User Manual

Allen-Bradley

PowerFlex 20-750-CNETC Coaxial ControlNet Option Module

Firmware Revision Number 1.xxx

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

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

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

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

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

This manual contains new and updated information.

New and Updated Information

This table contains the changes made to this revision.

Topic	Page
Added information about the Connected Components Workbench software configuration tool for drives and connected peripherals.	Throughout manual
In the Chapter 3 subsection 'Enable Datalinks To Write Data', revised step 3 for better understanding.	27
In the Chapter 4 sub-subsection 'Add the Drive/Option Module to the I/O Configuration', included new information for the Create Database, Web Update, and Match Drive buttons on the Module Definition dialog box, which are described in the step 6 table.	41
In Chapter 6 Explicit Messaging, added Table 4. Also added footnotes about limitations when using DPI Parameter Object Class code 0x93 or Host DPI Parameter Object Class code 0x9F to tables below message configuration dialog boxes.	74...84

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Notes:

This manual provides information about the 20-750-CNETC ControlNet option module for network communication and how to use the module with PowerFlex® 750-Series drives.

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 - [DPI Port]**.
- 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 ControlNet 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.

Rockwell Automation Support

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

Local Product Support

Contact your local Rockwell Automation representative for the following:

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

Technical Product Assistance

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

Additional Resources

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

Resource	Description
Network Communication Option Module Installation Instructions, publication 750COM-IN002	Information on the installation of PowerFlex 750-Series Network Communication modules.
ControlNet Coax Media Planning and Installation Guide, publication CNET-IN002	Information on the required components of a ControlNet coax media system, which is useful in determining your system and for installing the required components.
Connected Components Workbench website http://www.ab.com/support/abdrives/webupdate/software.html, and online help (1)	Information on the Connected Components Workbench™ software tool—and includes a link for **free** software download.
DriveExplorer website http://www.ab.com/drives/driveexplorer, and online help (1)	Information on using the DriveExplorer™ software tool.
DriveExecutive website http://www.ab.com/drives/drivetools, and online help (1)	Information on using the DriveExecutive™ software tool.
RSNetWorx for ControlNet Getting Results Guide, publication CNET-GR001, and online help (1)	Information on using RSNetWorx™ for ControlNet.
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.
ControlNet Network Configuration User Manual, publication CNET-UM001	Information on how to use ControlNet communication modules with a ControlLogix controller.

(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.

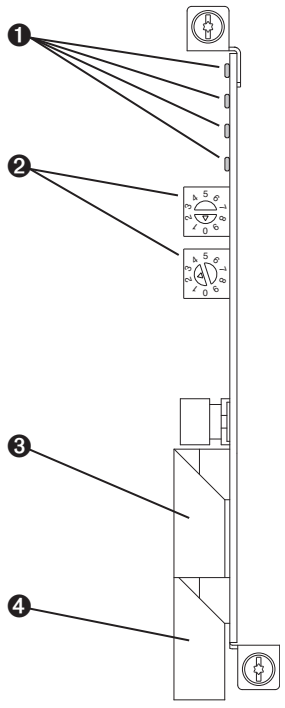
To find your local Rockwell Automation distributor or sales representative, visit http://www.rockwellautomation.com/locations.

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

Getting Started

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

Components



Item	Part	Description
❶	Status Indicators	Four status indicators that indicate the status of the option module and network communication. See Chapter 7, Troubleshooting.
❷	Node Address Switches	Sets the node address of the option module. See Setting the Node Address Switches on page 18.
❸	Channel A Coax Receptacle	BNC connector for the Channel A network coaxial cable.
❹	Channel B Coax Receptacle	BNC connector for the Channel B (redundant) network coaxial 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 before applying power to the drive—or you can disable the switches and use an option module parameter to configure the node address.
- 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 support.
- Master-Slave hierarchy that can be set up so that the option module and PowerFlex 750-Series drive transmit data to and from a scanner 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, the CIP Register Object, or the CIP Assembly object (Msg Flt Action)
- 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-CNETC Coaxial ControlNet 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
- ❑ ControlNet cable—for details, see the ControlNet Coax Media Planning and Installation Guide, publication CNET-IN002
- ❑ 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 is the recommended stand-alone software tool for use with PowerFlex drives. You can obtain a **free copy** by:
    - Internet download at http://www.ab.com/support/abdrives/webupdate/software.html
    - Requesting a DVD at http://www.ab.com/onecontact/controllers/micro800/

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

    Connected Components Workbench software cannot be used to configure SCANport-based drives or Bulletin 160 drives.
  - DriveExplorer software, version 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 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 ControlNet 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-PCC, 1784-KTCX, or 1770-KFC, for connection to the ControlNet network

Safety Precautions

Please read the following safety precautions carefully.

ATTENTION: Risk of injury or death exists. The PowerFlex drive may contain high voltages that can cause injury or death. Remove all power from the PowerFlex drive, and then verify power has been discharged before installing or removing the 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 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 crews to secure and ground the option module to the drive. d. Connect the option module to the network with a ControlNet 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 • I/O configuration • 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 ControlNet 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.

Preparing for an Installation

Before installing the option module, do the following:

- Read the ControlNet Coax Media Planning and Installation Guide, publication CNET-IN002. This publication provides information on selecting cables, setting up a network, and network basics.
- Verify that you have all required equipment. See Required Equipment on page 13.

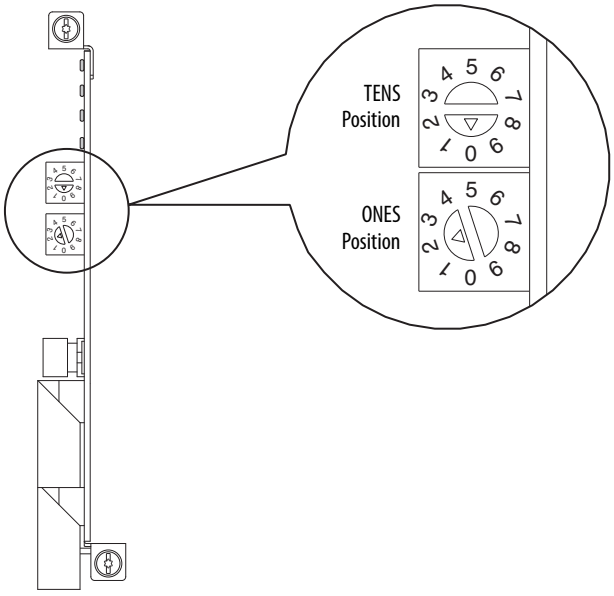
ATTENTION: Risk of equipment damage exists. The option module contains electrostatic discharge (ESD) sensitive parts that can be damaged if you do not follow ESD control procedures. Static control precautions are required when handling the option module. If you are unfamiliar with static control procedures,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

Setting the Node Address Switches

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

IMPORTANT Each node on the ControlNet 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.

Figure 1 - Setting Node Address Switches



Settings	Description
00	If the Node Address switches are set to '00', the option module uses the value stored in *Device* **Parameter 05 - [Net Addr Cfg]** for the node address. See Setting the Node Address on page 26.
01…99	Node address used by the option module. The default switch setting is 02.

The switch settings can be verified by viewing *Device* **Parameter 06 - [Net Addr Act]** or Diagnostic Device Item number 58 (page 93) 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

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.

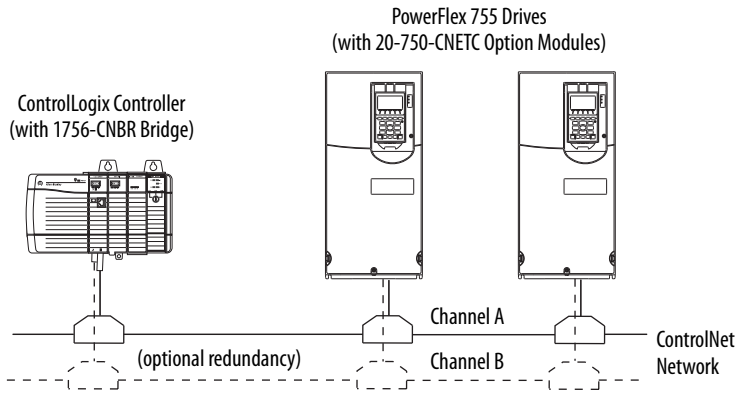
IMPORTANT After inserting the option module into Port 4, 5, or 6, make sure to tighten the module screws to the drive control pod to properly ground the module to the drive. Torque both screws to 0.45…0.67 N•m (4.0…6.0 lb•in).

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 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 ControlNet cable to the network.

Figure 2 - Coax Network Wiring Example



5. Route the other end of the ControlNet cable through the bottom of the drive, and insert its ControlNet cable plug into the mating option module receptacle. We recommend using a 1786-TPS straight tap.

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 3). Possible start-up status indications are shown in Table 1.

Figure 3 - Drive and Option Module Status Indicators

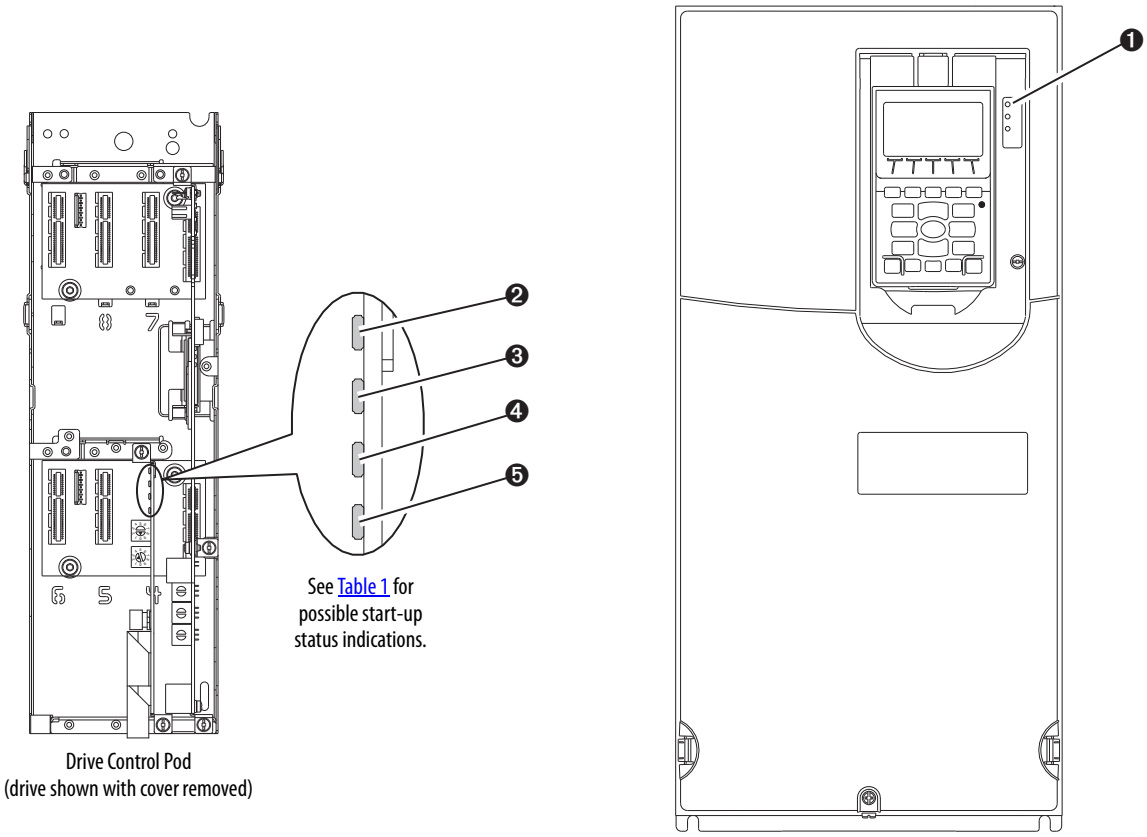


Table 1 - Drive and Option Module Start-Up Status Indications

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. It will turn 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 ❺	NET A NET B	Green	Flashing	A temporary channel error has occurred or the channel is in 'listen-only' mode.
			Steady	Normal operation for that channel. The option module is properly connected and communicating on the network.
		Red	Flashing	The channel is not receiving network activity.
		Green/Red	Flashing Alternately	There is an invalid link configuration for that channel.

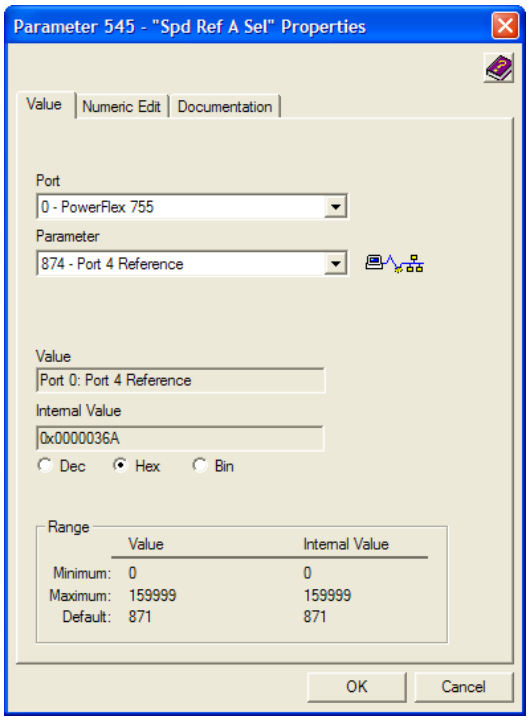
After verifying correct operation, swing down the drive HIM bezel to its closed position and install the drive cover. For more details on status indicator operation, see page 90 and page 91.

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 this example, Port 4 Reference).

   This ensures that any Reference 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.

Notes:

Configuring the Option Module

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

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 a different 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.

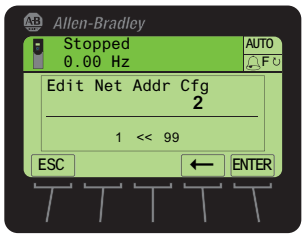
1. Display the Status screen, which is shown on HIM power up.
2. Use the 4 or 6 key to scroll to the Port in which the option module is installed.
3. Press the PAR# *soft key* to display the Jump to Param # entry pop-up box.
4. Use the numeric keys to enter the desired parameter number, or use the ▲ 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 Node Address switches (Figure 1) are set to '00' (Program) the value of *Device* **Parameter 05 - [Net Addr Cfg]** determines the node address. When the Node Address switches are in any other combination of positions, these switches determine the node address.

1. Set the value of *Device* **Parameter 05 - [Net Addr Cfg]** to a unique node address.



2. Reset the option module; see Resetting the Option Module on page 31.

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 bridge or scanner (1756-CNB, 1756-CNBR, 1747-SCNR, and so forth).

Enable Datalinks To Write Data

The controller output image (controller outputs-to-drive) can have 0 to 16 additional 32-bit parameters (Datalinks). The Datalinks are configured using *Host* **Parameters 01 - [DL From Net 01]** through **Parameter 16 - [DL From Net 16]**. The number of Datalinks actively used is controlled by the connection size in the controller. See the respective controller example sections in Chapter 4 for more information on setting the connection size.

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.

TIP When using a ControlLogix controller and an RSLogix 5000 drive Add-On Profile (version 16 or later), there is no need to configure Datalink parameters at this time. They will be assigned when configuring the RSLogix 5000 drive Add-On Profile (see Add the Drive/Option Module to the I/O Configuration on page 39).

When using a ControlLogix controller and the Generic Profile—or a PLC-5 or SLC 500 controller, configure the Datalink parameters now as described in this section.

Host **Parameters 01 - [DL From Net 01]** through **16 - [DL From Net 16]** configure 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 parameter value can be set manually by number using this formula:

From Net 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 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 values of only the required number of contiguous controller-to-drive Datalinks needed to write data to the drive and that are to be included in the network I/O connection.
2. Reset the option module; see Resetting the Option Module on page 31.
3. Since the Logic Command and Reference is 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 to 16 additional 32-bit parameters (Datalinks). The Datalinks are configured using *Host* **Parameters 17 - [DL To Net 01]** through **32 - [DL To Net 16]**. The number of Datalinks actively used is controlled by the connection size in the controller. See the respective controller example sections in Chapter 4 for more information on setting the connection size.

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.

TIP When using a ControlLogix controller and an RSLogix 5000 drive Add-On Profile, version 16.00 or later, there is no need to configure Datalink parameters at this time. They will be assigned when configuring the RSLogix 5000 drive Add-On Profile (see Add the Drive/Option Module to the I/O Configuration on page 39).

When using a ControlLogix controller and the Generic Profile—or a PLC-5 or SLC 500 controller, configure the Datalink parameters now as described in this section.

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, the parameter value can be set manually by number using this formula:

To Net 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 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 values of only the required number of contiguous drive-to-controller Datalinks needed to read data from the drive and that are to be included in the network I/O connection.
2. Reset the option module; see Resetting the Option Module on page 31.

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.

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, the CIP Register Object, or the CIP Assembly object by using *Host* **Parameter 36 - [Msg Flt Action]**.

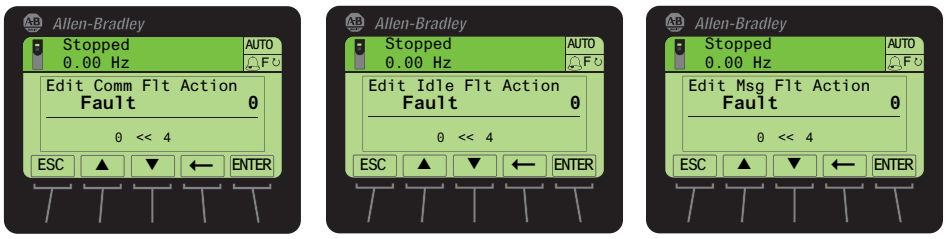
ATTENTION: Risk of injury or equipment damage exists. *Host* **Parameters 33 - [Comm Flt Action]**, **34 - [Idle Flt Action]**, and **36 - [Msg Flt Action]** let you determine the action of the option module and connected drive if communication is disrupted, the controller is idle, or explicit messaging 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 4 - 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 will automatically receive 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 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.)

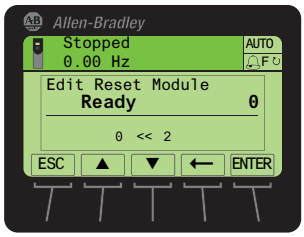
Changes to these parameters take effect immediately. A reset is not required.

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 07 - [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 07 - [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 will be immediately reset. An alternate method to reset the module is by power cycling the drive. When you enter '2' (Set Defaults), the option module will set **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 32.)

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 located in the drive's DIAGNOSTIC folder.

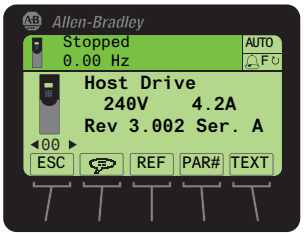
Restoring Option Module Parameters to Factory Defaults

As an alternate reset method, you can restore the option module parameters by using a MEMORY folder menu item instead of using *Device* **Parameter 07 - [Reset Module]** described in Resetting the Option Module on page 31. 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 *Device* **Parameter 05 - [Net Addr Cfg]** which is used for network setup.

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 folder 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 pop-up box.
7. Press the 5 (Enter) key again to display the warning pop-up 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 07 - [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.

Module *Device* Parameter	Description
02 - [DLs From Net Act]	The number of controller-to-drive Datalinks that are included in the network I/O connection (controller outputs).
03 - [DLs To Net Act]	The number of drive-to-controller Datalinks that are included in the network I/O connection (controller inputs).
04 - [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)
06 - [Net Addr Act]	The node address 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 05 - [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.)

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 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.

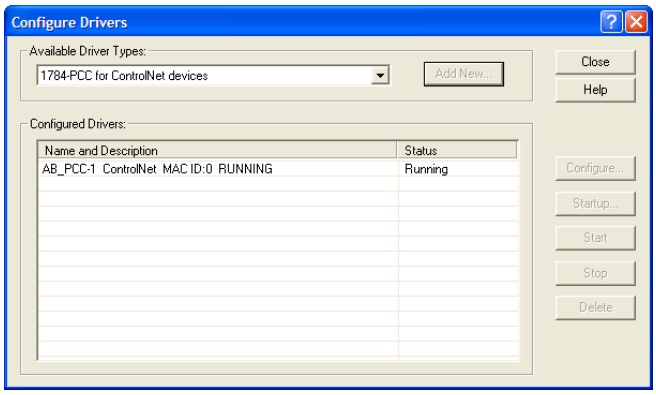
Using RSLinx Classic Software

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 ControlNet Drivers.
4. Click Add New to display the ControlNet Driver Selection dialog box.
5. In the Available ControlNet Drivers list, choose the computer connection adapter (1784-PCC, 1770-KFC, or 1784-KTCX) 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.

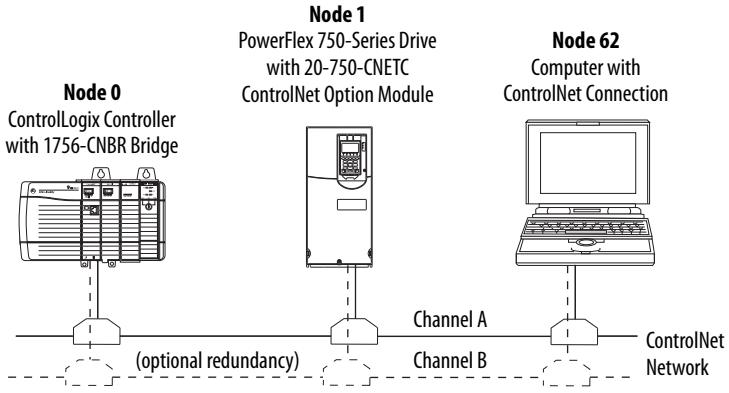


8. Click Close to close the Configure Drivers dialog box.
9. Keep RSLinx software running and verify that your computer recognizes the drive.
10. Verify that your computer recognizes the drive.
    a. From the Communications menu, choose RSWho.
    b. In the menu tree, click '+' next to the ControlNet 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 needed to configure a simple ControlNet network (see Figure 5). In our example, we will configure a ControlLogix controller with 1756-CNBR (Series D) bridge to communicate with a drive using Logic Command/Status, Reference/Feedback, and 32 Datalinks (16 to read and 16 to write) over the network.

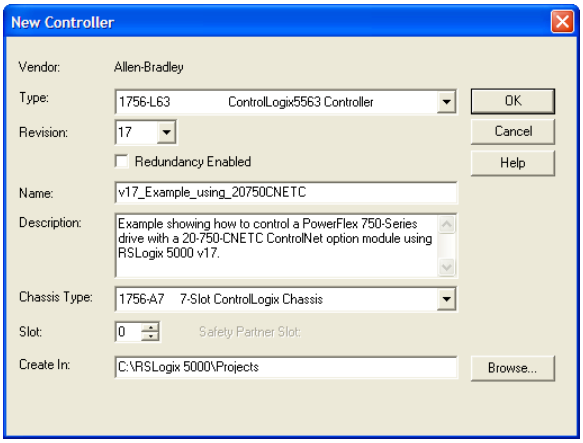
Figure 5 - Example ControlLogix Controller ControlNet Network



Adding the Bridge to the I/O Configuration

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

1. Start RSLogix 5000 software.
2. From the File menu, choose New to display the New Controller dialog box (RSLogix 5000 software, version 16.00 or later shown).



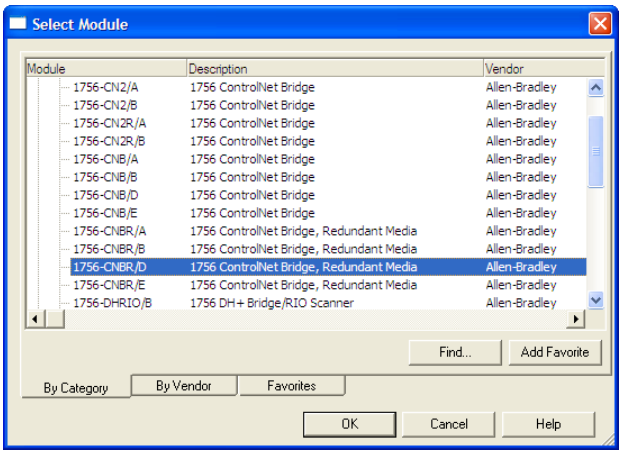
   a. Choose the appropriate choices for the fields in the dialog box to match your application.
   b. Click OK.

      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 of the available communication modules.

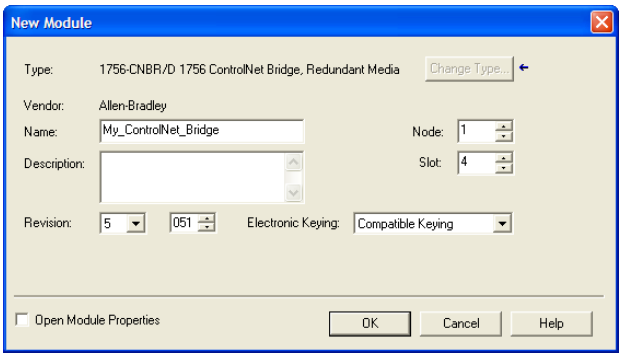


5. In the list, select the ControlNet bridge used by your controller.

In this example, we use a 1756-CNBR ControlNet Bridge (Series D), so the 1756-CNBR/D option is selected.

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

   The bridge's New Module dialog box appears.

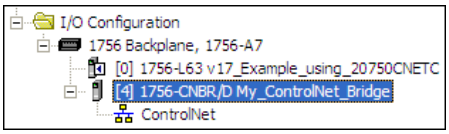


9. Edit the following:

Box	Setting
Name	A name to identify the ControlNet bridge.
Description	Optional – description of the ControlNet bridge.
Node	The node address of the ControlNet bridge.
Slot	The slot of the ControlNet bridge in the rack.
Revision	The minor revision of the firmware in the ControlNet bridge. (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 bridge 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.
Open Module Properties	When this box is checked, clicking OK opens additional module properties dialog boxes to further configure the bridge. When unchecked, clicking OK closes the bridge's New Module dialog box. For this example, uncheck this box.

10. Click OK.

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



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

There are two ways to add the option module into the I/O configuration:

- Drive Add-on Profiles (RSLogix 5000 software, version 16.00 or later)
- Drive Generic Profile (RSLogix 5000 software, all versions)

These are described in the following separate sections. If your version of RSLogix 5000 software supports drive Add-on Profiles, we recommend that you use this method.

Using RSLogix 5000 Drive Add-On Profiles, Version 16.00 or Later

When compared to using the Generic Profile (all versions), the RSLogix 5000 drive Add-on Profiles provide the following advantages:

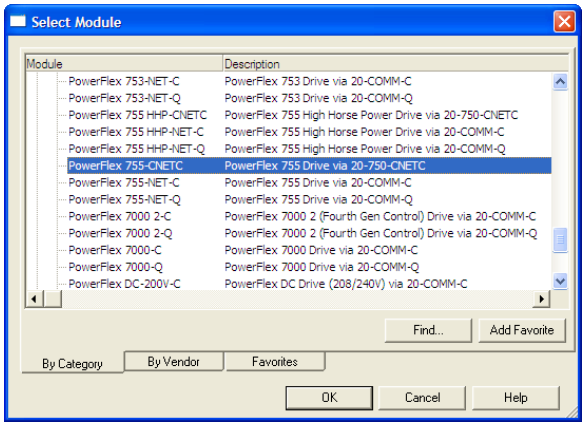
- Profiles for specific drives that provide descriptive controller tags for basic control I/O words (Logic Command/Status and Reference/Feedback) **and** Datalinks. Additionally, Datalinks automatically take the name of the drive parameter to which they are assigned. These profiles virtually eliminate I/O mismatch errors and substantially reduce drive configuration time.
- New Drive tab eliminates the need for a separate drive software configuration tool.
- Drive configuration settings are saved as part of the RSLogix 5000 software, version 16.00 or later, project file (.ACD) and also downloaded to the controller.
- Drive Add-on Profiles, version 2.01 or later, enable I/O to be added online while the controller is in Run mode.
- Drive Add-on Profiles can be updated anytime. When a new drive is used or to benefit from new updates for Add-on Profiles, you will need the newest Add-on Profile update. Go to http://www.ab.com/support/abdrives/webupdate to download the latest RSLogix 5000 drive Add-on Profile.

Add the Drive/Option Module to the I/O Configuration

To transmit data between the bridge and the drive, you must add the drive as a child device to the parent bridge. In this example, RSLogix 5000 software version 16.00 is used with drive Add-on Profile version 3.01. To determine your drive Add-on Profile version, see Allen-Bradley Knowledgebase document #65882.

1. In the treeview, right-click on the bridge and choose New Module to display the Select Module dialog box.

   In our example, we right-click on the 1756-CNBR/D bridge. Expand the Drives group to display all of the available drives with their communication option modules.



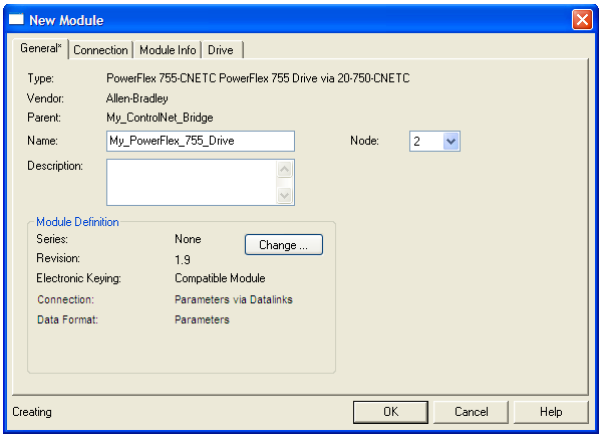
TIP If the PowerFlex drive is not shown, go to http://www.ab.com/support/abdrives/webupdate and download the latest RSLogix 5000 drive Add-on Profile.

2. From the list, select the drive and its connected option module.

   For this example, we selected 'PowerFlex 755-CNETC'.

3. Click OK.

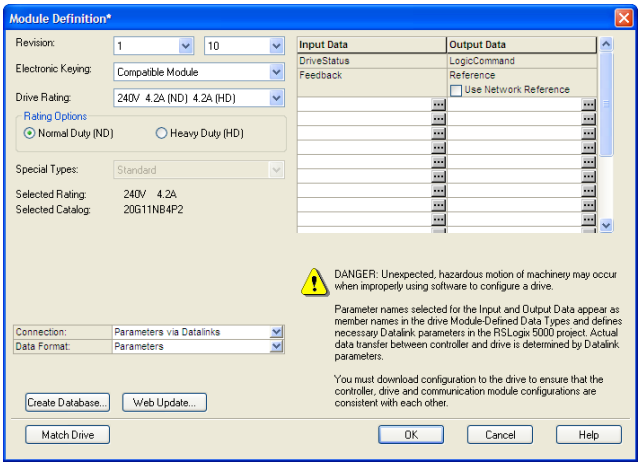
   The drive's New Module dialog box appears.



4. On the General tab, edit the following data about the drive/option module.

Box	Setting
Name	A name to identify the drive.
Description	Optional – description of the drive/option module.
Node	The node address of the option module.

5. On the New Module dialog box in the Module Definition section, click Change to launch the Module Definition dialog box and begin the drive/option module configuration process.



TIP To get the latest RSLogix 5000 drive Add-on Profile, go to http://www.ab.comsupport/abdrives/webupdate.

6. In the Module Definition dialog box, edit the following information.

Box	Setting
Revision	The major and minor revision of the firmware (database) in the drive. If the drive's major and minor revision is not available, the drive database is not installed on your computer. To get the correct database revision, use one of the following buttons at the bottom left of the Module Definition dialog box: • **Create Database:** Creates a database from an online network drive. Clicking this button displays an RSLinx software RSWho dialog box. Browse to the online drive (for this example, PowerFlex 755), select it, and click OK. The database will be uploaded and stored on the computer. Thereafter, close the Module Definition dialog box and then re-open it to display the new revision. • **Web Update:** When a drive is not available online, opens the Allen-Bradley Drives Web Updates website to download a specific database file. After downloading the file, close the Module Definition dialog box and then re-open it to display the new revision. • **Match Drive:** Use this button when the drive being added to the network matches the drive profile (revision, rating, Datalinks, configuration settings, and so forth) of an existing online network drive. Click this button to conveniently create a duplicate drive profile from the online drive, and automatically load this identical information into the Module Definition dialog box. This eliminates the need to manually enter the information each time a new drive with a matching profile is added to the network.
Electronic Keying	**Compatible Module.** The 'Compatible Module' setting for Electronic Keying verifies that the physical module is consistent with the software configuration before the controller and bridge 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'. Drives do not require keying, and so 'Disable Keying' is recommended.
Drive Rating	The voltage and current rating of the drive. If the drive rating is not listed, the drive database is not installed on your computer. To get the drive rating, use the **Create Database**, **Web Update**, or **Match Drive** button described above.
Rating Options	Selects the drive power output required for the application. This must match the drive's actual rating.
Special Types	Reserved for future use.
Connection	**Parameters via Datalinks.** When selecting 'Parameters via Datalinks' (default), the controller tags for the Datalinks use the drive parameter names to which they are assigned. When selecting 'Datalinks', the controller tags for the Datalinks have non-descriptive UserDefinedData[n] names like those used in RSLogix 5000 software, version 15.00.

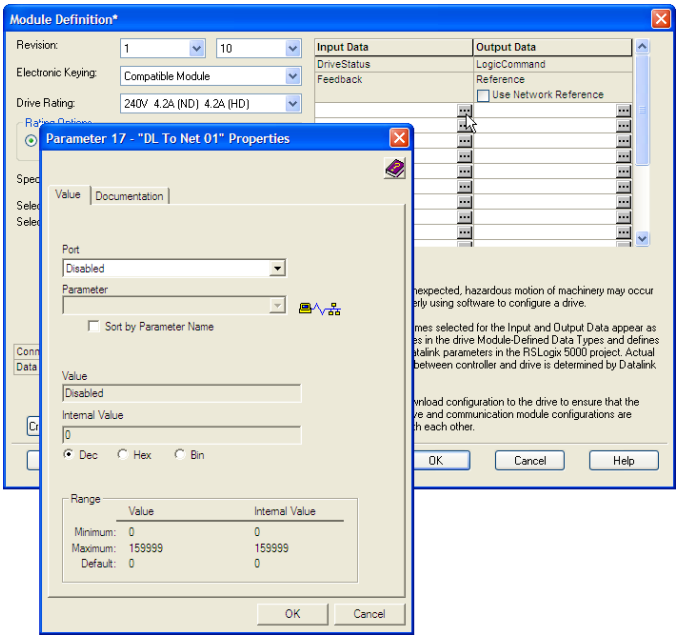
Box	Setting
Data Format	**Parameters.** When the Connection field is set to 'Parameters via Datalinks', 'Parameters' is automatically selected. When the Connection field is set to 'Datalinks', you must select the number of Datalinks required for your application in the 'Data Format' field.
Input Data	Assigns selected drive or connected peripheral parameters to be READ by the controller using DL To Net Datalinks. See steps 6a through 6e below for details.
Output Data	Assigns selected drive or connected peripheral parameters to be WRITTEN by the controller using DL From Net Datalinks. See steps 6a through 6e below for details.
Use Network Reference	Conveniently selects the speed reference for the drive to come from the network. This box is checked by default.

On the Module Definition dialog box, notice that the automatically-assigned controller tags DriveStatus, Feedback, LogicCommand, and Reference are always used.

However, when using Datalinks you must still assign *Host* **Parameters 01...16 - [DL From Net 01-16]** and *Host* **Parameters 17...32 - [DL To Net 01-16]** to point to the appropriate drive or connected peripheral parameters. The procedure to configure the Datalinks on the Module Definition dialog box for the Input Data and Output Data is the same.

a. Click the ... button in the topmost blank row to display the Parameter Properties dialog box for the corresponding Datalink.

IMPORTANT Always use the Datalink parameters in consecutive numerical order, starting with the first parameter. (For example, use Parameters 01, 02, and 03 to configure three Datalinks to write data and/or 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.



b. From the Port field pull-down menu, choose the port of the device to which this Datalink will be assigned (for this example, Port 0, the PowerFlex 755 drive).

c. From the Parameter field pull-down menu for the selected device, choose the parameter to which this Datalink will point (for this example, drive parameter 370 - [Stop Mode A]).

d. Click OK to complete configuration of the Datalink.

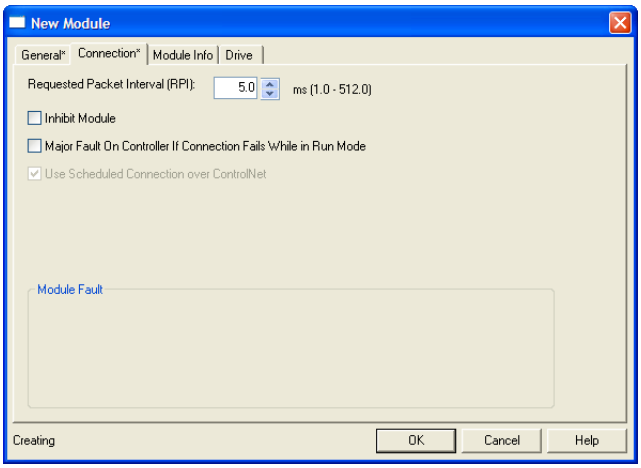
The name of the parameter that this Datalink points to is now shown in the row on the Module Definition dialog box.

e. Repeat Steps 6a through 6d for each Datalink being configured.

7. Click OK on the Module Definition dialog box to save the drive and option module configuration, and close the dialog box.

The drive's New Module dialog box reappears.

8. Click the Connection tab.



9. In the 'Requested Packet Interval (RPI)' box, set the value to 5.0 milliseconds or greater (default is 20.0 milliseconds).

This value determines the maximum interval that a controller should use to move data to and from the option module. To conserve bandwidth, use higher values for communicating with low priority devices.

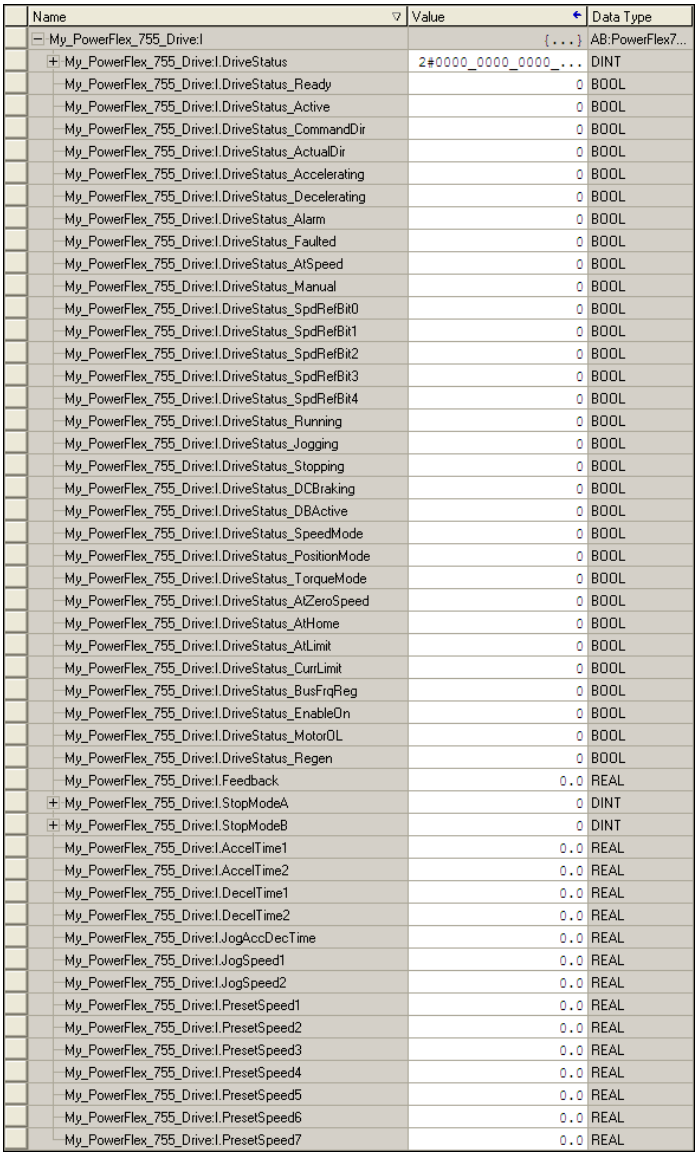
The 'Inhibit Module' box, when checked, inhibits the module from communicating with the RSLogix 5000 project. When the 'Major Fault On' box is checked, a major controller fault will occur when the module's connection fails while the controller is in the Run Mode. For this example, leave the 'Inhibit Module' and 'Major Fault On' boxes unchecked.

10. Click **OK** on the New Module dialog box.

The new node ('My_PowerFlex_755_Drive' in this example) now appears under the bridge ('My_ControlNet_Bridge' in this example) in the I/O Configuration folder. If you double-click the Controller Tags, you will see that module-defined data types and tags have been automatically created (Figure 6 and Figure 7). Note that all tag names are defined and Datalinks include the assigned drive parameter name. After you save and download

the configuration, these tags allow you to access the Input and Output data of the drive via the controller's ladder logic.

Figure 6 - Controller Input Tags



Name	Value	Data Type
My_PowerFlex_755_Drive:I	{...}	AB:PowerFlex7...
My_PowerFlex_755_Drive:I.DriveStatus	2#0000_0000_0000_...	DINT
My_PowerFlex_755_Drive:I.DriveStatus_Ready	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_Active	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_CommandDir	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_ActualDir	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_Accelerating	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_Decelerating	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_Alarm	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_Faulted	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_AtSpeed	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_Manual	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_SpdRefBit0	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_SpdRefBit1	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_SpdRefBit2	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_SpdRefBit3	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_SpdRefBit4	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_Running	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_Jogging	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_Stopping	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_DCBraking	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_DBActive	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_SpeedMode	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_PositionMode	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_TorqueMode	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_AtZeroSpeed	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_AtHome	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_AtLimit	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_CurrLimit	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_BusFrqReg	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_EnableOn	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_MotorOL	0	BOOL
My_PowerFlex_755_Drive:I.DriveStatus_Regen	0	BOOL
My_PowerFlex_755_Drive:I.Feedback	0.0	REAL
My_PowerFlex_755_Drive:I.StopModeA	0	DINT
My_PowerFlex_755_Drive:I.StopModeB	0	DINT
My_PowerFlex_755_Drive:I.AccelTime1	0.0	REAL
My_PowerFlex_755_Drive:I.AccelTime2	0.0	REAL
My_PowerFlex_755_Drive:I.DecelTime1	0.0	REAL
My_PowerFlex_755_Drive:I.DecelTime2	0.0	REAL
My_PowerFlex_755_Drive:I.JogAccDecTime	0.0	REAL
My_PowerFlex_755_Drive:I.JogSpeed1	0.0	REAL
My_PowerFlex_755_Drive:I.JogSpeed2	0.0	REAL
My_PowerFlex_755_Drive:I.PresetSpeed1	0.0	REAL
My_PowerFlex_755_Drive:I.PresetSpeed2	0.0	REAL
My_PowerFlex_755_Drive:I.PresetSpeed3	0.0	REAL
My_PowerFlex_755_Drive:I.PresetSpeed4	0.0	REAL
My_PowerFlex_755_Drive:I.PresetSpeed5	0.0	REAL
My_PowerFlex_755_Drive:I.PresetSpeed6	0.0	REAL
My_PowerFlex_755_Drive:I.PresetSpeed7	0.0	REAL

Figure 7 - Controller Output Tags

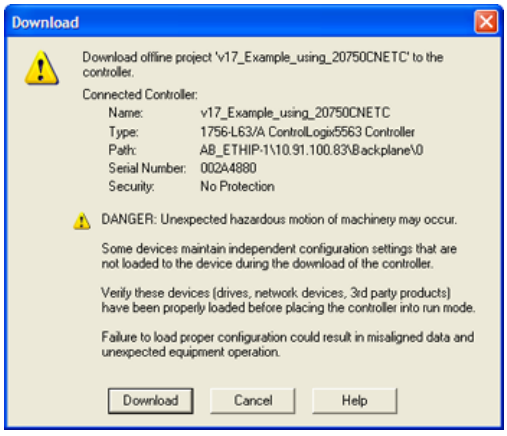
Name	Value	Data Type
My_PowerFlex_755_Drive:O	{...}	AB:PowerFlex7...
My_PowerFlex_755_Drive:O.LogicCommand	2#0000_0000_0000_...	DINT
My_PowerFlex_755_Drive:O.LogicCommand_Stop	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_Start	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_Jog1	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_ClearFaults	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_Forward	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_Reverse	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_Manual	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_AccelTime1	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_AccelTime2	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_DecelTime1	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_DecelTime2	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_SpdRefSel0	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_SpdRefSel1	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_SpdRefSel2	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_CoastStop	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_CLimitStop	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_Run	0	BOOL
My_PowerFlex_755_Drive:O.LogicCommand_Jog2	0	BOOL
My_PowerFlex_755_Drive:O.Reference	0.0	REAL
My_PowerFlex_755_Drive:O.StopModeA	0	DINT
My_PowerFlex_755_Drive:O.StopModeB	0	DINT
My_PowerFlex_755_Drive:O.AccelTime1	0.0	REAL
My_PowerFlex_755_Drive:O.AccelTime2	0.0	REAL
My_PowerFlex_755_Drive:O.DecelTime1	0.0	REAL
My_PowerFlex_755_Drive:O.DecelTime2	0.0	REAL
My_PowerFlex_755_Drive:O.JogAccDecTime	0.0	REAL
My_PowerFlex_755_Drive:O.JogSpeed1	0.0	REAL
My_PowerFlex_755_Drive:O.JogSpeed2	0.0	REAL
My_PowerFlex_755_Drive:O.PresetSpeed1	0.0	REAL
My_PowerFlex_755_Drive:O.PresetSpeed2	0.0	REAL
My_PowerFlex_755_Drive:O.PresetSpeed3	0.0	REAL
My_PowerFlex_755_Drive:O.PresetSpeed4	0.0	REAL
My_PowerFlex_755_Drive:O.PresetSpeed5	0.0	REAL
My_PowerFlex_755_Drive:O.PresetSpeed6	0.0	REAL
My_PowerFlex_755_Drive:O.PresetSpeed7	0.0	REAL

Save the I/O Configuration to the Controller

After adding the bridge 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 ControlNet driver with RSLinx software. See Using RSLinx Classic Software on page 35 and the RSLinx online help for details.

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

   When the download is successfully completed, RSLogix 5000 software goes into the Online mode and the I/O Not Responding box in the upper-left of the dialog box should be flashing green. Also, a yellow warning symbol ⚠ should be displayed on the I/O Configuration folder in the treeview and on the drive profile because the connections have not yet been scheduled with the RSNetWorx for ControlNet software.

   If the controller was in Run Mode before clicking Download, RSLogix 5000 software prompts you to change the controller mode back to Remote Run. In this case, choose the appropriate mode for your application. If the controller was in Program Mode before clicking Download, this prompt will not appear.

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.

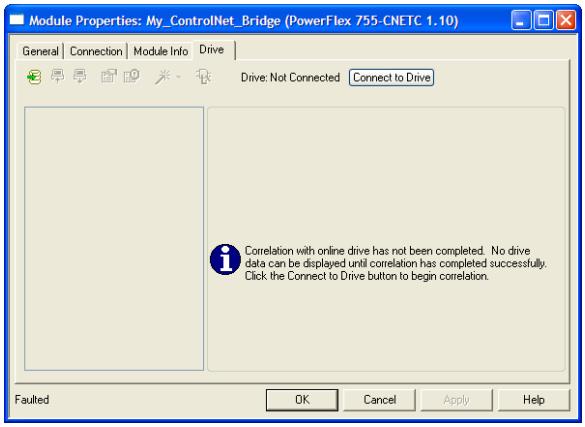
   To be sure that present project configuration values are saved, RSLogix 5000 software prompts you to upload them. Click Yes to upload and save the values.

Correlate the Drive with the Controller

You must now correlate the drive settings to the RSLogix 5000 project I/O settings so that they match. This requires loading the project I/O settings into the drive.

1. In the treeview under I/O Configuration, right-click the drive profile (for this example, 'My_PowerFlex_755_Drive') and choose Properties.

2. Click the Drive tab.

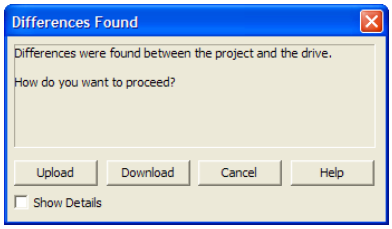


3. Click Connect to Drive to begin the correlation process.

   After the drive configuration data has been verified, a pop-up dialog box appears, which synchronizes ports from the online drive to the project to be sure that the correct Datalinks are assigned.

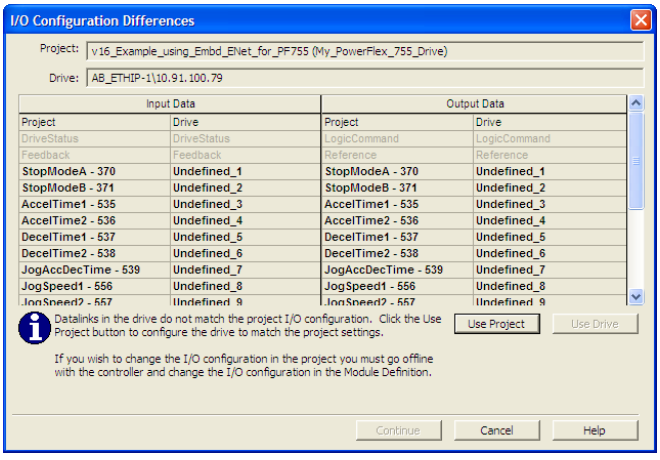
4. Click OK.

   If the Differences Found dialog box appears—which is typical, click Download. This will download the project settings from the controller to the drive and its connected option module. If Upload is clicked, the drive and option module settings are uploaded to the controller.



TIP On subsequent connections to the drive (after the initial download), click Upload.

5. The I/O Configuration Differences dialog box appears.



6. To match the Datalinks in the drive to the project I/O configuration, click Use Project.

   After the datalinks have been matched, the Input Data and Output Data columns are grayed out.

7. Click Continue.

   A series of download dialog boxes appear, which may take a minute to complete.

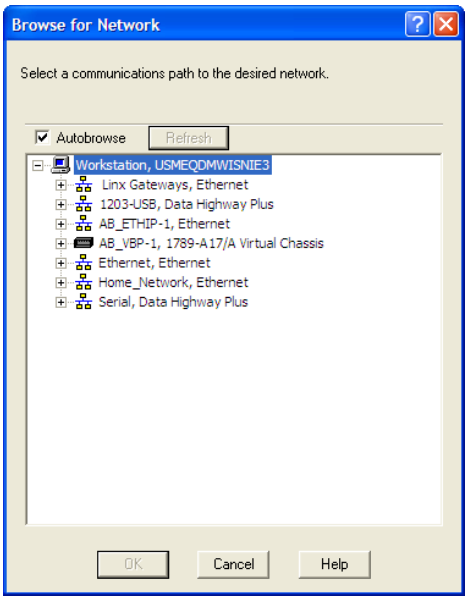
8. Click OK to close the Module Properties dialog box for the drive.

9. Use the procedure in the next subsection Use RSNetworx for ControlNet Software to Configure and Save the I/O to the Bridge to do the following:
   - Change the I/O Not Responding box in the upper-left of the RSLogix 5000 dialog box from flashing green to steady green.
   - Remove the yellow warning symbols in the treeview under the I/O Configuration folder and drive profile.

Use RSNetworx for ControlNet Software to Configure and Save the I/O to the Bridge

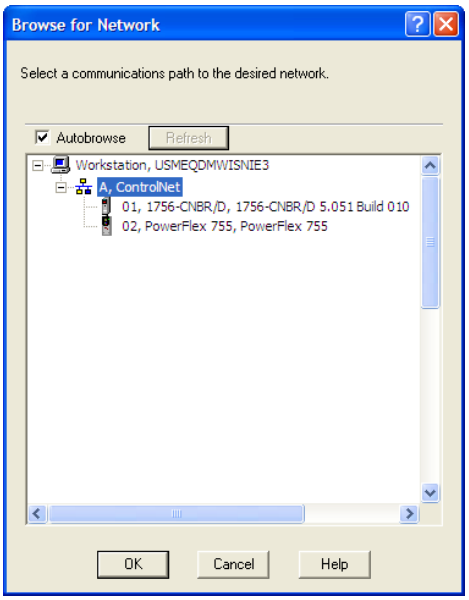
After configuring the I/O in the controller and drive, you must now download and save these configurations to the bridge. This will also resolve the I/O Not Responding box and the yellow warning symbols ⚠ in the RSLogix 5000 project.

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



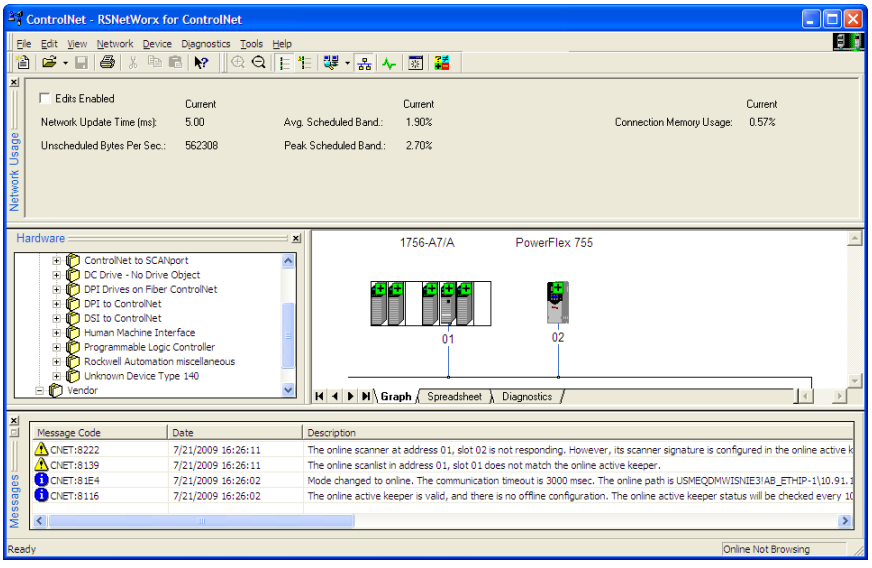
6. Expand the communication path from your computer to the ControlNet bridge.

   The following dialog box shows our example navigating to devices on a ControlNet 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 ControlNet network (for this example, A, ControlNet).

   As the selected ControlNet path is browsed, RSNetWorx for ControlNet 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, you must download the EDS file for that PowerFlex 750-Series drive from the Rockwell Automation 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, ControlNet), 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 on the Microsoft Windows Start button and choosing Programs > Rockwell Software > RSLinx Tools > EDS Hardware Installation Tool.

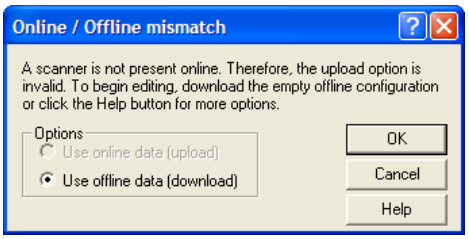
   Then follow the screen prompts to add the EDS file for use with your project.

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

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

8. From the Network menu, choose Enable Edits, or check the Edits Enabled box in the RSNetWorx for ControlNet project window.

If the bridge has a different I/O configuration than the configuration now being saved, the Online/Offline mismatch dialog box will appear.



a. When both Options choices are available, click 'Use offline data (download)'. When this choice is dimmed (grayed out), you must click 'Use online data (upload)'.

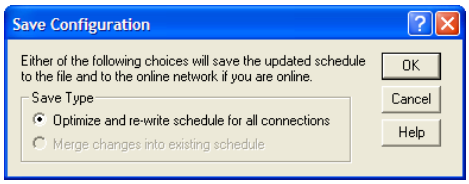
b. Click OK.

TIP If a message box reports that the download cannot be completed because the controller is not in Program mode, click Change Mode to place the controller in Remote Program mode and continue the download.

9. From File menu, choose Save to save the I/O configuration file to the computer.

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.
The Save Configuration dialog box appears.



d. Click OK to download the I/O configuration to the bridge.

TIP When both Save Type choices are available, we recommend to click 'Optimize and re-write schedule for all connections'.

Using the RSLogix 5000 Generic Profile, All Versions

We recommend that you only use the basic RSLogix 5000 software Generic Profile for any of the following reasons:

- A specific drive profile in other versions of RSLogix 5000 software is unavailable.
- Users are already familiar with a Generic Profile and do not want to convert an existing project to a drive Add-on Profile (RSLogix 5000 software, version 16.00 or later).
- A project must maintain specific revision level control.
- The controller cannot be taken offline. RSLogix 5000 software, version 16.00 or later, enables the drive Generic Profile to be added while the controller is online and in the Run mode.

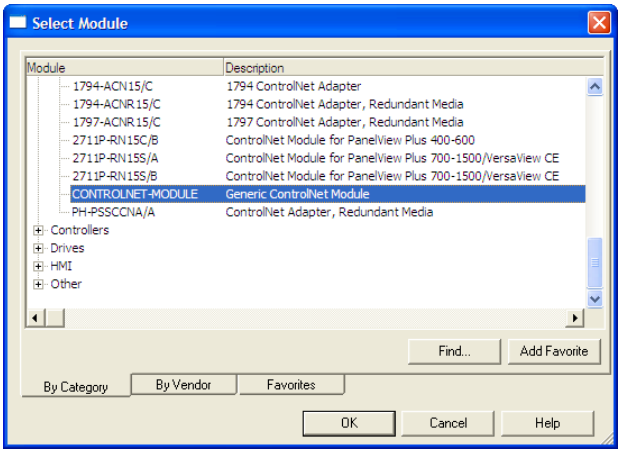
Add the Drive/Option Module to the I/O Configuration

To transmit data between the bridge and the drive, you must add the drive as a child device to the parent bridge.

1. In the treeview, right-click the bridge and choose New Module to display the Select Module dialog box.

   In our example, we right-click the 1756-CNBR/D bridge.

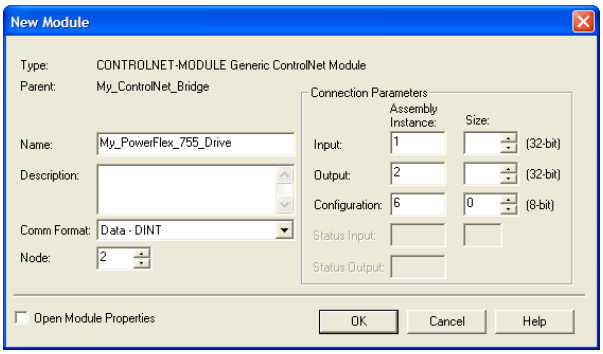
2. Expand the Communications group to display all of the available communication modules.



3. Select 'CONTROLNET-MODULE' from the list to configure the drive and its connected ControlNet option module.

4. Click OK.

   The drive's New Module dialog box appears.



5. Edit the following information about the drive and option module.

Box	Setting
Name	A name to identify the drive and option module.
Description	Optional – description of the drive/option module.
Comm Format	**Data - DINT** (This setting formats the data in 32-bit words.)
Node Address	The node address of the option module.
Open Module Properties	When this box is checked, clicking OK opens additional module properties dialog boxes to further configure the drive/option module. When unchecked, clicking OK closes the drive's New Module dialog box. For this example, check this box.

6. Under Connection Parameters, edit the following information.

Box	Assembly Instance	Size
Input	**1** (This value is required.)	The value will vary based on the number of *Host* **[DL From Net xx]** parameters used for your application (see details below).
Output	**2** (This value is required.)	The value will vary based on the number of *Host* **[DL To Net xx]** parameters used for your application (see details below).
Configuration	**6** (This value is required.)	**0** (This value is required.)

Enter the number of 32-bit words that are required for your I/O in the Input Size and Output Size boxes. Because the option module always uses the 32-bit Logic Status, 32-bit Feedback, and a 32-bit word dedicated for memory allocation of the Generic ControlNet module profile, at least three 32-bit words must be set for the Input Size. The option module also uses the 32-bit Logic Command and 32-bit Reference, requiring at least two 32-bit words for the Output Size. If any or all of the drive's sixteen 32-bit Datalinks are used (see Setting a Master-Slave Hierarchy (Optional) on page 26), the Input and Output Size settings must be increased accordingly.

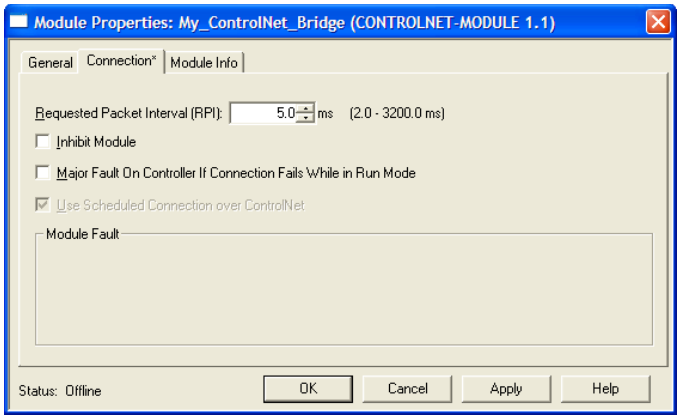
- **Input Size:** Start with 3 words and add 1 word for **each** Datalink used to read data. For example, if 3 Datalinks—*Host* **[DL To Net xx]** parameters—will be used to read drive or peripheral parameters, add 3 words to the required 3 words for a total of 6 words. You can use option module *Device* **Parameter 03 - [DLs To Net Act]** to check the total number of Datalinks being used. Word 0 is a pad word, Word 1 is Logic Status, Word 2 is Speed Feedback, Word 3 is DL To Net 01, and so forth (see Figure 8).
- **Output Size:** Start with 2 words and add 1 word for **each** Datalink used to write data. For example, if 7 Datalinks—*Host* **[DL From Net xx]** parameters—will be used to write to drive or peripheral parameters, add 7 words to the required 2 words for a total of 9 words. You can use option module *Device* **Parameter 02 - [DLs From Net Act]** to check the total number of Datalinks being used. Word 0 is Logic Command, Word 1 is Speed Reference, Word 2 is DL From Net 01, and so forth (see Figure 9).

For the example in this manual, all 16 *Host* **[DL From Net xx]** and all 16 *Host* **[DL To Net xx]** are used, resulting in an Input Size of '19' and an Output Size of '18'.

7. After setting the information in the drive's New Module dialog box, click OK.

   The Module Properties dialog box appears.

8. Click the Connection tab.



9. In the 'Requested Packet Interval (RPI)' box, set the value to 5.0 milliseconds or greater (default is 20.0 milliseconds).

   This value determines the maximum interval that a controller should use to move data to and from the option module. To conserve bandwidth, use higher values for communicating with low priority devices.

   The 'Inhibit Module' box, when checked, inhibits the module from communicating with the RSLogix 5000 project. When the 'Major Fault On' box is checked, a major controller fault will occur when the module's connection fails while the controller is in the Run Mode. For this example, leave the 'Inhibit Module' and 'Major Fault On' boxes unchecked.

10. Click **OK**.

    The new node ('My_PowerFlex_755_Drive' in this example) now appears under the bridge ('My_ControlNet_Bridge' in this example) in the I/O Configuration folder. If you double-click the Input and Output Controller Tags (Figure 8 and Figure 9), you will see that module-defined data types and tags have been automatically created. After you save and download the configuration, these tags allow you to access the Input and Output data of the drive via the controller's ladder logic.

Figure 8 - Input Image Controller Tags

Name	Data Type	Description
My_PowerFlex_755_Drive:I	AB:CONTROL...	
My_PowerFlex_755_Drive:I.Data	DINT[19]	
My_PowerFlex_755_Drive:I.Data[0]	DINT	Pad Word
My_PowerFlex_755_Drive:I.Data[1]	DINT	Logic Status
My_PowerFlex_755_Drive:I.Data[2]	DINT	Speed Feedback
My_PowerFlex_755_Drive:I.Data[3]	DINT	DL To Net 01
My_PowerFlex_755_Drive:I.Data[4]	DINT	DL To Net 02
My_PowerFlex_755_Drive:I.Data[5]	DINT	DL To Net 03
My_PowerFlex_755_Drive:I.Data[6]	DINT	DL To Net 04
My_PowerFlex_755_Drive:I.Data[7]	DINT	DL To Net 05
My_PowerFlex_755_Drive:I.Data[8]	DINT	DL To Net 06
My_PowerFlex_755_Drive:I.Data[9]	DINT	DL To Net 07
My_PowerFlex_755_Drive:I.Data[10]	DINT	DL To Net 08
My_PowerFlex_755_Drive:I.Data[11]	DINT	DL To Net 09
My_PowerFlex_755_Drive:I.Data[12]	DINT	DL To Net 10
My_PowerFlex_755_Drive:I.Data[13]	DINT	DL To Net 11
My_PowerFlex_755_Drive:I.Data[14]	DINT	DL To Net 12
My_PowerFlex_755_Drive:I.Data[15]	DINT	DL To Net 13
My_PowerFlex_755_Drive:I.Data[16]	DINT	DL To Net 14
My_PowerFlex_755_Drive:I.Data[17]	DINT	DL To Net 15
My_PowerFlex_755_Drive:I.Data[18]	DINT	DL To Net 16

Figure 9 - Output Image Controller Tags

Name	Data Type	Description
My_PowerFlex_755_Drive:O	AB:CONTROL...	
My_PowerFlex_755_Drive:O.Data	DINT[18]	
My_PowerFlex_755_Drive:O.Data[0]	DINT	Logic Command
My_PowerFlex_755_Drive:O.Data[1]	DINT	Speed Reference
My_PowerFlex_755_Drive:O.Data[2]	DINT	DL From Net 01
My_PowerFlex_755_Drive:O.Data[3]	DINT	DL From Net 02
My_PowerFlex_755_Drive:O.Data[4]	DINT	DL From Net 03
My_PowerFlex_755_Drive:O.Data[5]	DINT	DL From Net 04
My_PowerFlex_755_Drive:O.Data[6]	DINT	DL From Net 05
My_PowerFlex_755_Drive:O.Data[7]	DINT	DL From Net 06
My_PowerFlex_755_Drive:O.Data[8]	DINT	DL From Net 07
My_PowerFlex_755_Drive:O.Data[9]	DINT	DL From Net 08
My_PowerFlex_755_Drive:O.Data[10]	DINT	DL From Net 09
My_PowerFlex_755_Drive:O.Data[11]	DINT	DL From Net 10
My_PowerFlex_755_Drive:O.Data[12]	DINT	DL From Net 11
My_PowerFlex_755_Drive:O.Data[13]	DINT	DL From Net 12
My_PowerFlex_755_Drive:O.Data[14]	DINT	DL From Net 13
My_PowerFlex_755_Drive:O.Data[15]	DINT	DL From Net 14
My_PowerFlex_755_Drive:O.Data[16]	DINT	DL From Net 15
My_PowerFlex_755_Drive:O.Data[17]	DINT	DL From Net 16

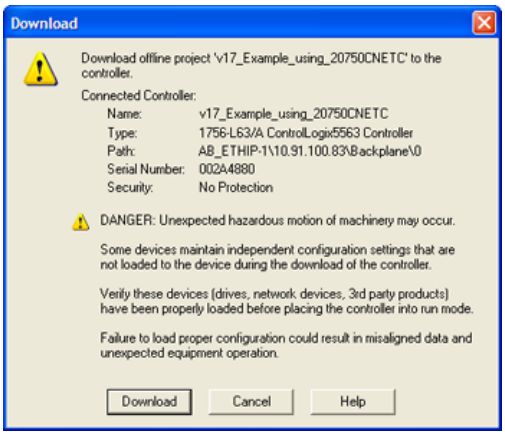
Save the I/O Configuration to the Controller

After adding the bridge 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.

TIP When using RSLogix 5000 software, version 16.00 or later, you can add the I/O configuration of a Generic Profile while the controller is online and in the Run mode.

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 ControlNet driver with RSLinx software. See Using RSLinx Classic Software on page 35 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 Not Responding box in the upper-left of the screen should be flashing 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. Configure any Datalinks in the drive that were enabled in the controller and option module during I/O configuration.

   Each Datalink being used must be assigned to a specific parameter in the drive or connected peripheral (see Setting a Master-Slave Hierarchy (Optional) on page 26). If this is not done, the controller will receive or send placeholder data instead of actual drive or peripheral parameter values.

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

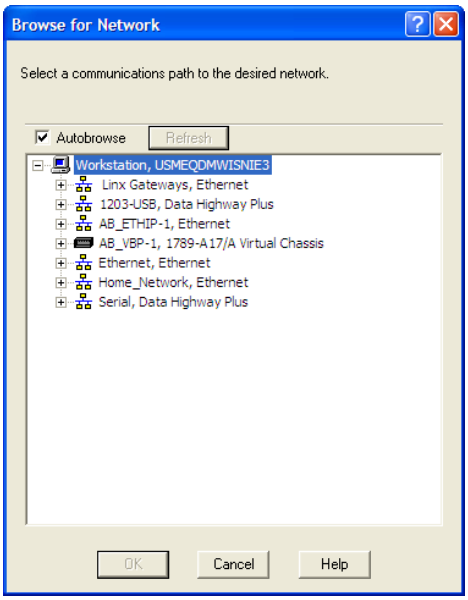
6. Use the procedure in the next subsection Use RSNetworx for ControlNet Software to Configure and Save the I/O to the Bridge to do the following:

   - Change the I/O Not Responding box in the upper-left of the RSLogix 5000 window from flashing green to steady green.
   - Remove the yellow warning symbols in the treeview under the I/O Configuration folder and drive profile.

Use RSNetworx for ControlNet Software to Configure and Save the I/O to the Bridge

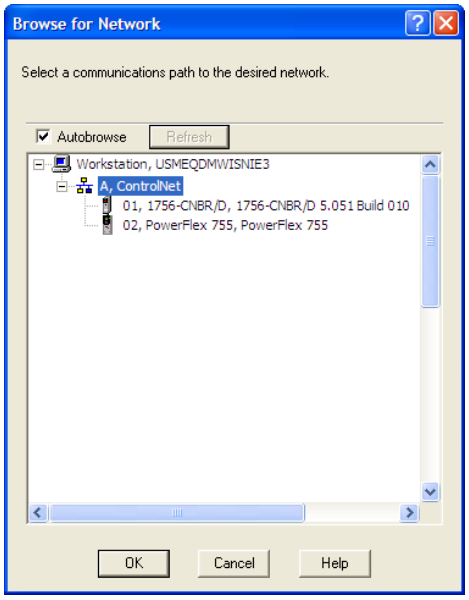
After configuring the I/O in the controller and drive, you must now download and save these configurations to the bridge. This will also resolve the I/O Not Responding box and the yellow warning symbols ⚠ in the RSLogix 5000 project.

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



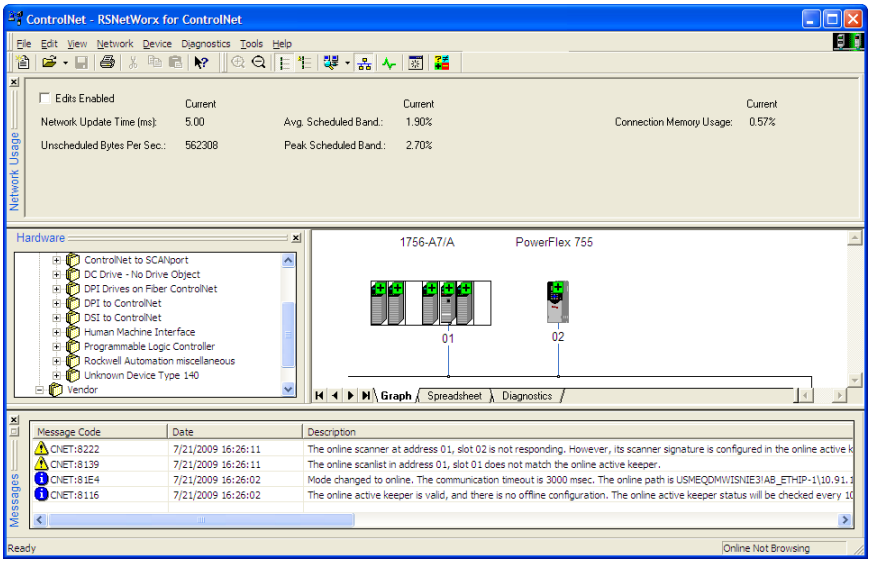
6. Expand the communications path from your computer to the ControlNet bridge.

   The following dialog box shows our example navigating to devices on a ControlNet 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 ControlNet network (for this example, A, ControlNet).

   As the selected ControlNet path is browsed, RSNetWorx for ControlNet 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, you must download the EDS file for that PowerFlex 750-Series drive from the Rockwell AUtomation 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, ControlNet), 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 on the Microsoft Windows Start button and choosing Programs > Rockwell Software > RSLinx Tools > EDS Hardware Installation Tool.

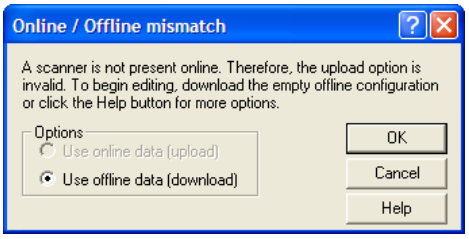
   Then follow the screen prompts to add the EDS file for use with your project.

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

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

8. From the Network menu, choose Enable Edits, or check the Edits Enabled box in the RSNetWorx for ControlNet project window.

If the bridge has a different I/O configuration than the configuration now being saved, the Online/Offline mismatch dialog box will appear.



a. When both Options choices are available, click 'Use offline data (download)'. When this choice is dimmed (grayed out), you must click 'Use online data (upload)'.

b. Click OK.

TIP If a message box reports that the download cannot be completed because the controller is not in Program mode, click Change Mode to place the controller in Remote Program mode and continue the download.

9. From the File menu, choose Save to save the I/O configuration file to the computer.

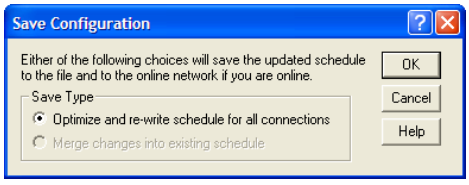
If this is the first time you saved the project, the Save As dialog box appears.

a. Navigate to a folder.

b. Type a file name.

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

The Save Configuration dialog box appears.



d. Click OK to download the I/O configuration to the bridge.

TIP When both Save Type choices are available, we recommend to click 'Optimize and re-write schedule for all connections'.

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.

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

About I/O Messaging

On CIP-based networks, including ControlNet, 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) in the controller's I/O image. This basic I/O must always be configured in the ControlNet bridge using RSLogix 5000 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 one 32-bit word 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 the following:

- How many of the drive's 32-bit Datalinks (*Host* **DL From Net 01-16** and *Host* **DL To Net 01-16**) are used.
- **ControlLogix/CompactLogix Controllers only**—The drive profile used in RSLogix 5000 software (drive Add-on Profile in version 16.00 or later, or Generic Profile in all versions).

Since the drive Add-on Profile in RSLogix 5000 software, version 16.00 or later, provides descriptive controller tags, the I/O image (tag size and location) is automatically configured based on the drive being used. When using the RSLogix 5000 Generic Profile, however, controller tags are not descriptive or defined.

Table 2 shows the I/O image when using all of the 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	Input I/O Using…			
		DINT	Drive Add-on Profile	DINT	Generic Profile
0	Logic Command	0	Logic Status	0	Padword
1	Reference	1	Feedback	1	Logic Status
2	DL From Net 01	2	DL To Net 01	2	Feedback
3	DL From Net 02	3	DL To Net 02	3	DL To Net 01
4	DL From Net 03	4	DL To Net 03	4	DL To Net 02
5	DL From Net 04	5	DL To Net 04	5	DL To Net 03
6	DL From Net 05	6	DL To Net 05	6	DL To Net 04
7	DL From Net 06	7	DL To Net 06	7	DL To Net 05
8	DL From Net 07	8	DL To Net 07	8	DL To Net 06
9	DL From Net 08	9	DL To Net 08	9	DL To Net 07
10	DL From Net 09	10	DL To Net 09	10	DL To Net 08
11	DL From Net 10	11	DL To Net 10	11	DL To Net 09
12	DL From Net 11	12	DL To Net 11	12	DL To Net 10
13	DL From Net 12	13	DL To Net 12	13	DL To Net 11
14	DL From Net 13	14	DL To Net 13	14	DL To Net 12
15	DL From Net 14	15	DL To Net 14	15	DL To Net 13
16	DL From Net 15	16	DL To Net 15	16	DL To Net 14
17	DL From Net 16	17	DL To Net 16	17	DL To Net 15
				18	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 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 when using the drive Add-on Profile.
- DINT 1 in the input image when using the Generic Profile.

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 produced by the controller and consumed by the option module. The Feedback is a 32-bit REAL (floating point) piece of status data 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 when using the drive Add-on Profile.
- DINT 2 in the input image when using the Generic Profile.

When using a drive Add-on Profile, the Reference and Feedback are automatically formatted properly and displayed as a controller tag. When using the Generic Profile, the I/O image is integer-based and the Reference and Feedback are floating point. Because of this, a COP (Copy) instruction or User Defined Data Type (UDDT) is required to correctly write values to the Reference and read values from the Feedback. See the ladder logic program examples in Figure 15 and Figure 16.

TIP When using the drive Add-on Profile, the controller tags for Reference and Feedback are automatically and properly formatted. This eliminates the need for data conversion using COP (copy) instructions or a UDDT to copy the DINT data into a REAL word.

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. Note that 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 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 installed in the drive.
- The data passed through the drive's Datalink mechanism is determined by the settings of *Host* **Parameters 01…16 - [DL From Net 01-16]** and *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 need to 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 will then change to 'LogicDisabld').

TIP When using the drive Add-on Profile, the controller tags for Reference and Feedback to Datalinks are automatically and properly formatted.

If a Generic Profile is used, 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 Drivesto view details.

ControlLogix Controller Example

This section include information when using a ControlLogix controller and an RSLogix 5000 Drive Add-on Profile or a Generic Profile.

Creating Ladder Logic Using the RSLogix 5000 Drive Add-on Profiles, Version 16.00 or Later

Because the drive Add-on Profile automatically created descriptive controller tags (Figure 6) for the entire I/O image in Chapter 4, you can use these tags to directly control and monitor the drive without creating any ladder logic program. However, if you intend to use Human Machine Interface devices (for example, a PanelView graphic terminal) to operate the drive and view its status, you will need to create descriptive user-defined Program tags (Figure 10) and a ladder logic program that will pass the Controller tag data to the Program tags.

Figure 10 - ControlLogix Program Tags for Drive Add-on Profile Ladder Logic Program Example

Name	Value	Data Type
Status_Reverse	0	BOOL
Status_Ready	0	BOOL
Status_Forward	0	BOOL
Status_Faulted	0	BOOL
Status_At_Speed	0	BOOL
Status_Active	0	BOOL
Speed_Reference	0.0	REAL
Speed_Feedback	0.0	REAL
Command_Stop	0	BOOL
Command_Start	0	BOOL
Command_Jog	0	BOOL
Command_Forward_Reverse	0	BOOL
Command_Clear_Faults	0	BOOL

An example ladder logic program that uses the automatically-created descriptive Controller tags and passes their data to the user-defined Program tags is shown in Figure 11 and Figure 12. Note that the prefix for the drive Controller tags is determined by the name assigned when configuring the I/O (Chapter 4).

Figure 11 - ControlLogix Controller Example Ladder Logic Program Using a Drive Add-on Profile for Logic Status/Feedback

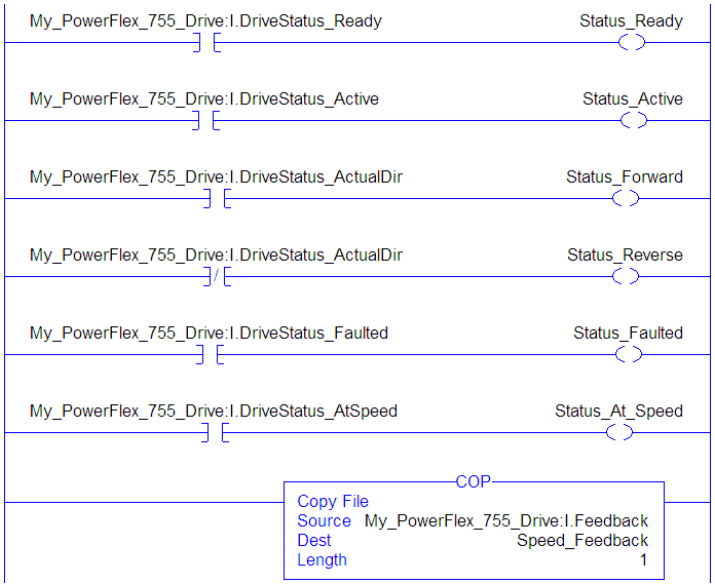
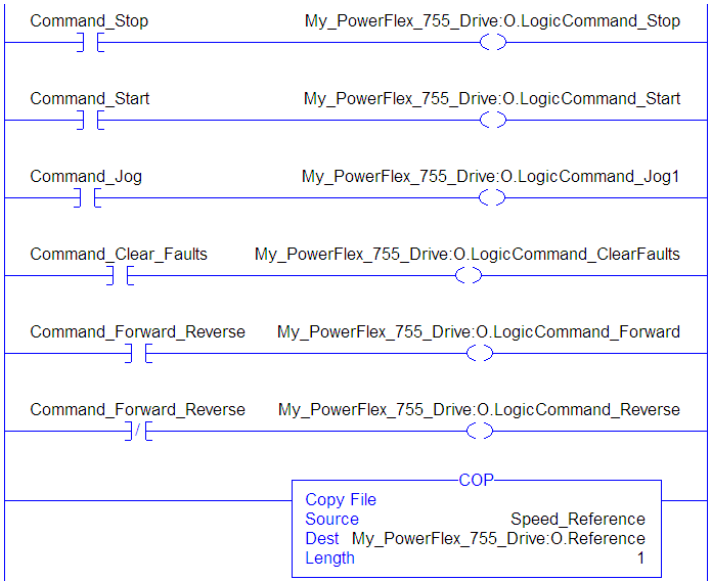


Figure 12 - ControlLogix Controller Example Ladder Logic Program Using a Drive Add-on Profile for Logic Command/Reference



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.

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]
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).

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	Value	Data Type	Description
+ My_PowerFlex_755_Drive:C	{...}	AB:CONTROL...	
+ My_PowerFlex_755_Drive:I	{...}	AB:CONTROL...	
+ My_PowerFlex_755_Drive:O	{...}	AB:CONTROL...	

You can expand the Input and Output tags to reveal the input and output configuration. The Input tag for this example program requires nineteen 32-bit words of data (see Figure 13). The Output tag for this example program requires eighteen 32-bit words of data (see Figure 14).

Figure 13 - ControlLogix Controller Input Image for Drive Generic Profile Example Ladder Logic Program

Name	Data Type	Description
− My_PowerFlex_755_Drive:I	AB:CONTROL...	
− My_PowerFlex_755_Drive:I.Data	DINT[19]	
+ My_PowerFlex_755_Drive:I.Data[0]	DINT	Pad Word
+ My_PowerFlex_755_Drive:I.Data[1]	DINT	Logic Status
+ My_PowerFlex_755_Drive:I.Data[2]	DINT	Speed Feedback
+ My_PowerFlex_755_Drive:I.Data[3]	DINT	DL To Net 01
+ My_PowerFlex_755_Drive:I.Data[4]	DINT	DL To Net 02
+ My_PowerFlex_755_Drive:I.Data[5]	DINT	DL To Net 03
+ My_PowerFlex_755_Drive:I.Data[6]	DINT	DL To Net 04
+ My_PowerFlex_755_Drive:I.Data[7]	DINT	DL To Net 05
+ My_PowerFlex_755_Drive:I.Data[8]	DINT	DL To Net 06
+ My_PowerFlex_755_Drive:I.Data[9]	DINT	DL To Net 07
+ My_PowerFlex_755_Drive:I.Data[10]	DINT	DL To Net 08
+ My_PowerFlex_755_Drive:I.Data[11]	DINT	DL To Net 09
+ My_PowerFlex_755_Drive:I.Data[12]	DINT	DL To Net 10
+ My_PowerFlex_755_Drive:I.Data[13]	DINT	DL To Net 11
+ My_PowerFlex_755_Drive:I.Data[14]	DINT	DL To Net 12
+ My_PowerFlex_755_Drive:I.Data[15]	DINT	DL To Net 13
+ My_PowerFlex_755_Drive:I.Data[16]	DINT	DL To Net 14
+ My_PowerFlex_755_Drive:I.Data[17]	DINT	DL To Net 15
+ My_PowerFlex_755_Drive:I.Data[18]	DINT	DL To Net 16

Figure 14 - ControlLogix Controller Output Image for Drive Generic Profile Example Ladder Logic Program

Name	Data Type	Description
− My_PowerFlex_755_Drive:O	AB:CONTROL...	
− My_PowerFlex_755_Drive:O.Data	DINT[18]	
+ My_PowerFlex_755_Drive:O.Data[0]	DINT	Logic Command
+ My_PowerFlex_755_Drive:O.Data[1]	DINT	Speed Reference
+ My_PowerFlex_755_Drive:O.Data[2]	DINT	DL From Net 01
+ My_PowerFlex_755_Drive:O.Data[3]	DINT	DL From Net 02
+ My_PowerFlex_755_Drive:O.Data[4]	DINT	DL From Net 03
+ My_PowerFlex_755_Drive:O.Data[5]	DINT	DL From Net 04
+ My_PowerFlex_755_Drive:O.Data[6]	DINT	DL From Net 05
+ My_PowerFlex_755_Drive:O.Data[7]	DINT	DL From Net 06
+ My_PowerFlex_755_Drive:O.Data[8]	DINT	DL From Net 07
+ My_PowerFlex_755_Drive:O.Data[9]	DINT	DL From Net 08
+ My_PowerFlex_755_Drive:O.Data[10]	DINT	DL From Net 09
+ My_PowerFlex_755_Drive:O.Data[11]	DINT	DL From Net 10
+ My_PowerFlex_755_Drive:O.Data[12]	DINT	DL From Net 11
+ My_PowerFlex_755_Drive:O.Data[13]	DINT	DL From Net 12
+ My_PowerFlex_755_Drive:O.Data[14]	DINT	DL From Net 13
+ My_PowerFlex_755_Drive:O.Data[15]	DINT	DL From Net 14
+ My_PowerFlex_755_Drive:O.Data[16]	DINT	DL From Net 15
+ My_PowerFlex_755_Drive:O.Data[17]	DINT	DL From Net 16

Program Tags

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

Name	Value	Data Type	Description
Command_Clear_Faults	0	BOOL	
Command_Forward_Reverse	0	BOOL	
Command_Jog	0	BOOL	
Command_Start	0	BOOL	
Command_Stop	0	BOOL	
Speed_Feedback	0.0	REAL	
Speed_Reference	0.0	REAL	
Status_Active	0	BOOL	
Status_At_Speed	0	BOOL	
Status_Faulted	0	BOOL	
Status_Forward	0	BOOL	
Status_Ready	0	BOOL	
Status_Reverse	0	BOOL	

Figure 15 - ControlLogix Controller Example Ladder Logic Program Using a Drive Generic Profile for Logic Status/Feedback

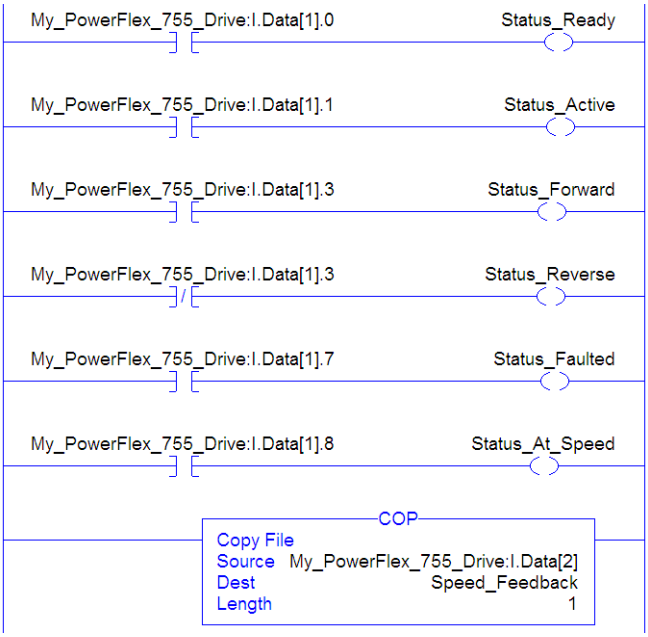
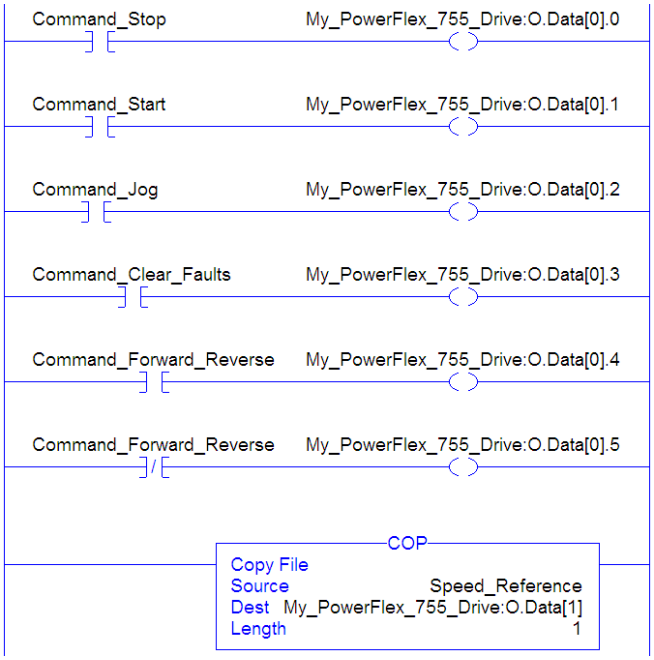


Figure 16 - ControlLogix Controller Example Ladder Logic Program Using a Drive Generic Profile for Logic Command/Reference



Example Datalink Data

The Datalink data used in the example program is shown in Figure 17. Note that to describe the parameters to which the Datalinks are assigned, you may want to add descriptions to the automatically-created generic controller tags or create a 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 17 - 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).

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.

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 screen during message setup. These message connections are in addition to the I/O connection. However, the trade off for more message connections is decreased network performance. If your application cannot tolerate this, do not check the 'Connected' box, 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 115 for *Device* parameters.
- Host DPI Parameter Object section on page 129 for *Host* parameters.

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

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

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

ControlNet 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 115 for instance (parameter) numbering.

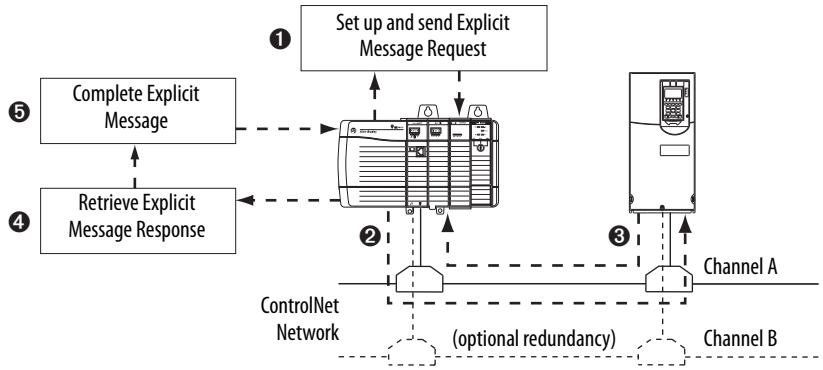
(2) Enables access to drive parameters (Port 0) and Host parameters for all ports (1…14). Host DPI Parameter Object Class code 0x9F cannot access DPI (device) parameters. For example, if a 20-750-CNET option module is in Port 4, its Host parameters can be accessed, but not its DPI (device) parameters. See Host DPI Parameter Object on page 129 for instance (parameter) numbering.

Performing Explicit Messaging

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

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

Figure 18 - 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 bridge or 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, ControlNet 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.

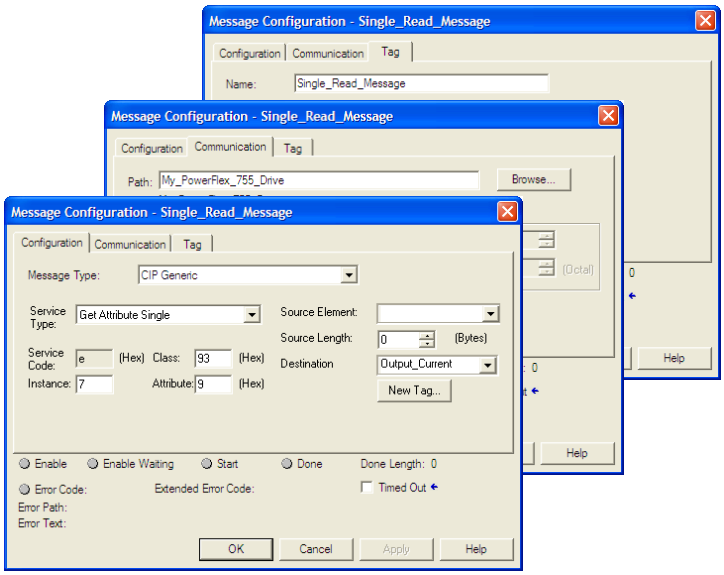
Table 5 - Example Controller Tags to Read a Single Parameter

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

Figure 19 - Example Ladder Logic to Read a Single Parameter

ControlLogix – Formatting a Message to Read a Single Parameter

Figure 20 - 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_PowerFlex_755_Drive	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 115 (Class code 0x93) or Host DPI Parameter Object on page 129 (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_PowerFlex_755_Drive).

(4) See Table 4 on page 74 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.

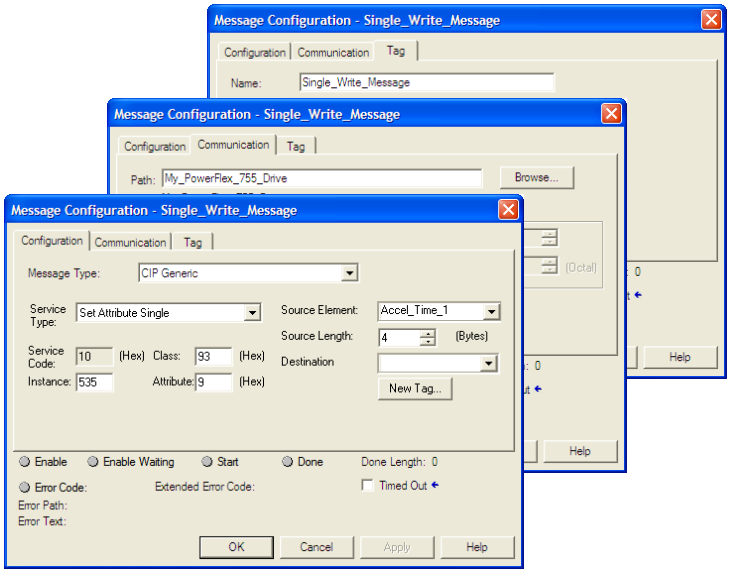
Table 6 - Example Controller Tags to Write a Single Parameter

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

Figure 21 - Example Ladder Logic to Write a Single Parameter

ControlLogix – Formatting a Message to Write a Single Parameter

Figure 22 - 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_PowerFlex_755_Drive	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 115 (Class code 0x93) or Host DPI Parameter Object on page 129 (Class code 0x9F) to determine the instance number.

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

(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_PowerFlex_755_Drive).

(5) See Table 4 on page 74 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 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 115 (Class code 0x93) or Host DPI Parameter Object on page 129 (Class code 0x9F) for parameter numbering.

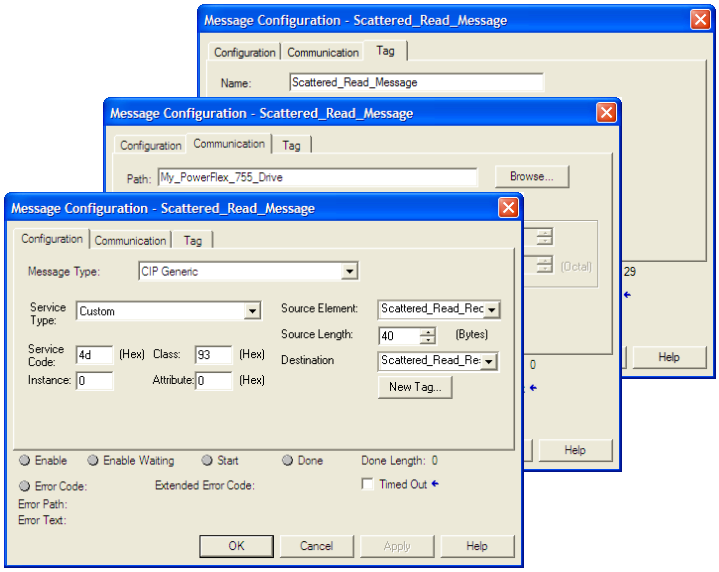
Table 7 - Example Controller Tags to Read Multiple Parameters

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

Figure 23 - Example Ladder Logic to Read Multiple Parameters

ControlLogix – Formatting a Message to Read Multiple Parameters

Figure 24 - 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_PowerFlex_755_Drive	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_PowerFlex_755_Drive).

(3) See Table 4 on page 74 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 256 bytes which can read up to 32 parameters, regardless of their size. For parameter numbering, see DPI Parameter Object on page 115 (Class code 0x93) or Host DPI Parameter Object on page 129 (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 conversions 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 25 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 115 (Class code 0x93) or Host DPI Parameter Object on page 129 (Class code 0x9F) for parameter numbering.

Figure 25 - 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 26 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 parameters being read are 32-bit integers, do not COP the data to a REAL tag.

Figure 26 - 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 115 (Class code 0x93) or Host DPI Parameter Object on page 129 (Class code 0x9F) for parameter numbering.

Table 8 - Example Controller Tags to Write Multiple Parameters

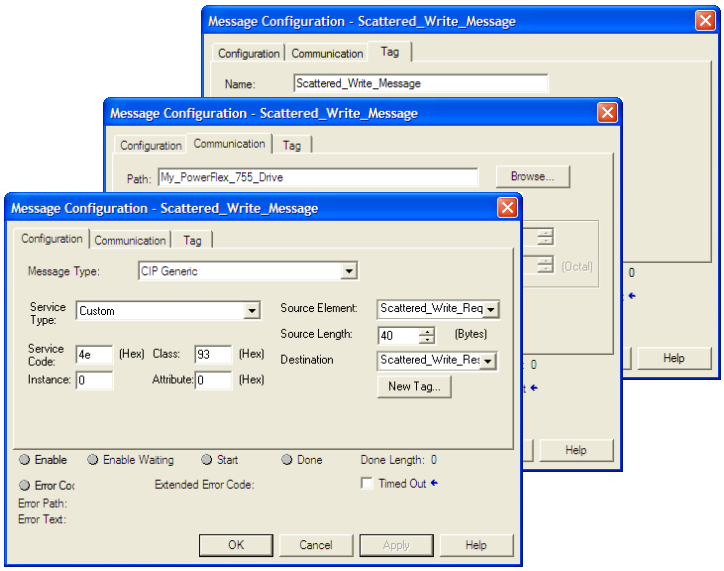
Operand	Controller Tags for Scattered Write Message	Data Type
XIC	Execute_Scattered_Write_Message	BOOL
MSG	Scattered_Write_Message	MESSAGE

Figure 27 - 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 79). 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 28 - 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_PowerFlex_755_Drive	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 very cautious as the EEPROM may quickly exceed its life cycle 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_PowerFlex_755_Drive).

(4) See Table 4 on page 74 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 256 bytes which can write up to 32 parameters, regardless of their size. For parameter numbering, see DPI Parameter Object on page 115 (Class code 0x93) or Host DPI Parameter Object on page 129 (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 29 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 115 (Class code 0x93) or Host DPI Parameter Object on page 129 (Class code 0x9F) for parameter numbering.

Figure 29 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 29 - 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 30). Values of '0' indicate no errors occurred.

Figure 30 - 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 Messaging

The data structures in Table 9 and Table 10 use 32-bit words and can accommodate up to 32 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

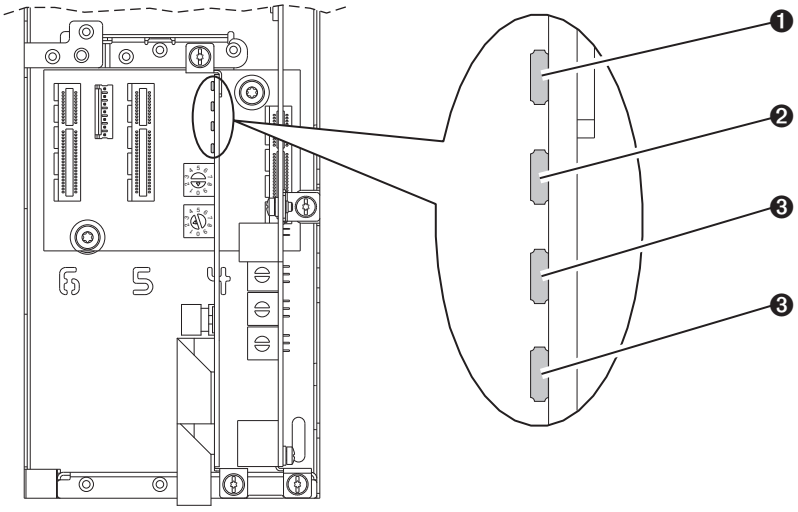
Notes:

Troubleshooting

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

Understanding the Status Indicators

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



Item	Status Indicator	Description	Page
❶	PORT	DPI Connection Status	90
❷	MOD	Option Module Status	90
❸	NET A	ControlNet Channel A Status	91
❹	NET B	ControlNet Channel B Status	91

PORT Status Indicator

This red/green bicolor LED 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.
Flashing Orange	The option module is not compatible with the drive's firmware.	Update the drive with the latest firmware revision.
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 LED 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 option module has failed the firmware test. The option module firmware is being updated.	• 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 and NET B Status Indicators

These red/green bicolor LEDs indicate the status for the ControlNet Channel A and Channel B network connections. Depending on the state of these LEDs, they should be interpreted together or independently.

Indicators Interpreted Together

When interpreted together, the NET A and NET B LEDs indicate the network status as shown in the table below.

Status	Cause	Corrective Actions
Both indicators Off	A reset occurred or the option module is not powered.	Apply power to the drive.
Both indicators Steady Red	A link interface failed.	• Check network coaxial media for broken cables, loose connectors, missing terminators, and so forth. • Cycle power to the drive, or reset the option module. If the problem persists, contact Rockwell Technical Support.
Indicators Alternately Flashing Red/Green	The option module is in self-test mode.	No action required. The option module will exit this mode after the self-test is completed.
Indicators Alternately Flashing Red/Off	There is a bad node configuration.	• Verify that all node addresses are unique. • Check the option module's configuration. • Check network coaxial media for broken cables, loose connectors, missing terminators, and so forth. • Cycle power to the drive, or reset the option module.

Indicators Interpreted Independently

When interpreted independently, the NET A and NET B LEDs respectively indicate the network status as shown in the table below.

Status	Cause	Corrective Actions
One channel indicator is Steady Off	That channel is disabled or not supported.	Program the network for redundant media, if required.
One channel indicator is Flashing Red/Green	There is an invalid link configuration for that channel.	• Cycle power to the drive, or reset the option module. • Reset the controller. • If the problem persists, contact Rockwell Technical Support.
One channel indicator is Flashing Red/Off	The channel is not receiving network activity.	Check network coaxial media for broken cables, loose connectors, missing terminators, and so forth.
One channel indicator is Flashing Green/Off	A temporary channel error has occurred, or the channel is in 'listen-only' mode.	Verify that the controller is present on the network and working.
One channel indicator is Steady Green	Normal operation for that channel.	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 using 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.
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	CN Rx Packets	A count of the number of network packets received by the option module.
48	CN Rx Underflows	A count of the number of network receive underflow errors.
49	CN Rx Overflows	A count of the number of network receive overflow errors.
50	CN Rx Bad Frames	A count of the number of network receive bad frame errors.
51	CN Tx Packets	A count of the number of network packets transmitted by the option module.
52	CN Tx Underflows	A count of the number of network transmit underflow errors.
53	CN Tx Overflows	A count of the number of network transmit overflow errors.
54	CN Tx OutOfSteps	A count of the number of network transmit out-of-step errors.
55	CN Tx Blockages	A count of the number of network transmit blockage errors.
56	Boot Flash Count	Number of times the boot firmware in the option module has been updated.
57	App Flash Count	Number of times the application firmware in the option module has been updated.
58	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 timestamp 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
- Other clients using the DPI Fault object

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 will become 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 will clear 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 Text	Description
Option Module Events		
1	No Event	Text 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 changed after start up.
12	DPI Host Reset	The drive sent a reset event message.

Table 12 - Option Module Events (Continued)

Code	Event Text	Description
13	DPI Baud 125kbps	The option module detected that the drive was communicating at 125 Kbps.
14	DPI Baud 500kbps	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 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 non-zero 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 non-zero 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.
45-57	Reserved	—
58	Module Defaulted	The option module has been set to defaults.

Notes:

Specifications

This appendix presents the specifications for the option module.

Communications

Network	
Protocol	ControlNet
Data Rate	5 Mbps (fixed)
Media	Coax with BNC connector
Connection Limits	16 simultaneous CIP messaging connections 32 simultaneous unconnected messages Unlimited input-only I/O connections One of the following connection types: • 1 exclusive-owner I/O connection • Up to 3 redundant-owner I/O connections • 1 listen-only I/O connection
Requested Packet Interval (RPI)	5 ms minimum
Packet Rate	Up to 400 total I/O packets per second (200 in and 200 out)
Drive	
Protocol	DPI
Data Rates	500 kbps

Electrical

Consumption	
Drive	250 mA at 14 VDC supplied by the host drive
Network	None

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% non-condensing
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

Certification	Specification
UL	UL508C
cUL	CAN / CSA C22.2 No. 14-05
CE	EN61800-3
CTick	EN61800-3

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

Option Module Parameters

This appendix provides information about the option module parameters.

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 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, ControlNet 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: Maximum: Type:	4 6 Read Only
02	**[DLs From Net Act]** Displays the number of controller-to-drive Datalinks that the drive is using based on the I/O connection opened by the controller.	Minimum: Maximum: Type:	0 16 Read Only
03	**[DLs To Net Act]** Displays the number of drive-to-controller Datalinks that the controller is using based on the I/O connection opened by the controller.	Minimum: Maximum: Type:	0 16 Read Only
04	**[Net Addr Src]** Displays the source from which the option module node address is taken. This will be either the Node Address switches (see Figure 1 on page 18), or the value of *Device* **Parameter 05- [Net Addr Cfg]**.	Values: Type:	0 = Switches 1 = Parameters Read Only
05	**[Net Addr Cfg]** Sets the network node address for the option module when *Device* **Parameter 04 - [Net Addr Src]** is set to '1' (Parameters).	Default: Minimum: Maximum: Type: Reset Required:	2 1 99 Read/Write Yes
06	**[Net Addr Act]** Displays the actual network node address used by the option module.	Minimum: Maximum: Type:	1 99 Read Only

Parameter No.	Name and Description	Details
07	**[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]**	Default: 0
	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 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].	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 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 will take 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 will automatically receive commands over the network again.	Default: 0 = Fault Values: 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Type: Read/Write Reset Required: No

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 will 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 will automatically receive commands over the network again.	Default: 0 = Fault Values: 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Type: Read/Write Reset Required: No
	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]** 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 will take if the option module detects that explicit messaging—only when used for drive control via the PCCC, CIP Assembly or CIP Register objects—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: Minimum: Maximum: Type: Reset Required:	0 -3.40282×10^{38} 3.40282×10^{38} Read/Write 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: Minimum: Maximum: Type: Reset Required:	0 0 4294967295 Read/Write No

ControlNet Objects

This appendix presents information about the ControlNet 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.

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

Supported Data Types

Data Type	Description
BOOL	8-bit value -- low bit is true or false
BOOL[x]	Array of x 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 x characters
STRUCT	Structure name only - no size in addition to elements
TCHAR	8 or 16-bit character
UDINT	32-bit unsigned integer
UINT	16-bit unsigned integer
USINT	8-bit unsigned integer

Identity Object

Class Code

Hexadecimal	Decimal
0x01	1

Services

	Implemented for:		
Service Code	Class	Instance	Service Name
0x05	Yes	Yes	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x01	Yes	Yes	Get_Attributes_All

Instances

The number of instances depends on the number of components in the device 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	140 = PowerFlex 750-Series via ControlNet
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

Assembly Object

Class Code

Hexadecimal	Decimal
0x04	4

Services

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

Instances

Instance	Description
1	All I/O data being read from the DPI device (read-only)
2	All I/O data written to the DPI device (read/write)

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT	2
2	Get	Max Instance	UINT	2
100	Set	Control Timeout	UINT	Control timeout in seconds

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Number of Members	UINT	1
2	Get	Member List	ARRAY of STRUCT: UINT UINT Packed EPATH	 Size of member data Size of member path Member path
3	Conditional (1)	Data	Array of Bits	Data to be transferred
4	Get	Size	UINT	Size of assembly data in bits

(1) For instance 1, access rule for the data attribute is Get. For instance 2, it is Get/Set.

IMPORTANT Setting an assembly object attribute can be done only when the Control Timeout (class attribute 100) has been set to a non-zero value.

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 I/O data being read from the option module (read-only)
2	All I/O data 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
0x4C	No	Yes	Execute_DH+

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_DH+

Request		
Name	**Data Type**	**Description**
DLink	UINT	Destination Link ID
DSta	USINT	Destination Station number
DUser	USINT	Destination 'User' number
SLink	UINT	Source Link ID
SSta	USINT	Source Station number
SUser	USINT	Source User number
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**
DLink	UINT	Destination Link ID
DSta	USINT	Destination Station number
DUser	USINT	Destination 'User' number
SLink	UINT	Source Link ID
SSta	USINT	Source Station number
SUser	USINT	Source User number
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	0xA1	SLC 500 protected typed read with 2 address fields
0x0F	0xA9	SLC 500 protected typed write with 2 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 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 the drive resides.	
N42:8	Peer Option Modules (read only): Bit field of devices having 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] parameter). • The value of N42:3 is set to a non-zero 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 750-Series Drive 0xA0 = 20-750-xxx 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)
14	Get	Product Option Support	BOOL[64]	
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 start up) 1 = Language was selected (no prompt)
20	Set	Customer-Generated Firmware	STRING[36]	GUID (Globally Unique Identifier) identifying customer firmware flashed into the device.

Attribute ID	Access Rule	Name	Data Type	Description
30	Get	International Status Text	STRINGN	Text describing the status of device with support for Unicode.
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	 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 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 118)
			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 118)
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 118)
			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 119)
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 120.

(3) Do NOT continually write parameter data to NVS. See the attention on page 73.

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 the Formula Data is derived from other parameters.
22	Access Level (Bit 1)	A 3-bit field used to control access to parameter data.
23	Access Level (Bit 2)	
24	Access Level (Bit 3)	
25	Writable ENUM	ENUM text: 0 = Read Only, 1 = Read/Write
26	Not a Link Source	0 = 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 to not 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). Note that 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 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 non-zero 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 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	Yes	Set_Attribute_Single

Instances

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

Instances		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 118)
			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 120.

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 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]	Name of the timer
			LWORD or STRUCT	Elapsed time in milliseconds unless timer is a real time clock (see attribute 2)
			BOOL[16]	See Attribute 3
1	Get	Timer Text	STRING[16]	Name of the timer
2	Get/Set	Timer Value	LWORD -or-	Elapsed time in milliseconds unless the timer is a real time clock.
			STRUCT of:	Real Time Clock Data:
			UINT	Milliseconds (0…999)
			USINT	Seconds (0…59)
			USINT	Minutes (0…59)
			USINT	Hours (0…23)
			USINT	Days (1…31)
			USINT	Months (1 = January, 12 = December)
			USINT	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	International timer text
			STRUCT	Timer value
			BOOL[16]	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 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 132)
			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 132)
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 132)
			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 133)
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 134.

(3) Do NOT continually write parameter data to NVS. See the attention on page 73.

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 the Formula Data is derived from other parameters.
22	Access Level (Bit 1)	A 3-bit field used to control access to parameter data.
23	Access Level (Bit 2)	
24	Access Level (Bit 3)	
25	Writable ENUM	ENUM text: 0 = Read Only, 1 = Read/Write
26	Not a Link Source	0 = 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 to not 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). Note that 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 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 non-zero 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

History of Changes

This appendix summarizes the revisions to this manual. Reference this appendix if you need information to determine what changes have been made across multiple revisions. This may be especially useful if you are deciding to upgrade your hardware or software based on information added with previous revisions of this manual.

750COM-UM003A-EN-P, September 2009

Change
This was the first release of this manual.

Notes:

The following terms and abbreviations are used throughout this manual. For definitions of terms 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.

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

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.

ControlFLASH A **free** software tool 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.

ControlNet Network An open producer-consumer communication network with features, such as redundant media and deterministic I/O timing, designed for high-performance or time-critical requirements.

General information about ControlNet and the ControlNet specification is available on the ControlNet website at http://www.controlnet.org.

Data Rate The speed at which data is transferred on the ControlNet network (fixed at 5 Mbps).

Datalinks A Datalink is a type of pointer 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.

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 not supported by Connected Components Workbench software.

DriveTools SP Software A software suite designed for running on various Microsoft Windows operating systems. This software suite provides a family of tools, including DriveExecutive software (version 3.01 or later), that you can use to program, monitor, control, troubleshoot, and maintain Allen-Bradley products. DriveTools SP software, 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 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 disconnected cable) occurs or when the controller is switched out of run mode. The former uses a communication fault action, and the latter uses an idle fault action.

Fault Configuration When communication is disrupted (for example, a cable is disconnected), the 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.

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 will continue 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 32-bit word of output to the option module from the network. 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 32-bit word 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 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 ControlNet option modules) are slave devices.

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

Node Address The valid range of ControlNet addresses is 1...99. The ControlNet option module has two rotary switches or *Device* **Parameter 05 - [Net Addr Cfg]** to set the ControlNet address. The option module reads the values of the switches only at powerup.

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 ControlNet. 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-CNETC ControlNet option module connects PowerFlex 750-Series drives to a ControlNet network. Option modules are sometimes also called 'adapters', 'cards', 'embedded communication options', or '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 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 on the network to determine if a node exists.

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. The source therefore sends a packet once and all the nodes consume the same packet if they need it. Data is produced once, regardless of the number of consumers. Also, better synchronization than Master-Slave networks is possible because data arrives at each node at the same time

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 ControlNet Software A software tool for configuring and monitoring ControlNet networks and connected devices. It is a 32-bit application that runs on various Windows operating systems. Information about RSNetWorx for ControlNet 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 connected to a network. See also Controller.

SI (Serial Interface) A next generation communication interface 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.

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 33 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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Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support/, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html, or contact your local Rockwell Automation representative.

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Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

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