User Manual

Allen-Bradley

PowerFlex 20-COMM-P Profibus Adapter

FRN 1.xxx

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

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.
	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 consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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The information below summarizes the changes made to this manual since its last release (November 2001):

Description of Changes	Page
Reformatted document from half size (5.5 x 8.5 in.) to full size (8.5 x 11 in.)	Throughout manual
Added information about Connected Components Workbench software configuration toll for drives and connected peripherals.	
Revised the 'DPI Ports and Internal Interface Cables' figure, and the 'Mounting and Grounding the Adapter' figure to show PowerFlex 700H/S Frames 9 and larger.	2-4 and 2-5
In the 'Applying Power' section in Chapter 2, added new subsections 'Start-Up Status Indications' and 'Configuring and Verifying Key Drive Parameters'.	2-8 and 2-9
In Chapter 3, added new section 'Updating the Adapter Firmware'.	3-6
In the section 'Using Reference/Feedback' in Chapter 5, added the following new subsections: • 'PowerFlex 70/700/700H, and PowerFlex 700L Drives with 700 Control' • 'PowerFlex 700S and PowerFlex 700L Drives with 700S Control' • 'PowerFlex Digital DC Drives'	 5-5 5-6 5-6
In the section 'Using Datalinks' in Chapter 5, added the new subsection 'Datalink Scaling'.	5-7
Revised Appendix C to include the following new sections: • 'PowerFlex 70/700/700H, and 700L (with 700 Control) Drives' • 'PowerFlex 700S (Phase II Control) and 700L (with 700S Control) Drives' • 'PowerFlex Digital DC Drives'	 C-1 C-3 C-5

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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. 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.

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.
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 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 Digital DC Drive User Manual, publication 20P-UM001	Information on installing and programming PowerFlex Digital DC drives.
Profibus Installation Guideline at http://www.profibus.com/	Information on the planning, installation, and techniques used to implement a Profibus network.
Profibus Standard at http://www.profibus.com/	Information on Profibus standards and specifications.
SLC 500 Modular Hardware Style Installation and Operation Manual, publication 1747-6.21	Information on installing and operating the SLC 500 controller.
SLC 500 Instruction Set, publication 1747-RM001	Information on status file functions and instructions for ladder logic programs.

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

Documentation can be 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 website 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.

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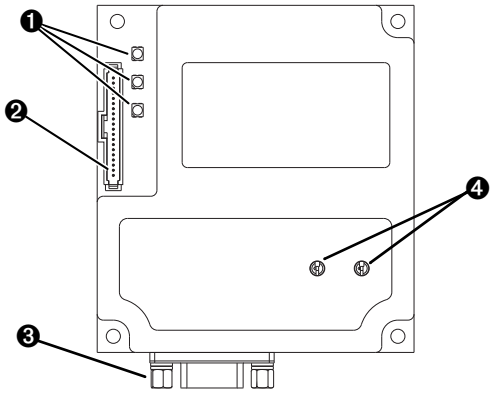
Components



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	Profibus Connector	A 9-pin, female D-sub connector to connect to the network.
4	Node Address Switches	Switches to set the node address. See Setting the Node Address Switches on page 2-2.

Features

The features of the adapter include the following:

- Typical mounting in a PowerFlex 7-Class drive.
- Captive screws to secure and ground the adapter to the drive.
- 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 before applying power to the PowerFlex drive. Or, you can disable the switches and use an adapter parameter to set the node address.
- Status indicators that report the status of the drive communications, the adapter, and network. They are visible when the drive cover is open or closed.
- Parameter-configured I/O (Logic Command/Reference and up to four pairs of Datalinks) to accommodate application requirements.
- Explicit Messaging support using the PROFIDRIVE Parameter Protocol.
- User-defined fault actions to determine how the adapter and connected PowerFlex drive respond to the following:
  - I/O messaging communication disruptions (Comm Flt Action)
  - Controllers in idle mode (Idle Flt Action)
- 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 700 drives with standard or vector control
- PowerFlex 700H drives
- PowerFlex 700S drives with Phase I or Phase II control
- PowerFlex 700L drives with 700 vector control or 700S control
- PowerFlex Digital DC drives
- SMC™ Flex smart motor controllers
- SMC-50 smart motor controllers

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-P 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 2.2 on page 2-4)
- ❑ GSD file on digital media
- ❑ One PowerFlex 7-Class DPI (Drive Peripheral Interface) Network Communication Adapter Installation Instructions, publication 20COMM-IN004

User-Supplied Equipment

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

- ❑ A small flathead screwdriver
- ❑ Profibus network cable
- ❑ One 9-pin, male D-Sub Profibus connector [**Note:** Profibus connectors are available from a variety of sources and in various sizes. As such, there may be mechanical limitations that prohibit the use of some connectors. Phoenix Subcon Plus M1 (Part # 2761826) or ERNI Profibus vertical (Node Part # 103658 and Termination Part # 103659), are recommended for use with PowerFlex 7-Class drives.]
- ❑ Drive and adapter configuration tool, such as the following:
  - PowerFlex 20-HIM-xx HIM
  - 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.

❑ 1203-USB Serial Converter or 1203-SSS Serial Converter with firmware revision 3.001 or later

❑ Profibus configuration software

❑ Controller configuration software

Safety Precautions

Please read the following safety precautions carefully.

ATTENTION: Risk of injury or death exists. The PowerFlex drive can 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 the 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 can 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 can fault when you reset the adapter. Determine how your drive responds before resetting an adapter.

ATTENTION: Risk of injury or equipment damage exists. **Parameters 9 - [Comm Flt Action]** and **10 - [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, take precautions 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 can 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 Profibus cable.	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 • I/O configuration • Fault actions	Chapter 3, Configuring the Adapter
6	Apply power to the Profibus master and other devices on the network. Verify that the master and network are installed properly and functioning in accordance with Profibus standards.	—
7	Configure the scanner to communicate with the adapter. Use a network tool for Profibus to configure the master on the network to recognize the adapter and drive.	Chapter 4, Configuring the Profibus Scanner
8	Create a ladder logic program. Use a controller configuration tool 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.

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Preparing for an Installation

Before installing the adapter, 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.

Commissioning the Adapter

To commission the adapter, you must set a unique node address on the network. See Setting the Node Address Switches on page 2-2 or Setting the Node Address on page 3-3 for details.

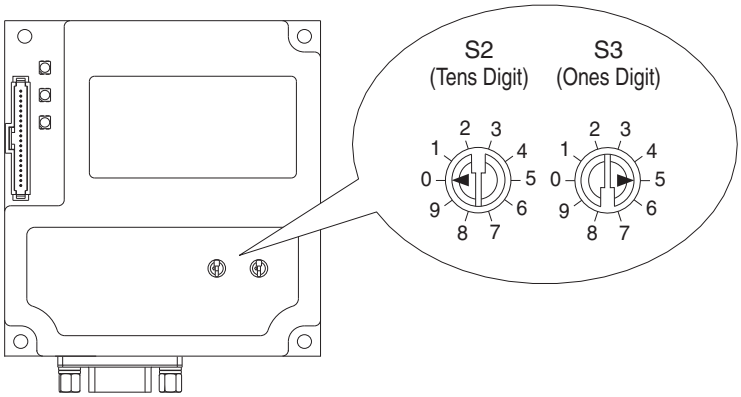
Important: New settings for some adapter parameters are recognized only when power is applied to the adapter or it is reset. After you change parameter settings, cycle power or reset the adapter.

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 Profibus 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…99	The node address used by the adapter if the Node Address switches are enabled. The default switch setting is 05. **Important:** If the Node Address switches are set to '00', the adapter uses the value stored in **Parameter 03 - [P-DP Addr Cfg]** for the node address. See Setting the Node Address on page 3-3.

The Node Address switch settings can be verified by viewing **Parameter 04 - [P-DP Addr Actual]** or Diagnostic Device Item numbers 27 and 28 (page 7-4) 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

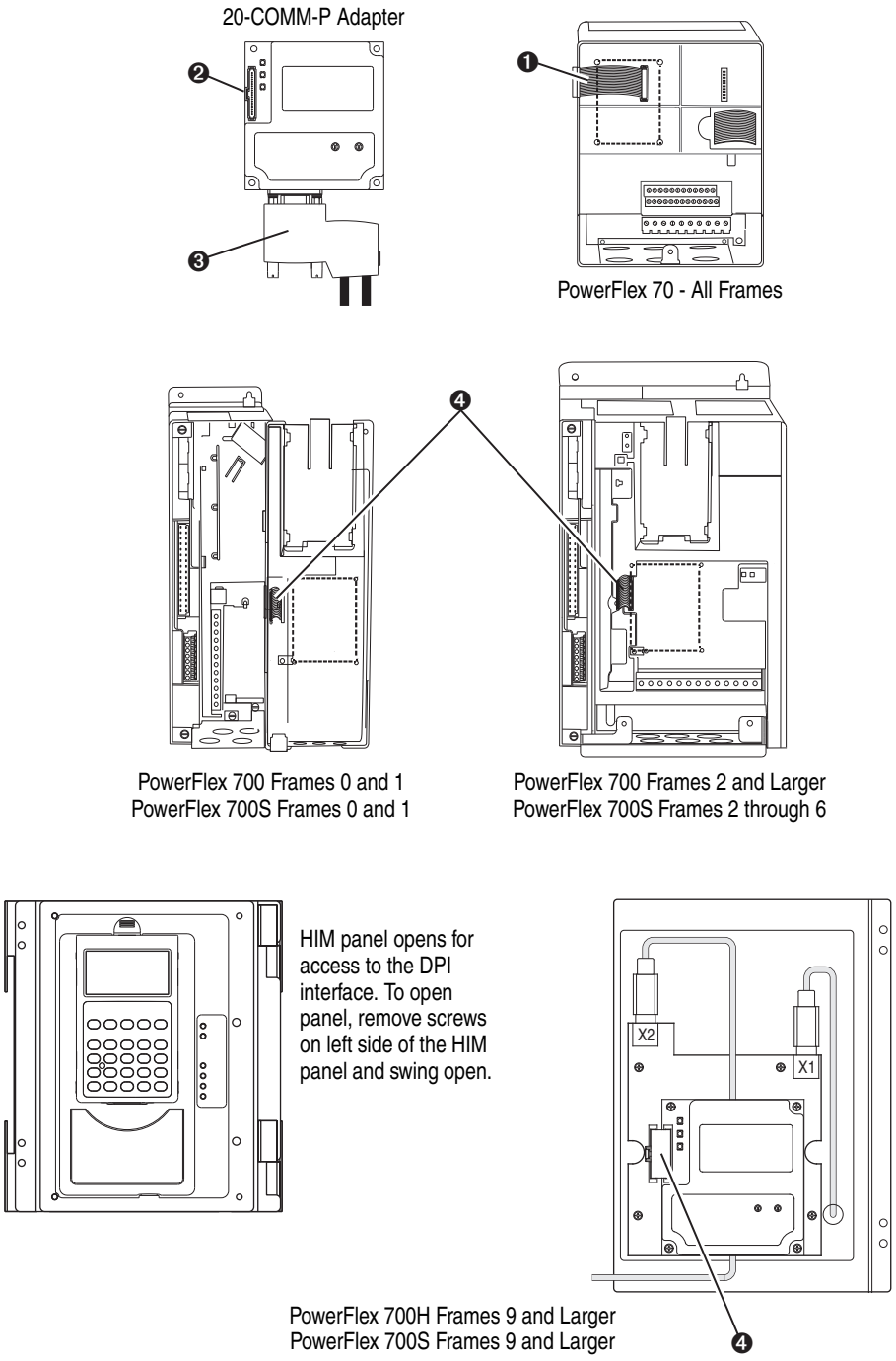
Connecting the Adapter to the Drive

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 2.2).
5. Secure and ground the adapter to the drive (see Figure 2.3) 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.

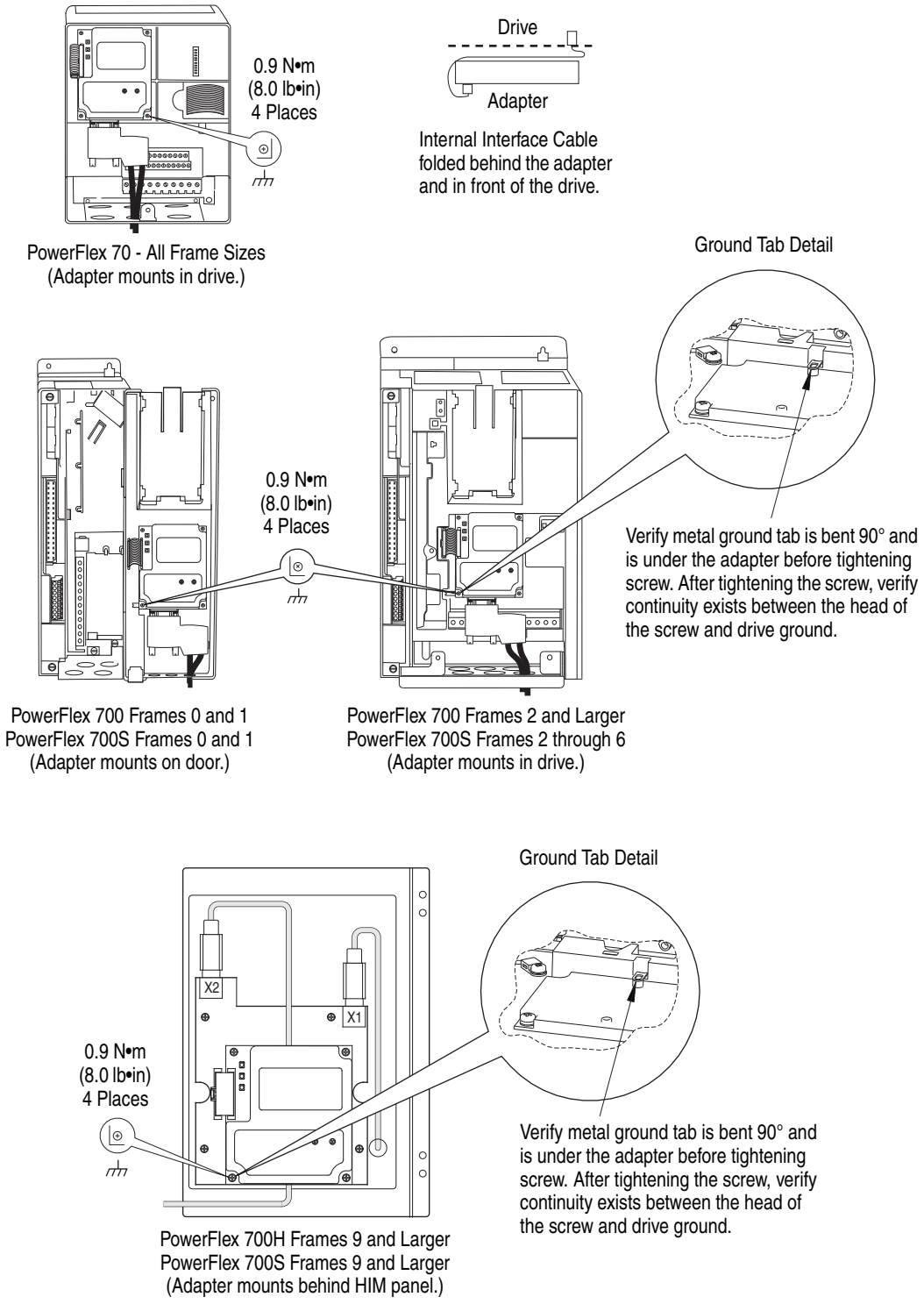
   Important: Tighten all screws to properly ground the adapter. Recommended torque is 0.9 N•m (8.0 lb•in).

Figure 2.2 DPI Ports and Internal Interface Cables



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

Figure 2.3 Mounting and Grounding the Adapter



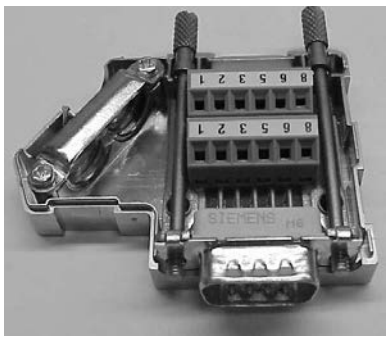
Connecting the Adapter to the Network

ATTENTION: Risk of injury or death exists. The PowerFlex drive can 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. Route the Profibus network cable through the bottom of the PowerFlex drive (see Figure 2.3).
4. Connect the Profibus connector to the network cable (see Figure 2.4, Figure 2.5, and Table 2.A.)

   NOTE: Profibus connectors are available from a variety of sources and in various sizes. As such, there may be mechanical limitations that prohibit the use of some connectors. Phoenix Subcon Plus M1 (Part # 2761826) or ERNI Profibus vertical (Node Part # 103658 and Termination Part # 103659 connectors), are recommended for use with PowerFlex 7-Class drives.

Figure 2.4 Phoenix Subcon and ENRI Connectors



Phoenix Subcon Connector

ENRI Connector

Figure 2.5 PROFIBUS Connector Network Diagram

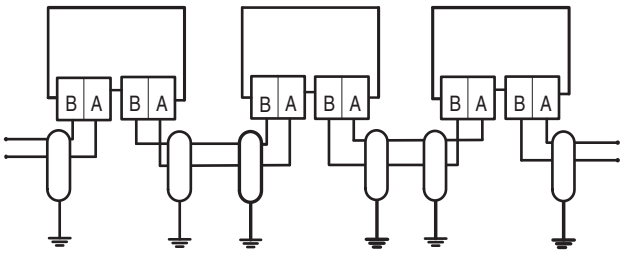


Table 2.A Adapter PROFIBUS Connector Pin Layout

Terminal	Signal	Function
Housing	Shield	—
1	Not connected	—
2	Not connected	—

Terminal	Signal	Function
3	B-LINE	Positive RxD/TxD, according to RS485 specification
4	RTS	Request to send
5	GND BUS	Isolated GND from bus
6	+5V BUS	Isolated +5V from bus
7	Not connected	—
8	A-LINE	Negative RxD/TxD, according to RS485 specification
9	Not connected	—

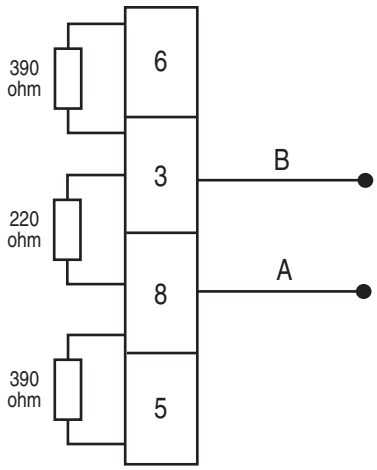
5. Insert the Profibus network cable connector into the mating adapter connector, and secure it with the two screws on the connector.

   NOTE: With some connectors, the screws on the connector connect the Profibus cable earth/screen to the metal of the socket. With some installations, Profibus will not operate without this connection.

Node Termination

The first and last node on the Profibus network needs to be terminated with a Profibus connector and terminating resistors. Some connector manufacturers offer standard terminating connectors, such as the yellow ERNI Profibus termination vertical connector (Part # 103659). Standard Profibus node connectors, such as the Phoenix Subcon Plus M1 (Part #2761826), can be configured as a terminating connector by adding resistors (see Figure 2.6).

Figure 2.6 Phoenix Subcon Plus M1 Connection for Terminating Resistors



Applying Power

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

1. Install the drive cover or close the drive door.
2. Verify that the adapter has a unique node address on the network.

   If a new address is needed, reset the node address switches (see Setting the Node Address Switches on page 2-2).
3. 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.
4. If the node address switches are set to '00', use a configuration tool to set the node address parameters in the adapter (see Setting the Node Address on page 3-3).
5. Apply power to the master device and other devices on the network.

Start-Up Status Indications

Status indicators for the drive and communication adapter can be viewed on the front of the drive (Figure 2.7) after power has been applied. Possible start-up status indications are shown in Table 2.B.

Figure 2.7 Drive and Adapter Status Indicators (location on drive may vary)

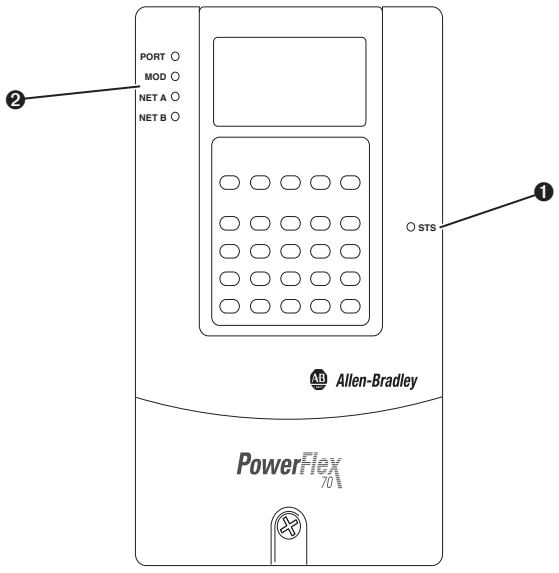


Table 2.B Drive and Adapter Start-Up Status Indications

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	Steady	Normal operation. The adapter is properly connected and Bus is on-line.
	NET B	—	—	Not used by Profibus 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 362 - [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.

Configuring the Adapter

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

Topic	Page
Configuration Tools	3-1
Using the PowerFlex 7-Class HIM to Access Parameters	3-2
Setting the Node Address	3-3
Setting the I/O Configuration	3-3
Setting a Fault Action	3-4
Resetting the Adapter	3-5
Viewing the Adapter Status Using Parameters	3-6
Updating the Adapter Firmware	3-6

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

Configuration Tools

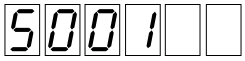
The adapter stores parameters and other information in its own nonvolatile storage (NVS) memory. You must, therefore, access the adapter to view and edit its parameters. The following tools can be used to access the adapter parameters.

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)

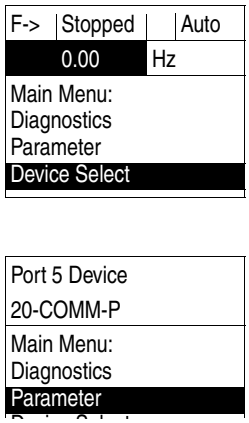
Using the PowerFlex 7-Class HIM to Access Parameters

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 ▲ or ▼ key to scroll to the adapter (20-COMM-P). 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.	

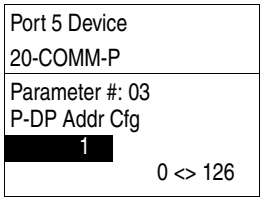
NOTE: All configuration procedures throughout this chapter use the PowerFlex 7-Class LCD HIM to access parameters in the adapter and show example LCD HIM screens.

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 Node Address switches (Figure 2.1) are set to ‘00’ (Program) the value of **Parameter 03 - [P-DP Addr Cfg]** determines the node address. When in any other combination of positions, the Node Address switches determine the node address.

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



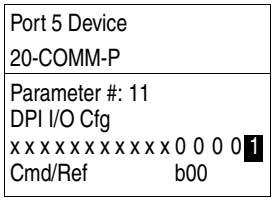
Default = 01

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

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



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 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.

3. 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. Also, verify that the Profibus adapter is the only adapter using the enabled Datalinks. See Chapter 4 for an example.

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

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 Profibus Scanner.

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 9 - [Comm Flt Action]**
- An idle controller by using **Parameter 10 - [Idle Flt Action]**

ATTENTION: Risk of injury or equipment damage exists. **Parameters 9 - [Comm Flt Action]** and **10 - [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, take precautions 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 9 - [Comm Flt Action]** and **10 - [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 13 - [Flt Cfg Logic]** through **22 - [Flt Cfg D2 In]**).

Port 5 Device 20-COMM-P
Parameter #: 9 Comm Flt Action 0 Fault

Port 5 Device 20-COMM-P
Parameter #: 10 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 receive commands from the network again.

Setting the Fault Configuration Parameters

If you set **Parameter 9 - [Comm Flt Action]** or **10 - [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
13 - [Flt Cfg Logic]	A 16-bit value sent to the drive for Logic Command.
14 - [Flt Cfg Ref]	A 32-bit value (0…4294967295) sent to the drive as a Reference or Datalink.
15 - [Flt Cfg x1 In] through **22 - [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 08 - [Reset Module]**.

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

Set **Parameter 08 - [Reset Module]** to '1' (Reset Module).

Port 5 Device 20-COMM-P
Parameter #: 08 Reset Module 1 Reset Module

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

When you enter '1' (Reset Module), the adapter immediately resets. When you enter '2' (Set Defaults), the adapter sets 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 is 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 - [P-DP Addr Actual]	The node address used by the adapter. This will be one of the following values: • The address set by the rotary switches. • The value of **Parameter 03 - [P-DP Addr Cfg]**. • An old address of the switches or parameter if they have been changed and the adapter has not been reset.
05 - [P-DP Rate Actual]	The Profibus data rate used by the adapter.
06 - [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.
07 - [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 - [DPI I/O Active]	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 Profibus Scanner

Profibus scanners are available from several manufacturers, including SST. Chapter 4 provides instructions on how to use the SST Profibus configuration software tool to:

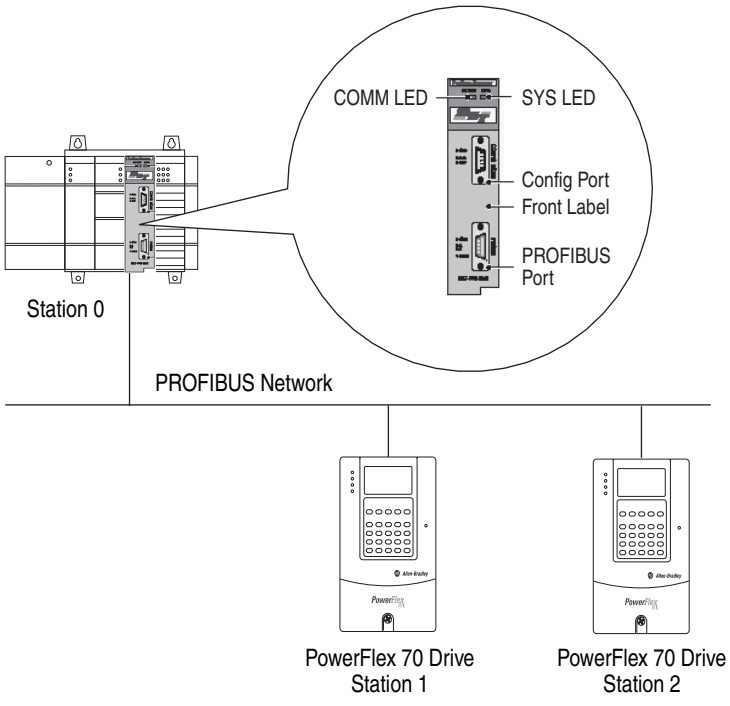
- Install the 20-COMM-P GSD file in the software tool library
- Configure the SST-PFB-SLC Profibus Scanner

Topic	Page
Example Network	4-1
SST Profibus Configuration Software Tool	4-2
Installing the 20-COMM-P GSD File Into Software Tool Library	4-2
Configuring the SST-PFB-SLC Profibus Scanner	4-4
GSD Diagnostic Messages	4-13

Example Network

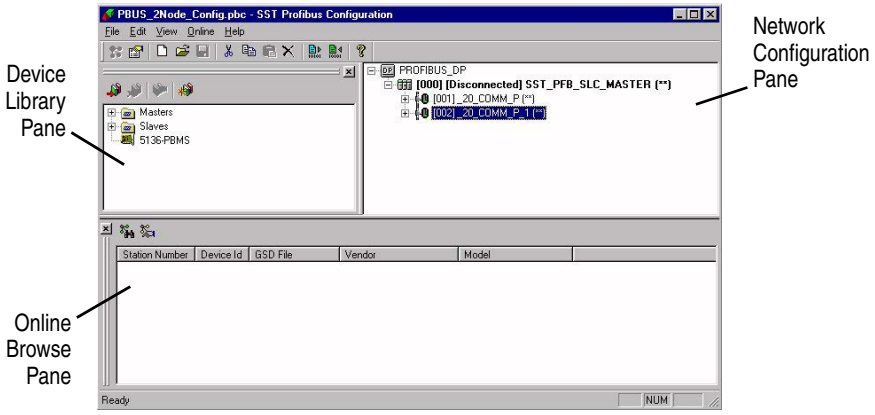
In this example, we will be configuring two PowerFlex 70 drives, to be Station 1 and Station 2 on a Profibus network. This will be the configuration used throughout the manual, including the ladder examples. Apart from the node address and scanner mapping, they will have identical configurations. This chapter describes the steps to configure a simple network like the example shown in Figure 4.1.

Figure 4.1 Example Profibus Network



SST Profibus Configuration Software Tool

SST Profibus scanners come with a software tool for configuring the scanner. An example software tool window is shown below.

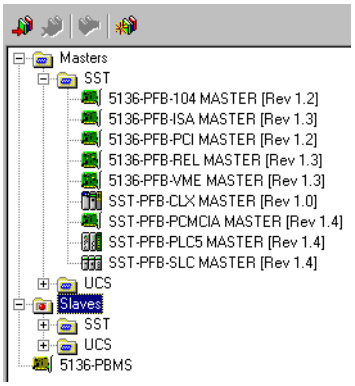


Installing the 20-COMM-P GSD File Into Software Tool Library

GSD files are used by software tools to configure the network, that is, to map and define the I/O in a Profibus scanner. A GSD file is required for each type of adapter on the network. For example, the 20-COMM-P adapter GSD file is 'A_B_0572.gsd' and a copy of the file is provided on digital media with each 20-COMM-P adapter. The file can also be downloaded from the Rockwell website at http://www.ab.com/support/abdrives/webupdate.

Follow the steps outlined below only when a new GSD file needs to be added to the SST Profibus Configuration Software Tool. Typically, this is only done once, after the software tool is initially installed or if configuring a 20-COMM-P on the network for the very first time with this software tool.

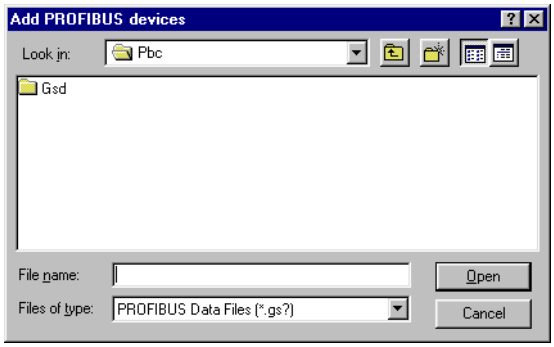
The software tool comes with standard data files as shown below.



Additional data files, such as the 20-COMM-P adapter GSD file, need to be added to configure the 20-COMM-P adapter in the scanner.

1. Click the 'New Device' icon to add the GSD file to the software library tool.

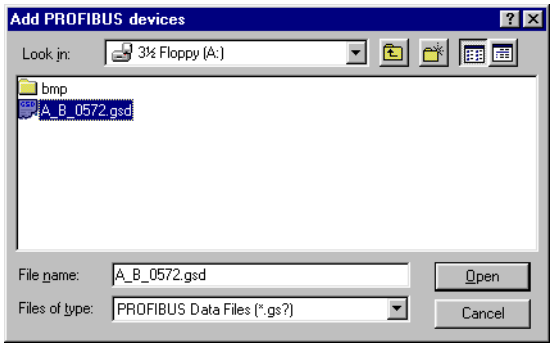
The ‘Add PROFIBUS devices’ Applet window appears.



A prompt appears for the location to add the Profibus data files to the library.

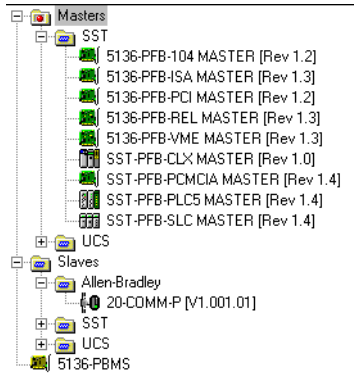
2. Find the directory location of the data file(s) you wish to add.

   Typically, the source location is a floppy disk in drive A. The ‘A_B_0572.gsd’ file shown below is the GSD file for the 20-COMM-P adapter.



3. Select ‘A_B_0572.gsd’ for the 20-COMM-P adapter and click **Open**.

4. In the treeview in the Device Library pane, click the ‘+’ sign of the Slaves folder.



The software tool will automatically create an Allen-Bradley sub-folder (in the Slaves folder) if it does not already exist. The 20-COMM-P is now shown in the library and the software tool is now ready to configure a 20-COMM-P adapter on a Profibus network.

Configuring the SST-PFB-SLC Profibus Scanner

The instructions in this section describe how to configure the SST-PFB-SLC scanner using the SST Profibus Configuration Software Tool. In our example, the Profibus network consists of a SLC master and two PowerFlex 70 drives. The ladder examples in this manual use the following configuration:

- Logic Command/Status and Reference/Feedback enabled
- Datalinks A, B, C, and D enabled
- Parameter Access enabled (used to perform explicit messaging)

Important: The SLC processor must be in Program mode to configure the scanner.

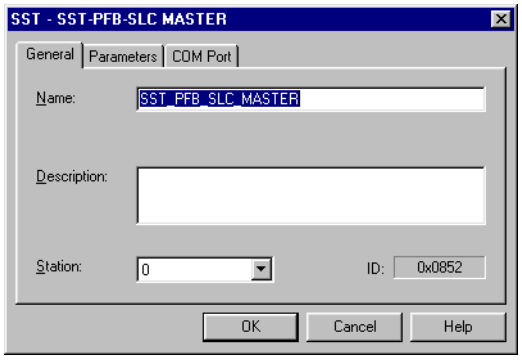
1. In the Device Library pane treeview, click the Masters folder '+' sign to open the **SST** sub-folder.

   Available DP masters are displayed in this sub-folder.

2. In the Device Library pane treeview, click the Slaves folder '+' sign and then the Allen-Bradley sub-folder '+' sign to display the available DP slaves or the 20-COMM-P slave.

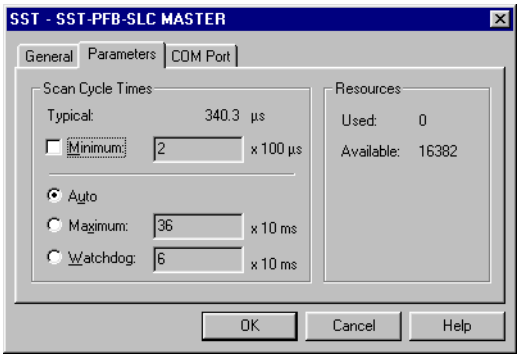
3. In the Device Library pane treeview under the Masters folder, double-click 'SST-PFB-SLC MASTER' to add the scanner to the network.

   A user-defined name and description can be given to the scanner. In our example, the scanner will be Station 0 on the network.

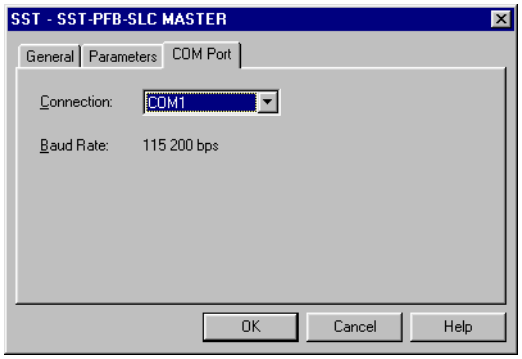


4. In the SST-PFB-SLC MASTER window, click the Parameters tab to view the Scan Cycle Times.

   In our example, use the default settings as shown below.



5. In the SST-PFB-SLC MASTER window, click the COM Port tab.



The Connection and Baud Rate settings configure how the software tool will communicate with the CONFIG RS232 port on the scanner.

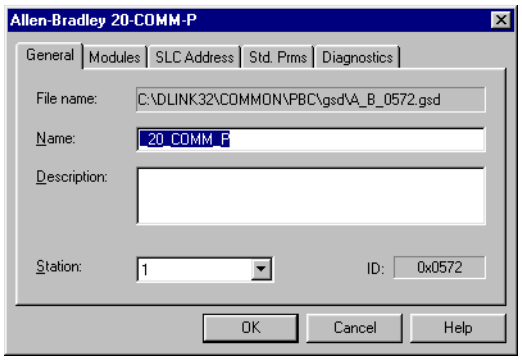
6. Click **OK** to accept the settings in our example (COM1 on the computer at 115200 bps baud rate).

The scanner will appear in the network configuration pane as shown below.

7. Double-click the scanner in the network configuration pane.

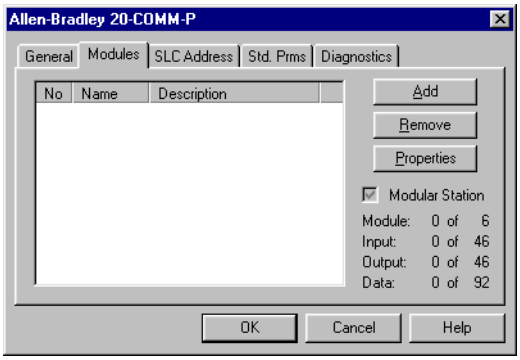
8. In the Device Library pane treeview under the Allen-Bradley folder, double-click the '20_COMM_P'.

The 20-COMM-P window appears.



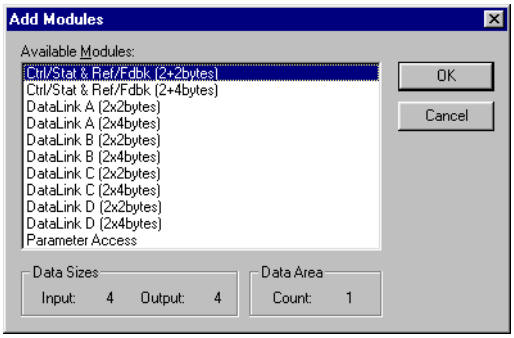
A user-defined name and description can be given to this 20-COMM-P. In our example, this device will be Station 1 on the network. Other stations may be chosen by using the Station pull-down menu.

9. In the 20-COMM-P window, click the Modules tab.



The Logic Command/Status, Reference/Feedback, Datalinks, and Parameter Access (explicit messaging) modules are added using the Modules tab.

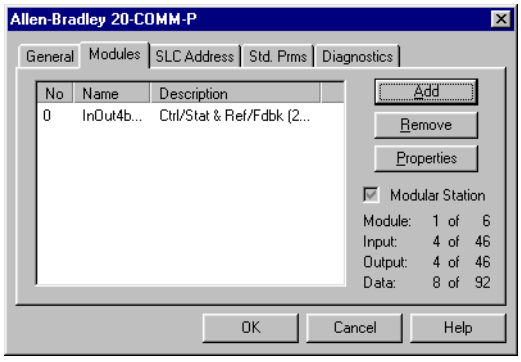
10. Click **Add** to view the choice of modules.



In our example, Station 1 will be controlled using Logic Command/ Status and Reference/Feedback. The PowerFlex 70 drive uses a 16-bit Reference/Feedback (2 bytes).

11. From the Available Modules list, select ‘Ctrl/Stat & Ref/Fdbk (2+2bytes)’ and click **OK**.

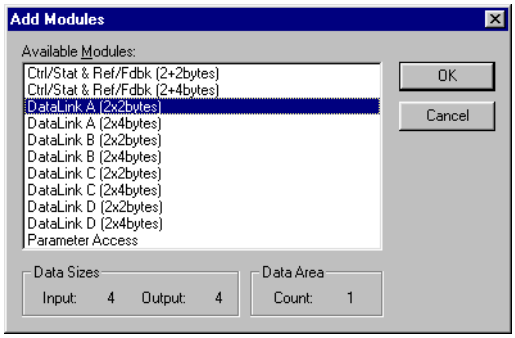
The ‘Ctrl/Stat & Ref/Fdbk (2+2 bytes)’ module has been added.



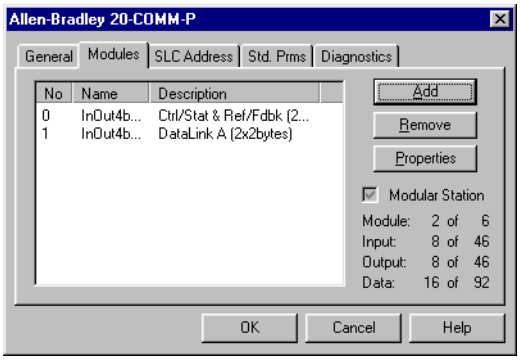
Station 1 will also be configured to use Datalinks A1 and A2. The PowerFlex 70 uses 16-bit Datalinks.

12. Click **Add** to continue adding modules.

13. Select ‘Datalink A (2x2 bytes)’ as shown below and click **OK**.



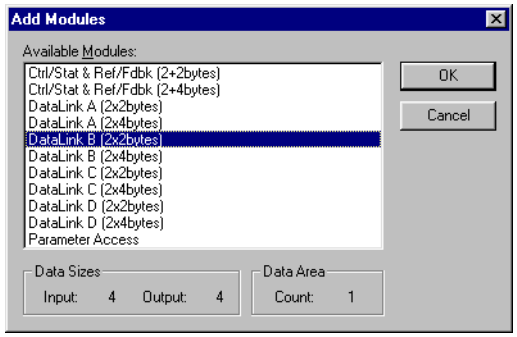
The ‘Datalink A’ module has been added.



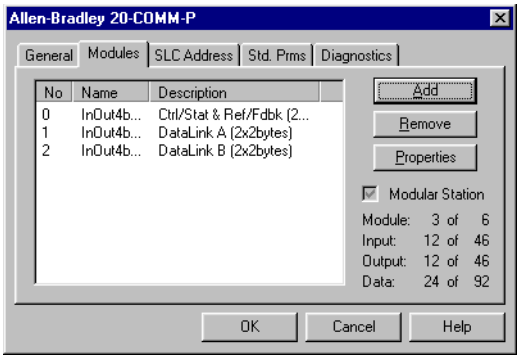
Station 1 will also be configured to use Datalinks B1 and B2. The PowerFlex 70 uses 16-bit Datalinks.

14. Click **Add** to continue adding modules.

15. Select ‘Datalink B (2x2 bytes)’ as shown below and click **OK**.



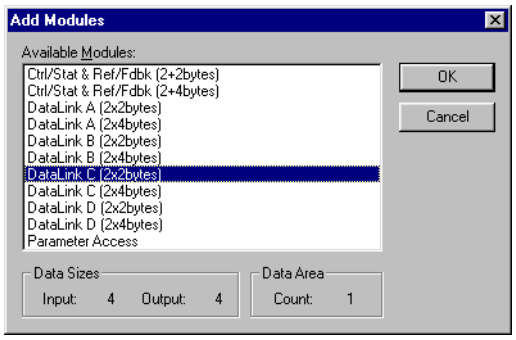
The ‘Datalink B’ module has been added.



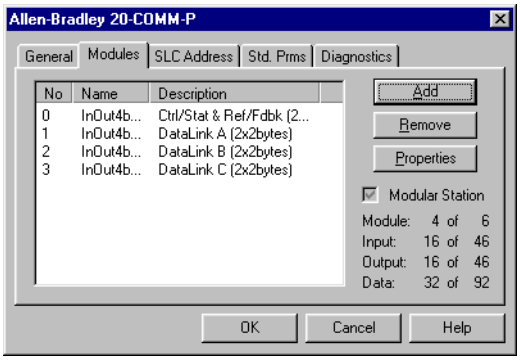
Station 1 will also be configured to use Datalinks C1 and C2. The PowerFlex 70 utilizes 16-bit Datalinks.

16. Click **Add** to continue adding modules.

17. Select ‘Datalink C (2x2 bytes)’ as shown below and click **OK**.



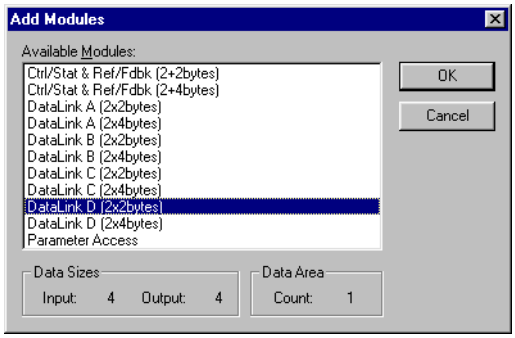
The ‘Datalink C’ module has been added.



Station 1 will also be configured to use Datalinks D1 and D2. The PowerFlex 70 uses 16-bit Datalinks.

18. Click **Add** to continue adding modules.

19. Select ‘Datalink D (2x2 bytes)’ as shown below and click **OK**.

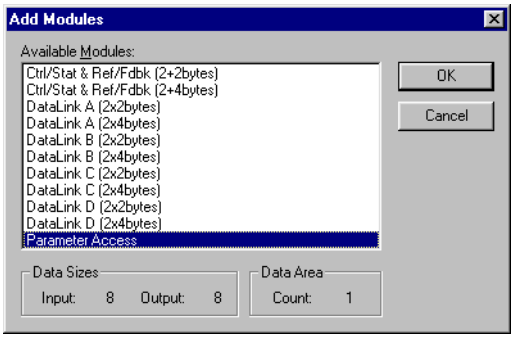


The ‘Datalink D’ module has been added.

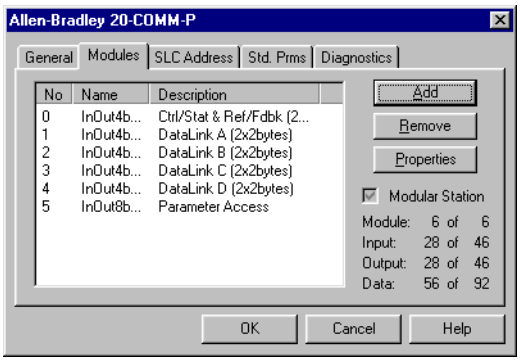
Station 1 will also be configured to use Parameter Access for explicit messaging.

20. Click **Add** to continue adding modules.

21. Select ‘Parameter Access’ as shown below and click **OK**.

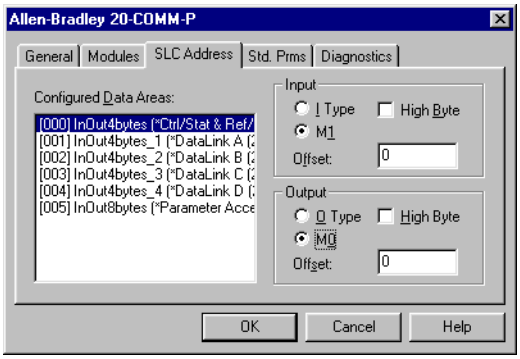


The ‘Parameter Access’ module has been added.



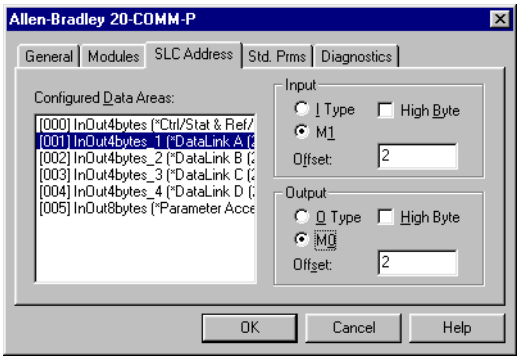
Settings can be chosen to map Station modules to SLC master addresses. In our example, M1/M0 files are used for Input/Output.

22. In the 20-COMM-P window, click the SLC Address tab.



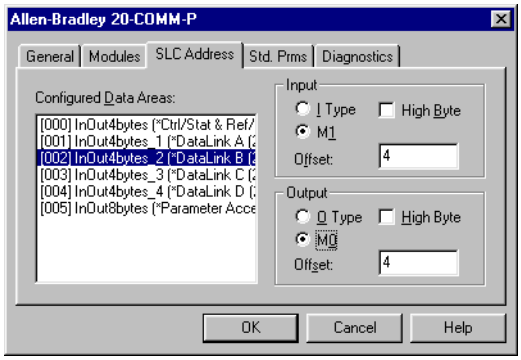
Note that Reference/Feedback (Ctrl/Stat & Ref/Fdbk) starts at word 0.

23. In the SLC Address Tab window, select Datalink A.



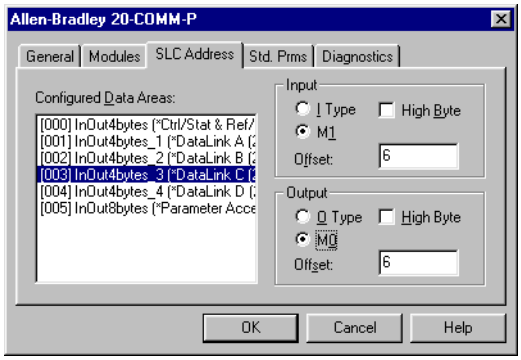
Datalink A is at word 2 in the M1/M0 files.

24. In the SLC Address Tab window, select Datalink B.



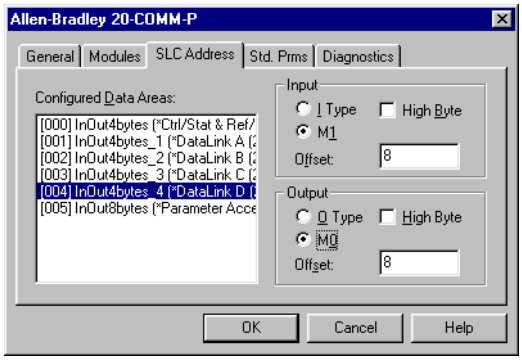
Datalink B is at word 4 in the M1/M0 files.

25. In the SLC Address Tab window, select Datalink C.



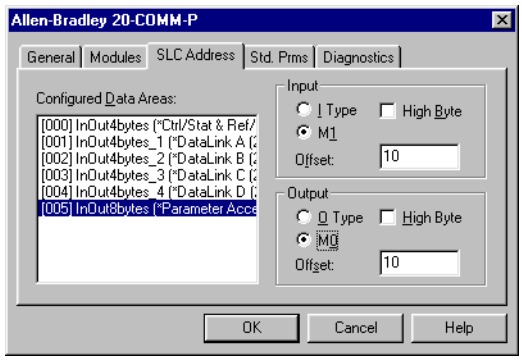
Datalink C is at word 6 in the M1/M0 files.

26. In the SLC Address Tab window, select Datalink D.



Datalink D is at word 8 in the M1/M0 files.

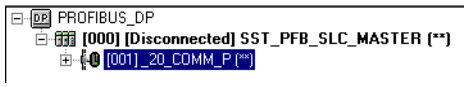
27. In the SLC Address Tab window, select Parameter Access.



Parameter Access starts at word 10 in the M1/M0 files. It uses 4 words (10…13).

28. Click **OK** when finished.

Station 1 is now displayed in the network configuration pane under its SLC master.



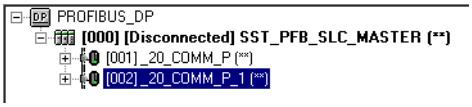
Station 1 is configured as follows.

Module	M1/M0 Word
Ctrl/Stat & Ref Fdbk	0
Datalink A	2
Datalink B	4
Datalink C	6
Datalink D	8
Parameter Access	10

Note that Station 1 occupies 14 words (0…13).

The same steps used to configure Station 1 will be used again to configure Station 2.

29. Starting at step 8 on page 4-5, configure the SST-PFB-SLC Profibus Master - Station 2.



Station 2 is configured as follows.

Module	M1/M0 Offset
Ctrl/Stat & Ref Fdbk	14
Datalink A	16
Datalink B	18
Datalink C	20
Datalink D	22
Parameter Access	24

Note that Station 2 occupies 14 words (14…27).

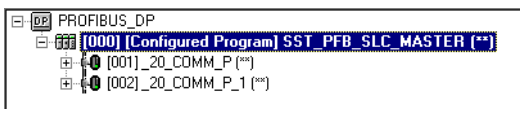
30. Connect COM1 on the computer to the CONFIG RS232 port on the scanner using the null modem cable provided with the scanner.

Important: The processor needs to be in Program mode before proceeding.

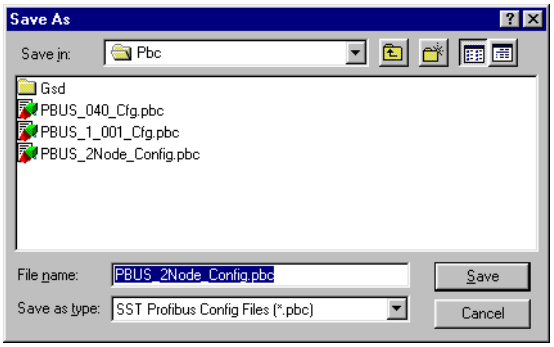
31. In the network configuration pane, right-click the SLC master and choose ‘Connect’.

32. Right-click the SLC master again in the network configuration pane and choose ‘Load Configuration’.

If a minimum cycle time attention window pops up, click **OK** to continue. After the configuration has been loaded into the scanner, ‘Configured Program’ will be displayed in the message window.



33. From the SST PROFIBUS Configuration Software Tool window, select **File > Save As** to save the file as a unique file name.



The configuration of the SLC Master scanner is now complete. Note that cycling power to the scanner is recommended.

Configuration Summary for Example

	M1/M0 Addressing	
20-COMM-P Adapter	**Station 1 Word**	**Station 2 Word**
Logic Command / Status	0	14
Reference / Feedback	1	15
Datalink A1	2	16
Datalink A2	3	17
Datalink B1	4	18
Datalink B2	5	19
Datalink C1	6	20
Datalink C2	7	21
Datalink D1	8	22
Datalink D2	9	23
Parameter Access	10…13	24…27

GSD Diagnostic Messages

In the case of an invalid GSD module configuration, the peripheral will send one of the following messages.

Fault	Description
No Ctrl/Stat & Ref/Fdbk	The Ctrl/Stat & Ref/Fdbk module must always be used and placed first in the configuration.
Module used more than once	A GSD module has been used more than once.
Not supported module	An unrecognized module has been used in the configuration.

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.

Topic	Page
About I/O Messaging	5-1
Understanding the I/O Image	5-2
Using Logic Command/Status	5-4
Using Reference/Feedback	5-4
Using Datalinks	5-6
SLC Controller Example Ladder Logic Program Information	5-8
SLC Ladder Logic Example Main Program	5-12
SLC Ladder Logic Example Station 1 Program	5-15
SLC Ladder Logic Example Station 2 Program	5-19

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 Profibus networks, 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 options for configuring and using I/O, including configuring the size of I/O by enabling or disabling the Logic Command/ Reference and Datalinks.

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

Understanding the I/O Image

The terms ‘input’ and ‘output’ are defined from the controller’s point of view. Therefore, output I/O is data that is produced by the controller and consumed by the adapter. Input I/O is status data that is produced by the adapter and consumed as input by the controller. The I/O image will vary based on 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 06 - [Ref/ Fdbk Size]** and **07 - [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 11 - [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.

The controller I/O image changes depending on the size of the drive’s Reference/Feedback and Datalinks. 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.

Table 5.A 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

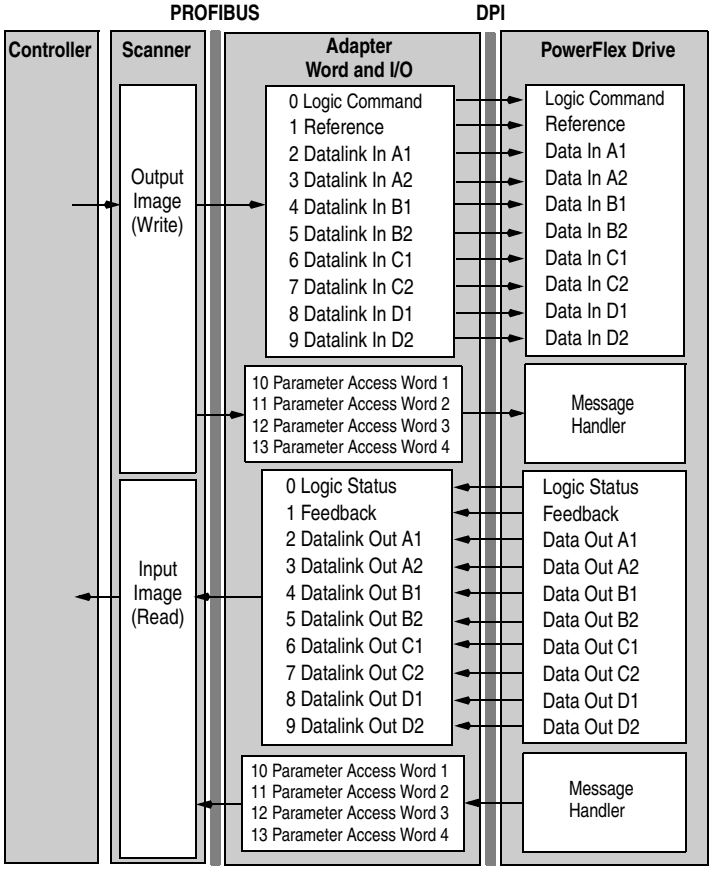


Table 5.B Controller I/O Image for Drives with 16-bit Reference/Feedback and 32-bit Datalinks

These products include the following:

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

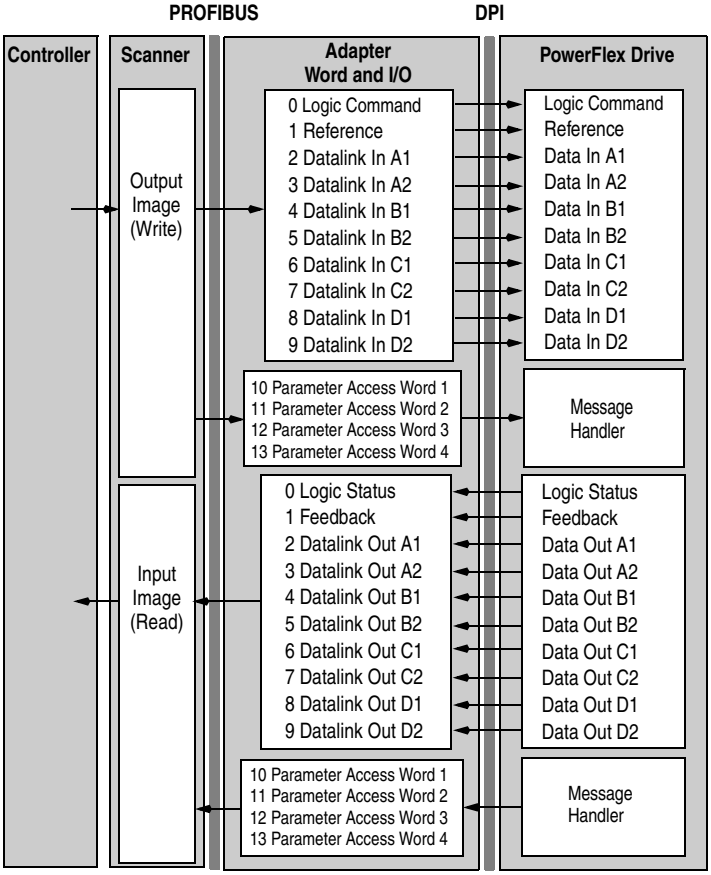
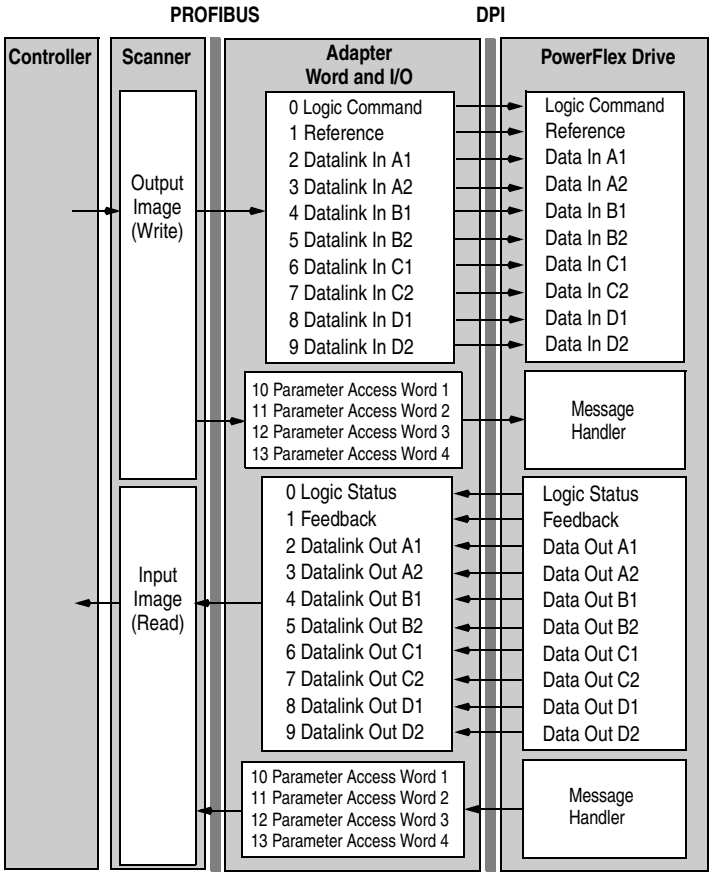


Table 5.C Controller I/O Image for Drives with 32-bit Reference/Feedback and 32-bit Datalinks

These products include the following:

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



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.

This manual contains the bit definitions for most compatible products available at the time of publication in Appendix C, 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 06 - [Ref/Fdbk Size]**.

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

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

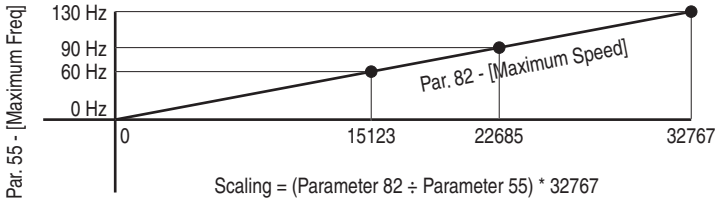
Therefore, 0…15123 = 0…60.0 Hz.

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 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 07 - [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, 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

SLC Controller Example Ladder Logic Program Information

The Profibus example program uses a SLC processor with an SST Profibus scanner (SST-PFB-SLC) in the first slot of the rack and intended to operate PowerFlex 7-Class drives.

Functions of the Example Programs

The example programs are written for two drives on the network and 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.
- Access Parameters (described in Chapter 6)

Adapter Switch Settings

The Node Address switch settings on the 20-COMM-P adapters are set to the following values:

- '1' for Station 1
- '2' for Station 2

Drive and Adapter Parameter Settings

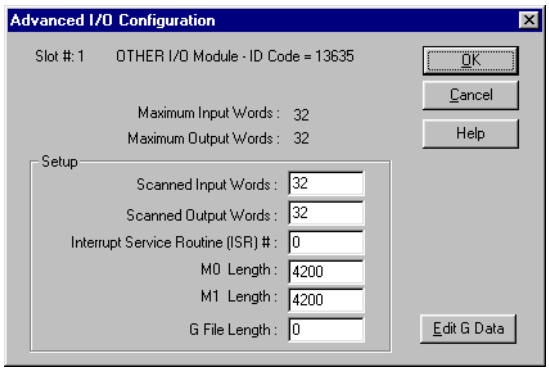
The following drive and adapter settings were used for the example ladder logic program in this section.

Device	Parameter	Value	Description
PowerFlex 70 EC Drive	90 - [Speed Ref A Sel	22 (DPI Port 5)	Assigns 20-COMM-P 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-P Adapter	11 - [DPI I/O Cfg]	xxx1 1111	Enables Cmd/Ref and Datalinks A…D.

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).

Scanner Settings

An SST-PFB-SLC scanner is in slot 1 of the rack and is configured as Station 0. The Advanced I/O Configuration is setup as shown below.



The two Profibus adapters are setup as Station 1 and Station 2, and are **each** configured as 14 words of Input I/O and 14 words of Output I/O (see Chapter 4).

SLC Controller Data Table

Read Data

File N10: contains the actual read data that can be used elsewhere in the ladder program.

Station 1 Address	Station 2 Address	Function
N10:0	N10:14	Logic Status
N10:1	N10:15	Feedback
N10:2	N10:16	Datalink A1
N10:3	N10:17	Datalink A2
N10:4	N10:18	Datalink B1
N10:5	N10:19	Datalink B2
N10:6	N10:20	Datalink C1
N10:7	N10:21	Datalink C2
N10:8	N10:22	Datalink D1
N10:9	N10:23	Datalink D2
N10:10	N10:24	Parameter Access Word 1
N10:11	N10:25	Parameter Access Word 2
N10:12	N10:26	Parameter Access Word 3
N10:13	N10:27	Parameter Access Word 4

Write Data

The Profibus scanner is configured for 28 bytes (14 words) of outputs for each drive. Two drives require 48 bytes (28 words).

Station 1 Address	Station 2 Address	Function
N20:0	N20:14	Logic Status
N20:1	N20:15	Feedback
N20:2	N20:16	Datalink A1
N20:3	N20:17	Datalink A2
N20:4	N20:18	Datalink B1
N20:5	N20:19	Datalink B2
N20:6	N20:20	Datalink C1
N20:7	N20:21	Datalink C2
N20:8	N20:22	Datalink D1
N20:9	N20:23	Datalink D2
N20:10	N20:24	Parameter Access Word 1
N20:11	N20:25	Parameter Access Word 2
N20:12	N20:26	Parameter Access Word 3
N20:13	N20:27	Parameter Access Word 4

Logic Command/Status Words

These examples use the Logic Command word and Logic Status word for PowerFlex 70/700 drives. See Appendix C 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.

SLC Ladder Logic Example Main Program

Figure 5.1 Example SLC Ladder Logic Main Program

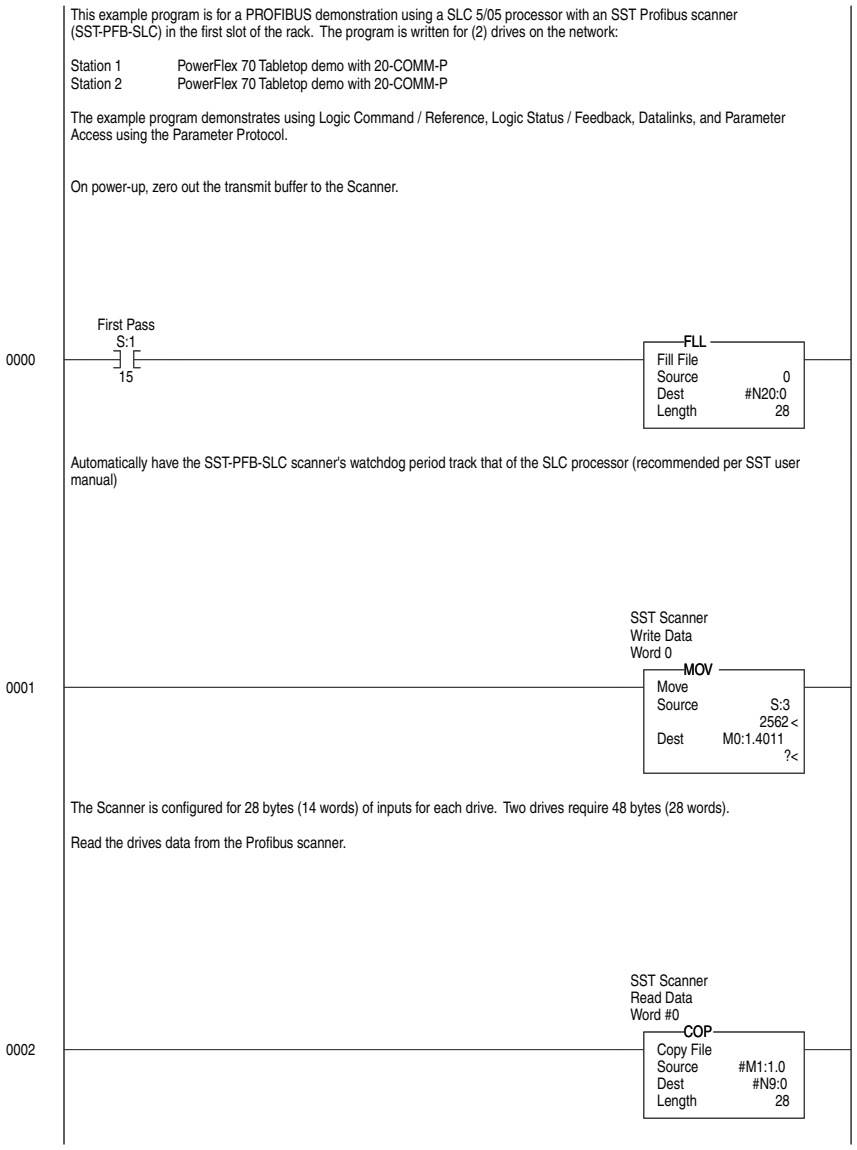
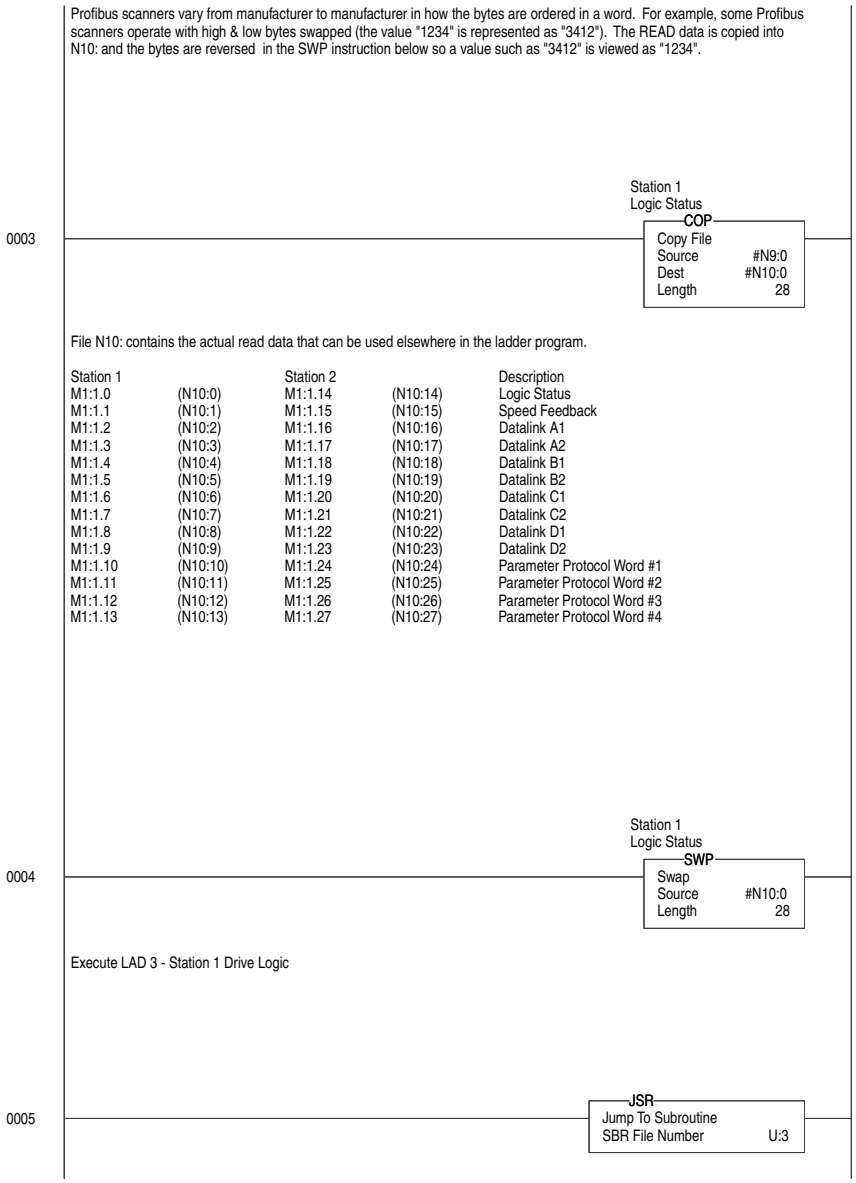


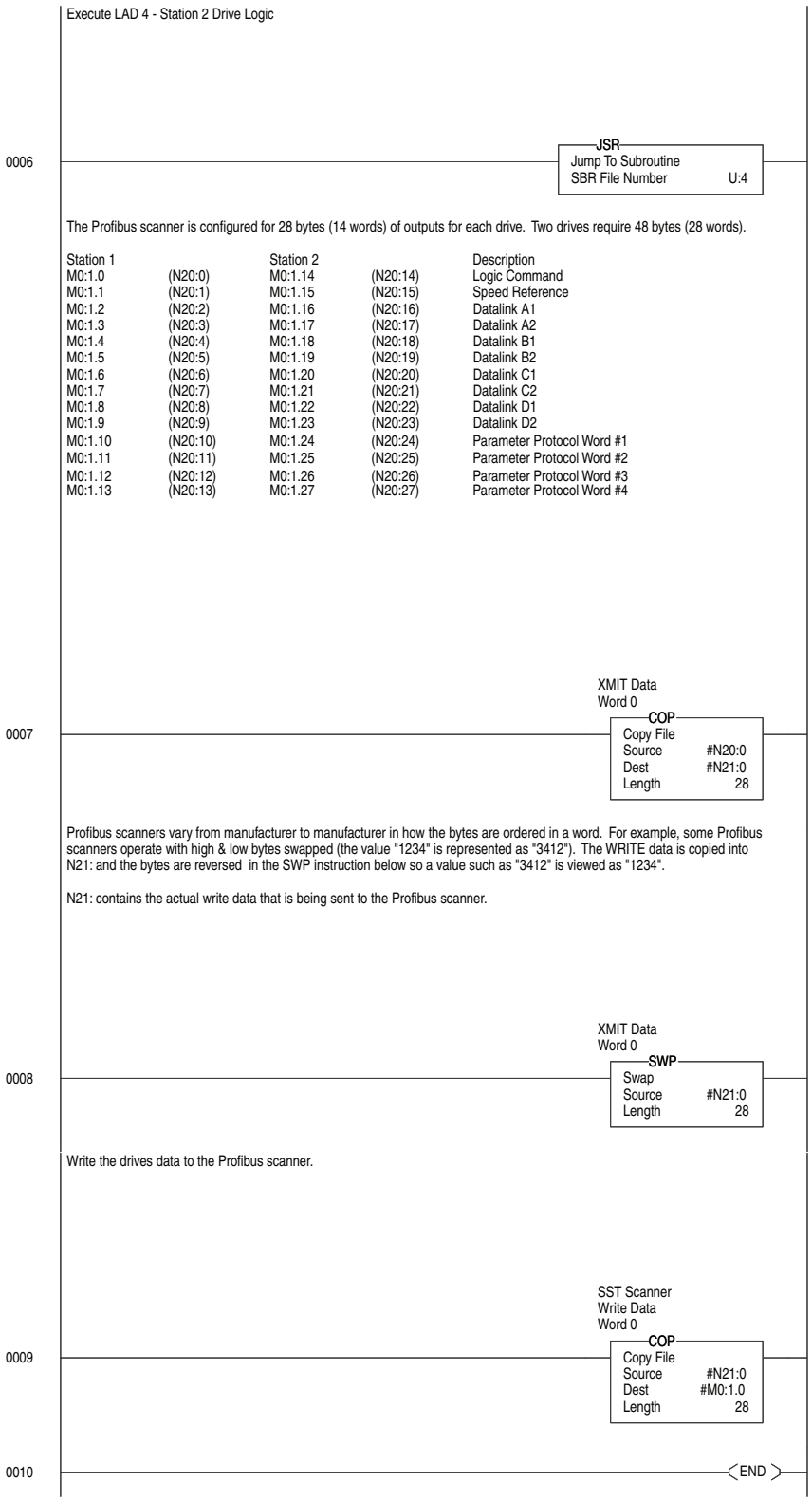
Figure 5.1 Example SLC Ladder Logic Main Program (continued)



For Ladder 3 Station 1 Drive Logic, see Figure 5.2 (Example SLC Ladder Logic Station 1 Program).

For Ladder 4 Station 2 Drive Logic, see Figure 5.3 (Example SLC Ladder Logic Station 2 Program).

Figure 5.1 Example SLC Ladder Logic Main Program (continued)



SLC Ladder Logic Example Station 1 Program

Figure 5.2 Example SLC Ladder Logic Station 1 Program

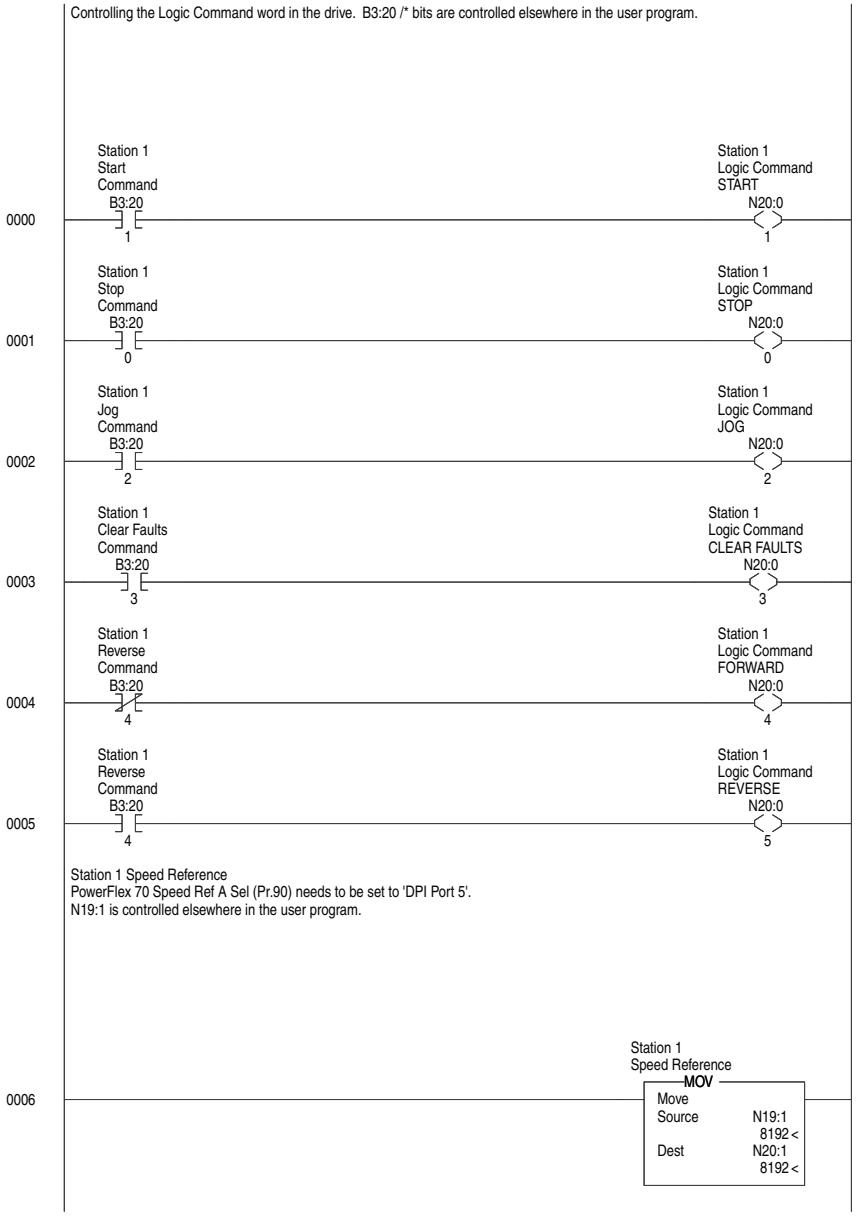


Figure 5.2 Example SLC Ladder Logic Station 1 Program (continued)

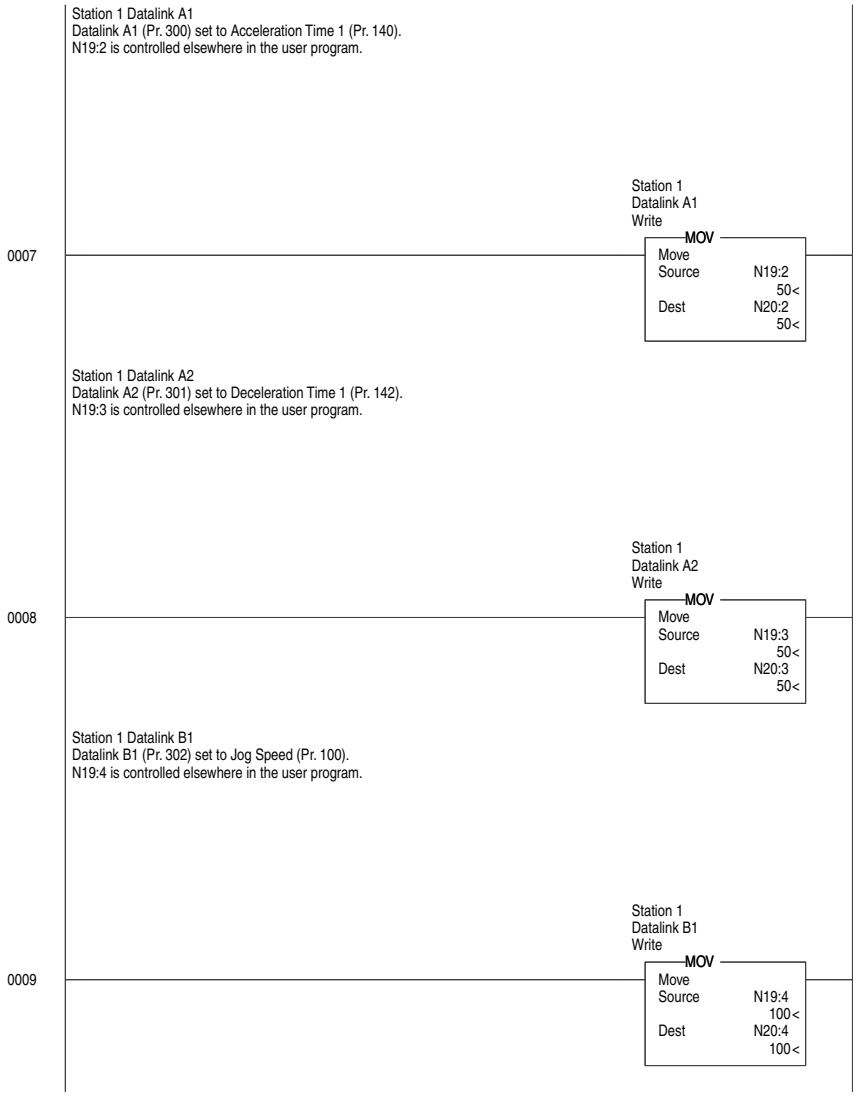


Figure 5.2 Example SLC Ladder Logic Station 1 Program (continued)

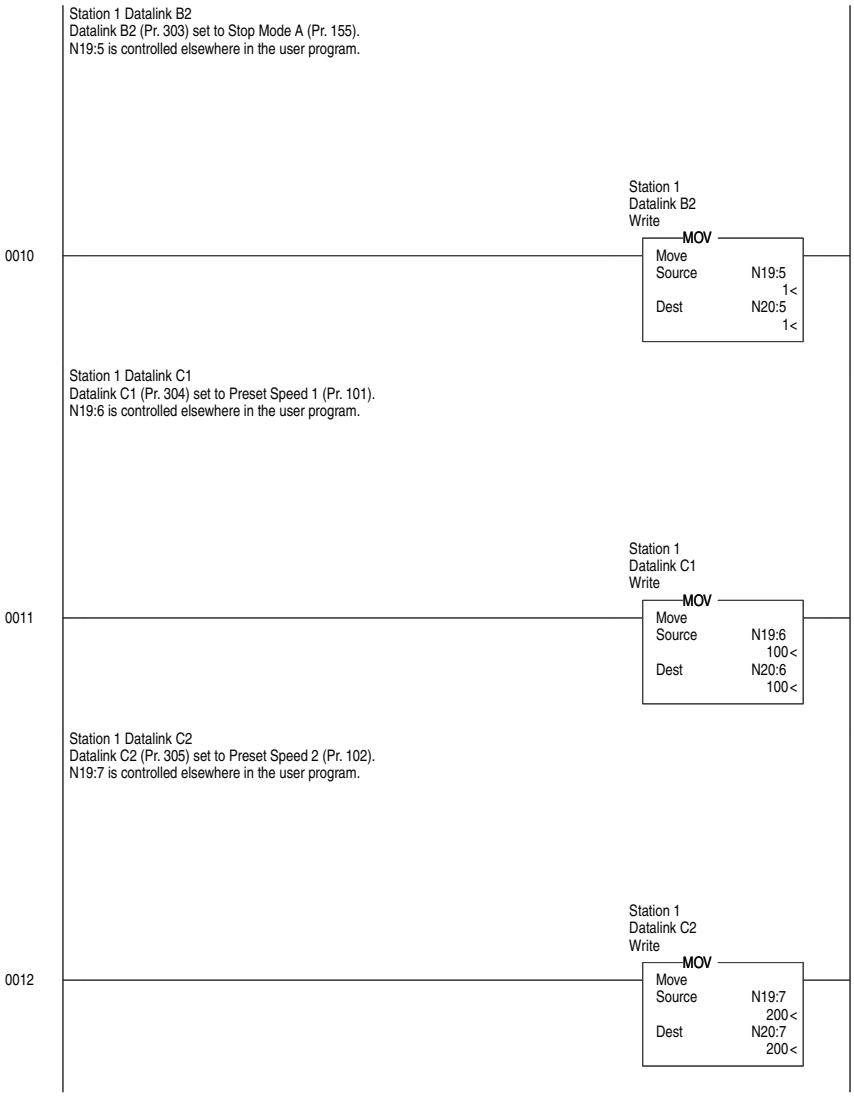
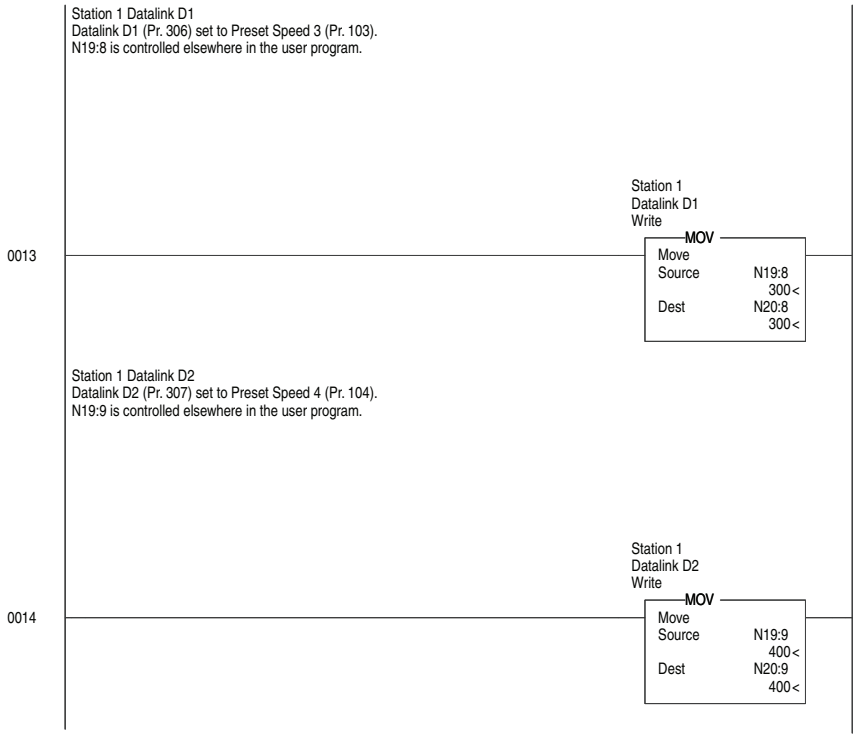


Figure 5.2 Example SLC Ladder Logic Station 1 Program (continued)



The Station 1 program can either end here or, if Explicit Messaging is needed, Parameter Protocol logic can be added (see Figure 6.5 on page 6-10).

SLC Ladder Logic Example Station 2 Program

Figure 5.3 Example SLC Ladder Logic Station 2 Program

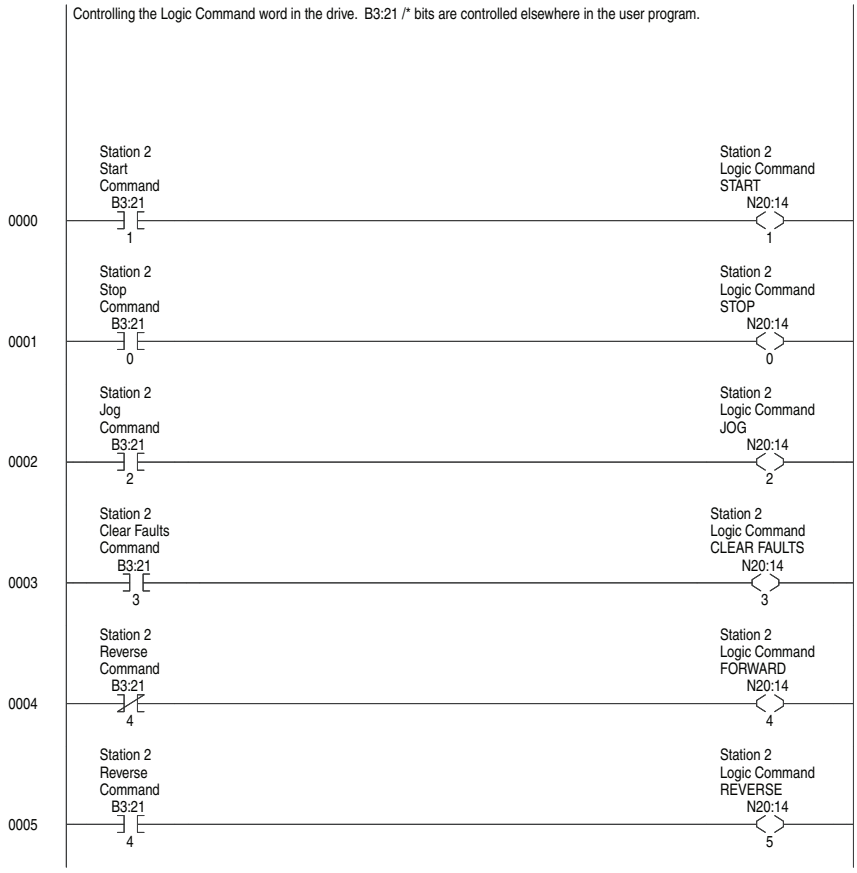


Figure 5.3 Example SLC Ladder Logic Station 2 Program (continued)

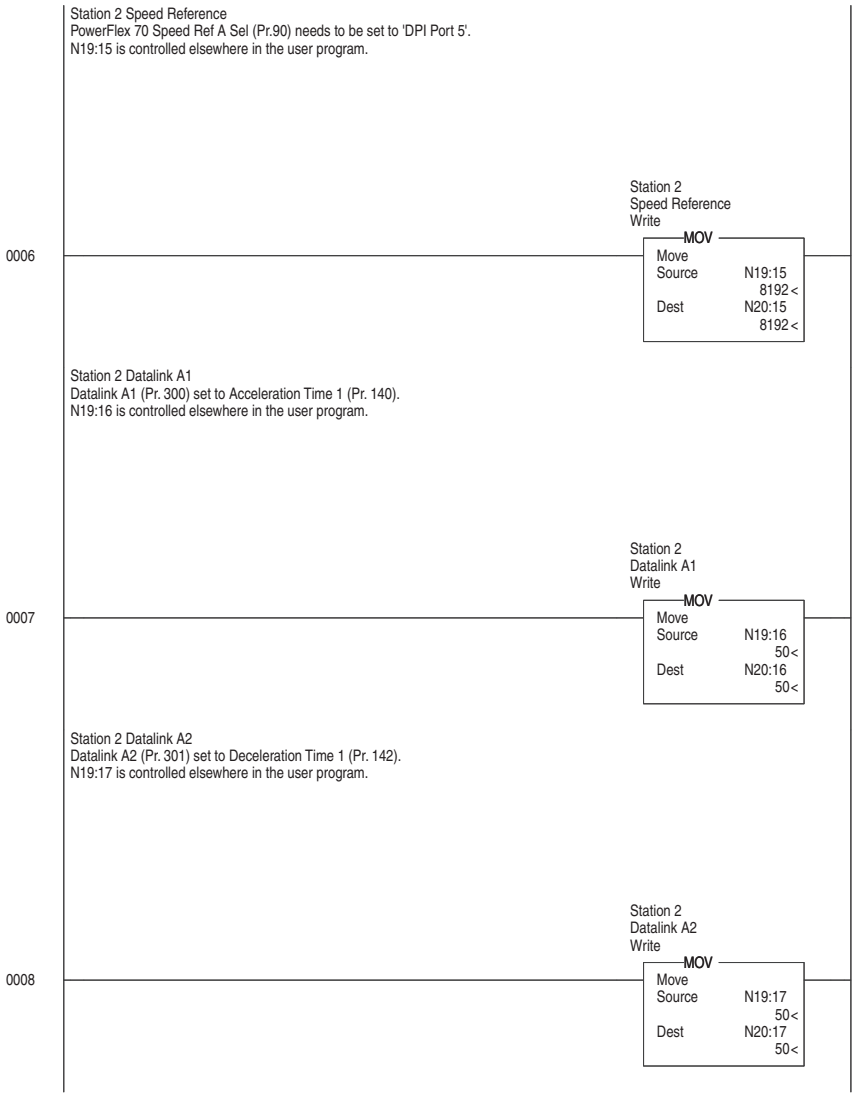


Figure 5.3 Example SLC Ladder Logic Station 2 Program (continued)

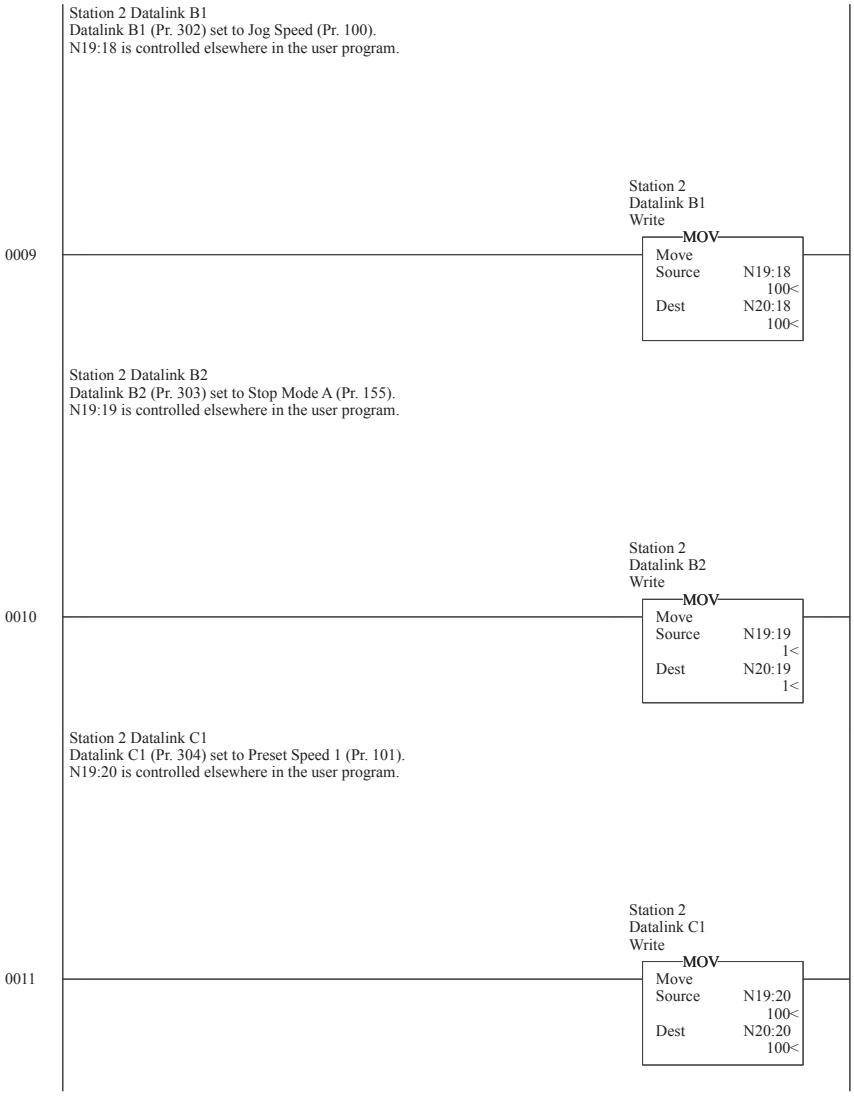
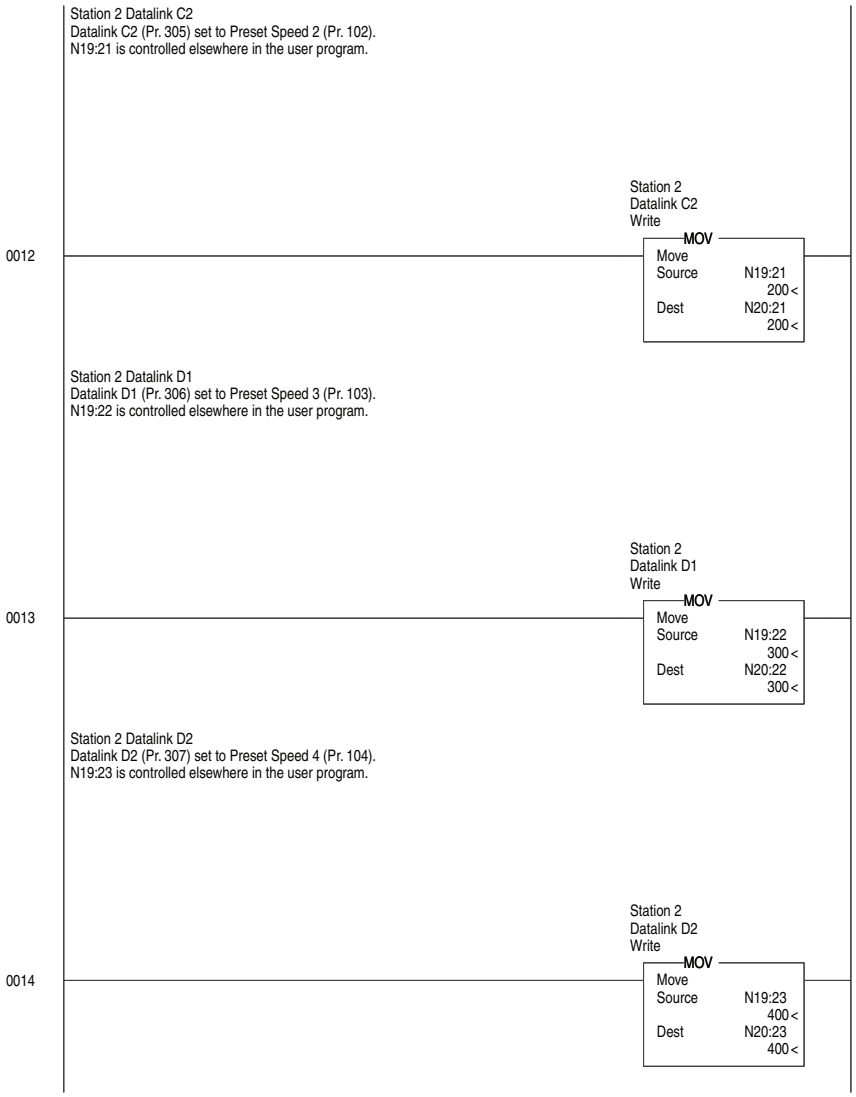


Figure 5.3 Example SLC Ladder Logic Station 2 Program (continued)



The Station 2 program can either end here or, if Explicit Messaging is needed, Parameter Protocol logic can be added (see Figure 6.6 on page 6-12).

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, and connected peripherals.

Topic	Page
About Explicit Messaging	6-2
Performing Explicit Messages	6-2
Parameter Protocol	6-3
SLC Ladder Example Station 1 Parameter Protocol	6-10
SLC Ladder Example Station 2 Parameter Protocol	6-12

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 can quickly exceed its life cycle and cause the drive to malfunction. Do not create a program that frequently uses Explicit Messages to write parameter data to NVS. Datalinks do not write to NVS and should be used for frequently changed parameters.

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

About Explicit Messaging

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

To use the parameter protocols in the 20-COMM-P adapter, the Parameter Access module in the GSD file must be added to the master configuration when configuring the network. See step 21 on page 4-9 to view the procedure to add the 'Parameter Access' module to a configuration. This maps 4 input words and 4 output words to the end of the I/O configuration, which is used as the request/response in the parameter message format (Figure 6.2).

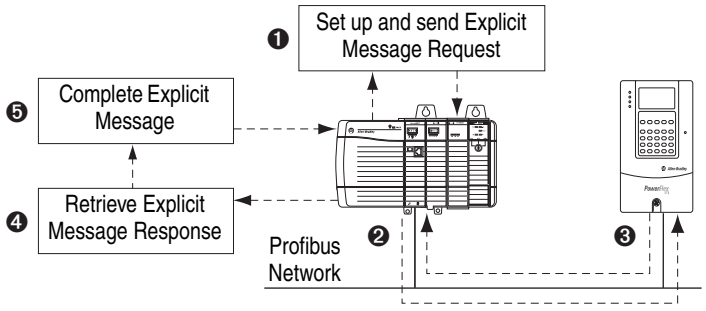
Parameter 23 - [Parameter Mode] in the 20-COMM-P module is used to configure the parameter protocol that is active. The default protocol is the Parameter Protocol.

Performing Explicit Messages

There are five basic events in the Explicit Messaging process. The details of each step 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 module (download).
❷	The scanner 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 user manual for the scanner and/or controller that is being used.

Parameter Protocol

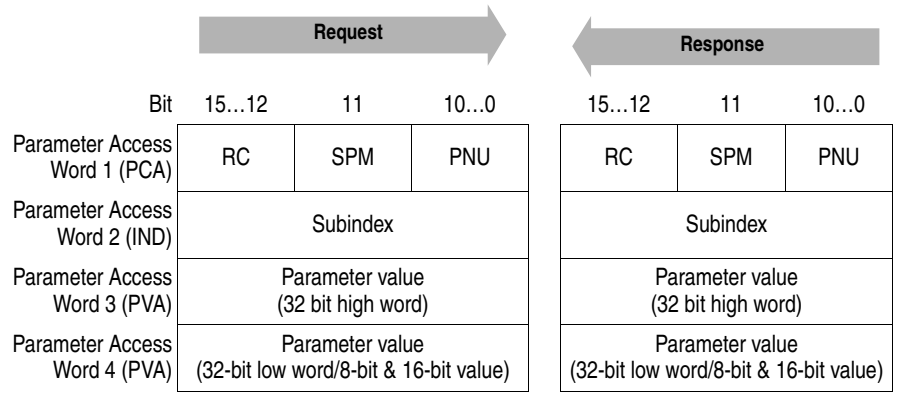
This protocol uses 4 words in the Profibus I/O area. Requests and responses are a handshake procedure and cannot be batched, meaning that if the master sends a request, it has to wait for the response before sending a new request.

With this protocol you can do the following:

- Read 8-bit, 16-bit, or 32-bit parameters from any DPI port
- Write 8-bit, 16-bit, or 32-bit parameters to any DPI port
- Read the Host Fault object

To enable this protocol, set adapter **Parameter 23 - [Parameter Mode]** to '1' (DPI Par Prot), which is the default.

Figure 6.2 Parameter Message Format



See Parameter Message Request on page 6-4 and Parameter Message Response on page 6-5 for a description of the data that is required in each word.

Parameter Message Request

Word	Description
1	**PNU - Parameter Number** (Bit 0…10) The parameter number determines which parameter to access, in the selected peripheral. Parameters 1…1023 can be accessed. Parameter numbers 1024…2048 are used to access the fault object. Parameter 1024 is equal to the latest fault, 1025 to the prior fault, and so on.
	SPM (Bit 11) Reserved - Should always bet set to 0.
	RC - Request Code (Bit 12…15) One of the following codes have to be used: 0 = No request 1 = Request parameter value 2 = Change parameter value (8-bit and 16-bit word) 3 = Change parameter value (32-bit word) 4…15 = Reserved
2	**IND - Index** The index word contains the DPI Port number of the DPI Peripheral that the request is addressed to. The drive always has Port number 0. The Port number of the 20-COMM-P module can be determined using **Parameter 01 - [DPI PORT]**. This is usually Port 5 on a PowerFlex 7-Class drive.
3	**PVA - Parameter Value** (32-bit high word) The parameter value; if the parameter is 32 bits, the most significant bytes are placed here.
4	**PVA - Parameter Value** (32-bit low word or 8-bit and 16-bit word) The parameter value; if the parameter is 32 bits, the least significant bytes are placed here. If the parameter is 16-bit or lower, the entire result is placed in this word.

Parameter Message Response

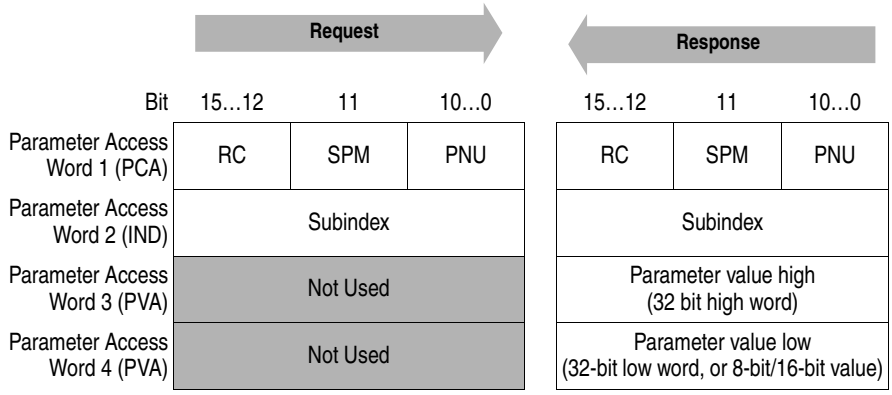
Word	Description
1	**PNU - Parameter Number** (Bit 0…10) Requested parameter number.
	SPM (Bit 11) Reserved - is always set to 0.
	RC - Response Code (Bit 12…15) One of the following codes will be sent: 0 = No request 1 = Transfer parameter value (8-bit and 16-bit word) 2 = Transfer parameter value (32-bit word) 3…6 = Reserved 7 = Request rejected. Error message found in Word 3; see table below for fault number description. 8 = No parameter change rights 9…15 = Reserved
2	**IND - Index** Port ID of requested parameter
3	**PVA - Parameter Value** (32-bit high word) The parameter value; if the parameter is 32 bits, the most significant bytes are placed here. If a fault was requested (Parameter 1024…2048), this word contains the fault code, that identifies the fault.
4	**PVA - Parameter value** (32-bit low word or 8-bit and 16-bit word) The parameter value; if the parameter is 32-bits, the least significant bytes are placed here. If the parameter is 16-bit or lower, the entire result is placed in this word. If a fault was requested (Parameter 1024…2048), the MSB contains the DPI Port number that caused the fault, and the LSB contains the DPI object instance that caused the fault.

Fault Number	Description
101	Service not supported (that is, Set service to a read-only parameter)
102	Service not valid
104	Parameter does not exist (parameter number is greater than the maximum number of parameters)
106	Data value out of range (Set value is out of range)
107	State conflict (parameter is not changeable while the product is in an operating state)

Parameter Protocol Examples

Read Examples

Figure 6.3 Overview Parameter Message Format (Read Request)



Request	Response
RC Set to '1' (0001 binary) to read.	**RC** '1' (0001 binary) Transferring 8-bit or 16-bit parameter value. '2' (0010 binary) Transferring a 32-bit parameter value. '7' (0111 binary) Request rejected (including fault code).
SPM Not used.	**SPM** Not used.
PNU Parameter number to read.	**PNU** Confirms the Parameter number (if successful, equals the PNU from the request).
Subindex Selects which DPI port to talk to ('0' = DPI Host, '5' = 20-COMM-P in drive).	**Subindex** Confirms the DPI port (if successful, equals the Subindex from the request).
Not Used	**Parameter value high word** Contains a '0' if returning a value from a 16-bit parameter and the high word from a 32-bit parameter.
Not Used	**Parameter value low word** Contains the value from an 8-bit or 16-bit parameter; the low word if reading from a 32-bit parameter, or the fault code (if RC = '7').

Reading parameter 140 - [Accel Time 1] in a PowerFlex 7-Class drive (DPI Port 0).

Message	SLC Address	Par. Access Word	Value (Hex)	Description
Request	N20:10	1	108C	1000 Hex = Read 8C Hex = 140 Dec (Par. 140)
	N20:11	2	0	DPI Port 0 (DPI Host)
	N20:12	3	0	Not Used
	N20:13	4	0	Not Used

Message	SLC Address	Par. Access Word	Value (Hex)	Description
Response	N10:10	1	108C	Transferring 16-bit parameter value (‘1’). Confirms Par. Number of the request (‘8C’).
	N10:11	2	0	Confirms Par. Access Word 2 of the request (DPI Port #).
	N10:12	3	0	Not Used
	N10:13	4	32	32 Hex = 50 Dec = 5.0 seconds

Reading parameter 4 - [P-DP Addr Actual] in the 20-COMM-P adapter (DPI Port 5).

Message	SLC Address	Par. Access Word	Value (Hex)	Description
Request	N20:10	1	1004	1000 Hex = Read 4 Hex = 4 Dec (Par. 4)
	N20:11	2	5	DPI Port 5 (20-COMM-P)
	N20:12	3	0	Not Used
	N20:13	4	0	Not Used
Response	N10:10	1	1004	Transferring 16-bit parameter value (‘1’). Confirms Par. Number of the request (‘4’).
	N10:11	2	5	Confirms Par. Access Word 2 of the request (DPI Port #).
	N10:12	3	0	Not Used
	N10:13	4	1	1 Hex = 1 Dec = Station 1

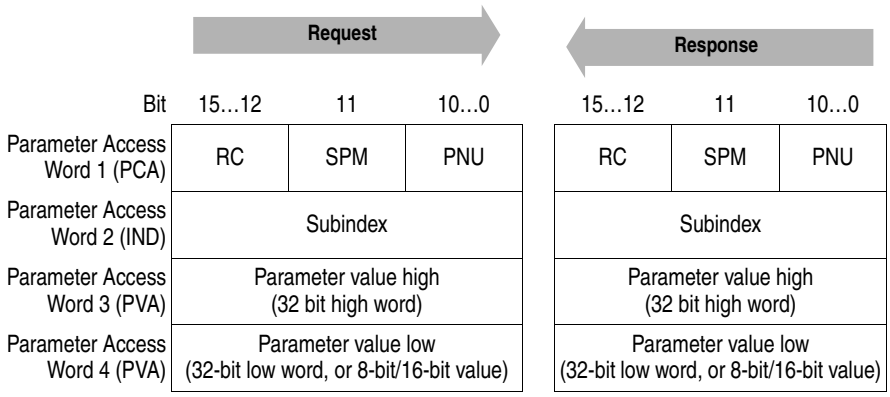
Reading parameter 244 - [Fault 1 Time] in a PowerFlex 7-Class drive (DPI Port 0).

Message	SLC Address	Par. Access Word	Value (Hex)	Description
Request	N20:10	1	10F4	1000 Hex = Read F4 Hex = 224 Dec (Par. 244)
	N20:11	2	0	DPI Port 0 (DPI Host)
	N20:12	3	0	Not Used
	N20:13	4	0	Not Used
Response	N10:10	1	10F4	Transferring 16-bit parameter value (‘1’). Confirms Par. Number of the request (‘F4’).
	N10:11	2	0	Confirms Par. Access Word 2 of the request (DPI Port #).
	N10:12	3	1B	Parameter value high word (1)
	N10:13	4	518E	Parameter value low word (1)

(1) The high and low word 1B518E Hex = 1,790,350 decimal, which equates to 179.0350 hours (fixed decimal point).

Write Examples

Figure 6.4 Overview Parameter Message Format (Write Request)



Request	Response
RC '2' (0010 binary) to write an 8-bit or 16-bit parameter. '3' (0011 binary) to write a 32-bit parameter.	**RC** '1' (0001 binary) Transferring 8-bit or 16-bit parameter value. '2' (0010 binary) Transferring a 32-bit parameter value. '7' (0111 binary) Request rejected (including fault code).
SPM Not used.	**SPM** Not used.
PNU Parameter number being written.	**PNU** Confirms the Parameter number (if successful, equals the PNU from the request).
Subindex Selects which DPI port to talk to ('0' = DPI Host, '5' = 20-COMM-P in drive).	**Subindex** Confirms the DPI port (if successful, equals the Subindex from the request).
Parameter value high word Contains the high word if writing to a 32-bit parameter.	**Parameter value high word** Confirms the high word if writing to a 32-bit parameter.
Parameter value low word Contains the write value for an 8-bit or 16-bit parameter, or high word if writing to a 32-bit parameter.	**Parameter value low word** Confirms the write value for an 8-bit or 16-bit parameter; the low word if writing to a 32-bit parameter, or the fault code (if RC = '7').

Writing to parameter 101 - [Preset Speed 1] in a PowerFlex 7-Class drive (DPI Port 0).

Message	SLC Address	Par. Access Word	Value (Hex)	Description
Request	N20:10	1	2065	2000 Hex = Change parameter value (word) 65 Hex = 101 Dec (Par. 101)
	N20:11	2	0	DPI Port 0 (DPI Host)
	N20:12	3	0	Not Used
	N20:13	4	64	64 Hex = 100 Dec = 10.0 Hz

Message	SLC Address	Par. Access Word	Value (Hex)	Description
Response	N10:10	1	1065	Transferring 16-bit parameter value (‘1’) Confirms Par. Number of the request (‘65’)
	N10:11	2	0	Confirms Par. Access Word 2 of the request
	N10:12	3	0	Not Used
	N10:13	4	64	Confirms Par. Access Word 4 of the request

Writing to **Parameter 9 - [Comm Flt Action]** in the 20-COMM-P adapter (DPI Port 5).

Message	SLC Address	Par. Access Word	Value (Hex)	Description
Request	N20:10	1	2009	2000 Hex = Change param. value 8-bit/16-bit 9 Hex = 9 Dec (Par. 9)
	N20:11	2	5	DPI Port 5 (20-COMM-P)
	N20:12	3	0	Not Used
	N20:13	4	2	2 Hex = 2 Dec = Zero Data
Response	N10:10	1	1009	Transferring 8-bit/16-bit parameter value (‘1’) Confirms Par. Number of the request (‘9’)
	N10:11	2	5	Confirms Par. Access Word 2 of the request
	N10:12	3	0	Not Used
	N10:13	4	2	Confirms Par. Access Word 4 of the request

Writing to **Parameter 15 - [Flt Cfg A1 In]** in the 20-COMM-P adapter (DPI Port 5).

Message	SLC Address	Par. Access Word	Value (Hex)	Description
Request	N20:10	1	300F	3000 Hex = Change parameter value (32-bit) F Hex = 15 Dec (Par. 15)
	N20:11	2	5	DPI Port 5 (20-COMM-P)
	N20:12	3	0	Not Used
	N20:13	4	64	64 Hex = 100 Dec = 10.0 Hz.
Response	N10:10	1	200F	Transferring 32-bit parameter value (‘2’) Confirms Par. Number of the request (‘F’)
	N10:11	2	5	Confirms Par. Access Word 2 of the request
	N10:12	3	0	Confirms Par. Access Word 3 of the request
	N10:13	4	64	Confirms Par. Access Word 4 of the request

SLC Ladder Example Station 1 Parameter Protocol

Figure 6.5 Example SLC Ladder Logic Station 1 Parameter Protocol

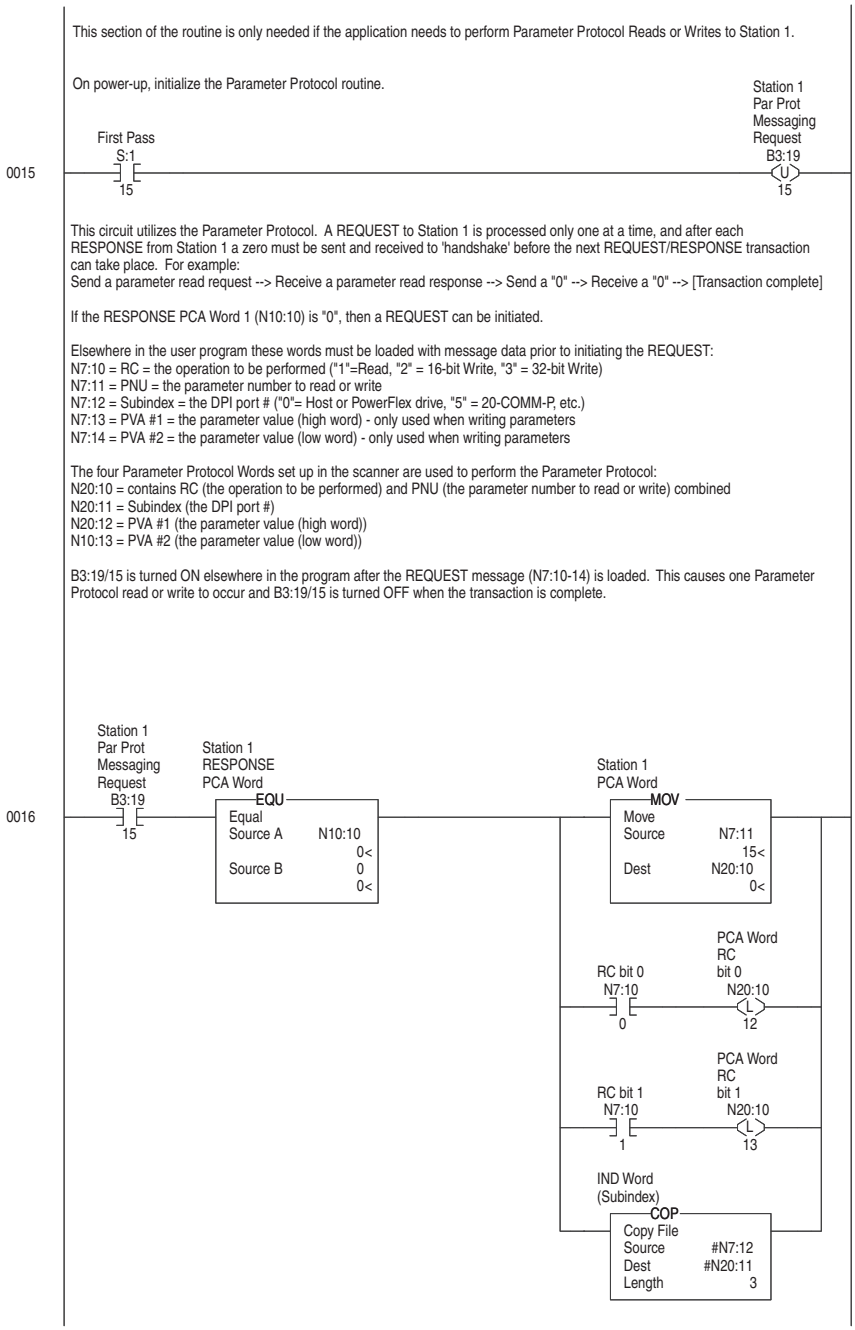
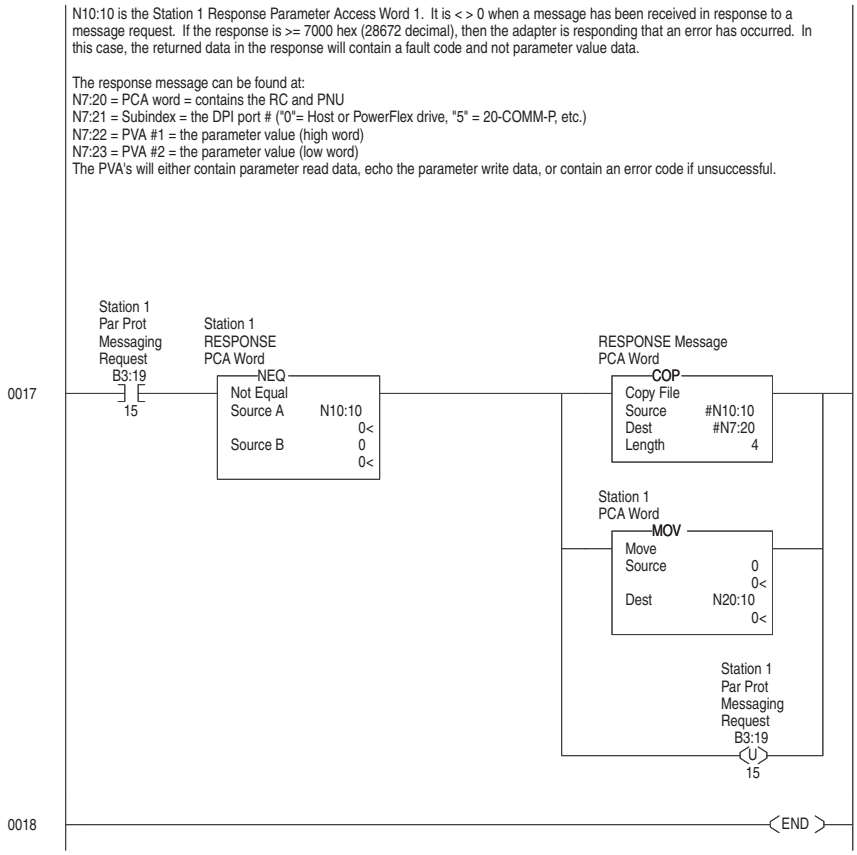


Figure 6.5 Example SLC Ladder Logic Station 1 Parameter Protocol (continued)



SLC Ladder Example Station 2 Parameter Protocol

Figure 6.6 Example SLC Ladder Logic Station 2 Parameter Protocol

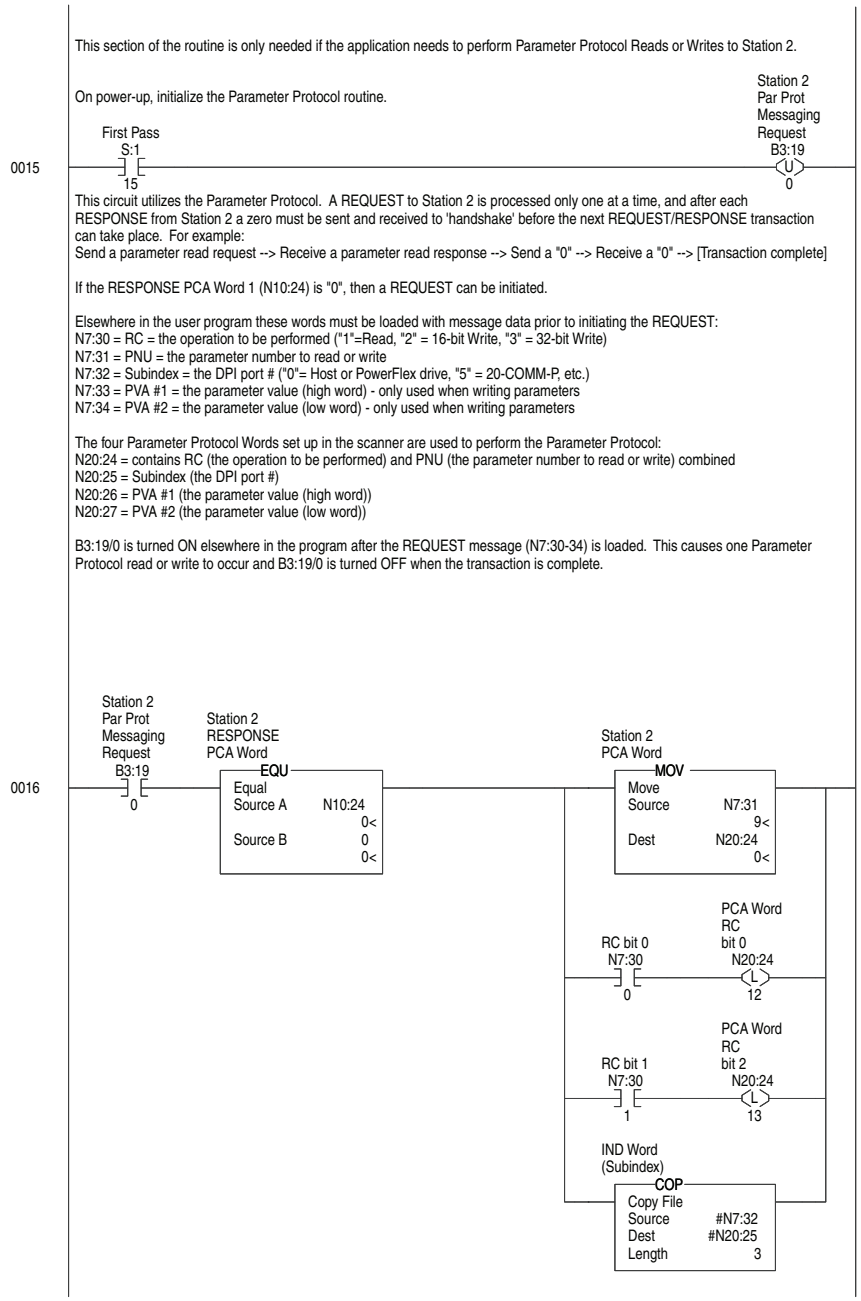
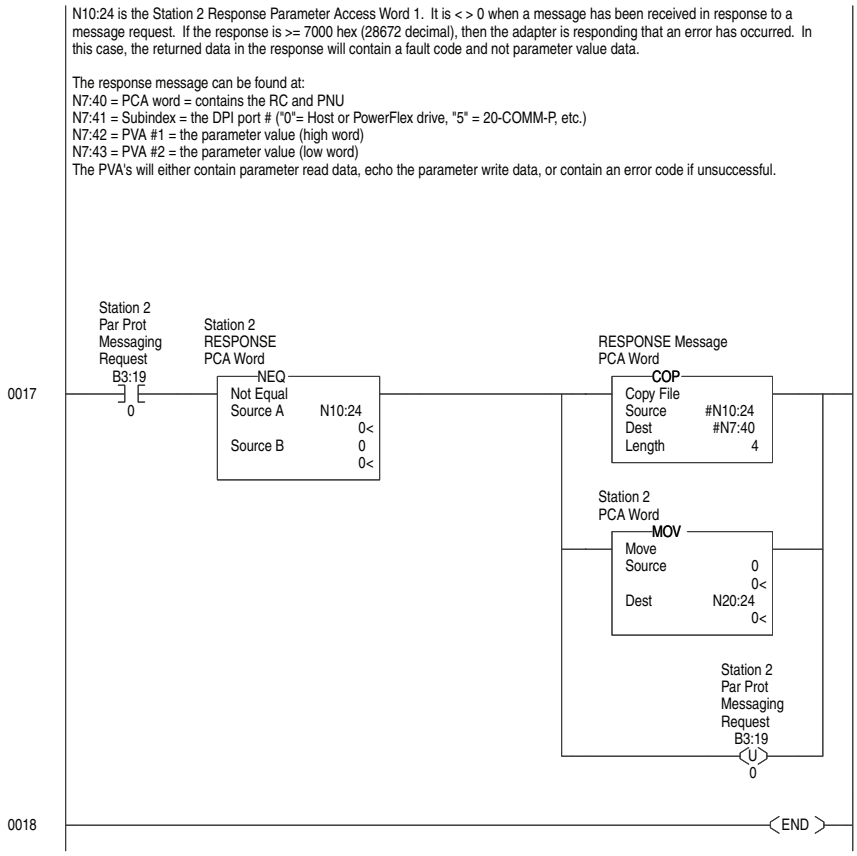


Figure 6.6 Example SLC Ladder Logic Station 2 Parameter Protocol (continued)



Notes:

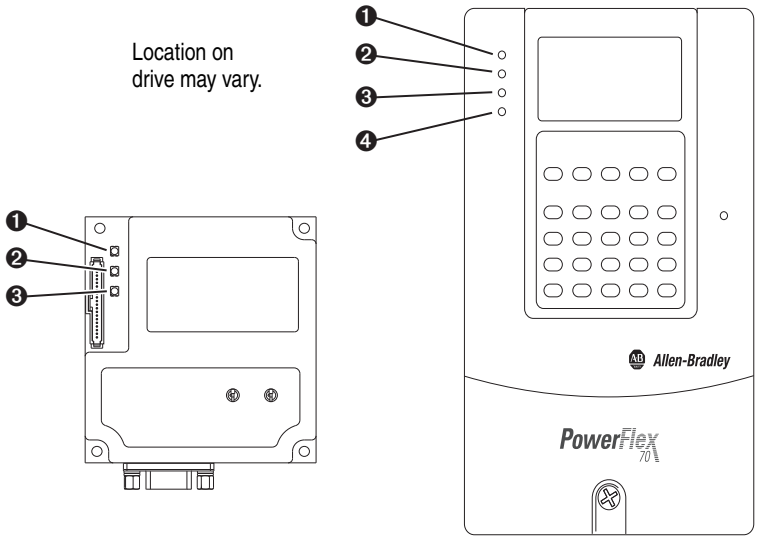
Troubleshooting

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

Topic	Page
Understanding the Status Indicators	7-1
PORT Status Indicator	7-2
MOD Status Indicator	7-2
NET A Status Indicator	7-3
Viewing Adapter Diagnostic Items	7-3
Viewing and Clearing Events	7-5

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	Profibus Network Status	7-3
❹	NET B (only on drive cover	Not used for Profibus	—

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 by using the Internal Interface (ribbon) cable. • Apply power to the drive.
Flashing Red	The adapter is not receiving a ping message from the drive.	• Verify that cables are securely connected and not damaged. Replace cables if necessary. • Cycle power to the drive.
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 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 PowerFlex 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 communication (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 by using the Internal Interface (ribbon) cable. • Apply power to the drive.
Flashing Red	The adapter has failed the firmware test. The adapter firmware is being updated.	• Clear faults in the adapter. • Cycle power to the drive. Parameter settings may have been changed. • 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.
Steady Red	The adapter has failed the hardware test.	• Cycle power to the drive. • Replace the adapter.
Flashing Green	The adapter is operational, but is not transferring I/O data 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 for the network connection as shown in the table below.

Status	Cause	Corrective Actions
Off	The adapter is not powered or is not properly connected to the drive.	• Securely connect the adapter to the drive by using the Internal Interface (ribbon) cable, and to the network by using a Profibus cable. • Correctly connect the Profibus cable to the Profibus connector. • Apply power to the drive and network.
Flashing Red	Error in Profibus configuration.	Reconfigure the adapter.
Steady Red	Error in Profibus controller initialization.	• Cycle power to the drive. • Reconfigure the Profibus scanner.
Steady Green	The adapter is properly connected and is communicating on the network.	No action required.

Viewing Adapter Diagnostic Items

If you encounter unexpected communications problems, the adapter's diagnostic items can 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.

Table 7.A Adapter Diagnostic Items (Continued)

No.	Name	Description
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	
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 CAN Receive error counter.
25	DPI Tx Errors	The present value of the DPI CAN Transmit error counter.
26	PbusImage Siz	The buffer size of active I/O image (Profibus size) in bytes.
27	Switch 0	The present value of the adapter node address Switch 0 (ones digit).
28	Switch 1	The present value of the adapter node address Switch 1 (tens digit).

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 becomes full, because 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 clears 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**.	Main Menu: **Diagnostics** Parameter Device Select
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 events. The most recent event is Event 1.	Event Q: **1** E3 Ping Time Flt
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.	Dgn: Events View Event Queue Clear Event **Clr Event Queue**
4. Repeat steps 2 and 3 to enter the **Events** option and then the **Clear Event** option or **Clr Event Queue** option. A message pops 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 display 'No Event'.	

Events

Many events in the event queue occur under normal operation. If you encounter unexpected communication problems, the events can help you or Allen-Bradley personnel troubleshoot the problem. The following events can 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	Message Timeout	A Client-Server message sent by the adapter was not completed within one second.
20	DPI Fault Msg	The host drive faulted.
21	DPI Fault Clear	The drive issued this because a fault was cleared.
22	Normal Startup	The adapter successfully started up.
23	NET Comm Flt	The adapter detected a fault condition on the Profibus network.
24	Fault 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.
25	P-DP Online	The adapter has gone online with the Profibus network.
26	P-DP Offline	The adapter has gone offline with the Profibus network.
27	P-DP Idle	The adapter received a network clear from the Profibus master.
28	Language CRC Decl	The language flash segment is corrupt; update the adapter with the latest firmware.

Specifications

This appendix presents the specifications for the adapter.

Topic	Page
Communications	A-1
Electrical	A-1
Mechanical	A-1
Environmental	A-1
Regulatory Compliance	A-2

Communications

Network Protocol Data Rates	 Profibus 9.6 kbps, 19.2 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps, or 12 Mbps The adapter has auto baud rate detection
Drive Protocol Data Rates	 DPI 125 kbps or 500 kbps

Electrical

Consumption Drive Network	 350 mA at 5V DC supplied by the host drive None

Mechanical

Dimensions Height Length Width	 19 mm (0.75 inches) 86 mm (3.39 inches) 78.5 mm (3.09 inches)
Weight	57 g (2 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 is not 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 C3 according to IEC 61800-3. It is not intended for operation in a domestic environment.

Adapter Parameters

This appendix provides information about the adapter parameters.

Topic	Page
About Parameter Numbers	B-1
Parameter List	B-1

About Parameter Numbers

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

Configuration Tool	Numbering Scheme
• HIM • 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 for details.

Parameter List

Parameter No.	Name and Description	Details
01	**[DPI Port]** Displays the port to which the adapter is connected. This is usually 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	**[P-DP Addr Cfg]** Sets the network node address used by the adapter if the Node Address switches are set to '00'. (Updates **Parameter 04 - [P-DP Addr Actual]** after reset).	Default: 1 Minimum: 00 Maximum: 126 Type: Read/Write Reset Required: Yes
04	**[P-DP Addr Actual]** Displays the actual network node address used by the adapter.	Minimum: 00 Maximum: 126 Type: Read Only

Parameter No.	Name and Description	Details
05	**[P-DP Rate Actual]** Displays the actual network data rate used by the adapter.	Values: 0 = 9.6 kbps 1 = 19.2 kbps 2 = 93.75 kbps 3 = 187.5 kbps 4 = 500 kbps 5 = 1.5 Mbps 6 = 3 Mbps 7 = 6 Mbps 8 = 12 Mbps Type: Read Only
06	**[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
07	**[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
08	**[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 resets 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 can fault when you reset the adapter. Determine how your drive responds before resetting a connected adapter.	Default: 0 = Ready Values: 0 = Ready 1 = Reset Module 2 = Set Defaults Type: Read/Write Reset Required: No
09	**[Comm Flt Action]** Sets the action that the adapter and drive takes 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 automatically receives commands over the network again. **ATTENTION:** Risk of injury or equipment damage exists. **Parameter 9 - [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, take precautions 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
10	**[Idle Flt Action]** Sets the action that the adapter and drive takes 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 automatically receives 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
	ATTENTION: Risk of injury or equipment damage exists. **Parameter 10 - [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, take precautions 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).	
11	**[DPI I/O Cfg]** Sets the I/O that is transferred through the adapter.	Default: xxx0 0001 Bit Values: 0 = I/O Disabled 1 = I/O Enabled Type: Read/Write Reset Required: Yes

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

12	**[DPI I/O Active]** Displays the I/O that the adapter is actively transmitting. The value of this parameter is usually equal to the value of **Parameter 11 - [DPI I/O Cfg]**.	Default: xxx0 0001 Bit Values: 0 = I/O Disabled 1 = I/O Enabled Type: Read Only

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

13	**[Flt Cfg Logic]** Sets the Logic Command data that is sent to the drive if any of the following is true: • **Parameter 9 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • **Parameter 10 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle. The bit definitions depend on the product to which the adapter is connected. See Appendix C 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

Parameter No.	Name and Description	Details
14	**[Flt Cfg Ref]** Sets the Reference data that is sent to the drive if any of the following is true: • **Parameter 9 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • **Parameter 10 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle.	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 occurs.
15 16 17 18 19 20 21 22	**[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 9 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • **Parameter 10 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle.	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.
23	**[Parameter Mode]** Sets the format for Parameter communication. • Par Prot (Parameter Protocol) is used to read or write single parameters. • DPI Par Prot is reserved for future use. Performing explicit messaging requires the 'Parameter Access' module to be added when configuring the node with a network software tool.	Default: 0 = Par Prot Values: 0 = Par Prot 1 = DPI Par Prot Type: Read/Write Reset Required: No
24	**[P-DP State]** Displays the state of the Profibus controller.	Values: 0 = WAIT_PRM 1 = WAIT CFG 2 = DATA_EX 3 = ERROR Type: Read Only

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, see your product 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 starts the drive. The Start command acts as a momentary Start command. A '1' starts the drive, but returning to '0' does not stop the drive.

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

[3] This Reference Select does 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																Status	Description
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
															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 more 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 starts the drive.

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

Logic Status Word

Logic Bits																Status	Description
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
															x	Active	0 = Not Active 1 = Active
														x		Running	0 = Not Running 1 = Running
													x			Command Direction	0 = Reverse 1 = Forward
												x				Actual Direction	0 = Reverse 1 = Forward
											x					Accel	0 = Not Accelerating 1 = Accelerating
										x						Decel	0 = Not Decelerating 1 = Decelerating
									x							Jogging	0 = Not Jogging 1 = Jogging
								x								Fault	0 = No Fault (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 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 starts the drive. The Start command acts as a momentary Start command. A '1' starts the drive, but returning to '0' does not stop the drive.

[2] This Start does 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 does 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 more information.

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 Profibus. 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-P Profibus adapter connects PowerFlex 7-Class drives to a Profibus network. Adapters are also called ‘cards’, ‘embedded communication options’, ‘gateways’, ‘modules’, or ‘peripherals’.

B

Bus Off

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

C

CAN (Controller Area Network)

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

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.

D

Data Rate

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

Data Rate	Maximum Cable Length
9.6 kbps	1000 m (3280.8 ft.)
19.2 kbps	1000 m (3280.8 ft.)
93.75 kbps	1000 m (3280.8 ft.)
187.5 kbps	1000 m (3280.8 ft.)
500 kbps	400 m (1312.3 ft.)
1.5 Mbps	200 m (656.2 ft.)
3 Mbps	100 m (328 ft.)
6 Mbps	100 m (328 ft.)
12 Mbps	100 m (328 ft.)

Datalinks

A Datalink is a type of pointer used by PowerFlex 7-Class drives to transfer data to and from the controller. Datalinks enable 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.

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-P 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 connected drive. 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 750-Series, PowerFlex 7-Class, and PowerFlex 4-Class drives, and also legacy drives that implement the SCANport communication interface. Information about DriveTools SP software can be obtained at http://www.ab.com/drives/drivetools.

E

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 connected drive can respond with a user-defined fault configuration. The user sets the data that is sent to the drive using specific fault configuration parameters in the adapter. When a fault action parameter is set to use the fault configuration data and a fault occurs, the data from these parameters is sent as the Logic Command, Reference, and/or Datalink(s).

G

GSD File

A file used by the network configuration tool to identify the type of adapter and its capabilities, so that it can configure the adapter for the network. This file is normally supplied on digital media as a text file.

H

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 connected 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 continues to run at the same Reference.

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 C.

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 C.

M

Master

See scanner.

N

Node Address

A Profibus network can have as many as 126 devices connected to it. Each device on the network must have a unique node address between 0 and 126.

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’.

P

Parameter Messaging

Parameter Messaging is used to configure, monitor, and diagnose devices over the Profibus network.

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.

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.

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.

Profibus Network

A Profibus network uses RS-485 to connect devices (for example, controllers, drives, and motor starters). A Profibus network can support a maximum of 126 devices. Each device is assigned a unique node address and transmits data on the network at the same data rate.

Cable is used to connect devices on the network. It contains the bus signal. Devices can be connected to the network in a daisy-chain connection.

General information about Profibus and the Profibus specification is maintained by the Profibus Trade Organization (PTO) available online at http://www.profibus.com.

R

Reference/Feedback

The Reference is used to send a setpoint (for example, speed, frequency, or 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.

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.

A scanner is often called a Master.

Status Indicators

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

U

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 3-6 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.

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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 and application notes, sample code, and links to software service packs. You can also visit our Support Center at https://rockwellautomation.custhelp.com/ for software updates, support chats and forums, technical information, FAQs, and to sign up for product notification updates.

In addition, we offer multiple support programs for installation, configuration, and troubleshooting. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/services/online-phone.

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/rockwellautomation/support/overview.page, or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to help 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.

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