PointMax Analog I/O Modules User Manual

5034-IF4, 5034-IF4XT, 5034-IF8C, 5034-IF8CXT, 5034-IF8V, 5034-IF8VXT, 5034-IRT4I, 5034-IRT4IXT, 5034-OF4, 5034-OF4XT

Allen-Bradley
by ROCKWELL AUTOMATION

User Manual

Original Instructions

Important User Information

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Table of Contents

Preface

This manual describes how to use PointMax analog I/O modules in Logix 5000® control systems.

Make sure that you are familiar with the following:

- Use of a controller in a Logix 5000 control system
- Use of an EtherNet/IP™ network
- Studio 5000 Logix Designer® application environment

Additional Resources

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

Table 1. Additional Resources

Resources	Description
PointMax I/O System Specifications Technical Data, publication 5034-TD001	Provides PointMax I/O system specifications.
PointMax I/O System Installation Instructions, publication 5034-IN001	Provides instructions on installing a complete PointMax I/O system.
PointMax EtherNet/IP Adapter User Manual, publication 5034-UM001	Provides information on how to configure and operate PointMax EtherNet/IP adapters.
PointMax Digital I/O Modules User Manual, publication 5034-UM002	Provides information on how to configure and operate PointMax digital I/O modules.
PointMax Analog I/O Modules User Manual, publication 5034-UM003	Provides information on how to configure and operate PointMax analog I/O modules.
PointMax IO-Link Master Module User Manual, publication 5034-UM004	Provides information on how to configure and operate PointMax IO-Link master modules.
EtherNet/IP Network Devices User Manual, publication ENET-UM006	Describes how to configure and use EtherNet/IP devices to communicate on the EtherNet/IP network.
Ethernet Reference Manual, publication ENET-RM002	Describes basic Ethernet concepts, infrastructure components, and infrastructure features.
System Security Design Guidelines Reference Manual, publication SECURE-RM001	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.
Safety Guidelines for the Application, Installation, and Maintenance of Solid-state Control, publication SGI-1.1	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 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Selection and Configuration tools website, rok.auto/systemtools	Helps configure complete, valid catalog numbers and build complete quotes based on detailed product information.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

Download Firmware, AOP, EDS, and Other Files

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

Terminology

This table defines the terms that are used in this publication.

Table 2. Terminology

Acronym	Full Term	Definition
BP	Backplane Power	Power that is generated from module power by the adapter and expansion power, then supplied to the I/O system through the backplane.
CIP™	Common Industrial Protocol	An industrial communication protocol that is used by Logix 5000 based automation systems on EtherNet/IP, ControlNet®, and DeviceNet® communication networks.
CIP Sync™	Common Industrial Protocol Synchronization	CIP Sync provides the increased control coordination needed for control applications where absolute time synchronization is vital to achieve real-time synchronization between distributed intelligent devices and systems.
CJC	Cold Junction Compensator	A device that is used in thermocouple measurements to help obtain accurate temperature readings at the hot junction.
MB	Mounting Base	A device that provides data and power connections from the backplane to the installed module.
MP	Module Power	Power that is supplied to the adapter and expansion power.
ODVA	Open DeviceNet Vendor Association	A nonprofit association of vendors that is been established for the promotion of CIP networks.
RIUP	Removal and Insertion Under Power	A feature that enables the device to be connected and disconnected from the system without having to remove power from the system.
RPI	Requested Packet Interval	Time interval (usually in milliseconds) that users are requesting their data be exchanged at
RTB	Removable Terminal Block	A component that is used for wiring field devices to.
RTD	Resistance Temperature Detector	A type of sensor whose resistances change as its temperature changes.
SA	Sensor Actuator	A term that is used to describe field-side devices.
SELV	Safety Extra Low Voltage	An electrical system where the voltage level is considered safe under normal or fault conditions, as defined in the EN and IEC standards.
TC	Thermocouple	A thermocouple is a device that measures temperature by joining two different metal wires at one end. When the junction between the wires heats or cools, it generates a voltage that can be measured. This voltage can be translated into a temperature reading.
XT	Harsh Environment	These modules have additional conformal coating and design considerations that add a greater degree of protection when exposed to harsh, corrosive environments.

Analog I/O Modules

This chapter describes the analog I/O module types and features that are common between analog input and output modules, and how to construct a PointMax I/O system.

Table 3. Analog I/O Module Types

I/O Type	Catalog Number	Description
Input modules	5034-IF4, 5034-IF4XT	4-channel voltage/current input module It supports 4 channels that accept voltage or current input.
	5034-IF8C, 5034-IF8CXT	8-channel current input module It supports 8 channels that only accept current input.
	5034-IF8V, 5034-IF8VXT	8-channel voltage input module It supports 8 channels that only accept voltage input.
	5034-IRT4I, 5034-IRT4IXT	4-channel isolated RTD/TC module It supports 4 channels that are configurable at channel level for RTD and Thermocouple inputs.
Output modules	5034-OF4, 5034-OF4XT	4-channel voltage/current output module It supports 4 channels that produce voltage or current output.

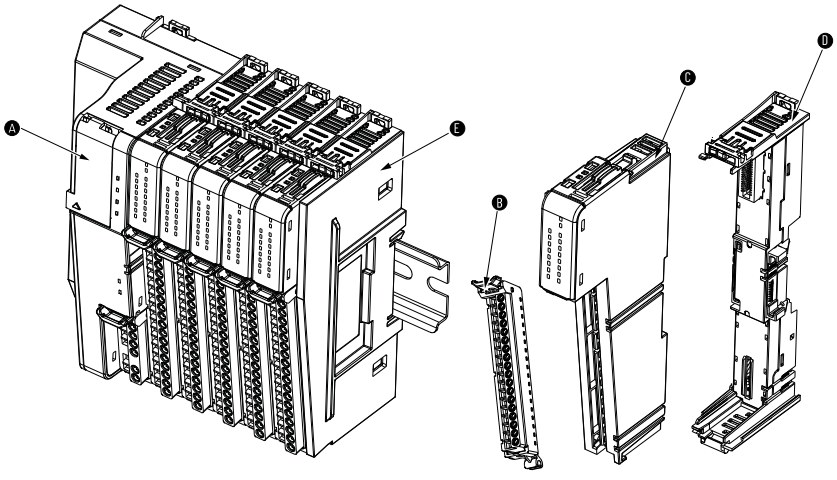
All I/O modules support removal and insertion under power (RIUP). You must remove the RTB first and then the I/O modules.

For technical and environmental specifications details, see PointMax I/O System Specifications Technical Data, publication 5034-TD001.

Construct a PointMax I/O System

PointMax I/O system contains the components that are pictured below.

Figure 1. PointMax I/O System



Item	Component Name	Description
A	Adapter	The adapter transfers data between the I/O module and the controller.

Item	Component Name	Description
B	Removable Terminal Block (RTB)	The RTB contains terminals to terminate wiring for field devices. Also it has interfaces to establish the connection between the RTB and the I/O module.
C	I/O module	The I/O module contains the SA or field power interface and circuitry that is needed to perform specific functions that are related to your application.
D	Mounting Base (MB)	The MB contains mechanical and electrical interfaces to establish the connection between I/O module and the backplane.
E	End cap	It is a dust protection cap for the last module in a rack.

For PointMax I/O system power requirements, see PointMax I/O System Installation Instructions, publication 5034-IN001.

IMPORTANT: You must limit the SA field-side power source to 10 A max, at 20...30V DC.

Secure Access to the System

To secure access to the device by authorized users only, consider these options:

- Password helps protect the source and execution of the control program
- Remove the key from the controller
- Implement physical barriers, such as locked cabinets

To secure access to the system, consider these options:

- Follow industry best practices to harden your personal computers and servers, including anti-virus/anti-malware and application allow list solutions.
  The recommendations are published at the Rockwell Automation technical support center in Knowledgebase Technote Rockwell Automation Customer Hardening Guidelines.
- Develop and deploy backup and disaster recovery policies and procedures. Test backups on a regular schedule.
- Minimize network exposure for all control system devices and systems, and confirm that they are not accessible from the Internet.
- Locate control system networks and devices behind firewalls and isolate them from the business network.
- Subscribe to the Knowledgebase Technote Security Advisory Index, so you have access to information about security matters that affect Rockwell Automation products.

Follow recommended network practices for products with network interfaces, such as communication ports or web servers. These practices help minimize risk or exposure by unauthorized activity or users. For more information, see:

- Converged Plantwide Ethernet (CPwE) Design and Implementation Guide, publication ENET-TD001
- Ethernet/IP Network Devices User Manual, publication ENET-UM006
- Configure System Security Features User Manual, publication SECURE-UM001

PointMax I/O in a Logix 5000 Control System

IMPORTANT: Throughout this publication, the term Logix 5000 controller refers to the controllers with which you can use PointMax I/O modules in a given capacity. You can use PointMax I/O modules with Logix 5000 controllers as remote I/O modules only. You cannot use PointMax I/O modules with all Logix 5000 controllers. For example, you can use PointMax I/O modules with CompactLogix® 5380 and ControlLogix® 5580 controllers but not with CompactLogix 5370 and ControlLogix 5570 controllers.

Logix 5000 controllers use I/O modules to control devices in a control system. The controllers access the modules over an EtherNet/IP network.

See Connections on page 15 for the communication model between controller and I/O modules.

Controller and Software Compatibility

Controller and programming software compatibility requirements apply when you use PointMax I/O modules. A module type and how it is used affect which requirements apply.

You must use Studio 5000 Logix Designer application version 36 or later. For more information, see the Product Compatibility and Download Center at rok.auto/pcdc.

If you use GuardLogix® controllers and need to use up to chassis slot 32, you must use Studio 5000 Logix Designer application version 37 or later.

Module Firmware Updates

I/O modules are manufactured with module firmware installed. If updated module firmware revisions are available in the future, you can update the firmware.

Firmware information for I/O modules is available at the Rockwell Automation Product Compatibility and Download Center (PCDC). The PCDC is available at: rok.auto/pcdc. At the PCDC, you can use the module catalog number to check for firmware updates. If the catalog number is not available, then no updates exist.

IMPORTANT: Only download firmware and access product release notes from the Rockwell Automation PCDC. Do not download firmware from non-Rockwell Automation sites.

Verify that the firmware revision of the I/O modules that you use is correct before commissioning the system. For more information on how to update your module firmware, see the ControlFLASH Plus Quick Start Guide, publication CFP-QS001.

When the firmware update is in progress, you cannot perform the following operations:

- Another firmware update request
- Module connection request
- Module reset request

WARNING: When you update the PointMax EtherNet/IP adapter firmware, the I/O modules in its chassis may reset and unable to maintain their Program Mode or Inhibit Mode states. Verify that all equipment controlled by the modules in this chassis is in a stopped state and that all safety-critical functions are unaffected.

Input Modules

Table 4. Input Modules Feature Comparison

Feature	5034-IF4, 5034-IF4XT	5034-IF8C, 5034-IF8CXT	5034-IF8V, 5034-IF8VXT	5034-IRT4I, 5034-IRT4IXT
Requested Packet Interval	✓	✓	✓	✓
Listen Only Mode	✓	✓	✓	✓
Module Inhibiting	✓	✓	✓	✓
Electronic Keying	✓	✓	✓	✓
Protected Operations	✓	✓	✓	✓
Alarm Latching	✓	✓	✓	✓
Scaling	✓	✓	✓	✓
CIP Sync Time	✓	✓	✓	✓
Rolling Timestamp of Data	✓	✓	✓	✓
Module Data Quality Reporting (Fault and Uncertain)	✓	✓	✓	✓
Notch Filter	✓	✓	✓	✓
Digital Filter	✓	✓	✓	✓
Process Alarms	✓	✓	✓	✓
Rate Alarms	✓	✓	✓	✓
Sensor Offset	✓	✓	✓	✓
Open Wire Detection	✓	✓	✓	✓
Field Power Loss Detection	✓	✓	✓	✓
Underrange/Overrange Detection	✓	✓	✓	✓
10 Ohm Copper Offset				✓
Cold Junction Compensation				✓
Fault and Status Reporting	✓	✓	✓	✓
Calibration (via AOP or Module Tags)	✓	✓	✓	✓

Output Module

Table 5. Output Module Features

Feature	5034-OF4, 5034-OF4XT
Requested Packet Interval	✓

Table 5. Output Module Features (continued)

Feature	5034-0F4, 5034-0F4XT
Listen Only Mode	✓
Module Inhibiting	✓
Electronic Keying	✓
Protected Operations	✓
Alarm Latching	✓
Scaling	✓
CIP Sync Time	✓
Data Echo	✓
Rolling Timestamp of Data	✓
Module Data Quality Reporting (Fault and Uncertain)	✓
Program and Inhibit Mode Handling	✓
Connection Fault Handling	✓
Channel Offset	✓
Hold for Initialization	✓
Output Clamping	✓
Output Ramping Rate Limiting	✓
Field Power Loss Detection	✓
No Load Detection	✓
Short-Circuit Protection	✓
Fault and Status Reporting	✓
Calibration (via AOP or Module Tags)	✓

Connections

A connection is a real-time data transfer link between the owner-controller and the module that occupies the slot that the configuration references.

During the module configuration, the connection type determines what data is exchanged between the controller and the module. When you uninhibit a module in online mode, or download the project with modules that are uninhibited to the controller, the controller attempts to establish a connection to each module.

The owner-controller monitors its connection with a module. Any break in the connection, for example, the loss of power to the PointMax I/O system, causes a fault. The Studio 5000 Logix Designer application monitors the fault status tags to indicate when a fault occurs on a module.

Producer/Consumer Communication

PointMax I/O modules use the Producer/Consumer communication model to produce data without a controller polling them first. The modules produce the data and controllers consume it. That is, the owner-controller and controllers with a Listen Only connection to the module can consume it.

When an input module produces data, the controllers can consume the data simultaneously. Simultaneous data consumption eliminates the need for one controller to send the data to other controllers.

Ownership

Every I/O module in a Logix 5000 control system must be owned by a controller, also known as the owner-controller. When the PointMax I/O modules are used in a Logix 5000 control system, the owner-controller performs the following:

- Stores configuration data for every module that it owns.
- Sends the I/O module configuration data to define module behavior and begin operation in the control system.

Each PointMax I/O module must continuously maintain communication with its owner-controller during normal operation.

When the owner-controller establishes I/O connection to the module, it sends the configuration data of the module. Two possible results are:

- If the configuration is appropriate to the module, a connection is established and operation begins.
- If the configuration is not appropriate to the module, the data is rejected and the Connection view in the Module Properties indicates that an error occurred. The configuration can be inappropriate for many reasons. For example, a mismatch in electronic keying that helps prevent operation on incompatible module.

Requested Packet Interval

Requested Packet Interval (RPI) is a configurable parameter that defines a specific rate at which data is exchanged between the controller and the module.

You set the RPI value during initial module configuration and can adjust it as necessary after module operation has begun.

IMPORTANT: If you change the RPI while the project is online, the connection to the module is closed and reopened in one of the following ways:

- You inhibit the connection to the module, change the RPI value, and uninhibit the connection.
- You change the RPI value. In this case, the connection is closed and reopened immediately after you apply the change to the module configuration.

Connection Optimization

PointMax I/O system supports automatic optimization for I/O connections.

The following conditions must be met for connections to be included in the optimization:

- I/O modules on the rack have the same RPI
- Unicast
- Sum of data sizes are within the packet limit

This is similar to how I/O systems such as POINT I/O™ support rack optimization or enhanced rack optimization. Functional safety modules, HART modules, and IO-Link master modules are excluded from the optimization.

Listen Only Mode

Any controller in the system can listen to the data from an I/O module. An owner-controller, as described in Ownership on page 16 exchanges data with I/O modules. Other controllers can use a Listen Only connection with the I/O module. In this case, the 'listening' controller can only

listens to the data produced by the module. The listening controller does not own the module configuration or exchange other data with the module.

During the I/O configuration process, you can specify a Listen Only connection.

IMPORTANT:

Remember the following:

- The Listen Only mode applies only to standard I/O modules.
- If a controller uses a Listen Only connection, the connection must use the Multicast option. In this case, all other connections to the module, for example, the connection of the owner-controller, must also use the Multicast option. The Listen Only connection RPI value must be the same as owner connection RPI value.
  - If a controller attempts to use a Listen Only connection to a module but the owner-controller connection uses the Unicast option, the attempt at a Listen Only connection fails.
  - The Listen Only controller receives data from the module as long as a connection between an owner-controller and module is maintained.
- RPI of the Listen Only connection must be the same as owner connection.
- If the connection between an owner-controller and the module is broken, the module stops sending data and connections to all 'listening controllers' are also broken.
- Due to Multicast, adding a Listen Only connection does not increase network bandwidth.
- Only one controller can own the I/O module. The PointMax I/O modules do not support multiple owners of the same module. Other controllers must use a Listen Only connection to the module.

Module Inhibiting

Module inhibiting lets you indefinitely suspend a connection, including Listen Only connections, between a controller and a module without removing the module from the configuration. This process temporarily stops the connection between the controller and the module.

IMPORTANT: Whenever you inhibit a module with outputs, all outputs change to the state that is configured for Program Mode.

Use the module inhibiting in the following scenarios:

- To perform maintenance on the module.
- To update a module, for example, update the module firmware revision.
- If you use a program that includes a module that you do not physically possess yet. You do not want the controller to look for a module that does not yet exist. In this case, you can inhibit the module in your program until it physically resides in the system.

Use the following procedure to inhibit and uninhibit the module:

1. Inhibit the module:
   a. Go to Connection view in the Module Properties dialog and select the Inhibit Module checkbox.
   b. Select Apply or OK.
2. Perform the necessary update.
3. Uninhibit the module:
   a. Go to Connection view in the Module Properties dialog and clear the Inhibit Module checkbox.
   b. Select Apply or OK.

Electronic Keying

Electronic Keying reduces the possibility that you use the wrong device in a control system. It compares the device that is defined in your project to the installed device. If keying fails, a fault occurs. These attributes are compared.

Attribute	Description
Vendor	The device manufacturer.
Device Type	The general type of the product, for example, an I/O module.
Product Code	The specific type of the product. The Product Code maps to a catalog number.
Major Revision	A number that represents the functional capabilities of a device.
Minor Revision	A number that represents behavior changes in the device.

Table 6. Electronic Keying Options

Keying Option	Description
Compatible Module	Lets the installed device accept the key of the device that is defined in the project when the installed device can emulate the defined device. With Compatible Module, you can typically replace a device with another device that has the following characteristics: • Same or compatible catalog number • Same or higher Major Revision • Minor Revision as follows: ◦ If the Major Revision is the same, the Minor Revision must be the same or higher. ◦ If the Major Revision is higher, the Minor Revision can be any number. • You can use an XT version of the module in place of a non-XT module or non-XT version of the module in place of XT module.
Disable Keying	Indicates that the keying attributes are not considered when attempting to communicate with a device. With Disable Keying, communication can occur with a device other than the type specified in the project.  **ATTENTION:** Be cautious when using Disable Keying; if used incorrectly, this option can lead to personal injury or death, property damage, or economic loss. We strongly suggest that you do not use Disable Keying. If you use Disable Keying, you must take full responsibility for understanding whether the device being used can fulfill the functional requirements of the application.
Exact Match	Indicates that all keying attributes must match to establish communication. If any attribute does not match precisely, communication with the device does not occur. When XT module is configured in Studio 5000 Logix Designer application project, only XT Module residing on XT MB is considered as Exact Match. When non-XT module is configured, only non-XT module (with any MB) is considered as exact match.

Carefully consider the implications of each keying option when selecting one.

IMPORTANT: Changing Electronic Keying parameters online interrupts connections to the device and any devices that are connected through the device. Connections from other controllers can also be broken. If an I/O connection to a device is interrupted, the result can be a loss of data.

For more detailed information on Electronic Keying, see Electronic Keying in Logix 5000 Control Systems Application Technique, publication LOGIX-AT001.

Protected Operations

If one of the module I/O connections is open and running, it is considered as the module is in Protection Mode. Protection Mode is a state where the device is operational but has

implemented defenses against disruptive changes that could take the product out of service. The following operations are restricted when the module is in Protection Mode:

- Firmware update request
- Module reset request
- Module calibration request
- Connection or data format change

The following operations can be applied in Studio 5000 Logix Designer application when the module is in Protection Mode but as a consequence, the I/O connections are closed and reopened:

- Change Electronic Keying
- Change RPI
- Change Unicast/Multicast

The following operations are allowed when the module is in Protection Mode:

- Listen-only connection requests from other controllers
- I/O channel configuration change. To apply configuration change without interrupting the I/O connections, there are two methods:
  - Change configurations and apply in Module Properties.
  - Change configuration tag values and send a Reconfigure Module MSG to the module to apply the changes

Inhibit the module to come out of the Protection Mode.

Unicast or Multicast Connection

During module configuration, you must configure the Connection over EtherNet/IP parameter. The configuration choice dictates how input data is broadcast over the network.

The PointMax I/O modules use one of the following methods to broadcast data:

- Multicast - Multicast connections deliver information from one sender to multiple receivers simultaneously. Copies of one transmission are passed to a selected subset of possible destinations.
- Unicast - Unicast connections are point-to-point transmissions between a source node and destination node on the network. A transmission is sent to one destination controller depending on the module configuration.

IMPORTANT: Unicast is the default setting. Use Unicast because it reduces network bandwidth usage. However, if you are using a ControlLogix 5580 controller in a high availability system, you must use Multicast.

Alarm Latching

Alarm latching lets you latch a module alarm in the set position once the alarm is triggered. The alarm remains set even if the condition that triggered the alarm disappears, until the alarm is unlatched.

Alarm latching is available on a per channel basis. You can latch the following alarms:

I/O Type	Available Alarms
Input modules	• Process Alarms • Rate Alarm
Output modules	• Clamp Alarms • Output Ramping Alarm

Enable Latching

You can enable alarm latching in Module Properties:

- For input modules, go to Chxx - Alarms view to enable latching for Process Alarms and Rate Alarm.
- For output modules, go to Chxx - Limits view to enable latching for Clamp Alarms and Rate Alarm.

Unlatch Alarms

IMPORTANT: Before you unlatch an alarm, make sure that the condition that triggered the alarm is no longer exists.

Once an alarm is latched, you must manually unlatch it. You can use the module tags to unlatch an alarm. The alarm type determines which module tag you must change.

For example, to unlatch a Low Low alarm on the analog input module, set the *Chxx.LLAlarmUnlatch* output tag to 1.

IMPORTANT: After an alarm is unlatched, change the module tag back from 1 to 0. You must change the module tag from 0 to 1 to unlatch the alarm each time an alarm is triggered. If you do not change the module tag back to 0 and the alarm is latched again in future, the alarm remains latched despite the *Unlatch* tag value being 1.

Scaling

When you scale a channel, you select two points that represent signal units, that is, a Low Signal and a High Signal. You also select two points that represent engineering units, that is, Low Engineering and High Engineering.

The Low Signal point equates to the Low Engineering point and the High Signal point matches the High Engineering point.

IMPORTANT: In choosing two points for the low and high value of your application, you do not limit the range of the module. The module range remains constant regardless of how you scale it.

Scaling lets you configure the module to return data to the controller in engineering units.

For example, if you use the 5034-IF4 module in Current mode with an input range of 4...20 mA, to receive values in Percent of Full Scale, configure the module as follows:

- Low Signal = 4 mA
- High Signal = 20 mA
- Low Engineering = 0%
- High Engineering = 100%

The returned value is indicated in the *I.Chxx.Data* tag.

The following table shows values that can appear when using Percent of Full Scale.

Table 7. Current Values Represented in Engineering Units

Current (mA)	Engineering Units Value (%) in *I.Chxx.Data* tag
0.0	-25.00
3.0	-6.00
4.0	0.0
12.0	50.0
20.0	100.0
23.0	118.75

For 5034-IRT4I module, there is a built-in scaling for following temperature units:

- Celsius
- Kelvin
- Fahrenheit
- Rankine

CIP Sync Time

I/O modules use CIP Sync for timestamps. CIP Sync is a CIP implementation of the IEEE 1588 PTP (Precision Time Protocol). CIP Sync provides accurate real-time (Real-World Time) or Universal Coordinated Time (UTC) synchronization of controllers and devices that are connected over CIP networks. This technology supports highly distributed applications that require timestamping, sequence of events recording, distributed motion control, and increased control coordination.

These modules are CIP Sync slave-only devices. There must be another module on the network that functions as a master clock. For more information on how to use CIP Sync technology, see the Integrated Architecture and CIP Sync Configuration Application Technique, publication IA-AT003.

I/O modules can be used to capture timestamps. The advantage is that CIP Sync is system-wide, so timestamp values are consistent across all modules in the system.

IMPORTANT: *I.CIPSyncValid* = 1 is not sufficient for an application to confirm that the module is ready for application requiring a system time synchronization to start operation. See Grandmaster Clock Verification on page 21 for extra verification needed.

Grandmaster Clock Verification

The application must verify that the module is synchronized with the same Grandmaster Clock as the owner-controller.

If Status connection is selected in the PointMax EtherNet/IP adapter Device Definition dialog, verify that all following conditions are true:

- I/O module's *I.CipSyncValid* is 1
- Adapter's *S.CipSyncValid* is 1
- Adapter's *S.GrandmasterClockID* is the same as the controller's GrandMasterClockID

If Status connection is not selected in the PointMax EtherNet/IP adapter Device Definition dialog, verify that all following conditions are true:

- I/O module's *I.CipSyncValid* is 1
- I/O module's *GrandmasterClockID* in GrandMasterClockInfo attribute of TimeSync object is the same as the controller's *GrandmasterClockID*
  - Class: 0x43
  - Instance: 0x01
  - Attribute: 0x08
  - Response: GrandMasterClockInfo (See the structure below)

GrandMasterClockInfo	STRUCT of
ClockIdentity	USINT[8]
ClockClass	UINT
TimeAccuracy	UINT
OffsetScaledLogVariance	UINT
CurrentUtcOffset	UINT
TimePropertyFlags	WORD
TimeSource	UINT
Priority1	UINT
Priority2	UINT

To get controller's GrandMasterClockID, access the TIMESYNCHRONE object through the GSV instruction. See Access the TimeSynchronize object.

Analog Input Modules

Analog input modules convert analog input signals to digital values. For example, the analog input modules can convert the following:

- Volts
- Millivolts
- Milliamps
- Ohms

RTD/Thermocouple modules convert Ohms or mV input analog signals into digital values.

Rolling Timestamp of Data

Rolling timestamp represents the time when the current *I.Chxx.Data* is sampled. It is a continuously running 15-bit rolling timestamp that counts in milliseconds from 0...32,767 ms. The rolling timestamp value is reported in the *I.Chxx.RollingTimestamp* tag for the analog I/O modules.

The controller program uses the last two rolling timestamp values to calculate the amount of time between the samples.

A system time change can cause a slight change in input sample timing. The rolling timestamp accurately reflects the change. There can be jitter in the timing between samples before and after the system time change.

Module Data Quality Reporting

The I/O modules indicate the quality of channel data that is returned to the owner-controller. Levels of data quality are reported via module input tags.

IMPORTANT: Once the condition that causes the Fault or Uncertain tag to change to 1 is removed, the tag automatically resets to 0. You cannot change the status of the tags. These tags are not always reset immediately after the condition is removed and typically resets after a small delay.

The following input tags indicate the level of data quality:

- *I.Chxx.Fault* - When the fault bit is set, this tag indicates that the reported channel data is inaccurate and cannot be trusted for use in your application. Do not use the reported channel data for control.

  If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.

  Example causes of inaccurate data include the following:
  - Channel is disabled
  - Connection fault is detected
  - Open Wire condition
  - Underrange/Overrange condition
  - Field Power Loss condition
  - Corresponding CJ Channel (including remote CJC) is in fault.

    IMPORTANT: Only applicable to TC modes except mV. Not applicable if fault is due to CJ Channel disable.

  You must troubleshoot the module for the typical causes first.

- *I.Chxx.Uncertain* - This tag indicates that the reported channel data can be inaccurate but the degree of inaccuracy is unknown. Do not use the reported channel data for control.

  If the tag is set to 1, you know that the data can be inaccurate. You must troubleshoot the module to discover what degree of inaccuracy exists.

  Example causes of uncertain data include the following:
  - Data signal outside the channel operating range
  - Sensor Offset data is not a number
  - Calibration fault on the channel
  - Calibration is in process on the current channel or another channel in the module. See Calibration Causes Uncertain Data Quality Indication on page 24 for more information.
  - Corresponding CJ Channel (including remote CJC) is in uncertain state

    IMPORTANT: Only applicable to TC modes except mV. Not applicable if fault is due to CJ Channel disable.

You must monitor the tags in your program to make sure that the application is operating as expected with accurate channel input data.

Calibration Causes Uncertain Data Quality Indication

When a channel on the analog input module is being calibrated, the Notch Filter setting for that channel changes to 10 Hz. This results in the *I.Chxx.Uncertain* tag being set to 1 for that channel until calibration is completed.

The Notch Filter settings for the other input channels in the module are unchanged. However, since multiple input channels share an Analog to Digital converter in 5034-IF4/IF8C/IF8V module, all input channels in the same group slows during the calibration process. As a result, *I.Chxx.Uncertain* tag is set to 1 for the other input channels in that group as well.

See Connection section under chapter 5034-IF4/IF8C/IF8V Details for the grouping information of the input channels.

Notch Filter

The Notch Filter is a built-in feature of the Analog-to-Digital converter (ADC) that removes line noise in your application. The removal of line noise is also known as noise immunity.

The Notch Filter attenuates the input signal at the specified frequency.

Choose a Notch Filter based on what noise frequencies are present in the module operating environment and any sampling requirements that are needed for control. For example if the Notch Filter setting is 60 Hz, 60 Hz AC line noise and its overtones are filtered out.

Table 8. Notch Filter Settings

5034-IF4, 5034-IF8C, 5034-IF8V	5034-IRT4I
• 10 Hz • 20 Hz • 50 Hz • 60 Hz • 100 Hz • 200 Hz • 400 Hz • 500 Hz • 1,000 Hz • 5,000 Hz • 10,000 Hz • 15,625 Hz • 31,250 Hz	• 10 Hz • 20 Hz • 50 Hz • 60 Hz • 100 Hz • 200 Hz • 500 Hz • 1,000 Hz • 2,500 Hz • 5,000 Hz

If you want to filter lower frequency noise, you get a slower input sample rate.

Relationship between Notch Filter Settings and RPI Setting

Since the notch filter selection determines the input sample rate, you must select the RPI value based on Notch Filter settings.

Additionally, 5034-IF4/IF8C/IF8V module provides two sets of recommended RPI values for each Notch Filter setting:

- **Better Noise Rejection**

  If you want greater noise suppression at the selected Notch Filter frequency and improved resolution, you use a slower input sample rate.

  For example, if you choose the 60 Hz notch filter setting and need better noise suppression and resolution, the recommended module minimum RPI is 53.2 ms, if the application is configured with only one channel enabled.

- **Faster Sampling Speed**

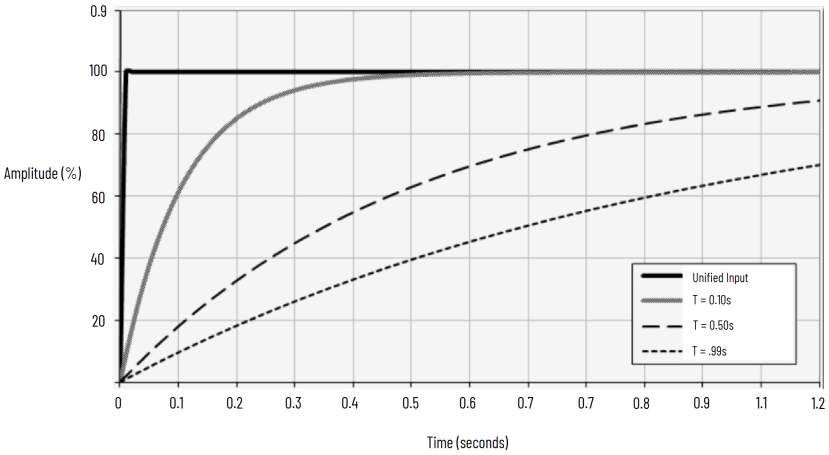
  If you want a faster input sample rate at the selected Notch Filter frequency, the noise suppression and resolution is lesser.

  Using the previous example, if you choose the 60 Hz notch filter setting and need faster input sampling, the recommended module minimum RPI is 18.3 ms, if the application is configured with only one channel enabled.

See the Recommended Minimum RPI Values for Notch Filters section for each module on how to determine the best RPI values based on Notch Filter settings.

Digital Filter

The Digital Filter is a first-order lag filter. It smooths input data noise transients on each input channel. This value specifies the time constant for a digital, first-order lag filter on the input. The input is 63% of the step change after the first time constant elapses.



The filter value is specified in units of milliseconds. A value of 0 (zero) disables the filter. Default value is 0. The digital filter is characterized by the following equation.

Y[n] = Y[n-1] + dt * (X[n] - Y[n-1])/(dt + T)

Where:

T

Configured time constant (Digital Filter in 'ms')

dt

Length of time between samples

X[n]

Unfiltered sample value at time n

Y[n]

Filtered sample value at time n

IMPORTANT:

Remember the following:

- Digital Filter input data changes only when new input data is collected.
- If an Overrange or Underrange condition is detected before the Digital Filter input data is collected, the condition is indicated immediately. An immediate indication also applies to the fault data for the input.

Process Alarms

Process alarms alert you when the module has exceeded configured high or low limits for each channel. You can configure the following alarm trigger points in Engineering Units:

- High High
- High
- Low
- Low Low

To use the Process Alarms, you must complete the following tasks:

- Enable the alarms
- Configure the trigger points

Enable Process Alarms

When the module tags are created, the Process Alarm tags are disabled by default.

To enable, uncheck Disable All Alarms, and then enable individual process alarms in output tags (example, *O.Chxx.LAlarmEn* = 1).

Configure Alarm Trigger Points

You must configure the Process Alarm with a trigger point. That is, set values in Engineering Units that, once the signal reaches the value, the alarm is triggered.

Process Alarm trigger points are related to the Scaling parameters that you configure for the channel. The Engineering Units that are established in Scaling determine the Process Alarm trigger points. That is, the available trigger point values are in engineering units.

For example, consider a channel that uses the Current (mA) input type, the 4...20 mA input range, and scales the High and Low Engineering values of 100% and 0%, respectively. The available Process Alarm values range from 0...100.

In this case, if the High Limit alarm is set to 50%, when the input signal reaches 12 mA, the High Limit alarm is set. The alarm is set because Scaling was configured for Percentage of Full Scale and a signal value of 12 mA is 50% of the full scale of engineering units.

IMPORTANT: Process Alarm values are in engineering units and must be recalculated when the scaling parameters are changed. Recalculate Units in the Module Properties dialog helps to recalculate the Process Alarm values and all other configurations with engineering units. Failure to update the Process Alarm values can cause the alarm alert not to take effect that could be misinterpreted as a hardware problem.

For example, an analog input module channel that uses Current (mA) input type with Process Alarms enabled has the following configuration parameters:

- Scaling values:
  - High Engineering = 100.0000%
  - Low Engineering = 0.0000%
- Process Alarming:
  - High High Limit = 100.0000%
  - High Limit = 100.0000%
  - Low Limit = 0.0000%
  - Low Low Limit = 0.0000%

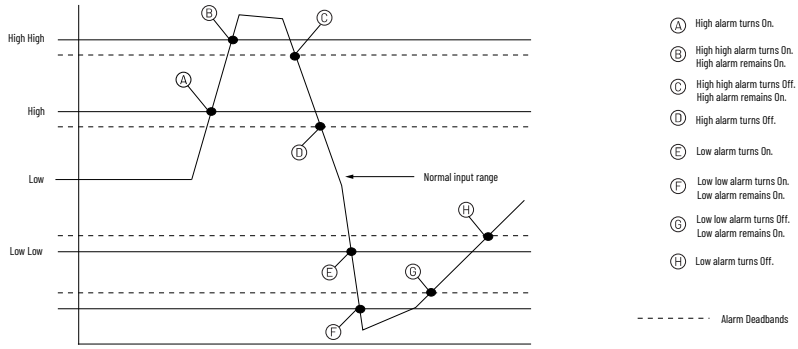
If you change the scaling High/Low Engineering values to 5 Kg/0 Kg, Recalculate Units suggest changing the Process Alarm values to 5/0 to make sure that the application continues to operate as expected.

Alarm Deadband

You can configure an alarm deadband to work with these alarms. The deadband lets the process alarm status bit remain set, despite the alarm condition disappearing, as long as the input data remains within the deadband of the process alarm.

The following graphic shows input data that sets each of the four alarms at some point during module operation. In this example, latching is disabled; therefore, each alarm turns Off when the condition that caused it to set ceases to exist.

Figure 2. Alarm Deadband Alarm Settings



Rate Alarm

The Rate Alarm defines the maximum rate of change between input samples in Engineering Units per second. If the Rate Alarm Limit is exceeded, the *I.Chxx.RateAlarm* tag is set to 1.

To enable Rate Alarm, go to Chxx - Alarms view in Module Properties, clear the Disable All Alarms checkbox, then set *O.Chxx.RateAlarmEn* tag to 1.

To enable Rate Alarm Latching, go to Chxx - Alarms view in Module Properties, select Enable Rate Alarm Latching checkbox, then Set the Rate Alarm Limit. Once the Rate Alarm is latched, you must change the *O.Chxx.RateAlarmUnlatch* tag to 1.

Sensor Types

The 5034-IF4, 5034-IF8C, and 5034-IF8V modules support 2-wire, 3-wire, and 4-wire sensors.

The 5034-IRT4I module supports RTD and TC sensor types. For RTD, the module supports 2-wire and 3-wire sensors. The available selections of sensor types are dictated by the input type configuration.

Table 9. Sensor Types – 5034-IRT4I

Input Type	Available Sensor Types
RTD	100 Ω PT 385 200 Ω PT 385 500 Ω PT 385 1000 Ω PT 385 100 Ω PT 3916 200 Ω PT 3916 500 Ω PT 3916 1000 Ω PT 3916 10 Ω CU 427 120 Ω NI 672 100 Ω NI 618 120 Ω NI 618 200 Ω NI 618 500 Ω NI 618
Thermocouple	mV, B, C, D, E, J, K, N, R, S, T, TXK/XK (L)

Sensor Type Temperature Limits

The 5034-IRT4I module can work for different temperature ranges depending on module configuration for the following parameters:

- Input Type
- Sensor Type

To know more details about the temperature range for each RTD and Thermocouple sensor types, see PointMax I/O System Specifications Technical Data, publication 5034-TD001.

Sensor Offset

The Sensor Offset compensates for any known error on the sensor or channel to which the sensor is connected. The value is set in engineering units and is added to the data value.

For example, consider an application that uses the Current (mA) input type with the 4...20 mA range and scaling at 0...100%. If a sensor has an error and the channel consistently reports current signal values by 0.2 mA lower than the actual value, you must set Sensor Offset to 1.25%.

You must use the *O.Chxx.SensorOffset* tag to set the Sensor Offset. In the example above, the *O.Chxx.SensorOffset* tag = 1.25.

Open Wire Detection

Open Wire detection detects when a wire is disconnected from the channel. For 5034-IF4/IF8C/IF8V module, to enable Open Wire detection, go to Channels → Chxx view in Module Properties and select Enable Open Wire Detection checkbox. For 5034-IRT4I module, Open Wire detection is always enabled.

For 5034-IRT4I module, the value that is reported during an Open Wire detection depends on the Diagnostics selection (minimum/maximum engineering) on the channel. See Chxx View on page 154 to set the diagnostic condition.

Table 10. Open Wire Conditions - 5034-IF4, 5034-IF8C, and 5034-IF8V Modules

Mode	Cause of Detection	Resulting Module Behavior
Current (mA)	The input signal for a channel is below 92 µA.	• The *I:Chxx.OpenWire* tag changes to 1. • A fault occurs and the *I:Chxx.Fault* tag is set to 1. • The *I.Chxx.Underrange* tag set to 1.
Voltage (V)	The input signal value is above 11V.	• The *I:Chxx.OpenWire* tag changes to 1. • A fault occurs and the *I:Chxx.Fault* tag is set to 1. • The *I.Chxx.Overrange* tag set to 1.

Table 11. Open Wire Conditions - 5034-IRT4I Module

Mode	Cause of Detection	Resulting Module Behavior
RTD Thermocouple	A wire is disconnected from the channel.	• Input data for the channel changes to Maximum/Minimum Engineering value depending on the configuration of parameter Input Value During Open Wire. • The *I:Chxx.OpenWire* tag changes to 1. • The *I.Chxx.Overrange* or *I.Chxx.Underrange* tag may be set to 1 based on the configuration of parameter Input Value During Open Wire. • A fault occurs and the *I:Chxx.Fault* tag is set to 1.

IMPORTANT: The Disable All Alarms feature does not disable the Open Wire detection feature but it disables all alarms on the module. The Open Wire detection feature is not an alarm. It is an indicator that a wire has been disconnected from the channel but does not trigger an alarm. For 5034-IF4, 5034-IF8C, and 5034-IF8V modules, to disable the Open Wire detection feature, you must clear the Enable Open Wire Detection checkbox in the Chxx view. For 5034-IRT4I module, open wire detection is always enabled. You can disable the channel if it is not in use.

Field Power (SA Power) Loss Detection

The Field Power Loss Detection feature monitors for the loss of field-side power on the SA power bus. It has a corresponding channel level tag that can be examined in the user program if a fault occurs. When field power to the module is lost, the channel level field power loss bit and fault bit are set for all channels and sent to the controller.

IMPORTANT: When SA power drops below 10V, it is possible that you may encounter a rise in the analog input data. You can use the Rate Alarm to monitor the data change rate and discard the input data when Rate Alarm is set.

Underrange/Overrange Detection

Underrange/Overrange Detection detects when signal is operating beyond limits set by the input range.

The module can read input signal levels outside the low and high signal values for each input range. The signal limits to which the module can read are thresholds. Only when the signal is beyond a threshold is an underrange or overrange condition that is detected and indicated.

The module has deadband values for each range. The deadband lets a condition remain set despite it disappearing. For example, if a module uses a Current input type in the 4...20 mA range and the signal value goes below 3 mA, the underrange condition is triggered. Because of the 0.07 mA deadband, the condition is not cleared until the signal value reaches 3.07 mA. See for more information.

The following table lists the input ranges of the input modules and the thresholds in each range before the module detects an underrange/overrange condition.

Table 12. Input Signal Threshold Ranges - 5034-IF4, 5034-IF4XT, 5034-IF8C, 5034-IF8C, 5034-IF8CXT, 5034-IF8V, 5034-IF8VXT

Input Type	Range	Underrange Threshold	Overrange Threshold
Current (mA)	0...20 mA	Not Applicable	> 23.00 mA
	4...20 mA	< 3 mA	
Voltage (V)	-10...+10V	< -10.7V	>10.7V
	0...5V	Not Applicable	>5.35V
	0...10V	Not Applicable	>10.7V

Table 13. Input Signal Threshold Ranges - 5034-IRT4I and 5034-IRT4IXT

Input Type	Sensor Type	Underrange Threshold	Overrange Threshold
RTD	Pt385	< -200 °C < -328 °F < 73 °K < 132 °R	> 870 °C > 1598 °F > 1143 °K > 2058 °R
	Pt3916	< -200 °C < -328 °F < 73 °K < 132 °R	> 630 °C > 1166 °F > 903 °K > 1626 °R
	Cu427	< -200 °C < -328 °F < 73 °K < 132 °R	> 260 °C > 500 °F > 533 °K > 960 °R
	Ni672	< -80 °C < -112 °F < 193 °K < 348 °R	> 320 °C > 608 °F > 593 °K > 1068 °R
	Ni618	< -60 °C < -76 °F < 213 °K < 384 °R	> 250 °C > 482 °F > 523 °K > 942 °R

Table 13. Input Signal Threshold Ranges - 5034-IRT4I and 5034-IRT4IXT (continued)

Input Type	Sensor Type	Underrange Threshold	Overrange Threshold
Thermocouple	B	< 21 °C < 68 °F < 293 °K < 528 °R	> 1820 °C > 3308 °F > 2093 °K > 3768 °R
	C	< 0.00 °C < 32 °F < 273 °K < 492 °R	> 2315 °C > 4199 °F > 2588 °K > 4659 °R
	E	< -270 °C < -454 °F < 3 °K < 6 °R	> 1000 °C > 1832 °F > 1273 °K > 2292 °R
	J	< -210 °C < -346 °F < 63 °K < 114 °R	> 1200 °C > 2192 °F > 1473 °K > 2652 °R
	K	< -270 °C < -454 °F < 3 °K < 6 °R	> 1372 °C > 2502 °F > 1645 °K > 2961 °R
	N	< -270 °C < -454 °F < 3 °K < 6 °R	> 1300 °C > 2372 °F > 1573 °K > 2832 °R
	R	< -50 °C < -58 °F < 223 °K < 402 °R	> 1768 °C > 3215 °F > 2041 °K > 3674 °R
	S	< -50 °C < -58 °F < 223 °K < 402 °R	> 1768 °C > 3215 °F > 2041 °K > 3674 °R
	T	< -270 °C < -454 °F < 3 °K < 6 °R	> 400 °C > 752 °F > 673 °K > 1212 °R
	TXK/XK(L)	< -200 °C < -328 °F < 73 °K < 132 °R	> 800 °C > 1472 °F > 1073 °K > 1932 °R
	D	< 0.00 °C < 32 °F < 273 °K < 492 °R	> 2315 °C > 4199 °F > 2588 °K > 4659 °R

IMPORTANT: The Disable All Alarms feature does not disable the Underrange/Overrange Detection feature but it disables alarms on the module. Underrange/Overrange detection is not an alarm. It is an indicator that channel data has gone beyond the maximum or minimum threshold, respectively, for the channel range. To disable the Underrange/Overrange Detection feature, you must disable the channel.

Underrange/Overrange conditions are indicated when the following tags change to 1:

- *I.Chxx.Underrange*
- *I.Chxx.Overrange*

10 Ohms Copper Offset (5034-IRT4I and 5034-IRT4IXT Only)

With 10 Ohms Copper Offset feature, you can compensate for a small offset error in a 10 Ohms copper RTD. The channel must be connected to the 10 Ohms CU 427 Sensor Type to use this feature. The offset value is indicated in units of 0.01 Ohm.

For example, if a 10 Ohms copper RTD used with a channel reports the resistance 9.74 Ω at 25 °C (77 °F), the 10 Ohms Copper Offset lets you account for the error. You must set the 10 Ohms Copper Offset field on the Configuration tab to 0.26 or by setting the *C.Chxx.TenOhmOffset* to 26.

To see where to set the 10 Ohms Copper Offset, see Chxx View on page 154.

Cold Junction Compensation (5034-IRT4I and 5034-IRT4IXT Only)

The junction at which temperature is measured is the hot junction. The junction where the thermocouple wire interfaces with copper are the cold junction. The transition from thermocouple wire to copper typically happens at the RTB terminal.

The thermoelectric effect alters the input signal and must be compensated to measure temperatures accurately. To compensate the input signal from your module accurately, you must use cold junction compensation (CJC) to account for the increased voltage.

When using the 5034-IRT4I or 5034-IRT4IXT module with a thermocouple input type, the channel must account for the thermoelectric effect of a junction of the thermocouple field wires and the RTB. The cold junction temperature should be within the valid sensor range. You must also make sure that the configured thermocouple sensor operating range includes the RTB ambient temperature.

The 5034-IRT4I/5034-IRT4IXT module supports following modes for CJC.

- Onboard CJC
- RTB CJC
- Remote Cold Junction Channel (Remote CJC)

Onboard CJC

The CJC thermistor inside the I/O module is used for Cold Junction Compensation. If your application does not require high accuracy, you can choose to opt for onboard CJC mode. You must use RTB without CJC (5034-RTB18/5034-RTB18S) in your setup if you want to use the onboard CJC.

RTB CJC

The CJC thermistor inside the RTB is used for Cold Junction Compensation. You must use one of the following RTB with CJC:

- 5034-RTBT - Screw-type
- 5034-RTBTS - Push-in spring type

IMPORTANT: RTBs with CJC are not shipped with your modules. You must purchase RTBs separately and install it on your module.

Remote CJC

Another TC/RTD channel of the I/O module is used for Cold Junction Compensation. That means:

- Thermocouple sensor is connected to a remote termination block.
- TC+/TC- from local removable termination block is connected to the remote termination block through copper wire.
- Remote CJ Channel's sensor (TC/RTD) is measuring the temperature in the remote termination block.

When remote CJC is used, the module verifies that the associated remote channel has a type TC (except mV) or RTD (except Ohms) and it is not configured to use remote CJC.

For more information, see CJChxx.Remote on Configuration Tag Definitions on page 167.

Select CJC Mode

In the Module Properties, go to CJ Channels view to select the CJC mode.

To use Remote CJC, configure Remote Cold Junction Channel in CJ Channels view.

To use RTB CJC:

- Set the Remote Cold Junction Channel to None (default).
- Select the Use RTB CJC checkbox.
- Use the 5034-RTBT/5034-RTBTS in the setup.

To use onboard CJC:

- Set the Remote Cold Junction Channel to None (default).
- Clear the Use RTB CJC checkbox.
- Use the 5034-RTB18/5034-RTB18S in the setup.

To disable CJC, select Disable Compensation checkbox.

IMPORTANT: When Remote Cold Junction Channel is None and Use RTB CJC checkbox is cleared, the 5034-IRT4I/5034-IRT4IXT module detects which RTB is connected. If an RTB with CJC (5034-RTBT/5034-RTBTS) is inserted, RTB CJC is used. If an RTB without CJC (5034-RTB18/5034-RTB18S) is inserted, onboard CJC is used.

Fault and Status Reporting

The analog input module sends fault and status data with channel data to the owner-controller and listening controllers. The data is returned via module tags that you can monitor in your Studio 5000 Logix Designer application.

With some exceptions, the analog input module provides the fault and data status in a channel-centric format. The tag names in the following table that include Chxx represent channel-centric data. The xx represents channel number.

Table 14. Fault and Status Data Tags

Data Type	Tag Name	Description
Fault	ConnectionFaulted	Indicates if a connection is running. The module sets this tag to 0 when connected. If the module is not connected, it changes the tag to 1.
	Chxx.Fault	Indicates that channel data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.

Table 14. Fault and Status Data Tags (continued)

Data Type	Tag Name	Description
	CJChxx.Fault	Indicates that the cold junction data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.
Status	RunMode	Channel's operating state.
	DiagnosticActive	Indicates if any diagnostics are active or if the prognostics threshold is reached.
	DiagnosticSequenceCount	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.
	Chxx.Uncertain	Indicates that the channel data can be inaccurate but the degree of inaccuracy is not known. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.
	CJChxx.Uncertain	The cold junction data can be inaccurate but it is not known to what degree of inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.

Calibration

The analog I/O modules are calibrated during the manufacturing process. Each module's accuracy remains high throughout its lifespan. You are not required to calibrate the module.

During the manufacturing process, analog I/O modules are calibrated at room temperature. If the module is intended to operate in an environment that is different from the room temperature, you may perform field calibration at the specific operating environment to improve the accuracy. For example, if intended operating temperature is more than 40 °C (104 °F).

There are two ways to perform calibration:

- Go to Module Properties dialog → Calibration view
- Use the input and output tags to perform calibration.

  To use this method, you must select Connection type as Data with Calibration in Device Definition dialog.

Analog Output Modules

Analog output modules convert digital values to analog signals. For example, the modules can convert the following:

- Volts
- Milliamps

Output Module Operation

The controller sends data to an output module at one of the following:

- At the RPI
- After an Immediate Output (IOT) instruction is executed

IMPORTANT: An IOT instruction sends data to the module immediately, and resets the RPI timer.

Data Echo

Data Echo automatically sends channel data values that match the analog value that was sent to the module's screw terminals then. The echoed value is indicated in the *I.Chxx.Data* and is represented in Engineering Units. This data is sent at the RPI.

Rolling Timestamp of Data

For the analog output modules, the rolling timestamp value is updated only when new values are applied to the Digital to Analog Converter (DAC). The echoed data is updated at the same time.

The rolling timestamp is a continuously running 15-bit rolling timestamp that counts in milliseconds from 0...32,767 ms. The rolling timestamp value is reported in the I.Chxx.RollingTimestamp tag for the analog I/O modules.

Module Data Quality Reporting

The I/O modules indicate the quality of channel data that is returned to the owner-controller. Levels of data quality are reported via module input tags.

IMPORTANT: Once the condition that causes the *Fault* or *Uncertain* tag to change to 1 is removed, the tag automatically resets to 0. You cannot change the status of the tags. These tags are not always reset immediately after the condition is removed and typically resets after a small delay.

The following input tags indicate the level of data quality:

- *I.Chxx.Fault* - When the fault bit is set, this tag indicates that the reported channel data is inaccurate and cannot be trusted for use in your application. Do not use the reported channel data for control.
  If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.
  Example causes of inaccurate data include the following:
  - Channel is disabled
  - Connection fault is detected
  - Short Circuit condition
  - No Load condition
  - Field Power Loss condition

You must troubleshoot the module for the typical causes first.

- *I.Chxx.Uncertain* - This tag indicates that the reported channel data can be inaccurate but the degree of inaccuracy is unknown. You do not use the reported channel data for control.
  If the tag is set to 1, you know that the data can be inaccurate. You must troubleshoot the module to discover what degree of inaccuracy exists.
  Example causes of uncertain data include the following:
  - Requested output signal is outside of maximum operating range
  - Received output data is "Not a Number"
  - Calibration data missing on the channel
  - Calibration is ongoing on the channel

You must monitor the tags in your program to make sure that the application is operating as expected.

Program and Inhibit Mode Handling

You can configure individual output channels to specific states when the module is in Program Mode or the module is Inhibited.

Output State in Program or Inhibited Mode

When the controller switches from Run Mode to Program Mode or Inhibited, the output can behave in the following ways, depending on how you configure the Output State in Program Mode parameter:

- Hold Last State – It causes the output to remain at the last value that is sent from the controller before being placed in Program Mode or Inhibit Mode.
- User Defined Value – It forces the output to transition to a specific, user-defined value.

When the module is inhibited, the output behavior follows the Output State in Program Mode configuration.

Connection Fault Handling

You can configure individual output channels to specific states when a connection fault occurs, that is, the connection between the owner-controller and the output module breaks unexpectedly.

You must define the following:

- Output Behavior Immediately After a Connection Fault
- Communication Fault State Duration After Connection Fault
- Final Communication Fault State Value

Output Behavior Immediately After a Connection Fault

When the connection between an owner-controller and output module breaks, the output can behave in the following ways depending on how the Output State in Communication Fault Mode parameter is configured:

- Hold Last State – It causes the output to remain at the last value that is sent from the controller before the connection fault occurs.
- User Defined Value – It forces the output to transition to a specific, user-defined value.

The output remains at that state value until the following occurs:

- The connection to the controller is re-established.
- The duration expired, which is based on the value that is defined in the Communication Fault Mode State Duration.

Communication Fault State Duration After Connection Fault

If you configure the output to transition to a specific value after the connection breaks, you must define how long the output remains at the specified value before it transitions to a Final Communication Fault State Value.

You can configure the output to remain at the specific value for the following times:

- Forever
- 1 second
- 2 seconds
- 5 seconds
- 10 seconds

After the Communication Fault State Duration time expires, the output transitions to user defined Final Communication Fault State Value.

Final Communication Fault State Value

The Final Communication Fault State Value defines the value to which the output goes after the Communication Fault State Duration time expires.

When Communication Fails in Program Mode

When communication fails in Program Mode, the output can behave in the following ways, depending on how you configure the When Communication Fails in Program Mode parameter:

- Leave Outputs in Program Mode State – It causes the output to behave as defined by the Output State in Program Mode selection.
- Change Outputs to Communication Fault Mode State – It causes the output to behave as defined by the Output State in Communication Fault Mode selection.

Output State Once Connection is Re-established

Once the connection between the owner-controller and output module is re-established, the output resumes normal operation if the controller is in Run mode or goes to the configured Program Mode state if the controller is in Program Mode.

Channel Offset

The Channel Offset feature compensates for any known error on the actuator or channel to which the actuator is connected. The value is set in the Engineering Units and is added to the output data.

For example, consider an application that uses the Current (mA) input type with the 4...20 mA range and scaling at 0...100%. If a channel used in the output range 4...20 mA has an error that results in it consistently outputing 7.8 mA when O.Chxx.Data is 8 mA, you must account for the error by setting the Channel Offset to 1.25.

Hold for Initialization

Hold for Initialization causes outputs to hold present state until the value commanded by the controller matches the value at the output screw terminal within 0.1% of full scale, providing a bumpless transfer.

If Hold for Initialization is selected, outputs hold if there is an occurrence of any of these three conditions:

- Initial connection is established after power-up.
- A new connection is established after a communication fault occurs.
- There is a transition to Run mode from Program state.
- The module loses SA power. In this case, the data echo value goes to 0.0.

The *I.Chxx.InHold* tag for a channel indicates that the channel is holding.

Output Clamping

Output Clamping limits the output from the analog module to remain within a range configured by the controller, even when the controller commands an output outside that range.

IMPORTANT: Output clamping does not apply during Program Mode and Communication Fault Mode.

Once clamp values are set, if data received from the controller exceeds those clamps, the following events occur:

- The output value transitions to the clamp limit but not to the requested value.
- The appropriate limit alarm is triggered.

For example, an application can set the high clamp on a module for 8V and the low clamp for -8V. If a controller sends a value corresponding to 9V to the module, the module applies only 8V to its screw terminals.

Clamping alarms are enabled by default. You can disable the alarms or configure latching behavior of the alarms on a per channel basis.

IMPORTANT: Clamp Limit values are in engineering units and must be recalculated when the scaling parameters are changed. Recalculate Units in the Module Properties dialog helps to recalculate the Clamp Limit values and all other configurations with engineering units. Failure to update the Clamp Limit values can cause clamping not to take effect or generate a small output signal that could be misinterpreted as a hardware problem.

For example, an analog output module channel that uses Current (mA) output type with Clamping enabled has the following configuration parameters:

- Scaling values:
  - High Engineering = 100.0000%
  - Low Engineering = 0.0000%
- Clamp Limits:
  - High Clamp = 100.0000%
  - Low Clamp = 0.0000%

If you change the scaling High/Low Engineering values to 2 Bar/0 Bar, the Recalculate Units suggest changing the High/Low Clamp Limit values to 2/0 to make sure that the application continues to operate as expected.

Output Ramping Rate Limiting

Output Ramping Rate Limiting limits the speed at which an analog output signal can change. This prevents fast transitions in the output from damaging the devices that an output module controls.

Table 15. Output Ramping Types

Output Ramping	Scenario in which Output Ramping Rate Limiting applies
Ramp in Run Mode	When the output value changes to the new output value received from the owner-controller in Run Mode.

Table 15. Output Ramping Types (continued)

Output Ramping	Scenario in which Output Ramping Rate Limiting applies
Ramp to Program Mode	When the present output value changes to the Program value after a Program command is received from the controller.
Ramp to Fault Mode and Final Fault State	When the present output value changes to the Fault value after a communication fault occurs.

In Module Properties dialog, go to Chxx - Limits view to configure the Output Ramping Rate Limiting parameters.

The maximum rate of change in outputs is expressed in engineering units per second and set in the Ramp Rate field.

Field Power (SA Power) Loss Detection

The Field Power Loss Detection feature monitors for the loss of field-side power on the SA power bus. It has a corresponding channel level tag that can be examined in the user program if a fault occurs. When field power to the module is lost, the channel level field power loss bit and fault bit are set for all channels and sent to the controller.

No Load Detection

IMPORTANT: This feature is available only in Current (mA) mode.

No Load Detection detects when a wire is disconnected from the channel or a missing load for each output channel. The output range that is used with the analog output module determines the current below which a load is considered missing.

The *I.Chxx.NoLoad* tag indicates the presence of a no load condition when it is set to 1.

The No Load Detection feature is disabled by default. You must enable the feature in your Studio 5000 Logix Designer application project. To enable No Load Detection, go to Channels, then Chxx view and select the Enable No Load Detection checkbox. Select Apply or OK to save the configuration.

Short Circuit Detection

IMPORTANT: This feature is available only in Voltage (V) mode.

Short Circuit Detection helps prevent damage that can result from a mis-wiring or driving a current from the channel greater than the maximum current level the channel can handle.

When a short circuit condition is detected, the following occurs:

- The output turns off.
- The *I.Chxx.ShortCircuit* tag is set to 1.

For more information on the maximum current that you can apply to an output, see the PointMax I/O System Specifications Technical Data, publication 5034-TD001.

Fault and Status Reporting

The analog output modules send fault and status data with channel data to the owner and listening controllers. The data is returned via module tags that you can monitor in your Studio 5000 Logix Designer application.

Table 16. Fault and Status Data Tags

Data Type	Tag Name	Description
Fault	ConnectionFaulted	Indicates if a connection is running. The module sets this tag to 0 when connected. If the module is not connected, it changes the tag to 1.
	Chxx.Fault	Indicates that channel data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.
Status	RunMode	Channel's operating state.
	DiagnosticActive	Indicates if any diagnostics are active or if the prognostics threshold is reached.
	DiagnosticSequenceCount	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.
	Chxx.Uncertain	Indicates that the channel data can be inaccurate but the degree of inaccuracy is not known. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.

Calibration

The analog I/O modules are calibrated during the manufacturing process. Each module's accuracy remains high throughout its lifespan. You are not required to calibrate the module.

During the manufacturing process, analog I/O modules are calibrated at room temperature. If the module is intended to operate in an environment that is different from the room temperature, you may perform field calibration at the specific operating environment to improve the accuracy. For example, if intended operating temperature is more than 40 °C (104 °F).

There are two ways to perform calibration:

- Go to Module Properties dialog → Calibration view
- Use the input and output tags to perform calibration.

  To use this method, you must select Connection type as Data with Calibration in Device Definition dialog.

IMPORTANT: During calibration, the screw output goes to low reference or high reference signal values. Make sure that the output module is not connected to the actuator.

Analog I/O Module Applications

This chapter describes how to configure your analog I/O modules in a Studio 5000 Logix Designer application project. You can use the default module configuration or edit the module configuration.

This chapter does not explain the user-configurable module features that you can edit on different screens in your Studio 5000 Logix Designer application project.

Add a New Module to a Studio 5000 Logix Designer Application Project

You must complete the following tasks before you configure the module:

1. Create a Studio 5000 Logix Designer application project.
2. Add a Logix 5000 controller to the project.
3. Add a PointMax EtherNet/IP adapter to the project.

   For more information on how to add a PointMax EtherNet/IP adapter to the Studio 5000 Logix Designer application project, see the PointMax EtherNet/IP Adapter User Manual, publication 5034-UM001.

After completing above steps, add your I/O module to the project by following one of the methods:

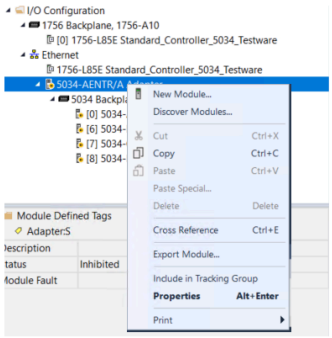
- Discover Modules
- New Module

Discover Modules

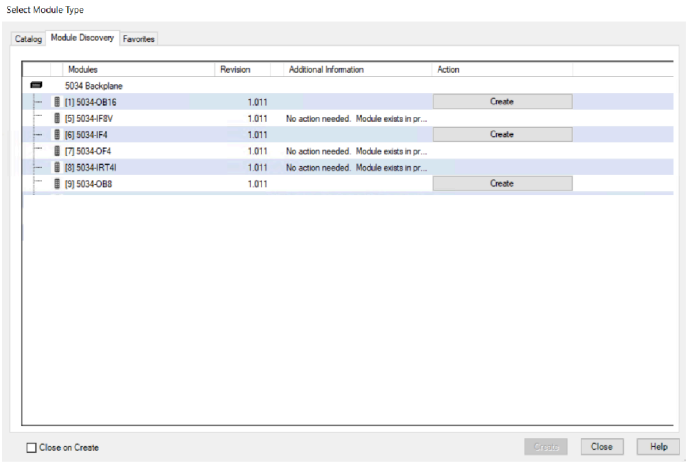
To use the Discover Modules method with PointMax I/O modules, complete these steps:

1. Go online with your Studio 5000 Logix Designer application.

   The project must include a PointMax EtherNet/IP adapter.
2. Right-click the PointMax EtherNet/IP adapter and select Discover Modules.

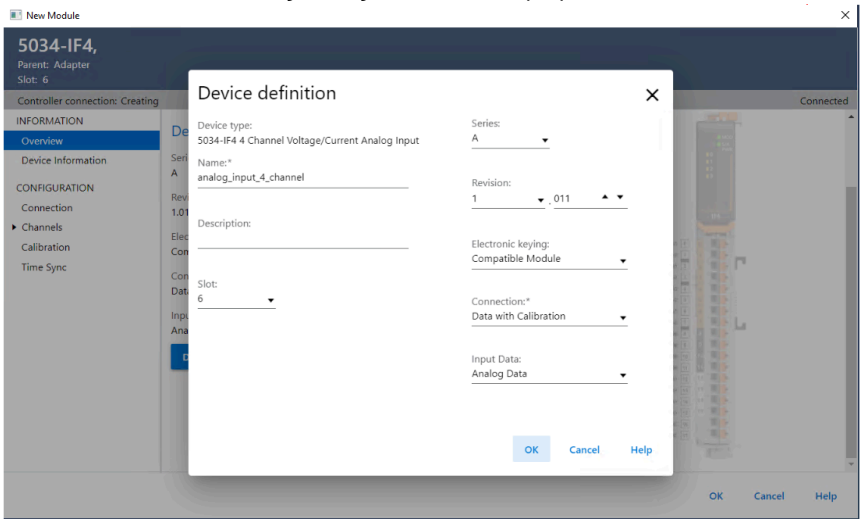


   The Studio 5000 Logix Designer application automatically detects available modules that are connected to the backplane. The Select Module Type dialog appears with list of modules detected.
3. In the Select Module Type window, select Create in the Action column to add the module to the project.

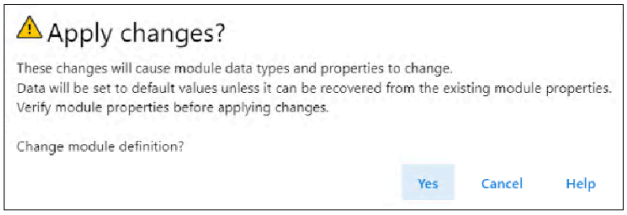


The New Module window with Device definition dialog appears.

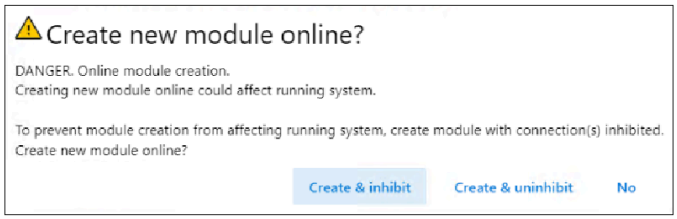
4. In the Device definition dialog, configure the module properties and select OK.



5. If Apply changes warning dialog appears, select Yes.



6. In the Create new module online warning dialog, select Create & inhibit.



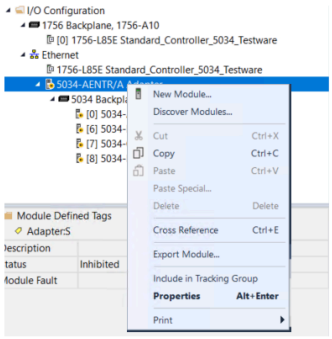
7. After adding as many as module you need, close the Select Module Type dialog.
   To add additional I/O modules with this method, complete one of the following:
   - If you selected the Close on Create checkbox when you created the first I/O module, repeat steps 2...6.
   - If you did not select the Close on Create checkbox when you created the first I/O module, repeat steps 3...6.

Add a New Module

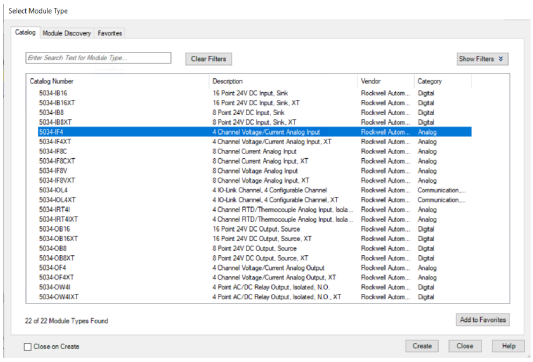
To use the New Module method with PointMax I/O modules, complete these steps.

This example shows how to add a module when the Studio 5000 Logix Designer application project is offline. You can add new modules when the project is online, if desired. In this case, the steps are similar to the steps described in Discover Modules. One exception is that, in Step 1, you must choose New Module instead of Discover Modules.

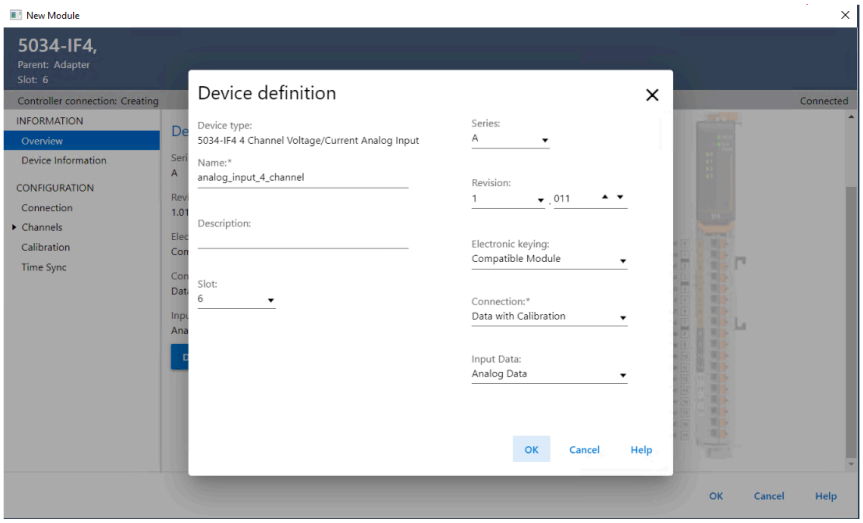
1. Right-click the PointMax EtherNet/IP adapter and select New Module.



2. In the Select Module Type dialog, choose the module you want to add and select Create.



   The New Module window appears with Device definition dialog.
3. You can select OK to use the default configuration as shown or edit the module configuration.



To add additional remote I/O modules with this method, complete one of the following:

- If you selected the Close on Create checkbox when you created the first I/O module, repeat steps 1...3.
- If you did not select the Close on Create checkbox when you created the first I/O module, repeat steps 2...3.

I/O Tag Name Conventions

The module tag names use defined naming conventions. The conventions are as follows:

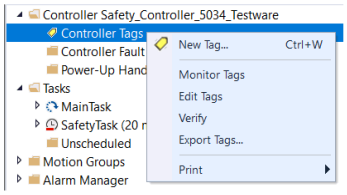
Example tag name = Adapter:1:I.Ch00.Data

- Adapter = Name of the PointMax EtherNet/IP adapter in the PointMax I/O system
- 1 = Slot number
- I = Tag type
  The possible PointMax analog module tag types are C (configuration), I (input), and O (output).
- Ch00 = Module channel number
- Data = Tag function
  In this case, Data represents the input data that is returned to the owner-controller.

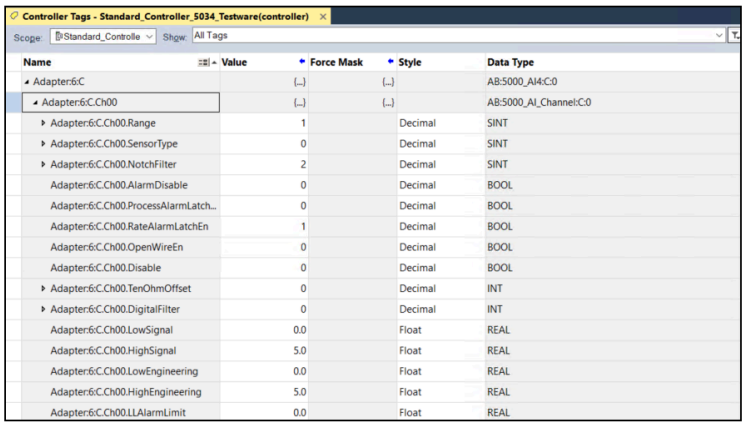
Access I/O Tags

To access the I/O tags in the Studio 5000 Logix Designer application, proceed as follows:

1. Open your Studio 5000 Logix Designer application project.
2. Right-click Controller Tags and select Monitor Tags.



3. Open the tags as necessary to view specific tags.



Troubleshoot Your Module

You can following the below methods to troubleshoot your module:

- Module Status Indicators

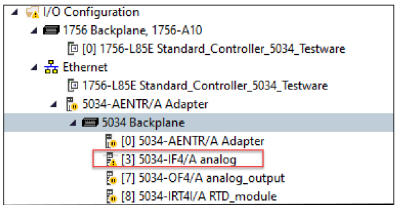
  See the respective module-specific sections for more information on how to troubleshoot using module status indicators.

- Studio 5000 Logix Designer application.

Troubleshooting using Studio 5000 Logix Designer Application

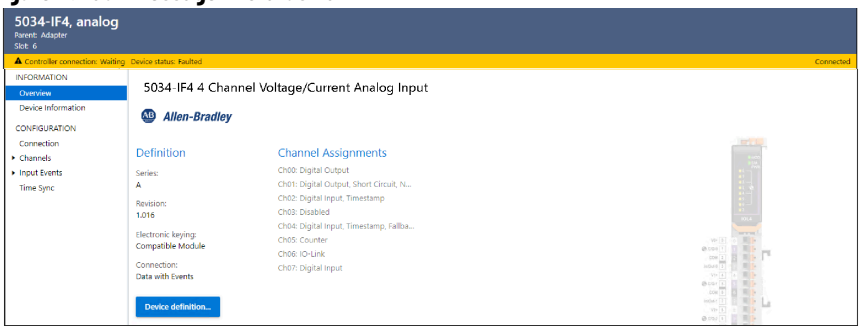
Check the Controller Organizer to see if there is a warning icon on the module.

Figure 3. Warning Icon in Controller Organizer



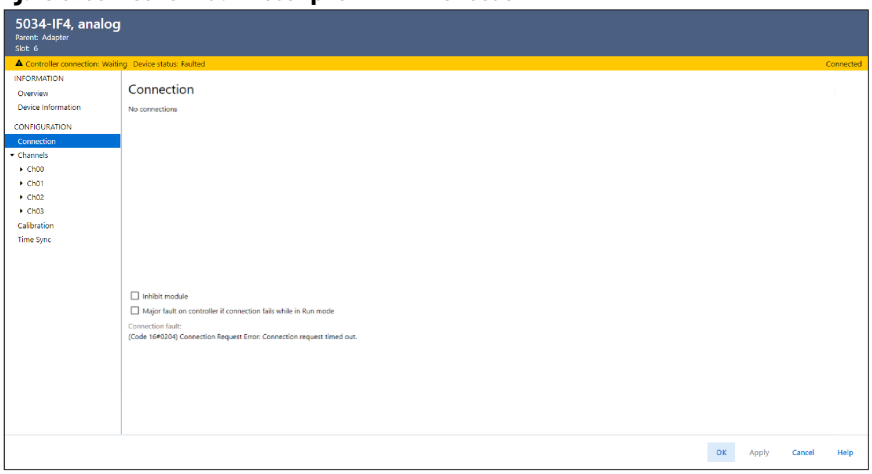
If a warning icon is present, open the Module Properties and check the status bar to identify the type of fault.

Figure 4. Fault Message in Status Bar



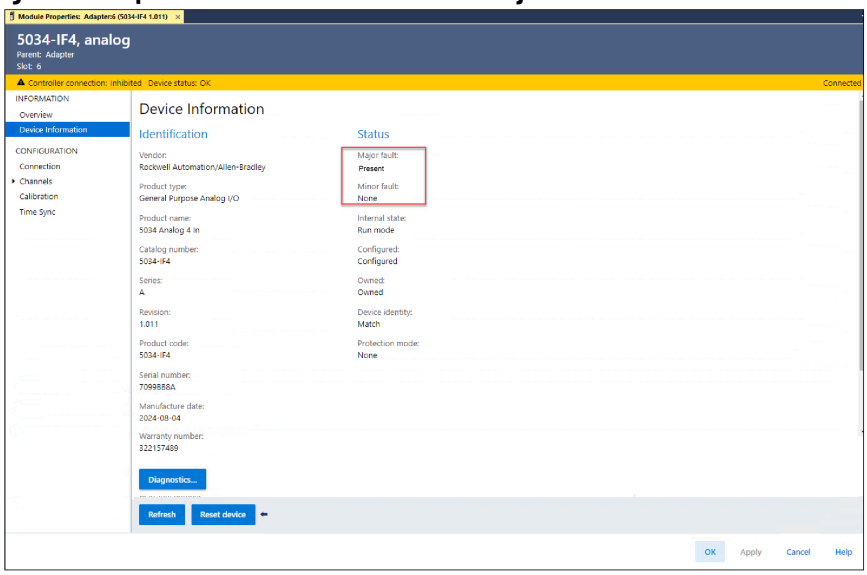
If connection is faulted, go to the Connection view and check the error code in the Connection Fault area.

Figure 5. Connection Fault Description with Error Code



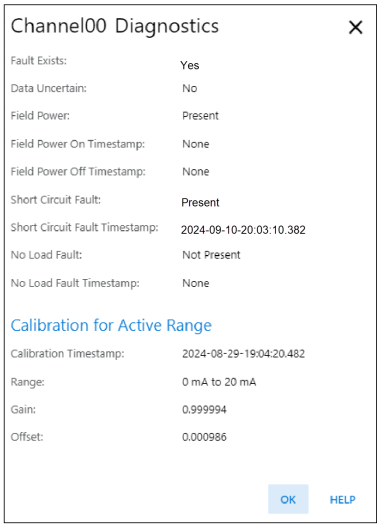
Error Code	Action
0x204	1. Open the Module Properties of the adapter. 2. Go to Chassis Information view and check the base status. If there is a fault, check the base details to identify the fault.
Keying Error	Go to Device Information view to confirm that the physical module is compliant or matches the configured identity. For more information, see Electronic Keying in Logix 5000 Control Systems Application Technique, publication LOGIX-AT001.
0x10	Go to Device Information view and check the firmware revision and major fault status: • If firmware update is required, update the firmware. • If the major fault is recoverable, reset the module. • If the major fault is unrecoverable, replace the module.

Figure 6. Example for Device Information View with Major Fault Present



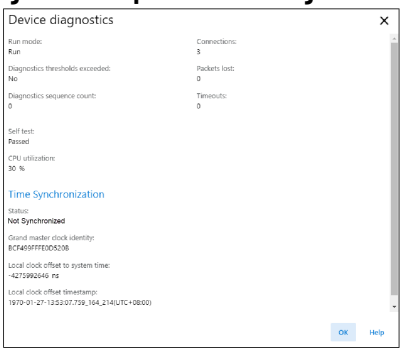
If a channel is faulted, go to the Channels → Chxx view and select the Diagnostics to see the diagnostic condition of the channel.

Figure 7. Example for Channel Diagnostics Dialog with Short Circuit Fault



If a Time Sync fault is present, go to the Device Diagnostics dialog to check the Time Synchronization status and Grandmaster clock identity.

Figure 8. Example for Device Diagnostics with Time Sync not Synchronized



The Grandmaster clock identity must match with the network Grandmaster clock identity. Also, check the Time Synchronization status of the adapter in the adapter Device Diagnostics dialog.

5034-IF4 and 5034-IF4XT Details

This chapter covers the detailed instructions on how to configure, calibrate, and troubleshoot your 5034-IF4 and 5034-IF4XT modules. It also describes the module tag definitions for input, output, and configuration tags.

Module Configuration

Before you start configuring your I/O module, you must create a Studio 5000 Logix Designer application project for the Logix 5000 controller that owns the PointMax I/O modules. See Add a New Module to a Studio 5000 Logix Designer Application Project on page 41 for more information. The project includes module configuration data for the PointMax I/O modules.

The Studio 5000 Logix Designer application transfers the project to the owner-controller during the program download. Data is then transferred to the PointMax I/O modules when the connection is established. The PointMax I/O modules can operate immediately after receiving and applying the configuration data.

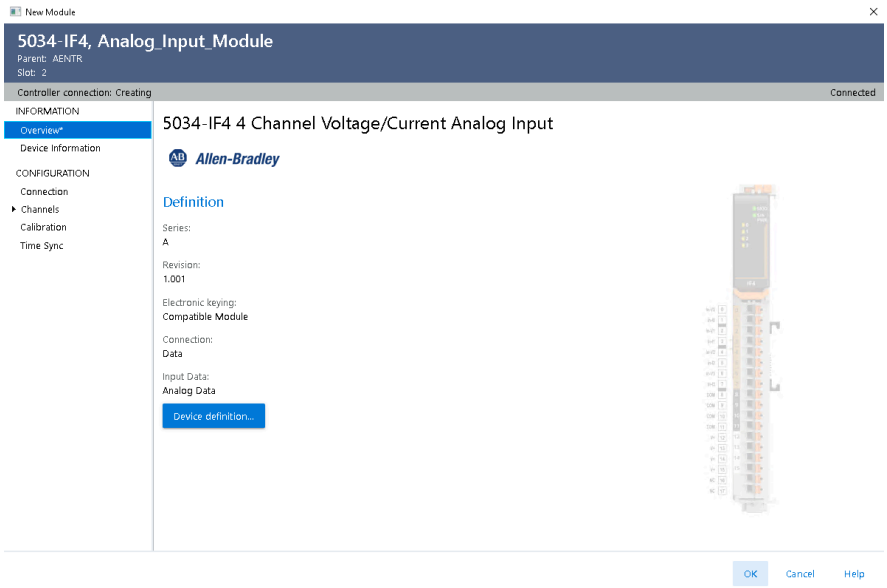
IMPORTANT: You must use Studio 5000 Logix Designer application version 36 or later.

Overview View

When you create a module or open the Module Properties, the Overview view appears first. Use Overview to view the definition of a device, including the device type, revision, electronic keying, connection, and other device-specific values.

To change the definition of a device, select the Device definition in the Overview view.

Figure 9. Overview View Example



Device Definition Dialog

Figure 10. Device Definition Dialog Example

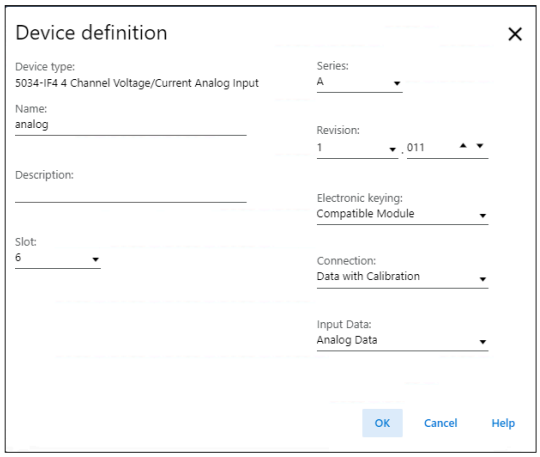


Table 17. Device Definition Parameters

Parameter	Definition	Available Choices
Device Type	Displays the device catalog number and type.	Device-specific
Name	Enter an IEC 61131 compliant device name. If an invalid character is entered in this field, or if the name exceeds 40 characters, the software ignores the character.	All valid values
Description	Enter the description of the device.	All valid values
Slot	Specify the slot number where the device resides. Only slots between 1 and the maximum number of I/O devices are valid depending on the platform. When the device is created, the slot number defaults to the first available slot position. When the controller is changed to one supporting a smaller maximum I/O count, the current slot value may no longer be valid.	1...32
Series	Specifies the module hardware series.	Device-specific

Table 17. Device Definition Parameters (continued)

Parameter	Definition	Available Choices
Revision	Specifies the major and minor revisions of the device. The valid range for minor revision is from 1...255.	Device-specific
Electronic Keying	Defines the electronic keying used for the device. Electronic keying compares the device defined in the project to the installed device. If keying fails, a fault occurs. For detailed information on Electronic keying, see Electronic Keying in Logix 5000 Control Systems Application Technique, publication LOGIX-AT001	• Exact Match • Compatible Module • Disable Keying **ATTENTION:** Be extremely cautious when using Disable Keying; if used incorrectly, this option can lead to personal injury or death, property damage, or economic loss. We strongly suggest that you do not use Disable Keying. If you use Disable Keying, you must take full responsibility for understanding whether the device being used can fulfill the functional requirements of the application.
Connection	Determines the following for the module type you configure: • Available configuration parameters • Data type transferred between the module and the controller • Which tags are generated when configuration is complete For the Listen Only Data choice, the controller and device establish communication without the controller sending any configuration or output data to the device. A full input data connection is established but depends on the connection between the owner-controller and the device.	• Data with Calibration • Data (default) • Listen Only
Input Data	Selects the input data type for the device.	Analog Data

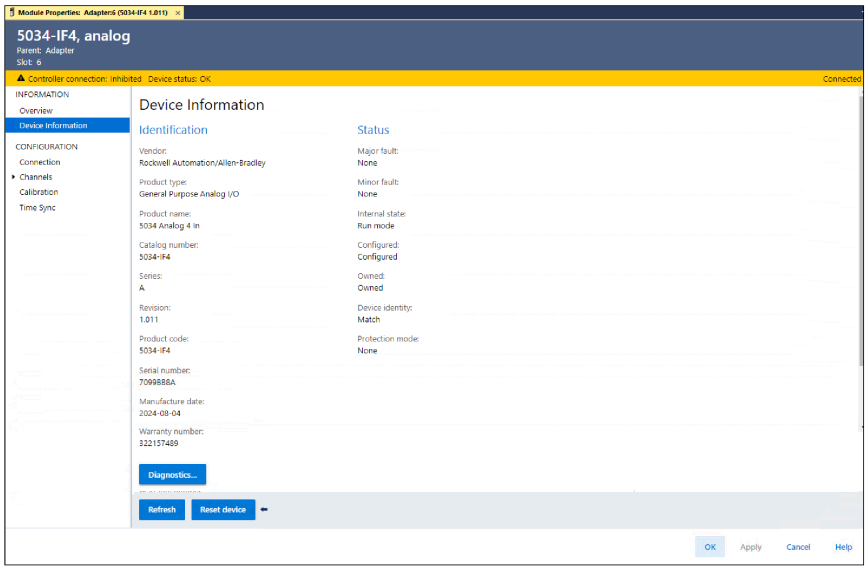
Device Information View

Use Device Information to view device and status information when the device is online. You can use this view to complete the following:

- Determine the identity of the device.
- View the device's current operational state.
- View whether the device was configured by the owner controller.
- View whether an owner controller is currently connected to the device.
- Retrieve the latest information from the device.
- Reset a device to its power-up state.

- If supported, view the Protection Mode of the device.
- Access device diagnostics

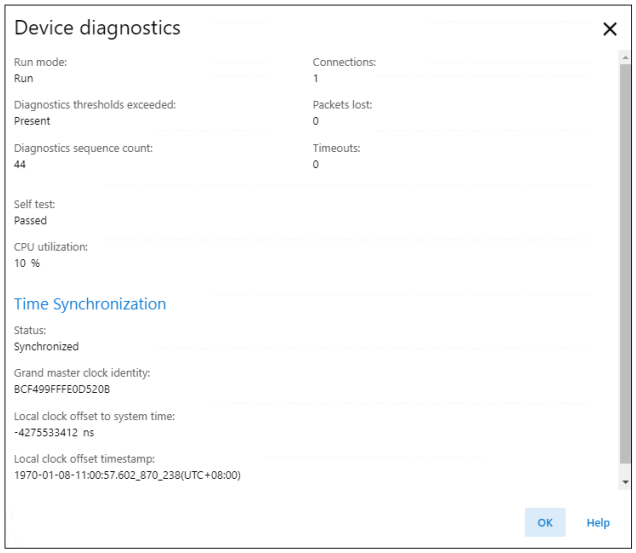
Figure 11. Device Information View Example



Device Diagnostics

To view the device diagnostics, select Diagnostics in the Device Information view. It displays the diagnostics information of the module.

Figure 12. Device Diagnostics Dialog Example



Connection View

The Connection view lets you complete the following tasks:

- Set the RPI rate. For more information, see Requested Packet Interval on page 16.
- Select Unicast or Multicast connection to use on the EtherNet/IP network. For more information, see Unicast or Multicast Connection on page 19.

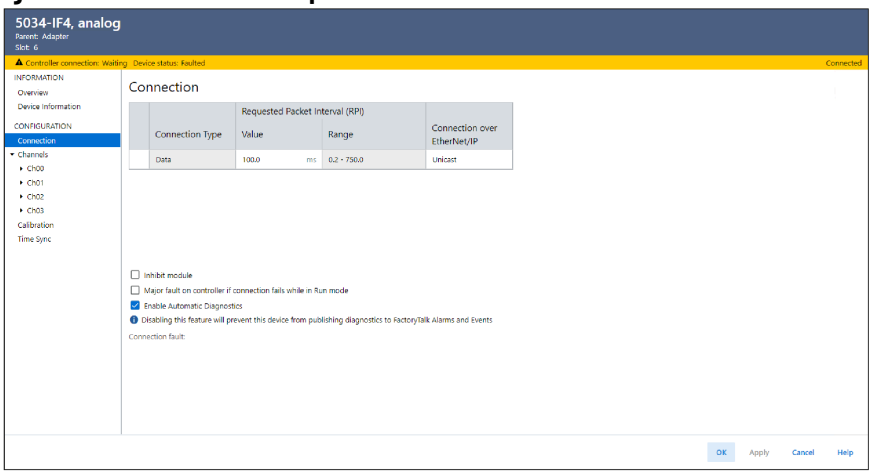
- View the reason of Connection Fault.

  If there is a connection fault, Connection Fault area displays the error code with description that helps you to troubleshoot the module. For more information, see Troubleshoot Your Module on page 45.

- Inhibit the module. For more information, see Module Inhibiting on page 17.
- Configure fault response for connection failure while the controller is in Run Mode.
- Enable or disable the Automatic Diagnostics.

  ATTENTION: If you do not enable Automatic Diagnostics, the device does not publish diagnostics to FatoryTalk Alarms and Events.

Figure 13. Connection View Example



Recommended Minimum RPI Values for Notch Filters

In the following table, each Notch Filter setting has two recommended minimum module RPI values that allow the required time to collect samples from each channel. One setting provides faster sample speed and the other provides slightly better resolution at slower sample speeds.

Table 18. Notch Filter and Recommended Minimum Module RPI Values

Notch Filter (Hz)	Recommended Minimum Module RPI Value			
	Application That is Configured With Only One Channel Enabled		Application With All Channels Enabled and Using the Same Notch Filter Setting on All Channels	
	Faster Sampling Speed (ms)	Better Noise Rejection (ms)	Faster Sampling Speed (ms)	Better Noise Rejection (ms)
10	106	316	422	NA
20	53.1	158.1	212	632
50	22	64	86	254
60 (default)	18.3	53.2	72	212
100	11.2	32.1	44	127
200	5.9	16.4	22.2	65
400	3.5	8.6	12	33
500	2.8	6.9	9.3	26.5
1000	1.7	3.8	5.2	13.5
5000	1.0	1.3	2.2	3.3
10000	0.7	0.9	1.7	2.1

Table 18. Notch Filter and Recommended Minimum Module RPI Values (continued)

Notch Filter (Hz)	Recommended Minimum Module RPI Value			
	Application That is Configured With Only One Channel Enabled		Application With All Channels Enabled and Using the Same Notch Filter Setting on All Channels	
	Faster Sampling Speed (ms)	Better Noise Rejection (ms)	Faster Sampling Speed (ms)	Better Noise Rejection (ms)
15625	0.8	0.8	1.7	1.7
31250	0.4	0.6	1.2	1.5

Minimum RPI Calculation When Using Different Notch Filter Selections

When input channels on the same module use different Notch Filter selections, you must consider the sample time for each channel. This helps you to find the recommended RPI that provides enough time for sampling all channels.

Because all input channels in IF4 share the same Analog to Digital Converter, the recommended minimum RPI rate for all enabled channels added together is the recommended minimum module RPI.

Table 19. Example Application That Requires Faster Sampling Speed

Channel	Notch Filter (Hz)	Recommended Minimum Module RPI for Each Channel (ms)	Recommended Minimum Module RPI (ms)
Ch00	50	22	24.1
Ch01	1000	1.7	
Ch02 - Disabled	N/A	N/A	
Ch03	31250	0.4	

Table 20. Example Application That Requires Better Noise Rejection

Channel	Notch Filter (Hz)	Recommended Minimum Module RPI for Each Channel (ms)	Recommended Minimum Module RPI (ms)
Ch00	50	64	68.4
Ch01	1000	3.8	
Ch02 - Disabled	N/A	N/A	
Ch03	31250	0.6	

Channels View

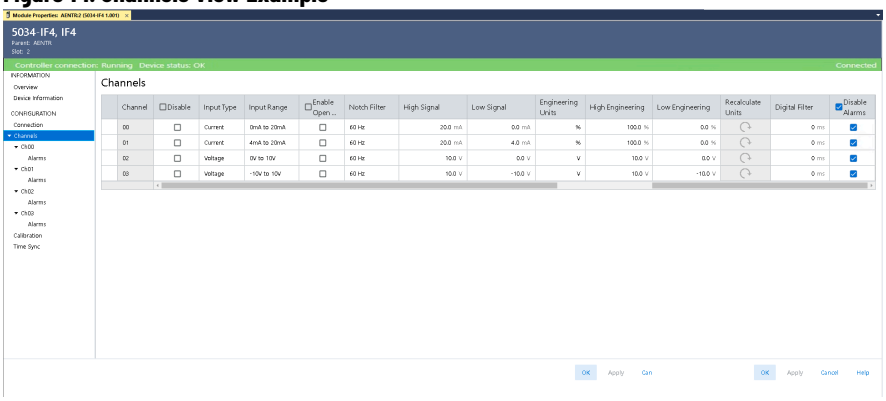
The Channels view shows an overview of the configuration values for all module channels.

Not all channel configurations are included in Channels view. To view or change the complete set of the channel configuration and also to view the diagnostics information for the channel, use Chxx view.

You can do the following actions on this view for all the channels:

- Disable the channel, if desired
- Change the input type and input range
- Set the notch filter
- Enable or disable open wire detection
- Set the scaling and recalculate all configurations with engineering unit
- Set digital filter
- Disable alarms

Figure 14. Channels View Example



Chxx View

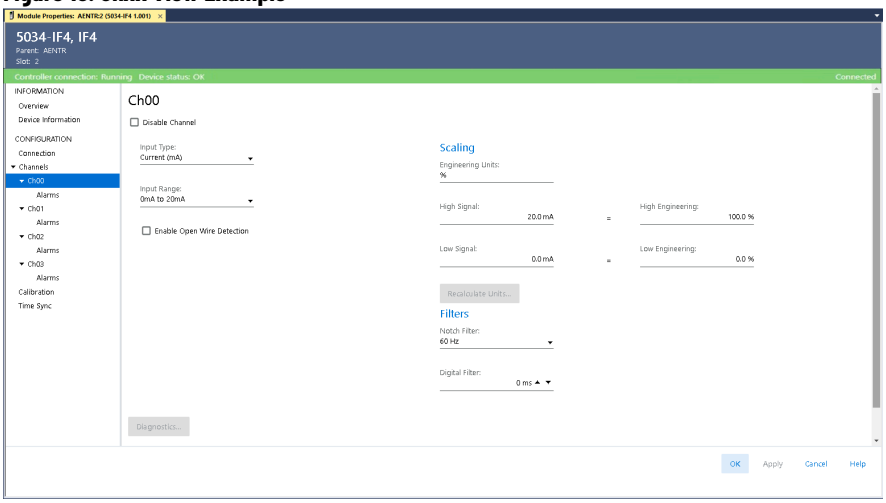
The Chxx view, where xx represents the channel number, shows the configuration options available for the respective channel.

You can do the following actions on this view:

- Disable the channel, if desired
- Change the input type and input range
- Set the notch filter
- Enable or disable open wire detection
- Set the scaling and recalculate all configurations with engineering unit
- Set digital filter
- View channel diagnostics information

To latch and configure alarm parameters, go to Alarms view.

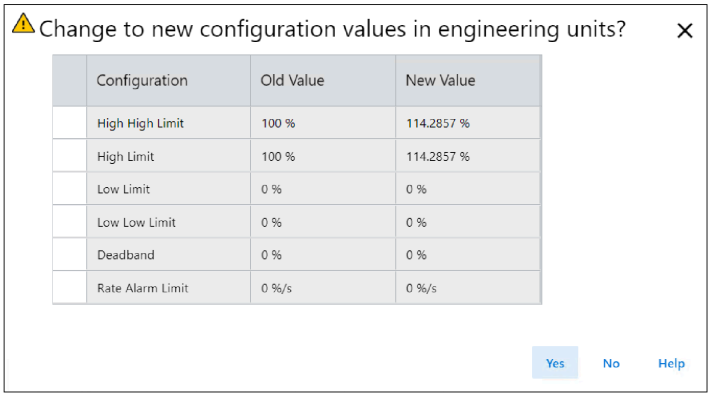
Figure 15. Chxx View Example



Recalculate Units

Recalculate Units lets you recalculate all configurations with engineering unit after a scaling change. Consider the following:

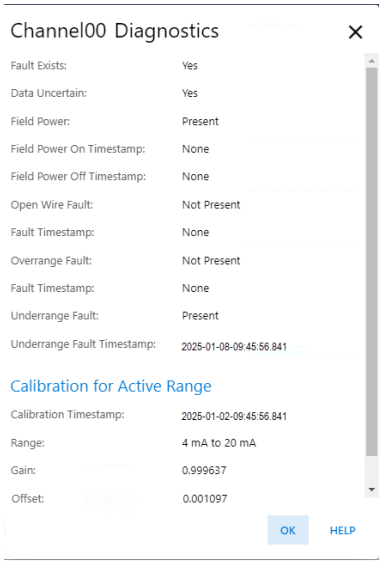
- The Recalculate Units option is enabled when the scaling configuration is changed.
- Upon selecting Recalculate Units option, the recalculated new values based on the new scaling configuration are displayed together with the old values for you to verify before changing.
- If you select "Yes" to proceed with the change, the new values will be set but it gets applied when you select "Apply/OK".
- If you select "No" to cancel the change, the old values are retained. You can either select the Recalculate Units again or manually change those configurations based on the new scaling.



Channelxx Diagnostics

Displays the channel diagnostics information when connected with the module. When online with the module, select the Diagnostics on the Chxx view to see the diagnostic information.

Figure 16. Channelxx Diagnostics Dialog Example



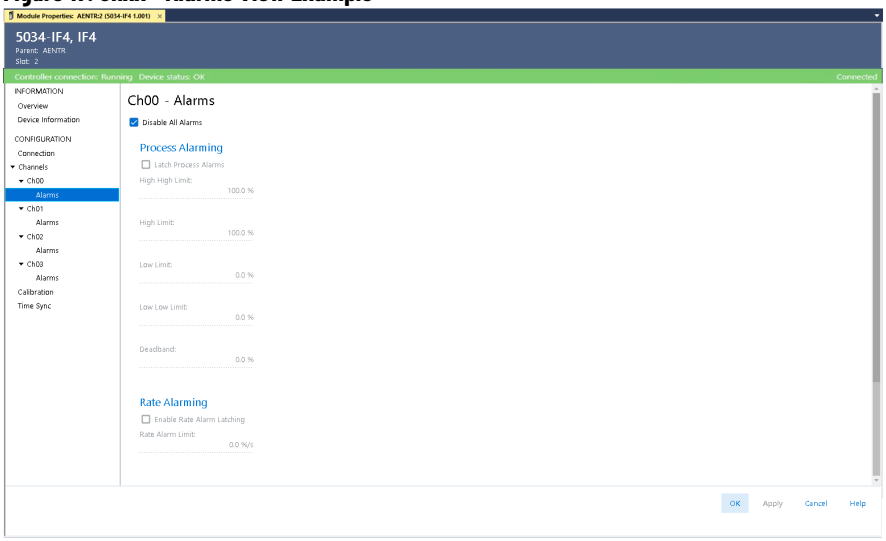
Alarms View

Each channel on the input module has an Alarms view. You can do the following actions on this view:

- Disable all the alarms.
- Enable/Disable latching and set the alarm limits for the process alarms:
  - High High
  - High
  - Low
  - Low Low
  - Deadband
- Enable/Disable latching and set limit for the rate alarm.

Rate Alarm Limit of 0.0 disables the rate alarm.

Figure 17. Chxx - Alarms View Example



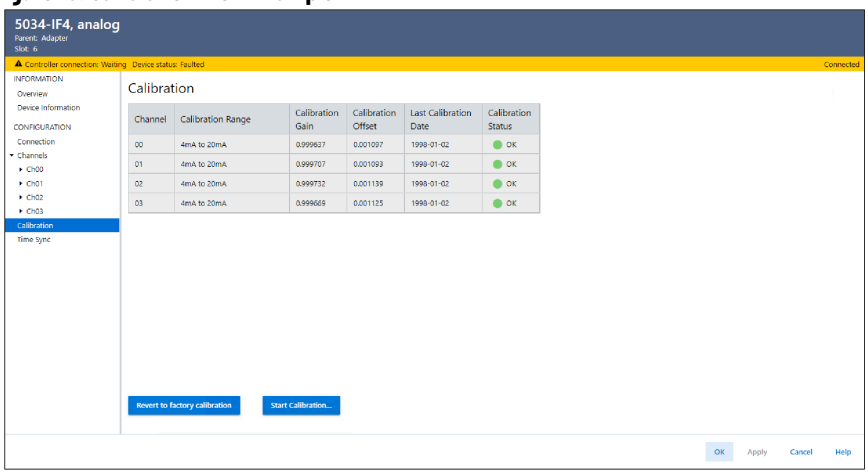
Calibration View

The Calibration view provides calibration information for all channels on the module. You can do the following actions on this view for all the channels:

- View calibration parameters and calibration status for the currently configured input ranges.
- Perform user calibration for one or multiple channels.
- Revert calibration parameters to the factory default values.

For more information on how to calibrate a module, see Module Calibration (Interactive) on page 58.

Figure 18. Calibration View Example

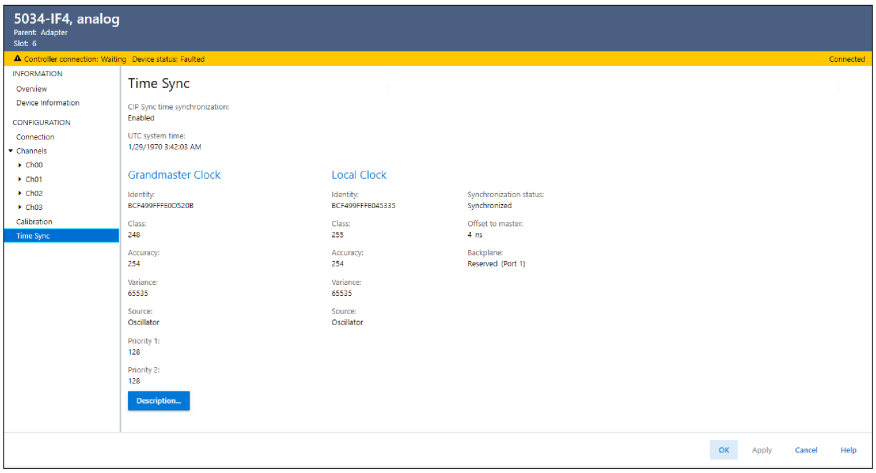


Time Sync View

The Time Sync view is read-only and displays the CIP Sync status information about the module when the project is online. The Time Sync category displays the following information:

- CIP Sync time synchronization status
- UTC system time
- Grandmaster Clock information
- Grandmaster Clock description
- Local Clock information

Figure 19. Time Sync View Example

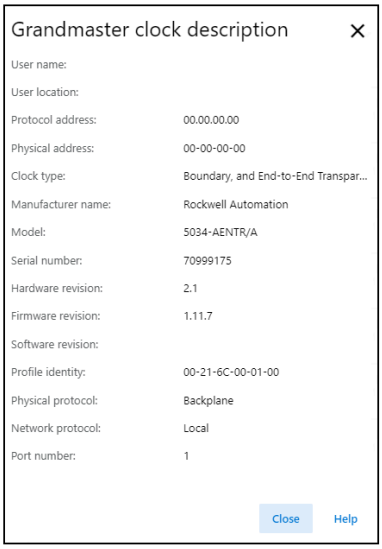


Grandmaster Clock Description

To view the Grandmaster clock description, select Description in the Time Sync view.

The Grandmaster clock description dialog provides detailed information about the grandmaster clock.

Figure 20. Grandmaster Clock Description Example



Module Calibration (Interactive)

You can use Calibration view in Module Properties to interactively calibrate the module on a per channel basis or in group.

Controller State During Calibration

You must add the module to your Studio 5000 Logix Designer application project, as described in Add a New Module to a Studio 5000 Logix Designer Application Project on page 41, before you can calibrate it.

The project must be online with the owner-controller to calibrate the PointMax analog modules. You can calibrate under any of the following conditions:

- The controller is in Program Mode, that is, either Remote Program or Program Mode.

  Your module must be in Program Mode and not be actively controlling a process when you calibrate it.

- There are no connections to the module.

Calibration Impacts Data Quality

When a channel on an analog input module is being calibrated, the Notch Filter setting for that channel changes to 10 Hz. The I.Chxx.Uncertain tag is set to 1 for that channel until calibration is completed.

All inputs of 5034-IF4 module share an Analog-to-Digital converter. As a result when any input channel is in the calibration process, the *I.Chxx.Uncertain* tag is set to 1 for all other input channels. This is because the data sampling rate slows for all input channels.

Calibration Instrumentation Specifications

When you calibrate the analog input modules, send current or voltage reference signals to the module to calibrate it. To maintain your module's factory calibration accuracy, use the instrumentation with the specifications listed in the following table.

IMPORTANT: Do not calibrate your module with an instrument that is less accurate than those specified in following table. The following events can result:

- Calibration appears to occur normally but the module gives inaccurate data during operation.
- A calibration fault occurs, forcing you to abort calibration. When this happens, I.Chxx.CalFault tag is set for the channel you attempted to calibrate. You can clear this tag by completing a valid calibration or cycling power to the module.

Table 21. Instrument Specifications

Catalog Number	Channel Input Type	Calibration Instrumentation Specifications
5034-IF4, 5034-IF4XT	Current (mA)	4.00...20.00 mA source ±100 nA current
	Voltage (V)	0...10V source ±2 µV voltage

Calibration Procedure

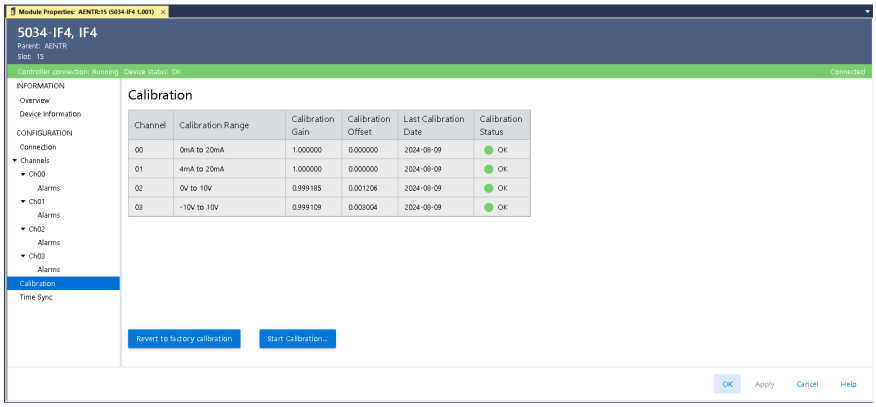
This procedure describes how to calibrate a channel on the analog input module for use with a Current (mA) input type. You can follow the same procedure for voltage input type, but make sure connect the voltage calibrator to the channel.

Apply Low and High Signal references to the analog input module to calibrate it. The references must match the input range the channel is using.

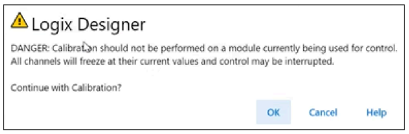
Table 22. Analog Input Module Calibration References

Input Type	Input Range	Low Calibration Reference	High Calibration Reference
Voltage (V)	-10...10V	0.0V	10.0V
	0...10V	0.5V	10.0V
	0...5V	0.5V	5.0V
Current (mA)	0...20 mA 4...20 mA	4.0 mA	20.0 mA

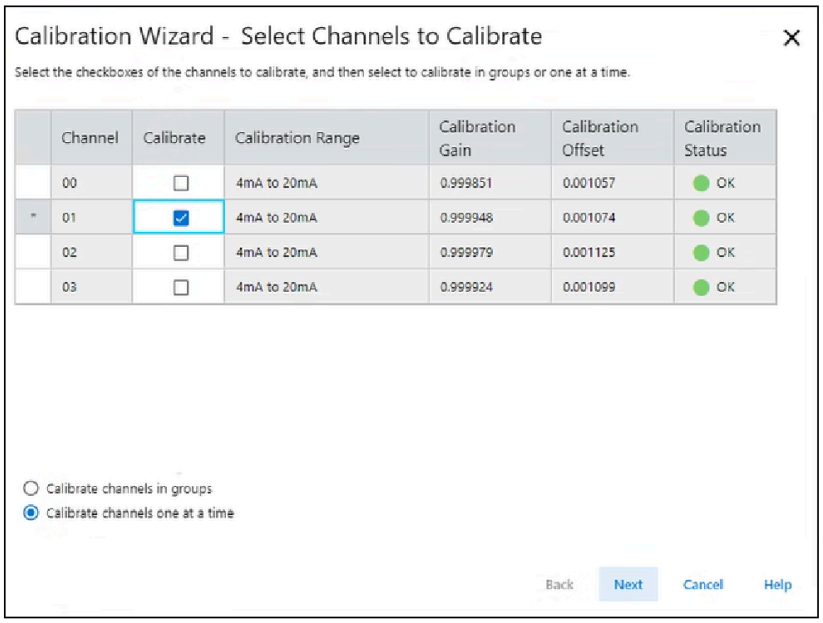
1. Connect the current calibrator to the channel being calibrated.
2. Go online with the project and make sure that the controller is in Program Mode.
3. Confirm that the channel to be calibrated is configured for the correct Input Range.
4. On the Calibration view in the Module Properties dialog, select Start Calibration.



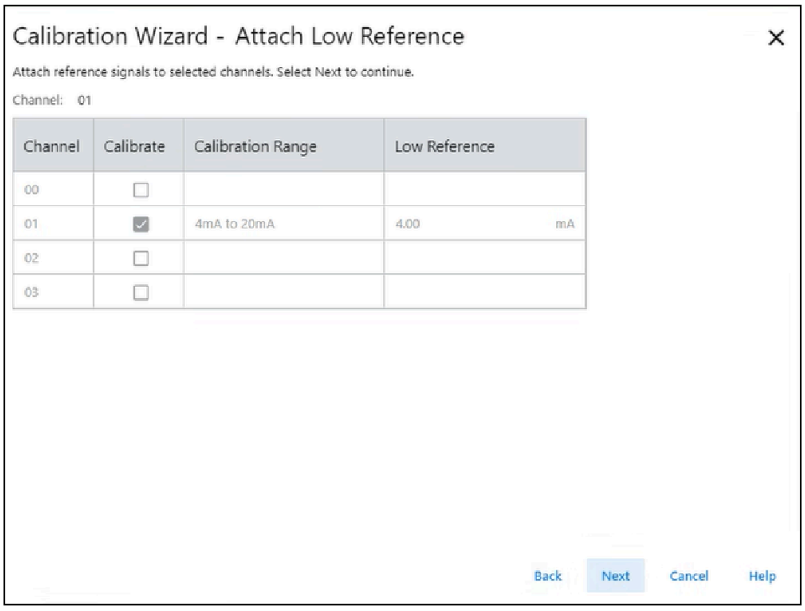
5. When the dialog appears to confirm that you want to calibrate the channel, select OK.



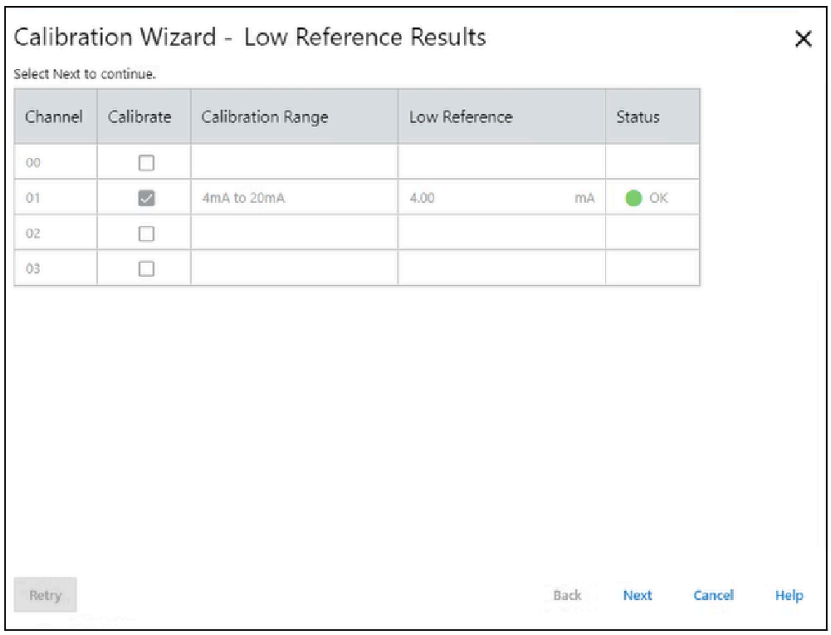
6. Select the channels one at a time or in groups to calibrate and then select Next.



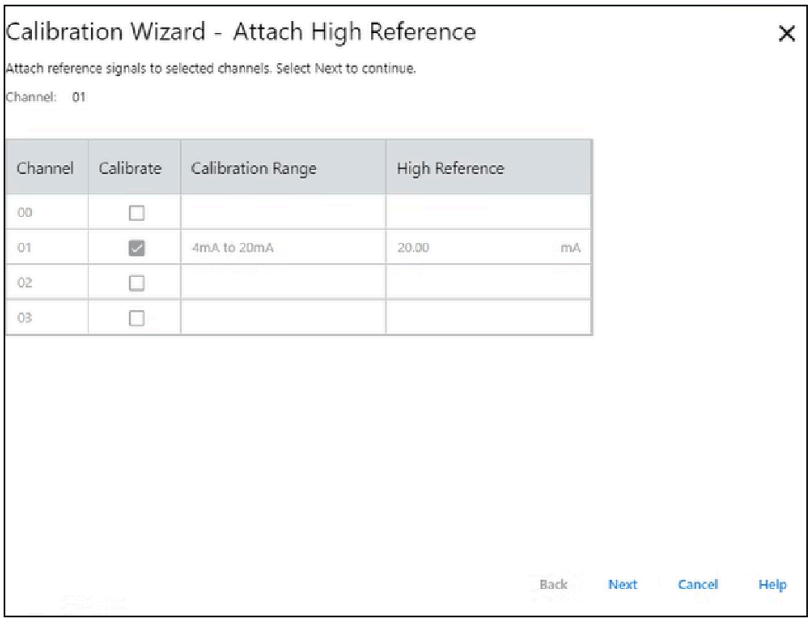
7. When the Attach Low Reference dialog appears, set the calibrator to the low reference and apply it to the channel.



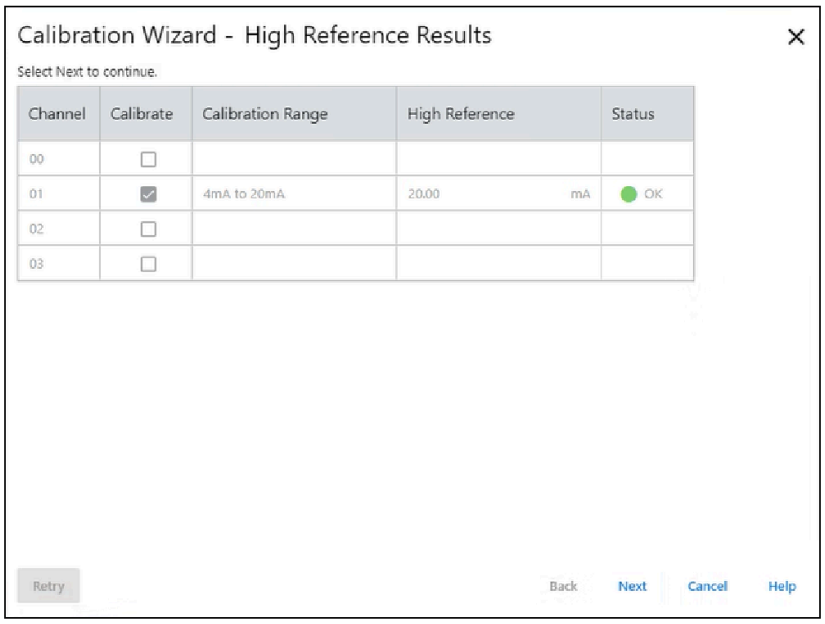
8. Select Next. The Low Reference Results dialog appears and indicates the status of the calibrated channel.



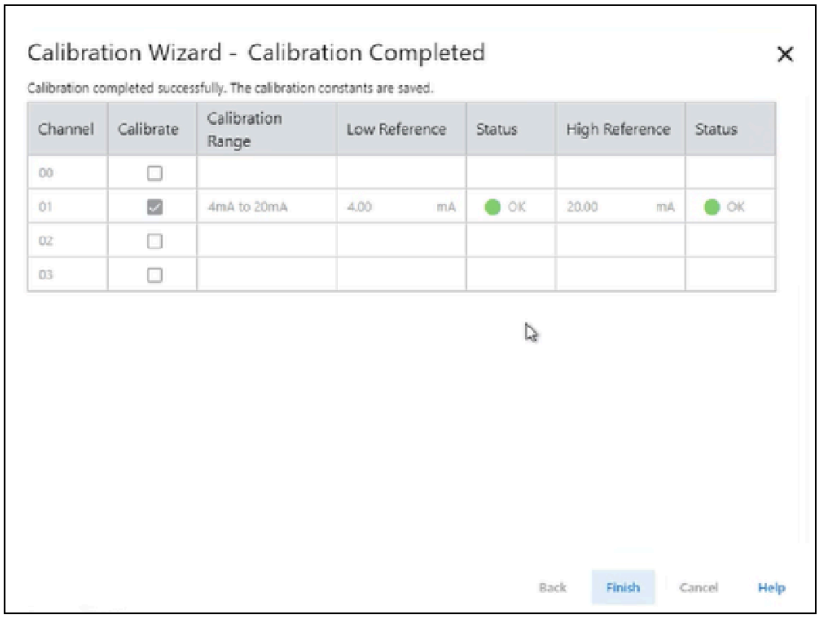
9. If the Status is OK, select Next. If the Status is not OK, repeat the calibration process.
10. When the Attach High Reference dialog appears, set the calibrator to the high reference and apply it to the channel.



11. Select Next. The High Reference Results dialog appears and indicates the status of the calibrated channel.



12. If the Status is OK, select Next. If the Status is not OK, repeat the calibration process.
13. When the Calibration Completed dialog appears, select Finish.



Use the Status Indicators for Troubleshooting

PointMax I/O modules use the following status indicators:

- SA Power Indicator - This indicator operates the same for all PointMax I/O modules.
- Module Status Indicator - This indicator operates the same for all PointMax I/O modules.
- Channel Status Indicator - This indicator operates differently based on the module type that you are using.

SA Power Indicator

Table 23. Interpret SA Power Indicator

Indicator State	Description	Recommended Action
Off	The module is not powered.	Complete the following actions: 1. Confirm that the system is powered. 2. Confirm that the module is installed properly.
Steady green	There is SA power to the module.	None
Steady red	There is no SA power to the module, or SA power voltage is not in the valid range.	Complete the following actions: 1. Confirm that SA power wiring is properly connected to the adapter, expansion power module, or 5034-MBSA mounting base. 2. Check the following: ◦ Check that the SA voltage is in the correct range. ◦ If an external power supply is used, confirm that the power supply is turned on. ◦ Make sure that the mounting base to mounting base connection is properly secured. Go to Chassis Information view in the Module Properties of the adapter to check the Field Power status of mounting bases installed in all slots.

Module Status Indicator

Table 24. Interpret Module Status Indicator

Indicator State	Description	Recommended Action
Off	The module is not powered.	Complete the following actions: 1. Confirm that the system is powered. 2. Confirm that the module is installed properly.
Steady green	The module is operational and all I/O connections are active.	None
Flashing green	The module has no I/O connections.	Troubleshoot your Studio 5000 Logix Designer application to determine what is preventing a connection from the module to the controller and correct the issue.

Table 24. Interpret Module Status Indicator (continued)

Indicator State	Description	Recommended Action
Flashing red	One of the following conditions exists: • A module firmware update is in progress. • A module firmware update attempt failed. • The device has experienced a recoverable fault. • A connection to the module has timed out.	Complete one of the following: • Let the firmware update process complete. • Reattempt a firmware update after one fails. • Use the Studio 5000 Logix Designer application to determine whether a module recoverable fault is occurred. It is shown in Device Information view. To clear a recoverable fault, complete one of the following: ◦ Cycle module power. ◦ Select Reset device in the Studio 5000 Logix Designer project via the Device Information view of the Module Properties dialog. If the fault does not clear after cycling power and module reset, contact Rockwell Automation Technical Support. • Use the Studio 5000 Logix Designer application to determine if a connection has timed out. The Connection view in the Module Properties indicates whether a connection request has timed out. If a connection has timed out, determine the cause and correct it. For example, a cable failure can cause a connection timeout.
Steady red	The module experienced a nonrecoverable fault.	Complete the following actions: 1. Cycle power to the module. 2. If the status indicator remains in the steady red state, replace the module.

Channel Status Indicators

Table 25. Interpret Analog Input Channel Status Indicators

Indicator State	Description	Recommended Action
Off	One of the following conditions exists: • The module is not powered. • The module is powered but connection is not established from the controller to module. • The module is powered, but the input channel is disabled.	Complete one of the following: • If you expect the module to be powered but it is not, complete the following: ◦ Confirm that the system is powered. ◦ Confirm that the module is installed properly. • If the module is powered but the channel is not operating as expected, use the Studio 5000 Logix Designer application to confirm that the channel is not disabled and the module has a connection to the controller. The Connection view in the Module Properties indicates if the connection is running or faulted. If the connection is faulted, the Connection view indicates error information. • If the channel is disabled, no action is needed.
Steady yellow	The input channel is operating normally.	None

Table 25. Interpret Analog Input Channel Status Indicators (continued)

Indicator State	Description	Recommended Action
Flashing red	One of the following conditions exists: • There is no SA power to the module, or SA power voltage is not in the valid range. • The input signal is overrange or underrange. The signal range is set in your Studio 5000 Logix Designer application project. • An Open Wire condition, that is, a wire is disconnected from the input channel.	Complete one of the following: • If there is a SA power fault, see the recommended action given for steady red indicator state in SA Power Indicator table above. • Check the input signal to determine if it is overrange or underrange. If so, make changes to return the input signal to within the range limits. • Check the wiring at the input channel. If necessary, reconnect the wire.
Flashing yellow/red	Calibration is in progress.	Successfully complete the calibration process.
Steady red	An issue has occurred that is internal to the module. The following are example issues that can cause the status indicator to be steady red: • A calibration fault occurred on the channel. • The module has experienced a nonrecoverable fault.	Complete one of the following: • If the indicator turns steady red after a calibration process, you can either perform a successful calibration or cycle the power to recover the fault. • If it is not caused by the calibration, cycle the power to recover the fault. If the condition is still present, replace the module.

Module Tag Definitions

Module tags are created when you add a module to the Studio 5000 Logix Designer application project.

The set of module tags associated with a module depends on the module type and Module Definition choices made during module configuration. For example, if you use a Listen Only connection in the Device Definition, the Studio 5000 Logix Designer application creates only Input tags for that module.

The tables contained in this section list all the tags available with a module. Not all tags in the list are used when that module type is added to a project. Tag use varies by module configuration.

Configuration Tag Definitions

Table 26. Configuration Tags

Name	Data Type	Definition	Valid Values
Chxx.Range	SINT	Channel's operating range	0 = -10...10V 1 = 0...5V 2 = 0...10V 4 = 0...20 mA 5 = 4...20 mA
Chxx.NotchFilter	SINT	Notch Filter removes line noise for the channel.	• 0 = 10 Hz • 16 = 20 Hz • 1 = 50 Hz • 2 = 60 Hz • 3 = 100 Hz • 4 = 200 Hz • 20 = 400 Hz • 5 = 500 Hz • 6 = 1,000 Hz • 8 = 5,000 Hz • 9 = 10,000 Hz • 10 = 15,625 Hz • 12 = 31,250 Hz
Chxx.AlarmDisable	BOOL	Disables all alarms on the channel. **IMPORTANT:** Consider the following: • If you change this tag to 0, that is, so that the alarms are not disabled, you must also enable the individual alarms for them to work. For example, if you want to use the Low Low Alarm for a channel, you must set the Chxx.AlarmDisable to 0 and set the Chxx.LLAlarmEn output tag to 1 so that the alarm is enabled. This applies to all alarms on the module. • Conversely, if you set this tag to 1, alarms are disabled regardless of the setting on the alarm enable tag for any alarm.	0 = Alarms are enabled 1 = Alarms are disabled
Chxx.ProcessAlarmLatchEn	BOOL	Configures Process alarms to latch until they are explicitly unlatched. The Process alarms include: • HighHigh Alarm • High Alarm • Low Alarm • LowLow Alarm	0 = Latching disabled 1 = Latching enabled
Chxx.RateAlarmLatchEn	BOOL	Configures the Rate Alarm to latch until it is explicitly unlatched.	0 = Latching disabled 1 = Latching enabled
Chxx.OpenWireEn	BOOL	Enables the input Open Wire diagnostic.	0 = Disabled 1 = Enabled

Table 26. Configuration Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.Disable	BOOL	Disables the channel. When a channel is disabled, the following occurs: • The I/O status indicator for the channel turns off. • The Chxx.Fault input tag is set to 1.	0 = Channel is enabled 1 = Channel is disabled
Chxx.TenOhmOffset	INT	Not Applicable	0
Chxx.DigitalFilter	INT	A non-zero value enables the filter, providing a time constant in milliseconds used in a first order lag filter to smooth the input signal.	0 = Filter is turned off Any value greater than zero = Filter value in milliseconds
Chxx.LowSignal	REAL	One of four points used in scaling. The low signal is in terms of the inputs signal units and corresponds to the low engineering term when scaled.	Any value less than the high signal in range.
Chxx.HighSignal	REAL	One of four points used in scaling. The high signal is in terms of the inputs signal units and corresponds to the high engineering term when scaled.	Any value greater than the low signal in range.
Chxx.LowEngineering	REAL	One of four points used in scaling. The low engineering helps determine the engineering units the signal values scale into. The low engineering term corresponds to the low signal value.	Any value
Chxx.HighEngineering	REAL	One of four points used in scaling. The high engineering helps determine the engineering units the signal values scale into. The high engineering term corresponds to the high signal value.	Any value
Chxx.LLAlarmLimit	REAL	The Low Low Alarm trigger point. Causes the Chxx.LLAlarm to trigger when the input signal moves beneath the configured trigger point. Value is in terms of engineering units.	Any value
Chxx.LAlarmLimit	REAL	The Low Alarm trigger point. Causes the ChxxLAlarm to trigger when the input signal moves beneath the configured trigger point. Value is in terms of engineering units.	Any value
Chxx.HAlarmLimit	REAL	The High Alarm trigger point. Causes the ChxxHAlarm to trigger when the input signal moves above the configured trigger point. Value is in terms of engineering units.	Any value
Chxx.HHAlarmLimit	REAL	The High High Alarm trigger point. Causes the ChxxHHAlarm to trigger when the input signal moves above the configured trigger point. Value is in terms of engineering units.	Any value
Chxx.RateAlarmLimit	REAL	The Rate Alarm trigger point. Causes the ChxxRateAlarm to trigger when the input signal changes at a rate faster than the configured Rate Alarm. Configured in Engineering Units per second.	0 = Rate Alarm is not used Any value greater than zero = Trigger point
Chxx.AlarmDeadband	REAL	Allows a process alarm to remain set, despite the alarm condition disappearing, as long as the input data remains within the deadband of the process alarm. The deadband value is subtracted from the High and High High Alarm Limits to calculate the deadband thresholds for these alarms. The deadband value is added to the Low and Low Low Alarm Limits to calculate the deadband thresholds for these alarms.	Any non-negative value

Input Tag Definitions

Table 27. Input Tags

Name	Data Type	Definition	Valid Values
RunMode	BOOL	Channel's operating state	0 = Idle 1 = Run When the value is 0, it means one of the following: • Connection is not up. • Connection has been opened but the module has not started producing data for the connection. • Module is not applying new Output tag data because the controller is in Program Mode. When the value is 1, it means the following: • Connection is up. • Module is producing data for the connection. • Output tag data is being applied.
ConnectionFaulted	BOOL	Indicates if a connection is running. The module sets this tag to 0 when connected. If the module is not connected, it changes the tag to 1.	0 = A connection exists between the module and the controller 1 = Connection is timed out or inhibited
DiagnosticActive	BOOL	Indicates if any diagnostics are active or if the prognostics threshold is reached.	0 = No diagnostics are active 1 = One or more diagnostics are active or the prognostics threshold is reached.
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.	-128...+127 The value of 0 is skipped except during module powerup.
Chxx.Fault	BOOL	Indicates that channel data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = No fault exists 1 = Fault exists
Chxx.Uncertain	BOOL	Indicates that the channel data can be inaccurate but the degree of inaccuracy is not known. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = Valid data 1 = Data validity uncertain
Chxx.OpenWire	BOOL	The signal wire is disconnected from the channel or the RTB is removed from the module.	0 = Open wire condition does not exist or open wire detection is disabled 1 = Open wire condition exists, which means the signal wire is disconnected from the channel or the RTB is removed from the module
Chxx.OverTemperature	BOOL	Not applicable for this module.	N/A
Chxx.FieldPowerOff	BOOL	Field power is not present at the channel.	0 = Field power is present 1 = Field power is not present

Table 27. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.NotANumber	BOOL	Indicates if the last received channel data was not a number.	0 = Last channel data received was a number 1 = Last channel data received was not a number
Chxx.Underrange	BOOL	Indicates that the channel data is beneath the underrange threshold for this channel. For example, when the channel operates in the 4...20 mA input range, the underrange threshold on the channel is <3.0 mA. If the input signal is 0 mA, this tag is set to 1.	0 = Channel data is not beneath the underrange threshold 1 = Channel data is beneath the underrange threshold
Chxx.Overrange	BOOL	Indicates that the channel data is above the overrange threshold for this channel. For example, when the channel operates in the 4...20 mA output range, the overrange threshold on the channel is >23.0 mA. If the input signal is 24 mA, this tag is set to 1.	0 = Channel data is not above the overrange threshold 1 = Channel data is above the overrange threshold
Chxx.LLAlarm	BOOL	Triggered when the input data value is less than the Low Low Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is greater than the Low Low Limit plus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.LAlarm	BOOL	Triggered when the input data value is less than the Low Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is greater than the Low Limit plus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.HAlarm	BOOL	Triggered when the input data value is greater than the High Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is less than the High Limit minus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.HHAlarm	BOOL	Triggered when the input data value is greater than the High High Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is less than the High High Limit minus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.RateAlarm	BOOL	Triggered when the change between consecutive channel samples divided by the period of time between when the samples were taken exceeds the Rate Alarm. If latched, this tag remains set until it is unlatched.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.CalFault	BOOL	Indicates that the last attempted Calibration for this channel failed or there is no calibration data present. This tag is cleared, that is, set to 0, when power is cycled to the module or a successful calibration for the range on the channel is performed.	0 = Calibration did not fail 1 = Calibration failed
Chxx.Calibrating	BOOL	Indicates that the channel is currently being calibrated.	0 = Channel is not being calibrated 1 = Channel is being calibrated

Table 27. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.CalGoodLowRef	BOOL	Indicates that a valid Low Reference signal is sampled on this channel in the calibration process. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Valid Low Reference signal has not been sampled on this channel 1 = Valid Low Reference signal has been sampled on this channel
Chxx.CalBadLowRef	BOOL	Indicates that an invalid Low Reference signal is sampled on this channel in the calibration process. You must correct this condition to successfully calibrate the module. If calibration is aborted with an invalid Low Reference signal, the Chxx.CalFault tag is set for this channel until a successful calibration is performed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Invalid Low Reference signal has not been sampled on this channel 1 = Invalid Low Reference signal has been sampled on this channel
Chxx.CalGoodHighRef	BOOL	Indicates that a valid High Reference signal is sampled on this channel in the calibration process. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Valid High Reference signal has not been sampled on this channel 1 = Valid High Reference signal has been sampled on this channel
Chxx.CalBadHighRef	BOOL	Indicates that an invalid High Reference signal is sampled on this channel in the calibration process. You must correct this condition to successfully calibrate the module. If calibration is aborted with an invalid High Reference signal, the Chxx.CalFault tag is set for this channel until a successful calibration is performed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Invalid High Reference signal has not been sampled on this channel 1 = Invalid High Reference signal has been sampled on this channel

Table 27. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.CalSuccessful	BOOL	Indicates calibration on this channel is complete and the Calibrating state has been exited. This tag remains set after valid calibration and until a new calibration process is started or the connection is closed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Calibration was not successful 1 = One of the following: • Calibration was successful and calibrating state has been exited. • Calibration data is present and applied.
Chxx.Data	REAL	Channel data in scaled Engineering Units.	Any value
Chxx.RollingTimestamp	INT	Continuously-running 15-bit timer that counts in milliseconds. Whenever an input module scans its channels, it also records the value of RollingTimestamp at that time. The user program uses the last two RollingTimestamp values and calculates the interval between receipt of data.	0...32,767

Output Tag Definitions

Table 28. Output Tags

Name	Data Type	Definition	Valid Values
Chxx.LLAlarmEn	BOOL	Enables the Low Low alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Enable alarm 1 = Disable alarm
Chxx.LAlarmEn	BOOL	Enables the Low alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Enable alarm 1 = Disable alarm

Table 28. Output Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.HAlarmEn	BOOL	Enables the High alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Enable alarm 1 = Disable alarm
Chxx.HHAlarmEn	BOOL	Enables the High High alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Enable alarm 1 = Disable alarm
Chxx.RateAlarmEn	BOOL	Enables the Rate alarm. **IMPORTANT:** To use this alarm, you must not only set the tag to 1. You must also make sure the Chxx.AlarmDisable configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Enable alarm 1 = Disable alarm
Chxx.LLAlarmUnlatch	BOOL	Unlatches a latched Low Low Alarm at the first instance of the bit transitioning from 0 to 1.	0 = Low Low Alarm remains latched 1 = Low Low Alarm unlatched
Chxx.LAlarmUnlatch	BOOL	Unlatches a latched Low Alarm at the first instance of the bit transition from 0 to 1.	0 = Low Alarm remains latched 1 = Low Alarm unlatched
Chxx.HAlarmUnlatch	BOOL	Unlatches a latched High Alarm at the first instance of the bit transition from 0 to 1.	0 = High Alarm remains latched 1 = High Alarm unlatched
Chxx.HHAlarmUnlatch	BOOL	Unlatches a set High High Alarm at the first instance of the bit transition from 0 to 1.	0 = High High Alarm remains latched 1 = High High Alarm unlatched
Chxx.RateAlarmUnlatch	BOOL	Unlatches a set Rate Alarm at the first instance of the bit transition from 0 to 1.	0 = Rate Alarm remains latched 1 = Rate Alarm unlatched
Chxx.Calibrate	BOOL	Initiates the Calibration process. This tag must remain set until a valid Low Reference and High Reference values are applied to the input. If the tag value transitions to 0 before calibration is finished, the process stops and calibration fails.	0 = Not to start calibration process 1 = Start calibration process

Table 28. Output Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.CalLowRef	BOOL	Rising edge triggers the Low Calibration at the Low Reference Point for the current input range value. A valid Low Reference signal must be connected to the channel before setting this tag. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Module does not start low reference sampling 1 = Module starts low reference sampling
Chxx.CalHighRef	BOOL	Rising edge triggers a High Calibration at the High Reference Point for the current input range value. A valid High Reference signal must be connected to the channel before setting tag. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Module does not start high reference sampling 1 = Module starts high reference sampling
Chxx.SensorOffset	REAL	Compensates for any known offset error on the sensor or channel to which the sensor is connected. In terms of engineering units. The value of this tag is added to the measured value in engineering units and is used in the Chxx.Data input tag.	Any valid float value 0.0 = Default (We recommend that you use a value in the channel's operating range.)

Diagnostic Assembly

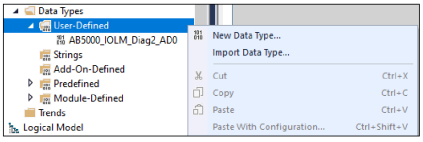
Diagnostic assembly helps you troubleshoot and diagnose the fault in your system.

Create User-defined Diagnostic Assembly Types

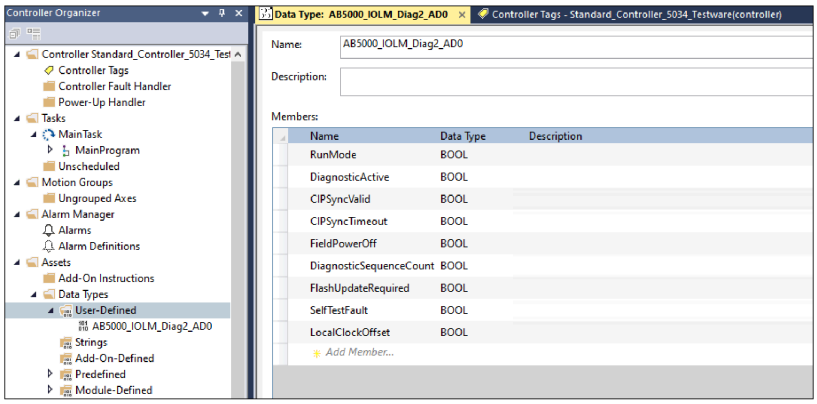
You can use the Studio 5000 Logix Designer application to create user-defined Diagnostic Assembly types.

Create user-defined diagnostic assembly by following the below steps:

1. From the Controller Organizer pane, go to Assets → Data types → User-Defined.
2. Right-click on the User-Defined folder and select New Data Type.



3. Add a Name and Description (optional) for your diagnostic assembly.
4. Under Members area, add the data members based on the diagnostic assembly detailed below.



IMPORTANT: The members indicated in the tables are arranged according to Data Alignment Rules of controllers. Strictly follow the data type and the sequence of the members that are indicated in the tables of this appendix. If the data type and the sequence are not followed, data misalignment may occur after executing Get Attribute Single Message (MSG) instruction.

Diagnostic Assemblies

1. Diagnostic Assembly for Analog 4 Channel Input Module
   - Instance ID: 0x801D (32797)
   - Size = 336 bytes

   Follow the information in the following table to add each member.

Table 29. Diagnostic Assembly Instance 32797

Name	Date Type	Size in Bytes
RunMode	BOOL	1
Infobit_Pad1	BOOL	
DiagnosticActive	BOOL	
CIPSyncValid	BOOL	
CIPSyncTimeout	BOOL	
Infobit_Pad5	BOOL	
FieldPowerOff	BOOL	
Infobit_Pad7	BOOL	
DiagnosticSequenceCount	SINT	1
Diagbit_Pad0	BOOL	2
Diagbit_Pad1	BOOL	
Diagbit_Pad2	BOOL	
Diagbit_Pad3	BOOL	
Diagbit_Pad4	BOOL	
Diagbit_Pad5	BOOL	
Diagbit_Pad6	BOOL	
Diagbit_Pad7	BOOL	
Diagbit_Pad8	BOOL	
Diagbit_Pad9	BOOL	
Diagbit_Pad10	BOOL	
Diagbit_Pad11	BOOL	
FlashUpdateRequired	BOOL	
SelfTestFault	BOOL	
Diagbit_Pad14	BOOL	
Diagbit_Pad15	BOOL	
Pad	DINT	4
LocalClockOffset	LINT	8

Name	Date Type	Size in Bytes
LocalClockOffsetTimestamp	LINT	8
GrandMasterClockID	SINT[8]	8
FieldPowerOnTimestamp	LINT	8
FieldPowerOffTimestamp	LINT	8
Ch00	Diagnostic_Channel_Structure	72
Ch01	Diagnostic_Channel_Structure	72
Ch02	Diagnostic_Channel_Structure	72
Ch03	Diagnostic_Channel_Structure	72

2. Diagnostic Counters Assembly for I/O
   - Instance ID: 0x301 (769)
   - Size = 16 bytes

Follow the information in the following table to add each member.

Table 30. Diagnostic Assembly Instance 769

Name	Date Type	Size in Bytes
RunMode	BOOL	1
Infobit_Pad1	BOOL	
DiagnosticActive	BOOL	
Infobit_Pad3	BOOL	
Infobit_Pad4	BOOL	
Infobit_Pad5	BOOL	
Infobit_Pad6	BOOL	
Infobit_Pad7	BOOL	
DiagnosticSequenceCount	SINT	1
CIPConnections	INT	2
CIPLostPackets	DINT	4
CIPTimeouts	DINT	4
CPUUtilization	INT	2
Pad	INT	2

Diagnostic Channel

1. Diagnostic Channel
   - Size = 72 bytes

This data type is retrieved as part of the diagnostic assembly instance.

Follow the information in the following table to add each member.

Table 31. 5034-IF4 Diagnostic Channel Structure

Name	Date Type	Size in Bytes
Databit_Pad0	BOOL	2
Fault	BOOL	
Uncertain	BOOL	
OpenWire	BOOL	
Databit_Pad4	BOOL	
Databit_Pad5	BOOL	
FieldPowerOff	BOOL	
Databit_Pad7	BOOL	
Disabled	BOOL	
Databit_Pad10	BOOL	
Databit_Pad11	BOOL	
Databit_Pad12	BOOL	
Databit_Pad13	BOOL	
Databit_Pad14	BOOL	
Databit_Pad15	BOOL	

Name	Date Type	Size in Bytes
CalFault	BOOL	2
Underrange	BOOL	
Overrange	BOOL	
Diagbit_Pad3	BOOL	
Diagbit_Pad4	BOOL	
Diagbit_Pad5	BOOL	
Diagbit_Pad6	BOOL	
Diagbit_Pad7	BOOL	
Diagbit_Pad8	BOOL	
Diagbit_Pad9	BOOL	
Diagbit_Pad10	BOOL	
Diagbit_Pad11	BOOL	
Diagbit_Pad12	BOOL	
Diagbit_Pad13	BOOL	
Diagbit_Pad14	BOOL	
Diagbit_Pad15	BOOL	
Pad1	INT	2
InternalErrorCount	SINT	1
CalRange	SINT	1
CalOffset	REAL	4
CalGain	REAL	4
CalLastDate	LINT	8
OpenWireTimestamp	LINT	8
Pad2	LINT	8
UnderrangeTimestamp	LINT	8
OverrangeTimestamp	LINT	8
FieldPowerOnTimestamp	LINT	8
FieldPowerOffTimestamp	LINT	8

Definitions for Diagnostic Assembly Types

Table 32. Definition of Members in Diagnostic Assembly Data Types

Name	Data Type	Definition	Valid Values
RunMode	BOOL	Channel's operating state	• 0 = Idle • 1 = Run Idle – The connection is up and the module is producing data for the connection and output tag data is being applied. Run - One of the following is present: • The connection is not up. • The connection is opened but the module has not started producing data for the connection. • The module is not applying new output tag data because the controller is in Program Mode.
DiagnosticActive	BOOL	Indicates if any diagnostics are active or if the prognostics threshold is reached.	0 = No diagnostics active 1 = One or more diagnostics are active or the prognostics threshold is reached.
CIPSyncValid	BOOL	Indicates if the module is synced with a 1588 master.	• 0 = Module is not synced • 1 = Module is synced
CIPSyncTimeout	BOOL	Indicates if the module was once synced with a 1588 master, but is not now due to a timeout	• 0 = A valid time master has not timed out. • 1 = A valid time master is detected on the backplane, but the time master has timed out. The module is using its local clock and can be drifting away from the last known time master.
FieldPowerOff	BOOL	Field power is not present at the channel.	0 = Field power is present 1 = Field power is not present
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.	-128...+127 The value of 0 is skipped except during module power-up.
FlashUpdateRequired	BOOL	Indicates whether flash update is required.	• 0 = Flash update is not required • 1 = Module has no application firmware
SelfTestFault	BOOL	Indicate whether the fault is present during module self-test.	• 0 = Module initialization code did not detect an error • 1 = Module initialization code detected an error
LocalClockOffset	LINT	The offset from the local clock to the system time. This value helps to detect steps in time. This value updates when a PTP update is received.	Any value

Table 32. Definition of Members in Diagnostic Assembly Data Types (continued)

Name	Data Type	Definition	Valid Values
LocalClockOffsetTimestamp	LINT	Indicates the timestamp of the local clock offset.	A valid time or None if there is no recorded event time. Time format is YYYY-MMDD-HH:mm:SS_mmm_uuu_nnn(UTC-00:00) • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds • uuu = microseconds • nnn = nanoseconds • UTC-00:00 = Time zone
GrandMasterClockID	SINT	The EUI-64 Identity of the CIP Sync Grandmaster clock the module is synced to.	Any value
FieldPowerOnTimestamp	LINT	Indicates the timestamp of the last time field power turned on.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
FieldPowerOffTimestamp	LINT	Indicates the timestamp of the last time field power turned off.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
Fault	BOOL	Indicates that channel data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.	0 = No fault exists 1 = Fault exists The typical causes of a fault are the following: • ◦ Channel is disabled ◦ Open Wire condition ◦ Underrange/Overrange condition ◦ SA power loss condition You must troubleshoot the module first to see if the typical causes exist.
Uncertain	BOOL	Indicates that the channel data can be inaccurate but the degree of inaccuracy is not known. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.	0 = Valid data 1 = Data validity uncertain

Table 32. Definition of Members in Diagnostic Assembly Data Types (continued)

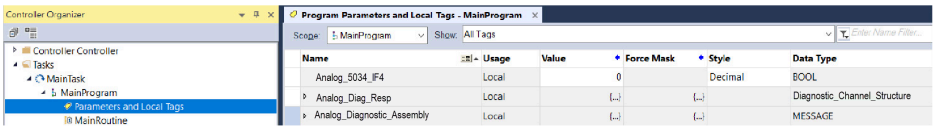
Name	Data Type	Definition	Valid Values
OpenWire	BOOL	The signal wire is disconnected from the channel or the RTB is removed from the module.	0 = Open wire condition does not exist or open wire detection is disabled. 1 = Open wire condition exists, that means the signal wire is disconnected from the channel or the RTB is removed from the module.
CalFault	BOOL	Indicates the last attempted Calibration for this channel failed or there is no calibration data present. This tag is cleared, that is, set to 0, when power is cycled to the module.	• 0 = Calibration did not fail • 1 = Calibration failed
Underrange	BOOL	Indicates the channel data is beneath the underrange threshold for this channel. For example, when the channel operates in the 4...20 mA input range, the underrange threshold on the channel is < 3.0 mA. If the input signal is 0 mA, this tag is set to 1.	0 = Channel data is not beneath the underrange threshold 1 = Channel data is beneath the underrange threshold
Overrange	BOOL	Indicates the channel data is above the overrange threshold for this channel. For example, when the channel operates in the 4...20 mA output range, the overrange threshold on the channel is > 23.0 mA. If the input signal is 24 mA, this tag is set to 1.	0 = Channel data is not above the overrange threshold 1 = Channel data is above the overrange threshold
CalRange	SINT	Indicates the value currently configured for the channel. Values display according to the Input Type selected.	• 0 = -10...10V • 1 = 0...5V • 2 = 0...10V • 4 = 0...20 mA • 5 = 4...20 mA
CalOffset	REAL	Indicates the offset in signal units as reported by the device.	Any value
CalGain	REAL	Indicates the calibration gain reported by the device.	Any value
CalLastDate	LINT	Indicates the time of the last calibration date for the channel.	Any value
OpenWireTimestamp	LINT	Indicates the timestamp of the last time when the open wire condition is detected.	A valid time or None if there is no recorded event time.
UnderrangeTimestamp	LINT	Indicates the timestamp of the last underrange fault.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds

Table 32. Definition of Members in Diagnostic Assembly Data Types (continued)

Name	Data Type	Definition	Valid Values
OverrangeTimestamp	LINT	Indicates the timestamp of the last overrange fault.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
CIPConnections	INT	Indicates the number of CIP connections currently open.	0...24
CIPLostPackets	DINT	Indicates the running sum of the number of Sequenced Address Item Sequence Numbers that are skipped in Class 0 and Class 1 connections consumed by the adapter and its children.	0...2,147,483,647
CIPTimeouts	DINT	Indicates the running count of the number of connections that time out, both originated and targeted, to and through the adapter.	0...2,147,483,647
CPUUtilization	INT	Indicates the usage of the compute engine.	0...100%

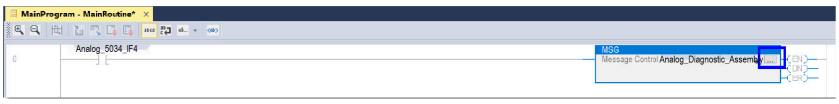
Create Message Type User Tags

Create MESSAGE type user tags for requests and associated response user tags for each of the new user-defined diagnostic assembly types.



From the Controller Organizer pane, expand Tasks → MainTask → MainProgram:

1. Create MESSAGE type user tags for each request.
2. Create associated response user tags for each new user-defined diagnostic assembly type.
3. Add the user tags to your ladder program.



4. Expand the message tag to open the message configuration dialog.
5. On the Configuration tab, select:
   - Service type: Get Attribute Single
   - Class: 4
   - Attribute: 3

- Instance:
  - **5034-IF4 and 5034-IF4XT**
    0x801D (32797) Diagnostic Assembly for Analog 4 Channel Input Module
    0x301 (769) Diagnostic Counters Base I/O Assembly
- Destination element: User-defined data type suitable for the instance entered.

6. On the Communication tab, select the path to the module that you wish to send the messages to.
7. Download the project and set to Run Mode.

   You can monitor the user-defined tag values from the Program Parameters and Local Tags window, under the MainProgram task in the Controller Organizer pane.

5034-IF8C and 5034-IF8CXT Details

This chapter covers the detailed instructions on how to configure, calibrate, and troubleshoot your 5034-IF8C and 5034-IF8CXT modules. It also describes the module tag definitions for input, output, and configuration tags.

Module Configuration

Before you start configuring your I/O module, you must create a Studio 5000 Logix Designer application project for the Logix 5000 controller that owns the PointMax I/O modules. See Add a New Module to a Studio 5000 Logix Designer Application Project on page 41 for more information. The project includes module configuration data for the PointMax I/O modules.

The Studio 5000 Logix Designer application transfers the project to the owner-controller during the program download. Data is then transferred to the PointMax I/O modules when the connection is established. The PointMax I/O modules can operate immediately after receiving and applying the configuration data.

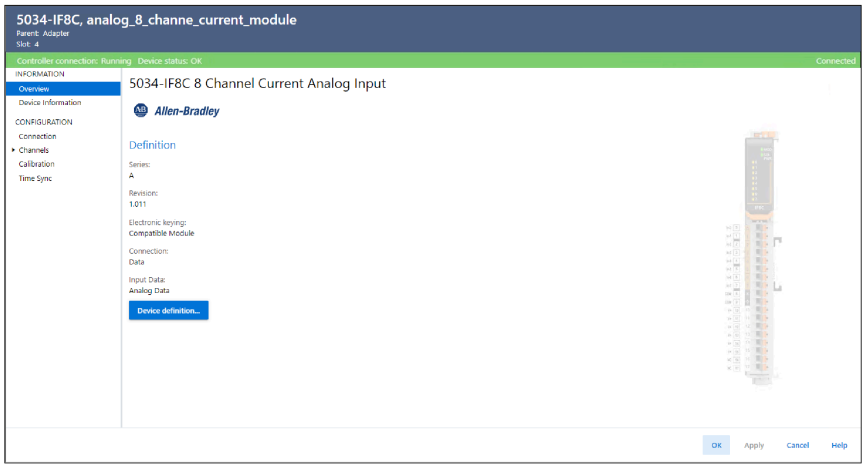
IMPORTANT: You must use Studio 5000 Logix Designer application version 36 or later.

Overview View

When you create a module or open the Module Properties, the Overview view appears first. Use Overview to view the definition of a device, including the device type, revision, electronic keying, connection, and other device-specific values.

To change the definition of a device, select the Device definition in the Overview view.

Figure 21. Overview View Example



Device Definition Dialog

Figure 22. Device Definition Dialog Example

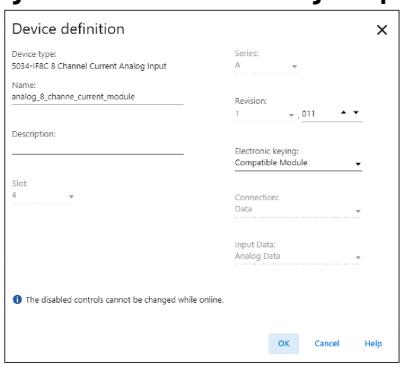


Table 33. Device Definition Parameters

Parameter	Definition	Available Choices
Device Type	Displays the device catalog number and type.	Device-specific
Name	Enter an IEC 61131 compliant device name. If an invalid character is entered in this field, or if the name exceeds 40 characters, the software ignores the character.	All valid values
Description	Enter the description of the device.	All valid values
Slot	Specify the slot number where the device resides. Only slots between 1 and the maximum number of I/O devices are valid depending on the platform. When the device is created, the slot number defaults to the first available slot position. When the controller is changed to one supporting a smaller maximum I/O count, the current slot value may no longer be valid.	1...32
Series	Specifies the module hardware series.	Device-specific

Table 33. Device Definition Parameters (continued)

Parameter	Definition	Available Choices
Revision	Specifies the major and minor revisions of the device. The valid range for minor revision is from 1...255.	Device-specific
Electronic Keying	Defines the electronic keying used for the device. Electronic keying compares the device defined in the project to the installed device. If keying fails, a fault occurs. For detailed information on Electronic keying, see Electronic Keying in Logix 5000 Control Systems Application Technique, publication LOGIX-AT001	• Exact Match • Compatible Module • Disable Keying  **ATTENTION:** Be extremely cautious when using Disable Keying; if used incorrectly, this option can lead to personal injury or death, property damage, or economic loss. We strongly suggest that you do not use Disable Keying. If you use Disable Keying, you must take full responsibility for understanding whether the device being used can fulfill the functional requirements of the application.
Connection	Determines the following for the module type you configure: • Available configuration parameters • Data type transferred between the module and the controller • Which tags are generated when configuration is complete For the Listen Only Data choice, the controller and device establish communication without the controller sending any configuration or output data to the device. A full input data connection is established but depends on the connection between the owner-controller and the device.	• Data with Calibration • Data (default) • Listen Only
Input Data	Selects the input data type for the device.	Analog Data

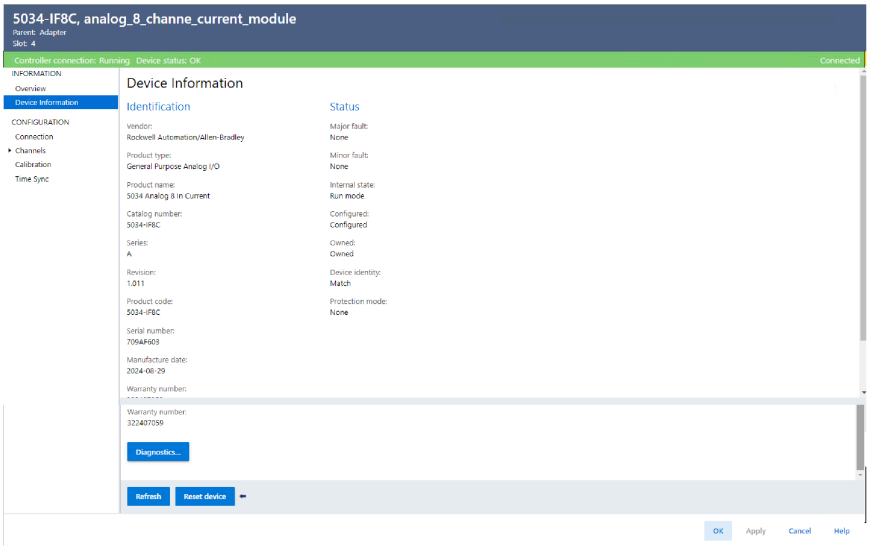
Device Information View

Use Device Information to view device and status information when the device is online. You can use this view to complete the following:

- Determine the identity of the device.
- View the device's current operational state.
- View whether the device was configured by the owner controller.
- View whether an owner controller is currently connected to the device.
- Retrieve the latest information from the device.
- Reset a device to its power-up state.

- If supported, view the Protection Mode of the device.
- Access device diagnostics

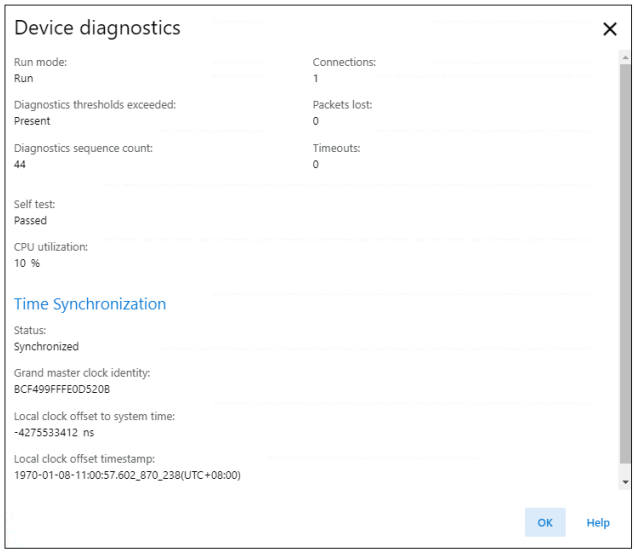
Figure 23. Device Information View Example



Device Diagnostics

To view the device diagnostics, select Diagnostics in the Device Information view. It displays the diagnostics information of the module.

Figure 24. Device Diagnostics Dialog Example



Connection View

The Connection view lets you complete the following tasks:

- Set the RPI rate. For more information, see Requested Packet Interval on page 16.
- Select Unicast or Multicast connection to use on the EtherNet/IP network. For more information, see Unicast or Multicast Connection on page 19.

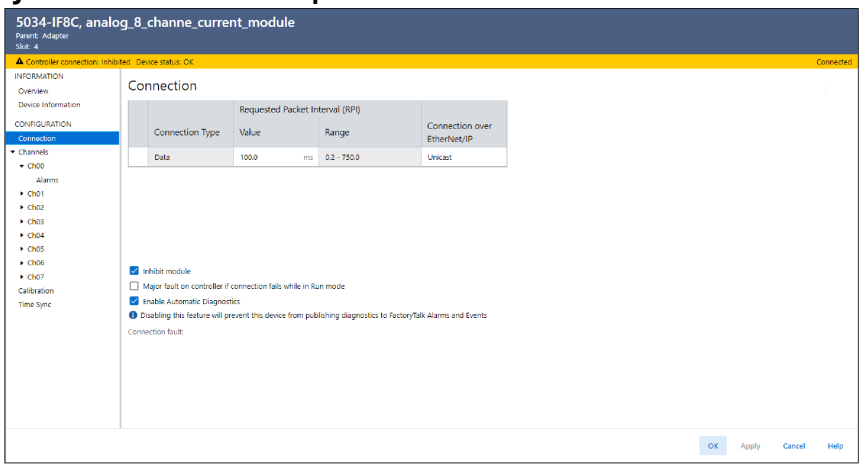
- View the reason of Connection Fault.

  If there is a connection fault, Connection Fault area displays the error code with description that helps you to troubleshoot the module. For more information, see Troubleshoot Your Module on page 45.

- Inhibit the module. For more information, see Module Inhibiting on page 17.
- Configure fault response for connection failure while the controller is in Run Mode.
- Enable or disable the Automatic Diagnostics.

  ATTENTION: If you do not enable Automatic Diagnostics, the device does not publish diagnostics to FatoryTalk Alarms and Events.

Figure 25. Connection View Example



Recommended Minimum RPI Values for Notch Filters

In the following table, each Notch Filter setting has two recommended minimum module RPI values that allow the required time to collect samples from each channel. One setting provides faster sample speed and the other provides slightly better resolution at slower sample speeds.

Table 34. Notch Filter and Recommended Minimum Module RPI Values

Notch Filter (Hz)	Recommended Minimum Module RPI Value			
	Application That is Configured With Only One Channel Enabled		Application With All Channels Enabled and Using the Same Notch Filter Setting on All Channels	
	Faster Sampling Speed (ms)	Better Noise Rejection (ms)	Faster Sampling Speed (ms)	Better Noise Rejection (ms)
10	106	316	422	NA
20	53.1	158.1	212	632
50	22	64	86	254
60 (default)	18.3	53.2	72	212
100	11.2	32.1	44	127
200	5.9	16.4	22.2	65
400	3.5	8.6	12	33
500	2.8	6.9	9.3	26.5
1000	1.7	3.8	5.2	13.5
5000	1.0	1.3	2.2	3.3
10000	0.7	0.9	1.7	2.1
15625	0.8	0.8	1.7	1.7

Table 34. Notch Filter and Recommended Minimum Module RPI Values (continued)

Notch Filter (Hz)	Recommended Minimum Module RPI Value			
	Application That is Configured With Only One Channel Enabled		Application With All Channels Enabled and Using the Same Notch Filter Setting on All Channels	
	Faster Sampling Speed (ms)	Better Noise Rejection (ms)	Faster Sampling Speed (ms)	Better Noise Rejection (ms)
31250	0.4	0.6	1.2	1.5

Minimum RPI Calculation When Using Different Notch Filter Selections

When input channels on the same module use different Notch Filter selections, you must consider the sample time for each channel. This helps you to find the recommended RPI that provides enough time for sampling all channels.

The eight input channels on the module are grouped into two groups. Channels 00...03 are grouped, and channels 04...07 are grouped. When you determine the recommended minimum module RPI value, remember:

- The recommended minimum module RPI value when channels use different Notch Filter selections is determined by group.

  The recommended minimum RPI rates for all enabled channels added together. If any channel in the other group is enabled, the recommended minimum RPI rate for each enabled channel is increased by 0.2 ms.

- If the groups have different recommended minimum RPI values, use the higher RPI value when you configure the module.

Table 35. Example Application That Requires Faster Sampling Speed

Channel Group	Channel	Notch Filter (Hz)	Recommended Minimum Module RPI for Each Channel (ms)(1)	Recommended Minimum Module RPI (ms)	Recommended Minimum Module RPI to Use in Module Configuration (ms)
Grouped together	Ch00	50	22.2	24.7	74.0
	Ch01	1000	1.9		
	Ch02 - Disabled	N/A	N/A		
	Ch03	31250	0.6		
Grouped together	Ch04	60	18.5	74.0	
	Ch05	60	18.5		
	Ch06	60	18.5		
	Ch07	60	18.5		

(1) The values in this column represent the corresponding recommended minimum RPI value listed in Table 34: Notch Filter and Recommended Minimum Module RPI Values on page 86 with an additional 0.2 ms added to it because at least one channel is enabled in the other group.

Table 36. Example Application That Requires Better Noise Rejection

Channel Group	Channel	Notch Filter (Hz)	Recommended Minimum Module RPI for Each Channel (ms)(1)	Recommended Minimum Module RPI (ms)	Recommended Minimum Module RPI to Use in Module Configuration (ms)
Grouped together	Ch00	50	64.2	69.0	213.6
	Ch01	1000	4		
	Ch02 - Disabled	N/A	N/A		
	Ch03	31250	0.8		
Grouped together	Ch04	60	53.4	213.6	
	Ch05	60	53.4		

Table 36. Example Application That Requires Better Noise Rejection (continued)

Channel Group	Channel	Notch Filter (Hz)	Recommended Minimum Module RPI for Each Channel (ms)(1)	Recommended Minimum Module RPI (ms)	Recommended Minimum Module RPI to Use in Module Configuration (ms)
	Ch06	60	53.4		
	Ch07	60	53.4		

(1) The values in this column represent the corresponding recommended minimum RPI value listed in Table 34: Notch Filter and Recommended Minimum Module RPI Values on page 86 with an additional 0.2 ms added to it because at least one channel is enabled in the other group.

Channels View

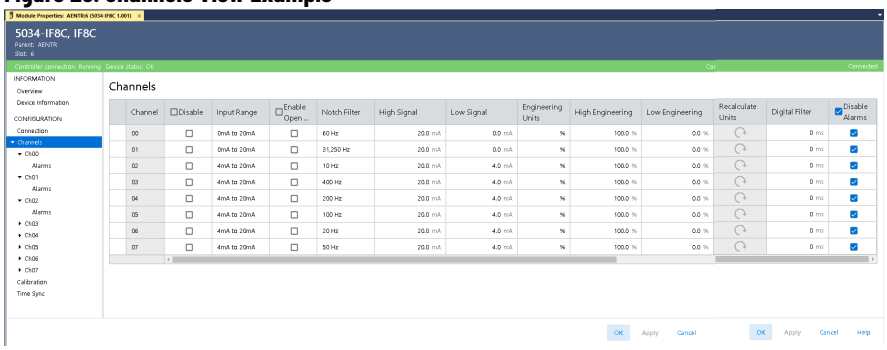
The Channels view shows an overview of the configuration values for all module channels.

Not all channel configurations are included in Channels view. To view or change the complete set of the channel configuration and also to view the diagnostics information for the channel, use Chxx view.

You can do the following actions on this view for all the channels:

- Disable the channel, if desired
- Change the input type
- Set the notch filter
- Enable or disable open wire detection
- Set the scaling and recalculate all configurations with engineering unit
- Set digital filter
- Disable alarms

Figure 26. Channels View Example



Chxx View

The Chxx view, where xx represents the channel number, shows the configuration options available for the respective channel.

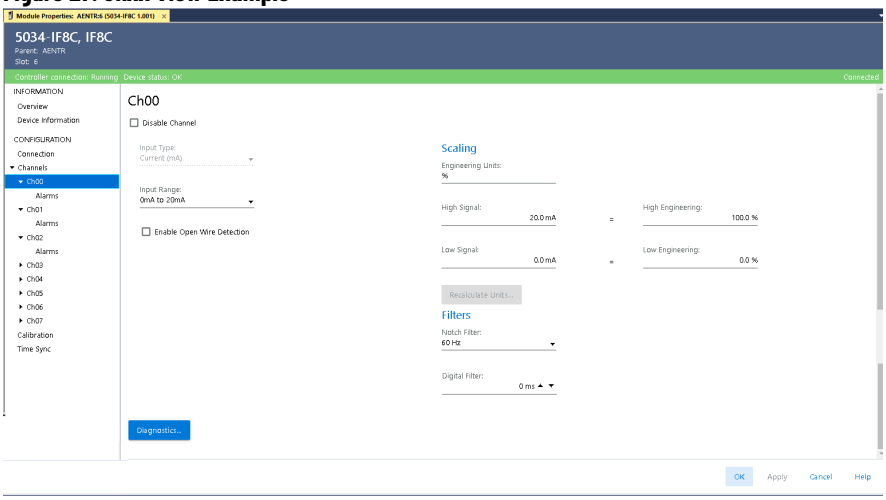
You can do the following actions on this view:

- Disable the channel, if desired
- Change the input type
- Set the notch filter
- Enable or disable open wire detection
- Set the scaling and recalculate all configurations with engineering unit

- Set digital filter
- View channel diagnostics information

To latch and configure alarm parameters, go to Alarms view.

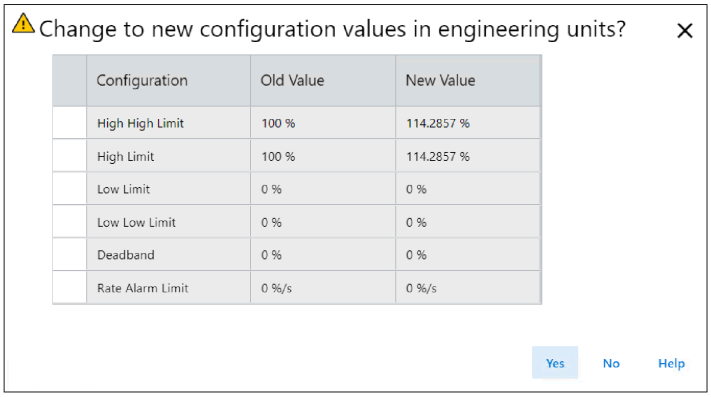
Figure 27. Chxx View Example



Recalculate Units

Recalculate Units lets you recalculate all configurations with engineering unit after a scaling change. Consider the following:

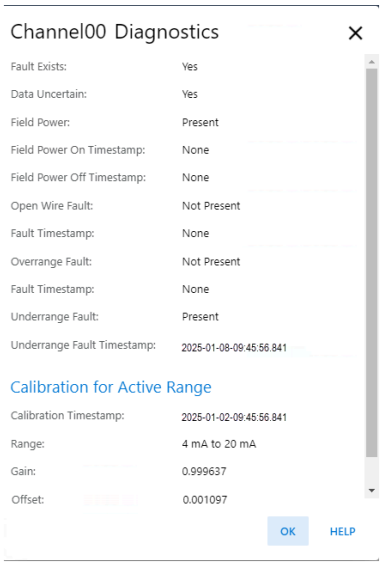
- The Recalculate Units option is enabled when the scaling configuration is changed.
- Upon selecting Recalculate Units option, the recalculated new values based on the new scaling configuration are displayed together with the old values for you to verify before changing.
- If you select "Yes" to proceed with the change, the new values will be set but it gets applied when you select "Apply/OK".
- If you select "No" to cancel the change, the old values are retained. You can either select the Recalculate Units again or manually change those configurations based on the new scaling.



Channelxx Diagnostics

Displays the channel diagnostics information when connected with the module. When online with the module, select the Diagnostics on the Chxx view to see the diagnostic information.

Figure 28. Channelxx Diagnostics Dialog Example



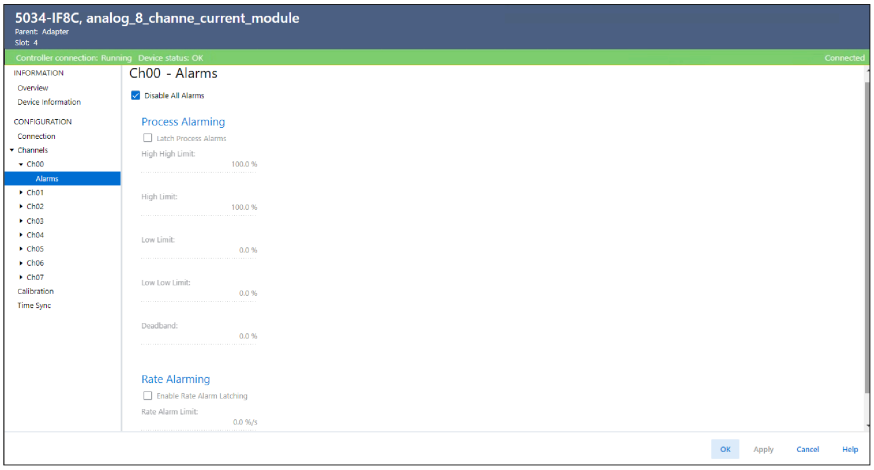
Alarms View

Each channel on the input module has an Alarms view. You can do the following actions on this view:

- Disable all the alarms.
- Enable/Disable latching and set the alarm limits for the process alarms:
  - High High
  - High
  - Low
  - Low Low
  - Deadband
- Enable/Disable latching and set limit for the rate alarm.

Rate Alarm Limit of 0.0 disables the rate alarm.

Figure 29. Chxx - Alarms View Example



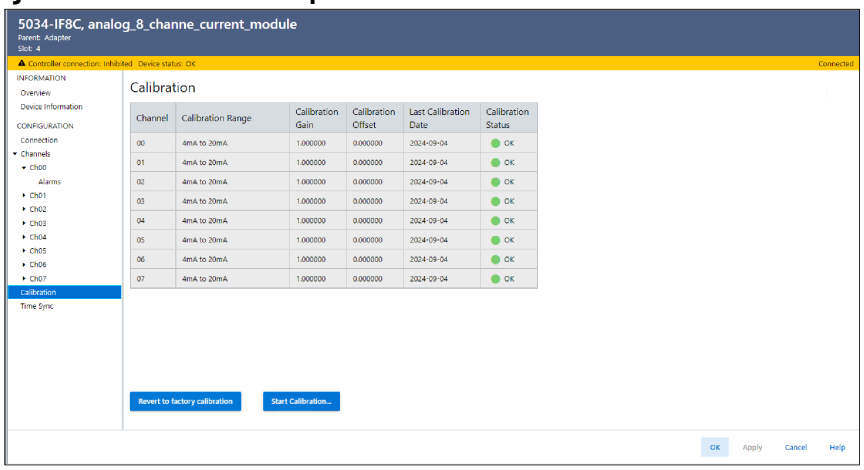
Calibration View

The Calibration view provides calibration information for all channels on the module. You can do the following actions on this view for all the channels:

- View calibration parameters and calibration status for the currently configured input ranges.
- Perform user calibration for one or multiple channels.
- Revert calibration parameters to the factory default values.

For more information on how to calibrate a module, see Module Calibration (Interactive) on page 92.

Figure 30. Calibration View Example

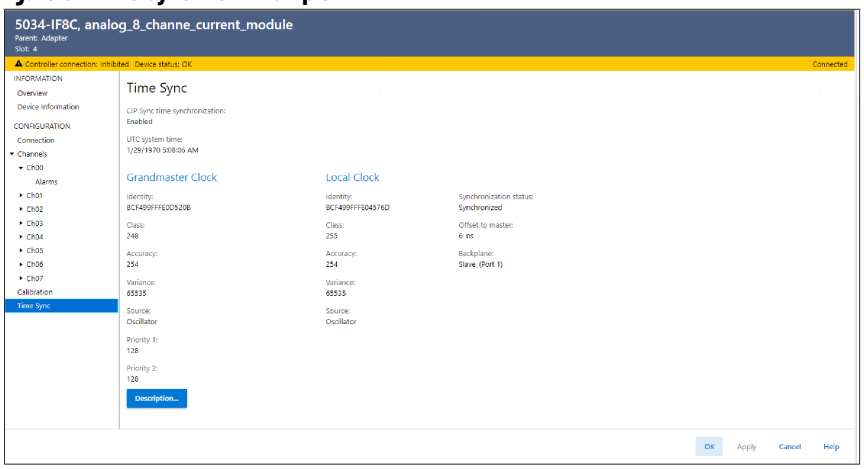


Time Sync View

The Time Sync view is read-only and displays the CIP Sync status information about the module when the project is online. The Time Sync category displays the following information:

- CIP Sync time synchronization status
- UTC system time
- Grandmaster Clock information
- Grandmaster Clock description
- Local Clock information

Figure 31. Time Sync View Example

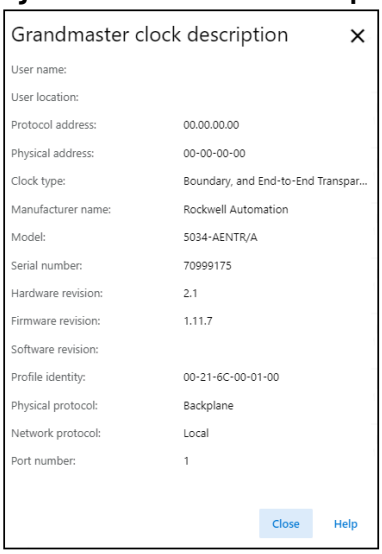


Grandmaster Clock Description

To view the Grandmaster clock description, select Description in the Time Sync view.

The Grandmaster clock description dialog provides detailed information about the grandmaster clock.

Figure 32. Grandmaster Clock Description Example



Module Calibration (Interactive)

You can use Calibration view in Module Properties to interactively calibrate the module on a per channel basis or in group.

Controller State During Calibration

You must add the module to your Studio 5000 Logix Designer application project, as described in Add a New Module to a Studio 5000 Logix Designer Application Project on page 41, before you can calibrate it.

The project must be online with the owner-controller to calibrate the PointMax analog modules. You can calibrate under any of the following conditions:

- The controller is in Program Mode, that is, either Remote Program or Program Mode.

  Your module must be in Program Mode and not be actively controlling a process when you calibrate it.

- There are no connections to the module.

Calibration Impacts Data Quality

When a channel on an analog input module is being calibrated, the Notch Filter setting for that channel changes to 10 Hz. The I.Chxx.Uncertain tag is set to 1 for that channel until calibration is completed.

Grouped inputs share an Analog-to-Digital converter. As a result when any input channel is in the calibration process, the *I.Chxx.Uncertain* tag is set to 1 for other input channels in that group. This is because the data sampling rate slows for all input channels in the group.

Calibration Instrumentation Specifications

When you calibrate the analog input modules, send current reference signal to the module to calibrate it. To maintain your module's factory calibration accuracy, use the instrumentation with the specifications listed in the following table.

IMPORTANT: Do not calibrate your module with an instrument that is less accurate than those specified in following table. The following events can result:

- Calibration appears to occur normally but the module gives inaccurate data during operation.
- A calibration fault occurs, forcing you to abort calibration. When this happens, I.Chxx.CalFault tag is set for the channel you attempted to calibrate. You can clear this tag by completing a valid calibration or cycling power to the module.

Table 37. Instrument Specifications

Catalog Number	Channel Input Type	Calibration Instrumentation Specifications
5034-IF8C and 5034-IF8CXT	Current (mA)	4.00...20.00 mA source ±100 nA current

Calibration Procedure

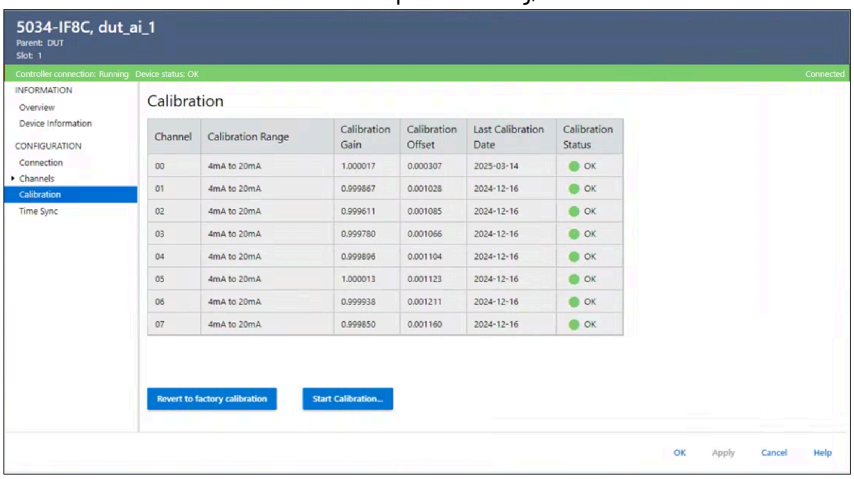
This procedure describes how to calibrate a channel on the analog input module for use with a Current (mA) input type.

Apply Low and High Signal references to the analog input module to calibrate it. The references must match the input range the channel is using.

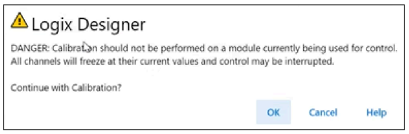
Table 38. Analog Input Module Calibration References

Input Type	Input Range	Low Calibration Reference	High Calibration Reference
Current (mA)	0...20 mA 4...20 mA	4.0 mA	20.0 mA

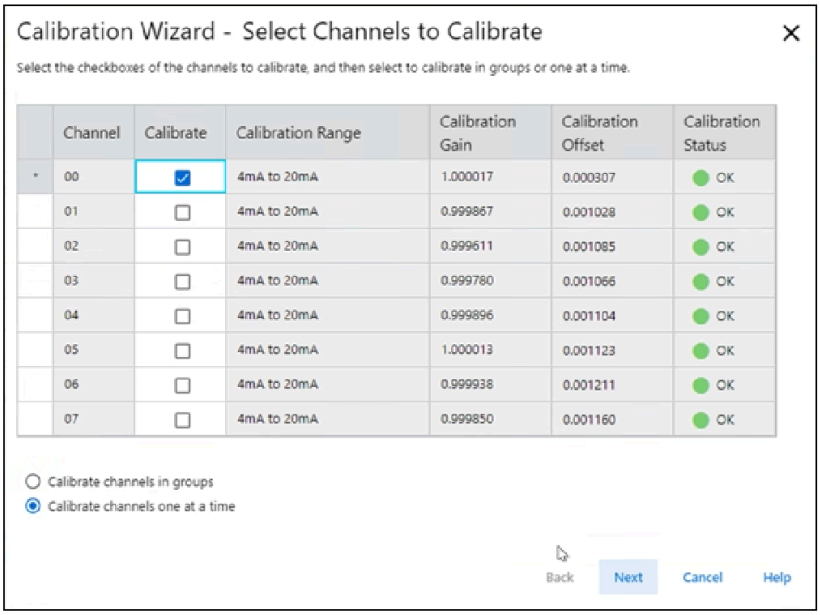
1. Connect the current calibrator to the channel being calibrated.
2. Go online with the project and make sure that the controller is in Program Mode.
3. Confirm that the channel to be calibrated is configured for the correct Input Range.
4. On the Calibration view in the Module Properties dialog, select Start Calibration.



5. When the dialog appears to confirm that you want to calibrate the channel, select OK.

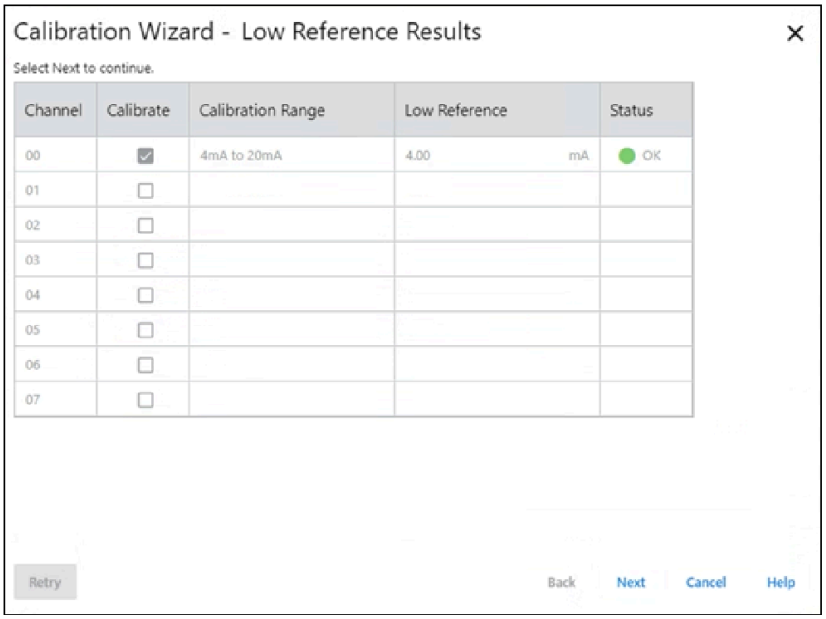


6. Select the channels one at a time or in groups to calibrate and then select Next.

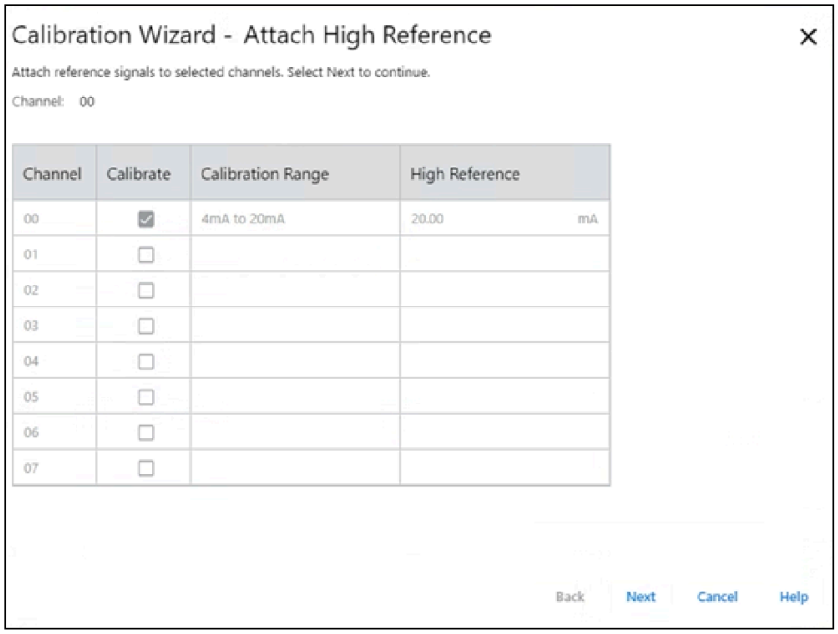


7. When the Attach Low Reference dialog appears, set the calibrator to the low reference and apply it to the channel.

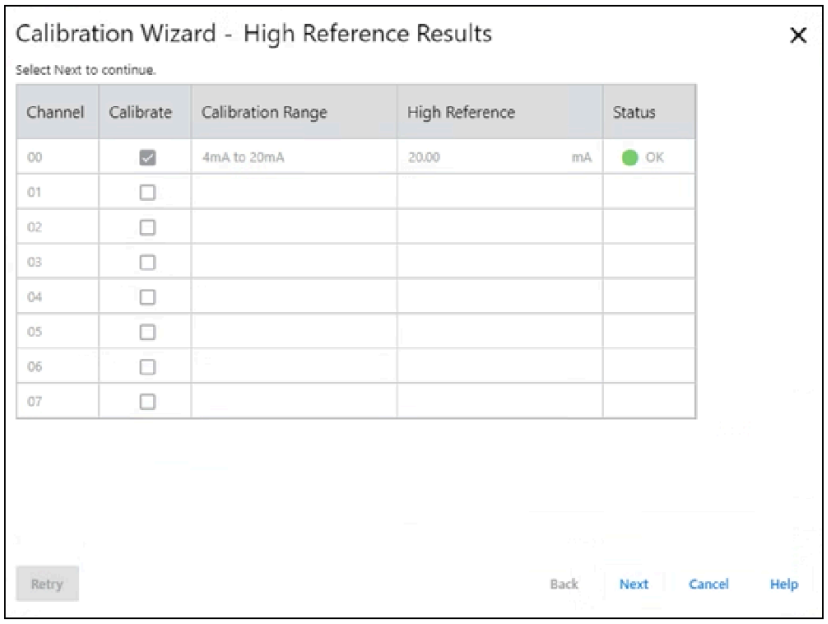
8. Select Next. The Low Reference Results dialog appears and indicates the status of the calibrated channel.



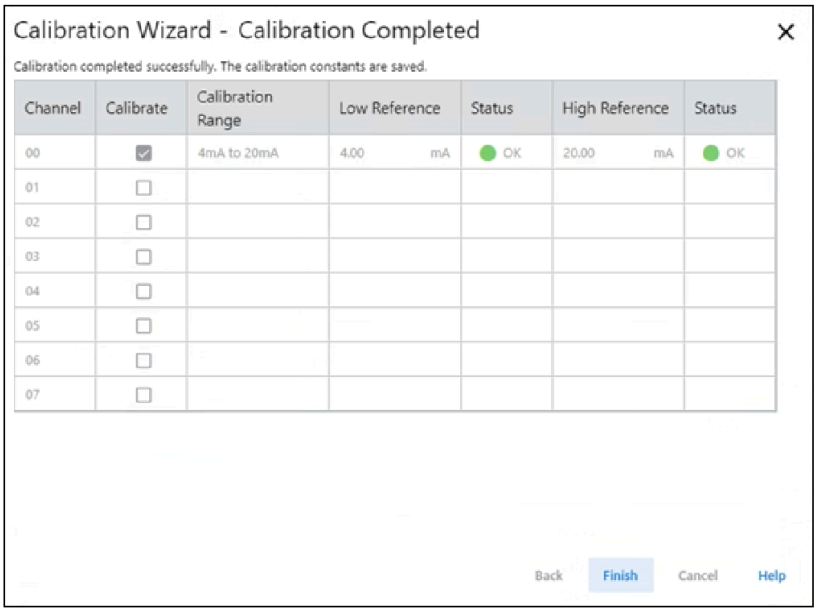
9. If the Status is OK, select Next. If the Status is not OK, repeat the calibration process.
10. When the Attach High Reference dialog appears, set the calibrator to the high reference and apply it to the channel.



11. Select Next. The High Reference Results dialog appears and indicates the status of the calibrated channel.



12. If the Status is OK, select Next. If the Status is not OK, repeat the calibration process.
13. When the Calibration Completed dialog appears, select Finish.



Use the Status Indicators for Troubleshooting

PointMax I/O modules use the following status indicators:

- SA Power Indicator - This indicator operates the same for all PointMax I/O modules.
- Module Status Indicator - This indicator operates the same for all PointMax I/O modules.
- Channel Status Indicator - This indicator operates differently based on the module type that you are using.

SA Power Indicator

Table 39. Interpret SA Power Indicator

Indicator State	Description	Recommended Action
Off	The module is not powered.	Complete the following actions: 1. Confirm that the system is powered. 2. Confirm that the module is installed properly.
Steady green	There is SA power to the module.	None
Steady red	There is no SA power to the module, or SA power voltage is not in the valid range.	Complete the following actions: 1. Confirm that SA power wiring is properly connected to the adapter, expansion power module, or 5034-MBSA mounting base. 2. Check the following: ◦ Check that the SA voltage is in the correct range. ◦ If an external power supply is used, confirm that the power supply is turned on. ◦ Make sure that the mounting base to mounting base connection is properly secured. Go to Chassis Information view in the Module Properties of the adapter to check the Field Power status of mounting bases installed in all slots.

Module Status Indicator

Table 40. Interpret Module Status Indicator

Indicator State	Description	Recommended Action
Off	The module is not powered.	Complete the following actions: 1. Confirm that the system is powered. 2. Confirm that the module is installed properly.
Steady green	The module is operational and all I/O connections are active.	None
Flashing green	The module has no I/O connections.	Troubleshoot your Studio 5000 Logix Designer application to determine what is preventing a connection from the module to the controller and correct the issue.

Table 40. Interpret Module Status Indicator (continued)

Indicator State	Description	Recommended Action
Flashing red	One of the following conditions exists: • A module firmware update is in progress. • A module firmware update attempt failed. • The device has experienced a recoverable fault. • A connection to the module has timed out.	Complete one of the following: • Let the firmware update process complete. • Reattempt a firmware update after one fails. • Use the Studio 5000 Logix Designer application to determine whether a module recoverable fault is occurred. It is shown in Device Information view. To clear a recoverable fault, complete one of the following: ◦ Cycle module power. ◦ Select Reset device in the Studio 5000 Logix Designer project via the Device Information view of the Module Properties dialog. If the fault does not clear after cycling power and module reset, contact Rockwell Automation Technical Support. • Use the Studio 5000 Logix Designer application to determine if a connection has timed out. The Connection view in the Module Properties indicates whether a connection request has timed out. If a connection has timed out, determine the cause and correct it. For example, a cable failure can cause a connection timeout.
Steady red	The module experienced a nonrecoverable fault.	Complete the following actions: 1. Cycle power to the module. 2. If the status indicator remains in the steady red state, replace the module.

Channel Status Indicators

Table 41. Interpret Analog Input Channel Status Indicators

Indicator State	Description	Recommended Action
Off	One of the following conditions exists: • The module is not powered. • The module is powered but connection is not established from the controller to module. • The module is powered, but the input channel is disabled.	Complete one of the following: • If you expect the module to be powered but it is not, complete the following: ◦ Confirm that the system is powered. ◦ Confirm that the module is installed properly. • If the module is powered but the channel is not operating as expected, use the Studio 5000 Logix Designer application to confirm that the channel is not disabled and the module has a connection to the controller. The Connection view in the Module Properties indicates if the connection is running or faulted. If the connection is faulted, the Connection view indicates error information. • If the channel is disabled, no action is needed.
Steady yellow	The input channel is operating normally.	None

Table 41. Interpret Analog Input Channel Status Indicators (continued)

Indicator State	Description	Recommended Action
Flashing red	One of the following conditions exists: • There is no SA power to the module, or SA power voltage is not in the valid range. • The input signal is overrange or underrange. The signal range is set in your Studio 5000 Logix Designer application project. • An Open Wire condition, that is, a wire is disconnected from the input channel.	Complete one of the following: • If there is a SA power fault, see the recommended action given for steady red indicator state in SA Power Indicator table above. • Check the input signal to determine if it is overrange or underrange. If so, make changes to return the input signal to within the range limits. • Check the wiring at the input channel. If necessary, reconnect the wire.
Flashing yellow/red	Calibration is in progress.	Successfully complete the calibration process.
Steady red	An issue has occurred that is internal to the module. The following are example issues that can cause the status indicator to be steady red: • A calibration fault occurred on the channel. • The module has experienced a nonrecoverable fault.	Complete one of the following: • If the indicator turns steady red after a calibration process, you can either perform a successful calibration or cycle the power to recover the fault. • If it is not caused by the calibration, cycle the power to recover the fault. If the condition is still present, replace the module.

Module Tag Definitions

Module tags are created when you add a module to the Studio 5000 Logix Designer application project.

The set of module tags associated with a module depends on the module type and Module Definition choices made during module configuration. For example, if you use a Listen Only connection in the Device Definition, the Studio 5000 Logix Designer application creates only Input tags for that module.

The tables contained in this section list all the tags available with a module. Not all tags in the list are used when that module type is added to a project. Tag use varies by module configuration.

Configuration Tag Definitions

Table 42. Configuration Tags

Name	Data Type	Definition	Valid Values
Chxx.Range	SINT	Channel's operating range	4 = 0...20 mA 5 = 4...20 mA
Chxx.NotchFilter	SINT	Notch Filter removes line noise for the channel.	• 0 = 10 Hz • 16 = 20 Hz • 1 = 50 Hz • 2 = 60 Hz • 3 = 100 Hz • 4 = 200 Hz • 20 = 400 Hz • 5 = 500 Hz • 6 = 1,000 Hz • 8 = 5,000 Hz • 9 = 10,000 Hz • 10 = 15,625 Hz • 12 = 31,250 Hz

Table 42. Configuration Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.AlarmDisable	BOOL	Disables all alarms on the channel. **IMPORTANT:** Consider the following: • If you change this tag to 0, that is, so that the alarms are not disabled, you must also enable the individual alarms for them to work. For example, if you want to use the Low Low Alarm for a channel, you must set the Chxx.AlarmDisable to 0 and set the Chxx.LLAlarmEn output tag to 1 so that the alarm is enabled. This applies to all alarms on the module. • Conversely, if you set this tag to 1, alarms are disabled regardless of the setting on the alarm enable tag for any alarm.	0 = Alarms are enabled 1 = Alarms are disabled
Chxx.ProcessAlarmLatchEn	BOOL	Configures Process alarms to latch until they are explicitly unlatched. The Process alarms include: • HighHigh Alarm • High Alarm • Low Alarm • LowLow Alarm	0 = Latching disabled 1 = Latching enabled
Chxx.RateAlarmLatchEn	BOOL	Configures the Rate Alarm to latch until it is explicitly unlatched.	0 = Latching disabled 1 = Latching enabled
Chxx.OpenWireEn	BOOL	Enables the input Open Wire diagnostic.	0 = Disabled 1 = Enabled
Chxx.Disable	BOOL	Disables the channel. When a channel is disabled, the following occurs: • The I/O status indicator for the channel turns off. • The Chxx.Fault input tag is set to 1.	0 = Channel is enabled 1 = Channel is disabled
Chxx.TenOhmOffset	INT	Not Applicable	0
Chxx.DigitalFilter	INT	A nonzero value enables the filter, providing a time constant in milliseconds used in a first order lag filter to smooth the input signal.	0 = Filter is turned off Any value greater than zero = Filter value in milliseconds
Chxx.LowSignal	REAL	One of four points used in scaling. The low signal is in terms of the inputs signal units and corresponds to the low engineering term when scaled.	Any value less than the high signal in range.
Chxx.HighSignal	REAL	One of four points used in scaling. The high signal is in terms of the inputs signal units and corresponds to the high engineering term when scaled.	Any value greater than the low signal in range.
Chxx.LowEngineering	REAL	One of four points used in scaling. The low engineering helps determine the engineering units the signal values scale into. The low engineering term corresponds to the low signal value.	Any value
Chxx.HighEngineering	REAL	One of four points used in scaling. The high engineering helps determine the engineering units the signal values scale into. The high engineering term corresponds to the high signal value.	Any value
Chxx.LLAlarmLimit	REAL	The Low Low Alarm trigger point. Causes the Chxx.LLAlarm to trigger when the input signal moves beneath the configured trigger point. Value is in terms of engineering units.	Any value

Table 42. Configuration Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.LAlarmLimit	REAL	The Low Alarm trigger point. Causes the ChxxLAlarm to trigger when the input signal moves beneath the configured trigger point. Value is in terms of engineering units.	Any value
Chxx.HAlarmLimit	REAL	The High Alarm trigger point. Causes the ChxxHAlarm to trigger when the input signal moves above the configured trigger point. Value is in terms of engineering units.	Any value
Chxx.HHAlarmLimit	REAL	The High High Alarm trigger point. Causes the ChxxHHAlarm to trigger when the input signal moves above the configured trigger point. Value is in terms of engineering units.	Any value
Chxx.RateAlarmLimit	REAL	The Rate Alarm trigger point. Causes the ChxxRateAlarm to trigger when the input signal changes at a rate faster than the configured Rate Alarm. Configured in Engineering Units per second.	0 = Rate Alarm is not used Any value greater than zero = Trigger point
Chxx.AlarmDeadband	REAL	Allows a process alarm to remain set, despite the alarm condition disappearing, as long as the input data remains within the deadband of the process alarm. The deadband value is subtracted from the High and High High Alarm Limits to calculate the deadband thresholds for these alarms. The deadband value is added to the Low and Low Low Alarm Limits to calculate the deadband thresholds for these alarms.	Any non-negative value

Input Tag Definitions

Table 43. Input Tags

Name	Data Type	Definition	Valid Values
RunMode	BOOL	Channel's operating state	0 = Idle 1 = Run When the value is 0, it means one of the following: • Connection is not up. • Connection has been opened but the module has not started producing data for the connection. • Module is not applying new Output tag data because the controller is in Program Mode. When the value is 1, it means the following: • Connection is up. • Module is producing data for the connection. • Output tag data is being applied.
ConnectionFaulted	BOOL	Indicates if a connection is running. The module sets this tag to 0 when connected. If the module is not connected, it changes the tag to 1.	0 = A connection exists between the module and the controller 1 = Connection is timed out or inhibited
DiagnosticActive	BOOL	Indicates if any diagnostics are active or if the prognostics threshold is reached.	0 = No diagnostics are active 1 = One or more diagnostics are active or the prognostics threshold is reached.
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.	-128...+127 The value of 0 is skipped except during module powerup.

Table 43. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.Fault	BOOL	Indicates that channel data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = No fault exists 1 = Fault exists
Chxx.Uncertain	BOOL	Indicates that the channel data can be inaccurate but the degree of inaccuracy is not known. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = Valid data 1 = Data validity uncertain
Chxx.OpenWire	BOOL	The signal wire is disconnected from the channel or the RTB is removed from the module.	0 = Open wire condition does not exist or open wire detection is disabled 1 = Open wire condition exists, which means the signal wire is disconnected from the channel or the RTB is removed from the module
Chxx.OverTemperature	BOOL	Not applicable for this module.	N/A
Chxx.FieldPowerOff	BOOL	Field power is not present at the channel.	0 = Field power is present 1 = Field power is not present
Chxx.NotANumber	BOOL	Indicates if the last received channel data was not a number.	0 = Last channel data received was a number 1 = Last channel data received was not a number
Chxx.Underrange	BOOL	Indicates the channel data is beneath the underrange threshold for this channel. For example, when the channel operates in the 4...20 mA input range, the underrange threshold on the channel is <3.0 mA. If the input signal is 0 mA, this tag is set to 1.	0 = Channel data is not beneath the underrange threshold 1 = Channel data is beneath the underrange threshold
Chxx.Overrange	BOOL	Indicates the channel data is above the overrange threshold for this channel. For example, when the channel operates in the 4...20 mA output range, the overrange threshold on the channel is >23.0 mA. If the input signal is 24 mA, this tag is set to 1.	0 = Channel data is not above the overrange threshold 1 = Channel data is above the overrange threshold
Chxx.LLAlarm	BOOL	Triggered when the input data value is less than the Low Low Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is greater than the Low Low Limit plus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.LAlarm	BOOL	Triggered when the input data value is less than the Low Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is greater than the Low Limit plus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered

Table 43. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.HAlarm	BOOL	Triggered when the input data value is greater than the High Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is less than the High Limit minus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.HHAlarm	BOOL	Triggered when the input data value is greater than the High High Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is less than the High High Limit minus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.RateAlarm	BOOL	Triggered when the change between consecutive channel samples divided by the period of time between when the samples were taken exceeds the Rate Alarm. If latched, this tag remains set until it is unlatched.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.CalFault	BOOL	Indicates the last attempted Calibration for this channel failed or there is no calibration data present. This tag is cleared, that is, set to 0, when power is cycled to the module or a successful calibration for the range on the channel is performed.	0 = Calibration did not fail 1 = Calibration failed
Chxx.Calibrating	BOOL	Indicates the channel is currently being calibrated.	0 = Channel is not being calibrated 1 = Channel is being calibrated
Chxx.CalGoodLowRef	BOOL	Indicates that a valid Low Reference signal is sampled on this channel in the calibration process. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Valid Low Reference signal has not been sampled on this channel 1 = Valid Low Reference signal has been sampled on this channel
Chxx.CalBadLowRef	BOOL	Indicates that an invalid Low Reference signal is sampled on this channel in the calibration process. You must correct this condition to successfully calibrate the module. If calibration is aborted with an invalid Low Reference signal, the Chxx.CalFault tag is set for this channel until a successful calibration is performed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Invalid Low Reference signal has not been sampled on this channel 1 = Invalid Low Reference signal has been sampled on this channel

Table 43. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.CalGoodHighRef	BOOL	Indicates that a valid High Reference signal is sampled on this channel in the calibration process. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Valid High Reference signal has not been sampled on this channel 1 = Valid High Reference signal has been sampled on this channel
Chxx.CalBadHighRef	BOOL	Indicates that an invalid High Reference signal is sampled on this channel in the calibration process. You must correct this condition to successfully calibrate the module. If calibration is aborted with an invalid High Reference signal, the Chxx.CalFault tag is set for this channel until a successful calibration is performed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Invalid High Reference signal has not been sampled on this channel 1 = Invalid High Reference signal has been sampled on this channel
Chxx.CalSuccessful	BOOL	Indicates calibration on this channel is complete and the Calibrating state has been exited. This tag remains set after valid calibration and until a new calibration process is started or the connection is closed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Calibration was not successful 1 = One of the following: • Calibration was successful and calibrating state has been exited. • Calibration data is present and applied.
Chxx.Data	REAL	Channel data in scaled Engineering Units.	Any value
Chxx.RollingTimestamp	INT	Continuously-running 15-bit timer that counts in milliseconds. Whenever an input module scans its channels, it also records the value of RollingTimestamp at that time. The user program uses the last two RollingTimestamp values and calculates the interval between receipt of data.	0...32,767

Output Tag Definitions

Table 44. Output Tags

Name	Data Type	Definition	Valid Values
Chxx.LLAlarmEn	BOOL	Enables the Low Low alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Alarm is disabled 1 = Alarm is enabled
Chxx.LAlarmEn	BOOL	Enables the Low alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Alarm is disabled 1 = Alarm is enabled
Chxx.HAlarmEn	BOOL	Enables the High alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Alarm is disabled 1 = Alarm is enabled
Chxx.HHAlarmEn	BOOL	Enables the High High alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Alarm is disabled 1 = Alarm is enabled
Chxx.RateAlarmEn	BOOL	Enables the Rate alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Alarm is disabled 1 = Alarm is enabled
Chxx.LLAlarmUnlatch	BOOL	Unlatches a latched Low Low Alarm at the first instance of the bit transitioning from 0 to 1.	0 = Low Low Alarm remains latched 1 = Low Low Alarm unlatched

Table 44. Output Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.LAlarmUnlatch	BOOL	Unlatches a latched Low Alarm at the first instance of the bit transition from 0 to 1.	0 = Low Alarm remains latched 1 = Low Alarm unlatched
Chxx.HAlarmUnlatch	BOOL	Unlatches a latched High Alarm at the first instance of the bit transition from 0 to 1.	0 = High Alarm remains latched 1 = High Alarm unlatched
Chxx.HHAlarmUnlatch	BOOL	Unlatches a set High High Alarm at the first instance of the bit transition from 0 to 1.	0 = High High Alarm remains latched 1 = High High Alarm unlatched
Chxx.RateAlarmUnlatch	BOOL	Unlatches a set Rate Alarm at the first instance of the bit transition from 0 to 1.	0 = Rate Alarm remains latched 1 = Rate Alarm unlatched
Chxx.Calibrate	BOOL	Initiates the Calibration process. This tag must remain set until a valid Low Reference and High Reference values are applied to the input. If the tag value transitions to 0 before calibration is finished, the process stops and calibration fails.	0 = Calibration process is not started 1 = Calibration process is started
Chxx.CalLowRef	BOOL	Rising edge triggers the Low Calibration at the Low Reference Point for the current input range value. A valid Low Reference signal must be connected to the channel before setting this tag. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Channel data value has not passed the Low Reference Point value for the current *InputRange* tag value 1 = Channel data value has passed the Low Reference Point value for the current *InputRange* tag value
Chxx.CalHighRef	BOOL	Rising edge triggers a High Calibration at the High Reference Point for the current input range value. A valid High Reference signal must be connected to the channel before setting tag. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Channel data value has not passed the High Reference Point for the current *InputRange* tag value 1 = Channel data value has passed the High Reference Point for the current *InputRange* tag value
Chxx.SensorOffset	REAL	Compensates for any known offset error on the sensor or channel to which the sensor is connected. In terms of engineering units. The value of this tag is added to the measured value in engineering units and is used in the Chxx.Data input tag.	Any valid float value 0.0 = Default (We recommend that you use a value in the channel's operating range.)

Diagnostic Assembly

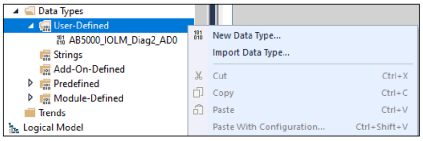
Diagnostic assembly helps you troubleshoot and diagnose the fault in your system.

Create User-defined Diagnostic Assembly Types

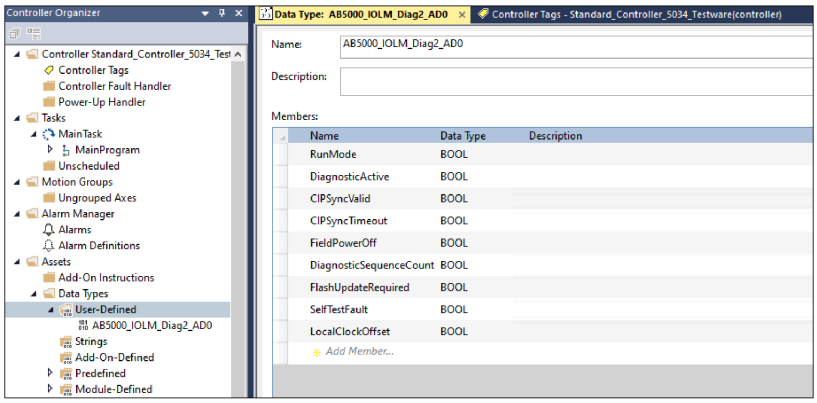
You can use the Studio 5000 Logix Designer application to create user-defined Diagnostic Assembly types.

Create user-defined diagnostic assembly by following the below steps:

1. From the Controller Organizer pane, go to Assets → Data types → User-Defined.
2. Right-click on the User-Defined folder and select New Data Type.



3. Add a Name and Description (optional) for your diagnostic assembly.
4. Under Members area, add the data members based on the diagnostic assembly detailed below.



IMPORTANT: The members indicated in the tables are arranged according to Data Alignment Rules of controllers. Strictly follow the data type and the sequence of the members that are indicated in the tables of this appendix. If the data type and the sequence are not followed, data misalignment may occur after executing Get Attribute Single Message (MSG) instruction.

Diagnostic Assemblies

1. Diagnostic Assembly A for Analog 8 Channel Input Module
   - Instance ID: 0x8019 (32793)
   - Size = 336 bytes

   Follow the information in the following table to add each member.

Table 45. Diagnostic Assembly Instance 32793

Name	Date Type	Size in Bytes
RunMode	BOOL	1
Infobit_Pad1	BOOL	
DiagnosticActive	BOOL	
CIPSyncValid	BOOL	
CIPSyncTimeout	BOOL	
Infobit_Pad5	BOOL	
FieldPowerOff	BOOL	
Infobit_Pad7	BOOL	
DiagnosticSequenceCount	SINT	1
Diagbit_Pad0	BOOL	2
Diagbit_Pad1	BOOL	
Diagbit_Pad2	BOOL	
Diagbit_Pad3	BOOL	
Diagbit_Pad4	BOOL	

Name	Date Type	Size in Bytes
Diagbit_Pad5	BOOL	
Diagbit_Pad6	BOOL	
Diagbit_Pad7	BOOL	
Diagbit_Pad8	BOOL	
Diagbit_Pad9	BOOL	
Diagbit_Pad10	BOOL	
Diagbit_Pad11	BOOL	
FlashUpdateRequired	BOOL	
SelfTestFault	BOOL	
Diagbit_Pad14	BOOL	
Diagbit_Pad15	BOOL	
Pad	DINT	4
LocalClockOffset	LINT	8
LocalClockOffsetTimestamp	LINT	8
GrandMasterClockID	SINT[8]	8
FieldPowerOnTimestamp	LINT	8
FieldPowerOffTimestamp	LINT	8
Ch00	Diagnostic_Channel_Structure	72
Ch01	Diagnostic_Channel_Structure	72
Ch02	Diagnostic_Channel_Structure	72
Ch03	Diagnostic_Channel_Structure	72

2. Diagnostic Assembly B for Analog 8 Channel Input Module
   - Instance ID: 0x801E (32798)
   - Size = 288 bytes

   Follow the information in the following table to add each member.

Table 46. Diagnostic Assembly Instance 32798

Name	Date Type	Size in Bytes
Ch04	Diagnostic_Channel_Structure	72
Ch05	Diagnostic_Channel_Structure	72
Ch06	Diagnostic_Channel_Structure	72
Ch07	Diagnostic_Channel_Structure	72

3. Diagnostic Counters Assembly for I/O
   - Instance ID: 0x301 (769)
   - Size = 16 bytes

   Follow the information in the following table to add each member.

Table 47. Diagnostic Assembly Instance 769

Name	Date Type	Size in Bytes
RunMode	BOOL	1
Infobit_Pad1	BOOL	
DiagnosticActive	BOOL	
Infobit_Pad3	BOOL	
Infobit_Pad4	BOOL	
Infobit_Pad5	BOOL	
Infobit_Pad6	BOOL	
Infobit_Pad7	BOOL	
DiagnosticSequenceCount	SINT	1
CIPConnections	INT	2
CIPLostPackets	DINT	4
CIPTimeouts	DINT	4
CPUUtilization	INT	2
Pad	INT	2

Diagnostic Channels

1. Diagnostic Channel
   - Size = 72 bytes

   This data type is retrieved as part of the diagnostic assembly instance.

   Follow the information in the following table to add each member.

Table 48. 5034-IF8C Diagnostic Channel Structure

Name	Date Type	Size in Bytes
Databit_Pad0	BOOL	2
Fault	BOOL	
Uncertain	BOOL	
OpenWire	BOOL	
Databit_Pad4	BOOL	
Databit_Pad5	BOOL	
FieldPowerOff	BOOL	
Databit_Pad7	BOOL	
Disabled	BOOL	
Databit_Pad10	BOOL	
Databit_Pad11	BOOL	
Databit_Pad12	BOOL	
Databit_Pad13	BOOL	
Databit_Pad14	BOOL	
Databit_Pad15	BOOL	
CalFault (DIAG 4)	BOOL	2
Underrange (DIAG 1)	BOOL	
Overrange (DIAG 1)	BOOL	
Diagbit_Pad3	BOOL	
Diagbit_Pad4	BOOL	
Diagbit_Pad5	BOOL	
Diagbit_Pad6	BOOL	
Diagbit_Pad7	BOOL	
Diagbit_Pad8	BOOL	
Diagbit_Pad9	BOOL	
Diagbit_Pad10	BOOL	
Diagbit_Pad11	BOOL	
Diagbit_Pad12	BOOL	
Diagbit_Pad13	BOOL	
Diagbit_Pad14	BOOL	
Diagbit_Pad15	BOOL	
Pad1	INT	2
InternalErrorCount	SINT	1
CalRange	SINT	1
CalOffset	REAL	4
CalGain	REAL	4
CalLastDate	LINT	8
OpenWireTimestamp	LINT	8
Pad2	LINT	8
UnderrangeTimestamp	LINT	8
OverrangeTimestamp	LINT	8
FieldPowerOnTimestamp	LINT	8
FieldPowerOffTimestamp	LINT	8

Definitions for Diagnostic Assembly Types

Table 49. Definition of Members in Diagnostic Assembly Data Types

Name	Data Type	Definition	Valid Values
RunMode	BOOL	Channel's operating state	• 0 = Idle • 1 = Run Idle – The connection is up and the module is producing data for the connection and output tag data is being applied. Run - One of the following is present: • The connection is not up. • The connection is opened but the module has not started producing data for the connection. • The module is not applying new output tag data because the controller is in Program Mode.
DiagnosticActive	BOOL	Indicates if any diagnostics are active or if the prognostics threshold is reached.	0 = No diagnostics active 1 = One or more diagnostics are active or the prognostics threshold is reached.
CIPSyncValid	BOOL	Indicates if the module is synced with a 1588 master.	• 0 = Module is not synced • 1 = Module is synced
CIPSyncTimeout	BOOL	Indicates if the module was once synced with a 1588 master, but is not now due to a timeout	• 0 = A valid time master has not timed out. • 1 = A valid time master is detected on the backplane, but the time master has timed out. The module is using its local clock and can be drifting away from the last known time master.
FieldPowerOff	BOOL	Field power is not present at the channel.	0 = Field power is present 1 = Field power is not present
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.	-128...+127 The value of 0 is skipped except during module power-up.
FlashUpdateRequired	BOOL	Indicates whether flash update is required.	• 0 = Flash update is not required • 1 = Module has no application firmware
SelfTestFault	BOOL	Indicate whether the fault is present during module self-test.	• 0 = Module initialization code did not detect an error • 1 = Module initialization code detected an error
LocalClockOffset	LINT	The offset from the local clock to the system time. This value helps to detect steps in time. This value updates when a PTP update is received.	Any value

Table 49. Definition of Members in Diagnostic Assembly Data Types (continued)

Name	Data Type	Definition	Valid Values
LocalClockOffsetTimestamp	LINT	Indicates the timestamp of the local clock offset.	A valid time or None if there is no recorded event time. Time format is YYYY-MMDD-HH:mm:SS_mmm_uuu_nnn(UTC-00:00) • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds • uuu = microseconds • nnn = nanoseconds • UTC-00:00 = Time zone
GrandMasterClockID	SINT	The EUI-64 Identity of the CIP Sync Grandmaster clock the module is synced to.	Any value
FieldPowerOnTimestamp	LINT	Indicates the timestamp of the last time field power turned on.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
FieldPowerOffTimestamp	LINT	Indicates the timestamp of the last time field power turned off.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
Fault	BOOL	Indicates that channel data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.	0 = No fault exists 1 = Fault exists The typical causes of a fault are the following: • ◦ Channel is disabled ◦ Open Wire condition ◦ Underrange/Overrange condition ◦ SA power loss condition You must troubleshoot the module first to see if the typical causes exist.
Uncertain	BOOL	Indicates that the channel data can be inaccurate but the degree of inaccuracy is not known. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.	0 = Valid data 1 = Data validity uncertain

Table 49. Definition of Members in Diagnostic Assembly Data Types (continued)

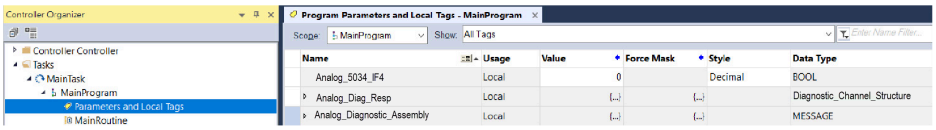
Name	Data Type	Definition	Valid Values
OpenWire	BOOL	The signal wire is disconnected from the channel or the RTB is removed from the module.	0 = Open wire condition does not exist or open wire detection is disabled. 1 = Open wire condition exists, that means the signal wire is disconnected from the channel or the RTB is removed from the module.
CalFault	BOOL	Indicates the last attempted Calibration for this channel failed or there is no calibration data present. This tag is cleared, that is, set to 0, when power is cycled to the module.	• 0 = Calibration did not fail • 1 = Calibration failed
Underrange	BOOL	Indicates the channel data is beneath the underrange threshold for this channel. For example, when the channel operates in the 4...20 mA input range, the underrange threshold on the channel is < 3.0 mA. If the input signal is 0 mA, this tag is set to 1.	0 = Channel data is not beneath the underrange threshold 1 = Channel data is beneath the underrange threshold
Overrange	BOOL	Indicates the channel data is above the overrange threshold for this channel. For example, when the channel operates in the 4...20 mA output range, the overrange threshold on the channel is > 23.0 mA. If the input signal is 24 mA, this tag is set to 1.	0 = Channel data is not above the overrange threshold 1 = Channel data is above the overrange threshold
CalRange	SINT	Indicates the value currently configured for the channel. Values display according to the Input Type selected.	• 0 = -10...10V • 1 = 0...5V • 2 = 0...10V • 4 = 0...20 mA • 5 = 4...20 mA
CalOffset	REAL	Indicates the offset in signal units as reported by the device.	Any value
CalGain	REAL	Indicates the calibration gain reported by the device.	Any value
CalLastDate	LINT	Indicates the time of the last calibration date for the channel.	Any value
OpenWireTimestamp	LINT	Indicates the timestamp of the last time when the open wire condition is detected.	A valid time or None if there is no recorded event time.
UnderrangeTimestamp	LINT	Indicates the timestamp of the last underrange fault.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds

Table 49. Definition of Members in Diagnostic Assembly Data Types (continued)

Name	Data Type	Definition	Valid Values
OverrangeTimestamp	LINT	Indicates the timestamp of the last overrange fault.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
CIPConnections	INT	Indicates the number of CIP connections currently open.	0...24
CIPLostPackets	DINT	Indicates the running sum of the number of Sequenced Address Item Sequence Numbers that are skipped in Class 0 and Class 1 connections consumed by the adapter and its children.	0...2,147,483,647
CIPTimeouts	DINT	Indicates the running count of the number of connections that time out, both originated and targeted, to and through the adapter.	0...2,147,483,647
CPUUtilization	INT	Indicates the usage of the compute engine.	0...100%

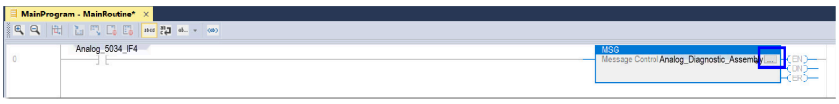
Create Message Type User Tags

Create MESSAGE type user tags for requests and associated response user tags for each of the new user-defined diagnostic assembly types.



From the Controller Organizer pane, expand Tasks → MainTask → MainProgram:

1. Create MESSAGE type user tags for each request.
2. Create associated response user tags for each new user-defined diagnostic assembly type.
3. Add the user tags to your ladder program.



4. Expand the message tag to open the message configuration dialog.
5. On the Configuration tab, select:
   - Service type: Get Attribute Single
   - Class: 4
   - Attribute: 3

- Instance:
  - **5034-IF8C and 5034-IF8CXT**
    0x8019 (32793) Diagnostic Assembly A for Analog 8 Channel Input Module
    0x801E (32798) Diagnostic Assembly B for Analog 8 Channel Input Module
    0x301 (769) Diagnostic Counters Base I/O Assembly
- Destination element: User-defined data type suitable for the instance entered.

6. On the Communication tab, select the path to the module that you wish to send the messages to.
7. Download the project and set to Run Mode.

   You can monitor the user-defined tag values from the Program Parameters and Local Tags window, under the MainProgram task in the Controller Organizer pane.

5034-IF8V and 5034-IF8VXT Details

This chapter covers the detailed instructions on how to configure, calibrate, and troubleshoot your 5034-IF8V and 5034-IF8VXT modules. It also describes the module tag definitions for input, output, and configuration tags.

Module Configuration

Before you start configuring your I/O module, you must create a Studio 5000 Logix Designer application project for the Logix 5000 controller that owns the PointMax I/O modules. See Add a New Module to a Studio 5000 Logix Designer Application Project on page 41 for more information. The project includes module configuration data for the PointMax I/O modules.

The Studio 5000 Logix Designer application transfers the project to the owner-controller during the program download. Data is then transferred to the PointMax I/O modules when the connection is established. The PointMax I/O modules can operate immediately after receiving and applying the configuration data.

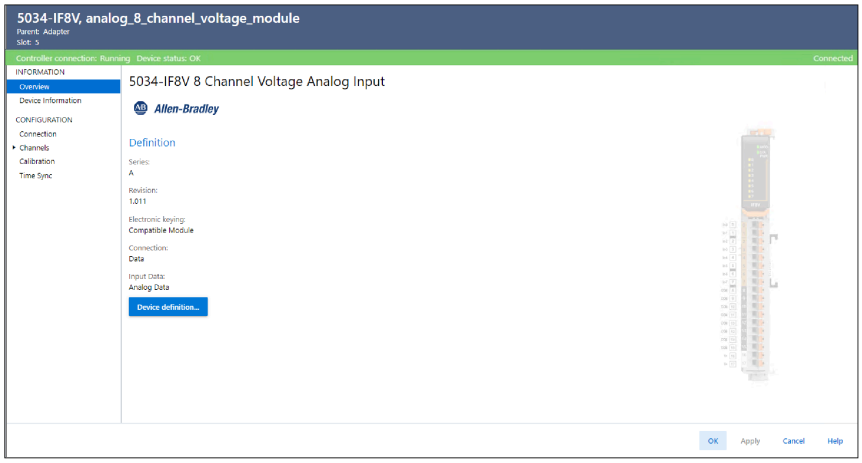
IMPORTANT: You must use Studio 5000 Logix Designer application version 36 or later.

Overview View

When you create a module or open the Module Properties, the Overview view appears first. Use Overview to view the definition of a device, including the device type, revision, electronic keying, connection, and other device-specific values.

To change the definition of a device, select the Device definition in the Overview view.

Figure 33. Overview View Example



Device Definition Dialog

Figure 34. Device Definition Dialog Example

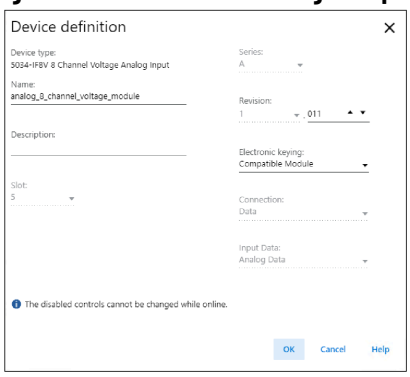


Table 50. Device Definition Parameters

Parameter	Definition	Available Choices
Device Type	Displays the device catalog number and type.	Device-specific
Name	Enter an IEC 61131 compliant device name. If an invalid character is entered in this field, or if the name exceeds 40 characters, the software ignores the character.	All valid values
Description	Enter the description of the device.	All valid values
Slot	Specify the slot number where the device resides. Only slots between 1 and the maximum number of I/O devices are valid depending on the platform. When the device is created, the slot number defaults to the first available slot position. When the controller is changed to one supporting a smaller maximum I/O count, the current slot value may no longer be valid.	1...32
Series	Specifies the module hardware series.	Device-specific

Table 50. Device Definition Parameters (continued)

Parameter	Definition	Available Choices
Revision	Specifies the major and minor revisions of the device. The valid range for minor revision is from 1...255.	Device-specific
Electronic Keying	Defines the electronic keying used for the device. Electronic keying compares the device defined in the project to the installed device. If keying fails, a fault occurs. For detailed information on Electronic keying, see Electronic Keying in Logix 5000 Control Systems Application Technique, publication LOGIX-AT001	• Exact Match • Compatible Module • Disable Keying  **ATTENTION:** Be extremely cautious when using Disable Keying; if used incorrectly, this option can lead to personal injury or death, property damage, or economic loss. We strongly suggest that you do not use Disable Keying. If you use Disable Keying, you must take full responsibility for understanding whether the device being used can fulfill the functional requirements of the application.
Connection	Determines the following for the module type you configure: • Available configuration parameters • Data type transferred between the module and the controller • Which tags are generated when configuration is complete For the Listen Only Data choice, the controller and device establish communication without the controller sending any configuration or output data to the device. A full input data connection is established but depends on the connection between the owner-controller and the device.	• Data with Calibration • Data (default) • Listen Only
Input Data	Selects the input data type for the device.	Analog Data

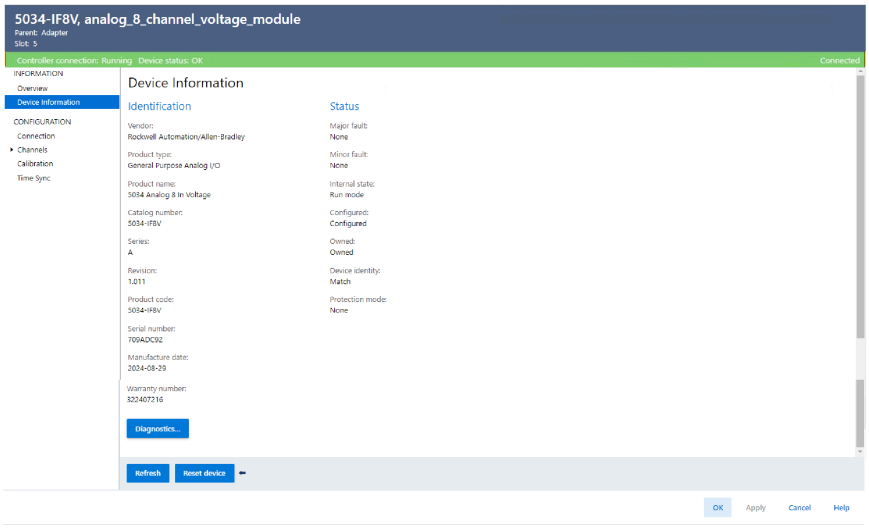
Device Information View

Use Device Information to view device and status information when the device is online. You can use this view to complete the following:

- Determine the identity of the device.
- View the device's current operational state.
- View whether the device was configured by the owner controller.
- View whether an owner controller is currently connected to the device.
- Retrieve the latest information from the device.
- Reset a device to its power-up state.

- If supported, view the Protection Mode of the device.
- Access device diagnostics

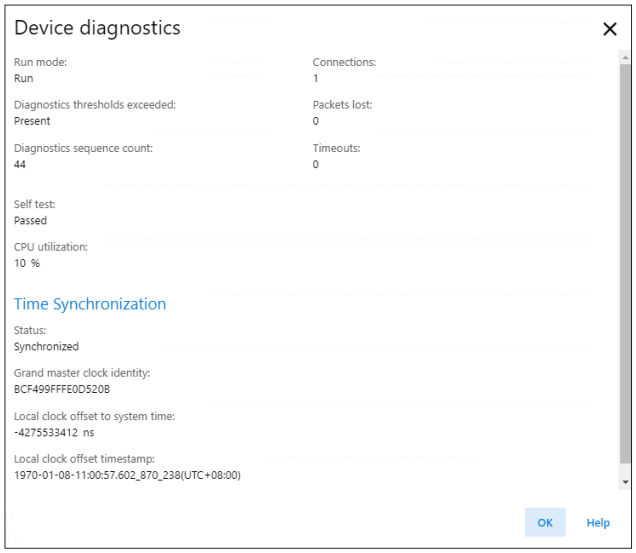
Figure 35. Device Information View Example



Device Diagnostics

To view the device diagnostics, select Diagnostics in the Device Information view. It displays the diagnostics information of the module.

Figure 36. Device Diagnostics Dialog Example



Connection View

The Connection view lets you complete the following tasks:

- Set the RPI rate. For more information, see Requested Packet Interval on page 16.
- Select Unicast or Multicast connection to use on the EtherNet/IP network. For more information, see Unicast or Multicast Connection on page 19.

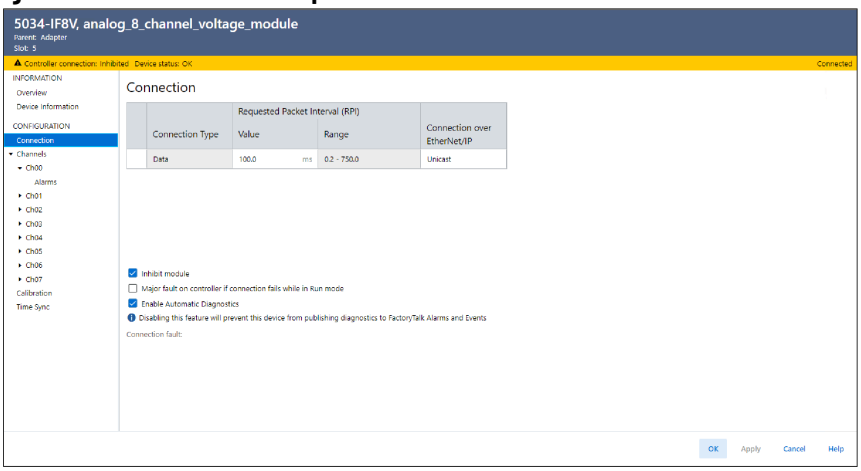
- View the reason of Connection Fault.

  If there is a connection fault, Connection Fault area displays the error code with description that helps you to troubleshoot the module. For more information, see Troubleshoot Your Module on page 45.

- Inhibit the module. For more information, see Module Inhibiting on page 17.
- Configure fault response for connection failure while the controller is in Run Mode.
- Enable or disable the Automatic Diagnostics.

  ATTENTION: If you do not enable Automatic Diagnostics, the device does not publish diagnostics to FatoryTalk Alarms and Events.

Figure 37. Connection View Example



Recommended Minimum RPI Values for Notch Filters

In the following table, each Notch Filter setting has two recommended minimum module RPI values that allow the required time to collect samples from each channel. One setting provides faster sample speed and the other provides slightly better resolution at slower sample speeds.

Table 51. Notch Filter and Recommended Minimum Module RPI Values

Notch Filter (Hz)	Recommended Minimum Module RPI Value			
	Application That is Configured With Only One Channel Enabled		Application With All Channels Enabled and Using the Same Notch Filter Setting on All Channels	
	Faster Sampling Speed (ms)	Better Noise Rejection (ms)	Faster Sampling Speed (ms)	Better Noise Rejection (ms)
10	106	316	422	NA
20	53.1	158.1	212	632
50	22	64	86	254
60 (default)	18.3	53.2	72	212
100	11.2	32.1	44	127
200	5.9	16.4	22.2	65
400	3.5	8.6	12	33
500	2.8	6.9	9.3	26.5
1000	1.7	3.8	5.2	13.5
5000	1.0	1.3	2.2	3.3
10000	0.7	0.9	1.7	2.1

Table 51. Notch Filter and Recommended Minimum Module RPI Values (continued)

Notch Filter (Hz)	Recommended Minimum Module RPI Value			
	Application That is Configured With Only One Channel Enabled		Application With All Channels Enabled and Using the Same Notch Filter Setting on All Channels	
	Faster Sampling Speed (ms)	Better Noise Rejection (ms)	Faster Sampling Speed (ms)	Better Noise Rejection (ms)
15625	0.8	0.8	1.7	1.7
31250	0.4	0.6	1.2	1.5

Minimum RPI Calculation When Using Different Notch Filter Selections

When input channels on the same module use different Notch Filter selections, you must consider the sample time for each channel. This helps you to find the recommended RPI that provides enough time for sampling all channels.

The eight input channels on the module are grouped into two groups. Channels 00...03 are grouped, and channels 04...07 are grouped. When you determine the recommended minimum module RPI value, remember:

- The recommended minimum module RPI value when channels use different Notch Filter selections is determined by group.

  The recommended minimum RPI rates for all enabled channels added together. If any channel in the other group is enabled, the recommended minimum RPI rate for each enabled channel is increased by 0.2 ms.

- If the groups have different recommended minimum RPI values, use the higher RPI value when you configure the module.

Table 52. Example Application That Requires Faster Sampling Speed

Channel Group	Channel	Notch Filter (Hz)	Recommended Minimum Module RPI for Each Channel (ms)(1)	Recommended Minimum Module RPI (ms)	Recommended Minimum Module RPI to Use in Module Configuration (ms)
Grouped together	Ch00	50	22.2	24.7	74.0
	Ch01	1000	1.9		
	Ch02 - Disabled	N/A	N/A		
	Ch03	31250	0.6		
Grouped together	Ch04	60	18.5	74.0	
	Ch05	60	18.5		
	Ch06	60	18.5		
	Ch07	60	18.5		

(1) The values in this column represent the corresponding recommended minimum RPI value listed in Table 51: Notch Filter and Recommended Minimum Module RPI Values on page 119 with an additional 0.2 ms added to it because at least one channel is enabled in the other group.

Table 53. Example Application That Requires Better Noise Rejection

Channel Group	Channel	Notch Filter (Hz)	Recommended Minimum Module RPI for Each Channel (ms)(1)	Recommended Minimum Module RPI (ms)	Recommended Minimum Module RPI to Use in Module Configuration (ms)
Grouped together	Ch00	50	64.2	69.0	213.6
	Ch01	1000	4		
	Ch02 - Disabled	N/A	N/A		
	Ch03	31250	0.8		
Grouped together	Ch04	60	53.4	213.6	

Table 53. Example Application That Requires Better Noise Rejection (continued)

Channel Group	Channel	Notch Filter (Hz)	Recommended Minimum Module RPI for Each Channel (ms)(1)	Recommended Minimum Module RPI (ms)	Recommended Minimum Module RPI to Use in Module Configuration (ms)
	Ch05	60	53.4		
	Ch06	60	53.4		
	Ch07	60	53.4		

(1) The values in this column represent the corresponding recommended minimum RPI value listed in Table 51: Notch Filter and Recommended Minimum Module RPI Values on page 119 with an additional 0.2 ms added to it because at least one channel is enabled in the other group.

Channels View

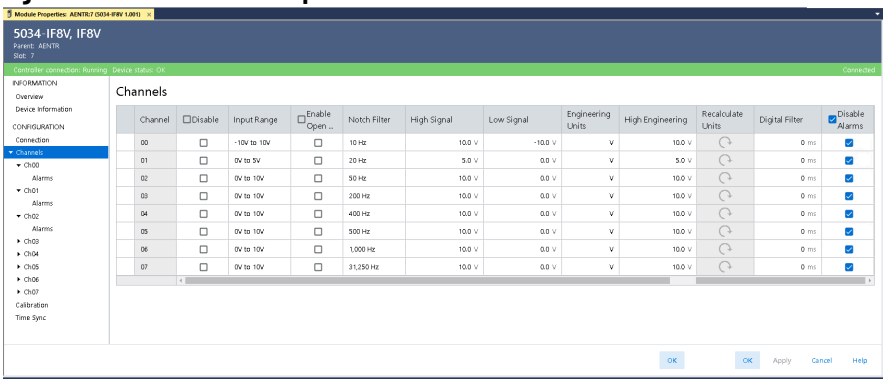
The Channels view shows an overview of the configuration values for all module channels.

Not all channel configurations are included in Channels view. To view or change the complete set of the channel configuration and also to view the diagnostics information for the channel, use Chxx view.

You can do the following actions on this view for all the channels:

- Disable the channel, if desired
- Change the input type
- Set the notch filter
- Enable or disable open wire detection
- Set the scaling and recalculate all configurations with engineering unit
- Set digital filter
- Disable alarms

Figure 38. Channels View Example



Chxx View

The Chxx view, where xx represents the channel number, shows the configuration options available for the respective channel.

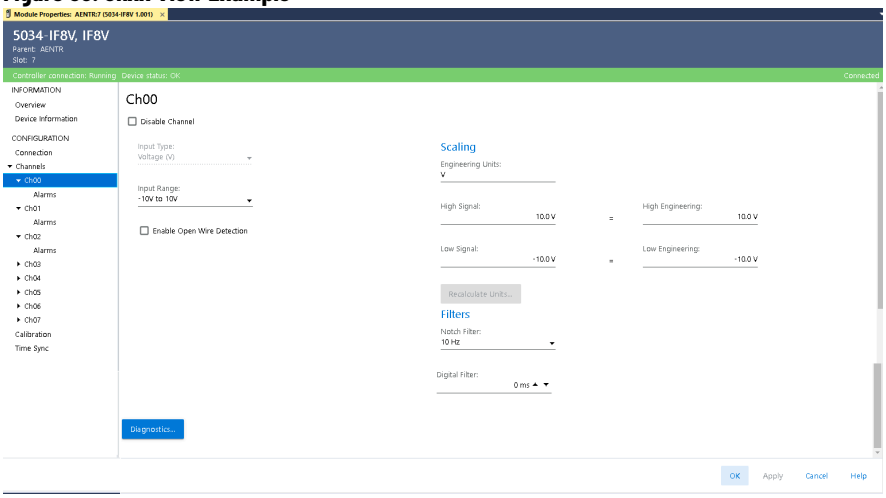
You can do the following actions on this view:

- Disable the channel, if desired
- Change the input type
- Set the notch filter
- Enable or disable open wire detection
- Set the scaling and recalculate all configurations with engineering unit

- Set digital filter
- View channel diagnostics information

To latch and configure alarm parameters, go to Alarms view.

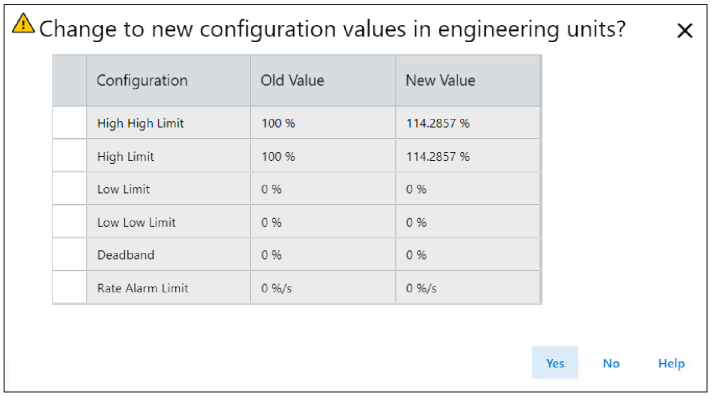
Figure 39. Chxx View Example



Recalculate Units

Recalculate Units lets you recalculate all configurations with engineering unit after a scaling change. Consider the following:

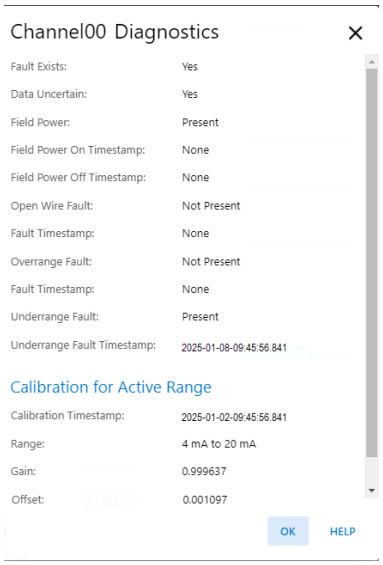
- The Recalculate Units option is enabled when the scaling configuration is changed.
- Upon selecting Recalculate Units option, the recalculated new values based on the new scaling configuration are displayed together with the old values for you to verify before changing.
- If you select "Yes" to proceed with the change, the new values will be set but it gets applied when you select "Apply/OK".
- If you select "No" to cancel the change, the old values are retained. You can either select the Recalculate Units again or manually change those configurations based on the new scaling.



Channelxx Diagnostics

Displays the channel diagnostics information when connected with the module. When online with the module, select the Diagnostics on the Chxx view to see the diagnostic information.

Figure 40. ChannelxxDiagnostics Dialog Example



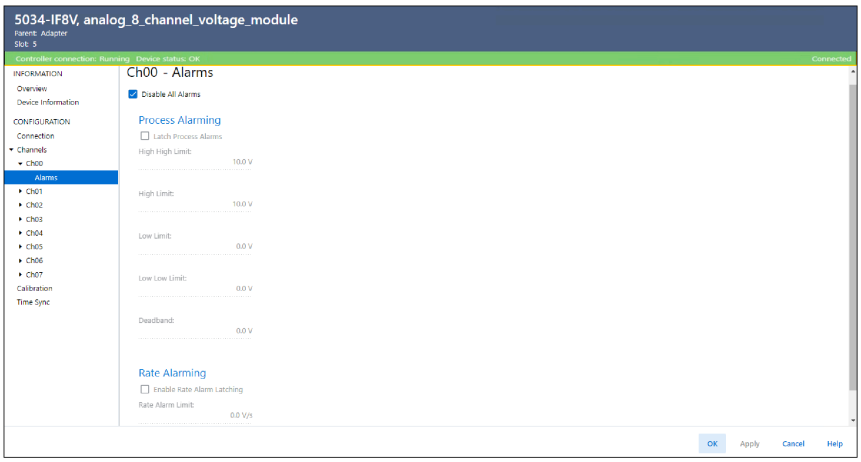
Alarms View

Each channel on the input module has an Alarms view. You can do the following actions on this view:

- Disable all the alarms.
- Enable/Disable latching and set the alarm limits for the process alarms:
  - High High
  - High
  - Low
  - Low Low
  - Deadband
- Enable/Disable latching and set limit for the rate alarm.

Rate Alarm Limit of 0.0 disables the rate alarm.

Figure 41. Chxx - Alarms View Example



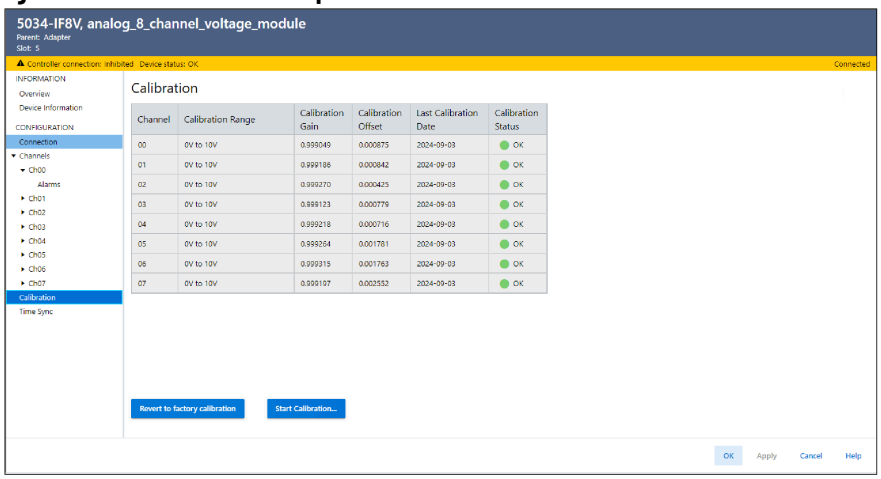
Calibration View

The Calibration view provides calibration information for all channels on the module. You can do the following actions on this view for all the channels:

- View calibration parameters and calibration status for the currently configured input ranges.
- Perform user calibration for one or multiple channels.
- Revert calibration parameters to the factory default values.

For more information on how to calibrate a module, see Module Calibration (Interactive) on page 125.

Figure 42. Calibration View Example

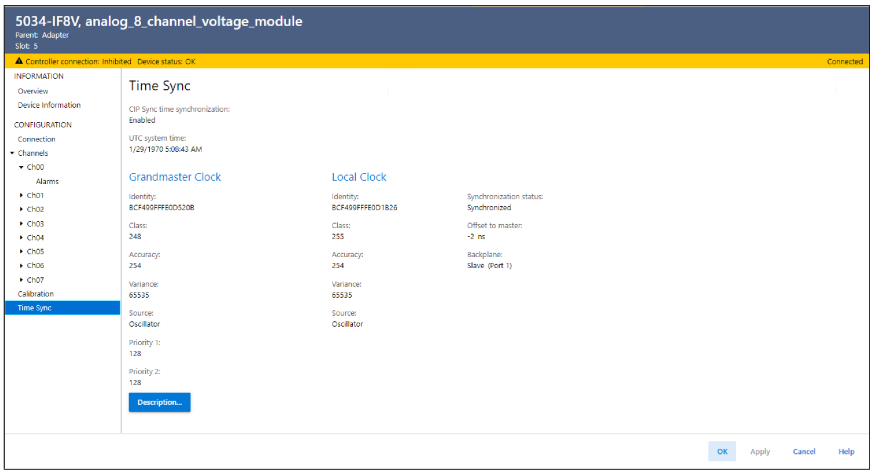


Time Sync View

The Time Sync view is read-only and displays the CIP Sync status information about the module when the project is online. The Time Sync category displays the following information:

- CIP Sync time synchronization status
- UTC system time
- Grandmaster Clock information
- Grandmaster Clock description
- Local Clock information

Figure 43. Time Sync View Example

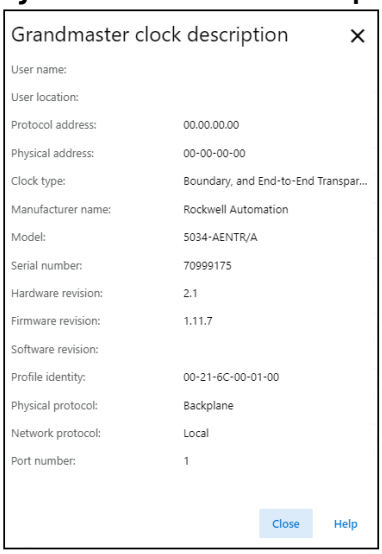


Grandmaster Clock Description

To view the Grandmaster clock description, select Description in the Time Sync view.

The Grandmaster clock description dialog provides detailed information about the grandmaster clock.

Figure 44. Grandmaster Clock Description Example



Module Calibration (Interactive)

You can use Calibration view in Module Properties to interactively calibrate the module on a per channel basis or in group.

Controller State During Calibration

You must add the module to your Studio 5000 Logix Designer application project, as described in Add a New Module to a Studio 5000 Logix Designer Application Project on page 41, before you can calibrate it.

The project must be online with the owner-controller to calibrate the PointMax analog modules. You can calibrate under any of the following conditions:

- The controller is in Program Mode, that is, either Remote Program or Program Mode.

  Your module must be in Program Mode and not be actively controlling a process when you calibrate it.

- There are no connections to the module.

Calibration Impacts Data Quality

When a channel on an analog input module is being calibrated, the Notch Filter setting for that channel changes to 10 Hz. The I.Chxx.Uncertain tag is set to 1 for that channel until calibration is completed.

Grouped inputs share an Analog-to-Digital converter. As a result when any input channel is in the calibration process, the *I.Chxx.Uncertain* tag is set to 1 for other input channels in that group. This is because the data sampling rate slows for all input channels in the group.

Calibration Instrumentation Specifications

When you calibrate the analog input modules, send voltage reference signal to the module to calibrate it. To maintain your module's factory calibration accuracy, use the instrumentation with the specifications listed in the following table.

IMPORTANT: Do not calibrate your module with an instrument that is less accurate than those specified in following table. The following events can result:

- Calibration appears to occur normally but the module gives inaccurate data during operation.
- A calibration fault occurs, forcing you to abort calibration. When this happens, I.Chxx.CalFault tag is set for the channel you attempted to calibrate. You can clear this tag by completing a valid calibration or cycling power to the module.

Table 54. Instrument Specifications

Catalog Number	Channel Input Type	Calibration Instrumentation Specifications
5034-IF8V and 5034-IF8VXT	Voltage (V)	0...10V source ±2 µV voltage

Calibration Procedure

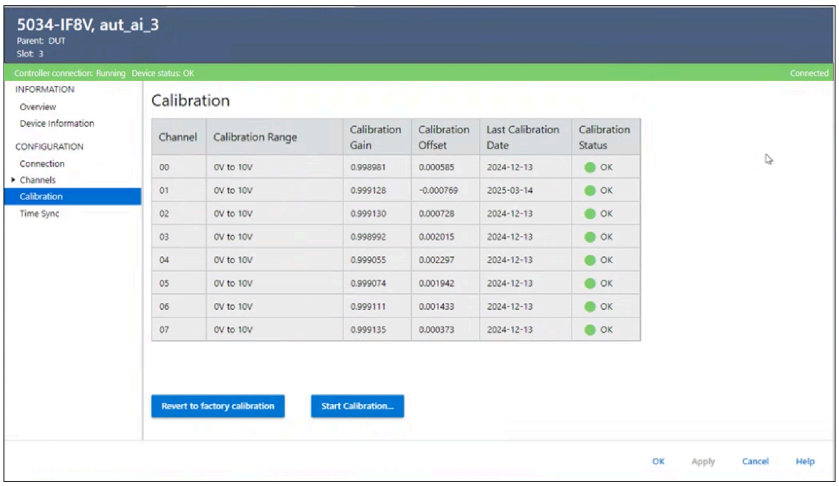
This procedure describes how to calibrate a channel on the analog input module for use with a Voltage (V) input type.

Apply Low and High Signal references to the analog input module to calibrate it. The references must match the input range the channel is using.

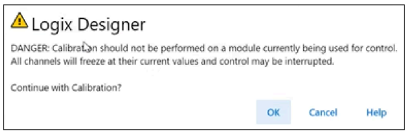
Table 55. Analog Input Module Calibration References

Input Type	Input Range	Low Calibration Reference	High Calibration Reference
Voltage (V)	-10...10V	0.0V	10.0V
	0...10V	0.5V	10.0V
	0...5V	0.5V	5.0V

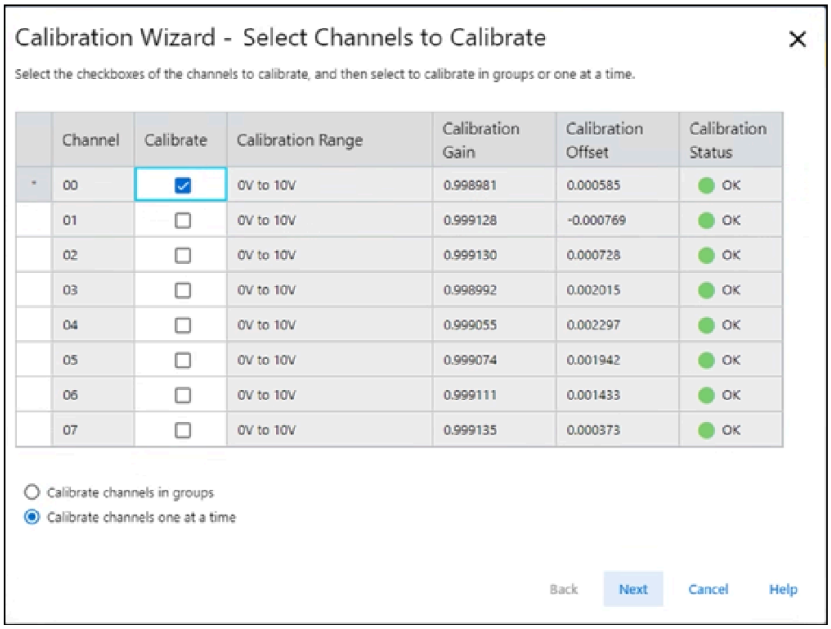
1. Connect the voltage calibrator to the channel being calibrated.
2. Go online with the project and make sure that the controller is in Program Mode.
3. Confirm that the channel to be calibrated is configured for the correct Input Range.
4. On the Calibration view in the Module Properties dialog, select Start Calibration.



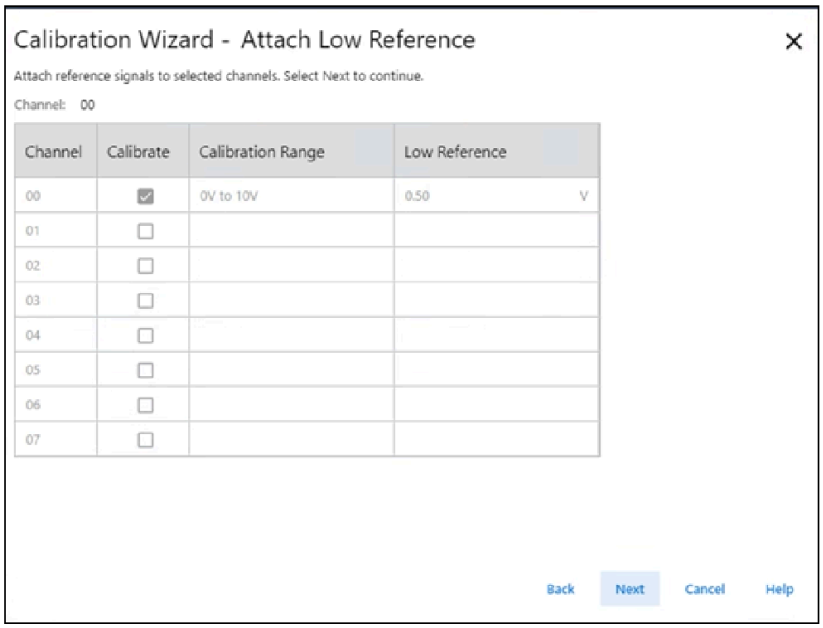
5. When the dialog appears to confirm that you want to calibrate the channel, select OK.



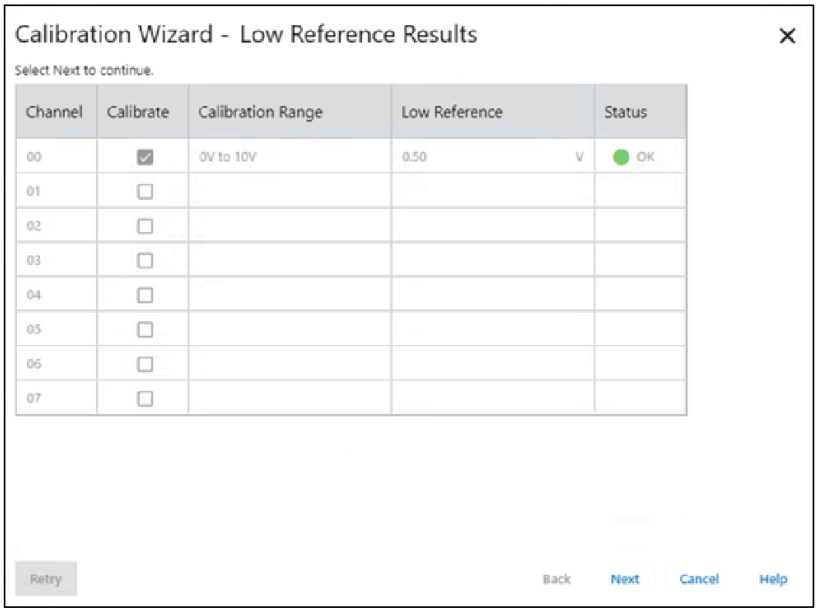
6. Select the channels one at a time or in groups to calibrate and then select Next.



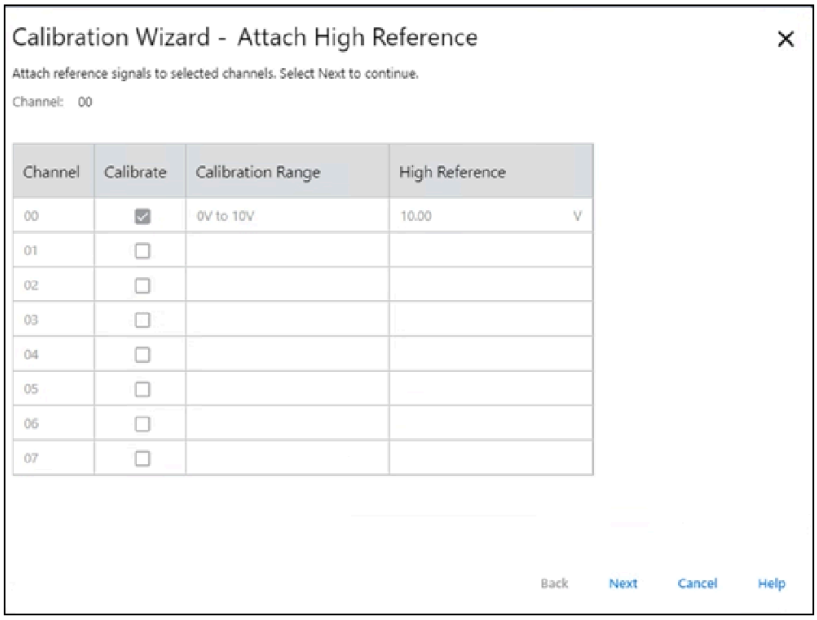
7. When the Attach Low Reference dialog appears, set the calibrator to the low reference and apply it to the channel.



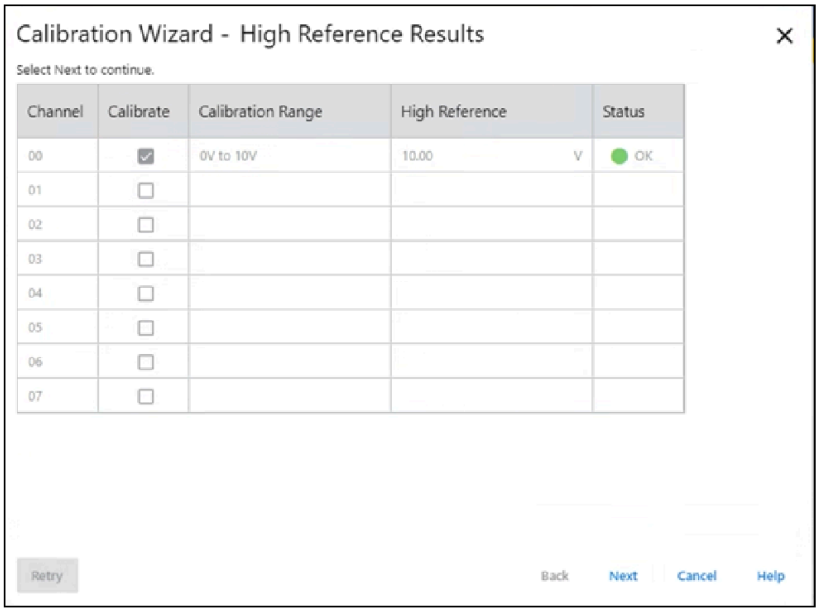
8. Select Next. The Low Reference Results dialog appears and indicates the status of the calibrated channel.



9. If the Status is OK, select Next. If the Status is not OK, repeat the calibration process.
10. When the Attach High Reference dialog appears, set the calibrator to the high reference and apply it to the channel.

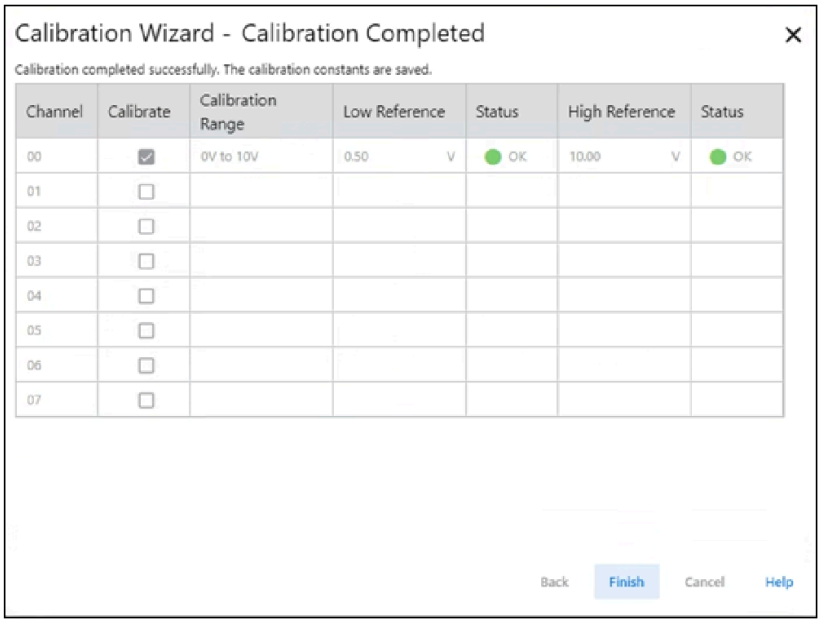


11. Select Next. The High Reference Results dialog appears and indicates the status of the calibrated channel.



12. If the Status is OK, select Next. If the Status is not OK, repeat the calibration process.

13. When the Calibration Completed dialog appears, select Finish.



Use the Status Indicators for Troubleshooting

PointMax I/O modules use the following status indicators:

- SA Power Indicator - This indicator operates the same for all PointMax I/O modules.
- Module Status Indicator - This indicator operates the same for all PointMax I/O modules.
- Channel Status Indicator - This indicator operates differently based on the module type that you are using.

SA Power Indicator

Table 56. Interpret SA Power Indicator

Indicator State	Description	Recommended Action
Off	The module is not powered.	Complete the following actions: 1. Confirm that the system is powered. 2. Confirm that the module is installed properly.
Steady green	There is SA power to the module.	None
Steady red	There is no SA power to the module, or SA power voltage is not in the valid range.	Complete the following actions: 1. Confirm that SA power wiring is properly connected to the adapter, expansion power module, or 5034-MBSA mounting base. 2. Check the following: ◦ Check that the SA voltage is in the correct range. ◦ If an external power supply is used, confirm that the power supply is turned on. ◦ Make sure that the mounting base to mounting base connection is properly secured. Go to Chassis Information view in the Module Properties of the adapter to check the Field Power status of mounting bases installed in all slots.

Module Status Indicator

Table 57. Interpret Module Status Indicator

Indicator State	Description	Recommended Action
Off	The module is not powered.	Complete the following actions: 1. Confirm that the system is powered. 2. Confirm that the module is installed properly.
Steady green	The module is operational and all I/O connections are active.	None
Flashing green	The module has no I/O connections.	Troubleshoot your Studio 5000 Logix Designer application to determine what is preventing a connection from the module to the controller and correct the issue.
Flashing red	One of the following conditions exists: • A module firmware update is in progress. • A module firmware update attempt failed. • The device has experienced a recoverable fault. • A connection to the module has timed out.	Complete one of the following: • Let the firmware update process complete. • Reattempt a firmware update after one fails. • Use the Studio 5000 Logix Designer application to determine whether a module recoverable fault is occurred. It is shown in Device Information view. To clear a recoverable fault, complete one of the following: ◦ Cycle module power. ◦ Select Reset device in the Studio 5000 Logix Designer project via the Device Information view of the Module Properties dialog. If the fault does not clear after cycling power and module reset, contact Rockwell Automation Technical Support. • Use the Studio 5000 Logix Designer application to determine if a connection has timed out. The Connection view in the Module Properties indicates whether a connection request has timed out. If a connection has timed out, determine the cause and correct it. For example, a cable failure can cause a connection timeout.
Steady red	The module experienced a nonrecoverable fault.	Complete the following actions: 1. Cycle power to the module. 2. If the status indicator remains in the steady red state, replace the module.

Channel Status Indicators

Table 58. Interpret Analog Input Channel Status Indicators

Indicator State	Description	Recommended Action
Off	One of the following conditions exists: • The module is not powered. • The module is powered but connection is not established from the controller to module. • The module is powered, but the input channel is disabled.	Complete one of the following: • If you expect the module to be powered but it is not, complete the following: ◦ Confirm that the system is powered. ◦ Confirm that the module is installed properly. • If the module is powered but the channel is not operating as expected, use the Studio 5000 Logix Designer application to confirm that the channel is not disabled and the module has a connection to the controller. The Connection view in the Module Properties indicates if the connection is running or faulted. If the connection is faulted, the Connection view indicates error information. • If the channel is disabled, no action is needed.
Steady yellow	The input channel is operating normally.	None
Flashing red	One of the following conditions exists: • There is no SA power to the module, or SA power voltage is not in the valid range. • The input signal is overrange or underrange. The signal range is set in your Studio 5000 Logix Designer application project. • An Open Wire condition, that is, a wire is disconnected from the input channel.	Complete one of the following: • If there is a SA power fault, see the recommended action given for steady red indicator state in SA Power Indicator table above. • Check the input signal to determine if it is overrange or underrange. If so, make changes to return the input signal to within the range limits. • Check the wiring at the input channel. If necessary, reconnect the wire.
Flashing yellow/red	Calibration is in progress.	Successfully complete the calibration process.
Steady red	An issue has occurred that is internal to the module. The following are example issues that can cause the status indicator to be steady red: • A calibration fault occurred on the channel. • The module has experienced a nonrecoverable fault.	Complete one of the following: • If the indicator turns steady red after a calibration process, you can either perform a successful calibration or cycle the power to recover the fault. • If it is not caused by the calibration, cycle the power to recover the fault. If the condition is still present, replace the module.

Module Tag Definitions

Module tags are created when you add a module to the Studio 5000 Logix Designer application project.

The set of module tags associated with a module depends on the module type and Module Definition choices made during module configuration. For example, if you use a Listen Only connection in the Device Definition, the Studio 5000 Logix Designer application creates only Input tags for that module.

The tables contained in this section list all the tags available with a module. Not all tags in the list are used when that module type is added to a project. Tag use varies by module configuration.

Configuration Tag Definitions

Table 59. Configuration Tags

Name	Data Type	Definition	Valid Values
Chxx.Range	SINT	Channel's operating range	0 = -10...10V 1 = 0...5V 2 = 0...10V
Chxx.NotchFilter	SINT	Notch Filter removes line noise for the channel.	• 0 = 10 Hz • 16 = 20 Hz • 1 = 50 Hz • 2 = 60 Hz • 3 = 100 Hz • 4 = 200 Hz • 20 = 400 Hz • 5 = 500 Hz • 6 = 1,000 Hz • 8 = 5,000 Hz • 9 = 10,000 Hz • 10 = 15,625 Hz • 12 = 31,250 Hz
Chxx.AlarmDisable	BOOL	Disables all alarms on the channel. **IMPORTANT:** Consider the following: • If you change this tag to 0, that is, so that the alarms are not disabled, you must also enable the individual alarms for them to work. For example, if you want to use the Low Low Alarm for a channel, you must set the Chxx.AlarmDisable to 0 and set the Chxx.LLAlarmEn output tag to 1 so that the alarm is enabled. This applies to all alarms on the module. • Conversely, if you set this tag to 1, alarms are disabled regardless of the setting on the alarm enable tag for any alarm.	0 = Alarms are enabled 1 = Alarms are disabled
Chxx.ProcessAlarmLatchEn	BOOL	Configures Process alarms to latch until they are explicitly unlatched. The Process alarms include: • HighHigh Alarm • High Alarm • Low Alarm • LowLow Alarm	0 = Latching disabled 1 = Latching enabled
Chxx.RateAlarmLatchEn	BOOL	Configures the Rate Alarm to latch until it is explicitly unlatched.	0 = Latching disabled 1 = Latching enabled
Chxx.OpenWireEn	BOOL	Enables the input Open Wire diagnostic.	0 = Disabled 1 = Enabled
Chxx.Disable	BOOL	Disables the channel. When a channel is disabled, the following occurs: • The I/O status indicator for the channel turns off. • The Chxx.Fault input tag is set to 1.	0 = Channel is enabled 1 = Channel is disabled

Table 59. Configuration Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.TenOhmOffset	INT	Not Applicable	0
Chxx.DigitalFilter	INT	A non-zero value enables the filter, providing a time constant in milliseconds used in a first order lag filter to smooth the input signal.	0 = Filter is turned off Any value greater than zero = Filter value in milliseconds
Chxx.LowSignal	REAL	One of four points used in scaling. The low signal is in terms of the inputs signal units and corresponds to the low engineering term when scaled.	Any value less than the high signal in range.
Chxx.HighSignal	REAL	One of four points used in scaling. The high signal is in terms of the inputs signal units and corresponds to the high engineering term when scaled.	Any value greater than the low signal in range.
Chxx.LowEngineering	REAL	One of four points used in scaling. The low engineering helps determine the engineering units the signal values scale into. The low engineering term corresponds to the low signal value.	Any value
Chxx.HighEngineering	REAL	One of four points used in scaling. The high engineering helps determine the engineering units the signal values scale into. The high engineering term corresponds to the high signal value.	Any value
Chxx.LLAlarmLimit	REAL	The Low Low Alarm trigger point. Causes the Chxx.LLAlarm to trigger when the input signal moves beneath the configured trigger point. Value is in terms of engineering units.	Any value
Chxx.LAlarmLimit	REAL	The Low Alarm trigger point. Causes the ChxxLAlarm to trigger when the input signal moves beneath the configured trigger point. Value is in terms of engineering units.	Any value
Chxx.HAlarmLimit	REAL	The High Alarm trigger point. Causes the ChxxHAlarm to trigger when the input signal moves above the configured trigger point. Value is in terms of engineering units.	Any value
Chxx.HHAlarmLimit	REAL	The High High Alarm trigger point. Causes the ChxxHHAlarm to trigger when the input signal moves above the configured trigger point. Value is in terms of engineering units.	Any value
Chxx.RateAlarmLimit	REAL	The Rate Alarm trigger point. Causes the ChxxRateAlarm to trigger when the input signal changes at a rate faster than the configured Rate Alarm. Configured in Engineering Units per second.	0 = Rate Alarm is not used Any value greater than zero = Trigger point
Chxx.AlarmDeadband	REAL	Allows a process alarm to remain set, despite the alarm condition disappearing, as long as the input data remains within the deadband of the process alarm. The deadband value is subtracted from the High and High High Alarm Limits to calculate the deadband thresholds for these alarms. The deadband value is added to the Low and Low Low Alarm Limits to calculate the deadband thresholds for these alarms.	Any non-negative value

Input Tag Definitions

Table 60. Input Tags

Name	Data Type	Definition	Valid Values
RunMode	BOOL	Channel's operating state	0 = Idle 1 = Run When the value is 0, it means one of the following: • Connection is not up. • Connection has been opened but the module has not started producing data for the connection. • Module is not applying new Output tag data because the controller is in Program Mode. When the value is 1, it means the following: • Connection is up. • Module is producing data for the connection. • Output tag data is being applied.
ConnectionFaulted	BOOL	Indicates if a connection is running. The module sets this tag to 0 when connected. If the module is not connected, it changes the tag to 1.	0 = A connection exists between the module and the controller 1 = Connection is timed out or inhibited
DiagnosticActive	BOOL	Indicates if any diagnostics are active or if the prognostics threshold is reached.	0 = No diagnostics are active 1 = One or more diagnostics are active or the prognostics threshold is reached.
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.	-128...+127 The value of 0 is skipped except during module powerup.
Chxx.Fault	BOOL	Indicates that channel data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = No fault exists 1 = Fault exists
Chxx.Uncertain	BOOL	Indicates that the channel data can be inaccurate but the degree of inaccuracy is not known. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = Valid data 1 = Data validity uncertain
Chxx.OpenWire	BOOL	The signal wire is disconnected from the channel or the RTB is removed from the module.	0 = Open wire condition does not exist or open wire detection is disabled 1 = Open wire condition exists, which means the signal wire is disconnected from the channel or the RTB is removed from the module
Chxx.OverTemperature	BOOL	Not applicable for this module.	N/A
Chxx.FieldPowerOff	BOOL	Field power is not present at the channel.	0 = Field power is present 1 = Field power is not present

Table 60. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.NotANumber	BOOL	Indicates if the last received channel data was not a number.	0 = Last channel data received was a number 1 = Last channel data received was not a number
Chxx.Underrange	BOOL	Indicates that the channel data is beneath the underrange threshold for this channel. For example, when the channel operates in the 4...20 mA input range, the underrange threshold on the channel is <3.0 mA. If the input signal is 0 mA, this tag is set to 1.	0 = Channel data is not beneath the underrange threshold 1 = Channel data is beneath the underrange threshold
Chxx.Overrange	BOOL	Indicates that the channel data is above the overrange threshold for this channel. For example, when the channel operates in the 4...20 mA output range, the overrange threshold on the channel is >23.0 mA. If the input signal is 24 mA, this tag is set to 1.	0 = Channel data is not above the overrange threshold 1 = Channel data is above the overrange threshold
Chxx.LLAlarm	BOOL	Triggered when the input data value is less than the Low Low Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is greater than the Low Low Limit plus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.LAlarm	BOOL	Triggered when the input data value is less than the Low Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is greater than the Low Limit plus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.HAlarm	BOOL	Triggered when the input data value is greater than the High Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is less than the High Limit minus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.HHAlarm	BOOL	Triggered when the input data value is greater than the High High Alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is less than the High High Limit minus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.RateAlarm	BOOL	Triggered when the change between consecutive channel samples divided by the period of time between when the samples were taken exceeds the Rate Alarm. If latched, this tag remains set until it is unlatched.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.CalFault	BOOL	Indicates that the last attempted Calibration for this channel failed or there is no calibration data present. This tag is cleared, that is, set to 0, when power is cycled to the module or a successful calibration for the range on the channel is performed.	0 = Calibration did not fail 1 = Calibration failed
Chxx.Calibrating	BOOL	Indicates that the channel is currently being calibrated.	0 = Channel is not being calibrated 1 = Channel is being calibrated

Table 60. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.CalGoodLowRef	BOOL	Indicates that a valid Low Reference signal is sampled on this channel in the calibration process. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Valid Low Reference signal has not been sampled on this channel 1 = Valid Low Reference signal has been sampled on this channel
Chxx.CalBadLowRef	BOOL	Indicates that an invalid Low Reference signal is sampled on this channel in the calibration process. You must correct this condition to successfully calibrate the module. If calibration is aborted with an invalid Low Reference signal, the Chxx.CalFault tag is set for this channel until a successful calibration is performed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Invalid Low Reference signal has not been sampled on this channel 1 = Invalid Low Reference signal has been sampled on this channel
Chxx.CalGoodHighRef	BOOL	Indicates that a valid High Reference signal is sampled on this channel in the calibration process. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Valid High Reference signal has not been sampled on this channel 1 = Valid High Reference signal has been sampled on this channel
Chxx.CalBadHighRef	BOOL	Indicates that an invalid High Reference signal is sampled on this channel in the calibration process. You must correct this condition to successfully calibrate the module. If calibration is aborted with an invalid High Reference signal, the Chxx.CalFault tag is set for this channel until a successful calibration is performed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Invalid High Reference signal has not been sampled on this channel 1 = Invalid High Reference signal has been sampled on this channel

Table 60. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.CalSuccessful	BOOL	Indicates calibration on this channel is complete and the Calibrating state has been exited. This tag remains set after valid calibration and until a new calibration process is started or the connection is closed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Device definition dialog. If you use the Data connection type, this tag does not appear in the module tags.	0 = Calibration was not successful 1 = One of the following: • Calibration was successful and calibrating state has been exited. • Calibration data is present and applied.
Chxx.Data	REAL	Channel data in scaled Engineering Units.	Any value
Chxx.RollingTimestamp	INT	Continuously-running 15-bit timer that counts in milliseconds. Whenever an input module scans its channels, it also records the value of RollingTimestamp at that time. The user program uses the last two RollingTimestamp values and calculates the interval between receipt of data.	0...32,767

Output Tag Definitions

Table 61. Output Tags

Name	Data Type	Definition	Valid Values
Chxx.LLAlarmEn	BOOL	Enables the Low Low alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Alarm is disabled 1 = Alarm is enabled
Chxx.LAlarmEn	BOOL	Enables the Low alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Alarm is disabled 1 = Alarm is enabled
Chxx.HAlarmEn	BOOL	Enables the High alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Alarm is disabled 1 = Alarm is enabled

Table 61. Output Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.HHAlarmEn	BOOL	Enables the High High alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Alarm is disabled 1 = Alarm is enabled

Table 61. Output Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.RateAlarmEn	BOOL	Enables the Rate alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Alarm is disabled 1 = Alarm is enabled
Chxx.LLAlarmUnlatch	BOOL	Unlatches a latched Low Low Alarm at the first instance of the bit transitioning from 0 to 1.	• 0 = Low Low Alarm remains latched • 1 = Low Low Alarm unlatches
Chxx.LAlarmUnlatch	BOOL	Unlatches a latched Low Alarm at the first instance of the bit transition from 0 to 1.	• 0 = Low Alarm remains latched • 1 = Low Alarm unlatches
Chxx.HAlarmUnlatch	BOOL	Unlatches a latched High Alarm at the first instance of the bit transition from 0 to 1.	• 0 = High Alarm remains latched • 1 = High Alarm unlatches
Chxx.HHAlarmUnlatch	BOOL	Unlatches a set High High Alarm at the first instance of the bit transition from 0 to 1.	• 0 = High High Alarm remains latched • 1 = High High Alarm unlatches
Chxx.RateAlarmUnlatch	BOOL	Unlatches a set Rate Alarm at the first instance of the bit transition from 0 to 1.	• 0 = Rate Alarm remains latched • 1 = Rate Alarm unlatches
Chxx.Calibrate	BOOL	Initiates the Calibration process. This tag must remain set until a valid Low Reference and High Reference values are applied to the input. If the tag value transitions to 0 before calibration is finished, the process stops and calibration fails.	• 0 = Calibration process is not started • 1 = Calibration process is started
Chxx.CalLowRef	BOOL	Rising edge triggers the Low Calibration at the Low Reference Point for the current input range value. A valid Low Reference signal must be connected to the channel before setting this tag. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	• 0 = Channel data value has not passed the Low Reference Point value for the current *InputRange* tag value • 1 = Channel data value has passed the Low Reference Point value for the current *InputRange* tag value
Chxx.CalHighRef	BOOL	Rising edge triggers a High Calibration at the High Reference Point for the current input range value. A valid High Reference signal must be connected to the channel before setting tag. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	• 0 = Channel data value has not passed the High Reference Point for the current *InputRange* tag value • 1 = Channel data value has passed the High Reference Point for the current *InputRange* tag value
Chxx.SensorOffset	REAL	Compensates for any known offset error on the sensor or channel to which the sensor is connected. In terms of engineering units. The value of this tag is added to the measured value in engineering units and is used in the Chxx.Data input tag.	Any valid float value (We recommend that you use a value in the channel's operating range.) 0.0 = Default

Diagnostic Assembly

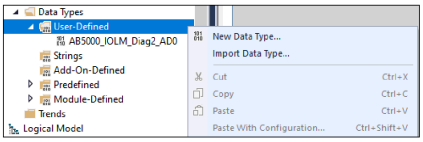
Diagnostic assembly helps you troubleshoot and diagnose the fault in your system.

Create User-defined Diagnostic Assembly Types

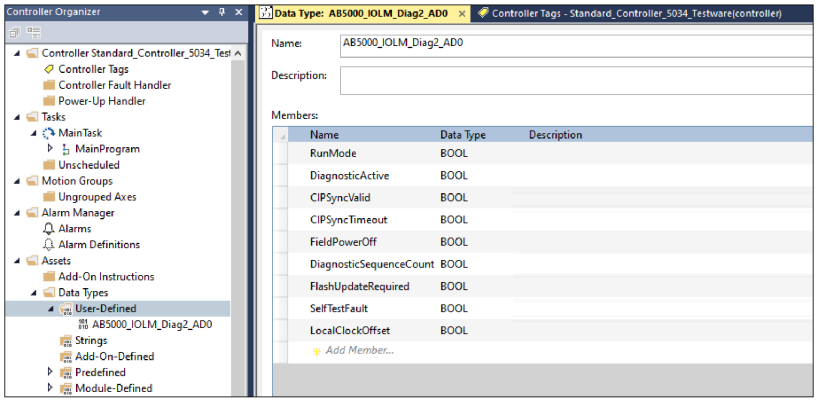
You can use the Studio 5000 Logix Designer application to create user-defined Diagnostic Assembly types.

Create user-defined diagnostic assembly by following the below steps:

1. From the Controller Organizer pane, go to Assets → Data types → User-Defined.
2. Right-click on the User-Defined folder and select New Data Type.



3. Add a Name and Description (optional) for your diagnostic assembly.
4. Under Members area, add the data members based on the diagnostic assembly detailed below.



IMPORTANT: The members indicated in the tables are arranged according to Data Alignment Rules of controllers. Strictly follow the data type and the sequence of the members that are indicated in the tables of this appendix. If the data type and the sequence are not followed, data misalignment may occur after executing Get Attribute Single Message (MSG) instruction.

Diagnostic Assemblies

1. Diagnostic Assembly A for Analog 8 Channel Input Module
   - Instance ID: 0x8019 (32793)
   - Size = 336 bytes

   Follow the information in the following table to add each member.

Table 62. Diagnostic Assembly Instance 32793

Name	Date Type	Size in Bytes
RunMode	BOOL	1
Infobit_Pad1	BOOL	
DiagnosticActive	BOOL	
CIPSyncValid	BOOL	
CIPSyncTimeout	BOOL	

Name	Date Type	Size in Bytes
Infobit_Pad5	BOOL	
FieldPowerOff	BOOL	
Infobit_Pad7	BOOL	
DiagnosticSequenceCount	SINT	1
Diagbit_Pad0	BOOL	2
Diagbit_Pad1	BOOL	
Diagbit_Pad2	BOOL	
Diagbit_Pad3	BOOL	
Diagbit_Pad4	BOOL	
Diagbit_Pad5	BOOL	
Diagbit_Pad6	BOOL	
Diagbit_Pad7	BOOL	
Diagbit_Pad8	BOOL	
Diagbit_Pad9	BOOL	
Diagbit_Pad10	BOOL	
Diagbit_Pad11	BOOL	
FlashUpdateRequired	BOOL	
SelfTestFault	BOOL	
Diagbit_Pad14	BOOL	
Diagbit_Pad15	BOOL	
Pad	DINT	4
LocalClockOffset	LINT	8
LocalClockOffsetTimestamp	LINT	8
GrandMasterClockID	SINT[8]	8
FieldPowerOnTimestamp	LINT	8
FieldPowerOffTimestamp	LINT	8
Ch00	Diagnostic_Channel_Structure	72
Ch01	Diagnostic_Channel_Structure	72
Ch02	Diagnostic_Channel_Structure	72
Ch03	Diagnostic_Channel_Structure	72

2. Diagnostic Assembly B for Analog 8 Channel Input Module
   - Instance ID: 0x801E (32798)
   - Size = 288 bytes

   Follow the information in the following table to add each member.

Table 63. Diagnostic Assembly Instance 32798

Name	Date Type	Size in Bytes
Ch04	Diagnostic_Channel_Structure	72
Ch05	Diagnostic_Channel_Structure	72
Ch06	Diagnostic_Channel_Structure	72
Ch07	Diagnostic_Channel_Structure	72

3. Diagnostic Counters Assembly for I/O
   - Instance ID: 0x301 (769)
   - Size = 16 bytes

   Follow the information in the following table to add each member.

Table 64. Diagnostic Assembly Instance 769

Name	Date Type	Size in Bytes
RunMode	BOOL	1
Infobit_Pad1	BOOL	
DiagnosticActive	BOOL	
Infobit_Pad3	BOOL	
Infobit_Pad4	BOOL	
Infobit_Pad5	BOOL	

Name	Date Type	Size in Bytes
Infobit_Pad6	BOOL	
Infobit_Pad7	BOOL	
DiagnosticSequenceCount	SINT	1
CIPConnections	INT	2
CIPLostPackets	DINT	4
CIPTimeouts	DINT	4
CPUUtilization	INT	2
Pad	INT	2

Diagnostic Channels

1. Diagnostic Channel
   - Size = 72 bytes

   This data type is retrieved as part of the diagnostic assembly instance.
   Follow the information in the following table to add each member.

Table 65. 5034-IF8V Diagnostic Channel Structure

Name	Date Type	Size in Bytes
Databit_Pad0	BOOL	2
Fault	BOOL	
Uncertain	BOOL	
OpenWire	BOOL	
Databit_Pad4	BOOL	
Databit_Pad5	BOOL	
FieldPowerOff	BOOL	
Databit_Pad7	BOOL	
Disabled	BOOL	
Databit_Pad10	BOOL	
Databit_Pad11	BOOL	
Databit_Pad12	BOOL	
Databit_Pad13	BOOL	
Databit_Pad14	BOOL	
Databit_Pad15	BOOL	
CalFault (DIAG 4)	BOOL	2
Underrange (DIAG 1)	BOOL	
Overrange (DIAG 1)	BOOL	
Diagbit_Pad3	BOOL	
Diagbit_Pad4	BOOL	
Diagbit_Pad5	BOOL	
Diagbit_Pad6	BOOL	
Diagbit_Pad7	BOOL	
Diagbit_Pad8	BOOL	
Diagbit_Pad9	BOOL	
Diagbit_Pad10	BOOL	
Diagbit_Pad11	BOOL	
Diagbit_Pad12	BOOL	
Diagbit_Pad13	BOOL	
Diagbit_Pad14	BOOL	
Diagbit_Pad15	BOOL	
Pad1	INT	2
InternalErrorCount	SINT	1
CalRange	SINT	1
CalOffset	REAL	4
CalGain	REAL	4
CalLastDate	LINT	8

Name	Date Type	Size in Bytes
OpenWireTimestamp	LINT	8
Pad2	LINT	8
UnderrangeTimestamp	LINT	8
OverrangeTimestamp	LINT	8
FieldPowerOnTimestamp	LINT	8
FieldPowerOffTimestamp	LINT	8

Definitions for Diagnostic Assembly Types

Table 66. Definition of Members in Diagnostic Assembly Data Types

Name	Data Type	Definition	Valid Values
RunMode	BOOL	Channel's operating state	• 0 = Idle • 1 = Run Idle - The connection is up and the module is producing data for the connection and output tag data is being applied. Run - One of the following is present: • The connection is not up. • The connection is opened but the module has not started producing data for the connection. • The module is not applying new output tag data because the controller is in Program Mode.
DiagnosticActive	BOOL	Indicates if any diagnostics are active or if the prognostics threshold is reached.	0 = No diagnostics active 1 = One or more diagnostics are active or the prognostics threshold is reached.
CIPSyncValid	BOOL	Indicates if the module is synced with a 1588 master.	• 0 = Module is not synced • 1 = Module is synced
CIPSyncTimeout	BOOL	Indicates if the module was once synced with a 1588 master, but is not now due to a timeout	• 0 = A valid time master has not timed out. • 1 = A valid time master is detected on the backplane, but the time master has timed out. The module is using its local clock and can be drifting away from the last known time master.
FieldPowerOff	BOOL	Field power is not present at the channel.	0 = Field power is present 1 = Field power is not present
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.	-128...+127 The value of 0 is skipped except during module power-up.
FlashUpdateRequired	BOOL	Indicates whether flash update is required.	• 0 = Flash update is not required • 1 = Module has no application firmware
SelfTestFault	BOOL	Indicate whether the fault is present during module self-test.	• 0 = Module initialization code did not detect an error • 1 = Module initialization code detected an error
LocalClockOffset	LINT	The offset from the local clock to the system time. This value helps to detect steps in time. This value updates when a PTP update is received.	Any value

Table 66. Definition of Members in Diagnostic Assembly Data Types (continued)

Name	Data Type	Definition	Valid Values
LocalClockOffsetTimestamp	LINT	Indicates the timestamp of the local clock offset.	A valid time or None if there is no recorded event time. Time format is YYYY-MMDD-HH:mm:SS_mmm_uuu_nnn(UTC-00:00) • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds • uuu = microseconds • nnn = nanoseconds • UTC-00:00 = Time zone
GrandMasterClockID	SINT	The EUI-64 Identity of the CIP Sync Grandmaster clock the module is synced to.	Any value
FieldPowerOnTimestamp	LINT	Indicates the timestamp of the last time field power turned on.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
FieldPowerOffTimestamp	LINT	Indicates the timestamp of the last time field power turned off.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
Fault	BOOL	Indicates that channel data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.	0 = No fault exists 1 = Fault exists The typical causes of a fault are the following: • ◦ Channel is disabled ◦ Open Wire condition ◦ Underrange/Overrange condition ◦ SA power loss condition You must troubleshoot the module first to see if the typical causes exist.
Uncertain	BOOL	Indicates that the channel data can be inaccurate but the degree of inaccuracy is not known. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.	0 = Valid data 1 = Data validity uncertain

Table 66. Definition of Members in Diagnostic Assembly Data Types (continued)

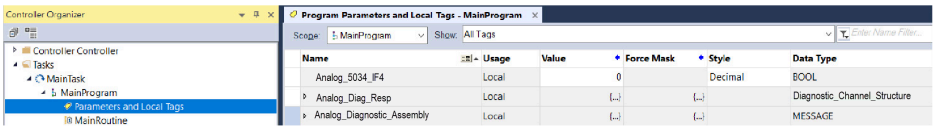
Name	Data Type	Definition	Valid Values
OpenWire	BOOL	The signal wire is disconnected from the channel or the RTB is removed from the module.	0 = Open wire condition does not exist or open wire detection is disabled. 1 = Open wire condition exists, that means the signal wire is disconnected from the channel or the RTB is removed from the module.
CalFault	BOOL	Indicates the last attempted Calibration for this channel failed or there is no calibration data present. This tag is cleared, that is, set to 0, when power is cycled to the module.	• 0 = Calibration did not fail • 1 = Calibration failed
Underrange	BOOL	Indicates the channel data is beneath the underrange threshold for this channel. For example, when the channel operates in the 4...20 mA input range, the underrange threshold on the channel is < 3.0 mA. If the input signal is 0 mA, this tag is set to 1.	0 = Channel data is not beneath the underrange threshold 1 = Channel data is beneath the underrange threshold
Overrange	BOOL	Indicates the channel data is above the overrange threshold for this channel. For example, when the channel operates in the 4...20 mA output range, the overrange threshold on the channel is > 23.0 mA. If the input signal is 24 mA, this tag is set to 1.	0 = Channel data is not above the overrange threshold 1 = Channel data is above the overrange threshold
CalRange	SINT	Indicates the value currently configured for the channel. Values display according to the Input Type selected.	• 0 = -10...10V • 1 = 0...5V • 2 = 0...10V • 4 = 0...20 mA • 5 = 4...20 mA
CalOffset	REAL	Indicates the offset in signal units as reported by the device.	Any value
CalGain	REAL	Indicates the calibration gain reported by the device.	Any value
CalLastDate	LINT	Indicates the time of the last calibration date for the channel.	Any value
OpenWireTimestamp	LINT	Indicates the timestamp of the last time when the open wire condition is detected.	A valid time or None if there is no recorded event time.
UnderrangeTimestamp	LINT	Indicates the timestamp of the last underrange fault.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds

Table 66. Definition of Members in Diagnostic Assembly Data Types (continued)

Name	Data Type	Definition	Valid Values
OverrangeTimestamp	LINT	Indicates the timestamp of the last overrange fault.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
CIPConnections	INT	Indicates the number of CIP connections currently open.	0...24
CIPLostPackets	DINT	Indicates the running sum of the number of Sequenced Address Item Sequence Numbers that are skipped in Class 0 and Class 1 connections consumed by the adapter and its children.	0...2,147,483,647
CIPTimeouts	DINT	Indicates the running count of the number of connections that time out, both originated and targeted, to and through the adapter.	0...2,147,483,647
CPUUtilization	INT	Indicates the usage of the compute engine.	0...100%

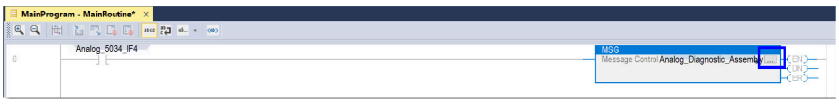
Create Message Type User Tags

Create MESSAGE type user tags for requests and associated response user tags for each of the new user-defined diagnostic assembly types.



From the Controller Organizer pane, expand Tasks → MainTask → MainProgram:

1. Create MESSAGE type user tags for each request.
2. Create associated response user tags for each new user-defined diagnostic assembly type.
3. Add the user tags to your ladder program.



4. Expand the message tag to open the message configuration dialog.
5. On the Configuration tab, select:
   - Service type: Get Attribute Single
   - Class: 4
   - Attribute: 3

- Instance:
  - **5034-IF8V and 5034-IF8VXT**
    0x8019 (32793) Diagnostic Assembly A for Analog 8 Channel Input Module
    0x801E (32798) Diagnostic Assembly B for Analog 8 Channel Input Module
    0x301 (769) Diagnostic Counters Base I/O Assembly
- Destination element: User-defined data type suitable for the instance entered.

6. On the Communication tab, select the path to the module that you wish to send the messages to.
7. Download the project and set to Run Mode.

   You can monitor the user-defined tag values from the Program Parameters and Local Tags window, under the MainProgram task in the Controller Organizer pane.

5034-IRT4I and 5034-IRT4IXT Details

This chapter covers the detailed instructions on how to configure, calibrate, and troubleshoot your 5034-IRT4I and 5034-IRT4IXT modules. It also describes the module tag definitions for input, output, and configuration tags.

Module Configuration

Before you start configuring your I/O module, you must create a Studio 5000 Logix Designer application project for the Logix 5000 controller that owns the PointMax I/O modules. See Add a New Module to a Studio 5000 Logix Designer Application Project on page 41 for more information. The project includes module configuration data for the PointMax I/O modules.

The Studio 5000 Logix Designer application transfers the project to the owner-controller during the program download. Data is then transferred to the PointMax I/O modules when the connection is established. The PointMax I/O modules can operate immediately after receiving and applying the configuration data.

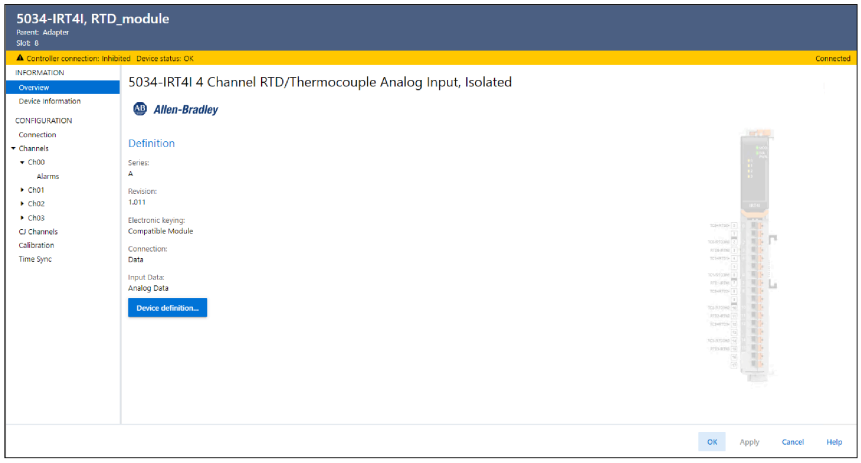
IMPORTANT: You must use Studio 5000 Logix Designer application version 36 or later.

Overview View

When you create a module or open the Module Properties, the Overview view appears first. Use Overview to view the definition of a device, including the device type, revision, electronic keying, connection, and other device-specific values.

To change the definition of a device, select the Device definition in the Overview view.

Figure 45. Overview View Example



Device Definition Dialog

Figure 46. Device Definition Dialog Example

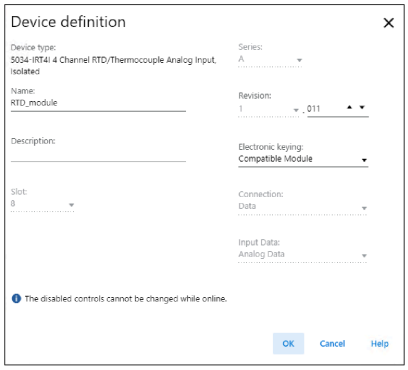


Table 67. Device Definition Parameters

Parameter	Definition	Available Choices
Device Type	Displays the device catalog number and type.	Device-specific
Name	Enter an IEC 61131 compliant device name. If an invalid character is entered in this field, or if the name exceeds 40 characters, the software ignores the character.	All valid values
Description	Enter the description of the device.	All valid values
Slot	Specify the slot number where the device resides. Only slots between 1 and the maximum number of I/O devices are valid depending on the platform. When the device is created, the slot number defaults to the first available slot position. When the controller is changed to one supporting a smaller maximum I/O count, the current slot value may no longer be valid.	1...32
Series	Specifies the module hardware series.	Device-specific

Table 67. Device Definition Parameters (continued)

Parameter	Definition	Available Choices
Revision	Specifies the major and minor revisions of the device. The valid range for minor revision is from 1...255.	Device-specific
Electronic Keying	Defines the electronic keying used for the device. Electronic keying compares the device defined in the project to the installed device. If keying fails, a fault occurs. For detailed information on Electronic keying, see Electronic Keying in Logix 5000 Control Systems Application Technique, publication LOGIX-AT001	• Exact Match • Compatible Module • Disable Keying  **ATTENTION:** Be extremely cautious when using Disable Keying; if used incorrectly, this option can lead to personal injury or death, property damage, or economic loss. We strongly suggest that you do not use Disable Keying. If you use Disable Keying, you must take full responsibility for understanding whether the device being used can fulfill the functional requirements of the application.
Connection	Determines the following for the module type you configure: • Available configuration parameters • Data type transferred between the module and the controller • Which tags are generated when configuration is complete For the Listen Only Data choice, the controller and device establish communication without the controller sending any configuration or output data to the device. A full input data connection is established but depends on the connection between the owner-controller and the device.	• Data with Calibration • Data (default) • Listen Only
Input Data	Selects the input data type for the device.	Analog Data

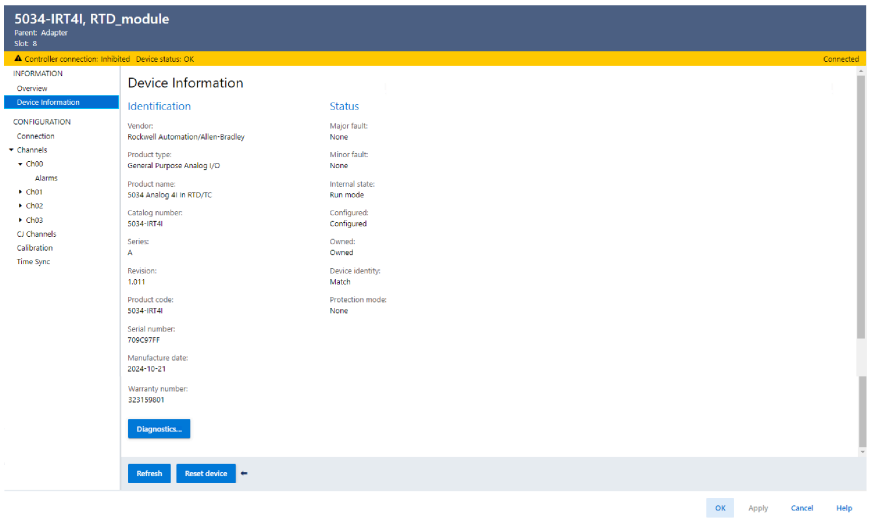
Device Information View

Use Device Information to view device and status information when the device is online. You can use this view to complete the following:

- Determine the identity of the device.
- View the device's current operational state.
- View whether the device was configured by the owner controller.
- View whether an owner controller is currently connected to the device.
- Retrieve the latest information from the device.
- Reset a device to its power-up state.

- If supported, view the Protection Mode of the device.
- Access device diagnostics

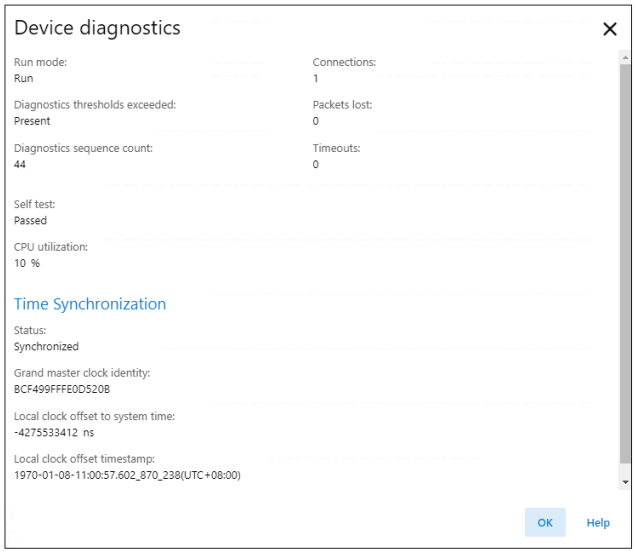
Figure 47. Device Information View Example



Device Diagnostics

To view the device diagnostics, select Diagnostics in the Device Information view. It displays the diagnostics information of the module.

Figure 48. Device Diagnostics Dialog Example



Connection View

The Connection view lets you complete the following tasks:

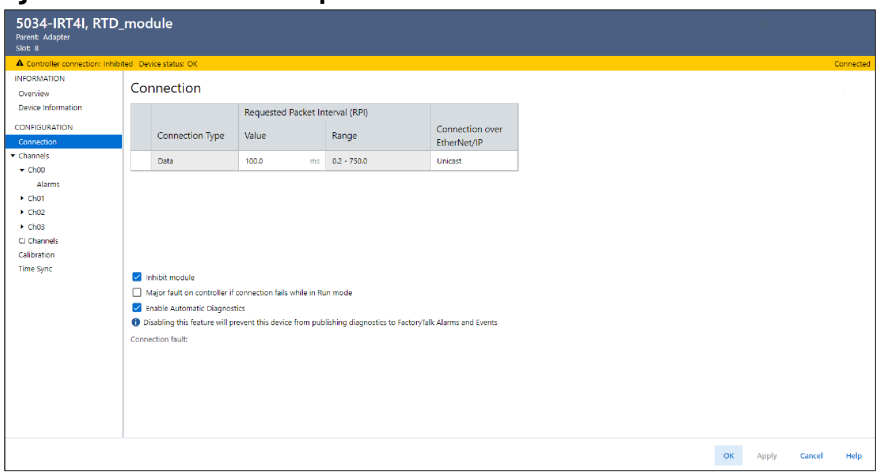
- Set the RPI rate. For more information, see Requested Packet Interval on page 16.
- Select Unicast or Multicast connection to use on the EtherNet/IP network. For more information, see Unicast or Multicast Connection on page 19.
- View the reason of Connection Fault.

If there is a connection fault, Connection Fault area displays the error code with description that helps you to troubleshoot the module. For more information, see Troubleshoot Your Module on page 45.

- Inhibit the module. For more information, see Module Inhibiting on page 17.
- Configure fault response for connection failure while the controller is in Run Mode.
- Enable or disable the Automatic Diagnostics.

ATTENTION: If you do not enable Automatic Diagnostics, the device does not publish diagnostics to FatoryTalk Alarms and Events.

Figure 49. Connection View Example



Recommended Minimum RPI Values for Notch Filters

In the following table, each Notch Filter setting has recommended minimum module RPI value that allow the required time to collect samples from each channel. The recommended minimum RPI for the module is the maximum one of all recommended values per channel.

Table 68. Notch Filter and Recommended Minimum Module RPI Values

Notch Filter (Hz)	Recommended Minimum Module RPI Value
10	106
20	53.1
50	22
60 (default)	18.3
100	9
200	5.9
500	2.2
1000	1.1
2500	0.5
5000	0.3

Channels View

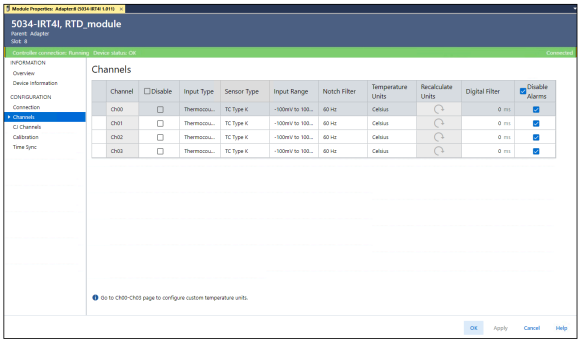
The Channels view shows an overview of the configuration values for all module channels.

Not all channel configurations are included in Channels view. To view or change the complete set of the channel configuration and also to view the diagnostics information for the channel, use Chxx view.

You can do the following actions on this page:

- Disable the channel, if desired
- Change the input type, wiring method, sensor type, and input range
- Set the notch filter
- Set the scaling and recalculate all configurations with engineering unit
- Set digital filter
- Disable alarms

Figure 50. Channels View Example



Chxx View

The Chxx view, where xx represents the channel number, shows the configuration options available for the respective channel.

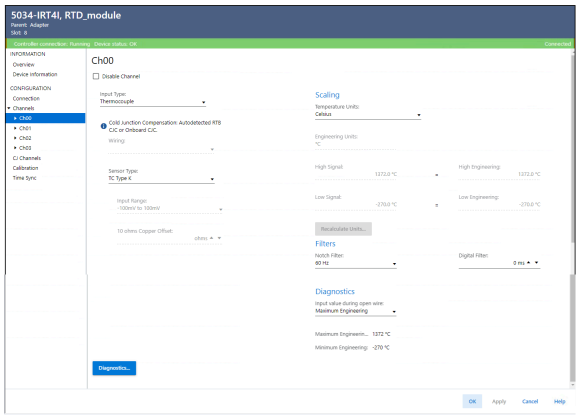
You can do the following actions on this view:

- Disable the channel, if desired
- Change the input type, wiring method, sensor type, input range, and 10 ohms copper offset
- Set the notch filter
- Enable or disable open wire detection
- Set the scaling and recalculate all configurations with engineering unit
- Set digital filter
- View channel diagnostics information

To latch and configure alarm parameters, go to Alarms view.

You cannot see the option to enable the open wire detection as it is always enabled for this module.

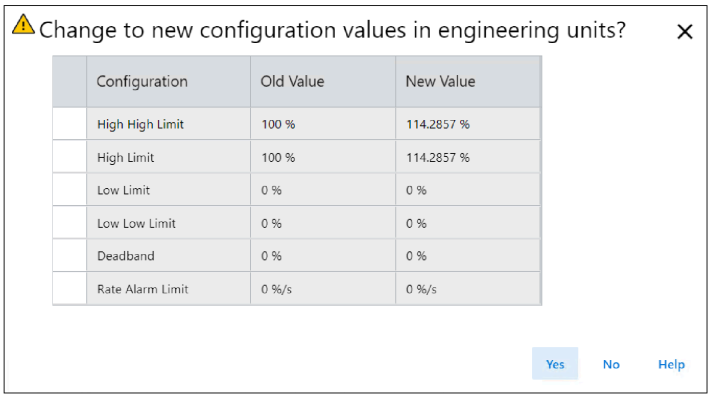
Figure 51. Chxx View Example



Recalculate Units

Recalculate Units lets you recalculate all configurations with engineering unit after a scaling change. Consider the following:

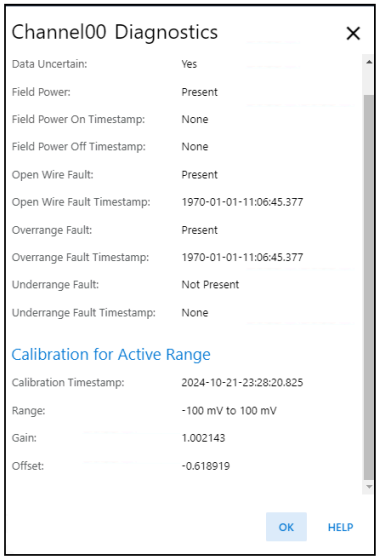
- The Recalculate Units option is enabled when the scaling configuration is changed.
- Upon selecting Recalculate Units option, the recalculated new values based on the new scaling configuration are displayed together with the old values for you to verify before changing.
- If you select "Yes" to proceed with the change, the new values will be set but it gets applied when you select "Apply/OK".
- If you select "No" to cancel the change, the old values are retained. You can either select the Recalculate Units again or manually change those configurations based on the new scaling.



Channelxx Diagnostics

Displays the channel diagnostics information when connected with the module. When online with the module, select the Diagnostics on the Chxx view to see the diagnostic information.

Figure 52. ChannelxxDiagnostics



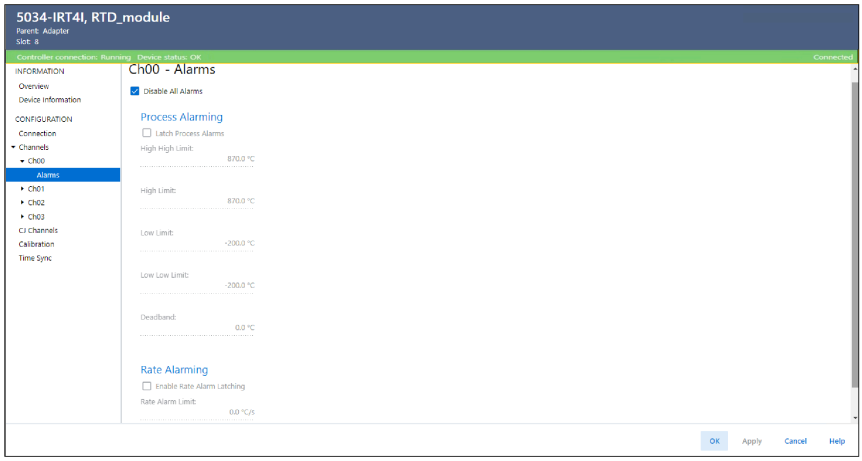
Alarms View

Each channel on the input module has an Alarms view. You can do the following actions on this view:

- Disable all the alarms.
- Enable/Disable latching and set the alarm limits for the process alarms:
  - High High
  - High
  - Low
  - Low Low
  - Deadband
- Enable/Disable latching and set limit for the rate alarm.

Rate Alarm Limit of 0.0 disables the rate alarm.

Figure 53. Chxx - Alarms View Example



CJ Channels View

Use the CJ Channels view to select Cold Junction Compensation, when you connect a module channel to a Thermocouple input type.

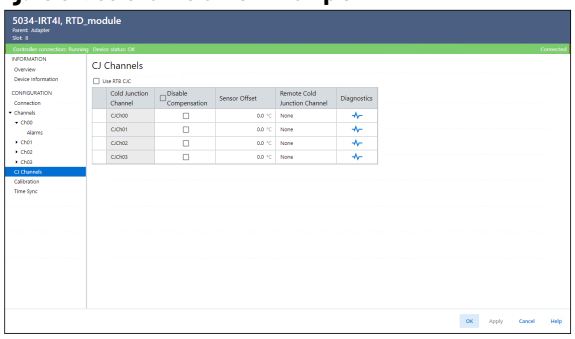
You can do the following actions on this view:

- Select the one of the following CJC modes for CJ compensation:
  - Onboard CJC - You cannot see this option in this view. If None is selected in the Remote Cold Junction Channel column, Use RTB CJC checkbox is not selected, and a standard RTB (without CJC) is used, then you can assume that the channel is using onboard CJC for CJ compensation.
  - RTB CJC - If None is selected in the Remote Cold Junction Channel column and an RTB with CJC is used, then you can assume that the channel is using the RTB CJC for CJ compensation.

    IMPORTANT: If using RTB CJC is a must for your application due to the accuracy requirement, make sure that Use RTB CJC checkbox is selected and you are using an RTB with CJC. If you are using standard RTB (without CJC) with Use RTB CJC checkbox selected, the channel gets faulted.

  - Remote Cold Junction Channel (Remote CJC) - If Chxx is selected in Remote Cold Junction Channel column, then you can assume that the channel is using the remote Chxx for CJ compensation.
- Disable the compensation for the channel.
- View the diagnostics details of the CJ channel.

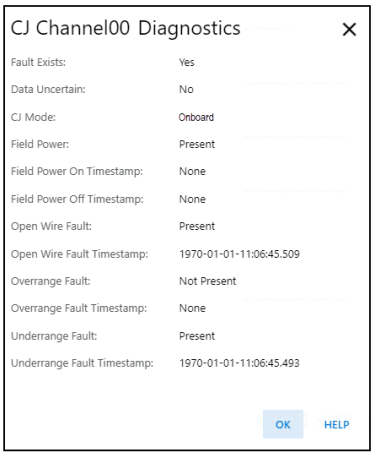
Figure 54. CJ Channels View Example



CJ ChannelxxDiagnostics

Displays the diagnostics information for the CJ channel when there is a CJ connection. When online with the module, select the icon on the CJ Channels view to see the diagnostic information.

Figure 55. CJ Channelxx Diagnostics



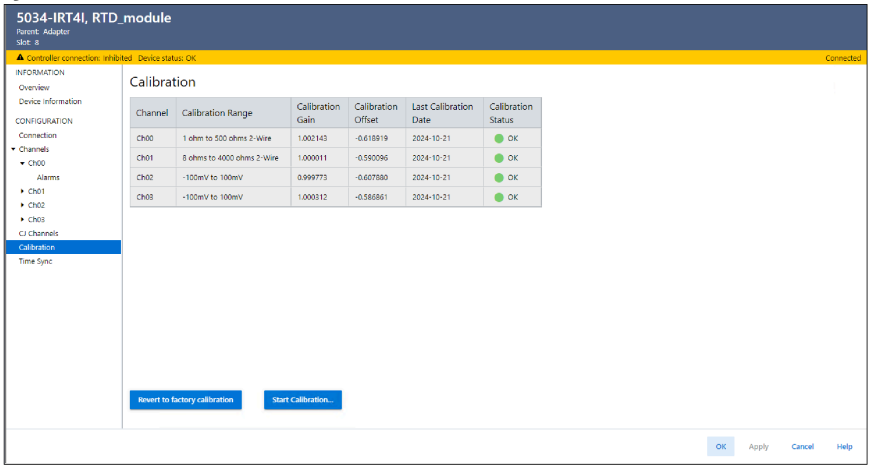
Calibration View

The Calibration view provides calibration information for all channels on the module. You can do the following actions on this view for all the channels:

- View calibration parameters and calibration status for the currently configured input ranges.
- Perform user calibration for one or multiple channels.
- Revert calibration parameters to the factory default values.

For more information on how to calibrate a module, see Module Calibration (Interactive) on page 159.

Figure 56. Calibration View Example

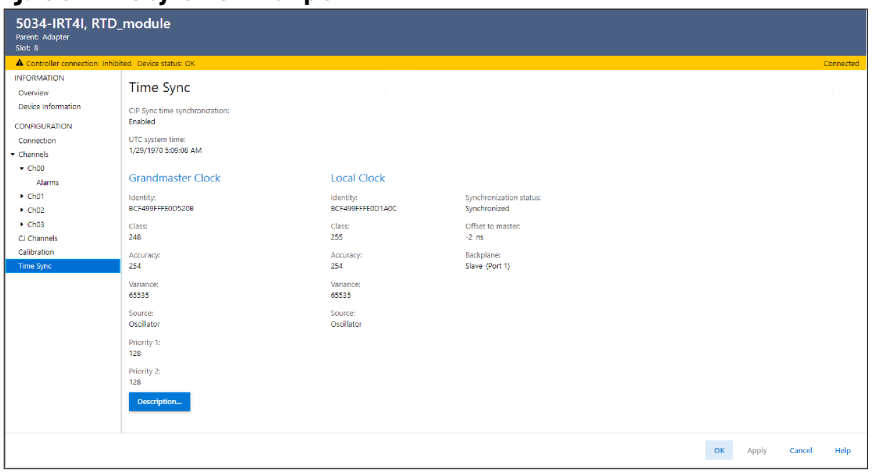


Time Sync View

The Time Sync view is read-only and displays the CIP Sync status information about the module when the project is online. The Time Sync category displays the following information:

- CIP Sync time synchronization status
- UTC system time
- Grandmaster Clock information
- Grandmaster Clock description
- Local Clock information

Figure 57. Time Sync View Example

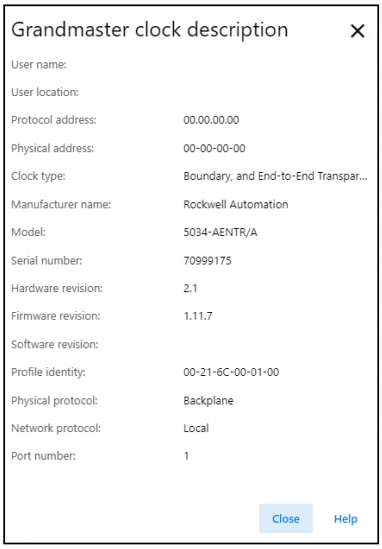


Grandmaster Clock Description

To view the Grandmaster clock description, select Description in the Time Sync view.

The Grandmaster clock description dialog provides detailed information about the grandmaster clock.

Figure 58. Grandmaster Clock Description Example



Module Calibration (Interactive)

You can use Calibration view in Module Properties to interactively calibrate the module on a per channel basis or in group.

Controller State During Calibration

You must add the module to your Studio 5000 Logix Designer application project, as described in Add a New Module to a Studio 5000 Logix Designer Application Project on page 41, before you can calibrate it.

The project must be online with the owner-controller to calibrate the PointMax analog modules. You can calibrate under any of the following conditions:

- The controller is in Program Mode, that is, either Remote Program or Program Mode.

  Your module must be in Program Mode and not be actively controlling a process when you calibrate it.

- There are no connections to the module.

Calibration Impacts Data Quality

When a channel on an analog input module is being calibrated, the Notch Filter setting for that channel changes to 10 Hz. The I.Chxx.Uncertain tag is set to 1 for that channel until calibration is completed.

Calibration Instrumentation Specifications

When you calibrate the analog input modules, send current or ohms reference signals to the module to calibrate it. To maintain your module's factory calibration accuracy, use the instrumentation with the specifications listed in the following table.

IMPORTANT: Do not calibrate your module with an instrument that is less accurate than those specified in following table. The following events can result:

- Calibration appears to occur normally but the module gives inaccurate data during operation.
- A calibration fault occurs, forcing you to abort calibration. When this happens, I.Chxx.CalFault tag is set for the channel you attempted to calibrate. You can clear this tag by completing a valid calibration or cycling power to the module.

Table 69. Instrument Specifications

Catalog Number	Channel Input Type	Calibration Instrumentation Specifications
5034-IRT4I and 5034-IRT4IXT	RTD	1.0...448.0 Ω resistors ±0.01%
	Thermocouple (mV)	0...100 mV source ±0.5 µV

Calibration Procedure

This example describes how to calibrate a channel on the 5034-IRT4I module for use with the RTD input type. The 5034-IRT4I module uses the following resistors to calibrate in ohms:

- 1 Ω resistor for low reference calibration
- 448 Ω resistor for high reference calibration

Apply Low and High Signal references to the analog input module to calibrate it. The references must match the input range the channel is using.

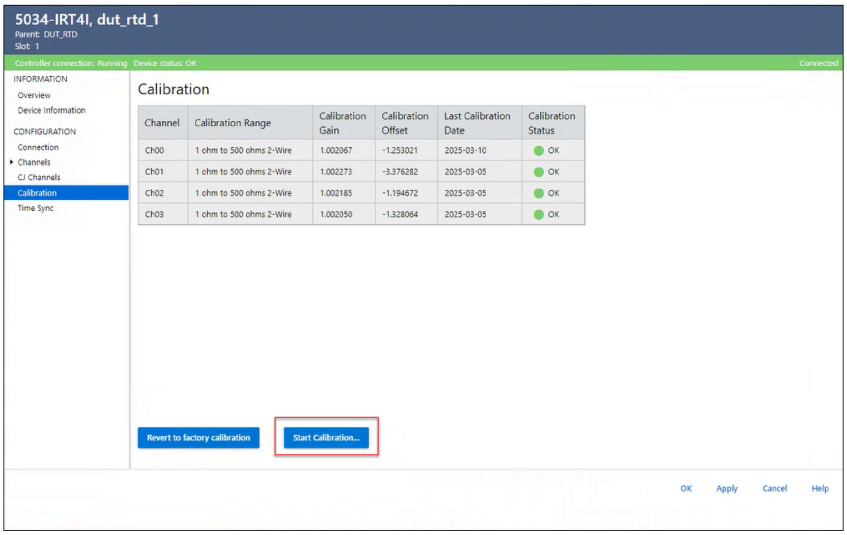
Table 70. Analog Input Module Calibration References

Input Type	Input Range	Low Calibration Reference	High Calibration Reference
RTD	1...500 Ω	1 Ω	448 Ω

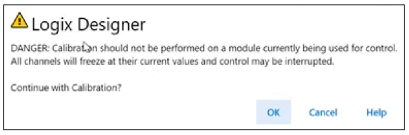
Table 70. Analog Input Module Calibration References (continued)

Input Type	Input Range	Low Calibration Reference	High Calibration Reference
Thermocouple	-100...+100 mV	0.0 mV	100.0 mV

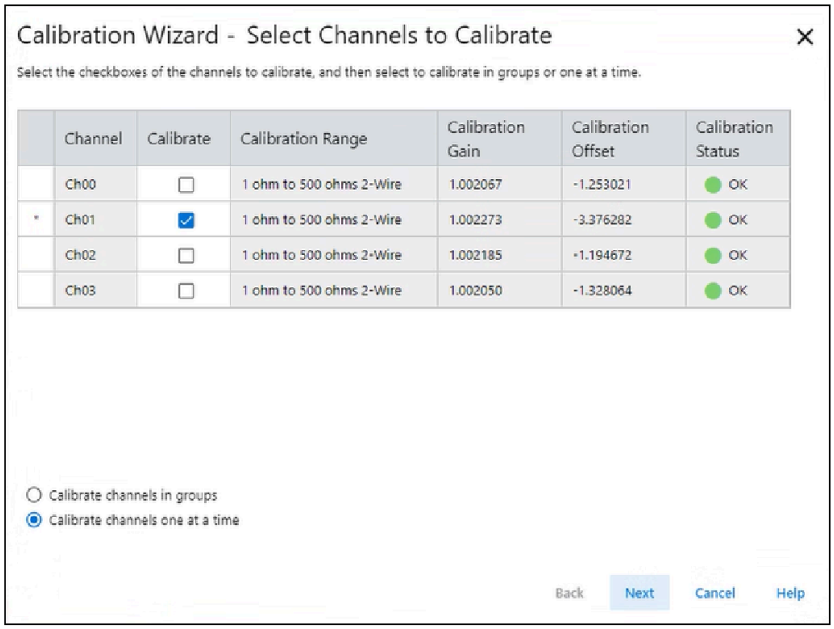
1. Connect the low reference resistor to the channel being calibrated.
2. Go online with the project and make sure that the controller is in Program Mode.
3. Confirm that the channel to be calibrated is configured for the correct Input Range.
4. On the Calibration view in the Module Properties dialog, select Start Calibration.



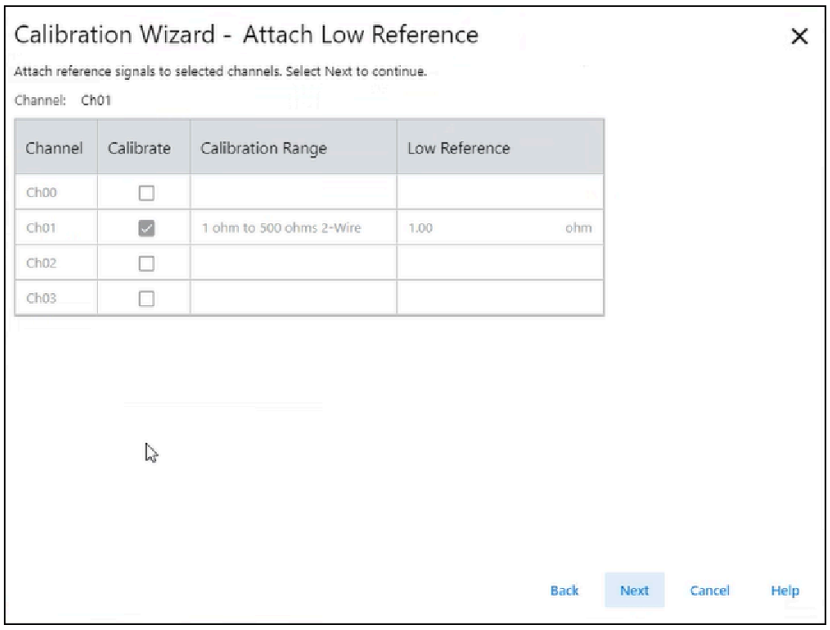
5. When the dialog appears to confirm that you want to calibrate the channel, select OK.



6. Select the channels one at a time or in groups to calibrate and then select Next.

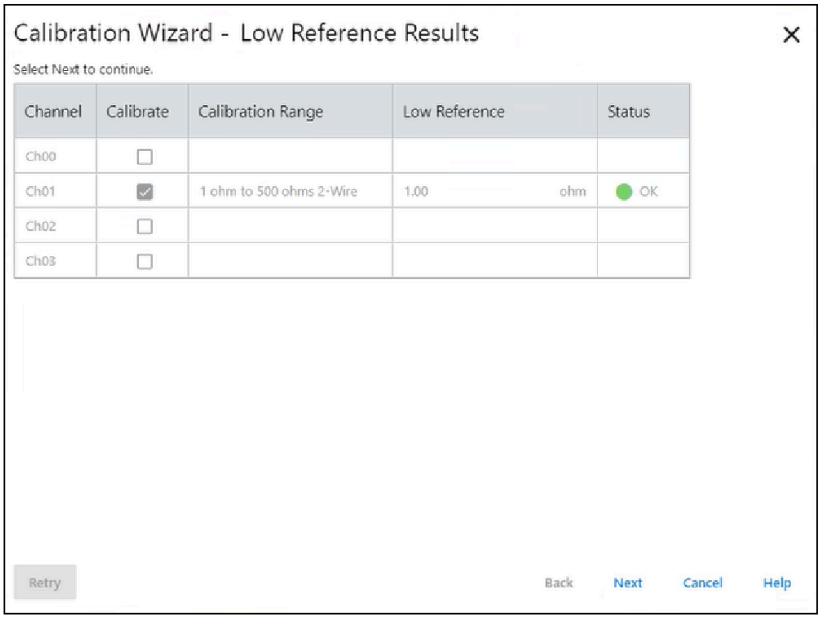


7. When the Attach Low Reference dialog appears, connect a 1 Ω resistor to the channel being calibrated.



8. Select Next.

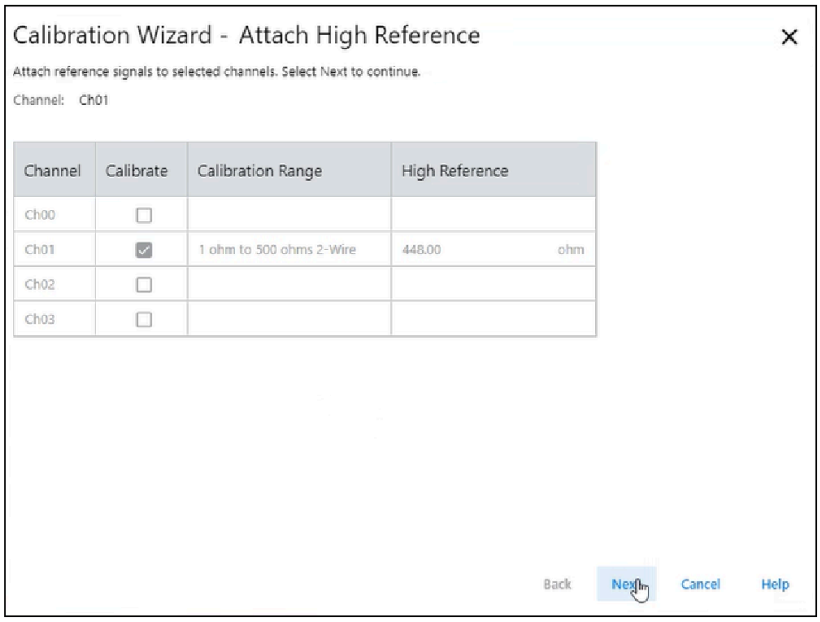
   The Low Reference Results dialog appears and indicates the status of the calibrated channel.



9. If the Status is OK, select Next.

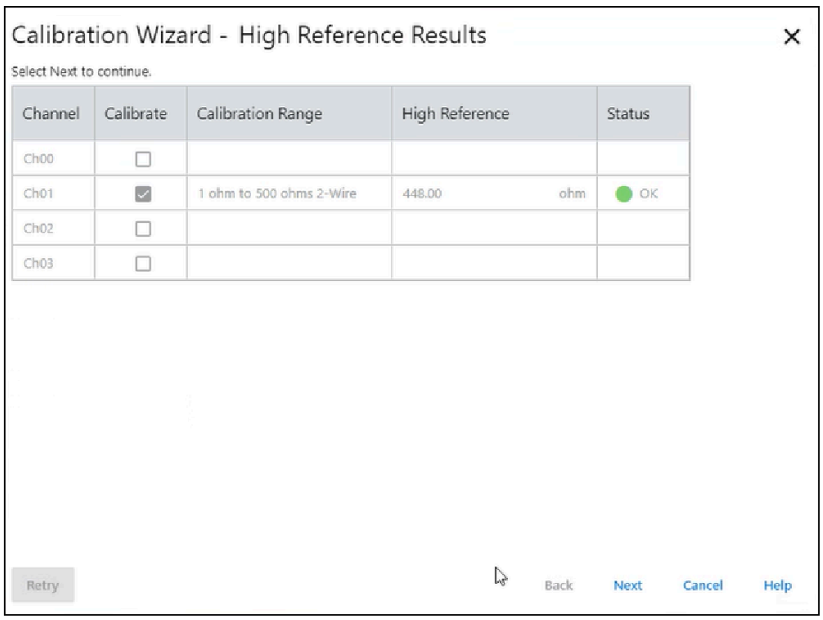
   If the Status is not OK, repeat the calibration procedure.

10. When the Attach High Reference dialog appears, connect a 448 Ω resistor to the channel being calibrated.



11. Select Next.

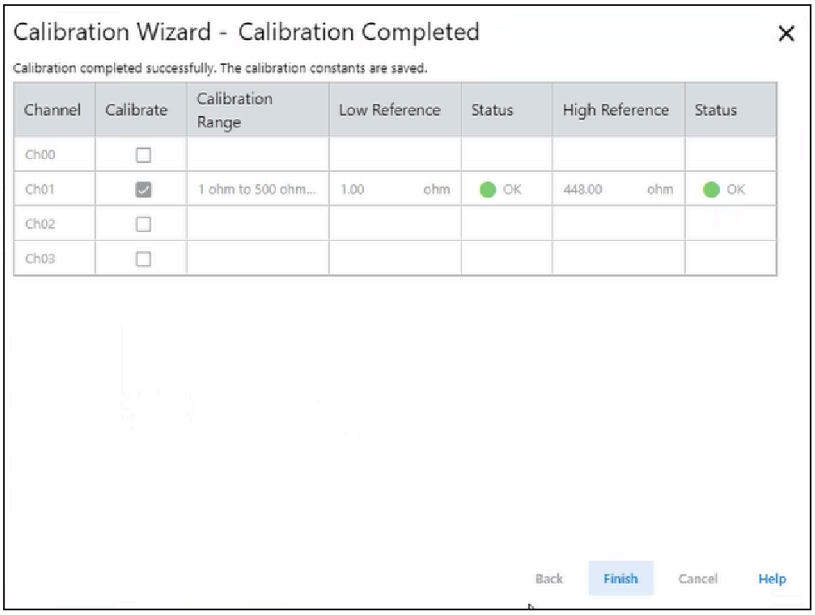
    The High Reference Results dialog appears and indicates the status of the calibrated channel.



12. If the Status is OK, select Next.

    If the Status is not OK, repeat the calibration procedure.

13. When the Calibration Completed dialog appears, select Finish.



Use the Status Indicators for Troubleshooting

PointMax I/O modules use the following status indicators:

- SA Power Indicator - This indicator operates the same for all PointMax I/O modules.
- Module Status Indicator - This indicator operates the same for all PointMax I/O modules.
- Channel Status Indicator - This indicator operates differently based on the module type that you are using.

SA Power Indicator

Table 71. Interpret SA Power Indicator

Indicator State	Description	Recommended Action
Off	The module is not powered.	Complete the following actions: 1. Confirm that the system is powered. 2. Confirm that the module is installed properly.
Steady green	There is SA power to the module.	None
Steady red	There is no SA power to the module, or SA power voltage is not in the valid range.	Complete the following actions: 1. Confirm that SA power wiring is properly connected to the adapter, expansion power module, or 5034-MBSA mounting base. 2. Check the following: ◦ Check that the SA voltage is in the correct range. ◦ If an external power supply is used, confirm that the power supply is turned on. ◦ Make sure that the mounting base to mounting base connection is properly secured. Go to Chassis Information view in the Module Properties of the adapter to check the Field Power status of mounting bases installed in all slots.

Module Status Indicator

Table 72. Interpret Module Status Indicator

Indicator State	Description	Recommended Action
Off	The module is not powered.	Complete the following actions: 1. Confirm that the system is powered. 2. Confirm that the module is installed properly.
Steady green	The module is operational and all I/O connections are active.	None
Flashing green	The module has no I/O connections.	Troubleshoot your Studio 5000 Logix Designer application to determine what is preventing a connection from the module to the controller and correct the issue.
Flashing red	One of the following conditions exists: • A module firmware update is in progress. • A module firmware update attempt failed. • The device has experienced a recoverable fault. • A connection to the module has timed out.	Complete one of the following: • Let the firmware update process complete. • Reattempt a firmware update after one fails. • Use the Studio 5000 Logix Designer application to determine whether a module recoverable fault is occurred. It is shown in Device Information view. To clear a recoverable fault, complete one of the following: ◦ Cycle module power. ◦ Select Reset device in the Studio 5000 Logix Designer project via the Device Information view of the Module Properties dialog. If the fault does not clear after cycling power and module reset, contact Rockwell Automation Technical Support. • Use the Studio 5000 Logix Designer application to determine if a connection has timed out. The Connection view in the Module Properties indicates whether a connection request has timed out. If a connection has timed out, determine the cause and correct it. For example, a cable failure can cause a connection timeout.
Steady red	The module experienced a nonrecoverable fault.	Complete the following actions: 1. Cycle power to the module. 2. If the status indicator remains in the steady red state, replace the module.

Channel Status Indicators

Table 73. Interpret Analog Input Channel Status Indicators

Indicator State	Description	Recommended Action
Off	One of the following conditions exists: • The module is not powered. • The module is powered but connection is not established from the controller to module. • The module is powered, but the input channel is disabled.	Complete one of the following: • If you expect the module to be powered but it is not, complete the following: ◦ Confirm that the system is powered. ◦ Confirm that the module is installed properly. • If the module is powered but the channel is not operating as expected, use the Studio 5000 Logix Designer application to confirm that the channel is not disabled and the module has a connection to the controller. The Connection view in the Module Properties indicates if the connection is running or faulted. If the connection is faulted, the Connection view indicates error information. • If the channel is disabled, no action is needed.
Steady yellow	The input channel is operating normally.	None
Flashing red	One of the following conditions exists: • There is no SA power to the module, or SA power voltage is not in the valid range. • The input signal is overrange or underrange. The signal range is set in your Studio 5000 Logix Designer application project. • An Open Wire condition, that is, a wire is disconnected from the input channel.	Complete one of the following: • If there is a SA power fault, see the recommended action given for steady red indicator state in SA Power Indicator table above. • Check the input signal to determine if it is overrange or underrange. If so, make changes to return the input signal to within the range limits. • Check the wiring at the input channel. If necessary, reconnect the wire.
Flashing yellow/red	Calibration is in progress.	Successfully complete the calibration process.
Steady red	An issue has occurred that is internal to the module. The following are example issues that can cause the status indicator to be steady red: • A calibration fault occurred on the channel. • The module has experienced a nonrecoverable fault.	Complete one of the following: • If the indicator turns steady red after a calibration process, you can either perform a successful calibration or cycle the power to recover the fault. • If it is not caused by the calibration, cycle the power to recover the fault. If the condition is still present, replace the module.

Module Tag Definitions

Module tags are created when you add a module to the Studio 5000 Logix Designer application project.

The set of module tags associated with a module depends on the module type and Module Definition choices made during module configuration. For example, if you use a Listen Only connection in the Device Definition, the Studio 5000 Logix Designer application creates only Input tags for that module.

The tables contained in this section list all the tags available with a module. Not all tags in the list are used when that module type is added to a project. Tag use varies by module configuration.

Configuration Tag Definitions

Table 74. Configuration Tags

<table>
<tr><th>Name</th><th>Data Type</th><th>Definition</th><th>Valid Values</th></tr>
<tr><td>Chxx.Range</td><td>SINT</td><td>Channel's operating range</td><td>If the input type is Thermocouple, the range is:
• 6 = -100...+100 mV
If the input type is RTD, the range values vary based on sensor type:
<table>
<tr><th>Sensor Type</th><th>Available Range Selection</th></tr>
<tr><td>100 Ohm Platinum 385
100 Ohm Platinum 3916
10 Ohm Copper 427
120 Ohm Nickel 672
100 Ohm Nickel 618
120 Ohm Nickel 618</td><td>8 = 1...500 Ohm 2-wire
12 = 1...500 Ohm 3-wire</td></tr>
<tr><td>200 Ohm Platinum 385
200 Ohm Platinum 3916
200 Ohm Nickel 618</td><td>9 = 2...1,000 Ohm 2-wire
13 = 2...1,000 Ohm 3-wire</td></tr>
<tr><td>500 Ohm Platinum 385
500 Ohm Platinum 3916
500 Ohm Nickel 618</td><td>10 = 4...2,000 Ohm 2-wire
14 = 4...2,000 Ohm 3-wire</td></tr>
<tr><td>1000 Ohm Platinum 385
1000 Ohm Platinum 3916</td><td>11 = 8...4,000 Ohm 2-wire
15 = 8...4,000 Ohm 3-wire</td></tr>
<tr><td>Resistance (Ohms)</td><td>8 = 1...500 Ohm 2-wire
9 = 2...1,000 Ohm 2-wire
10 = 4...2,000 Ohm 2-wire
11 = 8...4,000 Ohm 2-wire
12 = 1...500 Ohm 3-wire
13 = 2...1,000 Ohm 3-wire
14 = 4...2,000 Ohm 3-wire
15 = 8...4,000 Ohm 3-wire</td></tr>
</table>
</td></tr>
</table>

Table 74. Configuration Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.SensorType	SINT	Type of sensor	If the input type is RTD: • 0 = No linearization, Ohm • 1 = 100 Ohm Platinum 385 • 2 = 200 Ohm Platinum 385 • 3 = 500 Ohm Platinum 385 • 4 = 1000 Ohm Platinum 385 • 5 = 100 Ohm Platinum 3916 • 6 = 200 Ohm Platinum 3916 • 7 = 500 Ohm Platinum 3916 • 8 = 1000 Ohm Platinum 3916 • 9 = 10 Ohm Copper 427 • 10 = 120 Ohm Nickel 672 • 11 = 100 Ohm Nickel 618 • 12 = 120 Ohm Nickel 618 • 13 = 200 Ohm Nickel 618 • 14 = 500 Ohm Nickel 618 If input type is Thermocouple: • 0 = mV • 1 = B • 2 = C • 3 = E • 4 = J • 5 = K • 6 = N • 7 = R • 8 = S • 9 = T • 10 = TXK/XK (L) • 11 = D

Table 74. Configuration Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.NotchFilter	SINT	Notch Filter removes line noise for the channel.	0 = 10 Hz 16 = 20 Hz 1 = 50 Hz 2 = 60 Hz 3 = 100 Hz 4 = 200 Hz 5 = 500 Hz 6 = 1,000 Hz 7 = 2,500 Hz 8 = 5,000 Hz
Chxx.AlarmDisable	BOOL	Disables all alarms on the channel. **IMPORTANT:** Consider the following: • When if you change this tag to 0, that is, so alarms are not disabled, you must also enable the individual alarms for them to work. For example, if you want to use the Low Low alarm for a channel, you must set the Chxx.AlarmDisable to 0 and set the Chxx.LLAlarmEn output tag to 1 so the alarm is enabled. This applies to all alarms on the module. • Conversely, if you set this tag to 1, alarms are disabled regardless of the setting on the alarm enable tag for any alarm.	• 0 = Alarms are enabled • 1 = Alarms are disabled
Chxx.ProcessAlarmLatchEn	BOOL	Configures Process alarms to latch until they are explicitly unlatched. The Process alarms include: • HighHigh alarm • High alarm • Low alarm • LowLow alarm	• 0 = Latching disabled • 1 = Latching enabled
Chxx.RateAlarmLatchEn	BOOL	Configures the Rate alarm to latch until it is explicitly unlatched.	• 0 = Latching disabled • 1 = Latching enabled
Chxx.OpenWireDataMinEn	BOOL	Selects the "Data" value in the input tag when the channel is in Open Wire.	• 0 = Minimum Engineering value is selected. • 1 = Maximum Engineering value is selected.
Chxx.Disable	BOOL	Disables the channel.	• 0 = Channel is enabled • 1 = Channel is disabled
Chxx.EnforceRTBCJCEn	BOOL	Determines whether it is required to use RTB CJC.	• 0 = An RTB cold junction compensation is used when CJC RTB is detected. On-board cold junction compensation (lower accuracy) is used when CJC RTB is not detected. • 1 = The CJ and main channels are faulted when CJC RTB is not detected.
Chxx.TenOhmOffset	INT	Offset used to linearize a 10 Ω copper sensor type's input	-1.00...+1.00 Ω

Table 74. Configuration Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.DigitalFilter	INT	A non-zero value enables the filter, providing a time constant in milliseconds used in a first order lag filter to smooth the input signal.	All positive values
Chxx.LowSignal	REAL	One of four points used in scaling. The low signal is in terms of the inputs signal units and corresponds to the low engineering term when scaled.	• **RTD input type** - By default, this tag value is the lowest temperature supported by the Sensor Type connected to the channel. You can change the value, if necessary. The value is always Celsius units. • **Thermocouple input type** - By default, this tag value is the lowest temperature supported by the Thermocouple type connected to the channel. The value is always in Celsius units.
Chxx.HighSignal	REAL	One of four points used in scaling. The high signal is in terms of the inputs signal units and corresponds to the high engineering term when scaled.	• **RTD input type** - By default, this tag value is the highest temperature supported by the Sensor Type connected to the channel. You can change the value, if necessary. The value is always Celsius units. • **Thermocouple input type** - By default, the tag value is the highest temperature supported by the Thermocouple type connected to the channel. You can change the value, if necessary. The value is always in Celsius units.
Chxx.LowEngineering	REAL	One of four points used in scaling. The low engineering helps determine the engineering units the signal values scale into. The low engineering term corresponds to the low signal value.	Any value less than the high engineering value. • **RTD input type** - By default, the tag value is the lowest temperature supported by the Sensor Type connected to the channel. You can change the value, if necessary. The engineering units value matches the Temperature Units that you choose. • **Thermocouple input type** - By default, the tag value is the lowest temperature supported by the Thermocouple type connected to the channel. You can change the value, if necessary. The engineering units value matches the Temperature Units that you choose.
Chxx.HighEngineering	REAL	One of four points used in scaling. The high engineering helps determine the engineering units the signal values scale into. The high engineering term corresponds to the high signal value.	Any value greater than the low engineering value. • **RTD input type** - By default, the tag value is the highest temperature supported by the Sensor Type connected to the channel. You can change the value, if necessary. The engineering units value matches the Temperature Units that you choose. • **Thermocouple input type** - By default, the tag value is the highest temperature supported by the Thermocouple type connected to the channel. You can change the value, if necessary. The engineering units value matches the Temperature Units that you choose.
Chxx.LLAlarmLimit	REAL	The Low Low alarm trigger point. Causes the ChxxLLAlarm to trigger when the input signal moves beneath the configured trigger point. In terms of engineering units.	Any value

Table 74. Configuration Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.LAlarmLimit	REAL	The Low alarm trigger point. Causes the ChxxLAlarm to trigger when the input signal moves beneath the configured trigger point. In terms of engineering units.	Any value
Chxx.HAlarmLimit	REAL	The High alarm trigger point. Causes the ChxxHAlarm to trigger when the input signal moves above the configured trigger point. In terms of engineering units.	Any value
Chxx.HHAlarmLimit	REAL	The High High alarm trigger point. Causes the ChxxHHAlarm to trigger when the input signal moves above the configured trigger point. In terms of engineering units.	Any value
Chxx.RateAlarmLimit	REAL	The Rate alarm trigger point. Causes the ChxxRateAlarm to trigger when the input signal changes at a rate faster than the configured rate alarm. Configured in Engineering Units per second.	Any value
Chxx.AlarmDeadband	REAL	Allows a process alarm to remain set, despite the alarm condition disappearing, as long as the input data remains within the deadband of the process alarm. The deadband value is subtracted from the High and High High Alarm Limits to calculate the deadband thresholds for these alarms. The deadband value is added to the Low and Low Low Alarm Limits to calculate the deadband thresholds for these alarms.	Any non-negative value
CJChxx.Disable	BOOL	If this tag set to 1, the embedded Cold Junction measurement is not used when the module calculates the compensation. There is a CJC embedded in each input channels. Consider the following: • If you enable each CJChxx without remote CJ channel, it can be used as CJ measurement for the corresponding input channel. • If you disable CJChxx measurement, it is assumed that the cold junction temperature is 0 in the CJ compensation.	• 0 = Cold junction measurement is used to calculate CJ compensation • 1 = Cold junction measurement is not used to calculate CJ compensation
CJChxx.Remote	BOOL	Indicates if the cold junction sensor is mounted on a remote termination block when set, rather than the using onborad CJC or RTB with CJC in each channel. If the cold junction sensor is mounted on remote termination block, the module uses the respective remote CJC measurement on the chosen channel to calculate the CJC compensation.	• 0 = Cold junction sensor is not mounted on a remote termination block • 1 = Cold junction sensor is mounted on a remote termination block
CJChxx.RemoteCJChannel		Sets the main channel number where remote Cold Junction sensor is connected to.	Main channel numbers (00...03)
CJChxx.SensorOffset	REAL	Offset added directly to the measured CJ temperature. Used to compensate for cold junction temperature sensor error.	Any value

Input Tag Definitions

Table 75. Input Tags

Name	Data Type	Definition	Valid Values
RunMode	BOOL	Channel's operating state	0 = Idle 1 = Run Idle – The connection is up and the module is producing data for the connection and output tag data is being applied. Run - One of the following is present: • The connection is not up. • The connection is opened but the module has not started producing data for the connection. • The module is not applying new output tag data because the controller is in Program Mode.
ConnectionFaulted	BOOL	Indicates if a connection is running. The module sets this tag to 0 when connected. If the module is not connected, it changes the tag to 1.	0 = A connection exists between the module and the controller. 1 = Connection is timed out or inhibited.
DiagnosticActive	BOOL	Indicates if any diagnostics are active or if the prognostics threshold is reached.	0 = No diagnostics active 1 = One or more diagnostics are active or the prognostics threshold is reached.
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.	-128...+127 The value of 0 is skipped except during module power-up.
Chxx.Fault	BOOL	Indicates that channel data is inaccurate and **cannot be trusted** for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = No fault exists 1 = Fault exists The typical causes of a fault are the following: • ◦ Channel is disabled ◦ Open Wire condition ◦ Underrange/Overrange condition ◦ SA power loss condition You must troubleshoot the module first to see if the typical causes exist.
Chxx.Uncertain	BOOL	Indicates that the channel data can be inaccurate but the **degree of inaccuracy is not known**. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = Valid data 1 = Data validity uncertain. The typical causes of uncertain data are the following: • ◦ Data signal slightly outside the channel operating range ◦ The channel is slightly over temperature. ◦ Invalid sensor offset value ◦ Calibration fault on the channel ◦ Calibration is in process on the channel We recommend that you first troubleshoot the module to see if the typical causes exist.
Chxx.OpenWire	BOOL	The signal wire is disconnected from the channel or the RTB is removed from the module.	0 = Open wire condition does not exist or open wire detection is disabled. 1 = Open wire condition exists, which means the signal wire is disconnected from the channel or the RTB is removed from the module.
ChOx.OverTemperature		Not applicable for this module.	0

Table 75. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.FieldPowerOff	BOOL	Field power is not present at the channel.	0 = Field power is present 1 = Field power is not present
Chxx.NotANumber	BOOL	Indicates if the last received channel data was not a number.	0 = Last channel data received was a number 1 = Last channel data received was not a number
Chxx.Underrange	BOOL	Indicates that the channel data is beneath the underrange threshold for this channel.	0 = Channel data is not beneath the underrange threshold 1 = Channel data is beneath the underrange threshold
Chxx.Overrange	BOOL	Indicates that the channel data is above the overrange threshold for this channel.	0 = Channel data is not above the overrange threshold 1 = Channel data is above the overrange threshold
Chxx.LLAlarm	BOOL	Triggered when the input data value is less than the Low Low alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is greater than the Low Low Limit plus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.LAlarm	BOOL	Triggered when the input data value is less than the Low alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is greater than the Low Limit plus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.HAlarm	BOOL	Triggered when the input data value is greater than the High alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is less than the High Limit minus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.HHAlarm	BOOL	Triggered when the input data value is greater than the High High alarm value. If latching is enabled, this alarm remains triggered until unlatched. If latching is not enabled, the alarm clears after the input data value is less than the High High Limit minus the Alarm Deadband.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.RateAlarm	BOOL	Triggered when the change between consecutive channel samples divided by the period of time between when the samples were taken exceeds the Rate Alarm. If latched, this tag remains set until it is unlatched.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.CalFault	BOOL	Indicates that the last attempted Calibration for this channel failed. This tag is cleared, that is, set to 0, when power is cycled to the module or a successful calibration for the range on the channel is performed.	0 = Calibration did not fail 1 = Calibration failed
Chxx.Calibrating	BOOL	Indicates that the channel is currently being calibrated.	0 = Channel is not being calibrated 1 = Channel is being calibrated
Chxx.CalGoodLowRef	BOOL	Indicates that a valid Low Reference signal is sampled on this channel in the calibration process. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Valid Low Reference signal has not been sampled on this channel 1 = Valid Low Reference signal has been sampled on this channel

Table 75. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.CalBadLowRef	BOOL	Indicates that an invalid Low Reference signal is sampled on this channel in the calibration process.You must correct this condition to successfully calibrate the module. If calibration is aborted with an invalid Low Reference signal, the Chxx.CalFault tag is set for this channel until a successful calibration is performed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Invalid Low Reference signal has not been sampled on this channel 1 = Invalid Low Reference signal has been sampled on this channel
Chxx.CalGoodHighRef	BOOL	Indicates that a valid High Reference signal is sampled on this channel in the calibration process. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Valid High Reference signal has not been sampled on this channel 1 = Valid High Reference signal has been sampled on this channel
Chxx.CalBadHighRef	BOOL	Indicates that an invalid High Reference signal is sampled on this channel in the calibration process. You must correct this condition to successfully calibrate the module. If calibration is aborted with an invalid High Reference signal, the Chxx.CalFault tag is set for this channel until a successful calibration is performed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Invalid High Reference signal has not been sampled on this channel 1 = Invalid High Reference signal has been sampled on this channel
Chxx.CalSuccessful	BOOL	Indicates calibration on this channel is complete and the Calibrating state has been exited. This tag remains set after valid calibration and until a new calibration process is started or the connection is closed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Calibration was not successful 1 = One of the following: • Calibration was successful and calibrating state has been exited. • Calibration data is present and applied.
Chxx.Data	REAL	Channel data in scaled Engineering Units.	Any positive or negative value.
Chxx.RollingTimestamp	INT	Continuously-running 15-bit timer that counts in milliseconds. Whenever an input module scans its channels, it also records the value of RollingTimestamp at that time. The user program can then use the last two RollingTimestamp values and calculate the interval between receipt of data.	0...32,767

Table 75. Input Tags (continued)

Name	Data Type	Definition	Valid Values
CJChxx.Fault	BOOL	Indicates that the cold junction data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = No fault exists 1 = Fault exists The typical causes of a fault are the following: • ◦ Channel is disabled ◦ Open Wire condition ◦ Underrange/Overrange condition ◦ SA power loss condition You must troubleshoot the module first to see if the typical causes exist.
CJChxx.Uncertain	BOOL	Indicates that the cold junction data can be inaccurate but the degree of inaccuracy is not known. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = Valid data 1 = Data validity uncertain
CJChxx.OpenWire	BOOL	Open wire condition of the CJ channel. It can be caused by one of the following: • Non-CJC RTB used • CJC RTB removed • CJC RTB spoiled If this condition exists, confirm that you are using one of the following RTBs with CJC: • 5034-RTBT • 5034-RTBTS	0 = Open wire condition does not exist or open wire detection is disabled. 1 = Open wire condition exists, that means the signal wire is disconnected from the channel or the RTB is removed from the module.
CJChxx.FieldPowerOff	BOOL	Field power is present at the cold junction.	0 = Field power is present 1 = Field power is not present
CJChxx.Underrange	BOOL	The cold junction temperature at the channel is below the minimum of its operating range.	0 = Channel data is not above the underrange threshold 1 = Channel data is above the underrange threshold
CJChxx.Overrange	BOOL	The cold junction temperature at the channel is above the maximum of its operating range.	0 = Channel data is not above the overrange threshold 1 = Channel data is above the overrange threshold
CJChxx.Temperature	REAL	Current temperature of the cold junction in degrees C.	Any

Output Tag Definitions

Table 76. Output Tags

Name	Data Type	Definition	Valid Values
Chxx.LLAlarmEn	BOOL	Enables the Low Low alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Enable alarm 1 = Disable alarm

Table 76. Output Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.LAlarmEn	BOOL	Enables the Low alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Enable alarm 1 = Disable alarm
Chxx.HAlarmEn	BOOL	Enables the High alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Enable alarm 1 = Disable alarm
Chxx.HHAlarmEn	BOOL	Enables the High High alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Enable alarm 1 = Disable alarm
Chxx.RateAlarmEn	BOOL	Enables the Rate alarm. **IMPORTANT:** To use this alarm, set this tag to 1 and confirm that the *Chxx.AlarmDisable* configuration tag for the same channel is set to 0. If the Chxx.AlarmDisable configuration tag is set to 1, that is, alarms are disabled, this alarm does not work regardless of the tag value.	0 = Enable alarm 1 = Disable alarm
Chxx.LLAlarmUnlatch	BOOL	Unlatches a latched Low Low Alarm at the first instance of the bit transitioning from 0 to 1.	0 = Low Low Alarm remains latched 1 = Low Low Alarm unlatched
Chxx.LAlarmUnlatch	BOOL	Unlatches a latched Low Alarm at the first instance of the bit transitioning from 0 to 1.	0 = Low Alarm remains latched 1 = Low Alarm unlatched
Chxx.HAlarmUnlatch	BOOL	Unlatches a latched High Alarm at the first instance of the bit transitioning from 0 to 1.	0 = High Alarm remains latched 1 = High Alarm unlatched
Chxx.HHAlarmUnlatch	BOOL	Unlatches a set High High Alarm at the first instance of the bit transitioning from 0 to 1.	0 = High High Alarm remains latched 1 = High High Alarm unlatched
Chxx.RateAlarmUnlatch	BOOL	Unlatches a set Rate Alarm at the first instance of the bit transitioning from 0 to 1.	0 = Rate Alarm remains latched 1 = Rate Alarm unlatched
Chxx.Calibrate	BOOL	Initiates the Calibration process. This tag must remain set until a valid Low Reference and High Reference values are applied to the input. If the tag value transitions to 0 before calibration is finished, the process stops and calibration fails.	0 = Not to start calibration process 1 = Start calibration process

Table 76. Output Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.CalLowRef	BOOL	Rising edge triggers the Low Calibration at the Low Reference Point for the current input range value. A valid Low Reference signal must be connected to the channel before setting this tag. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Module does not start low reference sampling 1 = Module starts low reference sampling
Chxx.CalHighRef	BOOL	Rising edge triggers a High Calibration at the High Reference Point for the current input range value. A valid High Reference signal must be connected to the channel before setting tag. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Module does not start high reference sampling 1 = Module starts high reference sampling
Chxx.SensorOffset	REAL	Compensates for any known offset error on the sensor or channel to which the sensor is connected. In terms of engineering units. The value of this tag is added to the measured value in engineering units and is used in the Chxx.Data input tag.	Any 0.0 = default (We recommend that you use a value in the channel's operating range.)

Diagnostic Assembly

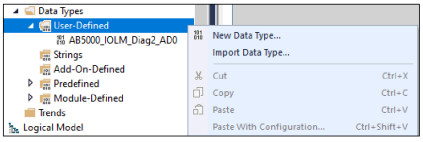
Diagnostic assembly helps you troubleshoot and diagnose the fault in your system.

Create User-defined Diagnostic Assembly Types

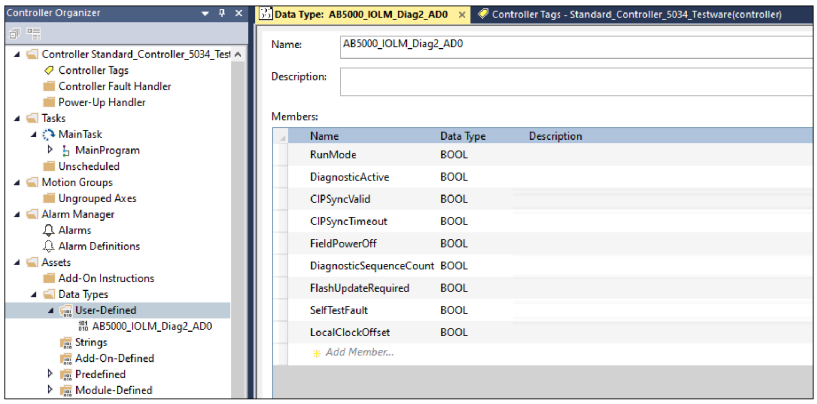
You can use the Studio 5000 Logix Designer application to create user-defined Diagnostic Assembly types.

Create user-defined diagnostic assembly by following the below steps:

1. From the Controller Organizer pane, go to Assets → Data types → User-Defined.
2. Right-click on the User-Defined folder and select New Data Type.



3. Add a Name and Description (optional) for your diagnostic assembly.
4. Under Members area, add the data members based on the diagnostic assembly detailed below.



IMPORTANT: The members indicated in the tables are arranged according to Data Alignment Rules of controllers. Strictly follow the data type and the sequence of the members that are indicated in the tables of this appendix. If the data type and the sequence are not followed, data misalignment may occur after executing Get Attribute Single Message (MSG) instruction.

Diagnostic Assemblies

1. Diagnostic Assembly A for Analog 4 Channel Input RTD/TC Module
   - Instance ID: 0x8019 (32793)
   - Size = 336 bytes

   Follow the information in the following table to add each member.

Table 77. Diagnostic Assembly Instance 32793

Name	Date Type	Size in Bytes
RunMode	BOOL	1
Infobit_Pad1	BOOL	
DiagnosticActive	BOOL	
CIPSyncValid	BOOL	
CIPSyncTimeout	BOOL	
Infobit_Pad5	BOOL	
FieldPowerOff	BOOL	
Infobit_Pad7	BOOL	
DiagnosticSequenceCount	SINT	1
Diagbit_Pad0	BOOL	2
Diagbit_Pad1	BOOL	
Diagbit_Pad2	BOOL	
Diagbit_Pad3	BOOL	
Diagbit_Pad4	BOOL	
Diagbit_Pad5	BOOL	
Diagbit_Pad6	BOOL	
Diagbit_Pad7	BOOL	
Diagbit_Pad8	BOOL	
Diagbit_Pad9	BOOL	
Diagbit_Pad10	BOOL	
Diagbit_Pad11	BOOL	
FlashUpdateRequired	BOOL	
SelfTestFault	BOOL	
Diagbit_Pad14	BOOL	
Diagbit_Pad15	BOOL	
Pad	DINT	4
LocalClockOffset	LINT	8

Name	Date Type	Size in Bytes
LocalClockOffsetTimestamp	LINT	8
GrandMasterClockID	SINT[8]	8
FieldPowerOnTimestamp	LINT	8
FieldPowerOffTimestamp	LINT	8
Ch00	Diagnostic_Channel_Structure	72
Ch01	Diagnostic_Channel_Structure	72
Ch02	Diagnostic_Channel_Structure	72
Ch03	Diagnostic_Channel_Structure	72

2. Diagnostic Assembly B for Analog 4 Channel RTD/TC Module
   - Instance ID: 0x80A1 (32929)
   - Size = 288 bytes

   Follow the information in the following table to add each member.

Table 78. Diagnostic Assembly Instance 32929

Name	Date Type	Size in Bytes
CJ Ch00	Diagnostic_CJChannel_Structure	72
CJ Ch01	Diagnostic_CJChannel_Structure	72
CJ Ch02	Diagnostic_CJChannel_Structure	72
CJ Ch03	Diagnostic_CJChannel_Structure	72

3. Diagnostic Counters Assembly for I/O
   - Instance ID: 0x301 (769)
   - Size = 16 bytes

   Follow the information in the following table to add each member.

Table 79. Diagnostic Assembly Instance 769

Name	Date Type	Size in Bytes
RunMode	BOOL	1
Infobit_Pad1	BOOL	
DiagnosticActive	BOOL	
Infobit_Pad3	BOOL	
Infobit_Pad4	BOOL	
Infobit_Pad5	BOOL	
Infobit_Pad6	BOOL	
Infobit_Pad7	BOOL	
DiagnosticSequenceCount	SINT	1
CIPConnections	INT	2
CIPLostPackets	DINT	4
CIPTimeouts	DINT	4
CPUUtilization	INT	2
Pad	INT	2

Diagnostic Channels

1. Diagnostic Channel
   - Size = 72 bytes

   This data type is retrieved as part of the diagnostic assembly instance.

   Follow the information in the following table to add each member.

Table 80. 5034-IRT4I Diagnostic Channel Structure

Name	Date Type	Size in Bytes
Databit_Pad0	BOOL	2
Fault	BOOL	
Uncertain	BOOL	

Name	Date Type	Size in Bytes
OpenWire	BOOL	
Databit_Pad4	BOOL	
Databit_Pad5	BOOL	
FieldPowerOff	BOOL	
Databit_Pad7	BOOL	
Databit_Pad8	BOOL	
Disabled	BOOL	
Databit_Pad10	BOOL	
Databit_Pad11	BOOL	
Databit_Pad12	BOOL	
Databit_Pad13	BOOL	
Databit_Pad14	BOOL	
Databit_Pad15	BOOL	
CalFault	BOOL	2
Underrange	BOOL	
Overrange	BOOL	
Diagbit_Pad3	BOOL	
Diagbit_Pad4	BOOL	
Diagbit_Pad5	BOOL	
Diagbit_Pad6	BOOL	
Diagbit_Pad7	BOOL	
Diagbit_Pad8	BOOL	
Diagbit_Pad9	BOOL	
Diagbit_Pad10	BOOL	
Diagbit_Pad11	BOOL	
Diagbit_Pad12	BOOL	
Diagbit_Pad13	BOOL	
Diagbit_Pad14	BOOL	
Diagbit_Pad15	BOOL	
Pad1	INT	2
InternalErrorCount	SINT	1
CalRange	SINT	1
CalOffset	REAL	4
CalGain	REAL	4
CalLastDate	LINT	8
OpenWireTimestamp	LINT	8
Pad2	LINT	8
UnderrangeTimestamp	LINT	8
OverrangeTimestamp	LINT	8
FieldPowerOnTimestamp	LINT	8
FieldPowerOffTimestamp	LINT	8

2. Diagnostic CJ Channel
   - Size = 72 bytes

   This data type is retrieved as part of the diagnostic assembly instance.

   Follow the information in the following table to add each member.

Table 81. 5034-IRT4I Diagnostic CJ Channel Structure

Name	Date Type	Size in Bytes
Databit_Pad0	BOOL	2
Fault	BOOL	
Uncertain	BOOL	
OpenWire	BOOL	
Databit_Pad4	BOOL	
Databit_Pad5	BOOL	
FieldPowerOff	BOOL	

Name	Date Type	Size in Bytes
Databit_Pad7	BOOL	
Databit_Pad8	BOOL	
Disabled	BOOL	
Databit_Pad10	BOOL	
Databit_Pad11	BOOL	
Databit_Pad12	BOOL	
Databit_Pad13	BOOL	
Databit_Pad14	BOOL	
Databit_Pad15	BOOL	
CalFault	BOOL	2
Underrange	BOOL	
Overrange	BOOL	
Diagbit_Pad3	BOOL	
Diagbit_Pad4	BOOL	
Diagbit_Pad5	BOOL	
Diagbit_Pad6	BOOL	
Diagbit_Pad7	BOOL	
Diagbit_Pad8	BOOL	
Diagbit_Pad9	BOOL	
Diagbit_Pad10	BOOL	
Diagbit_Pad11	BOOL	
Diagbit_Pad12	BOOL	
Diagbit_Pad13	BOOL	
Diagbit_Pad14	BOOL	
Diagbit_Pad15	BOOL	
Pad1	SINT	1
CJModeStatus	SINT	1
InternalErrorCount	SINT	1
CalRange	SINT	1
CalOffset	REAL	4
CalGain	REAL	4
CalLastDate	LINT	8
OpenWireTimestamp	LINT	8
Pad2	LINT	8
UnderrangeTimestamp	LINT	8
OverrangeTimestamp	LINT	8
FieldPowerOnTimestamp	LINT	8
FieldPowerOffTimestamp	LINT	8

Definitions for Diagnostic Assembly Types

Table 82. Definition of Members in Diagnostic Assembly Data Types

Name	Data Type	Definition	Valid Values
RunMode	BOOL	Channel's operating state	• 0 = Idle • 1 = Run Idle – The connection is up and the module is producing data for the connection and output tag data is being applied. Run - One of the following is present: • The connection is not up. • The connection is opened but the module has not started producing data for the connection. • The module is not applying new output tag data because the controller is in Program Mode.
DiagnosticActive	BOOL	Indicates if any diagnostics are active or if the prognostics threshold is reached.	0 = No diagnostics active 1 = One or more diagnostics are active or the prognostics threshold is reached.
CIPSyncValid	BOOL	Indicates if the module is synced with a 1588 master.	• 0 = Module is not synced • 1 = Module is synced
CIPSyncTimeout	BOOL	Indicates if the module was once synced with a 1588 master, but is not now due to a timeout	• 0 = A valid time master has not timed out. • 1 = A valid time master is detected on the backplane, but the time master has timed out. The module is using its local clock and can be drifting away from the last known time master.
FieldPowerOff	BOOL	Field power is not present at the channel.	0 = Field power is present 1 = Field power is not present
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.	-128...+127 The value of 0 is skipped except during module power-up.
FlashUpdateRequired	BOOL	Indicates whether flash update is required.	• 0 = Flash update is not required • 1 = Module has no application firmware
SelfTestFault	BOOL	Indicate whether the fault is present during module self-test.	• 0 = Module initialization code did not detect an error • 1 = Module initialization code detected an error
LocalClockOffset	LINT	The offset from the local clock to the system time. This value helps to detect steps in time. This value updates when a PTP update is received.	Any value

Table 82. Definition of Members in Diagnostic Assembly Data Types (continued)

Name	Data Type	Definition	Valid Values
LocalClockOffsetTimestamp	LINT	Indicates the timestamp of the local clock offset.	A valid time or None if there is no recorded event time. Time format is YYYY-MMDD-HH:mm:SS_mmm_uuu_nnn(UTC-00:00) • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds • uuu = microseconds • nnn = nanoseconds • UTC-00:00 = Time zone
GrandMasterClockID	SINT	The EUI-64 Identity of the CIP Sync Grandmaster clock the module is synced to.	Any value
FieldPowerOnTimestamp	LINT	Indicates the timestamp of the last time field power turned on.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
FieldPowerOffTimestamp	LINT	Displays the timestamp of the last time field power turned off.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
Fault	BOOL	Indicates that channel data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.	0 = No fault exists 1 = Fault exists The typical causes of a fault are the following: • ◦ Channel is disabled ◦ Open Wire condition ◦ Underrange/Overrange condition ◦ SA power loss condition You must troubleshoot the module first to see if the typical causes exist.
Uncertain	BOOL	Indicates that the channel data can be inaccurate but the degree of inaccuracy is not known. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.	0 = Valid data 1 = Data validity uncertain

Table 82. Definition of Members in Diagnostic Assembly Data Types (continued)

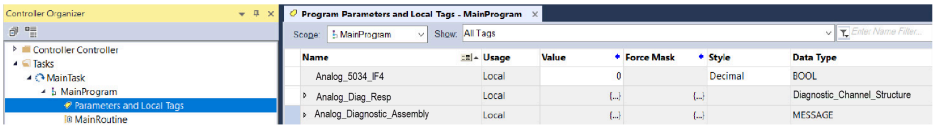
Name	Data Type	Definition	Valid Values
OpenWire	BOOL	The signal wire is disconnected from the channel or the RTB is removed from the module.	0 = Open wire condition does not exist or open wire detection is disabled. 1 = Open wire condition exists. It means the signal wire is disconnected from the channel or the RTB is removed from the module.
CalFault	BOOL	Indicates the last attempted Calibration for this channel failed or there is no calibration data present. This tag is cleared, that is, set to 0, when power is cycled to the module.	• 0 = Calibration did not fail • 1 = Calibration failed
Underrange	BOOL	Indicates the channel data is beneath the underrange threshold for this channel. For example, when the channel operates in the 4...20 mA input range, the underrange threshold on the channel is < 3.0 mA. If the input signal is 0 mA, this tag is set to 1.	0 = Channel data is not beneath the underrange threshold 1 = Channel data is beneath the underrange threshold
Overrange	BOOL	Indicates the channel data is above the overrange threshold for this channel. For example, when the channel operates in the 4...20 mA output range, the overrange threshold on the channel is > 23.0 mA. If the input signal is 24 mA, this tag is set to 1.	0 = Channel data is not above the overrange threshold 1 = Channel data is above the overrange threshold
CalRange	SINT	Indicates the value currently configured for the channel. Values display according to the Input Type selected.	• 0 = -10...10V • 1 = 0...5V • 2 = 0...10V • 4 = 0...20 mA • 5 = 4...20 mA
CalOffset	REAL	Indicates the offset in signal units as reported by the device.	Any value
CalGain	REAL	Indicates the calibration gain reported by the device.	Any value
CalLastDate	LINT	Indicates the time of the last calibration date for the channel.	Any value
OpenWireTimestamp	LINT	Indicates the timestamp of the last time when the open wire condition is detected.	A valid time or None if there is no recorded event time.
UnderrangeTimestamp	LINT	Indicates the timestamp of the last underrange fault.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds

Table 82. Definition of Members in Diagnostic Assembly Data Types (continued)

Name	Data Type	Definition	Valid Values
OverrangeTimestamp	LINT	Indicates the timestamp of the last overrange fault.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
CJModeStatus	SINT	Indicates the Cold Junction Channel mode currently used.	• 0 = Disabled • 1 = Onboard • 2 = RTB • 3 = Remote
CIPConnections	INT	Indicates the number of CIP connections currently open.	0...24
CIPLostPackets	DINT	Indicates the running sum of the number of Sequenced Address Item Sequence Numbers that are skipped in Class 0 and Class 1 connections consumed by the adapter and its children.	0...2,147,483,647
CIPTimeouts	DINT	Indicates the running count of the number of connections that time out, both originated and targeted, to and through the adapter.	0...2,147,483,647
CPUUtilization	INT	Indicates the usage of the compute engine.	0...100%

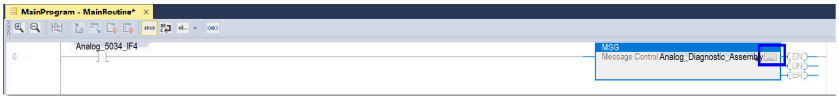
Create Message Type User Tags

Create MESSAGE type user tags for requests and associated response user tags for each of the new user-defined diagnostic assembly types.



From the Controller Organizer pane, expand Tasks → MainTask → MainProgram:

1. Create MESSAGE type user tags for each request.
2. Create associated response user tags for each new user-defined diagnostic assembly type.
3. Add the user tags to your ladder program.



4. Expand the message tag to open the message configuration dialog.

5. On the Configuration tab, select:
   - Service type: Get Attribute Single
   - Class: 4
   - Attribute: 3
   - Instance:
     - **5034-IRT4I and 5034-IRT4IXT**

       0x8019 (32793) Diagnostic Assembly A for Analog 4 Channel Input RTD/TC Module

       0x80A1 (32929) Diagnostic Assembly B for Analog 4 Channel Input RTD/TC Module

       0x301 (769) Diagnostic Counters Base I/O Assembly
   - Destination element: User-defined data type suitable for the instance entered.
6. On the Communication tab, select the path to the module that you wish to send the messages to.
7. Download the project and set to Run Mode.

   You can monitor the user-defined tag values from the Program Parameters and Local Tags window, under the MainProgram task in the Controller Organizer pane.

5034-OF4 and 5034-OF4XT Details

This chapter covers the detailed instructions on how to configure, calibrate, and troubleshoot your 5034-OF4 and 5034-OF4XT modules. It also describes the module tag definitions for input, output, and configuration tags.

Module Configuration

Before you start configuring your I/O module, you must create a Studio 5000 Logix Designer application project for the Logix 5000 controller that owns the PointMax I/O modules. See Add a New Module to a Studio 5000 Logix Designer Application Project on page 41 for more information.The project includes module configuration data for the PointMax I/O modules.

The Studio 5000 Logix Designer application transfers the project to the owner-controller during the program download. Data is then transferred to the PointMax I/O modules when the connection is established. The PointMax I/O modules can operate immediately after receiving and applying the configuration data.

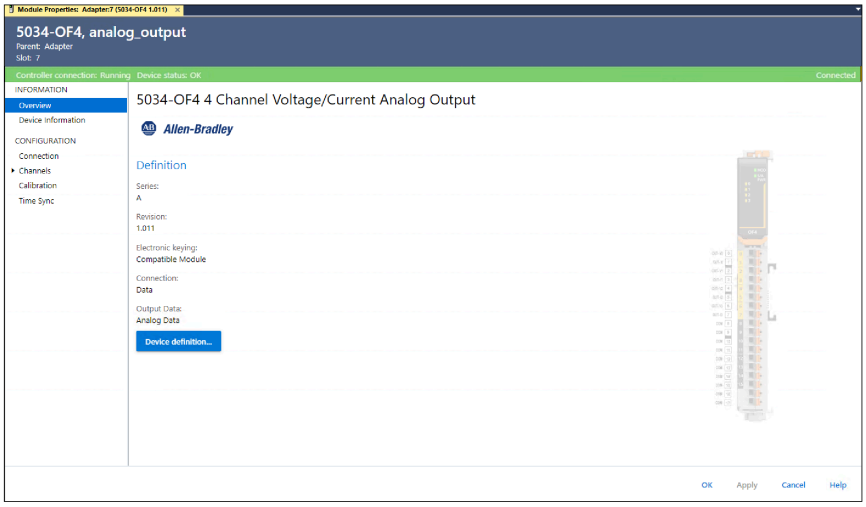
IMPORTANT: You must use Studio 5000 Logix Designer application version 36 or later.

Overview View

When you create a module or open the Module Properties, the Overview view appears first. Use Overview to view the definition of a device, including the device type, revision, electronic keying, connection, and other device-specific values.

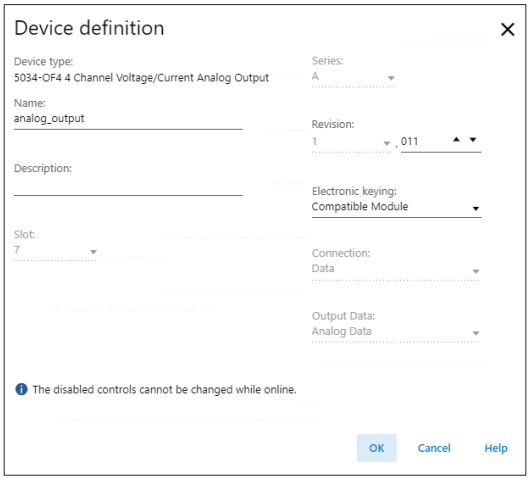
To change the definition of a device, select the Device definition in the Overview view.

Figure 59. Overview View Example



Device Definition Dialog

Figure 60. Device Definition Dialog



Parameter	Definition	Available Choices
Device Type	Displays the device catalog number and type.	Device-specific
Name	Enter an IEC 61131 compliant device name. If an invalid character is entered in this field, or if the name exceeds 40 characters, the software ignores the character.	All valid values
Description	Enter the description of the device.	All valid values
Slot	Specify the slot number where the device resides. Only slots between 1 and the maximum number of I/O devices are valid depending on the platform. When the device is created, the slot number defaults to the first available slot position. When the controller is changed to one supporting a smaller maximum I/O count, the current slot value may no longer be valid.	1...32
Series	Specifies the module hardware series.	Device-specific

Parameter	Definition	Available Choices
Revision	Specifies the major and minor revisions of the device. The valid range for minor revision is from 1...255.	Device-specific
Electronic Keying	Defines the electronic keying used for the device. Electronic keying compares the device defined in the project to the installed device. If keying fails, a fault occurs. For detailed information on Electronic keying, see Electronic Keying in Logix 5000 Control Systems Application Technique, publication LOGIX-AT001	• Exact Match • Compatible Module • Disable Keying  **ATTENTION:** Be extremely cautious when using Disable Keying; if used incorrectly, this option can lead to personal injury or death, property damage, or economic loss. We strongly suggest that you do not use Disable Keying.If you use Disable Keying, you must take full responsibility for understanding whether the device being used can fulfill the functional requirements of the application.
Connection	Determines the following for the module type you configure. For the Listen Only Data choice, the controller and device establish communication without the controller sending any configuration or output data to the device. A full input data connection is established but depends on the connection between the owner-controller and the device.	• Data with Calibration • Data (default) • Listen Only
Output Data	Selects the output data type for the device.	Analog Data

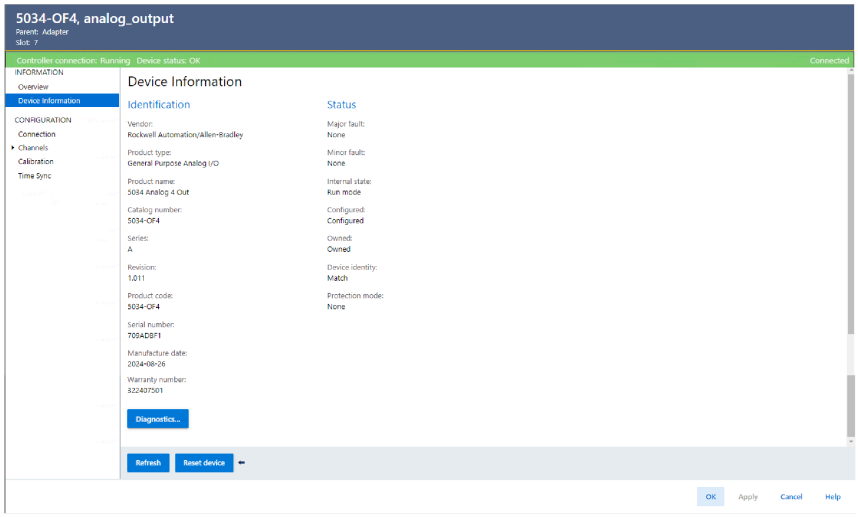
Device Information View

Use Device Information to view device and status information when the device is online. You can use this view to complete the following:

- Determine the identity of the device.
- View the device's current operational state.
- View whether the device was configured by the owner controller.
- View whether an owner controller is currently connected to the device.
- Retrieve the latest information from the device.

- Reset a device to its power-up state.
- If supported, view the protection mode of the device.
- Access device diagnostics

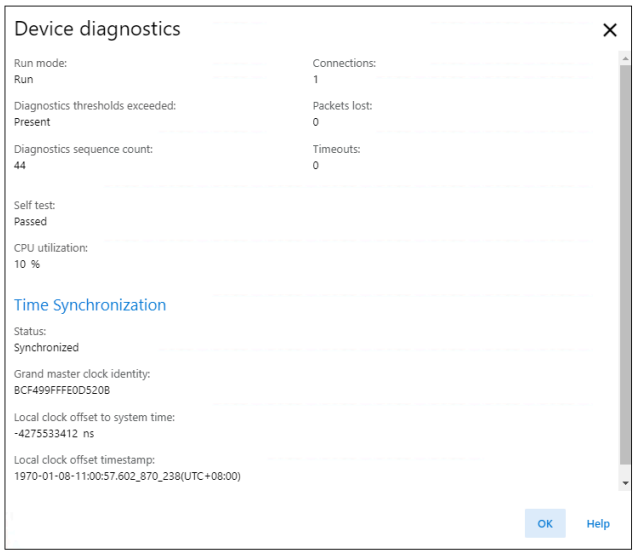
Figure 61. Device Information View Example



Device Diagnostics

To view the device diagnostics, select Diagnostics in the Device Information view. It displays the diagnostics information of the module.

Figure 62. Device Diagnostics Dialog Example



Connection View

The Connection view lets you complete the following tasks:

- Set the RPI rate. For more information, see Requested Packet Interval on page 16.
- Select Unicast or Multicast connection to use on the EtherNet/IP network. For more information, see Unicast or Multicast Connection on page 19.

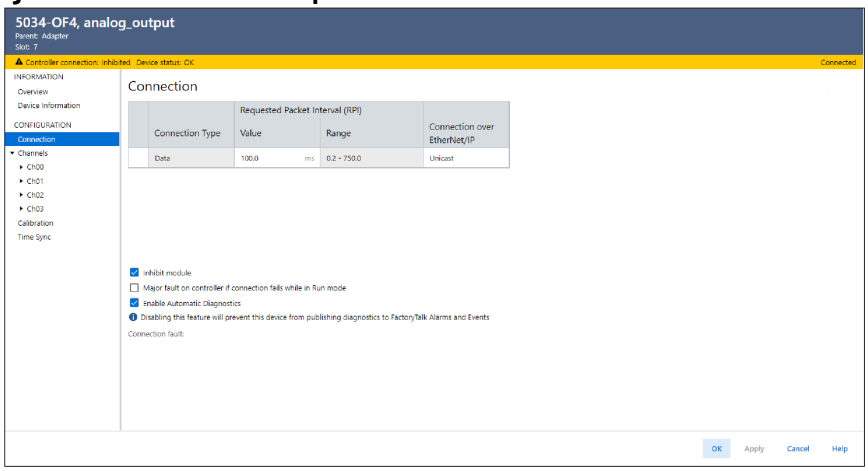
- View the reason of Connection Fault.

  If there is a connection fault, Connection Fault area displays the error code with description that helps you to troubleshoot the module. For more information, see Troubleshoot Your Module on page 45.

- Inhibit the module. For more information, see Module Inhibiting on page 17.
- Configure fault response for connection failure while the controller is in Run Mode.
- Enable or disable the Automatic Diagnostics.

  ATTENTION: If you do not enable Automatic Diagnostics, the device does not publish diagnostics to FatoryTalk Alarms and Events.

Figure 63. Connection View Example



Channels View

The Channels view shows an overview of the configuration values for all module channels.

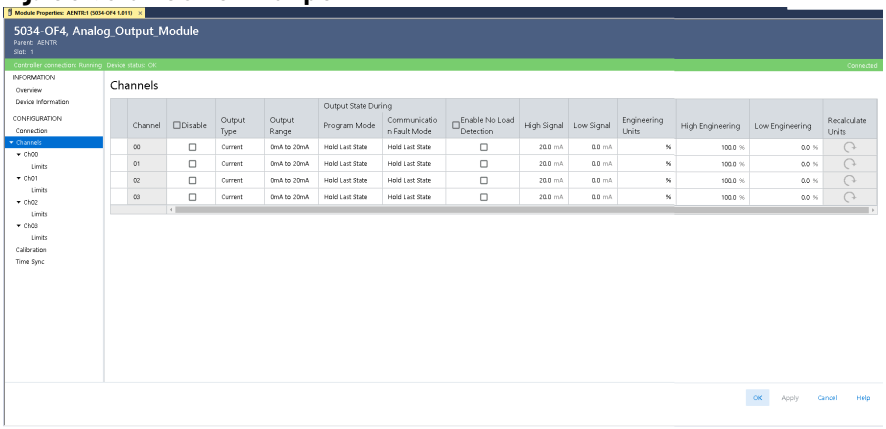
Not all channel configurations are included in Channels view. To view or change the complete set of the channel configuration and also to view the diagnostics information for the channel, use Chxx view.

You can do the following actions on this view for all the channels:

- Disable the channel, if desired.
- Change the output type and output range.
- Enable or disable no load detection
- Enable or disable hold for initialization
- Set the scaling and recalculate all configurations with engineering unit.
- Configure the connection fault handling

You can use this view to monitor the configuration for all channels in the module. To view the diagnostics information for the channel, go to respective Chxx view.

Figure 64. Channels View Example



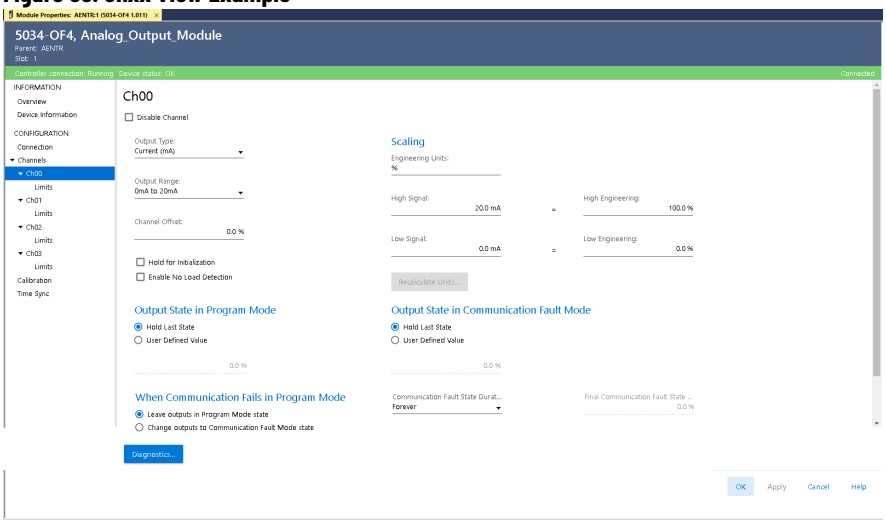
Chxx View

The Chxx view, where xx represents the channel number, shows the configuration options available for the respective channel.

You can do the following actions on this view for the respective channel:

- Disable the channel, if desired.
- Change the output type and output range.
- Enable or disable no load detection
- Enable or disable hold for initialization
- Set the scaling settings.
- Recalculate the engineering units if configuration is changed.
- Configure the connection fault handling
- View channel diagnostics information

Figure 65. Chxx View Example

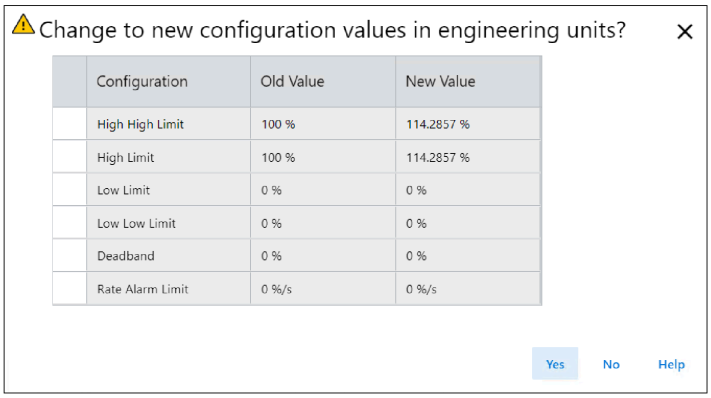


Recalculate Units

Recalculate Units lets you recalculate all configurations with engineering unit after a scaling change. Consider the following:

- The Recalculate Units option is enabled when the scaling configuration is changed.
- Upon selecting Recalculate Units option, the recalculated new values based on the new scaling configuration are displayed together with the old values for you to verify before changing.

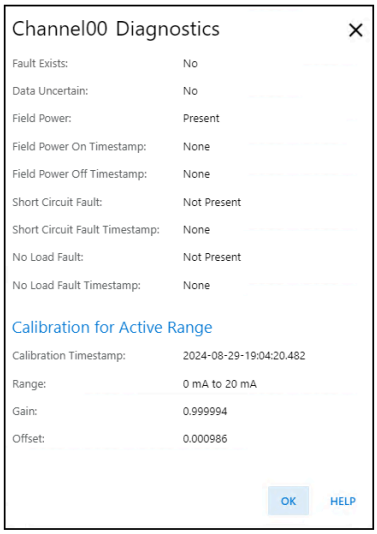
- If you select "Yes" to proceed with the change, the new values will be set but it gets applied when you select "Apply/OK".
- If you select "No" to cancel the change, the old values are retained. You can either select the Recalculate Units again or manually change those configurations based on the new scaling.



Channelxx Diagnostics

Displays the diagnostics channel information when connected with the module. When online with the module, select the Diagnostics on the Chxx view to see the diagnostic information.

Figure 66. Channelxx Diagnostics Dialog Example



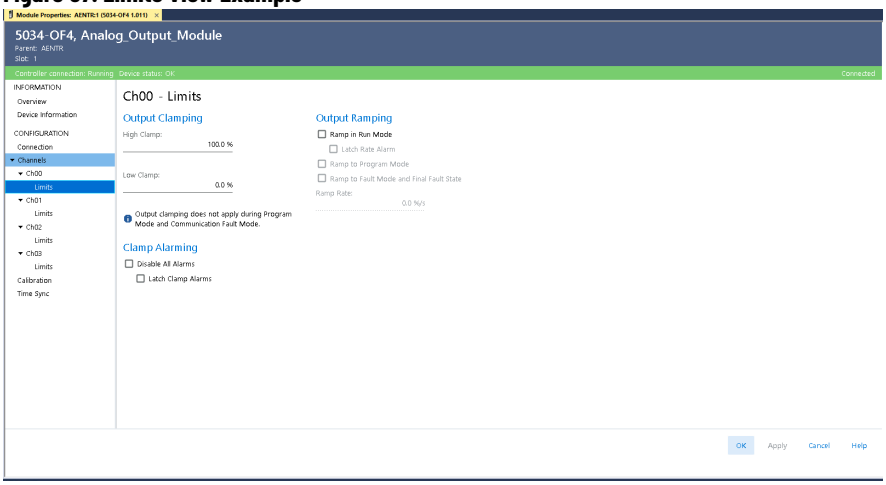
Limits View

Each channel on the analog output module has a Limits view with which it is associated. The Signal Units options correspond to the output type and range for the channel.

You can do the following actions on this view:

- Disable all the alarms.
- Latch clamp alarms and configure output claming
- Enable/disable the output ramping in different modes and configure the ramp rate (if any ramp mode is enabled).

Figure 67. Limits View Example



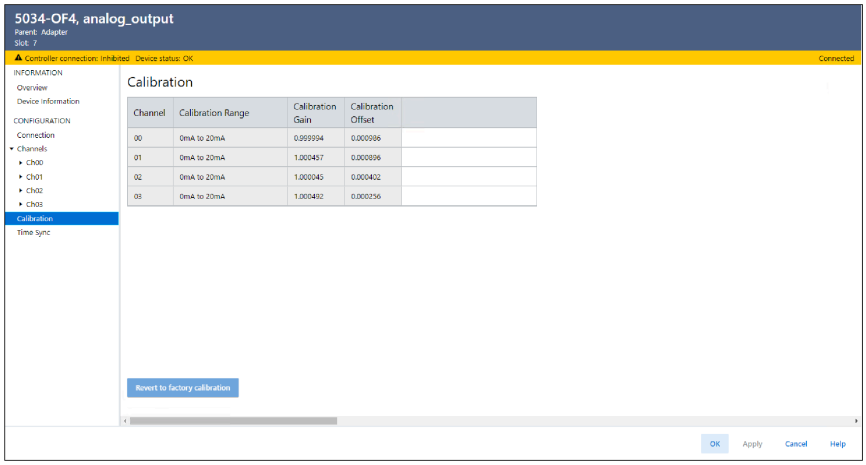
Calibration View

The Calibration view provides calibration information for all channels on the module. You can do the following actions on this view for all the channels:

- View calibration parameters and calibration status for the currently configured input ranges.
- Perform user calibration for one or multiple channels.
- Revert calibration parameters to the factory default values.

For more information on how to calibrate a module, see Module Calibration (Interactive) on page 195.

Figure 68. Calibration View Example

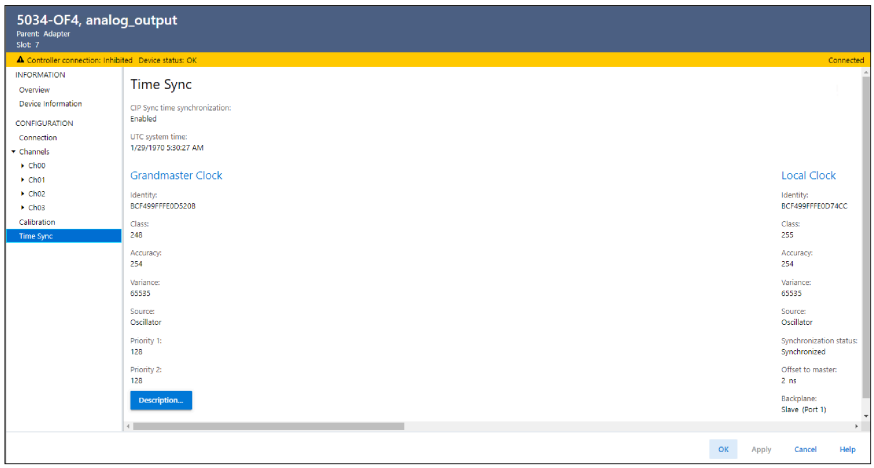


Time Sync View

The Time Sync view is read-only and displays the CIP Sync status information about the module when the project is online. The Time Sync category displays the following information:

- CIP Sync time synchronization status
- UTC system time
- Grandmaster Clock information
- Grandmaster Clock description
- Local Clock information

Figure 69. Time Sync View Example

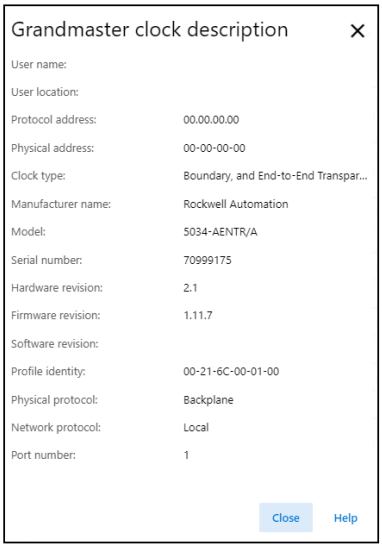


Grandmaster Clock Description

To view the Grandmaster clock description, select Description in the Time Sync view.

The Grandmaster clock description dialog provides detailed information about the grandmaster clock.

Figure 70. Grandmaster Clock Description Example



Module Calibration (Interactive)

You can use Calibration view in Module Properties to interactively calibrate the module on a per channel basis or in group.

Controller State During Calibration

You must add the module to your Studio 5000 Logix Designer application project, as described in Add a New Module to a Studio 5000 Logix Designer Application Project on page 41, before you can calibrate it.

The project must be online with the owner-controller to calibrate the PointMax analog modules. You can calibrate under any of the following conditions:

- The controller is in Program Mode, that is, either Remote Program or Program Mode.

  Your module must be in Program Mode and not be actively controlling a process when you calibrate it.

- There are no connections to the module.

Calibration Instrumentation Specifications

When you calibrate output modules, use a digital multimeter (DMM) to measure the current or voltage signal the module is sending out. To maintain your module's factory calibration accuracy, use the instrumentation with the specifications listed in the following table.

IMPORTANT: Do not calibrate your module with an instrument that is less accurate than those specified in following table. The following events can result:

- Calibration appears to occur normally but the module gives inaccurate data during operation.
- A calibration fault occurs, forcing you to abort calibration. When this happens, I.Chxx.CalFault tag is set for the channel you attempted to calibrate. You can clear this tag by completing a valid calibration or cycling power to the module.

Table 83. Calibration Instrument Specifications

Catalog Number	Channel Output Type	Calibration Instrumentation Specifications
5034-0F4 and 5034-0F4XT	Current (mA)	DMM with resolution better than 0.15 µA
	Voltage (V)	DMM with resolution better than 1.0 µV

Calibration Procedure

When calibrating an analog output channel, the Studio 5000 Logix Designer application commands the module to output specific signal levels. The signal type is determined by the output type being used by the channel.

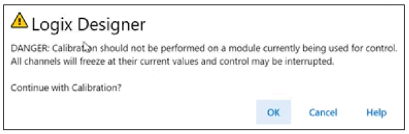
Table 84. Analog Output Module Calibration References

Output Type	Output Range	Low Calibration Reference Level	High Calibration Reference Level
Voltage (V)	-10...10V	-10.0V	10.0V
	0...10V	1.0V	10.0V
	0...5V	1.0V	5.0V
Current (mA)	0...20 mA	1.0 mA	20.0 mA
	4...20 mA	5.0 mA	20.0 mA

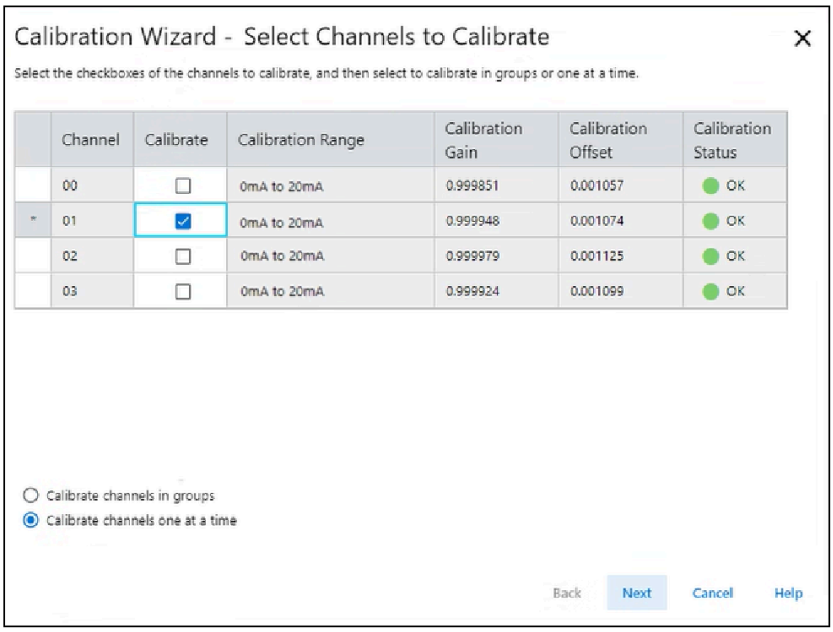
You must measure the actual level and record the results to account for any module inaccuracies.

This example describes how to calibrate a channel on the analog output module for use with a Current (mA) output type. Complete the following steps:

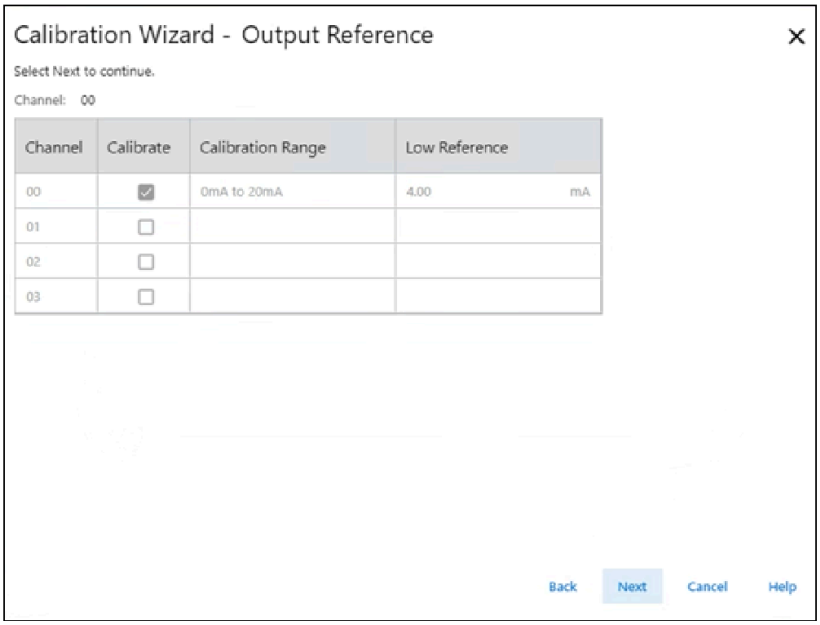
1. Connect the DMM to the channel being calibrated.
2. Go online with the project and make sure that the controller is in Program Mode.
3. Confirm that the channel to be calibrated is configured for the correct Output Range.
4. On the Calibration view in the Module Properties dialog, select Start Calibration.
5. When the dialog appears to confirm that you want to calibrate the channel, select OK.



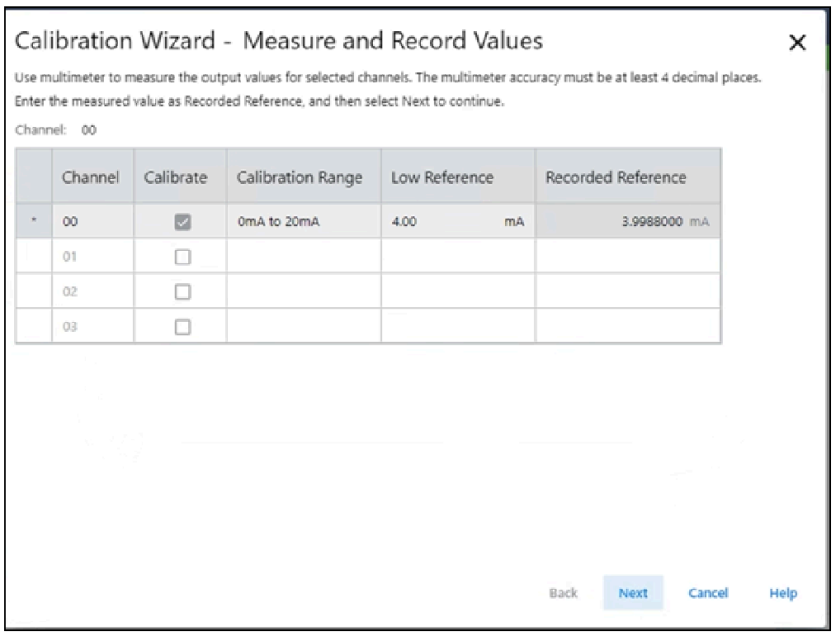
6. Select the channels one at a time or in groups to calibrate and then select Next.



7. When the Output Reference dialog appears and indicates the channel to be calibrated for the low reference, select Next.

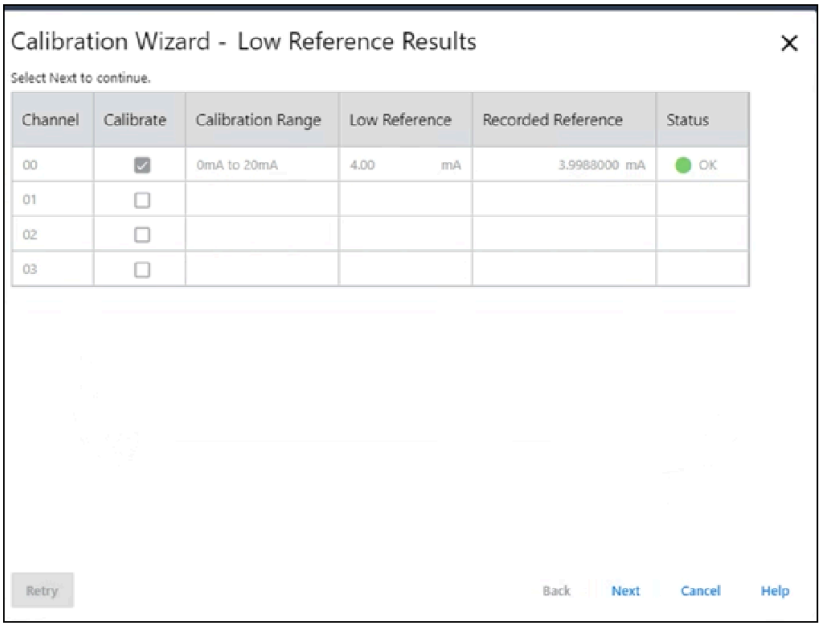


The Measure and Record Values dialog appears for low reference value.



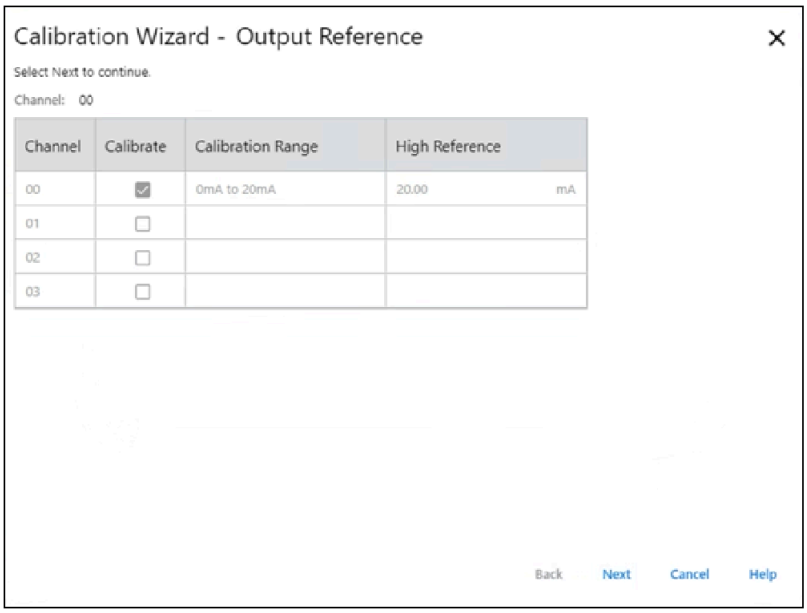
8. Use a multimeter to measure the low reference value of the channel.
9. In the Recorded Reference column, record the measured value and select Next.

   The Low Reference Results dialog appears and indicates the status of the calibrated channel.

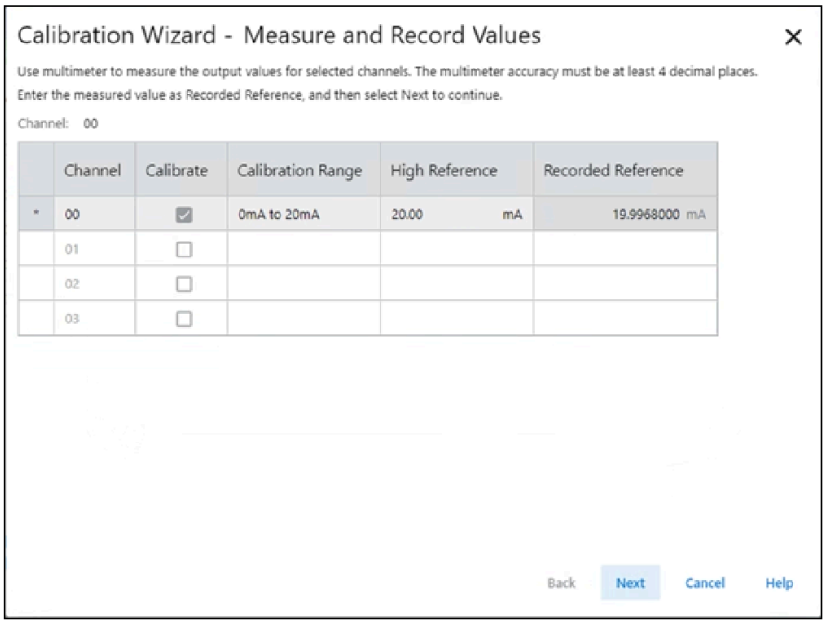


10. If the Status is OK, select Next.

    If the Status is not OK, repeat the calibration process.
11. When the Output Reference dialog appears and indicates the channel to be calibrated for the high reference, select Next.

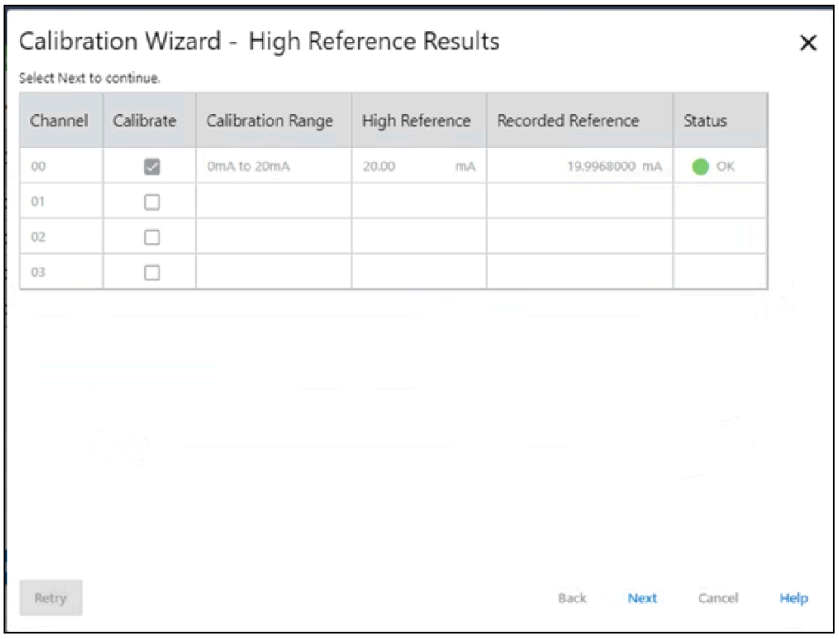


The Measure and Record Values dialog appears.



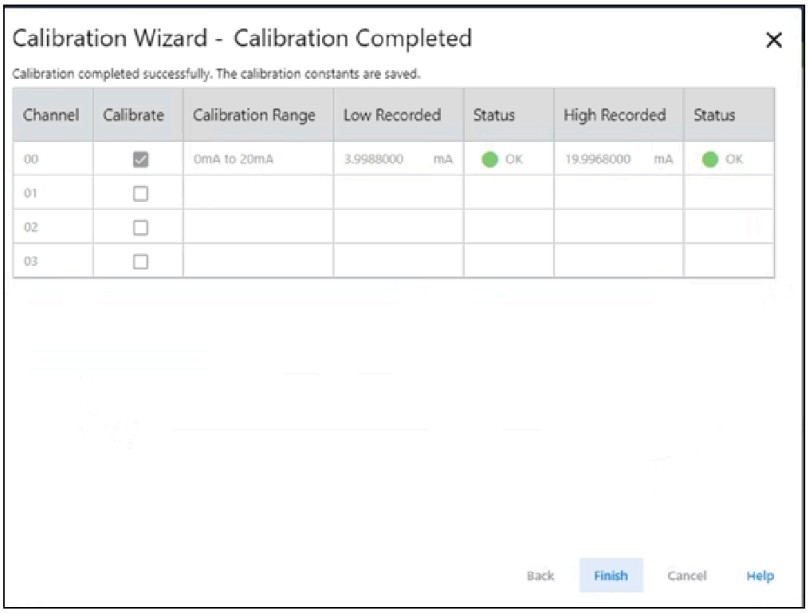
12. Use a multimeter to measure the high reference value of the channel.
13. In the Recorded Reference column, record the measured value and select Next.

The High Reference Results dialog appears and indicates the status of the calibrated channel.



14. If the Status is OK, select Next.

    If the Status is not OK, repeat the calibration process.
15. When the Calibration Completed dialog appears, select Finish.



Use the Status Indicators for Troubleshooting

PointMax I/O modules use the following status indicators:

- SA Power Indicator - This indicator operates the same for all PointMax I/O modules.
- Module Status Indicator - This indicator operates the same for all PointMax I/O modules.
- Channel Status Indicator - This indicator operates differently based on the module type that you are using.

SA Power Indicator

Table 85. Interpret SA Power Indicator

Indicator State	Description	Recommended Action
Off	The module is not powered.	Complete the following actions: 1. Confirm that the system is powered. 2. Confirm that the module is installed properly.
Steady green	There is SA power to the module.	None
Steady red	There is no SA power to the module, or SA power voltage is not in the valid range.	Complete the following actions: 1. Confirm that SA power wiring is properly connected to the adapter, expansion power module, or 5034-MBSA mounting base. 2. Check the following: ◦ Check that the SA voltage is in the correct range. ◦ If an external power supply is used, confirm that the power supply is turned on. ◦ Make sure that the mounting base to mounting base connection is properly secured. Go to Chassis Information view in the Module Properties of the adapter to check the Field Power status of mounting bases installed in all slots.

Module Status Indicator

Table 86. Interpret Module Status Indicator

Indicator State	Description	Recommended Action
Off	The module is not powered.	Complete the following actions: 1. Confirm that the system is powered. 2. Confirm that the module is installed properly.
Steady green	The module is operational and all I/O connections are active.	None
Flashing green	The module has no I/O connections.	Troubleshoot your Studio 5000 Logix Designer application to determine what is preventing a connection from the module to the controller and correct the issue.

Table 86. Interpret Module Status Indicator (continued)

Indicator State	Description	Recommended Action
Flashing red	One of the following conditions exists: • A module firmware update is in progress. • A module firmware update attempt failed. • The device has experienced a recoverable fault. • A connection to the module has timed out.	Complete one of the following: • Let the firmware update process complete. • Reattempt a firmware update after one fails. • Use the Studio 5000 Logix Designer application to determine whether a module recoverable fault is occurred. It is shown in Device Information view. To clear a recoverable fault, complete one of the following: ◦ Cycle module power. ◦ Select Reset device in the Studio 5000 Logix Designer project via the Device Information view of the Module Properties dialog. If the fault does not clear after cycling power and module reset, contact Rockwell Automation Technical Support. • Use the Studio 5000 Logix Designer application to determine if a connection has timed out. The Connection view in the Module Properties indicates whether a connection request has timed out. If a connection has timed out, determine the cause and correct it. For example, a cable failure can cause a connection timeout.
Steady red	The module experienced a nonrecoverable fault.	Complete the following actions: 1. Cycle power to the module. 2. If the status indicator remains in the steady red state, replace the module.

Channel Status Indicators

Table 87. Interpret Output Channel Status Indicators

Indicator State	Description	Recommended Action
Off	One of the following conditions exists: • The module is not powered. • The module is powered but connection is not established from the controller to module. • The module is powered, but the input channel is disabled.	Complete one of the following: • If you expect the module to be powered but it is not, complete the following: ◦ Confirm that the system is powered. ◦ Confirm that the module is installed properly. • If the module is powered but the channel is not operating as expected, use the Studio 5000 Logix Designer application to confirm that the channel is not disabled and the module has a connection to the controller. The Connection view in the Module Properties indicates if the connection is running or faulted. If the connection is faulted, the Connection view indicates error information. • If the channel is disabled, no action is needed.

Table 87. Interpret Output Channel Status Indicators (continued)

Indicator State	Description	Recommended Action
Steady yellow	The output channel is operating normally.	None
Flashing red	One of the following conditions exists: • There is no SA power to the module, or SA power voltage is not in the valid range. • A wire is disconnected from the output. That is, a No Load condition exists. • The module is driving a current from the channel greater than the maximum current level the channel can handle. That is, a Short Circuit condition exists.	One of the following: • If there is a SA power fault, see the recommended action given for steady red indicator state in SA Power Indicator table above. • Check the wiring at the output channel. If necessary, reconnect the wire. • Troubleshoot the application to make sure an acceptable level of current is driven from the channel.
Alternating yellow/red	Calibration is in progress.	Successfully complete the calibration process.
Steady red	An issue has occurred that is internal to the module. The following are example issues that can cause the status indicator to be steady red: • A calibration fault occurred on the channel. • The module has experienced a nonrecoverable fault.	Complete one of the following: • If the indicator turns steady red after a calibration process, you can either perform a successful calibration or cycle the power to recover the fault. • If it is not caused by the calibration, cycle the power to recover the fault. If the condition is still present, replace the module.

Module Tag Definitions

Module tags are created when you add a module to the Studio 5000 Logix Designer application project.

The set of module tags associated with a module depends on the module type and Module Definition choices made during module configuration. For example, if you use a Listen Only connection in the Device Definition, the Studio 5000 Logix Designer application creates only Input tags for that module.

The tables contained in this section list all the tags available with a module. Not all tags in the list are used when that module type is added to a project. Tag use varies by module configuration.

Configuration Tag Definitions

Table 88. Configuration Tags

Name	Data Type	Definition	Valid Values
Chxx.Range	SINT	Channel's operating range	0 = -10...+10V 1 = 0...5V 2 = 0...10V 4 = 0...20 mA 5 = 4...20 mA
Chxx.AlarmDisable	BOOL	Disables all alarms on the channel.	0 = Alarms are enabled 1 = Alarms are disabled

Table 88. Configuration Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.LimitAlarmLatchEn	BOOL	Configures Limit alarms to latch until they are explicitly unlatched.	0 = Latching disabled 1 = Latching enabled
Chxx.RampAlarmLatchEn	BOOL	Latches Ramp alarm when set so that does not clear until explicitly unlatched.	0 = Latching disabled 1 = Latching enabled
Chxx.NoLoadEn	BOOL	Enable the input No Load diagnostic	0 = Disabled 1 = Enabled
Chxx.Disable	BOOL	Disables the channel.	0 = Channel is enabled 1 = Channel is disabled
Chxx.FaultMode	BOOL	Determines output action when a connection fault occurs. At the fault occurrence, the output holds its last state or transitions to the value set in the Fault Value parameter. The channel continues the Fault Mode for the length of time set in the Fault Value State Duration parameter.	0 = Transition to user-defined value 1 = Hold Last State
Chxx.ProgMode	BOOL	Determines output action when the controller transitions to Program mode or Inhibit mode. At the transition to Program mode, the output holds its last state or transitions to the value set in the Program Value parameter.	0 = Transition to user-defined value 1 = Hold Last State
Chxx.ProgramToFaultEn	BOOL	Determines channel action if a connection faults while the module is in a safe state for Program mode. The channel can remain in the safe state for Program mode or transition to a safe state for Communication Fault mode. If the channel remains in safe state for Program mode, the Final Fault State parameter is ignored.	0 = Remains in the Program state 1 = Transitions to the safe state for the Fault mode
Chxx.FaultValueStateDuration	SINT	Determines the length of time the FaultMode or FaultValue parameter value is held prior to the Final Fault State.	0 = Hold forever 1 = Any of the following: • 1 s • 2 s • 5 s • 10 s
Chxx.FaultValue	REAL	Value to which the output changes if the following events exist: • Fault Mode = 0 • Either of the following: ◦ Controller is in Run mode and the connection is lost ◦ Controller is in Program mode, the connection is lost, and the ProgamToFaultEn tag is set	Any value
Chxx.ProgValue	REAL	Value to which the channel changes if the following events exist: • Program Mode = 0 • Controller transitions to Program mode	Any value
Chxx.FaultFinalState	REAL	Value to which the channel changes if the following events exist: • Connection is lost • Time defined by the FaultValueStateDuration parameter has been exceeded	Any value

Table 88. Configuration Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.RampInRun	BOOL	Enables Output Ramping when the module is in Run mode. Output changes during Run mode are limited to the Maximum Ramp Rate value.	0 = Ramping disabled 1 = Ramping enabled in Run mode
Chxx.RampToProg	BOOL	Enables Output Ramping when the controller transitions to Program mode. Output changes during Program mode are limited to the Maximum Ramp Rate value.	0 = Ramping disabled 1 = Ramping enabled to Program mode state
Chxx.RampToFault	BOOL	Enables Output Ramping when the connection to the module faults. Output transitions to FaultValue and FaultFinalState are limited to the MaximumRampRate.	0 = Ramping disabled 1 = Ramping enabled to Fault mode state
Chxx.HoldForInit	BOOL	When set, configures the channel to hold, or not change, until initialized with a value within 0.1% of full scale of its current value when one of the following conditions occurs. • Module initial connection (power up) • Controller transition from Program mode back to Run mode • Module reestablishes communication after a fault • SA power is restored after being lost.	0 = Output O.Chxx.Data signal immediately 1 = Hold last signal until initialization match
Chxx.MaxRampRate	REAL	Maximum rate at which the channel can transition to in Engineering Units/Second. This tag is used only if at least one of the following output ramping modes is enabled: • Ramp In Run • Ramp To Fault • Ramp To Program	Any value If the MaxRampRate = 0.0, the ramp rate is limited to ramping the range full scale in one RPI.
Chxx.LowSignal	REAL	One of four points used in scaling. The low signal is in terms of the inputs signal units and corresponds to the low engineering term when scaled.	Any value less than the high signal in range.
Chxx.HighSignal	REAL	One of four points used in scaling. The high signal is in terms of the inputs signal units and corresponds to the high engineering term when scaled.	Any value greater than the low signal in range.
Chxx.LowEngineering	REAL	One of four points used in scaling. The low engineering helps determine the engineering units the signal values scale into. The low engineering term corresponds to the low signal value.	Any value.
Chxx.HighEngineering	REAL	One of four points used in scaling. The high engineering helps determine the engineering units the signal values scale into. The high engineering term corresponds to the high signal value.	Any value greater than the low engineering value.
Chxx.LowLimit	REAL	Lowest value to which the output can go. The tag value is engineering units.	Any value lower than the HighLimit
Chxx.HighLimit	REAL	Highest value to which the output can go based on the operating range established by the Output Clamping feature. The tag value is engineering units.	Any value higher than the LowLimit
Chxx.Offset	REAL	Compensates for any known error on the sensor or channel to which the sensor is connected. The value is set in engineering units.	Any value (We recommend that you use a small value.)

Input Tag Definitions

Table 89. Input Tags

Name	Data Type	Definition	Valid Values
RunMode	BOOL	Channel's operating state	0 = Idle 1 = Run Idle – The connection is up and the module is producing data for the connection and output tag data is being applied. Run - One of the following is present: • The connection is not up. • The connection is opened but the module has not started producing data for the connection. • The module is not applying new output tag data because the controller is in Program Mode.
ConnectionFaulted	BOOL	Indicates if a connection is running. The module sets this tag to 0 when connected. If the module is not connected, it changes the tag to 1.	0 = A connection exists between the module and the controller. 1 = Connection is timed out or inhibited.
DiagnosticActive	BOOL	Indicates if any diagnostics are active or if the prognostics threshold is reached.	0 = No diagnostics active 1 = One or more diagnostics are active or the prognostics threshold is reached.
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.	-128...+127 The value of 0 is skipped except during module power-up.
Chxx.Fault	BOOL	Indicates that channel data is inaccurate and **cannot be trusted** for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = No fault exists 1 = Fault exists The typical causes of a fault are the following: • ◦ Channel is disabled ◦ No Load condition ◦ Underrange/Overrange condition ◦ SA power loss condition You must troubleshoot the module first to see if the typical causes exist.
Chxx.Uncertain	BOOL	Indicates that the channel data can be inaccurate but the **degree of inaccuracy is not known**. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. **IMPORTANT:** Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	0 = Valid data 1 = Data validity uncertain
Chxx.NoLoad	BOOL	The signal wire is disconnected from the channel or the RTB is removed from the module. This condition is detected only when the channel is used in current mode.	0 = No Load condition does not exist 1 = No Load condition exists. That is, a signal wire is disconnected from the channel or the RTB is removed from the module.
Chxx.ShortCircuit	BOOL	A Short Circuit or Overcurrent condition exists. This condition is detected only when the channel is used in voltage mode.	0 = No Short Circuit or Overcurrent condition exists 1 = Short Circuit or Overcurrent condition exists
ChOx.OverTemperature		Not applicable for this module.	0
Chxx.FieldPowerOff	BOOL	Field power is not present at the channel.	0 = Field power is present 1 = Field power is not present

Table 89. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.InHold	BOOL	Indicates that the channel is currently holding until the received data value is within 0.1% range full scale of the current data value.	0 = Channel is not holding 1 = Channel is holding
Chxx.NotANumber	BOOL	Indicates that the last value received for the channel output data value was not a number.	0 = Last channel data received was a number 1 = Last channel data received was not a number
Chxx.Underrange	BOOL	Indicates that the commanded output data in output tag is below the Underrange threshold. When it happens, the actual output signal is limited at the threshold or the configured Low Limit (whichever is higher). For example, when the channel operates in the 4...20 mA output range, the underrange threshold on the channel is < 3.6 mA. If the output signal is 0 mA, this tag is set to 1.	0 = Commanded output data is not below the Underrange threshold 1 = Commanded output data is below the Underrange threshold
Chxx.Overrange	BOOL	It indicates that the commanded output data in output tag is above the Overrange threshold. When it happens, the actual output signal is limited at the threshold or the configured High Limit (whichever is lower). For example, when the channel operates in the 4...20 mA output range, the overrange threshold on the channel is ≥ 21.0 mA. If the output signal is 21 mA, this tag is set to 1.	0 = Commanded output data is not below the Overrange threshold 1 = Commanded output data is below the Overrange threshold
Chxx.LLimitAlarm	BOOL	Triggered when the requested output value is below the configured Low Limit value. It remains set until the requested output is above the Low Limit. If the Chxx.AlarmDisable tag is set to 1, that is, the output signal is still clamped at the Low Limit value. But the Low Limit alarm is not triggered.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.HLimitAlarm	BOOL	Triggered when the requested output value is above the configured High Limit value. It remains set until the requested output is below the High Limit. If the Chxx.AlarmDisable tag is set to 1, that is, the output signal is still clamped at the High Limit value. But the High Limit alarm is not triggered.	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.RampAlarm	BOOL	Indicates that the analog output has been commanded to change value in a way such that the Maximum Ramp Rate is exceeded	0 = Alarm is not triggered 1 = Alarm is triggered
Chxx.CalFault	BOOL	Indicates that the last attempted Calibration for this channel failed. This tag is cleared, that is, set to 0, when power is cycled to the module or a successful calibration for the range on the channel is performed.	0 = Calibration did not fail 1 = Calibration failed
Chxx.Calibrating	BOOL	Indicates that the channel is currently being calibrated.	0 = Channel is not being calibrated 1 = Channel is being calibrated
Chxx.CalGoodLowRef	BOOL	Indicates that a valid Low Reference measurement was passed through the output tag to the module. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Valid Low Reference signal has not been sampled on this channel 1 = Valid Low Reference signal has been sampled on this channel

Table 89. Input Tags (continued)

Name	Data Type	Definition	Valid Values
Chxx.CalBadLowRef	BOOL	Indicates that an invalid Low Reference signal has been sampled on this channel.You must correct this condition to successfully calibrate the module. If calibration is aborted with an invalid Low Reference signal, the Chxx.CalFault tag is set for this channel until a successful calibration is performed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Invalid Low Reference signal has not been sampled on this channel 1 = Invalid Low Reference signal has been sampled on this channel
Chxx.CalGoodHighRef	BOOL	Indicates that a valid High Reference measurement was passed through the output tag to the module. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Valid High Reference signal has not been sampled on this channel 1 = Valid High Reference signal has been sampled on this channel
Chxx.CalBadHighRef	BOOL	Indicates that an invalid High Reference signal has been sampled on this channel. You must correct this condition to successfully calibrate the module. If calibration is aborted with an invalid High Reference signal, the Chxx.CalFault tag is set for this channel until a successful calibration is performed. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Invalid High Reference signal has not been sampled on this channel 1 = Invalid High Reference signal has been sampled on this channel
Chxx.CalSuccessful	BOOL	Indicates calibration on this channel is complete and the Calibrating state has been exited. This tag remains set after valid calibration as long as connection is open. **IMPORTANT:** This tag is available only when you use the Data with Calibration connection type in the Module Definition. If you use the Data connection type, this tag does not appear in the module tags.	0 = Calibration was not successful 1 = One of the following: • Calibration was successful and calibrating state has been exited. • Calibration data is present and applied.
Chxx.Data	REAL	Indicates the signal value currently output at the RTB in scaled Engineering Units.	Any positive or negative value.
Chxx.RollingTimestamp	INT	Continuously-running 15-bit timer that counts in milliseconds. Whenever the data echo value changes, the output module updates the value of the RollingTimestamp.	0...32767

Output Tag Definitions

Table 90. Output Tags

Name	Data Type	Definition	Valid Values
Chxx.LLimitAlarmUnlatch	BOOL	Unlatches a latched Low Limit alarm at the first instance of the bit transitioning from 0 to 1.	0 = Alarm remains latched (default) 1 = Alarm is unlatched
Chxx.HLimitAlarmUnlatch	BOOL	Unlatches a latched High Limit alarm at the first instance of the bit transitioning from 0 to 1.	0 = Alarm remains latched (default) 1 = Alarm is unlatched
Chxx.RampAlarmUnlatch	BOOL	Unlatches a latched Ramp alarm at the first instance of the bit transitioning from 0 to 1.	0 = Alarm remains latched (default) 1 = Alarm is unlatched
Chxx.Calibrate	BOOL	Initiates the Calibration process. This tag must remain set until a valid Low Reference and High Reference values are applied to the channel.	0 = Not to start calibration process 1 = Start calibration process
Chxx.CalOutputLowRef	BOOL	A 0 to 1 transition commands the channel to produce the Low Calibration Reference Point for the chosen current or voltage output range.	0 = Do not output Cal Low Reference 1 = Output Calibration Low Reference Do not set this tag and the *CalOutputHighRef* tag to 1 simultaneously.
Chxx.CalOutputHighRef	BOOL	A 0 to 1 transition commands the channel to produce the High Calibration Reference Point for the chosen current or voltage output range.	0 = Do not Output Cal High Reference 1 = Output Calibration High Reference Signal Do not set this tag and the CalOutputLowRef tag to 1 simultaneously.
Chxx.CalLowRefPassed	BOOL	A 0 to 1 transition indicates that the Chxx.Data output tag data contains the recorded Low Reference value for the channel that is used by the module in Calibration.	0 = Not sending Recorded Cal Low Ref 1 = Sending Recorded Cal Low Reference in Output Data for Calibration Verification
Chxx.CalHighRefPassed	BOOL	A 0 to 1 transition indicates that the Chxx.Data output tag data contains the recorded High Reference value for the channel that is used by the module in Calibration.	0 = Not sending Cal High Reference 1 = Sending recorded Calibration High Reference Signal in Output Data for Calibration Verification
Chxx.CalFinish	BOOL	Data value change that triggers the channel to complete the Calibration procedure, applying the Valid Low and High References received. Channel exits the Calibration state if successful.	0 = Channel not triggered to complete the calibration procedure 1 = Channel triggered to complete the calibration procedure
Chxx.Data	REAL	The value that is converted to the signal on the RTB in scaled Engineering Units.	Any value

Diagnostic Assembly

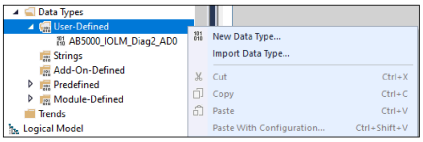
Diagnostic assembly helps you troubleshoot and diagnose the fault in your system.

Create User-defined Diagnostic Assembly Types

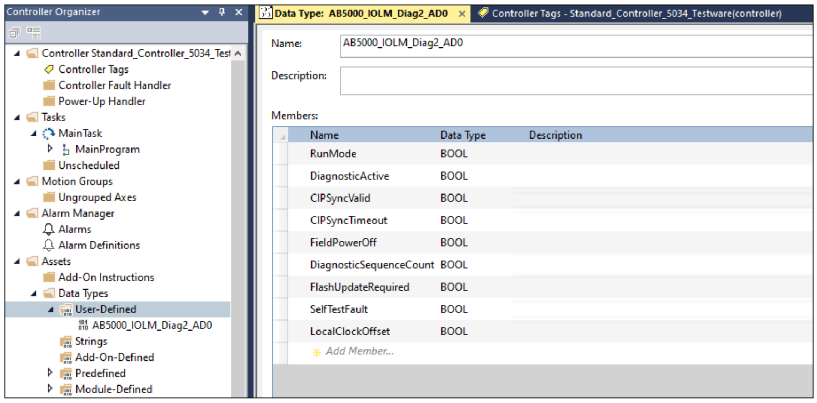
You can use the Studio 5000 Logix Designer application to create user-defined Diagnostic Assembly types.

Create user-defined diagnostic assembly by following the below steps:

1. From the Controller Organizer pane, go to Assets → Data types → User-Defined.
2. Right-click on the User-Defined folder and select New Data Type.



3. Add a Name and Description (optional) for your diagnostic assembly.
4. Under Members area, add the data members based on the diagnostic assembly detailed below.



IMPORTANT: The members indicated in the tables are arranged according to Data Alignment Rules of controllers. Strictly follow the data type and the sequence of the members that are indicated in the tables of this appendix. If the data type and the sequence are not followed, data misalignment may occur after executing Get Attribute Single Message (MSG) instruction.

Diagnostic Assemblies

1. Diagnostic Assembly for Analog 4 Channel Output Module
   - Instance ID: 0x8020 (32800)
   - Size = 304 bytes

   Follow the information in the following table to add each member.

Table 91. Diagnostic Assembly Instance 32800

Name	Date Type	Size in Bytes
RunMode	BOOL	1
Infobit_Pad1	BOOL	
DiagnosticActive	BOOL	
CIPSyncValid	BOOL	
CIPSyncTimeout	BOOL	
Infobit_Pad5	BOOL	
FieldPowerOff	BOOL	
Infobit_Pad7	BOOL	
DiagnosticSequenceCount	SINT	1
Diagbit_Pad0	BOOL	2
Diagbit_Pad1	BOOL	
Diagbit_Pad2	BOOL	
Diagbit_Pad3	BOOL	
Diagbit_Pad4	BOOL	
Diagbit_Pad5	BOOL	
Diagbit_Pad6	BOOL	
Diagbit_Pad7	BOOL	
Diagbit_Pad8	BOOL	
Diagbit_Pad9	BOOL	
Diagbit_Pad10	BOOL	
Diagbit_Pad11	BOOL	
FlashUpdateRequired	BOOL	
SelfTestFault	BOOL	

Name	Date Type	Size in Bytes
Diagbit_Pad14	BOOL	
Diagbit_Pad15	BOOL	
Pad	DINT	4
LocalClockOffset	LINT	8
LocalClockOffsetTimestamp	LINT	8
GrandMasterClockID	SINT[8]	8
FieldPowerOnTimestamp	LINT	8
FieldPowerOffTimestamp	LINT	8
Ch00	Diagnostic_Channel_Structure	64
Ch01	Diagnostic_Channel_Structure	64
Ch02	Diagnostic_Channel_Structure	64
Ch03	Diagnostic_Channel_Structure	64

2. Diagnostic Counters Assembly for I/O
   - Instance ID: 0x301 (769)
   - Size = 16 bytes

   Follow the information in the following table to add each member.

Table 92. Diagnostic Assembly Instance 769

Name	Date Type	Size in Bytes
RunMode	BOOL	1
Infobit_Pad1	BOOL	
DiagnosticActive	BOOL	
Infobit_Pad3	BOOL	
Infobit_Pad4	BOOL	
Infobit_Pad5	BOOL	
Infobit_Pad6	BOOL	
Infobit_Pad7	BOOL	
DiagnosticSequenceCount	SINT	1
CIPConnections	INT	2
CIPLostPackets	DINT	4
CIPTimeouts	DINT	4
CPUUtilization	INT	2
Pad	INT	2

Diagnostic Channels

1. Diagnostic Channel
   - Size = 64 bytes

   This data type is retrieved as part of the diagnostic assembly instance.

   Follow the information in the following table to add each member.

Table 93. 5034-0F4 Diagnostic Channel Structure

Name	Date Type	Size in Bytes
Databit_Pad0	BOOL	2
Uncertain	BOOL	
NoLoad	BOOL	
ShortCircuit	BOOL	
Databit_Pad4	BOOL	
FieldPowerOff	BOOL	
Databit_Pad7	BOOL	
Databit_Pad8	BOOL	
Disabled	BOOL	
Databit_Pad10	BOOL	
Databit_Pad11	BOOL	

Name	Date Type	Size in Bytes
Databit_Pad12	BOOL	
Databit_Pad13	BOOL	
Databit_Pad14	BOOL	
Databit_Pad15	BOOL	
CalFault	BOOL	2
Diagbit_Pad1	BOOL	
Diagbit_Pad2	BOOL	
Diagbit_Pad3	BOOL	
Diagbit_Pad4	BOOL	
Diagbit_Pad5	BOOL	
Diagbit_Pad6	BOOL	
Diagbit_Pad7	BOOL	
Diagbit_Pad8	BOOL	
Diagbit_Pad9	BOOL	
Diagbit_Pad10	BOOL	
Diagbit_Pad11	BOOL	
Diagbit_Pad12	BOOL	
Diagbit_Pad13	BOOL	
Diagbit_Pad14	BOOL	
Diagbit_Pad15	BOOL	
Pad1	INT	2
InternalErrorCount	SINT	1
CalRange	SINT	1
CalOffset	REAL	4
CalGain	REAL	4
CalLastDate	LINT	8
NoLoadTimestamp	LINT	8
ShortCicuitTimestamp	LINT	8
Pad2	LINT	8
FieldPowerOnTimestamp	LINT	8
FieldPowerOffTimestamp	LINT	8

Definitions for Diagnostic Assembly Types

Table 94. Definition of Members in Diagnostic Assembly Data Types

Name	Data Type	Definition	Valid Values
RunMode	BOOL	Channel's operating state	• 0 = Idle • 1 = Run Idle – The connection is up and the module is producing data for the connection and output tag data is being applied. Run - One of the following is present: • The connection is not up. • The connection is opened but the module has not started producing data for the connection. • The module is not applying new output tag data because the controller is in Program Mode.
DiagnosticActive	BOOL	Indicates if any diagnostics are active or if the prognostics threshold is reached.	0 = No diagnostics active 1 = One or more diagnostics are active or the prognostics threshold is reached.
CIPSyncValid	BOOL	Indicates if the module is synced with a 1588 master.	• 0 = Module is not synced • 1 = Module is synced
CIPSyncTimeout	BOOL	Indicates if the module was once synced with a 1588 master, but is not now due to a timeout	• 0 = A valid time master has not timed out. • 1 = A valid time master is detected on the backplane, but the time master has timed out. The module is using its local clock and can be drifting away from the last known time master.
FieldPowerOff	BOOL	Field power is not present at the channel.	0 = Field power is present 1 = Field power is not present
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected.	-128...+127 The value of 0 is skipped except during module power-up.
FlashUpdateRequired	BOOL	Indicates whether flash update is required.	• 0 = Flash update is not required • 1 = Module has no application firmware
SelfTestFault	BOOL	Indicate whether the fault is present during module self-test.	• 0 = Module initialization code did not detect an error • 1 = Module initialization code detected an error
LocalClockOffset	LINT	The offset from the local clock to the system time. This value helps to detect steps in time. This value updates when a PTP update is received.	Any value

Table 94. Definition of Members in Diagnostic Assembly Data Types (continued)

Name	Data Type	Definition	Valid Values
LocalClockOffsetTimestamp	LINT	Indicates the timestamp of the local clock offset.	A valid time or None if there is no recorded event time. Time format is YYYY-MMDD-HH:mm:SS_mmm_uuu_nnn(UTC-00:00) • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds • uuu = microseconds • nnn = nanoseconds • UTC-00:00 = Time zone
GrandMasterClockID	SINT	The EUI-64 Identity of the CIP Sync Grandmaster clock the module is synced to.	Any value
FieldPowerOnTimestamp	LINT	Indicates the timestamp of the last time field power turned on.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
FieldPowerOffTimestamp	LINT	Indicates the timestamp of the last time field power turned off.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
Fault	BOOL	Indicates that channel data is inaccurate and cannot be trusted for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.	0 = No fault exists 1 = Fault exists The typical causes of a fault are the following: • ◦ Channel is disabled ◦ Open Wire condition ◦ Underrange/Overrange condition ◦ SA power loss condition You must troubleshoot the module first to see if the typical causes exist.
Uncertain	BOOL	Indicates that the channel data can be inaccurate but the degree of inaccuracy is not known. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy.	0 = Valid data 1 = Data validity uncertain

Table 94. Definition of Members in Diagnostic Assembly Data Types (continued)

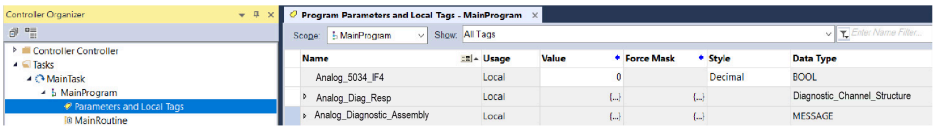
Name	Data Type	Definition	Valid Values
OpenWire	BOOL	The signal wire is disconnected from the channel or the RTB is removed from the module.	0 = Open wire condition does not exist or open wire detection is disabled. 1 = Open wire condition exists, that means the signal wire is disconnected from the channel or the RTB is removed from the module.
CalFault	BOOL	Indicates that the last attempted Calibration for this channel failed or there is no calibration data present. This tag is cleared, that is, set to 0, when power is cycled to the module.	• 0 = Calibration did not fail • 1 = Calibration failed
Underrange	BOOL	Indicates that the channel data is beneath the underrange threshold for this channel. For example, when the channel operates in the 4...20 mA input range, the underrange threshold on the channel is < 3.0 mA. If the input signal is 0 mA, this tag is set to 1.	0 = Channel data is not beneath the underrange threshold 1 = Channel data is beneath the underrange threshold
Overrange	BOOL	Indicates that the channel data is above the overrange threshold for this channel. For example, when the channel operates in the 4...20 mA output range, the overrange threshold on the channel is > 23.0 mA. If the input signal is 24 mA, this tag is set to 1.	0 = Channel data is not above the overrange threshold 1 = Channel data is above the overrange threshold
CalRange	SINT	Indicates that the value currently configured for the channel. Values display according to the Input Type selected.	• 0 = -10...10V • 1 = 0...5V • 2 = 0...10V • 4 = 0...20 mA • 5 = 4...20 mA
CalOffset	REAL	Indicates the offset in signal units as reported by the device.	Any value
CalGain	REAL	Indicates the calibration gain reported by the device.	Any value
CalLastDate	LINT	Indicates the time of the last calibration date for the channel.	Any value
OpenWireTimestamp	LINT	Indicates the timestamp of the last time when the open wire condition is detected.	A valid time or None if there is no recorded event time.
UnderrangeTimestamp	LINT	Indicates the timestamp of the last underrange fault.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds

Table 94. Definition of Members in Diagnostic Assembly Data Types (continued)

Name	Data Type	Definition	Valid Values
OverrangeTimestamp	LINT	Indicates the timestamp of the last overrange fault.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
NoLoad	BOOL	Indicates whether a load fault is present.	• 0 = No Load condition does not exist. • 1 = No Load condition exists.
NoLoadTimestamp	LINT	Indicates the timestamp of the last time a no load fault has occurred.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
ShortCircuit	BOOL	Indicates whether an output short circuit or overcurrent fault is present on the point.	• 0 = No Short Circuit condition exists. • 1 = Short Circuit condition is present.
ShortCircuitTimestamp	LINT	Indicates the timestamp of the last time short-circuit fault has occurred.	A valid time or None if there is no recorded event time. Time format is YYYY-MM-DD-HH:mm:SS.mmm. • YYYY = year • MM = month • DD = day • HH = hour (24 hour) • mm = minutes • SS = seconds • mmm = milliseconds
CIPConnections	INT	Indicates the number of CIP connections currently open.	0...24
CIPLostPackets	DINT	Indicates the running sum of the number of Sequenced Address Item Sequence Numbers that are skipped in Class 0 and Class 1 connections consumed by the adapter and its children.	0...2,147,483,647
CIPTimeouts	DINT	Indicates the running count of the number of connections that time out, both originated and targeted, to and through the adapter.	0...2,147,483,647
CPUUtilization	INT	Indicates the usage of the compute engine.	0...100%

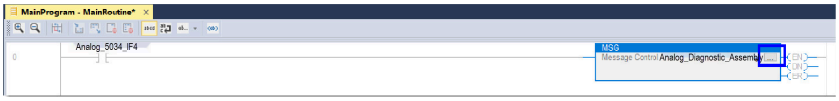
Create Message Type User Tags

Create MESSAGE type user tags for requests and associated response user tags for each of the new user-defined diagnostic assembly types.



From the Controller Organizer pane, expand Tasks → MainTask → MainProgram:

1. Create MESSAGE type user tags for each request.
2. Create associated response user tags for each new user-defined diagnostic assembly type.
3. Add the user tags to your ladder program.



4. Expand the message tag to open the message configuration dialog.
5. On the Configuration tab, select:
   - Service type: Get Attribute Single
   - Class: 4
   - Attribute: 3
   - Instance:
     - **5034-0F4 and 5034-0F4XT**
       0x8020 (32800) Diagnostic Assembly for Analog 4 Channel Output Module
       0x301 (769) Diagnostic Counters Base I/O Assembly
   - Destination element: User-defined data type suitable for the instance entered.
6. On the Communication tab, select the path to the module that you wish to send the messages to.
7. Download the project and set to Run Mode.

   You can monitor the user-defined tag values from the Program Parameters and Local Tags window, under the MainProgram task in the Controller Organizer pane.

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	rok.auto/pcdc

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Waste Electrical and Electronic Equipment (WEEE)

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

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

Rockwell Automation NV Commercial Registration Number 0424.293.935

Rockwell Otomasyon Ticaret A.Ş. Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400 EEE Yönetmeliğine Uygundur

Connect with us.

AMERICAS: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000
EUROPE/MIDDLE EAST/AFRICA: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2663 0600
ASIA PACIFIC: Rockwell Automation SEA Pte Ltd, 2 Corporation Road, #04-05, Main Lobby, Corporation Place, Singapore 618494, Tel: (65) 6510 6608
UNITED KINGDOM: Rockwell Automation Ltd., Pitfield, Kiln Farm, Milton Keynes, MK11 3DR, United Kingdom, Tel: (44)(1908) 838-800

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