



# Endress+Hauser EtherNet/IP Instrumentation for PlantPax DCS



***Allen-Bradley***

by ROCKWELL AUTOMATION

**Reference 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.

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**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.

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

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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.

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**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.

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

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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.

## Preface

About This Publication .....	7
Download Firmware, Add-on Profiles, and Other Files .....	7
Additional Resources .....	7

## Chapter 1

### Guidelines and Supported Instruments

Supported Instruments .....	10
Guidelines .....	10
Required Files .....	12
Controller Files .....	12
Before You Begin.....	12
Import Visualization Files .....	13
Adding Controller Logic .....	14

## Chapter 2

### Build Your Application

Flowmeter Integration .....	17
Add Flowmeter Device .....	17
Import Device Add-On Instruction.....	21
Import Add-On Instruction (Flowmeter) .....	22
Add Device Instruction to Routine .....	24
Add Flowmeter Instruction to Routine .....	26
Add Process Analog Input (PAI) Instruction to Routine.....	30
Add HMI Graphic Symbol to Application and Link to PAI Tag .....	32
Liquiline Analyzer Integration .....	35
Add Liquiline Device .....	35
Import Add-On Instruction (Sensor) .....	38
Add Instructions to Routine (Sensor) .....	39
Add Process Analog Input (PAI) Instruction to Routine.....	42
Add HMI Graphic Symbol to Application and Link to PAI Tag .....	44

## Chapter 3

### Endress+Hauser EtherNet/IP Flowmeter (raP\_Dvc\_EH\_Flowmeter) and Device-Specific Reference

Controller Code .....	46
InOut Structure for raP_Dvc_EH_Flowmeter .....	46
Input Structure for raP_Dvc_EH_Flowmeter .....	46
Output Structure for raP_Dvc_EH_Flowmeter .....	46
Local Configuration Tags for raP_Dvc_EH_Flowmeter.....	47
Operations .....	47
Alarms.....	47
Virtualization.....	47
Execution .....	47
Graphic Symbols .....	48
Using Global Objects.....	48
FactoryTalk View SE Faceplates .....	50
Operator Tab .....	50
Maintenance Tab.....	52

Advanced Properties Display .....	52
Diagnostics Tab .....	54
Faceplate Help .....	54
FactoryTalk Optix Faceplates .....	55
Operator Tab .....	55
Maintenance Tab .....	55
Advanced HMI Tab - Identification .....	56
Advanced HMI Tab - Precision .....	56
Advanced HMI Configuration Tab - Navigation .....	57
Diagnostics Tab .....	57
Faceplate Help .....	58

## Chapter 4

### Endress+Hauser EtherNet/IP Memosens Sensor (raP\_Dvc\_EH\_Sensor) Reference

Controller Code .....	61
InOut Structure for raP_Dvc_EH_Sensor .....	61
Input Structure for raP_Dvc_EH_Sensor .....	62
Output Structure for raP_Dvc_EH_Sensor .....	62
Local Configuration Tags for raP_Dvc_EH_Sensor .....	62
Operations .....	63
Alarms .....	63
Virtualization .....	63
Execution .....	63
Display Elements .....	63
Using Display Elements .....	64
FactoryTalk View SE Faceplates .....	66
Operator Tab .....	66
Maintenance Tab .....	67
Advanced Properties Display .....	67
HMI Configuration Tab .....	68
Diagnostics Tab .....	68
Faceplate Help .....	69
FactoryTalk Optix Faceplates .....	70
Operator Tab .....	70
Maintenance Tab .....	70
Advanced Engineering .....	71
Advanced HMI Tab - Identification .....	71
Advanced HMI Tab - Units and Precision .....	72
Advanced HMI Configuration Tab - Navigation .....	72
Diagnostics Tab .....	73
Faceplate Help .....	73

## Chapter 5

### Endress+Hauser EtherNet/IP Heartbeat (raP\_Dvc\_EH\_Heartbeat) Reference

Controller Code .....	76
InOut Structure for raP_Dvc_EH_Heartbeat .....	76
Input Structure for raP_Dvc_EH_Heartbeat .....	76
Output Structure for raP_Dvc_EH_Heartbeat .....	76
Local Tags .....	77
Read/write Structure for raP_Dvc_EH_Heartbeat .....	77
Read-only Structure for raP_Dvc_EH_Heartbeat .....	77

Enable Heartbeat .....	77
Enable Heartbeat Preparation .....	77
Navigation to Heartbeat Faceplate (FactoryTalk View and FactoryTalk Optix)...	78
Enable and Configure Heartbeat .....	80
FactoryTalk View SE Faceplates .....	84
Operator Tab .....	84
Maintenance Tab .....	85
Engineering Tab .....	85
HMI Configuration Tab .....	86
Diagnostic Tab .....	86
Faceplate Help .....	88
FactoryTalk Optix Faceplates .....	88
Operator Tab .....	88
Maintenance Tab .....	89
Advanced Engineering .....	89
Advanced HMI Configuration Tab .....	90
Diagnostics Tab .....	91
Faceplate Help .....	92



## About This Publication

This EtherNet/IP™ instrumentation manual contains new information for version 5.20 of the Rockwell Automation® Library of Process Objects.

## 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
Removed support for Studio 5000 View Designer	Throughout

## Download Firmware, Add-on Profiles, and Other Files

Download firmware, associated files (such as Add-on Profiles (AOP)), and access product release notes from the Product Compatibility and Download Center at [rok.auto/pcdc](http://rok.auto/pcdc).

## Additional Resources

These documents contain additional information concerning related products from Rockwell Automation. You can view or download publications at [rok.auto/literature](http://rok.auto/literature).

Resource	Description
Endress+Hauser EtherNet/IP Instrumentation Process Object Parameters, publication <a href="#">PROCES-RD212</a>	A list of the parameters for EtherNet/IP Instrumentation for the PlantPAx® DCS product.
Endress+Hauser Instruments in a PlantPAx Distributed Control System, publication <a href="#">PROCES-SG003</a>	Provides information on Endress+Hauser components in the PlantPAx DCS product
Rockwell Automation Library of Process Objects, publication <a href="#">PROCES-RM200</a>	Describes the use of the Library of Process Objects and the Add-On Instruction in the Library of Process Objects.
PlantPAx Process Control Instructions, publication <a href="#">PROCES-RM215</a>	This manual provides a programmer with details about the available General, Motion, Process, and Drives instruction set for a Logix-based controller.
PlantPAx Faceplates for Process Controller Instructions, publication <a href="#">PROCES-RM203</a>	Describes the PlantPAx instructions, and associated faceplates that are available to develop applications.
Power Device Library, publication <a href="#">DEVICE-RM100</a>	Provides objects for discrete, velocity, motion, and PowerMonitor™ devices.
I/O Device Library, publication <a href="#">DEVICE-RM200</a>	Provides objects for Rockwell Automation® 1756, 1769, 1734, 1794, 1738, 1732E, 1719, 5069, 5094 I/O modules including pre-configured status and diagnostic faceplates
Network Device Library, publication <a href="#">DEVICE-RM400</a>	Provides objects for Stratix® switch and Device Level Ring network objects
Condition Monitoring Device Library, publication <a href="#">DEVICE-RM600</a>	Provides Dynamix™ -1444 module and machinery Condition Monitoring applications such as motors and pumps. This includes FactoryTalk® View SE HMI faceplates and Studio 5000® Application Code Manager implementations.
EtherNet/IP Network Devices User Manual, <a href="#">ENET-UM006</a>	Describes how to configure and use EtherNet/IP devices to communicate on the EtherNet/IP network.
Ethernet Reference Manual, <a href="#">ENET-RM002</a>	Describes basic Ethernet concepts, infrastructure components, and infrastructure features.
System Security Design Guidelines Reference Manual, <a href="#">SECURE-RM001</a>	Provides guidance on how to conduct security assessments, implement Rockwell Automation products in a secure system, harden the control system, manage user access, and dispose of equipment.
UL Standards Listing for Industrial Control Products, publication <a href="#">CMPNTS-SR002</a>	Assists original equipment manufacturers (OEMs) with construction of panels, to help ensure that they conform to the requirements of Underwriters Laboratories.
American Standards, Configurations, and Ratings: Introduction to Motor Circuit Design, publication <a href="#">IC-AT001</a>	Provides an overview of American motor circuit design based on methods that are outlined in the NEC.
Industrial Components Preventive Maintenance, Enclosures, and Contact Ratings Specifications, publication <a href="#">IC-TD002</a>	Provides a quick reference tool for Allen-Bradley® industrial automation controls and assemblies.
Safety Guidelines for the Application, Installation, and Maintenance of Solid-state Control, publication <a href="#">SGI-1.1</a>	Designed to harmonize with NEMA Standards Publication No. ICS 1.1-1987 and provides general guidelines for the application, installation, and maintenance of solid-state control in the form of individual devices or packaged assemblies incorporating solid-state components.
Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-4.1</a>	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, <a href="http://rok.auto/certifications">rok.auto/certifications</a>	Provides declarations of conformity, certificates, and other certification details.
EtherNet/IP Network Devices User Manual, <a href="#">ENET-UM006</a>	Describes how to configure and use EtherNet/IP devices to communicate on the EtherNet/IP network.

**Notes:**



## Guidelines and Supported Instruments

This Library manual comprises objects that are made specifically to support EtherNet/IP™ process instrumentation in a PlantPax® Distributed Control System. The library is intended to be used with the Rockwell Automation® Library of Process Objects.

There are two main instructions currently available in the library, `raP_Dvc_EH_Flowmeter`, and `raP_Dvc_EH_Sensor`. Both instructions work with Endress+Hauser instruments. Supported instruments include several flowmeters and the Liquiline analyzer that are connected on an EtherNet/IP network.

An additional instruction, `raP_Dvc_EH_Heartbeat`, is used to execute advanced diagnostic tests on Endress+Hauser flowmeters that support heartbeat verification technology.

The `raP_Dvc_EH_Flowmeter` and `raP_Dvc_EH_Sensor` objects provide a common interface point for process control strategies. See PlantPax Control Strategies Reference Manual, publication [PROCES-RM201](#).

## Supported Instruments

**IMPORTANT** Make sure that you have the latest Endress+Hauser Device Add-on Profile. See Integrate Endress+Hauser Instruments in a PlantPax Distributed Control System, publication [PROCES-SG003](#). The procedures for downloading Add-on Profiles are in the Integration Components table.

The following table lists the devices that work with the Add-On Instructions.

### Supported EtherNet/IP Instruments

Manufacturer	Device	Process Library Add-On Instruction	Description
Endress+Hauser	Promag 53 (firmware 1.x)	raP_Dvc_EH_Promag53_FW1 <sup>(1)</sup>	Proline Promag 53 - Electromagnetic flowmeter
	Promag 100 (firmware 2.x)	raP_Dvc_EH_Promag100_FW2	Proline Promag 100 - Electromagnetic flowmeter
	Promag 300	raP_Dvc_EH_Promag300_500	Proline Promag 300- Electromagnetic flowmeter
	Promag 400 (firmware 3.x)	raP_Dvc_EH_Promag400_FW3	Proline Promag 400- Electromagnetic flowmeter
	Promag 400 V02 (firmware 4.x)	raP_Dvc_EH_Promag400_V02_Rev4	Proline Promag 400- Electromagnetic flowmeter Version 2
	Promag 500	raP_Dvc_EH_Promag300_500	Proline Promag 500- Electromagnetic flowmeter
	Promass 83 (firmware 2.x)	raP_Dvc_EH_Promass83_FW2	Proline Promass 83 - Coriolis flowmeter
	Promass 100 (firmware 3.x)	raP_Dvc_EH_Promass100_FW3	Proline Promass 100 - Coriolis flowmeter
	Promass 300	raP_Dvc_EH_Promass300_500	Proline Promass 300 - Coriolis flowmeter
	Promass 500	raP_Dvc_EH_Promass300_500	Proline Promass 500 - Coriolis flowmeter
	Liquiline CM442, CM444, and CM448	raP_Dvc_EH_Sensor	Liquiline - Multichannel transmitter for monitoring processes

(1) The files in the table are for the latest firmware revision as designated by the FWx in the file name. Other firmware revisions can be compatible with some modification of the Add-On Instruction definition.

## Guidelines

This section contains a brief description of EtherNet/IP communication, raP\_Dvc\_EH\_Flowmeter, raP\_Dvc\_EH\_Sensor instructions, and additional capabilities.

### About EtherNet/IP Communication

EtherNet/IP is one of the most popular industrial Ethernet standards in use today. The governing body of this standards-based Ethernet protocol is the ODVA organization. There are many new transmitters available in the market with EtherNet/IP. The type of data available is dependent on the type of instrument. Data can be exchanged between the device and the control system through EtherNet/IP adapters in the PlantPax system.

For example, a smart mass flowmeter on the EtherNet/IP network provides more process information, without errors created while converting the signal between analog and digital representations. The configuration of the flowmeter is completed by using multiple means, but the key is configuration in the project of the controller. In addition to several process variables and totalized values, device status is provided the EtherNet/IP network.

### *Communication Basics*

The EtherNet/IP protocol is an accepted standard for pure digital communication with smart (microprocessor-based) field devices. A digital signal is passed over standard Ethernet media.

One network can accommodate up to several hundred field devices. The data is transferred through the Ethernet media to a system controller via EtherNet/IP standards-based protocol.

The only configuration necessary in the instrument is the IP address, which can be hard-coded via switches, or it can be configured through software in a web server. Alternatively, the IP address can be set from a server computer via DHCP.

### *raP\_Dvc\_EH\_Flowmeter Instruction*

Use an instance of the raP\_Dvc\_EH\_Flowmeter instruction, with an instance of Process Analog Input (PAI), plus an instance of the supporting instrument-specific instruction, for each connected flowmeter.

Instrument-specific instructions are provided for the following Endress+Hauser flowmeters:

- Promag 53
- Promass 83
- Promag 100
- Promass 100
- Promag 300
- Promass 300
- Promag 400 (Firmware 3.x)
- Promag 400 V02 (Firmware 4.x)
- Promag 500
- Promass 500

Additional instrument-specific instructions may be provided in future Library releases.

The raP\_Dvc\_EH\_Flowmeter instruction provides the following capabilities:

- Selection of a Primary Variable (PV) from those variables available for the meter
- Output of several variables, including volumetric flow rate and mass flow rate, with status, plus three totalizers.
- Ability to clear each of the three totalizers to zero.
- Automatic setting of engineering units strings for display based on enumerations from instrument
- Display of Status strings that are based on fault code enumerations from instrument

### *raP\_Dvc\_EH\_Sensor Instruction*

The raP\_Dvc\_EH\_Sensor instruction monitors a set of inputs on an Endress+Hauser EtherNet/IP Liquiline CM44x Analyzer that is defined as belonging to a particular sensor along with an instance of Process Analog Input (PAI). The sensor can have 1...4 associated inputs from the analyzer. The first input is the Primary.

Features for all variables include:

- Retrieval of engineering unit's strings for display that is based on enumerations from instrument
- Display of Status strings that are based on fault-code enumerations from instrument

For each value, the instruction provides status, diagnostics, and units of measure. Lookup tables that are based on enumeration values that are received from the device provide

diagnostic text and units of measure text. The device can use this data to populate configuration fields automatically.

For more information on process objects, see Rockwell Automation Library of Process Objects, publication [PROCES-RM200](#), See PlantPax Process Control Instructions, publication [PROCES-RM215](#), and PlantPax Faceplates for Process Controller Instructions, publication [PROCES-RM203](#).

## Required Files

Add-On Instructions are reusable code objects that contain encapsulated logic that can streamline implementing your system. The code is used to create your own instruction set for programming logic as a supplement to the instruction set provided natively in the ControlLogix® firmware. An Add-On Instruction is defined once in each controller project, and can be instantiated multiple times in your application code.

## Controller Files

The module Add-On Instruction files are listed in the following table.

**Table 1 - Add-On Instruction Files**

Manufacturer	Device	Add-On Instruction Import Files per Device	Library Instructions per Device
Endress+Hauser	Promag 53	raP_Dvc_EH_Promag53_FW1.5.20. <b>xx</b> _A0I.L5X <sup>(1)</sup>	<ul style="list-style-type: none"> <li>raP_Dvc_EH_Flowmeter_4.10.<b>xx</b>_A0I.L5X<sup>(1)</sup></li> <li>PAI</li> </ul>
	Promag 100	raP_Dvc_EH_Promag100_FW2.5.20. <b>xx</b> _A0I.L5X	
	Promag 300	raP_Dvc_EH_Promag300_500.5.20. <b>xx</b> _A0I.L5X	
	Promag 400	raP_Dvc_EH_Promag400_FW3.5.20. <b>xx</b> _A0I.L5X	
	Promag 400 V02	raP_Dvc_EH_Promag400_V02_Rev4.5.20. <b>xx</b> _A0I.L5X	
	Promag 500	raP_Dvc_EH_Promag300_500.5.20. <b>xx</b> _A0I.L5X	
	Promass 83	raP_Dvc_EH_Promass83_FW2.5.20. <b>xx</b> _A0I.L5X	
	Promass 100	raP_Dvc_EH_Promass100_FW3.5.20. <b>xx</b> _A0I.L5X	
	Promass 300	raP_Dvc_EH_Promass300_500.5.20. <b>xx</b> _A0I.L5X	
	Promass 500	raP_Dvc_EH_Promass300_500.5.20. <b>xx</b> _A0I.L5X	
	Liquiline CM44x	raP_Dvc_EH_Sensor_5.20. <b>xx</b> _A0I.L5X	PAI

(1) Service release numbers (boldfaced) can change as service revisions are created.

As shown in [Table 1](#), flowmeters require two instructions and at least one PAI instruction. Necessary Add-On Instructions per device must be imported into the controller project to be used in the controller configuration.

## Before You Begin

To import the Add-On Instructions into your controller project, you must download the Rockwell Automation Library of Endress+Hauser and Process Integration Objects folder.

**IMPORTANT** You MUST have E+H AOPs installed before you create the devices in the I/O Configuration tree. The AOPs are required to have device input, output, and configuration so that assembly data types exist before you create tags.

See the following for procedures:

- Downloading Add-on Profiles, see Integrate Endress+Hauser Instruments in a PlantPax Distributed Control System, publication [PROCES-SG003](#).
- Using PCDC to download the Process Library Objects, see Library of Process Objects reference manual, publication [PROCES-RM200](#).

- Understand the Logix 5000® Advanced Process Control objects, particularly the Process Analog Input (PAI) instruction, see PlantPAx Process Control Instructions, publication [PROCES-RM215](#).
- Accessing the PCDC and importing visualization files, see [page 13](#).
- Adding instructions to your controller projects, see [page 14](#).

## Import Visualization Files

The Add-On Instructions in this document have associated visualization files that provide a common user interface. These files can be downloaded from the Product Compatibility and Download Center at <https://www.rockwellautomation.com/rockwellautomation/support/pcdc.page>.

**IMPORTANT** The visualization file dependencies require Process Library content imports to occur in a specific order as reflected in the following tables:

- Images
- Global Objects
- Standard Displays
- HMI Tags

Images are external graphic files that can be used in displays. The images must be imported for FactoryTalk® View to use them.

FactoryTalk View renames PNG files with a .bmp file extension when they are imported, but they retain a PNG format.

### Visualization Files: Images (.png)

FactoryTalk View SE Software	Description
All .png files in the images folder	The common icons that are used in the global objects and standard displays for all Process Objects.

The global object files (.ggfx file type) in the following table are Process Library display elements that are created once, but referenced multiple times on multiple displays in an application. When changes are made to a global object, all instances in the application are automatically updated.

### Visualization Files: Global Objects (.ggfx)

FactoryTalk View SE Software	Description
(raP-5_20-SE) Toolbox - EH Instrument Objects	Global objects that are used on the EH instrument faceplates.

The standard display files (.gfx file type) in the following table are the Process Library displays that you see at runtime.

### Visualization Files: Standard Displays (.gfx)

FactoryTalk View SE Software	Description
(raP-5_20-SE) raP_Dvc_EH_Flowmeter-Faceplate	The faceplate that is used for the object.
(raP-5_20-SE) raP_Dvc_EH_Flowmeter-Advanced	The faceplate that is used to configure the object and display advanced information.
(raP-5_20-SE) raP_Dvc_EH_Sensor-Faceplate	The faceplate that is used for the object.
(raP-5_20-SE) raP_Dvc_EH_Sensor-Advanced	The faceplate that is used to configure the object and display advanced information.
(raP-5_20-SE) raP_Dvc_EH_Heartbeat-Faceplate	The faceplate that is used for the object.
(raP-5_20-SE) raP_Dvc_EH_Heartbeat-Advanced	The faceplate that is used to configure the object and display advanced information.

## Adding Controller Logic

Do these steps for each Add-On Instruction.

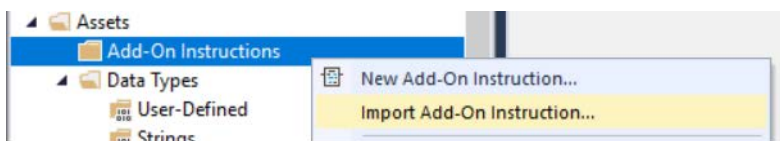
1. In the Studio 5000 Logix Designer® application, open a new or existing project.

---

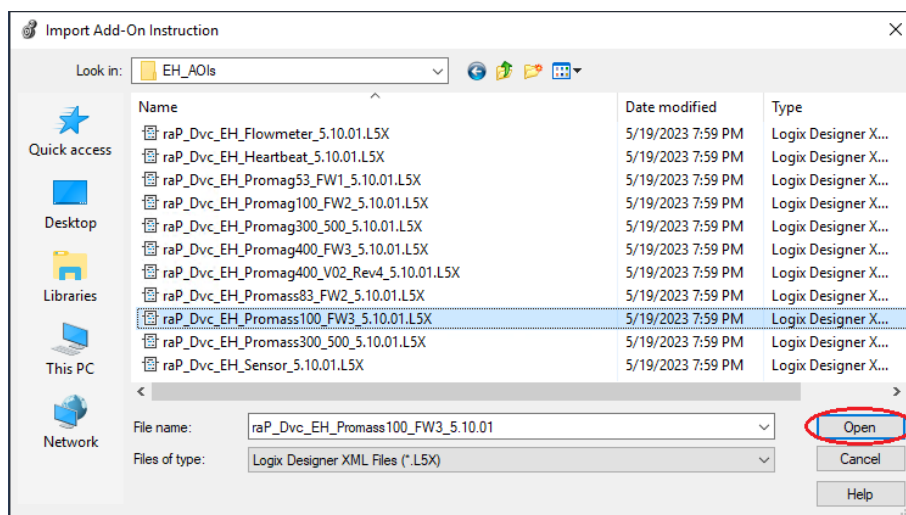
**IMPORTANT** Add-On Instruction definitions can be imported, but not updated, online.

---

2. Right-click the Add-On Instructions folder in the Controller Organizer and choose Import Add-On Instruction.



3. Select the Add-On Instruction and click Open.

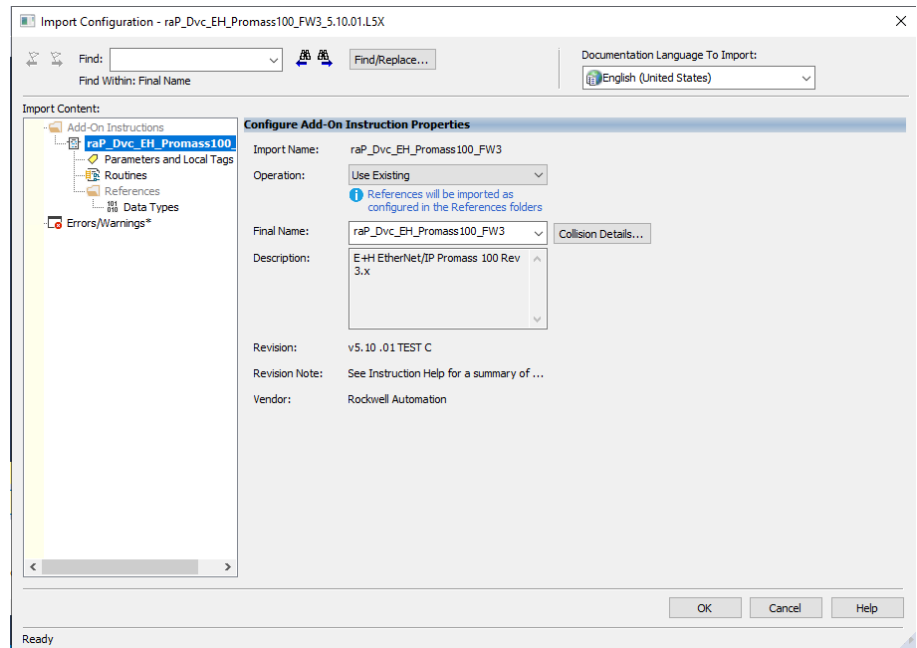


Some Add-On Instructions are provided in RUNG import files.

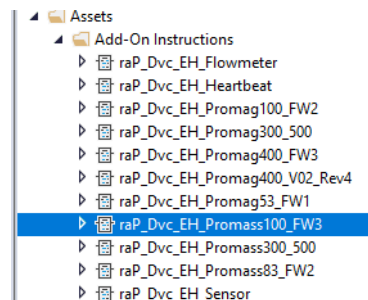


If a RUNG import file is provided, import the rung into a ladder diagram routine to get all required additional tags, data types, and message configurations.

## 4. On the Import Configuration dialog box, click OK.



Once the import is complete, the Add-On Instructions are visible in the Controller Organizer.



**Notes:**



## Build Your Application

This chapter describes procedures for how to configure and implement the process objects for EtherNet/IP™ process instrumentation.

The Liquiline CM44x and Promass 100 serve as examples in this chapter. The procedures for all devices are the same, but the set of tags that are created can vary by device family.

### Flowmeter Integration

You must have a project with a controller already configured. Make sure that the project path is set to the correct controller. For the purposes of this document, we refer to this controller as the target application.

The PlantPax® integration of Endress+Hauser EtherNet/IP flowmeters requires that you instantiate two Add-On Instructions and one Process Analog Input (PAI) instruction per field device:

- Device-specific Add-On Instruction that gathers the required device tags and prepares the data for use.
- Generic flowmeter object that uses the device data, along with custom-made device diagnostic and unit tables, to enable visibility with the PlantPax system.
- Process Analog Input (PAI) object that monitors one analog input channel to provide scaling and alarming.

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**IMPORTANT** Make sure that you have the latest Endress+Hauser Device Add-on Profile. See *Integrate Endress+Hauser Instruments in a PlantPax Distributed Control System*, publication [PROCES-SG003](#). The procedures for downloading Add-on Profiles are in the Integration Components table.

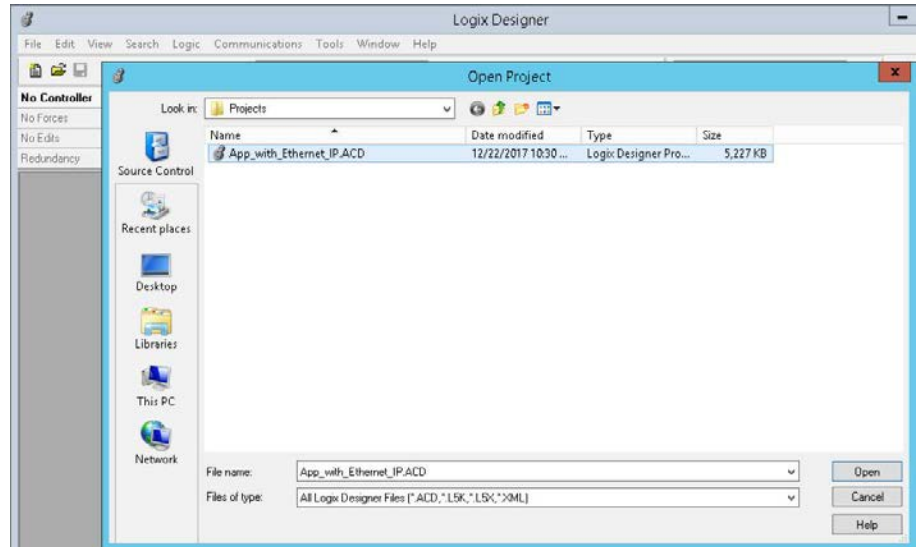
---

### Add Flowmeter Device

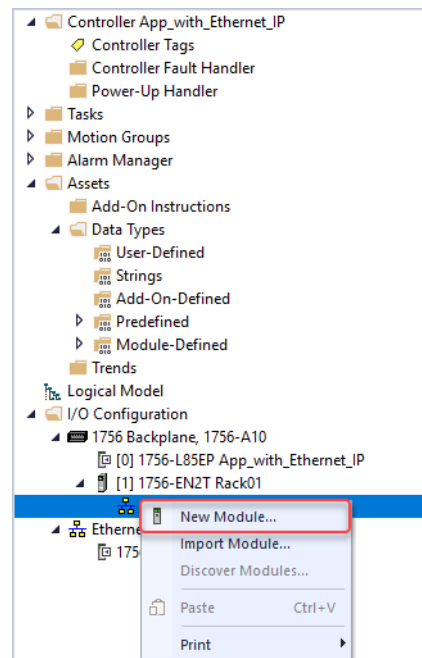
The desired device must be added into the project I/O configuration. This step is performed for every device in the I/O configuration tree.

Complete these steps after downloading the Process Library and installing the Endress+Hauser Device Add-on Profiles.

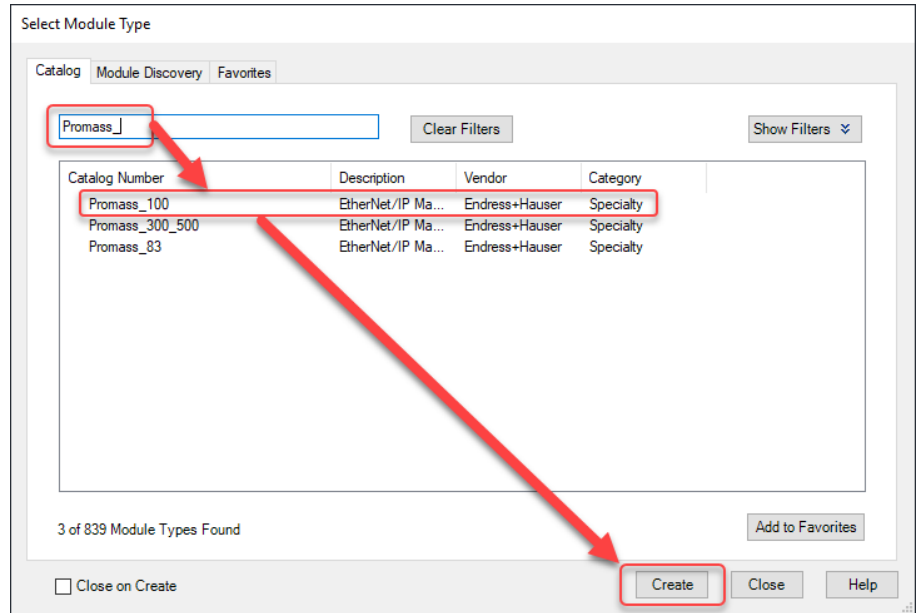
1. In the Studio 5000 Logix Designer® application, open your target application (App\_with\_Ethernet\_IP.ACD in our example).



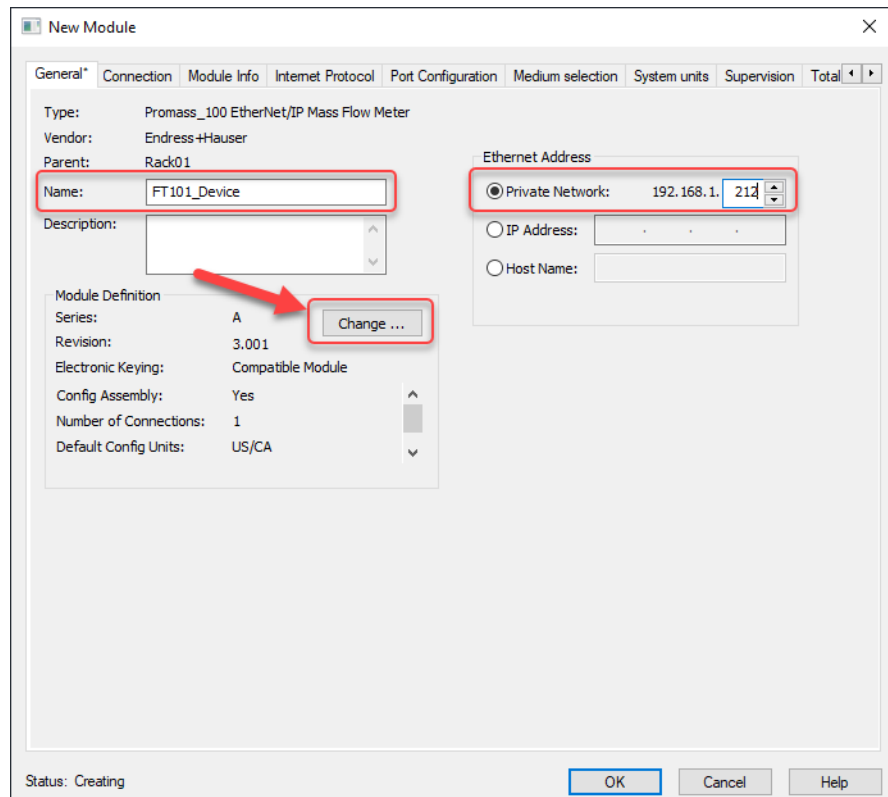
2. In the controller organizer, right-click Ethernet and select New Module.



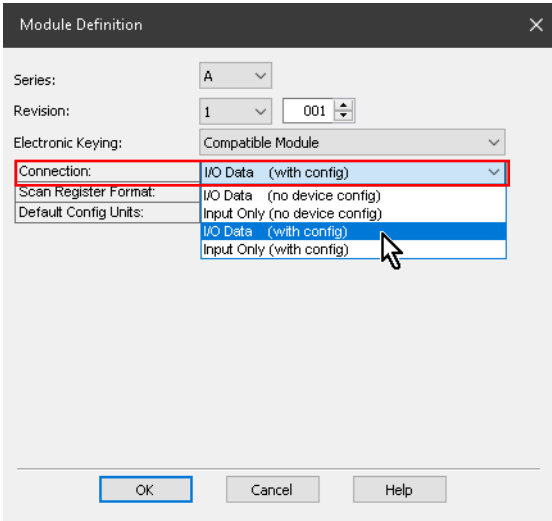
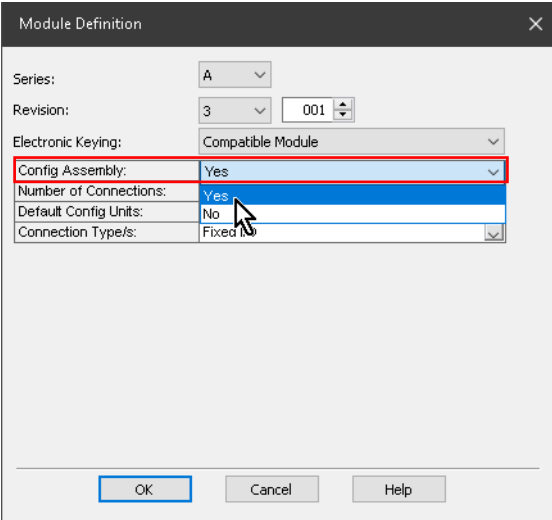
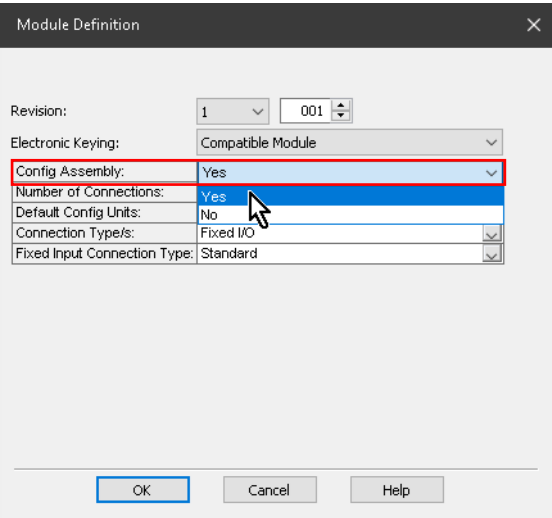
3. The Select Module Type dialog box appears. Search for the Endress+Hauser device you want to add. In this example, we are adding a Promass\_100. Click Create.



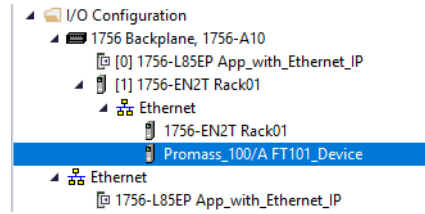
4. In the New Module dialog box, update the name of the device and the IP address. Then click the Change... button on the Module Definition.



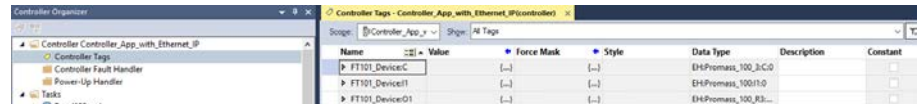
5. Ensure that the Module Definition settings are configured as outlined in the following table.

Manufacturer	Device	Module Definition Settings
Endress+Hauser	Promag 53 Promag 83	
	Promag 100 Promag 400 (FW3) Promass 100	
	Promag 400 V02 Promag 300 / 500 Promass 300 / 500	

- Apply any updates to the Module definition; apply and save the settings for the new module, click OK. Your device is now configured in the I/O Configuration tree.



- Open the controller tags, and note the input and configuration tags for this module.  
The following example shows the device name as "FT101\_Device." The device name that you entered when you created the flowmeter in the I/O Configuration appears here, with ":C", ":I", and ":O" for Configuration, Input, and Output data, respectively.

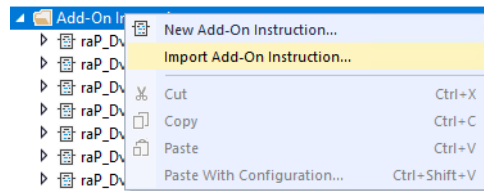


- To save the project, click .

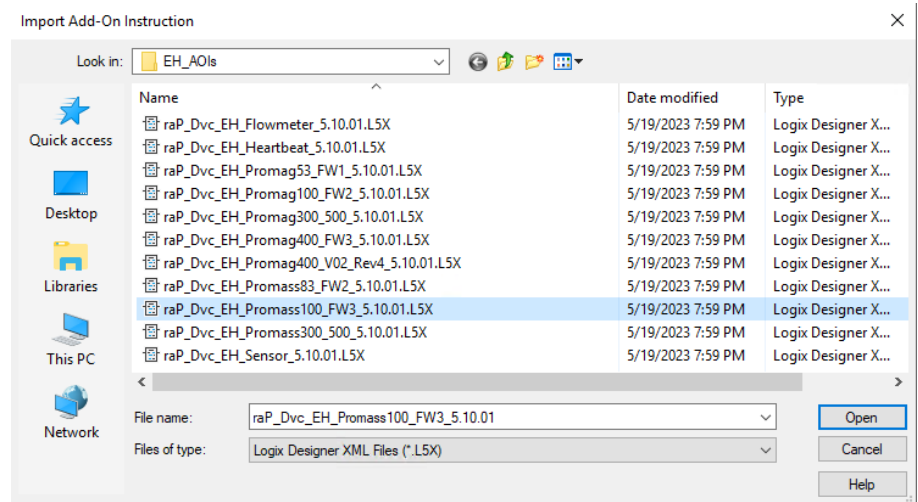
## Import Device Add-On Instruction

This procedure imports the definitions for the device Add-On Instruction. It is only necessary to import the definitions once per controller.

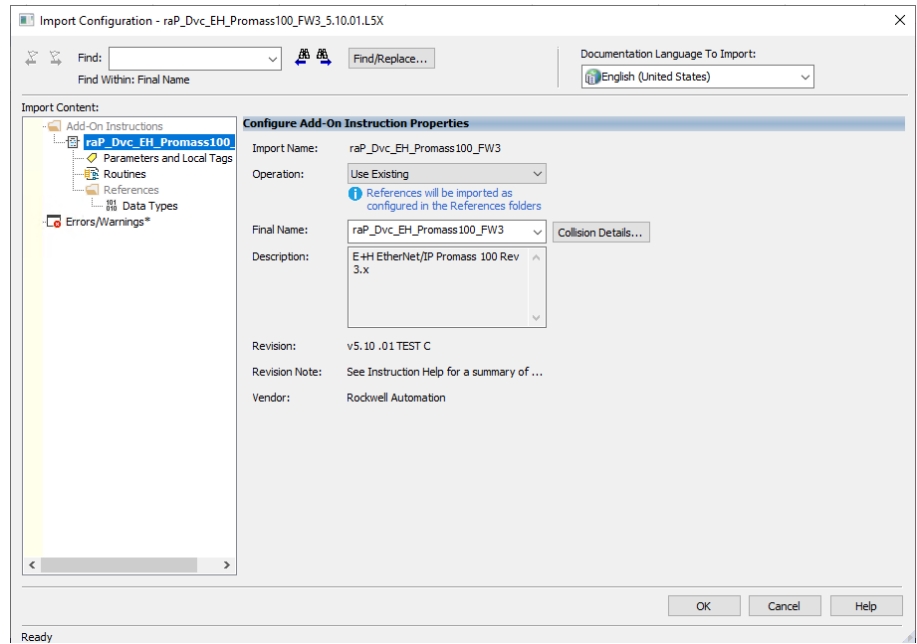
- Import the appropriate device Add-On Instruction. (This procedure uses raP\_Dvc\_EH\_Promass100\_FW3\_5.20.01.L5X as an example.)
- In the target Controller Organizer, right-click Add-On Instructions and choose Import Add-On Instruction.



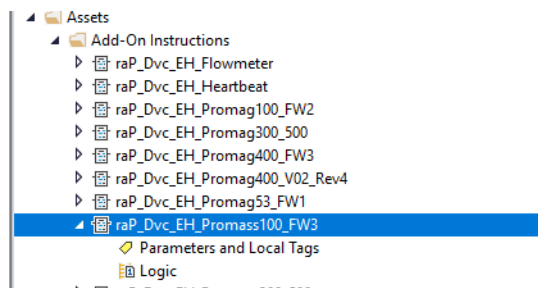
- Navigate to the folder that contains the device Add-On Instructions and select raP\_Dvc\_EH\_Promass100\_FW3\_5.20.01.L5X, and then click Open.



## 4. Click OK in the Import Configuration window.



## 5. The Add-On Instruction is then added to the Controller Organizer.

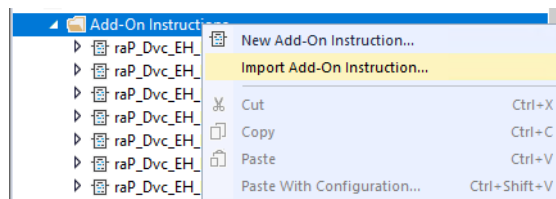


## Import Add-On Instruction (Flowmeter)

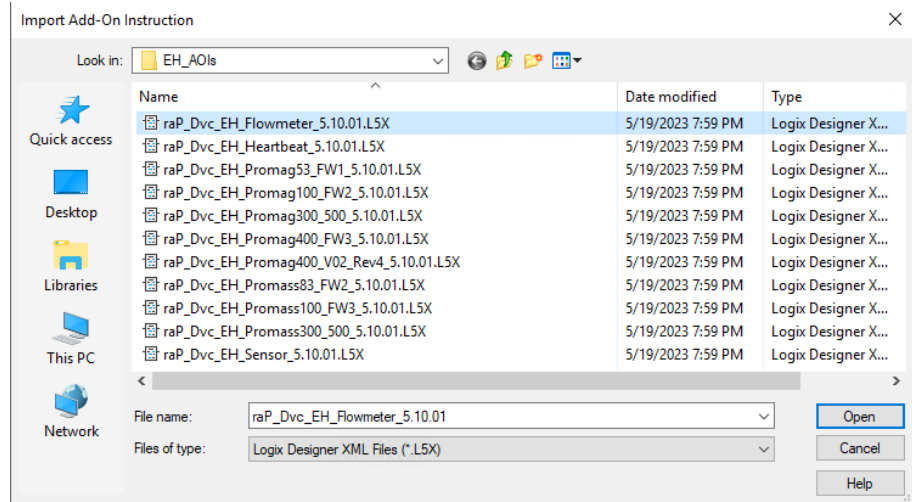
This procedure imports the definitions for the Flowmeter Add-On Instruction. It is only necessary to import the definitions once per controller.

The easiest way to add the logic to support your EtherNet/IP Flowmeter is to use the Import Add-On Instruction function. Use the procedure to create the required tags, Add-On Instructions, and Data Types.

1. In the target Controller Organizer, right-click Add-On Instructions and choose Import Add-On Instruction.



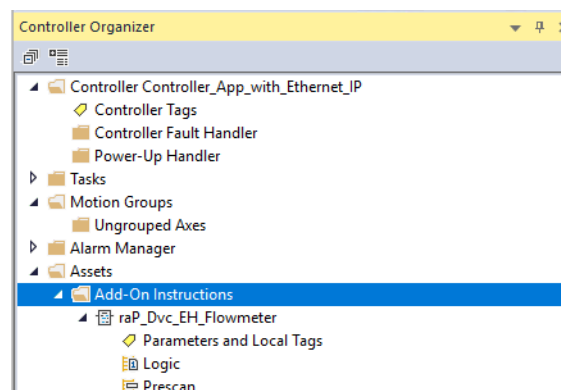
- Navigate to the folder that contains flowmeter Add-On Instructions and select `raP_Dvc_EH_Flowmeter_5.20.01.L5X`, and then click Open.



The Input Configuration window opens.

- Click OK.

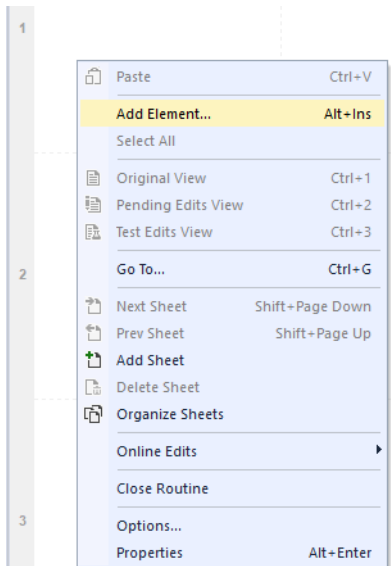
The Add-On Instruction is then added to the Controller Organizer.



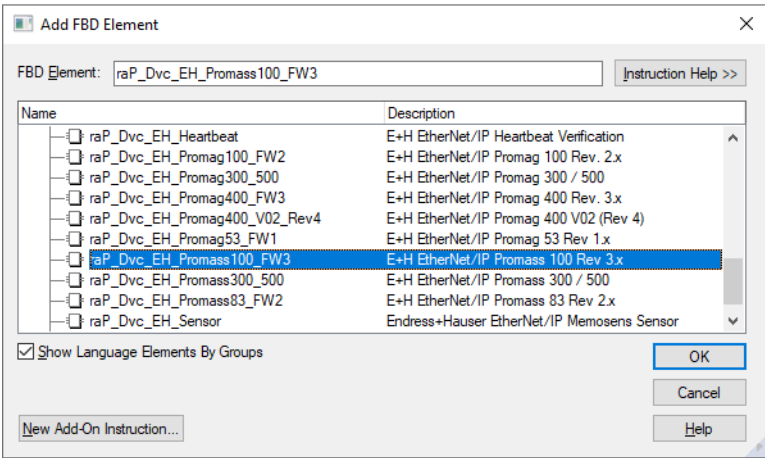
## Add Device Instruction to Routine

This procedure adds the device logic to the routine. Perform this procedure once for every device.

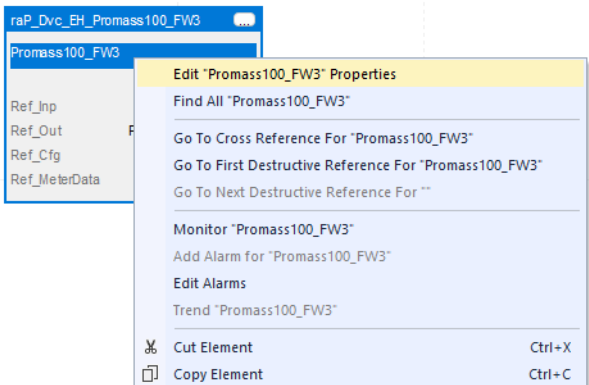
1. Open the routine where the device logic is used.
2. Within the routine, right-click the sheet and click Add Element.



3. Type the device Add-On Instruction name in the FBD Element box; for this example, raP\_Dvc\_EH\_Promass100\_FW3, and then click OK.

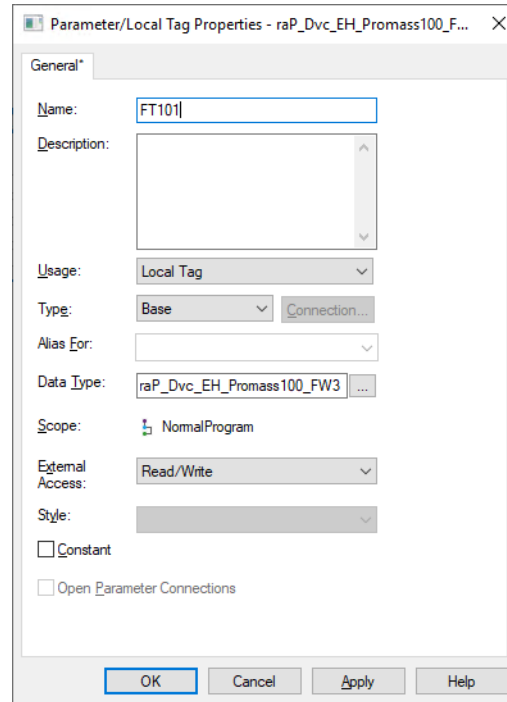


4. Right-click the name of the new Add-On Instruction and choose Edit...Properties.

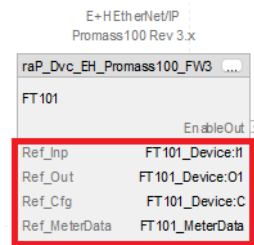




5. Change the name to correspond with the project convention. To save the changes, click OK.



6. Set the following four values in the Add-On Instruction. The first three operands are the Input, Output, and Configuration assemblies for the device you added to the I/O configuration. The fourth operand is a new tag that you will create in the next step.



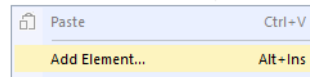
7. Right-click on the last parameter (Ref\_MeterData) and choose New Tag.

8. Ensure that the data type matches the following screen capture. To create the tag, click Create.

## Add Flowmeter Instruction to Routine

This procedure adds the Flowmeter logic to the routine. Perform this procedure once for every device.

1. Right-click the sheet within the routine, and choose Add Element to add another Add-On Instruction to the routine.



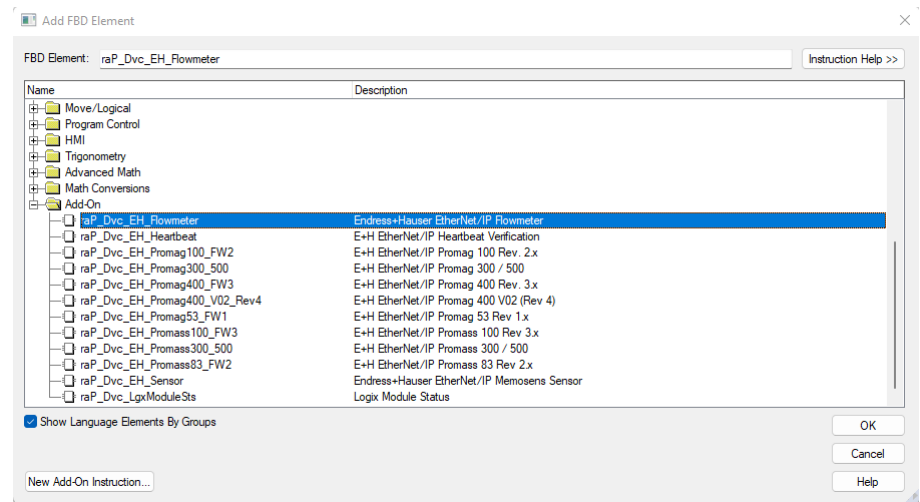
The Add FBD Element dialog box appears.

2. Type raP\_Dvc\_EH\_Flowmeter into the FBD Element text box, and click OK.

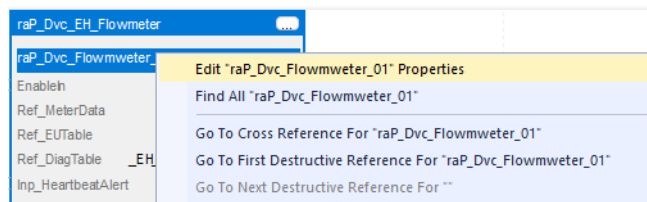
---

**IMPORTANT** An instance of the raP\_Dvc\_EH\_Flowmeter instruction is used for each channel (device) on the input module.

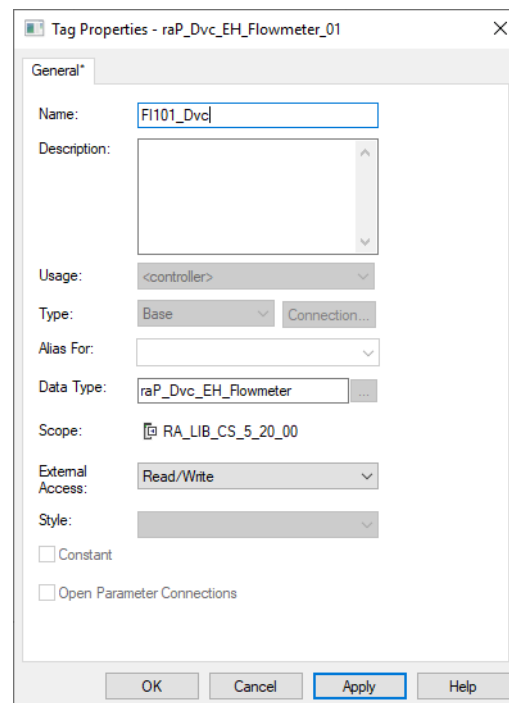
---



- Right-click the name of the new Add-On Instruction and choose Edit (name of device) Properties.



- Change the name according to the project convention. To save the changes, click OK.



### IMPORTANT

The tag name for the raP\_Dvc\_EH\_Flowmeter must be the name of the PAI object and appended with "\_Dvc". For example, if the corresponding PAI instruction is F1101, the raP\_Dvc\_EH\_Flowmeter tag must be F1101\_Dvc. This allows for automatic navigation from the SMART Device button on the HMI faceplate of the PAI.

5. Set three operands in the newly created Add-On Instruction. The first operand is the meter data tag that you created for the flowmeter-specific instruction. The last two parameters provide engineering units and diagnostic codes. A sample project is included in the Process Library download (S5kLD\_35\_Template\_All.ACD). The Engineering Unit and Diagnostic table tags can be copied from the sample project and pasted into the target project. See [Flowmeter Diagnostic and Engineering Unit Lookup Table Tag Descriptions on page 28](#)

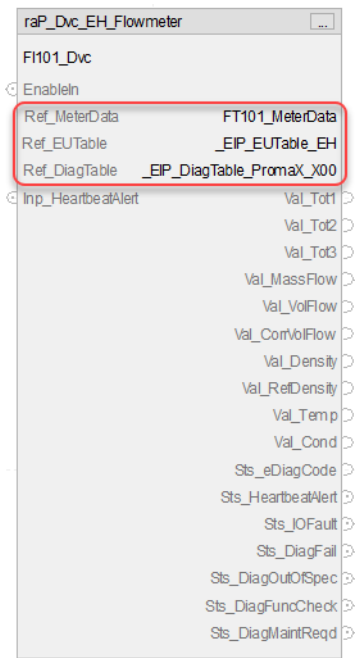


Figure 1 - Engineering Units and Diagnostic Table Tags for Promass 100

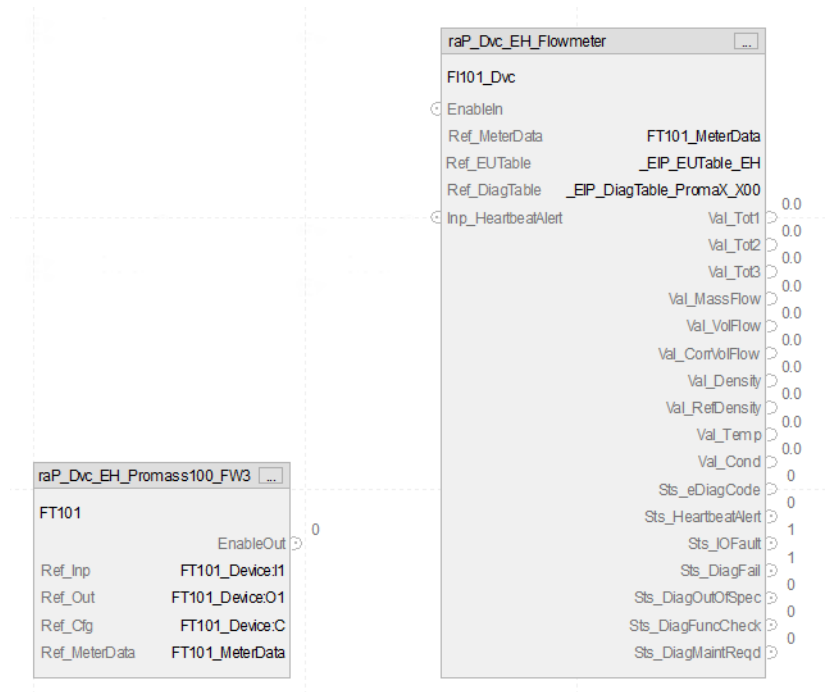
Scope: [App_with_Ethernet]		Show: All Tags		
Name	Data Type	Value	Force Mask	Style
FT101_Device:O1	EH:Promass_100_R3:O1:0		{...}	{...}
FT101_Device:I1	EH:Promass_100:I1:0		{...}	{...}
FT101_Device:C	EH:Promass_100_3:C:0		{...}	{...}
_EIP_EUTable_EH	RAC_CODE_DESCRIPTION[897]		{...}	{...}
_EIP_DiagTable_PromaX_X00	RAC_CODE_DESCRIPTION[99]		{...}	{...}

Table 2 - Flowmeter Diagnostic and Engineering Unit Lookup Table Tag Descriptions

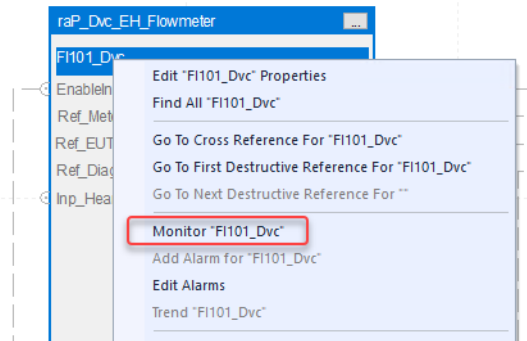
Device	Diagnostic Tag	Engineering Units Table <sup>(1)</sup>
Promag 53	_EIP_DiagTable_Promag53	_EIP_EUTable_EHLegacy
Promass 83	_EIP_DiagTable_Promass83	
Promag 100	_EIP_DiagTable_PromaX_X00	_EIP_EUTable_EH
Promag 300	_EIP_DiagTable_Promag_300_500	
Promag 400	_EIP_DiagTable_PromaX_X00	
Promag 500	_EIP_DiagTable_Promag_300_500	
Promass 100	_EIP_DiagTable_PromaX_X00	
Promass 300	_EIP_DiagTable_Promass_300_500	
Promass 500	_EIP_DiagTable_Promass_300_500	

(1) The '\_EIP\_EUTable\_Generic' tag is a generic EtherNet/IP engineering units table that is based on the EtherNet/IP standard, not using vendor-specific units. The tag is for use with ALL EtherNet/IP devices OTHER THAN Endress+Hauser devices, and is not used with these Add-On Instructions.

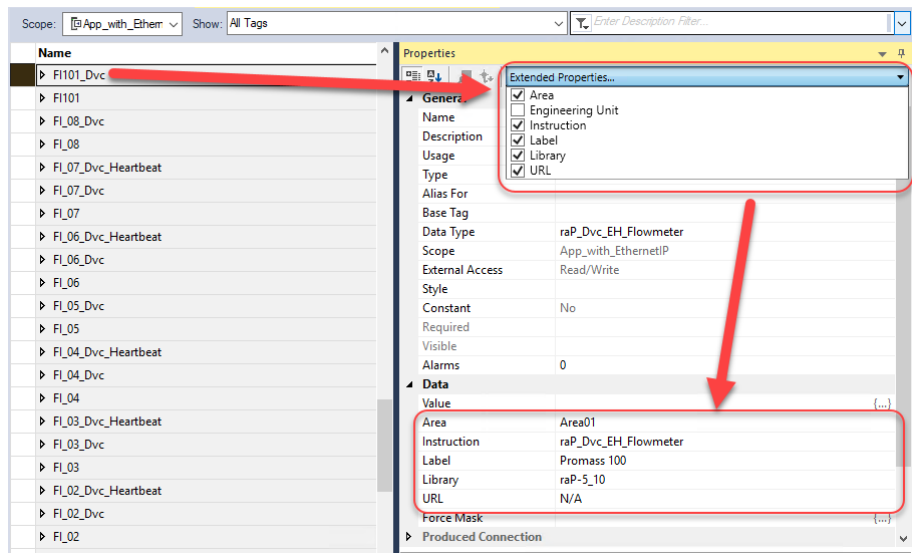
The routine looks as follows although the blocks can be situated differently.




6. Right-click the name of the flowmeter Add-On Instruction and choose Monitor... The tags list opens with the flowmeter tag selected.



7. In the right-hand panel, the properties for that tag are shown. Ensure that the following extended tag properties are enabled and the correct information is entered.

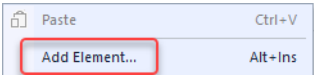


Extended Tag Property	Typical Value	Action
Area	Area01	Update per project conventions
Instruction	raP_Dvc_EH_Flowmeter	Leave as is
Label	Device name	Update per project conventions
Library	raP-5_20	Leave as is
URL	n/a	Update per project conventions

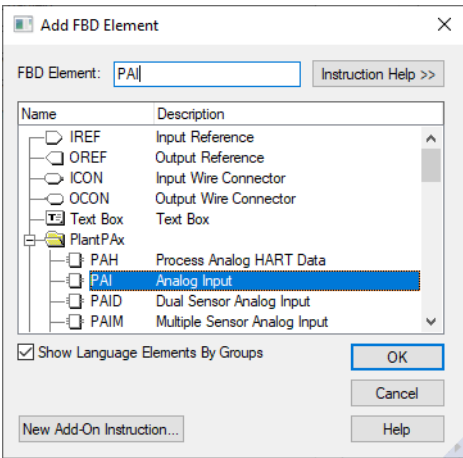
8. To save the project, click .

### Add Process Analog Input (PAI) Instruction to Routine

1. Right-click the sheet within the routine and choose Add Element to add the PAI instruction to the routine.

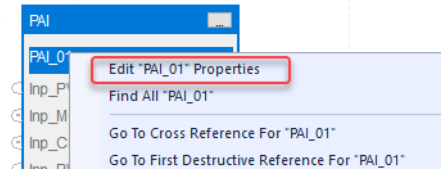


2. Type PAI into the FBD Element text box and select OK.

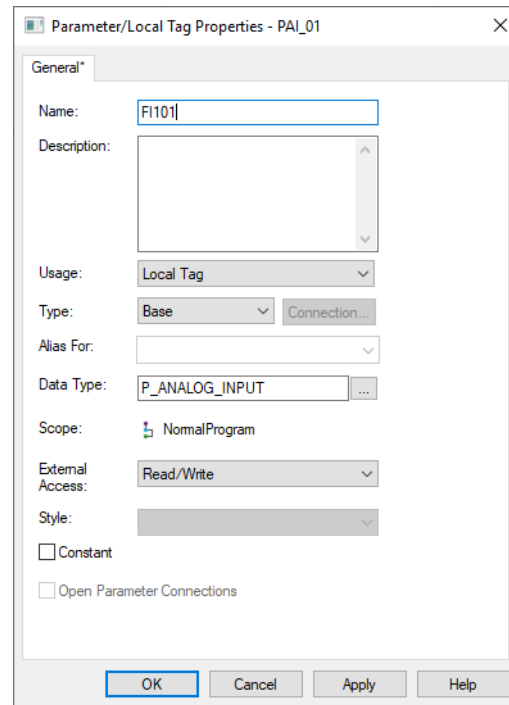


**IMPORTANT** At least one instance of the Process Analog Input (PAI) instruction is used for each channel (device) on the input module.

- Right-click the name of the new instance of PAI and choose Edit...Properties.



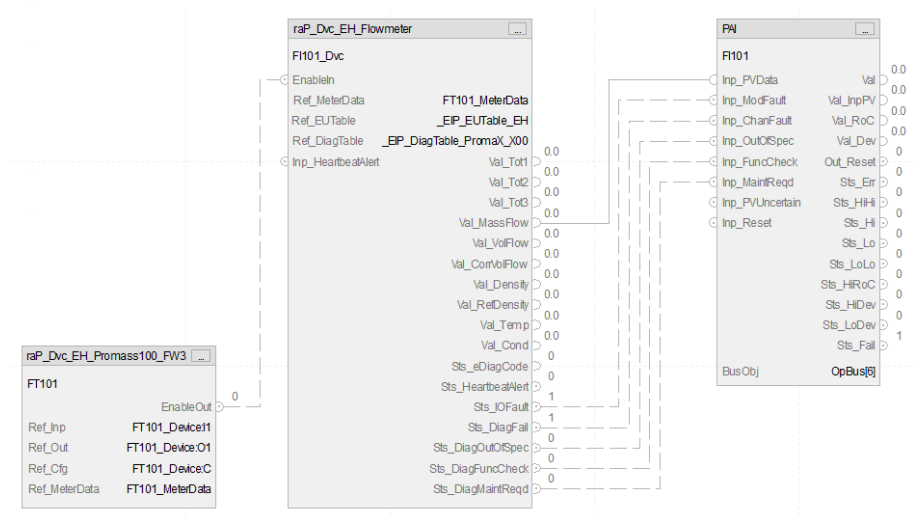
- Change the name according to the project convention. To save the changes, click OK.



### IMPORTANT

The tag name for the PAI instance must correspond to the instance of the raP\_Dvc\_EH\_Flowmeter that it is connected to. The tag name for the raP\_Dvc\_EH\_Flowmeter must be the name of the PAI object and appended with "\_Dvc". For example, if the corresponding PAI instruction is FI101, the raP\_Dvc\_EH\_Flowmeter tag must be FI101\_Dvc. This allows for automatic navigation via the SMART Device button on the HMI faceplate of the PAI.

5. Connect the instruction instances as shown in the following diagram, use the value corresponding to this device connected to Inp\_PVDData of the PAI. In this instance, Val\_MassFlow is used.



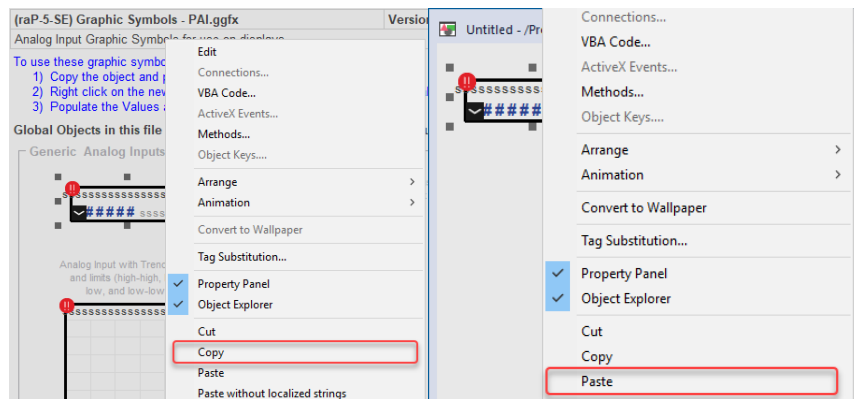
6. Open the properties of the PAI by selecting the ellipses. Ensure that the Cfg\_HasSmartDvc is set to 1, to allow navigation to the raP\_Dvc\_EH\_Flowmeter faceplate from the PAI faceplate.
7. To save the project, click .

## Add HMI Graphic Symbol to Application and Link to PAI Tag

Global objects are typically found in the global objects file for each instruction (for example: (raP-5-SE) Graphic Symbols - PAI.ggfx). The flowmeter faceplate is accessed from the associated PAI faceplate.

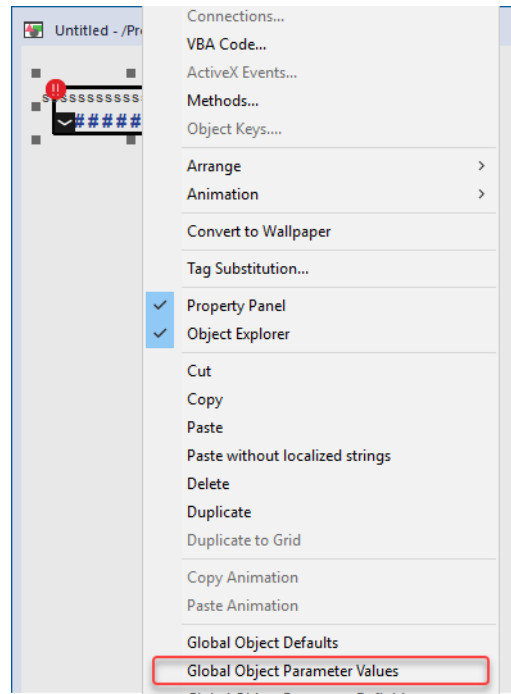
Follow these steps to use a global object.

1. Copy the global object from the global object file and paste it in the display file.

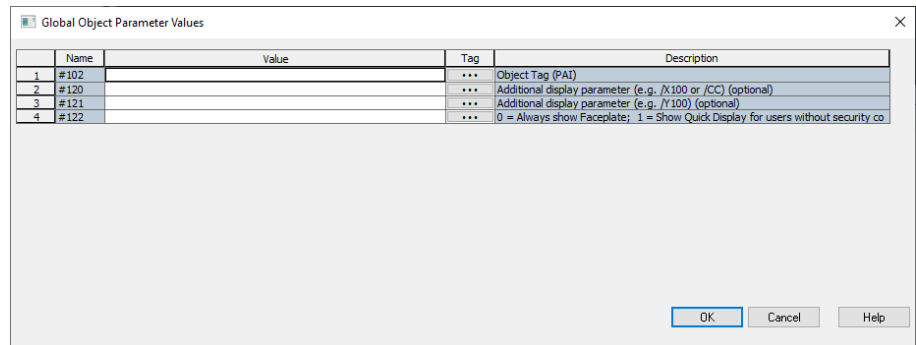




2. In the display, right-click the global object and choose Global ObjectParameter Values.



The Global Object Parameter Values dialog box appears.



The global object parameters are as follows.

Parameter	Required	Description
#102	Y	Object tag to point to the name of the associated object in the controller.
#120	N	Parameter to pass to the display command to open the faceplate. Typically used to define position for the faceplate.
#121	N	Parameter to pass to the display command to open the faceplate. To define X and Y coordinates, separate parameters so that #120 defines X and #121 defines Y. This separation lets these same parameters be used in subsequent display commands that originate from the faceplate.
#122	Y	The following are the options for the global object display: 0 = Always show faceplate 1 = Show Quick Display for users without Maintenance access (Code C) 2= Always show Quick Display

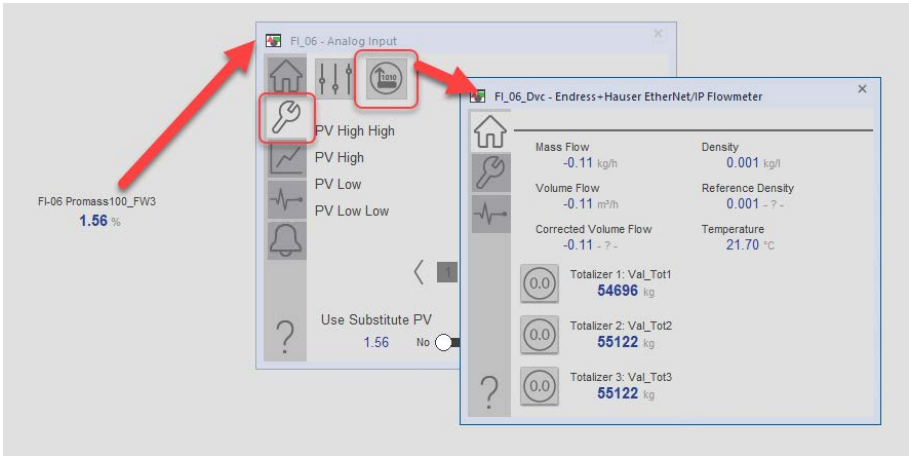
3. In the Value column, type the tag or value as specified in the Description column.



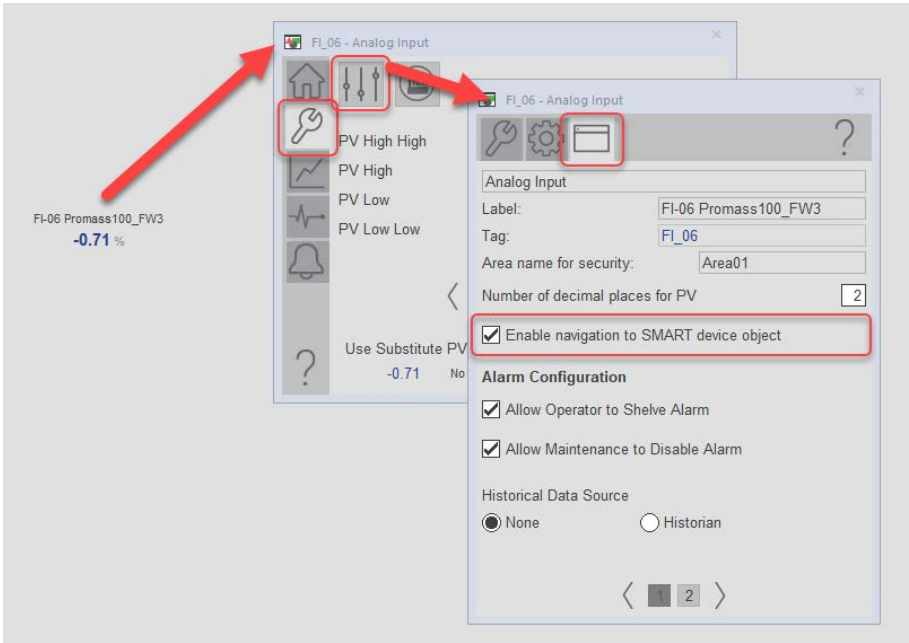
Click the ellipsis (...) to browse and select a tag.  
Values for items that are not required can be left blank.

Global Object Parameter Values				
	Name	Value	Tag	Description
1	#102	{PPAx_5_10_01/DATA::[App_with_Ethernet]FI101}	...	Object Tag (PAI)
2	#120	/CC	...	Additional display parameter (e.g. /X100 or /CC) (optional)
3	#121		...	Additional display parameter (e.g. /Y100) (optional)
4	#122	0	...	0 = Always show Faceplate; 1 = Show Quick Display for users without security co

- 4. Click OK.
- 5. From the runtime client, you can navigate to the new PAI object faceplate. Open the faceplate and navigate to the Maintenance tab. Select the SMART device button to access the flowmeter faceplate and access diagnostics for the Promass 100.



If the SMART device button is not visible on the PAI faceplate, ensure that Cfg\_HasSmartDvc is enabled.



## Liquiline Analyzer Integration

You must have a project with a controller already configured. Make sure that the project path is set to the correct controller. For the purposes of this document, we refer to this controller as the target application.

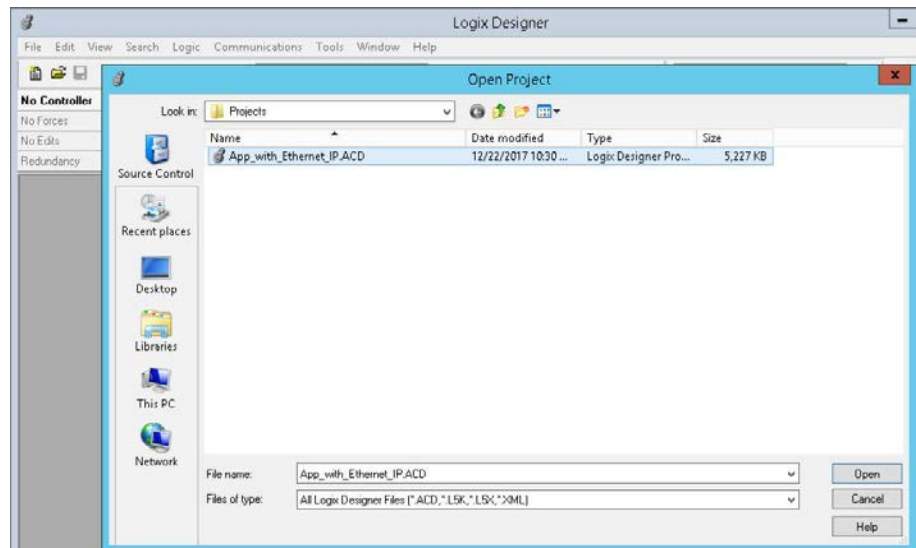
The PlantPAx integration of the Endress+Hauser EtherNet/IP Liquiline Analyzers requires that you instantiate one Add-On Instruction and one Process Analog Input (PAI) instruction per connected sensor. Your Liquiline has one or several sensors. Each sensor has a unique Add-On Instruction and a corresponding Liquiline channel assignment.

### Add Liquiline Device

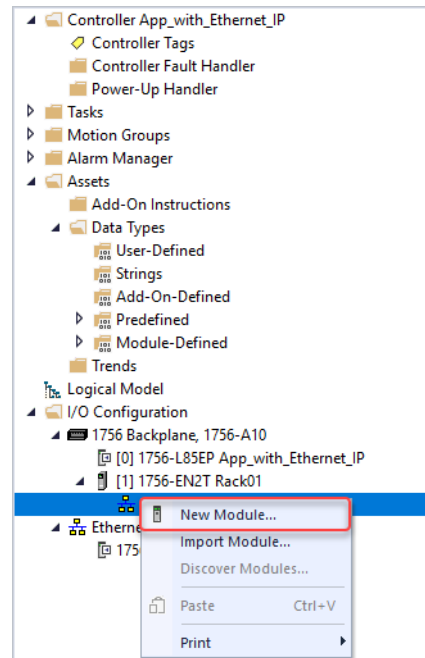
The desired Ethernet analyzer must be added into the project I/O configuration. This step is performed for every device in the I/O configuration tree.

Complete these steps after downloading the Process Library and installing the Endress+Hauser Device Add-on Profiles.

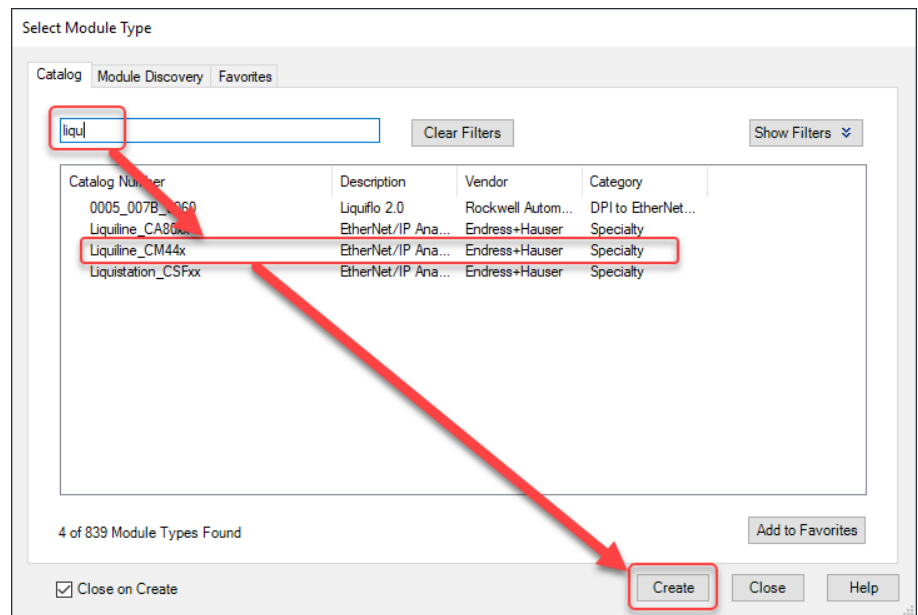
1. In the Logix Designer application, open your target application (App\_with\_Ethernet\_IP.ACD in our example).



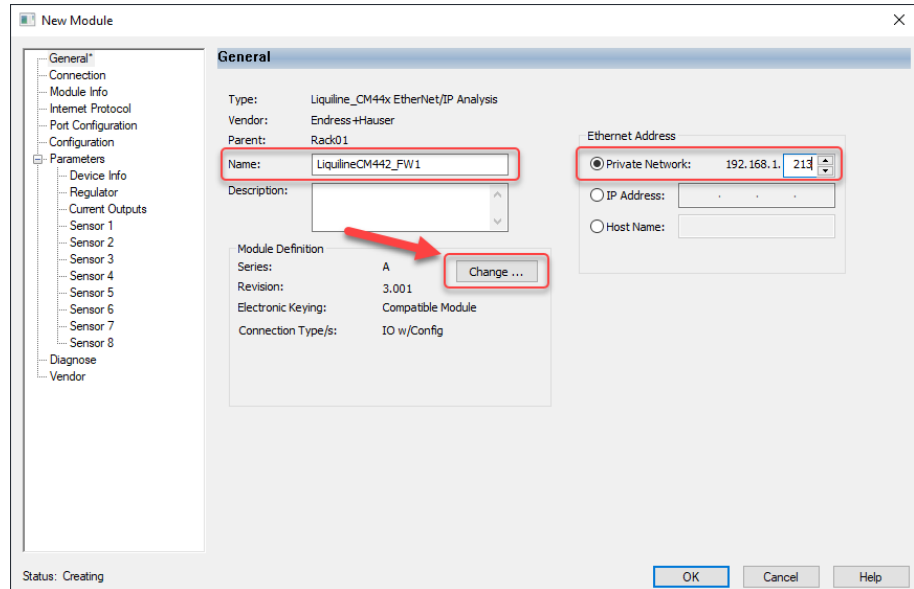
2. In the controller organizer, right-click Ethernet and select New Module.



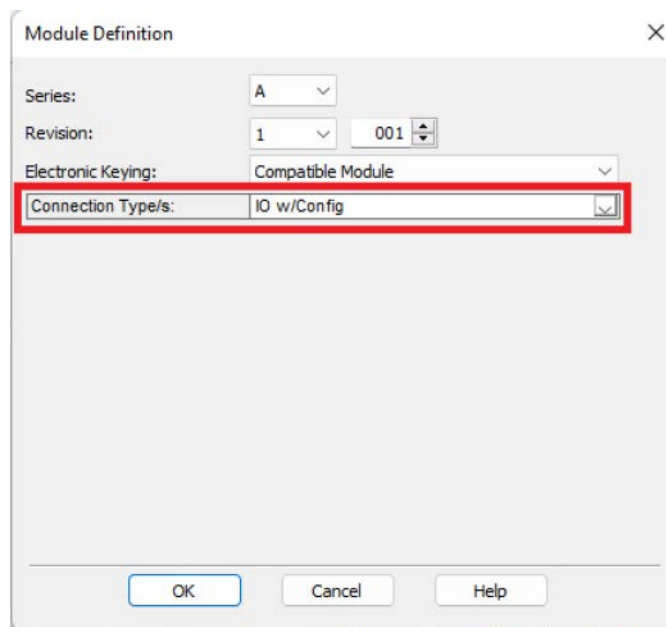
3. The Select Module Type dialog box appears. Search for the Endress+Hauser device you want to add. In this example, we are adding a Liquiline\_CM44x. Click Create.



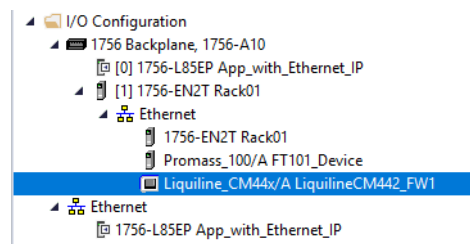
4. In the New Module dialog box, update the name of the device and the IP address. Then click the Change... button on the Module Definition.



5. Ensure that the Module Definition settings are configured as follows, with the Connection Type set to 'IO w/Config'.



6. Apply any updates to the Module definition; apply and save the settings for the new module, click OK. Your device is now configured in the I/O Configuration tree.



7. Open the controller tags and note the input and configuration tags for this module.

Scope: <span>App_with_Ethernet</span>		Show: <span>All Tags</span>		
Name	Value	Force Mask	Style	Data Type
▶ LiquilineCM442_FW1:O1	{...}		{...}	EH:CM44:O1:0
▶ LiquilineCM442_FW1:I1	{...}		{...}	EH:CM44:I1:0
▶ LiquilineCM442_FW1:C	{...}		{...}	EH:CM44:C:0

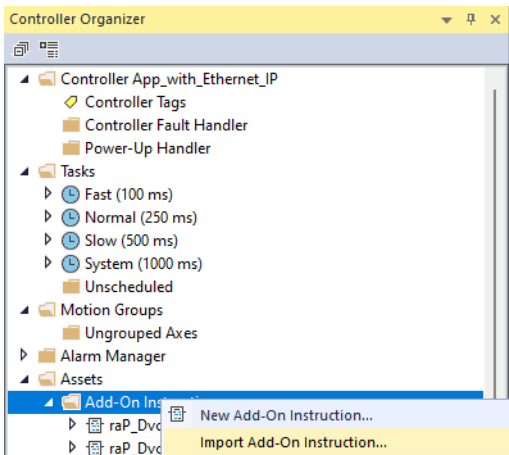
8. To save the project, click .

## Import Add-On Instruction (Sensor)

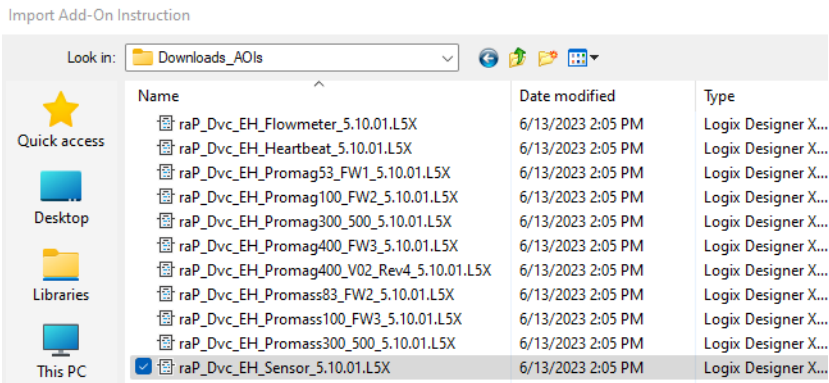
This procedure imports the definitions for the Sensor Add-On Instruction. It is only necessary to import the definitions once per controller.

The easiest way to add the logic to support your Liquiline Analyzer is to use the Import Add-On Instruction function. Use the procedure to create the required tags, Add-On Instructions, and Data Types.

1. In the target Controller Organizer, right-click Add-On Instructions and choose Import Add-On Instruction.



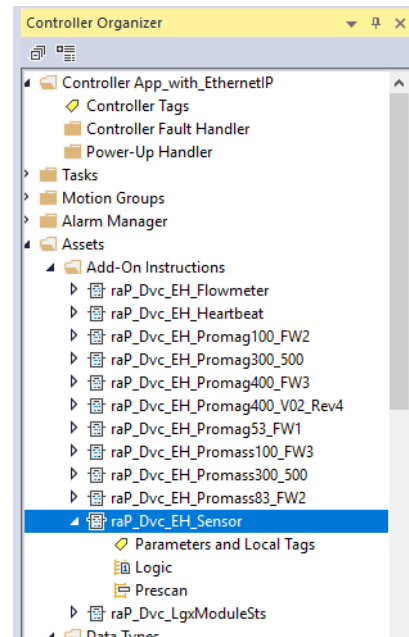
2. Navigate to the folder that contains the analyzer Add-On Instructions and select raP\_Dvc\_EH\_Sensor\_5.20.01.L5X, and then click Open.



The Input Configuration window appears.

3. Click OK.

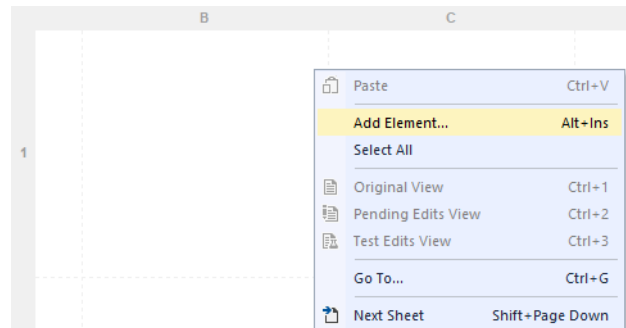
The Add-On Instruction is then added to the Controller Organizer.



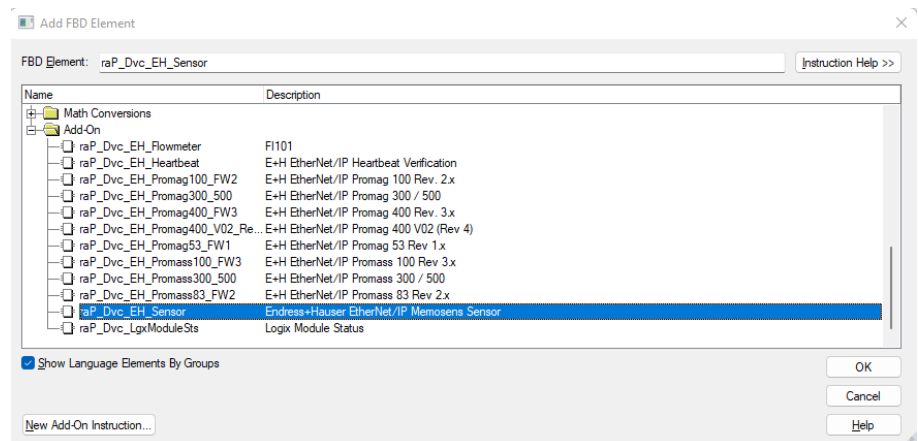
## Add Instructions to Routine (Sensor)

This procedure adds the Sensor logic to the routine. Perform this procedure once for every device.

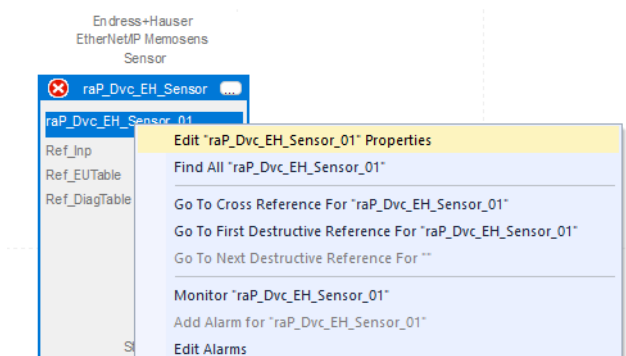
1. Open the routine where the device logic is used.
2. Within the routine, right-click the sheet and click Add Element.



3. Type the device Add-On Instruction name in the FBD Element box; for this example, raP\_Dvc\_EH\_Sensor, and then click OK.

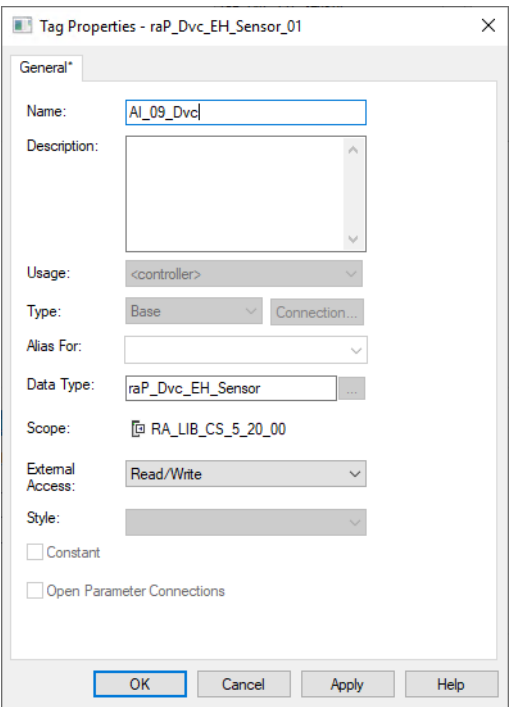


4. Right-click the name of the new Add-On Instruction and choose Edit...Properties.



The Parameter/Local Tag Properties window appears.

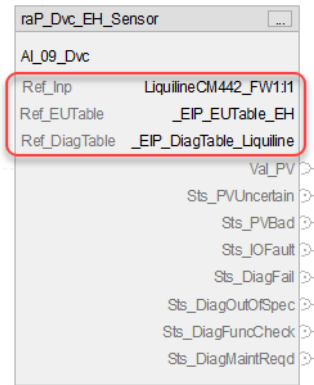
5. Change the Name to correspond with the project convention. To save the changes, click OK.



**IMPORTANT** The tag name for the raP\_Dvc\_EH\_Sensor must be the name of the PAI object and appended with "\_Dvc". For example, if the corresponding PAI instruction is AI\_09, the raP\_Dvc\_EH\_Sensor tag must be AI\_09\_Dvc. This allows for automatic navigation from the SMART Device button on the HMI faceplate of the PAI.



6. Set the following three values in the Add-On Instruction.



The last two parameters provide engineering units and diagnostic codes. A sample project is included in the Process Library download (S5kLD\_35\_Template\_All.ACD). Copy the Engineering Unit and Diagnostic table tags from the sample project and paste them into the target project. See [Liquiline Diagnostic and Engineering Unit Lookup Table Tag Descriptions on page 41](#).

#### Liquiline Diagnostic and Engineering Unit Lookup Table Tag Descriptions

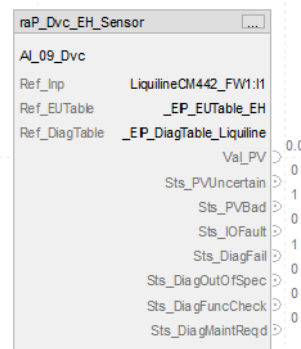
Device	Diagnostic Tag	Engineering Units Table <sup>(1)</sup>
Liquiline CM44x	_EIP_DiagTable_LiquilineCM44x	_EIP_EUTable_EH


(1) The '\_EIP\_EUTable\_Generic' tag is a generic EtherNet/IP engineering units table that is based on the EtherNet/IP standard, not using vendor-specific units. The tag is for use with ALL EtherNet/IP devices OTHER THAN Endress+Hauser devices, and is not used with these Add-On Instructions.

Figure 2 - Engineering Units and Diagnostic Table Tags

Name	Data Type	Value	Force Mask	Style
▶ LiquilineCM442_FW1:01	EH:CM44:01:0	{...}		{...}
▶ LiquilineCM442_FW1:11	EH:CM44:11:0	{...}		{...}
▶ LiquilineCM442_FW1:C	EH:CM44:C:0	{...}		{...}
▶ _EIP_EUTable_EH	RAC_CODE_DESCRIPTION[897]	{...}		{...}
▶ _EIP_DiagTable_Liquiline	RAC_CODE_DESCRIPTION[317]	{...}		{...}

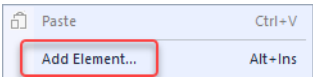
The routine now looks as follows.



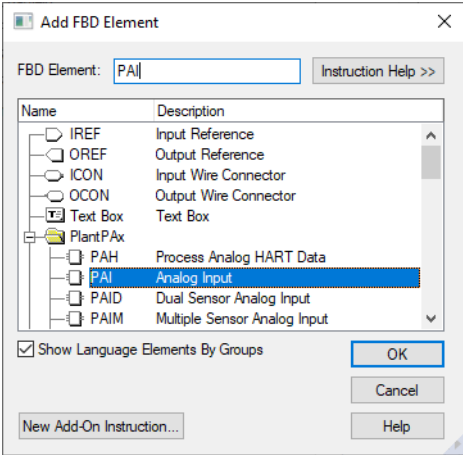
7. To save the project, click .

## Add Process Analog Input (PAI) Instruction to Routine

1. Right-click the sheet within the routine and choose Add Element to add the PAI instruction to the routine.



2. Type PAI into the FBD Element text box and select OK.

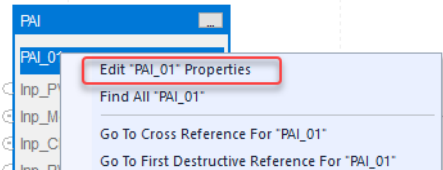


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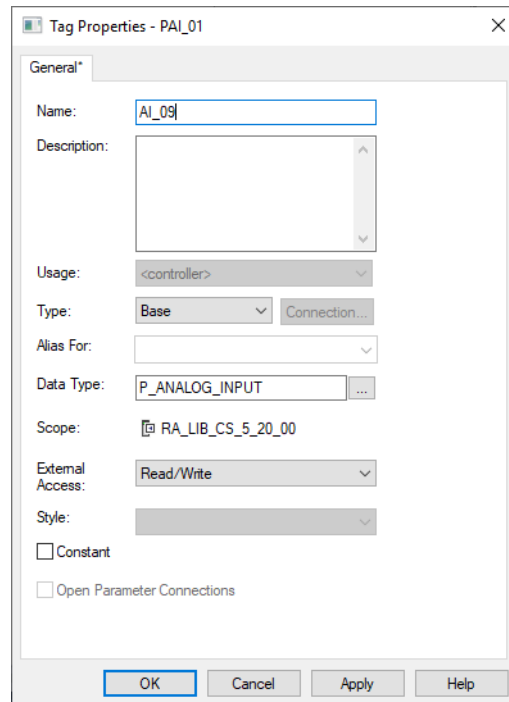
**IMPORTANT** At least one instance of the Process Analog Input (PAI) instruction is used for each channel (device) on the input module.

---

3. Right-click the name of the new instance of PAI and choose Edit...Properties.



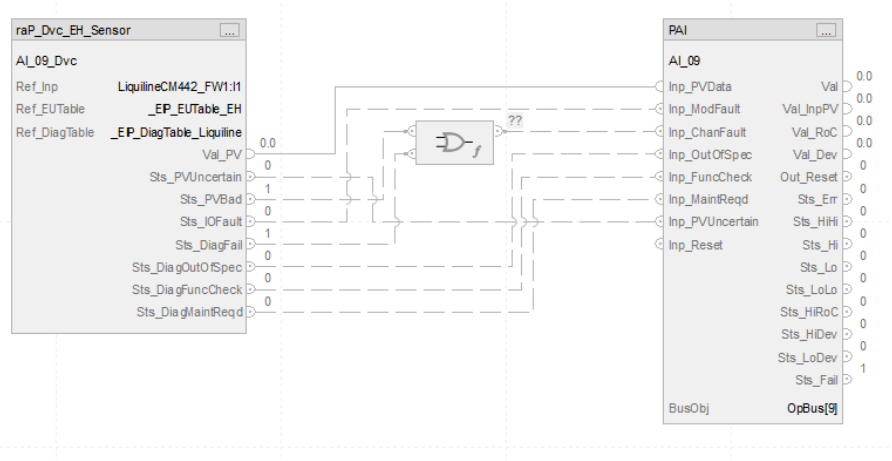
4. Change the name according to the project convention. To save the changes, click OK.




### IMPORTANT

The tag name for the PAI instance must correspond to the instance of the raP\_Dvc\_EH\_Sensor that it is connected to. The tag name for the raP\_Dvc\_EH\_Sensor must be the name of the PAI object and appended with "\_Dvc". For example, if the corresponding PAI instruction is AI\_09, the raP\_Dvc\_EH\_Sensor tag must be AI\_09\_Dvc. This will allow for automatic navigation via the SMART Device button on the HMI faceplate of the PAI.

5. Connect the instruction instances as shown in the following diagram.



6. Open the properties of the PAI by selecting the ellipses. Ensure that the Cfg\_HasSmartDvc is set to 1, to allow navigation to the raP\_Dvc\_EH\_Sensor faceplate from the PAI faceplate.
7. To save the project, click .

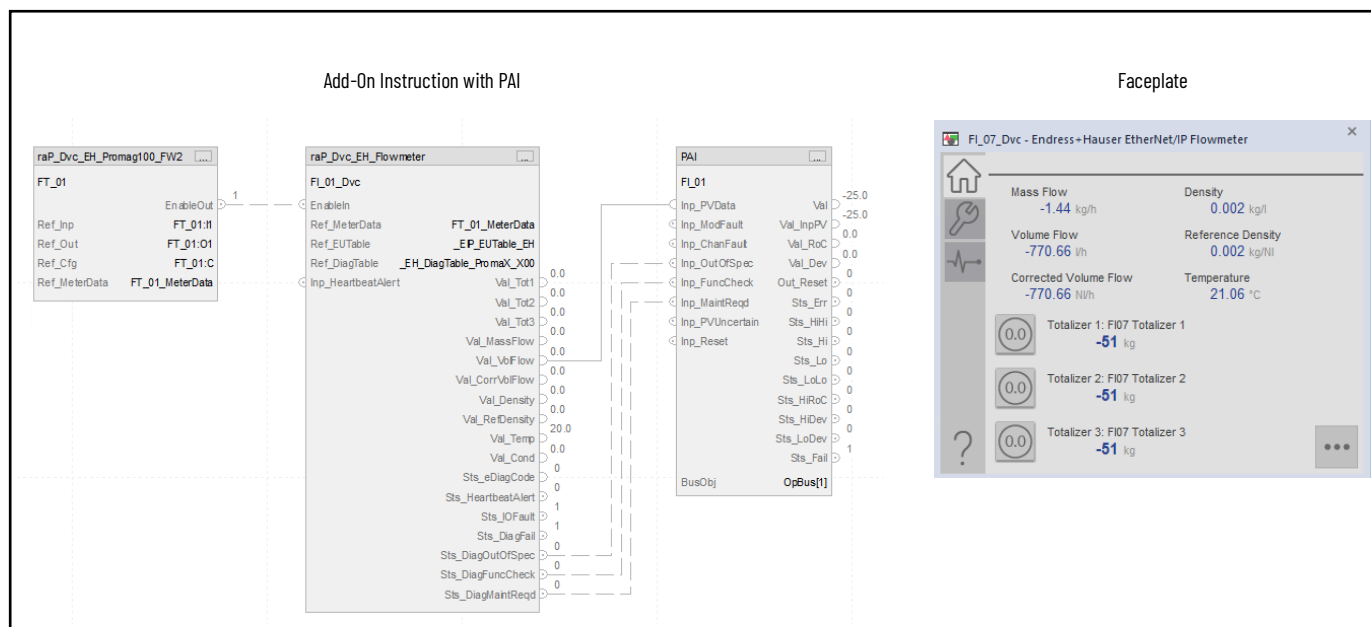
## Add HMI Graphic Symbol to Application and Link to PAI Tag

See [Add HMI Graphic Symbol to Application and Link to PAI Tag on page 32](#) for more information.

## Endress+Hauser EtherNet/IP Flowmeter (raP\_Dvc\_EH\_Flowmeter) and Device-Specific Reference

PlantPax® system integration of Endress+Hauser EtherNet/IP™ flowmeters requires that you instantiate two Add-On Instructions (AOI) and one Process Analog Input (PAI) instruction per field device:

- Device-specific Add-On Instruction (for example: raP\_Dvc\_EH\_Promag/Promass...) that gathers the required device tags and prepares the data for use.
- Generic flowmeter object (raP\_Dvc\_EH\_Flowmeter) that uses the device data, along with custom-made device diagnostic and unit tables, to enable visibility with the PlantPax system. The Flowmeter tagname must match the tagname of the PAI instruction with "\_Dvc" appended to the end of the name.
- Process Analog Input (PAI) object that monitors one analog input channel, this object provides scaling and alarming.



The raP\_Dvc\_EH\_Flowmeter instruction enables a selection of Primary Variable from those variables available in the meter. Alarms are provided and trigger from the PAI instruction when the selected Primary Variable value exceeds user-specified thresholds (high and low). Entry of a substitute Process Variable (PV) for an out-of-range or faulted input is included from the PAI instruction.

# Controller Code

This section describes the parameter references for this Add-On Instruction. See EtherNet/IP Instrumentation Process Object Parameters, publication [PROCES-RD212](#) for parameter names and descriptions.

## InOut Structure for raP\_Dvc\_EH\_Flowmeter

InOut parameters (Ref\_) are used to link the Add-On Instruction to external tags that contain necessary data for the instruction to operate. These external tags must be of the data type shown.

The diagnostic lookup table (Ref\_DiagTable) is a tag that contains a list (array) of entries with diagnostic codes and the corresponding description.

The following image shows diagnostic codes 145 and 146 from the Endress+Hauser Promass lookup table.

Figure 3 - Diagnostic Codes 145 and 146 from Endress+Hauser Promass Lookup Table

Name	Value
▸ _EH_DiagTable_PromaX_X00[20]	{...}
▸ _EH_DiagTable_PromaX_X00[21]	{...}
▴ _EH_DiagTable_PromaX_X00[22]	{...}
▸ _EH_DiagTable_PromaX_X00[22].Code	145
▸ _EH_DiagTable_PromaX_X00[22].Desc	'842 Process limit'
▴ _EH_DiagTable_PromaX_X00[23]	{...}
▸ _EH_DiagTable_PromaX_X00[23].Code	146
▸ _EH_DiagTable_PromaX_X00[23].Desc	'862 Partly filled / Empty pipe'
▸ _EH_DiagTable_PromaX_X00[24]	{...}

## Input Structure for raP\_Dvc\_EH\_Flowmeter

Input parameters include the following:

- Input data elements (Inp\_) are typically used to connect field inputs from I/O modules or signals from other objects.
- Configuration data elements (Cfg\_) are used to set configurable capabilities and features of the instruction.
- Program Commands (PCmd\_) are used by program logic to request instruction actions.

## Output Structure for raP\_Dvc\_EH\_Flowmeter

Output parameters include the following:

- Value data elements (Val\_) are numeric outputs of the instruction for use by the HMI. Values can also be used by other application logic or software packages.
- Source and Quality data elements (SrcQ\_) are outputs of the instruction that is used by the HMI to indicate PV source and quality.
- Status data elements (Sts\_) are bit outputs of the instruction for use by the HMI. Status bits can also be used by other application logic.

## Local Configuration Tags for raP\_Dvc\_EH\_Flowmeter

Configuration parameters that are array, string, or structure data types cannot be configured as parameters for Add-On Instructions. Configuration parameters of these types appear as local tags in the Add-On Instruction. Local tags can be configured through the HMI faceplates or in the Studio 5000 Logix Designer® application by opening the instruction logic of the Add-On Instruction instance. Then, open the Data Monitor on a local tag. These parameters cannot be modified by using controller logic or the Logix Designer application export/import functionality.

- Commands (OCmd\_) are used by operators to request instruction actions.
- Configuration data elements (Cfg\_) are used to set configurable capabilities and features of the instruction.

## Operations

This section describes the primary operations for the raP\_Dvc\_EH\_Flowmeter Add-On Instructions.

### Alarms

This instruction does not have alarms. The PAI instruction downstream provides alarm functionality.

For more information, see PlantPAx Process Control Instructions, publication [PROCES-RM215](#).

### Virtualization

This instruction does not provide virtualization capability. The PAI instruction downstream provides the capability to switch between virtual and physical modes.

### Execution

The following table explains the handling of instruction execution conditions.

Condition	Description
Powerup (prescan, first scan)	Any commands that are received before first scan are discarded.
Postscan (SFC transition)	No SFC postscan logic is provided.

For more information, see the Logix 5000® Controllers Add-On Instructions Programming Manual, publication [1756-PM010](#).

## Graphic Symbols

A graphic symbol (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix® system, aid consistency and save engineering time.

---

**IMPORTANT** Global Objects are linked to the downstream PAI instruction, which provides alarming and other standard analog input processing functions. The PAI instruction is linked for navigation to its upstream raP\_Dvc\_EH\_Flowmeter instruction faceplate for device diagnostics and other variables.

---

The following indicators will be provided by the downstream PAI instruction connected to the raP\_Dvc\_EH\_Flowmeter: Status/Quality indicators, threshold indicators, alarm indicators, maintenance bypass indicators.

For more information on the PAI instruction, see Rockwell Automation Library of Process Objects, publication [PROCES-RM200](#) and PlantPAx Faceplates for Process Controller Instructions, publication [PROCES-RM203](#).

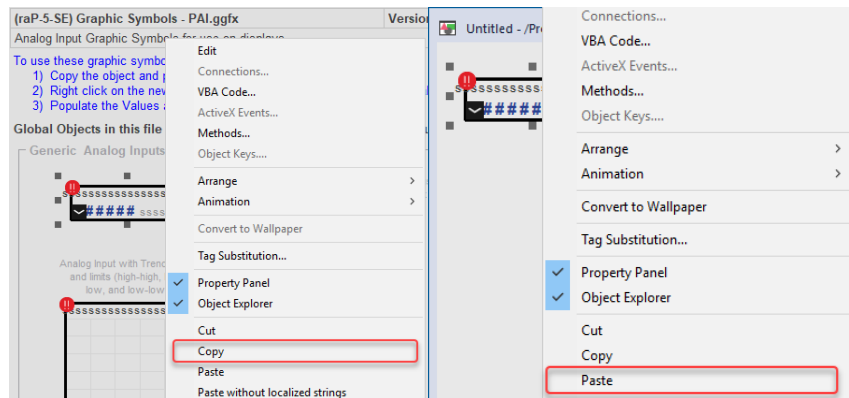
## Using Global Objects

In both FactoryTalk View SE and FactoryTalk Optix, the global objects for raP\_Dvc\_EH\_Flowmeter are automatically instantiated once the connected PAI global object is created and configured. Navigation to the raP\_Dvc\_EH\_Flowmeter occurs from the PAI faceplate.

Note: The flowmeter tag must match the tagname of the PAI with "\_Dvc" appended to the end of the name.

Follow these steps to use the global object and access the faceplate for the raP\_Dvc\_EH\_Flowmeter.

1. Copy the PAI global object from the global object file and paste it in the display file.



2. In the display, right-click the global object and choose Global ObjectParameter Values.



The Global Object Parameter Values dialog box appears.

	Name	Value	Tag	Description
1	#102		...	Object Tag (PAI)
2	#120		...	Additional display parameter (e.g., /X100 or /CC) (optional)
3	#121		...	Additional display parameter (e.g., /Y100) (optional)
4	#122		...	0 = Always show Faceplate; 1 = Show Quick Display for users without security co

OK Cancel Help

The global object parameters are as follows.

Parameter	Required	Description
#102	Y	Object tag to point to the name of the associated object Instruction in the controller.
#120	N	Parameter to pass to the display command to open the faceplate. Typically used to define position for the faceplate.
#121	N	Parameter to pass to the display command to open the faceplate. To define X and Y coordinates, separate parameters so that #120 defines X and #121 defines Y. This separation lets these same parameters be used in subsequent display commands that originate from the faceplate.
#122	Y	The following are the options for the global object display: 0 = Always show faceplate 1 = Show Quick Display for users without Maintenance access (Code C) 2 = Always show Quick Display

- In the Value column, type the tag or value as specified in the Description column.



Click the ellipsis (...) to browse and select a tag.  
Values for items marked '(optional)' can be left blank.

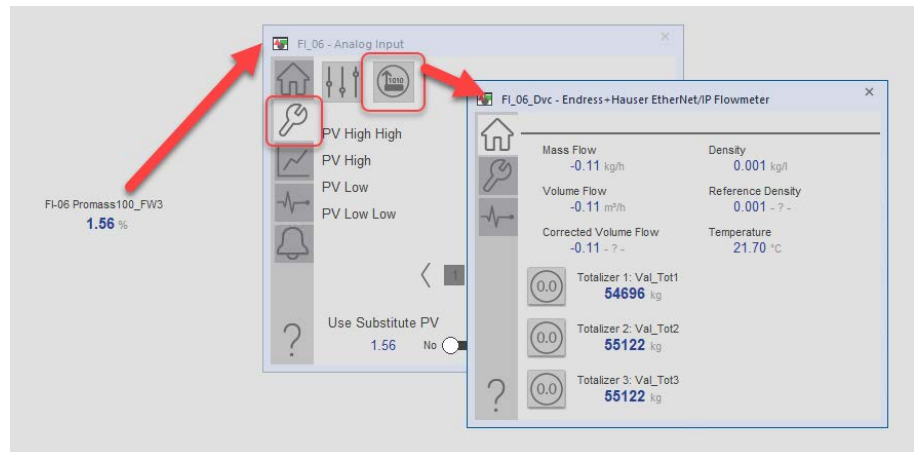
**Figure 4 - Example Parameter Values Dialog Box**

	Name	Value	Tag	Description
1	#102	{PPAx_5_10_01/DATA::[App_with_Ethernet]FI101}	...	Object Tag (PAI)
2	#120	/CC	...	Additional display parameter (e.g., /X100 or /CC) (optional)
3	#121		...	Additional display parameter (e.g., /Y100) (optional)
4	#122	0	...	0 = Always show Faceplate; 1 = Show Quick Display for users without security co

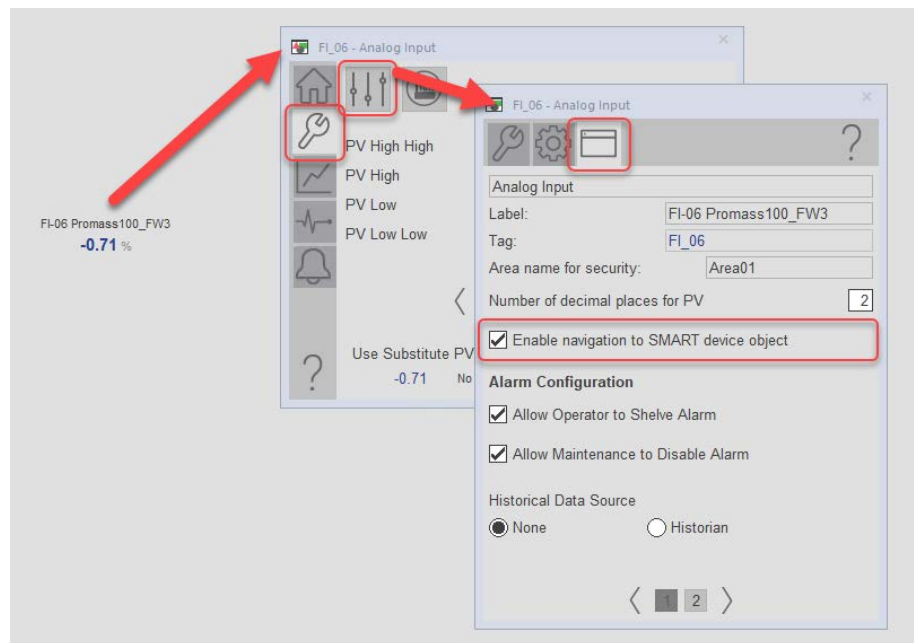
OK Cancel Help

- Click OK.

- From the runtime client, you can now navigate to the new PAI object faceplate. Open the faceplate and navigate to the Maintenance tab. Click the SMART device button to access the raP\_Dvc\_EH\_Flowmeter faceplate.



If the SMART device button is not visible on the PAI faceplate, ensure that Cfg\_HasSmartDvc is enabled.



## FactoryTalk View SE Faceplates

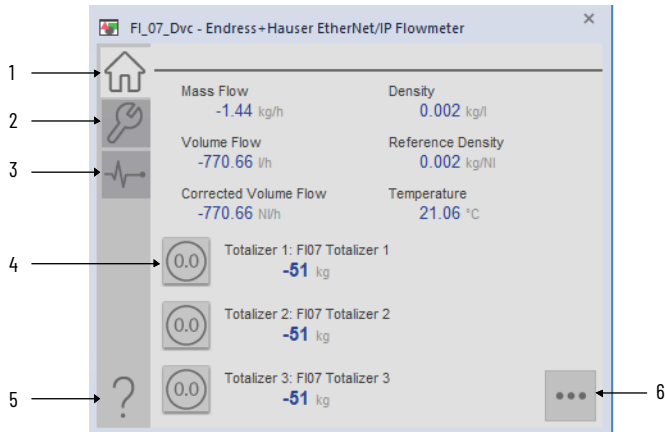
The faceplate provides the means for operators, maintenance workers, engineers, and others to interact with the instruction instance, which includes a view of its status and values. They can also manipulate it through its commands and settings.

The faceplate consists of tabs, and each tab consists of one or more pages.

The Operator tab is displayed when the faceplate is initially opened. Click the appropriate icon to access a specific tab.

## Operator Tab

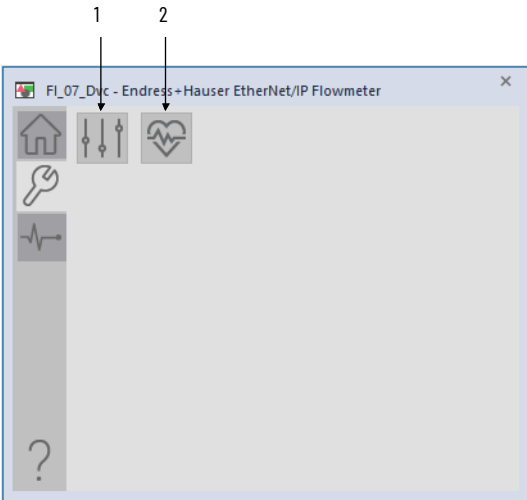
The faceplate initially opens to the Operator ('Home') tab. An operator can monitor the device status from here, and manually operate the device when it is in Operator mode.



Item	Action
1	Select to open the operator tab.
2	Select to open the maintenance tab.
3	Select to open the diagnostics tab.
4	Select to clear the totalizer.
5	Select to open the help file.
6	Select to navigate to an object with more information (Cfg_HasMoreObj is set to true.)  You configure the tag name of the object that you want to navigate to in the extended tag property "Cfg_HasMoreObj.@Navigation". It uses the <backing tag>.@Library and <backing tag>.@Instruction extended tag properties to display the object's faceplate.

## Maintenance Tab

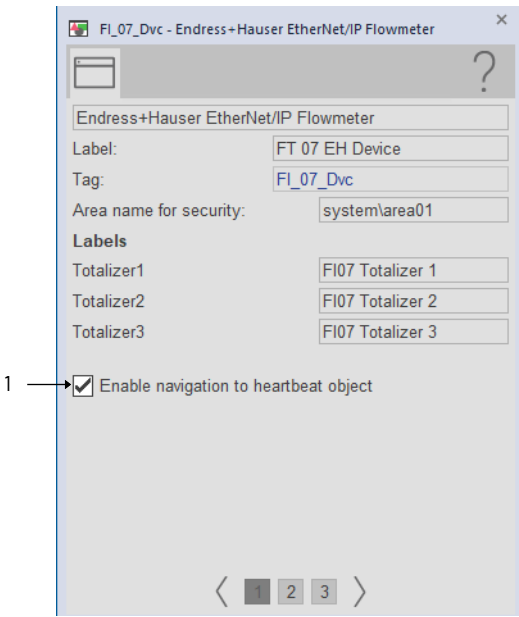
The Maintenance tab provides functions for adjusting device parameters.



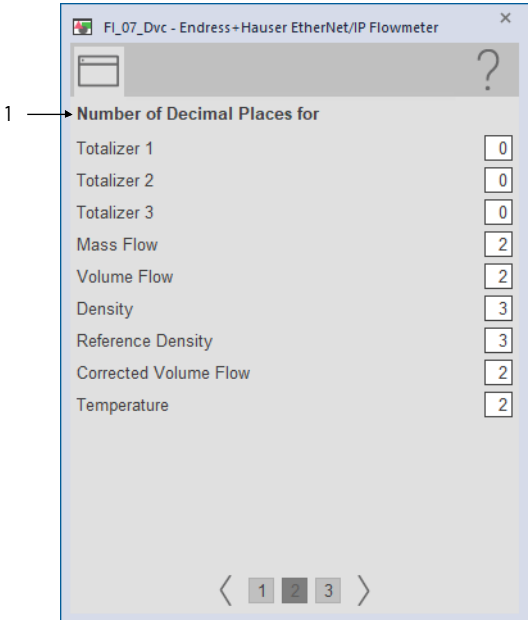
Item	Action
1	Select to display the advanced properties.
2	Select to display the Heartbeat faceplate.

## Advanced Properties Display

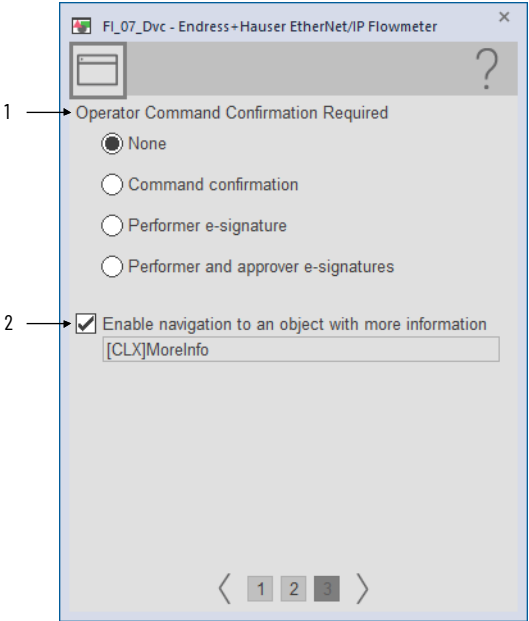
The Advanced Properties Display opens to the HMI settings. The HMI configuration tabs provide viewing of displayed text and faceplate-to-faceplate navigation settings.



Item	Action
1	Select to enable navigation to the heartbeat object.



Item	Action
1	Enter the number of decimal places to be used for each variable.

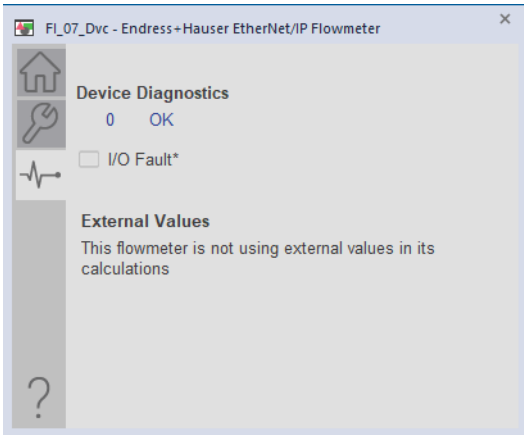


Item	Action
1	Select to configure operator command confirmation. This action would take place after any operator command.
2	Select to enable navigation to an object with more information (Cfg_HasMoreObj is set to true.) This can be configured to navigate to an object backing tag or a UDT tag that has Instruction and Library defined.


## Diagnostics Tab

The Diagnostic tab provides indications that help diagnose or help prevent device problems, which can include device warnings and faults, warning and fault history, and predictive/preventive maintenance data.

The Diagnostics tab displays messages that contain the diagnostic codes from the device. Codes differ depending on the device used.





## Faceplate Help


Press the help button  on the faceplates to access help specific to that faceplate. The help file is in .pdf format and opens in a separate window.


### E+H Flow Meter Faceplate Help


#### Status Indicators


 Operator Attention Required


 Invalid Configuration


 Data Quality Bad / Failure

 Data Quality Degraded / Uncertain


 Device in Simulation or Test


 Maintenance Required


 Maintenance Bypass Active


 Diagnostic Information

#### Threshold Indicators


 High-High Threshold exceeded

 High Threshold exceeded


 Low-Low Threshold exceeded


 Low Threshold exceeded

#### Commands

 Operator Command to Clear Totalizer Count

#### Navigation

 Show more information for this object

 Heartbeat Button

## FactoryTalk Optix Faceplates

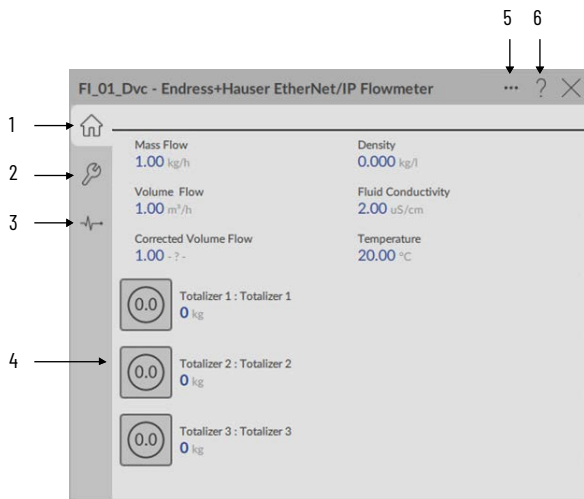
The faceplate provides the means for operators, maintenance workers, engineers, and others to interact with the instruction instance, which includes a view of its status and values. They can also manipulate it through its commands and settings.

The faceplate consists of tabs, and each tab consists of one or more pages.

The Operator tab is displayed when the faceplate is initially opened. Click the appropriate icon to access a specific tab.

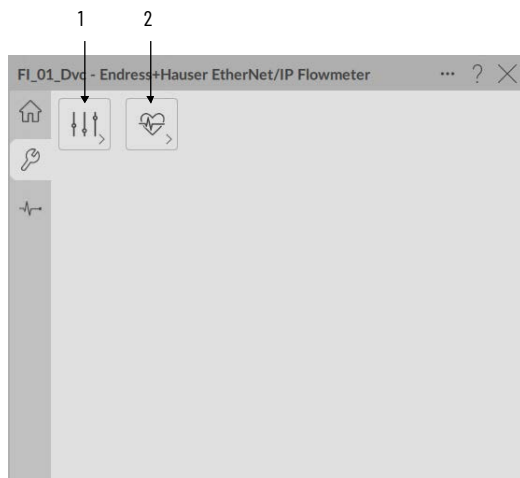
FactoryTalk® Optix™ faceplates contain features that are used in the FactoryTalk View SE faceplates. See [FactoryTalk View SE Faceplates on page 50](#) for descriptions of the features.

### Operator Tab



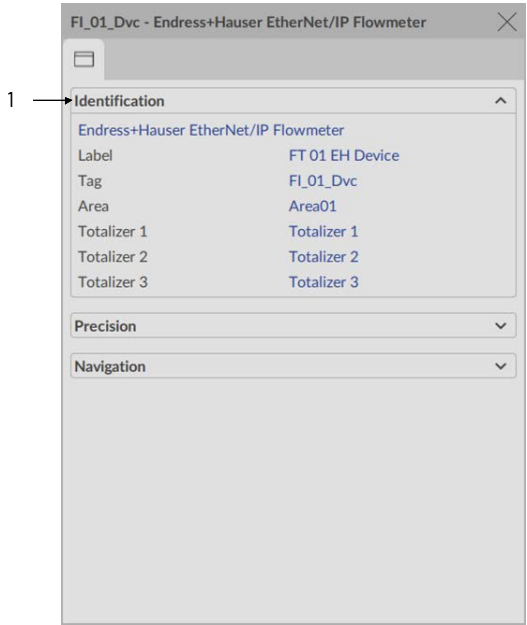
Item	Action
1	Select to open the operator tab.
2	Select to open the maintenance tab.
3	Select to open the diagnostics tab.
4	Select to clear the totalizer.
5	Select to navigate to an object with more information (Cfg_HasMoreObj is set to true.) You configure the tag name of the object that you want to navigate to in the extended tag property "Cfg_HasMoreObj.@Navigation". It uses the .@Library and .@Instruction extended tag properties to display the object's faceplate.
6	Select to open the help file.

### Maintenance Tab



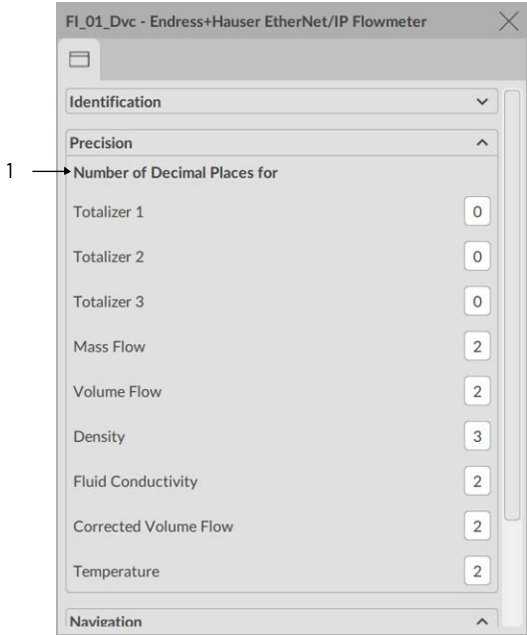
Item	Action
1	Select to display the advanced properties.
2	Select to display the Heartbeat faceplate.

### Advanced HMI Tab - Identification



Item	Action
1	Display Totalizers name.

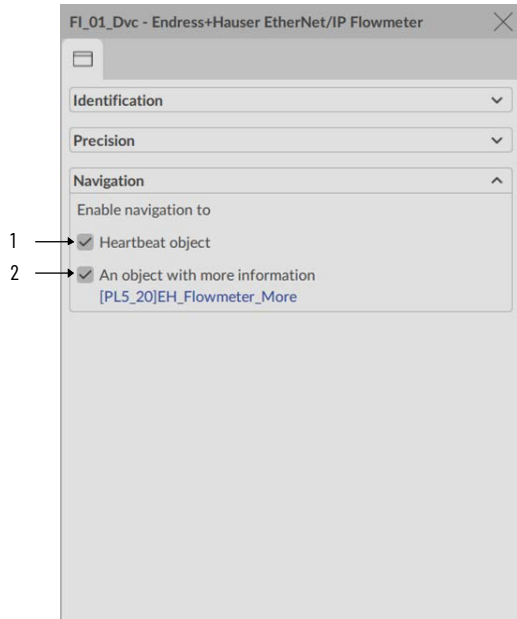
### Advanced HMI Tab - Precision



Item	Action
1	Enter the number of decimal places to be used for each variable.



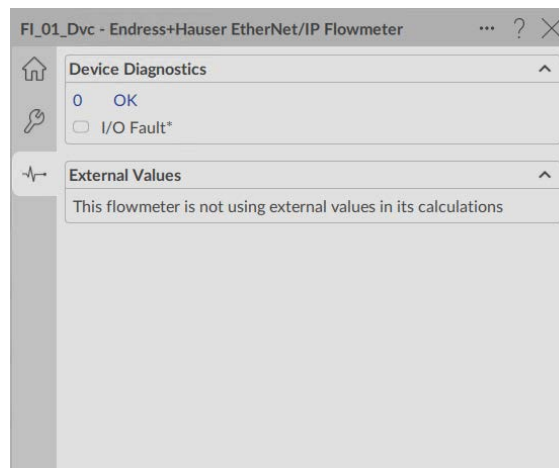
## Advanced HMI Configuration Tab - Navigation



Item	Action
1	Select to enable navigation to a heartbeat object.
2	Select to enable navigation to an object with more information (Cfg_HasMoreObj is set to true.) This can be configured to navigate to an object backing tag or a UDT tag that has Instruction and Library defined.

## Diagnostics Tab

The Diagnostic tab provides indications that help diagnose or help prevent device problems, which can include device warnings and faults, warning and fault history, and predictive/preventive maintenance data. The Diagnostics tab displays messages that contain the diagnostic codes from the device. Codes differ depending on the device used.





# Faceplate Help


FI\_01\_Dvc - Endress+Hauser EtherNet/IP Flowmeter


E+H Flow Meter Faceplate Help


Status Indicators


 Invalid configuration


 Data quality bad / failure


 Data quality degraded / uncertain

 Operator Attention Required


 Maintenance Required


 Maintenance Bypass active


 Device in Simulation or Test


 Diagnostic Information

Threshold Indicators


 High-High Threshold exceeded

 High Threshold exceeded


 Low-Low Threshold exceeded


 Low Threshold exceeded

Commands

 Operator Command to Clear Totalizer Count

Navigation

 Show more information for this object

 Heartbeat button

Process Library EH Flowmeter Faceplate  
raP\_5\_20\_raP\_Dvc\_EH\_Flowmeter\_Faceplate |  
Version: 5.20.03 Development

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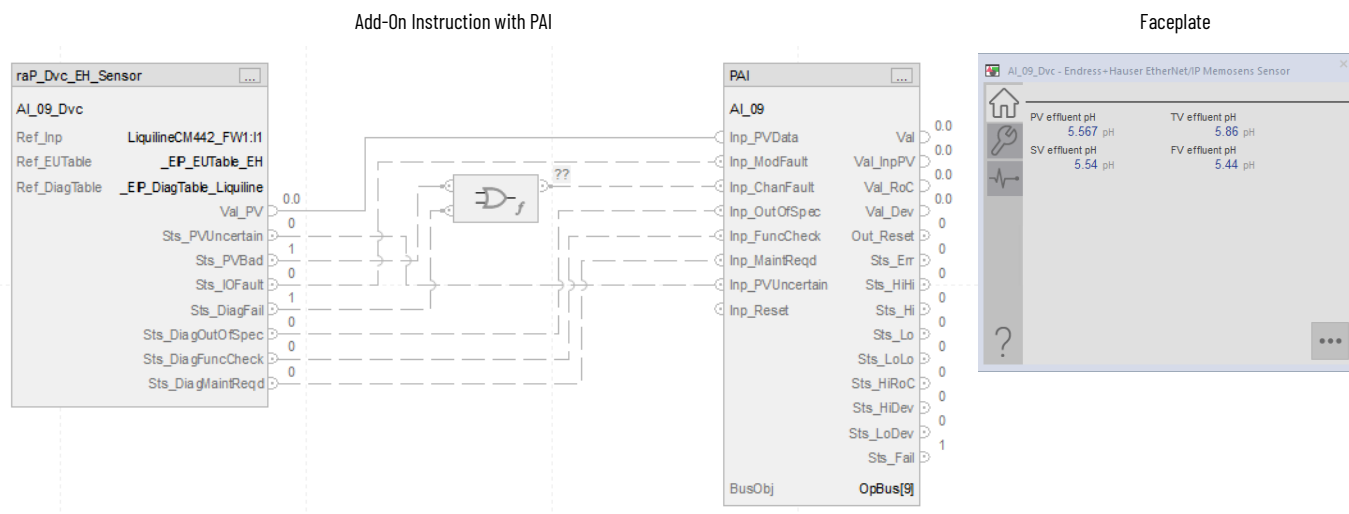
58

Rockwell Automation Publication PROCES-RM212C-EN-P - December 2025

## Endress+Hauser EtherNet/IP Memosens Sensor (raP\_Dvc\_EH\_Sensor) Reference

This chapter describes the raP\_Dvc\_EH\_Sensor Add-On Instruction and associated faceplates that support the configuration and operations of the Endress+Hauser Liquiline multichannel transmitters for liquid analysis. Suitable for all digital Memosens sensors, the uses for the analyzers include environmental monitoring, and industrial and municipal wastewater treatment.

The transmitters are seamlessly integrated with the PlantPAx® system over the EtherNet/IP™ network. Each Liquiline analyzer can have multiple sensors and multiple Add-On Instructions that are associated with it depending on the analyzer arrangement.



The raP\_Dvc\_EH\_Sensor Add-On Instruction monitors one sensor that is connected to an Endress+Hauser Liquiline CM442, CM444, or CM448 ("CM44x") analyzer. The instruction can monitor up to four analog value inputs from the sensor.

### Controller Code

This section describes the parameter references for this Add-On Instruction.

See EtherNet/IP Instrumentation Process Object Parameters, publication [PROCES-RD212](#) for parameter names and descriptions.

### InOut Structure for raP\_Dvc\_EH\_Sensor

InOut parameters (Ref\_) are used to link the Add-On Instruction to external tags that contain necessary data for the instruction to operate. These external tags must be of the data type shown.

The diagnostic lookup table (Ref\_DiagTable) is a tag that contains a list (array) of entries with diagnostic codes, and the corresponding description.

The following image shows diagnostic codes 4, 5, and 12 from the Endress+Hauser Liquiline lookup table.

Figure 5 - Diagnostic Codes Lookup Table

Name	Value	Force N
└─ _EIP_DiagTable_Liquiline		{...}
▸ _EIP_DiagTable_Liquiline[0]		{...}
▸ _EIP_DiagTable_Liquiline[1]		{...}
▸ _EIP_DiagTable_Liquiline[2]		{...}
└─ _EIP_DiagTable_Liquiline[3]		{...}
▸ _EIP_DiagTable_Liquiline[3].Code	4	
▸ _EIP_DiagTable_Liquiline[3].Desc	'Sensor defective'	
└─ _EIP_DiagTable_Liquiline[4]		{...}
▸ _EIP_DiagTable_Liquiline[4].Code	5	
▸ _EIP_DiagTable_Liquiline[4].Desc	'Sensor data invalid'	
▸ _EIP_DiagTable_Liquiline[5]		{...}
└─ _EIP_DiagTable_Liquiline[6]		{...}
▸ _EIP_DiagTable_Liquiline[6].Code	12	
▸ _EIP_DiagTable_Liquiline[6].Desc	'Writing data failed'	
▸ _EIP_DiagTable_Liquiline[7]		{...}
▸ _EIP_DiagTable_Liquiline[8]		{...}

## Input Structure for raP\_Dvc\_EH\_Sensor

Input parameters include the following:

- Configuration data elements (Cfg\_) are used to set configurable capabilities and features of the instruction.

## Output Structure for raP\_Dvc\_EH\_Sensor

Output parameters include the following:

- Value data elements (Val\_) are numeric outputs of the instruction for use by the HMI. Other application logic or software packages can also use values.
- Source and Quality data elements (SrcQ\_) are outputs of the instruction that is used by the HMI to indicate Process Variable source and quality.
- Status data elements (Sts\_) are bit outputs of the instruction for use by the HMI. Other application logic can also use status bits.

## Local Configuration Tags for raP\_Dvc\_EH\_Sensor

Configuration parameters that are array, string, or structure data types cannot be configured as parameters for Add-On Instructions. Configuration parameters of these types appear as local tags to the Add-On Instruction. Local tags can be configured through the HMI faceplates or in the

Studio 5000 Logix Designer® application. To do so, open the instruction logic of the Add-On Instruction instance, and then open the Data Monitor on a local tag. These parameters cannot be modified by using controller logic or Logix Designer application export/import functionality.

- Configuration data elements (Cfg\_) are used to set configurable capabilities and features of the instruction.

## Operations

This section describes the primary operations for the raP\_Dvc\_EH\_Sensor Add-On Instruction.

### Alarms

This instruction does not have alarms. The PAI instruction downstream provides alarm functionality.

For more information, see Rockwell Automation Library of Process Objects, publication [PROCES-RM200](#).

### Virtualization

This instruction does not provide virtualization capability. The PAI instruction downstream provides the capability to switch between virtual and physical modes.

### Execution

The following table explains the handling of instruction execution conditions.

Condition	Description
Powerup (prescan, first scan)	Any commands that are received before first scan are discarded.
Postscan (SFC transition)	No SFC postscan logic is provided.

For more information, see the Logix 5000® Controllers Add-On Instructions Programming Manual, publication [1756-PM010](#).

## Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, with tag structures in the ControlLogix® system, aid consistency and save engineering time.

---

**IMPORTANT** Display elements are linked to the downstream PAI instruction, which provides alarming and other standard analog input processing functions. The PAI instruction is linked for navigation to its upstream raP\_Dvc\_EH\_Sensor instruction faceplate for device diagnostics and other variables.

---

The following indicators will be provided by the downstream PAI instruction connected to the raP\_Dvc\_EH\_Sensor Add-on Instruction:

- Status/Quality indicators
- Threshold indicators
- Alarm indicators
- Maintenance bypass indicators

For more information on the PAI instruction, see Rockwell Automation Library of Process Objects, publication [PROCES-RM200](#) and PlantPax Faceplates for Process Controller Instructions, publication [PROCES-RM203](#).

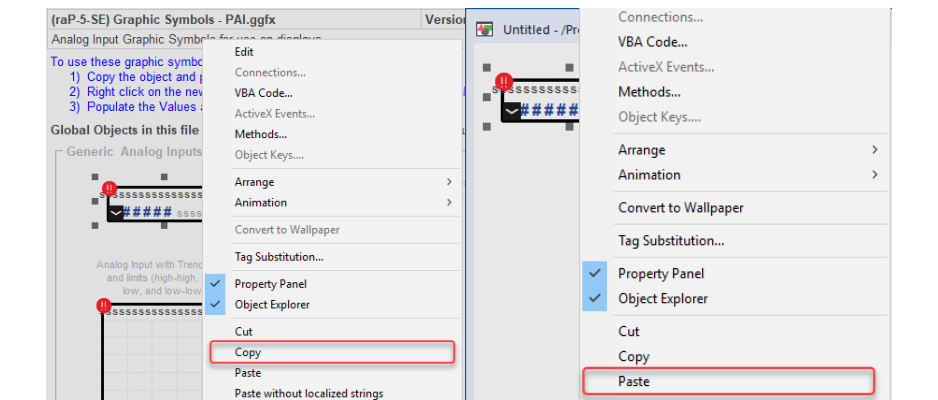
## Using Display Elements

In FactoryTalk View SE and FactoryTalk Optix, the global objects for raP\_Dvc\_EH\_Sensor are automatically instantiated once the connected PAI global object is created and configured. Navigation to the raP\_Dvc\_EH\_Sensor occurs from the PAI faceplate.

**Note:** The raP\_Dvc\_EH\_Sensor tagname must match the PAI tagname with "\_Dvc" appended to the end of the name.

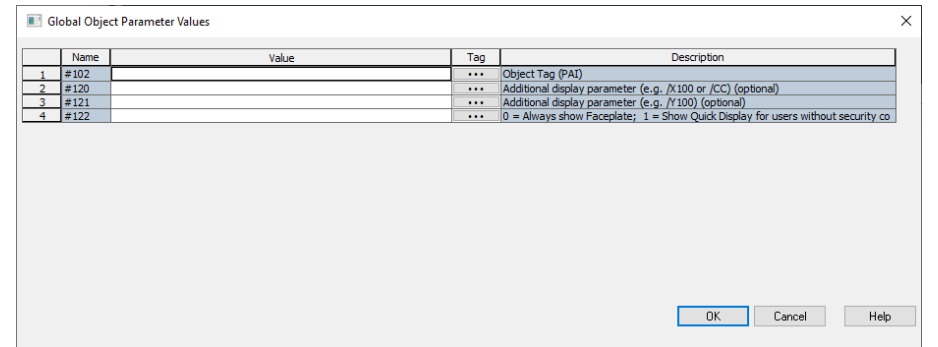
Follow these steps to use the global object and access the faceplate for raP\_Dvc\_EH\_Sensor

- 1. Copy the PAI global object from the global object file and paste it in the display file.



- 2. In the display, right-click the global object and choose Global Object.

The Global Object Parameter Values dialog box appears.



The global object parameters are as follows.

Parameter	Required	Description
#102	Y	Object tag to point to the name of the associated object Instruction in the controller.
#120	N	Additional parameter to pass to the display command to open the faceplate. Typically used to define position for the faceplate.
#121	N	Additional parameter to pass to the display command to open the faceplate. To define X and Y coordinates, separate parameters so that #120 defines X and #121 defines Y. This separation lets these same parameters be used in subsequent display commands that originate from the faceplate.
#122	Y	The following are the options for the global object display: 0 = Always show faceplate 1 = Show Quick Display for users without Maintenance access (Code C) 2= Always show Quick Display

3. In the Value column, type the tag or value as specified in the Description column.



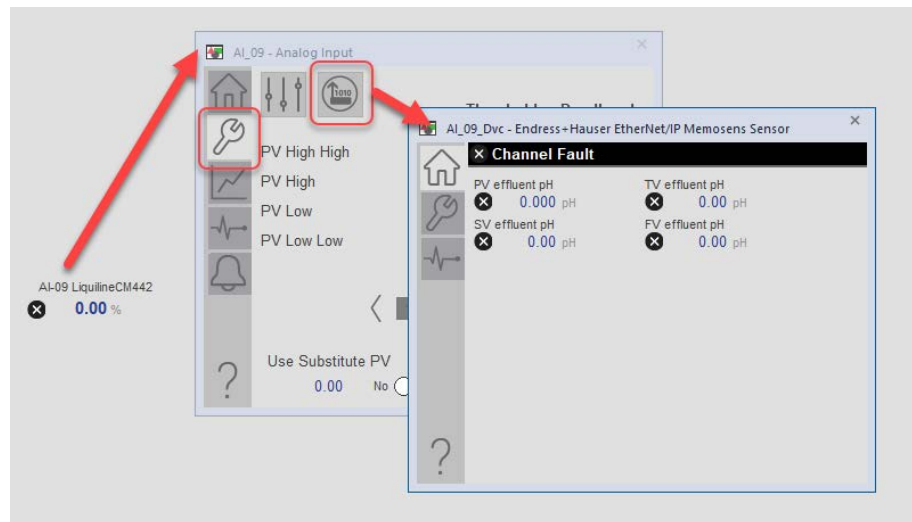
Click the ellipsis (...) to browse and select a tag.  
Values for items marked '(optional)' can be left blank.

**Figure 6 - Example Parameter Values Dialog Box**

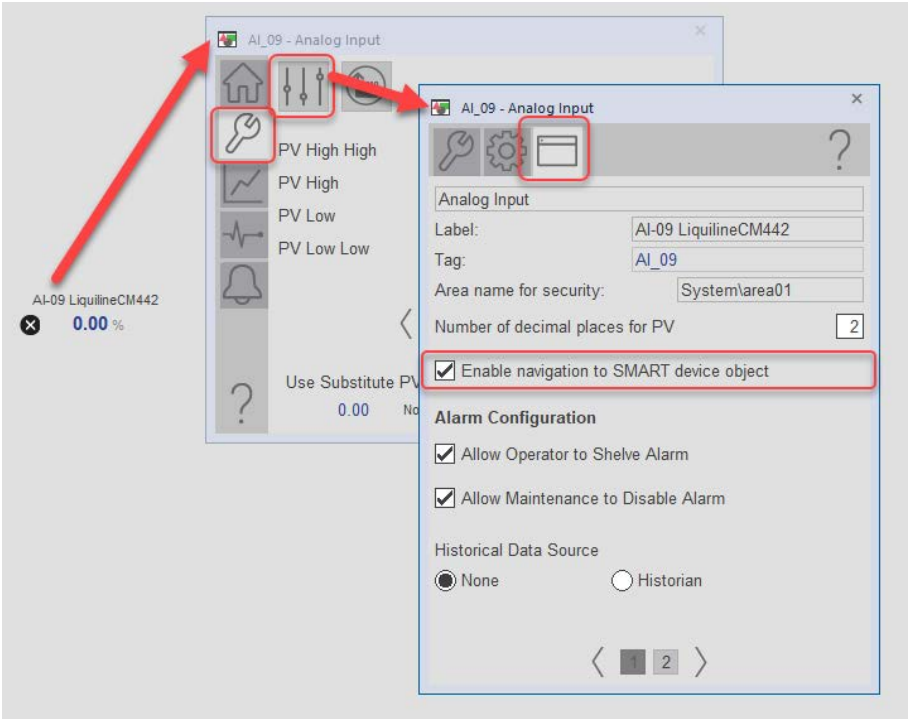
	Name	Value	Tag	Description
1	#102	{PPAx_5_10_01/DATA:[App_with_Ethernet]FI101}	...	Object Tag (PAI)
2	#120	/CC	...	Additional display parameter (e.g. /N100 or /CC) (optional)
3	#121		...	Additional display parameter (e.g. /I100) (optional)
4	#122	0	...	0 = Always show Faceplate; 1 = Show Quick Display for users without security co

OK Cancel Help

4. Click OK.
5. From the runtime client, you can now navigate to the new PAI object faceplate. Open the faceplate and navigate to the Maintenance tab. Click the SMART device button to access the raP\_Dvc\_EH\_Sensor faceplate.



If the SMART device button is not visible on the PAI faceplate, ensure that Cfg\_HasSmartDvc is enabled.



FactoryTalk View SE  
Faceplates

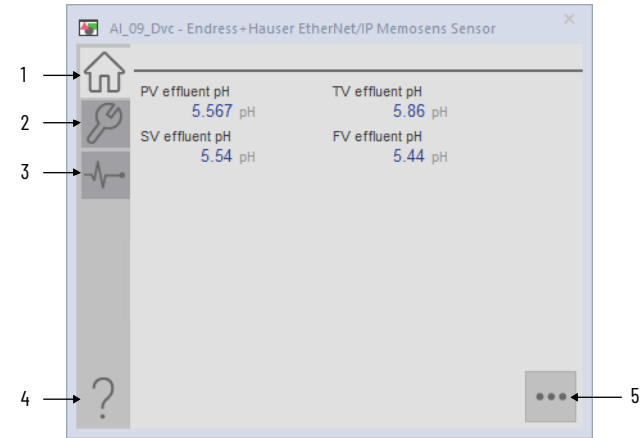
The faceplate provides the means for operators, maintenance workers, engineers, and others to interact with the raP\_Dvc\_EH\_Sensor instruction instance, which includes a view of its status and values. They can also manipulate it through its settings.

The faceplate consists of tabs, and each tab consists of one or more pages.

The Operator tab is displayed when the faceplate is initially opened. Click the appropriate icon to access a specific tab.

Operator Tab

The faceplate initially opens to the Operator ('Home') tab. An operator can monitor the device status from here, and manually operate the device when it is in Operator mode.

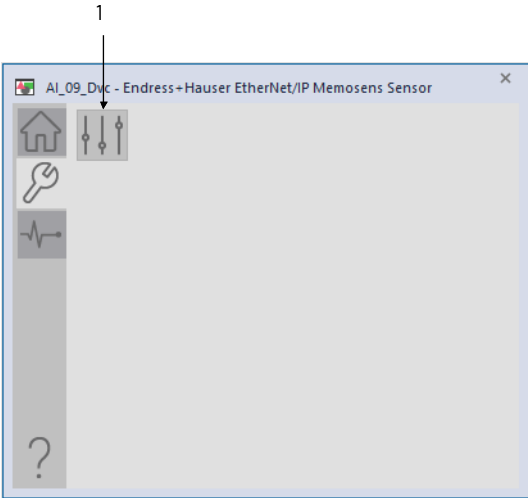


Item	Action
1	Select to open the operator tab.
2	Select to open the maintenance tab.
3	Select to open the diagnostics tab.
4	Click to open the help file.
5	Select to navigate to an object with more information (Cfg_HasMoreObj is set to true.)  You configure the tag name of the object that you want to navigate to in the extended tag property "Cfg_HasMoreObj.@Navigation". It uses the <backing tag>.@Library and <backing tag>.@Instruction extended tag properties to display the object's faceplate.



## Maintenance Tab

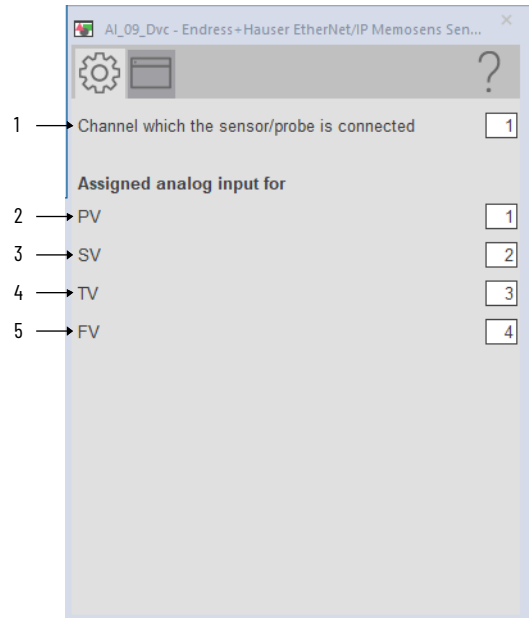
Maintenance personnel use the information and controls on the Maintenance tab to adjust device parameters, troubleshoot, temporarily work around device problems, and disable the device for routine maintenance.



Item	Action
1	Select to display the advanced properties.

## Advanced Properties Display

The Advanced Properties Display opens to the engineering settings. The Advanced Properties Display provides access to device configuration parameters and ranges, and options for device and I/O setup. This tab is used for initial system commissioning or later system changes.



Item	Action
1	Channel in CM44x to which probe is connected (1...8)
2	Assigned Input in CM44x to use for main PV (1...16)
3	Assigned Input in CM44x to use for SV (1...16, 0=none)
4	Assigned Input in CM44x to use for TV (1...16, 0=none)
5	Assigned Input in CM44x to use for FV (1...16, 0=none)

## HMI Configuration Tab

The HMI configuration tab provides access to displayed text, and faceplate-to-faceplate navigation settings. The tab consists of two pages.

AI\_09\_Dvc - Endress+Hauser EtherNet/IP Memosens Sen...

Endress+Hauser EtherNet/IP Memosens Sens

Label: Effluent pH

Tag: AI\_09\_Dvc

Area name for security: System\Area01

**Labels**

PV: Primary Effluent

SV: Effluent pH

TV: Effluent pH

FV: Fourth Effluent

**Number of Decimal Places for**

PV: 3

SV: 2

TV: 2

FV: 2

1 →

Item	Action
1	Enter the number of decimal places to be used for each variable.

AI\_09\_Dvc - Endress+Hauser EtherNet/IP Memosens Sen...

☐ Use text configuration from device

**Units**

PV: S/m

SV: °C

TV: pH

FV: °C

☒ Enable navigation to an object with more information

[CLX]MoreInfo

1 →

2 →

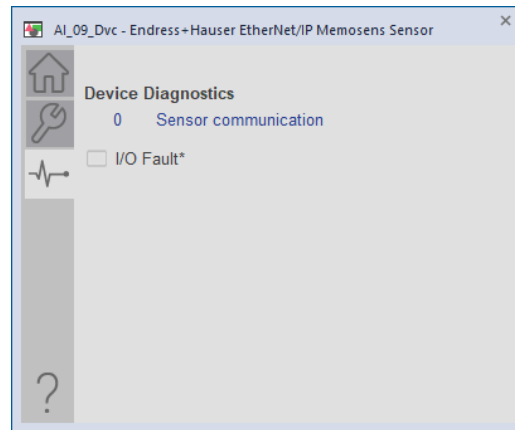
3 →

Item	Action
1	Select to enable units text configuration set from the device. Disable to manually enter the units from the Units configuration.
2	Enter the units that are used for each of the values.
3	Select to enable navigation to an object with more information (Cfg_HasMoreObj is set to true.) This can be configured to navigate to an object backing tag or a UDT tag that has Instruction and Library defined.


## Diagnostics Tab

The Diagnostic tab provides indications that help diagnose or help prevent device problems, which can include device warnings and faults, warning and fault history, and predictive/preventive maintenance data.

The Diagnostics tab displays messages that contain the diagnostic codes from the device. Codes differ depending on the device used.










## Faceplate Help





Press the help button  on the faceplates to access help specific to that faceplate. The help file is in .pdf format and opens in a separate window.

### E+H Sensor Faceplate Help

#### Status Indicators

	Invalid Configuration		Maintenance Required
	Data Quality Bad / Failure		Maintenance Bypass Active
	Data Quality Degraded / Uncertain		Diagnostic Information
	Device in Simulation or Test		

#### Threshold Indicators

	High-High Threshold exceeded		Low-Low Threshold exceeded
	High Threshold exceeded		Low Threshold exceeded

#### Navigation

• • • Show more information for this object

# FactoryTalk Optix Faceplates

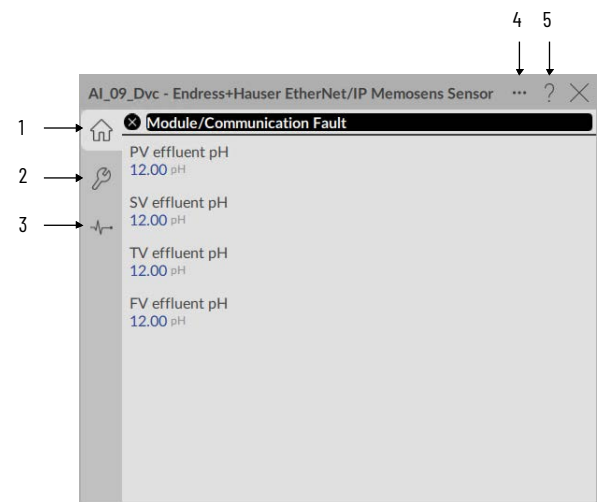
The faceplate provides the means for operators, maintenance workers, engineers, and others to interact with the instruction instance, which includes a view of its status and values. They can also manipulate it through its commands and settings.

The faceplate consists of tabs, and each tab consists of one or more pages.

The Operator tab is displayed when the faceplate is initially opened. Click the appropriate icon to access a specific tab.

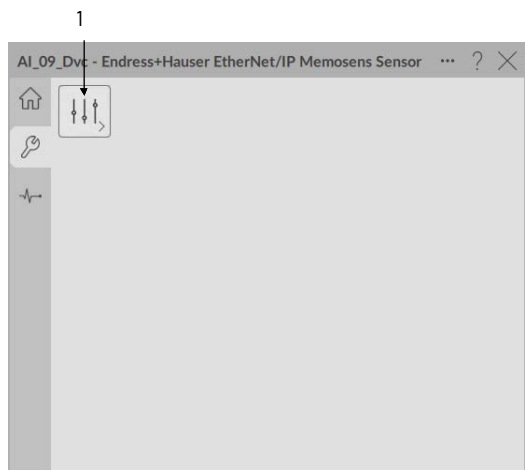
FactoryTalk® Optix™ faceplates contain features that are used in the FactoryTalk View SE faceplates. See [FactoryTalk View SE Faceplates on page 66](#) for descriptions of the features.

## Operator Tab



Item	Action
1	Select to open the operator tab.
2	Select to open the maintenance tab.
3	Select to open the diagnostics tab.
4	Select to navigate to an object with more information (Cfg_HasMoreObj is set to true.) You configure the tag name of the object that you want to navigate to in the extended tag property "Cfg_HasMoreObj.@Navigation". It uses the .@Library and .@Instruction extended tag properties to display the object's faceplate.
5	Select to open the help file.

## Maintenance Tab



Item	Action
1	Select to display the advanced properties.

## Advanced Engineering

AI\_09\_Dvc - Endress+Hauser EtherNet/IP Memosens Sensor

Channel Configuration

Channel which the sensor/probe is connected: 4

Assigned analog input for

PV: 1

SV: 1

TV: 1

FV: 1

Item	Action
1	Channel in CM44x to which probe is connected (1...8)
2	Assigned Input in CM44x to use for main PV (1...16)
3	Assigned Input in CM44x to use for SV (1...16, 0=none)
4	Assigned Input in CM44x to use for TV (1...16, 0=none)
5	Assigned Input in CM44x to use for FV (1...16, 0=none)

## Advanced HMI Tab - Identification

AI\_09\_Dvc - Endress+Hauser EtherNet/IP Memosens Sensor

Identification

Endress+Hauser EtherNet/IP Memosens Sensor

Label: Effluent pH

Tag: AI\_09\_Dvc

Area: Area01

PV: PV effluent pH

SV: SV effluent pH

TV: TV effluent pH

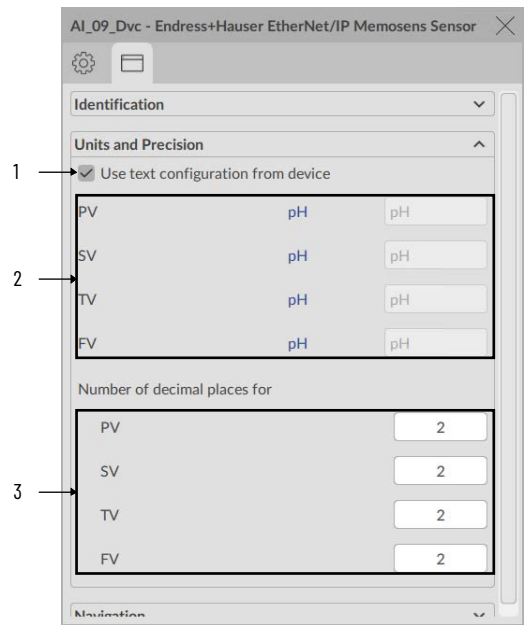
FV: FV effluent pH

Units And Precision

Navigation

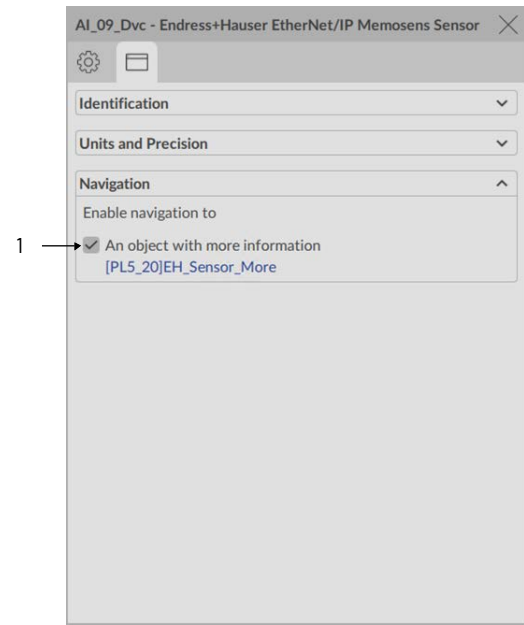
Item	Action
1	Display name for PV.
2	Display name for SV.
3	Display name for TV.
4	Display name for FV.

Advanced HMI Tab - Units and Precision



Item	Action
1	Select to enable units text configuration set from the device. Disable to manually enter the units from the Units configuration.
2	Enter the units that are used for each of the values.
3	Enter the number of decimal places to be used for each variable.

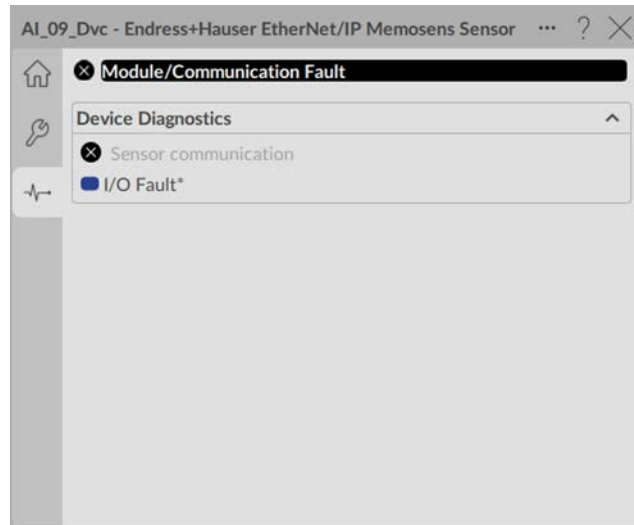
Advanced HMI Configuration Tab - Navigation



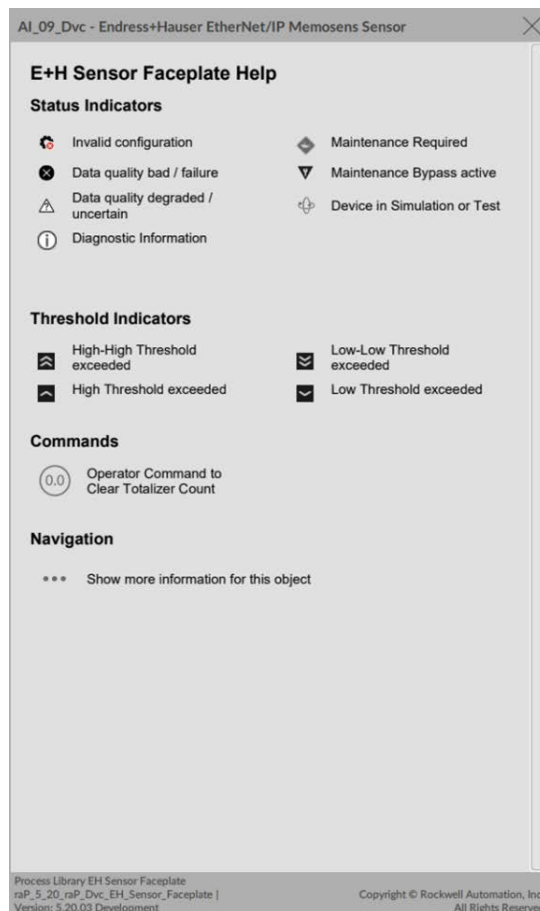
Item	Action
1	Select to enable navigation to an object with more information (Cfg_HasMoreObj is set to true.) This can be configured to navigate to an object backing tag or a UDT tag that has Instruction and Library defined.

## Diagnostics Tab

The Diagnostic tab provides indications that help diagnose or help prevent device problems, which can include device warnings and faults, warning and fault history, and predictive/preventive maintenance data. The Diagnostics tab displays messages that contain the diagnostic codes from the device. Codes differ depending on the device used.



## Faceplate Help



## Notes:



## Endress+Hauser EtherNet/IP Heartbeat (raP\_Dvc\_EH\_Heartbeat) Reference

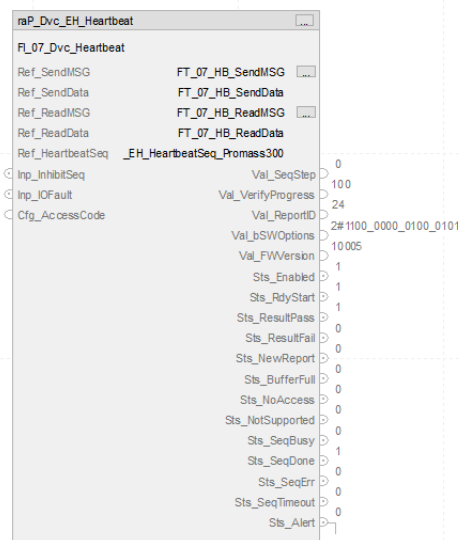
The Endress+Hauser EtherNet/IP™ Heartbeat (raP\_Dvc\_EH\_Heartbeat) Add-on Instruction is used to execute a heartbeat verification sequence on an Endress+Hauser instrument that supports Heartbeat Technology. Heartbeat Technology allows an instrument to execute a sophisticated self-diagnostic sequence to help ensure that it is working properly and that measurement accuracy is within the manufacturer's specification.

To use this instruction with a particular instrument requires that the instrument has firmware that supports remote execution of the Heartbeat sequence and that the instrument is configured to permit such execution.

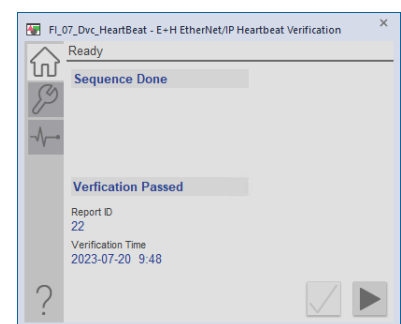
PlantPax® system integration of Endress+Hauser EtherNet/IP Heartbeat requires the following:

- Updated Firmware - compatible firmware versions:
  - Promass 100 (Firmware 1.02.02 or later)
  - Promag 100 (Firmware 1.01.03 or later)
  - Promass 300/500 (Firmware 1.00.04 or later)
  - Promag 300/500 (Firmware 1.00.04 or later)
  - Promag 400 (Firmware 2.00.00 or later)
- Meter configured for use with Heartbeat
- Heartbeat Verification and Monitoring option is activated within the instrument.

Add-On Instruction



Faceplate



## Controller Code

This section describes the parameter references for this Add-On Instruction.

See EtherNet/IP Instrumentation Process Object Parameters, publication [PROCES-RD212](#), for parameter names and descriptions.

### InOut Structure for raP\_Dvc\_EH\_Heartbeat

InOut parameters (Ref\_) are used to link the Add-On Instruction to external tags that contain necessary data for the instruction to operate. These external tags must be of the data type shown.

The MESSAGE tag that is referenced by Ref\_SendMSG must be configured as a Set Attribute Single message and its Path must point to the instrument. The MESSAGE tag that is referenced by Ref\_ReadMSG must be configured as a Get Attribute Single message and its Path must point to the instrument. The remaining MESSAGE parameters (class, attribute, and so on) and the data in the Ref\_SendData tag are set by the raP\_Dvc\_EH\_Heartbeat instruction.

The image displays two side-by-side 'Message Configuration' dialog boxes for the FT\_07\_HB\_SendMSG and FT\_07\_HB\_ReadMSG instructions.

**Left Dialog: Message Configuration - FT\_07\_HB\_SendMSG**

- Configuration Tab:**
  - Message Type: CIP Generic
  - Service Type: Set Attribute Single (highlighted with a red box)
  - Source Element: FT\_07\_HB\_SendData
  - Source Length: 2 (Bytes)
  - Destination Element: FT\_07\_HB\_ReadData
  - Service Code: 10 (Hex)
  - Class: 7a (Hex)
  - Instance: 1
  - Attribute: 17 (Hex)
- Status Bar:**
  - Enable, Enable Waiting, Start, Done (selected), Done Length: 0
  - Error Code, Error Path: FT\_07, Error Text

**Right Dialog: Message Configuration - FT\_07\_HB\_ReadMSG**

- Configuration Tab:**
  - Message Type: CIP Generic
  - Service Type: Get Attribute Single (highlighted with a red box)
  - Source Element: FT\_07\_HB\_ReadData
  - Source Length: 0 (Bytes)
  - Destination Element: FT\_07\_HB\_ReadData
  - Service Code: e (Hex)
  - Class: 7a (Hex)
  - Instance: 1
  - Attribute: 6 (Hex)
- Status Bar:**
  - Enable, Enable Waiting, Start, Done (selected), Done Length: 2
  - Error Code, Error Path: FT\_07, Error Text

### Input Structure for raP\_Dvc\_EH\_Heartbeat

Input parameters include the following:

- Input data elements (Inp\_) are typically used to connect field inputs from I/O modules or signals from other objects.
- Configuration data elements (Cfg\_) are used to set configurable capabilities and features of the instruction.
- Program Commands (PCmd\_) are used by program logic to request instruction actions.

### Output Structure for raP\_Dvc\_EH\_Heartbeat

Output parameters include the following:

- Value data elements (Val\_) are numeric outputs of the instruction for use by the HMI. Values can also be used by other application logic or software packages.
- Status data elements (Sts\_) are bit outputs of the instruction for use by the HMI. Status bits can also be used by other application logic.

## Local Tags

## Read/write Structure for raP\_Dvc\_EH\_Heartbeat

Read/write tags include the following:

- Configuration data elements (Cfg\_) are used to set configurable capabilities and features of the instruction.
- Commands (OCmd\_, MCmd\_) are used by operators, and maintenance personnel to request instruction actions.

## Read-only Structure for raP\_Dvc\_EH\_Heartbeat

Read-only tags include the following:

- Ready data elements (MRdy\_, ORdy\_) are used to enable the HMI button.

## Enable Heartbeat

The raP\_Dvc\_EH\_Heartbeat instruction does not have any icons (global objects for use on user displays). The raP\_Dvc\_EH\_Heartbeat instruction is accessed from the raP\_Dvc\_EH\_Flowmeter faceplate. The following steps explain how to enable access to the Heartbeat faceplate and to enable the Heartbeat sequence.

**IMPORTANT** You must be logged in as a user with engineering access to complete the following steps.

## Enable Heartbeat Preparation

1. The raP\_Dvc\_EH\_Flowmeter Add-On Instruction must be entered into the code to enable the use of the Heartbeat function. The following is an example of a typical routine.

**Note:** The raP\_Dvc\_EH\_Heartbeat tagname must match the flowmeter tagname with "\_HeartBeat" appended to the end of the name.

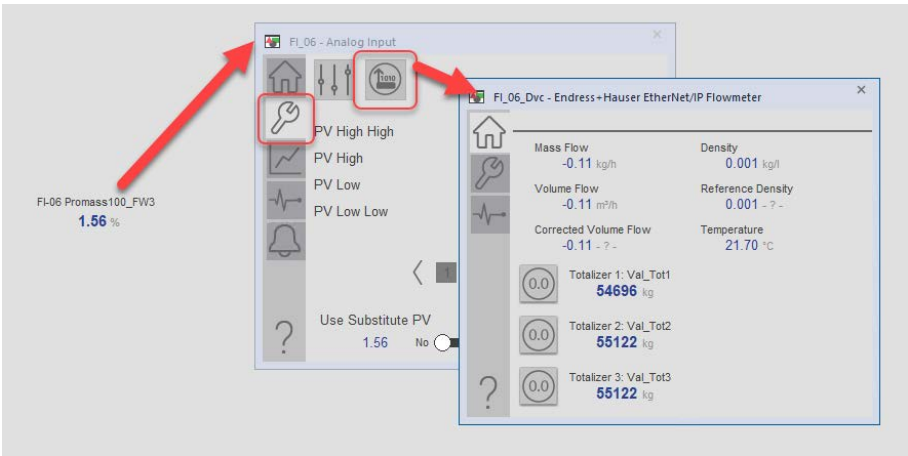


The Ref\_HeartbeatSeq InOut parameter tag, \_EH\_HeartbeatSeq\_Promass300 in the preceding example, must match the meter. Heartbeat Sequence tags for Promag 100, Promag 300, Promag 400, Promag 500, Promass 100, Promass 300, and Promass 500 are available.

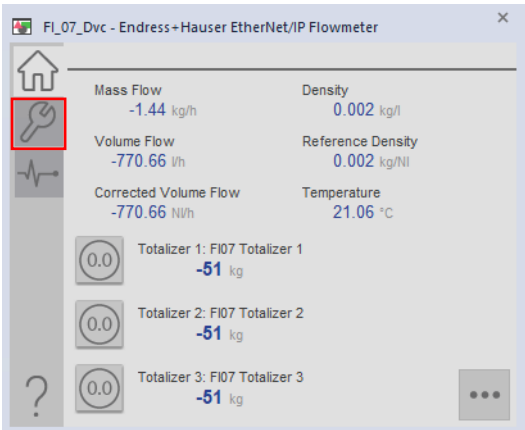
Name
▸ _EH_HeartbeatSeq_Promag100
▸ _EH_HeartbeatSeq_Promag300
▸ _EH_HeartbeatSeq_Promag400
▸ _EH_HeartbeatSeq_Promag500
▸ _EH_HeartbeatSeq_Promass100
▸ _EH_HeartbeatSeq_Promass300
▸ _EH_HeartbeatSeq_Promass500

Navigation to Heartbeat Faceplate (FactoryTalk View and FatcoryTalk Optix)

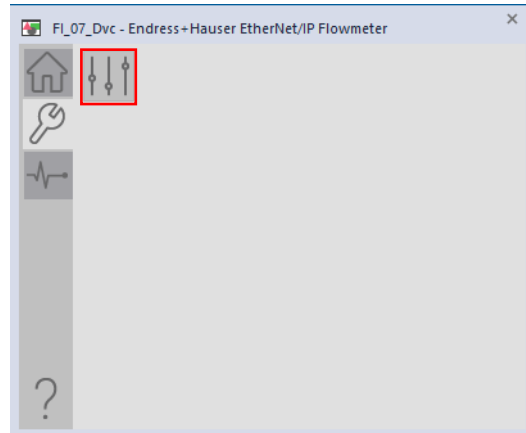
- 1. Click the PAI icon to bring up the PAI faceplate. Navigate to the Maintenance tab and Click the SMART device button to access the raP\_Dvc\_EH\_Flowmeter faceplate.



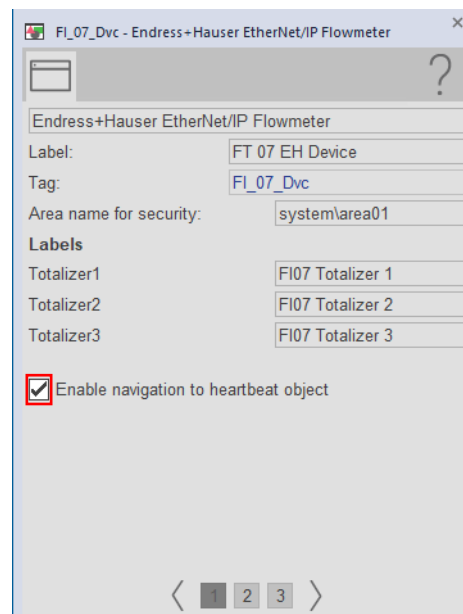
- 2. On the raP\_Dvc\_EH\_Flowmeter faceplate, click the Maintenance tab.



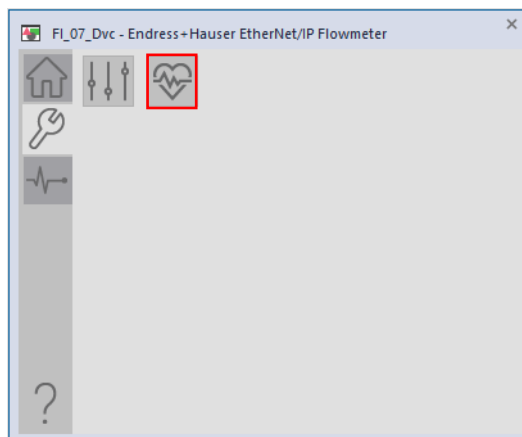
3. On the Maintenance tab, select the Display Advanced Properties icon to call up the raP\_Dvc\_EH\_Flowmeter advanced properties faceplate.



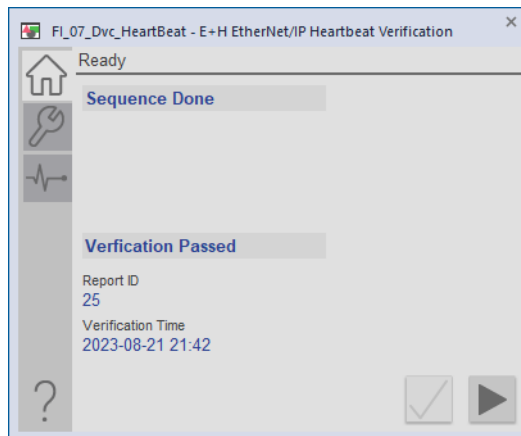
4. Select the box to enable navigation to the Heartbeat faceplate.



The Heartbeat icon becomes visible on the Maintenance tab of the raP\_Dvc\_EH\_Flowmeter faceplate.

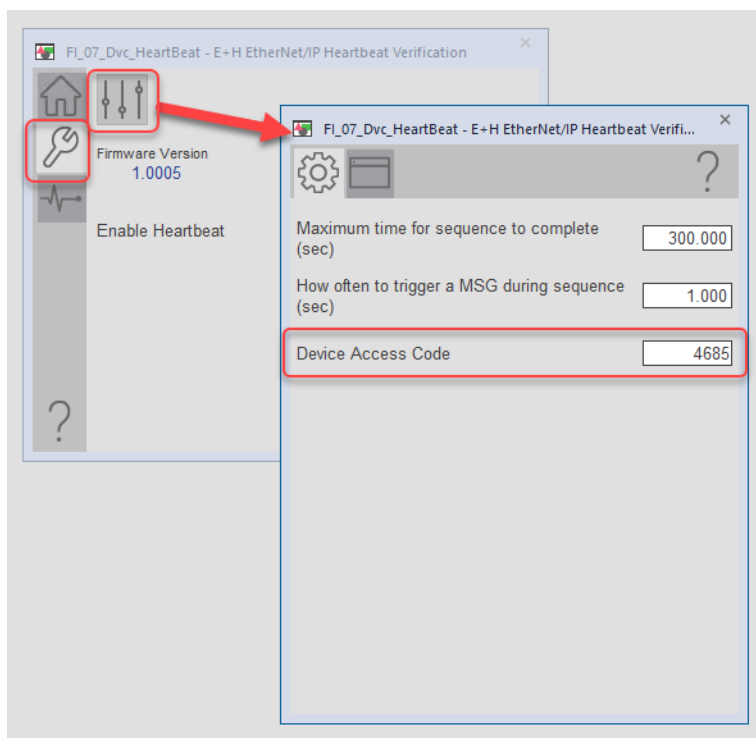


- On the Maintenance tab, click the Heartbeat icon.  
The Heartbeat faceplate is displayed in a disabled state.

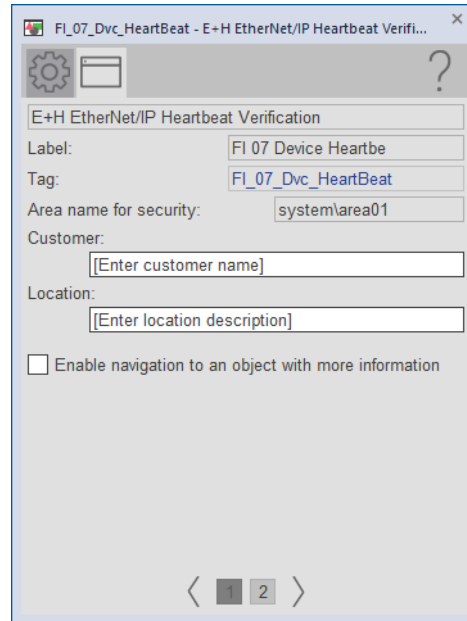


## Enable and Configure Heartbeat

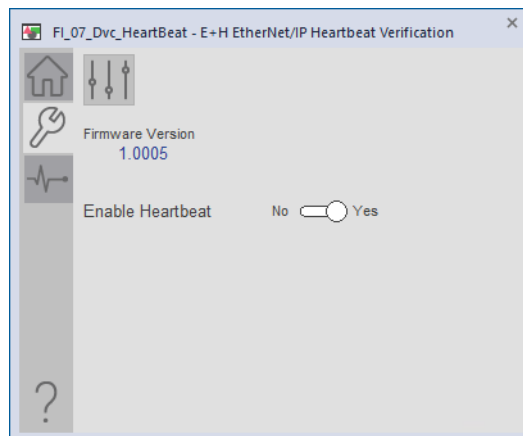
- On the Heartbeat faceplate, click the Maintenance tab and open the Advanced configuration settings.
- On the Engineering tab, enter the Device Access Code. This is the same code that you use with the flowmeter's built-in webpage to configure the meter.



3. On the HMI Configuration tab, from the Advanced Configuration faceplate, enter the required information for Customer, and Location.

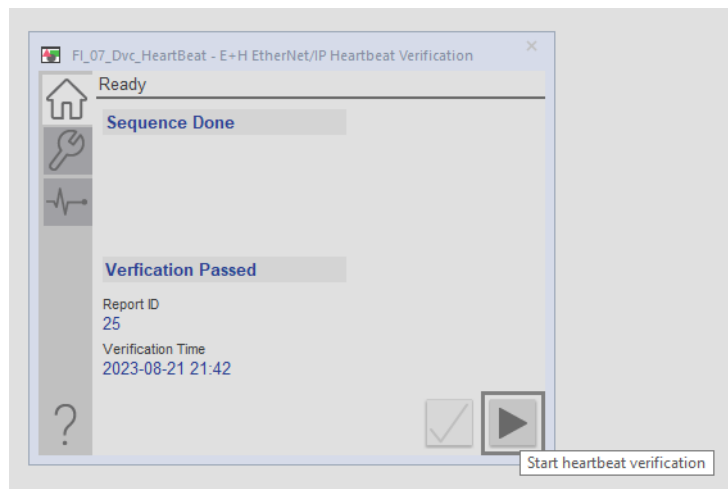


4. Close the Advanced Configuration faceplate.
5. Click the Maintenance tab of the Heartbeat faceplate, select yes to enable heartbeat verification.

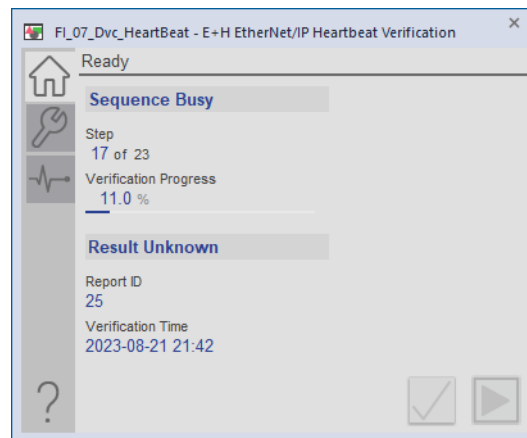


6. On the Heartbeat faceplate, click the Home tab.  
The status now shows 'Ready' on the Home tab.
7. Verify that the process is not actively using the flowmeter.

8. Click the Start icon to start the heartbeat verification.

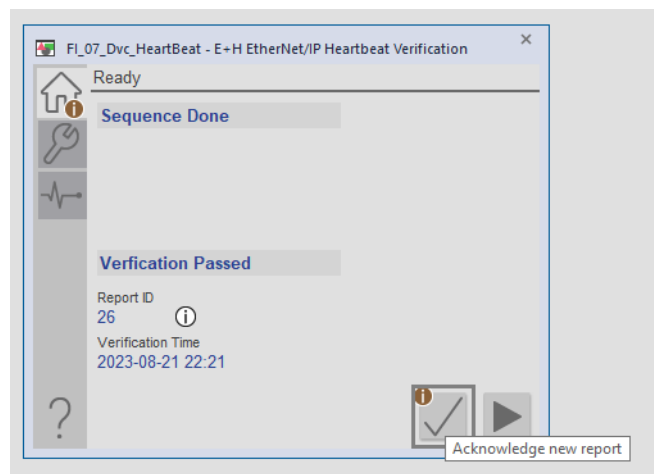


The heartbeat verification sequence runs through its steps to configure, initiate, monitor, and complete the heartbeat verification sequence.



When the heartbeat verification sequence is complete, a Pass or Fail result is displayed. Verification Time and Report ID are also shown.

9. Use the flowmeter's webpage to access the verification report.
10. Once you have read the report, click the check icon to acknowledge the report.

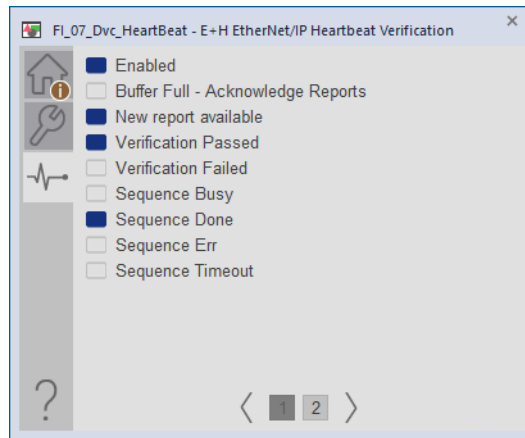


11. If the heartbeat verification sequence fails, check the Diagnostic tab of the faceplate; it may help you diagnose the failure. The sequence can fail for various reasons:
  - The Access Code is incorrect.



- The sequence does not complete in the allotted time. The default time allowed for the sequence to complete is 5 minutes.
- The flowmeter's firmware must be updated to a version that supports remote control of the heartbeat verification.
- The flowmeter does not have the correct software options enabled.
- The flowmeter does not have heartbeat verification that is enabled on the device webpage.
- The Logix controller clock has not been set (The controller date and time are sent to the meter for the verification report.)
- The MESSAGE tags associated with the sequence have not been configured correctly, such as with an incorrect Path to the flowmeter.

If the process is in a critical stage where the flowmeter is needed and the process cannot be interrupted to perform the verification, the logic may assert the sequence inhibit input. The inhibit input sequence helps prevent the sequence from being started.



# FactoryTalk View SE Faceplates

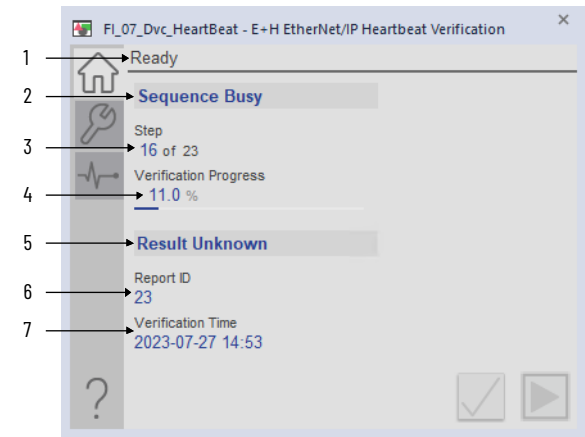
The faceplate provides the means for operators, maintenance workers, engineers, and others to interact with the instruction instance, which includes a view of its status and values. They can also manipulate it through its commands and settings.

The faceplate consists of tabs, and each tab consists of one or more pages.

The Operator tab is displayed when the faceplate is initially opened. Click the appropriate icon to access a specific tab.

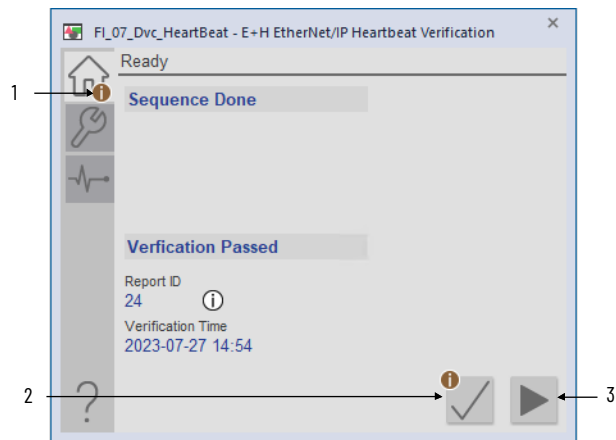
## Operator Tab

The following image shows the Operator tab with the verification sequence in progress.



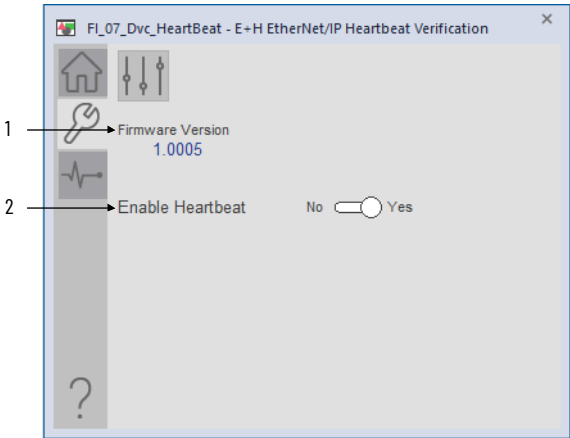
Item	Action
1	Controller OK indicator
2	Heartbeat sequence status
3	Heartbeat sequence step status
4	Heartbeat sequence verification progress
5	Heartbeat sequence result message.
6	Report ID—Displays the report ID number that is generated upon completion. (Previous report ID is shown when the sequence is running.)
7	Verification Time—Displays the date and time. (Previous Verification Time is shown in sequence is running.)

The following image shows the Operator tab with the verification sequence completed.



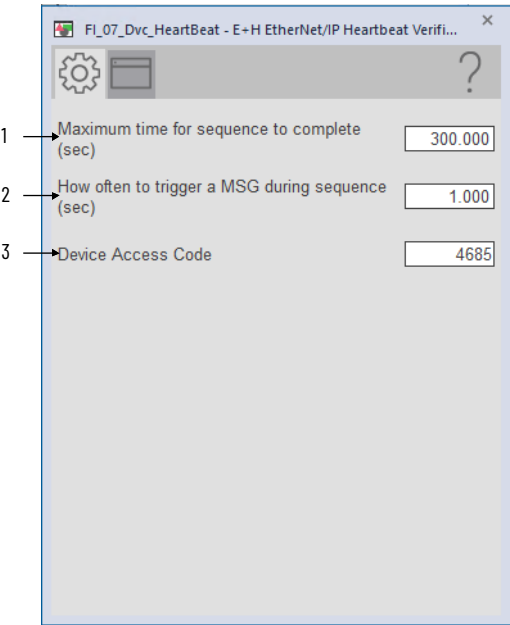
Item	Action
1	Acknowledgment required
2	Select to acknowledge the new report
3	Select to start Heartbeat test sequence when highlighted.

### Maintenance Tab



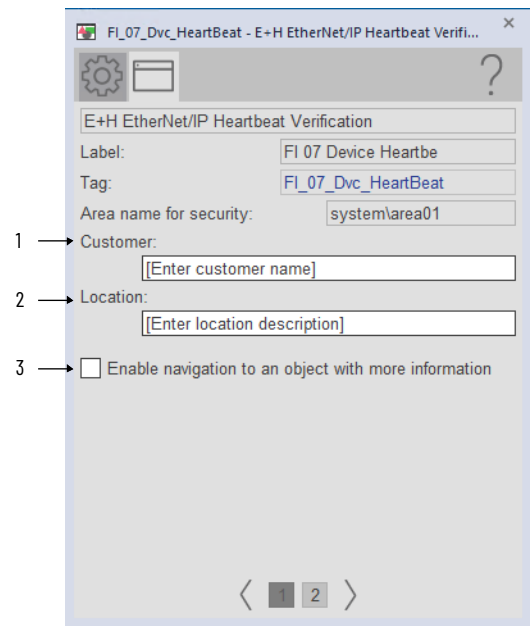
Item	Action
1	Displays the current firmware version
2	Enable Heartbeat—Select Yes to allow the Heartbeat sequence to run.

### Engineering Tab

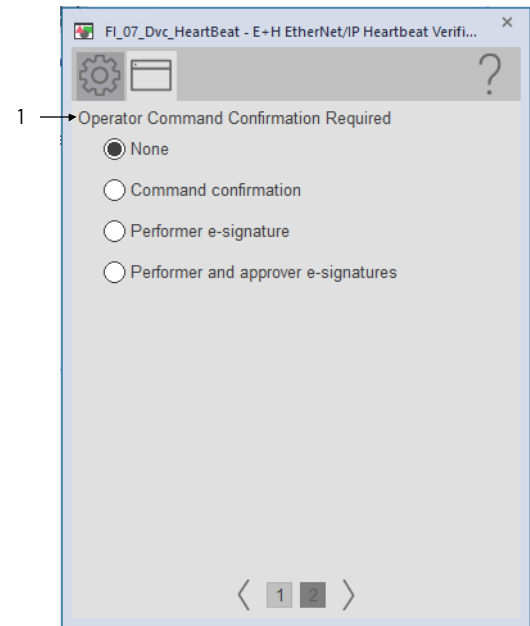


Item	Action
1	Enter the maximum time for the sequence to complete in seconds.
2	Enter how often to trigger a message (MSG) during the sequence in milliseconds.
3	Enter the Device Access Code

## HMI Configuration Tab



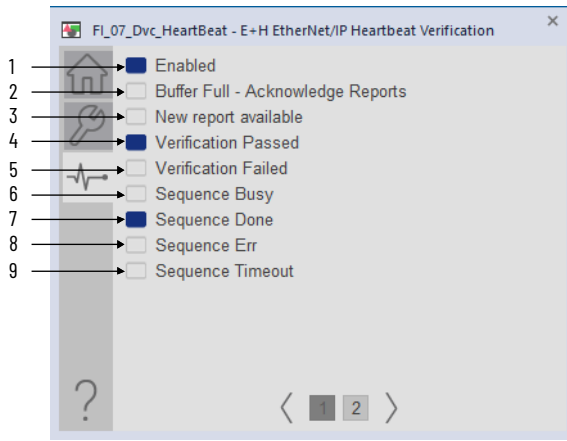
Item	Action
1	Enter the Customer name
2	Enter the location description
3	Select to enable navigation to an object with more information (Cfg_HasMoreObj is set to true.) This can be configured to navigate to an object backing tag or a UDT tag that has Instruction and Library defined.



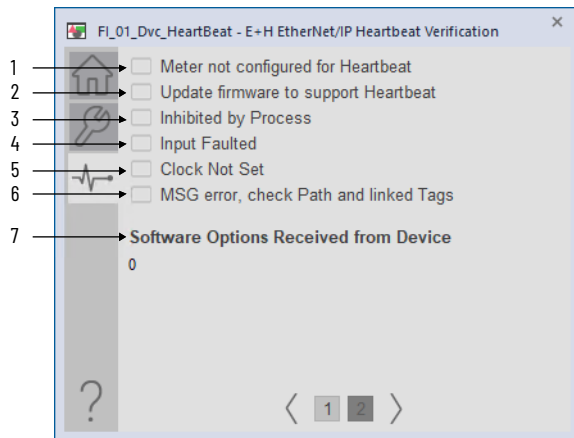
Item	Action
1	Select to configure operator command confirmation. This action would take place after any operator command.

## Diagnostic Tab

The Diagnostics tab displays the status of the Heartbeat Test. A highlight block indicates the status.




Item	Action
1	Enabled—Heartbeat verification sequence can be executed from faceplate.
2	Buffer Full— Read and acknowledge the verification reports on the instrument's built-in webpage to make room for new reports.
3	New report available—A new verification report is available to be read using the instrument's webpage.
4	Verification Passed—The most recent heartbeat verification test that is passed and the instrument is operating within specifications.
5	Verification Failed—The most recent heartbeat verification test failed; see the report on the instrument's webpage for details.
6	Sequence Busy— The raP_Dvc_EH_Heartbeat instruction is running the verification sequence; when it is done, check the pass / fail result.
7	Sequence Done—The verification sequence is complete, check the pass / fail result.
8	Sequence Err—The verification sequence was not able to complete. Possible causes include: sequence timed out; the instrument does not have the proper firmware; the instrument is not configured properly to run the sequence the MESSAGE tags do not have the correct Path to the instrument; the access code is incorrect.
9	Sequence Timeout—the verification sequence did not complete within the configured time.




Item	Action
1	Meter is not configured for Heartbeat—go to the meter's webpage and verify the configuration of software options.
2	Update firmware to support Heartbeat—verify that the meter's firmware level supports the heartbeat verification function. Contact Endress+Hauser for an update if necessary.
3	Inhibited by Process—the process is executing a function that cannot be interrupted and has inhibited running the verification sequence. Try again later.
4	Lost communication with the device while executing the communication sequence.
5	The controller clock has not been set. The controller real time clock must be set to a date and time after 2000-01-01 00:00:00 in order for the sequence to store the verification date in the device report.
6	There was a error while executing one of the message instructions sending or receiving data to / from the device. Check the message paths and tags linked to the message instruction.
7	The Software Options field indicates what Endress+Hauser options were purchased with the device. The heartbeat verification option must be purchased for the sequence to succeed. Contact Endress+Hauser if you need to purchase the heartbeat verification option.


## Faceplate Help


Press the help button  on the faceplates to access help specific to that faceplate. The help file is in .pdf format and opens in a separate window.

**E+H Heartbeat Faceplate Help**


Status Indicators


 Invalid Configuration

 Operator Attention Required


 Diagnostic Information

Commands

 Operator Command to acknowledge the new heartbeat report status. The report is available via the instrument's web page.

 Operator Command to start heartbeat verification.

Navigation

 Show more information for this object

## FactoryTalk Optix Faceplates

The faceplate provides the means for operators, maintenance workers, engineers, and others to interact with the instruction instance, which includes a view of its status and values. They can also manipulate it through its commands and settings.

The faceplate consists of tabs, and each tab consists of one or more pages.

The Operator tab is displayed when the faceplate is initially opened. Click the appropriate icon to access a specific tab.

FactoryTalk® Optix™ faceplates contain features that are used in the FactoryTalk View SE faceplates. See [FactoryTalk View SE Faceplates on page 84](#) for descriptions of the features.

## Operator Tab

FI\_01\_Dvc\_Heartbeat - E+H EtherNet/IP Heartbeat Verifica... ? X

1 Ready

2 Sequence Busy


3 Step 17 of 23


4 Verification Progress 74.0 %

5 Result Unknown

6 Report ID 17

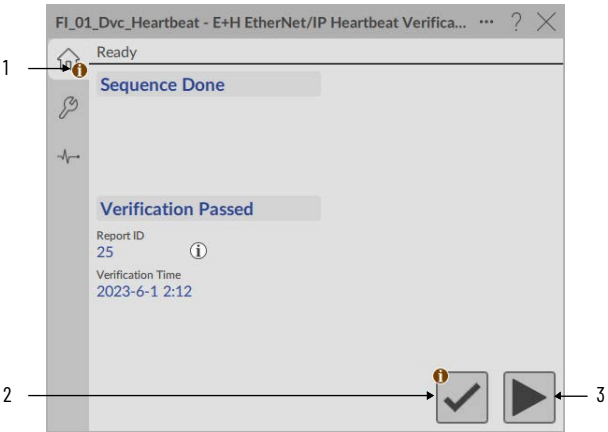
7 Verification Time 2023-6-1 2:12





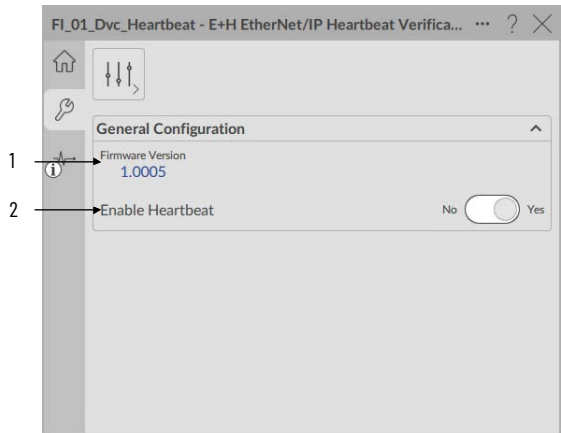
Item	Action
1	Controller OK indicator
2	Heartbeat sequence status
3	Heartbeat sequence step status
4	Heartbeat sequence verification progress
5	Heartbeat sequence result message.
6	Report ID—Displays the report ID number that is generated upon completion. (Previous report ID is shown when the sequence is running.)
7	Verification Time—Displays the date and time. (Previous Verification Time is shown in sequence is running.)

The following image shows the Operator tab with the verification sequence completed.



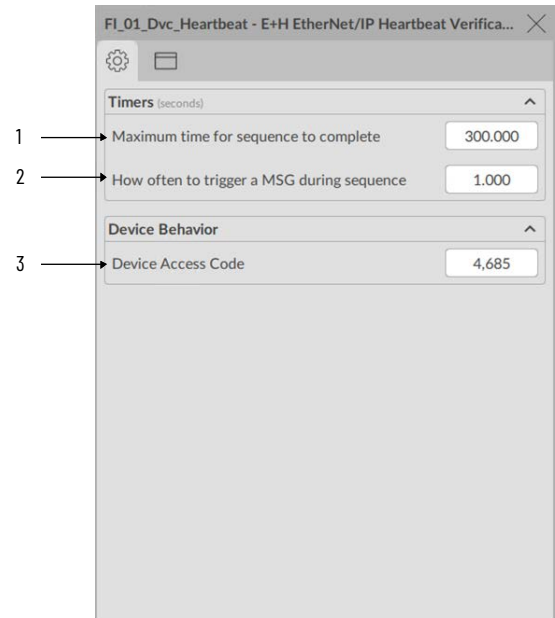
Item	Action
1	Acknowledgment required
2	Select to acknowledge the new report
3	Select to start Heartbeat test sequence when highlighted.

Maintenance Tab



Item	Action
1	Displays the current firmware version
2	Enable Heartbeat—Select Yes to allow the Heartbeat sequence to run.

Advanced Engineering



Item	Action
1	Enter the maximum time for the sequence to complete in seconds.
2	Enter how often to trigger a message (MSG) during the sequence in milliseconds.
3	Enter the Device Access Code.

Advanced HMI Configuration Tab

FI\_01\_Dvc\_Heartbeat - E+H EtherNet/IP Heartbeat Verifica...

⚙️

📄

Identification

E+H EtherNet/IP Heartbeat Verification

LabelFI 01 Device Heartbeat

TagFI\_01\_Dvc\_Heartbeat

AreaArea01

1 → Customer[Enter customer name]

2 → Location[Enter location description]

Navigation

Enable navigation to

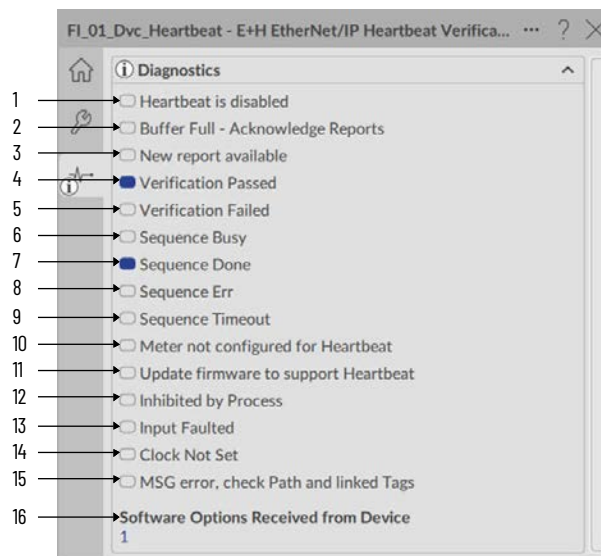
3 → ☒ An object with more information

[PL5\_20]Heartbeat\_More

Item	Action
1	Enter the Customer name
2	Enter the location description
3	Select to enable navigation to an object with more information (Cfg_HasMoreObj is set to true.) This can be configured to navigate to an object backing tag or a UDT tag that has Instruction and Library defined.



## Diagnostics Tab




Item	Action
1	Enabled-Heartbeat verification sequence can be executed from faceplate.
2	Buffer Full- Read and acknowledge the verification reports on the instrument's built-in webpage to make room for new reports.
3	New report available-A new verification report is available to be read using the instrument's webpage.
4	Verification Passed-The most recent heartbeat verification test that is passed and the instrument is operating within specifications.
5	Verification Failed-The most recent heartbeat verification test failed; see the report on the instrument's webpage for details.
6	Sequence Busy- The raP_Dvc_EH_Heartbeat instruction is running the verification sequence; when it is done, check the pass / fail result.
7	Sequence Done-The verification sequence is complete, check the pass / fail result.
8	Sequence Err-The verification sequence was not able to complete. Possible causes include: sequence timed out; the instrument does not have the proper firmware; the instrument is not configured properly to run the sequence the MESSAGE tags do not have the correct Path to the instrument; the access code is incorrect.
9	Sequence Timeout-the verification sequence did not complete within the configured time.
10	Meter is not configured for Heartbeat-go to the meter's webpage and verify the configuration of software options.
11	Update firmware to support Heartbeat-verify that the meter's firmware level supports the heartbeat verification function. Contact Endress+Hauser for an update if necessary.
12	Inhibited by Process-the process is executing a function that cannot be interrupted and has inhibited running the verification sequence. Try again later.
13	Lost communication with the device while executing the communication sequence.
14	The controller clock has not been set. The controller real time clock must be set to a date and time after 2000-01-01 00:00:00 in order for the sequence to store the verification date in the device report.
15	There was a error while executing one of the message instructions sending or receiving data to / from the device. Check the message paths and tags linked to the message instruction.
16	The Software Options field indicates what Endress+Hauser options were purchased with the device. The heartbeat verification option must be purchased for the sequence to succeed. Contact Endress+Hauser if you need to purchase the heartbeat verification option.


# Faceplate Help


FI\_01\_Dvc\_Heartbeat - E+H EtherNet/IP Heartbeat Verification

E+H Heartbeat Faceplate Help


Status Indicators


 Invalid configuration

 Diagnostic Information

 Operator Attention Required

Commands

 Operator Command to acknowledge the new heartbeat report status. The report is available via the instrument's web page.

 Operator Command to start heartbeat verification.

Navigation

...

Show more information for this object

Process Library EH Heartbeat Faceplate  
raP\_5\_20\_raP\_Dvc\_EH\_Heartbeat\_Faceplate |  
Version: 5.20.03 Development

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92

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# Rockwell Automation Support

Use these resources to access support information.

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

## Documentation Feedback

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## Waste Electrical and Electronic Equipment (WEEE)



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

Rockwell Automation maintains current product environmental compliance information on its website at [rok.auto/pec](http://rok.auto/pec).

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