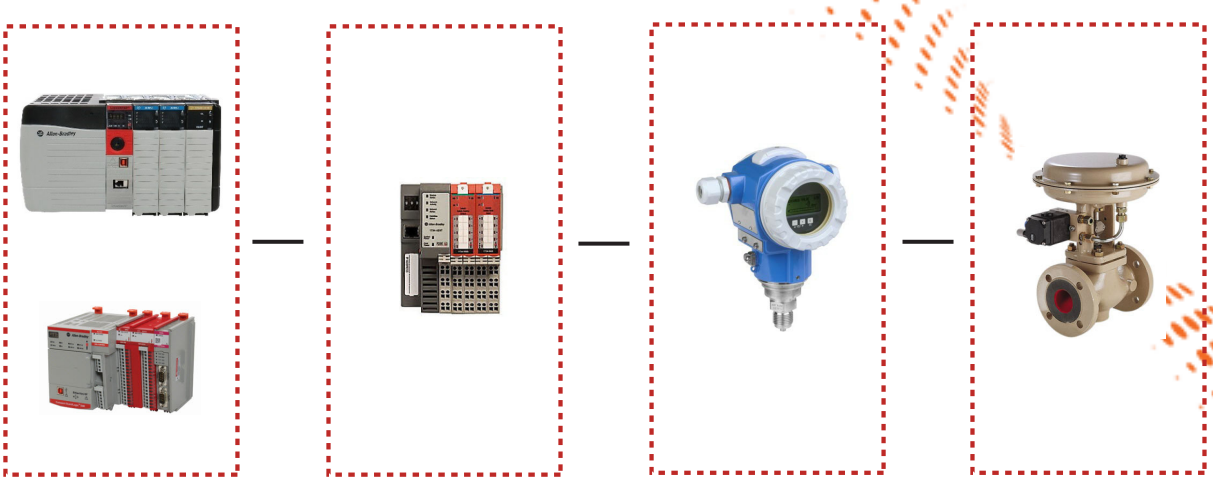
Application Technique

Original Instructions

SIL 2 Safety Function: High-pressure Monitoring with Low Demand

Products: GuardLogix Controller, Cerabar Pressure Transmitter, POINT Guard I/O Analog Input Safety Module, POINT Guard I/O Output Safety Module, SAMSON Globe Valve

Safety Rating: SIL 2 to IEC 61511



Important User Information

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

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

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

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

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

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

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

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

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

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

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

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

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

Summary of Changes

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

Topic	Page
Programming drawing	14
Updated ACD file attached to PDF	See Use Sample Project Files on page 4

General Safety Information

Contact Rockwell Automation to learn more about our safety risk assessment services.

IMPORTANT This application example is for advanced users and assumes that you are trained and experienced in safety system requirements.

ATTENTION: Perform a risk assessment to make sure that all task and hazard combinations have been identified and addressed. The risk assessment can require additional circuitry to reduce the risk to a tolerable level. Safety circuits must consider safety distance calculations, which are not part of the scope of this document.

Safety Distance Calculations

ATTENTION: While safety distance or access time calculations are beyond the scope of this document, compliant safety circuits must often consider a safety distance or access time calculation.

Non-separating safeguards provide no physical barrier to prevent access to a hazard. Publications that offer guidance for calculating compliant safety distances for safety systems that use non-separating safeguards, such as light curtains, scanners, two-hand controls, or safety mats, include the following:

- EN ISO 13855:2010 (Safety of Machinery – Positioning of safeguards with respect to the approach speeds of parts of the human body)
- EN ISO 13857:2008 (Safety of Machinery – Safety distances to prevent hazardous zones being reached by upper and lower limbs)
- ANSI B11:19 2010 (Machines – Performance Criteria for Safeguarding)

Separating safeguards monitor a movable, physical barrier that guards access to a hazard. Publications that offer guidance for calculating compliant access times for safety systems that use separating safeguards, such as gates with limit switches or interlocks (including SensaGuard™ switches), include the following:

- EN ISO 14119:2013 (Safety of Machinery – Interlocking devices associated with guards - Principles for design and selection)
- EN ISO 13855:2010 (Safety of Machinery – Positioning of safeguards with respect to the approach speeds of parts of the human body)
- EN ISO 13857:2008 (Safety of Machinery – Safety distances to prevent hazardous zones being reached by upper and lower limbs)
- ANSI B11:19 2010 (Machines – Performance Criteria for Safeguarding)

In addition, consult relevant national or local safety standards to assure compliance.

Introduction

This low-demand safety function application technique explains how to wire, configure, and program a GuardLogix® controller and a POINT Guard I/O™ analog input module to monitor a pressure transmitter. If there is high pressure in the process loop, a demand is placed on the safety function. The safety function drops power to a solenoid valve, which vents a pneumatic actuator, and places a globe valve into a fail-safe position.

This example uses the GuardLogix 5580 controller, but is applicable to any GuardLogix controller.

This example uses the Endress+Hauser Cerabar® S PMP71 pressure transmitter, but is applicable to any safety-rated transmitters with a 4...20 mA output.

This example uses a final element that consists of a SAMSON Type 3241 globe valve, a model 3277 pneumatic actuator, and a model 3963 solenoid valve, but is applicable to any safety-rated final elements that use 24V DC digital output to place the control valve into its fail-safe state.

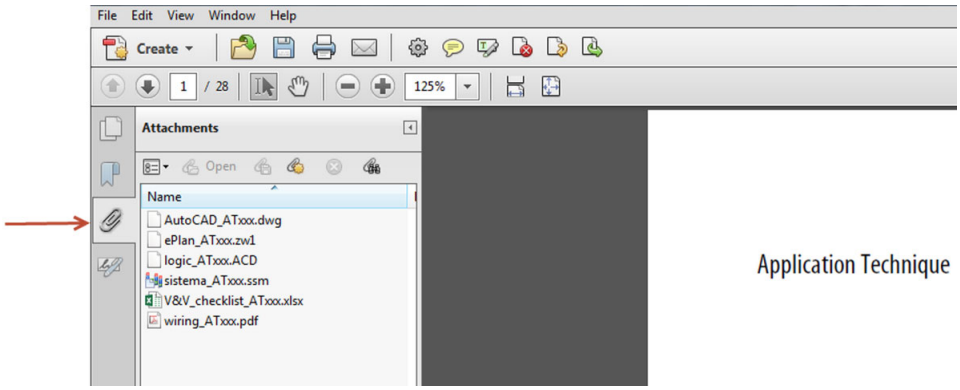
If different components are used, the Safety Integrity Level (SIL) calculations that are shown later in this document must be recalculated by using the actual components.

Use Sample Project Files

Sample project files (AutoCAD, EPLAN, ACD, SISTEMA, and Verification and Validation checklist) are attached to this document to help you implement this safety function.

To access these files, follow these steps.

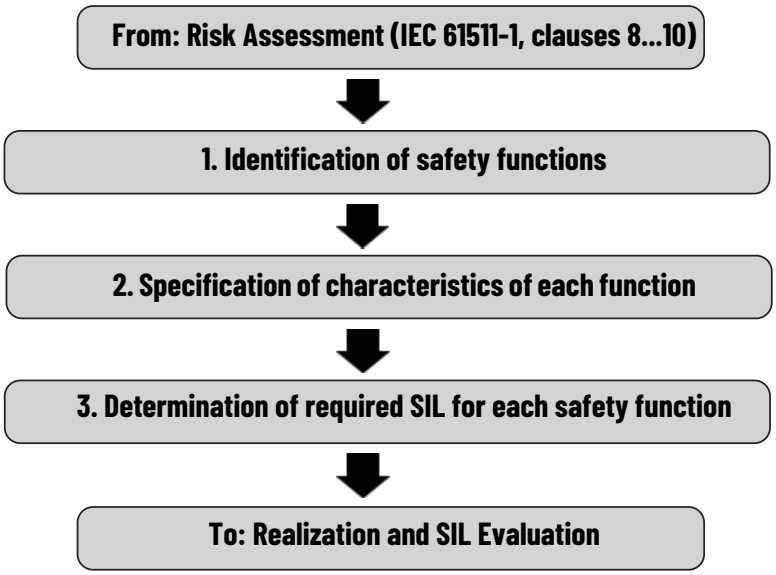
1. If you are viewing the PDF file in a browser and do not see the Attachments link, download the PDF file and open it in the Adobe Acrobat Reader application.
2. Right-click the Attachments link, and save the desired file.



3. Open the file in the appropriate application.

Safety Function Realization: Risk Assessment

The required safety integrity level (SIL) is the result of a risk assessment and refers to the amount of the risk reduction to be conducted by the safety-related parts of the control system. Part of the risk reduction process is to determine the safety functions of the machine. In this application, the SIL required by the risk assessment is SIL 2 for this safety function. Each safety product has its own rating and can be combined to create a safety function that meets or exceeds SIL 2.



High-pressure Monitoring Safety Function

This application technique includes one safety function: High-pressure monitoring. If high pressure occurs, power is dropped to the solenoid valve. This action vents the pneumatic actuator, and places the control valve into its fail-safe position–either open or closed, based on the risk assessment.

Safety Function Requirements

This safety function is assumed to be low demand, which means that one demand a year or less is placed on the safety function. For low-demand safety functions, the probability of a dangerous failure on demand (PFD) values are generated for each subsystem and used to calculate the overall SIL level for the safety function.

High pressure in the process loop places a demand on the safety function.

The useful lifetime of the 3963 solenoid valve that is used in this safety function is 11 years. Because of this, PFD values for ten-year proof test intervals were used for the logic hardware (GuardLogix controller and POINT Guard I/O modules). The sensor and final element hardware (globe valve, pneumatic actuator, and solenoid valve) provide PFD values that require one-year proof test intervals.

All hardware used in this safety function, except the 1734-OB8S digital safety output module, is capable of achieving SIL 2 with a hardware fault tolerance (HFT) equal to 0. The 1734-OB8S module requires an HFT of 1 to achieve SIL 2. To meet this requirement, two channels on the module drive a dual-channel safety input on a Guardmaster® single input safety relay. The power for the solenoid valve is provided by one safety output on the Guardmaster single input safety relay. There are alternatives to using a safety relay between the 1734-OB8S and the solenoid valve. Other options include redundant solenoid valves (with simplex pneumatic actuator and globe valve), or completely redundant final elements (that is, two-valve assemblies in a 1oo2 configuration).

Faults within all safety function (complex) subsystems are unknown and must be detected at a rate that enables the overall safety function to meet the requirements for SIL 2, per IEC 61511. The vendor must provide the probability of a dangerous failure on demand (PFDavg) values for these subsystems.

The safety function in this application technique meets or exceeds the requirements for SIL 2, per IEC 61511.

Functional Safety Description

The following sections describe the functionality of each component of this safety function.

Sensor

The PMP71 pressure transmitter generates a 4...20 mA output signal that is wired directly into one of the analog-input channels on the 1734-IE4S safety analog input module. The PMP71 transmitter is capable of SIL 2 by using only one channel. The 1734-IE4S module is capable of SIL 2 when a SIL 2-certified device is wired into one channel.

Logic Device

The 1734-IE4S module sends the signal to the GuardLogix safety controller by using the CIP Safety™ protocol, which is SIL 2 capable. The GuardLogix controller compares the signal against a high-pressure boundary within its safety task. If the pressure rises above the boundary, a demand is placed on the safety function. A fault on either the pressure transmitter or the 1734-IE4S module generates a signal or status that causes the high-pressure demand on the safety function.

Final Element

When the signal is below the high-pressure boundary, and the status is OK, the GuardLogix controller sends a high (1) signal over the CIP Safety protocol to the 1734-OB8S safety digital output module to energize two output channels. These output channels, in turn, energize the safety-input channel on a Guardmaster single input safety relay. The output of the Guardmaster single input safety relay energizes the solenoid valve.

When a demand is placed on the high-pressure safety function, the GuardLogix controller de-energizes the two output channels on the 1734-OB8S module. If either of these channels operate properly, the Guardmaster safety relay drops power to the solenoid valve, which vents the pneumatic actuator and places the globe valve into fail-safe position.

Network

The CIP Safety protocol inserts the data into the CIP Safety packet twice. One piece of data is normal and the other is inverted. The producer time stamps CIP Safety packets so that the consumer can determine the age of the packet when it arrives. If a good packet does not arrive before the connection reaction time limit (CRTL) expires, then the result is a demand on the safety function.

CIP Safety protocol supports a direct connection between the POINT Guard I/O safety modules and the GuardLogix controller, which makes the EtherNet/IP™ hardware between these two end devices a black channel. Therefore, the EtherNet/IP hardware does not have to be included in the SIL calculation. The probability of a dangerous failure on demand (PFD) of the CIP Safety protocol has already been included in the controller PFD value.

We assume that the Process Safety Time (PST) is greater than the worst-case reaction time of the safety function, so no reaction time calculations are required.

Bill of Material

This application technique uses these products.

Quantity	Cat. No.	Description
1	1783-US05T	Stratix® 2000 unmanaged Ethernet switch
1	1734-AENT	POINT Ethernet/IP I/O adapter
1	1734-IB8S	POINT Guard I/O input safety module 24V DC
1	1734-OB8S	POINT Guard I/O output safety module 24V DC
1	1734-IE4S	POINT Guard I/O analog input safety module
6	1734-TB	Module base with removable IEC screw terminals
1	PMP71	Endress + Hauser Cerabar S pressure transmitter
1	Type 3241	SAMSON series 240 globe valve
1	Type 3277	SAMSON pneumatic actuator
1	Type 3963	SAMSON solenoid valve
1	440R-S12R2	Guardmaster single input channel safety relay
2	800FM-G611MX10	800F reset push button - metal, guarded, blue, R, metal latch mount, 1 N.O. contact, standard

Choose one of the following safety-controller hardware groups.

Note: This application technique could use a GuardLogix 5580 or a Compact GuardLogix 5380 Controller.

Quantity	Controller	Cat. No.	Description
1	GuardLogix 5580 (1)	1756-L81ES	GuardLogix processor, 3 MB standard memory, 1.5 MB safety memory
		1756-L82ES	GuardLogix processor, 5 MB standard memory, 2.5 MB safety memory
		1756-L83ES	GuardLogix processor, 10 MB standard memory, 5 MB safety memory
		1756-L84ES	GuardLogix processor, 20 MB standard memory, 6 MB safety memory
1		1756-PA72	Power supply, 120/240V AC input, 3.5 A @ 24V DC
1		1756-A7	Seven-slot ControlLogix® chassis
1	Compact GuardLogix 5380-SIL 2	5069-L306ERS2	Compact GuardLogix processor, 0.6 MB standard memory, 0.3 MB safety memory
		5069-L306ERMS2	
		5069-L310ERMS	Compact GuardLogix processor, 1.0 MB standard memory, 0.5 MB safety memory
		5069-L310ERMS2	
		5069-L320ERS2	Compact GuardLogix processor, 2.0 MB standard memory, 1.0 MB safety memory
		5069-L320ERMS2	
		5069-L330ERS2	Compact GuardLogix processor, 3.0 MB standard memory, 1.5 MB safety memory
		5069-L330ERMS2	
		5069-L340ERS2	Compact GuardLogix processor, 4.0 MB standard memory, 2.0 MB safety memory
		5069-L340ERMS2	
		5069-L350ERS2	Compact GuardLogix processor, 5.0 MB standard memory, 2.5 MB safety memory
		5069-L350ERMS2	
		5069-L380ERS2	Compact GuardLogix processor, 8.0 MB standard memory, 4.0 MB safety memory
		5069-L380ERMS2	
		5069-L3100ERS2	Compact GuardLogix processor, 10.0 MB standard memory, 5.0 MB safety memory
		5069-L3100ERMS2	
2		1606 – XLS120E (2)	Performance power supply, 24…48V DC, 120 W, 120/240V AC / 110…300V DC input voltage
1		5069-ECR	Right end cap and terminator

(1) If your PLr is SIL 3, PLe, use a GuardLogix 5580 controller with a safety partner, 1756-L8SP
(2) The 1606 power supply can be ordered at different ratings. The one chosen in the table is just one example. Choose a power supply that best fits your MOD and SA power ratings.

Setup and Wiring

For detailed information on how to install and wire, refer to the publications that are listed in the Additional Resources on page 17.

System Overview

The 1734-OB8S module requires the use of two output channels to be SIL 2 capable. Therefore, the Guardmaster single input safety relay is used as an interposing relay between the 1734-OB8S module and the single-channel solenoid.

The 4...20 mA two-wire pressure transmitter is wired directly into the 1734-IE4S module. The 1734-IE4S module sources the 24V DC for the two-wire transmitter.

The final control element of the safety function is the combination of solenoid, actuator, and globe valve. The solenoid is wired to a safety output on the Guardmaster interposing relay.

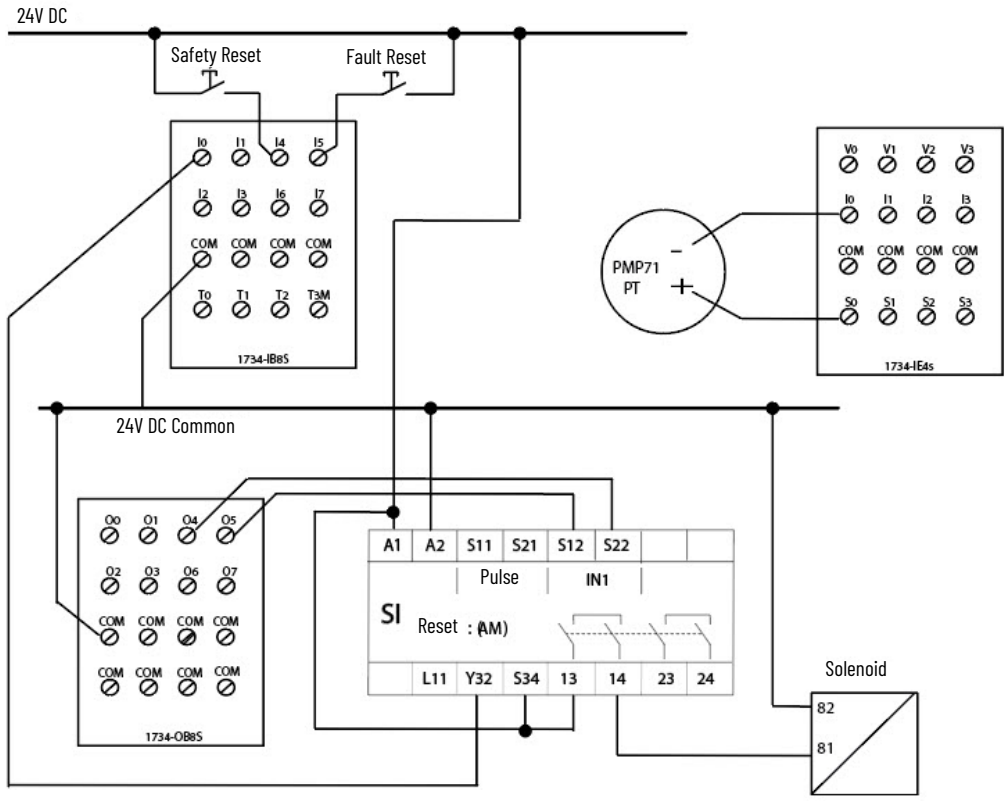
The GuardLogix controller and the three POINT Guard I/O safety modules are connected on an EtherNet/IP network. The CIP Safety protocol requires a direct connection between these modules and the GuardLogix controller. This configuration makes the EtherNet/IP hardware between these two end devices a black channel. Any EtherNet/IP hardware within an operational network can be used with no effect on the SIL calculation.

The overall safety function must have individual reset buttons to reset faults and to reset safety outputs. These reset buttons can be wired to any input module, safety or standard, in your system. The 1734-IB8S safety-input module is used in this example. The safety rating of the reset button must not diminish the rating of the relevant safety function. This is accomplished by the trailing edge or falling edge of the button that generates the reset command, thus tolerating faults in the reset circuit. Because only reset buttons are wired into the 1734-IB8S module, this module does not have to be included in the safety function SIL calculation.

Electrical Schematic

A schematic for the electrical subsystems is shown in the graphic. The final-element configuration that is chosen for this safety function is generic (no application specified) and is one of many configurations that can be chosen. The pneumatic connections depend on the devices and configuration chosen. See the vendor-specific installation manuals for information about these connections.

For an electrical schematic in AutoCAD or EPLAN format, see the attached files.



Configuration

The GuardLogix 5580 controller is configured by using the Studio 5000 Logix Designer® application, version 31 or later. You must create a project and add the digital input and output safety modules and the analog input safety module. Then, configure the input modules for the proper input types. A detailed description of each step is beyond the scope of this document. Knowledge of the Logix Designer application is assumed.

For a Studio 5000 Logix Designer project file that you can import into your own project, see the attached ACD file. The attached ACD file includes a GuardLogix 5580 controller, but if you choose a Compact GuardLogix 5380 controller, you can change the controller in the Logix Designer application.

Minimum Logix Designer Application Version	Product
31	GuardLogix 5580 or Compact GuardLogix 5380 controller

Create a Project with a GuardLogix Controller, Digital Input, Analog Input, and Digital Output Module

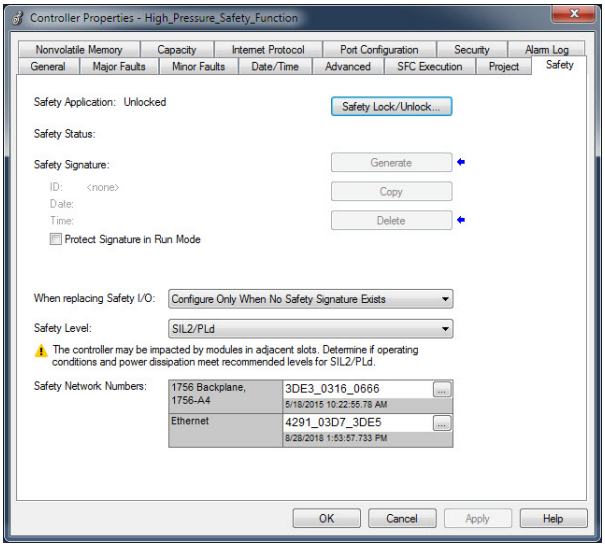
If you are not using the attached ACD file, follow these steps to create a project.

1. In the Logix Designer application, create a project with a GuardLogix controller that includes the following:
   - A connection to an Ethernet network.
   - GuardLogix 5570 controllers require the use of an Ethernet communication module, but GuardLogix 5580 and Compact GuardLogix 5370 and 5380 controllers have Ethernet ports.
   - Time Synchronization is enabled on the controller and any Ethernet communication modules, if used.

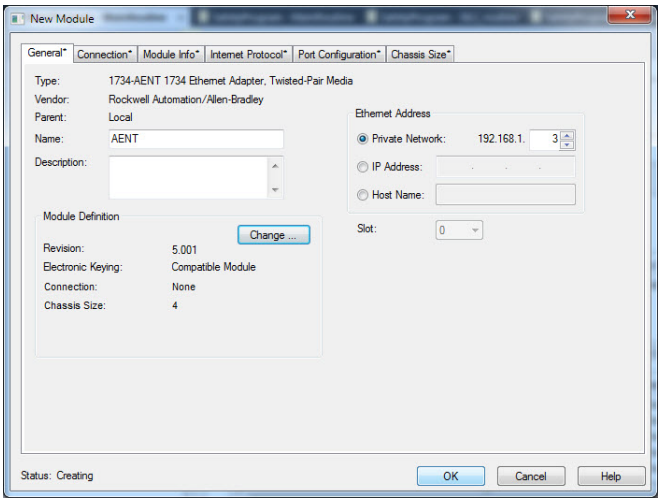
   The Compact GuardLogix controller is automatically configured for the Time Synchronization connection.

IMPORTANT If you use a GuardLogix 5580 controller, you must configure the safety level of the controller on the Safety tab of the Module Properties dialog box. The default setting is SIL 2, PLd. For SIL 3, PLe operation, you must have a 1756-L8SP Safety Partner installed to the right of the primary controller.

This safety function uses a 1756-L81ES controller in a SIL 2, PLd configuration without the 1756-L8SP safety partner.



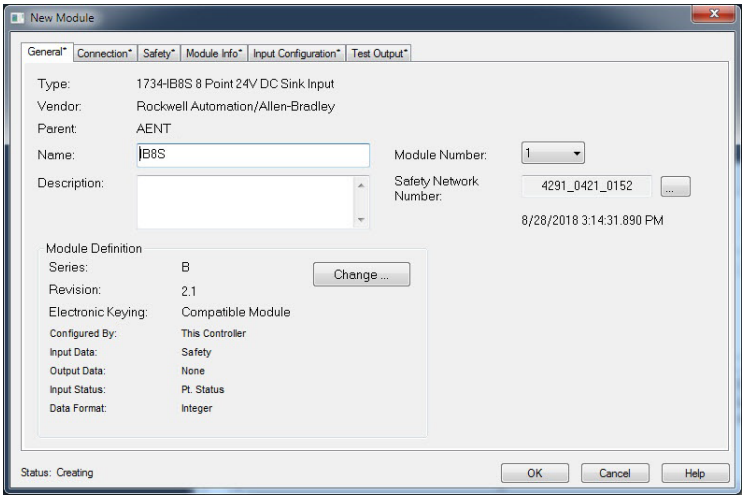
2. Add the 1734-AENT Point Adapter under the 1756- L81ES controller Ethernet port, and click configure it as shown.



The chassis size is set to 4 to accommodate the adapter and the three safety I/O modules.

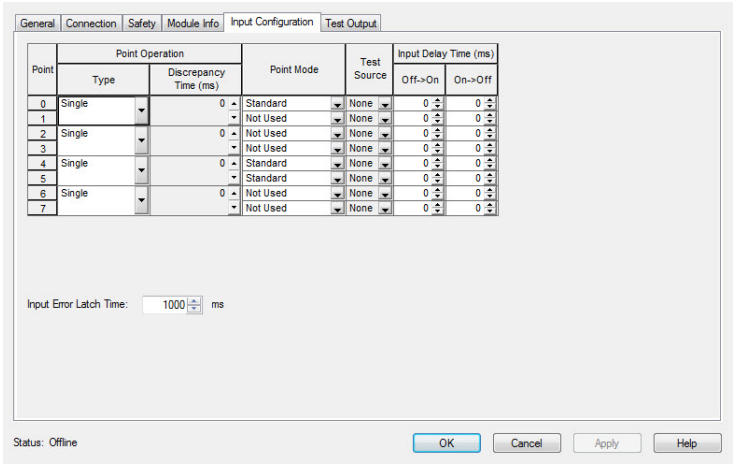
The Connection is set to None because there is a direct connection between the GuardLogix controller and the POINT Guard I/O modules.

3. In the Controller Organizer, add the 1734-IB8S module under the 1734-AENT adapter, and configure it as shown.



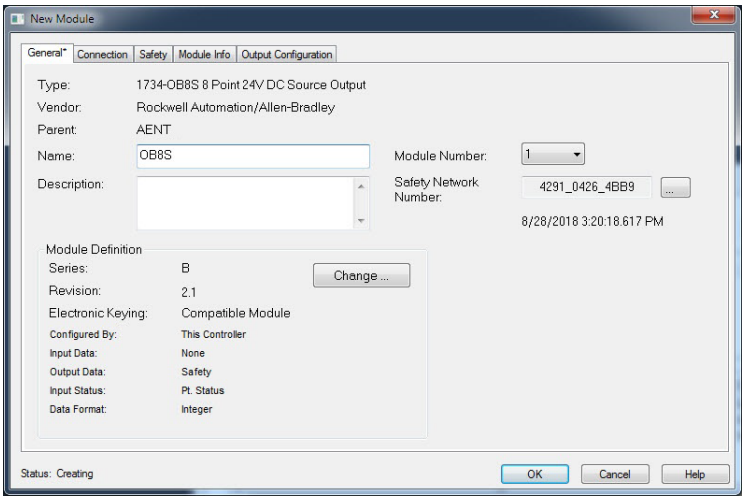
Only the reset buttons and Guardmaster auxiliary are wired to the 1734-IB8S module. No test outputs are needed, so the output data is set to None.

4. On the 1734-IB8S Input Configuration tab, change channels 0, 4, and 5 to Standard, and click OK.

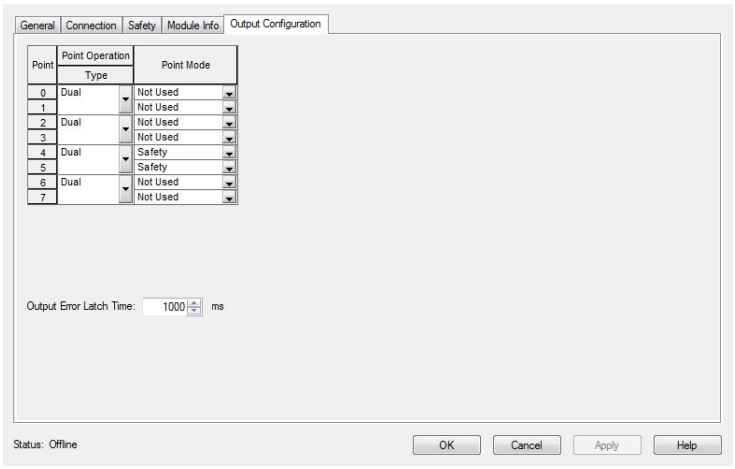


The reset buttons and Guardmaster auxiliary are standard inputs. Configuring the channels for standard does not alter the channel characteristics. They can be configured for standard or safety in this application.

5. In the Controller Organizer, add the 1734-OB8S module under the 1734-AENT adapter, and click configure it as shown.

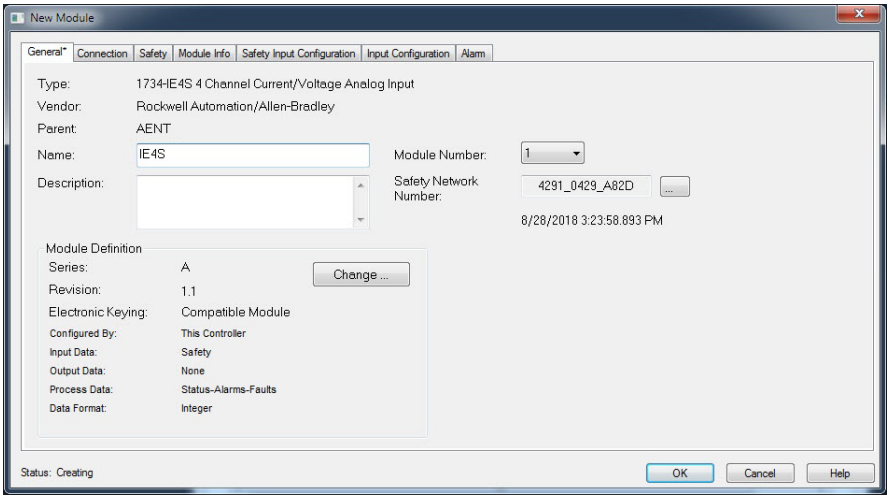


6. On the 1734-OB8S Output Configuration tab, change channels 4 and 5 to Safety, and click OK.

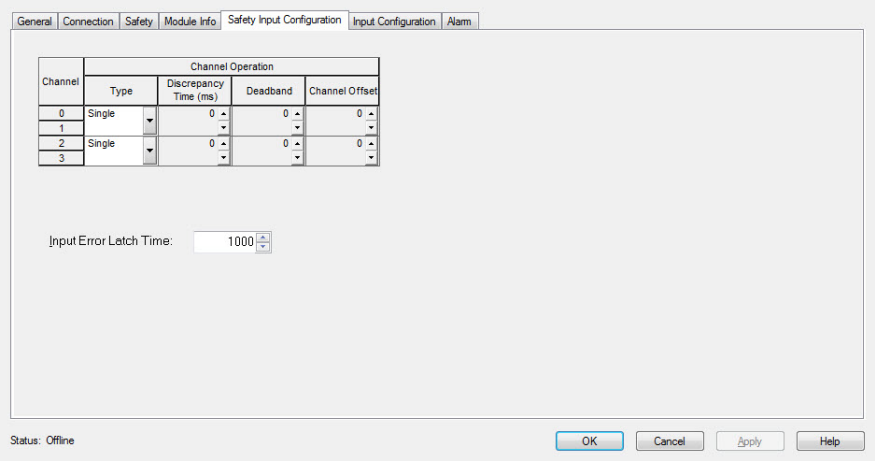


Output channels 4 and 5 drive the safety-relay input channels.

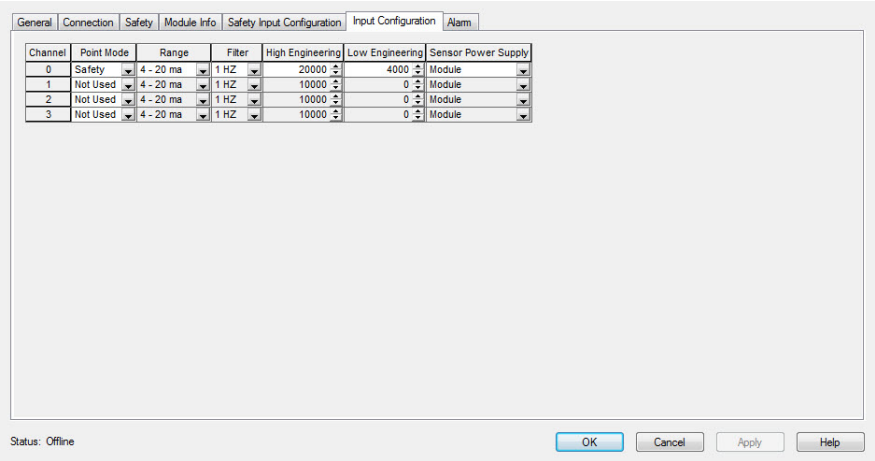
7. In the Controller Organizer, add the 1734-IE4S module under the 1734-AENT adapter, and configure it as shown.



8. On the Safety Input Configuration tab, verify that channels 0 and 1 are configured for SINGLE.

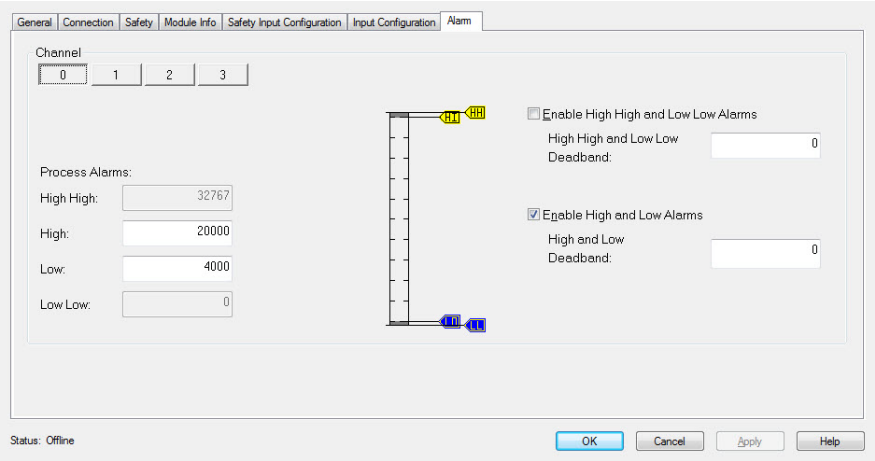


9. On the 1734-IE4S Input Configuration tab, do the following:
   a. Change channel 0 to Safety.
   b. Change the engineering limits.
   c. Click OK.

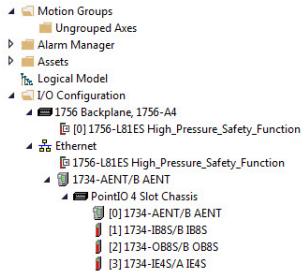


The pressure transmitter provides a 4...20 mA signal, and the 1734-IE4S module sources 24V DC for the two-wire transmitter.

10. On the Alarm tab, do the following:
    a. For channel 0, enable High and Low alarms.
    b. Set the underrange and overrange alarm values.
    c. Click OK.



The I/O Configuration now appears as shown.



11. Verify that the Guardmaster single input safety relay is set for reset selection AM.

    AM indicates that automatic reset can be used.

IMPORTANT The configuration of the actuator is beyond the scope of this document. The only requirement is that when the solenoid is de-energized, the valve is placed into the safe state.

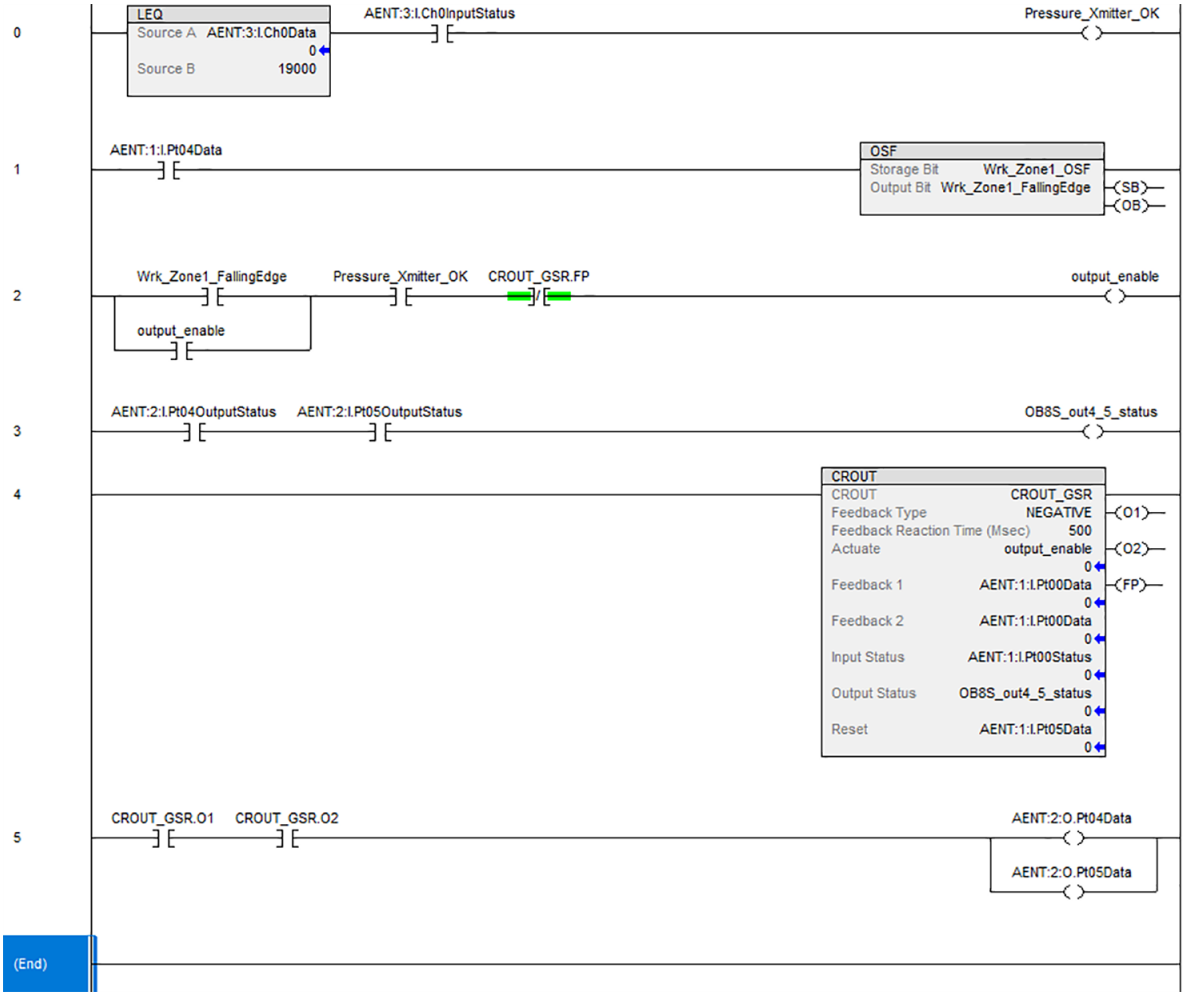
Programming

For controller logic that you can download to your controller, see the attached ACD file.

If the pressure transmitter is within the acceptable range, and there are no faults, then the output-enable signal energizes the Guardmaster input, which powers the solenoid. In our example, if the pressure transmitter signal rises above 19 mA (19000 is the raw data value), then the output-enable signal drops out, which de-energizes the solenoid. If the output enable drops out, a low-to-high transition of the reset is required to energize it. Both output-channel status bits were combined into one status bit for the Configurable Redundant Output (CROUT) output status signal.

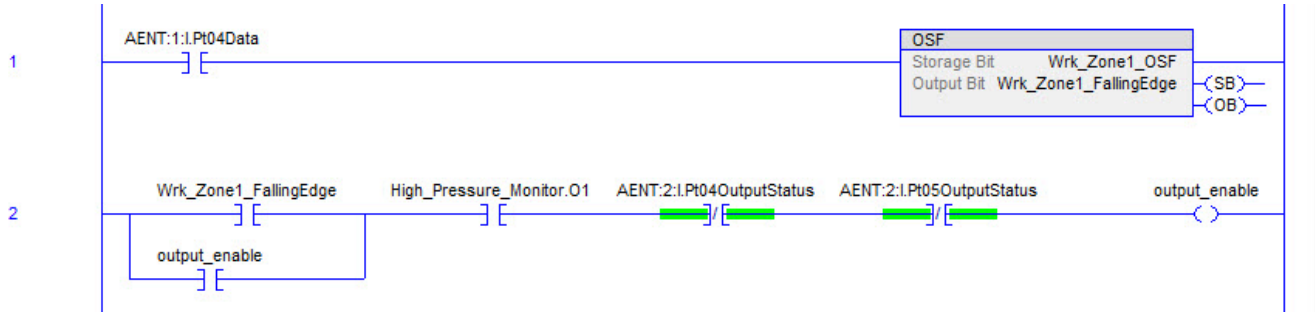
In this program, the modules are represented as follows:

- Module 1 (AENT:1) is the 1734-IB8S module.
- Module 2 (AENT:2) is the 1734-OB8S module.
- Module 3 (AENT:3) is the 1734-IE4S module.



Falling Edge Reset

A Falling Edge Reset is used to confirm that the safety output is not reset if the reset button gets jammed when pressed in, or if the input short circuits. In order for the reset function to occur, the reset input must be pressed and released before the outputs can close.



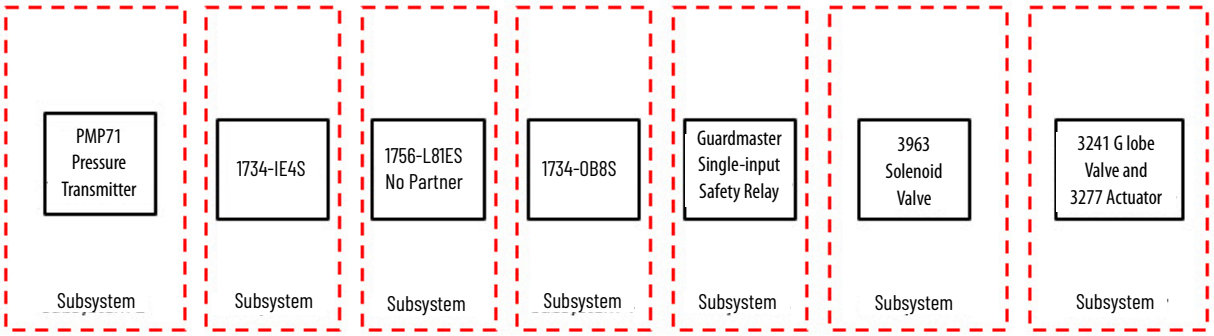
Calculation of the Safety Integrity Level

When properly implemented, this high-pressure safety function can achieve a safety rating of SIL 2, according to IEC 61511.

Subsystem	Vendor	Description	1oo1 PFD	PTI (yrs)	HFT	SFF	SIL CL
1	Endress + Hauser	PMP71 Pressure Transmitter	2.86E-04	1	0	92%	2
2	Rockwell Automation	1734-IE4S Analog Input Module	2.40E-06	10	single channel*	99%	3
3	Rockwell Automation	1756-L81ES GuardLogix (SIL2 architecture)	5.61E-04	20	n/a	99%	3
4	Rockwell Automation	1734-OB8S Digital Output Module	2.13E-05	10	dual channel	99%	3
5	Rockwell Automation	GSR SI Single Input Safety Relay	5.68E-04	20	n/a	99%	3
6	Samson	Type 3963 Solenoid Valve	7.79E-06	1	0	90%	2
7	Samson	Type 3241 Globe Valve & Type 3277 Pneumatic Actuator	2.40E-04	1	0	94%	2
		Overall Safety Function PFD	1.69E-03				
		Overall Safety Function SIL Level (capable of)	2				
	* both channels configured for SINGLE / DCA instruction performs tolerance test						

The 3963 solenoid valve has a useful lifetime of 11 years. Due to this, PFD values for ten-year proof test intervals were used. when possible, for the logic hardware. The sensor and final element hardware (globe valve, pneumatic actuator, and solenoid valve) provide PFD values that require one-year Proof Test Intervals.

The sensor, input, logic, and actuator subsystems can be modeled as follows.



IMPORTANT The PFD for this complete safety function, with the sensor, input, logic, and actuator subsystems, is 1.69E-03. The SIL for the complete safety function is SIL 2.

Verification and Validation Plan

Verification and validation play important roles in the avoidance of faults throughout the safety system design and development process. IEC 61511 sets the requirements for verification and validation. The standard calls for a documented plan to confirm that all safety functional requirements have been met.

Verification is an analysis of the resulting safety control system. The Safety Integrity Level (SIL) of the safety control system is calculated to confirm that the system meets the required SIL specified.

Validation is a functional test of the safety control system to demonstrate that the system meets the specified requirements of the safety function. The safety control system is tested to confirm that all safety-related outputs respond appropriately to their corresponding safety-related inputs. The functional test includes normal operating conditions and potential fault injection of failure modes. A checklist is typically used to document the validation of the safety control system.

For a validation checklist, see the attached spreadsheet.

Additional Resources

These documents contain more information about related products from Rockwell Automation.

Resource	Description
GuardLogix 5580 and Compact GuardLogix 5380 Controller Systems Safety Reference Manual, publication 1756-RM012	Describes the GuardLogix 5580 and Compact GuardLogix 5380 controller system. Provides instructions on how to develop, operate, or maintain a controller-based safety system that uses the Studio 5000 Logix Designer application.
ControlLogix 5580 and GuardLogix 5580 Controllers User Manual, publication 1756-UM543	Provides information on how to install, configure, and program the ControlLogix 5580 and GuardLogix 5580 controllers in the Logix Designer application.
CompactLogix 5380 and Compact GuardLogix 5380 Controllers User Manual, publication 5069-UM001	Provides information on how to install, configure, and program the CompactLogix® 5380 and Compact GuardLogix 5380 controllers in the Logix Designer application.
GuardLogix 5570 Controllers User Manual, publication 1756-UM022	Provides information on how to install, configure, and program the GuardLogix 5570 controllers in the Logix Designer application.
GuardLogix Safety Application Instruction Set Safety Reference Manual, publication 1756-RM095	Describes the Rockwell Automation® GuardLogix Safety Application Instruction Set. Provides instructions on how to design, program, or troubleshoot safety applications that use GuardLogix controllers.
Rockwell Automation Functional Safety Data Sheet, publication SAFETY-SR001	Provides functional safety data for Rockwell Automation products.
Industrial Automation Wiring and Grounding Guidelines, publication1770-4.1	Provides general guidelines on how to install a Rockwell Automation industrial system.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.
Safety Automation Builder and SISTEMA Library website	Download Safety Automation Builder® to help simplify machine safety design and validation, and reduce time and costs. Integration with our risk assessment software provides you with consistent, reliable, and documented management of the Functional Safety Lifecycle. The SISTEMA tool, also available for download from the Safety Automation Builder page, automates calculation of the attained Performance Level from the safety-related parts of a machine control system to (EN) ISO 13849-1.
SAMSON website, https://www.samson.de/de/home/	Provides specifications and describes uses for the Type 3241 globe valve. Also references documentation that is available for the globe valve.
Endress+Hauser website, Endress+Hauser Inc.	Provides specifications and describes uses for the Cerabar PMP71 digital pressure transmitter. Also references documentation that is available for the pressure transmitter.

You can view or download publications at rok.auto/literature.

Rockwell Automation Support

Use these resources to access support information.

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

Documentation Feedback

Your comments help us serve your documentation needs better. If you have any suggestions on how to improve our content, complete the form at rok.auto/docfeedback.

Waste Electrical and Electronic Equipment (WEEE)

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

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

Safety Function Capabilities

Visit rok.auto/safety for more information on our Safety System Development Tools, including Safety Functions.

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