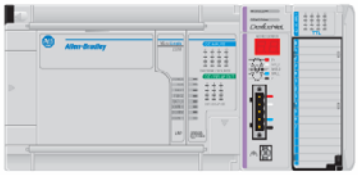
Using SmartGuard 600 Packaged Safety Controller as Standard Slave to MicroLogix 1500 Controller

Safety Network-enabled Example
Safety Rating: Category 4, according to EN954-1


Introduction

This example shows how to wire, configure and program a SmartGuard 600 packaged safety controller as a DeviceNet standard slave to a Micrologix 1500 controller.

Features and Benefits

- Programmable safety logic is used to monitor state of a safety tongue interlock on safety door guarding hazardous machinery.
- Expandable as needed by adding additional safety inputs or outputs.
- Easier integration into Logix controllers and HMIs through standard DeviceNet communication.
- Provides safety interlocking with GuardLogix, GuardPLC, and other SmartGuard safety controllers.

Important User Information

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

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

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

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

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

WARNING 	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
SHOCK HAZARD 	Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
BURN HAZARD 	Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

General Safety Information

IMPORTANT	This application example is for advanced users and assumes that you are trained and experienced in safety system requirements.
ATTENTION 	A risk assessment should be performed to make sure all task and hazard combinations have been identified and addressed. The risk assessment may require additional circuitry to reduce the risk to a tolerable level. Safety circuits must take into consideration safety distance calculations which are not part of the scope of this document.

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

Description

This application example describes how to pass standard, non-safety data such as Circuit Reset from a standard controller (running discrete control) to a SmartGuard 600 controller running safety logic. In the safety system, the SmartGuard 600 controller is monitoring a safety tongue interlock mounted on a safety gate guarding hazardous machinery.

The SmartGuard 600 safety controller is programmed using RSNetWorx for DeviceNet software. You must be familiar with this software to use this document.

The MicroLogix 1500 controller is programmed using RSLogix 500 software. You must be familiar with this software to use this document.

Safety Function

The safety components used in this example have dual dry contacts.

The SmartGuard 600 controller uses its Test Pulse Outputs (for example T0, T1) to send test pulses to the safety tongue interlock. This ensures that any faults in the safety circuit are caught, including shorts to 24V dc, shorts to ground, and shorts between channels.

Example Bill of Material

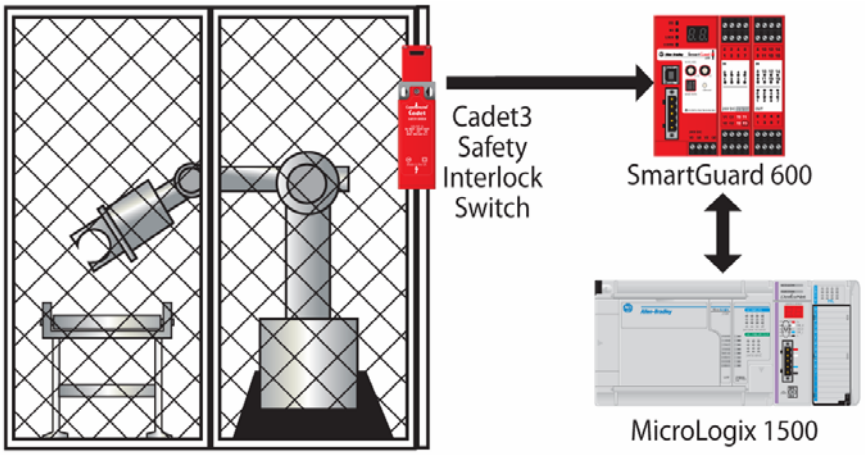
This application example uses these components.

Catalog Number	Description	Quantity
1752-L24BBB	SmartGuard 600 controller	1
1764-LRP	MicroLogix 1500 controller	1
1769-SDN	DeviceNet scanner	1
440K-C21058	Cadet 3 tongue interlock switch	1
100S-C	Safety contactors	2
800F	Standard push button	1
N/A (commercially available)	Standard USB cable (USB-A to USB-B male/male)	1
1764-L28BXB	MicroLogix 1500 base unit	1

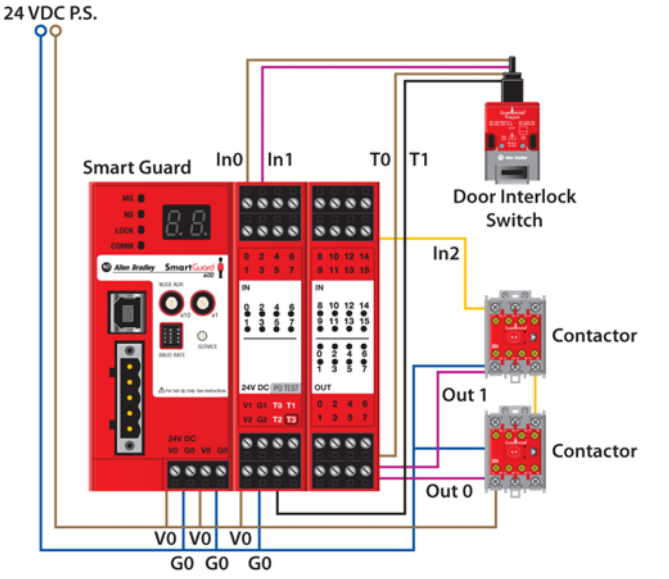
Setup and Wiring

For detailed information on installing and wiring, refer to the product manuals listed in the Additional Resources on page 18.

System Overview



Wiring



Configure

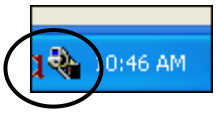
Configuring the SmartGuard 600 controller requires you to connect the USB cable, configure the drivers, name the local inputs and outputs, and configure the MicroLogix 1500 software.

Configuring the USB Driver

The USB drivers must be installed and recognized.

1. The USB driver needed for communicating to SmartGuard controller must be installed on the computer that will be used to program the SmartGuard controller.
2. Connect the USB cable between the SmartGuard controller and the programming station personal computer.
3. Wait for the Windows operating system to recognize the USB device.

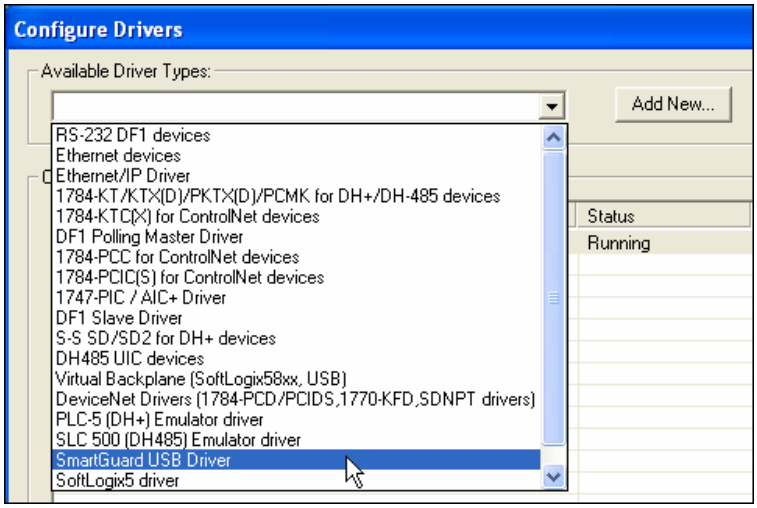
4. Open RSLinx Classic software by clicking on the RSLinx service icon in the Windows System Tray (lower right corner of your window).
5. If this service is not running, double-click the RSLinx Classic icon on your desktop.



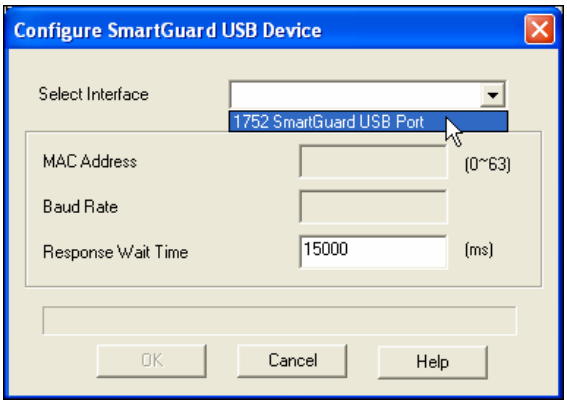
or

6. Select Communications > Configure Drivers to set up communication to the controller.

7. Use the pull-down menu to select the SmartGuard USB Driver from the list and click Add New.



8. Click OK to confirm the name of the driver.
9. Use the pull-down menu to select the 1752 SmartGuard USB Port from the list and click OK.

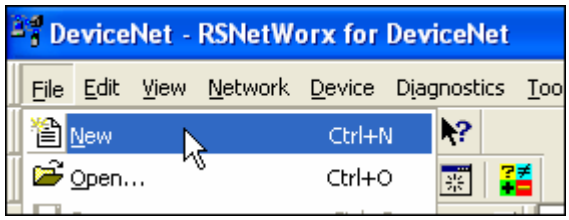


Going Online in RSNetWorx for DeviceNet Software

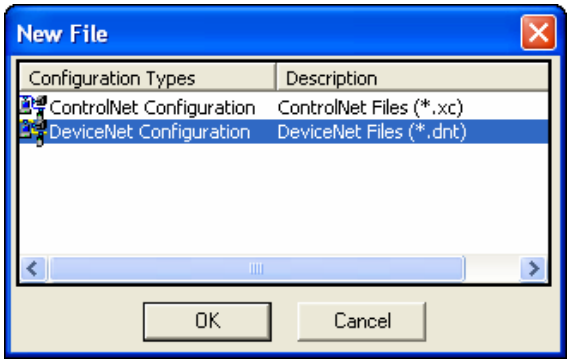
This series of steps explains how to start a new project to confirm that the driver has been uploaded from the network.

1. Open RSNetWorx for DeviceNet software by double-clicking the icon on the desktop.

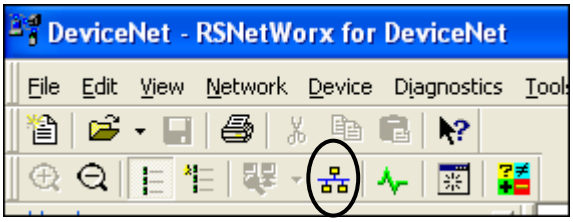
2. Choose File > New to create a new project.



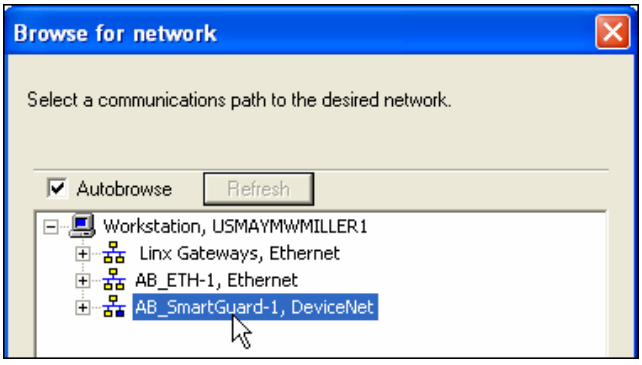
3. Choose DeviceNet Configuration from the list and click OK.



4. Go online by clicking the RSWho button.

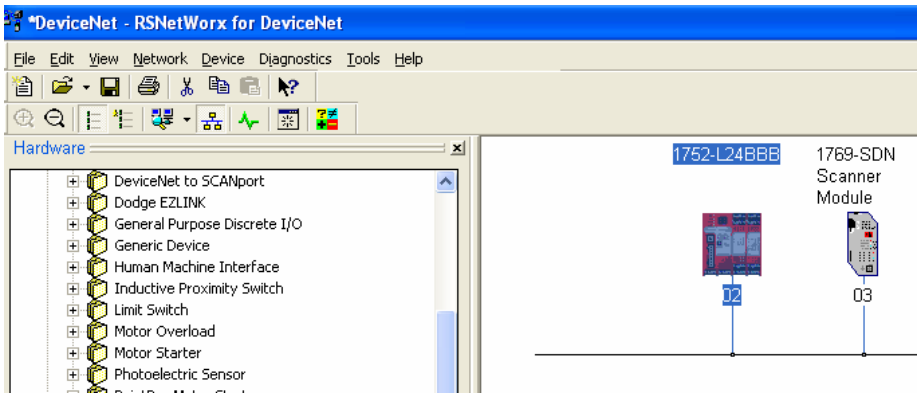


5. Choose the SmartGuard USB driver from the list and click OK.



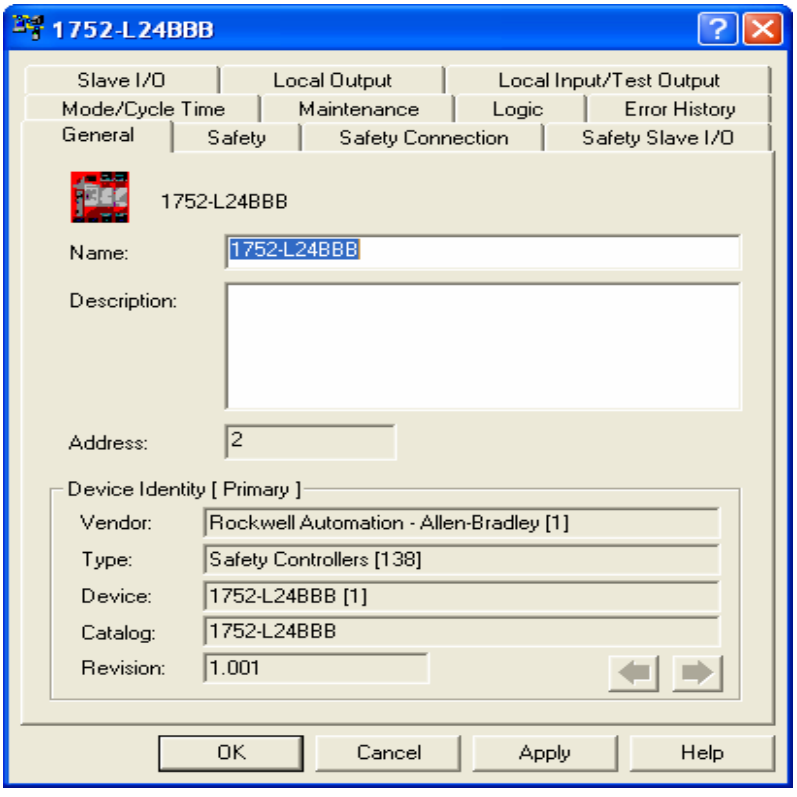
6. Click OK again to confirm the initial upload from the network.

The network displays SmartGuard 600 controller at node 2 and the 1769-SDN module at node 3 as shown.



7. In the RSNetWorx online graph, double-click 1752-L24BBB SmartGuard controller to open the properties dialog.

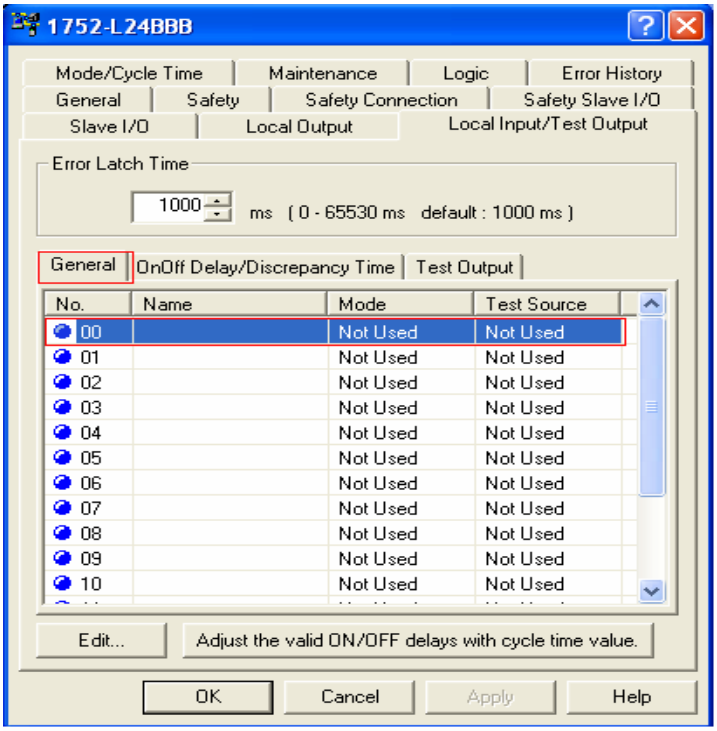
The screen should look like this.



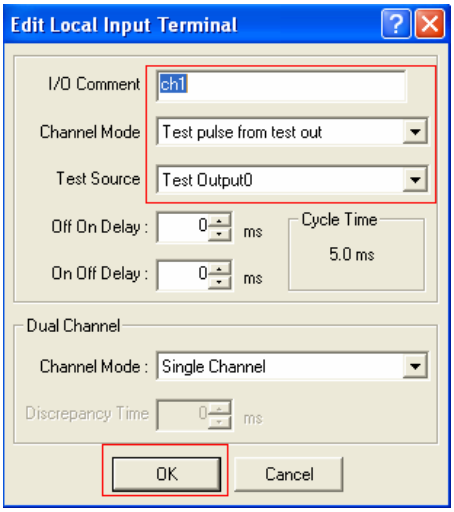
Configuring SmartGuard Local Inputs and Outputs

In these steps you will name the inputs and outputs.

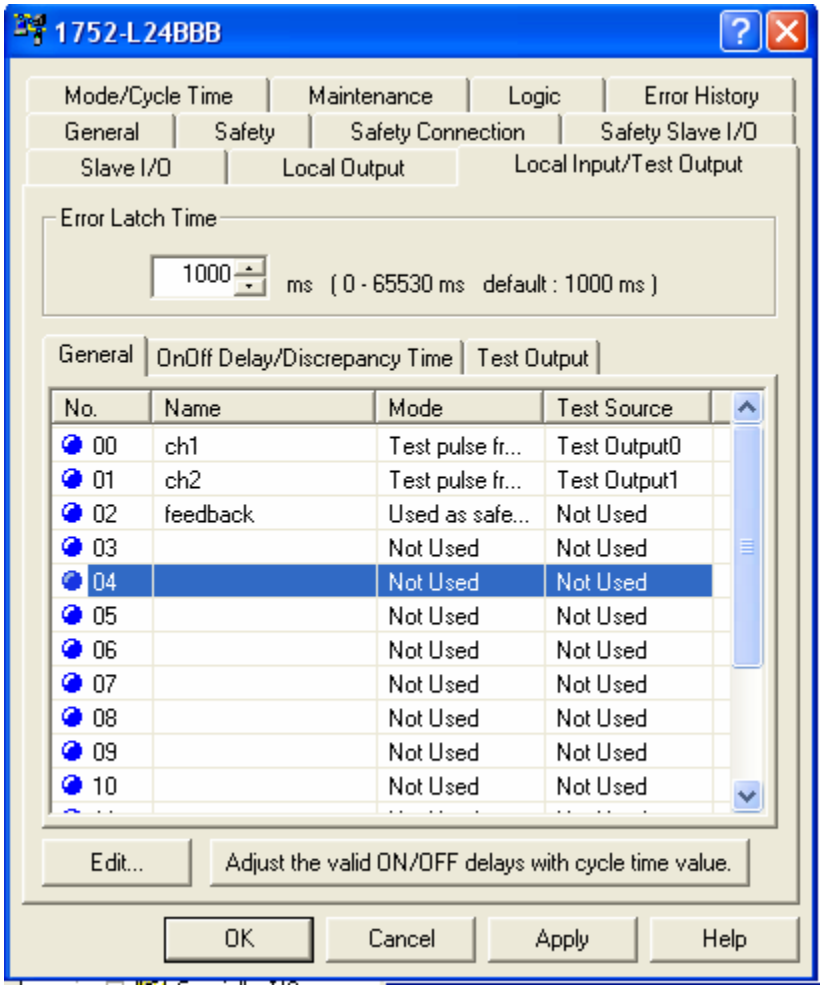
1. Click the Local Input/Test Output tab.
2. Give the local I/O meaningful names so that they are easy to recognize later in the programming editor.
3. Using the wiring diagram, assign names to the inputs as shown below.
4. On the General tab, double-click the first entry in the list labeled No. 00.



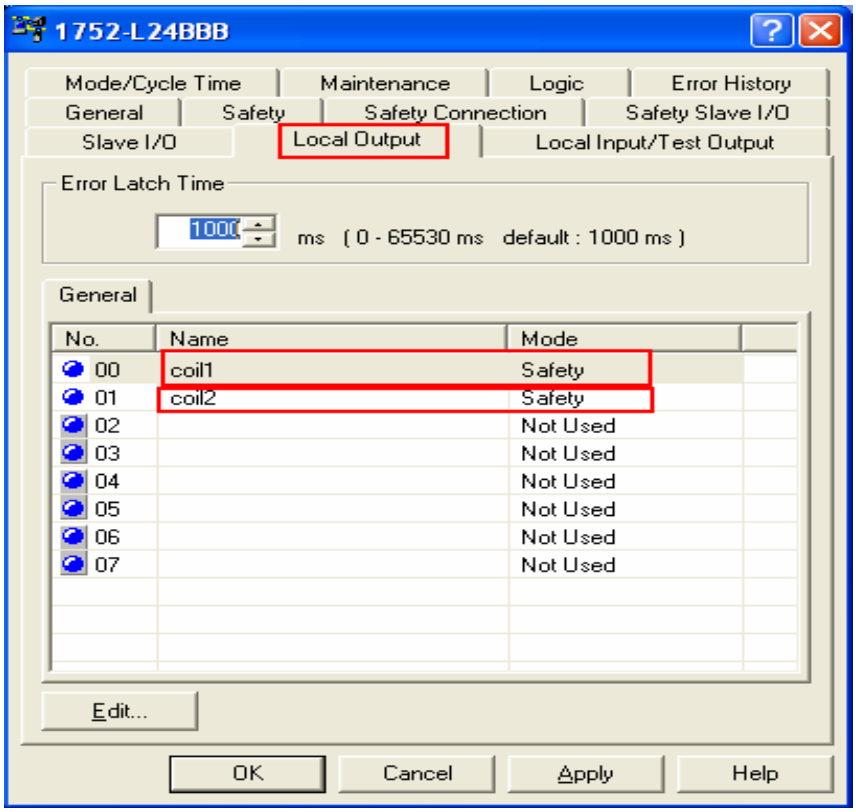
5. Fill in the Local Input Terminal fields.
   a. In the I/O Comment field, type ch1.
   b. From the Channel Mode pull-down menu, select Test pulse from test out.
   c. From the Test Source pull-down menu, select Test Output0.



6. Enter the other Signals as displayed below.



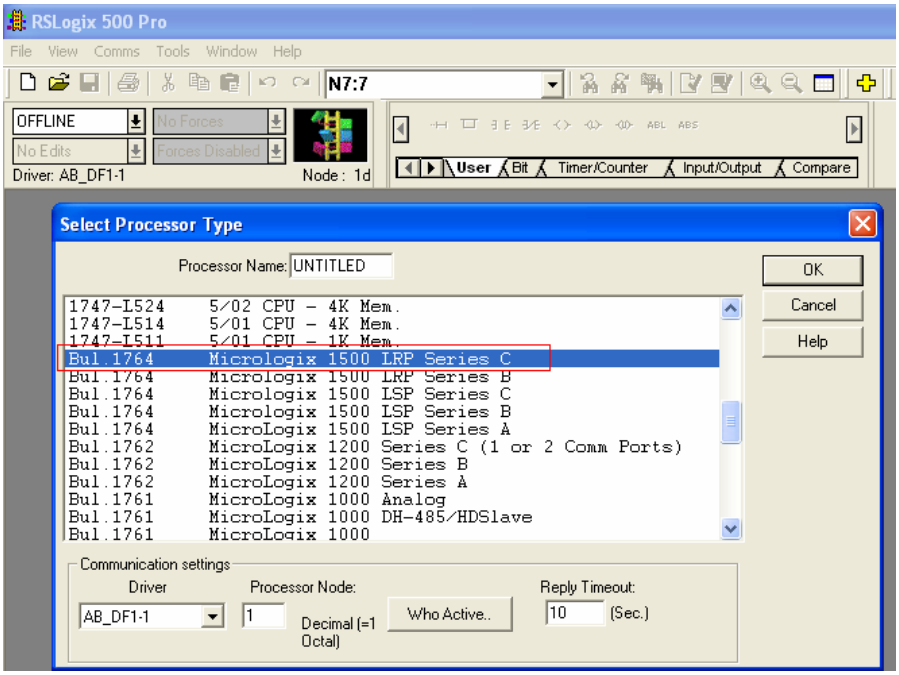
7. Under the Local Output tab, enter the signals as displayed below.



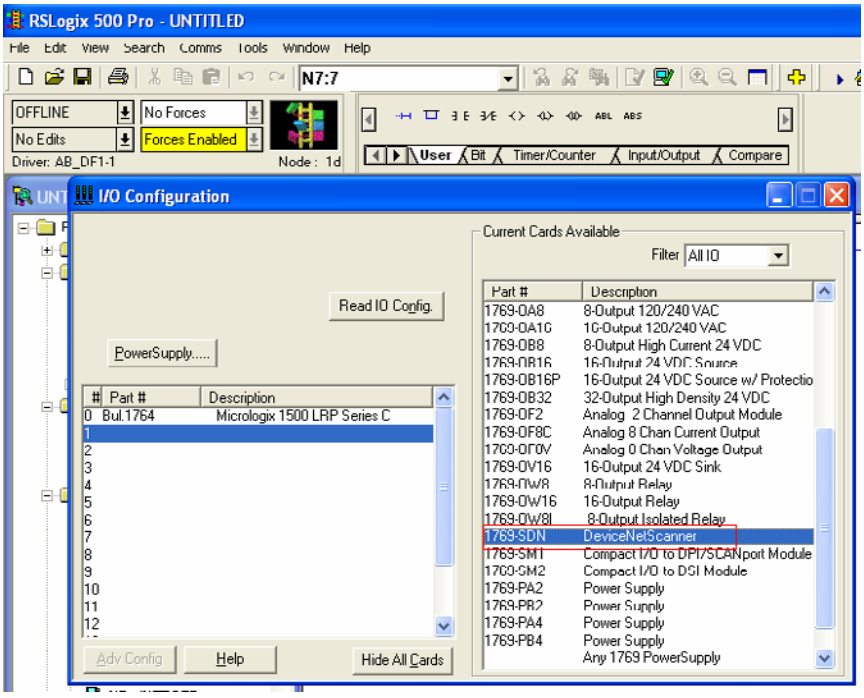
Configuring the MicroLogix 1500 Controller

To configure the MicroLogix 1500 controller, you must select the processor and download the controller.

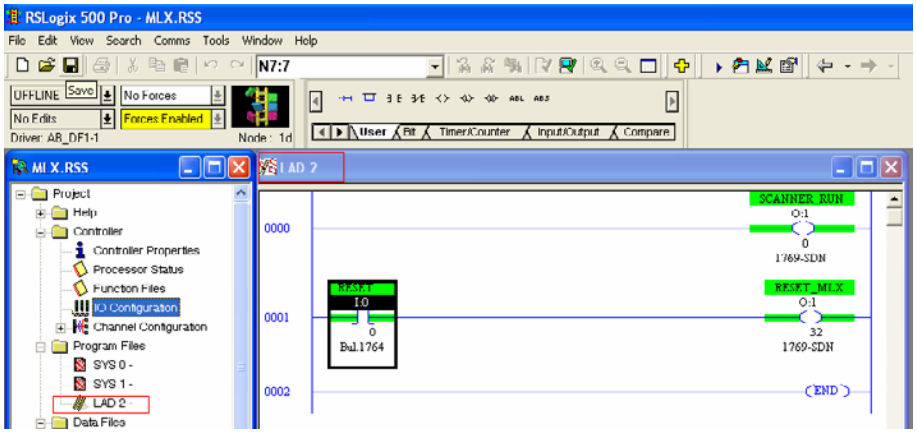
1. Launch RSLogix 500 software.
2. Open a new file.
3. Select the controller.



4. In the I/O Configuration dialog, place the 1769-SDN DeviceNet Scanner module in the first slot.



5. Enter the following rungs of ladder logic.
6. Download to the controller.
7. Switch the controller to Run mode.



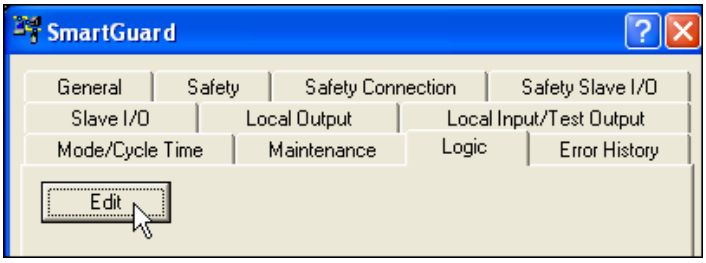
Programming

Programming this setup includes setting the parameters, uploading the 1769-SDN Scanner module, and monitoring the code.

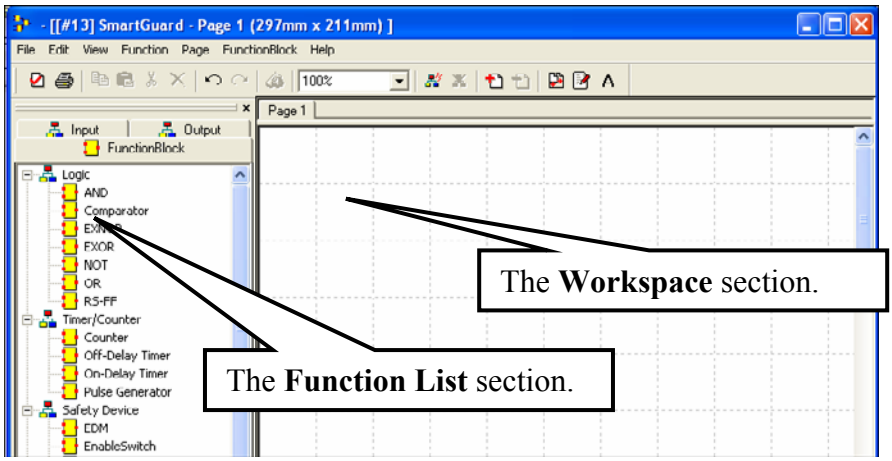
Programming the SmartGuard 600 Controller

To program the SmartGuard 600 controller, the editor is opened, functions are set up in the workspace, and the parameters are set.

1. Click the Logic tab to access the programming editor.
2. Click the Edit button to open the editor.

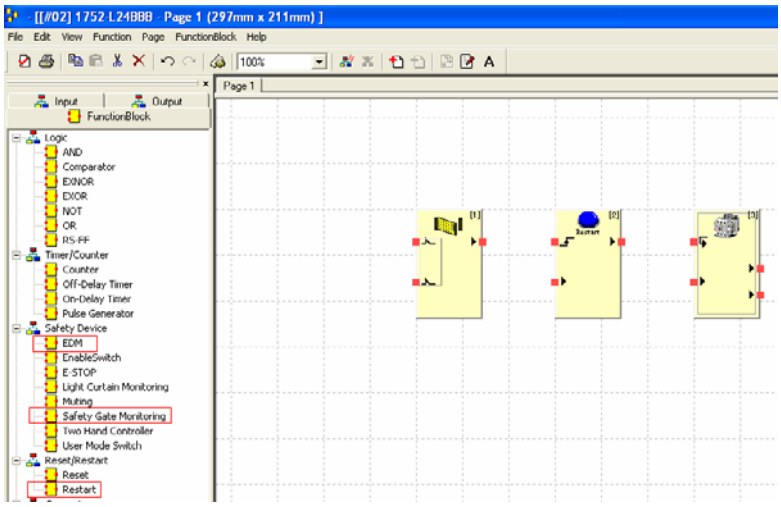


When the editor opens, there are two sections. They include the Function List and the Workspace section.

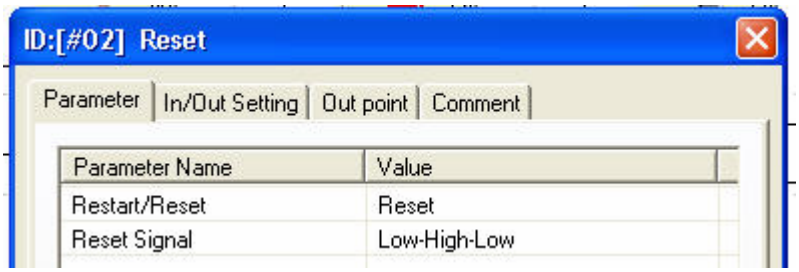


3. In the Safety Device area of the Function Block tab, locate the EDM, Restart, and Safety Gate Monitoring Function blocks.
4. Drag and drop the blocks onto the empty Workspace, as shown below.

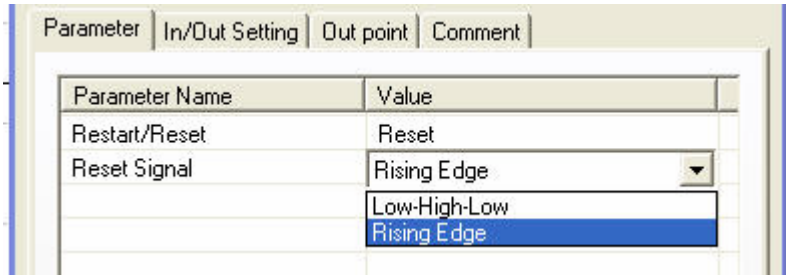
Leave space to the left for the inputs.



5. Double-click the Restart function block and notice that several functions may be set up within the block.



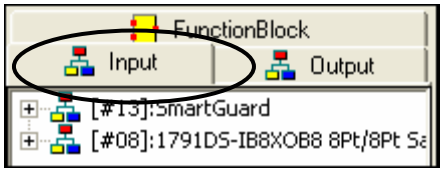
6. Click Reset Signal in the Parameter tab.



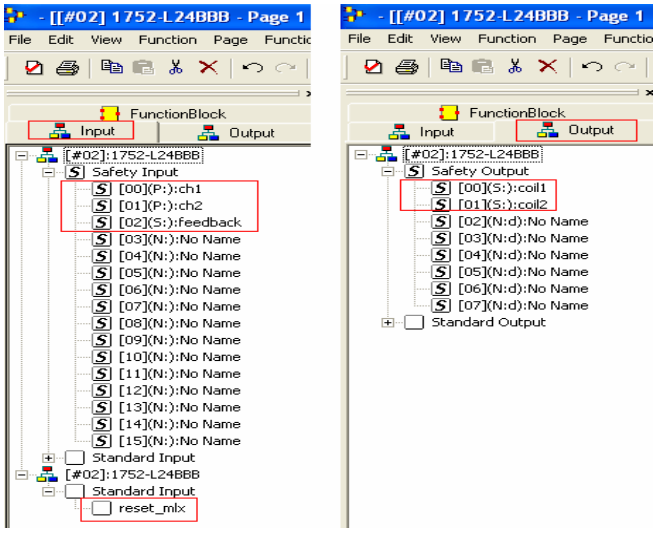
7. For the value, select Rising Edge from the pull-down menu.

For this application example it does not matter what the Reset type is because a momentary switch is used.

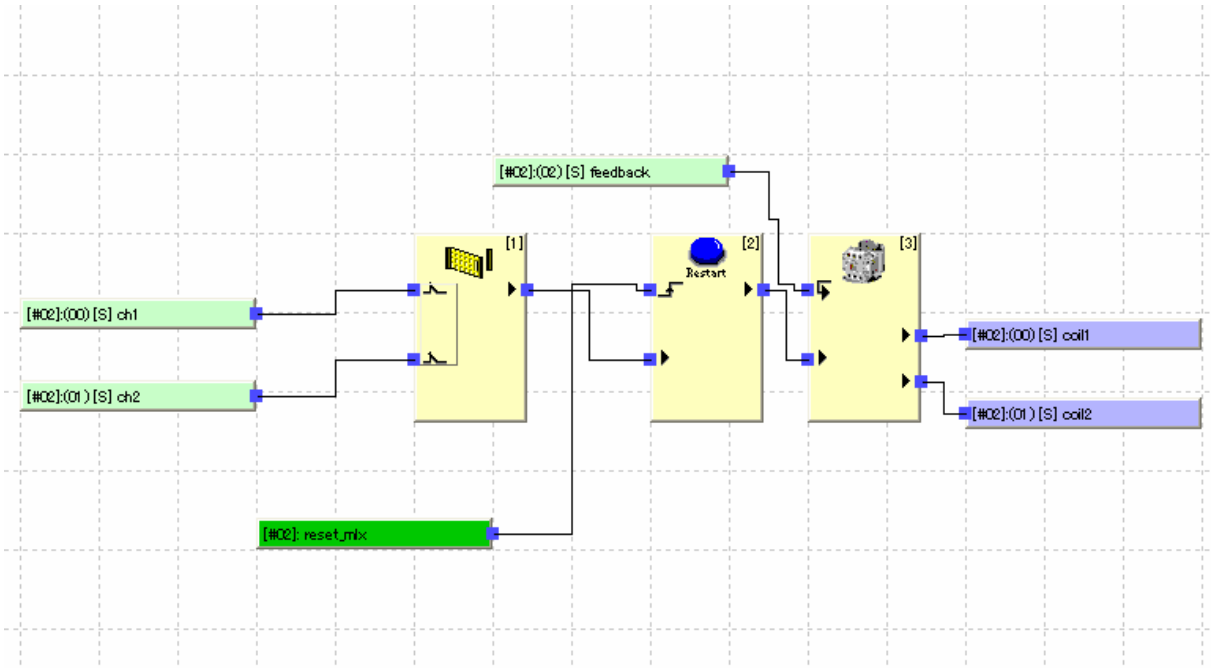
8. Connect the block to the inputs and outputs that were configured previously.
9. Click the Input tab in the Function List.



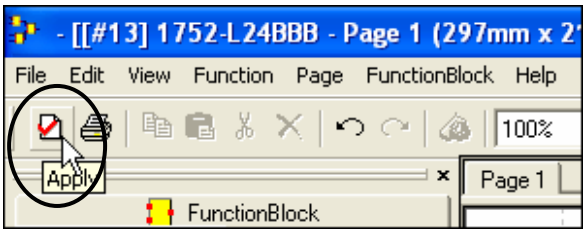
10. Expand the SmartGuard inputs and then the Safety Input section and observe the local inputs that were configured earlier. Similarly, observe the local outputs.



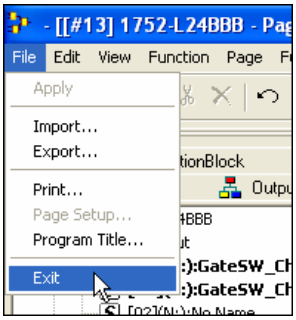
11. Connect function blocks to the input and output signals as shown below.



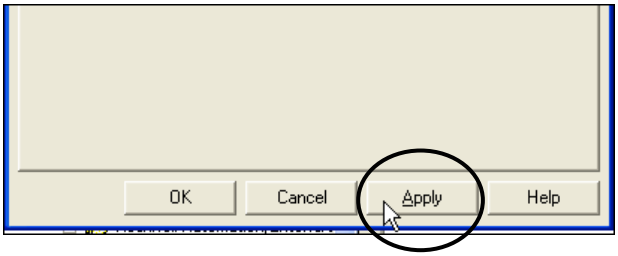
12. Click Apply in the upper left corner of the editor.
13. Confirm by clicking OK to the prompt.



14. Choose File > Exit.



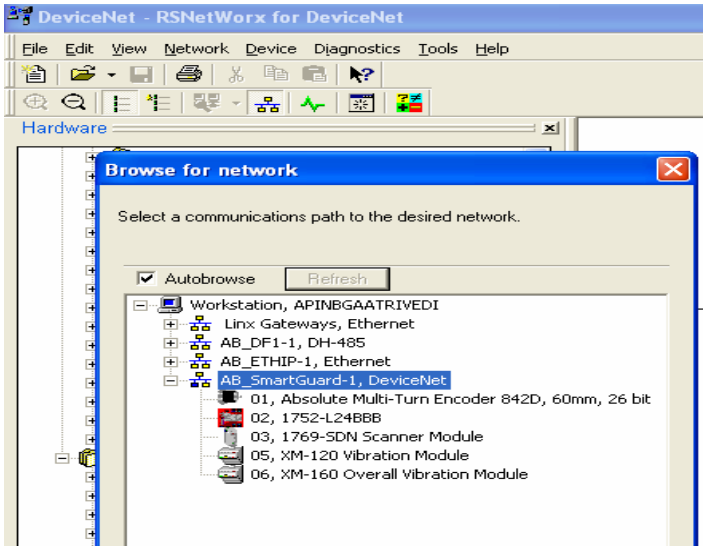
15. To download the program to the computer, click Apply on the SmartGuard Properties dialog.
16. Confirm by clicking Yes to any prompts.



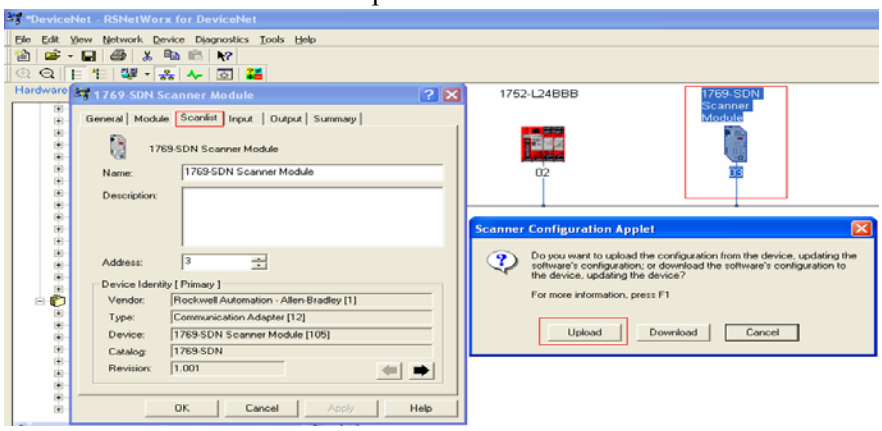
Browsing DeviceNet

In these steps you will upload the SmartGuard 600 controller.

1. Open RSNetworx for DeviceNet network.
2. Select the Browsing path as shown below.

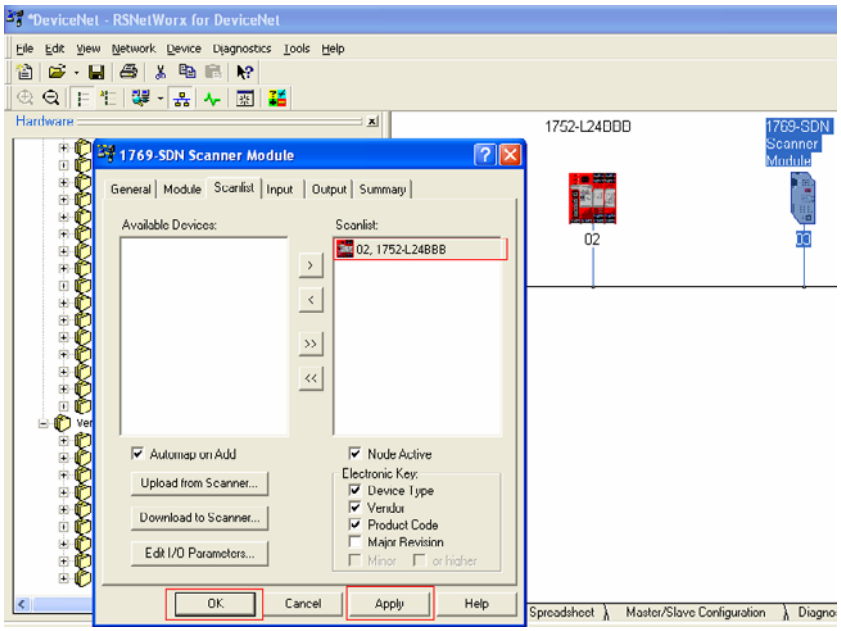


3. Double-click 1769-SDN Scanner Module.
4. Go to scan list and select Upload.



The SmartGuard is listed in the scan list of the 1769-SDN scanner.

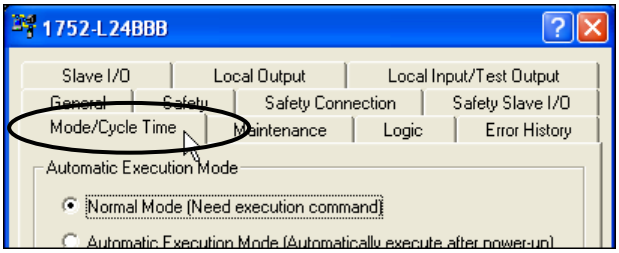
5. Click Apply.
6. Click OK.



Online Monitoring

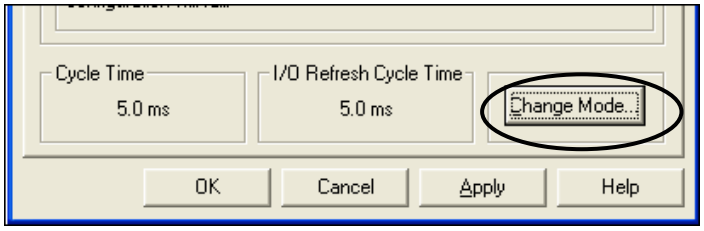
These steps show you how to observe the code online.

1. Click the Mode/Cycle Time tab.

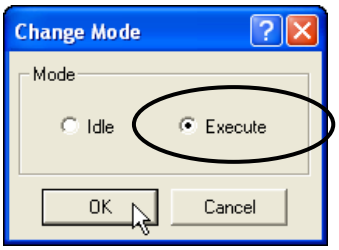


The SmartGuard controller may be changed from Idle mode or Program mode to Execute or Run mode.

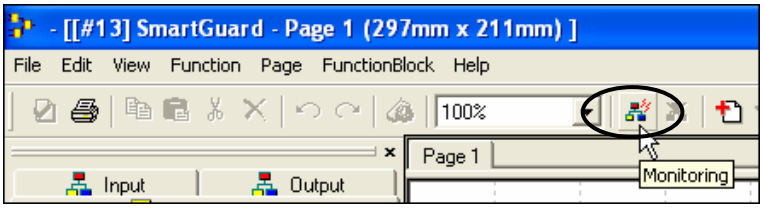
2. Click Change Mode.



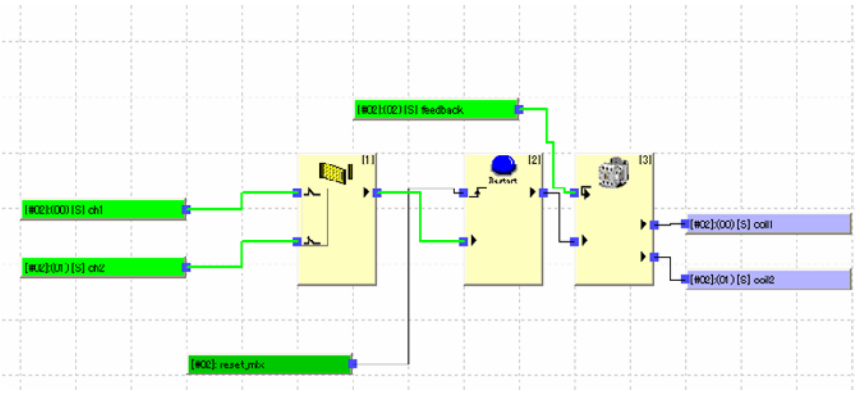
3. Click Execute.
4. Click OK to change modes.



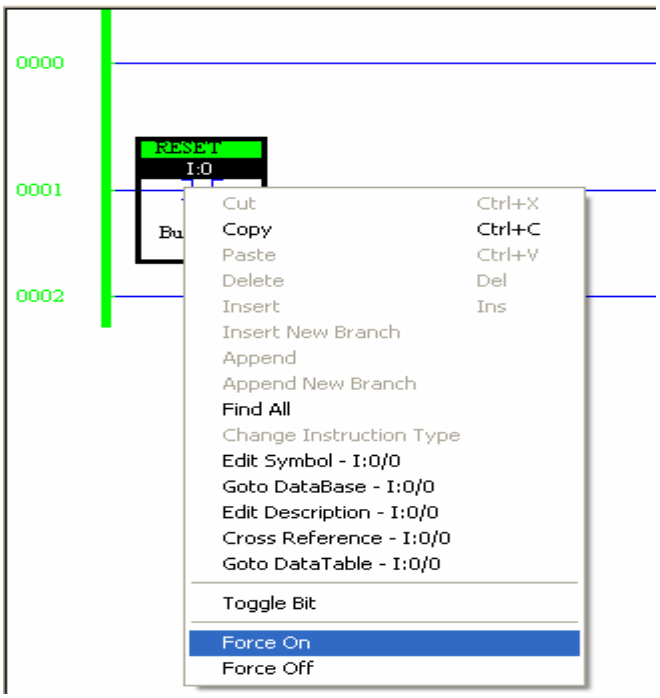
5. To observe the program online, return to the Logic tab.
6. Click Edit.
7. Click the Monitoring button to begin observing the code online.



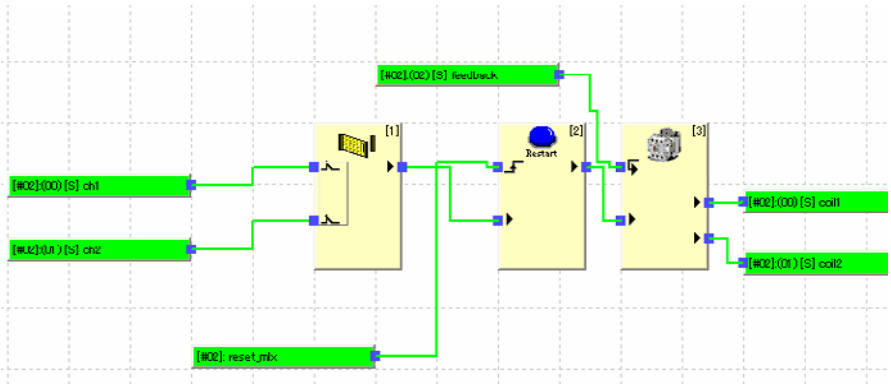
The Safety Gate inputs and Contactor Feedback turn green. This indicates that they are logically true.



8. Give the Reset input command from the MicroLogix 1500 controller by forcing the Reset Bit.



The contactors connected to the Safety outputs turns on and the screen appears as shown.



Additional Resources

For more information about the products used in this example, refer to these resources.

Resource	Description
MicroLogix 1500 Programmable Controller User Manual, publication 1764-UM001	Provides information for using the MicroLogix 1500 Programmable Controller.
SmartGuard 600 Controllers, publication 1752-UM001	Provides information for configuring, operating and troubleshooting the SmartGuard 600 controller.
DeviceNet Scanner User Manual, publication 1769-UM009	Provides information for designing, installing, programming and troubleshooting the Compact I/O DeviceNet Scanner Module.
Product Certifications website, http://ab.com	Provides declarations of conformity, certificates and other certification details.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
S115 - Interlock Tongue Switches Safety Catalog, publication 440K-CA502-EN-P	Provides description and specifications on the S115 - Interlock Tongue Switches.
Cadet 3 Compact Tongue-Operated Interlock Safety Switch Installation Instructions, publication 44545/1	Provides information for installing Cadet 3 Compact Tongue-Operated Interlock Safety Switches.

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