User Manual

Original Instructions

Allen-Bradley

PowerFlex 20-750-DNET DeviceNet Option Module

Firmware Revision Number 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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This manual provides information about the 20-750-DNET DeviceNet option module for network communication and how to use the module with PowerFlex® 750-Series drives.

This manual contains new and updated information.

Summary of Changes

This table contains the changes that are made to this revision.

Topic	Page
Removed ADR reference from Tip in Setting the Node Address section.	26
Removed ADR information from Glossary.	131
Removed Appendix E, History of Changes.	

Conventions Used in This Manual

The following conventions are used throughout this manual:

- Parameter names are shown in the format *Device* **Parameter xx -** [*] or *Host* **Parameter xx -** [*]. The xx represents the parameter number. The * represents the parameter name—for example, *Device* **Parameter 01 - [Port Number]**.
- The firmware revision number (FRN) is displayed as FRN *X.xxx*, where '*X*' is the major revision number and '*xxx*' is the minor revision number.
- The dialog box images in this manual resulted from using the following software:
  - RSLinx® Classic software, version 2.52
  - RSNetWorx™ for DeviceNet software, version 8.00
  - RSLogix 5000® software, version 16.00

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

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Local Product Support

Contact your local Rockwell Automation representative for the following:

- Sales and order support
- Product technical training

- Warranty support
- Support service agreements

Technical Product Assistance

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

Additional Resources

Resource	Description
Network Communication Option Module Installation Instructions, publication 750COM-IN002	Information on the installation of PowerFlex 750-Series Network Communication modules.
DeviceNet Media Design and Installation Guide, publication DNET-UM072	Information on the planning, installation, and techniques that are used to implement a DeviceNet™ network.
DeviceNet Starter Kit User Manual, publication DNET-UM003	
Connected Components Workbench™ software 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.
RSNetWorx™ for DeviceNet Getting Results Guide, publication DNET-GR001, and online help (1)	Information on using RSNetWorx™ for DeviceNet.
PowerFlex 750-Series Drive Installation Instructions, publication 750-IN001	Information on installing, programming, and technical data of PowerFlex 750-Series drives.
PowerFlex 750-Series Drive Programming Manual, publication 750-PM001	
PowerFlex 750-Series Drive Technical Data, publication 750-TD001	
PowerFlex 20-HIM-A6/-C6S HIM (Human Interface Module) User Manual, publication 20HIM-UM001	Information on the installation and use of PowerFlex 20-HIM-A6 or 20-HIM-C6S HIMs.
Getting Results with RSLinx® Guide, publication LINX-GR001, and online help (1)	Information on using RSLinx Classic software.
RSLogix 5000 PIDE Autotuner Getting Results Guide, publication PIDE-GR001, and online help (1)	Information on using the RSLogix 5000 software tool.
DeviceNet Network Configuration User Manual, publication DNET-UM004	Information on how to use DeviceNet modules with the Logix5000 controller and communicate with various devices on the DeviceNet network.

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

You can view or download publications at http://www.rockwellautomation.com/literature. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

To find your local Allen-Bradley 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 and Support website at http://www.ab.com/support/abdrives and click the Downloads or Knowledgebase link.

Getting Started

The 20-750-DNET option module is intended for installation into a PowerFlex® 750-Series drive and is used for network communication.

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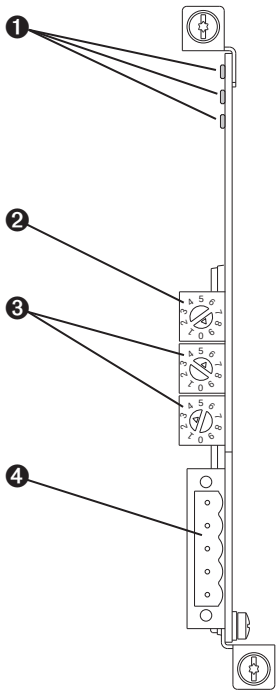
Components



Item	Part	Description
1	Status Indicators	Three status indicators that indicate the status of the option module and network communication. See Chapter 7, Troubleshooting.
2	Data Rate Switch	Sets the DeviceNet data rate at which the option module communicates. See Setting the Data Rate Switch on page 19.
3	Node Address Switches	Sets the network node address of the option module. See Setting the Node Address Switches on page 18.
4	DeviceNet Connector	A 5-pin connector for the DeviceNet network cable. (A mating 5-pin linear plug is supplied with the option module to connect to the network cable.

Features

The features of the option module include the following:

- Captive screws to secure and ground the module to the drive.
- Switches to set a node address and network data rate before applying power to the drive—or you can disable the switches and use option module parameters to configure these functions.
- Compatibility with the following configuration tools to configure the option module and host drive:
  - PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM (human interface module) on the drive, if available
  - Connected Components Workbench software, version 1.02 or later
  - DriveExplorer™ software, version 6.01 or later
  - DriveExecutive™ software, version 5.01 or later
- Status indicators that report the status of the option module and network communication. They are visible when the drive cover is removed.
- Parameter-configured 32-bit Datalinks in the I/O to meet application requirements (16 Datalinks to write data from the network to the drive, and 16 Datalinks to read data to the network from the drive).
- Explicit Messaging and UCMM (Unconnected Message Manager) support.
- Multiple data exchange methods, including Polled, Cyclic, and Change of State (COS), to transmit data between the network and option module.
- Master-Slave hierarchy that can be configured to transmit data to and from a controller on the network.
- User-defined fault actions to determine how the option module and its connected host drive respond to the following:
  - I/O messaging communication disruptions (Comm Flt Action)
  - Controllers in Idle mode (Idle Flt Action)
  - Explicit messaging disruptions for drive control via PCCC or the CIP Register Object (Msg Flt Action)
- Faulted node recovery support. You can configure a device even when it is faulted on the network if you have a configuration tool that uses faulted node recovery and have set the Data Rate switch to position '3'. With this configuration, the option module uses parameter settings that are stored in its nonvolatile storage (NVS) memory for the data rate and node address instead of using its switch settings.
- Access to any PowerFlex drive and its connected peripherals on the network to which the option module is connected.

Understanding Parameter Types

The option module has two types of parameters:

- *Device* parameters are used to configure the option module to operate on the network.
- *Host* parameters are used to configure the option module Datalink transfer and various fault actions with the drive.

You can view option module *Device* parameters and *Host* parameters with any of the following drive configuration tools:

- PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM—use the  or  key to scroll to the drive port in which the module resides, press the  (Folders) key, and use the  or  key to scroll to the DEV PARAM or HOST PARAM folder.
- Connected Components Workbench software—click the tab for the option module at the bottom of the window, click the Parameters icon in the tool bar, and click the *Device* or *Host* Parameters tab.
- DriveExplorer software—find the option module in the treeview and open its Parameters folder.
- DriveExecutive software—find the option module in the treeview, expand the module in the tree, and open its Parameters folder.

Compatible Products

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

- PowerFlex 753 drives (all firmware revisions)
- PowerFlex 755 drives (all firmware revisions)

Required Equipment

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

Equipment Shipped with the Option Module

When you unpack the option module, verify that the package includes the following:

- ❑ One 20-750-DNET DeviceNet Option Module
- ❑ One 5-pin linear DeviceNet plug
  (connected to the DeviceNet connector on the option module)
- ❑ One Network Communication Option Module Installation Instructions, publication 750COM-IN002

User-Supplied Equipment

To install and configure the option module, you must supply the following:

- ❑ A small screwdriver
- ❑ DeviceNet cable—we recommend thin cable with an outside diameter of 6.9 mm (0.27 in.)
- ❑ Drive and option module configuration tool, such as the following:
  - PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM
  - Connected Components Workbench software, version 1.02 or later

    Connected Components Workbench software is the recommended standalone 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 6.01 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 that are not supported by Connected Components Workbench software.
  - DriveExecutive software, version 5.01 or later

    A Lite version of DriveExecutive software ships with RSLogix 5000®, RSNetworx MD, FactoryTalk® AssetCentre, and IntelliCENTER® 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.
- ❑ RSNetWorx™ for DeviceNet network configuration software, version 8.00 or later

- ❑ Controller configuration software, such as RSLogix 5000 software, version 20.00 or earlier, or Studio 5000™ Logix Designer application, version 21.00 or later
- ❑ A computer communication card, such as 1784-PCD, 1784-PCID, 1784-PCIDS, or 1770-KFD, for connection to the DeviceNet network

Safety Precautions

Read the following safety precautions carefully.

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

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, startup, configuration, and subsequent maintenance of the drive using the option module. Failure to comply may result in injury and/or equipment damage.

ATTENTION: Risk of equipment damage exists. The option module 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 option module. 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 option module is transmitting control I/O to the drive, the drive may fault when you reset the option module. Determine how your drive will respond before resetting the module.

ATTENTION: Risk of injury or equipment damage exists. *Host* **Parameters 33 - [Comm Flt Action]**, **34 - [Idle Flt Action]**, and **36 - [Msg Flt Action]** let you determine the action of the option module and connected drive if I/O communication is disrupted, the controller is idle, or explicit messaging for drive control is disrupted. By default, these parameters fault the drive. You may configure these parameters so that the drive continues to run, however, precautions should be taken to verify that the settings of these parameters do not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable or a controller in idle state).

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

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

Quick Start

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

Step	Action	See
1	Review the safety precautions for the option module.	Throughout this manual
2	Verify that the PowerFlex drive is properly installed.	PowerFlex 750-Series AC Drive Installation Instructions, publication 750-IN001
3	Install the option module. a. Verify that the PowerFlex drive is not powered. b. Insert the option module in drive Port 4, 5, or 6. c. Use the captive screws to secure and ground the option module to the drive. d. Connect the option module to the network with a DeviceNet cable.	Network Communication Option Module Installation Instructions, publication 750COM-IN002, and Chapter 2, Installing the Option Module
4	Apply power to the option module. a. Verify that the option module is installed correctly. The option module 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 Option Module
5	Configure the option module for your application. Set option module parameters for the following functions as required by your application: • Node address—only if Data Rate switch is set to position '3'; otherwise use Node Address switches. • Data rate—only if Data Rate switch is set to position '3'; otherwise set this switch to position '0', '1', '2', or '4' through '9' depending on the application. • I/O configuration • Change of State, Cyclic or Polled I/O data exchange • Master-Slave hierarchy • Fault actions	Chapter 3, Configuring the Option Module
6	Configure the controller to communicate with the option module. Use the network configuration tool RSNetWorx for DeviceNet software, and a controller configuration tool, such as RSLogix software, to configure the master on the network to recognize the option module and drive.	Chapter 4, Configuring the I/O
7	Create a ladder logic program. Use a controller configuration tool, such as RSLogix software, to create a ladder logic program that enables you to do the following: • Control the connected drive, via the option module, by using I/O. • Monitor or configure the drive by using explicit messages.	Chapter 5, Using the I/O Chapter 6, Using Explicit Messaging

Installing the Option Module

This chapter provides instructions for installing the option module in a PowerFlex 750-Series drive.

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Preparing for an Installation

Before installing the option module, do the following:

- Read the DeviceNet Media Design and Installation Guide, publication DNET-UM072
- Read the DeviceNet Starter Kit User Manual, publication DNET-UM003.
- Verify that you have all required equipment. See Required Equipment on page 13.

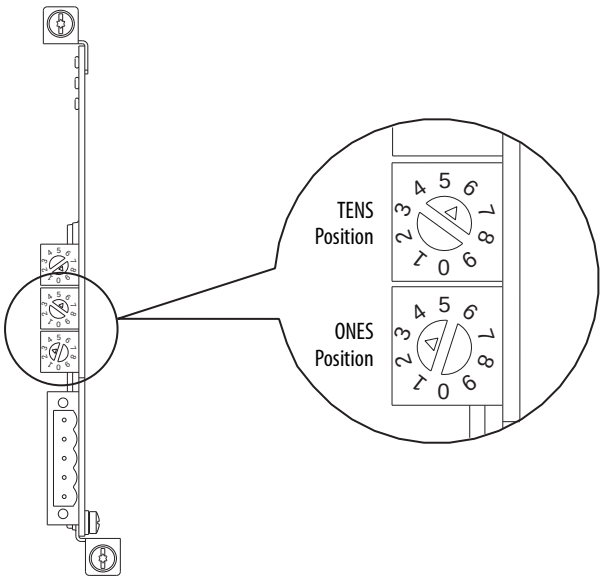
ATTENTION: Risk of equipment damage exists. The option module contains electrostatic discharge (ESD) sensitive parts that can be damaged if you do not follow ESD control procedures. Static control precautions are required when handling the option module. If you are unfamiliar with static control procedures,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

Setting the Node Address Switches

Set the option module Node Address switches (bottom two switches in Figure 1) by rotating the switches to the desired value for each digit.

IMPORTANT Each node on the DeviceNet network must have a unique address. Set the node address before power is applied because the option module 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 option module, or disconnect and reconnect the DeviceNet network cable.

Figure 1 - Setting the Node Address Switches



Settings	Description
0…63	Node address that is used by the option module if switches are enabled. The default switch setting is 63. Node address 63 is also the default address that is used by all non-commissioned devices. We recommend that you **do not** use this address as the final option module address. **Important:** If the Data Rate switch (Figure 2) is set to position '3', the option module uses the value that is stored in *Device* **Parameter 07 - [Net Addr Cfg]** for the node address. The default setting for *Device* **Parameter 07 - [Net Addr Cfg]** is 63. See Setting the Node Address on page 26.
64…99	**Do not use.** The option module will not recognize these addresses.

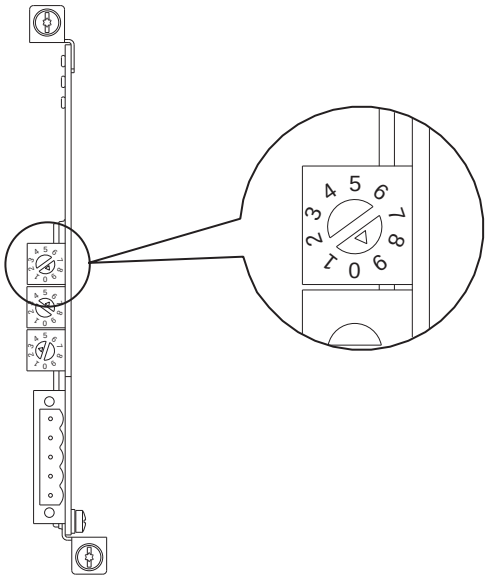
The switch settings can be verified by viewing *Device* **Parameter 08 - [Net Addr Act]** or Diagnostic Device Item number 54 (page 85) with any of the following drive configuration tools:

- PowerFlex® 20-HIM-A6 or 20-HIM-C6S HIM
- Connected Components Workbench software, version 1.02 or later
- DriveExplorer™ software, version 6.01 or later
- DriveExecutive™ software, version 5.01 or later

Setting the Data Rate Switch

Set the option module Data Rate switch (top switch in Figure 2) by rotating the switch to the desired setting.

Figure 2 - Setting the Data Rate Switch



Setting	Description
0	Sets the option module to the 125 Kbps data rate.
1	Sets the option module to the 250 Kbps data rate.
2	Sets the option module to the 500 Kbps data rate.
3	Sets the option module to use the data rate value that is stored in *Device* **Parameter 09 - [Net Rate Cfg]**, and sets the option module to use the node address value that is stored in *Device* **Parameter 07 - [Net Addr Cfg]**. See Setting the Data Rate on page 27.
4…9	Sets the option module to the Auto data rate—a data rate that is used by other network devices. Another device on the network must be set to a data rate. The default switch setting is 9.

The switch settings can be verified by viewing Diagnostic Device Item number 53 (page 85) with any of the drive configuration tools that are listed on page 18.

Connecting the Option Module to the Drive

IMPORTANT Remove power from the drive before installing the option module in the drive control pod.

Install the option module in the PowerFlex 750-Series drive control pod in Port 4, 5, or 6. For more installation details, see the Network Communication Option Module Installation Instructions, publication 750COM-IN002, provided with the option module.

IMPORTANT After inserting the option module into drive Port 4, 5, or 6, make sure to tighten the module screws to the pod mounting bracket to properly ground the module to the drive. Torque both screws to 0.45…0.67 N•m (4.0…6.0 lb•in).

Connecting the Option Module to the Network

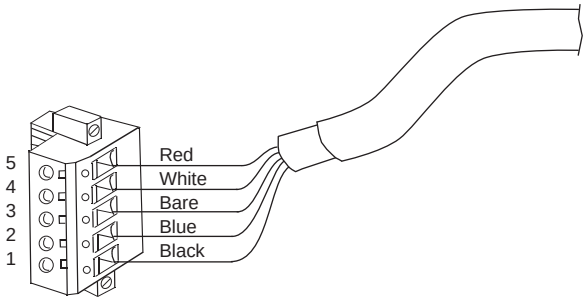
ATTENTION: Risk of injury or death exists. The PowerFlex drive may contain high voltages that can cause injury or death. Remove power from the drive, and then verify that power has been discharged before connecting the option module to the network.

1. Remove power from the drive.
2. Remove the drive cover and lift up the drive HIM bezel to its open position to access the drive control pod.
3. Use static control precautions.
4. Connect one end of the DeviceNet cable to the network. We recommend DeviceNet Thin cable with an outside diameter of 6.9 mm (0.27 in.).

IMPORTANT Maximum cable length depends on data rate. For details, see Data Rate on page 132.

5. Route the other end of the DeviceNet cable through the bottom of the drive, and connect the 5-pin linear plug (provided with the option module) to the DeviceNet cable (Figure 3). If a replacement plug is needed, the replacement plug part number is 1799-DNETSCON.

Figure 3 - Connecting the 5-Pin Linear Plug to the DeviceNet Cable



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

6. Insert the 5-pin linear plug into the mating option module receptacle, and secure it with the two screws. Verify that the colors of the wires on the plug match the color codes on the receptacle.

Applying Power

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

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

Start-up Status Indications

After power has been applied, the drive STS (status) indicator can be viewed on the front of the drive and the option module status indicators can be viewed with the drive cover open or removed (Figure 4). Possible startup status indications are shown in Table 1.

Figure 4 - Drive and Option Module Status Indicators

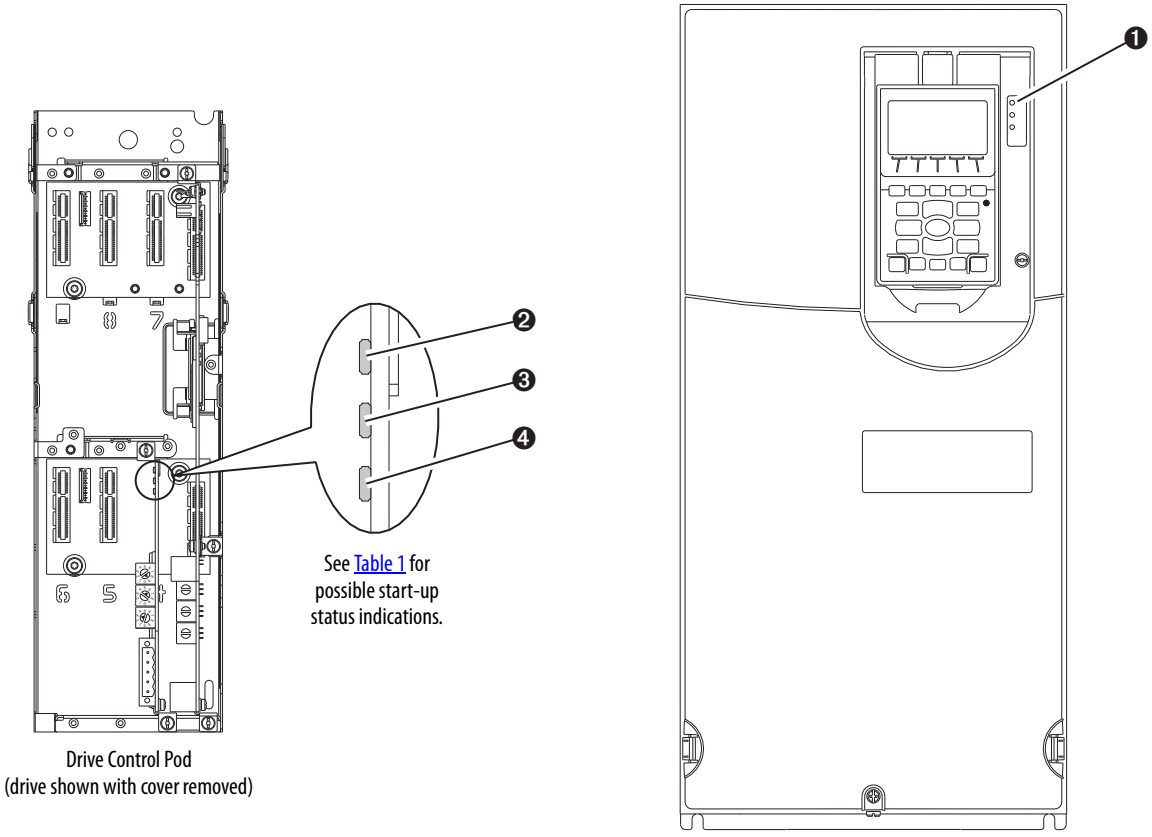


Table 1 - Drive and Option Module Start-up Status Indications

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	When running, a type 2 (non-configurable) alarm condition exists – drive continues to run. When stopped, a start inhibit condition exists and the drive cannot be started (see drive parameter 933 - [Start Inhibits]).
			Steady	A type 1 (user configurable) alarm condition exists, but the drive continues to run.
		Red	Flashing	A major fault has occurred. Drive will stop. Drive cannot be started until fault condition is cleared.
			Steady	A non-resettable fault has occurred.
		Red/Yellow	Flashing Alternately	A minor fault has occurred. Use drive parameter 950 - [Minor Flt Config] to enable. If not enabled, acts like a major fault. When running, the drive continues to run. System is brought to a stop under system control. The fault must be cleared to continue.
		Yellow/Green	Flashing Alternately	When running, a type 1 alarm exists.
		Green/Red	Flashing Alternately	Drive is firmware updating.
Option Module Status Indicators				
❷	PORT	Green	Flashing	Normal operation. The option module is establishing an I/O connection to the drive. The light turns steady green or red.
			Steady	Normal operation. The option module is properly connected and communicating with the drive.
❸	MOD	Green	Flashing	Normal operation. The option module is operating but is not transferring I/O data to a controller.
			Steady	Normal operation. The option module is operating and transferring I/O data to a controller.
❹	NET A	Green	Flashing	Normal operation. The option module is properly connected but is not communicating with any devices on the network.
			Steady	Normal operation. The option module is properly connected and communicating on the network.

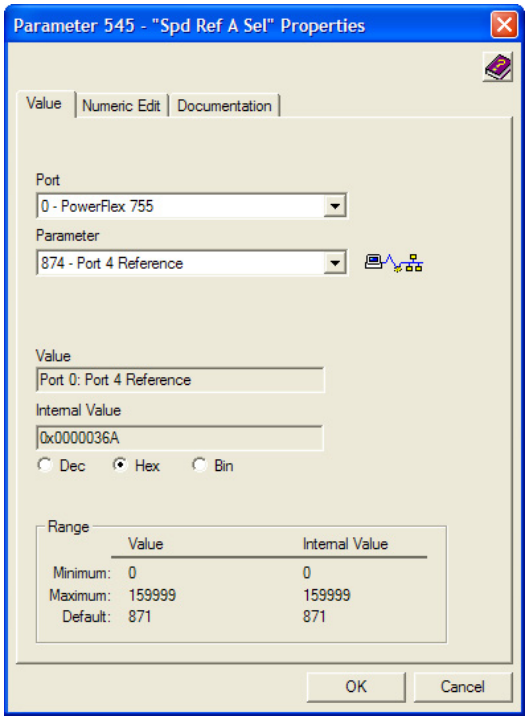
After verifying correct operation, swing down the drive HIM bezel to its closed position and install the drive cover. For more details on status indicator operation, see page 82 and page 83.

Configuring and Verifying Key Drive Parameters

The PowerFlex 750-Series 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. Verify that drive Parameter 301 - [Access Level] is set to '1' (Advanced) or '2' (Expert) to access the required parameters in this procedure.
2. Use drive Parameter 545 - [Speed Ref A Sel] to set the drive speed Reference.
   a. Set the Port field to '0' as shown below.



   b. Set the Parameter field to point to the port (slot) in which the option module is installed (for this example, Port 4 Reference).

      The number '874' in the Parameter field of the example dialog box above is the parameter in the drive that points to the port.
3. Verify that drive Parameter 930 - [Speed Ref Source] is reporting that the source of the Reference to the drive (Port 0) is the port in which the option module is installed (for example, Port 4 Reference).

   This helps ensure that any Reference that is commanded from the network can be monitored by using drive Parameter 002 - [Commanded SpdRef]. If a problem occurs, this verification step provides the diagnostic capability to determine whether the drive/option module or the network is the cause.
4. If hard-wired discrete digital inputs are not used to control the drive, verify that all unused digital input drive parameters are set to '0' (Not Used).

Commissioning the Option Module

To commission the option module, you must set a unique network node address. See the Glossary for details about node addresses. When using the Node Address switches, see Setting the Node Address Switches on page 18 for details.

IMPORTANT New settings are recognized only when power is applied to the option module or it is reset. After you change parameter settings, cycle power or reset the option module.

Configuring the Option Module

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

Topic	Page
Configuration Tools	25
Using the PowerFlex® 20-HIM-A6 or 20-HIM-C6S HIM to Access Parameters	26
Setting the Node Address	26
Setting the Data Rate	27
Setting a Master-Slave Hierarchy (Optional)	27
Selecting COS, Cyclic, or Polled Data Exchange	29
Setting a Fault Action	31
Resetting the Option Module	32
Restoring Option Module Parameters to Factory Defaults	33
Viewing the Option Module Status Using Parameters	34
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For a list of parameters, see Appendix B, Option Module Parameters. For definitions of terms in this chapter, see the Glossary.

Configuration Tools

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

Tool	See
PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM	page 26
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 6.01 or later	http://www.ab.com/drives/driveexplorer, or online help (installed with the software)
DriveExecutive™ software, version 5.01 or later	http://www.ab.com/drives/drivetools, or online help (installed with the software)

IMPORTANT For the HIM screens shown throughout this chapter, the option module was installed in drive Port 4. If your option module is installed in another drive port, that port would appear instead of Port 4.

Using the PowerFlex® 20-HIM-A6 or 20-HIM-C6S HIM to Access Parameters

If your drive has an enhanced PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM, it can be used to access parameters in the option module.

1. Display the Status screen, which is shown on HIM powerup.
2. Use the 4 or 6 key to scroll to the Port in which the option module is installed.
3. Press the PAR# *soft key* to display the Jump to Param # entry popup box.
4. Use the numeric keys to enter the desired parameter number, or use the ▲ or ▼ *soft key* to scroll to the desired parameter number.

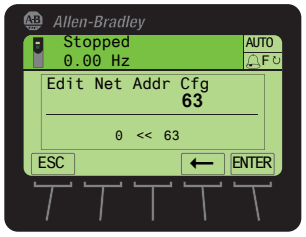
For details on viewing and editing parameters, see the PowerFlex 20-HIM-A6/-C6S HIM (Human Interface Module) User Manual, publication 20HIM-UM001.

Setting the Node Address

When the option module Data Rate switch (Figure 2) is set to position '3' (Program), the value of *Device* **Parameter 07 - [Net Addr Cfg]** determines the node address. When the Data Rate switch is set to any other position, the Node Address switch settings determine the node address.

TIP We recommend that you do not use node address 63 because all new devices on the network use this address as the default address.

1. Set the value of *Device* **Parameter 07 - [Net Addr Cfg]** to a unique node address.



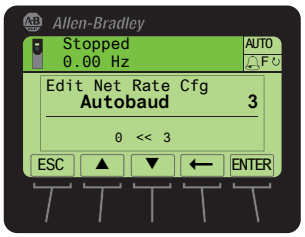
2. Reset the option module; see Resetting the Option Module on page 32.

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

Setting the Data Rate

When the option module Data Rate switch (Figure 2) is set to position '3' (Program), the value of *Device* **Parameter 09 - [Net Rate Cfg]** determines the data rate. The default setting for this parameter, '3' (Autobaud), detects the data rate that is used on the network if another device is setting the data rate. Your application may require a different setting.

1. Set the value of *Device* **Parameter 09 - [Net Rate Cfg]** to the data rate at which your network is operating.



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

2. Reset the option module; see Resetting the Option Module on page 32.

Setting a Master-Slave Hierarchy (Optional)

This procedure is only required if Datalinks are used to write or read data of the drive or its connected peripherals. A hierarchy determines the type of device with which the option module exchanges data. In a Master-Slave hierarchy, the option module exchanges data with a master, such as a scanner (1756-DNB, 1771-SDN, 1747-SDN, and so forth).

Enable Datalinks to Write Data

The controller output image (controller outputs-to-drive) can have 0...16 additional 32-bit parameters (Datalinks). The quantity of additional parameters is configured using *Device* **Parameter 02 - [DLs From Net Cfg]**.

IMPORTANT Always use the Datalink parameters in consecutive numerical order, starting with the first parameter. For example, use *Host* Parameters 01, 02, and 03 to configure three Datalinks to write data. Otherwise, the network I/O connection will be larger than necessary, which needlessly increases controller response time and memory usage.

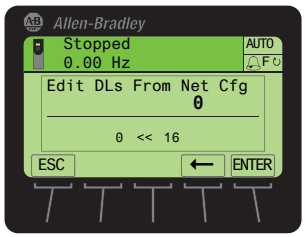
Host **Parameters 01 - [DL From Net 01]** through **16 - [DL From Net 16]** control which parameters in the drive, option module, or any other connected peripheral receive the values from the network. You can use the PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM, or another drive configuration tool such as Connected Components Workbench™, DriveExplorer™, or DriveExecutive™ software to select the drive or peripheral by port number and the parameter by name. As an alternate method, the set the parameter value manually by number using this formula:

From Net Parameter Value = (10000 * port number) + (Destination Parameter Number)

For example, suppose that you want to use *Host* **Parameter 01 - [DL From Net 01]** to write to Parameter 03 of an optional encoder module plugged into drive Port 5. Using the formula, the value for *Host* **Parameter 01 - [DL From Net 01]** would be (10000 * 5) + (3) = 50003.

Follow these steps to enable Datalinks to write data.

1. Set the value of *Device* **Parameter 02 - [DLs From Net Cfg]** to the number of contiguous controller-to-drive Datalinks that are to be included in the network I/O connection.



2. Reset the option module; see Resetting the Option Module on page 32.
3. Since the Logic Command and Reference are always used in the option module, configure the parameters in the drive to accept the Logic Command and Reference from the option module.

   When using the controller for speed reference via the option module, set two fields in drive Parameter 545 - [Speed Ref A Sel].

   a. Set the Port field for the drive (for example, 0 - PowerFlex 755).
   b. Set the Parameter field to point to the port in which the option module is installed (for this example, Port 4 Reference).

      Also, verify that the mask parameters in the drive (for example, Parameter 324 - [Logic Mask]) are configured to receive the desired logic from the option module. See the drive documentation for details.

After the above steps are complete, the option module is ready to receive input data and transfer status data to the master (controller). Next, configure the controller to recognize and transmit I/O to the option module. See Chapter 4, Configuring the I/O.

Enable Datalinks to Read Data

The controller input image (drive-to-controller inputs) can have 0...16 additional 32-bit parameters (Datalinks). The quantity of additional parameters is configured using *Device* **Parameter 04 - [DLs To Net Cfg]**.

IMPORTANT Always use the Datalink parameters in consecutive numerical order, starting with the first parameter. For example, use *Host* Parameters 17, 18, 19, 20, and 21 to configure five Datalinks to read data. Otherwise, the network I/O connection will be larger than necessary, which needlessly increases controller response time and memory usage.

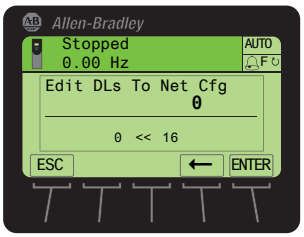
Host **Parameters 17 - [DL To Net 01]** through **32 - [DL To Net 16]** configure which parameters in the drive, option module, or any other connected peripheral send the values to the network. You can use the PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM, or another drive configuration tool such as Connected Components Workbench™, DriveExplorer, or DriveExecutive software to select the drive or peripheral by port number and the parameter by name. As an alternate method, set the parameter value manually by number using this formula:

To Net Parameter Value = (10000 * Port Number) + (Origination Parameter Number)

For example, suppose that you want to use *Host* **Parameter 17 - [DL To Net 01]** to read Parameter 2 of an optional I/O module plugged into drive Port 6. Using the formula, the value for *Host* **Parameter 17 - [DL To Net 01]** would be (10000 * 6) + (2) = 60002.

Follow these steps to enable Datalinks to read data.

1. Set the value of *Device* **Parameter 04 - [DLs To Net Cfg]** to the number of contiguous drive-to-controller Datalinks that are to be included in the network I/O connection.



2. Reset the option module; see Resetting the Option Module on page 32.

The option module is configured to send output data to the master (controller). You must now configure the controller to recognize and transmit I/O to the option module. See Chapter 4, Configuring the I/O.

Selecting COS, Cyclic, or Polled Data Exchange

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

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

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

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

configured in both the option module and the scanner. You need to set the I/O configuration and COS parameters in the option module.

Set up the COS (Change of State) Data Exchange (Optional)

Set *Device* **Parameter 11 - [COS Status Mask]** for the bits in the Logic Status word that should be checked for changes. For the Logic Status bit definitions, see Appendix D or the drive documentation.

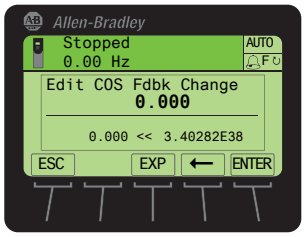
TIP The 20-HIM-A6 or 20-HIM-C6S HIM shows 32-bit Bit-type parameters in two 16-bit sets. By default, the lower 16-bit set (bits 0…15) is shown. To view the upper 16-bit set (bits 16…31), press the UPPER *soft key*. To view the lower 16-bit set again, press the LOWER *soft key*. To select each bit position, use the ◀ or ▶ *soft key* or the 4 ◀ or ▶ 6 numeric key.

1. Edit any of the bits as required.
   a. Press the EDIT *soft key* to display the Edit COS Status Mask screen.

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

   b. To toggle a bit between 0 or 1, press any numeric key—except the 4 ◀ or ▶ 6 key.

2. Set *Device* **Parameter 12 - [COS Fdbk Change]** for the amount of change to the Feedback that is required to trigger a Change of State message.



The option module is now configured for COS data exchange. You must configure the scanner to allocate it using COS (Chapter 4, Configuring the I/O).

Setting a Fault Action

By default, when communication is disrupted (for example, the network cable is disconnected), the controller is idle (in program mode or faulted), or explicit messaging for drive control is disrupted, 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 *Host* **Parameter 33 - [Comm Flt Action]**.
- An idle controller by using *Host* **Parameter 34 - [Idle Flt Action]**.
- Disrupted explicit messaging for drive control via PCCC or the CIP Register Object by using *Host* **Parameter 36 - [Msg Flt Action]**.

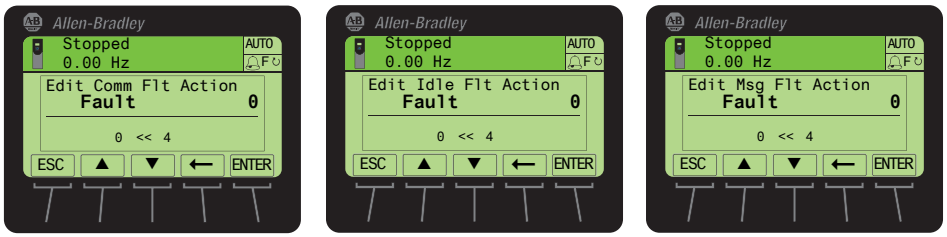
ATTENTION: Risk of injury or equipment damage exists. *Host* **Parameters 33 - [Comm Flt Action]**, **34 - [Idle Flt Action]**, and **36 - [Msg Flt Action]** let you determine the action of the option module and connected drive if communication is disrupted, the controller is idle, or explicit messaging for drive control is disrupted. By default, these parameters fault the drive. You may configure these parameters so that the drive continues to run, however, precautions should be taken to verify that the settings of these parameters do not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected network cable, controller in idle state, or explicit message control disruption).

Changing the Fault Action

Set the values of *Host* **Parameters 33 - [Comm Flt Action]**, **34 - [Idle Flt Action]**, and **36 - [Msg 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 (*Host* **Parameters 37 - [Flt Cfg Logic]**, **38 - [Flt Cfg Ref]**, and **39 - [Flt Cfg DL 01]** through **54 - [Flt Cfg DL 16]**).

Figure 5 - Edit Fault Action HIM Screens



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

If communication is disrupted and then is re-established, the drive automatically receives commands over the network again.

Setting the Fault Configuration Parameters

When setting *Host* **Parameter 33 - [Comm Flt Action]**, **34 - [Idle Flt Action]** or **36 - [Msg Flt Action]** to 'Send Flt Cfg', the values in the following parameters are sent to the drive after a communication fault, idle fault, and/or explicit messaging for drive control fault occurs. You must set these parameters to values required by your application.

Option Module *Host* Parameter	Description
Parameter 37 - [Flt Cfg Logic]	A 32-bit value sent to the drive for Logic Command.
Parameter 38 - [Flt Cfg Ref]	A 32-bit REAL (floating point) value that is sent to the drive for Reference.
Parameter 39 - [Flt Cfg DL 01] through Parameter 54 - [Flt Cfg DL 16]	A 32-bit integer value sent to the drive for a Datalink. If the destination of the datalink is a REAL (floating point) parameter, you must convert the desired value to the binary representation of the REAL value. (An internet search of 'hex to float' provides a link to a tool to do this conversion.)

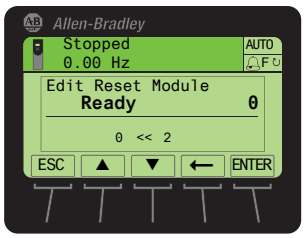
Changes to these parameters take effect immediately. A reset is not required.

Resetting the Option Module

Changes to switch settings and some option module parameters require you to reset the option module before the new settings take effect. You can reset the option module by power cycling the drive or by using *Device* **Parameter 14 - [Reset Module]**.

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

Set *Device* **Parameter 14 - [Reset Module]** to '1' (Reset Module).



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

When you enter '1' (Reset Module), the option module immediately resets. An alternate method to reset the module is by power cycling the drive. When you enter '2' (Set Defaults), the option module sets **all** of its *Device* **and** *Host* parameters to their factory default values. (This is the same as pressing the ALL *soft key* when using the MEMORY folder method described in Restoring Option Module Parameters to Factory Defaults on page 33.)

IMPORTANT When performing a Set Defaults, the drive may detect a conflict and then not allow this function to occur. If this happens, first resolve the conflict and then repeat a Set Defaults action. Common reasons for a conflict include the drive running or a controller in Run mode.

After performing a Set Defaults, you must enter '1' (Reset Module) or power cycle the drive so that the new values take effect. Thereafter, this parameter will be restored to a value of '0' (Ready).

TIP If your application allows, you can also reset the option module by cycling power to the drive (resetting the drive) or by using the HIM's Reset Device function that is located in the drive's DIAGNOSTIC folder.

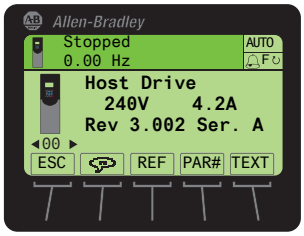
Restoring Option Module Parameters to Factory Defaults

As an alternate reset method, you can restore the option module parameters by using a MEMORY folder menu item instead of using *Device* **Parameter 14 - [Reset Module]** described in Resetting the Option Module on page 32. The MEMORY folder method provides two ways to restore the option module *Device* **and** *Host* parameters:

- ALL—restores ALL option module *Device* and *Host* parameters to their factory default values.
- MOST—restores MOST option module *Device* and *Host* parameters—except the following, which are used for network setup:
  - *Device* **Parameter 07 - [Net Addr Cfg]**
  - *Device* **Parameter 09 - [Net Rate Cfg]**

Follow these steps to restore option module *Device* and *Host* parameters to their factory default values.

1. Access the Status screen, which is displayed on HIM powerup.



2. Use the 4 or 6 key to scroll to the Port in which the option module is installed.
3. Press the key to display its last-viewed folder.
4. Use the 4 or 6 key to scroll to the MEMORY folder.
5. Use the 2 or 8 key to select **Set Defaults**.
6. Press the 5 (Enter) key to display the Set Defaults popup box.

7. Press the 5 (Enter) key again to display the warning popup box to reset *Device* and *Host* parameters to their factory default values.
8. Press the MOST *soft key* to restore MOST *Device* and *Host* parameters to factory defaults, or press the ALL *soft key* to restore ALL parameters. Or press the ESC *soft key* to cancel.

IMPORTANT	When performing a Set Defaults, the drive may detect a conflict and then not allow this function to occur. If this happens, first resolve the conflict and then repeat this Set Defaults procedure. Common reasons for a conflict include the drive running or a controller in Run mode.

9. Reset the option module using *Device* **Parameter 14 - [Reset Module]** or by cycling power to the drive so that the restored parameters take effect.

Viewing the Option Module Status Using Parameters

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

Option Module *Device* Parameter	**Description**
03 - [DLs From Net Act]	The number of controller-to-drive Datalinks that are included in the network I/O connection (controller outputs).
05 - [DLs To Net Act]	The number of drive-to-controller Datalinks that are included in the network I/O connection (controller inputs).
06 - [Net Addr Src]	Displays the source from which the option module node address is taken, which can be one of the following: • '0' (Switches) • '1' (Parameters)
08 - [Net Addr Act]	The node address that is used by the option module, which can be one of the following: • The address set with the Node Address switches (Figure 1). • The value of *Device* **Parameter 07 - [Net Addr Cfg]**. • An old address from the switches or parameter. (If either has been changed, but the option module has not been reset, the new address will not be in effect.)
10 - [Net Rate Act]	The data rate that is used by the Option Module. This will be one of the following: • The data rate set by the data rate switch (Figure 2). • The value of *Device* **Parameter 09 - [Net Rate Cfg]**. • An old data rate of the switch or parameter. (If either has been changed, but the option module has not been reset, the new data rate will not be in effect.)

Updating the Option Module Firmware

The option module 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 that are described above, or you can use HyperTerminal software set to the X-modem protocol.

To obtain a firmware update for this option module, go to http://www.ab.com/support/abdrives/webupdate. This site 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 the firmware using DriveExplorer, DriveExecutive, ControlFLASH, or HyperTerminal software

Notes:

Configuring the I/O

This chapter provides instructions on how to configure a Rockwell Automation® ControlLogix® controller to communicate with the option module and connected PowerFlex® drive.

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ControlLogix Controller Example	38

IMPORTANT Because the option module and PowerFlex 750-Series drive are 32-bit devices, the ControlLogix controller (also a 32-bit device) is used for example purposes in this chapter and throughout this manual. To simplify configuration and ladder logic programs, and to maximize drive performance, we recommend using only a 32-bit platform Logix controller with this option module and PowerFlex 750-Series drive. If you must use a 16-bit controller (PLC-5®, SLC™ 500, or MicroLogix™ 1100/1400), we recommend using a 20-COMM-D adapter and 20-750-20COMM or 20-750-20COMM-F1 Communication Carrier Card that is installed in drive Port 4, 5 or 6. In this case, go to the Rockwell Automation® Technical Support Knowledgebase website at www.rockwellautomation.com/knowledgebase for details to configure and use the I/O, and configure explicit messaging.

Using RSLinx® Classic Software

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

1. Start RSLinx Classic software.
2. From the Communications menu, choose Configure Drivers to display the Configure Drivers dialog box.
3. From the Available Driver Types pull-down menu, choose DeviceNet Drivers.
4. Click Add New to display the DeviceNet Driver Selection dialog box.
5. In the Available DeviceNet Drivers list, choose the computer connection adapter (1784-PCD, 1784-PCID, 1784-PCIDS, or 1770-KFD) being

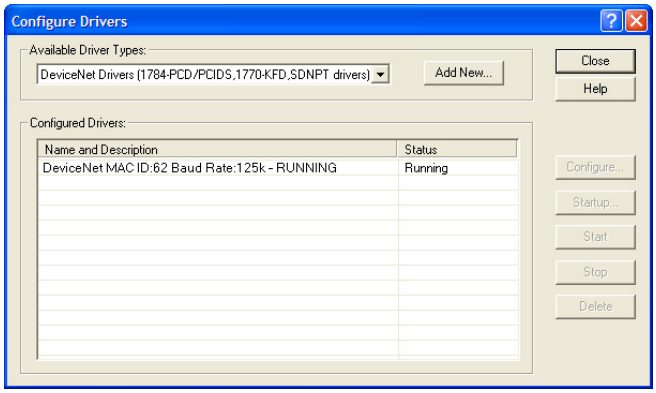
used to connect your computer to the network, and click Select to display the Driver Configuration dialog box.

6. Configure the driver for your computer and network settings and click OK.

   The Configure Drivers dialog box reports the progress of the configuration.

7. When the Add New RSLinx Driver dialog box appears, type a name (if desired) and click OK.

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

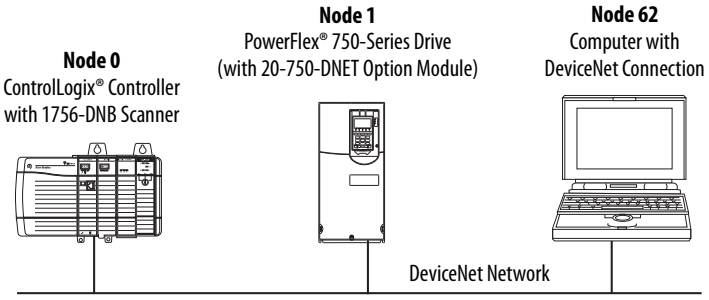


8. Click Close to close the Configure Drivers dialog box.
9. Keep RSLinx software running and verify that your computer recognizes the drive.
   a. From the Communications menu, choose RSWho.
   b. In the menu tree, click '+' next to the DeviceNet driver.

ControlLogix Controller Example

After the option module is configured, the drive and option module will be a single node on the network. This section provides the steps that are needed to configure a simple DeviceNet network (see Figure 6). In our example, we will configure a ControlLogix controller with 1756-DNB scanner to communicate with a drive using Logic Command/Status, Reference/Feedback, and 32 Datalinks (16 to read and 16 to write) over the network.

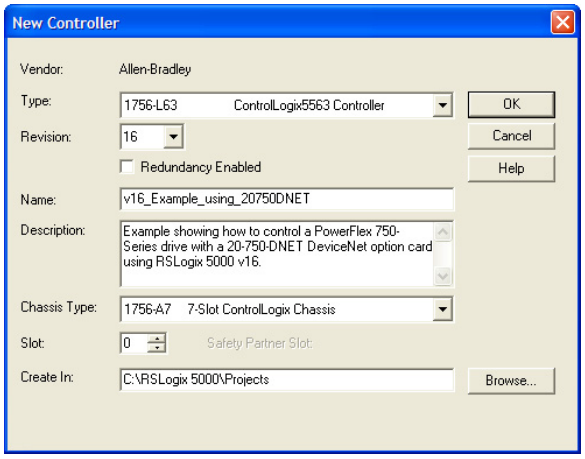
Figure 6 - Example ControlLogix Controller DeviceNet Network



Adding the Scanner to the I/O Configuration

To establish communication between the controller and option module over the network, you must first add the ControlLogix controller and its scanner to the I/O configuration.

1. Start RSLogix 5000 software.
2. From the File menu, choose New to display the New Controller dialog box.



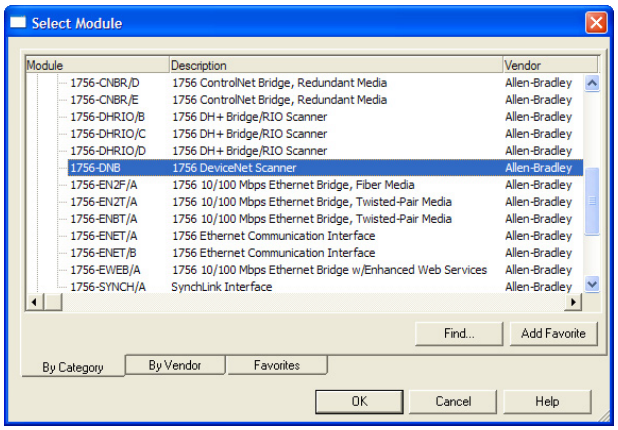
   a. Choose the appropriate choices for the fields in the dialog box to match your application.
   b. Click OK.

      The RSLogix 5000 dialog box reappears with the treeview in the left pane.

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

   The Select Module dialog box appears.

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

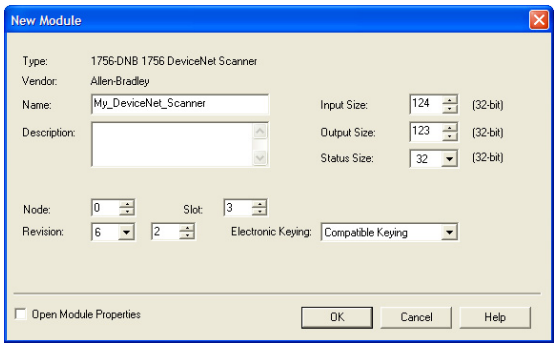


5. In the list, select the DeviceNet scanner used by your controller.

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

6. Click OK.
7. In the Select Major Revision popup dialog box, select the major revision of its firmware.
8. Click OK.

   The scanner's New Module dialog box appears.

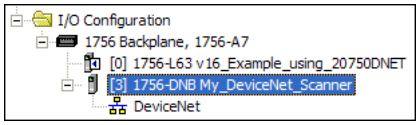


9. Edit the following:

Box	Setting
Name	A name to identify the scanner.
Description	Optional – description of the scanner.
Node	The node address of the DeviceNet scanner.
Slot	The slot of the DeviceNet scanner in the rack.
Revision	The minor revision of the firmware in the scanner. (You already set the major revision by selecting the scanner series in step 7.)
Electronic Keying	**Compatible Keying**. The 'Compatible Keying' setting for Electronic Keying verifies that the physical module is consistent with the software configuration before the controller and scanner make a connection. Therefore, be sure that you have set the correct revision in this dialog box. See the online Help for additional information on this and other Electronic Keying settings. If keying is not required, select 'Disable Keying'. Disable Keying is recommended.
Input Size	The size of the input data for the DeviceNet scanner. We recommend using the default value of 124.
Output Size	The size of the output data for the DeviceNet scanner. We recommend using the default value of 123.
Status Size	The size of the status data for the DeviceNet scanner. We recommend using the default value of 32.
Open Module Properties	When this box is checked, clicking OK opens additional module properties dialog boxes to further configure the scanner. When unchecked, clicking OK closes the scanner's New Module dialog box. For this example, uncheck this box.

10. Click OK.

    The scanner is now configured for the DeviceNet network, added to the RSLogix 5000® project, and appears in the I/O Configuration folder.

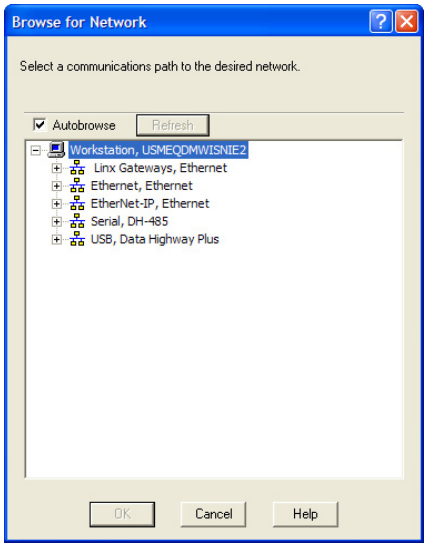


In our example, a 1756-DNB scanner appears under the I/O Configuration folder with its assigned name. For convenience, keep the project open. Later in this chapter the project needs to be downloaded to the controller.

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

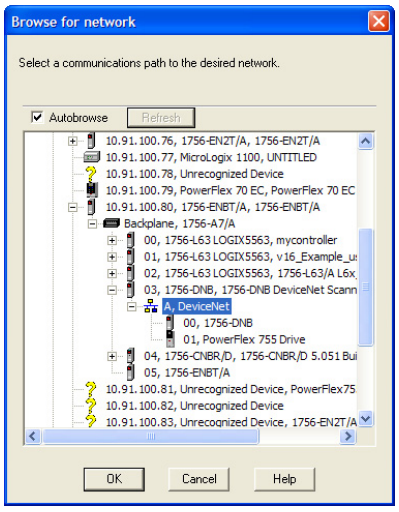
After adding the scanner to the I/O configuration, you now must configure and save the I/O to the scanner.

1. Start RSNetWorx™ for DeviceNet software.
2. From the File menu, choose New to display the New File dialog box.
3. Select DeviceNet Configuration as the network configuration type.
4. Click OK.
5. From the Network menu, choose Online to display the Browse for Network dialog box.



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

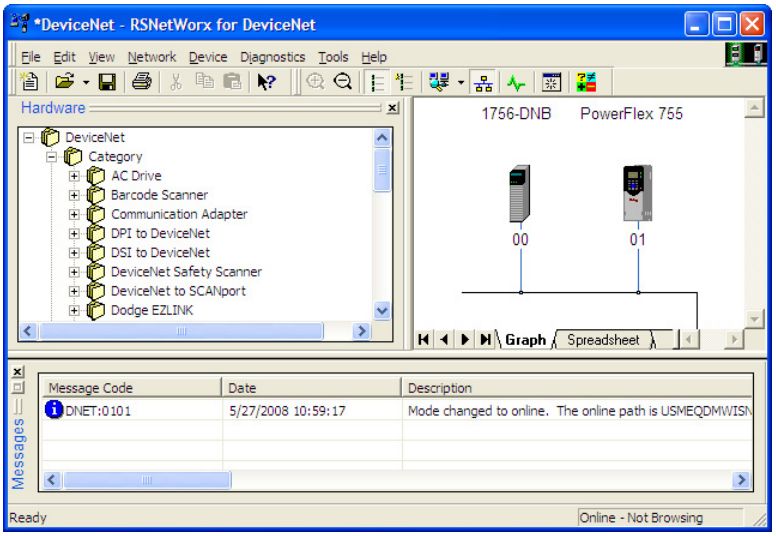
   The following dialog box shows our example navigating to devices on a DeviceNet network. Depending on the communication link you are using, the navigation path may be different.



7. Click OK after selecting a valid path to the DeviceNet network (for this example, A, DeviceNet).

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

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



   If the icon for the drive (for this example, PowerFlex 755) on the network appears as Unrecognized Device, use RSNetWorx for DeviceNet software to create the PowerFlex 750-Series drive EDS file.

   The EDS file for a PowerFlex 750-Series drive differs from EDS files for all other PowerFlex 7-Class drives in that the file does not contain any drive or peripheral parameters. Therefore, when the EDS file is being created for a PowerFlex 750-Series drive, no parameters are uploaded and there is no Parameters tab, which normally appears on the Drive Properties screen.

8. Either create the EDS file by uploading it from the online device on the network or download the EDS file from the Rockwell Automation® website.

Create the EDS File from Online Device On the Network

a. Right-click the Unrecognized Device icon and select Register Device in the menu. The EDS Wizard appears.

b. Click Next to start creating the EDS file.

c. Select Create an EDS file.

d. Click Next.

   If the EDS file is already downloaded and resides on your computer, select 'Register an EDS file' and click Next. Then follow the screen prompts and disregard the remaining steps (e through m) in this procedure.

e. Enter a description (if desired).

f. Click Next.

g. Check the Polled box.

h. Enter '8' into the Input Size and Output Size boxes (which accounts for just the basic I/O).

i. Click Next.

   RSNetWorx for DeviceNet software uploads the EDS file from the drive.

j. Click Next to display the icon options for the node.

   We recommend using the icon for the PowerFlex 750-Series drive. You can change icons by clicking Change icon.

k. Click Next to view a summary.

l. Click Next again to accept it.

m. Click Finish to finish creating the EDS file.

   A new icon represents your PowerFlex 750-Series drive and communications option module in the RSNetWorx for DeviceNet graph view window.

Download the EDS File from the Internet Website

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

b. On the website search screen in the Network entry field, enter the type of network (for this example, DeviceNet), which enables the use of the other search fields.

c. In the Keyword entry field, enter the type of PowerFlex 750-Series drive (for this example, PowerFlex 755), noting that this field is space sensitive.

d. Click Search.

   Due to the large number of EDS files, this search may take seconds or up to several minutes.

e. On the search results screen in the Details & Download Column, click the 'Download' hyperlink for the EDS file.

f. Click Save on the File Download screen to save the EDS file to an appropriate location on your computer.

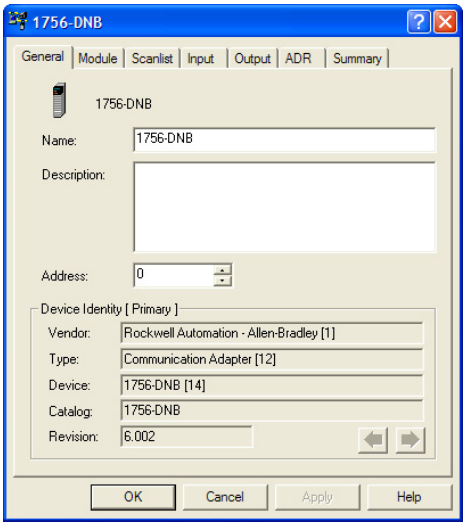
g. Launch the EDS Hardware Installation Tool by clicking the Microsoft Windows Start button and choose Programs > Rockwell Software > RSLinx Tools > EDS Hardware Installation Tool.

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

h. Restart the computer and repeat steps 1...7 at the beginning of this subsection.

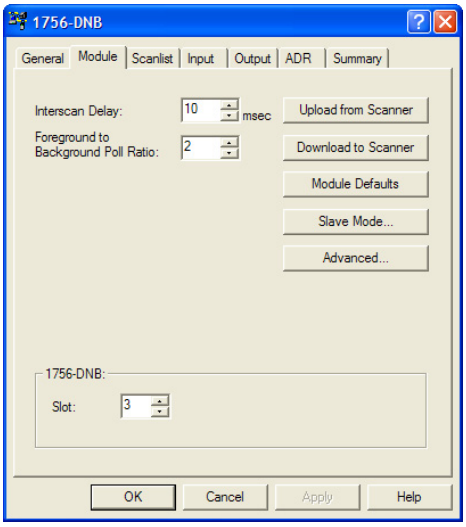
   The Unrecognized Device icon in the RSNetWorx for DeviceNet graph view window in step 7 should have been replaced by a drive icon (for this example, the icon for a PowerFlex 755 drive).

9. In the graph view window, right-click the 1756-DNB icon and choose Properties to display its properties dialog box.



10. Click the Module tab to display the Scanner Configuration dialog box.

11. Click Upload to upload the 1756-DNB scanner configuration to the RSNetWorx for DeviceNet project and display the 1756-DNB Module Tab dialog box.



12. Edit the following:

Box	Setting
Interscan Delay	Sets the scanner time delay between consecutive I/O scans on the network. For this example, we recommend using the default setting of 10 milliseconds. **TIP:** When numerous drives are on the network and the drives are faulting on a Comm Loss, increasing this value may help.
Foreground…	Sets the ratio of foreground to background polls. For this example, we recommend using the default setting of 2.
Slot	Sets the slot location in which the scanner is installed. For this example, Slot 3 is selected.

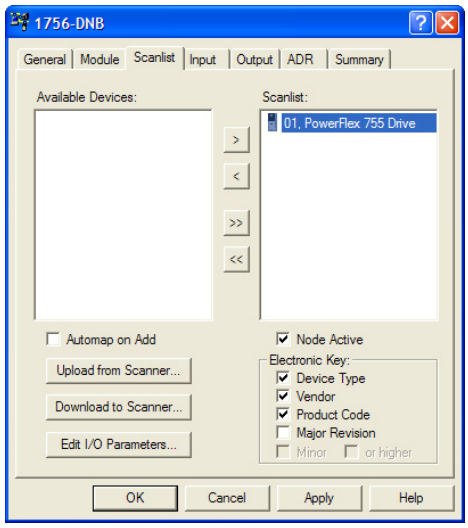
13. Click Apply.
14. Click the Scanlist tab to begin the drive I/O configuration.

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

    TIP The Automap on Add box is checked by default and allows RSNetWorx for DeviceNet software to automatically map the drive I/O into the scanner in the next available registers. The mapping is based on the minimum I/O requirements (8 bytes for input and 8 bytes for output) that the scanner obtains from the drive EDS file.

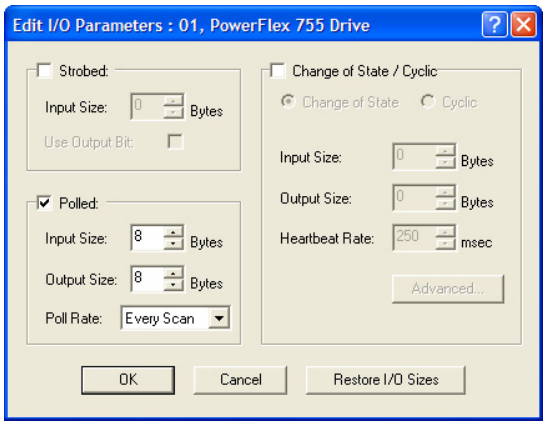
15. For this example, uncheck Automap on Add.

16. Select the PowerFlex 755 drive in the Available Devices box and click > to move it to the Scanlist window.



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

17. Click Edit I/O Parameters to display the Edit I/O Parameters dialog box for the PowerFlex 755 drive that is used in this example.



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

   For this example, Polled was selected, which we recommend.

b. Enter the number of bytes that are required for your I/O in the Input Size and Output Size boxes.

   For the example in this manual, all 16 [**DL From Net xx**] and all 16 [**DL To Net xx**] are used, resulting in an Input Size of '72' and an Output Size of '72'. To determine the byte sizes for your application,

either view option module Diagnostic Items 7 (Input Size) and 8 (Output Size) or calculate them.

View Diagnostic Items 7 and 8 for Input/Output Byte Sizes

Use the 20-HIM-A6 or 20-HIM-C6S HIM, or another drive configuration tool such as Connected Components Workbench, DriveExplorer, or DriveExecutive software to view Diagnostic Items 7 and 8. The option module automatically calculates the number of bytes for the Input Size and Output Size based on the values of *Device* **Parameters 2 - [DLs From Net Cfg]** and **4 - [DLs To Net Cfg]** configured in Setting a Master-Slave Hierarchy (Optional) on page 27.

Calculate the Input/Output Byte Sizes

You can easily calculate the number of bytes for the Input Size and Output Size. Since the option module always uses the 32-bit Logic Command, 32-bit Feedback, 32-bit Logic Status, and 32-bit Reference, at least 8 bytes must be set for both the Input Size and Output Size. (A 32-bit word is four bytes.) If any or all of the drive's sixteen 32-bit Datalinks are used (see Setting a Master-Slave Hierarchy (Optional) on page 27), increase the Input and Output Size settings accordingly.

- **Input Size:** Multiply the number of Datalinks that are used to write data (value of *Device* **Parameter 02 - [DLs From Net Cfg]**) by 4 bytes, and add this result to the minimum 8 bytes. For example, if **Parameter 02** has a value of '3', add 12 bytes (3 x 4 bytes) to the required minimum 8 bytes for a total of 20 bytes.
- **Output Size:** Multiply the number of Datalinks that are used to read data (value of *Device* **Parameter 04 - [DLs To Net Cfg]**) by 4 bytes, and add this result to the minimum 8 bytes. For example, if **Parameter 04** has a value of '7', add 28 bytes (7 x 4 bytes) to the required minimum 8 bytes for a total of 36 bytes.

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

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

Data Exchange Method	Rate Field Pull-down Setting
Polled	Poll Rate
Change of State	Heartbeat Rate
Cyclic	Send Rate

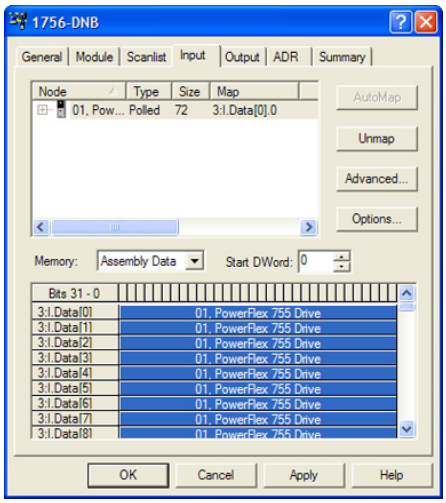
19. Click OK.

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

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

21. Click AutoMap to map the drive input image to the 1756-DNB scanner as shown in the example dialog box below.

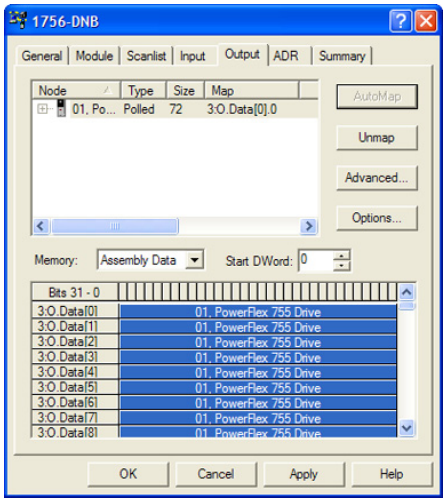
TIP If your RSLogix 5000 project requires a different starting DWord (double word, 32-bit) than the default value of '0' for the drive input image, set the Start DWord field to the appropriate value.



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

23. Click AutoMap to map the drive output image to the 1756-DNB scanner as shown in the example dialog box below.

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



24. Click OK.

If the Scanner Configuration dialog box appears asking to download these settings to the 1756-DNB scanner, click Yes.

25. From the File menu, choose Save.

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

    a. Navigate to a folder.

    b. Type a file name.

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

26. When configuring the I/O for additional PowerFlex 750-Series drives on the network, repeat steps 14 through 25.

IMPORTANT When all Datalinks in each drive are used (18 DINTs of I/O per drive), a maximum of 6 PowerFlex 750-Series drives can be mapped. This is due to the amount of I/O available in the 1756-DNB scanner, which is a maximum of 124 DINTs.

Setting Datalinks in the Drive (Optional)

After configuring the 1756-DNB scanner, Datalinks (if used) must be set to parameters that are appropriate for your application.

Use the 20-HIM-A6 or 20-HIM-C6S HIM, or another drive configuration tool such as Connected Components Workbench, DriveExplorer, DriveExecutive software to set the Datalinks in the drive. For this example, the following Datalink values are used.

Option Module *Host* Parameter	Value	Description
01 - [DL From Net 01]	370	Points to drive Par. 370 - [Stop Mode A]
02 - [DL From Net 02]	371	Points to drive Par. 371 - [Stop Mode B]
03 - [DL From Net 03]	535	Points to drive Par. 535 - [Accel Time 1]
04 - [DL From Net 04]	536	Points to drive Par. 536 - [Accel Time 2]
05 - [DL From Net 05]	537	Points to drive Par. 537 - [Decel Time 1]
06 - [DL From Net 06]	538	Points to drive Par. 538 - [Decel Time 2]
07 - [DL From Net 07]	539	Points to drive Par. 539 - [Jog Acc Dec Time]
08 - [DL From Net 08]	556	Points to drive Par. 556 - [Jog Speed 1]
09 - [DL From Net 09]	557	Points to drive Par. 557 - [Jog Speed 2]
10 - [DL From Net 10]	571	Points to drive Par. 571 - [Preset Speed 1]
11 - [DL From Net 11]	572	Points to drive Par. 572 - [Preset Speed 2]
12 - [DL From Net 12]	573	Points to drive Par. 573 - [Preset Speed 3]
13 - [DL From Net 13]	574	Points to drive Par. 574 - [Preset Speed 4]
14 - [DL From Net 14]	575	Points to drive Par. 575 - [Preset Speed 5]
15 - [DL From Net 15]	576	Points to drive Par. 576 - [Preset Speed 6]
16 - [DL From Net 16]	577	Points to drive Par. 577 - [Preset Speed 7]
17 - [DL To Net 01]	370	Points to drive Par. 370 - [Stop Mode A]
18 - [DL To Net 02]	371	Points to drive Par. 371 - [Stop Mode B]
19 - [DL To Net 03]	535	Points to drive Par. 535 - [Accel Time 1]

Option Module *Host* Parameter	Value	Description
20 - [DL To Net 04]	536	Points to drive Par. 536 - [Accel Time 2]
21 - [DL To Net 05]	537	Points to drive Par. 537 - [Decel Time 1]
22 - [DL To Net 06]	538	Points to drive Par. 538 - [Decel Time 2]
23 - [DL To Net 07]	539	Points to drive Par. 539 - [Jog Acc Dec Time]
24 - [DL To Net 08]	556	Points to drive Par. 556 - [Jog Speed 1]
25 - [DL To Net 09]	557	Points to drive Par. 557 - [Jog Speed 2]
26 - [DL To Net 10]	571	Points to drive Par. 571 - [Preset Speed 1]
27 - [DL To Net 11]	572	Points to drive Par. 572 - [Preset Speed 2]
28 - [DL To Net 12]	573	Points to drive Par. 573 - [Preset Speed 3]
29 - [DL To Net 13]	574	Points to drive Par. 574 - [Preset Speed 4]
30 - [DL To Net 14]	575	Points to drive Par. 575 - [Preset Speed 5]
31 - [DL To Net 15]	576	Points to drive Par. 576 - [Preset Speed 6]
32 - [DL To Net 16]	577	Points to drive Par. 577 - [Preset Speed 7]

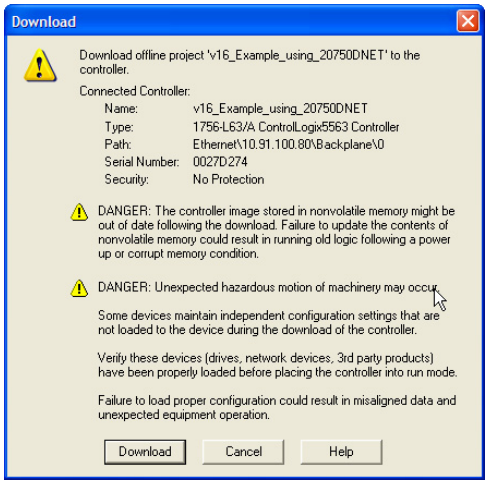
TIP The *Host* **[DL From Net xx]** parameters are inputs into the drive that come from controller outputs (for example, data to write to a drive parameter). The *Host* **[DL To Net xx]** parameters are outputs from the drive that go to controller inputs (for example, data to read a drive parameter).

Downloading the Project to the Controller and Going Online

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

1. From the Communications menu in the RSLogix 5000 dialog box, choose Download.

   The Download dialog box appears.



TIP If a message box reports that RSLogix 5000 software is unable to go online, find your controller in the Who Active dialog box. From the Communications menu, choose Who Active. After finding and selecting the controller, click Set Project Path to establish the path. If your controller does not appear, you need to add or configure the DeviceNet driver with RSLinx software. See Using RSLinx® Classic Software on page 37 and RSLinx online help for details.

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

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

3. From the File menu, choose Save.

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

   a. Navigate to a folder.

   b. Type a file name.

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

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

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

Notes:

Using the I/O

This chapter provides information and examples that explain how to control, configure, and monitor a PowerFlex® 750-Series drive using the configured I/O.

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Using Logic Command/Status	54
Using Reference/Feedback	55
Using Datalinks	56
Example Ladder Logic Program Information	57
ControlLogix Controller Example	58

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 that are shown in this publication.

About I/O Messaging

On CIP-based networks, including DeviceNet, I/O connections are used to transfer the data which controls the PowerFlex drive and sets its Reference. I/O can also be used to transfer data to and from Datalinks in PowerFlex 750-Series drives.

The option module includes the Logic Command, Logic Status, Reference, and Feedback (all as 32-bit words). This requires 8 bytes for the Input Size and 8 bytes for the Output Size in the controller's I/O image. This basic I/O must always be configured in the DeviceNet scanner using RSNetWorx™ for DeviceNet software. Additional I/O, if needed, can be set using up to 16 Datalinks to write data and/or up to 16 Datalinks to read data. When using any combination of these Datalinks, add 4 bytes for **each** Datalink to the basic I/O Input Size and/or Output Size.

Chapter 3, Configuring the Option Module, and Chapter 4, Configuring the I/O, discuss how to configure the option module and controller on the network for the required I/O. The Glossary defines the different options. This chapter discusses how to use I/O after you have configured the option module and controller.

Understanding the ControlLogix Controller 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 option module. Input I/O is status data that is produced by the option module and consumed as input by the controller. The I/O image will vary based on how many of the drive's 32-bit Datalinks (*Host* **DL From Net 01-16** and *Host* **DL To Net 01-16**) are used.

If all available I/O is not used, the image is truncated. The image always uses consecutive words starting at word 0.

Table 2 shows the I/O image when using all 32-bit Datalinks.

Table 2 - ControlLogix® Controller I/O Image for PowerFlex 750-Series Drives (32-bit Logic Command/Status, Reference/Feedback, and Datalinks)

DINT	Output I/O
0	Logic Command
1	Reference
2	DL From Net 01
3	DL From Net 02
4	DL From Net 03
5	DL From Net 04
6	DL From Net 05
7	DL From Net 06
8	DL From Net 07
9	DL From Net 08
10	DL From Net 09
11	DL From Net 10
12	DL From Net 11
13	DL From Net 12
14	DL From Net 13
15	DL From Net 14
16	DL From Net 15
17	DL From Net 16

DINT	Input I/O
0	Logic Status
1	Feedback
2	DL To Net 01
3	DL To Net 02
4	DL To Net 03
5	DL To Net 04
6	DL To Net 05
7	DL To Net 06
8	DL To Net 07
9	DL To Net 08
10	DL To Net 09
11	DL To Net 10
12	DL To Net 11
13	DL To Net 12
14	DL To Net 13
15	DL To Net 14
16	DL To Net 15
17	DL To Net 16

Using Logic Command/Status

The Logic Command is a 32-bit word of control data produced by the controller and consumed by the option module. The Logic Status is a 32-bit word of status data that is produced by the option module and consumed by the controller.

When using a ControlLogix controller, the Logic Command word is always DINT 0 in the output image and the Logic Status word is always DINT 0 in the input image.

This manual contains the bit definitions for compatible products available at the time of publication in Appendix D, Logic Command/Status Words: PowerFlex 750-Series Drives.

Using Reference/Feedback

The Reference is a 32-bit REAL (floating point) piece of control data that is produced by the controller and consumed by the option module. The Feedback is a 32-bit REAL (floating point) piece of status data that is produced by the option module and consumed by the controller.

When using a ControlLogix controller, the 32-bit REAL Reference word is always DINT 1 in the output image (see Table 2) and the 32-bit REAL Feedback word is always DINT 1 in the input image. Because the I/O image is integer-based and the Reference and Feedback are floating point, a COP (Copy) instruction or User Defined Data Types (UDDT) is required to correctly write values to the Reference and read values from the Feedback. See the ladder logic program examples in Figure 9 and Figure 10.

The Reference and Feedback 32-bit REAL values represent drive speed. The scaling for the speed Reference and Feedback is dependent on drive Parameter 300 - [Speed Units]. For example, if Parameter 300 is set to Hz, a 32-bit REAL Reference value of '30.0' would equal a Reference of 30.0 Hz. If Parameter 300 is set to RPM, a 32-bit REAL Reference value of '1020.5' would equal a Reference of 1020.5 RPM. The commanded maximum speed can never exceed the value of drive Parameter 520 - [Max Fwd Speed]. Table 3 shows example References and their results for a PowerFlex 750-Series drive that has its:

- Parameter 300 - [Speed Units] set to Hz.
- Parameter 37 - [Maximum Freq] set to 130 Hz.
- Parameter 520 - [Max Fwd Speed] set to 60 Hz.

When Parameter 300 - [Speed Units] is set to RPM, the other parameters are also in RPM.

Table 3 - PowerFlex 750-Series Drive Example Speed Reference/Feedback Scaling

Network Reference Value	Speed Command Value (2)	Output Speed	Network Feedback Value
130.0	130 Hz	60 Hz (3)	60.0
65.0	65 Hz	60 Hz (3)	60.0
32.5	32.5 Hz	32.5 Hz	32.5
0.0	0 Hz	0 Hz	0.0
-32.5 (1)	32.5 Hz	32.5 Hz	32.5

(1) The effects of values less than 0.0 depend on whether the PowerFlex 750-Series drive uses a bipolar or unipolar direction mode. See the drive documentation for details.

(2) For this example, drive parameter 300 - [Speed Units] is set to Hz.

(3) The drive runs at 60 Hz instead of 130 Hz or 65 Hz because drive Parameter 520 - [Max Fwd Speed] sets 60 Hz as the maximum speed.

Using Datalinks

A Datalink is a mechanism that is used by PowerFlex drives to transfer data to and from the controller. Datalinks allow a drive parameter value to be read or written to without using an Explicit Message. When enabled, each Datalink occupies one 32-bit word in a ControlLogix controller.

The following rules apply when using PowerFlex 750-Series drive Datalinks:

- The target of a Datalink can be any *Host* parameter, including those of a peripheral. For example, drive parameter 535 - [Accel Time 1] can be the target of any or all option modules that are installed in the drive.
- The data that is passed through the drive's Datalink mechanism is determined by the settings of the following parameters:

  Device **Parameter 02 - [DLs From Net Cfg]**
  Device **Parameter 04 - [DLs To Net Cfg]**
  Host **Parameters 01…16 - [DL From Net 01-16]**
  Host **Parameters 17…32 - [DL To Net 01-16]**

  IMPORTANT A reset is always required after configuring Datalinks so that the changes take effect.

- When an I/O connection that includes Datalinks is active, those Datalinks being used are locked and cannot be changed until that I/O connection becomes idle or inactive.
- 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 must change a value of a parameter frequently.

Datalinks for PowerFlex 750-Series drive peripherals (the embedded EtherNet/IP adapter on PowerFlex 755 drives only, and option modules such as an encoder or a communication module) are locked when the peripheral has an I/O connection with a controller. When a controller has an I/O connection to the drive, the drive does not allow a reset to defaults, configuration download, or anything else that could change the makeup of the I/O connection in a running system. The I/O connection with the controller must first be disabled to allow changes to the respective Datalinks.

Depending on the controller being used, the I/O connection can be disabled by doing the following:

- Inhibiting the module in RSLogix 5000® software
- Putting the controller in Program mode
- Placing the scanner in idle mode
- Disconnecting the drive from the network

DeviceLogix™ Datalinks are also locked while the DeviceLogix program is running. The DeviceLogix program must first be disabled to allow changes to the

Datalinks. Set DeviceLogix parameter 53 - [DLX Operation] to 'DisableLogic' to disable the logic (the parameter value then changes to 'LogicDisabld').

TIP A COP (Copy) instruction or a UDDT is needed—for REAL parameters, speed Reference, and speed Feedback only—to copy the DINT data into a REAL word for input data conversion. For output data conversion, a COP (Copy) instruction or UDDT is needed—for REAL parameters, speed Reference, and speed Feedback only—to copy the REAL data into a DINT word. To determine whether a parameter is a 32-bit integer (DINT) or a REAL data type, see the Data Type column in the chapter containing parameters in the PowerFlex 750-Series AC Drives Programming Manual, publication 750-PM001.

Example Ladder Logic Program Information

The example ladder logic programs in the sections of this chapter are intended for and operate PowerFlex 750-Series drives.

Functions of the Example Programs

The example programs enable you to do the following:

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

Logic Command/Status Words

These examples use the Logic Command word and Logic Status word for PowerFlex 750-Series drives. See Appendix D, Logic Command/Status Words: PowerFlex 750-Series Drives to view details.

ControlLogix Controller Example

This section includes information when using a ControlLogix controller and an RSLogix 5000 Generic Profile.

Creating Ladder Logic Using the RSLogix 5000 Generic Profile, All Versions

Option Module Parameter Settings for ControlLogix Controller Example

These option module settings were used for the example ladder logic program in this section.

Parameter	Value	Description
Option Module *Device* Parameters		
2 - [DLs From Net Cfg]	16	Sets the number of Datalinks used to write data from the network controller.
4 - [DLs To Net Cfg]	16	Sets the number of Datalinks used to read data to the network controller.
Option Module *Host* Parameters		
01 - [DL From Net 01]	370	Points to drive Par. 370 - [Stop Mode A]
02 - [DL From Net 02]	371	Points to drive Par. 371 - [Stop Mode B]
03 - [DL From Net 03]	535	Points to drive Par. 535 - [Accel Time 1]
04 - [DL From Net 04]	536	Points to drive Par. 536 - [Accel Time 2]
05 - [DL From Net 05]	537	Points to drive Par. 537 - [Decel Time 1]
06 - [DL From Net 06]	538	Points to drive Par. 538 - [Decel Time 2]
07 - [DL From Net 07]	539	Points to drive Par. 539 - [Jog Acc Dec Time]
08 - [DL From Net 08]	556	Points to drive Par. 556 - [Jog Speed 1]
09 - [DL From Net 09]	557	Points to drive Par. 557 - [Jog Speed 2]
10 - [DL From Net 10]	571	Points to drive Par. 571 - [Preset Speed 1]
11 - [DL From Net 11]	572	Points to drive Par. 572 - [Preset Speed 2]
12 - [DL From Net 12]	573	Points to drive Par. 573 - [Preset Speed 3]
13 - [DL From Net 13]	574	Points to drive Par. 574 - [Preset Speed 4]
14 - [DL From Net 14]	575	Points to drive Par. 575 - [Preset Speed 5]
15 - [DL From Net 15]	576	Points to drive Par. 576 - [Preset Speed 6]
16 - [DL From Net 16]	577	Points to drive Par. 577 - [Preset Speed 7]
17 - [DL To Net 01]	370	Points to drive Par. 370 - [Stop Mode A]
18 - [DL To Net 02]	371	Points to drive Par. 371 - [Stop Mode B]
19 - [DL To Net 03]	535	Points to drive Par. 535 - [Accel Time 1]
20 - [DL To Net 04]	536	Points to drive Par. 536 - [Accel Time 2]
21 - [DL To Net 05]	537	Points to drive Par. 537 - [Decel Time 1]
22 - [DL To Net 06]	538	Points to drive Par. 538 - [Decel Time 2]
23 - [DL To Net 07]	539	Points to drive Par. 539 - [Jog Acc Dec Time]
24 - [DL To Net 08]	556	Points to drive Par. 556 - [Jog Speed 1]
25 - [DL To Net 09]	557	Points to drive Par. 557 - [Jog Speed 2]
26 - [DL To Net 10]	571	Points to drive Par. 571 - [Preset Speed 1]
27 - [DL To Net 11]	572	Points to drive Par. 572 - [Preset Speed 2]
28 - [DL To Net 12]	573	Points to drive Par. 573 - [Preset Speed 3]

Parameter	Value	Description
29 - [DL To Net 13]	574	Points to drive Par. 574 - [Preset Speed 4]
30 - [DL To Net 14]	575	Points to drive Par. 575 - [Preset Speed 5]
31 - [DL To Net 15]	576	Points to drive Par. 576 - [Preset Speed 6]
32 - [DL To Net 16]	577	Points to drive Par. 577 - [Preset Speed 7]

TIP The *Host* **[DL From Net xx]** parameters are inputs into the drive that come from controller outputs (for example, data to write to a drive parameter). The *Host* **[DL To Net xx]** parameters are outputs from the drive that go to controller inputs (for example, data to read a drive parameter).

Controller Tags

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

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

You can expand the Input and Output tags to reveal the input and output configuration. The Input tag for this example program requires eighteen 32-bit words of data (Figure 7). The Output tag for this example requires eighteen 32-bit words of data (Figure 8).

Figure 7 - ControlLogix Controller Input Image for Drive Generic Profile Example Ladder Logic Program

Name	Data Type	Description
Local:3:I	AB:1756_DNB_...	
Local:3:I.StatusRegister	AB:1756_DNB_...	
Local:3:I.Data	DINT[124]	
Local:3:I.Data[0]	DINT	Logic Status
Local:3:I.Data[1]	DINT	Speed Feedback
Local:3:I.Data[2]	DINT	DL To Net 01
Local:3:I.Data[3]	DINT	DL To Net 02
Local:3:I.Data[4]	DINT	DL To Net 03
Local:3:I.Data[5]	DINT	DL To Net 04
Local:3:I.Data[6]	DINT	DL To Net 05
Local:3:I.Data[7]	DINT	DL To Net 06
Local:3:I.Data[8]	DINT	DL To Net 07
Local:3:I.Data[9]	DINT	DL To Net 08
Local:3:I.Data[10]	DINT	DL To Net 09
Local:3:I.Data[11]	DINT	DL To Net 10
Local:3:I.Data[12]	DINT	DL To Net 11
Local:3:I.Data[13]	DINT	DL To Net 12
Local:3:I.Data[14]	DINT	DL To Net 13
Local:3:I.Data[15]	DINT	DL To Net 14
Local:3:I.Data[16]	DINT	DL To Net 15
Local:3:I.Data[17]	DINT	DL To Net 16

Figure 8 - ControlLogix Controller Output Image for Drive Generic Profile Example Ladder Logic Program

Name	Data Type	Description
Local:3:O	AB:1756_DNB_...	
Local:3:O.CommandRegister	AB:1756_DNB_...	
Local:3:O.Data	DINT[123]	
Local:3:O.Data[0]	DINT	Logic Command
Local:3:O.Data[1]	DINT	Speed Reference
Local:3:O.Data[2]	DINT	DL From Net 01
Local:3:O.Data[3]	DINT	DL From Net 02
Local:3:O.Data[4]	DINT	DL From Net 03
Local:3:O.Data[5]	DINT	DL From Net 04
Local:3:O.Data[6]	DINT	DL From Net 05
Local:3:O.Data[7]	DINT	DL From Net 06
Local:3:O.Data[8]	DINT	DL From Net 07
Local:3:O.Data[9]	DINT	DL From Net 08
Local:3:O.Data[10]	DINT	DL From Net 09
Local:3:O.Data[11]	DINT	DL From Net 10
Local:3:O.Data[12]	DINT	DL From Net 11
Local:3:O.Data[13]	DINT	DL From Net 12
Local:3:O.Data[14]	DINT	DL From Net 13
Local:3:O.Data[15]	DINT	DL From Net 14
Local:3:O.Data[16]	DINT	DL From Net 15
Local:3:O.Data[17]	DINT	DL From Net 16

Program Tags

To use the Controller tags that are automatically created, create the following Program tags for this example program.

Name	Data Type	Description
Status_Ready	BOOL	
Status_Active	BOOL	
Status_Forward	BOOL	
Status_Reverse	BOOL	
Status_Faulted	BOOL	
Status_At_Speed	BOOL	
Command_Stop	BOOL	
Command_Start	BOOL	
Command_Jog	BOOL	
Command_Clear_Faults	BOOL	
Command_Forward_Reverse	BOOL	
Speed_Reference	REAL	
Speed_Feedback	REAL	

Figure 9 - ControlLogix Controller Example Ladder Logic Program Using a Drive Generic Profile for Logic Status/Feedback

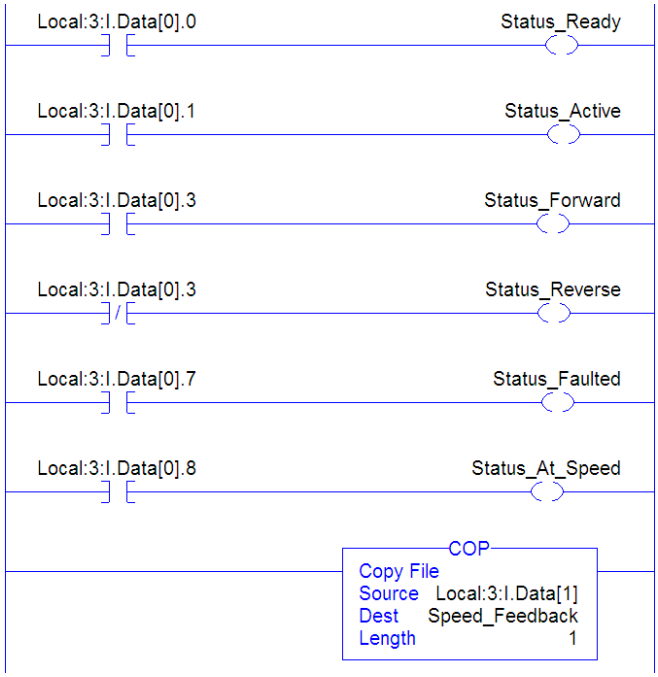
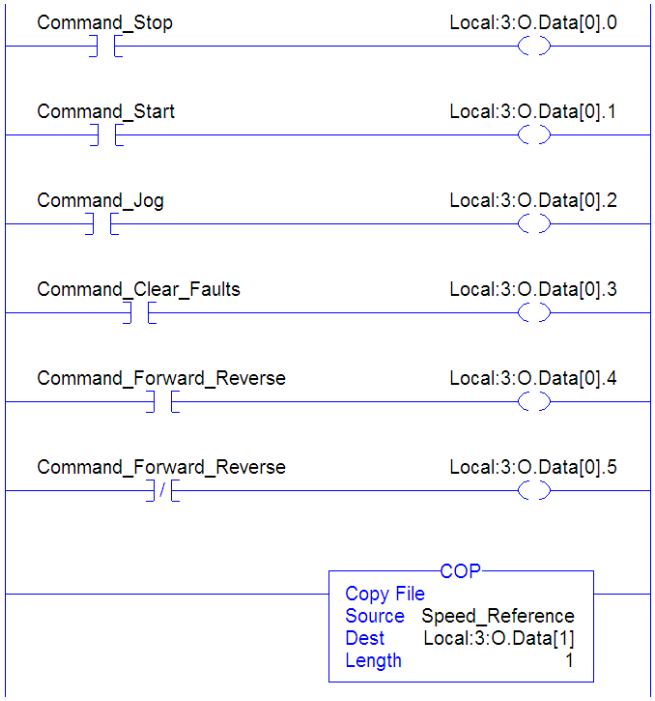
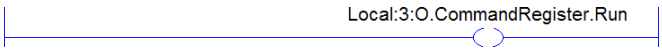


Figure 10 - ControlLogix Controller Example Ladder Logic Program Using a Drive Generic Profile for Logic Command/Reference



Enable the DeviceNet Scanner

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



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

Example Datalink Data

The Datalink data used in the example program is shown in Figure 11. To describe the parameters to which the Datalinks are assigned, you may want to add descriptions to the automatically created generic controller tags or create a UDDT. For this example, the DL_From_Net tags were created to describe the drive parameters to which these Datalinks are assigned. For example, DL_From_Net_01_Stop_Mode_A indicates that option module *Host* **Parameter 01 - [DL From Net 01]** is assigned to drive parameter 370 - [Stop Mode A]. This same method applies to the DL_To_Net tags.

Figure 11 - ControlLogix Controller Example Datalinks for Ladder Logic Program Using a Drive Generic Profile

Name	Value	Style	Data Type
DL_From_Net	{...}		DL_From_Net
DL_From_Net._01_Stop_Mode_A	1	Decimal	DINT
DL_From_Net._02_Stop_Mode_B	2	Decimal	DINT
DL_From_Net._03_Accel_Time_1	2.5	Float	REAL
DL_From_Net._04_Accel_Time_2	5.0	Float	REAL
DL_From_Net._05_Decel_Time_1	7.5	Float	REAL
DL_From_Net._06_Decel_Time_2	10.0	Float	REAL
DL_From_Net._07_Jog_Acc_Dec_Time	12.5	Float	REAL
DL_From_Net._08_Jog_Speed_1	10.0	Float	REAL
DL_From_Net._09_Jog_Speed_2	15.0	Float	REAL
DL_From_Net._10_Preset_Speed_1	20.0	Float	REAL
DL_From_Net._11_Preset_Speed_2	25.0	Float	REAL
DL_From_Net._12_Preset_Speed_3	30.0	Float	REAL
DL_From_Net._13_Preset_Speed_4	35.0	Float	REAL
DL_From_Net._14_Preset_Speed_5	40.0	Float	REAL
DL_From_Net._15_Preset_Speed_6	45.0	Float	REAL
DL_From_Net._16_Preset_Speed_7	50.0	Float	REAL
DL_To_Net	{...}		DL_To_Net
DL_To_Net._01_Stop_Mode_A	1	Decimal	DINT
DL_To_Net._02_Stop_Mode_B	2	Decimal	DINT
DL_To_Net._03_Accel_Time_1	2.5	Float	REAL
DL_To_Net._04_Accel_Time_2	5.0	Float	REAL
DL_To_Net._05_Decel_Time_1	7.5	Float	REAL
DL_To_Net._06_Decel_Time_2	10.0	Float	REAL
DL_To_Net._07_Jog_Acc_Dec_Time	12.5	Float	REAL
DL_To_Net._08_Jog_Speed_1	10.0	Float	REAL
DL_To_Net._09_Jog_Speed_2	15.0	Float	REAL
DL_To_Net._10_Preset_Speed_1	20.0	Float	REAL
DL_To_Net._11_Preset_Speed_2	25.0	Float	REAL
DL_To_Net._12_Preset_Speed_3	30.0	Float	REAL
DL_To_Net._13_Preset_Speed_4	35.0	Float	REAL
DL_To_Net._14_Preset_Speed_5	40.0	Float	REAL
DL_To_Net._15_Preset_Speed_6	45.0	Float	REAL
DL_To_Net._16_Preset_Speed_7	50.0	Float	REAL

TIP To determine whether a parameter is a 32-bit integer (DINT) or a REAL data type, see the Data Type column in the chapter containing parameters in the PowerFlex 750-Series AC Drives Programming Manual, publication 750-PM001. If a parameter is a REAL, a COP (Copy) instruction or UDDT is needed to copy the DINT to a REAL (inputs) or copy the REAL to a DINT (outputs).

Notes:

Using Explicit Messaging

This chapter provides information and examples that explain how to use Explicit Messaging with a ControlLogix® controller to configure and monitor the option module and connected PowerFlex® 750-Series drive.

Topic	Page
About Explicit Messaging	66
Performing Explicit Messaging	67
ControlLogix® Controller Examples	68

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

ATTENTION: Risk of equipment damage exists. If Explicit Messages are programmed to write parameter data to Nonvolatile Storage (NVS) frequently, the NVS will quickly exceed its life cycle and cause the drive to malfunction. Do not create a program that frequently uses Explicit Messages to write parameter data to NVS. Datalinks do not write to NVS and should be used for frequently changed parameters.

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

About Explicit Messaging

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

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

TIP To message to another device in a different drive port, see the Instance table in Appendix C:

- DPI Parameter Object section on page 109 for *Device* parameters.
- Host DPI Parameter Object section on page 123 for *Host* parameters.

In the Message Configuration dialog box, set the Instance field to an appropriate value within the range that is listed for the port in which the device resides.

IMPORTANT PowerFlex 750-Series drives have explicit messaging limitations. Table 4 shows the DeviceNet Object Class code compatibilities for these drives.

Table 4 - Explicit Messaging Class Code Compatibility with PowerFlex 750-Series Drive

DeviceNet Object Class Code	Compatibility	Explicit Messaging Function
Parameter Object 0x0F	No	Single parameter reads/writes
DPI Parameter Object 0x93	Yes (1) with limitations	Single and scattered parameter reads/writes
Host DPI Parameter Object 0x9F	Yes (2) with limitations	Single and scattered parameter reads/writes

(1) Enables access to drive parameters (Port 0), DPI device parameters (Ports 1…6 only), and Host parameters (Ports 7…14 only). For example, DPI Parameter Object Class code 0x93 can access a Safe Speed Monitor option module in Port 6. However, Class code 0x93 cannot access, for example, the Host parameters in a 24V I/O option module in Port 5. See DPI Parameter Object on page 109 for instance (parameter) numbering.

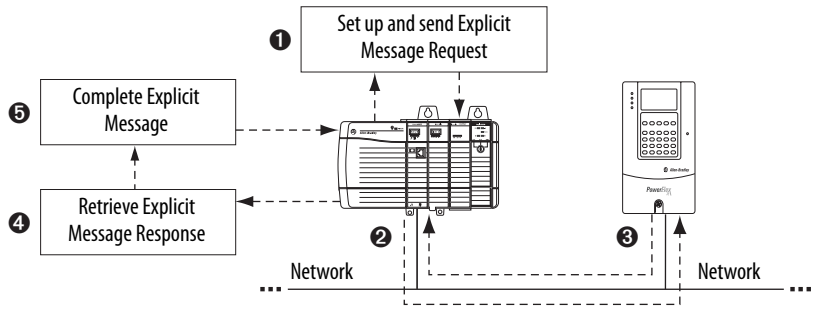
(2) Enables access to drive parameters (Port 0) and Host parameters for all ports (1…14). Host DPI Parameter Object Class code 0x9F cannot access DPI (device) parameters. For example, if a 20-750-DNET option module is in Port 4, its Host parameters can be accessed, but not its DPI (device) parameters. See Host DPI Parameter Object on page 123 for instance (parameter) numbering.

Performing Explicit Messaging

There are five basic events in the Explicit Messaging process. The details of each step varies 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 12 - 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 documentation for the scanner and/or controller that is being used.

ControlLogix® Controller Examples

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

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

IMPORTANT The explicit messaging examples in this section can be performed with RSLogix 5000 software, any version—or Studio 5000™ Logix Designer application, version 21.00 or later.

IMPORTANT The read and write messaging examples in this section are for *Device* parameters which use Class Code 0x93. For *Host* parameters, use Class Code 0x9F and format the rest of the message in the same way as these examples.

The Message Configuration has a Service Type of 'Parameter Read' which is Class code 0x0F, Parameter Object. Parameter Object is not supported in PowerFlex 750-series drives.

ControlLogix Controller Example Ladder Logic Program to Read a Single Parameter

A Get Attribute Single message is used to read a single parameter. This read message example reads the value of the 32-bit REAL (floating point) parameter 007 - [Output Current] in a PowerFlex 750-Series drive.

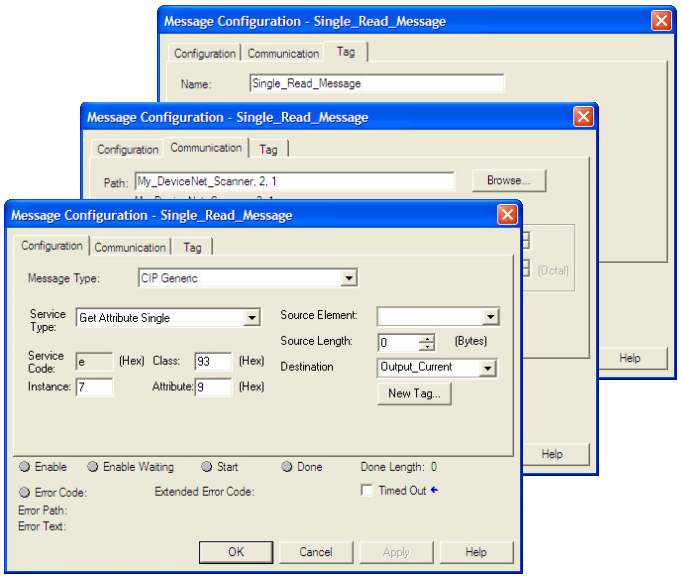
Table 5 - Example Controller Tags to Read a Single Parameter

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

Figure 13 - Example Ladder Logic to Read a Single Parameter

ControlLogix – Formatting a Message to Read a Single Parameter

Figure 14 - Get Attribute Single Message Configuration Dialog Boxes



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

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the DPI Parameter Object in the option module.
Service Type (1)	Get Attribute Single	This service is used to read a parameter value.
Service Code (1)	e (Hex.)	Code for the requested service.
Class	93 or 9F (Hex.) (4)	Class ID for the DPI Parameter Object.
Instance (2)	7 (Dec.)	Instance number is the same as parameter number.
Attribute	9 (Hex.)	Attribute number for the Parameter Value attribute.
Source Element	—	Leave blank (not applicable).
Source Length	0 bytes	Number of bytes of service data to be sent in the message.
Destination	Output_Current (5)	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (3)	My_DeviceNet_Scanner	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Single_Read_Message	The name for the message.

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

(2) The instance is the parameter number in the drive (Port 0). For example, to read parameter 4 of a peripheral in Port 5 of a PowerFlex 755 drive, the instance would be 21504 + 4 = 21508. See DPI Parameter Object on page 109 (Class code 0x93) or Host DPI Parameter Object on page 123 (Class code 0x9F) to determine the instance number.

(3) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder (for this example, My_DeviceNet_Scanner). Then always type in a comma followed by a '2' which is the DeviceNet scanner port, followed by another comma, and then the node of the drive (for this example, '1').

(4) See Table 4 on page 66 for limitations of PowerFlex 750-Series drives when using DPI Parameter Object Class code 0x93 or Host DPI Parameter Object Class code 0x9F for explicit messaging.

(5) In this example, Output Current is a 32-bit REAL floating point parameter requiring the Data Type field to be set to 'REAL' when creating the controller tag. To read a 32-bit integer parameter, set the tag Data Type field to 'DINT'. For a 16-bit parameter, set the Data Type field to 'INT'. See the drive documentation to determine the size of the parameter and its data type.

ControlLogix Controller Example Ladder Logic Program to Write a Single Parameter

A Set Attribute Single message is used to write to a single parameter. This write message example writes a value to the 32-bit REAL (floating point) parameter 535 - [Accel Time 1] in a PowerFlex 750-Series drive.

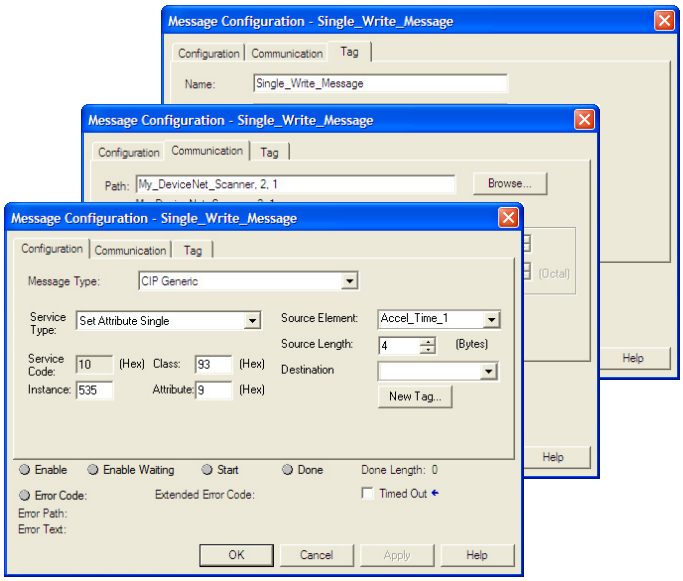
Table 6 - Example Controller Tags to Write a Single Parameter

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

Figure 15 - Example Ladder Logic to Write a Single Parameter

ControlLogix – Formatting a Message to Write a Single Parameter

Figure 16 - Set Attribute Single Message Configuration Dialog Boxes



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

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the DPI Parameter Object in the option module.
Service Type (1)	Set Attribute Single	This service is used to write a parameter value.
Service Code (1)	10 (Hex.)	Code for the requested service.
Class	93 or 9F (Hex.) (5)	Class ID for the DPI Parameter Object.
Instance (2)	535 (Dec.)	Instance number is the same as parameter number.
Attribute (3)	9 or A (Hex.)	Attribute number for the Parameter Value attribute.
Source Element	Accel_Time_1 (6)	Name of the tag for any service data to be sent from the scanner to the option module/drive.
Source Length	4 bytes (6)	Number of bytes of service data to be sent in the message.
Destination	—	Leave blank (not applicable).
Communication Tab	**Example Value**	**Description**
Path (4)	My_DeviceNet_Scanner	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Single_Write_Message	The name for the message.

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

(2) The instance is the parameter number in the drive (Port 0). For example, to write to parameter 4 of a peripheral in Port 5 of a PowerFlex 755 drive, the instance would be 21504 + 4 = 21508. See DPI Parameter Object on page 109 (Class code 0x93) or Host DPI Parameter Object on page 123 (Class code 0x9F) to determine the instance number.

(3) Setting the Attribute value to '9' writes the parameter value to the drive's Nonvolatile Storage (EEPROM) memory, which retains the parameter value even after the drive is power cycled. **Important:** When set to '9', the EEPROM may quickly exceed its lifecycle and cause the drive to malfunction. Setting the Attribute value to 'A' writes the parameter value to temporary memory, which deletes the parameter value after the drive is power cycled. When frequent write messages are required, we recommend using the 'A' setting.

(4) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder (for this example, My_DeviceNet_Scanner). Then always type in a comma followed by a '2' which is the DeviceNet scanner port, followed by another comma, and then the node of the drive (for this example, '1').

(5) See Table 4 on page 66 for limitations of PowerFlex 750-Series drives when using DPI Parameter Object Class code 0x93 or Host DPI Parameter Object Class code 0x9F for explicit messaging.

(6) In this example, Accel Time 1 is a 32-bit REAL floating point parameter requiring the Data Type field to be set to 'REAL' when creating the controller tag. To write to a 32-bit integer parameter, set the tag Data Type field to 'DINT'. For a 16-bit parameter, set the Data Type field to 'INT'. Also, the Source Length field on the Message Configuration dialog box must correspond to the selected Data Type in bytes (for example, 4 bytes for a REAL or a DINT, or 2 bytes for an INT). See the drive documentation to determine the size of the parameter and its data type.

ControlLogix Controller Example Ladder Logic Program to Read Multiple Parameters

A Scattered Read message is used to read the values of multiple parameters. This read message example reads the values of these five 32-bit REAL (floating point) parameters in a PowerFlex 750-Series drive:

- Parameter 001 - [Output Frequency]
- Parameter 007 - [Output Current]
- Parameter 008 - [Output Voltage]
- Parameter 009 - [Output Power]
- Parameter 011 - [DC Bus Volts]

See DPI Parameter Object on page 109 (Class code 0x93) or Host DPI Parameter Object on page 123 (Class code 0x9F) for parameter numbering.

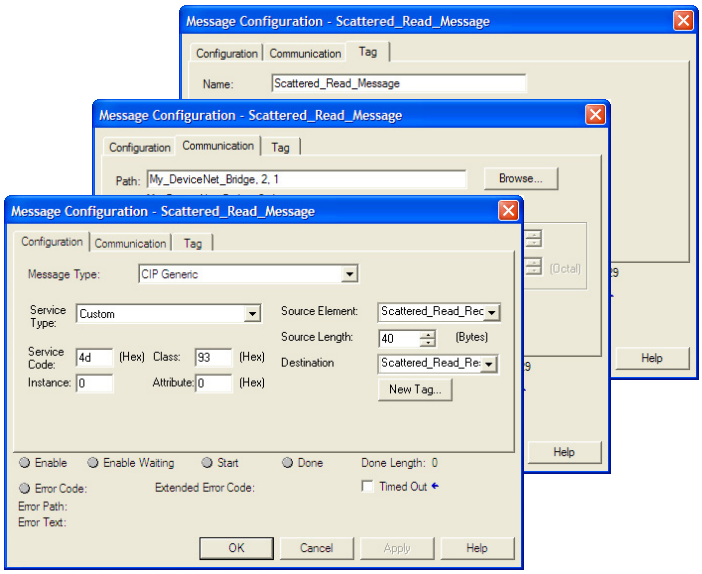
Table 7 - Example Controller Tags to Read Multiple Parameters

Operand	Controller Tags for Scattered Read Message	Data Type
XIC	Execute_Scattered_Read_Message	BOOL
MSG	Scattered_Read_Message	MESSAGE

Figure 17 - Example Ladder Logic to Read Multiple Parameters

ControlLogix – Formatting a Message to Read Multiple Parameters

Figure 18 - Scattered Read Message Configuration Dialog Boxes



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

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the DPI Parameter Object in the option module.
Service Type (1)	Custom	Required for scattered messages.
Service Code (1)	4d (Hex.)	Code for the requested service.
Class	93 or 9F (Hex.) (3)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute	0 (Hex.)	Required for scattered messages.
Source Element	Scattered_Read_Request (4)	Name of the tag for any service data to be sent from scanner to the option module/drive.
Source Length	40 bytes (4)	Number of bytes of service data to be sent in the message.
Destination	Scattered_Read_Response (5)	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (2)	My_DeviceNet_Scanner	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Scattered_Read_Message	The name for the message.

(1) The default setting for Service Type is 'Custom', enabling entry of a Service Code not available from the Service Type pull-down menu. When choosing a Service Type other than 'Custom' from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box, which is dimmed (unavailable). When reading 32-bit REAL (floating point) parameters, as in this example, data conversion using COP (Copy) instructions or UDDTs is required to correctly show the parameter values.

(2) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder (for this example, My_DeviceNet_Scanner). Then always type in a comma followed by a '2' which is the DeviceNet scanner port, followed by another comma, and then the node of the drive (for this example, '1').

(3) See Table 4 on page 66 for limitations of PowerFlex 750-Series drives when using DPI Parameter Object Class code 0x93 or Host DPI Parameter Object Class code 0x9F for explicit messaging.

(4) In this example, we are reading five 32-bit REAL (floating point) parameters. Each parameter being read requires two contiguous DINT registers. Therefore, a controller tag was created with its Data Type field set to 'DINT[10]'. Also, the Source Length field on the Message Configuration dialog box must correspond to the selected Data Type in bytes (for this example, 40 bytes for a DINT[10] array). Scattered read messages always assume that every parameter being read is a 32-bit parameter, regardless of its actual size. Maximum message length is 128 bytes which can read up to 16 parameters, regardless of their size. For parameter numbering, see DPI Parameter Object on page 109 (Class code 0x93) or Host DPI Parameter Object on page 123 (Class code 0x9F).

(5) The controller tag for 'Scattered_Read_Response' must be the same size as the controller tag for 'Scattered_Read_Request' (for this example, 40 bytes), but can be a different data type (for this example, a UDDT to handle conversion to parameter values that are a REAL data type).

ControlLogix Controller Example Scattered Read Request Data

In this message example, we use the data structure in Figure 19 in the source tag named Scattered Read Request to read these five 32-bit REAL (floating point) parameters in a PowerFlex 750-Series drive:

- Parameter 001 - [Output Frequency]
- Parameter 007 - [Output Current]
- Parameter 008 - [Output Voltage]
- Parameter 009 - [Output Power]
- Parameter 011 - [DC Bus Volts]

See DPI Parameter Object on page 109 (Class code 0x93) or Host DPI Parameter Object on page 123 (Class code 0x9F) for parameter numbering.

Figure 19 - Example Scattered Read Request Data

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

ControlLogix Controller Example Scattered Read Response Data

The Scattered Read Request message reads the multiple parameters and returns their values to the destination tag (Scattered_Read_Response). Figure 20 shows the parameter values which, in this example, have been converted using a UDDT for correct presentation. COP (Copy) instructions could have been used for this purpose instead of a UDDT. If the parameters being read are 32-bit integers, do not COP the data to a REAL tag.

Figure 20 - Example Scattered Read Response Converted Data

Name	Value	Data Type	Description
Scattered_Read_Response	{...}	Scattered_Rea...	
Scattered_Read_Response.Output_Frequency_Par_No	1	DINT	
Scattered_Read_Response.Output_Frequency_Par_Value	60.205975	REAL	
Scattered_Read_Response.Output_Current_Par_No	7	DINT	
Scattered_Read_Response.Output_Current_Par_Value	12.570678	REAL	
Scattered_Read_Response.Output_Voltage_Par_No	8	DINT	
Scattered_Read_Response.Output_Voltage_Par_Value	418.34348	REAL	
Scattered_Read_Response.Output_Power_Par_No	9	DINT	
Scattered_Read_Response.Output_Power_Par_Value	12.3584	REAL	
Scattered_Read_Response.DC_Bus_Volts_Par_No	11	DINT	
Scattered_Read_Response.DC_Bus_Volts_Par_Value	566.5277	REAL	

In this message example, the parameters have the following values:

PowerFlex 750-Series Drive Parameter	Read Value
1 - [Output Frequency]	60.205975 Hz
7 - [Output Current]	12.570678 Amp
8 - [Output Voltage]	418.34348V AC
9 - [Output Power]	12.3584 kW
11 - [DC Bus Volts]	566.5277V DC

ControlLogix Controller Example Ladder Logic Program to Write Multiple Parameters

A Scattered Write message is used to write to multiple parameters. This write message example writes the following values to these five 32-bit REAL (floating point) parameters in a PowerFlex 750-Series drive:

PowerFlex 750-Series Drive Parameter	Write Value
536 - [Accel Time 2]	11.1 Sec
538 - [Decel Time 2]	22.2 Sec
575 - [Preset Speed 5]	33.3 Hz
576 - [Preset Speed 6]	44.4 Hz
577 - [Preset Speed 7]	55.5 Hz

See DPI Parameter Object on page 109 (Class code 0x93) or Host DPI Parameter Object on page 123 (Class code 0x9F) for parameter numbering.

Table 8 - Example Controller Tags to Write Multiple Parameters

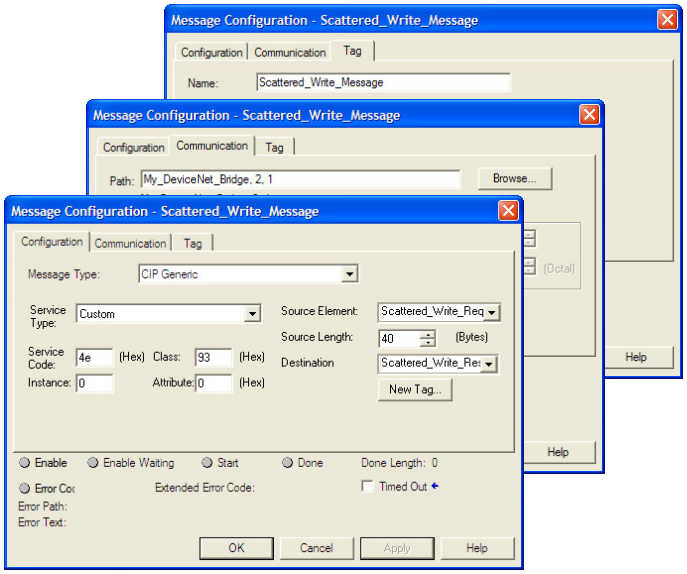
Operand	Controller Tags for Scattered Write Message	Data Type
XIC	Execute_Scattered_Write_Message	BOOL
MSG	Scattered_Write_Message	MESSAGE

Figure 21 - Example Ladder Logic to Write Multiple Parameters

IMPORTANT If the explicit message scattered write must be written continuously, then use a separate explicit message single write for each parameter using DPI Parameter Object Class code 0x93 and attribute A (see page 71). Attribute A writes to RAM—not NVS (EEPROM) memory. This example scattered write message using attribute 0 writes to NVS. Over time, continuous writes will exceed the EEPROM life cycle and cause the drive to malfunction.

ControlLogix – Formatting a Message to Write Multiple Parameters

Figure 22 - Scattered Write Multiple Message Configuration Dialog Boxes



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

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the DPI Parameter Object in the option module.
Service Type (1)	Custom	Required for scattered messages.
Service Code (1)	4e (Hex.)	Code for the requested service.
Class	93 or 9F (Hex.) (4)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute (2)	0 (Hex.)	Required for scattered messages.
Source Element	Scattered_Write_Request (5)	Name of the tag for any service data to be sent from scanner to the option module/drive.
Source Length	40 bytes (5)	Number of bytes of service data to be sent in the message.
Destination	Scattered_Write_Response (6)	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (3)	My_DeviceNet_Scanner	The path is the route that the message will follow.
Tag Tab	**Example Value**	**Description**
Name	Scattered_Write_Message	The name for the message.

(1) The default setting for Service Type is 'Custom', enabling entry of a Service Code not available from the Service Type pull-down menu. When choosing a Service Type other than 'Custom' from the pull-down menu, an appropriate Hex. value is automatically assigned to the Service Code box, which is dimmed (unavailable). When writing to 32-bit REAL (floating point) parameters, as in this example, data conversion using COP (Copy) instructions, or UDDTs is required to correctly write the parameter values.

(2) Scattered writes always write parameter values to the drive's Nonvolatile Storage (EEPROM) memory, which retains these values even after the drive is power cycled. **Important:** Be cautious as the EEPROM may quickly exceed its lifecycle and cause the drive to malfunction.

(3) Click **Browse** to find the path, or type in the name of the device listed in the I/O Configuration folder (for this example, My_DeviceNet_Scanner). Then always type in a comma followed by a '2' which is the DeviceNet scanner port, followed by another comma, and then the node of the drive (for this example, '1').

(4) See Table 4 on page 66 for limitations of PowerFlex 750-Series drives when using DPI Parameter Object Class code 0x93 or Host DPI Parameter Object Class code 0x9F for explicit messaging.

(5) In this example, we are writing to five 32-bit REAL (floating point) parameters. Each parameter being written to requires two contiguous DINT registers. Therefore, a controller tag was created with its Data Type field set to the name of the UDDT of five interleaved DINTs and REALs. Also, the Source Length field on the Message Configuration dialog box must correspond to the selected Data Type in bytes (for this example, 40 bytes for an array of five scattered REAL structures). Scattered write messages always assume that every parameter being written to is a 32-bit parameter, regardless of its actual size. Maximum message length is 128 bytes, which can write up to 16 parameters, regardless of their size. For parameter numbering, see DPI Parameter Object on page 109 (Class code 0x93) or Host DPI Parameter Object on page 123 (Class code 0x9F).

(6) The controller tag for 'Scattered_Write_Response' must be the same size as the controller tag for 'Scattered_Write_Request' (for this example, 40 bytes). An array of DINTs is suggested to be able to read any error codes that are returned.

ControlLogix Controller Example Scattered Write Request Data

In this message example, we use the data structure in Figure 23 in the source tag (Scattered_Write_Request) to write new values to these 32-bit REAL (floating point) parameters:

PowerFlex 750-Series Drive Parameter	Write Value
536 - [Accel Time 2]	11.1 Sec
538 - [Decel Time 2]	22.2 Sec
575 - [Preset Speed 5]	33.3 Hz
576 - [Preset Speed 6]	44.4 Hz
577 - [Preset Speed 7]	55.5 Hz

See DPI Parameter Object on page 109 (Class code 0x93) or Host DPI Parameter Object on page 123 (Class code 0x9F) for parameter numbering.

Figure 23 shows the parameter values which, in this example, have been converted using a UDDT to correctly write their values. COP (Copy) instructions could have been used for this purpose instead of a UDDT. If the parameters being written to are 32-bit integers, do not COP the data to a REAL tag.

Figure 23 - Example Scattered Write Request Converted Data

Name	Value	Data Type	Description
Scattered_Write_Request	{...}	Scattered_Writ...	
Scattered_Write_Request.Accel_Time_2_Par_No	536	DINT	
Scattered_Write_Request.Accel_Time_2_Par_Value	11.1	REAL	
Scattered_Write_Request.Decel_Time_2_Par_No	538	DINT	
Scattered_Write_Request.Decel_Time_2_Par_Value	22.2	REAL	
Scattered_Write_Request.Preset_Speed_5_Par_No	575	DINT	
Scattered_Write_Request.Preset_Speed_5_Par_Value	33.3	REAL	
Scattered_Write_Request.Preset_Speed_6_Par_No	576	DINT	
Scattered_Write_Request.Preset_Speed_6_Par_Value	44.4	REAL	
Scattered_Write_Request.Preset_Speed_7_Par_No	577	DINT	
Scattered_Write_Request.Preset_Speed_7_Par_Value	55.5	REAL	

ControlLogix Controller Example Scattered Write Response Data

The results of the message appear in the destination tag named Scattered_Write_Response (Figure 24). Values of '0' indicate no errors occurred.

Figure 24 - Example Scattered Write Response Data

Name	Value	Data Type	Description
Scattered_Write_Response	{...}	DINT[10]	
Scattered_Write_Response[0]	536	DINT	
Scattered_Write_Response[1]	0	DINT	
Scattered_Write_Response[2]	538	DINT	
Scattered_Write_Response[3]	0	DINT	
Scattered_Write_Response[4]	575	DINT	
Scattered_Write_Response[5]	0	DINT	
Scattered_Write_Response[6]	576	DINT	
Scattered_Write_Response[7]	0	DINT	
Scattered_Write_Response[8]	577	DINT	
Scattered_Write_Response[9]	0	DINT	

ControlLogix Controller – Explanation of Request and Response Data for Read/Write Multiple Parameter Messaging

The data structures in Table 9 and Table 10 use 32-bit words and can accommodate up to 16 parameters in a single message. In the Response Message, a parameter number with Bit 15 set indicates that the associated parameter value field contains an error code (parameter number in response data will be negative).

The PowerFlex 750-Series AC Drives Programming Manual, publication 750-PM001, lists the data type for each parameter. When performing a Scattered Read of REAL data type parameters, the DINT parameter value in the Response (Destination Data) array will need to be COP to a REAL tag.

Table 9 - Data Structures for Scattered Read Messages

	Request (Source Data)		Response (Destination Data)
DINT 0	Parameter Number	DINT 0	Parameter Number
1	Pad	1	Parameter Value
2	Parameter Number	2	Parameter Number
3	Pad	3	Parameter Value
4	Parameter Number	4	Parameter Number
5	Pad	5	Parameter Value
6	Parameter Number	6	Parameter Number
7	Pad	7	Parameter Value
8	Parameter Number	8	Parameter Number
9	Pad	9	Parameter Value
10	Parameter Number	10	Parameter Number
11	Pad	11	Parameter Value
12	Parameter Number	12	Parameter Number
13	Pad	13	Parameter Value
14	Parameter Number	14	Parameter Number
15	Pad	15	Parameter Value
16	Parameter Number	16	Parameter Number
17	Pad	17	Parameter Value
18	Parameter Number	18	Parameter Number
19	Pad	19	Parameter Value
20	Parameter Number	20	Parameter Number
21	Pad	21	Parameter Value
22	Parameter Number	22	Parameter Number
23	Pad	23	Parameter Value
24	Parameter Number	24	Parameter Number
25	Pad	25	Parameter Value
26	Parameter Number	26	Parameter Number
27	Pad	27	Parameter Value
28	Parameter Number	28	Parameter Number
29	Pad	29	Parameter Value
30	Parameter Number	30	Parameter Number
31	Pad	31	Parameter Value
32	Parameter Number	32	Parameter Number
33	Pad	33	Parameter Value
34	Parameter Number	34	Parameter Number
35	Pad	35	Parameter Value
⋮		⋮	
62	Parameter Number	62	Parameter Number
63	Pad	63	Parameter Value

When performing a Scattered Write to REAL data type parameters, the REAL parameter value will need to be COP to the DINT parameter value tag in the Request (Source Data) array.

Table 10 - Data Structures for Scattered Write Messages

	Request (Source Data)		Response (Destination Data)
DINT 0	Parameter Number	DINT 0	Parameter Number
1	Parameter Value	1	Pad
2	Parameter Number	2	Parameter Number
3	Parameter Value	3	Pad
4	Parameter Number	4	Parameter Number
5	Parameter Value	5	Pad
6	Parameter Number	6	Parameter Number
7	Parameter Value	7	Pad
8	Parameter Number	8	Parameter Number
9	Parameter Value	9	Pad
10	Parameter Number	10	Parameter Number
11	Parameter Value	11	Pad
12	Parameter Number	12	Parameter Number
13	Parameter Value	13	Pad
14	Parameter Number	14	Parameter Number
15	Parameter Value	15	Pad
16	Parameter Number	16	Parameter Number
17	Parameter Value	17	Pad
18	Parameter Number	18	Parameter Number
19	Parameter Value	19	Pad
20	Parameter Number	20	Parameter Number
21	Parameter Value	21	Pad
22	Parameter Number	22	Parameter Number
23	Parameter Value	23	Pad
24	Parameter Number	24	Parameter Number
25	Parameter Value	25	Pad
26	Parameter Number	26	Parameter Number
27	Parameter Value	27	Pad
28	Parameter Number	28	Parameter Number
29	Parameter Value	29	Pad
30	Parameter Number	30	Parameter Number
31	Parameter Value	31	Pad
32	Parameter Number	32	Parameter Number
33	Parameter Value	33	Pad
34	Parameter Number	34	Parameter Number
35	Parameter Value	35	Pad
⋮		⋮	
62	Parameter Number	62	Parameter Number
63	Parameter Value	63	Pad

Notes:

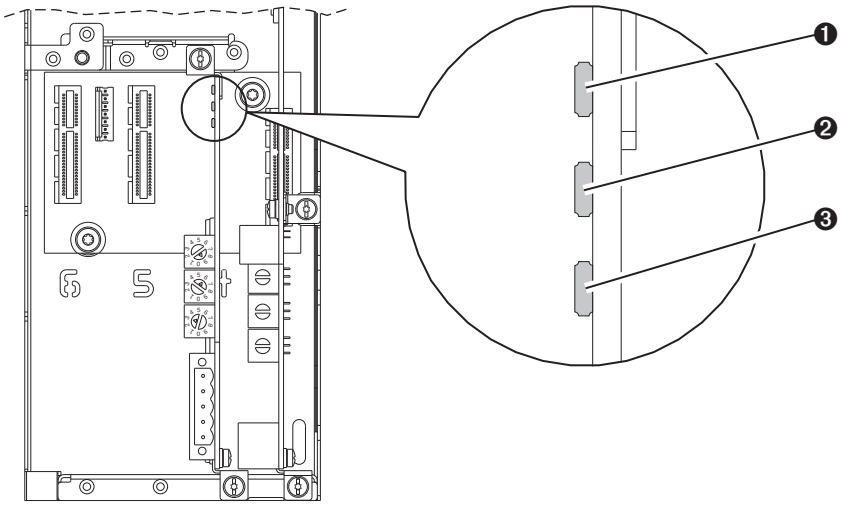
Troubleshooting

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

Topic	Page
Understanding the Status Indicators	81
PORT Status Indicator	82
MOD Status Indicator	82
NET A Status Indicator	83
Viewing Option Module Diagnostic Items	84
Viewing and Clearing Events	86

Understanding the Status Indicators

The option module has three status indicators. They can be viewed with the drive cover removed.



Item	Indicator Name	Description	Page
❶	PORT	DPI Connection Status	82
❷	MOD	Option Module Status	82
❸	NET A	DeviceNet Status	83

PORT Status Indicator

This red/green bicolor light-emitting diode indicates the status of the option module's connection to the drive as shown in the table below.

Status	Cause	Corrective Action
Off	The option module is not powered or is not properly connected to the drive.	• Securely connect and ground the option module to the drive by fully inserting it into the drive port and tightening its two captive screws to the recommended torque. • Apply power to the drive.
Flashing Red	The option module is not communicating with the drive via DPI.	• Verify that the option module is properly inserted in the drive port. • Cycle power to the drive.
Steady Red	The drive has refused an I/O connection from the option module. Another DPI peripheral is using the same DPI port as the option module.	**Important:** Cycle power to the drive after making any of the following corrections: • Securely connect and ground the option module to the drive by fully inserting it into the drive port and tightening its two captive screws to the recommended torque. • Verify that the drive supports the Comm Driver.
Steady Orange	The option module is not compatible with the drive.	Install the option module into a compatible product of the same brand (an Allen-Bradley PowerFlex 750-Series drive).
Flashing Green	The option module is establishing an I/O connection to the drive.	No action required. Normal behavior if no I/O is enabled.
Steady Green	The option module is properly connected and is communicating with the drive.	No action required.

MOD Status Indicator

This red/green bicolor light-emitting diode indicates the status of the option module as shown in the table below.

Status	Cause	Corrective Action
Off	The option module is not powered or is not properly connected to the drive.	• Securely connect and ground the option module to the drive by fully inserting it into the drive port and tightening its two captive screws to the recommended torque. • Apply power to the drive.
Flashing Red	The drive is in firmware upgrade mode. The option module has failed the firmware test.	View the option module event queue to determine which of these conditions is present. Then, depending on the cause, take appropriate corrective action. • Clear faults in the option module. • Cycle power to the drive. • If cycling power does not correct the problem, the option module parameter settings may have been corrupted. Reset defaults and reconfigure the option module. • If resetting defaults does not correct the problem, update the option module with the latest firmware revision.
Steady Red	The option module has failed the hardware test.	• Cycle power to the drive. • Replace the option module.
Flashing Green	The option module is operating normally, 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 option module. • Configure the option module for the program in the controller. • Normal behavior if no I/O is being transferred.
Steady Green	The option module is operating normally and is transferring I/O data to a controller.	No action required.

NET A Status Indicator

This red/green bicolor light-emitting diode indicates the status of the network connection as shown in the table below.

Status	Cause	Corrective Actions
Off	The option module or network is not powered. The option module is not properly connected to the network.	• Securely connect and ground the option module to the drive by fully inserting it into the drive port and tightening its two captive screws to the recommended torque. • Correctly connect the DeviceNet cable to the option module's DeviceNet plug. • Apply power to the drive. • Verify that the DeviceNet network is powered.
Steady Red	The option module failed the duplicate node address detection test or bus off. The node address switch setting is not valid.	• Configure the option module to use a unique node address on the DeviceNet network. • Configure the option module to use the correct network data rate. • Verify that the network has correct media installed. • Verify that the node address switch setting is between 0 and 63.
Flashing Red	A DeviceNet I/O connection has timed out.	• Place the scanner in RUN mode, or apply power to the peer device that will send I/O. • Check the amount of traffic on the network.
Flashing Red/ Green	The option module has received an Identify Comm Fault request.	Wait for the faulted node recovery to complete.
Flashing Green	The option module is properly connected, but is not communicating with any devices on the network.	• Place the controller in RUN mode. • Program a controller to recognize and transmit I/O or make a messaging connection to the option module. • Configure the option module for the program in the controller.
Steady Green	The option module is properly connected and is communicating on the network.	No action required.

Viewing Option Module Diagnostic Items

If you encounter unexpected communication problems, the option module's diagnostic items may help you or Rockwell Automation® personnel troubleshoot the problem. Option module diagnostic items can be viewed with any of these drive configuration tools:

- PowerFlex® 20-HIM-A6 or 20-HIM-C6S HIM
- Connected Components Workbench software, version 1.02 or later
- DriveExplorer™ software, version 6.01 or later
- DriveExecutive software, version 5.01 or later

For details on viewing diagnostic items with the HIM, see the PowerFlex 20-HIM-A6/-C6S HIM (Human Interface Module) User Manual, publication 20HIM-UM001.

Table 11 - Option Module Diagnostic Items

No.	Name	Description
1	Common Logic Cmd	The present value of the Common Logic Command being transmitted to the drive by this option module.
2	Prod Logic Cmd	The present value of the Product Logic Command being transmitted to the drive by this option module from the controller.
3	Reference	The present value of the Reference being transmitted to the drive by this option module.
4	Common Logic Sts	The present value of the Common Logic Status being received from the drive by this option module.
5	Prod Logic Sts	The present value of the Product Logic Status being received from the drive by this option module.
6	Feedback	The present value of the Feedback being received from the drive by this option module.
7	Input Size	The size of the input image in bytes transferred from the network to the drive.
8	Output Size	The size of the output image in bytes transferred from the drive to the network.
9	DL Fr Net Avail	The number of *Host* **DL From Net xx** Datalinks currently available to the Option Module.
10	DL To Net Avail	The number of *Host* **DL To Net xx** Datalinks currently available to the Option Module
11	DL Fr Net 01 Val	The present value of respective *Host* **DL From Net xx** parameter being transmitted to the drive by this option module. (If not using a Datalink, its respective value should be zero.)
12	DL Fr Net 02 Val	
13	DL Fr Net 03 Val	
14	DL Fr Net 04 Val	
15	DL Fr Net 05 Val	
16	DL Fr Net 06 Val	
17	DL Fr Net 07 Val	
18	DL Fr Net 08 Val	
19	DL Fr Net 09 Val	
20	DL Fr Net 10 Val	
21	DL Fr Net 11 Val	
22	DL Fr Net 12 Val	
23	DL Fr Net 13 Val	
24	DL Fr Net 14 Val	
25	DL Fr Net 15 Val	
26	DL Fr Net 16 Val	

Table 11 - Option Module Diagnostic Items (continued)

No.	Name	Description
27	DL To Net 01 Val	The present value of respective *Host* **DL To Net xx** parameter being received from the drive by this option module. (If not using a Datalink, its respective value should be zero.)
28	DL To Net 02 Val	
29	DL To Net 03 Val	
30	DL To Net 04 Val	
31	DL To Net 05 Val	
32	DL To Net 06 Val	
33	DL To Net 07 Val	
34	DL To Net 08 Val	
35	DL To Net 09 Val	
36	DL To Net 10 Val	
37	DL To Net 11 Val	
38	DL To Net 12 Val	
39	DL To Net 13 Val	
40	DL To Net 14 Val	
41	DL To Net 15 Val	
42	DL To Net 16 Val	
43	DPI Rx Errs	The present value of the DPI Receive error counter.
44	DPI Rx Errs Max	The maximum value (since reset) of the DPI Receive Error counter.
45	DPI Tx Errs	The present value of the DPI Transmit error counter.
46	DPI Tx Errs Max	The maximum value (since reset) of the DPI Transmit Error counter.
47	Net Rx Errs	The number of receive errors that are reported by the DeviceNet hardware.
48	Net Rx Errs Max	The maximum value (since connected) of the Network Receive Errors counter.
49	Net Tx Errs	The number of transmit errors reported by the DeviceNet hardware.
50	Net Tx Errs Max	The maximum value (since connected) of the Network Transmit Errors counter.
51	Boot Flash Count	Number of times the boot firmware in the Option Module has been flash updated.
52	App Flash Count	Number of times the application firmware in the Option Module has been flash updated.
53	Data Rate Sw	The present value of the data rate switch.
54	Net Addr Sw	The present value of the node address switches.

Viewing and Clearing Events

The option module has an event queue to record significant events that occur in the operation of the module. When such an event occurs, an entry consisting of the event's numeric code and a time stamp is put into the event queue. You can view the event queue with any of these drive configuration tools:

- PowerFlex 20-HIM-A6 or 20_HIM-C6S HIM
- Connected Components Workbench software, version 1.02 or later
- DriveExplorer™ software, version 6.01 or later
- DriveExecutive™ software, version 5.01 or later

For details on viewing and clearing events using the HIM, see the PowerFlex 20-HIM-A6/-C6S HIM (Human Interface Module) User Manual, publication 20HIM-UM001.

The event queue can contain up to 32 entries, which are stored in an EEPROM chip—making the event queue nonvolatile. Eventually the event queue becomes full, since its contents are retained through option module power cycles and resets. At that point, a new entry replaces the oldest entry. Only an event queue clear operation or the corruption of the EEPROM group containing the event queue clears the event queue contents. In the latter case, the option module will not generate a fault to indicate that the event queue was corrupted.

Resetting the option module to defaults has no effect on the event queue, other than to log a Code 58 'Module Defaulted' event.

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

Table 12 - Option Module Events

Code	Event	Description
Option Module Events		
1	No Event	Text that is displayed in an empty event queue entry.
2	Device Power Up	Power was applied to the option module.
3	Device Reset	The option module was reset.
4	EEPROM CRC Error	The EEPROM checksum/CRC is incorrect, which limits option module functionality. Default parameter values must be loaded to clear this condition.
5	App Updated	The option module application firmware was updated.
6	Boot Updated	The option module boot firmware was updated.
7	Watchdog Timeout	The software watchdog detected a failure and reset the option module.
DPI Events		
8	DPI Bus Off	A bus-off condition was detected on DPI. This event may be caused by noise.
9	DPI Ping Timeout	A ping message was not received on DPI within the specified time.
10	DPI Port Invalid	The option module was not connected to a valid port on a DPI product.
11	DPI Port Changed	The DPI port that is changed after startup.
12	DPI Host Reset	The drive sent a reset event message.
13	DPI Baud 125 kbps	The option module detected that the drive was communicating at 125 Kbps.

Table 12 - Option Module Events (continued)

Code	Event	Description
14	DPI Baud 500 kbps	The option module detected that the drive was communicating at 500 Kbps.
15	DPI Host Invalid	The option module was connected to an incompatible product.
16	DPI Dup Port	Another peripheral with the same port number is already in use.
17	DPI Type 0 Logon	The option module has logged in for Type 0 control.
18	DPI Type 0 Time	The option module has not received a Type 0 status message within the specified time.
19	DPI DL Logon	The option module has logged into a Datalink.
20	DPI DL Error	The drive rejected an attempt to log in to a Datalink because the Datalink is not supported or is used by another peripheral.
21	DPI DL Time	The option module has not received a Datalink message within the specified time.
22	DPI Ctrl Disable	The option module has sent a 'Soft Control Disable' command to the drive.
23	DPI Ctrl Enable	The option module has sent a 'Soft Control Enable' command to the drive.
24	DPI Msg Timeout	A Client-Server message that is sent by the option module was not completed within 1 second.
25	DPI Manual Reset	The option module was reset by changing its Reset Module parameter.
		SI Events
26	SI Online	The option module has logged into the Serial Interface Communication.
27	SI Logon Error	The option module failed to log into the Serial Interface.
28	SI Comm Fault	The Serial Interface Communication has faulted.
		Network Events
29	Net Link Up	A network link was available for the option module.
30	Net Link Down	The network link was removed from the option module.
31	Net Dup Address	The option module uses the same address as another device on the network.
32	Net Comm Fault	The option module detected a communication fault on the network.
33	Net Sent Reset	The option module received a reset from the network.
34	Net IO Close	An I/O connection from the network to the option module was closed.
35	Net Idle Fault	The option module received 'idle' packets from the network.
36	Net IO Open	An I/O connection from the network to the option module has been opened.
37	Net IO Timeout	An I/O connection from the network to the option module has timed out.
38	Net IO Size Err	The option module received an incorrectly sized I/O packet.
39	PCCC IO Close	The device sending PCCC Control messages to the option module has set the PCCC Control Timeout to zero.
40	PCCC IO Open	The option module has begun receiving PCCC control messages (the PCCC Control Timeout was previously set to a nonzero value).
41	PCCC IO Timeout	The option module has not received a PCCC Control message for longer than the PCCC Control Timeout.
42	Msg Ctrl Open	The timeout attribute in either the CIP Register or Assembly Object was written with a nonzero value, allowing control messages to be sent to the option module.
43	Msg Ctrl Close	The timeout attribute in either the CIP Register or Assembly Object was written with a zero value, disallowing control messages to be sent to the option module.
44	Msg Ctrl Timeout	The timeout attribute in either the CIP Register or Assembly Object elapsed between accesses of those objects.
45-46	Reserved	—
47	Net Bus Off	The network has experienced a Bus Off condition.
48	Net Poll Timeout	A Polled I/O connection has timed out.
49	Net IO Frag Err	A network I/O fragment was received out of sequence. Possible line noise problem.
50	Net COS Timeout	A Change of State (COS) connection has timed out.

Table 12 - Option Module Events (continued)

Code	Event	Description
51	Net Poll Alloc	A Polled connection has been allocated.
52	Net COS Alloc	A Change of State (COS) I/O connection has been allocated.
53	Net Poll Close	A Polled I/O connection was explicitly closed.
54	Net COS Close	A Change of State (COS) I/O connection was explicitly closed.
55-57	Reserved	—
58	Module Defaulted	The option module has been set to defaults.

Specifications

This appendix presents the specifications for the option module.

Topic	Page
Communications	89
Electrical	89
Mechanical	89
Environmental	90
Regulatory Compliance	90

Communications

Network	
Protocol	DeviceNet
Data Rates	125 Kbps, 250 Kbps, 500 Kbps or Autobaud (default) With the Data Rate switch (Figure 2) set to '3', the option module uses the data rate setting from *Device* **Parameter 9 - [Net Rate Cfg]**. Autobaud can be set only if another device on the network has established the data rate.
Drive	
Protocol	DPI
Data Rates	500 Kbps

Electrical

Consumption	
Drive	50 mA at 14V DC supplied by the host drive
Network	60 mA at 24V DC supplied by the network Use the 60 mA value to size the network current draw from the power supply.

Mechanical

Dimensions	
Height	68 mm (2.7 inches)
Length	150 mm (5.9 inches)
Width	26 mm (1.0 inches)
Weight	62 g (2.1 oz)

Environmental

Temperature	
Operating	-10…50 °C (14…122 °F)
Storage	-40…85 °C (-40…185 °F)
Relative Humidity	5…95% noncondensing
Atmosphere	**Important:** The option module **must not** be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors, or dust. If the option module is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.

Regulatory Compliance

UL	UL508C
c-UL	CAN / CSA C22.2 No. 14-M91
CE	EN50178 and EN61800-3
C-Tick	EN61800-3

NOTE: This is a product of category C2 according to IEC 61800-3. In a domestic environment, this product may cause radio interference in which case supplementary mitigation measures may be required.

Option Module Parameters

This appendix provides information about the option module parameters.

Topic	Page
Parameter Types	91
About Parameter Numbers	92
How Parameters Are Organized	92
Device Parameters	92
Host Parameters	94

Parameter Types

The option module has two types of parameters:

- *Device* parameters are used to configure the option module to operate on the network.
- *Host* parameters are used to configure the option module Datalink transfer and various fault actions with the drive.

You can view option module *Device* and *Host* parameters with any of the following drive configuration tools:

- PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM—use the 4 or 6 key to scroll to the drive port in which the module resides, press the (Folders) key, and use the 4 or 6 key to scroll to the DEV PARAM or HOST PARAM folder.
- Connected Components Workbench software—click the tab for the option module at the bottom of the window, click the Parameters icon in the tool bar, and click the *Device* or *Host* Parameters tab.
- DriveExplorer software—find the option module in the treeview and open its Parameters folder.
- DriveExecutive software—find the option module in the treeview, expand the module in the tree, and open its Parameters folder.

About Parameter Numbers

Each parameter set is independently and consecutively numbered.

Configuration Tool	Numbering Scheme
• HIM • Connected Components Workbench software • DriveExplorer software • DriveExecutive software	The *Device* parameters and *Host* parameters begin with parameter 01. For example, *Device* **Parameter 01 - [Port Number]** and *Host* **Parameter 01 - [Net to Drv DL 01]** are parameter 01 as indicated by this manual.
• Explicit Messaging	See Chapter 6, Using Explicit Messaging and Appendix C, DeviceNet Objects for details.

How Parameters Are Organized

The *Device* parameters and *Host* parameters are separately displayed in a **Numbered List** view order.

Device Parameters

Parameter No.	Name and Description	Details
01	**[Port Number]** Displays the drive port into which the option module is installed. Typically, this will be Port 4, 5 or 6.	Minimum: 0 Maximum: 7 Type: Read Only
02	**[DLs From Net Cfg]** Sets the number of contiguous controller-to-drive Datalinks (additional parameters) that are included in the network I/O connection. Logic Command and Reference are always included in the I/O connection. This parameter controls how many of the contiguous *Host* **[DL From Net xx]** parameters (16 maximum) are active. For example, if this parameter value is set to '5', then *Host* **Parameters 01 - [DL From Net 01]** through **05 - [DL From Net 05]** will be updated.	Default: 0 Minimum: 0 Maximum: 16 Type: Read/Write Reset Required: Yes
03	**[DLs From Net Act]** Displays the value of *Device* **Parameter 02 - [DLs From Net Cfg]** at the time the drive was reset. This is the number of actual contiguous controller-to-drive Datalinks that the drive is expecting.	Minimum: 0 Maximum: 16 Type: Read Only
04	**[DLs To Net Cfg]** Sets the number of contiguous drive-to-controller Datalinks (additional parameters) that are included in the network I/O connection. Logic Status and Feedback are always included in the I/O connection. This parameter controls how many of the contiguous *Host* **[DL To Net xx]** parameters (16 maximum) are active. For example, if this parameter value is set to '5', then *Host* **Parameters 17 - [DL To Net 01]** through **21 - [DL To Net 05]** will be updated.	Default: 0 Minimum: 0 Maximum: 16 Type: Read/Write Reset Required: Yes
05	**[DLs To Net Act]** Displays the value of *Device* **Parameter 04 - [DLs To Net Cfg]** at the time the drive was reset. This is the number of actual contiguous drive-to-controller Datalinks that the controller is expecting.	Minimum: 0 Maximum: 16 Type: Read Only
06	**[Net Addr Src]** Displays the source from which the option module's node address is taken. This will be either the Node Address switches (Figure 1 on page 18) or the value of *Device* **Parameter 07- [Net Addr Cfg]**.	Values: 0 = Switches 1 = Parameters Type: Read Only

Parameter No.	Name and Description	Details	
07	**[Net Addr Cfg]** Sets the network node address for the option module when *Device* **Parameter 06 - [Net Addr Src]** is set to '1' (Parameters).	Default: Minimum: Maximum: Type: Reset Required:	63 0 63 Read/Write Yes
08	**[Net Addr Act]** Displays the actual network node address used by the option module.	Minimum: Maximum: Type:	0 63 Read Only
09	**[Net Rate Cfg]** Sets the network data rate at which the option module communicates when the Data Rate switch (Figure 2 on page 19) is set to position '3'. (Updates *Device* **Parameter 10 - [Net Rate Act]** after a reset.)	Default: Values: Type: Reset Required:	0 = 125 Kbps 0 = 125 Kbps 1 = 250 Kbps 2 = 500 Kbps 3 = Autobaud Read/Write Yes
10	**[Net Rate Act]** Displays the actual network data rate being used by the option module.	Values: Type:	0 = 125 Kbps 1 = 250 Kbps 2 = 500 Kbps 3 = Autobauding Read Only
11	**[COS Status Mask]** Sets the mask for the 32-bit Logic Status word. Unless they are masked out, the bits in the Logic Status word are checked for changes when the option module is allocated using COS (Change of State). If a bit changes, it is reported as a change in the Change of State operation. If the mask bit is '0' (Off), the bit is ignored. If the mask bit is '1' (On), the bit is checked. **Important:** The bit definitions in the Logic Status word for PowerFlex 750-Series drives are shown in Appendix D.	Default: Minimum: Maximum: Type: Reset Required:	0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 1111 1111 1111 1111 1111 1111 1111 1111 Read/Write No
12	**[COS Fdbk Change]** Sets the amount of acceptable error (positive or negative) that the Feedback word can change before it is reported as a change in the COS (Change of State) operation.	Default: Minimum: Maximum: Type: Reset Required:	0 0.000 3.40282×10^{38} Read/Write No
13	**[COS/Cyc Interval]** Displays the amount of time that a scanner will wait to check for data in the option module. When COS (Change of State) data exchange has been configured, this is the maximum amount of time between scans. Scans will occur sooner if data changes. When Cyclic data exchange has been configured, this interval is the fixed time between scans.	Minimum: Maximum: Type:	0.000 seconds 65.535 seconds Read Only

Parameter No.	Name and Description	Details
14	**[Reset Module]** No action if set to '0' (Ready). Resets the option module if set to '1' (Reset Module). Restores the option module to its factory default settings if set to '2' (Set Defaults). This parameter is a command. It will be reset to '0' (Ready) after the command has been performed. When performing a Set Defaults, the drive may detect a conflict. If this occurs, the drive will not allow a Set Defaults action. You must resolve the conflict before attempting a Set Defaults action for the option module.	Default: 0 = Ready Values: 0 = Ready 1 = Reset Module 2 = Set Defaults Type: Read/Write Reset Required: No

ATTENTION: Risk of injury or equipment damage exists. If the option module is transmitting I/O that controls the drive, the drive may fault when you reset the option module. Determine how your drive will respond before resetting the option module.

Host Parameters

Parameter No.	Name and Description	Details
01	**[DL From Net 01]**	Default: 0
02	**[DL From Net 02]**	Default: 0
03	**[DL From Net 03]**	Default: 0
04	**[DL From Net 04]**	Default: 0
05	**[DL From Net 05]**	Default: 0
06	**[DL From Net 06]**	Default: 0
07	**[DL From Net 07]**	Default: 0
08	**[DL From Net 08]**	Default: 0
09	**[DL From Net 09]**	Default: 0
10	**[DL From Net 10]**	Default: 0
11	**[DL From Net 11]**	Default: 0
12	**[DL From Net 12]**	Default: 0
13	**[DL From Net 13]**	Default: 0
14	**[DL From Net 14]**	Default: 0
15	**[DL From Net 15]**	Default: 0
16	**[DL From Net 16]** Sets the port number and parameter number to which the selected Datalinks should connect. Each selected port/parameter will be written with data received from the network. These are parameters that are written by the controller (outputs from the controller). If setting the value manually, the parameter value = (10000 * port number) + (destination parameter number). For example, suppose you want to use *Host* **Parameter 01 - [DL From Net 01]** to write to Parameter 01 of an optional encoder module plugged into drive Port 5. The value for *Host* **Parameter 01 - [DL From Net 01]** would be 50001 [(10000 * 5) + 1].	Default: 0 Minimum: 0 Maximum: 159999 Type: Read/Write Reset Required: No

Parameter No.	Name and Description	Details
17	**[DL To Net 01]**	Default: 0
18	**[DL To Net 02]**	Default: 0
19	**[DL To Net 03]**	Default: 0
20	**[DL To Net 04]**	Default: 0
21	**[DL To Net 05]**	Default: 0
22	**[DL To Net 06]**	Default: 0
23	**[DL To Net 07]**	Default: 0
24	**[DL To Net 08]**	Default: 0
25	**[DL To Net 09]**	Default: 0
26	**[DL To Net 10]**	Default: 0
27	**[DL To Net 11]**	Default: 0
28	**[DL To Net 12]**	Default: 0
29	**[DL To Net 13]**	Default: 0
30	**[DL To Net 14]**	Default: 0
31	**[DL To Net 15]**	Default: 0
32	**[DL To Net 16]** Sets the port number and parameter number to which the selected Datalinks should connect. Each selected port/parameter will be read and their values transmitted over the network to the controller. These are parameters that are read by the controller (inputs to the controller). If setting the value manually, the parameter value = (10000 * port number) + (origination parameter number). For example, suppose you want to use *Host* **Parameter 17 - [DL To Net 01]** to read Parameter 02 of an optional I/O module plugged into drive Port 6. The value for *Host* **Parameter 17 - [DL To Net 01]** would be 60002 [(10000 * 6) + 2].	Default: 0 Minimum: 0 Maximum: 159999 Type: Read/Write Reset Required: No
33	**[Comm Flt Action]** Sets the action that the option module and drive takes if the option module detects that I/O communication has been disrupted. This setting is effective only if I/O that controls the drive is transmitted through the option module. When communication is re-established, 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. *Host* **Parameter 33 - [Comm Flt Action]** lets you determine the action of the option module and connected drive if I/O communication is disrupted. By default, this parameter faults the drive. You may configure this parameter so that the drive continues to run, however, precautions should be taken to verify that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).

Parameter No.	Name and Description	Details
34	**[Idle Flt Action]** Sets the action that the option module and drive take if the option module 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 option module. 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. *Host* **Parameter 34 - [Idle Flt Action]** lets you determine the action of the option module and connected drive when the controller is idle. By default, this parameter faults the drive. You may configure this parameter so that the drive continues to run, however, precautions should be taken to verify that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a controller in idle state).	
35	**[Peer Flt Action]** Reserved for future use. This parameter is functional. However, since the option module does not support peer I/O, any entered value is not used.	
36	**[Msg Flt Action]** Sets the action that the option module and drive take if the option module detects that explicit messaging— only when used for drive control via the PCCC or the CIP Register Object—has been disrupted. When explicit messaging is re-established, data is automatically received/sent 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. *Host* **Parameter 36 - [Msg Flt Action]** lets you determine the action of the option module and connected drive if explicit messaging for drive control is disrupted. By default, this parameter faults the drive. You may configure this parameter so that the drive continues to run, however, precautions should be taken to verify that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).	
37	**[Flt Cfg Logic]** Sets the Logic Command data that is sent to the drive if any of the following is true: • *Host* **Parameter 33 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • *Host* **Parameter 34 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle. • *Host* **Parameter 36 - [Msg Flt Action]** is set to '4' (Send Flt Cfg) and explicit messaging for drive control is disrupted. **Important:** The bit definitions in the Logic Command word for PowerFlex 750-Series drives are shown in Appendix D.	Default: 0000 0000 0000 0000 0000 0000 0000 0000 Minimum: 0000 0000 0000 0000 0000 0000 0000 0000 Maximum: 1111 1111 1111 1111 1111 1111 1111 1111 Type: Read/Write Reset Required: No

Parameter No.	Name and Description	Details
38	**[Flt Cfg Ref]** Sets the Reference data that is sent to the drive if any of the following is true: • *Host* **Parameter 33 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • *Host* **Parameter 34 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle. • *Host* **Parameter 36 - [Msg Flt Action]** is set to '4' (Send Flt Cfg) and explicit messaging for drive control is disrupted.	Default: 0 Minimum: -3.40282×10^{38} Maximum: 3.40282×10^{38} Type: Read/Write Reset Required: No
39	**[Flt Cfg DL 01]**	Default: 0
40	**[Flt Cfg DL 02]**	Default: 0
41	**[Flt Cfg DL 03]**	Default: 0
42	**[Flt Cfg DL 04]**	Default: 0
43	**[Flt Cfg DL 05]**	Default: 0
44	**[Flt Cfg DL 06]**	Default: 0
45	**[Flt Cfg DL 07]**	Default: 0
46	**[Flt Cfg DL 08]**	Default: 0
47	**[Flt Cfg DL 09]**	Default: 0
48	**[Flt Cfg DL 10]**	Default: 0
49	**[Flt Cfg DL 11]**	Default: 0
50	**[Flt Cfg DL 12]**	Default: 0
51	**[Flt Cfg DL 13]**	Default: 0
52	**[Flt Cfg DL 14]**	Default: 0
53	**[Flt Cfg DL 15]**	Default: 0
54	**[Flt Cfg DL 16]** Sets the data that is sent to the Datalink in the drive if any of the following is true: • *Host* **Parameter 33 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • *Host* **Parameter 34 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle. • *Host* **Parameter 36 - [Msg Flt Action]** is set to '4' (Send Flt Cfg) and explicit messaging for drive control is disrupted.	Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No

Notes:

DeviceNet Objects

This appendix presents information about the DeviceNet objects that can be accessed using Explicit Messages. For information on the format of Explicit Messages and example ladder logic programs, see Chapter 6, Using Explicit Messaging.

Object	Class Code		Page
	Hex.	Dec.	
Identity Object	0x01	1	100
Connection Object	0x05	5	101
Register Object	0x07	7	102
PCCC Object	0x67	103	103
DPI Device Object	0x92	146	106
DPI Parameter Object	0x93	147	109

Object	Class Code		Page
	Hex.	Dec.	
DPI Fault Object	0x97	151	115
DPI Alarm Object	0x98	152	117
DPI Diagnostic Object	0x99	153	119
DPI Time Object	0x9B	155	121
Host DPI Parameter Object	0x9F	159	123

TIP See the DeviceNet specification for more information about DeviceNet objects. Information about the DeviceNet specification is available on the ODVA website (http://www.odva.org).

Supported Data Types

Data Type	Description
BOOL	8-bit value -- low bit is true or false
BOOL[x]	Array of n bits
CONTAINER	32-bit parameter value - sign extended if necessary
DINT	32-bit signed integer
INT	16-bit signed integer
LWORD	64-bit unsigned integer
REAL	32-bit floating point
SHORT_STRING	Struct of: USINT length indicator (L); USINT[L] characters
SINT	8-bit signed integer
STRINGN	Struct of: UINT character length indicator (W); UINT length indicator (L); USINT[W x L] string data
STRING[x]	Array of n characters
STRUCT	Structure name only - no size in addition to elements
TCHAR	8-bit or 16-bit character
UDINT	32-bit unsigned integer
UINT	16-bit unsigned integer
USINT	8-bit unsigned integer

Identity Object

Class Code

Hexadecimal	Decimal
0x01	1

Services

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

Instances

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

Instance	Description
0	Class
1	Host
2…15	Peripherals on Ports 1…14

Class Attributes

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

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Vendor ID	UINT	1 = Allen-Bradley®
2	Get	Device Type	UINT	141 = PowerFlex® 750-Series via DeviceNet
3	Get	Product Code	UINT	Number identifying product name and rating
4	Get	Revision: Major Minor	STRUCT of: USINT USINT	 Value varies Value varies
5	Get	Status	UINT	Bit 0 = Owned Bit 8 = Minor recoverable fault Bit 10 = Major recoverable fault
6	Get	Serial Number	UDINT	Unique 32-bit number
7	Get	Product Name	SHORT_STRING	Product name and rating

Connection Object

Class Code

Hexadecimal	Decimal
0x05	5

Services

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

Instances

Instance	Description
2	Polled I/O Connection
4	Change of State/Cyclic Connection
6…10	Explicit Message Connection

Instance Attributes

See the DeviceNet specification for more information.

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	State	USINT	0 = Nonexistent 1 = Configuring 2 = Waiting for connection ID 3 = Established 4 = Timed out
2	Get	Instance Type	USINT	0 = Explicit message 1 = I/O message
3	Get	Transport	USINT	The Transport Class Trigger for this instance
4	Get	Produced Cnxn ID	USINT	CAN Identifier to transmit on
5	Get	Consumed Cnxn ID	USINT	CAN Identifier to receive on
6	Get	Initial Comm Char	USINT	Defines the DeviceNet message groups that the Tx/Rx Cnxn's apply
7	Get	Produced Cnxn Size	UINT	Max bytes to transmit across this connection
8	Get	Consumed Cnxn Size	UINT	Max bytes to receive across this connection
9	Get/Set	EPR	UINT	Expected Packet Rate (timer resolution = 1 msec.)
12	Get/Set	Watchdog Action	USINT	0 = Transition to timed out 1 = Auto delete 2 = Auto reset
13	Get	Produced Path Length	UINT	Number of bytes of data in the produced connection path
14	Get	Produced Connection Path	ARRAY of UINT	Byte stream which defines Application objects whose data is to be produced by this Connection object
15	Get	Consumed Path Length	UINT	Number of bytes of data in the consumed connection path
16	Get	Consumed Connection Path	ARRAY of USINT	Byte stream which defines Application objects whose data is to be consumed by this Connection object
17	Get/Set	Production Inhibit Time	UNIT	Defines minimum time between new data production
18	Get/Set	Connection Timeout Multiplier	UNIT	Specifies the multiplier that is applied to the expected packet rate value to derive the value for the Inactivity/Watchdog timer

Register Object

Class Code

Hexadecimal	Decimal
0x07	7

Services

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

Instances

Instance	Description
1	All polled data being read from the option module (read-only)
2	All polled data that is written to the option module (read/write)
3	Logic Status and Feedback data (read-only)
4	Logic Command and Reference data (read/write)
5	DL To Net 01 (input data from option module to scanner) (read only)
6	DL From Net 01 (output data from scanner to option module) (read/write)
⋮	⋮
35	DL To Net 16 (input data from option module to scanner) (read only)
36	DL From Net 16 (output data from scanner to option module) (read/write)
37	Logic Status and Feedback data (read-only)
38	Masked Logic Command (1) (read/write)
39	Logic Status data (read only)
40	Logic Command data (read/write)
41	Feedback data (read only)
42	Reference data (read/write)

(1) The mask command DWORD is set to the value of the first DWORD of the data where there are ones in the second DWORD of the data. Only the bits of the Logic Command that have the corresponding mask bit set are applied.

Class Attributes

Attribute ID	Access Rule	Name
1	Read	Revision
2	Read	Maximum Instance
3	Read	Number of Instances
100	Read/Write	Timeout

Instance Attributes

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

(1) For this attribute, the Access Rule is Get if Direction = 0. The Access Rule is Set if Direction = 1.

PCCC Object

Class Code

Hexadecimal	Decimal
0x67	103

Services

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

Instances

Supports Instance 1.

Class Attributes

Not supported.

Instance Attributes

Not supported.

Message Structure for Execute_PCCC

Request		
Name	**Data Type**	**Description**
Length	USINT	Length of requestor ID
Vendor	UINT	Vendor number of requestor
Serial Number	UDINT	ASA serial number of requestor
Other	Product Specific	Identifier of user, task, etc. on the requestor
CMD	USINT	Command byte
STS	USINT	0
TNSW	UINT	Transport word
FNC	USINT	Function code; not used for all CMDs.
PCCC_params	ARRAY of USINT	CMD/FNC specific parameters

Response		
Name	**Data Type**	**Description**
Length	USINT	Length of requestor ID
Vendor	UINT	Vendor number of requestor
Serial Number	UDINT	ASA serial number of requestor
Other	Product Specific	Identifier of user, task, etc. on the requestor
CMD	USINT	Command byte
STS	USINT	Status byte
TNSW	UINT	Transport word. Same value as the request.
EXT_STS	USINT	Extended status; not used for all CMDs.
PCCC_results	ARRAY of USINT	CMD/FNC specific result data

Message Structure for Execute_Local_PCCC

Request		
Name	**Data Type**	**Description**
CMD	USINT	Command byte
STS	USINT	0
TNSW	UINT	Transport word
FNC	USINT	Function code; not used for all CMDs
PCCC_params	ARRAY of USINT	CMD/FNC specific parameters

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

The option module supports the following PCCC command types:

CMD	FNC	Description
0x06	0x03	Identify host and some status
0x0F	0x67	PLC-5 typed write
0x0F	0x68	PLC-5 typed read
0x0F	0x95	Encapsulate other protocol
0x0F	0xA2	SLC 500 protected typed read with 3 address fields
0x0F	0xAA	SLC 500 protected typed write with 3 address fields
0x0F	0x00	Word range read
0x0F	0x01	Word range write

For more information regarding PCCC commands, see the DF1 Protocol and Command Set Manual, publication 1770-6.5.16.

N-Files

N-File	Description	
N42	This N-file lets you read and write some values configuring the port.	
N42:3	Time-out (read/write): Time (in seconds) allowed between messages to the N45 file. If the option module does not receive a message in the specified time, it performs the fault action that is configured in its [Comm Flt Action] parameter. A valid setting is between 1 and 32767 seconds (5…20 seconds is recommended).	
N42:7	Option Module Port Number (read only): Drive port in which option module resides.	
N42:8	Peer Option Modules (read only): Bit field of devices with peer messaging capabilities.	
N45	This N-file lets you read and write control I/O messages. You can write control I/O messages only when all of the following conditions are true: • The option module is not receiving I/O from a scanner. For example, there is no scanner on the network, the scanner is in idle (program) mode, the scanner is faulted, or the option module is not mapped to the scanner. • The option module is configured to receive I/O (for example, the [DLs From Net 01-16] parameters). • The value of N42:3 is set to a nonzero value.	
	Write	*Read*
N45:0	Logic Command (least significant)	Logic Status (least significant)
N45:1	Logic Command (most significant)	Logic Status (most significant)
N45:2	Reference (least significant)	Feedback (least significant)
N45:3	Reference (most significant)	Feedback (most significant)
N45:4	DL From Net 01 (least significant)	DL To Net 01 (least significant)
N45:5	DL From Net 01 (most significant)	DL To Net 01 (most significant)
N45:6	DL From Net 02 (least significant)	DL To Net 02 (least significant)
N45:7	DL From Net 02 (most significant)	DL To Net 02 (most significant)
N45:8	DL From Net 03 (least significant)	DL To Net 03 (least significant)
N45:9	DL From Net 03 (most significant)	DL To Net 03 (most significant)
N45:10	DL From Net 04 (least significant)	DL To Net 04 (least significant)
N45:11	DL From Net 04 (most significant)	DL To Net 04 (most significant)
N45:12	DL From Net 05 (least significant)	DL To Net 05 (least significant)
N45:13	DL From Net 05 (most significant)	DL To Net 05 (most significant)
N45:14	DL From Net 06 (least significant)	DL To Net 06 (least significant)
N45:15	DL From Net 06 (most significant)	DL To Net 06 (most significant)
N45:16	DL From Net 07 (least significant)	DL To Net 07 (least significant)
N45:17	DL From Net 07 (most significant)	DL To Net 07 (most significant)
N45:18	DL From Net 08 (least significant)	DL To Net 08 (least significant)
N45:19	DL From Net 08 (most significant)	DL To Net 08 (most significant)
N45:20	DL From Net 09 (least significant)	DL To Net 09 (least significant)
N45:21	DL From Net 09 (most significant)	DL To Net 09 (most significant)
N45:22	DL From Net 10 (least significant)	DL To Net 10 (least significant)
N45:23	DL From Net 10 (most significant)	DL To Net 10 (most significant)
N45:24	DL From Net 11 (least significant)	DL To Net 11 (least significant)
N45:25	DL From Net 11 (most significant)	DL To Net 11 (most significant)
N45:26	DL From Net 12 (least significant)	DL To Net 12 (least significant)
N45:27	DL From Net 12 (most significant)	DL To Net 12 (most significant)
N45:28	DL From Net 13 (least significant)	DL To Net 13 (least significant)
N45:29	DL From Net 13 (most significant)	DL To Net 13 (most significant)
N45:30	DL From Net 14 (least significant)	DL To Net 14 (least significant)
N45:31	DL From Net 14 (most significant)	DL To Net 14 (most significant)
N45:32	DL From Net 15 (least significant)	DL To Net 15 (least significant)
N45:33	DL From Net 15 (most significant)	DL To Net 15 (most significant)
N45:34	DL From Net 16 (least significant)	DL To Net 16 (least significant)
N45:35	DL From Net 16 (most significant)	DL To Net 16 (most significant)

DPI Device Object

Class Code

Hexadecimal	Decimal
0x92	146

Services

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

Instances

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

Instances		Device
(Hex.)	(Dec.)	
0x0000…0x3FFF	0…16383	Host Drive
0x4000…0x43FF	16384…17407	Option Module
0x4400…0x47FF	17408…18431	Port 1
0x4800…0x4BFF	18432…19455	Port 2
0x4C00…0x4FFF	19456…20479	Port 3
0x5000…0x53FF	20480…21503	Port 4
0x5400…0x57FF	21504…22527	Port 5
0x5800…0x5BFF	22528…23551	Port 6
0x5C00…0x5FFF	23552…24575	Port 7
0x6000…0x63FF	24576…25599	Port 8
0x6400…0x67FF	25600… 26623	Port 9
0x6800…0x6BFF	26624…27647	Port 10
0x6C00…0x6FFF	27648…28671	Port 11
0x7000…0x73FF	28672…29695	Port 12
0x7400…0x77FF	29696…30719	Port 13
0x7800…0x7BFF	30720…31743	Port 14

Example	Description
0	Class Attributes (Drive)
1	Drive Component 1
2	Drive Component 2
⋮	⋮
16384	Class Attributes (Option Module)
16385	Option Module Component 1
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Family Code	USINT	0x00 = DPI Peripheral 0x90 = PowerFlex 755 0xA0 = 20-750-xxxx Series Option Module 0xFF = HIM
1	Get	Family Text	STRING[16]	Text identifying the device.
2	Set	Language Code	USINT	0 = English 1 = French 2 = Spanish 3 = Italian 4 = German 5 = Japanese 6 = Portuguese 7 = Mandarin Chinese 9 = Dutch 10 = Korean
3	Get	Product Series	USINT	1 = A 2 = B …
4	Get	Number of Components	USINT	Number of components (for example, main control board, I/O boards) in the device.
5	Set	User Definable Text	STRING[16]	Text identifying the device with a user-supplied name.
6	Get	Status Text	STRING[12]	Text describing the status of the device.
7	Get	Configuration Code	USINT	Identification of variations.
8	Get	Configuration Text	STRING[16]	Text identifying a variation of a family device.
9	Get	Brand Code	UINT	0x0001 = Allen-Bradley
11	Get	NVS Checksum	UINT	A 16-bit checksum of the Nonvolatile Storage in a device.
12	Get	Class Revision	UINT	2 = DPI
13	Get	Character Set Code	USINT	0 = SCANport HIM 1 = ISO 8859-1 (Latin 1) 2 = ISO 8859-2 (Latin 2) 3 = ISO 8859-3 (Latin 3) 4 = ISO 8859-4 (Latin 4) 5 = ISO 8859-5 (Cyrillic) 6 = ISO 8859-6 (Arabic) 7 = ISO 8859-7 (Greek) 8 = ISO 8859-8 (Hebrew) 9 = ISO 8859-9 (Turkish) 10 = ISO 8859-10 (Nordic) 255 = ISO 10646 (Unicode)
15	Get	Languages Supported	STRUCT of: USINT USINT[n]	 Number of Languages Language Codes (see Class Attribute 2)
16	Get	Date of Manufacture	STRUCT of: UINT USINT USINT	 Year Month Day
17	Get	Product Revision	STRUCT of: USINT USINT	 Major Firmware Release Minor Firmware Release
18	Get	Serial Number	UDINT	Value between 0x00000000 and 0xFFFFFFFF
19	Set	Language Selected	USINT	0 = Default (HIM will prompt at startup) 1 = Language was selected (no prompt)
20	Set	Customer-Generated Firmware	STRING[36]	GUID (Globally Unique Identifier) identifying customer firmware upgraded into the device.
30	Get	International Status Text	STRINGN	Text describing the status of device with support for Unicode.

Attribute ID	Access Rule	Name	Data Type	Description
31	Get/Set	International User Definable Text	STRINGN	Text identifying the device with a user-supplied name with support for Unicode.
34	Get	Key Information	STRUCT of: UDINT UDINT UINT UINT UINT USINT USINT USINT USINT USINT USINT[16]	 Rating Code Device Serial Number Customization Code Customization Revision Brand Code Family Code Config Code Language Code Major Revision Minor Revision Customer-Generated Firmware UUID
35	Get	NVS CRC	UDINT	A 32-bit CRC of the Non-Volatile Storage in a device.
39	Get	SI Driver Code	UINT	Code identifying the protocol between the device and host.
128	Get	Customization Code	UINT	Code identifying the customized device.
129	Get	Customization Revision Number	UINT	Revision of the customized device.
130	Get	Customization Device Text	STRING[32]	Text identifying the customized device.

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
3	Get	Component Name	STRING[32]	Name of the component
4	Get	Component Firmware Revision	STRUCT of: USINT USINT	 Major Revision Minor Revision
8	Get	Component Serial Number	UDINT	Value between 0x00000000 and 0xFFFFFFFF
9	Get	International Component Name	STRINGN	Name of the component with support for Unicode.

DPI Parameter Object

Class Code

Hexadecimal	Decimal
0x93	147

To access 'Host Config' parameters, use the Host DPI Parameter Object (Class Code 0x9F).

Instances

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

Instances		Device
(Hex.)	(Dec.)	
0x0000…0x3FFF	0…16383	Host Drive
0x4000…0x43FF	16384…17407	Option Module
0x4400…0x47FF	17408…18431	Port 1
0x4800…0x4BFF	18432…19455	Port 2
0x4C00…0x4FFF	19456…20479	Port 3
0x5000…0x53FF	20480…21503	Port 4
0x5400…0x57FF	21504…22527	Port 5
0x5800…0x5BFF	22528…23551	Port 6
0x5C00…0x5FFF	23552…24575	Port 7
0x6000…0x63FF	24576…25599	Port 8
0x6400…0x67FF	25600…26623	Port 9
0x6800…0x6BFF	26624…27647	Port 10
0x6C00…0x6FFF	27648…28671	Port 11
0x7000…0x73FF	28672…29695	Port 12
0x7400…0x77FF	29696…30719	Port 13
0x7800…0x7BFF	30720…31743	Port 14

Example	Description
0	Class Attributes (Drive)
1	Drive Parameter 1 Attributes
2	Drive Parameter 2 Attributes
⋮	⋮
16384	Class Attributes (Option Module)
16385	Option Module Parameter 1 Attributes
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Number of Instances	UINT	Number of parameters in the device
1	Set	Write Protect Password	UINT	0 = Password disabled n = Password value
2	Set	NVS Command Write	USINT	0 = No Operation 1 = Store values in active memory to NVS 2 = Load values in NVS to active memory 3 = Load default values to active memory 4 = Partial defaults 5 = System defaults
3	Get	NVS Parameter Value Checksum	UINT	Checksum of all parameter values in a user set in NVS
4	Get	NVS Link Value Checksum	UINT	Checksum of parameter links in a user set in NVS
5	Get	First Accessible Parameter	UINT	First parameter available if parameters are protected by passwords. A '0' indicates that all parameters are protected.
7	Get	Class Revision	UINT	2 = DPI
8	Get	First Parameter Processing Error	UINT	The first parameter that has been written with a value outside of its range. A '0' indicates no errors.
9	Set	Link Command	USINT	0 = No Operation 1 = Clear All Parameter Links (This does not clear links to function blocks.)

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
6	Get	DPI Offline Read Full	STRUCT of:	
			BOOL[32]	Descriptor
			CONTAINER	Offline Minimum value
			CONTAINER	Offline Maximum value
			CONTAINER	Offline Default value
			STRING[16]	Parameter name
			STRING[4]	Offline parameter units
			UINT	Online minimum parameter instance
			UINT	Online maximum parameter instance
			UINT	Online default parameter instance
			UINT	Multiplier parameter instance
			UINT	Divisor parameter instance
			UINT	Base parameter instance
			UINT	Offset parameter instance
			USINT	Formula number
			USINT	Pad byte (always zero)
			UINT	Help instance
			UINT	Pad word (always a value of zero)
			CONTAINER	Parameter value
			UINT	Multiplier
			UNIT	Divisor
			UNIT	Base
			INT	Offset
7	Get	DPI Online Read Full	STRUCT of:	
			BOOL[32]	Descriptor (see page 112)
			CONTAINER(1)	Parameter value
			CONTAINER	Minimum value
			CONTAINER	Maximum value
			CONTAINER	Default value
			UINT	Next parameter
			UINT	Previous parameter
			STRING[4]	Units (for example, amps, Hz)
			UINT	Multiplier (2)
			UINT	Divisor (2)
			UINT	Base (2)
			INT	Offset (2)
			USINT[3]	Link (source of the value) (0 = no link)
			USINT	Always zero (0)
			STRING[16]	Parameter name
8	Get	DPI Descriptor	BOOL[32]	Descriptor (see page 112)
9	Get/Set	DPI Parameter Value	Various	Parameter value in NVS. (3)
10	Get/Set	DPI RAM Parameter Value	Various	Parameter value in temporary memory. Valid only for DPI drives.
11	Get/Set	DPI Link	USINT[3]	Link (parameter or function block that is the source of the value) (0 = no link)
12	Get	Help Object Instance	UINT	ID for help text for this parameter
13	Get	DPI Read Basic	STRUCT of:	
			BOOL[32]	Descriptor (see page 112)
			CONTAINER	Parameter value
			CONTAINER	Minimum value
			CONTAINER	Maximum value
			CONTAINER	Default value
			STRING[16]	Parameter name
			STRING[4]	Units (for example, amps, Hz)
14	Get	DPI Parameter Name	STRING[16]	Parameter name
15	Get	DPI Parameter Alias	STRING[16]	Customer-supplied parameter name.

Attribute ID	Access Rule	Name	Data Type	Description
16	Get	Parameter Processing Error	USINT	0 = No error 1 = Value is less than the minimum 2 = Value is greater than the maximum
18	Get	International DPI Offline Parameter Text	Struct of: STRINGN STRINGN	 International parameter name International offline units
19	Get	International DPI Online Parameter Text	Struct of: STRINGN STRINGN	 International parameter name International online units
20	Get	International DPI Online Read Full	Struct of: BOOL[32] CONTAINER CONTAINER CONTAINER CONTAINER UINT UINT UINT UINT UINT INT USINT[3] USINT BOOL[32] STRINGN STRINGN	 Descriptor Parameter value Online minimum value Online maximum value Online default value Next Previous Multiplier Divisor Base Offset Link Pad word (always zero) Extended descriptor International parameter name International online parameter units
21	Get	DPI Extended Descriptor	UDINT	Extended Descriptor (see page 113)
22	Get	International DPI Offline Read Full	Struct of: BOOL CONTAINER CONTAINER CONTAINER UINT UINT UINT UINT UINT UINT UINT USINT USINT UINT UINT CONTAINER UINT UINT UINT INT BOOL[32] STRINGN STRINGN	 Descriptor Offline minimum value Offline maximum value Offline default value Online minimum parameter instance Online maximum parameter instance Online default parameter instance Multiplier parameter instance Divisor parameter instance Base parameter instance Offset parameter instance Formula number Pad word (always zero) Help instance Pad word (always a value of zero) Parameter value Multiplier Divisor Base Offset Extended DPI descriptor International DPI parameter name International DPI offline parameter units

(1) A CONTAINER is a 32-bit block of data that contains the data type used by a parameter value. If signed, the value is sign extended. Padding is used in the CONTAINER to ensure that it is always 32-bits.

(2) This value is used in the formulas used to convert the parameter value between display units and internal units. See Formulas for Converting on page 114.

(3) Do NOT continually write parameter data to NVS. See the attention on page 65.

Descriptor Attributes

Bit	Name	Description
0	Data Type (Bit 1)	Right bit is least significant bit (0). 000 = USINT used as an array of Boolean 001 = UINT used as an array of Boolean 010 = USINT (8-bit integer) 011 = UINT (16-bit integer) 100 = UDINT (32-bit integer) 101 = TCHAR ((8-bit (not Unicode) or 16-bits (Unicode)) 110 = REAL (32-bit floating point value) 111 = Use bits 16, 17, 18
1	Data Type (Bit 2)	
2	Data Type (Bit 3)	
3	Sign Type	0 = unsigned 1 = signed
4	Hidden	0 = visible 1 = hidden
5	Not a Link Sink	0 = May be the sink end of a link 1 = May not be the sink end of a link
6	Not Recallable	0 = Recallable from NVS 1 = Not Recallable from NVS
7	ENUM	0 = No ENUM text 1 = ENUM text
8	Writable	0 = Read only 1 = Read/write
9	Not Writable When Enabled	0 = Writable when enabled (for example, drive running) 1 = Not writable when enabled
10	Instance	0 = Parameter value is not a Reference to another parameter 1 = Parameter value refers to another parameter
11	Uses Bit ENUM Mask	This parameter instance supports the Bit ENUM Mask attribute. For more information, see the definition of the attribute.
12	Decimal Place (Bit 0)	Number of digits to the right of the decimal point. 0000 = 0 1111 = 15
13	Decimal Place (Bit 1)	
14	Decimal Place (Bit 2)	
15	Decimal Place (Bit 3)	
16	Extended Data Type (Bit 4)	Bit 16 is the least significant bit. 000 = Reserved 001 = UDINT used as an array of Boolean 010 = Reserved 011 = Reserved 100 = Reserved 101 = Reserved 110 = Reserved 111 = Reserved
17	Extended Data Type (Bit 5)	
18	Extended Data Type (Bit 6)	
19	Parameter Exists	Used to mark parameters that are not available to network tools.
20	Not Used	Reserved
21	Formula Links	Indicates that the Formula Data is derived from other parameters.
22	Access Level (Bit 1)	A 3-bit field that is used to control access to parameter data.
23	Access Level (Bit 2)	
24	Access Level (Bit 3)	
25	Writable ENUM	ENUM text: 0 = Read Only, 1 = Read/Write
26	Not a Link Source	0 = May be the source end of a link 1 = May not be the source end of a link
27	Enhanced Bit ENUM	Parameter supports enhanced bit ENUMs.
28	Enhanced ENUM	Parameter supports enhanced ENUMs.
29	Uses DPI Limits Object	Parameter uses the DPI Limits Object. Intelligent offline tools make use of the Limits Object to select limits and units.
30	Extended Descriptor	Parameter uses Extended Descriptor bits, which can be obtained by reading the DPI Extended Descriptor attribute for this parameter.
31	Always Upload/Download	Parameter shall always be included in uploads and downloads.

Extended Descriptor Attributes

Bit	Name	Description
0	Indirect Mode	0 = Analog (selects entire parameters) 1 = Digital (selects individual bits within parameters)
1	Indirect Type 0	Analog input list (Instance 0xFFFF)
2	Indirect Type 1	Digital input list (Instance 0xFFFE)
3	Indirect Type 2	Feedback list (Instance 0xFFFD)
4	Indirect Type 3	Analog output list (Instance 0xFFFC)
5	Indirect Type 4	Digital output list (Instance 0xFFFB)
6	Indirect Type 5	Undefined (Instance 0xFFFA)
7	Indirect Type 6	Undefined (Instance 0xFFF9)
8	Indirect Type 7	Undefined (Instance 0xFFF8)
9	Indirect Type 8	Undefined (Instance 0xFFF7)
10	Indirect Type 9	Undefined (Instance 0xFFF6)
11	Indirect Type 10	Undefined (Instance 0xFFF5)
12	Indirect Type 11	Undefined (Instance 0xFFF4)
13	Indirect Type 12	Undefined (Instance 0xFFF3)
14	Indirect Type 13	Undefined (Instance 0xFFF2)
15	Indirect Type 14	Parameter-specific list
16	FP Max Decimals Bit 0	These four bits are used on REAL parameters only. They indicate the maximum number of decimal places to be displayed for small values. A value of 0 indicates not to limit the number of decimal places used.
17	FP Max Decimals Bit 1	
18	FP Max Decimals Bit 2	
19	FP Max Decimals Bit 1	
20	Extended Parameter Reference	0 = Not an Extended Parameter Reference 1 = Extended Parameter Reference An Extended Parameter Reference contains a reference to another parameter. The value is formatted the same as an analog mode Indirect Selector parameter (SSpppp, where SS = slot number of device to which this Extended Parameter Reference is pointing, and pppp = number of the parameter or diagnostic item to which this Extended Parameter Reference is pointing). An Extended Parameter Reference can only select parameters unlike an Indirect Selector. An Extended Parameter Reference could be used to configure a Datalink or show the source of a Reference (among other uses).
21	Uses Rating Table Object	This parameter has rating-dependent defaults and limits that can be obtained from the Rating Table Object. The Offline Read Full will include the default value for the smallest rating and limits that will accommodate the full range of values that are allowed in the family of devices using this particular combination of Family Code and Config Code. The Online Read Full will include the rating-dependent default and limit values for this particular combination of Family Code, Config Code, and Rating Code.
22	Writable Referenced Parameter	This bit must be zero unless the parameter is an Extended Parameter Reference. If the parameter is an Extended Parameter Reference, then: 0 = The referenced parameter may be read-only or writable. 1 = The referenced parameter must always be writable (including while running).
23	Disallow Zero	This bit must be zero unless the parameter is an Indirect Selector or Extended Parameter Reference. If the parameter is an Indirect Selector or Extended Parameter Reference, then: 0 = Allow zero 1 = Disallow zero If this bit is cleared (indicating that a value of zero is allowed), the device must support the 'Zero Text' parameter attribute so that a software tool or HIM can obtain text from the Zero Text parameter attribute. If this bit is set (indicating that a value of zero is disallowed), a software tool or HIM will not allow the user to enter a value of zero.
24	Datalink Out	This bit is used by offline tools and indicates that this is a Datalink Out parameter. Bit 20 must also be set.
25	Datalink In	This bit is used by offline tools and indicates that this is a Datalink In parameter. Bits 20 and 22 must also be set.
26	Not Writable While IO Active	This parameter cannot be written if the I/O data being exchanged between the Host and the peripheral is valid.
27	Command Parameter	This parameter commands the drive to take an action, such as 'Reset Defaults' or 'Autotune', and then returns to a value of zero. Offline software tools will not allow setting this parameter to anything other than a value of zero. If an offline file contains a Command Parameter with a nonzero value, the offline software tool will change the value to zero. Note that command parameters cannot have values that do not return to zero.

Bit	Name	Description
28	Current Value Is Default	This bit identifies a parameter that will not change if a 'Reset Defaults' is commanded. For example, if a drive contains a Language parameter that is set to German, setting defaults will leave the parameter set to German. Likewise, if the parameter is set to French, setting defaults will leave the parameter set to French.
29	Use Zero Text	If the 'Disallow Zero' bit is set, this bit must be cleared. If the 'Disallow Zero' bit is cleared, then: 0 = Use Disabled Text parameter class attribute. 1 = Use Zero Text parameter instance attribute.
30-31	Reserved	Reserved

Formulas for Converting

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

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

Common Services

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

Object Specific Services

Service Code	Implemented for:		Service Name	Allocation Size (in bytes)	
	Class	Instance		Par. Number	Par. Value
0x4D	Yes	No	Get_Attributes_Scattered	4	4
0x4E	Yes	No	Set_Attributes_Scattered	4	4

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

Name	Data Type	Description
Parameter Number	UDINT	Parameter to read or write
Parameter Value	UDINT	Parameter value to read or write (zero when reading)

DPI Fault Object

Class Code

Hexadecimal	Decimal
0x97	151

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

Services

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

Instances

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

Instances		Device
(Hex.)	(Dec.)	
0x0000…0x3FFF	0…16383	Host Drive
0x4000…0x43FF	16384…17407	Option Module
0x4400…0x47FF	17408…18431	Port 1
0x4800…0x4BFF	18432…19455	Port 2
0x4C00…0x4FFF	19456…20479	Port 3
0x5000…0x53FF	20480…21503	Port 4
0x5400…0x57FF	21504…22527	Port 5
0x5800…0x5BFF	22528…23551	Port 6
0x5C00…0x5FFF	23552…24575	Port 7
0x6000…0x63FF	24576…25599	Port 8
0x6400…0x67FF	25600…26623	Port 9
0x6800…0x6BFF	26624…27647	Port 10
0x6C00…0x6FFF	27648…28671	Port 11
0x7000…0x73FF	28672…29695	Port 12
0x7400…0x77FF	29696…30719	Port 13
0x7800…0x7BFF	30720…31743	Port 14

Example	Description
0	Class Attributes (Drive)
1	Most Recent Drive Fault
2	Second Most Recent Drive Fault
⋮	⋮
16384	Class Attributes (Option Module)
16385	Most Recent Option Module Event
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Class Revision	UINT	Revision of object
2	Get	Number of Instances	UINT	Maximum number of faults/events that the device can record in its queue
3	Set	Fault Command Write	USINT	0 = No Operation 1 = Clear Fault/Event 2 = Clear Fault/Event Queue 3 = Reset Device
4	Get	Fault Trip Instance Read	UINT	Fault that tripped the device. For option modules, this value is always 1 when faulted.
5	Get	Fault Data List	STRUCT of: USINT USINT UINT[n]	 Number of parameters instances Pad byte (always zero) Array of parameter instance numbers
6	Get	Number of Recorded Faults	UINT	Number of faults/events in the queue. A '0' indicates the fault queue is empty.
7	Get	Fault Parameter Reference	UINT	Reserved

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Full/All Information	STRUCT of UINT STRUCT of: USINT USINT STRING[16] STRUCT of: LWORD BOOL[16] UINT CONTAINER[n]	Fault code Fault source DPI port DPI Device Object Fault text Fault time stamp Timer value (0 = timer not supported) BOOL[0]: (0 = invalid data, 1 = valid data) BOOL[1]: (0 = elapsed time, 1 = real time) BOOL[2…15]: Not used Help Object Instance Fault data
1	Get	Basic Information	STRUCT of UINT STRUCT of: USINT USINT STRUCT of: LWORD BOOL[16]	Fault code Fault source DPI port DPI Device Object Fault time stamp Timer value (0 = timer not supported) BOOL[0]: (0 = invalid data, 1 = valid data) BOOL[1]: (0 = elapsed time, 1 = real time) BOOL[2…15]: Not used
2	Get	International Fault Text	STRINGN	Text describing the fault with support for Unicode.

DPI Alarm Object

Class Code

Hexadecimal	Decimal
0x98	152

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

Services

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

Instances

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

Instances		Device
(Hex.)	(Dec.)	
0x0000…0x3FFF	0…16383	Host Drive

Only host devices can have alarms.

Example	Description
0	Class Attributes (Drive)
1	Most Recent Alarm
2	Second Most Recent Alarm
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Class Revision	UINT	Revision of object
2	Get	Number of Instances	UINT	Maximum number of alarms that the device can record in its queue
3	Set	Alarm Command Write	USINT	0 = No Operation 1 = Clear Alarm 2 = Clear Alarm Queue 3 = Reset Device
4	Get	Alarm Data List	STRUCT of: USINT USINT UINT[n]	 Number of parameter instances Pad byte (always zero) Array of parameter instance numbers
5	Get	Number of Recorded Alarms	UINT	Number of alarms in the queue. A '0' indicates the alarm queue is empty.

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Full/All Information	STRUCT of UINT	Alarm code
			STRUCT of:	Alarm source
			USINT	DPI port
			USINT	DPI Device Object
			STRING[16]	Alarm text
			STRUCT of:	Alarm time stamp
			LWORD	Timer value (0 = timer not supported)
			BOOL[16]	BOOL[0]: (0 = invalid data, 1 = valid data)
				BOOL[1]: (0 = elapsed time, 1 = real time)
				BOOL[2…15] Reserved
			UINT	Reserved
			CONTAINER[n]	Reserved
1	Get	Basic Information	STRUCT of UINT	Alarm code
			STRUCT of:	Alarm source
			USINT	DPI port
			USINT	DPI Device Object
			STRUCT of:	Alarm time stamp
			LWORD	Timer value (0 = timer not supported)
			BOOL[16]	BOOL[0]: (0 = invalid data, 1 = valid data)
				BOOL[1]: (0 = elapsed time, 1 = real time)
				BOOL[2…15] Reserved
2	Get	International Alarm Text	STRINGN	Text describing the alarm with support for Unicode.

DPI Diagnostic Object

Class Code

Hexadecimal	Decimal
0x99	153

Services

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

Instances

The number of instances depends on the maximum number of diagnostic items in the device. The total number of diagnostic items can be read in Instance 0, Attribute 2.

Instances		Device
(Hex.)	(Dec.)	
0x0000…0x3FFF	0…16383	Host Drive
0x4000…0x43FF	16384…17407	Option Module
0x4400…0x47FF	17408…18431	Port 1
0x4800…0x4BFF	18432…19455	Port 2
0x4C00…0x4FFF	19456…20479	Port 3
0x5000…0x53FF	20480…21503	Port 4
0x5400…0x57FF	21504…22527	Port 5
0x5800…0x5BFF	22528…23551	Port 6
0x5C00…0x5FFF	23552…24575	Port 7
0x6000…0x63FF	24576…25599	Port 8
0x6400…0x67FF	25600…26623	Port 9
0x6800…0x6BFF	26624…27647	Port 10
0x6C00…0x6FFF	27648…28671	Port 11
0x7000…0x73FF	28672…29695	Port 12
0x7400…0x77FF	29696…30719	Port 13
0x7800…0x7BFF	30720…31743	Port 14

Example	Description
0	Class Attributes (Drive)
1	Drive Diagnostic Item 1
2	Drive Diagnostic Item 2
⋮	⋮
16384	Class Attributes (Option Module)
16385	Option Module Diagnostic Item 1
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Class Revision	UINT	1
2	Get	Number of Instances	UINT	Number of diagnostic items in the device
3	Get	ENUM Offset	UINT	DPI ENUM object instance offset

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Full/All Information	STRUCT of:	
			BOOL[32]	Descriptor (see page 112)
			CONTAINER (1)	Value
			CONTAINER	Minimum value
			CONTAINER	Maximum value
			CONTAINER	Default value
			UINT	Pad Word
			UINT	Pad Word
			STRING[4]	Units (for example, amps, Hz)
			UINT	Multiplier (2)
			UINT	Divisor (2)
			UINT	Base (2)
			INT	Offset (2)
			UDINT	Link (source of the value) (0 = no link)
			STRING[16]	Diagnostic name text
1	Get/Set	Value	Various	Diagnostic item value
2	Get	International Diagnostic Item Text	Struct of:	
			STRINGN	Diagnostic name text
			STRINGN	Diagnostic units text
3	Get	International Full Read All	STRUCT of:	
			BOOL[32]	Descriptor
			CONTAINER	Value
			CONTAINER	Minimum
			CONTAINER	Maximum
			CONTAINER	Default
			UINT	Pad word
			UINT	Pad word
			UINT	Multiplier
			UINT	Divisor
			UINT	Base
			INT	Offset
			UDINT	Pad
			BOOL[32]	Extended descriptor
			STRINGN	Diagnostic name text
			STRINGN	Diagnostic units text

(1) A CONTAINER is a 32-bit block of data that contains the data type used by a value. If signed, the value is sign extended. Padding is used in the CONTAINER to ensure that it is always 32-bits.

(2) This value is used in the formulas used to convert the value between display units and internal units. See Formulas for Converting on page 114.

DPI Time Object

Class Code

Hexadecimal	Decimal
0x9B	155

Services

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

Instances

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

Instances		Device
(Hex.)	(Dec.)	
0x0000…0x3FFF	0…16383	Host Drive
0x4000…0x43FF	16384…17407	Option Module
0x4400…0x47FF	17408…18431	Port 1
0x4800…0x4BFF	18432…19455	Port 2
0x4C00…0x4FFF	19456…20479	Port 3
0x5000…0x53FF	20480…21503	Port 4
0x5400…0x57FF	21504…22527	Port 5
0x5800…0x5BFF	22528…23551	Port 6
0x5C00…0x5FFF	23552…24575	Port 7
0x6000…0x63FF	24576…25599	Port 8
0x6400…0x67FF	25600…26623	Port 9
0x6800…0x6BFF	26624…27647	Port 10
0x6C00…0x6FFF	27648…28671	Port 11
0x7000…0x73FF	28672…29695	Port 12
0x7400…0x77FF	29696…30719	Port 13
0x7800…0x7BFF	30720…31743	Port 14

Example	Description
0	Class Attributes (Drive)
1	Real Time Clock (Predefined) (not always supported)
2	Timer 1
3	Timer 2
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Class Revision	UINT	Revision of object
2	Get	Number of Instances	UINT	Number of timers in the object, excluding the real time clock that is predefined.
3	Get	First Device Specific Timer	UINT	Instance of the first timer that is not predefined.
4	Set	Time Command Write	USINT	0 = No Operation 1 = Clear all timers (Does not clear real time clock or read only timers)
5	Get	Number of Supported Time Zones	UINT	Number of time zones that are described in the Time Zone List attribute.
6	Get	Time Zone List	STRUCT	Identifies a time zone.
7	Get/Set	Active Time Zone ID	UINT	The ID field of the Time Zone List structure for the desired time zone.

Attribute ID	Access Rule	Name	Data Type	Description
8	Get	Active Time Zone Data	Struct of:	
			INT	Standard bias
			USINT	Standard month
			USINT	Standard day of week
			USINT	Standard week
			USINT	Standard hour
			USINT	Standard minute
			USINT	Standard second
			INT	Daylight offset
			USINT	Daylight month
			USINT	Daylight day of week
			USINT	Daylight week
			USINT	Daylight hour
			USINT	Daylight minute
			USINT	Daylight second
9	Get/Set	Custom Time Zone Data	Struct of:	
			INT	Standard bias
			USINT	Standard month
			USINT	Standard day of week
			USINT	Standard week
			USINT	Standard hour
			USINT	Standard minute
			USINT	Standard second
			INT	Daylight offset
			USINT	Daylight month
			USINT	Daylight day of week
			USINT	Daylight week
			USINT	Daylight hour
			USINT	Daylight minute
			USINT	Daylight second

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Read Full	STRUCT of: STRING[16] LWORD or STRUCT BOOL[16]	 Name of the timer Elapsed time in milliseconds unless timer is a real time clock (see attribute 2) See Attribute 3
1	Get	Timer Text	STRING[16]	Name of the timer
2	Get/Set	Timer Value	LWORD -or- STRUCT of: UINT USINT USINT USINT USINT USINT USINT	Elapsed time in milliseconds unless the timer is a real time clock. Real Time Clock Data: Milliseconds (0…999) Seconds (0…59) Minutes (0…59) Hours (0…23) Days (1…31) Months (1 = January, 12 = December) Years (since 1972)
3	Get	Timer Descriptor	BOOL[16]	BOOL[0]: (0 = invalid data, 1 = valid data) BOOL[1]: (0 = elapsed time, 1 = real time) BOOL[2…15]: Not used
4	Get	International Read Full	Struct of: STRINGN STRUCT BOOL[16]	 International timer text Timer value Timer descriptor
5	Get	International Timer Text	STRINGN	Name of this timer
6	Get	Clock Status	BOOL[32]	Identifies clock status
8	Get/Set	Number of Leap Seconds	INT	Identifies the current number of Leap Seconds.
9	Get	Clock Options	BOOL[32]	Identifies the optional functionality available in the device's System Clock.
10	Get/Set	Clock Options Enable	BOOL[32]	Identifies which of the clock's options are enabled.

Host DPI Parameter Object

Class Code

Hexadecimal	Decimal
0x9F	159

To access 'Device' parameters, use the DPI Parameter Object (Class Code 0x93).

Instances

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

Instances		Device
(Hex.)	(Dec.)	
0x0000…0x3FFF	0…16383	Reserved
0x4000…0x43FF	16384…17407	Option Module
0x4400…0x47FF	17408…18431	Port 1
0x4800…0x4BFF	18432…19455	Port 2
0x4C00…0x4FFF	19456…20479	Port 3
0x5000…0x53FF	20480…21503	Port 4
0x5400…0x57FF	21504…22527	Port 5
0x5800…0x5BFF	22528…23551	Port 6
0x5C00…0x5FFF	23552…24575	Port 7
0x6000…0x63FF	24576…25599	Port 8
0x6400…0x67FF	25600…26623	Port 9
0x6800…0x6BFF	26624…27647	Port 10
0x6C00…0x6FFF	27648…28671	Port 11
0x7000…0x73FF	28672…29695	Port 12
0x7400…0x77FF	29696…30719	Port 13
0x7800…0x7BFF	30720…31743	Port 14

Example	Description
16384	Class Attributes (Option Module)
16385	Option Module Parameter 1 Attributes
16386	Option Module Parameter 2 Attributes
⋮	⋮
17408	Class Attributes (HIM)
17409	HIM Parameter 1 Attributes
17410	HIM Parameter 2 Attributes
⋮	⋮

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Number of Instances	UINT	Number of parameters in the device
1	Set	Write Protect Password	UINT	0 = Password disabled n = Password
2	Set	NVS Command Write	USINT	0 = No Operation 1 = Store values in active memory to NVS 2 = Load values in NVS to active memory 3 = Load default values to active memory
3	Get	NVS Parameter Value Checksum	UINT	Checksum of all parameter values in a user set in NVS
4	Get	NVS Link Value Checksum	UINT	Checksum of parameter links in a user set in NVS
5	Get	First Accessible Parameter	UINT	First parameter available if parameters are protected by passwords. A '0' indicates that all parameters are protected.
7	Get	Class Revision	UINT	2 = DPI
8	Get	First Parameter Processing Error	UINT	The first parameter that has been written with a value outside of its range. A '0' indicates no errors.
9	Set	Link Command	USINT	0 = No Operation 1 = Clear All Parameter Links (This does not clear links to function blocks.)

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
6	Get	DPI Offline Read Full	STRUCT of:	
			BOOL[32]	Descriptor
			CONTAINER	Offline Minimum value
			CONTAINER	Offline Maximum value
			CONTAINER	Offline Default value
			STRING[16]	Parameter name
			STRING[4]	Offline parameter units
			UINT	Online minimum parameter instance
			UINT	Online maximum parameter instance
			UINT	Online default parameter instance
			UINT	Multiplier parameter instance
			UINT	Divisor parameter instance
			UINT	Base parameter instance
			UINT	Offset parameter instance
			USINT	Formula number
			USINT	Pad byte (always zero)
			UINT	Help instance
			UINT	Pad word (always a value of zero)
			CONTAINER	Parameter value
			UINT	Multiplier
			UNIT	Divisor
			UNIT	Base
			INT	Offset
7	Get	DPI Online Read Full	STRUCT of:	
			BOOL[32]	Descriptor (see page 126)
			CONTAINER[1]	Parameter value
			CONTAINER	Minimum value
			CONTAINER	Maximum value
			CONTAINER	Default value
			UINT	Next parameter
			UINT	Previous parameter
			STRING[4]	Units (for example, amps, Hz)
			UINT	Multiplier [2]
			UINT	Divisor [2]
			UINT	Base [2]
			INT	Offset [2]
			USINT[3]	Link (source of the value) (0 = no link)
			USINT	Always zero (0)
			STRING[16]	Parameter name
8	Get	DPI Descriptor	BOOL[32]	Descriptor (see page 126)
9	Get/Set	DPI Parameter Value	Various	Parameter value in NVS. [3]
10	Get/Set	DPI RAM Parameter Value	Various	Parameter value in temporary memory. Valid only for DPI drives.
11	Get/Set	DPI Link	USINT[3]	Link (parameter or function block that is the source of the value) (0 = no link)
12	Get	Help Object Instance	UINT	ID for help text for this parameter
13	Get	DPI Read Basic	STRUCT of:	
			BOOL[32]	Descriptor (see page 126)
			CONTAINER	Parameter value
			CONTAINER	Minimum value
			CONTAINER	Maximum value
			CONTAINER	Default value
			STRING[16]	Parameter name
			STRING[4]	Units (for example, amps, Hz)
14	Get	DPI Parameter Name	STRING[16]	Parameter name
15	Get	DPI Parameter Alias	STRING[16]	Customer supplied parameter name.

Attribute ID	Access Rule	Name	Data Type	Description
16	Get	Parameter Processing Error	USINT	0 = No error 1 = Value is less than the minimum 2 = Value is greater than the maximum
18	Get	International DPI Offline Parameter Text	Struct of: STRINGN STRINGN	 International parameter name International offline units
19	Get	International DPI Online Parameter Text	Struct of: STRINGN STRINGN	 International parameter name International online units
20	Get	International DPI Online Read Full	Struct of: BOOL[32] CONTAINER CONTAINER CONTAINER CONTAINER UINT UINT UINT UINT UINT INT USINT[3] USINT BOOL[32] STRINGN STRINGN	 Descriptor Parameter value Online minimum value Online maximum value Online default value Next Previous Multiplier Divisor Base Offset Link Pad word (always zero) Extended descriptor International parameter name International online parameter units
21	Get	DPI Extended Descriptor	UDINT	Extended Descriptor (see page 127)
22	Get	International DPI Offline Read Full	Struct of: BOOL CONTAINER CONTAINER CONTAINER UINT UINT UINT UINT UINT UINT UINT USINT USINT UINT UINT CONTAINER UINT UINT UINT INT BOOL[32] STRINGN STRINGN	 Descriptor Offline minimum value Offline maximum value Offline default value Online minimum parameter instance Online maximum parameter instance Online default parameter instance Multiplier parameter instance Divisor parameter instance Base parameter instance Offset parameter instance Formula number Pad word (always zero) Help instance Pad word (always a value of zero) Parameter value Multiplier Divisor Base Offset Extended DPI descriptor International DPI parameter name International DPI offline parameter units

(1) A CONTAINER is a 32-bit block of data that contains the data type used by a parameter value. If signed, the value is sign extended. Padding is used in the CONTAINER to ensure that it is always 32-bits.

(2) This value is used in the formulas used to convert the parameter value between display units and internal units. See Formulas for Converting on page 128.

(3) Do NOT continually write parameter data to NVS. See the attention on page 65.

Descriptor Attributes

Bit	Name	Description
0	Data Type (Bit 1)	Right bit is least significant bit (0). 000 = USINT used as an array of Boolean 001 = UINT used as an array of Boolean 010 = USINT (8-bit integer) 011 = UINT (16-bit integer) 100 = UDINT (32-bit integer) 101 = TCHAR ((8-bit (not Unicode) or 16-bits (Unicode)) 110 = REAL (32-bit floating point value) 111 = Use bits 16, 17, 18
1	Data Type (Bit 2)	
2	Data Type (Bit 3)	
3	Sign Type	0 = unsigned 1 = signed
4	Hidden	0 = visible 1 = hidden
5	Not a Link Sink	0 = May be the sink end of a link 1 = May not be the sink end of a link
6	Not Recallable	0 = Recallable from NVS 1 = Not Recallable from NVS
7	ENUM	0 = No ENUM text 1 = ENUM text
8	Writable	0 = Read only 1 = Read/write
9	Not Writable When Enabled	0 = Writable when enabled (for example, drive running) 1 = Not writable when enabled
10	Instance	0 = Parameter value is not a Reference to another parameter 1 = Parameter value refers to another parameter
11	Uses Bit ENUM Mask	This parameter instance supports the Bit ENUM Mask attribute. For more information, see the definition of the attribute.
12	Decimal Place (Bit 0)	Number of digits to the right of the decimal point. 0000 = 0 1111 = 15
13	Decimal Place (Bit 1)	
14	Decimal Place (Bit 2)	
15	Decimal Place (Bit 3)	
16	Extended Data Type (Bit 4)	Bit 16 is the least significant bit. 000 = Reserved 001 = UDINT used as an array of Boolean 010 = Reserved 011 = Reserved 100 = Reserved 101 = Reserved 110 = Reserved 111 = Reserved
17	Extended Data Type (Bit 5)	
18	Extended Data Type (Bit 6)	
19	Parameter Exists	Used to mark parameters that are not available to network tools.
20	Not Used	Reserved
21	Formula Links	Indicates that the Formula Data is derived from other parameters.
22	Access Level (Bit 1)	A 3-bit field that is used to control access to parameter data.
23	Access Level (Bit 2)	
24	Access Level (Bit 3)	
25	Writable ENUM	ENUM text: 0 = Read Only, 1 = Read/Write
26	Not a Link Source	0 = May be the source end of a link 1 = May not be the source end of a link
27	Enhanced Bit ENUM	Parameter supports enhanced bit ENUMs.
28	Enhanced ENUM	Parameter supports enhanced ENUMs.
29	Uses DPI Limits Object	Parameter uses the DPI Limits Object. Intelligent offline tools make use of the Limits Object to select limits and units.
30	Extended Descriptor	Parameter uses Extended Descriptor bits, which can be obtained by reading the DPI Extended Descriptor attribute for this parameter.
31	Always Upload/Download	Parameter shall always be included in uploads and downloads.

Extended Descriptor Attributes

Bit	Name	Description
0	Indirect Mode	0 = Analog (selects entire parameters) 1 = Digital (selects individual bits within parameters)
1	Indirect Type 0	Analog input list (Instance 0xFFFF)
2	Indirect Type 1	Digital input list (Instance 0xFFFE)
3	Indirect Type 2	Feedback list (Instance 0xFFFD)
4	Indirect Type 3	Analog output list (Instance 0xFFFC)
5	Indirect Type 4	Digital output list (Instance 0xFFFB)
6	Indirect Type 5	Undefined (Instance 0xFFFA)
7	Indirect Type 6	Undefined (Instance 0xFFF9)
8	Indirect Type 7	Undefined (Instance 0xFFF8)
9	Indirect Type 8	Undefined (Instance 0xFFF7)
10	Indirect Type 9	Undefined (Instance 0xFFF6)
11	Indirect Type 10	Undefined (Instance 0xFFF5)
12	Indirect Type 11	Undefined (Instance 0xFFF4)
13	Indirect Type 12	Undefined (Instance 0xFFF3)
14	Indirect Type 13	Undefined (Instance 0xFFF2)
15	Indirect Type 14	Parameter-specific list
16	FP Max Decimals Bit 0	These four bits are used on REAL parameters only. They indicate the maximum number of decimal places to be displayed for small values. A value of 0 indicates not to limit the number of decimal places used.
17	FP Max Decimals Bit 1	
18	FP Max Decimals Bit 2	
19	FP Max Decimals Bit 1	
20	Extended Parameter Reference	0 = Not an Extended Parameter Reference 1 = Extended Parameter Reference An Extended Parameter Reference contains a reference to another parameter. The value is formatted the same as an analog mode Indirect Selector parameter (SSpppp, where SS = slot number of device to which this Extended Parameter Reference is pointing, and pppp = number of the parameter or diagnostic item to which this Extended Parameter Reference is pointing). An Extended Parameter Reference can only select parameters unlike an Indirect Selector. An Extended Parameter Reference could be used to configure a Datalink or show the source of a Reference (among other uses).
21	Uses Rating Table Object	This parameter has rating-dependent defaults and limits that can be obtained from the Rating Table Object. The Offline Read Full will include the default value for the smallest rating and limits that will accommodate the full range of values that are allowed in the family of devices using this particular combination of Family Code and Config Code. The Online Read Full will include the rating-dependent default and limit values for this particular combination of Family Code, Config Code, and Rating Code.
22	Writable Referenced Parameter	This bit must be zero unless the parameter is an Extended Parameter Reference. If the parameter is an Extended Parameter Reference, then: 0 = The referenced parameter may be read-only or writable. 1 = The referenced parameter must always be writable (including while running).
23	Disallow Zero	This bit must be zero unless the parameter is an Indirect Selector or Extended Parameter Reference. If the parameter is an Indirect Selector or Extended Parameter Reference, then: 0 = Allow zero 1 = Disallow zero If this bit is cleared (indicating that a value of zero is allowed), the device must support the 'Zero Text' parameter attribute so that a software tool or HIM can obtain text from the Zero Text parameter attribute. If this bit is set (indicating that a value of zero is disallowed), a software tool or HIM will not allow the user to enter a value of zero.
24	Datalink Out	This bit is used by offline tools and indicates that this is a Datalink Out parameter. Bit 20 must also be set.
25	Datalink In	This bit is used by offline tools and indicates that this is a Datalink In parameter. Bits 20 and 22 must also be set.
26	Not Writable While IO Active	This parameter cannot be written if the I/O data being exchanged between the Host and the peripheral is valid.
27	Command Parameter	This parameter commands the drive to take an action, such as 'Reset Defaults' or 'Autotune', and then returns to a value of zero. Offline software tools will not allow setting this parameter to anything other than a value of zero. If an offline file contains a Command Parameter with a nonzero value, the offline software tool will change the value to zero. Note that command parameters cannot have values that do not return to zero.

Bit	Name	Description
28	Current Value Is Default	This bit identifies a parameter that will not change if a 'Reset Defaults' is commanded. For example, if a drive contains a Language parameter that is set to German, setting defaults will leave the parameter set to German. Likewise, if the parameter is set to French, setting defaults will leave the parameter set to French.
29	Use Zero Text	If the 'Disallow Zero' bit is set, this bit must be cleared. If the 'Disallow Zero' bit is cleared, then: 0 = Use Disabled Text parameter class attribute. 1 = Use Zero Text parameter instance attribute.
30-31	Reserved	Reserved

Formulas for Converting

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

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

Common Services

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

Object Specific Services

Service Code	Implemented for:		Service Name	Allocation Size (in bytes)	
	Class	Instance		Par. Number	Par. Value
0x4D	Yes	No	Get_Attributes_Scattered	4	4
0x4E	Yes	No	Set_Attributes_Scattered	4	4

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

Name	Data Type	Description
Parameter Number	UDINT	Parameter to read or write
Parameter Value	UDINT	Parameter value to read or write (zero when reading)

Logic Command/Status Words: PowerFlex 750-Series Drives

This appendix presents the definitions of the Logic Command and Logic Status words that are used for PowerFlex 750-Series drives.

Logic Command Word

Logic Bits																													
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Command	Description
																															x	Normal Stop	0 = Not Normal Stop 1 = Normal Stop
																														x		Start (1)	0 = Not Start 1 = Start
																													x			Jog 1 (2)	0 = Not Jog 1 (Par. 556) 1 = Jog 1
																												x				Clear Fault (3)	0 = Not Clear Fault 1 = Clear Fault
																										x	x					Unipolar Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
																									x							Manual	0 = Not Manual 1 = Manual
																								x								Reserved	
																						x	x									Accel Time	00 = No Command 01 = Use Accel Time 1 (Par. 535) 10 = Use Accel Time 2 (Par. 536) 11 = Use Present Time
																				x	x											Decel Time	00 = No Command 01 = Use Decel Time 1 (Par. 537) 10 = Use Decel Time 2 (Par. 538) 11 = Use Present Time
																			x													Ref Select 1	000 = No Command 001 = Ref A Select (Par. 545) 010 = Ref B Select (Par. 550) 011 = Preset 3 (Par. 573) 100 = Preset 4 (Par. 574) 101 = Preset 5 (Par. 575) 110 = Preset 6 (Par. 576) 111 = Preset 7 (Par. 577)
																		x														Ref Select 2	
																	x															Ref Select 3	
																x																Reserved	
															x																	Coast Stop	0 = Not Coast to Stop 1 = Coast to Stop
														x																		Current Limit Stop	0 = Not Current Limit Stop 1 = Current Limit Stop
													x																			Run (4)	0 = Not Run 1 = Run
												x																				Jog 2 (2)	0 = Not Jog 2 (Par. 557) 1 = Jog 2
											x																					Reserved	
										x																						Reserved	
									x																							Reserved	
								x																								Reserved	
							x																									Reserved	
						x																										Reserved	
					x																											Reserved	
				x																												Reserved	
			x																													Reserved	
		x																														Reserved	
	x																															Reserved	
x																																Reserved	

(1) A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Start condition will start the drive.
(2) A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Jog 1/Jog 2 condition will jog the drive. A transition to a '0' will stop the drive.
(3) To perform this command, the value must switch from '0' to '1'.
(4) A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Run condition will run the drive. A transition to a '0' will stop the drive.

Logic Status Word

Logic Bits																													
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	**Command**	**Description**
																															x	Run Ready	0 = Not Ready to Run 1 = Ready to Run
																														x		Active	0 = Not Active 1 = Active
																													x			Command Direction	0 = Reverse 1 = Forward
																												x				Actual Direction	0 = Reverse 1 = Forward
																											x					Accelerating	0 = Not Accelerating 1 = Accelerating
																										x						Decelerating	0 = Not Decelerating 1 = Decelerating
																									x							Alarm	0 = No Alarm (Par. 959 and 960) 1 = Alarm
																								x								Fault	0 = No Fault (Par. 952 and 953) 1 = Fault
																							x									At Setpt Spd	0 = Not at Setpoint Speed 1 = At Setpoint Speed
																						x										Manual	0 = Manual Mode Not Active 1 = Manual Mode Active
																					x											Spd Ref ID 0	00000 = Reserved 00001 = Auto Ref A (Par. 545) 00010 = Auto Ref B (Par. 550) 00011 = Auto Preset Speed 3 (Par. 573) 00100 = Auto Preset Speed 4 (Par. 574) 00101 = Auto Preset Speed 5 (Par. 575) 00110 = Auto Preset Speed 6 (Par. 576) 00111 = Auto Preset Speed 7 (Par. 577) 01000 = Reserved 01001 = Reserved 01010 = Reserved 01011 = Reserved 01100 = Reserved 01101 = Reserved 01110 = Reserved 01111 = Reserved 10000 = Man Port 0 10001 = Man Port 1 10010 = Man Port 2 10011 = Man Port 3 10100 = Man Port 4 10101 = Man Port 5 10110 = Man Port 6 10111 = Reserved 11000 = Reserved 11001 = Reserved 11010 = Reserved 11011 = Reserved 11100 = Reserved 11101 = Man Port 13 (Embedded ENET) 11110 = Man Port 14 (Drive Logix) 11111 = Alternate Man Ref Sel
																				x												Spd Ref ID 1	
																			x													Spd Ref ID 2	
																		x														Spd Ref ID 3	
																	x															Spd Ref ID 4	
																x																Reserved	
															x																	Running	0 = Not Running 1 = Running
														x																		Jogging	0 = Not Jogging (Par. 556 and 557) 1 = Jogging
													x																			Stopping	0 = Not Stopping 1 = Stopping
												x																				DC Brake	0 = Not DC Brake 1 = DC Brake
											x																					DB Active	0 = Not Dynamic Brake Active 1 = Dynamic Brake Active
										x																						Speed Mode	0 = Not Speed Mode (Par. 309) 1 = Speed Mode
									x																							Position Mode	0 = Not Position Mode (Par. 309) 1 = Position Mode
								x																								Torque Mode	0 = Not Torque Mode (Par. 309) 1 = Torque Mode
							x																									At Zero Speed	0 = Not at Zero Speed 1 =At Zero Speed
						x																										At Home	0 = Not at Home 1 = At Home
					x																											At Limit	0 = Not at Limit 1 = At Limit
				x																												Current Limit	0 = Not at Current Limit 1 = At Current Limit
			x																													Bus Freq Reg	0 = Not Bus Freq Reg 1 = Bus Freq Reg
		x																														Enable On	0 = Not Enable On 1 = Enable On
	x																															Motor Overload	0 = Not Motor Overload 1 = Motor Overload
x																																Regen	0 = Not Regen 1= Regen

The following terms and abbreviations are used throughout this manual. For definitions of terms that are not listed here, see the Allen-Bradley® Industrial Automation Glossary, publication AG-7.1.

Bridge A network device that can route messages from one network to another. A bridge also refers to a communication module in a ControlLogix® controller that connects the controller to a network. See also scanner.

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

CAN (Controller Area Network) CAN is a serial bus protocol on which DPI™ is based.

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

CIP™ (Common Industrial Protocol) CIP is the transport and application layer protocol that is used for messaging over EtherNet/IP, ControlNet, and DeviceNet networks. The protocol is used for implicit messaging (real-time I/O) and explicit messaging (configuration, data collection, and diagnostics).

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 Windows operating systems. You can obtain a **free copy** of Connected Components Workbench software at http://www.ab.com/support/abdrives/webupdate/software.html.

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

ControlFLASH™ A **free** software tool that is used to electronically update the firmware of Allen-Bradley products and network communication adapters. ControlFLASH software is downloaded automatically when the firmware revision file for the product being updated is downloaded from the Allen-Bradley updates website to your computer.

Controller A controller, also called programmable logic controller, is a solid-state control system that has a user-programmable memory for storage of instructions to implement specific functions such as I/O control, logic, timing, counting, report generation, communication, arithmetic, and data file manipulation. A controller consists of a central processor, input/output interface, and memory. See also Scanner.

Cyclic I/O Data Exchange A device that is configured for Cyclic I/O data exchange transmits data at a user-configured interval. This type of exchange helps ensure that data is updated at an appropriate rate for the application and allows data to be sampled at precise intervals for better determinism.

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

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

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

Datalinks A Datalink is a type of pointer that is used by PowerFlex® 750-Series drives to transfer data to and from the controller. Datalinks allow specified parameter values to be accessed or changed without using explicit messages. When active, each 32-bit Datalink in a PowerFlex 750-Series drive consumes 4 bytes in the input image table and/or 4 bytes in the output image table of the controller.

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

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

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

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 6.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 that are not supported by Connected Components Workbench software.

DriveTools™ SP Software A software suite that is 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, version 1.01 or later, can be used with PowerFlex 750-Series, PowerFlex 7-Class, and PowerFlex 4-Class drives, and also legacy drives that implement a SCANport™ communication interface. Information about DriveTools SP software can be obtained at http://www.ab.com/drives/drivetools.

EDS (Electronic Data Sheet) Files Simple text files that are used by network configuration tools such as RSNetWorx™ for DeviceNet software to describe products so that you can easily commission them on a network. EDS files describe a product device type and revision. EDS files for many Allen-Bradley products can be found at http://www.ab.com/networks/eds.

Explicit Messaging Explicit messages are used to transfer data that does not require continuous updates. They are typically used to configure, monitor, and diagnose devices over the network.

Fault Action A fault action determines how the option module and connected drive act when a communication fault (for example, a cable is disconnected) 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 option module and PowerFlex drive can respond with a user-defined fault configuration. The user sets the data that is sent to the drive using specific fault configuration parameters in the option module. When a fault action parameter is set to use the fault configuration data and a fault occurs, the data from these parameters is sent as the Logic Command, Reference, and/or Datalinks.

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

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

HIM (Human Interface Module) A device that can be used to configure and control a drive. The PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM can be used to configure PowerFlex 750-Series drives and their connected peripherals.

Hold Last When communication is disrupted (for example, a cable is disconnected), the option module and PowerFlex drive can respond by holding last. Hold last results in the drive receiving the last data received via the network connection before the disruption. If the drive was running and using the Reference from the option module, it continues to run at the same Reference.

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

I/O Data I/O data, sometimes called 'implicit messages' or 'input/output', is time-critical data such as a Logic Command and Reference. The terms 'input' (To Net) and 'output' (From Net) are defined from the controller's point of view. Output is produced by the controller and consumed by the option module. Input is produced by the option module and consumed by the controller.

Logic Command/Logic Status The Logic Command is used to control the PowerFlex 750-Series drive (for example, start, stop, and direction). It consists of one DINT or DWORD of output from the network to the option module. The definitions of the bits in this word are shown in Appendix D.

The Logic Status is used to monitor the PowerFlex 750-Series drive (for example, operating state and motor direction). It consists of one DINT or DWORD of input from the option module to the network. The definitions of the bits in this word are shown in Appendix D.

Master-Slave Hierarchy An option module that is configured for a master-slave hierarchy exchanges data with the master device. Usually, a network has one scanner, which is the master device, and all other devices (for example, drives with installed DeviceNet option modules) are slave devices.

On a network with multiple scanners (called a multi-master hierarchy), each slave device must have one scanner that is specified as a master.

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

NVS (Nonvolatile Storage) NVS is the permanent memory of a device. Devices such as the option module 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'.

Option Module

Devices such as drives, controllers, and computers usually require a network communication option module to provide a communication interface between them and a network such as DeviceNet. An option module 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 20-750-DNET DeviceNet option module connects PowerFlex 750-Series drives to a DeviceNet network. Option modules are sometimes also called 'adapters', 'cards', 'embedded communication options', and 'peripherals'. On PowerFlex 750-Series drives, option modules can also be I/O modules, encoder modules, safety modules, and so forth.

PCCC (Programmable Controller Communications Command)

PCCC is the protocol that is 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.

Polled I/O Data Exchange

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

PowerFlex 750-Series (Architecture Class) Drives

Allen-Bradley PowerFlex 750-Series drives are part of the PowerFlex 7-Class family of drives.

Producer/Consumer Network

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

Reference/Feedback

The Reference is used to send a setpoint (for example, speed, frequency, and torque) to the drive. It consists of one 32-bit word of output to the option module from the network.

Feedback is used to monitor the speed of the drive. It consists of one 32-bit word of input from the option module to the network.

RSLogix 5000® Software

RSLogix 5000 software is a tool for configuring and monitoring controllers to communicate with connected devices. It is a 32-bit application that runs on various Windows operating systems. Information about RSLogix™ software can be found at http://www.software.rockwell.com/rslogix. See also Studio 5000 environment.

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

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 option modules that are connected to a network. See also Controller.

SI (Serial Interface) A next generation communication interface that is used by various Allen-Bradley drives, such as PowerFlex 750-Series drives.

Status Indicators LEDs that are used to report the status of the option module, network, and drive. They are on the option module and can be viewed when the drive is powered and its cover is removed.

Stop Action When communication is disrupted (for example, a cable is disconnected), the option module and drive can respond with a stop action. A stop action 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 option module, it will stay running but at zero Reference.

Studio 5000 Environment The Studio 5000 Engineering and Design Environment combines engineering and design elements into a common environment. The first element in the Studio 5000 environment is the Logix Designer application. The Logix Designer application is the rebranding of RSLogix 5000 software and will continue to be the product to program Logix 5000 controllers for discrete, process, batch, motion, safety, and drive-based solutions.

The Studio 5000 environment is the foundation for the future of Rockwell Automation® engineering design tools and capabilities. It is the one place for design engineers to develop all the elements of their control system.

UCMM (UnConnected Message Manager) UCMM provides a method to create connections between DeviceNet devices.

UDDT (User-Defined Data Type) A structure data type that you define during the development of an application (for example, to convert 32-bit REAL parameter data for written and read values to correctly display them in human readable format).

Update The process of updating firmware in a device. The option module can be updated using various Allen-Bradley software tools. See Updating the Option Module Firmware on page 35 for more information.

Zero Data When communication is disrupted (for example, a cable is disconnected), the option module 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 option module, it will stay running but at zero Reference.

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