User Manual

Allen-Bradley

POINT Guard I/O Safety Modules

Catalog Numbers 1734-IB8S, 1734-OB8S, 1734-IE4S

Rockwell Automation

Allen-Bradley · Rockwell Software
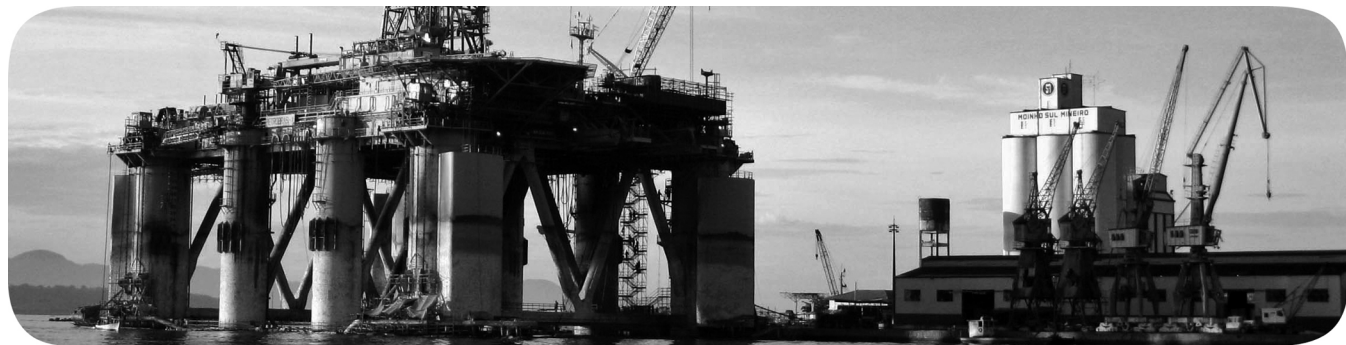
Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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

This manual contains new and updated information. Changes throughout this revision are marked by change bars, as shown to the right of this paragraph.

New and Updated Information

This table contains the changes made to this revision.

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Expanded Additional Resources to include terminal assembly and power supply installation instruction publications	10
Added information on safety analog inputs	15
Added RSLogix 5000™ software minimum version requirements	15
Updated references to controller safety system publications	17
Added information on safe states of the analog input module	20
Information on module configuration when using the GuardLogix® safety application instructions	23, 27
Added safety analog input features	27…34
Updated the description of the muting lamp test	36
Added Analog I/O Status Data	39
New Chapter: Guidelines for Placing Power Supplies and Modules in a System	41
Identified key positions for 1734-IE4S modules	50
Updated information on wiring POINT Guard I/O modules including 1734-IE4S modules	52
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Revised power supply considerations and examples	Chapter 3
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New chapter: Configuring Safety Connections Between a GuardLogix Controller and POINT Guard I/O™ Modules on a DeviceNet Network	Chapter 7
Information on resetting the module to out-of-box condition is now in the chapter on replacing a module	135
Revised information on replacing I/O modules in GuardLogix systems	137
Revised information on replacing I/O modules in SmartGuard systems	143
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Updated legislation and standards section and moved it to follow certifications	Appendix C
Updated safety data, including PFD/PFH values, MTTF and STR	Appendix D
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Notes:

Chapter 3

Guidelines for Placing Power Supplies and Modules in a System

Chapter 4

Install the Module

Chapter 5

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Chapter 6

Configure the Module for a SmartGuard Controller

Chapter 7

Configuring Safety Connections Between a GuardLogix Controller and POINT Guard I/O Modules on a DeviceNet Network

Chapter 8

Replacing POINT Guard I/O Modules

Thoroughly read and understand this manual before installing and operating a system using POINT Guard I/O modules.

Always observe the following guidelines when using a module, noting that in this manual we use safety administrator to mean a person qualified, authorized, and responsible to secure safety in the design, installation, operation, maintenance, and disposal of the 'machine'.

- Keep this manual in a safe place where personnel can refer to it when necessary.
- Use the module properly according to the installation environment, performance ratings, and functions of the machine.

  See and .

Product specifications and accessories can change at any time. Consult with your Rockwell Automation representative to confirm specifications of purchased product. Dimensions and weights are nominal and are not for manufacturing purposes, even when tolerances are shown.

Consult your Rockwell Automation representative if you have any questions or comments. Also refer to the related documentation, listed in the , as necessary.

Terminology

Refer to this table for the meaning of common terms.

Term	Means
Connection	Logical communication channel for communication between nodes. Connections are maintained and controlled between masters and slaves.
EDS	Electronic data sheet, a template used in RSNetWorx software to display the configuration parameters, I/O data profile, and connection-type support for a given I/O module. RSNetWorx software uses these simple text files to identify products and commission them on a network.
MTBF	Mean time between failure, the average time between failure occurrences.
ODVA	Open DeviceNet Vendor Association, a nonprofit association of vendors established for the promotion of CIP networks.
PFD	Probability of failure on demand, the average probability of a system to fail to perform its design function on demand.
PFH	Probability of failure per hour, the probability of a system to have a dangerous failure occur per hour.
Proof test	Periodic test performed to detect failures in a safety-related system so that, if necessary, the system can be restored to an as-new condition or as close as practical to this condition.
SNN	Safety network number, which uniquely identifies a network across all networks in the safety system. You are responsible for assigning a unique number for each safety network or safety sub-net within a system.
Standard	Devices or portions of devices that do not participate in the safety function.

Additional Resources

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

Resource	Description
POINT I/O Selection Guide, publication 1734-SG001	Provides selection information for POINT I/O™ modules. Additional publication references are listed as well.
GuardLogix Controller Systems Safety Reference Manual, publication 1756-RM093	Provides information on safety system requirements and describes the GuardLogix controller system.
GuardLogix Controllers User Manual, publication 1756-UM020	Provides general information about using GuardLogix controllers.
GuardLogix Safety Application Instructions Safety Reference Manual, publication 1756-RM095	Provides reference information describing the GuardLogix Safety Application Instruction Set.
SmartGuard 600 Controllers Installation Instructions, publication 1752-IN001	Provides information related to installation of SmartGuard 600 controllers.
SmartGuard 600 Controllers Safety Reference Manual, publication 1752-RM001	Describes SmartGuard 600-specific safety requirements and controller features.
SmartGuard 600 Controllers User Manual, publication 1752-UM001	Describes how to configure, operate, and troubleshoot the controller.
Field Potential Distributor Installation Instructions, publication 1734-IN059	Provides installation information on 1734-FPD distributors.
POINT I/O 24V DC Expansion Power Supply Installation Instructions, publication 1734-IN058	Provides installation information on 1734-EP24DC power supplies.
POINT I/O 120/240V AC Expansion Power Supply Installation Instructions, publication 1734-IN017	Provides installation information on 1734-EPAC power supplies.
POINT I/O Wiring Base Assembly Installation Instructions, publication 1734-IN511	Provides installation information on 1734-TB and 1734-TBS assemblies.
POINT I/O One-piece Wiring Base Assembly Installation Instructions, publication 1734-IN028	Provides installation information on 1734-TOP, 1734-TOPS, 1734-TOP3, and 1734-TOP3S assemblies.
DeviceNet Modules in Logix5000 Control Systems User Manual, publication DNET-UM004	Provides information on how to connect the controller to the network.
ODVA Media Planning and Installation Guide, http://www.odva.org	Describes the required media components and how to plan for and install these required components.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley® distributor or Rockwell Automation sales representative.

POINT Guard I/O Overview

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Use the POINT Guard I/O safety modules in the POINT I/O platform to distribute safety I/O on a safety-control network that meets the requirements up to and including SIL 3, and PLe, Cat. 4 as defined in IEC 61508, IEC 61511, IEC 62061, and ISO 13849-1. POINT Guard I/O modules may be used with 1756 GuardLogix, 1768 Compact GuardLogix, or SmartGuard 600 controllers.

You can configure the modules for use on DeviceNet networks by using the network configuration tool, RSNetWorx™ for DeviceNet™ software. For EtherNet networks, use the GuardLogix programming tool, RSLogix 5000 software.

Understand Suitability for Use

Rockwell Automation is not responsible for conformity with any standards, codes, or regulations that apply to the combination of the products in your application or use of the product. See Legislations and Standards on page 167 for more information.

Take all necessary steps to determine the suitability of the products for the systems, machine, and equipment with which it is used.

Know and observe all prohibitions of use applicable to these products.

Use this equipment within its specified ratings.

Never use these products for an application involving serious risk to life or property without making sure that the system as a whole was designed to address the risks and that the Rockwell Automation products are properly rated and installed for the intended use within the overall equipment or system.

Verify that the POINT Guard I/O firmware revision is correct prior to commissioning the safety system. Firmware information for safety I/O modules is available at http://www.rockwellautomation.com/products/certification/safety.

> **TIP**   Field power must be applied to the 1734-IE4S module when updating firmware.

Verify that a safety administrator conducts a risk assessment on the machine and determines module suitability before installation.

> ⚠ **ATTENTION:** Personnel responsible for the application of safety-related programmable electronic systems (PES) shall be aware of the safety requirements in the application of the system and shall be trained in using the system.

> ⚠ **ATTENTION:** Use only appropriate components or devices complying with relevant safety standards corresponding to the required safety category and safety integrity level.
>
> • Conformity to requirements of the safety category and safety integrity level must be determined for the entire system.
> • We recommend you consult a certification body regarding assessment of conformity to the required safety integrity level or safety category.
>
> You are responsible for confirming compliance with the applicable standards for the entire system.

Table 1 - Requirements for Controlling Devices

Device	Requirement	Allen-Bradley Bulletin Safety Components
Emergency stop switches	Use approved devices with direct opening mechanisms complying with IEC/EN 60947-5-1.	Bulletin 800F, 800T
Door interlocking switches, limit switches	Use approved devices with direct opening mechanisms complying with IEC/EN 60947-5-1 and capable of switching microloads of 24V DC, 3 mA.	Bulletin 440K, 440G, 440H for interlock switch Bulletin 440P, 802T for limit switch
Safety sensors	Use approved devices complying with the relevant product standards, regulations, and rules in the country where used.	Any Guardmaster product
Relays with forcibly- guided contacts, contactors	Use approved devices with forcibly-guided contacts complying with EN 50205. For feedback purposes, use devices with contacts capable of switching micro loads of 24V DC, 3 mA.	Bulletin 700S, 100S
Other devices	Evaluate whether devices used are appropriate to satisfy the requirements of safety category levels.	-

Safety Precautions

Observe these precautions for proper use of POINT Guard I/O modules.

> ⚠ **ATTENTION:** As serious injury may occur due to loss of required safety function, follow these safety precautions.
>
> - Never use test outputs as safety outputs. Test outputs are not safety outputs.
> - Do not use Ethernet, DeviceNet, or ControlNet standard I/O data or explicit message data as safety data.
> - Do not use LED status indicators on the I/O modules for safety operations.
> - Do not connect loads beyond the rated value to the safety outputs.
> - Apply properly specified voltages to the module. Applying inappropriate voltages may cause the module to fail to perform it's specified function, which could lead to loss of safety functions or damage to the module.
> - Wire the POINT Guard I/O modules properly following the wiring requirements and guidelines in Wire Modules on page 52.
> - Set unique network node addresses before connecting devices to the network.
> - Perform testing to confirm that device wiring, configuration, and operation is correct before starting system operation.
> - Do not disassemble, repair, or modify the module. This may result in loss of safety functions.

Installing and Replacing Modules

> ⚠ **ATTENTION:**
>
> - Clear previous configuration data before connecting devices to the network or connecting input or output power to the device.
> - Configure the replacement device properly and confirm that it operates correctly.
> - After installation of the module, a safety administrator must confirm the installation and conduct trial operation and maintenance.

When cleaning modules, do **not** use the following:

- Thinner
- Benzene
- Acetone

POINT Guard I/O Modules in CIP Safety Systems

POINT Guard I/O modules are used in the POINT I/O platform and implement CIP Safety protocol extensions over EtherNet/IP and DeviceNet networks to communicate safety messages. POINT Guard I/O modules connect to EtherNet/IP or DeviceNet networks via these network adapters.

Table 2 - Network Adapters

Network	System	Adapter[(1)]
EtherNet/IP	GuardLogix	1734-AENT (firmware revision 3 or later)
		1734-AENTR
DeviceNet	SmartGuard GuardLogix	1734-PDN

(1)   Not compatible with 1734-ADN, 1734-ADNX, 1734-APB, or 1734-ACNR adapters.

Distributed I/O communication for safety I/O data is performed through safety connections supporting CIP Safety over an EtherNet/IP or DeviceNet network. Data processing is performed in the safety controller. The status and fault diagnostics of POINT Guard I/O modules are monitored by a controller.

In addition to I/O state data, the modules include status data for monitoring I/O faults within each circuit.

The configuration information of the modules can be protected by a password.

1734-IB8S Digital Input Module Features

- Safety digital inputs
  - Safety devices, such as emergency stop push buttons, gate switches, and safety light curtains, can be connected.
  - Dual-channel mode evaluates consistency between two input signals (channels), which allows use of the module for safety Category 3 and 4 and in applications rated up to and including Performance Level e/ SIL 3.
  - You can configure a discrepancy time to control how long two channels are allowed to be discrepant before a fault is declared.
  - Single-channel mode for SIL 2-rated safety input devices.
  - Dual-channel mode for SIL 3-rated safety input devices.
  - An external wiring short-circuit check is possible when inputs are wired in combination with test outputs. The module must be wired in combination with test outputs when this function is used.
  - Independently adjustable on and off delays are available per channel.
- Test outputs (digital input modules only)
  - Separate test outputs are provided for short-circuit detection of a safety input (or inputs).
  - Power (24V) can be supplied to devices, such as safety sensors.
  - Test outputs can be configured as standard outputs.
  - Specific test outputs can be used for broken-wire detection of a muting lamp.

1734-OB8S Safety Digital Output Module Features

- Solid-state outputs
- Dual-channel mode provides redundant control by using two output signals (channels), which allows use of the module for safety Category 3 and 4, and applications rated up to and including Performance Level e/ SIL 3.
- Safety outputs can be pulse-tested to detect field wiring short circuits to 24V DC.

1734-IE4S Safety Analog Input Module Features

- Connection of up to four voltage or current sensors.
- Sensor power outputs are individually current-limited and monitored.
- Measurement of process variables, such as temperature, pressure, or flow rate.
- Seven configurable input ranges ($\pm$10V, $\pm$5V, 0…5V, 0…10V, 4…20 mA, 0…20 mA, Tachometer).
- Tachometer mode converts 24V DC switching signals into pulses per second.
- Single-channel or dual-channel for SIL 3-rated safety devices and applications.
- Dual-channel mode evaluates the consistency between two input signals (channels), which allows use of the module in applications rated up to and including SIL 3/PLe/Cat. 4.
- You can configure a discrepancy time to control how long two channels are allowed to be discrepant before a fault is declared.

Programming Requirements

Use the minimum software versions listed here.

Cat. No.	RSLogix 5000 Software Version[1] (EtherNet/IP Network)	RSNetWorx for DeviceNet Software Version[1] (DeviceNet Network)
1734-IB8S, 1734-OB8S	17[2]	9
1734-IE4S	18[3]	10

(1) This version or later.

(2) If you are using digital POINT Guard I/O modules with the analog POINT Guard I/O module, you need to update the add-on profiles to version 2.02.004 or later for the modules to be compatible with version 18 or later of RSLogix 5000 software. To find add-on profiles, go to http://www.rockwellautomation.com/support.

(3) Dual-channel Analog (DCA) safety application instruction is available in RSLogix 5000 software, version 20 or later.

CIP Safety Architectures

Use POINT Guard I/O modules in EtherNet/IP or DeviceNet safety architectures. Safety controllers control the safety outputs. Safety or standard PLC controllers can control the standard outputs.

Figure 1 - POINT Guard I/O Modules in EtherNet/IP Safety Architecture

GuardLogix
Controller

Stratix 8000™
Switch

CompactBlock
Guard I/O™

POINT Guard I/O and POINT I/O

Safety Communication

Standard Communication
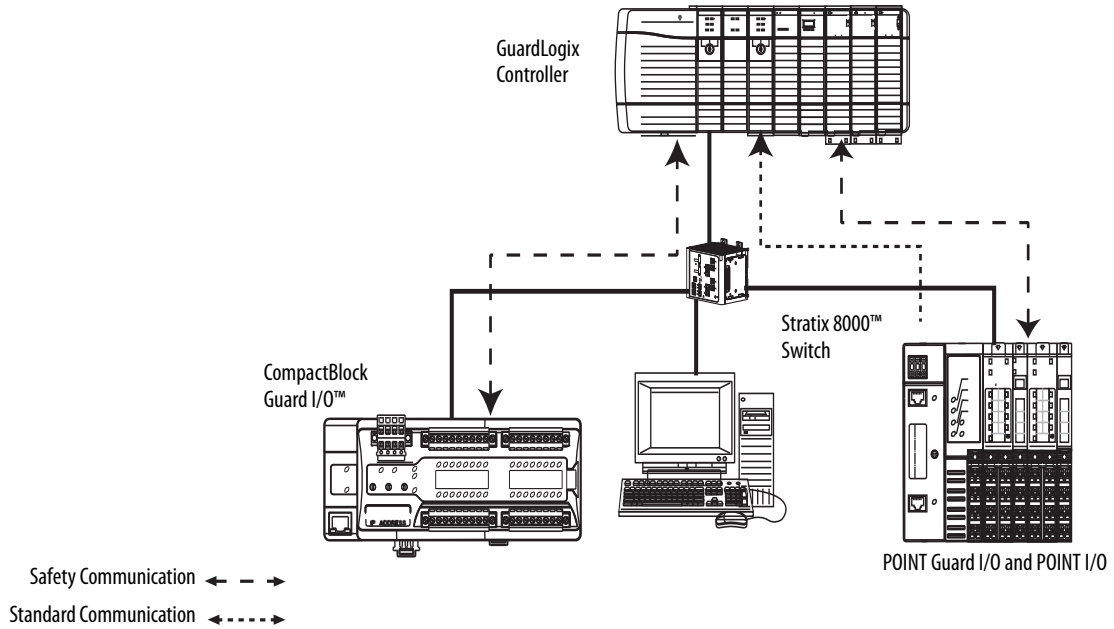
Figure 2 - POINT Guard I/O Modules in DeviceNet Safety Architectures

GuardLogix
Controller

SmartGuard
Controller

Guard I/O

POINT Guard I/O and POINT I/O

Safety Communication

Standard Communication
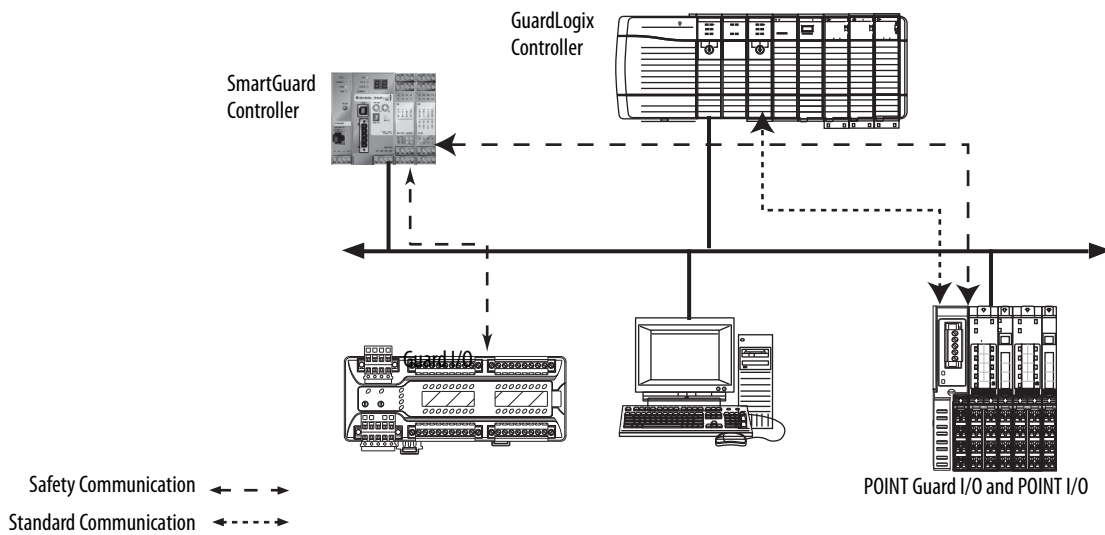
Safety Application Requirements

POINT Guard I/O modules are certified for use in safety applications up to and including Performance Level e (PLe/Cat. 4) and Safety Integrity Level 3 (SIL 3) in which the de-energized state is the safe state. Safety application requirements include evaluating probability of failure rates (PFD and PFH), system reaction time settings, and functional verification tests that fulfill SIL 3 criteria.

Creating, recording, and verifying the safety signature is also a required part of the safety application development process. Safety signatures are created by the safety controller. The safety signature consists of an identification number, date, and time that uniquely identifies the safety portion of a project. This includes all safety logic, data, and safety I/O configuration.

For safety system requirements, including information on the safety network number (SNN), verifying the safety signature, functional verification test intervals, system reaction time, and PFD/PFH calculations, refer to the following publications.

For safety requirements in	Refer to
GuardLogix controller systems	GuardLogix Controller Systems Safety Reference Manual, publication 1756-RM093
SmartGuard 600 controller systems	SmartGuard 600 Controllers Safety Reference Manual, publication 1752-RM001

You must read, understand, and fulfill the requirements detailed in these publications prior to operating a safety system that uses POINT Guard I/O modules.

Notes:

Safety Inputs, Safety Outputs, and Safety Data

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Safe States

POINT Guard Digital I/O Modules

> ⚠ **ATTENTION:**
> - The safe state of the outputs is defined as the off state.
> - The safe state of the module and its data is defined as the off state.
> - Use the POINT Guard I/O module only in applications where the off state is the safe state.

These are the safe states of the digital POINT Guard I/O modules:

- Safety outputs: OFF
- Safety input data to network: OFF (single channel and dual-channel equivalent)
- Safety input data to network: OFF/ON for input channels n/n+1 (dual-channel complimentary)

Figure 3 - Safety Status
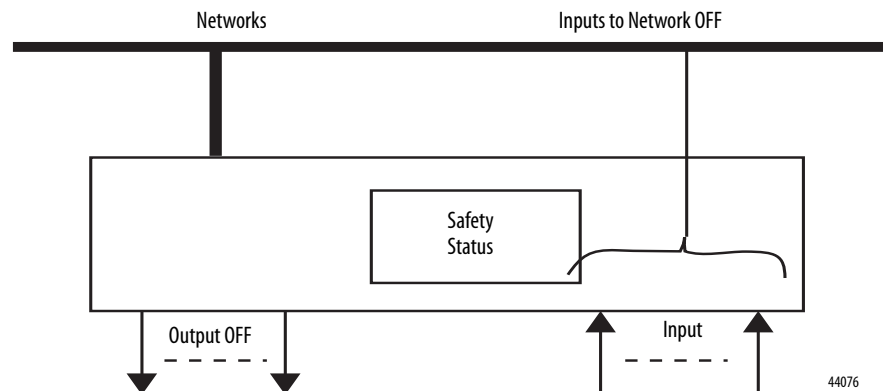
The module is designed for use in applications where the safe state is the off state.

POINT Guard Analog Input Module

These are the safe states of the POINT Guard analog input module:

- Safety input data to network in single-channel configuration: 0 (OFF)
- Safety input data to network in dual-channel equivalent configuration:
  - If a diagnostic fault occurs, the signal for the faulted channel is set to 0 (OFF).
  - If a dual-channel discrepancy fault occurs, the dual-channel inputs continue to report actual input signals.

Safety Inputs (1734-IB8S)

Safety inputs are used to monitor safety input devices.

Using a Test Output with a Safety Input

A test output can be used in combination with a safety input for short circuit, cross-channel, and open-circuit fault detection. Configure the test output as a pulse test source and associate it to a specific safety input.

TIP	The test output can also be configured as a power supply to source 24V DC to an external device, for example, a light curtain.

Figure 4 - Example Use of a POINT Guard I/O Input Module
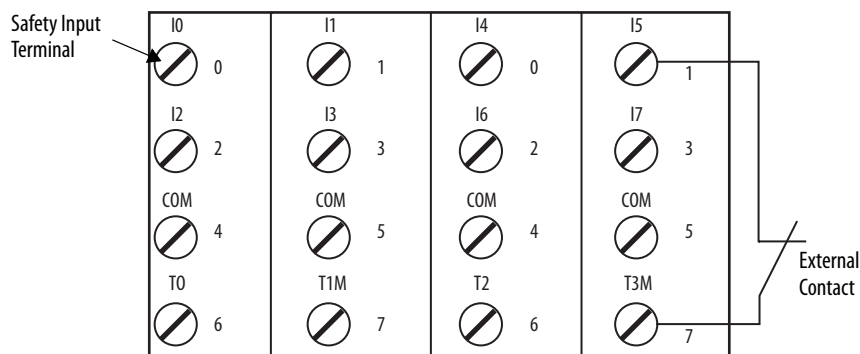
Where:
T0 = Test Output
T2 = Test Output 2
I0…I7 = Safety Inputs

T1M = Test Output 1 with Muting
T3M = Test Output 3 with Muting

Figure 5 - Test Pulse in a Cycle
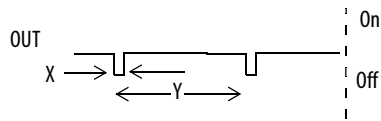
For the 1734-IB8S module, the pulse width (X) is typically 525 µs; the pulse period (Y) is typically 144 ms.

When the external input contact is closed, a test pulse is output from the test output terminal to diagnose the field wiring and input circuitry. By using this function, short-circuits between inputs and 24V power, and between input signal lines and open circuits can be detected.

Figure 6 - Short-circuit Between Input Signal Lines
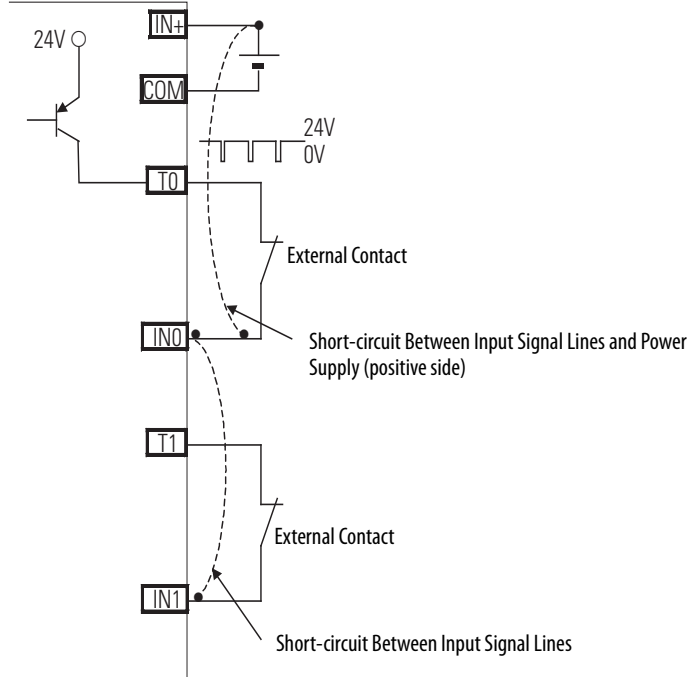
Single-channel Mode

If an error is detected, safety input data and safety input status turn off.

Figure 7 - Normal Operation and Fault Detection (not to scale)
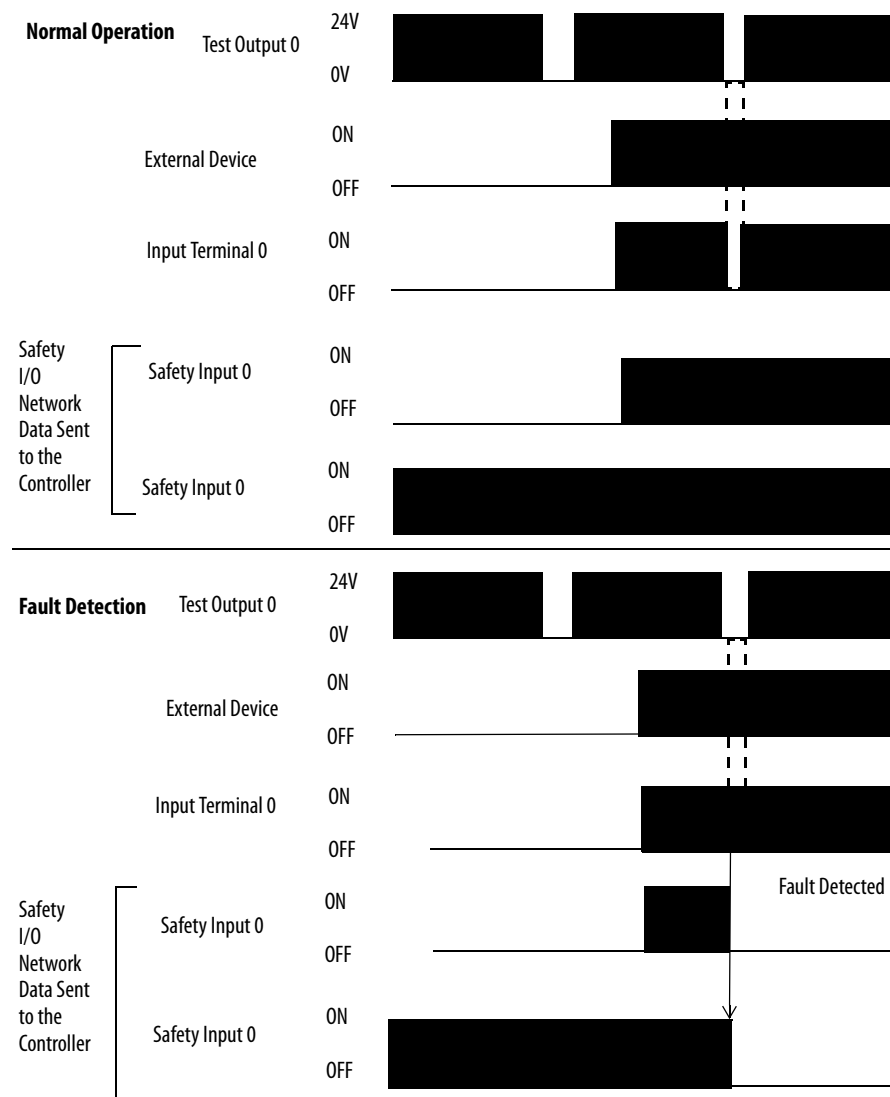
Dual-channel Mode and Discrepancy Time

To support dual-channel safety devices, the consistency between signals on two channels can be evaluated. Either equivalent or complementary can be selected.

If the length of a discrepancy between the channels exceeds the configured discrepancy time (0…65,530 ms in increments of 10 ms), the safety input data and the individual-safety input status turn off for both channels. In Dual-channel Complimentary mode, the safety input data goes to off/on for input channels n/n+1 respectively as described in Table 3.

IMPORTANT	The dual-channel function is used with two consecutive inputs that are paired together, starting at an even input number, such as inputs 0 and 1, 2 and 3, and so on.

IMPORTANT	If you are using the safety application instructions with a GuardLogix controller, set the module's inputs to Single (default). Do not use the modules' dual-channel mode as this functionality is provided by the safety application instructions.

This table shows the relation between input terminal states and controller input data and status.

Table 3 - Terminal Input Status and Controller I/O Data

Dual-channel Mode	Input Terminal		Controller Input Data and Status				Dual-channel Resultant Data	Dual-channel Resultant
	IN0	IN1	Safety Input 0 Data	Safety Input 1 Data	Safety Input 0 Status	Safety Input 1 Status		
Dual-channels, Equivalent	OFF	OFF	OFF	OFF	ON	ON	OFF	Normal
	OFF	ON	OFF	OFF	OFF	OFF	OFF	Fault
	ON	OFF	OFF	OFF	OFF	OFF	OFF	Fault
	ON	ON	ON	ON	ON	ON	ON	Normal
Dual-channels, Complementary	OFF	OFF	OFF	ON	OFF	OFF	OFF	Fault
	OFF	ON	OFF	ON	ON	ON	OFF	Normal
	ON	OFF	ON	OFF	ON	ON	ON	Normal
	ON	ON	OFF	ON	OFF	OFF	OFF	Fault

Dual-channel, Equivalent

In Equivalent mode, both inputs of a pair should be in the same (equivalent) state. When a transition occurs in one channel of the pair prior to the transition of the second channel of the pair, a discrepancy occurs. If the second channel transitions to the appropriate state prior to the discrepancy time elapsing, the inputs are considered equivalent. If the second transition does not occur before the discrepancy time elapses, the channels will fault. In the fault state, the input and status for both channels are set low (OFF). When configured as an equivalent dual pair, the data bits for both channels will always be sent to the controller as equivalent, both high or both low.

Figure 8 - Equivalent, Normal Operation and Fault Detection (not to scale)
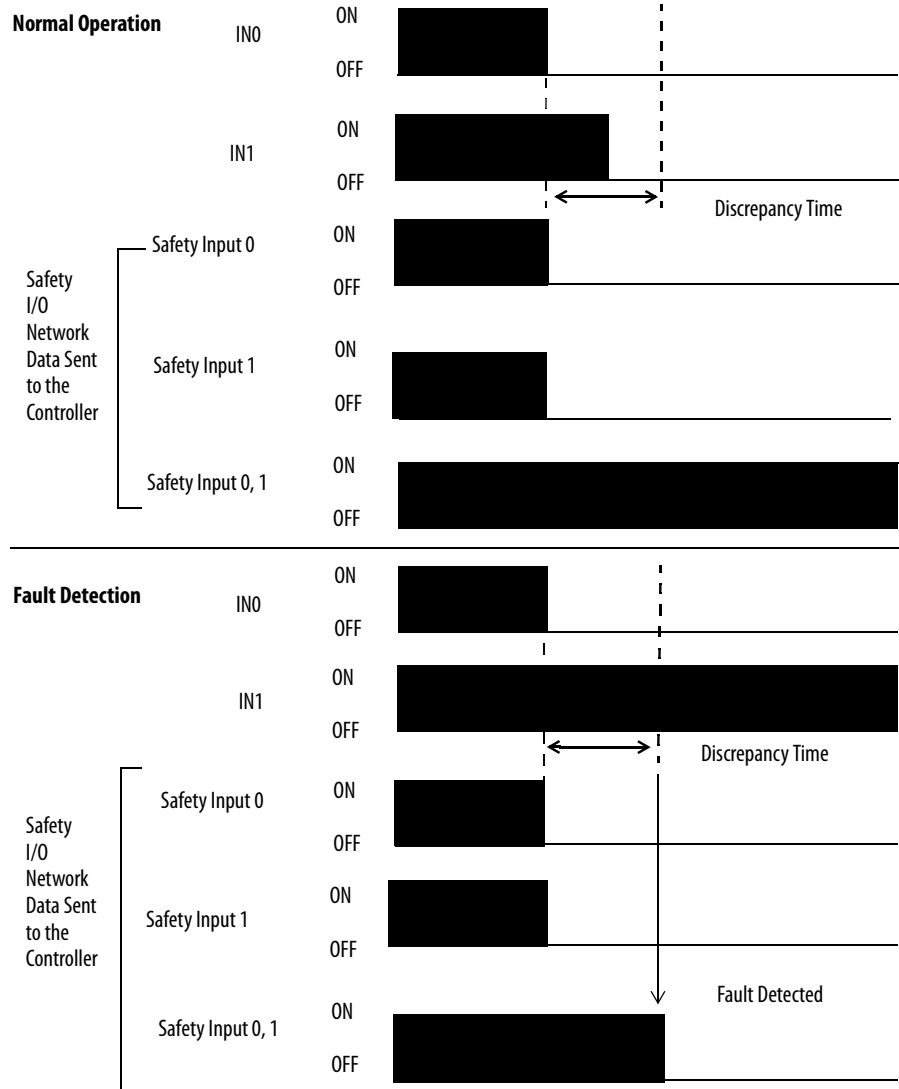
Dual-channels, Complementary

In Complementary mode, the inputs of a pair should be in the opposite (complementary) state. When a transition occurs in one channel of the pair prior to the transition of the second channel of the pair, a discrepancy occurs. If the second channel transitions to the appropriate state prior to the discrepancy time elapsing, the inputs are considered complementary.

If the second transition does not occur before the discrepancy time elapses, the channels will fault. The fault state of complementary inputs is the even-numbered input turned off and the odd-numbered input turned ON. Note that if faulted, both channel status bits are set low. When configured as a complementary dual-channel pair, the data bits for both channels will always be sent to the controller in complementary, or opposite states.

Figure 9 - Complementary, Normal Operation and Fault Detection (not to scale)
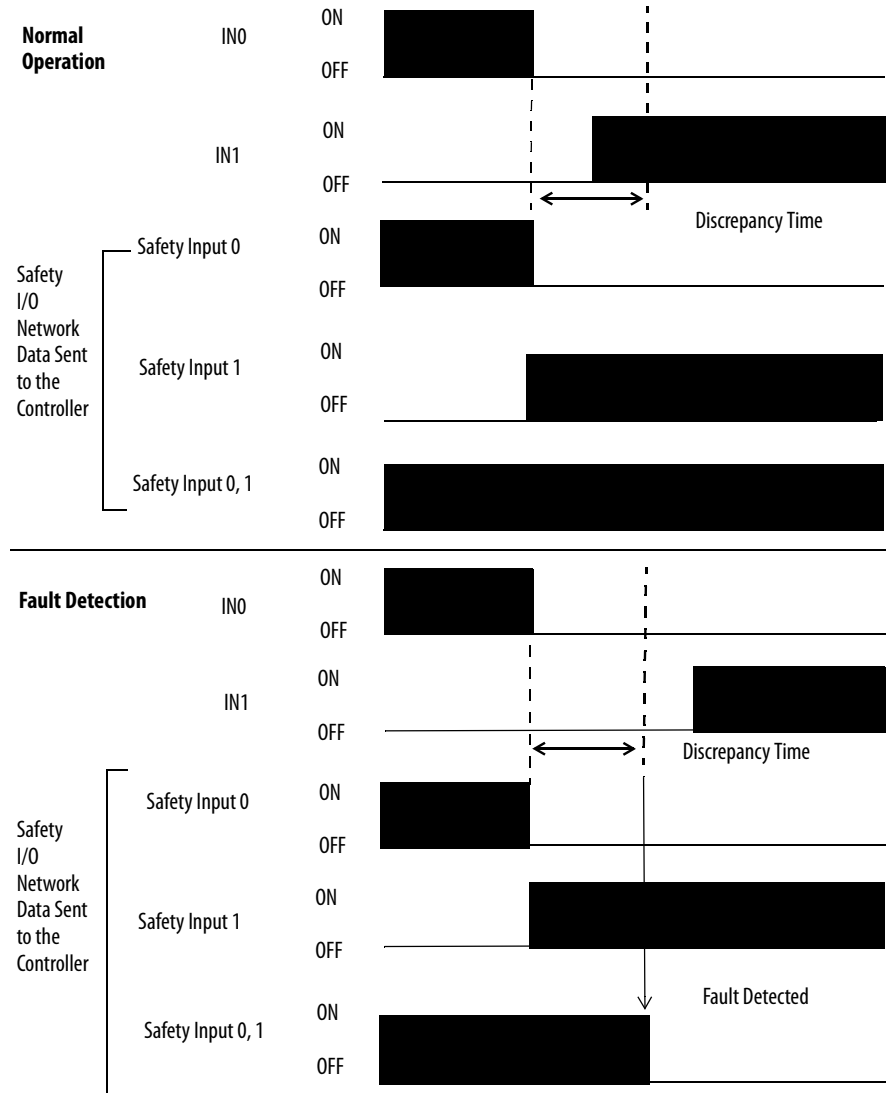
Safety Input Fault Recovery

If an error is detected, the safety input data remains in the OFF state. Follow this procedure to activate the safety input data again.

1. Remove the cause of the error.

2. Place the safety input (or safety inputs) into the safe state.

3. Allow the input-error latch time to elapse.

   After these steps are completed, the I/O indicator (red) turns off. The input data is now active.

Input Delays

On-delay—An input signal is treated as Logic 0 during the on-delay time (0...126 ms, in increments of 6 ms) after the input contact's rising edge. The input turns on only if the input contact remains on after the on-delay time has elapsed. This helps prevent rapid changes of the input data due to contact bounce.

Figure 10 - On-delay
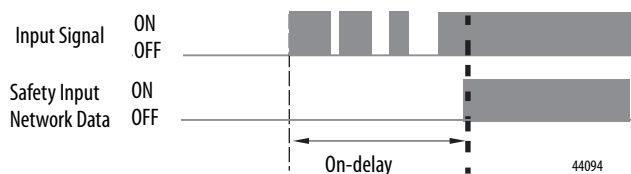
Off-delay—An input signal is treated as Logic 1 during the off-delay time (0...126 ms, in increments of 6 ms) after the input contact's falling edge. The input turns off only if the input contact remains off after the off delay time has elapsed. This helps prevent rapid changes of the input data due to contact bounce.

Figure 11 - Off-delay
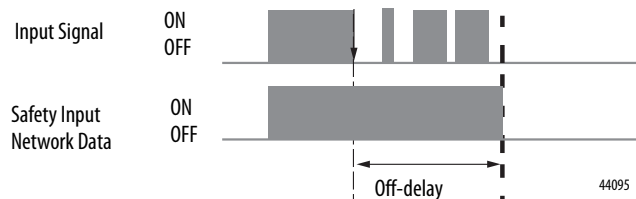
Safety Analog Inputs (1734-IE4S)

Safety analog-input channels can be configured for current, voltage, or tachometer inputs, and for input type: single-channel or dual-channel equivalent.

IMPORTANT	If you are using the module with a GuardLogix controller, set the module's inputs to Single (default). Do not use the modules' dual-channel equivalent mode with the GuardLogix dual channel safety application instructions, as dual-channel functionality is provided by the GuardLogix instructions.

Input Range

You configure the module for the following voltage or current input ranges, or for tachometer inputs.

- ±10V
- ±5V
- 0...5V
- 0...10V
- 4...20 mA
- 0...20 mA
- Tachometer (1...1000 Hz)

IMPORTANT	When ±10V and ±5V ranges are selected, you must make sure that a broken-wire condition is not a safety hazard. A broken wire causes the analog value to transition to 0, which is within the valid input range. Therefore, status bits will not indicate the broken-wire condition.

Scaling

The module converts input signals to the engineering units specified when you configure the module. You set the High Engineering value and the Low Engineering value to which the module scales the input signal before sending the data to the controller's application program.

EXAMPLE	The module is configured as follows: - Input Range = 0…10V - Low Engineering value = 0 - High Engineering value = 10,000 If the incoming signal is 1V, the data is 1000. If the incoming signal is 5.5V, the data is 5500.

Digital Input Filter

A single-pole, anti-aliasing filter of 10Hz is followed by a four-pole digital filter. Choose from the following available corner frequencies.

- 1 Hz
- 5 Hz
- 10 Hz
- 50 Hz

The default input filter setting is 1Hz.

Figure 12 - Filter Operation

Anti-alias Filter
10 Hz

Configurable Digital Filter Settings
N = 1 Hz, 5 Hz, 10 Hz, or 50 Hz

| 1 pole | | N | N | N | N |

1 pole | 1 pole | 1 pole | 1 pole | 1 pole
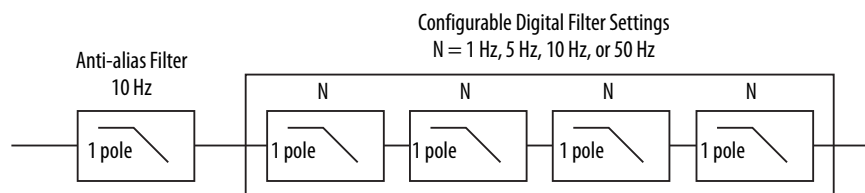
The filter setting affects the module's step response. See the technical specifications for the 1734-IE4S module, beginning on page 158.

For the analog input modes, the input filter settings set the low-pass filter to filter out noise that may be present on the signal. In Tachometer mode, the input filter removes noise that may be present on the calculated frequency, effectively changing how rapidly the tachometer frequency changes to provide a value with less jitter.

Sensor Power Supply

You can configure the module to supply power to the connected sensors, or you can supply power to the sensors from an external power supply. To comply with UL restrictions, field power and connected devices must be powered by a single, Class 2-complaint power supply.

We recommend that you configure the module to supply power to the sensors because this lets the module detect if a sensor loses power, if the sensor is drawing too much power, or if there is a short in the power wiring to the sensor.

At powerup or after a reconfiguration, each sensor power supply is tested by being turned on for 500 ms.

When a channel is configured for module sensor power, a sensor power diagnostic is executed on that channel at powerup to make sure that the sensors are not drawing over- or under-current and that channel-to-channel shorts are not present.

TIP	When a sensor power over-current condition occurs, it may take as much as 15 seconds longer than the configured latch time for channel status to recover after the over-current condition is cleared.

IMPORTANT	If you use an external power supply, you must monitor the system for the following:
	• The supply voltage must be within the sensors' operating range.
	• The sensors' current draw must not be over- or under-current, which could indicate a problem with the components of the sensor.
	• Channel-to-channel shorts must be detected, if they occur.

Channel Offset

You can configure an offset when differences in the sensors nominal input signals would otherwise exceed the desired discrepancy deadband. Use the Channel Offset if you are using two sensors of different types to measure the same variable; that is, sensors from two different vendors that may not give exactly the same data value for a given temperature or pressure. Use the Channel Offset to bring the data values back together. You can also use the Channel Offset with two identical sensors that are physically offset from each other.

The channel offset is applied before the channel discrepancy is evaluated.

TIP	The Channel Offset is applied only during the evaluation of discrepancy between two channels configured for Dual Channel and is not applied to any of the Process Alarms. Therefore, if you are using two sensors to measure the same process variable, and these sensors read different values, you may need to set the Process Alarms to different values based on the sensor readings.

Process Alarms

Process alarms alert you when an analog input value has exceeded the configured high or low limits for each channel. Process alarms are set at four configurable trigger points.

- High High alarm
- High alarm
- Low alarm
- Low Low alarm

You can configure a tolerance range, called a deadband, to work with process alarms. This deadband lets the process alarm status bit remain set, despite the alarm condition disappearing, as long as the data remains within the deadband of the process alarm.

> **IMPORTANT**   If you are using the safety application instructions with a GuardLogix controller, do not use the module's process alarms. Instead, perform analog range checking in your application logic.

Figure 13 - Alarms
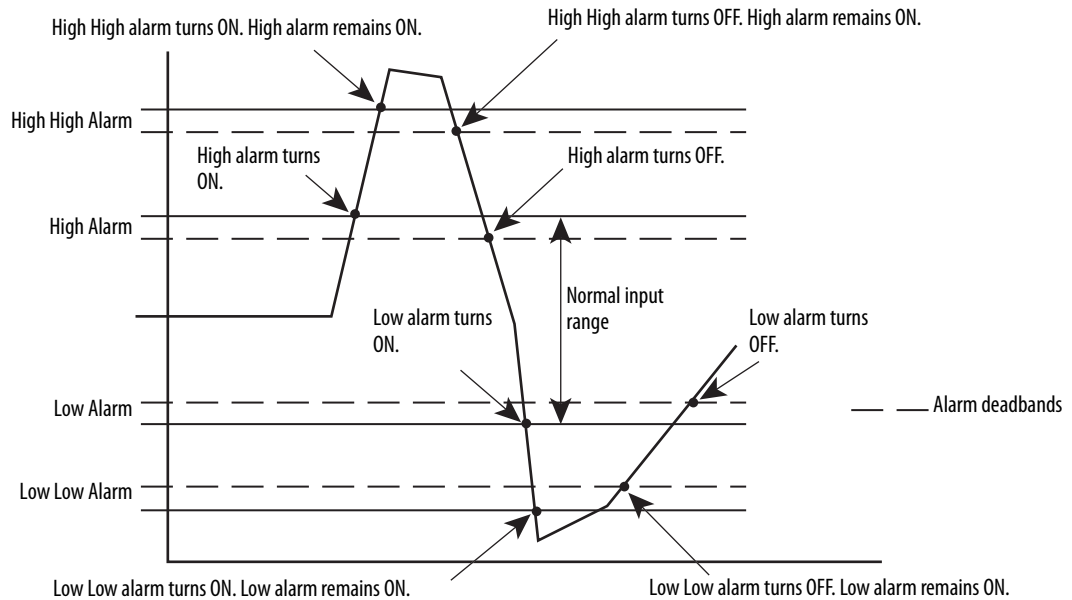
Using a Single-channel Sensor

You must address the following requirements to meet SIL 3 with a single-channel sensor.

- The module's ±10V and ±5V analog input modes must not be used for SIL 3 with a single-channel sensor because 0V falls within the valid input range. Therefore, a stuck at ground fault cannot be detected.

- In a single-channel sensor system, you must use other methods to make sure a channel-to-channel short cannot occur because these faults cannot be detected.

- If you are using a 3-wire sensor, you must verify its behavior to make sure that if it loses its ground connection, the signal is 0 (safe state) at the module input when the fault occurs.

Dual-channel Equivalent Mode

IMPORTANT	If you are using the module with a GuardLogix controller, set the module's inputs to Single (default). Do not use the modules' dual-channel mode as this functionality is provided by the GuardLogix safety application instructions.

The 1734-IE4S module supports Dual-channel Equivalent mode. In Dual-channel Equivalent mode, the values of both inputs of a pair must be within a configured tolerance range (discrepancy deadband). If the difference between the channel values exceeds the deadband for longer than the configured discrepancy time, a discrepancy fault is declared. When a dual-channel discrepancy fault occurs, the input status values for both channels are set low (off) and the actual input values are reported. The fault is cleared when the difference between the channel's values falls back within the discrepancy deadband tolerance range for the discrepancy time.

Figure 14 illustrates module operation in dual-channel equivalent mode. At A, the difference between the channel values exceeds the discrepancy deadband tolerance range and the discrepancy timer starts. When the timer expires at B, a dual-channel discrepancy fault occurs and the inputs status bits are set low. At C, the values fall back within the discrepancy deadband and the discrepancy timer starts again. When the timer expires at D, and the values are still within the discrepancy deadband, the fault is cleared. At E, the difference between the channels exceeds the discrepancy deadband and the discrepancy timer starts. A discrepancy fault occurs again at F, when the timer expires and the difference between the channel values remains greater than the discrepancy deadband.

Figure 14 - Timing Diagram
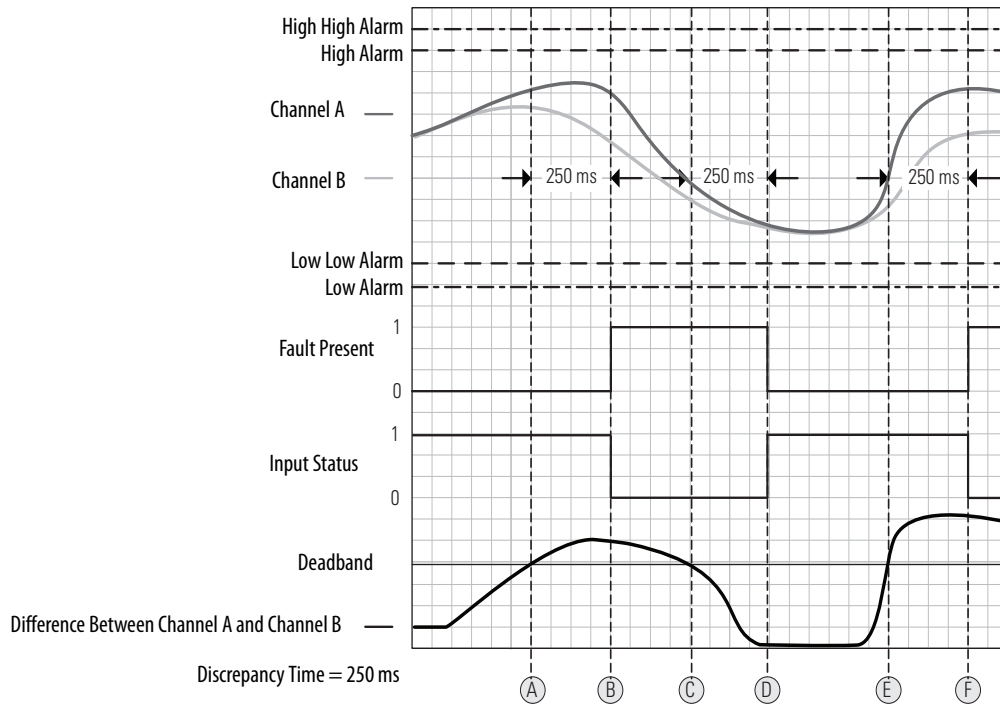
Tachometer Mode

In Tachometer mode, the module measures digital pulses between 0 and 24V DC and converts them into a frequency or pulses per second. Therefore, you can use 24V DC proximity sensors or 5V DC encoders, for example. The Tachometer function does not sense direction, so using a differential encoder will not yield direction data. Tachometer mode could be used, for example, to measure rotational speed of an axis connected to a gear.

Tachometer mode can operate as SIL 2 single-channel. SIL 3 is achievable by using two sensors, the dual-low detection parameter, and user program logic. Safety reaction time is dependent on the signal frequency.

IMPORTANT	When using two sensors in a dual-channel configuration, position the sensors to make sure the low pulses occur at different times. If you have configured the module for dual low detection and both sensors are low at the same time, a fault will be declared.

Figure 15 - Sensor Pulses in Dual-channel Configuration

Low pulses are offset.

Low pulses occur at the same time, causing a fault.
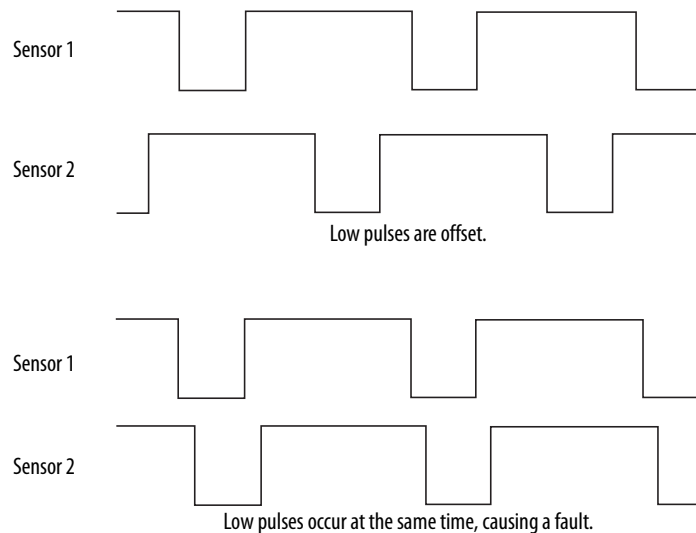
Signal Measurement

The edge-to-edge time of the pulse determines the frequency of the signal in pulses per second. The frequency range is 1 Hz...1 kHz.

In Tachometer mode, you define how the signal is measured, either on the falling (non-inverted) or rising (inverted) edge. For NPN-style sensors (sensor sinks), use falling edge. For PNP-style sensors (sensor sources), use rising edge. Depending on your application, you may need to install an appropriately-sized pull-up resistor for falling-edge signal measurements or a pull-down resistor for rising-edge signal measurements.

Figure 16 - Pulse Trains
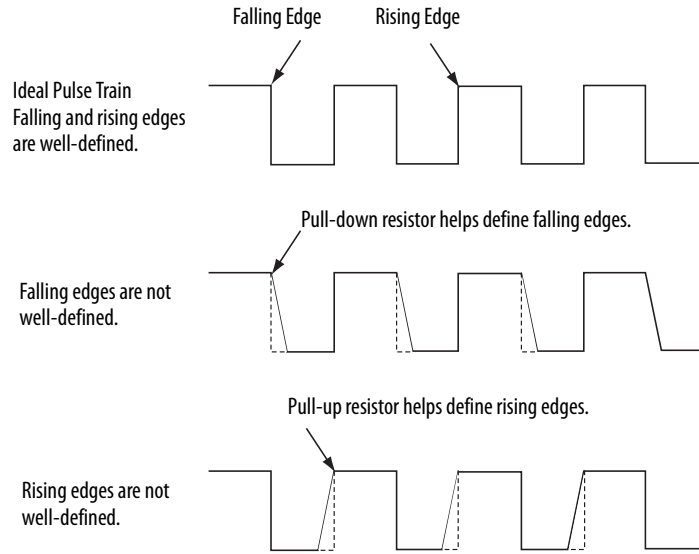
Off and On Signal Levels

You configure the Off and On levels, in 1V increments, for the signal. When selecting these levels, you should assume a tolerance of at least ±0.5V. For example, if you set the On Level to 10V, you can expect the module to recognize a signal between 9.5 and 10.5V as On. While the module's accuracy when measuring the analog signal is very good, Tachometer mode emphasizes a wider voltage range and speed to be able to measure pulse widths accurately.

Also consider the variance of the voltage output from your sensor when making the On and Off Level settings. If possible, we recommend selecting On Levels that are 2V below and Off Levels that are 2V above the actual thresholds of your device's expected output voltage level.

Determining Frequency in Pulses per Second

The edge-to-edge time of either the falling or rising edge of the pulse determines the frequency in pulses per second.
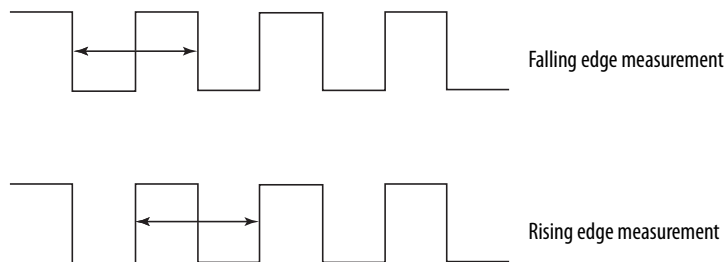
A single pulse, by itself, does not generate a non-zero frequency. To report a frequency of 1 Hz, two falling or rising edge pulses must be detected within 1 second. The module reports 0 Hz until 1 Hz is detected. For example, if a falling or rising edge is not detected for 1.02 seconds after the previous edge, the module reports 0 Hz.

Overfrequency Bit Operation

When the frequency exceeds 1 kHz, the module reports a data value of 1 kHz, sets the Overfrequency status bit to 0, and latches it. While the Overfrequency bit is set to 0, you must use an alternate method to monitor the frequency of the system because the value reported by the module is latched at 1 kHz. Once you have verified that the frequency is lower than 1 kHz, you may reset the Overfrequency condition by setting the Reset Tach bit, which lets the module begin measuring the frequency of field pulses again.

If you set the Reset Tach bit while the frequency is still above 1 kHz, the Tachometer Overfrequency bit transitions to 1 (within range) momentarily. However, as soon as the module begins measuring pulses, it will detect another overfrequency condition and immediately set the Tachometer Overfrequency bit to 0 again. The Reset Tach bit is edge-sensitive.

> ⚠ **ATTENTION:** Before resetting the Overfrequency condition, you must use another method to verify that the actual frequency is lower than 1 kHz.

See Output Assemblies on page 176 for more information on resetting the Overfrequency bit.

Figure 17 - Overfrequency Operation
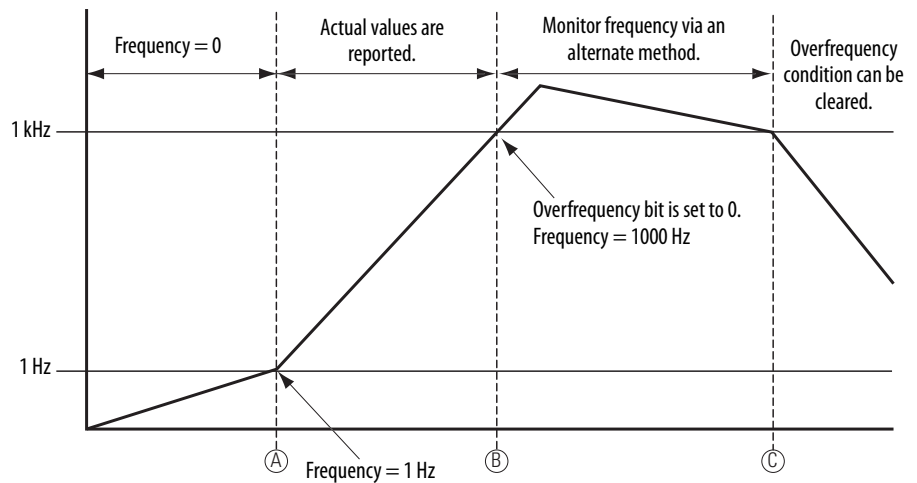
In Figure 17, the module reports a frequency of 0 Hz until the frequency of the system reaches 1 Hz at A, when the module begins reporting the actual value. At B, the frequency exceeds 1 kHz, the Overfrequency bit is set to 0, and the module continues to report a data value of 1 kHz. Between B and C, you must monitor the frequency by an alternate method because the value reported by the module may not be accurate. After C, the Overfrequency condition can be cleared, provided you have used an alternate method to verify that the actual frequency is below 1 kHz.

Safety Outputs (1734-OB8S)

Read this section for information about safety outputs.

Safety Output with Test Pulse

When the safety output is on, the safety output can be configured to pulse test the safety output channel. By using this function, you can continuously test the safety output's ability to remove power from the module's output terminals. If an error is detected, the safety output data and individual safety output status turn off.

Figure 18 - Test Pulse in a Cycle
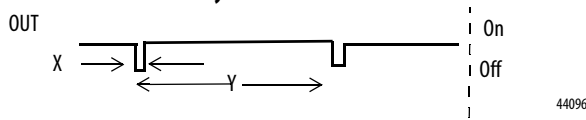
For the 1734-OB8S module, the pulse width (X) is typically 475 μs; the pulse period (Y) is typically 575 ms.

IMPORTANT	To prevent the test pulse from causing the connected device to malfunction, pay careful attention to the input response time of the output device.

Dual-channel Mode

When the data of both channels is in the on state, and neither channel has a fault, the outputs are turned on. The status is normal. If a fault is detected on one channel, the safety output data and individual safety output status turn off for both channels.

Figure 19 - Dual-channel Setting (not to scale)
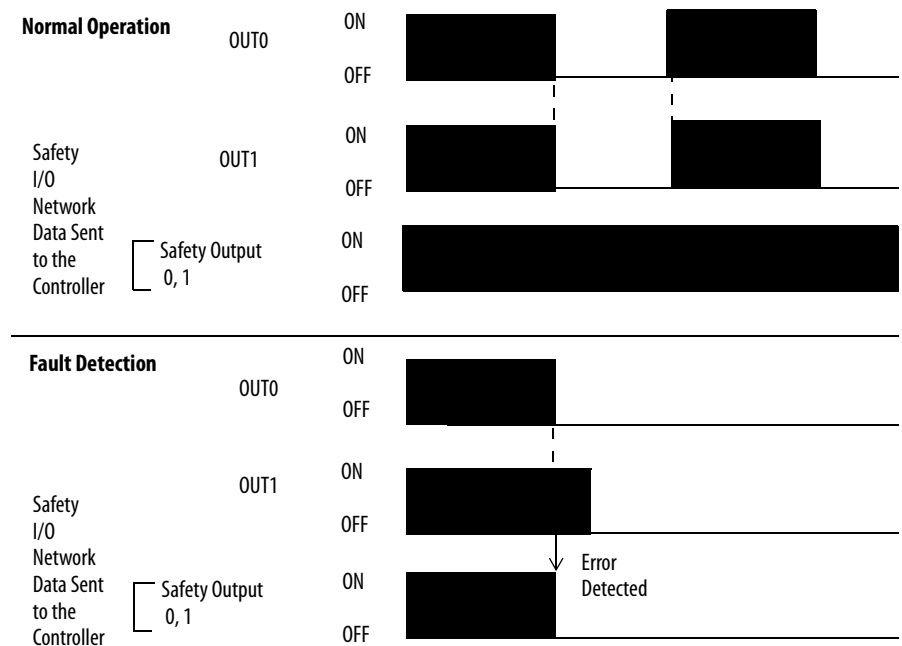
Safety Output Fault Recovery

If a fault is detected, the safety outputs are switched off and remain in the off state. Follow this procedure to activate the safety output data again.

1. Remove the cause of the error.

2. Command the safety output (or safety outputs) into the safe state.

3. Allow the output-error latch time to elapse.

After these steps are completed, the I/O indicator (red) turns off. The output data can now be controlled.

IMPORTANT	Stuck high faults require a module power reset to clear the error.

Muting Lamp Operation (1734-IB8S)

Beginning with firmware revision 1.2, the operation of the muting status bits for the test outputs T1 and T3 has changed. Test outputs T1 and T3 are controlled by your PLC processor program to illuminate a muting lamp. Muting lamp status is monitored with a test that runs periodically during every test interval to detect a burned-out lamp. The test runs repeatedly when the test output is commanded on. The figure below explains how muting lamp operation, status, and fault detection are monitored.

TIP	The lamp test interval is 3 seconds. Two consecutive failed lamp tests are required to declare a burned-out lamp condition. The lamp test may not run immediately after the test output is energized. It starts at the next 3-second interval. To allow time for two consecutive test intervals, program a minimum Test Output On Time of 6 seconds.

Figure 20 - Muting Lamp Timing Diagram
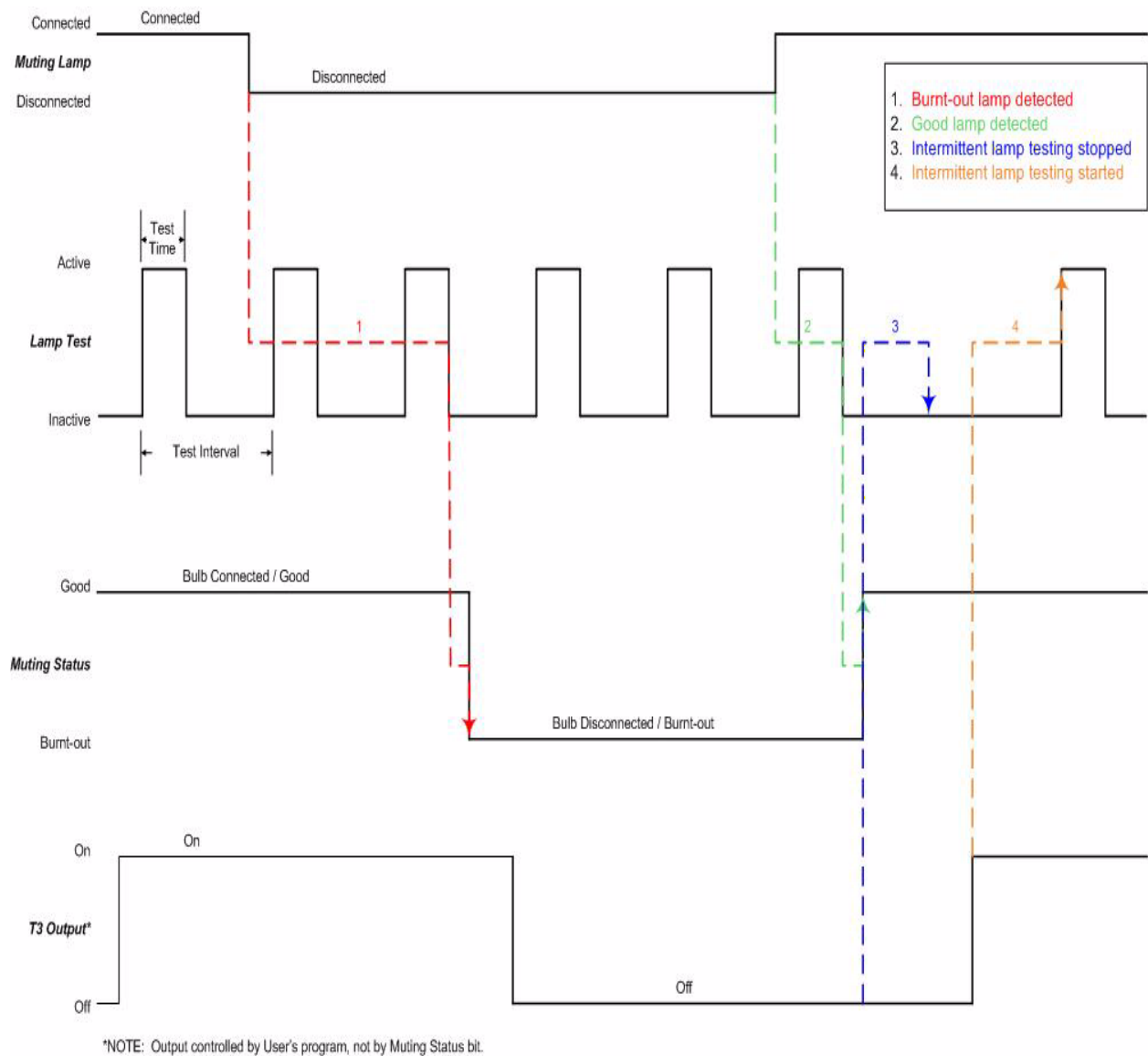
Table 4 shows the expected behavior of the muting status for test outputs T1 and T3. Keep these points in mind as well:

- When power is applied to the 1734-IB8S module, and T1 or T3 remains commanded off, the muting status defaults to on.

  This bit operation is designed to help prevent erroneous muting instruction faults from the GuardLogix controller. This bit status may not be the true indication of a burned-out lamp.

IMPORTANT	Before checking the state of the corresponding muting status, be sure the test output is commanded on. Once the test output is commanded on, a maximum time of 6 seconds is required for the module to detect a burned-out lamp.

- If a muting lamp circuit is open when power is applied to the module, the condition is detected when the test output is commanded on.
- When a lamp burns out and is replaced, the fault (muting status bit) returns to the normal condition, independent of the state of the test output.

Table 4 - Muting Status Bit Operation

Test Output Commanded State	Lamp Condition	Muting Status Bit	Description
ON	Bad (open circuit)	0	Repair lamp.
ON	Good	1	Normal condition. Lamp is operating properly.
OFF	Bad (open circuit)	0	If lamp remains OFF after T1/T3 output cycled, repair lamp.
OFF	Good	1	Normal condition.

I/O Status Data

In addition to I/O data, the module provides status data for monitoring the I/O circuits. The status includes diagnostic data that can be read by the controllers with 1 = ON/Normal and 0 = OFF/Fault/Alarm.

Digital I/O Status Data

The following data is monitored:
- Individual Point Input Status
- Combined Input Status
- Individual Point Output Status
- Combined Output Status
- Individual Test Output Status
- Individual Output Monitor (actual ON/OFF state of the outputs)

Individual Point status indicates whether each safety input, safety output, or test output is normal (normal: ON, faulted: OFF). For fatal errors, communication connections may be broken, so the status data cannot be read. Status bits are OFF in the controller data table when the connection is lost.

Combined status is provided by an AND of the status of all safety inputs or all safety outputs. When all inputs or outputs are normal, the respective combined status is ON. When one or more of them has an error, the respective combined status is OFF. This is known as the combined safety input status or combined safety output status.

Analog I/O Status Data

Individual input status indicates whether each analog input point is normal (ON) or faulted (OFF). In addition, the following diagnostic data is monitored:

- User 24V Supply Overrange or Underrange
- Sensor Power Overcurrent or Undercurrent
- Channel Signal Overrange or Underrange
- Broken Wire Detected (4…20 mA current mode)
- Single-channel Discrepancy Error (channel fault)

  In SIL 2 or SIL 3 operation, a single-channel discrepancy error occurs when both measurements (internal to the module) of the same input signal are not within tolerance. If a single-channel discrepancy occurs, indicating a problem with the module, input status is set to zero and a zero input value is reported for that channel.

- SIL 3 Dual-channel Discrepancy Error (channel fault)
- Alarms
    - High High and Low Low Alarm Overrange or Underrange
    - High and Low Alarms Overrange or Underrange
    - Dual-channel Tachometer Dual Low Inputs Detected
    - Tachometer Frequency Overrange or Underrange

  The alarm status is reported in the Alarm Status attribute for each channel.

Notes:

Guidelines for Placing Power Supplies and Modules in a System

Topic	Page
Choosing a Power Supply	41
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Placing Digital and Analog Modules	44

Choosing a Power Supply

The POINTBus™ backplane includes a 5V communication bus and field power bus that get their power from a communication adapter or expansion power supplies. All POINT I/O modules are powered from the POINTBus backplane by either the adapter or expansion power supply. POINT I/O adapters have built-in power supplies. Use the information and examples in this chapter to determine if you need an expansion power supply in your system.

> ⚠ **ATTENTION:** To comply with the CE Low Voltage Directive (LVD), this equipment and all connected I/O must be powered from a safety extra-low voltage (SELV) or protected extra-low voltage (PELV) compliant source.
>
> To comply with UL restrictions, field power and connected devices must be powered from a single Class 2-compliant power supply.

> **TIP** The following Rockwell Automation 1606 power supplies are SELV- and PELV-compliant, and they meet the isolation and output hold-off time requirements of the SmartGuard 600 controller:
> - 1606-XLP30E
> - 1606-XLP50E
> - 1606-XLP50EZ
> - 1606-XLP72E
> - 1606-XLP95E
> - 1606-XLDNET4
> - 1606-XLSDNET4

Follow the safety precautions listed in and the wiring guidelines described in before connecting a power supply to the system.

To choose which types of power supplies meet your requirements, you **must** consider the power consumption requirements for the 5V and 24V bus when designing a POINTBus backplane.

Choose from these power supplies for the POINTBus backplane and field power:

- Use the 1734-EP24DC expansion power supply to provide an additional 10 A of 24V DC field power and provide an additional 1.3 A of 5V current to the I/O modules to the right of the power supply.
- Use the 1734-FPD field power distributor to provide an additional 10 A of 24V DC field power, and to pass through all POINT I/O backplane signals including the 5V bus supplied to the left, without providing **additional** POINTBus backplane power. This lets you isolate field power segments.
- Use the 1734-EPAC expansion power supply (for standard I/O modules) to provide an additional 10 A of 120/240V AC field power and provide an additional 1.3 A of 5V current to the I/O modules to the right of the power supply.

IMPORTANT	If you use the 1734-EPAC expansion power supply to the left of the POINT Guard I/O modules, you must use a 1734-FPD field power distributor or 1734-EP24DC expansion power supply to isolate POINT Guard I/O field power from the AC field supply. Establishing and maintaining communication (connection) between the module and the controller requires 5V POINTBus power.

Refer to the POINT I/O Selection Guide, publication 1734-SG001, for more information on compatible power supplies.

Power Supply Examples

Use these valid power-supply example configurations to help you understand various combinations of power supplies that may fit your system:

These examples are for illustrative purposes only, to help you understand various power sourcing concepts.

IMPORTANT	• You must define the requirements for segmenting field and bus power in your application. • POINT Guard I/O does not require separate field-bus power usage, that is, separate power supplies for the 1734-IB8S, 1734-OB8S, or 1734-IE4S modules. This is optional. • POINT Guard I/O does not require separate POINTBus (communication) power-supply usage, separating it from any other POINT I/O modules, except when additional POINTBus power is required. • Do not apply AC voltage to POINT Guard I/O modules.

Example 1: Isolating Field Power Segments

This power supply example uses a 1734-EP24DC expansion power supply and 1734-FPD field power distributor to illustrate mixing standard POINT I/O and safety POINT Guard I/O modules, while creating separate groups for input and output modules, as well as digital and analog modules.
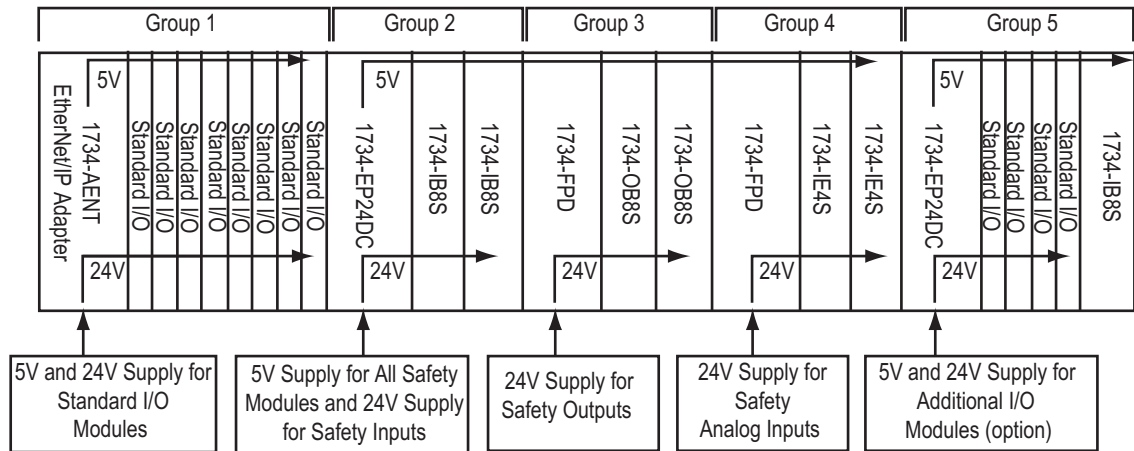
Example 2: POINT Guard I/O Used with AC I/O Modules

This power supply example uses 1734-EP24DC and 1734-EPAC expansion power supplies to illustrate mixing standard POINT I/O and safety POINT Guard I/O modules, while creating a separate power group for AC I/O modules.
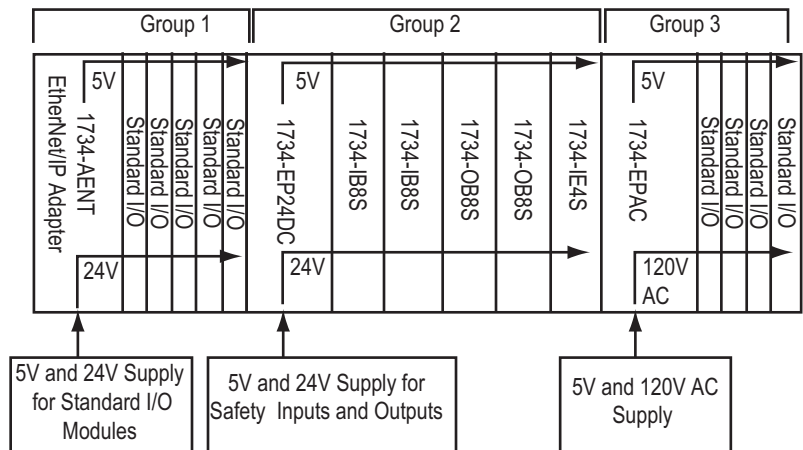
Placing Digital and Analog Modules

Always install modules in accordance with their specified operating temperature ratings, as listed in <u>Appendix C</u>, and provide a minimum of 5.08 cm (2 in.) clearance above the modules.

To implement a system containing 1734-IE4S modules in accordance with their derating, follow these guidelines.

- Limit ambient temperature operation to 40°C (104 °F) if POINT Guard I/O modules are used without 1734-CTM spacer modules.

Figure 21 - Placing Digital and Analog Modules for 40 °C (104 °F) Operation

5.08 cm (2 in.)

1734-AENT | 1734-IB8S | 1734-OB8S | 1734-IE4S | 1734-IB8S | 1734-IE4S | 1734-IE4S
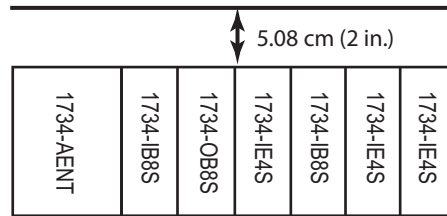
- In any system where you have 1734-IB8S, 1734-OB8S, and 1734-IE4S modules, use a 1734-CTM spacer between every module with ambient operation between 40 °C (104 °F) and 55 °C (131 °F).

  Insert a 1734-CTM module next to each standard I/O module (gray) if that module's dissipation specification is more than 1 W.

Figure 22 - Placing Digital and Analog Modules for Operation from 40 °C (104 °F)…55°C (131°F) max.

5.08 cm (2 in.)

1734-AENT | 1734-IB8S | 1734-OB8S | 1734-IE4S | 1734-IB8S | 1734-IE4S | 1734-IE4S

1734-CTM
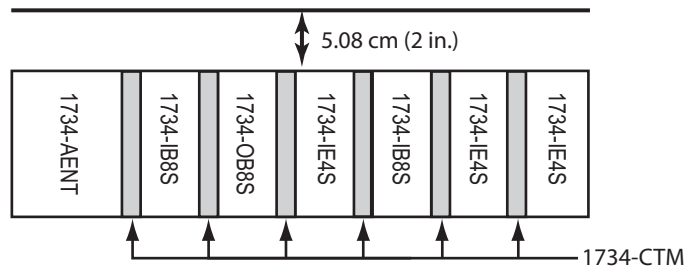
- When using only digital POINT Guard I/O modules in your system limit the power supply to 24V DC maximum, to limit the POINT Guard I/O module's thermal dissipation.

Figure 23 - Placing only Digital POINT Guard I/O Modules

5.08 cm (2 in.)

1734-AENT | 1734-IB8S | 1734-IB8S | 1734-OB8S | 1734-OB8S

See <u>System Temperature Derating When a 1734-IE4S Module Is Used on page 166</u> for more information.

⚠ **ATTENTION:** Vertical orientation requires that all modules in the stack must operate within their rated operating temperature range.

Install the Module

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Connect the Module to the Mounting Base	49
Connect the Removable Terminal Block	50
Remove a Mounting Base	51
Wire Modules	52
Connection Details	54
Wiring Examples	56

Figure 14 - POINT Guard I/O Modules
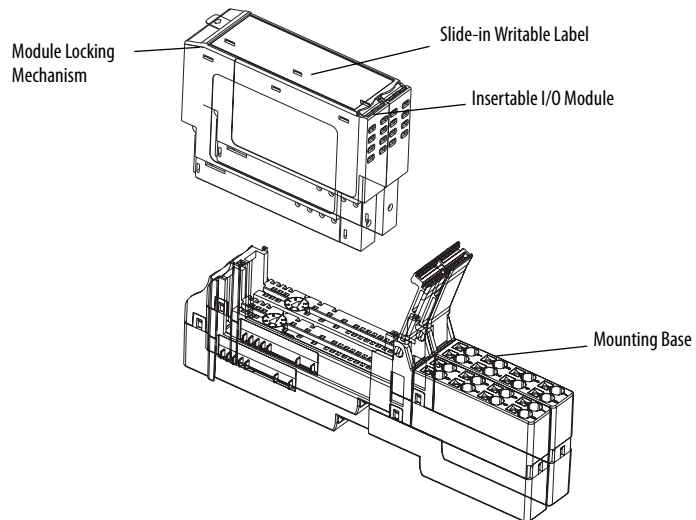
31867-M

Precautions

Follow these precautions for use.

European Hazardous Location Approval

This equipment is intended for use in potentially explosive atmospheres as defined by European Union Directive 94/9/EC and has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of Category 3 equipment intended for use in Zone 2 potentially explosive atmospheres, given in Annex II to this Directive.

Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 60079-15 and EN 60079-0.

> **WARNING:**
> - The secondary of a current transformer shall not be open-circuited when applied in Zone 2 environments.
> - This equipment must be installed in an enclosure providing at least IP54 protection when applied in Zone 2 environments.
> - This equipment shall be used within its specified ratings defined by Rockwell Automation.
> - Provision shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 40% when applied in Zone 2 environments.
> - Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.
> - Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.

> **ATTENTION:** This equipment is not resistant to sunlight or other sources of UV radiation.

North American Hazardous Location Approval

The following information applies when operating this equipment in hazardous locations.	Informations sur l'utilisation de cet équipement en environnements dangereux.
Products marked "CL I, DIV 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.	Les produits marqués "CL I, DIV 2, GP A, B, C, D" ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.
⚠ **EXPLOSION HAZARD -** • Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous. • Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product. • Substitution of components may impair suitability for Class I, Division 2. • If this product contains batteries, they must only be changed in an area known to be nonhazardous.	⚠ **RISQUE D'EXPLOSION –** • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement. • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit. • La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe I, Division 2. • S'assurer que l'environnement est classé non dangereux avant de changer les piles.

Environment and Enclosure

⚠ **ATTENTION:** This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR. Without appropriate precautions, there may be difficulties with electromagnetic compatibility in residential and other environments due to conducted and radiated disturbances.

This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5VA or be approved for the application if non-metallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see the following:

• Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1, for additional installation requirements.
• NEMA Standard 250 and IEC 60529, as applicable, for explanations of the degrees of protection provided by enclosures.

Preventing Electrostatic Discharge

⚠️ **ATTENTION:** This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

Mount the Module

IMPORTANT   Follow these guidelines when installing a module:

- Use the module in an environment that is within the general specifications.
- Use the module in an enclosure rated at IP54 (IEC60529) or higher.
- Use DIN rail that is 35 mm (1.38 in.) wide to mount the terminal base in the control panel.
- Place other heat sources an appropriate distance away from the module to maintain ambient temperatures around the module below specified maximums.
- You can mount your module horizontally or vertically.

To mount the module, you must install the mounting base, connect the module to the mounting base, and then connect the removable terminal block.

Install the Mounting Base

The mounting base assembly (catalog number 1734-TB or 1734-TBS) consists of a mounting base and a removable terminal block. Alternatively, you can use the POINT I/O one-piece mounting base (catalog number 1734-TOP, 1734-TOPS, 1734-TOP3, or 1734-TOP3S).

IMPORTANT   You need two mounting base assemblies for each POINT Guard I/O module. Do not use 1734-TB3 or 1734-TB3S mounting base assemblies.

Follow these steps to install the mounting base.

1. Position the mounting base as shown in the illustration below step 2.

2. Slide the mounting base down, allowing the interlocking side pieces to engage the adjacent module, power supply, or adapter.

Slide the mounting base to let the interlocking side pieces engage the adjacent module or adapter.

31868-M
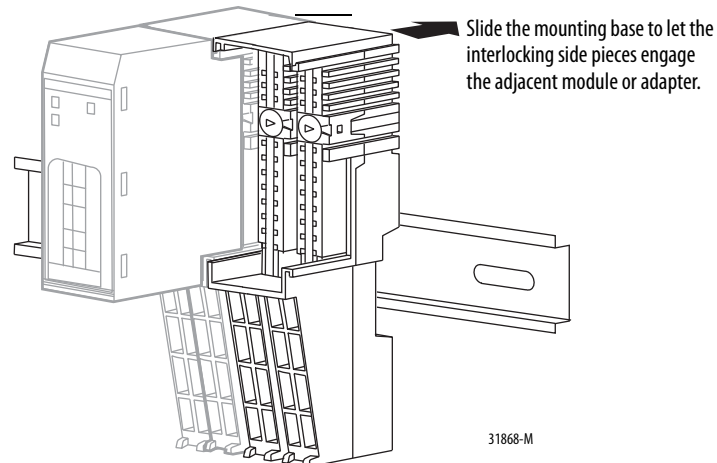
3. Press firmly to seat the mounting base on the DIN rail until the mounting base snaps into place.

> **TIP**   In high vibration environments, install slide locks to prevent movement of the mounting base along the DIN rail.

Refer to the terminal base installation instructions for detailed information on installation and removal. Always follow instructions and torque specifications in terminal base installation instructions. See Additional Resources on page 10 for terminal base installation publications.

Connect the Module to the Mounting Base

Install the module before or after installing the mounting base.

> ⚠️ **WARNING:** When you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.
>
> Repeated electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance that can affect module operation.

1. Using a screwdriver, rotate the keyswitches on the mounting base clockwise until the number required for the type of module aligns with the notch in the base.

   Keep track of which mounting base gets installed on the left and right of each module.

Cat. No.	Key 1 (left)	Key 2 (right)
1734-IB8S	8	1
1734-OB8S	8	2
1734-IE4S	8	3

Mounting Base Assembly

Keyswitch
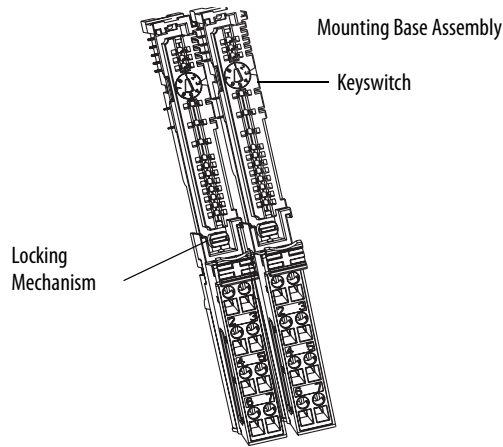
Locking Mechanism

2. Make certain the DIN-rail (orange) locking screw is in the horizontal position, noting that you cannot insert the module if the mounting-base locking mechanism is unlocked.

3. Insert the module straight down into the two side-by-side mounting bases and press to secure, locking the module into place.

Connect the Removable Terminal Block

If a removable terminal block (RTB) is supplied with your mounting base assembly, you need to remove it by pulling up on the RTB handle. This lets you remove and replace the base as necessary without removing any of the wiring.

> ⚠ **WARNING:** When you connect or disconnect the removable terminal block (RTB) with field-side power applied, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

Follow these directions to reinsert the RTB.

1. Insert the RTB end opposite the handle into the base unit, noting that this end has a curved section that engages with the mounting base.
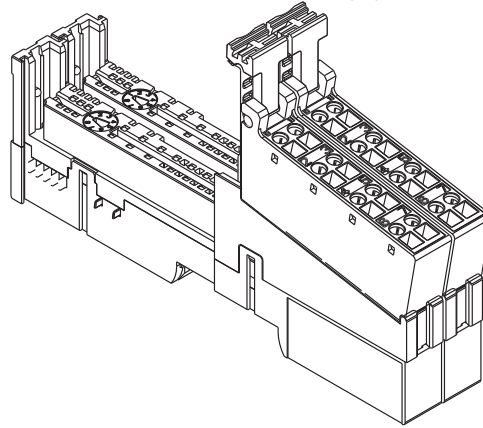
2. Rotate the terminal block into the mounting base until it locks itself in place.

3. If an I/O module is installed, snap the RTB handle into place on the module.

Remove a Mounting Base

To remove a mounting base, you must remove any installed module and the module installed in the base to the right. If the mounting base has a removable terminal base (RTB), unlatch the RTB handle on the I/O module and pull on the handle to remove the RTB.

> ⚠ **WARNING:** When you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure to remove power or that the area is nonhazardous before proceeding.

1. Pull up on the I/O module to remove it from the base.

2. Remove the module to the right of the base you are removing, noting that the interlocking portion of the base sits under the adjacent module.

3. Use a screwdriver to rotate the orange DIN-rail locking screw on the mounting base to a vertical position, noting this releases the locking mechanism.

4. Lift the mounting base off the DIN rail.

Wire Modules

Follow these guidelines when wiring the modules.

- Do not route communication, input, or output wiring with conduit containing high voltage. Refer to the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.
- Wire correctly after confirming the signal names of all terminals.
- Use shielded cable for analog and tachometer inputs.
- When using the sensor power supply on the 1734-IE4S module, do not connect an external power supply to the sensor.
- Tighten screws for communication and I/O connectors correctly.
- When using analog inputs, wire only to voltage or only to current inputs, not both. Mixing input types may induce noise on the input measurements.

> ⚠ **ATTENTION:** Wire the POINT Guard I/O modules properly so that 24V DC line does not touch the safety outputs accidentally or unintentionally.
>
> Do not connect loads beyond the rated value to safety outputs.
>
> Wire conductors correctly and verify operation of the module before placing the system into operation. Incorrect wiring may lead to loss of safety function.
>
> Do not apply DC voltages exceeding the rated voltages to the module.
>
> Do not connect a power source to the sensor power supply in the 1734-IE4S module or you could blow an internal fuse, rendering the module inoperative.
>
> Disconnect the module from the power supply before wiring. Devices connected to the module may operate unexpectedly if wiring is performed while power is supplied.

> ⚠ **WARNING:** If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.
>
> This equipment shall be used within its specified ratings defined by Rockwell Automation.

> ⚠ **ATTENTION:** This product is grounded through the DIN rail to chassis ground. Use zinc plated yellow-chromate steel DIN rail to assure proper grounding. The use of other DIN rail materials (for example, aluminum or plastic) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent grounding. Secure DIN rail to mounting surface approximately every 200 mm (7.8 in.) and use end-anchors appropriately.
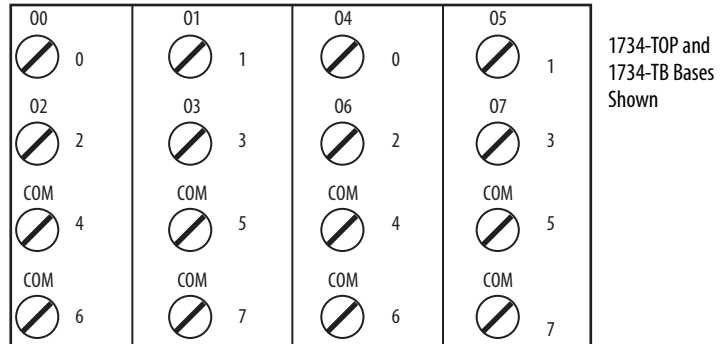
Terminal Layout

show the field wiring connections for the POINT Guard I/O modules.

Figure 15 - 1734-IB8S Field Connections

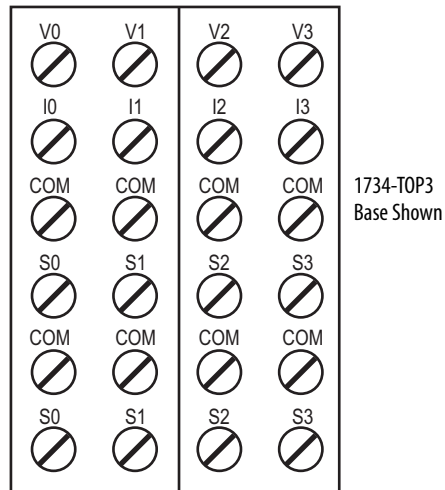|	
I0 — 0	1734-TOP and
I1 — 1	1734-TB Bases
I4 — 0	Shown
I5 — 1	
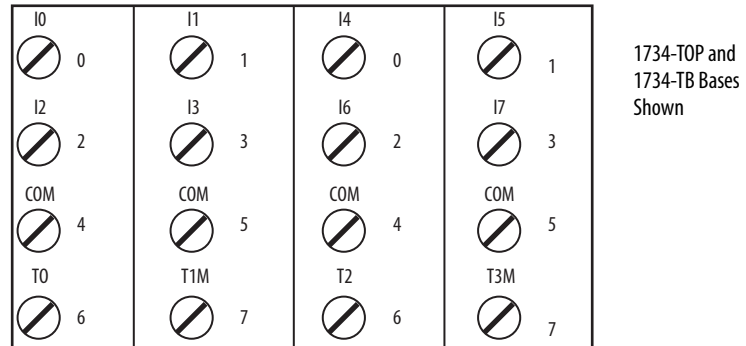
Where:
T0 = Test Output 0
T1M = Test Output 1 with Muting
T2 = Test Output 2
T3M = Test Output 3 with Muting
I0…I7 = Inputs 0…7

Figure 16 - 1734-OB8S Field Connections

1734-TOP and
1734-TB Bases
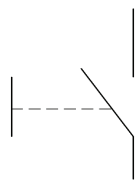Shown

Where:
O0…O7 = Safety Outputs 0…7
COM = Supply Common
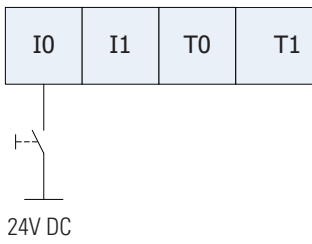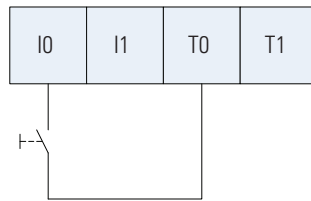
Figure 17 - 1734-IE4S Field Connections
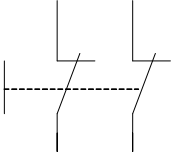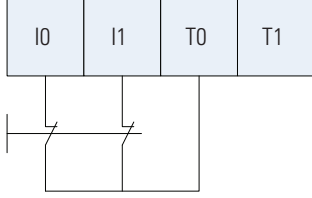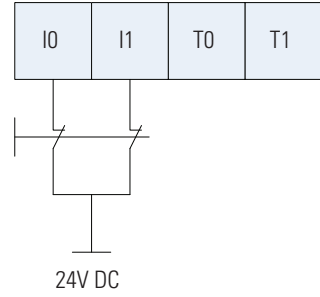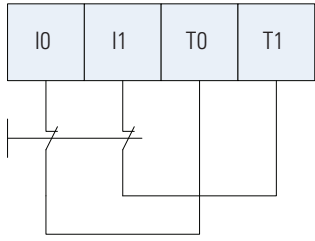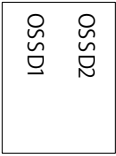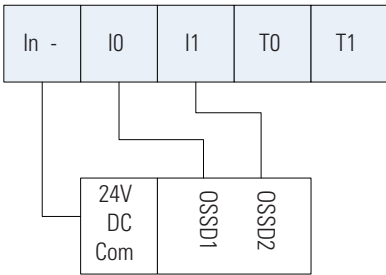
Where:
V0…V3 = Voltage inputs 0…3
I0…I3 = Current inputs 0…3
COM = Supply Common
S0…S3 = Sensor power terminals

Connection Details

See the tables that show input device connection methods and their safety categories.

Connected Device	Test Pulse from Test Output	Connection	Schematic Diagram	Safety Category
Push Button	No	Connect the push button between 24V DC and I0.		1
	Yes	Connect the push button between I0 and T0. T0 must be configured as test pulse.		2

Connected Device	Test Pulse from Test Output	Connection	Schematic Diagram	Safety Category
Emergency stop button Door monitoring switch	No	Connect the devices between T0 and I0 and I1, noting that T0 is configured for 24V power supply.		3
		Connect the devices between 24V DC and I0 and I1.		
	Yes	Connect the device between I0 and T0, and I1 and T1.		4
Light Curtain	Yes	Connect the OSSD1 and OSSD2 to I0 and I1, respectively. Connect the 24V power supply commons.		3 or 4 based on light curtain being used

Wiring Examples

Read this section for examples of wiring by application. See catalog number details for the appropriate module.

Emergency Stop Dual-channel Devices

This example shows wiring and controller configuration when using a digital POINT Guard I/O module with an emergency stop button and gate monitoring switch that have dual-channel contacts. When used in combination with the programs in a safety controller, this wiring is safety Category 4 (emergency stop button) and safety Category 3 (gate monitoring switch).

Figure 17 - POINT Guard I/O Module Wiring (dual-channel contacts)
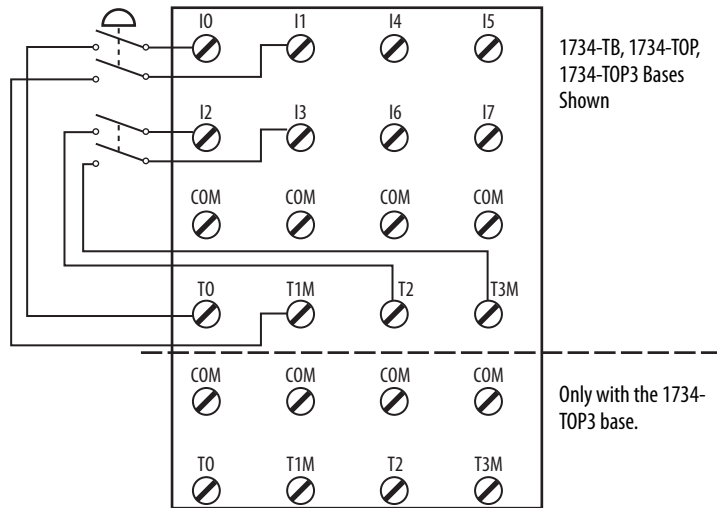
Controller Configuration	Parameter Name	Configuration Setting
Safety Input 0	Safety Input 0 Channel Mode	Test Pulse from Test Output
	Safety Input 0 Test Source	Test Output 0
	Dual-channel Safety Input 0/1 Mode	Dual-channel Equivalent
	Dual-channel Safety Input 0/1 Discrepancy Time	100 ms (application dependent)
Safety Input 1	Safety Input 1 Channel Mode	Test Pulse from Test Output
	Safety Input 1 Test Source	Test Output 1
Safety Input 2	Safety Input 2 Channel Mode	Safety Input
	Safety Input 2 Test Source	Test Output 2
	Dual-channel Safety Input 2/3 Mode	Dual-channel Equivalent
Safety Input 3	Safety Input 3 Channel Mode	Safety Input
	Safety Input 3 Test Source	Test Output 3
Test Output 0	Test Output 0 Mode	Pulse Test Output
Test Output 1	Test Output 1 Mode	Pulse Test Output
Test Output 2	Test Output 2 Mode	Power Supply Output
Test Output 3	Test Output 3 Mode	Power Supply Output

Single-channel Safety Contactor

This example shows wiring and controller configuration when using a digital POINT Guard I/O module with a single safety contactor.

When used in combination with the programs of the safety controller, this circuit configuration is safety Category 2.

Figure 18 - POINT Guard I/O Module Wiring (single safety contact)
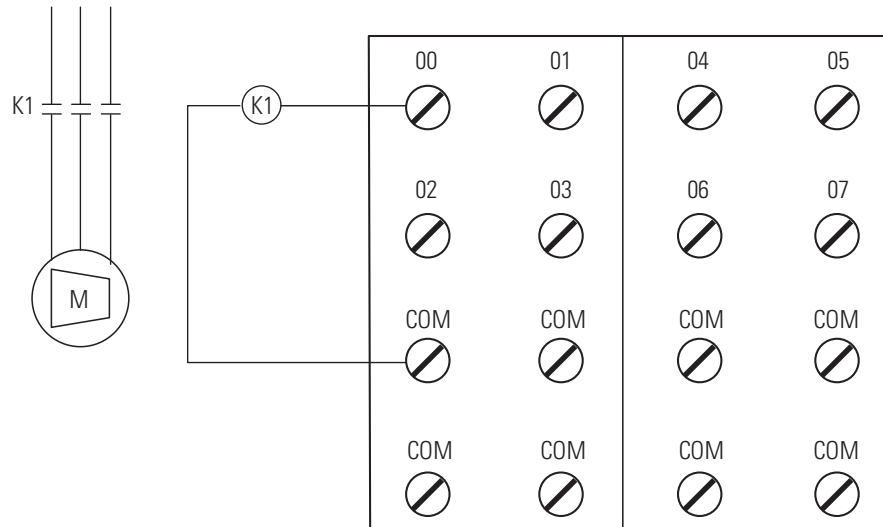
Where:
00…07 = Safety Outputs
COM = Common

Controller Configuration	Parameter Name	Configuration Setting
Safety Output 0	Safety Output 0 Point Mode	Safety Pulse Test
	Point Operation Type	Single Channel

Dual-channel Safety Contactors

This example shows wiring and controller configuration when using a digital POINT Guard I/O module with redundant safety contactors.

When used in combination with the programs of the safety controller, this circuit configuration is safety Category 4. Additional wiring, such as monitoring feedback, may be required to achieve safety Category 4.

Figure 19 - POINT Guard I/O Module Wiring (redundant safety contacts)
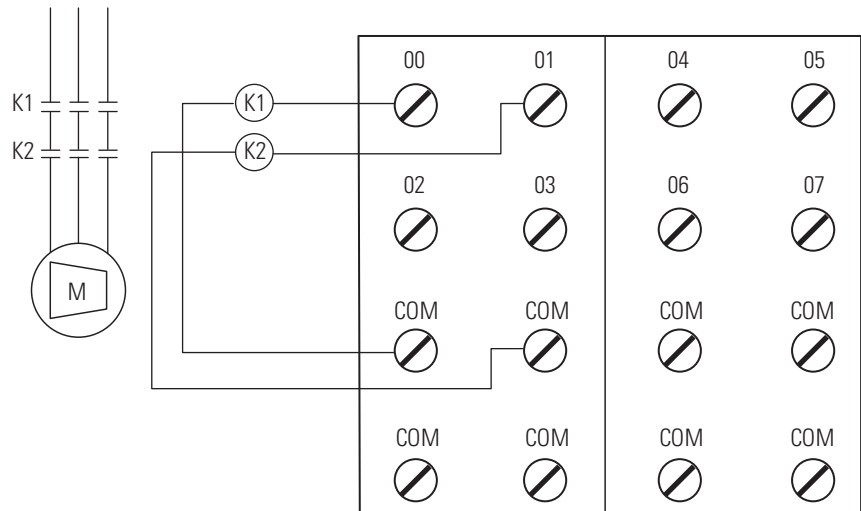
Where:
00…07 = Safety Outputs
COM = Common

Controller Configuration	Parameter Name	Configuration Setting
Safety Output 0	Safety Output 0 Point Mode	Safety Pulse Test
	Point Operation Type	Dual-channel
Safety Output 1	Safety Output 1 Point Mode	Safety Pulse Test

Safety Analog Input Wiring

The following sections contain important guidelines for wiring safety analog inputs and wiring examples for the 1734-IE4S module.

Guidelines for Wiring Safety Analog Inputs

Follow these guidelines when wiring your safety analog inputs.

For 8 terminal connections, either the 1734-TOP or 1734-TB terminal base can be used. For all 12 terminal connections, only the 1734-TOP3 base can be used. When using a 1734-TOP3 base, both of the COM terminals and both of the Sensor Power terminals for each channel are internally connected. The FE terminal connection shown on the diagrams represents a grounding lug on the panel or terminal connection to the DIN rail.

If the sensor has a digital output for use with Tachometer mode, it must be either a push-pull type output or have appropriate pull-up or pull-down resistors for NPN or PNP sensors The analog input module does not provide the low impedance of these pull-up or pull-down resistors.

See <u>Figure 32</u> and <u>Figure 33 on page 66</u> for examples.

IMPORTANT	You must verify the behavior of your 3-wire sensor to make sure that if it loses its ground connection, the signal is 0 (safe state) at the module input when the fault occurs.

IMPORTANT	To obtain SIL 3, Cat. 3 or Cat.4, you must make sure that the analog input signals cannot short together or that the two sensors are installed to provide signals that are offset from one another. When the module is configured as the source for sensor power, a short-circuit is detected at powerup (Cat. 2). However, when an external power supply is used, this fault must be detected by another means.

Safety Analog Input Wiring Examples

Figure 20 - 2-wire Current (4…20 mA) Sensor (SIL 2)
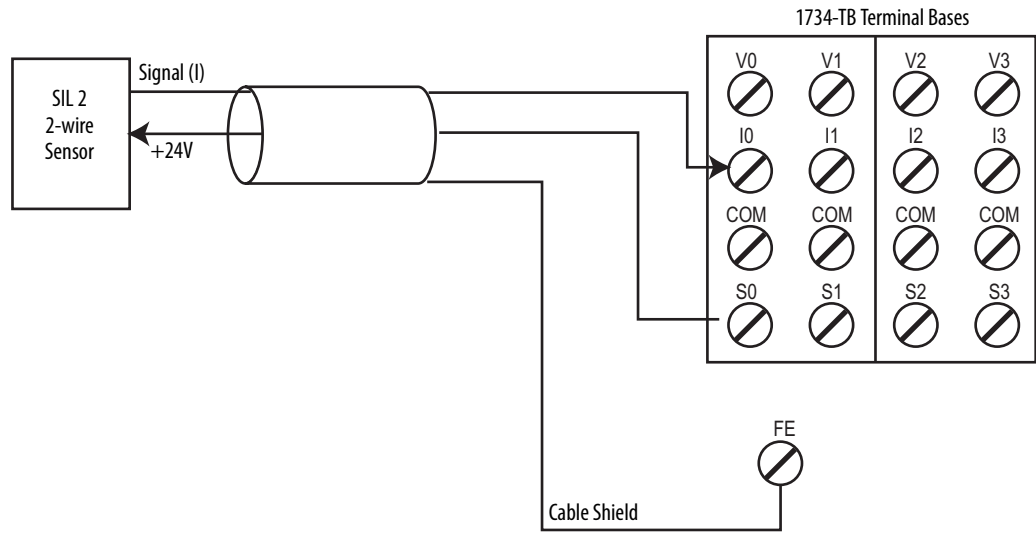
Figure 21 - 3-wire Voltage or Tachometer Sensor (SIL 2)
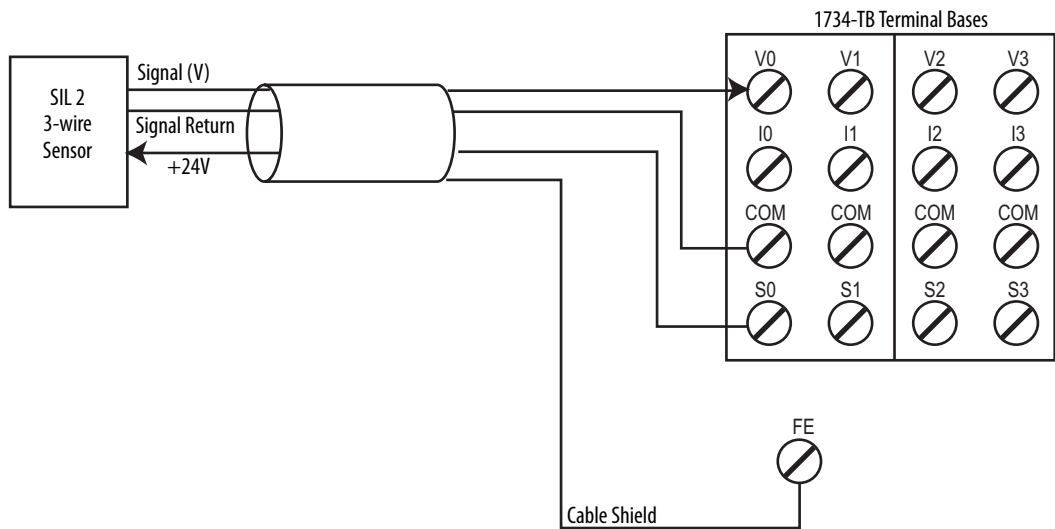
For analog voltage-output sensors, the signal levels for operation for the application must be outside the signal level when the signal is not present, for example, when the wire is broken.

See Figure 32 and Figure 33 on page 66 for tachometer wiring detail.

Follow the Guidelines for Wiring Safety Analog Inputs on page 59.

Figure 22 - 3-wire Current Sensor (SIL 2)

For 0…20 mA analog current-output sensors, the signal levels for operation for the application must be outside the signal level when the signal is not present, for example, when the wire is broken.

Figure 23 - 4-wire Voltage or Tachometer Sensor (SIL 2)
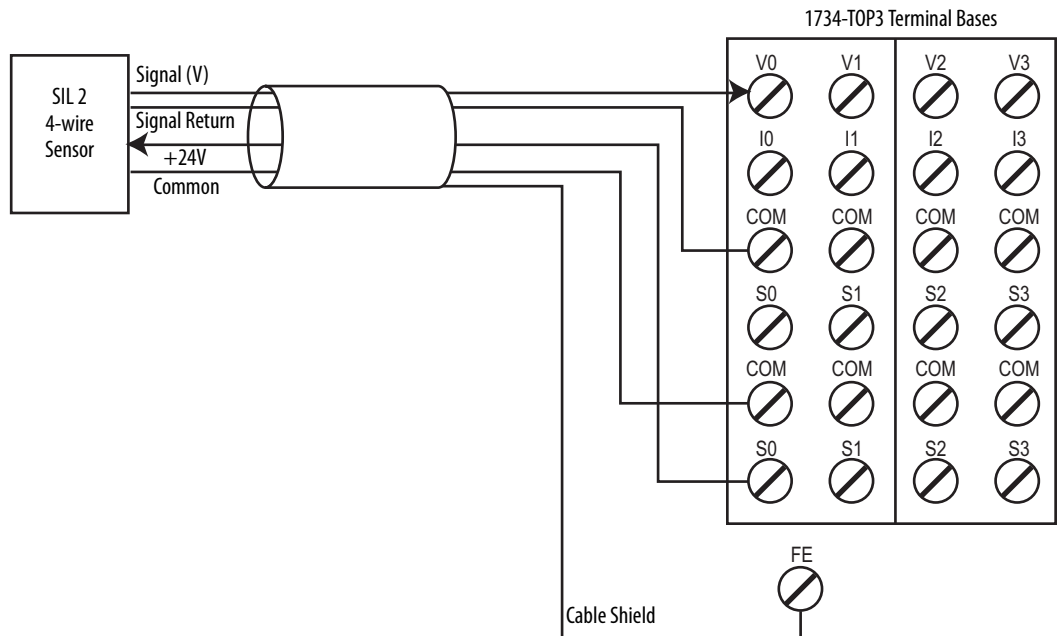
Signal Return and Common are at the same potential.
See Figure 32 and Figure 33 on page 66 for tachometer wiring detail.

Follow the Guidelines for Wiring Safety Analog Inputs on page 59.

Figure 24 - 4-wire Current Sensor (SIL 2)

Signal Return and Common are at the same potential.

Figure 25 - 2-wire Current (4…20 mA) Sensor (SIL 3)
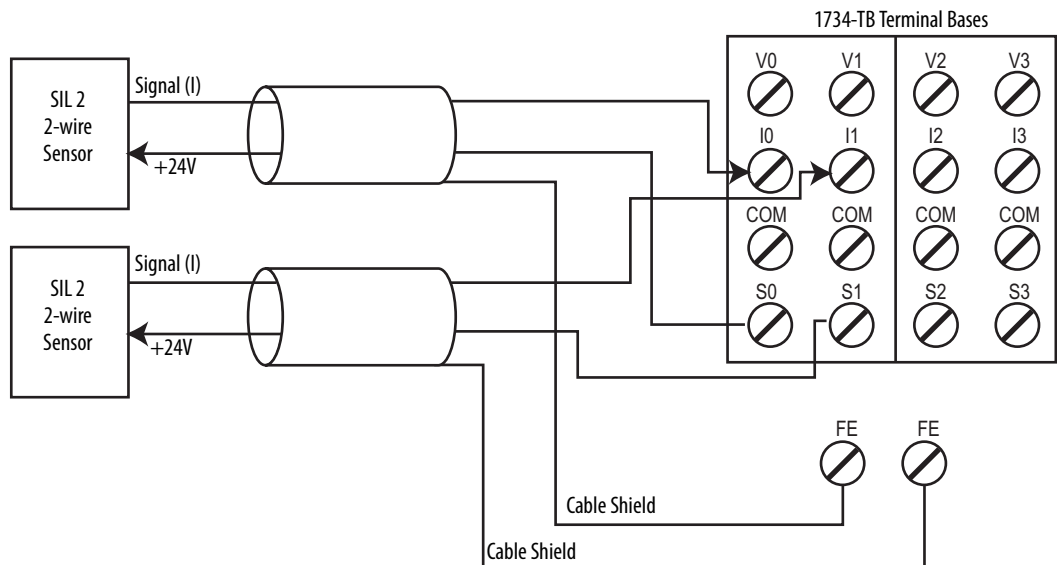
Field sensors are monitoring the same signal in a redundant configuration.
You must configure a safety deadband between the two signals to achieve SIL 3.

Follow the <u>Guidelines for Wiring Safety Analog Inputs on page 59</u>.

Figure 26 - 3-wire Voltage or Tachometer Sensor (SIL 3)
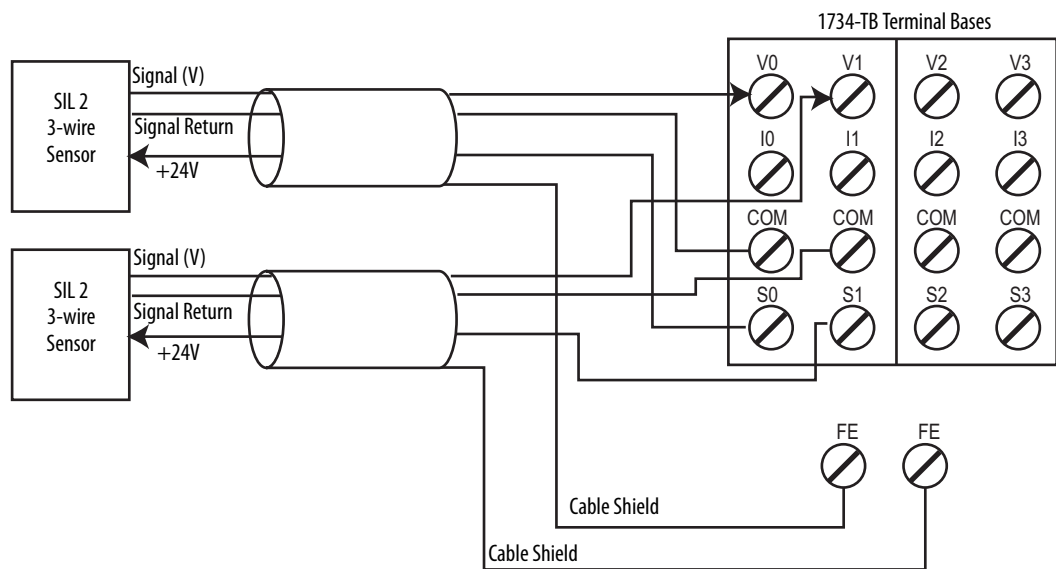
This wiring configuration may also be used for SIL 2 redundant Tachometer mode.

For analog voltage-output sensors, the signal levels for operation for the application must be outside the signal level when the signal is not present, for example, when the wire is broken.

Field sensors are monitoring the same signal in a redundant configuration.

You must configure a safety discrepancy deadband between the two signals to achieve SIL 3.
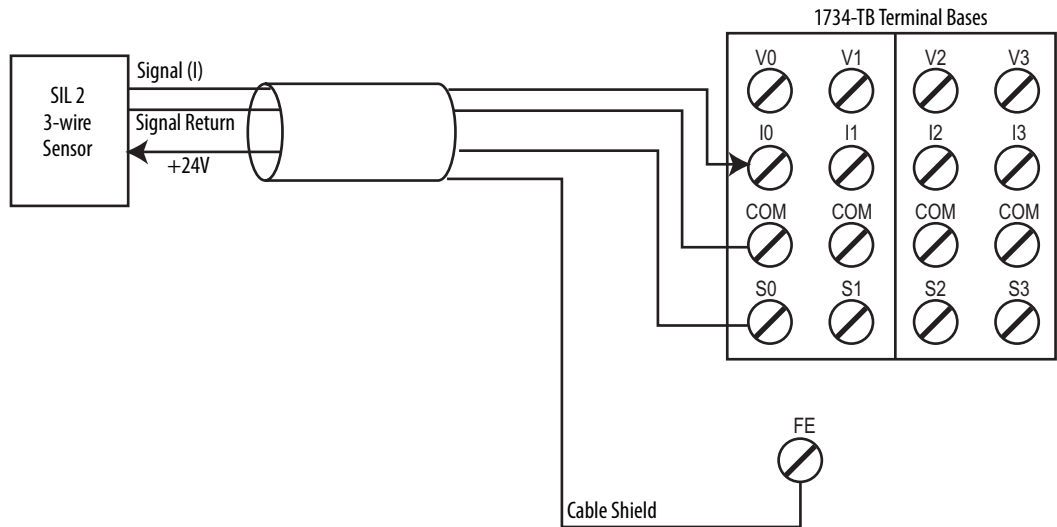
See for tachometer wiring detail.

Figure 27 - 3-wire Current Sensor (SIL 3)
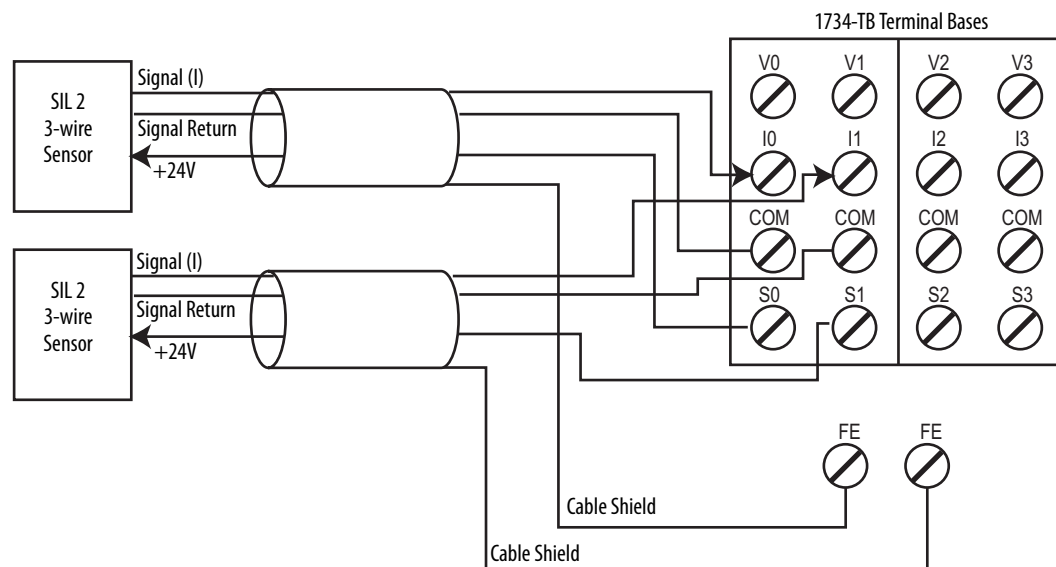
For 0…20 mA analog current-output sensors, the signal levels for operation for the application must be outside the signal level when the signal is not present, for example, when the wire is broken.

Field sensors are monitoring the same signal in a redundant configuration.

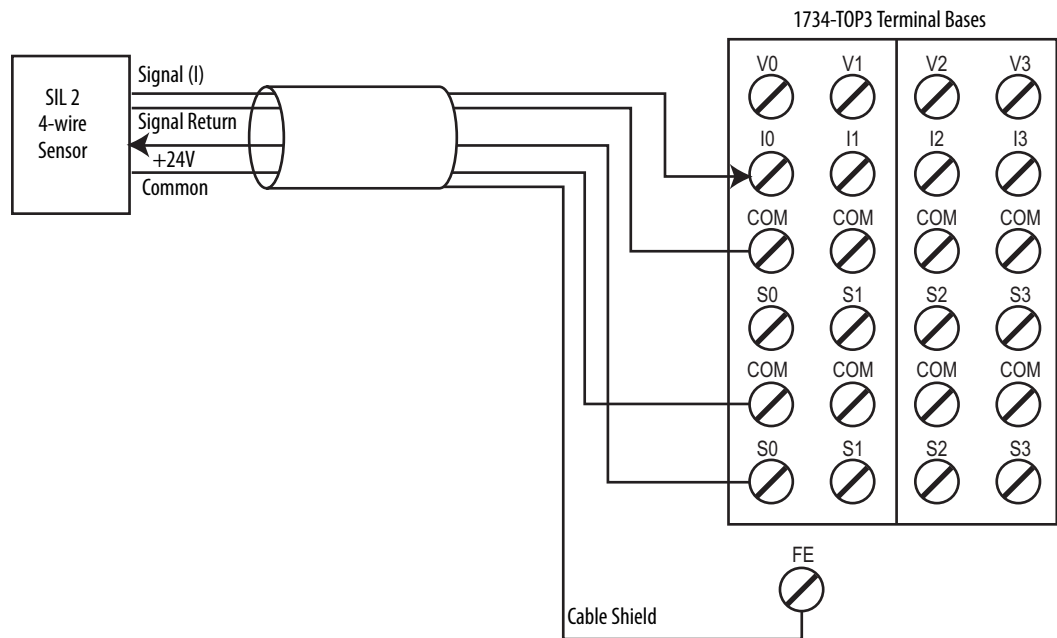You must configure a safety discrepancy deadband between the two signals to achieve SIL 3.

Follow the .

Figure 28 - 4-wire Voltage or Tachometer Sensor (SIL 3)
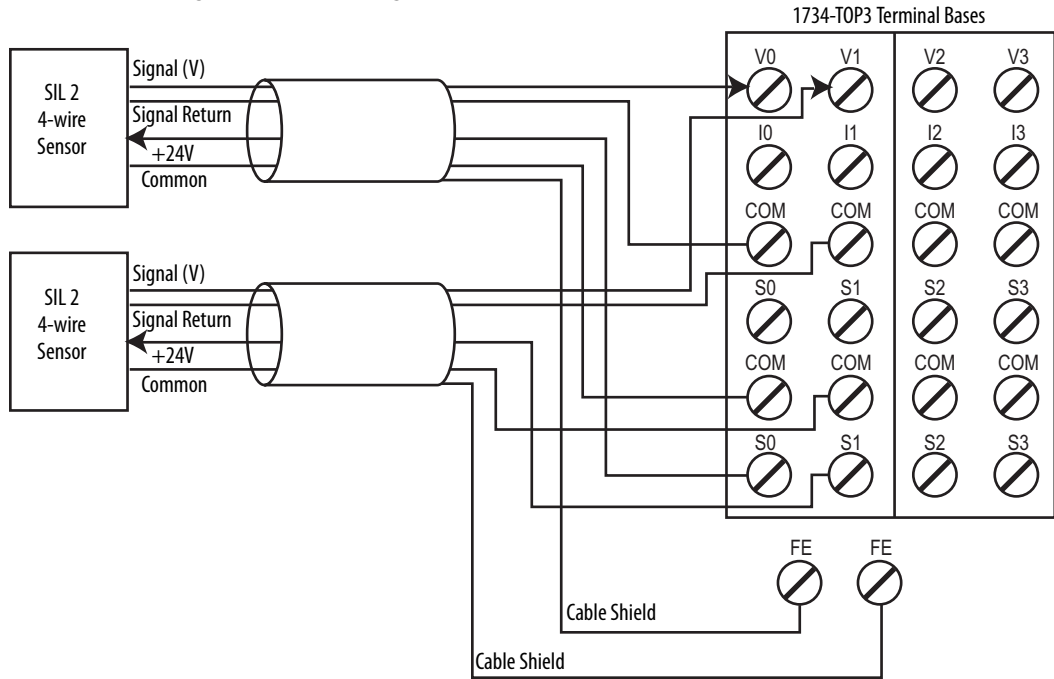
This wiring configuration may also be used for SIL 2 redundant Tachometer mode.

Signal Return and Common are at the same potential.

Field sensors are monitoring the same signal in a redundant configuration.

You must configure a safety discrepancy deadband between the two signals to achieve SIL 3.

See Figure 32 and Figure 33 on page 66 for tachometer wiring detail.

Figure 29 - 4-wire Current Sensor (SIL 3)
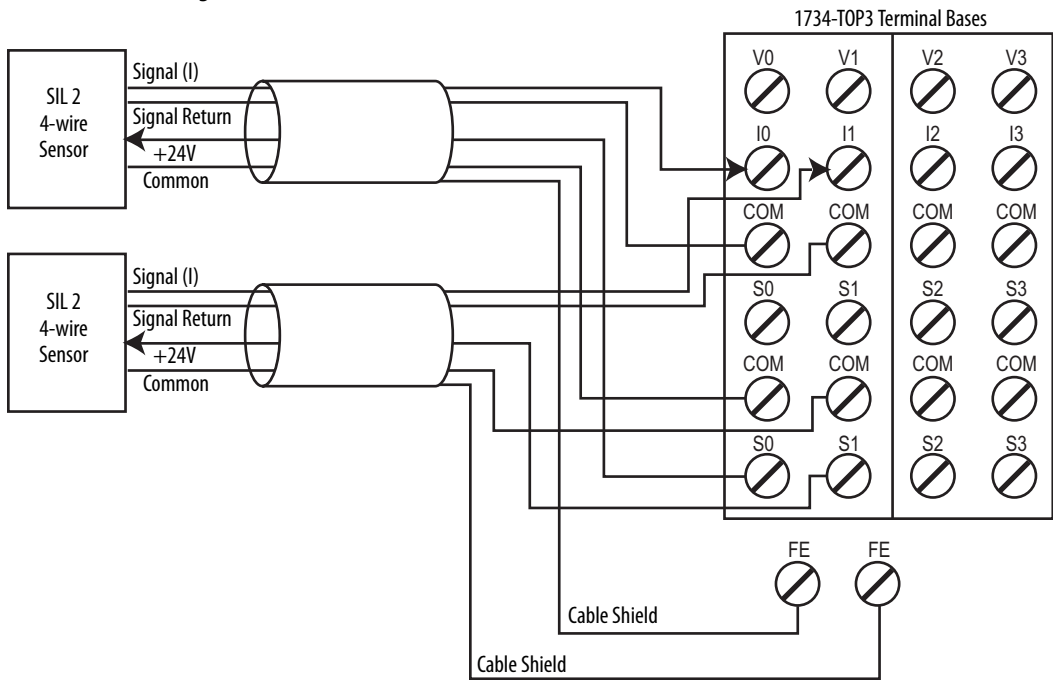
Signal Return and Common are at the same potential.
Field sensors are monitoring the same signal in a redundant configuration.
You must configure a safety discrepancy deadband between the two signals to achieve SIL 3.

Follow the <u>Guidelines for Wiring Safety Analog Inputs on page 59</u>.

In the following two examples, the negative terminal of the sensor power supply and that of the 1734 terminal base COMMON must be at the same potential. Use of an external power supply limits diagnostics and increases susceptibility to noise.

> **IMPORTANT**   You are responsible for making sure that the sensor is receiving appropriate power. Safety sensors that are not properly powered may not deliver accurate signals to the analog input module.

Follow the Guidelines for Wiring Safety Analog Inputs on page 59.

Figure 30 - 4-wire Voltage or Tachometer Sensor (SIL 2) with External Power Supply
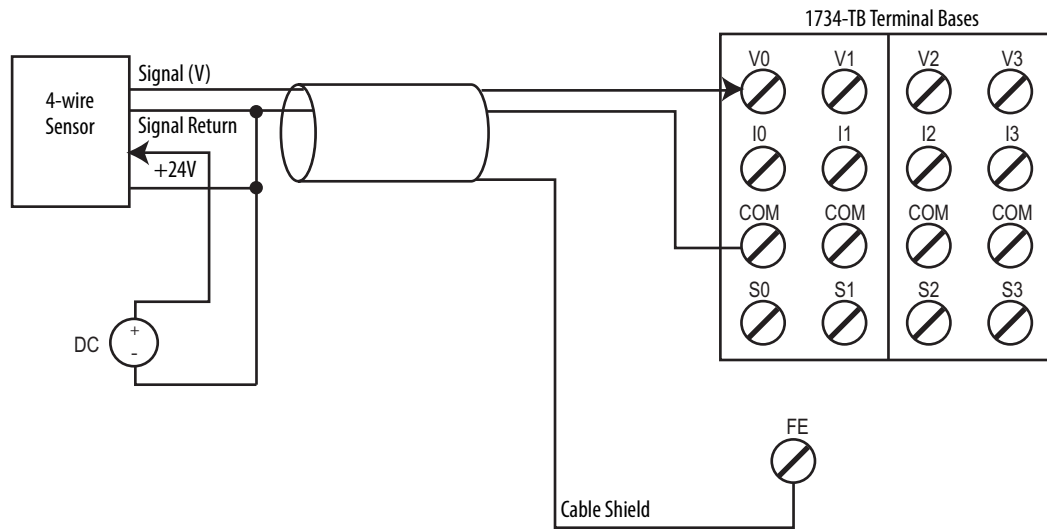

Signal Return and Common are at the same potential.

See Figure 32 and Figure 33 on page 66 for tachometer wiring detail.

Figure 31 - 4-wire Current Sensor (SIL 2) with External Power Supply
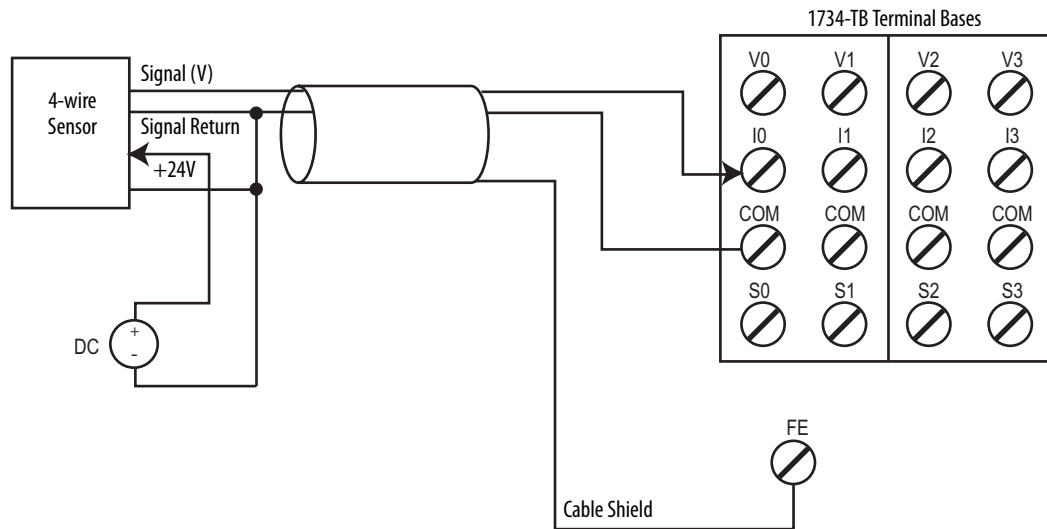
Signal Return and Common are at the same potential.

Figure 32 - Safety Analog Input Wiring for Sinking Tachometer Sensor

1734-IE4S with Trigger = Falling Edge
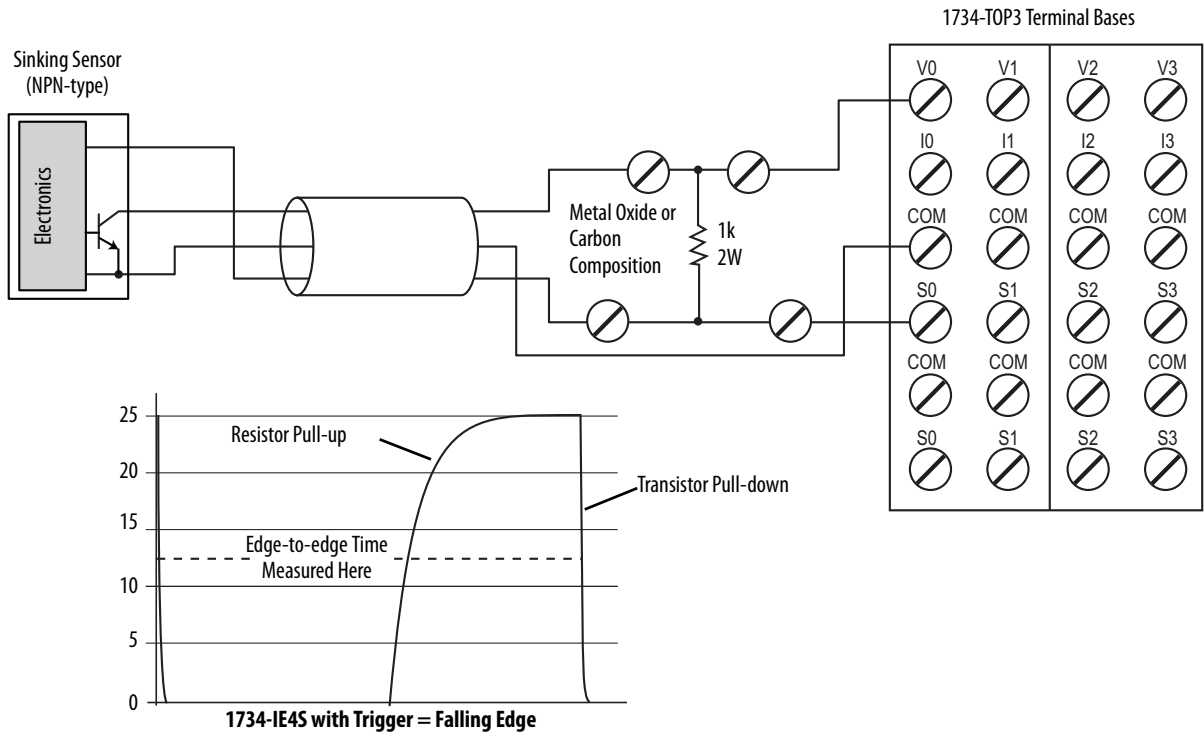
Figure 33 - Safety Analog Input Wiring for Sourcing Tachometer Sensor

1734-IE4S with Trigger = Rising Edge
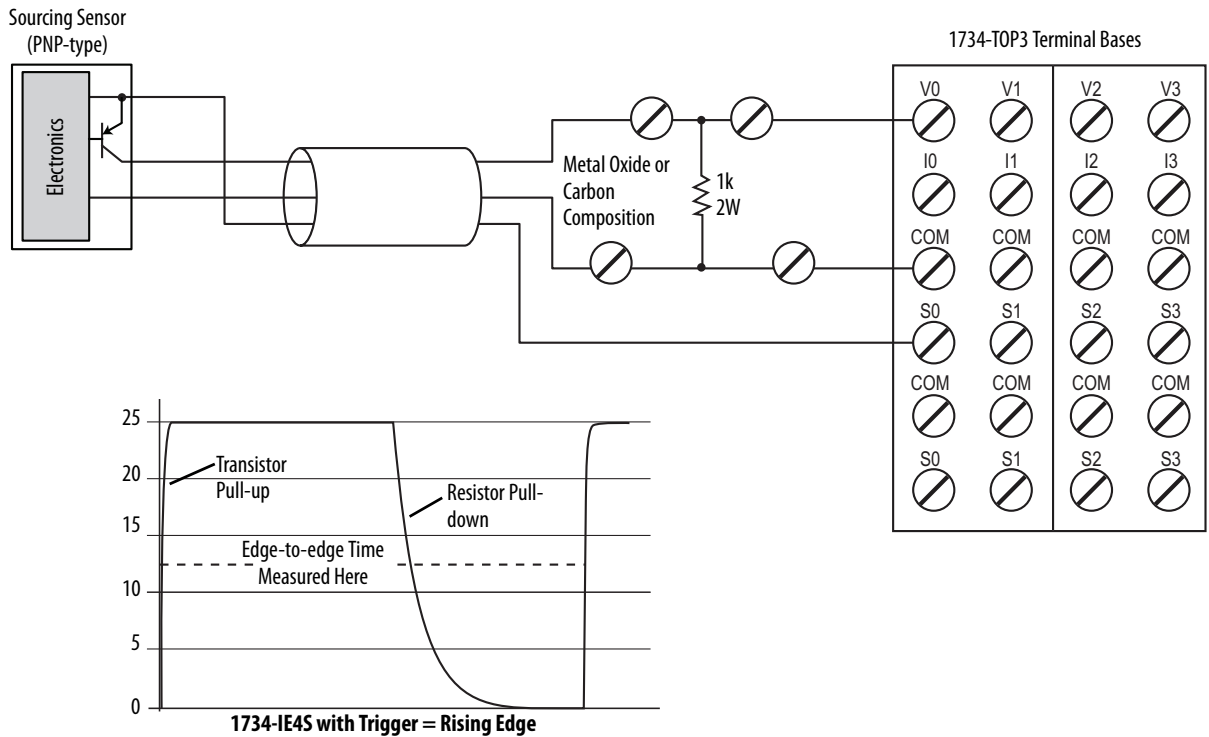
Follow the Guidelines for Wiring Safety Analog Inputs on page 59.

Configure the Module in a GuardLogix Controller System

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Using RSLogix 5000 Software

When using a GuardLogix controller on an EtherNet/IP network, configure the POINT Guard I/O modules by using RSLogix 5000 software.

IMPORTANT	You **must** configure each point that is to be used as a safety input or output. By default, all safety input and output points are disabled.

TIP	If you need an add-on profile, visit the RSLogix 5000 My Support website at http://support.rockwellautomation.com/ControlFlash/LogixProfiler.asp.

At the bottom of each dialog box, click Help for information about how to complete entries in that dialog box. At the bottom of warning dialog boxes, click Help for information about that specific error.

Use the minimum version of RSLogix 5000 software.

Cat. No.	Required Version
1734-IB8S, 1734-OB8S	17 or later
1734-IE4S	18 or later[1]

(1)　Dual-channel Analog (DCA) safety application instruction is available in RSLogix 5000 software, version 20 or later.

When first setting up your POINT Guard I/O modules on an EtherNet/IP network, use RSLogix 5000 software to perform the following steps.

1. [Add and Configure the Ethernet Bridge Module](#).

2. [Add and Configure the 1734 Ethernet Adapter](#).

3. [Add and Configure Safety Digital Input Modules](#).

4. [Add and Configure Safety Digital Output Modules](#).

5. [Add and Configure Safety Analog Input Modules](#)

Add and Configure the Ethernet Bridge Module

Follow this procedure to add and configure the Ethernet bridge module. In this example, we use a 1756 GuardLogix controller.

1. From the I/O Configuration tree, right-click 1756 Backplane, 1756-A*xx* and choose New Module.
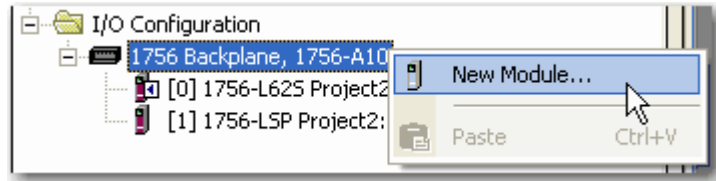
2. In the Select Modules dialog box, check Communication and Allen-Bradley.

3. Choose an Ethernet module from the list and click Create.

   In this example, we chose the 1756-EN2T bridge module. CIP Safety is supported by these module revisions.

Cat. No.	Compatible Major Revision
1756-EN2F	1 or later
1756-EN2T	1 or later
1756-ENBT	3 or later
1756-EN2TR	3 or later
1756-EN3TR	3 or later
1768-ENBT	3 or later

4. Specify the properties for the new module.
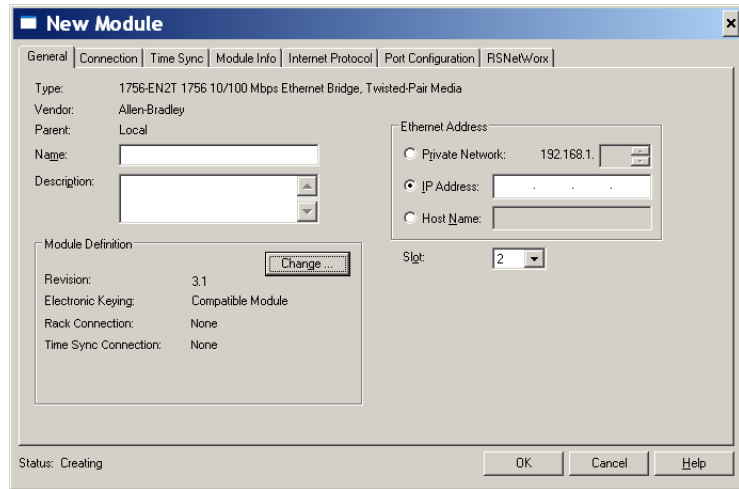
a. In the Name field of the New Module dialog box, type the name of the Ethernet bridge module.

b. In the Description field, type an optional description.

c. In the IP Address field, type the IP address.

d. In the Slot field, choose the slot number.

5. Click Change to edit the Module Definition.

a. In the Revision fields, choose the major and minor revisions.

b. From the Electronic Keying pull-down menu, choose the appropriate keying method.

Choose	Description
Compatible Module	Allows a module to determine whether it can emulate the module defined in the configuration sent from the controller.
Disable Keying	None of the parameters in the physical module and module configured in the software must match. **Do not choose Disable Keying.**
Exact Match	All of the parameters must match or the inserted module rejects a connection to the controller.

6. Click OK.

The I/O Configuration tree displays the Ethernet connection.
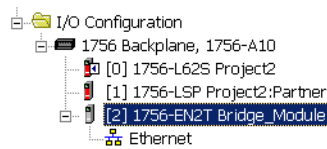
Add and Configure the 1734 Ethernet Adapter

1. Right-click the Ethernet connection and choose New Module.
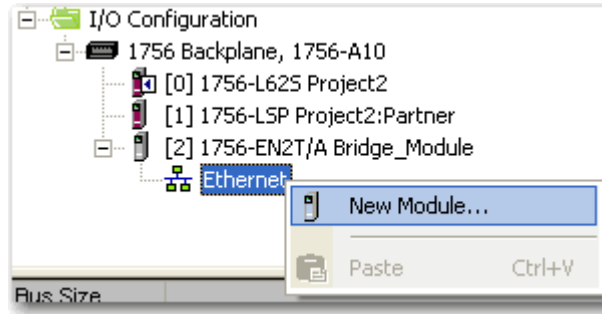
2. On the Select Module dialog box, check Communication and Allen-Bradley.

3. Choose an Ethernet adapter from the list and click Create.

4. Specify the general properties of the Ethernet adapter.
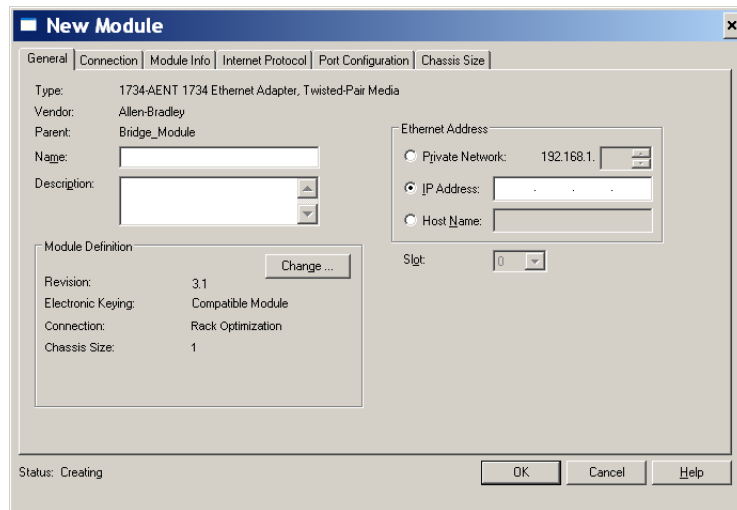
   a. In the Name field of the New Module dialog box, type the name of the 1734 Ethernet adapter.

   b. In the Description field, type a description, if desired.

   c. In the IP Address field, type the IP address.

5. Click Change to edit the Ethernet Adapter's Module Definition.
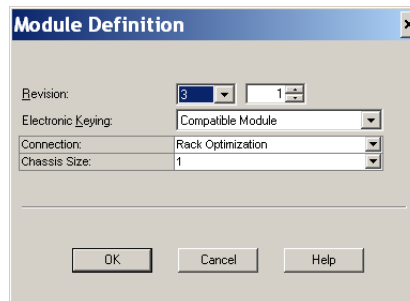
a. In the Revision fields, choose the major and minor revisions.

> **IMPORTANT** 1734-AENT adapter firmware must be major revision 3 or later to support POINT Guard I/O modules.

b. From the Electronic Keying pull-down menu, choose the appropriate keying method.

Choose	Description
Exact Match	Module and type series must exactly match or the module will be rejected by the controller.
Compatible Module	Controller will check module type and revision for compatibility. Compatible modules that match or are newer will be accepted.
Disable Keying	Controller will check module type, but will accept any version. **Do not choose Disable Keying.**

c. From the Connection pull-down menu, choose the appropriate connection for the 1734 Ethernet adapter.

| Choose	Description
Listen Only	Read or verify standard digital I/O data only, but does not control the modules. (When you have multiple controllers, one controller is used to control and the other controllers are used to monitor.)
None	The adapter makes a direct connection to each of the module's listed under the 1734-AENT adapter in the I/O Configuration tree.
Rack Optimization	Standard digital I/O data is collected into a single rack image. **POINT specialty, analog, or safety (POINT Guard I/O) modules do not use rack optimization.**

> **TIP** If there are no standard digital I/O modules in your POINT I/O system, choose None.

d. From the Chassis Size pull-down menu, choose the number of POINT I/O modules that will be attached to the 1734 Ethernet adapter plus 1 for the 1734 Ethernet adapter.

> **IMPORTANT** Do not count terminal bases. Enter only the number of physical modules installed, plus 1 for the adapter. This number must match exactly. You cannot enter a higher number anticipating future expansion.

6. Click OK to return to the Module Properties dialog box.

7. Click OK again to apply your changes.

The I/O Configuration tree displays the 1734 Ethernet adapter.
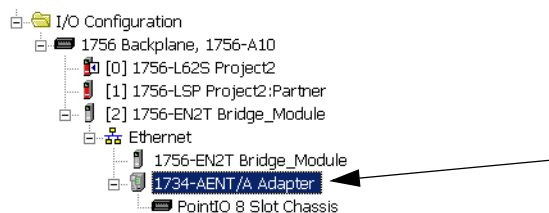
Add and Configure Safety Digital Input Modules

To include a safety digital input module in the RSLogix 5000 project, you add the module under the I/O chassis in the I/O Configuration tree, configure the module's general properties, configure the digital inputs, and then configure test outputs as described in the following sections.

Add the Safety Digital Input Module

Follow these steps to add the POINT Guard I/O safety digital input module.

1. Right-click the POINT I/O Chassis and choose New Module.
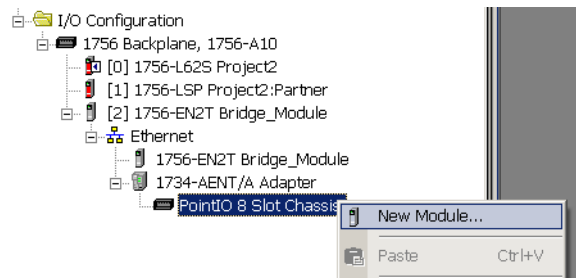
2. From the Select Module dialog box, check Digital and Allen-Bradley.

3. Select an input module and click Create.
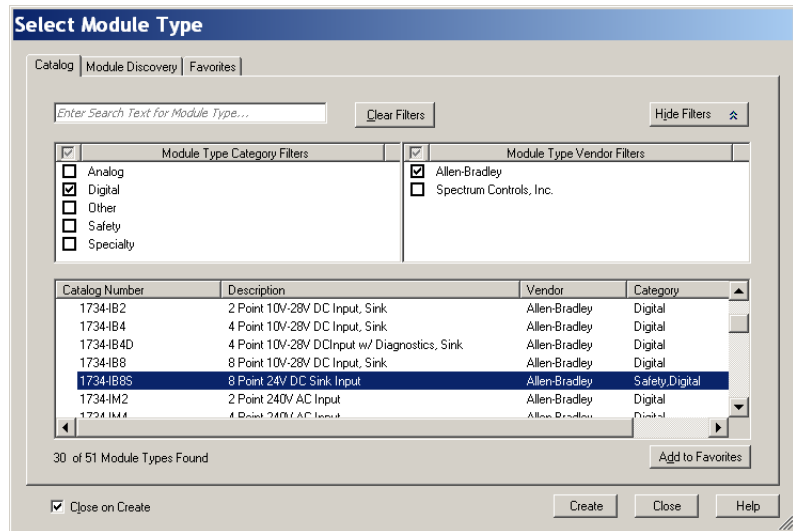
4. Specify the module's general properties.
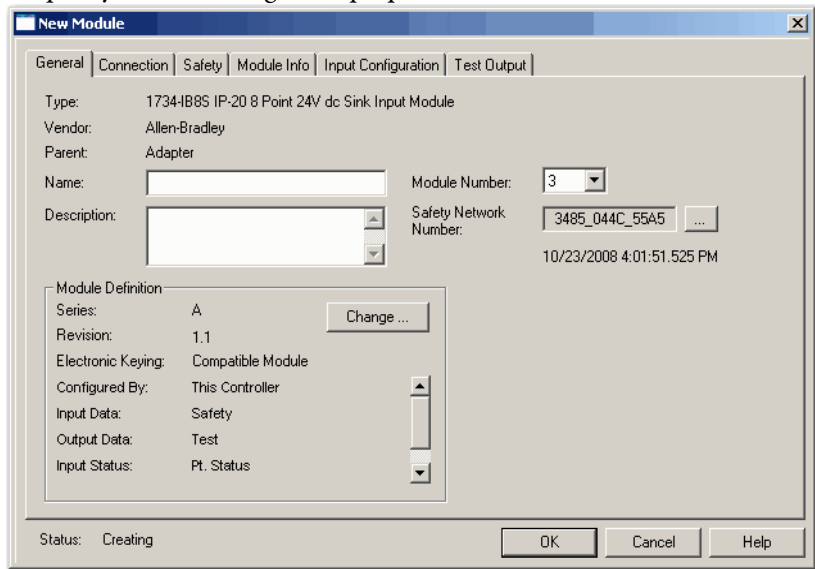
a. In the Name field of the New Module dialog box, type a unique name for the input module.

b. From the Module Number pull-down menu, choose a unique module number that corresponds to the module's position in the chassis.

c. In the Description field, type a description, if desired.

d. In the Safety Network Number field, use the default setting.

For a detailed explanation of the safety network number (SNN), see the GuardLogix Controller Systems Safety Reference Manual, publication 1756-RM093, noting that in most cases, you use the default provided by the RSLogix 5000 software.

The purpose of the safety network number (SNN) is to make sure that every module in a system can be uniquely identified. We suggest that all safety modules on a network have the same SNN, to make documentation easier. During configuration, RSLogix 5000 software defaults a safety device's SNN to match the SNN of the lowest safety node on each network.

5. Click Change to edit the Module Definition.
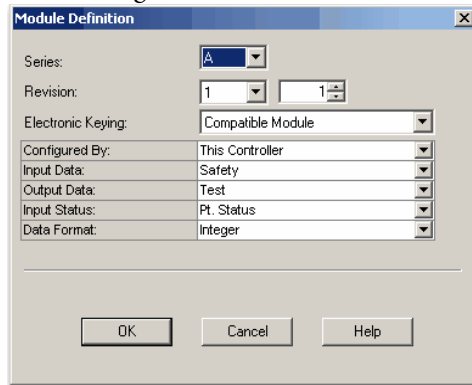
a. In the Series field, choose the input module's series letter.

b. In the Revision fields, choose the input module's revision numbers.

c. From the Electronic Keying pull-down menu, choose the appropriate keying method for the input module.

Choose	Description
Exact Match	All of the parameters must match or the inserted module rejects a connection to the controller.
Compatible Module	Allows an I/O module to determine whether it can emulate the module defined in the configuration sent from the controller.

d. From the Configured By pull-down menu, choose the appropriate method by which this module is configured.

Choose	Description
This Controller	This selection directs the controller to configure the module.
External Means	This selection directs the controller to establish a safety input connection only, and the controller will not configure the module or control the Test Outputs.

e. From the Input Data pull-down menu, choose Safety or None.

Choose	Description
Safety	These tags are created for the target module: • RunMode for module mode • ConnectionFaulted for communication status • Safety Data for safety inputs from the module

– AENT_Adapter:1:I	{...}	{...}		AB:1734_IB8S_Safety2:I:0	Safety
AENT_Adapter:1:I.RunMode	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.ConnectionFault...	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt00Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt01Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt02Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt03Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt04Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt05Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt06Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt07Data	0		Decimal	BOOL	Safety

f. From the Output Data pull-down menu, choose from the following options.

Choose	Description
None	Results in an input only connection to the module. Inputs and status are read, but no outputs are written. You can still use the test outputs as pulse test outputs or a power supply. If you are not controlling the module's test outputs via application logic, this is the recommended setting.
Test[1]	Creates these tags to enable application logic control of the test outputs on the module. This selection allows the test outputs to be used as standard outputs and muting outputs.

– AENT_Adapter:1:O	{...}	{...}		AB:1734_IB8S:O:0	Safety
AENT_Adapter:1:O.Test00Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:O.Test01Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:O.Test02Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:O.Test03Data	0		Decimal	BOOL	Safety

(1) To have this choice from the pull-down menu, you must choose 'This Controller' from the Configured By pull-down menu.

IMPORTANT   When test outputs are configured as standard outputs, they must not be used for safety purposes.

g. From the Input Status pull-down menu, choose from the following options.

Choose	Description
None	There are no status tags.
Pt. Status	There is one status tag for each input point.

AENT_Adapter:1:I.Pt00Status	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt01Status	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt02Status	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt03Status	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt04Status	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt05Status	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt06Status	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt07Status	0	Decimal	BOOL	Safety

Choose	Description
Combined Status - Muting	• A single BOOL tag represents an AND of the status bits for all the input points. For example, if any input channel has a fault, this bit goes LO.[1] • A single BOOL tag represents the Input Power Status (error bit) from the input assembly. • A muting status tag for test output T1 and T3.

AENT_Adapter:1:I.Muting01Status	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Muting03Status	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.InputPowerStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.CombinedInputStatus	0	Decimal	BOOL	Safety

Choose	Description
Pt. Status - Muting	There is a muting status tag for test output T1 and T3 with point status for each input point.

Adapter:1:I.Pt00Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt01Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt02Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt03Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt04Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt05Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt06Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt07Status	0	Decimal	BOOL	Safety
Adapter:1:I.Muting01Status	0	Decimal	BOOL	Safety
Adapter:1:I.Muting03Status	0	Decimal	BOOL	Safety
Adapter:1:I.InputPowerStatus	0	Decimal	BOOL	Safety

Choose	Description
Pt. Status-Muting-Test Output	• Status tags for each of the input points. • Muting status tag for test output T1 and T3. • Status tags for each of the test outputs.

Adapter:1:I.Pt00Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt01Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt02Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt03Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt04Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt05Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt06Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt07Status	0	Decimal	BOOL	Safety
Adapter:1:I.Pt00TestOutputStatus	0	Decimal	BOOL	Safety
Adapter:1:I.Pt01TestOutputStatus	0	Decimal	BOOL	Safety
Adapter:1:I.Pt02TestOutputStatus	0	Decimal	BOOL	Safety
Adapter:1:I.Pt03TestOutputStatus	0	Decimal	BOOL	Safety
Adapter:1:I.Muting01Status	0	Decimal	BOOL	Safety
Adapter:1:I.Muting03Status	0	Decimal	BOOL	Safety
Adapter:1:I.InputPowerStatus	0	Decimal	BOOL	Safety

(1) When using combined status, use explicit messaging to read individual point status for diagnostic purposes.

h. From the Data Format pull-down menu, use the default 'Integer'.

6. Click OK to return to the Module Properties dialog box.

7. Click OK again to apply your changes.

The I/O Configuration tree displays the module.
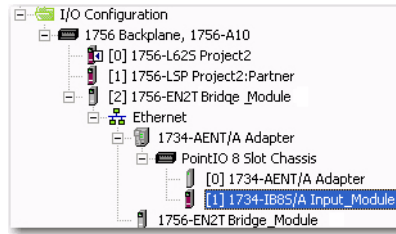
Configure the Safety Digital Inputs

Follow this procedure to configure the safety digital inputs.

1. From the Module Properties dialog box, click the Input Configuration tab.

2. Assign the Point Operation Type.

Choose	Description
Single	Inputs are treated as single channels.
	Dual-channel safety inputs can be configured as two individual single channels. This does not affect pulse testing because it is handled on an individual channel basis.
	IMPORTANT: Use single-channel mode when you intend to use the GuardLogix safety application instructions.
Equivalent	Inputs are treated as a dual-channel pair. The channels must match within the discrepancy time or an error is generated.
Complementary	Input are treated as a dual-channel pair. They must be in opposite states within the discrepancy time or an error is generated.

When you choose Equivalent or Complementary, you must also assign a Discrepancy Time.
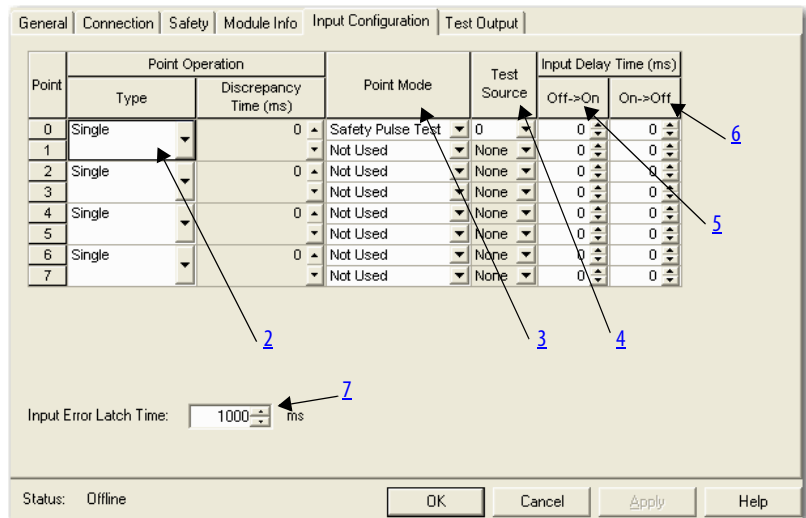
A discrepancy time setting of 0 ms means that the channels in a dual configuration can be discrepant for an infinite amount of time without a fault being declared.

For a discrepancy time setting of 0 ms, the evaluated status of the inputs still goes to the safe state due to a 'cycle inputs' required condition. However, with a 0 ms discrepancy time setting, a fault is not declared.

A 'cycle inputs' required condition occurs when one input terminal goes from its normal Active->Inactive->Active state while the other input terminal remains in its normal Active state. Even though no fault is declared, the inputs must be cycled through the safe state before the evaluated status of the inputs can return to the Active state. When in a 'cycle inputs' required condition, the logical state does not necessarily match the voltage at the terminals.

IMPORTANT	Configuring discrepancy time on safety I/O modules masks input discrepancies detected by the controller safety instructions. Status can be read by the controller to obtain this fault information.

3. Assign the Point Mode.

Choose	Description
Not Used	The input is disabled. It remains logic 0 if 24V is applied to the input terminal.
Safety Pulse Test	Pulse testing is performed on this input circuit. A test source on the POINT Guard I/O module **must** be used as the 24V source for this circuit. The test source is configured by using the test source pull-down menu. The pulse test will detect shorts to 24V and channel-to-channel shorts to other inputs.
Safety	A safety input is connected but there is no requirement for the POINT Guard I/O module to perform a pulse test on this circuit. An example is a safety device that performs its own pulse tests on the input wires, such as a light curtain.
Standard	A standard device, such as a reset switch, is connected. This point cannot be used in dual-channel operation.

4. Assign a Test Source for each safety input on the module you want to pulse test.

Choose	Description
None	
Test Output 0	If pulse testing is performed on an input point, then the test source that is sourcing the 24V for the input circuit must be selected. If the incorrect test source is entered, the result is pulse test failures on that input circuit.
Test Output 1[1]	
Test Output 2	
Test Output 3[1]	

(1)   Test Output 1 and 3 incorporate optional muting functionality.

5. Assign the Input Delay Time, Off -> On (0...126 ms, in increments of 6 ms).

Filter time is for OFF to ON transition. Input must be high after input delay has elapsed before it is set logic 1. This delay time is configured per channel with each channel specifically tuned to match the characteristics of the field device, for maximum performance.

6. Assign the Input Delay Time, Off -> On (0...126 ms, in increments of 6 ms).

Filter time is ON to OFF transition. Input must be low after input delay has elapsed before it is set logic 0. This delay time is configured per channel with each channel specifically tuned to match the characteristics of the field device, for maximum performance.

7. From the Input Error Latch Time field, enter the time the module holds an error to make sure the controller can detect it (0...65,530 ms, in increments of 10 ms - default 1000 ms).

   This setting provides more reliable diagnostics. The purpose for latching input errors is to make sure that intermittent faults that may exist only for a few milliseconds are latched long enough to be read by the controller. The amount of time to latch the errors should be based on the RPI, the safety task watchdog, and other application-specific variables.

8. Click Apply.

Configure the Test Outputs

Follow this procedure to complete the test output configuration.

1. From the Module Properties dialog box, click the Test Output tab.
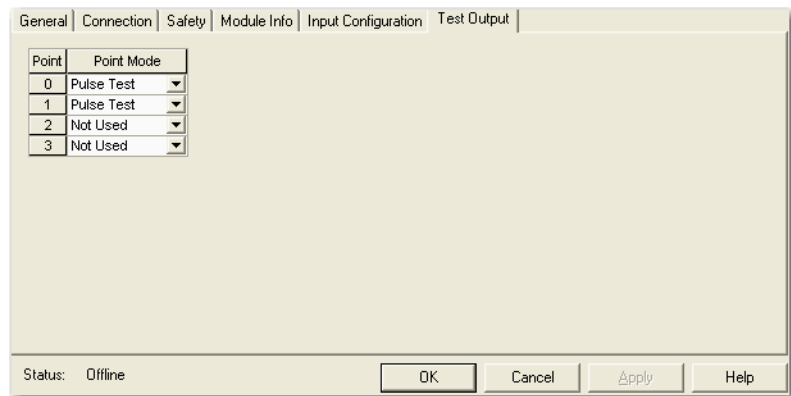
2. Assign the Point Mode.

Choose	Description
Not Used	The test output is disabled (default for T2 and T3).
Standard	The test output point can be controlled programmatically by the GuardLogix controller.
Pulse Test	The test output is being used as a pulse test source (default for T0 and T1).
Power Supply	A constant 24V is placed on the output terminal. It can be used to provide power to a field device.
Muting Lamp Output (terminals T1 and T3 only)	An indicator lamp is connected to the output. When this lamp is energized, a burned-out bulb, broken wire, or short to GND error condition can be detected. Typically, the lamp is an indicator used in light curtain applications.

There is also a Test Output Fault Action parameter that can only be read or written to via explicit messaging. If communication to the module times out, you can set the test outputs to Clear OFF (default) or Hold Last State. For more information, see Appendix B.

3. Click Apply.

Add and Configure Safety Digital Output Modules

To include a POINT Guard safety digital-output module in the RSLogix 5000 project, you add the module to the PointIO Chassis configure the module's general properties, and configure the digital outputs as described in the following sections.

Add the Safety Digital Output Module

Follow these steps to add the POINT Guard I/O safety digital output module.

Follow these steps to add and configure POINT Guard I/O safety modules.

1. Right-click the POINT I/O Chassis and choose New Module.
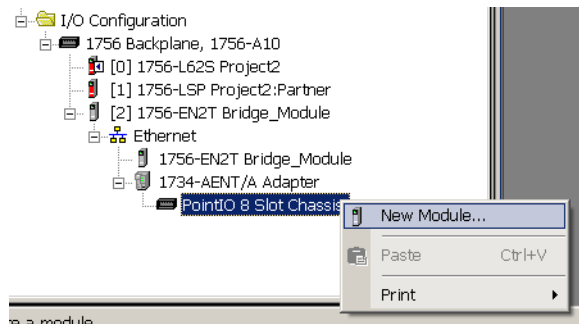
2. On the Select Module dialog box, select a safety output module and click OK.
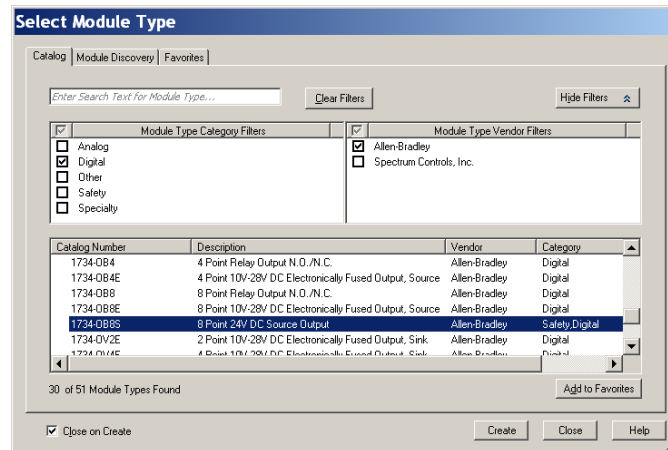
3. Specify the module's general properties.
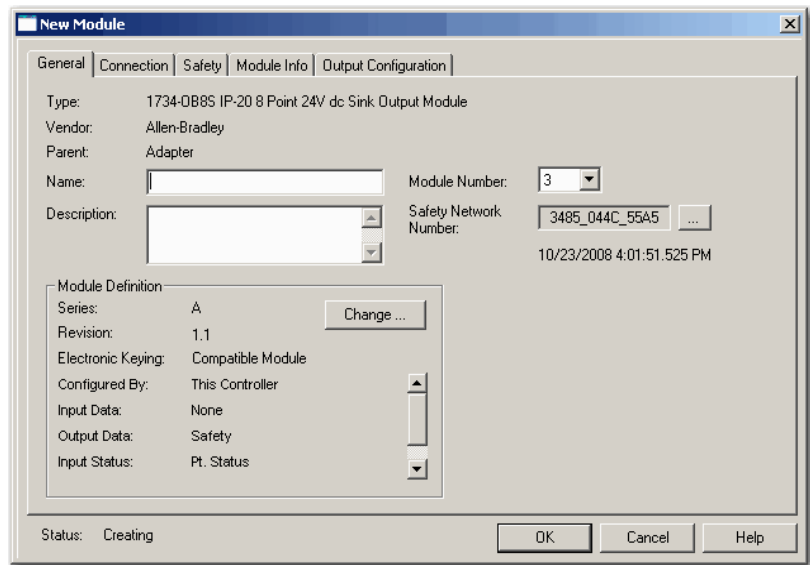
a. In the Name field of the New Module dialog box, type a unique name for the output module.

b. From the Module Node pull-down menu, choose a unique module node number that corresponds to the module's position in the chassis.

c. In the Description field, type a description, if desired.

d. In the Safety Network Number field, use the default setting.

   For a detailed explanation of the safety network number (SNN), see the GuardLogix Controller Systems Safety Reference Manual, publication 1756-RM093, noting that in most cases, you use the default provided by the RSLogix 5000 software.

4. Under Module Definition, click Change to edit the module's settings.
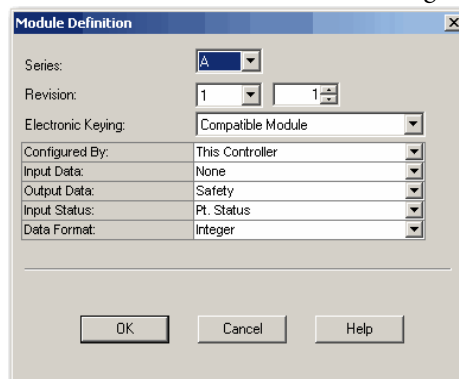
a. In the Series field, choose the output module's series letter.

b. In the Revision fields, choose the output module's revision numbers.

c. From the Electronic Keying pull-down menu, choose the appropriate keying method from the following options.

Choose	Description
Exact Match	All of the parameters must match or the inserted module rejects a connection to the controller.
Compatible Module	Lets an I/O module determine whether it can emulate the module defined in the configuration sent from the controller.

d. From the Configured By pull-down menu, choose the method by which this module is configured.

Choose	Description
This Controller	This selection directs the controller to configure and control the safety outputs. The Output Data selection will be set to Safety.
External Means	This selection directs the controller to establish a safety input connection only, and the controller will not configure the module or be able to control the safety outputs. The Output Data selection will be set to None.

e. From the Input Data pull-down menu, choose None.

None is the only valid selection, as this is an output-only safety module.

f. From the Output Data pull-down menu, choose from the following:

Choose	Description
Safety	Automatically selected when Configured By = This controller. Results in an output connection. Selecting Safety creates output tags and enables these outputs for use in the Safety Task.

⊟ POINT_Guard:1:O	{…}	{…}		AB:1734_OB8S:O:0	Safety
─ POINT_Guard:1:O.Pt00Data	0		Decimal	BOOL	Safety
─ POINT_Guard:1:O.Pt01Data	0		Decimal	BOOL	Safety
─ POINT_Guard:1:O.Pt02Data	0		Decimal	BOOL	Safety
─ POINT_Guard:1:O.Pt03Data	0		Decimal	BOOL	Safety
─ POINT_Guard:1:O.Pt04Data	0		Decimal	BOOL	Safety
─ POINT_Guard:1:O.Pt05Data	0		Decimal	BOOL	Safety
─ POINT_Guard:1:O.Pt06Data	0		Decimal	BOOL	Safety
└ POINT_Guard:1:O.Pt07Data	0		Decimal	BOOL	Safety

Choose	Description
None	Automatically selected when Configured By = External. Selecting None results in an input only connection to the module. Status is read, but no outputs are written.

g. From the Input Status pull-down menu, choose from the following.

Choose	Description
None	There are no status tags, only data for the outputs.
Pt. Status	There is one status tag for each output point.

AENT_Adapter:1:I.Pt00OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt01OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt02OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt03OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt04OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt05OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt06OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt07OutputStatus	0	Decimal	BOOL	Safety

Choose	Description
Pt. Status - Readback	• There is one status tag for each output point. • There is one data tag for the output readback.

AENT_Adapter:1:I.Pt00OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt01OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt02OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt03OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt04OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt05OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt06OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt07OutputStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt00Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt01Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt02Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt03Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt04Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt05Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt06Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt07Readback	0	Decimal	BOOL	Safety

Choose	Description
Combined Status - Readback - Power	• A single BOOL tag represents an AND of the status bits for all the output points. For example, if any output channel has a fault, this bit goes LO.[1] • There is one data tag for the output readback. • A single BOOL tag represents the Output Power Status (error bit) from the input assembly.

|				
AENT_Adapter:1:I.Pt00Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt01Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt02Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt03Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt04Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt05Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt06Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt07Readback	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.OutputPowerStatus	0	Decimal	BOOL	Safety
AENT_Adapter:1:I.CombinedOutputStatus	0	Decimal	BOOL	Safety

(1) When using combined status, use explicit messaging to read individual point status for diagnostic purposes.

h. From the Data Format pull-down menu, use the default 'Integer'.

5. Click OK to return to the Module Properties dialog box.
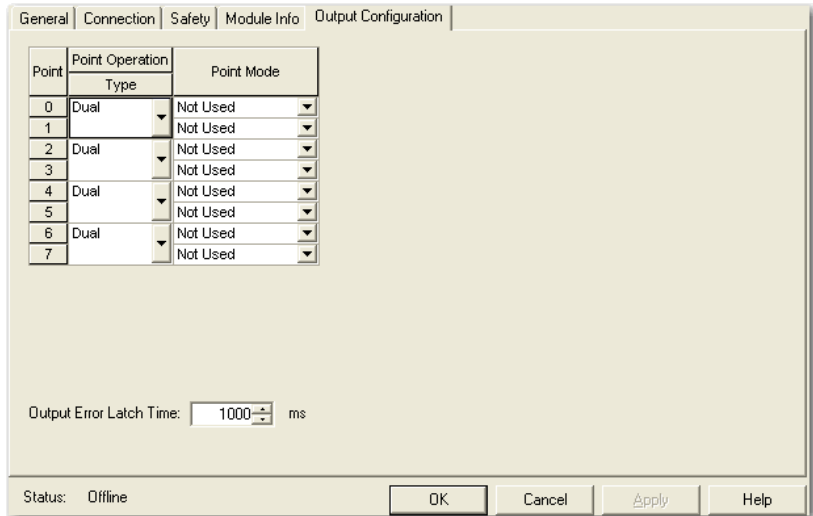
6. Click OK again to apply your changes.

The I/O Configuration tree displays the 1734-OB8S module.
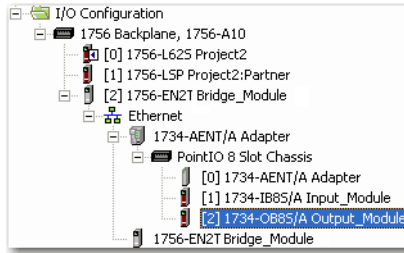
Configure the Safety Digital Outputs

Follow this procedure to configure the safety digital outputs.

1. From the Module Properties dialog box, click the Output Configuration tab.

2. Assign the Point Operation Type.

Choose	Description
Single	The output is treated as a single channel.
Dual (default)	The POINT Guard I/O module treats the outputs as a pair. It always sets them HI or LO as a matched pair. Safety logic must set both of these outputs ON or OFF at the same time or the module declares a channel fault.

3. Assign the Point Mode.

Choose	Description
Not Used	The output is disabled.
Safety	The output point is enabled and does not perform a pulse test on the output.
Safety Pulse Test	The output point is enabled and performs a pulse test on the output. When the output is energized, the output pulses low briefly. The pulse test detects whether the output is functioning properly.

4. In the Output Error Latch Time field, enter the time the module holds an error to make sure the controller can detect it (0...65,530 ms, in increments of 10 ms - default 1000 ms).

   This provides more reliable diagnostics. The purpose for latching output errors is to make sure that intermittent faults that may exist only for a few milliseconds are latched long enough to be read by the controller. The amount of time to latch the errors is based on the RPI, the safety task watchdog, and other application-specific variables.

5. Click Apply.

Add and Configure Safety Analog Input Modules

To include a POINT Guard safety analog input module in the RSLogix 5000 project, you add the module to the PointIO Chassis, configure the module's general properties, and configure the analog inputs as described in the following sections.

Add the Safety Analog Input Module

Follow these steps to add the POINT Guard I/O safety analog input module.

1. Right-click the POINT I/O Chassis and choose New Module.
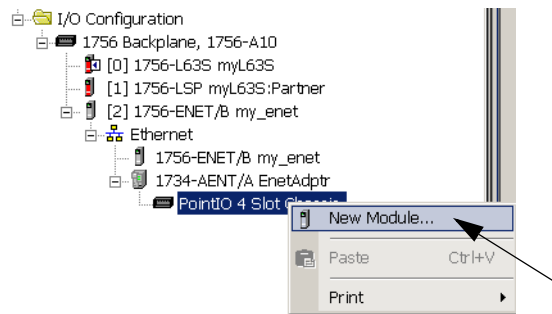
2. From the Select Module dialog box, select an analog input module and click Create.

3. Specify the module's general properties.

a. In the Name field of the New Module dialog box, type a unique name for the analog input module.
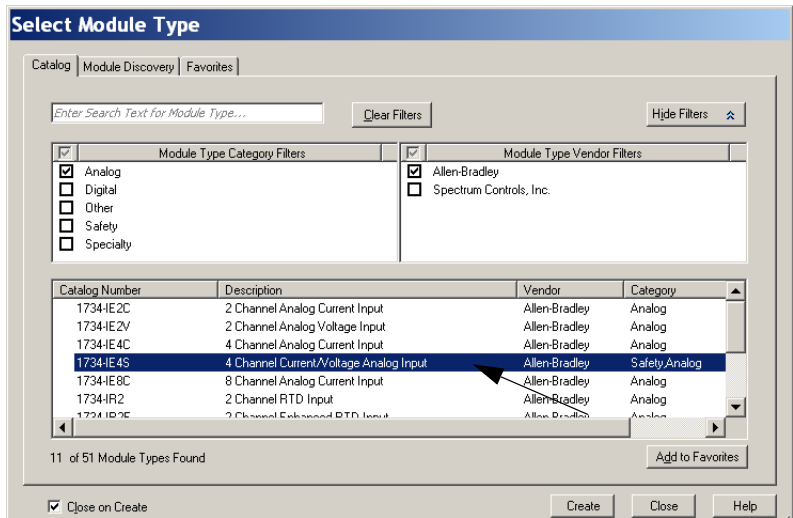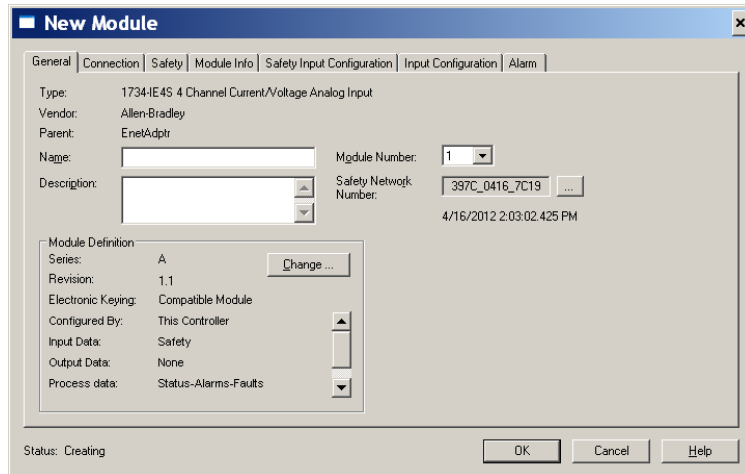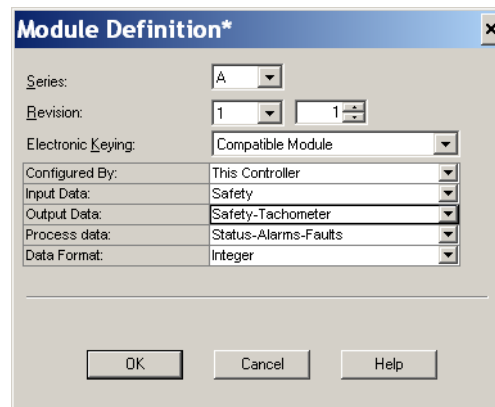
b. From the Module Number pull-down menu, choose a unique module number that corresponds to the module's position in the chassis.

c. In the Description field, type a description, if desired.

d. In the Safety Network Number field, use the default setting.

For a detailed explanation of the safety network number (SNN), see the GuardLogix Controller Systems Safety Reference Manual, publication 1756-RM093, noting that in most cases, you use the default provided by the RSLogix 5000 software.

The safety network number (SNN) is a unique number that identifies a safety subnet. We suggest that all safety modules on a network have the same SNN, to make documentation easier. During configuration, RSLogix 5000 software defaults a safety device's SNN to match the SNN of the lowest safety node on the network.

4. Click Change to open the Module Definition dialog box.

a. In the Series field, choose the analog input module's series letter.

b. In the Revision fields, choose the module's revision numbers.

c. From the Electronic Keying pull-down menu, choose the appropriate keying method for the input module.

Choose	Description
Exact Match	All of the parameters must match or the inserted module rejects a connection to the controller.
Compatible Module	Allows an I/O module to determine whether it can emulate the module defined in the configuration sent from the controller.

d. From the Configured By pull-down menu, choose the appropriate method by which this module is configured.

Choose	Description
This Controller	This selection directs the controller to configure the Inputs.
External Means	This selection directs the controller to establish a safety input connection only, and the controller will not configure the module.

e. From the Input Data pull-down menu, choose Safety.

f. From the Output Data pull-down menu, choose from the following.

Choose	Description
None	An output tag is not generated.
Safety-Tachometer	This option is available when the Configured By selection is This Controller. The output tag contains data members for safety output data needed for Tachometer mode. If you are using Tachometer mode, you must choose this setting; otherwise, you will not be able to configure other Tachometer parameters.

g. From the Process Data pull-down menu, choose from the following.

Choose	Description
Status	The input tag contains safety analog input data from the module.
Status - Alarms	These tags are created for the target module: • Safety data for individual process alarms • Safety data for safety analog inputs from the module
Status - Alarms - Faults	These tags are created for the target module: • Safety data for individual process alarms • Safety data for faults • Safety data for safety analog inputs from the module

h. From the Data Format pull-down menu, use the default 'Integer'.

5. Click OK to return to the Module Properties dialog box.

6. Click OK again to apply your changes.

The I/O Configuration tree displays the 1734-IE4S module.
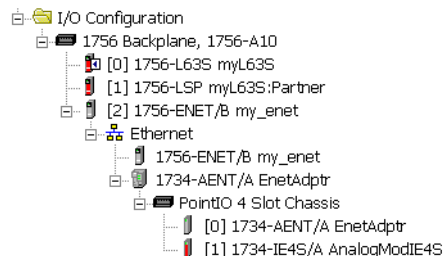
Configure the Safety Analog Input Channel Operation

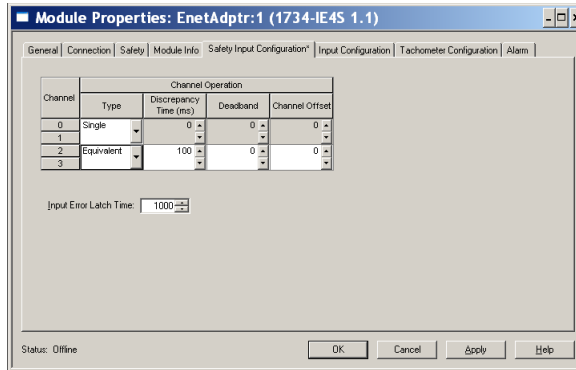Follow this procedure to configure the safety analog input channels.

1. From the Module Properties dialog box, click the Safety Input Configuration tab.

2. Assign the Operation Type.

Choose	Description
Single	Inputs are treated as single channels. Dual-channel safety inputs can be configured as two individual, single channels. **IMPORTANT:** Use single-channel mode when you intend to use the GuardLogix safety application instructions.
Equivalent	Inputs are treated as a dual-channel equivalent pair. The channels must match within the discrepancy time or an error is generated.

IMPORTANT	If you are using a Dual-channel Analog (DCA) safety instruction in your RSLogix 5000 application program, you must configure the 1734-IE4S module for single-channel operation. Analog input pairs are then evaluated as pairs and compared to each other in the application logic.

3. If you chose Equivalent, you must also assign a Discrepancy Time, from 0…65,530 ms in 10 ms increments.

This is the amount of time the two channels can be different from each other (larger than the Deadband value) before a discrepancy error is declared. A discrepancy time setting of 0 ms means that the channels in a dual configuration can be discrepant for an infinite amount of time without a fault being declared, effectively eliminating the usefulness of dual channel mode.

4. Configure a Deadband for the paired safety analog inputs.

The deadband can be any value from 0…32767 (engineering units) in increments of 1. When the paired input values exceed the deadband tolerance for longer than the Discrepancy Time, a discrepancy fault occurs.

TIP	Configure a deadband value for applications that use two sensors to measure the same variable; otherwise, spurious trips may occur.

5. If desired, configure a Channel Offset for the paired safety analog inputs.

   The channel offset can be any value from -32768...32767 (engineering units) in increments of 1. Configure an offset when differences in the sensors nominal input signals would otherwise exceed the desired deadband. The channel offset is applied from the second to the first member of the channel pair, that is, from channel 1 to channel 0 or from channel 3 to channel 2.

6. In the Input Error Latch Time field, enter the time the module holds an error to make sure the controller can detect it (0...65,530 ms, in increments of 10 ms - default 1000 ms).

   This setting provides more reliable diagnostics. The purpose for latching input errors is to make sure that intermittent faults that may exist only for a few milliseconds are latched long enough to be read by the controller. The amount of time to latch the errors should be based on the RPI, the safety task watchdog, and other application-specific variables.

7. Click Apply.

Configure the Safety Analog Inputs

Follow these steps to configure the analog input points.

1. From the Module Properties dialog box, click the Input Configuration tab.
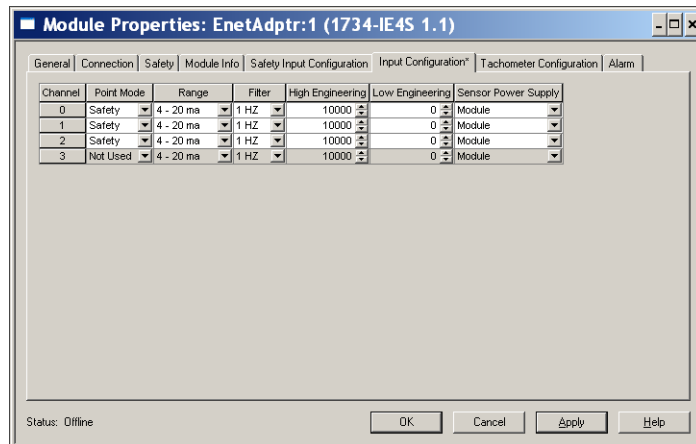
2. Assign the Point Mode.

Choose	Description
Not Used	The input is disabled.
Safety	Safety-related analog input value
Standard	Standard analog input value, not being used for a safety function

   When you click Apply, channel 1 is set to the same value as channel 0 and channel 3 is set to the same value as channel 2 if the channel operation is configured as dual-channel equivalent.

3. Configure the module for current, voltage, or tachometer inputs.

4. Configure an input filter.

   A single-pole, anti-aliasing filter of 10Hz is followed by a four-pole digital filter. Choose from the following available corner frequencies.

   - 1 Hz (recommended for Tachometer mode)

   - 5 Hz

   - 10 Hz

   - 50 Hz

   For more information on the filter frequencies and step response, see the technical specifications for the 1734-IE4S module, beginning on page 158 or <u>Digital Input Filter on page 28</u>.

5. Assign High and Low Engineering scaling values for the inputs, if desired.

   The valid range for both the High and Low Engineering settings is -30000…30000, in increments of 1. Scaling lets the module report in engineering units such as degrees, PSI, CFM, percent, and so on, rather than in raw counts.

   When you click Apply, channel 1 is set to the same value as channel 0 and channel 3 is set to the same value as channel 2 if the channel operation is configured as dual channel equivalent.

6. Set the Sensor Power Supply value to External or Module to indicate how each sensor will be powered.

   > **TIP**   Set this value to Module to supply power to the sensors connected to the POINT Guard Analog Input module. This allows the module to detect a loss of sensor power.

Configure Safety Analog Input Alarms (optional)

> **TIP**   If you are using a Dual-channel Analog (DCA) safety instruction in your RSLogix 5000 application program, we recommend that you do not configure these values on the module. Instead, to facilitate troubleshooting, use the application program to check for high and low alarm values via the Dual Channel Analog Input instruction or other data comparison instructions.

Follow these steps to configure alarms for each of the safety analog input channels.

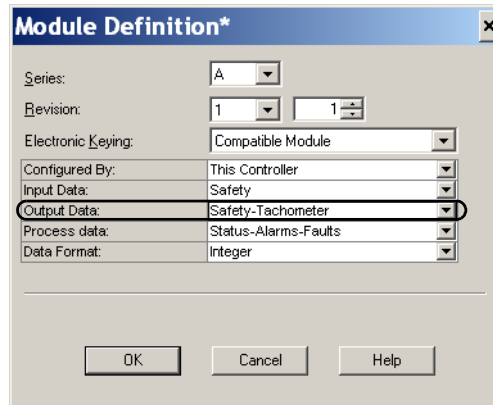1. From the Module Properties dialog box, click the Alarm tab.
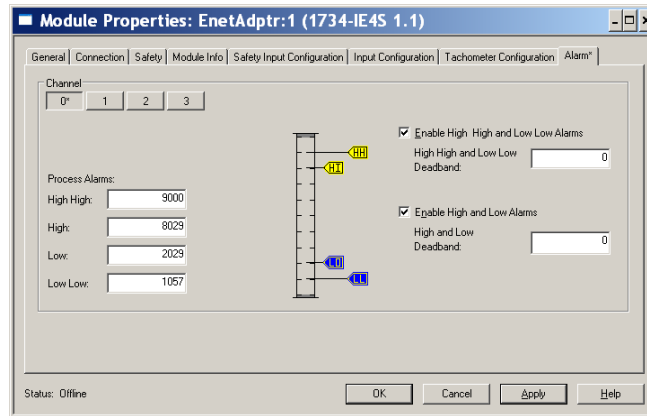
2. To configure each channel, click 0, 1, 2, or 3, as appropriate.

3. To enable the alarm, check the boxes:
   - Enable High High - Low Low Alarms
   - Enable High - Low Alarms

4. Type the alarm values from -32768…32767 in the appropriate fields, following these guidelines:
   - The High High alarm value must be greater than or equal to the High alarm value.
   - The High alarm value must be greater that the Low alarm value.
   - The Low Low alarm value must be less than or equal to the Low alarm value.
   - These values are based on the Engineering units configured on .

5. Configure a deadband value for the High High - Low Low alarms and High - Low alarms, if desired.

   The valid range is 0…32767. The deadband lets the alarm status bit remain set, despite the alarm condition disappearing, as long as the input data remains within the deadband of the alarm. These values are based on the Engineering units configured on .

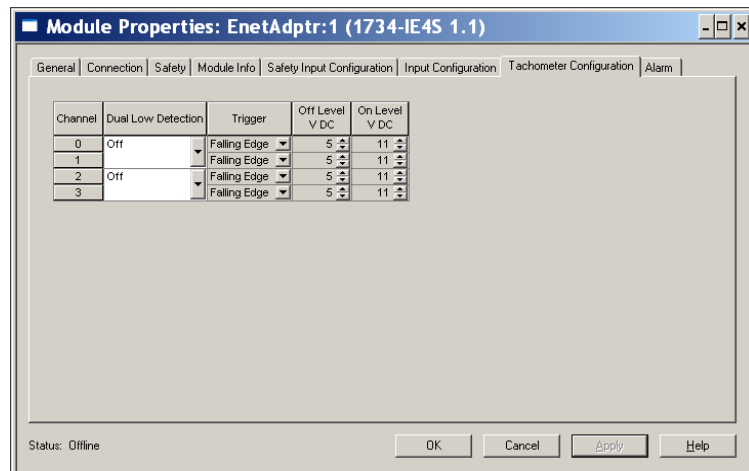   For more information on this feature, see

Configure Tachometer Operation

You can only configure the module for tachometer operation if your Module Definition includes Output Data for Safety-Tach.

Follow these steps to define how the module operates in Tachometer mode.

1. From the Module Properties dialog box, click the Tachometer Configuration tab.

2. Turn Dual Low Detection ON or OFF for each channel pair.

To increase the diagnostic coverage of your speed sensing loop, you need to determine whether the two tachometer sensors you are using to sense speed are shorted together. That is, you need to be able to detect a channel-to-channel fault. One method is to implement two tachometer sensors so that, during normal operation, their pulse trains are never low at the same time. When Dual Low Detection is ON, the module detects this condition as a fault, indicating that the two sensors are shorted together.

To use this feature, you must use Channels 0 and 1 together, and Channels 2 and 3 together. Channels 0 and 1 have the same setting and channels 2 and 3 have the same setting.

3. Configure the Trigger to indicate if the module channels should count pulses on the rising edge or falling edge.

When the module is configured as Dual, channels 0 and 1 have the same setting and channels 2 and 3 have the same setting.

4. Specify a tachometer Off Level in volts for each channel.

This is the voltage at which the module considers the tachometer sensor to be OFF for tachometer speed calculation purposes.

The valid range is 0...23V in increments of 1V. The default setting of 5V should be satisfactory for a 0...24V DC signal. For a 0...5V DC signal a setting of 1V is recommended.

See Off and On Signal Levels on page 33 for more information on the Off and On Levels.

When the module is configured as Dual Channel Equivalent, channels 0 and 1 have the same setting and channels 2 and 3 have the same setting.

5. Specify a tachometer On Level in volts for each channel.

This is the voltage at which the module considers the tachometer sensor to be ON for tachometer speed calculation purposes

The valid range is 1...24V in increments of 1V. The default setting of 11V should be satisfactory for a 0...24V DC signal. For a 0...5V DC signal, a setting of 4V is recommended.

See Off and On Signal Levels on page 33 for more information on the Off and On Levels.

When the module is configured as dual-channel Equivalent, channels 0 and 1 have the same setting and channels 2 and 3 have the same setting. The tachometer On Level must be greater than the tachometer Off Level.

Values and States of Tags

This table shows the values and states of the tags.

Data		Description
Digital Input Data	Run Mode STANDARD	Indicates whether consumed data is actively being updated by a device that is in one of these states: • Run mode: 1 Idle State: 0
	Connection Faulted STANDARD	Indicates the validity of the safety connection between the safety producer and the safety consumer. • Valid: 0 Faulted: 1
	Safety Input Data SAFETY	Indicates the ON/OFF state of each input circuit. • ON: 1 OFF: 0
	Combined Safety Input Status SAFETY	An AND of the status of all input circuits. • All circuits are normal: 1 • An error was detected in one or more input circuits: 0
	Individual Safety Input Status SAFETY	Indicates the status of each input circuit. • Normal: 1 Fault (Alarm): 0
	Combined Safety Output Status SAFETY	An AND of the status of all safety output circuits. • All circuits are normal: 1 • An error has been detected in one or more output circuits: 0
	Individual Safety Output Status SAFETY	Indicates the status of each safety output circuit. • Normal: 1 Fault (Alarm): 0
	Muting Lamp Status SAFETY	Indicates the status when circuit T1 and T3 is configured as the muting lamp output. • Normal: 1 Fault (Alarm): 0
	Output Readback STANDARD	Monitors the presence of 24V on the output circuit. Readback is ON (1) if 24V is on output terminal. • ON: 1 OFF: 0
	Individual Test Output Status STANDARD	Indicates the status of each of the test output circuits. • Normal: 1 Fault (Alarm): 0
	Input Power Error Bit	Indicates field power supplied is within specification. • Power error: 1 Power OK: 0
	Output Power Error Bit	Indicates field power supplied is within specification. • Power error: 1 Power OK: 0
Digital Output Data	Safety Output Data SAFETY	Controls the safety output. • ON: 1 OFF: 0
	Standard Output Data STANDARD	Controls the test output when Test Output mode is set to a standard output. • ON: 1 OFF: 0

Data		Description
Analog Input Data	Run Mode STANDARD	Indicates whether consumed data is actively being updated by a device that is in one of these states: • Run mode: 1 Idle State: 0
	Connection Faulted STANDARD	Indicates the validity of the safety connection between the safety producer and the safety consumer. • Valid: 0 Faulted: 1
	Safety Input Data SAFETY	Value of analog input data
	Individual Safety Input Status SAFETY	Indicates the status of each safety input circuit. Normal: 1 Fault (Alarm): 0
	Individual Status - Process Alarms STANDARD	Indicates whether each channel's Safety Input Data value is between the configured High and Low Alarm values. Normal: 1 Alarm: 0
	Individual Status - Fault Reason STANDARD	Input Point Fault Reason
	Individual HH Alarm Status STANDARD	Individual High High Alarm Status Normal: 1 Alarm: 0
	Individual H Alarm Status STANDARD	Individual High Alarm Status Normal: 1 Alarm: 0
	Individual L Alarm Status STANDARD	Individual Low Alarm Status Normal: 1 Alarm: 0
	Individual LL Alarm Status STANDARD	Individual Low Low Alarm Status Normal: 1 Alarm: 0
	Individual Tachometer Overfrequency SAFETY	When the input is configured for Tachometer mode, this data indicates an overfrequency condition; that is, when pulses are faster than 1000 Hz. Normal: 1 Fault: 0
	Individual Tachometer Under-frequency SAFETY	When the input is configured for Tachometer mode, this data indicates a under-frequency condition; that is, when pulses are slower than 1 Hz. Normal: 1 Fault: 0
	Individual Tachometer Dual Low SAFETY	Indicates that both channels are low when the input is configured for Tachometer mode. Normal: 1 Fault: 0
	Input Power STANDARD	Indicates that input power over- or under-range. Normal: 1 Fault: 0
Analog Output Data	Reset Tachometer SAFETY	Resets a latched overfrequency condition and enables the module to begin calculating frequency again. • No reset: 0 Reset: 1

> **IMPORTANT**   In the previous table, 'SAFETY' denotes information the controller can use in safety-related functions. 'STANDARD' denotes additional information that must not be directly used for safety functions.
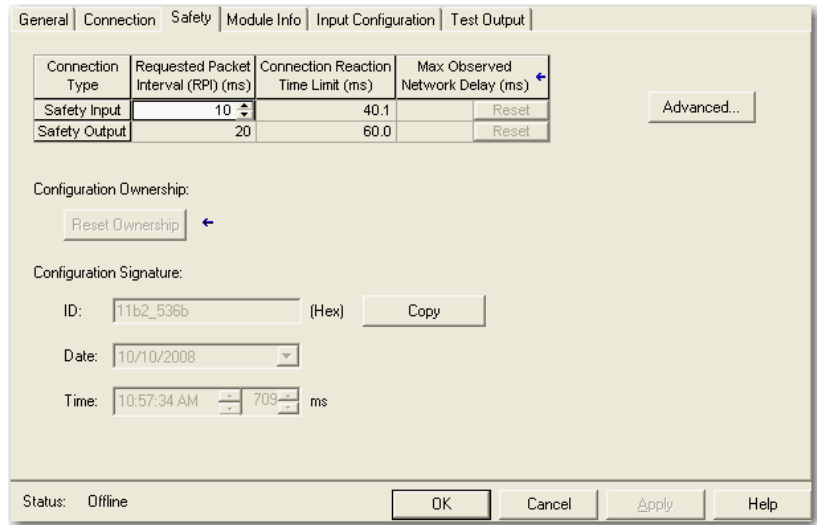
> **ATTENTION:** Do not rely on data readback to detect faults. You must monitor status bits to detect faults.
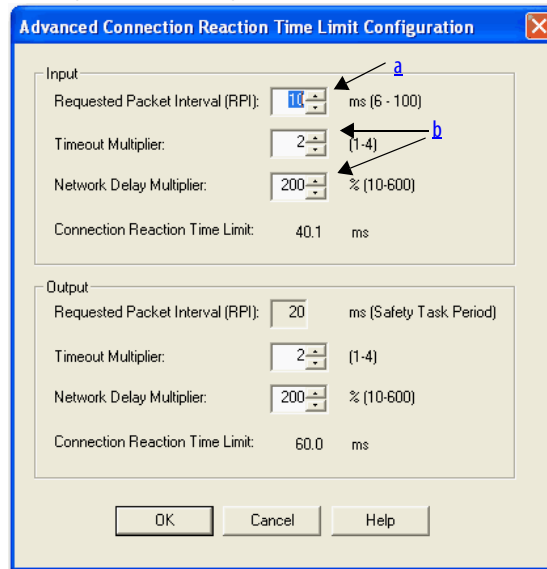
Configure Safety Connections

Follow these steps to configure the module's safety input connection.

1. From the Module Properties dialog box, click the Safety tab.

2. Click Advanced to open the Advanced Connection Reaction Time Limit Configuration dialog box.

a. In the Requested Packet Interval (RPI) field, enter the input connection RPI to support your application (between 6 and 500 ms).

The smallest input RPI allowed is 6 ms. Selecting small RPIs consumes network bandwidth and may cause nuisance trips because other devices cannot get access to the network.

As an example, a safety input module with only E-stop switches connected may generally work well with settings of 50…100 ms. An input module with a light curtain guarding a hazard may need the fastest response possible. Selecting appropriate RPIs results in a system with maximum (best) performance.

b. Use the default values for Timeout Multiplier (2) and Network Delay Multiplier (200).

> **IMPORTANT**   Analyze each safety channel to determine what is appropriate. The default Timeout Multiplier of 2 and Network Delay Multiplier of 200 creates a worst-case input connection-reaction time limit of 4 times the RPI, and an output connection-reaction time limit of 3 times the RPI. Changes to these parameters should be approved only after a thorough review by a safety administrator.

A connection status tag exists for every connection.

⊟ AENT_Adapter:1:I	{...}	{...}		AB:1734_IB8S_Safety5:I:0	Safety
AENT_Adapter:1:I.RunMode	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.ConnectionFaulted	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt00Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt01Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt02Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt03Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt04Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt05Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt06Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:I.Pt07Data	0		Decimal	BOOL	Safety

If the RPI and connection reaction time limit for the network are set appropriately, then this status tag should always remain low. Monitor all connection status bits to verify that they are not going high intermittently due to timeouts.

For more information about the Advanced Connection Reaction Time Limit Configuration dialog box, refer to the GuardLogix Controllers User Manual, publication 1756-UM020, or Compact GuardLogix Controllers User Manual, publication 1768-UM002.

Configuration Ownership

The connection between the owner and the POINT Guard I/O module is based on the following:

- POINT Guard I/O module number
- POINT Guard I/O safety network number
- GuardLogix slot number
- GuardLogix safety network number
- Path from the GuardLogix controller to the POINT Guard I/O module
- Configuration signature

If any differences are detected, the connection between the GuardLogix controller and the POINT Guard I/O module is lost, and the yellow yield icon appears in the RSLogix 5000 tree. For more information, see Chapter 8.

Saving and Downloading the Module Configuration

After you configure a module, you should save and download the configuration.

If, after downloading the program, the MS and NS status indicators on the POINT Guard I/O module are not both solid green, a loss of ownership may have occurred. A yellow yield icon in the RSLogix 5000 tree also indicates a loss of ownership. For more information, see Chapter 8.

Using ControlFlash to Update POINT Guard I/O Modules

IMPORTANT   Using ControlFlash to update a module stops a running safety I/O connection. You must inhibit I/O connections before updating a POINT Guard I/O module.

In addition, the 1734-IE4S safety analog input module requires field power to be applied while updating the module's firmware. If a ControlFLASH update fails, check the ControlFLASH log by clicking View Log on the Update Status dialog box.

If the last message is '[FAILURE] Update: Error #11001: Unknown General Status error code received. GS = 0xD0, ES = 0x0001,' verify that field power is connected to the module and restart the download.

TIP   The module receives it's field power from the 24V DC connection to the power supply feeding it, for example a 1734-AENT, 1734-FPD, or 1734-EP24DC module. Make sure that 24V DC power is connected to these modules before performing a flash update of the 1734-IE4S.

Notes:

Configure the Module for a SmartGuard Controller

This chapter provides information about how to configure a SmartGuard controller and POINT Guard I/O modules by using USB (Universal Serial Bus) connectivity. Refer to the corresponding RSNetWorx for DeviceNet software help files for network-configurator operating procedures.

> **TIP** For information about RSNetWorx for DeviceNet software, from the Help menu, choose RSNetWorx Help.
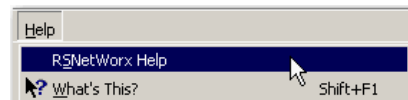
Before You Begin

Be sure you have these required items:

- RSNetWorx for DeviceNet software

Cat. No.	Required Version
1734-IB8S, 1734-OB8S	9 or later
1734-IE4S	10 or later

- RSLinx® software, version 2.51 or later
- SmartGuard USB driver
  The SmartGuard USB driver should already be in your RSLinx software. If it is not, load the driver onto your computer, noting the folder location as you need to browse to it later.
- Personal computer with a Microsoft Windows 2000, Microsoft Windows 2000 Terminal Server, or Microsoft Windows XP operating system
- 1734-PDN adapter
- SmartGuard controller and POINT Guard I/O module EDS files

Load the proper electronic data sheet (EDS) files by using the EDS Hardware Installation Tool at http://www.rockwellautomation.com/resources/eds/.

Include your 1752 SmartGuard controller and POINT Guard I/O modules.

Cat. No.	EDS File
1734-IB8S	0010023000F0100
1734-OB8S	001002300100100
1734-IE4S	0001002A00010100

Set the Node Address

Use RSNetWorx for DeviceNet software to set the node address of POINT Guard I/O modules. The module has an out-of-box preset node address of 63. We suggest that you connect and set the modules one at a time. Otherwise, the address conflicts (all of them at 63) will prevent communication with some of the modules.

IMPORTANT	The unique identifier for a safety node is a combination of the safety network number (SNN) and node address. When the SNN is set, the current node address is used to generate and store this identifier in flash memory. Once the identifier is set, for safety reasons, the node address cannot be changed unless specific action is taken to reset the POINT Guard I/O module's SNN. **For this reason, you are required to set the node address prior to applying a SNN.**

Follow these steps to set the node address with the node commissioning tool.

1. Choose Start>Programs>Rockwell Software>RSNetWorx>DeviceNet Node Commissioning Tool.
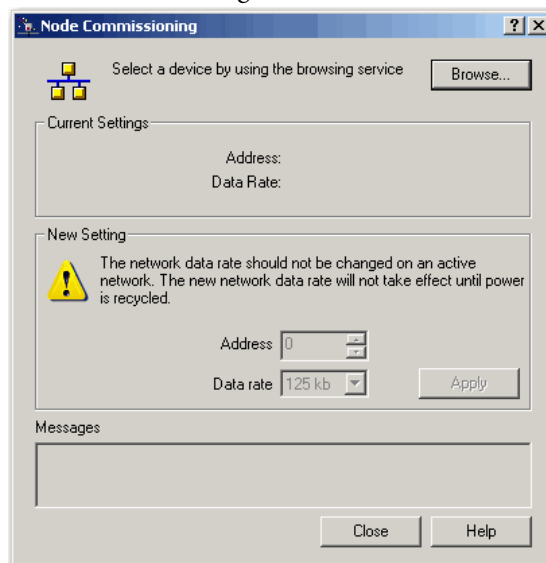
2. Click Browse.

3. Check 'I want to input the address for the device on the selected network'.

4. Browse to the DeviceNet network, being sure to **not** click OK when the browse is complete.

   If you are unable to browse the DeviceNet network and see the POINT Guard modules, the modules may have been previously configured to an incompatible data rate or node address. Attempt to add these modules on an isolated network to determine the node address and data rate.

5. Enter the current address for the device.

   An out-of-box device uses address 63.

6. Click OK
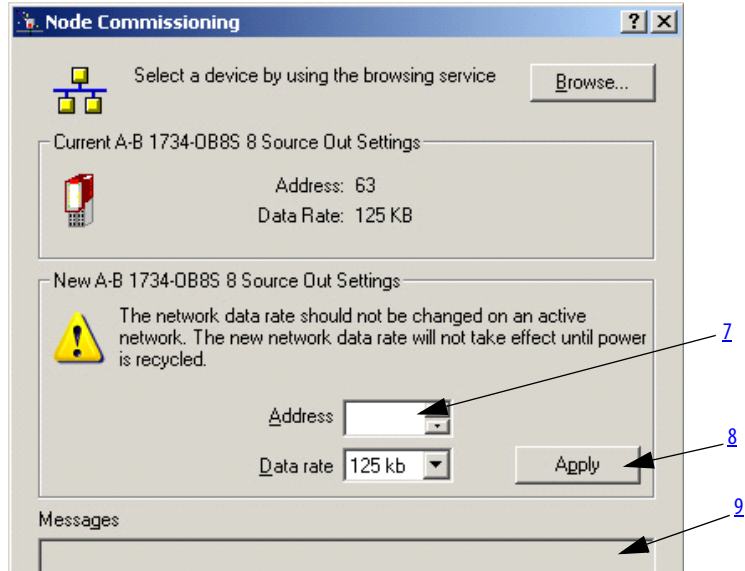
7. Enter the new address for the device.

8. Click Apply.

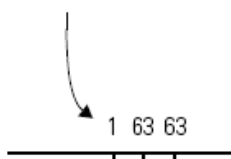**9.** Look for confirmation in the messages section.

Auto-addressing with a 1734-PDN Adapter

With sequential auto-addressing, the leftmost node address is configured and a parameter is set in that module to automatically assign addresses to the nodes residing to the right of the module. The leftmost node can be a POINT Guard I/O module or a standard POINT I/O module.
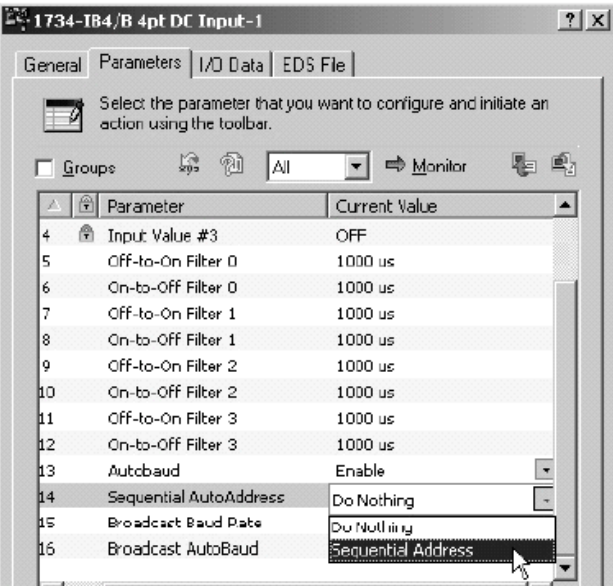
Follow these steps to use the auto-address feature.

1. Reset any modules that you are not sure are out-of-box.

2. Attach the first module to the 1734-PDN adapter.

3. Use the node commissioning tool to set the node address of this module.

4. Attach the additional nodes to the right of the module used in steps 2 and 3.

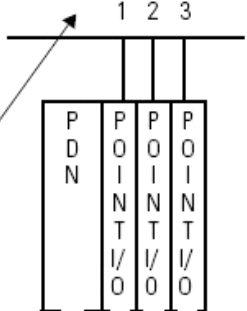5. Perform the auto-address feature on the module used in steps 2 and 3.

A. Set the address of the leftmost I/O module.

B. When you configure the leftmost module, set Sequential AutoAddress to 'Sequential Address'.

The module sequences the rest of the modules to its right in the group.

Set Up Your DeviceNet Network

Before you begin to design a project with RSNetWorx for DeviceNet software, follow these procedures.

1. From RSLinx software, open RSWho and select the SmartGuard driver.

   RSWho browses the DeviceNet network connected to the SmartGuard controller.

   In this example, three POINT Guard I/O modules are connected to the SmartGuard controller.
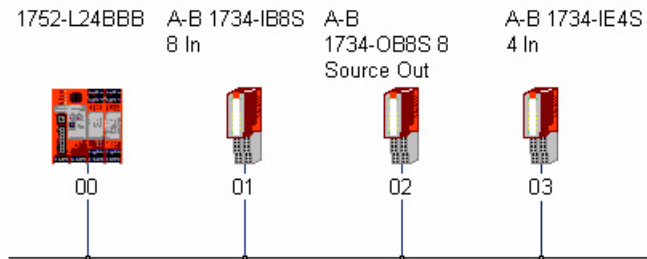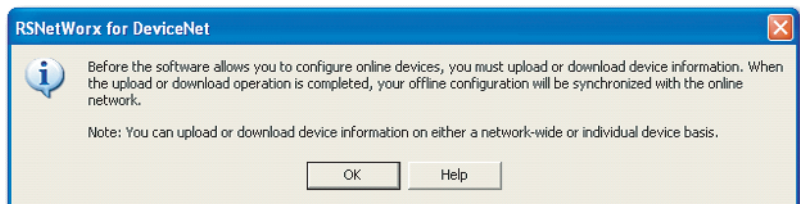

   If RSLinx software finds the nodes on the DeviceNet network, RSNetWorx for DeviceNet software also finds the nodes.

2. Open RSNetWorx for DeviceNet software.
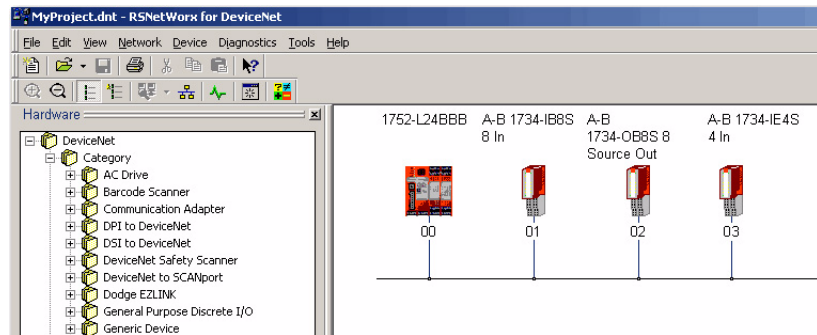
3. From the Networks menu, choose Online.
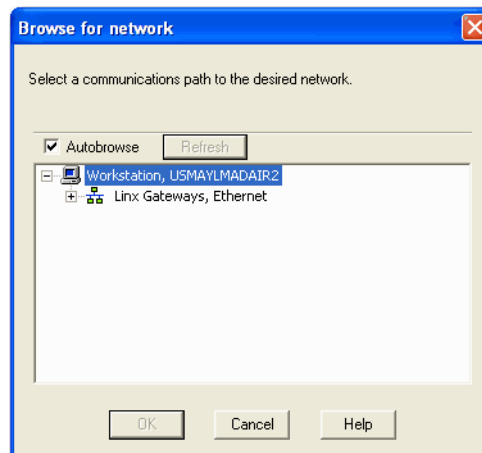
4. Select the SmartGuard driver and click OK.

5. Click OK.

RSNetWorx for DeviceNet software finds the SmartGuard and POINT Guard I/O modules on the DeviceNet network.
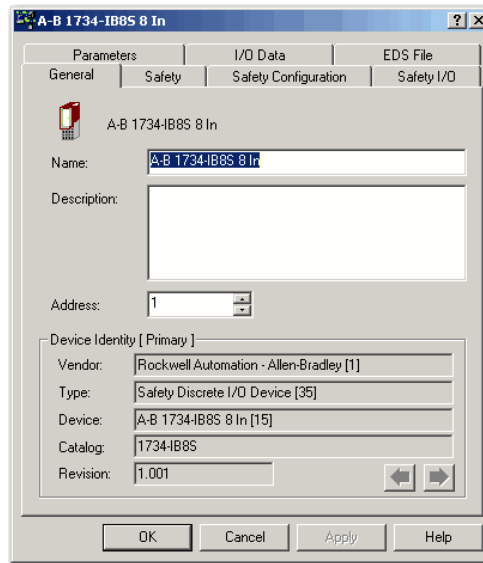

6. Click the online icon again to go offline.

Configure the POINT Guard I/O Modules
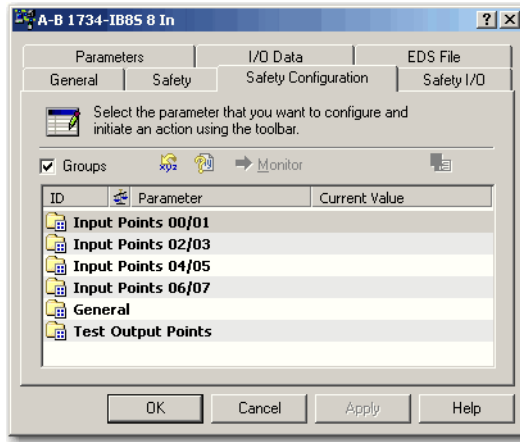
From the Safety Configuration tab, you can configure the module's safety inputs and outputs.
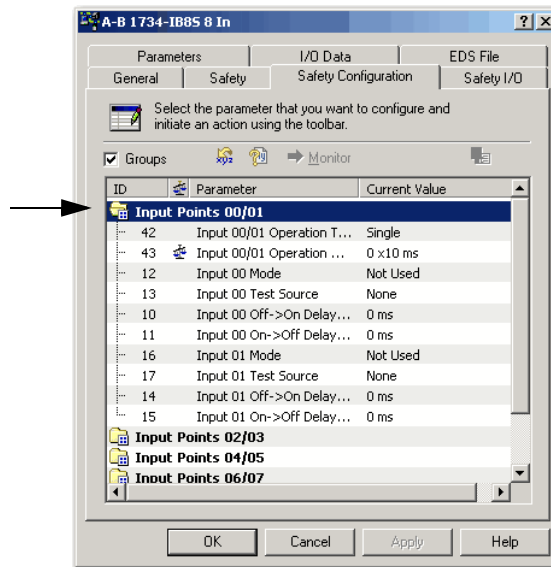
Configure Digital Safety Inputs and Test Outputs

1. Double-click the POINT Guard I/O digital input module to open the Properties dialog box.

2. Click the Safety Configuration tab.

3. Double-click each set of input points to edit their configuration.

Parameter Name	Value	Description	Default
Input Point Operation Type	Single Channel	Use as single channel.	Single
	Dual-channel Equivalent	Use as dual-channel. Normal when both channels are ON or OFF.	
	Dual-channel Complementary	Use as dual-channel. Normal when one channel is ON and the other channel is OFF.	
Input Point Mode	Not Used	External input device is not connected.	Not Used
	Safety Pulse Test	Use with a contact output device and in combination with a test output. Using this setting, short-circuits between input signal lines and the power supply (positive side) and short-circuits between input signal lines can be detected.	
	Safety	A solid-state output safety sensor is connected.	
	Standard	A standard device, such as a reset switch, is connected.	

Parameter Name	Value	Description	Default
Safety Input Test Source	None	The test output that is used with the input.	None
	Test Output 0		
	Test Output 1		
	Test Output 2		
	Test Output 3		
Input Delay Time Off -> On	0…126 ms (in 6 ms increments)	Filter time for OFF to ON transition.	0 ms
Input Delay Time On -> Off	0…126 ms (in 6 ms increments)	Filter time for ON to OFF transition.	0 ms

4. If you are pulse-testing the module, edit the parameters so that the channels are pulse tested by Test sources 0 and 1, respectively.
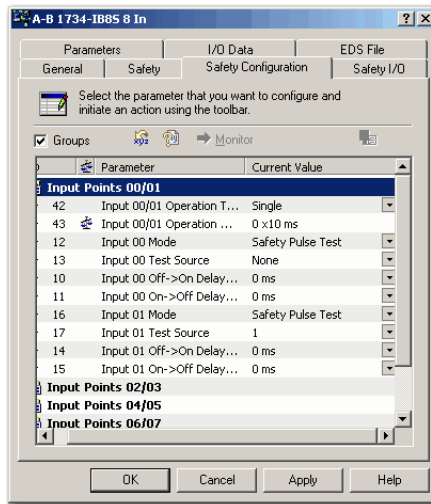
5. Double-click General to edit the Input Error Latch Time, if desired.

The default value is 1000 ms.
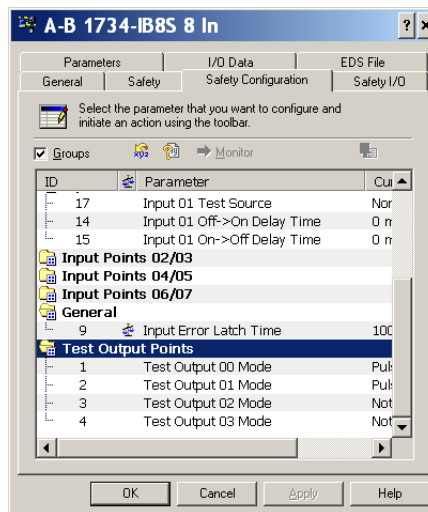
6. Double-click Test Output Points to edit their configuration.

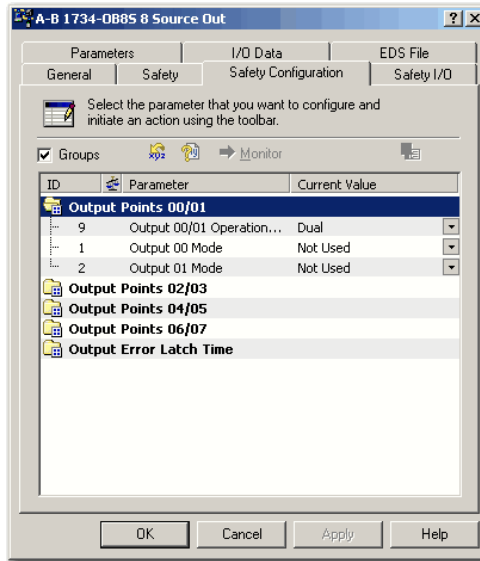| Parameter Name	Value	Description	Default
Test Output Mode	Not Used	An external device is not connected.	Not Used
	Standard	The output is connected to a standard device.	
	Pulse Test	A contact output device is connected. Use in combination with a safety input.	
	Power Supply	The power supply of a Safety Sensor is connected. The voltage supplied to I/O power (V, G) is output from the test output terminal.	
	Muting Lamp Output (Terminal T1 or T3 only)	An indicator is connected and turned ON to detect broken lines in an external indicator.	

7. Click Apply and OK.

Configure Digital Safety Outputs

1. Double-click each group of Outputs Points to display the parameters for editing.

Parameter Name	Value	Description	Default
Output Point Mode	Not Used	An external output devices is not connected.	Not Used
	Safety	When the output is ON, the test pulse is not output (remains ON).	
	Safety Pulse Test	Using this function, short-circuits between output signal lines and the power supply (positive side) and short-circuits between output signal lines can be detected.	
Output Point Operation Type	Single Channel	Use as single channel.	Dual-channel
	Dual-channel	Use as dual-channel. When both channels are normal, outputs can be turned ON.	
Safety Output Error Latch Time	0…65,530 ms (in 10 ms increments)	Safety output errors are latched for this time.	1000 ms

2. Double-click Output Error Latch Time to change from the default value (1000ms), if desired.
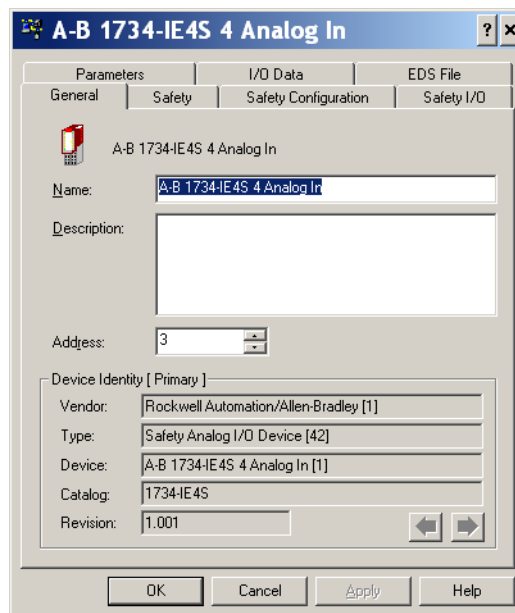
3. Click Apply and OK to return to the main RSNetWorx for DeviceNet dialog box.
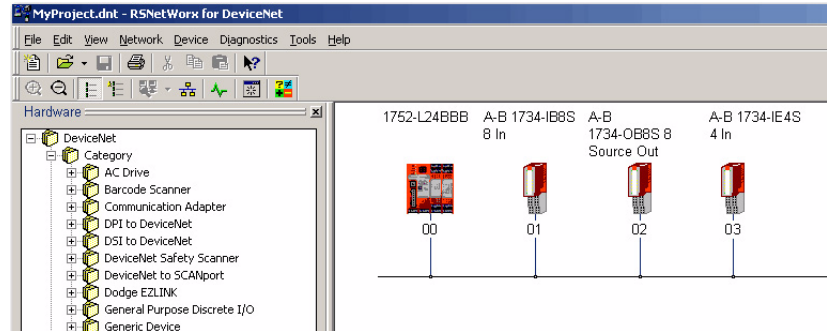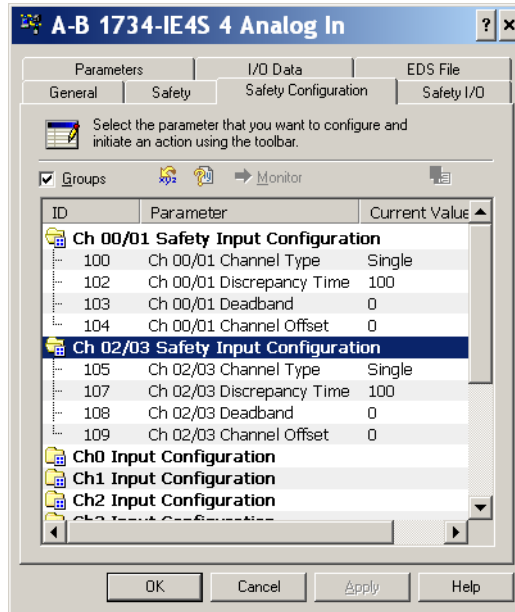

Configure Safety Analog Inputs

Follow these steps to configure a 1734-IE4S module.

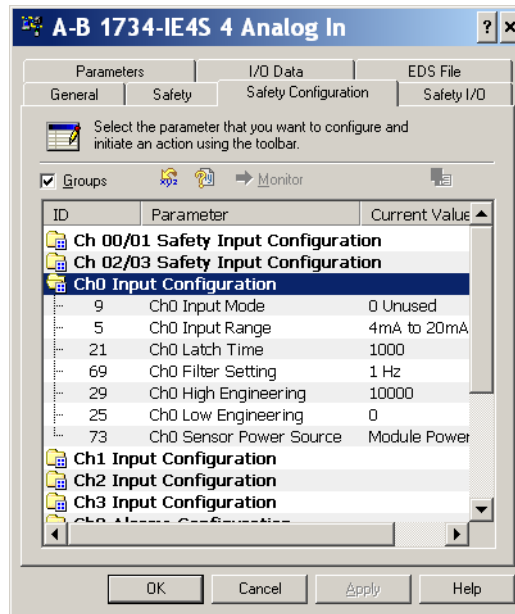1. Double-click the POINT Guard I/O analog module to open the Properties dialog box.

2. Click the Safety Configuration tab.

3. Double-click each group of Dual Channel Safety Inputs to display the parameters for editing.

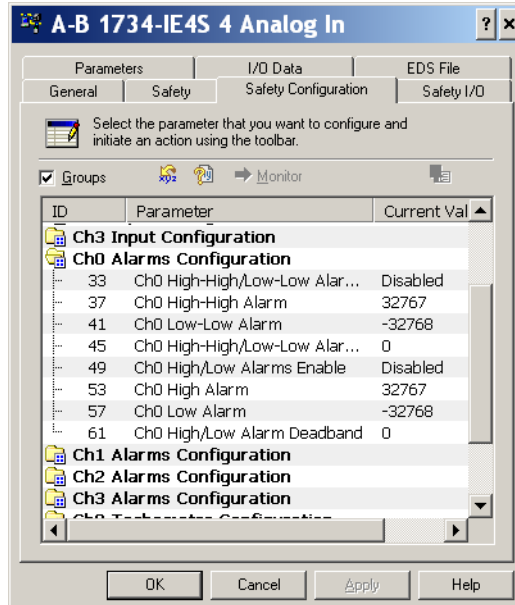| Parameter Name	Value	Description	Default
Channel Type	Single	Inputs are treated as single channels. Dual-channel safety inputs can be configured as two individual, single channels.	Single
	Equivalent	Inputs are treated as a dual-channel equivalent pair. The channels must match within the discrepancy time or an error is generated.	
Discrepancy Time	0…65,530 (in 10 ms increments)	When Dual Channel mode is selected, this is the amount of time the two channels can be different from each other (larger than the Deadband value) before a discrepancy error is declared. A discrepancy time setting of 0 ms means that the channels in a dual configuration can be discrepant for an infinite amount of time without a fault being declared, effectively eliminating the usefulness of dual channel mode.	100 ms
Discrepancy Deadband	0…32767 (in engineering units)	In Dual Channel mode, when the paired input values exceed the deadband tolerance for longer than the Discrepancy Time, a discrepancy fault occurs. **TIP** Configure a deadband value for applications that use two sensors to measure the same variable; otherwise, spurious trips may occur.	0
Channel Offset	-32768…32767 (in engineering units)	Offset value for dual channel mode only. Configure an offset when differences in the sensors nominal input signals would otherwise exceed the desired deadband.	0

4. Double-click each Channel Safety Configuration group to display the parameters for editing.

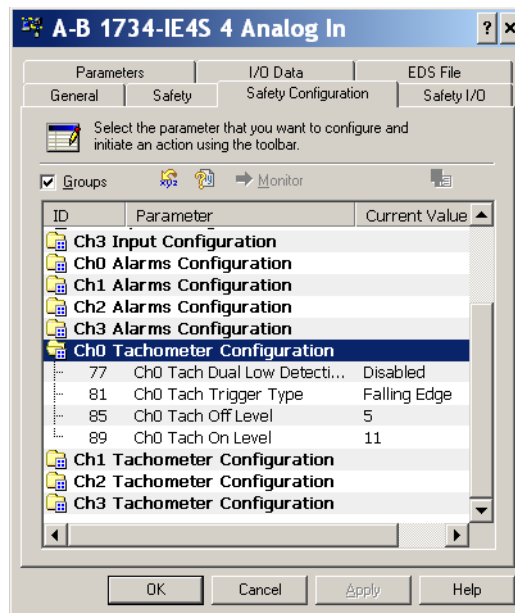| Parameter Name	Value	Description	Default
Input Mode	Not Used	External input device is not connected.	
	Safety	A solid-state safety sensor is connected.	Not Used
	Standard	A standard device is connected.	
Input Range	±10V		
	0…5V	Input voltage range.	
	0…10V		
	±5V		4…20 mA
	4…20 mA	Input current range.	
	0…20 mA		
	Tachometer	Tachometer mode.	
Latch Time	0…65,530 ms (in 10 ms increments)	Safety input errors are latched for this time so that they can be read by the controller and are not missed if they clear themselves too quickly. One value for all channels.	1000
Filter Setting	1 Hz	A single-pole, anti-aliasing filter of 10Hz is followed by a four-pole digital filter with these available frequencies.[1]	
	5 Hz		
	10 Hz		1 Hz
	50 Hz		
High Engineering	-30000…30000	scaling value for inputs	10000[2]
Low Engineering	-30000…30000	scaling value for inputs	0
Sensor Power Source	External	An external power supply is used to power the analog sensors. Terminals S0…S3 on the module are not being used.	Module
	Module	Terminals S0…S3 on the module are being used to power the analog sensors. **TIP** Set this value to Module to supply power to the sensors connected to the POINT Guard Analog Input module. This allows the module to detect a loss of sensor power.	

(1)   For more information on the filter frequencies and step response, see the technical specifications for the 1734-IE4S module, beginning on page 158.
(2)   1000 for Tachometer mode.

5. Double-click each Engineering Units Alarms group to display parameters for editing.

Parameter Name	Value	Description	Default
High High/Low Low Alarm Enable	Disable	Enable or disable alarms.	Disable
	Enable		
High High Alarm	-32768…32767	Follow these guidelines when setting the alarm values.	32767
Low Low Alarm	-32768…32767	• The High High alarm value must be greater than or equal to the High alarm value.	0
High Alarm	-32768…32767	• The High alarm value must be greater that the Low alarm value. • The Low Low alarm value must be less than or equal to the Low alarm value.	32767
Low Alarm	-32768…32767	• These values are based on the Engineering units	0
High High/Low Low Alarm Deadband	0…32767	Deadband on the High High and Low Low alarms.	0
High/Low Alarm Deadband	0…32767	Deadband on the High and Low alarms.	0

6. Double-click each Channel Tachometer Configuration group to display parameters for editing.

Parameter Name	Value	Description	Default
Tach Dual Low Detection	On	To increase the diagnostic coverage of your speed sensing loop, you need to determine whether the two tachometer sensors you are using to sense speed are shorted together. That is, you need to be able to detect a channel-to-channel fault. One method is to implement two tachometer sensors so that, during normal operation, their pulse trains are never low at the same time. When Dual Low Detection is enabled, the module detects this condition as a fault, indicating that the two sensors are shorted together.	Disabled
	Off	To use this feature, you must use Channels 0 and 1 together, and Channels 2 and 3 together. Channels 0 and 1 have the same setting and channels 2 and 3 have the same setting. Both channels in the pair must use tachometer mode and the dual low detection diagnostic.	
Tach Trigger Type	Falling edge (NPN)	Non-inverted input signal.	Falling edge
	Rising edge (PNP)	Inverted input signal.	
Tach Off Level	0…23V (in 1 V increments)	This is the voltage at which the module considers the tachometer sensor to be OFF for tachometer speed calculation purposes. The Tachometer Off Level must be less than the Tachometer On Level.	5V
Tach On Level	1…24V (in 1 V increments)	This is the voltage at which the module considers the tachometer sensor to be ON for tachometer speed calculation purposes. The Tachometer On Level must be greater than the Tachometer Off Level.	11V

Configure the SmartGuard Controller

Follow the procedures in the next sections to configure input and output connections to the controller and complete the controller's setup.

Set Up the Input and Output Connections

1. In RSNetWorx for DeviceNet software, right-click the SmartGuard controller and choose Properties.
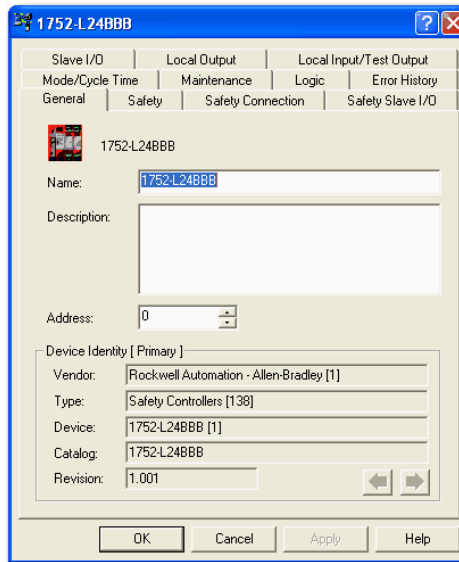
2. Click the Safety Connection tab to see a list of all Safety I/O modules currently in your project.
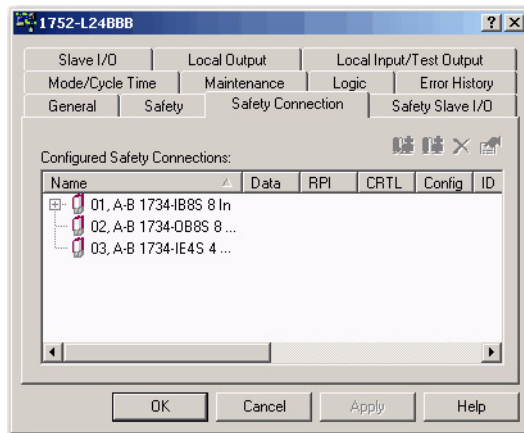
3. Right-click the POINT Guard I/O module and choose Add Connection.
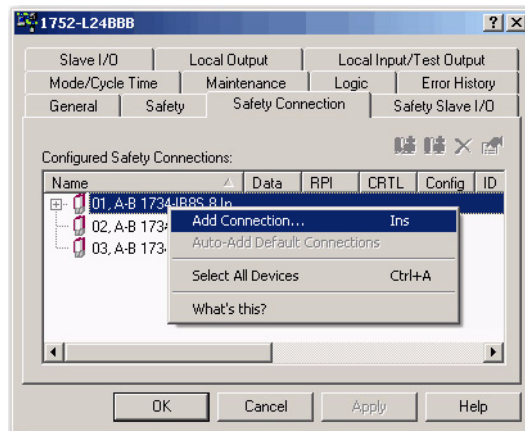
The Add Safety Connection dialog box appears.

You can add individual safety connections for the inputs and outputs. The SmartGuard 600 controller can have up to 32 connections.

4. To add a safety connection, from the Connection Name pull-down menu, choose one of these options.
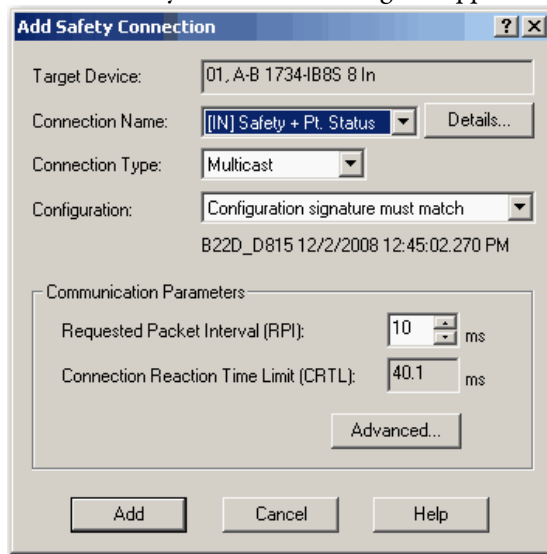
	Choose	Description
1734-IB8S	[IN] Safety	Control of safety inputs
	[IN] Safety + Combined Status[1] - Muting	• Control of safety inputs • Status for one bit for all inputs • Muting status is available
	[IN] Safety + Pt. Status	• Control of safety inputs • Individual status for each input point
	[IN] Safety + Pt. Status - Muting	• Control of safety inputs • Individual status for each input point • Muting status available
	[IN] Safety + Pt. Status- Muting - Test Output	• Control of safety inputs • Individual status for each input point • Muting status available • Test output status available
	[OUT] Test	Control of test outputs
1734-OB8S	[IN] Safety Monitor - Combined Status - Power	• Monitor safety outputs • Status for one bit for all outputs • Power status available
	[IN] Safety Output Status	• Individual status for each output point
	[IN] Safety Output Status+ Monitor	• Individual status for each output point • Monitor safety outputs
	[OUT] Safety	Control of safety outputs
1734-IE4S[2]	[IN] Channel and Combined Alarm Status	Combined channel status and alarm status for each input point
	[IN] Channel Status, Alarm Status	• Individual status for each input point • Combined alarm status for each input point • Power status
	[OUT] Tach Reset	Resets a latched overfrequency condition and enables the module to begin calculating frequency again.

(1) Most digital input connections use Combined Status.

(2) Other connection options are available via RSNetWorx for DeviceNet software, but their use with a SmartGuard controller is not recommended.

The more status that is read, the larger the packet size.

5. From the Connection Type pull-down menu, for this example choose Multicast.

6. From the Configuration pull-down menu, for this example choose Configuration signature must match.

7. In the Requested Packet Interval (RPI) box, enter 10 ms.

8. In the Connection Reaction Time Limit (CRTL), enter 40.1 ms.

9. Click Add.

This limits the packet size for normal communication. If detailed status is required when a fault occurs, that data can be read explicitly via MSG instructions.

10. Repeat steps 3…9 for each connection, being sure to assign input and output connections.

Notice that the connections for the 1734-IB8S module have 2 bytes. If you had selected individual point status, the input connection would be 5 bytes.
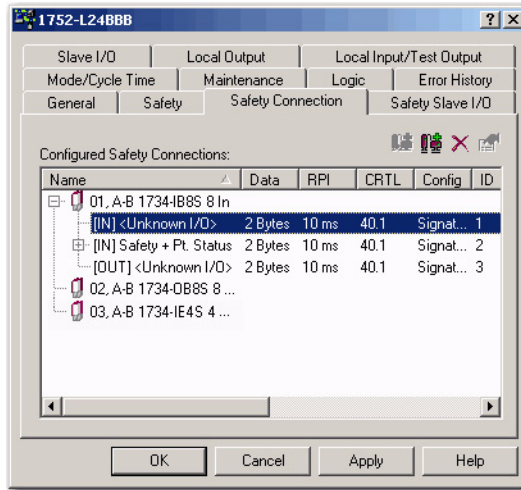
11. Click Apply.

For further details, see the SmartGuard 600 Controllers User Manual, publication 1752-UM001, and SmartGuard 600 Controllers Safety Reference Manual, publication 1752-RM001.

Complete the Set Up of the SmartGuard Controller

1. From the 1752-L24BBB dialog box, click Apply and then OK to accept the connection.

2. Place RSNetWorx from DeviceNet software back into Online mode.

   a. If you see this dialog box, click Yes to save changes.
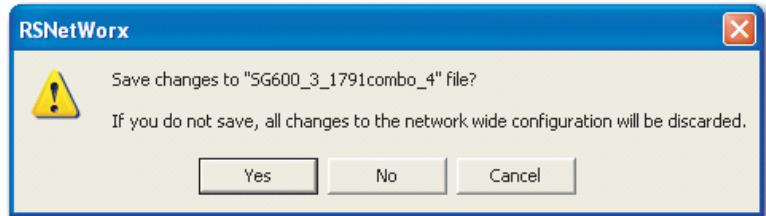
   b. Click OK to upload or download device information.
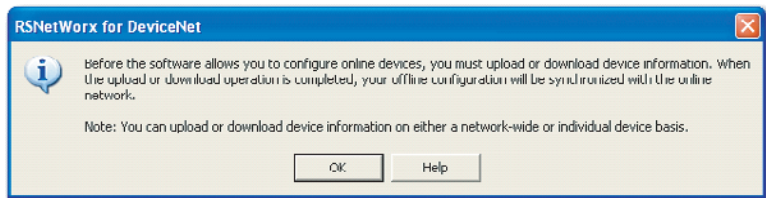
   You see the following nodes after the browse.

Save and Download Module Configuration

We recommend that after a module is configured you save your work.

> **IMPORTANT** If you have not followed the configuration guidelines in the parameter tables found in <u>Configure Safety Analog Inputs on page 110</u>, the error message "Invalid Configuration Parameter? occurred while attempting to configure the safety device" appears in the Error Log during download

If the MS and NS status indicators on the POINT Guard I/O module are not both solid green after download, ownership may have been lost. The ownership is based on the following:

- POINT Guard I/O module number
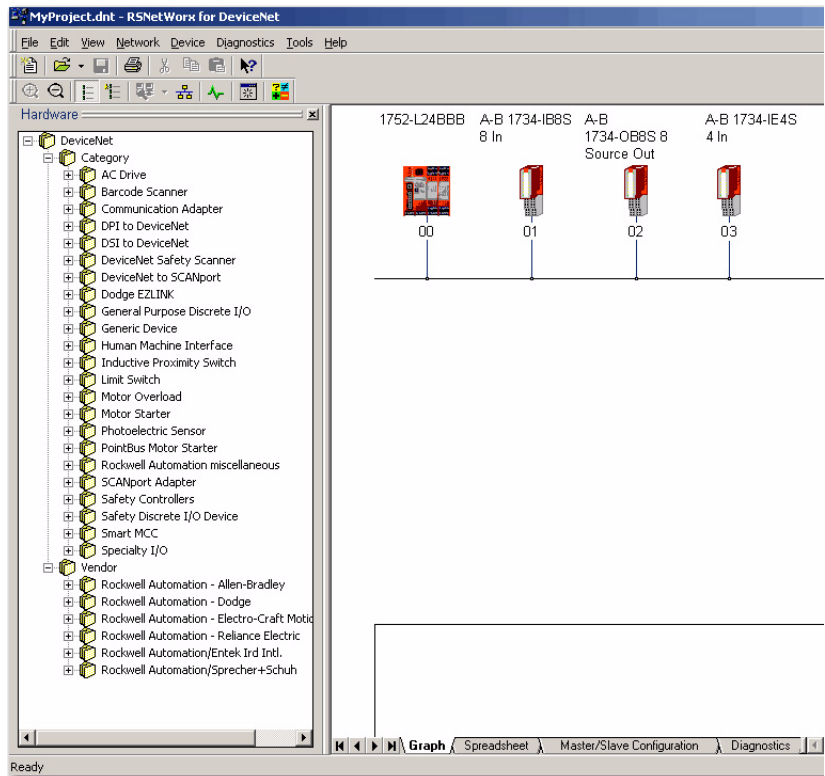- POINT Guard I/O safety network number
- SmartGuard slot number
- SmartGuard safety network number
- Path from SmartGuard controller to POINT Guard I/O module
- Configuration signature

If any of these change, the connection between the SmartGuard controller and the POINT Guard I/O module is lost, and a yellow yield icon appears in the RSNetWorx for DeviceNet tree. For more information, see <u>Chapter 8</u>.

Configuring Safety Connections Between a GuardLogix Controller and POINT Guard I/O Modules on a DeviceNet Network

Topic	Page
Configure the Module in RSNetWorx for DeviceNet Software	121
Add the POINT Guard I/O Module to the Controller Project	122
Complete the Safety Configuration	125
Download the DeviceNet Network Configuration	127
Verify Your DeviceNet Safety Configuration	127

To use POINT Guard I/O modules with a GuardLogix controller via a DeviceNet network, you must use a 1734-PDN module in place of an adapter. When using a 1734-PDN module, you must use RSNetWorx for DeviceNet software to configure the POINT Guard I/O modules, and the Generic DeviceNet Safety Module profile in RSLogix 5000 software to use the module data inside of the safety task.

Configure the Module in RSNetWorx for DeviceNet Software

Before you can add the module to the GuardLogix controller project, you must perform a number of tasks in RSNetWorx for DeviceNet software.

1. Set the node address of the module by using the Node Commissioning Tool. See .

2. Configure the module's inputs and outputs. See the following sections:

   -
   -
   -

Add the POINT Guard I/O Module to the Controller Project

Follow these steps to connect to the controller.

1. In RSLogix 5000 software, right-click the DeviceNet network and choose New Module.

2. In the Select Module Type dialog box, check Safety and Allen-Bradley.

3. Select the Generic DeviceNet Safety Module and click Create.
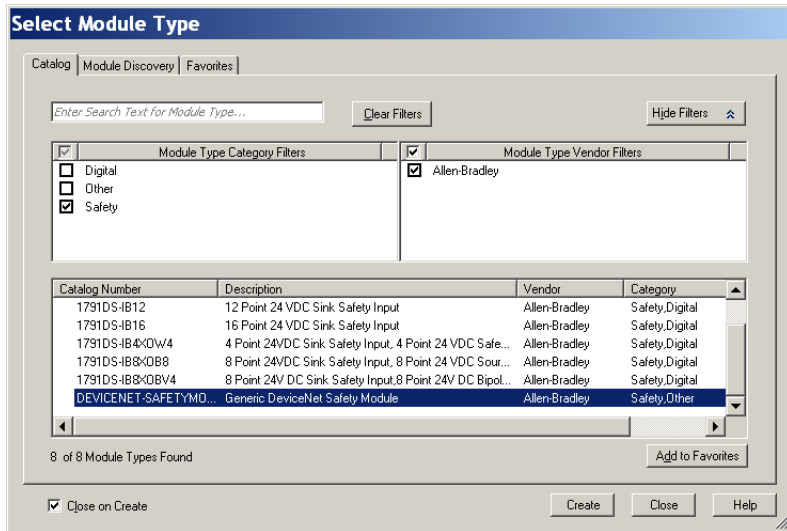
4. On the New Module dialog box, click Change.
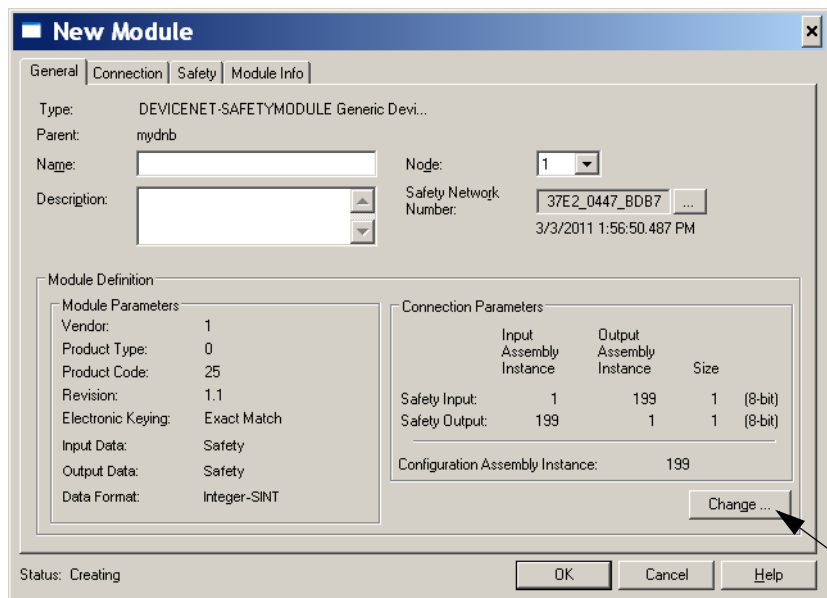
5. On the Module Definition dialog box, set these parameters for your module.

Cat. No.	Product Type	Product Code
1734-IB8S	35	15
1734-OB8S	35	16
1734-IE4S	42	1

1734-IB8S Module
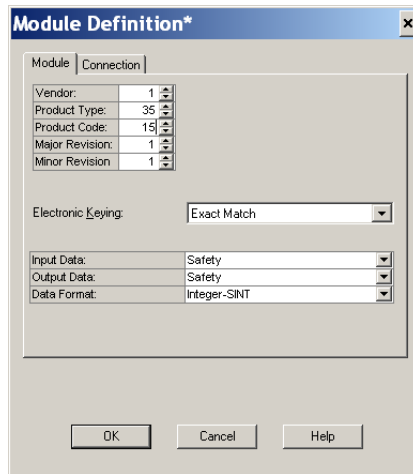
1734-IE4S Module
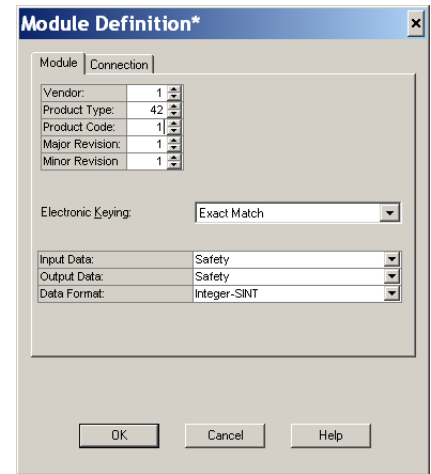
6. Click the Connection tab.

7. Set the Configuration Assembly Instance to 864 for all POINT Guard modules.

8. Determine which assemblies you want to connect to and set the safety input and output assemblies by using the following tables.

Table 5 - 1734-IB8S Input Assemblies

Safety Input Connection	Input Assembly Safety Input Number	Input Assembly Safety Output Number	Size
Safety	516 (204h)	199 (C7h)	1
Safety + Combined Status – Muting	788 (314h)	199 (C7h)	2
Safety + Pt. Status	548 (224h)	199 (C7h)	2
Safety + Pt. Status – Muting	820 (334h)	199 (C7h)	3
Safety + Pt. Status – Muting – Test Output	868 (364h)	199 (C7h)	4

Table 6 - 1734-IB8S Output Assemblies

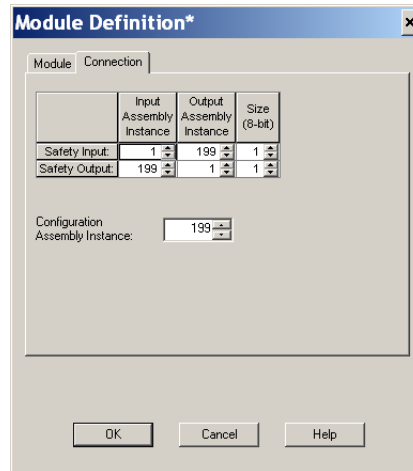| Safety Output Connection	Output Assembly Safety Input Number	Output Assembly Safety Output Number	Size
Test	199 (C7h)	33 (21h)	1

Table 7 - 1734-OB8S Input Assemblies

Safety Input Connection	Input Assembly Safety Input Number	Input Assembly Safety Output Number	Size
Safety Output Status	580 (244h)	199 (C7h)	1
Output Status + Monitor	1028 (404h)	199 (C7h)	2
Safety Monitor + Combined Status + Power	1044 (414h)	199 (C7h)	2

Table 8 - 1734-OB8S Output Assemblies

Safety Output Connection	Output Assembly Safety Input Number	Output Assembly Safety Output Number	Size
Test	199 (C7h)	564 (234h)	1

Table 9 - 1734-IE4S Input Assemblies

Safety Input Connection	Input Assembly Safety Input Number	Input Assembly Safety Output Number	Size
Safety + Status	402 (192h)	199 (C7h)	9
Safety + Status + Alarms	786 (312h)	199 (C7h)	13
Safety + Status + Process Status + Fault Reason + Alarms	802 (322h)	199 (C7h)	18

Table 10 - 1734-IE4S Output Assemblies

Safety Output Connection	Output Assembly Safety Input Number	Output Assembly Safety Output Number	Size
Safety Tachometer	199 (C7h)	770 (302h)	1

Individual members of each assembly are listed in .

IMPORTANT	If you are using the 1734-IE4S module with a GuardLogix system, use the application program to evaluate any dual channel requirements as well as determine any process alarms.

9. Click OK.

10. On the Safety Tab, uncheck the Configuration Signature checkbox.

11. Click OK and OK again to add the module to the I/O Configuration tree.

Complete the Safety Configuration

Follow these steps to copy the configuration signature and safety network number from RSNetWorx for DeviceNet software to the generic profile you set up in RSLogix 5000 software.

1. In RSNetWorx for DeviceNet software, double-click the module.

2. On the Safety tab, click Copy Signature.
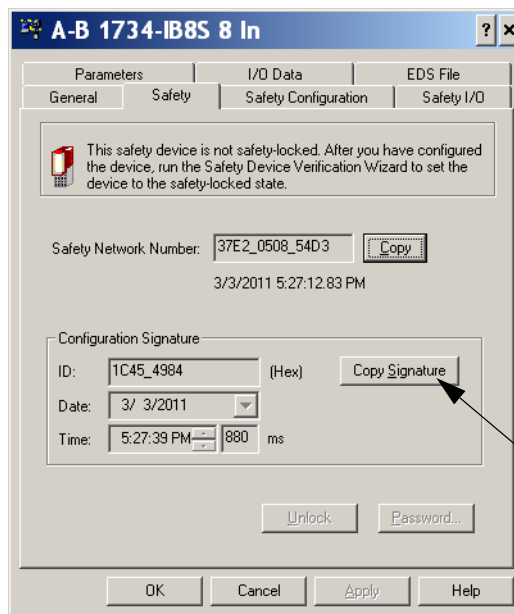
3. In RSLogix 5000 Software, right-click the DEVICENET-SAFETYMODULE and choose Properties.

4. On the Safety tab, check the Configuration Signature checkbox.

5. Click Paste.
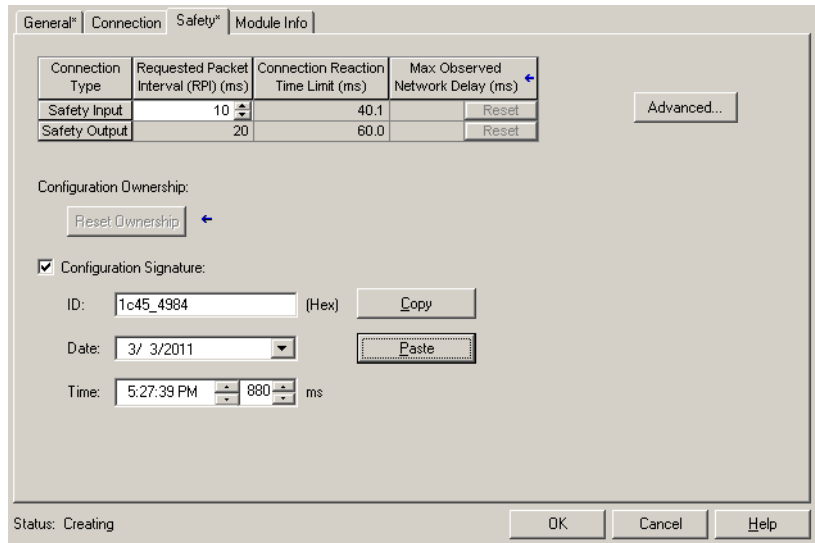
6. In RSNetWorx for DeviceNet software, click Copy to copy the safety network number.
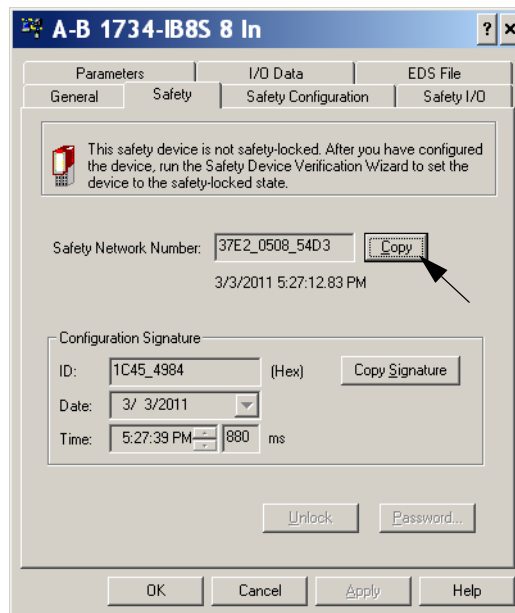
7. On the General tab in RSLogix 5000 software, click ⬚ next to the safety network number field.

8. Click Paste.
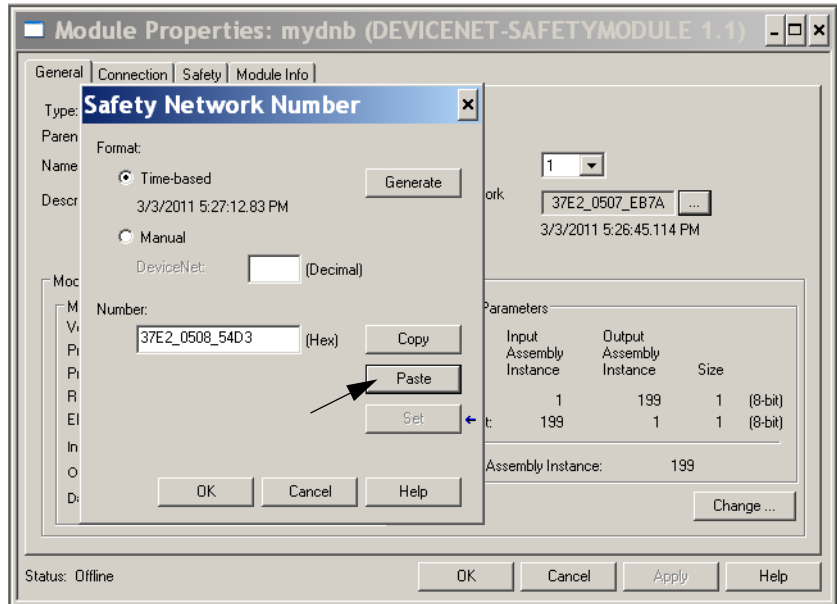
Download the DeviceNet Network Configuration

Before you download, you must go online to the DeviceNet network by using RSNetWorx for DeviceNet software. Your computer and the devices you wish to communicate with must be connected to the DeviceNet network.

When you go online to a DeviceNet network, RSNetWorx for DeviceNet software browses the network one time and shows you the devices on the network. Going online does not upload (read) or download (change) the parameters of any of the devices.

Follow these steps to download the DeviceNet network configuration.

1. Go online by clicking the online icon.

2. Browse to the DeviceNet network and click OK at the prompt.

3. Download your configuration to the network by right-clicking the device and choosing Download to Device.

4. Confirm your intent to download by clicking Yes.

Verify Your DeviceNet Safety Configuration

IMPORTANT Before running the Safety Device Verification Wizard, you should browse and upload your network and test the safety devices and all of their safety functions on your network to verify that they are operating properly. You must fully test your application prior to safety-locking your devices.

The Safety Device Verification Wizard, accessed from RSNetWorx for DeviceNet software, guides you through the process of verifying the configuration of your safety devices and provides the means for safety-locking those devices. The verification process includes upload and comparison of the configuration stored in the device and the configuration stored in the RSNetWorx for DeviceNet software configuration file. The configuration is displayed in a report to facilitate visual verification and record keeping.

> **IMPORTANT**   Some devices on your network may not support verification by the Safety Device Verification Wizard. Consult the user documentation to determine the method required for verifying these devices.

Follow these steps to run the Safety Device Verification Wizard.

1. Choose Network>Safety Device Verification Wizard.

2. On the Welcome dialog box, click Next.

Determine If Devices Can Be Verified

When the Safety Device Verification Wizard browses the network, it checks the safety status of the devices on the network to determine if the devices can be verified.

If any devices are in a state that prevents the wizard from continuing the verification process, the Unable to verify the listed devices dialog box appears listing those devices and their current status, including a device icon overlaid with a status icon.

Message	Icon Overlay	Description
Missing		The device is part of the network configuration, but was not found during the browse operation.
Mismatch		The device identity in the network configuration does not match the identity of the online device.
Unknown		The device is in the configuration, but has not been detected on the network yet.
Safety Network Number Error		The safety network number (SNN) in the device is either invalid or does not match the SNN for the device in the RSNetWorx for DeviceNet configuration file.
Signature Mismatch	None	The configuration signature in the device does not match the configuration signature in the RSNetWorx for DeviceNet configuration file.
Safety Locked		The device is already locked.

To return to RSNetWorx for DeviceNet software so that you can correct the status of the indicated devices, close the Safety Device Verification Wizard by clicking Cancel.

To skip the devices listed and continue the verification process for other safety devices on the network, click Next.

Select Devices to Verify

Choose which devices to verify by using the checkboxes in the Verify column of the Verify Safety Device Configuration dialog box. You can select only the devices whose status is Ready to be verified.
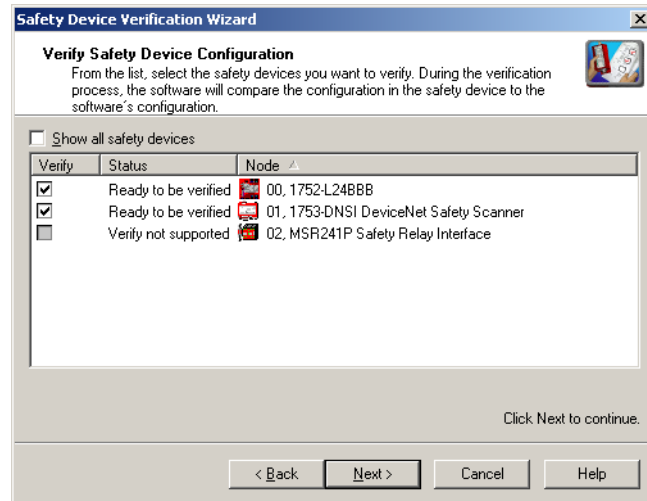
If the Show all safety devices checkbox is checked, the dialog box lists all of the safety devices on the network and shows their current status. If it is unchecked, which is the default, only devices with the following status are shown:

- Verify FAILED

  The upload and compare operation indicated that the configuration in the device does not match the configuration in the RSNetWorx for DeviceNet configuration file.

- Ready to be verified

  The device is not safety-locked and can be selected for verification.

- Verify not supported

  The device is not safety-locked, but the device does not support verification via the Safety Device Verification Wizard. Consult your user documentation for information on how to verify this device. Once the device has been verified, it can be safety-locked by the wizard.

Click Next to begin the upload and compare process.
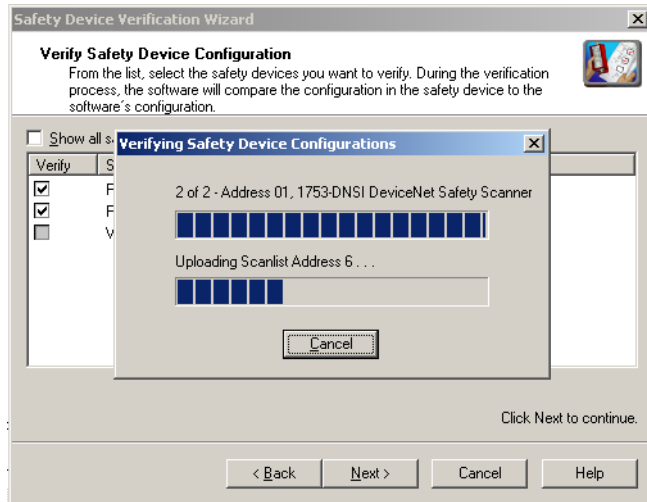
| | TIP | If you click Next without selecting a device to verify, the wizard checks whether any devices were verified or are ready to be locked in this execution of the wizard. |

If	Then the wizard displays
Devices were verified	the Review dialog box listing those devices.
Devices are ready to be safety-locked	the Lock dialog box listing those devices.
No devices were verified	the Finish dialog box.
No devices are ready to be safety-locked	the Finish dialog box.

Review the Safety Device Verification Reports

The Review page displays safety devices with status of either Verify FAILED or Ready to be Safety Locked.
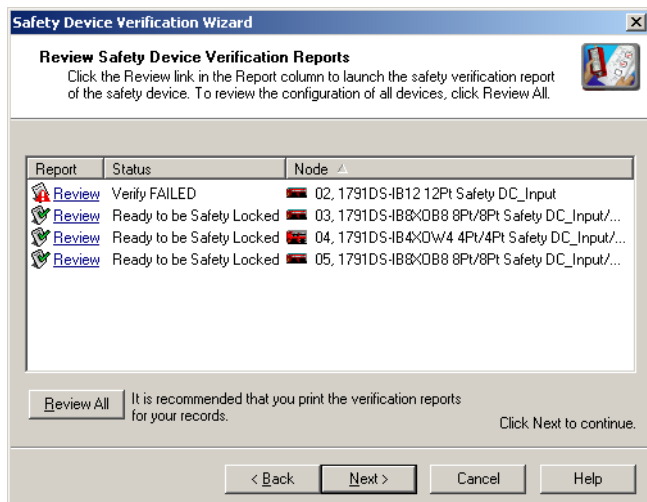
1. Click Review in the Report column to launch the device's HTML report in your default browser.

2. Click Review All to generate an HTML verification report for all of the devices listed.

> **TIP** If a device's status is Verify FAILED, more information is provided in the verification failure report.

3. Review and print the verification reports for your records.

> **IMPORTANT** You must review the device configurations and record the configuration signatures prior to operating a safety application.

Lock Safety Devices

> **IMPORTANT** Before you lock your safety device configurations, you must perform all of the verification steps required for your application.

1. Choose which devices to safety-lock by checking the checkbox in the Lock column for each device that is ready to be safety-locked.
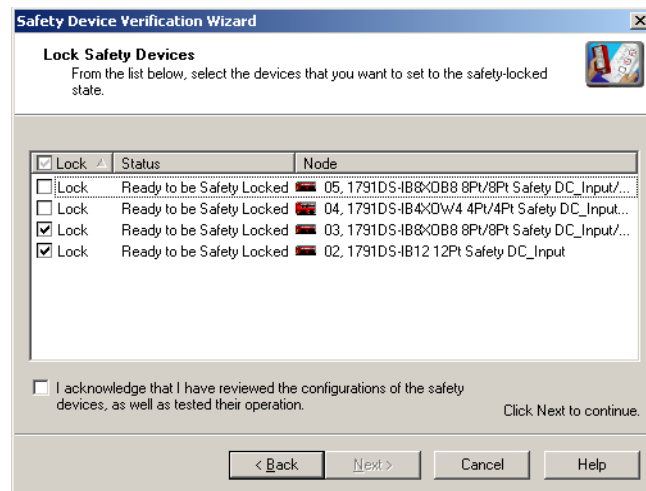
2. You must check the acknowledgement checkbox before the locking process can continue.

3. Click Next.

The wizard performs a final comparison of the configuration signature in each safety device to its configuration signature in RSNetWorx for DeviceNet software before locking the device.

4. View the Safety Device Verification Wizard Summary

Before closing, the wizard displays a summary of all the safety devices that were safety-locked, the number of safety devices that still need to be safety-locked, and lets you display the verified and safety-locked state of all of the safety devices on the network.

5. Click Finish to close the wizard.

Replacing POINT Guard I/O Modules

Topic	Page
The Safety Network Number	133
Manually Setting the Safety Network Number	134
Resetting a Module to Out-of-box Condition	135
Replacing a Module in a GuardLogix System on an EtherNet/IP Network	137
Replacing a Module When Using a SmartGuard or GuardLogix Controller on a DeviceNet Network	143

This chapter provides information on replacing POINT Guard I/O modules when they are connected to GuardLogix or SmartGuard controllers. For more information on these controllers, refer to the controller publications listed in the .

A major difference in functionality between the GuardLogix and SmartGuard safety controllers affects the replacement of safety I/O modules. GuardLogix controllers retain I/O module configuration on-board and are able to download the configuration to the replacement module. SmartGuard controllers do not retain I/O module configuration, so you need to use RSNetWorx for DeviceNet software to download the configuration to the replacement module.

The Safety Network Number

Replacing a safety I/O module that sits on a CIP safety network is more complicated than replacing standard devices because of the safety network number (SNN). The module number and SNN make up the safety module's DeviceID. Safety devices require this more complex identifier to make sure that duplicate module numbers do not compromise communication between the correct safety devices.

The following, simplified example shows Guard I/O modules on a DeviceNet network. Your products may differ, but the function is the same.

EXAMPLE   The DeviceNet network supports 64 node numbers, so if you have 100 devices on multiple DeviceNet networks, there are at least 36 duplicate node numbers being used. Even though the duplicate nodes are on separate DeviceNet networks, this must still be considered in a safety system.

In this example, the DNB scanner #1 is connected to node 5. The DNB scanner #2 is connected to another node 5. If the cables get inadvertently crossed, the scanners may be communicating with the incorrect node 5.

Crossed Cables
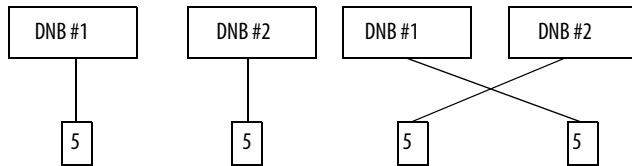
This crossed-cable scenario is unacceptable for a safety system. The SNN provides unique identification of every safety device. In this next example, all of the devices connected to DNB scanner #1 have an SNN of 100. All devices connected to DNB scanner #2 have an SNN of 101. If the cables get inadvertently crossed, the node connected to DNB scanner #1 changes from 100/5 to 101/5. The node connected to DNB scanner #2 changes from 101/5 to 100/5. Therefore, the safety connections are **not** made if the cables get crossed.

Connections Not Made
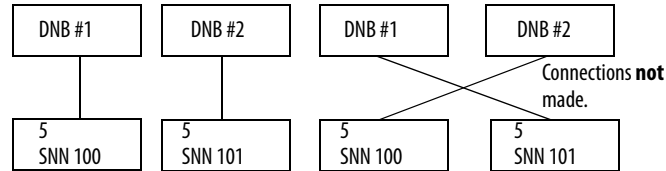
Manually Setting the Safety Network Number

The previous examples showed how the SNN is used to provide safety-connection integrity after the system is operational. But the SNN is also used to provide integrity on the initial download to the POINT Guard I/O module.

If a safety signature exists, then the POINT Guard I/O module must have a proper SNN/node number identification that matches the module within the RSLogix 5000 project, before it can receive its configuration. And to keep integrity, the setting of the module's SNN is **required** to be a manual action. This manual action is to use the 'set' function on an out-of-box POINT Guard I/O module.

Figure 20 - Setting the SNN with a GuardLogix Controller
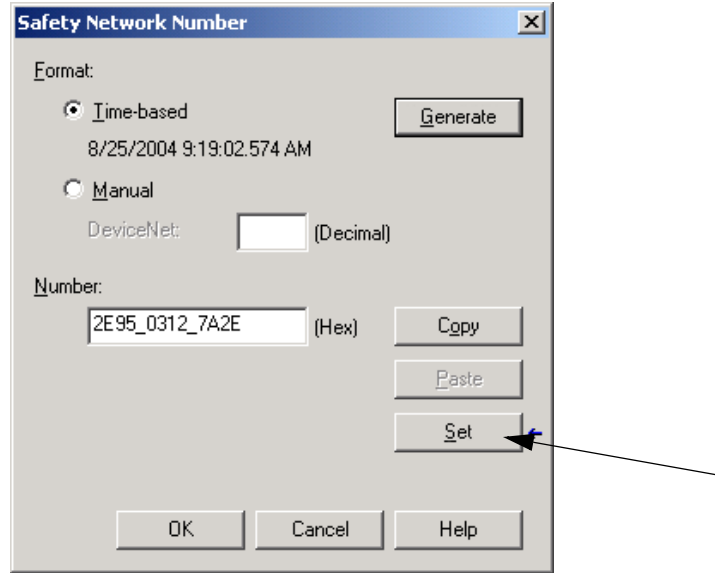
Figure 21 - Setting the SNN with a SmartGuard Controller
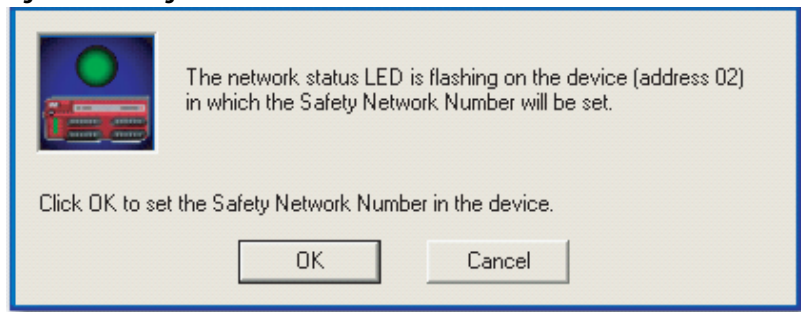
Resetting a Module to Out-of-box Condition

If a POINT Guard I/O module was used previously, clear the existing configuration before installing it on a safety network.

When using POINT Guard I/O with a	See
GuardLogix controller on an EtherNet/IP network	By Using RSLogix 5000 Software on page 135
GuardLogix controller with 1734-PDN module on a DeviceNet network	By Using RSNetWorx for DeviceNet Software on page 136
SmartGuard controller on a DeviceNet network	

By Using RSLogix 5000 Software

When RSLogix 5000 software is online, the Safety tab of the Module Properties dialog box displays the current configuration ownership. When the opened project owns the configuration, Local is displayed. When a second device owns the configuration, Remote is displayed, along with the safety network number (SNN), and node address or slot number of the configuration owner. Communication error is displayed if the module read fails.

If the connection is Local, you must inhibit the module connection before resetting ownership. To inhibit the module:

1. Right-click the module and choose Properties.

2. Click the Connection tab.

3. Check the inhibit module checkbox.

4. Click Apply and then OK.

Follow these steps to reset the module to its out-of-box configuration when online.

1. Right-click the module and choose Properties.

2. Click the Safety tab.

3. Click Reset Ownership.
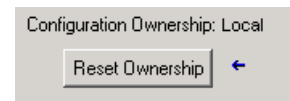
> **TIP**   You cannot reset ownership when there are pending edits to the module properties, when a safety task signature exists, or when safety-locked.

By Using RSNetWorx for DeviceNet Software

Follow these steps to reset the module to an out-of-box condition.

1. Right-click the module and choose Reset Safety Device.
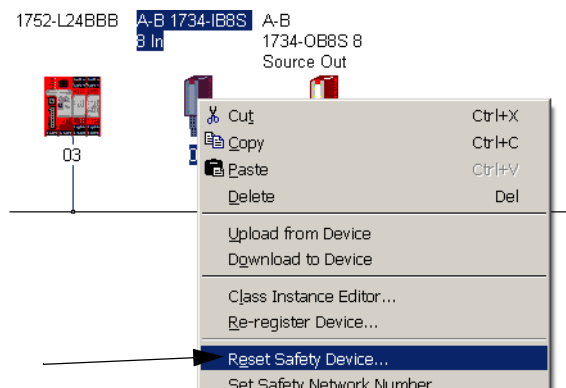
2. Check all of the options.
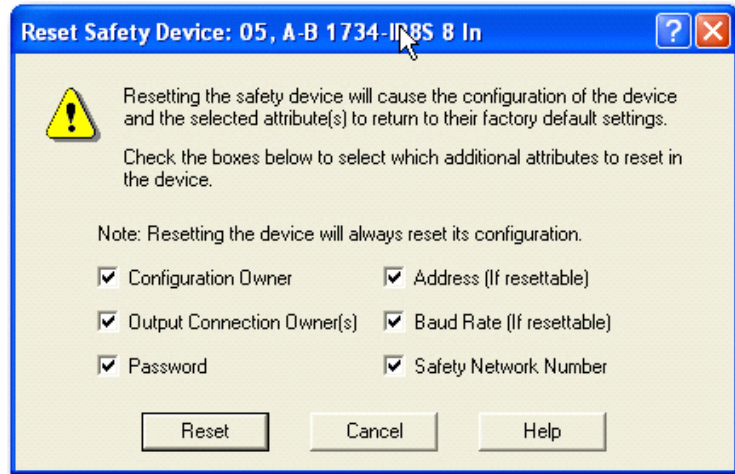
3. Click Reset.

Replacing a Module in a GuardLogix System on an EtherNet/IP Network

If you are relying on a portion of the CIP Safety system to maintain SIL 3 behavior during module replacement and functional testing, you must not use the Configure Always feature. Go to Replacement with 'Configure Only When No Safety Signature Exists' Enabled on page 138.

If you are not relying on the entire routable CIP Safety control system to maintain SIL 3/PLe during the replacement and functional testing of a module, you can use the Configure Always feature. Go to Replacement with 'Configure Always' Enabled on page 142.

Module replacement is configured on the Safety tab of the GuardLogix controller.
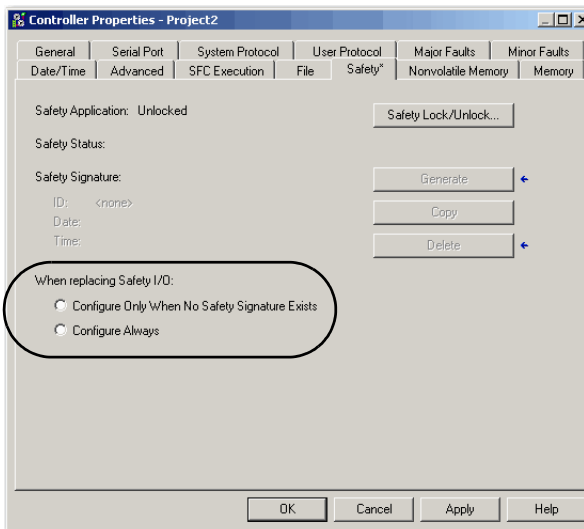
Replacement with 'Configure Only When No Safety Signature Exists' Enabled

When a module is replaced, the configuration will be downloaded from the safety controller if the DeviceID of the new module matches the original. The DeviceID is a combination of the node/IP address and the safety network number (SNN) and is updated whenever the SNN is set.

If the project is configured as 'Configure Only When No Safety Signature Exists', follow the appropriate instructions in Table 11 to replace a POINT Guard I/O module based on your scenario. Once you have completed the steps in the scenario correctly, the DeviceID will match the original, enabling the safety controller to download the proper module configuration, and re-establish the safety connection.

Table 11 - Replacing a Module

GuardLogix Safety Signature Exists	Replacement Module Condition	Action Required
No	No SNN (Out-of-box)	None. The module is ready for use.
Yes or No	Same SNN as original safety task configuration	None. The module is ready for use.
Yes	No SNN (Out-of-box)	See Scenario 1 - Replacement Module Is Out-of-box and Safety Signature Exists on page 138.
Yes	Different SNN from original safety task configuration	See Scenario 2 - Replacement Module SNN Is Different from Original and Safety Signature Exists on page 139.
No		See Scenario 3 - Replacement Module SNN Is Different from Original and No Safety Signature Exists on page 141.

Scenario 1 - Replacement Module Is Out-of-box and Safety Signature Exists

1. Remove the old I/O module and install the new module.

2. Right-click the replacement POINT Guard I/O module and choose Properties.

3. Click ⌐…⌐ to the right of the safety network number to open the Safety Network Number dialog box.
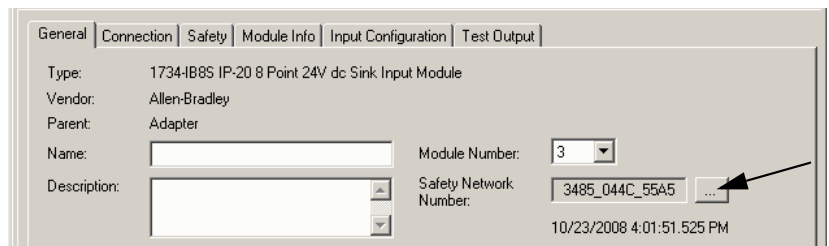
4. Click Set.
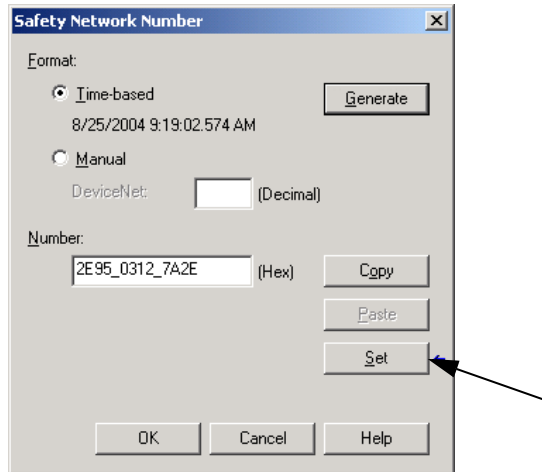
5. Verify that the Network Status (NS) status indicator is alternating red/green on the correct module before clicking Yes on the confirmation dialog box to set the SNN and accept the replacement module.
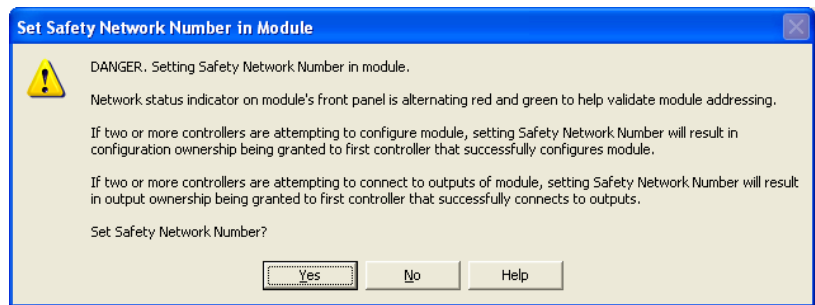
6. Follow your company-prescribed procedures to functionally test the replaced I/O module and system and to authorize the system for use.

Scenario 2 - Replacement Module SNN Is Different from Original and Safety Signature Exists

1. Remove the old I/O module and install the new module.

2. Right-click your POINT Guard I/O module and choose Properties.

3. Click the Safety tab.

4. Click Reset Ownership.

5. Click OK.

6. Right-click your GuardLogix controller and choose Properties.

7. Click [...] to the right of the safety network number to open the Safety Network Number dialog box.
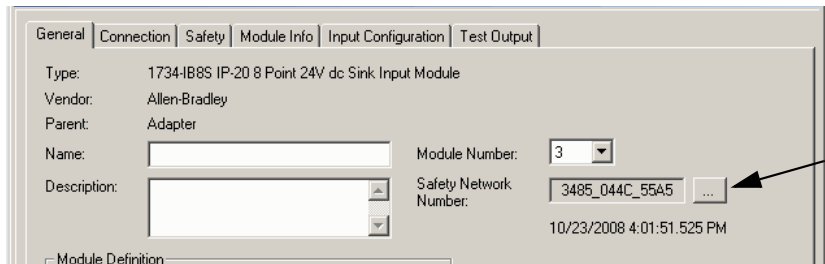
8. Click Set.
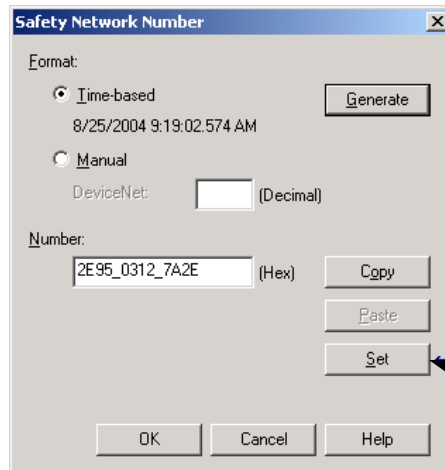
9. Verify that the Network Status (NS) status indicator is alternating red/green on the correct module before clicking Yes on the confirmation dialog box to set the SNN and accept the replacement module.
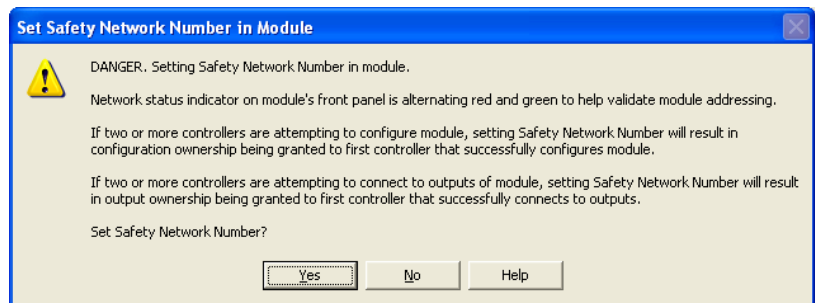
10. Follow your company-prescribed procedures to functionally test the replaced I/O module and system and to authorize the system for use.

Scenario 3 - Replacement Module SNN Is Different from Original and No Safety Signature Exists

1. Remove the old I/O module and install the new module.

2. Right-click your POINT Guard I/O module and choose Properties.

3. Click the Safety tab.
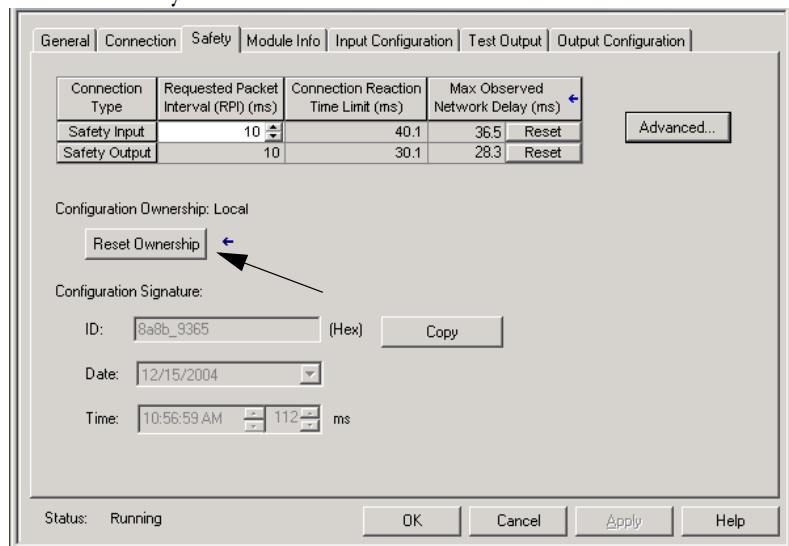
4. Click Reset Ownership.

5. Click OK.

6. Follow your company-prescribed procedures to functionally test the replaced I/O module and system and to authorize the system for use.

Replacement with 'Configure Always' Enabled

⚠️ **ATTENTION:** Enable the 'Configure Always' feature only if the entire CIP Safety Control System is **not** being relied on to maintain SIL 3 behavior during the replacement and functional testing of a module.

Do not place modules that are in the out-of-box condition on a CIP Safety network when the Configure Always feature is enabled, except while following this replacement procedure.

When the 'Configure Always' feature is enabled in RSLogix 5000 software, the controller automatically checks for and connects to a replacement module that meets all of the following requirements:

- The controller has configuration data for a compatible module at that network address.
- The module is in out-of-box condition or has an SNN that matches the configuration.

If the project is configured for 'Configure Always', follow the appropriate steps to replace a POINT Guard I/O module.

1. Remove the old I/O module and install the new module.

If	then
the module is in out-of-box condition	go to step 6. No action is needed for the GuardLogix controller to take ownership of the module.
an SNN mismatch error occurs	go to the next step to reset the module to out-of-box condition.

2. Right-click your POINT Guard I/O module and choose Properties.

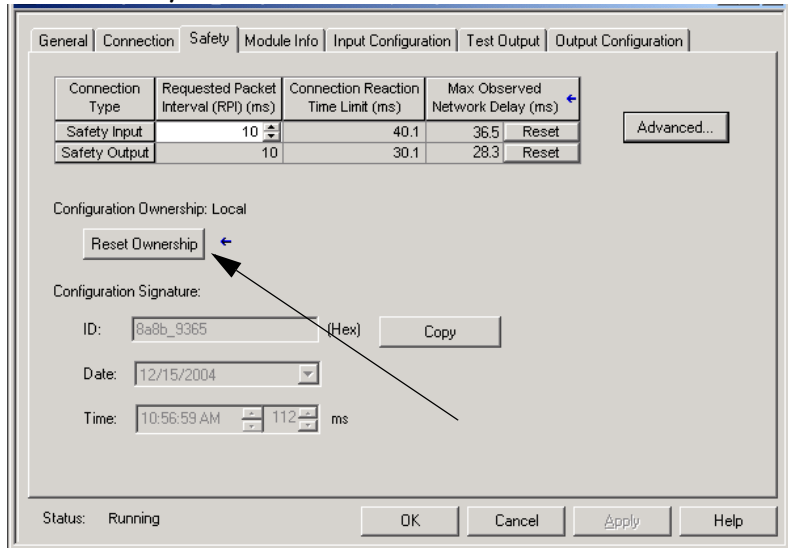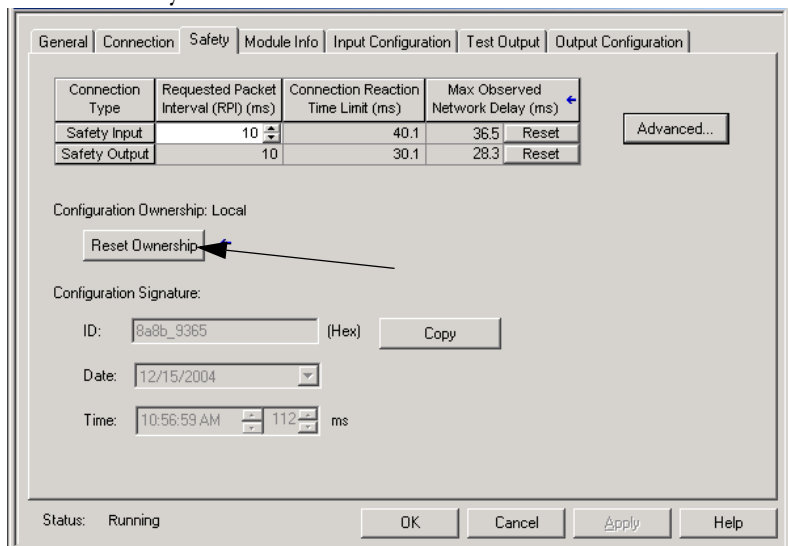3. Click the Safety tab.

4. Click Reset Ownership.

5. Click OK.

6. Follow your company-prescribed procedures to functionally test the replaced I/O module and system and to authorize the system for use.

Replacing a Module When Using a SmartGuard or GuardLogix Controller on a DeviceNet Network

Follow these steps to replace an I/O module when the module and the controller are on a DeviceNet network.

1. Replace the module and match the node number of the original module.

2. In RSNetWorx for DeviceNet software, open your project.

   If the replacement module is out-of-box or has an SNN that does not match the original module, the module appears with an exclamation mark.
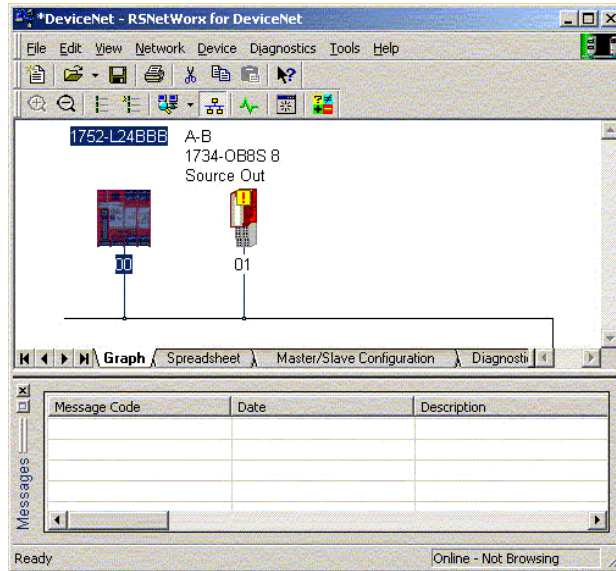
3. Right-click the module and choose Download to Device.
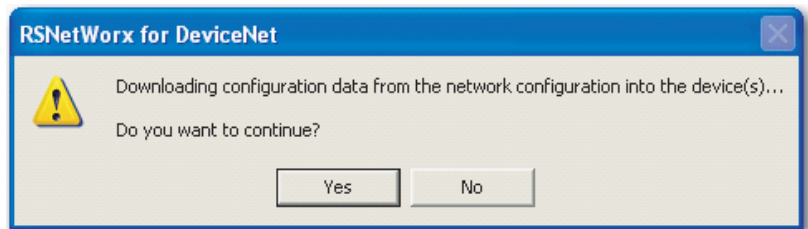
4. Click Yes to confirm.

5. Click Download on the Safety Network Number Mismatch dialog box to set the SNN on the replacement module.

6. Verify that the (NS) Network Status indicator is flashing on the correct module and click OK to set the SNN on that device.
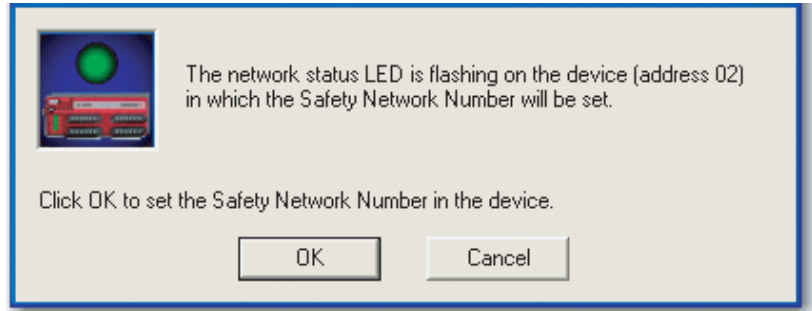
RSNetWorx for DeviceNet software confirms that the SNN has ben set.

Once the download successfully completes, the main project view displays this message: 'The device at address *xx* has been downloaded. Any device-specific messages related to the download operation are displayed separately.'
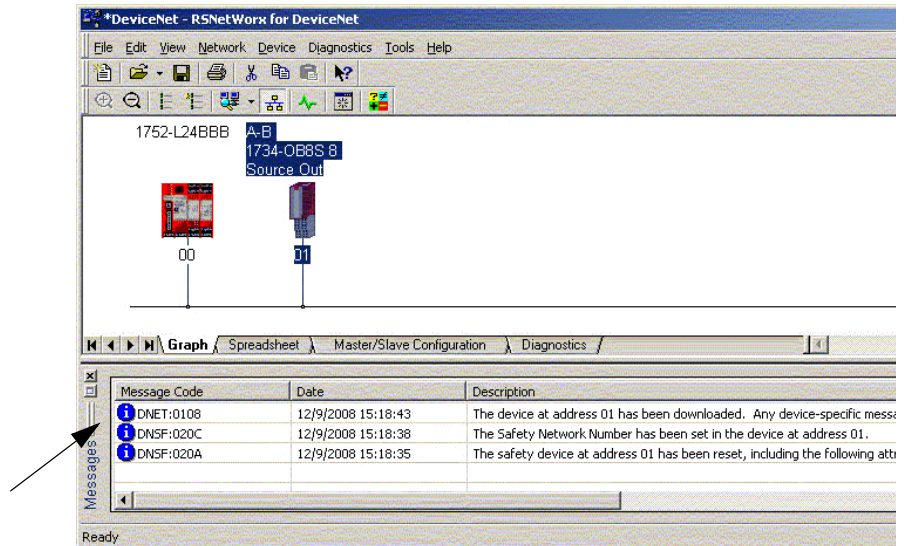
Assuming this is the proper configuration from the original DNT file, the SNN and configuration signature now match that of the original. If you are already connected to the controller, a connection is made. The controller does not need to be taken out of Run mode to download to the replacement module.

If you download this configuration to a temporary setup, place the module on the network and it automatically connects to the controller.

If the configuration downloaded to the module was not from the original DNT file, the configuration signature will not match the original. Even if you recreate the same parameters in a new DNT file, the time and date portions of the signature will be different so the connection to the controller is not made. If this occurs, click the Safety Connection tab for the controller that prompted you that the configuration signature is different and provides you with the option to match the new configuration signature. However, you should first re-validate the safety system because it is not using the original DNT file.
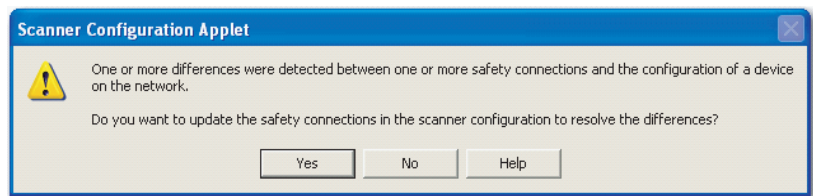
7. Click Yes.

    This takes the controller out of Run mode and prompts you to download the changes.
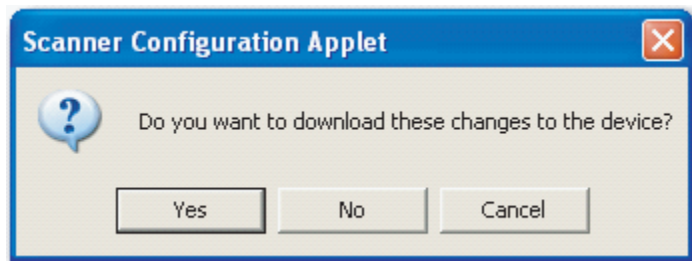
8. Click Yes to download the new connection configuration to the SmartGuard controller.

    After the download is complete, place the controller back in Run mode and the connection to the replacement module is established.

9. Follow your company-prescribed procedures to functionally test the replaced I/O module and system and to authorize the system for use.

Notes:

Indicators

Topic	Page
Module	148
Network Status	148
Configuration Lock	148
Power	149
1734-IE4S Sensor Power	149
1734-IE4S Safety Analog Input Status	149
1734-IB8S Safety Input Status	149
1734-OB8S Safety Output Status	150

Figure 22 - Indicators Placement

Module   Network
Configuration Lock
Input/Output 0   Input/Output 4
Input/Output 1   Input/Output 5
Input/Output 2   Input/Output 6
Input/Output 3   Input/Output 7
Power

1734-IB8S or 1734-OB8S

Module   Network
Configuration Lock
Input 0   Input 2
Input 1   Input 3
Sensor 0   Sensor 2
Sensor 1   Sensor 3
Power

1734-IE4S
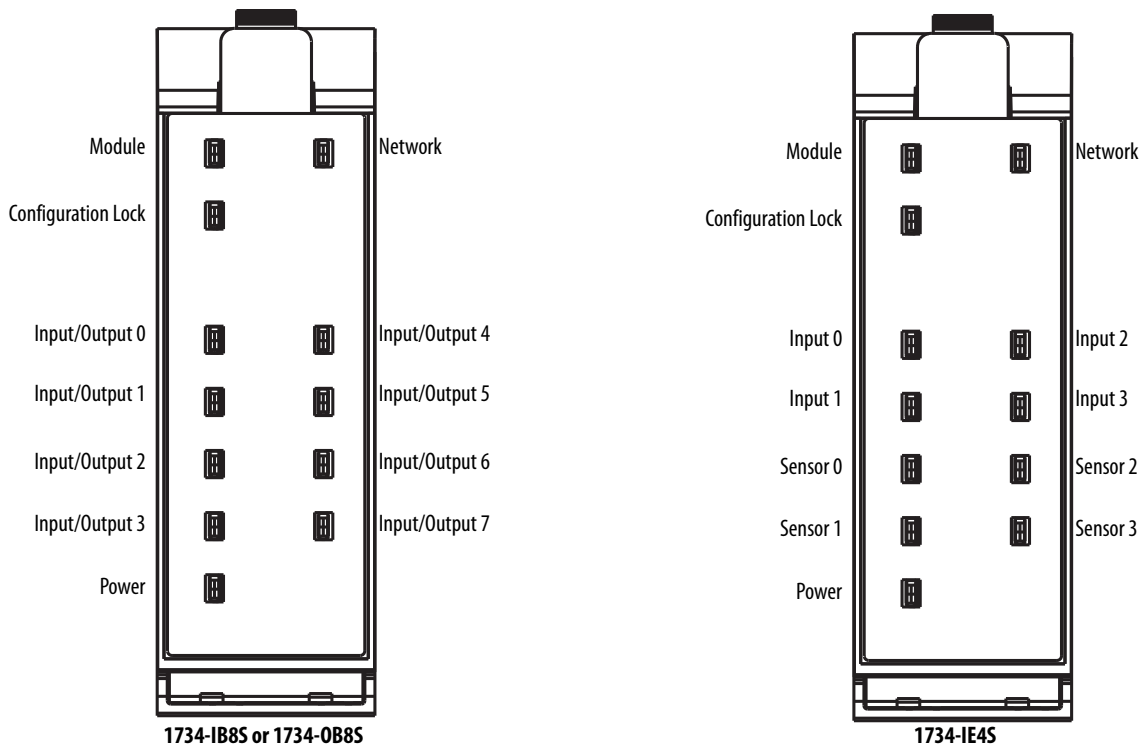
Module

Indicator		Description	Recommended Action
MS	Off	No power is applied to the module.	Apply power to this connector.
	Solid green	The module is operating normally.	None.
	Solid red	The module detected an unrecoverable fault.	Cycle power to the module. If problem persists, replace the module.
	Flashing green	Device is in the Idle or Standby state.	Configure the module and establish connection.
	Flashing red	The module has detected a recoverable fault.	Cycle power to the module or reset the module.
		User-initiated firmware update is in progress.	Wait for firmware update to complete.
	Flashing red and green	Module is not configured.	Reconfigure the module. For additional information, inspect Network Status indicator.
		The module is performing its power-cycle diagnostic tests.	Wait for the module to complete its power-cycle diagnostics.

Network Status

Indicator		Description	Recommended Action
NS	Off	The module is not online with the network or there is no power.	Verify your network is working properly.
	Flashing green	Module online with no connections in established state.	Verify your network and module configuration.
		The module identified the communication rate of the network but no connections are established.	
	Solid green	Module online with connections in established state. The module is operating normally.	None.
	Flashing red	One or more I/O connections is in timed-out state.	Verify your network and module configuration.
		A user-initiated firmware update is in progress.	Wait for firmware update to complete.
	Solid red	Critical link failure. The module detected an error that prevents it from communicating on the network, such as a duplicate node address.	Cycle power to the module. Check node addressing.

Configuration Lock

Indicator		Description	Recommended Action
LK[1]	Off	No configuration or configured by a GuardLogix originator.	Validate configuration by a network configuration tool, such as RSNetWorx software.
		Invalid configuration data.	
	Solid yellow	Locked.	None.
		Valid configuration, locked by a network configuration tool, such as RSNetWorx software.	
	Flashing yellow	Not locked.	None.
		Valid configuration by a network configuration tool, such as RSNetWorx software.	

(1) Not applicable when used with GuardLogix controllers.

Power

Indicator		Description	Recommended Action
PWR	Off	No field power applied.	Apply field power.
	Green	Normal condition, field power supplied and within specification.	None.
	Yellow	Field power out of specification.	The module is configured to use sensor power, and either the sensor is drawing too much current (short in the wiring or sensor), or the sensor is not drawing any current (broken wire or sensor). Check your connectors, wiring, and voltages.

1734-IE4S Sensor Power

Indicator		Description	Recommended Action
S0…S3	Off	Sensor power is not used.	None.
	Green	Sensor power is used.	None.
	Red	Over-current or under-current sensor power fault.	Check connectors, wiring, and power supply.

1734-IE4S Safety Analog Input Status

Indicator		Description	Recommended Action
0…3[1]	Off	Safety analog input is not used or the module is being configured.	Reconfigure the channel, if desired.
	Yellow	Safety analog input is configured for use and no faults exist.	None.
	Red	A fault has been detected in the analog input signal path.	Check the fault code in the module using one of the data assemblies that contains the Fault Reason. See Appendix B for details. Check configuration, field wiring, and devices. If no problem found, replace module.
	Flashing red	A fault has been detected in the partner input signal path of a dual-input configuration.	Check the field wiring and verify your configuration for the partner circuit. If no problem found, replace module.

(1)   Indicator behavior in Tachometer mode facilitates machine setup and troubleshooting. When the tachometer signal is below the configured OFF threshold, the indicator is off. When the tachometer signal is above the ON threshold, the indicator is yellow. Status indicator behavior during normal operation is dependent upon the module update rate and is not intended to indicate the actual tachometer input. When the input rate is above 30 Hz, the status indicator will be solid yellow. When the input rate is below 30 Hz, the status indicator will be flashing yellow as the signal turns on and off.

1734-IB8S Safety Input Status

Indicator		Description	Recommended Action
0…7	Off	Safety input is off, or module is being configured.	Turn the safety input on or reconfigure the channel, if desired.
	Yellow	Safety input is on.	None.
	Red	A fault in the external wiring or input circuit has been detected.	Check configuration, field wiring, and devices. If no problem found, replace module.
	Flashing red	A fault in the partner input circuit of a dual-input configuration has been detected.	Check the field wiring and verify your configuration for the partner circuit. If no problem found, replace module.

1734-OB8S Safety Output Status

Indicator		Description	Recommended Action
0…7	Off	Safety output is off, or module is being configured.	Turn the safety output on or reconfigure the channel, if desired.
	Yellow	Safety output is on.	None.
	Red	A fault in the output circuit has been detected.	Check the circuit wiring and end device. If no problem found, replace module.
		The tag values in a dual output configuration do not have the same value.	Make sure logic is driving tag values to the same state (off or on).
	Flashing red	A fault in the partner output circuit of a dual-output configuration has been detected.	Check the circuit wiring and end device of the partner. If no problem found, replace module.

Get I/O Diagnostic Status from Modules in Logix Systems

Topic	Page
Message Instructions	151
Configure the Message Instruction	152
Class, Instance, and Attribute Data for I/O Modules	153

You can use message instructions in a Logix system to determine the cause of input point or output point faults.

Message Instructions

When the controller detects a fault on an input or output point, you can use a message instruction to explicitly retrieve the cause of the fault.

In this example, we use a 1734-OB8S module with the Input Status set to return Point Status. This table illustrates the controller tags that you can monitor for this module.

Adapter:2:I.Pt00OutputStatus	0	Decimal	BOOL	Safety
Adapter:2:I.Pt01OutputStatus	0	Decimal	BOOL	Safety
Adapter:2:I.Pt02OutputStatus	0	Decimal	BOOL	Safety
Adapter:2:I.Pt03OutputStatus	0	Decimal	BOOL	Safety
Adapter:2:I.Pt04OutputStatus	0	Decimal	BOOL	Safety
Adapter:2:I.Pt05OutputStatus	0	Decimal	BOOL	Safety
Adapter:2:I.Pt06OutputStatus	0	Decimal	BOOL	Safety
Adapter:2:I.Pt07OutputStatus	0	Decimal	BOOL	Safety

Use the Point Output Status bits to detect if one or more of the output points on the module have a fault:

- If any status bit goes to a value of 0 (0 = error, 1 = no error), use the status bit to condition your message instruction as follows.
- Place these rungs in the standard task.

This sample ladder logic is monitoring the status of output point 3. This ladder logic rung examines the Output Point Status and, when a fault is detected (0 = error), the message instruction is executed.
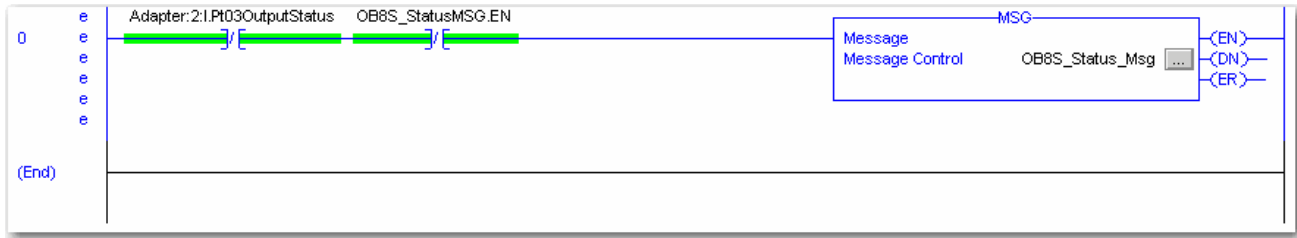
Configure the Message Instruction

Follow this procedure to edit the Message Configuration dialog box.

1. In the Message Instruction in the ladder logic, click the ⊡ icon.

2. On the Configuration tab, enter the appropriate data for what you want to monitor.

   a. From the Service Type pull-down menu, choose Get Attribute Single.

   b. Enter the Class, Instance, and Attribute data, referring to the appropriate tables on pages 153...154.

3. On the Communication tab, specify the path for the message.

This example illustrates values you enter to determine the reason for the fault on Output 3.

Figure 23 - Message Instruction Configuration Example
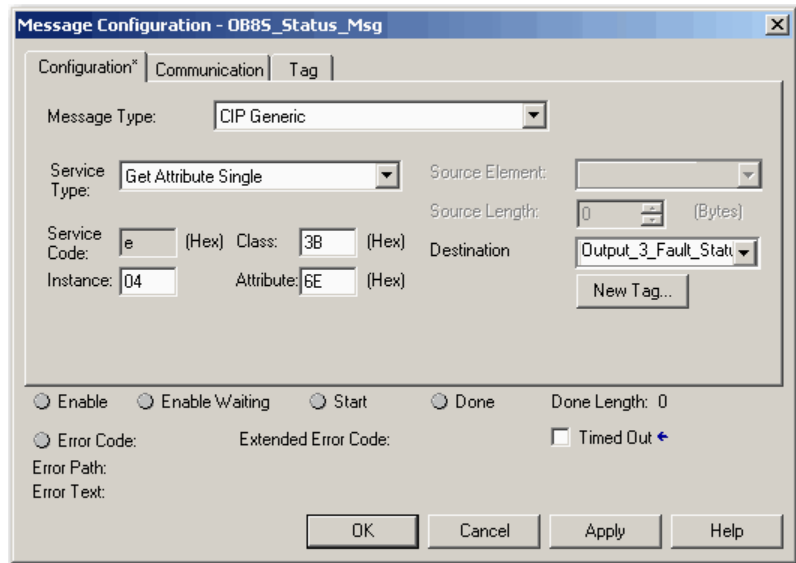
> **TIP**   When entering the Instance value, enter the input/output point plus 1
> In this example, Output Point 3 is Instance 4.

Class, Instance, and Attribute Data for I/O Modules

Use the information in the following tables to configure your message instruction.

Table 12 - Digital Safety Input Module (1734-IB8S)

Service Type	Function	Command (hex)					Response (hex)
		Service Code	Class ID	Instance ID	Attribute ID	Data Size	
Get Attribute Single	Reads the cause for the safety digital input fault specified by the Instance ID (1…8).	0E	3D	01…08	6E	-	0: No error 01: Configuration invalid 02: External test signal error 03:Internal input error 04: Discrepancy error 05: Error in the other dual channel input

Table 13 - Digital Safety Input Module Test Outputs (1734-IB8S)

Service Type	Function	Command (hex)					Response (hex)
		Service Code	Class ID	Instance ID	Attribute ID	Data Size	
Get Attribute Single	Reads the cause of the test output fault specified by the Instance ID (1…4).	0E	09	01…04	76	-	0 = No error 01: Configuration invalid 02: Overload detected 03: Cross circuit detected 05: Output ON error 06: Undercurrent detected for muting lamp
Set Attribute Single	Configures the test output to turn off or hold its last state after a communication error for an output specified by the Instance ID.	10	09	01…04	05	1 byte 00: Clear 01: Hold	-

Table 14 - Digital Safety Output Module (1734-OB8S)

Service Type	Function	Command (hex)					Response (hex)
		Service Code	Class ID	Instance ID	Attribute ID	Data Size	
Get Attribute Single	Reads the cause for the safety digital output fault specified by the Instance ID (1…8).	0E	3B	01…08	6E	-	0: No error 01: Configuration invalid 02: Over current detected 03: Short circuit detected 04: Output ON error 05: Error in the other dual channel output 06: N/A 07: N/A 08: Dual channel violation 09: Short circuit detected at safety output

Table 15 - Safety Analog Input Module (1734-IE4S)

Service Type	Function	Command (hex)					Response (hex)
		Service Code	Class ID	Instance ID	Attribute ID	Data Size	
Get Attribute Single	Reads the cause of the safety analog input fault specified by the Instance ID (1…4).	0E	49	01…04	6	-	00: Reserved 01: No error 02: Signal over-range 03: Signal under-range 04: Signal test failure 05: Dual-channel discrepancy 06: Error in the other dual-channel input 08: Reserved 100: Sensor supply overcurrent 101: Sensor supply undercurrent 102: Analog-digital converter (ADC) CPU Timing Fault[1] 103: 3.3V undervoltage 104: 3.3V overvoltage 105: CPU fault 106: Flash fault 107: RAM fault 108: Single-channel discrepancy 109: Tach Dual Low 110: Undefined error 111: Flash enable fault 112: Serial pattern fault 113: Channel uniqueness fault 114: Watchdog fault 115: Sync timeout fault 116: Missing clock fault 117: SCI Tx fault 118: ADC fault 119: ADC neighbor 1.8V fault 120: ADC channel configuration mismatch 121: SPI sequence number mismatch 122: Runtime 3.3V over- or under-voltage error 123: Reserved 124: Reserved 125: Field I/O power is missing 126: Startup 3.3V over- or under-voltage error 127: Sensor power/input wiring error
Get Attribute Single	Reads the data associated with the given instance of the defined assembly	0E	4	946	3	6[2]	input power

(1)   Missing clock, watchdog timeout.
(2)   For this instance, specify the Destination Tag to be a SINT[6].

Appendix **C**

Specifications

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Technical Specifications

Safety Digital Input Module Specifications

Attribute	1734-IB8S
Safety Input	
Inputs per module	8
Input type	Current sinking
Voltage, on-state input	11…30V DC
Voltage, off-state input, max	5V DC
Current, on-state input, min	3.3 mA
Current, off-state, max	1.3 mA
IEC 61131-2 (input type)	Type 3
Reaction time	<16.2 ms
Pulse Test Output	
Output type	Current sourcing
Number of sources (T0, T1M, T2, T3M)	4
Test output current (each output point)	0.7 A max
Aggregate current of test outputs per module	2.8 A @ 40 °C (104 °F)
Pulse width	525 µs
Pulse period	144 ms
Current, max (when used to control muting lamp)	25 mA (to avoid fault when used as a muted lamp output)
Current, min (when used to control muting lamp)	5 mA (at which fault indication is generated when used as a muted lamp output)

Attribute	1734-IB8S
1734-IB8S temperature versus current derating for both horizontal and vertical installations	2.8 A 2.0 A -20 °C (-4 °F) 40 °C (104 °F) 55 °C (131 °F)
Residual voltage, max	1.2V
Output leakage current, max	0.1 mA
Short circuit protection	Yes
POINTBus	
POINTBus current, max	175 mA
Power dissipation, max	2.44 W
Thermal dissipation, max	8.34 BTU/hr
Isolation voltage	50V (continuous), Basic Insulation Type between field side and system No isolation between individual channels Type tested at 707V DC for 60 s
Power bus, operating supply voltage	24V DC nom
Power bus, operating voltage range	19.2…28.8V DC
Input filter time, OFF to ON[1]	0…126 ms (in 6 ms increments)
Input filter time, ON to OFF[1]	
Terminal base screw torque	See terminal base specifications
Indicators	1 yellow lock status indicator 1 green/yellow power status indicator 8 I/O channel status indicators
Keyswitch positions (left and right)	1734-IB8S: Key 1 = 8 (left); Key 2 = 1 (right) 1734-OB8S: Key 1 = 8 (left); Key 2 = 2 (right)
North America temp code	T4
IEC temp code	T4
Enclosure type rating	None (open-style)
Wiring category[2]	2 - on signal ports
Wire size	Determined by installed terminal block
Weight, approx.	62.4 g (2.2 oz)
Dimensions (HxWxD), approx. (without terminal block)	77 x 25 x 55 mm (3.03 x 0.98 x 2.17 in.)

(1)   Input off-to-on filter time is the time from a valid input signal to recognition by the module. Input on-to-off time is the time from a valid input signal to recognition by the module.

(2)   Use this conductor category information for planning conductor routing. Refer to the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Safety Digital Output Module Specifications

Attribute	1734-OB8S
Safety Output	
Outputs per module	8
Output type	Current sourcing
Output current (each output point)	1 A max
Pulse width	475 µs
Pulse period	575 ms
On-state voltage drop	<0.6V
Leakage current, max	0.1 mA
Short-circuit detection	Yes (short high and low and cross-circuit fault detect)
Short-circuit protection	Electronic
Aggregate current of outputs per module	8 A (4 A per terminal base) @ 40 ℃ (104 ℉)
1734-OB8S temperature versus current derating for both horizontal and vertical installations	
Reaction time	<6.2 ms
POINTBus	
POINTBus current, max	190 mA
Power dissipation, max	3.02 W
Thermal dissipation, max	10.32 BTU/hr
Isolation voltage	50V (continuous), Basic Insulation Type between field side and system No isolation between individual channels Type tested at 707V DC for 60 s
Power bus, operating supply voltage	24V DC nom
Power bus, operating voltage range	19.2…28.8V DC
Input filter time, OFF to ON[1]	0…126 ms (in 6 ms increments)
Input filter time, ON to OFF[1]	
Terminal base screw torque	See terminal base specifications
Indicators	1 yellow lock status indicator 1 green/yellow power status indicator 8 I/O channel status indicators
Keyswitch positions (left and right)	Key 1 = 8 (left); Key 2 = 2 (right)
Pilot duty rating	Not rated
North America temp code	T4

Attribute	1734-OB8S
IEC temp code	T4
Enclosure type rating	None (open-style)
Wiring category[2]	2 - on signal ports
Wire size	Determined by installed terminal block
Weight, approx.	62.4 g (2.2 oz)
Dimensions (HxWxD), approx. (without terminal block)	75 x 24 x 55 mm (3.03 x 0.98 x 2.17 in.)

(1) Input off-to-on filter time is the time from a valid input signal to recognition by the module. Input on-to-off time is the time from a valid input signal to recognition by the module.

(2) Use this conductor category information for planning conductor routing. Refer to the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Safety Analog Input Module Specifications

Attribute	1734-IE4S
Safety Analog Input	
Inputs per module	4 single-ended
Input type	software-configurable for voltage, current, or tachometer
Input voltage mode ranges	±5V, ±10V, 0…5V, 0…10V
Input current mode ranges	0…20 mA, 4…20 mA
Input tachometer mode ranges	0…24V with configurable ON and OFF thresholds in 1V increments
Voltage code range	Bipolar modes: -32768/+32767 Unipolar modes: 0/+32767
Current code range (4…20 mA mode)	-8192…32767
Tachometer code range	0…1000
Voltage overrange thresholds	@ ±10V: 10.0V @±5V: 5.0V @0…10V: 10.0V @0…5V: 5.0V
Voltage underrange thresholds	@ ±10V: -10.0V @±5V: -5.0V @0…10V: 0.5V @0…5V: 0.25V
Current overrange thresholds	@ 0…20 mA: 20.0 mA @4…20 mA: 20.0 mA
Current underrange thresholds	@ 0…20 mA: 0.5 mA @4…20 mA: 4.0 mA
Tachometer frequency range	1…1000 Hz
Tachometer overrange threshold	1 kHz
ADC resolution	12 bits
Filter	Single-pole anti-aliasing filter: • Filter frequency = 10 Hz followed by four-pole digital filter Available corner frequencies, approx. • 1 Hz • 10 Hz • 5 Hz • 50 Hz
Step response to 63% (approx.)[1]	Filter frequency @ 1 Hz = 450 ms Filter frequency @ 5 Hz = 125 ms Filter frequency @ 10 Hz = 72 ms Filter frequency @ 50 Hz = 25 ms

Attribute	1734-IE4S	

Normal mode rejection	Filter frequency @ 1 Hz:
	    -3 dB @ 0.7 Hz
	    -70 dB @ 50 Hz
	    -70 dB @ 60 Hz
	Filter frequency @ 5 Hz:
	    -3 dB @ 2.6 Hz
	    -70 dB @ 50 Hz
	    -70 dB @ 60 Hz
		Filter frequency @ 10 Hz:
		    -3 dB @ 4.8 Hz
		    -50 dB @ 50 Hz
		    -50 dB @ 60 Hz
		Filter frequency @ 50 Hz:
		    -3 dB @ 10.2 Hz
		    -20 dB @ 50 Hz
		    -20 dB @ 60 Hz

Voltage mode input impedance	> 200K Ohms	
Current mode input impedance	<100 Ohms	
Tachometer mode input impedance	> 200K Ohms	
Data value format	16-bit, two's complement	
Accuracy	Voltage mode	@ 25° C [77° F]: ±0.5% full scale Drift: ±0.02% full scale/°C
	Current mode[3]	@ 25° C [77° F]: ±0.6% full scale Drift: ±0.03% full scale/°C
	Tachometer mode	@ 25° C [77° F]: ±0.1%/100 Hz drift: ±0.1%/°C/100 Hz
Calibration	Factory-calibrated; no user-calibration	
Maximum overload on inputs	±30V	
Isolation Voltage	50V continuous- basic Insulation Type, I/O and field power to system Type tested at 500V AC for 60 seconds No isolation between individual I/O or I/O to field power	
I/O scan rate	≤6 ms	
Indicators	4 analog input (yellow/red) 4 sensor power (green/red) 1 power (green/yellow)	
Keyswitch positions (left and right)	Key 1 = 8 (left); Key 2 = 3 (right)	
North America temp code	T4A	
IEC temp code	T4	
Enclosure type rating	None (open-style)	
Pilot Duty Rating	Sensor outputs not rated	
Wiring category[2]	2 - on signal ports 1 - on power ports	
Wire Type	Shielded on signal ports	
Wire size	Determined by installed terminal block	
Weight, approx.	68 g (2.4 oz)	
Dimensions (HxWxD), approx. (without terminal block)	77 x 24 x 55 mm (3.03 x 0.94 x 2.17 in.)	
POINTBus		
POINT Bus current, max	110 mA @ 5V	
Power Dissipation, max	2.2 W	
Thermal Dissipation, max	7.5 BTU/hr	
Field Power Input	19.2…28.8V DC, 65 mA, Class 2	
Sensor Output		
Output type	Sensor power supply, 24V DC	
Rated output current per point	150 mA max. per output @ 55℃ (131 °F)	

Attribute	1734-IE4S
On-state voltage drop	≤0.5V
Leakage current, max	< 0.1 mA
Over current detection	Yes
Open load detection	Yes
Aggregate current of sensor outputs per module	600 mA
Terminal base screw torque	See terminal base specifications

(1)   For more information, see Step Response and Filter Response for 1734-IE4S Modules on page 160.

(2)   Use this conductor category information for planning conductor routing. Refer to the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

(3)   For more information, see Figure 33, Accuracy Drift vs Temperature (Current mode) on page 165.

Step Response and Filter Response for 1734-IE4S Modules

Filter Setting	Step Response to 63%	Corner Frequency-3 dB
50 Hz	~ 25 ms	10.2 Hz
10 Hz	~ 72 ms	4.75 Hz
5 Hz	~ 125 ms	2.62 Hz
1 Hz	~ 450 ms	0.68 Hz

Figure 24 - Step Response

Figure 25 - Frequency Response of Current Input with Filter = 1 Hz

Frequency (Hz)

ADC resolution = -72.2 dB

Figure 26 - Frequency Response of Current Input with Filter = 5 Hz

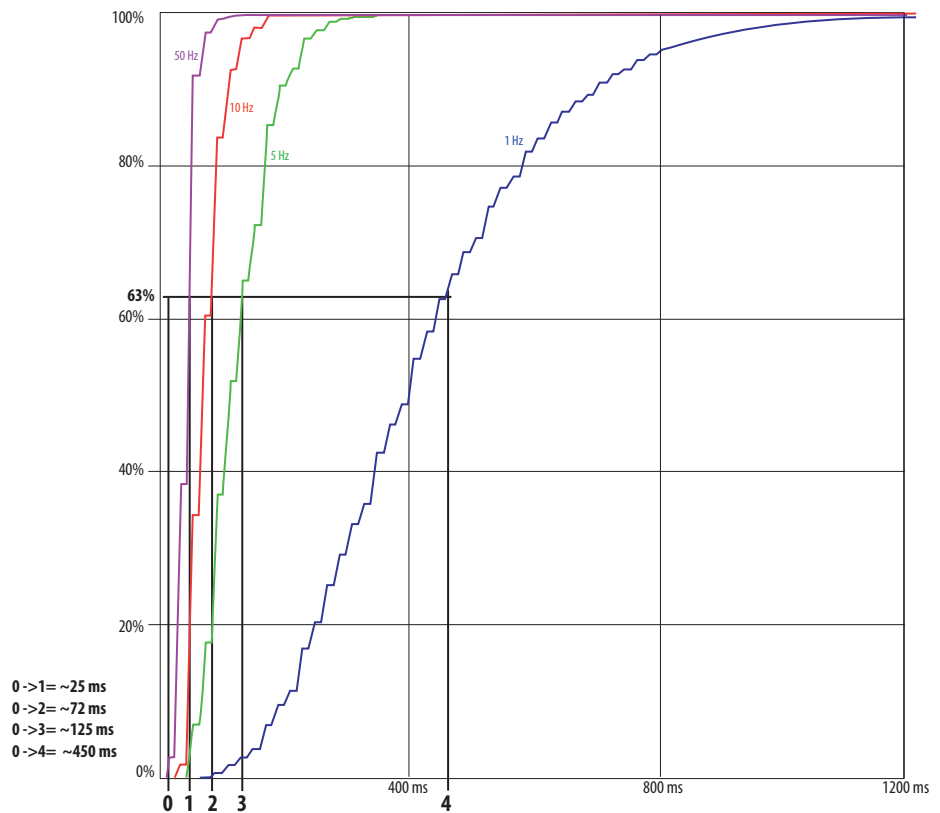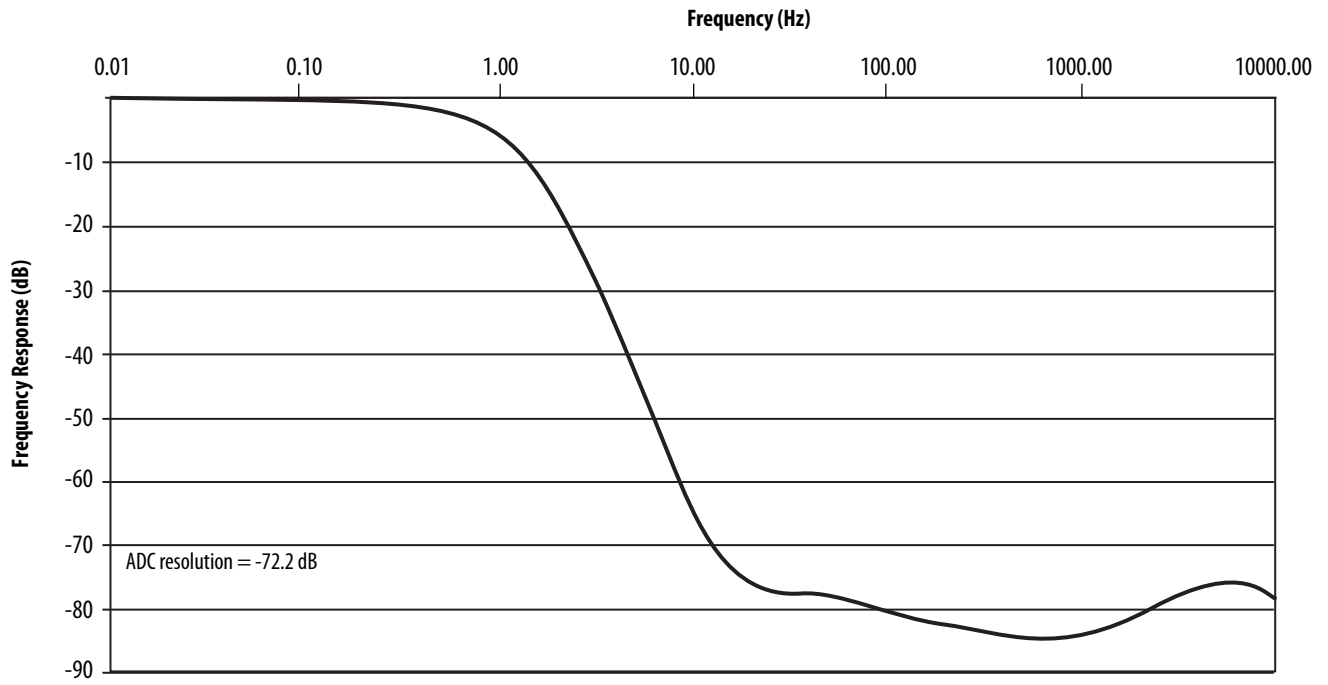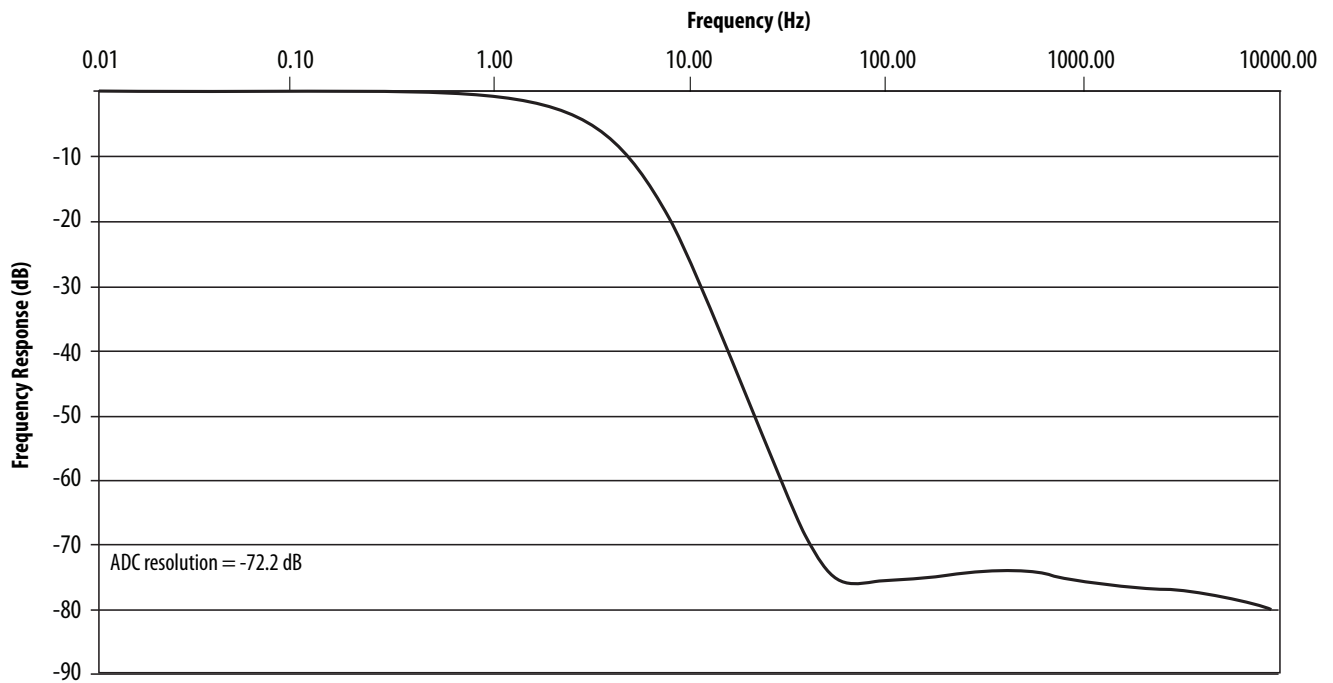**Frequency (Hz)**

ADC resolution = -72.2 dB

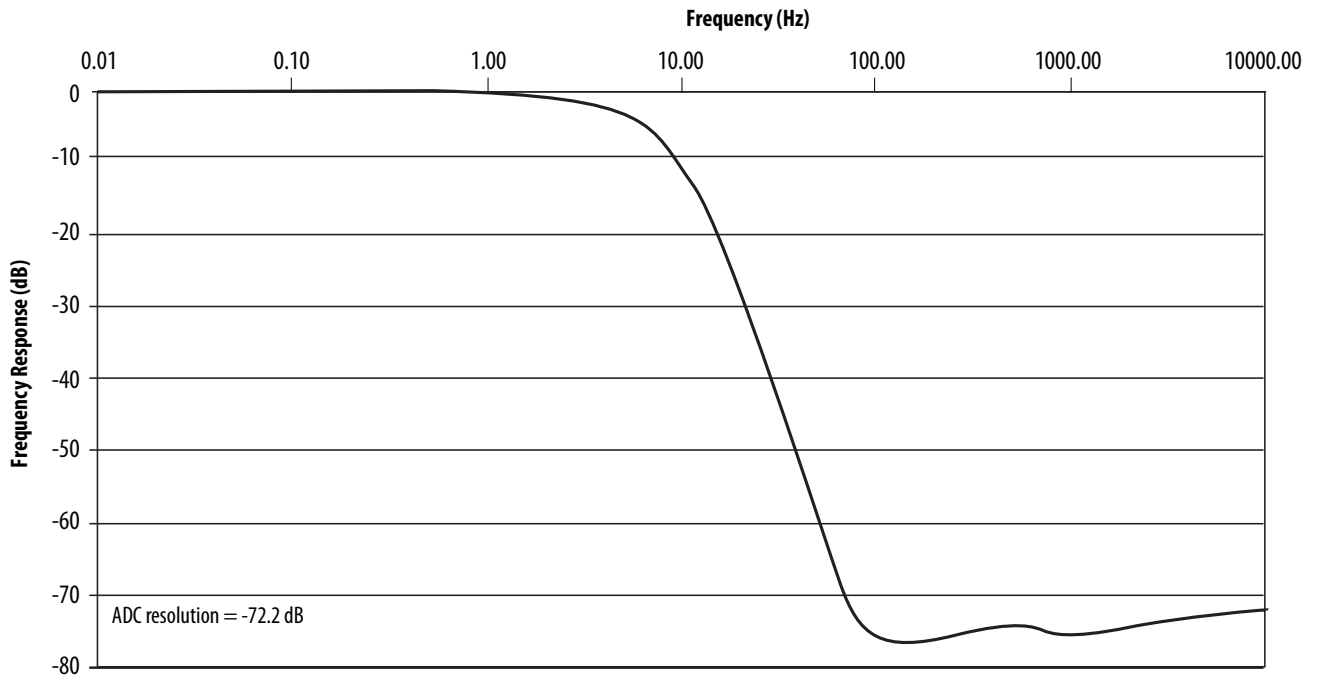**Figure 27 - Frequency Response of Current Input with Filter = 10 Hz**

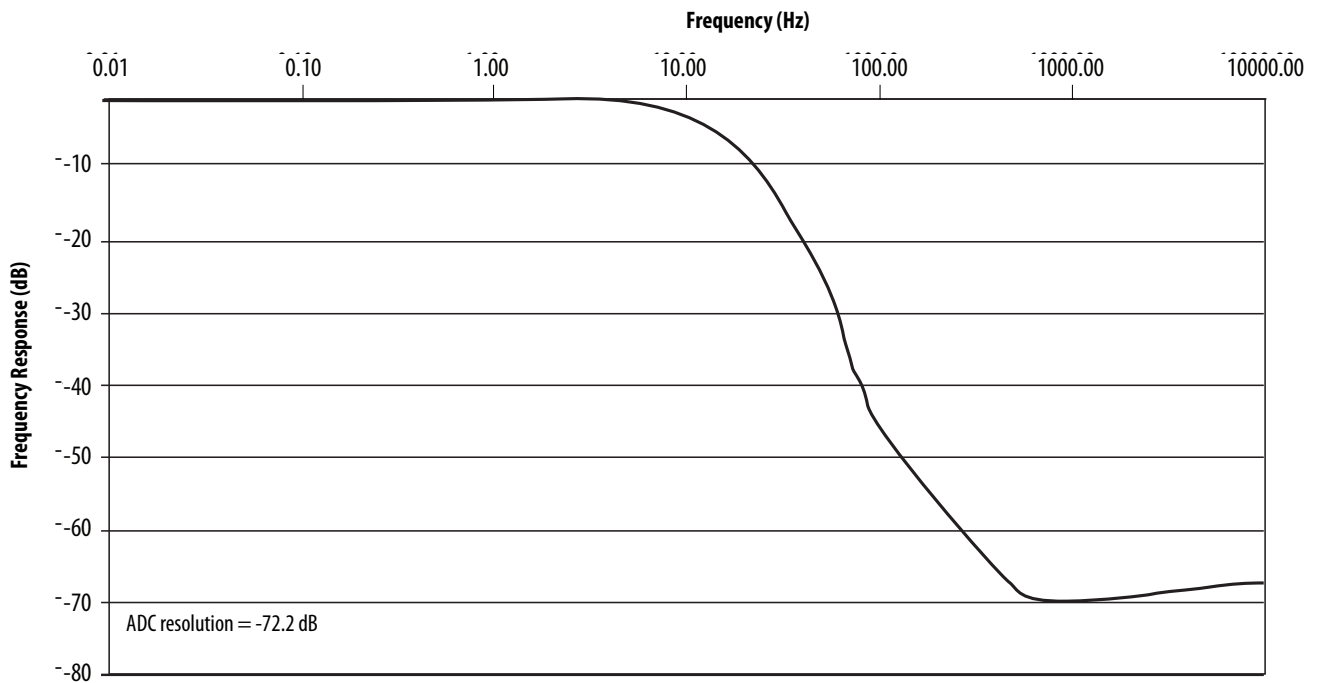**Figure 28 - Frequency Response of Current Input with Filter = 50 Hz**

Figure 29 - Frequency Response of Voltage Input with Filter = 1 Hz

Frequency (Hz)

ADC resolution = -72.2 dB

Figure 30 - Frequency Response of Voltage Input with Filter = 5 Hz

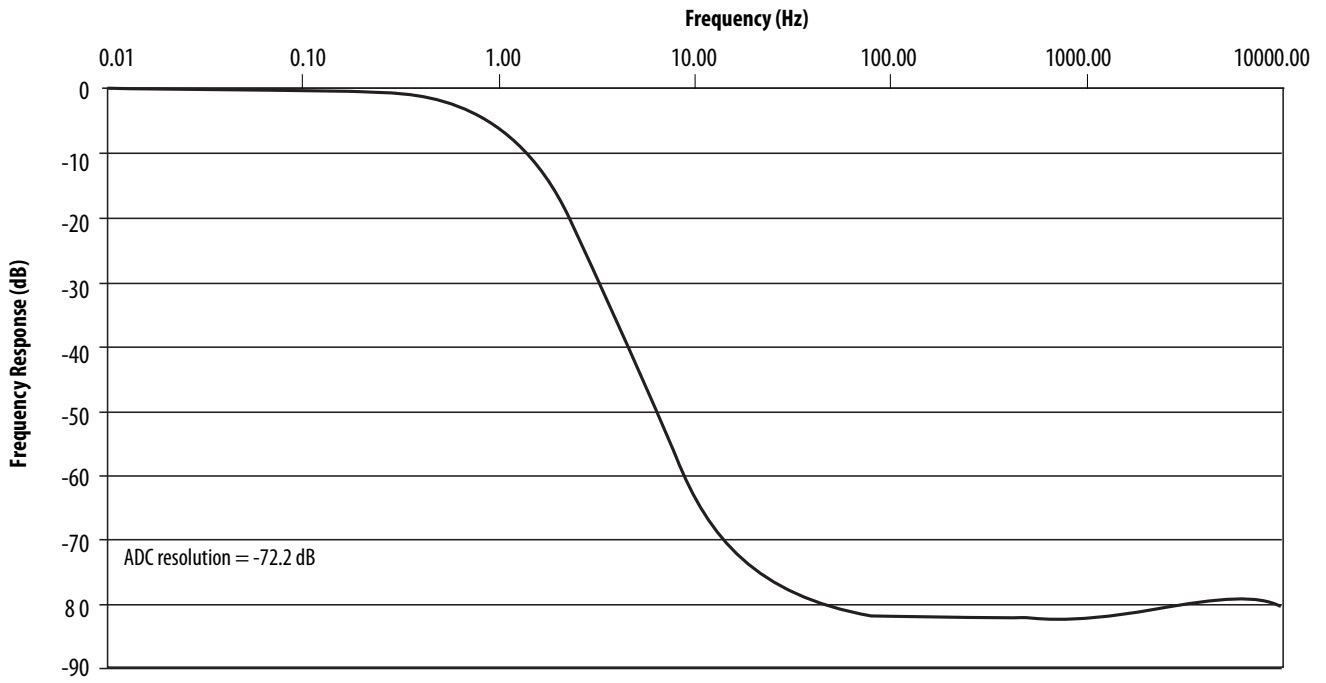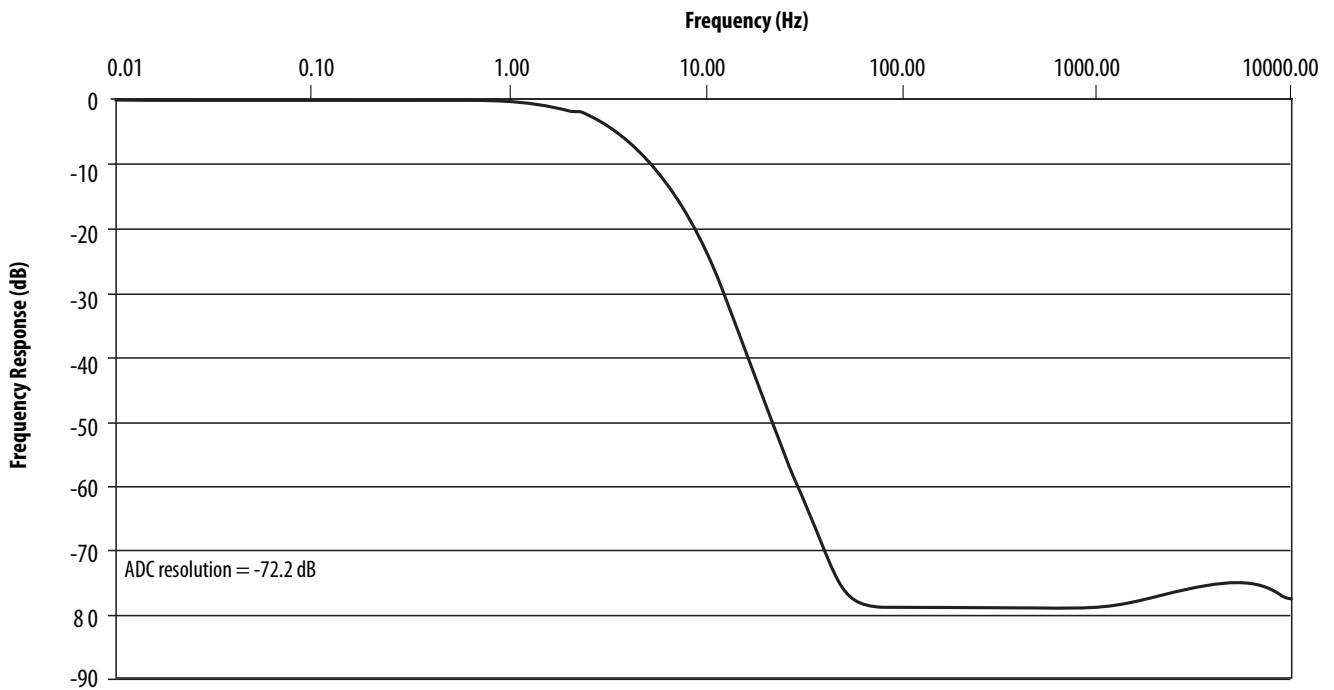**Frequency (Hz)**

ADC resolution = -72.2 dB

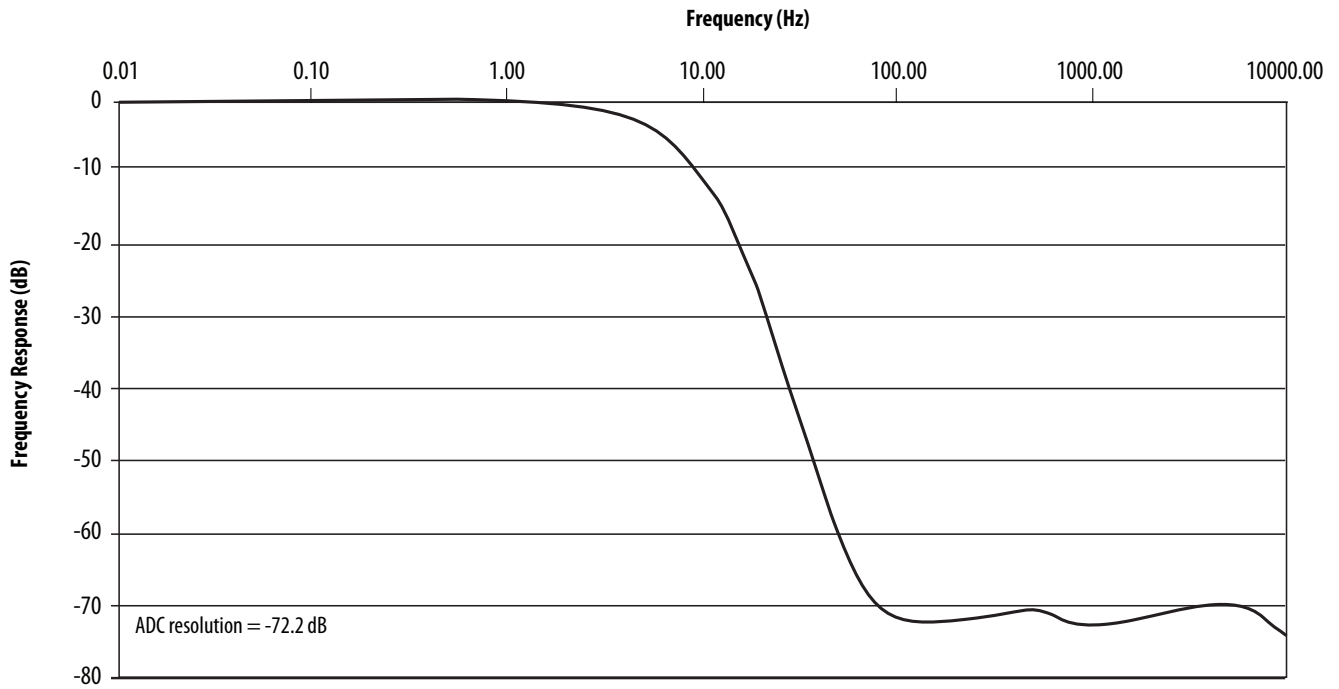**Figure 31 - Frequency Response of Voltage Input with Filter = 10 Hz**

Figure 32 - Frequency Response of Voltage Input with Filter = 50 Hz
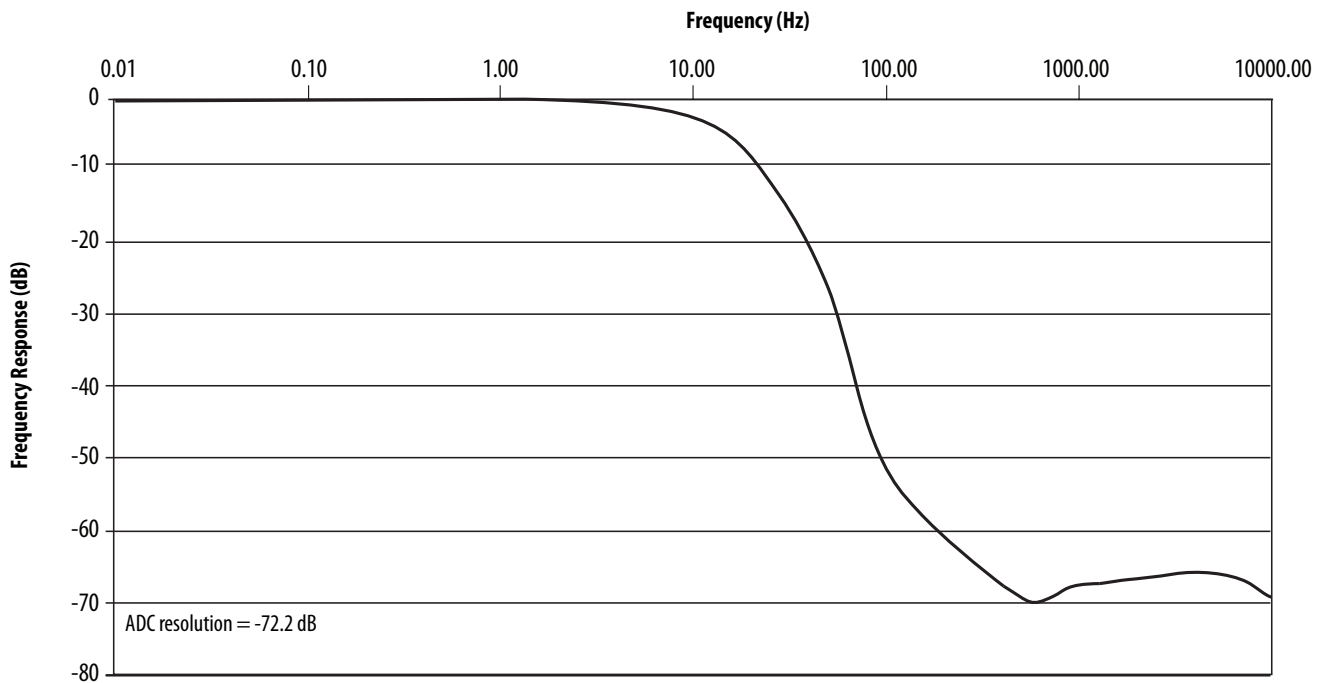
Drift and Temperature

In Current mode, the accuracy drift of the 1734-IE4S module is very dependant on the temperature of the module as well as the amount of current being measured. As shown in <u>Figure 33</u> below, the drift of the module increases greatly when measuring currents above 16mA. To help preserve the accuracy of the1734-IE4S module in Current mode, choose a sensor for your application that can operate in the middle of its range and not at the outer limits.

Figure 33 - Accuracy Drift vs Temperature (Current mode)
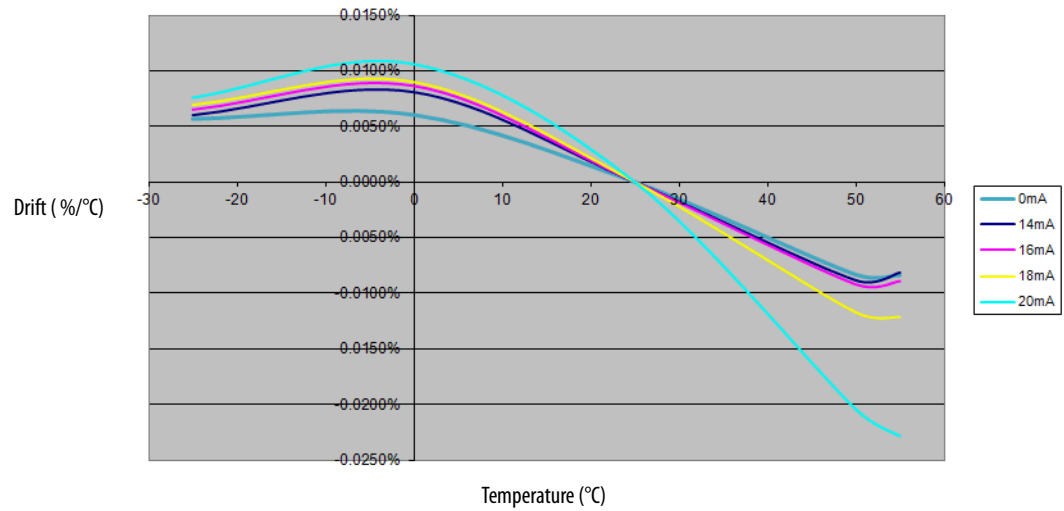
Environmental Specifications

| Attribute	Value
Temperature, operating	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20…55 °C (-4…131 °F)[1]
Temperature, nonoperating	IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock): -40…85 °C (-40…185 °F)
Temperature, surrounding air, max	55 °C (131 °F)[1]
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5…95% noncondensing
Vibration	IEC 60068-2-6, (Test Fc, Operating) 5 g @ 10…500 Hz
Shock, operating	IEC 60068-2-27 (Test Ea, Unpackaged Shock) 30 g
Shock, nonoperating	IEC 60068-2-27 (Test Ea, Unpackaged Shock) 50 g
Emissions	CISPR 11:Group 1, Class A
ESD immunity	IEC 61000-4-2: 6 kV contact discharges 8 kV air discharges
Radiated RF immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80% from 80…2000 MHz 10V/m with 200 Hz 50% Pulse 100%AM at 900 MHz 10V/m with 200 Hz 50% Pulse 100%AM at 1890 MHz 3V/m with 1 kHz sine-wave 80%AM from 2000…2700 MHz
EFT/B immunity	IEC 61000-4-4: ±3 kV at 5 kHz on power ports ±3 kV at 5 kHz on signal ports
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports ±2 kV line-earth (CM) on shielded ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80%AM from 150 kHz…80 MHz

(1)   See Figure 34 , System Temperature Derating When a 1734-IE4S Module Is Used.

Figure 34 - System Temperature Derating When a 1734-IE4S Module Is Used
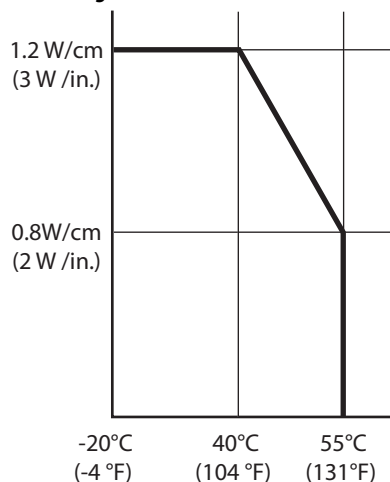
See Placing Digital and Analog Modules on page 44 for examples.

Certifications

POINT Guard I/O modules have the following certifications, when product is marked.

Certification (when product is marked)[1]	1734-IB8S, 1734-0B8S, 1734-IE4S
c-UL-us	Listed Industrial Control Equipment, certified for US and Canada. See UL File E65584. UL Listed for Class I, Division 2, Group A,B,C,D Hazardous Locations, certified for U.S.and Canada. See UL File E194810.
CE	European Union 2004/108/EC EMC Directive, compliant with: • EN 61326-1; Meas./Control/Lab., Industrial Requirements • EN 61000-6-2; Industrial Immunity • EN6100-6-4; Industrial Emissions • EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
Ex	European Union 94/9/EC ATEX Directive, compliant with: • EN 60079-15; Potentially Explosive Atmospheres, Protection 'n' • EN 60079-0; General Requirements II 3 G Ex nA IIC T4X Gc
C-Tick	Australian Radiocommunications Act, compliant with AS/NZS CISPR 11, Industrial Emissions
Functional Safety	Certified by TÜV Rheinland[2] : capable of SIL CL 3 (IEC 61508, IEC 62061) and PLe/Cat. 4 (ISO13849-1)
ODVA	ODVA conformance tested to CIP Safety on DeviceNet specifications
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: • Article 58-2 of Radio Waves Act, Clause 3

(1) See the Product Certification link at http://www.ab.com for Declaration of Conformity, Certificates, and other certification details.
(2) When used with specified firmware revisions.

Additionally, the 1734-IE4S has been certified to meet the following:

- NFPA 79 – Electrical Installation of Industrial Machinery
- NFPA 85 - Burners
- NFPA 86 - Furnaces
- NFPA 72 – Fire Alarms
- EN 14459, EN 13611

Legislations and Standards

Familiarize yourself with related legislation and standards information. Relevant international standards include the following:

- IEC 61508 (SIL 1-3)
- IEC 61131-2
- IEC 60204-1
- IEC 62061
- ISO 13849-1

Notes:

Safety Data

This appendix lists calculated values for probability of failure on demand, probability of failure per hour, and mean time between failure.

Calculated values of probability of failure on demand and probability of failure per hour appear in the table and must be calculated for the devices within the system to comply with the SIL level required for application.

Users must be responsible for following the requirements of ISO 13849-1:2008, to assess performance levels in their safety system.

Within the proof test interval, every I/O module must be functionally tested by individually toggling each input point and verifying that it is detected by the controller.

Additionally, each output point must be individually toggled by the controller and user-verified that the output point changes state.

Reference information in the GuardLogix Controller Systems Safety Reference Manual, publication 1756-RM093.

Figure 23 - Calculated Values for Probability of Failure on Demand (PFD) and Probability of Failure per Hour (PFH)

PFD versus Proof Test Interval
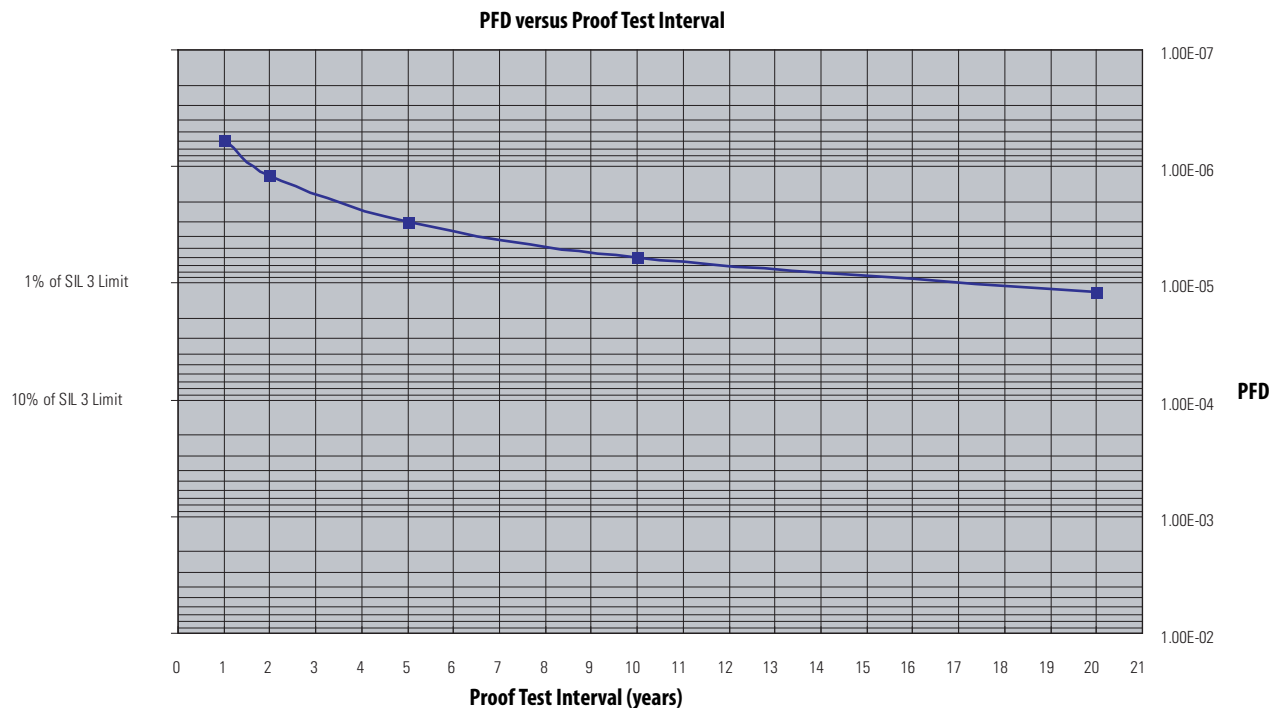
Model	Proof Test Interval (Mission Time)		PFD (1/hour)	PFH (1/hour)	Spurious Trip Rate (STR) [1]	MTTF$_{spurious}$ [2] (years)
	Year	Hour				
1734-IB8S	1	8760	5.85E-07	1.34E-10	2.533E-06	45.07
	2	17520	1.17E-06			
	5	43800	2.93E-06			
	10	87600	5.86E-06			
	20	175200	1.17E-05			
1734-OB8S	1	8760	6.05E-07	1.38E-10	3.096E-06	36.88
	2	17520	1.21E-06			
	5	43800	3.03E-06			
	10	87600	6.06E-06			
	20	175200	1.21E-05			
1734-IE4S	1	8760	1.6E-07	3.7E-11	9.402E-07	121.42
	2	17520	3.2E-07			
	5	43800	8.1E-07			
	10	87600	1.6E-07	3.8E-11		
	20	175200	3.3E-07	3.9E-11		

(1)   Calculated based on ISA TR-84 method
(2)   Mean Time to Failure (Spurious)

Mission Time for all modules is 20 years.

Configuration Parameters

This appendix lists parameters that can be configured via RSLogix 5000 software.

Table 16 - Safety Digital Input Parameters

Parameter Name[1]		Value	Description	Default
x	Input Delay Time Off -> On	0…126 ms (in increments of 6 ms)	Filter time for OFF to ON transition.	
x	Input Delay Time On -> Off	0…126 ms (in increments of 6 ms)	Filter time for ON to OFF transition.	
x	Input Point Mode	Not Used	External input device is not connected.	
		Safety Pulse Test	Use with a contact output device and in combination with a test output. Using this setting, short-circuits between input signal lines and the power supply (positive side) and short-circuits between input signal lines can be detected.	
		Safety	A solid-state output safety sensor is connected.	
		Standard	A standard device, such as a reset switch, is connected.	
x	Safety Input Test Source	Not Used	The test output that is used with the input.	
		Test Output 0		
		Test Output 1		
		Test Output 2		
		Test Output 3		
x	Input Point Operation Type	Single Channel	Use as single channel.	
		Dual-channel Equivalent	Use as dual-channel. Normal when both channels are ON or OFF.	
		Dual-channel Complementary	Use as dual-channel. Normal when one channel is ON and the other channel is OFF.	
x	Safety Input Error Latch Time	0…65,530 ms (in increments of 10 ms)	Safety input or test output errors are latched for this time.	1000 ms

(1) Parameters directly related to safety are marked with an x in the left column.

Table 17 - Test Output Parameters

Parameter Name[1]		Value	Description	Default
x	Test Output Mode	Not Used	An external device is not connected.	Not Used
		Standard	The output is connected to a standard device.	
		Pulse Test	A contact output device is connected. Use in combination with a safety input.	
		Power Supply	The power supply of a Safety Sensor is connected. The voltage supplied to I/O power (V, G) is output from the test output terminal.	
		Muting Lamp Output (Terminal T1 or T3 only)	An indicator is connected and turned ON to detect broken lines in an external indicator.	
	Test Output Fault Action	Clear OFF	Action to perform when a communication error is detected.	Clear OFF
		Hold Last Data		

(1)   Parameters directly related to safety are marked with an x in the left column.

Table 18 - Safety Digital Output Parameters

Parameter Name[1]		Value	Description	Default
x	Output Point Mode	Not Used	An external output devices is not connected.	Not Used
		Safety	When the output is ON, the test pulse is not output (remains ON).	
		Safety Pulse Test	Using this function, short-circuits between output signal lines and the power supply (positive side) and short-circuits between output signal lines can be detected.	
x	Output Point Operation Type	Single Channel	Use as single channel.	Dual-channel
		Dual-channel	Use as dual-channel. When both channels are normal, outputs can be turned ON.	
x	Safety Output Error Latch Time	0…65,530 ms (in increments of 10 ms)	Safety output errors are latched for this time.	1000 ms

(1)   Parameters directly related to safety are marked with an x in the left column.

Parameter Name	Value	Description	Default
Test Output Idle State[1]	Clear OFF or Keep Output Data	Definition of output data is in idle state.	Clear OFF

(1)   Set **only** through explicit messaging. Refer to for [Appendix B](#) more information.

Table 19 - Safety Analog Input Parameters

Parameter Name[1]		Value	Description	Default
x	Input Point Mode	Not Used	External input device is not connected.	
		Safety	A solid-state safety sensor is connected.	Not Used
		Standard	A device that is not used in the safety loop is connected.	
	Range	±10V	Input voltage range.	
		0…5V		
		0…10V		
		±5V		4…20 mA
		4…20 mA	Input current range.	
		0…20 mA		
		Tachometer	Tachometer mode.	

Table 19 - Safety Analog Input Parameters

	Parameter Name[1]	Value	Description	Default
x	Input Point Operation Type	Single channel	Use as single channel.	Single
		Dual channel	Use as a dual channel equivalent. This setting should be used only with SmartGuard controllers.	
	Filter	1 Hz	Input filter	1 Hz
		5 Hz		
		10 Hz		
		50 Hz		
x	Safety Input Error Latch Time	0…65,530 ms (in 10 ms increments)	Safety input errors are latched for this time so that they can be read by the controller and are not missed if they clear themselves too quickly. One value for all channels.	1000
	Low Engineering	–30000…30000	Scaling value for inputs	0
	High Engineering	–30000…30000	Scaling value for inputs	10,000[2]
x	Tachometer Dual Low Diagnostic	ON/OFF	Diagnostic that indicates if both channels are low. Channels 0 and 1 share the same value and channels 2 and 3 share the same value.	Off
	Tachometer Trigger	Falling edge (NPN)	Non-inverted input signal.	Falling edge
		Rising edge (PNP)	Inverted input signal.	
	Tachometer Off Level	0…23V (in 1 V increments)	Off-level for the Tachometer mode input signal.	5V
	Tachometer On Level	1…24V (in 1 V increments)	On-level for the Tachometer mode input signal.	11V
	Sensor Power Mode	External	Sensors are getting their power from a separate power supply.	Module
x		Module	Sensors are getting their power from the module (recommended).	
	Alarm Enable	Disable	Enable or disable alarms. We recommend disabling this feature when using the module in a GuardLogix system (evaluate alarms using the application program). Enable this feature when using the module in a SmartGuard system.	Disable
		Enable		
	High High Alarm Level	–32768…32767	High High alarm trip point.	32767
	Low Low Alarm Level	–32768…32767	Low Low alarm trip point.	–32767
	High High - Low Low Deadband	0…32767	Deadband on the High High and Low Low alarms.	0
	High Alarm	–32768…32767	High alarm trip point.	332767
	Low Alarm	–32768…32767	Low alarm trip point.	0
	High - Low Deadband	0…32767	Deadband on the High and Low alarms.	0
x	Discrepancy Time	0…65,530 (in 10 ms increments)	Time period during which the channel values may be discrepant before an error is reported.	100 ms
x	Discrepancy Deadband	0…32767	Tolerance range between channels in dual-channel mode (in engineering units)	0
x	Channel Offset	–32768…32767	Offset value for dual channel mode only (in engineering units).	0

(1)   Parameters directly related to safety are marked with an x in the left column.

(2)   1000 for Tachometer mode.

Notes:

I/O Assemblies

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Input Assemblies

Table 20 - 1734-IB8S Input Assemblies

Instance Decimal (hex)	Connection Type	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
516 (204h)	Safety and Standard	0	Safety Input 7	Safety Input 6	Safety Input 5	Safety Input 4	Safety Input 3	Safety Input 2	Safety Input 1	Safety Input 0
548 (224h)	Safety Only	0	Safety Input 7	Safety Input 6	Safety Input 5	Safety Input 4	Safety Input 3	Safety Input 2	Safety Input 1	Safety Input 0
		1	Safety Input 7	Safety Input 6	Safety Input 5	Safety Input 4	Safety Input 3	Safety Input 2	Safety Input 1	Safety Input 0
768 (300h)	Standard Only	0	Reserved							Input Power Error
788 (314h)	Safety and Standard	0	Safety Input 7	Safety Input 6	Safety Input 5	Safety Input 4	Safety Input 3	Safety Input 2	Safety Input 1	Safety Input 0
		1	Combined Safety Input	Reserved	Input Power Error[1]	Reserved	Reserved	Reserved	Muting Lamp 3	Muting Lamp 1
820 (334h)	Safety and Standard	0	Safety Input 7	Safety Input 6	Safety Input 5	Safety Input 4	Safety Input 3	Safety Input 2	Safety Input 1	Safety Input 0
		1	Safety Input 7	Safety Input 6	Safety Input 5	Safety Input 4	Safety Input 3	Safety Input 2	Safety Input 1	Safety Input 0
		2	Reserved		Input Power Error[1]	Reserved			Muting Lamp 3	Muting Lamp 1
868 (364h)	Safety and Standard	0	Safety Input 7	Safety Input 6	Safety Input 5	Safety Input 4	Safety Input 3	Safety Input 2	Safety Input 1	Safety Input 0
		1	Safety Input 7	Safety Input 6	Safety Input 5	Safety Input 4	Safety Input 3	Safety Input 2	Safety Input 1	Safety Input 0
		2	Reserved				Test Output 3	Test Output 2	Test Output 1	Test Output 0
		3	Reserved		Input Power Error[1]	Reserved			Muting Lamp 3	Muting Lamp 1
899 (383h)	Standard	0	Reserved							Input Power Error
		1	Reserved				Test Output 3	Test Output 2	Test Output 1	Test Output 0

(1)   This data is diagnostic only and does **not** have safety integrity.

Table 21 - 1734-OB8S Input Assemblies

Instance Decimal (hex)	Connection Type	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
580 (244h)	Safety and Standard	0	Safety Output 7	Safety Output 6	Safety Output 5	Safety Output 4	Safety Output 3	Safety Output 2	Safety Output 1	Safety Output 0
1028 (404h)	Safety and Standard	0	Safety Output 7	Safety Output 6	Safety Output 5	Safety Output 4	Safety Output 3	Safety Output 2	Safety Output 1	Safety Output 0
		1	Safety Output Monitor 7	Safety Output Monitor 6	Safety Output Monitor 5	Safety Output Monitor 4	Safety Output Monitor 3	Safety Output Monitor 2	Safety Output Monitor 1	Safety Output Monitor 0
1044 (414h)	Safety and Standard	0	Safety Output Monitor 7	Safety Output Monitor 6	Safety Output Monitor 5	Safety Output Monitor 4	Safety Output Monitor 3	Safety Output Monitor 2	Safety Output Monitor 1	Safety Output Monitor 0
		1	Reserved	Combined Output	Reserved	Output Power Error	Reserved			

Output Assemblies

Table 22 - Output Assemblies for all POINT Guard I/O Modules

Instance Decimal (hex)	Module	Connection Type	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
33 (21h)	1734-IB8S	Safety[1]	0	Reserved				Standard Output 3	Standard Output 2	Standard Output 1	Standard Output 0
564 (234h)	1734-OB8S	Safety Only	0	Safety Output 7	Safety Output 6	Safety Output 5	Safety Output 4	Safety Output 3	Safety Output 2	Safety Output 1	Safety Output 0
770 (302h)	1734-IE4S	Safety	0	Reserved	Reserved	Reserved	Reserved	Reset Tach 3[2]	Reset Tach 2[2]	Reset Tach 1[2]	Reset Tach 0[2]

(1)   Only outputs 1 and 3 are configurable to Muting or Test Outputs. This assembly is accessible only over a Safety connection.

(2)   When set (1), this bit specifies a reset of an overfrequency condition on the tachometer counter. Clear this bit to allow the tachometer channel to operate.

Analog Input Assemblies

Table 23 - 1734-IE4S Input Assemblies

Instance Decimal (hex)	Connection Type	Byte	High Byte				Low Byte			
402 (192h)	Safety and Standard	0, 1	Input 0				Input 0			
		2, 3	Input 1				Input 1			
		4, 5	Input 2				Input 2			
		6, 7	Input 3				Input 3			
			Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
		8	Reserved	Reserved	Reserved	Reserved	Ch 3 Input Status	Ch 2 Input Status	Ch 1 Input Status	Ch 0 Input Status

Table 23 - 1734-IE4S Input Assemblies

Instance Decimal (hex)	Connection Type	Byte	High Byte				Low Byte			
		0, 1	Input 0				Input 0			
		2, 3	Input 1				Input 1			
		4, 5	Input 2				Input 2			
		6, 7	Input 3				Input 3			
			Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
		8	Reserved	Reserved	Reserved	Reserved	Ch 3 Input Status	Ch 2 Input Status	Ch 1 Input Status	Ch 0 Input Status
		9	Alarms 0[1]							
786 (312h)	Safety and Standard		Reserved	Tachometer Dual Low	Tachometer Underfrequency	Tachometer Overfrequency	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
		10	Alarms 1[1]							
			Reserved	Tachometer Dual Low	Tachometer Underfrequency	Tachometer Overfrequency	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
		11	Alarms 2[1]							
			Reserved	Tachometer Dual Low	Tachometer Underfrequency	Tachometer Overfrequency	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
		12	Alarms 3[1]							
			Reserved	Tachometer Dual Low	Tachometer Underfrequency	Tachometer Overfrequency	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
Instance Decimal (hex)	**Connection Type**	**Byte**	**High Byte**				**Low Byte**			
		0, 1	Input 0				Input 0			
		2, 3	Input 1				Input 1			
		4, 5	Input 2				Input 2			
		6, 7	Input 3				Input 3			
			Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
		8	Ch 3 Combined Alarm Status	Ch 2 Combined Alarm Status	Ch 1 Combined Alarm Status	Ch 0 Combined Alarm Status	Ch 3 Input Status	Ch 2 Input Status	Ch 1 Input Status	Ch 0 Input Status
		9	Fault Reason 0							
		10	Fault Reason 1							
		11	Fault Reason 2							
		12	Fault Reason 3							
802 (322h)	Safety and Standard	13	Alarms 0[1]							
			Reserved	Tachometer Dual Low	Tachometer Underfrequency	Tachometer Overfrequency	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
		14	Alarms 1[1]							
			Reserved	Tachometer Dual Low	Tachometer Underfrequency	Tachometer Overfrequency	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
		15	Alarms 2[1]							
			Reserved	Tachometer Dual Low	Tachometer Underfrequency	Tachometer Overfrequency	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
		16	Alarms 3[1]							
			Reserved	Tachometer Dual Low	Tachometer Underfrequency	Tachometer Overfrequency	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
		17	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Input Power
Instance Decimal (hex)	**Connection Type**	**Byte**	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
930 (3A2h)	Safety and Standard	0	Ch 3 Combined Alarm Status	Ch 2 Combined Alarm Status	Ch 1 Combined Alarm Status	Ch 0 Combined Alarm Status	Ch 3 Input Status	Ch 2 Input Status	Ch 1 Input Status	Ch 0 Input Status

Table 23 - 1734-IE4S Input Assemblies

Instance Decimal (hex)	Connection Type	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
946 (3B2h)	Safety and Standard	0	Ch 3 Combined Alarm Status	Ch 2 Combined Alarm Status	Ch 1 Combined Alarm Status	Ch 0 Combined Alarm Status	Ch 3 Input Status	Ch 2 Input Status	Ch 1 Input Status	Ch 0 Input Status
		1	Alarms 0[1]							
			Reserved	Tachometer Dual Low	Tachometer Underfrequency	Tachometer Overfrequency	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
		2	Alarms 1[1]							
			Reserved	Tachometer Dual Low	Tachometer Underrange	Tachometer Overrange	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
		3	Alarms 2[1]							
			Reserved	Tachometer Dual Low	Tachometer Underrange	Tachometer Overrange	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
		4	Alarms 3[1]							
			Reserved	Tachometer Dual Low	Tachometer Underrange	Tachometer Overrange	Low Alarm Status	High Alarm Status	Low Low Alarm Status	High High Alarm Status
		5	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Input Power [1]

(1)   0 = fault; 1 = within range.

Configuration Assemblies

Refer to the appropriate table for 1734-IB8S, 1734-OB8S, and 1734-IE4S configuration assembly data.

Table 24 - Configuration Assemblies for 1734-OB8S Output Modules

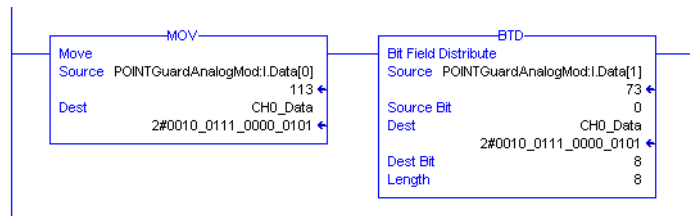| Instance Decimal (hex)	Byte	Field	Class (hex)	Instance (decimal)	Attribute (decimal)
864 (360h)	0	Safety Output Latch Error Time (low byte)	3B	0	8
	1	Safety Output Latch Error Time (high byte)			
	2	Safety Output 0 Channel Mode	3B	1	6
	3	Safety Output 1 Channel Mode		2	
	4	Safety Output 2 Channel Mode		3	
	5	Safety Output 3 Channel Mode		4	
	6	Safety Output 4 Channel Mode		5	
	7	Safety Output 5 Channel Mode		6	
	8	Safety Output 6 Channel Mode		7	
	9	Safety Output 7 Channel Mode		8	
	10	Dual-channel Safety Output 0 Mode	3F	1	3
	11	Dual-channel Safety Output 1 Mode		2	
	12	Dual-channel Safety Output 2 Mode		3	
	13	Dual-channel Safety Output 3 Mode		4	

Table 25 - Configuration Assemblies for 1734-IB8S Input Modules

Instance Decimal (hex)	Byte	Field	Class (hex)	Instance (decimal)	Attribute (decimal)
864 (360h)	0	Test Output 0 Mode	9	1	13
	1	Test Output 1 Mode		2	
	2	Test Output 2 Mode		3	
	3	Test Output 3 Mode		4	
	4	Safety Input Latch Error Time (low byte)	3D	0	8
	5	Safety Input Latch Error Time (high byte)			
	6	Safety Input 0 Off_On_Delay (low byte)		1	5
	7	Safety Input 1 Off_On_Delay (high byte)			
	8	Safety Input 0 On_Off_Delay (low byte)			6
	9	Safety Input 0 On_Off_Delay (high byte)			
	10	Safety Input 0 Channel Mode			8
	11	Safety Input 0 Test Source			9
	. . .	Safety Input 1…6 Configuration Data		. . .	. . .
	48	Safety Input 7 Off_On_Delay (low byte)		8	5
	49	Safety Input 7 Off_On_Delay (high byte)			
	50	Safety Input On_Off_Delay (low byte)			6
	51	Safety Input On_Off_Delay (high byte)			
	52	Safety Input 7 Channel Mode			8
	53	Safety Input 7 Test Source			9
	54	Dual-channel Safety Input 0 Mode	348	1	3
	55	Pad Byte (0x00)	. . .	. . .	. . .
	56	Dual-channel Safety Input 0 Discrepancy Time (low byte)	348	1	5
	57	Dual-channel Safety Input 0 Discrepancy Time (high byte)			
	. . .	Dual-channel Safety Input 1…2 Configuration	. . .	. . .	. . .
	66	Dual-channel Safety Input 3 Mode	348	4	3
	67	Pad Byte (0x00)	. . .	. . .	. . .
	68	Dual-channel Safety Input 3 Discrepancy Time (low byte)	348	4	5
	69	Dual-channel Safety Input 3 Discrepancy Time (high byte)			

Table 26 - Configuration Assemblies for 1734-IE4S Input Modules

Instance Decimal (hex)	Byte	Field	Class (hex)	Instance (decimal)	Attribute (decimal)	Description
864 (360h)	0	Input Type (Dual Channel Mode)	4B	1	1	
	1	Input Range	49	1	3	
	2	Input Channel Mode	49	1	4	
	3	Filter Setting	49	1		
	4	Input Error Latch Time (Low Byte)	49	1	8	
	5	Input Error Latch Time (High Byte)	49	1	8	
	6	Low Engineering (Low Byte)	49	1	14	
	7	Low Engineering (High Byte)	49	1	14	
	8	High Engineering (Low Byte)	49	1	15	
	9	High Engineering (High Byte)	49	1	15	
	10	Tach Dual Low Check	49	1	104	
	11	Tach Trigger	49	1	105	
	12	Tach OFF Level	49	1	106	
	13	Tach ON Level	49	1	107	
	14	Sensor Power Mode	49	1	103	
	15	High High/Low Low Alarm Enable	49	1	17	Safety Input 0 Configuration Data
	16	High High/Low Low Alarm Trip High (Low Byte)	49	1	18	
	17	High High/Low Low Alarm Trip High (High Byte)	49	1	18	
	18	High High/Low Low Alarm Trip Low Low(Low Byte)	49	1	19	
	19	High High/Low Low Alarm Trip Low Low(High Byte)	49	1	19	
	20	High High/Low Low Alarm Deadband (Low Byte)	49	1	20	
	21	High High/Low Low Deadband (High Byte)	49	1	20	
	22	Pad Byte (Reserved)	49	. . .	. . .	
	23	High/Low Alarm Enable	49	1	22	
	24	High/Low Alarm Trip High (Low Byte)	49	1	23	
	25	High/Low Alarm Trip High (High Byte)	49	1	23	
	26	High/Low Alarm Trip Low (Low Byte)	49	1	24	
	27	High/Low Alarm Trip Low (High Byte)	49	1	24	
	28	High/Low Alarm Deadband (Low Byte)	49	1	25	
	29	High/Low Alarm Deadband High Byte)	49	1	25	
	30	Pad Byte 1	. . .	. . .	. . .	
	31	Pad Byte 2	. . .	. . .	. . .	

Table 26 - Configuration Assemblies for 1734-IE4S Input Modules

Instance Decimal (hex)	Byte	Field	Class (hex)	Instance (decimal)	Attribute (decimal)	Description
864 (360h)	32	Input Type (Dual Channel Mode)	4B	2	1	
	33	Input Range	49	2	3	
	34	Input Channel Mode	49	2	4	
	35	Filter Setting	49	2		
	36	Input Error Latch Time (Low Byte)	49	2	8	
	37	Input Error Latch Time (High Byte)	49	2	8	
	38	Low Engineering (Low Byte)	49	2	14	
	39	Low Engineering (High Byte)	49	2	14	
	40	High Engineering (Low Byte)	49	2	15	
	41	High Engineering (High Byte)	49	2	15	
	42	Tach Dual Low Check	49	2	104	
	43	Tach Trigger	49	2	105	
	44	Tach OFF Level	49	2	106	
	45	Tach ON Level	49	2	107	
	46	Sensor Power Mode	49	2	103	
	47	High High/Low Low Alarm Enable	49	2	17	Safety Input 1 Configuration Data
	48	High High/Low Low Alarm Trip High (Low Byte)	49	2	18	
	49	High High/Low Low Alarm Trip High (High Byte)	49	2	18	
	50	High High/Low Low Alarm Trip Low Low(Low Byte)	49	2	19	
	51	High High/Low Low Alarm Trip Low Low(High Byte)	49	2	19	
	52	High High/Low Low Alarm Deadband (Low Byte)	49	2	20	
	53	High High/Low Low Deadband (High Byte)	49	2	20	
	54	Pad Byte (Reserved)	49	. . .	. . .	
	55	High/Low Alarm Enable	49	2	22	
	56	High/Low Alarm Trip High (Low Byte)	49	2	23	
	57	High/Low Alarm Trip High (High Byte)	49	2	23	
	58	High/Low Alarm Trip Low (Low Byte)	49	2	24	
	59	High/Low Alarm Trip Low (High Byte)	49	2	24	
	60	High/Low Alarm Deadband (Low Byte)	49	2	25	
	61	High/Low Alarm Deadband High Byte)	49	2	25	
	62	Pad Byte 1	. . .	. . .	. . .	
	63	Pad Byte 2	. . .	. . .	. . .	

Table 26 - Configuration Assemblies for 1734-IE4S Input Modules

Instance Decimal (hex)	Byte	Field	Class (hex)	Instance (decimal)	Attribute (decimal)	Description
864 (360h)	64	Input Type (Dual Channel Mode)	4B	3	1	
	65	Input Range	49	3	3	
	66	Input Channel Mode	49	3	4	
	67	Filter Setting	49	3		
	68	Input Error Latch Time (Low Byte)	49	3	8	
	69	Input Error Latch Time (High Byte)	49	3	8	
	70	Low Engineering (Low Byte)	49	3	14	
	71	Low Engineering (High Byte)	49	3	14	
	72	High Engineering (Low Byte)	49	3	15	
	73	High Engineering (High Byte)	49	3	15	
	74	Tach Dual Low Check	49	3	104	
	75	Tach Trigger	49	3	105	
	76	Tach OFF Level	49	3	106	
	77	Tach ON Level	49	3	107	
	78	Sensor Power Mode	49	3	103	
	79	High High/Low Low Alarm Enable	49	3	17	Safety Input 2 Configuration Data
	80	High High/Low Low Alarm Trip High (Low Byte)	49	3	18	
	81	High High/Low Low Alarm Trip High (High Byte)	49	3	18	
	82	High High/Low Low Alarm Trip Low Low(Low Byte)	49	3	19	
	83	High High/Low Low Alarm Trip Low Low(High Byte)	49	3	19	
	84	High High/Low Low Alarm Deadband (Low Byte)	49	3	20	
	85	High High/Low Low Deadband (High Byte)	49	3	20	
	86	Pad Byte (Reserved)	49	. . .	. . .	
	87	High/Low Alarm Enable	49	3	22	
	88	High/Low Alarm Trip High (Low Byte)	49	3	23	
	89	High/Low Alarm Trip High (High Byte)	49	3	23	
	90	High/Low Alarm Trip Low (Low Byte)	49	3	24	
	91	High/Low Alarm Trip Low (High Byte)	49	3	24	
	92	High/Low Alarm Deadband (Low Byte)	49	3	25	
	93	High/Low Alarm Deadband High Byte)	49	3	25	
	94	Pad Byte 1	. . .	. . .	. . .	
	95	Pad Byte 2	. . .	. . .	. . .	

Table 26 - Configuration Assemblies for 1734-IE4S Input Modules

Instance Decimal (hex)	Byte	Field	Class (hex)	Instance (decimal)	Attribute (decimal)	Description
864 (360h)	96	Input Type (Dual Channel Mode)	49	4	1	
	97	Input Range	49	4	3	
	98	Input Channel Mode	49	4	4	
	99	Filter Setting	49	4		
	100	Input Error Latch Time (Low Byte)	49	4	8	
	101	Input Error Latch Time (High Byte)	49	4	8	
	102	Low Engineering (Low Byte)	49	4	14	
	103	Low Engineering (High Byte)	49	4	14	
	104	High Engineering (Low Byte)	49	4	15	
	105	High Engineering (High Byte)	49	4	15	
	106	Tach Dual Low Check	49	4	104	
	107	Tach Trigger	49	4	105	
	108	Tach OFF Level	49	4	106	
	109	Tach ON Level	49	4	107	
	110	Sensor Power Mode	49	4	103	
	111	High High/Low Low Alarm Enable	49	4	17	Safety Input 3 Configuration Data
	112	High High/Low Low Alarm Trip High (Low Byte)	49	4	18	
	113	High High/Low Low Alarm Trip High (High Byte)	49	4	18	
	114	High High/Low Low Alarm Trip Low Low(Low Byte)	49	4	19	
	115	High High/Low Low Alarm Trip Low Low(High Byte)	49	4	19	
	116	High High/Low Low Alarm Deadband (Low Byte)	49	4	20	
	117	High High/Low Low Deadband (High Byte)	49	4	20	
	118	Pad Byte (Reserved)	49	…	…	
	119	High/Low Alarm Enable	49	4	22	
	120	High/Low Alarm Trip High (Low Byte)	49	4	23	
	121	High/Low Alarm Trip High (High Byte)	49	4	23	
	122	High/Low Alarm Trip Low (Low Byte)	49	4	24	
	123	High/Low Alarm Trip Low (High Byte)	49	4	24	
	124	High/Low Alarm Deadband (Low Byte)	49	4	25	
	125	High/Low Alarm Deadband High Byte)	49	4	25	
	126	Pad Byte 1	…	…	…	
	127	Pad Byte 2	…	…	…	
864 (360h)	128	Ch 0_1 Discrepancy Time (Low Byte)	4B	1	3	
	129	Ch 0_1 Discrepancy Time (High Byte)	4B	1	3	
	130	Ch 0_1 Discrepancy Deadband (Low Byte)	4B	1	6	Dual Channel Safety Input 0_1 Configuration
	131	Ch 0_1 Discrepancy Deadband (High Byte)	4B	1	6	
	132	Ch 0_1 Channel Offset (Low Byte)	4B	1	100	
	133	Ch 0_1 Channel Offset (High Byte)	4B	1	100	
	134	Ch 2_3 Discrepancy Time (Low Byte)	4B	2	3	
	135	Ch 2_3 Discrepancy Time (High Byte)	4B	2	3	
	136	Ch 2_3 Discrepancy Deadband (Low Byte)	4B	2	6	Dual Channel Safety Input 2_3 Configuration
	137	Ch 2_3 Discrepancy Deadband (High Byte)	4B	2	6	
	138	Ch 2_3 Channel Offset (Low Byte)	4B	2	100	
	139	Ch 2_3 Channel Offset (High Byte)	4B	2	100	

Using Data from Modules Configured via the Generic Profile

To use I/O assembly data from a 1734-IE4S module configured via the Generic Profile in your application program, you must first combine the input data from two SINTs into a single INT. The following example shows one method for converting the data by using a Move instruction and a Bit Field Distribute instruction.

EXAMPLE   This example uses Input Assembly Instance 802, which is described on page .

- POINTGuardAnalogMod.I.Data[0] = Channel 0 Low Byte (SINT)
- POINTGuardAnalogMod.I.Data[1] = Channel 0 High Byte (SINT)
- CH0_Data = Combined Channel 0 data (INT) that can be used in an application program

```
                 ──MOV──                                    ──BTD──
        Move                               Bit Field Distribute
        Source  POINTGuardAnalogMod:I.Data[0]   Source  POINTGuardAnalogMod:I.Data[1]
                                113 ←                              73 ←
        Dest                CH0_Data          Source Bit                0
                2#0010_0111_0000_0101 ←       Dest               CH0_Data
                                                      2#0010_0111_0000_0101 ←
                                             Dest Bit                 8
                                             Length                   8
```

Appendix **G**

History of Changes

This appendix summarizes the changes made in each revision of this manual.

1734-UM013E-EN-P, March 2012

Not published. See Summary of Changes on page 3 for changes made after September 2011.

1734-UM013D-EN-P, September 2011

Change
Updated values for maximum power dissipation and maximum thermal dissipation

1734-UM013C-EN-P, August 2010

Change
Muting lamp operation (test outputs T1 and T3)
Updated surrounding air specification
Revised TÜV certification

1734-UM013B-EN-P, June 2009

Change	
Revised information	ISO International Standard
	IEC European Standard
	Environment and enclosure
	Removal and insertion under power
	Monitoring a test output status attribute ID
	1734-IB8S Input voltage specification
	Off-state input voltage specification
	1734-IB8S and 1734-OB8S temperature ranges
	Isolation voltage specification
	North American Temperature Code
	Radiated RF Immunity specification
	CE certification
	TÜV certification

Change	
New information	European Hazardous Location Approval
	Warning statement about European Zone 2 certification
	North American Hazardous Location Approval
	Setting the node address of a POINT Guard I/O module
	Resetting POINT Guard I/O modules to out-of-box condition
	Auto-addressing with a 1734-PDN adapter
	IEC Temperature Code
	c-UL-us certification
	Ex certification
	ODVA certification

1734-UM013A-EN-P, February 2009

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