PowerFlex Dual–port EtherNet/IP Option Module

20-750-ENETR, Firmware Revision 1.xxx

20-750-ENET2P, Firmware Revision 7.xxx

Allen-Bradley

by **ROCKWELL AUTOMATION**

User Manual

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.

These 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).

The following icon may appear in the text of this document.

💡	Identifies information that is useful and can help to make a process easier to do or easier to understand.

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Notes:

About This Publication

This manual provides information about the following dual-port EtherNet/IP option modules:

- 20-750-ENETR

- 20-750-ENET2P

Download Firmware, AOP, EDS, and Other Files

Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes from the Product Compatibility and Download Center at rok.auto/pcdc.

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Added information about the 20-750-ENET2P option module	throughout

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**].

  > **TIP** All parameter numbers listed in this manual apply to the PowerFlex 750-Series Drives unless specifically noted. See the PowerFlex Drives with TotalFORCE Control Programming Manual, publication 750-PM100 for PF755T parameters.

- 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:
  – Studio 5000® Logix Designer software, version 30.00 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.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation. You can view or download publications at rok.auto/literature.

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 and 750COM-IN003	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 Device Level Ring Application Technique, publication ENET-AT007D-EN-P	
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 750-Series Drives with TotalFORCE Control Built-in EtherNet/IP Adapter, publication 750COM-UM009	This manual provides information about the dual-port, built-in EtherNet/IP interface in PowerFlex 755T, 755TM, 755TR, and 755TL drives and bus supplies, and how to use it for network communication.
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.
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, rok.auto/certifications	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.

(1) Visit ODVA.org and search for ODVA Publication 148.

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

Getting Started

The option modules are used for network communication. The 20-750-ENETR option module can be used with PowerFlex® 753/755 drives and PowerFlex 755T products. The 20-750-ENET2P option module can be used only with PowerFlex753/755 drives; it is not intended for use with PowerFlex 755T products.

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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 (TAP) Port (TAP only)	RJ45 connector to connect the short Ethernet cable to the Ethernet port on the PowerFlex 755 drive embedded EtherNet/IP adapter. This cable is provided ONLY with the 20-750-ENETR option module; cable not included with 20-750-ENET2P option module. 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 (20-750-ENET2P does not support Tap mode). Adapter or Tap mode 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 the ENET3 (TAP) port. The connection point is used to transfer 'Integrated Motion on the EtherNet/IP network'[1] data to the PowerFlex 755 drive's embedded EtherNet/IP adapter.

(1)   PowerFlex 755T products do not work with 'Integrated Motion'.

- 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 (TAP) port—for use with only PowerFlex 755 drives—that supports the transfer of 'Integrated Motion on the EtherNet/IP network' data for that drive. PowerFlex 755T products do not currently support Integrated Motion.

- 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 Linx-based 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. The PowerFlex 755T Series product firmware must be revision 1.001 and later.

- 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.

- 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.

- MSG instruction support in the controller.

- Leader-follower 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. This is accomplished using another 20-750-ENETR or 20-750-ENET2P option module, or the embedded EtherNet/IP adapter in a PowerFlex 755 drive.

> **TIP** The embedded Ethernet/IP adapter on PowerFlex 755T products does not support a peer-to-peer hierarchy.

- Supports 'Integrated Motion on the EtherNet/IP network[1] 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)
    - The PCCC, register object, and CIP assembly object are specific to the MSG instruction

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

- 20-750-ENETR only: 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.[2]

- 20-750-ENETR only: 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.[2]

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

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(1)   PowerFlex 755T products do not currently support 'Integrated Motion'.
(2)   PowerFlex 755T products do not support web pages or email.

Table 1 - Software Compatibility Matrix

Drive	Firmware	Connected Components Workbench™ Software[3]	DriveTools™ SP[3]	DriveExplorer™ Software
PowerFlex 753	version 1.005[2]			
PowerFlex 755	version 1.009 version 2.003 Frames 8…10	version 1.02	version 5.06	version 6.04
PowerFlex 755T[1]	version 1.001	version 11	Not supported	Not supported

Drive	Firmware	Studio 5000 Logix Designer® Application	RSLogix 5000® Software
PowerFlex 753	version 1.010[2]		
PowerFlex 755	version 1.009 version 2.003 Frames 8…10	version 21	version 16
PowerFlex 755T[1]	version 1.001	version 21[4]	version 20[4]

(1)   PowerFlex 755T products do not support DriveExecutive™ or DriveExplorer.

(2)   Only with version 8.001 20-750-ENETR option module.

(3)   Rockwell Automation recommendation the use of the latest available AOP for the drive being used.

(4)   Only with version 5.02 Add-On Profiles.

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 20-750-ENETR Option Module and 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.

Compatible Products

At the time of publication, the 20-750-ENETR option module is compatible with the following products:
- PowerFlex 753 drives (all firmware revisions)
- PowerFlex 755 drives (firmware revision 1.010 or later)
- PowerFlex 755T products (firmware revision 1.001 or later)

At the time of publication, the 20-750-ENET2P option module is compatible with the following products:
- PowerFlex 753 drives (all firmware revisions)
- PowerFlex 755 drives (firmware revision 1.010 or later)

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)

  Cable ships with 20-750-ENETR option module only.
- One Network Communication Option Card, Installation Instructions, 750COM-IN002 or 750COM-IN003.

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 [rok.auto/pcdc](#).

    Connected Components Workbench software cannot be used to configure SCANport-based drives or Bulletin 160 drives.
  - DriveExplorer software, version 6.04 or later[1]

    This software tool has been discontinued and is now available as **freeware** at [rok.auto/pcdc](#). 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[1] software, version 5.06 or later

    A Lite version of DriveExecutive software shipped 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 [rok.auto/pcdc](#). 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 5000 Logix Designer application, version 21.00 or later
- A computer connection to the EtherNet/IP network

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(1)   DriveExplorer and DriveExecutive are not supported when the option module is installed in a PowerFlex 755T product.

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
  -A MSG instruction 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. PowerFlex 750-Series with Total Force Control Drives Installation Instructions, publication 750-IN100.
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 screws 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, 750COM-IN003, 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 (20-750-ENETR option module only)	Chapter 3, Configuring the Option Module
7	Configure the controller to communicate with the option module. Use controller programming software to configure the master on the network to recognize the option module and drive.	Chapter 4, Configuring the Drive in a Logix 5000 System
8	Create a ladder logic program. Use controller programming 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 MSG instructions.	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 and 20-750-ENETR Option Module)

The following table provides information about Tap mode.

> **TIP** The 20-750-ENET2P option module does not support Tap mode.

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. PowerFlex 750-Series with Total Force Control Drives Installation Instructions, publication 750-IN100.
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 screws 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, 750COM-IN003, 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

Notes:

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 18.00 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 Appendix A for the number of CIP connections supported by the option module.

- Verify that you have all required equipment. See Required Equipment on page 15.

⚠ **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 8000-4.5.2.

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 (20-750-ENETR option module only). For information about the operating modes, see <u>Adapter Mode (default) on page 13</u> and <u>Tap Mode (only with 20-750-ENETR Option Module and PowerFlex 755 drives) on page 13</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
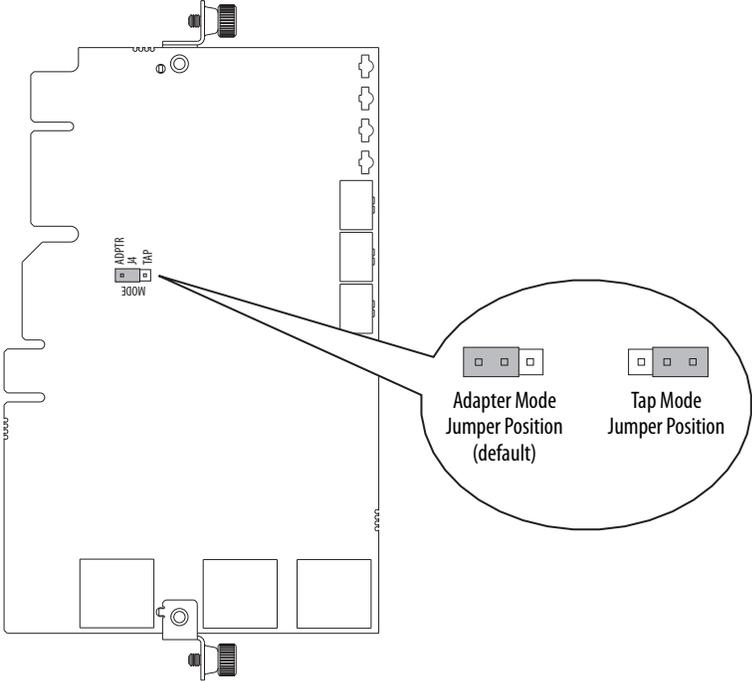
Setting the Node Address

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.xxx. 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.xxx, 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.

> **TIP** For PowerFlex 755T use **Parameter 300 [Net Addr Sel]**. Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

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, set 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.

> **TIP** For PowerFlex 755T products, use **Parameter 300 [Net Addr Sel]** set to '1' (Parameters). Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

- **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).

> **TIP** For PowerFlex 755T products, use **Parameter 300 [Net Addr Sel]** set to '2' (BOOTP). Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

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 <u>Using a BOOTP or DHCP Server on page 38</u> for details).

> **TIP** If the PowerFlex 750-Series drive is connected to a Stratix® 5700, 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 Managed Switches User Manual, publication <u>1783-UM007.</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).

> **TIP** For PowerFlex 755T products, use **Parameter 300 [Net Addr Sel]** set to '3' (DHCP). Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

> **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 117 or page 119) 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

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]**.

> **TIP**   For PowerFlex 755T products, use **Parameter 300 [Net Addr Sel]** and **Parameter 301 [Net Addr Scr]**. Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

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 Network Communication Option Module Installation Instructions, publication [750COM-IN002](#) or [750COM-IN003](#), 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 and 20-750-ENETR Option Module)

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 Network Communication Option Module Installation Instructions, publication [750COM-IN002](#) or [750COM-IN003](#), 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 Option Modules)

To other
EtherNet/IP
networks

External
Ethernet
Switch

Computer with
Ethernet Connection
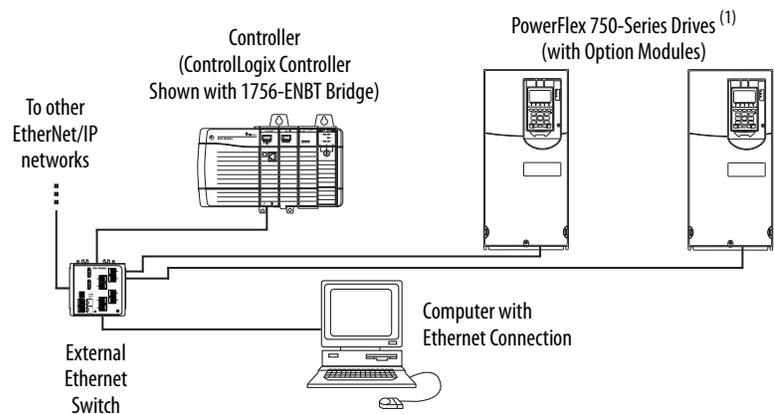
[1]   The ethernet cable can be connected to the option module ENET1 or ENET2 network port.

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

(1) The option module ENET1 and ENET2 network ports are used.
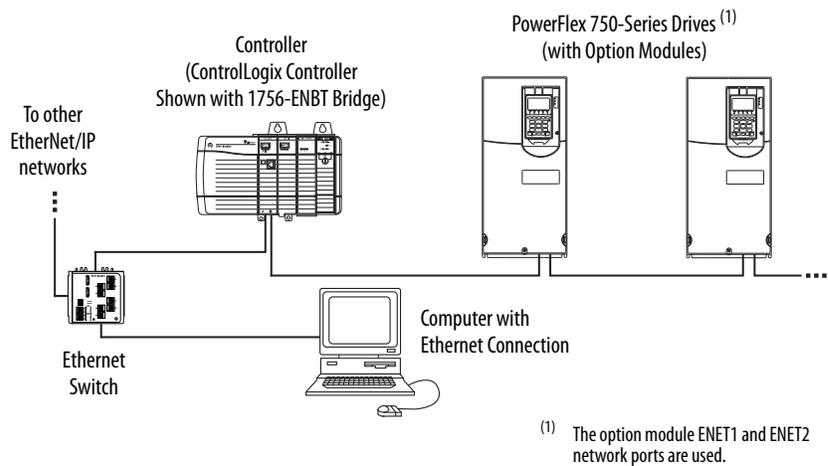
Figure 5 - Connecting the Ethernet Cable in a DLR Topology Network

(1) The option module ENET1 and ENET2 network ports are used.
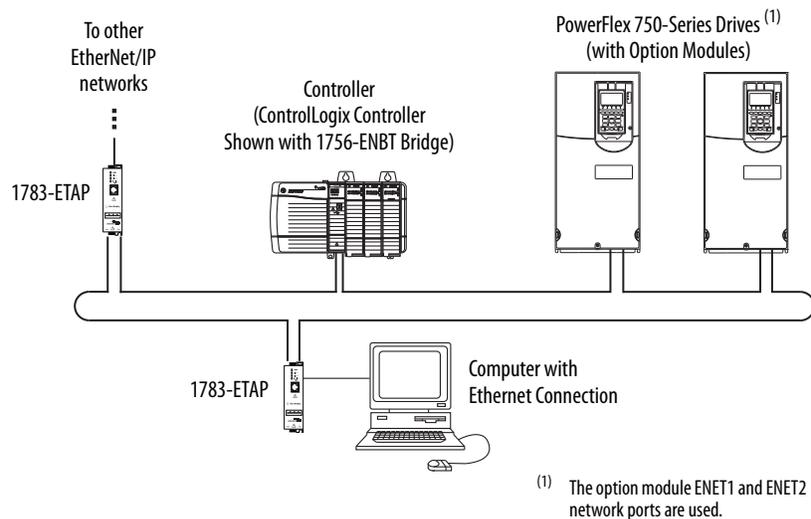
5. Depending on the network topology, do <u>either a or b</u>:

   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 with PowerFlex 755 Drives and 20-750-ENETR Option Module)

⚠ **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)

NOTE: On the PowerFlex 755T, the Ethernet ports are in a different location. It may be necessary to have a longer Ethernet cable.

Ethernet Port on PowerFlex 755 Drive Embedded EtherNet/IP Adapter

Option Module's ENET3 (TAP) 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 2 or Table 3 respectively.

Figure 7 - Drive and Option Module Status Indicators

For possible start-up status indications, see Table 2 for Adapter mode operation or Table 3 for Tap mode operation

Drive Control Pod
(drive shown with cover removed)
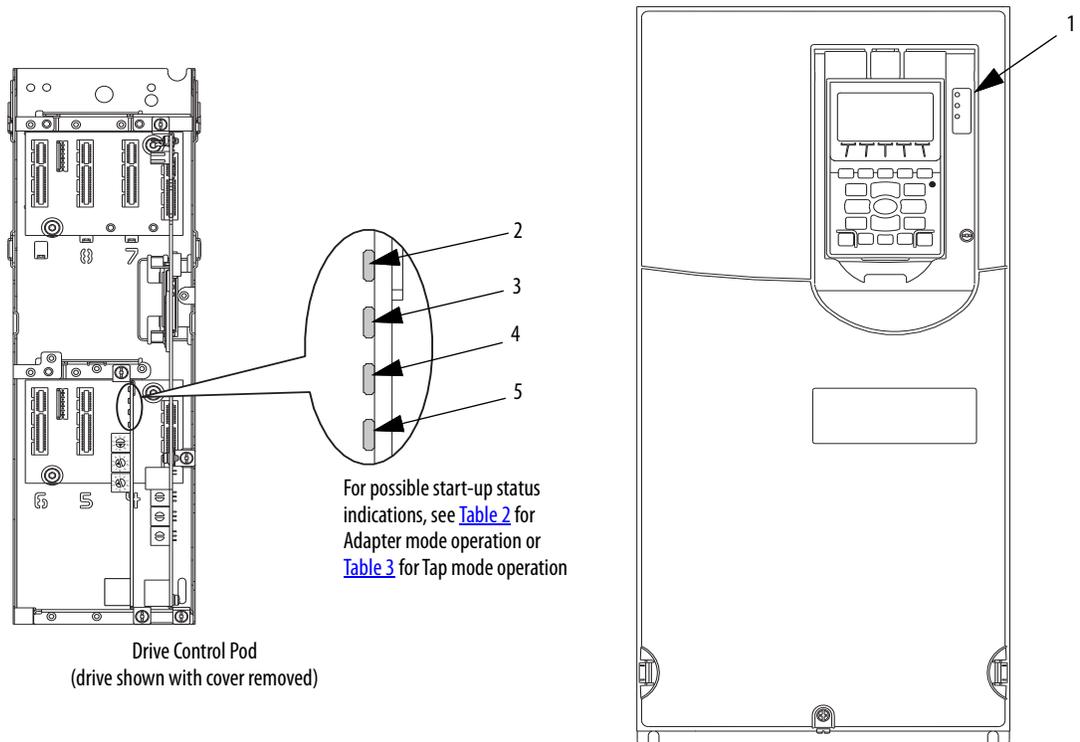
Table 2 - Adapter Mode – Drive and Option Module Start-Up Status Indications

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.
			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.

If any of the option module status indicators are a color other than green, see Chapter 7, beginning on page 107, for troubleshooting information. After verifying correct operation, return the drive cover to its original position.

Table 3 - 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.
			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.

If any of the option module status indicators are a color other than green, see Chapter 7, beginning on page 107, for troubleshooting information. After verifying correct operation, return the drive cover to its original position.

.

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).

TIP	For PowerFlex 755T products, use **Parameter 30 [Access Level]** set to '0' (Basic), '1' (Advanced), or '2' (Expert). Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

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

TIP	For PowerFlex 755T products, use **Parameter 1800 [VRef A Sel]**. Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

3. In the Value box, specify the parameter/port reference that specifies where the ENETR or ENET2P option module is installed. In the following example, **Parameter 874**, which references **Port 4**, is selected.
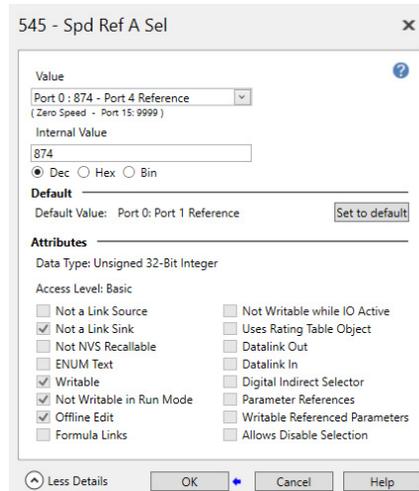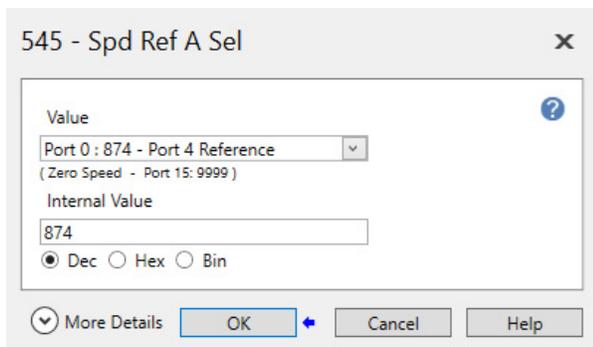
4. Verify that drive **Parameter 930 - [Speed Ref Source]** is reporting the source of the Reference to the drive (Port 0). The source of the reference is to the port in which the option module is installed. For this example, Port 4 Reference.

> **TIP** For PowerFlex 755T use **Parameter 350 [VRef Source]**. Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

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.

> **TIP** For PowerFlex 755T use **Parameter 1914 [VRef Commanded]**. Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

5. 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]** … **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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Access Parameters using the PowerFlex Human Interface Module (HIM)	38
Setting the Option Module Node Address	38
Setting the Data Rate	44
Selecting Leader-follower or Peer-to-peer Hierarchy (Adapter mode only)	45
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Setting Web Page Access (PowerFlex 755 Drive and ENETR Option Module only)	54
Resetting the Option Module	55
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Updating the Option Module Firmware	59

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>rok.auto/pcdc</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 Human Interface Module (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 Parameter # 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 26. 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® 5700, 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 Managed Switches User Manual, publication 1783-UM007.

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 rok.auto/pcdc. 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.
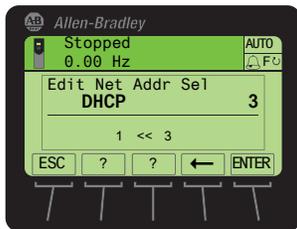
Value	Setting
1	Parameters
2	BOOTP
3	DHCP (default)

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

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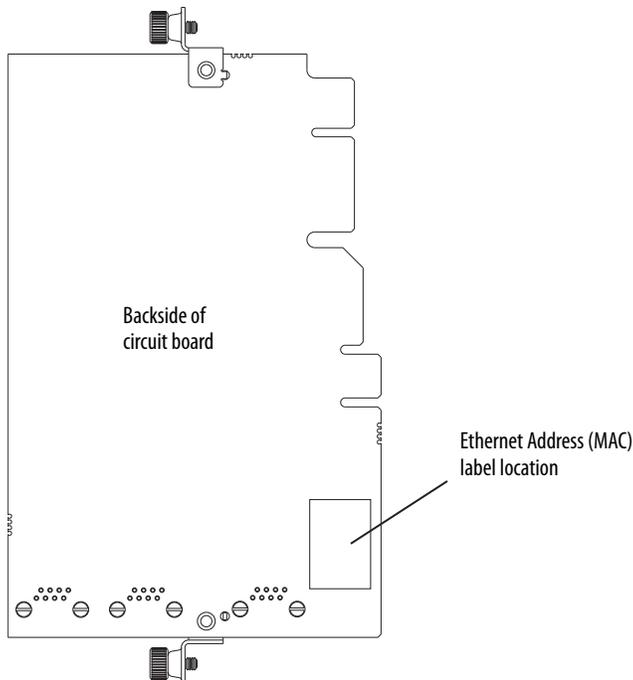
   - Use the HIM to scroll to the drive Port in which the option module is installed and access the option module DIAGNOSTIC folder screen. Then scroll to Diagnostic Items 49…54 (HW Addr 1…6) to view the Ethernet Address (MAC) of the option module hardware.

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

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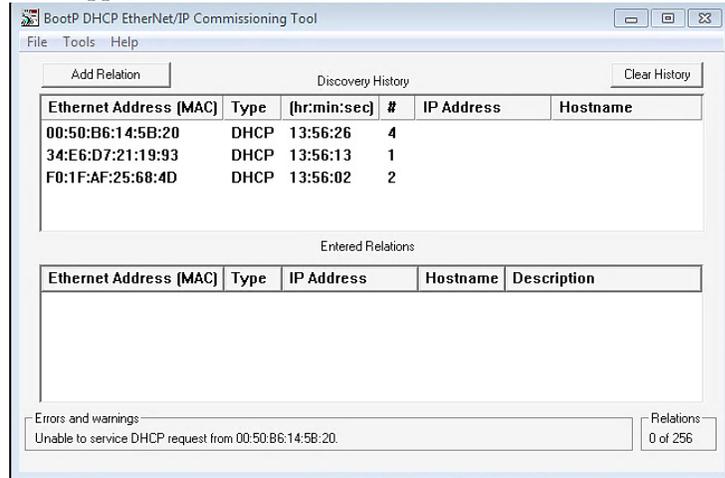
To configure devices on the EtherNet/IP network, you must configure settings in the BOOTP/DHCP software to match the network.

4. From the Tools menu, choose Network Settings.

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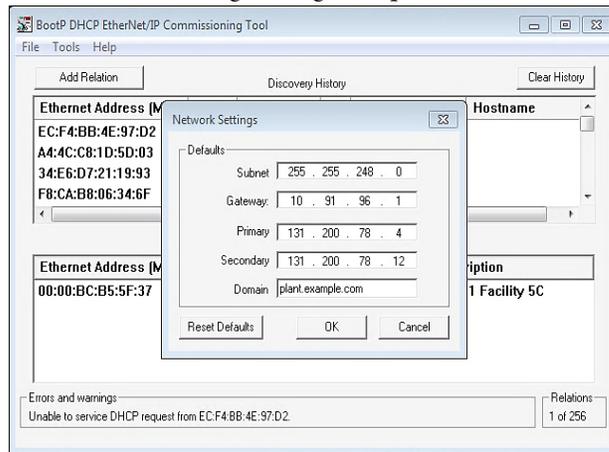
5. Edit the following:

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.
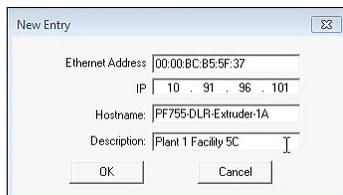
8. Edit the following:

Box	Type
IP [(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 Entered Relations list with the new settings.
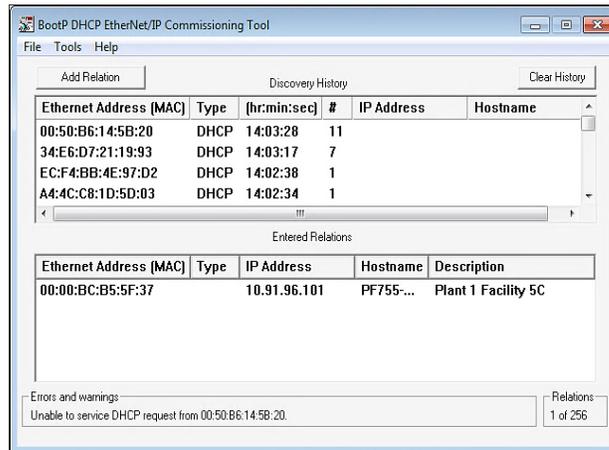
10. To assign this configuration to the option module permanently, select the device in the Entered Relations list and click Disable BOOTP/ DHCP.

    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 right click on the option module in the Entered Relations 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 Entered Relations 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.

> **TIP**   For PowerFlex 755T products, the node address must be set to 999.
> Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

Change the Source for the Node Address

1. Verify that the Node Address switches ([Figure 2 on page 26](#)) 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).
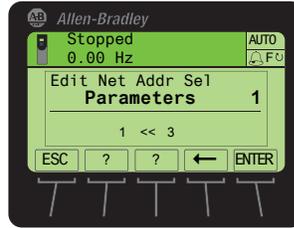
3. Reset the option module; see <u>Resetting the Option Module on page 55</u>.

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 38 [IP Addr Cfg 1]** through **41 [IP Addr Cfg 4]** to a unique IP address.
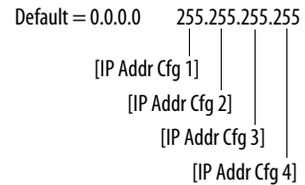
3. Reset the option module. See <u>Resetting the Option Module on page 55</u>.

   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 42 [Subnet Cfg 1]** through **45 [Subnet Cfg 4]** to the desired value for the subnet mask.
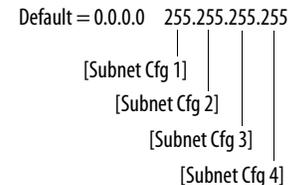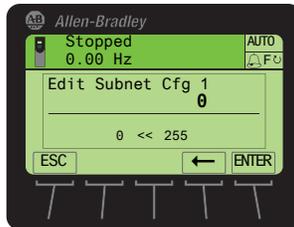
3. Reset the option module. See <u>Resetting the Option Module on page 55</u>.

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 46 [Gateway Cfg 1]** through **49 [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]
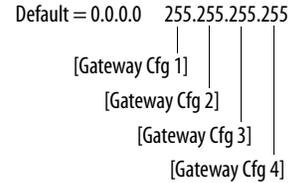
3. Reset the option module. See Resetting the Option Module on page 55.

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 50 [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 50 [Net Rate Cfg 1]** to the data rate at which your network is operating.
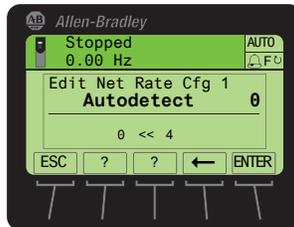
Value	Data Rate
0	Autodetect (default)
1	10 Mbps Full
2	10 Mbps Half
3	100 Mbps Full
4	100 Mbps Half

   > **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 Leader-follower 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 leader-follower hierarchy, the option module exchanges data with a leader, 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 leader-follower 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 Leader-follower Hierarchy

Enable Datalinks To Write Data

The controller output image (controller outputs-to-drive) can have 1...16 additional 32 bit parameters (Datalinks). They are configured using *Host* **Parameters 01 [DL From Net 01]...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 Chapter 4 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, firmware revision 16.00 or greater, install the AOP for the drive so you can configure the Datalink parameters within the controller project.

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 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]**.

   > **TIP**   For PowerFlex 755T products, use **Parameter 10:1800 [VRef A Sel]**. Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

   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.

   > **TIP**   For PowerFlex 755T products, use **Parameter 0:40 [Logic Mask Cfg]**. Note that the 20-750-ENET2P option module does not support PowerFlex 755T products.

   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 Drive in a Logix 5000 System.

Enable Datalinks To Read Data

The controller input image (drive-to-controller inputs) can have 1...16 additional 32 bit parameters (Datalinks). They are configured using *Host* **Parameters 17 [DL To Net 01]** ... **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…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, firmware revision 16 or greater, install the AOP for the drive so you can configure the Datalink parameters within the controller project.

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, 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 <u>Resetting the Option Module on page 55</u>.

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

3. Configure the controller to recognize and transmit I/O to the option module. See <u>Chapter 4</u>, Configuring the Drive in a Logix 5000 System.

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.

> **TIP**   If using the standard embedded Ethernet on the control board in PowerFlex 755T products, peer-to-peer is not available. If you use the ENETR card and plug the Ethernet cable into the option card, you can configure PowerFlex 755T to support peer-to-peer.

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).
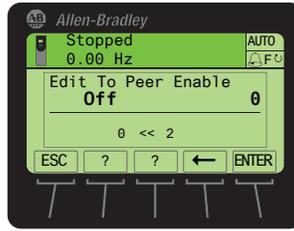
Value	Setting
0	Off (Default)
1	Reserved
2	Custom

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.

To configure the leader (broadcast) side of custom 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.

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) 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 follower (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 leader.

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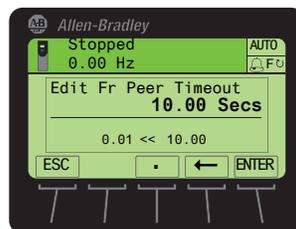
5. Set *Host* **Parameter 35 [Peer Flt Action]** to the desired action if peer I/O data is not received before the timeout is reached.

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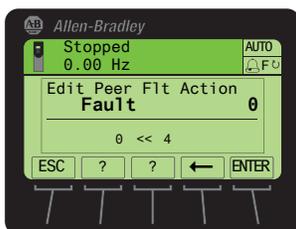
Value	Description
0	Fault (Default)
1	Stop
2	Zero Data
3	Hold Last
4	Send Flt Cfg

For more details about fault action, see <u>Setting a Fault Action (Adapter mode only) on page 52</u>.

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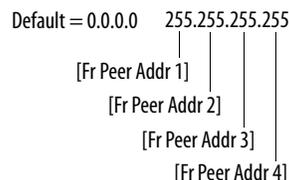
7. If a Logic Command is being sent, use *Device* **Parameter 30 [Logic Src Cfg]**. Set the number of the Datalink that contains the Logic Command within the range defined by *Device* **Parameter 28 [DLs Fr Peer Cfg]**.

    For example, suppose *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) contains 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 <u>Appendix D</u> 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 leader 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)

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 MSG instruction 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 MSG instruction 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.

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 faults and stops. (Default)
1	Stop	The drive stops but does not fault.
2	Zero Data	The adapter sends '0's to the drive.
3	Hold Last	The adapter continues to send the data present at the time of the action.
4	Send Flt Cfg	The adapter sends the logic command reference and data that is configured in these parameters to the drive: (*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
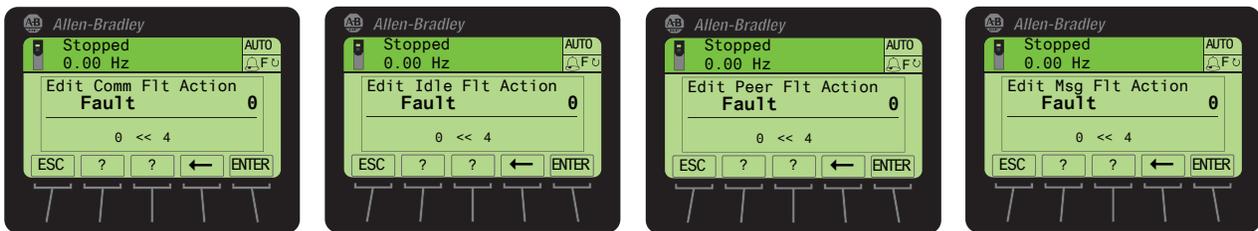
Changes to these parameters take effect immediately. A reset is not required.

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

Setting the Fault Configuration Parameters

When any of these **Parameters** to set to 'Send Flt Cfg the values in Table 4 are sent to the drive:

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

These values are sent after a communication fault, idle fault, peer I/O fault, and/or MSG instruction for drive control fault occurs. You must set these parameters to values required by your application.

Table 4 - Option Module Host Parameters and Descriptions

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] … **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 (PowerFlex 755 Drive and ENETR Option Module only)

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.

TIP	PowerFlex 755T products do not support web pages or email.

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 <u>Chapter 8</u>, How to View Option Module Web Pages (PowerFlex 753/755 with 20-750-ENETR Option Module Only).

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.

> **TIP**   The Parameter 25 [Reset Module] will reset the ENETR card, not the drive.

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 .)

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 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 the Set Defaults action. Common reasons for a conflict include the drive is running or a controller is in Run mode.
	After performing 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.

```
      Allen-Bradley
   Stopped              AUTO
   0.00 Hz              F
      Host Drive
       240V    4.2A
      Rev 3.002 Ser. A
  00
  ESC         REF  PAR# TEXT
```
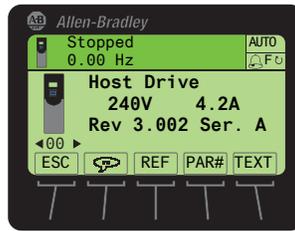
2. Use the 4◄ or ►6 key to scroll to the Port in which the option module is installed.

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 (TAP) 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
- ControlFLASH Plus

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.[1] The ENET2P option module can only be updated over its Ethernet network.

To obtain a firmware update for this option module, go to rok.auto/pcdc. 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, or HyperTerminal software

(1)   The 20-750-ENET2P option module does not support HyperTerminal software.

Notes:

Chapter 4

Configuring the Drive in a Logix 5000 System

This chapter provides instructions on how to configure an Allen-Bradley® ControlLogix® or CompactLogix controller to communicate with the connected option module and 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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Obtain Add-on Profiles

When a new drive is used, or to benefit from new updates for Add-on Profiles (AOP), you need the newest Add-on Profile update. Drive AOPs can be updated anytime, and contain the latest database files available at the time of release.

Go to rok.auto/pcdc to download the latest drive AOPs for the PowerFlex drive. The Logix Designer application drive AOPs 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 manual conversion in the user program. These profiles substantially reduce I/O mismatch errors and drive configuration time.
- The drive tab removes the need for a separate drive-software-configuration tool. All drive configuration can be done within the AOP.
- Drive configuration settings are saved as part of the controller project file (.ACD) and also downloaded to the controller.
- Automatic Device Configuration controller software version 20 or later.

Create Logix Controller Project (Adapter Mode)

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
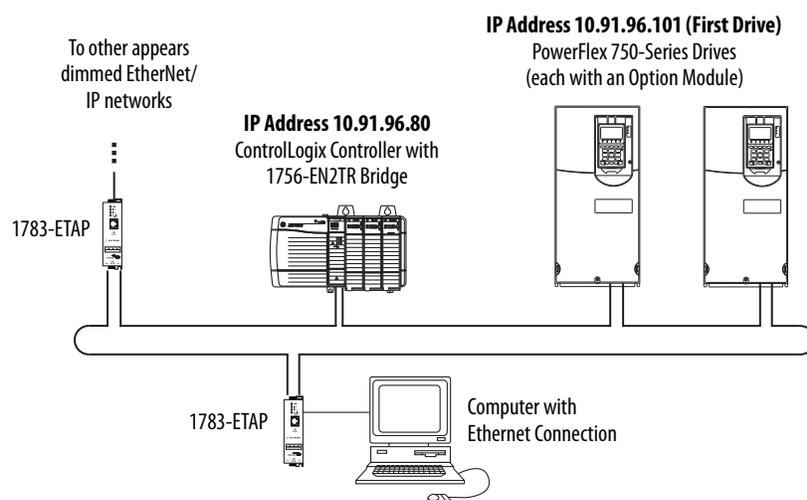
Add the Option Module to a Logix Controller Project

To establish communication between the controller and option module over the network, you must first have a controller project with a Logix 5000 controller and EtherNet/IP communication device.

For more information about controller projects, see the user manual for your controller. For more information about EtherNet/IP drivers and configuration, see EtherNet/IP Network Devices User Manual, publication ENET-UM006-EN-P.

1. In Logix Designer, right-click the EtherNet/IP communication device (1756-EN2TR in this example) and select New Module.
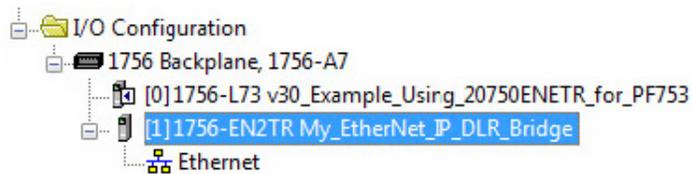
2. Search for and select the appropriate drive and option module combination.
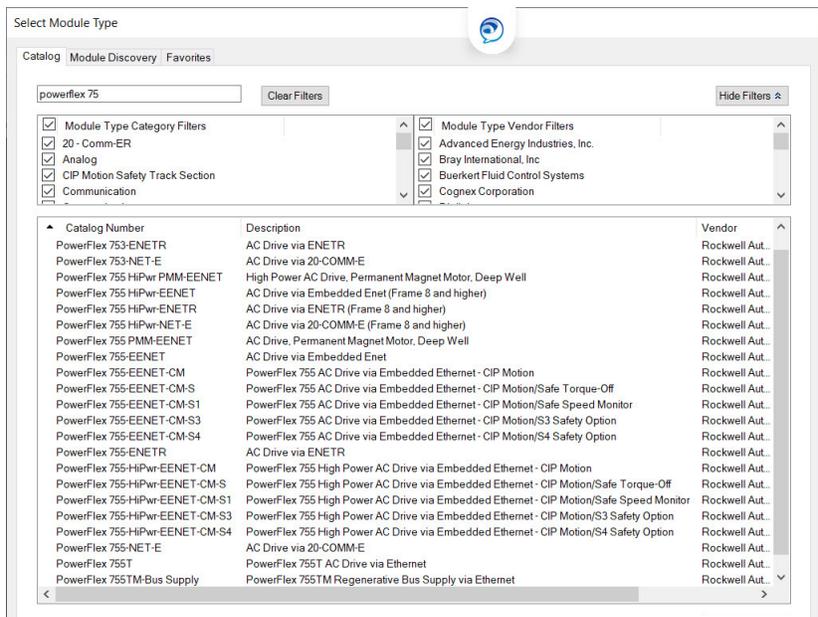
	IMPORTANT	For either the 20-750-ENETR or the 20-750-ENET2P option module, select the ENETR option. Both option modules use the same profile.

	TIP	In Tap mode, the 20-750-ENETR option module is transparent. To use a 20-750-ENETR option module in Tap mode, select a drive and option module combination with a description of Embedded EENET.

3. Click **Create**.

The New Module dialog box for the drive appears.
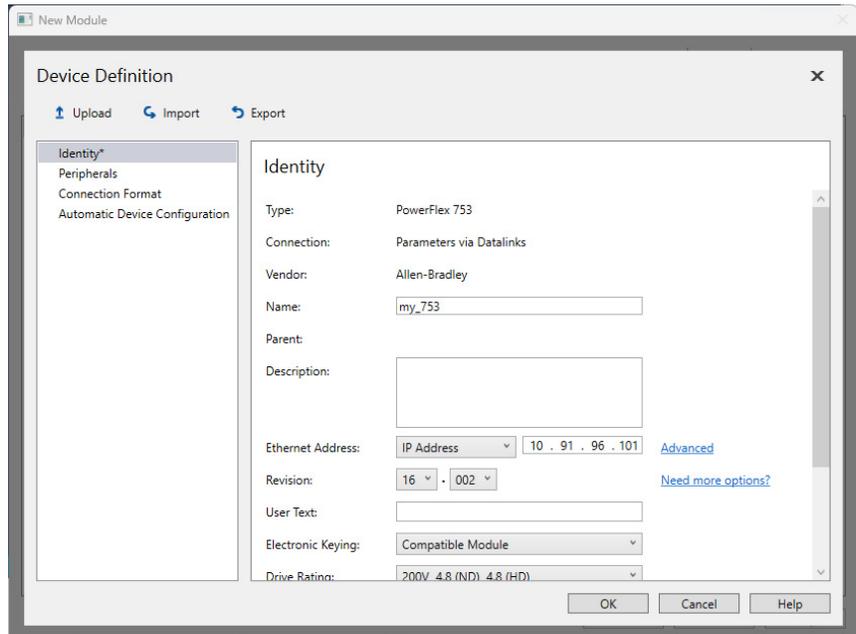
4. Name the drive and option module combination and enter an IP address.

Other settings include:

Setting	Description
Peripherals	Use the Peripherals page to add or remove peripherals for a drive. By default, some drives include predefined peripherals, such as embedded EtherNet/IP and DeviceLogix. For example, PowerFlex 755T drives include an embedded EtherNet/IP peripheral at port 0.
Connection Format	Use the Connection Format page to define the input and output data that will be transferred between the drive and controller and the safety module and controller (if applicable). To define the input and output data for the drive or safety module, you must be offline with the controller.
ADC or Automatic Device Configuration	Use the Automatic Device Configuration page to choose the Automatic Device Configuration (ADC) settings for the selected drive and its peripherals. This page provides a single location for ADC configuration of the drive's ports/devices.

5. Click OK.

The New Module dialog appears.
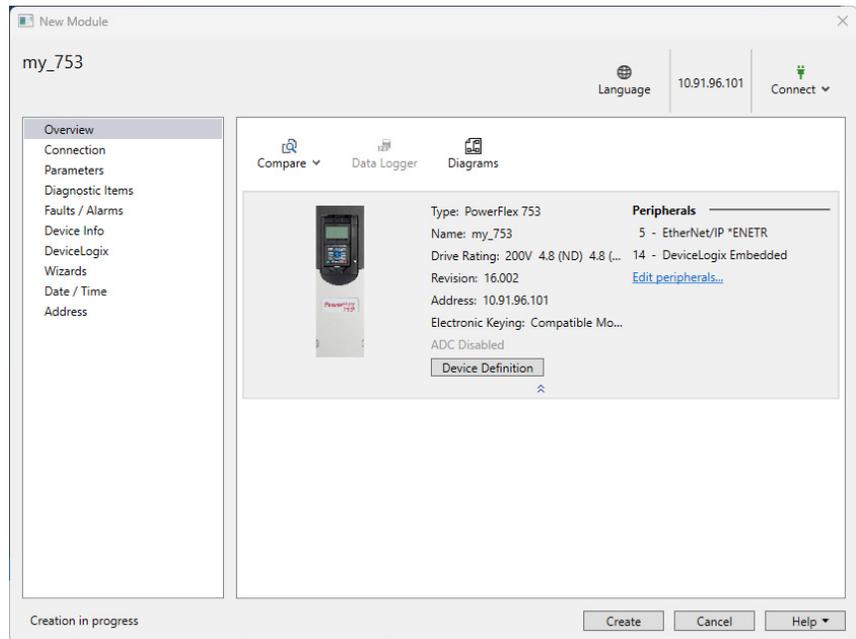
From here, you can configure additional properties and perform additional actions from the following pages.

Page	Description
Connection	Configure advanced controller and drive communication settings and view module faults
Parameters	View and configure parameters for the primary device and its peripheral devices
Diagnostic Items	View detailed information about the present state of the device.
Faults / Alarms	View and troubleshoot device faults, alarms, events, and exceptions for the drive and its peripheral devices.
Device Info	View a hierarchical list of all of the components in the drive, including revision level information.
Device Logix	Enable/disable logic for a drive, access the DeviceLogix (DLX) Editor, and record information associated with DeviceLogix programs.
Wizards	Access and start configuration and application wizards for the selected drive; for example, start-up, homing, or high-speed trend.
Date / Time	Use the Date / Time page to view and change system time settings for an online device. You must be online with the controller and connected to the drive to view and change system time settings.
Address	Use the Address page to view and configure communication settings for the following options or reset the communication settings for the device:

See the online help for details on the individual fields available on each page.

6. Click Create.

The New Module dialog box is closed and the drive and option module combination is added to the Controller Organizer.

Update the Device Profile and Database Files

The first time you go online with the drive, you might be prompted to update the database.

Correlate Drive Settings between the Project and the Drive

There are three ways to correlate the configuration settings of a drive and its peripherals with the settings in your project: Upload, Synchronize, and Download.

Method	Description	How to Acess
Upload	Upload all configuration settings from a physical drive and its peripheral(s) to an existing drive in your project.	Do one of the following: • Drive Details window banner, from the Connect drop-down menu, click Upload. • On the Device Definition window, click Upload.
Synchronize	Synchronize all or portions of the project with a physical drive. Differences between the offline project and physical drive are identified and you can choose which drive to use in the project.	1. Go offline with the controller. 2. In the Drive Details window banner, from the Connect drop-down menu, click Synchronize.
Download	Download all configuration settings from a drive and its peripherals in your project to a physical drive and peripherals. Note that all changes are actively written to the connected drive. Therefore, you cannot "download" to a connected drive.	1. Go offline with the controller. 2. In the Drive Details window banner, from the Connect drop-down menu, click Download.

See the online help for detailed information about the upload, synchronize, and download functions.

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 of the replacement. 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 independent features and can be used with or without each other. The option module must have an IP address before Firmware Supervisor or ADC will execute. If Firmware Supervisor and ADC are both enabled,

Firmware Supervisor executes first and must successfully complete before ADC executes.

Using an Ethernet Switch with a 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® 5700 (1783-EMS…)

The Stratix 5700 performs Dynamic IP address Assignment by Port per the DHCP Address Assignment page.
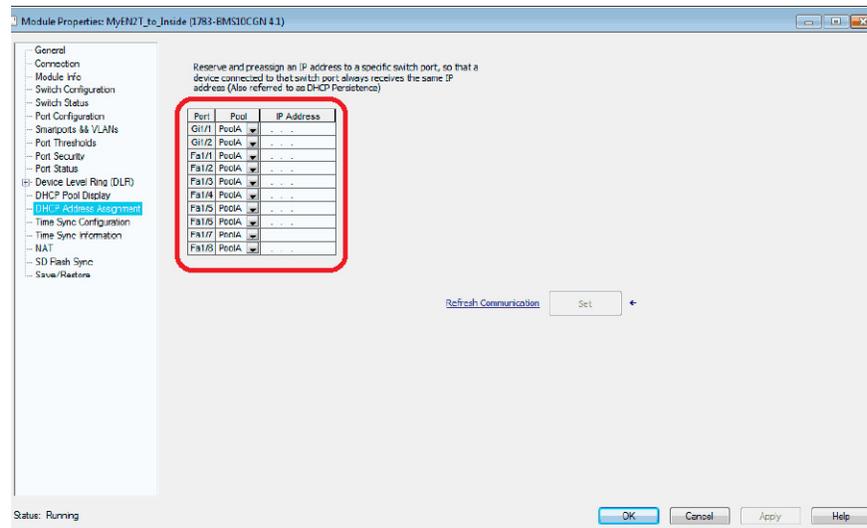
One IP Address is configured for each port on the switch (star topology - one drive per port). If you have a ring topology, the IP Address for the drive must be set via other means, such as the HIM or last octet rotary switches on the drive. Firmware Supervisor and/or ADC can still be used and will execute after the drive gets its IP Address and 'appears' on the network to the Logix controller.

Using Firmware Supervisor

The Firmware Supervisor feature automatically updates firmware in a project with a Logix controller that supports a removable memory card. This includes firmware of all modules having an Allen-Bradley® vendor ID. Firmware Supervisor is not used to update the controller firmware.

When Firmware Supervisor is enabled, the Logix Designer application transfers the firmware files for modules in the project with Electronic Keying set to Exact Match from the workstation to the controller's nonvolatile memory.

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:

- A MSG instruction in the controller program to write to the parameters.
- 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 controller programming 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 MDSG instruction 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 (**Parameter 571…57**7), and/or peripheral ports. Note the parameter value before and after your change. It is the initial parameter write that causes the Configuration Signature to clear for a particular port.

3. Reset the drive from the tool.

   ADC triggers and executes. Any parameter changed in <u>step 2</u> should now be back to the original setting.

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 the drive from the HIM.

   ADC triggers and executes. Any parameter changed in <u>step 1</u> should now be back to the original setting.

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 needs to 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 a configuration download must be performed for a 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 a DeviceLogix program (Port 14) is present and needs to be downloaded.

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 MSG).
NETB (ENETR) LINK (DRIVE)	Green	Flashes	Transmitting on the network.

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

If ADC is unsuccessful, the ENET/NET A status indicator continues to flash green or be off, and programming software can display additional information. When online, the drive at issue has a yellow triangle ⚠ next to it in the 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.

Table 5 - ADC Troubleshooting

Scenario/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 "Disable Keying". While this setting is not recommended with ADC because the type and revision of the drive are not checked, it can be used if parameter settings and overload protection are checked manually. Tuning and other manual adjustments may 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: rok.auto/pcdc

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: rok.auto/pcdc
		• 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: rok.auto/pcdc
		• Change Electronic Keying to "Disable Keying". While this setting is not recommended with ADC because the type and revision of the drive are not checked, it can be used if parameter settings and overload protection are checked manually. Tuning and other manual adjustments may 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 69 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 online help in the controller programming software 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.
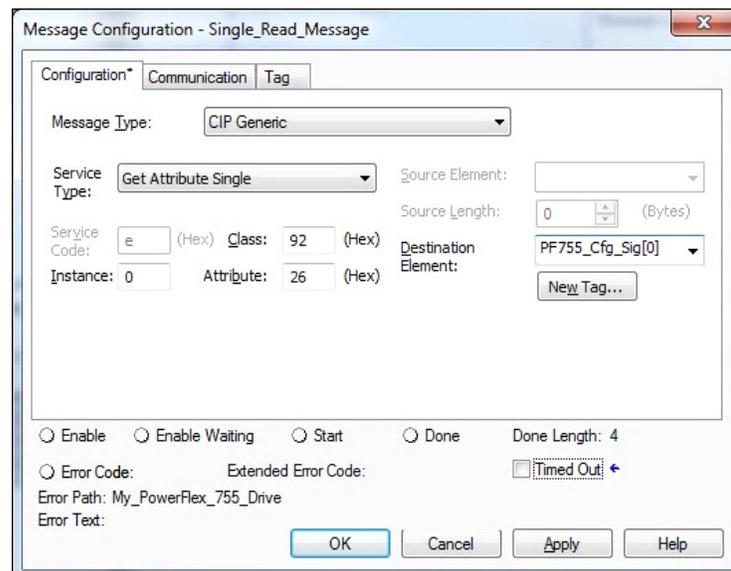
The MSG instruction Get Attribute Single uses the DPI Device Object (Class 92) to access Port 0 in drive (Instance 0). It then reads the Configuration Signature (Attribute 26 Hex = 38 Dec). See <u>DPI Device Object on page 162</u> for additional information.

<u>Figure 11</u> an example Logix program that monitors the Ethernet connection status to the PowerFlex drive and checks for 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 11 - Example of the Logix Program
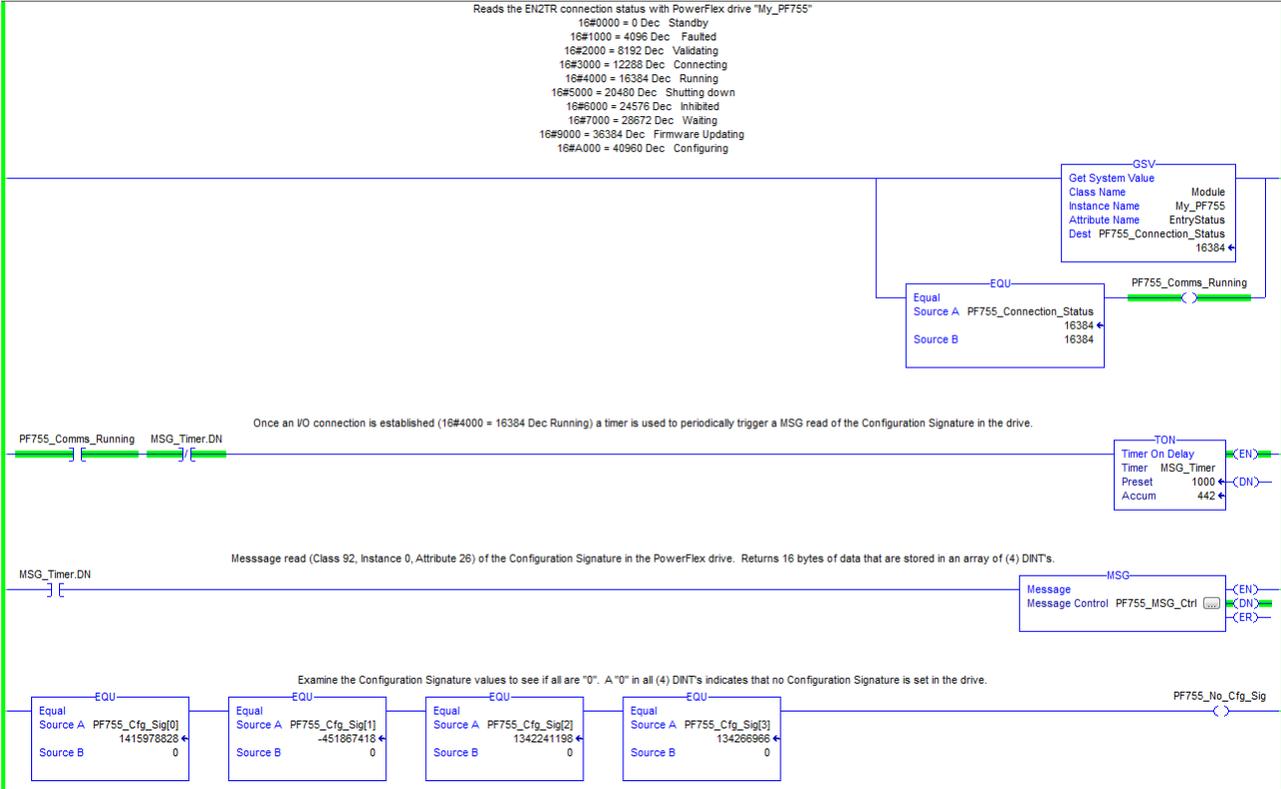
Additional. MSG's would be required to read the Configuration Signatures in the other Ports.

Figure 11 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.

TIP	A considerable time can pass before a drive will power cycle or reset, and 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.

Protected Operations

To maintain the secure operation of your 20-750-ENET/ENET2P option module, operations that can disrupt module operation are restricted based on the module's operating mode. Table 6 describes the restrictions.

Table 6 - Protected Operations on 20-750-ENETR/ENETR2P Option Module

Current Module Operation	CIP and DPI Object Access						
	Firmware Update Request	**Set Default Request**	**Reset Module Request**	**CIP I/O Connection Request**	**Network/Port Configuration Change**	**Electronic Keying Change**	**RPI Change**
Connection and drive not running	Accepted						
Drive running	Rejected		Rejected [1]	Accepted			
CIP I/O connection running	Rejected		Rejected [1]	Rejected		Accepted	
Firmware update is in process	Rejected						

(1)   Only applies to the 20-750-ENET2P option module. The 20-750-ENETR option module does not reject the module request.

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, PowerFlex 753-ENETR, or PowerFlex 755-ENETR/PowerFlex 755-ENET2P 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 Studio 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 Drive in a Logix 5000 System, 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 Studio 5000 software (drive Add-on Profile in version 16.00 or later, or Generic Profile in all versions).

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

Table 7 shows the I/O image when using all 32 bit Datalinks.

Table 7 - ControlLogix Controller I/O Image for PowerFlex 750-Series Drives (32 bit Logic Command/Status, Reference/Feedback, and Datalinks)

DINT	Output I/O	Input I/O Using…			
		DINT	Drive Add-on Profile	DINT	Generic Profile
0	Logic Command	0	Logic Status	0	Padword
1	Reference	1	Feedback	1	Logic Status
2	DL From Net 01	2	DL To Net 01	2	Feedback
3	DL From Net 02	3	DL To Net 02	3	DL To Net 01
4	DL From Net 03	4	DL To Net 03	4	DL To Net 02
5	DL From Net 04	5	DL To Net 04	5	DL To Net 03
6	DL From Net 05	6	DL To Net 05	6	DL To Net 04
7	DL From Net 06	7	DL To Net 06	7	DL To Net 05
8	DL From Net 07	8	DL To Net 07	8	DL To Net 06
9	DL From Net 08	9	DL To Net 08	9	DL To Net 07
10	DL From Net 09	10	DL To Net 09	10	DL To Net 08
11	DL From Net 10	11	DL To Net 10	11	DL To Net 09
12	DL From Net 11	12	DL To Net 11	12	DL To Net 10
13	DL From Net 12	13	DL To Net 12	13	DL To Net 11
14	DL From Net 13	14	DL To Net 13	14	DL To Net 12
15	DL From Net 14	15	DL To Net 14	15	DL To Net 13
16	DL From Net 15	16	DL To Net 15	16	DL To Net 14
17	DL From Net 16	17	DL To Net 16	17	DL To Net 15
				18	DL To Net 16

Using Logic Command/Status

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

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

- DINT 0 in the input image when using the drive Add-on Profile.
- DINT 1 in the input image when using the Generic Profile.

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

Using Reference/Feedback

The Reference is a 32 bit REAL (floating point) 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 Table 7.

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 Figure 17 and Figure 18.

> **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 8 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 8 - 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. See the PowerFlex 750-Series AC Drive Programming Manual, publication 750-PM001 for additional information.
(2) For this example, drive P**arameter 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 a MSG instruction. 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 module

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 the programming 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. For the PowerFlex 755 or 753, set DeviceLogix **Parameter 53 - [DLX Operation]** to 'DisableLogic' to disable the logic (the parameter value then changes to 'LogicDisabld') on port 14.

> **TIP**   For PowerFlex 755T, set **Parameter 09:1000 - [DLX OperationCmd]** 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 a Studio 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.

Automatically Define Tags with the Drive Add-on Profile

The drive Add-on Profile automatically creates descriptive controller tags for the entire I/O image. 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 12) and a ladder logic program that passes the Controller tag data to the program tags.

Figure 12 - ControlLogix Program Tags for Drive Add-on Profile Ladder Logic Program Example

Name	Value	←	Data Type	Description
⊞ ENETR:C		{...}	AB:ETHERNET_...	
⊞ ENETR:O		{...}	AB:ETHERNET_...	
⊞ ENETR:I		{...}	AB:ETHERNET_...	
⊞ My_PowerFlex_755_Drive:I		{...}	AB:PowerFlex755...	
⊞ My_PowerFlex_755_Drive:O		{...}	AB:PowerFlex755...	
Command_Clear_Faults	0		BOOL	
Command_Forward_Reverse	0		BOOL	
Command_Jog	0		BOOL	
Command_Start	0		BOOL	
Command_Stop	0		BOOL	
Execute_Scattered_Read_Message	1		BOOL	
Execute_Scattered_Write_Message	1		BOOL	
Execute_Single_Read_Message	0		BOOL	
Execute_Single_Write_Message	0		BOOL	
Status_Active	0		BOOL	
Status_At_Speed	0		BOOL	
Status_Faulted	0		BOOL	
Status_Forward	0		BOOL	
Status_Ready	0		BOOL	
Status_Reverse	1		BOOL	
⊞ Scattered_Read_Request		{...}	DINT[10]	
⊞ Scattered_Write_Response		{...}	DINT[10]	
⊞ Scattered_Read_Message		{...}	MESSAGE	
⊞ Scattered_Write_Message		{...}	MESSAGE	
⊞ Single_Read_Message		{...}	MESSAGE	
⊞ Single_Write_Message		{...}	MESSAGE	
Accel_Time_1	0.0		REAL	
Output_Current	0.0		REAL	
Speed_Feedback	0.0		REAL	
Speed_Reference	0.0		REAL	
⊞ Scattered_Read_Response		{...}	Scattered_Read_...	
⊞ Scattered_Write_Request		{...}	Scattered_Write_...	

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 13 and Figure 14. The name that is assigned when configuring the I/O (Chapter 4) determines the prefix for the drive controller tags.

Figure 13 - ControlLogix Controller Example Ladder Logic Program Using a Drive Add-on Profile for Logic Status/Feedback

Figure 14 - ControlLogix Controller Example Ladder Logic Program Using a Drive Add-on Profile for Logic Command/Reference
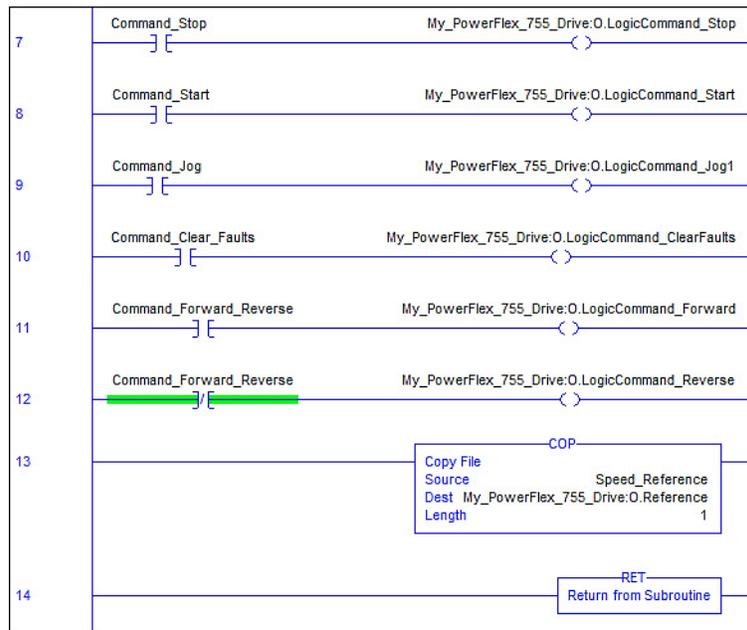
Manually Define Tags with the Generic Profile

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 Parameter 370 - [Stop Mode A]
02 - [DL From Net 02]	371	Points to drive Parameter 371 - [Stop Mode B]
03 - [DL From Net 03]	535	Points to drive Parameter 535 - [Accel Time 1]
04 - [DL From Net 04]	536	Points to drive Parameter 536 - [Accel Time 2]
05 - [DL From Net 05]	537	Points to drive Parameter 537 - [Decel Time 1]
06 - [DL From Net 06]	538	Points to drive Parameter 538 - [Decel Time 2]
07 - [DL From Net 07]	539	Points to drive Parameter 539 - [Jog Acc Dec Time]
08 - [DL From Net 08]	556	Points to drive Parameter 556 - [Jog Speed 1]
09 - [DL From Net 09]	557	Points to drive Parameter 557 - [Jog Speed 2]
10 - [DL From Net 10]	571	Points to drive Parameter 571 - [Preset Speed 1]
11 - [DL From Net 11]	572	Points to drive Parameter 572 - [Preset Speed 2]
12 - [DL From Net 12]	573	Points to drive Parameter 573 - [Preset Speed 3]
13 - [DL From Net 13]	574	Points to drive Parameter 574 - [Preset Speed 4]
14 - [DL From Net 14]	575	Points to drive Parameter 575 - [Preset Speed 5]
15 - [DL From Net 15]	576	Points to drive Parameter 576 - [Preset Speed 6]
16 - [DL From Net 16]	577	Points to drive Parameter 577 - [Preset Speed 7]
17 - [DL To Net 01]	370	Points to drive Parameter 370 - [Stop Mode A]
18 - [DL To Net 02]	371	Points to drive Parameter 371 - [Stop Mode B]
19 - [DL To Net 03]	535	Points to drive Parameter 535 - [Accel Time 1]
20 - [DL To Net 04]	536	Points to drive Parameter 536 - [Accel Time 2]
21 - [DL To Net 05]	537	Points to drive Parameter 537 - [Decel Time 1]
22 - [DL To Net 06]	538	Points to drive Parameter 538 - [Decel Time 2]
23 - [DL To Net 07]	539	Points to drive Parameter 539 - [Jog Acc Dec Time]
24 - [DL To Net 08]	556	Points to drive Parameter 556 - [Jog Speed 1]
25 - [DL To Net 09]	557	Points to drive Parameter 557 - [Jog Speed 2]
26 - [DL To Net 10]	571	Points to drive Parameter 571 - [Preset Speed 1]
27 - [DL To Net 11]	572	Points to drive Parameter 572 - [Preset Speed 2]
28 - [DL To Net 12]	573	Points to drive Parameter 573 - [Preset Speed 3]
29 - [DL To Net 13]	574	Points to drive Parameter 574 - [Preset Speed 4]
30 - [DL To Net 14]	575	Points to drive Parameter 575 - [Preset Speed 5]
31 - [DL To Net 15]	576	Points to drive Parameter 576 - [Preset Speed 6]
32 - [DL To Net 16]	577	Points to drive Parameter 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](#)), the software automatically creates generic (non-descriptive) controller tags. In this example program, the following controller tags are used.

+ My_PowerFlex_755_Drive:I	{ . . . }	AB:PowerFlex755...
+ My_PowerFlex_755_Drive:O	{ . . . }	AB:PowerFlex755...

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 15](#)). The Output tag for this example program requires eighteen 32 bit words of data ([Figure 16](#)).

Figure 15 - ControlLogix Controller Input Image for Drive Generic Profile (example ladder logic program)

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

Scope: v30_Example_us   Show: All Tags

Figure 16 - ControlLogix Controller Output Image for Drive Generic Profile (example ladder logic program)

Name	Data Type	Description
⊟ ENETR:O.Data	DINT[18]	
⊞ ENETR:O.Data[0]	DINT	Logic Command
⊞ ENETR:O.Data[1]	DINT	Speed Reference
⊞ ENETR:O.Data[2]	DINT	DL From Net 01
⊞ ENETR:O.Data[3]	DINT	DL From Net 02
⊞ ENETR:O.Data[4]	DINT	DL From Net 03
⊞ ENETR:O.Data[5]	DINT	DL From Net 04
⊞ ENETR:O.Data[6]	DINT	DL From Net 05
⊞ ENETR:O.Data[7]	DINT	DL From Net 06
⊞ ENETR:O.Data[8]	DINT	DL From Net 07
⊞ ENETR:O.Data[9]	DINT	DL From Net 08
⊞ ENETR:O.Data[10]	DINT	DL From Net 09
⊞ ENETR:O.Data[11]	DINT	DL From Net 10
⊞ ENETR:O.Data[12]	DINT	DL From Net 11
⊞ ENETR:O.Data[13]	DINT	DL From Net 12
⊞ ENETR:O.Data[14]	DINT	DL From Net 13
⊞ ENETR:O.Data[15]	DINT	DL From Net 14
⊞ ENETR:O.Data[16]	DINT	DL From Net 15
⊞ ENETR: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	
Execute_Scattered_Read_Message	1	BOOL	
Execute_Scattered_Write_Message	1	BOOL	
Execute_Single_Read_Message	0	BOOL	
Execute_Single_Write_Message	0	BOOL	
Status_Active	0	BOOL	
Status_At_Speed	0	BOOL	
Status_Faulted	0	BOOL	
Status_Forward	0	BOOL	
Status_Ready	0	BOOL	
Status_Reverse	1	BOOL	
⊞ Scattered_Read_Request	{...}	DINT[10]	
⊞ Scattered_Write_Response	{...}	DINT[10]	
⊞ Scattered_Read_Message	{...}	MESSAGE	
⊞ Scattered_Write_Message	{...}	MESSAGE	
⊞ Single_Read_Message	{...}	MESSAGE	
⊞ Single_Write_Message	{...}	MESSAGE	
Accel_Time_1	0.0	REAL	
Output_Current	0.0	REAL	
Speed_Feedback	0.0	REAL	
Speed_Reference	0.0	REAL	

Figure 17 - ControlLogix Controller Example Ladder Logic Program Using a Drive Generic Profile for Logic Status/Feedback
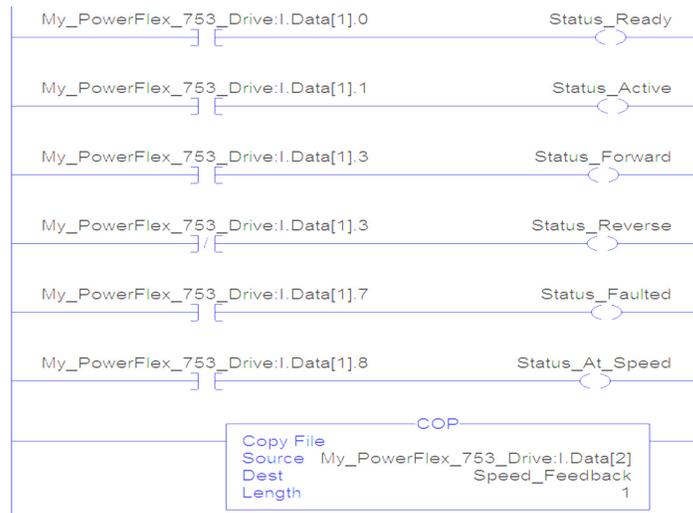
Figure 18 - ControlLogix Controller Example Ladder Logic Program Using a Drive Generic Profile for Logic Command/Reference
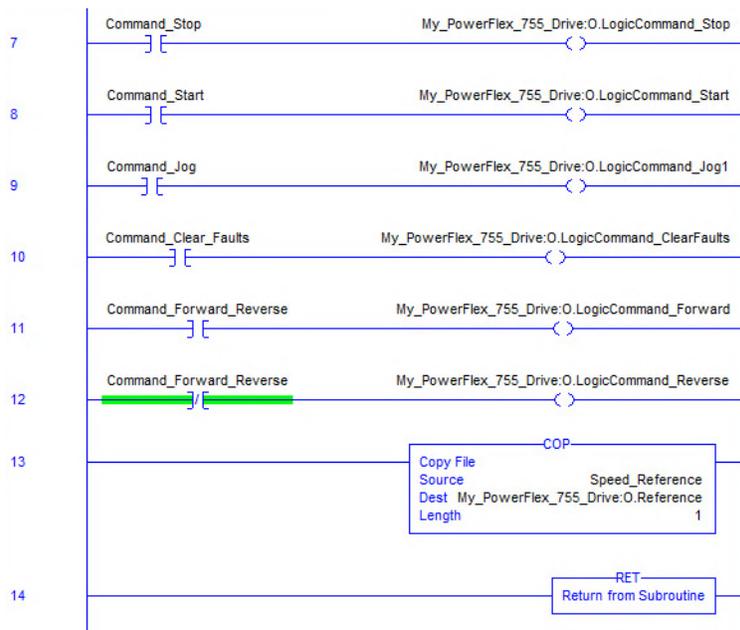
Example Datalink Data

The Datalink data that is used in the example program is shown in Figure 19. 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 19 - 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 MSG instructions 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 MSG instructions 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 uses a MSG instruction 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	By default, a MSG instruction is 'unconnected' and does not use a connection between the controller and drive. When timing of the message is important, check the 'Connected' box in the MSG configuration to create a dedicated message connection. As you increase the number of connected MSG instructions, network performance decreases.

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

- DPI Parameter Object section on page 165 for *Device* parameters
- Host DPI Parameter Object section on page 181 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 9 shows the EtherNet/IP Object Class code compatibilities for these drives.

Table 9 - 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 165 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 181 for instance (parameter) numbering.

MSG Instruction Process

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

Figure 20 - MSG instruction Process
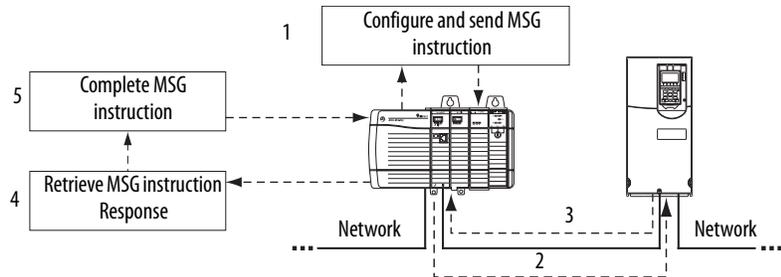
Event	Description
1	You format the required data and configure the ladder logic program to send a message request to the scanner or bridge module (download).
2	The scanner or bridge module transmits the message Request to the slave device over the network.
3	The slave device transmits the message Response back to the scanner. The data is stored in the scanner buffer.
4	The controller retrieves the message Response from the scanner buffer (upload).
5	The message is complete.

For information on the maximum number of MSG instruction 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, 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 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 10 - Example Controller Tags to Read a Single Parameter

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

Figure 21 - Example Ladder Logic to Read a Single Parameter

ControlLogix – Formatting a Message to Read a Single Parameter

Figure 22 - Get Attribute Single Message, Configuration Dialog-boxes
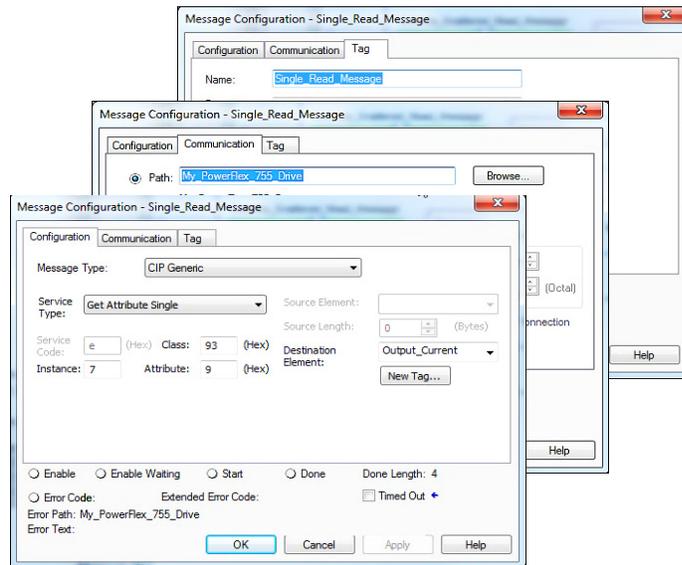
The following table identifies the data that is required in each box to configure a message to read a parameter.

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 165 (Class code 0x93) or Host DPI Parameter Object on page 181 (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 9 on page 92 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 11 - Example Controller Tags to Write a Single Parameter

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

Figure 23 - Example Ladder Logic to Write a Single Parameter

ControlLogix – Formatting a Message to Write a Single Parameter

Figure 24 - Set Attribute Single Message Configuration Dialog-boxes
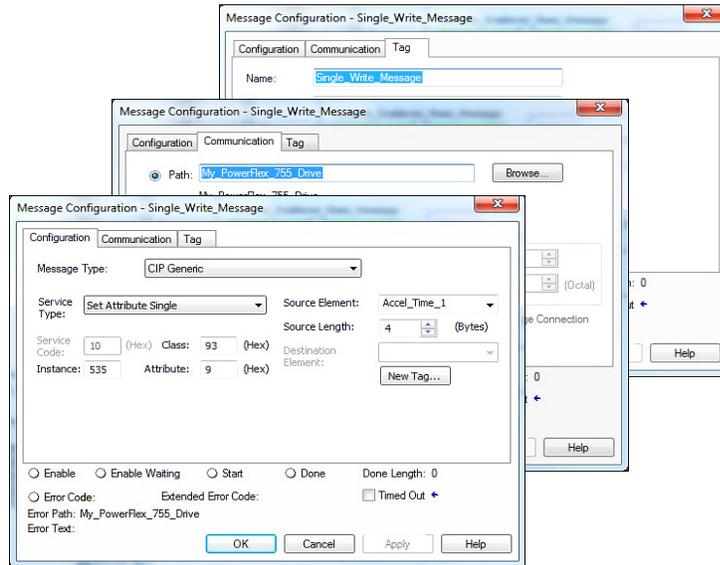
The following table identifies the data that is required in each box to configure a message to write a parameter.

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

Communication Tab	Example Value	Description
Path [4]	My_PowerFlex_755_Drive	The path is the route that the message 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 165 (Class code 0x93) or Host DPI Parameter Object on page 181 (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 9 on page 92 for limitations of PowerFlex 750-Series drives.

(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 12 and Table 13 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 12 - 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 13 - 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]**

> **TIP**   The parameters for PowerFlex 755T are as follows in Port 10/11:
>
> - Parameter 001 - [Output Frequency]
> - Parameter 002 - [Output Voltage]
> - Parameter 003 - [Output Current]
> - Parameter 004 - [Output Power]
>
> The parameters for PowerFlex 755T are as follows in Port 0
>
> - Parameter 003 - [DC Bus Volts]

See <u>DPI Parameter Object on page 165</u> (Class code 0x93) or <u>Host DPI Parameter Object on page 181</u> (Class code 0x9F) for parameter numbering.

Table 14 - Example Controller Tags to Read Multiple Parameters

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

Figure 25 - Example Ladder Logic to Read Multiple Parameters

ControlLogix – Formatting a Message to Read Multiple Parameters

Figure 26 - Scattered Read Message Configuration Dialog-boxes
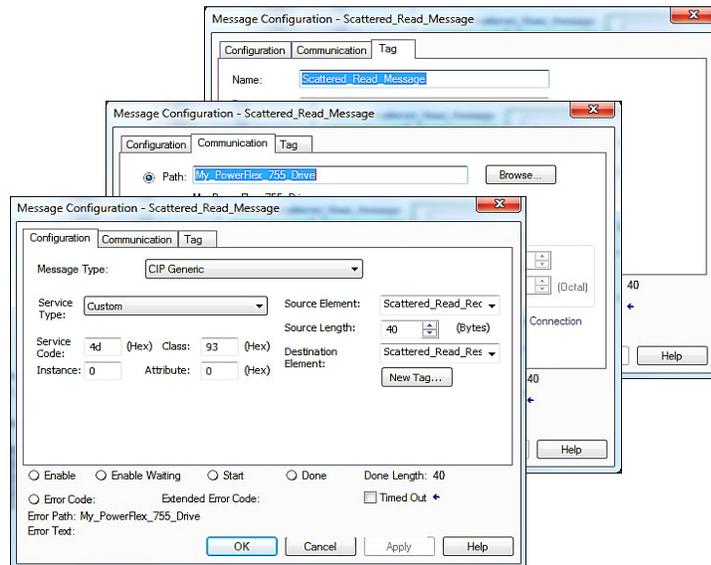
The following table identifies the data that is required in each box to configure a message to read multiple parameters.

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 9 on page 92 for limitations of PowerFlex 750-Series drives.

(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 165 (Class code 0x93) or Host DPI Parameter Object on page 181 (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 27.

- **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 165 (Class code 0x93) or Host DPI Parameter Object on page 181 (Class code 0x9F) for parameter numbering.

Figure 27 - Example Scattered Read Request Data

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 28 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 28 - Example Scattered Read Response Converted Data

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 <u>DPI Parameter Object on page 165</u> (Class code 0x93) or <u>Host DPI Parameter Object on page 181</u> (Class code 0x9F) for parameter numbering.

**Table 15 - Example Controller Tags to Write Multiple Parameters**

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

Figure 29 - Example Ladder Logic to Write Multiple Parameters

IMPORTANT	If you need to continuously write the MSG instruction, use a separate MSG instruction for each parameter. Use DPI Parameter Object Class code 0x93 and attribute A (see <u>page 96</u>). 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 30 - 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 Service Type [1] Service Code [1] Class Instance Attribute [2] Source Element Source Length Destination	CIP Generic Custom 4e (Hex.) 93 or 9F (Hex.) [4] 0 (Dec.) 0 (Hex.) Scattered_Write_Request [5] 40 bytes [5] Scattered_Write_Response [6]	Used to access the DPI Parameter Object in the option module. Required for scattered messages. Code for the requested service. Class ID for the DPI Parameter Object. Required for scattered messages. Required for scattered messages. Name of the tag for any service data to be sent from scanner or bridge to the option module/ drive. Number of bytes of service data to be sent in the message. 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 9 on page 92 for limitations of PowerFlex 750-Series drives.

(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 165 (Class code 0x93) or Host DPI Parameter Object on page 181 (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 <u>Figure 31</u> 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 <u>DPI Parameter Object on page 165</u> (Class code 0x93) or <u>Host DPI Parameter Object on page 181</u> (Class code 0x9F) for parameter numbering.

<u>Figure 31</u> 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 31 - Example Scattered Write Request Converted Data

Name	Value	←	Data Type	Description
─ Scattered_Read_Response		{...}	Scattered_Read_...	
+ Scattered_Read_Response.Output_Frequency_Par_No		1	INT	
── Scattered_Read_Response.Output_Frequency_Par_Value		0.0	REAL	
+ Scattered_Read_Response.Output_Current_Par_No		7	INT	
── Scattered_Read_Response.Output_Current_Par_Value		0.0	REAL	
+ Scattered_Read_Response.Output_Voltage_Par_No		8	INT	
── Scattered_Read_Response.Output_Voltage_Par_Value		0.0	REAL	
+ Scattered_Read_Response.Output_Power_Par_No		9	INT	
── Scattered_Read_Response.Output_Power_Par_Value		0.0	REAL	
+ Scattered_Read_Response.DC_Bus_Volts_Par_No		11	INT	
── Scattered_Read_Response.DC_Bus_Volts_Par_Value		567.20544	REAL	

ControlLogix Controller Example Scattered Write Response Data

The results of the message appear in the destination tag named Scattered_Write_Response (<u>Figure 32</u>). Values of '0' indicate that no errors occurred.

Figure 32 - Example Scattered Write Response Data

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

Notes:

Troubleshooting

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

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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)
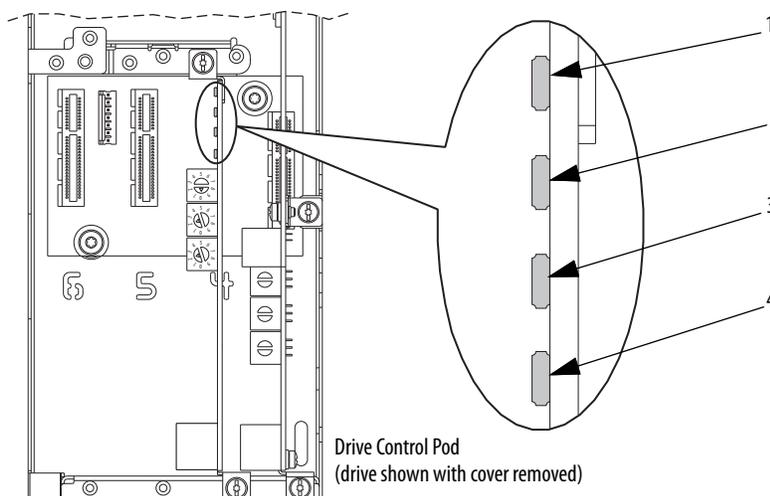
Item	Adapter Mode Operation		
	Indicator Name	Description	See
1	PORT	DPI™ Connection Status	Page 108
2	MOD	Option Module Status	Page 108
3	NET A	Network Connection Status	Page 110
4	NET B	Option Module Transmission Status	Page 110

Item	Tap Mode Operation		
	Indicator Name	Description	See
	OK	Option Module Status	Page 112
	LINK 1	ENET1 Network Port Status	Page 113
	LINK 2	ENET2 Network Port Status	Page 113
	LINK 3	ENET3 Network Port Status	Page 114

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 Yellow	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 internal 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 (not applicable to 750-ENET2P option module)	• 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 MSG).	• 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 MSG).	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 (with 20-750-ENETR Option Module Only)

Use the following sections to troubleshoot the Tap mode of operation. Note that Tap mode is not supported on the 750COM-ENET2P option module.

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

> **TIP** DriveExplorer and DriveExecutive are not supported when the option module is installed in a PowerFlex 755T drive.

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 16 and Table 17.

Diagnostic Items for Adapter Mode Operation

Table 16 - 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 16 - 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 16 - 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. Not applicable to the750COM-ENET2P option module.
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. Not applicable to the750COM-ENET2P option module.

Diagnostic Items for Tap Mode Operation

Table 17 - 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 17 - 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 time stamp is put into the event queue. You can view the event queue with any of these drive configuration tools:

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

> **TIP**   DriveExplorer and DriveExecutive are not supported when the option module is installed in a PowerFlex 755T drive.

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 18 - 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.

Table 18 - Option Module Events (continued)

Code	Event Text	Description
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.
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.

Table 18 - Option Module Events (continued)

Code	Event Text	Description
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.
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 (PowerFlex 753/755 with 20-750-ENETR Option Module Only)

This chapter details how to monitor the PowerFlex® 750-Series drive and its EtherNet/IP option module with the web interface for the module.[1]

Topic	Page
Enable the Option Module Web Pages	123
View Web Pages in Adapter Mode	123
Adapter Mode Process Display Pop-up Dialog Box	126
Adapter Mode TCP/IP Configuration Web Page	127
Adapter Mode Configure Email Notification Web Page	128
Adapter Mode Device-information Pages	130
View Web Pages in Tap Mode	133

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.

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(1) The 20-750-ENET2P option module does not support the Web page feature.

Bit 0 of *Device* **Parameter 27 - [Web Features]** can be used to help protect the configured settings. For more details, see <u>Adapter Mode Configure Email Notification Web Page on page 128</u>.

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 (<u>Figure 33</u>) 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 33 - Example of the Adapter Mode Home Page
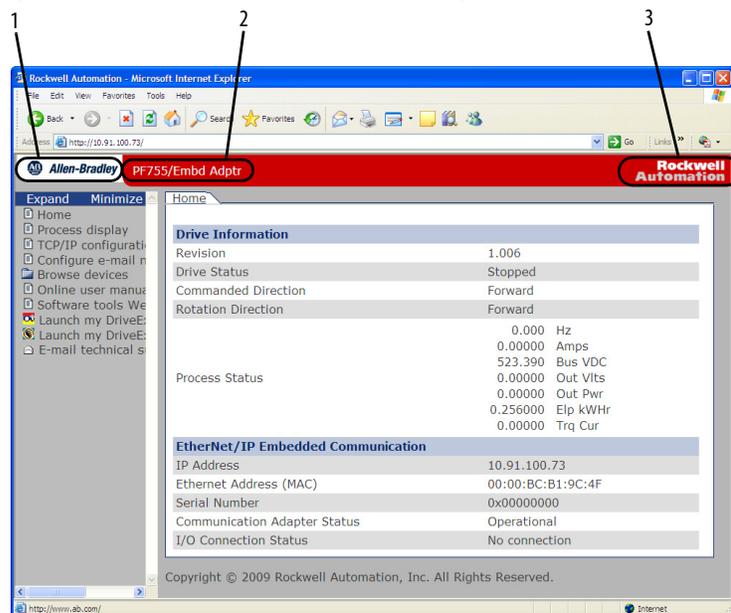
Title Bar on Adapter Mode Web Pages

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 33.

Title Bar Element	Description
1 Allen-Bradley® logo	This logo is a hyperlink.
2 Option Module Title	Shows the option module type or user-configured title.
3 Rockwell Automation® logo	This logo is a hyperlink.

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 33) of the module.
Process display link	Click this link to view the host drive Process Display pop-up dialog box (Figure 34).
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 35 shows an example TCP/IP Configuration page.
Configure email notification link	Click this link to view the Configure Email Notification web page (Figure 36) of the module to configure the option module to send automatic email messages. An example email message is shown in Figure 38.
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 39, Figure 40, and Figure 41.
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.[1]
Launch my DriveExecutive software link	Click this link to launch the DriveExecutive software that is already installed on your computer.[1]
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.

(1)   DriveExplorer and DriveExecutive are not supported when the option module is installed in a PowerFlex 755T drive.

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 34 - Example of Adapter Mode Process Display Pop-up Dialog Box
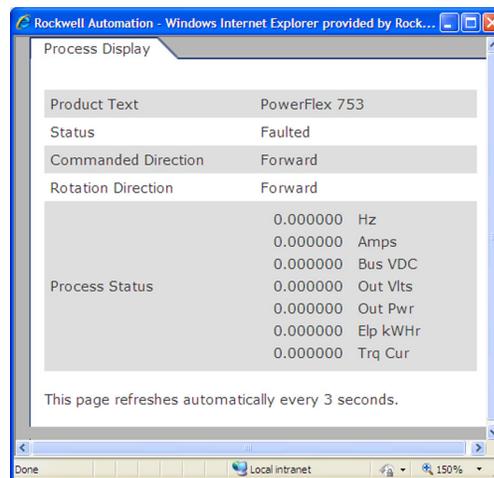
Information	Description
Product Text	Description of host drive.
Status	Status of host drive.
Commanded Direction	Commanded direction of host drive.
Rotation Direction	Rotation direction of host drive.
Process Status First Line	 Dynamic value of the host drive feedback parameter. This parameter is not 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.[1]

(1) Lines 2…7 are not available when the option module is installed in a PowerFlex 755T drive.

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 35</u>) in the navigation pane.

Figure 35 - Example of Adapter Mode TCP/IP Configuration Web Page
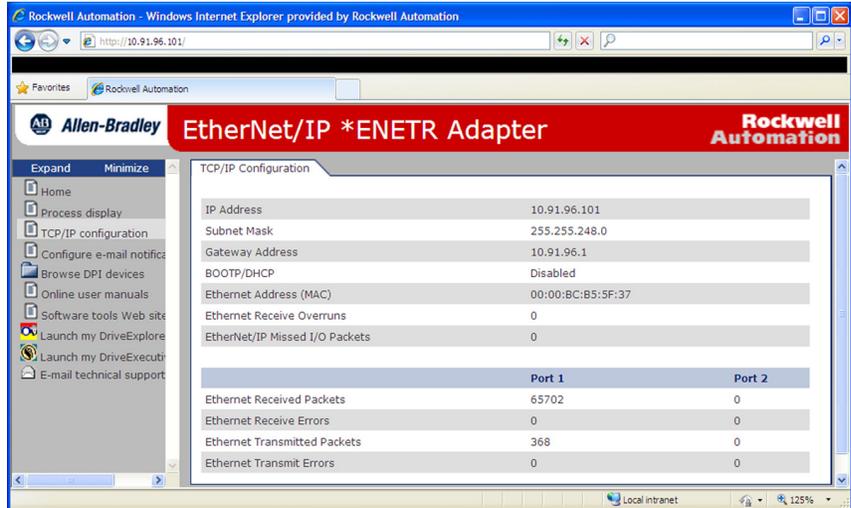
Information	Description
IP Address	IP address of the option module.
Subnet Mask	Subnet mask for the option module network.
Gateway Address	Address for the gateway device on the option module network.
BOOTP/DHCP	Shows status for BOOTP/DHCP, which can be used to configure the option module network information.
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 36) in the navigation pane.

Figure 36 - Example of Adapter Mode Configure Email Notification Web Page
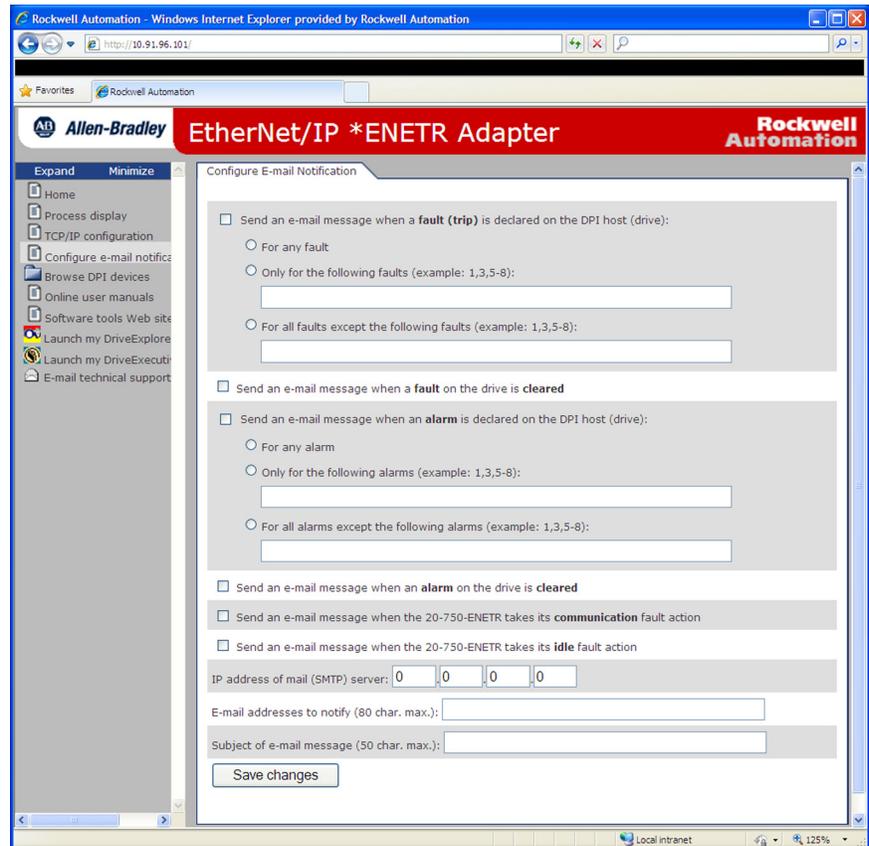
By default, settings are not protected. After configuration, settings can be protected by using *Device* **Parameter 27 - [Web Features]** to set Email Cfg Bit 0 value to '0' (Disabled). To change a protected configuration, it must first be unprotected by setting the Email Cfg Bit 0 value back to '1' (Enabled).

To configure email notifications, choose from the following list of options.

1. Click the Send an email when a fault (trip) is declared on the DPI™ Host (Drive) and choose the desired radio buttons that correspond to which faults you want to receive email notifications for.
   - For Any Fault: Click the radio button.
   - Only for the following faults: Enter the fault numbers.
   - For all fault except the following: Enter the fault numbers.

2. Click the Send an email when a fault on the drive is cleared if you want to know when the fault clears.

3. Click the Send an email when an alarm is declared on the DPI host (Drive) and choose the radio buttons that correspond to which alarms you want to receive email notifications for.

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

4. Click the Send an email when an alarm on the drive is cleared if you want to know when an alarm clears.

5. Click the 20-750-ENETR communication fault and/or idle fault checkbox if you want email notifications when these faults occur.

6. 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 37).
>
> 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 36).

Figure 37 - DOS Dialog Box Example Showing Email Server IP Address
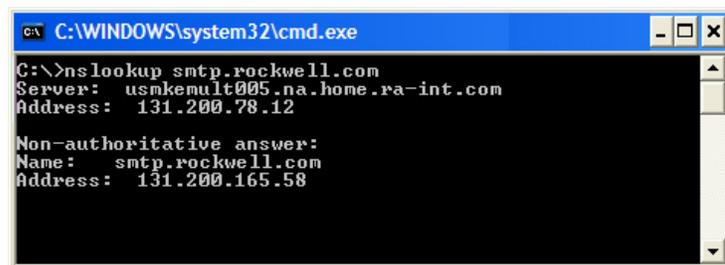
7. Click Save Changes.

> **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 38 shows an example of an option module email message that is automatically sent in response to selected events.

Figure 38 - Example of Email Message Sent by the Option Module
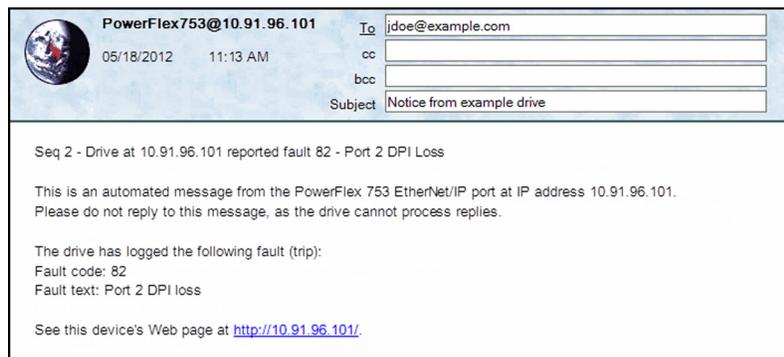
> **TIP**   To stop email messages, uncheck all 'Send an email message when…' boxes.
>
> When disabling the option module web pages by setting *Device* **Parameter 26 - [Web Enable]** to '0' (Disabled) it does **not stop** the option module from sending email messages.

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 39 shows module information for the Port 0 device (host drive).
Diagnostics	Shows diagnostic item information for the respective drive Port device. For example, Figure 40 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 41 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 42 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 43 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 39 - Example of Adapter Mode Port 0 (PowerFlex 750-Series Drive) Module Information Page
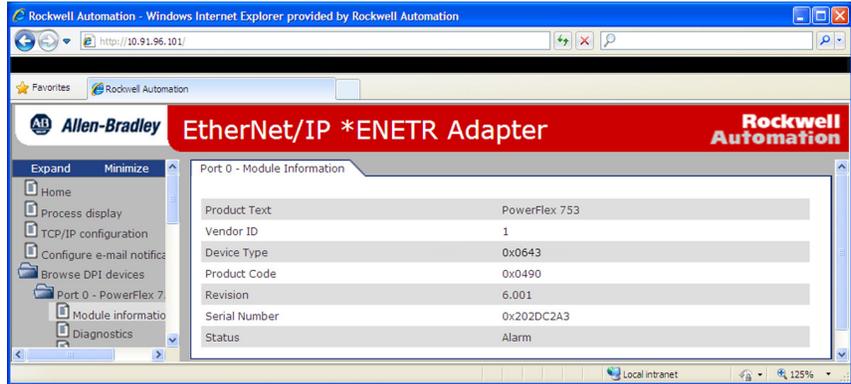
Information	Description
Product Text	Text that identifies the device
Vendor ID	1 = Allen-Bradley
Device Type	0x0643 = PowerFlex 753 drive
Product Code	Code for the product name and its rating
Revision	Firmware revision used by the device
Serial Number	Serial number of the device
Status	Operating status of the device (for example, Alarm)

Figure 40 - Example of Adapter Mode Port 0 (PowerFlex 750-Series Drive) Diagnostic Items Page
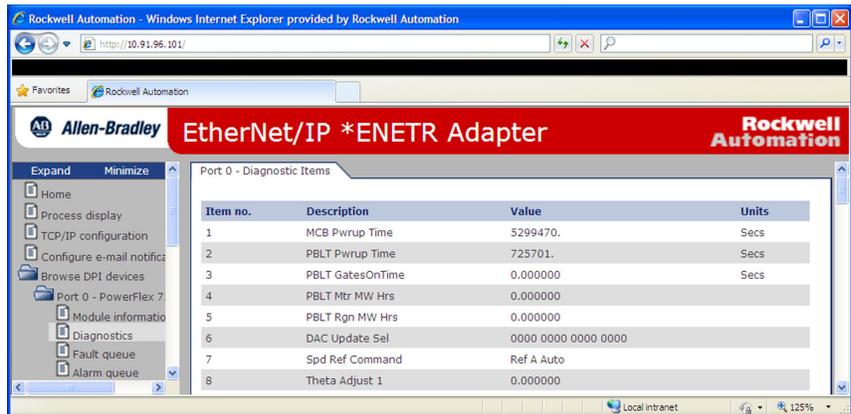
Figure 41 - Example of Adapter Mode Port 0 (PowerFlex 750-Series Drive) Fault Queue Page
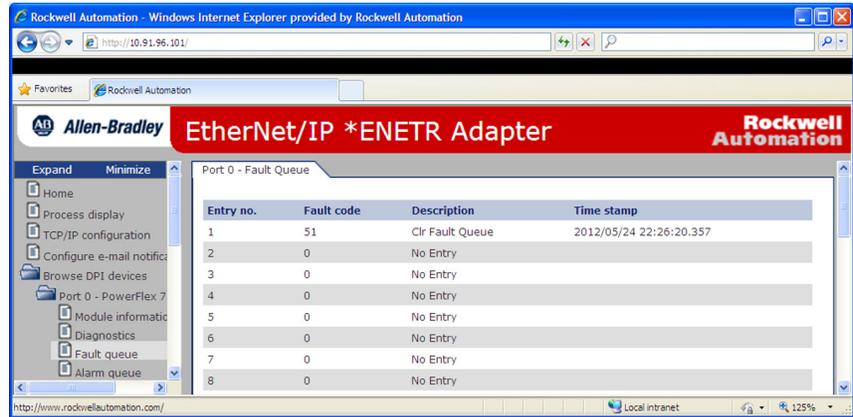
Figure 42 - Example of Adapter Mode Port 0 (PowerFlex 750-Series Drive) Alarm Queue Page
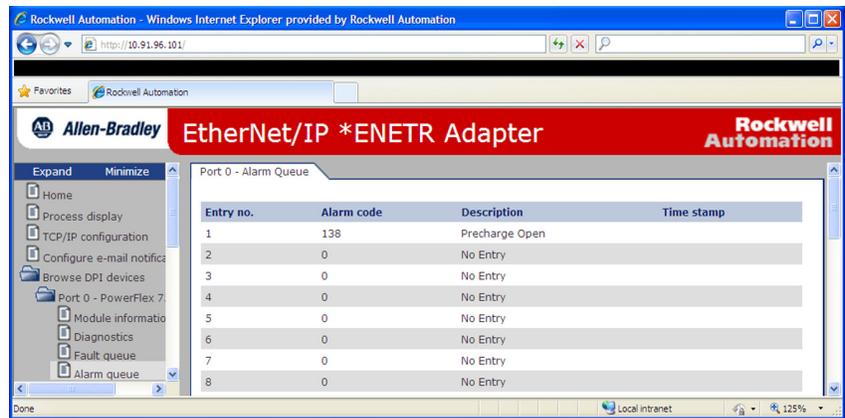
Figure 43 shows an example event queue page for the Port 4 device (EtherNet/IP option module).

Figure 43 - Example of Adapter Mode Port 4 (20-750-ENETR Option Module) Event Queue Page
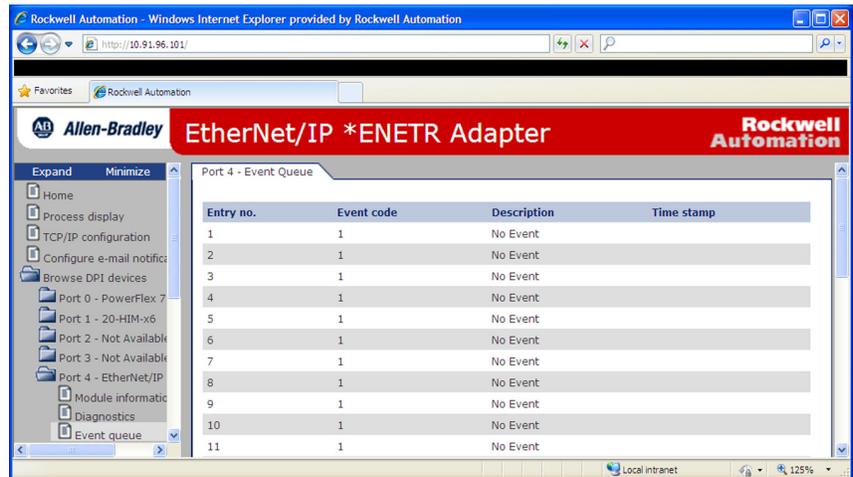
View Web Pages in Tap Mode

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 44) 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 44 - Example of the Tap Mode Web Home Page
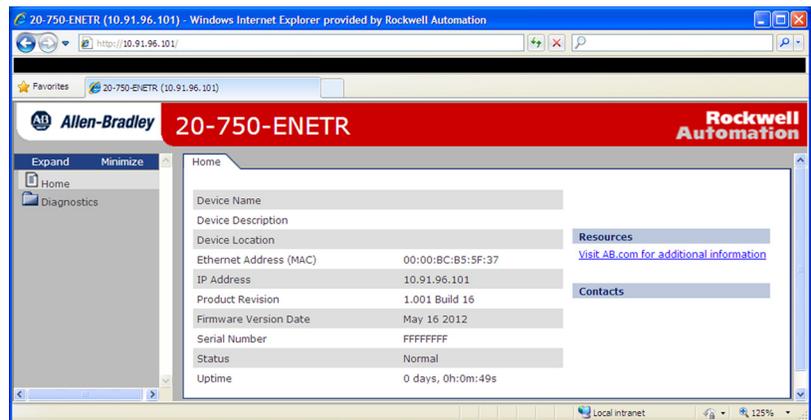
4. In the navigation pane, click Diagnostics to display links to the following web pages that contain the listed information.

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

Notes:

Specifications

This appendix presents the specifications for the option module.

Topic	Page
Communication	135
Electrical	136
Mechanical	136
Environmental	136
Regulatory Compliance	137

Communication

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

When Operating in Adapter Mode

Network	
Protocol	EtherNet/IP
Data Rates	10 Mbps Full-duplex, 10 Mbps Half-duplex, 100 Mbps Full-duplex, or 100 Mbps Half-duplex
Connection Limits	30 TCP connections
	16 simultaneous MSG instruction connections plus one exclusive owner I/O connection
	The following activities use a CIP connection: • I/O connections (for example, from a ControlLogix® controller) • MSG instruction, when 'connected' is checked on on the MSG configuration tab
	The following activities **do not** use a CIP connection: • MSG instruction that uses PCCC or the Register or Assembly Objects • MSG instruction, when 'connected' is not checked on on the MSG configuration tab (default)
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	DPI
Data Rates	500 Kbps

When Operating in Tap Mode (20-750-ENETR Option Module Only)

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 MSG instruction connections The following activity uses a CIP connection: • MSG instruction, when 'connected' is checked on on the MSG configuration tab The following activity **does not** use a CIP connection: • MSG instruction, when 'connected' is not checked on on the MSG configuration tab (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
CE	EN 61800-3
cUL	CAN / CSA C22.2 No. 14-2010
EAC	TR CU 020
KC	KN61800-3 (KS C 9800-3)
Morocco	NM EN 61800-3
RCM	EN 61800-3
UKCA	EN61800-3
UL	20-750-ENETR: UL508C 20-750-ENET2P: UL61800-5-1

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	139
How Parameters Are Organized	140
Parameters for Adapter Mode Operation	140
Parameters for Tap Mode Operation (PowerFlex 753/755 Drives and 20-750-ENETR Option Module Only)	151

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.

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 19 - 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 26) 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
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

Table 19 - Parameter (continued)

Number	Name and Description	Details
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 26) 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
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 26) 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 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 26) 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

Table 19 - 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.

Table 19 - Parameter (continued)

Number	Name and Description	Details
26	**[Web Enable]** (ENETR Option Module only) Enables/disables the web pages of the option module.	Default: 0 = Disabled Values: 0 = Disabled 1 = Enabled Type: Read/Write Reset Required: No
	Reserved (ENET2P Option Module only)	
27	**[Web Features]** ENETR Option Module only) Enables/disables the web-configurable email notification feature.	Default: xxxx xxx1 Bit Values: 0 = Disabled 1 = Enabled Type: Read/Write Reset Required: No

<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>

Number	Name and Description	Details
	Reserved (ENET2P Option Module only)	
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

TIP: 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

TIP: 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.

Table 19 - Parameter (continued)

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

TIP: 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
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: 10.00 Seconds Minimum: 0.01 Seconds Maximum: 10.00 Seconds Type: Read/Write Reset Required: No

TIP: 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.

Number	Name and Description	Details
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 210 for more information.	Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 255 Type: Read/Write Reset Required: No

TIP: 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.

Table 19 - Parameter (continued)

Number	Name and Description	Details	
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
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

TIP: 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.

Number	Name and Description	Details	
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

TIP: 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.

Table 19 - Parameter (continued)

Number	Name and Description	Details	
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
	TIP: 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). 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].	Minimum: Maximum: Type: Reset Required:	0 159999 Read/Write No
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). 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].	Minimum: Maximum: Type: Reset Required:	0 159999 Read/Write No

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).

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).

Parameter		

36	**[Msg Flt Action]**
	Sets the action that the option module and drive takes if the option module detects that a MSG instruction has been disrupted. Only valid when used for drive control via the PCCC, CIP Assembly, or CIP Register objects. When the MSG instruction 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 MSG instructions for drive control are 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 MSG instruction 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 MSG instruction 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 MSG instruction 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 (PowerFlex 753/755 Drives and 20-750-ENETR Option Module Only)

This section contains a list of *Device* parameters available when the option module is operated in Tap mode. Only PowerFlex 753/755 drives and the 20-750-ENETR option module can be used with 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 26) 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 26) 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 26](#)) 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 26](#)) 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-cycled 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.

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.

Appendix **C**

EtherNet/IP Objects (Adapter mode only)

This appendix presents information about the EtherNet/IP objects that can be accessed using MSG instruction. For information on the format of MSG instruction 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	156	DPI Alarm Object	0x98	152	174
Assembly Object	0x04	4	157	DPI Diagnostic Object	0x99	153	175
Register Object	0x07	7	158	DPI Time Object	0x9B	155	178
PCCC Object	0x67	103	159	Host DPI Parameter Object	0x9F	159	181
DPI Device Object	0x92	146	162	TCP/IP Interface Object	0xF5	245	188
DPI Parameter Object	0x93	147	165	Ethernet Link Object	0xF6	246	190
DPI Fault Object	0x97	151	172				

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 (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 20 - 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 20 - 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
⋮	⋮

> **TIP** Device parameters 1024 and greater for Port 1 through Port 14 cannot be accessed using the option module's DPI Parameter object when the option module is installed in a PowerFlex 755T drive.

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

Class Attributes (continued)

Attribute ID	Access Rule	Name	Data Type	Description
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 (the setting does not clear links to function blocks.)

Instance Attributes

Table 21 - 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 169)
			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 169)
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 169)
			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 21 - 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 170)
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 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 171.

(3)   Do NOT continually write parameter data to NVS. See the attention on page 91.

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	Reserved	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 22 - 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 3	
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 22 - 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
			STRUCT of:
			   USINT
			   USINT
			   STRING[16]
			STRUCT of:
			   LWORD
			   BOOL[16]
			
			UINT
			CONTAINER[n]
				Alarm code
				Alarm source
				DPI port
				DPI Device Object
				Alarm text
				Alarm time stamp
				Timer value (0 = timer not supported)
				BOOL[0]: (0 = invalid data, 1 = valid data)
				BOOL[1]: (0 = elapsed time, 1 = real time)
				BOOL[2…15] Reserved
				Reserved
				Reserved

1	Get	Basic Information	STRUCT of UINT
			STRUCT of:
			   USINT
			   USINT
			STRUCT of:
			   LWORD
			   BOOL[16]
				Alarm code
				Alarm source
				DPI port
				DPI Device Object
				Alarm time stamp
				Timer value (0 = timer not supported)
				BOOL[0]: (0 = invalid data, 1 = valid data)
				BOOL[1]: (0 = elapsed time, 1 = real time)
				BOOL[2…15] Reserved

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 169](#))
			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 171](#).

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
⋮	⋮

TIP Host parameters 1024 and greater for Port 1…Port 14 cannot be accessed using the option module's DPI Parameter object when the option module is installed in a PowerFlex 755T drive.

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

Attribute ID	Access Rule	Name	Data Type	Description
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 23 - 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 185)
			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 185)
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)

Table 23 - Instance Attributes (continued)

Attribute ID	Access Rule	Name	Data Type	Description
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 185) 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

Table 23 - Instance Attributes (continued)

Attribute ID	Access Rule	Name	Data Type	Description
20	Get	International DPI Online Read Full	Struct of:	
			BOOL[32]	Descriptor
			CONTAINER	Parameter value
			CONTAINER	Online minimum value
			CONTAINER	Online maximum value
			CONTAINER	Online default value
			UINT	Next
			UINT	Previous
			UINT	Multiplier
			UINT	Divisor
			UINT	Base
			INT	Offset
			USINT[3]	Link
			USINT	Pad word (always zero)
			BOOL[32]	Extended descriptor
			STRINGN	International parameter name
			STRINGN	International online parameter units
21	Get	DPI Extended Descriptor	UDINT	Extended Descriptor (see page 186)
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 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 187.

(3)   Do NOT continually write parameter data to NVS. See the attention on page 91.

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	Reserved	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 24 - 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 3	
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 24 - 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	Not Datalink In	When true, indicates that this parameter cannot be the target of a datalink in (a datalink moving data into the parameter)
31	Double Extended Descriptor	This parameter uses Double Extended Descriptor bits, which can be obtained by reading the DPI Double Extended Descriptor attribute for this parameter.

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
9	Set	Admin State	USINT	Ethernet port control bits '1' = Enable the interface (default) '2' = Disable the interface ENET1 and ENET2 are not permitted to set disable at the same. The latter disable setting is refused. The 20-750-ENETR option module does not support this attribute (20-750-ENET2P support only).
10	Get	Interface Label	SHORT_STRING	'1' = ENET1 network port '2' = ENET2 network port

Notes:

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, this includes PowerFlex 753 and PowerFlex 755 AC drives.

Logic Command Word

Table 25 - 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 (Parameter 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 (Parameter 535) 10 = Use Accel Time 2 (Parameter 536) 11 = Use Present Time
9	Accel Time	00 = No Command 01 = Use Accel Time 1 (Parameter 535) 10 = Use Accel Time 2 (Parameter 536) 11 = Use Present Time

Table 25 - Logic Command Word (continued)

Logic Bit	Command	Description
10	Decel Time	00 = No Command 01 = Use Decel Time 1 (Parameter 537) 10 = Use Decel Time 2 (Parameter 538) 11 = Use Present Time
11	Decel Time	00 = No Command 01 = Use Decel Time 1 (Parameter 537) 10 = Use Decel Time 2 (Parameter 538) 11 = Use Present Time
12	Ref Select 1	000 = No Command 001 = Ref A Select (Parameter 545) 010 = Ref B Select (Parameter 550) 011 = Preset 3 (Parameter 573) 100 = Preset 4 (Parameter 574) 101 = Preset 5 (Parameter 575) 110 = Preset 6 (Parameter 576) 111 = Preset 7 (Parameter 577)
13	Ref Select 2	00 = No Command 001 = Ref A Select (Parameter 545) 010 = Ref B Select (Parameter 550) 011 = Preset 3 (Parameter 573) 100 = Preset 4 (Parameter 574) 101 = Preset 5 (Parameter 575) 110 = Preset 6 (Parameter 576) 111 = Preset 7 (Parameter 577)
14	Ref Select 3	000 = No Command 001 = Ref A Select (Parameter 545) 010 = Ref B Select (Parameter 550) 011 = Preset 3 (Parameter 573) 100 = Preset 4 (Parameter 574) 101 = Preset 5 (Parameter 575) 110 = Preset 6 (Parameter 576) 111 = Preset 7 (Parameter 577)
15	Emrg OvrRide	0= Not Set or Clear 1=Set Emergency Override
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 (Parameter 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 26 - 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 (Parameter 959 and 960) 1 = Alarm
7	Fault	0 = No Fault (Parameter 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 (Parameter 545) 00010 = Auto Ref B (Parameter 550) 00011 = Auto Preset Speed 3 (Parameter 573) 00100 = Auto Preset Speed 4 (Parameter 574) 00101 = Auto Preset Speed 5 (Parameter 575) 00110 = Auto Preset Speed 6 (Parameter 576) 00111 = Auto Preset Speed 7 (Parameter 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
11	Spd Ref ID 1	
12	Spd Ref ID 2	
13	Spd Ref ID 3	
14	Spd Ref ID 4	
15	Emrg OvrRide	0 = Emergency Override not Active 1=Emergency Override Active

Table 26 - Logic Status Word (continued)

Logic Bit	Command	Description
16	Running	0 = Not Running 1 = Running
17	Jogging	0 = Not Jogging (Parameter 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 (Parameter 309) 1 = Speed Mode
22	Position Mode	0 = Not Position Mode (Parameter 309) 1 = Position Mode
23	Torque Mode	0 = Not Torque Mode (Parameter 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

Logic Command/Status Words: PowerFlex 755T Products

This appendix presents the definitions of the logic command and logic status words that are used for PowerFlex 755TL drives, PowerFlex 755TR drives, PowerFlex 755TS drives, PowerFlex 755TM common bus inverters, and PowerFlex 755TM bus supplies.

Logic Command Word

Table 27 - Logic Command Word: PowerFlex 755TL, 755TR, and 755TS Drives

Logic Bit	Command	Description
0	Stop	0 = Not Normal Stop 1 = Normal Stop
1	Start [1]	0 = Not Start 1 = Start
2	Jog 1 [2]	0 = Not Jog 1 1 = Jog 1 (speed set in 10:1894)
3	Clear Faults [3]	0 = Not Clear Fault 1 = Clear Fault
4	Forward	0 = Not Forward 1 = Forward
5	Reverse	0 = Not Reverse 1 = Reverse
6	Manual	0 = Not Manual 1 = Manual
7	Reserved	
8 9	Accel Time 1 Accel Time 2	00 = No Command 01 = Use Accel Time 1 (10:1915) 10 = Use Accel Time 2 (10:1916) 11 = Use Present Time
10 11	Decel Time 1 Decel Time 2	00 = No Command 01 = Use Decel Time 1 (10:1917) 10 = Use Decel Time 2 (10:1918) 11 = Use Present Time
12 13 14	Ref Select 1 Ref Select 2 Ref Select 3	000 = No Command 001 = Ref A Select (10:1800) 010 = Ref B Select (10:1807) 011 = Preset 3 (10:1816) 100 = Preset 4 (10:1817) 101 = Preset 5 (10:1818) 110 = Preset 6 (10:1819) 111 = Preset 7 (10:1820)

Table 27 - Logic Command Word: PowerFlex 755TL, 755TR, and 755TS Drives (continued)

Logic Bit	Command	Description
15	Emerg OVRD	0 = No Command 1 = Emergency Override
16	Coast Stop	0 = Not Coast to Stop 1 = Coast to Stop
17	Climit Stop	0 = Not Current Limit Stop 1 = Current Limit Stop
18	Run [4]	0 = Not Run 1 = Run
19	Jog 2 [2]	0 = Not Jog 2 (10:1895) 1 = Jog
20	Reserved	
21	Energy Pause	0 = Energy Resume 1 = Energy Pause
22	Reserved	
23	Reserved	
24	Reserved	
25	Reserved	
26	Reserved	
27	Reserved	
28	Reserved	
29	Reserved	
30	Reserved	
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.

Table 28 - Logic Command Word: PowerFlex 755TM Common Bus Inverters

Logic Bit	Command	Description
0	Stop	0 = Not Normal Stop 1 = Normal Stop
1	Start [1]	0 = Not Start 1 = Start
2	Jog 1 [2]	0 = Not Jog 1 1 = Jog 1 (speed set in 10:1894)
3	Clear Faults [3]	0 = Not Clear Fault 1 = Clear Fault
4	Forward	0 = Not Forward 1 = Forward
5	Reverse	0 = Not Reverse 1 = Reverse
6	Manual	0 = Not Manual 1 = Manual
7	Reserved	
8 9	Accel Time 1 Accel Time 2	00 = No Command 01 = Use Accel Time 1 (10:1915) 10 = Use Accel Time 2 (10:1916) 11 = Use Present Time
10 11	Decel Time 1 Decel Time 2	00 = No Command 01 = Use Decel Time 1 (10:1917) 10 = Use Decel Time 2 (10:1918) 11 = Use Present Time
12 13 14	Ref Select 1 Ref Select 2 Ref Select 3	000 = No Command 001 = Ref A Select (10:1800) 010 = Ref B Select (10:1807) 011 = Preset 3 (10:1816) 100 = Preset 4 (10:1817) 101 = Preset 5 (10:1818) 110 = Preset 6 (10:1819) 111 = Preset 7 (10:1820)
15	Emerg OVRD	0 = No Command 1 = Emergency Override
16	Coast Stop	0 = Not Coast to Stop 1 = Coast to Stop
17	Climit Stop	0 = Not Current Limit Stop 1 = Current Limit Stop
18	Run [4]	0 = Not Run 1 = Run
19	Jog 2 [2]	0 = Not Jog 2 (10:1895) 1 = Jog
20	Reserved	
21	Reserved	
22	Reserved	
23	Reserved	
24	Reserved	

Table 28 - Logic Command Word: PowerFlex 755TM Common Bus Inverters (continued)

Logic Bit	Command	Description
25	Reserved	
26	Reserved	
27	Reserved	
28	Reserved	
29	Reserved	
30	Reserved	
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.

Table 29 - Logic Command Word: PowerFlex 755TM Bus Supplies

Logic Bit	Command	Description
0	Stop	0 = Not Normal Stop 1 = Normal Stop
1	Start [1]	0 = Not Start 1 = Start
2	Reserved	
3	Clear Faults [2]	0 = Not Clear Fault 1 = Clear Fault
4	Reserved	
5	Reserved	
6	Reserved	
7	Reserved	
8 9	Reserved Reserved	
10 11	Reserved Reserved	
12 13 14	Reserved Reserved Reserved	
15	Reserved	
16	Reserved	
17	Reserved	
18	Run [3]	0 = Not Run 1 = Run
19	Reserved	
20	Reserved	
21	Energy Pause	0 = Energy Resume 1 = Energy Pause
22	Reserved	

Table 29 - Logic Command Word: PowerFlex 755TM Bus Supplies (continued)

Logic Bit	Command	Description
23	Reserved	
24	Reserved	
25	Reserved	
26	Reserved	
27	Reserved	
28	Reserved	
29	Reserved	
30	Reserved	
31	Reserved	

(1)   A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Start condition starts the drive.

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

(3)   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 30 - Logic Status Word: PowerFlex 755TL, 755TR, 755TS Drives, 755TM CBIs

Logic Bit	Status	Description
0	Ready	0 = Not Ready to Run 1 = Ready to Run
1	Active	0 = Not Active 1 = Active
2	Command Dir	0 = Reverse 1 = Forward
3	Actual Dir	0 = Reverse 1 = Forward
4	Accelerating	0 = Not Accelerating 1 = Accelerating
5	Decelerating	0 = Not Decelerating 1 = Decelerating
6	Alarm [1]	0 = No Alarm 1 = Alarm (10:465, 10:466, 10:467)
7	Faulted [1]	0 = No Fault (10:461 and 10:462) 1 = Fault
8	At Speed	0 = Not at Setpoint Speed 1 = At Setpoint Speed
9	Manual	0 = Manual Mode Not Active 1 = Manual Mode Active

Table 30 - Logic Status Word: PowerFlex 755TL, 755TR, 755TS Drives, 755TM CBIs (continued)

Logic Bit	Status	Description
10	Spd Ref ID 0	00000 = Reserved
11	Spd Ref ID 1	00001 = Auto Ref A (10:1800) 00010 = Auto Ref B (10:1801)
12	Spd Ref ID 2	00011 = Auto Preset Speed 3 (10:1816)
13	Spd Ref ID 3	00100 = Auto Preset Speed 4 (10:1817) 00101 = Auto Preset Speed 5 (10:1818)
14	Spd Ref ID 4	00110 = Auto Preset Speed 6 (10:1819) 00111 = Auto Preset Speed 7 (10:1820) 01000 = Reserved 01001 = Reserved 01010 = Reserved 01011 = Reserved 01100 = Reserved 01101 = Reserved 01110 = Reserved 01111 = Reserved 10000 = Manual Port 0 10001 = Manual Port 1 10010 = Manual Port 2 10011 = Manual Port 3 10100 = Manual Port 4 10101 = Manual Port 5 10110 = Manual Port 6 10111 = Reserved 11000 = Reserved 11001 = Reserved 11010 = Reserved 11011 = Reserved 11100 = Reserved 11101 = Manual Port 0 (Embedded ENET) 0:211 11110 = Manual Port 9 (DeviceLogix) 11111 = Alternate Manual Ref Sel (10:1835)
15	Reserved	
16	Running	0 = Not Running 1 = Running
17	Jogging	0 = Not Jogging 1 = Jogging (10:1894, 10:1895)
18	Stopping	0 = Not Stopping 1 = Stopping
19	DC Braking	0 = Not DC Braking 1 = DC Braking
20	DB Active	0 = Not Dynamic Brake Active 1 = Dynamic Brake Active
21	Speed Mode	0 = Not Speed Mode 1 = Speed Mode (10:34)
22	PositionMode	0 = Not Position Mode 1 = Position Mode (10:34)
23	Torque Mode	0 = Not Torque Mode 1 = Torque Mode (10:34)
24	AtZero Speed	0 = Not at Zero Speed 1 = At Zero Speed

Table 30 - Logic Status Word: PowerFlex 755TL, 755TR, 755TS Drives, 755TM CBIs (continued)

Logic Bit	Status	Description
25	At Home	0 = Not at Home 1 = At Home
26	At Limit	0 = Not at Limit 1 = At Limit
27	Cur 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 OL	0 = Not Bus Freq Reg 1 = Bus Freq Reg
31	Regen	0 = Not Regen 1 = Regen

(1)   On PowerFlex 755TR drives and 755TL drives, only the motor side inverter triggers alarms and faults. To check for alarms and
      faults on the line side converter see parameter 13:225 [Line Side Sts 1] bit 6 'Alarm' and bit 7 'Fault'.

Table 31 - Logic Status Word: PowerFlex 755TM Bus Supplies

Logic Bit	Status	Description
0	Ready	0 = Not Ready to Run 1 = Ready to Run
1	Reserved	
2	AutoRstr Act	0 = Not Active 1 = Active
3	AutoRstrCntDwn	0 = Not Counting Down to Restart 1 = Counting Down to Restart
4	HS Fan On	0 = Heatsink Fan Not Running 1 = Heatsink Fan Running
5	Autotuning	0 = Not Active 1 = Active
6	Alarm [1]	0 = No Alarm 1 = Alarm (10:465, 10:466, 10:467)
7	Fault [1]	0 = No Fault (10:461 and 10:462) 1 = Fault
8	At DC Ref	0 = Not at DC Reference 1 = At DC Reference
9	DrpGn Limit	0 = Droop Gain Not Limited 1 = Droop Gain Limited
10	Reserved	
11	Reserved	
12	Reserved	
13	Reserved	

Table 31 - Logic Status Word: PowerFlex 755TM Bus Supplies (continued)

Logic Bit	Status	Description
14	Reserved	
15	StartInhibit	0 = No Start Inhibit 1 = Start Inhibit
16	Running	0 = Not Running 1 = Running
17	Reserved	
18	Reserved	
19	Reserved	
20	Reserved	
21	AC Ride Thru	0 = No AC Ride Thru 1 = AC Ride Thru
22	InPhaseLoss	0 = No Input Phase Loss 1 = Input Phase Loss
23	AC Line Sync	0 = No AC Line Sync 1 = AC Line Sync
24	kVAR OnlyAct	0 = No Reactive Current Active 1 = Reactive Current Active
25	In Precharge	0 = Not In Precharge 1 = In Precharge
26	At Limit	0 = Not At Limit 1 = At Limit
27	Cur Limit	0 = No Current Limit 1 = Current Limit
28	Conv Bus Reg	0 = Not Regulating 1 = Regulating
29	Enable On	0 = Enable Not On 1 = Enable On
30	Motoring	0 = Not Motoring 1 = Motoring
31	Regenerating	0 = Not Regenerating 1 = Regenerating

(1)   On PowerFlex 755TR drives and 755TL drives, only the motor side inverter triggers alarms and faults. To check for alarms and faults on the line side converter see parameter 13:225 [Line Side Sts 1] bit 6 'Alarm' and bit 7 'Fault'.

Notes:

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)   A 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 https://compatibility.rockwellautomation.com/Pages/home.aspx.

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

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

Disable Keying This selection allows a replacement device to have any product identification, Major (X.xxx) and/or Minor (X.xxx) firmware revision, or rating.

This selection is not recommended because the PLC and replacement device will not confirm that the replacement device is the intended type, revision, or rating of device. This confirmation is especially important when using ADC, because the PLC will attempt to configure the replacement device, even if it is not the correct type of device.

If selected, it is up to the user to provide a replacement device that has a firmware revision greater than or equal to the original and has the appropriate rating. If a replacement with older firmware or a different rating is used, the ADC download may fail or the replacement device may not operate following the original device's configuration.

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 https://compatibility.rockwellautomation.com/Pages/home.aspx. 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 Must configure 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 https://compatibility.rockwellautomation.com/Pages/home.aspx.

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 (MSG instructions) 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	
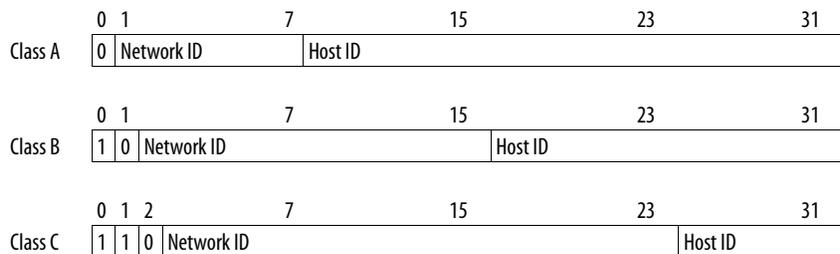
The number of devices on your EtherNet/IP network will vary depending on the number of bytes that are used for the network address. In many cases you are given a network with a Class C address, in which the first three bytes

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 Appendix D.

The Logic Status is used to monitor the PowerFlex 750-Series drive (for example, operating state and motor direction). It consists of one 32 bit word of input from the option module to the network. The definitions of the bits in this word are shown in Appendix D.

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

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 set point (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.
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 Logix Designer Software	Studio 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 https://compatibility.rockwellautomation.com/Pages/home.aspx.

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 acknowledgments 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 59 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:

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Notes:

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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Waste Electrical and Electronic Equipment (WEEE)

At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

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