POINT Guard I/O Safety Modules

Installation & User Manual

(Catalog Numbers 1734-IB8S, 1734-OB8S)

ALLEN-BRADLEY • ROCKWELL SOFTWARE

Rockwell Automation

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://literature.rockwellautomation.com) 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.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
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.

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How To Use This Manual

Read and understand this manual before using the POINT Guard I/O modules. Consult your Rockwell Automation representative if you have any questions or comments.

Common Techniques Used in This Manual

These conventions are used throughout this manual:

- Numbered lists provide sequential steps.
- Bulleted lists provide information, not sequential steps.

About the Specifications and Dimensions in This Manual

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

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	Acronym for 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	Acronym for mean time between failure, the average time between failure occurrences.
ODVA	Acronym for Open DeviceNet Vendor Association, a nonprofit association of vendors established for the promotion of CIP networks.
PFD	Acronym for probability of failure on demand, the average probability of a system to fail to perform its design function on demand.
PFH	Acronym for 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	Acronym for 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.

Notes:

POINT Guard I/O Overview

Introduction

Use the POINT Guard I/O Safety Modules in the POINT I/O platform to distribute Safety I/O on a GuardLogix or SmartGuard system. You can configure the modules by using the network configuration tool, RSNetWorx software, or the GuardLogix programming tool, RSLogix 5000 software, version 17 or later. GuardLogix systems are designed for the use of POINT Guard I/O modules with an EtherNet/IP adapter.

The mounting base assembly (catalog numbers 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 numbers 1734-TOP, 1734-TOPS, 1734-TOP3, or 1734-TOP3S).

IMPORTANT You need two mounting base assemblies for each 1734-IB8S or 1734-OB8S module. Do not use 1734-TB3 or 1734-TB3S mounting base assemblies.

Before You Begin

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':

- Thoroughly read and understand this manual before installing and operating the module. Also refer to the related documentation as necessary, listed in Appendix F.
- 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, and functions of the machine.
- Verify that a safety administrator conducts a risk assessment on the machine and determines module suitability before installation.
- Verify for CE LVD compliance, the external power supply that provides power to the modules is safety extra-low voltage (SELV) rated. Some Rockwell Automation Bulletin 1606 power supplies are SELV-compliant. Verify this in the Bulletin 1606 Installation Instructions.

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

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.

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

Know and observe all prohibitions of use applicable to this product.

Never use the 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 product is properly rated and installed for the intended use within the overall equipment or system.

Follow Precautions for Use

ATTENTION

Safety state of the outputs is defined as the off state. For complete details of the safety state of inputs, be sure to review Chapter 2.

Safety 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 safety state.

Serious injury may occur due to breakdown of safety outputs. Do not connect loads beyond the rated value to the safety outputs.

Serious injury may occur due to loss of required safety functions. Wire the module properly so that supply voltages or voltages for loads do **not** touch the safety outputs accidentally or inadvertently.

ATTENTION

Use DC supply satisfying the following requirements to prevent electric shock:

- A DC power supply with double or reinforced insulation, for example, according to IEC/EN 60950 or EN 50178 or a transformer according to IEC/EN 61558.
- A DC supply satisfies requirement for class 2 circuits or limited voltage/current circuit stated in UL 508.
- Use an external power supply that is safety extra-low voltage (SELV) rated.

ATTENTION

This equipment is considered Group I, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted, as well as radiated disturbance.

ATTENTION

Follow these precautions for safe use.

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.

Apply properly specified voltages to the module inputs. 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.

Never use test outputs as safety outputs. Test outputs are not safety outputs.

Note that after installation of the module, a safety administrator must confirm the installation and conduct trial operation and maintenance.

Do not disassemble, repair, or modify the module. This may result in loss of safety functions.

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.

Note that it is up to the user to confirm compliance with the applicable standards for the entire system.

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.

Precautions to Mount, Wire, and Clean

Observe these precautions to prevent operation failure, malfunctions, or undesirable effects on product performance.

Follow terminal base instructions for insertion and removal.

Follow these precautions when wiring modules:

- Do not place communication lines and I/O lines in the same wiring duct or track as high voltage lines.
- Wire correctly after confirming the signal names of all terminals.
- Follow torquing specifications as indicated in the terminal base installation instructions.

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

- Thinner
- Benzene
- Acetone

I/O Module Overview

The POINT Guard I/O modules implement the CIP-safety protocol extensions over EtherNet/IP and DeviceNet networks and provide various features for a safety system.

Use the modules to construct a safety-control network system that meets the requirements up to Safety Integrity Level 3 (SIL 3) as defined in IEC 61508, Functional Safety of Electrical, Electronic, and Programmable Electronic Safety-related Systems, and the requirements for Safety Category 4 of the EN ISO 13849-1 standard.

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. This is a list of features common to POINT Guard I/O modules:

- Safety 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.
  - The time of a logical discrepancy between two channels can be monitored by using a discrepancy time setting.
  - Single-channel mode for SIL 2 rated safety devices and applications.

  - 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 delay is available per channel.
- Test outputs (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.
- Safety outputs
  - 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, 4, and applications rated up to and including Performance Level e.
    - Safety outputs can be pulse tested to detect field wiring shorts to 24V DC.
- I/O status data—In addition to I/O state data, the module includes status data for monitoring I/O faults within each circuit.
- Security—The configuration information of the module can be protected by a password.

Safety System Architecture

POINT Guard I/O modules are used in the POINT I/O platform and can communicate safety messages via network adapters to connect to EtherNet/IP or DeviceNet networks.

Recommended Adapters

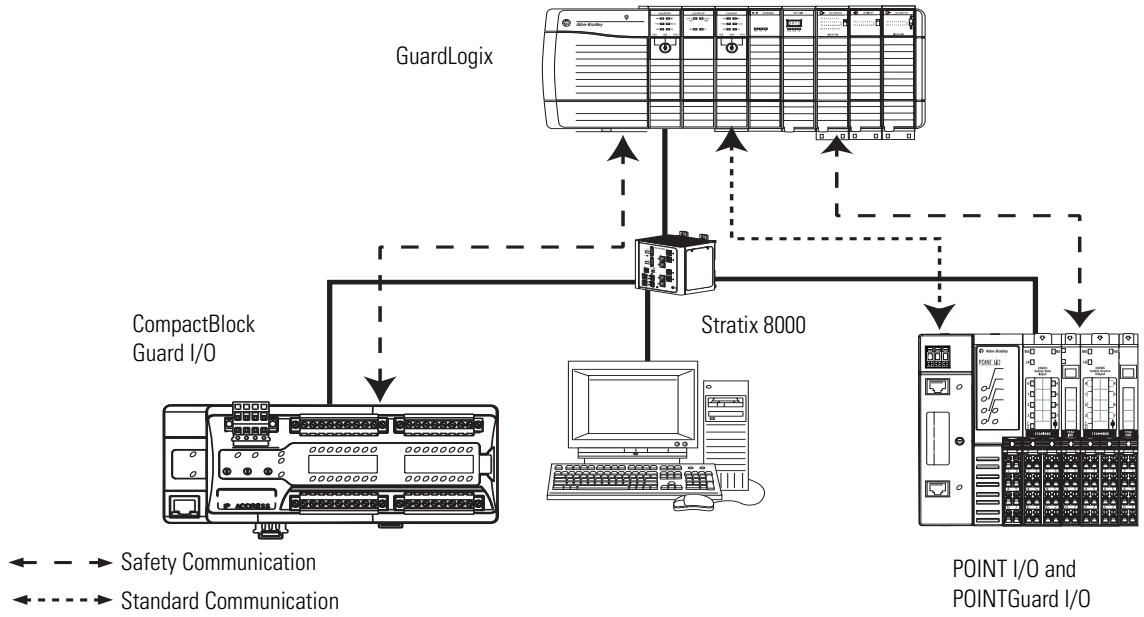
Network	System	Adapter[1]
EtherNet/IP	GuardLogix	1734-AENT
		1734-AENTR
DeviceNet	SmartGuard	1734-PDN

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

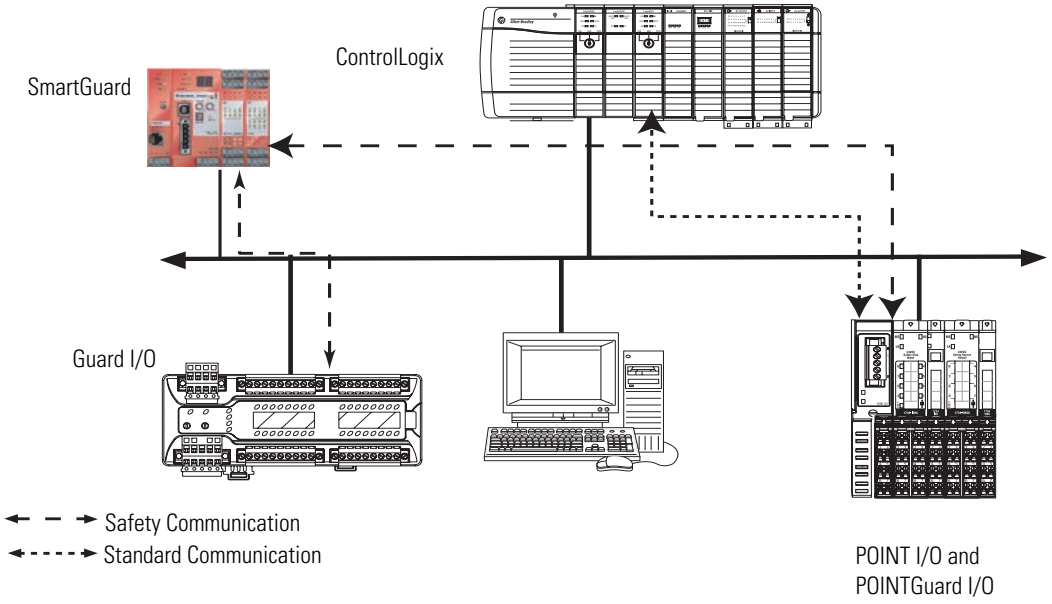
CIP Safety Architectures

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.

POINT Guard I/O Modules in EtherNet/IP Safety Architecture



POINT Guard I/O Modules in DeviceNet Safety Architectures



Safety Application Requirements

The POINT Guard I/O system is certified for use in safety applications up to and including Safety Integrity Level (SIL) 3 and Category (CAT) 4 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.

For safety system requirements, including functional validation test intervals, system reaction time, and PFD/PFH calculations, refer to the GuardLogix Controller Systems Safety Reference Manual, publication 1756-RM093. You must read, understand, and fulfill these requirements prior to operating a POINT Guard I/O system.

Safety Network Number

For information on the safety network number, refer to the GuardLogix Controller Systems Safety Reference Manual, publication 1756-RM093.

Safety Signature

Safety signatures are created by the safety controller. The safety signature consists of an ID number, date, and time that uniquely identifies the safety portion of a project. This includes all safety logic, data, and configuration. The POINT Guard I/O modules use the safety signature to determine the project's integrity and to let you verify that the correct project is downloaded to the target controller.

Creating, recording, and verifying the safety signature is a mandatory part of the safety application development process.

Refer to the GuardLogix Controller Systems Safety Reference Manual, publication 1756-RM093, for details.

Safety Functions

Introduction

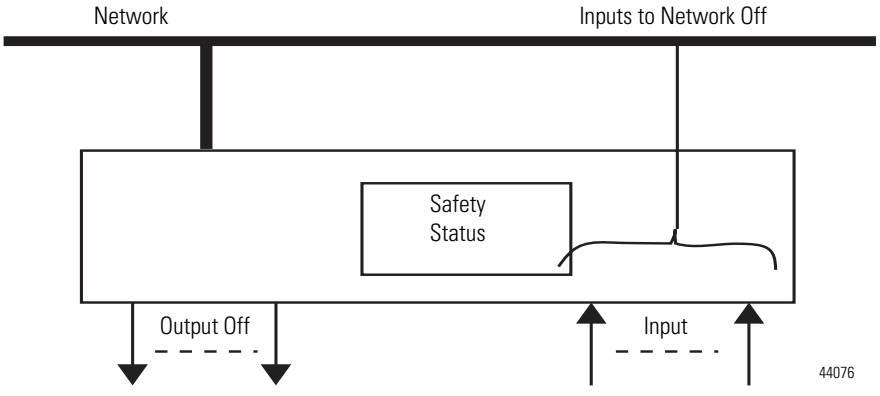
Read this chapter for important information related to the safety functions of the modules. Also, refer to the brief overview on international standards and directives.

Safety I/O Modules

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

- Safety outputs: off
- Safety input data to network: off (single channel and dual-channel equivalent)

Safety Status



The module is designed for use in applications where the safety state is the off state.

Safety Inputs

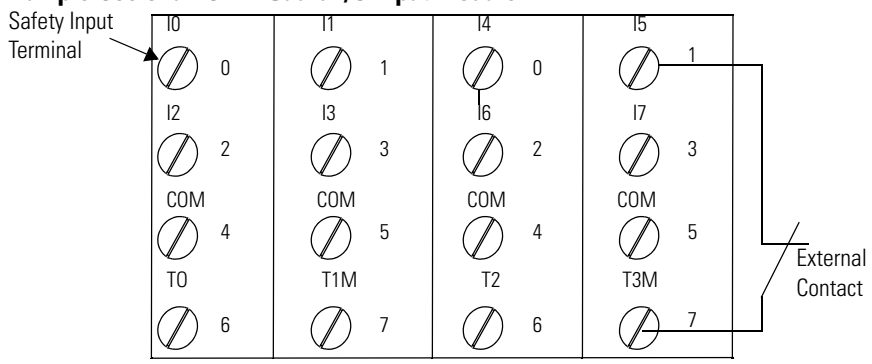
Read this section for information about safety inputs and their associated test outputs. A safety input can optionally be used with test outputs. Safety inputs are used to monitor safety input devices.

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.

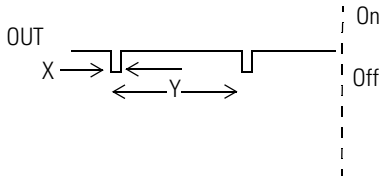
TIP The test output can also be configured as a power supply to source 24V DC to an external device, for example, a light curtain.

Example Use of a POINT Guard I/O Input Module



Where:
T0 = Test Output 0
T1M = Test Output 1 with Muting
T2 = Test Output 2
T3M = Test Output 3 with Muting
I0…I7 = Safety Inputs

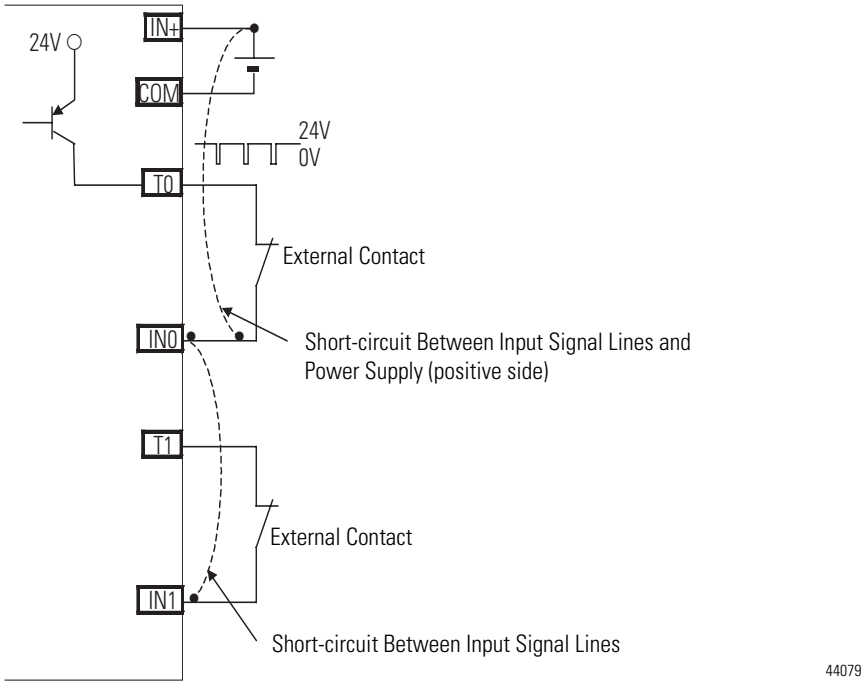
Test Pulse in a Cycle



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.

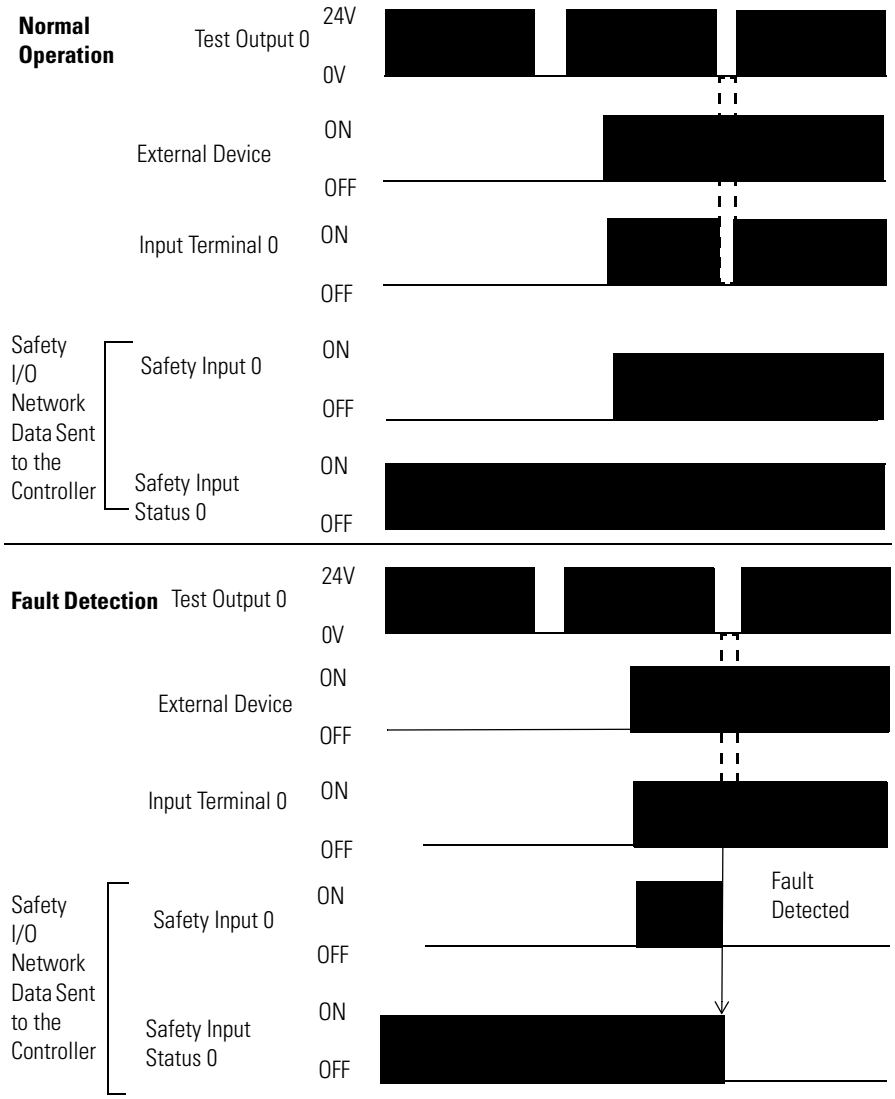
Short-circuit Between Input Signal Lines



Single Channel Mode

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

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. This function monitors the time during which there is a discrepancy between the two channels.

If the length of the discrepancy exceeds the configured discrepancy time (0…65,530 ms in increments of 10 ms), the safety input data and the individual-safety input status turns off for both channels.

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 The purpose of the discrepancy time is to allow for normal differences between contact switching when demands are placed on safety inputs. For this testing to operate correctly, only a single demand on the safety input is expected during the discrepancy time. If the discrepancy time is set too high, and multiple demands occur during this time, then both safety input channels will fault.

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

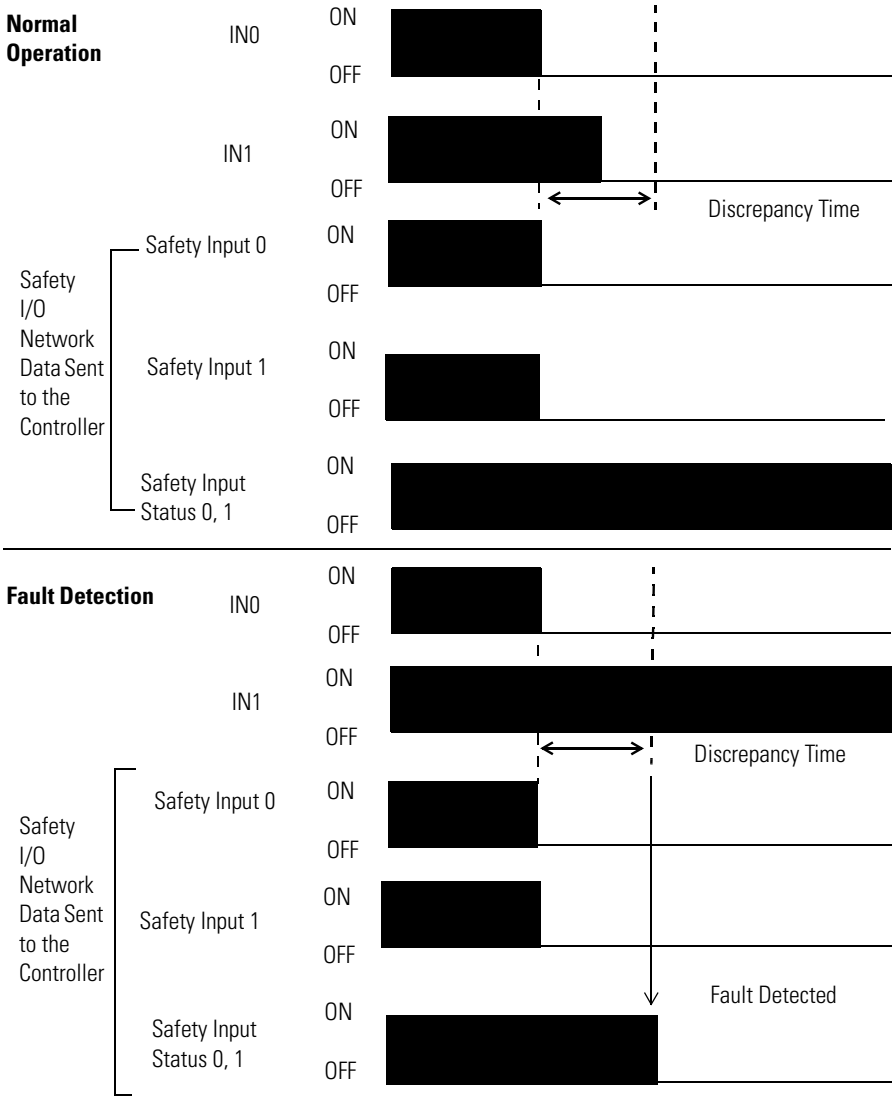
Terminal Input Status and Controller I/O Data

Dual-channel Mode	Input Terminal		Controller Input Data and Status				Dual-channel Resultant Data	Dual-channel Resultant Status
	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-channels, 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.

Equivalent, Normal Operation and Fault Detection (not to scale)

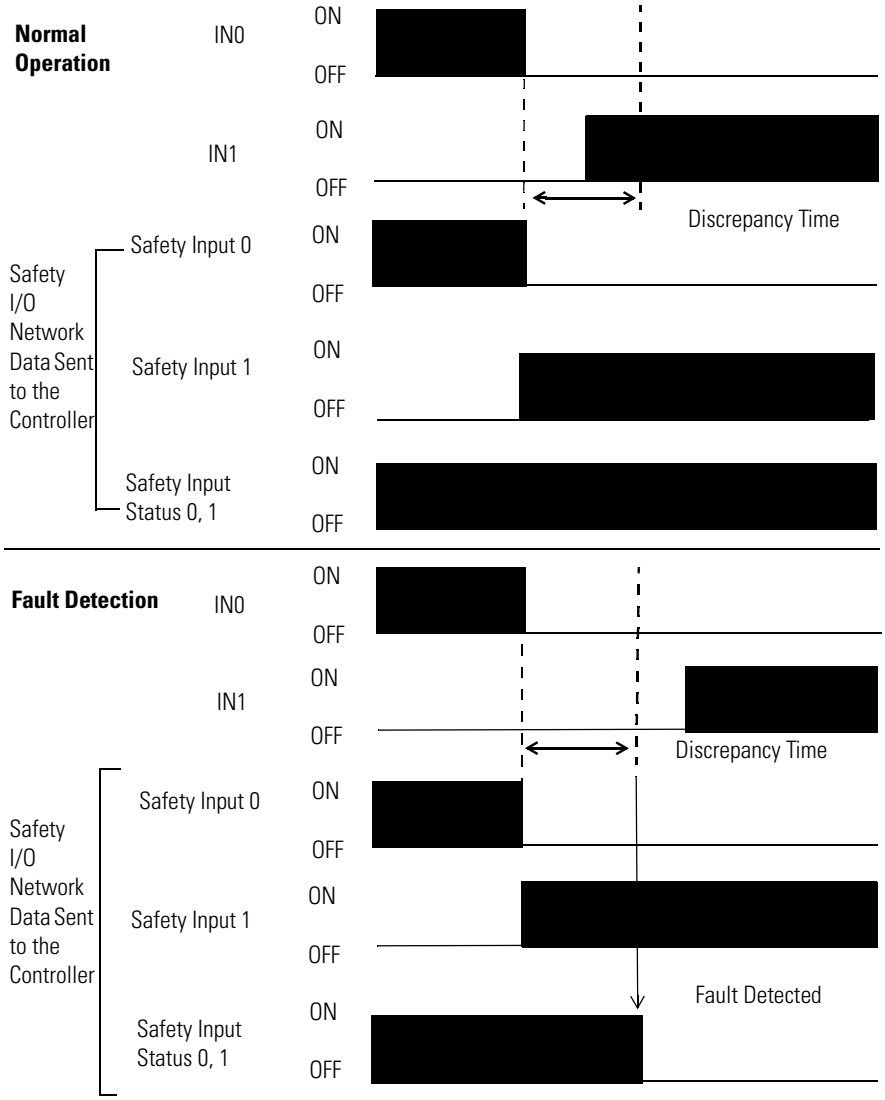


Dual-channels, Complementary

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.

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.

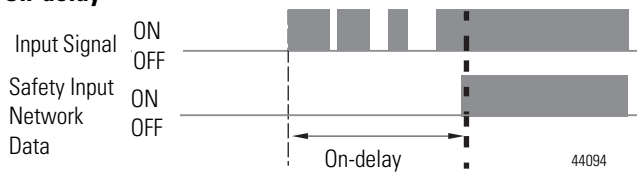
1. Remove the cause of the error.
2. Place the safety input (or safety inputs) into the safe state.
3. Allow the input-error latch time to elapse.

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

Input Delays

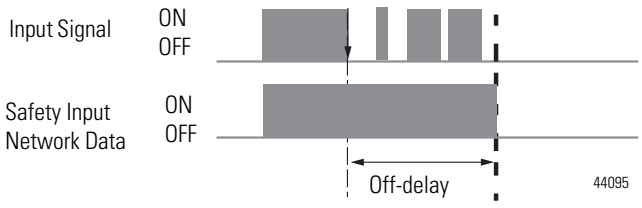
On-delay—An input signal is treated as Logic 0 during the on-delay time (0…126 ms, in increments of 6 ms) after the input contact's rising edge. The input turns on only if the input contact remains on after the on-delay time has elapsed. This helps prevent rapid changes of the input data due to contact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

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.

Off-delay



Safety Outputs

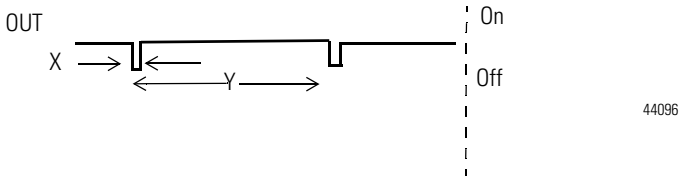
Read this section for information about safety outputs.

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, short-circuits between output signal lines and the power supply (positive side) and short-circuits between output signal lines can be detected. If an error is detected, the safety output data and individual safety output status turn off.

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 Setting

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.

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 safety 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.

I/O Status Data

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

- 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 status: ON, faulted status: 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.

Requirements for Controlling Devices

See this table for information about controlling devices.

ATTENTION

Use only appropriate components or devices complying with relevant Safety standards, corresponding to the required level of Safety categories (Safety integrity level). Conformity to requirements of the Safety category (Safety integrity level) is determined as an entire system. We recommend that you consult a certification body regarding an assessment of conformity to the required Safety level.

Controlling Device Requirements

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

ATTENTION

As serious injury may occur due to loss of required safety function, follow these safety precautions.

- Do not use test outputs of the modules as 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.
- Wire the POINT Guard I/O modules properly so that 24V DC line does not touch the safety outputs accidentally or unintentionally.
- Clear previous configuration data before connecting devices to the network.
- Set unique network node addresses before connecting devices to the network.
- Perform testing to confirm that device configuration and operation is correct before starting system operation.
- When replacing a device, configure the replacement device suitably and confirm that it operates correctly.
- When installing or replacing modules, clear any previous configuration before connecting input or output power to the device.

Legislations and Standards

Read this section to 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 61000-6-2
- IEC 61000-6-4
- IEC 62061
- IEC 13849-1

The modules received the DeviceNet Safety Conformance Test certification from ODVA, when product is marked.

Europe

In Europe, POINT Guard I/O modules are subject to the European Union (EU) Machinery Directive. The type approval of TUV-Rheinland addresses compliance to applicable requirements of the following standards, which may be found under legislation:

- EU legislation
  - Machinery Directive 98/37/EC
  - Low-voltage Directive 73/23/EEC
  - EMC Directive 89/336/EEC
- European standards
  - EN 61508 (SIL1-3)
  - EN 61131-2
  - EN 418
  - EN 60204-1
  - IEC 61000-6-2
  - IEC 61000-6-4
  - IEC 13849-1 (PL a, b, c, d, e)

North America

In North America, the TUV-Rheinland type approval includes Guard I/O compliance to the relevant standards and related information including the following:

- U.S. standards - ANSI RIA15.06, ANSI B11.19, NFPA 79
- The modules received UL Listing to standards of U.S. and Canada when product is marked.

Japan

In Japan, type test requirements are provided in Article 44 of the Industrial Safety and Health Law. These requirements apply to complete systems and cannot be applied to a module by itself. Accordingly, to use the module in Japan as a safety device for press machine or shearing tool pursuant to Article 42 of the above-mentioned law, it is necessary to apply for testing of the entire system.

EC Directives

These products conform to the EMC Directive and Low-voltage Directive, where applicable. For additional information, refer to the relevant installation instructions.

EMC Directive

Rockwell Automation devices that comply with EC directives also conform to the related EMC standards so that they can more easily be built into other devices or the overall machine. The actual products have been checked for conformity to EMC standards. Whether they conform to the standards in the system used by the customer, however, must be confirmed by the customer.

EMC-related performance of Rockwell Automation devices that comply with EMC directive vary depending on the configuration, wiring, and other conditions of the equipment or control panel in which the Rockwell Automation devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

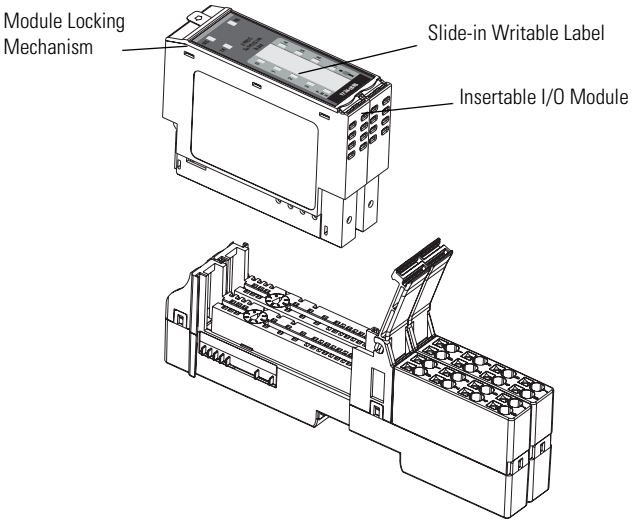
Notes:

Install the Module

Introduction

Follow these steps to install the modules.

1. Install the Mounting Base.
2. Connect the Module to the Mounting Base.
3. Connect the Removable Terminal Block.
4. Wire Modules.



31867-M

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 publication 60664-1), at altitudes up to 2000 m (6561 ft) without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

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, V2, V1, V0 (or equivalent) 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:

- Industrial Automation Wiring and Grounding Guidelines, for additional installation requirements, Allen-Bradley publication 1770-4.1.
- NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.

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.

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.

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.

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.

WARNING

If you connect or disconnect the communication cable with power applied to this module or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations.

WARNING

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.

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.

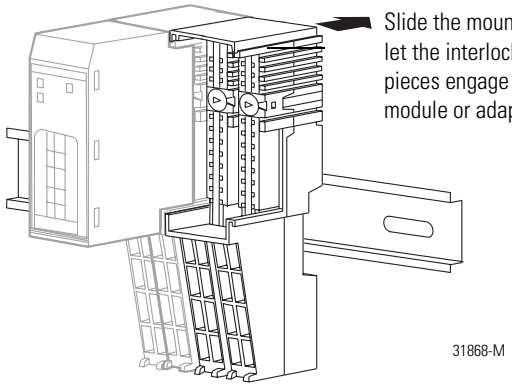
Install the Mounting Base

The mounting base consists of a one-piece terminal base or an assembly that includes a mounting base and removable terminable block (RTB). POINT Guard I/O modules occupy two bases.

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.

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



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

Connect the Module to the Mounting Base

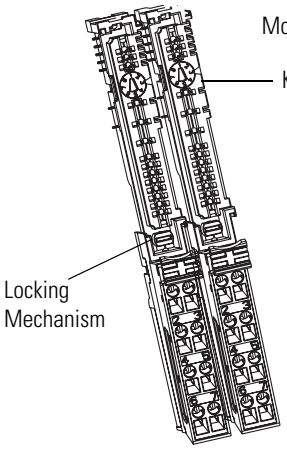
Install the module before or after mounting base installation.

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.

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.



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

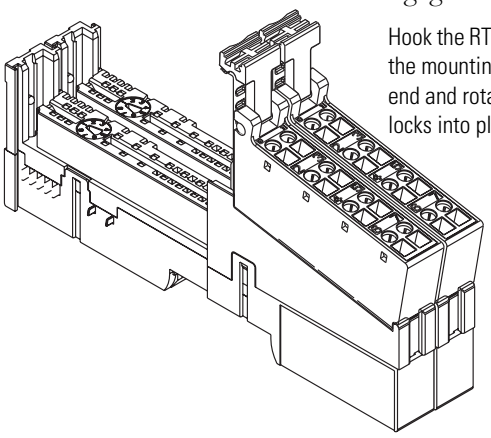
If a removable terminal block (RTB) is supplied with your mounting base assembly, you need to remove it by pulling up on the RTB handle. This lets you remove and replace the base as necessary without removing any of the wiring.

WARNING

When you connect or disconnect the RTB with field-side power applied, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure to remove power, or verify that 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.



Hook the RTB end into the mounting base end and rotate until it locks into place.

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.

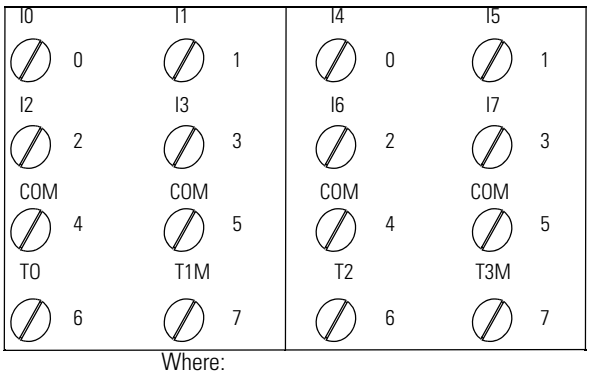
1. Pull up on the I/O module to remove it from the base.
2. Remove the module to the right of the base you are removing, noting that the interlocking portion of the base sits under the adjacent module.
3. Use a screwdriver to rotate the orange DIN-rail locking screw on the mounting base to a vertical 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.
- We recommend that you wire correctly after confirming the signal names of all terminals.
- Tighten screws for communication and I/O connectors correctly.

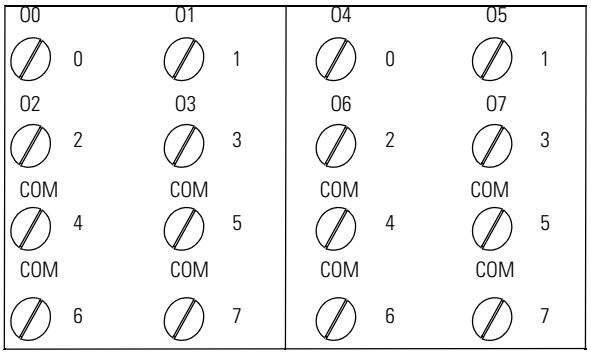
1734-IB8S Field Connections



1734-TOP and 1734-TB Bases Shown

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

1734-OB8S Field Connections



1734-TOP and 1734-TB Bases Shown

Where:
O0…O7 = Safety Outputs 0…7
COM = Supply Common

Wire the Module

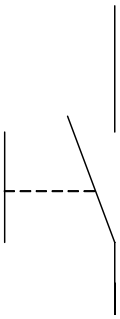
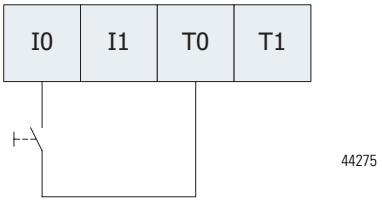
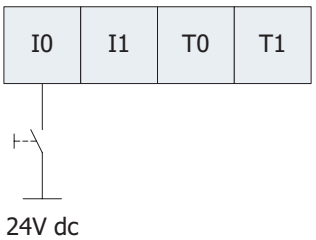
Introduction

Read this chapter for information about wiring and safety categories.

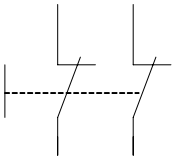
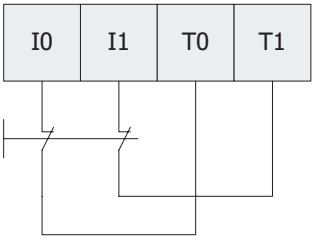
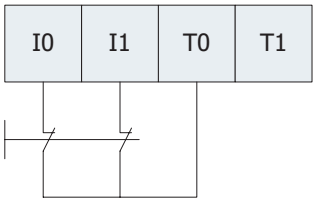
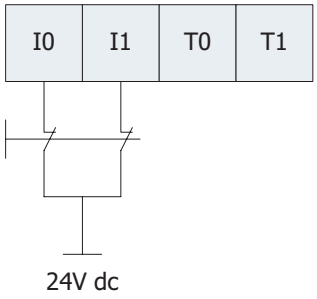
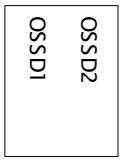
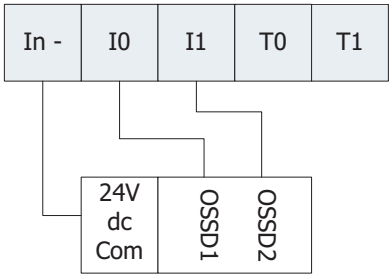
Connection Details

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

Connected Device and Safety Category

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

Connected Device and Safety Category

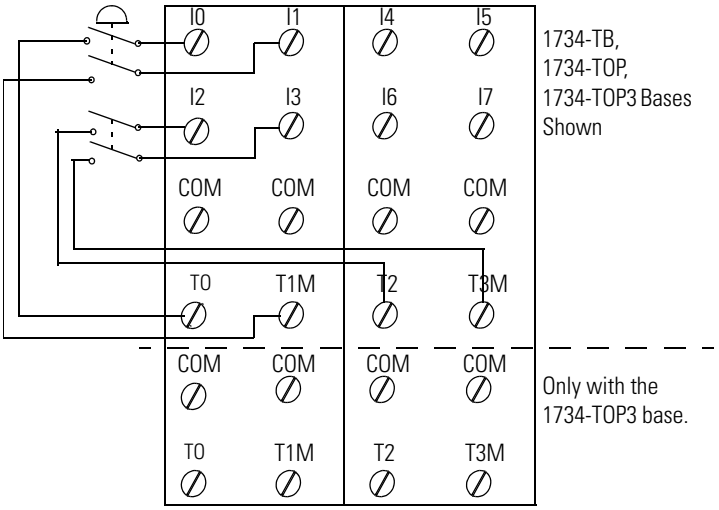
Connected Device	Test Pulse from Test Output	Connection	Schematic Diagram	Safety Category
Emergency stop button Door monitoring switch 	Yes	Connect the device between I0 and T0, and I1 and T1.		4
	No	Connect the devices between T0 and I0 and I1, noting that T0 is configured for 24V power supply.		3
		Connect the devices between 24V dc and I0 and I1.		
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

Examples of Wiring

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 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).

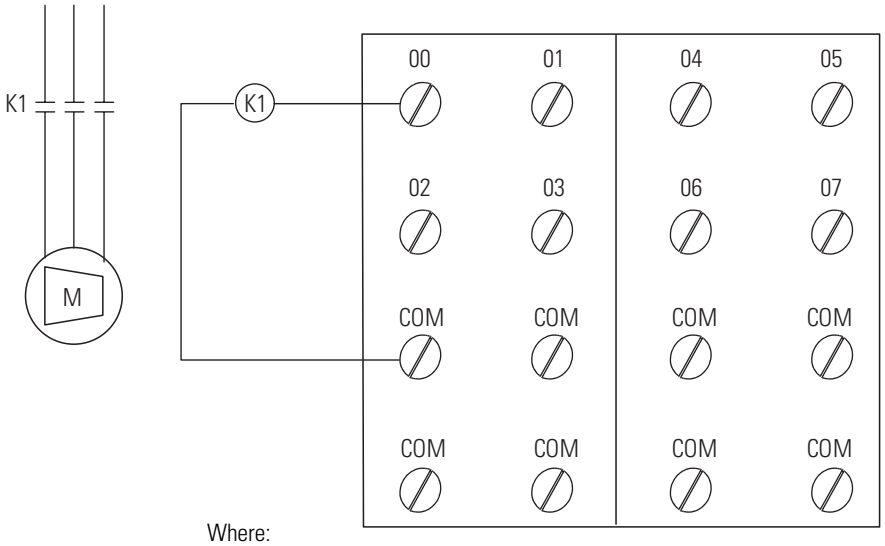


Controller Configuration	Parameter Name	Configuration Setting
Safety Input 0	Safety Input 0 Channel Mode	Test Pulse from Test Output
	Safety Input 0 Test Source	Test Output 0
	Dual-channel Safety Input 0/1 Mode	Dual-channel Equivalent
	Dual-channel Safety Input 0/1 Discrepancy Time	100 ms (application 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 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.



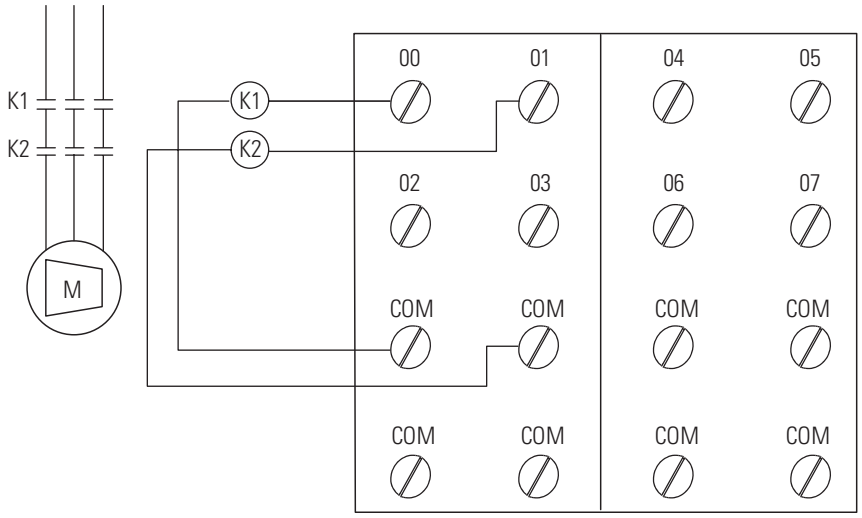
Where:
00…07 = Safety Outputs
COM = Common

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 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.



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

Notes:

Power Supply Examples

Introduction

A POINT Guard I/O system includes an adapter, I/O modules, mounting bases, and power distribution modules. POINT I/O adapters have built-in power supplies. All POINT I/O modules are powered from the POINTBus backplane by either an adapter or expansion power supply.

POINTBus Backplane

The POINTBus backplane includes a 5V communication bus and field power bus that get their power from the adapter or power supplies. 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 with the 5V and/or 24V bus.
- Use the 1734-EPAC expansion power supply to pass 120/240V AC field power to the I/O modules to the right of it.

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.

- The 1734-EP24DC and 1734-EPAC power supplies provide two services.
  - Breaks the field power distribution at the left of the power supply from the field power distribution to the right of it
  - Adds an additional 1.3 A of 5V current to the POINTBus backplane for I/O modules to the right of the power supply
- Use the 1734-FPD field power distributor with the 5V bus. The 1734-FPD field power distributor passes through all POINT I/O backplane signals including the 5V bus supplied to the left, but does not provide **additional** POINTBus backplane power. This lets you isolate field power segments.

Consider these recommendations when using the POINT Guard I/O modules:

- With the GuardLogix controllers, use the 1734-AENT adapter.
- With the SmartGuard controller, use the 1734-PDN adapter.

The adapters and power supplies differ in their amount of power supplied to the 5V and/or 24V bus.

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

Power Supply Examples

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

- Example 1: POINT Guard I/O Used with 1734-EP24DC for Input, 1734-FPD for Output - 24V DC Only I/O on page 49
- Example 2: POINT Guard I/O Used with 1734-EP24DC for Input and Output, Plus AC I/O on page 50

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

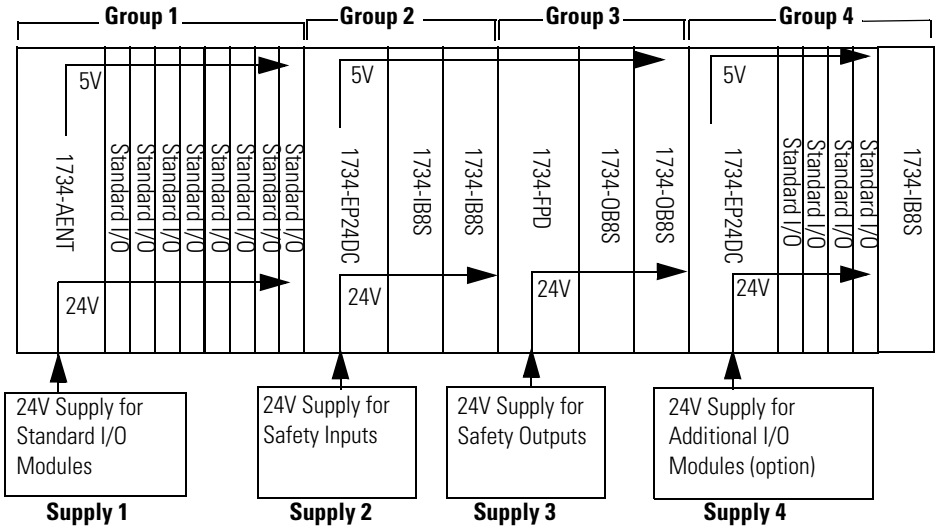
IMPORTANT

- You must define the requirements for your application, for segmenting field and bus power.
- POINT Guard I/O does not require separate field-bus power usage, that is, separate power supplies for the 1734-IB8S and 1734-OB8S 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.

Example 1: POINT Guard I/O Used with 1734-EP24DC for Input, 1734-FPD for Output - 24V DC Only I/O

This power supply example uses a 1734-EP24DC expansion power supply and 1734-FPD field power distributor to power I/O with these properties:

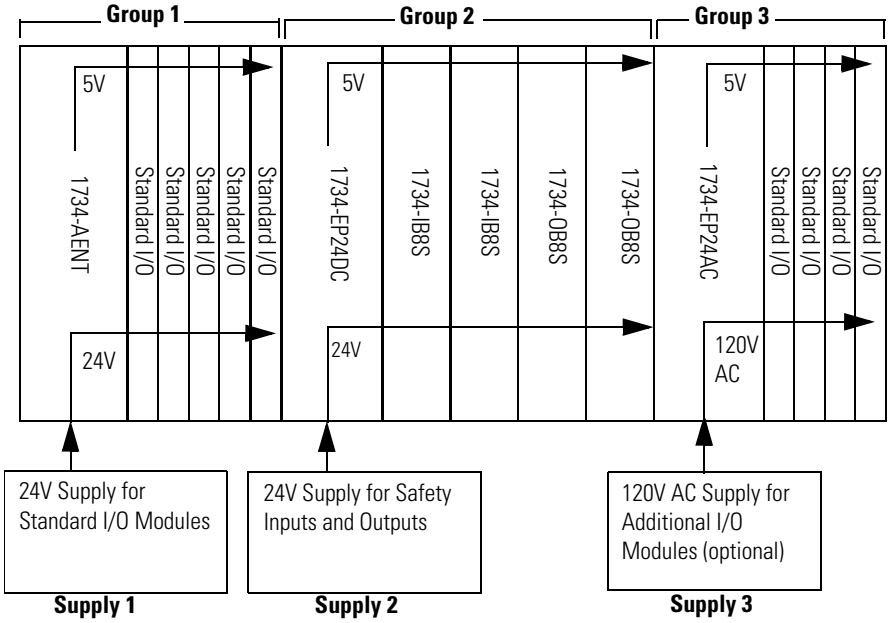
- Group 1 and Group 4 I/O have separate functioning groups of I/O, compared to the rest of the I/O.
- Field power for Group 3 is on a supply separate from bus communication power (Supply 3 loss is visible to the controller).
- Field power for Group 2 is on the same supply as bus communication power for Group 2 and Group 3 (Supply 2 loss causes broken connections to the controller for Group 2 and Group 3).



Example 2: POINT Guard I/O Used with 1734-EP24DC for Input and Output, Plus AC I/O

This power supply example uses a 1734-EP24DC input and output with these properties:

- Group 1 and Group 3 I/O have separate functioning groups of I/O, compared to Group 2.
- Field power for Group 2 outputs is on the same supply as bus communication (Supply 2 loss causes broken connections to the controller).
- Field power for Group 2 inputs is on the same supply as bus communication (Supply 2 loss causes broken connections to the controller).



Observing Precautions for Safe Use

Use these guidelines to be sure of proper product use:

- Do not apply AC voltage to the POINT Guard I/O modules.
- Wire conductors correctly and verify operation of the module before commissioning the system in which the module is incorporated. Incorrect wiring can lead to loss of safety function.
- Do not apply DC voltages exceeding rated voltages to the POINT Guard I/O modules.
- Apply properly specified voltages to the module inputs. Applying inappropriate voltages causes the module to fail to perform its specified function, which leads to loss of safety functions or damage to the module.

Notes:

Configure the Module in a GuardLogix Controller

Introduction

When using a GuardLogix controller, configure the POINT Guard I/O modules with RSLogix 5000 software, version 17, by using the appropriate add-on profile.

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

Use Help

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.

Add Modules to the I/O Configuration Tree

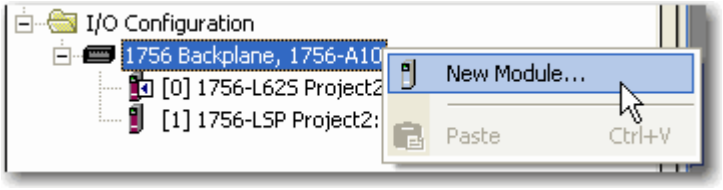
When first setting up your POINT Guard I/O modules for use with the GuardLogix controller, you will follow these steps as needed:

1. Add and Configure the Ethernet Bridge Module.
2. Add and Configure the 1734-AENT Adapter.
3. Add and Configure Safety Input Modules.
4. Add and Configure Safety Output Modules.

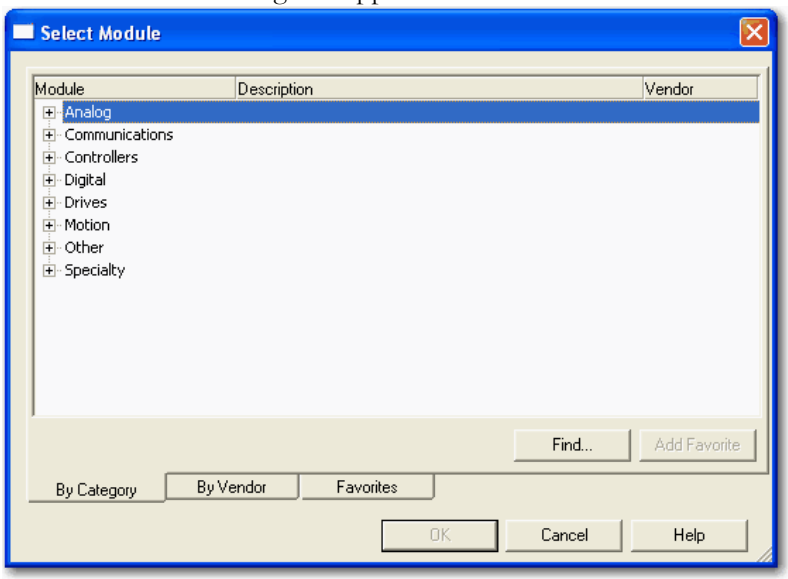
Add and Configure the Ethernet Bridge Module

Follow this procedure to add and configure the Ethernet bridge module.

1. From the I/O Configuration tree, right-click 1756 Backplane, 1756-A*xx* and choose New Module.



The Select Module dialog box appears.



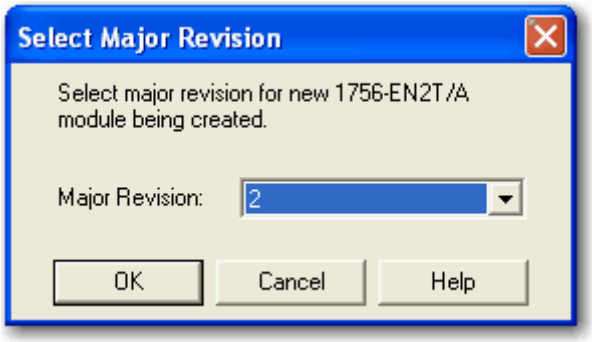
2. Expand the Communications option, select one of these Ethernet bridge modules, and click OK.

Cat. No.	Description
1756-EN2F/A	1756 10/100 Mbps Ethernet bridge, fiber media
1756-EN2T/A	1756 10/100 Mbps Ethernet bridge, twisted-pair media
1756-ENBT/A	1756 10/100 Mbps Ethernet bridge, twisted-pair media

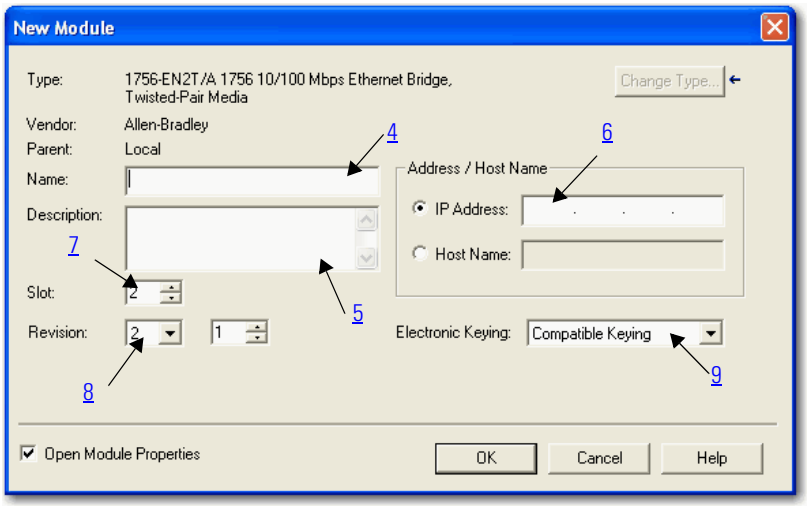
In this example, we chose the 1756-EN2T/A bridge module.

3. Enter the major revision number of the bridge module and click OK.

Cat. No.	Compatible Major Revision
1756-EN2F/A	1 or later
1756-EN2T/A	1 or later
1756-ENBT/A	3 or later



This New Module dialog box appears.



4. In the Name box, type the appropriate name of the Ethernet bridge module.

5. In the Description box, enter an optional description of the Ethernet bridge module.

6. In the IP Address box, enter the appropriate IP address of the Ethernet bridge module.

7. In the Slot box, enter the appropriate slot number of the Ethernet bridge module.

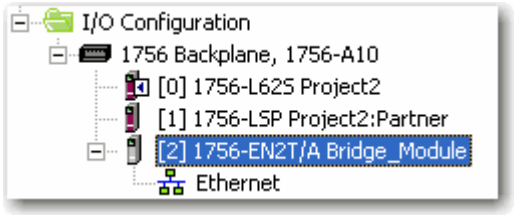
8. In the Revision boxes, enter the appropriate major and minor revisions of the bridge module.

9. From the Electronic Keying pull-down menu, choose the appropriate keying method for the Ethernet bridge module.

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.

10. Click OK.

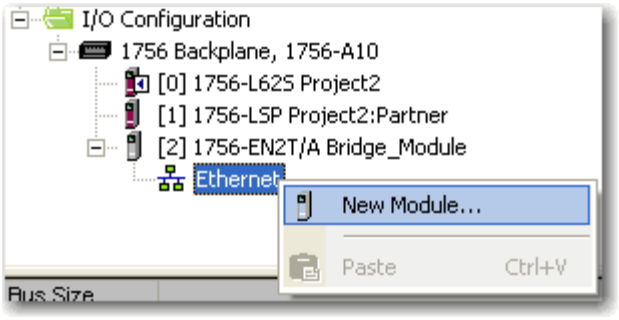
The I/O Configuration tree displays the Ethernet connection.



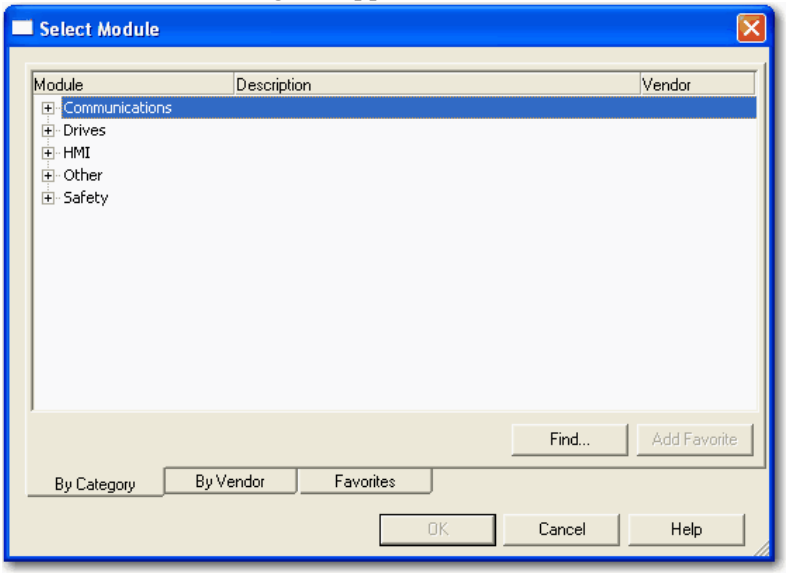
Add and Configure the 1734-AENT Adapter

Follow these steps to add and configure the 1734-AENT adapter.

1. Right-click the Ethernet connection and choose New Module.

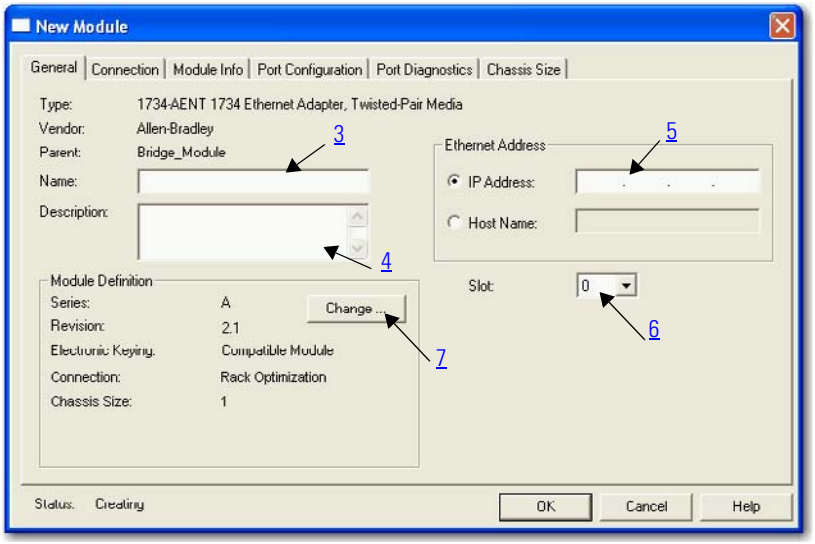


The Select Module dialog box appears.



2. Expand the Communications option and choose the 1734-AENT adapter.

This New Module dialog box appears.



3. In the Name box, type the appropriate name of the 1734-AENT adapter.

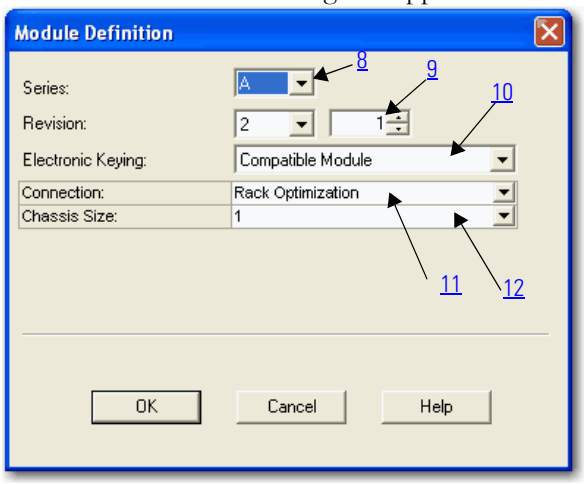
4. In the Description box, enter an optional description of the 1734-AENT adapter.

5. In the IP Address box, enter the appropriate IP address of the 1734-AENT adapter.

6. In the Slot box, enter the appropriate slot number of the 1734-AENT adapter.

7. Under Module Definition, click Change.

   The Module Definition dialog box appears.



8. In the Series box, enter the appropriate series letter of the 1734-AENT adapter.

9. In the Revision boxes, enter the appropriate major and minor revision of the 1734-AENT adapter.

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

10. From the Electronic Keying pull-down menu, choose the appropriate keying method for the 1734-AENT adapter.

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.**

11. From the Connection pull-down menu, choose the appropriate connection for the 1734-AENT 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. **This does not include specialty, analog, or POINT Guard I/O modules.**

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

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

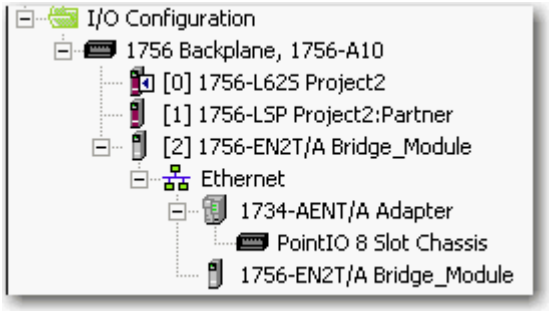
IMPORTANT Do not count terminal bases. Enter only the number of physical modules installed, plus 1 for the adapter. This number must match exactly. You cannot enter a higher number anticipating future expansion.

13. Click OK.

    You return to the Module Properties dialog box.

14. Click OK to apply your changes.

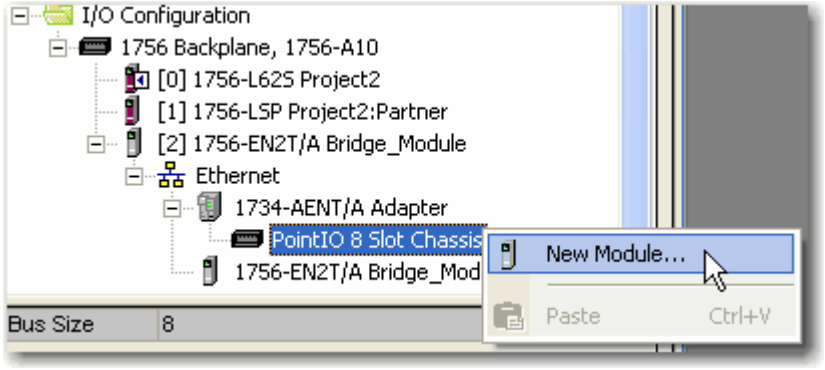
    The I/O Configuration tree displays the 1734-AENT adapter.



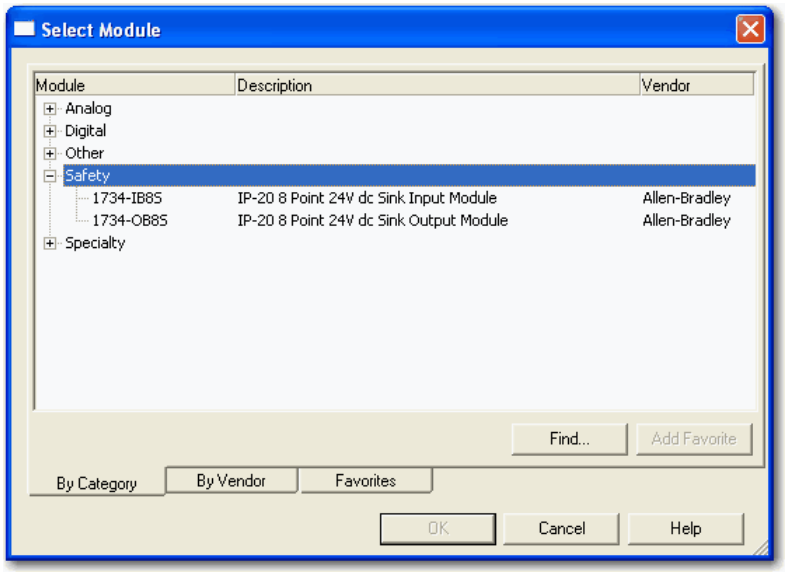
Add and Configure Safety Input Modules

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.

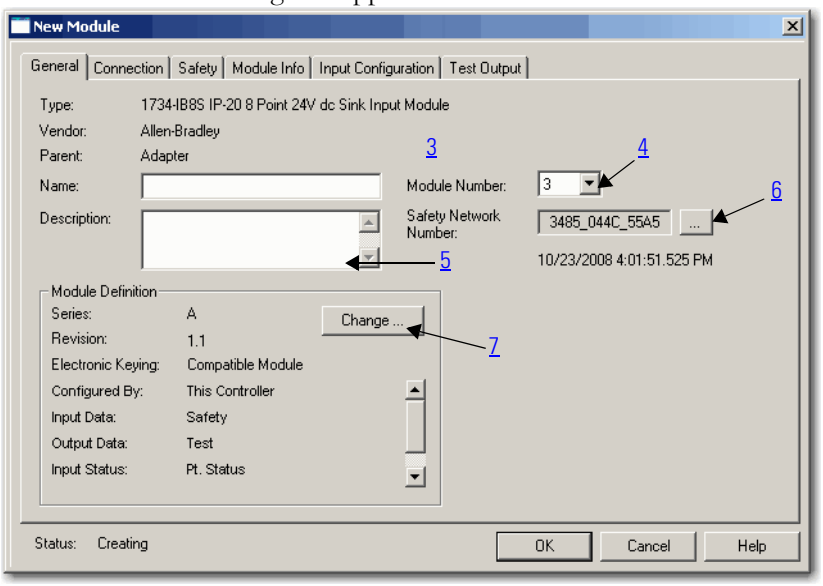


The Select Module dialog box displays a list that includes Safety.



2. Select the appropriate input module, such as 1734-IB8S, and click OK.

The New Module dialog box appears.



3. In the Name box, type a unique name for the input module.

4. In the Module Number box, enter a unique module number for the input module.

5. In the Description box, type a description if desired for the input module.

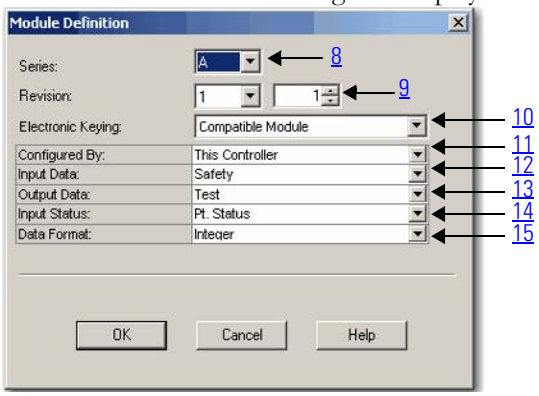
6. In the Safety Network Number box, use the default setting.

   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 the network.

7. Click Change to edit the Module Definition.

   This Module Definition dialog box displays.



8. In the Series box, enter the input module's series letter.

9. In the Revision boxes, enter the input module's revision numbers.

10. 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.

11. 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 and Test Outputs.
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.

12. From the Input Data pull-down menu, choose the appropriate method for the input module, Safety or None.

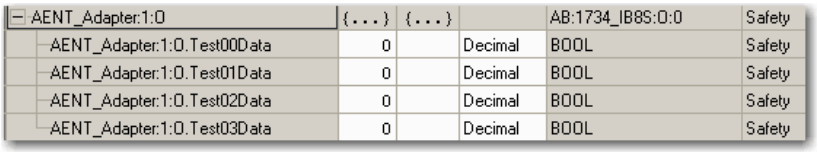
Choose	Description
Safety	These tags are created for the target module: • RunMode for module mode • ConnectionFaulted for communication status • Safety Data for safety inputs from the module

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

13. From the Output Data pull-down menu, choose the appropriate method from the following options.

IMPORTANT The test outputs that are configured as standard outputs on the module must not be used for safety purposes.

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.
Test[1]	Creates these tags to enable network control of the test outputs on the module. This selection allows the test outputs to be used as standard outputs and muting outputs.

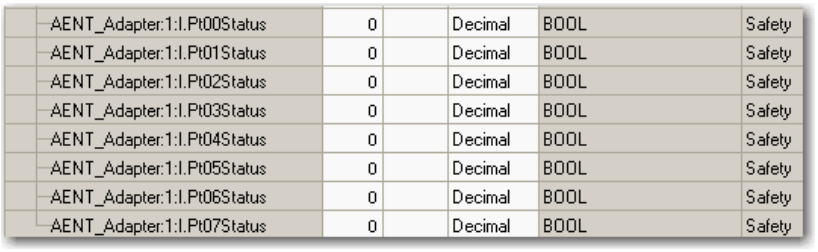


AENT_Adapter:1:O	{...}	{...}		AB:1734_IB8S:O:0	Safety
AENT_Adapter:1:O.Test00Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:O.Test01Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:O.Test02Data	0		Decimal	BOOL	Safety
AENT_Adapter:1:O.Test03Data	0		Decimal	BOOL	Safety

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

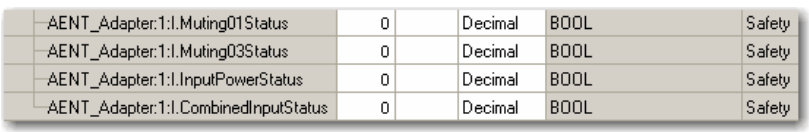
14. From the Input Status pull-down menu, choose the appropriate method for the input module from the following options.

Choose	Description
None	There are no status tags, only data for the inputs.
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

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

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.

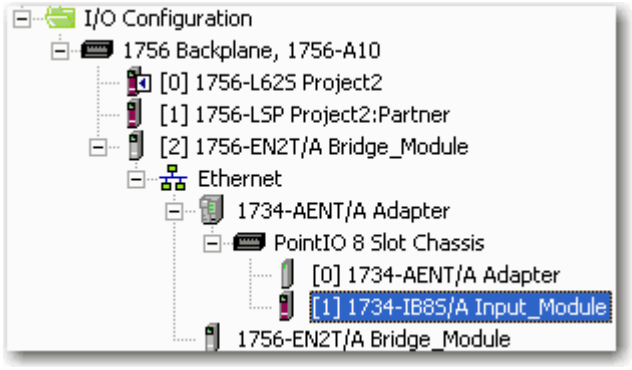
15. From the Data Format pull-down menu, use the default 'Integer'.

16. Click OK.

You return to the Module Properties dialog box.

17. Click OK to apply your changes.

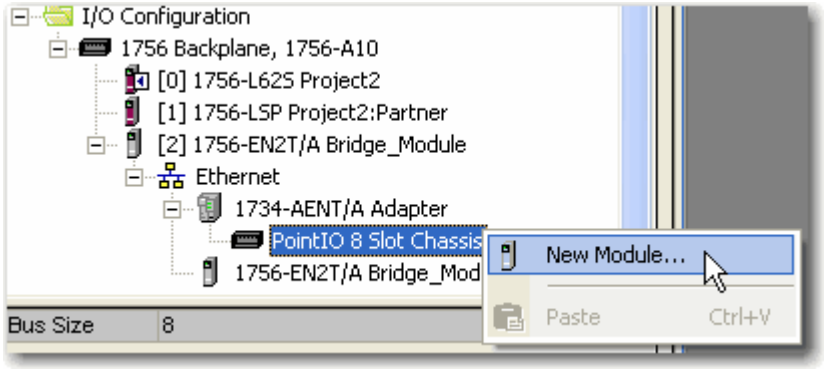
The I/O Configuration tree displays the 1734-IB8S module.



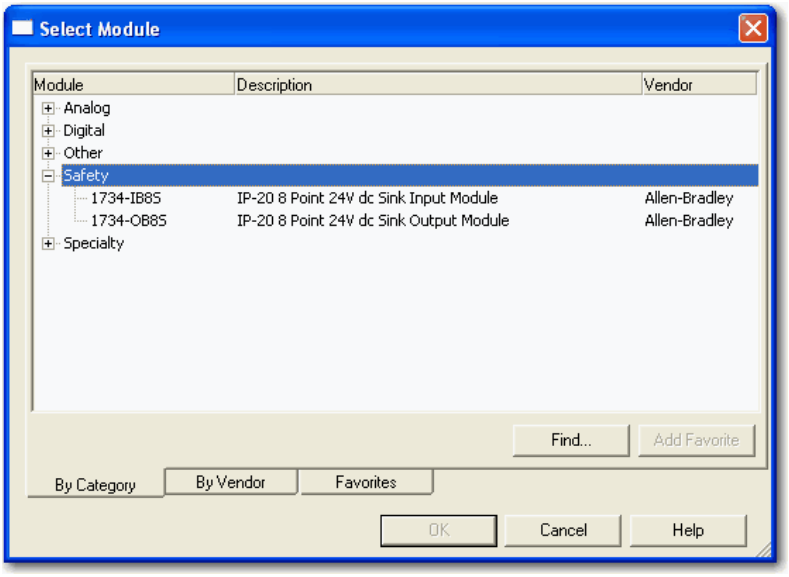
Add and Configure Safety Output Modules

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.

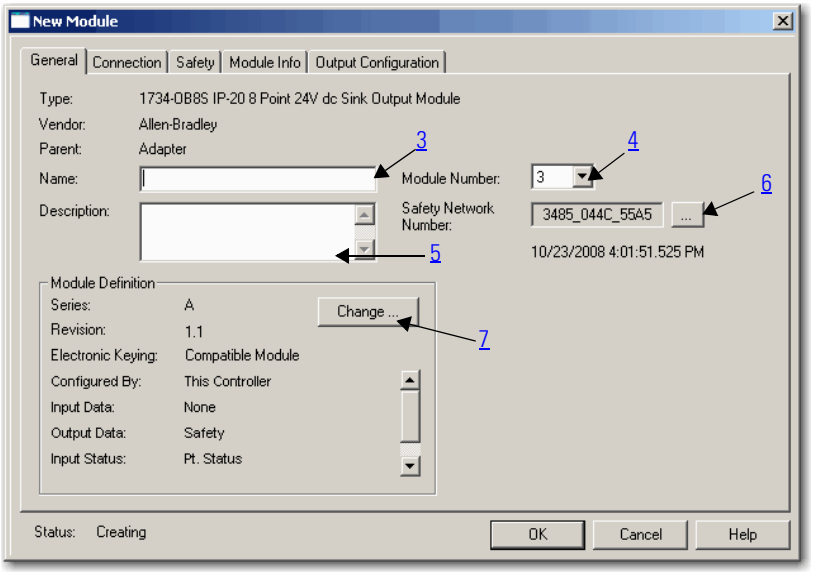


The Select Module dialog box displays a list that includes Safety.



2. Select the appropriate output module, such as 1734-OB8S, and click OK.

The New Module dialog box appears.



3. In the Name box, type a unique name for the output module.

4. In the Module Number box, enter a unique module number for the output module.

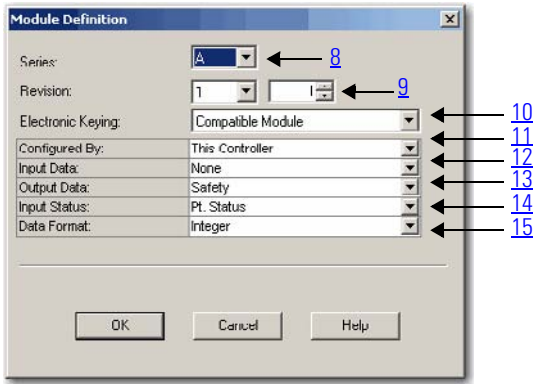
5. In the Description box, type a description if desired for the output module.

6. In the Safety Network Number box, 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.

7. Click Change to edit the Module Definition.

   This Module Definition dialog box displays.



8. In the Series box, enter the output module's series letter.

9. In the Revision boxes, enter the output module's revision numbers.

10. From the Electronic Keying pull-down menu, choose the appropriate keying method for the output module 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	Allows an I/O module to determine whether it can emulate the module defined in the configuration sent from the controller.

11. From the Configured By pull-down menu, choose the appropriate method by which this module is configured from the following options.

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.

12. From the Input Status pull-down menu, choose the appropriate method for the output module from the following options.

Choose	Description
Pt. Status	There is one status tag for each input and output point.

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

Point Status - Readback	This selection is available only for output safety modules. Selecting Point Status - Readback creates both output status and readback tags, with readback indicating the presence of 24V on the output terminal.

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
Adapter:2:I.Pt00Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt01Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt02Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt03Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt04Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt05Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt06Readback	0		Decimal	BOOL	Safety
Adapter:2: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] • Readback creates both output status and readback tags, with readback indicating the presence of 24V on the output terminal. • A single BOOL tag represents the Output Power Status (error bit) from the output assembly.

Adapter:2:I.Pt00Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt01Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt02Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt03Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt04Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt05Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt06Readback	0		Decimal	BOOL	Safety
Adapter:2:I.Pt07Readback	0		Decimal	BOOL	Safety
Adapter:2:I.OutputPowerStatus	0		Decimal	BOOL	Safety
Adapter:2:I.CombinedOutputStatus	0		Decimal	BOOL	Safety

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

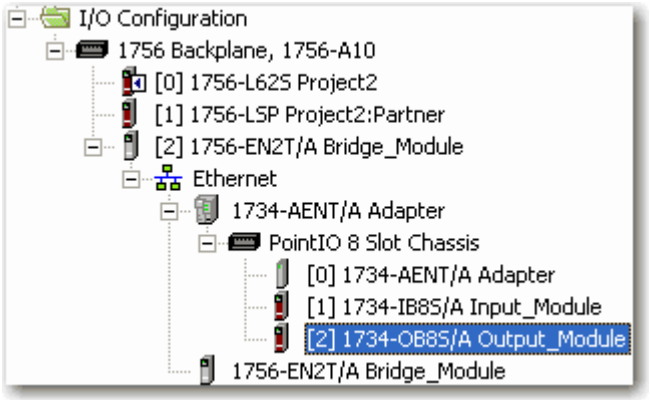
13. From the Data Format pull-down menu, use the default 'Integer'.

14. Click OK.

    You return to the Module Properties dialog box.

15. Click OK to apply your changes.

    The I/O Configuration tree displays the 1734-OB8S module.



Values and States of Tags

This table shows the values and states of the tags.

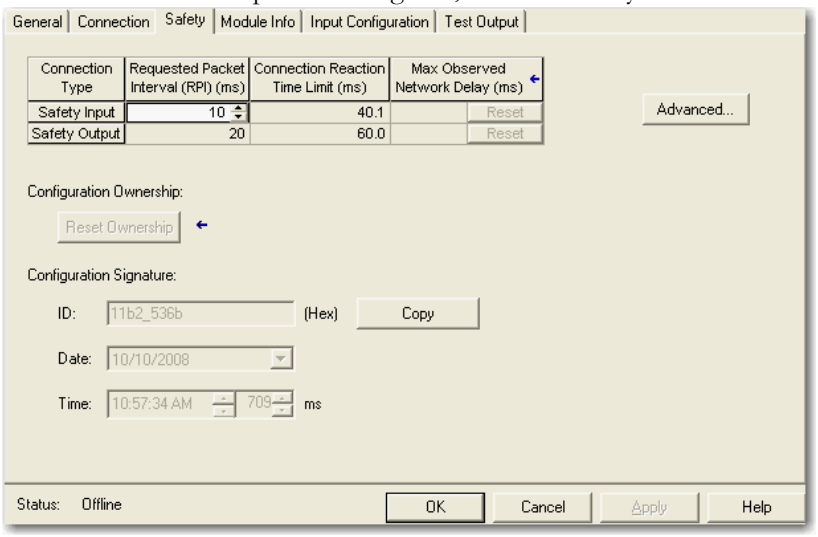
Data		Description
Input data	Safety Input Data SAFETY	Indicates the ON/OFF state of each input circuit. • ON: 1 OFF: 0
	Combined Safety Input Status SAFETY	An AND of the status of all input circuits. • All circuits are normal: 1 • An error was detected in one or more input circuits: 0
	Individual Safety 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
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

IMPORTANT Safety denotes information the controller can use in safety-related functions. Standard denotes additional information that must not be relied on for safety functions.

Configure the Safety Tab

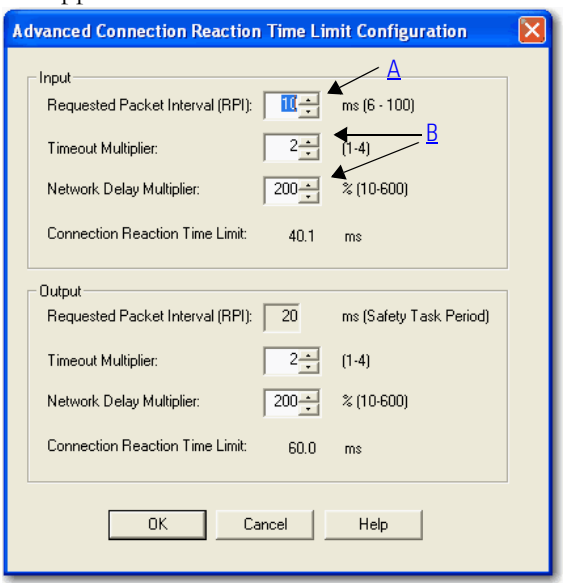
Read this for information about how to complete entries when you click the Safety tab.

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



2. Click Advanced.

   The Advanced Connection Reaction Time Limit Configuration dialog box appears.



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

A. In the Requested Packet Interval (RPI) box, 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 that is 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 an 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 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 HI. Monitor all connection status bits to verify that they are not going LO intermittently due to timeouts.

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 GuardLogix controller to POINT Guard I/O module
- Configuration signature

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

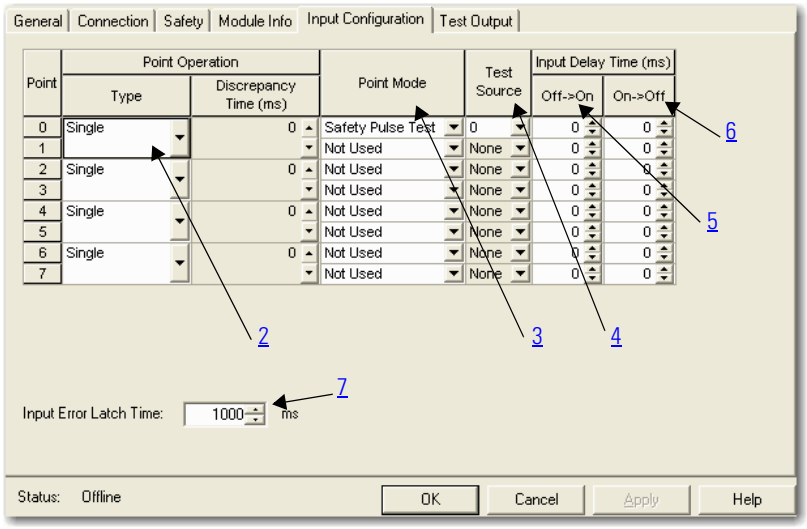
Configuration Signature

The configuration signature is created by RSLogix 5000 software and verified by the POINT Guard I/O module. The configuration signature provides SIL 3 integrity of the configuration of a POINT Guard I/O module. For detailed information on the configuration signature, refer to the GuardLogix Controllers User Manual, publication 1756-UM020.

Configure the Input Configuration Tab

Follow this procedure to complete the input configuration. Refer to Chapter 2 for related information.

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



2. Assign the Point Operation Type.

   When you choose Equivalent or Complementary, you must also assign an appropriate Discrepancy Time.

Choose	Description
Single	Inputs are treated as single channels. Note that in many cases, dual-channel safety inputs are configured as two individual single channels. This does not affect pulse testing because it is handled on an individual channel basis.
Equivalent(1)	Inputs are treated as a dual-channel pair. The channels must match within the discrepancy time or an error is generated.
Complementary(1)	Input are treated as a dual-channel pair. They must be in opposite states within the discrepancy time or an error is generated.

(1) Be aware that 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.

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 go to the Safety State due to a ‘cycle inputs’ required condition, but due to the 0 ms discrepancy time setting, a fault will not be 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 before the evaluated status of the inputs can return to the Active state.

But if the channels were in the Active state before going discrepant, and end up back in the Active state, then there is a 'cycle input' required condition that is **not** declared. The logical state does **not** match the voltage at the terminals. The channels must be cycled through the Safety state before returning to the Active state.

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 the Test Source for each safety input on the module you want pulse tested.

Choose	Description
None	If pulse testing is being 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 0	
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 HI 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 LO 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 box, 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 you more reliable diagnostics and enhances the chances that a nuisance error is detected. The purpose for latching input errors is to make sure that intermittent faults that may only exist 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.

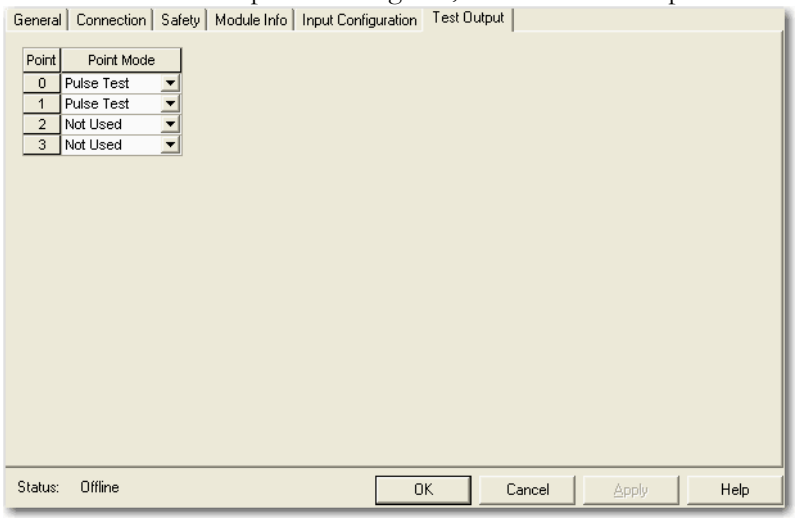
8. Click Apply.

Configure the Test Output Tab

This section describes how to work with the Test Output Configuration dialog box. Refer to this table for information on configuring 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 (default)	The test output is disabled.
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.
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 (terminal 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 A.

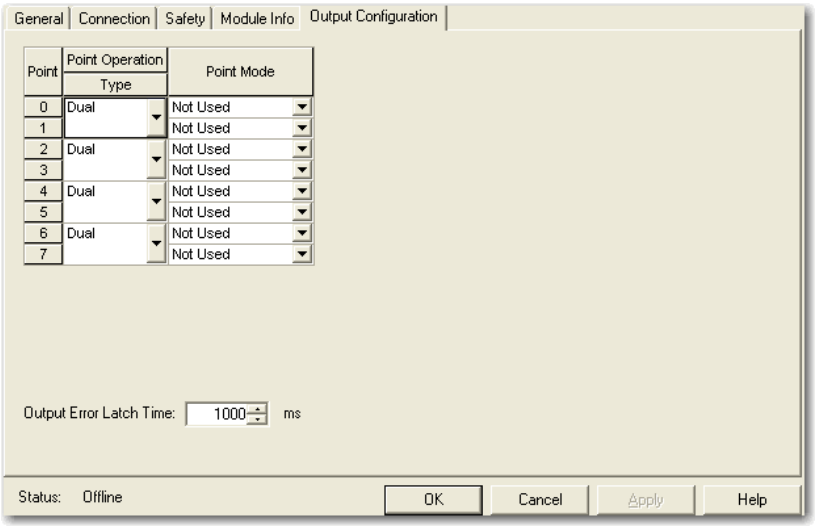
3. Click Apply.

Configure the Output Configuration Tab

This section provides a procedure for configuring safety outputs by using the information in this table and completing the entries referring to the figure.

Follow this procedure to complete the safety output configuration.

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



2. Assign the Point Operation Type.

Choose	Description
Single[1]	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.

(1) Does not apply to bipolar outputs.

3. Assign the Point Mode.

Choose	Description
Not Used	The output is disabled.
Safety	The output point is enabled, and it 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 LO briefly. The pulse test detects if 24V remains on the output terminal during this LO pulse due to a short to 24V or if the output is shorted to another output terminal.

4. From the Output Error Latch Time box, 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 you more reliable diagnostics and enhances the changes that a nuisance error is detected.

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

5. Click Apply.

Saving and Downloading Module Configuration

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

If after downloading the program the MS and NS status indicators on the POINT Guard I/O module are not both solid green, this may be due to loss of ownership. The ownership 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 GuardLogix controller to POINT Guard I/O module
- Configuration signature

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

Configure the Module for a SmartGuard Controller

Introduction

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.

Before You Begin

Be sure you have these required items:

- RSNetWorx for DeviceNet software, version 9.0 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

- 1734-IB8S and/or 1734-OB8S EDS files

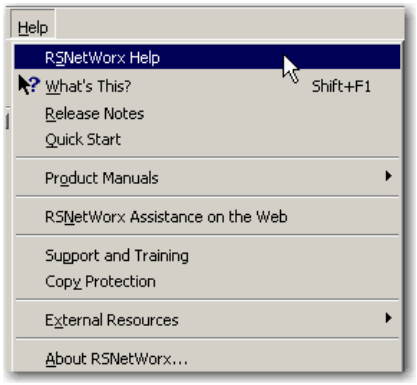
TIP

To download the appropriate EDS file, visit the EDS Hardware and Installation website at http://www.rockwellautomation.com/resources/eds/.

The EDS file for the 1734-IB8S module is 0010023000F0100.
The EDS file for the 1734-OB8S module is 001002300100100.

Use Help

For information about RSNetWorx for DeviceNet software, from the Help menu, choose RSNetWorx Help.



Work with RSNetWorx for DeviceNet Software

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

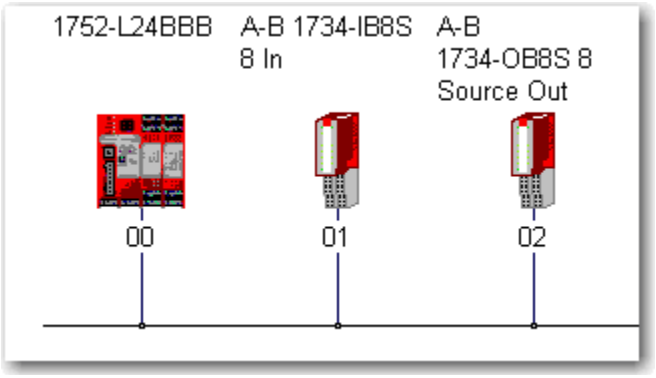
1. Load the proper electronic data sheet (EDS) files by using the EDS Hardware Installation Tool at http://www.rockwellautomation.com/resources/eds/.

   Be sure to include your 1752 SmartGuard controller and POINT Guard I/O modules.

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

   RSWho browses the DeviceNet network connected to the SmartGuard controller.

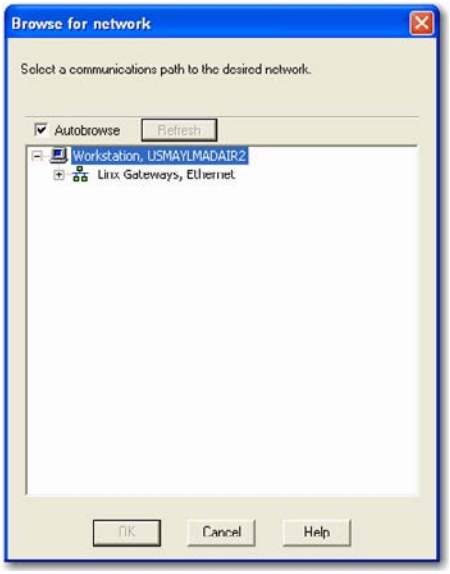
In this example, two POINT Guard I/O modules are connected to the SmartGuard controller.



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

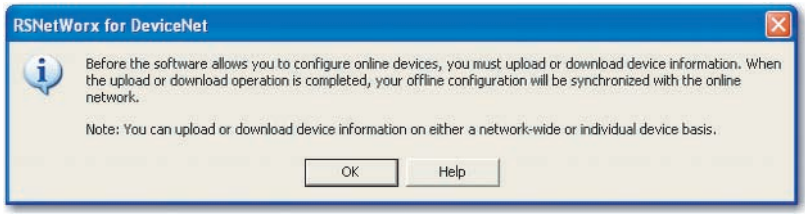
3. Open RSNetworx for DeviceNet software.

4. From the Networks menu, choose Online.



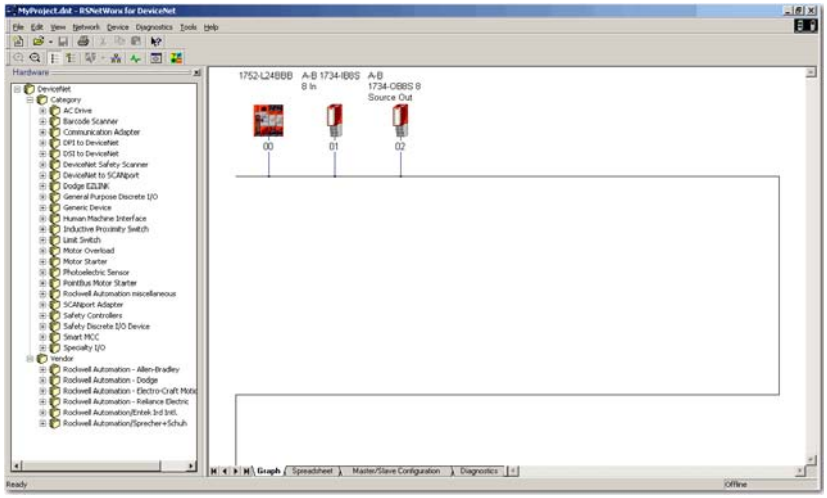
5. Select the SmartGuard driver and click OK.

This dialog box appears.



6. Click OK.

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



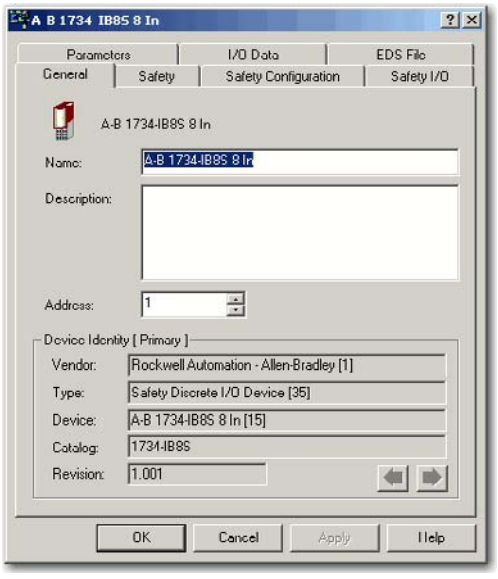
7. Click the online icon again to go offline.

Set Up the Safety Configuration

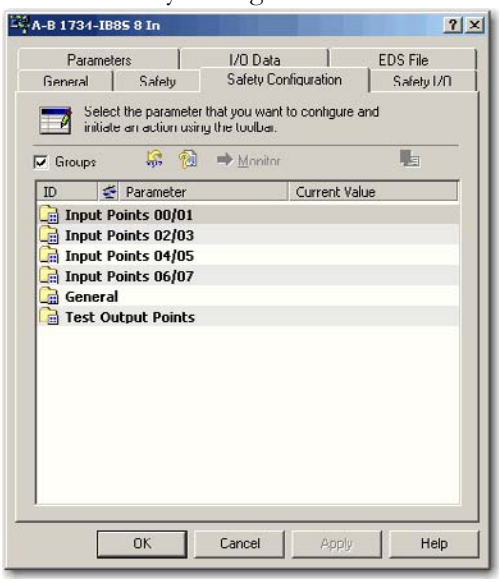
Use this procedure to set up the Safety Configuration tab.

Work with Inputs

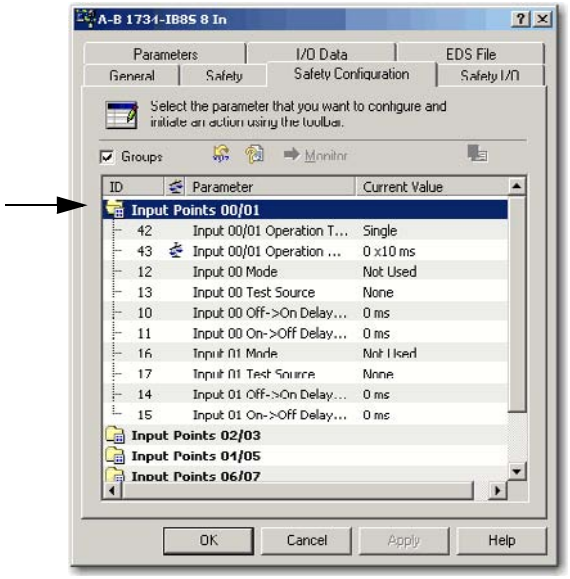
1. Double-click the POINT Guard I/O module to open the Properties dialog box.



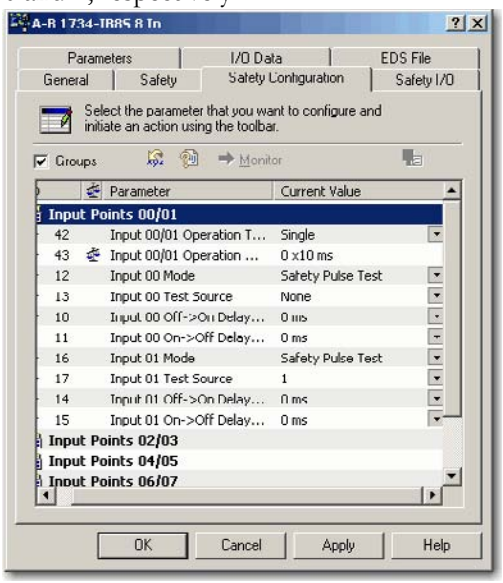
2. Click the Safety Configuration tab.



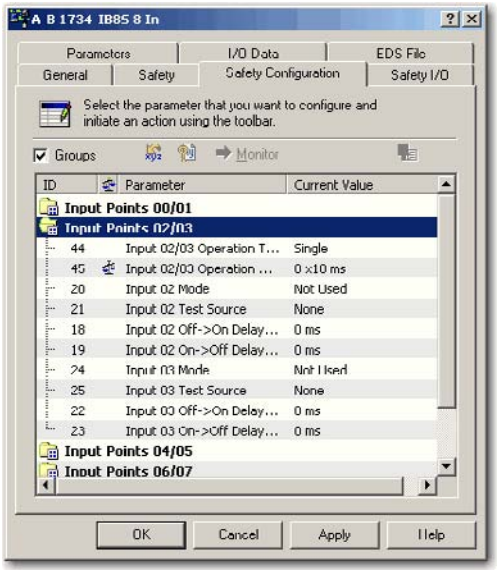
3. Double-click Input Points 00/01, noting that inputs 00 and 01 are the E-stop pushbuttons.



4. Edit the parameters so that the channels are pulse tested by Test sources 0 and 1, respectively.

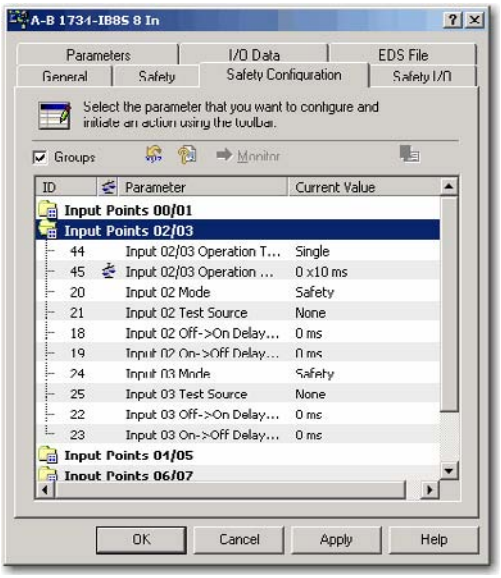


5. Double-click Input Points 00/01 to minimize and Input Points 02/03 to expand.



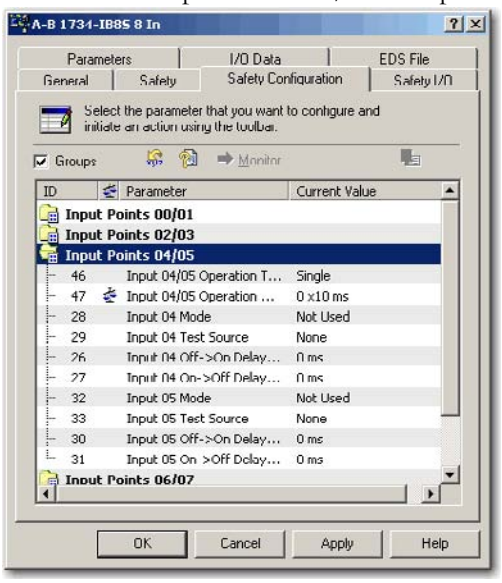
Note that the:

- light curtain is connected to inputs 02 and 03.
- GuardShield pulse tests OSSD1 and OSSD2, so these inputs will be configured as Safety Inputs.



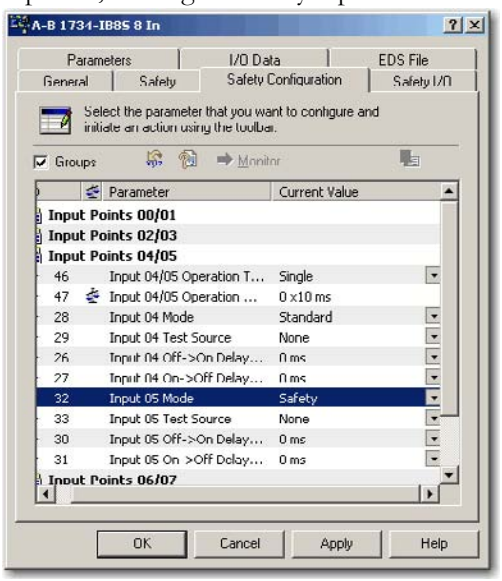
6. Double-click Input Points 02/03 to minimize.

7. Double-click Input Points 04/05 to expand.



8. Add the reset button to input 04, making it a standard input as it is not required to be a safety input.

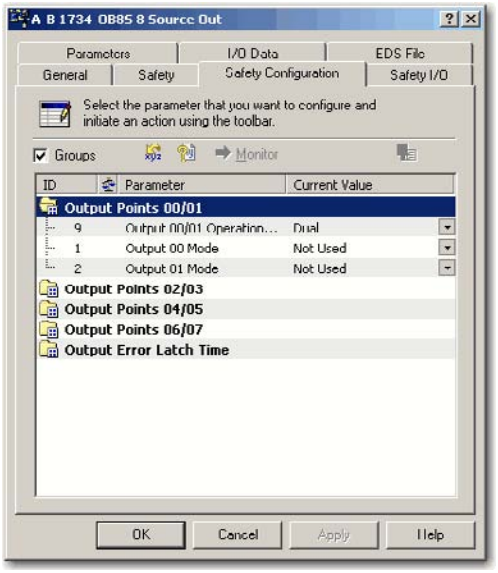
9. Add the AUX feedback circuit for the redundant safety contactors to input 05, making it a safety input as it is not being pulse tested.



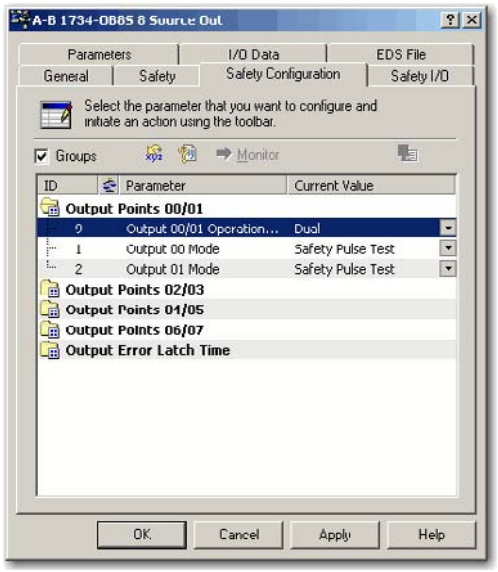
10. Double-click Input Points 04/05 to minimize.

Work with Outputs

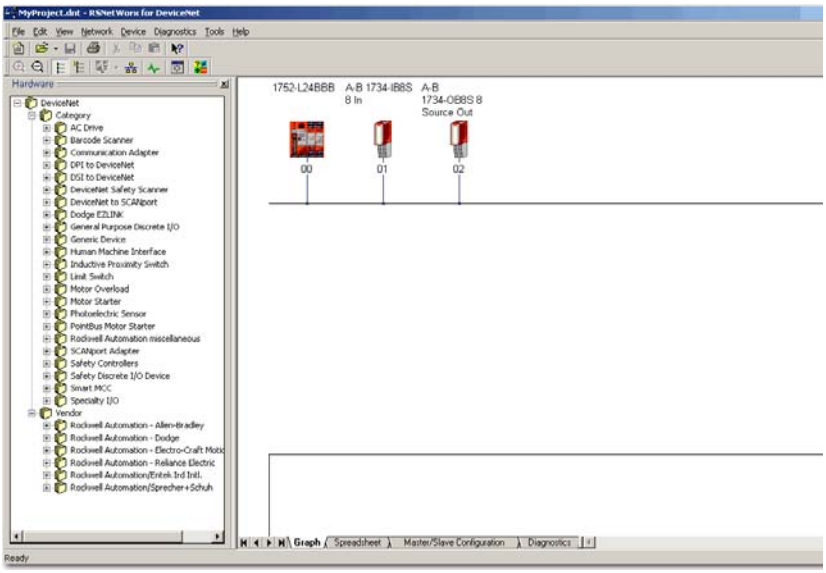
1. Double-click Outputs Points 00/01 to expand, noting that safety contactors are connected to outputs 00 and 01.



2. Configure them as Safety Pulse test.



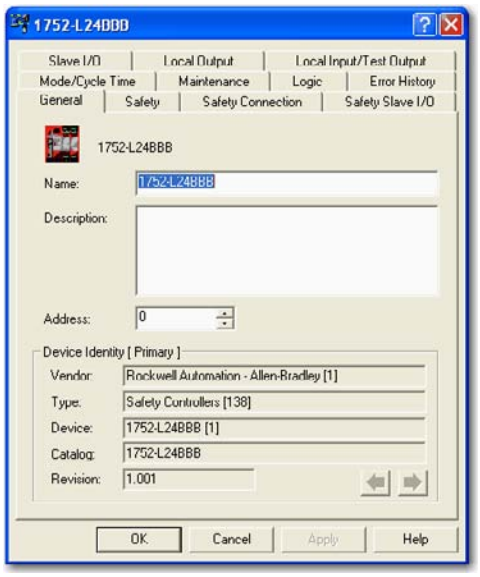
3. Click Apply and OK to return to the main RSNetWorx for DeviceNet dialog box.



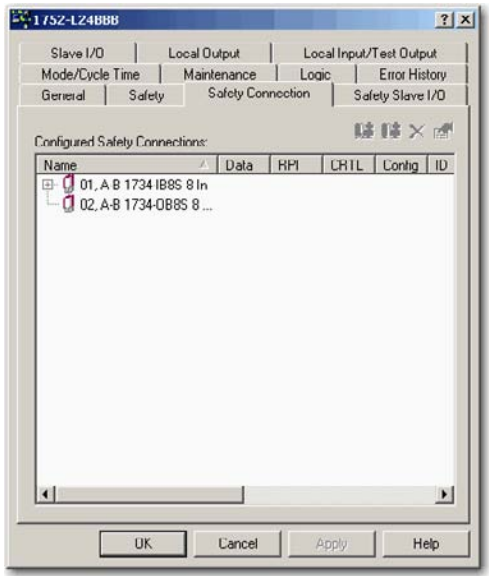
Set Up the Input and Output Connections of the SmartGuard Controller

Use this procedure to set up the input and output connections of the SmartGuard controller.

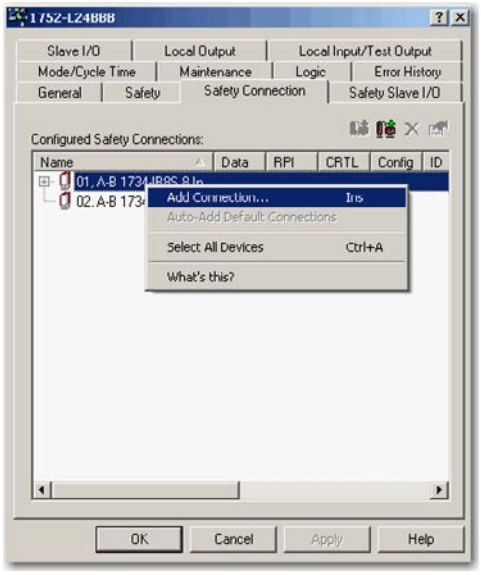
1. In RSNetworx for DeviceNet software, right-click the SmartGuard controller and choose Properties.



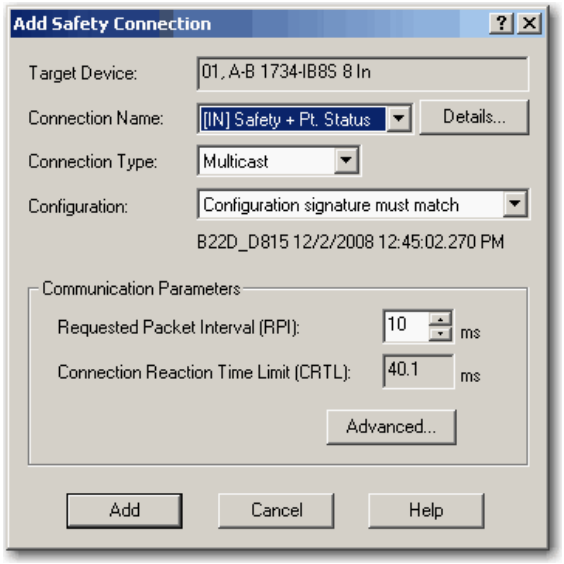
2. Click the Safety Connection tab to see a list of all Safety I/O modules currently in your project.



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

(1) Most input connections use Combined Status.

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.

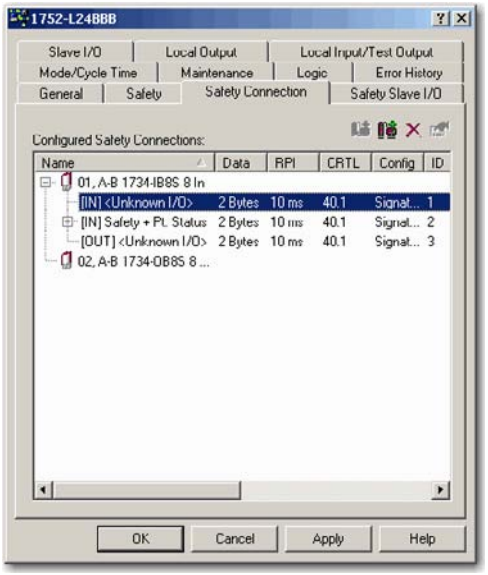
8. In the Connection Reaction Time Limit (CRTL), enter 40.1 ms.

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.



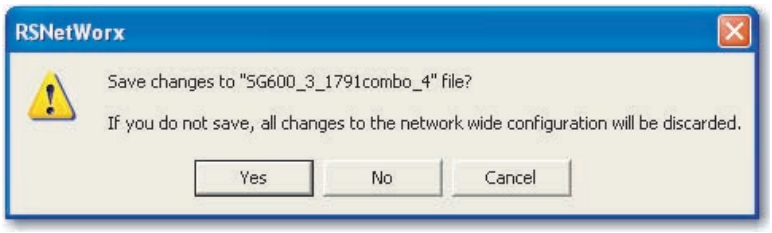
11. Click Apply.

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

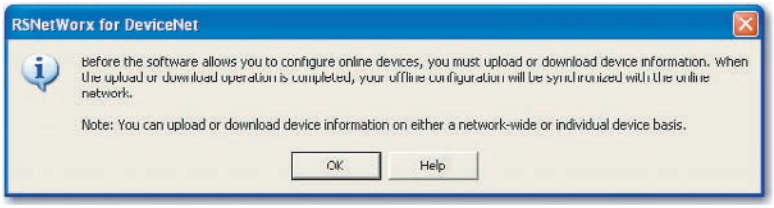
Complete the Set Up of the SmartGuard Controller

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

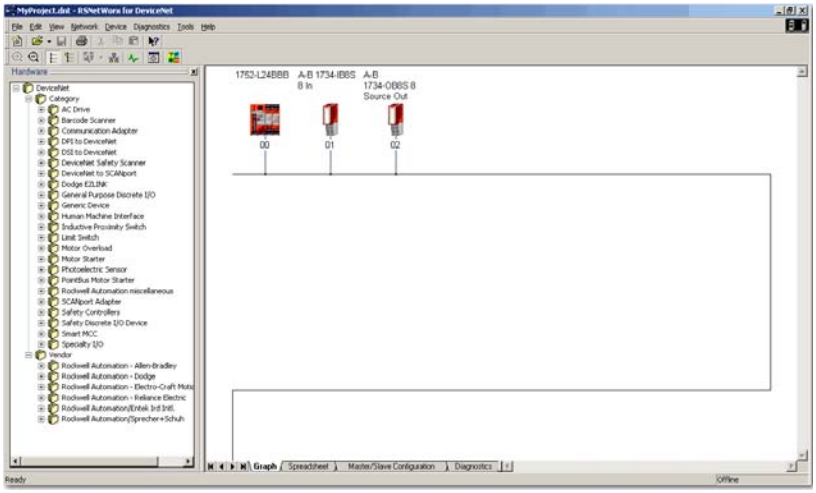
2. Place RSNetworx from DeviceNet software back into Online mode.
   a. If you see this dialog box, click Yes to save changes.



   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.

If after downloading the program the MS and NS status indicators on the POINT Guard I/O module are not both solid green, this may be due to loss of ownership. 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 in the RSNetWorx for DeviceNet tree appears. For more information, see Chapter 8.

Notes:

Considerations When Replacing POINT Guard I/O Modules

What This Chapter Contains

This chapter provides things to consider when replacing POINT Guard I/O modules when they are connected to GuardLogix or SmartGuard controllers. For more information, refer to the GuardLogix Controllers User Manual, publication 1756-UM020 and the SmartGuard 600 Controllers User Manual, publication 1752-UM001.

Considerations When Replacing POINT Guard I/O Modules

When POINT Guard I/O modules are connected to a GuardLogix or SmartGuard controller, consider the following when replacing the modules.

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

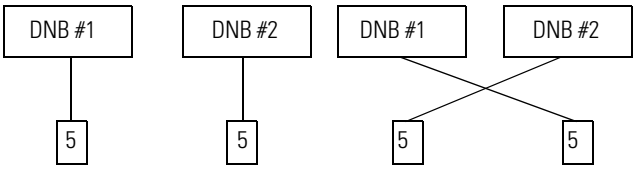
The following, simplified example is of CompactBlock Guard I/O on a DeviceNet network. Your products may differ, but the function is the same.

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.

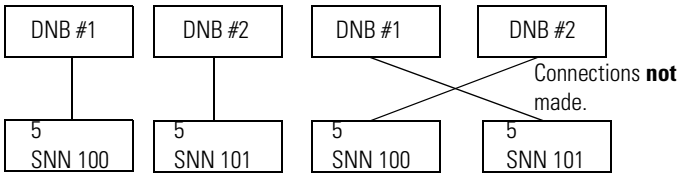
In this example, the DNB scanner #1 is connected to node 5. The DNB scanner #2 is connected to another node 5. If the cables get inadvertently crossed, the scanners may be communicating with the incorrect node 5.

Crossed Cable Example



This crossed-cable scenario is unacceptable for a safety system. The SNN guarantees 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 Example

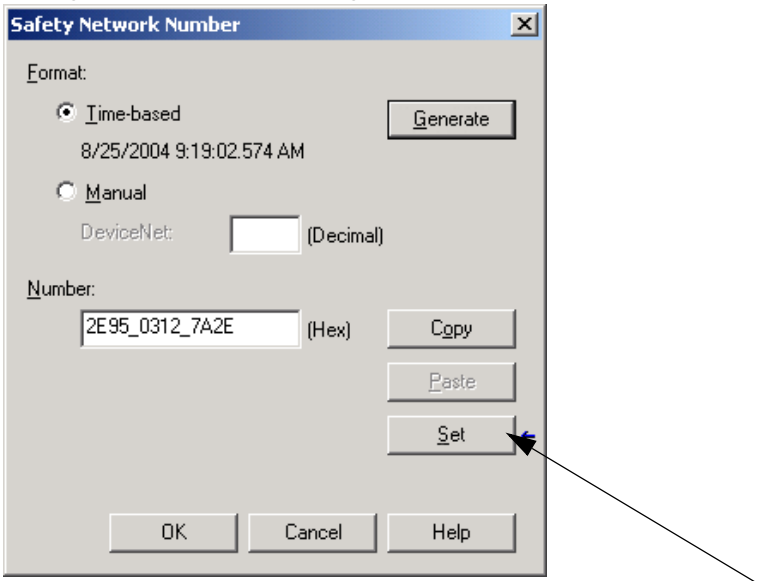


Why You Need to Manually Set the SNN

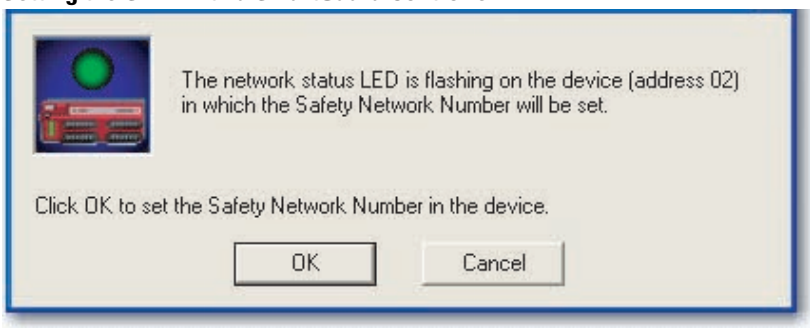
The examples above showed how the SNN is used to guarantee safety-connection integrity after the system is operational. But the SNN is also used to guarantee integrity on the initial download to the POINT Guard I/O module.

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.

Setting the SNN with a GuardLogix Controller



Setting the SNN with a SmartGuard Controller



GuardLogix Controllers versus SmartGuard Controllers

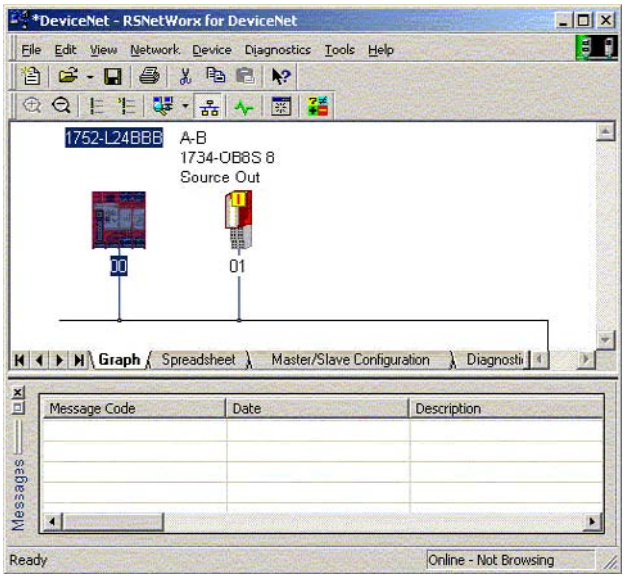
There is one major difference in functionality between the GuardLogix and SmartGuard safety controllers that affects the replacement of safety I/O modules. GuardLogix controllers retain I/O module configuration on-board and are able to download the configuration to the replacement module. SmartGuard 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.

Replacing an I/O Module When Using a SmartGuard Controller

Follow these steps to replace an I/O module when using a SmartGuard controller.

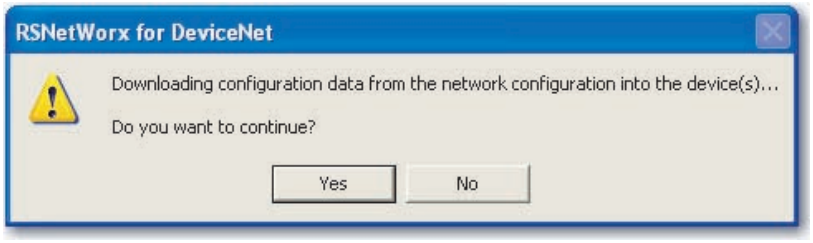
1. Replace the module and match the node number of the original module.
2. In RSNetWorx for DeviceNet software, open your project.

   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.



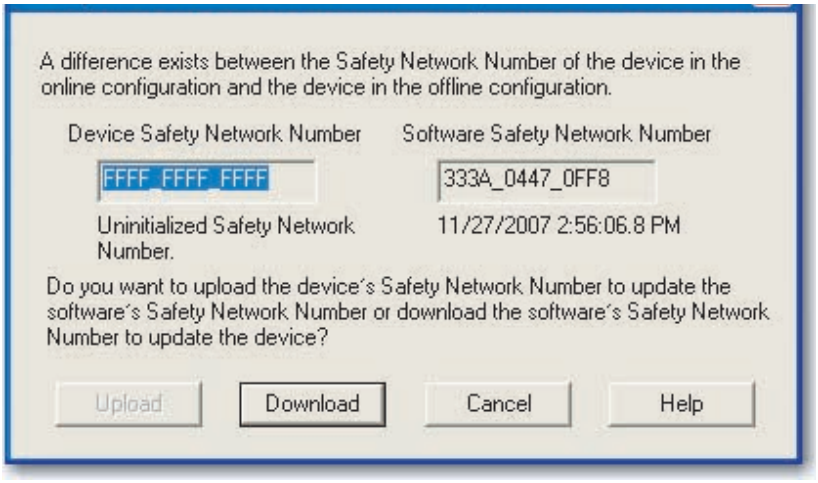
3. Right-click the module and choose Download to Device.

   This dialog box appears.



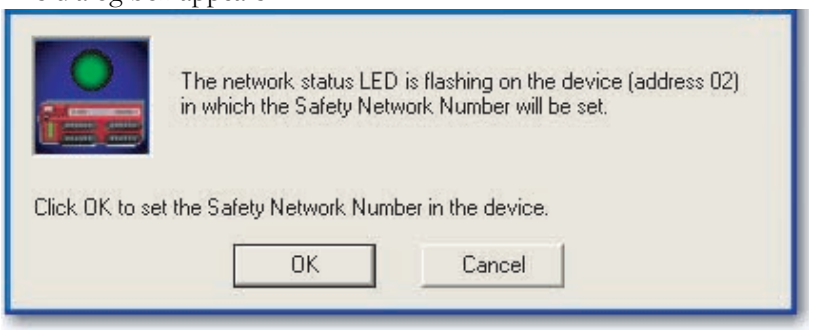
4. Click Yes.

   This dialog box appears informing you that the SNN of the replacement module does not match the SNN in the software.



5. Click Download to set the SNN on the replacement module.

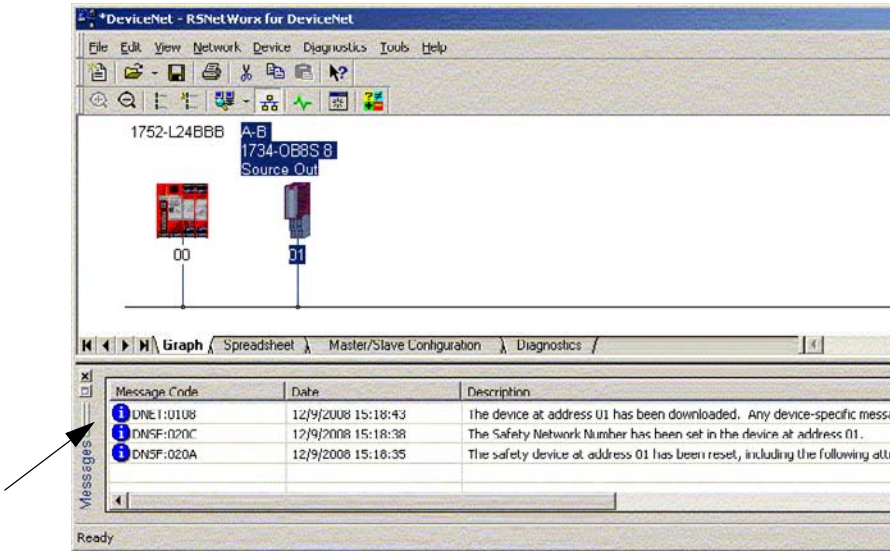
   This dialog box appears.



6. Click OK.

This dialog box appears, confirming that the SNN has ben set.

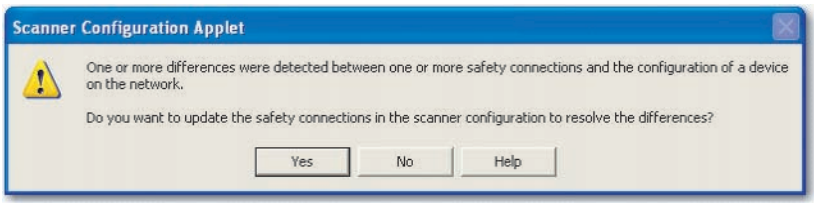
The download now occurs. Once completed successfully, you see this message in the main project view: 'The device at address *xx* has been downloaded. Any device-specific messages related to the download operation are displayed separately.'



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 SmartGuard controller, a connection is made. The SmartGuard 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 SmartGuard controller.

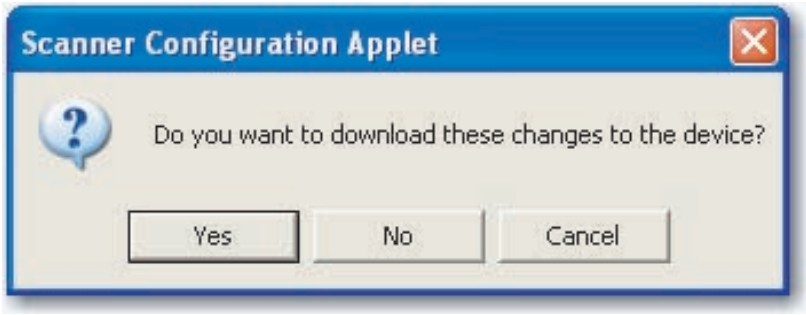
If the configuration downloaded to the module was not from the original DNT file, the configuration signature will not match the original. Even if you recreate the same parameters in a new DNT file, the time and date portions of the signature will be different so the connection to the SmartGuard controller is not made. If this occurs, click the Safety Connection tab for the SmartGuard controller that prompts you that the signature is different and provides you with the option to match the new 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 SmartGuard controller our of RUN mode.

   You see this dialog box.



8. Click Yes to download the new connection configuration to the SmartGuard controller.

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

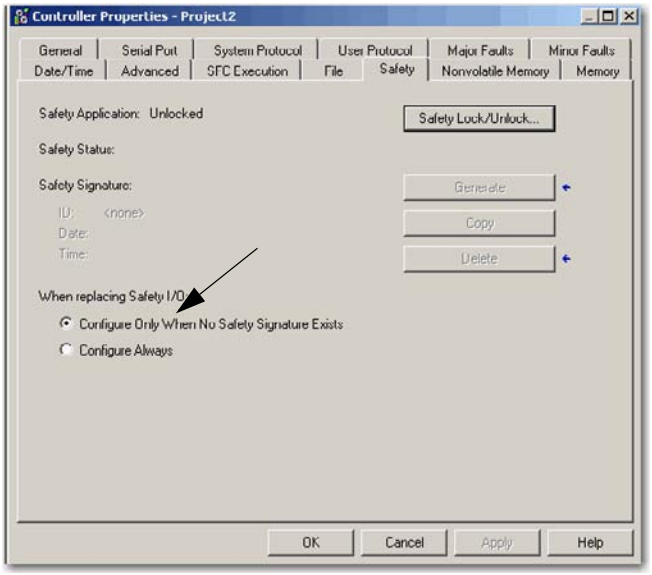
9. Follow your company-prescribed procedures to functionally test the replaced I/O module and system and to authorize the system for use.

Replacing an I/O Module When Using a GuardLogix Controller

Follow the appropriate steps to replace an I/O module when using a GuardLogix controller.

I/O Replacement with 'Configure Only When No Safety Signature Exists' Enabled

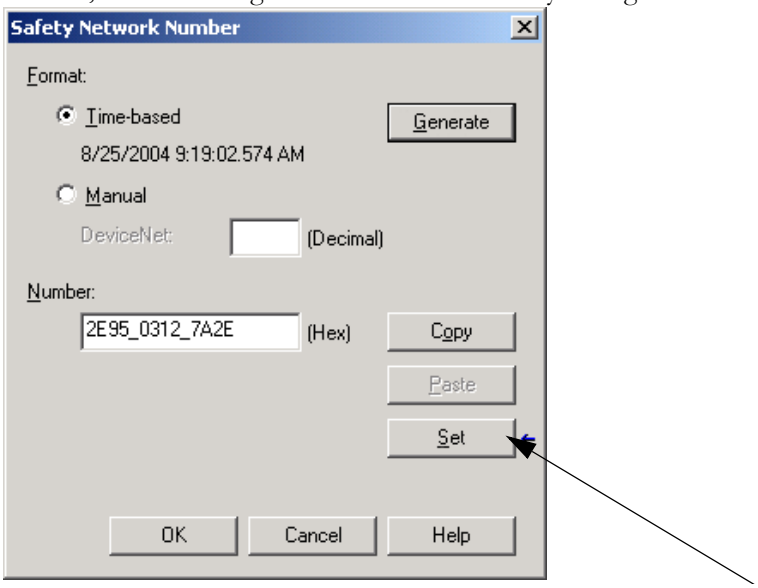
From the Controller Properties dialog box, choose 'Configure Only When No Safety Signature Exists'.



IMPORTANT When your GuardLogix controller is used in a SIL 3 application, you must choose 'Configure Only When No Safety Signature Exists'. Because you must have a safety signature in SIL 3 applications, this option verifies that the SNN of the replacement I/O module matches that of the GuardLogix controller before a connection is made.

If a safety signature exists, clicking Set downloads the correct SNN from the correct GuardLogix project to the replacement module. The only exception would be when the SNN is already the same as the replacement module, in which case no action is required.

Once the correct SNN has been downloaded to the POINT Guard I/O module, the GuardLogix controller automatically configures the module.



If the project is configured as 'Configure Only When No Safety Signature Exists', follow the appropriate steps to replace a POINT Guard I/O module based on your scenario.

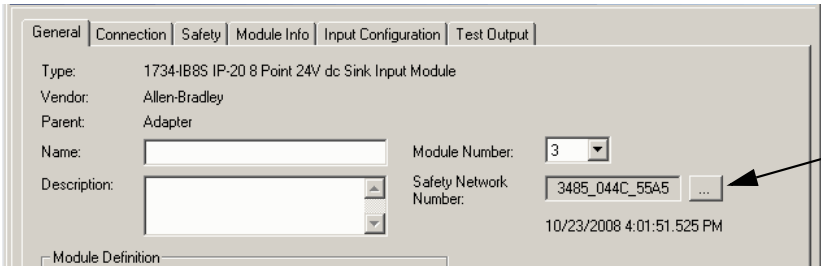
GuardLogix/ RSLogix 5000 Safety Signature Exists	Replacement Module SNN	Fault	Action Required
Yes	Out-of-box	SNN not set, device out-of-box	Click Set. Refer to Scenario 1 - New Module is Out-of-box and Safety Signature Exists on page 106.
No	Out-of-box	None	None.
Yes or No	Same as original	None	None.
Yes	Different from original	SNN mismatch SNN not set, device out-of-box	1. Click Reset Ownership. 2. Click Set. Refer to Scenario 2 - New Module SNN is Different from Original and Safety Signature Exists on page 107.
No	Different from original	SNN mismatch	Click Reset Ownership. Refer to Scenario 3 - New Module SNN is Different from Original and No Safety Signature Exists on page 109.

Scenario 1 - New Module is Out-of-box and Safety Signature Exists

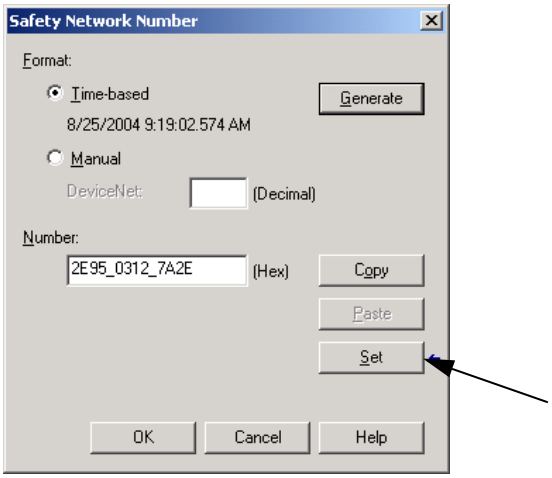
1. Remove the old I/O module and install the new module.

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

3. Click ... to the right of the safety network number to open the Safety Network Number dialog box.

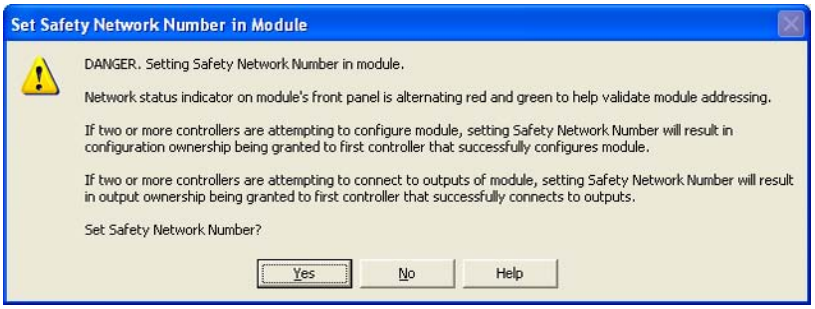


4. Click Set.



The Set Safety Network Number in Module confirmation dialog box appears.

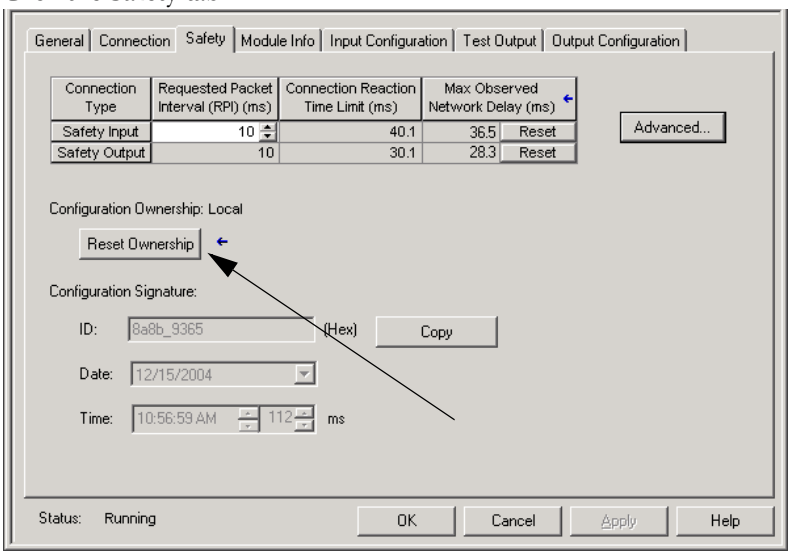
5. Verify that the Network Status (NS) status indicator is alternating red/green on the correct module before clicking Yes to set the SNN and accept the replacement module.



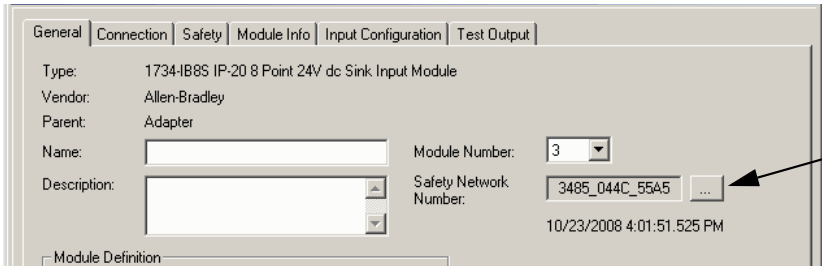
6. Follow your company-prescribed procedures to functionally test the replaced I/O module and system and to authorize the system for use.

Scenario 2 - New Module SNN is Different from Original and Safety Signature Exists

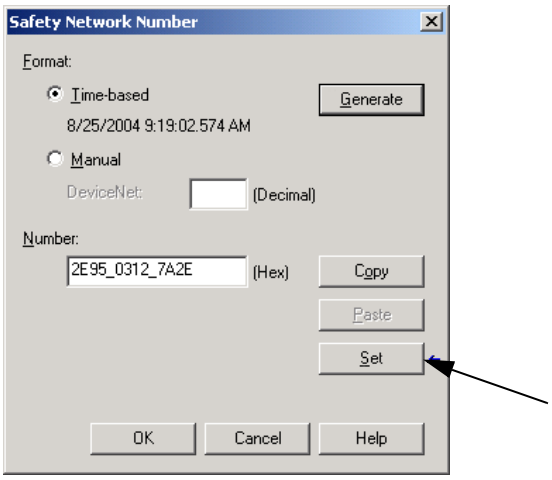
1. Remove the old I/O module and install the new module.
2. Right-click your POINT Guard I/O module and choose Properties.
3. Click the Safety tab.



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.

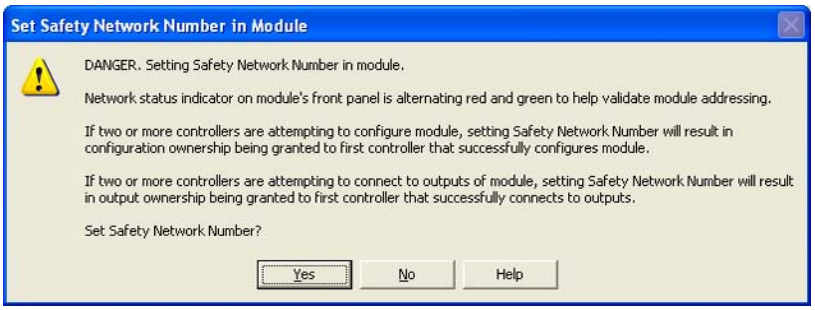


8. Click Set.



The Set Safety Network Number in Module confirmation dialog box appears.

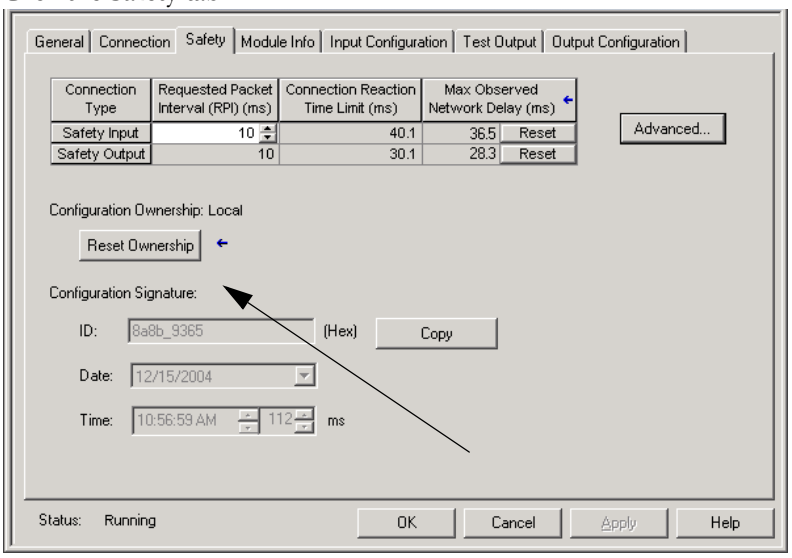
9. Verify that the Network Status (NS) status indicator is alternating red/green on the correct module before clicking Yes to set the SNN and accept the replacement module.



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 - New Module SNN is Different from Original and No Safety Signature Exists

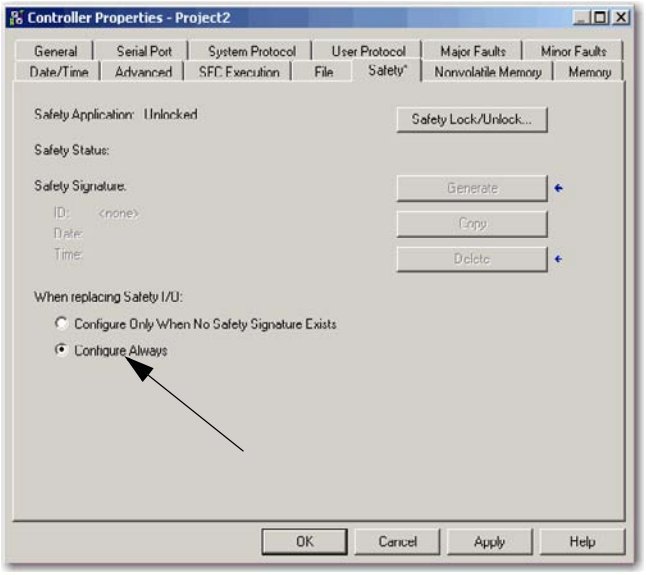
1. Remove the old I/O module and install the new module.
2. Right-click your POINT Guard I/O module and choose Properties.
3. Click the Safety tab.



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.

I/O Replacement with 'Configure Always' Enabled

From the Controller Properties dialog box, choose 'Configure Always'.



ATTENTION

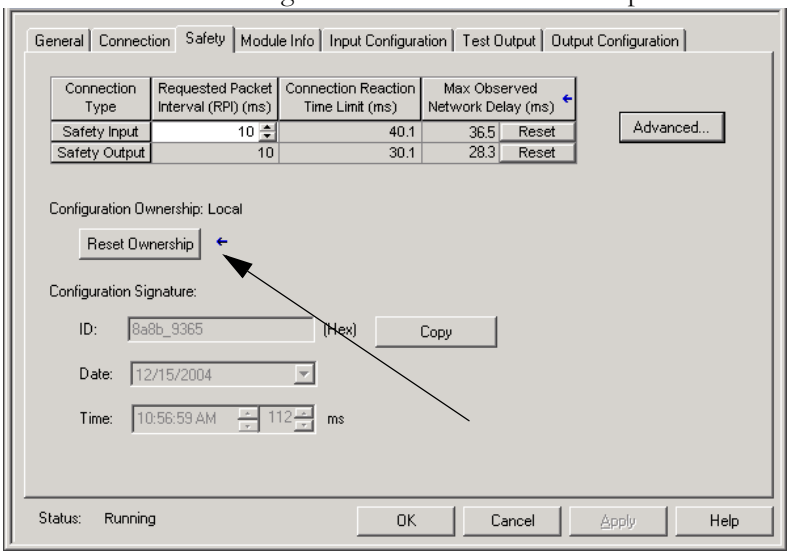
Enable the 'Configure Always' feature only if the entire CIP Safety Control System is **not** being relied on to maintain SIL 3 behavior during the replacement and functional testing of a module.

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.

Although chances are small, this allows the possibility of the wrong controller taking ownership of the replacement module. Therefore, testing is required after the download to be sure that this did not occur.

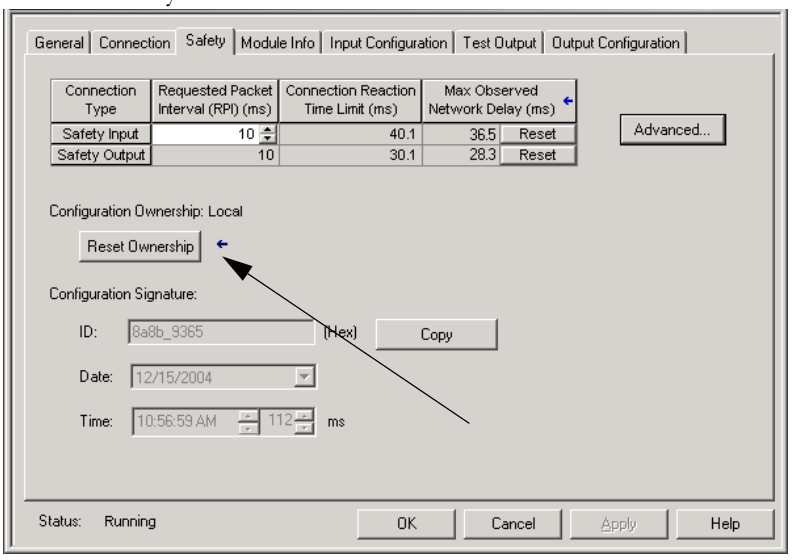
For modules with different SNNs, clicking Reset Ownership places the module in an out-of-box condition. Once in out-of-box mode, no action is needed for the GuardLogix controller to take ownership of the module.



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

GuardLogix/ RSLogix 5000 Safety Signature Exists	Replacement Module SNN	Fault	Action Required
Yes or No	Out-of-box	None	None.
Yes or No	Same as original	None	None.
Yes or No	Different from original	SNN mismatch	Click Reset Ownership. Follow the steps below.

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.



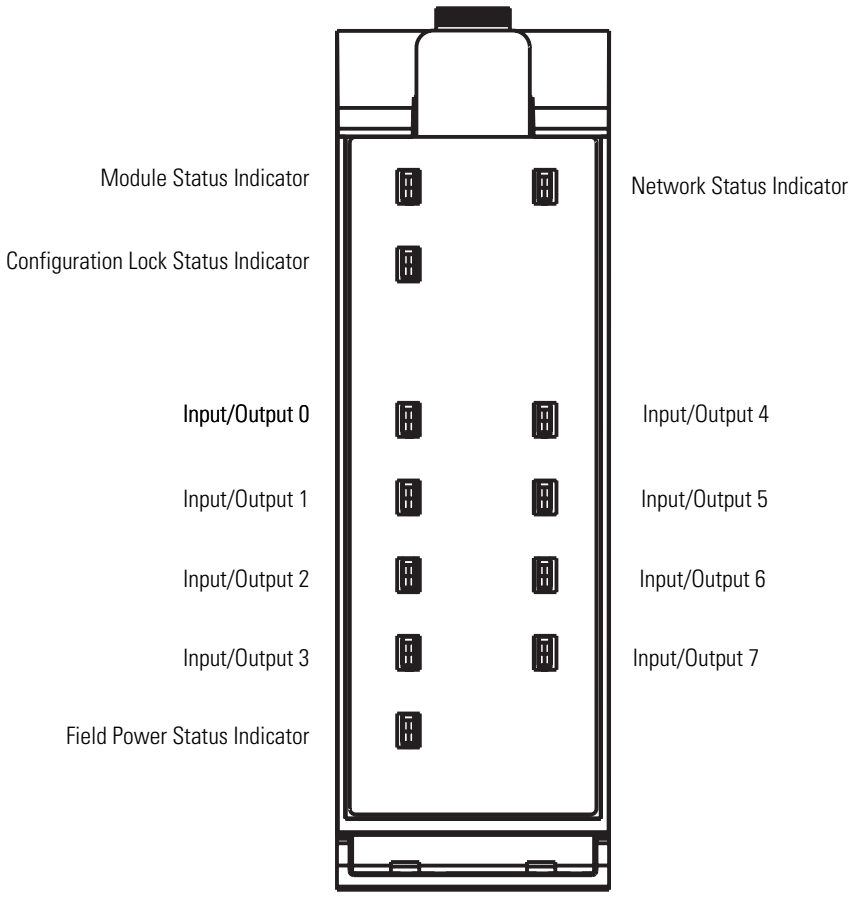
4. Click Reset Ownership.
5. Click OK.
6. Follow your company-prescribed procedures to functionally test the replaced I/O module and system and to authorize the system for use.

Status Indicators

Introduction

Refer to these status indicators as necessary.

Status Indicators Placement



Module Status

Indicator	Status	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 unconfigured.	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	Status	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	Status	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	Status	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.	Check your connectors, wiring, and voltages.

Safe Input Status (1734-IB8S module)

Indicator	Status	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.

Safe Output Status (1734-OB8S module)

Indicator	Status	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

Introduction

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.

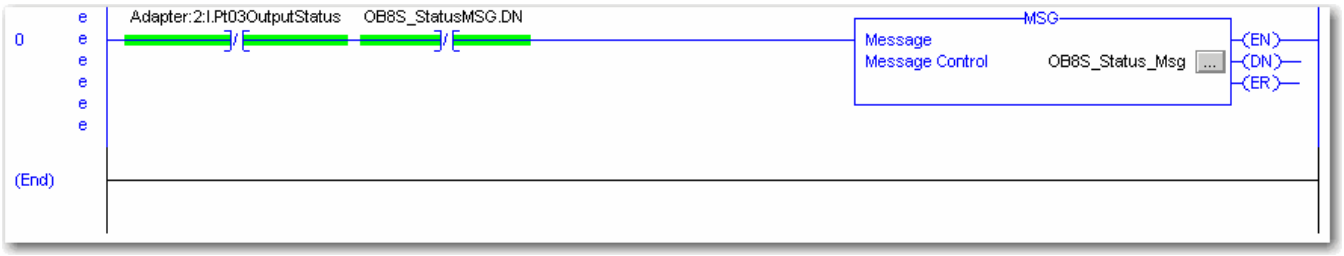
In this example, we use a 1734-OB8S module with the Input Status set to return Point Status. This table illustrates the controller tags that you can monitor for this module.

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.

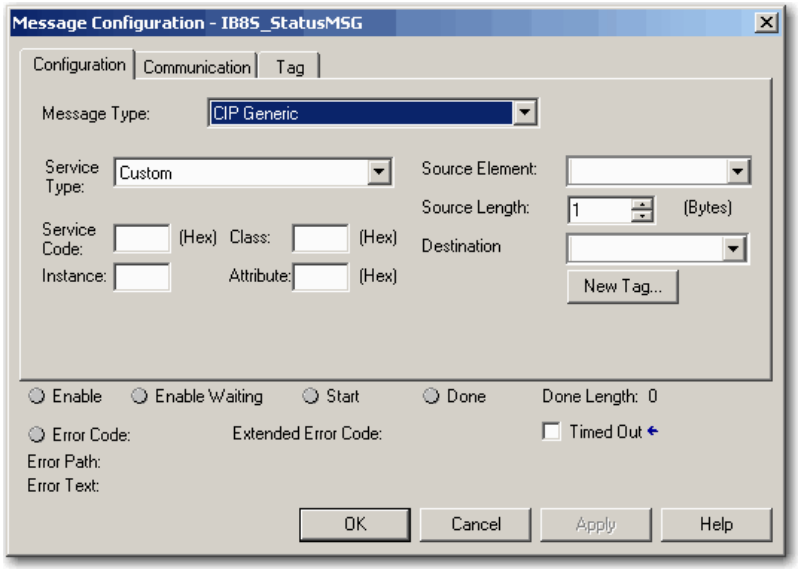
This sample ladder logic is monitoring the status of output point 3. This ladder logic rung examines the Output Point Status and, when a fault is detected (0 = error), the message instruction is executed.



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. Enter the appropriate data for what you want to monitor.

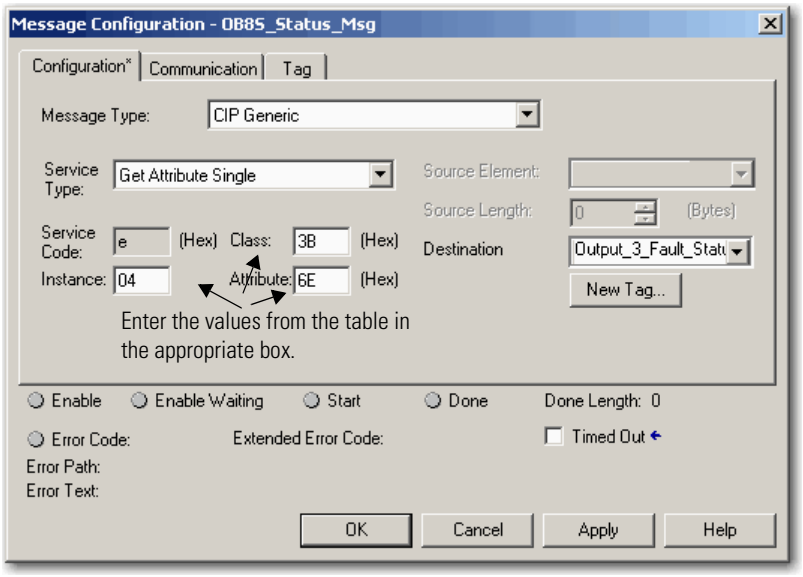


3. From the Service Type pull-down menu, choose Get Attribute Single.

4. Refer to the appropriate table, depending on what you'd like to monitor.

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

TIP When entering the Instance value, enter the input/output point plus 1. In our example, Output Point 3 is Instance 4.



Monitoring a Safety Input Status

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 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

Monitoring a Safety Output Status

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 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

Monitoring a Test Output Status

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	6E	-	0 = No error 01: Configuration invalid 02: Overload detected 03: Cross circuit detected 05: Output ON error 06: Undercurrent detected for muting lamp

Configuring Test Outputs for Communication Errors

Service Type	Function	Command (hex)					Response (hex)
		Service Code	Class ID	Instance ID	Attribute ID	Data Size	
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	-

Probability of Failure on Demand (PFD), Probability of Failure per Hour (PFH), and Mean Time Between (MTBF) Data

What This Appendix Contains

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

Calculated Values

See the table that shows the values. Reference information in the GuardLogix Controller Systems Safety Reference Manual, publication 1756-RM093.

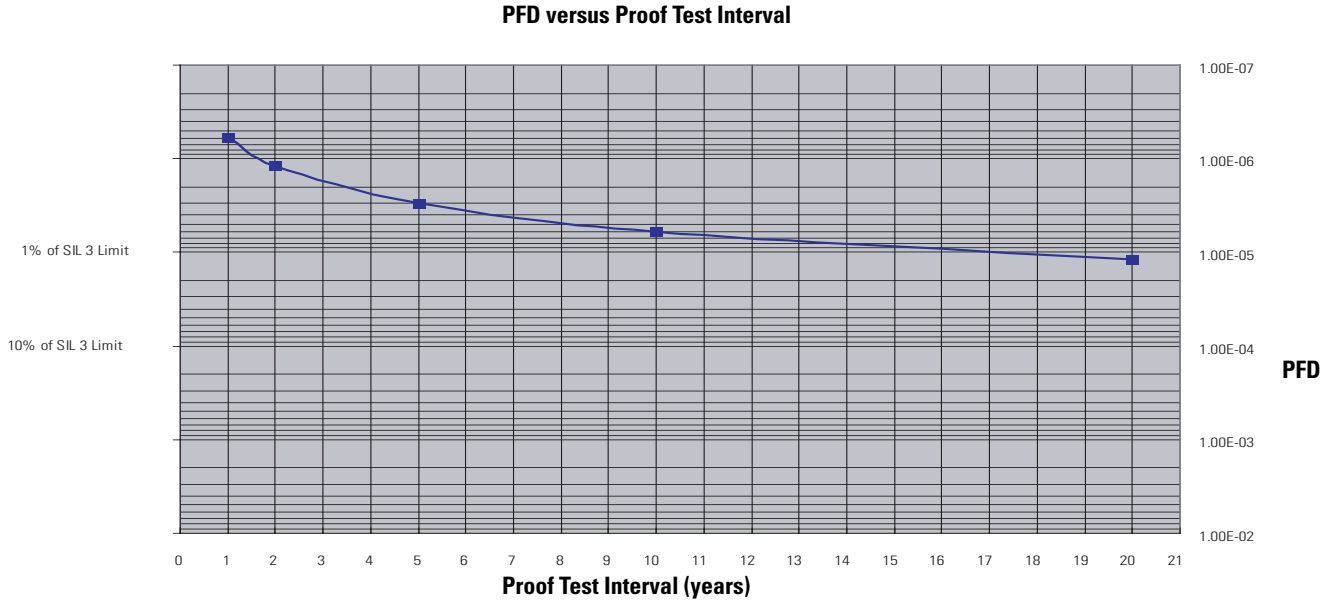
Calculated values of probability of failure on demand and probability of failure per hour appear in the table and must be calculated for the devices within the system to comply with the SIL level required for application.

Users must be responsible to follow the requirements of IEC 13849-1:2008, in order 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.

Calculated Values for Probability of Failure on Demand (PFD), Probability of Failure per Hour (PFH), and Mean Time Between Failure (MTBF)



Model	Proof Test Interval (Mission Time)		PFD (1/hour)	PFH (1/hour)	MTBF (hour)
	Year	Hour			
1734-IB8S	1	8760	5.85E-07	1.34E-10	5.76E+06
	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	4.57E+06
	2	17520	1.21E-06		
	5	43800	3.03E-06		
	10	87600	6.06E-06		
	20	175200	1.21E-05		

Configuration Reference Information

What This Appendix Contains

This appendix provides information about configuration settings.

Understand Parameter Groups

The modules have these parameter groups: safety input, test output, safety output. See the tables for the settings in each parameter group. All parameters are set by using RSLogix 5000 software.

Safety Input Parameters(1)

Parameter Name		Value	Description	
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.

Test Output Parameters[1]

Parameter Name		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.

Safety Output Parameters[1]

Parameter Name		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.

Other Parameters

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 A more information.

Specifications

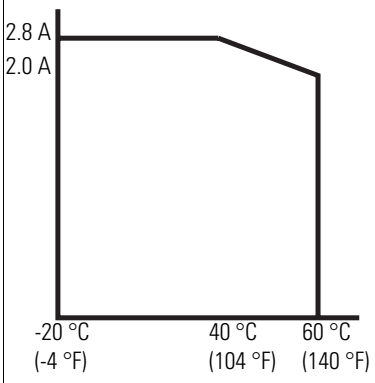
Introduction

Refer to these module specifications as necessary.

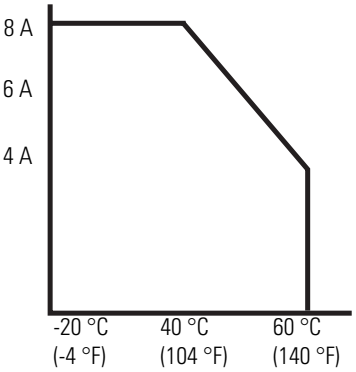
1734-IB8S - Technical Specifications

Attribute	Value
Safety Input	
Inputs per module	8
Input type	Current sinking
Voltage, on-state input, min	11V DC
Current, on-state input, min	3.3 mA
Voltage, off-state input, max	5V DC
Current, off-state, max	1.3 mA
IEC 61131-2 (input type)	Type 3
Reaction time	<16.2 ms

1734-IB8S - Technical Specifications

Attribute	Value
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)
1734-IB8S temperature versus current derating for both horizontal and vertical installations	
Residual voltage, max	1.2V
Output leakage current, max	0.1 mA
Short circuit protection	Yes
Current, max (when used to control muting lamp)	25 mA Current, max (to avoid fault when used as a muted lamp output)
Current, min (when used to control muting lamp)	5 mA Current, min (at which fault indication is generated when used as a muted lamp output)

1734-OB8S - Technical Specifications

Attribute	Value
Safety Output	
Outputs per module	8
Output type	Current sourcing
Output current (each output point)	1 A max
Residual 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 °C (104 °F)
1734-OB8S temperature versus current derating for both horizontal and vertical installations	
Galvanic isolation, I/O from logic	50V level Tested to 500V AC or 707V DC for 1 min
Reaction time	<6.2 ms

1734-IB8S and 1734-OB8S - Technical Specifications

Attribute	1734-IB8S	1734-OB8S
POINTBus		
POINTBus current, max	175 mA	190 mA
Power dissipation	1.4 W	1.9 W
Thermal dissipation	4.8 BTU/hr	6.5 BTU/hr
Isolation voltage	50V (continuous), Basic Insulation Type Type tested at 1206V DC for 60 s between field side and system No isolation between individual channels	
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	

(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.

1734-IB8S and 1734-OB8S Physical Specifications

Attribute	Value
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)
Pilot duty rating	Not rated (1734-OB8S only)
North America temp code	T3
Enclosure type rating	None (open-style)
Enclosure type rating	None (open-style)
Wiring category(1)	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) Use this conductor category information for planning conductor routing. Refer to the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

1734-IB8S and 1734-OB8S 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…60 °C (-4…140 °F)
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)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5…95% noncondensing
Shock, operating	IEC 60068-2-27 (Test Ea, Unpackaged Shock) 30 g
Shock, nonoperating	IEC 60068-2-27 (Test Ea, Unpackaged Shock) 50 g
Vibration	IEC 60068-2-6, (Test Fc, Operating) 5 g @ 10…500 Hz
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 30…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 signal ports
Surge transient immunity	IEC 61000-4-5: ±1 kV line-line (DM) and ±2 kV line-earth (CM) on signal ports
Conducted RF immunity	IEC 61000-4-6: 10V rms with 1 kHz sine-wave 80%AM from 150 kHz…80 MHz
Emissions	CISPR 11: Group 1, Class A

1734-IB8S and 1734-OB8S Certifications

Certification	Value	
Certifications: (when product is marked)[1]	**CE**	European Union 2004/108/EC EMC Directive, compliant with: EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
	C-Tick	Australian Radiocommunications Act compliant with AS/NZS CISPR 11, Industrial Emissions
	TÜV	TÜV Certified for Functional Safety up to and including SIL 3[2]/Category 4 and Performance Level e

(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.

I/O Assemblies

Introduction

Refer to the following tables for input, output, and configuration assemblies.

Input Assemblies

Instance Hex (Decimal)	Module	Connection Type	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
204	1734-IB8S	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
224	1734-IB8S	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 Status	Safety Input 6 Status	Safety Input 5 Status	Safety Input 4 Status	Safety Input 3 Status	Safety Input 2 Status	Safety Input 1 Status	Safety Input 0 Status
300	1734-IB8S	Standard Only	0	Reserved							Input Power Error
314	1734-IB8S	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 in Status	Reserved	Input Power Error[1]	Reserved	Reserved	Reserved	Muting Lamp 3 Status	Muting Lamp 1 Status
334	1734-IB8S	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 Status	Safety Input 6 Status	Safety Input 5 Status	Safety Input 4 Status	Safety Input 3 Status	Safety Input 2 Status	Safety Input 1 Status	Safety Input 0 Status
			2	Reserved		Input Power Error[1]	Reserved			Muting Lamp 3 Status	Muting Lamp 1 Status

Instance Hex (Decimal)	Module	Connection Type	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
364	1734-IB8S	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 Status	Safety Input 6 Status	Safety Input 5 Status	Safety Input 4 Status	Safety Input 3 Status	Safety Input 2 Status	Safety Input 1 Status	Safety Input 0 Status
			2	Reserved				Test Output 3 Status	Test Output 2 Status	Test Output 1 Status	Test Output 0 Status
			3	Reserved		Input Power Error[1]	Reserved			Muting Lamp 3 Status	Muting Lamp 1 Status
383	1734-IB8S	Standard	0	Reserved							Input Power Error
			1	Reserved				Test Output 3 Status	Test Output 2 Status	Test Output 1 Status	Test Output 0 Status
244	1734-OB8S	Safety and Standard	0	Safety Output 7 Status	Safety Output 6 Status	Safety Output 5 Status	Safety Output 4 Status	Safety Output 3 Status	Safety Output 2 Status	Safety Output 1 Status	Safety Output 0 Status
404	1734-OB8S	Safety and Standard	0	Safety Output 7 Status	Safety Output 6 Status	Safety Output 5 Status	Safety Output 4 Status	Safety Output 3 Status	Safety Output 2 Status	Safety Output 1 Status	Safety Output 0 Status
			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
414	1734-OB8S	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 Status	Reserved	Output Power Error	Reserved			

[1] This data is diagnostic only and does **not** have safety integrity.

Output Assemblies

Instance Hex (Decimal)	Module	Connection Type	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
21	1734-IB8S	Safety[1]	0	Reserved				Standard Output 3	Standard Output 2	Standard Output 1	Standard Output 0
234	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

[1] Only outputs 1 and 3 are configurable to Muting or Test Outputs. This assembly is only accessible over a Safety connection.

Configuration Assemblies

Refer to the appropriate table for 1734-IB8S or 1734-OB8S configuration assembly data.

1734-OB8S Configuration Assembly

Instance Hex (Decimal)	Module	Byte	Field	Class (Hex)	Instance (Decimal)	Attribute (Decimal)
360	1734-OB8S	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	

1734-IB8S Configuration Assembly

Instance Hex (Decimal)	Module	Byte	Field	Class (Hex)	Instance (Decimal)	Attribute (Decimal)
360	1734-IB8S	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)			

Additional Resources

Related Documentation

Refer to the following as needed for additional help when setting up and using your modules. For specifications refer to the relevant installation instructions. You can view or download publications at http://literature.rockwellautomation.com. To order paper copies of technical documentation, contact your local Rockwell Automation distributor or sales representative.body text

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 safety reference information 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.
ODVA Media Planning and Installation Guide 00148-BR001	Describes the required media components and how to plan for and install these required components.
DeviceNet Modules in Logix5000 Control Systems User Manual, publication DNET-UM004	Provides information on how to connect the controller to the network.
GuardPLC Controller Systems User Manual, publication 1753-UM001	Describes in brief the safety concept of the GuardPLC family of controllers.
GuardPLC Safety Reference Manual, publication 1753-RM002	Explains how the GuardPLC control system can be used in safety applications.
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.

Notes:

Numerics

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Notes:

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Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

United States	1.440.646.3434 Monday – Friday, 8 a.m. – 5 p.m. EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

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Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

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