FLEX I/O Isolated Input/Output HART Analog Modules

Catalog Numbers 1794-IF8IH, 1794-OF8IH, 1794-IF8IHNFXT

Allen-Bradley
by ROCKWELL AUTOMATION

User Manual

Original Instructions

Important User Information

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Rockwell Automation recognizes that some of the terms that are currently used in our industry and in this publication are not in alignment with the movement toward inclusive language in technology. We are proactively collaborating with industry peers to find alternatives to such terms and making changes to our products and content. Please excuse the use of such terms in our content while we implement these changes.

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About This Publication

This manual describes how to use FLEX™ I/O Highway Addressable Remote Transducer (HART) analog modules with ControlNet® and EtherNet/IP™ network products. It also helps you install, program, and troubleshoot your module. Make sure that you are familiar with the following:

- Able to program and operate ControlNet and EtherNet/IP network products
- Use of various software applications from Rockwell Automation

In this manual, 1794-IF8IH and 1794-IF8IHNFXT modules are referred as input modules and 1794-OF8IH module is referred as output module.

Download Firmware, AOP, EDS, and Other Files

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

Studio 5000 Logix Designer Application

The Studio 5000 Logix Designer® application is the rebranding of RSLogix 5000® software version 11 or later and will continue to be the product to program Logix 5000® controllers for discrete, process, batch, motion, safety, and drive-based solutions.

Summary of Changes

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

Topic	Page
Updated template	Throughout
Added rebranding statement for RSLogix 5000 software	5
Added Inclusive Language acknowledgment	2
Updated Additional Resources	5
Updated topic Mount the Terminal Base Unit on a Panel or Wall	19
Updated wiring procedure for 1794-OF8IH module	24
Updated General Tab Field Descriptions table	62

Additional Resources

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

Additional Resources

Resource	Description
FLEX I/O and FLEX I/O-XT Selection Guide, publication 1794-SG002	Provides guidance on how to select the FLEX I/O and FLEX I/O-XT™ modules and its accessories.
FLEX I/O DeviceNet Adapter Modules Installation Instructions, publication 1794-IN099	Describes how to install and wire a FLEX I/O DeviceNet® adapter.
FLEX I/O EtherNet/IP Adapters Installation Instructions, publication 1794-IN082	Describes how to install and wire the FLEX I/O EtherNet/IP adapters.
FLEX I/O Isolated Input HART Analog Module Installation Instructions, publication 1794-IN115	Provides information on wiring and installation of FLEX I/O isolated input HART analog module.
FLEX I/O Isolated Output HART Analog Module Installation Instructions, publication 1794-IN120	Provides information on wiring and installation of FLEX I/O isolated output HART analog module.
FLEX I/O-XT 8-Input Channel Isolated HART Analog Module Installation Instructions, publication 1794-IN134	Provides information on wiring and installation of FLEX I/O-XT isolated input HART analog module.
ControlNet Network Configuration User Manual, publication CNET-UM001	Describes how you can use ControlNet communication modules with your Logix 5000 controller.
EtherNet/IP Network Devices User Manual, publication ENET-UM006	Describes how to configure and use EtherNet/IP devices to communicate on the EtherNet/IP network.
Ethernet Reference Manual, publication ENET-RM002	Describes basic Ethernet concepts, infrastructure components, and infrastructure features.
Industrial Automation Wiring and Grounding Guidelines, publication 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.

Notes:

Overview of FLEX I/O HART Analog Modules

This chapter describes the FLEX I/O HART analog modules and what you must know and do before you begin to use them.

IMPORTANT	To use all features of the HART analog modules, you must use the one of the following adapters with correct firmware revision: • ControlNet adapter (1794-ACN15 or 1794-ACNR15) with firmware revision 5.001 or later • EtherNet/IP adapter (1794-AENT) with firmware revision 4.002 or later • EtherNet/IP adapter (1794-AENTR) with firmware revision 1.011 or later For more information about how to use and configure the ControlNet adapter (1794-ACN15 or 1794-ACNR15), see ControlNet Network Configuration User Manual, publication CNET-UM001.

IMPORTANT	The Studio 5000 Logix Designer application version 24 or later includes a full profile for the 1794-IF8IHNFXT module. You cannot use the 1794-IF8IH profile to configure the 1794-IF8IHNFXT module. See Use the 1794-IF8IHNFXT Module with the Generic and Thin Profiles on page 103 if you are using Studio 5000 Logix Designer application version 23 or earlier.

FLEX I/O HART Analog Modules

FLEX I/O HART input and output analog modules must be used in a ControlNet or EtherNet/IP network.

The 1794-IF8IH module accepts up to eight analog inputs. The inputs are isolated and accept the current range 0…20 mA or 4…20 mA. The default input range is 0…20 mA. The inputs have both fixed hardware filters and selectable firmware digital filters.

The 1794-IF8IHNFXT module:

- Supports current range 0…20 mA and 4…20 mA, with a default input current range of 0…20 mA.
- Has seven selectable input filters and seven input data formats.
- Supports loop alarm, which detects gross signal errors such as open and short circuit.
- Has programmable alarms such as high, low, remote high high, and remote low low.
- Has a HART modem per channel. It is compliant with HART versions 5, 6, and 7 except for multi-drop support.

The 1794-OF8IH module provides eight analog outputs. The outputs are isolated and provide the current range 0…20 mA or 4…20 mA. The default output range is 0…20 mA.

Each module offers:

- Full functionality without switches or jumpers
- Multiple data ranges that can be independently programmed for each channel
- Lead breakage detection
- Overrange/Underrange alarms
- Remote transmitter alarm

Communicate with Programmable Controllers

The data connections are established between a FLEX I/O module and an Allen-Bradley® programmable controller (PLC) to transfer information between the two at a scheduled rate.

The input module information is automatically made available in the PLC data table through the data connection. The output data information, which is determined by the PLC program, is also automatically transferred from the PLC data table to the output module through the data connection.

In addition, when the data connection is originally established, the configuration information for the module is automatically transferred to it through the network.

Events After Powerup

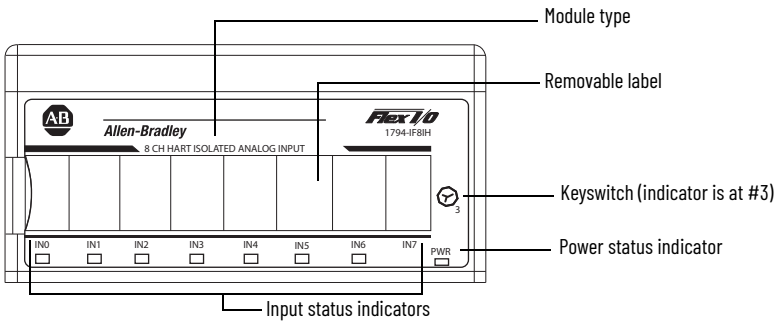
You must apply +24V DC power to your FLEX I/O analog modules. The following sequence of events occurs after power is applied to your module:

1. The module status indicator flashes red until a connection is established and a valid configuration is passed to the module.
2. Following the diagnostic check, the module implements the user-selected configuration settings that are downloaded over the network. For more information on configuration options, see Configurable FLEX I/O Analog Module Features on page 11.
3. Following the module configuration download:
   - The 1794-IF8IH and 1794-IF8IHNFXT modules start to produce the runtime data for the PLC processor.
   - The 1794-OF8IH module applies configuration data to the output channels.
4. If any diagnostics or alarms are generated during normal module operation, the data is returned to the PLC processor.

Physical Features of Your Module

The module label identifies the key-in position, wiring, and module type. Use the removable label to record the individual designations as per your application.

Indicators are provided to identify the input or output fault conditions, and to show when power is applied to the module. For example, the 1794-IF8IH module is shown below.



Use Alarms on the Input Modules

The 1794-IF8IH and 1794-IF8IHNFXT modules are capable for generating the following alarms:

- Low Alarm
- High Alarm
- Remote Fault Alarm
- Local Fault Alarm

These alarm conditions are described in general terms and as they relate to bits on the FLEX I/O module.

Low Alarm

The low alarm notifies you when the module input signal moves below the configured low alarm trigger point. If the input signal falls below 0% (4 mA), a Low Alarm is generated.

High Alarm

The high alarm works converse to the low alarm. This feature notifies you when the input signal exceeds the configured high alarm trigger point. If the input signal exceeds 0% (4 mA), a High Alarm is generated.

Remote Fault Alarm

The remote fault alarm is intended for use with remote transmitter loops.

Consider a remote transmitter measuring the temperature and transmitting it as a standard mA signal. In this loop, although the input module cannot determine the state of the loop on the far side of the transmitter, the remote transmitter can detect issues and alert the input module with a preprogrammed out-of-range (high or low) value.

The Fault Enable bit allows the 1794-IF8IH and 1794-IF8IHNFXT modules to work with transmitters like the one described above.

IMPORTANT	Once the alarm is issued, it remains active as long as the input signal value remains above or below the programmed value.

Use Remote Fault Alarm to Determine High-High or Low-Low Alarm Levels

If you do not have a remote transmitter in your loop, this alarm can also be used to program a high-high or low-low alarm level between the levels, which actuate the overrange or underrange alarms and high or low local fault alarms.

Programming the Remote Fault Alarm

For the remote fault alarm, you must program the threshold in 0.1 mA steps at any level on the high or low end of the input signal range. The remote fault alarm activates if your I/O module receives one of the following input signal values:

- 100.63…111.88% (20.1…21.9 mA) on the high end of the input signal range
- -0.63…-11.88% (3.9…2.1 mA) on the low end of the input signal range

Local Fault Alarm

The local fault alarm notifies you when the loop to the transmitter or field device (if no transmitter is used) is open or shorted.

IMPORTANT	Once the alarm is issued, it remains active as long as the input signal value remains in the programmed range.

The local fault alarm gets activated in one of the following conditions:

- 112.50% (22 mA) or higher on the high end of the input signal range.
  This value indicates a short in the loop.
- -12.50% (2 mA) or lower on the low end of the input signal range.
  This value indicates an open wire condition in the loop.

The remote fault and local fault alarms are issued with the same bit whether the cause is an underrange or overrange. Monitor the overrange and underrange bits in your programming software to determine if the problem is a high current or low current.

Use the HART Capabilities

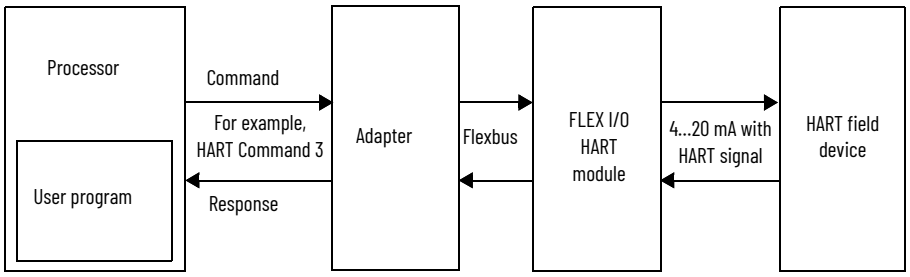
Before you use the HART capabilities, verify that:

- The I/O module and the associated field device are working properly in the analog 4...20 mA mode.
- The I/O module is configured for 4...20 mA current range.
- The field device is HART capable.
- No multiple HART field devices are connected to each channel.
- Input filtering is set to a valid (defined) value.

HART Implementation Overview

The FLEX I/O HART modules act as intelligent HART multiplexers. The module learns which HART devices are attached to its channels and then routes HART messages, as appropriate, between the HART field devices and the Flexbus. Since the HART modules act as intelligent HART multiplexers, the HART commands can be issued to the HART modules themselves.

Communication on the Flexbus occurs between the adapter and the HART module. The adapter converts these messages to the appropriate network format for communication with the controlling processor. The controlling processor gets its command from the user program and stores the responses in its memory.



Configurable FLEX I/O Analog Module Features

Read this chapter to familiarize yourself with configurable features on the input and output analog modules.

The configurable features of 1794-IF8IH and 1794-IF8IHNFXT input modules are as follows:

- Fault Mode
- High Low Error Level
- Input Filter Cutoff
- Data Format

The configurable features of 1794-OF8IH output module are as follows:

- Output Enable
- Module Fault State Mode
- Local Fault Mode
- Data Format
- Global Reset
- Analog Fault State
- Latch Retry Mode
- Fault Alarm

IMPORTANT	You must use the I/O configuration portion of your PLC programming software to select and configure these features for 1794-IF8IH and 1794-OF8IH modules. You must be familiar with the programming software. A brief description of each module feature is provided here. To learn more about the configuration for the 1794-IF8IH and 1794-OF8IH modules, see the following topics: • Configuration on page 25 • Use the 1794-IF8IH Module with the Generic Profile on page 91 • Use the 1794-OF8IH Module with the Generic Profile on page 121

IMPORTANT	Use the Studio 5000 Logix Designer application version 24 or later to configure the 1794-IF8IHNFXT module with full profile. See Edit Your 1794-IF8IHNFXT Module Configuration with Studio 5000 Logix Designer (Full Profile) on page 60 for more information. If you are already using Studio 5000 Logix Designer application version 23 or earlier, see Use the 1794-IF8IHNFXT Module with the Generic and Thin Profiles on page 103 to configure the 1794-IF8IHNFXT module with the generic and thin profiles.

Select Your Analog Input Module Operating Features

All features of 1794-IF8IH and 1794-IF8IHNFXT analog input modules are independently configurable.

IMPORTANT The default selection value for all parameters is 0.

Fault Enable

The input modules can indicate various fault conditions, depending on the input signal value. Use the Fault Enable feature to enable or disable the following alarms:

- Remote Fault Alarm
- Local Fault Alarm

Use your programming software to set the Fault Enable bit to 0 to disable these alarms. Set the bit to 1 to enable them.

IMPORTANT The Fault Enable feature enables or disables the Remote Fault Alarm and Local Fault Alarm. It does not affect the Underrange and Overrange alarms. They are always active.

For more information, see Remote Fault Alarm on page 9 and Local Fault Alarm on page 9.

Sample Filter Frequency Rates

The 1794-IF8IH module has six input filter settings and the 1794-IF8IHNFXT module has seven input filter settings. These filter settings allow you to choose the best rolloff frequency for input channels on your I/O module. When choosing a filter, remember that the time filter selection affects the accuracy of your input signal.

For example, if you choose the highest frequency 470 Hz (filter 0) for the 1794-IF8IH module, signal noise is more likely to affect the reading, but the lowest frequency 4.17 Hz (filter 5) provides the most accurate signal due to incoming noise filtering. We recommend that you use 62 Hz (filter 1) when HART is enabled to get more accurate signals due to incoming noise.

See Table 1 and Table 2 to decide which input filter to use in your FLEX I/O analog application:

Table 1 - Input Filter Frequency for the 1794-IF8IH Module

0	1	2	3	4	5	6	7
470 Hz	62 Hz	19.6 Hz	16.7 Hz	10 Hz	4.17 Hz	N/A	N/A

Table 2 - Input Filter Frequency for the 1794-IF8IHNFNXT Module(1)

0	1	2	3	4	5	6	7
242 Hz	123 Hz	62 Hz	19.6 Hz	16.7 Hz	10 Hz	4.17 Hz	N/A

(1) To configure the input filter frequency and other module features for 1794-IF8IHNFXT module in Studio 5000 Logix Designer application, see 1794-IF8IHNFXT Configuration Data Table on page 27.

Choose the best input filter cutoff in your programming software.

Data Formats

You must choose a module data format in your program. The 1794-IF8IH module has six data formats, and the 1794-IF8IHNFXT module has seven data formats. The default format is 0...20 mA. The data format selected interprets input readings and returns them to the PLC.

See the Data Format (Configuration Words 2, 3 – Bits 0...3, 4...7, 8...11, 12...15) on page 32 for more detailed description of data formats for the 1794-IF8IH and 1794-IF8IHNFXT modules.

To configure data formats and other features of the 1794-IF8IHNFXT module in Studio 5000 Logix Designer application, see 1794-IF8IHNFXT Channel Data Formats on page 33.

Select Your Analog Output Module Operating Features

All features of the 1794-OF8IH analog output module are independently configurable.

IMPORTANT The default selection value for all parameters is 0.

Local Fault Mode

The Local Fault Mode can be programmed to determine how the module responds to the communication faults and internal module faults.

Set the Local Fault Mode bit to 0 to use the analog fault state or digital fault state only if a communication fault occurs. Set the Local Fault Mode bit to 1 to use the analog fault state or digital fault state if any fault occurs.

Analog fault state and digital fault state determines how the module reacts to faults when a channel is used in analog mode or digital mode respectively.

Data Format

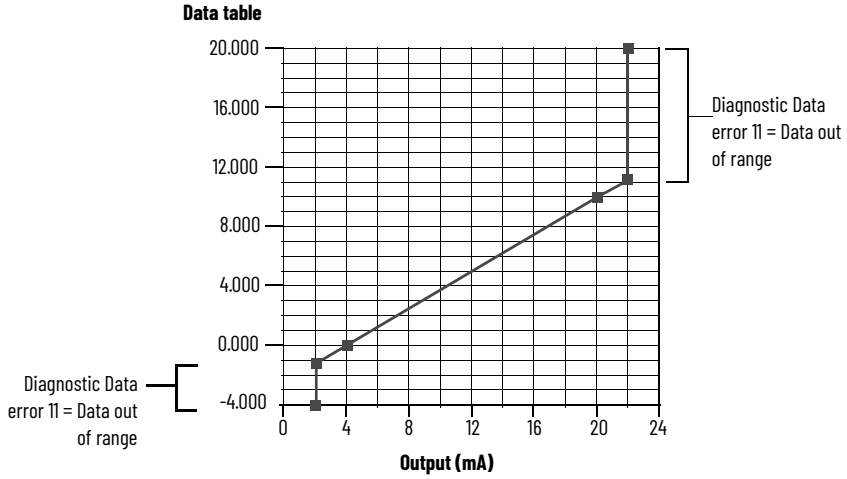
You must choose a module data format in your program. See 1794-OF8IH Data Formats on page 51 for the explanation of each bit. Data Formats 2, 5, 6, 8...13, and 15 are not assigned.

When choosing a data format, remember the following:

- If an unassigned Analog Data Format is selected, the module sets Diagnostic Data to 2 for configuration failure and puts the affected channels in corresponding fault state.
- An unconfigured module channel can be assumed to have the default configuration Analog Data Format 0, 0...20 mA, and Analog Mode Fault State minimum range. If an unassigned format is selected, then the module sets Diagnostic Data to 2 for configuration failure and the module channel goes to the default fault state minimum range.
- If the configuration is changed from the default, then it is changed again to an unassigned format, the module sets Diagnostic Data to 2 for configuration failure, and the module goes to the fault state for the last valid configuration.
- Formats 13 and 14 are 2's complement data formats, and require data to the module in that form
- Range 0...15
- Default: 0
- Data Table Reference: Data format, word 12 and 13, bits 0...3, bits 4...7

If the data sent to the module is out-of-range, the value is clipped and Diagnostic Data is set to 11 (an out-of-range condition).

Example of Analog Format 14 and Data Clipping Performance



For data format tables and a more detailed description of the data formats for the 1794-OF8IH module, see Data Format (Configuration Words 2, 3 — Bits 0...3, 4...7, 8...10, 12...15) on page 50.

Global Reset

The Global Reset works along with the Latch Mode during fault conditions. If Latch Mode is enabled and a fault condition occurs, the channel operating with a fault remains in this condition (with analog or digital fault state implied) until a Global Reset is issued. The Global Reset feature resets all outputs of a particular channel group to accept normal system output data.

The Global Reset feature is an edge triggered signal. Use your programming software to set the Global Reset bit to 1 for normal operation. Resetting of outputs occurs during the 1 to 0 transition.

Latch Mode

The Latch Mode determines channel operation under wire-off or lead-break fault conditions. This feature is available for each channel. The channel detection occurs on a continuous basis. If a fault is detected, the channel fault alarm is set.

If Latch Mode is enabled when a fault occurs, the fault remains latched in its fault state until a Global Reset is issued. If Latch Mode is disabled when a fault occurs, the channel reports a fault until the fault is corrected. The Global Reset is not necessary if Latch Mode is disabled.

When using your programming software, set the Latch Mode bit to 0 to disable the feature. Set the bit to 1 to enable it.

Fault Alarm

The Fault Alarm selects whether the channel fault detection is enabled or disabled. There is a 100 Hz (10 ms) filter for wire-off or lead-break fault detection.

Use your programming software to set the Fault Alarm. Set the Fault Alarm bit to 0 to disable the alarm. Set the bit to 1 to enable wire-off or lead-break fault detection.

Understand Image Table Mapping and Bit/Word Descriptions

All Allen-Bradley FLEX I/O modules have a 16 words table of Real-time Data (RTD) to be transferred between the controller and the I/O module. Not all 16 words must be allocated.

1794-IF8IH Module Analog Data Table

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Channel 0 Input Data															
1	Channel 1 Input Data															
2	Channel 2 Input Data															
3	Channel 3 Input Data															
4	Channel 4 Input Data															
5	Channel 5 Input Data															
6	Channel 6 Input Data															
7	Channel 7 Input Data															
8	H7	H6	H5	H4	H3	H2	H1	H0	L7	L6	L5	L4	L3	L2	L1	L0
9	R7	R6	R5	R4	R3	R2	R1	R0	P7	P6	P5	P4	P3	P2	P1	P0
10	Reserved								Diagnostic Status							

1794-IF8IH Module Analog Data Table (Continued)

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
11	C7	C6	C5	C4	C3	C2	C1	C0	F7	F6	F5	F4	F3	F2	F1	F0
12	X7	X6	X5	X4	X3	X2	X1	X0	Reserved							
Where:	Hn = Channel n High Alarm Ln = Channel n Low Alarm Pn = Channel n Out Of Range Alarm Rn = Channel n Second (Remote) Alarm Fn = Channel n HART Failure Cn = Channel n HART Current Fault Xn = Channel n HART Transmitter Present 0 = False; 1 = True															

1794-IF8IHNFXT Module Analog Data Table

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Channel 0 Input Data															
1	Channel 1 Input Data															
2	Channel 2 Input Data															
3	Channel 3 Input Data															
4	Channel 4 Input Data															
5	Channel 5 Input Data															
6	Channel 6 Input Data															
7	Channel 7 Input Data															
8	H7	H6	H5	H4	H3	H2	H1	H0	L7	L6	L5	L4	L3	L2	L1	L0
9	R7	R6	R5	R4	R3	R2	R1	R0	P7	P6	P5	P4	P3	P2	P1	P0
10[1]	X7	X6	X5	X4	X3	X2	X1	X0	Diagnostic Status							
11	C7	C6	C5	C4	C3	C2	C1	C0	F7	F6	F5	F4	F3	F2	F1	F0
Where:	Hn = Channel n High Alarm Ln = Channel n Low Alarm Pn = Channel n Out Of Range Alarm Rn = Channel n Second (Remote) Alarm Fn = Channel n HART Failure Cn = Channel n HART Current Fault Xn = Channel n HART Transmitter Present 0 = False; 1 = True															

(1) When Xn is set, a device is connected and it has a valid device information Data-Set™ available. This bit clears if the channel is inhibited, the device is removed, or the device is faulted, and cannot be set again until a complete device information set is successfully regathered. Words S:0…S:3 are input data that are classified as Status Words but in Studio 5000 Logix Designer generic profile, these words are shown as tags I:8…I:11.

1794-IF8IHNFXT Module Output Analog Data Table

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	R	R	R	R	R	R	R	R	HO7	HO6	HO5	HO4	HO3	HO2	HO1	HO0
Where:	HOn = Channel n HART Off Dynamic Control bit R = Reserved 0 = False; 1 = True															

Notes:

Install Your FLEX I/O Analog Modules

Read this chapter to install the input and output analog modules.

Before You Install Your Analog Module

WARNING: When used in a Class I Division 2, hazardous location, this equipment must be mounted in a suitable enclosure with proper wiring method that complies with the governing electrical codes.

Before installing your FLEX I/O analog module:

- Verify that you install the module in a suitable enclosure when used in a Class I Division 2, hazardous location.
- Set the keyswitch position on the terminal base as per Table 3.

Table 3 - Keyswitch Position

Module	Keyswitch Position
1794-IF8IH and 1794-IF8IHNFXT	3
1794-OF8IH	4

ATTENTION: FLEX I/O HART analog modules do not receive primary operational power from the backplane. +V and -V DC power must be applied to your module before operation. If power is not applied, the module position in your chassis appears as an empty slot to the adapter.

Removal and Insertion Under Power

WARNING: FLEX I/O HART analog modules support Removal and Insertion Under Power (RIUP). You can remove and insert them under power. However, take special care when removing or inserting these modules in an active process. An I/O attached to any module being removed or inserted can change states due to its input/output signal changing conditions.

WARNING: If you insert or remove the terminal base while backplane power is on, an electric arc can occur. This could cause an explosion in hazardous location installations.

WARNING: Verify that power is removed or the area is nonhazardous before proceeding.

Install the Module

To install the module, proceed as follows:

- Mount the terminal base unit.
- Install the analog I/O module into the terminal base unit
- Wire the terminal base unit.

If you are installing your module into a terminal base unit that is already installed, proceed to Mount the Analog Module on the Terminal Base Unit on page 19.

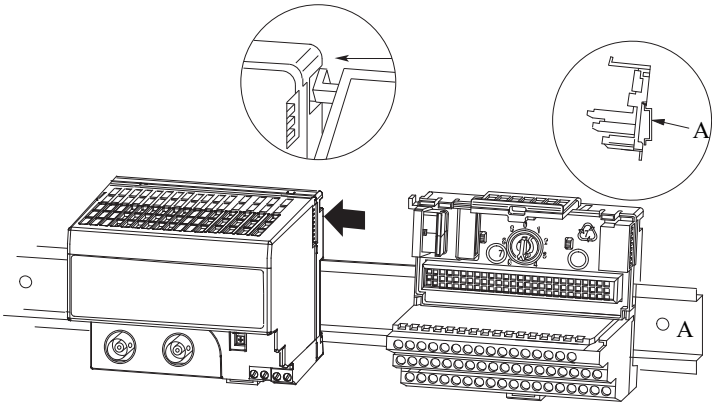
ATTENTION: Do not use the unused terminals on the terminal base unit. When you use these terminals as supporting terminals, it can result in damage to modules and/or unintended operation of your system.

Mount the Terminal Base Unit

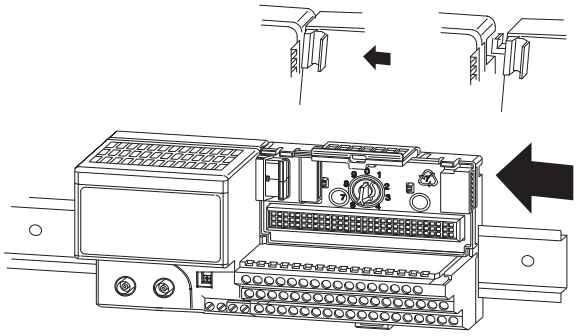
Mount the Terminal Base Unit on a DIN Rail

ATTENTION: Do not remove or replace a terminal base unit when power is applied. Interruption of the Flexbus can result in unintended operation or machine motion.

1. Remove the cover plug in the male connector of the unit to which you are connecting this terminal base unit.
2. Make sure that the 16 pins in the male connector on the adjacent device are straight and in line, so that the mating female connector on this terminal base unit can mate correctly.
3. Verify that the female Flexbus connector is **fully retracted** into the terminal base unit.
4. Position the terminal base at a slight angle and hooked over the top of the 35 x 7.5 mm DIN rail A (Allen-Bradley part number 199-DR1).



5. Slide the terminal base over tight against the adapter or proceeding terminal base. Make sure that the hook on the terminal base slides under the edge of the adapter or proceeding terminal base and the Flexbus connector is fully retracted.

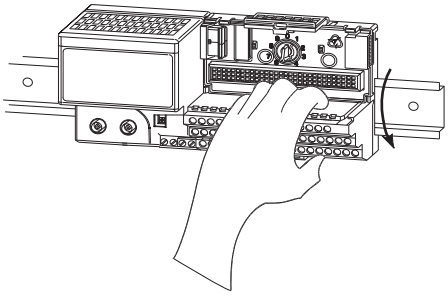


ATTENTION: Do not force the terminal base into the adjacent modules. Forcing the units together can bend or break the hook and allow the units to separate and break communication over the backplane.

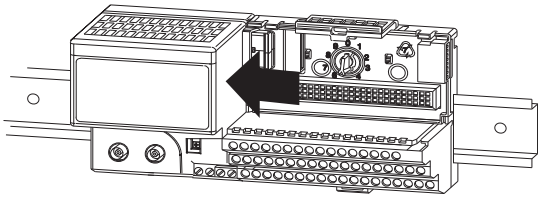
6. Rotate the terminal base onto the DIN rail with the top of the rail hooked under the lip on the rear of the terminal base.

ATTENTION: Make sure that the female Flexbus connector does not strike any of the pins in the mating male connector.

7. Press down on the terminal base unit to lock the terminal base on the DIN rail. If the terminal base does not lock into place, use a screwdriver or similar device to open the locking tab, press down on the terminal base until flush with the DIN rail and release the locking tab to lock the base in place.



Gently push the Flexbus connector into the side of the adapter (or proceeding terminal base) to complete the backplane connection.



8. For specific wiring information, see Wire the Terminal Base Units on page 21.
9. Repeat the above steps to install the next terminal base unit. Be sure that the Flexbus connector cover on the last terminal base unit is in place.

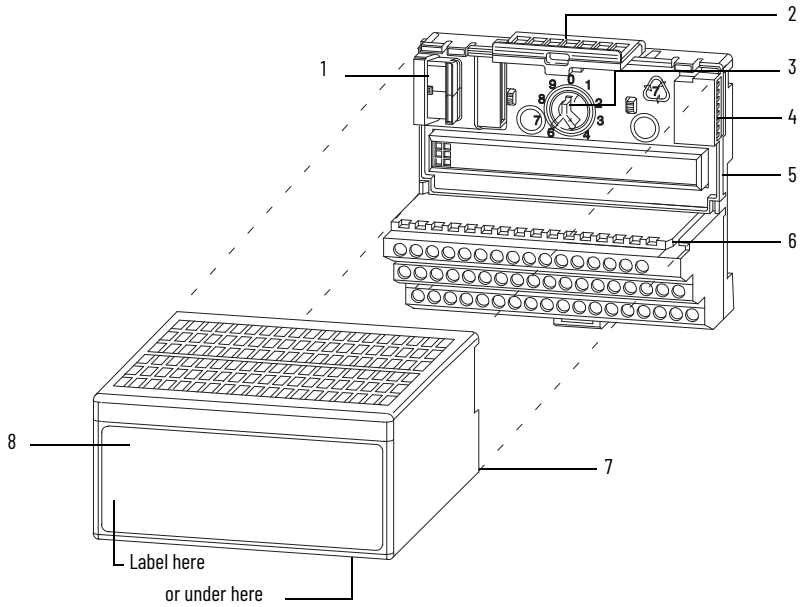
Mount the Terminal Base Unit on a Panel or Wall

Use the mounting kit Cat. No. 1794-NM1 for panel/wall mounting. To mount the terminal base unit on a panel or wall, see Panel Mounting Kit Cat. No. 1794-NM1/B Installation Instructions, publication 1794-IN135.

Mount the Analog Module on the Terminal Base Unit

The HART analog input and output modules mount on a 1794-TB3 or 1794-TB3S terminal base unit. To mount the analog module, proceed as follows:

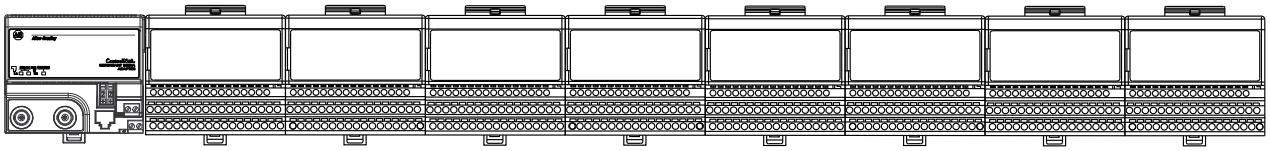
1. Turn the keyswitch on the terminal base unit clockwise to a position as required for each type of the module. See Table 3 for the keyswitch position. Do not change the position of the keyswitch after wiring the terminal base unit.



Component Description

	Description		Description
1	Flexbus connector	5	Base unit
2	Latching mechanism	6	Alignment groove
3	Keyswitch	7	Alignment bar
4	Cap plug	8	Module

2. Verify that the Flexbus connector is pushed all way to the left to connect with the neighboring terminal base/adapter. You cannot install the module unless the connector is fully extended.
3. Make sure that the pins on the bottom of the module are straight so that they align properly with the connector in the terminal base unit.
4. Position the module with its alignment bar aligned with the groove on the terminal base.
5. Press firmly and evenly to seat the module in the terminal base unit. The module is seated when the latching mechanism is locked into the module.
6. Remove cap plug and attach another terminal base unit to the right of this terminal base unit if necessary. Make sure that the last terminal base unit has the cap plug in place.



IMPORTANT The adapter can support up to eight I/O modules. Do not exceed a maximum of eight terminal base units in your system.

Wire the Terminal Base Units

You must use 1794-TB3 or 1794-TB3S terminal base unit for wiring the FLEX I/O HART analog modules.

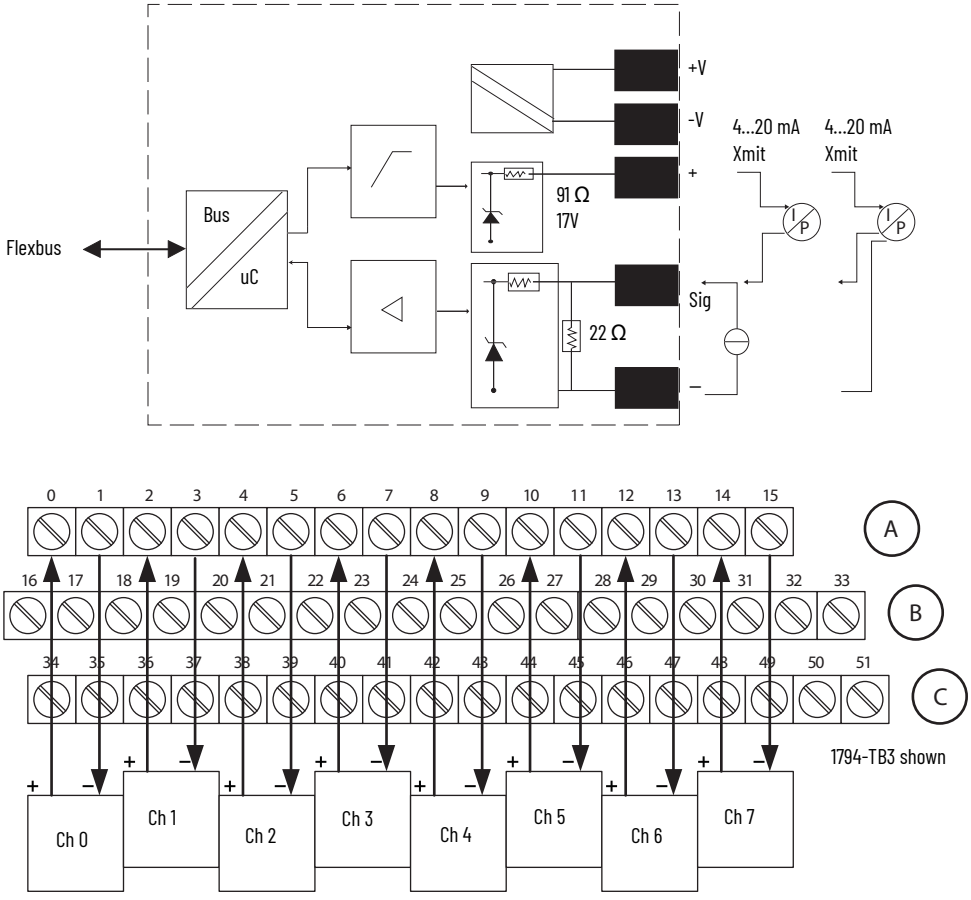
ATTENTION: The FLEX I/O analog modules do not receive primary operational power from the backplane. +24V DC power must be applied to your module before operation. If power is not applied, the module position in your chassis appears as an empty slot to the adapter. If the adapter does not recognize your module after installation is completed, cycle power to the adapter.

Connect Wiring to the FLEX I/O HART Analog Modules

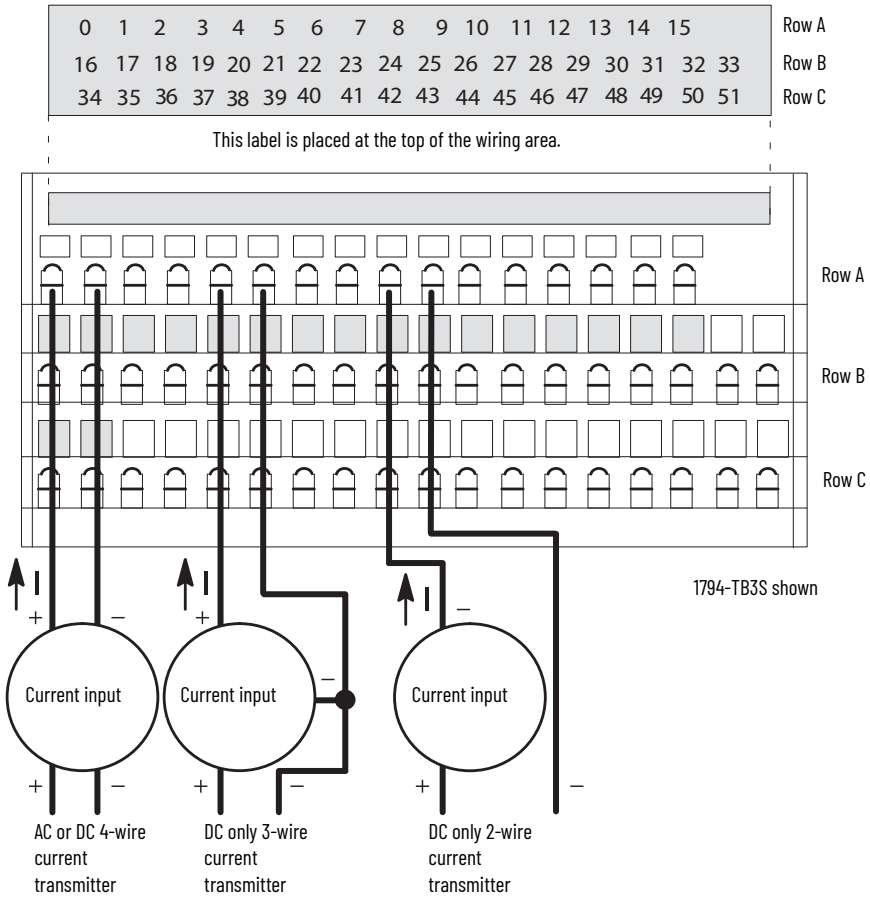
Each 1794-IF8IH and IF8IHNFXT module input channel can be operated from an analog field device signal, and each 1794-OF8IH module output channel can operate an analog field device.

IMPORTANT When interconnecting several lines, you must consider the total accumulated power.

Figure 1 - Wiring Connections for the 1794-IF8IH and 1794-IF8IHNFXT HART Analog Input Modules on 1794-TB3 and 1794-TB3S Terminal Base Units



NOTE: Loop power is not provided for the inputs. Each input requires an external power source, as illustrated in the following diagram.

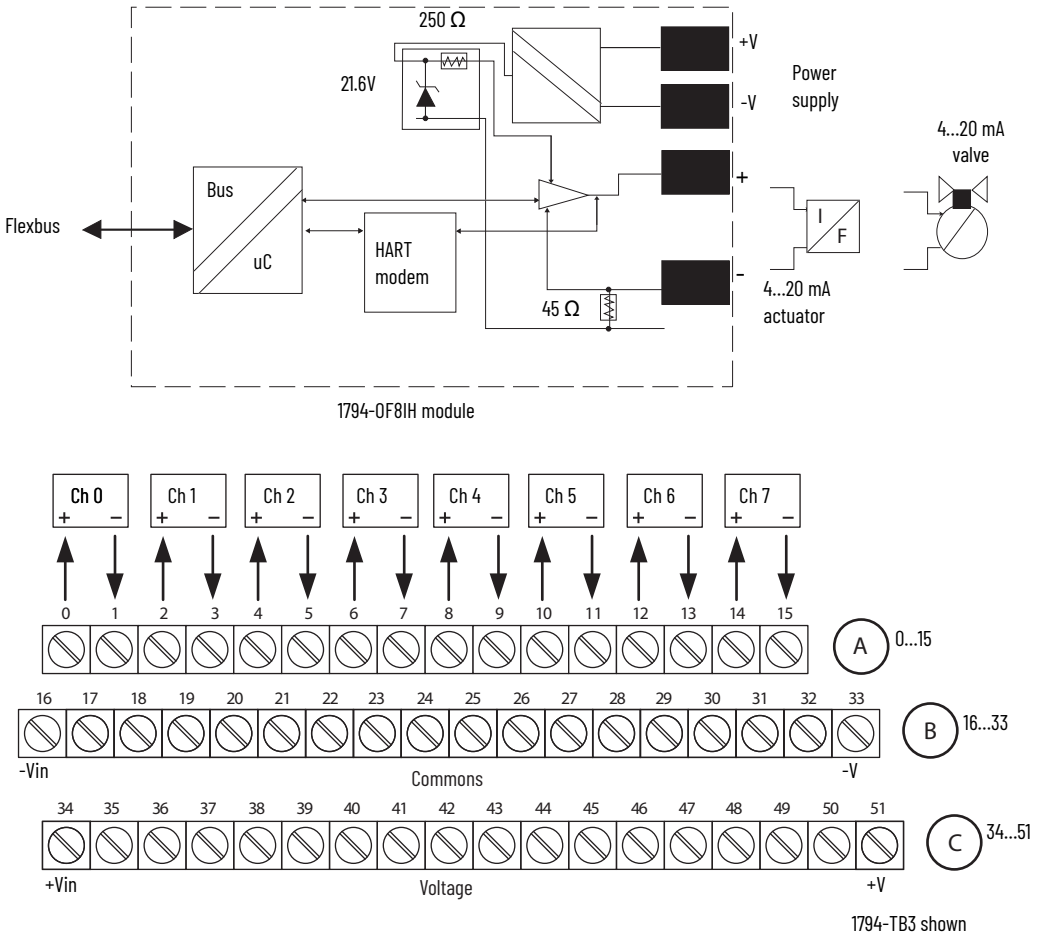


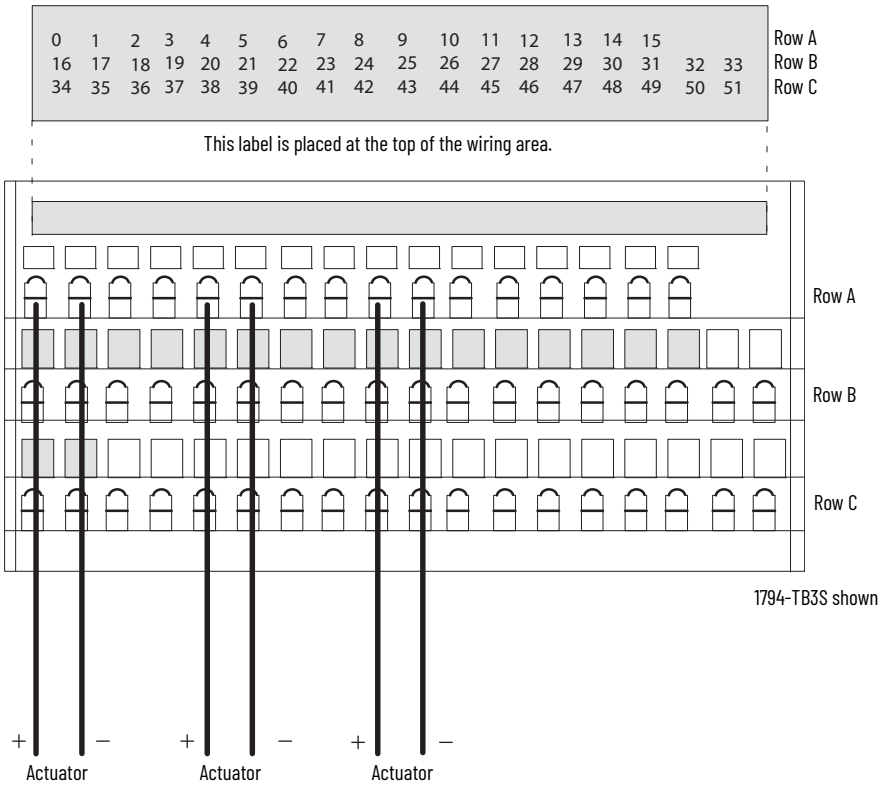
For 2-wire Transmitter Devices:

1. Connect the individual input wiring to the terminal pairs (0/1), (2/3), (4/5), (6/7), (8/9), (10/11), (12/13), and (14/15) on the 0...15 row (A).
2. Connect +V DC power to terminal 34 on the 34...51 row (C).
3. Connect -V common to terminal 16 on the 16...33 row (B).
4. If continuing power to the next terminal base unit, connect a jumper from terminal 51 (+V DC) on this terminal base unit to the +V DC power terminal 34 on the next terminal base unit.
5. If continuing common to the next terminal base unit, connect a jumper from terminal 33 (-V common) on this terminal base unit to the -V common terminal 16 on the next terminal base unit.

ATTENTION: Do not use the unused terminals on the terminal base unit. When you use these terminals as supporting terminals, it can result in damage to the module and/or unintended operation of your system.

Figure 2 - Wiring Connections for the 1794-OF8IH HART Analog Output Module on 1794-TB3 and 1794-TB3S Terminal Base Units



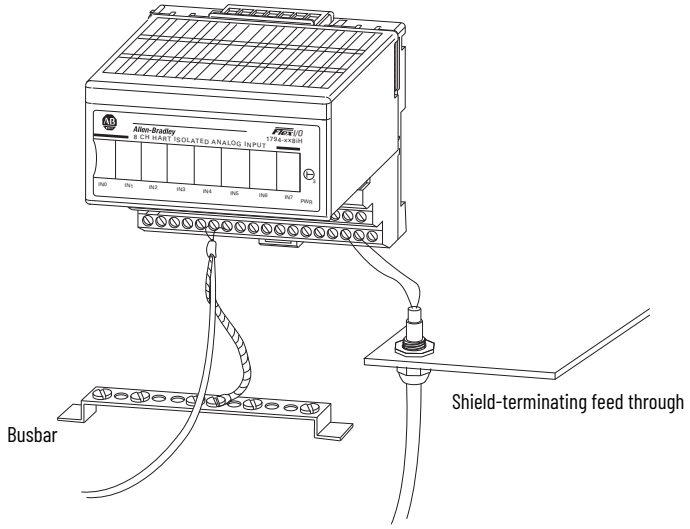


ATTENTION: Do not use the unused terminals on the terminal base unit. When you use these terminals as supporting terminals, it can result in damage to the module and/or unintended operation of your system.

1. Connect the individual input wiring to the terminal pairs (0/1), (2/3), (4/5), (6/7), (8/9), (10/11), (12/13), and (14/15) on the 0...15 row (A).
2. Connect +V DC power to terminal 34 on the 34...51 row (C).
3. Connect -V common to terminal 16 on the 16...33 row (B).
4. If continuing power to the next terminal base unit, connect a jumper from terminal 51 (+V DC) on this terminal base unit to the +V DC power terminal 34 on the next terminal base unit.
5. If continuing common to the next terminal base unit, connect a jumper from the terminal 33 (-V common) on this terminal base unit to the -V common terminal 16 on the next terminal base unit.

Ground the Module

All I/O wiring must use shielded wire. Shields must be terminated externally to the module, such as at busbars and shield-terminating feedthroughs.



Configuration

This section provides descriptions of the different configuration parameters for your FLEX I/O HART modules.

IMPORTANT Use the Studio 5000 Logix Designer application version 17 or later to configure the 1794-IF8IH and 1794-OF8IH modules. See the following topics for more information on how to configure your modules:

- Use the 1794-IF8IH Module with the Generic Profile on page 91
- Use the 1794-OF8IH Module with the Generic Profile on page 121

IMPORTANT Use Studio 5000 Logix Designer application version 24 or later to configure the 1794-IF8IHNFXT module with full profile. See Edit Your 1794-IF8IHNFXT Module Configuration with Studio 5000 Logix Designer (Full Profile) on page 60 for more information.

If you are already using the Studio 5000 Logix Designer application version 23 or earlier, see Use the 1794-IF8IHNFXT Module with the Generic and Thin Profiles on page 103 to configure the 1794-IF8IHNFXT module with the generic and thin profiles.

Data Transfer Types

The modules make use of three data transfer modes that are supported by the FLEX I/O adapter.

The first mode is a traditional real-time data transfer that is Cyclic Data Transfer (CDT). This Class 1 connection continuously transfers 16 words maximum, composed of Input, Output, and Configuration registers. The CDT is used for standard analog data transfers.

The second mode of data transfer uses the Cyclic Extended Data Transfer (EDT) mode. The Cyclic EDT is used for continuous Class 1 transfer of HART data. This includes the first four dynamic HART data variables, along with standard HART status information.

The third mode of data transfer uses EDT for HART pass-through Class 3 messages. HART pass-through messages can be initiated from a number of sources, and are non-periodic. This allows the HART pass-through messages from the HART Foundation Server, and other third-party sources.

1794-IF8IH and 1794-IF8IHNFXT Modules I/O Profiles

All Allen-Bradley FLEX I/O modules have a 16 word table of RTD to be transferred between the controller and the I/O module. Not all 16 words must be allocated. The 1794-IF8IH and 1794-IF8IHNFXT modules have the following RTD I/O profile:

1794-IF8IH Module RTD I/O Profile

RTD Index	Assembly/Index	Assembly
RTD 0	MSW	Module Status Word
RTD 1	EDT Read Word	EDT Read Word
RTD 2...9	I:0...I:7	RTD Input Data
RTD 10...14	S:0...14	RTD Status Data
RTD 15	EDT Write Word	EDT Write Word

In addition to the RTD, the module uses EDT for Configuration and HART data. The 1794-IF8IH and 1794-IF8IHNFXT modules have the following EDT I/O Profiles:

1794-IF8IH Module EDT I/O Profile

Number of Word	EDT Assembly
42	EDT Configuration Data
98	Cyclic EDT HART Input Data (Accessed in eight 24 byte Assemblies)
48	EDT Output Pass-through message request buffer A

1794-IF8IHNFXT Module EDT I/O Profile

Number of Word	EDT Assembly
106	EDT Configuration Data
98	Cyclic EDT HART Input Data (Accessed in eight 24 Assemblies)

Configuration Parameters for 1794-IF8IH Module

The configuration parameters for 1794-IF8IH module are shown in Table 4. These are normal module configuration items and are sent to the module. Configuration is located at EDT assembly 37. The last row of Table 4 gives a brief explanation of each configuration parameter bit. See Configuration Parameter Descriptions for 1794-IF8IH and 1794-IF8IHNFXT Modules on page 28 for a detailed description of each configuration parameter bits.

Table 4 - 1794-IF8IH Configuration Data Table

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	R	R	F7	F6	F5	F4	BOB(1)		R	R	F3	F2	F1	F0	BOA(1)	
1	DH7	DH6	DH5	DH4	DH3	DH2	DH1	DH0	Reserved(2)							
2	CH3 Format				CH2 Format				CH1 Format				CH0 Format			
3	CH7 Format				CH6 Format				CH5 Format				CH4 Format			
4	CH1 HART Current Ratio					FLTR1			CH0 HART Current Ratio					FLTR0		
5	CH3 HART Current Ratio					FLTR3			CH2 HART Current Ratio					FLTR2		
6	CH5 HART Current Ratio					FLTR5			CH4 HART Current Ratio					FLTR4		
7	CH7 HART Current Ratio					FLTR7			CH6 HART Current Ratio					FLTR6		
8	Reserved															
9	CH0 High Alarm Threshold															
10	CH0 Low Alarm Threshold															
11	CH0 Remote High High Alarm Limit															
12	CH0 Remote Low Low Alarm Limit															
13...16	Words 9...12 for Channel 1															
17...20	Words 9...12 for Channel 2															
21...24	Words 9...12 for Channel 3															
25...28	Words 9...12 for Channel 4															
29...32	Words 9...12 for Channel 5															
33...36	Words 9...12 for Channel 6															
37...40	Words 9...12 for Channel 7															
41	Reserved								C7	C6	C5	C4	C3	C2	C1	C0
Where:	BOA = Byte order group A BOB = Byte order group B Byte order group A and B values must match each other. See Byte Order (Configuration Word 0 – Bits 0, 1, 8, and 9) on page 28.															
	Cn = HART Data Publishing Disable for Channel n; 0 = HART Data Publishing Disable is enabled, 1 = HART Data Publishing Disable is disabled															
	CHn Format = Data format for Channel n. See the table 1794-IF8IH Channel Data Formats on page 32.															
	CHn HART Current Ratio = HART current ratio limit on Channel n. Valid values are 0, or 5...31% of full scale. A value of 0 disables this feature. See the table 1794-IF8IH HART Current Ratio on page 41 for more information.															
	DHn = Disable HART communication on Channel n; 0 = HART communication is enabled, 1 = HART communication is disabled															
	FLTRn = Channel n Digital Filter. See the table 1794-IF8IH Module Channel Digital Filter on page 30.															
	Fn = Fault mode channel n; 0 = Local/Remote Fault is disabled, 1 = Enabled															
	R = Reserved															

(1) Not shown or used in the Studio 5000 Logix Designer application.
(2) Reserved data may not be shown in certain controller software.

Configuration Parameters for 1794-IF8IHNFXT Module

The last row of Table 5 gives a brief explanation of each configuration bit. See Configuration Parameter Descriptions for 1794-IF8IH and 1794-IF8IHNFXT Modules on page 28 for a more detailed description of each configuration parameter bits.

Table 5 - 1794-IF8IHNFXT Configuration Data Table

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	R	R	F7	F6	F5	F4	BOB(1)		R	R	F3	F2	F1	F0	BOA(1)	
1	DH7	DH6	DH5	DH4	DH3	DH2	DH1	DH0	Reserved							
2	CH3 Format				CH2 Format				CH1 Format				CH0 Format			
3	CH7 Format				CH6 Format				CH5 Format				CH4 Format			
4	HART_Ilimit_CH1					FLTR1			HART_Ilimit_CH0					FLTR0		
5	HART_Ilimit_CH3					FLTR3			HART_Ilimit_CH2					FLTR2		
6	HART_Ilimit_CH5					FLTR5			HART_Ilimit_CH4					FLTR4		
7	HART_Ilimit_CH7					FLTR7			HART_Ilimit_CH6					FLTR6		
8	CH0 High Alarm Threshold															
9	CH0 Low Alarm Threshold															
10	CH0 Remote High High Alarm Limit															
11	CH0 Remote Low Low Alarm Limit															
12	CH0 PvDampingValue (32-bit, Floating Point, Low Word)															
13	CH0 PvDampingValue (32-bit Floating Point, High Word)															
14	CH0 PvUpperRange (32-bit Floating Point, Low Word)															
15	CH0 PvUpperRange (32-bit Floating Point, High Word)															
16	CH0 PvLowerRange (32-bit Floating Point, Low Word)															
17	CH0 PvLowerRange (32-bit Floating Point, High Word)															
18	Reserved								CH0 PV Range Units Code							
19	Unused															
20…31	Words 8…19 for Channel 1															
32…43	Words 8…19 for Channel 2															
44…55	Words 8…19 for Channel 3															
56…67	Words 8…19 for Channel 4															
68…79	Words 8…19 for Channel 5															
80…91	Words 8…19 for Channel 6															
92…103	Words 8…19 for Channel 7															
104	Reserved								C7	C6	C5	C4	C3	C2	C1	C0
105	ER7	ER6	ER5	ER4	ER3	ER2	ER1	ER0	ED7	ED6	ED5	ED4	ED3	ED2	ED1	ED0

Where:

BOA = Byte order group A
BOB = Byte order group B
Byte order group A and B values must match each other. See Byte Order (Configuration Word 0 – Bits 0, 1, 8, and 9) on page 28 for more information.

Cn = HART Data Publishing Disable for Channel n; 0 = HART Data Publishing Disable enabled, 1 = HART Data Publishing Disable disabled

CHn Format = Data format for Channel n. See table 1794-IF8IHNFXT Channel Data Formats on page 33 and Data Format (Configuration Words 2, 3 – Bits 0…3, 4…7, 8…11, 12…15) on page 32.

CHn PVDampingValue = 32-bit Float (per channel) value used in HART Command 34 to set the device PV (primary value) damping value.

CHn PV Range Units Code = 8-bit unsigned (per channel) PV Range Units Code used in HART Command 35. This value specifies the "Units Code" for the Upper and Lower Range value configuration parameters and also supplies the value for HART Command 44.
This value is required by HART Command 35 to inform the device what units the Upper and Lower range values being sent in HART Command 35 are in HART Command 35 does not change the PV units of the device.
HART Command 44 is automatically sent by the module if the module detects that the PV Units code of the device does not match the parameter in the configuration table.

CHn PvUpperRange = 32-bit Float (per channel). Specifies the value for the PV Upper Range value used in HART Command 35 to set the device PV Upper Range Value.

CHn PvLowerRange = 32-bit Float (per channel). Specifies the value for the PV Upper Range value used in HART Command 35 to set the device PV Upper Range Value.

DHn = Disable HART communication on Channel n; 0 = HART communications enabled, 1 = HART communications disabled

EDn = Enable HART PV Damping Value for Channel n; 0 = True, 1 = False

ERn = Enable HART PV Upper and Lower Range for Channel n; 0 = True, 1 = False

FLTRn = Channel n Digital Filter. See table 1794-IF8IHNFXT Module Channel Digital Filter on page 31.

Table 5 - 1794-IF8IHNFXT Configuration Data Table (Continued)

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Where: (continued)	Fn = Fault mode Channel n; 0 = Local/Remote faults disabled, 1 = Enabled															
	HART_Ilimit_CHn = HART Loop Tolerance Error Limit for Channel n. Defines comparison limit for HART current loop to ADC compare. Valid values are 0, or 5...31% of full scale. A value of zero disables this feature. Full scale is defined as the difference between the normal high scale and the normal low. Example: 4...20 mA: 20 - 4 = 16. 5% of 16 is 0.8 mA Example: 4...20 mA: 20 - 0 = 20. 5% of 20 is 1.0 mA															
	R = Reserved															

(1) Not shown in Studio 5000 Logix Designer application.

Configuration Parameter Descriptions for 1794-IF8IH and 1794-IF8IHNFXT Modules

This section describes each configuration parameters included in the following data tables:

- 1794-IF8IH Configuration Data Table on page 26
- 1794-IF8IHNFXT Configuration Data Table on page 27

These parameter descriptions apply to both 1794-IF8IH and 1794-IF8IHNFXT modules, unless otherwise specified.

Byte Order (Configuration Word 0 – Bits 0, 1, 8, and 9)

The Byte Order setting selects the byte order of module data. The MSW and EDT words (Words 0, 1, and 15) of the Primary Input Data Table are not swapped. All other Primary Input Data and Configuration Data are adjusted according to the following chart.

Byte Order (Configuration Word 0 – Bits 0, 1, 8, and 9)

Byte Order Group B		Byte Order Group A		
Bit 9	Bit 8	Bit 1	Bit 0	Description
0	0	0	0	Little Endian Format (default) — All data entries are in true little endian format.
1	0	1	0	Word Swap — Word swap only applies to values requiring more than one word. For example, 32-bit float values.
0	1	0	1	Byte Swap — Byte swap all words in the data table.
1	1	1	1	Big Endian Format — All data entries are in true big endian format.

IMPORTANT You cannot change the Byte Order using Studio 5000 Logix Designer application version 23 or earlier, since it uses the default Byte Swap setting.

The purpose of this parameter is to allow this module to operate properly within the data networks or systems utilizing various byte orders, across all data types (for example, Boolean data to 32-bit float data). Upon receiving the configuration assembly, the module must inspect Byte Order to determine how to interpret the configuration assembly.

IMPORTANT If you are already using Studio 5000 Logix Designer application version 23 or earlier, you do not need to configure the Byte Order bits. If you are using other programming software, see the 1794-IF8IH Configuration Data Table on page 26 and 1794-IF8IHNFXT Configuration Data Table on page 27 on how to map the Byte Order bits.

To accommodate unknown Endian formats at power-up and configuration reception, two Byte Order bit sets are provided. These dual sets ensure the module receives correct configuration information, regardless of whether the data is in Big Endian or Little Endian format. For configuration validation, both bit sets must match exactly. If they don't, the module reverts to the last valid configuration (default configuration on initial startup) and sets its Diagnostic Status to '2 - Configuration Failure'.

Reasoning for this Configuration Parameter

Within the CIP™ based Rockwell Automation control system all data is transported and utilized in Little Endian format. As such the default mode of operation for these modules is Little Endian.

Since these modules are HART modules, and HART data is normally provided in Big Endian format, the module is responsible for converting any HART data in Big Endian format into Little Endian format.

Examples

In each of the following examples, the module operates internally with Little Endian byte order.

Little Endian Byte Order

If Byte Order indicates Little Endian, utilize the configuration assembly directly.

Partial Configuration Assembly as Received

1	Param A CH2	Param B CH2	Param A CH1	Param B CH1
2	Param C CH0 (2nd byte)		Param C CH0 (low byte)	
3	Param C CH0 (high byte)		Param C CH0 (3rd byte)	

Partial Configuration Assembly after Byte Order Inspection and Processing

1	Param A CH2	Param B CH2	Param A CH1	Param B CH1
2	Param C CH0 (2nd byte)		Param C CH0 (low byte)	
3	Param C CH0 (high byte)		Param C CH0 (3rd byte)	

Provide all data to the Primary Data table in Little Endian byte order. The following two tables are examples of the Primary Input Data, if Byte Order indicated Little Endian.

Primary Input Data Before Byte Order Processing for Little Endian

1	CH2 Data A (REAL) (2nd byte)	CH2 Data A (REAL) (low byte)
2	CH2 Data A (REAL) (high byte)	CH2 Data A (REAL) (3rd byte)
3	CH2 Data C	CH2 Data B

Primary Input Data After Byte Order Processing for Little Endian

1	CH2 Data A (REAL) (2nd byte)	CH2 Data A (REAL) (low byte)
2	CH2 Data A (REAL) (high byte)	CH2 Data A (REAL) (3rd byte)
3	CH2 Data C	CH2 Data B

Word Swap Byte Order

If Byte Order indicates Word Swap, utilize the known structure of the configuration assembly to reorder multi-word data elements to Little Endian byte order. For example, word swap FLOATS.

Partial Configuration Assembly as Received

1	Param A CH2	Param B CH2	Param A CH1	Param B CH1
2	Param C CH0 (high byte)		Param C CH0 (3rd byte)	
3	Param C CH0 (2nd byte)		Param C CH0 (low byte)	

Partial Configuration Assembly after Byte Order Inspection and Processing

1	Param A CH2	Param B CH2	Param A CH1	Param B CH1
2	Param C CH0 (2nd byte)		Param C CH0 (low byte)	
3	Param C CH0 (high byte)		Param C CH0 (3rd byte)	

Provide all data to the Primary Data table in Word Swap byte order, except the MSW and EDT words (Words 0, 1, and 15), these remain in Little Endian byte order.

The following tables are examples of the Primary Input Data, if Byte Order Indicated Word Swap.

Primary Input Data Before Byte Order Processing for Little Endian

1	CH2 Data A (REAL) (2nd byte)	CH2 Data A (REAL) (low byte)
2	CH2 Data A (REAL) (high byte)	CH2 Data A (REAL) (3rd byte)
3	CH2 Data C	CH2 Data B

Primary Input Data After Byte Order Processing for Little Endian

1	CH2 Data A (REAL) (high byte)	CH2 Data A (REAL) (3rd byte)
2	CH2 Data A (REAL) (2nd byte)	CH2 Data A (REAL) (low byte)
3	CH2 Data C	CH2 Data B

Fault Mode (Configuration Word 0 — Bits 2...5, 10...13)

Selects whether the channel fault detection for Local and Remote Alarms is enabled or disabled. This does not disable High and Low Alarms.

Range: 0 = Disable, 1 = Fault detection is enabled (Remote transmitter loop, wire off, and overload or short circuit)

Default: 0 = Disable

Digital Filter (Configuration Words 4...7 - Bits 0...2, 8...10)

Digital filter for the channel. This parameter affects channel accuracy. See the following tables.

Accuracy vs Filter Cutoff for 1794-IF8IH Module

Filter Cutoff	7[1]	6[1]	5	4	3	2	1	0 (Default)
Frequency (Hz)	Not applicable	Not applicable	4.17	10	16.7	19.6	62	470
Word Setting	Not applicable	Not applicable	101	100	011	010	001	000

(1) For settings of 6 and 7, the module returns a configuration error and remain in the last properly configured state.

Accuracy vs Filter Cutoff for 1794-IF8IHNFXT Module

Filter Cutoff	7	6	5	4	3	2	1	0 (Default)
Frequency (Hz)	Not applicable[1]	4.17	10	16.7	19.6	62	123	242
Word Setting	Not applicable	110	101	100	011	010	001	000

(1) Invalid or configuration error.

1794-IF8IH Module Channel Digital Filter[1]

Digital Filter Frequency (Hz)	**Decimal Value**	**Bits**		
		10	**9**	**8**
		2	**1**	**0**
470	0	0	0	0
62	1	0	0	1
19.6	2	0	1	0
16.7	3	0	1	1
10	4	1	0	0

1794-IF8IH Module Channel Digital Filter(1) (Continued)

Digital Filter Frequency (Hz)	Decimal Value	Bits		
		10	9	8
		2	1	0
4.17	5	1	0	1
Not applicable	6	1	1	0
Not applicable	7	1	1	1

(1) The channel Digital Filters are represented by Words 4...7 (bits 0...2 and 8...10) in the 1794-IF8IH Configuration Data Table on page 26.

1794-IF8IHNFXT Module Channel Digital Filter(1)

Digital Filter frequency (Hz)	Decimal Value	Bits		
		10	9	8
		2	1	0
242	0	0	0	0
123	1	0	0	1
62	2	0	1	0
19.6	3	0	1	1
16.7	4	1	0	0
10	5	1	0	1
4.17	6	1	1	0
Not applicable	7	1	1	1

(1) The channel Digital Filters for the 1794-IF8IHNFXT module are represented by Words 4...7 (bits 0...2 and 8...10) of the 1794-IF8IHNFXT Configuration Data Table on page 27.

ADC Conversion Rate, Channel Update Time, and Repeatability

The following table shows the channel update time, channel settling time, repeatability, 50 Hz normal mode rejection, and 60 Hz normal mode rejection for each A/D conversion rate. The repeatability is based on six-sigma RMS noise levels.

ADC Conversion Rate Effects for the 1794-IF8IH Module

A/D Conversion Rate (Hz)	Channel Update Time (ms)	Channel Settling Time (ms)	50 Hz Rejection	60 Hz Rejection
4.17	240	480	70 dB	70 dB
10.0	100	200	65 dB	65 dB
16.7	60	120	75 dB	–
19.6	51	101	–	70 dB
62	16	32		–
470	2	4		

ADC Conversion Rate Effects for the 1794-IF8IHNFXT Module

A/D Conversion Rate (Hz)	Channel Update Time (ms)	Channel Settling Time (ms)	50 Hz Rejection	60 Hz Rejection
4.17	240	480	70 dB	70 dB
10	100	200	65 dB	65 dB
16.7	60	120	75 dB	–
19.6	51	101	–	70 dB
62	16	32		–
123	8	17		
242	4	8		

Data Format (Configuration Words 2, 3 – Bits 0...3, 4...7, 8...11, 12...15)

Specifies the module data format. If they are selected, a configuration failure is declared. The configuration is not accepted and the last valid configuration can be used.

Range: 0...7; Default: 0

See the following 1794-IF8IH and 1794-IF8IHNFXT data format tables.

1794-IF8IH Data Formats(1)

Data Format	Format	Resolution	Input Range	Module Data Processing	Data Table Value (Interpretation)	Count per mA/Resolution
0	0...20 mA as mA	0.1% of 0...20 mA	0...22 mA	Datatable = 1000 (Input)	0...22000 (0...22.000 mA)	1000/1.0 µA
1	0...20 mA as %	0.2% of 0...20 mA	0...22 mA	Datatable = 10000 $\left(\frac{\text{Input}}{20}\right)$	0...11000 (0...110.00%)	500/2.0 µA
3	0...20 mA as unsigned integer	0.03% of 0...20 mA	0...20 mA	Datatable = 65535 $\left(\frac{\text{Input}}{20}\right)$	0...65535 (0...20 mA)	3276/0.3052 µA
4	4...20 mA as mA	0.1% of 4...20 mA	2...22 mA	Datatable = 1000 (input)	2000...22000 (2.000...22.000 mA)	1000/1.0 µA
5	4...20 mA as %	0.16% of 4...20 mA	2...22 mA	Datatable = 10000 $\left(\frac{\text{Input-4}}{16}\right)$	-1250...+11250 (2's complement) (-12.50%...+112.50%)	625/1.6 µA
7	4...20 mA as unsigned integer	0.03% of 4...20 mA	4...20 mA	Datatable = 65535 $\left(\frac{\text{Input-4}}{16}\right)$	0...65535 (4...20 mA)	4095/0.2441 µA

(1) All other formats are invalid.

1794-IF8IH Channel Data Formats(1)

Format(2)	Bits 15 11 7 3	Bits 14 10 6 2	Bits 13 9 5 1	Bits 12 8 4 0	Format Name	Signal Range LO	Signal Range HI	User Range LO	User Range HI	Resolution (µA)
0	0	0	0	0	0...20 mA in Milliamps	0.00	22.00	0 (0.000 mA)	22000 (22.000 mA)	1.0
1	0	0	0	1	0...20 mA in % Full Scale	0.00	22.00	0 (0%)	11000 (110.00%)	2.0
3	0	0	1	1	0...20 mA in UINT	0.00	20.00	0	65535	0.3052
4	0	1	0	0	4...20 mA in Milliamps	2.00	22.00	2000 (2.000 mA)	22000 (22.000 mA)	1.0
5	0	1	0	1	4...20 mA in % Full Scale	2.00	22.00	-1250 (-12.50%)	11250 (112.50%)	1.6
7	0	1	1	1	4...20 mA in UINT	4.00	20.00	0	65535	0.2441

(1) The channel Data Formats for 1794-IF8IH are represented by Words 2 and 3 in the 1794-IF8IH Configuration Data Table on page 26.
(2) All other formats are invalid.

1794-IF8IHNFXT Data Formats(1)

Data Format	Format	Normal Signal Range LO	Normal Signal Range HI	Normal User Range LO	Normal User Range HI	Resolution (µA)
0	0...20 mA as mA	0.00	20.0	0	20000	1.0
1	0...20 mA as %	0.00	20.0	0	10000	2.0
3	0...20 mA as unsigned integer	0.00	20.0	0	65535	0.3052
4	4...20 mA as mA	4.00	20.0	4000	20000	1.0
5	4...20 mA as %	4.00	20.0	0	10000	1.6
6	4...20 mA Signed 2's Complement	4.00	20.0	0	30840	0.5188
7	4...20 mA as unsigned integer	4.00	20.0	0	65535	0.2441

(1) All other formats are invalid.

1794-IF8IHNFXT Data Formats Full Reporting Range

Data Format	Format	0.0 mA	2.0 mA	4.0 mA	20.0 mA	21.0 mA	22.0 mA
0	0...20 mA as mA	0	2000	4000	20000	21000	22000
1	0...20 mA as %	0	1000	2000	10000	10500	11000
3	0...20 mA as unsigned integer	0	6554	13107	65535	65535(1)	65535(1)
4	4...20 mA as mA	2000(1)	2000	4000	20000	21000	22000
5	4...20 mA as %	-1250(1)	-1250	0	10000	10625	11250
6	4...20 mA Signed 2's Complement(2)	-7710	-3855	0	30840	32767	32767(1)
7	4...20 mA as unsigned integer	0(1)	0(1)	0	65535	65535(1)	65535(1)

(1) These values are under or over the supported user range and are clamped at the lowest/highest supported values.
(2) This 4...20 mA format differs from all other 4...20 mA formats as it continues to report values all the way down to 0 mA whereas the other 4...20 mA formats stop reporting at 2 mA (except for binary, which stops at 4 mA). In addition, this 4...20 mA format does not force the input value to the Minimum Scale value on an open circuit or short circuit condition.

1794-IF8IHNFXT Channel Data Formats(1)

Format	Bits 15 11 7 3	Bits 14 10 6 2	Bits 13 9 5 1	Bits 12 8 4 0	Format Name	Signal Range LO	Signal Range HI	User Range LO	User Range HI	Resolution (µA)
0	0	0	0	0	0...20 mA in Milliamps	0.00	20.00	0 (0.000 mA)	20000 (20.000 mA)	1.0
1	0	0	0	1	0...20 mA in % Full Scale	0.00	20.00	0 (0%)	10500 (105.00%)	2.0
3	0	0	1	1	0...20 mA in UINT	0.00	20.00	0	65535	0.3052
4	0	1	0	0	4...20 mA in Milliamps	4.00	20.00	4000 (4.000 mA)	20000 (20.000 mA)	1.0
5	0	1	0	1	4...20 mA in % Full Scale	4.00	20.00	0	10000 (100.00%)	1.6
6	0	1	1	0	4...20 mA Signed 2's Complement	4.00	20.00	0	30840	0.5188
7	0	1	1	1	4...20 mA in UINT	4.00	20.00	0	65535	0.2441

(1) Channel Data Formats are represented by Words 2 and 3 in the 1794-IF8IHNFXT Configuration Data Table on page 27.

Remote Low Low Alarm Limit

This bit parameter exists on both 1794-IF8IH and 1794-IF8IHNFXT configuration but different configuration word numbers are assigned in the configuration data tables. See Table 6 for reference.

Table 6 - Configuration Words and Bits as per Configuration Data Table

I/O Module	Parameter	Configuration Words	Bits
1794-IF8IH	Remote Low Low Alarm Limit	12, 16, 20, 24, 28, 32, 36, and 40	0...15
1794-IF8IHNFXT		11, 23, 35, 47, 59, 71, 83, and 95	

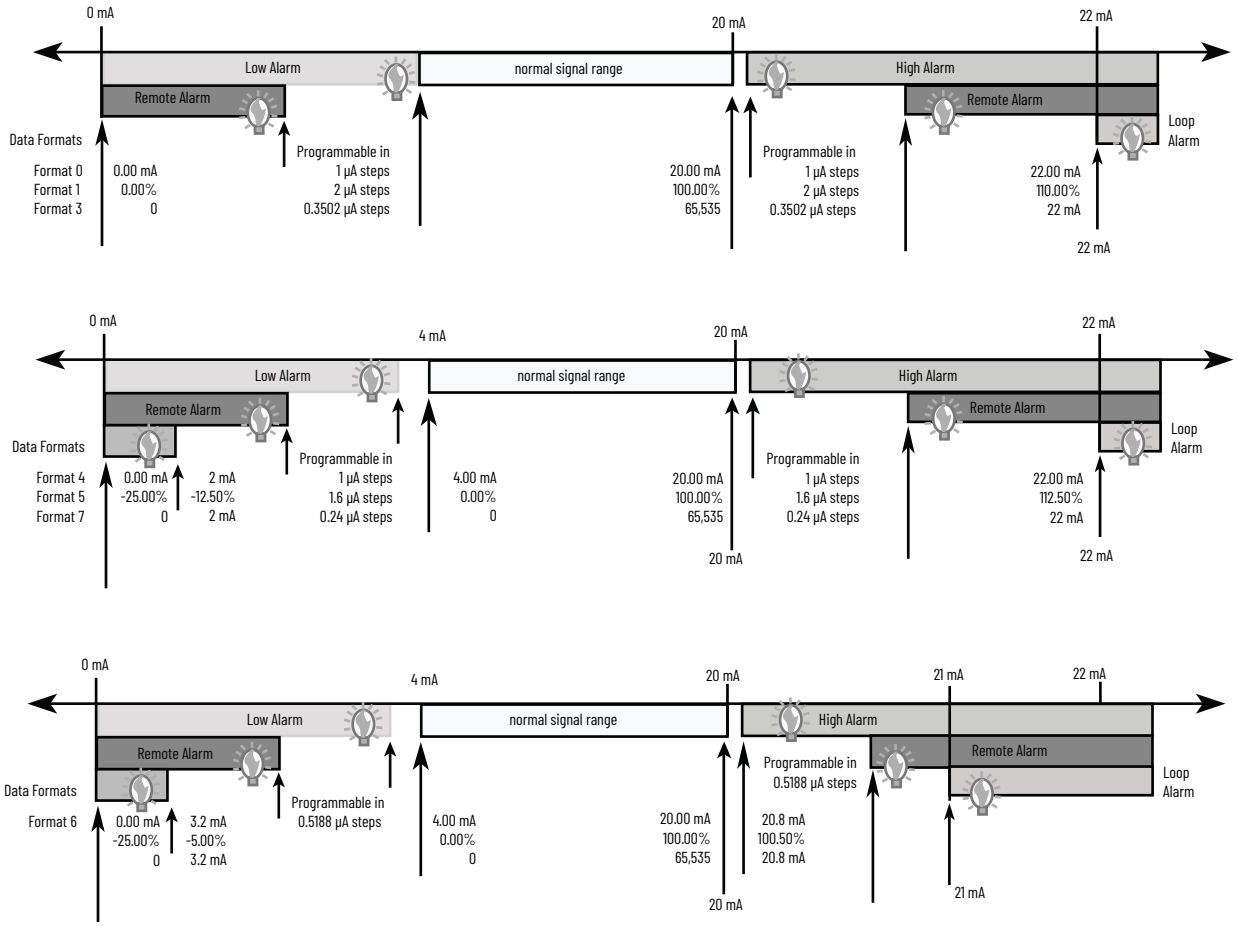
This parameter sets the limit for the Remote Fault Low Low alarm. This affects Data Formats 0...7. The following steps apply to the 4...20 mA range.

For example, a value of 3600 causes a Remote Fault Low Low Alarm below 3.6 mA (3600 x 1 µA = 3.6 mA).

Range: 0...22000 (0 = Disabled, 1 x 1 µA to 22000 x 1 µA)

Default: 0 = Disabled

Data Formats and Error Ranges



Remote High High Alarm Limit

This bit parameter exists on both 1794-IF8IH and 1794-IF8IHNFXT configurations but different configuration word numbers are assigned in the configuration data tables. See Table 7 for reference.

Table 7 - Configuration Words and Bits as per Configuration Data Table

I/O Module	Parameter	Configuration Words	Bits
1794-IF8IH	Remote High High Alarm Limit	11, 15, 19, 23, 27, 31, 35, and 39	0...15
1794-IF8IHNFXT		10, 22, 34, 46, 58, 70, 82, and 94	

This parameter sets the limit for the Remote Fault High High Alarm. This affects Data Formats 0...7. The following steps apply to the 4...20 mA range and 0...20 mA range.

For example, a value of 20400 causes a Remote Fault High High Alarm above 20.4 mA (20400 x 1 µA = 20.4 mA).

Range: 0...22000 (0 = Disabled, 1 x 1 µA to 22000 x 1 µA)

Default: 0 = Disabled

Low Alarm Limit

This bit parameter exists on both 1794-IF8IH and 1794-IF8IHNFXT configurations but different configuration word numbers are assigned in the configuration data tables. See Table 8 for reference.

Table 8 - Configuration Words and Bits as per Configuration Data Table

I/O Module	Parameter	Configuration Words	Bits
1794-IF8IH	Low Alarm Limit	10, 14, 18, 22, 26, 30, 34, and 38	0...15
1794-IF8IHNFXT		9, 21, 33, 45, 57, 69, 81, and 93	

This parameter sets the limit for the Low Alarm. This affects Data Formats 0...7. The following steps apply to the 4...20 mA range.

For example, a value of 4000 causes a Low Alarm below 4.0 mA (4000 x 1 µA = 4 mA).

Range: 0...22000 (0 = Disabled, 1 x 1 µA to 22000 x 1 µA)

Default: 0 = Disabled

High Alarm Limit

This bit parameter exists on both 1794-IF8IH and 1794-IF8IHNFXT configurations but different configuration word numbers are assigned in the configuration data tables. See Table 8 for reference.

Table 9 - Configuration Words and Bits as per Configuration Data Table

I/O Module	Parameter	Configuration Words	Bits
1794-IF8IH	High Alarm Limit	9, 13, 17, 21, 25, 29, 33, and 37	0...15
1794-IF8IHNFXT		8, 20, 32, 44, 56, 68, 80, and 97	

This parameter sets the limit for the High Alarm. This affects Data Formats 0...7. The following steps apply to the 4...20 mA range and 0...20 mA range.

For example, a value of 20000 causes a High Alarm above 20.0 mA (20000 x 1 µA = 20 mA).

Range: 0...22000 (0 = Disabled, 1x1 µA to 22000x1 µA)

Default: 0 = Disabled

HART Disable Channel 0...7 (Configuration Word 1 – Bits 8...15)

When this bit is set, the I/O module inhibits HART communication.

Default: 0, Range: 0, 1

0 = Enable, 1 = Disable

HART Current Fault Limit (Configuration Words 4...7 – Bits 3...7, 11...15)

This bit parameter applies to 1794-IF8IHNFXT module only.

Delivers the percentage value (in steps of 1%, starting at 5%) of the threshold for causing a HART current fault indication (input signal deviation HART/Analog) = 31% maximum deviation.

If there is no HART transmitter on the loop or the loop is not in the transmitter list, the function is switched off internally in the I/O module.

Default: 0, Range: 0...31

0 = Disabled
1...4 = Not supported by the I/O module. A configuration request of 1...4 causes the module to use a value of 5.
5...31 = Percentage threshold data (5...31%)

HART Data Publishing Disable

This bit parameter exists on both 1794-IF8IH and 1794-IF8IHNFXT configurations but different word number is assigned in the configuration data tables. See Table 10 for reference.

Table 10 - Configuration Words and Bits as per Configuration Data Table

I/O Module	Parameter	Configuration Word	Bits
1794-IF8IH	HART Data Publishing Disable	41	0...7
1794-IF8IHNFXT		104	

This bit disables the I/O channel from forwarding the associated HART Command 3 information from the HART field device through Cyclic EDT to the adapter.

This does not disable the module from gathering HART Command 3 information from the HART field device. As such, HART Command 3 information from the HART field device is still available via an unconnected message to the module.

When the adapter powers up, it reads each module to determine which modules are present in the Flexbus. For EDT modules, it reads Assembly 125 to gain knowledge of all assemblies the module has, whether they are EDT/CEDT and GET/SET. If an assembly is a CEDT assembly, the adapter automatically creates a CEDT entry and drops it into the EDT machine to gather/send this assembly and store the assembly locally in the adapter.

Sometime later, a ForwardOpen configuration arrives by the network for the module. The adapter proxy strips off a portion (Configuration Part 1) and sends the rest (Configuration Part 2) on through EDT to the module. Within this module configuration part are the CMD3 Disable Chx bits. These bits instruct the module to include or not include CMD3 scanning in the work for the channel. Users may not have HART devices on every channel so some channels may want CMD3 disabled. If scanning is disabled, the module also disables the adapter from including that particular associated assembly in the CEDT scanning routine by the method described below.

The module uses the CMD3 Disable Chx bits to adjust the CEDT entries in Assembly 125. Initially, the Assembly 125 CEDT assemblies (46...53) are identified as CEDT (0xC0 Cyclic EDT Get or 0x40 Cyclic EDT Set). This causes the adapter to add them to the CEDT scan. If the module receives a configuration with CMD3 Disable CHx bits set to "1" (disable), the module changes the appropriate channel Assembly 125 entry from 0xC0 Cyclic EDT Get to 0x80 EDT Get or 0x40 Cyclic EDT Set to 0x00 EDT Set.

Whenever the adapter receives a ForwardOpen to an EDT module, the adapter automatically rereads the module's Assembly 125 to gain a new view of the assemblies. This reread is to check for any changes of CEDT Assembly status to EDT status. If a CMD3 Disable Chx was received on any particular channel, now the previous CEDT assembly is marked as an EDT assembly and the adapter will not add that assembly to its CEDT scan. This ForwardOpen reread will happen any time that a module receives a ForwardOpen, including a Null-ForwardOpen received during system runtime.

Range: 0 = Enabled, 1 = Disabled

Default: 0

Enable HART PV Upper and Lower Range (Configuration Word 105, bits 8...15)

This configuration bit applies to the 1794-IF8IHNFXT module only.

This bit enables the PV Upper and Lower Range (HART Command 35) values.

See Auto-configure HART Device with user-supplied PV Damping and Range Values on page 69 for more information.

Range: 0 = True, 1 = False

Default: 0

Enable HART PV Damping Value (Configuration Word 105 — Bits 0...7)

This configuration bit applies to the 1794-IF8IHNFXT module only.

When this bit is set, it automatically configures a HART device with user-supplied PV (Primary Value) Damping by sending HART Command 34 to the device at the time of device connection.

See Auto-configure HART Device with user-supplied PV Damping and Range Values on page 69 for more information.

Range: 0 = True, 1 = False

Default: 0

Primary Input Data (RTD Input Data) for 1794-IF8IH and 1794-IF8IHNFXT Modules

Table 11 - Primary Input Data for 1794-IF8IH Module

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Channel 0 Input Data															
1	Channel 1 Input Data															
2	Channel 2 Input Data															
3	Channel 3 Input Data															
4	Channel 4 Input Data															
5	Channel 5 Input Data															
6	Channel 6 Input Data															
7	Channel 7 Input Data															
8	H7	H6	H5	H4	H3	H2	H1	H0	L7	L6	L5	L4	L3	L2	L1	L0
9	R7	R6	R5	R4	R3	R2	R1	R0	P7	P6	P5	P4	P3	P2	P1	P0

Table 11 - Primary Input Data for 1794-IF8IH Module (Continued)

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
10	Reserved								Diagnostic Status							
11	C7	C6	C5	C4	C3	C2	C1	C0	F7	F6	F5	F4	F3	F2	F1	F0
12	X7	X6	X5	X4	X3	X2	X1	X0	Reserved							
Where:	Hn = Channel n High Alarm Ln = Channel n Low Alarm Rn = Channel n Out of Range Alarm Pn = Channel n Second (Remote) Alarm Pn = Channel n HART Failure Cn = Channel n HART Current Fault Xn = Channel n HART Transmitter Present															

Table 12 - Primary Input Data for 1794-IF8IHNFXT Module

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Channel 0 Input Data															
1	Channel 1 Input Data															
2	Channel 2 Input Data															
3	Channel 3 Input Data															
4	Channel 4 Input Data															
5	Channel 5 Input Data															
6	Channel 6 Input Data															
7	Channel 7 Input Data															
8	H7	H6	H5	H4	H3	H2	H1	H0	L7	L6	L5	L4	L3	L2	L1	L0
9	R7	R6	R5	R4	R3	R2	R1	R0	P7	P6	P5	P4	P3	P2	P1	P0
10	X7	X6	X5	X4	X3	X2	X1	X0	Diagnostic Status							
11	C7	C6	C5	C4	C3	C2	C1	C0	F7	F6	F5	F4	F3	F2	F1	F0
Where:	Hn = Channel n High Alarm Ln = Channel n Low Alarm Rn = Channel n Out of Range Alarm Pn = Channel n Second (Remote) Alarm Fn = Channel n HART Failure Cn = Channel n HART Current Fault Xn = Channel n HART Transmitter Present															

Primary Input Data (Input Words 0...7 — Bits 0...15)

Specifies the value of the input data from the module. Specific format is controlled by module Data Format Control parameter.

Range: See Data Format (Configuration Words 2, 3 – Bits 0...3, 4...7, 8...11, 12...15) on page 32.

Module Diagnostic Status (Input Word 10 — Bits 0...7)

Response from module on its condition.

Diagnostic Status for 1794-IF8IH and 1794-IF8IHNFXT

Diagnostic Status Value: 0	Channel	Failure
0x00	All	No Errors (default)
0x10	Channel 0	HART Iloop Threshold Configuration Error
0x11	Channel 1	HART Iloop Threshold Configuration Error
0x12	Channel 2	HART Iloop Threshold Configuration Error
0x13	Channel 3	HART Iloop Threshold Configuration Error
0x14	Channel 4	HART Iloop Threshold Configuration Error
0x15	Channel 5	HART Iloop Threshold Configuration Error

Diagnostic Status for 1794-IF8IH and 1794-IF8IHNFXT (Continued)

Diagnostic Status Value: 0	Channel	Failure
0x16	Channel 6	HART Iloop Threshold Configuration Error
0x17	Channel 7	HART Iloop Threshold Configuration Error
0x20	Channel 0	Remote/Local Alarm Configuration Error
0x21	Channel 1	Remote/Local Alarm Configuration Error
0x22	Channel 2	Remote/Local Alarm Configuration Error
0x23	Channel 3	Remote/Local Alarm Configuration Error
0x24	Channel 4	Remote/Local Alarm Configuration Error
0x25	Channel 5	Remote/Local Alarm Configuration Error
0x26	Channel 6	Remote/Local Alarm Configuration Error
0x27	Channel 7	Remote/Local Alarm Configuration Error
0x30	Channel 0	High/Low Alarm Configuration Error
0x31	Channel 1	High/Low Alarm Configuration Error
0x32	Channel 2	High/Low Alarm Configuration Error
0x33	Channel 3	High/Low Alarm Configuration Error
0x34	Channel 4	High/Low Alarm Configuration Error
0x35	Channel 5	High/Low Alarm Configuration Error
0x36	Channel 6	High/Low Alarm Configuration Error
0x37	Channel 7	High/Low Alarm Configuration Error
0x40	Channel 0	Format Configuration Error
0x41	Channel 1	Format Configuration Error
0x42	Channel 2	Format Configuration Error
0x43	Channel 3	Format Configuration Error
0x44	Channel 4	Format Configuration Error
0x45	Channel 5	Format Configuration Error
0x46	Channel 6	Format Configuration Error
0x47	Channel 7	Format Configuration Error
0x50	Channel 0	ADC Filter Configuration Error
0x51	Channel 1	ADC Filter Configuration Error
0x52	Channel 2	ADC Filter Configuration Error
0x53	Channel 3	ADC Filter Configuration Error
0x54	Channel 4	ADC Filter Configuration Error
0x55	Channel 5	ADC Filter Configuration Error
0x56	Channel 6	ADC Filter Configuration Error
0x57	Channel 7	ADC Filter Configuration Error
0x70[1]	Channel 0	PV Configuration Enable selected with HART Disabled
0x71[1]	Channel 1	PV Configuration Enable selected with HART Disabled
0x72[1]	Channel 2	PV Configuration Enable selected with HART Disabled
0x73[1]	Channel 3	PV Configuration Enable selected with HART Disabled
0x74[1]	Channel 4	PV Configuration Enable selected with HART Disabled
0x75[1]	Channel 5	PV Configuration Enable selected with HART Disabled
0x76[1]	Channel 6	PV Configuration Enable selected with HART Disabled
0x77[1]	Channel 7	PV Configuration Enable selected with HART Disabled
0x80	Module	Hardware Failure
0x90	Channel 0	Calibration Error
0x91	Channel 1	Calibration Error
0x92	Channel 2	Calibration Error
0x93	Channel 3	Calibration Error
0x94	Channel 4	Calibration Error
0x95	Channel 5	Calibration Error
0x96	Channel 6	Calibration Error

Diagnostic Status for 1794-IF8IH and 1794-IF8IHNFXT (Continued)

Diagnostic Status Value: 0	Channel	Failure
0x97	Channel 7	Calibration Error
0xA0	Channel 0	Internal Bus Com Error
0xA1	Channel 1	Internal Bus Com Error
0xA2	Channel 2	Internal Bus Com Error
0xA3	Channel 3	Internal Bus Com Error
0xA4	Channel 4	Internal Bus Com Error
0xA5	Channel 5	Internal Bus Com Error
0xA6	Channel 6	Internal Bus Com Error
0xA7	Channel 7	Internal Bus Com Error
0xB0[2]	Channel 0	Value set to nearest supported value
0xB1[2]	Channel 1	Value set to nearest supported value
0xB2[2]	Channel 2	Value set to nearest supported value
0xB3[2]	Channel 3	Value set to nearest supported value
0xB4[2]	Channel 4	Value set to nearest supported value
0xB5[2]	Channel 5	Value set to nearest supported value
0xB6[2]	Channel 6	Value set to nearest supported value
0xB7[2]	Channel 7	Value set to nearest supported value
0xC0	Channel 0	Device is write-protected
0xC1	Channel 1	Device is write-protected
0xC2	Channel 2	Device is write-protected
0xC3	Channel 3	Device is write-protected
0xC4	Channel 4	Device is write-protected
0xC5	Channel 5	Device is write-protected
0xC6	Channel 6	Device is write-protected
0xC7	Channel 7	Device is write-protected
0xD0	Channel 0	Value out of limits or invalid selection
0xD1	Channel 1	Value out of limits or invalid selection
0xD2	Channel 2	Value out of limits or invalid selection
0xD3	Channel 3	Value out of limits or invalid selection
0xD4	Channel 4	Value out of limits or invalid selection
0xD5	Channel 5	Value out of limits or invalid selection
0xD6	Channel 6	Value out of limits or invalid selection
0xD7	Channel 7	Value out of limits or invalid selection
0xE0	Channel 0	Primary value configuration HART commands not supported
0xE1	Channel 1	Primary value configuration HART commands not supported
0xE2	Channel 2	Primary value configuration HART commands not supported
0xE3	Channel 3	Primary value configuration HART commands not supported
0xE4	Channel 4	Primary value configuration HART commands not supported
0xE5	Channel 5	Primary value configuration HART commands not supported
0xE6	Channel 6	Primary value configuration HART commands not supported
0xE7	Channel 7	Primary value configuration HART commands not supported
0xF0	Channel 0	Primary value configuration general error
0xF1	Channel 1	Primary value configuration general error
0xF2	Channel 2	Primary value configuration general error

Diagnostic Status for 1794-IF8IH and 1794-IF8IHNFXT (Continued)

Diagnostic Status Value: 0	Channel	Failure
0xF3	Channel 3	Primary value configuration general error
0xF4	Channel 4	Primary value configuration general error
0xF5	Channel 5	Primary value configuration general error
0xF6	Channel 6	Primary value configuration general error
0xF7	Channel 7	Primary value configuration general error

(1) This does not apply to the output control bits HART OFF. That means HART can still be disabled which would prevent the PV Configuration feature from working until the control bit is cleared.
(2) Applies to 1794-IF8IHNFXT only.

HART Failure (Input Word 11 — Bits 0...7)

This bit indicates each time a HART communication failure is detected between the module and the HART field device (HART FD) on the channel. This failure could be due to some of the following reasons that are device detected at last rebuild:

- Time out
- Response checksum
- Parity
- Framing
- HART FD missing
- HART FD mismatch

If there is a failure, the appropriate channel's bit is set. The bit is not latched.

The I/O module performs automatic retries and therefore you should rarely recognize communication problems at the protocol layer. Therefore, this flag can be used to qualify the communication quality.

Range: 0 = No HART failures are detected, 1 = HART failure is detected

HART Current Ratio (Input Word 11 — Bits 8...15)

An alarm signal for HART Current Fault indicates that the HART data value is outside the HART Current Fault limit percentage. Active when limit is exceeded. The analog measured current is compared with the digital current value, read out dynamically via the HART interface. Active when limit is exceeded. See HART Current Fault Limit (Configuration Words 4...7 - Bits 3...7, 11...15) on page 36.

Range: 0 = Normal, 1 = Fault is detected.

1794-IF8IH HART Current Ratio(1)

HART Current Ratio Limit	Decimal Value	Bits				
		15	14	13	12	11
		7	6	5	4	3
Disabled	0	0	0	0	0	0
Not applicable	1	0	0	0	0	1
Not applicable	2	0	0	0	1	0
Not applicable	3	0	0	0	1	1
Not applicable	4	0	0	1	0	0
5%	5	0	0	1	0	1
6%	6	0	0	1	1	0
7%	7	0	0	1	1	1
8%	8	0	1	0	0	0
9%	9	0	1	0	0	1
10%	10	0	1	0	1	0

1794-IF8IH HART Current Ratio[1] (Continued)

HART Current Ratio Limit	Decimal Value	Bits				
		15	14	13	12	11
		7	6	5	4	3
...	...	...	...	...	...	...
30%	30	1	1	1	1	0
31%	31	1	1	1	1	1

(1) HART Current Ratio is represented by Words 4...7 (Bits 11...17 and 3...7) in the 1794-IF8IH Configuration Data Table on page 26.

HART Transmitter List (Input Word 10 — Bits 8...15)

Indicates that a HART transmitter has been detected on this channel, during the last rebuild.

Range: 0 = A HART Transmitter is not detected, 1 = A HART Transmitter is detected

Secondary Input Data (Cyclic EDT Input Data) for 1794-IF8IH and 1794-IF8IHNFXT Modules

The data in the following table is where the HART protocol device data is published. The data table is not available as a group in the module. It is formed in the communication adapter by the Cyclic EDT mechanism (adapter to module) where the adapter cyclically requests a set of module attributes and forms this data table.

Additionally, the adapter appends the first two words to indicate communication status between adapter and module regarding each of the cyclic EDT transfers. Two words are provided, for status, as today's adapters provide for up to 32 items in the CEDT queue.

For this module the total Secondary Input Data Table (I) Words are 98, as shown in Table 13.

Table 13 - Secondary Input Data (Cyclic Input Data) for the 1794-IF8IH and 1794-IF8IHNFXT Modules

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0/I	Reserved								Ch7 (HART CMD 3 Communication Status)	Ch6	Ch5	Ch4	Ch3	Ch2	Ch1	Ch0
1	Reserved															
2	CH0 HART Field Device Status								CH0 HART Comm Status							
3	Reserved				FVA	TVA	SVA	PVA	CH0 HART Loop Status							
4	CH0 HART Primary Value (IEEE 754-1985 Single-Precision 32-bit floating point)															
5																
6	CH0 HART Secondary Value (IEEE 754-1985 Single-Precision 32-bit floating point)															
7																
8	CH0 HART Third (Tertiary) Value (IEEE 754-1985 Single-Precision 32-bit floating point)															
9																
10	CH0 HART Fourth (Quaternary) Value (IEEE 754-1985 Single-Precision 32-bit floating point)															
11																
12	CH0 SV Units Code								CH0 PV Units Code							
13	CH0 FV Units Code								CH0 TV Units Code							
14...25	Words 2...13 for Channel 1															
26...37	Words 2...13 for Channel 2															
38...49	Words 2...13 for Channel 3															
50...61	Words 2...13 for Channel 4															
62...73	Words 2...13 for Channel 5															
74...85	Words 2...13 for Channel 6															
86...97	Words 2...13 for Channel 7															

Table 13 - Secondary Input Data (Cyclic Input Data) for the 1794-IF8IH and 1794-IF8IHNFXT Modules (Continued)

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Where:	CHn HART CMD 3 Communication Status 0 = HART CMD 3 Communication Disabled or No Error; 1: HART CMD 3 Communication Error between Adapter and Module See HART Command 3 Communication Status (Secondary Input Word 0 —Bits 0...7) on page 43.															
	CHn HART Comm Status (HART CMD 3 Response first status byte) See HART Field Device Command and Communication Status (Secondary Input Word 2 — Bits 0...7) on page 43.															
	CHn HART Field Device Status (HART CMD 3 Response second status byte) See HART Field Device Status (Secondary Input Word 2 — Bits 8...15) on page 43.															
	HART Loop Status Bit 0 = HART enable; 0 = Disabled, 1 = Enabled Bit 1 = Device Connected; 0 = Not Connected, 1 = Connected Bit 2 = Response Error; 0 = No HART message failure, 1 = Response ended in error Bit 3 = CMD 48 Update; 0 = CMD 48 not updated, 1 = CMD 48 updated Bit 4 = HART Loop Tolerance Error; 0 = No HART Current Fault, 1 = HART Current Fault Bit 5 = HART Update; 0 = HART Device information not updated, 1 = HART Device information updated since last read Bit 6 = HART message; 0 = No new message, 1 = HART user message queue has completed a message Bit 7 = Reserved See HART Field Device Status (Secondary Input Word 2 — Bits 8...15) on page 43.															
	PVA – The primary variable for this channel has been acquired. SVA – The secondary variable for this channel has been acquired. TVA – The tertiary variable for this channel has been acquired. FVA – The fourth (quaternary) variable for this channel has been acquired.															

HART Command 3 Communication Status (Secondary Input Word 0 — Bits 0...7)

These bits indicate status of the CEDT data transfer between the adapter and the modules. In this module, the CEDT attributes transferred are HART Command 3 data for the indicated channel number.

Range: 0 = Disabled or no CEDT HART Command 3 Communication error between the adapter and the I/O module, 1 = A CEDT HART Command 3 Communication error between the adapter and the I/O module.

HART Field Device Command and Communication Status (Secondary Input Word 2 — Bits 0...7)

These bits indicate the status of HART field device communication for the channel. It is the first status byte of the HART response and the field device status. For example, parity error, framing error, invalid selection, or too few data bytes received.

HART Field Device Status (Secondary Input Word 2 — Bits 8...15)

These bits are part of the CMD 3 data response of the HART FD. It is the second status byte of the HART response and the FD status. For example, primary variable is out of limits or analog output is saturated.

CMD 3 Second Status Byte Response Codes

HART Field Device Status	
Bit 0	The primary variable is out of limits.
Bit 1	Non-primary variable is out of limits.
Bit 2	An analog output is saturated.
Bit 3	An analog output is current fixed.
Bit 4	More statuses are available.
Bit 5	Cold start
Bit 6	The configuration is changed.
Bit 7	Field device malfunction

IMPORTANT When a communication error is reported in the CMD 3 first status byte, the value of bits 0...7 is 0.

Data Table Reference: HART Field Device Status, Secondary Input Word 2, bits 8...15.

HART Loop Status (Secondary Input Word 3 — Bits 0...7)

This bit indicates the status of the HART loop from the I/O modules point of view. This byte is generated by the I/O module itself and not by the HART field device.

HART Loop Status (Secondary Input Word 3 — Bits 0...7)

Bit 0	HCS_COMM_ENABLED[1] — HART is enabled on this channel. Range: 0 = HART is not enabled on this channel, 1 = HART is enabled on this channel.
Bit 1	HCS_CONNECTED — A connection is established with this device. Range: 0 = No HART connection on this channel, 1 = There is a HART connection on this channel.
Bit 2	HCS_RESPONSE_ERROR — A HART message attempt ended in failure. Range: 0 = No HART message failures, 1 = HART message attempt failed.
Bit 3	HCS_CMD48_UPDATE — Extended HART status (Command 48) was updated. Range: 0 = Extended HART status (Command 48) was not updated, 1 = Extended HART status (Command 48) was updated.
Bit 4	HCS_ILOOP_TOLERANCE — HART Current Fault loop current fault Range: 0 = No HART Current Fault loop current fault, 1 = HART Current Fault loop current fault
Bit 5	HART_update — The HART field device data for the channel is updated since the last read. Range: 0 = No HART FD data update, 1 = New HART FD data is available.
Bit 6	HART_Message — The channel's HART message queue has completed a message since the request was received. Range: 0 = No HART message has completed, 1 = A HART message has completed.
Bit 7	Reserved (for 1794-IF8IH and 1794-OF8IH only)
	PV Configuration Values do not match (for 1794-IF8IHNFXT) Range: 0 = No mismatch, 1 = PV Damping/Range mismatch

(1) HCS = HART Communications State machine.

HART PV Status (Secondary Input Word 3 — Bits 8...15)

This bit indicates the status of the HART variables (primary, secondary, third, and fourth).

HART PV Status (Secondary Input Word 3 — Bits 8...15)

Bit 8	The primary variable for this channel has been acquired.
Bit 9	The secondary variable for this channel has been acquired.
Bit 10	The third variable for this channel has been acquired.
Bit 11	The fourth variable for this channel has been acquired.
Bit 12	Reserved
Bit 13	
Bit 14	
Bit 15	

HART Primary Variable (Secondary Input Words 4, 5 — Bits 0...15)

This is the Primary HART Variable from the field device. Its datatype is REAL and it is organized according to the Byte Order, see Byte Order (Configuration Word 0 – Bits 0, 1, 8, and 9).

HART Secondary Variable (Secondary Input Words 6, 7 — Bit 0...15)

This is the Secondary HART Variable from the field device. Its datatype is REAL and it is organized according to the Byte Order, see Byte Order (Configuration Word 0 – Bits 0, 1, 8, and 9).

HART Third Variable (Secondary Input Words 8, 9 — Bits 0...15)

This is the Third HART Variable from the field device. Its datatype is REAL and it is organized according to the Byte Order, see Byte Order (Configuration Word 0 – Bits 0, 1, 8, and 9).

HART Fourth Variable (Secondary Input Words 10, 11 — Bits 0...15)

This is the Fourth HART Variable from the field device. Its datatype is REAL and it is organized according to the Byte Order, see Byte Order (Configuration Word 0 – Bits 0, 1, 8, and 9).

HART Primary Variable Units Code (Secondary Input Word 12 — Bits 0...7)

This is the units code for the HART Primary Variable.

HART Secondary Variable Units Code (Secondary Input Word 12 — Bits 8...15)

This is the units code for the HART Secondary Variable.

HART Third Variable Units Code (Secondary Input Word 13 — Bits 0...7)

This is the units code for the HART Third Variable.

HART Fourth Variable Units Code (Secondary Input Word 13 — Bits 8...15)

This is the units code for the HART Fourth Variable.

RTD Output Data for 1794-IF8IHNFXT Module

The output data consists of the EDT Write Word and the HART Control Word.

RTD Output Data Table – 1794-IF8IHNFXT Module

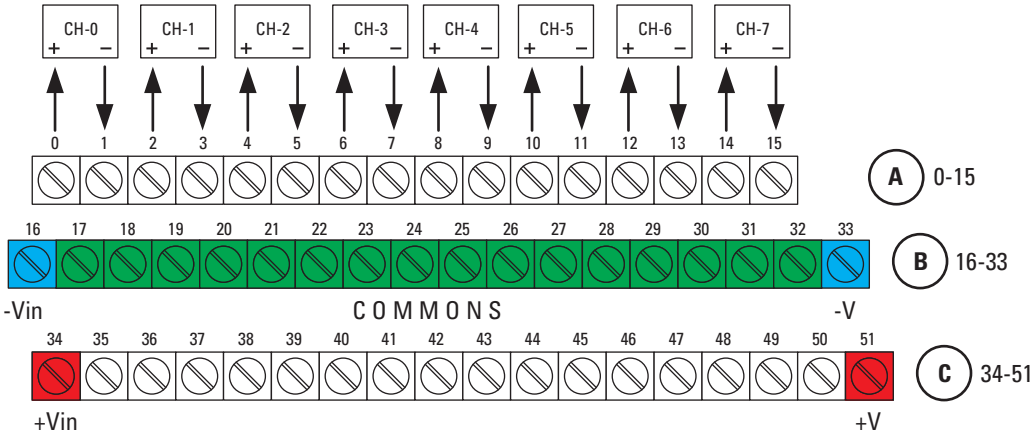
Word	Read/Write	Data Type	Bit															
			15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
14/EDT	Write	RealT	R/P	Flt	Reserved		EDT COntr				EDT Write Data							
15/0:0	Write	RealT	Reserved								HO7	HO6	HO5	HO4	HO3	HO2	HO1	HO0
Where:	Flt = Fault R = Reserved HO = HART Off Dynamic Control bit This HART OFF control output bit, along with the HART Disable configuration bit, determines if HART communication is enabled on a channel. The HART Disable configuration bit has priority and disables all communication on a channel at all times even when the HART OFF output bit is False(0). If the HART Disable configuration bit is False(0), then the HART OFF output control bit can be used to dynamically turn HART off and back on again at any time.																	

Module Configuration for the 1794-OF8IH Module

Output Connections

The 1794-OF8IH module uses the 1794-TB3, series B terminal base for full isolation. Connect the I+ output to the terminal contacts indicated and the corresponding center return contact. Make sure to observe the polarity indicated for proper operation. Channels are numbered in order, 0...7, from left to right.

1794-OF8IH Terminal Base Connections



Connect an external 24V DC power supply to terminals 34 (V+) and 16 (V-) observing polarities indicated. Terminals 17...33 are internally shorted to terminal 16. Terminal 51 is internally shorted to terminal 34. Use the DC output terminals only for low-power modules, following FLEX I/O power connection guidelines.

Follow the wiring instruction for FLEX I/O modules, terminal bases, and racks. Ground the shield drain wire at one end only. The preferred/required location is at the sensor end. When connecting the shield drain at the module end, connect it to earth ground using a panel or DIN rail mounting screw.

Configuration Parameters for 1794-OF8IH Module

The last row of Table 14 provides a brief description of each configuration parameter bit for the 1794-OF8IH module. The next sections provide more information about each bit.

All configuration parameters are EDT WRITE items. Configuration is located at EDT assembly 37.

Table 14 - 1794-OF8IH Configuration Data Table

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	FT	R	EW7	EW6	EW5	EW4	BOB(1)		R	R	EW3	EW2	EW1	EW0	BOA(1)	
1	DH7	DH6	DH5	DH4	DH3	DH2	DH1	DH0	Reserved(2)							
2	CH3 Format				CH2 Format				CH1 Format				CH0 Format			
3	CH7 Format				CH6 Format				CH5 Format				CH4 Format			
4	CH1 HART Current Ratio					L1	AFS1		CH0 HART Current Ratio					L0	AFS0	
5	CH3 HART Current Ratio					L3	AFS3		CH2 HART Current Ratio					L2	AFS2	
6	CH5 HART Current Ratio					L5	AFS5		CH4 HART Current Ratio					L4	AFS4	
7	CH7 HART Current Ratio					L7	AFS7		CH6 HART Current Ratio					L6	AFS6	
8	DF7	DF6	DF5	DF4	DF3	DF2	DF1	DF0	DM7	DM6	DM5	DM4	DM3	DM2	DM1	DM0
9	Channel 0 Analog Fault Value Output Data															
10	Channel 1 Analog Fault Value Output Data															
11	Channel 2 Analog Fault Value Output Data															
12	Channel 3 Analog Fault Value Output Data															
13	Channel 4 Analog Fault Value Output Data															
14	Channel 5 Analog Fault Value Output Data															
15	Channel 6 Analog Fault Value Output Data															
16	Channel 7 Analog Fault Value Output Data															
17	Reserved								C7	C6	C5	C4	C3	C2	C1	C0

Table 14 - 1794-OF8IH Configuration Data Table (Continued)

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Where:	AFSn = Analog Fault Selection for Channel n. See Channel Fault Mode Selection on page 49.															
	BOA = Byte order group A BOB = Byte order group B Byte order group A and B values must match each other. See Byte Order (Configuration Word 0 — Bits 0, 1, 8, and 9) on page 47.															
	Cn = HART CMD 3 Disable 0 = HART CMD 3 communication is enabled, 1 = HART CMD 3 communication is disabled.															
	CHn Format = Channel data formats See Channel Data Formats for 1794-OF8IH on page 51.															
	CHn HART Current Ratio = HART current fault ratio on channel n Valid values are 0, 5...31% of full scale. A value of 0 disables this feature. See 1794-OF8IH HART Current Ratio on page 50 for more information.															
	DFn = Channel n Digital Fault Mode Selection 0 = Reset (0 mA), 1 = Hold Last State															
	DHn = Disable HART communications on channel n 0 = HART communications is enabled, 1 = HART communication is disabled.															
	DMn = Channel n Enable Digital Mode 0 = Analog, 1 = Digital															
	EWn = Fault Enable for wire fault detection on channel n.(3) 0 = Disable wire off/lead break detection, 1 = Enable wire off/lead break detection(4)															
	FT = Local Fault Mode 0 = The outputs are set to a safe value on communication faults only, 1 = The outputs are set to a safe value on any fault.															
	Ln = Channel n Enable Latching of Wire Fault 0 = Unlatched, 1 = Latched															
	R = Reserved															

(1) Not shown or used in Studio 5000 Logix Designer application version 23 or earlier.
(2) Reserved data may not be shown in certain controller software.
(3) Not supported in analog 0...20 mA formats.
(4) Lead break must be present for 100 ms or more.

Configuration Parameter Descriptions for 1794-OF8IH Module

This section provides a description of each configuration parameter bit indicated in the 1794-OF8IH Configuration Data Table on page 46.

Byte Order (Configuration Word 0 — Bits 0, 1, 8, and 9)

Selects the byte order of the module data.

The MSW and EDT words (Words 0, 1 and 15) of the primary input data table (see Table 15) are not swapped. All other primary input data and configuration data listed in Table 14 and Table 15 are adjusted according to the following chart:

Byte Order

Byte Order Group B		Byte Order Group A		Description
Bit 9	Bit 8	Bit 1	Bit 0	
0	0	0	0	Little Endian Format (default) — All data entries are in true little endian format.
1	0	1	0	Word Swap — Word swap only applies to values requiring more than one word. For example, 32-bit float values.
0	1	0	1	Byte Swap — Byte swap all words in data table.
1	1	1	1	Big Endian Format — All data entries are in true big endian format.

IMPORTANT You cannot change the Byte Order using Studio 5000 Logix Designer application version 23 or earlier, since it uses the default Byte Swap setting.

The purpose of this parameter is to allow this module to operate properly within data networks or systems utilizing various byte orders, across all data types (for example, Boolean data to 32-bit float data).

Upon receiving the configuration assembly the module must inspect Byte Order to determine how to interpret the configuration assembly.

To accommodate unknown Endian formats at power-up and configuration reception, two Byte Order bit sets are provided. These dual sets ensure the module receives correct configuration information, regardless of whether the data is in Big Endian or Little Endian format. For configuration validation, both bit sets must match exactly. If they don't, the module reverts to the last valid configuration (default configuration on initial startup) and sets its Diagnostic Status to '2 - Configuration Failure'.

Within the CIP-based Rockwell Automation control system all data is transported and utilized in Little Endian format. As such the default mode of operation for these modules is Little Endian.

Since these modules are HART modules, and HART data is normally provided in Big Endian format, the module is responsible for converting any HART in Big Endian format into Little Endian format.

Examples

In each of the following examples, the module operates internally with little Endian byte order.

Little Endian Byte Order

If Byte Order indicates Little Endian, utilize the configuration assembly directly.

Partial Configuration Assembly as Received

1	Param A CH2	Param B CH2	Param A CH1	Param B CH1
2	Param C CH0 (2nd byte)		Param C CH0 (low byte)	
3	Param C CH0 (high byte)		Param C CH0 (3rd byte)	

Partial Configuration Assembly after Byte Order Inspection and Processing

1	Param A CH2	Param B CH2	Param A CH1	Param B CH1
2	Param C CH0 (2nd byte)		Param C CH0 (low byte)	
3	Param C CH0 (high byte)		Param C CH0 (3rd byte)	

Provide all data to the Primary Data table in Little Endian byte order. The following two tables are an example of the Primary Input Data, if Byte Order indicated Little Endian.

Primary Input Data Before Byte Order Processing for Little Endian

1	CH2 Data A (REAL) (2nd byte)	CH2 Data A (REAL) (low byte)
2	CH2 Data A (REAL) (high byte)	CH2 Data A (REAL) (3rd byte)
3	CH2 Data C	CH2 Data B

Primary Input Data After Byte Order Processing for Little Endian

1	CH2 Data A (REAL) (2nd byte)	CH2 Data A (REAL) (low byte)
2	CH2 Data A (REAL) (high byte)	CH2 Data A (REAL) (3rd byte)
3	CH2 Data C	CH2 Data B

Word Swap Byte Order

If Byte Order Indicates Word Swap, utilize the known structure of the configuration assembly to reorder multi-word data elements to Little Endian byte order, for example, word swap Floats.

Partial Configuration Assembly as Received

1	Param A CH2	Param B CH2	Param A CH1	Param B CH1
2	Param C CH0 (high byte)		Param C CH0 (3rd byte)	
3	Param C CH0 (2nd byte)		Param C CH0 (low byte)	

Partial Configuration Assembly After Byte Order Inspection and Processing

1	Param A CH2	Param B CH2	Param A CH1	Param B CH1
2	Param C CH0 (2nd byte)		Param C CH0 (low byte)	
3	Param C CH0 (high byte)		Param C CH0 (3rd byte)	

Provide all data to the Primary Data table in Word Swap byte order, except the MSW and EDT words (Words 0, 1, and 15), these remain in Little Endian byte order.

The following tables are an example of the Primary Input Data, if Byte Order indicated Word Swap.

Primary Input Data Before Byte Order Processing for Little Endian

1	CH2 Data A (REAL) (2nd byte)	CH2 Data A (REAL) (low byte)
2	CH2 Data A (REAL) (high byte)	CH2 Data A (REAL) (3rd byte)
3	CH2 Data C	CH2 Data B

Primary Input Data After Byte Order Processing for Little Endian

1	CH2 Data A (REAL) (high byte)	CH2 Data A (REAL) (3rd byte)
2	CH2 Data A (REAL) (2nd byte)	CH2 Data A (REAL) (low byte)
3	CH2 Data C	CH2 Data B

Default: 0

Fault Mode (Configuration Word 0 – Bit 15)

Selects whether the channel fault detection is enabled or disabled. There is a 100 ms filter for wire off/lead break and short circuit detection.

Range: 0 = Disable, 1 = Wire off/lead break and short circuit fault detection are enabled.

Default: 0

Channel Fault Mode Selection

Analog Fault Mode	Decimal Value	Bits	
		9	8
		1	0
Min Scale	0	0	0
Max Scale	1	0	0
Hold Last State	2	1	0
User Specified Data Value	3	1	1

Disable HART Channel 0...7 (Configuration Word 17 — Bits 0...7)

When this bit is set, the I/O module inhibits HART Communication.

Range: 0 = Enable, 1 = Disable

Default: 0

HART Current Ratio (Configuration Words 4...7 – Bits 3...7, 11...15.)

Delivers the percentage value (in steps of 1%, starting at 5%) of the threshold for causing a HART current fault indication (input signal deviation HART/ Analog) up to a 31% maximum deviation.

If there is no HART transmitter on the loop or the loop is not in the transmitter list, the function is switched off internally in the I/O module.

Default: 0

Range: 0...31
0 = Disabled
1...4 = Not supported by the I/O module. A configuration request of 1...4 causes the module to use a value of 5.
5...31 = Percentage threshold data (5...31%)

1794-OF8IH HART Current Ratio(1)

HART Current Ratio Limit	Decimal Value	Bits				
		15	14	13	12	11
		7	6	5	4	3
Disabled	0	0	0	0	0	0
Not applicable	1	0	0	0	0	1
Not applicable	2	0	0	0	1	0
Not applicable	3	0	0	0	1	1
Not applicable	4	0	0	1	0	0
5%	5	0	0	1	0	1
6%	6	0	0	1	1	0
7%	7	0	0	1	1	1
8%	8	0	1	0	0	0
9%	9	0	1	0	0	1
10%	10	0	1	0	1	0
...	...	...	...	...	...	...
30%	30	1	1	1	1	0
31%	31	1	1	1	1	1

(1) HART Current Ratio parameter bits are represented by Configuration Words 4, 5, 6, and 7, bits 3...7, 11...15. See 1794-OF8IH Configuration Data Table on page 46.

Data Format (Configuration Words 2, 3 – Bits 0...3, 4...7, 8...10, 12...15)

Specifies the module data format for a channel.

If a module channel has never been configured, then it can be assumed to have the default configuration Analog Data Format "0", 0...20 mA and Analog Mode Fault State minimum range. If a non-assigned format is selected, then the diagnostic bit "2" for configuration failure is set, and the module channel goes to the default fault state minimum range.

If the configuration is changed from the default, and then changed again to a non-assigned format, then the diagnostic bit "2" for configuration failure is set and the module goes to the fault state for the last valid configuration.

Formats 13 and 14 are 2's complement data formats and require data to be provided to the module in that form.

Range: 0...15. See the table 1794-OF8IH Data Formats on page 51.

1794-OF8IH Data Formats

Data Format	Format	Resolution	Full Output Range	Module Data Processing	Data Table Value (Interpretation)	Count per mA/ Resolution	Analog Fault State
0 (default)	0...20 mA as mA	0.1% of 0...20 mA	0...22 mA	Output = $\frac{\text{Datatable}}{1000}$	0...22000 (0...22.000 mA)	1000/1.0 µA	Min = 0 mA Max = 22 mA hold Last = hold FS value
1	0...20 mA as %	0.2% of 0...20 mA	0...22 mA	Output = 20 $\left(\frac{\text{Datatable}}{10000}\right)$	0...11000 (0...110.00%)	500/2.0 µA	Min = 0 mA Max = 22 mA hold Last = hold FS value
2	0...20 mA	–	0...22 mA	Not assigned			
3	Unsigned integer as 0...20 mA	0.03% of 0...20 mA	0...20 mA	Output = 20 $\left(\frac{\text{Datatable}}{65535}\right)$	0...65535 (0...20 mA)	3276/0.305 µA	Min = 0 mA Max = 20 mA hold Last = hold FS value
4	4...20 mA as mA	0.1% of 4...20 mA	2...22 mA	Output = $\frac{\text{Datatable}}{1000}$	2000...22000 (2.000...22.000 mA)	1000/1.0 µA	Min = 2 mA Max = 22 mA hold Last = hold FS value
5	4...20 mA	–	4...20 mA	Not assigned			
6	4...20 mA		4...20 mA	Not assigned			
7	Unsigned integer as 4...20 mA	0.03% of 4...20 mA	4...20 mA	Output = 16 $\left(\frac{\text{Datatable}}{65535}\right)$ + 4	0...65535 (4...20 mA)	4095/0.244 µA	Min = 4 mA Max = 20 mA hold Last = hold FS value
8	0...20 mA	–	0...20 mA	Not assigned			
9	0...20 mA		0...20 mA	Not assigned			
10	0...20 mA		0...20 mA	Not assigned			
11	0...20 mA		0...20 mA	Not assigned			
12	4...20 mA		–	Not assigned			
13	4...20 mA			Not assigned			
14	4...20 mA as %	0.16% of 4...20 mA	2...22 mA	Output = 16 $\left(\frac{\text{Datatable}}{10000}\right)$ + 4	-1250...+11250 (2's complement) (-12.50...+112.50%)	625/1.6 µA	Min = 2 mA Max = 22 mA hold Last = hold FS value
15	4...20 mA	–	4...20 mA	Not assigned			

Channel Data Formats for 1794-OF8IH[1]

Format[2]	Bits 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	Format Name	Signal Range		User Range		Resolution (µA)
			LO	HI	LO	HI	
0	0 0 0 0	0...20 mA in Milliamps	0.00	22.00	0 (0.000 mA)	22000 (22.000 mA)	1.0
1	0 0 0 1	0...20 mA in % Full Scale	0.00	22.00	0 (0%)	11000 (110.00%)	2.0
3	0 0 1 1	0...20 mA in UINT	0.00	20.00	0	65535	0.3052
4[3]	0 1 0 0	4...20 mA in Milliamps	2.00	22.00	2000 (2.000 mA)	22000 (22.000 mA)	1.0
7[2]	0 1 1 1	4...20 mA in UINT	4.00	20.00	0	65535	0.2441
14[2]	1 1 1 0	4...20 mA in % Full Scale	2.00	22.00	-1250 (-12.50%)	11250 (112.50%)	1.6

(1) The Data Format configuration bits are represented by Configuration Words 2 and 3, bits 0...3, 4...7, 8...11, and 12...15. See 1794-OF8IH Configuration Data Table on page 46.
(2) All other formats are invalid.
(3) HART Communication is supported with these data formats only.

If data sent to the module is out of range, the value is clipped, and the Diagnostic Data is set to "11" for data out of range. To view a graphical representation of this performance, see the example on page 13.

Latch Mode (Configuration Words 4...7 — Bits 2, 10)

Latch Mode determines channel operation under wire-off/lead-break fault conditions. Channel fault detection occurs on a continuous basis. If a fault is detected, the channel fault alarm is set (if Fault Mode is enabled).

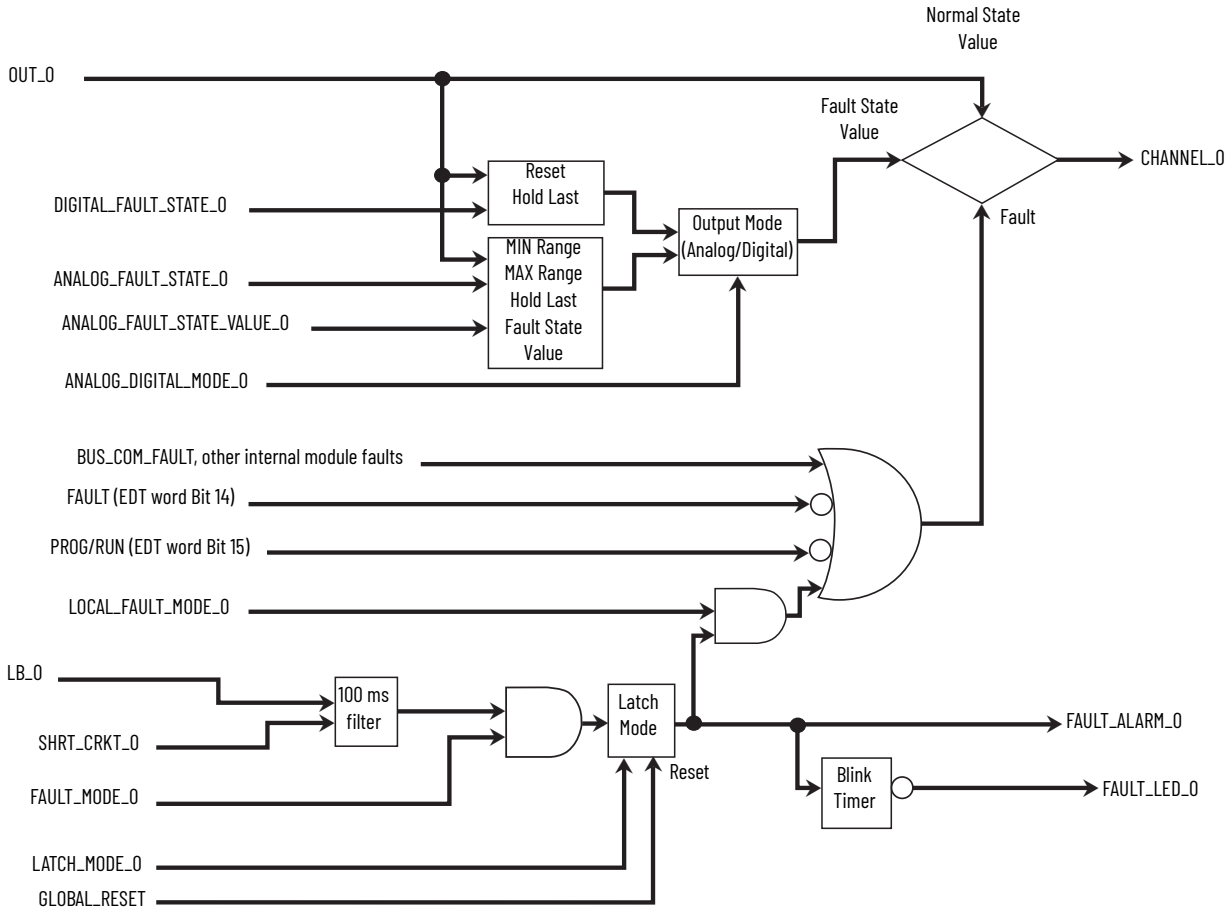
If latch is ON, the fault is latched until a Global Reset is issued, at which time the fault is reset.

If latch is OFF, the channel reports the fault until the fault is corrected. Upon correction, the fault is reset.

Range: 0 = Off, 1 = On

Default: 0

Analog/Digital Output Normal and Fault State Operation



Analog/Digital Output Mode (Configuration Word 8 — Bits 0...7)

Selects if the channel acts as a normal analog output or as a switched digital output.

Analog Output Mode follows the Analog Data Format selected.

Digital Output Mode configurations:

- When the Fault Mode is 0 (disable) — Output: 0 mA = ON, 22 mA = OFF
- When the Fault Mode is 1 (wire-off fault detection is enabled) — Output: 500 µA (OFF) and 22 mA (ON)

Range: 0 = Normal analog output, 1 = Switched digital output
Default: 0

Analog Fault Mode Selection (Configuration Words 4...7 — Bits 0...1, 8...9)

Determines how the module reacts to faults when channel is used in analog normal mode.

Default: 0
Range: 0...3, where:

0 = Go to minimum value of Full Output Range

1 = Go to maximum value of Full Output Range

2 = Hold last state

3 = Use channel fault state values given in Words 10...17

Analog Fault Value Output Data (Configuration Words 9...16 — Bits 0...15)

This parameter specifies the fault state value of the analog output data for the channel. Specific format is controlled by analog data format control parameter, see Data Format (Configuration Words 2, 3 — Bits 0...3, 4...7, 8...10, 12...15) on page 50.

This data is used when the channel is in analog output mode.

Examples

If you choose the data format 2 and set the fault state value to 11000 (accordingly 110.00%), the I/O module provides 22 mA in case of fault state.

If you choose the data format 7 and set the fault state value to 32000, the I/O module provides 11.813 mA in case of fault state.

The fault state value is treated in the same way as the normal output value is treated. So you do not need to recalculate the current when you are used to work in a special format.

Range: See Data Format (Configuration Words 2, 3 — Bits 0...3, 4...7, 8...10, 12...15) on page 50.

Default: 0

Digital Mode Fault State (Configuration Word 8 — Bit 8...15)

Determines how the module reacts to faults when channel is used in digital mode.

Default: 0
Range: 0 = Reset; 1 = Hold Last State

HART CMD 3 Disable (Configuration Word 7 — Bits 0...7)

This bit disables the I/O channel from forwarding the associated HART Command 3 information from the HART Field device through Cyclic EDT to the adapter.

This does not disable the module from gathering HART Command 3 information from the HART Field device. As such, HART Command 3 information from the HART Field device is still available via an unconnected message to the module.

This feature should be exercised by using a Null ForwardOpen method in the Logix system. That is, the connection to the module and original configuration has already been accomplished. If utilized, Command 3 Disable should be utilized under program control (change bit in module configuration tag then issue reconfiguration message to module) or, more unusually, a manual operation by an operator (open module profile, change parameter then apply).

When the adapter powers up, it reads each module to determine who is out there. For EDT modules, it reads Assembly 125 to gain knowledge of all the assemblies the module has, whether they are EDT/CEDT and whether they are GET/SET. If an assembly is a CEDT assembly, the adapter automatically creates a CEDT entry and drops it into its EDT machine to gather/send this assembly and store the assembly locally in the adapter.

After this power-up process, a ForwardOpen configuration arrives by the network for the module. The adapter proxy strips off a portion (Configuration Part 1) and sends the rest (Configuration Part 2) on through EDT to the module. Within this module configuration part are the CMD3 Disable Chx bits. These bits instruct the module to include or not include CMD3 scanning in its work for the channel. Users may not have HART devices on every channel so some channels may want CMD3 disabled.

If users do disable scanning, the module also disables the adapter from including that particular associated assembly in the CEDT scanning routine by the following method:

The module uses the CMD3 Disable Chx bits to adjust the CEDT entries in Assembly 125. Initially the Assembly 125 CEDT assemblies (46...53) are identified as CEDT (0xC0 Cyclic EDT Get or 0x40 Cyclic EDT Set) this causes the adapter to add them to the CEDT scan. If the module receives a configuration with CMD3 Disable CHx bits set to "1" (disable), the module changes the appropriate channel Assembly 125 entry from 0xC0 Cyclic EDT Get to 0x80 EDT Get or 0x40 Cyclic EDT Set to 0x00 EDT Set.

Whenever the adapter receives a ForwardOpen to an EDT module, the adapter automatically rereads the module Assembly 125 to gain a new view of the assemblies. This reread is to check for any changes of CEDT Assembly status to EDT status. If a CMD3 Disable Chx is received on any particular channel, now the previous CEDT assembly is marked as an EDT assembly and the adapter does not add that assembly to the CEDT scan. This ForwardOpen reread happens any time that a module receives a ForwardOpen, including a Null-ForwardOpen received during system runtime.

Default: 0
Range: 0 = Enabled; 1 = Disabled

Primary Input Data (RTD Output Data) for the 1794-OF8IH Module

Table 15 - Primary Input Data (RTD Output Data) for 1794-OF8IH Module

Word/ SISOC	Read/ Write	Data Transport	Bit															
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0/MSW	Read	RealT	Bus Fail Bits			#	# Words to Read				Module ID/Type							
1/EDT			PU/ Cfg	Event Pdg	Reserved		Read	Write	SeqCount		EDT Data Byte from Module							
2/S0			F7	F6	F5	F4	F3	F2	F1	F0	Diagnostic status							
3/S1			Reserved															
4/S2			C7	C6	C5	C4'	C3	C2	C1	C0	Reserved							
5/S3			X7	X6	X5	X4	X3	X2	X1	X0	Reserved							
6/EDT	Write		Prog/ Run	Fault	Reserved		Read	Write	SeqCount		EDT Data Byte from Module							
7/00	Read		Reserv ed	Global reset	Reserved						D7	D6	D5	D4	D3	D2	D1	D0
8/01	Write		Output Data Channel 0															
9/02	Read		Output Data Channel 1															
10/03			Output Data Channel 2															
11/04			Output Data Channel 3															
12/05			Output Data Channel 4															
13/06			Output Data Channel 5															

Table 15 - Primary Input Data (RTD Output Data) for 1794-OF8IH Module (Continued)

Word/ SISOC	Read/ Write	Data Transport	Bit															
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
14/07	Read	RealT	Output Data Channel 6															
15/EDT			Output Data Channel 7															
Where:	Fn = Channel n Fault alarm Cn = Channel n HART Current Fault Xn = HART n Transmitter List Dn = Channel n Digital out																	

Fault Alarm (S0 Read Word — Bits 8...15)

Alarm signal for open-wire channel fault, detected at <2 mA (<500 µA in digital mode) and short circuit (R<42 in the 4...20 mA range, <86 in digital mode, channel off).

This alarm is disabled when a data format is selected which includes 0 mA.
Range: 0 = Normal, 1 = Wire off/short circuit fault detected
Default: 0

Diagnostic Data (S0 Read Word — Bits 0...7)

Response from module as to its condition.

Diagnostic Data

Diagnostic Status Value: 0	Channel	Failure
0x00	All	No Errors (default)
0x10	Channel 0	HART Iloop Threshold Configuration Error
0x11	Channel 1	HART Iloop Threshold Configuration Error
0x12	Channel 2	HART Iloop Threshold Configuration Error
0x13	Channel 3	HART Iloop Threshold Configuration Error
0x14	Channel 4	HART Iloop Threshold Configuration Error
0x15	Channel 5	HART Iloop Threshold Configuration Error
0x16	Channel 6	HART Iloop Threshold Configuration Error
0x17	Channel 7	HART Iloop Threshold Configuration Error
0x40	Channel 0	Format Configuration Error
0x41	Channel 1	Format Configuration Error
0x42	Channel 2	Format Configuration Error
0x43	Channel 3	Format Configuration Error
0x44	Channel 4	Format Configuration Error
0x45	Channel 5	Format Configuration Error
0x46	Channel 6	Format Configuration Error
0x47	Channel 7	Format Configuration Error
0x50	Channel 0	Data out of range
0x51	Channel 1	Data out of range
0x52	Channel 2	Data out of range
0x53	Channel 3	Data out of range
0x54	Channel 4	Data out of range
0x55	Channel 5	Data out of range
0x56	Channel 6	Data out of range
0x57	Channel 7	Data out of range
0x80	Module	Hardware Failure
0x90	Channel 0	Calibration Error
0x91	Channel 1	Calibration Error
0x92	Channel 2	Calibration Error
0x93	Channel 3	Calibration Error

Diagnostic Data (Continued)

Diagnostic Status Value: 0	Channel	Failure
0x94	Channel 4	Calibration Error
0x95	Channel 5	Calibration Error
0x96	Channel 6	Calibration Error
0x97	Channel 7	Calibration Error
0xA0	Channel 0	Internal Bus Com Error
0xA1	Channel 1	Internal Bus Com Error
0xA2	Channel 2	Internal Bus Com Error
0xA3	Channel 3	Internal Bus Com Error
0xA4	Channel 4	Internal Bus Com Error
0xA5	Channel 5	Internal Bus Com Error
0xA6	Channel 6	Internal Bus Com Error
0xA7	Channel 7	Internal Bus Com Error

HART Status Fields

The 1794-OF8IH module supports two connections for pass-through messages. Pass-through messages provide the ability to send HART messages to the HART device by passing through the I/O Module. In addition, HART device information that is automatically gathered by the I/O module may be accessed through this interface.

The 1794-OF8IH module provides eight queues for each of the two connections. This allows each connection to have up to eight messages pending at any given time, one for each channel. HART pass-through message implements a timeout, which is fixed at 20 seconds.

The first connection is provided for a ladder logic user. The following status bits are provided to simplify ladder logic. The second connection does not have status bits provided in the RTD. It can obtain this status by implementing polling messages using the pass-through message interface.

HART Current Fault (S2 Read Word — Bits 8...15)

Alarm signal for HART Current Fault, indicating the HART data value is outside the HART Current Fault limit percentage. Active when limit is exceeded. The analog measured current is compared with the digital current value, read out dynamically via the HART interface. Active when limit is exceeded. See HART Current Ratio (Configuration Words 4...7 — Bits 3...7, 11...15.) on page 50.

Range: 0 = Normal, 1 = Fault detected

HART Transmitter List (S3 Read Word — Bits 8...15)

Indicates that a HART transmitter is detected on this channel, during the last rebuild.

Range: 0 = A HART Transmitter is not detected; 1 = A HART Transmitter is detected.

Primary Output Data (RTD Output Data) for 1794-OF8IH Module

Analog Output Data

Specifies the value of the analog output data to the module. The specific format is controlled by the Module Data Format Control parameter. This data is used when the channel is in analog output mode.

Range: See Data Format (Configuration Words 2, 3 — Bits 0...3, 4...7, 8...10, 12...15) on page 50.

Digital Output Data (00 Read Word — Bits 0...7)

Specifies the value of the digital output data to the module. This data is used when the channel is in digital output mode.

Range: 0 (OFF) and 1 (ON), where:

- 0 = 0 mA, 1 = 22 mA when the Fault Mode is 0 (disable)
- 0 = 500 µA, 1 = 22 mA when the Fault Mode is 1 (wire-off fault detection is enabled)

See Analog/Digital Output Mode (Configuration Word 8 — Bits 0...7) on page 52.

Global Reset (00 Read Word — Bit 14)

This bit resets all latched fault alarms. It acts in conjunction with the Latch Retry parameter. If any channel faults occur, the Latch Retry parameter can be set to cause the fault to be latched and the output to go to its fault state value if the Local Fault mode bit is set.

This is an edge triggered signal. It must first be set to the "1" state, then reset occurs on "1" to "0" transition.

Range: 0 = Normal; 1 = Reset

Fault (EDT Write Word — Bit 14) and Run/Prog (EDT Write Word — Bit 13)

Fault bit — Signal from the adapter to the module indicating that communication with network is interrupted.

Prog/Run bit — Signal from the adapter to the module indicating the processor mode. These two bits are used together.

When the adapter and I/O are initially powered up, the Fault bit is set to '0' by the adapter. On power-up, any module outputs remain OFF (0 mA out) or reset.

When the Fault bit is at '1', the outputs follow the data specified in output data words if the Prog/Run bit indicates that the processor is in the Run mode ('1'). When the Fault bit is '0' or the Prog/Run bit indicates that the processor is in the Program mode ('0'), the outputs follow the data specified in the fault state configuration data words. The following table explains this in more detail.

Prog/Run Bit	Fault Bit	Module Output Behavior
0	0	Follow fault state configuration data words
0	1	
1	0	
1	1	Follow output data words

Fault (EDT Write Word) — Bit 14

Default: 0

Range: 0 = Local control of outputs; 1 = Adapter controls outputs

Run/Prog (EDT Write Word) — Bit 13

Default: 0

Range: 0 = Processor in PROGRAM mode; 1 = Processor in RUN mode

Secondary Input Data (Cyclic EDT Input Data) for 1794-OF8IH

The description of this data table section is identical for HART input or output modules. See Secondary Input Data (Cyclic EDT Input Data) for 1794-IF8IH and 1794-IF8IHNFXT Modules on page 42 for description information.

Bit parameter descriptions are provided in the last row of Table 16.

Table 16 - Secondary Input Data (Cyclic EDT Input Data) for 1794-OF8IH Module

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Reserved								CH7 (HART CMD 3 Communication Status)	CH6	CH5	CH4	CH3	CH2	CH1	CH0
1	Reserved															
2	CH0 HART Field Device Status								CH0 HART Comm Status							
3	Reserved				FVA	TVA	SVA	PVA	CH0 HART Loop Status							
4	CH0 HART Primary Value (IEEE 754-1985 Single-Precision 32 bit floating point)															
5																
6	CH0 HART Secondary Value (IEEE 754-1985 Single-Precision 32 bit floating point)															
7																
8	CH0 HART Third (Tertiary) Value (IEEE 754-1985 Single-Precision 32 bit floating point															
9																
10	CH0 HART Fourth (Quaternary) Value (IEEE 754-1985 Single-Precision 32 bit floating point)															
11																
12	CH0 SV Units Code								CH0 PV Units Code							
13	CH0 FV Units Code								CH0 TV Units Code							
14...25	Words 2...13 for channel 1															
26...37	Words 2...13 for channel 2															
38...49	Words 2...13 for channel 3															
50...61	Words 2...13 for channel 4															
62...73	Words 2...13 for channel 5															
74...85	Words 2...13 for channel 6															
86...97	Words 2...13 for channel 7															
Where:	CHn HART CMD 3 Communication Status 0 = HART CMD 3 Communication Disabled or No Error; 1: HART CMD 3 Communication Error between Adapter and Module See HART Command 3 Communication Status (Secondary Input Word 0 —Bits 0...7) on page 43.															
	CHn HART Comm Status (HART CMD 3 Response first status byte) See HART Field Device Command and Communication Status (Secondary Input Word 2 — Bits 0...7) on page 43.															
	CHn HART Field Device Status (HART CMD 3 Response second status byte) See HART Field Device Status (Secondary Input Word 2 — Bits 8...15) on page 43.															
	HART Loop Status Bit 0 = HART enable; 0 = Disabled, 1 = Enabled Bit 1 = Device Connected; 0 = Not Connected, 1 = Connected Bit 2 = Response Error; 0 = No HART message failure, 1 = Response ended in error Bit 3 = CMD 48 Update; 0 = CMD 48 not updated, 1 = CMD 48 updated Bit 4 = HART Loop Tolerance Error; 0 = No HART Current Fault, 1 = HART Current Fault Bit 5 = HART Update; 0 = HART Device information not updated, 1 = HART Device information updated since last read Bit 6 = HART message; 0 = No new message, 1 = HART user message queue has completed a message Bit 7 = Reserved See HART Field Device Status (Secondary Input Word 2 — Bits 8...15) on page 43.															
	PVA – The primary variable for this channel has been acquired. SVA – The secondary variable for this channel has been acquired. TVA – The third (tertiary) variable for this channel has been acquired. FVA – The fourth (quaternary) variable for this channel has been acquired.															

Secondary Data Table Section Created by the Adapter

The description of this data table section is identical for HART input or output modules. See HART Command 3 Communication Status (Secondary Input Word 0 —Bits 0...7) on page 43 for more information.

HART Command 3 Communication Status (Input Word 0 — Bits 0...7)

The description of this data table section is identical for HART input or output modules. See HART Command 3 Communication Status (Secondary Input Word 0 —Bits 0...7) on page 43 for more information.

Secondary Data Table Section from Module CEDT Attribute

The description of this data table section is identical for HART input or output modules.

HART Field Device Status (Secondary Input Word 2 — Bits 8...15)

This byte is part of the CMD 3 data response of the HART FD. It is the second status byte of the HART response and the FD status, example: "primary variable out of limits" or "analog output saturated".

CMD 3 Second Status byte response codes

HART Field Device Status	
Bit 0	Primary variable out of limits
Bit 1	Non-primary variable out of limits
Bit 2	Analog output saturated
Bit 3	Analog output current fixed
Bit 4	More status available
Bit 5	Cold start
Bit 6	Configuration changed
Bit 7	Field device malfunction

IMPORTANT When a communication error is reported in the CMD 3 first status byte, bits 0...7 will have the value of 0.

Data Table Reference: HART Field Device Status, Secondary Input Word 2, bits 8...15.

Interpret the Status Indicators

The module status indicators conform to the FLEX I/O standard. The module has one Red and one Green indicator for global module status/power indication. The module supports six states, common to all Phase 1 EDT-compliant modules, as described below. A single bi-color indicator displays the module status as given below.

Module Status Indicators

Module State	Condition	PU Bit	Prog/Run bit	Fault bit	LED Color and State
New	Power up initialization is complete and self-test successful. The module loads the stored configuration, if available. Read the Module Information Block(1).	*(2)	*	*	Flashing red at 1 Hz
No Config	The module has not received configuration from Master. It can Set and Get attributes.	0	*	*	Flashing green at 1 Hz
Idle	The controller is in Program Mode and communication is normal.	1	0	1	Flashing green at 1 Hz
Active	The controller is in Run Mode and communication is normal.	1	1	1	Steady green
Fault	FLEX I/O Communications Fault or PU bit = 1 and Fault bit = 0	*	*	0	Flashing green at 1 Hz
Fatal Fault	Self-test failure or an invalid state transition causes module failure.	*	*	*	Steady red
Off	External power has not been applied.				Off

(1) The status bits in the table correspond to the module status bits available in the module status word.
(2) Bit state flagged as '*' depends on the state transition, per FLEX I/O Systems Specifications.

Edit Your 1794-IF8IHNFXT Module Configuration with Studio 5000 Logix Designer (Full Profile)

The Studio 5000 Logix Designer application automatically creates module-defined data types and tags when a module is created. This section describes how to modify the default configuration for your 1794-IF8IHNFXT module.

IMPORTANT Use the Studio 5000 Logix Designer application version 17 or later to configure the 1794-IF8IH and 1794-OF8IH modules. Configuration for the 1794-IF8IHNFXT module is done through the Module Definition interface using Studio 5000 Logix Designer application version 24 or later, as described in the next sections. See Use the 1794-IF8IHNFXT Module with the Generic and Thin Profiles on page 103 if you are using Studio 5000 Logix Designer application version 23 or earlier.

Data types symbolically name module configuration, input, and output data. Tags let you provide each a unique name, such as where the user-defined data type and slot reside on the controller. This information is used to communicate data between the controller and module.

After you have set configuration for a module, you can review and change your choices. You can change configuration data and download it to the controller while online. This is called dynamic reconfiguration.

Your freedom to change some configurable features, though, depends on whether the controller is in Remote Run Mode or Program Mode.

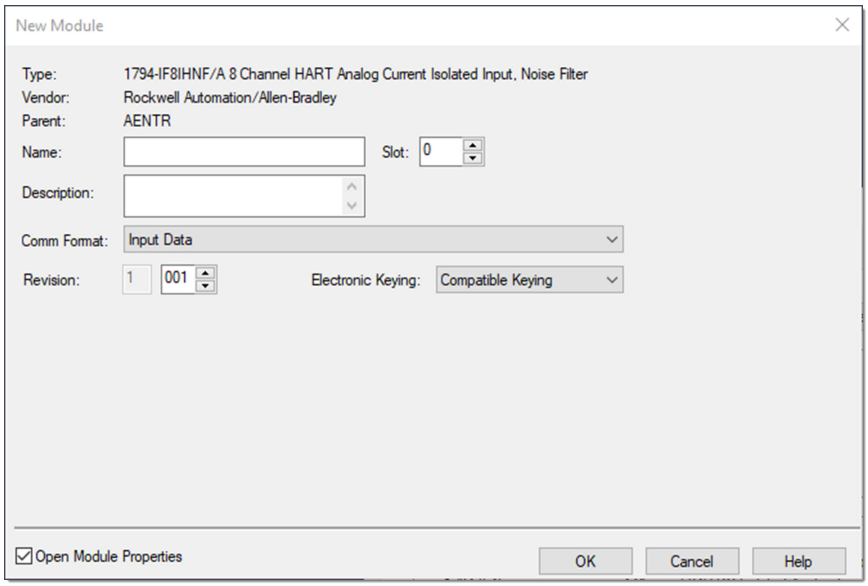
IMPORTANT Although you can change configuration while online, you must go offline to add or delete modules from the project.

The editing process begins on the main page of the Studio 5000 Logix Designer application.

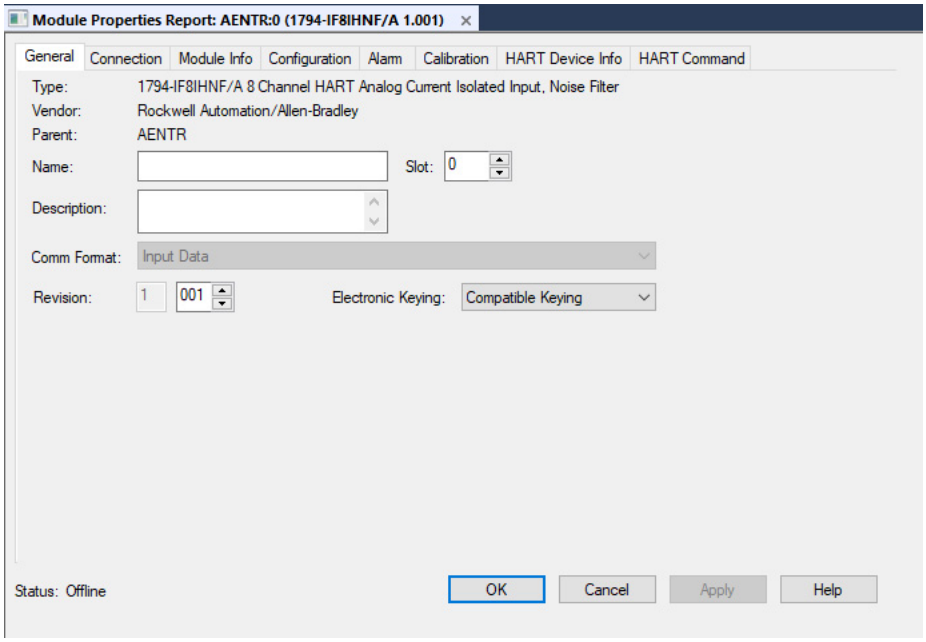
1. On the I/O Configuration tree for your project in Studio 5000 Logix Designer application, add your 1794-IF8IHNFXT module.

   On the New Module dialog that appears when you add your module to the I/O Configuration tree, specify the following properties of the module:

   - Name
   - Description
   - Slot
   - Comm Format
   - Revision
   - Electronic Keying



2. Select Open Module Properties. The Module Properties dialog appears and has the following tabs available for configuration:
   - General
   - Connection
   - Module Info
   - Configuration
   - Alarm
   - Calibration
   - HART Device Info
   - HART Command



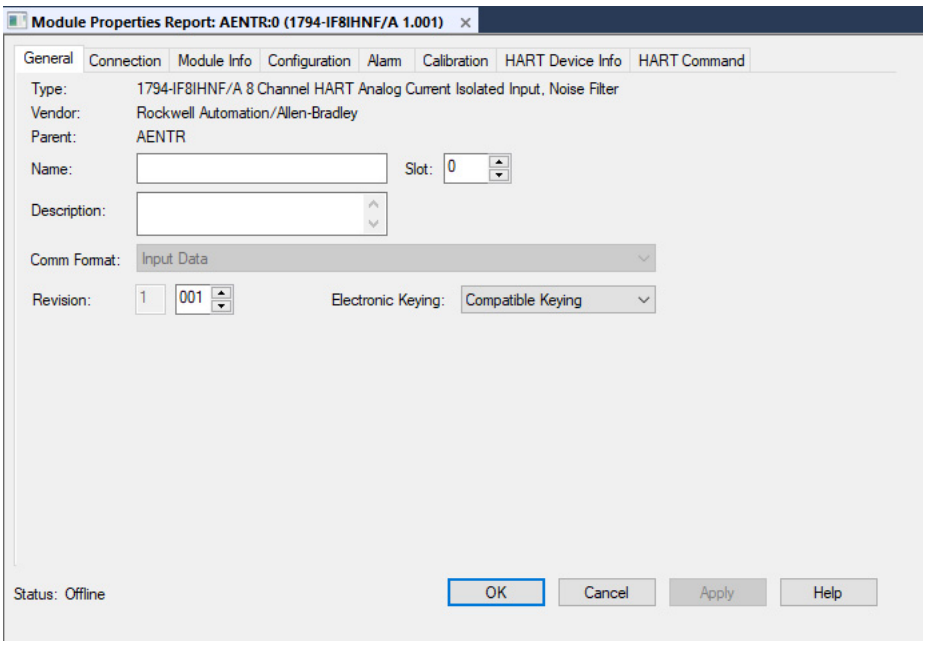
3. Select any of the tabs to edit the parameters for your module. The next sections show you how to edit the different tabs in the Module Properties dialog.

Tabs can be selected in any order. The following examples are for instructional purposes.

General Tab

The General tab allows you to edit the following general properties:

- Name
- Description
- Slot
- Comm Format
- Revision
- Electronic Keying



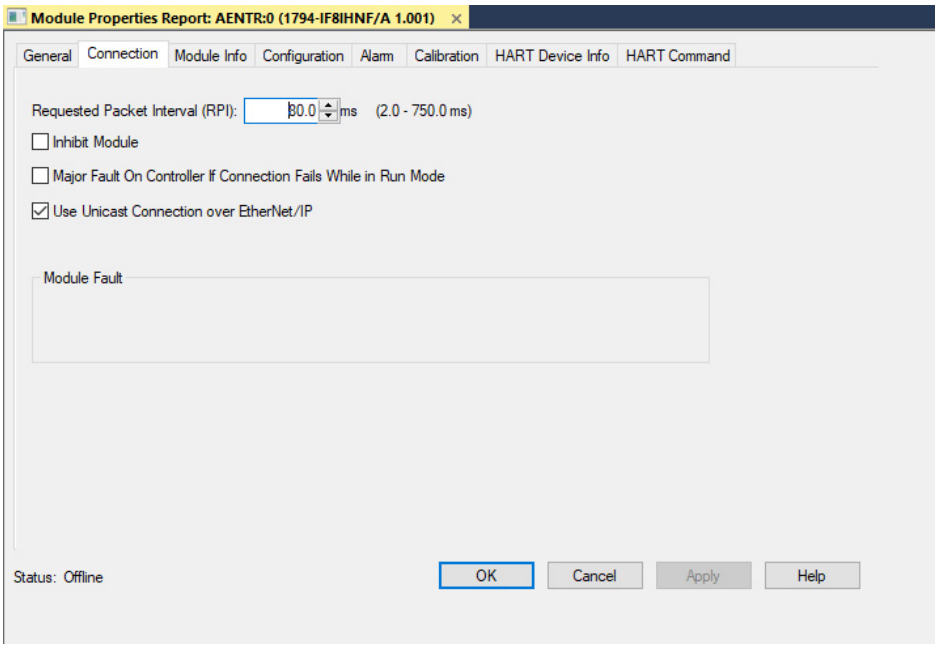
General Tab Field Descriptions

Field Name	Description
Name	Describes the name of the module for identification purpose
Description	General description of the module
Slot	Module position in the I/O chassis
Comm Format	The following Comm Format options are available: **Input Data** – Specifies an independent connection where a device receives inputs from the target device and send configuration data to the target device. An Input Only connection does not send outputs. It only receives inputs. You can specify multiple Input Only connections to the target device from different originators. **Listen-Only and Input Data** – The Listen Only mode option lets the controller and module establish communication without the controller sending any configuration data. **Input Data and HART PV** **Listen-Only, Input Data and HART PV**
Revision	Specifies the module major and minor revisions
Electronic Keying	The electronic keying feature automatically compares the expected module, as shown in the I/O Configuration tree, to the physical module before I/O communication begins. You can use electronic keying to help prevent the communication to a module that does not match the type and revision expected. For each module in the I/O Configuration tree, the user-selected keying option determines if, and how, an electronic keying check is performed. Typically, three keying options are available: • Exact Match • Compatible Keying (default) • Disable Keying **Exact Match** is an electronic keying protection mode that requires the physical module and the module configured in the software to match according to vendor, catalog number, major revision, and minor revision. **Compatible Keying** indicates that the module determines whether to accept or reject the communication. Compatible Keying is the default setting. It allows the physical module to accept the key of the module configured in the software, if the configured module is one the physical module is capable of emulating. The exact level of emulation required is product and revision specific. **Disable Keying** indicates that the keying attributes are not considered when attempting to communicate with a module. Other attributes, such as data size and format, are considered and must be acceptable before I/O communication is established. With Disabled Keying, I/O communication may occur with a module other than the type specified in the I/O configuration tree with unpredictable results. This keying option is not generally recommended.

Connection Tab

The Connection tab on the Module Properties dialog lets you enter a Requested Packet Interval (RPI), inhibit a module, and set a connection fault when the controller is in Run mode. The RPI provides a defined, maximum period of time when data is transferred to the owner-controller.

1. Choose from the options on the Connection tab.



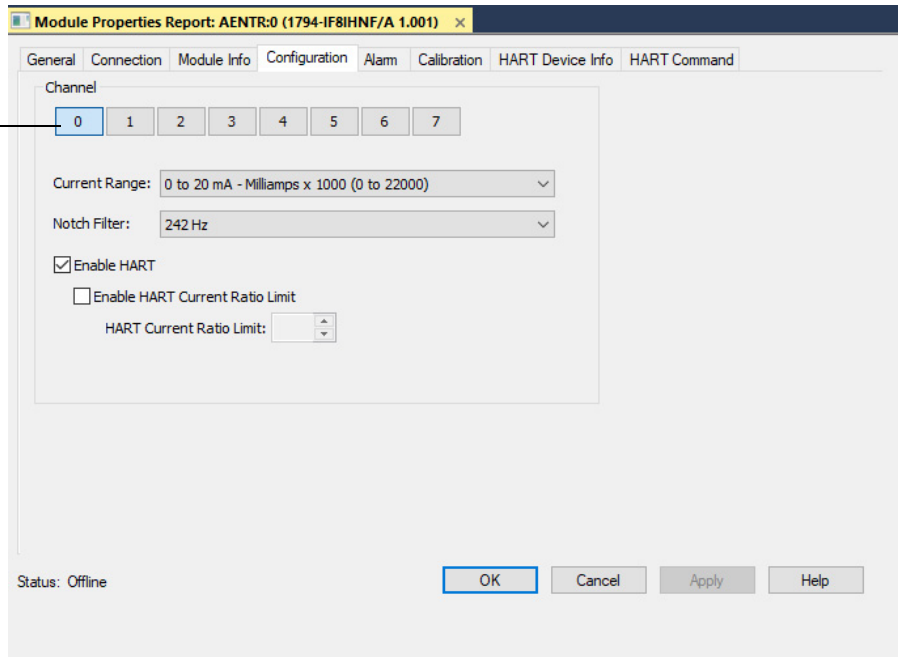
Connection Tab Field Descriptions

Field	Description
Requested Packet Interval (RPI) (ms)	A user-defined rate at which the module updates the information sent to its owner-controller. This interval defines the slowest rate at which a module sends its data to the owner-controller. The time ranges from 2.0...750.0 ms and is sent to the module with all other configuration parameters.
Inhibit Module	Select the checkbox to prevent communication between the owner-controller and the module. This option allows for maintenance of the module without faults being reported to the controller.
Major Fault On Controller If Connection Fails While in Run Mode	Select the checkbox to create a major fault if there is a connection failure with the controller while in Run mode.
Use Unicast Connection over EtherNet/IP	This option is enabled by default. Unicast connections are point-to-point transmissions between a source node and destination node on the network. A Frame is sent to a single destination.
Module Fault	The Module Fault message area remains empty while you are offline. The type of connection fault appears in the message area if a fault occurs when the module is online.

2. Do one of the following:
   a. Select Apply to store the changes and stay on the dialog to choose another tab.
   b. Select OK if you are done with changes and want to close the dialog.

Configuration Tab

The Configuration tab on the Module Properties dialog lets you program information on each of the eight channels on the 1794-IF8IHNFXT module.



Select Channel button to configure each channel.

1. Choose from the options on the Configuration tab.

Configuration tab

Field	Description
Channel	Indicates the eight input channels 0...7
Current Range	The Current Range dropdown has the following options: • 0 to 20 mA - Milliamps x 1000 (0 to 22000) – **Default** • 0 to 20 mA - % Full Scale (0 to 11000) • 0 to 20 mA - Binary (0 to 65535) • 4 to 20 mA - Milliamps x 1000 (2000 to 22000) • 4 to 20 mA - % Full Scale (-1250 to +11250) • 4 to 20 mA - Signed 2's Complement (-7710 to 32767) • 4 to 20 mA - Binary (0 to 65535)
Notch Filter	Serves to reject higher frequency noise and harmonics. Choose a value in Hz that specifies the time constant for a digital first order lowpass filter on the input. A value of 0 disables the filter. The Notch Filter options are: • 242 Hz (Default) • 123 Hz • 62 Hz • 19.6 Hz • 16.7 Hz • 10 Hz • 4.17 Hz
Enable HART	Allows you to enable or disable HART feature. Select the checkbox to enable HART. By default the Enable HART checkbox remains unchecked. The Enable HART checkbox (DHn bit in the configuration data table) along with the HART OFF Dynamic control bit determines if HART communication is enabled on a channel. The Enable HART checkbox has priority and disables all HART communication on a channel at all times even when the HART OFF Dynamic control bit is False (0). If Enable HART checkbox is selected, then the HART OFF output control bit can be used to dynamically turn HART On/Off at any time. See HART On/Off at Dynamic Runtime on page 65 for more details.
Enable HART Current Ratio Limit	Allows you to enable or disable the HART current ratio limit per channel. Default: Unchecked
HART Current Ratio Limit	Allows you to set the HART current ratio limit. For more information about this parameter, see HART Current Ratio (Configuration Words 4...7 – Bits 3...7, 11...15.) on page 50.

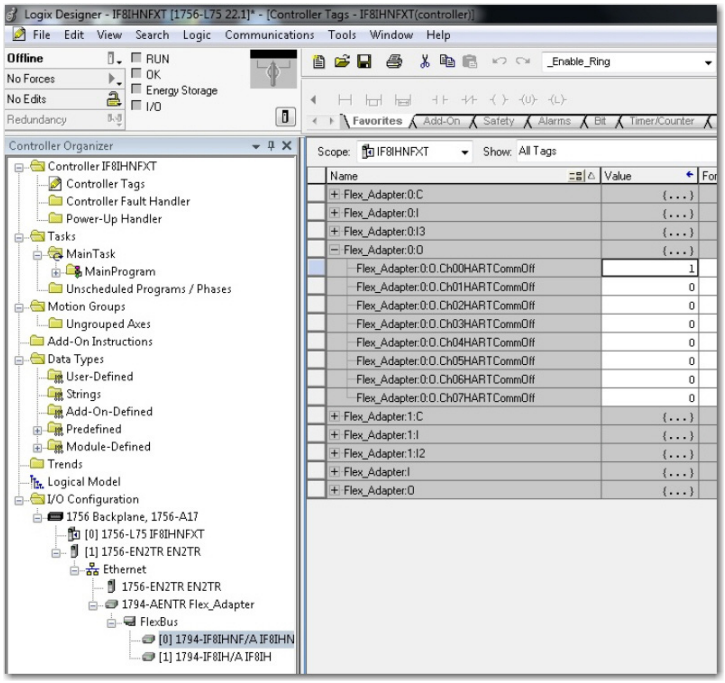
2. Do one of the following:
   a. Select Apply to store the changes and stay on the dialog to choose another tab.
   b. Select OK if you are done with changes and want to close the dialog.

HART On/Off at Dynamic Runtime

To enable HART at runtime:

1. Ensure that the Enable HART checkbox in Configuration tab is selected.
2. Change the HART OFF Dynamic Control bit (tag name: ChxxHARTCommOff) to 1 to turn off the HART dynamically.
3. Change the HART OFF Dynamic Control bit (tag name: ChxxHARTCommOff) to 0 to turn on the HART dynamically again.

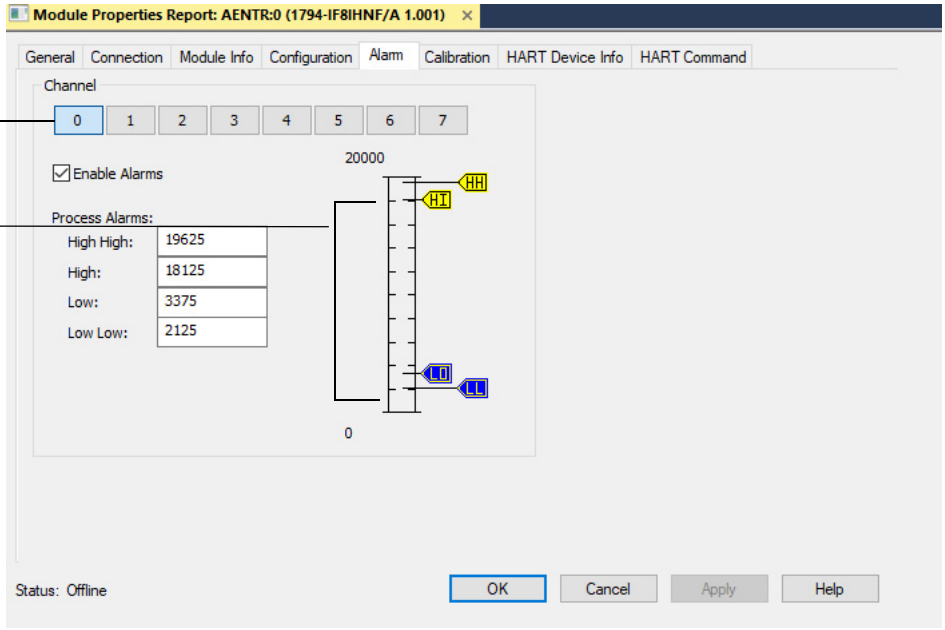
Edit the output controller tag ChxxHARTCommOff using a configuration software such as Studio 5000 Logix Designer version 24 or later. To enable HART on each channel, set the tag value to 0. To disable HART, set the tag value to 1 as shown below.



The HART OFF dynamic control bit, along with the HART Disable configuration bit, determines if HART communication is enabled on a channel. The HART Disable (DHn) configuration bit has priority and disables all HART communication on a channel at all times even when the HART OFF dynamic control bit is False (0). If the HART Disable configuration bit is False (0), then you can use the HART OFF dynamic control bit to turn HART Off/On dynamically at any time.

Alarm Tab

The Alarm tab on the Module Properties dialog lets you program high and low limits, and disable and latch alarms per channel.



Select Channel button to set limits and alarm configuration for each of the eight channels.

Use the sliders to set limits. HH slider for High High alarm limits, HI slider for High alarm limits, LL slider for Low Low alarm limits, and LO slider for Low alarm limits.

1. Choose from the options on the Alarm tab.

Alarm Configuration Tab Field Descriptions

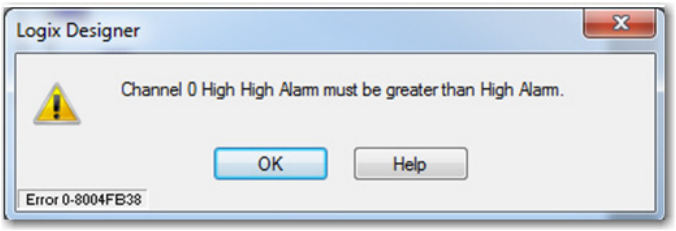
Field	What to do	Description
Channel	Select a push button to correspond to a channel (0…7).	Select the channel that is being configured.
Enable Alarms	Select the checkbox to enable alarms.	Check the box to enable all alarms and show the slider control. **Important**: When you disable all alarms, you disable process, and channel diagnostic alarms (for example, underrange and overrange). We recommend that you disable only unused channels so extraneous alarm bits are not set. Default: Unchecked
Process Alarms Type a value for each of the four alarm trigger points that alert you when the module has exceeded these limitations. You also can use the respective slider icon to set a trigger value.		
High High	Choose from -32,768…+32,767	Select a value so that any value out of range in this field causes a profile validation error. This value also appears in the HH slider on this dialog.
High	Choose from -32,768…+32,767	Select a value so that any value out of range in this field causes a profile validation error. This value also appears in the HI slider on this dialog.
Low	Choose from -32,768…+32,767	Select a value so that any value out of range in this field causes a profile validation error. This value also appears in the LO slider on this dialog.
Low Low	Choose from -32,768…+32,767	Select a value so that any value out of range in this field causes a profile validation error. This value also appears in the LL slider on this dialog.

2. After the channels are configured, do one of the following:
   a. Select Apply to store the changes and stay on the dialog to choose another tab.
   b. Select OK to apply the changes and close the dialog.
   c. Select Cancel to close the dialog without applying changes.

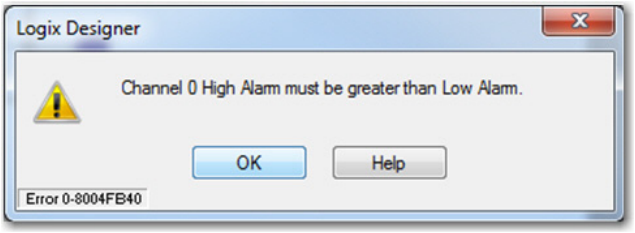
Alarm Conditions

When configuring alarms, error messages are displayed if the following conditions are not met.

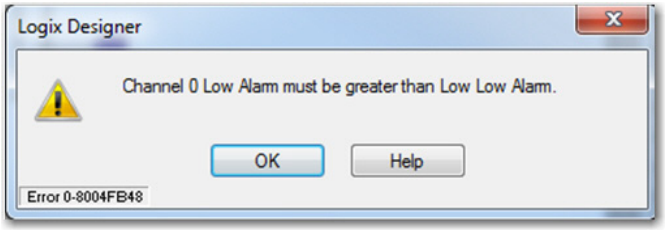
1. The High High alarm value must be greater than the High Alarm value. If not, the following error message is displayed.



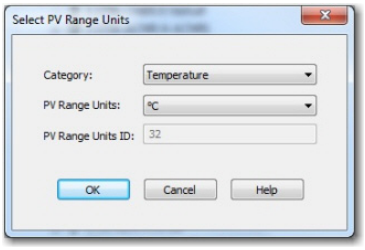
2. The High Alarm value must be greater than the Low Alarm value. If not, the following error message is displayed.

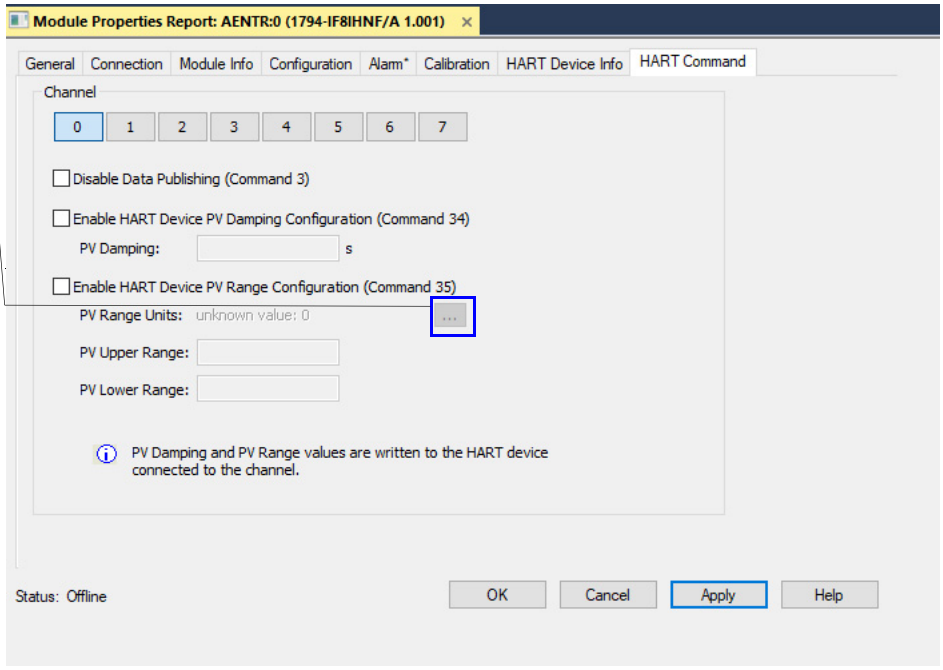


3. The Low Alarm value must be greater than the Low Low Alarm value. If not, the following error message is displayed.



HART Command Tab





IMPORTANT The HART Command tab can be edited only in RUN mode.

Possible Categories for PV Range Units

Field	Possible Categories
Category	Electrical
	Energy
	Length
	Mass
	Mass Flow
	Mass per volume
	Miscellaneous
	Power
	Pressure
	Radial velocity
	Temperature
	Time
	Velocity
	Viscosity
	Volume
	Volumetric flow

Configure the HART Command tab based on the following field descriptions.

HART Command Tab Field Descriptions

Field	What to do	Description
Channel	Select a push button to correspond to a channel (0...7).	Select the channel that is being configured.
Disable Data Publishing (Command 3)	Select the checkbox to disable.	This option removes the channel being configured from the cyclic update lists such that the channel's HART data is no longer being published to the user. Default: Unchecked
Enable HART Device PV Damping Configuration (Command 34)	Select the checkbox to enable.	This option enables the module to automatically configure the HART device by sending the HART Command 34 during the initialization sequence that occurs when either a device is first detected on the channel or the module detects that the device's "Config Changed" bit is set. Default: Unchecked
PV Damping	Specify 32-bit floating point value.	This field is enabled if "Enable HART Device PV Damping Configuration (Command 34)" checkbox is selected. Values allowed are 32-bit floating point value. It sets the PV Damping value for the channel. For more information about PV Damping, see Enable HART PV Damping Value (Configuration Word 105 — Bits 0...7) on page 37.
Enable HART Device PV Range Configuration (Command 35)	Select the checkbox to enable.	This option enables the module to automatically configure the HART device by sending the HART Command 35 during the initialization sequence that occurs when either a device is first detected on the channel or the module detects that the device's "Config Changed" bit is set. This feature requires the user to enter the upper, lower, and range units code values into the module's configuration data. Default: Unchecked

HART Command Tab Field Descriptions (Continued)

Field	What to do	Description
PV Range Units	1. Select three dots button next to the PV Range Units option to bring up the Select PV Range Units dialog. 2. Specify the value.	The field is enabled when "Enable HART Device PV Range Configuration (Command 35)" checkbox is selected. This field specifies the PV Range Units for the channel being configured.
PV Upper Range	Specify 32-bit floating point value.	The field is available when "Enable HART Device PV Range Configuration (Command 35)" checkbox is selected. This field specifies the PV Upper Range value for the channel being configured.
PV Lower Range	Specify 32-bit floating point value.	The field is available when "Enable HART Device PV Range Configuration (Command 35)" checkbox is selected. This field specifies the PV Lower Range value for the channel being configured.

Auto-configure HART Device with user-supplied PV Damping and Range Values

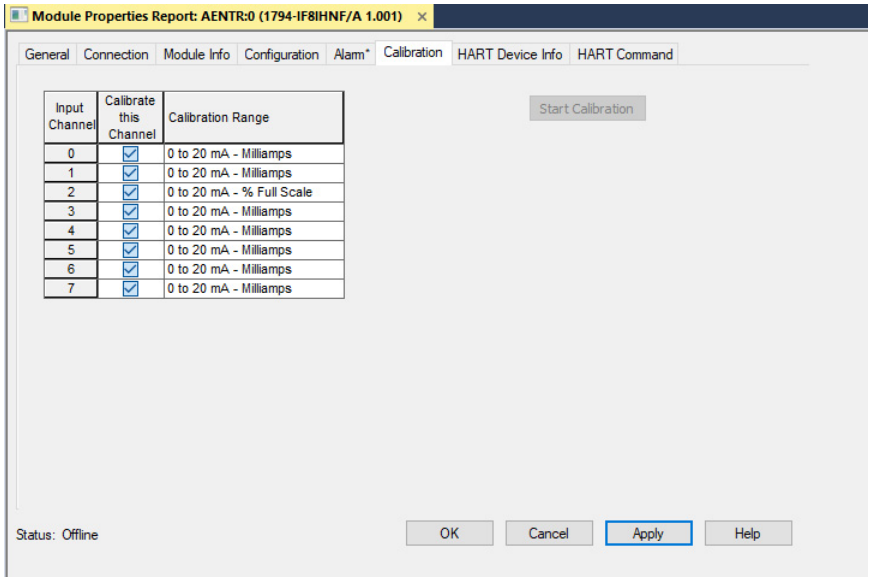
The Enable HART Device PV Damping and Enable HART Device PV Range configuration allows for automatic configuration of a HART device with user-supplied PV Damping and/or PV Range values by sending HART commands 34, 35, and 44 to the device at device connection time or if the module detects that the configuration bits are set. See Enable HART PV Upper and Lower Range (Configuration Word 105, bits 8...15) on page 37 and Enable HART PV Damping Value (Configuration Word 105 — Bits 0...7) on page 37.

The HART commands only sent to the device if the feature is enabled and the module detects that the value in the device differs from what is in the configuration table. If the PV Range enable bit is set and the module detects that the PV Units Code value of the device does not match the value in the configuration table, the module also sends command 44 to the HART device. The PV Damping, PV units code, and the PV Upper and Lower Range floating point values reside in the configuration table.

If the write operation fails (device write protected, unsupported values, and so on), then a status flag is set in bit 7 of the "HART Loop Status" byte to notify the user that the device is not configured properly. If the write is successful and no errors are returned from the device, the module also verifies the floating point values (PV Range and Damping) read back from the device are within 0.5% of the configuration table values, otherwise an error is flagged.

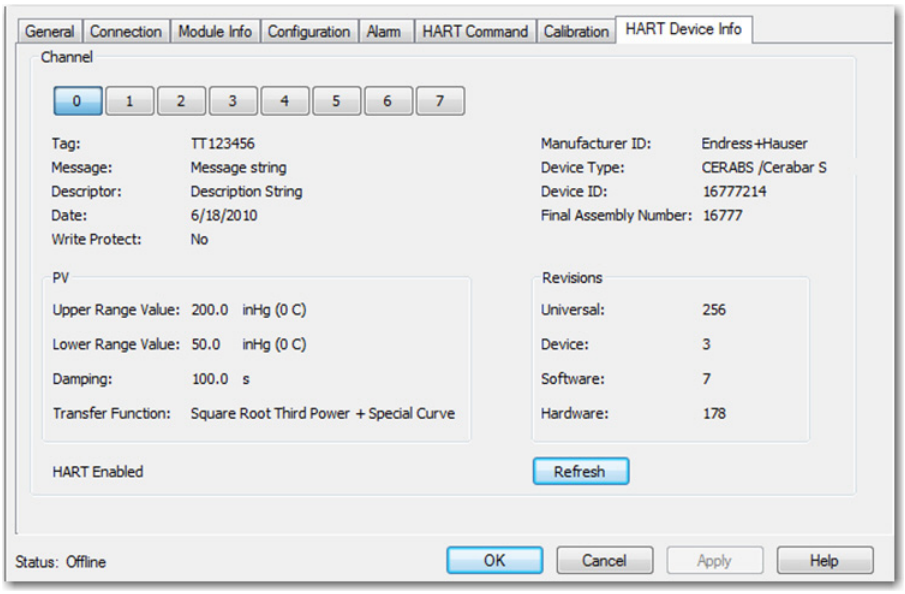
Calibration Tab

The Calibration tab on the Module Properties dialog lets you recalibrate the module, if necessary. Calibration corrects any hardware inaccuracies on a particular channel.



HART Device Info Tab

The HART Device Info tab is used for diagnostics. It is only available when the Enable HART is selected in the Configuration tab. It allows the user to monitor and check the diagnostic data for the module.



IMPORTANT	The HART Device Info tab in Studio 5000 Logix Designer application can be edited only in RUN mode.

Getting HART Data Using CIP MSG Instructions

Read this chapter to learn how to:

- Configure the module to collect HART data from HART field devices.
- Use MSG instructions to access additional HART data that is cached within the module.
- Use MSG instructions to send a HART message directly to the HART device using the HART pass-through mechanism of the module.

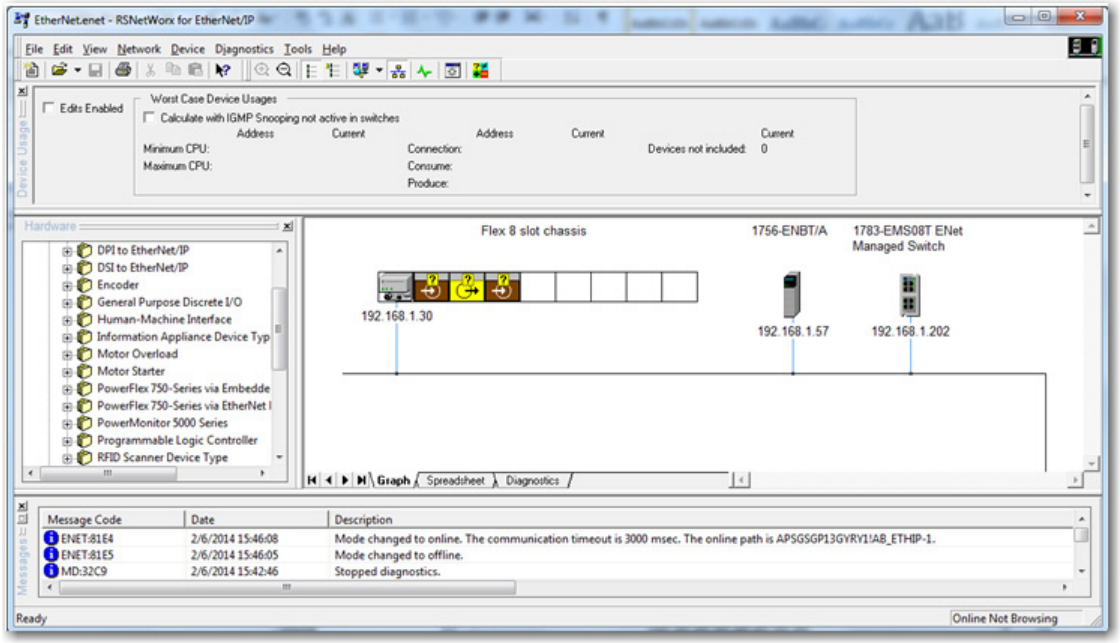
This chapter shows you how to send and receive HART data using CIP MSG instructions as well as structures and format of the messages. It includes a quickstart example that briefly illustrates how to do this.

This chapter also includes methods to access additional HART field device data by using a MSG instruction. By using these mechanisms, your controller has easy access to some commonly used data, and with some extra effort, access to any HART feature.

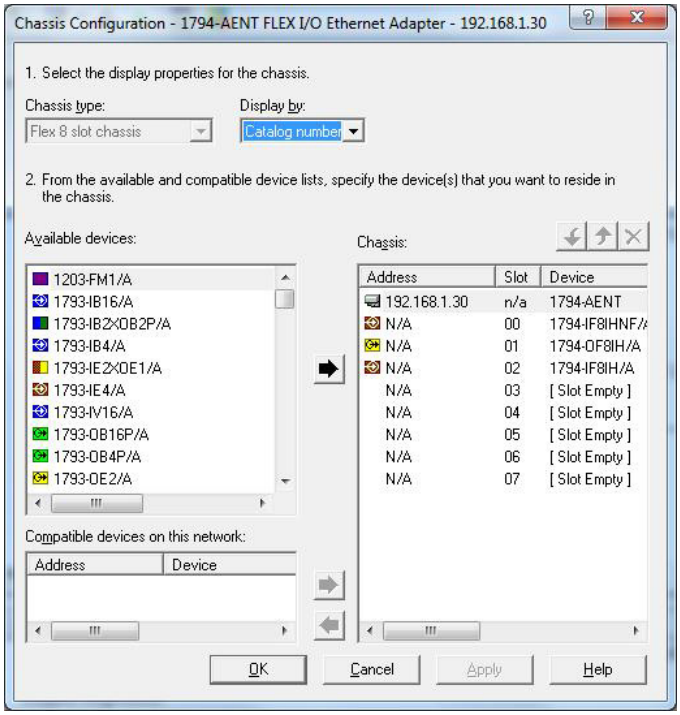
Use RSNetWorx to Send and Receive CIP MSG Instructions

Use the RSNetWorx™ software to connect FLEX I/O modules to a processor or scanner through a FLEX I/O EtherNet/IP adapter (catalog number 1794-AENT). The following example shows an RSNetWorx setup with the following modules in the chassis:

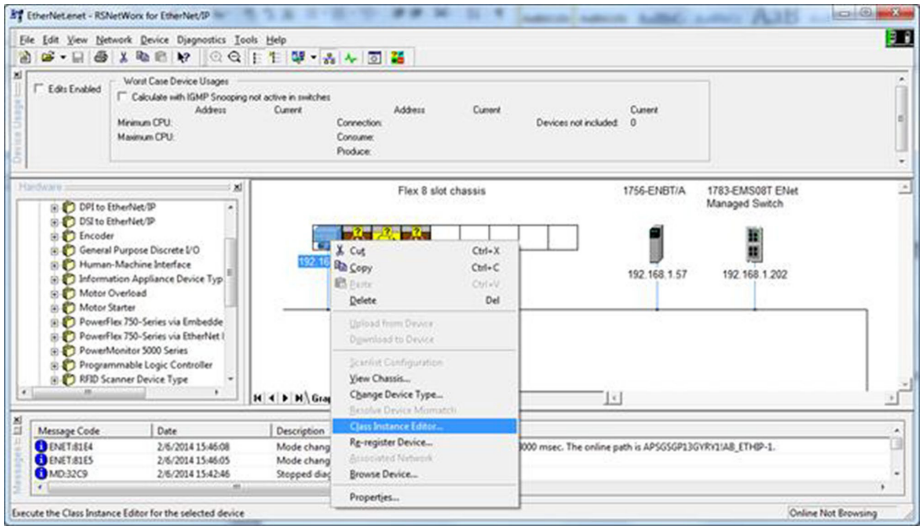
- 1794-AENT adapter
- 1794-IF8IHNFXT (Slot 0)
- 1794-OF8IH (Slot 1)
- 1794-IF8IH (Slot 2)



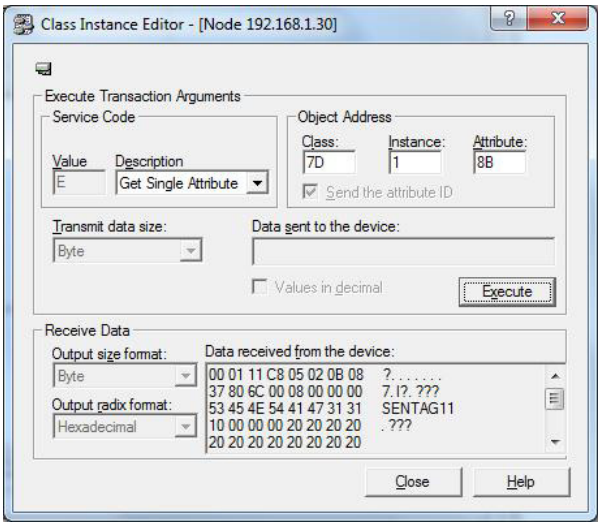
1. Configure your chassis through the Chassis Configuration dialog.



2. To send a message to a device, right-click the adapter and select Class Instance Editor.



3. From the Class Instance Editor window, send Get Device Information Block 1 message to channel 1 of the 1794-IF8IHNFXT module in Slot 0 by following the below steps:
   a. Select Get Single Attribute from the Description dropdown list.
   b. Select Execute.

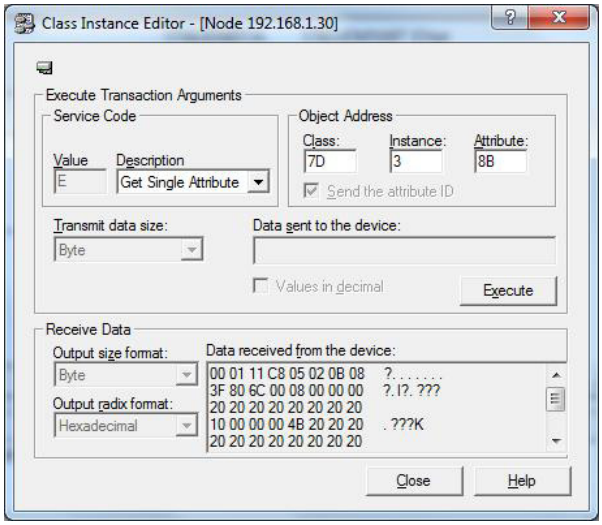


There are 56 bytes of data returned from the 1794-IF8IHNFXT device as indicated in the Receive Data section of the dialog.

To learn about request and reply packet structure for the 1794-IF8IHNFXT module, see the following topics:

- 1794-IF8IHNFXT Get Device Information Block 1 Message – Request Packet Structure on page 77
- 1794-IF8IHNFXTHART Get Device Information Block 1 – Reply packet structure on page 77

4. Send Block 1 message to channel 1 of 1794-IF8IH module in Slot 2.



There are 48 bytes of data returned from the module. See the following tables to understand message reply and request message structure from the device:

- Get Device Information Block 1 Message – Reply Packet Structure on page 76
- Get Device Information Block 1 Message – Request Packet Structure on page 76

Access HART Data Using CIP Message Instruction (MSG)

The 1794-IF8IH, 1794-OF8IH, and 1794-IF8IHNFXT modules support these broad categories of MSG-based HART access:

- CIP formatted messages to retrieve common HART data cached in the module.
- CIP messages containing HART formatted commands that are passed directly to the HART Field Device for processing. These are called pass-through messages.

Fill in the Information Needed for a MSG Instruction

The MSG instruction is formatted as shown.

CIP Message Format – Unconnected Message Header

Field	Value	Definition
Message Type	CIP Generic	—
Service Code	0x0E Get Attribute Single-READ DATA 0x10 Set Attribute Single-WRITE DATA	
Class Name	0x007D	FLEX I/O module object
Instance Name	1...8 (1 = Module next to adapter)	Module location
Object Attribute	0x7E...0xA7	Selects Data Assembly or function (See Module Data Access Assemblies on page 74)
Source Length (applies to Set Attribute Single)	Depends on the data assembly selected	Specifies the size in bytes of data to write to module

Select the Attribute Value for the Operation You Want to Perform

CIP message attribute values of 0x7E...0x86 are used for HART pass-through messages, values 0x87...0xA6 are used to retrieve additional HART data from the modules internal database, and attribute 0xA7 is used to reset the Secondary Input table flag, HART Update, which is bit 5 of the loop status.

Module Data Access Assemblies

Attribute	Size (Words)	R/W	Description
0x7E	1	R	Get HART Channel Status (Dev Info Valid)
0x7F	1	W	User -Select Handle For Msg Response Query
0x80	3	R	User - Get Message Response Status
0x81	24	R/W	HART Pass-through Message Request/Response Buffer
0x82	18	R/W	HART Pass-through Message Request/Response Buffer
0x83	12	R/W	HART Pass-through Message Request/Response Buffer
0x84	9	R/W	HART Pass-through Message Request/Response Buffer
0x85	6	R/W	HART Pass-through Message Request/Response Buffer
0x86	4	R/W	HART Pass-through Message Request/Response Buffer
0x87	24 28[1]	R	Chan 0 - Get Device Info Block 1
0x88	28	R	Chan 0 – Get Device Info Block 2
0x89	8	R	Chan 0 – Get Device Info Block 3
0x8A	19	R	Chan 0 – Get Device Info Block 4
0x8B	24 28[1]	R	Chan 1 – Get Device Info Block 1
0x8C	28	R	Chan 1 – Get Device Info Block 2
0x8D	8	R	Chan 1 – Get Device Info Block 3
0x8E	19	R	Chan 1 – Get Device Info Block 4
0x8F	24 28[1]	R	Chan 2 – Get Device Info Block 1

Module Data Access Assemblies (Continued)

Attribute	Size (Words)	R/W	Description
0x90	28	R	Chan 2 – Get Device Info Block 2
0x91	8	R	Chan 2 – Get Device Info Block 3
0x92	19	R	Chan 2 – Get Device Info Block 4
0x93	24 28(1)	R	Chan 3 – Get Device Info Block 1
0x94	28	R	Chan 3 – Get Device Info Block 2
0x95	8	R	Chan 3 – Get Device Info Block 3
0x96	19	R	Chan 3 – Get Device Info Block 4
0x97	24 28(1)	R	Chan 4 – Get Device Info Block 1
0x98	28	R	Chan 4 – Get Device Info Block 2
0x99	8	R	Chan 4 – Get Device Info Block 3
0x9A	19	R	Chan 4 – Get Device Info Block 4
0x9B	24 28(1)	R	Chan 5 – Get Device Info Block 1
0x9C	28	R	Chan 5 – Get Device Info Block 2
0x9D	8	R	Chan 5 – Get Device Info Block 3
0x9E	19	R	Chan 5 – Get Device Info Block 4
0x9F	24 28(1)	R	Chan 6 – Get Device Info Block 1
0xA0	28	R	Chan 6 – Get Device Info Block 2
0xA1	8	R	Chan 6 – Get Device Info Block 3
0xA2	19	R	Chan 6 – Get Device Info Block 4
0xA3	24 28(1)	R	Chan 7 – Get Device Info Block 1
0xA4	28	R	Chan 7 – Get Device Info Block 2
0xA5	8	R	Chan 7 – Get Device Info Block 3
0xA6	19	R	Chan 7 – Get Device Info Block 4
0xA7	1	W	Reset User Device Info Changed Status Bit (Dn)
0xCB	18(1)	R/W	User calibration
0xCC	32(1)	R	Get PV Config Errors

(1) Applies to 1794-IF8IHNFXT module.

Retrieve Additional Information About the HART Device

The module automatically acquires and then stores information about the HART device that is connected to a channel and this data can be retrieved using the MSG instruction. You can get information such as the device identity or additional status information that the device might have on its current condition. The module request is called Get Device Information and each reply data structure returns specific elements of HART data that is referenced by what HART command was issued to retrieve that piece of the HART data. See the HART device user manual or the HART specification for detailed explanation of each data element.

Get Device Info Block 1 Message for 1794-IF8IH and 1794-OF8IH Modules

Get Device Information Block 1 Message – Request Packet Structure

Field	Value	Definition
Message Type	CIP Generic	—
Service Type	Get Attribute Single	Read from the module
Service Code	0x0E	—
Class Name	0x7D	FLEX I/O module object
Instance	1…8 (1 = Module next to the adapter)	Module location
Object Attribute	0x87 = Channel 0 (Add 4 for next channel) 0x8B = Channel 1 0x8F = Channel 2 0x93 = Channel 3 0x97 = Channel 4 0x9B = Channel 5 0x9F = Channel 6 0xA3 = Channel 7	Selects channel that the data is from
Reply Size	48 bytes	—
Request Size	0	

Get Device Information Block 1 Message – Reply Packet Structure

Offset[1]	Field	Value	Definition
0	Status	00 = SUCCESS 0x86 = Channel is not HART Enabled 0x87 = No Device Found	Command status
1	Echo of Channel	0…7	Channel
2	HARTManufacturerIDCode	(1 byte)	CMD#0, Byte 1
3	HARTDeviceTypeCode	(1 byte)	CMD#0, Byte 2
4	HARTUnivCmdCode	(1 byte)	CMD#0, Byte 4
5	HARTTransSpecRev	(1 byte)	CMD#0, Byte 5
6	HARTSoftwareRevision	(1 byte)	CMD#0, Byte 6
7	HARTHardwareRevision	(1 byte)	CMD#0, Byte 7
8…11	HARTDeviceIDNumber	(4 bytes - UINT)	CMD#0, Bytes 9…11 Bytes reordered into Intel Format (LSB first) from HART format (MSB first)
12…15	TagSize	8 (4 bytes)	
16…23	TagString	(8 bytes unpacked ASCII)	CMD#13, Bytes 0…5
24…27	DescriptorSize	16 (4 bytes)	
28…43	DescriptorString	(16 bytes unpacked ASCII)	CMD#13, Bytes 6…17
44	DataDay	(1 byte)	CMD#13, Byte 18
45	DataMonth	(1 byte)	CMD#13, Byte 19
46…47	DataYear	(2 bytes)	CMD#13, Byte 20 (+1900)
Total = 48 bytes			

(1) Data in offsets 2…47 are set to 0 if Status in offset 0 indicates a problem (Status = 0x86 or 0x87).

Get Device Info Block 1 Message for 1794-IF8IHNFXT Module

1794-IF8IHNFXT Get Device Information Block 1 Message – Request Packet Structure

Field	Value	Definition
Message Type	CIP Generic	—
Service Type	Get Attribute Single	Read from the module
Service Code	0x0E	—
Class Name	0x7D	FLEX I/O module object
Instance	1…8 (1 = Module next to the adapter)	Module location
Object Attribute	0x87 = Channel 0 (Add 4 for next channel) 0x8B = Channel 1 0x8F = Channel 2 0x93 = Channel 3 0x97 = Channel 4 0x9B = Channel 5 0x9F = Channel 6 0xA3 = Channel 7	Selects the channel that provides the data
Reply Size	56 bytes	—
Request Size	0	

1794-IF8IHNFXTHART Get Device Information Block 1 – Reply packet structure

Offset	Field	Value	Definition
0	Status	00 = SUCCESS 0x86 = Channel is not HART Enabled 0x87 = No Device Found	Command status
1	Echo of Channel	0…7	Channel
2	HART ManufacturerIDCode	(1 byte)	CMD#0, Byte 1
3	HARTDeviceTypeCode	(1 byte)	CMD#0, Byte 2
4	HARTUnivCmdCode	(1 byte)	CMD#0, Byte 4
5	HARTTransSpecRev	(1 byte)	CMD#0, Byte 5
6	HARTSoftwareRevision	(1 byte)	CMD#0, Byte 6
7	HARTHardwareRevision	(1 byte)	CMD#0, Byte 7
8…11	HARTDeviceIDNumber	(4 bytes - UINT)	CMD#0, Bytes 9…11 Bytes reordered into Intel Format (LSB first) from HART format (MSB first)
12…15	TagSize	8 (4 bytes)	
16…23	TagString	(8 bytes unpacked ASCII)	CMD#13, Bytes 0…5
24…27	DescriptorSize	16 (4 bytes)	
28…43	DescriptorString	(16 bytes unpacked ASCII)	CMD#13, Bytes 6…17
44	DataDay	(1 byte)	CMD#13, Byte 18
45	DataMonth	(1 byte)	CMD#13, Byte 19
46…47	DataYear	(2 bytes)	CMD#13, Byte 20 (+ 1900)
48…49	OEMManufacturerID16Bit	(2 bytes)	CMD#0, Byte 1 if HART rev < 7 CMD#0, Bytes 17…18 if HART rev ≥ 7 Bytes reordered into Intel Format (LSB first) from HART format (MSB first)

1794-IF8IHNFXTHART Get Device Information Block 1 – Reply packet structure (Continued)

Offset	Field	Value	Definition
50…51	PrivateLabelMfg16Bit	(2 bytes)	CMD#0, Byte 1 if HART rev < 7 CMD#0, Bytes 19…20 if HART rev ≥ 7 Bytes reordered into Intel Format (LSB first) from HART format (MSB first)
52…53	—	(2 bytes)	CMD#0, Byte 2 if HART rev < 7 CMD#0, Bytes 1…2 if HART rev ≥ 7 Bytes reordered into Intel Format (LSB first) from HART format (MSB first)
54…55	Pad (32-bit alignment)	(2 bytes)	Unused

Get Device Info Block 2 Message

Get Device Information Block 2 Message – Request Packet Structure

Field	Value	Definition
Message Type	CIP Generic	—
Service Type	Get Attribute Single	Read from the module
Service Code	0x0E	—
Class Name	0x7D	FLEX I/O module object
Instance	1…8 (1 = Module next to the adapter)	Module location
Object Attribute	0x88 = Channel 0 (Add 4 for next channel) 0x8C = Channel 1 0x90 = Channel 2 0x94 = Channel 3 0x98 = Channel 4 0x9C = Channel 5 0xA0 = Channel 6 0xA4 = Channel 7	Selects the channel that provides the data
Reply Size	56 bytes	—
Request Size	0	

Get Device Information Block 2 Message – Reply Packet Structure

Offset[1]	Field	Value	Definition
0	Status	00 = SUCCESS 0x86 = Channel is not HART Enabled 0x87 = No Device Found	Command status
1	Echo of Channel	0…7	Channel
2	TransferFunction	(1 byte)	CMD#15, Byte 1
3	WriteProtectCode	(1 byte)	CMD#15, Byte 15
4…7	MessageSize	(4 bytes)	—
8…39	MessageString	(32 bytes unpacked ASCII)	CMD#12, Bytes 0…23
40…43	HARTPVUpperRange	(4 bytes - UINT)	CMD#15, Bytes 3…6
44…47	HARTPVLowerRange	(4 bytes - UINT)	CMD#15, Bytes 7…10
48…51	DampingValue	(4 bytes - UINT)	CMD#15, Bytes 11…14
52…55	FinalAssemblyNumber	(4 bytes - UINT)	CMD#16, Bytes 0…2 Bytes reordered into Intel Format (LSB first) from HART Format (MSB first)

(1) Data in offsets 2…55 will be set to 0 if Status in offset 0 indicates a problem (Status = 0x86 or 0x87).

Get Device Info Block 3 Message

Get Device Information Block 3 Message – Request Packet Structure

Field	Value	Definition
Message Type	CIP Generic	–
Service Type	Get Attribute Single	Read from the module
Service Code	0x0E	–
Class Name	0x7D	FLEX I/O module object
Instance	1…8 (1 = Module next to the adapter)	Module location
Object Attribute	0x89 = Channel 0 (Add 4 for next channel) 0x8D = Channel 1 0x91 = Channel 2 0x95 = Channel 3 0x99 = Channel 4 0x9D = Channel 5 0xA1 = Channel 6 0xA5 = Channel 7	Selects channel that the data is from
Reply Size	16 bytes	–
Request Size	0	

Get Device Information Block 3 Message – Reply Packet Structure

Offset[1]	Field	Value	Definition
0	Status	00 = SUCCESS 0x86 = Channel is not HART Enabled 0x87 = No Device Found	Command status
1	Echo of Channel	0…7	Channel
2	pad	0	–
3	pad	0	
4	PVAssignmentCode	(1 byte)	CMD#50, Byte 0; Set to 0xff if HART Cmd 50 not supported by device
5	SVAssignmentCode	(1 byte)	CMD#50, Byte 1; Set to 0xff if HART Cmd 50 not supported by device
6	TVAssignmentCode	(1 byte)	CMD#50, Byte 2; Set to 0xff if HART Cmd 50 not supported by device
7	FVAssignmentCode	(1 byte)	CMD#50, Byte 3; Set to 0xff if HART Cmd 50 not supported by device
8	PVUnits	(1 byte)	CMD#3, Byte 4; Set to 0 if device does not return a value for PV
9	SVUnits	(1 byte)	CMD#3, Byte 9; Set to 0 if device does not return a value for SV
10	TVUnits	(1 byte)	CMD#3, Byte 14; Set to 0 if device does not return a value for TV
11	FVUnits	(1 byte)	CMD#3, Byte 19; Set to 0 if device does not return a value for FV
12	PVRangeUnits	(1 byte)	CMD#15, Byte 2
13	Pad_8 alignment	(1 byte)	–
14	HARTPreamble	(1 byte)	CMD#0, Byte 3
15	HARTFlages	(1 byte)	CMD#0, Byte 8

(1) Data in offsets 4…15 will be set to 0 if Status in offset 0 indicates a problem (Status = 0x86 or 0x87).

Get Device Information Block 4 Message

Get Device Information Block 4 Message – Request Packet Structure

Field	Value	Definition
Message Type	"CIP Generic"	–
Service Type	Get Attribute Single	Read from the module
Service Code	0x0E	–
Class Name	0x7D	FLEX I/O module object
Instance	1...8 (1 = Module next to adapter)	Module location
Object Attribute	0x8A = Channel 0 (Add 4 for next channel) 0x8E = Channel 1 0x92 = Channel 2 0x96 = Channel 3 0x9A = Channel 4 0x9E = Channel 5 0xA2 = Channel 6 0xA6 = Channel 7	Selects the channel that provides the data
Reply Size	38 bytes	–
Request Size	0	

Get Device Information Block 4 Message – Reply Packet Structure

Offset(1)	Field	Value	Definition
0	Status	00 = SUCCESS 0x86 = Channel is not HART Enabled 0x87 = No Device Found	Command status
1	Echo of Channel	0...7	Channel
2	pad	0	–
3	pad	0	
4...7	Loop Current	Float (4 bytes)	
8...11	Count	0...25 (DINT,4 bytes)	Number of extended status bytes that device returned
12...36	Ext Status Bytes[25]	0...255	Extended status bytes returned by CMD 48 Unused bytes are set to 0
37	pad	0	–

(1) Data in offsets 4...36 will be set to 0 if Status in offset 0 indicates a problem (Status = 0x86 or 0x87).

Reset the Device Info Changed Status Bit Message

This resets the Device Info Changed Status Bit (Bit 5 in the Loop Status Byte) located in the Secondary Input Data Table (Cyclic EDT Input Data). If this message is not sent, then the bit will remain set once the module has set this bit, after it has detected that the data has changed.

Here is an example of usage of this message.

1. Detect that the "Device Info Changed Status Bit" is set.
2. Send Reset Message.
3. Send "Get Device Info Block X" messages to refresh the data that is being used in the User's Ladder Program.

Reset Message Request Packet Structure

Field	Value	Definition
Message Type	CIP Generic	–
Service Type	Set Attribute Single	Write to the module
Service Code	0x10	
Class Name	0x7D	FLEX I/O module object
Instance	1...8 (1 = Module next to adapter)	Module location
Object Attribute	0xA7	–
Reply Size	0	
Request Size	2 bytes	

Reset Message Reply Packet Structure

Offset	Field	Value	Definition
0	Select Channel	0...7	Channel to reset
1	Pad	NA	–
Total = 2 bytes			

HART Pass-through Message Overview

FLEX I/O modules have a HART pass-through messaging mechanism that provides the user the ability to send any HART command to the HART device using MSG instructions.

There are five module commands related to pass-through:

- Pass-through Init
- Get Pass-through Message Query Status
- Read pass-through Reply
- Select Handle
- Flush Queues (rarely needed)

Pass-through Init

Pass-through Init is used to instruct the module to initiate a HART pass-through operation by sending the needed information for a HART pass-through request to the module.

There are two types of HART pass-through INIT requests, one is called Easy-HART, and the other is called Full-HART. The Easy HART method is simpler, requires less data, and does not require you to know the details of creating a fully formatted HART message as defined by the HART specifications since the module takes care of the extra details like adding the message start delimiter, the device address, and the checksum of the message for you. The module also supports sending the fully formatted HART message if you need the extra security of knowing that the fully formatted message contains a specific device's address and is only accepted by that device. In general, the Easy-HART method is meant for users who need to send a message using ladder to a device but do not want to spend time learning the details of the HART protocol.

IMPORTANT The native HART data returned by devices are in a different format than the one used by the Logix controllers. HART uses the Big Endian format and Logix controller uses the Little Endian format. The order of the bytes in a multi-byte value is in the opposite order, so they must be reversed before use. Little Endian means that the least significant byte of a number is stored at the lowest address (array index).

Also be aware that Logix controller aligns multi-byte data boundaries that permit fast access and HART packs them into the smallest space. HART encodes text strings using 6 bits per letter into a format called Packed ASCII. When using pass-through messaging, your Logix program must be able to handle these data layout issues.

Get Pass-through Message Query Status

The "Get pass-through message query status" read command returns status of a pass-through operation that lets you know if the pass-through HART message reply has been received by the module from the device.

Read Pass-through Reply

Once the "Query Status" shows that the reply is ready, then you can issue a "Read Pass-through Reply" buffer operation to retrieve the reply from the module.

Each channel has a separate buffer to hold a pass-through request so you can have eight requests running at once. The module discards a reply being held in a buffer if the reply has not been retrieved from the module within 50 seconds.

Select Handles

If you are managing multiple messages, send the Select Handle for Message Response Query message to select which handle the Get pass-through message query status or read pass-through reply is associated to.

Flush Queues

Flush queues can be sent to have the module discard any pending HART replies awaiting a query command. These replies are automatically discarded after a period of time, which is configurable on the Configuration tab of the Module Properties dialog box. This value is usually 15 seconds. Unless you need to discard the replies faster than 15 seconds, you will not need to use this Flush Queue command.

Format a HART Pass-through Init Request Message

A HART Pass-through Init request consists of setting up a MSG instruction with a Service type of Set Attribute Single, which allows you to write data into the module. This data is formatted to include information about the HART command that you want to send to the HART device.

HART Pass-through Init – Message Packet Structure

Field	Value	Definition
Message Type	CIP Generic	–
Service Type	Set Attribute Single	Write to the module
Service Code	0x10	–
Class Name	0x7D	FLEX I/O module object
Instance	1...8 (1 = Module next to adapter)	Module location

HART Pass-through Init – Message Packet Structure (Continued)

Field	Value	Definition
Object Attribute	0x81...0x86 (See Module Data Access Assemblies on page 74)	Select smallest buffer size that will hold message request
Reply Size	0	–
Request Size	8...48 bytes	

HART Pass-through Init – Reply Packet Structure

Offset	Field	Value	Definition
0	Module command	1 = EASY-HART Format 2 = FULL-HART Protocol	Pass-through Init Command
1	Channel	0...7	Selects module channel
2	Handle	0...255	User supplied message handle
3	Page number	0...5	Page number of this Write
4...5	Data size	0...264 (INT, 2 bytes)	Total size of HART Data bytes needed for complete message that start at byte offset = 8 (does not include the 8 header bytes)
6	HART Command [EASY-HART Format] Pad Byte [FULL-HART Protocol]	0...255 or 0	For the "EASY-HART Format", this field selects the HART Command. For the "FULL-HART Protocol", this field is an unused byte and can be set to 0.
7	Pad byte	0	Pad byte for 32-bit alignment
8...47	HART data	0...255	For the "EASY-HART Format", this data array contains only the HART Data portion of a HART message if HART command selected requires any data. For the "FULL-HART Protocol", this data array contains the complete, fully formatted HART Message excluding preamble bytes. (Preamble bytes are not supported and will cause the message to fail.)

Format a Get Pass-through Message Status Request

This message is used to query the module for status on a HART message that has already been initiated. The handle associated with the query is either the last HART message initiated or the handle selected by the "Select Handle" message, whichever occurred most recently.

Get Pass-through Message Status – Message Packet Structure

Field	Value	Definition
Message Type	CIP Generic	–
Service Type	Get Attribute Single	Read from the module
Service Code	0x0E	–
Class Name	0x7D	FLEX I/O module object
Instance	1...8 (1 = Module next to adapter)	Module location
Object Attribute	0x80	Get status
Reply Size	6 bytes	–
Request Size	0	

Get Pass-through Message Status – Reply Packet Structure

Offset	Field	Value	Definition
0	Query Status	0...5	Status of command related to Handle
1	Channel	0...7 (Handle active) 0xFF (Handle not active)	Channel associated with Status
2	Handle	0...255	Message Handle Echo
3	Next Assembly Attribute OR HART Failed Reason Code if Query Status = 3	0x81...0x86 1...0x88 HART Failed Reason Code	Recommended assembly to read next, else returns 0 if this is the last page. If Query Status is equal to 3, then this value is the Failed Reason Code.
4...5	Total Bytes in Reply	0...264 (16-bit Word)	Total bytes available in reply excluding the 8 bytes of header information returned in each read request (page)

Query Status:

0 = Success, data is available. Retrieve reply by reading next assembly index.
1 = No Data/Message Active. Handle requested not associated with any active message.
2 = Running; data reply is not available yet
3 = HART Request Failed. See Reason Code in byte 3.
4 = Incomplete Message Request. Not enough data received yet.
5 = Handle already in use

HART Failed Reason Code

Codes 1...0x7F (127) are only reported in EASY-HART Format and are codes that are reported directly from the HART device Command Response status byte.

For a listing of the most common HART failure error codes, see HART Failure Error Codes on page 89.

Format a Read Pass-through Reply Request

This message returns the status of pass-through messages along with the actual reply from the device if the pass-through is completed. The handle associated with the response data is either the last HART message initiated or the handle selected by the "Select Handle" message, whichever occurred most recently.

Read Pass-through Reply – Message Packet Structure

Field	Value	Definition
Message Type	CIP Generic	–
Service Type	Get Attribute Single	Read from the module
Service Code	0x0E	–
Class Name	0x7D	FLEX I/O module object
Instance	1...8 (1 = Module next to adapter)	Module location
Object Attribute	0x81...0x86	Get status
Reply Size	8...48 bytes(1)	–
Request Size	0	

(1) Depends on attribute selected.

Read Pass-through Reply – Reply Packet Structure

Offset	Field	Value	Definition
0	Query Status	0…5	Status of command related to Handle
1	Channel	0…7 (Handle active) 0xFF (Handle not active)	Channel associated with Status
2	Handle	0…255	Message Handle
3	Next Assembly Attribute OR HART Failed Reason Code if Query Status = 3	0x81…0x86 1…0x88 HART Failed Reason Code	Recommended assembly to read next, else returns 0 if this is the last page. If Query Status is equal to 3, then this value is the Failed Reason Code.
4	Number of HART Data bytes returned in this reply (this page)	0…40	Bytes in this page that are valid starting at offset 8 (page reply size excluding the 8 bytes of header)
5	Page number of this reply	0…5	Page number of this reply After a buffer reply read, the page is incremented internal to module so that the next read contains the next page.
6	HART Com Status Byte	0…255	First Status Byte returned from Device
7	HART Field Status Byte	0…255	Second Status Byte returned from Device
8…47 (per page)	HART reply Data	0…255	If request type was EASY-HART format, then this data array is the HART Data bytes from the device's reply message. If Request was FULL-HART Protocol format, then this data array is the complete HART reply message excluding the preamble bytes. Preamble bytes are removed from the reply by the module.

Get PV Config Errors – Request Packet Structure

Field	Value	Definition
Message Type	CIP Generic	–
Service Type	Get Attribute Single	Read from the module
Service Code	0x0E	–
Class Name	0x7D	FLEX I/O module object
Instance	1…8 (1 = Module next to adapter)	Module location
Object Attribute	0xCC	–
Reply Size	32 bytes	
Request Size	0	

Get PV Config Errors Reply Data

Byte offset	Definition
0	Chan 0 Cmd 34 Response Code
1	Chan 0 Cmd 35 Response Code
2	Chan 0 Cmd 44 Response Code
3	Chan 0 Comms and Verify Errors Code
4	Chan 1 Cmd 34 Response Code

Get PV Config Errors Reply Data (Continued)

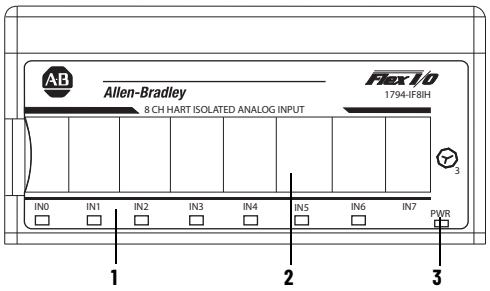
Byte offset	Definition
5	Chan 1 Cmd 35 Response Code
6	Chan 1 Cmd 44 Response Code
7	Chan 1 Comms and Verify Errors Code
8	Chan 2 Cmd 34 Response Code
9	Chan 2 Cmd 35 Response Code
10	Chan 2 Cmd 44 Response Code
11	Chan 2 Comms and Verify Errors Code
12	Chan 3 Cmd 34 Response Code
13	Chan 3 Cmd 35 Response Code
14	Chan 3 Cmd 44 Response Code
15	Chan 3 Comms and Verify Errors Code
16	Chan 4 Cmd 34 Response Code
17	Chan 4 Cmd 35 Response Code
18	Chan 4 Cmd 44 Response Code
19	Chan 4 Comms and Verify Errors Code
20	Chan 5 Cmd 34 Response Code
21	Chan 5 Cmd 35 Response Code
22	Chan 5 Cmd 44 Response Code
23	Chan 5 Comms and Verify Errors Code
24	Chan 6 Cmd 34 Response Code
25	Chan 6 Cmd 35 Response Code
26	Chan 6 Cmd 44 Response Code
27	Chan 6 Comms and Verify Errors Code
28	Chan 7 Cmd 34 Response Code
29	Chan 7 Cmd 35 Response Code
30	Chan 7 Cmd 44 Response Code
31	Chan 7 Comms and Verify Errors Code

Troubleshoot Your Module

This chapter describes how to troubleshoot the FLEX I/O isolated input/output HART analog modules.

Interpret Status Indicators

The modules have one power status indicator that is On when power is applied to the module and one status indicator for each input and output.



1794-IF8IH shown

	Description
1	Module status indicator
2	Insertable labels for writing individual input designations
3	Power status indicator

Table 17 - Interpret Status Indicators

Status Indicator	Status Indicator State	Module State	Description
Power status indicator	Off	No field power	The field power is not connected.
	Steady red	Fault[1]	Hardware fault, ARM Watchdog Reset occurred, or at least one channel has a calibration fault.
	Flashing green at 1 Hz	Power-up The module is not configured.	The module has not received configuration.
	Steady green	Program Mode/Idle	The controller is in Program Mode and communication is normal.
		Run Mode/Active	The controller is in RUN Mode and communication is normal.
Module status indicator	Off	Off	External power is not applied.
	Steady red	Fatal fault	Self-test failure or an invalid state transition causes module failure.
	Flashing red at 1 Hz	New	Power-up initialization is complete and self-test successful. The module loads the stored configuration, if available. Read the Module Information Block[2].
	Flashing green at 1 Hz	No configuration	The module has not received configuration from Master. It can Set and Get attributes.
		Idle	The controller is in Program Mode and communication is normal.
		Fault	FLEX I/O Communications Fault or PU bit = 1 and Fault bit = 0
	Steady green	Active	The controller is in Run Mode and communication is normal.

(1) Not all hardware faults cause the power status indicator to turn red. Specifically, if ARM fails, the power status indicator state will be indeterminate.

(2) The status bits in the table correspond to the module status bits available in the module status word.

Diagnostic Codes

The module reports a diagnostic code in the RTD input data table (See Table 11 for 1794-IF8IH module and Table 12 for 1794-IF8IHNFXT module), for the following errors:

- Module configuration errors
- Hardware errors
- HART PV configuration errors

If there are multiple errors, only one error is reported in the following order of priority:

1. Hardware error
2. Module configuration error
3. HART PV configuration error

Also multiple channels can have an error simultaneously but the module can only report one error at a time. In this case, the module first reports the lowest channel number with error.

Hardware Errors

Table 18 shows some hardware error codes that the module can report. For a description of each possible diagnostic code, see the table Diagnostic Status for 1794-IF8IH and 1794-IF8IHNFXT on page 38.

Table 18 - Hardware Errors

Diagnostic Code(1)	Description
0x80	Error can be caused by a hardware failure of the module or if the field power is not applied.
0x9n (0x90...0x97)	The channel n is not calibrated.
0xAn (0xA0...0xA7)	The channel n internal communication bus error The communication to the channel hardware has failed.

(1) n = 0...7, represents channel 0...7.

Module Configuration Errors

The module validates values in the configuration data block and reports any module configuration error.

The module configuration error results in the rejection of that configuration and the activation of the last good configuration. If no good configuration exists, the module behaves as if no configuration has been received.

Table 19 shows some module configuration error codes that the module can report. For a description of each possible diagnostic code, see the table Diagnostic Status for 1794-IF8IH and 1794-IF8IHNFXT on page 38.

Table 19 - Module Configuration Errors

Diagnostic Code(1)	Description	Valid Values
0x1n (0x10...0x17)	Channel n's HART Loop Tolerance Error Limit value is invalid.	0, 5...31 (%) **Note**: A value of zero disables this feature.
0x2n (0x20...0x27)	Channel n's Remote Alarm value is invalid.	RemoteLow < RemoteHigh and RemoteLow > RangeMIN and RemoteHigh < RangeMAX **Note**: 0 is valid as long as both RemoteLow and RemoteHigh are set to zero. This value disables the remote alarms.
0x4n (0x40...0x47)	Channel n's Data Format selection is invalid.	0, 1, and 3...7

Table 19 - Module Configuration Errors (Continued)

Diagnostic Code(1)	Description	Valid Values
0x5n (0x50...0x57)	Channel n's ADC Filter selection is invalid.	0...6
0x58	Byte Order Groups (BOA/BOB) do not match.	Configuration settings for BOA must be the same as BOB.
0x7n (0x70...0x77)	PV Configuration Enable is selected with HART Disabled	HART Disabled channels in configuration table are not allowed with the PV Configuration Enable feature enabled. **Important**: This does not apply to the output control bits HART OFF that means HART can still be disabled which would prevent the PV Configuration Enable feature from working until the control bit is cleared.

(1) n = 0...7, represents channel 0...7.

HART PV Configuration Errors

If there is a failure from any of the HART commands used to send the HART PV configuration data to a HART device, then the module sets the channel PV Configuration Mismatch bit in the secondary input data table to inform the user that HART device configuration has failed.

In addition to this bit, the module decodes the response codes from the device and place a value in the RTD Input table in the diagnostic byte location. Since there is only one diagnostic byte with limited unused codes and no other available data locations to place more information, the diagnostic value reports on only the lowest channel number that has an error.

Also, due to limited available codes, only a few of the most common failure modes are decoded and which HART command the error occurred on is not reported in the diagnostics code byte. Additional error information can be obtained by sending a Get PV Config Errors CIP message to the module to retrieve the specific error that occurred.

Diagnostic Codes for HART PV Configuration Errors

Diagnostic Code(1)	Description	Applies to
Bn (B0...B7)	Value set to nearest supported value	HART Cmds: 34, 35 Device Response Code: 8
Cn (C0...C7)	Device is write-protected.	HART Cmds: 34, 35, 44 Device Response Code: 7
Dn (D0...D7)	Value is out-of-limits or selection is invalid.	HART Cmds: 34, 35, 44 Device Response Codes: 2, 3, 4, 9...14
En (E0...E7)	PV Config HART commands not supported	HART Cmds: 34, 35, 44 Device Response Code: 64 HART Commands 34, 35, and 44 are classified as Common Practice commands and may not be supported by all devices.
Fn (F0...F7)	PV configuration general error	HART Cmds: 34, 35, 44 Device Response Codes: 6, 16, 18, 29, 32 All other device response codes are not decoded into more specific meaning.

(1) n = 0...7, represents the channels 0...7.

HART Failure Error Codes

The following table indicates the most common HART failure error codes.

HART Failure Error Codes

Diagnostic Code	Description	Applies to HART Format
0x01	Undefined command error	EASY-HART format
0x02	Invalid selection	EASY-HART format
0x03	Passed parameter too large	EASY-HART format
0x04	Passed parameter too small	EASY-HART format
0x05	Bytes received are too few	EASY-HART format
0x06	Device-specific command error	EASY-HART format
0x07	Failure due to device in write-protected mode	EASY-HART format

HART Failure Error Codes (Continued)

Diagnostic Code	Description	Applies to HART Format
0x08...0x0F	Command-specific multiple meaning. See HART specification.	EASY-HART format
0x10	Access restricted	EASY-HART format
0x1C	Command-specific multiple meaning. See HART specification.	EASY-HART format
0x20	Device is busy	EASY-HART format
0x40	Command not implemented	EASY-HART format
0x81	No response from HART device	EASY-HART and FULL-HART format
0x82	Invalid long frame address	FULL-HART format
0x83	Checksum error in request	FULL-HART format
0x84	HART Cmd not allowed	Ladder pass-through attributes 0x81...0x86
0x85	Invalid channel selected	EASY-HART and FULL-HART format
0x86	Channel is not HART enabled	EASY-HART and FULL-HART format
0x87	Connection with device has not been established	EASY-HART and FULL-HART format
0x88	HART message already active on this channel. Try again later.	EASY-HART and FULL-HART format

Repair

This module is not field repairable. Any attempt to open this module will void the warranty. If repair is necessary, return this module to the factory.

See the following publications for complete specifications for your module:

- 1794-IF8IH — FLEX I/O Isolated Input HART Analog Module Installation Instructions, publication 1794-IN115
- 1794-OF8IH — FLEX I/O Isolated Output HART Analog Module Installation Instructions, publication 1794-IN120
- 1794-IF8IHNFXT — FLEX I/O-XT 8-Input Channel Isolated HART Analog Module Installation Instructions, publication 1794-IN134

Use the 1794-IF8IH Module with the Generic Profile

This appendix provides the information needed to configure the 1794-IF8IH analog input module in Studio 5000 Logix Designer application version 16 or earlier over the ControlNet network and the FLEX I/O module generic profile.

IMPORTANT There are two ways to configure your 1794-IF8IH input module in Studio 5000 Logix Designer application, that are:

- Generic profile — Use Studio 5000 Logix Designer application version 16 or earlier to configure this profile.
- Specific profile - Use Studio 5000 Logix Designer application version 17 or later to configure this profile.

Using the generic profile, you need to map the parameters into the configuration, input, and output tables. Using the specific profile, you can retrieve the tags from the configuration, input, and output tables.

See Chapter 4 for configuration data tables.

Background Information

Make sure that your Comm-Format is set to Input Data - INT. In the FLEX I/O generic profile, you need the following sizes:

- Input – 8
- Output – Grayed out
- Config – 42
- Status – 5
- Cyclic HART input data is not available in the generic profile

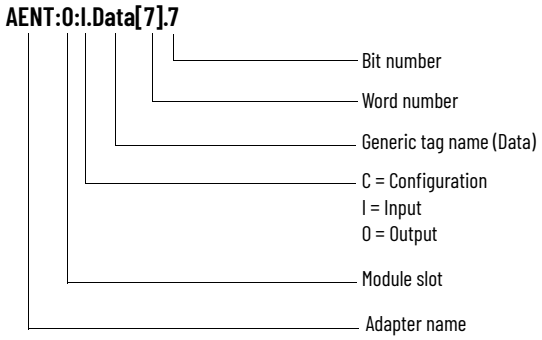
IMPORTANT HART commands only works when the Data Format control is configured for a 4...20 mA range.

The default configuration when using the generic profile is 0, which configures the module for the 0...20 mA range.

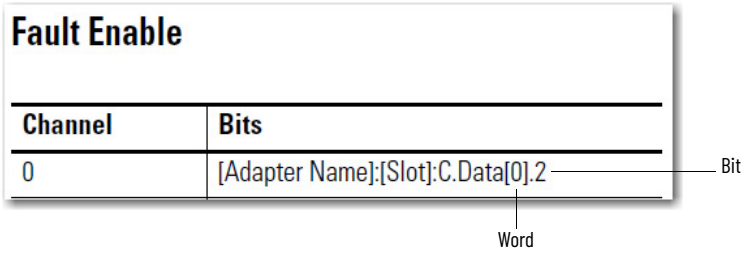
Adapter Name is what you named the ControlNet adapter when it was originally created. Slot is the position of the FLEX I/O module in the rack, starting with zero.

Generic Profile Tag Name Structure

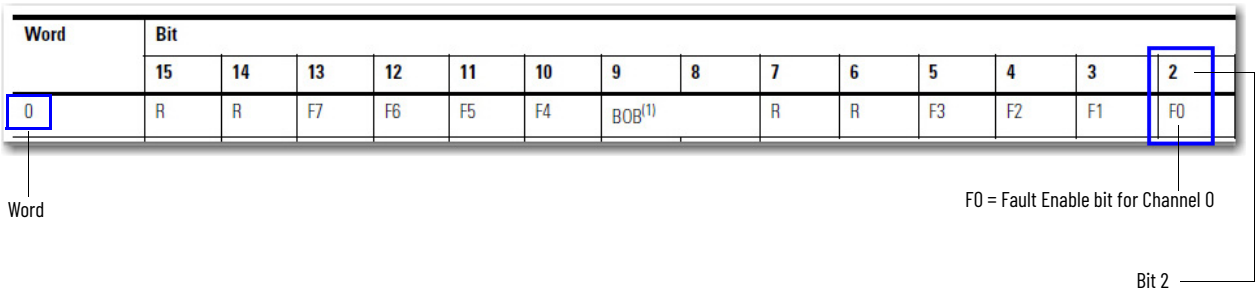
Tag names under the generic profile have the following structure:



To use the generic tags, you can consult the tables in the following section for designated tag names for each bit. For example, the following tag name refers to the Fault Enable configuration bit for Channel 0.



In the configuration data table, you see this bit as F0:



Configuration Data Table for 1794-IF8IH Module

1794-IF8IH Module Configuration Data Table

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	R	R	F7	F6	F5	F4	BOB(1)		R	R	F3	F2	F1	F0	BOA(1)	
1	DH7	DH6	DH5	DH4	DH3	DH2	DH1	DH0	Reserved(2)							
2	CH3 Format				CH2 Format				CH1 Format				CH0 Format			
3	CH7 Format				CH6 Format				CH5 Format				CH4 Format			
4	CH1 HART Current Ratio				FLTR1				CH0 HART Current Ratio					FLTR0		
5	CH3 HART Current Ratio				FLTR3				CH2 HART Current Ratio					FLTR2		
6	CH5 HART Current Ratio				FLTR5				CH4 HART Current Ratio					FLTR4		
7	CH7 HART Current Ratio				FLTR7				CH6 HART Current Ratio					FLTR6		
8	Reserved															
9	CH0 High Alarm threshold															
10	CH0 Low Alarm threshold															
11	CH0 Remote High High Alarm Limit															
12	CH0 Remote Low Low Alarm Limit															
13...16	Words 9...12 for Channel 1															
17...20	Words 9...12 for Channel 2															
21...24	Words 9...12 for Channel 3															
25...28	Words 9...12 for Channel 4															
29...32	Words 9...12 for Channel 5															
33...36	Words 9...12 for Channel 6															
37...40	Words 9...12 for Channel 7															
41	Reserved								C7	C6	C5	C4	C3	C2	C1	C0

1794-IF8IH Module Configuration Data Table (Continued)

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Where:	BOA = Byte order group A BOB = Byte order group B Byte order group A and B values must match each other. See Byte Order (Configuration Word 0 – Bits 0, 1, 8, and 9) on page 28 for more information.															
	Cn = HART Data Publishing Disable for Channel n; 0 = HART Data Publishing Disable is enabled, 1 = HART Data Publishing Disable is disabled															
	CHn HART Current Ratio = HART current ratio limit on Channel n. Valid values are 0, or 5...31% of full scale. A value of 0 disables this feature. See table 1794-IF8IH HART Current Ratio on page 41 for more information.															
	CHn Format = Data format for Channel n. See the table1794-IF8IH Channel Data Formats on page 32.															
	DHn = Disable HART communication on Channel n; 0 = HART communication is enabled, 1 = HART communication is disabled															
	FLTRn = Channel n Digital Filter. See the table1794-IF8IH Module Channel Digital Filter on page 30.															
	Fn = Fault mode channel n; 0 = Local/Remote Fault is disabled, 1 = Enabled															
	R = Reserved															

(1) Not shown or used in the Studio 5000 Logix Designer application version 23 or earlier.
(2) Reserved data may not be shown in certain controller software.

The following tables show the structure of each configuration bit per channel.

Byte Order

Channel	Bits
0...3	[Adapter Name]:[Slot]:C.Data[0].0
	[Adapter Name]:[Slot]:C.Data[0].1
4...7	[Adapter Name]:[Slot]:C.Data[0].8
	[Adapter Name]:[Slot]:C.Data[0].9

Byte Order Group B		Byte Order Group A		Description
Bit 9	Bit 8	Bit 1	Bit 0	
0	0	0	0	Little Endian Format (default) — All data entries are in true little endian format.
1	0	1	0	Word Swap — Word swap only applies to values requiring more than one word. For example, 32-bit float values.
0	1	0	1	Byte Swap — Byte swap all words in the data table.
1	1	1	1	Big Endian Format — All data entries are in true big endian format.

Fault Enable

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[0].2
1	[Adapter Name]:[Slot]:C.Data[0].3
2	[Adapter Name]:[Slot]:C.Data[0].4
3	[Adapter Name]:[Slot]:C.Data[0].5
4	[Adapter Name]:[Slot]:C.Data[0].10
5	[Adapter Name]:[Slot]:C.Data[0].11
6	[Adapter Name]:[Slot]:C.Data[0].12
7	[Adapter Name]:[Slot]:C.Data[0].13

Fault Mode	Bit 0
Disabled	0
Enabled	1

HART Disable

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[1].8
1	[Adapter Name]:[Slot]:C.Data[1].9
2	[Adapter Name]:[Slot]:C.Data[1].10
3	[Adapter Name]:[Slot]:C.Data[1].11
4	[Adapter Name]:[Slot]:C.Data[1].12
5	[Adapter Name]:[Slot]:C.Data[1].13
6	[Adapter Name]:[Slot]:C.Data[1].14
7	[Adapter Name]:[Slot]:C.Data[1].15

Disable Mode	Bit 0
False	0
True	1

Channel Data Format

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[2].0
	[Adapter Name]:[Slot]:C.Data[2].1
	[Adapter Name]:[Slot]:C.Data[2].2
	[Adapter Name]:[Slot]:C.Data[2].3
1	[Adapter Name]:[Slot]:C.Data[2].4
	[Adapter Name]:[Slot]:C.Data[2].5
	[Adapter Name]:[Slot]:C.Data[2].6
	[Adapter Name]:[Slot]:C.Data[2].7
2	[Adapter Name]:[Slot]:C.Data[2].8
	[Adapter Name]:[Slot]:C.Data[2].9
	[Adapter Name]:[Slot]:C.Data[2].10
	[Adapter Name]:[Slot]:C.Data[2].11
3	[Adapter Name]:[Slot]:C.Data[2].12
	[Adapter Name]:[Slot]:C.Data[2].13
	[Adapter Name]:[Slot]:C.Data[2].14
	[Adapter Name]:[Slot]:C.Data[2].15
4	[Adapter Name]:[Slot]:C.Data[3].0
	[Adapter Name]:[Slot]:C.Data[3].1
	[Adapter Name]:[Slot]:C.Data[3].2
	[Adapter Name]:[Slot]:C.Data[3].3
5	[Adapter Name]:[Slot]:C.Data[3].4
	[Adapter Name]:[Slot]:C.Data[3].5
	[Adapter Name]:[Slot]:C.Data[3].6
	[Adapter Name]:[Slot]:C.Data[3].7
6	[Adapter Name]:[Slot]:C.Data[3].8
	[Adapter Name]:[Slot]:C.Data[3].9
	[Adapter Name]:[Slot]:C.Data[3].10
	[Adapter Name]:[Slot]:C.Data[3].11
7	[Adapter Name]:[Slot]:C.Data[3].12
	[Adapter Name]:[Slot]:C.Data[3].13
	[Adapter Name]:[Slot]:C.Data[3].14
	[Adapter Name]:[Slot]:C.Data[3].15

Format[1]	Bits 15	14	13	12	Format Name	Signal Range		User Range		Resolution
	11	10	9	8						
	7	6	5	4						
	3	2	1	0		LO	HI	LO	HI	
0	0	0	0	0	0...20 mA in Milliamps	0.00	22.00	0 (0.000 mA)	22000 (22.000 mA)	1.0 µA
1	0	0	0	1	0...20 mA in % Full Scale	0.00	22.00	0 (0%)	11000 (110.00%)	2.0 µA
3	0	0	1	1	0...20 mA in UINT	0.00	20.00	0	65535	0.3052 µA
4[2]	0	1	0	0	4...20 mA in Milliamps	2.00	22.00	2000 (2.000 mA)	22000 (22.000 mA)	1.0 µA
5[2]	0	1	0	1	4...20 mA in % Full Scale	2.00	22.00	-1250 (-12.50%)	11250 (112.50%)	1.6 µA
7[2]	0	1	1	1	4...20 mA in UINT	4.00	20.00	0	65535	0.2441 µA

(1) All other formats are invalid.
(2) HART Communication supported with these data formats only.

Digital Filters

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[4].0
	[Adapter Name]:[Slot]:C.Data[4].1
	[Adapter Name]:[Slot]:C.Data[4].2
1	[Adapter Name]:[Slot]:C.Data[4].8
	[Adapter Name]:[Slot]:C.Data[4].9
	[Adapter Name]:[Slot]:C.Data[4].10
2	[Adapter Name]:[Slot]:C.Data[5].0
	[Adapter Name]:[Slot]:C.Data[5].1
	[Adapter Name]:[Slot]:C.Data[5].2
3	[Adapter Name]:[Slot]:C.Data[5].8
	[Adapter Name]:[Slot]:C.Data[5].9
	[Adapter Name]:[Slot]:C.Data[5].10
4	[Adapter Name]:[Slot]:C.Data[6].0
	[Adapter Name]:[Slot]:C.Data[6].1
	[Adapter Name]:[Slot]:C.Data[6].2
5	[Adapter Name]:[Slot]:C.Data[6].8
	[Adapter Name]:[Slot]:C.Data[6].9
	[Adapter Name]:[Slot]:C.Data[6].10
6	[Adapter Name]:[Slot]:C.Data[7].0
	[Adapter Name]:[Slot]:C.Data[7].1
	[Adapter Name]:[Slot]:C.Data[7].2
7	[Adapter Name]:[Slot]:C.Data[7].8
	[Adapter Name]:[Slot]:C.Data[7].9
	[Adapter Name]:[Slot]:C.Data[7].10

Digital Filter Frequency (Hz)	Decimal Value	Bits		
		10	9	8
		2	1	0
470	0	0	0	0
62	1	0	0	1
19.6	2	0	1	0
16.7	3	0	1	1
10	4	1	0	0
4.17	5	1	0	1
Not applicable	6	1	1	0
Not applicable	7	1	1	1

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[4].3
	[Adapter Name]:[Slot]:C.Data[4].4
	[Adapter Name]:[Slot]:C.Data[4].5
	[Adapter Name]:[Slot]:C.Data[4].6
	[Adapter Name]:[Slot]:C.Data[4].7
1	[Adapter Name]:[Slot]:C.Data[4].11
	[Adapter Name]:[Slot]:C.Data[4].12
	[Adapter Name]:[Slot]:C.Data[4].13
	[Adapter Name]:[Slot]:C.Data[4].14
	[Adapter Name]:[Slot]:C.Data[4].15
2	[Adapter Name]:[Slot]:C.Data[5].3
	[Adapter Name]:[Slot]:C.Data[5].4
	[Adapter Name]:[Slot]:C.Data[5].5
	[Adapter Name]:[Slot]:C.Data[5].6
	[Adapter Name]:[Slot]:C.Data[5].7
3	[Adapter Name]:[Slot]:C.Data[5].11
	[Adapter Name]:[Slot]:C.Data[5].12
	[Adapter Name]:[Slot]:C.Data[5].13
	[Adapter Name]:[Slot]:C.Data[5].14
	[Adapter Name]:[Slot]:C.Data[5].15
4	[Adapter Name]:[Slot]:C.Data[6].3
	[Adapter Name]:[Slot]:C.Data[6].4
	[Adapter Name]:[Slot]:C.Data[6].5
	[Adapter Name]:[Slot]:C.Data[7].6
	[Adapter Name]:[Slot]:C.Data[7].7
5	[Adapter Name]:[Slot]:C.Data[7].11
	[Adapter Name]:[Slot]:C.Data[7].12
	[Adapter Name]:[Slot]:C.Data[7].13
	[Adapter Name]:[Slot]:C.Data[7].14
	[Adapter Name]:[Slot]:C.Data[7].15
6	[Adapter Name]:[Slot]:C.Data[8].3
	[Adapter Name]:[Slot]:C.Data[8].4
	[Adapter Name]:[Slot]:C.Data[8].5
	[Adapter Name]:[Slot]:C.Data[8].6
	[Adapter Name]:[Slot]:C.Data[8].7
7	[Adapter Name]:[Slot]:C.Data[8].11
	[Adapter Name]:[Slot]:C.Data[8].12
	[Adapter Name]:[Slot]:C.Data[8].13
	[Adapter Name]:[Slot]:C.Data[8].14
	[Adapter Name]:[Slot]:C.Data[8].15

HART Current Ratio Limit	Decimal Value	Bits				
		15	14	13	12	11
		7	6	5	4	3
Disabled	0	0	0	0	0	0
Not applicable	1	0	0	0	0	1
Not applicable	2	0	0	0	1	0
Not applicable	3	0	0	0	1	1
Not applicable	4	0	0	1	0	0
5%	5	0	0	1	0	1
6%	6	0	0	1	1	0
7%	7	0	0	1	1	1
8%	8	0	1	0	0	0
9%	9	0	1	0	0	1
10%	10	0	1	0	1	0
...	...	...	...	...	...	...
30%	30	1	1	1	1	0
31%	31	1	1	1	1	1

High Alarm Limit

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[9]
1	[Adapter Name]:[Slot]:C.Data[13]
2	[Adapter Name]:[Slot]:C.Data[17]
3	[Adapter Name]:[Slot]:C.Data[21]
4	[Adapter Name]:[Slot]:C.Data[25]
5	[Adapter Name]:[Slot]:C.Data[29]
6	[Adapter Name]:[Slot]:C.Data[33]
7	[Adapter Name]:[Slot]:C.Data[37]

Low Alarm Limit

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[10]
1	[Adapter Name]:[Slot]:C.Data[14]
2	[Adapter Name]:[Slot]:C.Data[18]
3	[Adapter Name]:[Slot]:C.Data[22]
4	[Adapter Name]:[Slot]:C.Data[26]
5	[Adapter Name]:[Slot]:C.Data[30]
6	[Adapter Name]:[Slot]:C.Data[34]
7	[Adapter Name]:[Slot]:C.Data[38]

Remote High High Alarm Limit

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[11]
1	[Adapter Name]:[Slot]:C.Data[15]
2	[Adapter Name]:[Slot]:C.Data[19]
3	[Adapter Name]:[Slot]:C.Data[23]
4	[Adapter Name]:[Slot]:C.Data[27]
5	[Adapter Name]:[Slot]:C.Data[31]
6	[Adapter Name]:[Slot]:C.Data[35]
7	[Adapter Name]:[Slot]:C.Data[39]

Remote Low Low Alarm Limit

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[12]
1	[Adapter Name]:[Slot]:C.Data[16]
2	[Adapter Name]:[Slot]:C.Data[20]
3	[Adapter Name]:[Slot]:C.Data[24]
4	[Adapter Name]:[Slot]:C.Data[28]
5	[Adapter Name]:[Slot]:C.Data[32]
6	[Adapter Name]:[Slot]:C.Data[36]
7	[Adapter Name]:[Slot]:C.Data[40]

HART Command 3 Disable

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[41].0
1	[Adapter Name]:[Slot]:C.Data[41].1
2	[Adapter Name]:[Slot]:C.Data[41].2
3	[Adapter Name]:[Slot]:C.Data[41].3
4	[Adapter Name]:[Slot]:C.Data[41].4
5	[Adapter Name]:[Slot]:C.Data[41].5
6	[Adapter Name]:[Slot]:C.Data[41].6
7	[Adapter Name]:[Slot]:C.Data[41].7

Disable Mode	Bit 0
False	0
True	1

Input Data

Primary Input Data for 1794-IF8IH

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Channel 0 Input Data															
1	Channel 1 Input Data															
2	Channel 2 Input Data															
3	Channel 3 Input Data															
4	Channel 4 Input Data															
5	Channel 5 Input Data															
6	Channel 6 Input Data															
7	Channel 7 Input Data															
8	H7	H6	H5	H4	H3	H2	H1	H0	L7	L6	L5	L4	L3	L2	L1	L0
9	R7	R6	R5	R4	R3	R2	R1	R0	P7	P6	P5	P4	P3	P2	P1	P0
10	Reserved								Diagnostic Status							
11	C7	C6	C5	C4	C3	C2	C1	C0	F7	F6	F5	F4	F3	F2	F1	F0
12	X7	X6	X5	X4	X3	X2	X1	X0	Reserved							
Where:	Hn = Channel n High Alarm Ln = Channel n Low Alarm Rn = Channel n Out of Range Alarm Pn = Channel n Second (Remote) Alarm Fn = Channel n HART Failure Cn = Channel n HART Current Fault Xn = Channel n HART Transmitter Present															

Input Data

Channel	Words
0	[Adapter Name]:[Slot]:I.Data[0]
1	[Adapter Name]:[Slot]:I.Data[1]
2	[Adapter Name]:[Slot]:I.Data[2]
3	[Adapter Name]:[Slot]:I.Data[3]
4	[Adapter Name]:[Slot]:I.Data[4]
5	[Adapter Name]:[Slot]:I.Data[5]
6	[Adapter Name]:[Slot]:I.Data[6]
7	[Adapter Name]:[Slot]:I.Data[7]

High Alarm

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[8].0
1	[Adapter Name]:[Slot]:I.Data[8].1
2	[Adapter Name]:[Slot]:I.Data[8].2
3	[Adapter Name]:[Slot]:I.Data[8].3
4	[Adapter Name]:[Slot]:I.Data[8].4
5	[Adapter Name]:[Slot]:I.Data[8].5
6	[Adapter Name]:[Slot]:I.Data[8].6
7	[Adapter Name]:[Slot]:I.Data[8].7

Low Alarm

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[8].8
1	[Adapter Name]:[Slot]:I.Data[8].9
2	[Adapter Name]:[Slot]:I.Data[8].10
3	[Adapter Name]:[Slot]:I.Data[8].11
4	[Adapter Name]:[Slot]:I.Data[8].12
5	[Adapter Name]:[Slot]:I.Data[8].13
6	[Adapter Name]:[Slot]:I.Data[8].14
7	[Adapter Name]:[Slot]:I.Data[8].15

Out of Range

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[9].0
1	[Adapter Name]:[Slot]:I.Data[9].1
2	[Adapter Name]:[Slot]:I.Data[9].2
3	[Adapter Name]:[Slot]:I.Data[9].3
4	[Adapter Name]:[Slot]:I.Data[9].4
5	[Adapter Name]:[Slot]:I.Data[9].5
6	[Adapter Name]:[Slot]:I.Data[9].6
7	[Adapter Name]:[Slot]:I.Data[9].7

Second Alarm

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[9].8
1	[Adapter Name]:[Slot]:I.Data[9].9
2	[Adapter Name]:[Slot]:I.Data[9].10
3	[Adapter Name]:[Slot]:I.Data[9].11

Channel	Bits
4	[Adapter Name]:[Slot]:I.Data[9].12
5	[Adapter Name]:[Slot]:I.Data[9].13
6	[Adapter Name]:[Slot]:I.Data[9].14
7	[Adapter Name]:[Slot]:I.Data[9].15

Diagnostic Status

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[10].0
1	[Adapter Name]:[Slot]:I.Data[10].1
2	[Adapter Name]:[Slot]:I.Data[10].2
3	[Adapter Name]:[Slot]:I.Data[10].3
4	[Adapter Name]:[Slot]:I.Data[10].4
5	[Adapter Name]:[Slot]:I.Data[10].5
6	[Adapter Name]:[Slot]:I.Data[10].6
7	[Adapter Name]:[Slot]:I.Data[10].7

HART Fault

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[11].0
1	[Adapter Name]:[Slot]:I.Data[11].1
2	[Adapter Name]:[Slot]:I.Data[11].2
3	[Adapter Name]:[Slot]:I.Data[11].3
4	[Adapter Name]:[Slot]:I.Data[11].4
5	[Adapter Name]:[Slot]:I.Data[11].5
6	[Adapter Name]:[Slot]:I.Data[11].6
7	[Adapter Name]:[Slot]:I.Data[11].7

Fault Mode	Bit 0
False	0
True	1

HART Current Fault

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[11].8
1	[Adapter Name]:[Slot]:I.Data[11].9
2	[Adapter Name]:[Slot]:I.Data[11].10
3	[Adapter Name]:[Slot]:I.Data[11].11
4	[Adapter Name]:[Slot]:I.Data[11].12
5	[Adapter Name]:[Slot]:I.Data[11].13
6	[Adapter Name]:[Slot]:I.Data[11].14
7	[Adapter Name]:[Slot]:I.Data[11].15

Fault Mode	Bit 0
False	0
True	1

HART Transmitter Present

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[12].8
1	[Adapter Name]:[Slot]:I.Data[12].9
2	[Adapter Name]:[Slot]:I.Data[12].10
3	[Adapter Name]:[Slot]:I.Data[12].11
4	[Adapter Name]:[Slot]:I.Data[12].12
5	[Adapter Name]:[Slot]:I.Data[12].13
6	[Adapter Name]:[Slot]:I.Data[12].14
7	[Adapter Name]:[Slot]:I.Data[12].15

Fault Mode	Bit 0
False	0
True	1

Notes:

Use the 1794-IF8IHNFXT Module with the Generic and Thin Profiles

There are three profiles available for programming your 1794-IF8IHNFXT module depending on your module firmware, software, and the desired functionality. You can use one of the following:

- Full profile — See section Edit Your 1794-IF8IHNFXT Module Configuration with Studio 5000 Logix Designer (Full Profile) on page 60 for more information.
- Thin profile
- Generic profile

IMPORTANT	For full profile support, Studio 5000 Logix Designer application version 24 or later includes a separate Configuration tab that simplifies the 1794-IF8IHNFXT module operational data entry through a user-friendly interface with error checking. See section Edit Your 1794-IF8IHNFXT Module Configuration with Studio 5000 Logix Designer (Full Profile) on page 60 to configure a full profile for your 1794-IF8IHNFXT module.

This section describes how to configure a generic profile and modify the tags with a thin profile, if you are using Studio 5000 Logix Designer application version 24 or earlier which do not include a user-interface that provides error checking and user-friendly data entry.

A generic profile lets a prior software version use the functionality that is available only for the latest software. For example, a 1794-IF8IHNFXT module, with software version 18, could use a generic profile to configure the module, available in software version 24.

A generic profile creates non-specific tags, with a name related to the modules slot location. The tag names created will not reference any specific 1794-IF8IHNFXT module terminology.

Edit a Thin Profile Tag

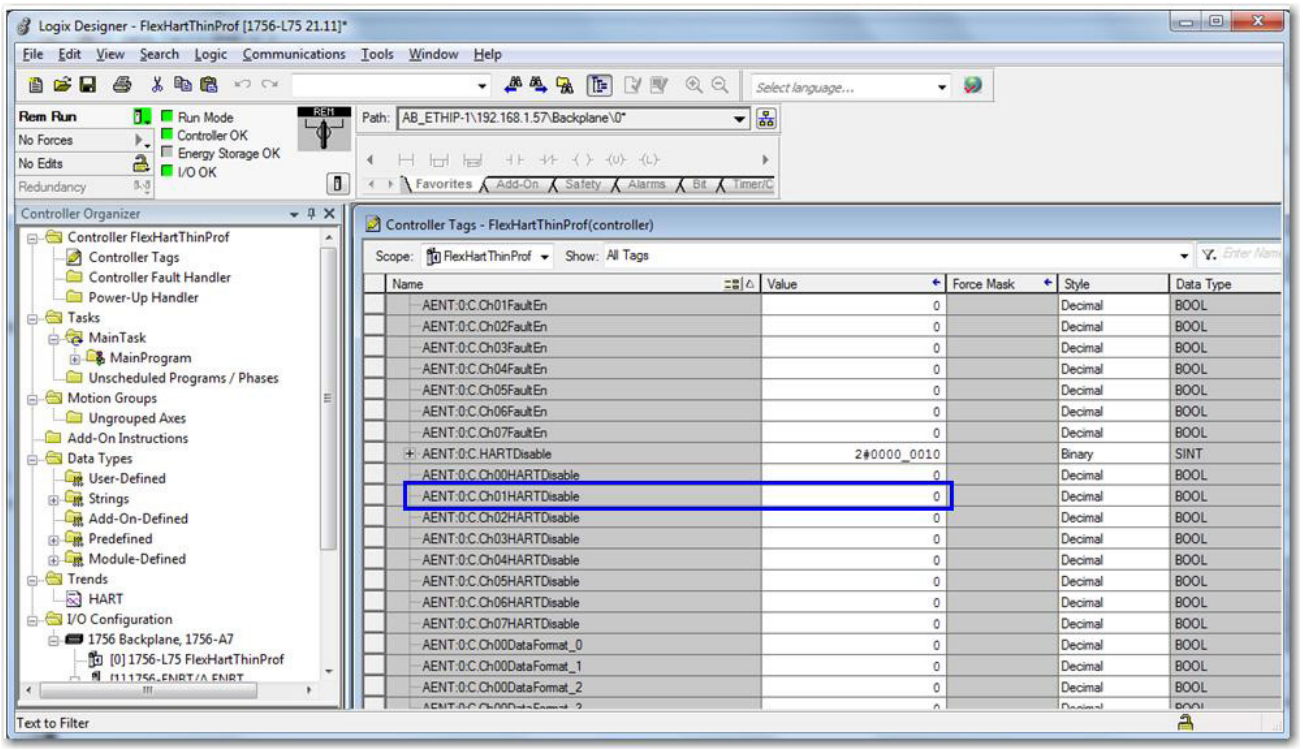
Use this section if you want your 1794-IF8IHNFXT module running the original functionality and your Studio 5000 Logix Designer application version is earlier than version 23.

The Studio 5000 Logix Designer application earlier than version 23 does not have a user-interface for data entry. A thin profile is required to manually enter operational modes and output settings in the Controller Tags window.

IMPORTANT	A global search and replace is needed only for those tags that are referenced in ladder logic. For example, if there is no configuration tag referenced in ladder logic, it is not necessary to perform a search and replace on the .C tags.

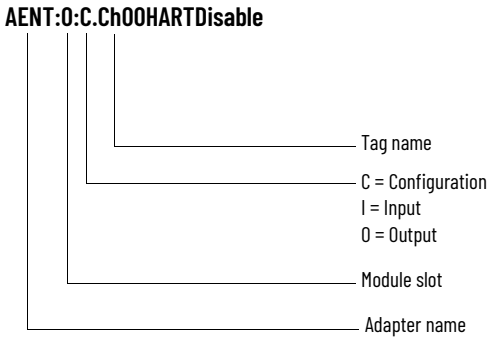
Example: How to Configure HART Enable Using Thin Profile Tags

The following steps show you how to edit a thin profile tag. This example illustrates specifically how to enable HART using a thin profile.



IMPORTANT Input and output tags are not editable using the thin profile.

1. Right-click Controller Tags and select Monitor Tags. The tags have the following structure:



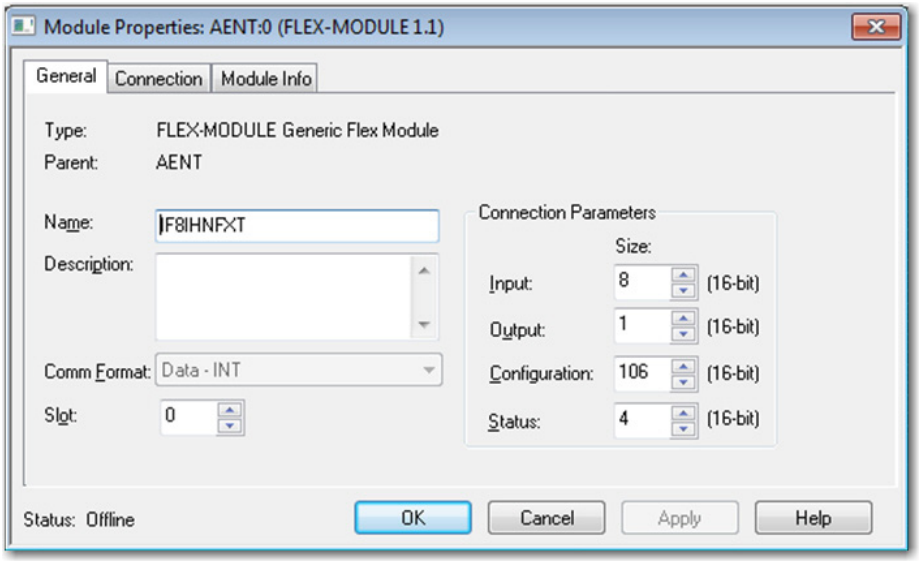
2. To enable HART on channel 1, set the value of the Ch00HARTDisable tag to 0. The default value of 0 indicates that HART is enabled by default in the channels. To disable HART, set the tag to 1.
3. Using your monitoring tool, check that your channel can receive HART messages.

Configure a Generic Profile

Use a generic profile if your Studio 5000 Logix Designer application is earlier than version 20. You must use the FLEX-MODULE Generic Profile as indicated in this procedure.

Follow these steps to create a generic profile.

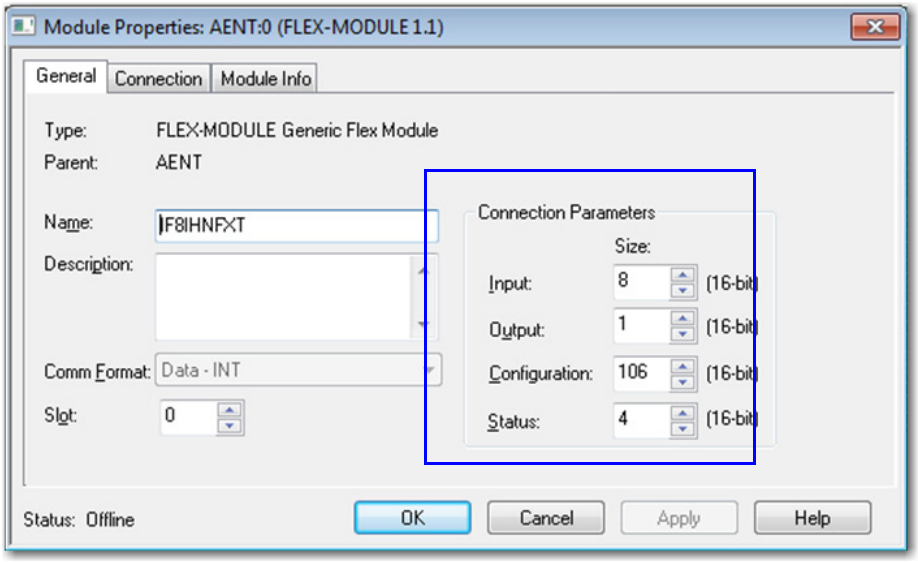
1. In Studio 5000 Logix Designer application, open or create a project for your controller. From the File menu, choose New to access the New Controller dialog to create a controller name.
2. On the Controller Organizer, right-click I/O Configuration and choose New Module. The Select Module window appears.
3. Select '+' next to Other to display a list of I/O modules.
4. Select FLEX-MODULE Generic and then OK. The Module Properties dialog appears.



5. Enter a name for the module in the Name field.
6. From the Comm Format dropdown menu, select Data - INT.
7. Enter a module slot number that is specific to your chassis configuration.

Connection Parameters

In the right-side column of the Module Properties dialog, you can see the entry fields for the Connection Parameters. You must set connection parameters for input, output, and configuration for the owner-controller to exchange information with the 1794-IF8IHNFXT module.



The Size field determines how large the connections are between the owner-controller and the I/O module. Connections are sent in sizes matching the selected communication format data type.

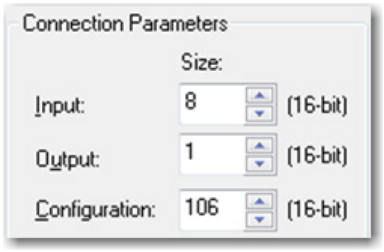
IMPORTANT	The Data - INT communication format must be chosen to use the correct connection parameters as shown in the sample New Module dialog.

IMPORTANT	Cyclic HART input data is not available in the generic profile.

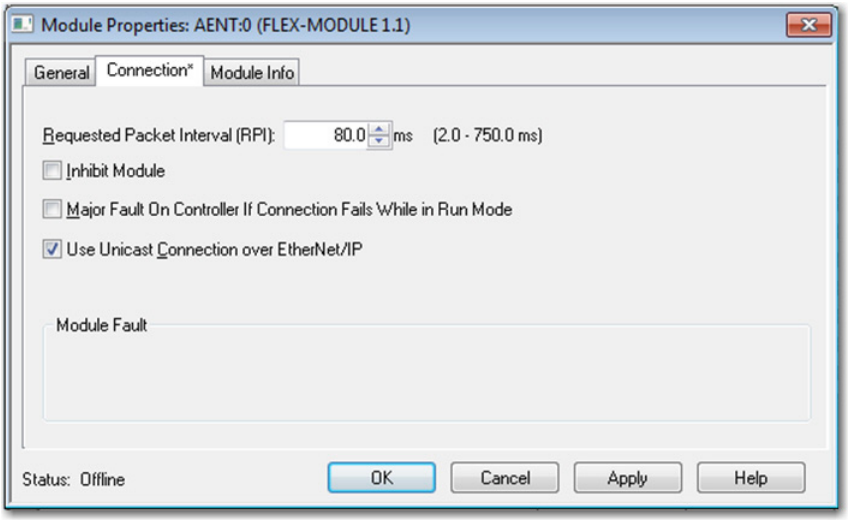
IMPORTANT HART commands work with Data Format control configured for all ranges. The default configuration when using the generic profile is 0, which configures the module for 0...20 mA range.

In the generic module configuration, configuration data is created as an array of bytes. User-defined tags are copied over the array specified by the communication format selection.

8. Enter Connection Parameters exactly as shown in the example below.



9. Select the Connection tab.



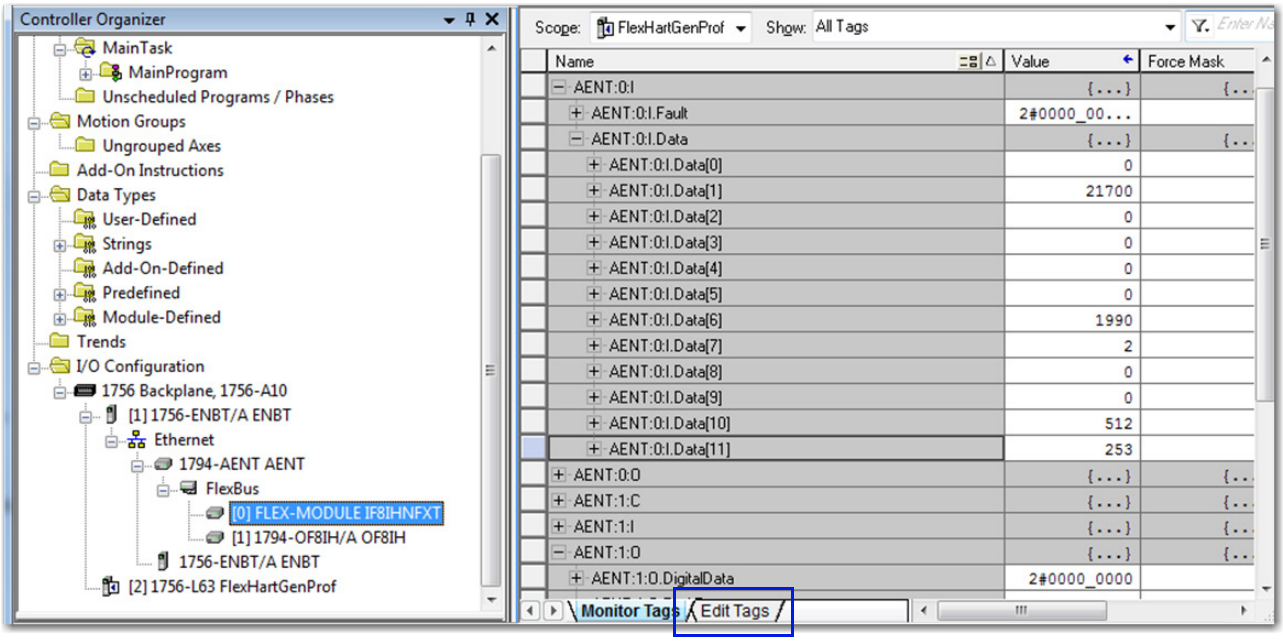
10. Set the RPI value to 80 ms and select the checkbox 'Use Unicast Connection over EtherNet/IP'.
11. Select OK.
12. On the Controller Organizer, right-click I/O Configuration and choose New Module.

    Add a 1794-IF8IHNFXT module and assign it to an unused chassis slot in your I/O Configuration tree. This module will not be used, but the configuration of this profile will aid later in the configuration of the generic module.
13. Select OK.

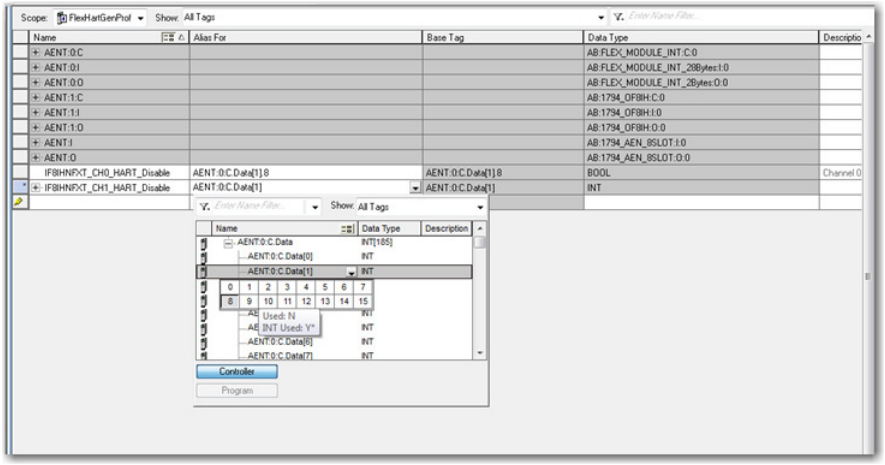
    The ladder logic in your Studio 5000 Logix Designer application project copies the module configuration from this profile to the generic profile.
14. Select OK.
15. Save the project.

Define Your Own Tags

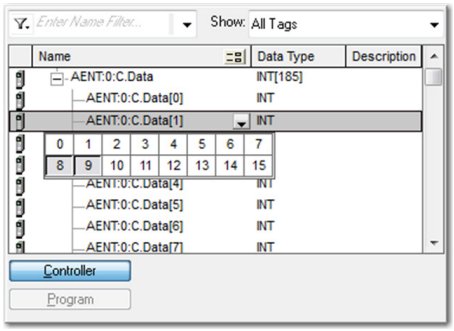
1. To define your own tags, double-click Controller Tags on the Controller Organizer.
2. Select the Edit Tags tab at the bottom of the Controller Tags window.



3. In the blank entry field at the bottom of the window, enter your tag name.

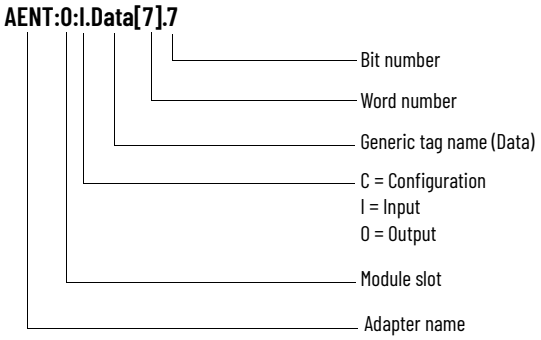


4. Select the dropdown arrow in the Alias For field and map the tag to a generic one. See the data tables as reference.

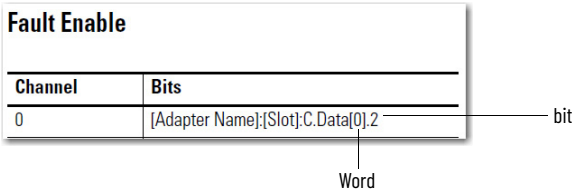


Generic Profile Tag Name Structure

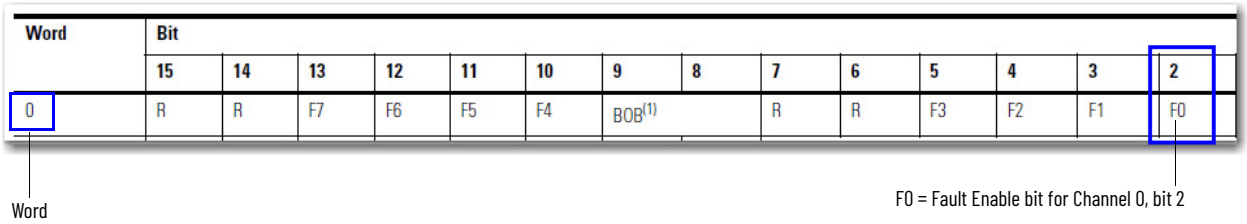
Tag names under the generic profile have the following structure:



To use the generic tags, you can consult the tables in the following section for designated tag names for each bit. For example, the following tag name refers to the Fault Enable configuration bit for Channel 0.



In the configuration data table, you see this bit as F0:



Configuration Data Table for 1794-IF8IHNFXT Module

See the following tables for configuration information.

1794-IF8IHNFXT Module Configuration Data Table

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	R	R	F7	F6	F5	F4	BOB(1)		R	R	F3	F2	F1	F0	BOA(1)	
1	DH7	DH6	DH5	DH4	DH3	DH2	DH1	DH0	Reserved							
2	CH 3 Format				CH 2 Format				CH 1 Format				CH 0 Format			
3	CH 7 Format				CH 6 Format				CH 5 Format				CH 4 Format			
4	HART_Ilimit_CH1					FLTR1			HART_Ilimit_CH0					FLTR0		
5	HART_Ilimit_CH3					FLTR3			HART_Ilimit_CH2					FLTR2		
6	HART_Ilimit_CH5					FLTR5			HART_Ilimit_CH4					FLTR4		
7	HART_Ilimit_CH7					FLTR7			HART_Ilimit_CH6					FLTR6		
8	CH0 High Alarm Threshold															
9	CH0 Low Alarm Threshold															
10	CH0 Remote High High Alarm Limit															
11	CH0 Remote Low Low Alarm Limit															

1794-IF8IHNFXT Module Configuration Data Table (Continued)

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
12	CH0 PvDampingValue (32 bit, Floating Point, Low Word)															
13	CH0 PvDampingValue (32-bit Floating Point, High Word)															
14	CH0 PvUpperRange (32-bit Floating Point, Low Word)															
15	CH0 PvUpperRange (32-bit Floating Point, High Word)															
16	CH0 PvLowerRange (32-bit Floating Point, Low Word)															
17	CH0 PvLowerRange (32-bit Floating Point, High Word)															
18	Reserved								CH0 PV Range Units Code							
19	Unused															
20…31	Words 8…19 for channel 1															
32…43	Words 8…19 for channel 2															
44…55	Words 8…19 for channel 3															
56…67	Words 8…19 for channel 4															
68…79	Words 8…19 for channel 5															
80…91	Words 8…19 for channel 6															
92…103	Words 8…19 for channel 7															
104	Reserved								C7	C6	C5	C4	C3	C2	C1	C0
105	ER7	ER6	ER5	ER4	ER3	ER2	ER1	ER0	ED7	ED6	ED5	ED4	ED3	ED2	ED1	ED0
Where:	BOA = Byte order group A BOB = Byte order group B Byte order group A and B values must match each other. See Byte Order (Configuration Word 0 – Bits 0, 1, 8, and 9) on page 28 for more information.															
	Cn = HART Data Publishing Disable for Channel n; 0 = HART Data Publishing Disable is enabled, 1 = HART Data Publishing Disable is disabled															
	CHn Format = Data format for Channel n. See table 1794-IF8IHNFXT Channel Data Formats on page 33 and Data Format (Configuration Words 2, 3 – Bits 0…3, 4…7, 8…11, 12…15) on page 32.															
	CHn PVDampingValue = 32-bit Float (per channel) value used in HART Command 34 to set the device PV (primary value) damping value															
	CHn PV Range Units Code = 8 bit unsigned (per channel) PV Range Units Code used in HART Command 35. This value specifies the "Units Code" for the Upper and Lower Range value configuration parameters and also supplies the value for command 44. This value is required by command 35 to inform the device what units the Upper and Lower range values being sent in command 35 does not change the PV units of the device. Command 44 is automatically sent by the module if the module detects that the PV Units code of the device does not match the parameter in the configuration table.															
	CHn PvUpperRange = 32-bit Float (per channel) specifies the value for the PV Upper Range value used in HART Command 35 to set the device PV Upper Range Value															
	CHn PvLowerRange = 32-bit Float (per channel). Specifies the value for the PV Upper Range value used in HART Command 35 to set the device PV Upper Range Value															
	DHn = Disable HART communication on Channel n; 0 = HART communication is enabled, 1 = HART communication is disabled															
	EDn = Enable HART PV Damping Value for Channel ; 0 = True, 1 = False															
	ERn = Enable HART PV Upper and Lower Range for Channel n; 0 = True, 1 = False															
	FLTRn = Channel n Digital Filter. See table1794-IF8IHNFXT Module Channel Digital Filter on page 31.															
	Fn = Fault mode Channel n; 0 = Local/Remote fault is disabled, 1 = Enabled															
	HART_Ilimit_CHn = HART Loop Tolerance Error Limit for Channel n. Defines comparison limit for HART current loop to ADC compare. Valid values are 0, or from 5…31% of full scale. A value of zero disables this feature. Full scale is defined as the difference between the normal high scale and the normal low. Example: 40…20 mA: 20 - 4 = 16. 5% of 16 is 0.8 mA. Example: 4…20 mA: 20 - 0 = 20. 5% of 20 is 1.0 mA.															
	R = Reserved															

(1) Not shown in Studio 5000 Logix Designer application.

The following tables show the structure of each configuration bit per channel.

Byte Order

Channel	Bits
0…3	[Adapter Name]:[Slot]:C.Data[0].0
	[Adapter Name]:[Slot]:C.Data[0].1
4…7	[Adapter Name]:[Slot]:C.Data[0].8
	[Adapter Name]:[Slot]:C.Data[0].9

Byte Order Group B		Byte Order Group A		Description
Bit 9	Bit 8	Bit 1	Bit 0	
0	0	0	0	Little Endian Format (default) — All data entries are in true little endian format.
1	0	1	0	Word Swap — Word swap only applies to values requiring more than one word. For example, 32-bit float values.
0	1	0	1	Byte Swap — Byte swap all words in the data table.
1	1	1	1	Big Endian Format — All data entries are in true big endian format.

Fault Enable

Channel	Bits
4	[Adapter Name]:[Slot]:C.Data[0].10
5	[Adapter Name]:[Slot]:C.Data[0].11
6	[Adapter Name]:[Slot]:C.Data[0].12
7	[Adapter Name]:[Slot]:C.Data[0].13

Fault Mode	Bit 0
Local Remote Faults Disabled	0
Enabled	1

HART Disable

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[1].8
1	[Adapter Name]:[Slot]:C.Data[1].9
2	[Adapter Name]:[Slot]:C.Data[1].10
3	[Adapter Name]:[Slot]:C.Data[1].11
4	[Adapter Name]:[Slot]:C.Data[1].12
5	[Adapter Name]:[Slot]:C.Data[1].13
6	[Adapter Name]:[Slot]:C.Data[1].14
7	[Adapter Name]:[Slot]:C.Data[1].15

Disable Mode	Bit 0
False	0
True	1

Channel Data Format

Channel Data Format

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[2].0
	[Adapter Name]:[Slot]:C.Data[2].1
	[Adapter Name]:[Slot]:C.Data[2].2
	[Adapter Name]:[Slot]:C.Data[2].3
1	[Adapter Name]:[Slot]:C.Data[2].4
	[Adapter Name]:[Slot]:C.Data[2].5
	[Adapter Name]:[Slot]:C.Data[2].6
	[Adapter Name]:[Slot]:C.Data[2].7
2	[Adapter Name]:[Slot]:C.Data[2].8
	[Adapter Name]:[Slot]:C.Data[2].9
	[Adapter Name]:[Slot]:C.Data[2].10
	[Adapter Name]:[Slot]:C.Data[2].11

Channel Data Format (Continued)

Channel	Bits
3	[Adapter Name]:[Slot]:C.Data[2].12
	[Adapter Name]:[Slot]:C.Data[2].13
	[Adapter Name]:[Slot]:C.Data[2].14
	[Adapter Name]:[Slot]:C.Data[2].15
4	[Adapter Name]:[Slot]:C.Data[3].0
	[Adapter Name]:[Slot]:C.Data[3].1
	[Adapter Name]:[Slot]:C.Data[3].2
	[Adapter Name]:[Slot]:C.Data[3].3
5	[Adapter Name]:[Slot]:C.Data[3].4
	[Adapter Name]:[Slot]:C.Data[3].5
	[Adapter Name]:[Slot]:C.Data[3].6
	[Adapter Name]:[Slot]:C.Data[3].7
6	[Adapter Name]:[Slot]:C.Data[3].8
	[Adapter Name]:[Slot]:C.Data[3].9
	[Adapter Name]:[Slot]:C.Data[3].10
	[Adapter Name]:[Slot]:C.Data[3].11
7	[Adapter Name]:[Slot]:C.Data[3].12
	[Adapter Name]:[Slot]:C.Data[3].13
	[Adapter Name]:[Slot]:C.Data[3].14
	[Adapter Name]:[Slot]:C.Data[3].15

Format[1]	Bits 15 14 13 12 / 11 10 9 8 / 7 6 5 4 / 3 2 1 0	Format Name	Signal Range		User Range		Resolution
			LO	HI	LO	HI	
0	0 0 0 0	0...20 mA in Milliamps	0.00	20.00	0 (0.000 mA)	20000 (20.000 mA)	1.0 µA
1	0 0 0 1	0...20 mA in % Full Scale	0.00	20.00	0 (0%)	10000 (100.00%)	2.0 µA
3	0 0 1 1	0...20 mA in UINT	0.00	20.00	0	65535	0.3052 µA
4	0 1 0 0	4...20 mA in Milliamps	4.00	20.00	4000	20000 (20.000 mA)	1.0 µA
5	0 1 0 1	4...20 mA in % Full Scale	4.00	20.00	0	10000 (100.00%)	1.6 µA
6	0 1 1 0	4...20 mA in Signed 2's Complement	4.00	20.00	0	30840	0.5188 µA
7	0 1 1 1	4...20 mA in UINT	4.00	20.00	0	65535	0.2441 µA

(1) All other formats are invalid.

Digital Filters

Digital Filters

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[4].0
	[Adapter Name]:[Slot]:C.Data[4].1
	[Adapter Name]:[Slot]:C.Data[4].2
1	[Adapter Name]:[Slot]:C.Data[4].8
	[Adapter Name]:[Slot]:C.Data[4].9
	[Adapter Name]:[Slot]:C.Data[4].10

Digital Filters (Continued)

Channel	Bits
2	[Adapter Name]:[Slot]:C.Data[5].0
	[Adapter Name]:[Slot]:C.Data[5].1
	[Adapter Name]:[Slot]:C.Data[5].2
3	[Adapter Name]:[Slot]:C.Data[5].8
	[Adapter Name]:[Slot]:C.Data[5].9
	[Adapter Name]:[Slot]:C.Data[5].10
4	[Adapter Name]:[Slot]:C.Data[6].0
	[Adapter Name]:[Slot]:C.Data[6].1
	[Adapter Name]:[Slot]:C.Data[6].2
5	[Adapter Name]:[Slot]:C.Data[6].8
	[Adapter Name]:[Slot]:C.Data[6].9
	[Adapter Name]:[Slot]:C.Data[6].10
6	[Adapter Name]:[Slot]:C.Data[7].0
	[Adapter Name]:[Slot]:C.Data[7].1
	[Adapter Name]:[Slot]:C.Data[7].2
7	[Adapter Name]:[Slot]:C.Data[7].8
	[Adapter Name]:[Slot]:C.Data[7].9
	[Adapter Name]:[Slot]:C.Data[7].10

Digital Filter Frequency (Hz)	Decimal Value	Bits		
		10	9	8
		2	1	0
242	0	0	0	0
123	1	0	0	1
62	2	0	1	0
19.6	3	0	1	1
16.7	4	1	0	0
10	5	1	0	1
4.17	6	1	1	0
Not applicable	7	1	1	1

HART Current Ratio Limit

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[4].3
	[Adapter Name]:[Slot]:C.Data[4].4
	[Adapter Name]:[Slot]:C.Data[4].5
	[Adapter Name]:[Slot]:C.Data[4].6
	[Adapter Name]:[Slot]:C.Data[4].7
1	[Adapter Name]:[Slot]:C.Data[4].11
	[Adapter Name]:[Slot]:C.Data[4].12
	[Adapter Name]:[Slot]:C.Data[4].13
	[Adapter Name]:[Slot]:C.Data[4].14
	[Adapter Name]:[Slot]:C.Data[4].15
2	[Adapter Name]:[Slot]:C.Data[5].3
	[Adapter Name]:[Slot]:C.Data[5].4
	[Adapter Name]:[Slot]:C.Data[5].5
	[Adapter Name]:[Slot]:C.Data[5].6
	[Adapter Name]:[Slot]:C.Data[5].7

HART Current Ratio Limit (Continued)

Channel	Bits
3	[Adapter Name]:[Slot]:C.Data[5].11
	[Adapter Name]:[Slot]:C.Data[5].12
	[Adapter Name]:[Slot]:C.Data[5].13
	[Adapter Name]:[Slot]:C.Data[5].14
	[Adapter Name]:[Slot]:C.Data[5].15
4	[Adapter Name]:[Slot]:C.Data[6].3
	[Adapter Name]:[Slot]:C.Data[6].4
	[Adapter Name]:[Slot]:C.Data[6].5
	[Adapter Name]:[Slot]:C.Data[6].6
	[Adapter Name]:[Slot]:C.Data[6].7
5	[Adapter Name]:[Slot]:C.Data[6].11
	[Adapter Name]:[Slot]:C.Data[6].12
	[Adapter Name]:[Slot]:C.Data[6].13
	[Adapter Name]:[Slot]:C.Data[6].14
	[Adapter Name]:[Slot]:C.Data[6].15
6	[Adapter Name]:[Slot]:C.Data[7].3
	[Adapter Name]:[Slot]:C.Data[7].4
	[Adapter Name]:[Slot]:C.Data[7].5
	[Adapter Name]:[Slot]:C.Data[7].6
	[Adapter Name]:[Slot]:C.Data[7].7
7	[Adapter Name]:[Slot]:C.Data[7].11
	[Adapter Name]:[Slot]:C.Data[7].12
	[Adapter Name]:[Slot]:C.Data[7].13
	[Adapter Name]:[Slot]:C.Data[7].14
	[Adapter Name]:[Slot]:C.Data[7].15

HART Current Ratio Limit	Decimal Value	Bits				
		15	14	13	12	11
		7	6	5	4	3
Disabled	0	0	0	0	0	0
Not applicable	1	0	0	0	0	1
Not applicable	2	0	0	0	1	0
Not applicable	3	0	0	0	1	1
Not applicable	4	0	0	1	0	0
5%	5	0	0	1	0	1
6%	6	0	0	1	1	0
7%	7	0	0	1	1	1
8%	8	0	1	0	0	0
9%	9	0	1	0	0	1
10%	10	0	1	0	1	0
...	...	...	...	...	...	...
30%	30	1	1	1	1	0
31%	31	1	1	1	1	1

High Alarm Limit

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[8]
1	[Adapter Name]:[Slot]:C.Data[20]
2	[Adapter Name]:[Slot]:C.Data[32]
3	[Adapter Name]:[Slot]:C.Data[44]
4	[Adapter Name]:[Slot]:C.Data[56]
5	[Adapter Name]:[Slot]:C.Data[68]
6	[Adapter Name]:[Slot]:C.Data[80]
7	[Adapter Name]:[Slot]:C.Data[92]

Low Alarm Limit

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[9]
1	[Adapter Name]:[Slot]:C.Data[20]
2	[Adapter Name]:[Slot]:C.Data[32]
3	[Adapter Name]:[Slot]:C.Data[44]
4	[Adapter Name]:[Slot]:C.Data[56]
5	[Adapter Name]:[Slot]:C.Data[68]
6	[Adapter Name]:[Slot]:C.Data[80]
7	[Adapter Name]:[Slot]:C.Data[92]

Remote High High Alarm Limit

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[10]
1	[Adapter Name]:[Slot]:C.Data[20]
2	[Adapter Name]:[Slot]:C.Data[32]
3	[Adapter Name]:[Slot]:C.Data[44]
4	[Adapter Name]:[Slot]:C.Data[56]
5	[Adapter Name]:[Slot]:C.Data[68]
6	[Adapter Name]:[Slot]:C.Data[80]
7	[Adapter Name]:[Slot]:C.Data[92]

Remote Low Low Alarm Limit

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[11]
1	[Adapter Name]:[Slot]:C.Data[20]
2	[Adapter Name]:[Slot]:C.Data[32]
3	[Adapter Name]:[Slot]:C.Data[44]
4	[Adapter Name]:[Slot]:C.Data[56]
5	[Adapter Name]:[Slot]:C.Data[68]
6	[Adapter Name]:[Slot]:C.Data[80]
7	[Adapter Name]:[Slot]:C.Data[92]

PV Damping Value (32-bit Floating Point, Low Word)

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[12]
1	[Adapter Name]:[Slot]:C.Data[20]
2	[Adapter Name]:[Slot]:C.Data[32]
3	[Adapter Name]:[Slot]:C.Data[44]
4	[Adapter Name]:[Slot]:C.Data[56]
5	[Adapter Name]:[Slot]:C.Data[68]
6	[Adapter Name]:[Slot]:C.Data[80]
7	[Adapter Name]:[Slot]:C.Data[92]

PV Damping Value (32-bit floating point, High Word)

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[13]
1	[Adapter Name]:[Slot]:C.Data[20]
2	[Adapter Name]:[Slot]:C.Data[32]
3	[Adapter Name]:[Slot]:C.Data[44]
4	[Adapter Name]:[Slot]:C.Data[56]
5	[Adapter Name]:[Slot]:C.Data[68]
6	[Adapter Name]:[Slot]:C.Data[80]
7	[Adapter Name]:[Slot]:C.Data[92]

PV Upper Range (32-bit floating point, Low Word)

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[15]
1	[Adapter Name]:[Slot]:C.Data[20]
2	[Adapter Name]:[Slot]:C.Data[32]
3	[Adapter Name]:[Slot]:C.Data[44]
4	[Adapter Name]:[Slot]:C.Data[56]
5	[Adapter Name]:[Slot]:C.Data[68]
6	[Adapter Name]:[Slot]:C.Data[80]
7	[Adapter Name]:[Slot]:C.Data[92]

PV Lower Range (32-bit floating point, Low Word)

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[16]
1	[Adapter Name]:[Slot]:C.Data[20]
2	[Adapter Name]:[Slot]:C.Data[32]
3	[Adapter Name]:[Slot]:C.Data[44]
4	[Adapter Name]:[Slot]:C.Data[56]
5	[Adapter Name]:[Slot]:C.Data[68]
6	[Adapter Name]:[Slot]:C.Data[80]
7	[Adapter Name]:[Slot]:C.Data[92]

PV Lower Range (32-bit floating point, High Word)

PV Lower Range (32-bit floating point, High Word)

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[17]
1	[Adapter Name]:[Slot]:C.Data[20]
2	[Adapter Name]:[Slot]:C.Data[32]

PV Lower Range (32-bit floating point, High Word) (Continued)

Channel	Word
3	[Adapter Name]:[Slot]:C.Data[44]
4	[Adapter Name]:[Slot]:C.Data[56]
5	[Adapter Name]:[Slot]:C.Data[68]
6	[Adapter Name]:[Slot]:C.Data[80]
7	[Adapter Name]:[Slot]:C.Data[92]

PV Range Units Code

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[18].7
	[Adapter Name]:[Slot]:C.Data[18].6
	[Adapter Name]:[Slot]:C.Data[18].5
	[Adapter Name]:[Slot]:C.Data[18].4
	[Adapter Name]:[Slot]:C.Data[18].3
	[Adapter Name]:[Slot]:C.Data[18].2
	[Adapter Name]:[Slot]:C.Data[18].1
	[Adapter Name]:[Slot]:C.Data[18].0

HART Command 3 Disable

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[41].0
1	[Adapter Name]:[Slot]:C.Data[41].1
2	[Adapter Name]:[Slot]:C.Data[41].2
3	[Adapter Name]:[Slot]:C.Data[41].3
4	[Adapter Name]:[Slot]:C.Data[41].4
5	[Adapter Name]:[Slot]:C.Data[41].5
6	[Adapter Name]:[Slot]:C.Data[41].6
7	[Adapter Name]:[Slot]:C.Data[41].7

Disable Mode	Bit 0
False	0
True	1

Input Map

Input Data

Channel	Words
0	[Adapter Name]:[Slot]:I.Data[0]
1	[Adapter Name]:[Slot]:I.Data[1]
2	[Adapter Name]:[Slot]:I.Data[2]
3	[Adapter Name]:[Slot]:I.Data[3]
4	[Adapter Name]:[Slot]:I.Data[4]
5	[Adapter Name]:[Slot]:I.Data[5]
6	[Adapter Name]:[Slot]:I.Data[6]
7	[Adapter Name]:[Slot]:I.Data[7]

High Alarm

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[8].0
1	[Adapter Name]:[Slot]:I.Data[8].1
2	[Adapter Name]:[Slot]:I.Data[8].2
3	[Adapter Name]:[Slot]:I.Data[8].3
4	[Adapter Name]:[Slot]:I.Data[8].4
5	[Adapter Name]:[Slot]:I.Data[8].5
6	[Adapter Name]:[Slot]:I.Data[8].6
7	[Adapter Name]:[Slot]:I.Data[8].7

Low Alarm

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[8].8
1	[Adapter Name]:[Slot]:I.Data[8].9
2	[Adapter Name]:[Slot]:I.Data[8].10
3	[Adapter Name]:[Slot]:I.Data[8].11
4	[Adapter Name]:[Slot]:I.Data[8].12
5	[Adapter Name]:[Slot]:I.Data[8].13
6	[Adapter Name]:[Slot]:I.Data[8].14
7	[Adapter Name]:[Slot]:I.Data[8].15

Out of Range

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[9].0
1	[Adapter Name]:[Slot]:I.Data[9].1
2	[Adapter Name]:[Slot]:I.Data[9].2
3	[Adapter Name]:[Slot]:I.Data[9].3
4	[Adapter Name]:[Slot]:I.Data[9].4
5	[Adapter Name]:[Slot]:I.Data[9].5
6	[Adapter Name]:[Slot]:I.Data[9].6
7	[Adapter Name]:[Slot]:I.Data[9].7

Second Alarm

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[9].8
1	[Adapter Name]:[Slot]:I.Data[9].9
2	[Adapter Name]:[Slot]:I.Data[9].10
3	[Adapter Name]:[Slot]:I.Data[9].11
4	[Adapter Name]:[Slot]:I.Data[9].12
5	[Adapter Name]:[Slot]:I.Data[9].13
6	[Adapter Name]:[Slot]:I.Data[9].14
7	[Adapter Name]:[Slot]:I.Data[9].15

Diagnostic Status

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[10].0
1	[Adapter Name]:[Slot]:I.Data[10].1
2	[Adapter Name]:[Slot]:I.Data[10].2
3	[Adapter Name]:[Slot]:I.Data[10].3
4	[Adapter Name]:[Slot]:I.Data[10].4
5	[Adapter Name]:[Slot]:I.Data[10].5
6	[Adapter Name]:[Slot]:I.Data[10].6
7	[Adapter Name]:[Slot]:I.Data[10].7

HART Fault

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[11].0
1	[Adapter Name]:[Slot]:I.Data[11].1
2	[Adapter Name]:[Slot]:I.Data[11].2
3	[Adapter Name]:[Slot]:I.Data[11].3
4	[Adapter Name]:[Slot]:I.Data[11].4
5	[Adapter Name]:[Slot]:I.Data[11].5
6	[Adapter Name]:[Slot]:I.Data[11].6
7	[Adapter Name]:[Slot]:I.Data[11].7

Fault Mode	Bit 0
False	0
True	1

HART Current Fault

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[11].8
1	[Adapter Name]:[Slot]:I.Data[11].9
2	[Adapter Name]:[Slot]:I.Data[11].10
3	[Adapter Name]:[Slot]:I.Data[11].11
4	[Adapter Name]:[Slot]:I.Data[11].12
5	[Adapter Name]:[Slot]:I.Data[11].13
6	[Adapter Name]:[Slot]:I.Data[11].14
7	[Adapter Name]:[Slot]:I.Data[11].15

Fault Mode	Bit 0
False	0
True	1

HART Transmitter Present

Channel	Bits
0	[Adapter Name]:[Slot]:I.Data[12].8
1	[Adapter Name]:[Slot]:I.Data[12].9
2	[Adapter Name]:[Slot]:I.Data[12].10
3	[Adapter Name]:[Slot]:I.Data[12].11
4	[Adapter Name]:[Slot]:I.Data[12].12
5	[Adapter Name]:[Slot]:I.Data[12].13
6	[Adapter Name]:[Slot]:I.Data[12].14
7	[Adapter Name]:[Slot]:I.Data[12].15

Fault Mode	Bit 0
False	0
True	1

Notes:

Use the 1794-OF8IH Module with the Generic Profile

This appendix provides the information that is needed to configure the 1794-OF8IH analog output module in Studio 5000 Logix Designer application over the ControlNet network using version 16 or earlier and the generic profile.

Background Information

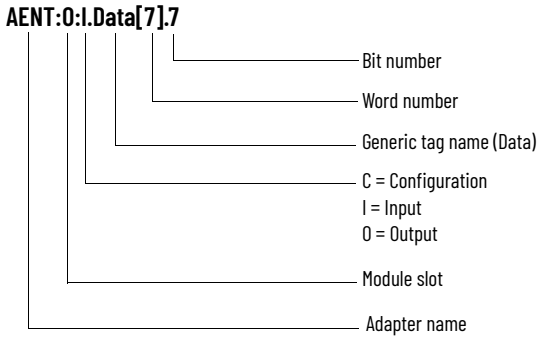
Make sure that your Comm-Format is set to Data - INT. In the FLEX generic profile, you need these sizes:

- Input – 0
- Output – 9
- Config – 18
- Status – 4
- Cyclic HART input data is not available in the generic profile.

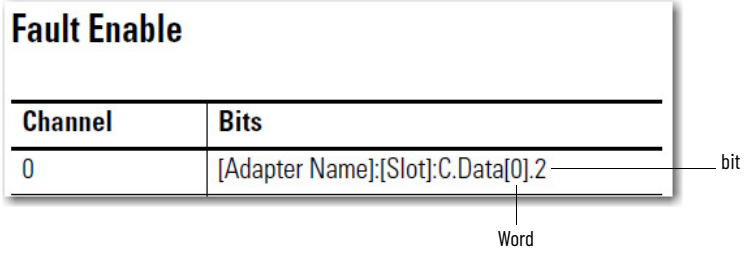
IMPORTANT	HART commands only works when the Data Format control is configured for a 4...20 mA range. The default configuration when using the generic profile is 0, which configures the module for a 0...20 mA range.

Generic Profile Tag Name Structure

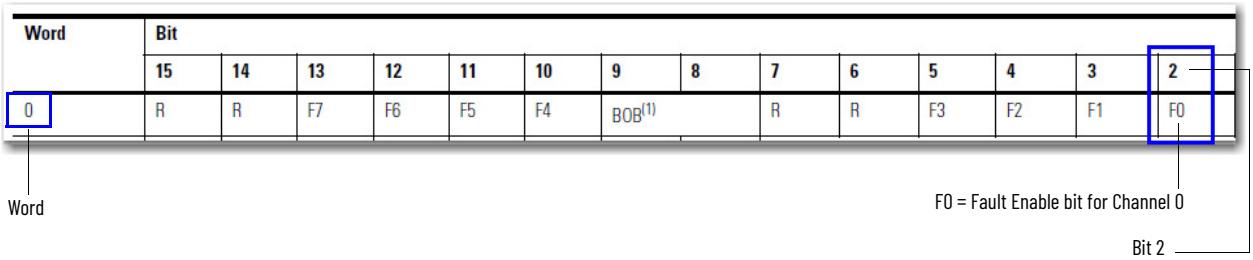
Tag names under the generic profile have the following structure:



To use the generic tags, you can consult the tables in the following section for designated tag names for each bit. For example, the following tag name refers to the Fault Enable configuration bit for Channel 0.



In the configuration data table, you will see this bit as:



Configuration Data Table for 1794-OF8IH Module

See the following tables for configuration.

1794-OF8IH Configuration Data Table

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	FT	R	EW7	EW6	EW5	EW4	BOB(1)		R	R	EW3	EW2	EW1	EW0	BOA(1)	
1	DH7	DH6	DH5	DH4	DH3	DH2	DH1	DH0	Reserved(2)							
2	CH3 Format				CH2 Format				CH1 Format				CH0 Format			
3	CH7 Format				CH6 Format				CH5 Format				CH4 Format			
4	CH1 HART Current Ratio					L1	AFS1		CH0 HART Current Ratio					L0	AFS0	
5	CH3 HART Current Ratio					L3	AFS3		CH2 HART Current Ratio					L2	AFS2	
6	CH5 HART Current Ratio					L5	AFS5		CH4 HART Current Ratio					L4	AFS4	
7	CH7 HART Current Ratio					L7	AFS7		CH6 HART Current Ratio					L6	AFS6	
8	DF7	DF6	DF5	DF4	DF3	DF2	DF1	DF0	DM7	DM6	DM5	DM4	DM3	DM2	DM1	DM0
9	Channel 0 Analog Fault Value Output Data															
10	Channel 1 Analog Fault Value Output Data															
11	Channel 2 Analog Fault Value Output Data															
12	Channel 3 Analog Fault Value Output Data															
13	Channel 4 Analog Fault Value Output Data															
14	Channel 5 Analog Fault Value Output Data															
15	Channel 6 Analog Fault Value Output Data															
16	Channel 7 Analog Fault Value Output Data															
17	Reserved								C7	C6	C5	C4	C3	C2	C1	C0
Where:	AFSn = Analog Fault Selection for Channel n See Analog Fault Mode Selection (Configuration Words 4...7 — Bits 0...1, 8...9) on page 53.															
	BOA = Byte order group A BOB = Byte order group B Byte order group A and B values must match each other. See Byte Order (Configuration Word 0 — Bits 0, 1, 8, and 9) on page 47.															
	Cn = HART CMD 3 Disable 0 = HART CMD 3 communication is enabled, 1 = HART CMD 3 communication is disabled															
	CHn Format = Channel Data Formats. See Data Format (Configuration Words 2, 3 – Bits 0...3, 4...7, 8...11, 12...15) on page 32.															
	CHn HART Current Ratio = HART current fault ratio on channel n Valid values are 0, 5...31% of full scale. A value of 0 disables this feature. See HART Current Ratio (Configuration Words 4...7 — Bits 3...7, 11...15.) on page 50.															
	DFn = Channel n Digital Fault Mode Selection 0 = Reset (0 mA), 1 = Hold Last State															
	DHn = Disable HART communications on channel n 0 = HART communication is enabled, 1 = HART communication is disabled															
	DMn = Channel n Enable Digital Mode 0 = Analog, 1 = Digital															
	EWn = Fault Enable for wire fault detection on channel n(3) 0 = Disable wire off/lead break detection, 1 = Enable wire off/lead break detection(4)															

1794-OF8IH Configuration Data Table (Continued)

Word	Bit															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Where: (continued)	FT = Local Fault Mode; 0 = Outputs set to safe value on communication faults only, 1 = Outputs set to safe value on any fault															
	Ln = Channel n Enable Latching of Wire Fault 0 = Unlatched, 1 = Latched															
	R = Reserved															

(1) Not shown or used in Studio 5000 Logix Designer application.
(2) Reserved data may not be shown in certain controller software.
(3) Not supported in analog 0…20 mA formats.
(4) Lead break must be present for 100 ms or more.

Byte Order

Channel	Bits
0…3	[Adapter Name]:[Slot]:C.Data[0].0
	[Adapter Name]:[Slot]:C.Data[0].1
4…7	[Adapter Name]:[Slot]:C.Data[0].8
	[Adapter Name]:[Slot]:C.Data[0].9

Byte Order Group B		Byte Order Group A		Description
Bit 9	Bit 8	Bit 1	Bit 0	
0	0	0	0	Little Endian Format (default) — All data entries are in true little endian format.
1	0	1	0	Word Swap — Word swap only applies to values requiring more than one word. For example, 32-bit float values.
0	1	0	1	Byte Swap — Byte swap all words in data table.
1	1	1	1	Big Endian Format — All data entries are in true big endian format.

Fault Enable

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[0].2
1	[Adapter Name]:[Slot]:C.Data[0].3
2	[Adapter Name]:[Slot]:C.Data[0].4
3	[Adapter Name]:[Slot]:C.Data[0].5
4	[Adapter Name]:[Slot]:C.Data[0].10
5	[Adapter Name]:[Slot]:C.Data[0].11
6	[Adapter Name]:[Slot]:C.Data[0].12
7	[Adapter Name]:[Slot]:C.Data[0].13

Fault Mode	Bit 0
Disabled	0
Enabled	1

Local Fault Mode

Channel	Bits
0…7	[Adapter Name]:[Slot]:C.Data[0].15

Fault Mode	Bit 0
Disabled	0
Enabled	1

HART Disable

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[1].8
1	[Adapter Name]:[Slot]:C.Data[1].9
2	[Adapter Name]:[Slot]:C.Data[1].10
3	[Adapter Name]:[Slot]:C.Data[1].11
4	[Adapter Name]:[Slot]:C.Data[1].12
5	[Adapter Name]:[Slot]:C.Data[1].13
6	[Adapter Name]:[Slot]:C.Data[1].14
7	[Adapter Name]:[Slot]:C.Data[1].15

Fault Mode	Bit 0
False	0
True	1

Channel Data Format

Channel Data Format

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[2].0
	[Adapter Name]:[Slot]:C.Data[2].1
	[Adapter Name]:[Slot]:C.Data[2].2
	[Adapter Name]:[Slot]:C.Data[2].3
1	[Adapter Name]:[Slot]:C.Data[2].4
	[Adapter Name]:[Slot]:C.Data[2].5
	[Adapter Name]:[Slot]:C.Data[2].6
	[Adapter Name]:[Slot]:C.Data[2].7
2	[Adapter Name]:[Slot]:C.Data[2].8
	[Adapter Name]:[Slot]:C.Data[2].9
	[Adapter Name]:[Slot]:C.Data[2].10
	[Adapter Name]:[Slot]:C.Data[2].11
3	[Adapter Name]:[Slot]:C.Data[2].12
	[Adapter Name]:[Slot]:C.Data[2].13
	[Adapter Name]:[Slot]:C.Data[2].14
	[Adapter Name]:[Slot]:C.Data[2].15
4	[Adapter Name]:[Slot]:C.Data[3].0
	[Adapter Name]:[Slot]:C.Data[3].1
	[Adapter Name]:[Slot]:C.Data[3].2
	[Adapter Name]:[Slot]:C.Data[3].3
5	[Adapter Name]:[Slot]:C.Data[3].4
	[Adapter Name]:[Slot]:C.Data[3].5
	[Adapter Name]:[Slot]:C.Data[3].6
	[Adapter Name]:[Slot]:C.Data[3].7
6	[Adapter Name]:[Slot]:C.Data[3].8
	[Adapter Name]:[Slot]:C.Data[3].9
	[Adapter Name]:[Slot]:C.Data[3].10
	[Adapter Name]:[Slot]:C.Data[3].11
7	[Adapter Name]:[Slot]:C.Data[3].12
	[Adapter Name]:[Slot]:C.Data[3].13
	[Adapter Name]:[Slot]:C.Data[3].14
	[Adapter Name]:[Slot]:C.Data[3].15

Format[1]	Bits				Format Name	Signal Range		User Range		Resolution
	15	14	13	12						
	11	10	9	8						
	7	6	5	4						
	3	2	1	0		LO	HI	LO	HI	
0	0	0	0	0	0...20 mA in Milliamps	0.00	22.00	0 (0.000 mA)	22000 (22.000 mA)	1.0 µA
1	0	0	0	1	0...20 mA in % Full Scale	0.00	22.00	0 (0%)	11000 (110.00%)	2.0 µA
3	0	0	1	1	0...20 mA in UINT	0.00	20.00	0	65535	0.3052 µA
4[2]	0	1	0	0	4...20 mA in Milliamps	2.00	22.00	2000 (2.000 mA)	22000 (22.000 mA)	1.0 µA
7	0	1	1	1	4...20 mA in UINT	4.00	20.00	0	65535	0.2441 µA
14	1	1	1	0	4...20 mA in % Full Scale	2.00	22.00	-1250 (-12.50%)	11250 (112.50%)	1.6 µA

(1) All other formats are invalid.
(2) HART Communication supported with these data formats only.

Analog Fault Mode

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[4].0
	[Adapter Name]:[Slot]:C.Data[4].1
1	[Adapter Name]:[Slot]:C.Data[4].8
	[Adapter Name]:[Slot]:C.Data[4].9
2	[Adapter Name]:[Slot]:C.Data[5].0
	[Adapter Name]:[Slot]:C.Data[5].1
3	[Adapter Name]:[Slot]:C.Data[5].8
	[Adapter Name]:[Slot]:C.Data[5].9
4	[Adapter Name]:[Slot]:C.Data[6].0
	[Adapter Name]:[Slot]:C.Data[6].1
5	[Adapter Name]:[Slot]:C.Data[6].8
	[Adapter Name]:[Slot]:C.Data[6].9
6	[Adapter Name]:[Slot]:C.Data[7].0
	[Adapter Name]:[Slot]:C.Data[7].1
7	[Adapter Name]:[Slot]:C.Data[7].8
	[Adapter Name]:[Slot]:C.Data[7].9

Analog Fault Mode	Decimal Value	Bits	
		9	8
		1	0
Min Scale	0	0	0
Max Scale	1	0	0
Hold Last State	2	1	0
User Specified Data Value	3	1	1

Latch Mode

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[4].2
1	[Adapter Name]:[Slot]:C.Data[4].10
2	[Adapter Name]:[Slot]:C.Data[5].2
3	[Adapter Name]:[Slot]:C.Data[5].10
4	[Adapter Name]:[Slot]:C.Data[6].2

Latch Mode (Continued)

Channel	Bits
5	[Adapter Name]:[Slot]:C.Data[6].10
6	[Adapter Name]:[Slot]:C.Data[7].2
7	[Adapter Name]:[Slot]:C.Data[7].10

Latch Mode	Bit 0
Unlatched	0
Latched	1

HART Current Ratio Limit

Channel	Bits
0	[Adapter Name]:[Slot]:C.Data[4].3
	[Adapter Name]:[Slot]:C.Data[4].4
	[Adapter Name]:[Slot]:C.Data[4].5
	[Adapter Name]:[Slot]:C.Data[4].6
	[Adapter Name]:[Slot]:C.Data[4].7
1	[Adapter Name]:[Slot]:C.Data[4].11
	[Adapter Name]:[Slot]:C.Data[4].12
	[Adapter Name]:[Slot]:C.Data[4].13
	[Adapter Name]:[Slot]:C.Data[4].14
	[Adapter Name]:[Slot]:C.Data[4].15
2	[Adapter Name]:[Slot]:C.Data[5].3
	[Adapter Name]:[Slot]:C.Data[5].4
	[Adapter Name]:[Slot]:C.Data[5].5
	[Adapter Name]:[Slot]:C.Data[5].6
	[Adapter Name]:[Slot]:C.Data[5].7
3	[Adapter Name]:[Slot]:C.Data[5].11
	[Adapter Name]:[Slot]:C.Data[5].12
	[Adapter Name]:[Slot]:C.Data[5].13
	[Adapter Name]:[Slot]:C.Data[5].14
	[Adapter Name]:[Slot]:C.Data[5].15
4	[Adapter Name]:[Slot]:C.Data[6].3
	[Adapter Name]:[Slot]:C.Data[6].4
	[Adapter Name]:[Slot]:C.Data[6].5
	[Adapter Name]:[Slot]:C.Data[6].6
	[Adapter Name]:[Slot]:C.Data[6].7
5	[Adapter Name]:[Slot]:C.Data[6].11
	[Adapter Name]:[Slot]:C.Data[6].12
	[Adapter Name]:[Slot]:C.Data[6].13
	[Adapter Name]:[Slot]:C.Data[6].14
	[Adapter Name]:[Slot]:C.Data[6].15
6	[Adapter Name]:[Slot]:C.Data[7].3
	[Adapter Name]:[Slot]:C.Data[7].4
	[Adapter Name]:[Slot]:C.Data[7].5
	[Adapter Name]:[Slot]:C.Data[7].6
	[Adapter Name]:[Slot]:C.Data[7].7
7	[Adapter Name]:[Slot]:C.Data[7].11
	[Adapter Name]:[Slot]:C.Data[7].12
	[Adapter Name]:[Slot]:C.Data[7].13
	[Adapter Name]:[Slot]:C.Data[7].14
	[Adapter Name]:[Slot]:C.Data[7].15

HART Current Ratio Limit	Decimal Value	Bits				
		15	14	13	12	11
		7	6	5	4	3
Disabled	0	0	0	0	0	0
Not applicable	1	0	0	0	0	1
Not applicable	2	0	0	0	1	0
Not applicable	3	0	0	0	1	1
Not applicable	4	0	0	1	0	0
5%	5	0	0	1	0	1
6%	6	0	0	1	1	0
7%	7	0	0	1	1	1
8%	8	0	1	0	0	0
9%	9	0	1	0	0	1
10%	10	0	1	0	1	0
...	...	...	...	...	...	...
30%	30	1	1	1	1	0
31%	31	1	1	1	1	1

Digital Mode

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[8].0
1	[Adapter Name]:[Slot]:C.Data[8].1
2	[Adapter Name]:[Slot]:C.Data[8].2
3	[Adapter Name]:[Slot]:C.Data[8].3
4	[Adapter Name]:[Slot]:C.Data[8].4
5	[Adapter Name]:[Slot]:C.Data[8].5
6	[Adapter Name]:[Slot]:C.Data[8].6
7	[Adapter Name]:[Slot]:C.Data[8].7

Mode	Bit 0
Analog	0
Digital	1

Digital Fault Mode

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[8].8
1	[Adapter Name]:[Slot]:C.Data[8].9
2	[Adapter Name]:[Slot]:C.Data[8].10
3	[Adapter Name]:[Slot]:C.Data[8].11
4	[Adapter Name]:[Slot]:C.Data[8].12
5	[Adapter Name]:[Slot]:C.Data[8].13
6	[Adapter Name]:[Slot]:C.Data[8].14
7	[Adapter Name]:[Slot]:C.Data[8].15

Mode	Bit 0
Disabled	0
Enabled	1

Analog Fault Value

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[9]
1	[Adapter Name]:[Slot]:C.Data[10]
2	[Adapter Name]:[Slot]:C.Data[11]
3	[Adapter Name]:[Slot]:C.Data[12]
4	[Adapter Name]:[Slot]:C.Data[13]
5	[Adapter Name]:[Slot]:C.Data[14]
6	[Adapter Name]:[Slot]:C.Data[16]
7	[Adapter Name]:[Slot]:C.Data[17]

HART Command 3 Disable

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[17].0
1	[Adapter Name]:[Slot]:C.Data[17].1
2	[Adapter Name]:[Slot]:C.Data[17].2
3	[Adapter Name]:[Slot]:C.Data[17].3
4	[Adapter Name]:[Slot]:C.Data[17].4
5	[Adapter Name]:[Slot]:C.Data[17].5
6	[Adapter Name]:[Slot]:C.Data[17].6
7	[Adapter Name]:[Slot]:C.Data[17].7

Mode	Bit 0
False	0
True	1

Output

See the following tables for output information.

Digital Data

Channel	Word
0	[Adapter Name]:[Slot]:O.Data[0].0
1	[Adapter Name]:[Slot]:O.Data[0].1
2	[Adapter Name]:[Slot]:O.Data[0].2
3	[Adapter Name]:[Slot]:O.Data[0].3
4	[Adapter Name]:[Slot]:O.Data[0].4
5	[Adapter Name]:[Slot]:O.Data[0].5
6	[Adapter Name]:[Slot]:O.Data[0].6
7	[Adapter Name]:[Slot]:O.Data[0].7

Fault Reset

Channel	Word
0	[Adapter Name]:[Slot]:C.Data[0].15

Analog Data

Analog Data

Channel	Word
0	[Adapter Name]:[Slot]:O.Data[1]
1	[Adapter Name]:[Slot]:O.Data[2]
2	[Adapter Name]:[Slot]:O.Data[3]
3	[Adapter Name]:[Slot]:O.Data[4]

Analog Data (Continued)

Channel	Word
4	[Adapter Name]:[Slot]:O.Data[5]
5	[Adapter Name]:[Slot]:O.Data[6]
6	[Adapter Name]:[Slot]:O.Data[7]
7	[Adapter Name]:[Slot]:O.Data[8]

Input

See the following tables for input information.

Diagnostic Status

Channel	Word
0	[Adapter Name]:[Slot]:I.Data[0].0
1	[Adapter Name]:[Slot]:I.Data[0].1
2	[Adapter Name]:[Slot]:I.Data[0].2
3	[Adapter Name]:[Slot]:I.Data[0].3
4	[Adapter Name]:[Slot]:I.Data[0].4
5	[Adapter Name]:[Slot]:I.Data[0].5
6	[Adapter Name]:[Slot]:I.Data[0].6
7	[Adapter Name]:[Slot]:I.Data[0].7

HART Current Fault

Channel	Word
0	[Adapter Name]:[Slot]:I.Data[3].8
1	[Adapter Name]:[Slot]:I.Data[3].9
2	[Adapter Name]:[Slot]:I.Data[3].10
3	[Adapter Name]:[Slot]:I.Data[3].11
4	[Adapter Name]:[Slot]:I.Data[3].12
5	[Adapter Name]:[Slot]:I.Data[3].13
6	[Adapter Name]:[Slot]:I.Data[3].14
7	[Adapter Name]:[Slot]:I.Data[3].15

Fault	Bit 0
False	0
True	1

HART Transmitter Present

Channel	Word
0	[Adapter Name]:[Slot]:I.Data[3].8
1	[Adapter Name]:[Slot]:I.Data[3].9
2	[Adapter Name]:[Slot]:I.Data[3].10
3	[Adapter Name]:[Slot]:I.Data[3].11
4	[Adapter Name]:[Slot]:I.Data[3].12
5	[Adapter Name]:[Slot]:I.Data[3].13
6	[Adapter Name]:[Slot]:I.Data[3].14
7	[Adapter Name]:[Slot]:I.Data[3].15

Transmitter Present	Bit 0
False	0
True	1

Notes:

Numerics

A

B

C

D

E

F

G

H

I

L

M

N

O

P

R

S

T

U

W

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
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