



# Compact 5000 Analog I/O Modules

Catalog Numbers 5069-IF8, 5069-IY4, 5069-IY4K, 5069-OF4, 5069-OF4K, 5069-OF8



***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.

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## About This Publication

This manual describes how to use Compact 5000™ I/O analog 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, if the analog I/O modules are used remotely
- Use of Studio 5000 Logix Designer® environment

Rockwell Automation recognizes that some of the terms that are currently used in our industry and in this presentation are not in alignment with the movement toward inclusive language in technology.

While we proactively collaborate with industry peers to find alternatives to such terms and make changes to our products and content, please excuse the use of such terms in our content.

## Download Firmware, AOP, EDS, and Other Files

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

## Summary of Changes

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

Topic	Page
Updated the Protected Operations section to include information about Protection Mode	29
Updated the description of the 5069-IF8 module with Series B information	39
Updated the 5069-IF8 terminal diagram with Series B information	95

## Additional Resources

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

Resource	Description
Compact 5000™ I/O Field Potential Distributor Installation Instructions, publication <a href="#">5069-IN001</a>	Describes how to install and wire the 5069-FPD field potential distributor.
Compact 5000 I/O Address Reserve Module Installation Instructions, publication <a href="#">5069-IN002</a>	Describes how to install the 5069-ARM address reserve module.
Compact 5000 I/O EtherNet/IP™ Adapters Installation Instructions, publication <a href="#">5069-IN003</a>	Describes how to install the 5069-AENTR and 5069-AEN2TR EtherNet/IP adapters.
Compact 5000 I/O Digital 16-point Sourcing Output Modules Installation Instructions, publication <a href="#">5069-IN007</a>	Describes how to install and wire the 5069-OB16, 5069-OB16F, and 5069-OB16K output modules.
Compact 5000 I/O Analog 8-channel Current/Vole Input Module Installation Instructions, publication <a href="#">5069-IN010</a>	Describes how to install and wire the 5069-IF8 analog input module.
Compact 5000 I/O Analog 4-channel Current/Vole/RTD/Thermocouple Input Module Installation Instructions, publication <a href="#">5069-IN011</a>	Describes how to install and wire the 5069-IY4 and 5069-IY4K analog input modules.
Compact 5000 I/O Analog Current/Vole Output Modules Installation Instructions, publication <a href="#">5069-IN012</a>	Describes how to install and wire the 5069-OF4, 5069-OF4K, and 5069-OF8 analog output modules.
Compact 5000 I/O Modules and EtherNet/IP Adapters Specifications Technical Data, publication <a href="#">5069-TD001</a>	Provides specifications, wiring diagrams, and module block diagrams for Compact 5000 I/O modules.
CompactLogix™ 5380 and Compact GuardLogix® 5380 Controllers User Manual, publication <a href="#">5069-UM001</a>	Describes how to configure, operate, and troubleshoot CompactLogix 5380 and Compact GuardLogix 5380 controllers.
CompactLogix 5480 Controllers User Manual, publication <a href="#">5069-UM002</a>	Describes how to configure, operate, and troubleshoot CompactLogix 5480 controllers.
Compact 5000 I/O Digital Modules User Manual, publication <a href="#">5069-UM004</a>	Describes how to use Compact 5000 I/O digital modules.
Compact 5000 I/O High-speed Counter Module User Manual, publication <a href="#">5069-UM006</a>	Describes how to use Compact 5000 I/O high-speed counter modules.
GuardLogix and Compact GuardLogix 5380 Controller Systems Safety Reference Manual, publication <a href="#">1756-RM012</a>	Describes requirements for achieving and maintaining Safety Integrity Level (SIL) 2 and Performance Level (PL) d requirements with the GuardLogix 5580 controller system, with the Studio 5000 Logix Designer® application.
ControlLogix® 5580 and GuardLogix 5580 Controllers User Manual, publication <a href="#">1756-UM543</a>	Describes how to configure, operate, and troubleshoot ControlLogix 5580 and GuardLogix 5580 controllers.
Electronic Keying in Logix 5000 Control Systems Application Technique, publication <a href="#">LOGIX-AT001</a>	Describes how to use electronic keying in Logix 5000 control system applications.
Integrated Architecture® and CIP Sync™ Configuration Application Technique, publication <a href="#">IA-AT003</a>	Provides information about CIP Sync technology and how to synchronize clocks within the Rockwell Automation® Integrated Architecture® system.
System Security Design Guidelines Reference Manual, publication <a href="#">SECURE-RM001</a>	Provides guidance on how to conduct security assessments, implement Rockwell Automation products in a secure system, harden the control system, manage user access, and dispose of equipment.
Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-4.1</a>	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, <a href="http://rok.auto/certifications">rok.auto/certifications</a>	Provides declarations of conformity, certificates, and other certification details.



## Analog Module Operation in a Control System

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Logix 5000® controllers use the Compact 5000™ I/O analog modules to control devices in a control system.

Analog I/O modules convert analog signals to digital values for inputs and convert digital values to analog signals for outputs. Controllers use these signals for control purposes.

Compact 5000 I/O analog modules use removable terminal blocks (RTBs) to connect field-side wiring. You use the Studio 5000 Logix Designer® application to configure the modules.

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**IMPORTANT** Controller and programming software compatibility requirements apply when you use Compact 5000 I/O analog modules.  
For more information on controller and software compatibility, see [Controller and Software Compatibility](#).

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Compact 5000 I/O analog modules use the Producer/Consumer network communication model. This communication is an intelligent data exchange between modules and other system devices in which each module produces data without first being polled.

## Controller and Software Compatibility

Controller and programming software compatibility requirements apply when you use Compact 5000 I/O analog modules.

### Controller Compatibility

Compatibility between Logix 5000 controllers and Compact 5000 I/O analog modules varies based on module location. That is, whether the module is local or remote.

For example, CompactLogix™ 5380, CompactLogix 5480, and Compact GuardLogix® 5380 controllers are compatible with local or remote Compact 5000 I/O analog modules. ControlLogix® 5580 or GuardLogix 5580 controllers are only compatible with remote Compact 5000 I/O modules.

### Software Compatibility

Compact 5000 I/O analog modules are supported in the Studio 5000 Logix Designer application, version 28 or greater. However, the Logix 5000 controllers that are compatible with the I/O modules support different minimum versions of the Studio 5000 Logix Designer application. You must consider the different device requirements when you design your system.

For example, to use a 5069-IF8 input module with a 5069-L330ERM controller, you can use the Studio 5000 Logix Designer application, version 29 or later. To use a 5069-IF8 input module with a 5069-L350ERM controller, you must use the Studio 5000 Logix Designer application, version 30 or later.

This table describes the module compatibility requirements when you use Compact 5000 I/O analog modules with Logix 5000 controllers.

**Compact 5000 I/O Analog Modules Controller and Software Compatibility Requirements**

Module Location	Controllers		Studio 5000 Logix Designer Application
	System	Cat. Nos.	
Local I/O modules	CompactLogix 5380	5069-L320ER, 5069-L320ERMK, 5069-L330ERMK, 5069-L340ERM, 5069-L350ERMK	Version 28.00.00 or later
		5069-L306ER, 5069-L306ERM, 5069-L310ER, 5069-L310ERM, 5069-L310ERMK, 5069-L310ER-NSE, 5069-L310ERS2, 5069-L320ERM, 5069-L320ERMK, 5069-L320ERP, 5069-L330ER, 5069-L330ERM, 5069-L330ERMK, 5069-L340ER, 5069-L340ERP	Version 29.00.00 or later
		5069-L350ERM, 5069-L350ERMK, 5069-L380ERM, 5069-L3100ERM	Version 30.00.00 or later
	CompactLogix 5480	5069-L46ERMW	Version 32.00.00 or later
	Compact GuardLogix 5380	5069-L306ERS2, 5069-L306ERMS2, 5069-L310ERS2, 5069-L310ERMS2, 5069-L320ERS2, 5069-L320ERS2K, 5069-L320ERMS2, 5069-L320ERMS2K, 5069-L330ERS2, 5069-L330ERS2K, 5069-L330ERMS2, 5069-L330ERMS2K, 5069-L340ERS2, 5069-L340ERMS2, 5069-L350ERS2, 5069-L350ERS2K, 5069-L350ERMS2, 5069-L350ERMS2K, 5069-L380ERS2, 5069-L380ERMS2, 5069-L3100ERS2, 5069-L3100ERMS2	Version 31.00.00 or later
Remote I/O modules	CompactLogix 5380	5069-L320ER, 5069-L340ERM	Version 28.00.00 or later
		5069-L306ER, 5069-L306ERM, 5069-L310ER, 5069-L310ERM, 5069-L310ERMK, 5069-L310ER-NSE, 5069-L310ERS2, 5069-L320ERM, 5069-L320ERP, 5069-L330ER, 5069-L330ERM, 5069-L340ER, 5069-L340ERP	Version 29.00.00 or later
		5069-L350ERM, 5069-L380ERM, 5069-L3100ERM	Version 30.00.00 or later
	CompactLogix 5480	5069-L46ERMW	Version 32.00.00 or later
	Compact GuardLogix 5380	5069-L306ERS2, 5069-L306ERMS2, 5069-L310ERS2, 5069-L310ERMS2, 5069-L320ERS2, 5069-L320ERS2K, 5069-L320ERMS2, 5069-L320ERMS2K, 5069-L330ERS2, 5069-L330ERS2K, 5069-L330ERMS2, 5069-L330ERMS2K, 5069-L340ERS2, 5069-L340ERMS2, 5069-L350ERS2, 5069-L350ERS2K, 5069-L350ERMS2, 5069-L350ERMS2K, 5069-L380ERS2, 5069-L380ERMS2, 5069-L3100ERS2, 5069-L3100ERMS2	Version 31.00.00 or later
	ControlLogix 5580	1756-L83E, 1756-L85E	Version 28.00.00 or later
		1756-L81E, 1756-L82E, 1756-L84E	Version 29.00.00 or later
	GuardLogix 5580	1756-L81ES, 1756-L82ES, 1756-L83ES, 1756-L84ES	Version 31.00.00 or later

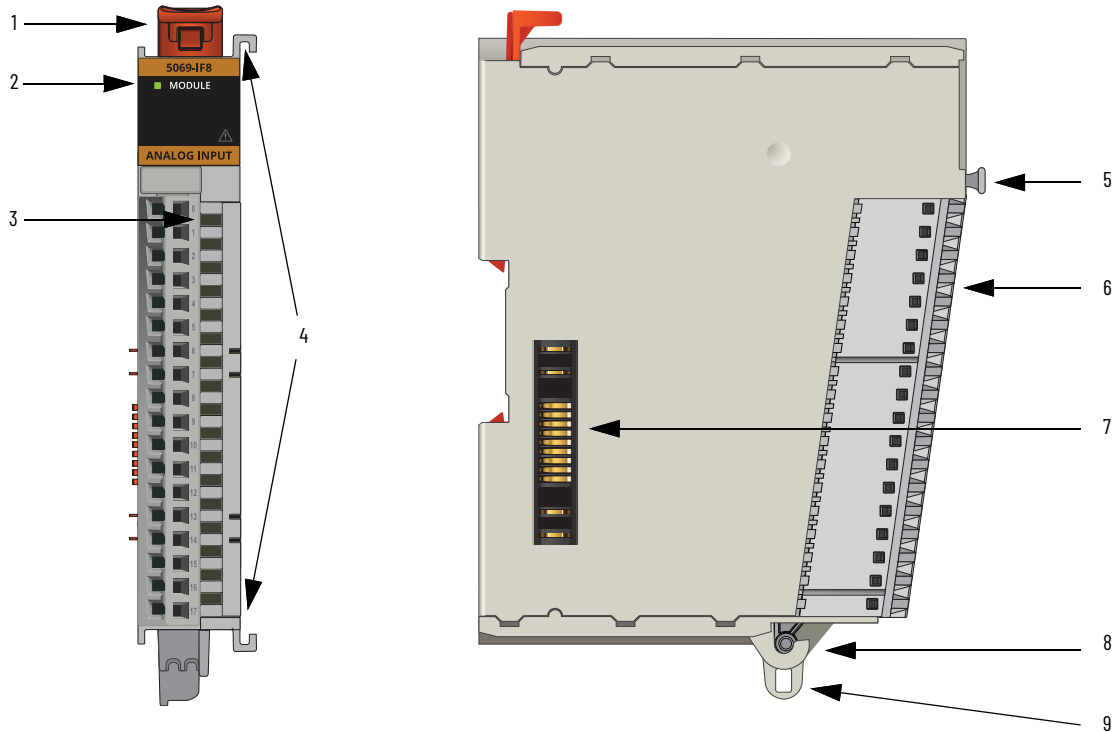
## Types of Modules

This table describes the types of Compact 5000 I/O analog modules.

Catalog Number	Description
5069-IF8	8-channel current/voltage input module
5069-IY4	4-channel current/voltage/RTD/Thermocouple input module
5069-IY4K	4-channel current/voltage/RTD/Thermocouple conformal coated input module
5069-OF4	4-channel current/voltage output module
5069-OF4K	4-channel current/voltage conformal coated output module
5069-OF8	8-channel current/voltage output module

## Module Overview

This figure shows the parts of an example Compact 5000 I/O analog module.



Item	Item	Description
1	DIN rail latch	Locks the module on the DIN rail.
2	Module status indicator	Displays the status of communication and module health.
3	I/O status indicators	Displays the status of the input/output point.
4	Interlocking pieces	Securely installs Compact 5000 I/O analog modules in the system.
5	RTB handle	Anchors the RTB on the module.
6	RTB	Provides a wiring interface for the module.
7	MOD power bus and SA power bus connectors	Pass system-side and field-side power across the internal circuitry of the module in a Compact 5000 I/O system. The connectors are isolated from each other.
8	RTB lower tab	Hooks RTB onto the module to begin installation.
9	Lower hook	Used with cable tie after you wire the module.

# Local I/O Modules or Remote I/O Modules

You can use Compact 5000 I/O analog modules as local or remote I/O modules, with some restrictions that are based on the module and controller type. Compatibility requirements apply and are described in [Controller and Software Compatibility](#).

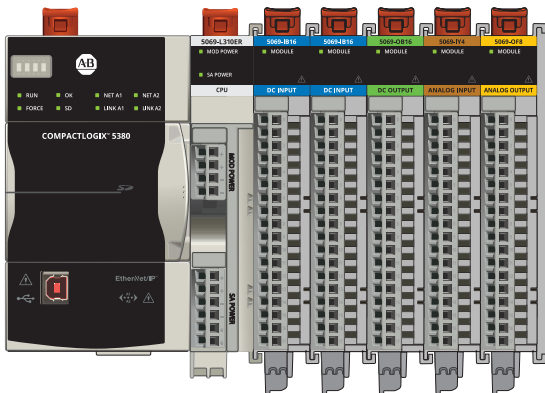
## Local I/O Modules

When Compact 5000 I/O analog modules reside in the same system as the controller, the modules are local I/O modules.

Local I/O modules are installed to the right of the controller and exchange data with the controller over the system backplane.

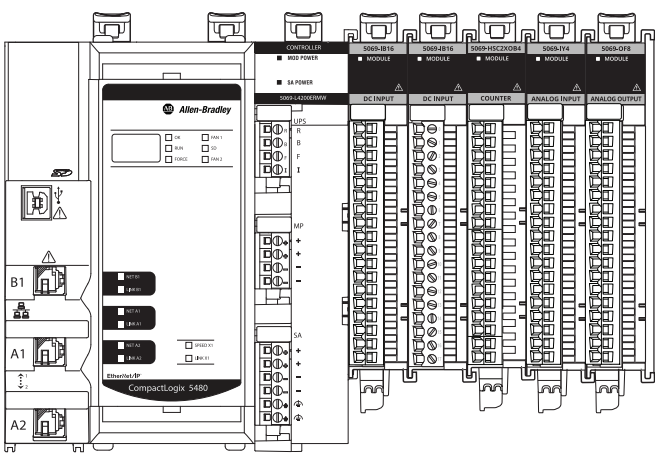
CompactLogix 5380 Controller

Local Compact 5000 I/O Modules



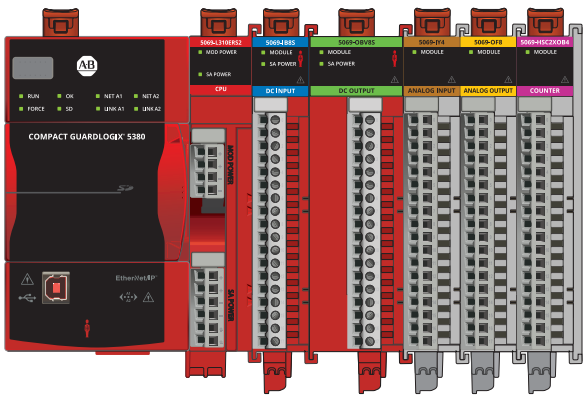
CompactLogix 5480 Controller

Local Compact 5000 I/O Modules



Compact GuardLogix 5380 Controller

Local Compact 5000 I/O Modules



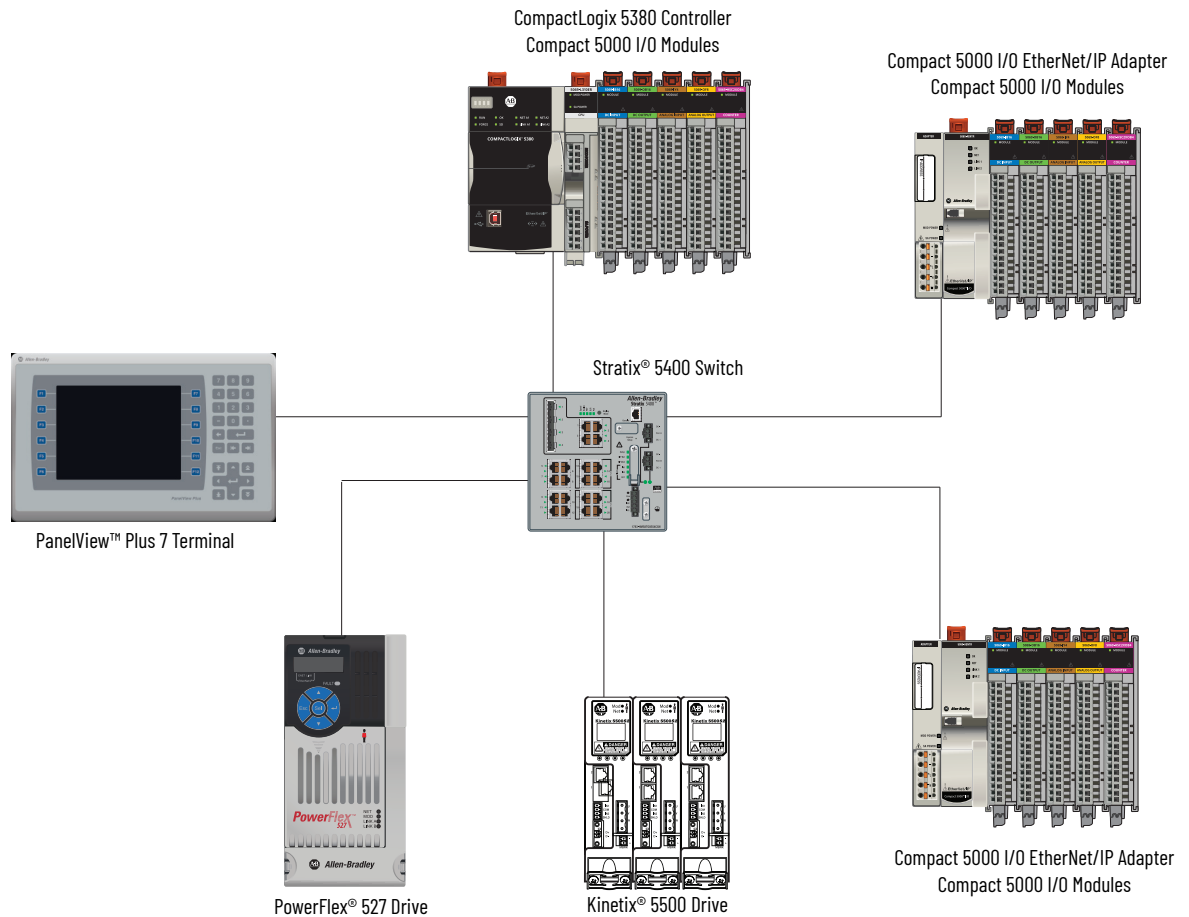


## Remote I/O Modules

When Compact 5000 I/O analog modules reside in a separate location from Logix 5000 controllers, they are remote I/O modules. Remote Compact 5000 I/O analog modules are accessible over an EtherNet/IP™ network via a Compact 5000 I/O EtherNet/IP adapter.

The modules are installed to the right of the adapter and exchange data across the remote system backplane. The data is then exchanged with the controller over the EtherNet/IP network.

This figure shows remote Compact 5000 I/O analog modules in an example CompactLogix 5380 control system.



## Limit Access to the System

To limit access to a Logix 5000 controller, Compact 5000 EtherNet/IP adapter, or I/O module, consider these options.

- Follow the guidelines provided in the System Security Design Guidelines Reference Manual, publication [SECURE-RM001](#).
- Password protect the source and execution of the control program.
- Use EtherNet/IP devices in accordance with recommended architectures and concepts. See the Converged Plantwide Ethernet (CPwE) Design and Implementation Guide, publication [ENET-TD001](#).
- Implement physical barriers, such as locked cabinets.

To limit access to the system, consider these options.

- Follow industry best practices to harden your PCs and servers, including antivirus/anti-malware and application solutions for whitelisting.  
The recommendations are published in the Rockwell Automation Customer Hardening Guidelines, Knowledgebase Document ID [PN767](#).
- Develop and use backup and disaster recovery policies and procedures. Test backups on a regular schedule.
- Minimize network exposure for all control system devices and systems, and make sure that they are not accessible from the Internet.
- Locate control system networks and devices behind firewalls and isolate them from the business network.

For access to information about security matters that affect Rockwell Automation products, visit the [Rockwell Automation Security Advisories](#) website and sign up for alerts.

## Ownership

A controller must own every I/O module in a Logix 5000 control system, also known as the owner-controller. When you use the Compact 5000 I/O analog modules in a Logix 5000 control system, the owner-controller performs the following:

- Stores configuration data for every module that it owns.
- Can reside in a location that differs from the Compact 5000 I/O system.
- Sends the I/O module configuration data to define module behavior and begin operation in the control system.

Each Compact 5000 I/O analog module must continuously maintain communication with its owner-controller during normal operation.

The Compact 5000 I/O analog modules are limited to one owner-controller that performs the functions that are listed previously. Other controllers can establish Listen-Only connections to the Compact 5000 I/O analog modules.

## Construct a System

Before you use your Compact 5000 I/O analog modules, you must complete tasks that are based on the way that you use the modules. That is, if the modules are used locally, remotely or both locally and remotely.

### Local I/O Modules

Complete the following:

1. Install a CompactLogix 5380, CompactLogix 5480, or Compact GuardLogix 5380 controller.
2. Install the modules to the right of the controller.
3. Install the end cap on the last module in the local system.

---

**IMPORTANT** The end cap in a CompactLogix 5380, CompactLogix 5480, or Compact GuardLogix 5380 control system covers the exposed interconnection on the last module on the DIN rail.

If you do not install an end cap on the last module on the DIN rail, equipment damage or injury can occur.

---

### Remote I/O Modules

Complete the following:

1. Install a controller that is compatible with the remote Compact 5000 I/O analog modules to be used in the application via an EtherNet/IP network.
2. Install an EtherNet/IP network.
3. Connect the controller to the network.
4. Install a Compact 5000 EtherNet/IP adapter.
5. Connect the adapter to the network.
6. Install the Compact 5000 I/O analog modules to the right of the adapter.
7. Install the end cap on the last module in the local system.

---

**IMPORTANT** The end cap in a CompactLogix 5380, CompactLogix 5480, or Compact GuardLogix 5380 control system covers the exposed interconnection on the last module on the DIN rail.

If you do not install an end cap on the last module on the DIN rail, equipment damage or injury can occur.

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For information on how to install compatible controllers, adapters, and Compact 5000 I/O modules, see the publications that are listed in [Additional Resources](#).

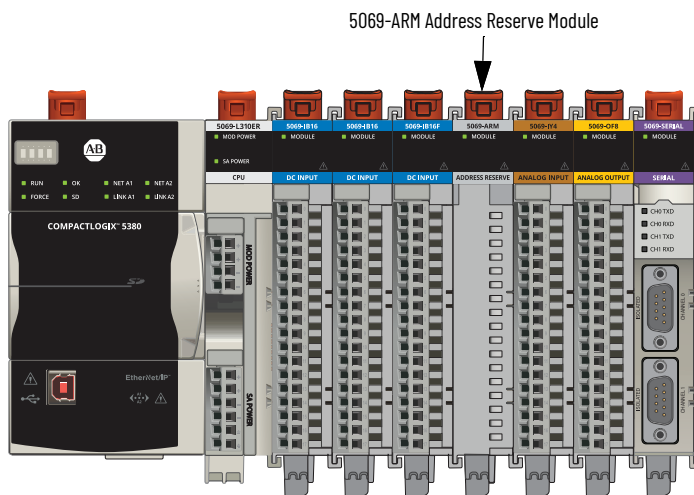
## Use a 5069-ARM Address Reserve Module to Reserve a Node Address

Every Compact 5000 I/O digital module has a unique node address in a system. As modules are installed, the node addresses increment. The Studio 5000 Logix Designer project includes modules in the I/O Configuration that correspond to the physical modules.

If a module is not available during initial system installation and operation, you can use a 5069-ARM address reserve module to reserve the node address. The address reserve module remains installed until the functional I/O module is available.

When you install the address reserve module, you also make sure that the modules that are installed afterward have the correct node address.

You use the corresponding entry in the Studio 5000 Logix Designer project to reserve the node address. When you add modules to the I/O Configuration tree in the project, you add an address reserve module at the node address that matches the physical module location.



When the I/O module becomes available, complete the following tasks.

1. Remove the 5069-ARM module from the system.
2. Install the I/O module in the slot that previously contained the 5069-ARM module.
3. Replace the 5069-ARM module entry in the I/O Configuration section of the Studio 5000 Logix Designer project with the new I/O module.

For more information on how to use a 5069-ARM module in a Studio 5000 Logix Designer project, see [Reserve an I/O Module Slot](#).



## Power the Modules

Compact 5000 I/O analog modules receive these power types from the the controller or adapter.

- System-side Power - Powers the system and lets modules transfer data and execute logic.

System-side power is provided through the Module (MOD) Power connector and is passed to each module as it is added to the system.

System-side power is also known as **MOD power**.

- Field-side Power - Powers field-side devices that are connected to some Compact 5000 I/O digital modules.

Field-side power is provided through the sensor actuator (SA) Power connector and is passed to each module as it is added to the system.

Field-side power is also known as **SA power**.

Power begins at the leftmost device in the system and passes across the I/O module internal circuitry via power buses. The MOD power bus and SA power buses are isolated from each other. The leftmost device is either a controller or an EtherNet/IP adapter.

---

**IMPORTANT** Remember the following:

- A system has only one MOD power bus.
- A system can have multiple SA power buses. The first SA power bus typically starts at the controller or adapter, and 5069-FPD field potential distributors let you establish new SA power buses in the same system.

For more information, see [Use a 5069-FPD Field Potential Distributor to Establish New SA Power Buses](#).

---

For more information on how to power local Compact 5000 I/O modules, see these resources.

- CompactLogix 5380 and Compact GuardLogix 5380 Controllers User Manual, publication [5069-UM001](#)
- CompactLogix 5480 Controller User Manual, publication [5069-UM002](#)

For more information on how to power remote Compact 5000 I/O modules, see the Compact 5000 EtherNet/IP Adapters User Manual, publication [5069-UM007](#).

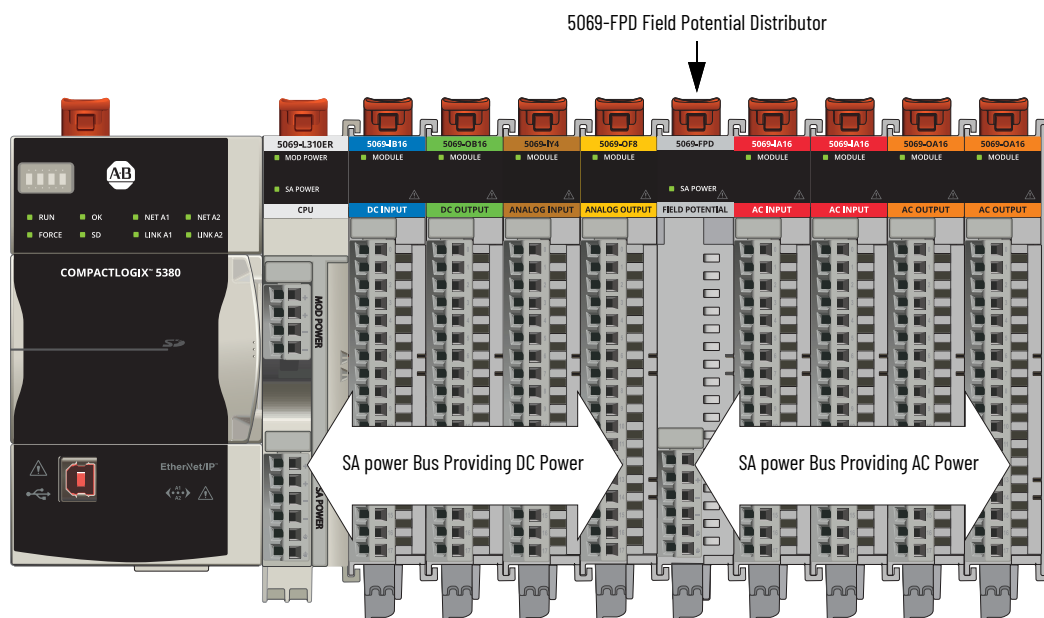
## Use a 5069-FPD Field Potential Distributor to Establish New SA Power Buses

A 5069-FPD field potential distributor lets you change the field-side power distribution source for Compact 5000 I/O modules to the right of the field power distributor. The field potential distributor passes MOD power bus signals through to the next module in the system.

You can use a 5069-FPD field potential distributor to establish a new SA power bus in a system. The field potential distributor blocks the current that passes across the SA power bus to the left of the field potential distributor. It then establishes a new SA power bus for modules to the right. The new SA power bus extends to the last module in the system or until another field potential distributor establishes another SA power bus.

The SA power bus that a field potential distributor establishes functions in the same way as the SA power bus that a controller or adapter establishes.

This figure shows a CompactLogix 5380 system that includes a field potential distributor. In this example, the field potential distributor is required to isolate DC-type modules from AC-type modules.



### IMPORTANT You must install **DC-type modules** and **AC-type modules** on **separate SA power buses**.

You use 5069-FPD field potential distributors to establish SA power buses that are separate from the SA power bus that the controller or adapter establishes.

To install modules on separate SA power buses, complete these steps.

1. Install the controller or adapter.  
The controller or adapter establishes the first SA power bus.
2. Install one type of modules to the right of the controller or adapter, for example, DC-type modules.
3. Install a 5069-FPD field potential distributor.  
The field potential distributor establishes a new SA power bus that is isolated from the first one.
4. Install the other type of modules to the right of the field potential distributor, for example, AC-type modules.

Compact 5000 I/O analog modules are **DC-type modules**. You must install them on an SA power bus that uses DC-type power.

You **cannot** install Compact 5000 I/O analog modules on an SA power bus that uses AC-type power.

## Configure the Modules

You must create a Studio 5000 Logix Designer project for the Logix 5000 controller that owns the Compact 5000 I/O analog module. The project includes module configuration data for the Compact 5000 I/O analog modules.

The Studio 5000 Logix Designer application transfers the project to the owner-controller during the program download. Data is then transferred to the I/O modules either across the backplane or over an EtherNet/IP network.

The I/O modules can operate immediately after receiving the configuration data.

---

**IMPORTANT** This section shows some of the configurable parameters, it is not a complete description of how to configure a module.

For more information on how to use the Studio 5000 Logix Designer application to configure Compact 5000 I/O analog modules, see [Configure the Module](#).

---

## Connections

During module configuration, you must define the module. Among the Module Definition parameters, you must choose a connection type for the module. A connection is a real-time data transfer link between the owner-controller and the module that occupies the slot that the configuration references.

When you download module configuration to a controller, the controller attempts to establish a connection to each module in the configuration.

Because part of module configuration includes a slot number in the local or remote system, the owner-controller checks for the presence of a module there. If a module is detected, the owner-controller sends the configuration.

One of the following occurs:

- If the configuration is appropriate to the module detected, a connection is made and operation begins.
- If the configuration is not appropriate to the module detected, the data is rejected and the Studio 5000 Logix Designer application indicates that an error occurred.

The configuration can be inappropriate for many reasons. For example, a mismatch in electronic keying that prevents normal operation.

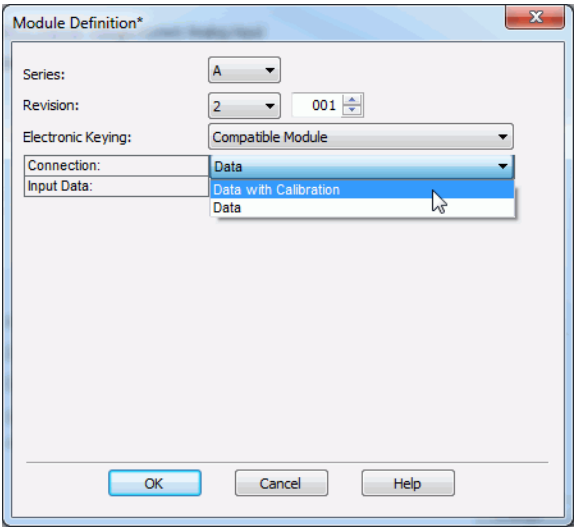
The owner-controller monitors its connection with a module. Any break in the connection, for example, the loss of power to the system, causes a fault. The Studio 5000 Logix Designer application monitors the fault status tags to indicate when a fault occurs on a module.

Connection Types Available with Compact 5000 I/O Analog Modules

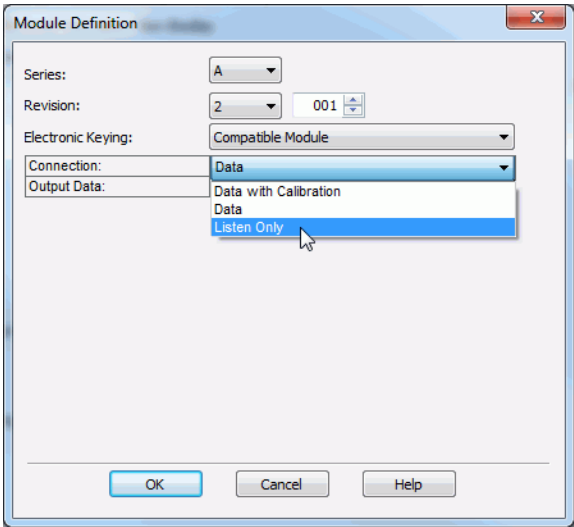
The Connection choice determines what data is exchanged between the owner-controller and the module.

The following screens show the Connection choices that are available on the Module Definition dialog box for local and remote Compact 5000 I/O analog modules. The Listen Only Connection type is only available with remote modules.

Local Compact 5000 I/O Analog Module



Remote Compact 5000 I/O Analog Module



Connections - Compact 5000 I/O Analog Modules

Connection Type	Description	
	Compact 5000 I/O Analog Input Modules	Compact 5000 I/O Analog Output Modules
Data with Calibration	The module returns the following to the owner-controller: <ul style="list-style-type: none"><li>• General fault data</li><li>• Input data</li><li>• Calibration data</li></ul>	The module returns the following to the owner-controller: <ul style="list-style-type: none"><li>• General fault data</li><li>• Output data</li><li>• Calibration data</li></ul>
Data	The module returns the following to the owner-controller: <ul style="list-style-type: none"><li>• General fault data</li><li>• Input data</li></ul>	The module returns the following to the owner-controller: <ul style="list-style-type: none"><li>• General fault data</li><li>• Output data</li></ul>
Listen Only	When a Listen Only connection is used, another controller owns the module. A controller that makes a Listen Only connection to the module does not configure the module. It only listens to the data exchanged with the owner-controller. <b>IMPORTANT:</b> If a controller uses a Listen Only connection, the connection must use the Multicast option. For more information, see <a href="#">Listen Only</a> . In this case, all other connections to the module, for example, the connection to the owner-controller must also use the Multicast option.	



### *Data Types Available with Compact 5000 I/O Analog Modules*

The Module Definition includes a Data parameter.

- Compact 5000 I/O analog input modules always use Analog Data.
- Compact 5000 I/O analog output modules use Analog Data or None.

The Data choice None is only available if you choose the Connection parameter Listen Only.

### *Requested Packet Interval*

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

You set the RPI value during initial module configuration and can adjust it as necessary after module operation has begun. Valid RPI values are 0.2...750 ms.

---

**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.
- 

To set the RPI, see [Connection](#).

For more information on guidelines for specifying RPI rates, see the Logix 5000 Controllers Design Considerations Reference Manual, publication [1756-RM094](#).

## **Connection Over EtherNet/IP**

When you configure a remote Compact 5000 I/O analog module, you must configure the Connection over EtherNet/IP parameter in the configuration for the remote adapter that connects the I/O modules to the network. The configuration choice dictates how input data is transmitted over the network

The Compact 5000 I/O analog modules use one of the following methods to transmit data:

- Multicast - Data is sent to all network devices.  
If you are using the I/O modules in a redundancy system, you must use Multicast.
- Unicast - Data is sent to one or more controllers depending on module configuration.  
Unicast is the default setting.

## Input Module Operation

Logix 5000 controllers do not poll the Compact 5000 I/O analog input modules for input data.

At the RPI, not only does the module send input data to the controller, but also the controller sends data to the module inputs. For example, the controller sends data to command the module to unlatch alarms or enable alarms.

The data exchange process between the input modules and the controller differs based on whether the module is a local I/O module or remote I/O module.

### Local Compact 5000 I/O Analog Input Modules

Local Compact 5000 I/O analog input modules broadcast their input data, that is, channel and status data, to the system backplane at the time that is defined in the RPI.

#### *Local Input Module to Controller Data Transmission*

At the RPI, the following events occur.

1. The input module scans its channels for input data.
2. The module sends the data to the system backplane.
3. The controller receives the data immediately.

#### *Controller to Local Input Module Data Transmission*

The following events occur when the controller sends data to the local input module.

1. The controller broadcasts the data to the system backplane.
2. The module receives the data from the backplane and behaves as dictated by its configuration.

### Remote Compact 5000 I/O Analog Input Modules

Remote Compact 5000 I/O analog input modules broadcast their input data to the Compact 5000 I/O system backplane at the time that is defined in the RPI. The input data consists of channel and status data.

#### *Remote Input Module to Controller Data Transmission*

At the RPI, the following events occur.

1. The input module scans its channels for input data.
2. The module sends the data to the remote system backplane.
3. The Compact 5000 I/O EtherNet/IP adapter sends the data over the EtherNet/IP network.
4. One of the following:
  - If the controller is connected directly to the EtherNet/IP network, it receives the input data immediately.
  - If the controller is connected to the EtherNet/IP network through an adapter, the module sends the data to its backplane and the controller receives it.

---

#### **IMPORTANT**

An EtherNet/IP adapter can be used **only** if a **ControlLogix 5580** or **GuardLogix 5580** controller owns the I/O module.

CompactLogix 5380, CompactLogix 5480, and Compact GuardLogix 5380 controllers do not support the use of an EtherNet/IP communication module in the local system.

---

### Controller to Remote Input Module Data Transmission

The following events occur when the controller sends data to the remote input module.

1. One of the following:
  - If the controller is connected directly to the EtherNet/IP network, it broadcasts the data to the network. Proceed to [step 3](#).
  - If the controller is connected to the EtherNet/IP network via an EtherNet/IP communication module, the controller transmits the data to its backplane. Continue to [step 2](#).

---

**IMPORTANT** Use an EtherNet/IP communication module **only** if a **ControlLogix 5580** or **GuardLogix 5580** controller owns the I/O module. CompactLogix 5380, CompactLogix 5480, and Compact GuardLogix 5380 controllers do not support the use of an EtherNet/IP communication module in the local system.

---

2. The EtherNet/IP communication module transmits the data to the EtherNet/IP network.
3. The Compact 5000 I/O EtherNet/IP adapter receives the data from the network and transmits it to the remote system backplane.
4. The Compact 5000 I/O analog input module receives the data from the backplane and behaves as dictated by its configuration.

## Output Module Operation

Logix 5000 controllers send data to Compact 5000 I/O analog output modules at the RPI or after an Immediate Output (IOT) instruction is executed.

The RPI defines when the controller sends data to an output module and when the module sends data to the controller. For example, the output module sends the channel data quality. The IOT instruction sends new data to an output module whenever new data is produced.

---

**IMPORTANT** Only CompactLogix 5380 and CompactLogix 5480 controllers can send data to Compact 5000 I/O analog output modules when an IOT instruction is executed. Compact GuardLogix 5380 controllers **cannot** send data when an IOT instruction is executed.

---

The data exchange process between Compact 5000 I/O analog output modules and a controller differs based on whether the module is a local I/O module or remote I/O module.

## Local Compact 5000 I/O Analog Output Modules

Local Compact 5000 I/O analog output modules receive output data from a controller and send data to the controller. The data exchange occurs over the system backplane.

### *Controller to Local Output Module Data Transmission*

The controller broadcasts data to its local backplane at one of the following:

- RPI
- An IOT instruction is executed.

---

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

---

Based on the RPI rate and the length of the controller program scan, the output module can receive and send data multiple times during one program scan.

When the RPI is less than the program scan length, the output channels can change values multiple times during a program scan. The owner-controller does not depend on the program scan to complete to send data.

These events occur when the controller sends data to a local Compact 5000 I/O analog output module.

1. The controller sends data to the system backplane at the RPI or when an IOT instruction is executed.
2. The local output module receives the data from the system backplane and behaves as dictated by its configuration.

### *Local Output Module to Controller Data Transmission*

When a local Compact 5000 I/O analog output module receives new data and the requested data value is present on the RTB, the output module sends, or 'echoes', a data value back to the controller and to the rest of the control system. The data value corresponds to the signal present at its terminals. This feature is called [Data Echo](#).

The output module also sends other data to the controller at the RPI. For example, the module alerts the controller if a short circuit condition exists on the module.

The following events occur when a local Compact 5000 I/O analog output module sends data to the controller at the RPI.

1. The module sends the data to the system backplane.
2. The controller receives the data immediately.

## Remote Compact 5000 I/O Analog Output Modules

Remote Compact 5000 I/O digital output modules receive output data from a controller and send data to the controller. The data exchange occurs over an EtherNet/IP network.

### *Controller to Remote Output Module Data Transmission*

The controller broadcasts data to its local backplane at one of the following:

- RPI
- An IOT instruction is executed.

---

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

---

Based on the RPI rate and the length of the controller program scan, the output module can receive and echo data multiple times during one program scan.

When the RPI is less than the program scan length, the output channels can change values multiple times during a program scan. The owner-controller does not depend on the program scan to complete to send data.

These events occur when the controller sends data to a remote Compact 5000 I/O analog output module.

1. One of the following:
  - If the controller is connected directly to the EtherNet/IP network, it broadcasts the data to the network. Proceed to [step 3](#).
  - If the controller is connected to the EtherNet/IP network via an EtherNet/IP communication module, the controller transmits the data to its backplane. Continue to [step 2](#).

---

**IMPORTANT** Use an EtherNet/IP communication module **only** if a **ControlLogix 5580** or **GuardLogix 5580** controller owns the I/O module. CompactLogix 5380, CompactLogix 5480, and Compact GuardLogix 5380 controllers do not support the use of an EtherNet/IP communication module in the local system.

---

2. The EtherNet/IP communication module transmits the data to the EtherNet/IP network.
3. The Compact 5000 EtherNet/IP adapter receives the data from the network and transmits it to the remote system backplane.
4. The Compact 5000 I/O analog input module receives the data from the backplane and behaves as dictated by its configuration.

### Remote Output to Controller Data Transmission

When a remote Compact 5000 I/O analog output module receives new data and the requested data value is present on the RTB, the output module sends, or 'echoes', a data value back to the controller and to the rest of the control system. The data value corresponds to the signal present at its terminals. This feature is called [Data Echo](#).

The output module also sends other data to the controller at the RPI. For example, the module alerts the controller if a short circuit condition exists on the module.

The following events occur when a local Compact 5000 I/O analog output module sends data to the controller at the RPI.

1. The output module sends the data to the system backplane.
2. The Compact 5000 EtherNet/IP adapter transmits the data to the network.
3. One of the following:
  - If the controller is directly connected to the EtherNet/IP network, it receives the data immediately.
  - If the controller is connected to the EtherNet/IP network through another communication module, the output module sends the data to its backplane and the controller receives it.

---

**IMPORTANT** Use an EtherNet/IP communication module **only** if a **ControlLogix 5580** or **GuardLogix 5580** controller owns the I/O module. CompactLogix 5380, CompactLogix 5480, and Compact GuardLogix 5380 controllers do not support the use of an EtherNet/IP communication module in the local system.

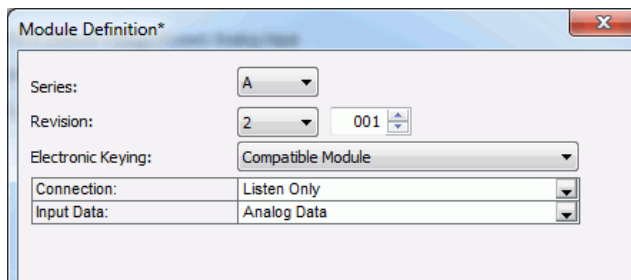
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## Listen Only

The owner-controller, as described in [Ownership](#), exchanges data with I/O modules. The owner-controller owns the module configuration in its Studio 5000 Logix Designer project.

Other controllers that do not own the module or exchange data with it can listen to input data or 'echoed' output data. While the listen-only controller does not own the module configuration, the module is included in the listen-only controller's Studio 5000 Logix Designer project.

During the I/O configuration process, you choose a Listen Only connection type. The Connection dropdown menu is available on the Module Definition dialog box.



For more information, see [Module Definition](#).

---

**IMPORTANT** Listen Only connections include the following restrictions:

- The connection type is only available with Compact 5000 I/O standard modules.
- The I/O modules must reside in a remote system. Controllers cannot make Listen Only connections to local I/O modules.

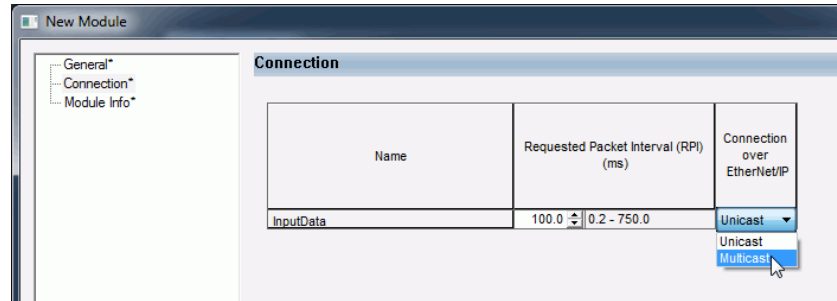
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## Connection Over EtherNet/IP

You must set the Connection Over EtherNet/IP parameter when you configure a remote Compact 5000 I/O module. The available choices are Unicast and Multicast.

To establish a Listen Only connection from a listen-only controller, the Connection over EtherNet/IP must be Multicast in both Studio 5000 Logix Designer projects, the owner-controller project and the listen-only controller project.

The Connection over EtherNet/IP pull-down menu is available on the Connection page.

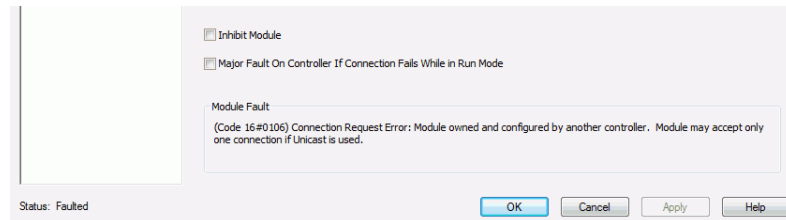


For more information, see [Connection](#).

### Connection Request Errors

Module faults and connection request errors occur if the Connection Over EtherNet/IP connection is not Multicast in both Studio 5000 Logix Designer projects.

Information about the fault is available on the Connection page.



Connection over EtherNet/IP Choice		Error Code
Owner-controller project	Listen-only controller project	
Multicast	Multicast	None - Connection established successfully
Multicast	Unicast	16#0106 Connection Request Error: Module owned and configured by another controller. Module may accept only one connection if Unicast is used.
Unicast	Unicast or Multicast	16#0108: Connection Request Error: Connection type (Multicast/Unicast) not supported.
Inhibited or powered-down	Multicast	16#0119 Connection Request Error: Module not owned.



In rare instances, the Studio 5000 Logix Designer application lets you configure a module with choices that result in connection request errors. However, the application does not alert you to the error that occurs as a result of the choices until the project goes online.

For example, if an owner-controller project uses Multicast and the listen-only controller project uses Unicast, the result is a module fault and error code 16#106. However, the Studio 5000 Logix Designer project in the listen-only controller only alerts you to the error when the project goes online.

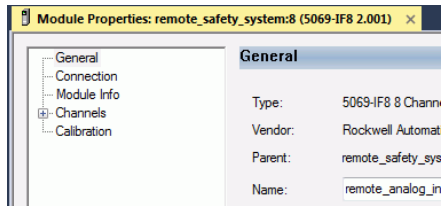
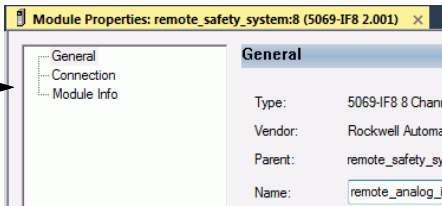
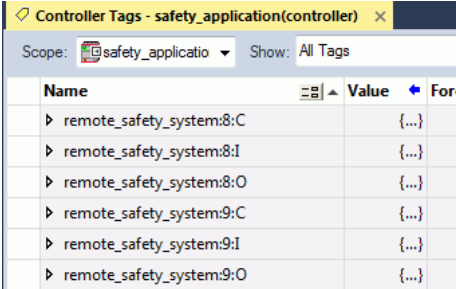
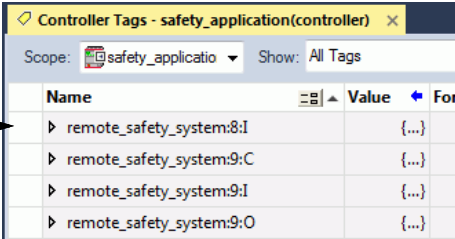
We recommend that you confirm the Connection Over EtherNet/IP choice in the listen-only controller's project is correct before you go online.



## Additional Considerations With Listen Only Connections

Remember the following when you use Listen Only connections:

- Listen-only controllers receive data from the module as long as the connection between the owner-controller and the module is maintained.  
If the connection between an owner-controller and the module is broken, data is no longer sent and connections to all listen-only controllers are also broken.
  - When a controller uses a Listen Only Data connection, configurable properties in the Module Properties are not available. And only Input tags are created in the Module tags.
- This table shows the categories and module tags that appear when a 5069-IF8 module is configured in an owner-controller or listen-only controller project.

	Owner-controller Project	Listen-only Controller Project
Module Properties Pages		
Module Tags Created		

## Protected Operations

Operations that can disrupt the operation of your Compact 5000 I/O analog module are restricted based on the module operating mode.

Current Module Operation	Activity							
	Firmware Update Request	Module Reset Request	Module Calibration Request <sup>(1)</sup>	Connection Request	Configuration Change	Connection or Data Format Change	Electronic Keying Change	RPI Change
Connection not running	Accepted							
Connection running <sup>(2)</sup>	Rejected <sup>(3)</sup>			Accepted <sup>(4)</sup>	Accepted <sup>(5)</sup>	Not allowed <sup>(6)</sup>	Accepted <sup>(7)</sup>	
Firmware update is in process	Rejected							
Calibration is in process	Accepted <sup>(8)</sup>							

(1) When the request is made through the Module Properties.

(2) Protection Mode - For more information see, [Enter and Exit Protection Mode](#).

(3) A module calibration request is accepted when the module is connected and the owner-controller is in Program mode.

(4) Only requests for Listen Only connections are accepted.

(5) Configuration changes are accepted when you complete one of these actions.

- Change the Module Properties parameters and click Apply.
- Change the Configuration tags and send a Reconfigure Module MSG to the module.

(6) The difference between Rejected and Not allowed is that rejected activities can be attempted in the Studio 5000 Logix Designer application but do not take effect. The activities that are not allowed, that is, attempts to change the Connection or Data Format used, are prevented from occurring in the Studio 5000 Logix Designer application.

For example, if you attempt to reset a module that is connected to the owner-controller, the Studio 5000 Logix Designer application executes the request and alerts you that it was rejected. If you attempt to change the data format on a module that is connected to an owner-controller, the Studio 5000 Logix Designer application does not execute the attempted change. The application only alerts you that the change is not allowed. In the case, if the change is attempted online, the Module Definition field that changes the data format is disabled.

(7) The change occurs after the connection is closed and reopened. You can close and reopen the connection in these ways.

- Change the project while it is offline and download the updated project before you go online again.
- Change the project while it is online and click Apply or OK in the Module Properties parameters. In this case, before the change is made, a warning alerts you of the ramifications before the change is made.

(8) The module accepts the requests and changes listed. Keep in mind, when the request or change is made, the calibration process is automatically aborted. We recommend that you wait for the module calibration to finish before attempting any of the requests or changes.

## Enter and Exit Protection Mode

A Compact 5000 I/O analog module enters Protection Mode as soon as I/O connection is established with the module. A Compact 5000 I/O analog module exits Protection Mode as soon as I/O connection to the module is stopped.

**Notes:**

## Common Analog I/O Module Features

Topic	Page
Software Configurable	31
Module Data Quality Reporting	32
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Module Firmware	34
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Calibration	36
Alarm Latching	36
Scaling	37
Data Offset	37
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Compact 5000™ I/O analog input modules convert an analog signal to a digital value. For example, the modules can convert the following:

- Volts
- Millivolts
- Milliamps
- Ohms

Compact 5000 I/O analog output modules convert a digital value to an analog signal. For example, the modules can convert the following:

- Volts
- Milliamps

### Software Configurable

The Studio 5000 Logix Designer® application provides an interface to configure each module. All module features are enabled or disabled through the I/O configuration within the software.

All module features are enabled or disabled through the I/O configuration in the Studio 5000 Logix Designer application. You can use the Studio 5000 Logix Designer application to retrieve the following information from any module in the system:

- Serial number
- Firmware revision information
- Product code
- Vendor
- Error and fault information
- Diagnostic information

By minimizing the need for tasks, such as setting hardware switches and jumpers, the software makes module configuration easier and more predictable.

## Module Data Quality Reporting

The Compact 5000 I/O analog modules indicate the quality of channel data that is returned to the owner-controller. Data quality represents accuracy. There are levels of data quality that are reported via module input tags.

The following input tags indicate the level of data quality.

---

**IMPORTANT** Once the condition that causes the Fault or Uncertain tag to change to 1 is removed, the tag automatically resets to 0. The Studio 5000 Logix Designer application controls the tags. You cannot change the status of the tags. Keep in mind that in some system configurations, the tag is not reset immediately after the condition is removed. The tag typically resets after a small delay.

---

- **I.Chxx.Fault** - This tag indicates that the reported channel data is inaccurate and cannot be trusted for use in your application. Do not use the data for control.

If the tag is set to 1, you cannot trust the data reported. You must troubleshoot the module to correct the cause of the inaccuracy.

Example causes of inaccurate data include the following:

- Channel is disabled
- Open Wire (input modules)
- No Load (output modules) condition
- Underrange/Overrange condition
- Short Circuit condition

We recommend that you troubleshoot the module for the typical causes first.

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

If the module sets this tag to 1, you know that the data can be inaccurate but you must troubleshoot the module to discover what degree of inaccuracy exists.

Example causes of uncertain data include 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 - an active calibration process on one channel can cause an indication of Uncertain data quality on other module channels simultaneously.

For more information see, [Calibration](#).

We strongly recommend that you troubleshoot the module for the typical causes first.

We recommend that you monitor these tags in your program to make sure that the application is operating as expected with accurate channel input data.

## Fault and Status Reports

The Compact 5000 I/O analog modules report fault and status data along with channel data. Fault and status data is reported in the following ways:

- Studio 5000 Logix Designer application
- Module status indicators
- I/O status indicators

For more information on fault and status reports, see:

- 5069-IF8 module - [Fault and Status Reports](#)
- 5069-IY4 and 5069-IY4K modules - [Fault and Status Reports](#)
- 5069-OF4, 5069-OF4K, and 5069-OF8 modules - [Fault and Status Reports](#)
- [Troubleshoot the Module](#)

## Inhibit a Module

When you inhibit a module you indefinitely suspend a connection, including Listen Only connections, between an owner-controller and an analog module without removing the module from the configuration. This process lets you temporarily disable a module, such as to perform maintenance.

This table explains when to use the Inhibit Module feature.

Inhibit the Module	Description	Example
Before the controller connects to a module	You can write a configuration for a module and inhibit the module to prevent it from communicating with the owner-controller. The owner does not establish a connection and the configuration is not sent to the module until the connection is uninhibited.	If you need to update the firmware on a module, use this procedure. 1. Inhibit the module. 2. Perform the update. 3. Uninhibit the module.
After the controller connects to the module	Your controller already owns a module, has downloaded the configuration to the module, and is exchanging data over the connection between the devices. When you inhibit the module, the owner-controller behaves as if the connection to the module does not exist.	If you write a program that includes a module that is not installed yet. Inhibit the module until it is installed so the controller does not look for it.

**IMPORTANT** When you inhibit an output module that has ProgMode enabled, it enters Program mode, and all outputs change to the state configured for Program mode.

For example, if an output module is configured so that the state of the outputs transition to zero during Program mode, whenever that module is inhibited, the outputs transition to zero.

To inhibit an analog module, see [Connection](#).

# 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, digital 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.

The following Electronic Keying options are available.

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: <ul style="list-style-type: none"><li>• Same catalog number</li><li>• Same or higher Major Revision</li><li>• Minor Revision as follows:<ul style="list-style-type: none"><li>– If the Major Revision is the same, the Minor Revision must be the same or higher.</li><li>– If the Major Revision is higher, the Minor Revision can be any number.</li></ul></li></ul>
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. <b>ATTENTION:</b> Be cautious when you use Disable Keying; if used incorrectly, this option can lead to personal injury or death, property damage, or economic loss. We <b>strongly recommend</b> that you <b>do not use</b> 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.

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

<b>IMPORTANT</b>	If you change the Electronic Keying parameters while the project is online, you interrupt 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.
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For more detailed information on Electronic Keying, see the Logix 5000™ Control Systems Application Technique, publication [LOGIX-AT001](#).

# Module Firmware

The Compact 5000 I/O analog modules are manufactured with module firmware installed. If updated module firmware revisions are available in the future, you can update the firmware.

Updated firmware revisions are made available for various reasons, for example, to correct an anomaly that existed in previous module firmware revisions.

Download updated firmware files from the Rockwell Automation® Product Compatibility and Download Center (PCDC) at [rok.auto/pcdc](http://rok.auto/pcdc).

Do not download firmware from non-Rockwell Automation sites.

## Producer/Consumer Communication

Compact 5000 I/O analog modules use the Producer/Consumer communication model to produce data before a controller polls them. 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 removes the need for one controller to send the data to other controllers.

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**IMPORTANT** Keep in mind, **only one controller** can own the I/O module. The Compact 5000 I/O analog modules do not support multiple owners of the same module.  
Other controllers must use a Listen Only connection to the module.

---

## Rolling Time Stamp of Data

The rolling time stamp is a continuously running 15-bit rolling time stamp that counts in milliseconds from 0...32,767 ms.

The rolling time stamp value is reported in the *I.Chxx.RollingTimestamp* tag for the Compact 5000 I/O analog modules.

### Rolling Time Stamp with the Analog Input Modules

Typically, the 5069-IF8, 5069-IY4, and 5069-IY4K modules scan their inputs at the RPI. The module also updates the rolling time stamp data at the RPI. The controller program uses the last two rolling time stamp 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 time stamp accurately reflects the change.

There can be jitter in the timing between samples before and after the system time change.

### Rolling Time Stamp with the Analog Output Modules

For the 5069-OF4, 5069-OF4K, and 5069-OF8 modules, the rolling time stamp value is updated only when new values are applied to the Digital to Analog Converter (DAC).

## Floating Point Data Format

The Compact 5000 I/O analog modules return channel data to the controller in the IEEE 32-bit floating point data format. In your Studio 5000 Logix Designer application, the data type is REAL.

The floating point data format lets you change the data representation of the selected channel. Although the full range of the module does not change, you can scale your module to represent I/O data in specific terms for your application.

For more information, see [Scaling](#).



## Calibration

The Compact 5000 I/O analog modules use precise analog components that maintain their specifications over time. The modules are calibrated via the following methods:

- Factory calibration when the modules are built.
- User-executed calibration.

For more information on how to calibrate a module, see [Calibrate the Module](#).

## Uncertain Data Quality Indication on Input Module Groups

When a channel on a Compact 5000 I/O analog input module is being calibrated, the Notch Filter setting for that channel changes to 5 Hz. This change results in the *I.Chxx.Uncertain* tag being 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 the other input channels in that group. This setting is because the rate at which data is sampled slows for all input channels in the group.

The Notch Filter settings for the other input channels in the group remain the same.

## Alarm Latching

When enabled, 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 caused it to occur disappears, until the alarm is unlatched.

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

- Input modules - Process and Rate alarms
- Output modules - Clamp and Rate alarms

For more information on alarm latching, see these sections.

- 5069-IF8 module - [Process Alarms](#) and [Rate Alarm](#)
- 5069-IY4 and 5069-IY4K modules - [Process Alarms](#) and [Rate Alarm](#)
- 5069-OF4, 5069-OF4K, and 5069-OF8 modules - [Clamp Alarming](#)

## Enable Latching

To enable alarm latching, see these sections.

- Module Properties:
  - Input modules - [Alarms](#)
  - Output modules - [Limits](#)
- [Module Tags](#) - The alarm type determines which tag to change.

## Unlatch Alarms

---

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

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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 to change.

For example, to unlatch a Low Low alarm on a Compact 5000 I/O analog input module, you set the *Chxx.LLAlarmUnlatch* output tag to 1.

For more information, see [Module Tags](#).

## 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** When you choose the 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 signal units or in engineering units. It is listed as **Percent of Full Scale** in the Studio 5000 Logix Designer application.

For example, if you use the 5069-IF8 module in Current mode with an input range of 4...20 mA, use these settings.

- To receive values in **signal units**,
  - Low Signal = 4 mA
  - High Signal = 20 mA
  - Low Engineering = 4 EU
  - High Engineering = 20 EU
- To receive values in **Percent of Full Scale**, use this configuration.
  - 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 you use Percent of Full Scale.

Current	Engineering Units Value	Value in <i>I.Chxx.Data</i> Tag
0.0 mA	-25.00%	-25.00
3.0 mA	-6.00%	-6.00
4.0 mA	0.0%	0.00
12.0 mA	50.0%	50.0
20.0 mA	100.0%	100.0
23.0 mA	118.75%	118.75

To configure Scaling, see [Chxx](#).

## Data Offset

The Compact 5000 I/O analog modules support offset features that let you compensate for any inaccuracy inherent to the input or output device that is connected to the channel. The offset value adjusts the input or output data value.

These channel offset features are available.

- 5069-IF8 module - [Sensor Offset](#)
- 5069-IY4 and 5069-IY4K modules - [Sensor Offset](#)
- 5069-OF4, 5069-OF4K, and 5069-OF8 modules - [Channel Offset](#)

# Module Accuracy

Module accuracy represents the module accuracy when its ambient temperature is the same as the temperature at which the module was calibrated.

The following specifications are related to Module Accuracy:

- [Absolute Accuracy at 25 °C \(77 °F\)](#)
- [Module Accuracy Drift with Temperature](#)

## Absolute Accuracy at 25 °C (77 °F)

This specification matches the temperature at which the module was calibrated in the factory during manufacturing. The Compact 5000 I/O analog modules absolute accuracy when operating in 25 °C (77 °F) conditions = 0.10%.

The level of module accuracy remains 0.10% whether it is operating in Current (mA), Voltage (V), RTD, or Thermocouple mode. Only the 5069-IY4 and 5069-IY4K modules support the RTD or Thermocouple modes.

## Module Accuracy Drift with Temperature

Module Accuracy Drift with Temperature represents the error that occurs if the module's ambient temperature changes a total of 60 °C (140 °F). For example, from 0...60 °C (32...140 °F) or 60...0 °C (140...32 °F).

The module accuracy drift with temperature varies by module and the mode being used. The following table lists module accuracy drift values.

Cat. No.	Mode	Module Accuracy Drift with Temperature
5069-IF8	Voltage (V)	0.2%
	Current (mA)	0.3%
5069-IY4, 5069-IY4K	Voltage (V)	0.2%
	Current (mA)	0.3%
	RTD	0.2%
	Thermocouple	0.2%
5069-OF4, 5069-OF4K, 5069-OF8	Voltage (V)	0.3%
	Current (mA)	0.5%

## Current/Voltage Analog Input Module Features - 5069-IF8

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The 5069-IF8 input module has eight non-isolated channels that are either differential (Series A) or single-ended (Series B). Each channel supports connection to the following input types:

- Current
- Voltage

Differential inputs have a greater resistance to the effects of electromagnetic noise and provide improved cable length flexibility when you wire the module. Single-ended inputs provide improved flexibility in wiring configuration.

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**IMPORTANT** Remember the following:

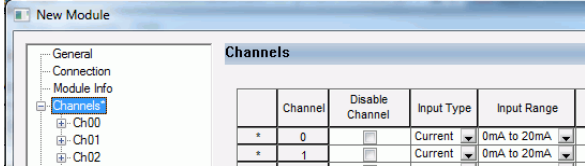
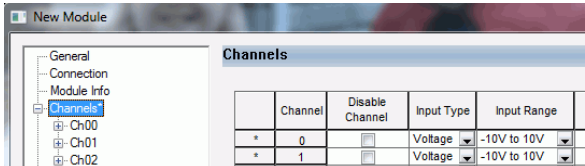
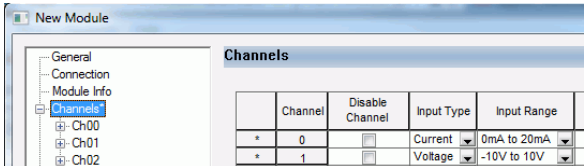
- This module also has features that apply to all Compact 5000™ analog I/O modules that are described in [Common Analog I/O Module Features](#).
- You can configure the features that are described in this chapter with the Studio 5000 Logix Designer® application. For information on how to configure the module, see [Configure the Module](#).

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# Analog Device Support

The 5069-IF8 module does not support connection to all analog devices. This table lists the analog devices that the 5069-IF8 module supports.

**IMPORTANT**     Verify that the channel configuration in your Studio 5000 Logix Designer project matches the input device type that is connected to the channel. Choose the input type on the Channels page in the Module Properties. For example, if a current input device is connected to channel 0 on the module, the channel configuration must be Input Type = Current.

Device	Mode	Supported	Example Channel Configuration
2-wire analog device 4-wire analog device <sup>(1)</sup>	Current	Yes	In this example, current devices are connected to channels 0 and 1. 
	Voltage		In this example, voltage devices are connected to channels 0 and 1. 
	Combination of current and voltage		In this example, a current device is connected to channel 0 and a voltage device is connected to channel 1. 
1-wire analog device 3-wire analog device 2-wire Thermocouple device 2-wire RTD device 3-wire RTD device	These devices are not supported regardless of the channel mode configuration.	No	—

(1)     These devices are 2-wire current and voltage devices with 2-wire sensor power connections.

For more module configuration information, see [Module-specific Parameters](#)

For more information on how to wire devices to the 5069-IF8 modules, see the Compact 5000 I/O Modules and EtherNet/IP™ Adapters Specification Technical Data, publication [5069-TD001](#).

## Multiple Input Ranges

The 5069-IF8 module supports multiple input ranges. The input type that you choose during module configuration determines the available input ranges. An input type is chosen on a channel-by-channel basis.

Input Type	Available Input Range
Current (mA)	<ul style="list-style-type: none"><li>0...20 mA</li><li>4...20 mA</li></ul>
Voltage (V)	<ul style="list-style-type: none"><li>-10...10V</li><li>0...5V</li><li>0...10V</li></ul>

To select the input range, see [Chxx](#).

## 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 sample 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.

### Available Notch Filter Settings

• 5 Hz	• 100 Hz	• 10,000 Hz
• 10 Hz	• 200 Hz	• 15,625 Hz
• 15 Hz	• 500 Hz	• 25,000 Hz
• 20 Hz	• 1000 Hz	• 31,250 Hz
• 50 Hz	• 2500 Hz	• 62,500 Hz
• 60 Hz	• 5000 Hz	

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

To choose a notch filter for the 5069-IF8 module, see [Chxx](#).

## Relationship between Notch Filter Settings and RPI Setting

There is a relationship between a Notch Filter setting and the RPI rate.

- 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 60 ms.
- If you want a faster input sample rate at the selected Notch Filter frequency, the noise suppression and resolution is lesser.  
For example, if you choose the 60 Hz notch filter setting and need faster input samples, the recommended module minimum RPI is 20 ms.

In this 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.

Notch Filter	Recommended Minimum Module RPI Value			
	Application with Only One Channel Enabled		Application with All Channels Enabled and the Same Notch Filter Setting on All Channels	
	Faster Sample Speed	Better Noise Rejection	Faster Sample Speed	Better Noise Rejection
5 Hz	215 ms	635 ms	750 ms <sup>(1)</sup>	—
10 Hz	110 ms	320 ms	440 ms	—
15 Hz	65 ms	195 ms	260 ms	—
20 Hz	60 ms	165 ms	240 ms	660 ms
50 Hz	25 ms	70 ms	100 ms	280 ms
60 Hz (default)	20 ms	60 ms	80 ms	240 ms
100 Hz	15 ms	35 ms	60 ms	140 ms
200 Hz	10 ms	20 ms	40 ms	80 ms
500 Hz	5 ms	10 ms	20 ms	40 ms
1000 Hz	2 ms	5 ms	8 ms	20 ms
2500 Hz	1.5 ms	2.5 ms	6 ms	10 ms
5000 Hz	1 ms	2 ms	4 ms	8 ms
10,000 Hz	0.8 ms	1 ms	3.2 ms	4 ms
15,625 Hz	0.8 ms	0.9 ms	3.2 ms	3.5 ms
25,000 Hz	0.8 ms	0.8 ms	3.2 ms	3.2 ms
31,250 Hz	0.8 ms	0.8 ms	3.2 ms	3.2 ms
62,500 Hz	—	0.7 ms	—	2.8 ms

(1) If you use the 5 Hz Notch Filter setting with four or more channels, the input data cannot be refreshed at every RPI, even if the maximum RPI allowed is used. Instead, fresh data is delivered approximately every other RPI.

## Noise Rejection with Different Notch Filter Frequencies

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

The eight input channels on the 5069-IF8 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 channel groups determine the recommended minimum module RPI value.
- If any channel in the other group is enabled, 0.2 ms is added to the recommended minimum RPI rate for all enabled channels in each group.
- The recommended minimum RPI rates for all enabled channels are combined to produce the recommended minimum module RPI for the group.
- If the groups have different recommended minimum RPI values, use the higher RPI value when you configure the module.

### Example Configuration for Faster Sample Speed

Channel Group	Channel	Notch Filter	Recommended Minimum Module RPI for Each Channel <sup>(1)</sup>	Combined Minimum Module RPI for the Group	Highest Group RPI to use in Module Configuration	
Grouped	Ch00	50 Hz	25.2 ms	28.3 ms	80.8 ms	
	Ch01	1000 Hz	2.2 ms			
	Ch02	Disabled				
	Ch03	62,500 Hz	0.9 ms			
Grouped	Ch04	60 Hz	20.2 ms	80.8 ms		
	Ch05	60 Hz	20.2 ms			
	Ch06	60 Hz	20.2 ms			
	Ch07	60 Hz	20.2 ms			

(1) The values in this column represent the corresponding recommended minimum RPI value from the [Notch Filter](#) table with 0.2 ms added because at least one channel is enabled in the other group.

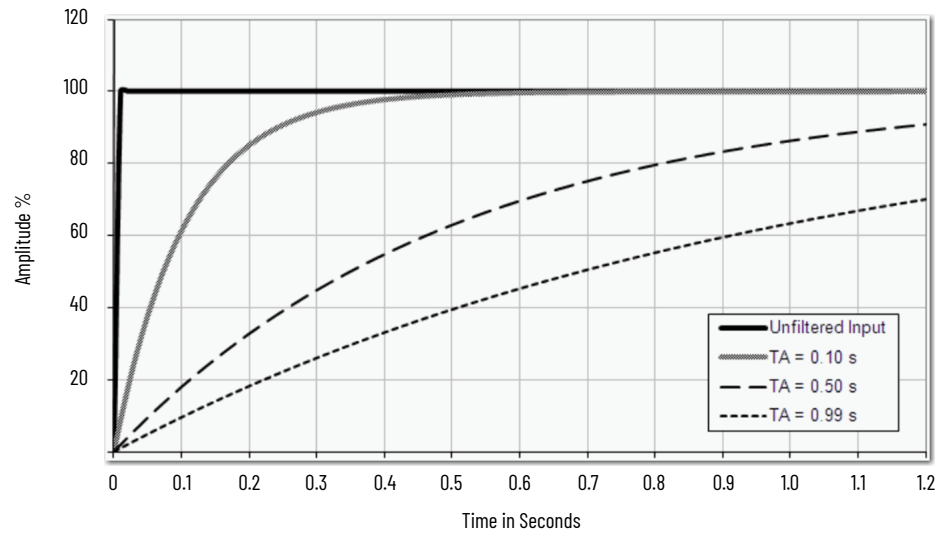
### Example Configuration for Better Noise Rejection

Channel Group	Channel	Notch Filter	Recommended Minimum Module RPI for Each Channel <sup>(1)</sup>	Combined Minimum Module RPI for the Group	Highest Group RPI to use in Module Configuration	
Grouped	Ch00	50 Hz	70.2 ms	76.3 ms	240.8 ms	
	Ch01	1000 Hz	5.2 ms			
	Ch02	Disabled				
	Ch03	62,500 Hz	0.9 ms			
Grouped	Ch04	60 Hz	60.2 ms	240.8 ms		
	Ch05	60 Hz	60.2 ms			
	Ch06	60 Hz	60.2 ms			
	Ch07	60 Hz	60.2 ms			

(1) The values in this column represent the corresponding recommended minimum RPI value from the [Notch Filter](#) table with 0.2 ms added because at least one channel is enabled in the other group.

## 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. The digital filter equation is as shown.

$$Y_n = Y_{n-1} + \frac{\Delta t * (X_n - Y_{n-1})}{\Delta t + TA}$$

$Y_n$  = Present Output, Filtered Peak Voltage (PV)

$Y_{n-1}$  = Previous Output, Filtered PV

$\Delta t$  = Module Channel Update Time (seconds)

TA = Digital Filter time Constant (seconds)

$X_n$  = Present Input, Unfiltered PV

### 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.

To set the digital filter, see [Chxx](#).



# Underrange/Overrange Detection

Underrange/Overrange Detection detects when the 5069-IF8 module 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.

For example, if you configure a 5069-IF8 module channel to use the  $\pm 10\text{V}$  input range, an overrange condition does not exist until the input signal exceeds 12V.

This table lists the input ranges of the 5069-IF8 module and the thresholds in each range before the module detects an underrange/overrange condition.

Input Type	Range	Underrange Threshold	Overrange Threshold	Deadband <sup>(1)</sup>
Current (mA)	0...20 mA	$\leq -0.07\text{ mA}$	$\geq 23.00\text{ mA}$	0.07 mA
	4...20 mA	$\leq 3\text{ mA}^{(2)}$		
Voltage (V)	$\pm 10.00\text{V}$	$\leq -12.00\text{V}$	$\geq 12.00\text{V}$	0.04V
	0...5V	$\leq -0.02\text{V}$	$\geq 6.00\text{V}$	0.02V
	0...10V	$\leq -0.04\text{V}$	$\geq 12.00\text{V}$	0.04

(1) The module has alarm deadband values for each range. The deadband keeps the alarm status bit set, despite the removal of the alarm condition. 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. For more information, see [Alarm Deadband](#).

(2) Underrange is set at  $\leq 3\text{ mA}$ , but the *I:Chxx.Data* tag reports values as low as 0.0 mA. The condition is clamped when the signal reaches 3 mA.

**IMPORTANT**

The Disable All Alarms feature, does not disable the underrange/overrange detection feature because underrange/overrange detection is not an alarm.

To disable the Underrange/Overrange detection feature, you must disable the channel.

Underrange/overrange conditions are indicated when one of these tags changes to 1.

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

For more information, see [Module Tags](#).

## Process Alarms

Process alarms alert you when the module has exceeded configured high or low limits for **each channel**. This list is the user-configurable, alarm trigger points.

- 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 Process Alarms, see [Alarms](#).

### 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 can be in signal units or engineering units.

For example, consider a channel that uses the Current (mA) input type, the 4 mA...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 EU, 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.

To set the Process Alarm trigger points, see [Alarms](#).

### Latch Alarms

Select the Latch Process Alarms checkbox on the *Alarms* tab to latch the process alarms. To latch Process Alarms, see [Alarms](#).

## Unlatch Alarms

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

Once an alarm is latched, you must manually unlatch it. To unlatch an alarm, change the output tag for that alarm.

For example, change the *0.Chxx.LAlarmUnlatch* tag for the low alarm that you want to unlatch from 0 to 1.

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

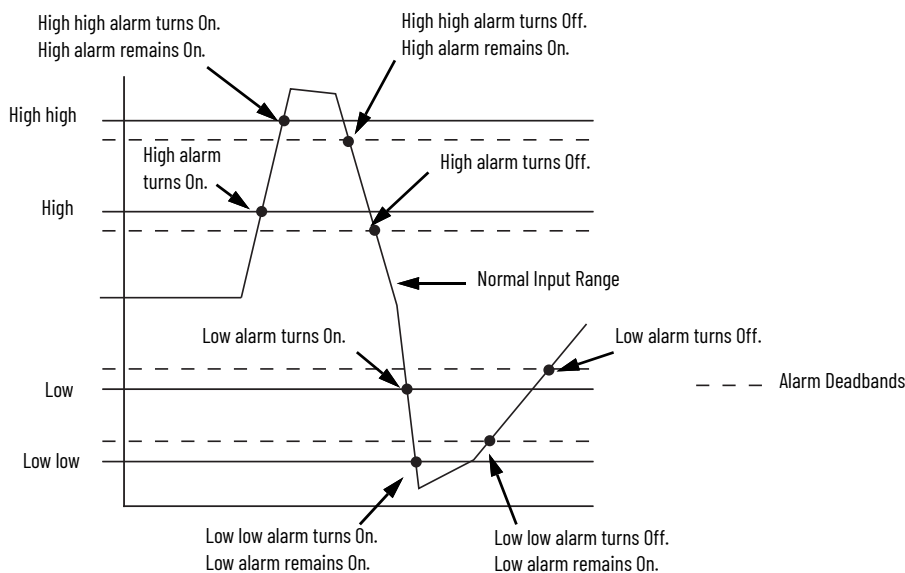
For more information, see [Module Tags](#).

## Alarm Deadband

You can configure an alarm deadband to work with these alarms. The deadband keeps the process alarm status bit set, despite the removal of the alarm condition, 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, alarm latching is disabled; therefore, each alarm turns Off when the condition that caused it to set ceases to exist.

### Alarm Deadband Alarm Settings



To to set the Alarm Deadband, see [Alarms](#).

## 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 set to 1.

You can enable or disable Rate Alarm Latching on each channel. To enable the Rate Alarm, see [Alarms](#).

Once the Rate Alarm is latched, you must change the *O.Chxx.RateAlarmUnlatch* tag to 1.

You can unlatch the alarm at any point in the system operation. If you change the unlatch tag to 1 and the triggering condition remains, the alarm is immediately latched again.

We suggest that you unlatch the Rate Alarm only after the rate of change between input samples has returned below the Rate Alarm Limit value.

## 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 signal 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.

For more information, see [Module Tags](#).

## Open Wire Detection

Open Wire Detection detects when a wire is disconnected from the channel. You must enable Open Wire Detection in the module configuration.

To enable Open Wire Detection, see [Chxx](#).

### Open Wire Conditions

Mode	Cause of Detection	Module Behavior
Current (mA)	The input signal for a channel is below 100 $\mu$ A.	<ul style="list-style-type: none"> <li>Input data for the channel changes to a specific scaled value that corresponds to the Underrange value for the Input Range.</li> <li>The <i>I.Chxx.OpenWire</i> tag changes to 1.</li> <li>A fault occurs and the <i>I.Chxx.Fault</i> tag is set to 1.</li> </ul>
Voltage	The input signal value reaches full-scale of the input range.	<ul style="list-style-type: none"> <li>Input data for the channel changes to a specific scaled value that corresponds to the Overrange value for the Input Range.</li> <li>The <i>I.Chxx.OpenWire</i> tag changes to 1.</li> <li>A fault occurs and the <i>I.Chxx.Fault</i> tag is set to 1.</li> </ul>

**IMPORTANT** The Disable All Alarms feature, does not disable the Open Wire Detection feature. The Disable All Alarms feature 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. To disable the Open Wire Detection feature, you must clear the Open Wire Detection checkbox in the module configuration.

## Over Temperature Detection

The Over Temperature Detection feature indicates that the temperature of the conditions within which the module is operating are higher than the module operating limits.

When an Over Temperature condition exists, the *I.Chxx.OverTemperature* tag is set to 1.

## Fault and Status Reports

The 5069-IF8 module sends fault and status data with channel data to the owner-controller and listen-only controllers. The data is returned via module tags that you can monitor in your Studio 5000 Logix Designer application.

With some exceptions, the 5069-IF8 module provides the fault and data status in a channel-specific format. The tag names in the following table that include Chxx, where xx is the channel number, represent channel-specific data.

### Fault and Status Data Tags

Data Type	Tag Name	Triggering Event That Sets Tag
Fault	ConnectionFaulted <sup>(1)</sup>	The owner-controller loses its connection to the module.
	Chxx.Fault	The channel data quality is bad.
	Chxx.OpenWire	The following conditions: <ul style="list-style-type: none"> <li>The channel uses a <b>Voltage</b> input type in any input range and the input signal value reaches full-scale.</li> <li>The channel uses a <b>Current</b> input type in any input range and the input signal goes below 100 <math>\mu</math>A. The input signal at the channel is below 100 <math>\mu</math>A.</li> </ul>
	Chxx.Underrange	The channel data is beneath the absolute minimum for this channel.
	Chxx.OVERRANGE	The channel data is above the absolute maximum for this channel.
	Chxx.OverTemperature	The module is at a higher temperature than its rated operating limits.
Status	RunMode <sup>(1)</sup>	The module is in Run Mode.
	DiagnosticActive	Indicates if any diagnostics are active.
	DiagnosticSequenceCount	A counter that increments when a diagnostic condition occurs or goes away. The counter is a rolling counter that skips 0 on rollovers.
	Chxx.Uncertain	The channel data can be imperfect but it is not known to what degree of inaccuracy.
	Chxx.FieldPowerOff	Field power is not present on the channel.
	Chxx.NotANumber	The most recently received data value was not a number.
	Chxx.LLAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>The I.Chxx.Data tag value is less than the C.Chxx.LLAlarmLimit tag value or the alarm is latched.</li> <li>The O.Chxx.LLAlarmEn tag is set.</li> <li>Alarms are enabled for the channel.</li> </ul>
	Chxx.LAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>The I.Chxx.Data tag value is less than the C.Chxx.LAlarmLimit tag value or the alarm is latched.</li> <li>The O.Chxx.LAlarmEn tag is set.</li> <li>Alarms are enabled for the channel.</li> </ul>
	Chxx.HAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>The I.Chxx.Data tag value is greater than the C.Chxx.HAlarmLimit tag value or the alarm is latched.</li> <li>The O.Chxx.HAlarmEn tag is set.</li> <li>Alarms are enabled for the channel.</li> </ul>
	Chxx.HHAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>The I.Chxx.Data tag value is greater than the C.Chxx.HHAlarmLimit tag value or the alarm is latched.</li> <li>The O.Chxx.HHAlarmEn tag is set.</li> <li>Alarms are enabled for the channel.</li> </ul>
	Chxx.RateAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>The absolute change between consecutive channel samples exceeds the C.Chxx.RateAlarmLimit tag value or the alarm is latched.</li> <li>The O.Chxx.RateAlarmEn tag is set.</li> <li>Alarms are enabled for the channel.</li> </ul>
	Chxx.Data	The channel data in scaled engineering units.
	RollingTimestamp <sup>(1)</sup>	A continuously running, 15-bit timer that counts in milliseconds and is not related to the CST. Whenever a module scans its channels, it records the value of RollingTimestamp then. The controller program uses the last two rolling time stamp values to calculate the amount of time between the samples.

<sup>(1)</sup> This tag provides module-wide data and affects all channels simultaneously.

## Current/Voltage/RTD/Temperature Analog Input Module Features - 5069-IY4, 5069-IY4K

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The 5069-IY4 and 5069-IY4K input modules have four differential, non-isolated channels. Each channel supports connection to these types.

- Current
- Voltage
- RTD
- Thermocouple

Differential inputs have a greater resistance to the effects of electromagnetic noise and provide improved flexibility regarding cable length when wiring your module.

---

**IMPORTANT** Remember the following:

- These modules also have features that apply to all Compact 5000™ I/O analog modules that are described in [Common Analog I/O Module Features](#).
  - You can configure the features that are described in this chapter with the Studio 5000 Logix Designer® application. For information on how to configure the module, see [Configure the Module](#).
-

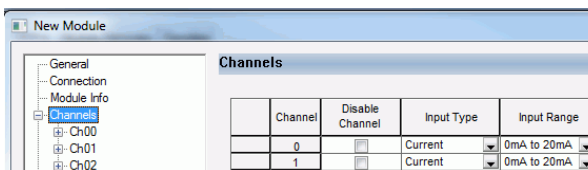
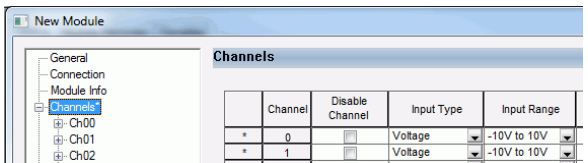
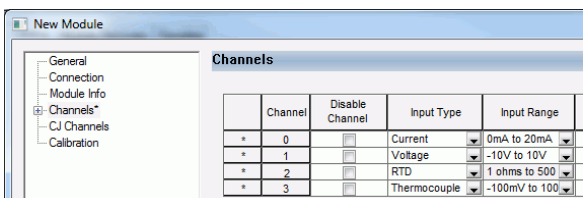
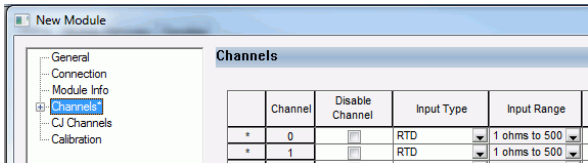
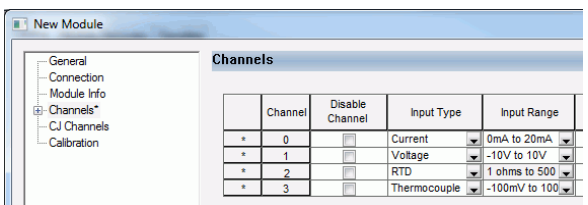
## Analog Device Support

The 5069-IY4 and 5069-IY4K modules do not support connection to all analog devices. This table lists the analog devices that the 5069-IY4 and 5069-IY4K modules support.

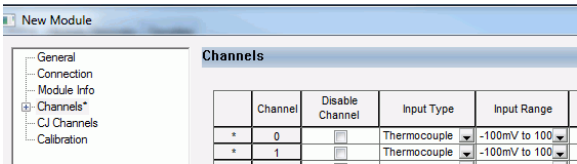

**IMPORTANT** Make sure that the channel configuration in your Studio 5000 Logix Designer project matches the input device type that is connected to the channel. Choose the input type on the Channels page in the Module Properties.

For example, if a current input device is connected to channel 0 on the module, the channel configuration must be Input Type = Current.

### Analog Devices Supported - 5069-IY4, 5069-IY4K

Device	Modes	Supported	Example Channel Configuration
2-wire analog device 4-wire analog device <sup>(1)</sup>	Current	Yes	<p>In this example, current devices are connected to channels 0 and 1.</p> 
	Voltage		<p>In this example, voltage devices are connected to channels 0 and 1.</p> 
	Any combination of current, voltage, RTD, Thermocouple <sup>(2)</sup>	Yes	<p>In this example, a current device is connected to channel 0, a voltage device is connected to channel 1, an RTD is connected to channel 3, a thermocouple is connected to channel 4.</p> 
2-wire RTD device 3-wire RTD device	RTD	Yes	<p>In this example, RTDs are connected to channels 0 and 1.</p> 
	Any combination of current, voltage, RTD, Thermocouple <sup>(2)</sup>	Yes	<p>In this example, a current device is connected to channel 0, a voltage device is connected to channel 1, an RTD is connected to channel 3, a thermocouple is connected to channel 4.</p> 

## Analog Devices Supported - 5069-IY4, 5069-IY4K

Device	Modes	Supported	Example Channel Configuration
2-wire Thermocouple device	Thermocouple	Yes	<p>In this example, thermocouples are connected to channels 0 and 1.</p> 
	Any combination of current, voltage, RTD, Thermocouple	Yes	<p>In this example, a current device is connected to channel 0, a voltage device is connected to channel 1, an RTD is connected to channel 3, a thermocouple is connected to channel 4.</p> 
1-wire analog device 3-wire analog device	— These devices are not supported regardless of the channel mode configuration.	No	—

(1) These devices are 2-wire current and voltage devices with 2-wire sensor power connections.

(2) You must use the 5069-RTB14CJC RTB if at least one thermocouple is connected to the module. If there are no thermocouples that are connected to the module, we recommend that you use the 5069-RTB18 RTB.

For more module configuration information, see [Configure the Module Parameters](#).

For more information on how to wire devices to the 5069-IY4 and 5069-IY4K modules, see the Compact 5000 I/O Modules and EtherNet/IP™ Adapters Specification Technical Data, publication [5069-TD001](#).



## Multiple Input Ranges

The 5069-IY4 and 5069-IY4K modules offer multiple input ranges. The input type that you choose during module configuration determines the available input ranges.

For the RTD input type, the sensor type that you choose determines the available input ranges. The Studio 5000 Logix Designer application automatically sets the Input Range to the valid setting after you select a sensor type.

Input Type	Sensor Type	Available Input Ranges
Current (mA)	—	One of the following: <ul style="list-style-type: none"> <li>0...20 mA</li> <li>4...20 mA</li> </ul>
Voltage (V)	—	One of the following: <ul style="list-style-type: none"> <li>-10...10V</li> <li>0...5V</li> <li>0...10V</li> </ul>
RTD	100 $\Omega$ PT 385	1...500 $\Omega$
	200 $\Omega$ PT 385	2...1000 $\Omega$
	500 $\Omega$ PT 385	4...2000 $\Omega$
	1000 $\Omega$ PT 385	8...4000 $\Omega$
	100 $\Omega$ PT 3916	1...500 $\Omega$
	200 $\Omega$ PT 3916	2...1000 $\Omega$
	500 $\Omega$ PT 3916	4...2000 $\Omega$
	1000 $\Omega$ PT 3916	8...4000 $\Omega$
	10 $\Omega$ CU 427	1...500 $\Omega$
	120 $\Omega$ NI 672	1...500 $\Omega$
	100 $\Omega$ NI 618	1...500 $\Omega$
	120 $\Omega$ NI 618	1...500 $\Omega$
	200 $\Omega$ NI 618	2...1000 $\Omega$
	500 $\Omega$ NI 618	4...2000 $\Omega$
Thermocouple	mV or any Thermocouple type	-100...+100 mV

To choose an input range, see [Chxx](#).

## 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.

Available Notch Filter Settings		
• 5 Hz	• 100 Hz	• 10,000 Hz
• 10 Hz	• 200 Hz	• 15,625 Hz
• 15 Hz	• 500 Hz	• 25,000 Hz
• 20 Hz	• 1000 Hz	• 31,250 Hz
• 50 Hz	• 2500 Hz	• 62,500 Hz
• 60 Hz	• 5000 Hz	

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

To set the notch filter, see [Chxx](#).

## Relationship between Notch Filter Settings and RPI Setting

There is a relationship between a Notch Filter setting and the RPI rate.

- 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 60 ms.

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

For example, if you choose the 60 Hz notch filter setting and need faster input samples, the recommended module minimum RPI is 20 ms.

In this 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.

Notch Filter	Recommended Minimum Module RPI Value			
	Application with Only One Channel Enabled		Application with All Channels Enabled and the Same Notch Filter Setting on All Channels	
	Faster Sample Speed	Better Noise Rejection	Faster Sample Speed	Better Noise Rejection
5 Hz	215 ms	635 ms	750 ms <sup>(1)</sup>	—
10 Hz	110 ms	320 ms	440 ms	—
15 Hz	65 ms	195 ms	260 ms	—
20 Hz	60 ms	165 ms	240 ms	660 ms
50 Hz	25 ms	70 ms	100 ms	280 ms
60 Hz (default)	20 ms	60 ms	80 ms	240 ms
100 Hz	15 ms	35 ms	60 ms	140 ms
200 Hz	10 ms	20 ms	40 ms	80 ms
500 Hz	5 ms	10 ms	20 ms	40 ms
1000 Hz	2 ms	5 ms	8 ms	20 ms
2500 Hz	1.5 ms	2.5 ms	6 ms	10 ms
5000 Hz	1 ms	2 ms	4 ms	8 ms
10,000 Hz	0.8 ms	1 ms	3.2 ms	4 ms
15,625 Hz	0.8 ms	0.9 ms	3.2 ms	3.5 ms
25,000 Hz	0.8 ms	0.8 ms	3.2 ms	3.2 ms
31,250 Hz	0.8 ms	0.8 ms	3.2 ms	3.2 ms
62,500 Hz	—	0.7 ms	—	2.8 ms

(1) If you use the 5 Hz Notch Filter setting with four channels, the input data cannot be refreshed at every RPI, even if the maximum RPI allowed is used. Instead, fresh data is delivered approximately every other RPI.

### Noise Rejection with Different Notch Filter Frequencies

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

When input channels on the same module use different Notch Filter selections, the recommended minimum RPI rates for all enabled channels are combined to produce the recommended minimum module RPI.

#### Example Configuration for Requires Faster Sample Speed

Channel	Notch Filter	Recommended Minimum Module RPI for Each Channel <sup>(1)</sup>	Combined Minimum Module RPI to Use in Module Configuration
Ch00	50 Hz	25 ms	37.7 ms
Ch01	1000 Hz	2 ms	
Ch02	200 Hz	10 ms	
Ch03	625,000 Hz	0.7 ms	

(1) The values in this column are listed in the [Notch Filter](#) table.

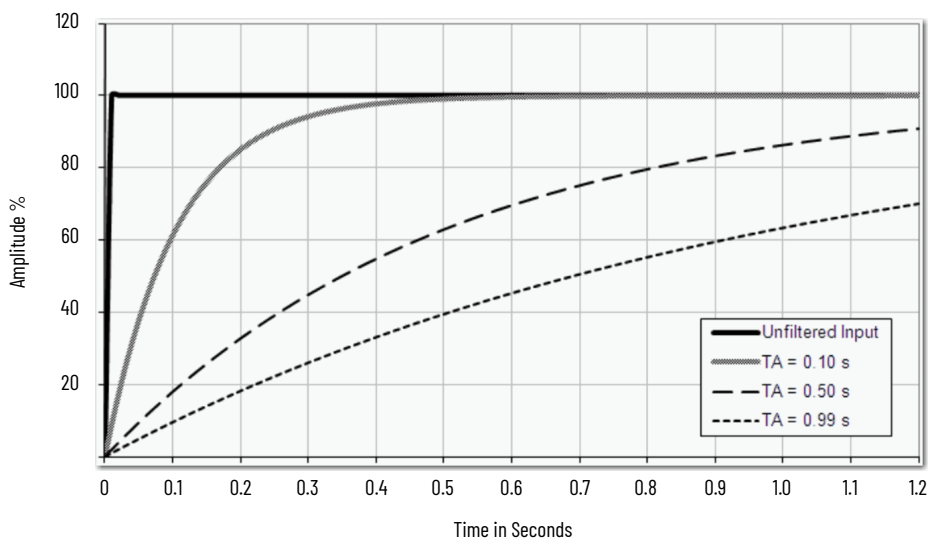
#### Example Configuration for Better Noise Rejection

Channel	Notch Filter	Recommended Minimum Module RPI for Each Channel <sup>(1)</sup>	Combined Minimum Module RPI to Use in Module Configuration
Ch00	50 Hz	70 ms	85.7 ms
Ch01	1000 Hz	5 ms	
Ch02	200 Hz	10 ms	
Ch03	625,000 Hz	0.7 ms	

(1) The values in this column are listed in the [Notch Filter](#) table.

## 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. The digital filter equation is as shown.

$$Y_n = Y_{n-1} + \frac{\Delta t * (X_n - Y_{n-1})}{\Delta t + TA}$$

$Y_n$  = Present Output, Filtered Peak Voltage (PV)

$Y_{n-1}$  = Previous Output, Filtered PV

$\Delta t$  = Module Channel Update Time (seconds)

TA = Digital Filter time Constant (seconds)

$X_n$  = Present Input, Unfiltered PV

### 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.

To choose a digital filter, see [Chxx](#).

## Underrange/Overrange Detection

Underrange/Overrange Detection detects when the 5069-IY4 or 5069-IY4K module 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.

For example, if a 5069-IY4 module channel uses the  $\pm 10\text{V}$  input range, an overrange condition does not exist until the input signal is greater than 12V.

### Input Ranges, Sensor Types, and Thresholds

Input Type	Range or Sensor Type	Underrange Threshold	Overrange Threshold	Deadband <sup>(1)</sup>
Current (mA)	0...20 mA	$\leq -0.07\text{ mA}$	$\geq 23.00\text{ mA}$	0.07 mA
	4...20 mA	$\leq 3\text{ mA}^{(2)}$		
Voltage (V)	$\pm 10.00\text{V}$	$\leq -12.00\text{V}$	$\geq 12.00\text{V}$	0.04V
	0...5V	$\leq -0.02\text{V}$	$\geq 6.00\text{V}$	0.02V
	0...10V	$\leq -0.04\text{V}$	$\geq 12.00\text{V}$	0.04
RTD	Pt 385	$\leq -200\text{ }^{\circ}\text{C}$ $\leq -328\text{ }^{\circ}\text{F}$ $\leq 73\text{ }^{\circ}\text{K}$ $\leq 132\text{ }^{\circ}\text{R}$	$\geq 870\text{ }^{\circ}\text{C}$ $\geq 1598\text{ }^{\circ}\text{F}$ $\geq 1143\text{ }^{\circ}\text{K}$ $\geq 2058\text{ }^{\circ}\text{R}$	—
	Pt3916	$\leq -200\text{ }^{\circ}\text{C}$ $\leq -328\text{ }^{\circ}\text{F}$ $\leq 73\text{ }^{\circ}\text{K}$ $\leq 132\text{ }^{\circ}\text{R}$	$\geq 630\text{ }^{\circ}\text{C}$ $\geq 1166\text{ }^{\circ}\text{F}$ $\geq 903\text{ }^{\circ}\text{K}$ $\geq 1626\text{ }^{\circ}\text{R}$	
	Cu427	$\leq -200\text{ }^{\circ}\text{C}$ $\leq -328\text{ }^{\circ}\text{F}$ $\leq 73\text{ }^{\circ}\text{K}$ $\leq 132\text{ }^{\circ}\text{R}$	$\geq 260\text{ }^{\circ}\text{C}$ $\geq 500\text{ }^{\circ}\text{F}$ $\geq 533\text{ }^{\circ}\text{K}$ $\geq 960\text{ }^{\circ}\text{R}$	
	Ni672	$\leq -80\text{ }^{\circ}\text{C}$ $\leq -112\text{ }^{\circ}\text{F}$ $\leq 193\text{ }^{\circ}\text{K}$ $\leq 348\text{ }^{\circ}\text{R}$	$\geq 320\text{ }^{\circ}\text{C}$ $\geq 608\text{ }^{\circ}\text{F}$ $\geq 593\text{ }^{\circ}\text{K}$ $\geq 1068\text{ }^{\circ}\text{R}$	
	Ni618	$\leq -60\text{ }^{\circ}\text{C}$ $\leq -76\text{ }^{\circ}\text{F}$ $\leq 213\text{ }^{\circ}\text{K}$ $\leq 384\text{ }^{\circ}\text{R}$	$\geq 250\text{ }^{\circ}\text{C}$ $\geq 482\text{ }^{\circ}\text{F}$ $\geq 523\text{ }^{\circ}\text{K}$ $\geq 942\text{ }^{\circ}\text{R}$	
Thermocouple	B	$\leq 21\text{ }^{\circ}\text{C}$ $\leq 68\text{ }^{\circ}\text{F}$ $\leq 293\text{ }^{\circ}\text{K}$ $\leq 528\text{ }^{\circ}\text{R}$	$\geq 1820\text{ }^{\circ}\text{C}$ $\geq 3308\text{ }^{\circ}\text{F}$ $\geq 2093\text{ }^{\circ}\text{K}$ $\geq 3768\text{ }^{\circ}\text{R}$	—
	C	$\leq 0.00\text{ }^{\circ}\text{C}$ $\leq 32\text{ }^{\circ}\text{F}$ $\leq 273\text{ }^{\circ}\text{K}$ $\leq 492\text{ }^{\circ}\text{R}$	$\geq 2320\text{ }^{\circ}\text{C}$ $\geq 4208\text{ }^{\circ}\text{F}$ $\geq 2593\text{ }^{\circ}\text{K}$ $\geq 4668\text{ }^{\circ}\text{R}$	
	E	$\leq -270\text{ }^{\circ}\text{C}$ $\leq -454\text{ }^{\circ}\text{F}$ $\leq 3\text{ }^{\circ}\text{K}$ $\leq 6\text{ }^{\circ}\text{R}$	$\geq 1000\text{ }^{\circ}\text{C}$ $\geq 1832\text{ }^{\circ}\text{F}$ $\geq 1273\text{ }^{\circ}\text{K}$ $\geq 2292\text{ }^{\circ}\text{R}$	
	J	$\leq -210\text{ }^{\circ}\text{C}$ $\leq -346\text{ }^{\circ}\text{F}$ $\leq 63\text{ }^{\circ}\text{K}$ $\leq 114\text{ }^{\circ}\text{R}$	$\geq 1200\text{ }^{\circ}\text{C}$ $\geq 2192\text{ }^{\circ}\text{F}$ $\geq 1473\text{ }^{\circ}\text{K}$ $\geq 2652\text{ }^{\circ}\text{R}$	
	K	$\leq -270\text{ }^{\circ}\text{C}$ $\leq -454\text{ }^{\circ}\text{F}$ $\leq 3\text{ }^{\circ}\text{K}$ $\leq 6\text{ }^{\circ}\text{R}$	$\geq 1372\text{ }^{\circ}\text{C}$ $\geq 2502\text{ }^{\circ}\text{F}$ $\geq 1645\text{ }^{\circ}\text{K}$ $\geq 2961\text{ }^{\circ}\text{R}$	
	N	$\leq -270\text{ }^{\circ}\text{C}$ $\leq -454\text{ }^{\circ}\text{F}$ $\leq 3\text{ }^{\circ}\text{K}$ $\leq 6\text{ }^{\circ}\text{R}$	$\geq 1300\text{ }^{\circ}\text{C}$ $\geq 2372\text{ }^{\circ}\text{F}$ $\geq 1573\text{ }^{\circ}\text{K}$ $\geq 2832\text{ }^{\circ}\text{R}$	
	R	$\leq -50\text{ }^{\circ}\text{C}$ $\leq -58\text{ }^{\circ}\text{F}$ $\leq 223\text{ }^{\circ}\text{K}$ $\leq 402\text{ }^{\circ}\text{R}$	$\geq 1768\text{ }^{\circ}\text{C}$ $\geq 3215\text{ }^{\circ}\text{F}$ $\geq 2041\text{ }^{\circ}\text{K}$ $\geq 3674\text{ }^{\circ}\text{R}$	

## Input Ranges, Sensor Types, and Thresholds

Input Type	Range or Sensor Type	Underrange Threshold	Overrange Threshold	Deadband <sup>(1)</sup>
Thermostat	S	$\leq -50\text{ }^{\circ}\text{C}$ $\leq -58\text{ }^{\circ}\text{F}$ $\leq 223\text{ }^{\circ}\text{K}$ $\leq 402\text{ }^{\circ}\text{R}$	$\geq 1768\text{ }^{\circ}\text{C}$ $\geq 3215\text{ }^{\circ}\text{F}$ $\geq 2041\text{ }^{\circ}\text{K}$ $\geq 3674\text{ }^{\circ}\text{R}$	—
	T	$\leq -270\text{ }^{\circ}\text{C}$ $\leq -454\text{ }^{\circ}\text{F}$ $\leq 3\text{ }^{\circ}\text{K}$ $\leq 6\text{ }^{\circ}\text{R}$	$\geq 400\text{ }^{\circ}\text{C}$ $\geq 752\text{ }^{\circ}\text{F}$ $\geq 673\text{ }^{\circ}\text{K}$ $\geq 1212\text{ }^{\circ}\text{R}$	
	TXK/XK(L)	$\leq -200\text{ }^{\circ}\text{C}$ $\leq -328\text{ }^{\circ}\text{F}$ $\leq 73\text{ }^{\circ}\text{K}$ $\leq 132\text{ }^{\circ}\text{R}$	$\geq 800\text{ }^{\circ}\text{C}$ $\geq 1472\text{ }^{\circ}\text{F}$ $\geq 1073\text{ }^{\circ}\text{K}$ $\geq 1932\text{ }^{\circ}\text{R}$	
	D	$\leq 0.00\text{ }^{\circ}\text{C}$ $\leq 32\text{ }^{\circ}\text{F}$ $\leq 273\text{ }^{\circ}\text{K}$ $\leq 492\text{ }^{\circ}\text{R}$	$\geq 2320\text{ }^{\circ}\text{C}$ $\geq 4208\text{ }^{\circ}\text{F}$ $\geq 2593\text{ }^{\circ}\text{K}$ $\geq 4668\text{ }^{\circ}\text{R}$	

(1) The module has alarm deadband values for each range. The deadband keeps the alarm status bit set, despite the removal of the alarm condition. 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. For more information, see [Alarm Deadband](#).

(2) Underrange is set at  $\leq 3\text{ mA}$ , but the *I:Chxx.Data* tag reports values as low as 0.0 mA. The condition is clamped when the signal reaches 3 mA.

**IMPORTANT** The Disable All Alarms feature, does not disable the underrange/overrange detection feature.

The Disable All Alarms feature disables **alarms** on the module. Underrange/Overrange detection is not an alarm. It is an indicator that channel data has gone beyond the absolute maximum or minimum, 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

For more information, see [Module Tags](#).

## Process Alarms

Process alarms alert you when the module has exceeded configured high or low limits for **each channel**. The following are the user-configurable, alarm trigger points:

- 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 Process Alarms, see [Alarms](#).

## 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 can be in signal units or engineering units.

For example, consider a channel that uses the Current (mA) input type, the 4 mA...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 EU, 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.

To set the Process Alarm trigger points, see [Alarms](#).

## Latch Alarms

Select the Latch Process Alarms checkbox on the *Alarms* page to latch the process alarms. For more information, see [Alarms](#).

## Unlatch Alarms

---

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

---

Once an alarm is latched, you must manually unlatch it. To unlatch an alarm, change the output tag for that alarm.

For example, change the *O.Chxx.LAlarmUnlatch* tag for the low alarm that you want to unlatch from 0 to 1.

---

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

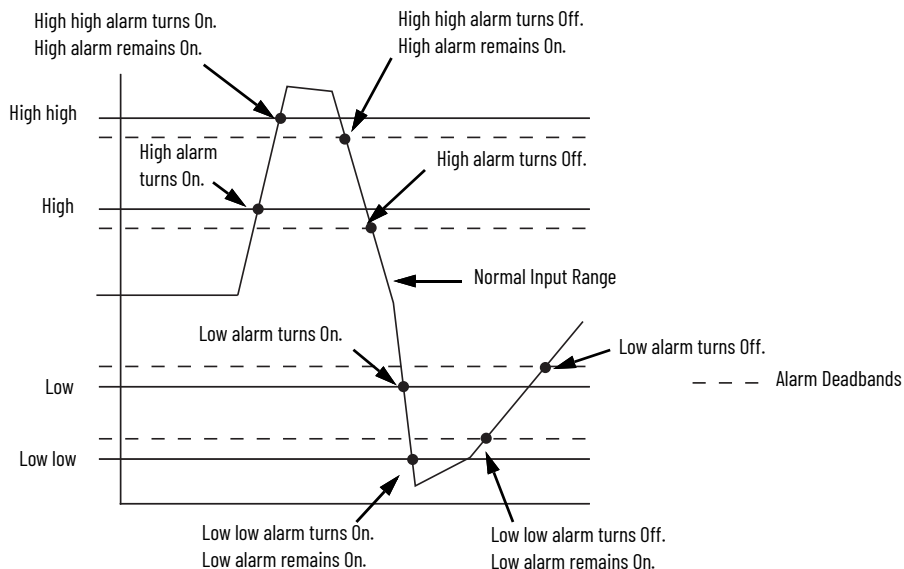
---

For more information on how to use the module tags, see [Module Tags](#).

## Alarm Deadband

You can configure an alarm deadband to work with these alarms. The deadband keeps the process alarm status bit set, despite the removal of the alarm condition, 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, alarm latching is disabled; therefore, each alarm turns Off when the condition that caused it to set ceases to exist.



To set the Alarm Deadband, see [Alarms](#).

## 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 set to 1.

You can enable or disable Rate Alarm Latching on each channel. To enable the Rate Alarm, see [Alarms](#).

Once the Rate Alarm is latched, you must change the *O.Chxx.RateAlarmUnlatch* tag to 1.

You can unlatch the alarm at any point in the system operation. If you change the unlatch tag to 1 and the triggering condition remains, the alarm is immediately latched again.

We suggest that you unlatch the Rate Alarm only after the rate of change between input samples has returned below the Rate Alarm Limit value.



## Sensor Types

This module supports multiple sensor types. The input type configuration dictates the available selections.

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

To select a Sensor Type for a channel, see [Chxx](#).

### Sensor Type Temperature Limits

The 5069-IY4 lets you set temperature limits when the module uses the RTD or Thermocouple input types.

The choices that are made during module configuration for the following parameters determine Sensor Type temperature limits:

- Input Type
- Sensor Type
- Temperature Units

To set the parameters that affect the temperature limits, see [Chxx](#).

**IMPORTANT** When you configure the Input Type, Sensor Type, and Temperature Units, the Scaling parameters are automatically set on the Chxx page in the Module Properties. They cannot be changed manually.  
The Low Signal value equals the Low Engineering value. The High Signal value equals the High Engineering value.

For example, if you configure a channel with these parameters:

- Input Type = RTD
- Sensor Type = 120 Ω NI 672
- Temperature Units = Celsius

The Scaling parameters are set as shown:

Scaling

Engineering Units:

EU

High Signal:

320.0000

°C

=

High Engineering:

320.0000

EU

Low Signal:

-80.0000

°C

=

Low Engineering:

-80.0000

EU

## Temperature Limits for RTD and Thermocouple Sensor Types

Input Type	Sensor Type	Temperature Range Limits
RTD	100 $\Omega$ PT 385 200 $\Omega$ PT 385 500 $\Omega$ PT 385 1000 $\Omega$ PT 385	-200...+870 °C -328...+1598 °F 73...1143 °K 132...2058 °R
	100 $\Omega$ PT 3916 200 $\Omega$ PT 3916 500 $\Omega$ PT 3916 1000 $\Omega$ PT 3916	-200...+630 °C -328...+1166 °F 73...903 °K 132...1626 °R
	10 $\Omega$ CU 427	-200...+260 °C -328...+500 °F 73...533 °K 132...960 °R
	120 $\Omega$ NI 672	-80...+320 °C -112...+608 °F 193...593 °K 348...1068 °R
	100 $\Omega$ NI 618 120 $\Omega$ NI 618 200 $\Omega$ NI 618 500 $\Omega$ NI 618	-60...+250 °C -76...+482 °F 213...523 °K 384...942 °R
Thermocouple (mV)	B	21...1820 °C 68...3308 °F 293...2093 °K 528...3768 °R
	C	0...2320 °C 32...4208 °F 273...2593 °K 492...4668 °R
	D	0...2320 °C 32...4208 °F 273...2593 °K 492...4668 °R
	E	-270...+1000 °C -454...+1832 °F 3...1273 °K 6...2292 °R
	J	-210...+1200 °C -346...+2192 °F 63...1473 °K 114...2652 °R
	K	-270...+1372 °C -454...+2502 °F 3...1645 °K 6...2961 °R
	N	-270...+1300 °C -454...+2372 °F 3...1573 °K 6...2832 °R
	R	-50...+1768 °C -58...+3215 °F 223...2041 °K 402...3674 °R
	S	-50...+1768 °C -58...+3215 °F 223...2041 °K 402...3674 °R
	T	-270...+400 °C -454...+752 °F 3...673 °K 6...1212 °R
	TXK/XK (L)	-200...+800 °C -328...+1472 °F 73...1073 °K 132...1932 °R

## 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 signal 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.

For more information, see [Module Tags](#).

## 10 Ohm Copper Offset

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

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

To set the 10 Ohm Copper Offset, see [Chxx](#).

## Open Wire Detection

Open Wire Detection detects when a wire is disconnected from the channel. You must enable Open Wire Detection in the module configuration.

To enable Open Wire Detection, see [Chxx](#).

On the 5069-IY4 and 5069-IY4K modules, this feature is available in the following modes:

- Current (mA)
- Voltage
- RTD
- Thermocouple

Mode	Cause of Detection	Module Behavior
Current (mA)	The input signal for a channel is below 100 μA.	<ul style="list-style-type: none"><li>• The <i>I:Chxx.OpenWire</i> tag changes to 1.</li><li>• A fault occurs and the <i>I:Chxx.Fault</i> tag is set to 1.</li></ul>
Voltage	The input signal value reaches full-scale of the input range.	<ul style="list-style-type: none"><li>• The <i>I:Chxx.OpenWire</i> tag changes to 1.</li><li>• A fault occurs and the <i>I:Chxx.Fault</i> tag is set to 1.</li></ul>
RTD	A wire is disconnected from the channel.	<ul style="list-style-type: none"><li>• The <i>I:Chxx.OpenWire</i> tag changes to 1.</li><li>• A fault occurs and the <i>I:Chxx.Fault</i> tag is set to 1.</li></ul>
Thermocouple with Sensor Type = Any TC Type	A wire is disconnected from the channel.	<ul style="list-style-type: none"><li>• The <i>I:Chxx.OpenWire</i> tag changes to 1.</li><li>• A fault occurs and the <i>I:Chxx.Fault</i> tag is set to 1.</li></ul>
Thermocouple with Sensor Type = mV	A wire is disconnected from the channel.	<ul style="list-style-type: none"><li>• The <i>I:Chxx.OpenWire</i> tag changes to 1.</li><li>• A fault occurs and the <i>I:Chxx.Fault</i> tag is set to 1.</li></ul>

**IMPORTANT** The Disable All Alarms feature, does not disable the Open Wire Detection feature. The Disable All Alarms feature 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. To disable the Open Wire Detection feature, you must clear the Open Wire Detection checkbox in the module configuration.

## Multiple Temperature Units

You can use these temperature units with the 5069-IY4 and 5069-IY4K modules.

- Celsius
- Kelvin
- Fahrenheit
- Rankine
- Custom

Each channel is individually configurable for its temperature units.

To select the temperature units for a channel, see [Chxx](#).

## Over Temperature Detection

The Over Temperature Detection feature indicates that the temperature of the conditions within which the module is operating are higher than the module operating limits.

When an Over Temperature condition exists, the I.Chxx.OverTemperature tag is set to 1.

## Cold Junction Compensation

When you use the 5069-IY4 and 5069-IY4K modules with a thermocouple input type, the channel must account for the thermoelectric effect of a junction of the thermocouple field wires and the RTB terminals.

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**IMPORTANT** You must use a cold junction compensation (CJC) RTB when a 5069-IY4 or 5069-IY4K modules uses a thermocouple input type. The CJC RTBs account for the thermoelectric effect.

The following CJC RTBs are available for order:

- 5069-RTB14CJC-SPRING
- 5069-RTB14CJC-SCREW

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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 for to measure temperatures accurately. To compensate the input signal from your module accurately, you must use cold junction compensation to account for the increased voltage.

## Cold Junction Disable Option

You can disable cold junction compensation on your 5069-IY4 and 5069-IY4K modules. To disable cold junction compensation, see [CJ Channels](#).

## Fault and Status Reports

The 5069-IY4 and 5069-IY4K modules send fault and status data with channel data to the owner-controller and listen-only controllers. The data is returned via module tags that you can monitor in your Studio 5000 Logix Designer application.

With some exceptions, the 5069-IY4 and 5069-IY4K modules provide the fault and data status in a channel-specific format. The tag names in the following table that include Chxx, where xx is the channel number, represent channel-specific data.

Data Type	Tag Name	Triggering Event That Sets Tag
Fault	ConnectionFaulted <sup>(1)</sup>	The owner-controller loses its connection to the module.
	Chxx.Fault	The channel data quality is bad.
	CJChxx.Fault	The cold junction data quality is bad.
	Chxx.OpenWire	The following conditions: <ul style="list-style-type: none"> <li>The channel uses a <b>Voltage</b> input type in any input range and the input signal value reaches full-scale.</li> <li>The channel uses a <b>Current</b> input type in any input range and the input signal goes below 100 µA. The input signal at the channel is below 100 µA.</li> <li>When the channel uses <b>RTD or Thermocouple</b> input type and a wire is disconnected from the channel.</li> </ul>
	CJChxx.OpenWire	A wire is disconnected from the cold junction.
	Chxx.Underrange	The channel data is beneath the absolute minimum for this channel.
	CJChxx.Underrange	The cold junction at the channel is beneath the absolute minimum for this channel.
	Chxx.Overrange	The channel data is above the absolute maximum for this channel.
	CJChxx.Overrange	The cold junction at the channel is above the absolute maximum for this channel.
Status	RunMode <sup>(1)</sup>	The module is in Run Mode.
	DiagnosticActive	Indicates if any diagnostics are active.
	DiagnosticSequenceCount	A counter that increments when a diagnostic condition occurs or goes away. The counter is a rolling counter that skips 0 on rollovers.
	Chxx.Uncertain	The channel data can be imperfect but it is not known to what degree of inaccuracy.
	CJChxx.Uncertain	The cold junction data can be inaccurate but it is not known to what degree of inaccuracy.
	Chxx.OverTemperature	The module is operating at a higher temperature than its rated operating limits.
	CJChxx.Temperature	Current temperature of the cold junction.
	Chxx.FieldPowerOff	Field power is not present on the channel.
	CJChxx.FieldPowerOff	Field power is not present at the cold junction.
	Chxx.NotANumber	The most recently received data value was not a number.
	Chxx.LLAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>The <i>I.Chxx.Data</i> tag value is less than the <i>C.Chxx.LLAlarmLimit</i> tag value or the alarm is latched.</li> <li>The <i>O.Chxx.LLAlarmEn</i> tag is set.</li> <li>Alarms are enabled for the channel.</li> </ul>
	Chxx.LAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>The <i>I.Chxx.Data</i> tag value is less than the <i>C.Chxx.LAlarmLimit</i> tag value or the alarm is latched.</li> <li>The <i>O.Chxx.LAlarmEn</i> tag is set.</li> <li>Alarms are enabled for the channel.</li> </ul>
	Chxx.HAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>The <i>I.Chxx.Data</i> tag value is greater than the <i>C.Chxx.HAlarmLimit</i> tag value or the alarm is latched.</li> <li>The <i>O.Chxx.HAlarmEn</i> tag is set.</li> <li>Alarms are enabled for the channel.</li> </ul>
	Chxx.HHAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>The <i>I.Chxx.Data</i> tag value is greater than the <i>C.Chxx.HHAlarmLimit</i> tag value or the alarm is latched.</li> <li>The <i>O.Chxx.HHAlarmEn</i> tag is set.</li> <li>Alarms are enabled for the channel.</li> </ul>
	Chxx.RateAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>The absolute change between consecutive channel samples exceeds the <i>C.Chxx.RateAlarmLimit</i> tag value or the alarm is latched.</li> <li>The <i>O.Chxx.RateAlarmEn</i> tag is set.</li> <li>Alarms are enabled for the channel.</li> </ul>
	Chxx.Data	The channel data in scaled engineering units.
	RollingTimestamp <sup>(1)</sup>	A continuously running, 15-bit timer that counts in milliseconds and is not related to the CST. Whenever a module scans its channels, it records the value of RollingTimestamp then. The controller program uses the last two rolling time stamp values to calculate the amount of time between the samples.

(1) This tag provides module-wide data and affects all channels simultaneously.

## Current/Voltage Analog Output Module Features - 5069-OF4, 5069-OF4K, 5069-OF8

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The 5069-OF4, 5069-OF4K, and 5069-OF8 output modules have four and eight non-isolated channels, respectively. Each channel supports connection to the following output types:

- Current
- Voltage

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**IMPORTANT** Remember the following:

- This module also has features that apply to all Compact 5000™ I/O analog modules that are described in [Common Analog I/O Module Features](#).
- You can configure the features that are described in this chapter with the Studio 5000 Logix Designer® application. For more information, see [Configure the Module](#).

---

## Multiple Output Ranges

The Compact 5000 I/O analog output modules offer multiple output ranges. The output type that you choose during module configuration determines the available ranges.

Input Type	Available Output Range
Current (mA)	<ul style="list-style-type: none"><li>• 0...20 mA</li><li>• 4...20 mA</li></ul>
Voltage (V)	<ul style="list-style-type: none"><li>• -10...10V</li><li>• 0...5V</li><li>• 0...10V</li></ul>

To choose an output range, see [Chxx](#).

## Channel Offset

The Channel Offset feature compensates for any known error on the sensor or channel to which the sensor is connected. The value is set in signal 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 4...20 mA output range has an error that results in consistent reports of 8 mA as 7.8 mA, you must set the Channel Offset to 1.25 to account for the error.

To set the channel offset, see [Chxx](#).

## Hold for Initialization

The Hold for Initialization features causes outputs to hold the current state until the value that the controller requests matches the value at the output screw terminal within 0.1% of full-scale. This hold causes a bumpless transfer.

If Hold for Initialization is selected, outputs hold if there is an occurrence of any of the following 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.Ch[x].InHold* tag for a channel indicates that the channel is holding.

To enable Hold for Initialization, see [Chxx](#).

## Connection Fault Handling

You can configure the output module behavior when a connection fault occurs, that is, the connection breaks between the owner-controller and the output module. This table describes the parameters that you can configure.

Behavior	Description	Available Values
Output state immediately after a fault	If a connection fault occurs, the output state changes to the selected option.	<ul style="list-style-type: none"> <li>Hold Last State - the output remains at that value until the following occurs: <ul style="list-style-type: none"> <li>The connection to the owner-controller is re-established.</li> <li>The output returns to normal operation, as defined in the module configuration.</li> </ul> </li> <li>User Defined Value - the output transitions to the set value.</li> </ul>
Fault state duration after a fault	If you configure the output to transition to a specific value after the connection fault, you must define how long the output remains at the specified value before it transitions to a final fault state value.	<ul style="list-style-type: none"> <li>Forever</li> <li>One second</li> <li>Two seconds</li> <li>Five seconds</li> <li>Ten seconds</li> </ul>
Final fault state value		User-defined

Once the connection between the owner-controller and output module is re-established, the output resumes normal operation.

To set the Connection Fault Handling parameters, see [Chxx](#).

## Output Clamping

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

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 more information on limit alarms, see [Clamp Alarming](#).

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

You can disable or latch clamping alarms on a per channel basis. The alarms are disabled by default.

<b>IMPORTANT</b>	<p>Clamp values are in engineering units and are <b>not automatically updated</b> when the scaling high and low engineering units are changed. Failure to update the clamp values can generate a small output signal that could be misinterpreted as a hardware problem.</p> <p>For example, a Compact 5000 I/O analog output module channel that uses a Current (mA) output type with Clamping enabled has the following configuration parameters:</p> <ul style="list-style-type: none"> <li>Scaling values: High Engineering = 100.0000%, Low Engineering = 0.0000%</li> <li>Clamp Limits: High Clamp = 100.0000%, Low Clamp = 0.0000%</li> </ul> <p>If you change the Scaling High Engineering value to 90.0000%, the High Clamp value remains at 100.0000.</p> <p><b>You must change</b> the High Clamp value to 90.0000 to make sure that the application continues to operate as expected.</p>
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To set the high clamp and low clamp parameters, see [Limits](#).



## Clamp Alarming

Clamp Alarming works directly with Output Clamping. When a module receives a data value from the controller that exceeds the limits for clamping, it applies signal values to the clamping limit. In addition, a limit alarm is triggered.

The following tags indicate that a clamping alarm was triggered. That is, the tag is set to 1.

- I.Chxx.LLimitAlarm
- I.Chxx.HLimitAlarm

For more information, see [Module Tags](#).

## Output Ramping/Rate Limiting

Output Ramping limits the speed at which an analog output signal can change. This feature helps to prevent fast transitions in the output from damaging the devices that an output module controls. Output Ramping is also known as Rate Limiting.

Type of Ramping	Description
Ramp in Run mode	When the module is in Run mode, ramping occurs to all new output values at the maximum ramp rate.
Ramp to Program mode	When the current output value changes to the Program value after a Program command is received from the controller.
Ramp to Fault mode	When the current output value changes to the Fault value after a communication fault occurs.

The maximum rate of change in outputs is expressed in engineering units per second (EU/s), is called the maximum ramp rate and set in the Ramp Rate field.

To enable the Ramp in Run mode, see [Limits](#).

To enable the other Output Ramping parameters, you must change these module tags to 1.

- C.Chxx.RampToProg - Ramp to Program Mode
- StateC.Chxx.RampToFault - Ramp to Fault Mode and Final Fault

For more information, see [Module Tags](#).

## Data Echo

Data Echo automatically sends channel data values that match the analog value that was sent to the module's screw terminals.

At the RPI, the output module sends fault and status data, and returns a value that was sent to it by the owner-controller. The echoed value is indicated in the I.Chxx.Data and is represented in engineering units.

For more information, see [Local Output Module to Controller Data Transmission](#).

## No Load Detection

The No Load Detection feature detects when a wire is disconnected from an output channel or a load is missing for each output channel.

**IMPORTANT** This feature is only available when an output operates in Current (mA) mode.

The output range that is used with the output channel determines whether a load is missing. If the load draws less than the minimum level of current in the range, it is considered missing.

For example, if an output channel on a 5069-OF4 module uses in the 4...20 mA range, the presence of a no load condition is detected when the channel is connected to a load that draws less than 4 mA.

No Load Detection is disabled by default on Compact 5000 I/O analog output modules. You can **enable** the No Load Detection feature, in the following ways:

- Check Enable No Load Diagnostic on the Chxx - Limits Configuration page in the Module Properties, where xx is the channel number.
- Change the C.Chxx.NoLoadEn tag to 1, where xx is the channel number.

You can **monitor** for the presence of a No Load condition in the following ways:

- Module tags in your Studio 5000 Logix Designer project.
- Channel diagnostics available in the Module Properties.
- Output channel status indicators.

This table describes what happens when a No Load condition is detected and when it is corrected. To correct the issue, reconnect the disconnected wires or troubleshoot the application to correct the level of current that is driven from the channel.

Attribute	No Load Condition Detected	No Load Condition Corrected
I.Chxx.NoLoad tag value	1	0
No Load diagnostic value	1	0
I/O status indicator state	Flashing red	Steady Yellow

## Short Circuit Protection

Short Circuit Protection helps prevent damage that can result from driving a current from the channel greater than the maximum current level the channel can handle.

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

This table describes what happens when a short circuit is detected and when it is corrected. To correct the issue, remove the short circuit condition.

Attribute	Short Circuit Detected	Short Circuit Corrected
Output behavior	<ul style="list-style-type: none"> <li>• Faults</li> <li>• Electronically limited to 16 mA or less</li> </ul>	Restarts in its commanded state
I.Chxx.ShortCircuit tag value	1	0
Short Circuit diagnostic value	1	0
I/O status indicator state	Flashing red	Steady Yellow

## Over Temperature Detection

The Over Temperature Detection feature indicates that the temperature of the conditions within which the module is operating are higher than the module operating limits.

When an Over Temperature condition exists, the I.Chxx.OverTemperature tag is set to 1.

## Fault and Status Reports

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

With some exceptions, as noted in the following table, the Compact 5000 I/O analog output modules provides the fault and data status in a channel-specific format. The tag names in the following table that include Chxx, where xx is the channel number, represent channel-specific data.

Data Type	Tag Name	Triggering Event That Sets Tag
Fault	ConnectionFaulted <sup>(1)</sup>	The owner-controller loses its connection to the module.
	Chxx.Fault	The channel data quality is bad.
	Chxx.NoLoad	A no load condition exists on the channel.
	Chxx.ShortCircuit	A short circuit condition exists on the channel.
	Chxx.OverTemperature	The module is at a higher temperature than its rated operating limits.
Status	RunMode <sup>(1)</sup>	The module is in Run Mode.
	DiagnosticActive	Indicates if any diagnostics are active.
	DiagnosticSequenceCount	A counter that increments when a diagnostic condition occurs or goes away. The counter is a rolling counter that skips 0 on rollovers.
	Chxx.Uncertain	The channel data can be imperfect.
	Chxx.FieldPowerOff	Field power is not present on the channel.
	Chxx.InHold	The channel is holding until the received channel data is within 0.1% of the current channel data value.
	Chxx.NotANumber	The most recently received data value was not a number.
	Chxx.LLimitAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>Alarms are enabled on this channel.</li> <li>The channel data requested, indicated in the <i>O.Chxx.Data</i> tag, is less than the configured LowLimit or the alarm is latched.</li> </ul>
	Chxx.HLimitAlarm	The following conditions exist: <ul style="list-style-type: none"> <li>Alarms are enabled on this channel.</li> <li>The channel data requested, indicated in the <i>O.Chxx.Data</i> tag, is greater than the configured HighLimit or the alarm is latched.</li> </ul>
	Chxx.RampAlarm	The channel is limited to changing the output at the Maximum Ramp rate, or once was limited and is now latched.
	Chxx.Data	The channel data in scaled engineering units. This data is the Output Data Echo data that is returned from the D/A converter.
	Chxx.RollingTimestamp	A 15-bit time stamp that 'rolls' from 0...32,767 ms. Compatible with existing PID instruction to calculate sample deltas automatically.

(1) This tag provides module-wide data and affects all channels simultaneously.

# Configure the Module

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Configure the Module Parameters	79
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This chapter describes how to configure your Compact 5000™ I/O analog modules in a Studio 5000 Logix Designer® project. You can use the default module configuration or edit the module configuration.

## Before You Begin

You must complete these tasks before you configure the module:

1. Create a Studio 5000 Logix Designer project.
2. If you use the standard modules as remote modules, add a Compact 5000 I/O EtherNet/IP™ adapter to the project.

For more information on how to add a Compact 5000 I/O EtherNet/IP adapter to a Studio 5000 Logix Designer project, see the Compact 5000 EtherNet/IP Adapters User Manual, publication [5069-UM007](#).

## Create a New Module

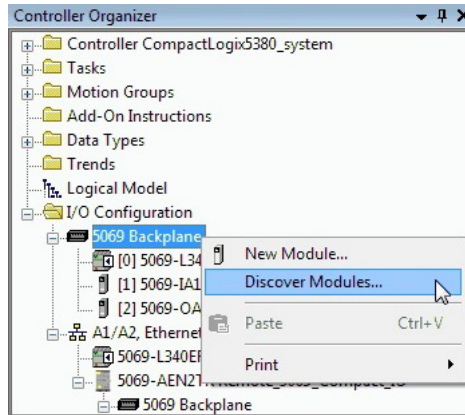
Use one of these methods to add modules to the project.

- [Go Online and Discover Local I/O Modules](#)
- [Remain Offline and Add New Local I/O Modules](#)
- [Go Online and Discover Remote I/O Modules](#)
- [Remain Offline and Add New Remote I/O Modules](#)

### Go Online and Discover Local I/O Modules

To use the Discover Modules method with local I/O modules, complete these steps.

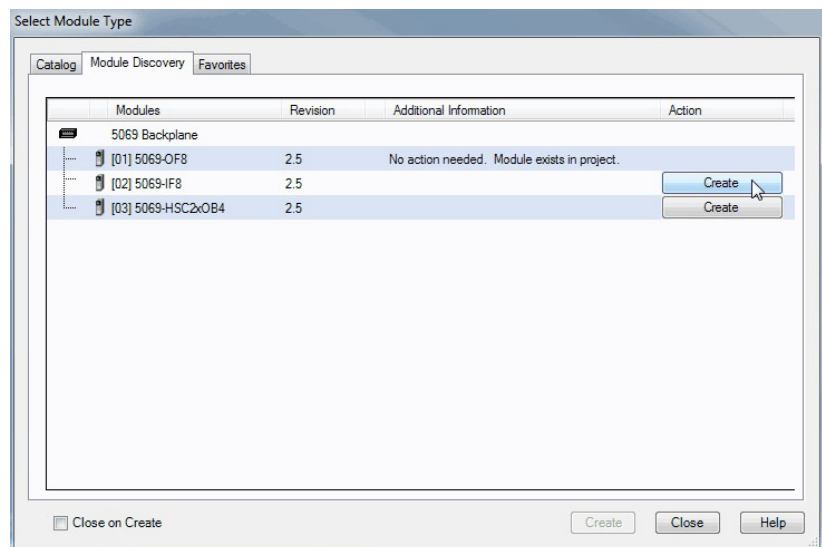
1. Go online with your Studio 5000 Logix Designer application.
2. Right-click the 5069 Backplane and select Discover Modules.



The Studio 5000 Logix Designer application automatically detects available modules that are connected to the backplane and the Select Module Type dialog opens.

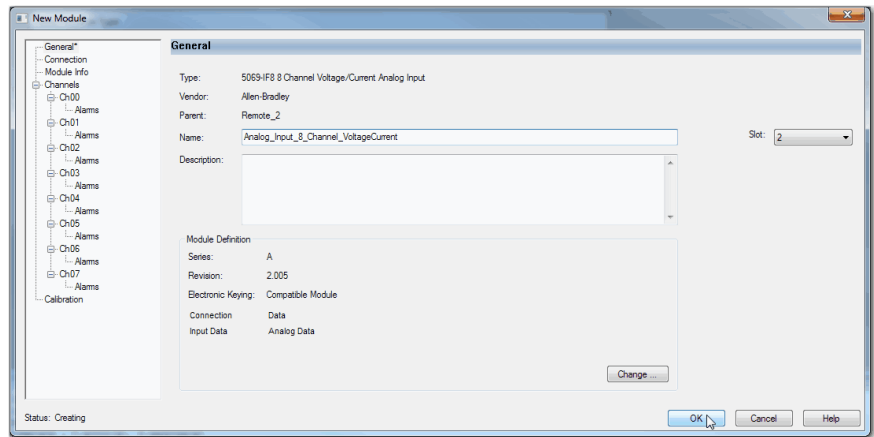


If you have more than one module to add, **do not** select the Close on Create checkbox.

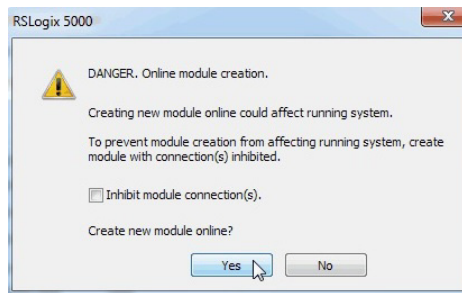


3. To add the discovered module to your project, click Create.

- At the New Module dialog, configure the module properties and click OK.



A warning opens.



If you inhibit the module connection, you must remember to uninhibit the connection later.

- Click Yes.
- To add additional local I/O modules with this method, repeat steps [3...6](#).

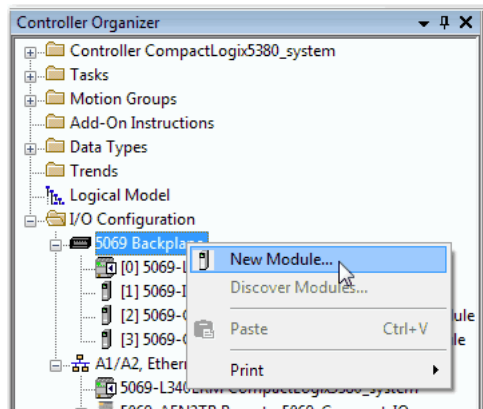
## Remain Offline and Add New Local I/O Modules

To add local I/O modules when the Studio 5000 Logix Designer project is offline, complete these steps.



To add new local I/O modules when the project is online, complete the steps in [Go Online and Discover Local I/O Modules](#), but select New Module instead of Discover Modules in [step 2](#).

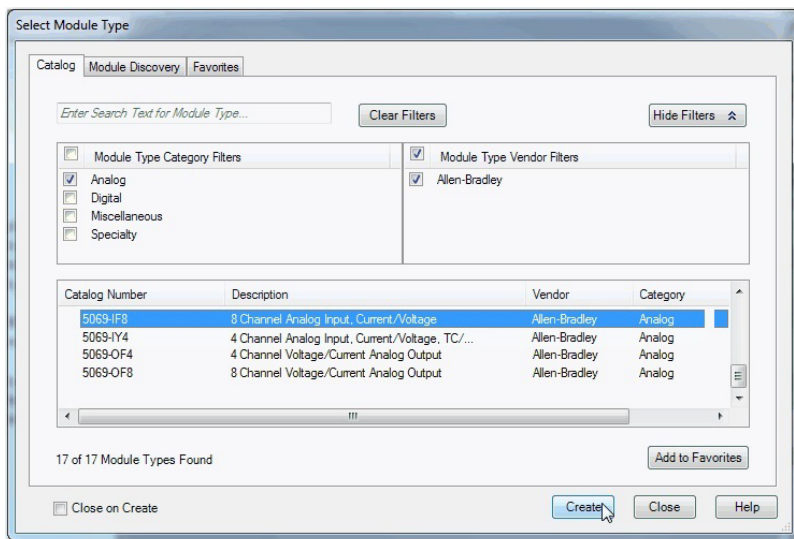
- Right-click the 5069 Backplane and choose New Module.



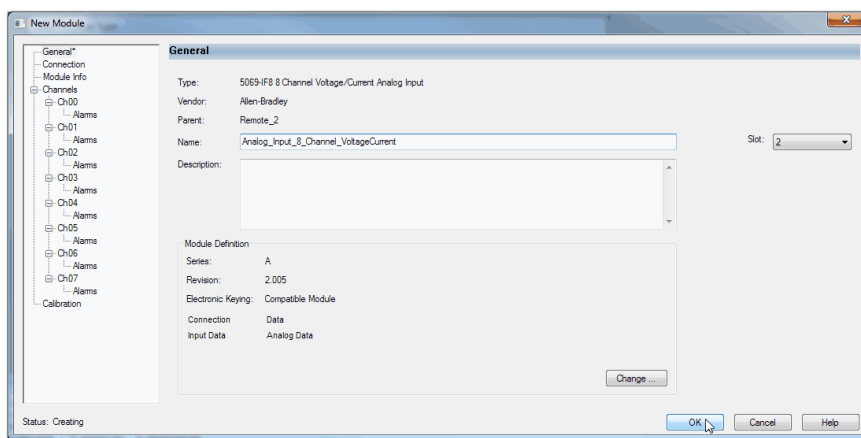
The Select Module Type dialog opens.



If you have more than one module to add, **do not** select the Close on Create checkbox.



2. Navigate to the catalog number for the module that you are adding, and click Create.
3. At the New Module dialog, configure the module properties and click OK.

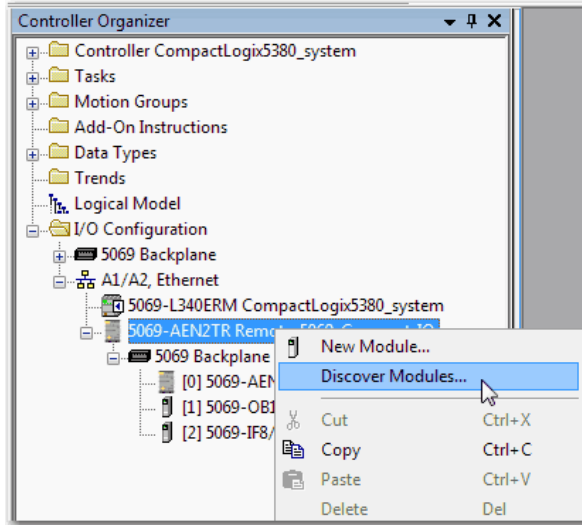


4. To add additional local I/O modules with this method, repeat steps [2...3](#).

## Go Online and Discover Remote I/O Modules

To use the Discover Modules method with remote I/O modules, complete these steps.

1. Go online with your Studio 5000 Logix Designer application.  
The project must include a Compact 5000 I/O EtherNet/IP adapter.
2. Right-click the Compact EtherNet/IP adapter and choose Discover Modules.

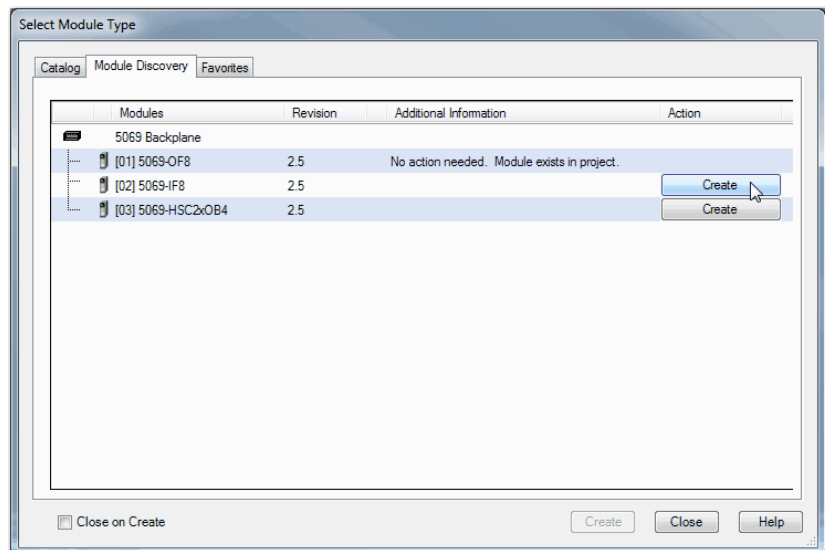


The Studio 5000 Logix Designer application automatically detects available modules that are connected to the adapter and the Select Module Type dialog opens.



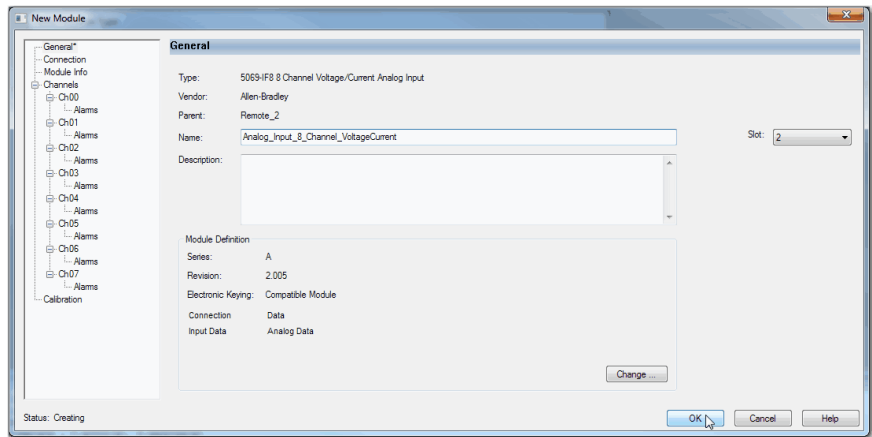
If you have more than one module to add, **do not** select the Close on Create checkbox.

3. At the Select Module Type dialog, click Create to add the discovered module to your project.





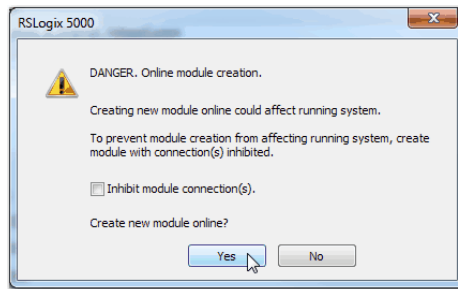
- At the New Module dialog, configure the module properties and click OK.



A warning opens.



If you inhibit the module connection, you must remember to uninhibit the connection later.



- Verify that the Inhibit module connection(s) checkbox is selected and click Yes.
- To add additional local I/O modules with this method, repeat steps 3...5.

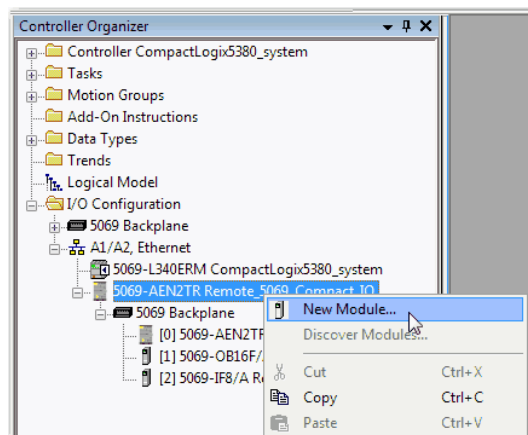
## Remain Offline and Add New Remote I/O Modules

To add remote I/O modules when the Studio 5000 Logix Designer project is offline, complete these steps.



To add new remote I/O modules when the project is online, complete the steps in [Go Online and Discover Remote I/O Modules](#), but select New Module instead of Discover Modules in [step 2](#).

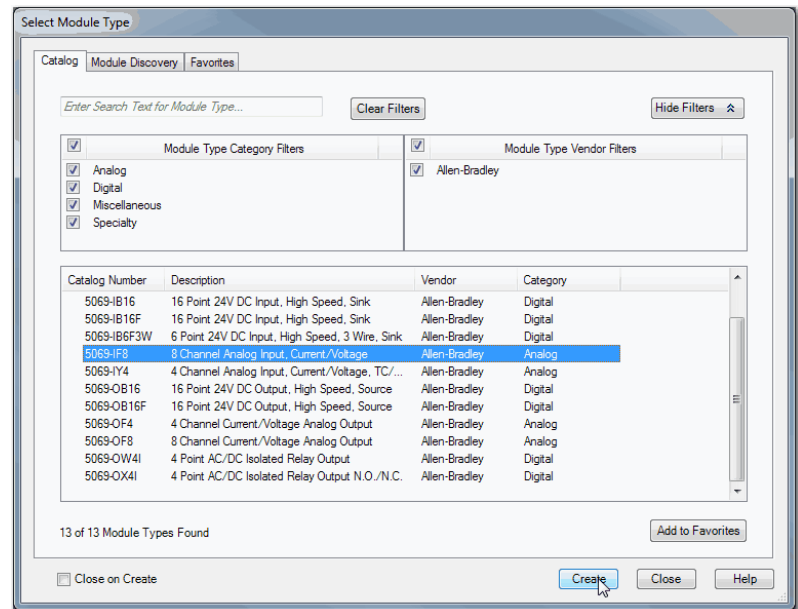
- Right-click the Compact 5000 I/O EtherNet/IP adapter and choose New Module.



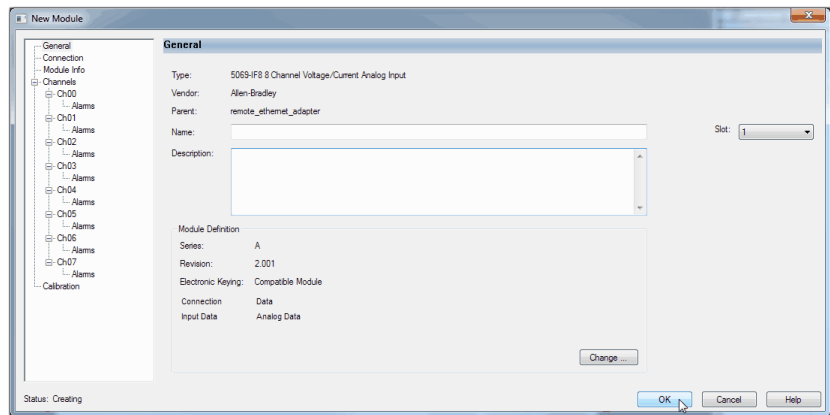
The Select Module Type dialog opens.



If you have more than one module to add, **do not** select the Close on Create checkbox.



2. Navigate to the catalog number for the module that you are adding, and click Create.
3. At the New Module dialog, configure the module properties and click OK.



4. To add additional local I/O modules with this method, repeat steps 2...3.

## Reserve an I/O Module Slot

As described in [Use a 5069-ARM Address Reserve Module to Reserve a Node Address](#), the 5069-ARM address reserve module reserves a module slot in the physical system and in the Studio 5000 Logix Designer project that is configured for the system.

## Add the 5069-ARM Module to the Project

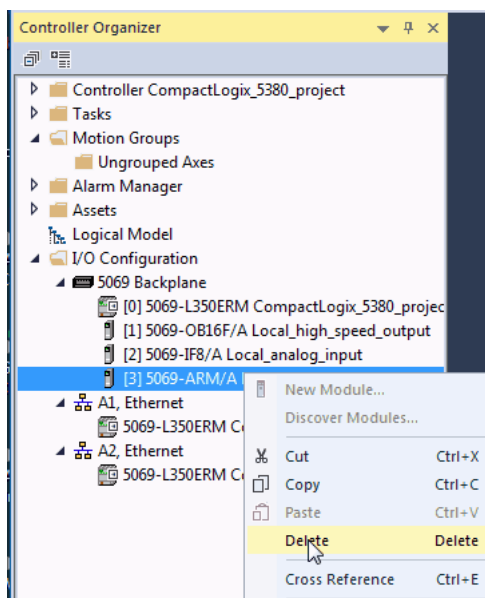
To add an address reserve module to the project, use one of the methods in [Create a New Module](#).

## Delete the 5069-ARM Module From the Project

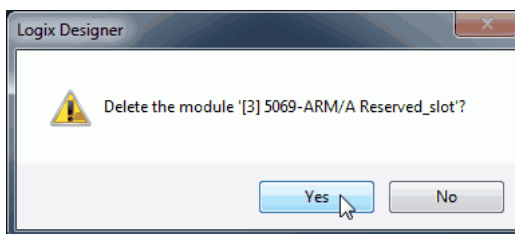
When you remove the 5069-ARM module from the system and install the Compact 5000 I/O module that is intended for that node address, you must also change the Studio 5000 Logix Designer project.

You must delete the 5069-ARM module from the project as these steps show.

1. Right-click the module name and choose Delete.



2. To confirm the module deletion, click Yes on the dialog box.



3. To add the Compact 5000 I/O module that uses the node address that the 5069-ARM module reserved, use one of the methods in [Create a New Module](#).

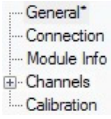
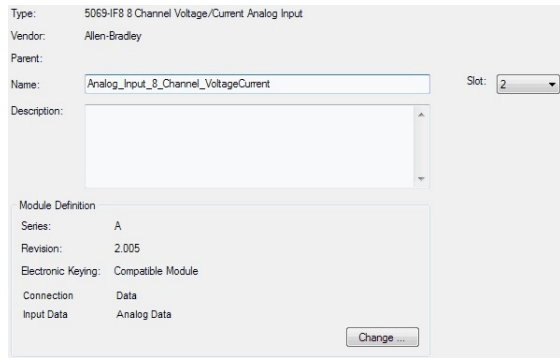
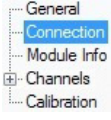
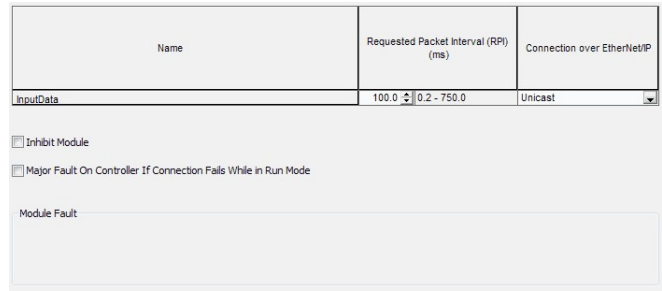
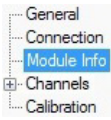
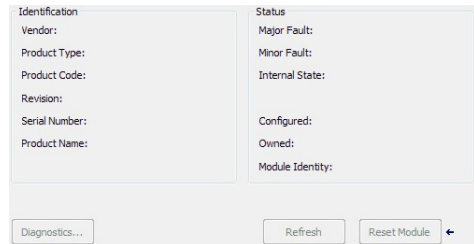
## Configure the Module Parameters

Click the parameter pages in the New Module dialog box to view and change the parameters that are associated with that module.

**IMPORTANT** This chapter shows how to configure the parameters as you add the module to the Studio 5000 Logix Designer project in the New Module dialog box. If you access the parameters after the module has been added to the project, the dialog box is named Module Properties. The Module Properties dialog box shows the same parameters as the New Module dialog box.

### Common Module Parameters

These parameters apply to all Compact 5000 I/O analog modules.

Parameter Page	Available Actions	Configurable Parameters
<b>General</b> 	<ul style="list-style-type: none"> <li>Name the module</li> <li>Assign a slot number (required)</li> <li>Describe the module</li> <li>Access the Module Definition</li> </ul> <p>For more information, see the <a href="#">Module Definition</a> table.</p>	
<b>Connection</b> 	<ul style="list-style-type: none"> <li>Set the RPI rate For more information, see <a href="#">Requested Packet Interval</a>.</li> <li>Set the connection type to use on the EtherNet/IP network</li> <li>Inhibit the module For more information, see <a href="#">Inhibit a Module</a>.</li> <li>Select if a major or minor fault occurs when there is a connection failure while the controller is in Run mode</li> </ul> <p><b>TIP:</b> Use the Module Fault box to help troubleshoot the module when the project is online.</p>	
<b>Module Info</b> 	<p>These actions are available when the project is online.</p> <ul style="list-style-type: none"> <li>View module information and status</li> <li>Access module diagnostics</li> <li>Refresh the data on the screen</li> <li>Reset the module</li> </ul>	

Module Definition

Click Change... on the General parameters page to access the configurable module definition parameters.

Series: 

A

Revision: 

1

1

Electronic Keying: 

Compatible Module

Connection: 

Data

Input Data: 

Analog Data

Parameter	Description	Available Selections <sup>(1)</sup>
Series	Module hardware series	Module-specific
Revision	Module firmware revision, including major and minor revision levels	Module-specific
Electronic Keying	Software method by which you reduce the possibility of using the wrong device in a control system. For more information, see the following: <ul style="list-style-type: none"><li><a href="#">Electronic Keying</a></li><li>Electronic Keying in Logix 5000™ Control Systems Application Technique, publication <a href="#">LOGIX-AT001</a></li></ul>	<ul style="list-style-type: none"><li>Exact Match</li><li>Compatible Module</li><li>Disable Keying</li></ul>
Connection	Determines the following for the module type that you configure: <ul style="list-style-type: none"><li>Available configuration parameters</li><li>Data type transferred between the module and the controller</li><li>Which tags are generated when configuration is complete</li></ul>	<ul style="list-style-type: none"><li>Data with Calibration Data</li><li>Listen Only<sup>(2)</sup></li></ul>
Input Data - Input modules only	All available configuration, input, and output data for the input module that is being defined.	<ul style="list-style-type: none"><li>Analog Data</li></ul>
Output Data— Output module only	All available configuration, input, and output data for the output module that is being defined.	<ul style="list-style-type: none"><li>Analog Data</li><li>None—This choice is available only if you use the Listen Only Connection choice.</li></ul>

(1) The range of available choices varies by module type.

(2) The controller establishes communication with the module but does not send any configuration or output data to the module. A full input data connection is established but relies on the connection between the owner-controller and the module.

## Module-specific Parameters

Some parameters are specific to the module type. This table describes the additional parameters and the modules to which these parameters apply.

**IMPORTANT** If you use the Listen Only connection type, the Channels and Calibration pages are not available.

### Module-specific Parameters

Parameter Page	Description	Modules	Configurable Parameters																																																																																																																																																																																																																																																																																																																																																																																																																										
<div>Channels</div> <div><div>General</div><div>Connection</div><div>Module Info</div><div>Channels*</div><div>Calibration</div></div>	<div>Overview of the configuration values for all module channels. The values for each parameter indicate how each channel is configured on the Chxx page.</div>	5069-IF8	<table><tr><th></th><th>Channel</th><th>Disable Channel</th><th>Input Range</th><th>High Signal</th><th>Low Signal</th><th>Units</th><th>High Engineering</th><th>Low Engineering</th><th>Units</th><th>Digital Filter (ms)</th><th>Disable Alarms</th><th>Calibrate</th></tr><tr><td>*</td><td>0</td><td><input type="checkbox"/></td><td>0mA to 20mA</td><td>20.0</td><td>4.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td>0</td><td><input type="checkbox"/></td><td></td></tr><tr><td>*</td><td>1</td><td><input type="checkbox"/></td><td>4mA to 20mA</td><td>20.0</td><td>4.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td>0</td><td><input type="checkbox"/></td><td></td></tr><tr><td>*</td><td>2</td><td><input type="checkbox"/></td><td>-10V to 10V</td><td>10.0</td><td>-10.0</td><td>V</td><td>10.0</td><td>-10.0</td><td>V</td><td>0</td><td><input type="checkbox"/></td><td></td></tr><tr><td>*</td><td>3</td><td><input type="checkbox"/></td><td>0V to 5V</td><td>5.0</td><td>0.0</td><td>V</td><td>5.0</td><td>0.0</td><td>V</td><td>0</td><td><input type="checkbox"/></td><td></td></tr><tr><td>*</td><td>4</td><td><input checked="" type="checkbox"/></td><td>4mA to 20mA</td><td>20.0</td><td>4.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td>0</td><td><input checked="" type="checkbox"/></td><td></td></tr><tr><td>*</td><td>5</td><td><input checked="" type="checkbox"/></td><td>4mA to 20mA</td><td>20.0</td><td>4.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td>0</td><td><input checked="" type="checkbox"/></td><td></td></tr><tr><td>*</td><td>6</td><td><input checked="" type="checkbox"/></td><td>4mA to 20mA</td><td>20.0</td><td>4.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td>0</td><td><input checked="" type="checkbox"/></td><td></td></tr><tr><td>*</td><td>7</td><td><input checked="" type="checkbox"/></td><td>4mA to 20mA</td><td>20.0</td><td>4.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td>0</td><td><input checked="" type="checkbox"/></td><td></td></tr></table>		Channel	Disable Channel	Input Range	High Signal	Low Signal	Units	High Engineering	Low Engineering	Units	Digital Filter (ms)	Disable Alarms	Calibrate	*	0	<input type="checkbox"/>	0mA to 20mA	20.0	4.0	mA	100.0	0.0	%	0	<input type="checkbox"/>		*	1	<input type="checkbox"/>	4mA to 20mA	20.0	4.0	mA	100.0	0.0	%	0	<input type="checkbox"/>		*	2	<input type="checkbox"/>	-10V to 10V	10.0	-10.0	V	10.0	-10.0	V	0	<input type="checkbox"/>		*	3	<input type="checkbox"/>	0V to 5V	5.0	0.0	V	5.0	0.0	V	0	<input type="checkbox"/>		*	4	<input checked="" type="checkbox"/>	4mA to 20mA	20.0	4.0	mA	100.0	0.0	%	0	<input checked="" type="checkbox"/>		*	5	<input checked="" type="checkbox"/>	4mA to 20mA	20.0	4.0	mA	100.0	0.0	%	0	<input checked="" type="checkbox"/>		*	6	<input checked="" type="checkbox"/>	4mA to 20mA	20.0	4.0	mA	100.0	0.0	%	0	<input checked="" type="checkbox"/>		*	7	<input checked="" type="checkbox"/>	4mA to 20mA	20.0	4.0	mA	100.0	0.0	%	0	<input checked="" type="checkbox"/>		5069-IY4, 5069-IY4K	<table><tr><th></th><th>Channel</th><th>Disable Channel</th><th>Input Range</th><th>High Signal</th><th>Low Signal</th><th>Units</th><th>High Engineering</th><th>Low Engineering</th><th>Units</th><th>Digital Filter (ms)</th><th>Disable Alarms</th><th>Calibration Status</th></tr><tr><td>*</td><td>0</td><td><input type="checkbox"/></td><td>4mA to 20mA</td><td>20.0</td><td>4.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td>0</td><td><input type="checkbox"/></td><td></td></tr><tr><td>*</td><td>1</td><td><input type="checkbox"/></td><td>-10V to 10V</td><td>10.0</td><td>-10.0</td><td>V</td><td>10.0</td><td>-10.0</td><td>mV</td><td>0</td><td><input type="checkbox"/></td><td></td></tr><tr><td>*</td><td>2</td><td><input type="checkbox"/></td><td>-100mV to 100mV</td><td>100.0</td><td>-100.0</td><td>mV</td><td>100.0</td><td>-100.0</td><td>mV</td><td>0</td><td><input type="checkbox"/></td><td></td></tr><tr><td>*</td><td>3</td><td><input type="checkbox"/></td><td>4mA to 20mA</td><td>20.0</td><td>4.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td>0</td><td><input type="checkbox"/></td><td></td></tr></table>		Channel	Disable Channel	Input Range	High Signal	Low Signal	Units	High Engineering	Low Engineering	Units	Digital Filter (ms)	Disable Alarms	Calibration Status	*	0	<input type="checkbox"/>	4mA to 20mA	20.0	4.0	mA	100.0	0.0	%	0	<input type="checkbox"/>		*	1	<input type="checkbox"/>	-10V to 10V	10.0	-10.0	V	10.0	-10.0	mV	0	<input type="checkbox"/>		*	2	<input type="checkbox"/>	-100mV to 100mV	100.0	-100.0	mV	100.0	-100.0	mV	0	<input type="checkbox"/>		*	3	<input type="checkbox"/>	4mA to 20mA	20.0	4.0	mA	100.0	0.0	%	0	<input type="checkbox"/>		5069-OF4, 5069-OF4K	<table><tr><th></th><th>Channel</th><th>Disable Channel</th><th>Output Range</th><th colspan="2">Output State During</th><th>High Signal</th><th>Low Signal</th><th>Units</th><th>High Engineering</th><th>Low Engineering</th><th>Units</th><th>Calibrate</th></tr><tr><th></th><th></th><th></th><th></th><th>Program Mode</th><th>Fault Mode</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></tr><tr><td>*</td><td>0</td><td><input type="checkbox"/></td><td>4mA to 20mA</td><td>Hold Last State</td><td>Hold Last State</td><td>20.0</td><td>4.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td></td></tr><tr><td>*</td><td>1</td><td><input type="checkbox"/></td><td>0mA to 20mA</td><td>User Defined Value</td><td>User Defined Value</td><td>20.0</td><td>0.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td></td></tr><tr><td>*</td><td>2</td><td><input type="checkbox"/></td><td>-10V to 10V</td><td>Hold Last State</td><td>Hold Last State</td><td>10.0</td><td>-10.0</td><td>V</td><td>10.0</td><td>-10.0</td><td>V</td><td></td></tr><tr><td>*</td><td>3</td><td><input type="checkbox"/></td><td>0V to 5V</td><td>User Defined Value</td><td>User Defined Value</td><td>5.0</td><td>0.0</td><td>V</td><td>5.0</td><td>0.0</td><td>V</td><td></td></tr></table>		Channel	Disable Channel	Output Range	Output State During		High Signal	Low Signal	Units	High Engineering	Low Engineering	Units	Calibrate					Program Mode	Fault Mode								*	0	<input type="checkbox"/>	4mA to 20mA	Hold Last State	Hold Last State	20.0	4.0	mA	100.0	0.0	%		*	1	<input type="checkbox"/>	0mA to 20mA	User Defined Value	User Defined Value	20.0	0.0	mA	100.0	0.0	%		*	2	<input type="checkbox"/>	-10V to 10V	Hold Last State	Hold Last State	10.0	-10.0	V	10.0	-10.0	V		*	3	<input type="checkbox"/>	0V to 5V	User Defined Value	User Defined Value	5.0	0.0	V	5.0	0.0	V		5069-OF8	<table><tr><th></th><th>Channel</th><th>Disable Channel</th><th>Output Type</th><th>Output Range</th><th colspan="2">Output State During</th><th>High Signal</th><th>Low Signal</th><th>Units</th><th>High Engineering</th><th>Low Engineering</th><th>Units</th><th>Calibrate</th></tr><tr><th></th><th></th><th></th><th></th><th></th><th>Program Mode</th><th>Fault Mode</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></tr><tr><td>*</td><td>0</td><td><input type="checkbox"/></td><td>Current</td><td>0mA to 20mA</td><td>Hold Last State</td><td>Hold Last State</td><td>20.0</td><td>0.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td></td></tr><tr><td>*</td><td>1</td><td><input type="checkbox"/></td><td>Current</td><td>4mA to 20mA</td><td>Hold Last State</td><td>Hold Last State</td><td>20.0</td><td>4.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td></td></tr><tr><td>*</td><td>2</td><td><input type="checkbox"/></td><td>Voltage</td><td>-10V to 10V</td><td>Hold Last State</td><td>Hold Last State</td><td>10.0</td><td>-10.0</td><td>V</td><td>10.0</td><td>-10.0</td><td>V</td><td></td></tr><tr><td>*</td><td>3</td><td><input type="checkbox"/></td><td>Voltage</td><td>0V to 5V</td><td>Hold Last State</td><td>Hold Last State</td><td>5.0</td><td>0.0</td><td>V</td><td>5.0</td><td>0.0</td><td>V</td><td></td></tr><tr><td>*</td><td>4</td><td><input checked="" type="checkbox"/></td><td>Current</td><td>0mA to 20mA</td><td>Hold Last State</td><td>Hold Last State</td><td>20.0</td><td>0.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td></td></tr><tr><td>*</td><td>5</td><td><input checked="" type="checkbox"/></td><td>Current</td><td>0mA to 20mA</td><td>Hold Last State</td><td>Hold Last State</td><td>20.0</td><td>0.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td></td></tr><tr><td>*</td><td>6</td><td><input checked="" type="checkbox"/></td><td>Current</td><td>0mA to 20mA</td><td>Hold Last State</td><td>Hold Last State</td><td>20.0</td><td>0.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td></td></tr><tr><td>*</td><td>7</td><td><input checked="" type="checkbox"/></td><td>Current</td><td>0mA to 20mA</td><td>Hold Last State</td><td>Hold Last State</td><td>20.0</td><td>0.0</td><td>mA</td><td>100.0</td><td>0.0</td><td>%</td><td></td></tr></table>		Channel	Disable Channel	Output Type	Output Range	Output State During		High Signal	Low Signal	Units	High Engineering	Low Engineering	Units	Calibrate						Program Mode	Fault Mode								*	0	<input type="checkbox"/>	Current	0mA to 20mA	Hold Last State	Hold Last State	20.0	0.0	mA	100.0	0.0	%		*	1	<input type="checkbox"/>	Current	4mA to 20mA	Hold Last State	Hold Last State	20.0	4.0	mA	100.0	0.0	%		*	2	<input type="checkbox"/>	Voltage	-10V to 10V	Hold Last State	Hold Last State	10.0	-10.0	V	10.0	-10.0	V		*	3	<input type="checkbox"/>	Voltage	0V to 5V	Hold Last State	Hold Last State	5.0	0.0	V	5.0	0.0	V		*	4	<input checked="" type="checkbox"/>	Current	0mA to 20mA	Hold Last State	Hold Last State	20.0	0.0	mA	100.0	0.0	%		*	5	<input checked="" type="checkbox"/>	Current	0mA to 20mA	Hold Last State	Hold Last State	20.0	0.0	mA	100.0	0.0	%		*	6	<input checked="" type="checkbox"/>	Current	0mA to 20mA	Hold Last State	Hold Last State	20.0	0.0	mA	100.0	0.0	%		*	7	<input checked="" type="checkbox"/>	Current	0mA to 20mA	Hold Last State	Hold Last State	20.0	0.0	mA	100.0	0.0	%		5069-IF8, 5069-IY4, 5069-IY4K	<div><div><div><input type="checkbox"/> Disable Channel</div><div>Input Type: <div>Current (mA)</div></div><div>Input Range: <div>0mA to 20mA</div></div></div><div><div><input type="checkbox"/> Disable Channel</div><div>Input Type: <div>Current (mA)</div></div><div>Sensor Type: <div></div></div><div>Input Range: <div>4mA to 20mA</div></div><div>Temperature Units: <div></div></div><div>10 Ω Copper Offset: <div>0.00</div> Ω</div></div><div><div>Scaling</div><div>Engineering Units: <div>%</div></div><div>High Signal: <div>20.0</div> mA = <div>100.0</div> %</div><div>Low Signal: <div>4.0</div> mA = <div>0.0</div> %</div></div><div><div>Filters</div><div>Notch Filter: <div>60 Hz</div></div><div>Digital Filter: <div>0</div> ms</div></div><div><div>Diagnostics</div><div><input type="checkbox"/> Open Wire Detection</div></div><div><div>Diagnostics...</div><div>Diagnostics...</div></div></div>	5069-OF4, 5069-OF4K, 5069-OF8	<div><div><div><input type="checkbox"/> Disable Channel</div><div>Output Type: <div>Current (mA)</div></div><div>Output Range: <div>4mA to 20mA</div></div><div>Channel Offset: <div>0.0</div> %</div><div><input type="checkbox"/> Hold for Initialization</div></div><div><div>Output State in Program Mode</div><div><div><input checked="" type="radio"/> Hold Last State</div><div><input type="radio"/> User Defined Value: <div>0.0</div> %</div></div></div><div><div>When Communication Fails in Program Mode</div><div><div><input checked="" type="radio"/> Leave outputs in Program Mode state</div><div><input type="radio"/> Change outputs to Fault Mode state</div></div></div><div><div>Diagnostics...</div></div></div> <div><div><div>Scaling</div><div>Engineering Units: <div>%</div></div><div>High Signal: <div>20.0</div> mA = <div>100.0</div> %</div><div>Low Signal: <div>4.0</div> mA = <div>0.0</div> %</div></div><div><div>Output State in Fault Mode</div><div><div><input checked="" type="radio"/> Hold Last State</div><div><input type="radio"/> User Defined Value: <div>0.0</div> %</div></div><div>Fault State Duration: <div>Forever</div></div><div>Final Fault State Value: <div>0.0</div> %</div></div></div>
			Channel	Disable Channel	Input Range	High Signal	Low Signal	Units	High Engineering	Low Engineering	Units	Digital Filter (ms)	Disable Alarms	Calibrate																																																																																																																																																																																																																																																																																																																																																																																																															
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<div>Chxx</div> <div><div>General</div><div>Connection</div><div>Module Info</div><div>Channels*</div><div>Ch00</div></div>	<div>The configuration options available for the channel, where xx represents the channel number. Scaling and Filter options correspond to the type and range of the channel. You can also disable the channel on this page.</div>																																																																																																																																																																																																																																																																																																																																																																																																																												

Module-specific Parameters

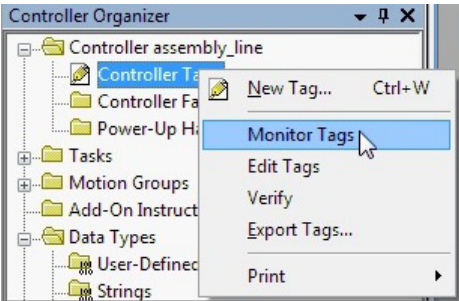
Parameter Page	Description	Modules	Configurable Parameters																																																																																				
<div>Alarms</div> <div><div>General</div><div>Connection</div><div>Module Info</div><div>Channels*</div><div>Ch00</div><div>Alarms</div></div>	Each input channel has an associated alarm. The Signal Units correspond to the input type and range for the channel. You can also disable all alarms on this page.	5069-IF8, 5069-IY4, 5069-IY4K	<div><div><div><div><div><input type="checkbox"/> Disable All Alarms</div></div><div><div>Process Alarming</div><div><div><input type="checkbox"/> Latch Process Alarms</div><div>High High Limit: 100.0 %</div><div>High Limit: 100.0 %</div><div>Low Limit: 0.0 %</div><div>Low Low Limit: 0.0 %</div><div>Deadband: 0.0 %</div></div><div><div>Rate Alarming</div><div><div><input type="checkbox"/> Enable Rate Alarm Latching</div><div>Rate Alarm Limit: 0.0 %/s</div></div></div></div></div><div><div>Signal Units</div><div>mA</div><div>Engineering Units</div><div>%</div><div>20.0</div><div>100.0</div><div>4.0</div><div>0.0</div></div></div></div>																																																																																				
<div>Limits</div> <div><div>General</div><div>Connection</div><div>Module Info</div><div>Channels*</div><div>Ch00</div><div>Limits</div></div>	Each output channel has an associated limit. The Signal Units options correspond to the input type and range for the channel.	5069-OF4, 5069-OF4K, 5069-OF8	<div><div><div><div><div>Output Clamping</div><div>High Clamp: 100.0 %</div><div>Low Clamp: 0.0 %</div><div>Clamp Alarming</div><div><div><input type="checkbox"/> Disable All Alarms</div><div><input type="checkbox"/> Latch Clamp Alarms</div></div><div><div>Output Ramping</div><div><div><input type="checkbox"/> Ramp in Run Mode</div><div><input type="checkbox"/> Ramp to Program Mode</div><div><input type="checkbox"/> Ramp to Fault Mode and Final Fault State</div><div>Ramp Rate: 0.0 %/s</div><div><input type="checkbox"/> Latch Rate Alarm</div></div><div><div>Diagnostics</div><div><input type="checkbox"/> Enable No Load Diagnostic</div></div></div></div><div><div>Signal Units</div><div>mA</div><div>Engineering Units</div><div>%</div><div>20.0</div><div>100.0</div><div>4.0</div><div>0.0</div></div></div></div></div>																																																																																				
<div>CJ Channels</div> <div><div>General</div><div>Connection</div><div>Module Info</div><div>Channels</div><div>CJ Channels</div><div>Calibration</div></div>	Configuration for a Thermocouple input type.	5069-IY4, 5069-IY4K	<table><tr><th></th><th>Cold Junction Channel</th><th>Disable Channel</th><th>Sensor Offset (°C)</th><th>Remote Termination</th></tr><tr><td></td><td>CJCh00</td><td><input type="checkbox"/></td><td>0.0</td><td><input type="checkbox"/></td></tr><tr><td></td><td>CJCh01</td><td><input type="checkbox"/></td><td>0.0</td><td><input type="checkbox"/></td></tr></table>		Cold Junction Channel	Disable Channel	Sensor Offset (°C)	Remote Termination		CJCh00	<input type="checkbox"/>	0.0	<input type="checkbox"/>		CJCh01	<input type="checkbox"/>	0.0	<input type="checkbox"/>																																																																					
	Cold Junction Channel	Disable Channel	Sensor Offset (°C)	Remote Termination																																																																																			
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	CJCh01	<input type="checkbox"/>	0.0	<input type="checkbox"/>																																																																																			
<div>Calibration</div> <div><div>General</div><div>Connection</div><div>Module Info</div><div>Channels</div><div>CJ Channels</div><div>Calibration</div></div>	Provides calibration information for all channels on the module. Calibration information is not displayed when the Logic Designer application is offline. For more information, see <a href="#">Calibrate the Module</a> .	5069-IF8, 5069-OF8  5069-IY4, 5069-IY4K, 5069-OF4, 5069-OF4K	<div><table><tr><th>Channel</th><th>Calibration Range</th><th>Calibration Gain</th><th>Offset</th><th>Last Calibration Date</th><th>Calibration Status</th></tr><tr><td>00</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>01</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>02</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>03</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>04</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>05</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>06</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>07</td><td></td><td></td><td></td><td></td><td></td></tr></table><div>Start Calibration</div></div> <div><table><tr><th>Channel</th><th>Calibration Range</th><th>Calibration Gain</th><th>Offset</th><th>Last Calibration Date</th><th>Calibration Status</th></tr><tr><td>00</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>01</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>02</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>03</td><td></td><td></td><td></td><td></td><td></td></tr></table><div>Start Calibration</div></div>	Channel	Calibration Range	Calibration Gain	Offset	Last Calibration Date	Calibration Status	00						01						02						03						04						05						06						07						Channel	Calibration Range	Calibration Gain	Offset	Last Calibration Date	Calibration Status	00						01						02						03					
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## View the Module Tags

When you create a module, the Studio 5000 Logix Designer application creates a set of tags that you can view in the Tag Editor. Each configured feature on your module has a distinct tag that is available for use in the controller program logic.

Complete the following steps to access the module tags.

1. In the Controller Organizer, right-click Controller Tags and choose Monitor Tags.



The Controller Tags dialog box appears with data.

2. To view the module tags as shown, click the + symbols.

A screenshot of the 'Controller Tags' dialog box. At the top, there is a 'Scope' dropdown set to 'assembly\_line\_2' and a 'Show:' dropdown set to 'All Tags'. Below this is a table with columns: 'Name', 'Value', 'Force Mask', and 'Style'. The table contains several rows of tags, some of which are expanded with a '+' symbol in the 'Name' column. The tags listed are: 'remote\_ethernet\_adapter:1:C', 'remote\_ethernet\_adapter:1:C.Ch00', 'remote\_ethernet\_adapter:1:C.Ch00.Range', 'remote\_ethernet\_adapter:1:C.Ch00.SensorType', 'remote\_ethernet\_adapter:1:C.Ch00.NotchFilter', 'remote\_ethernet\_adapter:1:C.Ch00.AlarmDisable', 'remote\_ethernet\_adapter:1:C.Ch00.ProcessAlarmLatch...', 'remote\_ethernet\_adapter:1:C.Ch00.RateAlarmLatchEn', 'remote\_ethernet\_adapter:1:C.Ch00.OpenWireEn', 'remote\_ethernet\_adapter:1:C.Ch00.Disable', 'remote\_ethernet\_adapter:1:C.Ch00.TenOhmOffset', 'remote\_ethernet\_adapter:1:C.Ch00.DigitalFilter', and 'remote\_ethernet\_adapter:1:C.Ch00.LowSignal'. The 'Value' column shows values like '{...}', '0', and '5'. The 'Style' column shows 'Decimal' for most entries.

Name	Value	Force Mask	Style
remote_ethernet_adapter:1:C	{...}	{...}	
remote_ethernet_adapter:1:C.Ch00	{...}	{...}	
+ remote_ethernet_adapter:1:C.Ch00.Range	0		Decimal
+ remote_ethernet_adapter:1:C.Ch00.SensorType	0		Decimal
+ remote_ethernet_adapter:1:C.Ch00.NotchFilter	5		Decimal
- remote_ethernet_adapter:1:C.Ch00.AlarmDisable	0		Decimal
- remote_ethernet_adapter:1:C.Ch00.ProcessAlarmLatch...	0		Decimal
- remote_ethernet_adapter:1:C.Ch00.RateAlarmLatchEn	0		Decimal
- remote_ethernet_adapter:1:C.Ch00.OpenWireEn	0		Decimal
- remote_ethernet_adapter:1:C.Ch00.Disable	0		Decimal
+ remote_ethernet_adapter:1:C.Ch00.TenOhmOffset	0		Decimal
+ remote_ethernet_adapter:1:C.Ch00.DigitalFilter	0		Decimal
remote_ethernet_adapter:1:C.Ch00.LowSignal	10	0	Count

For more information, see [Module Tags](#).



**Notes:**

## Calibrate the Module

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Calibration Differences and Accuracy	86
Calibrate the Input Modules	86
Calibrate the Output Modules	91

The Compact 5000™ I/O analog modules are calibrated during the manufacturing process. Each module's accuracy remains high throughout its lifespan. You are not required to calibrate the module.

You can calibrate on a per channel basis or in groups.

---

**IMPORTANT** This chapter describes a few example module calibration scenarios. It does not cover how to calibrate every Compact 5000 I/O analog module in all operating modes that the module supports.

---

### Before You Begin

Consider this information before you begin.

### Controller State During Calibration

You must add the module to your Studio 5000 Logix Designer® project, as described in [Configure the Module](#), before you can calibrate it.

The project must be online with the owner-controller to calibrate Compact 5000 I/O analog modules.

The controller must be in Program mode or Remote Program to calibrate the module. We **recommend** that your module is in Program mode and not actively controlling a process when you calibrate it.

### Calibration Impacts Data Quality on Entire Input Module Group

When a channel on a Compact 5000 I/O analog input module is in the calibration process, the Notch Filter setting for that channel changes to 5 Hz. This change results in the *I.Chxx.Uncertain* tag being set to 1 for that channel until calibration is completed.

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

## Calibration Differences and Accuracy

The purpose of calibrating the Compact 5000 I/O analog modules is the same for input and output modules, to improve the module's accuracy and repeatability. The procedures used to calibrate the module, differ by module type:

- When you calibrate input modules, you use current, voltage, or ohms reference signals to send a signal to the module to calibrate it.
- When you calibrate output modules, you 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, we recommend instrumentation with the specifications that are listed in the following table. You can use a high-resolution DMM to adjust a voltage/current calibrating source to its value.

Cat. No.	Channel Input Type	Recommended Instrument Specifications
5069-IF8	Current (mA)	1.00...20.00 mA source $\pm 100$ nA current
	Voltage (V)	0...10V source $\pm 2$ $\mu$ V voltage
5069-IY4	Current (mA)	1.00...20.00 mA source $\pm 100$ nA current
	Voltage (V)	0...10V source $\pm 2$ $\mu$ V voltage
	RTD	1.0...487.0 $\Omega$ resistors $\pm 0.01\%$
	Thermocouple (mV)	0...100 mV source $\pm 0.5$ $\mu$ V
5069-OF4, 5069-OF4K, 5069-OF8	Current (mA)	DMM with resolution better than 0.15 $\mu$ A
	Voltage (V)	DMM with resolution better than 1.0 $\mu$ V

### IMPORTANT

If you calibrate your module with an instrument that is less accurate than the recommendation, the following events can result:

- Calibration appears to occur normally but the module gives inaccurate data during operation.
- A calibration fault occurs that forces you to cancel calibration.
- The *I.Chxx.CalFault* tag is set for the channel that you tried to calibrate.

To clear the tag, complete a valid calibration or cycle power to the module. In this case, you must recalibrate the module with an instrument as accurate as recommended.

## Calibrate the Input Modules

You apply low and high signal references to the Compact 5000 I/O analog input module to calibrate it. The references must match the input range of the channel is using.

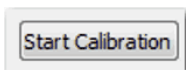
### Compact 5000 I/O Analog Input Module Calibration References

Input Type	Input Range	Low Calibration Reference	High Calibration Reference
Voltage (V)	-10...10V	0.0V	10.0V
	0...10V	0.0V	5.0V
Current (mA)	0...20 mA	4.0 mA	20.0 mA
	4...20 mA	4.0 mA	20.0 mA
RTD (5069-IY4 only)	1...500 $\Omega$	1 $\Omega$	487 $\Omega$
	2...1000 $\Omega$		
	4...2000 $\Omega$		
	8...4000 $\Omega$		
Thermocouple (5069-IY4 only)	-100...+100 mV	0.0 mV	100.0 mV

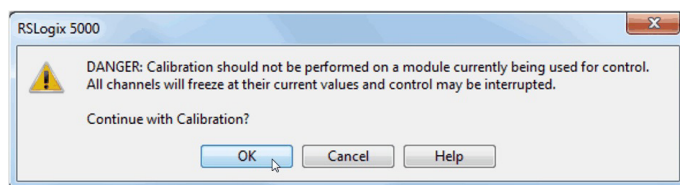
## Calibrate the 5069-IF8 Module

This example describes how to calibrate a channel on the 5069-IF8 module for use with a Voltage (V) input type. Complete the following steps:

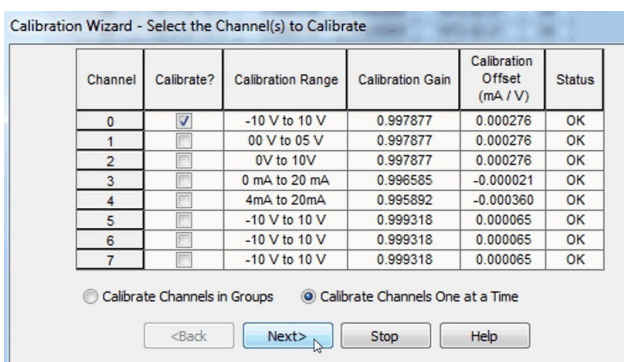
1. Connect the voltage calibrator to the channel being calibrated.
2. Go online with the project and make sure that the controller is in Program mode.
3. Confirm that the channel to be calibrated is configured for the correct Input Range.
4. On the Calibration page in the Module Properties, click Start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



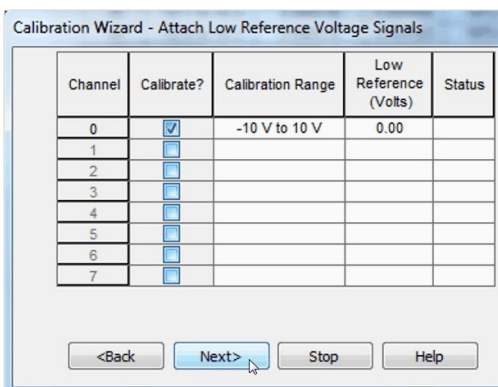
5. When the dialog box appears to confirm that you want to calibrate the channel, click OK.



6. Select the checkbox of the channel that you want to calibrate, and click Next.



7. At the Attach Low Reference Voltage Signals dialog, set the calibrator to the low reference and apply it to the channel.
8. Click Next.



The One at a Time Low Reference Results dialog opens and indicates the status of the channel after applying the low reference.

Calibration Wizard- One At a Time Low Reference Results

Channel	Calibrate?	Calibration Range	Low Reference (Volts)	Status
0	<input checked="" type="checkbox"/>	-10 V to 10 V	0.00	OK
1	<input type="checkbox"/>			
2	<input type="checkbox"/>			
3	<input type="checkbox"/>			
4	<input type="checkbox"/>			
5	<input type="checkbox"/>			
6	<input type="checkbox"/>			
7	<input type="checkbox"/>			

Retry   Next>   Stop   Help

- 9. If the status is OK, click Next.  
If the status reports an error, repeat the calibration process.
- 10. At the Attach High Reference Voltage Signals dialog, set the calibrator to the high reference and click Next.

Calibration Wizard - Attach High Reference Voltage Signals

Channel	Calibrate?	Calibration Range	High Reference (Volts)	Status
0	<input checked="" type="checkbox"/>	-10 V to 10 V	10.00	
1	<input type="checkbox"/>			
2	<input type="checkbox"/>			
3	<input type="checkbox"/>			
4	<input type="checkbox"/>			
5	<input type="checkbox"/>			
6	<input type="checkbox"/>			
7	<input type="checkbox"/>			

<Back   Next>   Stop   Help

The One at a Time High Reference Results dialog opens and indicates the status of the channel after applying the low reference.

Calibration Wizard- One At a Time High Reference Results

Channel	Calibrate?	Calibration Range	High Reference (Volts)	Status
0	<input checked="" type="checkbox"/>	-10 V to 10 V	10.00	OK
1	<input type="checkbox"/>			
2	<input type="checkbox"/>			
3	<input type="checkbox"/>			
4	<input type="checkbox"/>			
5	<input type="checkbox"/>			
6	<input type="checkbox"/>			
7	<input type="checkbox"/>			

Retry   Next>   Stop   Help

- 11. If the status is OK, click Next.  
If the status reports an error, repeat the calibration process.
- 12. At the Calibration Completed dialog, click Finish.

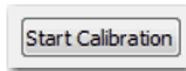
## Calibrate the 5069-IY4 and 5069-IY4K Modules

This example describes how to calibrate a channel on the module for use with the RTD input type. The 5069-IY4 and 5069-IY4K modules use the following resistors to calibrate in ohms:

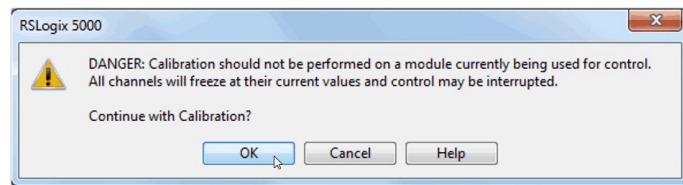
- 1  $\Omega$  resistor for low reference calibration
- 487  $\Omega$  resistor for high reference calibration

Complete the following steps:

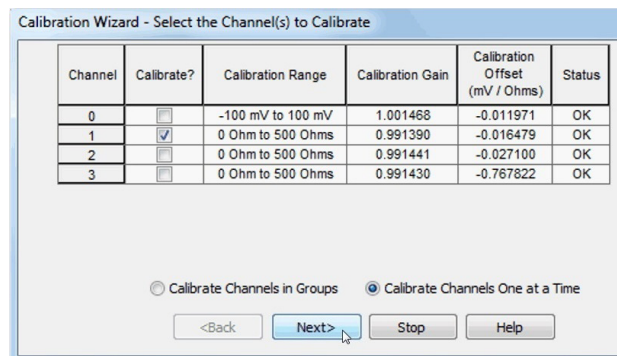
1. Connect the low reference resistor to the channel being calibrated.
2. Go online with the project and make sure that the controller is in Program mode.
3. Confirm that the channel to be calibrated is configured for the correct Input Range.
4. On the Calibration page in the Module Properties dialog,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



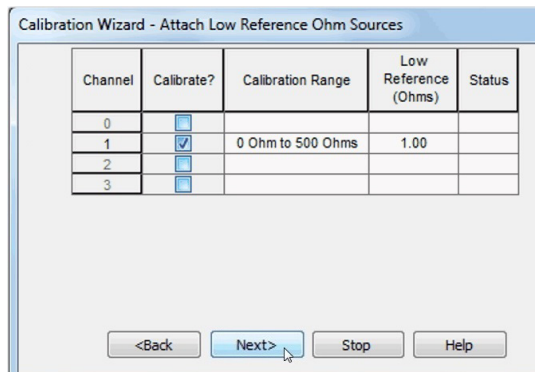
5. At the warning, click OK.



6. Select the checkbox of the channel that you want to calibrate, and click Next.



7. At the Attach Low Reference Ohm Sources dialog, connect a 1  $\Omega$  resistor to the channel being calibrated and click Next.



The One at a Time Low Reference Results dialog opens and indicates the status of the channel after calibrating for the low reference.

Calibration Wizard- One At a Time Low Reference Results

Channel	Calibrate?	Calibration Range	Low Reference (Ohms)	Status
0	<input type="checkbox"/>			
1	<input checked="" type="checkbox"/>	0 Ohm to 500 Ohms	1.00	OK
2	<input type="checkbox"/>			
3	<input type="checkbox"/>			

Retry   Next>   Stop   Help

- 8. If the status is OK, click Next.  
If the status reports an error, return to [step 7](#) until the status is OK.
- 9. At the Attach High Reference Ohm Sources dialog, connect a 487 Ω resistor to the channel being calibrated and click Next.

Calibration Wizard - Attach High Reference Ohm Sources

Channel	Calibrate?	Calibration Range	High Reference (Ohms)	Status
0	<input type="checkbox"/>			
1	<input checked="" type="checkbox"/>	0 Ohm to 500 Ohms	487.00	
2	<input type="checkbox"/>			
3	<input type="checkbox"/>			

<Back   Next>   Stop   Help

The One at a Time High Reference Results dialog opens and indicates the status of the channel after calibrating for a high reference

Calibration Wizard- One At a Time High Reference Results

Channel	Calibrate?	Calibration Range	High Reference (Ohms)	Status
0	<input type="checkbox"/>			
1	<input checked="" type="checkbox"/>	0 Ohm to 500 Ohms	487.00	OK
2	<input type="checkbox"/>			
3	<input type="checkbox"/>			

Retry   Next>   Stop   Help

- 10. If the status is OK, click Next.  
If the status reports an error, return to [step 9](#) until the status is OK.
- 11. At the Calibration Completed dialog, click Finish.

## Calibrate the Output Modules

When calibrating a Compact 5000 I/O analog output channel, the Studio 5000 Logix Designer application commands the module to output specific signal levels. The channel output type determines the signal type.

### Compact 5000 I/O Analog Output Module Calibration References

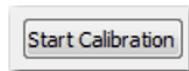
Output Type	Output Range	Low Calibration Reference Level	High Calibration Reference Level
Voltage (V)	-10...10V	-10.0V	10.0V
	0...10V	1.0V	10.0V
	0...5V	1.0V	5.0V
Current (mA)	0...20 mA	1.0 mA	20.0 mA
	4...20 mA	5.0 mA	20.0 mA

You must measure the actual level and record the results to account for any module inaccuracies.

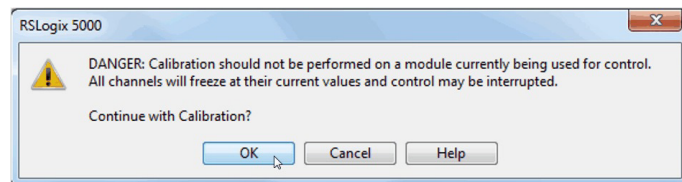
### Calibrate a 5069-OF8 Module

This example describes how to calibrate a channel on the 5069-OF8 module for use with a Voltage (V) output type. Complete the following steps:

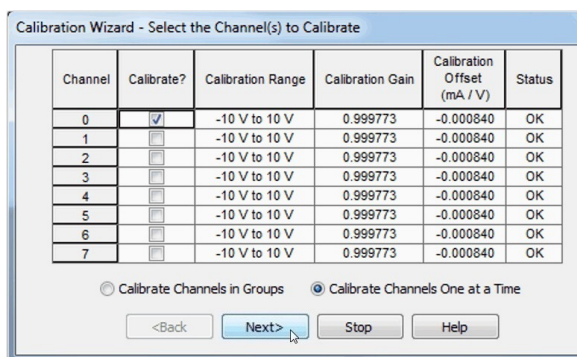
1. Connect the DMM to the channel being calibrated.
2. Go online with the project and make sure that the controller is in Program mode.
3. Confirm that the channel to be calibrated is configured for the correct Output Range.
4. On the Calibration page in the Module Properties dialog, click Start Calibration.



5. At the warning, click OK.



6. Select the checkbox of the channel that you want to calibrate, and click Next.





7. At the Output Reference Signals dialog, click Next.

Calibration Wizard - Output Reference Signals

Channel	Calibrate?	Calibration Range	Low Reference (Volts)	Recorded Reference (Volts)	Status
0	<input checked="" type="checkbox"/>	-10 V to 10 V	-10.00		
1	<input type="checkbox"/>				
2	<input type="checkbox"/>				
3	<input type="checkbox"/>				
4	<input type="checkbox"/>				
5	<input type="checkbox"/>				
6	<input type="checkbox"/>				
7	<input type="checkbox"/>				

<Back    **Next>**    Stop    Help

The Measure and Record Values dialog opens.

- 8. Use a multimeter to measure the reference value of the channel.
- 9. In the Recorded Reference (Volts) column, enter the measured value and click Next.

Calibration Wizard - Measure and Record Values

Channel	Calibrate?	Calibration Range	Low Reference (Volts)	Recorded Reference (Volts)	Status
0	<input checked="" type="checkbox"/>	-10 V to 10 V	-10.00	-10.0035	
1	<input type="checkbox"/>				
2	<input type="checkbox"/>				
3	<input type="checkbox"/>				
4	<input type="checkbox"/>				
5	<input type="checkbox"/>				
6	<input type="checkbox"/>				
7	<input type="checkbox"/>				

Retry    **Next>**    Stop    Help

The One At a Time Low Reference Results dialog opens and indicates the status of the calibrated channel.

Calibration Wizard- One At a Time Low Reference Results

Channel	Calibrate?	Calibration Range	Low Reference (Volts)	Recorded Reference (Volts)	Status
0	<input checked="" type="checkbox"/>	-10 V to 10 V	-10.00	-10.00350	OK
1	<input type="checkbox"/>				
2	<input type="checkbox"/>				
3	<input type="checkbox"/>				
4	<input type="checkbox"/>				
5	<input type="checkbox"/>				
6	<input type="checkbox"/>				
7	<input type="checkbox"/>				

Retry    **Next>**    Stop    Help

- 10. If the status is OK, click Next.  
If the status is not OK, repeat the calibration process.

11. The Output Reference Signals dialog opens and indicates the channel to be calibrated for the high reference, click Next.

Calibration Wizard - Output Reference Signals

Channel	Calibrate?	Calibration Range	High Reference (Volts)	Recorded Reference (Volts)	Status
0	<input checked="" type="checkbox"/>	-10 V to 10 V	10.00		
1	<input type="checkbox"/>				
2	<input type="checkbox"/>				
3	<input type="checkbox"/>				
4	<input type="checkbox"/>				
5	<input type="checkbox"/>				
6	<input type="checkbox"/>				
7	<input type="checkbox"/>				

<Back   **Next>**   Stop   Help

The Measure and Record Values dialog opens.

12. Use a multimeter to measure the reference value of the channel.
13. In the Recorded Reference (Volts) column, record the measured value and click Next.

Calibration Wizard - Measure and Record Values

Channel	Calibrate?	Calibration Range	High Reference (Volts)	Recorded Reference (Volts)	Status
0	<input checked="" type="checkbox"/>	-10 V to 10 V	10.00	10.0043	
1	<input type="checkbox"/>				
2	<input type="checkbox"/>				
3	<input type="checkbox"/>				
4	<input type="checkbox"/>				
5	<input type="checkbox"/>				
6	<input type="checkbox"/>				
7	<input type="checkbox"/>				

Retry   **Next>**   Stop   Help

The One At a Time High Reference Results dialog opens and indicates the status of the calibrated channel.

Calibration Wizard - One At a Time High Reference Results

Channel	Calibrate?	Calibration Range	High Reference (Volts)	Recorded Reference (Volts)	Status
0	<input checked="" type="checkbox"/>	-10 V to 10 V	10.00	10.0043	OK
1	<input type="checkbox"/>				
2	<input type="checkbox"/>				
3	<input type="checkbox"/>				
4	<input type="checkbox"/>				
5	<input type="checkbox"/>				
6	<input type="checkbox"/>				
7	<input type="checkbox"/>				

Retry   **Next>**   Stop   Help

14. If the status is OK, click Next.  
If the status is not OK, repeat the calibration process.
15. When the Calibration Completed dialog box appears, click Finish.

**Notes:**

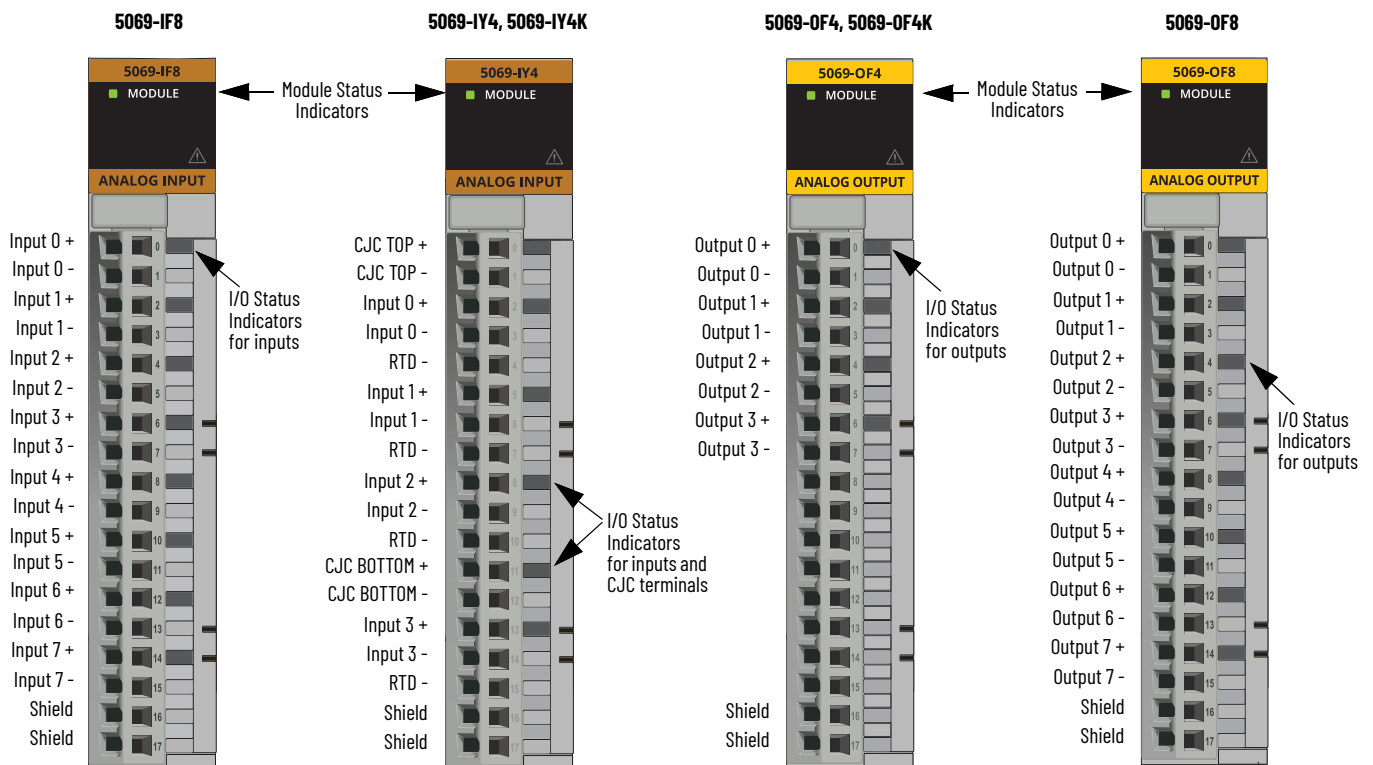
## Troubleshoot the Module

Topic	Page
Troubleshoot with the Status Indicators	95
Troubleshoot with the Studio 5000 Logix Designer Application	99

### Troubleshoot with the Status Indicators

Use this information to troubleshoot with the status indicators.

This figure shows the status indicators on the Compact 5000 I/O Analog Modules.



For 5069-IF8 Series B modules, terminal inputs 0 ...7 - are internally connected.

## Module Status Indicator

This table describes the Module (MOD) Status indicator on the Compact 5000 I/O analog modules.

Indicator State	Description	Recommended Action
Off	The module is not powered.	None - If your application does not use the module. If your application uses the module and it is expected to be operating, complete the following: <ul style="list-style-type: none"> <li>Confirm that the system is powered.</li> <li>Confirm that the module is installed properly.</li> </ul>
Steady green	The module has a connection to the owner-controller and is operating as expected according to the module configuration.	None
Flashing green	The following conditions exist: <ul style="list-style-type: none"> <li>The module is powered.</li> <li>The module does not have a connection to the controller.</li> <li>This can result from missing, incomplete, or incorrect module configuration, or the module is inhibited.</li> </ul>	Troubleshoot your Studio 5000 Logix Designer project to determine what is helping prevent a connection from the module to the controller and correct the issue.
Steady red	The module has experienced a nonrecoverable fault.	Replace the module.
Flashing red	One of the following conditions exist: <ul style="list-style-type: none"> <li>A module firmware update is in progress.</li> <li>A module firmware update attempt failed.</li> <li>The device has experienced a recoverable fault.</li> <li>A connection to the module has timed out.</li> </ul>	Complete one of the following: <ul style="list-style-type: none"> <li>Let the firmware update progress complete.</li> <li>Re-attempt a firmware update after one fails.</li> <li>Use the Studio 5000 Logix Designer application to determine the cause of the module fault. The Connection and Module Info categories of the module's configuration indicate the fault type. To clear a recoverable fault, complete one of the following: <ul style="list-style-type: none"> <li>Cycle module power.</li> <li>Click Reset Module in the Studio 5000 Logix Designer project via the Module Info page of the Module Properties.</li> </ul> If the fault does not clear after cycling power and resetting the Module, contact Rockwell Automation Technical Support.</li> <li>Use the Studio 5000 Logix Designer application to determine if a connection has timed out. The Connection page in the Module Properties indicates the module state, including if a connection 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.</li> </ul>
1. Steady red for approximately 2 seconds 2. Flashing green indefinitely	Module is powering up.	Wait for the power-up sequence to finish.

## I/O Status Indicators - Analog Input Modules

This table describes the I/O status indicator on Compact 5000 I/O analog input modules.

Indicator State	Description	Recommended Action
Off	One of the following conditions exists: <ul style="list-style-type: none"> <li>The module is not powered.</li> <li>The module is powered but no connection from the controller to module has been established.</li> <li>The module is powered, but the input channel is disabled.</li> </ul>	Complete one of the following: <ul style="list-style-type: none"> <li>None - If your application does not use the input channel.</li> <li>If you expect the module to be powered but it is not, complete the following: <ul style="list-style-type: none"> <li>Confirm that the system is powered.</li> <li>Confirm that the module is installed properly.</li> </ul> </li> <li>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 has a connection to the controller. The Connection page in the Module Properties indicates if the module is running or faulted. If the module is faulted, the Connection page indicates error information affecting the state of the module.</li> </ul>
Steady yellow	The input channel is operating normally.	None
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: <ul style="list-style-type: none"> <li>The module has experienced a nonrecoverable fault.</li> <li>A calibration fault occurred on the channel.</li> <li>The module is operating over its specified temperature. That is, an Over Temperature condition exists.</li> </ul>	Complete one of the following: <ul style="list-style-type: none"> <li>If the indicator is in the steady red state following the initial power-up sequence and remains in that state, replace the module.</li> <li>If a calibration fault occurred, cycle power to the module. When the power-up sequence completes, the channel returns to the factory calibration setting.</li> <li>If the indicator remains in the steady red state after you cycle power, replace the module.</li> <li>To return the module to the specified operating temperature range, complete the following: <ul style="list-style-type: none"> <li>Check the temperature at the module installation location and lower it if necessary.</li> <li>Make sure the proper level of current is applied to the module. If not, change the current applied to an acceptable level.</li> </ul> </li> </ul> Module specifications, for example, acceptable operating temperature or applied current levels, are available in the Compact 5000 I/O Modules Specifications Technical Data, publication <a href="#">5069-TD001</a> .
Flashing red	An external device caused a fault on the input channel. The following are examples of issues that can cause the fault: <ul style="list-style-type: none"> <li>The input signal is overrange or underrange.</li> <li>The signal range is set in your Studio 5000 Logix Designer project.</li> <li>An Open Wire condition, that is, a wire is disconnected from the input channel.</li> <li>The module is using SA bus power but the power is not available or correct.</li> </ul>	Complete one of the following: <ul style="list-style-type: none"> <li>Check the input signal to determine if it is overrange or underrange.</li> <li>If so, make changes to return the input signal to within the range limits.</li> <li>Check the wiring at the input channel.</li> <li>If necessary, reconnect the wire.</li> <li>Check the SA connector, available on a 5069-AEN2TR adapter or a 5069-FPD module to make sure 24V DC power is present. If 24V DC power is not present, troubleshoot the SA power connection. For more information on using the SA connector, see the 5069-AEN2TR adapter and 5069-FPD module documentation that is listed in <a href="#">Additional Resources</a>.</li> </ul>
Alternating yellow/red	Calibration is in progress.	Finish the calibration process in the Studio 5000 Logix Designer application.

## I/O Status Indicators - Analog Output Modules

This table describes the I/O status indicator on Compact 5000 I/O analog output modules.

Indicator State	Description	Recommended Action
Off	One of the following conditions exists: <ul style="list-style-type: none"> <li>The module is not powered.</li> <li>The module is powered but no connection from the controller to module was ever established.</li> <li>The module is powered, but the output channel is disabled.</li> </ul>	Complete one of the following: <ul style="list-style-type: none"> <li>None - If your application does not use the output channel.</li> <li>If you expect the module to be powered but it is not, complete the following: <ul style="list-style-type: none"> <li>Confirm that the system is powered.</li> <li>Confirm that the module is installed properly.</li> </ul> </li> <li>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 has a connection to the controller. The Connection page in the Module Properties indicates if the module is running or faulted. If the module is faulted, the Connection page indicates error information affecting the state of the module.</li> </ul>
Steady yellow	The output channel is operating normally.	No action necessary.
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: <ul style="list-style-type: none"> <li>The module has experienced a nonrecoverable fault.</li> <li>A calibration fault occurred on the channel.</li> <li>The module is operating over its specified temperature. That is, an Over Temperature condition exists.</li> </ul>	Complete one of the following: <ul style="list-style-type: none"> <li>If the indicator is in the steady red state following the initial power-up sequence and remains in that state, replace the module.</li> <li>If a calibration fault occurred, cycle power to the module. When the power-up sequence completes, the channel returns to the factory calibration setting.</li> <li>If the indicator remains in the steady red state after you cycle power, replace the module.</li> <li>To return the module to the specified operating temperature range, complete the following: <ul style="list-style-type: none"> <li>Check the temperature at the module installation location and lower it if necessary.</li> <li>Make sure the proper level of current is applied to the module. If not, change the current applied to an acceptable level.</li> </ul> </li> </ul> Module specifications, for example, acceptable operating temperature or applied current levels, are available in the Compact 5000 I/O Modules Specifications Technical Data, publication <a href="#">5069-TD001</a> .
Flashing red	An external device caused a fault on the output channel. The following are examples of issues that can cause the fault: <ul style="list-style-type: none"> <li>A wire is disconnected from the output. That is, a No Load condition exists.</li> <li>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.</li> <li>The module is using SA bus power but the power is not available or correct.</li> </ul>	One of the following: <ul style="list-style-type: none"> <li>Check the wiring at the output channel.</li> <li>If necessary, reconnect the wire.</li> <li>Troubleshoot the application to make sure an acceptable level of current is driven from the channel.</li> <li>Check the SA connector, available on a 5069-AEN2TR adapter or a 5069-FPD module to make sure 24V DC power is present.</li> <li>If 24V DC power is not present, troubleshoot the SA power connection. For more information on using the SA connector, see the 5069-AEN2TR adapter and 5069-FPD module documentation that is listed in <a href="#">Additional Resources</a>.</li> </ul>
Alternating yellow/red	Calibration is in progress.	Finish the calibration process in the Studio 5000 Logix Designer application.

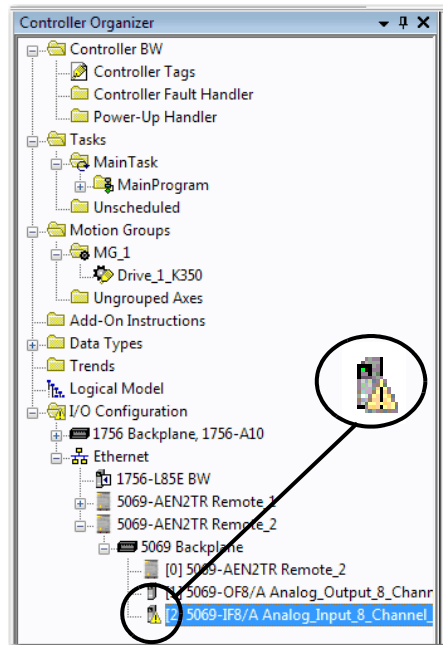
## Troubleshoot with the Studio 5000 Logix Designer Application

The Studio 5000 Logix Designer application indicates the presence of fault conditions in these following ways.

- [Warning Signal in the I/O Configuration Tree](#)
- [Status and Fault Information in the Module Properties](#)
- [Studio 5000 Logix Designer Tag Editor](#)

### Warning Signal in the I/O Configuration Tree

A warning icon appears in the I/O Configuration tree when a fault occurs.





## Status and Fault Information in the Module Properties

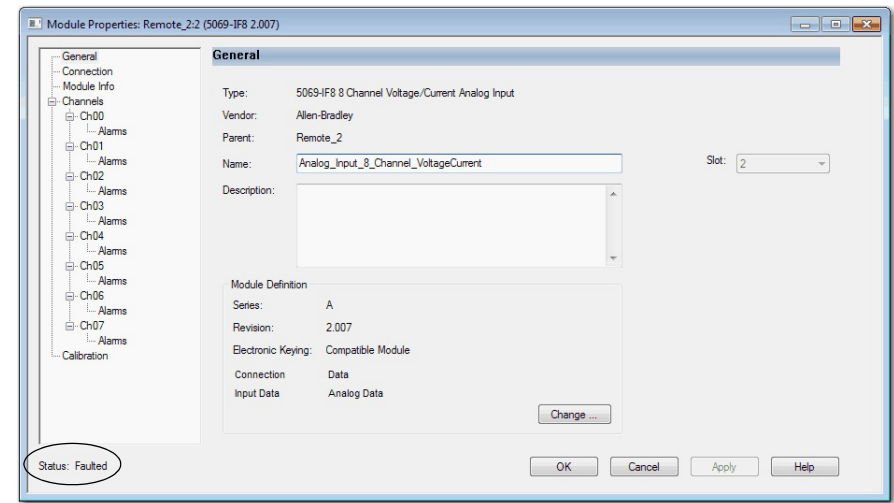
The Module Properties contain pages where you can monitor and configure the module. The pages vary due to module type.

You can monitor a module's state for faults in these ways.

- [Module Status on the General Page](#)
- [Module Fault Descriptions on the Connection Page](#)

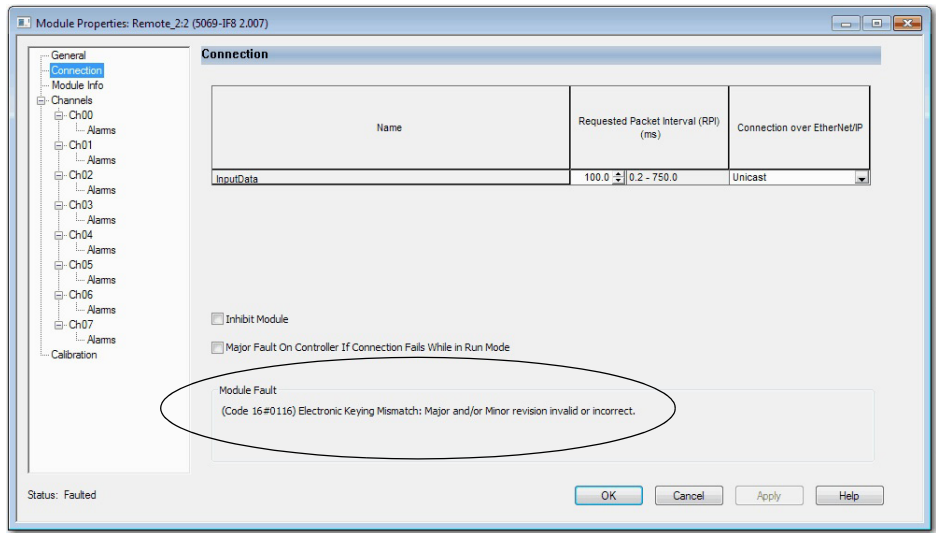
### Module Status on the General Page

The module status is indicated on the General page of the Modules Properties.



### Module Fault Descriptions on the Connection Page

In the Module Fault box on the Connection page, a fault description is listed. The description includes an error code that is associated with the specific fault type.



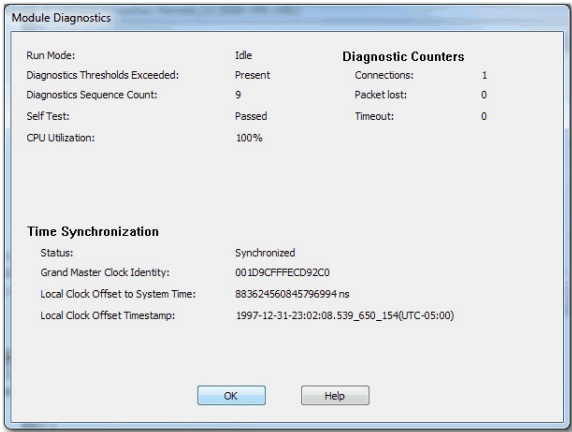
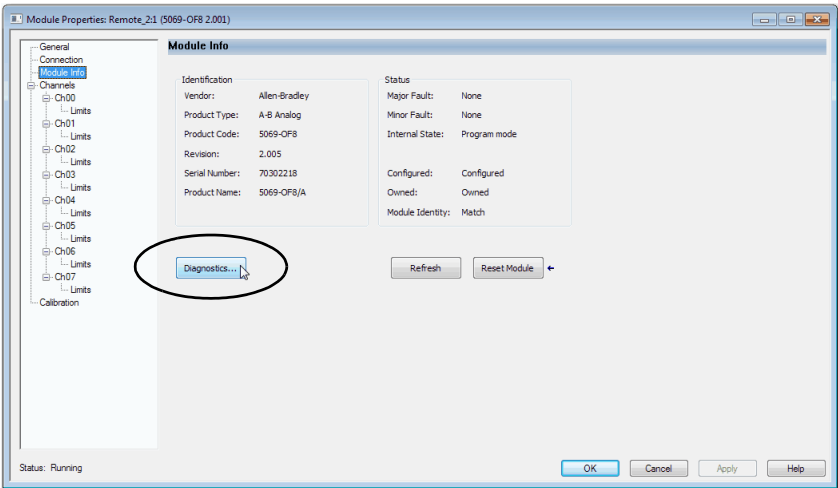
## Studio 5000 Logix Designer Tag Editor

Fault conditions are indicated in the controller tags for the module.

Name	Value	Force Mask	Style	Data Type
Remote_2:2:C	{...}	{...}		AB:5000_AI8:C:0
Remote_2:2:I	{...}	{...}		AB:5000_AI8:I:0
Remote_2:2:1.RunMode	0		Decimal	BOOL
Remote_2:2:1.ConnectionFaulted	1		Decimal	BOOL
Remote_2:2:1.DiagnosticActive	1		Decimal	BOOL
Remote_2:2:1.DiagnosticSequenceCount	9		Decimal	SINT
Remote_2:2:1.Ch00	{...}	{...}		CHANNEL_AI_DI...
Remote_2:2:1.Ch00.Fault	1		Decimal	BOOL
Remote_2:2:1.Ch00.Uncertain	0		Decimal	BOOL
Remote_2:2:1.Ch00.OpenWire	0		Decimal	BOOL
Remote_2:2:1.Ch00.OverTemperature	0		Decimal	BOOL

### Module Diagnostics

Module Diagnostics are accessible from the Module Info page.



**Notes:**

## Module Tags

Topic	Page
View the Tags	104
Input Module Tags	105
Output Module Tags	111

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

The following types of tags are available with the Compact 5000™ I/O analog modules:

- Configuration
- Input
- Output

The set of module tags that are associated with a module depends on the module type and the parameters that you select during module configuration. For example, if you select a Listen Only connection, the Studio 5000 Logix Designer application creates only Input tags for that module.

The tables in this section list all tags available with each module. Not all tags in the list are available when a module is first added to a project. More tags are available as you configure the module.

### Conventions for Tag Names

This table defines the name conventions for tags.

For Modules in a	Example	Location	Slot Number	Tag Type <sup>(1)</sup>	Module Channel No. (if applicable)	Tag Function <sup>(2)</sup>
Local system	Local:1:I.Ch00.Data	Local	1	I	Ch00	Data
Remote system	remote_ethernet_adapter:1:I.Ch00.Data	Remote	1	I	Ch00	Data

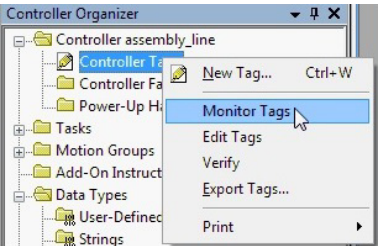
(1) The possible Compact 5000 I/O analog tag types are C (configuration), I (input), and O (output).

(2) In this case, Data represents the input data that is returned to the owner-controller.

# View the Tags

Complete these steps to view the tags.

1. In your Studio 5000 Logix Designer project, right-click Controller Tags and select Monitor Tags.



The Tags window opens.

A screenshot of the 'Tags' window. At the top, the 'Scope' is set to 'assembly\_line\_2' and 'Show:' is set to 'All Tags'. The window contains a table with the following columns: 'Name', 'Value', 'Force Mask', and 'Style'. The table lists various tags for a 'remote\_ethernet\_adapter:1:C' device, including 'remote\_ethernet\_adapter:1:C.Ch00', 'remote\_ethernet\_adapter:1:C.Ch00.Range', 'remote\_ethernet\_adapter:1:C.Ch00.SensorType', 'remote\_ethernet\_adapter:1:C.Ch00.NotchFilter', 'remote\_ethernet\_adapter:1:C.Ch00.AlarmDisable', 'remote\_ethernet\_adapter:1:C.Ch00.ProcessAlarmLatch...', 'remote\_ethernet\_adapter:1:C.Ch00.RateAlarmLatchEn', 'remote\_ethernet\_adapter:1:C.Ch00.OpenWireEn', 'remote\_ethernet\_adapter:1:C.Ch00.Disable', 'remote\_ethernet\_adapter:1:C.Ch00.TenOhmOffset', and 'remote\_ethernet\_adapter:1:C.Ch00.DigitalFilter'. Each tag has a corresponding value and style.

Name	Value	Force Mask	Style
remote_ethernet_adapter:1:C	{ ... }	{ ... }	
remote_ethernet_adapter:1:C.Ch00	{ ... }	{ ... }	
+ remote_ethernet_adapter:1:C.Ch00.Range	0		Decimal
+ remote_ethernet_adapter:1:C.Ch00.SensorType	0		Decimal
+ remote_ethernet_adapter:1:C.Ch00.NotchFilter	5		Decimal
- remote_ethernet_adapter:1:C.Ch00.AlarmDisable	0		Decimal
- remote_ethernet_adapter:1:C.Ch00.ProcessAlarmLatch...	0		Decimal
- remote_ethernet_adapter:1:C.Ch00.RateAlarmLatchEn	0		Decimal
- remote_ethernet_adapter:1:C.Ch00.OpenWireEn	0		Decimal
- remote_ethernet_adapter:1:C.Ch00.Disable	0		Decimal
+ remote_ethernet_adapter:1:C.Ch00.TenOhmOffset	0		Decimal
+ remote_ethernet_adapter:1:C.Ch00.DigitalFilter	0		Decimal

2. To expand the tags and view additional tags, click the + symbol.

## Input Module Tags

This section describes the tags that are associated with the 5069-IF8, 5069-IY4, and 5069-IY4K modules. To view the tags, see [page 104](#).

### Configuration Tags - 5069-IF8, 5069-IY4, 5069-IY4K

Name	Size	Description	Valid Values	
			5069-IF8	5069-IY4, 5069-IY4K
CJChxx.Disable	BOOL	The CJ measurement is not used when the module calculates the CJ compensation. There are two CJ measurements that can be taken on the module. The combination of configuration values determines how CJ compensation is affected. Consider the following: <ul style="list-style-type: none"> <li>If you enable CJCh00 and CJCh01 measurements, both measurements are used to calculate CJ compensation.</li> <li>If you enable only one CJChxx measurement, only that measurement is used to calculate CJ compensation.</li> <li>If you disable both CJChxx measurements, it is assumed that the cold junction temperature is 0 in the CJ compensation.</li> </ul>	-	<ul style="list-style-type: none"> <li>0 = Cold junction measurement is used to calculate CJ compensation</li> <li>1 = Cold junction measurement is not used to calculate CJ compensation</li> </ul>
CJChxx.Remote	BOOL	Indicates if the cold junction sensor is mounted on a remote termination block when set, rather than on the local terminal block. Needed for proper cold junction compensation when linearizing thermocouples. If the cold junction sensor is mounted on a remote termination block, CJCh00 is used with channels 00 and 01 and CJCh01 is used with channels 02 and 03.		<ul style="list-style-type: none"> <li>0 = Cold junction sensor is not mounted on a remote termination block</li> <li>1 = Cold junction sensor is mounted on a remote termination block</li> </ul>
CJChxx.SensorOffset	REAL	Offset added directly to the measured CJ temperature. Used to compensate for cold junction temperature sensor error.		Any
Chxx.Range	SINT	Channel's operating range	<ul style="list-style-type: none"> <li>0 = -10...10V</li> <li>1 = 0...5V</li> <li>2 = 0...10V</li> <li>4 = 0...20 mA</li> <li>5 = 4...20 mA</li> </ul>	<ul style="list-style-type: none"> <li>0 = -10...10V</li> <li>1 = 0...5V</li> <li>2 = 0...10V</li> <li>4 = 0...20 mA</li> <li>5 = 4...20 mA</li> <li>6 = -100...100 mV</li> <li>7 = unused</li> <li>8 = 1...500 Ω</li> <li>9 = 2...1,000 Ω</li> <li>10 = 4...2,000 Ω</li> <li>11 = 8...4,000 Ω</li> </ul>
Chxx.NotchFilter	SINT	Notch Filter removes line noise for the channel.	<ul style="list-style-type: none"> <li>0 = 10 Hz (simultaneous 50/60Hz rejection)</li> <li>1 = 50 Hz</li> <li>2 = 60 Hz</li> <li>3 = 100 Hz</li> <li>4 = 200 Hz</li> <li>5 = 500 Hz</li> <li>6 = 1,000 Hz</li> <li>7 = 2,500 Hz</li> </ul>	<ul style="list-style-type: none"> <li>8 = 5,000 Hz</li> <li>9 = 10,000 Hz</li> <li>10 = 15,625 Hz</li> <li>11 = 25,000 Hz</li> <li>12 = 31,250 Hz</li> <li>13 = 5 Hz</li> <li>14 = 62,500 Hz</li> <li>15 = 15 Hz</li> <li>16 = 20 Hz</li> </ul>
Chxx.SensorType	SINT		-	RTD Mode: <ul style="list-style-type: none"> <li>0 = no linearization, Ω</li> <li>1 = 100 Ω Platinum 385</li> <li>2 = 200 Ω Platinum 385</li> <li>3 = 500 Ω Platinum 385</li> <li>4 = 1000 Ω Platinum 385</li> <li>5 = 100 Ω Platinum 3916</li> <li>6 = 200 Ω Platinum 3916</li> <li>7 = 500 Ω Platinum 3916</li> <li>8 = 1000 Ω Platinum 3916</li> <li>9 = 10 Ω Copper 427</li> <li>10 = 120 Ω Nickel 672</li> <li>11 = 100 Ω Nickel 618</li> <li>12 = 120 Ω Nickel 618</li> <li>13 = 200 Ω Nickel 618</li> <li>14 = 500 Ω Nickel 618</li> </ul> Thermocouple Mode: <ul style="list-style-type: none"> <li>0 = mV</li> <li>1 = B</li> <li>2 = C</li> <li>3 = E</li> <li>4 = J</li> <li>5 = K</li> <li>6 = N</li> <li>7 = R</li> <li>8 = S</li> <li>9 = T</li> <li>10 = TXX/XX (L)</li> </ul>

## Configuration Tags - 5069-IF8, 5069-IY4, 5069-IY4K

Name	Size	Description	Valid Values	
			5069-IF8	5069-IY4, 5069-IY4K
Chxx.AlarmDisable	BOOL	Disables all alarms on the channel. <b>IMPORTANT</b> - Consider the following: <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>Applies to all alarms on the module.</li> <li>Conversely, if you set this tag to 1, alarms are disabled regardless of the setting on the alarm enable tag for any alarm.</li> </ul>	<ul style="list-style-type: none"> <li>0 = Alarms are not disabled</li> <li>1 = Alarms are disabled (default)</li> </ul>	
Chxx.ProcessAlarmLatchEn	BOOL	Configures Process alarms to latch until they are explicitly unlatched. The Process alarms include: <ul style="list-style-type: none"> <li>HighHigh alarm</li> <li>High alarm</li> <li>Low alarm</li> <li>LowLow alarm</li> </ul>	<ul style="list-style-type: none"> <li>0 = Latching disabled (default)</li> <li>1 = Latching enabled</li> </ul>	
Chxx.RateAlarmLatchEn	BOOL	Configures the Rate alarm to latch until it is explicitly unlatched.	<ul style="list-style-type: none"> <li>0 = Latching disabled (default)</li> <li>1 = Latching enabled</li> </ul>	
Chxx.OpenWireEn	BOOL	Enable the input Open Wire diagnostic	<ul style="list-style-type: none"> <li>0 = Disabled (default)</li> <li>1 = Enabled</li> </ul>	
Chxx.Disable	BOOL	Disables the channel. When a channel is disabled, the following occurs: <ul style="list-style-type: none"> <li>The I/O status indicator for the channel turns off.</li> <li>The Chxx.Fault input tag is set to 1.</li> </ul>	<ul style="list-style-type: none"> <li>0 = Channel is enabled (default)</li> <li>1 = Channel is disabled</li> </ul>	
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	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.	<b>Current applications</b> - Any value less than the high signal in range. <ul style="list-style-type: none"> <li>0 = default for 0...20 mA range</li> <li>4 = default for 4...20 mA</li> </ul> <b>Voltage applications</b> - Any value less than the high signal in range. <ul style="list-style-type: none"> <li>-10 = default for -10...+10V range</li> <li>0 = default for 0...5V and 0...10V ranges</li> </ul>	
			-	<b>RTD applications</b> - By default, this tag value is the lowest temperature in °C that is supported by the Sensor Type connected to the channel. You can change the value, if necessary. For a list of the temperature values associated with each sensor type, see <a href="#">page 56</a> . <b>Thermocouple applications</b> - By default, this tag value is the lowest temperature in °C that is supported by the Thermocouple type connected to the channel. You can change the value, if necessary. For a list of the temperature values associated with each sensor type, see <a href="#">page 56</a> .
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.	<b>Current applications</b> - Any value greater than the low signal in range, 20 = default for either current input range <b>Voltage applications</b> - Any value greater than the low signal in range. <ul style="list-style-type: none"> <li>10 = default for 0...10V and -10...10V ranges</li> <li>5 = default for 0...5V range</li> </ul>	
			-	<b>RTD applications</b> - By default, this tag value is the highest temperature in °C that is supported by the Sensor Type connected to the channel. You can change the value, if necessary. For a list of the temperature values associated with each sensor type, see <a href="#">page 56</a> . <b>Thermocouple applications</b> - By default, the tag value is the highest temperature in °C that is supported by the Thermocouple type connected to the channel. You can change the value, if necessary. For a list of the temperature values associated with each sensor type, see <a href="#">page 56</a> .

## Configuration Tags - 5069-IF8, 5069-IY4, 5069-IY4K

Name	Size	Description	Valid Values	
			5069-IF8	5069-IY4, 5069-IY4K
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.	<b>Current applications</b> - Any value less than the high engineering value, 0.0 = default <b>Voltage applications</b> - Any value less than the high engineering value, LowSignal = default. For example, with the -10...10V range, the default = -10.	
			-	<b>RTD applications</b> - By default, the tag value is the lowest temperature that is supported by the Sensor Type connected to the channel. You can change the value, if necessary. The engineering units match the Temperature Units you select. For a list of the temperature values associated with each sensor type, see <a href="#">page 56</a> . <b>Thermocouple applications</b> - By default, the tag value is the lowest temperature that is supported by the Thermocouple type connected to the channel. You can change the value, if necessary. The engineering units match the Temperature Units you select. For a list of the temperature values associated with each sensor type, see <a href="#">page 56</a> .
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.	<b>Current applications</b> - Any value greater than the low engineering value, 100.0 = default <b>Voltage applications</b> - Any value greater than the low engineering value, High signal = default. For example, with the -10...10V range, the default = 10.	
			-	<b>RTD applications</b> - By default, the tag value is the highest temperature that is supported by the Sensor Type connected to the channel. You can change the value, if necessary. The engineering units match the Temperature Units you select. For a list of the temperature values associated with each sensor type, see <a href="#">page 56</a> . <b>Thermocouple applications</b> - By default, the tag value is the highest temperature that is supported by the Thermocouple type connected to the channel. You can change the value, if necessary. The engineering units match the Temperature Units you select. For a list of the temperature values associated with each sensor type, see <a href="#">page 56</a> .
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. In terms of engineering units.	0.0 = default	
Chxx.LAlarmLimit	REAL	The Low alarm trigger point. Causes the Chxx.LAlarm to trigger when the input signal moves beneath the configured trigger point. In terms of engineering units.	0.0 = default	
Chxx.HAlarmLimit	REAL	The High alarm trigger point. Causes the Chxx.HAlarm to trigger when the input signal moves above the configured trigger point. In terms of engineering units.	100.0 = default	
Chxx.HHAlarmLimit	REAL	The High High alarm trigger point. Causes the Chxx.HHAlarm to trigger when the input signal moves above the configured trigger point. In terms of engineering units.	100.0 = default	
Chxx.RateAlarmLimit	REAL	The Rate alarm trigger point. Causes the Chxx.RateAlarm 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 >0 = Trigger point	0...100 0 = default
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, 0 = default	



## Input Tags - 5069-IF8, 5069-IY4, 5069-IY4K

Name	Size	Definition		Valid Values
		5069-IF8	5069-IY4, 5069-IY4K	
RunMode	BOOL	Channel's operating state		<ul style="list-style-type: none"> <li>0 = Idle</li> <li>1 = Run</li> </ul>
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.		<ul style="list-style-type: none"> <li>0 = Connection running</li> <li>1 = Connection not running</li> </ul>
DiagnosticActive	BOOL	Indicates if any diagnostics are active.		<ul style="list-style-type: none"> <li>0 = No diagnostics active</li> <li>1 = One or more diagnostics are active</li> </ul> <p>The following can trigger the diagnostic to be active:</p> <ul style="list-style-type: none"> <li>- Open Wire condition</li> <li>- Over Temperature condition</li> <li>- Field Power Off condition</li> <li>- Underrange/Overrange condition</li> </ul> <p>We recommend that you first troubleshoot the module to determine the trigger.</p>
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected. Set to zero by product reset or power cycle. Wraps from 255 (-1) to 1 skipping zero.		-128...+127 0 is skipped except during module power-up.
CJChxx.Fault, Chxx.Fault	BOOL	Indicates that the data is inaccurate and <b>cannot be trusted</b> for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. <b>IMPORTANT:</b> Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.		<ul style="list-style-type: none"> <li>0 = Good</li> <li>1 = Bad, causing fault</li> </ul> <p>The typical causes of fault data are the following:</p> <ul style="list-style-type: none"> <li>- Channel is disabled</li> <li>- Open Wire condition</li> <li>- Underrange/Overrange condition</li> <li>- Short Circuit condition</li> </ul> <p>We recommend that you first troubleshoot the module to see if the typical causes exist.</p>
CJChxx.Uncertain, Chxx.Uncertain	BOOL	Indicates that the data may be inaccurate but the <b>degree of inaccuracy is not known</b> . If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. <b>IMPORTANT:</b> Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.		<ul style="list-style-type: none"> <li>0 = Good data</li> <li>1 = Uncertain data</li> </ul> <p>The typical causes of uncertain data are the following:</p> <ul style="list-style-type: none"> <li>- Data signal slightly outside the channel operating range</li> <li>- The channel is slightly over temperature.</li> <li>- Invalid sensor offset value</li> <li>- Calibration fault on the channel</li> <li>- Calibration is in process on the channel</li> </ul> <p>We recommend that you first troubleshoot the module to see if the typical causes exist.</p>
CJChxx.OpenWire, Chxx.OpenWire	BOOL	The signal wire is disconnected from the channel or the RTB is removed from the module. -	If this condition exists, confirm that you are using one of these RTBs: 5069-RTB14CJC-SPRING, 5069-RTB14CJC-SCREW	<ul style="list-style-type: none"> <li>0 = Open Wire condition does not exist or Open Wire Detection is disabled</li> <li>1 = Open Wire condition exists. That is, a signal wire is disconnected from the channel or the RTB is removed from the module.</li> </ul>
Chxx.OverTemperature	BOOL	Module is higher temperature than its operating limits. If this tag is set to 1 but a fault does not exist on the channel, this tag is only an indication of operating conditions but the channel is functioning. If this tag is set to 1 and a fault exists on the channel, the channel is not functioning.		<ul style="list-style-type: none"> <li>0 = Module temperature is not over the operating limits</li> <li>1 = Module temperature is over the operating limits</li> </ul>
CJChxx.FieldPowerOff, Chxx.FieldPowerOff	BOOL	Field power is present or not present at the channel. Field power is provided through the SA power connector on the controller, EtherNet/IP adapter, or field potential distributor.		<ul style="list-style-type: none"> <li>0 = Field Power is present</li> <li>1 = Field Power is not present</li> </ul>
Chxx.NotANumber	BOOL	Indicates that the last value received for the channel input data value was not a number.		<ul style="list-style-type: none"> <li>0 = Last channel data received was a number</li> <li>1 = Last channel data received was not a number</li> </ul>
Chxx.Underrange, CJChxx.Underrange	BOOL	Indicates that the channel data is below 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 $\leq 3.0$ mA. If the input signal is 0 mA, this tag is set to 1.	The cold junction at the channel is below the minimum of its operating range.	<ul style="list-style-type: none"> <li>0 = Channel data is not beneath the underrange threshold/absolute minimum</li> <li>1 = Channel data is beneath the underrange threshold/absolute minimum</li> </ul>
Chxx.Overrange, CJChxx.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 $\geq 23.0$ mA. If the input signal is 24 mA, this tag is set to 1.	The cold junction at the channel is above the maximum of its operating range.	<ul style="list-style-type: none"> <li>0 = Channel data is not above the overrange threshold/absolute minimum</li> <li>1 = Channel data is above the overrange threshold/absolute minimum</li> </ul>
CJChxx.Temperature	REAL	-	Current temperature of the cold junction in °C. This tag <b>must</b> use °C.	Any
Chxx.LLAlarm	BOOL	Triggered when the input data value is less than the Low Low alarm value. If latched, this alarm remains triggered until unlatched. If not latched, the alarm clears after the input data value is greater than the Low Low limit and the Alarm Deadband.	If latched, this alarm remains triggered until unlatched or if the input data value is within Deadband.	<ul style="list-style-type: none"> <li>0 = Alarm is not triggered</li> <li>1 = Alarm is triggered</li> </ul>

## Input Tags - 5069-IF8, 5069-IY4, 5069-IY4K

Name	Size	Definition		Valid Values
		5069-IF8	5069-IY4, 5069-IY4K	
Chxx.LAlarm	BOOL	Triggered when the input data value is less than the Low alarm value. If latched, this alarm remains triggered until unlatched. If not latched, the alarm clears after the input data value is greater than the Low limit and the Alarm Deadband.		<ul style="list-style-type: none"> <li>0 = Alarm is not triggered</li> <li>1 = Alarm is triggered</li> </ul>
Chxx.HAlarm	BOOL	Triggered when the input data value is greater than the High alarm value. If latched, this alarm remains triggered until unlatched. If not latched, the alarm clears after the input data value is less than the High limit and the Alarm Deadband.	If latched, this alarm remains triggered until unlatched or if the input data value is within Deadband.	<ul style="list-style-type: none"> <li>0 = Alarm is not triggered</li> <li>1 = Alarm is triggered</li> </ul>
Chxx.HHAlarm	BOOL	Triggered when the input data value is greater than the High High alarm value. If latched, this alarm remains triggered until unlatched. If not latched, the alarm clears after the input data value is less than the High High limit and the Alarm Deadband.	If latched, this alarm remains triggered until unlatched or if the input data value is within Deadband.	<ul style="list-style-type: none"> <li>0 = Alarm is not triggered</li> <li>1 = Alarm is triggered</li> </ul>
Chxx.RateAlarm	BOOL	Triggered when the change between consecutive channel samples divided by the time between when the samples were taken exceeds the Rate Alarm. If latched, this tag remains set until it is unlatched.		<ul style="list-style-type: none"> <li>0 = Alarm is not triggered</li> <li>1 = Alarm is triggered</li> </ul>
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.		<ul style="list-style-type: none"> <li>0 = Calibration did not fail</li> <li>1 = Calibration failed</li> </ul>
Chxx.Calibrating	BOOL	Indicates that the channel is currently being calibrated.		<ul style="list-style-type: none"> <li>0 = Channel is not being calibrated</li> <li>1 = Channel is being calibrated</li> </ul>
Chxx.CalGoodLowRef	BOOL	Indicates that a valid Low Reference signal has been sampled on this channel. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .		<ul style="list-style-type: none"> <li>0 = Valid Low Reference signal has not been sampled on this channel</li> <li>1 = Valid Low Reference signal has been sampled on this channel</li> </ul>
Chxx.CalBadLowRef	BOOL	Indicates that an invalid Low Reference signal has been sampled on the 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. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .		<ul style="list-style-type: none"> <li>0 = Invalid Low Reference signal has not been sampled on this channel</li> <li>1 = Invalid Low Reference signal has been sampled on this channel</li> </ul>
Chxx.CalGoodHighRef	BOOL	Indicates that a valid High Reference signal has been sampled on this channel. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .		<ul style="list-style-type: none"> <li>0 = Valid High Reference signal has not been sampled on this channel</li> <li>1 = Valid High Reference signal has been sampled on this channel</li> </ul>
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. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .		<ul style="list-style-type: none"> <li>0 = Invalid High Reference signal has not been sampled on this channel</li> <li>1 = Invalid High Reference signal has been sampled on this channel</li> </ul>
Chxx.CalSuccessful	BOOL	Indicates that 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. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .		<ul style="list-style-type: none"> <li>0 = Calibration was not successful</li> <li>1 = One of the following: <ul style="list-style-type: none"> <li>Calibration was successful and calibrating state has been exited.</li> <li>Calibration data is present and applied.</li> </ul> </li> </ul>
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 or the time when new data has been received.		0 ...32767

## Output Tags - 5069-IF8, 5069-IY4, 5069-IY4K

Name	Size	Definition	Valid Values
Chxx.LLAlarmEn	BOOL	Enables the Low Low alarm. <b>IMPORTANT:</b> To use this alarm, you must set the tag to 1 <b>and</b> verify that Chxx.AlarmDisable tag for the same channel is set to 0. If all alarms are disabled, the Low Low alarm cannot be enabled.	<ul style="list-style-type: none"> <li>0 = Alarm is disabled</li> <li>1 = Alarm is enabled</li> </ul>
Chxx.LAlarmEn	BOOL	Enables the Low alarm. <b>IMPORTANT:</b> To use this alarm, you must set the tag to 1 <b>and</b> verify that Chxx.AlarmDisable tag for the same channel is set to 0. If all alarms are disabled, the Low alarm cannot be enabled.	<ul style="list-style-type: none"> <li>0 = Alarm is disabled</li> <li>1 = Alarm is enabled</li> </ul>
Chxx.HAlarmEn	BOOL	Enables the High alarm. <b>IMPORTANT:</b> To use this alarm, you must set the tag to 1 <b>and</b> verify that Chxx.AlarmDisable tag for the same channel is set to 0. If all alarms are disabled, the High alarm cannot be enabled.	<ul style="list-style-type: none"> <li>0 = Alarm is disabled</li> <li>1 = Alarm is enabled</li> </ul>
Chxx.HHAlarmEn	BOOL	Enables the High High alarm. <b>IMPORTANT:</b> To use this alarm, you must set the tag to 1 <b>and</b> verify that Chxx.AlarmDisable tag for the same channel is set to 0. If all alarms are disabled, the High High alarm cannot be enabled.	<ul style="list-style-type: none"> <li>0 = Alarm is disabled</li> <li>1 = Alarm is enabled</li> </ul>
Chxx.RateAlarmEn	BOOL	Enables the Rate alarm. <b>IMPORTANT:</b> To use this alarm, you must set the tag to 1 <b>and</b> verify that Chxx.AlarmDisable configuration tag for the same channel is set to 0. If all alarms are disabled, the Rate alarm cannot be enabled.	<ul style="list-style-type: none"> <li>0 = Alarm is disabled</li> <li>1 = Alarm is enabled</li> </ul>
Chxx.LLAlarmUnlatch	BOOL	Unlatches a latched Low Low Alarm at the first instance of the bit transitioning from 0 to 1.	<ul style="list-style-type: none"> <li>0 = Low Low Alarm remains latched</li> <li>1 = Low Low Alarm unlatches</li> </ul>
Chxx.LAlarmUnlatch	BOOL	Unlatches a latched Low Alarm at the first instance of the bit transition from 0 to 1.	<ul style="list-style-type: none"> <li>0 = Low Alarm remains latched</li> <li>1 = Low Alarm unlatches</li> </ul>
Chxx.HAlarmUnlatch	BOOL	Unlatches a latched High Alarm at the first instance of the bit transition from 0 to 1.	<ul style="list-style-type: none"> <li>0 = High Alarm remains latched</li> <li>1 = High Alarm unlatches</li> </ul>
Chxx.HHAlarmUnlatch	BOOL	Unlatches a set High High Alarm at the first instance of the bit transition from 0 to 1.	<ul style="list-style-type: none"> <li>0 = High High Alarm remains latched</li> <li>1 = High High Alarm unlatches</li> </ul>
Chxx.RateAlarmUnlatch	BOOL	Unlatches a set Rate Alarm at the first instance of the bit transition from 0 to 1.	<ul style="list-style-type: none"> <li>0 = Rate Alarm remains latched</li> <li>1 = Rate Alarm unlatches</li> </ul>
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.	<ul style="list-style-type: none"> <li>0 = Calibration process is not started</li> <li>1 = Calibration process is started</li> </ul>
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 you set this tag. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .	<ul style="list-style-type: none"> <li>0 = Low Reference Signal is not applied to the RTB</li> <li>1 = Low Reference Signal is applied to RTB</li> </ul>
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 you set this tag. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .	<ul style="list-style-type: none"> <li>0 = High Reference Signal is not applied to the RTB</li> <li>1 = High Reference Signal is applied to RTB</li> </ul>
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.

## Output Module Tags

These tables describe the tags that are associated with the 5069-OF4, 5069-OF4K, and 5069-OF8 modules. For more information, see [View the Tags](#).

### Configuration Tags - 5069-OF4, 5069-OF4K, 5069-OF8

Name	Size	Definition	Valid Values
Chxx.Range	SINT	Channel's operating range	<ul style="list-style-type: none"> <li>0 = -10...10V</li> <li>1 = 0...5V</li> <li>2 = 0...10V</li> <li>4 = 0...20 mA</li> <li>5 = 4...20 mA</li> </ul>
Chxx.AlarmDisable	BOOL	Disables all alarms on the channel.	<ul style="list-style-type: none"> <li>0 = Alarms are enabled</li> <li>1 = Alarms are disabled (default)</li> </ul>
Chxx.LimitAlarmLatchEn	BOOL	Configures Limit alarms to latch until they are explicitly unlatched.	<ul style="list-style-type: none"> <li>0 = Latching disabled (default)</li> <li>1 = Latching enabled</li> </ul>
Chxx.RampAlarmLatchEn	BOOL	Latches Ramp alarm when set so that it does not clear until manually unlatched.	<ul style="list-style-type: none"> <li>0 = Latching disabled (default)</li> <li>1 = Latching enabled</li> </ul>
Chxx.NoLoadEn	BOOL	Enable the input No Load diagnostic	<ul style="list-style-type: none"> <li>0 = Disabled (default)</li> <li>1 = Enabled</li> </ul>
Chxx.Disable	BOOL	Disables the channel.	<ul style="list-style-type: none"> <li>0 = Channel is enabled (default)</li> <li>1 = Channel is disabled</li> </ul>
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.	<ul style="list-style-type: none"> <li>0 = Transition to user-defined value</li> <li>1 = Hold Last State (default)</li> </ul>
Chxx.ProgMode	BOOL	Determines output action when the controller transitions to Program mode or the connection to the module is inhibited. At the transition to Program mode, the output holds its last state or transitions to the value set in the Program Value parameter.	<ul style="list-style-type: none"> <li>0 = Transition to user-defined value</li> <li>1 = Hold Last State (default)</li> </ul>
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 Fault mode. If the channel remains in safe state for Program mode, the Final Fault State parameter is ignored.	<ul style="list-style-type: none"> <li>0 = Remains in the Program state</li> <li>1 = Transitions to the safe state for the Fault mode</li> </ul>
Chxx.RampInRun	BOOL	Enables Output Ramping when the module is in Run mode. Output changes in Run mode are limited to the Maximum Ramp Rate value.	<ul style="list-style-type: none"> <li>0 = Ramping disabled (default)</li> <li>1 = Ramping enabled in Run mode</li> </ul>
Chxx.RampToProg	BOOL	Enables Output Ramping when the controller transitions to Program mode. Output changes in Program mode are limited to the Maximum Ramp Rate value.	<ul style="list-style-type: none"> <li>0 = Ramping disabled (default)</li> <li>1 = Ramping enabled to Program mode state</li> </ul>
Chxx.RampToFault	BOOL	Enables Output Ramping when the connection to the module faults. Output transitions to FaultValue and FaultFinalState are limited to the MaximumRampRate.	<ul style="list-style-type: none"> <li>0 = Ramping disabled (default)</li> <li>1 = Ramping enabled to Fault mode state</li> </ul>
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. <ul style="list-style-type: none"> <li>Module initial connection (power up)</li> <li>Controller transition from Program mode back to Run mode</li> <li>Module re-establishes communication after a fault</li> <li>SA power is restored after being lost.</li> </ul>	<ul style="list-style-type: none"> <li>0 = Output 0.Chxx.Data signal immediately</li> <li>1 = Hold last signal until initialization match</li> </ul>
Chxx.FaultValueStateDuration	SINT	Determines the length of time the FaultMode or FaultValue parameter value is held before the Final Fault State.	<ul style="list-style-type: none"> <li>0 = Hold forever (default)</li> <li>Any of the following: 1, 2, 5, or 10 seconds</li> </ul>
Chxx.MaxRampRate	REAL	Maximum rate at which the channel can transition to in Engineering Units/s. This tag is used only if at least one of these output ramping modes is enabled: <ul style="list-style-type: none"> <li>Ramp In Run</li> <li>Ramp To Fault</li> <li>Ramp To Program</li> </ul>	Any value $\geq 0.0$ 1,000,000.00 = default 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.	<b>Current applications</b> - Any value less than the high signal in range. <ul style="list-style-type: none"> <li>0 = default for 0...20 mA range</li> <li>4 = default for 4...20 mA</li> </ul> <b>Voltage applications</b> - Any value less than the high signal in range. <ul style="list-style-type: none"> <li>-10 = default for -10...10V range</li> <li>0 = default for 0...5V and 0...10V range</li> </ul>
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.	<b>Current applications</b> - Any value greater than the low signal in range, 20 = default for either current input range <b>Voltage applications</b> - Any value greater than the low signal in range. <ul style="list-style-type: none"> <li>10 = default for 0...10V and -10...10V ranges</li> <li>5 = default for 0...5V range</li> </ul>
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.	<b>Current applications</b> - Any value less than the high engineering value, 0.0 = default <b>Voltage applications</b> - Any value less than the high engineering value, Low signal = default. For example, with the -10...10V range, the default = -10.

## Configuration Tags - 5069-0F4, 5069-0F4K, 5069-0F8

Name	Size	Definition	Valid Values
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.	<b>Current applications</b> - Any value greater than the low engineering value, 100.0 = default <b>Voltage applications</b> - Any value greater than the low engineering value, High signal = default. For example, with the -10...10V range, the default = 10.
Chxx.LowLimit	REAL	Lowest value to which the output can go based on the operating range that is established by the Output Clamping feature. The tag value is engineering units.	Any value lower than the HighLimit 0.0 = default
Chxx.HighLimit	REAL	Highest value to which the output can go based on the operating range that is established by the Output Clamping feature. The tag value is engineering units.	Any value higher than the LowLimit 0.0 = default
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.) 0.0 = default
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 ProgramToFaultEn tag is set	Any value 0.0 = default
Chxx.ProgValue	REAL	Value to which the channel changes if the following events exist: • Program Mode = 0 • Controller transitions to Program mode	Any value 0.0 = default
Chxx.FaultFinalState	REAL	Value to which the channel changes if the following events exist: • Connection is lost • Time that is defined by the FaultValueStateDuration parameter has been exceeded Output transitions to FaultValue and FaultFinalState are limited to the MaximumRampRate.	Any value 0.0 = default

## Input Tags - 5069-0F4, 5069-0F4K, 5069-0F8

Name	Size	Definition	Valid Values
RunMode	BOOL	Indicates the operating state of the channel.	• 0 = Idle • 1 = Run
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 = Connection running • 1 = Connection not running
DiagnosticActive	BOOL	Indicates if any diagnostics are active.	• 0 = No diagnostics active • 1 = One or more diagnostics are active
DiagnosticSequenceCount	SINT	Increments for each time a distinct diagnostic condition is detected, and when a distinct diagnostic condition transitions from detected to not detected. Set to zero by product reset or power cycle. Wraps from 255 (-1) to 1 skipping zero.	-128...+127 0 is skipped except during module power-up.
Chxx.Fault	BOOL	Indicates that channel data is inaccurate and <b>cannot be trusted</b> for use in the application. If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. <b>IMPORTANT:</b> Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	• 0 = Good • 1 = Bad, causing fault The typical causes of fault data are the following: - Channel is disabled - No Load condition - Short Circuit condition We recommend that you first troubleshoot the module to see if the typical causes exist.
Chxx.Uncertain	BOOL	Indicates that the channel data may be inaccurate but the <b>degree of inaccuracy is not known</b> . If the tag is set to 1, you must troubleshoot the module to correct the cause of the inaccuracy. <b>IMPORTANT:</b> Once the condition that causes the tag to change to 1 is removed, the tag automatically resets to 0.	• 0 = Good data • 1 = Uncertain data The typical causes of uncertain data are the following: - Data signal 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.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
Chxx.OverTemperature	BOOL	Module is higher temperature than its operating limits. If this tag is set to 1 but a fault does not exist on the channel, this tag is only an indication of operating conditions but the channel is functioning. If this tag is set to 1 and a fault exists on the channel, the channel is not functioning.	• 0 = Module temperature is not over the operating limits • 1 = Module temperature is over the operating limits
Chxx.FieldPowerOff	BOOL	Field power is not present at the channel. Field power is provided through the SA power connector on the controller, EtherNet/IP adapter, or field potential distributor.	• 0 = Field Power is present • 1 = Field Power is not present

## Input Tags - 5069-0F4, 5069-0F4K, 5069-0F8

Name	Size	Definition	Valid Values
Chxx.InHold	BOOL	Indicates that the channel is holding until the received data value is within 0.1% range full scale of the current data value.	<ul style="list-style-type: none"> <li>0 = Channel is not holding</li> <li>1 = Channel is holding</li> </ul>
Chxx.NotANumber	BOOL	Indicates that the last value received for the channel output data value was not a number.	<ul style="list-style-type: none"> <li>0 = Last channel data received was a number</li> <li>1 = Last channel data received was not a number</li> </ul>
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 output range, the underrange threshold on the channel is $\leq 3.6$ mA. If the output signal is 0 mA, this tag is set to 1.	<ul style="list-style-type: none"> <li>0 = Channel data is not beneath the underrange threshold</li> <li>1 = Channel data is beneath the underrange threshold</li> </ul>
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 $\geq 21.0$ mA. If the output signal is 21 mA, this tag is set to 1.	<ul style="list-style-type: none"> <li>0 = Channel data is not above the overrange threshold</li> <li>1 = Channel data is above the overrange threshold</li> </ul>
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.	<ul style="list-style-type: none"> <li>0 = Alarm is not triggered</li> <li>1 = Alarm is triggered</li> </ul>
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.	<ul style="list-style-type: none"> <li>0 = Alarm is not triggered</li> <li>1 = Alarm is triggered</li> </ul>
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	<ul style="list-style-type: none"> <li>0 = Alarm is not triggered</li> <li>1 = Alarm is triggered</li> </ul>
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.	<ul style="list-style-type: none"> <li>0 = Calibration did not fail</li> <li>1 = Calibration failed</li> </ul>
Chxx.Calibrating	BOOL	Indicates that the channel is currently being calibrated.	<ul style="list-style-type: none"> <li>0 = Channel is not being calibrated</li> <li>1 = Channel is being calibrated</li> </ul>
Chxx.CalGoodLowRef	BOOL	Indicates that a valid Low Reference measurement was passed through the output tag to the module. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .	<ul style="list-style-type: none"> <li>0 = Valid Low Reference measurement was not passed to the module</li> <li>1 = Valid Low Reference measurement was passed to the module</li> </ul>
Chxx.CalBadLowRef	BOOL	Indicates that an invalid Low Reference signal has been sampled on the 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. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .	<ul style="list-style-type: none"> <li>0 = Invalid Low Reference signal has not been sampled on this channel</li> <li>1 = Invalid Low Reference signal has been sampled on this channel</li> </ul>
Chxx.CalGoodHighRef	BOOL	Indicates that a valid High Reference measurement was passed through the output tag to the module. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .	<ul style="list-style-type: none"> <li>0 = Valid High Reference measurement was not passed to the module</li> <li>1 = Valid High Reference measurement was passed to the module</li> </ul>
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. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .	<ul style="list-style-type: none"> <li>0 = Invalid High Reference signal has not been sampled on this channel</li> <li>1 = Invalid High Reference signal has been sampled on this channel</li> </ul>
Chxx.CalSuccessful	BOOL	Indicates that 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. <b>IMPORTANT:</b> This tag is available only when you select the Data with Calibration connection type in the Module Definition. If you select the Data connection type, this tag does not appear in the module tags. For more information, see <a href="#">Module Definition</a> .	<ul style="list-style-type: none"> <li>0 = Calibration was not successful</li> <li>1 = Calibration was successful and calibrating state has been exited.</li> </ul>
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 Tags - 5069-OF4, 5069-OF4K, 5069-OF8

Name	Size	Definition	Valid Values
Chxx.LLimitUnlatch	BOOL	Unlatches a latched Low Limit alarm at the first instance of the bit transitioning from 0 to 1.	<ul style="list-style-type: none"> <li>0 = Alarm remains latched (default)</li> <li>1 = Alarm is unlatched</li> </ul>
Chxx.HLimitUnlatch	BOOL	Unlatches a latched High Limit alarm at the first instance of the bit transitioning from 0 to 1.	<ul style="list-style-type: none"> <li>0 = Alarm remains latched (default)</li> <li>1 = Alarm is unlatched</li> </ul>
Chxx.RampAlarmUnlatch	BOOL	Unlatches a latched Ramp alarm at the first instance of the bit transitioning from 0 to 1.	<ul style="list-style-type: none"> <li>0 = Alarm remains latched (default)</li> <li>1 = Alarm is unlatched</li> </ul>
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.	<ul style="list-style-type: none"> <li>0 = Calibration process is not started (default)</li> <li>1 = Calibration process is started</li> </ul>
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.	<ul style="list-style-type: none"> <li>0 = Do not output Cal Low Reference</li> <li>1 = Output Calibration Low Reference</li> </ul> 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.	<ul style="list-style-type: none"> <li>0 = Do not Output Cal High Reference</li> <li>1 = Output Calibration High Reference Signal</li> </ul> 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.	<ul style="list-style-type: none"> <li>0 = Not sending Recorded Cal Low Ref</li> <li>1 = Sending Recorded Cal Low Reference in Output Data for Calibration Verification</li> </ul>
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.	<ul style="list-style-type: none"> <li>0 = Not sending Cal High Reference</li> <li>1 = Sending recorded Calibration High Reference Signal in Output Data for Calibration Verification</li> </ul>
Chxx.CalFinishCalibration	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.	<ul style="list-style-type: none"> <li>0 = Channel not triggered to complete the calibration procedure</li> <li>1 = Channel triggered to complete the calibration procedure</li> </ul>
Chxx.Data	REAL	The value that is converted to the signal on the RTB in scaled Engineering Units.	Any valid engineering unit

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