User Manual

Original Instructions

Allen-Bradley

PowerFlex 755 Drive Embedded EtherNet/IP Adapter

Bulletin Numbers 20G, 21G

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

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

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

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

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

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

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

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

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

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

Appendix D

Logic Command/Status Words: PowerFlex 750-Series Drives

Notes:

This manual contains new and updated information as indicated in the following table.

Topic	Page
Updated manual to include Logix Designer Version 30.00 screen shots.	All
Updated to current RA standards. Replaced: explicit messaging with MSG instruction, RSLinx with Linx-based software or controller (as applicable), removed most version and revision references, and updated RSLogix and RSLogix 5000 to Studio 5000 Logix Designer.	All
Removed Parameter 36 - [Net Addr Sel].	All
Removed information and references for DHCP (Dynamic Host Configuration Protocol).	All
Removed firmware versions and references as appropriate.	All
Added Ethernet Tools and Features compatibility table.	15
Chapter 3: Updated section Using a BOOTP Server	30
Chapter 3: Updated section Using Adapter Parameters	34
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Chapter 4: changed section name: Using RSLinx Classic to Establish Communication.	51
Chapter 4: Added section Uploading the Electronic Data Sheet (EDS) File.	52
Chapter 4: Added section Obtain Add-on Profiles.	53
Chapter 4: changed section name: ControlLogix Example to Create Logix Designer Project	54
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Notes:

This manual provides information about the EtherNet/IP adapter that is embedded on the main control board in PowerFlex® 755 drives, and how to use it for network communication.

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

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

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

Conventions Used in This Manual

These conventions are used throughout this manual:

- Parameter names are shown in the format *Device* **Parameter xx -** [*] or *Host* **Parameter xx -** [*]. The xx represents the parameter number. The * represents the parameter name—for example, *Device* **Parameter 01 - [Operating Mode]**.
- The firmware revision number (FRN) is displayed as FRN *X.xxx*, where '*X*' is the major revision number and '*xxx*' is the minor revision number.
- The dialog box images in this manual resulted from using this software:
  - Studio5000® 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.

Rockwell Automation Support

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

Local Product Support	Contact your local Rockwell Automation representative for: – Sales and order support – Product technical training – Warranty support – Support service agreements
Technical Product Assistance	For technical assistance, please review the information in Chapter 7, Troubleshooting, first. If you still have problems, then access the Allen-Bradley Technical Support website at http://www.ab.com/support/abdrives or contact Rockwell Automation.

Additional Resources

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

Resource	Description
EtherNet/IP Media Planning and Installation Manual, ODVA publication 148 (1)	The planning, installation, and techniques that are used to implement an EtherNet/IP network.
EtherNet/IP Network Infrastructure Guidelines, ODVA publication 35 (1)	
Ethernet Design Considerations Reference Manual, ENET-RM002	
EtherNet/IP Embedded Switch Technology - Linear and Device Level Ring Topologies, ENET-AP005	
PowerFlex 750-Series Drive Installation Instructions, 750-IN001	The installation of programming, and technical data of PowerFlex 750-Series drives.
PowerFlex 750-Series Drive Programming Manual, 750-PM001	
PowerFlex 750-Series Drive Technical Data, 750-TD001	
PowerFlex 20-HIM-A6/-C6S HIM (Human Interface Module) User Manual, publication 20HIM-UM001	The installation and use of PowerFlex 20-HIM-A6 or 20-HIM-C6S HIMs.
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).
Industrial Automation Wiring and Grounding Guidelines, 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.
Product Compatibility and Download Center website https://compatibility.rockwellautomation.com/Pages/home.aspx, and online help (2)	• The Connected Components Workbench™ software tool. Includes a link for **free** software download. • How to use the DriveExplorer software tool. • How to use the DriveExecutive software tool.

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

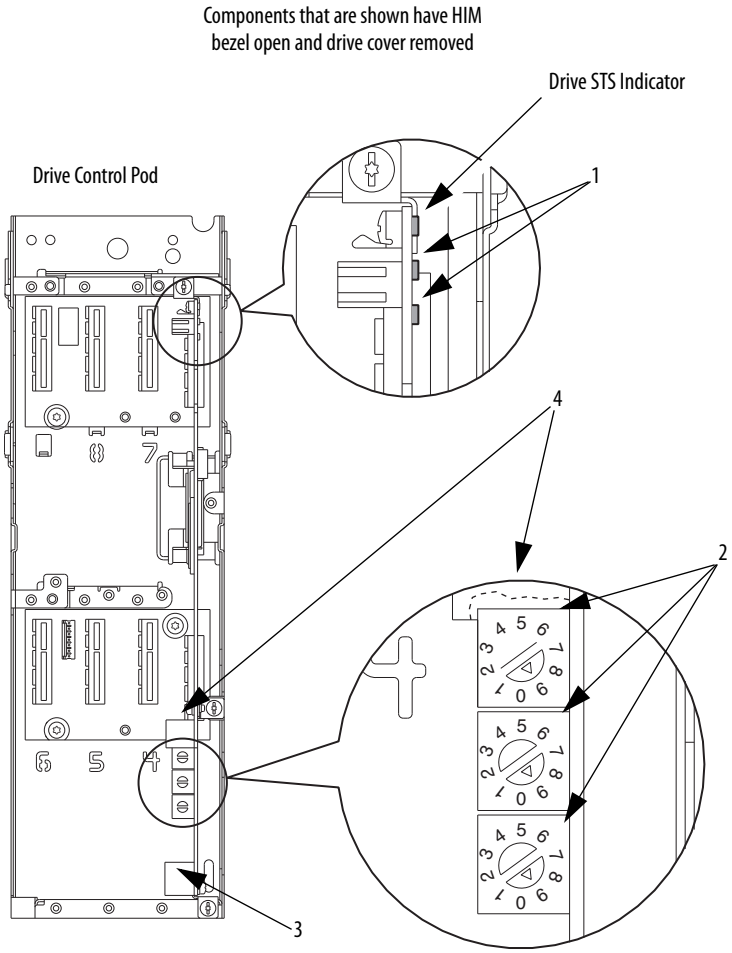
(2) The online help is installed with the software.

To view or download publications
Go to http://www.rockwellautomation.com/global/literature-library/overview.page

Getting Started

The EtherNet/IP adapter, which is embedded on the main control board in PowerFlex® 755 drives, is used for network communication.

Status Indicators



Item	Part	Description
1	Status Indicator	Two status indicators that indicate the status of the adapter and network communication. See Chapter 7, Troubleshooting.
2	IP Address Switches	Sets the IP address of the embedded adapter when **not** using any of these other methods: • Adapter parameters • BOOTP server See Setting the IP Address on page 20 for details.
3	Ethernet Connector	An RJ45 connector for the Ethernet cable. The connector is CAT-5 compliant to deliver data transfer on 100Base-TX Ethernet connections.
4	DPI Port 2	Cable connection for handheld and remote options.

Features

The features of the embedded EtherNet/IP adapter include the following:

- Switches to set an IP address before power is applied to the drive. Or you can disable the switches and use one of these other methods to configure the IP address:
  - Adapter parameters
  - BOOTP (Bootstrap Protocol) server
- Compatibility with the following configuration tools to configure the embedded EtherNet/IP adapter and host drive:
  - PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM (Human Interface Module) on the drive, if available
  - Connected Components Workbench™ software, version1.02 or later
  - DriveExplorer™ software, version 6.01 or later
  - DriveExecutive™ software, version 5.01 or later.
- Status indicators that report the status of the embedded EtherNet/IP adapter and network communications. They are visible when the drive cover is open or closed.
- 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 (Explicit message) support.
- Master-Slave or Peer-to-Peer hierarchy that can be configured to transmit data to and from either a controller or another PowerFlex 750-Series drive on the network.
- Supports 'Integrated Motion on the EtherNet/IP network' operation for 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 embedded EtherNet/IP adapter and its host PowerFlex 755 drive respond to the following:
  - I/O messaging communication disruptions (Comm Flt Action)
  - Controllers in Idle mode (Idle Flt Action)
  - Peer device communication disruptions (Peer Flt Action)
  - Explicit Messaging disruptions for drive control via PCCC, the CIP Register Object, or the CIP Assembly Object (Msg Flt Action)
- Automatic Device Configuration (ADC), an RSLogix 5000® software feature, version 20.00 or later, which supports the automatic download of configuration data. The download occurs after the Logix controller establishes an EtherNet/IP network connection to a PowerFlex 755 drive (firmware revision 4.001 or later) and its associated peripherals.

- Web pages, which are viewed by using a web browser, which shows information about the embedded EtherNet/IP adapter, its host drive, and DPI™ devices connected to the drive.
- Configured email messaging to desired addresses when selected drive faults occur and/or are cleared, and/or when the embedded EtherNet/IP adapter takes a communication or idle fault action.
- Access to any PowerFlex drive and its connected peripherals on the network to which the embedded EtherNet/IP adapter is connected.

Compatible Products

At the time of publication, the embedded EtherNet/IP adapter is compatible with Allen-Bradley® PowerFlex 755 drives.

Required Equipment

Some of the equipment that is required for use with the embedded EtherNet/IP adapter is shipped with the drive, but some you must supply yourself.

Equipment Shipped with the Drive

Since the EtherNet/IP adapter is embedded on the main control board in the PowerFlex 755 drive, it is always a part of the drive. Installation instructions for the adapter are not required.

User-supplied Equipment

To configure the embedded EtherNet/IP adapter, you must supply the following:

- A small screwdriver
- Ethernet cable (for details, see the EtherNet/IP Media Planning and Installation Manual, ODVA publication 148 available on the ODVA website at http://odva.org/Home/ODVATECHNOLOGIES/EtherNetIP/EtherNetIPLibrary/tabid/76/Default.aspx)
- Ethernet switch (for details, see the Ethernet Design Considerations Reference Manual, publication ENET-RM002)
- Drive and embedded adapter configuration tool, such as the following:
  - PowerFlex 20-HIM-A6 or 20-HIM-C6S HIM
  - Connected Components Workbench software, version 1.02 or later. Connected Components Workbench software cannot be used to configure SCANport-based drives or Bulletin 160 drives.

    TIP Connected Components Workbench is the recommended standalone software tool for use with PowerFlex drives. You can obtain a **free copy** by internet download at the Product Compatibility and Download Center http://compatibility.rockwellautomation.com/Pages/home.aspx.

  - DriveExplorer software, version 6.01 or later

    TIP 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. The download is being provided 'as-is' for users that lost their DriveExplorer CD, or who must configure legacy products that not supported by Connected Components Workbench software.

  - DriveExecutive software, version 5.01 or later

    A Lite version of DriveExecutive software ships with the Studio5000 environment, 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 https://compatibility.rockwellautomation.com/Pages/home.aspx. It is highly recommended that you periodically check for and install the latest update.

  - BOOTP, version 2.1 or later for network install only

- Controller configuration software, such as RSLogix 5000 software, version 20.00 and earlier, or Studio 5000™ Logix Designer application, version 21.00 and later
- A computer connection to the EtherNet/IP network

The table that follows shows the minimum software versions for configuring the respective drives:

Table 1 - Software Compatibility Matrix

Drive	Firmware	Connected Components Workbench Software(1)	DriveTools SP(1)	DriveExplorer Software
PowerFlex 755	v1.009 v2.003 Frames 8…10	version 1.02	version 5.06	version 6.04

Drive	Firmware	Studio 5000 Logix Designer Application	RSLogix 5000 Software
PowerFlex 755	version 1.009 version 2.003 Frames 8…10	version 21	version 16

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

Safety Precautions

Read the following safety precautions carefully.

ATTENTION: 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, start up, or configuration. Only qualified personal can perform subsequent maintenance of the drive by using this embedded adapter. Failure to comply can result in injury and/or equipment damage.
- The embedded adapter contains electrostatic discharge (ESD) sensitive parts that can be damaged if you do not follow ESD control procedures. Static control precautions are required when handling the adapter. If you are unfamiliar with static control procedures, see Guarding Against Electrostatic Damage, publication 8000-4.5.2.
- If the adapter is transmitting control I/O to the drive, the drive can fault when you reset the adapter. Determine how your drive responds before resetting the adapter.
- Embedded adapter Parameters 54 - [Comm Flt Action], 55 - [Idle Flt Action], 56 - [Peer Flt Action], and 57 - [Msg Flt Action] let you determine the action of the adapter and drive when any of the following occurs:
  - an I/O communication is disrupted
  - the controller is idle
  - peer I/O is disrupted
  - a MSG instruction for drive control is disrupted

  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).
- 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.

Quick Start

This section is provided to help experienced personnel quickly start using the embedded EtherNet/IP adapter. If you are unsure how to complete a step, refer to the referenced chapter.

Step	Action	See
1	Review the safety precautions for the adapter.	Throughout this manual
2	Verify that the PowerFlex drive is properly installed.	PowerFlex 750-Series AC Drive Installation Instructions, publication 750-IN001
3	Set the adapter IP address. a. When using the adapter switches, set the IP address now and proceed with step 4. When using a BOOTP or adapter parameters to set the IP address, perform step 3b, 3c, and all of step 4. Then proceed with step 5. b. Verify that the PowerFlex drive is not powered. c. Connect the embedded EtherNet/IP adapter to the network with an Ethernet cable.	Chapter 2, Installing the Adapter
4	Apply power to the drive. a. Replace the drive cover or close the drive door. b. Apply power to the drive. The embedded EtherNet/IP adapter receives power from 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 Adapter
5	Configure the adapter for your application. Set embedded EtherNet/IP adapter parameters for the following functions as required by your application: • IP address, subnet mask, and gateway address (only when not using adapter switches) • Data rate • I/O configuration • Master-Slave or Peer-to-Peer hierarchy • Fault actions • Web enable and features	Chapter 3, Configuring the Adapter
6	Configure the controller to communicate with the adapter. Use controller programming software to configure the master controller on the network to recognize the embedded EtherNet/IP adapter and drive.	Chapter 4, Configuring the Drive in a Logix System
7	Create a ladder logic program. Use controller programming software to create a ladder logic program that enables you to do the following: • Control the drive, via the embedded EtherNet/IP adapter, by using I/O • Monitor or configure the drive by using MSG instructions	Chapter 5, Using the I/O Chapter 6, Using Message Instructions

Notes:

Installing the Adapter

The EtherNet/IP adapter is embedded on the main control board in the PowerFlex® 755 drive. The only required adapter installation is setting its IP address and its connection to the network.

Preparing for an Installation

Before installing the embedded EtherNet/IP adapter, 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 18.00 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, publication ENET-RM002
- Understand IGMP Snooping/Ethernet Switches.

  The embedded EtherNet/IP adapter is a multicast device. In most situations, an IGMP snooping (managed) switch is required. If multiple embedded EtherNet/IP adapters are connected to the switch, a managed switch is required—otherwise the drive can fault on a Net I/O Timeout network loss. The embedded EtherNet/IP adapter, RSLogix 5000 software version 18 or later, and a ControlLogix® or CompactLogix™ controller supports unicast. Unicast setup is required when adding the drive to the I/O. When all embedded EtherNet/IP adapters 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. Only the multicast packets are forwarded 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. The pools are sent to learn what devices are part of the multicast group. Some layer 2 switches can use IGMP snooping without a router having to send polls. If your control system is a standalone network or is required to continue performing if the router is out of service. Make sure that the switch supports IGMP snooping without a router being present.

- See Appendix A for the number of integrated motion connections that are supported by the embedded EtherNet/IP adapter.
- Verify that you have all required equipment. See Required Equipment on page 13.

Setting the IP Address

There are four ways to configure the embedded EtherNet/IP adapter IP address:

- **Adapter Rotary Switches** — Use the switches when working on a simple, isolated network (for example, 192.168.1.xx). And you prefer a simplified node addressing method that:
  - Has other products with switches to set their IP addresses.
  - Does not need to be accessed from outside the network.

  The three adapter switches are read when the drive powers up, and represent three decimal digits from top to bottom. If set to a valid address (001...254), the adapter uses that value as the lower octet of its IP address (192.168.1.xx. Where xxx = rotary switch settings), along with a subnet mask of 255.255.255.0 and there is no configured gateway. Also, the setting for adapter **Parameter 36 - [BOOTP]** (with drive firmware 1.xxx-7xx) or **Parameter 36 - [Net Addr Sel]** (with drive firmware 8.xxx or later) is automatically ignored.

  See Figure 1 on page 22 and its accompanying table for switch settings and their related descriptions.

IMPORTANT When using the adapter rotary switches, set the IP address before power is applied because the adapter uses the IP address it detects when it first receives power.

- **Adapter Parameters** — Use adapter parameters for more flexibility when configuring the IP address, or to communicate outside the control network by using a gateway. To use parameters as the source for the IP address, set the rotary switches to a value other than 001...254 or 888. Set **Parameter 36 - [BOOTP]** (with drive firmware 1.xxx-7.xx) to '0' (disabled). Or set **Parameter 36 - [Net Addr Sel]** (with drive firmware 8.xxx or later) to '0' (Parameters). The IP address, subnet mask, and gateway addresses come from the values set using the associated adapter parameters.

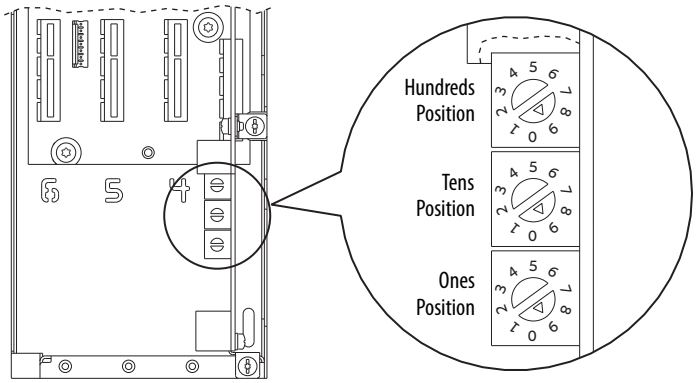
- **BOOTP** — Use BOOTP, the default, when you want to configure a **temporary** IP addresses, subnet mask, and gateway address for the adapter by using a BOOTP server. To use BOOTP as the source for the IP address, set the rotary switches to a value other than 001...254 or 888. Set **Parameter 36 - [BOOTP]** (with drive firmware 1.xxx ...7.xxx) to '1' (enabled) or set **Parameter 36 - [Net Addr Sel]** (with drive firmware 8.xxx or later) to '1' (BOOTP).

  Record the adapter hardware Ethernet Address (MAC) on the main control board of the drive. This address is used in step 7 when configuring the BOOTP server (see Using a BOOTP Server on page 30 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 1783-UM007.

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

Figure 1 - Setting the IP Address Switches



Settings	Description
001…254	The adapter uses the rotary switch settings for the IP address (192.168.1.xxx, where xxx = rotary switch settings). The value stored in **Parameter 36 - [BOOTP]** (with drive firmware 1.xxx…7.xxx) or **Parameter 36 - [Net Addr Sel]** (with drive firmware 8.xxx or later) is automatically ignored.
888	Resets the adapter IP address function to factory defaults. Thereafter, the drive must be powered down, the switches set to a correct value (001…254), and then the drive must be powered up again to accept the new address.
Any other setting	Disables the rotary switches, and requires using one of the following: • **Parameter 36 - [BOOTP]** (with drive firmware 1.xxx …7.xxx), if enabled, selects the BOOTP server as the source for the IP address, or if disabled, selects the adapter parameters as the source. • **Parameter 36 - [Net Addr Sel]** (with drive firmware 8.xxx or later) selects the source for the adapter IP address, which is one of the following: – Parameters of the adapter – BOOTP server (default)

The switch settings can be verified by viewing Diagnostic Device Item number 68 (page 131) with any of the following drive configuration tools:

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

Also, you can use **Parameter 37 - [Net Addr Src]**, a read-only parameter, to verify the selected setting for **Parameter 36 - [BOOTP]** (with drive firmware 1.xxx ...7.xxx) or **Parameter 36 - [Net Addr Sel]** (with drive firmware 8.xxx or later).

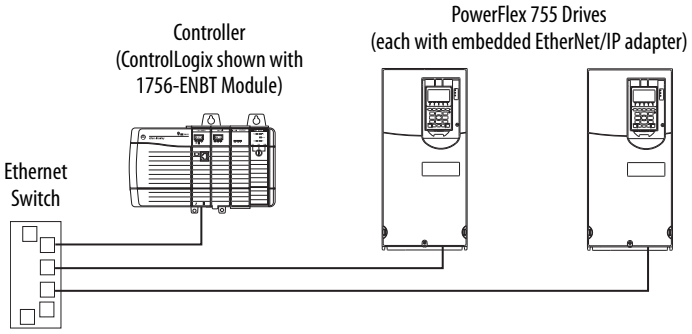
Connecting the Adapter to the Network

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

1. Remove power from the drive.
2. To access the drive control pod, remove the drive cover and lift the drive HIM bezel to its open position.
3. Use static control precautions.
4. Connect one end of an Ethernet cable to the network.

   See Figure 2 for an example of wiring to an EtherNet/IP network.

Figure 2 - Connecting the Ethernet Cable to the Network



5. Route the other end of the Ethernet cable through the bottom of the PowerFlex 755 drive.
6. Insert the cable plug into the embedded EtherNet/IP adapter mating-socket. See item 3 in Status Indicators on page 11.

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.

Install the drive cover, and apply power to the drive. The embedded EtherNet/IP adapter receives its power from the drive. When you apply power to the embedded EtherNet/IP adapter for the first time, its ENET status indicator is steady green or flashes green after an initialization. If it is red, there is a problem. See Chapter 7, Troubleshooting.

Start-up Status Indications

After power is applied, the drive STS (status) indicator and the embedded EtherNet/IP adapter ENET and LINK status indicators can be viewed on the front of the drive (Figure 3). Possible start-up status indications are shown in Table 2.

Figure 3 - Drive and Adapter Status Indicators

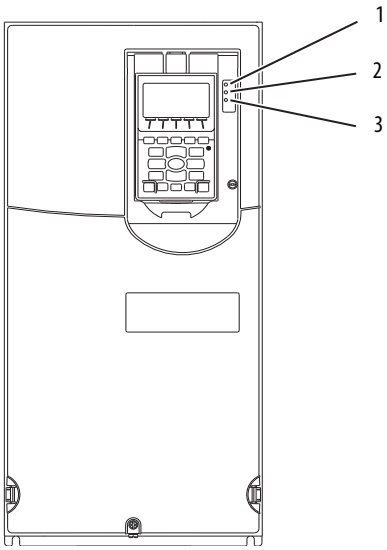


Table 2 - Drive and Adapter Start-Up Status Indications

Item	Name	Color	State	Description
				Drive STS Indicator
1	STS (Status)	Green	Flashing	Drive ready but is 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 Inhibit]**).
			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 updating firmware.
				Embedded EtherNet/IP Adapter Status Indicators
2	ENET	Unlit	Off	Adapter and/or network is not powered, adapter is not properly connected to the network, or adapter needs an IP address.
		Red	Flashing	An EtherNet/IP connection has timed out.
			Steady	Adapter failed the duplicate IP address detection test.
		Red/Green	Flashing Alternately	Adapter is performing a self-test.
		Green	Flashing	Adapter is properly connected, but is not communicating with any devices on the network.
			Steady	Adapter is properly connected and is communicating on the network.
3	LINK	Unlit	Off	Adapter is not powered or is not transmitting on the network.
		Green	Flashing	Adapter is properly connected and is transmitting data packets on the network.
			Steady	Adapter is properly connected, but is not transmitting on the network.

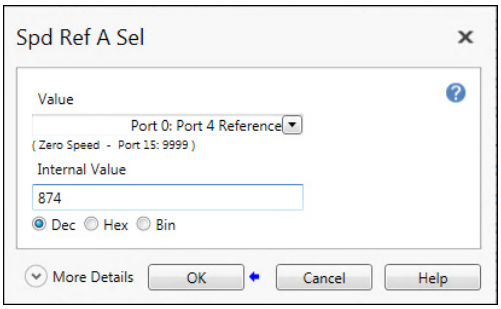
After verifying correct operation, place the drive HIM bezel to its closed position and install the drive cover. For more details on status indicator operation, see page 128.

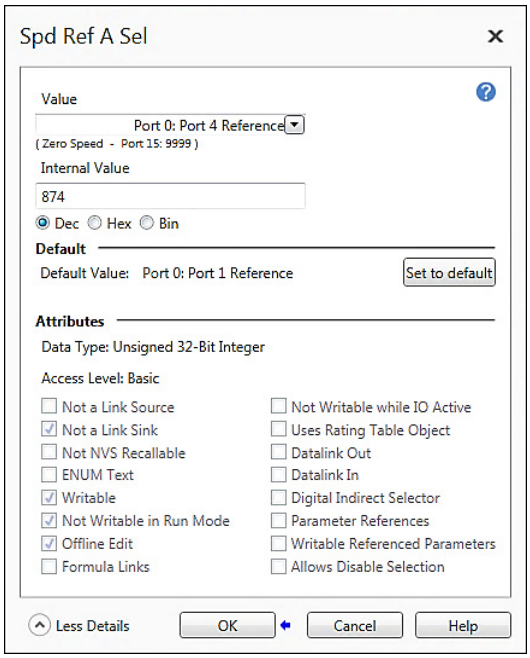
Configuring and Verifying Key Drive Parameters

The PowerFlex 755 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 that comes from the network. Or you could set the drive to have its control come from the network with the Reference that comes from another peripheral or terminal block. Or you could set the drive to have both its control and Reference come from the network.

The following steps in this section assume that the drive receives the Logic Command and Reference from the network.

1. To access the required parameters in this procedure, verify that drive **Parameter 301 - [Access Level]** is set to '1' (Advanced) or '2' (Expert).
2. To set the drive speed Reference, use drive **Parameter 545 - [Speed Ref A Sel]**.
   a. Set the Port field to '0 - PowerFlex 755' as shown.





   b. Set the Parameter field to point to the port in which the embedded EtherNet/IP adapter is located (always 'Port 13 Reference' – the drive port dedicated to the embedded EtherNet/IP adapter).

      The number '877' in the Parameter field of the example dialog box is the parameter in the drive that points to the port.

3. Verify that drive **Parameter 930 - [Speed Ref Source]** is reporting the source of the Reference to the drive (Port 0). The source is the port in which the embedded EtherNet/IP adapter resides (always 'Port 13 Reference').

   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/embedded adapter or the network is the cause.

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

Commissioning the Adapter

To commission the embedded EtherNet/IP adapter, you must set a unique IP address. See the Glossary for details about IP addresses. When using the adapter switches, see Setting the IP Address on page 20 for details. When not using these switches, a BOOTP server, or adapter parameters can be used to set the IP address. But only after connecting the adapter to the network and power is applied the drive.

By default, the adapter is configured so that you must set the IP address by using a BOOTP server. For details, see Using a BOOTP Server on page 30. To set the IP address using adapter parameters, see Using Adapter Parameters on page 34.

IMPORTANT New settings for some adapter parameters are recognized only when power is applied to the adapter or it is reset. For example, **Parameters 38 - [IP Addr Cfg 1]** . . . **41 - [IP Addr Cfg 4]**. After you change parameter settings, cycle power or reset the adapter.

Notes:

Configuring the Adapter

This chapter provides instructions and information for setting the parameters to configure the embedded EtherNet/IP adapter.

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

Configuration Tools

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

Tool	See
PowerFlex® 20-HIM-A6 or 20-HIM-C6S HIM	page 30
BOOTP server	page 30
Connected Components Workbench™ software, version 1.02 or later	http://compatibility.rockwellautomation.com/Pages/home.aspx, or online help (installed with the software)
DriveExplorer™ software, version 6.01 or later	http://compatibility.rockwellautomation.com/Pages/home.aspx, or online help (installed with the software)
DriveExecutive™ software, version 5.01 or later	http://compatibility.rockwellautomation.com/Pages/home.aspx, or online help (installed with the software)

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

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

1. Display the Status screen, which is shown on HIM power up.
2. Use the 4 or 6 key to scroll to the Port in which the embedded EtherNet/IP adapter resides (always Port 13).
3. To display the Jump to Parameter # entry pop-up box, press 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 Adapter IP Address

When the adapter IP address switches (Figure 1 on page 22) are set to a value other than 001...254 or 888, **Parameter 36 - [BOOTP]** determines the source for the adapter node address. By default, the embedded EtherNet/IP adapter is configured to set its IP address, subnet mask, and gateway address by using a BOOTP server. To use a BOOTP server to set the node address, see the procedure in Using a BOOTP Server. To use adapter parameters, see Using Adapter Parameters on page 34.

Using a BOOTP Server

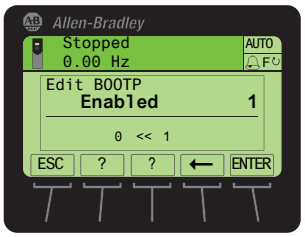
TIP If the PowerFlex 755 drive is connected to a Stratix® 5700, Stratix 6000, or Stratix 8000 managed Ethernet switch, and the drive is set for BOOTP mode, the 'dynamic IP address assignment by port' (Stratix 6000) or 'DHCP persistence' (Stratix 8000) feature sets the IP address for the drive. For more details, see the Stratix Managed Switches User Manual, publication 1783-UM007.

There are various BOOTP servers available. The following instructions use Rockwell Automation® BOOTP Server, version 2.3 or later, a **free** standalone program that incorporates the functionality of standard BOOTP utilities with a graphical interface.

It is available from https://compatibility.rockwellautomation.com/Pages/home.aspx. See the Readme file and online Help for more information.

TIP If you prefer to configure the IP address, subnet mask, and gateway address by using adapter parameters, set adapter **Parameter 36 - [BOOTP]** to '0' (disabled). For details, see Using Adapter Parameters on page 34.

1. Depending on the type of server (BOOTP) being used, set **Parameter 36 - [BOOTP]** is set to '1' (Enabled)**.**

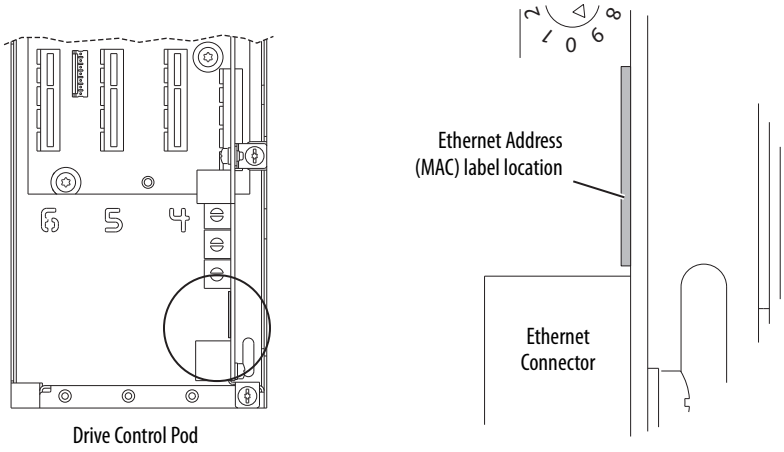


2. Make note of the Ethernet Address (MAC) of the adapter hardware, which is used in step 7.

   There are two ways to find the MAC:

   - Remove the PowerFlex 755 drive cover and locate the hardware Ethernet Address (MAC) of the adapter label on the main control board of the drive(Figure 4).

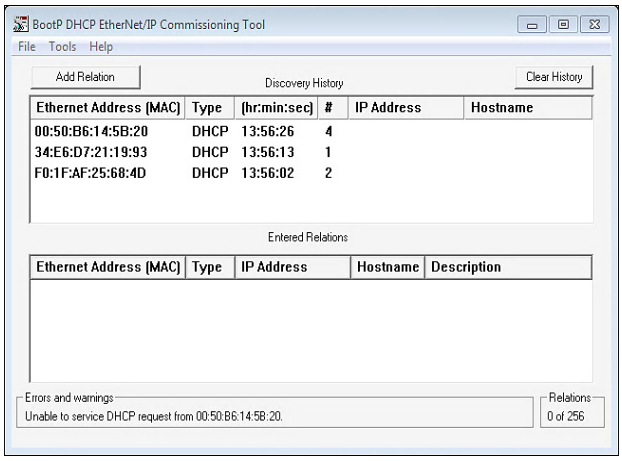
Figure 4 - Location of the Adapter Hardware Address Label



   - Use the HIM to scroll to drive Port 13 and access the embedded EtherNet/IP adapter DIAGNOSTIC folder screen. Then scroll to Diagnostic Items 43...48 (HW Addr 1...6) to view the hardware Ethernet Address (MAC) of the adapter. Finally, convert these decimal values to a hex values.

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

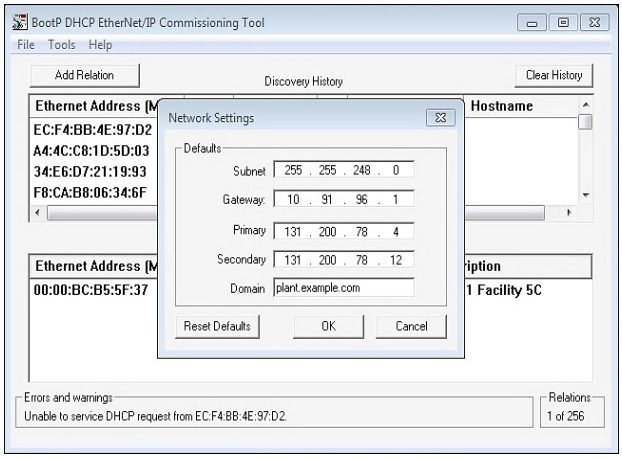
   The BOOTP Server dialog box appears.



   To configure devices on your EtherNet/IP network, you must configure settings in the BOOTP 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 embedded EtherNet/IP of the adapter network.
Gateway (1)	The IP address of the gateway device on the network of the adapter.
Primary	The address of the primary DNS server to be used on the local end of the link for negotiating with remote devices.
Secondary	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	The text name that corresponds to the numeric IP address that was assigned to the server that controls the network.

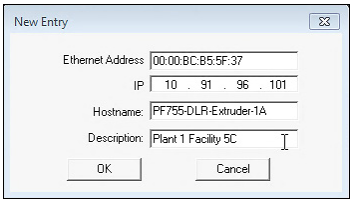
(1) For definitions of these terms, see the Glossary.

6. Click OK to apply the settings.

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

7. In the BOOTP Request History list, either double-click the Ethernet Address (MAC) of the adapter 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.



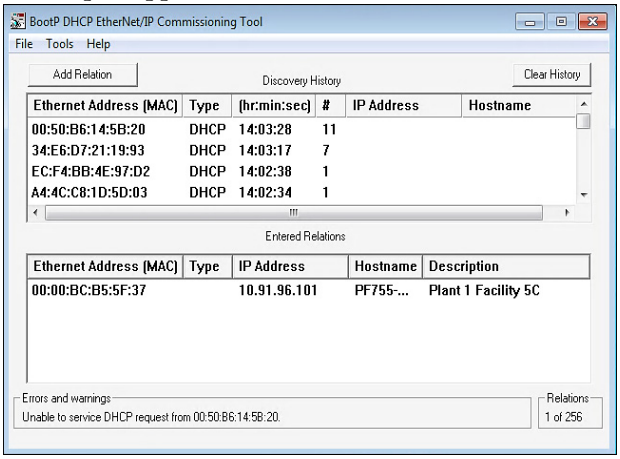
8. Edit the following:

Box	Type
IP (1)	A unique IP address for the adapter
Host name	Optional
Description	Optional

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

9. Click OK to apply the settings.

   The adapter appears in the Entered Relations list with the new settings.



10. To assign this configuration permanently to the adapter, select the device in the Entered Relations list and click Disable BOOTP.

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

    TIP To enable BOOTP for an embedded adapter that has had BOOTP disabled, right click on the adapter in the Entered Relations list. Then, depending on the type of server, click Enable BOOTP, and lastly, reset the adapter or power cycle the drive.

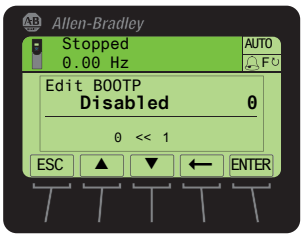
11. From the File menu, choose Save to save the Entered Relations list.

Using Adapter Parameters

By default, the adapter is configured to use a BOOTP server as the source for the adapter IP address, subnet mask, and gateway address. To use adapter parameters instead, you must first disable BOOTP by using **Parameter 36 - [BOOTP]**. Then set the associated adapter parameters as described in the following subsections.

Disable the BOOTP Feature or Change the Source for the Node Address

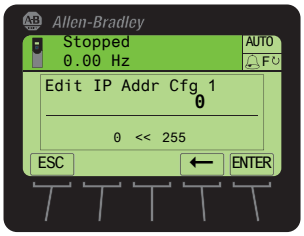
1. Verify that the IP Address switches (Figure 1 on page 22) are set to any value other than 001...254 or 888. The default setting is 999.
2. Set the value of **Parameter 36 - [BOOTP]** to '0' (Disabled).

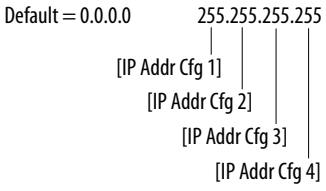


3. Cycle power to the drive to reset the adapter or by using the HIM Reset Device function located in the DIAGNOSTIC folder of the drive.
4. Set the IP address, subnet mask, and gateway address by using adapter parameters. Perform the steps in the following subsections.

Set the IP Address

1. Verify **Parameter 36 - [BOOTP]** is set to '0' (Disabled).
2. Set the value of **Parameters 38 - [IP Addr Cfg 1]** through **41 - [IP Addr Cfg 4]** to a unique IP address.



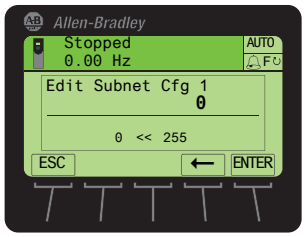


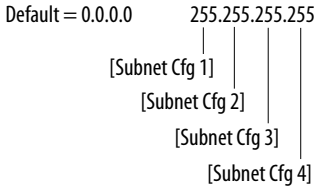
3. Cycle power to the drive to reset the adapter or by using the Reset Device function of the HIM, located in the DIAGNOSTIC folder for the drive.

   The ENET status indicator is steady green or flashes green if the IP address is correctly configured.

Set the Subnet Mask

1. Verify **Parameter 36 - [BOOTP]** is set to '0' (Disabled).
2. Set the value of **Parameters 42 - [Subnet Cfg 1]** ... **Parameter 45 - [Subnet Cfg 4]** to the desired value for the subnet mask.

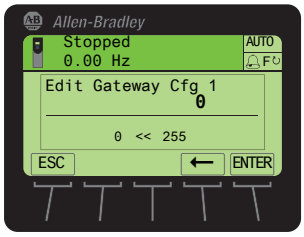


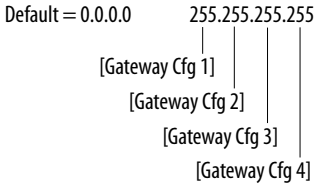


3. Cycle power to the drive to reset the adapter or by using the Reset Device function of the HIM located in the DIAGNOSTIC folder for the drive.

Set the Gateway Address

1. Verify **Parameter 36 - [BOOTP]** is set to '0' (Disabled).
2. Set the value of **Parameters 46 - [Gateway Cfg 1]** ... **Parameter 49 - [Gateway Cfg 4]** to the IP address of the gateway device.



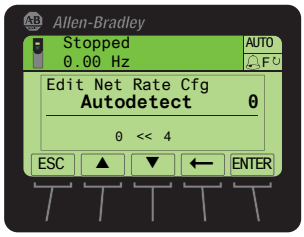


3. Cycle power to the drive to reset the adapter or by using the HIM Reset Device function located in the DIAGNOSTIC folder of the drive.

Setting the Data Rate

By default, the adapter is set to autodetect, so 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 **Parameter 50 - [Net Rate Cfg]** value. This value determines the Ethernet data rate and duplex setting that the adapter uses to communicate. For definitions of data rate and duplex, see the Glossary.

1. Set the value of **Parameter 50 - [Net Rate Cfg]** 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.

2. Cycle power to the drive to reset the adapter or by using the Reset Device function of the HMI located in the DIAGNOSTIC folder for the drive.

Selecting Master-Slave or Peer-to-Peer Hierarchy

A hierarchy determines the type of device with which the adapter exchanges data. In a Master-Slave hierarchy, the adapter exchanges data with a master, such as a scanner or bridge. In a peer-to-peer hierarchy, the adapter exchanges data with embedded EtherNet/IP adapters in other PowerFlex 755 drives.

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

Setting a Master-Slave Hierarchy

Enable Datalinks To Write Data

The controller output image (controller outputs-to-drive) can have 1...16 additional 32 bit parameters (Datalinks). They are configured using **Parameters 01 - [DL From Net 01]** ... **Parameter 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 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 or greater, install the AOP for the drive so you can configure the Datalink parameters within the controller project. They are assigned when configuring the RSLogix 5000 drive Add-on Profile (see Add the PowerFlex Drive to the I/O Configuration on page 58).

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

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

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

For example, if you want to use **Parameter 01 - [DL From Net 01]** to write to Parameter 03 of an optional encoder card plugged into drive Port 5. By using

the formula, the value for **Parameter 01 - [DL From Net 01]** would be (10000 * 5) + (3) = 50003.

Follow these steps to enable Datalinks to write data.

1. Set the values of only the required number of contiguous controller-to-drive Datalinks that write data to the drive and that added in the network I/O connection.
2. Cycle power to the drive to reset the adapter or by using the Reset Device function of the HIM located in the DIAGNOSTIC folder for the drive.
3. Since the Logic Command and Reference are always used in the adapter, configure the parameters in the drive to accept the Logic Command and Reference from the adapter.

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

   a. Set the Port field for the drive (for example, 0 - PowerFlex 755).
   b. Set the Parameter field to point to the drive port in which the embedded EtherNet/IP adapter is installed (always 'Port 13 Reference', the drive port dedicated to the embedded adapter).

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

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

Next, configure the controller to recognize and transmit I/O to the adapter. See Chapter 4, Configuring the Drive in a Logix 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 **Parameters 17 - [DL To Net 01]** ... **Parameter 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 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 **Parameters 17, 18, 19, 20,** and **21** to configure five Datalinks to read 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 or greater, install the AOP for the drive so you can configure the Datalink parameters within the controller project. They are assigned when configuring the drive Add-on Profile (see Add the PowerFlex Drive to the I/O Configuration on page 58).

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

Parameters 17 - [DL To Net 01] ... Parameter 32 - [DL To Net 16] configure which parameters in the drive, adapter, or any other connected peripheral send the values to the network. 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 using this formula:

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

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

Follow these steps to enable Datalinks to read data.

1. Set the values of only the required number of contiguous drive-to-controller Datalinks that are to read data from the drive and that are included in the network I/O connection.
2. Cycle power to the drive to reset the adapter or by using the Reset Device function of the HIM located in the DIAGNOSTIC folder for the drive.

The adapter is configured to send output data to the master (controller). You must now configure the controller to recognize and transmit I/O to the adapter. See Chapter 4, Configuring the Drive in a Logix System.

Setting the Adapter to Transmit Peer-to-Peer Data

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

Simple Peer I/O Configuration

The most common use of peer I/O is to take the Logic Command and Reference from one drive and 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 embedded EtherNet/IP adapter provides a simplified configuration method for simple peer I/O.

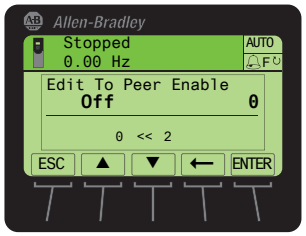
IMPORTANT Because of the 32 bit REAL (floating point) Reference, the following method works only if the drives that transmit and receive are PowerFlex 750-Series drives. Peer-to-peer communication only works between drives with a 20-750-ENETR option module or PowerFlex 755 drives with the embedded EtherNet/IP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

Follow these steps to configure the master (broadcast) side of simple peer I/O.

1. Set **Parameters 89 - [To Peer Period]** and **90 - [To Peer Skip]** as desired for your application.

   Parameter 89 controls how frequently the adapter transmits data when it is changing. **Parameter 90** controls how frequently the adapter transmits data when it is **not** changing.

2. Set **Parameter 91 - [To Peer Enable]** to a value of '1' (Cmd/Ref).



Value	Setting
0	Off (Default)
1	Cmd/Ref
2	Custom

Follow these steps to configure the slave (receiver) side of simple peer I/O.

1. Set **Parameter 80 - [Fr Peer Timeout]** to a suitable timeout value for your application.

   This value must be greater than the product of **Parameter 89 - [To Peer Period]** and **Parameter 90 - [To Peer Skip]** in the transmitting drive.

2. Set **Parameters 81 - [Fr Peer Addr 1]** ... **Parameter 84 - [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). This setting makes sure that it follows the speed reference and commanded direction for the master drive.
4. Set **Parameter 85 - [Fr Peer Enable]** to a value of '1' (Cmd/Ref).

Custom Peer I/O Configuration

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

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

Follow these steps to configure the master (broadcast) side of custom peer I/O.

1. Decide how many Datalink parameters you want to transmit. Set **Parameter 87 - [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 **Parameter 87 - [DLs To Peer Cfg]** is set to '3', then Datalinks 14, 15, and 16 are allocated to peer I/O. Make sure that **Parameter 35 - [DLs To Net Act]** plus **Parameter 87 - [DLs To Peer Cfg]** do not total more than 16. This setting avoids an overlap between Master-Slave and peer I/O.
3. Set **Parameters 17...32 - [DL To Net 01...16]** to the parameters you want to transmit, based on the allocation in step 2.
4. Power cycle the drive to reset the adapter. Or by using the Reset Device function of the HIM located in the DIAGNOSTIC folder of the drive so that changes to **Parameter 87 - [DLs To Peer Cfg]** take effect.
5. Set **Parameters 89 - [To Peer Period]** and **90 - [To Peer Skip]** as required for your application.

   Parameter 89 controls how frequently the adapter transmits data when it is changing. **Parameter 90** controls how frequently the adapter transmits data when it is **not** changing.
6. Set **Parameter 91 - [To Peer Enable]** to a value of '2' (Custom).

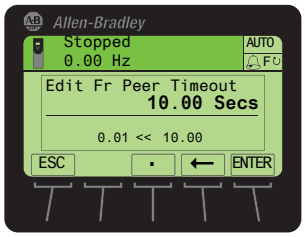
Follow these steps to configure the slave (receiver) side of custom peer I/O.

1. Decide how many pieces of data (Logic Command, Reference, and Datalink parameters) you want to receive and set **Parameter 76 - [DLs Fr Peer Cfg]** to that value.

   This setting must match the number of parameters transmitted by the master.
2. Determine how the Datalinks are allocated.

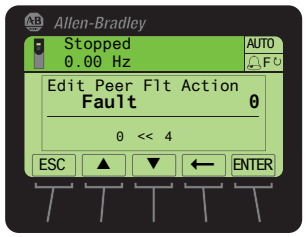
   The highest numbered of the 16 Datalinks are allocated to peer I/O. For example, if **Parameter 76 - [DLs Fr Peer Cfg]** is set to '3', Datalinks 14, 15, and 16 are allocated to peer I/O. Make sure that **Parameter 34 - [DLs From Net Act]** plus **Parameter 76 - [DLs Fr Peer Cfg]** does not total more than 16. This parameter total avoids an overlap between Master-Slave and peer I/O.
3. Set **Parameters 1...16 - [DL From Net 01...16]** to the parameters you want to receive, based on the allocation in step 2.
4. Set **Parameter 80 - [Fr Peer Timeout]** to a timeout value for your application.

This value must be greater than the product of **Parameter 89 - [To Peer Period]** and **Parameter 90 - [To Peer Skip]** in the transmitting drive.



5. Set **Parameter 56 - [Peer Flt Action]** to the desired action when peer I/O data is not received before the timeout is reached.

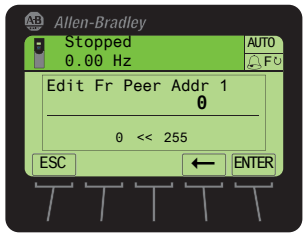
ATTENTION: Risk of injury or equipment damage exists. **Parameter 56 - [Peer Flt Action]** lets you determine the action of the adapter and connected drive when the adapter is unable to communicate with the designated peer. By default, this parameter faults the drive. You can configure this parameter so that the drive continues to run. However, precautions must be taken to verify that the setting of this parameter does not create a hazard of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).

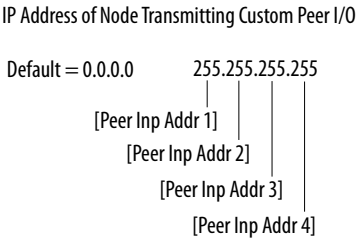


Value	Description
0	Fault (Default)
1	Stop
2	Zero Data
3	Hold Last
4	Send Flt Cfg

For more details about fault action, see Setting a Fault Action on page 44.

6. Set **Parameters 81 - [Fr Peer Addr 1]** ... **84 - [Fr Peer Addr 4]** to the IP address of the drive that transmits the custom peer I/O.





7. If a Logic Command is being sent, use **Parameter 78 - [Logic Src Cfg]**. To set the number of the Datalink that contains the Logic Command within the range defined by **Parameter 76 - [DLs Fr Peer Cfg]**.

For example, if **Parameter 76 - [DLs Fr Peer Cfg]** is set to receive five Datalinks (Datalinks 12...16). And the first of those five Datalinks (Datalink 12) contain the Logic Command. Set **Parameter 78 - [Logic Src Cfg]** to a value of '1'. Otherwise, set **Parameter 78** to a value of '0'. For Logic Command bit definitions, see Appendix D or the drive documentation.

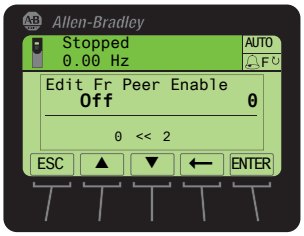
8. If a Reference is being sent, use **Parameter 79 - [Ref Src Cfg]** to set the number of the Datalink that contains the Reference within the range defined by **Parameter 76 - [DLs Fr Peer Cfg]**.

   For example, if **Parameter 76 - [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 **Parameter 79 - [Ref Src Cfg]** to a value of '2'. Otherwise, set **Parameter 79** to a value of '0'.

9. In each PowerFlex 750-Series slave drive, set drive **Parameter 308 - [Direction Mode]** to '0' (Unipolar). This setting makes sure that it follows the speed reference and commanded direction for the master drive.

10. Cycle power to the drive to reset the adapter. Or by using the Reset Device function of the HIM, located in the DIAGNOSTIC folder for the drive, so that changes to **Parameter 76 - [DLs Fr Peer Cfg]** take effect.

11. Set **Parameter 85 - [Fr Peer Enable]** to a value of '2' (Custom).



Value	Setting
0	Off (Default)
1	Cmd/Ref
2	Custom

Setting a Fault Action

The drive responds by faulting if it is using I/O from the network. You can configure another response to these faults:

- Disrupted I/O communication by using **Parameter 54 - [Comm Flt Action]**
- An idle controller by using **Parameter 55 - [Idle Flt Action]**
- Disrupted peer I/O by using **Parameter 56 - [Peer Flt Action]**
- Disrupted MSG instruction for drive control via PCCC, the CIP Register Object, or the CIP Assembly Object by using **Parameter 57 - [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 adapter and drive use the embedded adapter parameters**:**

- **54 - [Comm Flt Action]**
- **55 - [Idle Flt Action]**
- **56 - [Peer Flt Action]**
- **57 - [Msg Flt Action]**

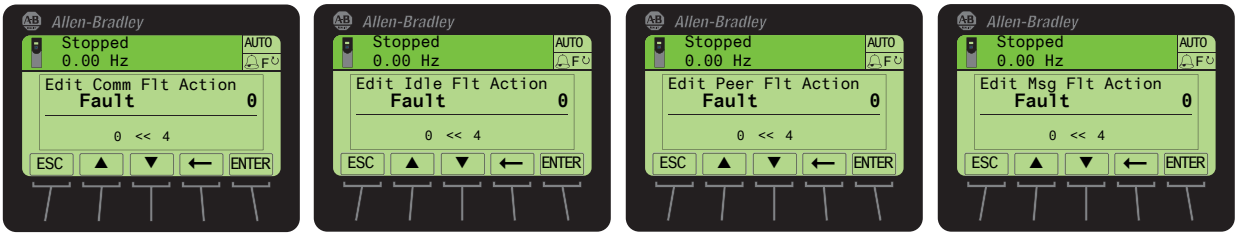
By default, these parameters fault the drive. You can configure these parameters so that the drive continues to run, however verify that the settings of these parameters do not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly.

Changing the Fault Action

Set the values of **Parameters 54 - [Comm Flt Action]**, **55 - [Idle Flt Action]**, **56 - [Peer Flt Action]**, and **57 - [Msg Flt Action]** 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 5 - Edit Fault Action HIM Screens



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

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

Setting the Fault Configuration Parameters

When any of these parameters are set to 'Send Flt Cfg' the values in Table 3 are sent to the drive:

- **54 - [Comm Flt Action]**
- **55 - [Idle Flt Action]**
- **56 - [Peer Flt Action]**
- **57 - [Msg Flt Action]**

TIP Only one fault can register at a time. If several faults occur, they are processed in the order in which the system receives them.

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

Table 3 - Fault Configuration Parameter Values

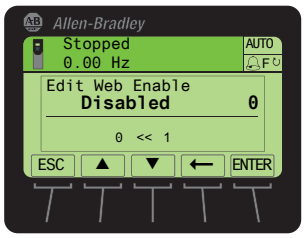
Adapter Parameter	Description
Parameter 58 - [Flt Cfg Logic]	A 32 bit value sent to the drive for Logic Command.
Parameter 59 - [Flt Cfg Ref]	A 32 bit REAL (floating point) value sent to the drive for Reference.
Parameter 60 - [Flt Cfg DL 01] . . . Parameter 75 - [Flt Cfg DL 16]	A 32 bit integer value 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 Access Control

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

By default, the adapter web pages are disabled. To enable the adapter web pages, set **Parameter 52 - [Web Enable]** to '1' (Enabled) and then reset the adapter for the change to take effect.



Value	Description
0	Disabled (Default)
1	Enabled

For more details on the web pages for the adapter, see Chapter 8, Viewing the Adapter Web Pages.

The adapter can be configured to send email messages automatically to desired addresses when:

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

Bit 0 of **Parameter 53 - [Web Features]** is used to protect the configured settings for e-mail messaging. By default, settings are not protected and changes can be made.

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

Email messaging always remains active regardless of whether its settings are protected—unless e-mail messaging was **never** configured. For more information about the configuration of adapter email messaging or to stop email messages, see Configure Email Notification Web Page on page 138.

Bit	Description
0	E-mail 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 Adapter

Changes to switch settings and some adapter parameters require that you reset the adapter before the new settings take effect. You can reset the adapter by cycling power to the drive or by using the Reset Device function of the HIM located in the DIAGNOSTIC folder for the drive.

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

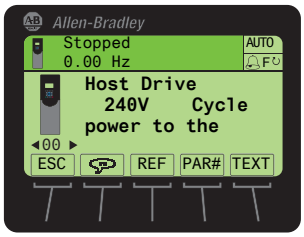
Restoring Adapter Parameters to Default Configurations

Adapter parameters can be restored in two ways:

- ALL—restores ALL adapter parameters to their default configuration values.
- MOST—restores MOST adapter parameters—except the following, which are used for network setup:
  - **Parameter 36 - [BOOTP]**
  - **Parameters 38…41 - [IP Addr Cfg 1…4]**
  - **Parameters 42…45 - [Subnet Cfg 1…4]**
  - **Parameters 46…49 - [Gateway Cfg 1…4]**
  - **Parameter 50 - [Net Rate Cfg]**

Follow these steps to restore adapter parameters to their default configuration values.

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



2. Use the 4 or 6 key to scroll to Port 13, which is always the drive port dedicated to the embedded EtherNet/IP adapter.
3. Press the key displays its last-viewed folder.
4. Use the 4 or 6 key to scroll to the MEMORY folder.
5. Use the 2 or 8 key to select Set Defaults.
6. Press the 5 (Enter) key.

   The Set Defaults pop-up box appears.
7. Press the 5 (Enter) key again.

   The warning pop-up box appears.

8. Reset parameters to their default configuration values by selecting 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 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 the Set Defaults procedure. The common reasons for a conflict include: a drive that is running or a controller in Run mode.

9. Reset the adapter by cycling power to the drive or by using the Reset Device function of the HIM, located in the DIAGNOSTIC folder for the drive.

Viewing the Adapter Status Using Parameters

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

Adapter Parameter	Description
34 - [DLs From Net Act]	The number of controller-to-drive Datalinks that are included in the network I/O connection (controller outputs).
35 - [DLs To Net Act]	The number of drive-to-controller Datalinks that are included in the network I/O connection (controller inputs).
36 - [BOOTP]	Displays the source from which the adapter IP address is taken. The source can be either of the following: • The IP address switch settings shown in Figure 1, and whether **Parameter 36 - [BOOTP]** 0= Parameters—uses the address from **Parameters 38…41 [IP Addr Cfg x]** 1=BOOTP—the default
50 - [Net Rate Act]	The data rate used by the adapter.
86 - [Fr Peer Status]	The status of the consumed peer I/O input connection, which can be one of the following values: 0 = Off 1 = Waiting 2 = Running 3 = Faulted
77 - [DLs Fr Peer Act]	The number of peer-to-drive Datalinks that the drive is expecting.
88 - [DLs To Peer Act]	The number of drive-to-peer Datalinks that the drive is expecting.

Updating the Adapter Firmware

The adapter firmware is contained within the PowerFlex 755 drive firmware. The adapter firmware can be updated over the network or serially through a direct connection from a computer to the drive by using a 1203-USB or 1203-SSS serial converter.

When updating firmware over the network, you can use:

- The Allen-Bradley® ControlFLASH™ software tool
- The built-in update capability of DriveExplorer Lite
- Full software, or the built-in update capability DriveExecutive software

When updating firmware through a direct serial connection from a computer to a drive, you can use the same Allen-Bradley software tools that were previously described. Or you can use HyperTerminal software set to the X-modem protocol.

To obtain a firmware update for the PowerFlex 755 drives, go to the Product Compatibility and Downloads Center (PCDC) http://compatibility.rockwellautomation.com/Pages/home.aspx. This website contains all firmware update files and associated Release Notes that describe the following items:

- Firmware update enhancements and anomalies
- How to determine the existing firmware revision

How to update the firmware using ControlFLASH, DriveExplorer, DriveExecutive, or HyperTerminal software.

Notes:

Configuring the Drive in a Logix System

This chapter provides instructions on how to configure an Allen-Bradley® ControlLogix® controller to communicate with a connected PowerFlex® 755 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.

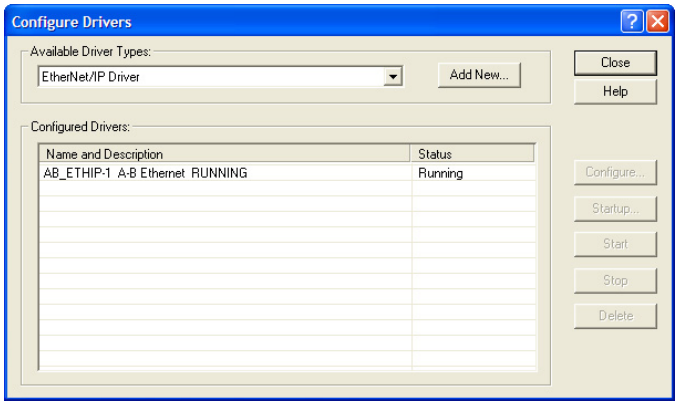
Establish Communication

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

1. Start Linx-based software.
2. From the Communications menu, choose Configure Drivers to display the Configure Drivers dialog box.
3. From the Available Driver Types pull-down menu, choose EtherNet/IP Driver.
4. Click Add New to display the Add New Driver dialog box.
5. Use the default name or type a name.
6. Click OK.

   The ‘Configure driver:’ dialog box appears.
7. Depending on your application, select either the browse local or remote subnet option.
8. Click OK.

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



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

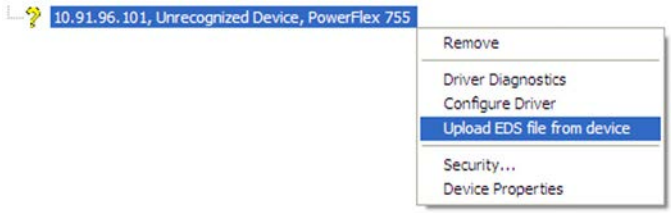
    If the 'EtherNet/IP Driver' cannot see your drive, as an alternative, use either the 'Ethernet devices' or 'Remote Devices via Linx Gateway' driver.

Uploading the Electronic Data Sheet (EDS) File

PowerFlex 755 Series drives have built-in EDS files for the Linx-based software to upload and register.

1. Right-click the EtherNet/IP drive that is shown as a yellow question mark or 'Unrecognized Device' in the RSWho dialog box.
2. Choose 'Upload EDS file from device' as shown in the following example.

   By uploading the EDS file, it also uploads the icon files for the device. The question mark changes to a drive icon.



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 Add-on Profiles can be updated anytime, and contain the latest database files available at the time of release.

Go to the Product Compatibility and Downloads Center (PCDC) http://compatibility.rockwellautomation.com/Pages/home.aspx to download the latest drive Add-on Profile for the PowerFlex 755 drive. The Logix Designer application drive Add-on Profiles provide these advantages:

- Profiles for specific drives that provide descriptive controller tags for basic control I/O words (logic command/status and reference/feedback) **and** datalinks. Additionally, datalinks automatically take the name of the drive parameter to which they are assigned. All Tags are of the proper data type so there is no need for 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 Logix Designer Application.
- 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).

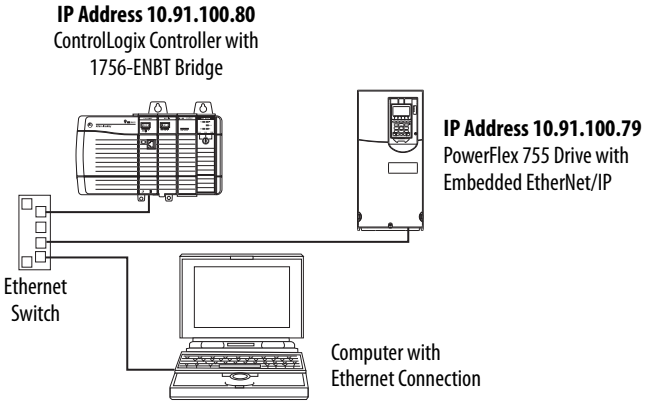
Create Logix Designer Project

Before you can add your drive, you must create a Logix Designer project that includes a controller with an Ethernet connection to the network. See the product documentation for your controller and Ethernet module. For details to configure 'Integrated Motion on the EtherNet/IP network' operation, see Integrated Motion on the EtherNet/IP network, publication MOTION-UM003.

Example Network

After the drive is configured, it will be a node on the network. This section provides the steps to configure a simple EtherNet/IP network (see Figure 6). In our example, we configure a 1756-ENBT (Series A) bridge to communicate with a drive. By using, Logic Command/Status, Reference/Feedback, and 32 Datalinks (16 to read and 16 to write) over the network.

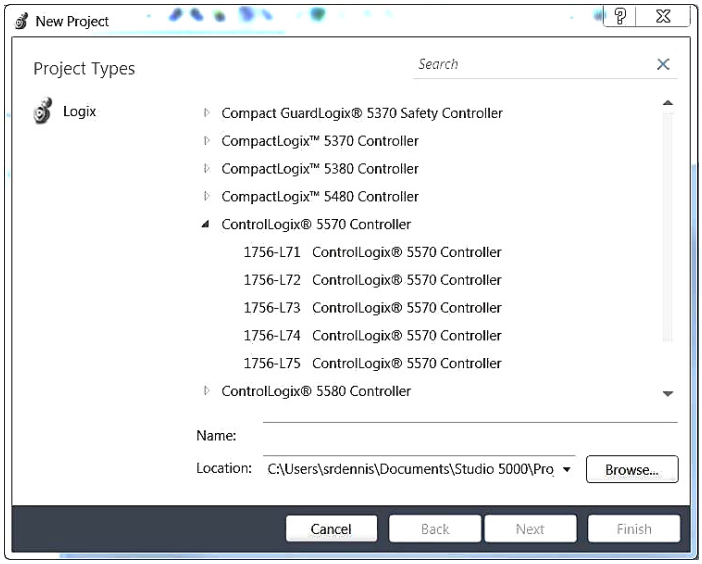
Figure 6 - Example ControlLogix Controller EtherNet/IP Network

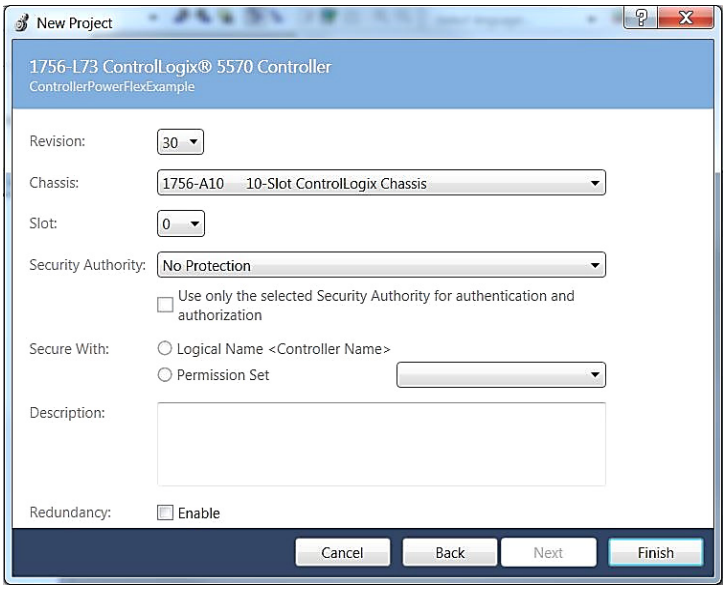


Adding a Controller and Ethernet Bridge to the Project

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

1. Start the controller programming software.
2. From the splash screen, choose New Project to display the New Project dialog box.





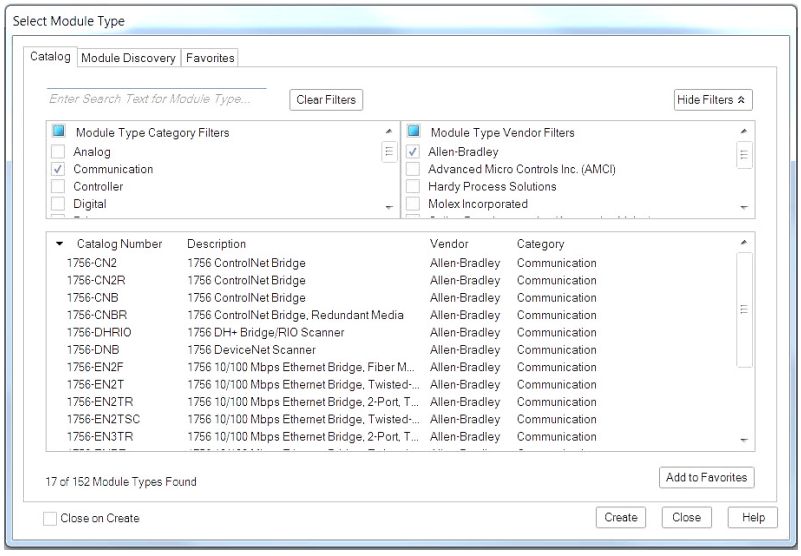
   a. Choose the appropriate choices for the fields in the dialog box to match your application.
   b. Click OK.

      The dialog box reappears with the Controller Organizer in the left pane.

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

   The Select Module dialog box appears.

4. Check the Communication group to display all available communication modules.



5. In the list, select the EtherNet/IP bridge used by your controller.

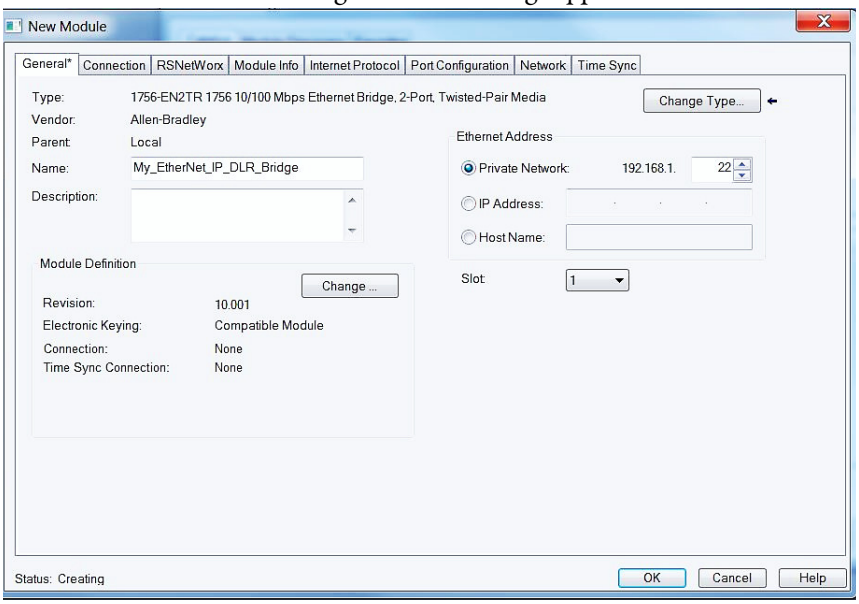
   In this example, we use the 1756-EN2TR option and it is selected.

6. Click OK.

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

8. Click OK.

   The New Module dialog box for the bridge appears.

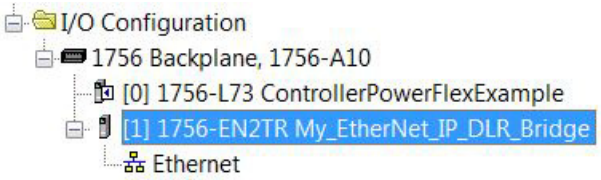


9. Edit the following:

Box	Setting
Name	A name to identify the bridge.
Description	Optional – description of the bridge.
Revision	The minor revision of the firmware in the bridge. You already set the major revision by selecting the bridge series in step 7.
Electronic Keying	**Compatible Keying**. The 'Compatible Keying' setting for Electronic Keying verifies that the physical module is consistent with the software configuration before the controller and bridge make a connection. Therefore, be sure that you have set the correct revision in this dialog box. See the online Help for additional information on this and other Electronic Keying settings. If keying is not required, select 'Disable Keying'.
Private Network or IP Address	The IP address of the EtherNet/IP bridge.
Host Name	Not used.
Slot	The slot of the EtherNet/IP bridge in the rack.
Open Module Properties	When this box is checked, click OK to open additional module properties dialog boxes to configure the bridge. When unchecked, click OK to close the New Module dialog box for the bridge. For this example, uncheck this box.

10. Click OK.

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



    In our example, a 1756-EN2TR bridge appears under the I/O Configuration folder with its assigned name.

There are two ways to add the PowerFlex drive into the I/O configuration:

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

Using the Drive Add-on Profiles

When compared to the Generic Profile, the drive Add-on Profiles provide these advantages:

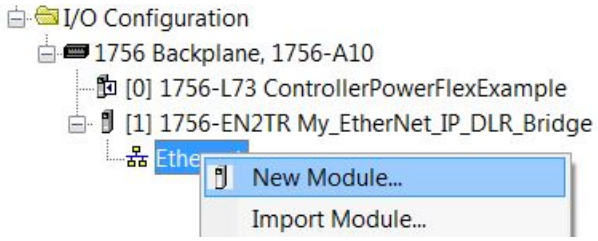
- Profiles for specific drives that automatically provide descriptive controller tags for basic control I/O words (Logic Command/Status and Reference/Feedback) **and** Datalinks. Additionally, Datalinks automatically take the name of the drive parameter to which they are assigned. All Tags are of the proper data type so there is no need for conversion in the user program. These profiles substantially reduce I/O mismatch errors and drive configuration time.

- A built-in drive configuration tool removes the need for a separate, drive software configuration tool.
- Drive configuration settings are saved as part of the controller project file (.ACD) and also downloaded to the controller.
- Automatic device configuration (drive add-on profiles version 4.03 or later, RSLogix 5000 or Studio 5000 software version 20 or later).
- Drive Add-on Profiles, version 2.01 or later enable I/O to be added online while the controller is in Run mode. To determine your drive Add-on Profile version, see Updating the Add-on Profiles and Database Files on page 69.
- Drive Add-on Profiles can be updated anytime. When a new drive is used or to benefit from new updates for Add-on Profiles, you need the newest Add-on Profile update. Go to http://compatibility.rockwellautomation.com/Pages/home.aspx to download the latest drive Add-on Profile.

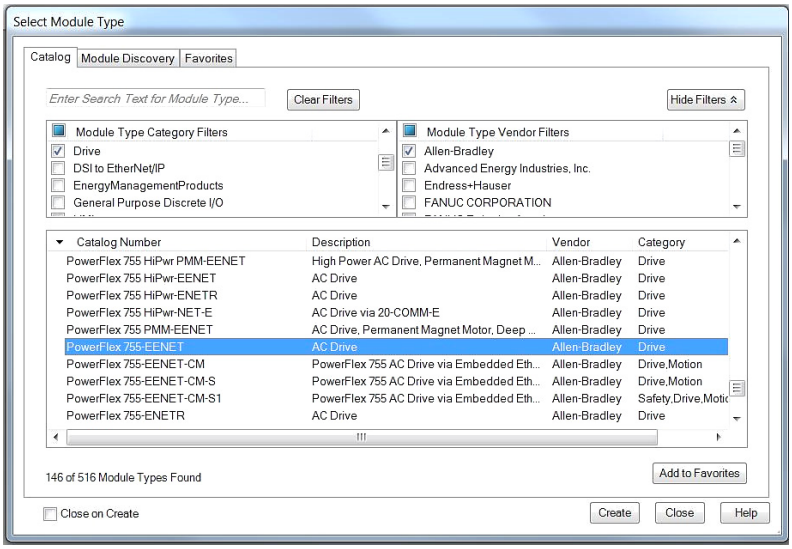
Add the PowerFlex Drive to the I/O Configuration

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

1. In the Controller Organizer, right-click the Ethernet network and choose New Module to display the Select Module dialog box.



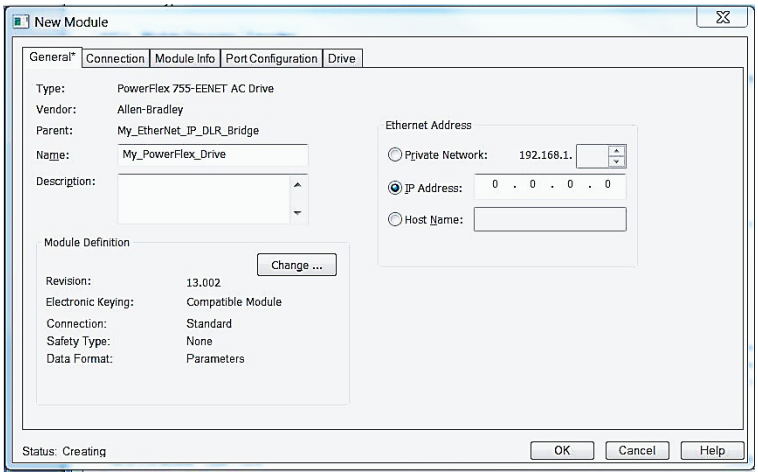
   Check the Drives group to display all available drives with their communication option modules.



TIP If the PowerFlex drive is not shown, go to http://compatibility.rockwellautomation.com/Pages/home.aspx and download the latest drive Add-on Profile.

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

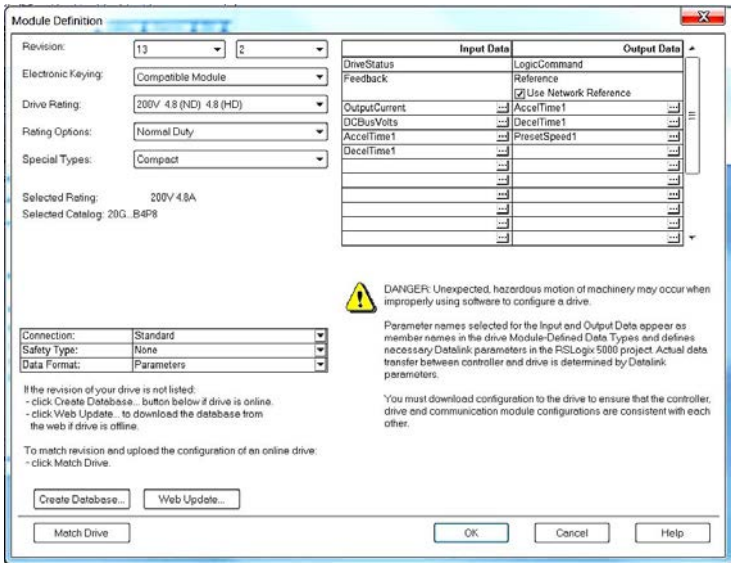
   The New Module dialog box for the drive appears.



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

Box	Setting
Name	A name to identify the drive.
Description	Optional – description of the drive/option module.
IP Address	The IP Address of the option module.

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



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

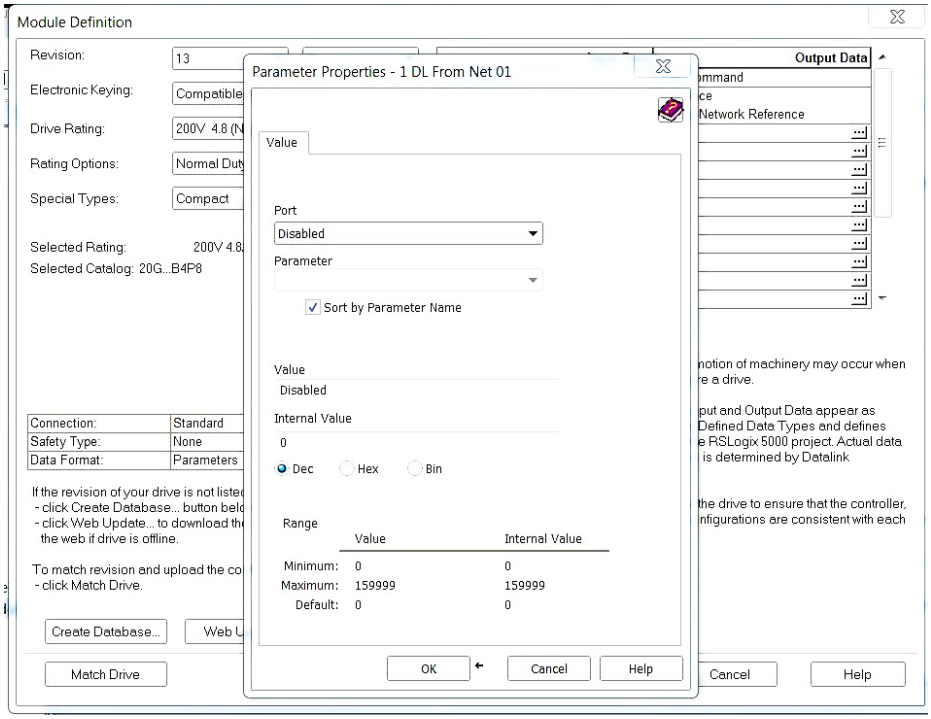
Box	Setting
Revision	The major and minor revision of the firmware (database) in the drive. If the major and minor revision for the drive is not available, the drive database is not installed on your computer. To get the correct database revision, see section Updating the Add-on Profiles and Database Files on page 69.
Electronic Keying	**Compatible Module.** The 'Compatible Module' setting for Electronic Keying verifies that the physical module is consistent with the software configuration before the controller and bridge make a connection. Make sure to set the correct revision in this dialog box. See the online Help for additional information on this and other Electronic Keying settings. When using Firmware Supervisor to store firmware for the drive, always choose 'Exact Match'. When using ADC, see the table on page 78 for more details.
Drive Rating	The voltage and current rating of the drive. If the drive rating is not listed, the drive database is not installed on your computer. To get the drive rating, use the **Create Database**, **Web Update**, or **Match Drive** button described in the Revision section of this table.
Rating Options	Selects the drive power output required for the application. Drive power must match the actual rating of the drive.
Special Types	Special Types can be Standard or Compact. Compact removes slots 7-9. Standard has slots 7-9.
Connection	**Parameters via Datalinks.** When selecting 'Parameters via Datalinks' (default), the controller tags for the Datalinks use the drive parameter names to which they are assigned. When selecting 'Datalinks', the controller tags for the Datalinks are non-descriptive UserDefinedData[n].
Data Format	**Parameters.** When the Connection field is set to 'Parameters via Datalinks', 'Parameters' is automatically selected. When the Connection field is set to 'Datalinks', you must select the number of Datalinks required for your application in the 'Data Format' field.
Input Data	Assigns selected drive or connected peripheral parameters to be READ by the controller.
Output Data	Assigns selected drive or connected peripheral parameters to be WRITTEN by the controller.
Use Network Reference	Conveniently selects the speed reference for the drive to come from the network. This box is checked by default.

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

When using Datalinks, you must still assign them to point to the appropriate drive or connected peripheral parameters. The procedure to configure the Datalinks on the Module Definition dialog box for the Input Data and Output Data is the same.

a. Click the ... button in the topmost blank row.

The Parameter Properties dialog box for the corresponding Datalink appears.



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

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

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

d. Click OK to complete configuration of the Datalink.

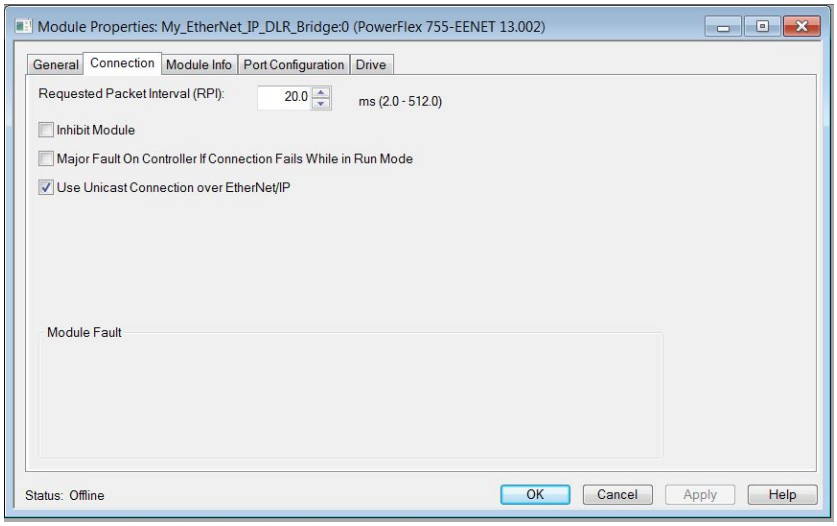
The name of the parameter that this Datalink points to is now shown in the row on the Module Definition dialog box.

e. Repeat step 6a ... step d for each Datalink being configured on both the Input and Output tabs.

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

   The New Module dialog box for the drive reappears.

8. Click the Connection tab.



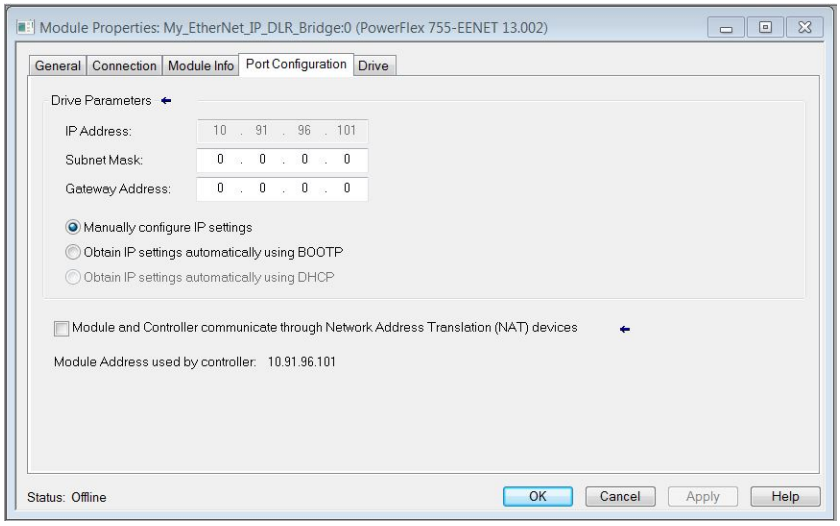
9. In the Requested Packet Interval (RPI) box, set the value to the desired rate (default is 20.0 milliseconds).

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

   The 'Inhibit Module' box, when checked, inhibits the module from communicating with the controller project. While the controller is in Run Mode, a connection failure will trigger a major controller fault when the 'Major Fault On' box is checked.

   Unicast support is added to RSLogix 5000 software, version 18.00 or later. Unicast is recommended whenever possible. For the benefits of unicast operation, see Preparing for an Installation on page 19.

10. Click the Port Configuration tab.



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

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

12. Click Apply to save the Port Configuration information, which sets the corresponding offline Subnet Cfg x and Gateway Cfg x parameters in the option module.
13. Click OK on the New Module dialog box.

    The new node now appears under the bridge in the I/O Configuration folder. If you double-click the Controller Tags, you see that module-defined data types and tags have been automatically created (Figure 7 and Figure 8).

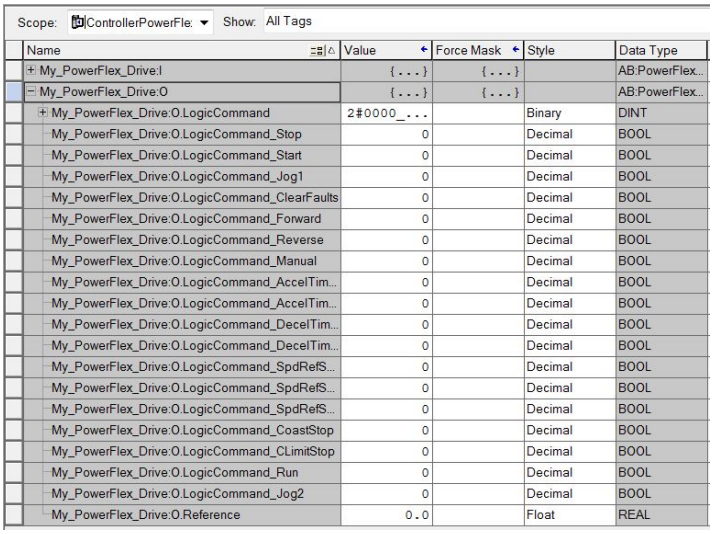
    All tag names are defined and Datalinks include the assigned drive parameter name. After you save and download the configuration, these tags allow you to access the Input and Output data of the drive via the ladder logic of the controller.

Figure 7 - Controller Input Tags Example

Scope: ControllerPowerFle Show: All Tags

Name	Value	Force Mask	Style	Data Type
My_PowerFlex_Drive:I	{...}	{...}		AB:PowerFlex...
My_PowerFlex_Drive:I.DriveStatus	2#0000_...		Binary	DINT
My_PowerFlex_Drive:I.DriveStatus_Ready	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_Active	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_CommandDir	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_ActualDir	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_Accelerating	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_Decelerating	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_Alarm	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_Faulted	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_AtSpeed	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_Manual	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_SpdRefBit0	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_SpdRefBit1	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_SpdRefBit2	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_SpdRefBit3	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_SpdRefBit4	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_Running	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_Jogging	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_Stopping	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_DCBraking	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_DBActive	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_SpeedMode	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_PositionMode	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_TorqueMode	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_AtZeroSpeed	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_AtHome	0		Decimal	BOOL
My_PowerFlex_Drive:I.DriveStatus_AtLimit	0		Decimal	BOOL

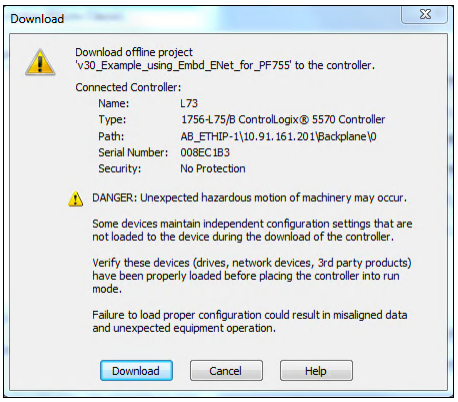
Figure 8 - Controller Output Tags Example



Download and Save the Project to the Controller

To download the configuration to the controller and save the project, follow these steps.

1. From the Communications menu, choose Download.



2. If there are no connection messages, continue to step 3. If a message box reports that the programming software is unable to go online use these steps:
   a. Find your controller in the Who Active dialog box.
   b. From the Communications menu, choose Who Active.
   c. Find and select the controller.
   d. Click Set Project Path to establish the path.

   If your controller does not appear, add or configure the EtherNet/IP driver. See Establish Communication on page 51 and online help for details.

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

   When the download is successfully completed, the software is online with the controller.

   If the controller was in Run mode before Download was clicked, the software prompts you to change the Controller mode back to Remote Run. In this case, choose the appropriate mode for your application.

   If the controller was in Program mode before Download was click, this prompt does not appear.

4. From the File menu, choose Save.

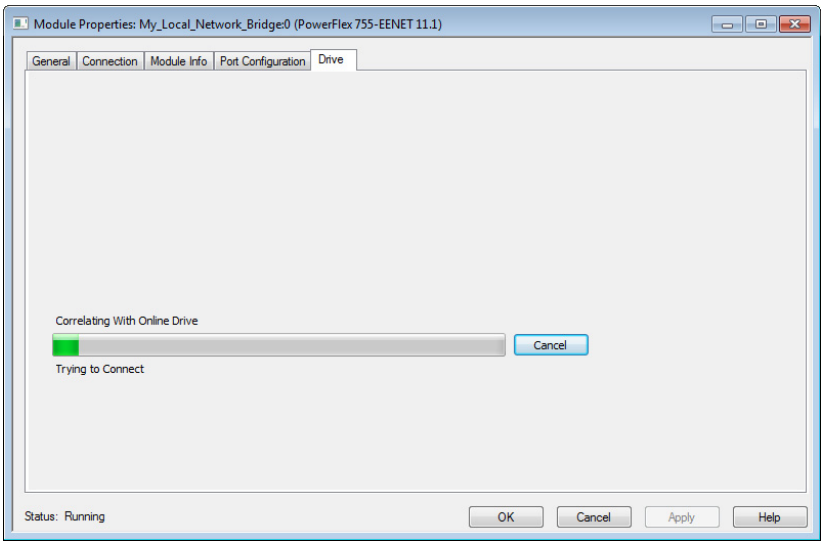
   To verify that present project configuration values are saved, the software prompts you to upload them.

5. Click Yes to upload and save the values.

Correlate the Drive with the Controller

When online with the controller, you must correlate the drive settings to the controller project I/O settings so that they match, and to load the project I/O settings into the drive.

1. In the Controller Organizer under I/O Configuration, right-click the drive and choose Properties.
2. Click the Drive tab.



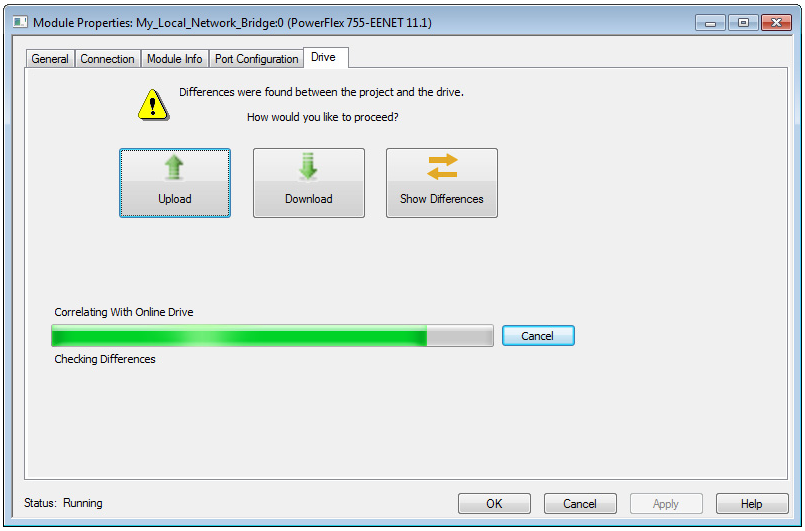
When the drive configuration data is verified, a pop-up dialog box appears. This dialog synchronizes ports from the online drive to the project, to make sure that the correct Datalinks are assigned.

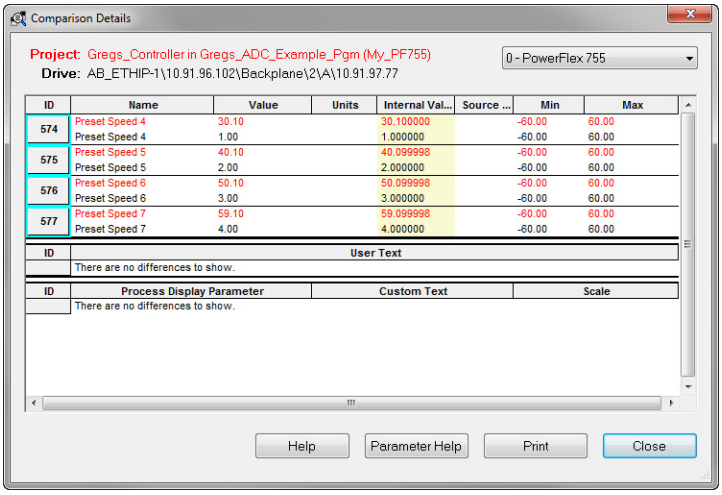
TIP On subsequent connections to the drive (after the initial download), click Upload.

3. Click OK.

   If the Differences Found dialog box appears (which is typical), click Download. The project settings are downloaded from the controller to the drive and its connected option module.

   If Upload is clicked, the drive and option module settings are uploaded to the controller.





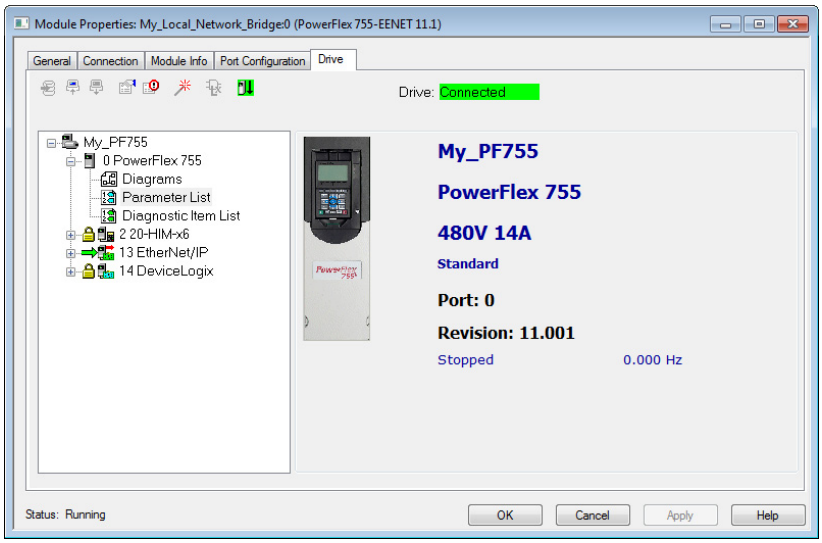
4. To match the Datalinks in the drive to the project I/O configuration, click Use Project.

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

5. Click Continue.

   A series of download dialog boxes appear. After dialog boxes have stopped appearing, the I/O OK box in the upper left of the dialog box must be steady green. There must not be a yellow warning symbol in the Controller Organizer under the I/O Configuration folder next to the drive.

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



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

Updating the Add-on Profiles and Database Files

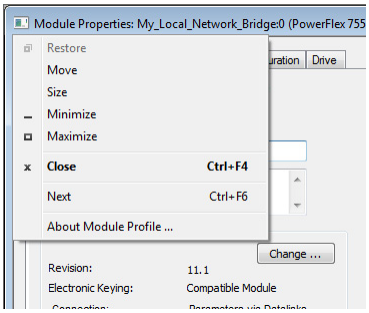
Each version of the controller ships with the latest versions of available AOPs. However, new drives (new AOPs), updates (software enhancements and anomaly fixes), and device database files that are required for new firmware releases can occur at any time. If you are missing any of the following, you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

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

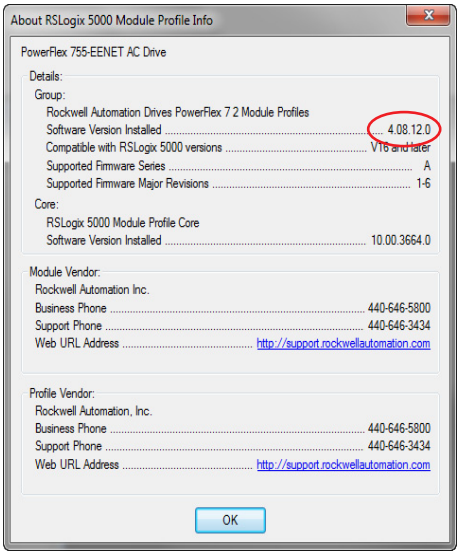
http://compatibility.rockwellautomation.com/Pages/home.aspx

To determine your AOP version:

1. Left-click on the Module Properties icon in the upper left-hand corner of the Module Properties dialog box.

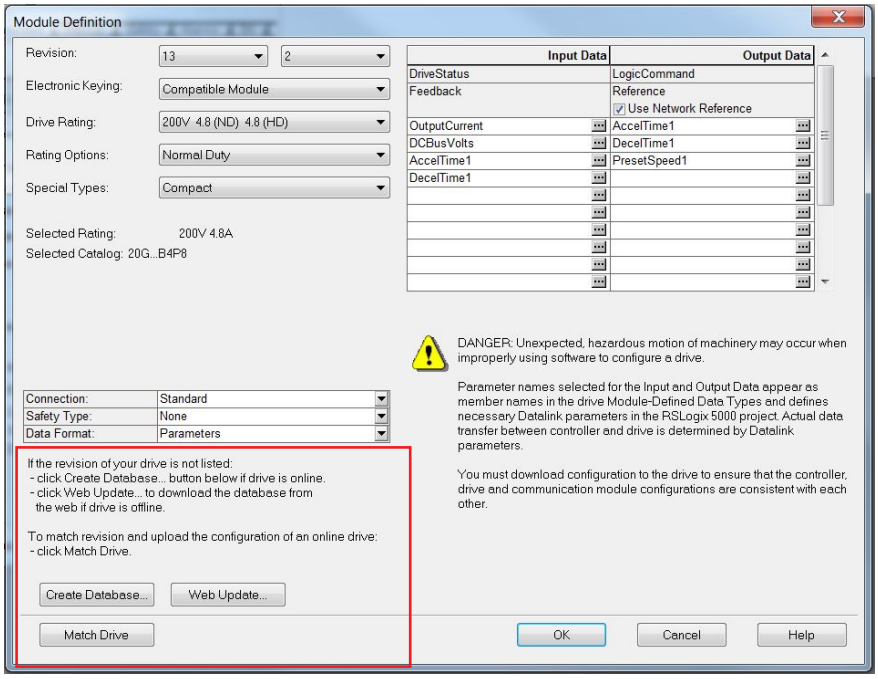


2. Select About Module Profile.

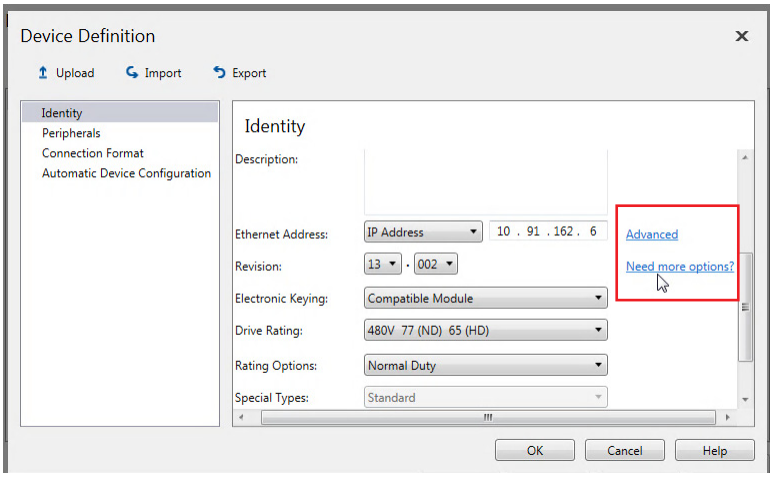


All available firmware revisions for a drive are displayed in the Revision field in the Module Definition window. If the desired firmware version is not listed, check the Create Database (generate from actual drive) or Web Update (get from website) button to retrieve the desired firmware version.

Figure 9 - Module Definition



In version 14.001 and greater



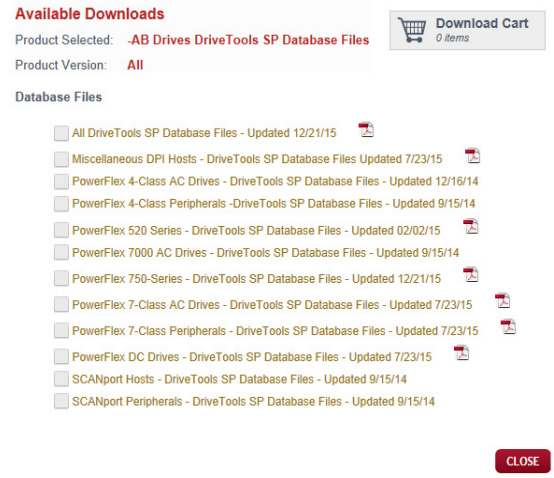
Three methods, two online and one offline, are provided:

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

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

Web Update – Opens a web browser for offline downloads. Use the PCDC Product Search to either search for 'database' or search for drive (for example 'PowerFlex 755') and select the desired firmware revision refer to Figure 10.

Figure 10 - Example of All Available Database Files



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 Connected Components Workbench™ 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.

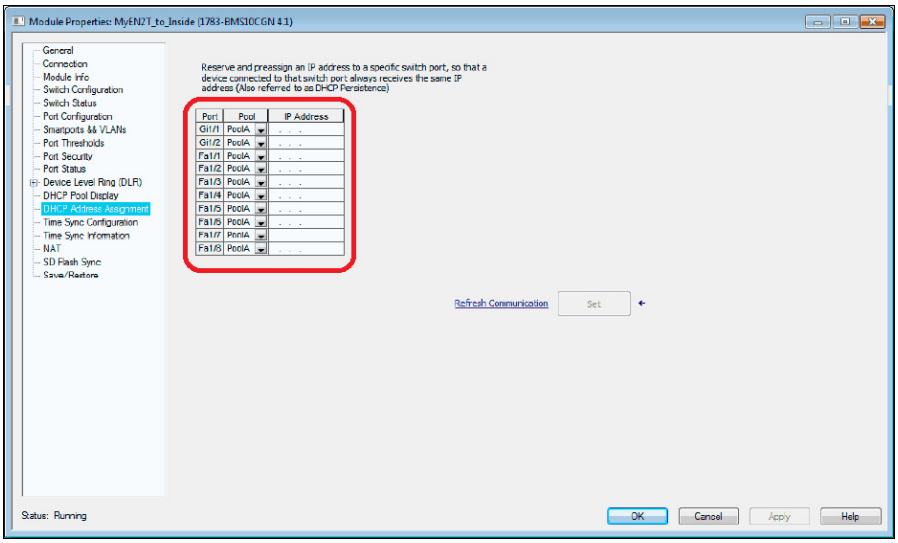
Automatic IP address assignment in the Ethernet switch, Firmware Supervisor, and ADC are independent features and can be used with or without each other. The drive must have an IP address before Firmware Supervisor or ADC will execute. If Firmware Supervisor and ADC are both enabled, Firmware Supervisor executes first and must successfully complete before ADC executes.

Using an Ethernet Switch with 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:

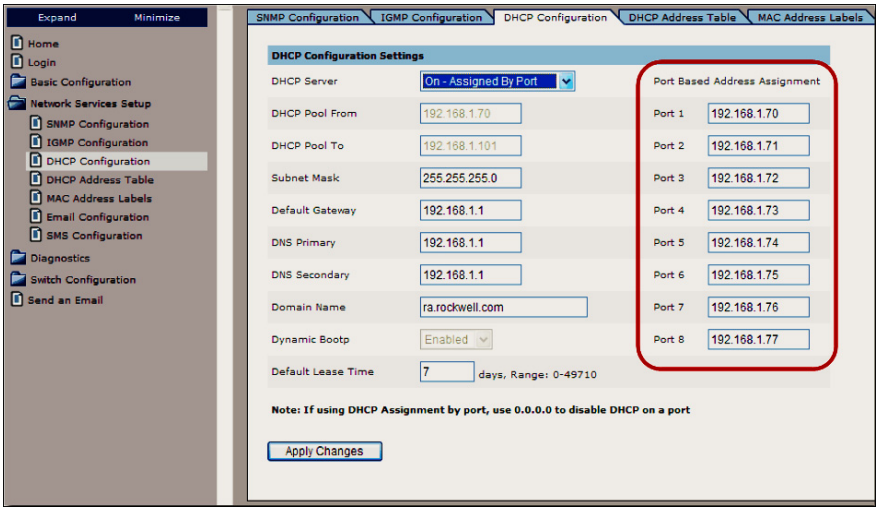
Stratix 5700 (1783-EMS…)

The Stratix 5700 performs Dynamic IP address Assignment by Port per the DHCP Address Assignment page.



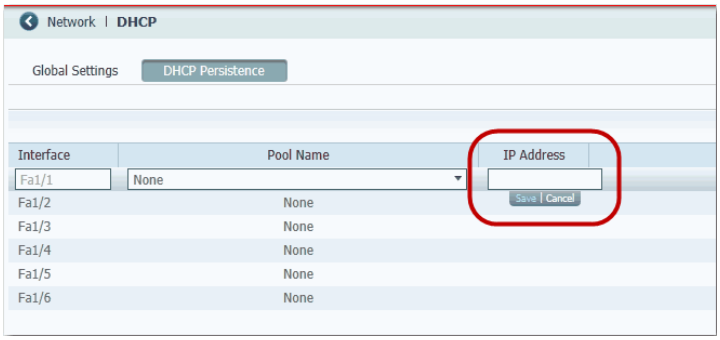
Stratix 6000 (1783-EMS…)

The Stratix 6000 performs 'Dynamic IP address Assignment by Port' per the settings on the DHCP Configuration tab:



Stratix 8000 (1783-MS…) / 8300 (1783-RMS…)

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



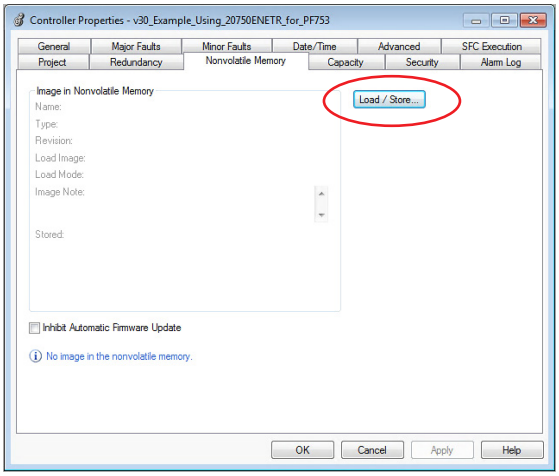
One IP Address is configured for each port on the switch (star topology - one drive per port). If you have a ring topology, the IP Address for the drive must be set via other means, such as the HIM or last octet rotary switches on the drive/communication Firmware Supervisor and/or ADC can still be used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

Using Firmware Supervisor

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

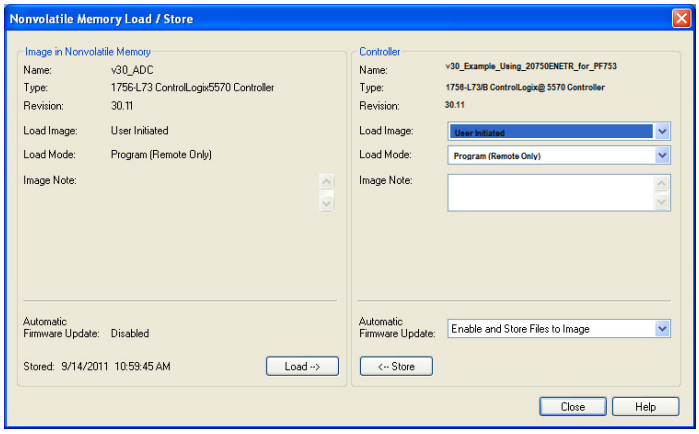
1. Verify that 'Exact Match' keying is selected in the drive and peripherals' properties dialog boxes.
   a. View the drive keying by clicking the General tab.
   b. Right-click each peripheral on the Drive tab.
   c. View the keying of the peripheral by choosing Properties.
2. Verify that ControlFLASH firmware kits for each revision of firmware for each device that must be stored in the controller is installed on the computer running the programming software.
3. Verify that a CompactFlash or other storage card is installed in the controller.
4. Use the programming software to go online with the controller in Program mode.
5. Download your program if you have not done so already.
6. In the tree view, right-click the controller folder at the top of the Controller Organizer.
7. Choose Properties.

8. On the Controller Properties dialog box, click the Nonvolatile Memory tab.



9. Click Load/Store.

   The Nonvolatile Memory Load/Store dialog box appears.

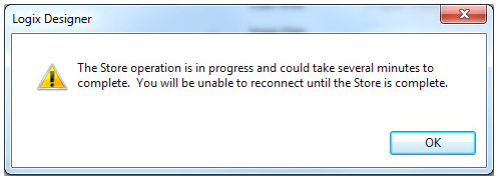


10. From the Automatic Firmware Update pull-down menu, choose Enable and Store Files to Image.
11. Click <-- Store.

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

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

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



13. Wait for the store operation to complete, and then attempt to go online with the controller again.

Using Automatic Device Configuration (ADC)

Automatic Device Configuration (ADC) is a feature that supports the automatic download of drive configuration data. When the Logix controller establishes an I/O connection with a drive and its associated peripherals, it checks a configuration signature for each port to determine if an ADC download is needed. The purpose is to reduce downtime in a field replacement situation by automatically downloading the configuration rather than manually with a separate tool.

ADC is available with the following software:

- RSLogix 5000 software
  - Version 20
- Studio 5000 environment
  - Version 21 and higher
- Drive AOPs
  - Version 4.01 and higher for PowerFlex 755 (version 4.08 and higher recommended)

TIP To identify the Drive AOP version you are using, open the drives Module Properties dialog box, click the icon in the upper left corner of the window and choose 'About Module Profile'.

ADC works with the following PowerFlex 750 Series hardware:

- PowerFlex 755 revision 4.001 and higher (revision 10.003 and higher recommended)
- 20-750-ENETR revision 1.001 and higher (revision 1.002 and higher recommended)

Firmware updates are available for free download at:

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

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

Drive configuration settings are stored inside the ACD project file. With ADC enabled, the Controller Organizer automatically downloads the configuration settings for a particular drive port if it detects that there is a 'configuration signature' mismatch with the port.

A configuration signature is a globally unique ID number. The Logix controller uses the number to perform a quick compare to determine that a download is needed. If the signatures match, no download is needed. If an option module or entire drive is replaced, the configuration signature for the respective port does not match and a download occurs to the port.

IMPORTANT ADC will always execute the first time the Logix controller connects to the drive after ADC has been enabled. The configuration signatures in the controller and drive synchronize, and helps prevent future ADC downloads from occurring unless a configuration change is made or the drive / peripheral is replaced.

Typically at least two drive resets occur during the ADC download process. If a port, such as the drive Port 0 or Embedded EtherNet/IP Port 13, has configuration parameters that require a reset to become 'active'. The drive will reset after the respective port parameters are downloaded.

See page 79 for a representation of the ADC icon.

ATTENTION: Logix holds the Master copy of the drive configuration. When ADC is enabled, ADC is triggered any time the Logix controller detects a configuration signature mismatch when establishing an EtherNet/IP network I/O connection.

- The use of other configuration tools: a HIM, Connected Components Workbench software, or DriveTools™ SP software, must be minimized and restricted to monitor-only operation. Any configuration changes made by these tools will cause a configuration signature mismatch the next time the controller connects to the device. ADC writes over any configuration changes made by the other tools. The Write Mask function (drive Parameter 888 - [Write Mask Cfg]) helps prevent tools that are connected to ports other than the embedded EtherNet/IP port in a PowerFlex 755 drive from writing to the drive. Any drive configuration changes must be made with the Add-on Profile (AOP).
- The use of MSG Instruction to perform parameter writes in the Logix program must be limited to RAM memory by setting the proper attribute in the MSG instruction. Any writes to parameter nonvolatile storage (EEPROM) memory will clear the configuration signature and cause a mismatch the next time the Logix controller connects to the device. This triggers ADC, which writes over any configuration changes that were previously made.

IMPORTANT When ADC is enabled, it can be activated if the controller is in Run or Program mode. Select 'Inhibit Module' when changes are made to the drive to limit ADC from writing over your changes. 'Inhibit Module' is on the Connection tab in the drive module profile.

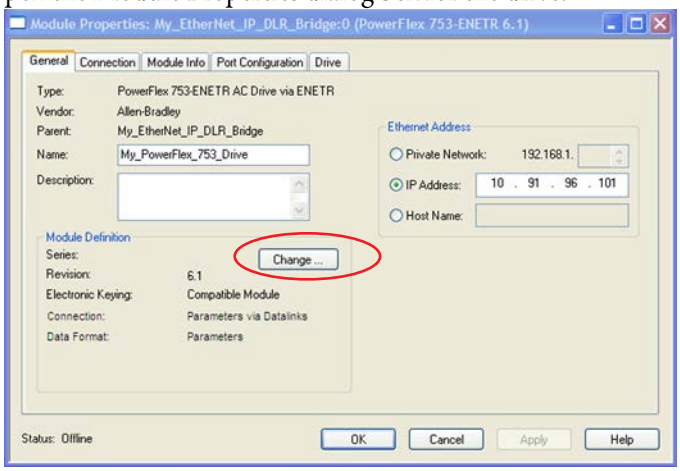
IMPORTANT Use select Stratix switches to provide the dynamic IP address assignment by port. This removes the need to manually enter the IP address, subnet mask, and Gateway address before connecting a replacement drive to the Ethernet network.

IMPORTANT ADC can work in tandem with the Firmware Supervisor. If the Firmware Supervisor is configured and enabled for a drive ('Exact Match' keying must be used), the drive/ peripheral firmware is automatically updated (if necessary) before any ADC operation for that port.

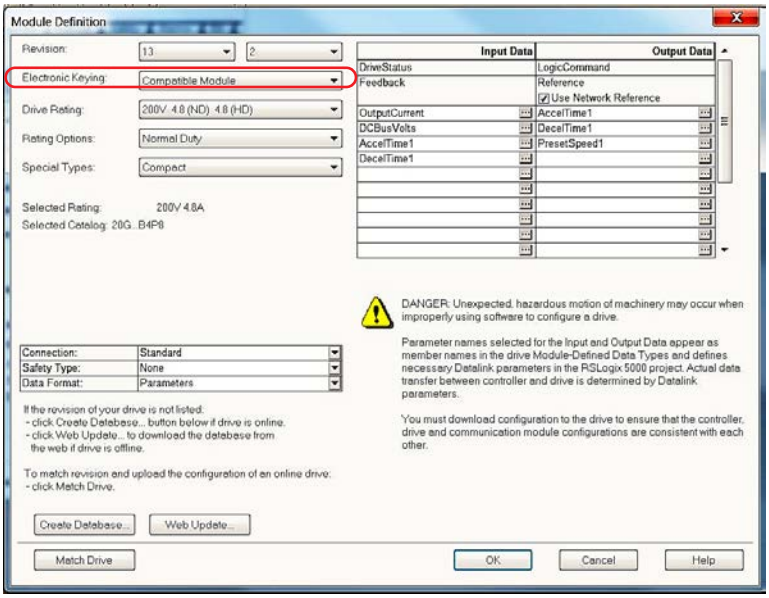
Configure a PowerFlex 750-Series Drive for ADC

Follow these steps to configure ADC for your drive.

1. Open the Module Properties dialog box for the drive.



2. Click Change to open the Module Definition dialog box.
3. Select the appropriate Electronic Keying for your application.



There are three Electronic Keying choices available in the Module Definition dialog box, but only two are recommended with ADC.

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

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

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

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

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

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

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

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

4. Click OK when finished and return to the Module Properties dialog box.
5. Click the Drive tab.
6. Open the ADC Settings dialog box by Click the ADC icon  . (As and alternative, you may need to choose the ADC setting on the left pane of the dialog box.)

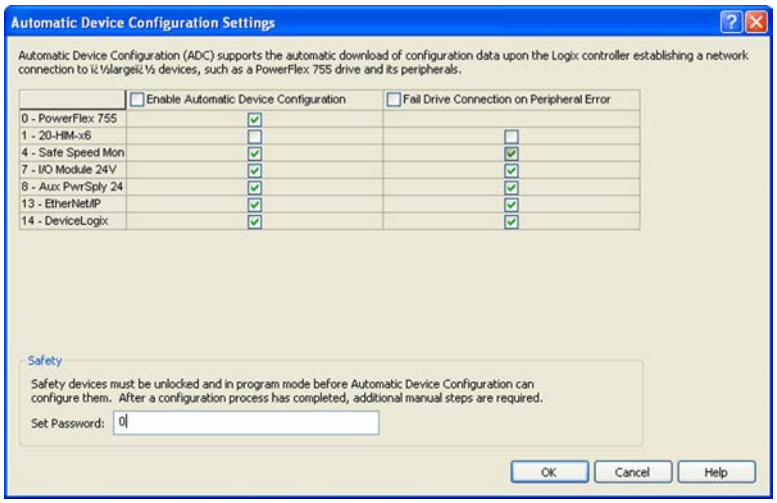
Version 4.02 (or later) Drive AOPs have an ADC icon on the Drive tab to show general ADC enable/disable status for the drive.

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

7. Click the ADC icon.

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

Figure 11 - Automatic Device Configuration Settings



- The global checkbox at the top of each column checks or unchecks the devices in the entire column. ADC is typically enabled for the entire drive.
- Ports can be checked or unchecked individually.
- The 'Enable Automatic Device Configuration' column is used to enable or disable ADC for individual ports.
- The 'Fail Drive Connection on Peripheral Error' is used to fail the network I/O connection process when an error occurs during ADC download to the corresponding port.
- If ADC is used, the general rule is to check all boxes with the following exceptions:
  - Any 'temporary' peripherals that are not critical for drive operation, such as a 20-HIM-x6 or 1203-USB, is typically unchecked.
  - DeviceLogix is an embedded feature. If DeviceLogix is not used in the application, it is typically unchecked.

Figure 11 shows a typical ADC configuration setup for a PowerFlex 755 that has two optional peripherals and does not use DeviceLogix.

The Safety section that is shown in Figure 11 is only present if a 20-750-S1 Safe Speed Monitor option module is present. Safety systems have a mandatory requirement for manual steps in the configuration process. See Special Considerations When Using a 20-750-S1 Safe Speed Monitor Module on page 85 for more information. This section allows the Safety password to be conveniently set directly from the ADC Settings window.

The Allow Writes on Port section provides access to **Parameter 888 [Write Mask Cfg]**. This parameter helps prevent tools that are connected to ports other than the Ethernet port from writing to the drive. When ADC is enabled, Logix owns the configuration in the drive. Changes can only be made by using the drive Module Properties dialog box settings. Changes that are made by using other tools clear the configuration signature. An ADC download is triggered to overwrite the changes the next time a network I/O connection is established with the drive. Figure 11 shows the typical **Parameter 888 [Write Mask Cfg]** settings when ADC is enabled.

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

8. If you have network access to the drive being configured for ADC:
   a. Verify the ADC and drive configuration setup by clicking the ADC Auditor.
   b. Check for possible errors.
   c. If you do not have network access to the actual drive now, proceed to step . Remember to run the ADC Auditor later when you have network access to the actual drive. See ADC Auditor v4.xx AOP's on page 82 more information.

IMPORTANT Some parameters can affect the minimum/maximum of other parameters and can cause the settings of these parameters to be 'out of range'. This effect causes ADC to fail with a module fault code 16#0110: mode or state of module does not allow object to perform requested service.

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

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

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

TIP Review all parameters that are needed for your application to verify that they are 'in range'. A yellow highlight and text notification in the Parameters Linear List editor appears to identify out of range parameters. The ADC Auditor also shows these errors.

9. Click OK when finished.
10. Perform all previous steps for each additional PowerFlex 750-Series drive.
11. Save the project and download it to the Logix controller.

ADC Auditor v4.xx AOP's

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

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

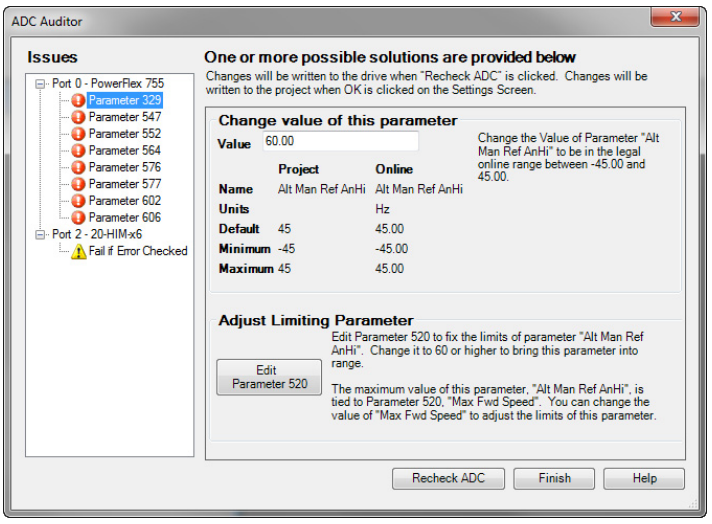
   The Connect to Drive window opens to select the correct drive on the network.

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

   Only proceed with the use of the ADC Auditor if:
   - Drive configuration in the project is complete
   - Drive is not running
   - DeviceLogix is disabled
   - Connection to the drive is inhibited
2. Click the Start ADC Auditor Analysis button when the previously mentioned conditions are met.

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

Figure 12 - {ADC Auditor Issues Found}



3. Click each issue in the Issues list for more information and corrective actions.

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

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

   Both types of issues come with corrective actions.

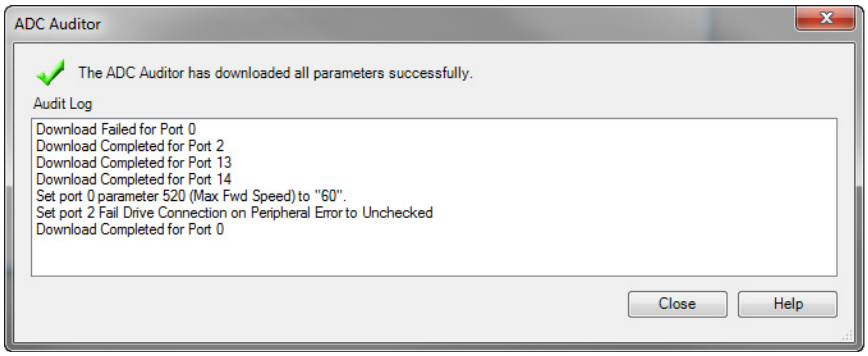
4. Perform any corrective actions.
5. Click Recheck ADC for the ADC Auditor to run again.

   Corrected issues disappear from the Issues list.

6. Click Finish when finished.

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

Figure 13 - ADC Auditor_Summary Success



7. Click Close when finished with the ADC Auditor.
8. Click OK to save any changes and close the ADC Settings window.

ADC and Logix Memory

Drive configuration settings are stored in the project ACD file that is downloaded and stored in the controller. Note these examples of memory usage:

- A PowerFlex 755 drive with no option modules, minimal parameters that are changed from defaults, and no DeviceLogix program consumes approximately 8.5 kilobytes of Logix memory per drive.
- A PowerFlex 755 drive with four option modules, approximately 50 changed parameters, and a 32-block DeviceLogix program consumes approximately 25 kilobytes of Logix memory per drive.

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

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

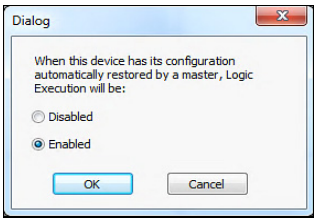
Special Considerations When Using a DeviceLogix Program

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

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

1. Select the PowerFlex 750-Series drive and click the Drive tab.
2. Select the DeviceLogix Port in the device tree.
3. Click the DeviceLogix icon.

   The DeviceLogix Editor appears.
4. From the Edit menu, choose Recovery mode.
5. Click Enabled to enable DeviceLogix after ADC.



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

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

- 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 the 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 **Parameter 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 MSG instructions writes from the controller program. To meet SIL 3, 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 Connected Components Workbench or DriveExecutive.
2. Change any unused parameter in the drive, such as an unused Preset Speed (**Parameters 571...577**), 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. Any parameter changed in step 2 should now be back at the original setting.

   ADC triggers and executes.

Method 2

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

   ADC triggers and executes. Any parameter changed in step 1 should now be back at 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 the programming software can display additional information. When online with the controller, if the drive is unsuccessful it will have a yellow triangle  next to it in the project I/O Configuration folder.

To open the drive Module Properties dialog box, 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 to also show the faulted ports.

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

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 'Disabled Keying'. Manually review the parameter settings and any overload protection. Tuning and other manual adjustments can be required.
Unable to replace with a lower firmware version.	Not an 'Exact Match' or 'Compatible Module' for Electronic Keying	Use ControlFLASH to update the replacement drive to a greater than or equal to firmware revision. Firmware can be downloaded at: http://compatibility.rockwellautomation.com/Pages/home.aspx.
Unable to replace with a higher firmware version.	Not an 'Exact Match' or 'Compatible Module' for Electronic Keying.	• If 'Exact Match' keying is used: – Use ControlFLASH to update the replacement drive to the same firmware revision. Firmware can be downloaded at: http://compatibility.rockwellautomation.com/Pages/home.aspx. • If 'Compatible module' keying is used: – Make sure that the replacement drive is version 10.003 or higher. Firmware can be downloaded at: http://compatibility.rockwellautomation.com/Pages/home.aspx. • Change Electronic Keying to 'Disabled Keying'. Manually review the new features, and so forth, in the higher firmware revision. Tuning and other manual adjustments can be required.
ADC is failing because the HIM, 1203-UDSB and/or 1203-SSS are missing.	Port in drive the peripheral is connected to is set to 'Fail Drive Connection on Peripheral Error'.	• Add the missing peripheral. • Open ADC Settings window in the corresponding drive Module Properties dialog box 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 85 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 Logix Designer project.	Can occur when a second software tool, such as DriveExecutive, is being used to configure the drive. A second tool is not necessary and not recommended. Upload the configuration from the drive and save it in the project. Run ADC Auditor and correct any issues found. Download the project to controller.

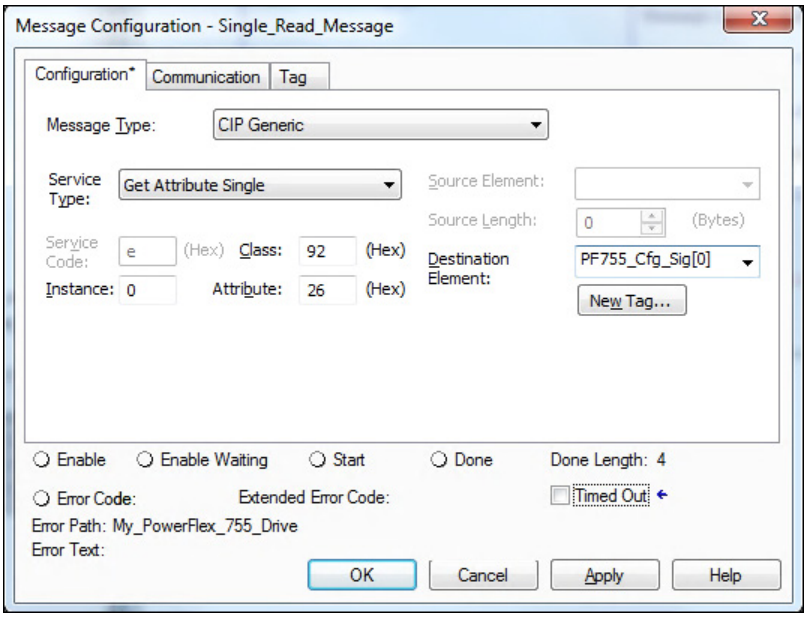
Programmatically Monitoring Connection Status / ADC Configuration Signature

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)

Refer to the online help in the controller programming software for more information on the GSV Instruction, GSV/SSV Objects, and the Module Object.

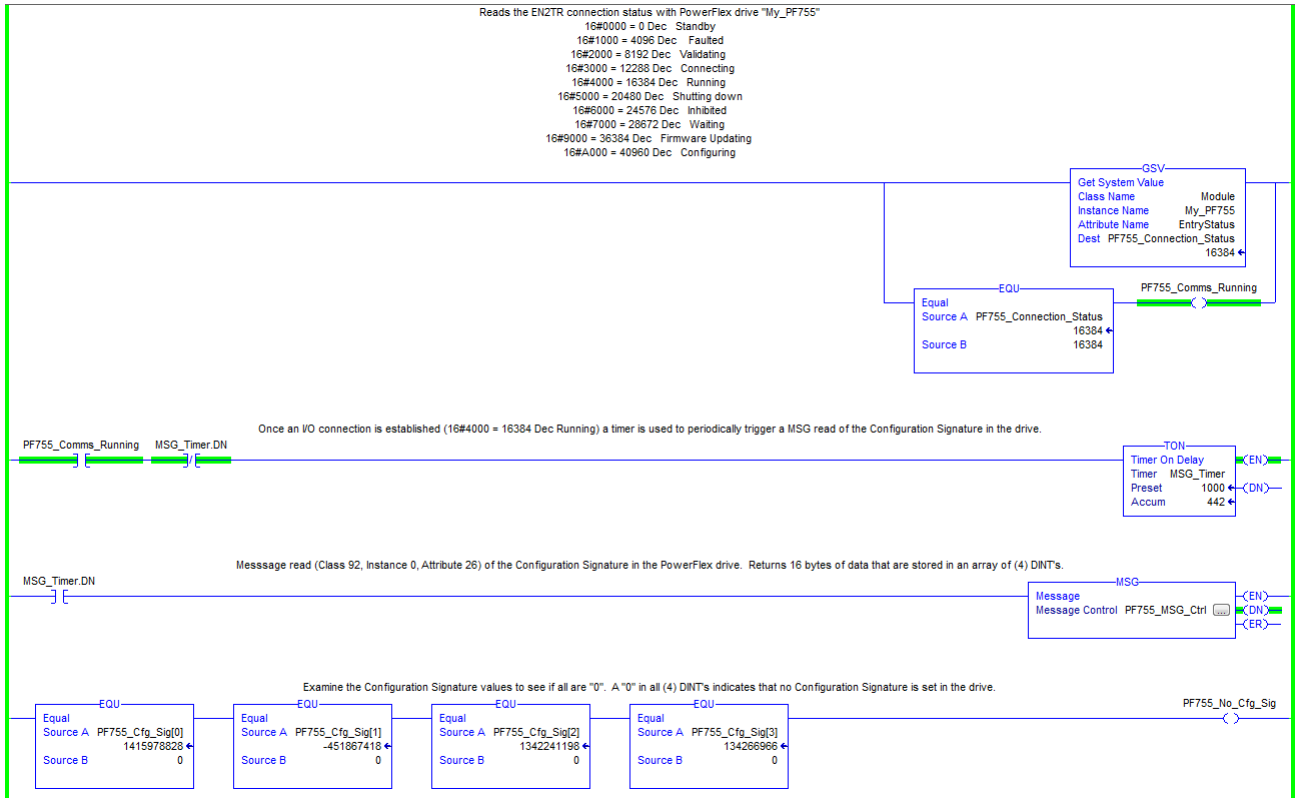
The Configuration Signature for a given Port in the PowerFlex drive can be monitored using an MSG instruction. The following MSG instruction reads the Configuration Signature from Port 0 in a PowerFlex drive.



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 DPI Device Object on page 166 for additional information.

Figure 14 is an example of a 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 14 - Example of the Logix Program



Additional. MSG's would be required to read the Configuration Signatures in the other Ports.

Figure 14 is an example, and is optional. The GSV is good way to check Ethernet connection status for program use and to display status on an HMI. A 'Running' connection to control the drive is required. If ADC is enabled, the 'Running' status confirms a successful ADC download. The status information that is displayed is the same as when online with the AOP.

Reading the Configuration Signature is not typical, but could be used to detect and annunciate that a configuration change was made. ADC will trigger and download on the next I/O connection. There can be a requirement for the application to detect that a change was made before an ADC download. A considerable time can pass before a drive will power cycle or reset, 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 Module Properties dialog box.

Best Practices

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

- To configure a drive, make sure to install the AOP file for the drive.
- Enable ADC as the last step in the commissioning process, after all drive configuration has been completed. By enabling ADC as the last step, it eliminates ADC downloads being triggered after any parameter adjustments are made during the commissioning process.
- Upload the configuration from the actual drive before ADC is enabled. This action makes sure that rating, peripherals, firmware revisions, and parameter configuration settings in the ACD project matches the actual drive.
- Use the ADC Auditor to check for any warnings or errors. Fix any errors (required or the Logix ADC download fails).
- Enable and test ADC with one drive before enabling it for the entire control system. Apply any lessons learned to the configuration settings of the other drives in the project. Verify that ADC is successfully working before proceeding to enable it on other drives. Depending on your success with the ADC Auditor, the running of the Auditor on every drive is optional.
- After testing ADC with an initial drive, enable ADC in small groups of drives at a time (for example, five drives). Make sure all drives successfully come up on the network and are operational before proceeding to the next 'group'.

Using the Generic Profile, All Versions

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

- A specific drive profile is unavailable.
- You are already familiar with a Generic Profile and do not want to convert an existing project to a drive Add-on Profile.

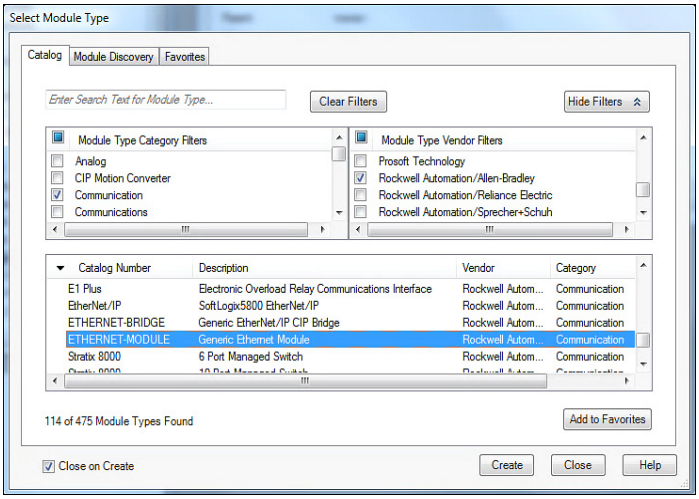
Add the Drive/Adapter to the I/O Configuration

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

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

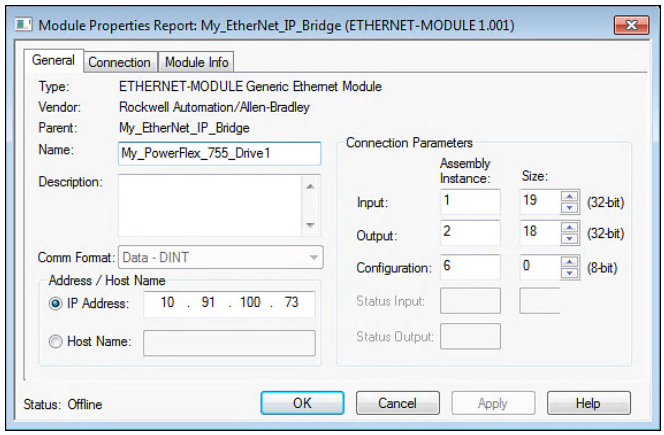
   In our example, we right-click on the 1756-ENBT/A bridge.

2. Check the Communication group to display all available communication modules.



3. Select 'ETHERNET-MODULE' from the list to configure the drive and its embedded EtherNet/IP adapter.
4. Click OK.

The New Module dialog box of the drive appears.



5. Edit the following information about the drive and adapter.

Box	Setting
Name	A name to identify the drive and adapter.
Description	Optional – description of the drive/adapter.
Comm Format	**Data - DINT**- This setting formats the data in 32 bit words.
IP Address	The IP address of the adapter.
Open Module Properties	When this box is checked, click OK to open additional module properties dialog boxes to configure the drive/adapter. When unchecked, click OK to close the New Module dialog box of the drive. For this example, check this box.

6. Under Connection Parameters, edit the following information.

Box	Assembly Instance	Size
Input	**1** -This value is required.	The value varies based on the number of **[DL From Net xx]** parameters that are used for your application (see details in the following paragraph).
Output	**2** -This value is required.	The value varies based on the number of **[DL To Net xx]** parameters that are used for your application (see details in the following paragraph).
Configuration	**6** -This value is required.	**0** - This value is required.

Enter the number of 32 bit words that are required for your I/O in the Input Size and Output Size boxes. At least three 32 bit words must be set for the Input Size. The adapter always uses the 32 bit Logic Status, 32 bit Feedback, and a 32 bit word that is dedicated for memory allocation of the Generic Ethernet module profile. The adapter also uses the 32 bit Logic Command and 32 bit Reference, which requires at least two 32 bit words for the Output Size. If any or all sixteen 32 bit Datalinks for the drive are used, the Input and Output Size settings must be increased accordingly. See Setting a Master-Slave Hierarchy on page 37 or Custom Peer I/O Configuration on page 40.

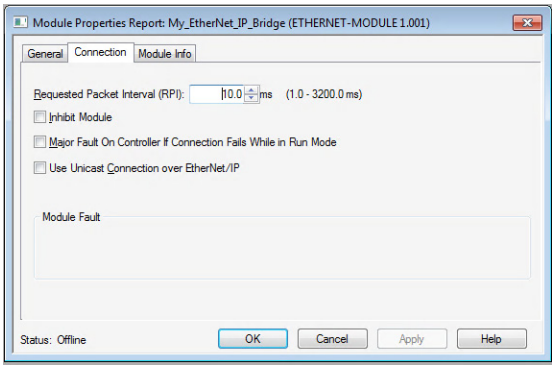
- **Input Size:** Start with three words and add one word for **each** Datalink that is used to read data. For example, if three Datalinks—**[DL To Net xx]** parameters—is used to read drive or peripheral parameters. Add three words to the required three words for a total of six words. You can use adapter **Parameter 35 - [DLs To Net Act]** to check the total number of Datalinks being used. Word 0 is a pad word, Word 1 is Logic Status, Word 2 is Speed Feedback, Word 3 is DL To Net 01, and so forth (see Figure 15).
- **Output Size:** Start with two words and add one word for **each** Datalink that is used to write data. For example, if seven Datalinks—**[DL From Net xx]** parameters—is used to write to drive or peripheral parameters. Add seven words to the required two words. For a total of nine words. You can use adapter **Parameter 34 - [DLs From Net Act]** to check the total number of Datalinks being used. Word 0 is Logic Command, Word 1 is Speed Reference, Word 2 is DL From Net 01, and so forth (see Figure 16).

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

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

   The Module Properties dialog box appears.

8. Click the Connection tab.



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

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

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

Unicast support has been added to RSLogix 5000 software, version 18.00 (or later). Unicast is recommended whenever possible. For the benefits of unicast operation, see Preparing for an Installation on page 19.

10. Click OK.

    The new node ('My_PowerFlex_755_Drive' in this example) now appears under the bridge ('My_EtherNet_IP_Bridge' in this example) in the I/O Configuration folder. If you double-click the Input and Output Controller Tags (Figure 15 and Figure 16), you see that module-defined data types and tags have been automatically created. After you save and download the configuration, these tags allow you to access the Input and Output data of the drive via the ladder logic of the controller.

Figure 15 - Input Image Controller Tags

Scope: v30_Example_us Show: All Tags

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

Figure 16 - Output Image Controller Tags

Scope: v30_Example_us Show: All Tags

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

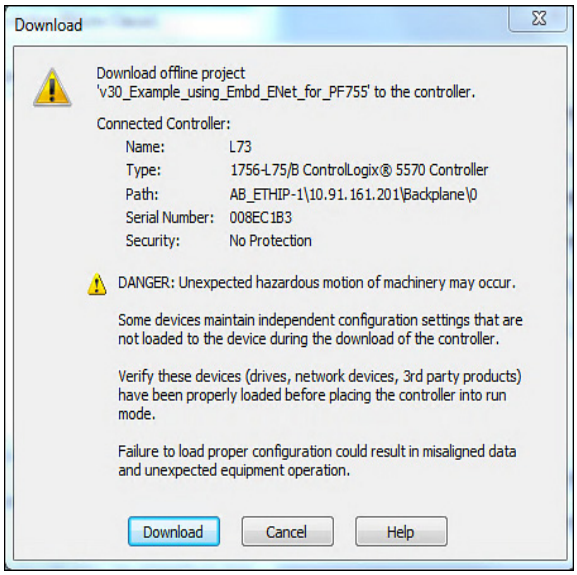
Save the I/O Configuration to the Controller

After adding the bridge and drive/adapter to the I/O configuration, you must download the configuration to the controller. Save the configuration to a file on your computer.

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

1. From the Communications menu, choose Download.

   The Download dialog box appears.



   TIP If a message box reports that the software is unable to go online, find your controller in the Who Active dialog box. From the Communications menu, choose Who Active. After finding and selecting the controller, click Set Project Path to establish the path. If your controller does not appear, you must add or configure the EtherNet/IP driver with Linx-based software. See Establish Communication on page 51 and online help for details.

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

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

3. From the File menu, choose Save.

   The first time that you save the project, the Save As dialog box appears.

   a. Navigate to a folder.

   b. Type a file name.

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

4. Configure any Datalinks in the drive that were enabled in the controller and adapter during I/O configuration.

   Each Datalink being used must be assigned to a specific parameter in the drive or connected peripheral. See Setting a Master-Slave Hierarchy on page 37 or Custom Peer I/O Configuration on page 40). If this process is not done, the controller receives or sends placeholder data instead of actual drive or peripheral parameter values.

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

Using the I/O

This chapter provides information and examples that explain how to control, configure, and monitor a PowerFlex® 755 drive by using the configured I/O.

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

About I/O Messaging

On CIP-based networks, including 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 adapter includes the Logic Command, Logic Status, Reference, Feedback, and memory allocation for the Generic Ethernet or the PowerFlex 755-EENET module profile (all as 32 bit words) in the I/O image of the controller. This basic I/O must always be configured in the Ethernet bridge using the Logix Designer application. 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 Adapter, and Chapter 4, Configuring the Drive in a Logix System, discuss how to configure the adapter 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 adapter 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 (**DL From Net 01…16** and **DL To Net 01…16**) for the drive are used.
- **ControlLogix® /CompactLogix™ Controllers only**—The drive profile that is used for programming 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 4 shows the I/O image when using all 32 bit Datalinks.

Table 4 - ControlLogix I/O Image for PowerFlex 750-Series Drives (32 bit Logic Command/Status, Reference/Feedback, and Datalinks)

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

Input I/O Using…			
DINT	Drive Add-on Profile	DINT	Generic Profile
0	Logic Status	0	Padword
1	Feedback	1	Logic Status
2	DL To Net 01	2	Feedback
3	DL To Net 02	3	DL To Net 01
4	DL To Net 03	4	DL To Net 02
5	DL To Net 04	5	DL To Net 03
6	DL To Net 05	6	DL To Net 04
7	DL To Net 06	7	DL To Net 05
8	DL To Net 07	8	DL To Net 06
9	DL To Net 08	9	DL To Net 07
10	DL To Net 09	10	DL To Net 08
11	DL To Net 10	11	DL To Net 09
12	DL To Net 11	12	DL To Net 10
13	DL To Net 12	13	DL To Net 11
14	DL To Net 13	14	DL To Net 12
15	DL To Net 14	15	DL To Net 13
16	DL To Net 15	16	DL To Net 14
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 adapter. The Logic Status is a 32 bit word of status data produced by the adapter 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 adapter. The Feedback is a 32 bit REAL (floating point) word of status data produced by the adapter and consumed by the controller.

When using a ControlLogix controller, the 32 bit REAL Reference word is always DINT 1 in the output image (see Table 4) and the 32 bit REAL Feedback word is always:

- DINT 1 in the input image when using the drive Add-on Profile.
- DINT 2 in the input image when using the Generic Profile.

When using a drive Add-on Profile, the Reference and Feedback are automatically formatted properly and displayed as a controller tag. When using the Generic Profile, the I/O image is integer-based and the Reference and Feedback are floating point. 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 22 and Figure 23.

The Reference and Feedback 32 bit REAL values represent drive speed. The scaling for the speed Reference and Feedback is dependent on drive **Parameter 300 - [Speed Units]**. For example, if **Parameter 300** is set to Hz, a 32 bit REAL Reference value of '30.0' would equal a Reference of 30.0 Hz. If **Parameter 300** is set to RPM, a 32 bit REAL Reference value of '1020.5' would equal a Reference of 1020.5 RPM. The commanded maximum speed can never exceed the value of drive **Parameter 520 - [Max Fwd Speed]**. Table 5 shows example References and their results for a PowerFlex 750-Series drive that has its:

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

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

Table 5 - PowerFlex 750-Series Drive Example Speed Reference/Feedback Scaling

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

(1) The effects of values less than 0.0 depend on whether the PowerFlex 750-Series drive uses a bipolar or unipolar direction mode. See the drive documentation for details.
(2) For this example, drive Parameter 300 - [Speed Units] is set to Hz.
(3) The drive runs at 60 Hz instead of 130 Hz or 65 Hz because drive **Parameter 520 - [Max Fwd Speed]** sets 60 Hz as the maximum speed.

Using Datalinks

A Datalink is a mechanism that is used by PowerFlex drives to transfer data to and from the controller. Datalinks allow a drive parameter value to be read or written to without using 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 parameters of a peripheral. For example, drive **parameter 535 - [Accel Time 1]** can be the target of the embedded EtherNet/IP adapter and any or all option modules installed in the drive.
- The settings of **Parameters 01…16 - [DL From Net 01…16]** and **Parameters 17…32 - [DL To Net 01…16]** determine the data that is passed through the Datalink mechanism of the drive.

IMPORTANT A reset is always required after Datalinks are configured 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 to change a value of a parameter frequently.

Datalinks for PowerFlex 750-Series drive peripherals are locked when the peripheral has an I/O connection with a controller. This is true for the embedded EtherNet/IP adapter on PowerFlex 755 drives, and 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 could change the makeup of the I/O connection in a running system. For example, a reset to

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

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

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

Example of Ladder Logic Program Information

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

Functions of the Example Programs

The following can be done by using the example programs.

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

Logic Command/Status Words

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

ControlLogix Controller Example

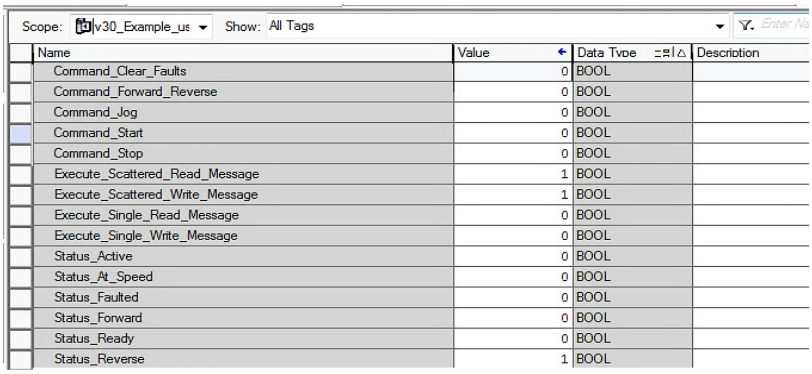
This section includes information when using a ControlLogix controller and a Studio 5000 Drive Add-on Profile or a Generic Profile.

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 (Figure 7) for the entire I/O image in Chapter 4. Use these tags to control and monitor the drive without creating any ladder logic program. However, if HMI devices (for example, a PanelView graphic terminal) are used to operate the drive and view its status. Create descriptive user-defined Program tags (Figure 17) and a ladder logic program that passes the Controller tag data to the Program tags.

Figure 17 - ControlLogix Program Tags for Drive Add-on Profile Ladder Logic Program Example



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 18 and Figure 19. The name that is assigned when configuring the I/O (Chapter 4) determines the prefix for the drive Controller tags.

Figure 18 - ControlLogix Controller Example Ladder Logic Program for Logic Status/Feedback

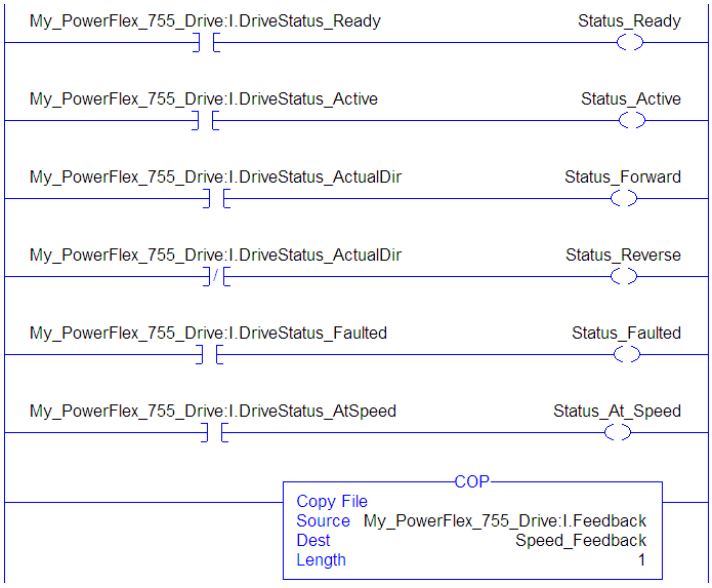
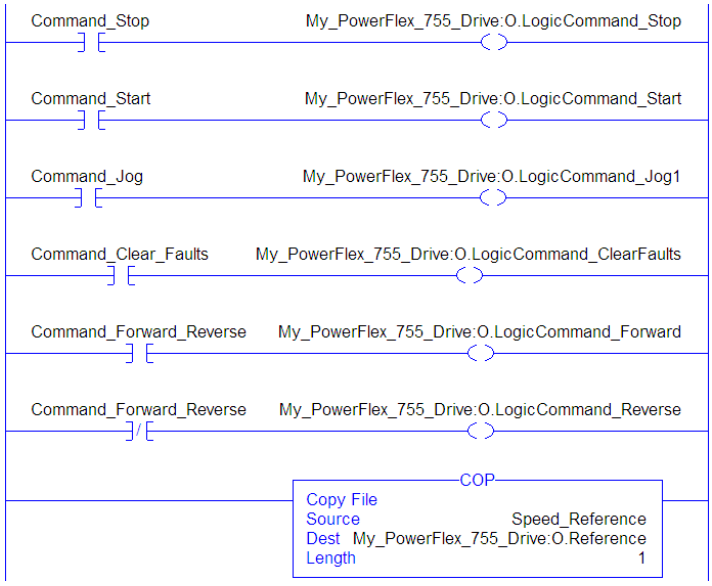


Figure 19 - ControlLogix Controller Example Ladder Logic Program for Logic Command/ Reference



Manually Define Tags with the Generic Profile

Adapter Parameter Settings for ControlLogix Controller Example

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

Adapter 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 **[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 **[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 adapter 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.

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 20). The Output tag for this example program requires eighteen 32 bit words of data (Figure 21).

Figure 20 - ControlLogix Controller Input Image for Drive Generic Profile (example ladder logic program)

Scope: v30_Example_us Show: All Tags

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

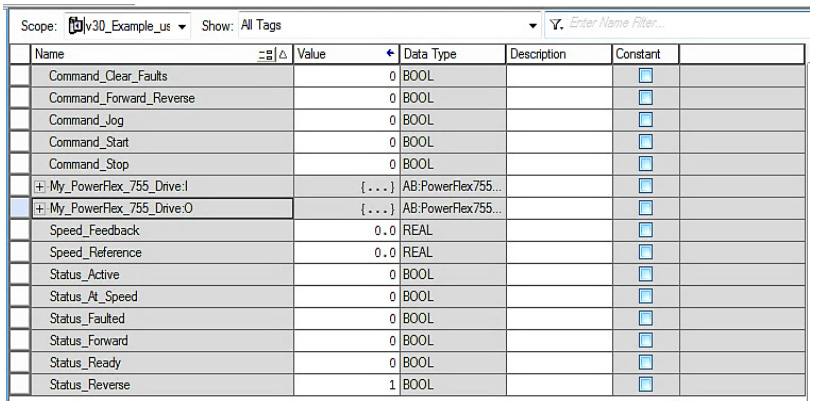
Figure 21 - ControlLogix Controller Output Image for Drive Generic Profile (example ladder logic program)

Scope: v30_Example_us Show: All Tags

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. Create the following Program tags for this example program.



Scope: v30_Example_us Show: All Tags Enter Name Filter...

Name	Value	Data Type	Description	Constant
Command_Clear_Faults	0	BOOL		
Command_Forward_Reverse	0	BOOL		
Command_Jog	0	BOOL		
Command_Start	0	BOOL		
Command_Stop	0	BOOL		
My_PowerFlex_755_Drive:I	{...}	AB:PowerFlex755...		
My_PowerFlex_755_Drive:O	{...}	AB:PowerFlex755...		
Speed_Feedback	0.0	REAL		
Speed_Reference	0.0	REAL		
Status_Active	0	BOOL		
Status_At_Speed	0	BOOL		
Status_Faulted	0	BOOL		
Status_Forward	0	BOOL		
Status_Ready	0	BOOL		
Status_Reverse	1	BOOL		

Figure 22 - ControlLogix Controller Example Ladder Logic Program Using a Drive Generic Profile for Logic Status/Feedback

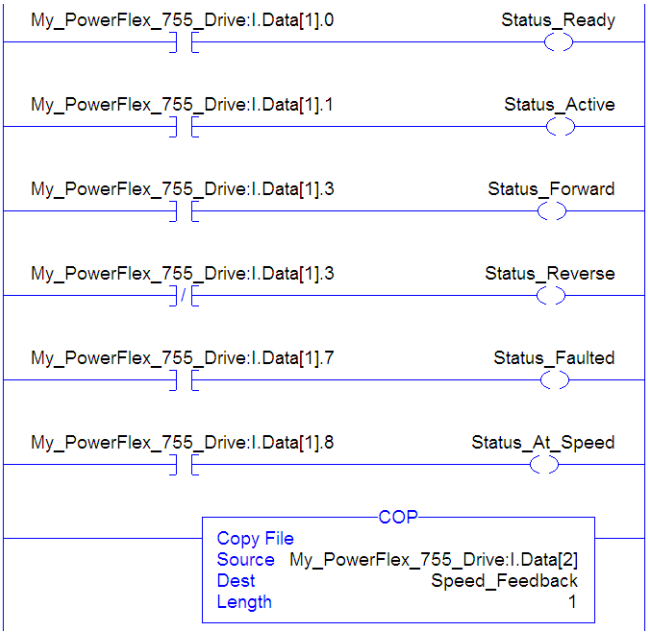
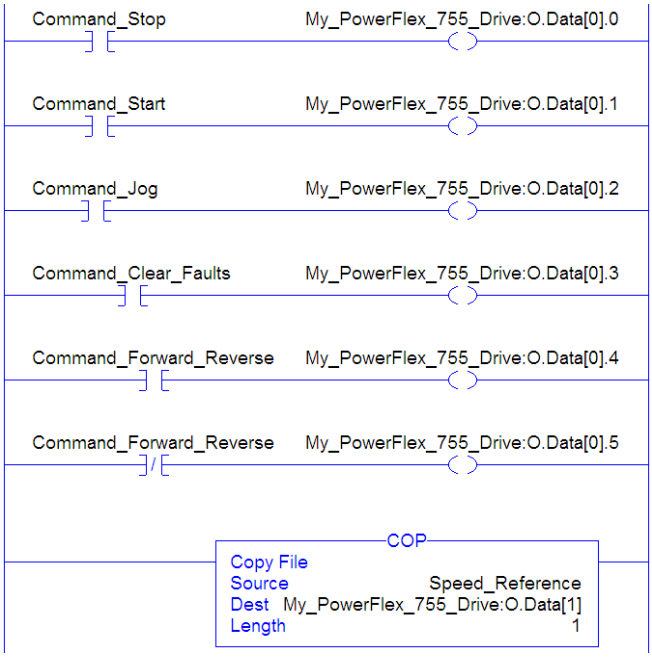


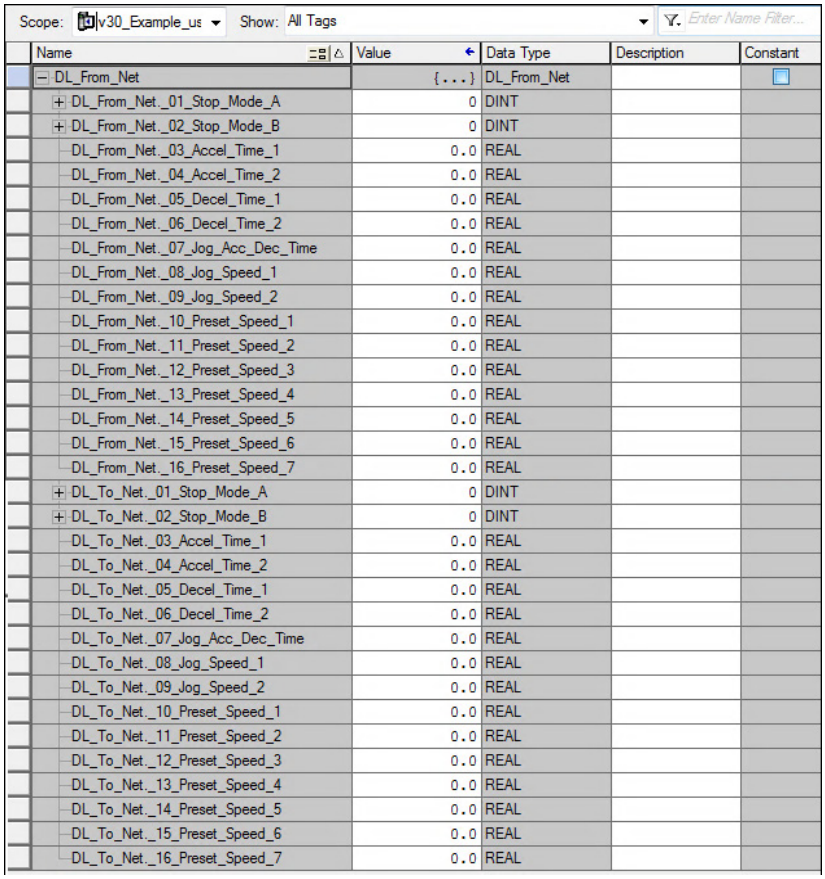
Figure 23 - ControlLogix Controller Example Ladder Logic Program Using a Drive Generic Profile for Logic Command/Reference



Example Datalink Data

The Datalink data that is used in the example program is shown in Figure 24. 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 adapter **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 24 - ControlLogix Controller Example Datalinks for Ladder Logic Program Using a Drive Generic Profile



Scope: v30_Example_us Show: All Tags Enter Name Filter...

Name	Value	Data Type	Description	Constant
DL_From_Net	{...}	DL_From_Net		
DL_From_Net._01_Stop_Mode_A	0	DINT		
DL_From_Net._02_Stop_Mode_B	0	DINT		
DL_From_Net._03_Accel_Time_1	0.0	REAL		
DL_From_Net._04_Accel_Time_2	0.0	REAL		
DL_From_Net._05_Decel_Time_1	0.0	REAL		
DL_From_Net._06_Decel_Time_2	0.0	REAL		
DL_From_Net._07_Jog_Acc_Dec_Time	0.0	REAL		
DL_From_Net._08_Jog_Speed_1	0.0	REAL		
DL_From_Net._09_Jog_Speed_2	0.0	REAL		
DL_From_Net._10_Preset_Speed_1	0.0	REAL		
DL_From_Net._11_Preset_Speed_2	0.0	REAL		
DL_From_Net._12_Preset_Speed_3	0.0	REAL		
DL_From_Net._13_Preset_Speed_4	0.0	REAL		
DL_From_Net._14_Preset_Speed_5	0.0	REAL		
DL_From_Net._15_Preset_Speed_6	0.0	REAL		
DL_From_Net._16_Preset_Speed_7	0.0	REAL		
DL_To_Net._01_Stop_Mode_A	0	DINT		
DL_To_Net._02_Stop_Mode_B	0	DINT		
DL_To_Net._03_Accel_Time_1	0.0	REAL		
DL_To_Net._04_Accel_Time_2	0.0	REAL		
DL_To_Net._05_Decel_Time_1	0.0	REAL		
DL_To_Net._06_Decel_Time_2	0.0	REAL		
DL_To_Net._07_Jog_Acc_Dec_Time	0.0	REAL		
DL_To_Net._08_Jog_Speed_1	0.0	REAL		
DL_To_Net._09_Jog_Speed_2	0.0	REAL		
DL_To_Net._10_Preset_Speed_1	0.0	REAL		
DL_To_Net._11_Preset_Speed_2	0.0	REAL		
DL_To_Net._12_Preset_Speed_3	0.0	REAL		
DL_To_Net._13_Preset_Speed_4	0.0	REAL		
DL_To_Net._14_Preset_Speed_5	0.0	REAL		
DL_To_Net._15_Preset_Speed_6	0.0	REAL		
DL_To_Net._16_Preset_Speed_7	0.0	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).

Using Message Instructions

This chapter provides information and examples that explain how to use a Message instruction with a ControlLogix® controller to configure and monitor the adapter and connected PowerFlex® 755 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.

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 write parameter data to Nonvolatile Storage (NVS) frequently, the NVS can quickly exceed its lifecycle and causes 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

Use a MSG instruction to transfer data that does not require continuous updates. With a MSG instruction, 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 Message configuration dialog box 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 169 for *Device* parameters.
- Host DPI Parameter Object section on page 184 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 messaging limitations. Table 6 shows the EtherNet/IP Object Class code compatibilities for these drives.

Table 6 - Message Class Code Compatibility with PowerFlex 750-Series Drives

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

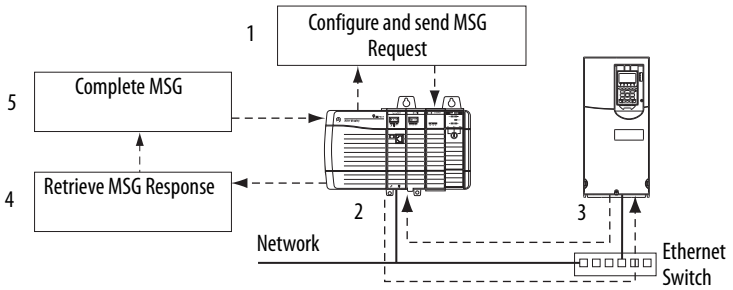
(1) Enables access to drive parameters (Port 0), DPI device parameters (Ports 1…6 only), and Host parameters (Ports 7…14 only). For example, DPI Parameter Object Class code 0x93 can access a Safe Speed Monitor Option Module in Port 6. However, Class code 0x93 cannot access, for example, the Host parameters in a 24V I/O Option Module in Port 5. See DPI Parameter Object on page 169 for instance (parameter) numbering.

(2) Enables access to drive parameters (Port 0) and Host parameters for all ports (1…14). Host DPI Parameter Object Class code 0x9F cannot access DPI (device) parameters. For example, if a 20-750-DNET option module is in Port 4, its Host parameters can be accessed, but not its DPI (device) parameters. See Host DPI Parameter Object on page 184 for instance (parameter) numbering.

MSG Instruction Process

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

Figure 25 - 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 instructions 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

For supported classes, instances, and attributes for the ControlLogix® controller, see Appendix C, EtherNet/IP Objects.

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.

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

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

ControlLogix Controller Example Ladder Logic Program to Read a Single Parameter

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

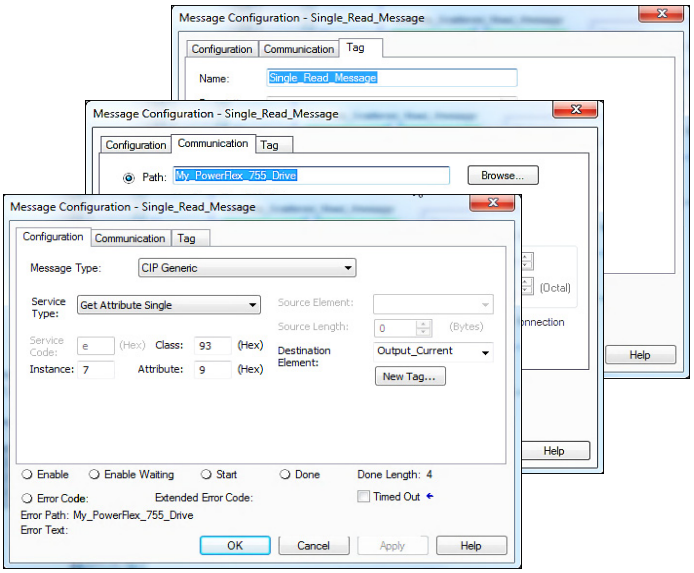
Table 7 - Example Controller Tags to Read a Single Parameter

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

Figure 26 - Example Ladder Logic to Read a Single Parameter

ControlLogix – Formatting a Message to Read a Single Parameter

Figure 27 - 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 adapter.
Service Type (1)	Get Attribute Single	This service is used to read a parameter value.
Service Code (1)	e (hexadecimal)	Code for the requested service.
Class	93 or 9F (hexadecimal) (4)	Class ID for the DPI Parameter Object.
Instance (2)	7 (Dec.)	Instance number is the same as parameter number.
Attribute	9 (hexadecimal)	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 enable 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 169 (Class code 0x93) or Host DPI Parameter Object on page 184 (Class code 0x9F) to determine the instance number.

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

(4) See Table 6 on page 112 for limitations of PowerFlex 750-Series drives when using DPI Parameter Object Class code 0x93. Or Host DPI Parameter Object Class code 0x9F for explicit messaging.

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

ControlLogix Controller Example Ladder Logic Program to Write a Single Parameter

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

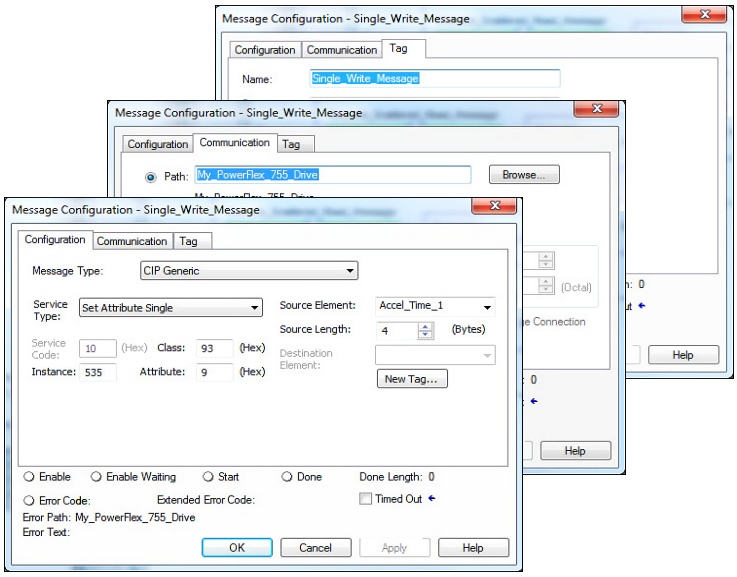
Table 8 - Example Controller Tags to Write a Single Parameter

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

Figure 28 - Example Ladder Logic to Write a Single Parameter

ControlLogix – Formatting a Message to Write a Single Parameter

Figure 29 - 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 adapter.
Service Type (1)	Set Attribute Single	This service is used to write a parameter value.
Service Code (1)	10 (hexadecimal)	Code for the requested service.
Class	93 or 9F (hexadecimal) (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 (hexadecimal)	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 adapter/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 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 169 (Class code 0x93) or Host DPI Parameter Object on page 184 (Class code 0x9F) to determine the instance number.

(3) When the Attribute value is set to '9', the parameter value is written to the Non-Volatile Storage (EEPROM) memory of the drive. The drive retains the parameter value even after the drive power is cycled. **Important:** When set to '9', the EEPROM can quickly exceed its lifecycle and cause the drive to malfunction. By setting the Attribute value to 'A' it writes s the parameter value to temporary memory, which deletes the parameter value after the drive power is cycled. When frequent write messages are required, we recommended using the 'A' setting.

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

(5) See Table 6 on page 112 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 Example Ladder Logic Program to Read Multiple Parameters

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

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

See DPI Parameter Object on page 169 (Class code 0x93) or Host DPI Parameter Object on page 184 (Class code 0x9F) for parameter numbering.

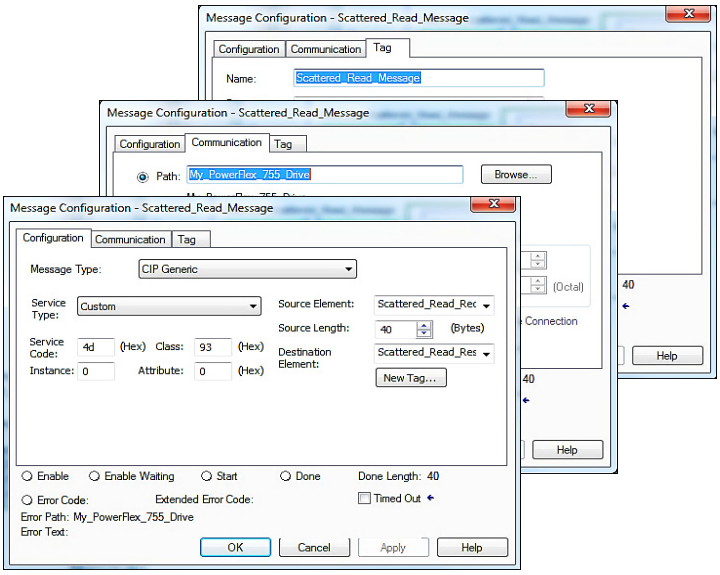
Table 9 - Example Controller Tags to Read Multiple Parameters

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

Figure 30 - Example Ladder Logic to Read Multiple Parameters

ControlLogix – Formatting a Message to Read Multiple Parameters

Figure 31 - 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 (hexadecimal)	Code for the requested service.
Class	93 or 9F (hexadecimal) (3)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute	0 (hexadecimal)	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 adapter/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', 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). When reading 32 bit REAL (floating point) parameters, as in this example, data conversion by using COP (Copy) instructions or UDDTs is required to show the parameter values.

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

(3) See Table 6 on page 112 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 numbers, see DPI Parameter Object on page 169 (Class code 0x93) or Host DPI Parameter Object on page 184 (Class code 0x9F).

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

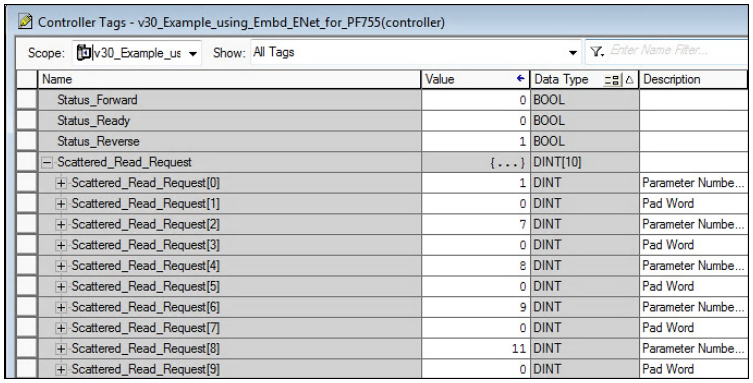
ControlLogix Controller Example Scattered Read Request Data

In this message example, the source tag Scattered Read Request is used to read the following five floating point parameters (32 bit REAL) in a PowerFlex 750-Series drive. See the data structure in Figure 32.

- **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 169 (Class code 0x93) or Host DPI Parameter Object on page 184 (Class code 0x9F) for parameter numbering.

Figure 32 - 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 33 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 a 32 bit integers, do not COP (copy) the data to a REAL tag.

Figure 33 - Example Scattered Read Response 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	

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 these floating point (32 bit REAL) parameters in a PowerFlex 750-Series drive:

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

See DPI Parameter Object on page 169 (Class code 0x93) or Host DPI Parameter Object on page 184 (Class code 0x9F) for parameter numbering.

Table 10 - Example Controller Tags to Write Multiple Parameters

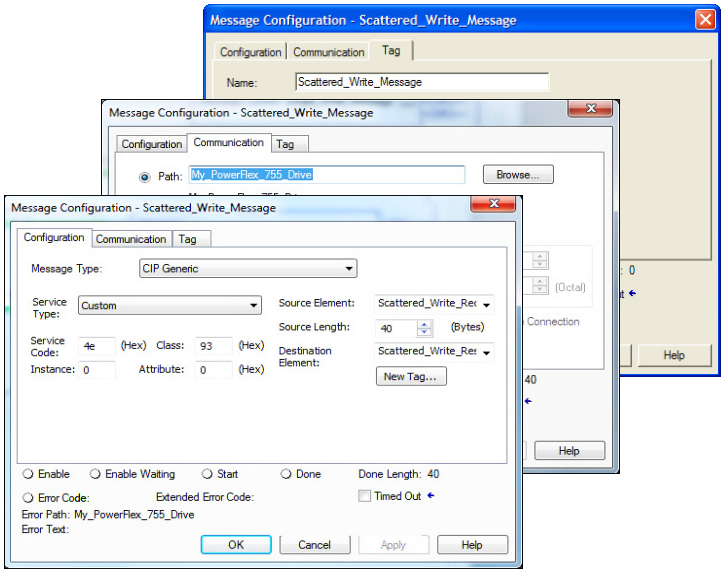
Instruction	Controller Tags for Scattered Write Message	Data Type
XIC	Execute_Scattered_Write_Message	BOOL
MSG	Scattered_Write_Message	MESSAGE

Figure 34 - 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 page 117). Attribute A writes to RAM—not NVS (EEPROM) memory. This scattered write message example, uses 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 35 - Scattered Write Multiple Message Configuration Dialog-boxes



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

Configuration Tab	Example Value	Description
Message Type	CIP Generic	Used to access the DPI Parameter Object in the adapter.
Service Type (1)	Custom	Required for scattered messages.
Service Code (1)	4e (hexadecimal)	Code for the requested service.
Class	93 or 9F (hexadecimal) (4)	Class ID for the DPI Parameter Object.
Instance	0 (Dec.)	Required for scattered messages.
Attribute (2)	0 (hexadecimal)	Required for scattered messages.
Source Element	Scattered_Write_Request (5)	Name of the tag for any service data to be sent from scanner or bridge to the adapter/drive.
Source Length	40 bytes (5)	Number of bytes of service data to be sent in the message.
Destination	Scattered_Write_Response (6)	The tag where the data that is read is stored.
Communication Tab	**Example Value**	**Description**
Path (3)	My_PowerFlex_755_Drive	The path is the route that the message follows.
Tag Tab	**Example Value**	**Description**
Name	Scattered_Write_Message	The name for the message.

(1) The default setting for Service Type is 'Custom', 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). When writing to 32 bit REAL (floating point) parameters, as in this example, data conversion that is using COP (Copy) instructions or UDDTs is required to write the parameter values.

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

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

(4) See Table 6 on page 112 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 169 (Class code 0x93) or Host DPI Parameter Object on page 184 (Class code 0x9F).

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

ControlLogix Controller Example Scattered Write Request Data

In this message example, we use the data structure in Figure 36 in the source tag (Scattered_Write_Request) to write new values to these floating point(32 bit REAL) parameters:

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

See DPI Parameter Object on page 169 (Class code 0x93) or Host DPI Parameter Object on page 184 (Class code 0x9F) for parameter numbering.

Figure 36 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 being written are 32 bit integers, do not COP (copy) the data to a REAL tag.

Figure 36 - Example Scattered Write Request Converted Data

⊟	Scattered_Write_Request	{...}	Scattered_Write_...
⊞	Scattered_Write_Request.Accel_Time_2_Par_No	536	DINT
	Scattered_Write_Request.Accel_Time_2_Par_Value	11.1	REAL
⊞	Scattered_Write_Request.Decel_Time_2_Par_No	538	DINT
	Scattered_Write_Request.Decel_Time_2_Par_Value	22.2	REAL
⊞	Scattered_Write_Request.Preset_Speed_5_Par_No	575	DINT
	Scattered_Write_Request.Preset_Speed_5_Par_Value	33.3	REAL
⊞	Scattered_Write_Request.Preset_Speed_6_Par_No	576	DINT
	Scattered_Write_Request.Preset_Speed_6_Par_Value	44.4	REAL
⊞	Scattered_Write_Request.Preset_Speed_7_Par_No	577	DINT
	Scattered_Write_Request.Preset_Speed_7_Par_Value	55.5	REAL

ControlLogix Controller Example Scattered Write Response Data

The results of the message appear in the destination tag named Scattered_Write_Response (Figure 37). Values of '0' indicate that no errors occurred.

Figure 37 - Example Scattered Write Response Data

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

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

The data structures in Table 11 and Table 12 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 11 - 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 12 - Data Structures for Scattered Write Messages

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

Notes:

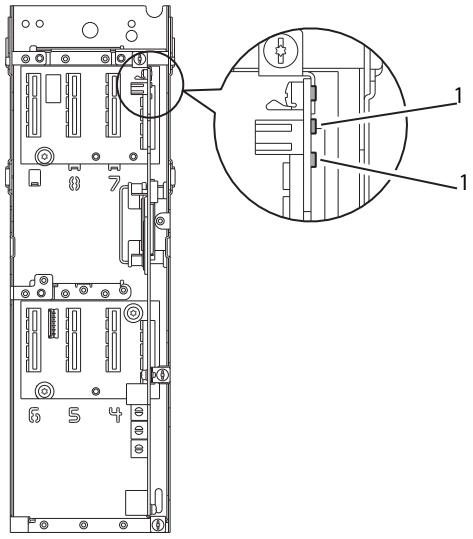
Troubleshooting

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

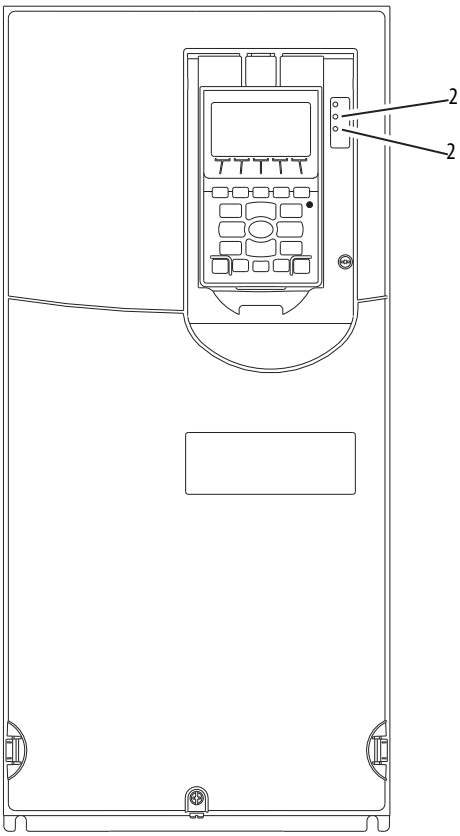
Understanding the Status Indicators

The adapter has two status indicators. They can be viewed with the drive HIM bezel closed or open.

Embedded EtherNet/IP adapter indicators are on main control board in drive control pod



Indicators that are shown with HIM bezel closed and drive cover installed



Item	Indicator Name	Description	Page
1	ENET	EtherNet/IP Connection Status	128
1	LINK	EtherNet/IP Transmit Status	128

ENET Status Indicator

This red/green bicolor status indicator shows the status of the network connection for the adapter, as shown in the following table.

Status	Cause	Corrective Actions
Off	The adapter is not powered, the adapter is not properly connected to the network, or the adapter needs an IP address.	• Apply power to the drive. • Securely connect the adapter to the network by using an Ethernet cable. Also, make sure that the Ethernet cable is connected to the Ethernet connector. • Set a unique IP address by using the adapter switches, a BOOTP server, or by disabling BOOTP and using adapter parameters.
Steady Red	The adapter failed the duplicate IP address detection test.	Configure the adapter to use a unique IP address and cycle power.
Flashing Red	An EtherNet/IP connection has timed out.	• Apply power to the scanner or enable the peer device that sends I/O. • Check the IGMP Snooping/Ethernet Switches for correct operation. • Check the amount of traffic on the network.
Flashing Red/Green	The adapter is performing a self-test.	No action required.
Flashing Green	The adapter is properly connected but is not communicating with any devices on the network.	• 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 messaging connection to the adapter. • Configure the adapter for the program in the controller or the I/O from the peer device.
Steady Green	The adapter is properly connected and is communicating on the network.	No action required.

LINK Status Indicator

This green status indicator shows the status of the adapter that is transmitting on the network as shown in the following table.

Status	Cause	Corrective Actions
Off	The adapter is not powered or is not properly connected to the network.	• Apply power to the drive. • Securely connect the adapter to the network by using an Ethernet cable. Also, make sure that the Ethernet cable is correctly connected to the Ethernet connector.
Flashing Green	The adapter is transmitting on the network.	No action required.
Steady Green	The adapter is linked to the network and is ready to communicate.	• Configure the adapter to use a unique IP address and cycle power. • Check the IP address in the adapter and scanner, and verify that the controller can communicate with the adapter. • Ping the adapter. • Set a unique IP address by using the adapter switches, a BOOTP server, or by disabling BOOTP and using adapter parameters. Normal condition if the adapter is idle.

Viewing Adapter Diagnostic Items

If you encounter unexpected communications problems, the diagnostic items of the adapter can help you or Rockwell Automation® personnel troubleshoot the problem. Adapter diagnostic items can be viewed with any of these drive configuration tools:

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

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

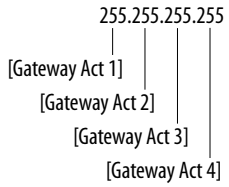
Table 13 - Adapter Diagnostic Items

No.	Name	Description
1	Common Logic Cmd	The present value of the Common Logic Command being transmitted to the drive by this adapter.
2	Prod Logic Cmd	The present value of the Product Logic Command being transmitted to the drive by this adapter from the controller.
3	Reference	The present value of the Reference being transmitted to the drive by this adapter.
4	Common Logic Sts	The present value of the Common Logic Status being received from the drive by this adapter.
5	Prod Logic Sts	The present value of the Product Logic Status being received from the drive by this adapter from the controller.
6	Feedback	The present value of the Feedback being received from the drive by this adapter.
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 From Net Datalinks currently available to the adapter.
10	DL To Net Avail	The number of To Net Datalinks currently available to the adapter.
11	DL Fr Net 01 Val	The present value of respective **DL From Net xx** parameter being transmitted to the drive by this adapter. If a Datalink is not used, its respective value must be zero.
12	DL Fr Net 02 Val	
13	DL Fr Net 03 Val	
14	DL Fr Net 04 Val	
15	DL Fr Net 05 Val	
16	DL Fr Net 06 Val	
17	DL Fr Net 07 Val	
18	DL Fr Net 08 Val	
19	DL Fr Net 09 Val	
20	DL Fr Net 10 Val	
21	DL Fr Net 11 Val	
22	DL Fr Net 12 Val	
23	DL Fr Net 13 Val	
24	DL Fr Net 14 Val	
25	DL Fr Net 15 Val	
26	DL Fr Net 16 Val	

Table 13 - Adapter Diagnostic Items (continued)

No.	Name	Description
27	DL To Net 01 Val	The present value of respective **DL To Net xx** parameter being received from the drive by this adapter. If Datalink is not used, 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 44 45 46 47 48	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 Ethernet hardware address of the adapter. 255:255:255:255:255:255 [HW Addr 1] [HW Addr 2] [HW Addr 3] [HW Addr 4] HW Addr 5] [HW Addr 6]
49 50 51 52	IP Addr Act 1 IP Addr Act 2 IP Addr Act 3 IP Addr Act 4	Value of each byte in the present IP address of the adapter. A value of '0' appears if the adapter 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]
53 54 55 56	Subnet Act 1 Subnet Act 2 Subnet Act 3 Subnet Act 4	Value of each byte in the present subnet mask of the adapter. A value of '0' appears if the adapter does not currently have a subnet mask. 255.255.255.255 [Subnet Act 1] [Subnet Act 2] [Subnet Act 3] [Subnet Act 4]

Table 13 - Adapter Diagnostic Items (continued)

No.	Name	Description
57 58 59 60	Gateway Act 1 Gateway Act 2 Gateway Act 3 Gateway Act 4	Value of each byte in the present gateway address of the adapter. A value of '0' appears if the adapter does not currently have a gateway address. 
61	Net Rx Overruns	A count of the number of receive buffer overruns reported by the Ethernet hardware.
62	Net Rx Packets	A count of the number of Ethernet packets that the adapter has received.
63	Net Rx Errors	A count of the number of Ethernet hardware errors that are received.
64	Net Tx Packets	A count of the number of Ethernet packets that the adapter has sent.
65	Net Tx Errors	A count of the number of transmit errors reported by the Ethernet hardware.
66	Last TCP Reset	The last reason that the adapter reset or rejected a TCP/IP connection.
67	Missed IO Pkts	A count of the number of incoming I/O connection packets that the adapter did not receive.
68	Net Addr Sw	The present value of the adapter IP address switches.

Viewing and Clearing Events

The adapter has an event queue to record significant events that occur in the operation of the adapter. When such an event occurs, an entry 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

For details on how to view and clear 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 and makes the event queue non-volatile. Eventually the event queue becomes full, since its contents are retained through adapter 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 adapter does not generate a fault to indicate that the event queue was corrupted.

If the adapter is reset to defaults there is no effect on the event queue, other than to log a Code 58 'Module Defaulted' event.

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

Table 14 - Adapter Events

Code	Event	Description
Adapter Events		
1	No Event	Text that is displayed in an empty event queue entry.
2	Device Power Up	Power was applied to the adapter.
3	Device Reset	The adapter was reset.
4	EEPROM CRC Error	The EEPROM checksum/CRC is incorrect, which limits adapter functionality. Default parameter values must be loaded to clear this condition.
5	App Updated	The adapter application firmware was updated.
6	Boot Updated	The adapter boot firmware was updated.
7…24	Reserved	—
DPI Events		
25	DPI Manual Reset	The adapter was reset.
26…28	Reserved	—
Network Events		
29	Net Link Up	A network link was available for the adapter.
30	Net Link Down	The network link was removed from the adapter.
31	Net Dup Address	The adapter uses the same IP address as another device on the network.
32	Net Comm Fault	The adapter detected a communications fault on the network.
33	Net Sent Reset	The adapter received a reset from the network.
34	Net IO Close	An I/O connection from the network to the adapter was closed.
35	Net Idle Fault	The adapter received 'idle' packets from the network.
36	Net IO Open	An I/O connection from the network to the adapter has been opened.
37	Net IO Timeout	An I/O connection from the network to the adapter has timed out.
38	Net IO Size Err	The adapter received an incorrectly sized I/O packet.
39	PCCC IO Close	The device that is sending PCCC Control messages to the adapter has set the PCCC Control Timeout to zero.
40	PCCC IO Open	The adapter has begun receiving PCCC Control messages (the PCCC Control Timeout was previously set to a non-zero value).
41	PCCC IO Timeout	The adapter has not received a PCCC Control message for longer than the PCCC Control Timeout.
42	Msg Ctrl Open	The timeout attribute in either the CIP Register or Assembly Object was written with a non-zero value. Allows control messages to be sent to the adapter.
43	Msg Ctrl Close	The timeout attribute in either the CIP Register or Assembly Object was written with a zero value. Disallows control messages to be sent to the adapter.
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 adapter received the first Peer I/O message.
46	Peer IO Timeout	The adapter has not received a Peer I/O message for longer than the Peer I/O Timeout.
47…54	Reserved	—
55	BOOTP Response	The adapter received a response to its BOOTP request.
56	E-mail Failed	The adapter encountered an error that is attempting to send a requested email message.
57	Option Card Flt	The adapter experienced a generic fault condition (drive only).
58	Module Defaulted	The adapter has been set to defaults.
59	Net Memory Mgmt	Internal memory error
60	Reserved	—

Viewing the Adapter Web Pages

This chapter provides instructions on how to monitor the PowerFlex® 755 drive and its embedded adapter by using the web interface of the adapter.

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

Enabling the Adapter Web Pages

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

By default the adapter web pages are disabled. To enable the adapter web pages, set **Parameter 52 - [Web Enable]** to '1' (Enabled) and then reset the adapter for the change to take effect.

Viewing the Web Pages

The adapter 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 adapter takes a communication or idle fault action.

Bit 0 of **Parameter 53 - [Web Features]** can be used to help protect the configured settings. For more details, see Configure Email Notification Web Page on page 138.

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

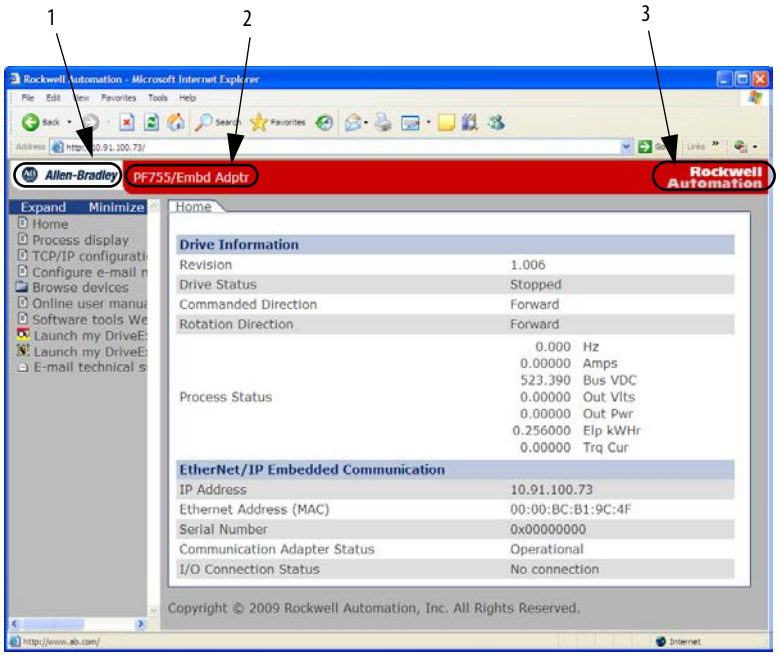
   The computer can access the adapter web pages if it is connected to:
   - The same network as the drive/adapter.
   - A network with access to the drive/adapter network via a gateway device (for example, a router).

2. In the Address box, type the IP address of the adapter.
3. Press Enter.

   The adapter web Home Page (Figure 38) appears.

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

Figure 38 - Example of the Adapter Web Home Page



Title Bar on Adapter Web Pages

The title bar appears on the adapter Home Page and all other web pages for the adapter. The title bar consists of three elements as shown in Figure 38.

Title Bar Element		Description
1	Allen-Bradley® logo	Click this logo to view the Rockwell Automation Home page.
2	Adapter Title	Shows the adapter type or user-configured title.
3	Rockwell Automation® logo	Click this logo to view the Rockwell Automation Home page.

Navigation Pane on Adapter Web Pages

The navigation pane appears on the left side of the adapter Home Page and all other adapter web pages. 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 Home page for the adapter(Figure 38).
Process display link	Click this link to view the Process Display pop-up dialog box of the host drive(Figure 39).
TCP/IP configuration link	Click this link to view the TCP/IP Configuration web page for the adapter. This page shows information about the TCP/IP configuration, such as the IP address of the adapter and the number of packets being sent. Figure 40 shows an example TCP/IP Configuration web page.
Configure email notification link	Click this link to view the Configure E-mail Notification web page of the adapter (Figure 41) to configure the adapter to send automatic email messages. An example email message is shown in Figure 43.
Browse DPI devices folder	Click this folder to expand and view the Port folders for all present devices, including the drive, adapter, and other devices connected to the drive such as a HIM.
Port x folders	Click a respective Port folder to expand and view various links its devices, which take you to related information pages. For Port 0 (PowerFlex 755 Drive) example information pages, see Figure 44, Figure 45, and Figure 46.
Online user manuals link	Click this link to go to the Rockwell Automation Literature Library website with provides access to product documentation.
Product Compatibility and Download Center	Click this link to go to the software tools Home page, for items such as DriveExplorer™ and DriveExecutive™.
Launch my DriveExplorer software link	Click this link to launch the DriveExplorer software that is already installed on your computer.
Launch my DriveExecutive software link	Click this link to launch the DriveExecutive software that is already installed on your computer.
Email technical support link	Click this link to view a new email message dialog box to send a message to the Allen-Bradley Technical Support Team.

Information on Adapter Home Page

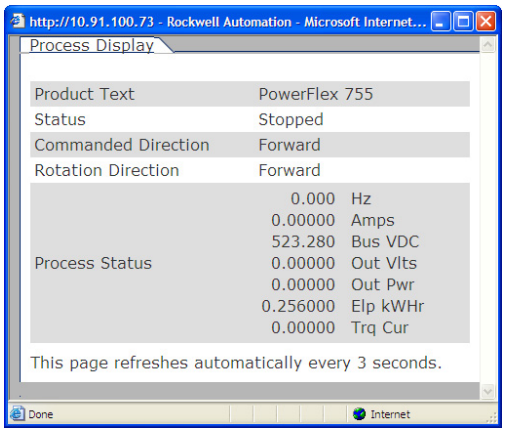
The adapter Home Page displays the following information for the host PowerFlex 755 drive and its embedded EtherNet/IP adapter.

Device	Information
Host PowerFlex 755 Drive	• Revision • Status • Commanded Direction • Rotation Direction • Process Status
Embedded EtherNet/IP Adapter	• IP Address • Ethernet Address (MAC) • Serial Number • Adapter Status • I/O Connection Status

Process Display Pop-up Dialog Box

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

Figure 39 - Example of Process Display Pop-up Dialog Box

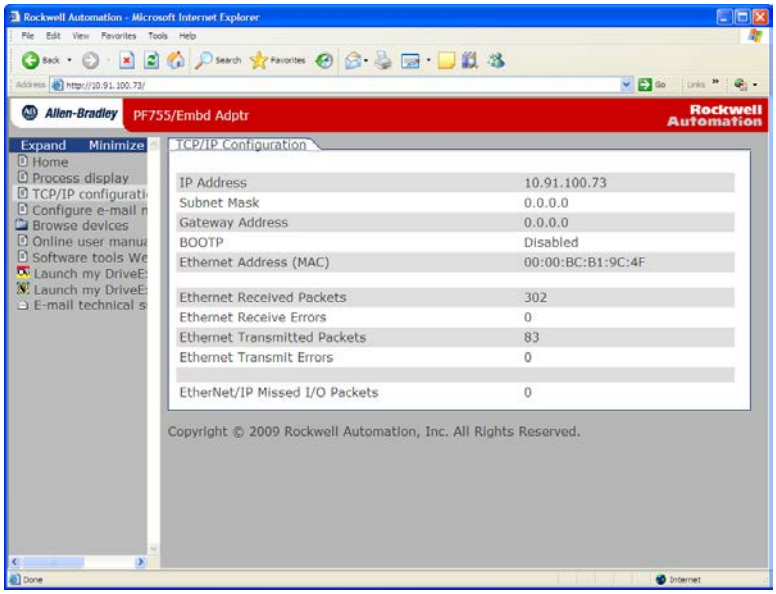


Information	Description
Product Text	Description of host drive.
Status	Status of host drive.
Commanded Direction	Commanded direction of host drive.
Rotation Direction	Rotation direction of host drive.
Process Status	
Line 1	Dynamic value of the host drive feedback parameter. This parameter is not selectable.
Lines 2...7	Dynamic value of each default-displayed host drive parameter. The displayed drive parameters for lines 2...7 are selectable using a HIM, or another drive configuration tool such as Connected Components Workbench™, DriveExecutive, or DriveExplorer software.

TCP/IP Configuration Web Page

The TCP/IP Configuration web page provides information about the Ethernet settings and network activities of the adapter. To view this web page, click the 'TCP/IP configuration' link (highlighted in Figure 40) in the navigation pane.

Figure 40 - Example of TCP/IP Configuration Web Page

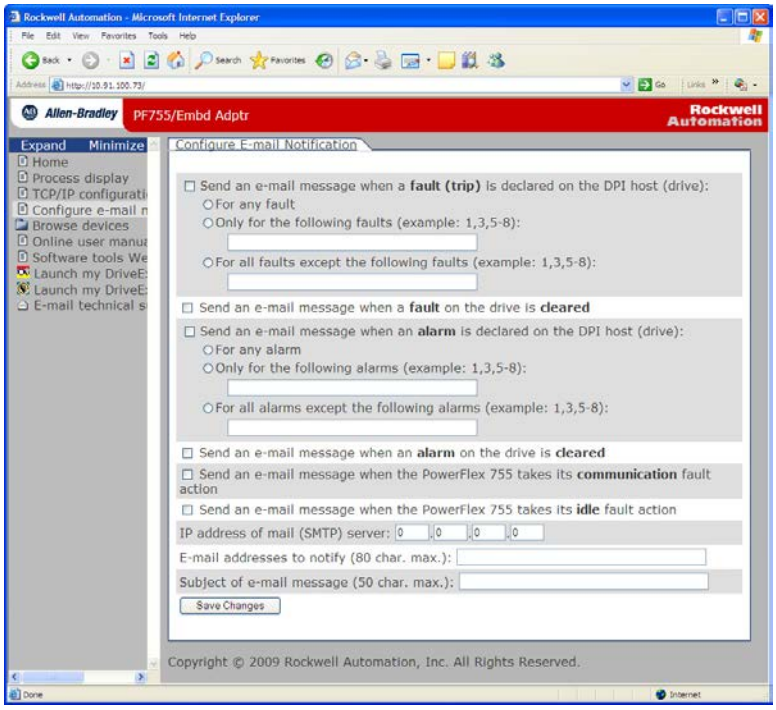


Information	Description
IP Address	IP address of the adapter.
Subnet Mask	Subnet mask for the network of the adapter.
Gateway Address	Address for the gateway device on the network of the adapter.
BOOTP	Shows status for BOOTP, which can be used to configure the network information of the adapter.
Ethernet Address (MAC)	Hardware address for the adapter.
Ethernet Received Packets	Number of packets that the adapter has received.
Ethernet Receive Errors	Number of hardware errors that are received.
Ethernet Transmitted Packets	Number of packets that the adapter has sent.
Ethernet Transmit Errors	Number of transmit errors reported by the hardware.
EtherNet/IP Missed I/O Packets	Number of I/O connection packets that the adapter did not receive.

Configure Email Notification Web Page

The Configure email Notification web page contains selections and data fields for configuring the adapter to send email messages to desired addresses when selected types of events occur. To view this web page, click the 'Configure email...' link (highlighted in Figure 41) in the navigation pane.

Figure 41 - Example of Configure Email Notification Web Page



By default, settings are not protected. After configuration, settings can be protected by using **Parameter 53 - [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 PowerFlex 755 drive 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	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.
'E-mail addresses to notify…'	Type in addresses to where you want email messages to be sent. Separate multiple addresses by commas (comma delimited).
'Subject of e-mail 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.

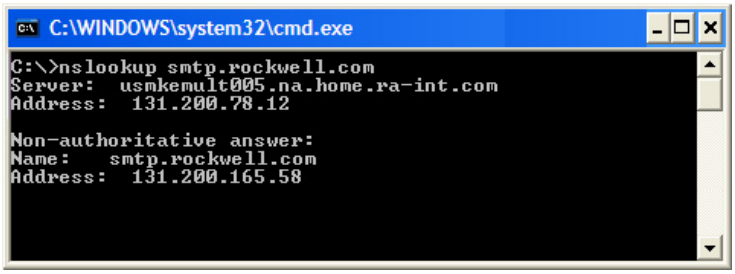
d. On the c:\ > command line, type 'nslookup [name of email server]'.

The entry 'c:\ > nslookup smtp.company.com' is an example.

e. Press Enter to display the email server IP address (Figure 42).

f. Type the second (bottom) IP address shown in the DOS dialog box (for this example, 131.200.165.58) into the E-mail Notification web page (Figure 41).

Figure 42 - DOS Dialog Box Example Showing Email Server IP Address

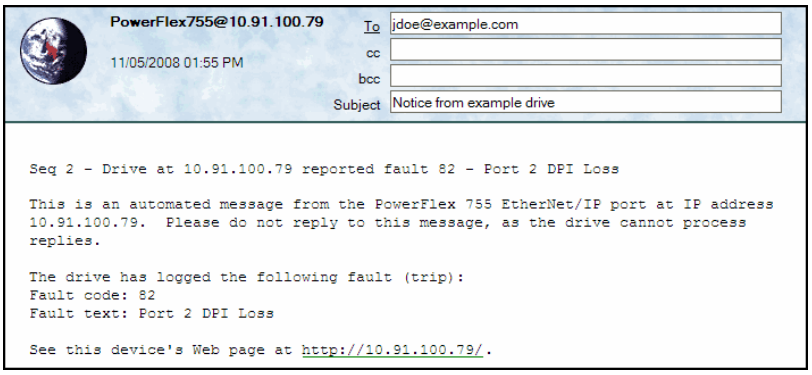


7. Click Save Changes.

IMPORTANT After configuring E-mail Notification, it is recommended to protect the settings. Otherwise the configuration can be changed anytime the web page is accessed with a browser. To help protect the settings, use **Parameter 53 - [Web Features]** to set E-mail Cfg Bit 0 value to '0' (Disabled).

Figure 43 shows an example email message that the adapter automatically sends in response to selected events.

Figure 43 - Example of Email Message Sent by the Adapter



TIP To stop email messages, uncheck all 'Send an e-mail message when…' boxes.

If **Parameter 52 - [Web Enable]** is set to '0' (Disabled) to disable, the adapter web pages do **not stop** the adapter from sending email messages.

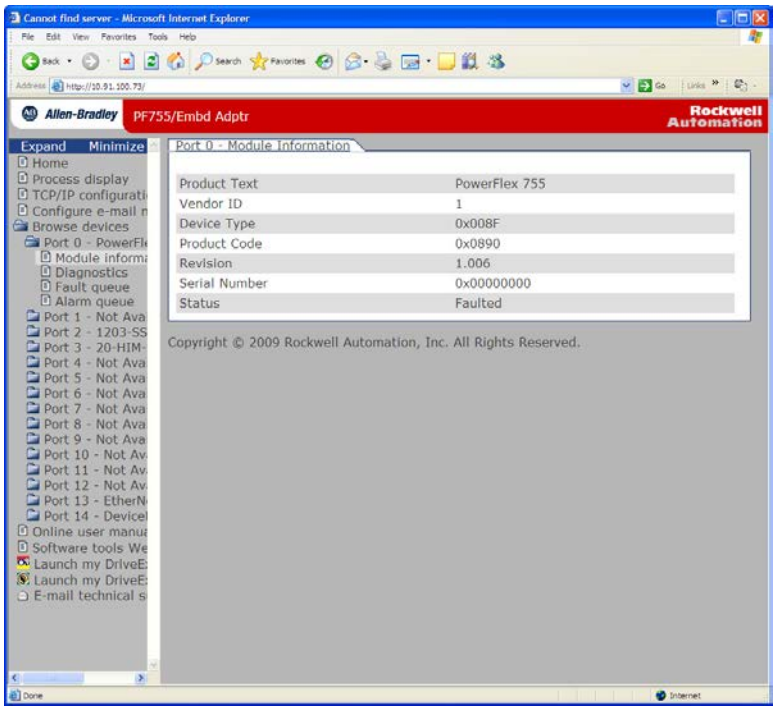
Device Information Pages

Device information pages are viewed by clicking the respective links in the navigation pane:

Web Page	Description
Module Information	Shows module information for the respective drive Port device. For example, Figure 44 shows module information for the Port 0 device (host drive).
Diagnostics	Shows diagnostic item information for the respective drive Port device. For example, Figure 45 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 46 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 47 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 48 shows the event queue for the Port 13 device (embedded EtherNet/IP adapter).

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

Figure 44 - Example of Port 0 (PowerFlex 755 Drive) Module Information Page



Information	Description
Product Text	Text that identifies the device
Vendor ID	1 = Allen-Bradley
Device Type	0x008F (143 decimal) = PowerFlex 755 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	Operational status of the device (for example, faulted)

Figure 45 - Example of Port 0 (PowerFlex 755 Drive) Diagnostic Items Page

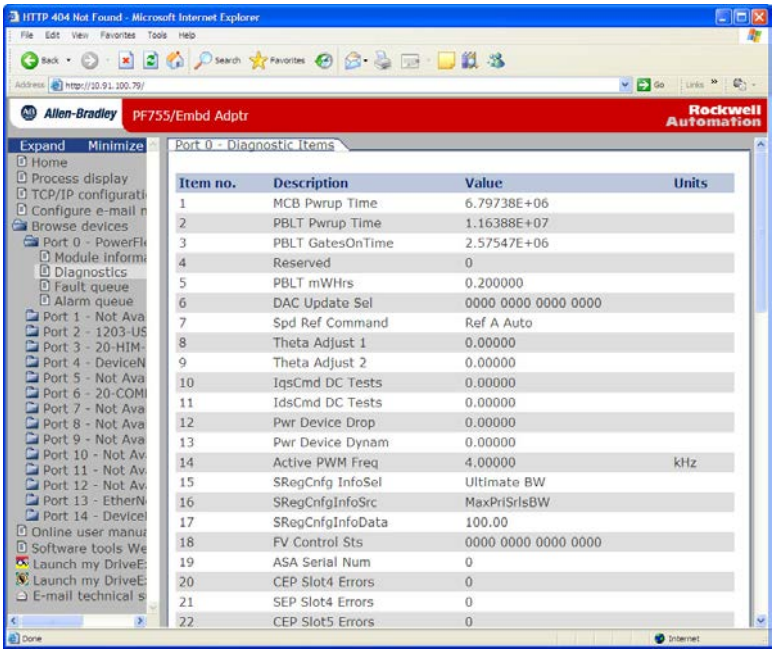


Figure 46 - Example of Port 0 (PowerFlex 755 Drive) Fault Queue Page

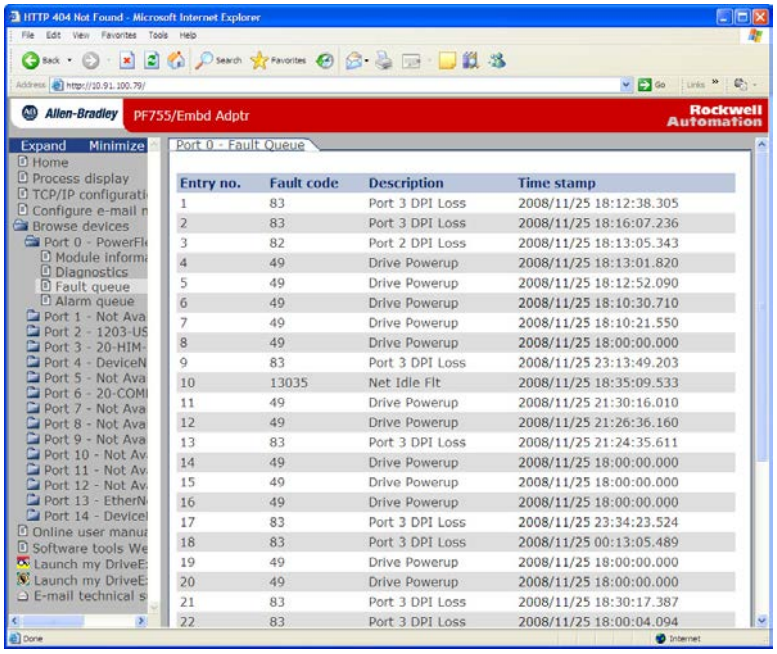


Figure 47 - Example of Port 0 (PowerFlex 755 Drive) Alarm Queue Page

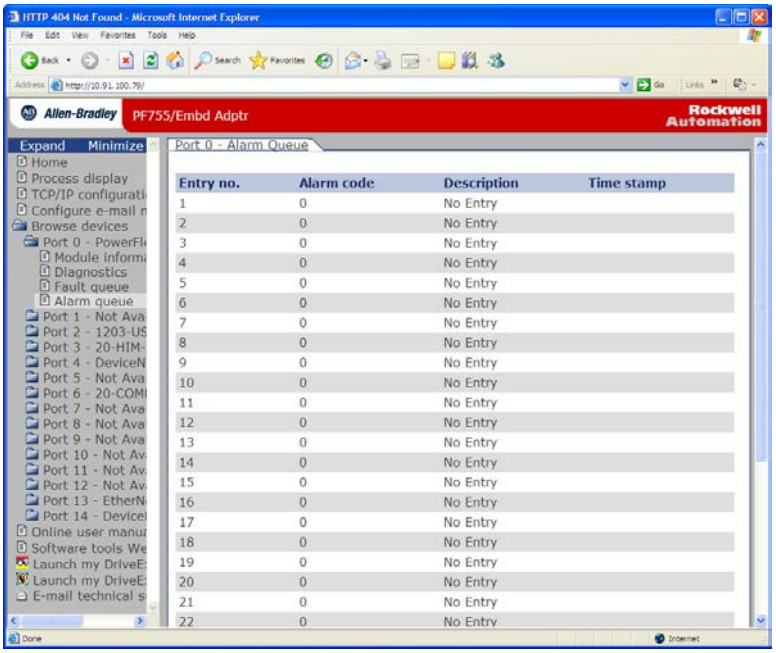
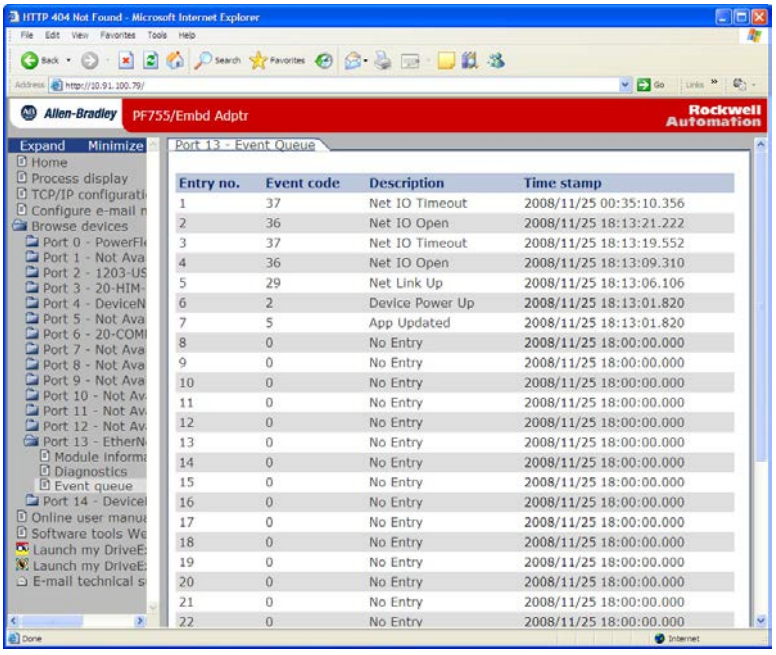


Figure 48 shows an example event queue page for the Port 13 device (embedded EtherNet/IP adapter).

Figure 48 - Example of Port 13 (Embedded EtherNet/IP Adapter) Event Queue Page



Notes:

Specifications

This appendix presents the specifications for the adapter.

Communication

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 CIP MSG instruction connections including one exclusive-owner I/O connection The following activities use a CIP connection: • I/O connections (for example, from a ControlLogix® controller) or Integrated Motion on the EtherNet/IP network connection • MSG instruction, when 'connected' is checked on in the MSG configuration tab • DriveExecutive™ connections to the drive 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 the MSG Configuration tab (default) • DriveExplorer™ software connections to the drive
Requested Packet Interval (RPI)	2 ms minimum
'Integrated Motion on the EtherNet/IP network' Coarse Update Rate	3 ms minimum
Packet Rate	Up to 400 total I/O packets per second (200 in and 200 out)
Drive	
Protocol	DPI™
Data Rate	500 Kbps

Regulatory Compliance

UL	UL508C
cUL	CAN / CSA C22.2 No. 14-M91
CE	EN50178 and EN61800-3
CTick	EN61800-3

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

Notes:

Adapter Parameters

This appendix provides information about the adapter parameters.

How Parameters Are Organized

The embedded EtherNet/IP adapter parameters are numbered consecutively and displayed in a **Numbered List** view order.

You can view the adapter parameters with any of the following drive configuration tools:

- PowerFlex® 20-HIM-A6 or 20-HIM-C6S HIM—use the 4 or 6 key to scroll to drive Port 13 (the adapter). Press the (Folders) key, and use the 4 or 6 key to scroll to the PARAM folder.
- Connected Components Workbench™ software—click the tab for the embedded EtherNet/IP adapter at the bottom of the window. Click the Parameters icon in the tool bar, and click the Parameters tab.
- DriveExplorer™ software—find the embedded EtherNet/IP adapter in the Controller Organizer and open its Parameters folder.
- DriveExecutive™ software—find the embedded EtherNet/IP adapter in the Controller Organizer, expand the adapter in the tree, and open its Parameters folder.

Parameter List

Table 15 - Parameter List

No.	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 must connect. Each selected port/parameter is written with data received from the network. These parameters are written and output by the controller. If setting the value manually, the parameter value = (10000 * port number) + (destination parameter number). For example, suppose that you want to use **Parameter 01 - [DL From Net 01]** to write to Parameter 01 of an optional encoder card plugged into drive Port 5. The value for **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 must connect. Each selected port/parameter is read and their values transmitted over the network to the controller. The controller read 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 **Parameter 17 - [DL To Net 01]** to read Parameter 02 of an optional I/O card plugged into drive Port 6. The value for **Parameter 17 - [DL To Net 01]** would be 60002 [(10000 * 6) + 2].	Minimum: Maximum: Type: Reset Required:	0 159999 Read/Write No
33	**[Port Number]** Displays the drive port to which the embedded EtherNet/IP adapter is dedicated. This port is always Port 13.	Value: Type:	13 Read Only
34	**[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

Table 15 - Parameter List (continued)

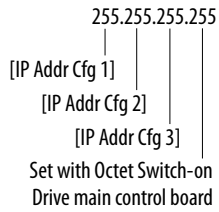
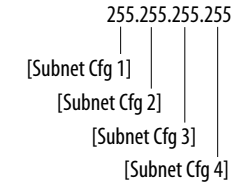
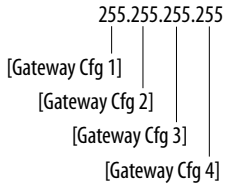
No.	Description	Details
35	**[DLs To Net Act]** Displays the number of drive-to-controller Datalinks that the controller is using based on the I/O connection opened by the controller.	Minimum: 0 Maximum: 16 Type: Read Only
36	**[BOOTP]** Configures the adapter to use BOOTP so that you can set its IP address, subnet mask, and gateway address with a BOOTP server. When this parameter is disabled, you must use either the adapter IP address switches (Figure 1 on page 22) or the adapter parameters to set these addressing functions.	Default: 1 = Enabled Values: 0 = Disabled 1 = Enabled Type: Read/Write Reset Required: Yes
37	**[Net Addr Src]** Displays the source from which the node address of the adapter is taken.	Values: 0 = Switches 1 = Parameters 2 = BOOTP Type: Read Only
38 39 40 41	**[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 adapter when **Parameter 36 - [BOOTP]** with drive firmware 1.xxx…7.xxx) is set to '0' (Disabled). Or **Parameter 36 - [Net Addr Sel]** (with drive firmware 8.xxx or later) is set to '0' (Parameters). And the IP address switches (Figure 1 on page 22) are not being used. That is, switches set to any value other than 001…254 or 888.  	Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 255 Type: Read/Write Reset Required: Yes
42 43 44 45	**[Subnet Cfg 1]** **[Subnet Cfg 2]** **[Subnet Cfg 3]** **[Subnet Cfg 4]** Sets the subnet mask bytes for the network address of the adapter when **Parameter 36 - [BOOTP]** (with drive firmware 1.xxx …7.xxx) is set to '0' (Disabled). Or **Parameter 36 - [Net Addr Sel]** (with drive firmware 8.xxx or later) is set to '0' (Parameters). And the IP address switches (Figure 1 on page 22) are not being used. That is, switches set to any value other than 001…254 or 888.  	Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 255 Type: Read/Write Reset Required: Yes

Table 15 - Parameter List (continued)

No.	Description	Details
46 47 48 49	**[Gateway Cfg 1]** **[Gateway Cfg 2]** **[Gateway Cfg 3]** **[Gateway Cfg 4]** Sets the gateway address bytes for the network address of the adapter when **Parameter 36 - [BOOTP]** (with drive firmware 1.xxx…7.xxx) is set to '0' (Disabled) or **Parameter 36 - [Net Addr Sel]** (with drive firmware 8.xxx or later) is set to '0' (Parameters). And the IP address switches (Figure 1 on page 22) are not being used (that is, switches set to any value other than 001…254 or 888).  	Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 255 Type: Read/Write Reset Required: Yes
50	**[Net Rate Cfg]** Sets the speed and duplex network data rate at which the adapter communicates. Updates **Parameter 51 - [Net Rate Act]** 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 Type: Read/Write Reset Required: Yes
51	**[Net Rate Act]** Displays the actual speed and duplex network data rate used by the adapter.	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
52	**[Web Enable]** Enables/disables the web pages of the adapter.	Default: 0 = Disabled Values: 0 = Disabled 1 = Enabled Type: Read/Write Reset Required: Yes
53	**[Web Features]** Enables/disables the web-configurable email notification feature.	Default: xxxx xxxx xxxx xxx1 Bit Values: 0 = Disabled 1 = Enabled Type: Read/Write Reset Required: No

Bit Definition	Not Used	Not Used	Not Used	Not Used	…	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	E-mail Cfg
Default	x	x	x	x	…	x	x	x	x	x	x	x	1
Bit	15	14	13	12	…	7	6	5	4	3	2	1	0

Table 15 - Parameter List (continued)

No.	Description	Details
54	**[Comm Flt Action]** Sets the action that the adapter and drive takes if the adapter detects that I/O communication has been disrupted. This setting is effective only if I/O that controls the drive is transmitted through the adapter. When communication is re-established, the drive automatically receives the commands over the network again.	Default: 0 = Fault Values: 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Type: Read/Write Reset Required: No
	ATTENTION: Risk of injury or equipment damage exists. **Parameter 54 - [Comm Flt Action]** lets you determine the action of the adapter and connected drive if I/O communication is disrupted. By default, this parameter faults the drive. You can configure this parameter so that the drive continues to run. However, precautions must be taken to verify that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).	
55	**[Idle Flt Action]** Sets the action that the adapter and drive takes if the adapter detects that the controller is in Program mode or faulted. This setting is effective only if I/O that controls the drive is transmitted through the adapter. When the controller is put back in Run mode, the drive automatically receives commands over the network again.	Default: 0 = Fault Values: 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Type: Read/Write Reset Required: No
	ATTENTION: Risk of injury or equipment damage exists. **Parameter 55 - [Idle Flt Action]** lets you determine the action of the adapter and connected drive when the controller is idle. By default, this parameter faults the drive. You can configure this parameter so that the drive continues to run. However, precautions must be taken to verify that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a controller in idle state).	

Table 15 - Parameter List (continued)

No.	Description	Details
56	**[Peer Flt Action]** Sets the action that the adapter and drive takes if the adapter detects that peer I/O communication has been disrupted. This setting is effective only if I/O is transmitted through the adapter. 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. **Parameter 56 - [Peer Flt Action]** lets you determine the action of the adapter and connected drive if the adapter 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, precautions must be taken to verify that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).	
57	**[Msg Flt Action]** Sets the action that the adapter and drive takes if the adapter detects that a MSG instruction has been disrupted. Only when used for drive control via PCCC or the CIP Register Object. When a 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. **Parameter 57 - [Msg Flt Action]** lets you determine the action of the adapter and connected drive if MSG instruction for drive control is disrupted. By default, this parameter faults the drive. You can configure this parameter so that the drive continues to run. However, precautions must be taken to verify that the setting of this parameter does not create a risk of injury or equipment damage. When commissioning the drive, verify that your system responds correctly to various situations (for example, a disconnected cable).	
58	**[Flt Cfg Logic]** Sets the Logic Command data that is sent to the drive if any of the following is true: • **Parameter 54 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • **Parameter 55 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle. • **Parameter 56 - [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is disrupted. • **Parameter 57 - [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 Appendix D.	Default: 0000 0000 0000 0000 Minimum: 0000 0000 0000 0000 Maximum: 1111 1111 1111 1111 Type: Read/Write Reset Required: No

Table 15 - Parameter List (continued)

No.	Description	Details
59	**[Flt Cfg Ref]** Sets the Reference data that is sent to the drive if any of the following is true: • **Parameter 54 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • **Parameter 55 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle. • **Parameter 56- [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is disrupted. • **Parameter 57 - [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
60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75	**[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: • **Parameter 54 - [Comm Flt Action]** is set to '4' (Send Flt Cfg) and I/O communication is disrupted. • **Parameter 55 - [Idle Flt Action]** is set to '4' (Send Flt Cfg) and the controller is idle. • **Parameter 56 - [Peer Flt Action]** is set to '4' (Send Flt Cfg) and peer I/O communication is disrupted. • **Parameter 57 - [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
76	**[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 this parameter value 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. **NOTE:** The adapter 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 the powered to the adapter is cycled or reset.	Default: 0 Minimum: 0 Maximum: 16 Type: Read/Write Reset Required: Yes
77	**[DLs Fr Peer Act]** Displays the value of **Parameter 76 - [DLs Fr Peer Cfg]** at the time the adapter/drive was reset. This value is the number of actual peer-to-drive Datalinks that the drive is expecting.	Minimum: 0 Maximum: 16 Type: Read Only

Table 15 - Parameter List (continued)

No.	Description	Details
78	**[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 for the drive. Non-zero values specify the 'index' for the Datalink that contains the Logic Command for the drive. For example, if **Parameter 76 - [DLs Fr Peer Cfg]** has the value 3 specifying that Datalinks 14…16 are allocated for peer I/O. And **Parameter 78 - [Logic Src Cfg]** has the value 1 specifying that the first peer I/O Datalink contains the Logic Command for the drive. Then Datalink 14 contains the Logic Command for the drive. **NOTE:** The adapter 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 adapter is cycled or reset.	Default: 0 Minimum: 0 Maximum: 16 Type: Read/Write Reset Required: No
79	**[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 for the drive. For example, if **Parameter 76 - [DLs Fr Peer Cfg]** has the value 3 specifying that Datalinks 14…16 are allocated for peer I/O. And **Parameter 79 - [Ref Src Cfg]** has the value 1 specifying that the first peer I/O Datalink contains the Reference for the drive. Then Datalink 14 contains the Reference for the drive. **NOTE:** The adapter 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 the power to the adapter is cycled or reset.	Default: 0 Minimum: 0 Maximum: 16 Type: Read/Write Reset Required: No
80	**[Fr Peer Timeout]** Sets the timeout for a peer I/O connection. If the time is reached without the adapter having received (consumed) a message, the adapter responds with the action specified in **Parameter 56 - [Peer Flt Action]**. In an adapter that receives (consumes) peer I/O, the value the parameter must be greater than the product of the value of **Parameter 89 - [To Peer Period]**. In the adapter that transmitted (produced) the peer I/O. Multiplied by the value of **Parameter 90 - [To Peer Skip]**. In the adapter that transmitted (produced) peer I/O. **NOTE:** The adapter 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 the power to the adapter is cycled or reset.	Default: 10.00 Seconds Minimum: 0.01 Seconds Maximum: 10.00 Seconds Type: Read/Write Reset Required: No

Table 15 - Parameter List (continued)

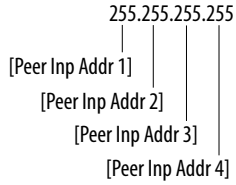
No.	Description	Details
81 82 83 84	**[Fr Peer Addr 1]** **[Fr Peer Addr 2]** **[Fr Peer Addr 3]** **[Fr Peer Addr 4]** Sets the IP address bytes that specify the device from which the adapter receives (consumes) peer I/O data.  **Important:** The Fr Peer Addr must be on the same subnet as the embedded EtherNet/IP adapter. See IP Addresses on page 202 for more information. Changes to these parameters are ignored when **Parameter 85 - [Fr Peer Enable]** is '1' (On).	Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 255 Type: Read/Write Reset Required: No
85	**[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 **Parameters:** • **76 - [DLs Fr Peer Cfg]** • **78 - [Logic Src Cfg]** • **79 - [Ref Src Cfg]** And automatically uses peer Datalink 01 as the present Logic Command of the drive and peer Datalink 02 as the Reference of the drive. A value of '2' (Custom) enables peer I/O input that uses the Datalink count and settings that you provide. If the value of this parameter is changed from '1' (Cmd/Ref) to '2' (Custom) or from '2' (Custom) to '1' (Cmd/Ref) while peer I/O is running, the drive is commanded to do its Peer Fault Action before the Peer Input mode is changed.	Default: 0 = Off Values: 0 = Off 1 = Cmd/Ref 2 = Custom Type: Read/Write Reset Required: No
86	**[Fr Peer Status]** Displays the status of the consumed peer I/O input connection.	Values: 0 = Off 1 = Waiting 2 = Running 3 = Faulted Type: Read Only
87	**[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 this parameter value is set to '3', Datalinks 14…16 are allocated for the three selected Datalinks. The Datalinks that are allocated cannot overlap with other assigned DL To Net 01…16 parameters. **NOTE:** The adapter 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 the power to the adapter is cycled or reset.	Default: 0 Minimum: 0 Maximum: 16 Type: Read/Write Reset Required: Yes
88	**[DLs To Peer Act]** Displays the value of **Parameter 87 - [DLs To Peer Cfg]** at the time the drive was reset. This value is the number of actual drive-to-peer Datalinks that the drive is expecting.	Minimum: 0 Maximum: 16 Type: Read Only

Table 15 - Parameter List (continued)

No.	Description	Details
89	**[To Peer Period]** Sets the minimum time that an adapter waits when transmitting data to a peer. **Important:** Changes to this parameter are ignored when **Parameter 91 - [To Peer Enable]** is '1' (On).	Default: 10.00 Seconds Minimum: 0.01 Seconds Maximum: 10.00 Seconds Type: Read/Write Reset Required: No
90	**[To Peer Skip]** Sets the maximum time that an adapter waits when transmitting data to a peer. The value of **Parameter 89 - [To Peer Period]** is multiplied by the value of this parameter to set the time. **Important:** Changes to this parameter are ignored when **Parameter 91 - [To Peer Enable]** is '1' (On).	Default: 1 Minimum: 1 Maximum: 16 Type: Read/Write Reset Required: No
91	**[To Peer Enable]** Controls whether peer I/O output is operating. A value of '0' (Off) turns off peer I/O output. A value of '1' (Cmd/Ref) overrides the settings in **Parameters:** • **31 - [DL To Net 15]** • **32 - [DL To Net 16]** • **76 - [DLs Fr Peer Cfg]** • **77 - [DLs Fr Peer Act]** And automatically sends the present Logic Command of the drive (as Datalink 01) and Reference (as Datalink 02). A value of '2' (Custom) enables peer I/O output by using the Datalink count and settings you provide.	Default: 0 = Off Values: 0 = Off 1 = Cmd/Ref 2 = Custom Type: Read/Write Reset Required: No

EtherNet/IP Objects

This appendix presents information about the EtherNet/IP objects that can be accessed by using MSG instructions. For information on the format of MSG instructions and example ladder logic programs, see Chapter 6, Using Message Instructions.

Object	Class Code		Page
	Hex.	Dec.	
Identity Object	0x01	1	158
Assembly Object	0x04	4	160
Register Object	0x07	7	161
PCCC Object	0x67	103	162
DPI Device Object	0x92	146	166
DPI Parameter Object	0x93	147	169
DPI Fault Object	0x97	151	176

Object	Class Code		Page
	Hex.	Dec.	
DPI Alarm Object	0x98	152	178
DPI Diagnostic Object	0x99	153	180
DPI Time Object	0x9B	155	182
Host DPI Parameter Object	0x9F	159	184
TCP/IP Interface Object	0xF5	245	191
Ethernet Link Object	0xF6	246	192

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

Supported Data Types

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

Data Type	Description
UDINT	32 bit unsigned integer
UINT	16 bit unsigned integer
USINT	8 bit unsigned integer

Identity Object

Class Code

Hexadecimal	Decimal
0x01	1

Services

	Implemented for		
Service Code	Class	Instance	Service Name
0x05	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 adapter. 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	123
3	Get	Product Code	UINT	Number that identifies the product name and rating
4	Get	Revision: Major Minor	STRUCT of: USINT USINT	 Value varies Value varies
5	Get	Status	UINT	Bit 0 = Owned Bit 8 = Minor recoverable fault Bit 10 = Major recoverable fault
6	Get	Serial Number	UDINT	Unique 32 bit number
7	Get	Product Name	SHORT_STRING	Product name and rating

Assembly Object

Class Code

Hexadecimal	Decimal
0x04	4

Services

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

Instances

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

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Revision	UINT	2
2	Get	Max Instance	UINT	2
100	Set	Control Timeout	UINT	Control 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 The 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 embedded adapter (read-only)
2	All I/O data written to the embedded adapter (read/write)
3	Logic Status and Feedback data (read-only)
4	Logic Command and Reference data (read/write)
5	Logic Status data (read-only)
6	Logic Command data (read/write)
7	Logic Status and Feedback data (read-only)
8	Masked Logic Command ([1])read/write)
9	Feedback data (read-only)
10	Reference data (read/write)
11	DL To Net 01 (input data from embedded adapter to scanner) (read only)
12	DL From Net 01 (output data from scanner to embedded adapter) (read/write)
⋮	⋮
41	DL To Net 16 (input data from embedded adapter to scanner) (read only)
42	DL From Net 16 (output data from scanner to embedded adapter) (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 can 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 forth, 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 forth, 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 embedded EtherNet/IP adapter 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 writes

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 adapter does not receive a message in the specified time, it does the fault action configured in its [Comm Flt Action] parameter. A valid setting is 1...32767 seconds (5 . . . 20 seconds is recommended).	
N42:7	Adapter Port Number (read only): Drive Port 13 in which the adapter resides.	
N42:8	Peer Adapters (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 adapter 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 adapter is not mapped to the scanner. • The adapter is not receiving Peer I/O from another adapter. • 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)

N-File	Description
N150…N199	These N-files let you read and write parameter values in the PowerFlex® 755 drive as 32 bit double words. You can interpret the data in various ways (for example, 32 bit real, 32 bit integer) To read a parameter, you must send a message with two elements. For example, to read parameter 1, read two elements, start at N150:2. As another example, to read parameters 2…6, read ten elements, start at N150:4.
N150:0…1	Number of parameters in the drive
N150:2…249	Drive parameters 1…124
N151:0…249	Drive parameters 125…249
N152:0…249	Drive parameters 250…374
N153:0…249	Drive parameters 375…499
⋮	⋮
N199:0…249	Drive parameters 6125…6249
N201…N212	These N-files let you read and write parameter values in DPI Peripherals (for example, a HIM or adapter) as 32 bit double words. You can interpret the data in various ways (for example, 32 bit real, 32 bit integer) To read a parameter, you must send a message with two elements. For example, to read parameter 1 in the peripheral connected to DPI port 1, read two elements, start at N201:2. As another example, to read parameters 2…6 in the peripheral connected to DPI port 5 (the adapter), read ten elements, start at N209:4.
N201:0…1	Number of parameters in the DPI peripheral at DPI port 1
N201:2…249	Parameters 1…124 in the DPI peripheral at DPI port 1
N202:0…249	Parameters 125…249 in the DPI peripheral at DPI port 1
N203:0…1	Number of parameters in the DPI peripheral at DPI port 2
N203:2…249	Parameters 1…124 in the DPI peripheral at DPI port 2
N204:0…249	Parameters 125…249 in the DPI peripheral at DPI port 2
N205:0…1	Number of parameters in the DPI peripheral at DPI port 3
N205:2…249	Parameters 1…124 in the DPI peripheral at DPI port 3
N206:0…249	Parameters 125…249 in the DPI peripheral at DPI port 3
N207:0…1	Number of parameters in the DPI peripheral at DPI port 4
N207:2…249	Parameters 1…124 in the DPI peripheral at DPI port 4
N208:0…249	Parameters 125…249 in the DPI peripheral at DPI port 4
N209:0…1	Number of parameters in the DPI peripheral at DPI port 5
N209:2…249	Parameters 1…124 in the DPI peripheral at DPI port 5
N210:0…249	Parameters 125…249 in the DPI peripheral at DPI port 5
N211:0…1	Number of parameters in the DPI peripheral at DPI port 6
N211:2…249	Parameters 1…124 in the DPI peripheral at DPI port 6
N212:0…249	Parameters 125…249 in the DPI peripheral at DPI port 6
N213:0…1	Number of parameters in the DPI peripheral at DPI port 7
N213:2…249	Parameters 1…124 in the DPI peripheral at DPI port 7
N214:0…249	Parameters 125…249 in the DPI peripheral at DPI port 7
N215:0…1	Number of parameters in the DPI peripheral at DPI port 8
N215:2…249	Parameters 1…124 in the DPI peripheral at DPI port 8
N216:0…249	Parameters 125…249 in the DPI peripheral at DPI port 8
N217:0…1	Number of parameters in the DPI peripheral at DPI port 9
N217:2…249	Parameters 1…124 in the DPI peripheral at DPI port 9
N218:0…249	Parameters 125…249 in the DPI peripheral at DPI port 9
N219:0…1	Number of parameters in the DPI peripheral at DPI port 10
N219:2…249	Parameters 1…124 in the DPI peripheral at DPI port 10
N220:0…249	Parameters 125…249 in the DPI peripheral at DPI port 10
N221:0…1	Number of parameters in the DPI peripheral at DPI port 11
N221:2…249	Parameters 1…124 in the DPI peripheral at DPI port 11
N222:0…249	Parameters 125…249 in the DPI peripheral at DPI port 11
N223:0…1	Number of parameters in the DPI peripheral at DPI port 12
N223:2…249	Parameters 1…124 in the DPI peripheral at DPI port 12
N224:0…249	Parameters 125…249 in the DPI peripheral at DPI port 12
N225:0…1	Number of parameters in the DPI peripheral at DPI port 13
N225:2…249	Parameters 1…124 in the DPI peripheral at DPI port 13
N226:0…249	Parameters 125…249 in the DPI peripheral at DPI port 13
N227:0…1	Number of parameters in the DPI peripheral at DPI port 14
N227:2…249	Parameters 1…124 in the DPI peripheral at DPI port 14
N228:0…249	Parameters 125…249 in the DPI peripheral at DPI port 14

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	Adapter
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 (Adapter)
16385	Adapter Component 1
⋮	⋮

Class Attributes

Table 16 - 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 Non-Volatile 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

Table 16 - Class Attributes (continued)

Attribute ID	Access Rule	Name	Data Type	Description
19	Set	Language Selected	USINT	0 = Default (HIM prompts at startup) 1 = Language was selected (no prompt)
20	Set	Customer-Generated Firmware	STRING[36]	GUID (Globally Unique Identifier) that identifies customer firmware flashed 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 UDINT UINT UINT UINT USINT USINT USINT USINT USINT USINT[16]	 Rating Code Device Serial Number Customization Code Customization Revision Brand Code Family Code Config Code Language Code Major Revision Minor Revision Customer-Generated Firmware UUID
35	Get	NVS CRC	UDINT	A 32 bit CRC of the Non-Volatile Storage in a device.
38	Set	ADC Configuration Signature	USINT[16]	A value stored by the device. Zeroed if its 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 USINT	 Major Revision Minor Revision
8	Get	Component Serial Number	UDINT	Value between 0x00000000 and 0xFFFFFFFF
9	Get	International Component Name	STRINGN	Name of the component with support for Unicode.

DPI Parameter Object

Class Code

Hexadecimal	Decimal
0x93	147

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

Instances

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

Instances		Device
(Hex.)	(Dec.)	
0x0000…0x3FFF	0…16383	Host Drive
0x4000…0x43FF	16384…17407	Adapter
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 (Adapter)
16385	Adapter Parameter 1 Attributes
⋮	⋮

Class Attributes

Table 17 - Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
0	Get	Number of Instances	UINT	Number of parameters in the device
1	Set	Write Protect Password	UINT	0 = Password disabled n = Password value
2	Set	NVS Command Write	USINT	0 = No Operation 1 = Store values in active memory to NVS 2 = Load values in NVS to active memory 3 = Load default values to active memory 4 = Partial defaults 5 = System defaults
3	Get	NVS Parameter Value Checksum	UINT	Checksum of all parameter values in a user set in NVS
4	Get	NVS Link Value Checksum	UINT	Checksum of parameter links in a user set in NVS
5	Get	First Accessible Parameter	UINT	First parameter available if parameters are protected by passwords. A '0' indicates that all parameters are protected.

Table 17 - Class Attributes (continued)

Attribute ID	Access Rule	Name	Data Type	Description
7	Get	Class Revision	UINT	2 = DPI
8	Get	First Parameter Processing Error	UINT	The first parameter that has been written with a value outside of its range. A '0' indicates no errors.
9	Set	Link Command	USINT	0 = No Operation 1 = Clear All Parameter Links, does not clear links to function blocks.

Instance Attributes

Table 18 - Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Description
6	Get	DPI Offline Read Full	STRUCT of:	
			BOOL[32]	Descriptor
			CONTAINER	Offline minimum value
			CONTAINER	Offline maximum value
			CONTAINER	Offline Default value
			STRING[16]	Parameter name
			STRING[4]	Offline parameter units
			UINT	Online minimum parameter instance
			UINT	Online maximum parameter instance
			UINT	Online default parameter instance
			UINT	Multiplier parameter instance
			UINT	Divisor parameter instance
			UINT	Base parameter instance
			UINT	Offset parameter instance
			USINT	Formula number
			USINT	Pad byte (always zero)
			UINT	Help instance
			UINT	Pad word (always a value of zero)
			CONTAINER	Parameter value
			UINT	Multiplier
			UNIT	Divisor
			UNIT	Base
			INT	Offset
7	Get	DPI Online Read Full	STRUCT of:	
			BOOL[32]	Descriptor (see page 173)
			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 173)
9	Get/Set	DPI Parameter Value	Various	Parameter value in NVS. (3)

Table 18 - Instance Attributes (continued)

Attribute ID	Access Rule	Name	Data Type	Description
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] CONTAINER CONTAINER CONTAINER CONTAINER STRING[16] STRING[4]	 Descriptor (see page 173) 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 18 - 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 174)
22	Get	International DPI Offline Read Full	Struct of:	
			BOOL	Descriptor
			CONTAINER	Offline minimum value
			CONTAINER	Offline maximum value
			CONTAINER	Offline default value
			UINT	Online minimum parameter instance
			UINT	Online maximum parameter instance
			UINT	Online default parameter instance
			UINT	Multiplier parameter instance
			UINT	Divisor parameter instance
			UINT	Base parameter instance
			UINT	Offset parameter instance
			USINT	Formula number
			USINT	Pad word (always zero)
			UINT	Help instance
			UINT	Pad word (always a value of zero)
			CONTAINER	Parameter value
			UINT	Multiplier
			UINT	Divisor
			UINT	Base
			INT	Offset
			BOOL[32]	Extended DPI descriptor
			STRINGN	International DPI parameter name
			STRINGN	International DPI offline parameter units

(1) A CONTAINER is a 32 bit block of data that contains the data type used by a parameter value. If signed, the value is sign that is extended. Padding is used in the CONTAINER to maintain that it is 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 175.

(3) Do NOT continually write parameter data to NVS. See the attention on page 111.

Descriptor Attributes

Bit	Name	Description
0	Data Type (Bit 1)	Right bit is least significant bit (0). 000 = USINT used as an array of Boolean 001 = UINT used as an array of Boolean 010 = USINT (8 bit integer) 011 = UINT (16 bit integer) 100 = UDINT (32 bit integer) 101 = TCHAR ((8 bit (not Unicode) or 16 bits (Unicode)) 110 = REAL (32 bit floating point value) 111 = Use bits 16, 17, 18
1	Data Type (Bit 2)	
2	Data Type (Bit 3)	
3	Sign Type	0 = unsigned 1 = signed
4	Hidden	0 = visible 1 = hidden
5	Not a Link Sink	0 = 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. 0000 = 0 1111 = 15
13	Decimal Place (Bit 1)	
14	Decimal Place (Bit 2)	
15	Decimal Place (Bit 3)	
16	Extended Data Type (Bit 4)	Bit 16 is the least significant bit. 000 = Reserved 001 = UDINT used as an array of Boolean 010 = Reserved 011 = Reserved 100 = Reserved 101 = Reserved 110 = Reserved 111 = Reserved
17	Extended Data Type (Bit 5)	
18	Extended Data Type (Bit 6)	
19	Parameter Exists	Used to mark parameters that are not available to network tools.
20	Not Used	Reserved
21	Formula Links	Indicates that the Formula Data is derived from other parameters.
22	Access Level (Bit 1)	A 3 bit field that is used to control access to parameter data.
23	Access Level (Bit 2)	
24	Access Level (Bit 3)	
25	Writable ENUM	ENUM text: 0 = Read Only, 1 = Read/Write
26	Not a Link Source	0 = 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 must always be included in uploads and downloads.

Extended Descriptor Attributes

Table 19 - Extended Descriptor Attributes

Bit	Name	Description
0	Indirect Mode	0 = Analog (selects entire parameters) 1 = Digital (selects individual bits within parameters)
1	Indirect Type 0	Analog input list (Instance 0xFFFF)
2	Indirect Type 1	Digital input list (Instance 0xFFFE)
3	Indirect Type 2	Feedback list (Instance 0xFFFD)
4	Indirect Type 3	Analog output list (Instance 0xFFFC)
5	Indirect Type 4	Digital output list (Instance 0xFFFB)
6	Indirect Type 5	Undefined (Instance 0xFFFA)
7	Indirect Type 6	Undefined (Instance 0xFFF9)
8	Indirect Type 7	Undefined (Instance 0xFFF8)
9	Indirect Type 8	Undefined (Instance 0xFFF7)
10	Indirect Type 9	Undefined (Instance 0xFFF6)
11	Indirect Type 10	Undefined (Instance 0xFFF5)
12	Indirect Type 11	Undefined (Instance 0xFFF4)
13	Indirect Type 12	Undefined (Instance 0xFFF3)
14	Indirect Type 13	Undefined (Instance 0xFFF2)
15	Indirect Type 14	Parameter-specific list
16	FP Max Decimals Bit 0	These 4 bits are used on REAL parameters only. They indicate the maximum number of decimal places to be displayed for small values. A value of 0 indicates that there is no limit to the number of decimal places used.
17	FP Max Decimals Bit 1	
18	FP Max Decimals Bit 2	
19	FP Max Decimals Bit 1	
20	Extended Parameter Reference	0 = Not an Extended Parameter Reference. 1 = Extended Parameter Reference. An Extended Parameter Reference contains a reference to another parameter. The value is formatted the same as an analog-mode Indirect Selector parameter SSpppp. Where SS = slot number of device to which this Extended Parameter Reference is pointing. And pppp = number of the parameter or diagnostic item to which this Extended Parameter Reference is pointed. 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, to indicate 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 you to enter a value of zero.
24	Datalink Out	This bit is used by offline tools and indicates a Datalink Out parameter. Bit 20 must also be set.
25	Datalink In	This bit is used by offline tools and indicate a Datalink In parameter. Bits 20 and 22 must also be set.
26	Not Writable While IO Active	This parameter cannot be written if the I/O data being exchanged between the Host and the peripheral is valid.
27	Command Parameter	This parameter commands the drive to do an action, such as 'Reset Defaults' or 'Autotune', and then returns to a value of zero. Offline software tools does 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. Command parameters cannot have values that do not return to zero.

Table 19 - Extended Descriptor Attributes (continued)

Bit	Name	Description
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 writes (zero when reading)

The response data appears in the following format:

Name	Data Type	Description
Parameter Number	UDINT	Parameter can 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. Adapters 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	Adapter
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 (Adapter)
16385	Most Recent Adapter 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 adapters, 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. Adapters do not support this object.

Services

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

Instances

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

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

Only host devices can have alarms.

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

Class Attributes

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

Instance Attributes

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

DPI Diagnostic Object

Class Code

Hexadecimal	Decimal
0x99	153

Services

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

Instances

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

Instances		Device
(Hex.)	(Dec.)	
0x0000…0x3FFF	0…16383	Host Drive
0x4000…0x43FF	16384…17407	Adapter
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 (Adapter)
16385	Adapter 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 173)
			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 that is extended. Padding is used in the CONTAINER to ensure 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 175.

DPI Time Object

Class Code

Hexadecimal	Decimal
0x9B	155

Services

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

Instances

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

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

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

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Description
1	Get	Class Revision	UINT	Revision of object
2	Get	Number of Instances	UINT	Number of timers in the object, excluding the real-time clock that is predefined.
3	Get	First Device Specific Timer	UINT	Instance of the first timer that is not predefined.
4	Set	Time Command Write	USINT	0 = No Operation 1 = Clear all timers (Does not clear real-time clock or read-only timers)
5	Get	Number of Supported Time Zones	UINT	Number of time zones described in the Time Zone List attribute.
6	Get	Time Zone List	STRUCT	Identifies a time zone.
7	Get/Set	Active Time Zone ID	UINT	The ID field of the Time Zone List structure for the desired time zone.
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	Adapter
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 (Adapter)
16385	Adapter Parameter 1 Attributes
16386	Adapter Parameter 2 Attributes
⋮	⋮
17408	Class Attributes (HIM)
17409	HIM Parameter 1 Attributes
17410	HIM Parameter 2 Attributes
⋮	⋮

Class Attributes

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

Instance Attributes

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 188)
			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 188)
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 188)
			CONTAINER	Parameter value
			CONTAINER	Minimum value
			CONTAINER	Maximum value
			CONTAINER	Default value
			STRING[16]	Parameter name
			STRING[4]	Units (for example, Amps, Hz)
14	Get	DPI Parameter Name	STRING[16]	Parameter name
15	Get	DPI Parameter Alias	STRING[16]	Customer supplied parameter name.

Attribute ID	Access Rule	Name	Data Type	Description
16	Get	Parameter Processing Error	USINT	0 = No error 1 = Value is less than the minimum 2 = Value is greater than the maximum
18	Get	International DPI Offline Parameter Text	Struct of: STRINGN STRINGN	 International parameter name International offline units
19	Get	International DPI Online Parameter Text	Struct of: STRINGN STRINGN	 International parameter name International online units
20	Get	International DPI Online Read Full	Struct of: BOOL[32] CONTAINER CONTAINER CONTAINER CONTAINER UINT UINT UINT UINT UINT INT USINT[3] USINT BOOL[32] STRINGN STRINGN	 Descriptor Parameter value Online minimum value Online maximum value Online default value Next Previous Multiplier Divisor Base Offset Link Pad word (always zero) Extended descriptor International parameter name International online parameter units
21	Get	DPI Extended Descriptor	UDINT	Extended Descriptor (see page 189)
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 ensure
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 190.

(3) Do NOT continually write parameter data to NVS. See the attention on page 111.

Descriptor Attributes

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

Extended Descriptor Attributes

Bit	Name	Description
0	Indirect Mode	0 = Analog (selects entire parameters) 1 = Digital (selects individual bits within parameters)
1	Indirect Type 0	Analog input list (Instance 0xFFFF)
2	Indirect Type 1	Digital input list (Instance 0xFFFE)
3	Indirect Type 2	Feedback list (Instance 0xFFFD)
4	Indirect Type 3	Analog output list (Instance 0xFFFC)
5	Indirect Type 4	Digital output list (Instance 0xFFFB)
6	Indirect Type 5	Undefined (Instance 0xFFFA)
7	Indirect Type 6	Undefined (Instance 0xFFF9)
8	Indirect Type 7	Undefined (Instance 0xFFF8)
9	Indirect Type 8	Undefined (Instance 0xFFF7)
10	Indirect Type 9	Undefined (Instance 0xFFF6)
11	Indirect Type 10	Undefined (Instance 0xFFF5)
12	Indirect Type 11	Undefined (Instance 0xFFF4)
13	Indirect Type 12	Undefined (Instance 0xFFF3)
14	Indirect Type 13	Undefined (Instance 0xFFF2)
15	Indirect Type 14	Parameter-specific list
16	FP Max Decimals Bit 0	These 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 that there is no limit to the number of decimal places used.
17	FP Max Decimals Bit 1	
18	FP Max Decimals Bit 2	
19	FP Max Decimals Bit 1	
20	Extended Parameter Reference	0 = Not an Extended Parameter Reference 1 = Extended Parameter Reference An Extended Parameter Reference contains a reference to another parameter. The value is formatted the same as an analog-mode Indirect Selector parameter SSpppp. Where SS = slot number of device to which this Extended Parameter Reference is pointing. And pppp = number of the parameter or diagnostic item to which this Extended Parameter Reference is pointed. 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, indicating that a value of zero is allowed. The device must support the 'Zero Text' parameter attribute so that a software tool or HIM can obtain text from the Zero Text parameter attribute. If this bit is set (indicating that a value of zero is disallowed), a software tool or HIM does not allow you to enter a value of zero.
24	Datalink Out	This bit is used by offline tools and indicates a Datalink Out parameter. Bit 20 must also be set.
25	Datalink In	This bit is used by offline tools and indicates a Datalink In parameter. Bits 20 and 22 must also be set.
26	Not Writable While IO Active	This parameter cannot be written if the I/O data being exchanged between the Host and the peripheral is valid.
27	Command Parameter	This parameter commands the drive to complete and action, 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. Command parameters cannot have values that do not return to zero.

Bit	Name	Description
28	Current Value Is Default	This bit identifies a parameter that 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 writes (zero when reading)

The response data appears in the following format:

Name	Data Type	Description
Parameter Number	UDINT	Parameter to 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 bit 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	0 = Not configured 1 = Valid configuration 2…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 (not supported) 3 = DHCP-DNS Update (not supported) 4 = Configuration Settable (able to set the network configuration via TCP/IP object) 5…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 (not supported) 3…15 = Reserved 4 = DNS Enabled (resolves host names by query to DNS server) 5…31 = Reserved

Attribute ID	Access Rule	Name	Data Type	Description
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	 Adapter IP address Adapter subnet mask Adapter gateway address Primary name server Secondary name server Default domain name
6	Get	Host Name	STRING	Host name when using DHCP (not supported)

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

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	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.

Attribute ID	Access Rule	Name	Data Type	Description
4	Get	Interface Counters	STRUCT of:	
			UDINT	Octets received
			UDINT	Unicast packets received
			UDINT	Non-unicast packets received
			UDINT	Inbound packets received but discarded
			UDINT	Inbound packets with errors (not discarded)
			UDINT	Inbound packets with unknown protocol
			UDINT	Octets sent
			UDINT	Unicast packets sent
			UDINT	Non-unicast packets sent
			UDINT	Outbound packets discarded
			UDINT	Outbound packets with errors
5	Get	Media Counters	STRUCT of:	RX = Received, TX = Transmitted
			UDINT	RX frames not having integral number of octets long
			UDINT	RX frames not passing FCS check
			UDINT	TX frames having one collision
			UDINT	TX frames having multiple collisions
			UDINT	Number of times of SQE test error message
			UDINT	TX Frames delayed first attempt by busy medium
			UDINT	Collisions detected later than 512 bit-times in trans.
			UDINT	TX frames failing due to excessive collisions
			UDINT	TX frames failing due to intern MAC sublayer TX error
			UDINT	Times of carrier sense condition loss during trans
			UDINT	RX frames exceeding the maximum frame size
			UDINT	RX frames failing due to intern MAC sublayer RX error

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.

Logic Command Word

Table 20 - Logic Command Word

Logic Bit	Command	Description
0	Normal Stop	0 = Not Normal Stop 1 = Normal Stop
1	Start (1)	0 = Not Start 1 = Start
2	Jog 1 (2)	0 = Not Jog 1 (Par. 556) 1 = Jog 1
3	Clear Fault (3)	0 = Not Clear Fault 1 = Clear Fault
4	Unipolar Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
5	Unipolar Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
6	Manual	0 = Not Manual 1 = Manual
7	Reserved	
8	Accel Time	00 = No Command 01 = Use Accel Time 1 (Par. 535) 10 = Use Accel Time 2 (Par. 536) 11 = Use Present Time
9	Accel Time	00 = No Command 01 = Use Accel Time 1 (Par. 535) 10 = Use Accel Time 2 (Par. 536) 11 = Use Present Time
10	Decel Time	00 = No Command 01 = Use Decel Time 1 (Par. 537) 10 = Use Decel Time 2 (Par. 538) 11 = Use Present Time
11	Decel Time	00 = No Command 01 = Use Decel Time 1 (Par. 537) 10 = Use Decel Time 2 (Par. 538) 11 = Use Present Time

Table 20 - Logic Command Word (continued)

Logic Bit	Command	Description
12	Ref Select 1	000 = No Command 001 = Ref A Select (Par. 545) 010 = Ref B Select (Par. 550) 011 = Preset 3 (Par. 573) 100 = Preset 4 (Par. 574) 101 = Preset 5 (Par. 575) 110 = Preset 6 (Par. 576) 111 = Preset 7 (Par. 577)
13	Ref Select 2	
14	Ref Select 3	
15	Reserved	
16	Coast Stop	0 = Not Coast to Stop 1 = Coast to Stop
17	Current Limit Stop	0 = Not Current Limit Stop 1 = Current Limit Stop
18	Run (4)	0 = Not Run 1 = Run
19	Jog 2 (2)	0 = Not Jog 2 (Par. 557) 1 = Jog 2
20…31	Reserved	

(1) A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Start condition starts the drive.
(2) A Not Stop condition (logic bit 0 = 0) must first be present before a 1 = Jog 1/Jog 2 condition jogs the drive. A transition to a '0' stops the drive.
(3) To perform this Xcommand, 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 21 - Logic Status Word

Logic Bit	Command	Description
0	Run Ready	0 = Not Ready to Run 1 = Ready to Run
1	Active	0 = Not Active 1 = Active
2	Command Direction	0 = Reverse 1 = Forward
3	Actual Direction	0 = Reverse 1 = Forward
4	Accelerating	0 = Not Accelerating 1 = Accelerating
5	Decelerating	0 = Not Decelerating 1 = Decelerating
6	Alarm	0 = No Alarm (Par. 959 and 960) 1 = Alarm
7	Fault	0 = No Fault (Par. 952 and 953) 1 = Fault
8	At Setpt Spd	0 = Not at Setpoint Speed 1 = At Setpoint Speed
9	Manual	0 = Manual ode Not Active 1 = Manual Mode Active

Table 21 - Logic Status Word (continued)

Logic Bit	Command	Description
10	Spd Ref ID 0	00000 = Reserved 00001 = Auto Ref A (Par. 545) 00010 = Auto Ref B (Par. 550) 00011 = Auto Preset Speed 3 (Par. 573) 00100 = Auto Preset Speed 4 (Par. 574) 00101 = Auto Preset Speed 5 (Par. 575) 00110 = Auto Preset Speed 6 (Par. 576) 00111 = Auto Preset Speed 7 (Par. 577) 01000 = Reserved 01001 = Reserved 01010 = Reserved 01011 = Reserved 01100 = Reserved 01101 = Reserved 01110 = Reserved 01111 = Reserved 10000 = Man Port 0 10001 = Man Port 1 10010 = Man Port 2 10011 = Man Port 3 10100 = Man Port 4 10101 = Man Port 5 10110 = Man Port 6 10111 = Reserved 11000 = Reserved 11001 = Reserved 11010 = Reserved 11011 = Reserved 11100 = Reserved 11101 = Man Port 13 (embedded ENET) 11110 = Man Port 14 (Drive Logix) 11111 = Alternate Man Ref Sel
11	Spd Ref ID 0	
12	Spd Ref ID 0	
13	Spd Ref ID 0	
14	Spd Ref ID 0	
15	Reserved	
16	Running	0 = Not Running 1 = Running
17	Jogging	0 = Not Jogging (Par. 556 and 557) 1 = Jogging
18	Stopping	0 = Not Stopping 1 = Stopping
19	DC Brake	0 = Not DC Brake 1 = DC Brake
20	DB Active	0 = Not Dynamic Brake Active 1 = Dynamic Brake Active
21	Speed Mode	0 = Not Speed Mode (Par. 309) 1 = Speed Mode
22	Position Mode	0 = Not Position Mode (Par. 309) 1 = Position Mode
23	Torque Mode	0 = Not Torque Mode (Par. 309) 1 = Torque Mode
24	At Zero Speed	0 = Not at Zero Speed 1 =At Zero Speed
25	At Home	0 = Not at Home 1 = At Home
26	At Limit	0 = Not at Limit 1 = At Limit

Table 21 - Logic Status Word (continued)

Logic Bit	Command	Description
27	Current Limit	0 = Not at Current Limit 1 = At Current Limit
28	Bus Freq Reg	0 = Not Bus Freq Reg 1 = Bus Freq Reg
29	Enable On	0 = Not Enable On 1 = Enable On
30	Motor Overload	0 = Not Motor Overload 1 = Motor Overload
31	Regen	0 = Not Regen 1= Regen

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

Adapter Devices such as drives, controllers, and computers usually require a network communication adapter to provide a communication interface between them and a network such as EtherNet/IP. An adapter reads data on the network and transmits it to the connected device. It also reads data in the device and transmits it to the network.

The embedded EtherNet/IP adapter connects its PowerFlex® 755 drive to an EtherNet/IP network. Adapters are sometimes also called 'cards', 'embedded communication options', 'gateways', 'modules', or 'peripherals'.

Adapter Parameter A configuration parameter for the embedded Ethernet adapter. These appear as host parameters on port 13.

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 version 4.001 or later) and its associated peripherals.

BOOTP (Bootstrap Protocol) BOOTP lets the adapter configure itself dynamically at restart if the network has a BOOTP server. The BOOTP server assigns the adapter a preconfigured IP address, a subnet mask, and a gateway address; therefore, you do not have to configure these with the parameters in the adapter. BOOTP can make it easier to administer an Ethernet network. A **free version** of the Rockwell Software® BOOTP 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 communications 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 MSG instruction (configuration, data collection, and diagnostics).

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

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

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 adapter 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 enabled, 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 Parameter A type of configuration parameter for the drive, an option card, or a DPI peripheral device such as a HIM, where the parameter and its operation are managed by the device itself. Examples include network address and speed settings for communication option cards.

Embedded Ethernet adapter only: The embedded Ethernet adapter has host parameters (see separate definition) and no device parameters. However, the embedded Ethernet adapter can be used to access device parameters in the drive and other option cards.

DHCP (Dynamic Host Configuration Protocol) DHCP lets the adapter configure itself dynamically at restart if the network has a DHCP server. The DHCP server assigns the adapter a preconfigured IP address, a subnet mask, and a gateway address; therefore, you do not have to configure these with the parameters in the adapter. 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.

Duplex Duplex describes the mode of communication. 'Full-duplex' communications let a device exchange data in both directions simultaneously. 'Half-duplex' communications let a device exchange data only in one direction at a time. The duplex that is used by the adapter depends on the type of duplex that other network devices, such as switches, support.

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 communications, 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 adapter and connected drive act when a communication fault (for example, a disconnected cable) occurs or when the controller is switched out of run mode. The former uses a communication fault action, and the latter uses an idle fault action.

Fault Configuration When communication is disrupted (for example, a cable is disconnected), the adapter and its PowerFlex 750-Series drive can respond with a user-defined fault configuration. The user sets the data that is sent to the drive by using specific fault configuration parameters in the adapter. When a fault action parameter is set to use the fault configuration data and a fault occurs, the data from these parameters is sent as the Logic Command, Reference, and/or Datalinks.

Gateway A device on a network that connects an individual network to a system of networks. When a node must communicate with a node on another network, a gateway transfers the data between the two networks. You must configure the address for the gateway device in the adapter if you want the adapter 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 from 0 to 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 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 adapter and its PowerFlex drive can respond by holding last. Hold last results in the drive that is receiving the last data received via the network connection before the disruption. If the drive was running and was using the Reference from the adapter, it continues to run at the same Reference.

Host Parameter A type of configuration parameter for a physical or embedded option card where the parameter and its operation are managed by the drive firmware. These are used on option cards where a set of cards require common behavior, and on ports that do not correspond to a physical option card. Examples include communication fault action settings for communication option cards, and settings for embedded ports such as DeviceLogix.

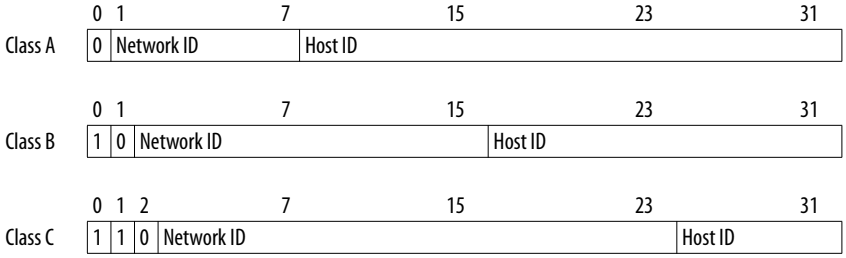
Idle Action An idle action determines how the adapter and connected drive act when the controller is switched out of run mode.

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 adapter. Input is produced by the adapter 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.



The number of devices on your EtherNet/IP network 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 that is 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 adapter by using its rotary address switches, a DHCP server, or by manually configuring the parameters in the adapter. The adapter reads the values of these parameters only at power-up.

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 adapter 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 adapter to the network. The definitions of the bits in this word are shown in Appendix D.

Master-Slave Hierarchy An adapter 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 connected to EtherNet/IP adapters) are slave devices.

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

NVS (Nonvolatile Storage) NVS is the permanent memory of a device. Devices such as the adapter and drive store parameters and other information in NVS so that they are not lost when the device loses power. NVS is sometimes called 'EEPROM'.

PCCC (Programmable Controller Communication Command) PCCC is the protocol that is used by some controllers to communicate with devices on a network. Some software products (for example, DriveExplorer software and DriveExecutive software) also use PCCC to communicate.

Peer-to-Peer Hierarchy An adapter 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 configured 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 adapter to transmit data and one or more adapters to receive the data.

Ping A message that is sent on the network to determine if a node exists.

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

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

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

Stop Action When communication is disrupted (for example, a cable is disconnected), the adapter 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 adapter, it will stay running but at zero Reference.

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 can 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 by using IP. UDP provides a simple, but fast capability to send I/O messaging packets between devices. This protocol ensures that adapters 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 display them in human readable format).

Update The process of updating firmware in a device. The adapter can be updated using various Allen-Bradley software tools. See Updating the Adapter Firmware on page 49 for more information.

Zero Data When communication is disrupted (for example, a cable is disconnected), the adapter and drive can respond with zero data. Zero data results in the drive receiving zero as values for Logic Command, Reference, and Datalink data. If the drive was running and by using the Reference from the adapter, it stays running but at zero Reference.

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Rockwell Automation Support

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page

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