Quick Start

Original Instructions



Safety Accelerator Toolkit

Catalog Numbers 1756-L61S, 1756-L62S, 1756-L63S, 1756-LSP, 1756-L71S, 1756-L72S, 1756-L73S, 1756-L73SXT, 1756-L73SXT, 1756-L73SXT, 1768-L43S, 1768-L43S, 1768-L45S, 1756-L72EROMS, 1769-L30ERMS, 1769-L33ERMS, 1769-L36ERMS





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.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

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		7
Where to Start		9
Preface	About This Publication 1 Software Requirements 1	1
	Additional Resources 1	2
	Chapter 1	
Risk Assessment and System	Introduction	3
Design	Before You Begin 1	3
besign	Follow These Steps 1	4
	Safety Strategy Fundamentals 1	4
	Conducting a Team-based Risk Assessment 1	6
	Task and Hazard Identification 1	6
	Risk Estimation 1	6
	Risk Assessment Example for Robot Cell Application 1	8
	Select Mitigation Techniques for Hazard Control	22
	Incorporate Protective Systems and Measures 2	22
	Safety Specification Example for Robot Cell Application 2	23
	Load Station #1 2	23
	Panel Assembly Feed Conveyor (B) 2	24
	How Rockwell Automation Can Help 2	25
	Chapter 2	
Hardware Selection and Safety	Introduction	27
Wiring Layout	Before You Begin	27
	What You Need 2	27
	Follow These Steps 2	28
	Select Hardware	28

Defining Module and Safety Zone Tags30Fill Out the Safety Zone Configuration Worksheet30Fill Out the Safety Module Configuration Worksheet32Lay Out Your Safety Wiring36Access and Gather Drawings from Toolkit36Edit Project Drawing Set38Considerations for Safety Drawings44Access Other Allen-Bradley® CAD Drawings45

GuardLogix® Controllers Logic Integration

Chapter 3

-
Introduction
Before You Begin
What You Need
Follow These Steps
Open the GuardLogix Application File
Configure Your Guard I/O Modules 51
Create Your Safety Logic Routines
Import Your Safety Input Device Logic 56
Import Your Safety Output Device Logic
Add Safety Input and Safety Output Device Logic for
Each Safety Zone
Adding Your Faceplate Logic
Faceplate Logic for Safety Instruction Faceplates
Import User-defined Data Type for Safety Instruction
Faceplates
Create Faceplate Animation Tags for Safety Instruction
Faceplates
Faceplate Logic for Digital Guard I/O Faceplates
Import Add-On Instruction for Digital Guard I/O Faceplate . 70
Create Controller Tags for Digital Guard I/O Faceplate 71
Create GuardIO AOI Instances in Standard Program Routines
for Each Digital Guard I/O Faceplate
Configure Guard I/O Module Add-On Instruction Message
Instructions for each Digital Guard I/O Faceplate
Faceplate Logic for Analog Guard I/O Faceplates
Import Add-On Instructions for Analog Guard I/O
Faceplates
Create a GuardIO Analog AOI Instance in a Standard
Program Routine
Create a GuardIO Analog AOI Safety Instance in a Safety
Program Routine
Map Standard Tachometer Reset Tags to Safety Reset Tags 89
Map Digital and Analog GuardIO AOI Tags to Safety Zone
Reset Tags
Configure Logix Communication
Save and Download Your Program 100

Chapter 4

Introduction	101
Before You Begin	101
What You Need	101
Follow These Steps	102

SmartGuard[™] 600 Controllers

Logic Integration

Configure Your SmartGuard 600 Controller and Safety I/O 102
Select and Save Pre-configured Configuration File 102
Delete, Add, and Configure SmartGuard 600 Controller and
Guard I/O Modules 104
Configure SmartGuard 600 Local Inputs and Test Outputs 108
Configure SmartGuard 600 Local Outputs 113
Create Your Safety Zone Logic 116
Select Zone Inputs117
Select Safety Device Function Blocks and Connect Inputs 120
Select Input Logic Function Blocks and Connect Inputs 122
Import Zone Function Block and Connect Inputs 122
Select Zone Outputs and Connect to Zone Function Block 125
Save and Download Your RSNetWorx Project 127
Verify Zone Safety Logic Operation
Add Your Faceplate Logic
Copy SmartGuard 600 Module Configuration to Your Logix
Controller Project
Import SmartGuard 600 Faceplate Add-On Instruction and
Logic Rungs to Your Logix Controller Project
Create an Instance of Your SmartGuard 600 Faceplate Add-On
Instruction in Your CompactLogix Project Routine 137
Configure CompactLogix Communication141
Save and Download Your Program142

Chapter 5

Introduction	143
Before You Begin	44
What You Need 1	44
Follow These Steps 1	44
Configure Your Safety Instruction Faceplates 1	145
Configure Your Guard I/O or SmartGuard 600 I/O Faceplates 1	48
Adding Pre-configured Goto Buttons to Your Factory Talk View	
ME Application 1	151
Add Goto Buttons to Your Application 1	151
Associate Each Button to a Faceplate and Parameter File 1	154
Create a Runtime File 1	159

Chapter 6

Safety System Application Guide

FactoryTalk® View ME Software

Integration

Introduction	161
Before You Begin	161
What You Need	161
Follow These Steps	162
Launching Your Faceplates from Your System Overview Display.	163
Safety System Overview Display	163
Digital Guard I/O Module Faceplate Overview	164

Robot Cell Application Example

Safety Output Logic Example for

Multiple Output Devices

GuardLogix® Tools

SmartGuard[™] 600 Controller

with GuardLogix® or

Digital Guard I/O Module Faceplate Input Status View –
Demand Indication
Digital Guard I/O Module Faceplate Input Status View –
Fault Indication
Error Content, Probable Cause, and Recommended Actions . 166
Digital Guard I/O Module Faceplate Output Status View 167
Digital Guard I/O Module Faceplate – Online Configuration
Options
Digital Guard I/O Module Faceplate – Online Help Options 169
Analog Guard I/O Faceplate Overview
Analog Guard I/O Module Faceplate Input Status View –
Fault Indication
Error Content, Probable Cause, and Recommended Actions . 171
Analog Guard I/O Module Faceplate – Online Configuration
Options 173
Analog Guard I/O Module Faceplate – Online Help Options 174
Safety Instruction Faceplate Overview
Safety Instruction Faceplate – Fault Views
Safety Instruction Faceplate – Diagnostic Views 175

Appendix A

Introduction	177
Robot Cell Module and Safety Zone Configuration	178
Robot Cell Safety Logic Examples	182
Robot Cell Faceplate Logic Examples	188

Appendix B

Appendix C

)3
94
96
97
97
97
97
)8
)8
18

Topic	Page
Revised available catalog numbers.	Front cover
Added LogixDesigner row to Software Requirements table.	11
Added publication 1769-UM022 to the Additional Resources table.	12
Revised title to publication 1756-RM099 in Additional Resources table.	12
Added Compact GuardLogix® 5370 information row to Table 6.	29
Revised instructions and graphics in Access Other Allen-Bradley® CAD Drawings section.	45
Added LogixDesigner software version information to What You Need section.	47
Updated website URL for Safety Accelerator Toolkit in What You Need section.	47
Added publication 1769-UM022 to What You Need section.	47
Revised information and graphic in third bullet point.	53
Added information to step 14.	55
Revised information in step 6 and added step 7.	74
Revised information in step 12.	81
Revised information in step 6 and added step 7.	85
Added Compact GuardLogix 5370 controller to What You Need section.	161

This manual contains new and updated information as indicated in this table.

Notes:

Follow this path to complete your safety application.





Notes:

About This Publication

This quick start provides a framework to develop safety applications. Each section guides you through the tasks that you need to perform to design, program, and monitor your safety application.

To assist in the design and installation of your system, application files and other information are provided on the Safety Accelerator Toolkit, <u>SAFETY-CL002</u>. The DVD provides CAD drawings for components, wiring diagrams, logic routines, and more. With these tools and the built-in best-practices design, you can focus on the design of your system and not on design overhead tasks.

IMPORTANT Before you use this quick start and the CD, read the Terms and Conditions on the CD.

Each chapter begins with the following information. Read these sections carefully before you begin work in each chapter.

- **Before You Begin** This section lists the steps that must be completed and decisions that must be made before you start that chapter. The chapters in this quick start do not have to be completed in the order in which they appear, but this section defines the minimum amount of preparation required before you complete the current chapter.
- What You Need This section lists the tools that are required to complete the steps in the current chapter. This includes, but is not limited to, hardware and software.
- Follow These Steps This illustrates the steps in the current chapter and identifies which steps are required to complete the examples.

Software Requirements

You need these software to use this toolkit.

Rockwell Automation® Software	Version
RSLogix 5000®	16 or later for 1756 GuardLogix® controllers 18 or later for 1768 GuardLogix controllers
Studio 5000 [®] environment	28.00.00 or later for 5370 Compact GuardLogix controllers
FactoryTalk [®] View Machine Edition	6.1 or later
RSNetWorx [™] for DeviceNet	9.1 or later for 1752-L24BBBE SmartGuard™ 600 controller
RSLinx® Classic	2.55 or later for 1756 and 1768 GuardLogix controllers 3.80 or later for 5370 Compact GuardLogix controllers

Additional Resources

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

Resource	Description
GuardLogix Controllers User Manual, publication <u>1756-UM020</u>	Provides information to configure and program the 1756 GuardLogix system in RSLogix 5000 software.
GuardLogix 5570 Controllers User Manual, publication <u>1756-UM022</u>	Provides information to configure and program the 1756 GuardLogix system in the Studio 5000 environment.
Compact GuardLogix Controllers User Manual, publication <u>1768-UM002</u>	Provides information to configure and program the 1768 Compact GuardLogix controller system.
Compact GuardLogix 5370 Controllers User Manual, publication 1769-UM022	Provides information to configure and program the Compact GuardLogix 5370 controller system.
GuardLogix Controller Systems Safety Reference Manual, publication <u>1756-RM093</u>	Contains detailed requirements to achieve and maintain SIL 3 with the GuardLogix controller system and RSLogix 5000 software.
GuardLogix 5570 and Compact GuardLogix 5370 Controller Systems Safety Reference Manual, publication <u>1756-RM099</u>	Contains detailed requirements to achieve and maintain SIL 3 with the GuardLogix and Compact GuardLogix controller systems, and the Studio 5000 environment.
SmartGuard 600 Controller Installation Instructions, publication <u>1752-1N001</u>	Provides information to install the SmartGuard 600 controller.
SmartGuard 600 Controllers User Manual, publication <u>1752-UM001</u>	Provides information to configure and program the SmartGuard 600 controller system.
SmartGuard 600 Controllers Safety Reference Manual, publication <u>1752-RM001</u>	Contains detailed requirements to achieve and maintain SIL 3 with the SmartGuard 600 controller system.
CompactBlock [™] Guard I/O [™] DeviceNet Safety Module Installation Instructions, publication <u>1791DS-IN002</u>	Provides information to install CompactBlock Guard I/O DeviceNet Safety modules.
Guard I/O DeviceNet Safety Modules User Manual, publication <u>1791DS-UM001</u>	Provides information to use Guard I/O™ DeviceNet Safety modules.
Guard I/O EtherNet/IP Safety Modules Installation Instructions, publication <u>1791ES-IN001</u>	Provides information to install CompactBlock Guard I/O EtherNet/IP Safety modules.
Guard I/O EtherNet/IP Safety Modules User Manual, publication <u>1791ES-UM001</u>	Provides information to use Guard I/O EtherNet/IP Safety modules.
POINT Guard I/O [™] Safety Module User Manual, publication <u>1734-UM013</u>	Provides information to install, configure, and operate POINT Guard I/O Safety Modules.
Safety Products Catalog available at http://www.ab.com/catalogs/	Provides selection and specification information for Rockwell Automation safety products.
CompactLogix [™] System User Manual, publication <u>1769-UM007</u>	Provides information to configure, operate, and troubleshoot systems with 1769-L20 or 1769-L30 CompactLogix controllers.
1769-L20, 1769-L30 CompactLogix Controllers Installation Instructions, publication <u>1769-IN047</u>	Provides information to install 1769-L20 or 1769-L30 CompactLogix controllers.
1769 CompactLogix Controllers User Manual, publication <u>1769-UM011</u>	Provides information to configure, operate, and troubleshoot systems with 1769-L31, 1769-L32C, 1769-L32CR, 1769-L32E, or 1769-L35E CompactLogix controllers.
1769-L31 CompactLogix Controller Installation Instructions, publication <u>1769-IN069</u>	Provides information to install 1769-L31 CompactLogix controllers.
1769-L32C, 1769-L32CR CompactLogix Controller Installation Instructions, publication <u>1769-IN070</u>	Provides information to install 1769-L32C and 1769-L32CR CompactLogix controllers.
CompactLogix Controller Installation Instructions, publication <u>1769-IN020</u>	Provides information to install 1769-L32E and 1769-L35E CompactLogix controllers.
Logix Common Procedures Programming Manual, publication <u>1756-PM001</u>	Provides information to program Logix5000 controllers, which includes how to manage project files, organize tags, program and test routines, and handle faults.
Rockwell Automation Configuration and Selection Tools, available at <u>http://www.rockwellautomation.com/en/e-tools/</u>	These online tools install on your personal computer so that you can quickly access information on our products: • CrossWorks™ • Industrial Computer Selector • Operator Interface Selection Tool • Programmable Controller Family Selector

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

Risk Assessment and System Design

Introduction

The GuardLogix[®] controller offers you the capability to integrate safety and standard control in the same system. Safety functions supported by the system include:

- Determine specifically which gate has been opened or E-stop device has been pressed
- Perimeter and point-of-operation guarding
- Zone control

In this chapter, you learn the fundamentals of safety strategy development, see examples of risk assessment and estimation worksheets and safety system design, and learn how Rockwell Automation can help.

In subsequent chapters of this toolkit, you'll create a bill of materials based on the functional requirements identified by a risk assessment. Once you've determined which safety components you'll need, you'll learn how to use the Safety Accelerator Toolkit to layout your system wiring, integrate logic routines in your safety application program, and use faceplates designed to facilitate HMI.

Before You Begin

Become familiar with the local, national, and international standards, including consensus standards that govern machine safety.

The safety standards that would be applied for safeguarding a work cell, like the example shown in this quick start, are extensive.

• National Standards

- Risk Assessment Standards
- Safeguarding Application Standards
- Personal Protective Equipment Standards
- Energy Isolation Standards for Routine, Repetitive And Routine Tasks
- · Standards pertaining to Awareness Means

Controller Application Standards

- Standards relating to validation and maintenance associated with the verification of the system performance on a regular basis
- Robotic Standards
- Electrical System Design Standards
- Energy Isolation Standards for Maintenance Tasks

Follow These Steps



Safety Strategy Fundamentals

IMPORTANT The information in this section is not advocated as the definitive method. Individual circumstances may dictate a different approach. It is intended as a general guideline to encourage a methodical and documented structure.

To devise a proper safety strategy, these steps must be addressed.

- 1. **Risk Assessment:** based on a clear understanding of the machine limits and functions and the tasks that may be required to be performed throughout its life.
- 2. **Risk Reduction:** performed if necessary with safety measures selected and implemented based on the performance requirements dictated by the risk assessment methodology.

Risk Assessment Methodologies dictate that the hierarchy of safety controls be followed, implementing system redesign measures, if possible, to totally eliminate the risk.

A hazard control technique must be defined for each hazardous motion, including each mode of operation (such as Automatic, Jog, or Cycle Stop) and each demand on the safety system (such as E-stop device activated or safety gate opened). This is essential so that the energy source is properly controlled in all interactions with the machine and all demand scenarios on the safety system.

RISK ASSESSMENT Identify all machines within the workplace—Then for each machine Consult relevant information and expertise MACHINE LIMITS NO Can you foresee all possible operation and use of the machine YES HAZARD IDENTIFICATION Identify each hazard situation-Then for each hazard **RISK ESTIMATION** Estimate the level of risk due to the hazard **RISK REDUCTION** Address the hazard by a **RISK EVALUATION** process of re-design or NO additional measures Is the level of risk acceptable Determine whether the performance and functional Have any safety measures characteristics of the safety been analyzed and NO measure are suitable for the proven adequate? machine and its type of use YES END OF SAFETY STRATEGY PROCESS

The manner in which risk assessment and risk reduction are performed is the basis of the safety strategy for the machine.

- 3. **Functional Safety Specification:** performed to identify the required functionality of the total system. The functional safety specification includes identification of:
 - the interconnections between standard control and the safety control system.
 - all of the safety devices (input, output, and logic-solving).
 - the requirements for integrating devices into the existing system.
 - the sequence of events due to various demands on the safety system for each mode of machine operation.
 - diagnostic requirement.
 - any other items related to the system design.
- 4. Design, building, and installation of the system.
- 5. Final Risk Assessment: conducted to make sure that no new hazards have been introduced into the system.
- 6. Administrative Requirements and Training: develop and implement administrative requirements, as well as operator, technician, and affected personnel training.
- 7. **Validation:** performed prior to production release to verify that the safety system meets the requirements set forth by the risk assessment and performs at the proper level of fault tolerance prescribed by the chosen methodology.

Conducting a Team-based Risk Assessment

A formal team-based risk assessment is a task-by-task evaluation of the hazards that operators, technicians, and other personnel may come in contact with. The results of a risk assessment help designers identify a more complete list of hazards that can be addressed and mitigated by following a formal process.

The formal process embraces a hierarchy of measures for risk reduction that includes system redesign, engineered guarding, administrative and training requirements, awareness means, and personal protective equipment (PPE) identification. This leads to a systematic approach to reducing risk, not a guarding bandage approach.

Risk assessments include a risk rating system for identifying the risk level for each task and hazard combination. Once the hazards are understood, mitigation techniques are applied to lower the risk to an acceptable level. A system designer who uses a formal risk assessment methodology, based on safety standards, shows due diligence in the safety system design. Some formal processes and standards also provide steps to identify the residual risk after the mitigation techniques have been applied and provide guidelines on what is an acceptable level of residual risk.

Overall, the risk assessment process establishes the appropriate level of safety guarding, so that you don't over- or underdesign but apply the right level of risk mitigation to the hazard.

Task and Hazard Identification

All of the hazards at the machine must be identified and listed in terms of their nature and location. Examples of hazards include crushing, shearing, entanglement, part ejections, fumes, radiation, heat, noise, and more.

For each hazard, be sure to identify the energy source and component that could cause the injury, such as a crushed arm due to powered robot motion or a crushed hand due to uncontrolled vertical motion from the potential energy of a gantry.

The results of a task analysis should be compared with the results of hazard identification to show where there are possibilities for the convergence of a hazard and a hazardous situation.

Risk Estimation

Any machine that has the potential for hazardous situations presents a risk of a hazardous event, that is, causing physical harm, property or environmental damage. The greater the risk, the more important it becomes to do something about it. To make a decision on how to respond to the risk, you need to be able to quantify it.

Risk is often thought of solely in terms of the severity of injury at an accident. Both the severity of potential harm and the probability of its occurrence have to be taken into account to estimate the amount of risk present. Probability of occurrence comprises two factors: the frequency of exposure and the possibility of avoidance. Risk estimation assigns values to each of these factors, which are then used to determine appropriate risk reduction measures that are feasible, realistic, and cost-effective.

ISO 13849-1 provides methods and guidance on how to specify a safety-related control system that is providing a protective measure or safety function.

These two risk estimation flow charts are typical methods of defining risk for machinery safety. Other methods are available for process safety. In fact, many of these types of tools are available. It's important to use these types of processes to help define the level of risk.

Figure 1 - Risk Graph for Performance Level for a Safety Function (ISO 13849-1:2006



Must be determined for each safety function!

Figure 2 - Risk Graph for ISO13849-1:2006 Category Determination



Risk Assessment Example for Robot Cell Application

The following is an example of a robot cell risk assessment worksheet including both task and hazard identification and risk estimation.





This application consists of an assembly and inspection station with this equipment.

- Manual Loading Station #1 (A)
- Panel Assembly Feed Conveyor (B)
- 6-axis Servo Robot (C)
- Automated inspection station (D)
- Overhead Transfer Gantry (E)
- Finished Part Transfer Elevator (F)

The application follows this sequence of operation.

- 1. The Panel Assembly Feed Conveyor (B) indexes the panel into Panel Position Station #2.
- 2. The operator loads the part at Station #1 (A).
- 3. The operator initiates a part ready sequence to activate the robot.
- 4. Robot (C) picks part from Station #1 (A).
- 5. The robot inserts the part from Station #1 into a panel on the Panel Assembly Feed Conveyor.
- 6. The robot picks the assembly from Panel Assembly Feed Conveyor (B) and places it into the Inspection Station (D).
- 7. The Overhead Transfer Gantry (E) transfers the assembly to the Transfer Elevator (F).
- 8. The Transfer Elevator (F) indexes one position to complete the cycle.

The machine operating modes, as defined by the operators, are Automatic, Manual, and Jog with gates open. The Jog mode operation is required for the movement of the following equipment.

Equipment	Movement
Robot (C)	5 axis End of Arm (EOA) tooling
Overhead Transfer Gantry (E)	X-axis Y-axis End of Arm (EOA) tooling
Parts Transfer Elevator (F)	Index

Table 1 - Key for Risk Assessment Worksheet

Category	Rating	Description
S = Severity of injury		Slight (normally reversible)
	S2	Serious (normally irreversible including death)
F = Frequency or exposure to hazard	F1	Seldom to less often and/or the exposure time is short
	F2	Frequent to continuous and/or the exposure time is long
P = Possibility of avoiding the hazard or limiting the harm	P1	Possible under specific conditions
	P2	Scarcely possible

Table 2 - Risk Assessment Worksheet - Load Part at Load Station #1

		Prior to Safeguards					With Safeguards				
Steps	Potential Incidents or Accidents	Severity of Injury	Frequency (Exposure)	Avoidance	Risk Reduction Category ⁽¹⁾	Current Safeguards	Recommendations	Severity of Injury	Frequency (Exposure)	Avoidance	Residual Risk <footnote>(1)</footnote>
1. Remove part from the transfer rack.	Ergonomic exposure due to part pick location.	S2	F2	A2	R1		Evaluate cart design for pick elevation and modify, if necessary.	S1	F2	A1	R3A
							Train workers on proper lifting technique.				
							Job rotation.				
							Awareness posters on proper lifting technique.				
	Cuts to hands or arms due to sharp edges on parts.	S2	F2	A2	R1		PPE: Hand and arm protection such as protective gloves and sleeves.	S1	F1	A1	R4
	Crushing or cuts due to cart tip- over hazard.	S2	F1	A2	R2B		Evaluate cart design for stability and correct if required. Verify that the cart does not move while unloaded.	S1	F1	A1	R4
2. Move part to loading station on	Slips or tripping due to debris on the floor.	S2	F2	A1	R2A		Enforce housekeeping procedures for floor cleaning.	S2	F1	A1	R3B
indication: OK to load.	Slips or tripping due to raised edges or floor discontinuity.	S2	F2	A1	R2A		Verify that the floor area does not have any discontinuities higher than 3/16 in.	S2	F1	A1	R3B
3. Place part into loading fixture. Part loading is complete upon stacklight indication: Part position OK.	Mechanical impact: Pinch or Crush hazard due to robot motion.	52	F2	A2	R1		 Inhibit robot motion while person is in the hazardous area. a. Use hard guards to reduce hazardous area. b. Use floor mat, light curtain, area scanner, or automatic gate to sense when a person is in the hazardous area or prevent exposure to the hazardous area. c. Implement robot zone control with annunciation to allow for part loading when robot does not present a hazard. Use base safety limit switches to define the zone. d. Install a properly-rated safety control system. 	51	F1	A1	R4
	Eye injury due to compressed air or airborne debris from the environment.	S2	F1	A2	R2B		PPE: Safety glasses to protect eyes.	S1	F1	A1	R4

(1) Risk Ratings of R1, R2A, R2B, R3, R4 correspond to the Safety Control Circuit Performance requirements of ANSI/RIA R15.06-1999. An R1 rating represents a control reliable circuit with continuous checking for electrical and fluid power circuits. See the standard for a complete definition of performance requirements for the related risk ratings.

Table 3 - Risk Assessment Worksheet - Panel Assembly Feed Conveyor

		Prior to Safeguards				With	Safe	guards	;		
Steps	Potential Incidents or Accidents	Severity of Injury	Frequency (Exposure)	Avoidance	Risk Reduction Category ⁽¹⁾	Current Safeguards	Recommendations	Severity of Injury	Frequency (Exposure)	Avoidance	Residual Risk <footnote>(1)</footnote>
Tasks in the general area of the work cell where a person may be tempted to enter the hazardous area.	Mechanical impact: Pinch or crush hazard due to robot motion.	52	F2	A2	R1		 Safeguarding: Use hard guards to prevent access to the hazardous area. Use a light curtain to prevent access to guarded area, such as workers climbing on the conveyor. Install a properly-rated safety control system. 	S1	F1	A1	R4
	Mechanical impact: Pinch or crush hazard due to conveyor power transmission.	52	F2	A1	R2A		 Hard-guarding: Make sure that the power transmission equipment and belts or pulleys are properly guarded. Install awareness signs to communicate that equipment must not be operated without guards. Verify that the training covers what guards are in place and that safety inspections validate that guards are present. 	S1	F1	A1	R4

(1) Risk Ratings of R1, R2A, R2B, R3, R4 correspond to the Safety Control Circuit Performance requirements of ANSI/RIA R15.06-1999. An R1 rating represents a control reliable circuit with continuous checking for electrical and fluid power circuits. See the standard for a complete definition of performance requirements for the related risk ratings.

Select Mitigation Techniques for Hazard Control

These basic methods should be considered and applied in the order shown.

- 1. Eliminate or reduce the risks as far as possible using inherently safe machine design and construction.
- 2. Install the necessary protective systems and measures in relation to risks that cannot be eliminated by design.
- 3. Implement the administrative, awareness means, Personal Protective Equipment (PPE), and training requirements.
- 4. Inform the affected personnel of the controlled and residual risks after the mitigation techniques have been implemented. Indicate whether any additional training is required and specify any need to provide PPE.

Each measure from the hierarchy should be considered starting from the top and used where possible. This usually results in a combination of measures.

Incorporate Protective Systems and Measures

If access to a hazardous area is not required, the solution may be to safeguard it within the body of the machine or by some type of fixed enclosing guard. If access is required, it is necessary to make sure that access can only be gained while the machine is in a safe state. Protective measures such as interlocked guard doors or trip systems may be required. The choice of protective devices or systems should be heavily influenced by the operating characteristics of the machine. The safety of the operator depends on the proper application and correct operation of the protective system even under fault conditions.

A safety-related system may contain many elements, including the protective device, wiring, power switching device, and sometimes parts of the machine's operational control system. All these elements of the safety system should have suitable performance characteristics relevant to their design principles, technology and safety functional requirements.

Safety Specification Example for Robot Cell Application

To adequately describe the system, its equipment, sequence of operation, operating modes, and the detailed functional and physical specifications of each station must be documented.

Load Station #1

An analysis of Load Station #1 yields the following information.

Part weight: 3 lbs

Loading Frequency: 8...12 parts per minute

Task: The operator removes parts from the transfer rack and places the part into Load Station #1 (A). When the part is in position, the operator initiates the part ready sequence. The operator is also responsible for repositioning any miss-picked parts, moving empty racks out of the way, and moving full racks into position for loading. Maintenance personnel adjust and repair fixtures, as needed.

The part fixture has sensors to indicate that the part is loaded properly. A stack light annunciates proper part loading with a green light and improper loading with a red light.

Table 4 - Proposed Architecture for Load Station #1

Components	Standard Inputs	Safety Inputs	Safety Outputs	Comments
Floor mat		2		
E-stop device		2		
Robot safety enable 2		2		
Robot safety contactors		1 or 2	2	for contactor feedback
Total:		7	2	

Panel Assembly Feed Conveyor (B)

Analysis of the Panel Assembly Feed Conveyor (B) yields the following information.

Part weight: 12 lbs

Indexing frequency: 8...12 parts per minute

Drive: 3 HP PowerFlex[®] 70 Variable Frequency Drive, 460V, 3-phase

Two mechanical brakes: power to release, spring to hold (fail to safe) Top speed: 12 in./s (30 cm/s) Tested stop time: 0.3 s Index time: 2...3 s

Pneumatic clamp actuator: pneumatic cylinder, 80 psi (5.6 kg/cm) required Top speed: 32 in./s (81 cm/s) Tested stop time: 0.35 s

Task: The operator realigns parts in the part locators at Positioning Station #1 and Positioning Station #2 of the Panel Assembly Feed Conveyor. Maintenance personnel adjust tool positioning at both stations and lubricate and repair equipment as needed.

The Panel Assembly Feed Conveyor has sensors to indicate when a part is in position at Positioning Station #1 for rough alignment and at Positioning Station #2 for final alignment and part holding for assembly. A stack light annunciates proper part positioning with a green light and improper loading with a red light.

The Panel Assembly Feed Conveyor is loaded automatically upstream of this station.

Components	Standard Inputs	Safety Inputs	Safety Outputs	Comments
Drive enable	1			The standard input is the output of the control system into the safety logic to initiate the drive motion.
Safety enable 1			1	Enable to the PowerFlex 70 Drive
Safety enable 2			1	Enable to the PowerFlex 70 Drive
Feedback 1		1		Drive Safety System Feed Back #1
Feedback 2		1		(Feedback can be wired in series)
Pneumatic safety valve #1			1	
Pneumatic safety valve #2			1	
Pneumatic safety valve feedback		1		
Total:	1	2 or 3	4	

	Table 5 - Pro	posed Architecture	for Panel Assembl	v Feed Convevor
--	---------------	--------------------	-------------------	-----------------

How Rockwell Automation Can Help

Many formal and informal methodologies exist for assessing risk. Formal methodologies include ANSI, ISO, IEC, RIA, MIL Spec and other standards. Informal methodologies include job hazard analysis (JHA), job safety analysis (JSA), process hazard analysis (PHA), or other assessment tools a company may have developed internally. Regardless of the method selected, the system engineer must determine the method and type of safety protection for the identified hazards.

Rockwell Automation recommends you follow a formal Risk Assessment process. Rockwell Automation currently uses the ANSI RIA R15.06-1999 model as our standard risk assessment methodology, and options for ISO and IEC based risk assessments.

For hazard assessment, risk assessment, safety circuit analysis, safety system validation, or safety consulting, contact Rockwell Automation through your local Rockwell Automation[®] distributor or Rockwell Automation Customer Support and Maintenance Sales team or your Rockwell Automation representative.

Notes:

Hardware Selection and Safety Wiring Layout

Introduction

In this chapter, you will create a bill of materials and access CAD drawings from the safety accelerator toolkit to lay out your system wiring. You will also use two worksheets to document your devices in preparation for developing application logic.

Before You Begin

Complete a risk assessment and safety system specification as recommended in Chapter 1.

Make sure that you have installed the required software and have access to the Internet if you are not using the Safety Accelerator Toolkit DVD.

What You Need

- Personal computer with internet access for downloading software and files
- AutoCAD program to open the .dwg files or Adobe Acrobat Reader software to open .pdf files.

TIP Use AutoCAD Electrical to take advantage of advanced features.

- Safety Accelerator Toolkit, DVD SAFETY-CL002, or visit the Integrated Architecture[®] Tools and Resources website at http://www.ab.com/go/iatools to download toolkit files
- Safety Products catalog, available at <u>http://www.ab.com/catalogs/</u>
- Microsoft Excel software

Follow These Steps



Select Hardware

To determine the hardware required for your application, follow these steps.

- 1. List the inputs and outputs required for your application and derived from your safety system specification, described in <u>Chapter 1</u>.
- 2. Use this decision tree to determine your safety controller platform.



3. Consult the table below for additional capabilities and performance to further select your safety controller platform.

This toolkit supports 1756 GuardLogix, 1768 Compact GuardLogix, 5370 Compact GuardLogix, and 1752 SmartGuard 600 controllers.

Table 6 - Capabilities and Performance

Controller Platform	Capacity	Functionality	Performance
GuardLogix (1756)	Up to 125 nodes (max)	 Safety and standard control logic Extensive suite of safety application instructions CIP Safety on Ethernet, ControlNet, and DeviceNet Superior ease of use 	 High performance integrated safety Use GuardLogix calculator and estimating tools to calculate performance.
Compact GuardLogix (1768)	Up to 64 nodes (max)	Same as GuardLogix, except CIP Safety only on Ethernet	Similar performance to GuardLogix
Compact GuardLogix (5370)	Up to 48 nodes (max)	Same as GuardLogix, except CIP Safety only on Ethernet	Similar performance to GuardLogix
SmartGuard 600 (1752)	 16 safety inputs 8 safety outputs 4 standard inputs 68 networked safety expansion modules (practical performance limits) 254 configurable function blocks 	Only Safety logic	Cost-effective safety retrofit to existing systems

4. Refer to the Safety Products Catalog, available at <u>http://www.ab.com/catalogs/</u>, to determine which safety devices meet your functional requirement specification.

5. Refer to the Safety Products Catalog, available at <u>http://www.ab.com/catalogs/</u>, to select Guard I/O[™] modules that fit your network specifications and number of required inputs and outputs.

Defining Module and Safety Zone Tags

A safety zone in this toolkit is defined as an area of the machine that controls a single logical safety function based on the status of safety-related input devices. This single logical safety function may control one or more safety-related output devices. The safety function is identified and defined by your risk assessment.

IMPORTANT For each of the safety zones and I/O modules in your safety application, use the Safety Zone Configuration and Safety Module Configuration worksheets found on the safety accelerator toolkit CD to document names for your safety zones, modules, and devices so that you can customize the predefined logic in the toolkit. The worksheet helps make sure that you import the proper input and output safety logic, and name your tags correctly and consistently.

For examples that show the completed worksheets, see the <u>Robot Cell Module and Safety Zone Configuration</u> in <u>Appendix A</u>, which is used throughout this Quick Start.

Fill Out the Safety Zone Configuration Worksheet

The Safety Zone Configuration worksheet lists key items in the safety project. To complete the Safety Zone Configuration worksheet, follow these steps.



1. Determine the number of zones in your application.

You need to fill out a Safety Zone Configuration worksheet for each zone in your application.

2. Browse to the Guard I/O and SmartGuard Modules directory in the toolkit.

If the toolkit has been loaded onto your personal computer, the hard drive path is C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Modules.

3. Make a copy of the Safety_Zone_Configuration.xls file for each safety zone in your application and name them using the *ZoneName*, for example Zone1.xls.

	A	В	C
1	Safety Zone C	onfiguration Wor	ksheet
2			
3	Zone Name	Zone1	
4			
5	Zone Modules & Tags	Name	
6	Safety Module 1	CellGuard1	
7	Safety Module 2	CellGuard2	
8	Safety Module 3		
9	Safety Module 4		
10	Safety Module 5		
11	Safety Module 6		
	Standard I/O		
12	Fault Reset Tag		
	Standard HMI	(#1 Cmd FaultPacat)	
13	Fault Reset Tag	(#1.Ciliu_i aditReset)	
	Safety	Cmd Zone1 FaultReset	
14	Fault Reset Tag	Cilia_Zolle1_1 adiriveser	
	Standard I/O		
15	Safety Reset Tag		
	Standard HMI	1#1 Cmd SafatyRecet)	
16	Safety Reset Tag	(#I.Cilid_Dalety/teset)	
	Safety	Cmd Zone1 SafetyReset	
17	Safety Reset Tag	Child_Zoner_BaletyNeset	2
18	Inputs OK Tag	Sts_Zone1_InputsOK	
19			

4. Open your newly created Safety Zone Configuration worksheet and enter a Zone Name.

For this example, we entered Zone1. The ZoneName will be inserted in many of the Zone Tags listed in the worksheet. You will use the tag names in this worksheet in your application logic, developed in <u>Chapter 3</u> for GuardLogix Controllers, and <u>Chapter 4</u> for SmartGuard 600 controllers.

5. Type a Safety Module Name for each module used in the Safety Zone and save the file.

For this example, we entered CellGuard1 and CellGuard2 for Safety Module 1 and 2, respectively.

Fill Out the Safety Module Configuration Worksheet

The documentation of how each safety I/O module is identified is a critical step that will make using the toolkit to develop your application logic more efficient. To complete the Safety Module Configuration worksheets for your safety application, follow these steps.

1. Browse to the Guard I/O and SmartGuard Modules directory in the toolkit.



If the toolkit has been loaded onto your personal computer, the hard drive path is C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Modules.

2. Select the safety module configuration file that corresponds to your first safety I/O module, make a copy, and name it using the *ModuleName* listed in the Safety Zone Configuration Worksheet.

Safety I/O Module Type	Safety Module Configuration File Name
Guard I/O Module used with GuardLogix Controller	GLX Guard IO Configuration.xls
Guard I/O Module used with SmartGuard 600 Controller	SG Guard IO Configuration.xls
SmartGuard 600 Local I/O	SG Local IO Configuration.xls

For this example, we selected GLX Guard IO Configuration.xls, copied the file, and named it CellGuard1.xls

3. Open your newly-copied safety module configuration file.

4. Type the zone name and module name of your module that you entered in the Safety Zone Configuration worksheet.

Guar	dLogix G	uard IO Co	nfigura	tion Worksheet		
Zone Name			Module Name	Module Cat No./ Safety Category		
	Zone1			CellGuard1	1791ES-IB16/CAT4	
Digital Safety Inputs	Device Name (If Dual Channel)	Device Name (If Single Channel)	Device Type	Channel Tao Name	Input Interlock Tag Name	
Input 00		(.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	CellGuard1:I.Pt00Data	Sts_Zone1_InputOK	
Input 01				CellGuard1:I.Pt01Data	Sts_Zone1_InputOK	
Input 02	-			CellGuard1:I.Pt02Data	Sts_Zone1_InputOK	
Input 03		1		CellGuard1:LPt03Data	Sts_Zone1_InputOK	-
Input 04				CellGuard1:I.Pt05Data	Sts Zone1 InputOK	
Input 06				CellGuard1:I.Pt06Data	Sts_Zone1_InputOK	
Input 07				CellGuard1:I.Pt07Data	Sts_Zone1_InputOK	
Input 08				CellGuard1:I.Pt08Data	Sts_Zone1_InputOK	
Input 09				CellGuard1:LPt09Data	Sts_Zone1_InputOK	-
Input 10	1			CellGuard1:I.Pt11Data	Sts Zone1 InputOK	
Input 12				CellGuard1:I.Pt12Data	Sts_Zone1_InputOK	
Input 13				CellGuard1:I.Pt13Data	Sts_Zone1_InputOK	
Input 14				CellGuard1:I.Pt14Data	Sts_Zone1_InputOK	
Input 15				CellGuard1:I.Pt15Data	Sts_Zone1_InputOK	
Digital						
Test	Device					
Outputs	Name			Test Output Tag Name		
Output 00				CellGuard1:O.Test00Data		
Output 01				CellGuard1:O.Test01Data		
Output 02				CellGuard1:O.Test02Data		
Output 03				CellGuard1:O.Test03Data		
Output 04				CellGuard1:O.Test05Data		
Output 06				CellGuard1:O.Test06Data		
Output 07				CellGuard1:O.Test07Data		
Output 08				CellGuard1:O.Test08Data		
Output 09		-		CellGuard1:O.Test09Data		
Output 10				CellGuard1:O Test11Data		
Output 12				CellGuard1:O.Test12Data		
Output 13				CellGuard1:O.Test13Data		
Output 14				CellGuard1:O.Test14Data		
Output 15				CellGuard1:O.Test15Data		
Digital						
Safety	Device Name	Device Name	Device	Output Enable	CROUT	Output
Outputs	(If Dual Channel)	(If Single Channel)	Туре	Tag Name	Tag Name	Tag Name
Output 00				Cmd_Zone1_OutputEnable	Zone1_	CellGuard1:O.Pt00Data
Output 01				Cmd_Zone1_OutputEnable	Zone1	CellGuard1:O.Pt01Data
Output 02	-			Cmd_Zone1_OutputEnable	Zone1	CellGuard1:O.Pt02Data
Output 03			-	Cmd Zone1 OutputEnable	Zone1	CellGuard1:O.Pt03Data
Output 05	1			Cmd Zone1 OutputEnable	Zone1	CellGuard1:O.Pt05Data
Output 06				Cmd_Zone1_OutputEnable	Zone1	CellGuard1:O.Pt06Data
Output 07				Cmd_Zone1_OutputEnable	Zone1_	CellGuard1:O.Pt07Data
Analog						
Safety	Device Name	Device Name	Device	Channel	Input Interlock	
Inputs	(If Dual Channel)	(If Single Channel)	Туре	Tag Name	Tag Name	
Input 00				CellGuard1:I.Ch0Data	Sts_Zone1_InputOK	
Input 01	-	-	÷	CellGuard1:I.Ch1Data	Sts_Zone1_InputOK	
Input 02	4			CellGuard1:LCh2Data	Sts_Zone1_InputOK	_
input 03		-		CellGuard 1:1.Ch3Data	Sts_Zone1_InputOK	

For this example, we typed Zone1 as the Zone Name and CellGuard1 as a module name.

The zone name and module name will be automatically inserted in the input and output tags listed in the worksheet.

- 5. You may also enter the module catalog number and safety category although it is not critical for toolkit use.
- 6. Fill in the Device Name for each input on your module.

If your application requires Category 3 or Category 4, each device typically requires two inputs and both input channels will have the same Device Name. Use the dual channel column.

If your application is Category 2, each input (single-channel) has its own name. Use the single channel column. See the <u>Robot Cell Module and Safety Zone Configuration</u> in <u>Appendix A</u> for example worksheets that show CAT 4 devices.

7. Use the pull-down list to enter the Device Type.

GuardLogix Guard IO Configuration Worksheet

	9	Module Name CellGuard1			
Digital Safety Inputs	Device Name (If Dual Channel)	Device Name (If Single Channel)	Device Type	Channel Tag Name	
Input 00 Input 01	LOCKINGSW1		Electronic Sensor	*	CellGuard1:I.Pt00Data CellGuard1:I.Pt01Data
Input 02 Input 03			EStop Feedback Gate Switch		CellGuard1:I.Pt02Data CellGuard1:I.Pt03Data
Input 04 Input 05 Input 06			Kinetix Servo Drive Laser Scanner Light Curtain	+	CellGuard1:I.Pt04Data CellGuard1:I.Pt05Data CellGuard1:I.Pt06Data

- 8. For any test outputs, fill in the Device Name field.
- 9. For safety outputs, fill in the Device Name and use the pull-down list to choose the Device Type.

Category 3 or Category 4 outputs typically require either two devices with one output channel each or a single device with dual-channel outputs. Use the dual channel column.

For Category 2, each output (single-channel) has its own name. Use the single channel column.

TIP The device names will be automatically inserted in the input and output tags listed in the worksheet. You will use the tag names in this worksheet in your application logic, developed in 3 for GuardLogix Controllers and 4 for SmartGuard 600 controllers.

The following example illustrates a completed worksheet for a CAT 4 safety input module.

GuardLogix Guard IO Configuration Worksheet										
Zone Name Zone1			Module Name CellGuard1		Module Cat No./ Safety Category					
					1791ES-IB16/CAT4					
Sec. 1										
Digital Safety Inputs	Device Name (If Dual Channel)	Device Name (If Single Channel)	Device Type	Channel Tag Name	Input Interlock Tag Name					
Input 00	LOCKINGSW1		Locking Switch	CellGuard1:I.Pt00Data	Sts_Zone1_LOCKINGSW1InputOK Sts_Zone1_LOCKINGSW1InputOK					
Input 02	LOCKINGSW2		Locking Switch	CellGuard1:I.Pt02Data	Sts_Zone1_LOCKINGSW2InputOK					
Input 03			Locking Switch	CellGuard1:I.Pt03Data	Sts_Zone1_LOCKINGSW2InputOK					
Input 05	ESTOP1		EStop	CellGuard1:I.Pt05Data	Sts_Zone1_ESTOP1InputOK					
Input 06	ESTOP2		EStop	CellGuard1:I.Pt06Data	Sts_Zone1_ESTOP2InputOK					
Input 07			EStop	CellGuard1:I.Pt07Data	Sts_Zone1_ESTOP2InputOK					
Input 09	ESTOP3		EStop	CellGuard1:I.Pt09Data	Sts Zone1 ESTOP3InputOK					
Input 10	ESTOP/		EStop	CellGuard1:I.Pt10Data	Sts_Zone1_ESTOP4InputOK					
Input 11	LSTOF4		EStop	CellGuard1:I.Pt11Data	Sts_Zone1_ESTOP4InputOK					
Input 12	LC1		Light Curtain	CellGuard1:I.Pt12Data	Sts_Zone1_LC1InputOK					
Input 14			Light Cuitain	CellGuard1:LPt14Data	Sts Zone1 InputOK					
Input 15				CellGuard1:I.Pt15Data	Sts_Zone1_InputOK					
Digital										
Test	Device									
Outputs	Name			Test Output Tag Name						
Output 00				CellGuard1:O.Test00Data						
Output 01				CellGuard1:O.Test01Data						
Output 02				CellGuard1:O.Test02Data						
Output 04				CellGuard1:O.Test04Data						
Output 05				CellGuard1:O.Test05Data						
Output 06				CellGuard1:O.Test06Data						
Output 07				CellGuard1:O Test07Data						
Output 09				CellGuard1:O.Test09Data						
Output 10				CellGuard1:O.Test10Data						
Output 11				CellGuard1:O.Test11Data						
Output 12 Output 13				CellGuard1:O Test12Data						
Output 14	LOCKINGSW1SOLENOID			CellGuard1:O.Test14Data						
Output 15	LOCKINGSW2SOLENOID			CellGuard1:O.Test15Data						
Digital Safety Outputs	Device Name (If Dual Channel)	Device Name (If Single Channel)	Device Type	Output Enable Tag Name	CROUT Tag Name	Output Tag Name				
Output 00				Cmd_Zone1_OutputEnable	Zone1_	CellGuard1:O.Pt00Data				
Output 01				Cmd_Zone1_OutputEnable	Zone1_	CellGuard1:0.Pt01Data				
Output 02	-			Cmd_Zone1_OutputEnable	Zone1	CellGuard1:0.Pt02Data				
Output 04				Cmd_Zone1_OutputEnable	Zone1_	CellGuard1:O.Pt04Data				
Output 05				Cmd_Zone1_OutputEnable	Zone1_	CellGuard1:O.Pt05Data				
Output 06	-			Cmd_Zone1_OutputEnable	Zone1	CellGuard1:O.Pt06Data				
Output 07					Zune I_	GenGuard I:O.Pt0/Data				
Analog										
Safety	Device Name	Device Name	Device	Channel	Input Interlock					
Inputs	(If Dual Channel)	(If Single Channel)	Туре	Tag Name	Tag Name					
Input 00	-			CellGuard1:I.Ch0Data	Sts_Zone1_InputOK	·				
Input 01				CellGuard11Ch1Data	Sts_Zone1_InputOK	-				
Input 03	1			CellGuard1:I.Ch3Data	Sts Zone1 InputOK					
-										

Lay Out Your Safety Wiring

The toolkit includes wiring diagrams, available in DWG, DXF, and PDF file formats, to assist you in planning the layout of your system. The files are organized by safety category (Cat. 2, Cat. 3, Cat. 4) and include safety I/O, safety device, and various project drawings. The diagrams include power and control wiring.

If you do not have CAD software, use the PDF files to build your system drawing.

Access and Gather Drawings from Toolkit

Refer to your bill of materials and follow these steps to access the safety system drawings.



1. Browse to the System Wiring Diagrams directory in the toolkit.

If the toolkit has been loaded onto your personal computer, the hard drive path is C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\System Layout and Wiring Diagrams.
2. Navigate to the desired file directory based on your safety category (Analog, CAT2, CAT3, or CAT4) and the desired file format (DXF, DWG, or PDF).

File Edd Year Tools tedp		🗁 DWG		
Back Image Search Folders Folder Sign Folder Sync Address C:/program Files/RA_Simplification(Safety/GuardLogic)/Files/System Layout and Dires Safet Jonue Off Wiring Size Type Name * Size Type File Folder File Folder File Folder Title 00_CAT4_Snebt_DowerRex_SafeTorqueOff File Folder Dires Safety Wiring 00_CAT4_Snebt_DowerRex_Drive_w_Bipoler_Outputs 731 KB DWG TrueView Drawing 30_CAT4_Scandar Drive w_Bipoler_Outputs 397 KB DWG TrueView Drawing 397 KB DWG TrueView Drawing 30_CAT4_Soc0_Ontx_120VAC_Power 322 KB DWG TrueView Drawing 397 KB DWG TrueView Drawing 3164ty Controller Power 04_CAT4_SG00_OntX_120VAC_Power 166 KB DWG TrueView Drawing 04_CAT4_TY91DS_BI8X0BV4 400 KB 045 TrueView Drawing 398 KB DWG TrueView Drawing 01_CAT4_TP1DS_BI8X0BV4 400 KB 040 KG TrueView Drawing 302 KB DWG TrueView Drawing 01_CAT4_TP1DS_BI8X0BV4 308 KB 308 KB DWG TrueView Drawing 302 KB DWG TrueView Drawing <t< th=""><th></th><th>Eile Edit Yiew Favorites Tools Help</th><th></th><th>-</th></t<>		Eile Edit Yiew Favorites Tools Help		-
Address C:\Program Files\RA_Simplification\SafetyGuardLogk\Files\System Layout and Name Size Type Kinetix ^a and PowerFilex ^a Safe Torque Off File Folder 73 Is B DWG TrueView Drawing Drive Safety Wining 00, CAT4_SiteLy, Drive_w_Bipolar_Outputs 495 KB DWG TrueView Drawing Drive Safety Wining 00, CAT4_SiteLy, Drive_w_Bipolar_Outputs 397 KB DWG TrueView Drawing Out_CAT4_SiteLy, Drive_w_Bipolar_Outputs 397 KB DWG TrueView Drawing 04 (CAT4_CMGAL, J20VAC_Power 325 KB DWG TrueView Drawing Safety Controller Power 04, CAT4_GCMGAL, J20VAC_Power 166 KB DWG TrueView Drawing Other Safety Devices 05, CAT4_Honktored_Safety_Relay 309 KB DWG TrueView Drawing 00+ CAT4_T791D5_JB8X0084 360 KB DWG TrueView Drawing 08, CAT4_1791D5_JB8X0084 300 KB DWG TrueView Drawing 00+ CAT4_T791D5_JB8X0084 360 KB DWG TrueView Drawing 11, CAT4_1791D5_JB8X0084 300 KB DWG TrueView Drawing 00+ CAT4_T17205_JB8X0084 370 KB DWG TrueView Drawing 11, CAT4_17205_JB8X0084 370 KB DWG TrueView Drawing 01- CAT4_TAT4		Back 🔹 💮 👻 🏂 🔎 Search 🦻	Folders	🔢 🗸 🚺 Folder Sync
Name Size Type Kinetis* and PowerFlex* Safe Torque Off File Folder File Folder Title 100_CAT4_Kinetix_PowerFlex_SafeTorqueOff File Folder Drive Safety Wiring 101_CAT4_Kinetix_Prive_w_Bipolar_Outputs 394 K6 DWG TrueView Drawing Drive Safety Wiring 101_CAT4_Sinetix_Drive_w_Bipolar_Outputs 394 K6 DWG TrueView Drawing Safety Controller Power 104_CAT4_SCAL_120VAC_Power 325 K6 DWG TrueView Drawing Other Safety Devices 104_CAT4_GRLX_120VAC_Power 166 KB DWG TrueView Drawing Other Safety Devices 105_CAT4_Honkored_Safety_Relay 309 KB DWG TrueView Drawing Other Safety Devices 105_CAT4_1791DS_JB8X0B4 400 KB DWG TrueView Drawing Guard I/0 Module Wiring 101_CAT4_1791DS_JB8X0B4 306 KB DWG TrueView Drawing Guard I/0 Module Wiring 11_CAT4_1791DS_JB8X0B4 306 KB DWG TrueView Drawing Guard I/0 Module Wiring 11_CAT4_1791DS_JB8X0B4 376 KB DWG TrueView Drawing Guard I/0 Module Wiring 11_CAT4_1791DS_JB8X0B4 376 KB DWG TrueView Drawing Guard I/0 Module W		Address C:\Program Files\RA_Simplification\Sal	fetyGuardLog	ix\Files\System Layout and
Klinetix ^a and PowerFlex ^a Safe TorqueOff File Folder Title 100 CA14_Title_Sheet 731 K8 DWG TrueView Drawing Drive Safety Wiring 102 CA14_State_Sheet 731 K8 DWG TrueView Drawing Drive Safety Wiring 102 CA14_State_Sheet 731 K8 DWG TrueView Drawing Safety Controller Power 103 CA14_Standard_Drive_w_Bipolar_Outputs 394 K8 DWG TrueView Drawing Safety Controller Power 104 CA14_GCM2L/J20VAC_Power 322 K8 DWG TrueView Drawing Other Safety Devices 104 CA14_SG800_CMLX_120VAC_Power 325 K8 DWG TrueView Drawing Other Safety Devices 105 CA14_J1791D5_JB16 366 K5 DWG TrueView Drawing Other Safety Devices 105 CA14_J1791D5_JB16 366 K5 DWG TrueView Drawing Guard I/0 Module Wiring 112 CA14_J1791D5_JB12 360 K5 DWG TrueView Drawing Guard I/0 Module Wiring 112 CA14_J1791D5_JB12 360 K5 DWG TrueView Drawing J12 CA14_J1791D5_JB12 360 K5 DWG TrueView Drawing 370 K6 DWG TrueView Drawing J12 CA14_J1731D5_JB14 360 K5 DWG TrueView Drawing 360 K5 DWG TrueView Drawing J14_CA14_JA_JB85_OB85		Name 🔺	Size	Туре
Title 00_CAT4_Tride_Sheet 731 K8 DWG TrueView Drawing Drive Safety Wring 00_CAT4_SheetX_Drive_w_Bipolar_Outputs 395 K6 DWG TrueView Drawing Drive Safety Wring 00_CAT4_SheetX_Drive_w_Bipolar_Outputs 397 K6 DWG TrueView Drawing Safety Controller Power 00_CAT4_GKX_120VAC_Power 325 K6 DWG TrueView Drawing Other Safety Devices 00_CAT4_GKX_120VAC_Power 325 K6 DWG TrueView Drawing Other Safety Devices 00_CAT4_GKX_120VAC_Power 166 K8 DWG TrueView Drawing Other Safety Devices 00_CAT4_GKX_120VAC_Power 166 K8 DWG TrueView Drawing Other Safety Devices 00_CAT4_T91DS_BI8 396 K6 DWG TrueView Drawing 00_CAT4_T91DS_BI8XOB4 300 K6 DWG TrueView Drawing 10_CAT4_T91DS_BI8XOB4 400 K6 DWG TrueView Drawing Guard I/0 Module Wiring 11_CAT4_T91DS_BI8XOB4 360 K6 DWG TrueView Drawing 10_CAT4_T171DS_BI8XOB4 360 K6 DWG TrueView Drawing 11_CAT4_T172DS_BI8XOB4 370 K6 DWG TrueView Drawing 11_CAT4_T172DS_BI8XOB4 360 K6 DWG TrueView Drawing 11_CAT4_T172DS_BI8XOB4 370 K6 DWG TrueView Drawing 11_CAT4_T172DS_BI8XOB4 <th>Kinetix[®] and PowerFlex[®] Safe Torque Off Wiring</th> <th>050 CAT4 Kinetix PowerFlex SafeTorqueOff</th> <th></th> <th>File Folder</th>	Kinetix [®] and PowerFlex [®] Safe Torque Off Wiring	050 CAT4 Kinetix PowerFlex SafeTorqueOff		File Folder
01_CAT4_Kinetx_Drive_w_Bipolar_Outputs 495 KB DWG TrueView Drawing 02_CAT4_Semandar Drive_w_Bipolar_Outputs 394 KB DWG TrueView Drawing 03_CAT4_Standard Drive_w_Bipolar_Outputs 394 KB DWG TrueView Drawing 04_CAT4_CMGLX_120VAC_Power 325 KB DWG TrueView Drawing 04_CAT4_GLX_120VAC_Power 356 WG TrueView Drawing 309 KB DWG TrueView Drawing 04+CAT4_GLX_120VAC_Power 166 KB DWG TrueView Drawing 04+CAT4_GLX_120VAC_Power 166 KB DWG TrueView Drawing 06+CAT4_Upht_Curtain_SensaGuard 352 KB DWG TrueView Drawing 09-CAT4_1791D5_JB8XOB4 400 KB DWG TrueView Drawing 09-CAT4_1791D5_JB8XOB4 306 KB DWG TrueView Drawing 10_CAT4_1791D5_JB8XOB4 370 KB DWG TrueView Drawing 11_CAT4_1791D5_JB8XOB4 370 KB DWG TrueView Drawing 12_CAT4_1791D5_JB8XOB4 370 KB DWG TrueView Drawing 12_CAT4_1791D5_JB8XOB4 370 KB DWG TrueView Drawing 12_CAT4_1791D5_JB8XOB4 370 KB DWG TrueView Drawing 13_CAT4_1791D5_JB8XOB4 370 KB DWG TrueView Drawing 14_CAT4_173205_JB8XOB4 378 KB DWG T	Title —	00 CAT4 Title Sheet	731 KB	DWG TrueView Drawing
Drive Safety Wining 002_CAT4_PowerFlex_Drive_w_Bipolar_Outputs 394 KB DWG TrueView Drawing Safety Controller Power 04_CAT4_GMCLX_120VAC_Power 325 KB DWG TrueView Drawing Other Safety Vontroller Power 04_CAT4_GMCLX_120VAC_Power 325 KB DWG TrueView Drawing Other Safety Devices 04_CAT4_GMCLX_120VAC_Power 166 KB DWG TrueView Drawing Other Safety Devices 05_CAT4_Monitored_Safety_Relay 309 KB DWG TrueView Drawing Other Safety Devices 06_CAT4_1791D5_IB16 366 KB DWG TrueView Drawing Other Safety Mining 06_CAT4_1791D5_IB12 360 KB DWG TrueView Drawing Out CAT4_1791D5_IB12 360 KB DWG TrueView Drawing 10_CAT4_1791D5_IB12 360 KB DWG TrueView Drawing Guard I/0 Module Wining 11_CAT4_1791D5_IB12 360 KB DWG TrueView Drawing 12_CAT4_1791D5_IB3 360 KB DWG TrueView Drawing I12_CAT4_1791D5_IB4XCW44 370 KB DWG TrueView Drawing 14_CAT4_1732D5_IB8XOBV4 378 KB DWG TrueView Drawing I12_CAT4_ISSD_IB8XOBV4 378 KB DWG TrueView Drawing 14_CAT4_1732D5_IB8XOBV4 378 KB DWG TrueView Drawing Drive I/0 18_CAT4_Kineti		01 CAT4 Kinetix Drive w Bipolar Outputs	495 KB	DWG TrueView Drawing
397 KB DWG TrueView Drawing 04_CAT4_CMGX_120VAC_Power 322 KB DWG TrueView Drawing 04_CAT4_CMGX_120VAC_Power 322 KB DWG TrueView Drawing 04_CAT4_SG00_CMLX_120VAC_Power 368 KB DWG TrueView Drawing 04_CAT4_SG00_CMLX_120VAC_Power 166 KB DWG TrueView Drawing 04_CAT4_SG00_CMLX_120VAC_Power 166 KB DWG TrueView Drawing 05_CAT4_Monitored_Safety_Relay 399 KB DWG TrueView Drawing 06_CAT4_1791D5_1B16 366 KB DWG TrueView Drawing 06_CAT4_1791D5_1B8X084 400 KB DWG TrueView Drawing 09_CAT4_1791D5_1B8X084 309 KB DWG TrueView Drawing 09_CAT4_1791D5_1B8X084 300 KB DWG TrueView Drawing 10_CAT4_1791D5_1B8X084 300 KB DWG TrueView Drawing 11_CAT4_1791D5_1B8X084 300 KB DWG TrueView Drawing 12_CAT4_1791D5_1B8X084 300 KB DWG TrueView Drawing 11_CAT4_1791D5_1B8X084 300 KB DWG TrueView Drawing 12_CAT4_17925_2B8 0B8 SB 306 KB DWG TrueView Drawing 12_CAT4_17925_B8X084 322 KB DWG TrueView Drawing 12_CAT4_17325_B8 12_CAT4_Kinetix_	Drive Safety Wiring	02_CAT4_PowerFlex_Drive_w_Bipolar_Outputs	394 KB	DWG TrueView Drawing
Safety Controller Power 322 KB DWG TrueView Drawing Od_CAT4_CMGLX_120VAC_Power 355 KB DWG TrueView Drawing Od_CAT4_GX_120VAC_Power 166 KB DWG TrueView Drawing Other Safety Devices Od_CAT4_Montored_Safety_Relay 390 KB DWG TrueView Drawing Other Safety Devices Od_CAT4_Upht_Curtain_SensaGuard 352 KB DWG TrueView Drawing Od_CAT4_UPIDS_IB16 386 KB DWG TrueView Drawing 00°_CAT4_1791DS_IB16 366 KB DWG TrueView Drawing Og_CAT4_1791DS_IB12 360 KB DWG TrueView Drawing 10°_CAT4_1791DS_IB12 360 KB DWG TrueView Drawing Guard I/0 Module Wiring 11_CAT4_1791DS_IB12 360 KB DWG TrueView Drawing 12_CAT4_1791DS_IB8XOB4 370 KB DWG TrueView Drawing 13_CAT4_1791DS_IB8XOB4 376 KB DWG TrueView Drawing 14_CAT4_1731DS_IB8XOB4 376 KB DWG TrueView Drawing 12_CAT4_1732DS_IB8XOB4 376 KB DWG TrueView Drawing 12_CAT4_IT32DS_IB8XOB4 376 KB DWG TrueView Drawing 12_CAT4_1734LB85_ORB5 336 KB DWG TrueView Drawing 14_CAT4_IXentix_Axis2_Drive_I_O 420 KG TrueView Drawing		03_CAT4_Standard_Drive_w_Bipolar_Outputs	397 KB	DWG TrueView Drawing
Safety Controller Power 04_CAT4_GLX_120VAC_Power 325 KB DWG TrueView Drawing Other Safety Devices 06_CAT4_Monitored_Safety_Relay 309 KB DWG TrueView Drawing Other Safety Devices 06_CAT4_Monitored_Safety_Relay 308 KB DWG TrueView Drawing OC_CAT4_1791D5_IB16 386 KB DWG TrueView Drawing Og_CAT4_1791D5_IB3XOB8 369 KB DWG TrueView Drawing Og_CAT4_1791D5_IB3XOB8 369 KB DWG TrueView Drawing Guard I/0 Module Wiring 11_CAT4_1791D5_IB12 360 KB DWG TrueView Drawing 12_CAT4_1791D5_IB12 300 KB DWG TrueView Drawing 12_CAT4_1791D5_IB4XOW4 370 KB DWG TrueView Drawing Guard I/0 Module Wiring 11_CAT4_1791D5_IB12 300 KB DWG TrueView Drawing 12_CAT4_1791D5_IB4XOW4 370 KB DWG TrueView Drawing 12_CAT4_1791D5_IB12 308 KB DWG TrueView Drawing 14_CAT4_1732D5_IB8 308 KB DWG TrueView Drawing 14_CAT4_1732D5_IB8XOBV4 378 KB DWG TrueView Drawing 16_CAT4_Vinetix_Axis0_Drive_J_O 49 KB DWG TrueView Drawing Drive I/0 18_CAT4_Kinetix_Axis0_Drive_J_O 49 KB DWG TrueView Drawing 22_CAT4_Kinetix_Axis0_Drive_J_O		04_CAT4_CMGLX_120VAC_Power	322 KB	DWG TrueView Drawing
Other Safety Devices 166 KB DWG TrueView Drawing Other Safety Devices 05_CAT4_Monitored_Safety_Relay 309 KB DWG TrueView Drawing 07_CAT4_Light_Curtain_SensaGard 352 KB DWG TrueView Drawing 08_CAT4_Light_Curtain_SensaGard 366 KB DWG TrueView Drawing 09_CAT4_1791D5_IB1C 366 KB DWG TrueView Drawing 09_CAT4_1791D5_IB3XOBV4 400 KB DWG TrueView Drawing 00_CAT4_1791D5_IB3XOBV4 300 KB DWG TrueView Drawing Guard I/0 Module Wiring 11_CAT4_1791D5_IB4XOW4 300 KB DWG TrueView Drawing 12_CAT4_1791D5_IB4XOW4 370 KB DWG TrueView Drawing 11_CAT4_1791D5_IB4XOW4 370 KB DWG TrueView Drawing 13_CAT4_Kinetix_Aix1_272D5_IB8 308 KB DWG TrueView Drawing 15_CAT4_1732D5_IB8XOBV4 378 KB DWG TrueView Drawing 15_CAT4_1732D5_IB8XOBV4 352 KB DWG TrueView Drawing 15_CAT4_1732D5_IB8XOBV4 358 KB DWG TrueView Drawing 16_CAT4_Kinetix_Aix1_Drive_J_O 429 KB DWG TrueView Drawing 12_CAT4_Kinetix_Aix1_Drive_J_O 420 KB DWG TrueView Drawing 21_CAT4_Kinetix_Aix1_Drive_J_O 420 KB DWG TrueView Drawing 22_CAT4_Kinetix_Aix1_D	Safety Controller Power ——	04_CAT4_GLX_120VAC_Power	325 KB	DWG TrueView Drawing
Other Safety Devices 309 KB DWG TrueView Drawing 0 0 CAT4_Lipht_Curtain_SensaGuard 352 KB DWG TrueView Drawing 0 0 CAT4_Lipht_Curtain_SensaGuard 352 KB DWG TrueView Drawing 0 0 CAT4_LiP1DS_JB8X0BV4 400 KB DWG TrueView Drawing 0 0 CAT4_LiP31DS_JB8X0BV4 400 KB DWG TrueView Drawing 0 0 CAT4_T791DS_JB8X0BV4 400 KB DWG TrueView Drawing 0 0 CAT4_T791DS_JB8X0BV4 300 KB DWG TrueView Drawing 0 0 CAT4_T791DS_JB8X0BV4 300 KB DWG TrueView Drawing 0 10 CAT4_T791DS_JB8X0BV4 300 KB DWG TrueView Drawing 0 11 CAT4_T791DS_JB8X0BV4 300 KB DWG TrueView Drawing 1 12 CAT4_T791DS_JB8X0BV4 308 KB DWG TrueView Drawing 1 12 CAT4_T791DS_JB8X0BV4 308 KB DWG TrueView Drawing 1 15 CAT4_T732DS_JB8X0BV4 308 KB DWG TrueView Drawing 1 15 CAT4_T32DS_JB8X0BV4 308 KB DWG TrueView Drawing 0 10 CAT4_Kinetix_Axis1_Drive_J_O 430 KB DWG TrueView Drawing 0 11 CAT4_T32DS_JB8X0BV4 308 KB DWG TrueView Drawing 0 12 CAT4_Kinetix_Axis1_Drive_J_O 430 KB DWG TrueView Drawing <tr< td=""><td></td><td>04_CAT4_SG600_CMLX_120VAC_Power</td><td>166 KB</td><td>DWG TrueView Drawing</td></tr<>		04_CAT4_SG600_CMLX_120VAC_Power	166 KB	DWG TrueView Drawing
Uther Safety Devices 506_CAT4_Light_Curtain_SensaGuard 352 K8 DWG TrueView Drawing 07_CAT4_1791D5_JB16 368 K8 DWG TrueView Drawing 09_CAT4_1791D5_JB8X0BV4 400 K8 DWG TrueView Drawing 09_CAT4_1791D5_JB8X0B8 369 K8 DWG TrueView Drawing 09_CAT4_1791D5_JB8X0B4 360 K8 DWG TrueView Drawing 10_CAT4_1791D5_JB4X0W4 370 K8 DWG TrueView Drawing 11_CAT4_1791E5_JB4X0W4 370 K8 DWG TrueView Drawing 12_CAT4_1791E5_JB4X0W4 370 K8 DWG TrueView Drawing 12_CAT4_1791E5_JB4X0W4 370 K8 DWG TrueView Drawing 12_CAT4_1732D5_JB8X0BV4 360 K8 DWG TrueView Drawing 12_CAT4_1732D5_JB8X0BV4 352 K8 DWG TrueView Drawing 15_CAT4_1732D5_JB8X0BV4 352 K8 DWG TrueView Drawing 16_CAT4_1732D5_JB8X0BV4 352 K8 DWG TrueView Drawing 17_CAT4_Kinetix_Axis1_Drive_1_O 420 K8 DWG TrueView Drawing 19_CAT4_Kinetix_Axis1_Drive_1_O 431 K8 DWG TrueView Drawing 21_CAT4_CMGLX_Comm_Networks 287 K8 DWG TrueView Drawing 22_CAT4_CMGLX_Digital_Inputs 360 K8 DWG TrueView Drawing		05 CAT4 Monitored Safety Relay	309 KB	DWG TrueView Drawing
Guard I/0 Module Wiring 007_CAT4_1791D5_IB16 386 K8 DWG TrueView Drawing Guard I/0 Module Wiring 102_CAT4_1791D5_IB8XOBV4 400 K8 DWG TrueView Drawing Guard I/0 Module Wiring 112_CAT4_1791D5_IB4XOW4 360 K8 DWG TrueView Drawing 112_CAT4_1791D5_IB4XOW4 370 K8 DWG TrueView Drawing 112_CAT4_1791E5_IB16 360 K8 DWG TrueView Drawing 112_CAT4_1791E5_IB16 360 K8 DWG TrueView Drawing 112_CAT4_1791E5_IB4XOW4 370 K8 DWG TrueView Drawing 112_CAT4_1791E5_IB4 360 K8 DWG TrueView Drawing 113_CAT4_1732D5_IB8 308 K8 DWG TrueView Drawing 115_CAT4_1732D5_IB8 308 K8 DWG TrueView Drawing 115_CAT4_1731E5_IB8XOBV4 352 K5 DWG TrueView Drawing 116_CAT4_1731E5_IB8XOBV4 352 K5 DWG TrueView Drawing 116_CAT4_1731E5_IB8XOBV4 352 K5 DWG TrueView Drawing 116_CAT4_CAT4_ICAT4_CAT4_IXAIS_Drive_I_O 431 K8 DWG TrueView Drawing 119_CAT4_Kinetix_Axis1_Drive_I_O 431 K8 DWG TrueView Drawing 21_CAT4_CMGLX_Comm_Networks 287 K8 DWG TrueView Drawing 21_CAT4_GLX_Comm_Networks <td>Other Safety Devices</td> <td>06 CAT4 Light Curtain SensaGuard</td> <td>352 KB</td> <td>DWG TrueView Drawing</td>	Other Safety Devices	06 CAT4 Light Curtain SensaGuard	352 KB	DWG TrueView Drawing
Guard I/0 Module Wiring 108_CAT4_1791D5_IB8XO84 400 K8 DWG TrueView Drawing Guard I/0 Module Wiring 110_CAT4_1791D5_IB12 360 K8 DWG TrueView Drawing 111_CAT4_1791D5_IB12 300 K8 DWG TrueView Drawing 111_CAT4_1791D5_IB16 360 K8 DWG TrueView Drawing 111_CAT4_1791E5_IB16A 360 K8 DWG TrueView Drawing 112_CAT4_1791E5_IB8XOBV4 370 K8 DWG TrueView Drawing 113_CAT4_1732D5_IB8XOBV4 378 K8 DWG TrueView Drawing 114_CAT4_1732D5_IB8XOBV4 378 K8 DWG TrueView Drawing 115_CAT4_1732D5_IB8XOBV4 378 K8 DWG TrueView Drawing 116_CAT4_1732D5_IB8XOBV4 378 K8 DWG TrueView Drawing 116_CAT4_1732D5_IB8XOBV4 328 K8 DWG TrueView Drawing 116_CAT4_1734L5Acity_Axis1_Drive_I_O 430 K8 DWG TrueView Drawing 121_CAT4_Kinetix_Axis2_Drive_I_O 431 K8 DWG TrueView Drawing 221_CAT4_GAX_Digital_Inputs 360 K8		07 CAT4 1791D5 IB16	386 KB	DWG TrueView Drawing
Guard I/0 Module Wiring 00°_CAT4_1791D5_IB8XO88 369 KB DWG TrueView Drawing Guard I/0 Module Wiring 11_CAT4_1791D5_IB4XOW4 370 KB DWG TrueView Drawing 12_CAT4_1791E5_IB16 360 KB DWG TrueView Drawing 13_CAT4_1791E5_IB16 360 KB DWG TrueView Drawing 14_CAT4_1791E5_IB3 308 KB DWG TrueView Drawing 15_CAT4_1732D5_IB8 308 KB DWG TrueView Drawing 16_CAT4_1734_IB85_OB85 336 KB DWG TrueView Drawing 16_CAT4_Kinetix_Axis0_Drive_I_O 429 KB DWG TrueView Drawing 19_CAT4_Kinetix_Axis2_Drive_I_O 430 KB DWG TrueView Drawing 20_CAT4_CMGLX_Comm_Networks 287 KB DWG TrueView Drawing 21_CAT4_CMGLX_Comm_Networks 287 KB DWG TrueView Drawing 22_CAT4_GLX_COmm_Networks 296 KB DWG TrueView Drawing 22_CAT4_CMGLX_Digita_Inputs 360 KB DWG TrueView Drawing 22_CAT4_GLX_Digita_Outputs 360 KB DWG TrueView Drawing 22_CAT4_GLX_Digita_Outputs 360 KB DWG TrueView Drawing 22_CAT4_GLX_Digita_Outputs 360 KB DWG TrueView Drawing 23_CAT4_CMGLX_Digita_Outputs 360 KB			400 KB	DWG TrueView Drawing
Guard I/0 Module Wiring 10_CAT4_1791D5_IB12 360 KB DWG TrueView Drawing Guard I/0 Module Wiring 11_CAT4_1791D5_IB4XOW4 370 KB DWG TrueView Drawing 12_CAT4_1791E5_IB16 360 KB DWG TrueView Drawing 13_CAT4_1791E5_IB4 378 KB DWG TrueView Drawing 14_CAT4_1732D5_IB8XO8V4 378 KB DWG TrueView Drawing 14_CAT4_1732D5_IB8XO8V4 378 KB DWG TrueView Drawing 15_CAT4_1732D5_IB8XO8V4 352 KB DWG TrueView Drawing 15_CAT4_1732D5_IB8XO8V4 352 KB DWG TrueView Drawing 16_CAT4_1732D5_IB8XO8V4 352 KB DWG TrueView Drawing 16_CAT4_1734_IB85_O885 336 KB DWG TrueView Drawing 16_CAT4_Linetix_Axis1_Drive_I_O 429 KB DWG TrueView Drawing 19_CAT4_Kinetix_Axis2_Drive_I_O 430 KB DWG TrueView Drawing 20_CAT4_CMCLX_Comm_Networks 237 KB DWG TrueView Drawing 21_CAT4_CMCLX_Comm_Networks 296 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 360 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 335 KB D		09 CAT4 1791D5 IB8XOB8	369 KB	DWG TrueView Drawing
Guard I/0 Module Wiring 11_CAT4_1791D5_IB4XOW4 370 KB DWG TrueView Drawing 12_CAT4_1791E5_IB16 360 KB DWG TrueView Drawing 13_CAT4_1791E5_IB16 308 KB DWG TrueView Drawing 14_CAT4_1732D5_IB8 308 KB DWG TrueView Drawing 15_CAT4_1732D5_IB8X0BV4 378 KB DWG TrueView Drawing 16_CAT4_1732D5_IB8X0BV4 352 KB DWG TrueView Drawing 16_CAT4_1734_IB85_0B85 336 KB DWG TrueView Drawing 16_CAT4_Kinetix_Axis0_Drive_I_O 429 KB DWG TrueView Drawing 18_CAT4_Kinetix_Axis1_Drive_I_O 430 KB DWG TrueView Drawing 20_CAT4_PowerFlex_Drive_I_O 431 KB DWG TrueView Drawing 21_CAT4_CMGLX_Comm_Networks 287 KB DWG TrueView Drawing 22_CAT4_Kinetix_Axis2_Drive_I_O 431 KB DWG TrueView Drawing 21_CAT4_CMGLX_Comm_Networks 286 KB DWG TrueView Drawing 22_CAT4_GCG_CMLX_Sofety_Inputs 137 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 364 KB DWG TrueView Drawing 22_CAT4_SG600_CMLX_Safety_Inputs 137 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Dr		10 CAT4 1791D5 IB12	360 KB	DWG TrueView Drawing
12_CAT4_1791E5_IB16 360 K8 DWG TrueView Drawing 13_CAT4_1791E5_IB8XOBV4 378 K8 DWG TrueView Drawing 14_CAT4_17325_IB8 308 K8 DWG TrueView Drawing 15_CAT4_17325_IB8XOBV4 352 K8 DWG TrueView Drawing 16_CAT4_1734_IB85_OB85 336 K8 DWG TrueView Drawing 16_CAT4_Kinetix_Axis0_Drive_I_O 429 K8 DWG TrueView Drawing 19_CAT4_Kinetix_Axis2_Drive_I_O 430 K8 DWG TrueView Drawing 20_CAT4_PowerFlex_Drive_I_O 430 K8 DWG TrueView Drawing 21_CAT4_GLX_Comm_Networks 287 K8 DWG TrueView Drawing 22_CAT4_GLX_Dom_Networks 296 K8 DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 360 K8 DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 360 K8 DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 K8 DWG TrueView Drawing 24_CAT	Guard I/O Module Wiring	11 CAT4 1791D5 IB4XOW4	370 KB	DWG TrueView Drawing
Safety Controller Network Drawings 13_CAT4_1791ES_IB8XO8V4 378 KB DWG TrueView Drawing Drive I/0 14_CAT4_1732D5_IB8 308 KB DWG TrueView Drawing Drive I/0 16_CAT4_1732D5_IB8XOBV4 352 KB DWG TrueView Drawing Drive I/0 16_CAT4_1734_IB85_O885 336 KB DWG TrueView Drawing Drive I/0 18_CAT4_Kinetix_Axis0_Drive_I_O 429 KB DWG TrueView Drawing 20_CAT4_Kinetix_Axis1_Drive_I_O 430 KB DWG TrueView Drawing 20_CAT4_PowerFlex_Drive_I_O 292 KB DWG TrueView Drawing 21_CAT4_CMGLX_Comm_Networks 287 KB DWG TrueView Drawing 22_CAT4_CMGLX_Comm_Networks 296 KB DWG TrueView Drawing 22_CAT4_GAT_Ocom_Networks 296 KB DWG TrueView Drawing 22_CAT4_GAT_GCOM_Networks 296 KB DWG TrueView Drawing 22_CAT4_GAT_Digital_Inputs 360 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_CMGLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Draw		12 CAT4 1791ES IB16	360 KB	DWG TrueView Drawing
14_CAT4_1732D5_I88 308 KB DWG TrueView Drawing 15_CAT4_1732D5_I88XOBV4 352 KB DWG TrueView Drawing 16_CAT4_1734_IB85_OB85 336 KB DWG TrueView Drawing 17_CAT4_Kinetix_Axis0_Drive_I_O 429 KB DWG TrueView Drawing 18_CAT4_Kinetix_Axis1_Drive_I_O 430 KB DWG TrueView Drawing 19_CAT4_Kinetix_Axis2_Drive_I_O 431 KB DWG TrueView Drawing 20_CAT4_PowerFlex_Drive_I_O 431 KB DWG TrueView Drawing 21_CAT4_GCC_Comm_Networks 287 KB DWG TrueView Drawing 21_CAT4_GCC_Comm_Networks 296 KB DWG TrueView Drawing 21_CAT4_GCC_Comm_Networks 296 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 360 KB DWG TrueView Drawing 22_CAT4_SG600_CMLX_Safety_Inputs 137 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GCAT4_S6600_CMLX_Safety_Outputs 329 KB DWG TrueView Drawing 23_CAT4_GCAT4_SG600_CMLX_Safety_Outputs 329 KB DWG TrueView D		13 CAT4 1791ES IB8XOBV4	378 KB	DWG TrueView Drawing
Safety Controller Network Drawings 52 CAT4_1732D5_JB8XOBV4 352 KB DWG TrueView Drawing Drive I/0 16_CAT4_1734_B85_O885 336 KB DWG TrueView Drawing Drive I/0 18_CAT4_Kinetix_Axis0_Drive_I_O 429 KB DWG TrueView Drawing 20_CAT4_Kinetix_Axis1_Drive_I_O 430 KB DWG TrueView Drawing 21_CAT4_Kinetix_Axis2_Drive_I_O 431 KB DWG TrueView Drawing 22_CAT4_PowerFlex_Drive_I_O 292 KB DWG TrueView Drawing 21_CAT4_GLX_Comm_Networks 286 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 366 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 329 KB DWG TrueView Drawing 23_CAT4_GLX_Panel_Layout 2,944 KB DWG TrueView Drawing 24_CAT4_Ethernet_Switch 286 KB DWG TrueView Drawing 25_CAT4_GLX_Panel_Layout 2,944 KB DWG TrueView Drawing 25		14 CAT4 1732D5 IB8	308 KB	DWG TrueView Drawing
Init CAT4_1734_IB85_0885 336 KB DWG TrueView Drawing Drive I/0 Init CAT4_Kinetix_Axis0_Drive_I_0 429 KB DWG TrueView Drawing Drive I/0 Init CAT4_Kinetix_Axis1_Drive_I_0 430 KB DWG TrueView Drawing Drive I/0 Init CAT4_Kinetix_Axis2_Drive_I_0 431 KB DWG TrueView Drawing Drive I/0 Init CAT4_Kinetix_Axis2_Drive_I_0 431 KB DWG TrueView Drawing 20_CAT4_PowerFlex_Drive_I_0 292 KB DWG TrueView Drawing 21_CAT4_GLX_Comm_Networks 287 KB DWG TrueView Drawing 21_CAT4_GLX_Digital_Inputs 286 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 360 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_CMGLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_CMGLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_CMGLX_Panel_Layout 286 KB DWG TrueView Drawing 24_CAT4_GLX_Digital_Outputs 320 KB DWG TrueView Drawing		15 CAT4 1732D5 IB8XOBV4	352 KB	DWG TrueView Drawing
Drive I/017_CAT4_Kinetix_Axis0_Drive_I_O429 KBDWG TrueView DrawingDrive I/018_CAT4_Kinetix_Axis1_Drive_I_O430 KBDWG TrueView Drawing20_CAT4_PowerFlex_Drive_I_O292 KBDWG TrueView Drawing21_CAT4_CMGLX_Comm_Networks287 KBDWG TrueView Drawing21_CAT4_GLX_Comm_Networks296 KBDWG TrueView Drawing22_CAT4_GLX_Comm_Networks296 KBDWG TrueView Drawing22_CAT4_GLX_Comm_Networks296 KBDWG TrueView Drawing22_CAT4_GLX_Digital_Inputs364 KBDWG TrueView Drawing22_CAT4_GLX_Digital_Inputs360 KBDWG TrueView Drawing23_CAT4_GLX_Digital_Outputs363 KBDWG TrueView Drawing23_CAT4_GLX_Digital_Outputs363 KBDWG TrueView Drawing23_CAT4_GLX_Digital_Outputs360 KBDWG TrueView Drawing23_CAT4_GLX_Digital_Outputs360 KBDWG TrueView Drawing24_CAT4_Ethernet_Switch286 KBDWG TrueView Drawing25_CAT4_GLX_Panel_Layout2,803 KBDWG TrueView DrawingPanel Layout Drawings25_CAT4_GLX_Panel_Layout3,320 KB24_CAT4_SG600_CMLX_Panel_Layout3,320 KBDWG TrueView Drawing		16 CAT4 1734 IB85 OB85	336 KB	DWG TrueView Drawing
Drive I/0 118_CAT4_Kinetix_Axis1_Drive_I_0 430 K8 DWG TrueView Drawing Drive I/0 19_CAT4_Kinetix_Axis2_Drive_I_0 431 K8 DWG TrueView Drawing 20_CAT4_PowerFlex_Drive_I_0 292 K8 DWG TrueView Drawing 21_CAT4_CMGLX_Comm_Networks 287 K8 DWG TrueView Drawing 21_CAT4_GLX_Comm_Networks 287 K8 DWG TrueView Drawing 21_CAT4_GLX_Comm_Networks 296 K8 DWG TrueView Drawing 21_CAT4_SG600_CMLX_Comm_Networks 296 K8 DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 364 K8 DWG TrueView Drawing 22_CAT4_GG600_CMLX_Safety_Inputs 137 K8 DWG TrueView Drawing 22_CAT4_GG600_CMLX_Safety_Inputs 363 K8 DWG TrueView Drawing 23_CAT4_CMGLX_Digital_Outputs 360 K8 DWG TrueView Drawing 23_CAT4_GG00_CMLX_Safety_Outputs 329 K8 DWG TrueView Drawing 23_CAT4_GG00_CMLX_Safety_Outputs 329 K8 DWG TrueView Drawing 23_CAT4_SG600_CMLX_Safety_Outputs 329 K8 DWG TrueView Drawing 23_CAT4_GG00_CMLX_Safety_Outputs 329 K8 DWG TrueView Drawing 25_CAT4_GG00_CMLX_Panel_Layout 2,803 K8 DWG TrueView Drawing <t< td=""><td></td><td>17 CAT4 Kinetix Axis0 Drive I O</td><td>429 KB</td><td>DWG TrueView Drawing</td></t<>		17 CAT4 Kinetix Axis0 Drive I O	429 KB	DWG TrueView Drawing
Drive I/0 19_CAT4_Kinetix_Axis2_Drive_I_O 431 KB DWG TrueView Drawing 20_CAT4_PowerFlex_Drive_I_O 292 KB DWG TrueView Drawing 21_CAT4_CMGLX_Comm_Networks 287 KB DWG TrueView Drawing 21_CAT4_GLX_Comm_Networks 296 KB DWG TrueView Drawing 21_CAT4_SG600_CMLX_Comm_Networks 716 KB DWG TrueView Drawing 22_CAT4_SG600_CMLX_Comm_Networks 366 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 366 KB DWG TrueView Drawing 22_CAT4_SG600_CMLX_Safety_Inputs 137 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_SG600_CMLX_Safety_Outputs 329 KB DWG TrueView Drawing 23_CAT4_SG600_CMLX_Safety_Outputs 329 KB DWG TrueView Drawing 23_CAT4_SG600_CMLX_Safety_Outputs 329 KB DWG TrueView Drawing 24_CAT4_Ethernet_Switch 286 KB DWG TrueView Drawing 25_CAT4_GLX_Panel_Layout 2,904 KB DWG TrueView Drawing 25_CAT4_SG600_CMLX_Panel_Layout 3,320 KB DWG TrueView Drawing		18 CAT4 Kinetix Axis1 Drive I O	430 KB	DWG TrueView Drawing
Safety Controller Network Drawing 20_CAT4_PowerFlex_Drive_I_O 292 KB DWG TrueView Drawing Safety Controller Network Drawings 21_CAT4_CMGLX_Comm_Networks 287 KB DWG TrueView Drawing Safety Controller Network Drawings 21_CAT4_GLX_Comm_Networks 296 KB DWG TrueView Drawing Safety Controller Network Drawings 21_CAT4_SG600_CMLX_Comm_Networks 716 KB DWG TrueView Drawing Safety Controller I/O 22_CAT4_GLX_Digital_Inputs 364 KB DWG TrueView Drawing Safety Controller I/O 23_CAT4_SG600_CMLX_Safety_Inputs 137 KB DWG TrueView Drawing Safety Controller I/O 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing Safety Controller I/O 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing Safety Controller I/O 23_CAT4_GLX_Digital_Outputs 329 KB DWG TrueView Drawing Safety Controller I/O 23_CAT4_GLX_Digital_Outputs 329 KB DWG TrueView Drawing Safety Controller I/O 23_CAT4_GLX_Digital_Outputs 329 KB DWG TrueView Drawing Safety Controller I/O 23_CAT4_GLX_Digital_Outputs 329 KB DWG TrueView Drawing Safety Controller I/O 23_CAT4_GLX_Digital_Outputs	Drive I/O ———	19 CAT4 Kinetix Axis2 Drive I O	431 KB	DWG TrueView Drawing
Safety Controller Network Drawings 21_CAT4_CMGLX_Comm_Networks 287 KB DWG TrueView Drawing Safety Controller Network Drawings 21_CAT4_GLX_Comm_Networks 296 KB DWG TrueView Drawing 21_CAT4_SG600_CMLX_Comm_Networks 716 KB DWG TrueView Drawing 22_CAT4_CMGLX_Digital_Inputs 364 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 360 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Outputs 363 KB DWG TrueView Drawing Safety Controller I/0 23_CAT4_GLX_Digital_Outputs 363 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing Ethernet Switch Wiring 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 25_CAT4_GLX_Panel_Layout 2,944 KB DWG TrueView Drawing 25_CAT4_GCLX_Panel_Layout 2,803 KB DWG TrueView Drawing 25_CAT4_SG600_CMLX_Panel_Layout 3,320 KB DWG TrueView Drawing	l	20 CAT4 PowerFlex Drive I O	292 KB	DWG TrueView Drawing
Safety Controller Network Drawings 21_CAT4_GLX_Comm_Networks 296 KB DWG TrueView Drawing 21_CAT4_SG600_CMLX_Comm_Networks 716 KB DWG TrueView Drawing 22_CAT4_CMGLX_Digital_Inputs 364 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 360 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 360 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Outputs 363 KB DWG TrueView Drawing 23_CAT4_CMGLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Panel_Layout 296 KB DWG TrueView Drawing 24_CAT4_Ethernet_Switch 286 KB DWG TrueView Drawing 25_CAT4_CMGLX_Panel_Layout 2,803 KB DWG TrueView Drawing 25_CAT4_S6600_CMLX_Panel_Layout 3,320 KB DWG TrueView Drawing		21 CAT4 CMGLX Comm Networks	287 KB	DWG TrueView Drawing
21_CAT4_5G600_CMLX_Comm_Networks 716 KB DWG TrueView Drawing 22_CAT4_CMGLX_Digital_Inputs 364 KB DWG TrueView Drawing 22_CAT4_GLX_Digital_Inputs 360 KB DWG TrueView Drawing 22_CAT4_SG600_CMLX_Safety_Inputs 137 KB DWG TrueView Drawing 23_CAT4_CMGLX_Digital_Outputs 363 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 329 KB DWG TrueView Drawing 24_CAT4_Ethernet_Switch 286 KB DWG TrueView Drawing 25_CAT4_CMGLX_Panel_Layout 2,803 KB DWG TrueView Drawing 25_CAT4_S6600_CMLX_Panel_Layout 3,320 KB DWG TrueView Drawing	Safety Controller Network Drawings	21 CAT4 GLX Comm Networks	296 KB	DWG TrueView Drawing
Safety Controller I/0 22_CAT4_CMGLX_Digital_Inputs 364 KB DWG TrueView Drawing Safety Controller I/0 22_CAT4_GLX_Digital_Inputs 360 KB DWG TrueView Drawing Safety Controller I/0 22_CAT4_GLX_Digital_Outputs 137 KB DWG TrueView Drawing Safety Controller I/0 23_CAT4_CMGLX_Digital_Outputs 360 KB DWG TrueView Drawing Safety Controller I/0 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing Safety Controller I/0 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing Safety Controller I/0 23_CAT4_GLX_Digital_Outputs 329 KB DWG TrueView Drawing Safety Controller I/0 23_CAT4_SG600_CMLX_Safety_Outputs 329 KB DWG TrueView Drawing Safety Controller I/0 24_CAT4_Ethernet_Switch 286 KB DWG TrueView Drawing Safety Controller I/0 25_CAT4_CMGLX_Panel_Layout 2,904 KB DWG TrueView Drawing Panel Layout Drawings 25_CAT4_GLX_Panel_Layout 2,803 KB DWG TrueView Drawing Safety Controller I/0 25_CAT4_SG600_CMLX_Panel_Layout 3,320 KB DWG TrueView Drawing	y	21 CAT4 SG600 CMLX Comm Networks	716 KB	DWG TrueView Drawing
Safety Controller I/0 22_CAT4_GLX_Digital_Inputs 360 KB DWG TrueView Drawing Safety Controller I/0 22_CAT4_SG600_CMLX_Safety_Inputs 137 KB DWG TrueView Drawing Safety Controller I/0 23_CAT4_CMGLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_SG600_CMLX_Safety_Outputs 329 KB DWG TrueView Drawing 23_CAT4_SG600_CMLX_Safety_Outputs 329 KB DWG TrueView Drawing 24_CAT4_Ethernet_Switch 286 KB DWG TrueView Drawing 25_CAT4_CMGLX_Panel_Layout 2,944 KB DWG TrueView Drawing Panel Layout Drawings 25_CAT4_GGAN_Panel_Layout 2,803 KB DWG TrueView Drawing		22 CAT4 CMGLX Digital Inputs	364 KB	DWG TrueView Drawing
Safety Controller I/0 22_CAT4_SG600_CMLX_Safety_Inputs 137 KB DWG TrueView Drawing Safety Controller I/0 23_CAT4_CMGLX_Digital_Outputs 363 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_SG600_CMLX_Safety_Outputs 360 KB DWG TrueView Drawing 23_CAT4_SG600_CMLX_Safety_Outputs 329 KB DWG TrueView Drawing 24_CAT4_Ethernet_Switch 286 KB DWG TrueView Drawing 25_CAT4_CMGLX_Panel_Layout 2,944 KB DWG TrueView Drawing Panel Layout Drawings 25_CAT4_SG600_CMLX_Panel_Layout 2,803 KB DWG TrueView Drawing		22 CAT4 GLX Digital Inputs	360 KB	DWG TrueView Drawing
Safety Controller I/0 23_CAT4_CMGLX_Digital_Outputs 363 KB DWG TrueView Drawing 23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_SG600_CMLX_Safety_Outputs 329 KB DWG TrueView Drawing 24_CAT4_Ethernet_Switch 286 KB DWG TrueView Drawing 25_CAT4_CMGLX_Panel_Layout 2,944 KB DWG TrueView Drawing 25_CAT4_GLX_Panel_Layout 2,803 KB DWG TrueView Drawing 25_CAT4_SG600_CMLX_Panel_Layout 3,320 KB DWG TrueView Drawing 3,320 KB DWG TrueView Dr		22 CAT4 SG600 CMLX Safety Inputs	137 KB	DWG TrueView Drawing
23_CAT4_GLX_Digital_Outputs 360 KB DWG TrueView Drawing 23_CAT4_SG600_CMLX_Safety_Outputs 329 KB DWG TrueView Drawing 24_CAT4_Ethernet_Switch 286 KB DWG TrueView Drawing 25_CAT4_GLX_Panel_Layout 2,944 KB DWG TrueView Drawing Panel Layout Drawings 25_CAT4_SG600_CMLX_Panel_Layout 2,803 KB DWG TrueView Drawing 25_CAT4_SG600_CMLX_Panel_Layout 3,320 KB DWG TrueView Drawing	Safety Controller I/O	23 CAT4 CMGLX Digital Outputs	363 KB	DWG TrueView Drawing
Ethernet Switch Wiring 323_CAT4_SG600_CMLX_Safety_Outputs 329 KB DWG TrueView Drawing Ethernet Switch Wiring 24_CAT4_Ethernet_Switch 286 KB DWG TrueView Drawing 25_CAT4_CMGLX_Panel_Layout 2,944 KB DWG TrueView Drawing Panel Layout Drawings 25_CAT4_GLX_Panel_Layout 2,803 KB DWG TrueView Drawing 25_CAT4_SG600_CMLX_Panel_Layout 3,320 KB DWG TrueView Drawing		23 CAT4 GLX Digital Outputs	360 KB	DWG TrueView Drawing
Ethernet Switch Wiring 24_CAT4_Ethernet_Switch 286 KB DWG TrueView Drawing 25_CAT4_CMGLX_Panel_Layout 2,944 KB DWG TrueView Drawing Panel Layout Drawings 25_CAT4_GLX_Panel_Layout 2,803 KB DWG TrueView Drawing 25_CAT4_SG600_CMLX_Panel_Layout 3,320 KB DWG TrueView Drawing		23 CAT4 5G600 CMLX Safety Outputs	329 KB	DWG TrueView Drawing
Panel Layout Drawings 25_CAT4_CMGLX_Panel_Layout 2,944 KB DWG TrueView Drawing 25_CAT4_GLX_Panel_Layout 2,803 KB DWG TrueView Drawing 3,320 KB DWG TrueView	Ethernet Switch Wiring ——	24 CAT4 Ethernet Switch	286 KB	DWG TrueView Drawing
Panel Layout Drawings 25_CAT4_GLX_Panel_Layout 2,803 KB DWG TrueView Drawing 25_CAT4_SG600_CMLX_Panel_Layout 3,320 KB DWG TrueView Drawing		25 CAT4 CMGLX Panel Lavout	2,944 KB	DWG TrueView Drawing
25_CAT4_5G600_CMLX_Panel_Layout 3,320 KB DWG TrueView Drawing	Panel Layout Drawings	25 CAT4 GLX Panel Layout	2,803 KB	DWG TrueView Drawing
		25_CAT4_5G600_CMLX_Panel_Layout	3,320 KB	DWG TrueView Drawing

For this example, the CAT4\DWG directory was chosen. A number of drawings for different devices, I/O and controllers, are included.

3. Copy desired drawing files into a project folder.

😑 C:\Project Drawings\RobotCell				- 🗆 ×
Eile Edit View Favorites Tools Help				1
🛛 🚱 Back 🔹 💮 🚽 🏂 🔎 Search 🧯		國國	× ∽	
Address C:\Project Drawings\RobotCell			•	🔁 Go
Name 🔺	Size	Туре	Date Modified	
00_CAT4_Title_Sheet.DWG	731 KB	DWG File	1/26/2011 11:33 AM	
04_CAT4_GLX_120VAC_Power.DWG	325 KB	DWG File	3/10/2010 4:18 PM	
6_CAT4_Light_Curtain_SensaGuard.DWG	352 KB	DWG File	3/10/2010 3:58 PM	
07_CAT4_1791D5_IB16.DWG	386 KB	DWG File	3/10/2010 4:25 PM	
08_CAT4_1791D5_IB8XOBV4.DWG	400 KB	DWG File	3/10/2010 4:26 PM	
09_CAT4_1791D5_IB8XOB8.DWG	369 KB	DWG File	3/10/2010 4:27 PM	
🖬 10_CAT4_1791D5_IB12.DWG	360 KB	DWG File	3/10/2010 4:27 PM	
11_CAT4_1791D5_IB4XOW4.DWG	370 KB	DWG File	3/10/2010 4:27 PM	
12_CAT4_1791E5_IB16.DWG	360 KB	DWG File	3/10/2010 3:59 PM	
13 CAT4 1791ES IB8XOBV4.DWG	378 KB	DWG File	3/10/2010 3:59 PM	
14 CAT4 1732D5 IB8.DWG	308 KB	DWG File	3/10/2010 3:59 PM	
15 CAT4 1732D5 IB8XOBV4.DWG	352 KB	DWG File	3/10/2010 3:59 PM	
21 CAT4 GLX Comm Networks.DWG	296 KB	DWG File	3/10/2010 4:29 PM	
22 CAT4 GLX Digital Inputs.DWG	360 KB	DWG File	3/10/2010 4:00 PM	
23 CAT4 GLX Digital Outputs.DWG	360 KB	DWG File	3/10/2010 4:00 PM	
24 CAT4 Ethernet Switch.DWG	286 KB	DWG File	1/18/2011 12:20 PM	
25_CAT4_GLX_Panel_Layout.DWG	2,803 KB	DWG File	3/11/2010 9:04 AM	

The Guard I/O module drawings include a wide variety of safety devices but not all on each module drawing. So it is recommended you copy most of the Guard I/O module drawings into your project.

For this Robot Cell example, GuardLogix power, networks, I/O, and layout drawings were gathered along with light curtain and Guard I/O drawings.

Edit Project Drawing Set

These steps provide general instructions for how to maximize the use of the toolkit's drawing library in creating a safety system layout and wiring drawing set. AutoCAD or AutoCAD Electrical software is recommended to take full advantage of the drawing editing steps included in this chapter and the library's device wiring references and attributes that move with the devices as you edit your project drawing set. Some of the initial project creation steps are illustrated using AutoCAD Electrical software, but most are generic and can be used with a variety of software drawing packages.

- 1. Open your drawing software.
- 2. Create and name your new project.

Create New Project	×
Name:	
RobotCell	
Location: My Projects	Browse
Create Folder with Project Name	010430
\My_Projects\RobotCell\RobotCell.wdp	
Copy Settings from Project File:	
VProject_Templates\My_Template.wdp	Browse
Descriptions	
OK - Properties OK Cancel Help	

3. Add and select the toolkit library drawings you copied in the previous section.

Look in:	RobotCell					▼ Tools ▼
History My Documents Fovorites Costop	Name	Size Type 731 KB AutoC 325 KB AutoC 335 KB AutoC 336 KB AutoC 306 KB AutoC 307 KB AutoC 308 KB AutoC 308 KB AutoC 306 KB AutoC 2,803 KB AutoC	Drawing Drawing		Coce Coce Coce Coce Coce Coce Coce Coce	
	File name: Files of type: Drawings (*.dwg)			roject Mana		Add Cancel

4. Open the original Title Sheet drawing and edit the drawing list and title blocks specific to your applications.





5. Open Drive or Drive Safety Torque Off Wiring Drawings and edit drawings specific to your application.

6. Open your Safety Controller Power Drawing and edit controller connections and edit or add other device power supply connections.





7. Open other Safety Device Drawings and edit drawings specific to your application.

8. Open Guard I/O and/or SmartGuard 600 Safety Input and Output Drawings. Copy and paste safety devices that represent your specific safety I/O configuration from one sheet to another.



This example shows Cat. 4 drawings for a 1791ES-IB16 module and a light curtain device.



9. Open Safety Controller Network and/or Ethernet Switch Drawings and modify your application.



10. Open Panel Layout Drawings and edit drawings specific to your application.

This example shows a GuardLogix System Panel Layout including Guard I/O, Kinetix, PowerFlex, PanelView[™] Plus and power distribution devices.

Considerations for Safety Drawings

The drawings were created with AutoCAD Electrical. The project files are included in the DWG directory. The path references in the project file are the default AutoCAD Electrical installation path.

Some safety input devices, such as Electronic Sensors (Cat. 2 and Cat. 3 only), have safety category restrictions, so they are not included on every category Guard I/O module drawing.

Toolkit drawings for Kinetix, PowerFlex, and Standard drives use bipolar outputs requiring two output channels even in Cat. 2 examples.

Access Other Allen-Bradley® CAD Drawings

Follow these steps to download other Allen-Bradley product CAD drawings.

1. Open your browser and go to <u>http://www.rockwellautomation.com/global/support/select-design-configure.page?</u>.

On the home page, click Product Drawings.

2. Enter the catalog number of the product.



3. Click Submit.

The Configuration Results window opens, showing what documents are available for that catalog number.

ation Results			
Product: 2094-BM01-S			
Description: Module, Axis, 400/460V, 9A IN	IV., Safe Torque Off		
Selected Components			
Selected Components			
Selected Components			
Selected Components Selected Components Catalog Number	Qty	Product Description	
Selected Components Selected Components Catalog Number 2094-BM01-S	Qty 1	Product Description Module, Axis, 400/460V, 9A INV., Safe Torque Off	
Selected Components Selected Components Catalog Number 2094-BM01-S	Qty 1	Product Description Module, Axis, 400/460V, 9A INV., Safe Torque Off	
Selected Components Selected Components Catalog Number 2094-BM01-S	Qty 1	Product Description Module, Axis, 400/460V, 9A INV., Safe Torque Off	

- 4. Click AutoCad Drawing 2D (DXF).
- 5. Download the drawing to a destination of your choice.

Notes:

GuardLogix® Controllers Logic Integration

Introduction

In this chapter, you configure your Guard I/O^{∞} modules using pre-defined configurations, and assemble your safety and faceplate logic by importing pre-configured safety device logic rungs for your GuardLogix Systems.

Before You Begin

Complete your risk assessment and functional specification. Create a bill of materials based on your application needs. Complete your Safety Zone Configuration and Safety Module Configuration worksheets as described in <u>Chapter 2</u>.

Load RSLogix 5000° or Studio 5000° and FactoryTalk° View Machine Edition software on your personal computer or workstation.

We assume you are starting with an existing control application that contains a configured safety controller and communication module to interface with your Guard I/O modules.

TIP The steps in this chapter show a 1756 GuardLogix controller and the 1756 backplane software configuration screens. The 1768 Compact GuardLogix controller configuration is nearly identical, except for the controller and backplane naming. The steps in this chapter also show RSLogix 5000 screen captures, although Studio 5000 configuration screens are very similar.

What You Need

- Software versions to use this toolkit; see <u>Software Requirements on page 11</u>
- Safety Accelerator Toolkit, DVD SAFETY-CL002 or visit the Integrated Architecture* Tools and Resources website at <u>http://www.rockwellautomation.com/global/products-technologies/integrated-architecture/tools/</u> overview.page
- Product manuals:
 - GuardLogix Controllers User Manual, publication <u>1756-UM020</u>
 - Compact GuardLogix Controllers User Manual, publication <u>1768-UM002</u>
 - Compact GuardLogix 5370 Controllers User Manual, publication <u>1769-UM022</u>
 - GuardLogix Controller Systems Safety Reference Manual, publication <u>1756-RM093</u>
 - Guard I/O DeviceNet Safety Modules User Manual, publication <u>1791DS-UM001</u>
 - Guard I/O EtherNet/IP Safety Modules User Manual, publication <u>1791ES-UM001</u>
 - POINT Guard I/O Safety Modules User Manual, publication <u>1734-UM013</u>
 - Logix Common Procedures Programming Manual, publication <u>1756-PM001</u>, if you are not familiar with programming Logix controllers with RSLogix 5000 software

Follow These Steps



Open the GuardLogix Application File

TIP The steps in this chapter show a 1756 GuardLogix controller and the 1756 backplane software configuration screens. The 1768 Compact GuardLogix controller configuration is nearly identical with the exception of the controller and backplane naming. The steps in this chapter also show RSLogix 5000 screen captures, although Studio 5000 configuration screens are very similar.

Follow these steps to access the GuardLogix application file from the toolkit.

- 1. Open your existing GuardLogix controller RSLogix 5000 ACD file.
- 2. Browse to the Guard I/O module configurations in the toolkit and open either the RSLogix 5000 version 16 or version 17 ACD file:
 - GuardIO_Module_Configuration_V16.ACD
 - GuardIO_Module_Configuration_V17.ACD
 - GuardIO_Module_Configuration_V20.ACD



If the toolkit has been loaded onto your personal computer, the hard drive path is C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard[™] Modules.

These application files include pre-configured Guard I/O module configurations based on network and safety category type to assist you in configuring your safety I/O modules.



Configure Your Guard I/O Modules

 IMPORTANT
 The 1756 GuardLogix controller and 1756 communication modules support both Guard I/O EtherNet/IP and DeviceNet modules.

 The 1768 Compact GuardLogix controller and 1768-ENBT communication module support Guard I/O EtherNet/IP safety modules. The 1769-SDN communication module does not support Guard I/O DeviceNet safety modules. However, the 1769-SDN can be used with the 1768 Compact GuardLogix controller for standard DeviceNet communication.

Follow these steps to configure your Guard I/O modules.

- 1. From the I/O Configuration within GuardIO_Module_Configuration_V1*x*.ACD, browse to the Ethernet or DeviceNet communication module with the appropriate safety rating for your application.
- 2. Referring to the Safety Module Configuration worksheets you created in <u>Chapter 2</u>, choose your Guard I/O module to match the catalog number and safety category.

This example shows a 1791ES-IB16 in a Cat. 4 Ethernet application.

3. Right-click the module and choose Copy.



4. Paste the module configuration under the appropriate network in the I/O Configuration of your application file. This example uses an EtherNet/IP network. Yours could be a DeviceNet or EtherNet/IP network.



- 5. To edit module properties for your application, right-click the I/O module and choose Properties.
- 6. Rename the I/O module according to your <u>Fill Out the Safety Module Configuration Worksheet</u>, which you created in <u>Chapter 2</u>.

Module Properties: Safety_Block_IO (1791ES-IB16/A 1.1)					
General [×] Conr	action Safety Module Info Port Configuration Port Diagnostics Input Configuration Test Dutput				
Type: Vendor:	Type: 1791ES-IB16 16 Point 24 VDC Sink Safety Input Vendor: Allen-Bradley				
Parent: Na <u>m</u> e:	Safety_Block_IO [CellGuard1] IP Address: 10 . 10 . 2				
Description:	Safety Network 3338_0429_3FF4 Number: 11/28/2007 1:23:32 212 PM				
Module Defin	A Cruzzal				
Revision: Electronic Ke	1.1 Compatible Module				
Input Data:	Safety Combined Status - Muting				
Output Data:	Test				
	1 10 get				
Status: Offlin	OK Cancel Apply Help				

7. Change the IP Address (EtherNet/IP networks) or Node Address (DeviceNet networks).

8. Check the module definition by clicking Change.

The pre-configured Guard I/O module configurations that you added in steps 1...4 include the settings required to work with the Guard I/O faceplates and AOI instructions.

These required **digital** I/O configuration settings include:

• Set Input Status to 'Combined Status - Muting' for all modules

Aodule Definition		
<u>S</u> eries:	A	
<u>R</u> evision:	1 🔻 1÷	
Electronic <u>K</u> eying:	Compatible Module	•
Input Data:	Safety	-
Input Status:	Combined Status - Muting	•
Output Data:	Test	-
Data Format:	Integer	-

• Set Output Data to 'Combined' for all modules with both safety inputs and outputs

Module Definition		×
<u>S</u> eries: <u>R</u> evision: Electronic Keying:	A 1 Compatible Module	-
Input Data:	Safety	-
Input Status:	Combined Status - Muting	-
Output Data:	Combined	-
Data Format:	Integer	-

• Set Output Data to 'Combined Status' for all modules with only safety outputs

Series: I I Revision: 1 I Electronic Keying: Compatible Module Imput Data Input Data None Imput Status: Output Data: Combined Status Imput Status	Module Definition		<
Input Data None Input Status: Combined Status - Muting Output Data: Combined Status	<u>S</u> eries: <u>R</u> evision: Electronic Kevina:	A 1 1 <u>→</u> Compatible Module	
Input Status: Combined Status - Muting Output Data: Combined Status	Input Data	None	
Output Data: Combined Status	Input Status:	Combined Status - Muting	
	Output Data:	Combined Status	
Data Format: Integer	Data Format:	Integer 🔹	

For analog I/O configuration settings, see the module definition examples below:

Analog	Current and Voltage Unly Modules	Analog	lachometer, Current, and/or Voltage Module
Module Definition	×	Module Definition	×
<u>S</u> eries: <u>R</u> evision: Electronic <u>K</u> eying:	A 1 Compatible Module	Series: Revision: Bectronic Keying:	A 1 Compatible Module
Configured By:	This Controller	Configured By:	This Controller
Input Data:	Safety	Input Data:	Safety
Output Data:	None	Output Data:	Safety-Tachometer
Process Data:	Status-Alarms-Faults	Process Data:	Status-Alarms-Faults
Data Format:	Integer 🗸	Data Format:	Integer 🗨
ОК	Cancel Help	0	Cancel Help

Analog Current and Voltage Only Modules Analog Tachon

For more information on module definitions, refer to these manuals:

- Guard I/O DeviceNet Safety Modules User Manual, publication 1791DS-UM001
- Guard I/O EtherNet/IP Safety Modules User Manual, publication 1791ES-UM001
- POINT Guard I/O Safety Modules User Manual, publication 1734-UM013

9. Repeat these steps for all of the I/O modules in your application.

This example includes an additional module, a 1791ES-IB8XOBV4 module named CellGuard2.



10. Check your Safety Network Numbers (SNN).

IMPORTANT If you have more than one communication bridge module in your application, you must make sure that each subnet that contains Guard I/O modules has a unique Safety Network Number (SNN).

The copy and paste module configuration procedure can create Guard I/O modules with the same SNNs on different bridge modules. Follow steps <u>11</u>...<u>15</u> to create a unique SNN for the Guard I/O modules on each communication bridge module.

11. To change the SNN, right-click the Guard I/O module and choose Properties.

12. In the Module Properties dialog box, click 🔜 next to the SNN field to open the Safety Network Number dialog box.

🔲 Module Proj	perties: Safety_Block_IO (1791ES	-IB16/A 1.1)	
General [×] Con	nection Safety Module Info Port Config	guration Port Diagno	stics Input Configuration Test Output
Type: Vendor:	1791ES-IB16 16 Point 24 VDC Sink Safe Allen-Bradlev	ty Input	
Parent	Safety_Block_IO		
Na <u>m</u> e: Description:		IP <u>A</u> ddress: Safety Network	2228.0429.2554
e computer.		Number:	11/28/2007 1:23:32.212 PM

13. Click Generate to generate a new time-based SNN.

Safety Network Number	×
Format:	
Imme-based 8/4/2004 8:36:16.195 AM	<u>G</u> enerate
C <u>M</u> anual	
1756 Backplane: (Decimal)	
<u>N</u> umber:	
2E80_02EB_5143 (Hex)	Сору
	Paste
OK Cancel	Help

- 14. When the new SNN appears in the Number field, click Copy.
- 15. Paste the new SNN to all other Guard I/O modules under the same communication bridge module.

Create Your Safety Logic Routines

To add the safety routines needed for your application, right-click your SafetyProgram and choose New Routine.

Create routines for each of the safety zones you documented in your Safety Zone Configuration worksheet from <u>Chapter 2</u>. This example shows a single routine named Zone1.

👪 RSLogix 500	0 - Ro	bot_Ce	ell in Safet								
File Edit View	Search	Logic	Communicat								
````	3 %										
	⊨ s ( /	⊣⊢ ⊣ \dd-On	/+  -( )-  -(L								
Offline	-	No For	ces								
No Edits	-	Forces	Disabled								
Path: < < none>											
Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Contro	Patht < (none> Controller Robot_Cell Tasks MainTask SafetyTask SafetyProgram Program Tags MainRoutine Controller Robot_Cell MainTask MainTask Controller Robot_Cell MainTask MainTask Controller Robot_Cell MainTask Controller Robot_Cell Controller Robot_Cell C										

## **Import Your Safety Input Device Logic**

Follow these steps to add safety input logic for each safety input device in each zone.

- 1. Open your safety zone routine.
- 2. Right-click the initial rung and choose Import Rung.



3. Browse to the Safety Device Routines>RSL5k_V16_or_Later, RSL5k_V17_or_Later, or RSL5k_V20_or_Later directory in the toolkit and select the CAT2 or CAT3_CAT4 subdirectory based on your digital input device safety category requirements. Select the Analog subdirectory for your analog input device routines.



If the toolkit has been loaded onto your personal computer, the hard drive path is C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Safety Device Routines\RSL5k_Vxx_or _Later

4. Select the XML file based on the device type of the first input device listed on your first Safety Module Configuration worksheet, and click Import.

a import kungs			_	-		_	
Look in: Recent Places Desktop Libraries Computer Network	CAT3_CAT4 Area_Scanne Cable_Pull_S Electronic_S: EStop_CAT3 Four_Sensor Kinetix_Servy Kinetix_Servy Kinetix_Servy Kinetix_Servy Kinetix_Servy Cutai DoverFlex_D PowerFlex_D Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Cont: Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safety_Safet	er_CAT3_CAT4.L5X witch_CAT3_CAT4.L5X ensor_CAT3.L5X _CAT4.L5X _Bidirectional_Muting_CAT3_i o_Drive_CAT3.L5X o_Drive_CAT3_ISO13849.L5X n_CAT3_CAT4.L5X trive_CAT3_CAT4.L5X trive_CAT3_CAT4.L5X wive_CAT3_CAT4.L5X cAT3_CAT4.L5X cAT3_CAT4.L5X cAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT3_CAT4.L5X CAT	CATA	4.L5X 4.L5X	P		
	File name:	Locking_Switch_CAT3_CAT4	2		 •		Import
	Files containing:	H Rungs			 -	]	Help
	Int <u>o</u> :	Zone1 (SafetyProgram)			-	]	
	Dverwrite Sele	cted Bungs					

ISO 13849-1 requires that manual reset functions must occur on falling edge signals. If compliance with this standard is required, select safety device logic that is followed by the ISO 13849 designation.

5. Type the *ZoneName* from your Safety Zone Configuration worksheet into the tagnames on the Import Configuration dialog box.

r 1	Find: Find Within: Final Name		•	Eind/Replace				
oport C	Content:	Cor	figu					
1	Safetylask SafetyProgram		ingu	Import Name	Operation		Final Name 🛆	1
	Cone1 (Rungs)		_	Cmd_ZoneName_DeviceName_Safet	Create	1	Cmc_ <u>ZoneName_</u> DeviceName_Safety_Unlock 🖉	I
	Tags			Cmd_ZoneName_FaultReset	Use Existing		Cmc_ZoneName_FaultReset	Τ
	Other Components		_1	Cmd_ZoneName_Safety_Test	Create		Cmc_ZoneName_Safety_Test	
- 🛛	Errors/Warnings		_	DeviceName_Motion_Stopped	Create		DeviceName_Motion_Stopped	
		٣	9	ModuleName:I	Undefined		ModuleName:I	
		٣	9	ModuleName:0	Undefined	1	ModuleName:0	
				Sts_ZoneName_DeviceName_InputOK	Create		Sts_ZoneName_DeviceName_Input0K	
			_	Sts_ZoneName_OutputEnable	Create		Sts_ZoneName_DutputEnable	
			_	Wrk_ZoneName_DeviceName_Entry	Create	1	Wik_ZoneName_DeviceName_EntryDelay_Latch	
			_	Wrk_ZoneName_DeviceName_Entry	Create		Wrk_ZoneName_DeviceName_EntryDelay_Time	_
			_	Wrk_ZoneName_DeviceName_Entry	Create	1	Wrk_ZoneName_DeviceName_EntryDelay_Timer	
			_	Wrk_ZoneName_DeviceName_Outp	Create	1	Wrk_ZoneName_DeviceName_OutputEnable_ONS	
				ZoneName_DeviceName	Use Existing		ZoneName DeviceName	

Any 'none' tags listed in the import configuration are used as placeholders for unused tags. Refer to the rung comments for more information.

6. Type the *DeviceName* from your Safety Module Configuration worksheet into the tag names on the Import Configuration dialog box.

	mport Name	Operation		Final Name 🛆	1	Alias	Ŀ
× 🎒	Cmd_ZoneName_FaultRe	Create		Cmd_Zone1_FaultReset			k
* -	Cmd_ZoneName_Safety	Create		Cmd_Zone1_Safety_Test			
-	DeviceName_Motion_Sto	Create		DeviceName_Motion_Stopped			
9	ModuleName:I	Undefined		ModuleName:			
9	ModuleName:0	Undefined		ModuleName:0			1
× 🎒	Sts_ZoneName_DeviceN	Create		Sts_Zone1_DeviceName_InputOK			
*	Sts_ZoneName_OutputEn	Create		Sts_Zone1_OutputEnable			1
× _	Wrk_ZoneName_Device	Create		Wrk_Zone1_DeviceName_EntryDelay_L			
* <b>-</b> )	Wrk_ZoneName_Device	Create		Wrk_Zone1_DeviceName_EntryDelay_Ti			1
*	Wrk_ZoneName_Device	Create		Wrk_Zone1_DeviceName_EntryDelay_Ti	-		
× -	Wrk_ZoneName_Device	Create		Wrk_Zone1_DeviceName_OutputEnable			1
× _	ZoneName_DeviceName	Create		Zone1_LOCKINGSW1			1
						>	
CT Show			NER		1889		1

In addition, for a dual channel analog input logic import, type the *ModuleName* of the Analog Module into the ModuleName_Ch0Ch1_InputStatus tag.

7. Select the ModuleName:I or PtAdapterName:SlotNumber field.

on	figu	re Tag References						
		Import Name	Operation	Final Name	۵	1	Alias	^
×	_)	Cmd_ZoneName_FaultRe	Use Existing	Cmd_Zone1_FaultReset				
×	_1	Cmd_ZoneName_OutputE	Create	Cmd_Zone1_OutputEnable		-		
×	_)	Cmd_ZoneName_SafetyR	Create	Cmd_Zone1_SafetyReset				
×	IJ	ModuleName:I	Undefined	ModuleName:I	-	1		

8. Click the pull-down arrow to browse to the Guard I/O module or Point I/O Ethernet Adapter and Slot number of the module to which this input device is connected.

Some analog input device imports include "Ch0" references that must be updated to specific channel for that input.

igu	re Tag References				
	Import Name	-1	Final Name 🛆	1	
-)	Cmd_ZoneName_FaultReset		Cmd_ZoneName_FaultReset		
-1	ModuleName_Ch0FreqUnder1Hz		ModuleName_Ch0FreqUnder1Hz		
-PJ	ModuleName_Ch0HMITachReset		ModuleName_Ch0HMITachReset		
]	ModuleName_OSF_ResetCh0Tach		ModuleName_OSF_Reset <b>Ch0</b> Tach		
-)	OSF_Internal_ZoneName_DeviceName		OSF_Internal_ZoneName_DeviceName		
IJ	PtAdapterName:1:1		PtAdapterName:1:1		
IJ	PtAdapterName:1:0		PtAdapterName:1:0		
		import Name           Import Name           Cmd_ZoneName_FaultReset           ModuleName_Ch0FreqUnder1Hz           ModuleName_Ch0HMITachReset           ModuleName_Ch0HMITachReset           ModuleName_OSF_ResetCh0Tach           OSF_Internal_ZoneName_DeviceName           PtAdapterName:1:1           PtAdapterName:1:0	igure Tag References       Import Name     Import Name       Import Name_Ch0FreqUnder1Hz     Import Name_Ch0HMITachReset       ModuleName_Ch0HMITachReset     Import Name_Ch0HMITachReset       ModuleName_OSF_ResetCh0Tach     Import Name_Ch0HMITachReset       Import Name_OSF_ResetCh0Tach     Import Name_Ch0HMITachReset	igure Tag References         Import Name       import Name         Import Name       import Name         Import Name       import Name         Import Name       import Name         Import Name       import Name_FaultReset         Import Name_Ch0FreqUnder1Hz       ModuleName_Ch0FreqUnder1Hz         Import Name_Ch0HMITachReset       ModuleName_Ch0HMITachReset         Import Name_OSF_ResetCh0Tach       ModuleName_OSF_ResetCh0Tach         Import Name_DeviceName       OSF_Internal_ZoneName_DeviceName         Import Name:1:1       Import PtAdapterName:1:1         Import Name:1:0       Import Name:1:0	import Name       import Name

9. Double-click the Guard I/O module input tag.

Con	figu	re Tag References								
		Import Name		Operation		Final Name	۵	1	Alias	^
×	_)	Cmd_ZoneName_F	aultRe	Use Existing		Cmd_Zone1_FaultReset		-		
×	-9	Cmd_ZoneName_0	utputE	Create		Cmd_Zone1_OutputEnable				
×	P)	Cmd_ZoneName_S	afetyR	Create		Cmd_Zone1_SafetyReset				
×	1	ModuleName:I		Undefined		ModuleName:I	-			
۲	1	ModuleName:0	Name	•			Data Type			~
×	]	Sts_ZoneName_D	₽ +-Ce	ellGuard1:I			AB:1791ES_I	316	Safet	y5:l
×	_1	Sts_ZoneName_D	¶∓-Ce	ellGuard1:O	-	AB:1791		316:	0:0	

10. If the input device has a *ModuleName:O* output tag, select the *ModuleName:O* field.

or	figu	re Tag References							
1		Import Name	Operation		Final Name	Δ		Alias	^
×	_	Cmd_ZoneName_FaultRe	Create		Cmd_Zone1_FaultReset				
×		Cmd_ZoneName_Safety	Create		Cmd_Zone1_Safety_Test				
		DeviceName_Motion_Sto	Create		DeviceName_Motion_Stopped				
×		ModuleName:I	Use Existing	Ū	CellGuard1:I				
×		ModuleName:0	Use Existing	E	CellGuard1:0	-	•••		

- 11. Click the pull-down arrow to browse to the Guard I/O module to which this input device is connected.
- 12. Double-click the Guard I/O module output tag.

	Import Name	Operation		Final Name	Δ	1	Alias	^
*	Cmd_ZoneName_FaultRe	Create		Cmd_Zone1_FaultReset				
× 🎒	Cmd_ZoneName_Safety	Create		Cmd_Zone1_Safety_Test				
-	DeviceName_Motion_Sto	Create		DeviceName_Motion_Stoppe	ed			
× •	ModuleName:I	Use Existing	E	CellGuard1:I				
× •	ModuleName:0	Use Existing	E	CellGuard1:0	•			
* 9	Sts_ZoneName_D Nam	e		-	Data Type			
× _	Sts_ZoneName_C	ellGuard1:I			AB:1791ES_I	316	Safet	y5:
*	Wrk_ZoneName_ 9 +-0	ellGuard1:0			AB:1791ES_I	316:	O:0	_
× P	Wrk ZoneName	ellGuard2:1	-		AB:1791ES I	38X(	OB8_S	af

13. Click OK to complete the import.

		Import Name	Operation	Final Name 🛆	1	Alias	^
×	9	Cmd_ZoneName_FaultRe	Create	Cmd_Zone1_FaultReset			
×	°)	Cmd_ZoneName_Safety	Create	Cmd_Zone1_Safety_Test			
×	9	DeviceName_Motion_Sto	Create	LOCKINGSW1_Motion_Stopped			
×	ŋ	ModuleName:I	Use Existing	CellGuard1:I			
×	9	ModuleName:0	Use Existing	CellGuard1:0			
×	9	Sts ZeeeName_Device	Create	Sts_Zopoel_LOCKINGSW1_Dutknab			
×	-	ZoneName_DeviceName	Create	Zone1_LOCKINGSW1			
						>	
				OK Cancel		Help	

# 14. Review the imported rung comments on the next page to understand the general operation and configuration details.

	This Safety Logic Example should only be used and applied in accordance with the Safety Concepts and Requirements covered in the GuardLogix Controller Systems Safety Reference Manual (Publication 1756-RM095).     GENERAL OPERATION     The Dual-channel Input Stop with Test and Lock monitors dual-input safety devices whose main function is to stop safely. This instruction can only energize Output 1 when both safety inputs, Channel A and Channel B,     are in the active state as determined by the Input type parameter, and the correct reset actions are carried out. In addition, this instruction has the ability to monitor a locked feedback signal from a safety device and     issue a lock request to a safety device. The Unitod Request parameter, and the correct reset actions are carried out. In addition, this instruction has the ability to monitor a locked feedback signal from a safety device and     unlock command. The Lock Feedback input is used to determine whether or not the safety device is currently locked. To energize output 1, the Lock Feedback input must be stopped for the instruction     CONFIGURATION DO TRILS     The DCSTL instruction tag is CONTROLLER scoped, and if you wish to copy and paste this into another routine, you will need to provide a unique name on every new copy. The ZoneName_DeviceName DCSTL instruction     tag name will identify this instruction with the unique device within a specific Logic Chample is set to AUTOMATIC Reset Type for continuous monitoring of input device states. Using automatic reset     functionally moves the safety output reset thancion from the DCSTL instructions Reset to your Safety Joutput Logic. The Safety Joutput Logic
0	Dual Channel Input Stop With Test And Lock     Zone1_LOCKINGSW1       DCSTL     Safety Function       Safety Function     Safety Function       Input Type     EQUIVALENT - ACTIVE HIGH       Discrepancy Time (Msec)     AUTOMATIC       Cold Start Type     AUTOMATIC       Channel B     CellGuard1:1.ProDotata       Unlock Request     Cmd_Zone1_Safety_Test       Unlock Request     Cmd_Zone1_Safety_Test       Unlock Request     CellGuard1:1.ProDotata       Hazard Stopped     LOCKINGSW1_Motion_Stopped       Input Status     CellGuard1:1.ProDotata       Reset     Cmd_Zone1_FaultReset       O     Zone1_LOCKINGSW1.TC       CellGuard1:1.CombinedInputStatus     O
	Zone1_LOCKINGSW1.ULC CellGuard1:0.Test00Data
2	Locking Switch Output Solenoid Interlock Logic The following two rungs provide the logic that energizes the Cmd_ZoneName_Unlock, Request, allowing entry into the Safety Zone, 3 seconds after the Zone'S Output has been disabled. Test Outputs configured as standard can be used to drive the locking switch solenoids. This logic shows the output solenoid connected to a test output of a Guard I/O module, ModuleName:O.TestOOData. The test output is used as a convenient standard output, as this solenoid may be connected to a safe or standard output. Reassignment of tags will need to be made to match your unique safety wiring configuration. Sts_Zone1_OUtputEnable
3 -	Image: Delay timer on Delay timer Wrk_Zone1_LOCKINGSW1_EntryDelay_Timer Wrk_Zone1_LOCKINGSW1_EntryDelay_Timer 3000 0       CDN >         Wrk_Zone1_LOCKINGSW1_EntryDelay_Timer.DN       Wrk_Zone1_LOCKINGSW1_EntryDelay_Time 0NS         CellGuard1:0.Test00Data       0         Image: Content of the second of the se

Refer to the GuardLogix Instruction Set Reference Manual, publication <u>1756-RM095</u>, for additional information and configuration of the instructions required for your application.

15. After the import is complete, double-click the Channel A and Channel B tags on the main safety instruction and browse to the associated Channel Tags for the first device listed on your first Safety Module Configuration worksheet.

DCSTL-		
Dual Channel Input Stop With Test Ar DCSTL Safety Function Input Type EQUI Discrepancy Time (Msec) Restart Type Cold Start Type Channel A	VALENT - ACTIVE HIGH VALENT - ACTIVE HIGH CellGuardt 1:Pr00Data CellGuardt 1:Pr00Data (FP)-	
Channel B CellGuard1:1.Pt01Data		
Name	Data Type	^
CellGuard1:I.Pt01Data	BOOL	
_CellGuard1:I.Pt02Data	BOOL	Ξ.
CellGuard1:I.Pt03Data	BOOL	_
ellGuard1:I.Pt04Data	BOOL	
CellGuard1:I.Pt05Data	BOOL	
CellGuard1:1Pt06Data	BOOL	
d CellGuard1:1 Pt07Data	BOOL	
fil CollCuard111 Pt09Data	BOOL	
	BOOL	~
_ <u>C</u> ontroller	<u>S</u> tandar	d
2 Program	Safety	
Show: Show All		>>

16. Double-click each of your other module input or output tags within your safety logic and browse to the associated input and output tags listed in your Safety Module Configuration worksheet.

	Z	one1	_LOCKINGSWI.T	с	CellGuard	d1:O.Test02	Data 👻	
			Name			Data Type		^
	ż	ľ	CellGuard1:	O.Test02Data		BOOL		
	-	Ē	_CellGuard1:	O.Test03Data		BOOL		
		É	_CellGuard1:	O.Test04Data		BOOL		=
		É	_CellGuard1:	O.Test05Data		BOOL		
		É	_CellGuard1:	O.Test06Data		BOOL		
		É	_CellGuard1:	O.Test07Data		BOOL		
		É	_CellGuard1:	O.Test08Data		BOOL		
Swite	'n	É	_CellGuard1:	O.Test09Data		BOOL		
e Crno	3_2	é	CellGuard1	O_Test10Data		BOOL		*
Zone' stand:	s ( arc	<b></b>	<u>C</u> ontroller			Ľ	<u>S</u> tandard	
ected	i to		Program			Г	Safety	
dard ( to be	e m	Show	w: Show All				1	>>

17. Repeat the <u>Import Your Safety Input Device Logic</u> steps, on pages <u>56...61</u>, for each safety input device listed in the first zone of the Safety Zone Configuration worksheet you created in <u>Chapter 2</u>.

See <u>Appendix A</u> for the completed input logic for the Robot_Cell Application example used in this toolkit.

## **Import Your Safety Output Device Logic**

Follow these steps to add safety output logic.

1. Go to your first safety zone routine.

Add your output logic after the input logic in your safety routine.

2. Right-click the end rung and choose Import Rung.



3. Browse to the Safety Device Routines>

RSL5k_V16_or_Later, RSL5k_V17_or_Later, or RSL5k_V20_or_Later directory in the toolkit and select the CAT2 or CAT3_CAT4 subdirectory based on your output device safety category requirements.



4. Select the device type of the first output device listed on your first Safety Module Configuration worksheet and click Import.

ISO 13849-1 requires that manual reset functions must occur on falling edge signals. If compliance with this standard is required, select safety device logic that is followed by the ISO 13849 designation.

- 5. Type the *ZoneName* from your Safety Zone Configuration worksheet into the tagnames on the Import Configuration dialog box.
- 6. Type the *DeviceName* of the first output device from your Safety Module Configuration worksheet into the tagnames on the Import Configuration dialog box.

	Import Name	Operation	Final Name 🛆	1	Alias
U	ModuleName:0	Undefined	ModuleName:0		
_)	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName1_Input0K		
-)	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName2_Input0K		
	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName3_Input0K		
-)	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName4_Input0K		
2	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName5_Input0K		
1	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName6_Input0K		
_)	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName7_Input0K		
2	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName8_Input0K		
9	Sts_ZoneName_InputsOK	Create	Sts_Zone1_Inputs0K		
1	Wrk_ZoneName_SafetyR	Create	Wrk_Zone1_SafetyReset_ONS		
-1	ZoneName_DeviceName	Create	Zone1_DeviceName		

7. In the *DeviceName1* through *DeviceName8* tags, type the *DeviceNames* for the input devices that control this output in this zone.

	Import Name	Operation	Final Name 🛆		Alias	^
10	ModuleName:0	Undefined	ModuleName:0			
* _	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName1_InputOK	-		
* •	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName2_InputOK			
* F	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName3_InputOK	-		
* •	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName4_Input0K	-		
* •	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName5_InputOK			
* •	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName6_Input0K			
*	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName7_InputOK			
* •	Sts_ZoneName_DeviceN	Create	Sts_Zone1_DeviceName8_Input0K			
* •	Sts_ZoneName_InputsOK	Create	Sts_Zone1_InputsDK			
* •	Wrk_ZoneName_SafetyR	Create	Wrk_Zone1_SafetyReset_ONS			
* •	ZoneName_DeviceName	Create	Zone1_DeviceName			

If you do not have 8 input devices, leave the unused DeviceName tag fields as is. This example shows 7 inputs.

	mport Name	Operation		Final Name 4		Alias	^	
IJ	ModuleName:0	Undefined		ModuleName:0	1000			
1	Sts_ZoneName_DeviceN	Create		Sts_Zone1_LOCKINGSW1_Input0K				
1	Sts_ZoneName_DeviceN	Create		Sts_Zone1_LOCKINGSW2_InputOK				
1	Sts_ZoneName_DeviceN	Create		Sts_Zone1_ESTOP1_InputOK				
1	Sts_ZoneName_DeviceN	Create		Sts_Zone1_ESTOP2 InputOK				- Used inn
-	Sts_ZoneName_DeviceN	Create		Sts_Zone1_ESTOP3_InputOK				oscump
1	Sts_ZoneName_DeviceN	Create		Sts_Zone1_ESTOP4_InputOK				
1	Sts_ZoneName_DeviceN	Create		Sts_Zone1_LC1_Input0K				
9	Sts_ZoneName_DeviceN	Create		Sts Zone1_DeviceName8 Input0K	-			– Unused i
9	Sts_ZoneName_InputsOK	Create	1	Sts_Zone1_Inputs0K				
1	Wrk_ZoneName_SafetyR	Create	٦	Wrk_Zone1_SafetyReset_ONS				
- 1	ZoneName DeviceName	Create		Zone1 DeviceName				

If you have more than 8 input devices, you need to add more instructions after the import is complete.

- 8. Click ModuleName: I field.
- 9. Click the pull-down arrow to browse to the Guard I/O module to which this safety output is connected.

Con	figu	re Tag References						
		Import Name	Operation	Final Name	Δ		Alias	^
×	_)	Cmd_ZoneName_FaultRe	Use Existing	Cmd_Zone1_FaultReset				
×	_1	Cmd_ZoneName_OutputE	Create	Cmd_Zone1_OutputEnable				
×	_)	Cmd_ZoneName_SafetyR	Create	Cmd_Zone1_SafetyReset				
1	IJ	ModuleName:I	Undefined	ModuleName:I	-	1		

10. Double-click the module's input tag.

		Import Name	Operation	1	Final Name	0	2	Alias	^
×	_)	Cmd_ZoneName_FaultRe	Use Existing		Cmd_Zone1_FaultReset		•••		
×	-9	Cmd_ZoneName_OutputE	Create		Cmd_Zone1_OutputEnable				
×	P)	Cmd_ZoneName_SafetyR	Create		Cmd_Zone1_SafetyReset		•••		
٣	1	ModuleName:I	Undefined		ModuleName:I	-			
۲.	1	ModuleName:0 Nam	e			Data Type			10
×	-9	Sts_ZoneName_D	ellGuard1:I			AB:1791ES_IB	16_5	Safety	15
×	-9	Sts_ZoneName_D +-O	ellGuard1:0			AB:1791ES_IB	16:0	:0	
×	P	Sts_ZoneName_D +-C	ellGuard2:1			AB:1791ES_IB	8X0	88_S	af
×	٩	Sts_ZoneName_D +-C	ellGuard2:0			AB:1791ES_IB	8XO	88_S	af
×	ol	0. T 11 0 0 0	md Zonol Fo	1 NPC	seat	BOOL			

11. Click ModuleName:O field.

	Import Name	Operation	-6	Final Name 🛆	1	Alias	^
*	Cmd_ZoneName_FaultRe	Use Existing		Cmd_Zone1_FaultReset			
*	Cmd_ZoneName_OutputE	Create		Cmd_Zone1_OutputEnable			
*	Cmd_ZoneName_SafetyR	Create		Cmd_Zone1_SafetyReset			
*	ModuleName:I	Use Existing	0	CellGuard2:I			
IJ	ModuleName:0	Undefined		ModuleName:0			

- 12. Click the pull-down arrow to browse to the Guard I/O module to which this safety output is connected.
- 13. Double-click the module's output tag.

Configu	e Tag References								
	Import Name	Operation		Final Name	Δ	1	Alias	^	
× 💾	Cmd_ZoneName_FaultRe	Use Existing		Cmd_Zone1_FaultReset					
× _	Cmd_ZoneName_OutputE	Create		Cmd_Zone1_OutputEnable		•••			
× 💾	Cmd_ZoneName_SafetyR	Create		Cmd_Zone1_SafetyReset					
_* <b>_</b>	ModuleName:I	Use Existing	6	CellGuard2:I					
٦ 🕈	ModuleName:0	Undefined		ModuleName:0	-				
	Sts_ZoneName_D	e			Data Type			^	
	Sts_ZoneName_C 📑 🕂 -C	ts_ZoneName_D 📑 🕂 CellGuard1:I			AB:1791ES_IE	316_	Safet	/5:I:	
	Sts_ZoneName_C 📑 🛨 -C	ts_ZoneName_D 📑 🕂 CellGuard1:O					AB:1791ES_IB16:0:0		
	Sts_ZoneName_C 📑 🕂 -C	its_ZoneName_D 📑 ⊕-CellGuard2:I				AB:1791ES_IB8XOB8_Sat			
	Sts_ZoneName_C 📑 🛨 🤆	ellGuard2:0			AB:1791ES_IE	38XC	)88_S	afe	
× P	Sts ZoneName D	md_Zone1_Fa	ultRe	set	BOOL			-	

14. Click OK to complete the import.

Cmd_ZoneName_FaultRe Use Existing     Cmd_Zone1_FaultReset     Cmd_ZoneName_OutputE     Create     Cmd_ZoneName_SafetyR     Create     Cmd_ZoneName_SafetyR     Create     Cmd_Zone1_SafetyReset     State     ModuleName:     Use Existing     CellGuard2:0     State     St	× P				- Harren -		Viide	1000
Cmd_ZoneName_OutputE Create     Cmd_Zone1_OutputEnable     Cmd_ZoneName_SafetyR Create     Cmd_Zone1_SafetyReset     ModuleName:I     Use Existing     CellGuard2:I     ModuleName:O     Use Existing     CellGuard2:O     Sts_Zone1_EC1_InputOK     Sts_Zone1_EC1_InputOK     Sts_Zone1_EC1_InputOK     Sts_Zone1_EC1_InputOK		Cmd_ZoneName_FaultRe	Use Existing		Cmd_Zone1_FaultReset			
Cmd_ZoneName_SafetyR Create     Cmd_Zone1_SafetyReset     ModuleName:I     Use Existing     CellGuard2:I     ModuleName:D     Use Existing     CellGuard2:O     Sts_Zone1_Lot_InputOK     Sts_Zone1_Lot_InputOK     Sts_Zone1_Lot_InputOK     Sts_Zone1_Lot_InputOK     Sts_Zone1_Lot_InputOK	* •	Cmd_ZoneName_OutputE	Create		Cmd_Zone1_OutputEnable			
ModuleName:1     Use Existing     CellGuard2:1       ModuleName:0     Use Existing     CellGuard2:0       Sts ZoneName DeviceN     Create     Sts_Zone1_LC1_InputOK       Notable DeviceN     Create     Sts_Zone1_LC1_InputOK	*	Cmd_ZoneName_SafetyR	Create		Cmd_Zone1_SafetyReset			
ModuleName:O Use Existing CellGuard2:O ·····	*	ModuleName:I	Use Existing		CellGuard2:1			
Sts ZoneName DeviceN Create Sts Zone1_LC1_InputOK SK 44	* •	ModuleName:0	Use Existing	Ū	CellGuard2:0	177		
* B. Du Zanahana Davieshi Carala 3 Du Zanat Davieshi and IsanADK ini	× -	Sts_ZoneName_DeviceN	Create	2	Sts_Zone1_LC1_InputOK	-		
	N D	PL 7 Delien	·····	h	01. 7-1-1 D		>	~

#### 15. Review the imported rung comments to understand the general operation and configuration details.



Refer to the GuardLogix Instruction Set Reference Manual, publication <u>1756-RM095</u>, for additional information and configuration of the instructions required for your application.

16. After the import is complete, right-click any unused input device instructions in the safety input interlock rung and choose Delete Instruction.

	Satety Input Interlock Rung This rung includes (8) safety device input interlocks, with tag names Sts_ZoneName_DeviceName1_nputOK through Sts_Zon that energize the Sts_ZoneName_InputsOK OTE instruction. These interlocks tags can be driven by the individual safety devic this toolkit. The Sts_ZoneName_InputsOK tag is then included in the Output Enable Rung which drives the RC	eName_DeviceName8_InputOK, e input logic routines provided in UT instruction.
18	Sts_Zone1_LOCKINGSW1_InputOK Sts_Zone1_LOCKINGSW2_InputOK Sts_Zone1_ESTOP1_InputOK Sts_Zone1_ESTOP3_InputOK Sts_Zone1_ESTOP3_InputOK Sts_Zone1_ESTOP3_InputOK Sts_Zone1_ESTOP4_InputOK Sts_Zone1_LC1_InputOK Sts_Zone1_DeviceName8	iTOP2_InputOK
	Log Cut Instruction Ctrl+X	
	Copy Instruction Ctrl+C	Sts_Zone1_InputsOK
	Paste Ctrl+V	
	Delete Instruction Del	

 If your Guard I/O module is a 1791DS-IB4XOW4, 1791DS-IB8XOB8, 1791DS-IB8OXBV4, or 1732DS-IB8XOBV4, then double-click *ModuleName:I.OutputStatus* in the Output Enable Rung and choose *ModuleName:I.CombinedOutputStatus* tag from the pull-down list.

ee	Cmd_Zone1_SafetyReset Wrk_Zone1_SafetyReset_ONS		Sts_Zone1_InputsOK CellGuard2:1.Combined	JOut 👻		
e	J [[ONS]		Name	Data Typ	e 🔥	Ī
<u> </u>	Cmd_Zone1_OutputEnable		-CellGuard2:I.Pt07Data	BOOL		
e	L][	- É	-CellGuard2:I.Muting03Status	BOOL		
e		- É	-CellGuard2:I.Muting07Status	BOOL		I
e	Zone1 ROBOTCONTACTOR FP	PÍ	-CellGuard2:I.OutputPowerStatus	BOOL		1
e	7	e e	-CellGuard2:I.InputPowerStatus	BOOL		
e		P	CellGuard2:1.CombinedOutputStatus	BOOL		
e		. ei	CellGuard2:I.CombinedInputStatus	BOOL		
e		eí.		AB:17916	ES_IB8XOB8_Safe	
e		. ei	Cmd Zone1 FaultReset	BOOL	~	
e			Controller		Standard	i
e e			Program		S <u>a</u> fety	-
e e		Shov	v: Show All		>>	
-						

18. Double-click the Feedback 1 and Feedback 2 tags on the CROUT safety output instruction and browse to the Guard I/O module input tags assigned to the feedback of the safety output device controlled by this CROUT instruction.

		(100)	
		Configurable Redundant Ou CROUT Zond Feedback Type Feedback Reaction Time (N Actuate Cri Feedback 1 CellGuard2:1	ttput e1_ROBOTCONTACTOR -(01)- NEGATIVE fisec) 500 -(02)- nd_Zone1_OutputEnable ∩ ← (FP)- Pt00Data ▼
[		Name	Data Type
	-	-CellGuard2:I.Pt00Data	BOOL
[	-1	-CellGuard2:I.Pt01Data	BOOL
	Ŕ	-CellGuard2:I.Pt02Data	BOOL
	Ŕ	_CellGuard2:I.Pt03Data	BOOL
	e i	_CellGuard2:1.Pt04Data	BOOL
	-	_CellGuard2:1.Pt05Data	BOOL
	-í	CellGuard2:1.Pt06Data	BOOL
	-í	CellGuard2:1.Pt07Data	BOOL
Sa on e Guerd	2	CellGuard21 Muting03Status	BOOL
vame:O.Pt0 nels will ne		<u>C</u> ontroller	<u>Standard</u>
ITACTOR.C	Shov	v: Show All	) Jarey

19. Double-click the Guard I/O module output tags and browse to the Guard I/O module output tags assigned to the safety output device controlled by this CROUT instruction.

21	1		Zone1_ROBOTCONTACTOR.02		ellGuard2:O.Pt00Data	
	N	ame		Data Type	De	^
	٩j	CellGuard2:O.Pt01Data		BOOL		
	٩	-CellGuard2:O.Pt02Data		BOOL		1
	eí –	-CellGuard2:O.Pt03Data		BOOL		
	eí –	_CellGuard2:O.Pt04Data		BOOL		
	eí -	_CellGuard2:O.Pt05Data		BOOL		
	á	0.000 10.0000 1		- BAAI		~
	ļ	Controller			Standard	
Г		Program			Safety	_

20. If your zone has multiple output devices requiring separate safety output instructions, then see <u>Appendix B</u> for an example of how to modify the output logic.

## Add Safety Input and Safety Output Device Logic for Each Safety Zone

Repeat the <u>Import Your Safety Input Device Logic</u> and <u>Import Your Safety Output Device Logic</u> steps on pages <u>56</u>...<u>66</u> for each zone listed on your Safety Zone Configuration worksheet from <u>Chapter 2</u>.

See <u>Appendix A</u> for the completed input and output logic for the Robot_Cell Application example used in this toolkit.

## **Adding Your Faceplate Logic**

The toolkit features three pre-configured faceplates.

- The digital Guard I/O module faceplate lets you view the status of the safety circuits and logic, and provides diagnostics for safety demands and faults. You will need to add one Guard I/O Add-On Instruction (AOI) for each digital I/O module in your zone.
- The Guard I/O Analog module faceplate lets you view the status of the analog safety circuits and logic, and provides diagnostics for safety demands and faults. You will need to add one Guard I/O Analog AOI and one Guard I/O Analog AOI Safety for each analog module in your zone.
- The safety instruction faceplate lets you monitor the status and diagnostic information of a safety instruction. To use the safety instruction faceplate, you must first import the required user-defined data type and create a tag using that data type.

# **Faceplate Logic for Safety Instruction Faceplates**

### Import User-defined Data Type for Safety Instruction Faceplates

Follow these steps to import the required user-defined data type.

1. Under Data Types in RSLogix 5000 software, right-click User-Defined and choose Import Data Type.



2. Browse to the Safety Instruction Faceplate files in the toolkit and open the ME_Safety_Faceplate_Files folder.

If the toolkit has been loaded onto your personal computer, the hard drive path is C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Safety Instruction Faceplate Files \ME_SafetyInstruction_Faceplate_Files

3. Select the SafetyInstruction_FaceplateAnimation_UDT file and click Import.



4. On the Import Configuration dialog box, click OK.

Find: Find: Find Within: Final Name	- <u>A</u> A AA	<u>Find/Replace</u>
port Content:	Configure Data	Tuno Proposition
Errors/Warnings	Import Name: Operation: Final <u>N</u> ame: Description:	SafetyInstruction_FaceplateAnimation_UDT Create  SafetyInstruction_FaceplateAnimation Properties

The SafetyInstruction_FaceplateAnimation_UDT appears in your project's User-Defined data type folder.

🕒 🧰 Controller Robot_Cell
庄 🧰 Tasks
庄 🧰 Motion Groups
Add-On Instructions
🖻 📇 Data Types
🖃 📆 User-Defined
SafetyInstruction_FaceplateAnimation_UDT

### **Create Faceplate Animation Tags for Safety Instruction Faceplates**

When you create an HMI safety instruction faceplate that corresponds to a safety instruction, you also need to create a tag that stores the animation information for that faceplate. This tag will have the same data type you imported in the last section. Follow these steps to create an animation tag.

- 1. Expand your controller folder.
- 2. Right-click Controller Tags and choose New Tag.

3. In the New Tag dialog box, type the tag name based on the safety instruction you will be monitoring.

<u>N</u> ame:	Zone1_LOCKINGSW1_	DCSTL_Anima	Create
escription:		*	Cancel
		Ŧ	Help
<u>U</u> sage:	<nomal></nomal>	-	
Typ <u>e</u> :	Base 💌	Connection	
Alias <u>F</u> or:		~	
Data <u>T</u> ype:	SafetyInstruction_Facep	lateAnima	
Scope:	Robot_Cell	-	

4. Choose the SafetyInstruction_FaceplateAnimation_UDT Data Type.

The Class for these tags must be Standard. You will create a faceplate animation tag for every safety instruction you wish to monitor.

## Faceplate Logic for Digital Guard I/O Faceplates

### Import Add-On Instruction for Digital Guard I/O Faceplate

Follow these steps to load the Add-On Instruction logic that will let you use these digital Guard I/O faceplates.

1. In your RSLogix 5000 application file, right-click Add-On Instructions and choose Import Add-On Instruction.



2. Browse to the ME Faceplate Files folder within the Guard I/O and SmartGuard Faceplate Files directory in the toolkit.

If the toolkit has been loaded onto your personal computer, the hard drive path is C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Faceplate Files\ ME Faceplate Files.

3. Choose the GuardIO_AOI file and click Import.

M Import Add-O	n Instruction			×	👪 RSLogix 5000 - Robot_Cell in SafetyApp	
Look in:	ME Faceplate	Files 🗸	G 🗊 📂 🖽	-	File Edit View Search Logic Communications	
Recent Places Desktop Libraries	<ul> <li>ENIP_SmartGuard_AOI.L5X</li> <li>ENIP_SmartGuard_AOI_Map.L5X</li> <li>ENIP_SmartGuard_AOI_Map_2.L5X</li> <li>GuardIO_Analog_AOI_Safety.L5X</li> <li>GuardIO_Analog_AOI_Tach_Map.L5X</li> <li>GuardIO_AOI_Map.L5X</li> <li>GuardIO_AOI_Map.L5X</li> <li>GuardIO_AOI_Map.2.L5X</li> <li>SmartGuard_AOI_Map.L5X</li> </ul>				Image: Controller Robot_Cell         Image: Control Robot_Cell         C	
Computer	File name:	GuardIO_Analog_AOI	•	Import	Add-On Instructions	
	Files of type:	RSLogix 5000 XML Files (*.L5X)	*	Cancel	Parameters and Local Tags	
Network	Files containing:	Add-On Instruction	•	Help	ل Logic Types	
	Int <u>o</u> :	Add-On Instructions	<b>~</b>			

The Guard I/O Add-On Instruction appears in your project's Add-On Instruction folder.

### Create Controller Tags for Digital Guard I/O Faceplate

Prior to creating an instance of the digital GuardIO_AOI, you must create tags within the controller application. You need to add these six tags for each of your digital Guard I/O modules, which you listed in your Safety Zone Configuration worksheet from <u>Chapter 2</u>.

Table 7	' - Guard	I/O Module	Tags
---------	-----------	------------	------

Tag Name	Data Type	Tag Scope
[ <i>ModuleName</i> ]_MSG1	Message	Controller
[ <i>ModuleName</i> ]_MSG2	Message	Controller
[ModuleName]_ExtendedData	DINT[2]	Controller or program
[ModuleName]_InputData	DINT[2]	Controller or program
[ModuleName]_OutputData	DINT	Controller or program
[ <i>ModuleName</i> ]_ErrorCode	DINT	Controller or program

Follow these steps to create a controller tag.

- 1. Expand your controller folder.
- 2. Right-click Controller Tags and choose New Tag.



3. In the New Tag dialog box, type the tag name, based on the <u>Guard I/O Module Tags</u> table on page <u>71</u> and enter the *ModuleName* for the associated Guard I/O module found on the Safety Zone Configuration worksheet you completed in <u>Chapter 2</u>.

New Tag		
<u>N</u> ame:	Robot_Cell_IB16_MSG1	OK
Description:		Cancel
		Help
<u>U</u> sage:	<normal></normal>	
Typ <u>e</u> :	Base Connection	
Alias <u>F</u> or:	<b>v</b>	
Data <u>T</u> ype:	MESSAGE	
Scope:	Robot_Cell	
Cl <u>a</u> ss:	Standard 💌	
Style:	Ţ	
Den ME	SSAGE Configuration	

 Choose the appropriate data type and scope for each tag based on the <u>Guard I/O Module Tags</u> table on page <u>71</u>. The Class for these tags must be Standard.
5. Click OK to complete the controller tag assignment.

The tags shown here represent a set of tags for a module named CellGuard1.

Ø	2 Controller Tags - Robot_Cell(controller)							
s	coge: Cell - Show STRIN	G, STRIN	G_12, STR	ING_24, ALARM, ALAR	M_DIGITAL, AXIS_CO	INSUMED, AX	as_e	
	Name 🛆	Alias For	Base Tag	Data Type	Class	Style		
	CellGuard1_ErrorCode			DINT	Standard	Decimal		
	← CellGuard1_ExtendedData			DINT[2]	Standard	Decimal		
	← CellGuard1_InputData			DINT[2]	Standard	Decimal	-	
				MESSAGE	Standard			
	+-CellGuard1_MSG2			MESSAGE	Standard			
				DINT	Standard	Decimal	-	
•	Monitor Tags AEdit Tags			•		•	· [//	

#### Create GuardIO_AOI Instances in Standard Program Routines for Each Digital Guard I/O Faceplate

You must create a GuardIO_AOI instance for each Guard I/O module in your application.

- 1. Open the intended standard program routine and add a rung.
- 2. Select the GuardIO_AOI from the Add-On Instructions tab.

Guar di0			
λ Add-On	Alarms & Bit & Timer/Count	er 🔏 Input/Output 🔏 Compa	are 🔏 Compute/Mat
GUa	rdIO_AOI VI.0		
	GuardIO_AOI		
	-		
	GuardIO_AOI	?(Sts_CmbdSafe	etyinputStatus)—
	Sts_SafetyInputData	??	
	Sts_SafetyInputStatus	?? -(Sts_CmbdSafe	etyOutputStatus)—
	Sts_SafetyInputLatch	??	
	Sts_SafetyOutputStatus	??	
	Sts_SafetyOutputReadback	??	
	Sts_TestOutputStatus	??	
	Sts_SafetyOutputData	??	
	Ref_MSG1	?	
	Ref_MSG2	?	
	Ref_ExtendedData	?	
	Ref InputData	?	
	Ref_OutputData	?	
	Set SafetylOModuleSelect	?	
	_	??	
	Ref_ErrorCode	?	

- 3. Double-click the GuardIO_AOI tag name field.
- 4. Type the ModuleName of the first Guard I/O module from your Safety Module Configuration worksheet.

This example shows an Add-On Instruction named CellGuard1 that is associated with a Guard I/O module of the same name.

~	е	GuardiO_AOI		1	
0	e	Quantilo a of California	-11		
	e	Guardio_AOI		-(sts_cmbdsaretyinputstatus)	
	e	Sts_SafetyinputData	f f		
	е	Sts_SafetyInputStatus	??	-(Sts_CmbdSafetyOutputStatus)-	
	е	Sts_SafetyInputLatch	??		
	е	Sts_SafetyOutputStatus	??		
	е	Sts_SafetyOutputReadback	??		
	е	Sts_TestOutputStatus	??		
	е	Sts_SafetyOutputData	??		

5. Right-click in the tag name field and choose New *tag name*, where *tag name* is the name you typed.

ым	lainProgram - Ma	nRoutine*			
陶	<u>s</u> eee				
0	e e e	GuardIO_AOI GuardIO_AOI Sts_SafetyInputData ?	1	New "CellGuard1"	Ctrl+W
	e e e	Sts_SafetyInputStatus ? Sts_SafetyInputLatch ? Sts_SafetyOutputStatus ? Sts_SafetyOutputReadback ?	? ? 🔏 ? 🗈	Cut Instruction Copy Instruction	Ctrl+X Ctrl+C

6. In the New Tag dialog box, verify that your settings match what is shown below.

Change where needed to match.

New Tag		X
<u>N</u> ame:	CellGuard1	OK
Description:		Cancel
		Help
<u>U</u> sage:	<normal></normal>	
Тур <u>е</u> :	Base <u>Connection</u>	
Alias <u>F</u> or:	<b></b>	
Data <u>T</u> ype:	GuardIO_AOI	
Scope:	Robot_Cell	
Cl <u>a</u> ss:	Standard	
Style:		
🔲 <u>O</u> pen Cor	figuration	

7. Click OK.

8. Assign the remaining required tags you defined from the Guard I/O Module Tags table on page 71.



- 9. Double-click each Ref_*Tag* and click the pull-down arrow to browse to and select the appropriate controller tags, which you created in the <u>Create Controller Tags for Digital Guard I/O Faceplate</u> section of this chapter.
- 10. Double-click the *Set_SafetyIOModuleSelect* field and type in the value that matches your module catalog number, as shown in this table.

Set_SafetyIOModuleSelect Value	Guard I/O Module Catalog Number
1	1791DS-IB8X0B8
2	1791DS-IB12
3	1791DS-IB4XOW4
4	1791DS-IB8XOBV4
5	1791DS-IB16
6	1732DS-IB8XOBV4
7	1732DS-IB8
8	1791ES-IB8XOBV4
9	1791ES-IB16
10	1734-0B8S
11	1734-IB8S
12	1752-L24BBB

#### Table 8 - Set Safety I/O Module Type

11. Insert a rung before the GuardIO_AOI rung.

0 × 1 1 1	e e Cut Rung Copy Rung Paste Delete Rung Add Rung	Ctrl+X Ctrl+C Ctrl+V Del Ctrl+R	GuardiO_AOI           cellGuard1           outData           0 +           putData           0 +           putStatus           0 +           dputStatus           0 +           dputStatus           0 +           dputStatus           0 +           dputStatus           0 +           dputFleadback           0 +
	Edit Rung	Enter	utputData 0 +
	Edit Rung Comment	Ctrl+D	CellGuard1_MSG1
	Import Rung		CellGuard1_MSG2
	Export Rung		a CellGuard1_InputData
	Start Pending Rung Edits	Ctrl+Shift+S	ModuleSelect 5
	Accept Pending Rung Edits		e CellGuard1_ErrorCode
	Cancel Pending Rung Edits		

- 12. Right-click the rung and choose Import Rung.
- 13. Browse to the ME Faceplate files folder within the Guard I/O and SmartGuard Faceplate Files toolkit directory.

Import Rungs					×
Look in:	ME Faceplat	e Files 💌	G	2 📂 🛄-	
My Recent Documents Desktop My Documents	HENIP_SmartGu HENIP_SmartGu GuardIO_AOI HGuardIO_AOI SmartGuard_A	iard_AOI_Map.L5X iard_AOI_Map_2.L5X Map.L5X Map_2.L5X iOI_Map.L5X			
<b>1</b>	, File <u>n</u> ame:			-	Import
My Computer	Files of type:	RSLogix 5000 XML Files (*.L5X)		-	Cancel
	Files <u>c</u> ontaining:	H Rungs		Ŧ	Help
My Network	Int <u>o</u> :	MainRoutine (MainProgram)		~	
Places	C Overwrite Sele	acted Rungs			

If the toolkit has been loaded onto your personal computer, the hard drive path is C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Faceplate Files\ ME Faceplate Files.

- 14. Select the GuardIO_AOI_Map file and click Import.
- 15. Click the ModuleName:I field.
- 16. Click the pull-down arrow to browse to your first Guard I/O module.

17. Double-click the module's input tag.

Import Cor	nfiguration					×
Tags						
	Name	△ Alias For	Data Type	Description	Operation	
X	ModuleName:	•	AB:1791ES_IB		Discard	
XJ	Name			Data Type	Discard	
20	CellGuard1	Use Existing				
1	P + CellGuard1:I	AB:1791ES_E				
	P CellGuard1:0 AB:1791ES_E					
	CellGuard1_E	rrorCode		DINT		
		xtendedData		DINT[2]		
	<u>a</u>					
	<u>Controller</u>			<u>S</u> tandard		
	Program			Safety		
	Show: Show All			>>		
				UK	Cancel	Help

- 18. Click the ModuleName:O field.
- 19. Click the pull-down arrow to browse to your first Guard I/O module.
- 20. Double-click the module's output tag.

Import Co	onfiguration				
Tags					1
	Name 🛆	Alias For	Data Type	Description	Operation
XI	CellGuard1:I		AB:1791ES_IB		Discard
X	ModuleName:0		AB:1791ES_IB		Discard
2 1	Name	Use Existing			
2 1	CellGuard1	Use Existing			
	.CellGuard1:I				
	.CellGuard1:O			AB:1791ES_IE	
	CellGuard1_Error	Code		DINT	
		ndedData		DINT[2]	
	Controllor	~		Chandard	
	j <u>C</u> ontroller			j <u>s</u> tandald	
<u> </u>	Program			Safety	
	Show: Show All			<u>&gt;&gt;</u>	Cancel Help

21. Type the *ModuleName* of the first Guard I/O module listed in your Safety Zone Configuration worksheet into both the *ModuleName_*InputData and *ModuleName_*OutputData tags.

		Name	Alias For	Data Type	Description	Operation
×.	P	CellGuard1:I		AB:1791ES_IB		Discard
×.	PJ	CellGuard1:0		AB:1791ES_IB		Discard
2	IJ	ModuleName_InputData	-	DINT		Use Existing
2	1	ModuleName_OutputData		DINT		Use Existing

22. Click OK to complete the import.

23. If the import was successful, the Guard_AOI mapping and Guard_AOI rungs should appear without errors similar to the example shown here.



The example illustrates the GuardIO_AOI instance and mapping logic for a module named CellGuard1.

24. Repeat the <u>Create GuardIO_AOI Instances in Standard Program Routines for Each Digital Guard I/O Faceplate</u> steps <u>1...23</u>, on pages <u>73</u>...<u>78</u>, for each of the Guard I/O modules you wish to use with the pre-configured faceplate.

#### Configure Guard I/O Module Add-On Instruction Message Instructions for each Digital Guard I/O Faceplate

For each of your module Add-On Instructions, configure the MSG_1 instruction to return status information from the I/O module and the MSG_2 instruction to return specific error status from a failed I/O point.

1. To configure MSG_1, click the message instruction dialog button.



2. Set the Destination as the ExtendedData tag you created for your I/O module.

Message Configuration - CellGuard1_MSG1			
Configuration [*] Communication Tag		GuardiO_	
Message Type: CIP Generic	•	tData	
		tLatch	0 + -(Sts_C
Service Get Attribute Single	Source Element:	DutStatus putReadback	0 <del>*</del> 0 <del>*</del>
Service The service and	Source Length:	0  (Bytes)  Status utData	0 <del>•</del>
Code: [e [Hex] Llass: [4 [Hex]	Destination	CellGuard1_Extender	CellGuard1_MSG1
Instance: 869 Attribute: 3 (Hex)		Name	Data Type 🔥 🔼
		¶CellGuard1	GuardIO_AOI
		CellGuard1_ErrorCode	DINT
		CellGuard1_ExtendedData	DINT[2]
Enable  Enable Waiting  Start	Done Do	🖞 🕂 CellGuard1_InputData	DINT[2]
Error Code: Extended Error Code:	Γ	EllGuard1_MSG1	MESSAGE
Error Path:		Controller	Standard
Error Text:		Program	Safety
OK	Cancel	- Show: Show All	>>

- 3. Configure the Service Type as Get Attribute Single, which results in a Service Code of 'e'.
- 4. Fill in the Class, Instance, and Attribute fields using this table.

Guard I/O Module	Class	Instance	Attribute
1791DS-IB8X0B8	4	803	3
1791DS-IB12	4	786	3
1791DS-IB4X0W4	4	819	3
1791DS-IB8XOBV4	4	884	3
1791DS-IB16	4	869	3
1732DS-IB8XOBV4	4	884	3
1732DS-IB8	4	868	3
1791ES-IB8X0BV4	4	884	3
1791ES-IB16	4	869	3
1734-0B8S	4	1028	3
1734-IB8S	4	868	3
1752-L24BBB	39	1	бе

#### Table 9 - Guard I/O Module Configuration Data

- 5. To access Message communication, select the Communication tab on the Message Configuration dialog box.
- 6. Set the Message Path by clicking Browse and choosing the intended Guard I/O module from the I/O Configuration tree.

Message Configuration - CellG Configuration Communication	uard1_MSG1 ag Browse		
Communication Method CIP C DH+ Channel: CIP With Source ID Connected Enable Enable Waiting Error Co Error Path: Error Text:	Message Path Browser  Path: [CellGuard1 Safety_Block_10, 2, 10.10.10.2      Safety_Block_10, 2, 10.10.10.2      Safety_Block_10, 2, 10.10.10.2      [1] 1756-L62S Robot_Cell     [1] 1756-L52 Robot_CellPather     [2] 1756-ENBT/A Safety_Block_10     [3] 1756-DNB DeviceNet_CAT4     [-] # [3] 1756-DNB DeviceNet_CAT4		
	OK Cancel	Help	

- 7. Click OK to accept the message path.
- 8. Click OK on the Message Configuration dialog box to accept the MSG1 configuration.
- 9. To configure the MSG_2 instruction, click the message instruction dialog button for MSG_2.



10.	Set the Destination as	the ErrorCode tag you o	created for your I/O module.

Message Configuration - CellGuard1_MSG2	2		GuardIO_AOI	
Configuration* Communication Tag			CellGuard1(Sts	_Crr
configuration [ communication] ray [		La latu		Cr
Managan Tunar	_	lick lick		_0.1
Message Type. Join denend	· ·	sta	tus 0 ←	
		Rea	adback 0 🗲	
Service Get Attribute Single	Source Element:	The second secon	s 0+	
Type:	Source Length:	D A (Butes) Dat	ta 0 ←	
Service and a service at a	oouroe congin.	U T (Dytes)	CellGuard1_MSG1	
Code: [e [Hex] Llass: [3d [Hex]	Destination	CellGuard1_ErrorCode -	CellGuard1_MSG2	
Instance: 1 Attribute: 6e (Hex)		Name	Data Type	~
		CellGuard1	GuardIO_AOI	Ē
		CellGuard1_ErrorCode	▼ DINT	-
		-CellGuard1_ExtendedDat	a DINT[2]	1
Enable      Enable Waiting      Start	Done D	□ 🗍 🛨 CellGuard1_InputData	DINT[2]	
G Enable G Enable Waking G Start	9 00ne 0	A	MESSAGE	
Error Code: Extended Error Code:	Г			~
Error Path:		Controller	Standard	-
Error Text:				_
		Program	Safety	
	Cancel	Show: Show All	>	·>

- 11. Configure the Service Type as Get Attribute Single, which results in a Service Code of 'e'.
- 12. Fill in the Class, Instance, and Attribute fields to match what is shown in the above example.

Logic within the GuardIO_AOI modifies the Class, Instance, and Attribute, depending upon the module selected and which Guard I/O point faults.

13. To access Message communication, select the Communication tab on the Message Configuration dialog box.

Message Configuration - CellG	uard1_MSG2	×
Configuration* Communication	[ag	
Path:	Browse	
Communication Method	Message Path Browser	X
C CIP With Source ID Source Lit Connected Enable Enable Waiting Error Co Extend Error Path: Error Text:	Path: [CellGuard1 Safety_Block_10, 2, 10.10.10.2 	
m)	OK Cancel	Help

- 14. Set the Message Path by clicking Browse and choosing the intended Guard I/O module from the I/O Configuration tree.
- 15. Click OK to accept the message path.
- 16. Click OK on the Message Configuration dialog box to accept the MSG2 configuration.

Refer to these manuals for additional diagnostic information that is available from Guard I/O Modules:

- Guard I/O DeviceNet Safety Modules User Manual, publication <u>1791DS-UM001</u>
- Guard I/O EtherNet/IP Safety Modules User Manual, publication 1791ES-UM001
- POINT Guard I/O Safety Modules User Manual, publication <u>1734-UM013</u>
- 17. Repeat the <u>Configure Guard I/O Module Add-On Instruction Message Instructions for each Digital Guard I/O</u> <u>Faceplate steps 1...16</u>, on pages <u>78...81</u> for each of the GuardIO_AOI instructions in your application.

See <u>Appendix A</u> for the completed faceplate logic for the <u>Robot Cell Module and Safety Zone Configuration</u> used in this toolkit.

### Faceplate Logic for Analog Guard I/O Faceplates

#### Import Add-On Instructions for Analog Guard I/O Faceplates

1. In your RSLogix 5000 application file, right-click Add-On Instructions and choose Import Add-On Instruction.



2. Browse to the ME Faceplate Files folder within the Guard I/O and SmartGuard Faceplate Files directory in the toolkit.

If the toolkit has been loaded onto your personal computer, the hard drive path is:

C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Faceplate Files\ME Faceplate Files.

3. Choose the GuardIO_Analog_AOI file and click Import.

The Guard I/O Add-On Instruction appears in your project's Add-On Instruction folder.



4. To choose GuardIO_Analog_Safety_AOI file, follow steps 1 through 3 and click Import.

The Guard I/O Analog Add-On Instruction should also appear in your project's Add-On Instruction folder.



#### Create a GuardIO_Analog_AOI Instance in a Standard Program Routine

You must create a Standard GuardIO_Analog_AOI instance for each Guard I/O module in your application.

- 1. Open the intended standard program routine and add a rung.
- 2. Select the GuardIO_Analog_AOI from the Add-On Instructions tab.



3. Double-click the GuardIO_Analog_AOI tag name field.



4. Type the ModuleName of the first Analog Guard I/O module from your Safety Module Configuration worksheet.

This example shows an Add-On Instruction named E_IE4S that is associated with a Analog Guard I/O module of the same name.

5. Right-click in the tag name field and choose New tag name, where tag name is the name you typed.



6. In the New Tag dialog box, verify that your settings match what is shown below.

Change where needed to match.

<u>N</u> ame:	E_IE4S	Create 🔻
Description:		<ul> <li>Cancel</li> </ul>
		- Help
<u>U</u> sage:	<normal></normal>	-
Тур <u>е</u> :	Base   Connection	<b>1</b>
Alias <u>F</u> or:		¥
Data <u>T</u> ype:	GuardIO_Analog_AOI	
<u>S</u> cope:	🕞 Main Program	•
Cl <u>a</u> ss:	Standard	•
E <u>x</u> ternal Access:	Read/Write	•
Style:		<b>~</b>
Constant		

- 7. Click OK.
- 8. Repeat steps 1...6 for each safety analog module in your system.

#### Create a GuardIO_Analog_AOI_Safety Instance in a Safety Program Routine

You must also create a GuardIO_Analog_AOI_Safety instance for each Guard I/O module in your application.

- 1. Open the intended Safety program routine and add a rung. This will most likely be the program routine for the safety zone that this module will be used for.
- 2. Select the GuardIO_Analog_Safety_AOI from the Add-On Instructions tab.



3. Double-click the GuardIO_Analog_AOI_Safety tag name field.

GuardIO_Analog	_AOI_Safety
GuardIO_Analog_AOI	_S E_IE4S_S 👻
Module	
Ch0_Used	?
	??
Ch1 Used	?
	??
Ch2 Used	?
	??
Ch3 Used	?
	22

4. Type the ModuleName_S of the first Analog Guard I/O module from your Safety Module Configuration worksheet.

This example shows an Add-On Instruction named E_IE4S_S that is associated with a Analog Guard I/O module named E_IE4S.

5. Right-click in the tag name field and choose New tag name, where tag name is the name you typed.



6. In the New Tag dialog box, verify that your settings match what is shown below.

Change where needed to match.

Name:	E_IE4S_S		Create
Description:		*	Cancel
		-	Help
<u>U</u> sage:	<normal></normal>	-	
Тур <u>е</u> :	Base	on	
Alias <u>F</u> or:		Y	
Data <u>T</u> ype:	GuardIO_Analog_AOI_Safety		
<u>S</u> cope:	SAT_Analog_Update_Test	•	
Cl <u>a</u> ss:	Safety	•	
E <u>x</u> ternal Access:	Read/Write	•	
Chules		-	

- 7. Click OK.
- 8. Assign the Safety Analog Input Module's input tag to the Safety Analog GuardIO_AOI Module field.

Name		==	Data Typ	e	Description
<b>Y.</b> Enter Na	ma Filter	-	Show:	AB:1734_I	E4S3:1:0
	GuardIO Module	Analo Enet_	g_AOI_S Adapter:1:	E_IE4S_S	S ▼

The Module assignment in this example is Enet_Adapter:1:I which is the input tag of the IE4S module in slot 1 of the Point I/O chassis.

9. Double click each of the Chx_User tags and enter value of 1 if the channel on the module is being used or a value of 0 if the channel is not used.

GuardIO_Analog_AOI_S	E_IE4S_S [
Module Ene	t_Adapter:1:I
Ch0_Used 1	-
Ch1_Used	?
	??
Ch2_Used	?
	??
a. a	0

The channel assignment in this example show channels 0, 1, and 2 being used and channel 3 not used.

GuardIO_Analog_A	OI_Safety
GuardIO_Analog_AOI_S. Module Enet Ch0_Used	E_IE4S_S Adapter:1:1 1
Ch1_Used	1
Ch2_Used	1
Ch3_Used	0

#### Map Standard Tachometer Reset Tags to Safety Reset Tags

If any of your analog inputs are tachometers then you need to map the associated ModuleName.Cmd_ChxTachReset and ModuleName_Cmd_ChxFreqUnder1Hz standard tags to their corresponding ModuleName_ChxHMITachReset and ModuleName_ChxFreqUnder1Hz safety tags.

- 1. Select the Analog GuardIO_AOI instance rung in your Standard Task for the safety analog module that includes a tachometer input.
- 2. Right-click your Analog GuardIO_AOI instance rung and chose Import Rung.

0	× 1	Cu <u>t</u> Rung <u>C</u> opy Rung Paste	Ctrl+X Ctrl+C Ctrl+V	GuardIO_Analog_AOI
(End)		<u>D</u> elete Rung Add Rung Ed <u>i</u> t Rung Edit <u>R</u> ung Comment	Del Ctrl+R Enter Ctrl+D	
		Import Rungs		
		Export Rungs		

3. Browse to the ME Faceplate files folder within the Guard I/O and SmartGuard Faceplate Files toolkit directory.

If the toolkit has been loaded onto your personal computer, the hard drive path is: C:\\ProgramFiles\RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Faceplate Files\ME Faceplate Files.

4. Select the GuardIO_Analog_AOI_Tach_Map file and click Import.



The import configuration dialog appears.

5. Select Tags from Import Content Tree.

4	Find:		•	A A Eind/Replace		
	Find W	fithin: Final Name				
port Co	intent:					
-	MainTask	<	Configu	ure Tag References		
L	🕞 Maini	Program		Import Name	Δ	7
		Beferences	🐔 🖞	ModuleName		
		- A Tags	1	ModuleName_ChxFreqUnder1Hz_Map 🗋 ModuleName_ChxFreqUnder1Hz_Map		••••
ň		- Add-On Instruction:	1	ModuleName_ChxHMITachReset_Map 🗋 ModuleName_ChxHMITachReset_Map		
- 😢	Errors/W	amings	1	ModuleName_Cmd_ChxFreqUnder1Hz 🗋 ModuleName_Cmd_ChxFreqUnder1Hz		•••
				The existing data type will be used. Data values for the tag will be converted if possible and sor be lost. Check to ensure tag data converts as expected.	ne value	15

6. Select the first tag ModuleName within the Final Names column and click the arrow key to browse to the Analog GuardIO_AOI instance tag.

For this example, the Analog GuardIO_AOI tag named E_IE4S was selected.

Con	figu	re Tag References						
		Import Name			Final Name			6 😭 A
<b>*</b>	9	ModuleName		1	E_IE4S			
	IJ	ModuleName_ChxFreqUnder1H	γ.	Enter A	Vame Filter		Show: All Tags	
	IJ	ModuleName_ChxHMITachRe:	-					
	P	ModuleName Cmd ChxFregUn		Name		-8	Data Type	Dese
			9	+ E_E	4S		GuardIO_Analog_AOI	
			- 1	+-E_E	45_S		GuardIO_Analog_AOI_	Safety
			ß	+-Ene	t_Adapter:1:I		AB:1734_IE4S3:1:0	
			ß	+-Ene	t_Adapter:1:0		AB:1734_IE4S:0:0	
			Ĵ	+-Ene	t_Adapter:2:I		AB:1734_0B8S_Safet	ty3:1:0

7. Select each of the remaining tags in the Final Names column and replace ModuleName text with the same name as the Analog GuardIO_AOI tag name.

For this example, ModuleName was replaced with E_IE4S in each of the remaining tags.

Con	figu	re Tag References			
		Import Name	-	Final Name	Δ
×	IJ	ModuleName	3	E_IE4S	
×	U	ModuleName_ChxFreqUnder1Hz_Map		E_IE4S_ChxFreqUnder1Hz_Map	
×	IJ	ModuleName_ChxHMITachReset_Map		E_IE4S_ChxHMITachReset_Map	
×	IJ	ModuleName_Cmd_ChxFreqUnder1Hz	1	E_IE4S_Cmd_ChxFreqUnder1Hz	-

8. Select each of the remaining tags in the Final Names column and replace Chx text with the tachometer channel you are mapping.

For this example, Ch2 was entered to map the tachometer channel 2 tags of the analog input module.

Import Configuration	a			
🗶 🍒 Find: Find Within: F	inal Name	A A Eind/Replace		
Import Content:	Config	ure Tag References		
A MainProgram	n outine (Rungs) erences Tags Add-On Instruction:	Import Name ModuleName_ChyFreqUnder1H ModuleName_ChyFreqUnder1H ModuleName_ChyHMITachRes ModuleName_Cmd_ChyFreqUnd	Final Name     E_E4S     E_E4S     E_E4S_Ch2FreqUnder1Hz     E_E4S_Ch2FreqUnder1Hz     E_E4S_Ch2HMITachReset er1Hz     E_E4S_Cmd_G00FreqUnde	Map Map Map #1Hz
		III		
<	•		ОК	Cancel Help
Ready				

9. Click OK to complete tachometer reset mapping tag rungs.

Two rungs appear just below the Analog GuardIO_AOI instance rung.



- 10. Double click the E_IE4S.Cmd_ChxTachReset tag on the XIC instruction of the first rung and click the drop down arrow.
- 11. Browse to and select the Analog GuardIO_AOI's Cmd_ChxTachReset tag.

For this example, E_IE4S.Cmd_Ch2TachReset tag was selected, representing the reset tag that is assigned to the faceplate tachometer reset button for channel 2.



The tachometer reset mapping rungs are now complete and your Analog GuardIO_AOI and mapping rungs should look similar to the following rungs.



12. Choose Logic>Map Safety Tags to map the associated standard controller tachometer reset tags to the safety tachometer reset tags.

😰 RSLogix 5000 - Robot_Ce	II in Safety_AnalogPoint_Test.ACD [
File Edit View Search	Logic Communications Tools
1 🖻 🖬 🎒 🕹 🕅	<u>O</u> pen
Offline 🛛 🗸 🗐 R	Monitor Tags
No Forces	<u>E</u> dit Tags
No Edits 🔒 🗖	Produced Tags
Safety Unlocked	Map P <u>L</u> C/SLC Messages
Controller Organizer	Map Safety Tags
5/	

- 13. Select the standard tag name field and click the pull-down arrow.
- 14. Locate the ModuleName_ChxHMITachReset_Map output tag of the first rung you imported in the previous steps and double click to place in the standard tag name field.

For this example, E_IE4D_Ch2HMITachReset_Map was selected.

Standar	d Tag Name 2 Ch2HMITachBeset Man	Safe	ty Tag Name	+	Close
<b>T</b> . En	ter Name Filter 🗸 Sl	how: All T	ags	-l	Help
Na	ime	-8	Data Type	•	
f E_	IE4S		GuardIO_Analog_AOI		Delete Row
1 E_	E4S_Ch2FreqUnder1Hz_Map		BOOL		
1 E_	E4S_Ch2HMITachReset_Map		BOOL		
1 E_	E4S_Cmd_Ch2FreqUnder1Hz		BOOL	E	
En En	et_Adapter:I		AB:1734_3SLOT:1:0		
En En	et_Adapter:0		AB:1734_3SLOT:0:0		
				-	
C	ontroller		<u>Standard</u>		

- 15. Select the safety tag name field and click the pull-down arrow.
- 16. Locate the associated ModuleName_ChxHMITachReset safety tag and double click to place in the safety tag name field.

	Standard Tag Name	₽€	Safety Tag Name		+	Close	
J	E_IE4S_Ch2HMITachReset	Map	E_IE4S_Ch2HMITachRes	et	-		
*		Y. E	nter Name Filter 🚽 🚽	Show: All T	ags		•
	[	N	lame	==	Data Type		-
		e C	md_Zone1_FaultReset		BOOL		-
		ej c	md_Zone1_OutputEnable		BOOL		-
		ej c	md_Zone1_SafetyReset		BOOL		
		e c	md_ZoneName_FaultReset		BOOL		
		E E	_IE4S_Ch2FreqUnder1Hz		BOOL		
		PE	E4S_Ch2HMITachReset		BOOL		ī.
		E E	_IE4S_S		GuardIO_An	alog_AOI_Sa	ē.
		P E	net_Adapter:1:1		AB:1734_IE4	\$3:1:0	
	l	ΡE	net Adapter:1:0		AB:1734 IE4	IS:0:0	-
			Controller			Standard	
			Promon			Cafabu	-

For this example, E_IE4S_Ch2HMITachReset safety tag was selected.

17. Repeat steps 1...16 for all of the tachometer analog channels of each module.

The following is an example of mapping four tachometer channels from an analog module named E_IE4S.

Sa	fety	Tag Mapping			
		Standard Tag Name	4	Safety Tag Name	+
		E_IE4S_Ch0HMITachReset_Map		E_IE4S_Ch0HMITachReset	
		E_IE4S_Ch1HMITachReset_Map		E_IE4S_Ch1HMITachReset	
		E_IE4S_Ch2HMITachReset_Map		E_IE4S_Ch2HMITachReset	
		E_IE4S_Ch3HMITachReset_Map		E_IE4S_Ch3HMITachReset	

## Map Digital and Analog GuardIO_AOI Tags to Safety Zone Reset Tags

You must create ladder logic to map Digital and Analog GuardIO_AOI module reset tags to controller safety tags. This enables the faceplate reset buttons to execute safety and fault resets.

1. Add a rung directly after your last Digital or Analog GuardIO_AOI instance rung for each of your safety zones.



- 2. Right-click your last Digital or Analog GuardIO_AOI instance rung and choose Import Rung.
- 3. Browse to the ME Faceplate files folder within the Guard I/O and SmartGuard Faceplate Files toolkit directory.

If the toolkit has been loaded onto your personal computer, the hard drive path is C:\Program Files\ RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Faceplate Files\ME Faceplate Files.

4. Select the GuardIO_AOI_Map_2 file and click Import.



Alternatively, if the safety I/O module you are configuring is a SmartGuard 600 controller (1752-L24BBB), then import SmartGuard_AOI_Map instead of the GuardIO_AOI_Map_2.

You must also set the copy instruction source tag to the corresponding SmartGuard 600 mapping in the 1756-DNB module and set the DeviceFailureRegister bit to correspond with the SmartGuard DeviceNet node as shown here.



5. Type the *ZoneName* from your Safety Zone Configuration worksheet into the two map tags on the Import Configuration dialog.

	Name	^	Alias For	Data Type	Description
1	Cmd_ZoneName_FaultReset_Map	-		BOOL	
Ĩ	Cmd_ZoneName_SafetyReset_Map			BOOL	
🔥 Ū	ModuleName1			GuardIO_AOI	
B 🖗	ModuleName2			GuardIO_AOI	
B 🖗	ModuleName3			GuardIO_AOI	
B 🖗	ModuleName4			GuardIO_AOI	
B 🖗	ModuleName5			GuardIO_AOI	
B 🖗	ModuleName6			GuardIO_AOI	

6. For the *ModuleName1* through *ModuleName6* Add-On Instruction tags, click *ModuleName* and then click the pulldown arrow to browse to your configured GuardIO_AOI tags as listed in your Safety Zone configuration worksheet.

mport Tags	C	onfiguration Data Types Add-On Instructi	ions						l
		Name		Δ	Alias For	Data Type	Description		Op
<u> </u>	"	Cmd_Zone1_FaultResel	t_Map			BOOL			Use
	ñ	Cmd_Zone1_SafetyRes	et_Map			BOOL			Use
	ñ	ModuleName1		-		GuardIO_AOI			Cre
	Ŭ	ModuleName2		Name			Data Type	~	Cre
	1	ModuleName3	1	+ CellGuar	d1		GuardIO_AOI		Cre
	1	ModuleName4	ň	+ CellGuar	d2		GuardIO_AOI		Cre
	1	ModuleName5						=	Cre
	ř.	ModuleName6	_						Cre
		_						~	
				Controller			<u>S</u> tanda	ard	
				Program			Safet	ly	
			Sho	w: GuardIO_	A01			>>	
							ОК	Cancel	Help

7. Double-click the GuardIO_AOI tag to select it.

If your zone has less than 6 safety modules, leave any unused tags names as is.

If your zone has more than 6 safety modules, you will need to add more instructions after the import is complete.

This examples shows two Guard I/O modules configured with ModuleNames 'CellGuard1' and 'CellGuard2'

	r I	Valle	0	Alias FOI	Data Type	Description	Operation
	U	Cmd_Zone1_FaultReset_Map			BUUL		Lifeate New
Ŷ	IJ	Umd_Zone1_SafetyReset_Map			BUUL		Lifeate New
-70	۶U	CellGuard1			GuardIO_AOI		Use Existing
-76	1	CellGuard2	-		GuardIO_AOI		Use Existing
	U	ModuleName3	-		GuardIO_AOI		Create New
	IJ	ModuleName4			GuardIO_AOI		Create New
	1	ModuleName5			GuardIO_AOI		Create New
_	0	ModuleName6			GuardIO AOI		Create New

8. Click OK to complete the import.

9. After the import is complete, the imported safety reset and fault reset logic rungs should look similar to rungs 2 and 3 in the example shown here.



10. Delete all Safety Reset and Fault Reset Rung instruction branches that are not assigned GuardIO_AOI tags, by right-clicking the branch and choosing Delete branch level.



11. Choose Logic>Map Safety Tags to map the associated standard controller tags to the safety tags.

💕 RSLogix 5000 - Robot_	Cell in SafetyApplicationExa
🛱 File Edit View Search	Logic Communications Tools W
1 2 2 3 2	Open
Offline 🛛 🗸 🔲 Rl	<u>M</u> onitor Tags
No Forces	Edit Tags
No Edits	Produced Tags
Safety Unlocked	Map PLC/SLC Messages
	Map Safety Tags
Controller Robot_Ce	<u>V</u> erify ▶

- 12. Select the standard name field and click the pull-down arrow.
- 13. Select both the Cmd_ZoneName_FaultReset_Map and Cmd_ZoneName_SafetyReset_Map tags.

afe	ty Tag Mapping	X
*	Standard Tag Name △ ← Safety Tag Name	Close
	Name	Data Type 🔥
	Cmd_Zone1_FaultReset_Map	BOOL
	Cmd_Zone1_SafetyReset_Map	BOOL
	Local:3:1	AB:1756_DNB_500E
	Local:3:O	AB:1756_DNB_496E
	J Local:3:S	AB:1756_DNB_Statt
	Controller	<u>S</u> tandard
	Program	Safety
	Show: Show All	>>
ļ		

- 14. Select the safety tag name field and click the pull-down arrow.
- 15. Select the corresponding Cmd_ZoneName_FaultReset and Cmd_ZoneName_SafetyReset safety tags.

Standard Tag Name     △ ← Safety Tag Name       X     Cmd_Zone1_FaultReset_Map       X     Cmd_Zone1_SafetyReset_Map	← <u>C</u> lose
Name     Ord_Zone1_FautReset     Cmd_Zone1_FautReset     Ord_Zone1_ROBOTCONT Cmd_Zone1_ROBOTCONT Cmd_Zone1_SafetyReset     P D_B8XO86_CAT4:1     P D_B8XO86_CAT4:0	Data Type BOOL BOOL BOOL AB:1791DS_IB8XOE AB:1791DS_IB8XOE
Controller Program Show: Show All	Standard Safety

16. Click Close to complete safety tag mapping.

S	afei	ty Tag Mapping		
	<i>.</i> / *	Standard Tag Name △ ← Cmd_Zone1_FaultReset_Map Cmd_Zone1_SafetyReset_Map	Safety Tag Name  Cmd_Zone1_FaultReset Cmd_Zone1_SafetyReset	<u>C</u> lose Help
				Delete Row

17. Repeat the <u>Map Digital and Analog GuardIO_AOI Tags to Safety Zone Reset Tags</u> steps <u>1...17</u>, on pages <u>94</u>...<u>98</u> for each of the zones you wish to use <u>1</u>the pre-configured faceplates for.

### **Configure Logix Communication**

This procedure assumes that your communication method to the GuardLogix controller is via the Ethernet protocol and that your Logix Ethernet module has already been configured. For additional information, refer to the GuardLogix Controllers User Manual, publication <u>1756-UM020</u> or the Compact GuardLogix Controllers User Manual, publication <u>1768-UM002</u>.

Follow these steps to configure Logix Communication.

- 1. Open RSLinx[®] Classic software and select Configure Drivers... in the Communication menu.
- 2. Select the Ethernet Devices driver from the pull-down list.

3. Click the Add New... button.

onfigure Drivers		?
Available Driver Types:		Close
Ethernet devices	Add New	Help
- Configured Drivers:		
Name and Description	Status	
		Configure

4. In the Add New RSLinx Classic Driver dialog box, name the new driver and click OK.

Choose a name for the new driver. (15 characters maximum)	OK
	Cancel

5. In the Configure driver dialog box, type the IP address of your Logix Ethernet module and click OK. The IP address shown is an example. Yours will be different.

-	and the state and the state of	<u></u>
ation Map	ping	
Station	Host Name	Add New
Station 0	Host Name 10.91.36.82	Add New

TIP

If your Logix Ethernet module is already configured, the IP address is displayed on the module.

- 6. Click Close.
- 7. Select RSWho from the Communication menu.
- 8. In the RSWho window, expand the Ethernet communication module until your controller is visible.



- 9. Verify that you can browse to your Logix controller.
- 10. Minimize the RSLinx application window and return to your RSLogix 5000 project window.

### Save and Download Your Program

Follow these steps to save your program and download it to your GuardLogix controller.

- 1. Save the program by choosing File>Save from the menu bar.
- 2. Turn the keyswitch on the controller to REM.
- 3. Define the path to the controller by clicking Who Active 🖁 and selecting the controller.
- 4. Click Download.

The software compares the following information in the offline project and the controller.

- Controller serial number (if project to controller match is selected)
- Firmware major and minor revisions
- Safety status between the primary controller and safety partner
- Safety task signature (if one exists)
- Safety-lock status
- 5. Follow the directions in this table to complete the download based on the software's response.

If the software indicates	Then
Download to the controller.	Choose Download. The project downloads to the controller and RSLogix 5000 software goes online.
Unable to download to the controller. Mismatch between the offline project and the controller serial number. Selected controller may be the wrong controller.	Connect to the correct controller or verify that this is the correct controller. If it is the correct controller, select the Update project serial number checkbox to allow the download to proceed. The project serial number is modified to match the controller serial number.
Unable to download to the controller. The major revision of the offline project and the controller's firmware are not compatible.	Choose Update Firmware. Choose the required revision and click Update. Confirm your selection by clicking Yes.
Unable to download to controller. The safety partner is missing or unavailable.	Cancel the download process. Install a compatible safety partner before attempting to download.
Unable to download to controller. The firmware revision of the safety partner is not compatible with the primary controller.	Update the firmware revision of the safety partner. Choose Update Firmware. Choose the required revision and click Update. Confirm your selection by clicking Yes.
Unable to download to controller. Safety partnership has not been established.	Cancel this download process and attempt a new download.
Unable to download to controller. Incompatible safety task signature cannot be deleted while the project is safety-locked.	Cancel the download. To download the project, you must safety-unlock the offline project, delete the safety task signature, and download the project.
	IMPORTANT: The safety system requires revalidation.
Cannot download in a manner that preserves safety task signature. Controller's firmware minor revision is not compatible with safety task signature in offline project.	<ul> <li>If the firmware minor revision is incompatible, to preserve the safety task signature, update the firmware revision in the controller to exactly match the offline project. Then download the offline project.</li> </ul>
	<ul> <li>To proceed with the download despite the safety task signature incompatibility, click Download. The safety task signature is deleted.</li> <li>IMPORTANT: The safety system requires revalidation.</li> </ul>
Unable to download to controller. Controller is locked. Controller and offline project safety task signatures do not match.	Choose Unlock. The Safety Unlock for Download dialog box appears. If the Delete Signature checkbox is selected and you choose Unlock, you must confirm the deletion by selecting Yes.
A non-recoverable safety fault will occur in the safety controller. No designated Coordinated System Time (CST) master exists.	Check Enable Time Synchronization and click Download to proceed.

# SmartGuard[™] 600 Controllers Logic Integration

### Introduction

In this chapter, you configure your SmartGuard controller and I/O modules by using pre-defined configurations, and create your safety logic by leveraging pre-configured safety function block logic. In addition, you import faceplate logic for use with a Logix controller.

# **Before You Begin**

Complete your risk assessment and functional specification. Create a bill of materials based on your application needs.

Load RSNetWorx[™] for DeviceNet, RSLogix 5000°, RSLinx[®] Classic, and FactoryTalk[®] View Machine Edition software on your personal computer or workstation.

### What You Need

- RSLogix 5000 software
- RSNetWorx for DeviceNet software
- RSLinx software
- Safety Accelerator Toolkit DVD, SAFETY-CL002 or visit the Integrated Architecture[®] Tools and Resources website at <u>http://www.ab.com/go/iatools</u>
- Product manuals:
  - SmartGuard 600 Controllers User Manual, publication 1752-UM001
  - 1769 CompactLogix[™] Controllers User Manual (for catalog numbers 1769-L31, 1769-L32C, 1769-L32CR, 1769-L32E, or 1769-L35E), publication <u>1769-UM011</u>
  - CompactLogix System User Manual (for catalog numbers 1769-L20, 1769-L30), publication <u>1769-</u> <u>UM007</u>
  - Logix Common Procedures Programming Manual, publication <u>1756-PM001</u>, if you are not familiar with programming Logix controllers with RSLogix 5000 software

### **Follow These Steps**



## Configure Your SmartGuard 600 Controller and Safety I/O

Follow these steps to access the pre-configured RSNetWorx application file from the toolkit and configure both the SmartGuard 600 and safety I/O connections for your specific application.

### Select and Save Pre-configured Configuration File

1. Browse to the Guard I/O[™] and SmartGuard Modules directory in the toolkit.

If the toolkit has been loaded onto your personal computer, the hard drive path is C:\Program Files\ RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Modules.



The directory includes three RSNetWorx application files based on the safety category level:

- SmartGuard IO CAT 2
- SmartGuard Guard IO CAT 3
- SmartGuard IO CAT 4

Open the RSNetWorx DNT file appropriate for your application's safety category level.

2. Double-click the DNT file to launch RSNetWorx for DeviceNet application file.

If RSNetWorx for DeviceNet does not launch, make sure that RSNetWorx for DeviceNet software has been installed and is at version 9.1 or later.

For this example, we opened SmartGuard Guard IO CAT 4.dnt.

😑 C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Guard 10 and SmartGuard Modules 💶 🗙								
Eile Edit View Favorites Tools	Help			1				
🛛 🚱 Back 🔹 🕥 👻 🏂 🔎 Sea	arch 😥 Fo	lders 🔒 🏂 🕽	< 🍤 📖 ·					
Address C:\Program Files\RA_Simpl	ification\Safet	yGuardLogix\Files\Guard	IO and SmartGuard Modules	🔁 Go				
Name 🔺	Size	Туре	Date Modified					
SLx Guard IO Configuration	37 KB	Microsoft Excel Wor	3/9/2011 2:40 PM					
BuardIO_Module_Configurati	414 KB	RSLogix 5000 Project	7/1/2010 12:03 PM					
BuardIO_Module_Configurati	434 KB	RSLogix 5000 Project	4/27/2010 12:46 PM					
Safety Zone Configuration	25 KB	Microsoft Excel Wor	3/9/2011 2:43 PM					
SG Guard IO Configuration	38 KB	Microsoft Excel Wor	3/9/2011 2:42 PM					
SG Local IO Configuration	32 KB	Microsoft Excel Wor	3/9/2011 2:43 PM					
SmartGuard Guard IO CAT 2	56 KB	Rockwell Automatio	4/14/2010 2:54 PM					
SmartGuard Guard IO CAT 3	56 KB	Rockwell Automatio	4/14/2010 2:55 PM					
SmartGuard Guard IO CAT 4	56 KB	Rockwell Automatio	4/26/2010 11:31 AM					

3. Save the file before you make edits.

For this example, the file was saved as RobotCell.dnt.



#### Delete, Add, and Configure SmartGuard 600 Controller and Guard I/O Modules

Each file contains all of the Guard I/O modules and both the SmartGuard 600 controller (1752-L24BBB) and the SmartGuard 600 controller with EtherNet/IP (1752-L24BBBE).

1. Select the Graph tab at the bottom of the spreadsheet to view controllers and modules in a graphical form.



2. Reference your Safety Zone Configuration spreadsheet and select all of the controllers and Guard I/O modules that are not in your application. Use the Ctrl key and left mouse button to select the individual controllers and modules.

For this example, all modules except one SmartGuard 600 Controller and 1732DS-IB8 were selected.

3. Right-click one of the modules in the group and choose Delete from the pull-down menu to delete all the selected modules.



4. For systems with more than one Guard I/O module of the same type, right-click the Guard I/O module and select Copy.



5. Right-click in the Graphic view and choose Paste to add additional modules to your system.



6. Double-click the node number below each device and type the desired DeviceNet node number.



7. To configure the controller's safety connections, right-click the SmartGuard 600 controller, and choose Properties.



- 8. Select the Safety Connection tab.
- 9. To auto-configure the Guard I/O modules, right-click each Guard I/O module and choose Auto-Add Default Connections.

EtherNet	/IP Target	1/0	Local O	utput	Local	Input/Te	est Output	
Mode	e/Cycle Tim	ie	M	aintenan	се		Logic	
E	rror History		1	Ether	Net/IP E	rror Histo	лу	
General	Safety	Safety (	Connectio	on Sa	afety Slav	/e1/0	Slave I/0	
						<b>112 11</b> 2	×	
Configure	d Safety Co	onnections	8					
Name			Δ.	Data	RPI	CRTL	. Config	
	14, 01-1732	DS-IB8 C4	AT 4				-	
	5, 1732DS	IB8 CAT	Add	Lonnecti	on		Ins	
			Auto	-Add Der	ault Con	nections		
			Selec	t All Dev	ices		Ctrl+A	
			What	's this?				
			1				Þ	

10. For a Cat. 2 application or for a Cat. 4 input-only Guard I/O module, remove the Test Output connection that is created with the Auto-Add Default connections, as it is not required.

For this example, the Test Output connection for 1732DS-IB8 CAT 4 is removed.

Maintenand Ether Stion Sa Data 2 Bytes 1 Byte 2 Bytes 1 Byte 500 Propertie Connection	EUCai ce Net/IP E fety Slav 10 ms 10 ms 10 ms 10 ms	L rror Histor e I/O   CRTL 40.1 40.1 40.1 40.1	ogic y Slave I/I Config Signat Signat Signat
Ether Ether Ction Sa Data 2 Bytes 1 Byte 2 Bytes 1 Byte 2 Bytes 1 Byte Connection	Net/IP E fety Slav RPI 10 ms 10 ms 10 ms 10 ms	ror Histor e I/O ] <b>12</b> CRTL 40.1 40.1 40.1 40.1	y Slave I/( Config Config Signat. Signat.
2 Bytes 2 Bytes 2 Bytes 2 Bytes 1 Byte 2 Bytes 1 Byte 500 Propertie Connection	fety Slav RPI 10 ms 10 ms 10 ms 10 ms 10 ms	e I/O ] <b>111 ()</b> <b>111 ()</b> <b>()</b> <b>()()()()()()()()()()</b>	Slave I/( Config Signat. Signat. Signat.
2 Bytes 2 Bytes 2 Bytes 2 Bytes 1 Byte on Propertie Connection	RPI 10 ms 10 ms 10 ms 10 ms	40.1 40.1 40.1 40.1	i X 🖆 Config Signat. Signat. Signat.
2 Bytes 2 Bytes 1 Byte 2 Bytes 1 Byte on Propertie Connection	RPI 10 ms 10 ms 10 ms 10 ms 10 ms	0.1 40.1 40.1 40.1 40.1	Config Signat Signat Signat Signat
2 Bytes 1 Byte 2 Bytes 1 Byte on Propertie Connection	10 ms 10 ms 10 ms 10 ms	40.1 40.1 40.1 40.1	Signat. Signat. Signat. Signat.
		Del	
Default Co	nnection	s codu a	
is?		CUITA	<u>.</u>
			•
	Default Co Devices is?	Default Connection Devices is?	Default Connections Devices Ctrl+A is?

### **Configure SmartGuard 600 Local Inputs and Test Outputs**

The SmartGuard 600 local input and test output configuration is dependent on the input device type, input relationship, and fault detection requirements. All the inputs and test outputs are pre-configured for volt-free contact devices to perform the diagnostics necessary to achieve the safety category level indicated by the pre-configured *.dnt file name. Use the following steps and table recommendations to configure the safety inputs and test outputs.

Input Device Type	Category	Channel Mode	Test Source	On-Off Delay Time	Off-On Delay Time	Dual Channel Mode	Discrepancy	Time Error Latch Time	Test Output Mode
Volt-free contacts (2 Normally Closed)	4	Test pulse from test output	Ch A: Test Output(x), Ch B: Test Output(x+1) ⁽¹⁾	Cycle Time x 2 ⁽²⁾	Cycle Time x 2	Dual Channel Equivalent	100	1000	Safety Pulse Test
	3	Used as safety input	Not Used	Cycle Time x 2	Cycle Time x 2	Dual Channel Equivalent	100	1000	Safety
Volt-free contacts (1 Normally Closed, 1 Normally Open)	4	Test pulse from test output	Ch A: Test Output(x), Ch B: Test Output(x+1)(1 )	Cycle Time x 2	Cycle Time x 2	Dual Channel Equivalent	100	1000	Safety Pulse Test
	3	Used as safety input	Not Used	Cycle Time x 2	Cycle Time x 2	Dual Channel Equivalent	100	1000	Safety
Volt-free contacts (1 Normally Closed)	2	Test pulse from test output	Test Output(x)	Cycle Time x 2	Cycle Time x 2	Single Channel	N/A	1000	Safety Pulse Test
2 channel OSSD (Output Signal	4 ⁽³⁾	Used as safety input	Not Used	0	0	Dual Channel Equivalent	0	1000	Not Used
SWITCH DEVICE)	3 ⁽⁴⁾	Used as safety input	Not Used	0	0	Dual Channel Equivalent	0	1000	Not Used
1 channel OSSD	2 ⁽⁵⁾	Used as safety input	Not Used	0	0	Single Channel	N/A	1000	Not Used

(1) Dual channels require different test sources.

(2) Time must be multiple of cycle-time.

(3) Must be a Cat. 4 capable OSSD.

(4) Must be a Cat. 3 capable OSSD.

(5) Must be a Cat. 2 capable OSSD.
1. To access SmartGuard 600 local input and test output properties, right-click the SmartGuard controller and choose Properties.



- 2. On the Properties dialog box, choose the Local Input/Test Output tab.
- 3. On the General tab, select each of the inputs (00...15) and click Edit to access the individual local input configuration dialog box.

Mode Ei ieneral EtherNet	/Cycle Inne   ror History Safety   Safety 'IP Target I/O	Maintenance EtherNe Connection Safety Local Output	Logn t/IP Error History y Slave I/O   Sla Local Input/Test C	c ive 1/1 Jutput
Error Lato	h Time	(0 - 65530 ms defau	lt : 1000 ms )	
No.	Name	Mode	Test Source	
O0[e]		Test pulse fr	Test Output0	
🙆 01[e]		Test pulse fr	Test Output1	
O2[e]		Test pulse fr	Test Output0	
🙆 03[e]		Test pulse fr	Test Output1	
🗿 04[e]		Test pulse fr	Test Output0	
🙆 05[e]		Test pulse fr	Test Output1	
O6[e]		Test pulse fr	Test Output0	
🙆 07[e]		Test pulse fr	Test Output1	
O8[e]		Test pulse fr	Test Output0	
		Test pulse fr	Test Output1	
🗿 09[e]		Test pulse fr	Test Output0	-
<ul> <li>09[e]</li> <li>10[e]</li> </ul>				- 22.5

Type the input name into the I/O Comment field.
 For this example, we typed EStop ChA.

1/0 Comment :	EStop_ChA	
Channel Mode :	Test pulse from test out	-
Test Source :	Test Output0	-
Off On Delay : On Off Delay :	0 ms Cycle Time- 10.0 ms	
Dual Channel		
Channel Mode :	Dual Channel Equivalent	-
Discrepancy Time	100 * ms	

5. Select the Channel Mode from the pull-down list based on the table below.

I/O Comment:	EStop_ChA		
Channel Mode :	Test pulse from tes	t out	
Test Source :	Not Used Test pulse from tes	tout	
Off On Delay	Used as standard in Used as standard in ms	nput	
On Off Delay:	0 ÷ ms	10.0 ms	
)ual Channel —			
Channel Mode :	Dual Channel Equi	valent	
) iscrepancy Time	100 me		

Channel Mode	Description
Not Used	The input channel is not connected to an external device. This is the default.
Test pulse from test output	Use this mode when you are achieving a Category 4 input circuit. This mode assumes that you have connected your input device to a Pulse Test Source, and then wired to this input terminal. This enables detection of short circuits with the power supply line (positive side), earth faults, and short circuits with other input signal lines (channel-to-channel shorts). The controller must know that the input signal is being pulse-tested, or nuisance trips may occur.
Used as a safety input	Use this mode to connect to a safety device with a semiconductor output, such as a light curtain.
Used as a standard input	Use this mode to connect to a standard (non-safety) device.

- 6. If you set the Channel Mode to Test pulse from test output, choose the test output to use in combination with the safety input by selecting it from the Test Source pull-down list.
- 7. Set the ON Delay and OFF Delay time for the safety input. The setting range is 0 ... 128 ms. Setting the input ON and OFF delays helps reduce the influence of chattering and external noise. When setting the value for ON and OFF Delay, consider the following:
  - The ON Delay and OFF Delay time value must be an integral multiple of the controller's cycle time. Make sure to check the displayed cycle time value before you set the value for ON and OFF Delay time.
  - The optimal value for the cycle time is automatically calculated based on the parameter settings and the program. Therefore, the ON and OFF Delay time must be set last.
- 8. Set the Dual Channel mode and Discrepancy Time for the safety input.

Edit Local Input Terminal	? ×
I/O Comment : EStop_ChA	
Channel Mode : Test pulse fr	om test out
Test Source : Test Output	
Off On Delay : 0 🗶 r On Off Delay : 0 🗶 r	ns Cycle Time 10.0 ms
Dual Channel	
Channel Mode : Dual Channe	el Equivalent 📃 💌
Discrepancy Time 100 - r	ns
ОК	Cancel

Setting Dual Channel mode enables the status of two inputs to be evaluated and reflected in I/O tags. The Discrepancy Time between changes in the status of two inputs can also be evaluated. The combinations that can be set are pre-defined. The Discrepancy Time can be set between 0 and 65530 ms in 10 ms increments. Both inputs must change state within the Discrepancy Time or an error occurs.

Channel Mode	Description
Single Channel	The safety input terminal is used independently. The two channels are independent of each other. The module will not detect discrepancy faults.
Dual Channel Equivalent	The safety input terminal is used as a Dual Channel Equivalent with a paired safety input terminal. The channels are dependent on each other. The active state is when both channels are high. The module will detect discrepancy faults between channels.
Dual Channel Complementary	The safety input terminal is used as a Dual Channel Complement with a paired safety input terminal. The channels are dependent on each other. This setting is typically used for devices with diverse inputs. Active state is when one channel (first channel) is high the other (second channel) is low. The module will detect discrepancy faults between channels.

9. Click OK to save the local safety input configuration.

10. Select the Test Output tab on the Local Input/Test Output tab to access the Test Output configuration.

Error History       EtherNet/IP Error History         Seneral       Safety       Safety Connection       Safety Slave I/O       Slave I/O         EtherNet/IP Target I/O       Local Dutput       Local Input/Test Output         Error Latch Time       1000 = ms       (0 - 65530 ms       default : 1000 ms )         General       OnOff Delay/Discrepancy Time       Test Output         No.       Name       Mode         00       Pulse Test Output         01       Pulse Test Output         02       Pulse Test Output         03       Pulse Test Output         Edit       Adjust the valid ON/OFF delays with cycle time value.	Mod	e/Cycle Time	Maintenance	Logic
Safety       Safety       Safety       Safety       Safety       Slave I/O         EtherNet/IP Target I/O       Local Output       Local Input/Test Output         Error Latch Time       1000 =       ms       (0 - 65530 ms       default : 1000 ms )         General       OnOff Delay/Discrepancy Time       Test Output       1000 ms )         No.       Name       Mode       1000 ms )         00       Pulse Test Output       1000 ms )         01       Pulse Test Output       1000 ms )         02       Pulse Test Output       1000 ms )         03       Pulse Test Output       1000 ms )	E	Fror History	EtherNet/IP Er	ror History
EtherNet/IP Target I/0     Local Dutput     Local Input/Test Output       Error Latch Time     1000	General	Safety   Safety Con	nection   Safety Slave	1/0   Slave 1/0
Error Latch Time          1000 ms       (0 - 65530 ms       default : 1000 ms )         General       OnOff Delay/Discrepancy Time       Test Output         No.       Name       Mode         00       Pulse Test Output         01       Pulse Test Output         02       Pulse Test Output         03       Pulse Test Output         Edit       Adjust the valid ON/OFF delays with cycle time value.	EtherNe	t/IP Target I/O Lo	cal Output Local I	nput/Test Output
General     OnOff Delay/Discrepancy Time     Test Output       No.     Name     Mode       00     Pulse Test Output       01     Pulse Test Output       02     Pulse Test Output       03     Pulse Test Output       04     Pulse Test Output       05     Pulse Test Output       06     Pulse Test Output       07     Pulse Test Output       08     Pulse Test Output		1000 <u>→</u> ms (0.	65530 ms_default : 100	10 ms )
No.         Name         Mode           00         Pulse Test Output           01         Pulse Test Output           02         Pulse Test Output           03         Pulse Test Output           Edit         Adjust the valid ON/OFF delays with cycle time value.	-	6		
00     Pulse Test Output       01     Pulse Test Output       02     Pulse Test Output       03     Pulse Test Output       Edit     Adjust the valid ON/OFF delays with cycle time value.	General	OnOff Delay/Discrepar	ncy Time Test Output	
01     Pulse Test Output       02     Pulse Test Output       03     Pulse Test Output       Edit     Adjust the valid ON/OFF delays with cycle time value.	General No.	OnOff Delay/Discrepar	ncy Time Test Output	
02     Pulse Test Output       03     Pulse Test Output       Edit     Adjust the valid ON/OFF delays with cycle time value.	No.	OnOff Delay/Discrepar	ncy Time Test Output Mode Pulse Test I	Dutput
03     Pulse Test Output       Edit     Adjust the valid ON/OFF delays with cycle time value.	No. 00 01	OnOff Delay/Discrepar	ncy Time Test Output Mode Pulse Test I Pulse Test	Dutput Dutput
Edit	No. 00 01 02	OnOff Delay/Discrepar	ncy Time Test Output Mode Pulse Test 1 Pulse Test 1 Pulse Test 1	Dutput Dutput Dutput
Edit	No.           00           01           02           03	OnOff Delay/Discrepar	Mode Pulse Test U Pulse Test I Pulse Test I Pulse Test I Pulse Test I	Dutput Dutput Dutput Dutput Dutput
	No.           00           01           02           03	OnOff Delay/Discrepar	ncy Time Test Output Mode Pulse Test Pulse Test Pulse Test Pulse Test	Dutput Dutput Dutput Dutput Dutput

11. Set the Error Latch Time. The Error Latch Time applies to all safety inputs and test outputs, and sets the time to latch the error state when an error occurs in an input or output.

Even if the error is removed, the error state is always latched for the configured error latch time. The Error Latch Time is set from 0...65530 ms in 10-ms increments. The default is 1000 ms.

- 12. Select each of the Test Outputs and click Edit to access the individual Test Output configuration dialog box.
- 13. Type the test output name into the I/O Comment field.

For this example, we typed LOCKINGSW1SOLENOID.

I/O Commer	nt: LOCKINGSW1SOLENOID	
Test Output Mod	e : Pulse Test Output	-

14. From the Test Output Mode pull-down list, choose a Test Output Mode based on the following table.

Test Output Mode	Description
Not Used	The corresponding Test Output is not used.
Standard Output	Select this mode if you are connecting to the input from a muting lamp or programmable logic controller. This output is used as a monitor output.
Pulse Test Output	Select this mode if you are connecting a device with a contact output in combination with a safety input.
Power Supply Output	Select this mode if you are connecting to the power supply terminal of a safety sensor. The voltage supplied from the test output terminal to the I/ O power supply (V,G) is output.
Muting Lamp Output	Select this mode to specify a muting lamp output. This setting is supported only on the T3 terminal. When the output is ON, disconnection of the muting lamp can be detected.

- 15. Click OK on the Test Output Configuration dialog box to accept the test output configuration.
- 16. Click OK on the overall Local Input/Test Output dialog box to save the local input and test output configuration.
- 17. Repeat Steps 1 through 14 to configure each input and test output in your system.

#### **Configure SmartGuard 600 Local Outputs**

The SmartGuard 600 local output configuration is dependent on the output device type, output relationship, and fault detection requirements. All of the outputs are pre-configured for coil devices to perform the diagnostics necessary to achieve the safety category level indicated by the pre-configured .dnt file name. Use the following steps and table recommendations to configure the safety outputs.

Output Device Type	Category	Channel Mode	Dual Channel Mode
Coil	4	Safety Pulse Test	Dual Channel
	3	Safety	Dual Channel
	2	Safety Pulse Test	Single Channel
Solid-state actuators	4 ⁽²⁾	Safety Pulse Test	Dual Channel
(non-reactive to pulse testing)	3 ⁽³⁾	Safety	Dual Channel
	2 ⁽⁴⁾	Safety Pulse Test	Single Channel
Solid-state actuators	4 ⁽²⁾	Safety	Dual Channel
(reactive to pulse testing)	3 ⁽³⁾	Safety	Dual Channel
	2 ⁽⁴⁾	Safety	Single Channel

Table 11 - Typical Safety Output Configuration Parameters

(1) For example, Kinetix[®] 300 or Kinetix 350 drives.

(2) Must be a Category 4 capable device.

(3) Must be a Category 3 capable device.

(4) Must be Category 2 capable device.

1. To access SmartGuard 600 local output properties, right-click the SmartGuard controller and choose Properties.



- 2. On the Properties dialog box, choose the Local Output tab
- 3. Select each of the outputs (00...07) and click Edit to access the individual local input configuration dialog boxes.

ieneral EtherNe	rror History Ei Safety Safety Connection   VIP Target I/O Local Output	hance Logic therNet/IP Error History Safety Slave 1/0 Sla Local Input/Test 0	; ve I/ utpui
Error La General	ch Time 1000 - ms (0 - 65530 ms	default : 1000 ms )	
No.	Name	Mode	
00		Safety Pulse Test	
<b>O</b> 1		Safety Pulse Test	
02		Safety Pulse Test	
O3		Safety Pulse Test	
04		Safety Pulse Test	
O5		Safety Pulse Test	
2100		Safety Pulse Test	
06		Safety Pulse Test	
06	-		

4. Type the output name into the I/O Comment field.

For this example, we typed ROBOTCONTACTOR A.

Channel Mode : Safety Pulse Test	
	•
Dual Channel	

5. Select the Channel Mode from the pull-down list based on table below.

1/0 Comment	ROBOTCONTACTOR A	
Channel Mode :	Safety Pulse Test	
Dual Channel	Not Used Safety	
a di chamina	Safety Pulse Test	
	Dual Channel	

Channel Mode	Description
Not Used	The output terminal is not connected to an output device.
Safety	A test pulse is not sent when the output is on. When the output is off, short-circuits with the power supply line (positive side) can be detected. Ground faults can also be detected.
Safety Pulse Output	A test pulse is sent when the output is on. This enables detection of short circuits with the power supply line (positive side) whether the output is on or off. Ground faults and short circuits between output signals can also be detected.

**IMPORTANT** If a safety pulse output is set, an off pulse signal (pulse width 580 μs) is output to diagnose the output circuit when the safety output turns ON. Check the input response time of the control device to make sure this output pulse will not cause malfunctions.

6. Set the Dual Channel mode for the safety output from the pull-down list based on table below. Setting Dual Channel mode enables an error to be detected if the two outputs from a user program are not equivalent. If an error is detected in one of two outputs circuits, both outputs to the device become inactive.

Channel Mode	Description
Single Channel	The safety output terminal is used independently.
Dual Channel	The safety output terminal is paired with another output terminal. The output can be turned ON when both the output and the paired safety output are consistent.

7. Repeat Steps 1 through 5 to configure each output in your system.

8. Save your RSNetWorx application file.

* *SmartGuard_Robot_Cell - RSNetWorx for	DeviceNet
Eile Edit View Network Device Diagnostics Tools	s Help
📔 🖆 - 🔚 😂 🕺 🖻 🖻 😽	
🔍 Q   巨 作  驛 - 品   🗛   📰 🅻	
1752-L24BBBE CAT 4	
H + H Graph / Spreadsheet / Master/Slave	Configuration ) Diagnostics
Message Code Date	Description
Σ [1]	<b>_</b>
Ready	Offline //

## **Create Your Safety Zone Logic**

The Logic Editor consists of a Function List, where function blocks, I/O tags, and other programming elements are listed, and a workspace where programming is performed.

Programs are created from function blocks, input tags, and output tags. The basic elements are dragged from the Function List to the workspace and placed where you desire them. The I/O are connected with connection lines.

A maximum of 254 logic functions and function blocks can be used on maximum of 32 pages. You can create custom blocks made up of predefined blocks, but ALL blocks within the custom blocks count toward the 254 maximum.



#### **Select Zone Inputs**

1. To access the Logic Editor, right-click the SmartGuard controller and choose Properties.



2. In the SmartGuard Properties dialog box, select the Logic tab and click Edit to open the Logic Editor.



3. Select the Input tab within the Logic Editor to access the inputs.



4. Expand the first instance of your safety controller so it displays the safety inputs that you configured in the previous section.

The inputs shown are for the Robot Cell Example; yours will be specific to your application.



5. Select and drag all of the safety inputs required for your initial zone control onto the Logic Editor Page 1.

Two E-stop, two light curtains, and one feedback safety input are used in this simple zone control example. Group safety input channels as shown for easier function block connections later on in editing process.



6. Expand the second instance of your safety controller to display any standard reset inputs needed for your application.



For this example, eight standard reset inputs are listed.



 Select and drag any standard reset inputs required for your initial zone control onto the Logic Editor, Page 1. Reset bit 0 is used in this simple zone control example.

#### **Select Safety Device Function Blocks and Connect Inputs**

1. Within the Logic Editor, select the FunctionBlock tab to access device and logic function blocks.

1752-L24BBBE CAT 4 - Pa	ige 1 (297n	nm x 211m	m)]			- 🗆 ×
Eile Edit View Eunction Page FunctionBlo	ick <u>H</u> elp					
] ❷ <b>@</b>   ħ € % ×   ∽ ~   @	100%	•	2 x   •	0 -0	B 📝 A	
	Page 1					
FunctionBlock Finput Toutput						<u>^</u>
AND Comparator Comparator Comparator Comparator Comparator		(03) (00) Reset				 

2. Select and drag the associated Safety Device function block for your initial safety input pair to the right of the inputs on the Logic Editor page.

For this example, we added the E-STOP safety device block to the Logic Editor page.



3. Click, drag, and drop safety input channels onto the associated Safety Device function block.



4. Repeat steps 1 through 3 for all safety inputs.

For this example, the Light Curtain Monitoring function block was also added and connected to the safety inputs.



#### Select Input Logic Function Blocks and Connect Inputs

1. Identify paired Safety Device blocks, and select and drag the associated Logic function blocks to the right of the Safety Device blocks.

For this example, an AND logic block was added to provide safety logic allowing outputs when both ESTOP and Light Curtain inputs are OK.



- 2. Click, drag, and drop Safety Device output pins onto the associated Logic function blocks.
- 3. Repeat steps 1 and 2 for all paired Safety Device blocks.

#### **Import Zone Function Block and Connect Inputs**

1. Within the Logic Editor, choose Import from the FunctionBlock menu.



2. Browse to the Files\Safety Device Routines\SmartGuard directory in the toolkit and select ZoneFB.fbd.

If you loaded the toolkit onto your personal computer's hard drive, the default path is C:\ProgramFiles\RA_Simplification\SafetyGuardLogix\Files\Safety Device Routines\SmartGuard.

3. Click Open to initiate the Zone Function Block import.

Open		? ×
Look in: 🔀	SmartGuard	- ← 🖻 📸 -
Zone FB.fl	bd	
File <u>n</u> ame:	Zone FB	<u>O</u> pen
Files of type:	FunctionBlock file (*.fbd)	Cancel

The Zone Function Block appears in the User define directory of the FunctionBlock tree.

4. Right-click Zone FB and choose Edit.



The Zone FB appears in the Logic Editor, Page 1.



The Zone FB controls a single safety zone. A zone is a group of all of the monitored safety inputs, such as E-stops, light curtains, or gate switches, that must have a status of OK to energize a set of safety outputs.

Inside the logic of the Zone FB, an Inputs OK input represents a summation of all of the monitored safety inputs. The Restart block monitors this import. If the input is OK, a low-high-low transition of the Restart input energizes the output of the Restart block.

If the output of the Restart block is OK, the External Device Monitoring (EDM) block turns ON the safety outputs, 01 and 02. The EDM block also monitors the feedback input and turns OFF the outputs if the feedback does not switch in a predefined time.

- 5. Close the Zone FB Logic Editor.
- 6. Select and drag the Zone FB block to the right of the input blocks on the Logic Editor page.



7. Click, drag, and drop the Safety Input Logic Block output pin onto the Zone FB's Inputs OK input pin.



8. Click, drag, and drop Reset and Feedback Input pins onto the Zone FB's Restart and Feedback input pins, respectively.



#### Select Zone Outputs and Connect to Zone Function Block

- 1. To access your zone outputs, select the Output tab in the Logic Editor.
- 2. Expand your safety controller to display the safety outputs you configured in the previous section.

The safety outputs shown here are for the Robot Cell example. Your outputs will be specific to your application.



3. Select and drag all of the safety outputs required for you initial zone control onto the Logic Editor, Page 1.

Two safety contactors, A and B, and a safety reset output were selected for use in this simple zone control example.



4. Click, drag, and drop safety output pins onto the associated Zone FB output pins.



For this example, the Zone FB outputs 01 and 02 are connected to SmartGuard 600 safety outputs to control Cat. 4 dual-safety contactors for the robots. For Cat. 2, only one actual output is required, so an unconnected or unnamed safety output may be connected to the second Zone output pin. The Zone FB Restart Required output is also connected to the SmartGuard 600 safety output to provide power to a safety reset-required indicator.

5. Click the Apply icon to apply the logic changes and then click OK to confirm.



6. To create additional zone logic for your application, click Add Page and OK and repeat all of the <u>Create Your</u> <u>Safety Zone Logic</u> steps starting on page <u>116</u>.



## Save and Download Your RSNetWorx Project

1. Close the Logic Editor.



2. Click Apply and then OK to close the Properties dialog box.

EtherNe	/IP Target I	/0 LocalOu	tput	Local Input/	Test Output
E	rror History		Ether	Net/IP Error Hi	story
General	Safety	Safety Connection	n Sal	ety Slave I/O	Slave I/O
Mod	e/Cycle Time	e Ma	intenanc	e	Logic
Passwo	rd able Passwo	ıd			

3. Click Save to save the RSNetWorx project.



4. Click Online to go online to the DeviceNet network.



5. On the Browse for Network dialog box, navigate to your DeviceNet network under your SmartGuard controller and click OK.



The software browses for all nodes on the network.

6. Click Cancel after your highest node has been found.

Browsing net	work	×
Not four	d: Device at address 17	
	Cancel	

7. Right-click your SmartGuard controller node and choose Download to Device.

*SmartGuard_Robot_Cell - RSN	tWorx for DeviceNet
Eile Edit View Network Device Diag	stics Iools Help
🛅 🖆 - 🖬 🎒 🗶 🖻 🛍	?
● Q 目 性 驛 - 品 4-1	
1752-L24BBBE	×
	Ctrl+X
	Ctrl+C
R Paste	Ctrl+V
Delete	Del
Upload from Device	-
H I I M Gra Download to Device	pn 👌 Diagnostics , 🕥 🕨

The software notifies you when the download has completed successfully.

- 8. Double-click your SmartGuard controller node to open the Properties dialog box.
- 9. Select the Mode/Cycle Time tab.
- 10. Click Change Mode.

1752-L24BBBE	? ×
EtherNet/IP Target I/O Local Output Local Input/Te	st Output
Error History EtherNet/IP Error Histor	ry ]
eneral   Safety   Safety Connection   Safety Slave I/O	Slave I/O
Mode/Cycle Time Maintenance L	ogic
Automatic Execution Mode	
<ul> <li>Normal Mode (Need execution command)</li> </ul>	
C Automatic Execution Mode (Automatically execute after power of the security of the securi	ver-up)
NOTE	
This parameter becomes effective when the device starts with	
power-up after the download of this configuration.	
DeviceNet Communication	
DeviceNet Communication     Enable (Normal Mode)     Disable (Stand Alone Mode)     WARNING     If you would like to disable the DeviceNet communication, you c     configure it from the USB or Ethernet connection only. If you dor     the USB or Ethernet connection and you select "DISABLE", the     download of this configuration will fail.	an It use
DeviceNet Communication  C Enable (Normal Mode)  WARNING  If you would like to disable the DeviceNet communication, you c configure it from the USB or Ethernet connection only. If you dor the USB or Ethernet connection and you select "DISABLE", the download of this configuration will fail.  Cycle Time  8.0 ms  I/O Refresh Cycle Time  4.0 ms  Change	an 't use



11. Select Execute and click OK.

## **Verify Zone Safety Logic Operation**

- 1. Check that all safety input devices in your initial zone are in the safe or OK state.
- 2. Energize the Restart input and verify that the zone safety outputs energize.
- 3. Trip one of the zone safety inputs and verify that the zone safety outputs de-energize.
- 4. Place the safety input back into its safe state, re-energize the Restart input, and verify that the safety outputs energize.
- 5. Repeat steps 3 and 4 for each zone safety input.
- 6. Repeat steps 1...5 for each safety zone in your system.

## **Add Your Faceplate Logic**

Because SmartGuard 600 controllers process only safety logic, they are typically used in conjunction with CompactLogix[™] controllers to process the standard control logic and communicate safety status and diagnostic information to PanelView[™] Plus terminals.

The toolkit includes SmartGuard 600 and Guard I/O HMI faceplates that provide status of the safety circuits and logic, and provide diagnostics for safety demands and faults. To support these faceplates, standard logic needs to be added to your CompactLogix or GuardLogix controller.

If you are using a SmartGuard 600 controller with EtherNet/IP capabilities (1752-L24BBBE), use the steps in <u>Copy</u> <u>SmartGuard 600 Module Configuration to Your Logix Controller Project on page 130</u> to add the required logic to support the SmartGuard 600 controller faceplate.

If your SmartGuard 600 controller has only DeviceNet communication capability (1752-L24BBB), follow the steps in <u>Adding Your Faceplate Logic on page 67</u>.

#### Copy SmartGuard 600 Module Configuration to Your Logix Controller Project

The toolkit includes a generic Ethernet module that has been pre-configured for access to status and diagnostic data assemblies in the SmartGuard 600 controller that the SmartGuard 600 faceplate can use. Follow these steps to use the generic module.

1. Navigate to the Guard I/O and SmartGuard Modules directory in the toolkit and open the RSLogix 5000 project named GuardIO_Module_Configuration_V17.ACD.

C: Program Files RA_Simplification S	afetyGuardLo	gix\Files\Guard 10	and SmartGuar 💶 🗙
Eile Edit View Favorites Tools Help			C:\Program Files\RA_Si
🔇 Back 🔹 🕥 🖌 🎓 🔎 Search 👔	Folders	3 3 × 19	<b></b> .
Address C:\Program Files\RA_Simplification\S	SafetyGuardLogix	Files\Guard IO and Sma	rtGuard Modules 💌 🛃 Go
Name A	Size	Туре	Date Modified
CLX Guard IO Configuration	37 KB	Microsoft Excel Wor	3/9/2011 2:40 PM
BuardIO_Module_Configuration_V16.ACD	414 KB	RSLogix 5000 Project	7/1/2010 12:03 PM
GuardIO_Module_Configuration_V17.ACD	434 KB	RSLogix 5000 Project	4/27/2010 12:46 PM
Safety Zone Configuration	25 KB	Microsoft Excel Wor	3/9/2011 2:43 PM

If you loaded the toolkit image onto your personal computer's hard drive, the default path is C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Modules.

- 2. In the Controller Organizer, navigate to the I/O Configuration folder.
- 3. Right-click ETHERNET-MODULE SmartGuard_600 and choose Copy.



4. Open your existing Logix controller project and paste the ETHERNET-MODULE SmartGuard_600 module into your I/O Configuration.

For this example, the SmartGuard 600 modules was added to the network of the CompactLogix L35E Local Ethernet port.



5. Double-click the SmartGuard 600 module to open it's Properties dialog box.



6. Edit the name and IP address specific to your application.

Type: Vendor: Parent:	ETHERNET-MODULE Generic Ethern Allen-Bradley LocalENB	net Module			
Na <u>m</u> e:	SmartGuard_600	Connection Par	ameters Assembly	Cize.	
Description:	Input Cnxn: 100 or 101 Dutput Cnxn: 102 or 103 Config: 255	Input:	100	8	(8-bit)
Comm <u>F</u> orma Address / H	t: Data - SINT 📃	<u>C</u> onfiguration:	255	0	(8-bit)
IP <u>A</u> dde     C Heat N	ress: 192 . 168 . 1 . 12	Status Input: Status Output			

7. Click OK to close the SmartGuard 600 Properties dialog box.

#### Import SmartGuard 600 Faceplate Add-On Instruction and Logic Rungs to Your Logix Controller Project

The toolkit includes pre-configured logic for the SmartGuard 600 faceplate as well.

1. Right-click Add-On Instructions and choose Import Add-On Instruction.



2. Browse to the ME Faceplate Files folder within the Guard I/O and SmartGuard Faceplate Files toolkit directory.

If the toolkit has been loaded onto your personal computer, the path is C:\Program Files\ RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Faceplate Files\ME Faceplate Files. 3. Select the Add-On Instruction file named ENIP_SmartGuard_AOI.L5X, and click Import.

mport Add-On	Instruction				×
Look jn:	ME Faceplate	e Files	00	• 🖭 ٵ	
My Recent Documents Desktop My Documents	엔 ENIP_SmartGu	ard_AOLLSX			
Mu Computer	File <u>n</u> ame:	Г		•	Import
ing comparer	Files of type:	RSLogix 5000 XML Files (*,L5X)		<u> </u>	Cancel
	Files <u>c</u> ontaining:	Add-On Instruction		-	Help
My Network Places	Int <u>o</u> :	Add-On Instructions		¥	

4. Click OK on the Import Configuration dialog box to execute the import.

Import Configuration				×
Find: Find Within: Final Name	- <u>A</u> A	Eind/Replace		
Import Content:	-			
- Add-On Instructions	Configure Add-0	n Instruction Properties		1
ENIP_SmartGuard_AUI	Import Name:	ENIP_SmartGuard_A01		
- B Routines	Operation:	Create		
References		References will be imported as configured in the References folders		
- S Errors/Warnings	Final <u>N</u> ame:	ENIP_SmartGuard_AOI	Properties	
	Description:			
	Devision	v1.0.04122010		
	nevision.	V1.0 04122010		
	Revision Note:			
	Vendor:	Rockwell Automation		
			OK Cancel Help	
Ready				1.

The ENIP_SmartGuard_AOI appears in the Add-On Instruction folder of your Logix controller.



5. Double-click your Main Routine or the routine in which you want to use the faceplate logic.



6. Right-click a rung insertion location and choose Import Rungs.



7. Browse to the ME Faceplate Files folder within the Guard I/O and SmartGuard Faceplate Files toolkit directory.

If the toolkit has been loaded onto your personal computer, the path is C:\Program Files\ RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Faceplate Files.\ME Faceplate Files.

8. Select the Add-On Instruction file named ENIP_SmartGuard_AOI_Map.L5X, and click Import.

Import Rungs					×
Look jn:	ME Faceplat	e Files 💌	00	10 🛄 -	
My Recent Documents Desktop My Documents	ENIP_SmartGU ENIP_SmartGU GuardIO_AOI GuardIO_AOI GuardIO_AOI SmartGuard_A	ard_AOI_Map.L5X ard_AOI_Map_2.L5X _Map.L5X _Map_2.L5X :OI_Map.L5X			
	File <u>n</u> ame:	ENIP_SmartGuard_AOI_Map		•	Import
My Computer	Files of type:	RSLogix 5000 XML Files (*.L5X)		v	Cancel
<b>(</b>	Files <u>c</u> ontaining:	H Rungs		¥	Help
My Network	Int <u>o</u> :	MainRoutine (MainProgram)		Y	
Places	C Overwrite Sele	ected Rungs			1.

9. Select Tags from the Import Content organizer on the Import Configuration dialog box.

Import Configuration		Eind/Replace		×
Find Within: Final Name	Configure Rung Imported Rungs: Operation:	Properties 1 Create 3 Federates will be imported as configuration the References foldere	after last Rung	
- C Errors/Warnings	Routine Proper Name: Description:	ties MainRoutine		
	Type: In Program:	🚽 🗐 Ladder Diagram		
			OK	Cancel Help

- 10. If you did not use the default SmartGuard 600 name for your SmartGuard Ethernet module, then rename both the SmartGuard_600:I tag and the SmartGuard_600_InputData tag; otherwise skip this step.
  - a. Click the pull-down arrow next to the SmartGuard_600:I input tag in the Final Name column (A).
  - b. In the pull-down menu, browse to your SmartGuard 600 Ethernet module input tag and select it (B).
  - c. Select the SmartGuard_600_InputData tag in the Final Name column and type over the existing name with the name of your SmartGuard 600 Ethernet module (C).
  - d. Click OK to complete the rung import (D).

Import Configuration	×
오 및 Find:	▼ ▲ ▲ Find/Replace
Find Within: Final Name	
Import Content: MainTask MainFourine (Rungs) MainFourine (Rungs) Tags Tags Duther Components - © Errors/Warnings	Configure Tag References         Import Name       Operation       Final Name       Affinal Service       Descrit         Import Name       Operation       Import Name       Affinal Service       Descrit         Import Name       Operation       Import Name       Affinal Service       Descrit         Import Name       Import Name       Affinal Service       Affinal Service       Descrit         Import Name       Import Name       Import Name       Import Name       Show, All Tage       Import Name         Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name         Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import Name       Import
Import Configuration  Find:  Find Within: Final Name	▼ ▲ ▲ Eind/Replace
Import Content:	
MainTask MainProgram MainRoutine (Rur References Tags Other Compo - S Errors/Warnings	Import Name     Operation     Import Name     Alias For Data       Import Name     Operation     Import Name     Alias For Data       Import Name     Operation     Import Name     Alias For Data       Import Name     Import Name     Import Name     Alias For Data       Import Name     Import Name     Import Name     Alias For Data       Import Name     Import Name     Import Name     Alias For Data       Import Name     Import Name     Import Name     Alias For Data       Import Name     Import Name     Import Name     Alias For Data       Import Name     Import Name     Import Name     Import Name       Import Name     Import Name     Import Name     Alias For Data       Import Name     Import Name     Import Name     Import Name       Import Name     Import Name     Imp
•	
	U OK Cancel Help

The imported rung appears in your routine.

11. Right-click the end rung and choose Import Rungs to import output tag mapping rungs.

🗎 Main	Prog	ram - MainRoutine*			- 🗆 🗙
周國		🔁 📴 abed 🤹 ab	<ul> <li><ab></ab></li> </ul>		
0				Copy File Source SmartGuard_600:I.Data[0] Dest SmartGuard_600_inputData[0] Length 2	
(End)	2 m	Cut Rung ⊆opy Rung Baste	Ctrl+X Ctrl+C Ctrl+V	<u> </u>	
		Delete Rung Add Rung Edit Rung Edit Rung Comment	Del Ctrl+R Enter Ctrl+D		
		Import Rungs			-
<ul> <li>✓ Ma</li> </ul>	ir ir	Export Rungs			•

12. Browse to the ME Faceplate Files folder within the Guard I/O and SmartGuard Faceplate Files directory.

If the toolkit has been loaded onto your personal computer, the path is C:\Program Files\RA_Simplification\ SafetyGuardLogix\Files\Guard IO and SmartGuard Faceplate Files\ME Faceplate Files.

- 13. Select ENIP_SmartGuard_AOI_Map_2.L5X and click Import to import the additional SmartGuard 600 faceplate rungs.
- 14. Select Tags from the Import Content organizer on the Import Configuration dialog box.
- 15. If you did not use the default SmartGuard 600 name for your SmartGuard Ethernet module, then rename the SmartGuard_600:O tag as follows:
  - a. Click the pull-down arrow next to the SmartGuard_600:O input tag in the Final Name column (A).
  - b. In the pull-down menu, browse to your SmartGuard 600 Ethernet module output tag and select it. In this example, we selected the SmartGuard 600 Ethernet module tag named SmartGuard _600:O (B).
  - c. Click OK to complete the rung import (C).

Import Configuration		×
Find: Find: Find Name	▼ <u>A6</u> A Find/Replace	
Import Content:		
MainTask     MainProgram     MainProgram     MainRoutine (Rungs)     Parts     Add-On Instruction:     Data Types     Other Components     Errors/Warnings	Import Name       Operation       Import Name       Alias For Data Type         Import Name       SmartGuard_600       ENIP_SmartGuard_ADI         Import Name       SmartGuard_600       ENIP_SmartGuard_ADI         Import Name       SmartGuard_600       ENIP_SmartGuard_ADI         Import Name       SmartGuard_600       ENIP_SmartGuard_ADI         Import Name       Import Name       Show All Tags         Import Name       Import Name       Import Name         Import Name       Import Na	lytes:0:0
×>	Controller Program Controller DK Cancel	Help

	COP-
	Source SmartGuard_600:IData[0] Dest SmartGuard_600_inputData[0] Length 2
 Safety Reset	
SmartGuard_600.Cmd_SafetyReset	SinartGuard_600: O.Data[0].0
Fault Reset	
SmartGuard_600.Cmd_FaultReset	SmartGuard_600:O.Data[0].1

The additional two imported rungs will appear in your routine.

## Create an Instance of Your SmartGuard 600 Faceplate Add-On Instruction in Your CompactLogix Project Routine

1. Right-click on the rung just after the imported output tag mapping rungs within you project routine and choose Add Rung.

	1			008
o				Copy File Source SmartGuard_600:1Data[0] Dest SmartGuard_600_InputData[0] Length 2
1	s	Safety Reset martGuard_600.Cmd_Safe	etyReset	SinartGuard_600:O.Data[0].( < >
2	SI	Fault Reset nartGuard_600.Cmd_Fau	tReset	SmartGuard_600: O.Data[0] /
2 (Epd)	Si Xe	Fault Reset nartGuard_600.Cmd_Fau	tReset Ctrl+X	SmartGuard_600:O.Data(0):
2. (End)	Si Xi Ili	Fault Reset nartGuard_600.Cmd_Faul	Ctrl+XCtrl+C	SmartGuard_600:O.Data(0):
2 (End)	Si the site of the	Fault Reset nartGuard_600.cmd_Fau 3 E Cut; Rung Coty: Rung Paste	Ctrl+X Ctrl+C Ctrl+V	SmartGuard_600:O.Data(0):
2 (End)	si Xan	Fault Reset nartGuard_600.Cmd_Faul B Cut Rung Copy Rung Paste Delete Rung	Ctrl+X Ctrl+C Ctrl+V Del	SmartGuard_600:O.Data(0):
2 (End)	s ×m	Fault Reset nartGuard_600.Cmd_Faul 3 E Cut Rung Copy Rung Paste Delete Rung Add Rung	Ctrl+X Ctrl+C Ctrl+V Del Ctrl+R	SmartGuard_600:O.Data(0):
2 (End)	s × m	Fault Reset nartGuard_600.Cmd_Faul 3 E Cut Rung Copy Rung Paste Delete Rung Add Rung Edit Rung	Ctrl+X Ctrl+C Ctrl+C Ctrl+V Del Ctrl+R Enter	SmartGuard_600:O.Data(0):

2. Select the Add-On element group tab and click the ENIP_SmartGuard_AOI instruction button.



An instance of the ENIP_SmartGuard_AOI instruction appears in the rung.

Mair	nProgra	um - MainKoutine"		<u></u> _
		Safety Reset		
	SI	nartGuard_600.Cmd_SafetyReset		SmartGuard_600:O.Data[0].0
		10.03		
		Fault Reset		
-	Sr	nartGuard_600.Cmd_FaultReset		SmartGuard_600:O.Data[0].1
2		J L		()
4	, r	ENIR SmortGuard AO		_
	e 🗕	AO		
	e	ENIP_SmartGuard_AOI	?	(Sts_CmbdSafetyInputStatus)-
2	e	Sts_SafetyInputData	??	
	e	Sts_SafetyInputStatus	??	-(Sts_CmbdSafetyOutputStatus)-
	e	Sts_SafetyInputLatch	??	
1	e	Sts_SafetyOutputStatus	??	
	e	Sts_SafetyOutputReadback	??	
	e	Sts_TestOutputStatus	??	
	e	Sts_SafetyOutputData	??	
	e	Ref_InputData	?	
	e	Ref_OutputData	?	
	e			
	e			
	a in Danti			

- 3. Assign the ENIP_SmartGuard_AOI to the SmartGuard 600 module that you configured in the previous section.
  - a. Double-click the ENIP_SmartGuard_AOI tag entry field (A).
  - b. Select the pull-down arrow (B).
  - c. Double-click on the SmartGuard 600 Ethernet module tag within the pull-down dialog box.

In this example, we selected the SmartGuard 600 Ethernet module tag named SmartGuard_600 (C).

🗎 MainP	rogram - MainRoutine*		- 🗆 ×	
画际	state abca ab ab sab			
1 2 3 e e e	Safety Reset SmartGuard_600.Cnd_SafetyReset Fault Reset SmartGuard_600.Cnd_FaultReset	SmartGuard_ SmartGuard_ rd_AOI	500:0.Data[0].0 () 500:0.Data[0].1 () inputStatus)	
e e	Sts_SafetyInputData Sts_SafetyInputStatus Sts_SafetyInputLatch	🗙 Enter Name Filter.	Show: ENIP_SmartGuard_AC	DI
e e e e e	Sts_SafetyOutputStatus Sts_SafetyOutputR Sts_TestOutputStatus Sts_SafetyOutputData Ref_InputData Ref_OutputData	Name	_≘¦ Data Type ENIP_SmartGuar	d_AOI
e Main Main	nRoutine*	<u>C</u> ontroller <u>P</u> rogram		

- 4. Assign the Ref_input Data tag.
  - a. Double-click the Ref_Input Data tag entry field (D).
  - b. Click the pull-down arrow (E).
  - c. Double-click the SmartGuard 600 InputData tag in the pull-down dialog box.

In this example, we chose the SmartGuard 600 input data tag named SmartGuard_600_InputData (F). Be sure to select the input data tag that you configured in the previous section if you did not use the default name.

■ MainP	rogram - MainRoutine*	
1 2 3 e e e e e e e e e e	Safety Reset SmartGuard_600.Cmd_SafetyReset Fault Reset SmartGuard_600.Cmd_FaultReset ENIP_SmartGuard_AOI ENIP_SmartGuard_AOI Sts_SafetyInputData Sts_SafetyInputData Sts_SafetyInputData Sts_SafetyInputStatus Sts_SafetyOctudIStatus	SmartGuard_600.0.Data[0].0           SmartGuard_600.0.Data[0].1           SmartGuard_600.0.Data[0].1           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()           ()
e e e e e e e e	Ste_SafeVolpubliceandack Ste_TestOutpubliceandack Ste_TestOutpublice Ref_outpublice Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Program Progr	Show All Tags  Show All Tags  Show All Tags  Show All Tags  ENP_SmartGuard_AOI  AB:ETHERNET_MODULE_SINT  AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT  AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT AB:ETHERNET_MODULE_SINT AB:E

- 5. Assign the Ref_OutputData tag.
  - a. Select the Ref_OutputData tag entry field and type SmartGuard_600_OutputData (A).

If you did not use the default SmartGuard 600 Ethernet module tag, enter 'Your SmartGuard 600 Ethernet Module Name_OutputData'.

b. Right-click the entered output data tag and select the tag name you typed in the previous step to open the New Tag dialog box (B).



c. Click OK to create the new tag.

New Tag		2
<u>N</u> ame:	SmartGuard_600_OutputData	ОК
Description:		Cancel
		Help
	×	
<u>U</u> sage:	<normal></normal>	ĺ
Typ <u>e</u> :	Base Connection	ĺ
Alias <u>F</u> or:	·	
Data <u>T</u> ype:	DINT	
Scope:	🕞 MainProgram 💌	
E <u>x</u> ternal Access:	Read/Write	
Style:	Decimal	
□ <u>C</u> onstant		
C Open Cor	figuration	



If the instance of your SmartGuard 600 Faceplate Add-On Instruction was configured correctly, then the rung should display with no errors.

## **Configure CompactLogix Communication**

This procedure assumes that your communication method to the CompactLogix controller is via the Ethernet protocol and that your Logix Ethernet module has already been configured. For additional information, refer to these publications:

- 1769 CompactLogix Controllers User Manual (for catalog numbers 1769-L31, 1769-L32C, 1769-L32CR, 1769-L32E, or 1769-L35E), publication <u>1769-UM011</u>
- CompactLogix System User Manual (for catalog numbers 1769-L20, 1769-L30), publication 1769-UM007

Follow these steps to configure Logix Communication.

- 1. Open RSLinx Classic software and select Configure Drivers... in the Communication menu.
- 2. Select the Ethernet Devices driver from the pull-down list.
- 3. Click the Add New... button.

wailable Driver Tuper		
Ethomotechning	Add New	Close
crueiner revices	• Addition	
		Help
Configured Drivers:		Help

4. In the Add New RSLinx Classic Driver dialog box, name the new driver and click OK.

Add New RSLinx Classic Driver	
Choose a name for the new driver. (15 characters maximum)	OK
AB FTH-1	Cancel

5. In the Configure driver dialog box, type the IP address of your Logix Ethernet module and click OK.

The IP address shown is an example. Yours will be different.

figure o	river: AB_ETH-1	1
ation Map	bing	
Station	Host Name	Add New
Station 0	Host Name 10.91.36.82	Add New

If your Logix Ethernet module is already configured, the IP address is displayed on the module.

6. Click Close.

TIP

- 7. Select RSWho from the Communication menu.
- 8. In the RSWho window, expand the Ethernet communication module until your controller is visible.



- 9. Verify that you can browse to your CompactLogix controller.
- 10. Minimize the RSLinx application window and return to your RSLogix 5000 project window.

### Save and Download Your Program

Follow these steps to save your program and download it to your CompactLogix controller.

- 1. Save the program by choosing File>Save from the menu bar.
- 2. Turn the keyswitch on the controller to REM.
- 3. To define the path to the controller, click Who Active 🖁 and select the controller.
- 4. Click Download.

# FactoryTalk® View ME Software Integration

## Introduction

The Safety Accelerator Toolkit contains faceplates that let you create displays in FactoryTalk View Machine Edition software. Use safety I/O module faceplates for displays that let you control and monitor your Guard I/O[™] modules or SmartGuard[™] 600 I/O. Use safety instruction faceplates for displays that monitor the status and diagnostic information of GuardLogix[®] controller safety application instructions.

This example shows a pre-configured Guard I/O Goto display button that can launch the on-top display or faceplate for the particular Guard I/O module. The faceplate includes status and diagnostic views controlled by its own toolbar buttons.



#### Figure 4 - Guard I/O Module Faceplate Views

## **Before You Begin**

Complete the Logix integration steps in <u>Chapter 3</u> or <u>Chapter 4</u> to prepare your project. Make sure FactoryTalk View ME software is installed on your personal computer.

## What You Need

- FactoryTalk View Machine Edition software, version 6.1 or later
- Safety Accelerator Toolkit, DVD SAFETY-CL002 or visit the Integrated Architecture[®] Tools and Resources website at <u>http://www.ab.com/go/iatools</u>

## **Follow These Steps**


#### **Configure Your Safety Instruction Faceplates**

Safety Instruction faceplates are used only with 1756 GuardLogix and 1768 Compact GuardLogix controllers.

- 1. Open your existing FTViewME application to which you want to add the faceplates.
- 2. Right-click on Displays and choose Add Component Into Application.



- 3. Browse to the Safety Instruction Faceplate files in the toolkit and open the ME_SafetyInstruction_Faceplate_Files folder.
- 4. Select the SafetyInstruction_Faceplate.gfx.



**IMPORTANT** If you are using the CPM, CBIM, CBSSM, or CBCM instructions, choose SafetyInstruction2_Faceplate.gfx instead.

5. Add the faceplate parameter file by right-clicking on Parameters and choosing Add Component Into Application.



6. Browse to the SafetyInstruction Faceplate files in the toolkit and open the ME_SafetyInstruction_Faceplate_Files folder.



- 7. Select the ME_SafetyInstruction_Parameter file.
- 8. Double-click the parameter file you just added to open it.
- 9. Edit the Device Shortcut name to match the GuardLogix controller that you configured for both parameter 1 and parameter 2.

This example shows a shortcut name for a controller named 'GuardLogix'.



10. Type the Safety Instruction tag name for the safety instruction you want to monitor.

This example shows a safety instruction tag named 'Zone1_LOCKINGSW1'.



11. Type the name of the user-defined tag for the user-defined data type that you created for your corresponding safety instruction.

This example shows a tag named 'Zone1_LOCKINGSW1_Animation'.



- 12. Close the parameter file.
- 13. Rename the parameter file by right-clicking the file, choosing Rename, and typing the new parameter file name.

Renan	10	
From:	Zone1_LOCKINGSW1	ОК
<u>I</u> o:	Zone1_LOCKINGSW1	Cancel

It is recommend that you use the safety instruction name from within the parameter.

14. Create a separate parameter file for each safety instruction.

This example shows two parameter files configured for the safety instruction named 'Zone1_LOCKINGSW1' and the safety instruction named 'Zone1_ROBOTCONTACTORS'.



### Configure Your Guard I/O or SmartGuard 600 I/O Faceplates

- 1. Open your existing FTViewME application to which you want to add the faceplates.
- 2. Right-click on Displays and choose Add Component Into Application.



3. Browse to the ME Faceplate Files folder within the Guard I/O and SmartGuard Faceplate files directory.



If the toolkit has been loaded onto your personal computer, the hard drive path is C:\Program Files\ RA_Simplification\SafetyGuardLogix\Files\Guard IO and SmartGuard Faceplate Files.ME Faceplate Files.

4. Select the GuardIO_Faceplate.gfx for Guard I/O digital modules or select GuardIO_Analog_Faceplate.gfx for Guard I/O analog modules.

Add Component Into	Proje	d 🖷 🛎 🔍 🗒		×
🕒 🔾 🗢 📕 « Guar	d IO a	nd Sm 🕨 ME Faceplate Files 🔹 👻 🐓	Search ME Faceplate Fil	es 🔎
Organize 👻 New	folde		8== ▼	
🔆 Favorites	Â	Name	Date modified	Туре
Desktop 😥 Downloads		GuardIO_Analog_Faceplate.gfx GuardIO_Faceplate.gfx	2/21/2013 11:05 AM 4/21/2009 9:56 AM	GFX File GFX File
<ul> <li>Recent Places</li> <li>Libraries</li> <li>Documents</li> </ul>	ш			

5. Add the faceplate parameter file by right-clicking on Parameters and choosing Add Component Into Application.

PSView Studio - Hashing Edition	
an workew Statuto - Machine Edition	
ile View Application Tools Window Help	
🗃 🖶 🎂 🗅 🐸 🤻 🔃 🎒	
xplorer - Robot Cell	
🖃 🎻 Local	
E Robot Cell	
🖻 🤀 Robot Cell	
😟 🧰 System	
🕀 🦳 HMI Tags	
🖃 🔄 Graphics	
Displays	
Global Objects	
Libraries	
Parameters	
Local Mes: New	1
Add Component Into Application	
🕫 🦳 Information	

6. Browse to the ME Faceplate Files folder within the Guard I/O and SmartGuard Faceplate files directory.

Add Component Into	o Proje	ct 🧉 🗂 🖉 👘				x
G 🗢 📕 « Gua	rd IO a	nd S > ME Faceplate Files 🔹	47	Search ME Face	plate Files	٩
Organize 🕶 New	folde	r		83		?
Documents	^	Name	Dat	te modified	Туре	
Music		🖶 ME_GuardIO_Analog_Parameter	1/2	8/2013 4:30 PM	RA Database	
Pictures		He_GuardIO_Parameter	4/2	1/2009 9:56 AM	RA Database	
Videos						

- 7. Select the ME_GuardIO_Parameter file for Guard I/O digital modules or select GuardIO_Analog_Parameter for Guard I/O analog modules.
- 8. Double-click the parameter file you just added to open it.
- 9. Edit the Device Shortcut name to match the GuardLogix controller that you configured or the CompactLogix[™] controller to which your SmartGuard 600 controller is attached.

This example shows a shortcut name for a controller named 'GuardLogix'.

ME_GuardIO_Parameter	
! Parameter File Created 2008/02/11	~
l IThis parameter file is for use with the GuardIO Faceplate display I	
I Use this parameter file in conjunction with a Goto display button that I represents a Guard I/O Module that you intend to monitor. I Simply assign this parameter file within the Goto display button's I Properties - Display Settings.	
   General Parameter Syntax:   #replacement=tagname   Example:   #1=:[GLX-L62S]GuardlOModule_1	
! !#1 in any expression of a graphic object would be replaced by the tag ::[GLX-L62S]GuardIOModule_ I	,1
Assign the "tagname" of the Guard I/O Module you intend to monitor.	
The "tagname" includes the "Device Shortcut" of your system's Logix Controller and the 1 "Module Name" of the Guard I/O Module that was configured in your Logix application file.	
I GLX-62S represents the "Device Shortcut" name of Logix controller you configured in         I RSLinx Enterprise Communication Setup that is connected to the intended Guard I/O Module.         I         I GuardIOModule_1 represents the "Mc"         #1=::[GuardLogix]GuardIOModule_1	đ
#1=::[GuardLogix]GuardIOModule_1	~

10. Type the GuardIO_AOI or ENIP_SmartGuard_AOI *ModuleName* of the module you want to control and monitor.

This example shows a module named 'CellGuard1'.



For the ME_GuardIO_Analog_Parameter there are two parameters.

- First parameter name should be the name of the standard GuardIO_Analog_AOI, typically the *AnalogModuleName*.
- Second parameter name should be the name of the safety GuardIO_Analog_AOI_Safety AOI, typically the *AnalogModuleName_S*.

This example shows a parameter for an analog module name IE4S.



- 11. Close the parameter file.
- 12. Rename the parameter file by right-clicking the file, choosing Rename, and typing the new parameter file name.

Renan	10	
From:	CellGuard1	ОК
<u>Ι</u> ο:	CellGuard1	Cancel

Using the ModuleName from within the parameter is recommended.

13. Create a separate parameter file for each Guard I/O or SmartGuard 600 module.

This example shows two parameter files configured for two Guard I/O modules named CellGuard1 and CellGuard2.

Explorer - Guard IO Faceplate 032408 for Q
🖻 🔄 Graphics
🖃 🌌 Displays
[ALARM]
INFORMATION]
≣ Goto_GuardIO
≣ GuardIO_Faceplate
🔤 🌌 🖬 🖬 🔤 🔤
🕀 🌌 Libraries
🛨 🚾 Images
📑 CellGuard1
🔤 CellGuard2
Local Messages

#### Adding Pre-configured Goto Buttons to Your FactoryTalk View ME Application

Goto buttons launch the faceplates for the individual safety instructions, Guard I/O modules, or SmartGuard 600 I/O in your application. First you need to add the Goto button graphics and objects to your application. Then, associate the individual Goto Display buttons to the appropriate faceplate and specific parameter file.

#### Add Goto Buttons to Your Application

Follow these steps to add the Goto buttons to your application.

1. Add the safety instruction, Guard I/O, or SmartGuard bitmap images into your FTViewME application by right-clicking Images and choosing Add Component Into Application.



2. Browse to the appropriate faceplate files on the toolkit DVD and open the desired folder:

For these	Browse to
Guard I/O Goto Button images	C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\ Guard I/O and SmartGuard Faceplate File\ME_GotoButtons
Safety Instruction Goto Button images	C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Safety Instruction Faceplate Files\ME_SafetyInstruction_GotoButtons



3. Select the Bitmap images you need for the type of I/O module or safety instruction that you have and click Open. Choose the generic safety instruction bitmap if none of the other instruction bitmaps match your application. 4. Add the Goto Displays by right-clicking Display and choosing Add Component into Application.



5. Browse to the appropriate faceplate files on the toolkit DVD and open the desired folder:

For these	Browse to
Guard I/O Goto Button Display	C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\ Guard I/O and SmartGuard Faceplate File\ME_GotoButtons
Safety Instruction Goto Button Display	C:\Program Files\RA_Simplification\SafetyGuardLogix\Files\Safety Instruction Faceplate Files\ME_SafetyInstruction_GotoButtons



6. Select the desired '.gfx' file and click Open.

The selected display appears under Displays in your application.

7. Create a new Display or open your existing system display.

This example shows a new display named Robot_Cell_Main.



8. Open the Goto_SafetyInstruction or Goto_GuardIO display and copy your desired GotoDisplay button objects.



Copy InstructionName2 if you are using the CBIM, CPM, CBSSM, or CBCM instructions.

- 9. Open your system display.
- 10. Right-click Display and choose Paste.



11. Repeat steps <u>8</u>...<u>10</u> for each safety instruction, Guard I/O, or SmartGuard module in your application.

#### Associate Each Button to a Faceplate and Parameter File

1. Click the copied Goto Display button and select View>Object Explorer.



2. In the Object Explorer, double-click the Goto Display button to open the Goto Display Button Properties dialog.

📧 Robot_Cell_Main - /AcelTest	t// (Display)		😹 Robot_Cell_Main	/Robot Cell// (Display)
Instructic Name_1	Object Explorer 2	or	Guard I M Module	Object Explorer  Guard_I0_1 MultistateIndicator1 GotoDisplayButton1 Highlighting on Settings
	Expand Collapse Help			Expand Collapse Help

- 3. On the General tab, click ... next to the Display field.
- 4. In the Component Browser display box, select the desired faceplate display and click OK.









- 5. Click .... next to the Parameter file field.
- 6. Select the associated parameter file and click OK.

Goto Display Button Properties		Goto Display Button Properties
General       Label       Common         Appearance       Border width:         None       Image: Common im	Or ×	General       Label       Common         Appearance       Border style:       Border widh:         None       ✓       Border uses back color         Back style:       Pattern style:       Border color         Back style:       Pattern style:       Border color         Transparent       None       Pattern color         Shape:       Pattern color       Highlight color         Display settings       Select a component       CellGuadd         Display:       Parameter file:       CellGuadd
Display: Parameter file: SafetyInstruction_Fax ME_SafetyInstruction Top position: Left position: 0 Displ	IRS I <u>H</u> elp	Foundation       Top position:       Imagins





7. To rename the Goto Display buttons, double-click the MultistateIndicator object in the Object Explorer (A).

or

8. Select the States tab on the Multistate Indicator Properties dialog (B).

	Object Explorer SafetyInstruction_Gott MultistateIndicator GotoDisplayButtor	2 4 4
tistate Indica	tor Properties	
State0	General Value: 0 Back color Border colo Blink	Pattern style: None Pattern color
	InstructionName_1	<u>~</u>
	J Font: Size: Arial ▼ 9 ▼	Insert Variable
×.	Caption color Alignmen Caption back color C C Caption blink C C C Word wrap C C C	nt Caption back style:
Insert State	Image settings Image:	Image back style:
1		Transparent -

Robot_Cell_Main	n - /Robot Cell// (Display)	
Guard I/O Module	Object Explorer     Guard_I0_1     MultistateIndicator1     GotoDisplayButton1	×
Multistate Indicat	or Properties	
General States	nmon Connections	
Select state: State0 State1 Error	General Value: 0 Back color Border color Blink Caption Guard I/O Module	Pattern style: None  Pattern color
	Font: Size: Arial V 9 V Caption color Alignment Caption blnk C C C Vord wrap C C C	Insert Variable  B I U Caption back style: Transparent
Delete State	Image:	Image back style: Transparent

un unu	Object Explore	r		
Module	□- Guard_I0 - Multist - GotoD - Shutdown	3 ateIndicator3 isplayButton3 Button1		
	Aultistate Indicator	Properties		
	General States	B mon Connections		
	Select state: State0 State1 Error	General Value: 0	Back color Border color Blink	Pattern style: None  Pattern color
		Caption		
		Analog Pt Module	0	^
				Insert Variable
		Font:	Size:	вли
		Caption color	Alignment	Caption back style:
	-	Caption back color		Transparent 💌
		Image settings		
	Insert State	Image scalings		Image back style:

- 9. To assign the Expression for the blinking MultistateIndicator object Caption, select the Connections tab on the Multistate Indicator Properties dialog (D).
- 10. Click Exprn (E).
- 11. Create the Expression (F) as shown:
  - Replace InstructionName_1 with the name of the instruction or
  - Replace ModuleName with the name of the Guard I/O module that this Goto Display button object represents or
  - Replace ModuleName with the name of the Analog Module's GuardIO_Analog_AOI_Safety instance tag name, typically ModuleName_S.

Safety Instruction Expression	Guard I/O Expression
Multistate Indicator Properties         General States Common Connections         Name         Tag / Expersion         Indextor + If ([GLXL625])nstructionName_1.FP) Then TEIs         Expression Editor         Expression         [figt02L625] instructionName_1.FP]         Then 1         [figt02L625] instructionName_1.FP]         Else III (GLXL625] instructionName_1.FP]         Else III (GLXL625] instructionName_1.FP]         Else III (GLXL625] instructionName_1.FP]         Else III (GLXL625] instructionName_1.FP]         Else III (GLXL625) instructionName_1.FP]         Inter 2 Else C         Inter 5       Column: 14	Current of Connections         Include I/O Expression         Expression Editor         Expression Editor         Expression Editor         Include I/O Expression         Include I/O Expression<
or	



12. Replace the *Device Shortcut* with the Device Shortcut name you configured in this FactoryTalk View ME application for your GuardLogix controller.

This expression causes the caption to blink when a demand or fault code is present on the module.

13. Repeat steps <u>1...12</u> for each Goto Display button you require.

See <u>Chapter 6</u>, <u>Safety System Application Guide</u>, which illustrates a System Display with two Goto Display buttons, one for each of the Guard I/O modules in that system.

14. When you have copied all the objects you need for your display, you can delete the Goto Display file from your application by right-clicking the file and choosing Delete.



#### **Create a Runtime File**

Create a runtime file to test and download your FactoryTalk View ME application by choosing Application>Create Runtime Application.



## Notes:

# Safety System Application Guide

#### Introduction

This chapter guides you through the pre-configured FactoryTalk® View ME Guard I/O™ Faceplate that interfaces with the pre-configured GuardLogix® Guard I/O and Guard I/O Safety Add-On Instructions, SmartGuard™ 600 Add-On Instructions, and Safety Device Routines. It also provides information about the Safety Instruction Faceplate. You will be guided through the faceplate views, which provide the information you need to monitor your safety system and quickly diagnose, take action, and restart your system.

#### **Before You Begin**

Complete both the Logix and FactoryTalk View ME software integration of your safety system, including download and test.

#### What You Need

- Hardware installation and wiring complete with power applied
- Logic application file downloaded to your 1756 GuardLogix, 1768 Compact GuardLogix, or 5370 Compact GuardLogix controllers, or your SmartGuard 600 controller
- Controllers are set to Run mode
- FactoryTalk View ME runtime application file downloaded to the PanelView[™] Plus terminal with Run Application activated on the terminal

#### **Follow These Steps**

Complete these display overview steps to run the pre-configured safety logic and faceplates to gain an understanding of how to use these tools in your specific application.



### Launching Your Faceplates from Your System Overview Display

Although your system overview display is unique to your specific application, you may use the Goto Display buttons provided in this toolkit to launch the faceplates. Our simplified robot cell application example includes a main display that shows the layout of the safety devices in the system along with the CellGuard1 and CellGuard2 Goto Display buttons.

## Safety System Overview Display

The Goto Display buttons provided in the toolkit include a multi-state indicator text object to which you may have assigned a tag to provide status of whether the assigned Guard I/O module has faulted or has a demand on one of the inputs. The display below illustrates that the CellGuard1 module is in a faulted or demand state (red indicator text) and the CellGuard2 module is in a normal state.



To access the CellGuard1 module's status and diagnostic faceplate, simply press the CellGuard1 Goto Display button.

### Digital Guard I/O Module Faceplate Overview



The faceplate toolbar includes these buttons:

- The Alarm button indicates a Guard I/O module fault condition and activates the Error Content view. A black bell indicates normal status, with no faults. A yellow-black flashing bell indicates a fault condition.
- The Configuration button lets you edit the Guard I/O faceplate name or Device Descriptions.
- The Input/Output Selector buttons let you select which view is shown.
- The Help button let you select Help information for the view.

To close the faceplate, click the Close button in the upper right corner of the display.

### Digital Guard I/O Module Faceplate Input Status View – Demand Indication

This Guard I/O faceplate view illustrates a 16-point Guard I/O module's 0...7 input channel status. The IN 0-7 button is lighter to confirm this view. The faceplate provides State, Demand, and Cycle indication for each input.

	С	ellGuard1	X
×	IN 0-7	IN 8-15	0
Input         State           0         1           2         1           3         1           4         1           5         1           6         1           7         1           Safety F	te Demand	Cycle Device Descr Locking Swit Locking Swit Locking Swit Locking Swit EStop 1A EStop 1B EStop 2A EStop 2B EStop 2B	<u>iption</u> ch 1A ch 1B ch 2A ch 2B
Indicator	Color	Description	Action Required
State	Gray 🗖	De-energized (OFF)	None
	Orange 💻	Energized (ON)	None
	Red 💻	Faulted	Clear the Input/Output (device) fault.
Demand	Gray 🗖	No Demand on input	None
	Orange 📻	Input in Demand ⁽¹⁾	Set inputs (devices) to active state, if necessary. Press Demand Rese

(1) A high-to-low transition of the input causes a demand.

This Guard I/O faceplate view illustrates two locking switches and two E-stop buttons with two channels each (A and B). Locking switch 1A and 1B indicators are gray, indicating that both inputs are de-energized (OFF), but are in Demand (orange Demand indicators). This initiates a stop action on the Robot_Cell safety outputs. All other locking switch and E-stop indicators show that the associated inputs are energized (State indicators are orange) and not in Demand (demand indicators are gray). This condition requires the operator to set indicated inputs to active state (close locking switch), press the Demand Reset button on the faceplate.

### Digital Guard I/O Module Faceplate Input Status View – Fault Indication

This Guard I/O faceplate view illustrates a fault of locking switch 1A and 1B inputs. When inputs or outputs are in a fault state, both the State and Cycle indicators for that input are red. The Alarm button on the toolbar flashes yellowblack. This condition typically requires the operator to correct the input or output fault, cycle the input or output, and press Fault Reset to reset the associated safety instruction. Finally, the operator must press the Safety Reset button to reset the safety module's and zone's safety logic.

	CellGuard1					X
	ø	IN 0-7	IN 8-15			0
<u>Input</u> 0 1 2 3	State D	emand		<u>Device Des</u> Locking Sw Locking Sw Locking Sw Locking Sw	<u>cription</u> /itch 1A /itch 1B /itch 2A /itch 2B	
4 5 6 7				EStop 1A EStop 1B EStop 2A EStop 2B		
Safe	ety Res	et			Fault Re	set

Indicator	Color	Description	Action Required
State	Gray 🗖	De-energized (OFF)	None
Orange 📻 Energized (ON)		Energized (ON)	None
	Red 💻	Faulted	Clear the Input/Output (device) fault.
Cycle	Gray 🗖	Input/Output not faulted.	None
	Red 🚥	Input/Output faulted.	Clear the Input/Output (device) fault. Cycle Input/Output. Press Fault Reset. Press Safety Reset.

To access the specific Fault/Error information and Recommended actions, press the Alarm button on the toolbar.

#### **Error Content, Probable Cause, and Recommended Actions**

When you press the Alarm button on the toolbar, the Error Content view is displayed, indicating the specific error being reported by the module.

CellGuard1 X		CellGuard1 X
Furer Content	Help Button	Probable Cause
Locking Switch 1A Discrepancy error		Locking Switch 1A 1) Ground fault break in an input signal line. 2) Trouble with the connected device.
	Black Arrow Key —	►►.

To access the probable cause of the reported error, press the Help button on the toolbar. For further diagnostic help, press the black arrow key at the bottom of the view to access Recommended Action information.

This diagnostic information is triggered by the reported module error code. The input and output error code information provided is in accordance with the Guard I/O and SmartGuard I/O information represented in the tables on the following page.



Code (hex)	Error Content	Probable Cause	Recommended Action
01	Configuration invalid	The configuration is invalid.	Configure the module correctly.
02	External test signal error	<ol> <li>The power source (positive side) is in contact with the input signal line.</li> <li>Short-circuit between input signal lines.</li> <li>Trouble with the connected device.</li> </ol>	<ol> <li>Check the wiring.</li> <li>Replace the connected device.</li> </ol>
03	Internal input error	Trouble with the internal circuit.	Replace the module.
04	Discrepancy error	<ol> <li>Ground fault or break in an input signal line.</li> <li>Trouble with the connected device.</li> </ol>	<ol> <li>Check the wiring.</li> <li>Replace the connected device.</li> </ol>
05	Error in the other dual channel input	Dual channels are set and an error occurred in the other channel.	Remove the error in the other channel.

Code (hex)	Error Content	Probable Cause	Recommended Action
01	Configuration invalid	The configuration is invalid.	Configure the module correctly.
02	Over current detected	Trouble with the connected device.	Replace the connected device.
03	Short-circuit detected	Ground fault of the output signal line.	Check the wiring.
04	Output ON error	<ol> <li>The power source (positive side) is in contact with the output signal line.</li> <li>Trouble with the internal circuit.</li> </ol>	<ol> <li>Check the wiring.</li> <li>Replace the module.</li> </ol>
05	Error in the other dual channel output	Dual channels are set and an error occurred in the other channel.	Remove the error in the other channel.
06	Internal-relay output circuit error	Trouble with the internal circuit (1791DS-IB4XOW4 module only).	Replace the module.
07	Relay error	Trouble with the relay (1791DS-IB4XOW4 module only).	Replace the relay.
08	Output data error	Wrong setting for output data.	Check the program.
09	Short-circuit detected in output	Short-circuit between output signal lines.	Check the wiring.

## Digital Guard I/O Module Faceplate Output Status View

The Guard I/O Faceplate Output Status view operates identically to the Input Status view except it does not have Demand associated with it.

CellGuard2					Χ	
2	<b>F</b>	IN 0-7		OUT 0-7		0
Outpu 0 1 2 3	t <u>State</u>		Cycle	Device [ Robot C Robot C Spare Spare	<u>Description</u> ontactor A ontactor B	
4 5 6 7				Spare Spare Spare Spare		
Sat	fe <mark>ty</mark> Rese	t			Fault Re	eset

The following table provides the indicator descriptions, color codes, and required actions.

Indicator	Color	Description	Action Required
State	Gray 🗖	De-energized (OFF)	None
	Orange 📻	Orange 🚃 Energized (ON) None	
	Red 💻	Faulted	Clear the Input/Output (device) fault.
Cycle	Gray 🗖	Input/Output not faulted.	None
	Red 🚥	Input/Output faulted.	Clear the Input/Output (device) fault. Cycle Input/Output. Press Fault Reset. Press Safety Reset.

#### Digital Guard I/O Module Faceplate – Online Configuration Options

The Guard I/O Faceplate lets you modify the Faceplate Titles and Device Descriptions specific to your application. Follow these steps to modify this information.

1. Press the Configuration button on the toolbar so that the button border is highlighted.



- Then press the title or device description you desire to update. The popup keyboard appears.
- 3. Type the desired text and press Enter.

### Digital Guard I/O Module Faceplate – Online Help Options

Press the Help button on any view to access help information.



#### Analog Guard I/O Faceplate Overview



The faceplate toolbar includes these buttons:

- The Alarm button indicates a Analog Guard I/O module fault condition and activates the Error Content view. A black bell indicates normal status, with no faults. A yellow-black flashing bell indicates a fault condition.
- The Configuration button lets you edit the Analog Guard I/O faceplate name or Device Descriptions.
- The Input/Output Selector buttons let you select which view is shown.
- The Help button let you select Help information for the view.

To close the faceplate, click the Close button in the upper right corner of the display.

## Analog Guard I/O Module Faceplate Input Status View – Fault Indication

This Analog Guard I/O faceplate view illustrates a fault of analog Sensor 2 input. When inputs are in a fault state the state indicator for that input is red. The Alarm button on the toolbar flashes yellow-black. This condition typically requires the operator to correct the input fault, press the Fault Reset button to reset the associated safety instruction and press the Safety Reset button to reset the safety module's and zone's safety logic.

	CellGuard1 X						
2	5	IN 0-3	0				
Input	State	Value	Device Description				
0		1846	Sensor 1				
1	-	10493	Sensor2				
2		0	TachInput1				
3		0					
		Safety Res	set Fault Reset				

Indicator Color	Description		Action Required
State	Gray 🗖 Non-Used		None
	Orange 💼	Operational	None
	Red 💻	Faulted	Clear the input (device) fault

To access the specific Fault/Error Channel and Module information, press the Alarm button on the toolbar.

This Channel and Module fault view illustrates a fault of analog input Channel 1. When channel inputs or module are in a fault state the border of the indicators are red. The Alarm button on the toolbar flashes yellow-black. To access the specific input channel or module faults, press the input or module buttons.



#### **Error Content, Probable Cause, and Recommended Actions**

When you press the Alarm button on the toolbar, the Error Content view is displayed, indicating the specific error being reported by the input or module.

CellGuard1	X	CellGuard1 X
1N 0-3	Help Button	1N 0-3
Error Content		Probable Cause
Sensor2 Signal Over-Range		Sensor2 Signal Exceeded Configured Range
	Black Arrow Key –	<b>&gt;</b>

To access the probable cause of the reported error, press the Help button on the toolbar. For further diagnostic help, press the black arrow key at the bottom of the view to access Recommended Action information.

This diagnostic information is triggered by the reported module error code. The input and module error code information provided is in accordance with the Analog Guard I/O information represented in the following table.

	CellGuard1 X						
X	¥	IN 0-3					
Recon	nmende	ed Acti	on —				
			Sensor2				
	С	heck	Field Wiring/Power				

Code (hex)	Error Content	Probable Cause	Recommended Action
00	Reserved		
01	No error		
02	Signal over-range	Signal Exceeded Configured Range	Check Field Wiring/Power
03	Signal under-range	Signal Below Configured Range	Check Field Wiring/Power
04	Signal test failure	Undefined Error for IE4S	If Problem Persists, Replace Module
05	Dual-channel discrepancy	Exceeded Tolerance Between Dual Channels	Check Field Sensors to for Discrepancy
06	Error in the other dual-channel input	Partner Channel Faulted	Troubleshoot Partner Channel Fault
08	Reserved		
100	Sensor supply overcurrent	Exceeded Specification	Check Field Wiring/Sensor Power Draw
101	Sensor supply undercurrent	Too Little Current Drawn from Sensor Power	Check Field Wiring/Sensor Power Draw
102	ADC or CPU Timing Fault	ADC Missed a Clock, Failed a Sync or Watchdog	If Problem Persists, Replace Module
103	3.3V undervoltage	3.3V Supply Voltage was Detected Too Low	If Problem Persists, Replace Module
104	3.3V overvoltage	3.3V Supply Voltage was Detected Too High	If Problem Persists, Replace Module
105	CPU fault	ADC Failed Register, Instruction, or Flag Diag	If Problem Persists, Replace Module
106	Flash fault	FLASH Test Detected Bit Errors	If Problem Persists, Replace Module
107	RAM fault	RAM Test Detected Bit Errors	If Problem Persists, Replace Module
108	Single-channel discrepancy	Dual Measurements of Single Channel Disagree	If Problem Persists, Replace Module
109	Tach Dual Low	Both Channels LOW at the Same Time	Check Sensor Signal Timing
110	Undefined error		If Problem Persists, Replace Module
111	Flash enable fault	ADC's FLASH Memory Drawing Too Much Current	If Problem Persists, Replace Module
112	Serial pattern fault	Serial Communication Pattern Errors Detected	Check Field Wiring for Proper Grounding/Shielding. Verify that Temperature Within Enclosure is not Excessive. If Problem Persists, Replace Module
113	Channel uniqueness fault	Pulse Testing Revealed Improper Channel	If Problem Persists, Replace Module
114	Watchdog fault	ADC Watchdog Timed Out	If Problem Persists, Replace Module
115	Sync timeout fault	ADC Conversion Out of Sync	If Problem Persists, Replace Module
116	Missing clock fault	ADC Detected a Missing Clock	If Problem Persists, Replace Module
117	SCI Tx fault	Serial Communication Bit Errors Detected	Check Field Wiring for Proper Grounding/Shielding. Verify that Temperature Within Enclosure is not Excessive.
118	ADC fault	ADC Test Pattern Failure	If Problem Persists, Replace Module
119	ADC neighbor 1.8V fault	ADC Detected Out-of-Range Voltage on its Partner	If Problem Persists, Replace Module
120	ADC channel configuration mismatch	Dual ADCs are Not Configured the Same	If Problem Persists, Replace Module
121	SPI sequence number mismatch	Serial Comm State Machines are Out of Sync	If Problem Persists, Replace Module
122	Runtime 3.3V over-under-voltage error	3.3V Supply Voltage was Too High or Too Low	If Problem Persists, Replace Module
123	Reserved		
124	Reserved		
125	Field I/O power is missing	24V Power is not Within Specification	Check Field Power Supply and Wiring
126	Startup 3.3V over-under-voltage error	OV-UV Detector Failed Startup Test	If Problem Persists, Replace Module
127	Sensor power/input wiring error	Sensor Power to Input Signal Violation Detected	Check Field Wiring

## Analog Guard I/O Module Faceplate – Online Configuration Options

The Analog Guard I/O Faceplate lets you modify the Faceplate Titles and Device Descriptions specific to your application. Follow these steps to modify this information.

1. Press the Configuration button on the toolbar so that the button border is highlighted.

Configuration Button			CellGuard1			X					
1		F	IN 0-3				0				
		<u>Input</u> 0	State	Value         Device Description           1846         Sensor1		scriptio	<u>n</u>				
		1		6972 Sensor2							
		2		0 Tachinput1							
		3		0							
				Safety	Reset	Fault	Reset				
Cel	lGı	lar	d1								
1	2	3	4	5	6	7	8	9	0	-	=
q	w	е	r	t	у	u	i	ο	р	Ι	]
а	s	d	f	g	h	j	k	I	;	•	、
z	x	с	v	b	n	m	,		/	١	
SHF	CAP	INS		SPACE		<<	>>	ESC	CLR	+	

2. Then press the title or device description you desire to update.

The popup keyboard appears.

3. Type the desired text and press Enter.

### Analog Guard I/O Module Faceplate – Online Help Options

Press 🕜 on any view to access help information.



#### **Safety Instruction Faceplate Overview**

Safety instruction faceplates are used only with GuardLogix controllers.

The faceplate includes these buttons:



- The Fault button launches the fault Probable Cause and Recommended Actions views.
- The Diagnostics button launches the diagnostic Probable Cause and Recommended Actions views.

To rename the faceplate, click in the title bar, type the new name by using the popup keyboard, and press Enter.

To close the faceplate, click the Close button in the upper right corner of the display.

The GuardLogix Safety Application Instruction Set Safety Reference Manual, publication <u>1756-RM095</u>, provides error code and diagnostic information for safety application instructions.

#### Safety Instruction Faceplate – Fault Views

The Probable Cause view explains the likely cause of the fault. Click the arrow to move to the Recommended Actions view.

Probable Cause View	Recommended Action View
Zone1 Muting X Probable Cause An illegal muting sequence was detected when Sensor 4 transitioned to an invalid sequence state. The first sensor blocked does not correspond to the value of the Direction input.	Zone1 Muting X Recommended Action Check the value of the Direction input parameter with respect to the movement of the material and reset the fault.
Diagnostics	Diagnostics

The Recommended Actions view shows a possible solution for the problem. Click the arrow to return to the Probable Cause view.

#### Safety Instruction Faceplate – Diagnostic Views

The Probable Cause view explains the diagnostic. Click the arrow to move to the Recommended Actions view.

Probable Cause View	Recommended Action View
Zone1 Muting X – Probable Cause The Muting Lamp Status input is OFF (0).	Zone1 MutingXRecommended Action1.) Check the muting lamp and replace it, if necessary.2.) If a muting lamp is not required, set the Muting Lamp Status input to ON (1).

The Recommended Actions view provides steps for clearing the diagnostic. Click the arrow to return to the Probable Cause view.

## Notes:

## Robot Cell Application Example with GuardLogix[®] or SmartGuard[™] 600 Controller

#### Introduction

As hardware selection is dependent upon specific application requirements, this quick start references this robot cell guarding application example to guide you through the hardware selection, Logix integration, and FactoryTalk[®] View ME integration steps in this quick start.



The safety zone in this example is comprised of these guarding devices (inputs): four E-stop buttons, two locking switch/ solenoid devices, and a light curtain. The zone features two safety contactors (outputs) for powering the robot control. Communication with the Guard I/O^m modules is over an EtherNet/IP network.

#### **Robot Cell Module and Safety Zone Configuration**

The example has one safety zone that could be configured on a GuardLogix controller with two Guard I/O modules, a 1791ES-IB16 and 1791ES-IB8XOBV4, or it could be configured on a SmartGuard 600 controller with local I/O. The following worksheets illustrate how the Zone and Guard I/O modules or the SmartGuard 600 local I/O could be configured.

GuardLogix System Safety Zone Configuration Worksheet

Zone Name	Zone1		
Zone Modules & Tags	Name		
Safety Module 1	CellGuard1		
Safety Module 2	CellGuard2		
Safety Module 3			
Safety Module 4			
Safety Module 5			
Safety Module 6			
Standard I/O Fault Reset Tag			
Standard HMI Fault Reset Tag	{#1.Cmd_FaultReset}		
Safety Fault Reset Tag	Cmd_Zone1_FaultReset		
Standard I/O Safety Reset Tag			
Standard HMI Safety Reset Tag	{#1.Cmd_SafetyReset}		
Safety Safety Reset Tag	Cmd_Zone1_SafetyReset		
Inputs OK Tag	Sts_Zone1_InputsOK		

SmartGuard 600 System Zone Configuration Worksheet

Zone Name	Zone1		
Zone Modules & Tags	Name		
Safety Module 1	SmartGuard		
Safety Module 2			
Safety Module 3			
Safety Module 4			
Safety Module 5			
Safety Module 6			
Standard I/O Fault Reset Tag			
Standard HMI Fault Reset Tag	{#1.Cmd_FaultReset}		
Safety Fault Reset Tag	Cmd_SmartGuard_FaultReset		
Standard I/O Safety Reset Tag			
Standard HMI Safety Reset Tag	{#1.Cmd_SafetyReset}		
Safety Safety Reset Tag	Cmd_SmartGuard_SafetyReset		
Inputs OK Tag	Sts_SmartGuard_InputsOK		

•		110.0		14/ 1 1		
Gua	rdLogix Gua	ard 10 Cont	iguration	n Worksheet		
4						
					Module Cat No./	
-	Zone Name		8	Module Name	Safety Category	
	2000					
	Zone1	1	-	CellGuard1	1791ES-IB16/CAT 4	
Safety	Device Name	Device Name	Device	Channel	Input Interlock	1
Inputs	(If Dual Channel)	(If Single Channel)	Туре	Tag Name	Tag Name	
Input 00	LOCKINGSV1	8	Locking Switch	CellGuard1:I.Pt00Data	Sts_Zone1_LOCKINGSW1InputOK	8
Input 01	Self-Self-Self-Self-Self-Self-Self-Self-		Locking Switch	CellGuard1:I.Pt01Data	Sts_Zone1_LOCKINGSW1InputOK	-
Input 02	LOCKINGSW2		Locking Switch	CellGuard1:I.Pt02Data	Sts_Zone1_LOCKINGSW2InputOK	_
Input 03	1	2	Locking Switch	CellGuard1:I.Pt03Data	Sts_Zone1_LOCKINGSW2InputOK	_
Input 04	ESTOP1		EStop	CellGuard1:I.Pt04Data	Sts_Zone1_ESTOP1InputOK	_
Input 05			EStop	CellGuard1:I.Pt05Data	Sts_Zone1_ESTOP1InputOK	-
Input 06	ESTOP2		EStop	CellGuard1:I.Pt06Data	Sts_Zone1_ESTOP2InputOK	_
Input 07		-	EStop	CellGuard1:I.Pt07Data	Sts_Zone1_ESTOP2InputOK	-
Input 08	ESTOP3		EStop	CellGuard1:I.Pt08Data	Sts_Zone1_ESTOP3InputOK	
Input 09	0.000000		EStop	CellGuard1:I.Pt09Data	Sts_Zone1_ESTOP3InputOK	-
Input 10	ESTOP4		EStop	CellGuard1:I.Pt10Data	Sts_Zone1_ESTOP4InputOK	-
Input 11	and the second second		EStop	CellGuard1:I.Pt11Data	Sts_Zone1_ESTOP4InputOK	-
Input 12	LC1		Light Curtain	CellGuard1:I.Pt12Data	Sts_Zone1_LC1InputOK	
Input 13	1995 F.A.		Light Curtain	CellGuard1:I.Pt13Data	Sts_Zone1_LC1InputOK	
Input 14		2	-	CellGuard1:I.Pt14Data	Sts_Zone1_InputOK	-
Input 15				CellGuard1:LPt15Data	Sts_Zone1_InputOK	
Test	Device	16	2			
Outputs	Name			Test Output Tag Name		
Output 00				CellGuard1:O.Test00Data		
Output 01		8	8	CellGuard1:0.Test01Data		
Output 02				CellGuard1:0.Test02Data		
Output 03				CellGuard1:0.Test03Data		
Output 04		8	2	CellGuard1:O.Test04Data		
Output 05				CellGuard1:O.Test05Data		
Output 06		0	8	CellGuard1:O.Test06Data		
Output 07				CellGuard1:0.Test07Data		
Output 08				CellGuard1:O.Test08Data		
Output 09		8	8	CellGuard1:O.Test09Data		
Output 10				CellGuard1:O.Test10Data		
Output 11				CellGuard1:O.Test11Data		
Output 12		8	8	CellGuard1:0.Test12Data		
Output 13				CellGuard1:0.Test13Data		
Output 14	LOCKINGSWISOLENOID	0	0.000	CellGuard1:0.Test14Data		
Output 15	LOCKINGSW2SOLENOID			CellGuard1:0.Test15Data		
Safet	Device Name	Device Name	Device	Output Enable	CROUT	Output
Outputs	(If Dual Channel)	(If Single Channel)	Type	Tag Name	Tag Name	Tag Name
Output 00	· · · · · ·			Cmd Zone1 OutoutEnable	Zonel	CellGuard1O.Pt00Data
Output 01		6	5 5	Cmd Zone1 OutputEnable	Zonel	CellGuardtO.Pt01Data
Output 02				Cmd Zone1 OutputEnable	Zonel	CellGuard1:0.Pt02Data
Output 03		1		Cmd Zonel OutputEnable	Zonel	CellGuard1:0.Pt03Data
Output 04		1		Cmd Zonel OutputEnable	Zonel	CellGuard1:0.Pt04Data
Output 05				Cmd Zone1 OutputEnable	Zonel	CellGuard1:0.Pt05Data
Output 06	-		1 1	Cmd Zone1 OutputEnable	Zonel	CellGuard1:0.Pt06Data
Output 07	1			Cmd Zone1 OutputEnable	Zone1	CellGuard1:0.Pt07Data
20.04.41		-		and a series and particulated		a that a shart for a start

The completed worksheet for the 1791ES-IB16 module is shown below.

#### The completed worksheet for the 1791ES-IB8XOBV4 module is shown below.

#### Safety Module Configuration Worksheet

Zone Name			Module Name	Module Cat No./Safety Category	
	Zone1			CellGuard2	1791ES-IB8X0BV4/CAT 4
Safety	Device Name	Device Name	Device	Channel	Input Interlock
Inputs	(If Dual Channel)	(If Single Channel)	Туре	Tag Name	Tag Name
Input 00		CONTACTORFB*	Feedback	CellGuard2 :I.Pt00Data	**Not Used
Input 01				[ModuleName ]:I.Pt01Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 02				[ModuleName ]:I.Pt02Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 03	1			[ModuleName ]:I.Pt03Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 04				[ModuleName ]:I.Pt04Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 05				[ModuleName ]:I.Pt05Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 06				[ModuleName ]:I.Pt06Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 07				[ModuleName ]:I.Pt07Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 08				[ModuleName ]:I.Pt08Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 09				[ModuleName ]:I.Pt09Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 10				[ModuleName ]:I.Pt10Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 11				[ModuleName ]:I.Pt11Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 12				[ModuleName ]:I.Pt12Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 13	1			[ModuleName ]:I.Pt13Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 14				[ModuleName ]:I.Pt14Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
Input 15				[ModuleName ]:I.Pt15Data	Sts_[ ZoneName ]_[DeviceName ].InputOK
* The auxiliary feedback contacts on both ROBOTCONTACTOR outputs are wired ** Contactor feedback only used in ROUT instruction.					** Contactor feedback only used in ROUT instruction.

in series to a single safety output.

Test	Device		
Outputs	Name		Test Output Tag Name
Output 00	1		[ModuleName ]:0.Test00Data
Output 01			[ModuleName ]:0.Test01Data
Output 02			[ModuleName ]:0.Test02Data
Output 03			[ModuleName ]:0.Test03Data
Output 04			[ModuleName ]:0.Test04Data
Output 05			[ModuleName ]:0.Test05Data
Output 06			[ModuleName ]:0.Test06Data
Output 07			[ModuleName ]:0.Test07Data
Output 08			[ModuleName ]:0.Test08Data
Output 09			[ModuleName ]:0.Test09Data
Output 10			[ModuleName ]:0.Test10Data
Output 11			[ModuleName ]:0.Test11Data
Output 12			[ModuleName ]:0.Test12Data
Output 13			[ModuleName ]:0.Test13Data
Output 14			[ModuleName ]:0.Test14Data
Output 15			[ModuleName ]:0.Test15Data

Safety Outputs	Device Name (If Dual Channel)	Device Name (If Single Channel)	Device Type	Enable Tag Name	ROUT Tag Name	Output Tag Name
Output 00	ROBOTCONTACTOR		Safety Contactor	Cmd_ ZONE1_ OutputEnable	Zone1_ROBOTCONTACTOR	CellGuard2 :0.Pt00Data
Output 01			Safety Contactor	†	‡	CellGuard2 :0.Pt01Data
Output 02				Cmd_[ ZoneName ]_OutputEnable	[ZoneName ]_[DeviceName ]	[ModuleName ]:0.Pt02Data
Output 03				Cmd_[ ZoneName ]_OutputEnable	[ZoneName ]_[DeviceName ]	[ModuleName ]:0.Pt03Data
Output 04				Cmd_[ ZoneName ]_OutputEnable	[ZoneName ]_[DeviceName ]	[ModuleName ]:0.Pt04Data
Output 05				Cmd_[ ZoneName ]_OutputEnable	[ZoneName ]_[DeviceName ]	[ModuleName ]:0.Pt05Data
Output 06				Cmd_[ ZoneName ]_OutputEnable	[ZoneName ]_[DeviceName ]	[ModuleName ]:0.Pt06Data
Output 07				Cmd_[ ZoneName ]_OutputEnable	[ZoneName ]_[DeviceName ]	[ModuleName ]:0.Pt07Data

† All safety outputs in the same zone have the same output enable tag name. ‡ Dual contactors for a single device are controlled by a single ROUT instruction.
The completed worksheet for the SmartGuard 600 local I/O is shown below.

Node Number	Module Cat No./ Safety Category						
03	CAT 4						
Safety Inputs	Device Type	I/O Comment	Channel Tag Name				
Input 00	Locking Switch	LOCKINGSW1 ChA	[#03]:(00) [S] LOCKINGSW1 ChA				
Input 01	Locking Switch	LOCKINGSW1 ChB	[#03]:(01) [S] LOCKINGSW1 ChB				
Input 02	Locking Switch	LOCKINGSW2 ChA	[#03]:(02) [S] LOCKINGSW2 ChA				
Input 03	Locking Switch	LOCKINGSW2 ChB	[#03]:(03) [S] LOCKINGSW2 ChB				
Input 04	EStop	ESTOP1 ChA	[#03]:(04) [S] ESTOP1 ChA				
Input 05	EStop	ESTOP1 ChB	[#03]:(05) [S] ESTOP1 ChB				
Input 06	EStop	ESTOP2 ChA	[#03]:(06) [S] ESTOP2 ChA				
Input 07	EStop	ESTOP2 ChB	[#03]:(07) [S] ESTOP2 ChB				
Input 08	EStop	ESTOP3 ChA	[#03]:(08) [S] ESTOP3 ChA				
Input 09	EStop	ESTOP3 ChB	[#03]:(09) [S] ESTOP3 ChB				
Input 10	EStop	ESTOP4 ChA	[#03]:(10) [S] ESTOP4 ChA				
Input 11	EStop	ESTOP4 ChB	[#03]:(11) [S] ESTOP4 ChB				
Input 12	Light Curtain	LC1 ChA	[#03]:(12) [S] LC1 ChA				
Input 13	Light Curtain	LC1 ChB	[#03]:(13) [S] LC1 ChB				
Input 14	Feedback	CONTACTORFB	[#03]:(14) [S] CONTACTORFB				
Input 15			[#03]:(15) [S]				
Test Outputs		I/O Comment	Test Output Tag Name				
Output 00			[#03]:				
Output 01			[#03]:				
Output 02		LOCKINGSW1SOLENOID	[#03]:LOCKINGSW1SOLENOID				
Output 03		LOCKINGSW2SOLENOID	[#03]:LOCKINGSW2SOLENOID				
Safety Outputs	Device Type	I/O Comment	Output Tag Name				
Output 00		ROBOTCONTACTOR A	#031(00) ISI ROBOTCONTACTOR A				
Output 01		ROBOTCONTACTOR B	#031:(01) ISI ROBOTCONTACTOR B				
Output 02		Reset Required	(#03):(02) (S) Reset Required				
Output 03			[#03]:(03) [S]				
Output 04			[#03];(04) [S]				
Output 05			[#03]:(05) [S]				
Output 06			[#03]:(06) [S]				
Output 07	_		[#03]:(07) [S]				

# SmartGuard 600 Local I/O Configuration Worksheet

# **Robot Cell Safety Logic Examples**

### Figure 5 - GuardLogix Safety Logic











### Figure 6 - SmartGuard 600 Safety Logic



# **Robot Cell Faceplate Logic Examples**

#### Figure 7 - GuardLogix Faceplate Logic



#### Figure 7 - GuardLogix Faceplate Logic (continued)



### Figure 8 - Ethernet SmartGuard 600 Faceplate Logic



# Notes:

# Safety Output Logic Example for Multiple Output Devices

This GuardLogix[®] safety logic example illustrates the output logic for a safety zone that has two dual-channel devices that require separate safety ROUT output instructions.

	**************************************
	GENERAL OPERATION This sample code demonstrates how to control multiple sets of redundant safety contactors in series to drop out a individual loads.
	These ROUT instructions provide SIL 3 level diagnostics for redundant contactors with auxiliary feedback (EDM). The ROUT instructions control dual outputs from different Guard I/O Modules. This Multiple Safety Contactor CAT3_CAT4 Safety Logic includes a single Safety Input Interlock rung that works in conjunction with the CAT3 and CAT4 safety input device logic routines for this zone.
	CONFIGURATION DETAILS The ROUT instructions are the primary safety instructions within this routine. The ZoneName_DeviceName ROUT instruction tag names (Zone1_ROBOTCONTACTOR1 and Zone1_ROBOTCONTACTOR2) identify the specific instruction for the unique safety output devices.
	This routine assumes that the auxiliary feedback channels for each device are wired in series to a single input. This is why the Feedback 1 and 2 tags for each ROUT are identical.
	The Fault Reset is assigned to a tag named "Cmd_ZoneName_FaultReset" representing a command triggered by an HMI or hardwired input. This same Fault Reset tag, "Cmd_ZoneName_FaultReset", will be used on all of the the safety input and output instructions within it's safety zone.
	Safety Input Interlock Rung This rung illustrates (7) safety device input interlocks that energize the Sts_ZoneName_InputsOK OTE instruction. The Sts_ZoneName_InputsOK tag is then included in the Output Enable Rung for all ROUTinstructions within the same zone.
0	Sts_Zone1_LOCKINGSW1_Input0K Sts_Zone1_LOCKINGSW2_Input0K Sts_Zone1_ESTOP1_Input0K
	Sts_Zone1_ESTOP2_InputOK Sts_Zone1_ESTOP3_InputOK Sts_Zone1_ESTOP4_InputOK
	Sts_Zone1_LC1_InputOK Sts_Zone1_InputsOK



# **GuardLogix®** Tools

For many safety applications, especially those applications that require the safety system to monitor and react, the performance of the safety system needs to be estimated early in the design of the system. With safety systems that use safety networks and distributed safety devices, this can be difficult. Rockwell Automation has developed two software tools to help you estimate how a system will perform.

# **GuardLogix Safety Calculator**

The first tool, called the GuardLogix Calculator, uses a spreadsheet that provides three worst-case performance estimates based on how the GuardLogix controller, specifically the safety task, and the safety I/O was configured and distributed on DeviceNet networks.

Microsoft Excel - GLX_Reaction_Times_V02.xls								
Eile Edit View Insert Format Tools Data Window Help								
□ ☞ 🖬 🛍 😫 🎒 증 🖪 🖑 🗼 ☜ 않・ ඒ 🗠 •	0		$\Sigma \cdot \overset{\mathbb{A}}{Z} \downarrow$	⊼↓   <b>(</b> @)[				
Anal • 10 • B I U + # 三 三 三 國 \$ % , th + 10 律 律 日								
A	В	С	D					
1		20	ms (Min)					
If there are no Faults or Errors	H	<u> </u>	nie (nin)					
2	$\vdash$	62	ms (Max)					
3 Considering a Single Fault (Max)		92	ms (Max)					
4 Considering Multiple Faults (Max)		112	ms (Max)					
6 Instructions : Enter Values into Yello	w	cells	belov	v				
		00110						
				From mo				
			25800	enter Or				
8 Input Point Delay Time	$\vdash$	0	ms	enter Of				
9 Input Module Delay (max)	$\vdash$	16.2	ms	From mo				
10 Input Module Time (max) reaction to a fault	$\vdash$	16.2	ms	From mo				
11 Safety Input RPI	$\vdash$	10	ms	From I/C				
12 Safety Task Period	$\vdash$	10	ms	From Sa				
13 Safety Task WatchDog	⊢	10	ms	From Sa				
14 Output Module Delay (max)	$\vdash$	6.2	ms	From mo				
is input wodule time (max) reaction to a fault		0.2	ms	From mo				
17 Advanced Connection Settings								
18 Input Connection Timeout Multiplier		2		From I/C				
19 Default Input Connection Network Delay Multiplier		200%		This the				
20 Suggested Input Connection NetworkDelay Multiplier		200%		This is a				
21 Input Connection Network Delay Multiplier	Γ	200%		From I/C				
22 Network Delay Value in milli-seconds		20	ms					
24 Output Connection Timeout Multiplier	Ē	2		From I/C				
25 Default Output Connection Network Delay Multiplier		200%		This the				
26 Suggested Output Connection Network Delay Multiplier	Γ	200%		This is a				
27 Output Connection Network Delay Multiplier		200%		From I/C				
28 Network Delay Value in milli-seconds		20	ms					

The GuardLogix safety calculator was the original spreadsheet used when GuardLogix controllers were introduced in 2005 and is a limited-functionality performance calculator used to estimate the performance of a single safety loop.

The calculator is compatible with Microsoft Excel software.

# **GuardLogix Estimator**

The second tool, the GuardLogix Safety Estimator was based on the initial calculator and was expanded to provide a more intuitive interface through a wizard. This tool also provides multiple network functionality within the application, adding Ethernet communication to the original DeviceNet-only implementation.

💀 GuardLogix Safety Estimator 📃 🗖 🔀
Welcome to the GuardLogix Safety Estimator Version: 3.04
The GuardLogix Safety Estimator allows you to model safety reaction time and safety network system size for GuardLogix safety applications. This estimator has two primary tools: this wizard that assists users in entering safety parameters, and a series of spreadsheets that performs all the calculations.
Users can work directly in the spreadsheets since all user inputs in this wizard have entry cells in the spreadsheets (Yellow highlighted cells).
When estimating DeviceNet loading and node counts, this estimator makes the default assumption that all safety nodes are IB8×OB8 modules configured as having 2 input bytes and 2 output bytes of data. This is a typical configuration using an input assembly with combined status. If you are using different module types or assemblies with more or less than 2 bytes of data, you can change these assumptions in the System Estimator.
EtherNet/IP loading and node count calculations apply to any I/O module in any combination.
Cancel

Safety reaction-time performance is based on how the safety task is configured in the GuardLogix controller, and the settings for the safety I/O modules used in the GuardLogix project. The wizard interface in the GuardLogix Estimator lets you move forward or backward to change values and evaluate how those changes impact system behavior.

Each of the tabs in the estimator lets you enter system settings. Enter safety task settings on the Controller Settings tab.

Safety Task/Output Update Rate    C	ontroller Settings	Input Module Delays	Output Module Delays	Reaction Time
Estimate how much time	e is needed to :	scan safety logic i	(all logic within the	safety task)
This time must be less than allocated will be equal to Se equations assume that the	the Safety Task afety Task Perioc Safety Task will I	Period. If you expe I - Safety Logic Exec be the highest priori	ct to run standard log cution time. NOTE: 1 ty task in the applica	gic, the time These tion.
Safety Output Updates		Safety Output Updates		
Safety Logic Execution Time	Safet Execut	y Logic ion Time		
Safety Logic Time For Sin Execution Time For Sin Watchdog Time Safety Task Safety Task Period	Time valiable andard sks Output Update Rate = Safety Task Period			
The Safety Task Period (in	ms) entered wa	s: 40		
Safety Logic Execution time	e (in ms)	25		
Suggested Safety Watchdo	og Time (in ms)	28		
Time Available for Standar	d Logic (in ms)	15		

Use the Input Module Delays and Output Module Delays tabs to enter settings for your safety I/O modules.

Based on the settings you enter and the network configurations you plan to use, the estimator provides a series of examples to choose from.

Total number of Devic	eNet safety node	s in	this project:	75			
The following tables e you'll need for the sys appropriate RPI and b he assumed input ou imitations for the bau	stimate how ma tem size you sp baud rate. You r output data siz d rates. All Dev	ny s ecifi can tes b riceN	afety nodes yo ed. You can u view/compare by pressing the let distance ar	ou can place or use this as a gu the numbers fo "Adjust I/O Siz nd drop limits a	n al ide ir 25 rest ret	DeviceNet sul to help you co 50K and 500K 'button. Don' he same for s	onet and how o onfigure your s or 125K and t t forget to con afety compone
	50K - 500K - 105K	050	2				
select an option in the	200K . 500K 125K	2501	SI.				
configure the subnet			e	250K Baud		e	
ndicated subnets, /0 counts	Suggested	T	Safety	Only		Safety and	Standard
and RPIs	Input RPI		Max Nodes	# of Subnets		Max Nodes	# of Subnets
What series DNB	8	0	10	8	0	6	13
is being used?	16	0	18	5	0	11	7
Assume no DNB	20	۲	21	4	0	13	6
ONB/B	32	0	28	3	0	17	5
O DNB/C	40	0	30	3	0	20	4
		-		500K			
	Suggested		Safety	Only		Safety and	Standard
	Input RPI		Max Nodes	# of Subnets		Max Nodes	# of Subnets
	8	0	21	4	0	13	6
	16	0	30	3	0	23	4
	20	0	30	3	0	26	3
Adjust 1/0	32	0	30	3	0	30	3
Adjustivo							

These examples let you evaluate the effects of different settings and network configurations.

You can select DeviceNet, EtherNet/IP, or a combination of DeviceNet and EtherNet/IP networks.

	Network Estimates	EtherNet/IP Net	work Estimates			
Total number of E	EtherNet/IP safet	y nodes in this p	oroject 50			
Select the Etherl (stated in packet per bridge.	Net/IP bridge m ts/sec). These l	odule you plan limits are one o	to use. Each f the factors us	EtherNet/IP bi sed to determi	ridge has capa ne the node co	acity limits ount limits
1756-EN2T	~	Packets/Sec (	Capacity (minu	s reserved ba	andwidth): 900	0
1756-ENBT 1756-EN2T 1756-ENET/B	acity ha	as been reserve ljust this value	ed for Explicit n if you expect t	nessaging and o do a lot of e	d Connection E xplicit messagi	stablishmer ng.
estimate the con estimates for this	nections and R s case. If multip	Pls you expect le bridges are i	to have. The required to act	estimator prov nieve your sys	tem configurat	de count tion, it is bes
if you can route a	ali standard cor	Er Cor	ter Standard I/O nection Estimates	nd all safety th	irough anothei	r.
The following tak many of EtherNe help you configu	ali standard cor bles estimate ho st/IP bridges you ire your system	w many safety u'll need for the and to select a	ter Standard I/O nection Estimates nodes you ca system size y in appropriate	nd all safety th n place on an ou specified. Input RPI and	EtherNet/IP ne You can use th Safety Task ri	r. etwork and h his as a guid ate.
The following tak many of EtherNe help you configu	oles estimate ho at/IP bridges you ire your system	w many safety u'll need for the and to select a	ter Standard I/O nection Estimates osystem size y n appropriate	nd all safety th n place on an ou specified. Input RPI and y VO	EtherNet/IP ne You can use th SafetyTask n	r. etwork and h his as a guid ate.
The following tat many of EtherNe help you configu	bles estimate ho at/IP bridges you ire your system Suggested Input RPI	w many safety u'll need for the and to select a Ethe Safet Max Nodes	ter Standard I/O inection Estimates nodes you ca system size y in appropriate rNet/IP Safet y Only # of Bridges	n place on an ou specified. Input RPI and y VO Safety an Max Nodes	EtherNet/IP ne You can use the Safety Task me d Standard	r. etwork and h his as a guid ate.
The following tat many of EtherNe help you configu	oles estimate ho t/IP bridges you re your system Suggested Input RPI 8	En Cor Dow many safety u'll need for the and to select a Ethe Safet Max Nodes 60	ter Standard I/O nection Estimates nodes you ca system size y in appropriate erNet/IP Safet y Only # of Bridges 1	n place on an ou specified. Input RPI and y VO Safety an Max Nodes 60	EtherNet/IP ne You can use ti Safety Task n d Standard # of Bridges 1	r. etwork and h his as a guid ate.
The following tak many of EtherNe help you configu	all standard con st/IP bridges you ire your system Suggested Input RPI 8 16	Er Cor www.many.safety u'll need for the and to select a Ethe Safet Max.Nodes 60 102	gn one ENB an ter Standard I/O nection Estimates nodes you ca system size y n appropriate synNet/IP Safet y Only ≇ of Bridges 1 1	n place on an ou specified. Input RPI and <b>y I/O</b> Safety an Max Nodes 60 102	EtherNet/IP n You can use ti SafetyTask n d Standard # of Bridges 1 1	r. etwork and h his as a guid ate.
The following tab many of EtherNe help you configu	all standard con at/IP bridges you re your system Suggested Input RPI 8 16 20	Er Cor www.any.safety u'll need for the and to select a Ethe Safet Max.Nodes 60 102 120	gn one ENB an ter Standard I/O nection Estimates nodes you ca system size y in appropriate enNet/IP Safet y Only ≇ of Bridges 1 1 1	n place on an ou specified. Input RPI and <b>y VO</b> Safety an Max Nodes 60 102 120	EtherNet/IP n You can use th Safety Task n d Standard # of Bridges 1 1 1	r. etwork and h his as a guid ate.
The following tab many of EtherNe help you configu	bles estimate hc tr/IP bridges you rre your system Suggested Input RPI 8 16 20 32	Erther www.many.safety u'll need for the and to select a Ether Max.Nodes 60 102 120 160	ter Standard I/O nection Estimates nodes you ca system size y in appropriate rNet/IP Safet y Only	n place on an ou specified. Input RPI and <b>Safety an</b> <b>Max Nodes</b> 60 102 120 160	EtherNet/IP n You can use th Safety Task r d Standard # of Bridges 1 1 1 1	r. his as a guid ate.
IT you can route i The following tat many of EtherNe help you configu	Suggested Input RPI 8 16 20 40	Errors and Errors and to we many safety u'll need for the and to select a Ethe Safet Max Nodes 60 102 120 160 180	In one ENB and ter Standard I/O nection Estimates nodes you ca system size y in appropriate rNet/IP Safet y Only # of Bridges 1 1 1 1 1	n place on an ou specified. Input RPI and <b>y VO</b> Safety an Max Nodes 60 102 120 160 180	EtherNet/IP nr You can use ti Safety Task nr d Standard # of Bridges 1 1 1 1	r. His as a guic ate.

The estimator provides three performance numbers to consider for use.

Data Parameters	Reaction Set 1	Reaction Set 2	Reaction Set 3	Reaction Set 4	Reaction Set 5
Suggested RPIValue (in ms)	8	16	20	32	40
No Fault Reaction Time (in ms)	114	138	150	186	210
Single Fault Reaction Time (in ms)	218	226	230	242	250
Multiple Fault Reaction Time (in ms)	242	274	290	338	370
'ou can optimize these re Optimize Reaction Times vill guide you further. The reflected here when yo	action times ". The dialog changes yo ou return.	by Clicking o g box that pop u make there	n os up e will	Advar Optimize Tin	nced: Reaction nes

## No-fault Reaction Time (ms)

This value is the worst-case performance of the system when it is running normally without errors or faults.

### Single-fault Reaction Time (ms)

This value is the worst-case performance of the system when it encounters a single fault or error. This type of error would not cause the controller to fault or shutdown, but could cause a delay in performance. An example would be if a communications packet is corrupted and a retry is needed. During this sequence, controller performance for that fault is affected. As another example, if an error occurred with a communication from an I/O module, the data from the module is delayed by one RPI period of that module, so any downstream logic, including a safety output, would be delayed by the RPI period.

### Multiple-fault Reaction Time (ms)

This value is the calculated worst-case performance of the system. An example of this type of fault could be a controller hard fault, this number would be the absolute worst-case delay before a safety output would transition to a safe state.

### Which Reaction Time to Use?

Only you can determine which reaction time meets the requirements of your specific safety application. Safety systems are intended to minimize the risk of a hazard, not eliminate all of the risk. Some safety systems will use the no-fault reaction time because a risk assessment of the application indicates it is sufficient. In an example light curtain application where an operator is loading material, the safety system lets the load occur only at a non-hazardous phase of machine operation. Since the operator knows when to load material, it's unlikely that they would try to load during a hazardous phase. The chances of the operator attempting to load at the wrong time, and the system having a fault at that same time, is considered to be remote. Another consideration is that the possible injury would likely be medically recoverable and not more severe. The resulting decision was to use no-fault performance.

Other application criteria may result in the use of single-fault performance. The decision on which number to use is up to the user to decide based on their risk assessment criteria.

## **Safety Estimator Installation Information**

The wizard feature of the Rockwell Automation[®] Safety Estimator works only in MSExcel 2003 or MSExcel 2007.

- Microsoft Office Professional Edition 2003 software
- Microsoft Office Professional Enterprise Edition 2003 software
- Microsoft Office Excel 2003 (standalone) software
- Microsoft Office Professional Edition 2003 Trial software
- Microsoft Office System Evaluation 2003 Enterprise Edition software
- All suite editions of the 2007 Microsoft Office system
- Microsoft Office Excel 2007 (standalone) software

NOTE: Microsoft Office Standard Edition 2003 software does not support the wizard.

### Macro Security in Microsoft Excel 2007

The wizard in the Safety Estimator spreadsheet uses macros and document-level extensions. When MSExcel 2007 has macro security turned on, neither of these will run. Macro security is turned on by default when MSExcel 2007 is installed. There are two ways to work around this.

- Turn off macro security entirely. This the most expedient method but may leave you open to future macro viruses.
- Add the Safety Estimator certificate to the certificate store on your machine and configure your MSExcel software to trust all content from that source. This is the preferred method. For directions, please read the MSWord document, Macro Security Settings in Excel 2007.pdf, included with the GuardLogix tools.

### **Microsoft Excel 2003**

If you have MSExcel 2003 installed, follow these steps to install the wizard.

1. Run set up.exe to install all the necessary components.

The set up program installs all of the required files in the default directory or the directory you designate.

2. After the installation is complete, launch Safety Estimator.xls *from your subdirectory*. When it loads in MSExcel software, the wizard runs automatically. Click the button on the spreadsheet to restart the wizard whenever you want to.

### **Using Other Versions of Microsoft Excel Software**

If you don't have MSExcel 2003 or MSExcel 2007 installed, don't run the set up program. Instead, move these files to a convenient folder.

- Safety Estimator.xls
- Safety Estimator Walk through.doc

The walk-through document will instruct you on using the spreadsheet without the help of the wizard.

### **Rockwell Automation Support**

Use the following resources to access support information.

Technical Support Center	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	https://rockwellautomation.custhelp.com/		
Local Technical Support Phone Numbers	Locate the phone number for your country.	http://www.rockwellautomation.com/global/support/get-support-now.page		
Direct Dial Codes	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	http://www.rockwellautomation.com/global/support/direct-dial.page		
Literature Library	Installation Instructions, Manuals, Brochures, and Technical Data.	http://www.rockwellautomation.com/global/literature-library/overview.page		
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	http://www.rockwellautomation.com/global/support/pcdc.page		

### **Documentation Feedback**

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at <a href="http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf">http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf</a>.

Rockwell Automation maintains current product environmental information on its website at http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page.

Allen-Bradley, Rockwell Software, and Rockwell Automation are trademarks of Rockwell Automation, Inc. Trademarks not belonging to Rockwell Automation are property of their respective companies.

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

#### www.rockwellautomation.com

#### Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444 Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640 Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846