User Manual

Original Instructions

AB QUALITY   *Allen-Bradley*

PowerFlex 20-750-ENETR Dual-port EtherNet/IP Option Module

Firmware Revision1.*xxx*

Important User Information

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

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

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

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

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

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

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

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

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

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

SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.

BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

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

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Notes:

This manual provides information about the 20-750-ENETR Dual-port EtherNet/IP option module for network communication and how to use the module with PowerFlex® 750-Series drives.

To order paper copies of documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

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 the Downloads or Knowledgebase link.

Conventions Used in This Manual

These 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 - [Operating Mode]**.
- 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 this software:
  – RSLinx® Classic software, version 2.52
  – RSLogix 5000® software, version 16.00 and, for Automatic Device Configuration (ADC) information, version 20.00

  Different versions of the software can 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:
	  – 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.

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

Additional Resources

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

Resource	Description
Industrial Automation Wiring and Grounding Guidelines, 1770-4.1	Provides general guidelines for installing a Rockwell Automation® industrial system.
Network Communication Option Module, Installation Instructions, 750COM-IN002	Provides installation instructions for PowerFlex® 750-Series Network Communication Modules.
EtherNet/IP Media Planning and Installation Manual, ODVA publication 148 [1]	The planning, installation, and techniques that are used to implement an EtherNet/IP network.
EtherNet/IP Network Infrastructure Guidelines, ODVA publication 35 [1]	
Ethernet Design Considerations Reference Manual, ENET-RM002	
EtherNet/IP Embedded Switch Technology - Linear and Device Level Ring Topologies, ENET-AP005	
PowerFlex 750-Series Drive Installation Instructions, 750-IN001	The installation of programming, and technical data of PowerFlex 750-Series drives.
PowerFlex 750-Series Drive Programming Manual, 750-PM001	
PowerFlex 750-Series Drive Technical Data, 750-TD001	
PowerFlex 20-HIM-A6/-C6S HIM (Human Interface Module) User Manual, publication 20HIM-UM001	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 [2]	The use of RSLinx® Classic software.
RSLogix 5000 PIDE Autotuner Getting Results Guide, publication PIDE-GR001, and online help [2]	The use of the RSLogix 5000 software tool.
EtherNet/IP Modules in Logix5000 Control Systems User Manual, ENET-UM001	The use of ControlLogix® 1756-EN2TR or 1756-EN3TR EtherNet/IP communication modules with your Logix5000™ controller and how to communicate with various devices on the EtherNet/IP network.
Controller Examples for EtherNet/IP Network Communications with PowerFlex 750-Series Drives, publication 750COM-AT001	The use of PLC-5®, SLC™ 500, and MicroLogix™ 1100/1400 controllers with PowerFlex 750-Series drives that are equipped with a 20-750-ENETR Dual-port EtherNet/IP option module. Or embedded EtherNet/IP adapter (PowerFlex 755 drive only).
Product Certifications website, http://www.rockwellautomation.com/global/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.
Connected Components Workbench website http://www.ab.com/support/abdrives/webupdate/software.html, and online help [2]	The Connected Components Workbench™ software tool. Includes a link for **free** software download.
DriveExplorer website http://www.ab.com/drives/driveexplorer, and online help [2]	How to use the DriveExplorer™ software tool.
DriveExecutive website http://www.ab.com/drives/drivetools, and online help [2]	How to use the DriveExecutive™ software tool.

(1) Use this link to the ODVA EtherNet/IP library: http://odva.org/Home/ODVATECHNOLOGIES/EtherNetIP/EtherNetIPLibrary/tabid/76/Default.aspx.

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

To view or download publications go to http://www.rockwellautomation.com/literature

Getting Started

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

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Components

Component Side View   Top View
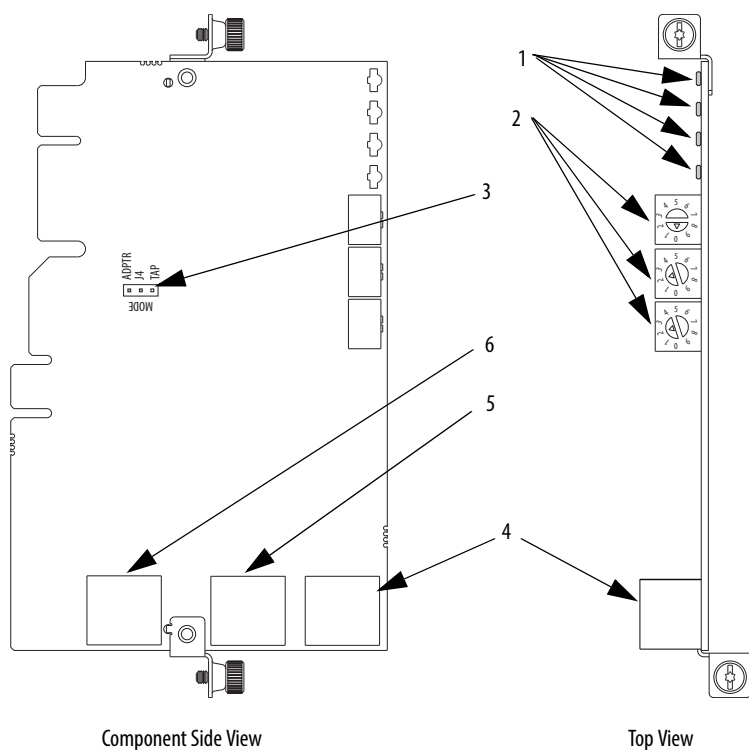
Item	Part	Description
1	Status Indicators	Four status indicators that indicate the status of the option module and network communication. See Chapter 7, Troubleshooting.
2	Node Address Switches	Sets the network node address of the option module when **not** using: A BOOTP or DHCP server Option module parameters See Setting the Node Address on page 24.
3	Operating Mode Jumper (J4)	Selects the mode in which the option module operates. See Setting the Operating Mode on page 23.
4	ENET1 Network Port	RJ45 connector for the Ethernet network cable. The connector is CAT-5 compliant to help data transfer on 100Base-TX Ethernet connections. Either port can be used in Adapter mode.
5	ENET2 Network Port	
6	ENET3 (DEVICE) Port (PowerFlex 755 only)	RJ45 connector to connect the short Ethernet cable (provided with the option module) to the Ethernet port on the PowerFlex® 755 drive embedded EtherNet/IP adapter. This connection is intended for 'Integrated Motion on the EtherNet/IP network' data transfer.

Features

The features of the option module include the following:

- Adapter or Tap mode of operation that is selected by using the Operating Mode Jumper (J4). In Adapter mode (default), the option module operates as a network communication adapter supporting-star, linear or device level ring (DLR) network topologies. In Tap mode, only intended for use with PowerFlex 755 drives, the option module uses ENET3 (DEVICE) port. The connection point is used to transfer 'Integrated Motion on the EtherNet/IP network' data to the PowerFlex 755 drive's embedded EtherNet/IP adapter.

- Industrial Ethernet switch, and ENET1 and ENET2 network ports that provide connections for EtherNet/IP star, linear, or device-level ring (DLR) network topologies.

- ENET3 (DEVICE) port—for use with only PowerFlex 755 drives— that supports the transfer of 'Integrated Motion on the EtherNet/IP network' data for that drive.

- Embedded electronic data sheet (EDS) files for PowerFlex 750-Series drives that eliminate the need to download an EDS file from the Rockwell Automation website. Instead, the EDS file is uploaded from the option module by using RSLinx® software.

- Automatic Device Configuration (ADC), is an 'RSLogix 5000® software feature, version 20 or later, that supports the automatic download of configuration data. Download occurs after the Logix controller establishes an EtherNet/IP network connection to a PowerFlex® 750-Series drive and its associated peripherals. The Power Flex 750-Series drive firmware must be revision 4.001 or later.

- Captive screws to secure and ground the module to the drive.

- Switches to set a network node address before power is applied to the drive. Alternately you can disable the switches and use a BOOTP server, a Dynamic Host Configuration Protocol (DHCP) server, or option module parameters to configure the IP 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 or peer-to-peer hierarchy that can be configured to transmit data to and from a controller. Or another PowerFlex 750-Series drive on the network by using another 20-750-ENETR option module or the embedded EtherNet/IP adapter in a PowerFlex 755 drive.

- Supports 'Integrated Motion on the EtherNet/IP network' operation (Tap mode only) for only the PowerFlex 755 drive, firmware revision 2.003 or later. For details to configure 'Integrated Motion on the EtherNet/IP network' operation, see Integrated Motion on the EtherNet/IP Network User Manual, publication [MOTION-UM003](#).

  > **TIP**   Rockwell Automation recommends that Rockwell Automation Cat5e shielded Ethernet cable is used in 'Integrated Motion on the EtherNet/IP network' applications.

- 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)
  – Peer device communication disruptions (Peer Flt Action)
  – Explicit messaging disruptions for drive control via PCCC, the CIP Register Object, or the CIP Assembly object (Msg Flt Action)

- Access to parameters by using their name or their number.

- Web pages show information about the option module, its host drive, and DPI™ devices connected to the drive. Depending on its selected operating mode (Adapter or Tap), the option module provides a unique set of web pages with different information.

- Configured email messaging (Adapter mode only) to desired addresses when selected drive faults occur and/or are cleared, and/or when the option module takes a communication or idle fault action.

- Access to any PowerFlex drive and its connected peripherals on the network to which the option module is connected.

Option Module Operating Modes

The option module can be operated in Adapter mode (default) or Tap mode. The Operating Mode Jumper J4 (item 3 in <u>Figure 1 on page 23</u>) is used to select the operating mode. If the jumper is missing, the option module operates in the Adapter mode.

Adapter Mode (default)

In the Adapter mode, the option module operates as an EtherNet/IP network communication module. With its EtherNet/IP embedded switch technology and ENET1 and ENET2 network ports, the option module enables the drive to be used in a linear or device-level ring (DLR) network topology. When using a star network topology, either the ENET1 or ENET2 network port can be used. In Adapter mode, the 'Integrated Motion on the EtherNet/IP network' functionality is not supported.

Tap Mode (only with PowerFlex 755 drives)

In the Tap mode, the option module operates like a gateway and functions similar to the 1783-ETAP module. The option module enables the PowerFlex 755 drive to extend its I/O connection to a linear or device-level ring (DLR) network topology. The connection is done by connecting the supplied Ethernet cable between ENET3 network port (of the option module) and the embedded EtherNet/IP adapter port on the PowerFlex 755 drive. The PowerFlex 755 supports these topologies and enables the 'Integrated Motion on the EtherNet/IP network' functionality.

Understanding the Parameter Types

The option module has two types of parameters, *Device* and *Host*.

- *Device* parameters are used to configure the option module to operate on the network.

> **IMPORTANT**   Some *Device* parameters are not applicable when operating the option module in Adapter mode while others are not applicable in Tap mode. Therefore, these non-applicable parameters are labeled 'Reserved' in the Adapter and Tap mode operation parameter tables in <u>Appendix B</u>.

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

> **IMPORTANT**   When operating the option module in Tap mode, *Host* parameters are **not** supported.

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

- PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM

1. Use the [4 ◄] or [► 6] key to scroll to the drive port in which the module resides.

2. 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

1. Click the tab for the option module at the bottom of the window.

2. Click the Parameters icon in the tool bar.

3. Click the *Device* or *Host* Parameters tab.

- DriveExplorer™ software

1. Find the option module in the tree view.

2. Open its Parameters folder.

- DriveExecutive™ software

1. Find the option module in the tree view.

2. Expand the module in the tree.

3. Open the 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 (firmware revision 1.010 or later) [1]

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(1) When the option module is connected to an incompatible drive, its PORT status indicator flashes orange to indicate that it is not compatible with the drive.

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-ENETR Dual-port EtherNet/IP Option Module
- One short Ethernet cable (spare part catalog number 1585J-M8CBJM-0M3; for Tap mode use only with PowerFlex 755 drives)
- One Network Communication Option Card, Installation Instructions, [750COM-IN002](#)

User-supplied Equipment

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

- A small screwdriver
- Ethernet cable (see the [EtherNet/IP Media Planning and Installation Manual, ODVA](#) publication 148 available on the ODVA website.
- 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 standalone software tool for use with PowerFlex drives. You can obtain a **free copy** by internet download at [http://compatibility.rockwellautomation.com/Pages/home.aspxl](#)

    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 future updates to this tool. The download is being provided 'as-is' for users that lost their DriveExplorer CD, or must configure legacy products that 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.

– –BOOTP, version 2.1 or later, or DHCP Server for network configure only

- Controller configuration software, such as RSLogix 5000® software, version 20.00 or earlier, or Studio 5000Logix Designer® application, version 21.00 or later

- A computer connection to the EtherNet/IP network

Safety Precautions

Read these safety precautions carefully.

⚠️ **ATTENTION:**

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

- Risk of injury or equipment damage exists. Only personnel familiar with drive and power products and the associated machinery can plan or implement the installation, startup, configuration. Only qualified personal can perform subsequent maintenance of the drive by using the option module. Failure to comply can result in injury and/or equipment damage.

- 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.

- Risk of injury or equipment damage exists. If the option module is transmitting control I/O to the drive, the drive can fault when you reset the option module. Determine how your drive responds before resetting the module.

- Risk of injury or equipment damage exists. If:
  -the I/O communication is disrupted
  -the controller is idle
  -Peer I/O is disrupted
  -Explicit Messaging for drive control is disrupted
  To determine the action of the option module and connected drive, use Host Parameters 33 - [Comm Flt Action], 34 - [Idle Flt Action], 35 - [Peer Flt Action], and 36 - [Msg Flt Action]. By default, these parameters fault the drive. You can configure these parameters so that the drive continues to run; however, 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).

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

- 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 personnel start using the option module in Adapter mode or Tap mode. If you are unsure how to complete a step, refer to the referenced chapter.

Adapter Mode of Operation

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	Set the option module IP address. a. When using the node address switches of the option module, set the IP address now and proceed to step 4. When using a DHCP or BOOTP server, or option module parameters instead to set the IP address, first perform step 3b and all of step 4. Proceed to step 5. b. Verify that the PowerFlex drive is not powered.	Chapter 2, Installing the Option Module
4	Install the option module. a. Insert the option module in drive Port 4, 5, or 6. b. Use the captive crews to secure and ground the option module to the drive. c. Connect the option module to the network with an Ethernet cable.	Network Communication Option Module Installation Instructions, 750COM-IN002, and Chapter 2, Installing the Option Module
5	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 must 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
6	Configure the option module for your application. Set option module parameters for the following functions as required by your application: • IP address, subnet mask, and gateway address (only when not using the module Node Address switches) • Data rate • I/O configuration • Master-slave or peer-to-peer hierarchy • Fault actions • Web enable and features	Chapter 3, Configuring the Option Module
7	Configure the controller to communicate with the option module. Use 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
8	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 (Adapter mode only) Chapter 6, Using Explicit Messaging (Adapter mode only)

Tap Mode of Operation (only with PowerFlex 755 drives)

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	Set the option module IP address. a. When using the node address switches of the option module, set the IP address now and proceed with step 4. To set the IP address when using, a DHCP server, BOOTP server, or option module parameters, first perform step 3b and all of step 4. Then proceed with step 5. b. Verify that the PowerFlex drive is not powered.	Chapter 2, Installing the Option Module
4	Install the option module. a. Insert the option module in only PowerFlex 755 drive Port 4 or 5. b. Use the captive crews to secure and ground the option module to the drive. c. Connect the option module to the network with an Ethernet cable.	Network Communication Option Card, Installation Instructions, publication 750COM-IN002 and Chapter 2, Installing the Option Module
5	Apply power to the option module. a. The option module receives power from the drive. Verify that the option module is installed correctly. b. Apply power to the drive. The status indicators must 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
6	Configure the option module for your application. Set option module parameters for the following functions as required by your application: • IP address, subnet mask, and gateway address (only when not using the node address switches of the option module) • Data rate • Web enable and features	Chapter 3, Configuring the Option Module
7	Set (or verify) the IP address for the embedded EtherNet/IP adapter in the PowerFlex 755 drive.	PowerFlex 755 Drive Embedded EtherNet/IP Adapter User Manual, publication 750COM-UM001

Installing the Option Module

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

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Preparing for an Installation

Before installing the option module, do the following:

- Make sure that the Ethernet switch is the correct type. A 'managed' switch that supports IGMP snooping is recommended. An 'unmanaged' switch can be used instead if RSLogix 5000® software, version 18.0 or later, is used and all devices on the network are configured for 'unicast' I/O. For more details, see the following documents:

  – EtherNet/IP Media Planning and Installation Manual, ODVA publication 148
  – EtherNet/IP Network Infrastructure Guidelines, ODVA publication 35
  – Ethernet Design Considerations Reference Manual, ENET-RM002

- Understand IGMP Snooping/Ethernet Switches

  The option module is a multicast device. In most situations, an IGMP snooping (managed) switch is required. If multiple EtherNet/IP option modules are connected to the switch, a managed switch is required—otherwise the drive can fault on a Net IO Timeout network loss. The option module, RSLogix 5000 software version 18.0 or later, and a ControlLogix or CompactLogix™ controller supports unicast. Unicast setup is required when adding the drive to the I/O. When all option modules are configured as unicast devices, then an IGMP snooping (managed) switch is not needed.

Much of EtherNet/IP implicit (I/O) messaging uses IP multicast to distribute I/O control data, which is consistent with the CIP producer/consumer model. Historically, most switches have treated multicast packets the same as broadcast packets. That is, all multicast packets are retransmitted to all ports.

IGMP snooping constrains the flooding of multicast traffic by dynamically configuring the switch ports so that multicast traffic is forwarded only to ports associated with a particular IP multicast group.

Switches that support IGMP snooping (managed switches) 'learn' which ports have devices that are part of a particular multicast group. The multicast packets are forwarded only to the ports that are part of the multicast group.

Be careful as to what level of support a switch has of IGMP snooping. Some layer 2 switches that support IGMP snooping require a router (which could be a layer 3 switch) to send out IGMP polls. These polls are used to learn what devices are part of the multicast group. Some layer 2 switches can use IGMP snooping without a router sending polls. If your control system is a standalone network or is required to continue performing if the router is out of service. Make sure the switch that you are using supports IGMP snooping without a router being present.

- See <u>Appendix A</u> for the number of CIP connections supported by the option module.

- Verify that you have all required equipment. See <u>Required Equipment on page 16</u>.

> ⚠ **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 *G*uarding Against Electrostatic Damage, publication <u>8000-4.5.2</u>.

> **IMPORTANT**   The option module has EtherNet/IP embedded switch technology, and ENET1 and ENET2 network ports to connect to a linear or Device Level Ring (DLR) network in a subnet.
>
> You cannot use ENET1 and ENET 2 network ports as two network interface cards connected to two different subnets.

Setting the Operating Mode

The option module can be operated in Adapter mode (default) or Tap mode. For information about the operating modes, see <u>Option Module Operating Modes on page 14</u>.

Before installing the option module, set its Operating Mode Jumper J4 (<u>Figure 1</u>) for the desired mode of operation.

> **TIP**   If Operating Mode Jumper J4 is missing, the option module operates in the Adapter mode.

> **IMPORTANT**   A new jumper setting is recognized only when power is applied to the option module, or the module is reset. If you change a jumper setting, cycle power to the drive or reset the module to apply the change.

Figure 1 - Setting Operating Mode Jumper J4

Adapter Mode Jumper Position (default)

Tap Mode Jumper Position
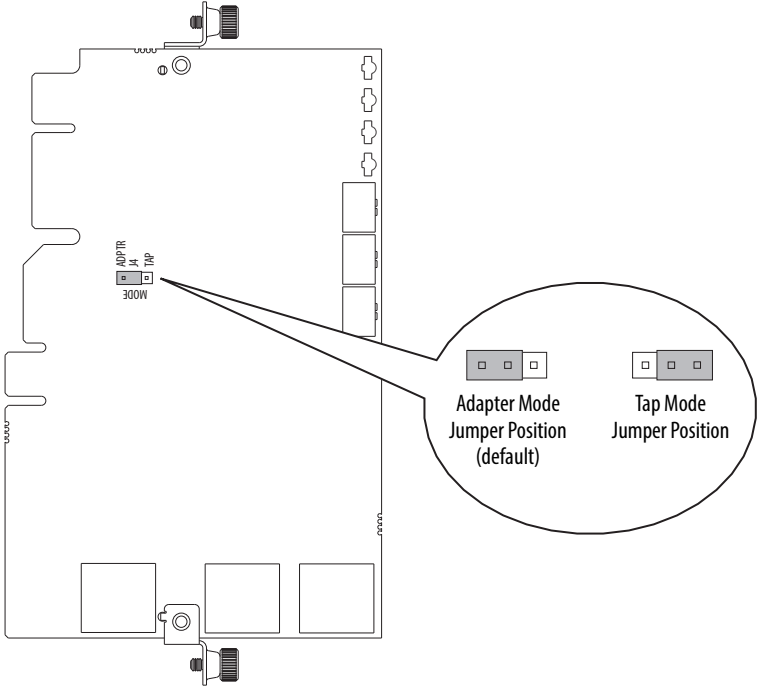
Setting the Node Address

There are four methods for configuring the option module node address:

- **Node Address Switches** — Use these switches when working on a simple, isolated network that has other products with switches to set their IP addresses. Also the network does not need to be accessed from outside the network, and has a simplified node addressing method. For example, 192.168.1.xx. The three rotary switches are read when the drive powers up, and represent three decimal digits from top to bottom (see Figure 2).
  When set to a valid address (001...254), the option module uses that value as the lower octet of its IP address. 192.168.1.xx, where xxx = rotary switch settings.
  Along with a subnet mask of 255.255.255.0, and a gateway address of 0.0.0.0. when switches are set to 001. Or a gateway address of 192.168.1.1 when switches are set from 002...254.
  Also, the setting for *Device* **Parameter 05 - [Net Addr Sel]** is automatically ignored.

See Figure 2 and its accompanying table for all possible switch settings and their related descriptions.

IMPORTANT   When using the Node Address switches, set the network node address before power is applied because the option module uses the node address it detects when it first receives power.

- **Option Module Parameters** — Use option module parameters when you want more flexibility to configure the network node address, or communicate outside the control network by using a gateway. When parameters are used as the source for the IP address, set the Node Address switches to a value other than 001...254 or 888. Then the *Device* **Parameter 05 - [Net Addr Sel]** value to '1' (Parameters). The IP address, subnet mask, and gateway address come from the values set using the associated option module parameters. For details, see Using the Option Module Parameters on page 42.

IMPORTANT   If parameter values are invalid or the option module was not reset for the values to take effect, the node address is established by using DHCP.

- **BOOTP** — Use BOOTP to configure a 'temporary' IP address, subnet mask, and gateway address for the option module by using a BOOTP server. When BOOTP is used as the source for the IP address, set the Node Address switches to a value other than 001...254 or 888. Then set the *Device* **Parameter 05 - [Net Addr Sel]** to '2' (BOOTP).

  Take note of the Ethernet Address (MAC) of the option module hardware on the data nameplate label of the module. The nameplate is on the backside of the circuit board. The MAC is used when configuring the BOOTP server (see Using a BOOTP or DHCP Server on page 38 for details).

> **TIP**   If the PowerFlex® 750-Series drive is connected to a Stratix® 6000 or Stratix® 8000 managed Ethernet switch. The drive is set for BOOTP mode, the 'dynamic IP address assignment by port' (Stratix 6000) or 'DHCP persistence' (Stratix 8000) feature sets the IP address for the drive. For more details, see the Stratix 6000 Ethernet Managed Switch User Manual, publication <u>1783-UM001</u> or the Stratix 8000 and Stratix 8300 Ethernet Managed Switches User Manual, publication <u>1783-UM003</u>.

• **DHCP (Dynamic Host Configuration Protocol)** — Use DHCP, the default, for flexibility and ease-of-use in the configuring of the IP address, subnet mask, and gateway address for the option module. by Use a DHCP server as the source for the IP address:

  – Set the Node Address switches to a value other than 001…254 or 888.
  – Set the *Device* **Parameter 05 - [Net Addr Sel]** to '3' (DHCP).

> **IMPORTANT**   When the DHCP lease expires, the option module stops communicating on the network. A power cycle or option module reset is required.

Note the Ethernet Address (MAC) of the option module hardware on the module data nameplate. The nameplate is on the backside of the circuit board. The MAC is used in step 7 when configuring the DHCP server (see <u>Using a BOOTP or DHCP Server on page 38</u> for details).

> **IMPORTANT**   Regardless of the method that is used to set the network node address of the option module, each node on the EtherNet/IP network must have a unique IP address. To change a node address, you must set the new value and then remove and reapply power to (or reset) the option module.

Figure 2 - Setting the Node Address Switches

Settings	Description
001…254	The option module uses the Node Address switch settings for the network node address (192.168.1.xxx, where xxx = rotary switch settings). The value that is stored in *Device* **Parameter 05 - [Net Addr Sel]** is automatically ignored.
888	Resets the network node address of the option module to default configurations. Thereafter, the drive must be powered down. Set the Node Address switches to a correct value (001…254). Power up the drive to accept the new address.
Any other setting	Disables the Node Address switches, and requires using *Device* **Parameter 05 - [Net Addr Sel]** to select the source for the network node address of the option module: • 1 = Parameters of the option module • 2 = BOOTP server • 3 = DHCP server (default)

The switch settings can be verified by viewing Diagnostic Item number 73 (page 145 or page 147) 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

Also, you can use *Device* **Parameter 06 - [Net Addr Src]**, a read-only parameter, to verify the selected setting for *Device* **Parameter 05 - [Net Addr Sel]**.

Connecting the Option Module to the Drive

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

The option module is connected to the drive differently depending on the mode in which the option module is operated.

When Operating in Adapter Mode

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

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

When Operating in Tap Mode (only with PowerFlex 755 drives)

Install the option module in the PowerFlex® 755 drive control pod in only Port 4 or 5. (When operating in Tap mode, drive Port 6 cannot be used.) For more installation details, see publication 750COM-IN002, provided with the option module.

IMPORTANT	After inserting the option module into PowerFlex 755 drive Port 4 or 5 only, tighten the module screws to the control pod bracket to 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

The option module is connected to the network differently depending on the mode in which the option module is operated.

When Operating in Adapter Mode

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

1. Remove power from the drive.

2. Access the drive control pod by removing the drive cover and lift the drive HIM bezel to its open position.

3. Use static control precautions.

4. Connect one end of the Ethernet cable to the network.

    Examples of different EtherNet/IP network topologies are shown in Figure 3, Figure 4, and Figure 5. For information about linear and Device Level Ring (DLR) topologies, see EtherNet/IP Embedded Switch Technology, publication ENET-AP005.

IMPORTANT	The option module has EtherNet/IP embedded switch technology, and ENET1 and ENET2 network ports to connect to a linear or Device Level Ring (DLR) network in a subnet.
	You cannot use ENET1 and ENET 2 network ports as two network interface cards connected to two different subnets.

Figure 3 - Connecting the Ethernet Cable in a Star Topology Network

Controller
(ControlLogix Controller
Shown with 1756-ENBT Bridge)

PowerFlex 750-Series Drives [1]
(with 20-750-ENETR Option Modules)

To other
EtherNet/IP
networks

External
Ethernet
Switch

Computer with
Ethernet Connection
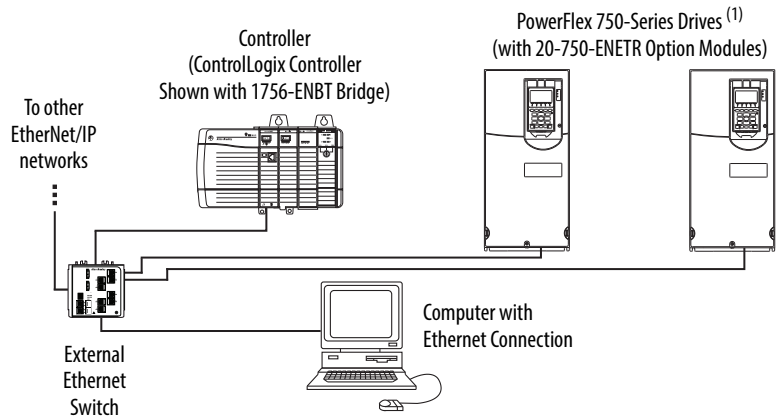
[1]   The ethernet cable can be connected to the option module ENET1 or ENET 2 network port.

Figure 4 - Connecting the Ethernet Cable in a Linear Topology Network

Controller
(ControlLogix Controller
Shown with 1756-ENBT Bridge)

PowerFlex 750-Series Drives [1]
(with 20-750-ENETR Option Modules)

To other
EtherNet/IP
networks

Ethernet
Switch

Computer with
Ethernet Connection
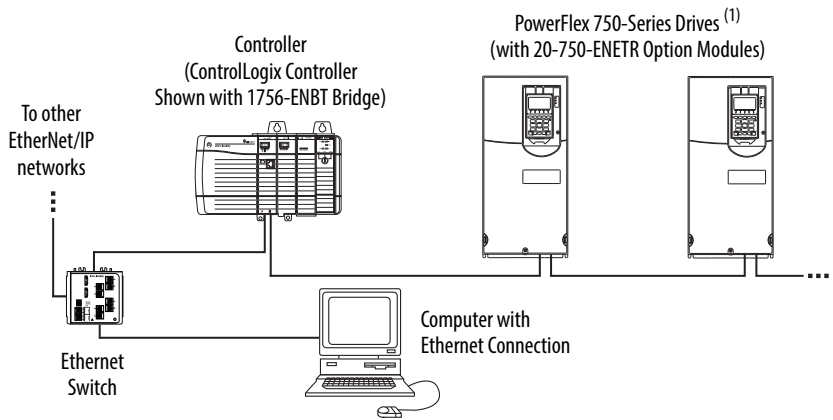
[1]   The option module ENET1 and ENET2 network ports are used.

Figure 5 - Connecting the Ethernet Cable in a DLR Topology Network

To other
EtherNet/IP
networks

Controller
(ControlLogix Controller
Shown with 1756-ENBT Bridge)

PowerFlex 750-Series Drives [1]
(with 20-750-ENETR Option Modules)

1783-ETAP

1783-ETAP

Computer with
Ethernet Connection
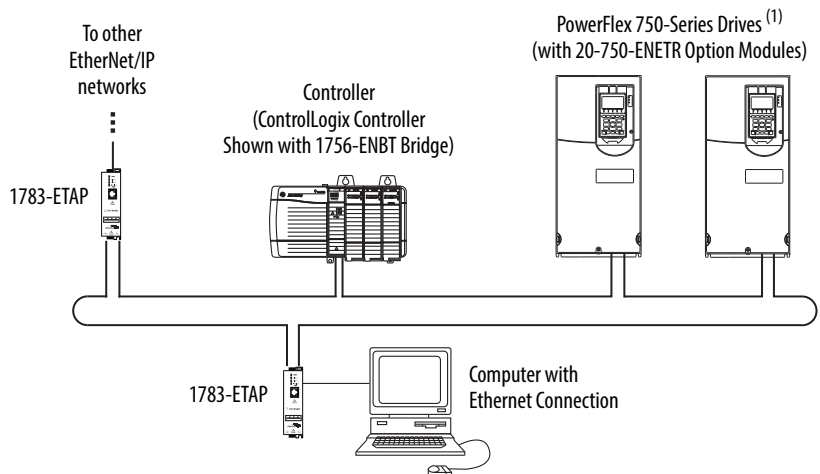
[1]   The option module ENET1 and ENET2 network ports are used.

5. Depending on the network topology, do <u>either a or b</u>:

   a. Star Network Topology—Route the other end of the Ethernet cable from the network through the bottom of the drive. Insert its cable plug into the option module ENET1 or ENET2 network port.

   b. Linear or DLR Network Topology—Route the other end of the Ethernet cable from the network through the bottom of the first drive. Insert its cable plug into the option module ENET1 network port.

To connect to the second drive, attach another Ethernet cable between the first option module ENET2 network port and the second option module ENET1 network port.

To connect additional drives, repeat these daisy-chain connections in the same way.

When Operating in Tap Mode (only PowerFlex 755 drives)

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

1. Remove power from the drive.

2. Access the drive control pod by removing the drive cover and lift the drive HIM bezel to its open position.

3. Use static control precautions.

4. Connect the short Ethernet cable provided with the option module. Connect between the option module ENET3 (DEVICE) port and the Ethernet port on the PowerFlex 755 drive embedded EtherNet/IP adapter (see Figure 6). ENET1 and ENET2 ports are used for linear or DLR network topology as shown in Figure 4 or Figure 5.

Figure 6 - Connecting the Short Ethernet Cable for Tap Mode of Operation

PowerFlex 755 Drive Control Pod
(drive shown with cover removed)

Ethernet Port on
PowerFlex 755 Drive
Embedded EtherNet/IP
Adapter

Option Module's
ENET3 (DEVICE) Port
(bottom port from top of card)

Short Ethernet Cable
(provided with option module; spare part
catalog number 1585J-M8CBJM-0M3)
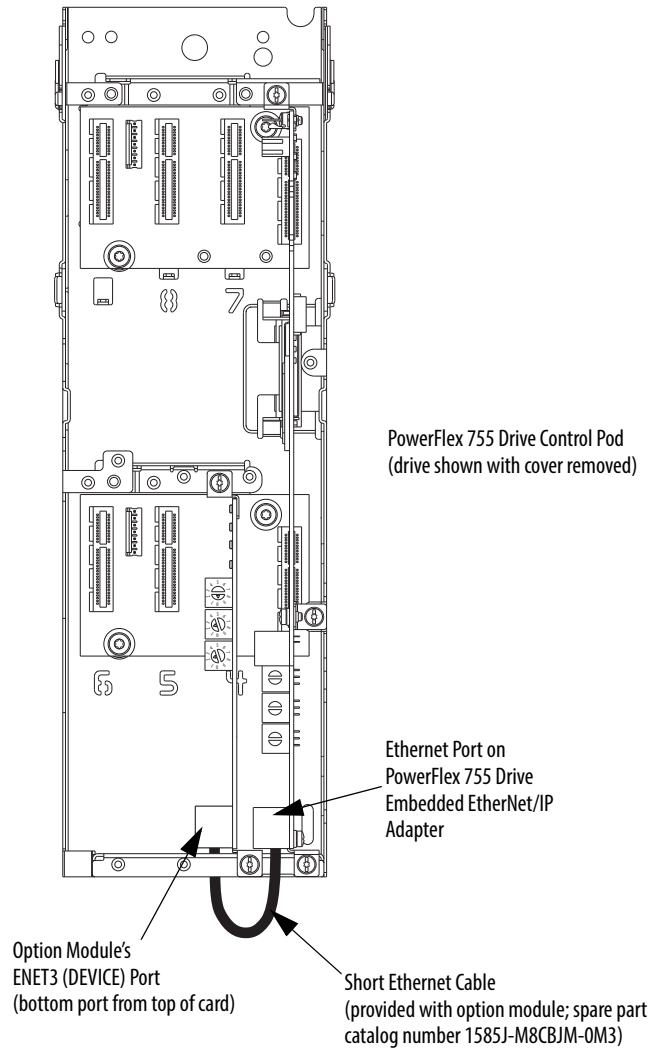
Apply Power

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

Apply power to the drive, the option module receives its power from the drive. When power is applied to the option module for the first time, the status indicator ('PORT' for Adapter mode or 'OK' for Tap mode) must be steady or flashing green. 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. The option module status indicators can be viewed with the drive cover open or removed (Figure 7). The indicators operate differently in Adapter mode than Tap mode. Depending on the operating mode, possible start-up status indications are shown in Table 1 or Table 2 respectively.

Figure 7 - Drive and Option Module Status Indicators

For possible start-up status indications, see Table 1 for Adapter mode operation or Table 2 for Tap mode operation

Drive Control Pod
(drive shown with cover removed)
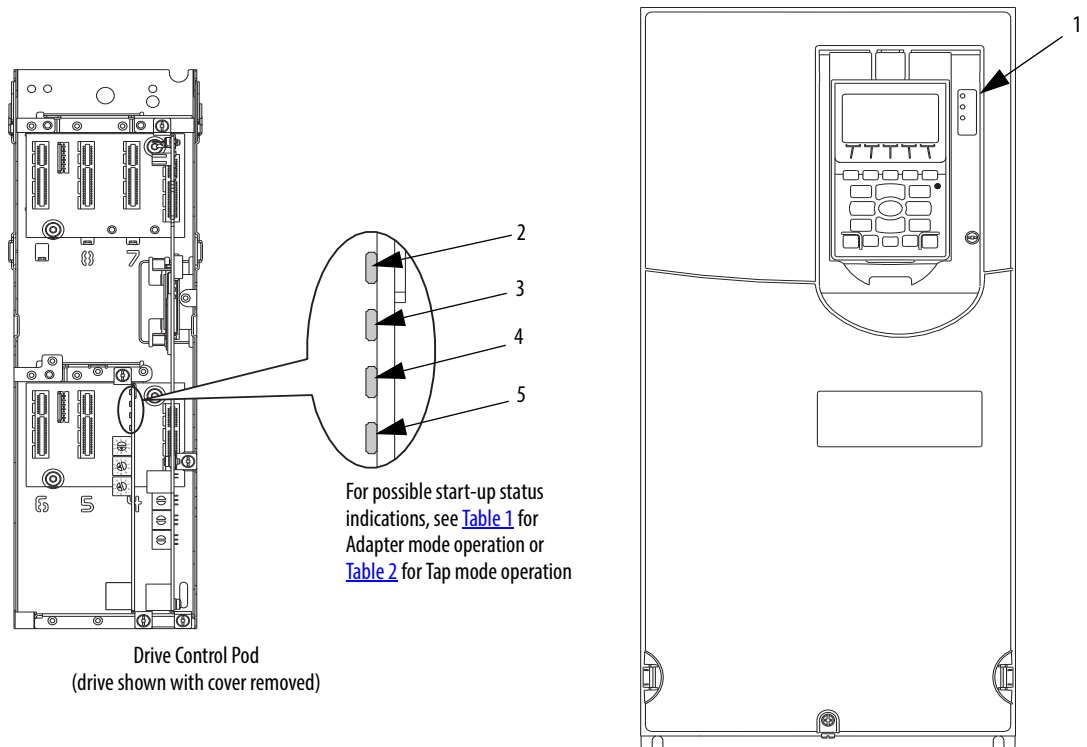
Table 1 - Adapter Mode – Drive and Option Module Start-Up Status Indications

Item	Name	Color	State	Description
				Drive STS Indicator
1	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 (configurable) alarm condition exists, but the drive continues to run.
		Red	Flashing	A major fault has occurred. Drive stops. 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—Adapter Mode
2	PORT	Green	Flashing	Normal operation. The option module is establishing an I/O connection to the drive. It turns steady green or red.
			Steady	Normal operation. The option module is properly connected and communicating with the drive.
3	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.
4	NET A	Unlit	Off	Normal operation. DHCP is enabled or a valid IP address is not set.
		Green	Flashing	Normal operation. DHCP is disabled, the option module is properly connected, has an IP address, and is connected to an EtherNet/IP network—but does not have an I/O connection.
			Steady	Normal operation. The option module is properly connected and communicating on the network to a controller.
5	NET B	Unlit	Off	Normal operation. The option module is properly connected, but is idle.
		Green	Flashing	Normal operation. The option module is properly connected, DHCP is enabled, and the option module is transmitting on the network.

After verifying correct operation, swing down the drive HIM bezel to its closed position and install the drive cover. For more details on status indicator operation, see page 136 and page 138.

Table 2 - Tap Mode – PowerFlex 755 Drive and Option Module Start-Up Status Indications

Item	Name	Color	State	Description
				Drive STS Indicator
1	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 (configurable) alarm condition exists, but the drive continues to run.
		Red	Flashing	A major fault has occurred. Drive stops. 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—Tap Mode
2	OK	Green	Flashing	Normal operation. The option module is establishing DPI communication with the drive. It turns steady green or red.
			Steady	Normal operation. The option module has established DPI communication with the drive.
3 4 5	LINK 1 LINK 2 LINK 3	Unlit	Off	The option module is not properly connected to the network.
		Green	Flashing	Normal operation. There is a 100 Mbps network link, with activity.
			Steady	Normal operation. There is a 100 Mbps network link, no activity.
		Yellow	Flashing	Normal operation. There is a 10 Mbps network link, with activity.
			Steady	Normal operation. There is a 10 Mbps network link, no activity.

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 .

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 receives the Logic Command and Reference from the network.

1. To access the required parameters in this procedure, verify that drive Parameter 301 - [Access Level] is set to '1' (Advanced) or '2' (Expert).

2. To set the drive speed Reference, use drive Parameter 545 - [Speed Ref A Sel].

   a. Set the Port field to '0' as shown
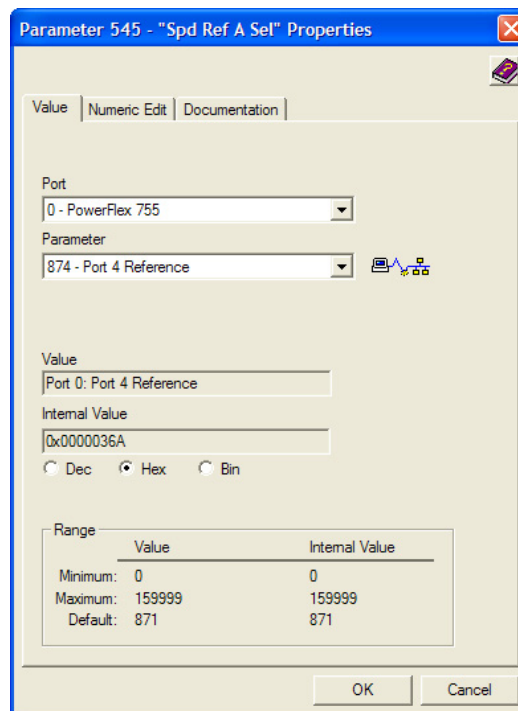
   b. Set the Parameter field to point to the port (slot) in which the option module is installed (for this example, Port 4 Reference).

   The number '874' in the Parameter field of the example is the parameter in the drive that points to the port.

3. Verify that drive Parameter 930 - [Speed Ref Source] is reporting the source of the Reference to the drive (Port 0). The source of the reference is to the port in which the option module is installed. For this example, Port 4 Reference).

Verifying the reference makes sure that any Reference that is commanded from the network can be monitored by using drive Parameter 002 - [Commanded SpdRef]. If a problem occurs, this verification step provides the diagnostic capability to determine whether the drive/option module or the network is the cause.

4. If hard-wired discrete digital inputs are not used to control the drive, verify that all unused digital input drive parameters are set to '0' (Not Used).

Commissioning the Option Module

To commission the option module, you must set a unique network node address. See the Glossary for details about IP addresses. When using the Node Address switches, see Setting the Node Address on page 24 for details. When not using these switches, a BOOTP or DHCP server, or option module parameters can be used to set the node address. But only after connecting the option module to the network and power is applied to the drive.

By default, the option module is configured so that you must set the node address using a DHCP server. For details, see Using a BOOTP or DHCP Server on page 38. To set the node address by using option module parameters, see Using the Option Module Parameters on page 42.

IMPORTANT	New settings for some option module parameters (for example, *Device* **Parameters 07 - [IP Addr Cfg 1]** through **10 - [IP Addr Cfg 4]**) 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.

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Setting the Option Module Node Address	38
Setting the Data Rate	44
Selecting Master-slave or Peer-to-peer Hierarchy (Adapter mode only)	44
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Setting Web Page Access	54
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Restore Option Module Parameters to Default Configurations	56
View the Option Module Status by Using Parameters	57
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For a list of parameters, see <u>Appendix B</u>, Option Module Parameters. For definitions of terms in this chapter, see the <u>Glossary</u>.

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	<u>page 38</u>
BOOTP server or DHCP server	<u>page 38</u>
Connected Components Workbench™ software, version 1.02 or later	<u>http://compatibility.rockwellautomation.com/Pages/home.aspx</u> or online help (installed with the software)
DriveExplorer™ software, version 6.01 or later	<u>http://compatibility.rockwellautomation.com/Pages/home.aspx</u>, or online help (installed with the software)
DriveExecutive™ software, version 5.01 or later	<u>http://compatibility.rockwellautomation.com/Pages/home.aspx</u>, or online help (installed with the software)

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

Access Parameters using the PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM

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

1. Display the Status screen, which is shown on HIM powerup.

2. Use the ⁴◄ or ▶⁶ key to scroll to the Port in which the option module is installed.

3. Display the Jump to Param # entry pop-up box by pressing the PAR# *soft key*.

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 how to view and edit parameters, see the PowerFlex 20-HIM-A6/-C6S HIM (Human Interface Module) User Manual, publication 20HIM-UM001.

Setting the Option Module Node Address

When the Node Address switches are set to a value other than 001...254 or 888; *Device* **Parameter 05 - [Net Addr Sel]** determines the source for the option module node address. See Figure 2 on page 25. By default, the Node Address switches are set to 999 and *Device* **Parameter 05 - [Net Addr Sel]** is set to '3' (DHCP). This combination selects a DHCP server as the source for the node address. To use a BOOTP or DHCP server to set the node address, Using a BOOTP or DHCP Server. To use option module parameters, see Using the Option Module Parameters on page 42.

Using a BOOTP or DHCP Server

> **TIP**   If the PowerFlex® 750-Series drive is connected to a Stratix® 6000™, or Stratix® 8000™ managed Ethernet switch and the drive is set for BOOTP mode. The 'dynamic IP address assignment by port' (Stratix® 6000) or 'DHCP persistence' (Stratix® 8000) feature sets the IP address for the drive. For more details, see the Stratix 6000 Ethernet Managed Switch User Manual, publication 1783-UM001, or the Stratix 8000 and Stratix 8300 Ethernet Managed Switches User Manual, 1783-UM003.

There are various BOOTP or DHCP servers available. The following instructions use the Rockwell Automation® BOOTP/DHCP Server, version 2.3 or later. The **free** standalone program incorporates the function of standard BOOTP and DHCP utilities with a graphical interface. It is available from http://www.software.rockwell.com/support/download/detail.cfm?ID=3390. See the Readme file and online Help for directions and more information.

> **TIP**   If you prefer to configure the IP address, subnet mask, and gateway address by using option module parameters, set *Device* **Parameter 05 - [Net Addr Sel]** to '1' (Parameters). Then use the appropriate option module parameters. For details, see Using the Option Module Parameters on page 42.

1. Depending on the type of server (BOOTP or DHCP) being used, set *Device* **Parameter 05 - [Net Addr Sel]** to either '2' (BOOTP) or '3' (DHCP) respectively.

	AB *Allen-Bradley*	
	Stopped	AUTO
	0.00 Hz	F↻
	Edit Net Addr Sel	
	DHCP	**3**
	1 << 3	
	ESC ? ? ← ENTER	
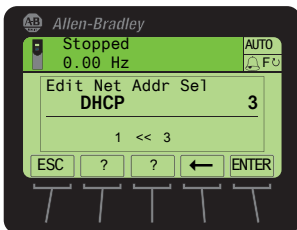
Value	Setting
1	Parameters
2	BOOTP
3	DHCP (default)

2. Note the Ethernet Address (MAC) of the option module hardware, which is used in step 7.

   There are two ways to locate the address:
   - Locate the option Ethernet Address (MAC) of the option module hardware on the product data nameplate label (Figure 8) on the backside of the circuit board.

   Figure 8 - Address Label Location of Option Module Hardware

   Backside of circuit board

   Ethernet Address (MAC) label location
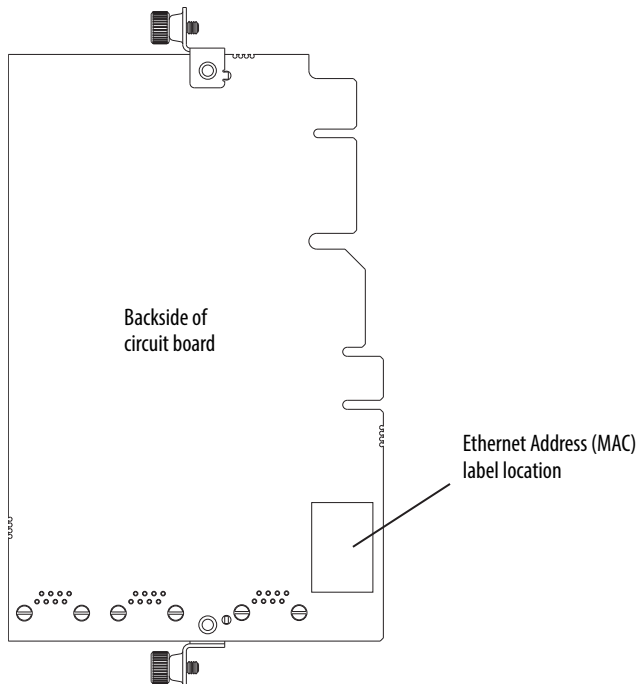
   - Use the HIM to scroll to the drive Port in which the option module is installed and access the option module DIAGNOSTIC folder screen. Then scroll to Diagnostic Items 49...54 (HW Addr 1...6) to view the Ethernet Address (MAC) of the option module hardware.

3. On a computer that is connected to the EtherNet/IP network, start the BOOTP/DHCP software.

The BOOTP/DHCP Server dialog box appears.
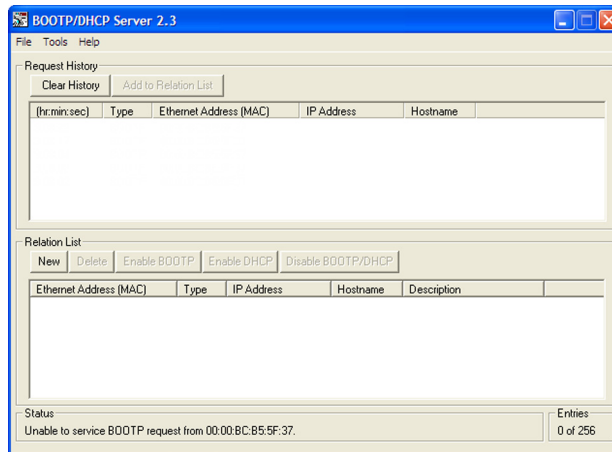
To configure devices on the EtherNet/IP network, you must configure settings in the BOOTP/DHCP software to match the network.

4. From the Tools menu, choose Network Settings.

The Network Settings dialog box opens.
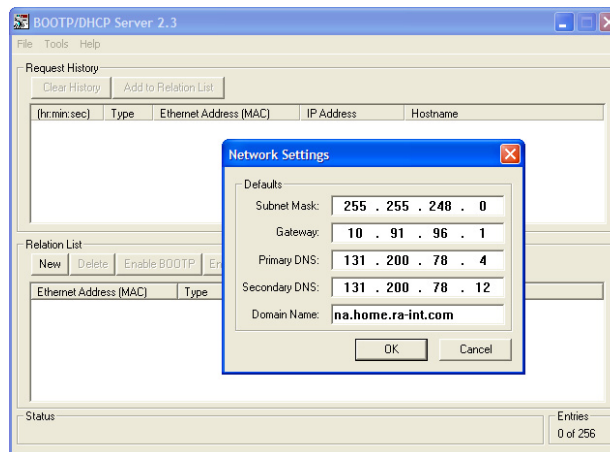
5. Edit the following:

Box	Type
Subnet Mask [1]	The subnet mask for the network of the option module.
Gateway [1]	The IP address of the gateway device on network of the option module.
Primary DNS	The address of the primary DNS server to be used on the local end of the link for negotiating with remote devices.
Secondary DNS	Optional—the address of the secondary DNS server to be used on the local end of the link for negotiating with remote devices when the primary DNS server is unavailable.
Domain Name	The text name that corresponds to the numeric IP address that was assigned to the server that controls the network.

(1)   For definitions of these terms, see the Glossary.

6. Click OK to apply the settings.

Devices on the network that issue BOOTP/DHCP requests appear in the BOOTP/DHCP Request History list.

7. In the BOOTP/DHCP Request History list, either double-click the Ethernet Address (MAC) of the option module noted in step 2, or click New in the Relation List.

   The New Entry dialog box appears. In the first instance, the Ethernet Address (MAC) is automatically entered. In the latter instance, it must be manually entered.
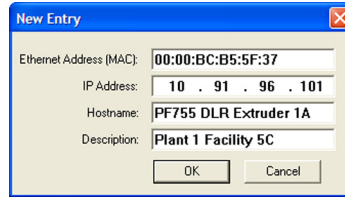
8. Edit the following:

Box	Type
IP Address [1]	A unique IP address for the option module
Host Name	Optional
Description	Optional

(1) For definition of this term, see the Glossary.

9. Click OK to apply the settings.

   The option module appears in the Relation List with the new settings.
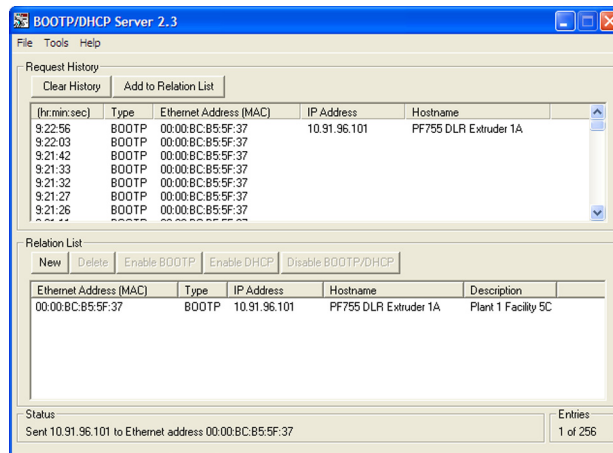
10. To assign this configuration to the option module permanently, select the device in the Relation List and click Disable BOOTP/DHCP.

    When power is cycled on the option module, it uses the configuration that you assigned it and not issue new BOOTP/DHCP requests.

> **TIP**   To enable BOOTP or DHCP for an option module that has had BOOTP/DHCP disabled, first select the option module in the Relation List. Then, depending on the type of server, click Enable BOOTP or Enable DHCP and, lastly, reset the option module or power cycle the drive.

11. From the File menu, choose Save to save the Relation List.

Using the Option Module Parameters

By default, the option module is configured to use a DHCP server as the source for the IP address, subnet mask, and gateway address for the option module. To use option module parameters instead, you must first change the source for the node address to 'Parameters'. Then set the associated option module parameters as described in the following subsections.

Change the Source for the Node Address

1. Verify that the Node Address switches (Figure 2 on page 25) are set to any value other than 001...254 or 888. The default setting is 999.
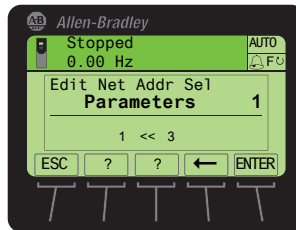
2. Set the value of *Device* **Parameter 05 - [Net Addr Sel]** to '1' (Parameters).

Value	Setting
1	Parameters
2	BOOTP
3	DHCP (default)

3. Reset the option module; see Resetting the Option Module on page 55.

4. Set the IP address, subnet mask, and gateway address by using the option module parameters. Perform the steps in the following subsections.

Set the IP Address

1. Verify that *Device* **Parameter 05 - [Net Addr Sel]** is set to '1' (Parameters).

2. Set the value of *Device* **Parameters 07 - [IP Addr Cfg 1]** through **10 - [IP Addr Cfg 4]** to a unique IP address.

Default = 0.0.0.0   255.255.255.255

[IP Addr Cfg 1]
[IP Addr Cfg 2]
[IP Addr Cfg 3]
[IP Addr Cfg 4]
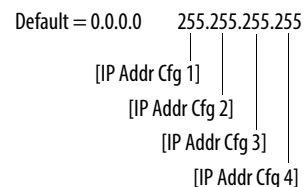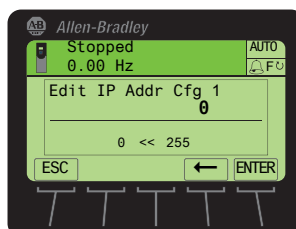
3. Reset the option module. See .

   If the IP address is correctly configured, the NET A status indicator is steady green or a flashing green.

Set the Subnet Mask

1. Verify that *Device* **Parameter 05 - [Net Addr Sel]** is set to '1' (Parameters).

2. Set the value of *Device* **Parameters 11 - [Subnet Cfg 1]** through **14 - [Subnet Cfg 4]** to the desired value for the subnet mask.

Default = 0.0.0.0   255.255.255.255
[Subnet Cfg 1]
[Subnet Cfg 2]
[Subnet Cfg 3]
[Subnet Cfg 4]
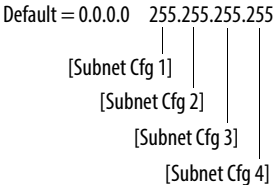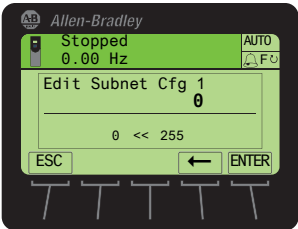
3. Reset the option module. See .

Set the Gateway Address

1. Verify that *Device* **Parameter 05 - [Net Addr Sel]** is set to '1' (Parameters).

2. Set the value of *Device* **Parameters 15 - [Gateway Cfg 1]** through **18 - [Gateway Cfg 4]** to the IP address of the gateway device.

Default = 0.0.0.0   255.255.255.255
[Gateway Cfg 1]
[Gateway Cfg 2]
[Gateway Cfg 3]
[Gateway Cfg 4]
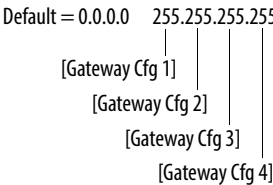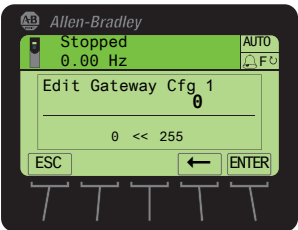
3. Reset the option module. See .

Setting the Data Rate

By default, the option module is set to autodetect. It automatically detects the data rate and duplex setting used on the network. If you must set a specific data rate and duplex setting use the *Device* **Parameter 19 - [Net Rate Cfg 1]** value**.** This value determines the Ethernet data rate and duplex setting that is used to communicate on the option module ENET1 network port. For definitions of data rate and duplex, see the Glossary.

1. Set the value of *Device* **Parameter 19 - [Net Rate Cfg 1]** to the data rate at which your network is operating.
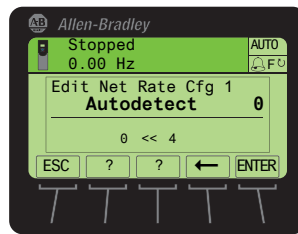
Value	Data Rate
0	Autodetect (default)
1	10 Mbps Full
2	10 Mbps Half
3	100 Mbps Full
4	100 Mbps Half

> **TIP** Auto detection of communication rate and duplex works only if the device (usually a switch) on the other end of the cable is also set to detect the baud rate/duplex. If one device has the baud rate/duplex hard-coded, the other device must be hard-coded to the same settings.

If the ENET2 network port of the option module is used to connect another drive. In a linear or DLR network topology, set the value of *Device* **Parameter 21 - [Net Rate Cfg 2]** to the appropriate data rate.

2. Reset the option module; see Resetting the Option Module on page 55.

Selecting Master-slave or Peer-to-peer Hierarchy (Adapter mode only)

This procedure is only required if Datalinks are used to write or read data of the drive or its connected peripherals. A hierarchy determines the type of device with which the option module exchanges data. In a master-slave hierarchy, the option module exchanges data with a master, such as a scanner or bridge. In a peer-to-peer hierarchy, the option module exchanges data with EtherNet/IP option modules in other PowerFlex® 750-Series drives.

For both mastersSlave and peer-to-peer hierarchies, the devices exchanging data must be on the same IP subnet. See 'IP Addresses' in the Glossary for information about IP subnets.

Setting a Master-slave Hierarchy

Enable Datalinks To Write Data

The controller output image (controller outputs-to-drive) can have 0...16 additional 32 bit parameters (Datalinks). They are configured using *Host* **Parameters 01 - [DL From Net 01]** through **16 - [DL From Net 16]**. The connection size in the controller determines the number of Datalinks that are

actively used. See the respective controller example sections in for more information on setting the connection size.

IMPORTANT	Always use the Datalink parameters in consecutive numerical order. Start 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 is 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 currently. They are assigned when configuring the RSLogix 5000® drive Add-on Profile (see <u>Add the Drive/Option Module to the I/O Configuration on page 64</u>).

When using a ControlLogix controller and the Generic Profile, configure the Datalink parameters now as described in this section.

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

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

For example, if 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. By using the formula, the value for *Host* **Parameter 01 - [DL From Net 01]** would be $(10000 * 5) + (3) = 50003$.

To enable Datalinks to write data:

1. Set the values of only the required number of contiguous controller-to-drive Datalinks that write data to the drive and are added in the network I/O connection.

2. Reset the option module; see <u>Resetting the Option Module on page 55</u>.

3. Since the Logic Command and Reference are always used in the option module, configure the parameters in the drive to accept the Logic Command and Reference from the option module.

4. 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 drive port in which the option module is installed (for this example, Port 4 Reference).

   c. 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.

   The option module is ready to receive input data and transfer status data to the master (controller).

5. Configure the controller to recognize and transmit I/O to the option module. See <u>Chapter 4</u>, Configuring the I/O.

Enable Datalinks To Read Data

The controller input image (drive-to-controller inputs) can have 0...16 additional 32 bit parameters (Datalinks). They are configured using *Host* **Parameters 17 - [DL To Net 01]** through **32 - [DL To Net 16]**. The connection size in the controller determines the number of Datalinks that are actively used. See the respective controller example sections in <u>Chapter 4</u> for more information on setting the connection size.

IMPORTANT	Always use the Datalink parameters in consecutive numerical order. Start with the first parameter. For example, use *Host* Parameters 17, 18, 19, 20, and 21 to configure five Datalinks to read data. Otherwise, the larger than necessary network I/O connection 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. They are assigned when configuring the RSLogix 5000 drive Add-on Profile. See <u>Add the Drive/Option Module to the I/O Configuration on page 64</u>.

When using a ControlLogix controller and the Generic Profile, 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 send the values to the network. These parameters apply to the drive, option module, or any other connected peripheral. To select the drive or peripheral by port number and the parameter by name:

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.

As an alternate method, set the parameter value manually by number by using the formula:

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

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

To enable Datalinks to read data:

1. Set the values of only the required number of contiguous drive-to-controller Datalinks that are to read data from the drive and that are included in the network I/O connection.

2. Reset the option module; see .

   The option module is configured to send output data to the master (controller).

3. Configure the controller to recognize and transmit I/O to the option module. See , Configuring the I/O.

Setting the Option Module to Transmit Peer-to-peer Data

Peer-to-peer communication can be configured as a simple peer I/O configuration or a custom peer I/O configuration.

Simple Peer I/O Configuration

The most common use of peer I/O is to take the Logic Command and Reference from one drive. Then repeat it over Ethernet to one or more other drives. If scaling of the Reference is required to enable drives to run at different but related speeds, use drive Parameter 609 - [TrmPct RefA Stpt]. The EtherNet/IP option module provides a simplified configuration method for simple peer I/O.

> **IMPORTANT** Because of the 32 bit REAL (floating point) Reference, the following method works only if the drives that transmit and receive are PowerFlex 750-Series drives. Peer-to-peer communication only works between drives with a 20-750-ENETR option module or PowerFlex 755 drives with the embedded EtherNet/IP adapter.

To configure the master (broadcast) side of simple peer I/O.

1. Set *Device* **Parameters 41 - [To Peer Period]** and **42 - [To Peer Skip]** as desired for your application.

   Parameter 41 controls how frequently the option module transmits data when it is changing. Parameter 42 controls how frequently the option module transmits data when it is **not** changing.

2. Set *Host* **Parameter 31 - [DL To Net 15]** to point to the drive parameter [Drive Logic Rslt], which is parameter 879 for PowerFlex 753 drives and PowerFlex 755 drives.

3. Set *Host* **Parameter 32 - [DL To Net 16]** to point to the drive parameter [Drive Ref Rslt], which is parameter 883 for PowerFlex 753 drives and PowerFlex 755 drives.

4. Set *Device* **Parameter 39 - [DLs To Peer Cfg]** to a value of '2'.

5. Set *Device* **Parameter 43 - [To Peer Enable]** to a value of '2' (Custom).
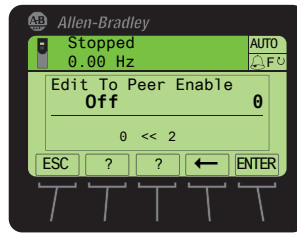
Value	Setting
0	Off (Default)
1	Reserved
2	Custom

To configure the slave (receiver) side of simple peer I/O.

1. Set *Device* **Parameter 32 - [Fr Peer Timeout]** to a suitable timeout value for your application.

    This value must be greater than the product of *Device* **Parameter 41 - [To Peer Period]** and *Device* **Parameter 42 - [To Peer Skip]** in the transmitting drive.

2. Set *Device* **Parameters 33 - [Fr Peer Addr 1]** through **36 - [Fr Peer Addr 4]** to the IP address of the drive that is transmitting peer I/O.

3. In each PowerFlex 750-Series slave drive, set drive parameter 308 - [Direction Mode] to '0' (Unipolar) to be sure that it properly follows the master drive's speed reference and commanded direction.

4. Set *Device* **Parameter 37 - [Fr Peer Enable]** to a value of '1' (Cmd/Ref).

Custom Peer I/O Configuration

Peer I/O also allows more flexibility in custom data that is sent over the network, but requires more configuration.

IMPORTANT	Because of the 32 bit REAL (floating point) Reference, the following method works only if the drives that transmit and receive are PowerFlex 750-Series drives.

To configure the master (broadcast) side of custom peer I/O:

1. Decide how many Datalink parameters you want to transmit, and set *Device* **Parameter 39 - [DLs To Peer Cfg]** to that value.

2. Determine how the Datalinks are allocated.

    The highest numbered of the 16 Datalinks are allocated to peer I/O. For example, if *Device* **Parameter 39 - [DLs To Peer Cfg]** is set to '3', then Datalinks 14, 15, and 16 are allocated to peer I/O. Make sure that *Device* **Parameter 04 - [DLs To Net Act]** plus *Device* **Parameter 39 - [DLs To Peer Cfg]** does not total more than 16. This total value avoids an overlap between master-slave and peer I/O.

3. Set *Host* **Parameters 17...32 - [DL To Net 01...16]** to the parameters you want to transmit, based on the allocation in step 2.

4. Reset the option module (see <u>Resetting the Option Module on page 55</u>) so that changes to *Device* **Parameter 39 - [DLs To Peer Cfg]** take effect.

5. Set *Device* **Parameters 41 - [To Peer Period]** and **42 - [To Peer Skip]** as required for your application.

   Parameter 41 controls how frequently the option module transmits data when it is changing. Parameter 42 controls how frequently the option module transmits data when it is **not** changing.

6. Set *Device* **Parameter 43 - [To Peer Enable]** to a value of '2' (Custom).

To configure the slave (receiver) side of custom peer I/O:

1. Decide how many pieces of data (Logic Command, Reference, and Datalink parameters) you want to receive, and set *Device* **Parameter 28 - [DLs Fr Peer Cfg]** to that value.

   The value must match the number of parameters transmitted by the master.

2. Determine how the Datalinks are allocated.

   The highest numbered of the 16 Datalinks are allocated to peer I/O. For example, if *Device* **Parameter 28 - [DLs Fr Peer Cfg]** is set to '3', Datalinks 14, 15, and 16 are allocated to peer I/O. Make sure that *Device* **Parameter 03 - [DLs From Net Act]** plus *Device* **Parameter 28 - [DLs Fr Peer Cfg]** does not total more than 16. This total avoids an overlap between master-slave and peer I/O.

3. Set *Host* **Parameters 1...16 - [DL From Net 01...16]** to the parameters you want to receive, based on the allocation in step 2.

4. Set *Device* **Parameter 32 - [Fr Peer Timeout]** to a suitable timeout value for your application.

   This value must be greater than the product of *Device* **Parameter 41 - [To Peer Period]** and *Device* **Parameter 42 - [To Peer Skip]** in the transmitting drive.

5. Set *Host* **Parameter 35 - [Peer Flt Action]** to the desired action if peer I/O data is not received before the timeout is reached.

> ⚠️ **ATTENTION:** Risk of injury or equipment damage exists. *Host* **Parameter 35 - [Peer Flt Action]** lets you determine the action of the option module and connected drive when the option module is unable to communicate with the designated peer. By default, this parameter faults the drive. You can configure this parameter so that the drive continues to run. However, verify that the setting of this parameter does not create a hazard of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).

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

For more details about fault action, see Setting a Fault Action (Adapter mode only) on page 51.

6. Set *Device* **Parameters 33 - [Fr Peer Addr 1]** through **36 - [Fr Peer Addr 4]** to the IP address of the drive that is transmitting the custom peer I/O.

IP Address of Node Transmitting Custom Peer I/O

Default = 0.0.0.0   255.255.255.255

[Fr Peer Addr 1]
[Fr Peer Addr 2]
[Fr Peer Addr 3]
[Fr Peer Addr 4]

7. If a Logic Command is being sent, use *Device* **Parameter 30 - [Logic Src Cfg]**. Set the number of the Datalink that contains the Logic Command within the range defined by *Device* **Parameter 28 - [DLs Fr Peer Cfg]**.

For example, if *Device* **Parameter 28 - [DLs Fr Peer Cfg]** is set to receive five Datalinks (Datalinks 12...16). And the first of those five Datalinks (Datalink 12) contain the Logic Command, set *Device* **Parameter 30 - [Logic Src Cfg]** to a value of '1'.

Otherwise, set Parameter 30 to a value of '0'. For Logic Command bit definitions, see Appendix D or the drive documentation.

8. If a Reference is being sent, use *Device* **Parameter 31 - [Ref Src Cfg]**. Set the number of the Datalink that contains the Reference within the range defined by *Device* **Parameter 28 - [DLs Fr Peer Cfg]**.

For example, if *Device* **Parameter 28 - [DLs Fr Peer Cfg]** is set to receive five Datalinks (Datalinks 12...16. And the second of those five Datalinks (Datalink 13) contain the Reference. Set *Device* **Parameter 31 - [Ref Src Cfg]** to a value of '2'. Otherwise, set Parameter 31 to a value of '0'.

9. In each PowerFlex 750-Series slave drive, set drive parameter 308 - [Direction Mode] to '0' (Unipolar) to be sure that it properly follows the master drive's speed reference and commanded direction.

10. Reset the option module (see) so that changes to *Device* **Parameter 28 - [DLs Fr Peer Cfg]** take effect.

11. Set *Device* **Parameter 37 - [Fr Peer Enable]** to a value of '2' (Custom).
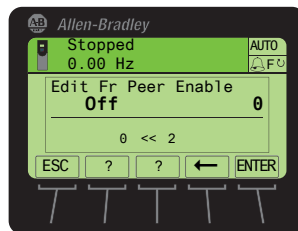
Value	Setting
0	Off (Default)
1	Cmd/Ref
2	Custom

Setting a Fault Action (Adapter mode only)

By default, when:

- Communication is disrupted (for example, the network cable is disconnected.
- The controller is idle (in program mode or faulted).
- And/or peer I/O or explicit messaging for drive control is disrupted.

The drive responds by faulting when it is using I/O from the network. You can configure another 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 peer I/O by using *Host* **Parameter 35 - [Peer 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. If communication is disrupted, the controller is idle, peer I/O is disrupted, or explicit messaging for drive control is disrupted. To determine the action of the option module and connected drive, use *Host* **Parameters:**

- **33 - [Comm Flt Action]**
- **34 - [Idle Flt Action]**
- **35 - [Peer Flt Action]**
- **36 - [Msg Flt Action]**

By default, these parameters fault the drive. You can configure these parameters so that the drive continues to run. However, 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]**
- **35 - [Peer Flt Action]**
- **36 - [Msg Flt Action]**

Set the value 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. 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 is set in the fault configuration parameters (*Host* **Parameters 37 - [Flt Cfg Logic]**, **38 - [Flt Cfg Ref]**, and **39 - [Flt Cfg DL 01]** … **54 - [Flt Cfg DL 16]**).

Figure 9 - Edit Fault Action HIM Screens
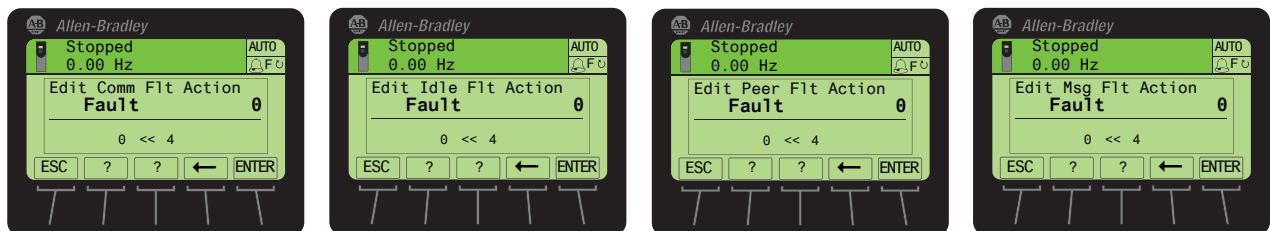
Changes to these parameters take effect immediately. A reset is not required.

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

Setting the Fault Configuration Parameters

When these *Host* **Parameters** to set to 'Send Flt Cfg:

- **33 - [Comm Flt Action]**
- **34 - [Idle Flt Action]**
- **35 - [Peer Flt Action]**
- **36 - [Msg Flt Action]**

The values in <u>Table 3</u> are sent to the drive after a communication fault, idle fault, peer I/O fault, and/or explicit messaging for drive control fault occurs. You must set these parameters to values required by your application.

Table 3 -

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.

Setting Web Page Access

By using a web browser to access the IP address set for the option module, you can view the option module web pages for information about the module. You can also view information about the drive and other DPI devices connected to the drive, such as HIMs or converters.

IMPORTANT	Depending on its selected operating mode (Adapter or Tap), the option module provides a unique set of web pages with different information.

By default, the option module web pages are disabled. To enable the option module web pages, set *Device* **Parameter 26 - [Web Enable]** to '1' (Enabled).
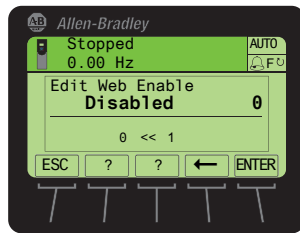
Value	Description
0	Disabled (Default)
1	Enabled

For more details on the option module web pages, see , How to View Option Module Web Pages.

In Adapter mode, the option module can be configured to send email messages automatically to desired addresses when:

- Selected drive faults occur and are cleared
- The option module takes a communication or idle fault action

Bit 0 of *Device* **Parameter 27 - [Web Features]** is used to help protect the configured settings for email messaging. By default, settings are not protected and changes can be made.

- To help protect configured settings, set the value of Email Cfg Bit 0 to '0' (Disabled).
- To unprotect the configuration change Bit 0 to '1' (Enabled).

Email messaging always remains active regardless of whether its settings are protected—unless email messaging was **never** configured. For more information about the configuring option module email messaging or to stop email messages, see .
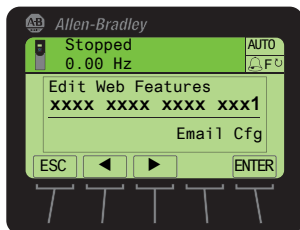
Bit	Description
0	Email Cfg (Default = 1 = Enabled)
1…15	Not Used

Bit 0 is the right-most bit. In the example above, it equals '1' (Enabled).

Changes to this parameter take effect immediately. A reset is not required.

Resetting the Option Module

Changes to switch and jumper 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 cycling the power to the drive or by using *Device* **Parameter 25 - [Reset Module]**.

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

Set *Device* **Parameter 25 - [Reset Module]** to '1' (Reset Module).
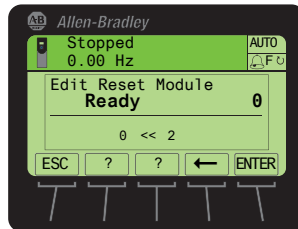
Value	Description
0	Ready (Default)
1	Reset Module
2	Set Defaults

When you enter '1' (Reset Module), the option module is immediately reset. An alternate method to reset the module is by cycling the power to the drive. When you enter '2' (Set Defaults), the option module sets **all** of its *Device* **and** *Host* parameters to their default configuration values. This function is the same as pressing the ALL *soft key* when using the MEMORY folder method described in <u>Restore Option Module Parameters to Default Configurations on page 56</u>.)

> **IMPORTANT**   When operating the option module in Tap mode, *Host* parameters are **not** supported, so only *Device* parameters are reset to their factory default values.

> **IMPORTANT**   When performing a Set Defaults, the drive can detect a conflict and then not allow this function to occur. If this situation happens, first resolve the conflict and then repeat a Set Defaults action. Common reasons for a conflict include the drive is running or a controller is 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 is 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 Reset Device function of the HIM, located in the drive DIAGNOSTIC folder.

Restore Option Module Parameters to Default Configurations

As an alternate reset method, restore the option module parameters by using a MEMORY folder menu item instead of using *Device* **Parameter 25 - [Reset Module].** See <u>Resetting the Option Module on page 55</u>. The MEMORY folder method provides two ways to restore the option module *Device* **and** *Host* parameters.

- ALL—restores ALL option module *Device* and *Host* parameters to their factory default values.
- MOST—restores MOST option module *Device* and *Host* parameters— except the following, which are used for network setup:
  - *Device* **Parameter 05 - [Net Addr Sel]**
  - *Device* **Parameters 07…10 - [IP Addr Cfg 1…4]**
  - *Device* **Parameters 11…14 - [Subnet Cfg 1…4]**
  - *Device* **Parameters 15…18 - [Gateway Cfg 1…4]**
  - *Device* **Parameter 19 - [Net Rate Cfg 1]**
  - *Device* **Parameter 21 - [Net Rate Cfg 2]**
  - *Device* Parameter 23 - [Net Rate Cfg 3] (Tap mode only)

IMPORTANT	When operating the option module in Tap mode, *Host* parameters are **not** supported, so only *Device* parameters are reset to their factory default values.

To restore option module *Device* and *Host* parameters to their factory default values.

1. Access the Status screen, which is displayed on HIM powerup.
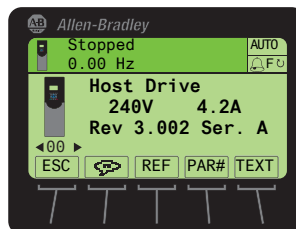
2. Use the [4◄] or [►6] key to scroll to the Port in which the option module is installed.

3. Press the [📁] key.

   The last-viewed folder appears.

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.

   The Set Defaults pop-up box appears.

7. Press the [5] (Enter) key.

The warning pop-up box appears.

8. Select the appropriate option:

    - To restore MOST *Device* and *Host* parameters to default configurations, press the MOST *soft key.*
    - To restore ALL parameters, press the ALL *soft key.*
    - To cancel, press the ESC *soft key.*

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

---

9. Reset the option module by using *Device* **Parameter 25 - [Reset Module]** or by cycling power to the drive so that the restored parameters take effect.

View the Option Module Status by Using Parameters

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

When Operating in Adapter Mode

Option Module *Device* Parameter	Description
03 - [DLs From Net Act]	The number of controller-to-drive Datalinks that are included in the network I/O connection (controller outputs).
04 - [DLs To Net Act]	The number of drive-to-controller Datalinks that are included in the network I/O connection (controller inputs).
06 - [Net Addr Src]	Displays the source from which the option module IP address is taken. The Node Address switch settings, which are shown in <u>Figure 2</u>, and the value of *Device* **Parameter 05 - [Net Addr Sel]** determine the source. The source can be any of the following: • '1' (Parameters)—uses address from *Device* **Parameters 07…10 - [IP Addr Cfg x]** • '2' (BOOTP) • '3' (DHCP)—the default
20 - [Net Rate Act 1]	The data rate used by the option ENET1 network port of the option module.
22 - [Net Rate Act 2]	The data rate used by the option ENET2 network port of the option module.
38 - [Fr Peer Status]	The status of the consumed peer I/O input connection. Values: 0 = Off; 1 = Waiting; 2 = Running; 3 = Faulted
29 - [DLs Fr Peer Act]	The number of peer-to-drive Datalinks that the drive is expecting.
40 - [DLs To Peer Act]	The number of drive-to-peer Datalinks that the drive is expecting.

When Operating in Tap Mode

Option Module *Device* Parameter	Description
06 - [Net Addr Src]	Displays the source from which the option module IP address is taken. The Node Address switch settings (shown in <u>Figure 2</u>) and the value of *Device* **Parameter 05 - [Net Addr Sel] deter** determines the source. The source can be any of the following: • '1' (Parameters)—uses address from *Device* **Parameters 07…10 - [IP Addr Cfg x]** • '2' (BOOTP) • '3' (DHCP)—the default
20 - [Net Rate Act 1]	The data rate used by the option module ENET1 network port.
22 - [Net Rate Act 2]	The data rate used by the option module ENET2 network port.
24 - [Net Rate Act 3]	The data rate used by the option module ENET3 (DEVICE) port.

Updating the Option Module Firmware

The option module firmware can be updated over the network or serially. A direct connection is used 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
- 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 Allen-Bradley® software tools or the HyperTerminal software set to the X-modem protocol.

To obtain a firmware update for this option module, go to http://compatibility.rockwellautomation.com/Pages/home.aspx. This website contains all firmware update files and associated Release Notes that describe the following items:

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

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.

For information on how to use a PLC-5®, SLC™ 500, or MicroLogix™ 1100/1400 controller, see Controller Examples for EtherNet/IP Network Communications with PowerFlex® 750-Series Drives, publication 750COM-AT001.

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Uploading the Electronic Data Sheet (EDS) File	60
ControlLogix Controller Example (Adapter mode only)	61

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 EtherNet/IP Driver.

4. Click Add New to display the Add New RSLinx Driver dialog box.

5. Use the default name or type a name.

6. Click OK.

   The 'Configure driver:' dialog box appears.

7. Depending on your application, select either the browse local or remote subnet option.

8. Click OK.

The Configure Drivers dialog box reappears with the new driver in the Configured Drivers list.
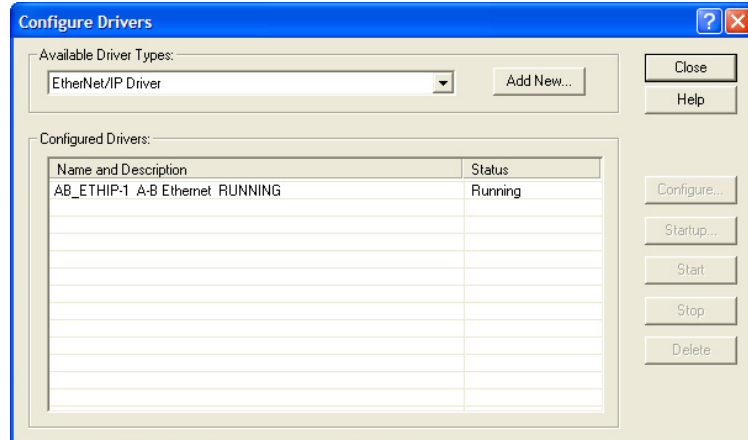
9. Click Close to close the Configure Drivers dialog box.

10. To verify that the drive is recognized, keep running the RSLinx® software.

   a. From the Communications menu, choose RSWho.

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

   If the 'EtherNet/IP Driver' cannot see your drive, as an alternative, use either the 'Ethernet devices' or 'Remote Devices via Linx Gateway' RSLinx® driver.

Uploading the Electronic Data Sheet (EDS) File

The option module has embedded EDS files for PowerFlex 750-Series drives that eliminate the need to download an EDS files. RSLinx software is used to upload the EDS file from the option module.

1. Right-click the EtherNet/IP drive that is shown as a yellow question mark or 'Unrecognized Device' in the RSWho dialog box.

2. Choose 'Upload EDS file from device' as shown in the following example.

   By uploading the EDS file, it also uploads the icon files for the device.

   The question mark changes to a drive (in Adapter mode) or an ETAP (in Tap mode).
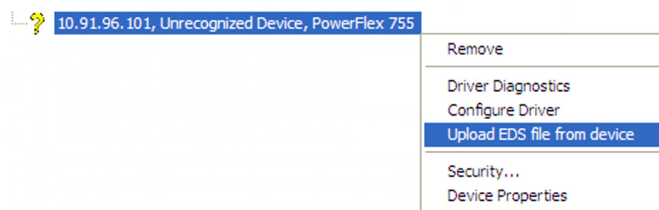
ControlLogix Controller Example (Adapter mode only)

After the option module is configured, the drive and option module will be one node on the network. This section provides the steps to configure a simple Device Level Ring (DLR) topology EtherNet/IP network (see Figure 10). In the example, a 1756-EN2TR (Series A) bridge is configured to communicate with the first drive in the network ring. Communication is done by using Logic Command/Status, Reference/Feedback, and 32 Datalinks (16 to read and 16 to write) over the network.

Figure 10 - Example of ControlLogix Controller EtherNet/IP Device Level Ring Network
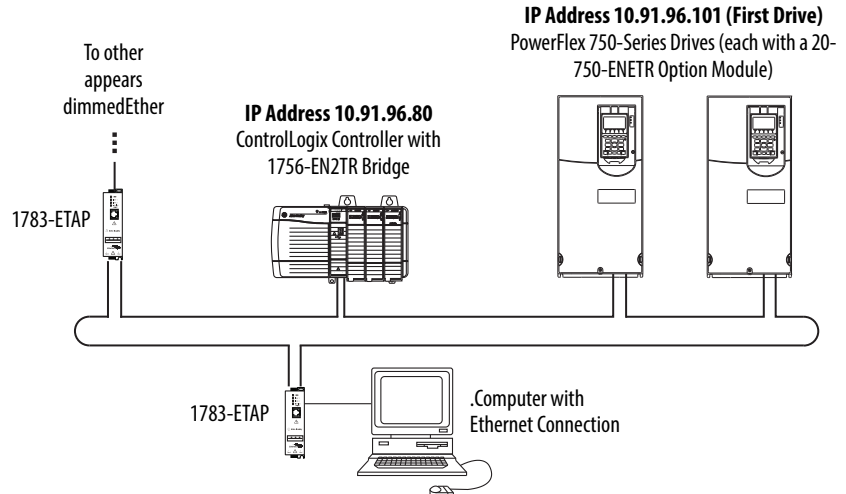
Adding the Bridge to the I/O Configuration

To establish communication between the controller and option module over the network, you must first add the ControlLogix controller and its 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.
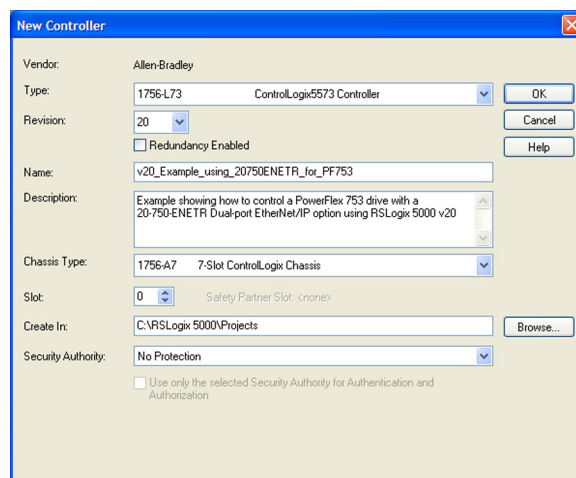
     a. Choose the appropriate choices for the fields in the dialog box to match your application.

     b. Click OK.

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

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

   The Select Module dialog box appears.

4. Expand the Communications group to display all available communication modules.
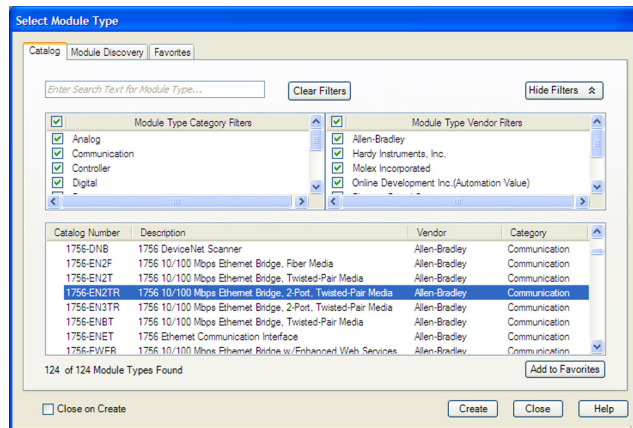
5. In the list, select the EtherNet/IP bridge used by your controller.

   In this example, 1756-EN2TR EtherNet/IP Bridge (Series A) is used, so the 1756-EN2TR/A 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 New Module dialog box for the bridge appears.
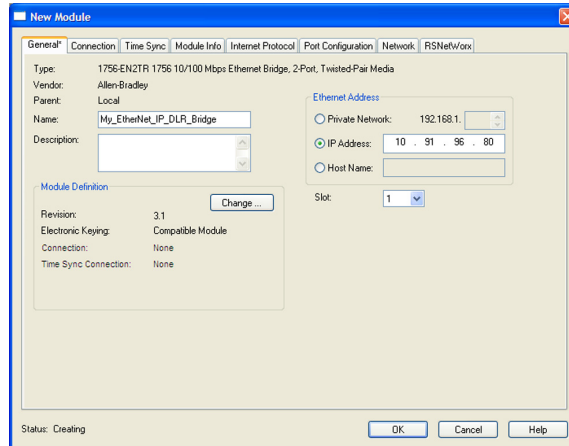
9. Edit the following:

Box	Setting
Name	A name to identify the bridge.
Description	Optional – description of the bridge.
Revision Electronic Keying	Click Change to change Revision or Electronic Keying. The minor revision of the firmware in the bridge. (You already set the major revision by selecting the bridge series in step 7.) **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'. Disable keying is recommended.
IP Address	The IP address of the EtherNet/IP bridge.
Host Name	The setting is not used.
Slot	The slot of the EtherNet/IP bridge in the rack.

10. Click OK.

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

```
I/O Configuration
  1756 Backplane, 1756-A7
    [0] 1756-L73 v20_Example_using_20750ENETR_for_PF753
    [1] 1756-EN2TR My_EtherNet_IP_DLR_Bridge
      Ethernet
```
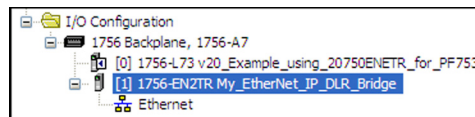
In our example, a 1756-EN2TR bridge appears under the I/O Configuration folder with its assigned name.

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

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

These options are described in the following separate sections. If your version of RSLogix 5000 software supports drive Add-on Profiles, this method is recommended.

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

When compared to the Generic Profile (all versions), the RSLogix 5000 drive Add-on Profiles provide these 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. All Tags are of the proper data type so there is no need for conversion in the user program. These profiles substantially reduce I/O mismatch errors and drive configuration time.

- Drive tab removes the need for a separate, drive software configuration tool.
- Drive configuration settings are saved as part of the controller software project file (.ACD) and also downloaded to the controller.
- Automatic device configuration (drive add-on profiles version 4.03 or later, controller programming software version 20 or later).
- 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 need the newest Add-on Profile update. Go to http://compatibility.rockwellautomation.com/Pages/home.aspx to download the latest 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 20 is used with drive Add-on Profile version 4.03. To determine your drive Add-on Profile version, see Allen-Bradley Knowledgebase document #65882.

1. In the treeview, right-click the bridge and choose New Module to display the Select Module dialog box.
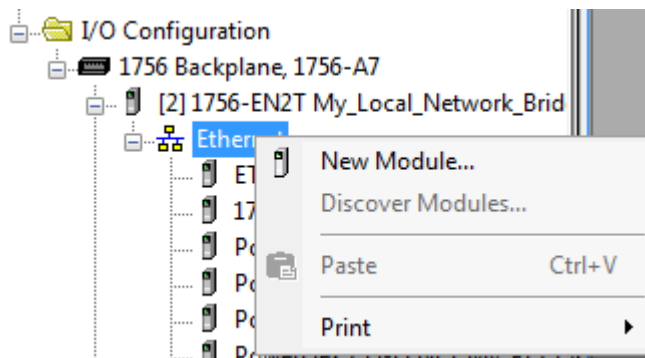
In the example, right-click the 1756-EN2TR/A bridge. Expand the Drives group to display all available drives with their communication option modules.
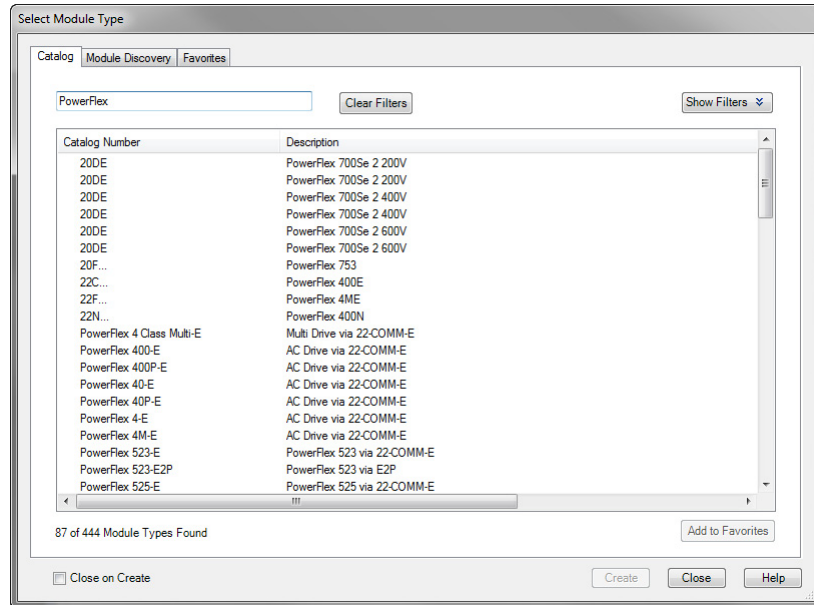
> **TIP**   If the PowerFlex drive is not shown, go to http://compatibility.rockwellautomation.com/Pages/home.aspx and download the latest drive Add-on Profile.

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

3. Click OK.

    The New Module dialog box for the drive appears.
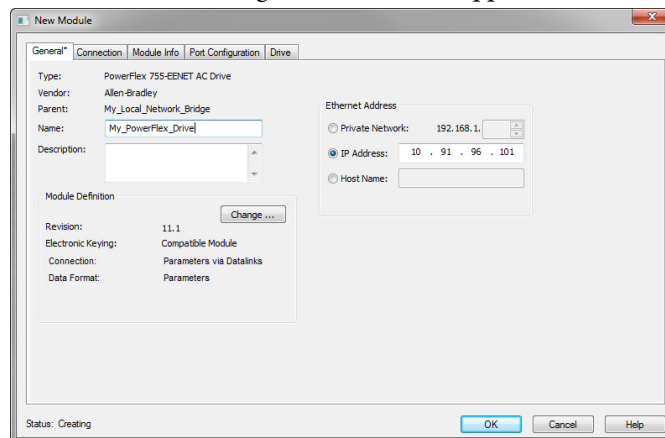
4. On the General tab, edit the following data about the drive/option module.

Box	Setting
Name	A name to identify the drive.
Description	Optional – description of the drive/option module.
IP Address	The IP 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.
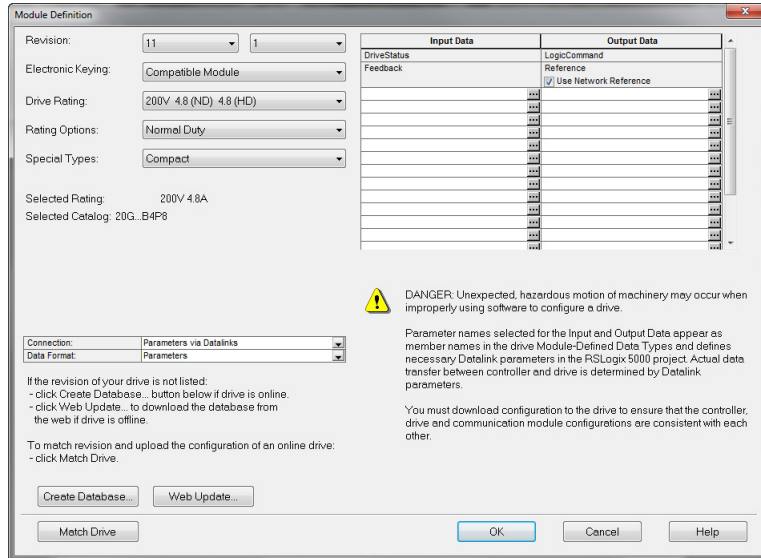
6. In the Module Definition dialog box, edit the following information.

Box	Setting
Revision	The major and minor revision of the firmware (database) in the drive. If the major and minor revision for the drive 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. 1. Click to display the RSLinx software RSWho dialog box. 2. Browse to the online drive, select it, and click OK. The database is uploaded and on the computer. 3. Close the Module Definition dialog box and then reopen it to display the new revision.
	• **Web Update:** When a drive is not available online, do the following. 1. Automatically opens the website to download a specific database file. 2. Download the file. 3. Close the Module Definition dialog box. 4. Reopen 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 to create a duplicate drive profile from the online drive, and automatically load this identical information into the Module Definition dialog box. The Match Drive button eliminates the need to enter the information manually 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. Make sure to set the correct revision in this dialog box. See the online Help for additional information on this and other Electronic Keying settings. When using Firmware Supervisor to store firmware for the drive, always choose 'Exact Match'. When using ADC, see the table on page 84 for more details.
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 in the Revision section of this table.
Rating Options	Selects the drive power output required for the application. Drive power must match the actual rating of the drive.
Special Types	Reserved for future use.

Box	Setting
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 in RSLogix 5000 software, version 15.00.
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.
Output Data	Assigns selected drive or connected peripheral parameters to be WRITTEN by the controller.
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 them 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.

The Parameter Properties dialog box for the corresponding Datalink appears.

IMPORTANT   Always use the Datalink parameters in consecutive numerical order by starting with the first parameter. Otherwise, the network I/O connection is larger than necessary, which needlessly increases response time and memory usage.

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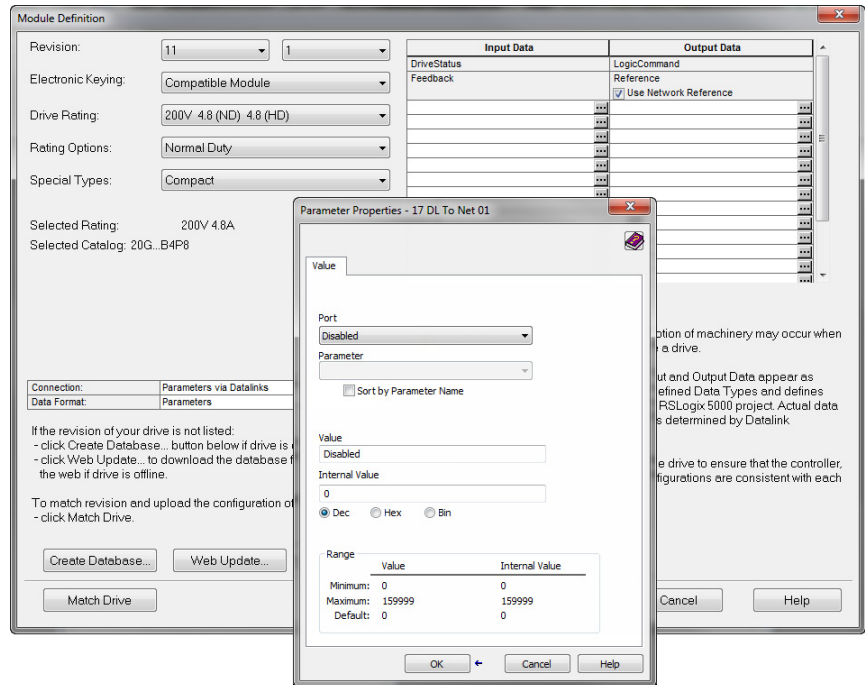
b. From the Port field pull-down menu, choose the port of the device to which Datalink is assigned.

c. From the Parameter field pull-down menu for the selected device, choose the parameter to which the Datalink points.

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. To save the drive and option module configuration, and close the dialog box, click OK on the Module Definition dialog box.

The New Module dialog box for the drive reappears.

8. Click the Connection tab.
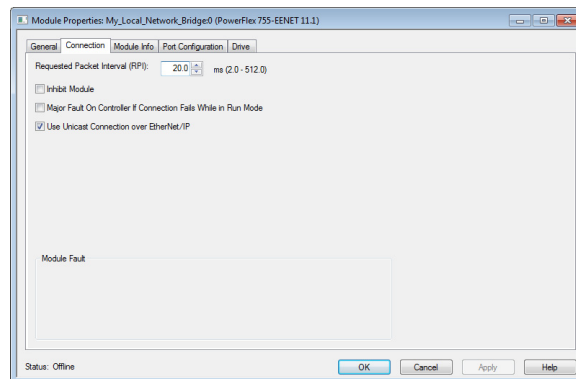
9. In the Requested Packet Interval (RPI) box, set the value to 2.0 milliseconds or greater (default is 20.0 milliseconds).

This value determines the maximum interval that a controller must 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 occurs when the module's connection fails while the controller is in the Run Mode.

Unicast support is added to RSLogix 5000 software, version 18.00 or later. Unicast is recommended whenever possible. For the benefits of unicast operation, see Preparing for an Installation on page 21.

10. Click the Port Configuration tab.
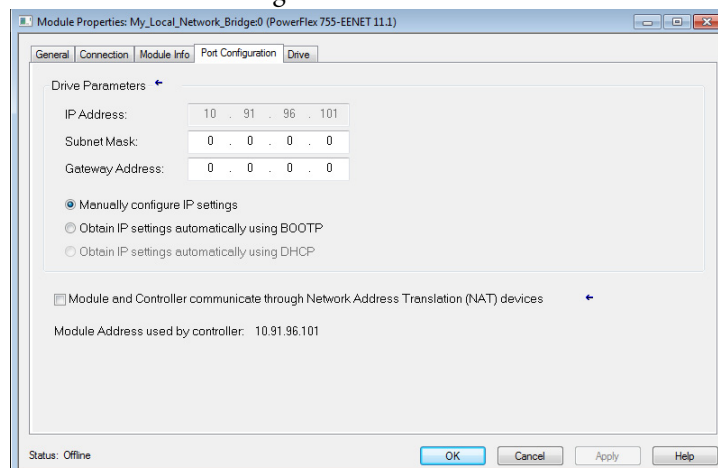
11. In the dialog box for Port Configuration tab, edit the following information.

Box	Setting
IP Address	The IP address of the option module that was already set in the General tab. This field is not configurable (appears dimmed).
Subnet Mask	The Subnet Mask configuration setting of the network. This setting must match the setting of other devices on the network (for example, 255.255.255.0).
Gateway Address	The Gateway Address configuration setting of the network. This setting must match the setting of other devices on the network (for example, 10.91.100.1).
Enable BootP	When this box is checked, BOOTP is enabled in the option module and ignores the IP address set in the General tab. When unchecked, the controller uses the set IP address. This method is an alternative way to enable/disable BOOTP in the option module.

12. Click Set to save the Port Configuration information, which sets the corresponding offline Subnet Cfg x and Gateway Cfg x parameters in the option module.

13. Click OK on the New Module dialog box.

The new node now appears under the bridge in the I/O Configuration folder. If you double-click the Controller Tags, you see that module-defined data types and tags have been automatically created (Figure 11 and Figure 12).

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 ladder logic of the controller.

Figure 11 - Controller Input Tags Example

Name	Value	Data Type
− My_PowerFlex_753_Drive:I	{...}	AB:PowerFlex753...
+ My_PowerFlex_753_Drive:I.DriveStatus	2#0000_0000_000...	DINT
My_PowerFlex_753_Drive:I.DriveStatus_Ready	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_Active	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_CommandDir	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_ActualDir	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_Accelerating	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_Decelerating	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_Alarm	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_Faulted	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_AtSpeed	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_Manual	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_SpdRefBit0	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_SpdRefBit1	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_SpdRefBit2	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_SpdRefBit3	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_SpdRefBit4	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_Running	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_Jogging	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_Stopping	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_DCBraking	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_DBActive	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_SpeedMode	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_PositionMode	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_TorqueMode	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_AtZeroSpeed	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_AtHome	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_AtLimit	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_CurrLimit	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_BusFrqReg	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_EnableOn	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_MotorOL	0	BOOL
My_PowerFlex_753_Drive:I.DriveStatus_Regen	0	BOOL
My_PowerFlex_753_Drive:I.Feedback	0.0	REAL
+ My_PowerFlex_753_Drive:I.StopModeA	0	DINT
+ My_PowerFlex_753_Drive:I.StopModeB	0	DINT
My_PowerFlex_753_Drive:I.AccelTime1	0.0	REAL
My_PowerFlex_753_Drive:I.AccelTime2	0.0	REAL
My_PowerFlex_753_Drive:I.DecelTime1	0.0	REAL
My_PowerFlex_753_Drive:I.DecelTime2	0.0	REAL
My_PowerFlex_753_Drive:I.JogAccDecTime	0.0	REAL
My_PowerFlex_753_Drive:I.JogSpeed1	0.0	REAL
My_PowerFlex_753_Drive:I.JogSpeed2	0.0	REAL
My_PowerFlex_753_Drive:I.PresetSpeed1	0.0	REAL
My_PowerFlex_753_Drive:I.PresetSpeed2	0.0	REAL
My_PowerFlex_753_Drive:I.PresetSpeed3	0.0	REAL
My_PowerFlex_753_Drive:I.PresetSpeed4	0.0	REAL
My_PowerFlex_753_Drive:I.PresetSpeed5	0.0	REAL
My_PowerFlex_753_Drive:I.PresetSpeed6	0.0	REAL
My_PowerFlex_753_Drive:I.PresetSpeed7	0.0	REAL

Figure 12 - Controller Output Tags Example

Name	Value	Data Type
+ My_PowerFlex_753_Drive:I	{...}	AB:PowerFlex753...
− My_PowerFlex_753_Drive:O	{...}	AB:PowerFlex753...
+ My_PowerFlex_753_Drive:O.LogicCommand	2#0000_0000_000...	DINT
My_PowerFlex_753_Drive:O.LogicCommand_Stop	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_Start	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_Jog1	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_ClearFaults	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_Forward	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_Reverse	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_Manual	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_AccelTime1	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_AccelTime2	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_DecelTime1	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_DecelTime2	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_SpdRefSel0	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_SpdRefSel1	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_SpdRefSel2	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_CoastStop	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_CLimitStop	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_Run	0	BOOL
My_PowerFlex_753_Drive:O.LogicCommand_Jog2	0	BOOL
My_PowerFlex_753_Drive:O.Reference	0.0	REAL
+ My_PowerFlex_753_Drive:O.StopModeA	0	DINT
+ My_PowerFlex_753_Drive:O.StopModeB	0	DINT
My_PowerFlex_753_Drive:O.AccelTime1	0.0	REAL
My_PowerFlex_753_Drive:O.AccelTime2	0.0	REAL
My_PowerFlex_753_Drive:O.DecelTime1	0.0	REAL
My_PowerFlex_753_Drive:O.DecelTime2	0.0	REAL
My_PowerFlex_753_Drive:O.JogAccDecTime	0.0	REAL
My_PowerFlex_753_Drive:O.JogSpeed1	0.0	REAL
My_PowerFlex_753_Drive:O.JogSpeed2	0.0	REAL
My_PowerFlex_753_Drive:O.PresetSpeed1	0.0	REAL
My_PowerFlex_753_Drive:O.PresetSpeed2	0.0	REAL
My_PowerFlex_753_Drive:O.PresetSpeed3	0.0	REAL
My_PowerFlex_753_Drive:O.PresetSpeed4	0.0	REAL
My_PowerFlex_753_Drive:O.PresetSpeed5	0.0	REAL
My_PowerFlex_753_Drive:O.PresetSpeed6	0.0	REAL
My_PowerFlex_753_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, download the configuration to the controller. Save the project on your computer.

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

   The Download dialog box appears.
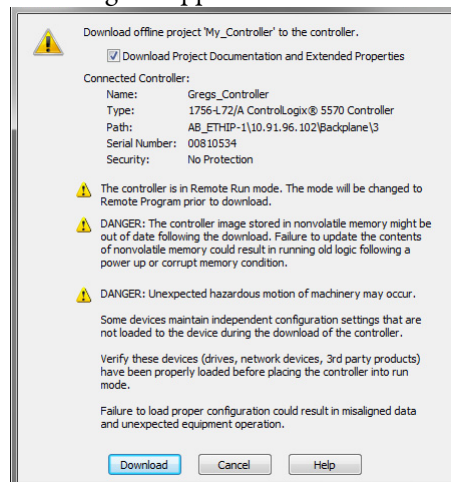
> **TIP**   If a message box reports that RSLogix 5000 software is unable to go online:
>
> Find your controller in the Who Active dialog box.
>
> From the Communications menu, choose Who Active.
>
> Find and select the controller.
>
> Click Set Project Path to establish the path.
>
> If your controller does not appear, add or configure the EtherNet/IP driver with RSLinx software. See 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.

   If the controller was in Run Mode before Download was clicked, 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 Download was click, this prompt does not appear.

3. From the File menu, choose Save.

   The first time a project is saved, 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 verify that present project configuration values are saved, RSLogix 5000 software prompts you to upload them.

4. 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. To load the project I/O settings into the drive.

1. In the treeview under I/O Configuration, right-click the drive profile and choose Properties.

2. Click the Drive tab.
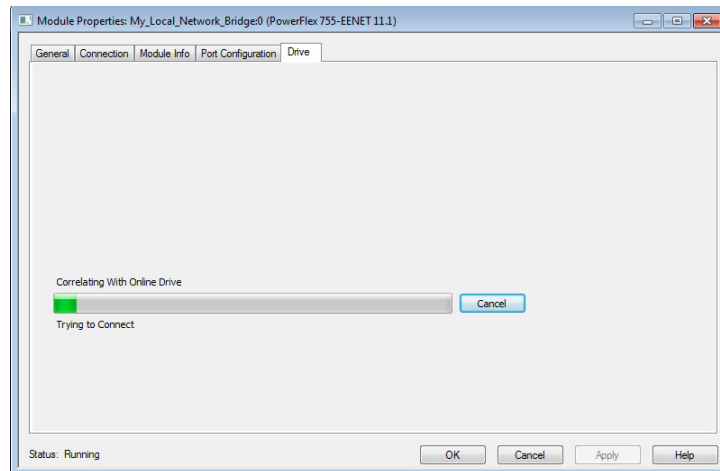
When the drive configuration data is verified, a pop-up dialog box appears. This dialog synchronizes ports from the online drive to the project, to make sure that the correct Datalinks are assigned.

3. Click OK.

   If the Differences Found dialog box appears (which is typical), click Download. The project settings are downloaded 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.
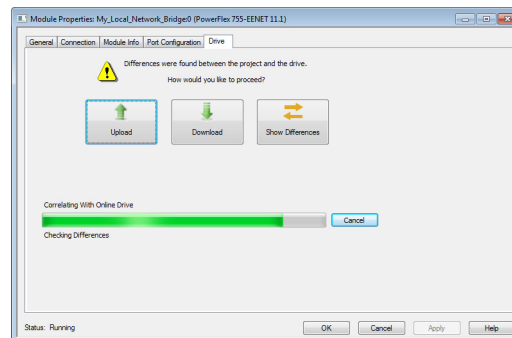
> **TIP**   On subsequent connections to the drive (after the initial download), click Upload.
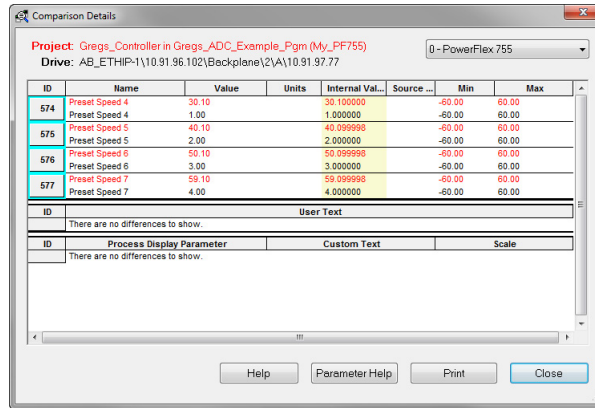
4. To match the Datalinks in the drive to the project I/O configuration, click Use Project.

   After the Datalinks have been matched, the Input Data and Output Data columns appear dimmed.

5. Click Continue.

   A series of download dialog boxes appear, which can take a minute to complete. After dialog boxes have stopped appearing, the I/O OK box in the upper left of the RSLogix 5000 dialog box must be steady green.

   There must not be a yellow warning symbol ⚠ in the treeview under the I/O Configuration folder next to the drive.

   After a few moments, the Module Properties dialog box will indicate that it is connected to the online drive.
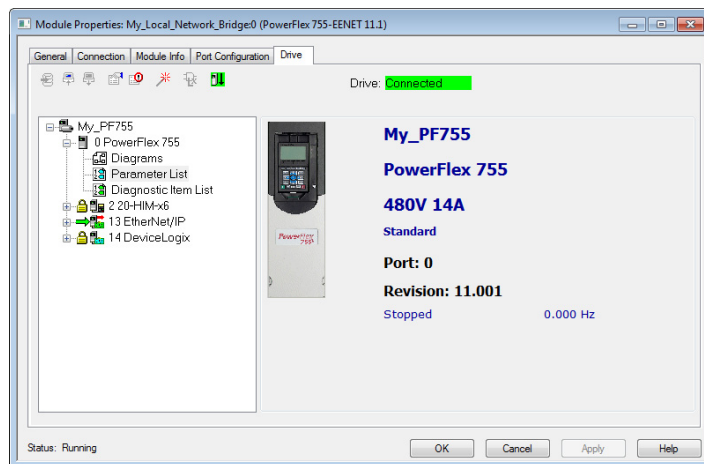
6. Click OK to close the Module Properties dialog box for the drive.

Updating the AOPs and Database Files

Each version of the controller programming software ships with the latest versions of available AOPs. However, new drives (new AOPs), updates (software enhancements and anomaly fixes), and device database files that are required for new firmware releases can occur at any time. If you are missing any of the following, you can obtain AOP and database updates via free download at the Product Compatibility and Download Center (PCDC):

- An AOP for a drive
- A specific feature such as ADC
- A desired firmware revision in an existing AOP

http://compatibility.rockwellautomation.com/Pages/home.aspx

To determine your AOP version:

1. Left-click on Module Properties icon in the upper left-hand corner of the AOP.
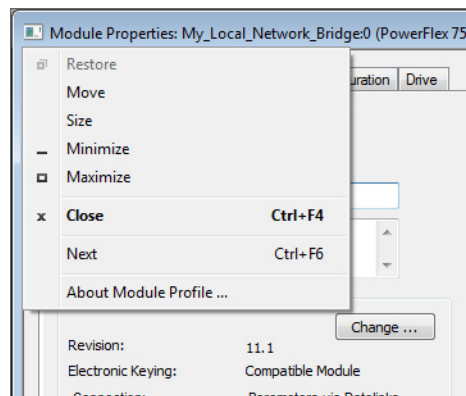
2. Display the AOP version by selecting About Module Profile.
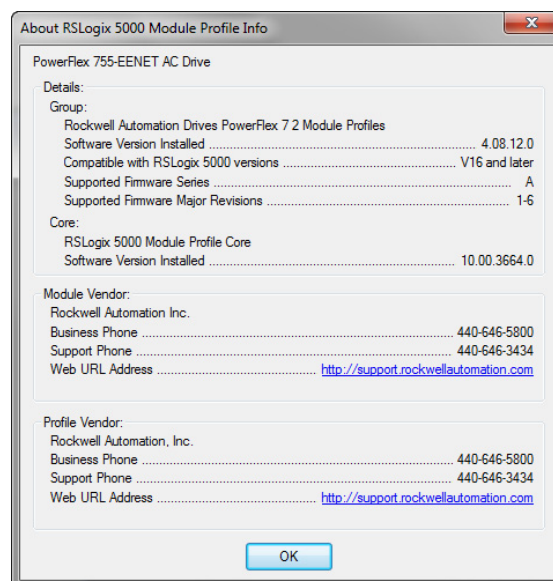
The drive AOPs are shipped with the latest drive and peripheral database files. However, new firmware revisions can release at any time. All available firmware revisions for a drive are displayed in the Revision field in the Module Definition window. There can be various online and offline options to update them. For example, only 11 major revisions are shown Figure 13. If you have a version 12 or later drive, see the red highlighted area for update options.

Figure 13 - Module Definition
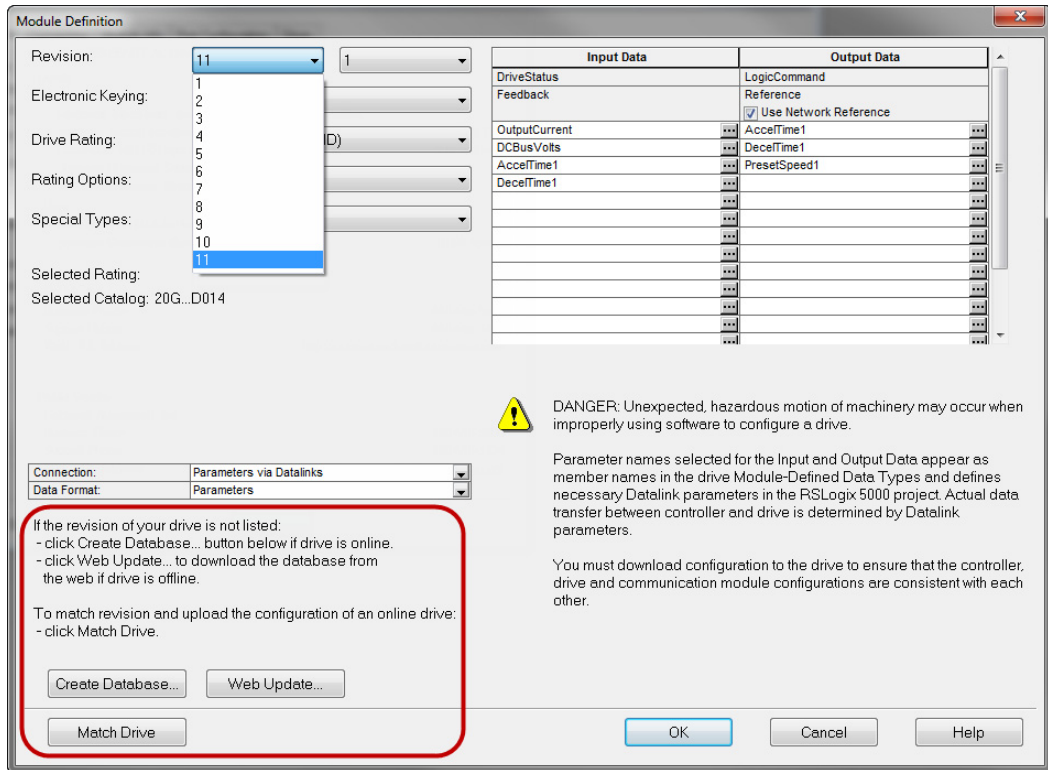
Three methods, two online and one offline, are provided:

Create Database – Opens the Connect to Drive window to navigate to any drive on the network, including a drive type that is different than the AOP you are using. The AOP automatically creates a database for it (must be a supported device).

Match Drive – Opens the Connect to Drive window and automatically creates a database if one does not exist. And matches the revision and uploads the configuration.

Web Update – Opens a web browser for offline downloads. Use the PCDC Product Search to either search for "database" or search for drive (for example "PowerFlex® 755") and select the desired firmware revision.

Figure 14 - Example of All Available Database Files
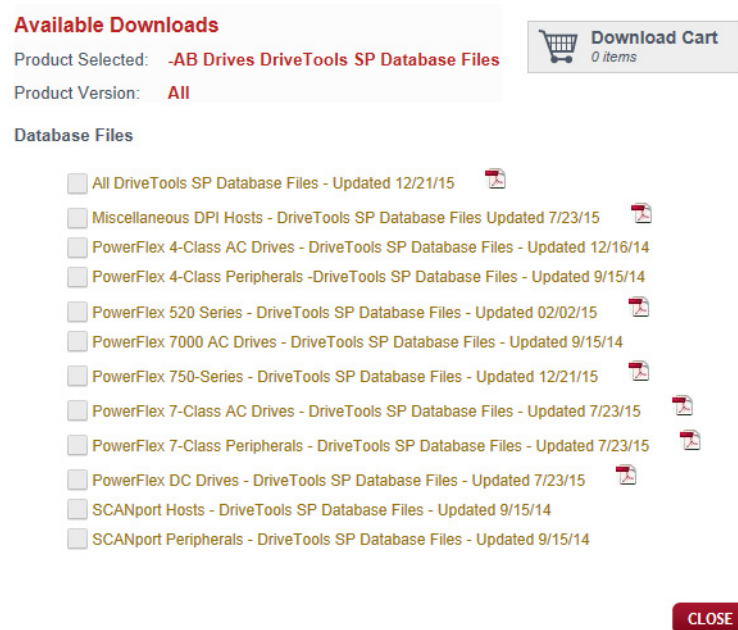
Figure 15 - Example of Databases Posted with Each Firmware
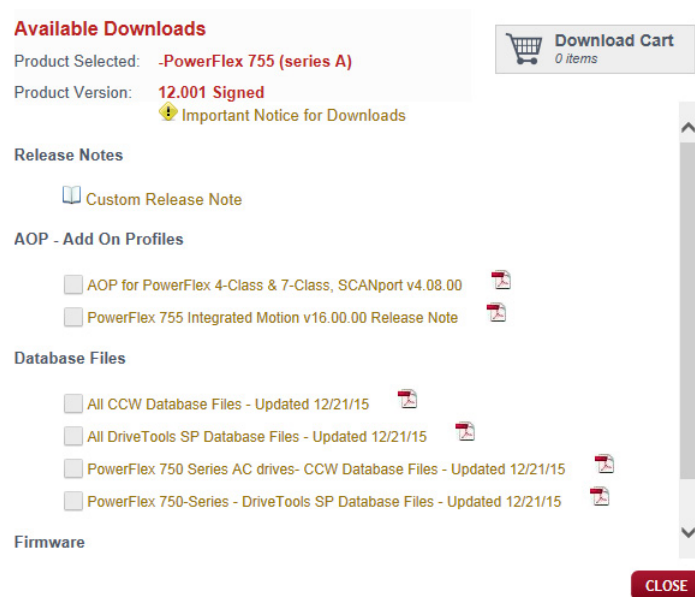
Configuration to Aid in Field-failure Replacement

Historically field-failure replacement has been a manually intensive process, from the removal and replacement, to the configuration the replacement. Replacement can take an extended time due to unavailability of trained personnel to download any updates from the web. Other factors include locating a laptop with the latest saved update and configuration files along with a cable, and finally the configuring of the drive. Downtime can be minimized by automating some of the steps in the replacement process.

Step	Manual Process	Automatic Process
1	Remove failed drive.	
2	Mount and wire replacement drive.	
3	Manually set IP address setting on drive so it appears on network.	BOOTP server in Ethernet switch automatically assigns the IP address. Drive is BOOTP enabled by default and accepts assigned IP address.
4	Manually update drive with ControlFLASH™ if necessary.	Electronic Keying between Logix controller and drive must resolve successfully.
5	Manually connect with CCW or DriveExecutive™ software, locate correct saved configuration file and download to the drive.	ADC in the Logix controller automatically downloads the configuration when there is a 'configuration signature' mismatch.

Automatic IP address assignment in the Ethernet switch, Firmware Supervisor, and ADC are mutually exclusive and can be used with or without each other. If Firmware Supervisor and ADC are both enabled, Firmware Supervisor executes first and must successfully complete before ADC executes.

Using an Ethernet Switch with DHCP/BOOTP server

To determine if a BOOTP server feature is supported, see the respective Stratix® switch or third-party switch user manual (Note: Switches with DHCP servers typically provide BOOTP server function too). The following Stratix switches also provide BOOTP server support:

Stratix 6000 (1783-EMS…)

The Stratix® 6000™ performs "Dynamic IP address Assignment by Port" per the settings on the DHCP Configuration tab:
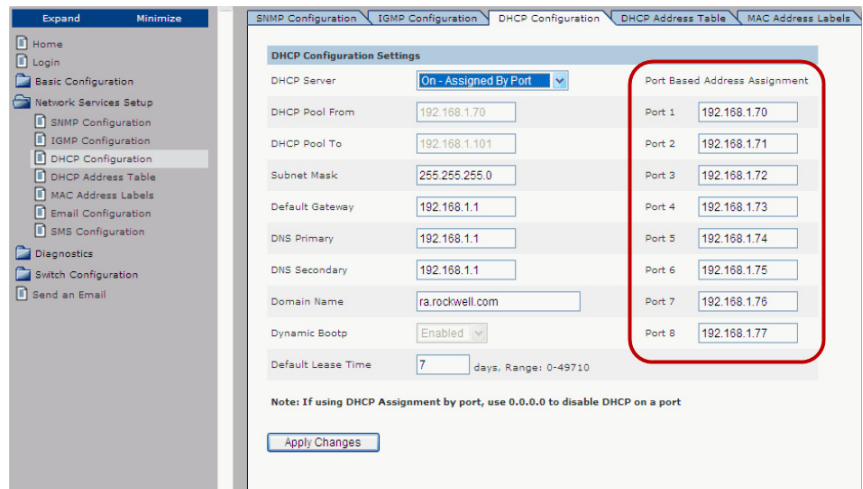
Stratix 8000 (1783-MS...) / 8300 (1783-RMS...)

The Stratix® 8000/8300 sets the IP Address per the "DHCP Persistence" tab:

One IP Address is configured for each port on the switch (star topology - one drive per port). If you have a ring topology, the IP Address for the drive must be set via other means, such as the HIM or last octet rotary switches on the drive. Firmware Supervisor and/or ADC can still be used and will execute after the drive gets its IP Address and 'appears' on the network to the Logix controller.

Using Firmware Supervisor

The Logix Firmware Supervisor function has been extended to provide firmware updates for the peripherals connected to the drive. You must be online and in program mode with the controller to load/store the firmware supervisor settings. To configure the controller to check and refresh the correct firmware for the drive and peripherals, perform the following steps.

1. Verify that 'Exact Match' keying is selected in the drive's and peripherals' properties dialog boxes.
   a. View the drive keying by clicking the General tab.
   b. Right-click each peripheral on the Drive tab.
   c. View the keying of the peripheral by choosing Properties.

2. Verify that ControlFLASH™ firmware kits for each revision of firmware for each device that must be stored in the controller is installed on the computer running the programming software.

3. Verify that a CompactFlash or other storage card is installed in the controller.

4. Use the programming software to go online with the controller in Program mode.

5. Download your program if you have not done so already.

6. In the tree view, right-click the controller folder at the top of the Controller Organizer.

7. Choose Properties.

8. On the Controller Properties dialog box, click the Nonvolatile Memory tab.
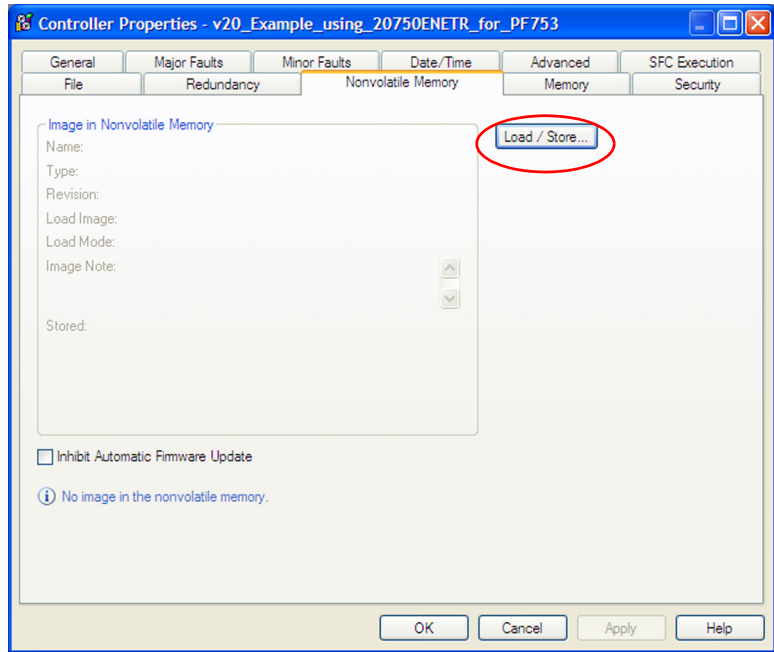
9. Click Load/Store.

   The Nonvolatile Memory Load/Store dialog box appears.
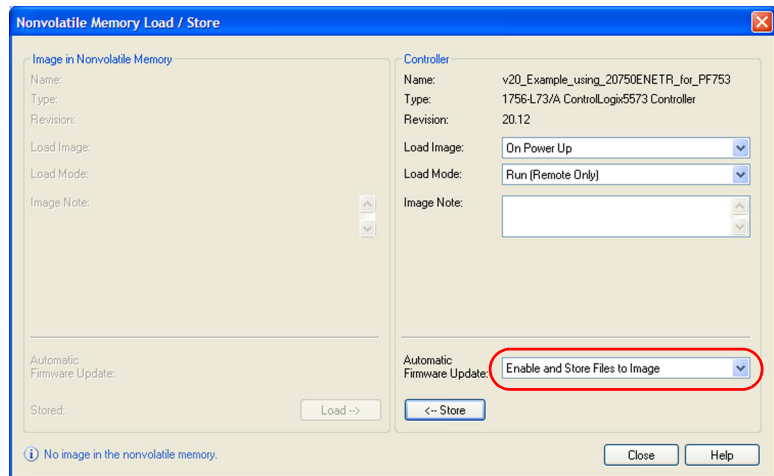
10. From the Automatic Firmware Update pull-down menu, choose Enable and Store Files to Image.

11. Click <-- Store.

    Two different continue confirmation dialog boxes open that relate to communication disruptions and erasure of the current contents of the storage card.

12. If okay, click Yes on either dialog box.

The programming software goes to the Offline state, and this dialog box appears.

> **RSLogix 5000**
>
> ⚠️ The Store operation is in progress and could take up to 3 minutes to complete. You will be unable to reconnect until the Store is complete.
>
> [OK]
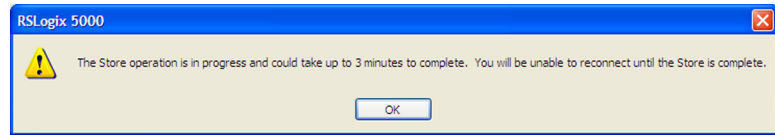
13. Wait for the store operation to complete, and then attempt to go online with the controller again.

Using Automatic Device Configuration (ADC)

Automatic Device Configuration (ADC) is an RSLogix 5000 / Studio 5000 feature that supports the automatic download of drive configuration data. The Logix controller establishes an I/O connection with a drive and its associated peripherals. Then it detects a 'configuration signature' mismatch, which indicates an ADC download is needed. The purpose is to reduce downtime in a field replacement situation by automatically downloading the configuration rather than manually with a separate tool.

ADC is available with the following software:
- RSLogix 5000
  - Version 20
- Studio 5000
  - Version 21 and higher
- Drive AOPs
  - Version 4.01 and higher for PowerFlex 755 (version 4.08 and higher recommended)
  - Version 4.03 and higher for PowerFlex 753 (version 4.08 and higher recommended)

The drive AOP is shipped with RSLogix 5000, Studio 5000. They are both also are available for free download at:
http://compatibility.rockwellautomation.com/Pages/home.aspx

> **TIP**   To identify the Drive AOP version you are using, open the AOP, click the icon in the upper left corner of the window and select "About Module Profile".

ADC works with the following PowerFlex 750 Series hardware:
- PowerFlex 755 revision 4.001 and higher (revision 10.003 and higher recommended)
- PowerFlex 753 revision 7.001 and higher (revision 10.003 and higher recommended)
- 20-750-ENETR revision 1.001 and higher (revision 1.002 and higher recommended).

Firmware updates are available for free download at:
http://www.rockwellautomation.com/support/pcdc.page

If you do not have the minimum levels of software and hardware, the ADC feature is not available (ADC icon is missing or appears dimmed).

Drive configuration settings are stored inside the .ACD project file (the first being RSLogix version 16). With ADC enabled, the Logix controller automatically downloads the configuration settings for a particular drive port if it detects that there is a 'configuration signature' mismatch with the port. A configuration signature is a globally unique ID number. The Logix controller uses the number to perform a quick compare to determine that a download is needed. If the signatures match, no download is needed. If an option module or entire drive is replaced, the configuration signature for the respective port does not match and a download occurs to the port.

IMPORTANT	ADC will always execute the first time the Logix controller connects to the drive after ADC has been enabled. The configuration signatures in the controller and drive synchronize, and prevent future ADC downloads from occurring unless a configuration change is made or the drive / peripheral is replaced.
	Typically at least two drive resets occur during the ADC download process. If a port, such as the drive Port 0 or Embedded EtherNet/IP Port 13, has configuration parameters that require a reset to become 'active'. The drive will reset after the respective port parameters are downloaded.
	See for a representation of the ADC icon.

⚠️	**ATTENTION:** When ADC is enabled, ADC is triggered any time the Logix controller detects a configuration signature mismatch when establishing an EtherNet/IP network I/O connection.
	ATTENTION: The use of other configuration tools, such as a HIM, CCW software, or DriveTools™ SP software, must be minimized and restricted to monitor-only operation. Any configuration changes made by these tools will cause a configuration signature mismatch the next time the Logix controller connects to the device. ADC writes over any configuration changes made by the other tools. Consider using the Write Mask function (drive Parameter 888 - [Write Mask Cfg]). The function prevents tools that are connected to ports other than the Embedded EtherNet/IP port in a PowerFlex 755 drive from writing to the drive. Any drive configuration changes must be made with the Add-on Profile (AOP).
	ATTENTION: The use of Explicit Messaging to perform parameter writes in the Logix program must be limited to RAM memory by setting the proper Attribute in the MSG instruction. Any writes to parameter nonvolatile storage (EEPROM) memory will clear the configuration signature and cause a mismatch the next time the Logix controller connects to the device. This triggers ADC, which writes over any configuration changes that were previously made

Configure a PowerFlex 750-Series Drive for ADC

ADC is configured within the AOP of the PowerFlex 750-Series drive. Start by creating or opening a PowerFlex 750-Series drive in the I/O Configuration folder.

1. Open the General tab dialog box of the drive.
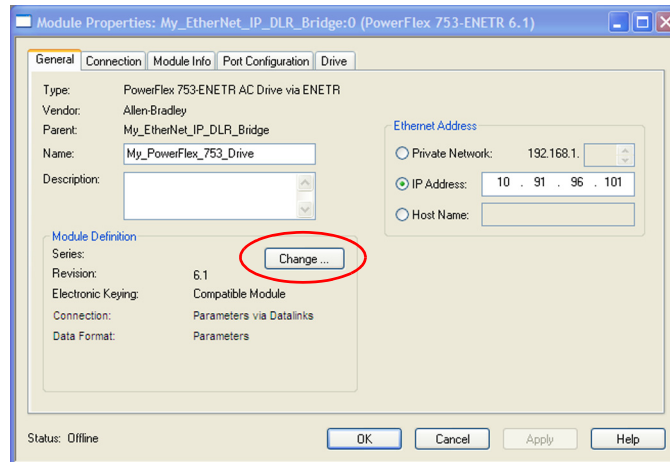
2. Click Change to open the Module Definition dialog box.

3. Select the appropriate Electronic Keying for your application.
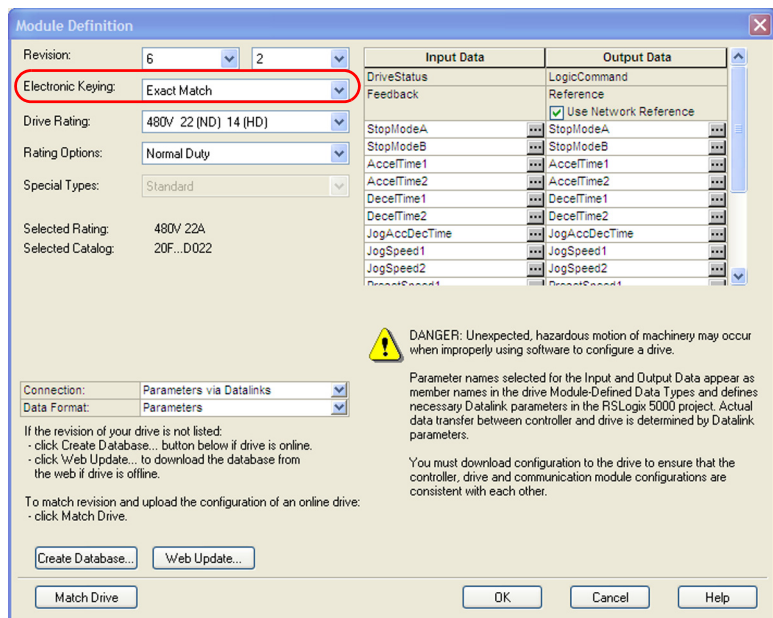
There are three Electronic Keying choices available in the Module Definition dialog box in the Drive AOP, but only two are recommended with ADC.

Electronic Keying Selection	Recommendation
Exact Match	This selection must only be used if: • Your system design specification requires that a replacement drive/peripheral is identical—down to the Minor revision of firmware (*x.xxx*). • You are implementing Firmware Supervisor upgrade support and ADC. ControlFLASH™ firmware kits for the revision of firmware that is used for each drive/peripheral must be installed on the computer running the programming software. Upgrade files can be downloaded from: http://www.rockwellautomation.com/support/pcdc.page

Compatible Module	This selection is typically used with ADC when Firmware Supervisor is not needed. The compatibility of the replacement PowerFlex 750 Series drive varies depending on the firmware revision:
	• PowerFlex 755
	  – version 10.00 and higher – the replacement is compatible if the Major/Minor revision is greater than or equal to the original (RECOMMENDED).
	  – version 9.00 and lower – the replacement is compatible if the Major revision (X.xxx) matches the original and the Minor revision (X.xxx) is greater than or equal.
	• PowerFlex 753
	  – 20-750-ENETR is version 1.002 and higher - the replacement is compatible if the Major/Minor revision is greater than or equal to the original (RECOMMENDED).
	  – 20-750-ENETR is version 1.001 - the replacement is compatible if the Major revision (X.xxx) matches the original and the Minor revision (X.xxx) is greater than or equal.

Disable Keying	When using ADC, this selection is not recommended. This selection allows a replacement to have any different Major (X.xxx) and/or Minor (X.xxx) firmware revision. It is up to the user to provide a replacement that has a firmware revision greater than or equal to the original. If a replacement with older firmware is used, the ADC download can fail.

> **IMPORTANT**   To be a "compatible module", the replacement drive must be the same rating. Replacing a drive with a higher rating is NOT compatible and no network I/O connection is established. ADC does not execute in this scenario.

Keying for peripherals is managed via the respective Port Properties dialog box for each peripheral.

Electronic Keying for the embedded EtherNet/IP adapter (Port 13 on PowerFlex 755 drives) and DeviceLogix (Port 14) ports are 'Disabled' by default. Both ports do not have individual firmware. The drive firmware (Port 0) manages both ports.

If either port is set to 'Exact Match', Firmware Supervisor is unable to locate the upgrade files during setup.

If the 'Fault Drive Connection on Peripheral Error' checkbox is selected and mismatch or failure occurs while connecting or configuring. The overall ADC process fails and the I/O connection is not made to the drive.

Electronic Keying for HIMs and serial converters (1203-SSS and 1203-USB) are disabled by default. Typically these devices are temporary or are only used for monitoring, therefore their presence does not matter. You can select these devices to other Keying selections if desired.

4. Click OK when finished and return to the Module Properties dialog box.

5. Click the Drive tab.

6. Open the ADC Settings dialog box by Click the ADC icon 〔⬚⬇〕.

    Version 4.02 (or later) Drive AOPs have an ADC icon on the Drive tab to show general ADC enable/disable status for the drive.

Icon	Meaning
〔⬚⬇〕	No ports on the drive have ADC enabled.
〔⬚⬇〕	At least one port on the drive has ADC enabled.
〔⬚⬇〕	ADC is not supported.

7. Click the ADC icon.

    Launch for the Automatic Device Configuration Settings, dialog box appears. This dialog box provides a, convenient location to enable or disable ADC for any of the ports on the drive.

Figure 16 - Automatic Device Configuration Settings
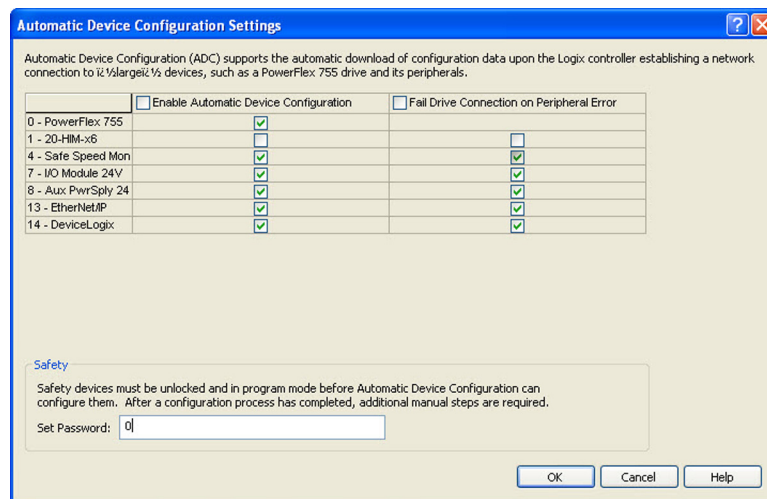
- Global checkbox at the top of each column checks or unchecks the devices in the entire column.

- Ports can be checked or unchecked individually.

- The "Enable Automatic Device Configuration" column is used to enable ADC for individual ports.

- The "Fail Drive Connection on Peripheral Error" is used to fail the network I/O connection process when an error occurs during ADC download to the corresponding port.

- If ADC is used, the general rule is to check all boxes with the following exceptions:

    – Any 'temporary' peripherals that are not critical for drive operation, such as a 20-HIM-x6 or 1203-USB, it is typically unchecked.

– DeviceLogix™ is an embedded feature. If DeviceLogix is not used in the application, it is typically unchecked.

Figure 16 shows a typical ADC configuration setup for a PowerFlex 755 that has two optional peripherals and does not use DeviceLogix.

The Safety section that is shown in Figure 16 is only present if a 20-750-S1 Safe Speed Monitor option module is present. Safety systems have a mandatory requirement for manual steps in the configuration process. See Special Considerations When Using a 20-750-S1 Safe Speed Monitor Module on page 91 for more information. This section allows the Safety password to be conveniently set directly from the ADC Settings window.

The Allow Writes on Port section provides access to Parameter 888 [Write Mask Cfg]. This parameter prevents tools that are connected to ports other than the Ethernet port from writing to the drive. When ADC is enabled, Logix 'owns' the configuration in the drive. Changes can only be made with the Add-On Profile (AOP). Changes that are made by other tools clear the configuration signature. An ADC download is triggered to overwrite the changes the next time a network I/O connection is established with the drive. Figure 16 shows the typical Pr.888 [Write Mask Cfg] settings when ADC is enabled.

When a port has writes disabled, an HIM and other software tools can still be used to monitor the drive. Writes are not allowed and an error message indicates that the port is write protected.

8. If you have network access to the drive being configured for ADC:

    a. Verify the ADC and drive configuration setup by clicking the ADC Auditor.

    b. Check for possible errors.

    c. If you do not have network access to the actual drive now, proceed to step 9. Remember to run the ADC Auditor later when you have network access to the actual drive. See ADC Auditor on page 87 more information.

IMPORTANT	Some parameters can affect the minimum/maximum of other parameters and can cause the settings of these parameters to be 'out of range'. This effect causes ADC to fail with a module fault (code 16#0010) 'Mode or state of module does not allow object to perform requested service'.

For example, drive Parameters 520 - [Max Fwd Speed] and 521 - [Max Rev Speed] affect the minimum/maximum of the following drive parameters:

- **329 - [Alternate Manual Reference Analog High]**
- **547 - [Speed Reference A Analog High]**
- **552 - [Speed Reference B Analog High]**
- **564 - [Digital Input Manual Reference Analog High]**
- **571…577 - [Preset Speed 1…7]**
- **602 - [Trim Reference A Analog High]**
- **606 - [Trim Reference B Analog High]**

By setting drive Parameter 520 or 521 to a lower value, you can cause the settings in the listed parameters to become 'out of range'. If you adjust Parameter 520 or 521, check the listed parameters and make any necessary updates to verify that they are 'in range'.

NOTE: It is recommended to review all parameters that are needed for your application to verify that they are 'in range'. When using version 4.02 (or later) Drive AOPs, a yellow highlight and text notification in the Parameters Linear List editor appears to identify out of range parameters. The ADC Auditor shows these errors.

9. Click OK when finished.

10. Perform all previous steps for each additional PowerFlex 750-Series drive.

11. Save your RSLogix 5000 project and download the project to the Logix controller.

ADC Auditor

The ADC Auditor is used to verify the correctness of the ADC setup and check for possible errors.

1. Click the ADC Auditor icon after configuring the drive for ADC and when you can connect to the actual drive over the network.

   The Connect to Drive window opens to select the correct drive on the network.

   The ADC Auditor checks the ADC configuration for errors and warnings by downloading the configuration to the drive.

2. Only proceed with the use of the ADC Auditor if:

   - Drive configuration in the project is complete
   - Drive is not running

- DeviceLogix is disabled
- Connection to the drive is inhibited.

3. Click the Start ADC Auditor Analysis button when the previously mentioned conditions are met.

   The ADC Auditor downloads the configuration data to the drive and reports back any warnings and errors.

Figure 17 - {ADC Auditor Issues Found}
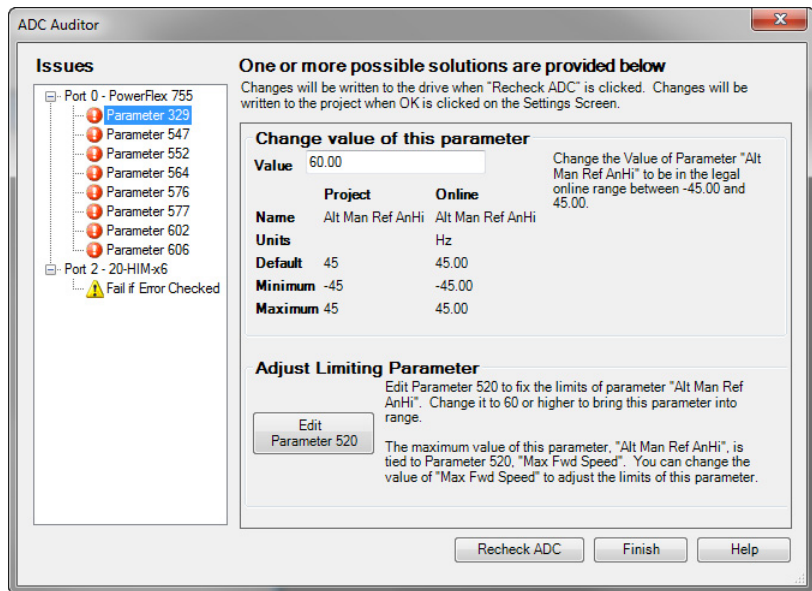
4. Click each issue in the Issues list for more information and corrective actions.

   An Error icon ⬤ indicates an issue that causes ADC to fail when the Logic controller downloads the configuration. These issues must be resolved for ADC to work.

   A Warning icon ⚠ indicates a potential issue that could affect the ADC download from the Logix controller in the future. These issues do not have to be resolved for ADC to work.

   Both types of issues come with corrective actions.

5. Perform any corrective actions.

6. Click Recheck ADC for the ADC Auditor to run again.

   Corrected issues disappear from the Issues list.

7. Click Finish when finished.

   If ADC was successfully configured, a final summary with a green check mark is shown. If there are any remaining warnings or errors, they are shown. An audit log of what was performed is included.

Figure 18 - ADC Auditor_Summary Success
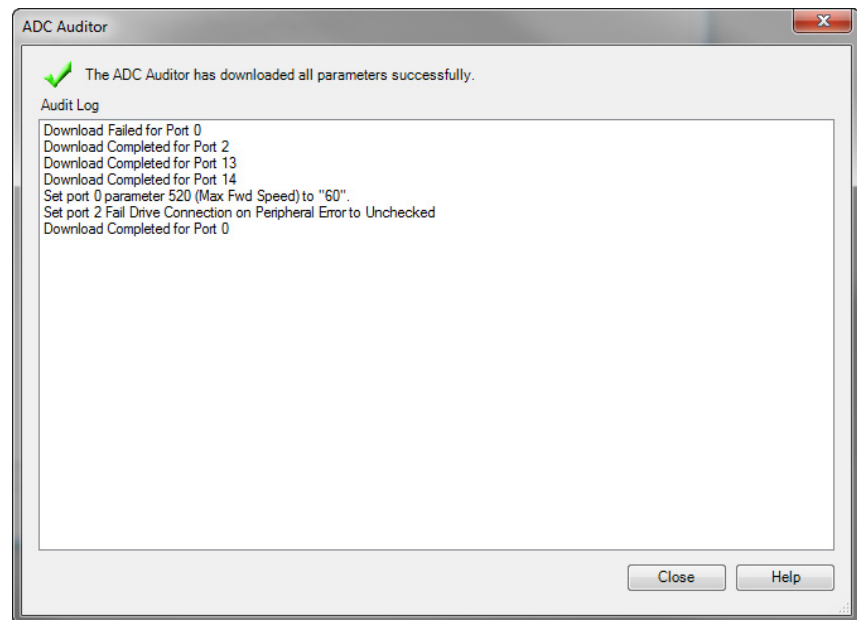
8. Click Close when finished with the ADC Auditor.

9. Click OK to save any changes and close the ADC Settings window.

ADC and Logix Memory

When starting in RSLogix 5000 software, version 16.00, drive configuration settings are stored in the project ACD file that is downloaded and stored in the controller. Configuration settings for ADC-capable devices contain additional port and script information. This information is used to choreograph the download process. Additional Logix memory is used compared with PowerFlex 750-Series drives in RSLogix 5000 software, version 16.00...19.00 systems. Note these examples of memory usage:

- A PowerFlex 755 drive with no option modules, minimal parameters that are changed from defaults, and no DeviceLogix program consumes approximately 8.5 kilobytes of Logix memory per drive.

- A PowerFlex 755 drive with four option modules, approximately 50 changed parameters, and a 32-block DeviceLogix program consumes approximately 25 kilobytes of Logix memory per drive.

Most Logix controllers have megabytes of memory available, so memory typically is not an issue.

To monitor Logix memory usage in the programming software, from the Controller Properties dialog box, click the Memory tab.

Special Considerations When Using a DeviceLogix Program

There are special considerations when a PowerFlex 750-Series drive has ADC enabled and is running a DeviceLogix program. ADC will download the DeviceLogix program after the drive is replaced. By default, the program is disabled (not functional). The factory default setting is 'Logic disabled' for a new replacement drive.

To enable (run) the DeviceLogix program after ADC, you must configure the drive in your project by performing the following steps.

1. Select the PowerFlex 750-Series drive and click the Drive tab.

2. Select the DeviceLogix Port in the device tree.

3. Click the DeviceLogix icon.

    The DeviceLogix Editor appears.

4. From the Edit menu, choose Recovery Mode.

5. Click Enabled to enable DeviceLogix after ADC.
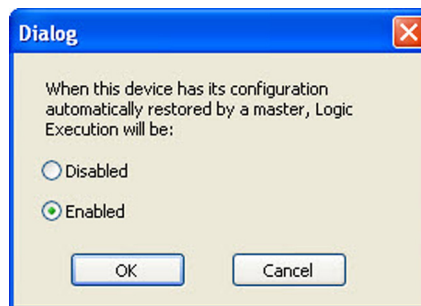
If you do not configure the automatic method that is previously described to enable DeviceLogix after ADC, you can still do so manually. To enable the DeviceLogix program:

Set DeviceLogix Parameter 53 - [DLX Operation] to '0' (Enable Logic) by using one of these methods:

- An explicit message in the Logix program to write to the parameter.
- A HIM or drive software tool to set the parameter.

After setting DeviceLogix Parameter 53 to '0' (Enable Logic), the drive changes the value to '6' (Logic Enabled) to indicate operation status.

IMPORTANT	Do not set DeviceLogix parameter 53 - [DLX Operation] to '0' (Enable Logic) in the Add-on Profile configuration before saving the configuration to the controller. This setting would lock the module, prevent writing the higher numbered parameters, and cause the ADC download to fail.

Special Considerations When Using a 20-750-S1 Safe Speed Monitor Module

There are special considerations when using ADC with the 20-750-S1 Safe Speed Monitor Module. Safety requires manual user intervention before the drive can become operational. Although a manual 'step' is required, ADC can still be used.

IMPORTANT	Firmware Supervisor cannot be used to update the 20-750-S1 Safe Speed Monitor Module firmware. Due to unique upgrade components with its safety core. It can be manually upgraded using ControlFLASH, a 1203-USB Serial Converter, and the appropriate upgrade file.

Along with the configuration of the Safe Speed Monitor Module, the password for the Module is stored in the configuration script in the controller. The password is used as part of the connection process to allow the configuration that is stored in the controller to be downloaded to the Module. This password must be entered into the profile for the Safe Speed Monitor Module in the Module Properties dialog box of the drive, in RSLogix/Studo 5000 software. This password value is entered in parameter 13 of the Safe Speed Monitor Module on controller download to the Module. Record the parameter value for future use when interacting with the Module. Enter the password into parameter 1 for the Safe Speed Monitor Module to allow either locking via parameter 5 or by changing the password via parameters 13 and 17.

IMPORTANT	Before you save the configuration to the controller, do not set the Safe Speed Monitor Module parameters in the Add-on Profile configuration: • Parameter 5 [Lock State] to '1' (Lock) • Parameter 6 [Operating Mode] to '1' (Run) By setting these parameters, you lock the Module, prevent writing the higher numbered parameters, and cause the ADC download to fail. These two parameters must be changed manually after performing an upload or after the ADC download.

The following manual steps take an existing configured Safe Speed Monitor Module out of Run mode to allow the controller to download the configuration to the Safe Speed Monitor Module. For example, during replacement of the drive and reuse of the existing Module.

IMPORTANT	Perform these manual steps with the Ethernet cable disconnected from the drive. The controller, while attempting to configure the Safe Speed Monitor Module locks out writes from other sources, such as the HIM.

1. Inhibit the drive connection—or disconnect the communication card through which the controller is trying to configure the Safe Speed Monitor Module by using ADC.

2. Set Safe Speed Monitor Module parameter 1 [Password] to the current password of the module.

3. Set Safe Speed Monitor Module parameter 5 [Lock State] to '0' (Unlock).

4. Set Safe Speed Monitor Module parameter 6 [Operating Mode] to '0' (Program).

5. If the Safe Speed Monitor Module password is not '0', change the password of the Module to '0'.

6. Set Safe Speed Monitor Module parameter 1 [Password] to the current password of the module.

7. Set Safe Speed Monitor Module parameter 13 [New Password] to '0'.

8. Set Safe Speed Monitor Module parameter 17 [Password Command] to '1' (Change PW).

9. Uninhibit the connection or reconnect the cable.

   The controller can download the new configuration, including the new password.

The following manual steps are required to put the Safe Speed Monitor Module into Run mode, generate a configuration signature, and lock the configuration. To replace the Safe Speed Monitor Module with a new, 'out-of-the-box' unit.

1. Set Safe Speed Monitor Module parameter 6 [Operating Mode] to '1' (Run).

   A configuration signature is generated.

2. Access Safe Speed Monitor Module parameter 10 [Signature ID] and record the configuration signature value stored in this parameter.

3. Enter the current password for the Safe Speed Monitor Module into parameter 1 [Password].

4. Set Safe Speed Monitor Module parameter 5 [Lock State] to '1' (Lock).

These steps can be performed with a HIM, drive software configuration tool, or via an HMI that can trigger explicit message writes from the controller program. To meet SIL CL3, PLe, or Cat 4 requirements, verify that the correct configuration is locked in the Safe Speed Monitor Module. See the drive and Safe Speed Monitor Module documentation for more information.

Testing ADC

ADC can be tested by clearing the Configuration Signature in a drive port and then either cycling power or by resetting the drive. Possible methods are:

Method 1

1. Connect via the Ethernet by using a second configuration tool, such as CCW or DriveExecutive™.

2. Change any unused parameter in the drive, such as an unused Preset Speed (Pr. 571...577), and/or peripheral ports.

3. Reset the drive from the tool.

   ADC triggers and executes.

Method 2

1. If a HIM is present and the port it resides in (typically Port 1) is not write protected, use the HIM to change any unused parameter in drive / peripheral.

2. Reset (similar to step 3).

   ADC triggers and executes.

Monitoring ADC Progress

The time that it takes for the connection process to complete varies from seconds to several minutes depending on several factors.

- Whether Firmware Supervisor is enabled and must upgrade the drive and/or any peripherals before ADC occurs. Updating drives or peripherals add significantly to the connection process time and is similar to the time it takes to update manually using ControlFLASH™ software.

- The number of peripherals enabled for ADC.

- If a configuration signature, for the drive/peripheral, indicates that a configuration download must be performed for the given port.

- If a 20-750-S1 Safe Speed Monitor option module, which requires a manual 'step' in its configuration process, is used.

- The number of drive resets required for ports with configuration parameters require a reset to become "active".

- If the DeviceLogix program (Port 14) is used for connection.

See the PowerFlex 750-Series AC Drive Programming Manual, publication 750-PM001 (or Chapter 7 of this manual for ENETR) for information about the status indicators. An operational drive in a running Logix system has the following status indicator states.

Status Indicator	Color	State	Description
STS (Drive)	Green	Flashes	Drive ready but is not running, and no faults are present.
		Steady	Drive is running, no faults are present.
NETA (NETR) ENET (Drive)	Green	Steady	COMMS is operating and has at least one CIP connection (I/O or explicit).
NETB (ENETR) LINK (DRIVE)	Green	Flashes	Transmitting on the network.

If the HIM is present, it can display additional information.

If ADC is unsuccessful, the ENET/NET A status indicator continues to flash green or be off, and RSLogix /Studio 5000 software can be used to get additional information. When online, the drive at issue has a yellow triangle ⚠ next to it in the RSLogix 5000 project I/O Configuration folder.

To open the Drive AOP, double-click the drive. The Connection tab shows a Module Fault code and the Drive tab identifies issues to the Port level.

Connection Status Field	Description
Running	Any desired configuration is complete, and the I/O connection is running.
Configuring	ADC is updating the configuration of the drive or one of its peripherals. To show which device is being updated, click the Connection tab.
Firmware Updating	ADC is updating the firmware of the drive or one of its peripherals. To show which device is being updated click the Drive tab.
Inhibited	The program has the connection inhibited. You can uninhibit the connection on the Connection tab.
Faulted	A problem is preventing the controller from connecting to the drive (for example, the device at the IP address that is provided is not a PowerFlex 750-Series drive). To show the cause Module Fault, click the Connection tab. Click the Drive tab can also show the faulted ports.

The following are examples of Logix controller ADC 'failures' with identified potential issues and associated solutions.

Senario/Error	Probable Solution	Potential Solution
Unable to replace with a higher rating drive.	Not an "Exact Match" or "Compatible Module" for Electronic Keying.	• Use the same rating for the replacement drive • Change Electronic Keying to "Disabled Keying". Manually review the parameter settings and any overload protection. Tuning and other manual adjustments can be required.
Unable to replace with a lower firmware version.	Not an "Exact Match" or "Compatible Module" for Electronic Keying. Not an "Exact Match" or "Compatible Module" for Electronic Keying.	Use ControlFLASH to update the replacement drive to a greater than or equal to firmware revision. Firmware can be downloaded at: http://compatibility.rockwellautomation.com/Pages/home.aspx

Unable to replace with a higher firmware version.	Not an "Exact Match" or "Compatible Module" for Electronic Keying.	• If "Exact Match" keying is used:
		  – Use ControlFLASH™ to update the replacement drive to the same firmware revision. Firmware can be downloaded at: http://compatibility.rockwellautomation.com/Pages/home.aspx
		• If "Compatible module" keying is used:
		  – Make sure that the replacement drive is version 10.003 or higher.
		  – If a 20-750-ENETR is used, make sure that the replacement is version 1.002 or higher.
		Firmware can be downloaded at: http://compatibility.rockwellautomation.com/Pages/home.aspx
		• Change Electronic Keying to "Disabled Keying". Manually review the new features, and so forth, in the higher firmware revision. Tuning and other manual adjustments can be required.

ADC is failing because the HIM, 1203-UDSB and/or 1203-SSS are missing.	Port in drive the peripheral is connected to is set to "Fail Drive Connection on Peripheral Error".	• Add the missing peripheral. • Open ADC Settings window in the corresponding drive AOP and uncheck the "Fail Drive Connection on Peripheral Error" box for the peripheral at issue. To avoid having to put the controller in Program mode to download the updated project. Perform this while online with the drive/controller.
ADC doesn't complete when 20-750-S1 Safe Speed Monitor option module is used.	Required manual steps to unlock/lock and set the password that is not performed.	ADC is not fully automatic when used with a 20-750-S1 Safe Speed Monitor module. Safety systems have a mandatory requirement for manual steps in the configuration process. See Special Considerations When Using a 20-750-S1 Safe Speed Monitor Module on page 91 for more information.
ADC fails due to parameter 'out of range' error.	The Min/Max on a parameter was affected when another parameter was adjusted.	Run ADC Auditor (Drive AOP version 4.06 and later) and correct any issues found. Out of range parameters have a yellow highlight and text notification in the Linear List parameter editor.
Drive is at default configuration settings after ADC is performed (equivalent to a Reset to Defaults).	Drive configuration did not upload and save to the Drive AOP.	Can occur when a second software tool, such as DriveExecutive, is being used to configure the drive and the Drive AOP. A second tool is not necessary and not recommended. Upload the configuration from the drive and save it in the Drive AOP. Run ADC Auditor (Drive AOP version 4.06 and later) and correct any issues found. Download project to controller.

Programmatically Monitoring Connection Status / ADC Configuration Signature

The Ethernet connection status between the Logix controller and PowerFlex drive can be monitored using a GSV instruction.

- Class: Module
- Instance: {name of drive in project}
- Attribute: EntryStatus (returns a value that indicates status)

See the RSLogix / Studio 5000 Help for more information on the GSV Instruction, GSV/SSV Objects, and the Module Object.

The Configuration Signature for a given Port in the PowerFlex drive can be monitored using an MSG instruction. The following MSG instruction reads the Configuration Signature from Port 0 in a PowerFlex drive.
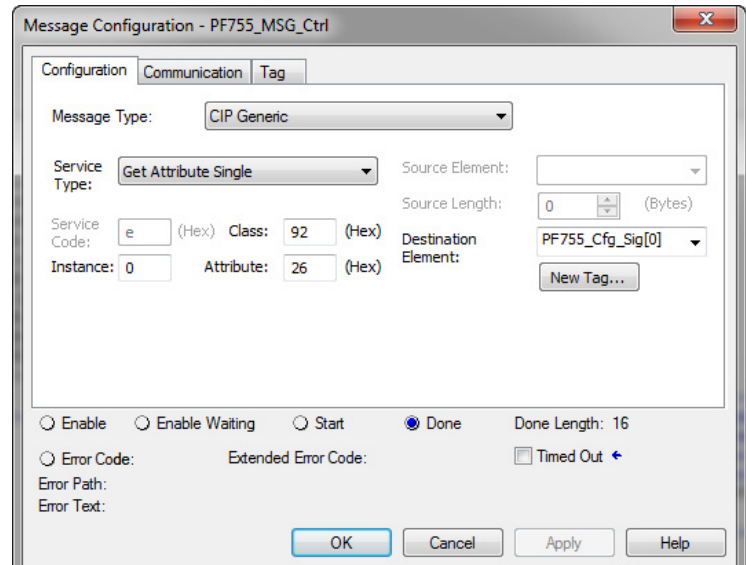
The MSG instruction Get Attribute Single uses the DPI Device Object (Class 92) to access Port 0 in drive (Instance 0). It then reads the Configuration Signature (Attribute 26 Hex = 38 Dec). See DPI Device Object on page 190 for additional information.

Figure 19 an example Logix program that monitors the Ethernet connection status to the PowerFlex drive and checks for96 a Configuration Signature in Port 0 in the drive. If the connection is "Running" (4000 Hex = 16384 Dec), a timer is used to read the Configuration Signature periodically in Port 0 in the drive. If no Configuration Signature is present, all read data are zero's.

Figure 19 - Example of the Logix Program
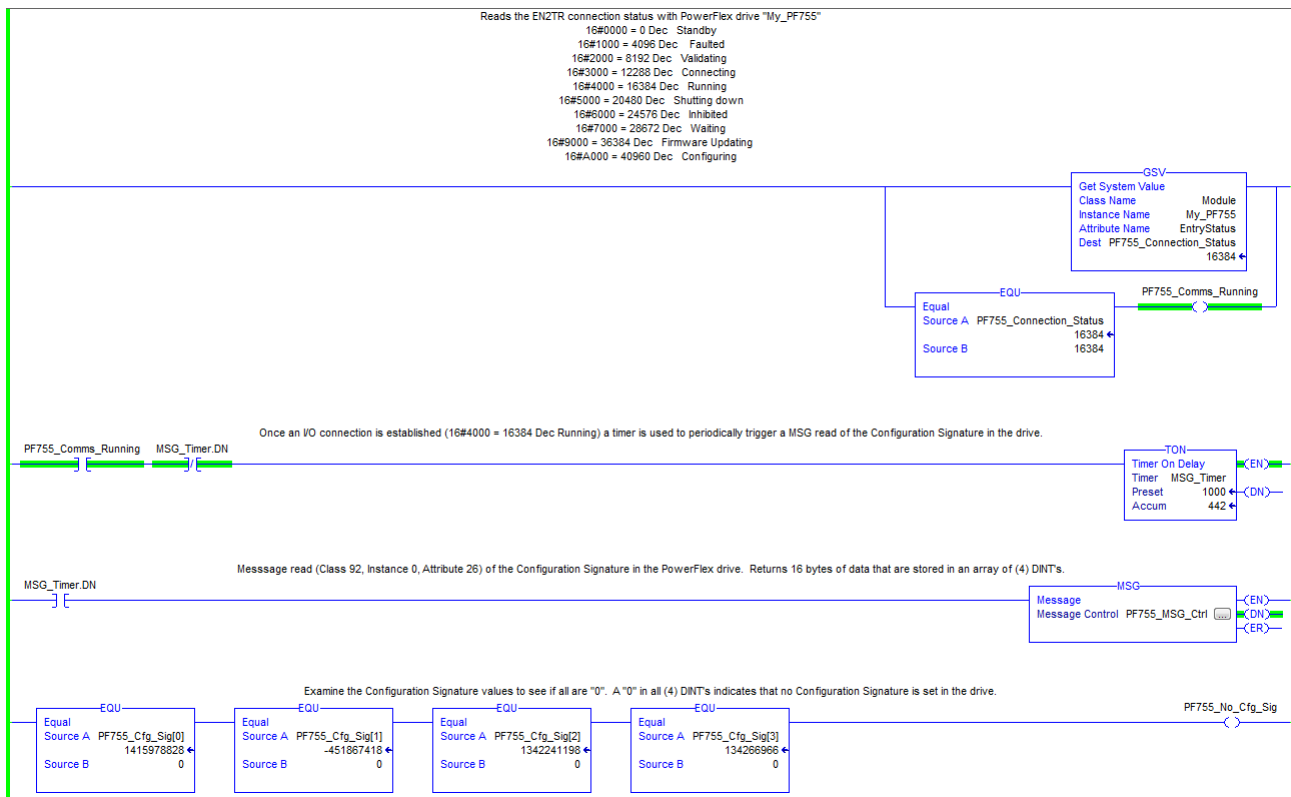
Additional. MSG's would be required to read the Configuration Signatures in the other Ports.

Figure 19 is an example only and optional. The GSV is good way to check Ethernet connection status for program use and to display status on an HMI. A "Running" connection to control the drive is required. If ADC is enabled, the "Running" status confirms a successful ADC download. The status information that is displayed is the same as when online with the AOP.

Reading the Configuration Signature is not typical, but could be used to detect and annunciate that a configuration change was made. ADC will trigger and download on the next I/O connection. There can be a requirement for the application to detect that a change was made before an ADC download. A considerable time can pass before a drive will power cycle or reset. It could be days or months before an I/O connection is dropped and re-established for ADC to occur. When ADC does occur, it overwrites any changes that were made outside of the drive AOP.

Best Practices

When using ADC in your control system, adhere to the following recommendations:

- To configure a drive, only use the RSLogix / Studio 5000 Drive AOP. If DriveExecutive or another tool is used to configure the drive, complete the drive configuration and then upload the configuration to the Drive AOP. Only use the Drive AOP for any future configuration changes. DriveExecutive, DriveObserver™, CCW, and so forth, can still be used only for monitoring.

- Enable ADC as the last step in the commissioning process, after all drive configuration has been completed. By enabling ADC as the last step, it eliminates ADC downloads being triggered after any parameter adjustments are made during the commissioning process.

- Upload the configuration from the actual drive before ADC is enabled. This action makes sure that rating, peripherals, firmware revisions, and parameter configuration settings in the ACD project matches the actual drive.

- Use the ADC Auditor (Drive AOP version 4.06 and later) to check for any warnings or errors. Fix any errors (required or the Logix ADC download fails).

- Enable and test ADC with one drive before enabling it for the entire control system. Apply any lessons learned to the configuration settings of the other drives in the project. Verify that ADC is successfully working before proceeding to enable it on other drives. Depending on your success with the ADC Auditor, the running of the Auditor on every drive is optional.

After testing ADC with an initial drive, enable ADC in small groups of drives at a time (for example, six drives). Make sure all drives successfully come up on the network and are operational before proceeding to the next 'group'.

Using the RSLogix 5000 Generic Profile, All Versions

Rockwell Automation® recommends 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.

- Operator is 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 the example, 1756-EN2TR/A bridge is right-clicked.

2. Expand the Communications group to display all available communication modules.
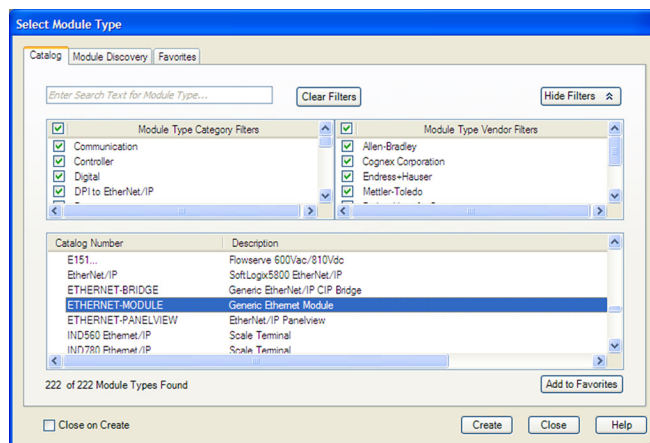
3. Select 'ETHERNET-MODULE' from the list to configure the drive and its connected EtherNet/IP option module.

4. Click OK.

The New Module dialog box of the drive appears.
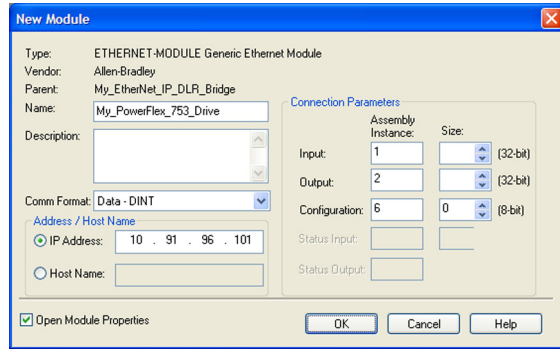
5. Edit the following information about the drive and option module.

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.)
IP Address	The IP address of the option module.
Open Module Properties	When this box is checked, click OK to open the additional module properties dialog boxes to configure the drive/option module. When unchecked, the New Module dialog box of the module closes when OK is clicked.

6. Under Connection Parameters, edit the following information.

Box	Assembly Instance	Size
Input	**1** (This value is required.)	The value varies based on the number of *Host* **[DL From Net xx]** parameters that are used for your application (see details in step 6).
Output	**2** (This value is required.)	The value varies based on the number of *Host* **[DL To Net xx]** parameters that are used for your application (see details in step 6).
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. At least three 32 bit words must be set for the Input Size. The option module uses the 32 bit Logic Status, 32 bit Feedback, and a 32 bit word that is dedicated for memory allocation of the Generic Ethernet module profile.

The option module also uses the 32 bit Logic Command and 32 bit Reference, which requires at least two 32 bit words for the Output Size. If any or all sixteen 32 bit Datalinks of the drive are used, the Input and Output Size settings must be increased accordingly. See Selecting Master-slave or Peer-to-peer Hierarchy (Adapter mode only) on page 44 or Custom Peer I/O Configuration on page 48.

- **Input Size:** Start with three words and add one word for **each** Datalink that is used to read data. For example, if three Datalinks— *Host* [**DL To Net xx**] parameters—are used to read the drive or peripheral parameters. Add three words to the required three words for a total of six words. You can use option module *Device* **Parameter**

04 - [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 <u>Figure 20</u>).

- **Output Size:** Start with two words and add one word for **each** Datalink that is used to write data. For example, if seven Datalinks— *Host* **[DL From Net xx]** parameters—are used to write to drive or peripheral parameters. Add seven words to the required two words for a total of nine words. You can use option module *Device Parameter 03 -* **[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 <u>Figure 21</u>).

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

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

    The Module Properties dialog box appears.

8. Click the Connection tab.
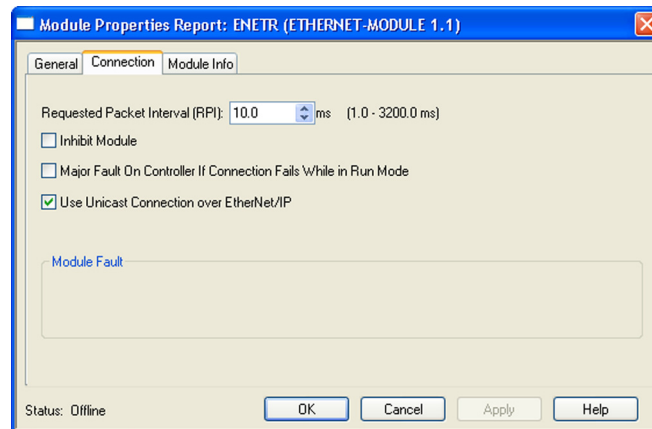
9. In the 'Requested Packet Interval (RPI)' box, set the value to 2.0 milliseconds or greater (default is 20.0 milliseconds).

    This value determines the maximum interval that a controller uses 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 occurs 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.

    Unicast support has been added to RSLogix 5000 software, version 18.00 (or later). Unicast is recommended whenever possible. For the benefits of unicast operation, see <u>Preparing for an Installation on page 21</u>.

10. Click OK.

The new node ('My_PowerFlex_753_Drive' in this example) now appears under the bridge ('My_EtherNet_IP_DLR_Bridge' in this example) in the I/O Configuration folder. If you double-click the Input and Output Controller Tags (Figure 20 and Figure 21), you 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 ladder logic of the controller.

Figure 20 - Input Image Controller Tags

Name	△	Data Type	Description
⊟ My_PowerFlex_753_Drive:I		AB:ETHERNET...	
⊟ My_PowerFlex_753_Drive:I.Data		DINT[19]	
⊞ My_PowerFlex_753_Drive:I.Data[0]		DINT	Pad Word
⊞ My_PowerFlex_753_Drive:I.Data[1]		DINT	Logic Status
⊞ My_PowerFlex_753_Drive:I.Data[2]		DINT	Speed Feedback
⊞ My_PowerFlex_753_Drive:I.Data[3]		DINT	DL To Net 01
⊞ My_PowerFlex_753_Drive:I.Data[4]		DINT	DL To Net 02
⊞ My_PowerFlex_753_Drive:I.Data[5]		DINT	DL To Net 03
⊞ My_PowerFlex_753_Drive:I.Data[6]		DINT	DL To Net 04
⊞ My_PowerFlex_753_Drive:I.Data[7]		DINT	DL To Net 05
⊞ My_PowerFlex_753_Drive:I.Data[8]		DINT	DL To Net 06
⊞ My_PowerFlex_753_Drive:I.Data[9]		DINT	DL To Net 07
⊞ My_PowerFlex_753_Drive:I.Data[10]		DINT	DL To Net 08
⊞ My_PowerFlex_753_Drive:I.Data[11]		DINT	DL To Net 09
⊞ My_PowerFlex_753_Drive:I.Data[12]		DINT	DL To Net 10
⊞ My_PowerFlex_753_Drive:I.Data[13]		DINT	DL To Net 11
⊞ My_PowerFlex_753_Drive:I.Data[14]		DINT	DL To Net 12
⊞ My_PowerFlex_753_Drive:I.Data[15]		DINT	DL To Net 13
⊞ My_PowerFlex_753_Drive:I.Data[16]		DINT	DL To Net 14
⊞ My_PowerFlex_753_Drive:I.Data[17]		DINT	DL To Net 15
⊞ My_PowerFlex_753_Drive:I.Data[18]		DINT	DL To Net 16

Figure 21 - Output Image Controller Tags

Name	△	Data Type	Description
⊟ My_PowerFlex_753_Drive:O		AB:ETHERNET...	
⊟ My_PowerFlex_753_Drive:O.Data		DINT[18]	
⊞ My_PowerFlex_753_Drive:O.Data[0]		DINT	Logic Command
⊞ My_PowerFlex_753_Drive:O.Data[1]		DINT	Speed Reference
⊞ My_PowerFlex_753_Drive:O.Data[2]		DINT	DL From Net 01
⊞ My_PowerFlex_753_Drive:O.Data[3]		DINT	DL From Net 02
⊞ My_PowerFlex_753_Drive:O.Data[4]		DINT	DL From Net 03
⊞ My_PowerFlex_753_Drive:O.Data[5]		DINT	DL From Net 04
⊞ My_PowerFlex_753_Drive:O.Data[6]		DINT	DL From Net 05
⊞ My_PowerFlex_753_Drive:O.Data[7]		DINT	DL From Net 06
⊞ My_PowerFlex_753_Drive:O.Data[8]		DINT	DL From Net 07
⊞ My_PowerFlex_753_Drive:O.Data[9]		DINT	DL From Net 08
⊞ My_PowerFlex_753_Drive:O.Data[10]		DINT	DL From Net 09
⊞ My_PowerFlex_753_Drive:O.Data[11]		DINT	DL From Net 10
⊞ My_PowerFlex_753_Drive:O.Data[12]		DINT	DL From Net 11
⊞ My_PowerFlex_753_Drive:O.Data[13]		DINT	DL From Net 12
⊞ My_PowerFlex_753_Drive:O.Data[14]		DINT	DL From Net 13
⊞ My_PowerFlex_753_Drive:O.Data[15]		DINT	DL From Net 14
⊞ My_PowerFlex_753_Drive:O.Data[16]		DINT	DL From Net 15
⊞ My_PowerFlex_753_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 must 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.
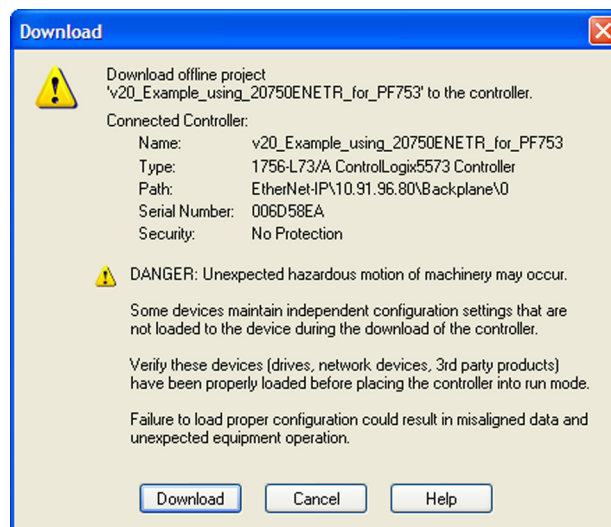
> **TIP**   If a message box reports that RSLogix 5000 software is unable to go online, find your controller in the Who Active dialog box. From the Communications menu, choose Who Active. After finding and selecting the controller, click Set Project Path to establish the path. If your controller does not appear, you must add or configure the EtherNet/IP driver with RSLinx software. See <u>Using RSLinx Classic Software on page 59</u> 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. The I/O OK box in the upper left of the dialog box is a steady green.

3. From the File menu, choose Save.

   If you are saving the project for the first time, 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 <u>Selecting Master-slave or Peer-to-peer Hierarchy (Adapter mode only) on page 44</u> or <u>Custom Peer I/O Configuration on page 48</u>. If this process is not done, the controller receives or sends placeholder data instead of actual drive or peripheral parameter values.

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

Using the I/O (Adapter mode only)

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

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> ⚠ **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 EtherNet/IP, I/O connections are used to transfer the data that 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, Feedback, and memory allocation for the Generic Ethernet module profile (all as 32 bit words) in the controller I/O image. This basic I/O must always be configured in the Ethernet 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, discusses 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 point of view of the controller. Therefore, output I/O is controller produced data consumed by the option module. Input I/O is option module produced status data consumed as input by the controller. The I/O image varies based on the following:

- How many of the 32 bit Datalinks of the drive (*Host* **DL From Net 01…16** and *Host* **DL To Net 01…16**) are used.

- **ControlLogix/CompactLogix Controllers only**—The drive profile that is used in RSLogix 5000® software (drive Add-on Profile in version 16.00 or later, or Generic Profile in all versions).

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 4 shows the I/O image when using all 32 bit Datalinks.

Table 4 - 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 <u>Appendix D</u>, Logic Command/Status Words: PowerFlex 750-Series Drives.

Using Reference/Feedback

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

When using a ControlLogix® controller, the 32 bit REAL Reference word in the output image is always DINT 1. See <u>Table 4</u>.

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. A COP (Copy) instruction or User-defined Data Type (UDDT) is required to write values to the Reference and read values from the Feedback. See the ladder logic program examples in <u>Figure 27</u> and <u>Figure 28</u>.

> **TIP**   When using the drive Add-on Profile, the controller tags for Reference and Feedback are automatically and properly formatted. The use of COP (copy) instructions or a UDDT to copy the DINT data into a REAL word is no longer required.

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.

> **IMPORTANT**   The commanded maximum speed must never exceed the value of drive
> Parameter 520 - [Max Fwd Speed].

Table 5 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 5 - 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 32 bit PowerFlex 750-Series drive uses a bipolar or unipolar direction
     mode. See the drive documentation for details.
(2) For this example, drive Parameter 300 - [Speed Units] is set to Hz.
(3) The drive runs at 60 Hz instead of 130 Hz or 65 Hz because drive Parameter 520 - [Max Fwd Speed] sets 60 Hz as the maximum
     speed.

Using Datalinks

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

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

- The target of a Datalink can be any *Host* parameter, including a *Host*
  parameter 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 settings of *Host* **Parameters 01…16 - [DL From Net 01…16]** and
  Host **Parameters 17…32 - [DL To Net 01…16]** determine the data that
  passes through the Datalink mechanism of the drive.

> **IMPORTANT**   A reset is always required after configuring the 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. Use Datalinks when you must change a value of a parameter frequently.

Datalinks are locked when the peripheral has an I/O connection with a controller for:
- PowerFlex 750-Series drive
- The embedded EtherNet/IP adapter on PowerFlex® 755 drives only
- Option modules such as an encoder or a communication moduleLOL

When a controller has an I/O connection to the drive, the drive does not allow anything that changes the I/O connection in a running system. These disallowed changes include, for example, a reset to defaults or configuration download. The I/O connection with the controller must first be disabled to allow changes to the respective Datalinks.

Depending on the controller being used, the I/O connection can be disabled by doing the following:
- Inhibiting the module in RSLogix 5000 software
- Putting the controller in Program mode
- Placing the scanner in idle mode
- Disconnecting the drive from the network

DeviceLogix™ Datalinks are also locked while the DeviceLogix™ program is running. The DeviceLogix program must first be disabled to allow changes to the Datalinks. Set DeviceLogix parameter 53 - [DLX Operation] to 'DisableLogic' to disable the logic (the parameter value then changes to 'LogicDisabld').

> **TIP** 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. The COP or UDDT is used 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 PowerFlex 750-Series AC Drives Programming Manual, publication 750-PM001. Go to the Data Type column in the chapter that contains the parameters.

Example of 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 following can be done by using the example programs.

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

Logic Command/Status Words

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

ControlLogix Controller Example

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

For information on how to use a PLC-5®, SLC™ 500, or MicroLogix™ 1100/ 1400 controller, see Controller Examples for EtherNet/IP Network Communications with PowerFlex 750-Series Drives, publication 750COM-AT001.

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

The drive Add-on Profile automatically creates descriptive controller tags (Figure 11) for the entire I/O image in Chapter 4. Use these tags to control and monitor the drive without creating any ladder logic program. However, if HMI devices (for example, a PanelView™ graphic terminal) are used to operate the drive and view its status. Create descriptive user-defined Program tags (Figure 22) and a ladder logic program that passes the Controller tag data to the Program tags.

Figure 22 - 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 23 and Figure 24. The name that is assigned when configuring the I/O (Chapter 4) determines the prefix for the drive Controller tags.

Figure 23 - ControlLogix Controller Example Ladder Logic Program Using a Drive Add-on Profile for Logic Status/Feedback
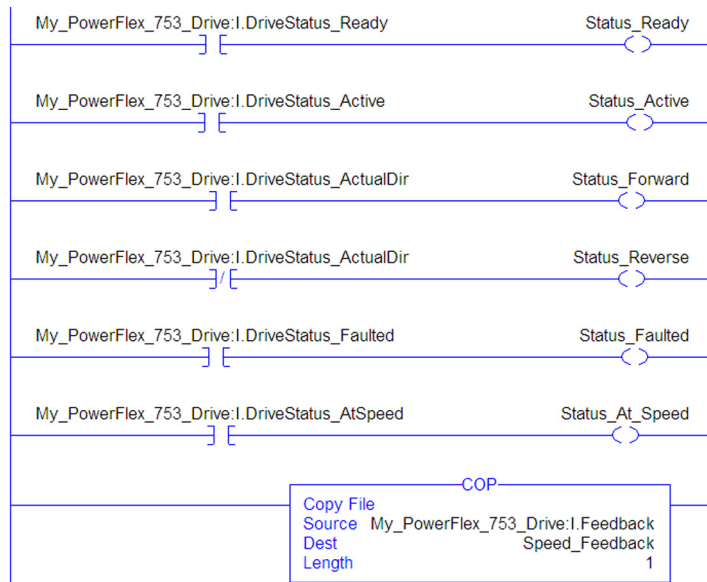
Figure 24 - ControlLogix Controller Example Ladder Logic Program Using a Drive Add-on Profile for Logic Command/Reference
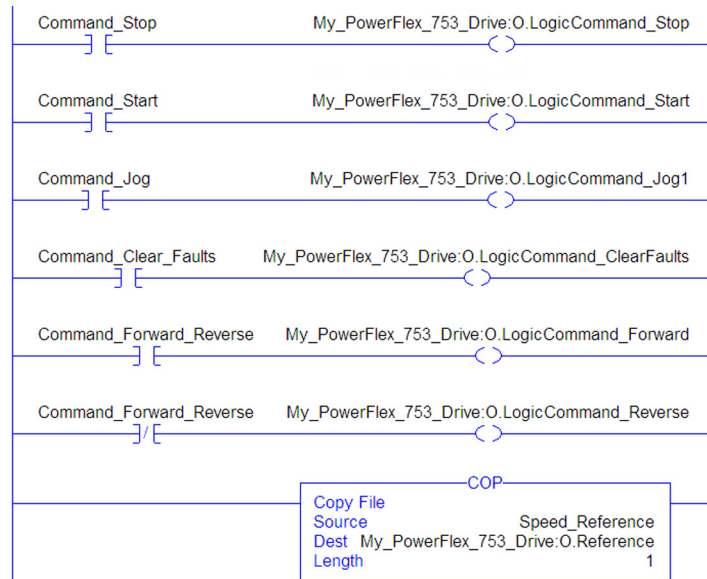
Create Ladder Logic by Using the RSLogix 5000 Generic Profile, All Versions

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]

Option Module *Host* Parameter	Value	Description
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_753_Drive:C		{...}		AB:ETHERNET...	
+ My_PowerFlex_753_Drive:I		{...}		AB:ETHERNET...	
+ My_PowerFlex_753_Drive:O		{...}		AB:ETHERNET...	

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 (Figure 25). The Output tag for this example program requires eighteen 32 bit words of data (Figure 26).

Figure 25 - ControlLogix Controller Input Image for Drive Generic Profile (example ladder logic program)

Name	Data Type	Description
⊟ My_PowerFlex_753_Drive:I	AB:ETHERNET...	
⊟ My_PowerFlex_753_Drive:I.Data	DINT[19]	
⊞ My_PowerFlex_753_Drive:I.Data[0]	DINT	Pad Word
⊞ My_PowerFlex_753_Drive:I.Data[1]	DINT	Logic Status
⊞ My_PowerFlex_753_Drive:I.Data[2]	DINT	Speed Feedback
⊞ My_PowerFlex_753_Drive:I.Data[3]	DINT	DL To Net 01
⊞ My_PowerFlex_753_Drive:I.Data[4]	DINT	DL To Net 02
⊞ My_PowerFlex_753_Drive:I.Data[5]	DINT	DL To Net 03
⊞ My_PowerFlex_753_Drive:I.Data[6]	DINT	DL To Net 04
⊞ My_PowerFlex_753_Drive:I.Data[7]	DINT	DL To Net 05
⊞ My_PowerFlex_753_Drive:I.Data[8]	DINT	DL To Net 06
⊞ My_PowerFlex_753_Drive:I.Data[9]	DINT	DL To Net 07
⊞ My_PowerFlex_753_Drive:I.Data[10]	DINT	DL To Net 08
⊞ My_PowerFlex_753_Drive:I.Data[11]	DINT	DL To Net 09
⊞ My_PowerFlex_753_Drive:I.Data[12]	DINT	DL To Net 10
⊞ My_PowerFlex_753_Drive:I.Data[13]	DINT	DL To Net 11
⊞ My_PowerFlex_753_Drive:I.Data[14]	DINT	DL To Net 12
⊞ My_PowerFlex_753_Drive:I.Data[15]	DINT	DL To Net 13
⊞ My_PowerFlex_753_Drive:I.Data[16]	DINT	DL To Net 14
⊞ My_PowerFlex_753_Drive:I.Data[17]	DINT	DL To Net 15
⊞ My_PowerFlex_753_Drive:I.Data[18]	DINT	DL To Net 16

Figure 26 - ControlLogix Controller Output Image for Drive Generic Profile (example ladder logic program)

Name	Data Type	Description
⊟ My_PowerFlex_753_Drive:O	AB:ETHERNET...	
⊟ My_PowerFlex_753_Drive:O.Data	DINT[18]	
⊞ My_PowerFlex_753_Drive:O.Data[0]	DINT	Logic Command
⊞ My_PowerFlex_753_Drive:O.Data[1]	DINT	Speed Reference
⊞ My_PowerFlex_753_Drive:O.Data[2]	DINT	DL From Net 01
⊞ My_PowerFlex_753_Drive:O.Data[3]	DINT	DL From Net 02
⊞ My_PowerFlex_753_Drive:O.Data[4]	DINT	DL From Net 03
⊞ My_PowerFlex_753_Drive:O.Data[5]	DINT	DL From Net 04
⊞ My_PowerFlex_753_Drive:O.Data[6]	DINT	DL From Net 05
⊞ My_PowerFlex_753_Drive:O.Data[7]	DINT	DL From Net 06
⊞ My_PowerFlex_753_Drive:O.Data[8]	DINT	DL From Net 07
⊞ My_PowerFlex_753_Drive:O.Data[9]	DINT	DL From Net 08
⊞ My_PowerFlex_753_Drive:O.Data[10]	DINT	DL From Net 09
⊞ My_PowerFlex_753_Drive:O.Data[11]	DINT	DL From Net 10
⊞ My_PowerFlex_753_Drive:O.Data[12]	DINT	DL From Net 11
⊞ My_PowerFlex_753_Drive:O.Data[13]	DINT	DL From Net 12
⊞ My_PowerFlex_753_Drive:O.Data[14]	DINT	DL From Net 13
⊞ My_PowerFlex_753_Drive:O.Data[15]	DINT	DL From Net 14
⊞ My_PowerFlex_753_Drive:O.Data[16]	DINT	DL From Net 15
⊞ My_PowerFlex_753_Drive:O.Data[17]	DINT	DL From Net 16

Program Tags

To use the Controller tags that are automatically created, you must 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 27 - ControlLogix Controller Example Ladder Logic Program Using a Drive Generic Profile for Logic Status/Feedback
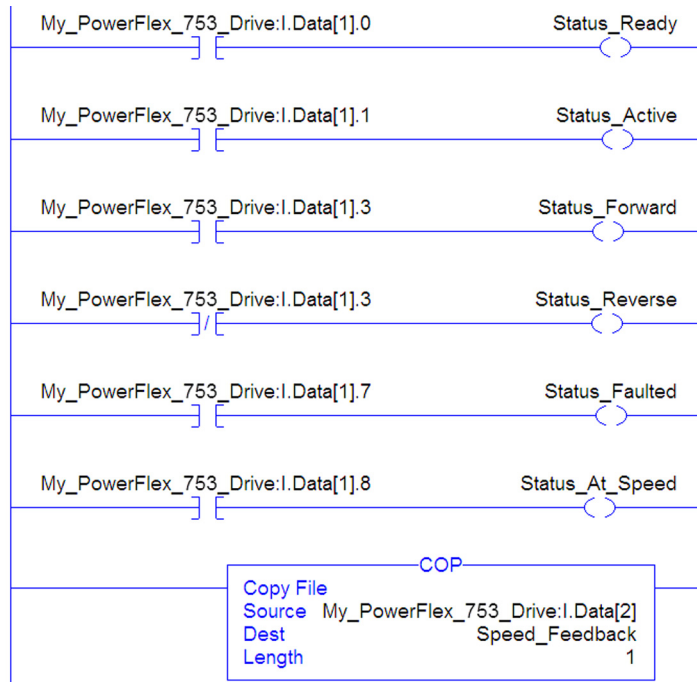
Figure 28 - ControlLogix Controller Example Ladder Logic Program Using a Drive Generic Profile for Logic Command/Reference
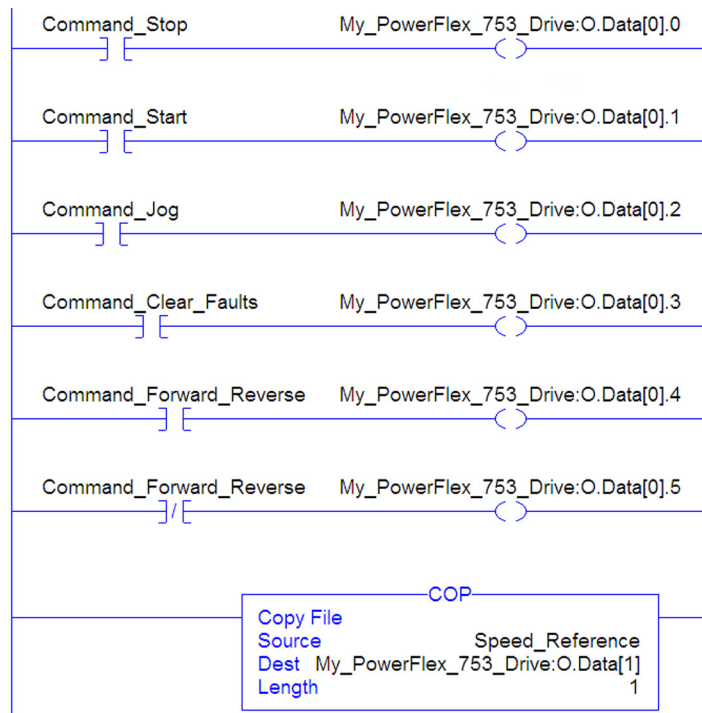
Example Datalink Data

The Datalink data that is used in the example program is shown in Figure 29. To describe the parameters to which the Datalinks are assigned, 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 29 - 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   Determine whether a parameter is a 32 bit integer (DINT) or a REAL data type. See the Data Type column in the chapter that contains 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 required to copy the DINT to a REAL (inputs) or copy the REAL to a DINT (outputs).

Notes:

Using Explicit Messaging (Adapter mode only)

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.

For Explicit Messaging with a PLC-5®, SLC™ 500, or MicroLogix™ 1100/1400 controller, see Controller Examples for EtherNet/IP Network Communications with PowerFlex® 750-Series Drives, publication 750COM-AT001.

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⚠️ **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.

- Risk of equipment damage exists. If Explicit Messages are programmed to write parameter data to Nonvolatile Storage (NVS) frequently, the NVS can quickly exceed its lifecycle 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 must be used for frequently changed parameters.

See Chapter 5 for information about the I/O Image, the use of 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 the parameters of a slave device 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. Check the 'Connected' box in the dialog box of the Communications tab message configuration during message setup. The connections include message connections and the I/O connection. However, the trade-off for more message connections is decreased network performance. It is recommended that if your application cannot tolerate the decreased network performance, do not check the 'Connected' box.

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

- DPI Parameter Object section on page 193 for *Device* parameters
- Host DPI Parameter Object section on page 209 for *Host* parameters

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

IMPORTANT   PowerFlex 750-Series drives have Explicit Messaging limitations. Table 6 shows the EtherNet/IP Object Class code compatibilities for these drives.

Table 6 - Explicit Messaging Class Code Compatibility with PowerFlex 750-Series Drive

EtherNet/IP Object Class Code	Compatibility	Explicit Messaging Function
Parameter Object 0x0F	No	Single parameter reads/writes
DPI Parameter Object 0x93	Yes with[1] limitations	Single and scattered parameter reads/writes
Host DPI Parameter Object 0x9F	Yes with[2] 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 193 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-ENETR 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 209 for instance (parameter) numbering.

Performing Explicit Messaging

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

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

Figure 30 - Explicit Message Process
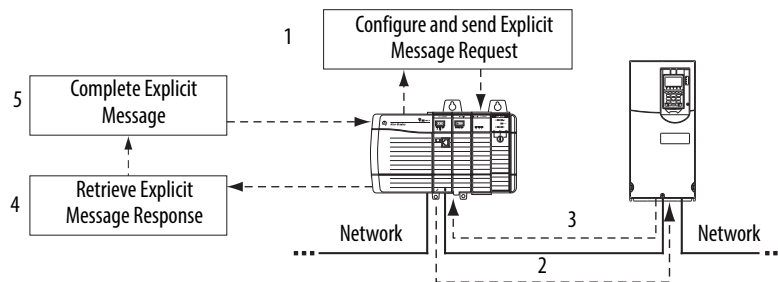
Event	Description
1	You format the required data and configure the ladder logic program to send an Explicit Message request to the scanner or bridge module (download).
2	The scanner or bridge module transmits the Explicit Message Request to the slave device over the network.
3	The slave device transmits the Explicit Message Response back to the scanner. The data is stored in the scanner buffer.
4	The controller retrieves the Explicit Message Response from the scanner buffer (upload).
5	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 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, EtherNet/IP Objects (Adapter mode only).

> **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 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 7 - 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 31 - Example Ladder Logic to Read a Single Parameter

ControlLogix – Formatting a Message to Read a Single Parameter

Figure 32 - Get Attribute Single Message, Configuration Dialog-boxes
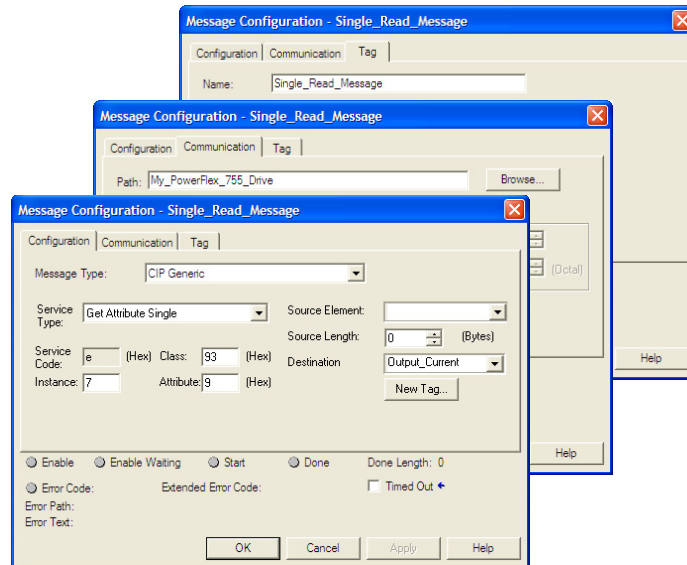
The following table identifies the data that is required in each box to configure a message to read a parameter.

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 follows.

Tag Tab	Example Value	Description
Name	Single_Read_Message	The name for the message.

(1) The default setting for Service Type is 'Custom', which enables the 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 hexadecimal 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 193 (Class code 0x93) or Host DPI Parameter Object on page 209 (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) There are Explicit Messaging limitations for PowerFlex 750-Series drives. See Table 6 on page 120 when using DPI Parameter Object Class code 0x93 or Host DPI Parameter Object Class code 0x9F.

(5) In this example, Output Current is a 32 bit REAL (floating point) parameter that requires 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 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 8 - 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 33 - Example Ladder Logic to Write a Single Parameter

ControlLogix – Formatting a Message to Write a Single Parameter

Figure 34 - Set Attribute Single Message Configuration Dialog-boxes
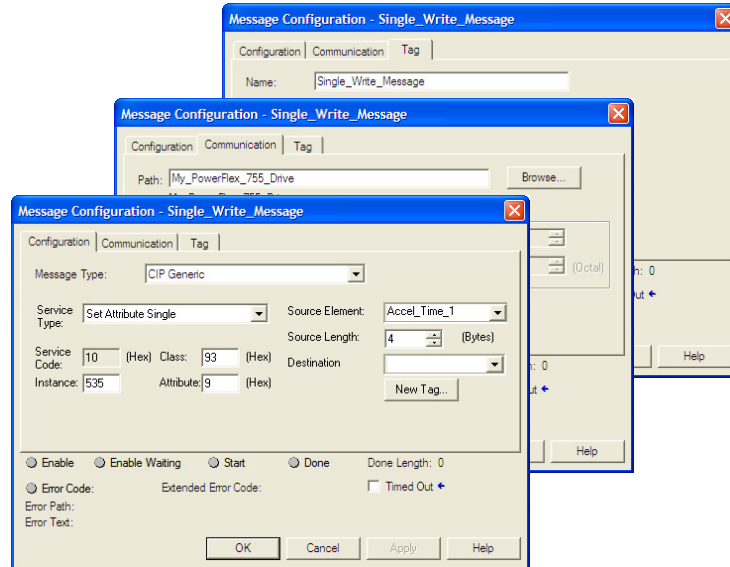
The following table identifies the data that is required in each box to configure a message to write a parameter.

Configuration Tab	Example Value	Description
Message Type Service Type [1] Service Code [1] Class Instance [2] Attribute [3] Source Element Source Length Destination	CIP Generic Set Attribute Single 10 (Hex.) 93 or 9F (Hex.) [5] 535 (Dec.) 9 or A (Hex.) Accel_Time_1 [6] 4 bytes [6] —	Used to access the DPI Parameter Object in the option module. This service is used to write a parameter value. Code for the requested service. Class ID for the DPI Parameter Object. Instance number is the same as parameter number. Attribute number for the Parameter Value attribute. Name of the tag for any service data to be sent from the scanner or bridge to the option module/drive. Number of bytes of service data to be sent in the message. Leave blank (not applicable).
Communication Tab	**Example Value**	**Description**
Path [4]	My_PowerFlex_755_Drive	The path is the route that the message follows.
Tag Tab	**Example Value**	**Description**
Name	Single_Write_Message	The name for the message.

(1) The default setting for Service Type is 'Custom', which enables the entry of a Service Code that is not available from the Service Type pull-down menu. When choosing a Service Type other than 'Custom' from the pull-down menu, an appropriate hexadecimal 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 193 (Class code 0x93) or Host DPI Parameter Object on page 209 (Class code 0x9F) to determine the instance number.

(3) Setting the Attribute value to '9' will write the parameter value to the drive Nonvolatile Storage (EEPROM) memory, which retains the parameter value even after the power to the drive is cycled. **Important:** When set to '9', the EEPROM can quickly exceed its lifecycle 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 is cycled. When frequent write messages are required, using the 'A' setting is recommended.

(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 6 on page 120 for limitations of PowerFlex 750-Series drives. Reference the table 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 that requires 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 – 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 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 is 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 must 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 must 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

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 floating point parameters (five 32 bit REAL) 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 <u>DPI Parameter Object on page 193</u> (Class code 0x93) or <u>Host DPI Parameter Object on page 209</u> (Class code 0x9F) for parameter numbering.

Table 11 - 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 35 - Example Ladder Logic to Read Multiple Parameters

ControlLogix – Formatting a Message to Read Multiple Parameters

Figure 36 - Scattered Read Message Configuration Dialog-boxes
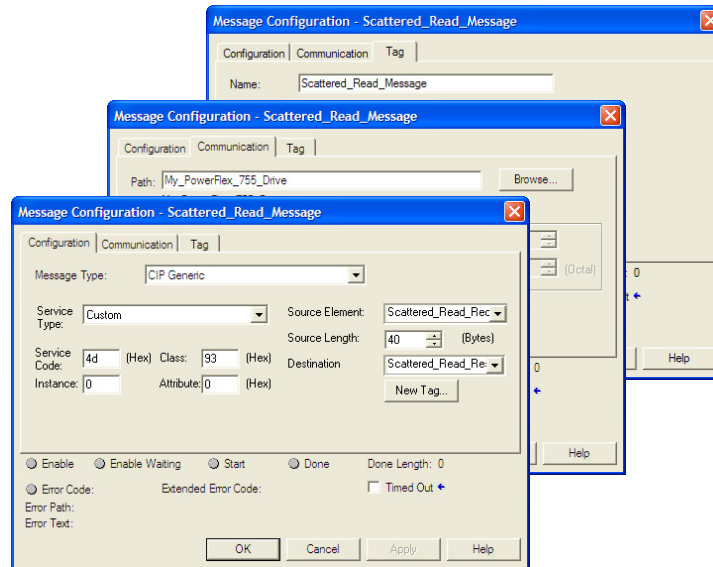
The following table identifies the data that is required in each box to configure a message to read multiple parameters.

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the DPI Parameter Object in the adapter.
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 or bridge 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 follows.

Tag Tab	Example Value	Description
Name	Scattered_Read_Message	The name for the message.

(1) The default setting for Service Type is 'Custom', enabling the 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 hexadecimal 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 by using COP (Copy) instructions or UDDTs is required to 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 6 on page 120 for limitations of PowerFlex 750-Series drives. Reference the table 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 193 (Class code 0x93) or Host DPI Parameter Object on page 209 (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 it can be another 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, the source tag Scattered Read Request is used to read the following five parameters (32 bit REAL floating point) in a PowerFlex 750-Series drive. See the data structure in Figure 37.

- 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 193 (Class code 0x93) or Host DPI Parameter Object on page 209 (Class code 0x9F) for parameter numbering.

Figure 37 - 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 38 shows the parameter values which, in this example, have been converted using a UDDT for correct presentation. COP (Copy) instructions could have been used for this purpose instead of a UDDT. If the parameters being read are 32 bit integers, do not copy (COP) the data to a REAL tag.

Figure 38 - 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]	12.3534 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 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 193 (Class code 0x93) or Host DPI Parameter Object on page 209 (Class code 0x9F) for parameter numbering.

Table 12 - 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 39 - 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. Use DPI Parameter Object Class code 0x93 and attribute A (see page 125). Attribute A writes to RAM—not NVS (EEPROM) memory. In this example, scattered write message using attribute 0 writes to NVS. Over time, continuous writes will exceed the EEPROM lifecycle and cause the drive to malfunction.

ControlLogix – Formatting a Message to Write Multiple Parameters

Figure 40 - 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 or bridge 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 follows.

Tag Tab	Example Value	Description
Name	Scattered_Write_Message	The name for the message.

(1) The default setting for Service Type is 'Custom', enabling the 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 hexadecimal 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 that uses COP (Copy) instructions or UDDTs is required to write the parameter values.

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

(3) Click **Browse** to find the path, or type in the name of the device listed in the 32 bitI/O Configuration folder (for this example, My_PowerFlex_755_Drive).

(4) See Table 6 on page 120 for limitations of PowerFlex 750-Series drives. Reference the table 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 numbers, see DPI Parameter Object on page 193 (Class code 0x93) or Host DPI Parameter Object on page 209 (Class code 0x9F).

(6) The hexadecimal 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, the data structure in Figure 41 in the source tag (Scattered_Write_Request) is used 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 193 (Class code 0x93) or Host DPI Parameter Object on page 209 (Class code 0x9F) for parameter numbering.

Figure 41 shows the parameter values which, in this example, have been converted using a UDDT to write their values. COP (Copy) instructions could have been used for this purpose instead of a UDDT. If the parameters that are being written to are 32 bit integers, do not copy (COP) the data to a REAL tag.

Figure 41 - Example Scattered Write Request Converted Data

ControlLogix Controller Example Scattered Write Response Data

The results of the message appear in the destination tag named Scattered_Write_Response (Figure 42). Values of '0' indicate that no errors occurred.

Figure 42 - Example Scattered Write Response Data

Notes:

Troubleshooting

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

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Viewing the Option Module Diagnostic Items	142
Viewing and Clearing Events	148

Understanding the Status Indicators

The option module has four status indicators. They can be viewed with the drive cover removed. The indicators operate differently in Adapter mode than Tap mode. See the respective section for details.

Drive Control Pod
(drive shown with cover removed)
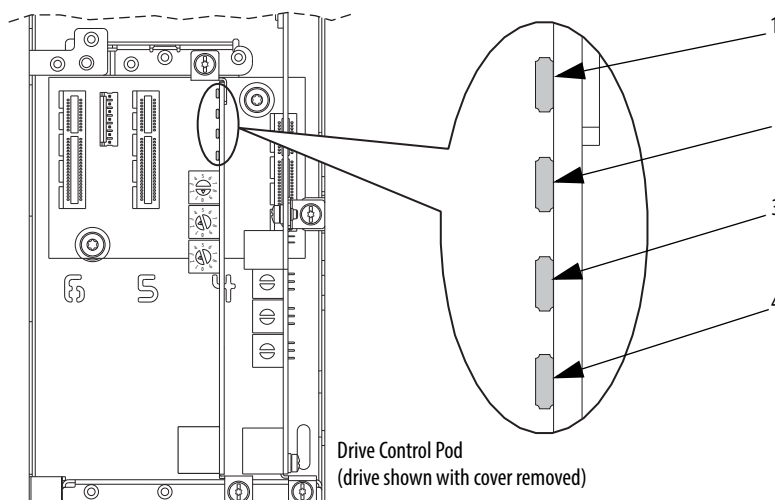
Item	Adapter Mode Operation				Tap Mode Operation		
	Indicator Name	**Description**	**See**		**Indicator Name**	**Description**	**See**
1	PORT	DPI™ Connection Status	Page 136		OK	Option Module Status	Page 140
2	MOD	Option Module Status	Page 136		LINK 1	ENET1 Network Port Status	Page 141
3	NET A	Network Connection Status	Page 138		LINK 2	ENET2 Network Port Status	Page 141
4	NET B	Option Module Transmission Status	Page 138		LINK 3	ENET3 Network Port Status	Page 142

Indications for Adapter Mode Operation

Use the following sections to troubleshoot the Adapter mode of operation.

PORT Status Indicator—Adapter Mode

This red/green bicolor status indicator indicates the status of the option module connection to the drive as shown in this table.

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. Tighten the two captive screws of the module to the recommended torque. • Apply power to the drive.
Flashes 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.	**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. Tighten the two captive screws of the module to the recommended torque. • Verify that the drive supports the Comm Driver.
Flashes 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).
Flashes 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—Adapter Mode

This red/green bicolor status indicator indicates the status of the option module as shown in this table.

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. Tighten the two captive screws of the module to the recommended torque. • Apply power to the drive.
Flashes Red	The drive is in firmware update mode. The option module has an EEPROM fault. The network address switches have been changed since powerup. A duplicate IP address fault has been detected. The DHCP lease has expired. The network address switches are set to '888'. The network configuration (IP address, subnet mask, gateway address) is invalid. The User FPGA configuration is invalid.	• View the option module event queue to determine which of these conditions is present. Then, depending on the cause, take the appropriate corrective action. • Clear faults in the option module. • Cycle power to the drive. • Cycle power. If the problem is not resolved, the option module parameter settings have been corrupted. Reset defaults and reconfigure the option module. • Reset defaults. If the problem is not resolved, update the option module with the latest firmware revision. • Change the network address switches to a value other than "888."
Flashes Green	The option module is operating normally, but is not transferring I/O data to a controller.	• Place the scanner in RUN mode. • Program the controller to recognize and transmit I/O to the option module. • Configure the option module for the program in the controller. • Normal behavior if no I/O is being transferred.
Steady Green	The option module is operating normally and is transferring I/O data to a controller.	No action required.

NET A Status Indicator—Adapter Mode

This red/green bicolor status indicator indicates the status for the network connection as shown in this table.

Status	Cause	Corrective Actions
Off	The option module is not powered. The option module is not properly connected to the network. The option module has not acquired its network configuration (IP address, subnet mask, gateway address) from the BOOTP/DHCP server.	• Securely connect and ground the option module to the drive by fully inserting it into the drive port. Tighten the two captive screws of the module to the recommended torque. • Correctly connect the Ethernet cable to the Ethernet connector. • Set a unique IP address with the option module rotary switches, option module parameters, or a BOOTP or DHCP server. • Apply power to the drive.
Flashes Red	The I/O connection has timed out.	• Place the controller in RUN mode, or apply power to the peer device that sends I/O. • Check the IGMP Snooping/Ethernet Switches for correct operation. • Check the amount of traffic on the network.
Steady Red	A duplicate IP address fault has been detected. The DHCP lease has expired.	Configure the option module to use a unique IP address and cycle power.
Flashes Green	The option module is operating normally, but does not have any CIP connections (I/O or explicit).	• Place the controller in RUN mode, or apply power to the peer device that sends I/O. • Program the controller or peer device to recognize and transmit I/O, or make a message connection to the option module. • Configure the option module for the program in the controller or the I/O from the peer device.
Steady Green	The option module is operating normally and has at least one CIP connection (I/O or explicit).	No action required.

NET B Status Indicator—Adapter Mode

This green status indicator indicates the status of the option module that is transmitting on the network as shown this table.

Status	Cause	Corrective Actions
Off	The option module is not transmitting on the network.	If NET A indicator is off: • Securely connect and ground the option module to the drive by fully inserting it into the drive port. Tighten the two captive screws to the recommended torque, and connect the option module to the network by using an Ethernet cable. • Correctly connect the Ethernet cable to the Ethernet connector. • Set a unique IP address with the option module rotary switches, option module parameters, or a BOOTP or DHCP server. If NET A indicator is steady red: • Configure the option module to use a unique IP address and cycle power. If NET A indicator is flashing red/green or red: • Check the IP address in the option module and scanner, and verify that the controller can communicate with the option module. • Ping the option module. • Normal condition if the option module is idle.
Flashes Green	The option module is transmitting on the network.	No action required.

Indications for Tap Mode Operation

Use the following sections to troubleshoot the Tap mode of operation.

OK Status Indicator—Tap Mode

This red/green bicolor status indicator indicates the status of the option module as shown in this table.

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. Tighten the two captive screws of the module to the recommended torque. • Apply power to the drive.
Flashes Red	The option module is not communicating with the drive via DPI. The drive is in firmware update mode. The option module has an EEPROM fault. The network address switches have been changed since powerup. A duplicate IP address fault has been detected. The DHCP lease has expired. The network address switches are set to '888'. The network configuration (IP address, subnet mask, gateway address) is invalid. The User FPGA configuration is invalid.	• View the option module event queue to determine which of these conditions is present. Then, depending on the cause, take the appropriate corrective action.
Steady Red	The option module is not communicating with the drive via DPI.	**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. Tighten the two captive screws of the module to the recommended torque. • Verify that the drive supports the Comm Driver.
Flashes Green	The option module is establishing DPI communication with the drive.	No action required. Normal behavior if no I/O is enabled.
Steady Green	The option module has established DPI communication with the drive.	No action required.

LINK 1 Status Indicator—Tap Mode

This green/yellow bicolor status indicator indicates the status of the ENET1 network port as shown in this table.

Status	Cause	Corrective Action
Off	The option module is not properly connected to the network.	Securely connect the option module to the network by using an Ethernet cable. Also, make sure that the Ethernet cable is correctly connected to the Ethernet connector.
Steady Green	ENET1 network port has a 100 Mbps network link, but no activity.	No action required.
Flashes Green	ENET1 network port has a 100 Mbps network link with activity.	No action required.
Steady Yellow	ENET1 network port has a 10 Mbps network link, but no activity.	No action required.
Flashes Yellow	ENET1 network port has a 10 Mbps network link with activity.	No action required.

LINK 2 Status Indicator—Tap Mode

This green/yellow bicolor status indicator indicates the status of the ENET2 network port as shown in this table.

Status	Cause	Corrective Action
Off	The option module is not properly connected to the network.	Securely connect the option module to the network by using an Ethernet cable. Also, make sure that the Ethernet cable is correctly connected to the Ethernet connector.
Steady Green	ENET2 network port has a 100 Mbps network link, but no activity.	No action required.
Flashes Green	ENET2 network port has a 100 Mbps network link with activity.	No action required.
Steady Yellow	ENET2 network port has a 10 Mbps network link, but no activity.	No action required.
Flashes Yellow	ENET2 network port has a 10 Mbps network link with activity.	No action required.

LINK 3 Status Indicator—Tap Mode

This green/yellow status indicator indicates the status of the ENET3 (DEVICE) network port as shown in this table.

Status	Cause	Corrective Action
Off	The option module is not properly connected to the network.	Securely connect the option module to the network by using an Ethernet cable. Also, make sure that the Ethernet cable is correctly connected to the Ethernet connector.
Steady Green	ENET3 network port has a 100 Mbps network link, but no activity.	No action required.
Flashes Green	ENET3 network port has a 100 Mbps network link with activity.	No action required.
Steady Yellow	ENET3 network port has a 10 Mbps network link, but no activity.	No action required.
Flashes Yellow	ENET3 network port has a 10 Mbps network link with activity.	No action required.

Viewing the Option Module Diagnostic Items

If you encounter unexpected communication problems, the option module diagnostic items can 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 how to view diagnostic items with the HIM, see the PowerFlex 20-HIM-A6/-C6S HIM (Human Interface Module) User Manual, publication 20HIM-UM001.

IMPORTANT   Some diagnostic items are not applicable when operating the option module in Adapter mode while others are not applicable in Tap mode. Therefore, these non-applicable diagnostic items are labeled 'Reserved' in Table 13 and Table 14.

Diagnostic Items for Adapter Mode Operation

Table 13 - Adapter Mode 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 must 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 13 - Adapter Mode 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 must 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	SI Primary Err	Number of CRC errors detected by the option module in the primary channel (Logic Status and Feedback) of the Serial Interface from the drive.
48	SI Secondary Err	Number of CRC errors detected by the option module in the secondary channel (Datalinks) of the Serial Interface from the drive.
49 50 51 52 53 54	HW Addr 1 HW Addr 2 HW Addr 3 HW Addr 4 HW Addr 5 HW Addr 6	Decimal value of each byte in the option module Ethernet hardware address. 255:255:255:255:255:255 [HW Addr 1] [HW Addr 2] [HW Addr 3] [HW Addr 4] HW Addr 5] [HW Addr 6]
55 56 57 58	IP Addr Act 1 IP Addr Act 2 IP Addr Act 3 IP Addr Act 4	Value of each byte in the option module present IP address. A value of '0' appears if the option module does not currently have an IP address. 255.255.255.255 [IP Addr Act 1] [IP Addr Act 2] [IP Addr Act 3] [IP Addr Act 4]

Table 13 - Adapter Mode Diagnostic Items (continued)

No.	Name	Description
59 60 61 62	Subnet Act 1 Subnet Act 2 Subnet Act 3 Subnet Act 4	Value of each byte in the option module present subnet mask. A value of '0' appears if the option module does not currently have a subnet mask. 255.255.255.255 [Subnet Act 1] 　[Subnet Act 2] 　　[Subnet Act 3] 　　　[Subnet Act 4]
63 64 65 66	Gateway Act 1 Gateway Act 2 Gateway Act 3 Gateway Act 4	Value of each byte in the option module present gateway address. A value of '0' appears if the option module does not currently have a gateway address. 255.255.255.255 [Gateway Act 1] 　[Gateway Act 2] 　　[Gateway Act 3] 　　　[Gateway Act 4]
67	Net Rx Overruns	The number of receive buffer overruns reported by the Ethernet hardware.
68	Net Rx Packets	The number of Ethernet packets that the option module has received.
69	Net Rx Errors	The number of receive errors that the Ethernet hardware reports.
70	Net Tx Packets	The number of Ethernet packets that the option module has sent.
71	Net Tx Errors	The number of transmit errors reported by the Ethernet hardware.
72	Missed IO Pkts	The number of incoming I/O connection packets that the option module did not receive.
73	Net Addr Sw	The present value of the option module node address (rotary) switches.
74	MDIX Status	Indicates the type of cable connected to the option module ports. P1 = ENET1 network port and P2 = ENET2 network port. Bit 0 - P1 Normal; Bit 1 - P1 Swapped Bit 2 - P2 Normal; Bit 3 - P2 Swapped
75	Boot Flash Count	Number of times the boot firmware in the option module has been upgraded.
76	App Flash Count	Number of times the application firmware in the option module has been upgraded.
77	FPGA Flash Count	Number of times the FPGA configuration in the option module has been upgraded.

Diagnostic Items for Tap Mode Operation

Table 14 - Tap Mode 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…42	Reserved	—
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…48	Reserved	—
49 50 51 52 53 54	HW Addr 1 HW Addr 2 HW Addr 3 HW Addr 4 HW Addr 5 HW Addr 6	Decimal value of each byte in the option module Ethernet hardware address. 255:255:255:255:255:255 [HW Addr 1] [HW Addr 2] [HW Addr 3] [HW Addr 4] HW Addr 5] [HW Addr 6]
55 56 57 58	IP Addr Act 1 IP Addr Act 2 IP Addr Act 3 IP Addr Act 4	Value of each byte in the option module present IP address. A value of '0' appears if the option module does not currently have an IP address. 255.255.255.255 [IP Addr Act 1] [IP Addr Act 2] [IP Addr Act 3] [IP Addr Act 4]
59 60 61 62	Subnet Act 1 Subnet Act 2 Subnet Act 3 Subnet Act 4	Value of each byte in the option module present subnet mask. A value of '0' appears if the option module does not currently have a subnet mask. 255.255.255.255 [Subnet Act 1] [Subnet Act 2] [Subnet Act 3] [Subnet Act 4]

Table 14 - Tap Mode Diagnostic Items (continued)

No.	Name	Description
63 64 65 66	Gateway Act 1 Gateway Act 2 Gateway Act 3 Gateway Act 4	Value of each byte in the option module present gateway address. A value of '0' appears if the option module does not currently have a gateway address. 255.255.255.255 [Gateway Act 1] [Gateway Act 2] [Gateway Act 3] [Gateway Act 4]
67	Net Rx Overruns	The number of receive buffer overruns reported by the Ethernet hardware.
68	Net Rx Packets	The number of Ethernet packets received by the option module.
69	Net Rx Errors	The number of receive errors the Ethernet hardware reports.
70	Net Tx Packets	The number of Ethernet packets sent by the option module.
71	Net Tx Errors	The number of transmit errors reported by the Ethernet hardware.
72	Reserved	—
73	Net Addr Sw	The present value of the option module node address (rotary) switches.
74	MDIX Status	Indicates the type of cable connected to the option module ports. P1 = ENET1 network port, P2 = ENET2 network port, and P3 = ENET3 (DEVICE) port. Bit 0 - P1 Normal; Bit 1 - P1 Swapped Bit 2 - P2 Normal; Bit 3 - P2 Swapped Bit 4 - P3 Normal; Bit 5 - P3 Swapped
75	Boot Flash Count	Number of times the boot firmware in the option module has been upgraded.
76	App Flash Count	Number of times the application firmware in the option module has been upgraded.
77	FPGA Flash Count	Number of times the FPGA configuration in the option module has been upgraded.

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 numeric code of the event 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

For details on the viewing and the clearing of events with 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, which makes the event queue nonvolatile. Eventually the event queue becomes full, since its contents are retained through option module power cycles and resets. At that point, a new entry replaces the oldest entry. Only an event queue clear operation or the corruption of the EEPROM group that contains the event queue clears the event queue contents. In the latter case, the option module does not generate a fault to indicate that the event queue was corrupted.

The resetting of 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 communication problems, the events can help you or Allen-Bradley personnel troubleshoot the problem. The following events can appear in the event queue.

Table 15 - Option Module Events

Code	Event Text	Description
**Option Module Events**		
1	No Event	Text that is displayed in an empty event queue entry.
2	Device Power Up	Power was applied to the option module.
3	Device Reset	The option module was reset.
4	EEPROM CRC Error	The EEPROM checksum/CRC is incorrect, which limits option module functionality. Default parameter values must be loaded to clear this condition.
5	App Updated	The option module application firmware was updated.
6	Boot Updated	The option module boot firmware was updated.
7	Watchdog Timeout	The software watchdog detected a failure and reset the option module.
**DPI Events**		
8	DPI Bus Off	A bus-off condition was detected on DPI.
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 startup.
12	DPI Host Reset	The drive sent a reset event message.

Table 15 - Option Module Events (continued)

Code	Event Text	Description
13	DPI Baud 125 kbps	The option module detected that the drive was communicating at 125 Kbps.
14	DPI Baud 500 kbps	The option module detected that the drive was communicating at 500 Kbps.
15	DPI Host Invalid	The option module was connected to an incompatible product.
16	DPI Dup Port	Another peripheral with the same port number is already in use.
17	DPI Type 0 Logon	The option module has logged in for Type 0 control.
18	DPI Type 0 Time	The option module has not received a Type 0 status message within the specified time.
19	DPI DL Logon	The option module has logged in to 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 in to the Serial Interface Communication.
27	SI Logon Error	The option module failed to log in to the Serial Interface.
28	SI Comm Fault	The Serial Interface Communication has faulted.
Network Events		
29…30	Reserved	—
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 that sends 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, to allow control messages to be sent to the option module.

Table 15 - Option Module Events (continued)

Code	Event Text	Description
43	Msg Ctrl Close	The timeout attribute in either the CIP Register or Assembly object was written with a zero value, to disallow 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	Peer IO Open	The option module received the first Peer I/O message.
46	Peer IO Timeout	The option module has not received a Peer I/O message for longer than the Peer I/O Timeout.
47 …54	Reserved	—
55	BOOTP Response	The option module received a response to its BOOTP request.
56	Email Failed	The option module encountered an error attempting to send a requested email message.
57	Reserved	—
58	Module Defaulted	The option module has been set to defaults.
59	FPGA Fact Load	The option module has loaded the Factory configuration into its FPGA.
60	FPGA User Load	The option module has loaded the User configuration into its FPGA.
61	Net Link 1 Up	A network link was available for the option module on its ENET1 network port.
62	Net Link 1 Down	The network link was removed from the option module on its ENET1 network port.
63	Net Link 2 Up	A network link was available for the option module on its ENET2 network port.
64	Net Link 2 Down	The network link was removed from the option module on its ENET2 network port.
65	Net Link 3 Up	A network link was available for the option module on its ENET3 (DEVICE) network port.
66	Net Link 3 Down	The network link was removed from the option module on its ENET3 (DEVICE) network port.
67	Net Ring Up	The Device Level Ring (DLR) status is Normal.
68	Net Ring Down	The Device Level Ring (DLR) status is Faulted.
69	Invalid Net Cfg	The network address configuration parameters for the option module are invalid, or the network address that is provided by the status indicator BOOTP or DHCP server is invalid.
70	DHCP Response	The option module received a response to its DHCP request.
71	DHCP Renew	The option module renewed its network address lease with the DHCP server.
72	DHCP Rebind	The option module rebinded its network address lease with the DHCP server.
73	DHCP Release	The network address lease for the option module is expired.

How to View Option Module Web Pages

This chapter details how to monitor the PowerFlex® 750-Series drive and its EtherNet/IP option module with the web interface for the module.

Future enhancements can result in option module web pages that look different than the examples shown in this chapter.

Enable the Option Module Web Pages

After the option module is configured and operating, you can view its web pages. They present information about the module, the drive to which it is connected, and the other DPI devices connected to the drive such as a HIM.

> **IMPORTANT** Depending on its selected operating mode (Adapter or Tap), the option module provides a unique set of web pages with different information.

By default the option module web pages are disabled. To enable the option module web pages, set *Device* **Parameter 26 - [Web Enable]** to '1' (Enabled).

View Web Pages in Adapter Mode

In Adapter mode, the option module can be configured to send email messages. These messages are sent automatically to desired addresses when selected drive faults occur and/or are cleared. Or when the option module takes a communication or idle fault action.

Bit 0 of *Device* **Parameter 27 - [Web Features]** can be used to help protect the configured settings. For more details, see .

1. On a computer with access to the EtherNet/IP network on which the drive/option module is installed, launch a web browser such as Microsoft™ Internet Explorer™ software, version 5.0 or later.

   The computer can access option module web pages if it is connected to:
   - The same network as the drive/option module.
   - A network with access to the network of the drive/option module via a gateway device (for example, a router).

2. In the Address box, type the IP address of the option module.

3. Press Enter.

   The option module, Adapter mode home page (Figure 43) appears.

IMPORTANT   From the browser view menu, choose Refresh to redisplay the option module home page while viewing any of the other web pages for the module.

Figure 43 - Example of the Adapter Mode Home Page
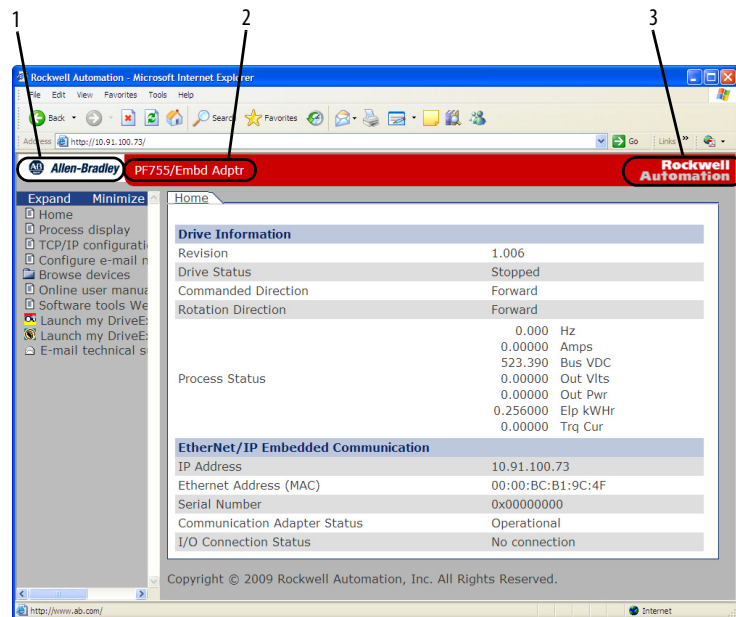
Title Bar on Adapter Mode Web Pages

The title bar appears on the Adapter mode home page and all other Adapter mode web pages. The title bar consists of three elements as shown in Figure 43.

Title Bar Element	Description
1 Allen-Bradley logo	This logo is a hyperlink. Click it to view the ab.com web Home Page.
2 Option Module Title	Shows the option module type or user-configured title.
3 Rockwell Automation logo	This logo is a hyperlink. Click it to view the Rockwell Automation web Home Page.

Navigation Pane on Adapter Mode Web Pages

The navigation pane appears on the left side of the home page of the option Adapter mode and all other Adapter mode pages of the module. The navigation pane consists of links and link folders, which can be expanded or minimized. The following table shows all navigation pane links and link folders.

Navigation Pane Link/Folder	Description
Home link	Click this link to view the Adapter mode home page (Figure 43) of the module.
Process display link	Click this link to view the host drive Process Display pop-up dialog box (Figure 44).
TCP/IP configuration link	Click this link to view the module TCP/IP Configuration page that shows information about the TCP/IP configuration. Such as the module IP address and the number of packets being sent. Figure 45 shows an example TCP/IP Configuration page.
Configure email notification link	Click this link to view the Configure Email Notification web page (Figure 46) of the module to configure the option module to send automatic email messages. An example email message is shown in Figure 48.
Browse DPI devices folder	Click this folder to expand and view the Port folders for all present devices, including the drive, option module, and other devices connected to the drive such as a HIM.
Port x folders	Click a respective Port folder to expand and view the various links of the device, which take you to related information pages. For Port 0 (PowerFlex 750-Series drive) example information pages, see Figure 49, Figure 50, and Figure 51.
Online user manuals link	Click this link to view the Rockwell Automation web page with documentation for drives and other devices.
Software tools website link	Click this link to view the Allen-Bradley web page with information about software tools such as DriveExplorer and DriveExecutive.
Launch my DriveExplorer software link	Click this link to launch the DriveExplorer™ software that is already installed on your computer.
Launch my DriveExecutive software link	Click this link to launch the DriveExecutive™ software that is already installed on your computer.
Email technical support link	Click this link to view a new email message dialog box to send a message to the Allen-Bradley Technical Support Team.

Information on Adapter Mode Home Page

The Adapter mode home page of the option module, displays the following information for the host PowerFlex 750-Series drive and its EtherNet/IP option module.

Device	Information
Adapter - EtherNet/IP *ENETR (Option Module)	• Revision • IP Address • Ethernet Address (MAC) • Serial Number • Status • I/O Connection Status • Ethernet Link
Host PowerFlex® 750 Series Drive	• Revision • Status • Commanded Direction • Rotation Direction • Process Status

Adapter Mode Process Display Pop-up Dialog Box

The Adapter mode Process Display pop-up dialog box dynamically shows the host drive information. To view this dialog box, click the 'Process display' link in the navigation pane.

Figure 44 - Example of Adapter Mode Process Display Pop-up Dialog Box
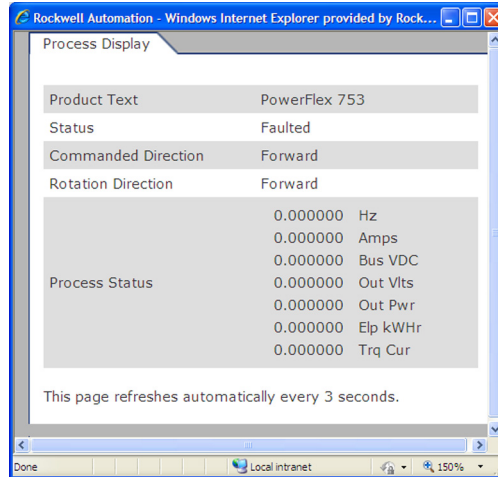
Information	Description
Product Text	Description of host drive.
Status	Status of host drive.
Commanded Direction	Commanded direction of host drive.
Rotation Direction	Rotation direction of host drive.
Process Status First Line	Dynamic value of the host drive feedback parameter. This parameter is not selectable.
Lines 2...7	Dynamic value of each default-displayed host drive parameter. The displayed drive parameters for lines 2...7 are selectable by using a HIM, or another drive configuration tool such as Connected Components Workbench, DriveExecutive™, or DriveExplorer™ software.

Adapter Mode TCP/IP Configuration Web Page

The Adapter mode TCP/IP Configuration web page provides information about the option module Ethernet settings and network activities. To view this web page, click the 'TCP/IP configuration' link (highlighted in <u>Figure 45</u>) in the navigation pane.

Figure 45 - Example of Adapter Mode TCP/IP Configuration Web Page
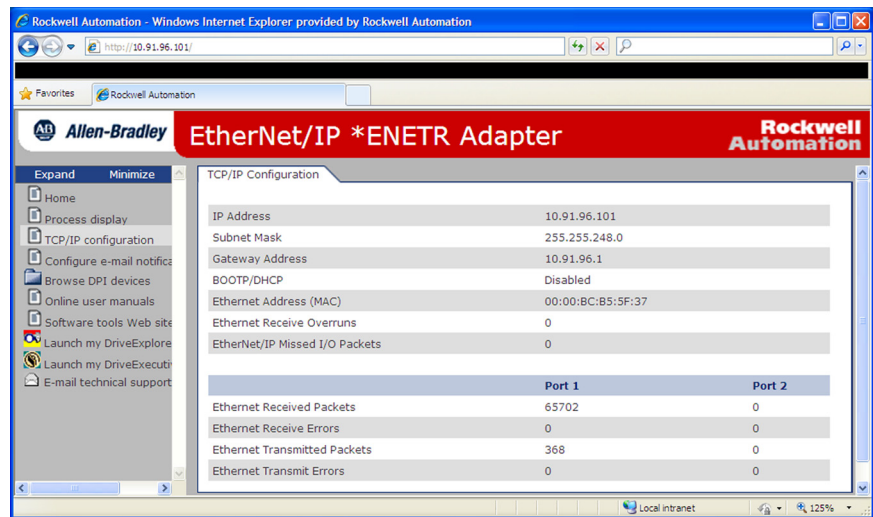
Information	Description
IP Address	IP address of the option module.
Subnet Mask	Subnet mask for the option module network.
Gateway Address	Address for the gateway device on the option module network.
BOOTP/DHCP	Shows status for BOOTP/DHCP, which can be used to configure the option module network information.
Ethernet Address (MAC)	Hardware address for the option module.
Ethernet Receive Overruns	Number of packets that the option module has received in excess.
Ethernet Received Packets	Number of packets that the option module has received.
EtherNet/IP Missed I/O Packets	Number of I/O connection packets that the option module did not receive.
Ethernet Receive Errors	Number of receive hardware errors that are reported.
Ethernet Transmitted Packets	Number of packets that the option module has sent.
Ethernet Transmit Errors	Number of transmit hardware errors reported.

Adapter Mode Configure Email Notification Web Page

The Adapter mode Configure email Notification page contains selections and data fields. These fields are used to configure the option module to send email messages automatically to the desired addresses when selected types of events occur. To view this web page, click the 'Configure email' link (highlighted in Figure 46) in the navigation pane.

Figure 46 - Example of Adapter Mode Configure Email Notification Web Page
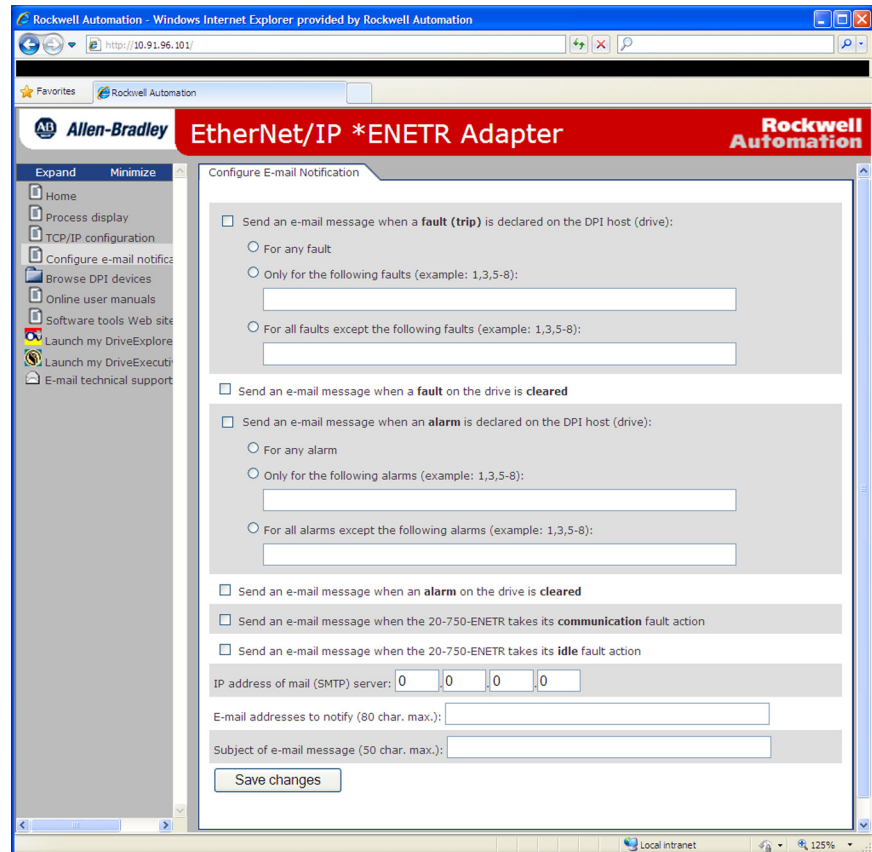
By default, settings are not protected. After configuration, settings can be protected by using *Device* **Parameter 27 - [Web Features]** to set Email Cfg Bit 0 value to '0' (Disabled). To change a protected configuration, it must first be unprotected by setting the Email Cfg Bit 0 value back to '1' (Enabled).

To configure email notification, perform the following steps.

1. Click the Send an email when a fault (trip) is declared on the DPI™ Host (Drive).

2. Click the desired radio button that corresponds to what you want to occur and that sends email notification.
   - For Any Alarm. Click the radio button.
   - Only for the following alarms. Enter the fault or alarm numbers.
   - For all alarms except the following. Enter the fault or alarm numbers.

3. Click the Send an email when a fault on the drive is cleared.
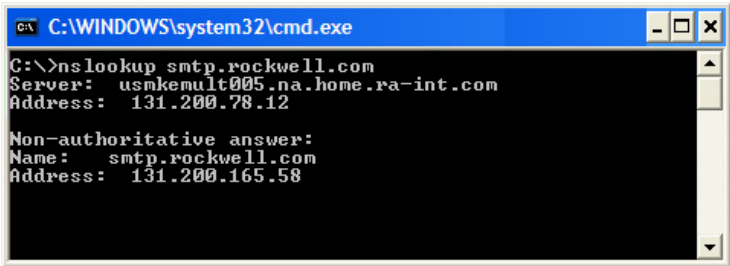
4. Click the desired radio button that corresponds to what you want to occur and that sends email notification.

- For Any Alarm. Click the radio button.
- Only for the following alarms. Enter the fault or alarm numbers.
- For all alarms except the following. Enter the fault or alarm numbers.

5. For all alarms except the following. Enter the fault or alarm numbers.

6. Click the communication fault and/or idle fault checkbox if you want email notification when these faults occur.

7. Type the following information in their respective boxes.

Information Field	Description
'IP address of…'	Type in the address of the mail server that is used to deliver the email messages. (When the IP address is unknown, read the TIP shown below this table to determine the mail server address.)
'Email addresses to notify…'	Type in addresses to where you want email messages to be sent. Multiple addresses can be used, separate them by commas (comma delimited).
'Subject of email message…'	Type in the desired subject text for the email message.

> **TIP** If the IP address of the email server is unknown, you can contact your IT department or use the following DOS command instructions to find its IP address.
>
> a. From the Start menu on the Windows task bar, choose Run to display the Run dialog box.
>
> b. In the Run dialog box Open field, type 'cmd'.
>
> c. Click OK to display the DOS dialog box.
>
> d. On the c:\ > command line, type 'nslookup [name of email server]'.
>
> The entry 'c:\ > nslookup smtp.company.com' is an example.
>
> e. Press Enter to display the email server IP address (Figure 47).
>
> f. Type the second (bottom) IP address shown in the DOS dialog box (for this example, 131.200.165.58) into the Email Notification web page (Figure 46).

Figure 47 - DOS Dialog Box Example Showing Email Server IP Address

8. Click Save Changes.

> **IMPORTANT**   After configuring Email Notification, protecting the settings is recommended. Otherwise the configuration can be changed anytime the web page is accessed with a browser. To protect the settings, use *Device* **Parameter 27 - [Web Features]** to set Email Cfg Bit 0 value to '0' (Disabled).

Figure 48 shows an example of an option module email message that is automatically sent in response to selected events.

Figure 48 - Example of Email Message Sent by the Option Module
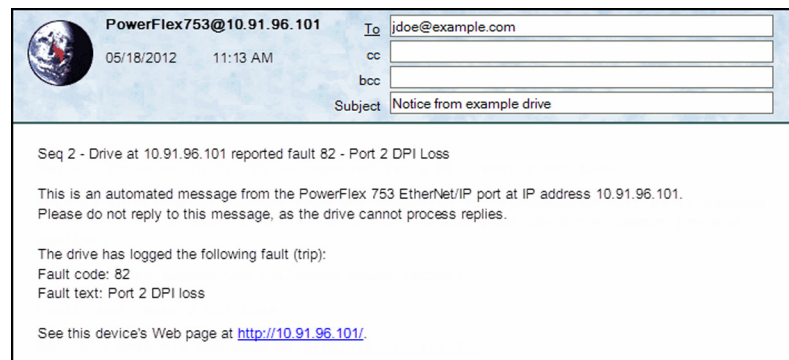
> **TIP**   To stop email messages, uncheck all 'Send an email message when...' boxes.
>
> When disabling the option module web pages by setting *Device* **Parameter 26 - [Web Enable]** to '0' (Disabled) it does **not stop** the option module from sending email messages.

Adapter Mode Device-information Pages

Adapter mode device-information pages are viewed by clicking the respective links in the navigation pane:

Adapter Mode Web Page	Description
Module Information	Shows module information for the respective drive Port device. For example, Figure 49 shows module information for the Port 0 device (host drive).
Diagnostics	Shows diagnostic item information for the respective drive Port device. For example, Figure 50 shows diagnostic items for the Port 0 device (host drive).
Fault Queue	Shows fault queue information for the respective drive Port device. For example, Figure 51 shows the fault queue for the Port 0 device (host drive).
Alarm Queue	Shows alarm queue information for the respective drive Port device. For example, Figure 52 shows the alarm queue for the Port 0 device (host drive).
Event Queue [1]	Shows event queue information for the respective drive Port device. For example, Figure 53 shows the event queue for the Port 4 device (EtherNet/IP option module).

(1)   Information that is shown only when supported by the device.

Figure 49 - Example of Adapter Mode Port 0 (PowerFlex 750-Series Drive) Module Information Page
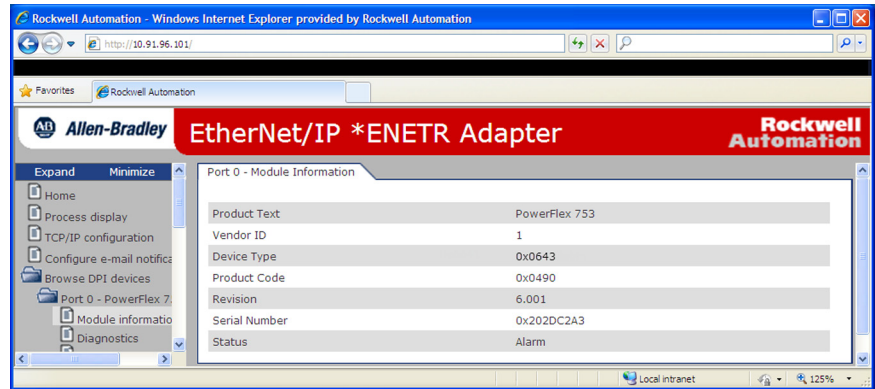
Information	Description
Product Text	Text that identifies the device
Vendor ID	1 = Allen-Bradley
Device Type	0x0643 = PowerFlex 753 drive
Product Code	Code for the product name and its rating
Revision	Firmware revision used by the device
Serial Number	Serial number of the device
Status	Operating status of the device (for example, Alarm)

Figure 50 - Example of Adapter Mode Port 0 (PowerFlex 750-Series Drive) Diagnostic Items Page
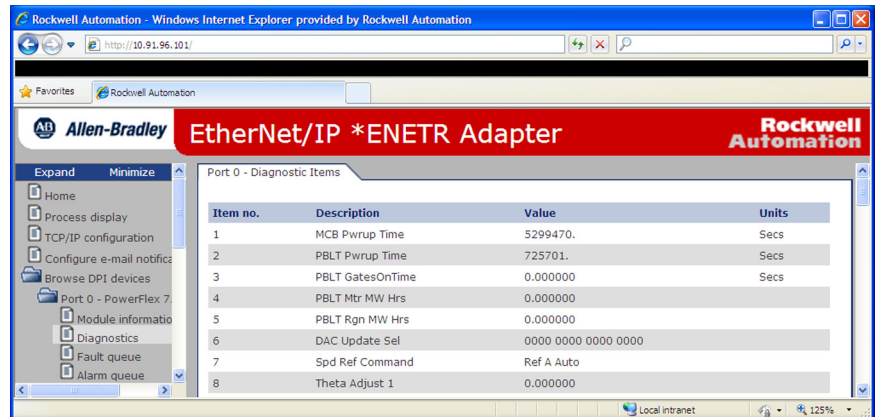
Figure 51 - Example of Adapter Mode Port 0 (PowerFlex 750-Series Drive) Fault Queue Page
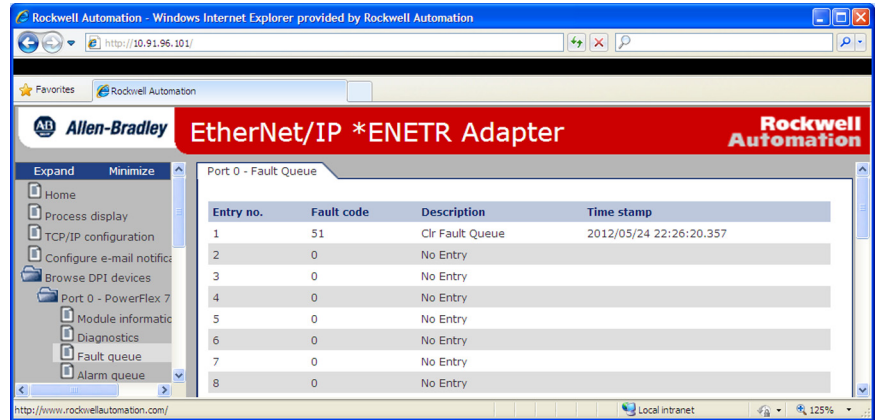
Figure 52 - Example of Adapter Mode Port 0 (PowerFlex 750-Series Drive) Alarm Queue Page
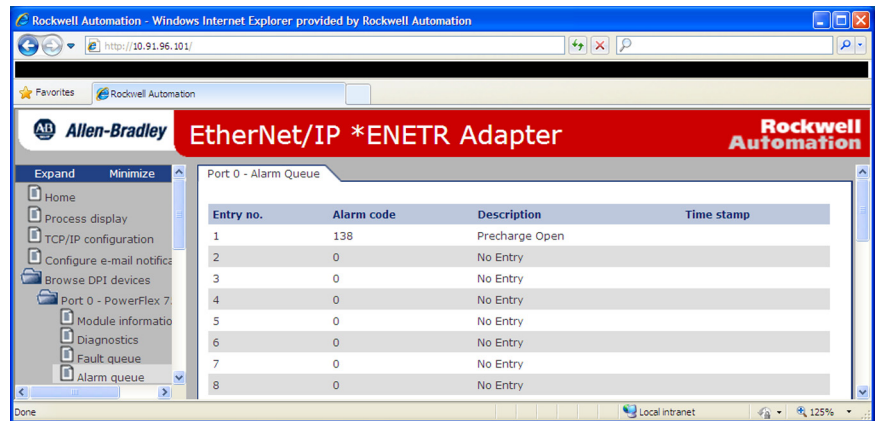
Figure 53 shows an example event queue page for the Port 4 device (EtherNet/IP option module).

Figure 53 - Example of Adapter Mode Port 4 (20-750-ENETR Option Module) Event Queue Page
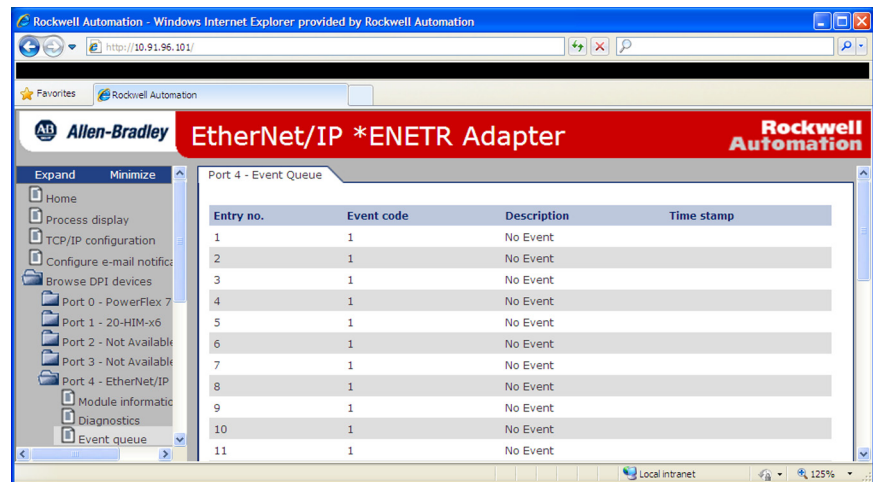
View Web Pages in Tap Mode

In Tap mode, the option module has a set of web pages that differ from what is shown in Adapter mode.

1. On a computer with access to the EtherNet/IP network on which the drive/option module is installed, launch a web browser such as Microsoft™ Internet Explorer software, version 5.0 or later.

   The computer can access option module web pages when it is connected to any of the following.
   - The same network as the drive/option module.
   - A network with access to the drive/option module network via a gateway device (for example, a router).

2. In the Address box, type the IP address of the option module.

3. Press Enter.

   The option module Tap mode web Home Page (Figure 54) appears.

IMPORTANT	From the browser View menu, choose Refresh to redisplay the option module Home Page, while viewing any of the other web pages of the module.

Figure 54 - Example of the Tap Mode Web Home Page
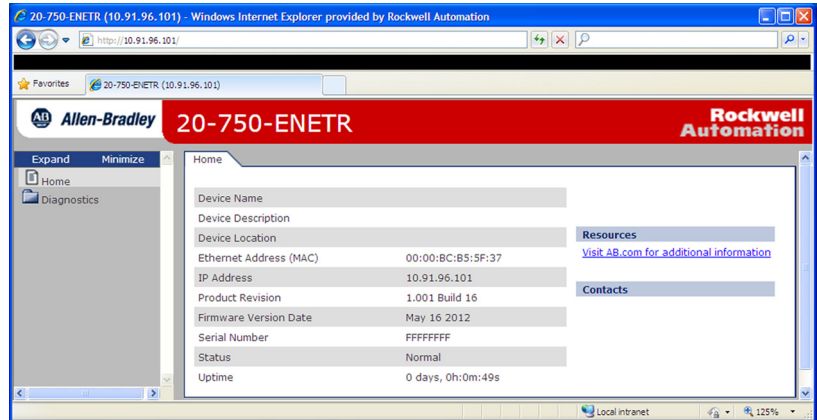
4. In the navigation pane, click Diagnostics to display links to the following web pages that contain the listed information.

Web Pages – Tap Mode	Information
Diagnostic Overview	• Module resource utilization • Web server read and write hits • Module settings • Ring status • Network management features
Network Settings	• Network interface details, such as IP address and subnet mask • Ethernet interface configuration method • Ethernet port details
Ethernet Statistics	• Ethernet counters • Ethernet port details • Error information
Ring Statistics	Ring supervisor, configuration, and fault details

Specifications

This appendix presents the specifications for the option module.

Topic	Page
Communication	163
Electrical	164
Mechanical	164
Environmental	164
Regulatory Compliance	164

Communication

This section contains communication specifications for the option module Adapter and Tap modes of operation.

When Operating in Adapter Mode

Network
    Protocol
    Data Rates
	EtherNet/IP
	10 Mbps Full-duplex, 10 Mbps Half-duplex, 100 Mbps Full-duplex, or 100 Mbps Half-duplex

Connection Limits	30 TCP connections 16 simultaneous Explicit Messaging connections plus one exclusive owner I/O connection The following activities use a CIP connection: • Class I I/O connections (for example, from a ControlLogix® controller) • Explicit Messaging, where 'connected' is chosen (for example, in a checkbox in RSLogix 5000® software) • DriveExecutive™ connections to the drive The following activities **do not** use a CIP connection: • Explicit messaging-based control that uses PCCC or the Register or Assembly Objects • Explicit Messaging, where 'connected' is **not** chosen, which is typically the default • DriveExplorer™ connections to the drive
Requested Packet Interval (RPI)	2 ms minimum
Packet Rate	Up to 1000 total I/O packets per second (500 in and 500 out)

Drive
    Protocol
    Data Rates
	DPI
	500 Kbps

When Operating in Tap Mode

Network
    Protocol
    Data Rates
	EtherNet/IP
	10 Mbps Full-duplex, 10 Mbps Half-duplex, 100 Mbps Full-duplex, or 100 Mbps Half Duple

Connection Limits	30 TCP connections 16 simultaneous Explicit Messaging connections The following activity uses a CIP connection: • Explicit Messaging, where 'connected' is chosen (for example, in a checkbox in RSLogix 5000® software) The following activity **does not** use a CIP connection: • Explicit Messaging, where 'connected' is **not** chosen, which is typically the default

Drive
    Protocol
    Data Rates
	DPI
	500 Kbps

Electrical

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

Mechanical

Dimensions
    Height
    Length
    Width
	68 mm (2.7 inches)
	150 mm (5.9 inches)
	26 mm (1.0 inches)

Weight	62 grams (2.1 ounces)

Environmental

Temperature
    Operating
    Storage
	-10…+50 °C (14…122 °F)
	-40…+85 °C (-40…+185 °F)

Relative Humidity	5…95% noncondensing
Atmosphere	**Important:** The option module **must not** be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors, or dust. If the option module is not going to be installed for a time, it must be stored in an area where it is not exposed to a corrosive atmosphere.

Regulatory Compliance

Certification	Specification
UL	UL508C
cUL	CAN / CSA C22.2 No. 14-2010
CE	EN 61800-3
CTick	EN 61800-3

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

Option Module Parameters

This appendix provides information about the option module parameters.

Topic	Page
Parameter Types	165
How Parameters Are Organized	166
Parameters for Adapter Mode Operation	166
Parameters for Tap Mode Operation	180

Parameter Types

The option module has two types of parameters:

- *Device* parameters are used to configure the option module to operate on the network.

> **IMPORTANT** Some *Device* parameters are not applicable when operating the option module in Adapter mode while others are not applicable in Tap mode. Therefore, these non-applicable parameters are labeled 'Reserved' in the Adapter Mode Operation and Tap Mode Operation parameter tables in this appendix.

> **IMPORTANT** When operating the option module in Tap mode, *Host* parameters are NOT supported.

- *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

1. Use the ④◀ or ▶⑥ key to scroll to the drive port in which the module resides.

2. 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

1. Click the tab for the option module at the bottom of the window.

2. Click the Parameters icon in the tool bar, and click the *Device* or *Host* Parameters tab.

- DriveExplorer software

1. Find the option module in the treeview.

2. Open its Parameters folder.

- DriveExecutive software

1. Find the option module in the treeview.

2. Expand the module in the tree, and open its Parameters folder.

How Parameters Are Organized

The *Device* parameters and *Host* parameters are separately displayed in a **Numbered List** view order. Each parameter set is independently and consecutively numbered.

Parameters for Adapter Mode Operation

This section contains lists of *Device* parameters and *Host* parameters available when the option module is operated in Adapter mode.

Device Parameters—Adapter Mode

Table 16 - Parameter

Number	Name and Description	Details	
01	**[Operating Mode]** Displays the option module operating mode set with the Operating Mode Jumper J4 ([Figure 1 on page 23](#)).	Values: Type:	0 = Adapter 1 = Tap Read Only
02	**[Port Number]** Displays the drive port into which the option module is installed. Typically, Port 4, 5 or 6.	Minimum: Maximum: Type:	4 6 Read Only
03	**[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
04	**[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
05	**[Net Addr Sel]** Selects the source of the node address for the option module when the Node Address switches ([Figure 2 on page 25](#)) are not being used. That is, it switches set to any value other than 001…254 or 888).	Default: Values: Type: Reset Required:	3 = DHCP 1 = Parameters 2 = BOOTP 3 = DHCP Read/Write Yes

Table 16 - Parameter (continued)
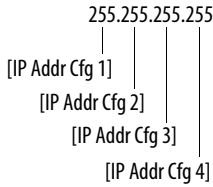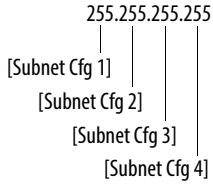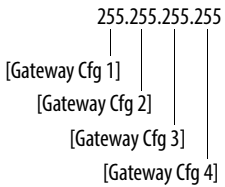
Number	Name and Description	Details	
06	**[Net Addr Src]** Displays the source of the node address for the option module.	Values: Type:	0 = Switches 1 = Parameters 2 = BOOTP 3 = DHCP Read Only

07
08
09
10
	[IP Addr Cfg 1]
	[IP Addr Cfg 2]
	[IP Addr Cfg 3]
	[IP Addr Cfg 4]
	Sets the IP address bytes for the network address of the option module'. Occurs when *Device* **Parameter 05 - [Net Addr Sel]**, is set to '1' (Parameters) and the Node Address switches (Figure 2 on page 25) are not being used. That is, switches are set to any value other than 001…254 or 888).
	
	255.255.255.255
	
	[IP Addr Cfg 1]
	   [IP Addr Cfg 2]
	      [IP Addr Cfg 3]
	         [IP Addr Cfg 4]
		Default:
		Default:
		Default:
		Default:
		Minimum:
		Maximum:
		Type:
		Reset Required:
			0
			0
			0
			0
			0
			255
			Read/Write
			Yes

11
12
13
14
	[Subnet Cfg 1]
	[Subnet Cfg 2]
	[Subnet Cfg 3]
	[Subnet Cfg 4]
	Sets the subnet mask bytes for the network address of the option module. Occurs when the *Device* **Parameter 05 - [Net Addr Sel]**, is set to '1' (Parameters) and the Node Address switches (Figure 2 on page 25) are not being used. That is, switches are set to any value other than 001…254 or 888).
	
	255.255.255.255
	
	[Subnet Cfg 1]
	   [Subnet Cfg 2]
	      [Subnet Cfg 3]
	         [Subnet Cfg 4]
		Default:
		Default:
		Default:
		Default:
		Minimum:
		Maximum:
		Type:
		Reset Required:
			0
			0
			0
			0
			0
			255
			Read/Write
			Yes

15
16
17
18
	[Gateway Cfg 1]
	[Gateway Cfg 2]
	[Gateway Cfg 3]
	[Gateway Cfg 4]
	Sets the gateway address bytes for the network address of the option module. Occurs when the *Device* **Parameter 05 - [Net Addr Sel],** is set to '1' (Parameters) and the Node Address switches (Figure 2 on page 25) are not being used. That is, switches are set to any value other than 001…254 or 888).
	
	255.255.255.255
	
	[Gateway Cfg 1]
	   [Gateway Cfg 2]
	      [Gateway Cfg 3]
	         [Gateway Cfg 4]
		Default:
		Default:
		Default:
		Default:
		Minimum:
		Maximum:
		Type:
		Reset Required:
			0
			0
			0
			0
			0
			255
			Read/Write
			Yes

Table 16 - Parameter (continued)

Number	Name and Description	Details	
19	**[Net Rate Cfg 1]** Sets the speed and duplex network data rate at which the option module communicates on its ENET1 network port. Updates *Device* **Parameter 20 - [Net Rate Act 1]** after a reset.	Default: Values: Type: Reset Required:	0 = Autodetect 0 = Autodetect 1 = 10 Mbps Full 2 = 10 Mbps Half 3 = 100 Mbps Full 4 = 100 Mbps Half 5 = Disabled Read/Write Yes
20	**[Net Rate Act 1]** Displays the actual speed and duplex network data rate for the ENET1 network port of the option module.	Values: Type:	0 = No Link 1 = 10 Mbps Full 2 = 10 Mbps Half 3 = 100 Mbps Full 4 = 100 Mbps Half 5 = Dup IP Addr Read Only
21	**[Net Rate Cfg 2]** Sets the speed and duplex network data rate at which the option module communicates on its ENET2 network port. Updates *Device* **Parameter 22 - [Net Rate Act 2]** after a reset.	Default: Values: Type: Reset Required:	0 = Autodetect 0 = Autodetect 1 = 10 Mbps Full 2 = 10 Mbps Half 3 = 100 Mbps Full 4 = 100 Mbps Half 5 = Disabled Read/Write Yes
22	**[Net Rate Act 2]** Displays the actual speed and duplex network data rate for the ENET2 network port of the option module.	Values: Type:	0 = No Link 1 = 10 Mbps Full 2 = 10 Mbps Half 3 = 100 Mbps Full 4 = 100 Mbps Half 5 = Dup IP Addr Read Only
23	**Reserved**		
24	**Reserved**		
25	**[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 default configuration 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 can detect a conflict. If conflict occurs, the drive does not allow a Set Defaults action. You must resolve the conflict before attempting a Set Defaults action for the option module.	Default: Values: Type: Reset Required:	0 = Ready 0 = Ready 1 = Reset Module 2 = Set Defaults Read/Write No

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

Number	Name and Description	Details	
26	**[Web Enable]** Enables/disables the web pages of the option module.	Default: Values: Type: Reset Required:	0 = Disabled 0 = Disabled 1 = Enabled Read/Write No

Table 16 - Parameter (continued)

Number	Name and Description	Details
27	**[Web Features]** Enables/disables the web-configurable email notification feature.	Default: xxxx xxx1 Bit Values: 0 = Disabled 1 = Enabled Type: Read/Write Reset Required: No Bit Definition table: <table><tr><td>Bit Definition</td><td>Not Used</td><td>Not Used</td><td>Not Used</td><td>Not Used</td><td>Not Used</td><td>Not Used</td><td>Not Used</td><td>Email Cfg</td></tr><tr><td>Default</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>X</td><td>1</td></tr><tr><td>Bit</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr></table>
28	**[DLs Fr Peer Cfg]** Sets the number of peer-to-drive Datalinks (parameters) that are used for peer I/O. The Datalinks being used are allocated from the end of the list. For example, if the value of this parameter is set to '3', Datalinks 14…16 are allocated for the three selected Datalinks. The Datalinks that are allocated for peer I/O cannot overlap with other assigned DL From Net 01…16 parameters.	Default: 0 Minimum: 0 Maximum: 16 Type: Read/Write Reset Required: No

NOTE: The option module allows the peer input configuration parameters to be written while peer inputs are running. However, the changes do not take effect until peer inputs are disabled and then re-enabled, or until power to the option module is cycled or reset.

Number	Name and Description	Details
29	**[DLs Fr Peer Act]** Displays the value of *Device* **Parameter 28 - [DLs Fr Peer Cfg]** at the time the option module was reset. The value is the number of actual peer-to-drive Datalinks that the option module is expecting.	Minimum: 0 Maximum: 16 Type: Read Only
30	**[Logic Src Cfg]** Controls, which of the peer-to-drive Datalinks contain the Logic Command for the drive. The value zero specifies that none of the Datalinks contain the Logic Command of the drive. Non-zero values specify the 'index' for the Datalink that contains the Logic Command of the drive. For example, if: • **Parameter 28 - [DLs Fr Peer Cfg]** has the value 3 specifying that Datalinks 14…16 are allocated for peer I/O. And, • **Parameter 30 - [Logic Src Cfg]** has the value 1 specifying that the first peer I/O Datalink contains the Logic Command of the drive. Then Datalink 14 contains the Logic Command of the drive.	Default: 0 Minimum: 0 Maximum: 16 Type: Read/Write Reset Required: No

NOTE: The option module allows the peer input configuration parameters to be written while peer inputs are running. However, the changes do not take effect until peer inputs are disabled and then re-enabled, or until power to the option module is cycled or reset.

Number	Name and Description	Details

31	**[Ref Src Cfg]**
	Controls, which of the peer-to-drive Datalinks contain the Reference for the drive. The value zero specifies that none of the Datalinks contain the Reference for the drive. Non-zero values specify the 'index' for the Datalink that contains the Reference of the drive. For example, if:
	• **Parameter 28 - [DLs Fr Peer Cfg]** has the value 3 specifying that Datalinks 14…16 are allocated for peer I/O.
	   And,
	   Parameter 31 - [Ref Src Cfg] has the value 1 specifying that the first peer I/O Datalink contains Reference of the drive.
	Then Datalink 14 contains the Reference of the drive.
		Default: 0
		Minimum: 0
		Maximum: 16
		Type: Read/Write
		Reset Required: No

Table 16 - Parameter (continued)

Number	Name and Description	Details	
	NOTE: The option module allows the peer input configuration parameters to be written while peer inputs are running. However, the changes do not take effect until peer inputs are disabled and then re-enabled, or until power to the option module is cycled or reset.		
32	**[Fr Peer Timeout]** Sets the timeout for a peer I/O connection. If the time is reached without the option module having received (consumed) a message, the option module responds with the action specified in *Host* **Parameter 35 - [Peer Flt Action]**. In an option module having received (consumed) peer I/O, the value of this parameter must be: • Greater than the product of the value of *Device* **Parameter 41 - [To Peer Period]** in the option module that transmits (produces) peer I/O. Then, • Multiplied by the value of *Device* **Parameter 42 - [To Peer Skip]** in the option module that transmits (produces) peer I/O.	Default: Minimum: Maximum: Type: Reset Required:	10.00 Seconds 0.01 Seconds 10.00 Seconds Read/Write No
	NOTE: The option module allows the peer input configuration parameters to be written while peer inputs are running. However, the change does not take effect until peer inputs are disabled and then re-enabled, or until power to the option module is cycled or reset.		
33 34 35 36	**[Fr Peer Addr 1]** **[Fr Peer Addr 2]** **[Fr Peer Addr 3]** **[Fr Peer Addr 4]** Sets the IP address bytes that specify the device from which the option module receives (consumes) peer I/O data. 255.255.255.255 [Fr Peer Addr 1] [Fr Peer Addr 2] [Fr Peer Addr 3] [Fr Peer Addr 4] **Important:** The Fr Peer Addr must be on the same subnet as the option module. See IP Addresses on page 226 for more information.	Default: Default: Default: Default: Minimum: Maximum: Type: Reset Required:	0 0 0 0 0 255 Read/Write No
	NOTE: The option module allows the peer input configuration parameters to be written while peer inputs are running. However, the changes do not take effect until peer inputs are disabled and then re-enabled, oruntil power to the option module is cycled or reset.		
37	**[Fr Peer Enable]** Controls whether peer I/O input is operating. A value of '0' (Off) turns off peer I/O input. A value of '1' (Cmd/Ref) overrides the settings in *Device* **Parameters 28 - [DLs Fr Peer Cfg], 30 - [Logic Src Cfg],** and **31 - [Ref Src Cfg]**. And automatically uses peer Datalink 01 as the present Logic Command and peer Datalink 02 as the Reference for the drive. A value of '2' (Custom) enables peer I/O input by using the provided Datalink count and settings. If the value of this parameter is changed while peer I/O is running, the drive is commanded to do its Peer Fault Action before the peer input mode is changed. This action is applicable if there is a change from '1' (Cmd/Ref) to '2' (Custom). Or from '2' (Custom) to '1' (Cmd/Ref).	Default: Values: Type: Reset Required:	0 = Off 0 = Off 1 = Cmd/Ref 2 = Custom Read/Write No

Table 16 - Parameter (continued)

Number	Name and Description	Details	
38	**[Fr Peer Status]** Displays the status of the consumed peer I/O input connection.	Values: Type:	0 = Off 1 = Waiting 2 = Running 3 = Faulted Read Only
39	**[DLs To Peer Cfg]** Sets the number of drive-to-peer Datalinks (parameters) that are used for peer I/O. The Datalinks being used are allocated from the end of the list. For example, if the value of this parameter is set to '3', Datalinks 14…16 are allocated for the three selected Datalinks. The allocated Datalinks cannot overlap with other assigned DL To Net 01…16 parameters.	Default: Minimum: Maximum: Type: Reset Required:	0 0 16 Read/Write Yes
NOTE: The option module allows the peer output configuration parameters to be written while peer outputs are running. However, the changes do not take effect until peer outputs are disabled and then re-enabled, or until power to the option module is cycled or reset.			
40	**[DLs To Peer Act]** Displays the value of *Device* **Parameter 39 - [DLs To Peer Cfg]** at the time the option module was reset. The value is the number of actual drive-to-peer Datalinks that the option module is expecting.	Minimum: Maximum: Type:	0 16 Read Only
41	**[To Peer Period]** Sets the minimum time that the option module waits when transmitting data to a peer.	Default: Minimum: Maximum: Type: Reset Required:	10.00 Seconds 0.01 Seconds 10.00 Seconds Read/Write No
NOTE: The option module allows the peer output configuration parameters to be written while peer outputs are running. However, the changes do not take effect until peer outputs are disabled and then re-enabled, or until power to the option module is cycled or reset.			
42	**[To Peer Skip]** Sets the maximum time that the option module waits when transmitting data to a peer. The value of *Device* **Parameter 41 - [To Peer Period]** is multiplied by the value of this parameter to set the time.	Default: Minimum: Maximum: Type: Reset Required:	1 1 16 Read/Write No
NOTE: The option module allows the peer output configuration parameters to be written while peer outputs are running. However, the changes do not take effect until peer outputs are disabled and then re-enabled, or until power to the option module is cycled or reset.			
43	**[To Peer Enable]** Controls whether peer I/O output is operating. A value of '0' (Off) or '1' (Reserved) turns off peer I/O output. A value of '2' (Custom) enables peer I/O output that is using the Datalink count and provided settings.	Default: Values: Type: Reset Required:	0 = Off 0 = Off 1 = Reserved 2 = Custom Read/Write No

Host Parameters—Adapter Mode

Parameter		
Number	**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 connect. Each selected port/parameter is written with data received from the network. The controller writes these parameters (outputs from the controller).	Minimum: 0 Maximum: 159999 Type: Read/Write Reset Required: No
	If setting the value manually, the parameter value = (10000 * port number) + (destination parameter number). For example, suppose that you want to use *Host* **Parameter 01 - [DL From Net 01]** to write to Parameter 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].	
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]**	Default: 0
	Sets the port number and parameter number to which the selected Datalinks connect. Each selected port/parameter is read and their values transmitted over the network to the controller. The controller reads these parameters (inputs to the controller).	Minimum: 0 Maximum: 159999 Type: Read/Write Reset Required: No
	If setting the value manually, the parameter value = (10000 * port number) + (origination parameter number). For example, suppose that you want to use *Host* **Parameter 17 - [DL To Net 01]** to read Parameter 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].	

Parameter		
Number	**Name and Description**	**Details**

33	**[Comm Flt Action]**
	Sets the action that the option module and drive takes if the option module detects that I/O communication has been disrupted. This setting is effective only if I/O that controls the drive is transmitted through the option module. When communication is re-established, the drive automatically receives commands over the network again.
		Default: 0 = Fault
		Values: 0 = Fault
		                 1 = Stop
		                 2 = Zero Data
		                 3 = Hold Last
		                 4 = Send Flt Cfg
		Type: Read/Write
		Reset Required: No

> ⚠️ **ATTENTION:** Risk of injury or equipment damage exists. *Host* **Parameter 33 - [Comm Flt Action]** lets you determine the action of the option module and connected drive if I/O communication is disrupted. By default, this parameter faults the drive. Before configuring this parameter, so that the drive continues to run, 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		
Number	**Name and Description**	**Details**

34	**[Idle Flt Action]**
	Sets the action that the option module and drive takes if the option module detects that the controller is in program mode or faulted. This setting is effective only if I/O that controls the drive is transmitted through the option module. When the controller is put back in Run mode, the drive automatically receives commands over the network again.
		Default: 0 = Fault
		Values: 0 = Fault
		                 1 = Stop
		                 2 = Zero Data
		                 3 = Hold Last
		                 4 = Send Flt Cfg
		Type: Read/Write
		Reset Required: No

> ⚠️ **ATTENTION:** Risk of injury or equipment damage exists. *Host* **Parameter 34 - [Idle Flt Action]** lets you determine the action of the option module and connected drive when the controller is idle. By default, this parameter faults the drive. Before configuring this parameter, so that the drive continues to run, 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).

Parameter		
Number	**Name and Description**	**Details**
35	**[Peer Flt Action]** Sets the action that the option module and drive takes if the option module detects that peer I/O communication has been disrupted. This setting is effective only if I/O is transmitted through the option module. When peer I/O communication is re-established, the drive automatically receives commands over the network again.	Default: 0 = Fault Values: 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Type: Read/Write Reset Required: No

ATTENTION: Risk of injury or equipment damage exists. *Host* **Parameter 35 - [Peer Flt Action]** lets you determine the action of the option module and connected drive if the option module is unable to communicate with the designated peer. By default, this parameter faults the drive. Before configuring this parameter, so that the drive continues to run, 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).

36	**[Msg Flt Action]** Sets the action that the option module and drive takes if the option module detects that Explicit Messaging has been disrupted. Only valid when used for drive control via the PCCC, CIP Assembly, or CIP Register objects. 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. Before configuring this parameter, so that the drive continues to run, 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 35 - [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is disrupted. • *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 Minimum: 0000 0000 0000 0000 Maximum: 1111 1111 1111 1111 Type: Read/Write Reset Required: No

Parameter		
Number	**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 35 - [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is disrupted. • *Host* **Parameter 36 - [Msg Flt Action]** is set to '4' (Send Flt Cfg) and Explicit Messaging for drive control is disrupted.	Default: 0 Minimum: -3.40282×10^{38} Maximum: 3.40282×10^{38} Type: Read/Write Reset Required: No
39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54	**[Flt Cfg DL 01]** **[Flt Cfg DL 02]** **[Flt Cfg DL 03]** **[Flt Cfg DL 04]** **[Flt Cfg DL 05]** **[Flt Cfg DL 06]** **[Flt Cfg DL 07]** **[Flt Cfg DL 08]** **[Flt Cfg DL 09]** **[Flt Cfg DL 10]** **[Flt Cfg DL 11]** **[Flt Cfg DL 12]** **[Flt Cfg DL 13]** **[Flt Cfg DL 14]** **[Flt Cfg DL 15]** **[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 35 - [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is disrupted. • *Host* **Parameter 36 - [Msg Flt Action]** is set to '4' (Send Flt Cfg) and Explicit Messaging for drive control is disrupted.	Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No

Parameter		
Number	**Name and Description**	**Details**
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16	**[DL From Net 01]** **[DL From Net 02]** **[DL From Net 03]** **[DL From Net 04]** **[DL From Net 05]** **[DL From Net 06]** **[DL From Net 07]** **[DL From Net 08]** **[DL From Net 09]** **[DL From Net 10]** **[DL From Net 11]** **[DL From Net 12]** **[DL From Net 13]** **[DL From Net 14]** **[DL From Net 15]** **[DL From Net 16]** Sets the port number and parameter number to which the selected Datalinks connect. Each selected port/parameter is written with data received from the network. The controller writes these parameters (outputs from the controller). If setting the value manually, the parameter value = (10000 * port number) + (destination parameter number). For example, suppose that you want to use *Host* **Parameter 01 - [DL From Net 01]** to write to Parameter 01 of an optional encoder module plugged into drive Port 5. The value for *Host* **Parameter 01 - [DL From Net 01]** would be 50001 [(10000 * 5) + 1].	Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 159999 Type: Read/Write Reset Required: No
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	**[DL To Net 01]** **[DL To Net 02]** **[DL To Net 03]** **[DL To Net 04]** **[DL To Net 05]** **[DL To Net 06]** **[DL To Net 07]** **[DL To Net 08]** **[DL To Net 09]** **[DL To Net 10]** **[DL To Net 11]** **[DL To Net 12]** **[DL To Net 13]** **[DL To Net 14]** **[DL To Net 15]** **[DL To Net 16]** Sets the port number and parameter number to which the selected Datalinks connect. Each selected port/parameter is read and their values transmitted over the network to the controller. The controller reads these parameters (inputs to the controller). If setting the value manually, the parameter value = (10000 * port number) + (origination parameter number). For example, suppose that you want to use *Host* **Parameter 17 - [DL To Net 01]** to read Parameter 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 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 159999 Type: Read/Write Reset Required: No

Parameter		
Number	**Name and Description**	**Details**

33		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. Before configuring this parameter, so that the drive continues to run, 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).

34	**[Idle Flt Action]**
	Sets the action that the option module and drive takes if the option module detects that the controller is in program mode or faulted. This setting is effective only if I/O that controls the drive is transmitted through the option module. When the controller is put back in Run mode, the drive automatically receives commands over the network again.
		Default: 0 = Fault
		Values: 0 = Fault
		                    1 = Stop
		                    2 = Zero Data
		                    3 = Hold Last
		                    4 = Send Flt Cfg
		Type: Read/Write
		Reset Required: No

> ⚠ **ATTENTION:** Risk of injury or equipment damage exists. *Host* **Parameter 34 - [Idle Flt Action]** lets you determine the action of the option module and connected drive when the controller is idle. By default, this parameter faults the drive. Before configuring this parameter, so that the drive continues to run, 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).

Parameter		
Number	**Name and Description**	**Details**

35	**[Peer Flt Action]**
	Sets the action that the option module and drive takes if the option module detects that peer I/O communication has been disrupted. This setting is effective only if I/O is transmitted through the option module. When peer I/O communication is re-established, the drive automatically receives commands over the network again.
		Default: 0 = Fault
		Values: 0 = Fault
		                  1 = Stop
		                  2 = Zero Data
		                  3 = Hold Last
		                  4 = Send Flt Cfg
		Type: Read/Write
		Reset Required: No

> ⚠ **ATTENTION:** Risk of injury or equipment damage exists. *Host* **Parameter 35 - [Peer Flt Action]** lets you determine the action of the option module and connected drive if the option module is unable to communicate with the designated peer. By default, this parameter faults the drive. Before configuring this parameter, so that the drive continues to run, 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).

36	**[Msg Flt Action]**
	Sets the action that the option module and drive takes if the option module detects that Explicit Messaging has been disrupted. Only when used for drive control via the PCCC, CIP Assembly, or CIP Register objects.
	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. Before configuring this parameter, so that the drive continues to run, 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		
Number	**Name and Description**	**Details**

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 35 - [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is disrupted.
	
	• *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 <u>Appendix D</u>.
		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

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 35 - [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is disrupted. • *Host* **Parameter 36 - [Msg Flt Action]** is set to '4' (Send Flt Cfg) and Explicit Messaging for drive control is disrupted.	Default: 0 Minimum: -3.40282×10^{38} Maximum: 3.40282×10^{38} Type: Read/Write Reset Required: No
39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54	**[Flt Cfg DL 01]** **[Flt Cfg DL 02]** **[Flt Cfg DL 03]** **[Flt Cfg DL 04]** **[Flt Cfg DL 05]** **[Flt Cfg DL 06]** **[Flt Cfg DL 07]** **[Flt Cfg DL 08]** **[Flt Cfg DL 09]** **[Flt Cfg DL 10]** **[Flt Cfg DL 11]** **[Flt Cfg DL 12]** **[Flt Cfg DL 13]** **[Flt Cfg DL 14]** **[Flt Cfg DL 15]** **[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 35 - [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is disrupted. • *Host* **Parameter 36 - [Msg Flt Action]** is set to '4' (Send Flt Cfg) and Explicit Messaging for drive control is disrupted.	Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No

Parameters for Tap Mode Operation

This section contains a list of *Device* parameters available when the option module is operated in Tap mode.

Device Parameters—Tap Mode

Parameter		
Number	**Name and Description**	**Details**
01	**[Operating Mode]** Displays the option module operating mode set with the Operating Mode Jumper J4 (Figure 1 on page 23).	Values: 0 = Adapter 1 = Tap Type: Read Only
02	**[Port Number]** Displays the drive port into which the option module is installed. Typically, Port 4, 5 or 6.	Minimum: 4 Maximum: 6 Type: Read Only
03	**Reserved**.	
04	**Reserved**.	

05	**[Net Addr Sel]**
	Selects the source of the node address for the option module when the Node Address switches (Figure 2 on page 25) are not being used. That is, it switches set to any value other than 001…254 or 888.
		Default: 3 = DHCP
		Values: 1 = Parameters
		                    2 = BOOTP
		                    3 = DHCP
		Type: Read/Write
		Reset Required: Yes

06	**[Net Addr Src]**
	Displays the source from which the option module node address is taken.
		Values: 0 = Switches
		                    1 = Parameters
		                    2 = BOOTP
		                    3 = DHCP
		Type: Read Only

07
08
09
10
	[IP Addr Cfg 1]
	[IP Addr Cfg 2]
	[IP Addr Cfg 3]
	[IP Addr Cfg 4]
	Sets the IP address bytes for the option module network address. When *Device* **Parameter 05 - [Net Addr Sel]** is set to '1' (Parameters), and the Node Address switches (Figure 2 on page 25) are not being used. That is, switches are set to any value other than 001…254 or 888).
	
	                    255.255.255.255
	       [IP Addr Cfg 1]
	           [IP Addr Cfg 2]
	               [IP Addr Cfg 3]
	                   [IP Addr Cfg 4]
		Default: 0
		Default: 0
		Default: 0
		Default: 0
		Minimum: 0
		Maximum: 255
		Type: Read/Write
		Reset Required: Yes

Parameter		
Number	**Name and Description**	**Details**
11 12 13 14	**[Subnet Cfg 1]** **[Subnet Cfg 2]** **[Subnet Cfg 3]** **[Subnet Cfg 4]** Sets the subnet mask bytes for the option module network address. When *Device* **Parameter 05 - [Net Addr Sel]** is set to '1' (Parameters), and the Node Address switches (Figure 2 on page 25) are not being used. That is, switches are set to any value other than 001…254 or 888). 255.255.255.255 [Subnet Cfg 1] [Subnet Cfg 2] [Subnet Cfg 3] [Subnet Cfg 4]	Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 255 Type: Read/Write Reset Required: Yes
15 16 17 18	**[Gateway Cfg 1]** **[Gateway Cfg 2]** **[Gateway Cfg 3]** **[Gateway Cfg 4]** Sets the gateway address bytes for the option module network address. When *Device* **Parameter 05 - [Net Addr Sel]** is set to '1' (Parameters), and the Node Address switches (Figure 2 on page 25) are not being used. That is, switches are set to any value other than 001…254 or 888). 255.255.255.255 [Gateway Cfg 1] [Gateway Cfg 2] [Gateway Cfg 3] [Gateway Cfg 4]	Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 255 Type: Read/Write Reset Required: Yes

19	**[Net Rate Cfg 1]**
	Sets the speed and duplex network data rate at which the option module communicates on its ENET1 network port. (Updates *Device* **Parameter 20 - [Net Rate Act 1]** after a reset.)
		Default: 0 = Autodetect
		Values: 0 = Autodetect
		                       1 = 10 Mbps Full
		                       2 = 10 Mbps Half
		                       3 = 100 Mbps Full
		                       4 = 100 Mbps Half
		                       5 = Disabled
		Type: Read/Write
		Reset Required: Yes

20	**[Net Rate Act 1]**
	Displays the actual speed and duplex network data rate for the option module ENET1 network port.
		Values: 0 = No Link
		                       1 = 10 Mbps Full
		                       2 = 10 Mbps Half
		                       3 = 100 Mbps Full
		                       4 = 100 Mbps Half
		                       5 = Dup IP Addr
		Type: Read Only

21	**[Net Rate Cfg 2]**
	Sets the speed and duplex network data rate at which the option module communicates on its ENET2 network port. (Updates *Device* **Parameter 22 - [Net Rate Act 2]** after a reset.)
		Default: 0 = Autodetect
		Values: 0 = Autodetect
		                       1 = 10 Mbps Full
		                       2 = 10 Mbps Half
		                       3 = 100 Mbps Full
		                       4 = 100 Mbps Half
		                       5 = Disabled
		Type: Read/Write
		Reset Required: Yes

Parameter		
Number	**Name and Description**	**Details**
22	**[Net Rate Act 2]** Displays the actual speed and duplex network data rate for the option module ENET2 network port.	Values: 0 = No Link 1 = 10 Mbps Full 2 = 10 Mbps Half 3 = 100 Mbps Full 4 = 100 Mbps Half 5 = Dup IP Addr Type: Read Only
23	**[Net Rate Cfg 3]** Sets the speed and duplex network data rate at which the option module communicates on its ENET3 (DEVICE) port. (Updates *Device* **Parameter 24 - [Net Rate Act 3]** after a reset.)	Default: 0 = Autodetect Values: 0 = Autodetect 1 = 10 Mbps Full 2 = 10 Mbps Half 3 = 100 Mbps Full 4 = 100 Mbps Half 5 = Disabled Type: Read/Write Reset Required: Yes
24	**[Net Rate Act 3]** Displays the actual speed and duplex network data rate for the option module ENET3 (DEVICE) port.	Values: 0 = No Link 1 = 10 Mbps Full 2 = 10 Mbps Half 3 = 100 Mbps Full 4 = 100 Mbps Half 5 = Dup IP Addr Type: Read Only
25	**[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 default configuration 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 ca detect a conflict. If a conflict occurs, the drive does 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 power-cycledI/O that controls the drive, the drive can fault when you reset the option module. Determine how your drive responds before resetting the option module.

26	**[Web Enable]** Enables/disables the option module web pages.	Default: 0 = Disabled Values: 0 = Disabled 1 = Enabled Type: Read/Write Reset Required: No

Host Parameters—Tap Mode

When operating the option module in Tap mode, *Host* parameters are **not** supported.

EtherNet/IP Objects (Adapter mode only)

This appendix presents information about the EtherNet/IP 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 (Adapter mode only).

Object	Class Code		Page	Object	Class Code		Page
	Hex.	Dec.			Hex.	Dec.	
Identity Object	0x01	1	184	DPI Alarm Object	0x98	152	202
Assembly Object	0x04	4	185	DPI Diagnostic Object	0x99	153	203
Register Object	0x07	7	186	DPI Time Object	0x9B	155	206
PCCC Object	0x67	103	187	Host DPI Parameter Object	0x9F	159	209
DPI Device Object	0x92	146	190	TCP/IP Interface Object	0xF5	245	215
DPI Parameter Object	0x93	147	193	Ethernet Link Object	0xF6	246	217
DPI Fault Object	0x97	151	200				

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

Supported Data Types

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

Identity Object

Class Code

Hexadecimal	Decimal
0x01	1

Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x05	No	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	142
3	Get	Product Code	UINT	Number identifies 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

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 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 time out 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	Description
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, and so on, 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, and so on, 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 Reference 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, the fault action that is configured in its [Comm Flt Action] parameter is performed. A valid setting is 1…32767 seconds (5…20 seconds is recommended).	
N42:7	Option Module Port Number (read only): Drive port in which option module resides.	
N42:8	Peer Option Modules (read only): Bit field of devices with peer messaging capabilities.	
N45	This N-file lets you read and write control I/O messages. You can write control I/O messages only when all 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 not receiving Peer I/O from another option module.	
	• 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

Table 17 - 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-xxxx 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 8 = Russian 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	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 prompts at startup) 1 = Language was selected (no prompt)

Table 17 - Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
20	Set	Customer-Generated Firmware	STRING[36]	GUID (Globally Unique Identifier) identifies customer firmware upgraded into the device.
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	Rating Code
			UDINT	Device Serial Number
			UINT	Customization Code
			UINT	Customization Revision
			UINT	Brand Code
			USINT	Family Code
			USINT	Config Code
			USINT	Language Code
			USINT	Major Revision
			USINT	Minor Revision
			USINT[16]	Customer-Generated Firmware UUID
35	Get	NVS CRC	UDINT	A 32 bit CRC of the Nonvolatile Storage in a device.
38	Set	ADC Configuration Signature	USINT[16]	The stored value of the device. Zeroed if the device configuration changes.
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	Major Revision
			USINT	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

Class Attributes				
Attribute ID	**Access Rule**	**Name**	**Data Type**	**Description**
0	Get	Number of Instances	UINT	Number of parameters in the device
1	Set	Write Protect Password	UINT	0 = Password disabled n = Password value
2	Set	NVS Command Write	USINT	0 = No Operation 1 = Store values in active memory to NVS 2 = Load values in NVS to active memory 3 = Load default values to active memory 4 = Partial defaults 5 = System defaults
3	Get	NVS Parameter Value Checksum	UINT	Checksum of all parameter values in a user set in NVS
4	Get	NVS Link Value Checksum	UINT	Checksum of parameter links in a user set in NVS
5	Get	First Accessible Parameter	UINT	First parameter available if parameters are protected by passwords. A '0' indicates that all parameters are protected.

Class Attributes (continued)

Attribute ID	Access Rule	Name	Data Type	Description
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 (the setting does not clear links to function blocks.)

Instance Attributes

Table 18 - 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 197)
			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
			STRING[16]	Parameter name
8	Get	DPI Descriptor	BOOL[32]	Descriptor (see page 197)
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.

Table 18 - Instance Attributes (continued)

Attribute ID	Access Rule	Name	Data Type	Description
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] CONTAINER CONTAINER CONTAINER CONTAINER STRING[16] STRING[4]	 Descriptor (see page 197) Parameter value Minimum value Maximum value Default value Parameter name 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.
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 198)

Table 18 - Instance Attributes (continued)

Attribute ID	Access Rule	Name	Data Type	Description
22	Get	International DPI Offline Read Full	Struct of:	
			BOOL	Descriptor
			CONTAINER	Offline minimum value
			CONTAINER	Offline maximum value
			CONTAINER	Offline default value
			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 word (always zero)
			UINT	Help instance
			UINT	Pad word (always a value of zero)
			CONTAINER	Parameter value
			UINT	Multiplier
			UINT	Divisor
			UINT	Base
			INT	Offset
			BOOL[32]	Extended DPI descriptor
			STRINGN	International DPI parameter name
			STRINGN	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 that is extended. Padding is used in the CONTAINER to be sure that it is always 32 bits.

(2)   This value is used in the formulas that are used to convert the parameter value between display units and internal units. See Formulas for Converting on page 199.

(3)   Do NOT continually write parameter data to NVS. See the attention on page 119.

Descriptor Attributes

Bit	Name	Description
0	Data Type (Bit 1)	Right bit is least significant bit (0).
1	Data Type (Bit 2)	000 = USINT used as an array of Boolean
2	Data Type (Bit 3)	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 bit (Unicode))
		110 = REAL (32 bit floating point value)
		111 = Use bits 16, 17, 18
3	Sign Type	0 = unsigned
		1 = signed
4	Hidden	0 = visible
		1 = hidden
5	Not a Link Sink	0 = Can be the sink end of a link
		1 =Cannot 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.
13	Decimal Place (Bit 1)	0000 = 0
14	Decimal Place (Bit 2)	1111 = 15
15	Decimal Place (Bit 3)	
16	Extended Data Type (Bit 4)	Bit 16 is the least significant bit.
		000 = Reserved
17	Extended Data Type (Bit 5)	001 = UDINT used as an array of Boolean
		010 = Reserved, 011 = Reserved
18	Extended Data Type (Bit 6)	100 = Reserved,101 = Reserved
		110 = Reserved, 111 = Reserved
19	Parameter Exists	Used to mark parameters that are not available to network tools.
20	Not Used	Reserved
21	Formula Links	Indicates that the Formula Data is derived from other parameters.
22	Access Level (Bit 1)	A 3 bit field that is used to control access to parameter data.
23	Access Level (Bit 2)	
24	Access Level (Bit 3)	
25	Writable ENUM	ENUM text: 0 = Read Only, 1 = Read/Write
26	Not a Link Source	0 = Can be the source end of a link
		1 = Cannot 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 use 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 is always included in uploads and downloads.

Extended Descriptor Attributes

Table 19 - 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 4 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 the number of decimal places that are used is not limited.
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 parameter value is formatted the same as an analog mode, Indirect Selector parameter (SSpppp). Where: • SS = slot number of device to which the Extended Parameter Reference is pointing. • pppp = number of the parameter or diagnostic item to which this Extended Parameter Reference is pointing). Note: 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 includes the default value for the smallest rating and limits. These limits 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 includes 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 can 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, it indicates 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 does not allow the entry zero value.
24	Datalink Out	This bit is used by offline tools. Indicates that the attribute is a Datalink Out parameter. Bit 20 must also be set.
25	Datalink In	This bit is used by offline tools and indicates that the attribute is a Datalink In parameter. Bits 20 and 22 must also be set.

Table 19 - Extended Descriptor Attributes (continued)

Bit	Name	Description
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 act, such as 'Reset Defaults' or 'Autotune', and then returns to a value of zero. Offline software tools limit setting this parameter to a value of zero. If an offline file contains a Command Parameter with a non-zero value, the offline software tool changes the value to zero. Note: Command parameters cannot have values that do not return to zero.
28	Current Value Is Default	This bit identifies a parameter that does not change if a 'Reset Defaults' is commanded. For example, if a drive contains a Language parameter that is set to German, setting defaults leave the parameter set to German. Likewise, if the parameter is set to French, setting defaults 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

This table 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 write (zero when reading)

The response data appears in the following format.

Name	Data Type	Description
Parameter Number	UDINT	Parameter read or write [1]
Parameter Value	UDINT	Parameter value read (zero when writing) [2]

(1)   If an error occurred, bit 15 is turned on in the response.

(2)   If an error occurred, the error code appears instead of the value.

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	Yes	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]
				Reserved

6	Get	Number of Recorded Faults	UINT	Number of faults/events in the queue. A '0' indicates that 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
				Reserved
				Reserved

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	Fault Data List	STRUCT of: USINT USINT UINT[n]	Reserved
5	Get	Number of Recorded Alarms	UINT	Number of alarms in the queue. A '0' indicates that 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 197](#))
			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 be sure that it is always 32 bits.

(2)   This value is used in the formulas that are used to convert the value between display units and internal units. See [Formulas for Converting on page 199](#).

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 even though a device does not support it. The total number of timers can be read in Instance 0, Attribute 2.

Instances		Device		Example	Description
(Hex.)	(Dec.)				
0x0000…0x3FFF	0…16383	Host Drive		0	Class Attributes (Drive)
0x4000…0x43FF	16384…17407	Option Module		1	Real-Time Clock (Predefined) (not always supported)
0x4400…0x47FF	17408…18431	Port 1		2	Timer 1
0x4800…0x4BFF	18432…19455	Port 2		3	Timer 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			

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.
8	Get	Active Time Zone Data	Struct of: INT USINT USINT USINT USINT USINT USINT INT USINT USINT USINT USINT USINT USINT	 Standard bias Standard month Standard day of week Standard week Standard hour Standard minute Standard second Daylight offset Daylight month Daylight day of week Daylight week Daylight hour Daylight minute Daylight second
9	Get/Set	Custom Time Zone Data	Struct of: INT USINT USINT USINT USINT USINT USINT INT USINT USINT USINT USINT USINT USINT	 Standard bias Standard month Standard day of week Standard week Standard hour Standard minute Standard second Daylight offset Daylight month Daylight day of week Daylight week Daylight hour Daylight minute Daylight second

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description

0	Get	Read Full	STRUCT of:
			    STRING[16]
			    LWORD or STRUCT
			    BOOL[16]
				
				Name of the timer
				Elapsed time in milliseconds unless timer is a real-time clock (see attribute 2)
				See Attribute 3

1	Get	Timer Text	STRING[16]	Name of the timer

2	Get/Set	Timer Value	LWORD -or-
			STRUCT of:
			    UINT
			    USINT
			    USINT
			    USINT
			    USINT
			    USINT
			    USINT
				Elapsed time in milliseconds unless the timer is a real-time clock.
				Real-Time Clock Data:
				    Milliseconds (0…999)
				    Seconds (0…59)
				    Minutes (0…59)
				    Hours (0…23)
				    Days (1…31)
				    Months (1 = January, 12 = December)
				    Years (since 1972)

3	Get	Timer Descriptor	BOOL[16]	BOOL[0]: (0 = invalid data, 1 = valid data) BOOL[1]: (0 = elapsed time, 1 = real time) BOOL[2…15]: Not used

4	Get	International Read Full	Struct of:
			    STRINGN
			    STRUCT
			    BOOL[16]
				
				International timer text
				Timer value
				Timer descriptor

5	Get	International Timer Text	STRINGN	Name of this timer
6	Get	Clock Status	BOOL[32]	Identifies clock status
8	Get/Set	Number of Leap Seconds	INT	Identifies the current number of Leap Seconds.
9	Get	Clock Options	BOOL[32]	Identifies the optional functionality available in the System Clock of the device.
10	Get/Set	Clock Options Enable	BOOL[32]	Identifies which of the options for the clock are enabled.

Host DPI Parameter Object

Class Code

Hexadecimal	Decimal
0x9F	159

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

Instances

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

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

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

Class Attributes

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

Instance Attributes

Table 20 - 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 212)
			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 212)
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 212)
			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

Table 20 - Instance Attributes (continued)

Attribute ID	Access Rule	Name	Data Type	Description
15	Get	DPI Parameter Alias	STRING[16]	Customer supplied parameter name.
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 213)
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 be sure that it is always 32 bits.

(2) This value is used in the formulas that are used to convert the parameter value between display units and internal units. See Formulas for Converting on page 214.

(3) Do NOT continually write parameter data to NVS. See the attention on page 119.

Descriptor Attributes

Bit	Name	Description
0	Data Type (Bit 1)	Right bit is least significant bit (0).
1	Data Type (Bit 2)	000 = USINT used as an array of Boolean
2	Data Type (Bit 3)	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
3	Sign Type	0 = unsigned
		1 = signed
4	Hidden	0 = visible
		1 = hidden
5	Not a Link Sink	0 = Can be the sink end of a link
		1 = Not 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.
13	Decimal Place (Bit 1)	0000 = 0
14	Decimal Place (Bit 2)	1111 = 15
15	Decimal Place (Bit 3)	
16	Extended Data Type (Bit 4)	Bit 16 is the least significant bit.
17	Extended Data Type (Bit 5)	000 = Reserved
18	Extended Data Type (Bit 6)	001 = UDINT used as an array of Boolean
		010 = Reserved, 011 = Reserved
		100 = Reserved, 101 = Reserved
		110 = Reserved, 111 = Reserved
19	Parameter Exists	Used to mark parameters that are not available to network tools.
20	Not Used	Reserved
21	Formula Links	Indicates that the Formula Data is derived from other parameters.
22	Access Level (Bit 1)	A 3 bit field that is used to control access to parameter data.
23	Access Level (Bit 2)	
24	Access Level (Bit 3)	
25	Writable ENUM	ENUM text: 0 = Read Only, 1 = Read/Write
26	Not a Link Source	0 = Can be the source end of a link
		1 = Not 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 use 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 is always included in uploads and downloads.

Extended Descriptor Attributes

Table 21 - 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 4 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, the number of decimal places that are used is not limited.
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 • pppp = number of the parameter or diagnostic item to which this Extended Parameter Reference is pointing Note: 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 includes the default value for the smallest rating and limits allowed in the family of devices using this particular combination of Family Code and Config Code. It accommodates the full range of values. The Online Read Full includes 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 can 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, it indicates 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 does not allow value of zero to be entered.
24	Datalink Out	This bit is used by offline tools and indicates that this parameter is a Datalink Out. Bit 20 must also be set.

Table 21 - Extended Descriptor Attributes (continued)

Bit	Name	Description
25	Datalink In	This bit is used by offline tools and indicates that this parameter is a Datalink In . 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 perform actions, such as 'Reset Defaults' or 'Autotune', and then returns to a value of zero. Offline software tools do 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 changes the value to zero. Note: Command parameters cannot have values that do not return to zero.
28	Current Value Is Default	This bit identifies a parameter that does not change if a 'Reset Defaults' is commanded. For example, if a drive contains a Language parameter that is set to German, setting defaults leave the parameter set to German. Likewise, if the parameter is set to French, setting defaults 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

This table 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 write (zero when reading)

The response data appears in this format:

Name	Data Type	Description
Parameter Number	UDINT	Parameter read or write [1]
Parameter Value	UDINT	Parameter value read (zero when writing) [2]

(1)   If an error occurred, bit 15 is turned on in the response.

(2)   If an error occurred, the error code appears instead of the value.

TCP/IP Interface Object

Class Code

Hexadecimal	Decimal
0xF5	245

Services

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

Instances

The adapter supports one instance of the TCP/IP Interface object.

Number	Description
0	Class Attributes
1	Object Attributes

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT	The revision of this object

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description

1	Get	Status of TCP/IP Network Interface	UDINT	Bit | Value
				0…3 = Configuration status
				    0 = Not configured
				    1 = Configured using BOOTP, DHCP, or parameters
				    2 = Configured using Node Address switches
				    3…15 = Reserved
				4 = Reserved
				5 = Configuration pending
				6 = Duplicate IP address
				7…15 = Reserved

2	Get	Configuration Capability	UDINT	Bit | Value (0 = False, 1 = True) 0 = Supports BOOTP 1 = DNS Client (able to resolve host names by query to DNS server) 2 = DHCP Client (able to obtain network configuration through DHCP) 3 = DHCP-DNS Update (able to send its host name in the DHCP request) 4 = Configuration Settable (able to set the network configuration via TCP/IP object) 5 = Hardware Configurable (able to set the network configuration via the Node Address switches) 6 = Configuration change requires reset 7 = Address Conflict Detection (ACD) capable 8…31 = Reserved

3	Set	Configuration Control	UDINT	Bit | Value
				0…3 = Startup configuration
				    0 = Use configuration saved in NVS
				    1 = Obtain configuration via BOOTP
				    2 = Obtain configuration via DHCP
				    3…15 = Reserved
				4 = DNS Enabled (resolves host names by query to DNS server)
				5…31 = Reserved

4	Get	Physical Link Object	STRUCT of:
			    UINT
			    Padded EPATH
				
				Path size
				Path

5	Get	Interface Configuration	STRUCT of:
			    UDINT
			    UDINT
			    UDINT
			    UDINT
			    UDINT
			    STRING
				
				Option module IP address
				Option module subnet mask
				Option module gateway address
				Primary name server
				Secondary name server
				Default domain name

6	Get	Host Name	STRING	Host name when using DHCP
10	Set	Select ACD	BOOL	Activates the use of ACD

11	Set	Last Conflict Detected	STRUCT of:
			    USINT
			    USINT[6]
			    USINT[28]
				
				ACD Activity
				Remote MAC
				ARP PDU

Ethernet Link Object

Class Code

Hexadecimal	Decimal
0xF6	246

Services

Service Code	Implemented for:		Service Name
	Class	**Instance**	
0x0E	Yes	Yes	Get_Attribute_Single
0x4C	No	Yes	Get_and_Clear
0x10	No	Yes	Set_Attribute_Single

Instances

The adapter supports the following instances of the TCP/IP Interface object.

Number	Description
0	Class Attributes
1	ENET1 network port
2	ENET2 network port

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT	The revision of this object

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Interface Speed	UDINT	Speed in megabits per second (Mbs)
2	Get	Interface Flags	UDINT	Bit | Value 0 = Link status (0 = inactive, 1 = active) 1 = Duplex (0 = Half-duplex, 1 = Full-duplex) 2…31 = Reserved
3	Get	Physical Address	USINT[6]	MAC address (XX-XX-XX-XX-XX-XX) The first octet (USINT[0]) is on the left.
4	Get	Interface Counters	STRUCT of: UDINT UDINT UDINT UDINT UDINT UDINT UDINT UDINT UDINT UDINT UDINT	 Octets received Unicast packets received Non-unicast packets received Inbound packets received but discarded Inbound packets with errors (not discarded) Inbound packets with unknown protocol Octets sent Unicast packets sent Non-unicast packets sent Outbound packets discarded Outbound packets with errors
5	Get	Media Counters	STRUCT of: UDINT UDINT UDINT UDINT UDINT UDINT UDINT UDINT UDINT UDINT UDINT UDINT	RX = Received, TX = Transmitted RX frames not having integral number of octets long RX frames not passing FCS check TX frames having one collision TX frames having multiple collisions Number of times of SQE test error message TX Frames delayed first attempt by busy medium Collisions detected later than 512 bit-times in trans. TX frames failing due to excessive collisions TX frames failing due to intern MAC sublayer TX error Times of carrier sense condition loss during trans RX frames exceeding the maximum frame size RX frames failing due to intern MAC sublayer RX error
6	Set	Interface Control	STRUCT of: WORD UINT	 Control bits Forced interface speed
7	Get	Interface Type	USINT	Type of interface; 2 = twisted pair
10	Get	Interface Label	SHORT_STRING	'1' = ENET1 network port '2' = ENET2 network port

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

Table 22 - Logic Command Word

Logic Bit	Command	Description
0	Normal Stop	0 = Not Normal Stop 1 = Normal Stop
1	Start [1]	A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Start condition starts the drive. 0 = Not Start 1 = Start
2	Jog 1 [2]	A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Jog 1/Jog 2 condition jogs the drive. A transition to a '0' stops the drive. 0 = Not Jog 1 (Par. 556) 1 = Jog 1
3	Clear Fault [3]	To perform this command, the value must switch from '0' to '1'. 0 = Not Clear Fault 1 = Clear Fault
4	Unipolar Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
5	Unipolar Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
6	Manual	0 = Not Manual 1 = Manual
7	Reserved	
8	Accel Time	00 = No Command 01 = Use Accel Time 1 (Par. 535) 10 = Use Accel Time 2 (Par. 536) 11 = Use Present Time
9	Accel Time	00 = No Command 01 = Use Accel Time 1 (Par. 535) 10 = Use Accel Time 2 (Par. 536) 11 = Use Present Time

Table 22 - Logic Command Word (continued)

Logic Bit	Command	Description
10	Decel Time	00 = No Command 01 = Use Decel Time 1 (Par. 537) 10 = Use Decel Time 2 (Par. 538) 11 = Use Present Time
11	Decel Time	00 = No Command 01 = Use Decel Time 1 (Par. 537) 10 = Use Decel Time 2 (Par. 538) 11 = Use Present Time
12	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)
13	Ref Select 2	00 = 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)
14	Ref Select 3	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)
15	Reserved	
16	Coast Stop	0 = Not Coast to Stop 1 = Coast to Stop
17	Current Limit Stop	0 = Not Current Limit Stop 1 = Current Limit Stop
18	Run [4]	A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Run condition runs the drive. A transition to a '0' stops the drive. 0 = Not Run 1 = Run
19	Jog 2 [2]	A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Jog 1/Jog 2 condition jogs the drive. A transition to a '0' stops the drive. 0 = Not Jog 2 (Par. 557) 1 = Jog 2
20…31	Reserved	

(1)   A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Start condition starts the drive.
(2)   A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Jog 1/Jog 2 condition jogs the drive. A transition to a '0' stops 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 runs the drive. A transition to a '0' stops the drive.

Logic Status Word

Table 23 - Logic Status Word

Logic Bit	Command	Description
0	Run Ready	0 = Not Ready to Run 1 = Ready to Run
1	Active	0 = Not Active 1 = Active
2	Command Direction	0 = Reverse 1 = Forward
3	Actual Direction	0 = Reverse 1 = Forward
4	Accelerating	0 = Not Accelerating 1 = Accelerating
5	Decelerating	0 = Not Decelerating 1 = Decelerating
6	Alarm	0 = No Alarm (Par. 959 and 960) 1 = Alarm
7	Fault	0 = No Fault (Par. 952 and 953) 1 = Fault
8	At Setpt Spd	0 = Not at Setpoint Speed 1 = At Setpoint Speed
9	Manual	0 = Manual Mode Not Active 1 = Manual Mode Active
10	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)
11	Spd Ref ID 1	
12	Spd Ref ID 2	
13	Spd Ref ID 3	
14	Spd Ref ID 4	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
15	Reserved	

Table 23 - Logic Status Word (continued)

Logic Bit	Command	Description
16	Running	0 = Not Running 1 = Running
17	Jogging	0 = Not Jogging (Par. 556 and 557) 1 = Jogging
18	Stopping	0 = Not Stopping 1 = Stopping
19	DC Brake	0 = Not DC Brake 1 = DC Brake
20	DB Active	0 = Not Dynamic Brake Active 1 = Dynamic Brake Active
21	Speed Mode	0 = Not Speed Mode (Par. 309) 1 = Speed Mode
22	Position Mode	0 = Not Position Mode (Par. 309) 1 = Position Mode
23	Torque Mode	0 = Not Torque Mode (Par. 309) 1 = Torque Mode
24	At Zero Speed	0 = Not at Zero Speed 1 =At Zero Speed
25	At Home	0 = Not at Home 1 = At Home
26	At Limit	0 = Not at Limit 1 = At Limit
27	Current Limit	0 = Not at Current Limit 1 = At Current Limit
28	Bus Freq Reg	0 = Not Bus Freq Reg 1 = Bus Freq Reg
29	Enable On	0 = Not Enable On 1 = Enable On
30	Motor Overload	0 = Not Motor Overload 1 = Motor Overload
31	Regen	0 = Not Regen 1= Regen

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

ADC (Automatic Device Configuration) An RSLogix 5000® software, version 20.00 or later, feature that supports the automatic download of configuration data upon the Logix controller establishing an EtherNet/IP network connection to a PowerFlex 750-Series drive (firmware revision 4.001 or later) and its associated peripherals.

BOOTP (Bootstrap Protocol) BOOTP lets the option module configure itself dynamically at restart if the network has a BOOTP server. The BOOTP server assigns the option module a preconfigured IP address, a subnet mask, and a gateway address; therefore, you do not have to configure these with the parameters in the option module. BOOTP can make it easier to administer an Ethernet network. A **free version** of the Rockwell Software® BOOTP-DHCP server can be obtained at http://www.software.rockwell.com/support/download/detail.cfm?ID=3390.

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.

Data Rate The speed at which data is transferred on the EtherNet/IP network. You can set the adapter to a data rate of 10 Mbps full-duplex, 10 Mbps half-duplex, 100 Mbps full-duplex, or 100 Mbps half-duplex. If another device on the network sets or auto-negotiates the data rate, you can set the option module to automatically detect the data rate.

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

Device-level Ring (DLR)   An Ethernet topology that consists of multiple devices configured in a circle-style connection, which is implemented at the device level, and with no additional switches required.

DHCP (Dynamic Host Configuration Protocol)   DHCP lets the option module configure itself dynamically at restart if the network has a DHCP server. The DHCP server assigns the option module a preconfigured IP address, a subnet mask, and a gateway address; therefore, you do not have to configure these with the parameters in the option module. DHCP can make it easier to administer an Ethernet network. A **free version** of the Rockwell Software BOOTP-DHCP server can be obtained at http://www.software.rockwell.com/support/download/detail.cfm?ID=3390.

DriveExplorer Software   A tool for monitoring and configuring Allen-Bradley® products and network communication adapters. It can be used on computers that run 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 Mustconfigure legacy products that are 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), which 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.

Duplex   Duplex describes the mode of communication. 'Full-duplex' communication lets a device exchange data in both directions at the same time. 'Half-duplex' communication lets a device exchange data only in one direction at a time. The duplex that is used by the option module depends on the type of duplex that other network devices, such as switches, support.

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.

EtherNet/IP Network EtherNet/IP (Industrial Protocol) is an open producer-consumer communication network based on the Ethernet standard (IEEE 802.3), TCP/IP, UDP/IP, and CIP. Designed for industrial communication, both I/O and explicit messages can be transmitted over the network. Each device is assigned a unique IP address and transmits data on the network. The number of devices that an EtherNet/IP network can support depends on the class of IP address. For example, a network with a Class C IP address can have 254 nodes.

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

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.

Gateway A device on a network that connects an individual network to a system of networks. When a node needs to communicate with a node on another network, a gateway transfers the data between the two networks. You need to configure the address for the gateway device in the option module if you want the option module to communicate with devices that are not on its network.

Hardware Address Each Ethernet device has a unique hardware address (sometimes called a MAC address) that is 48 bits. The address appears as six digits separated by colons (for example, xx:xx:xx:xx:xx:xx). Each digit has a value between 0 and 255 (0x00 and 0xFF). This address is assigned in the hardware and cannot be changed. It is required to identify the device if you are using a BOOTP or DHCP server.

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.

IGMP Snooping   The process of listening to Internet Group Management Protocol (IGMP) network traffic. The feature allows a network switch to listen in on the IGMP conversation between hosts and routers. By listening to these conversations the switch maintains a map of which links need which IP multicast streams.

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.

IP Addresses   A unique IP address identifies each node on an EtherNet/IP network. An IP address consists of 32 bits that are divided into four segments of one byte each. It appears as four decimal integers separated by periods (xxx.xxx.xxx.xxx). Each 'xxx' can have a decimal value from 0 to 255. For example, an IP address could be 192.168.0.1.

An IP address has two parts: a network ID and a host ID. The class of network determines the format of the address.

	0 1		7	15	23	31
Class A	0	Network ID		Host ID		

	0 1		7	15	23	31
Class B	1 0	Network ID			Host ID	

	0 1 2		7	15	23	31
Class C	1 1 0	Network ID				Host ID
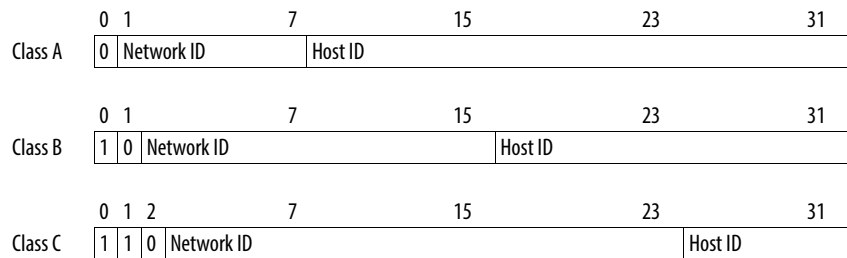
The number of devices on your EtherNet/IP network will vary depending on the number of bytes that are used for the network address. In many cases you are given a network with a Class C address, in which the first three bytes contain the network address (subnet mask = 255.255.255.0). This leaves 8 bits or 256 addresses on your network. Because two addresses are reserved for special uses (0 is an address for the network usually used by the router, and 255 is an address for broadcast messages to all network devices), you have 254 addresses to use on a Class C address block.

To be sure that each device on the Internet has a unique address, contact your network administrator or Internet Service Provider for unique fixed IP addresses. You can then set the unique IP address for the option module by using its rotary address switches, a DHCP or BOOTP server, or by manually configuring parameters in the option module. The option module reads the values of these parameters only at powerup.

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 <u>Appendix D</u>.

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 <u>Appendix D</u>.

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 EtherNet/IP 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.

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 EtherNet/IP. 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-ENETR Dual-port EtherNet/IP option module connects PowerFlex 750-Series drives to an EtherNet/IP 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.

Peer-to-Peer Hierarchy An option module that is configured for a peer-to-peer hierarchy can exchange data with a device on the network that is not a scanner. This type of hierarchy can be set up so that a scanner configures or transmits data to one PowerFlex 750-Series drive which then sends the same configuration or data to other PowerFlex 750-Series drives on the network. To use a peer-to-peer hierarchy, you configure one option module to transmit data and one or more option modules to receive the data.

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.

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.

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.

Subnet Mask An extension to the IP addressing scheme that lets you use a single network ID for multiple physical networks. A bit mask identifies the part of the address that specifies the network and the part of the address that specifies the unique node on the network. A '1' in the subnet mask indicates the bit is used to specify the network. A '0' in the subnet mask indicates that the bit is used to specify the node.

For example, a subnet mask on a network may appear as follows: 11111111 11111111 11111111 11000000 (255.255.255.192). This mask indicates that 26 bits are used to identify the network and 6 bits are used to identify devices on each network. Instead of a single physical Class C network with 254 devices, this subnet mask divides it into four networks with up to 62 devices each.

Switches Network devices that provide virtual connections that help to control collisions and reduce traffic on the network. They are able to reduce network congestion by transmitting packets to an individual port only if they are destined for the connected device. In a control application, in which real time data access is critical, network switches may be required in place of hubs.

TCP (Transmission Control Protocol) EtherNet/IP uses this protocol to transfer Explicit Messaging packets using IP. TCP guarantees delivery of data through the use of retries.

UDP (User Datagram Protocol) EtherNet/IP uses this protocol to transfer I/O packets using IP. UDP provides a simple, but fast capability to send I/O messaging packets between devices. This protocol verifies that option modules transmit the most recent data because it does not use acknowledgements or retries.

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 58 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.

Notes:

Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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