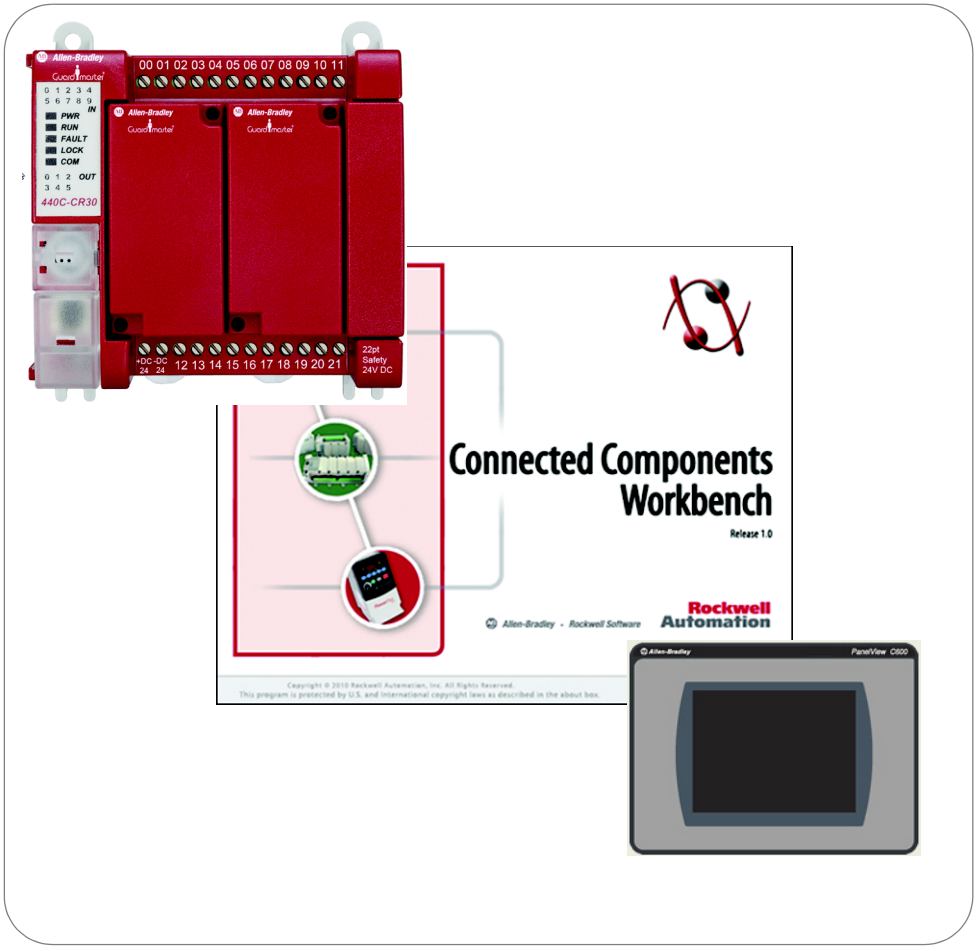
Allen-Bradley

Guardmaster®

Guardmaster® 440C-CR30 Software Configurable Safety Relay Quick Start Guide



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-IN001_-EN-P available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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

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

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.
	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

It is recommended that you save this user manual for future use.

Table of Contents

Introduction

Safety systems are often described as a safety function that consists of inputs devices, a logic device and output devices. In this example application, we have two safety input devices: a SensaGuard interlock that monitors a safety gate and an e-stop push button that is located in a readily accessible area. Our logic device is a Guardmaster 440C-CR30 software configurable safety relay. We have two safety rated output devices, both of which are 700HPS-2Z24 relays with positive opening contacts. The Guardmaster 440C-CR30 monitors the 700HPS output devices through the plug-in module. Opening the gate or pressing the e-stop causes the 700HPS relays to turn off, which disconnects the power to the hazards before the operator can reach the hazard.

Our next consideration is returning power to the machine. In our example application, the operator opens the gate and walks into the hazard area. In such cases, a manual reset of the safety system is required. The reset signal is not a safety signal and therefore can be provided by a graphical display.

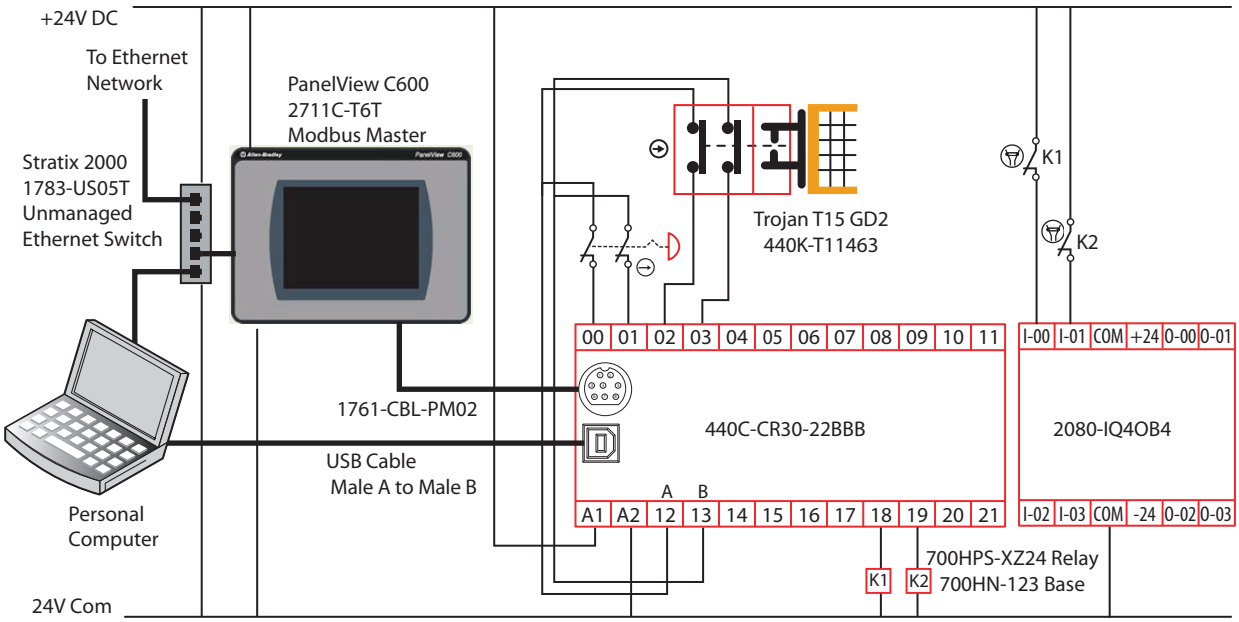
Assumptions

1. The user has loaded CCW Version 6.0 (or later) onto their computer.
2. The user has setup an Ethernet connection to the PanelView.

Schematic/Setup

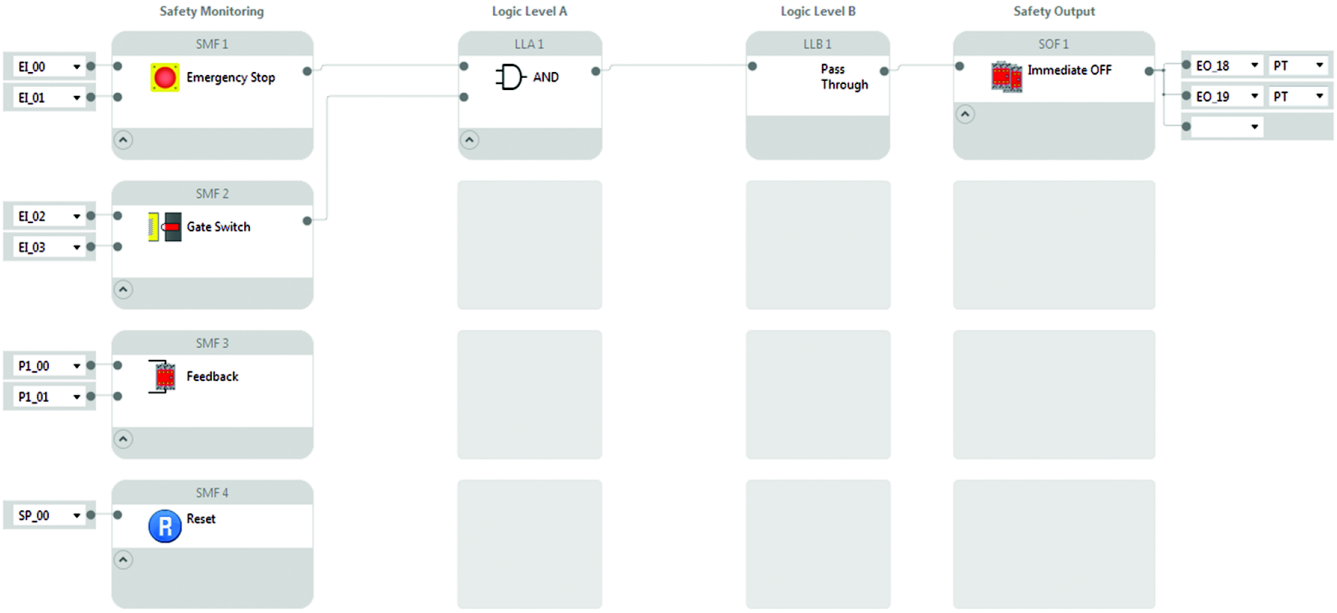
The schematic of our example safety system is shown below.

a. A PanelView C600 has a serial connection to the Guardmaster 440C-CR30.
b. The PC has a USB connection to the Guardmaster 440C-CR30 and an Ethernet connection to the PanelView C600.
c. An e-stop is connected to Inputs 00 and 01 and the e-stop uses test pulses A and B from terminals 12 and 13.
d. A Trojan T15 GD2 tongue interlock monitors a safety gate. It also uses test pulses A and B from terminals 12 and 13.
e. Two 700HPS relays are connected to output terminals 18 and 19.
f. The normally closed outputs of the 700HPS are connected to terminals I-00 and I-01 of the Plug-in Module.
g. The reset signal is provided by the PanelView C600.

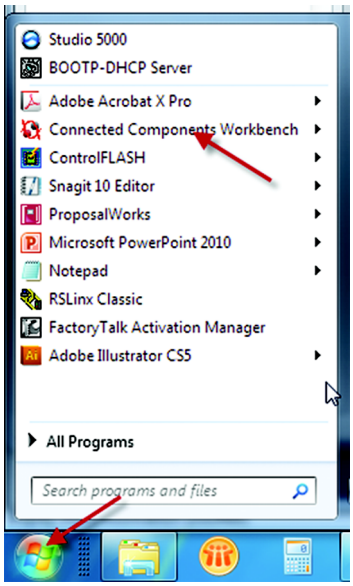


Configuring the Guardmaster 440C-CR30

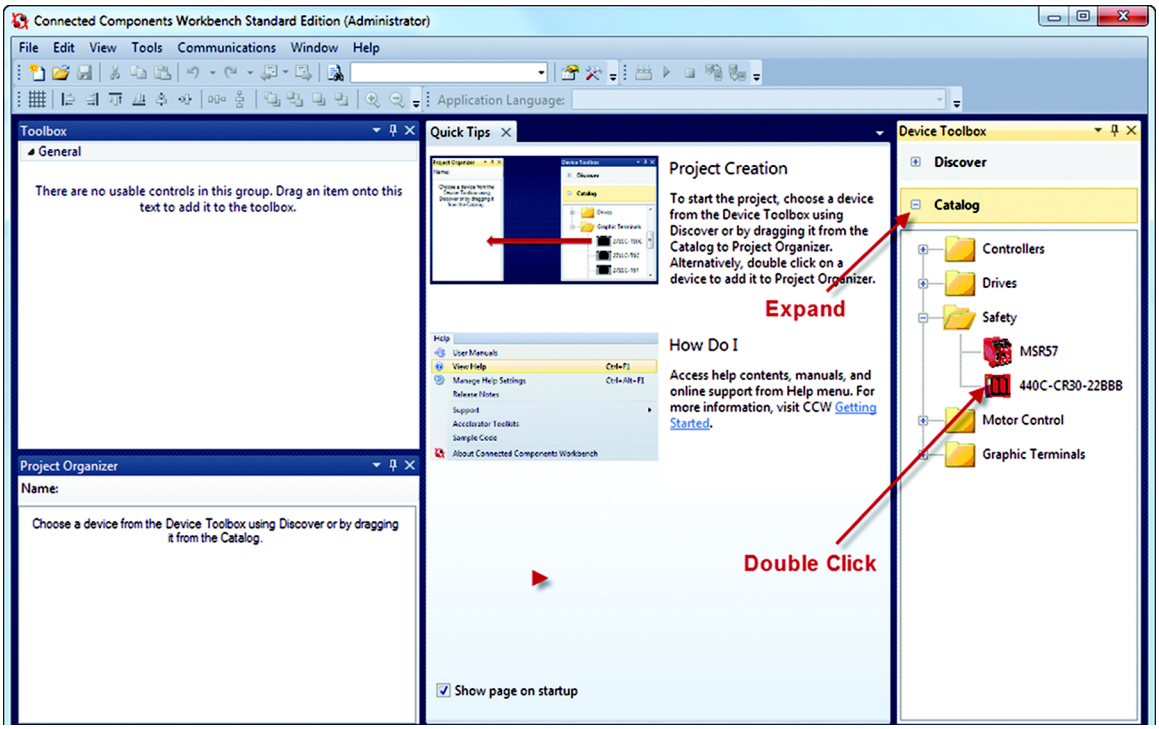
In this section, we will configure the Guardmaster 440C-CR30 workspace to match the schematic.



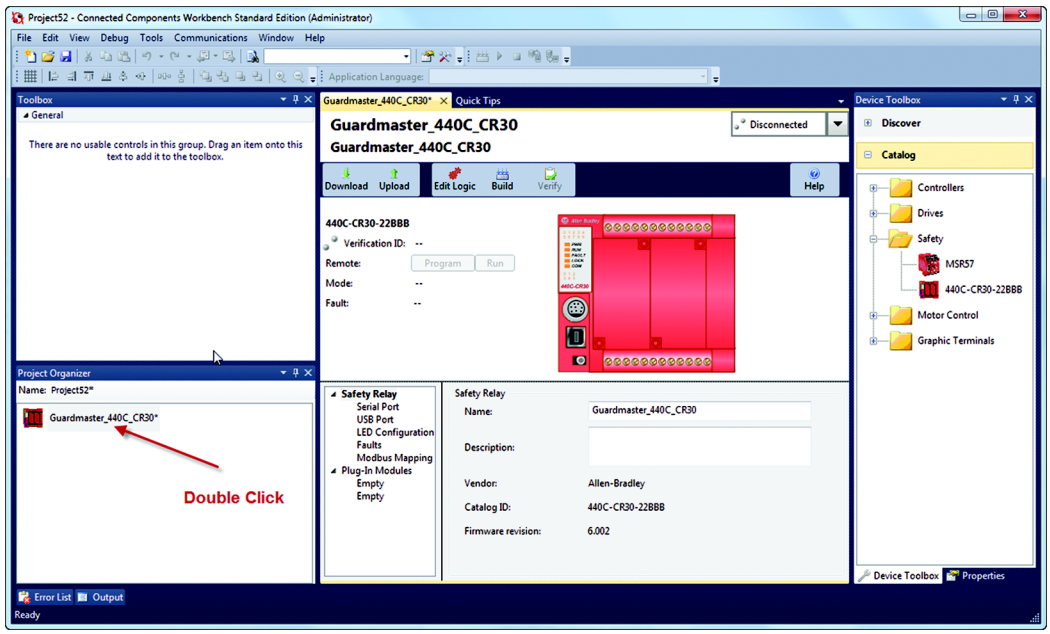
1. Start the CCW. Click on the Windows Start button and then click on the Connected Components Workbench.



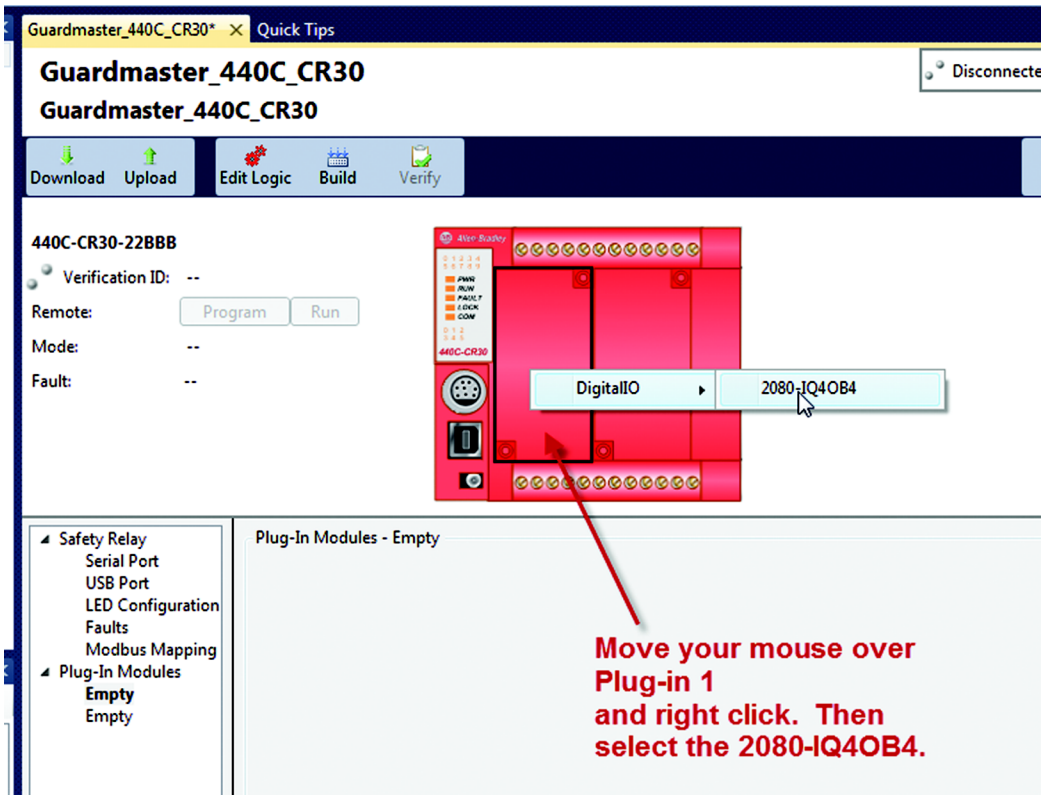
2. Expand the catalog items. Double click on the 440C-Guardmaster 440C-CR30-22BBB to load it into the Project Organizer.



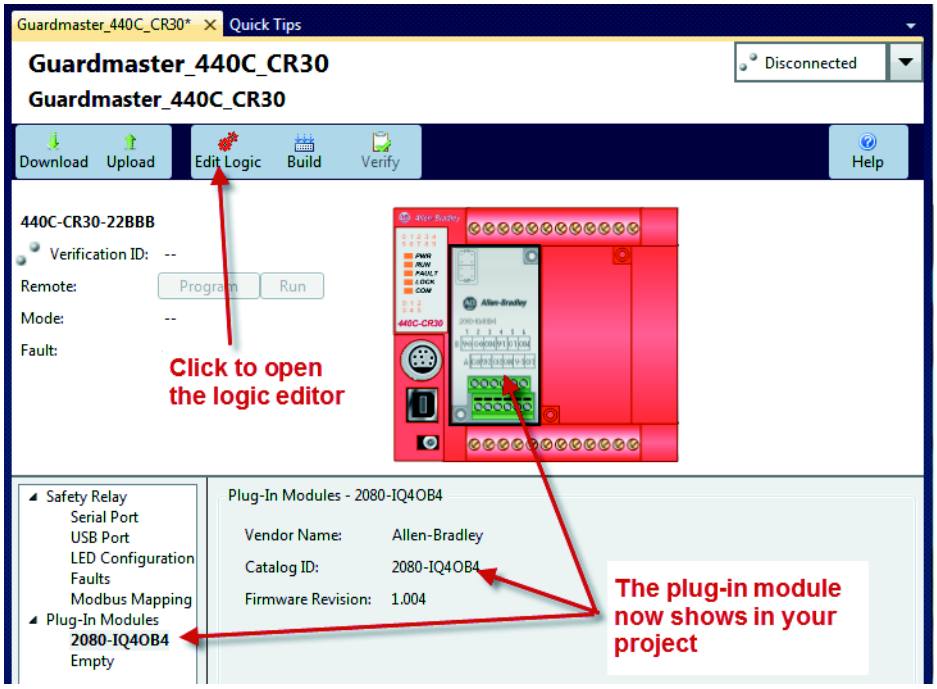
3. Double click on the controller.



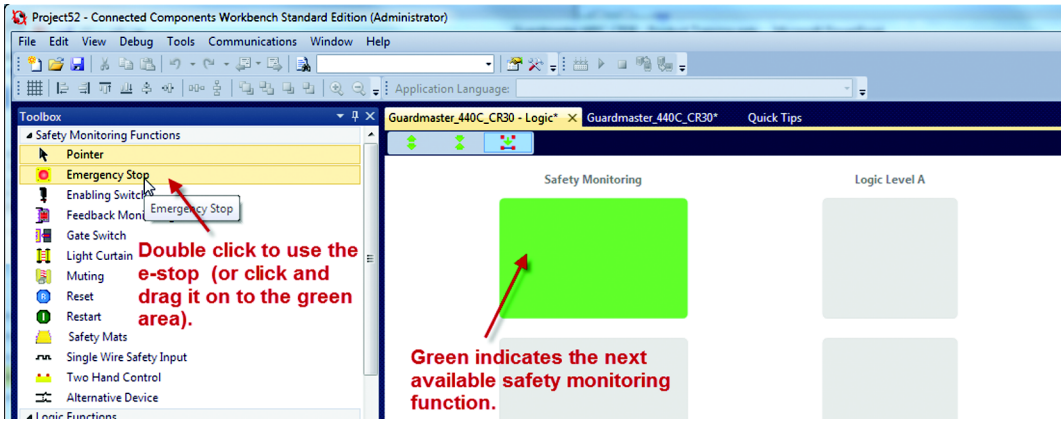
4. Load the Plug-in Module



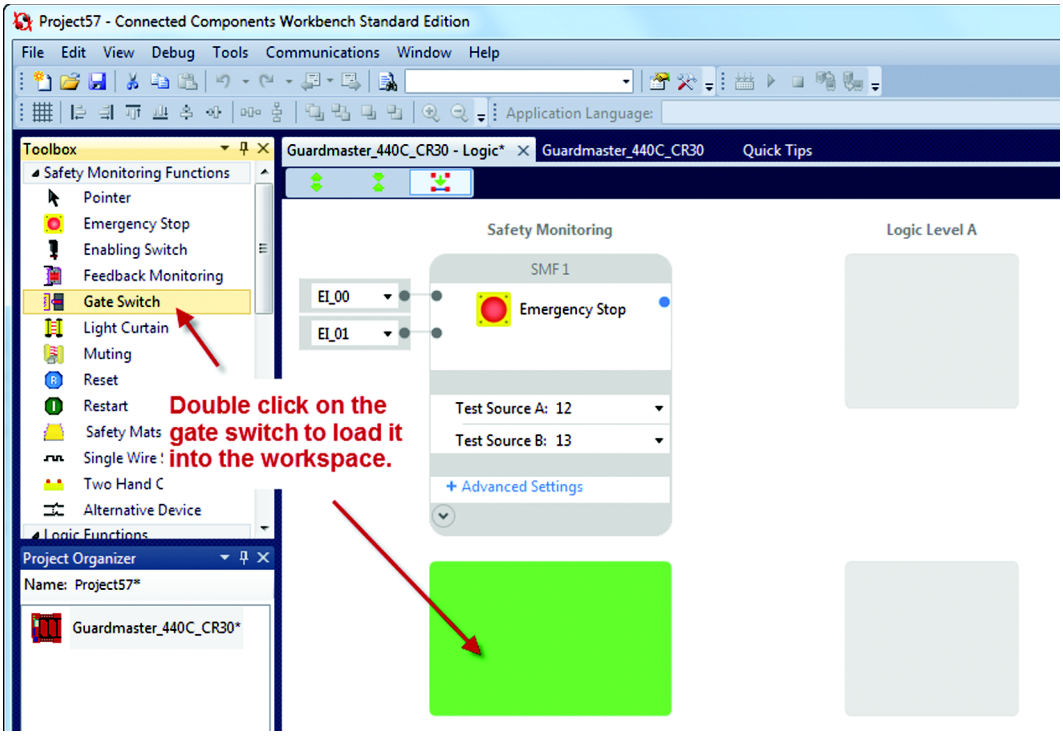
5. Open the Logic Editor. Also note that the Digital Input Module shows in the project.



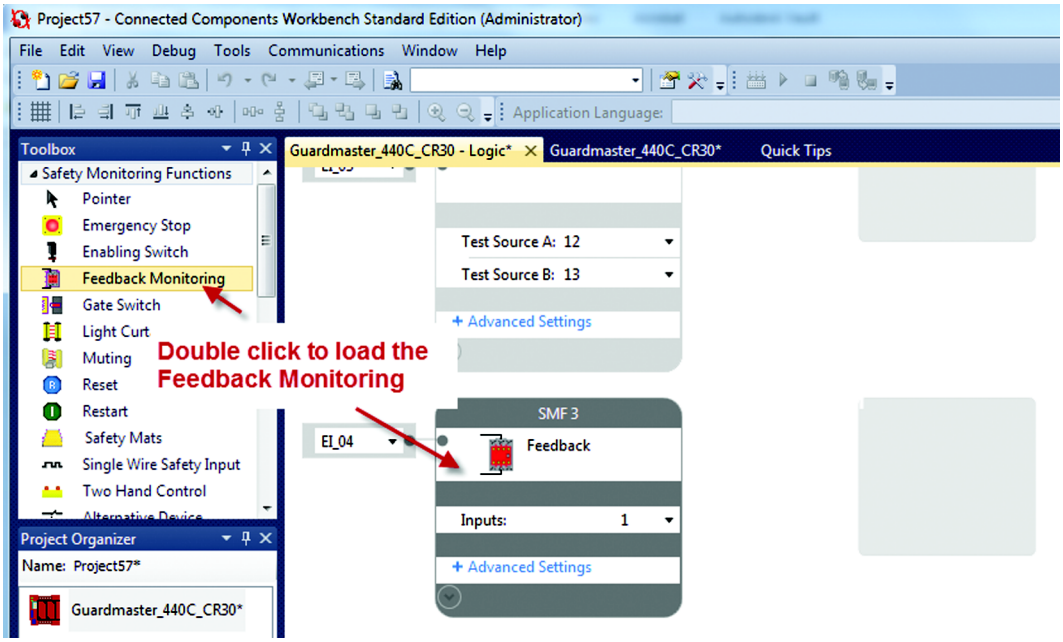
6. Load the e-stop.



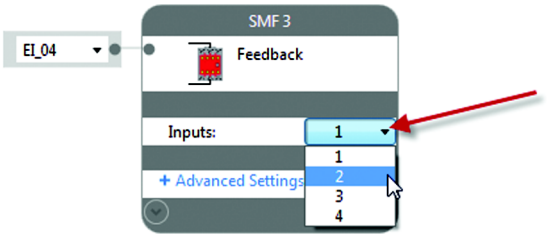
7. Load the Gate Switch.



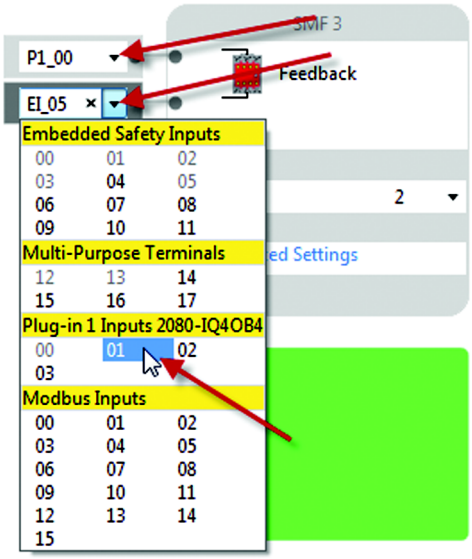
8. Load the Feedback monitoring. (Use the vertical scroll bar to adjust the workspace up to see the next available safety monitoring spot.)



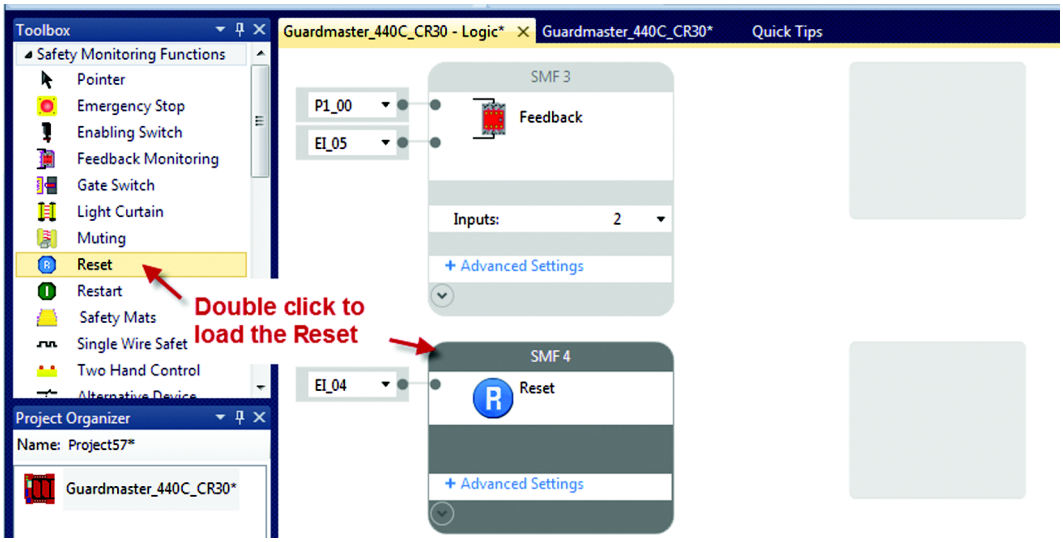
9. Modify the feedback block. Set the number of inputs to two.



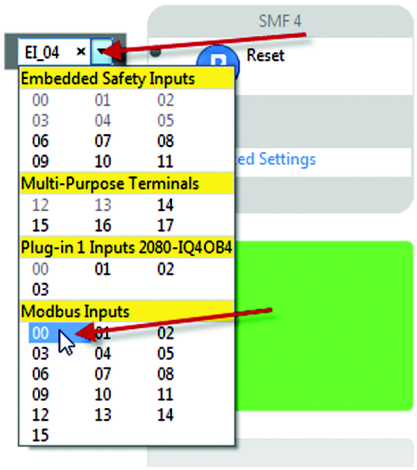
10. Assign the feedback wiring terminal. Set the Input Terminals to Plug-in 00 and 01.



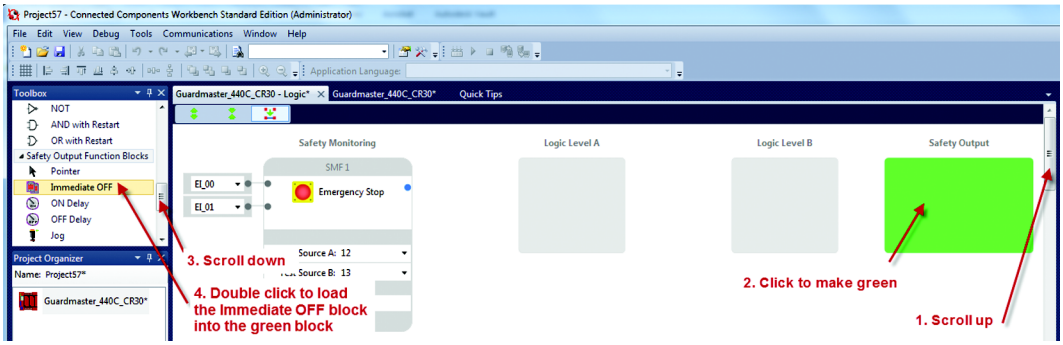
11. Load the reset block.



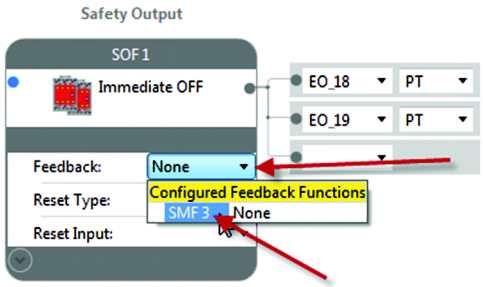
12. Change the reset input terminal to Modbus 00.



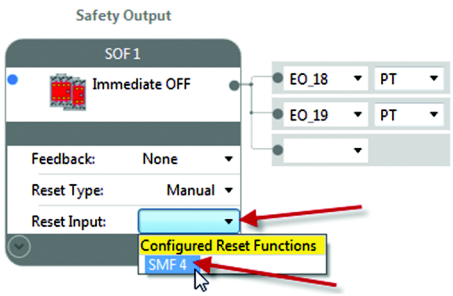
13. Load the Immediate OFF block.



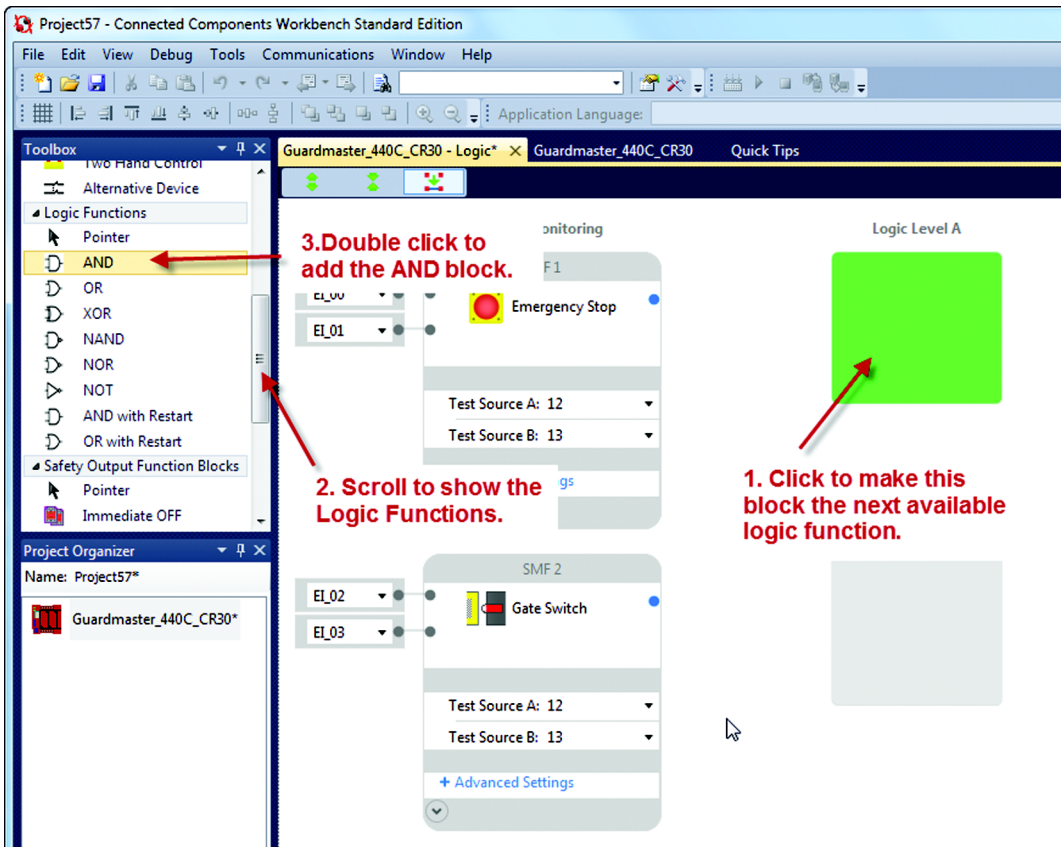
14. Change the Feedback connection to SMF3 (Safety Monitoring Function 3).



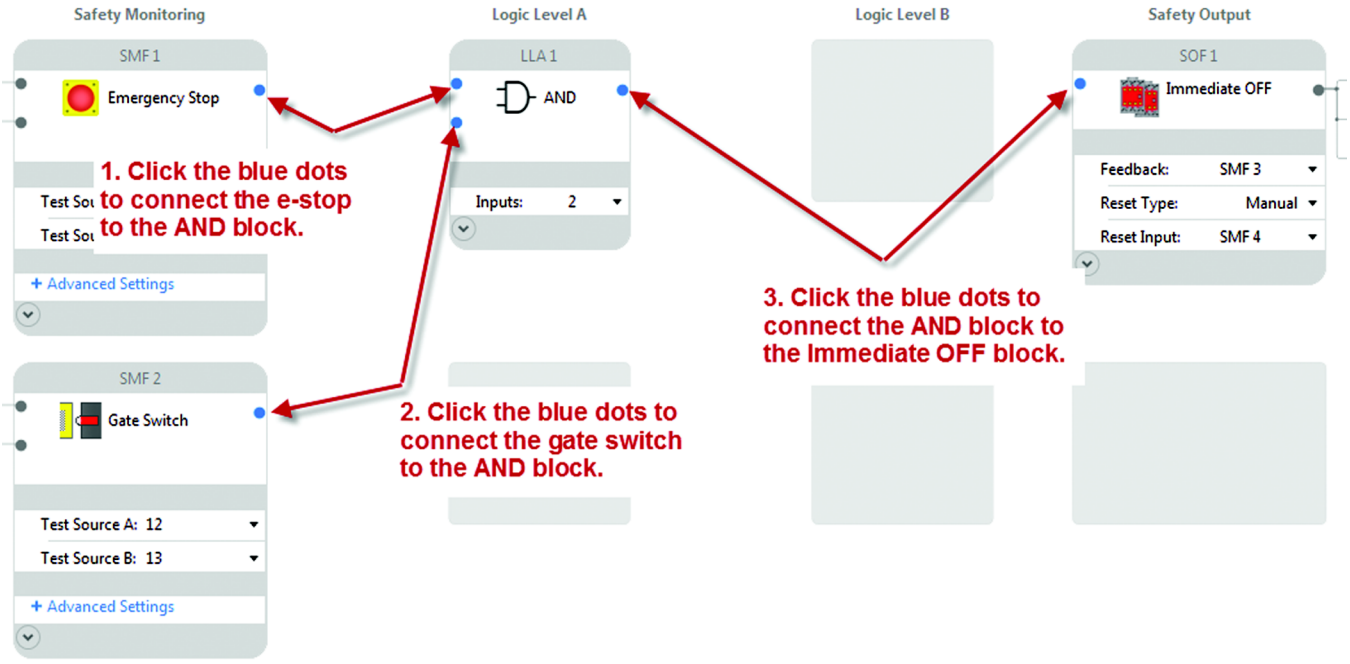
15. Change the reset Input to SMF4 (Safety Monitoring Input 4).



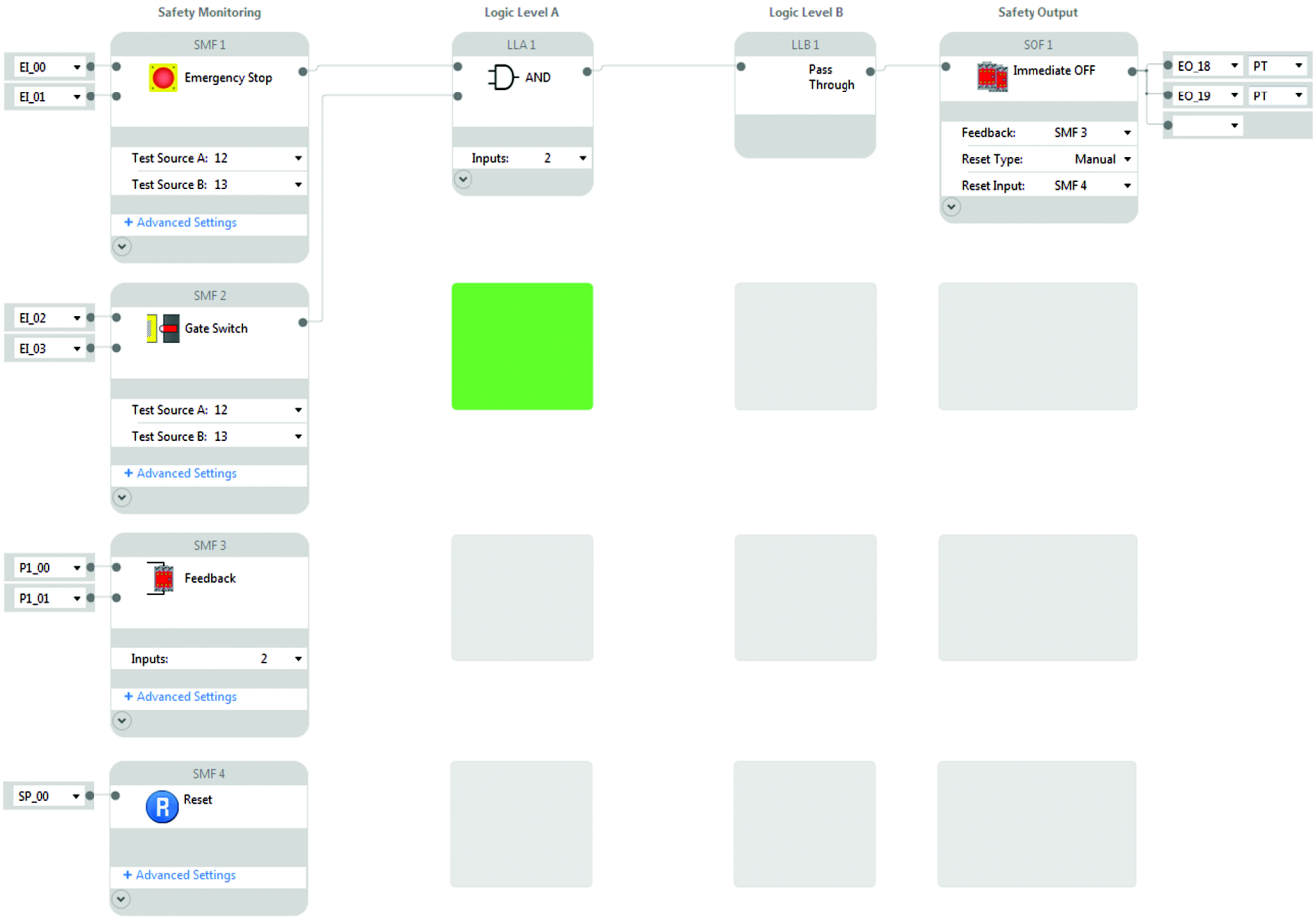
16. Load an AND block.



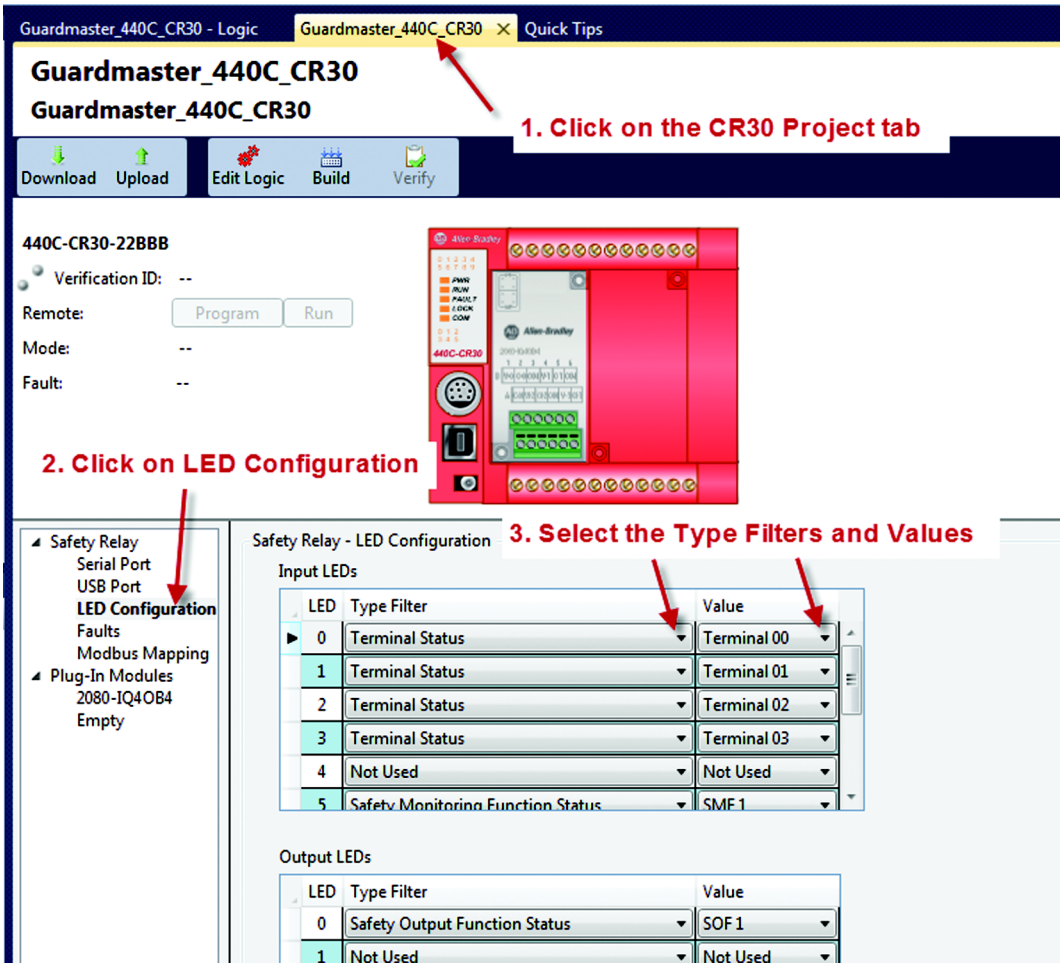
17. Make the connections.



18. The final diagram should look like this.
The CCW automatically created a 'Pass Through' block in Logic Level B.

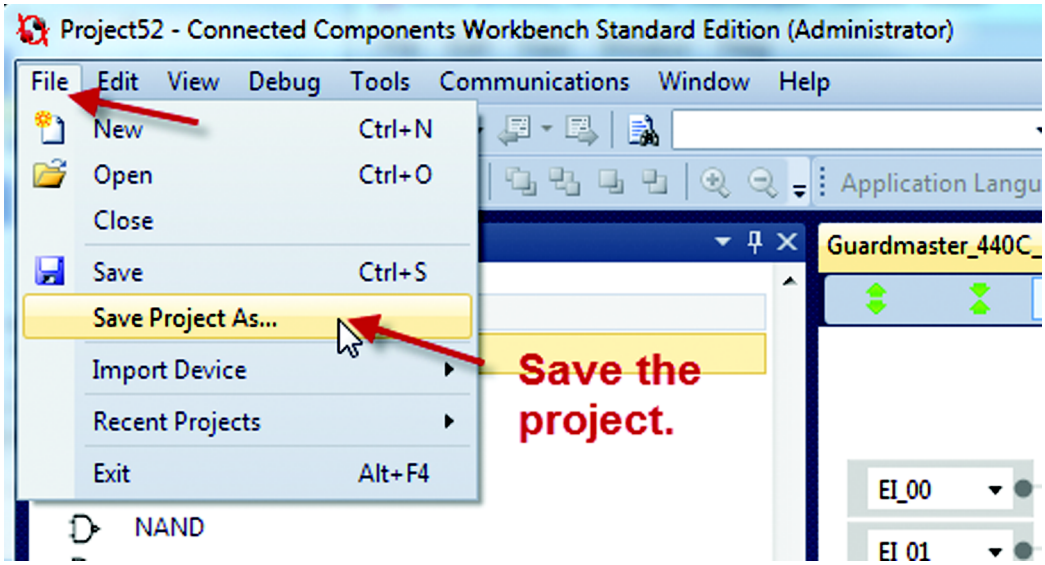


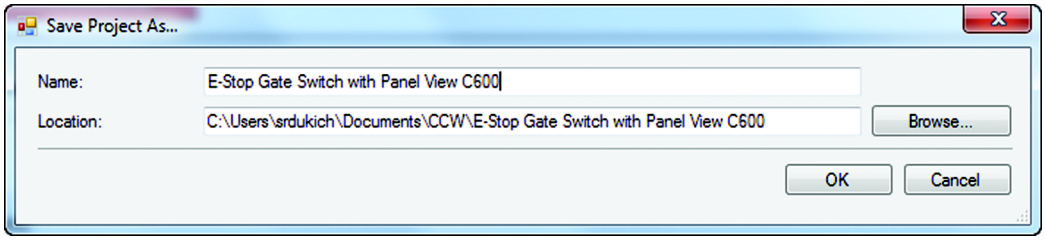
19. Configure the LEDs.



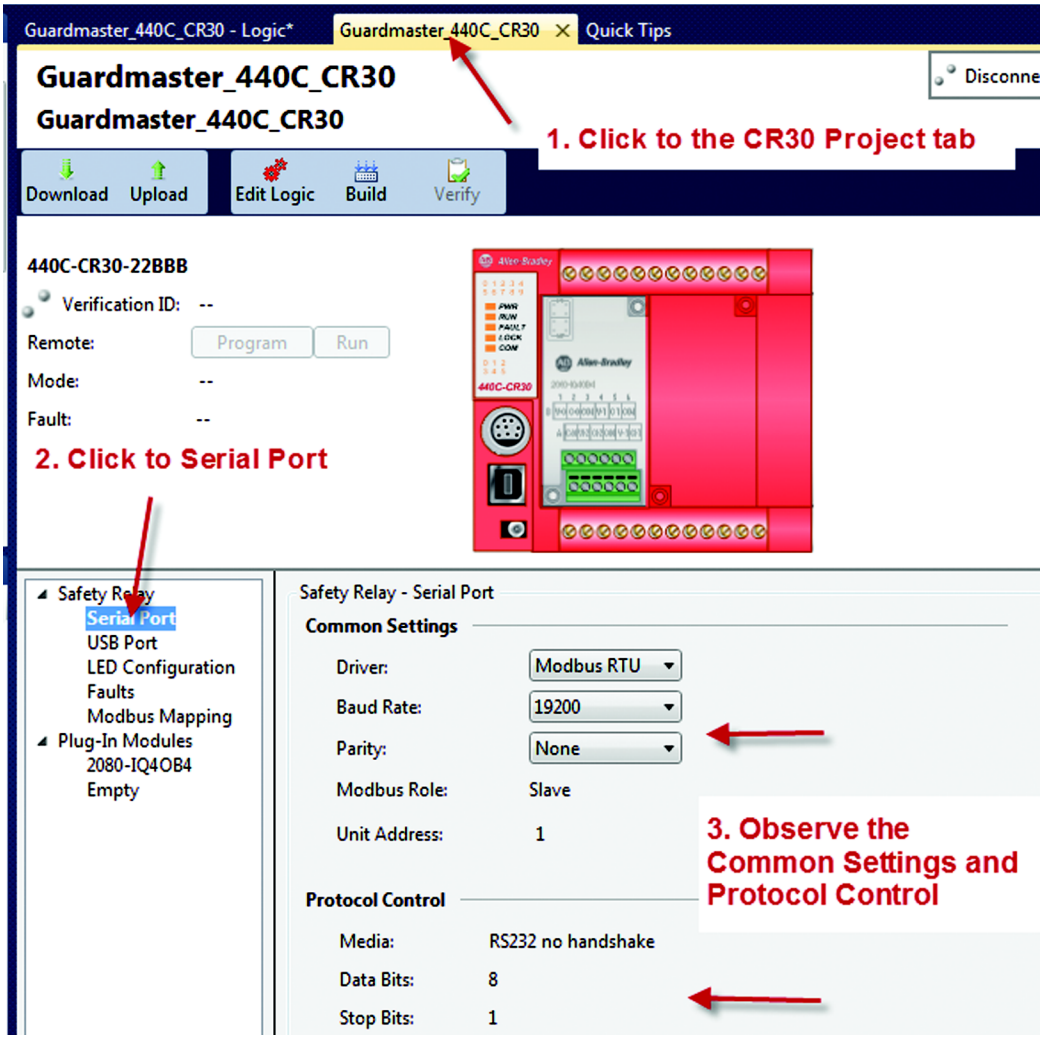
Input LEDs	Type Filter	Value
0	Terminal Status	Terminal 00
1	Terminal Status	Terminal 01
2	Terminal Status	Terminal 02
3	Terminal Status	Terminal 03
4	Not Used	Not Used
5	Safety Monitoring Function Status	SMF1
6	Safety Monitoring Function Status	SMF2
7	Safety Monitoring Function Status	SMF3
8	Safety Monitoring Function Status	SMF4
Output LEDs		
0	Safety Output Function Status	SOF1

20. Save the Project.

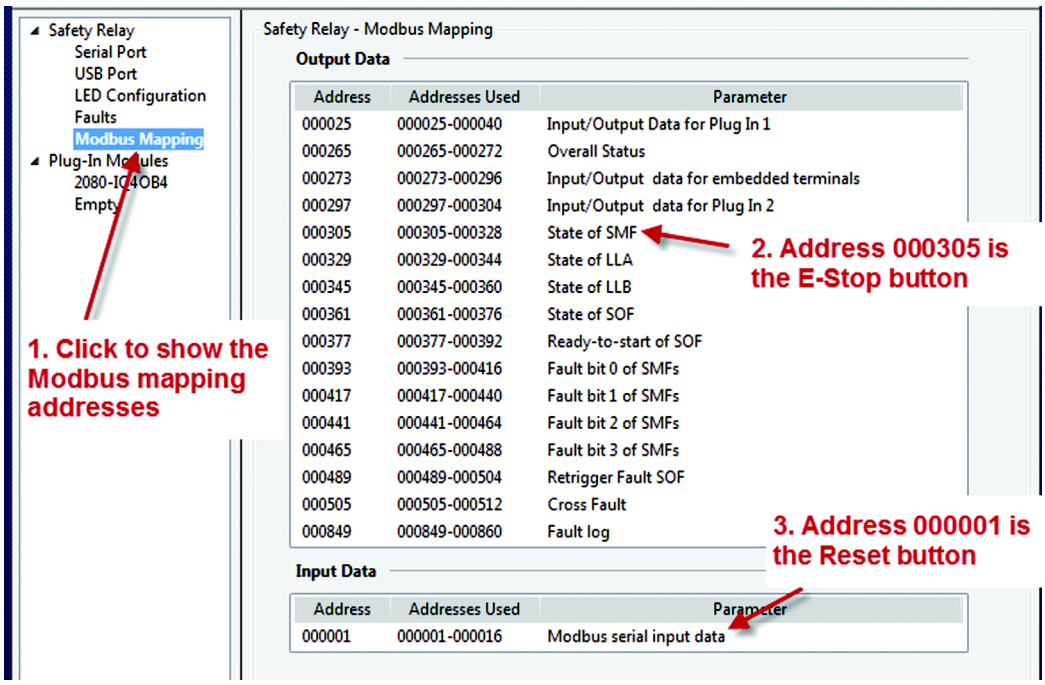




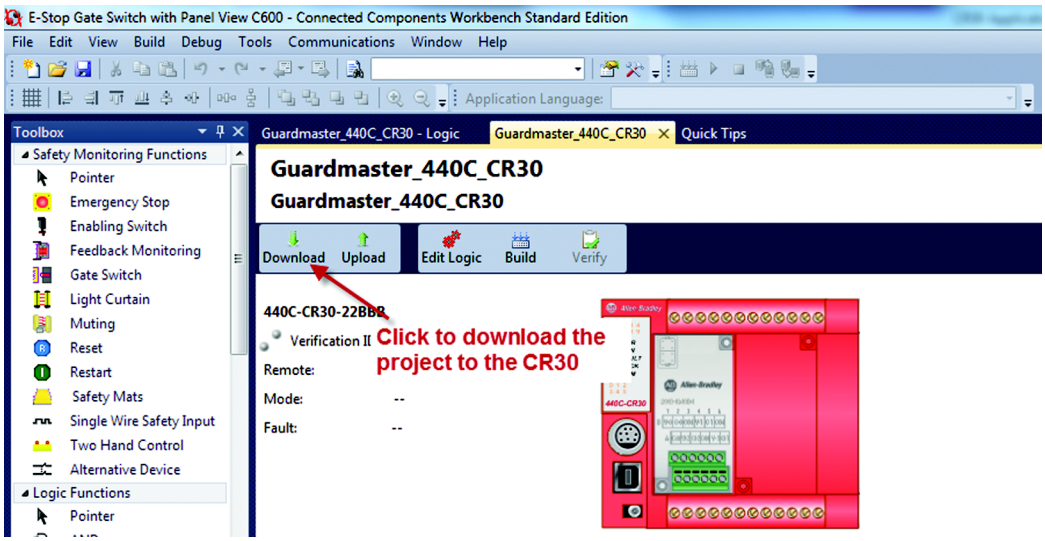
21. Observe the Serial Port Settings.

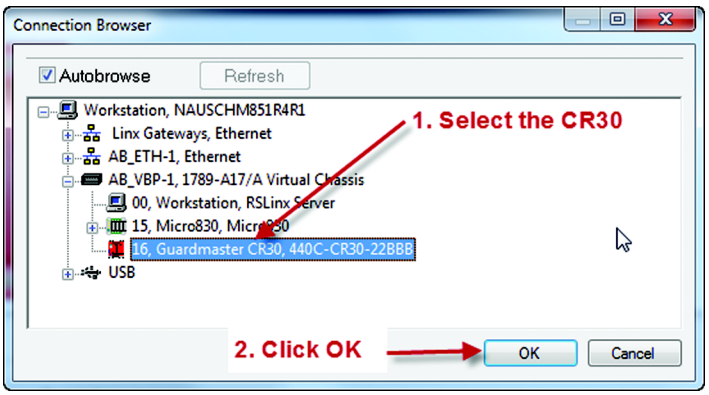


We will be using these Modbus Addresses.

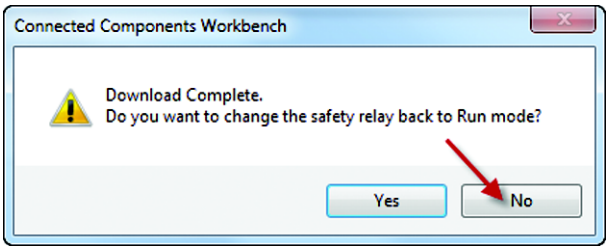


22. Download the project.



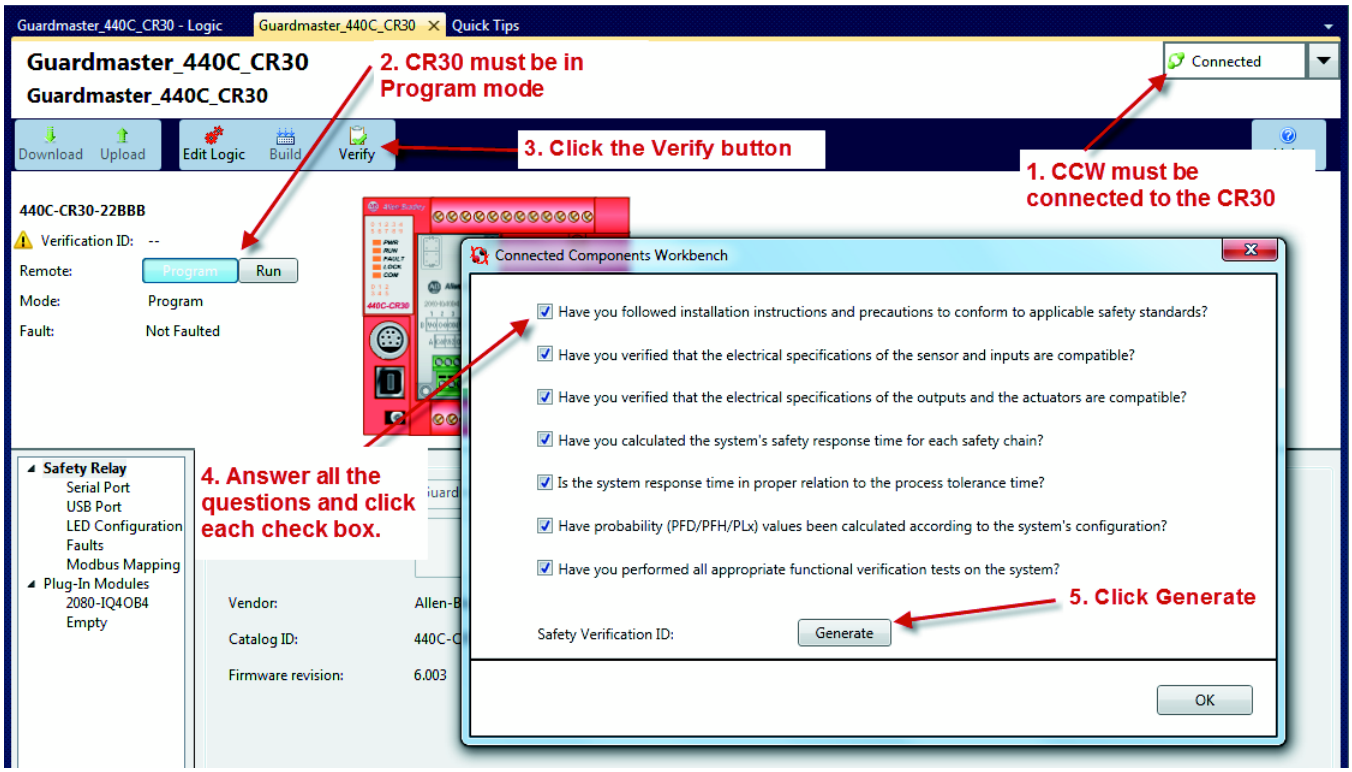


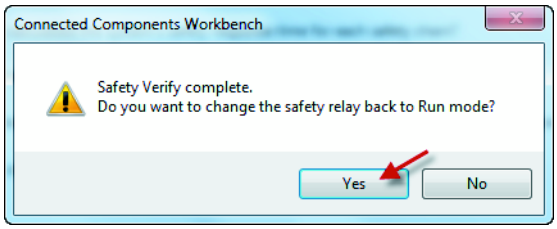
23. Click No to maintain project in Program mode.



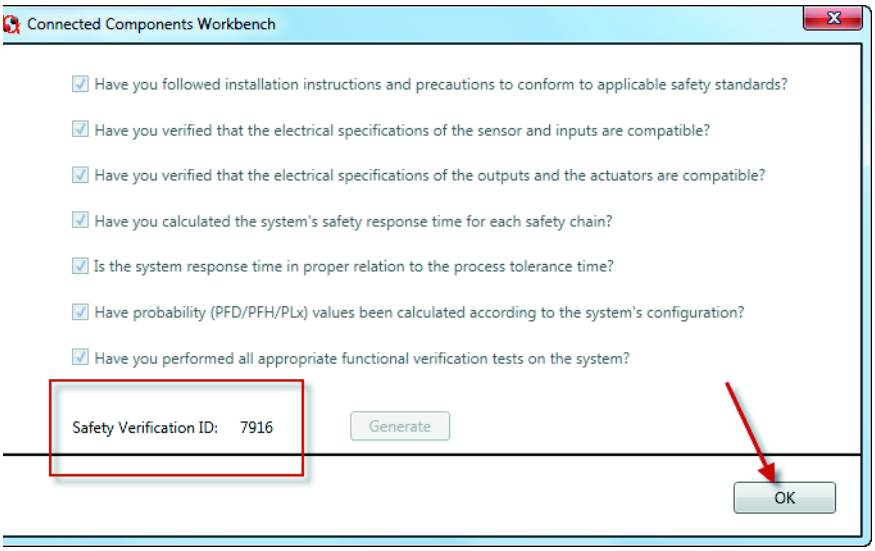
24. Verify the Project.

- If this step is not completed, the CR30 will stop functioning after 24 hours. The user can cycle the power to the CR30 and it will function again for another 24 hours.
- If this step is completed, the CR30 will continue to function after 24 hours and will run indefinitely.
- Verification can only take place while the CCW is connected to the CR30, and the CR30 is in program mode.

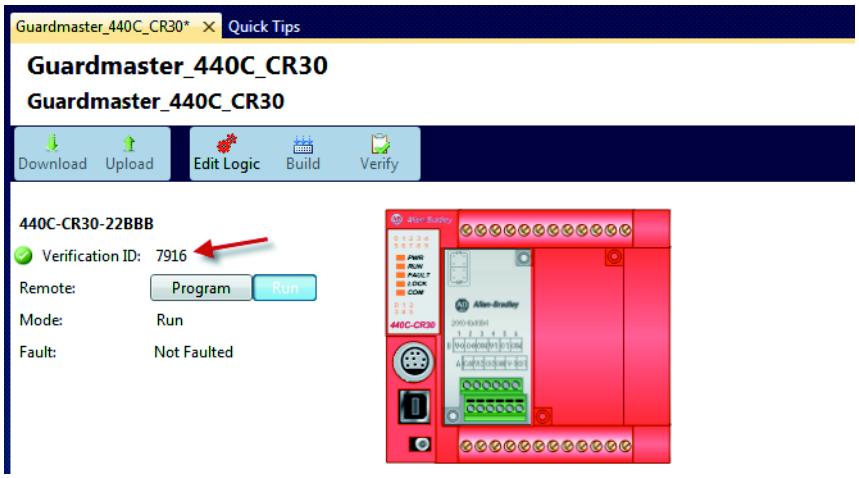




25. The CCW generates the Safety Verification ID. Press OK to continue.



26. Confirm that the Verification ID is present in the CCW Project tab workspace and the CR30 is returned to the Run mode.

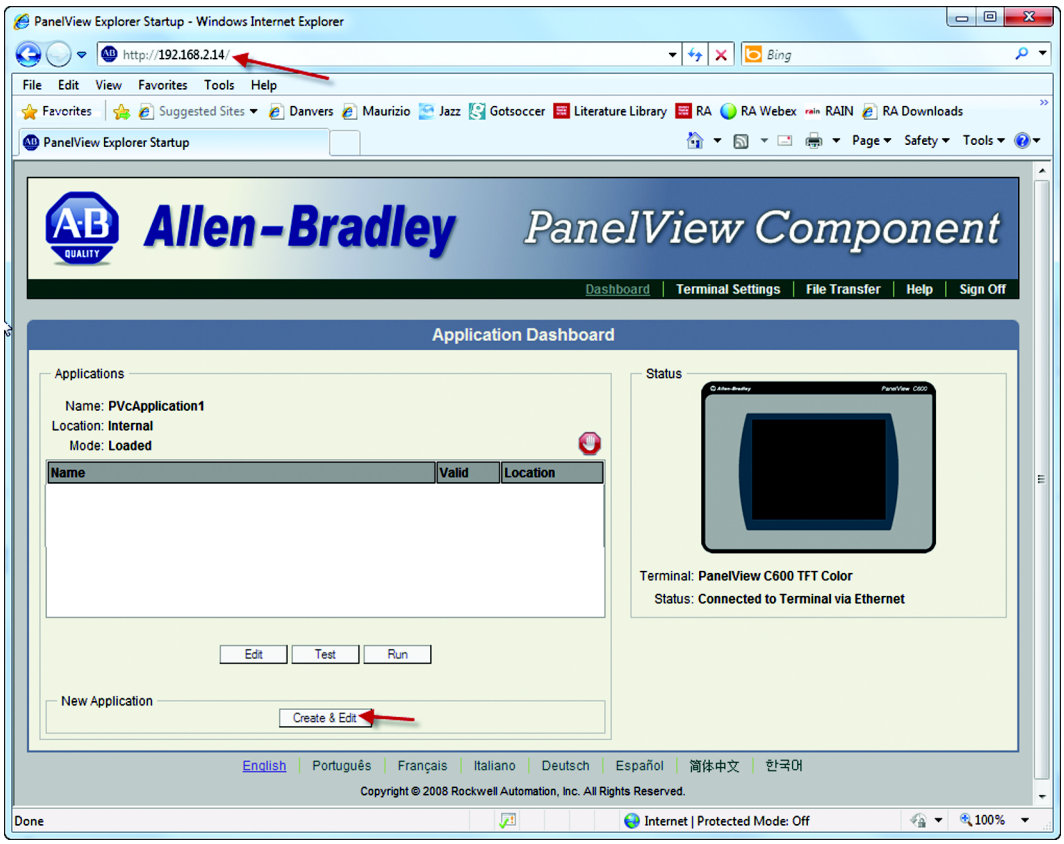


Note that the Verification ID is not saved with the CCW project file. It is saved in the CR30, so that when power is cycled, the user can upload the project from the CR30 and view the verification ID and the CR30 functions beyond the 24 hour limit.

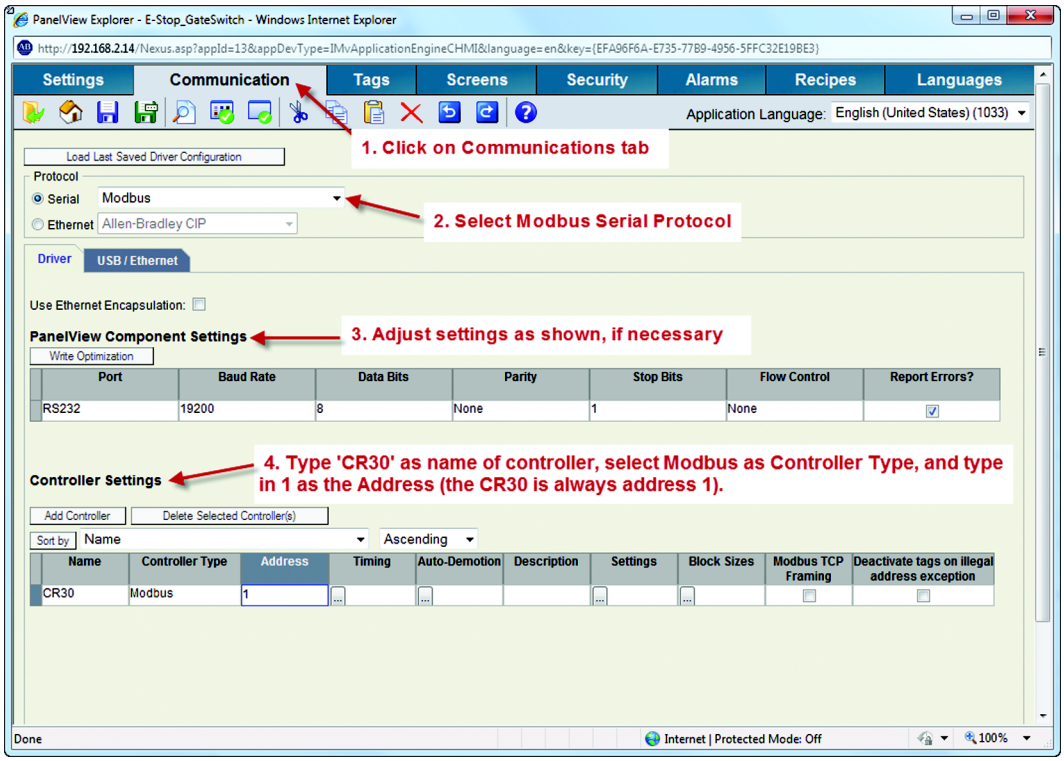
Configuring the PanelView 600

In this application guide, the PanelView C600 is configured over the internet connection. Open Internet Explorer and type in the IP address to the PanelView 600. In this application, the PanelView 600 has a fixed IP address of 192.168.2.14.

1. Click the Create and Edit button.



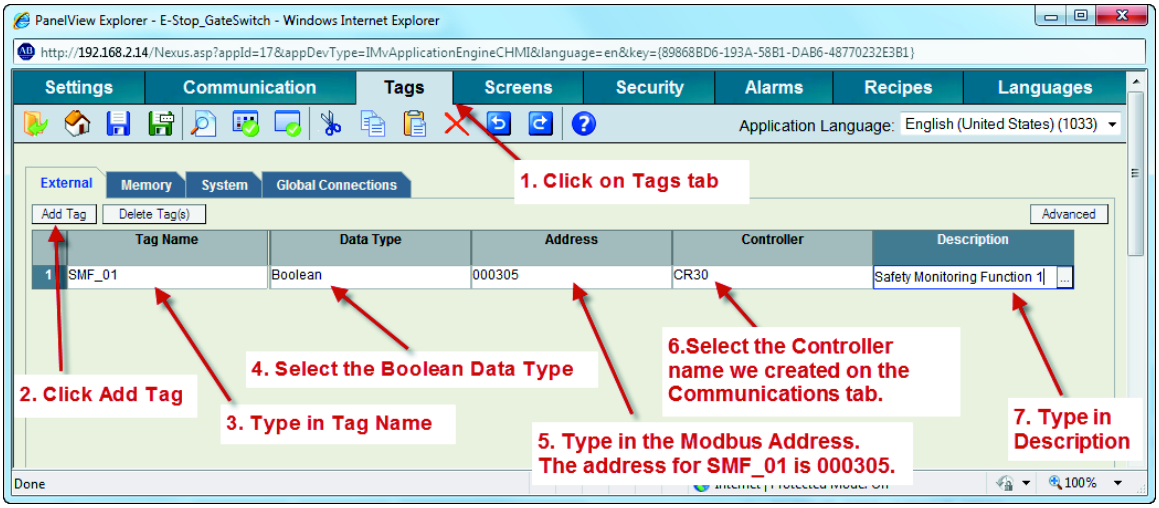
2. Set up Communications.



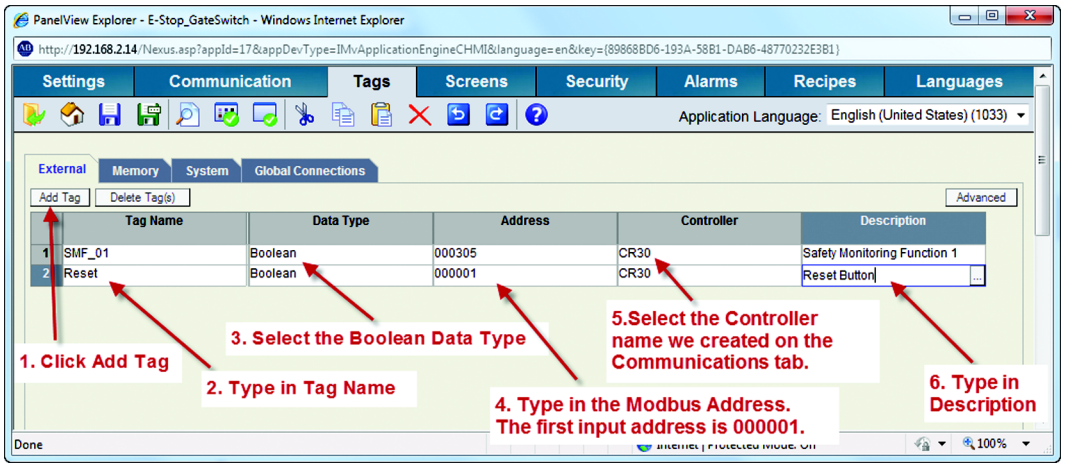
3. We will use the multi-state indicator to indicate the status of the Guardmaster 440C-CR30 inputs, outputs and fault status. We will use a multi-state pushbutton for the reset function. To do this, we need to create tags, then place icons onto the screen and link the icons to the tags.

This guide will show how to set up one indicator and the reset button. The user can follow these same steps to create additional indicators.

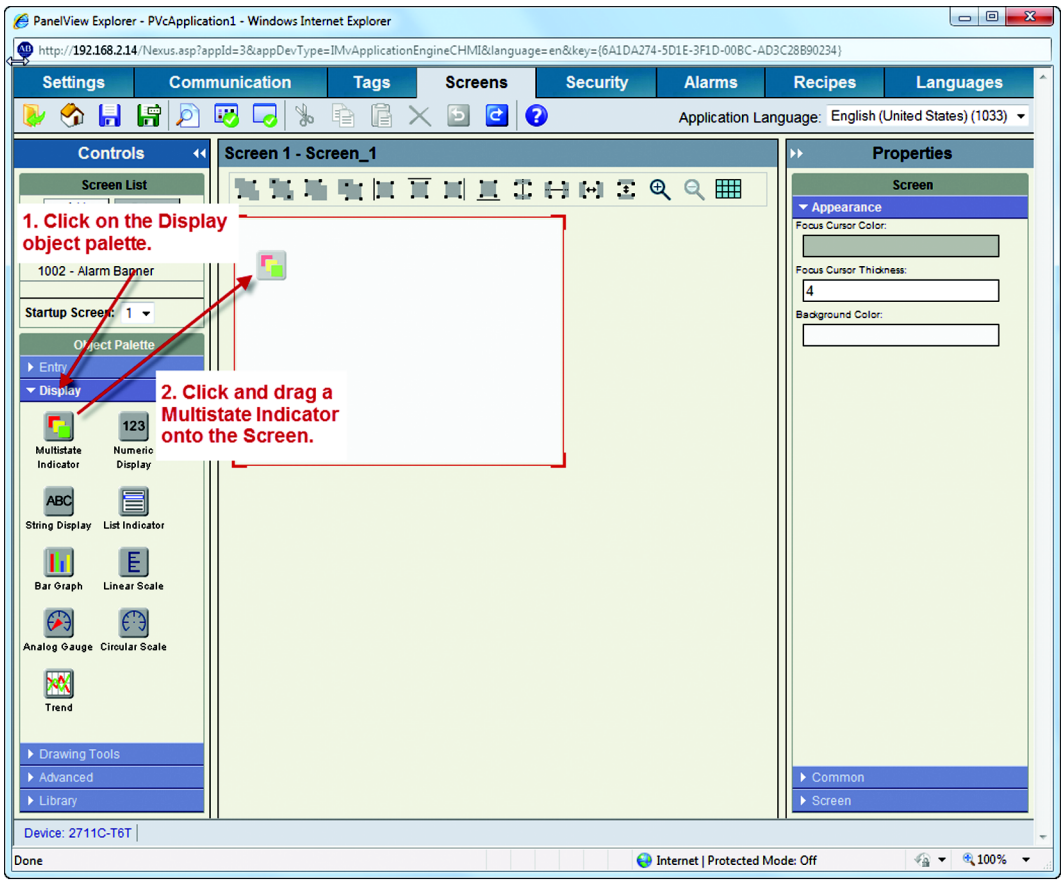
Create a tag for Safety Monitoring Function 1. This is the e-stop block.



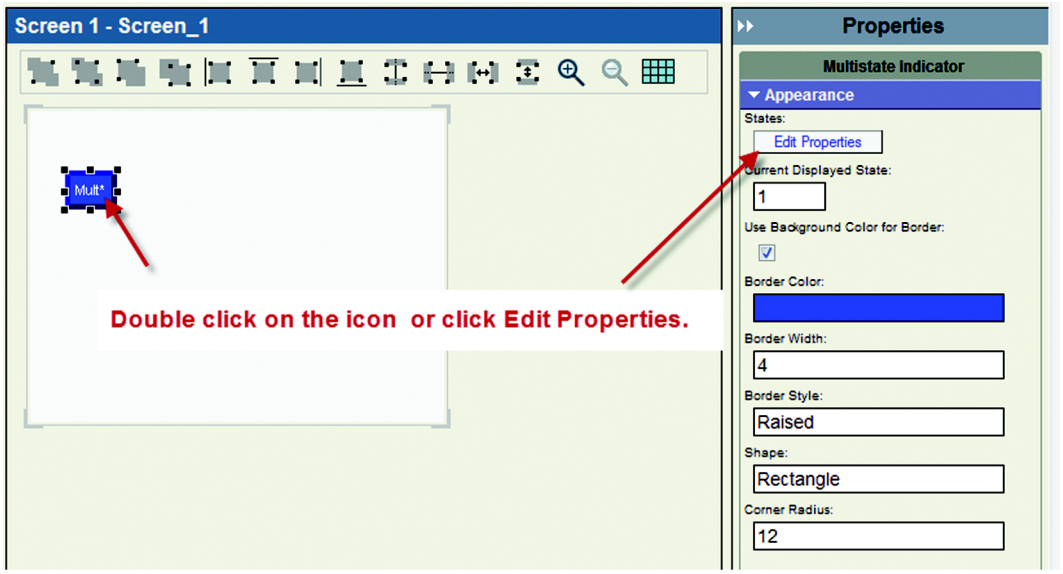
4. Create a tag for reset button.



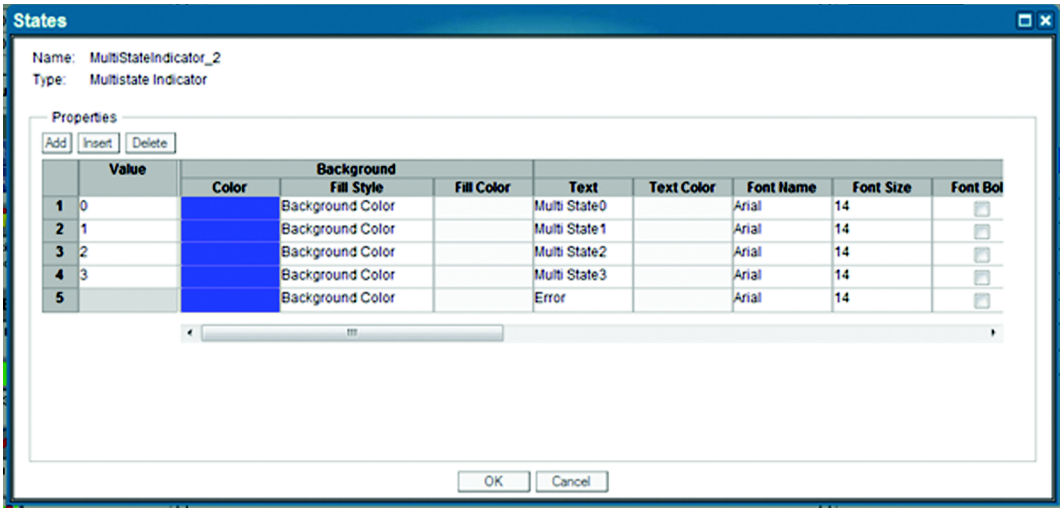
5. Put the SMF1 Indicator on the screen.



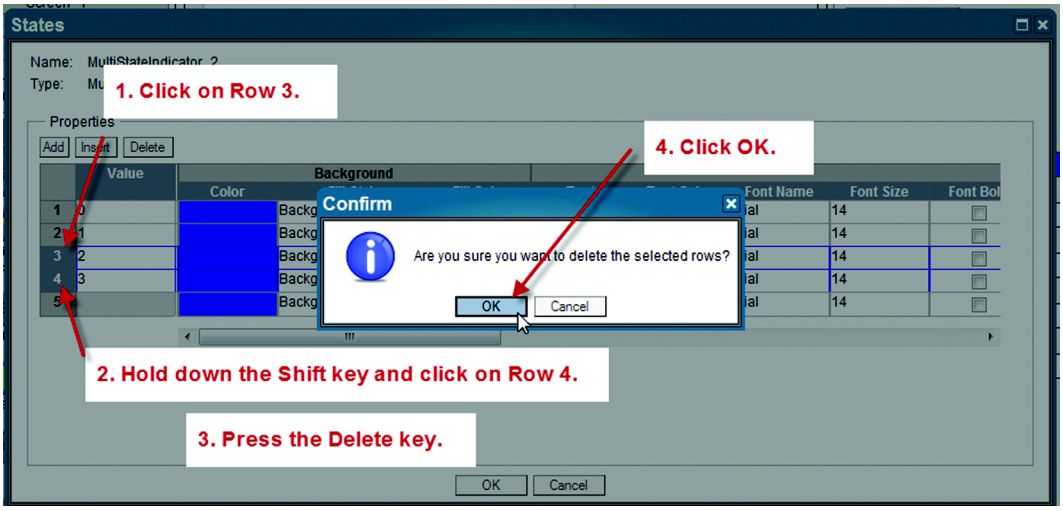
6. Double click on the multi-state indicator icon on the screen



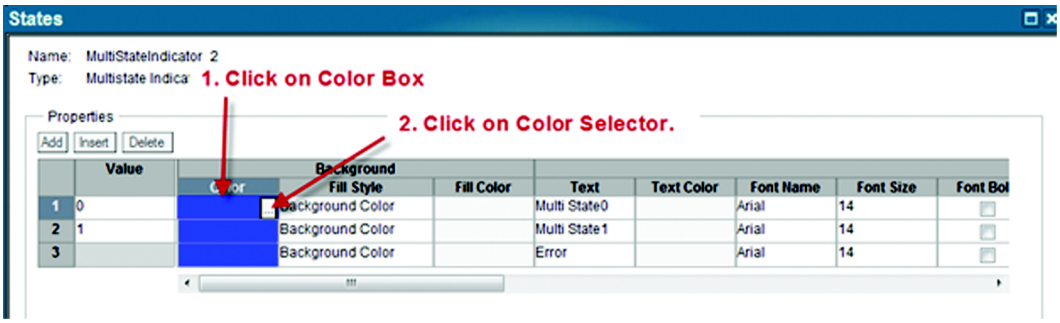
7. The multi-state indicator has a default setting of four states plus an error state.



8. We only want to use two states, plus the error state. Delete states three and four.

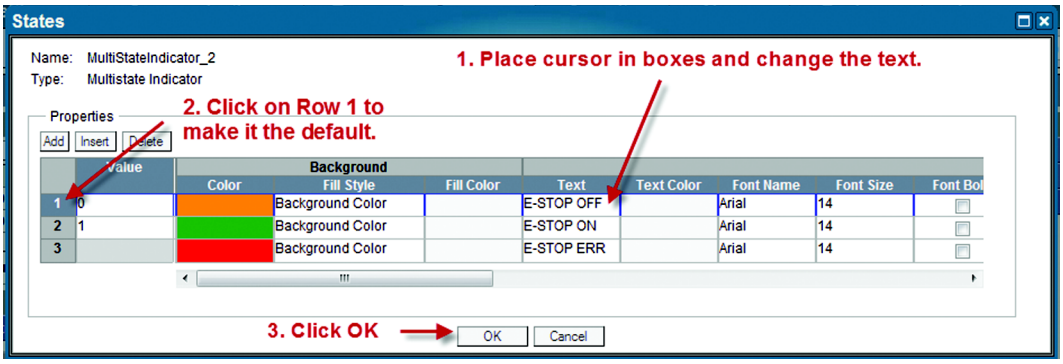


9. Change the colors for the states.

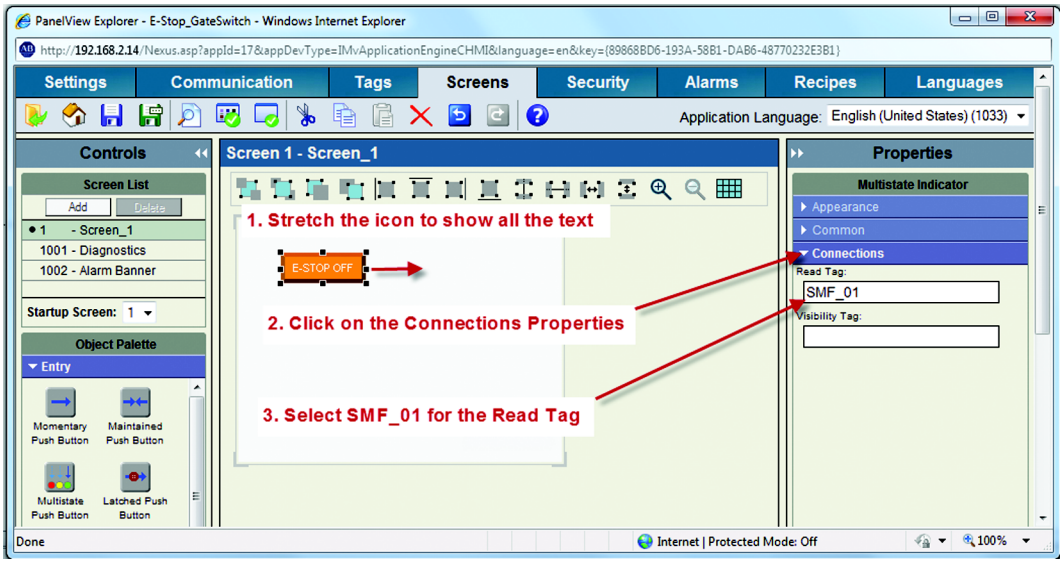


10. Modify the text.

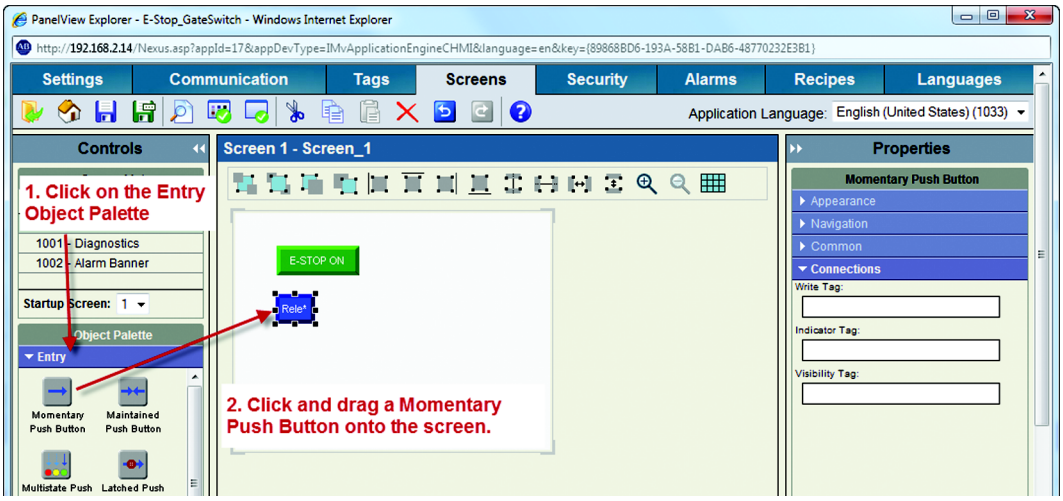
This first multi-state indicator will show the status of the e-stop function block. When the multi-state value is zero, we want the text to show OFF and the background color to be orange. When the value is one, we want to text to show ON and the color to be green. If an error occurs we want the color to show red and to display ERR.



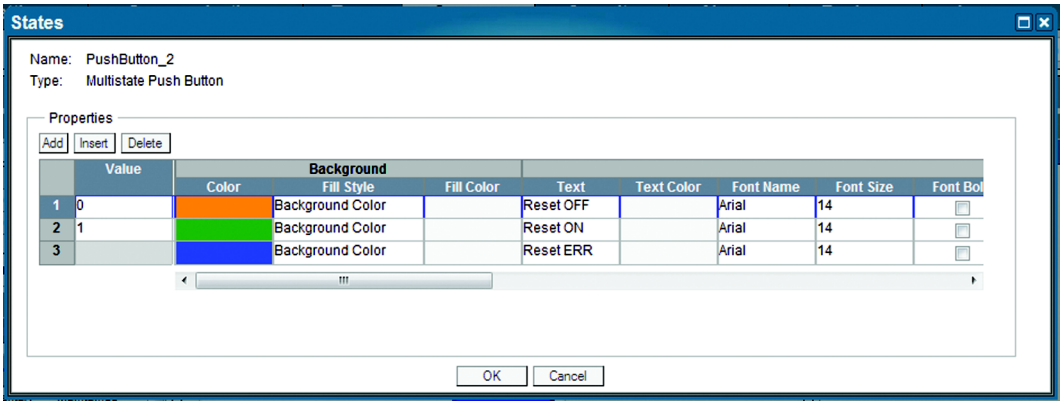
11. Make the e-stop connection.



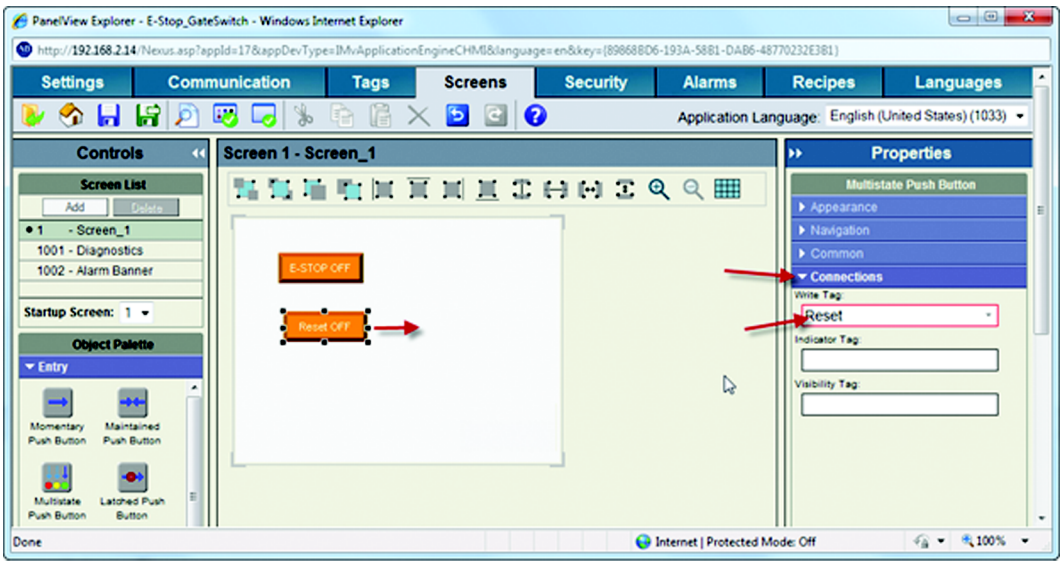
12. Add the reset button.



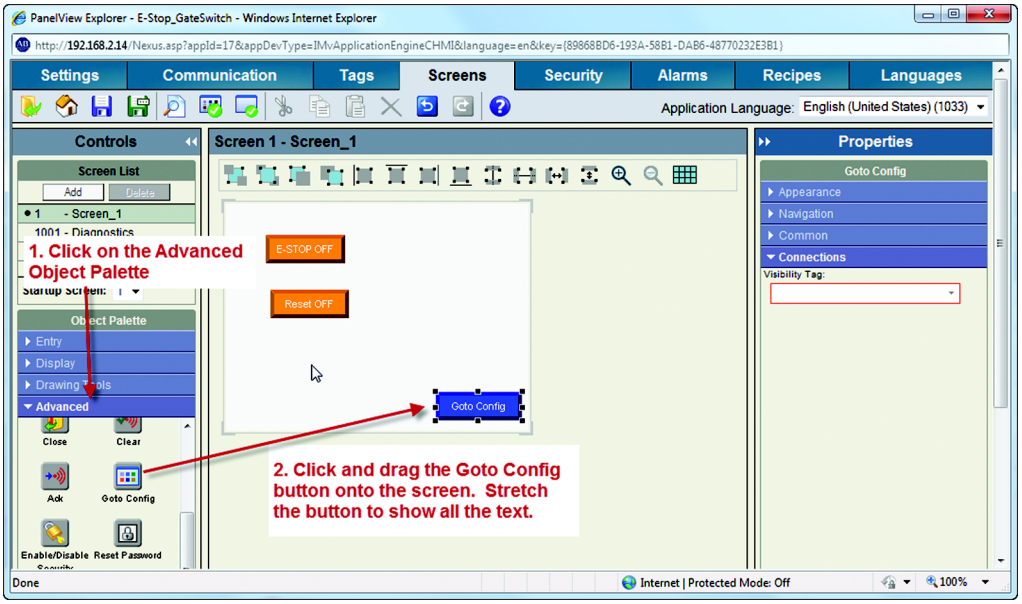
13. Set up the color, text and default states for the reset button.



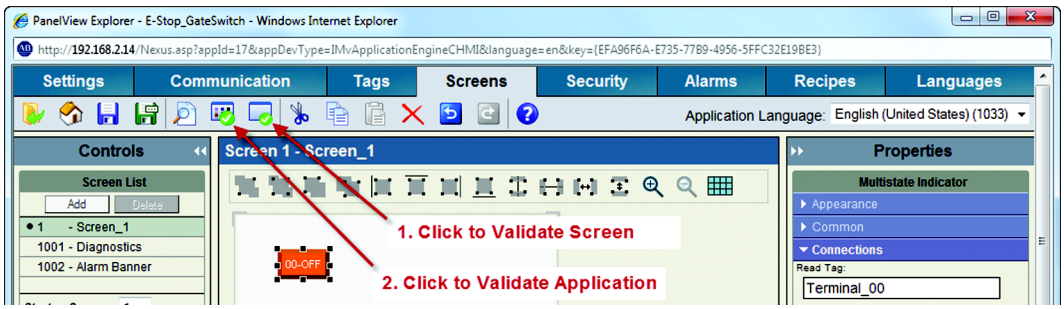
14. Stretch the reset icon and make the Write Tag connection to the reset.



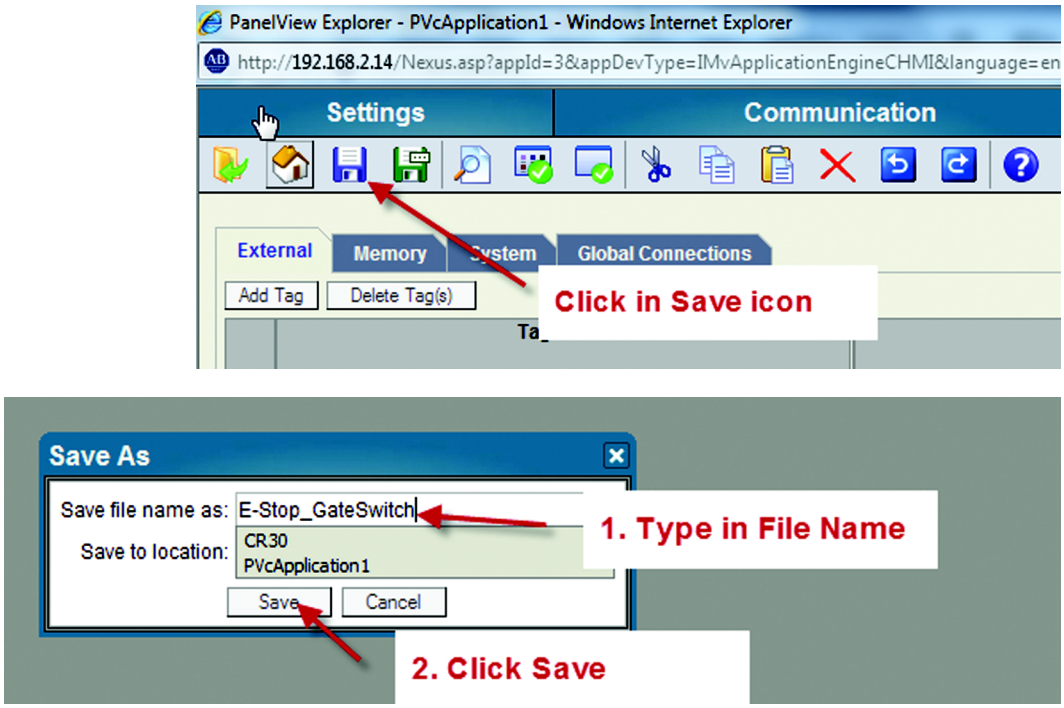
15. Add a Goto Config button.



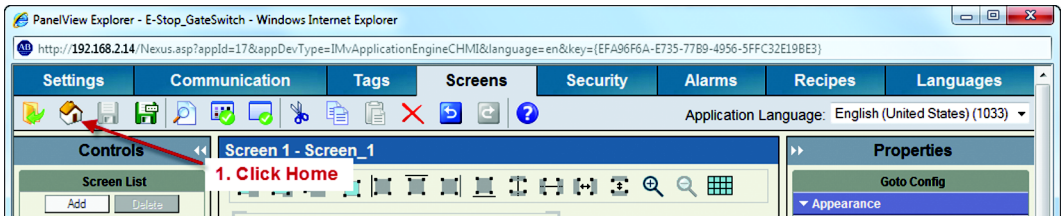
16. Validate the screen and application



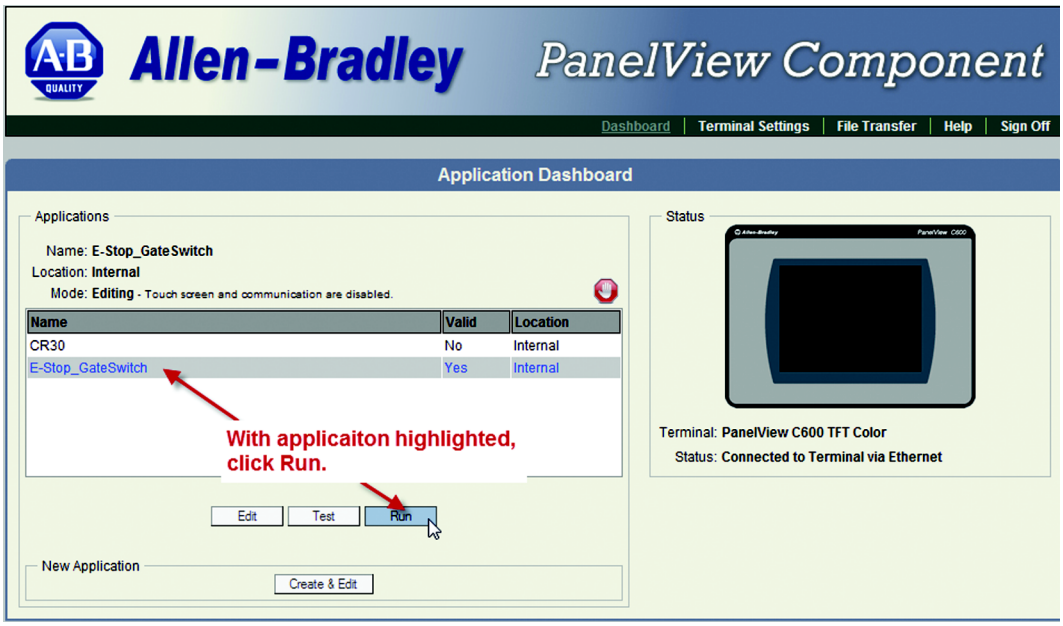
17. Save the file.



18. Go to the home page.

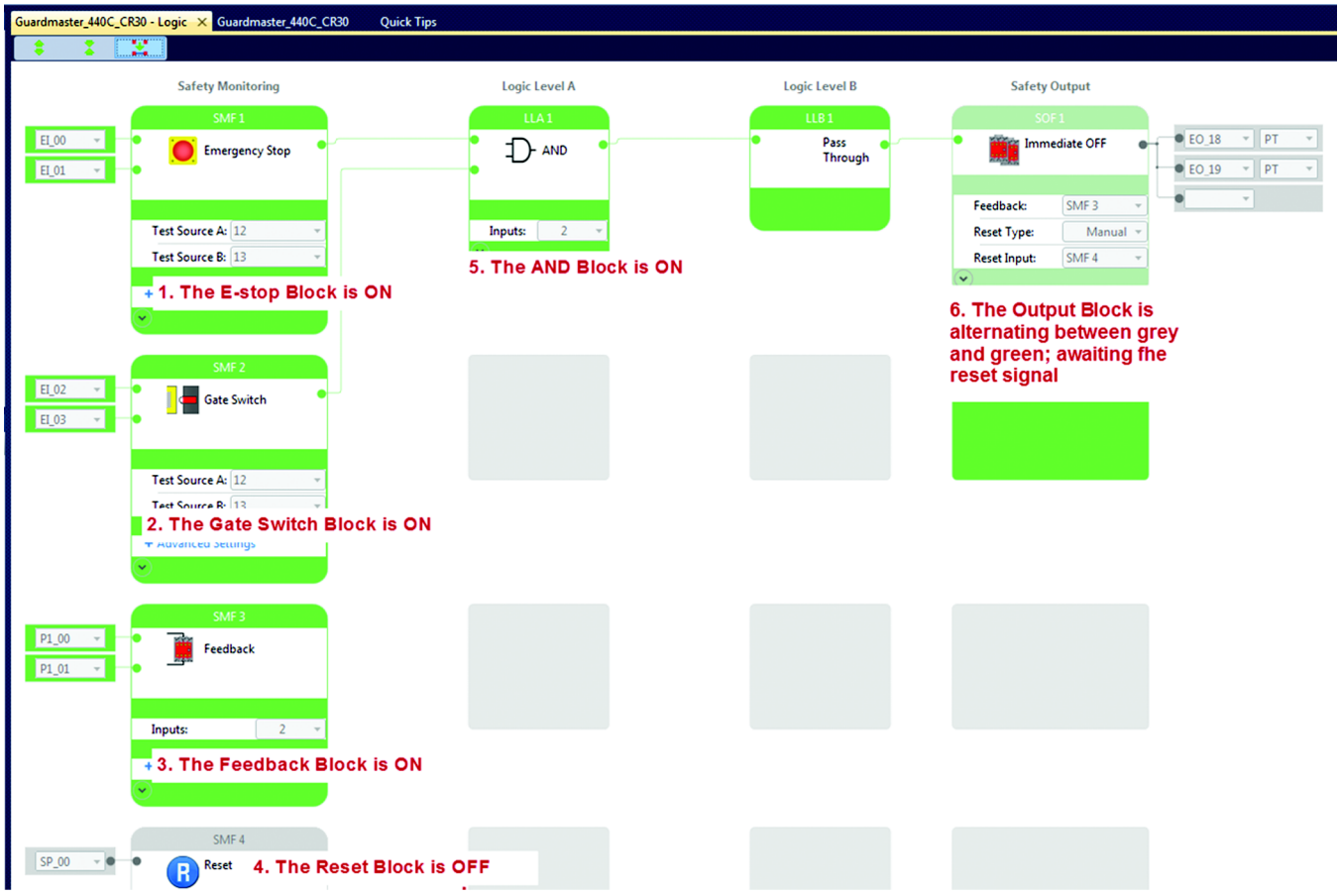


19. Run the application.



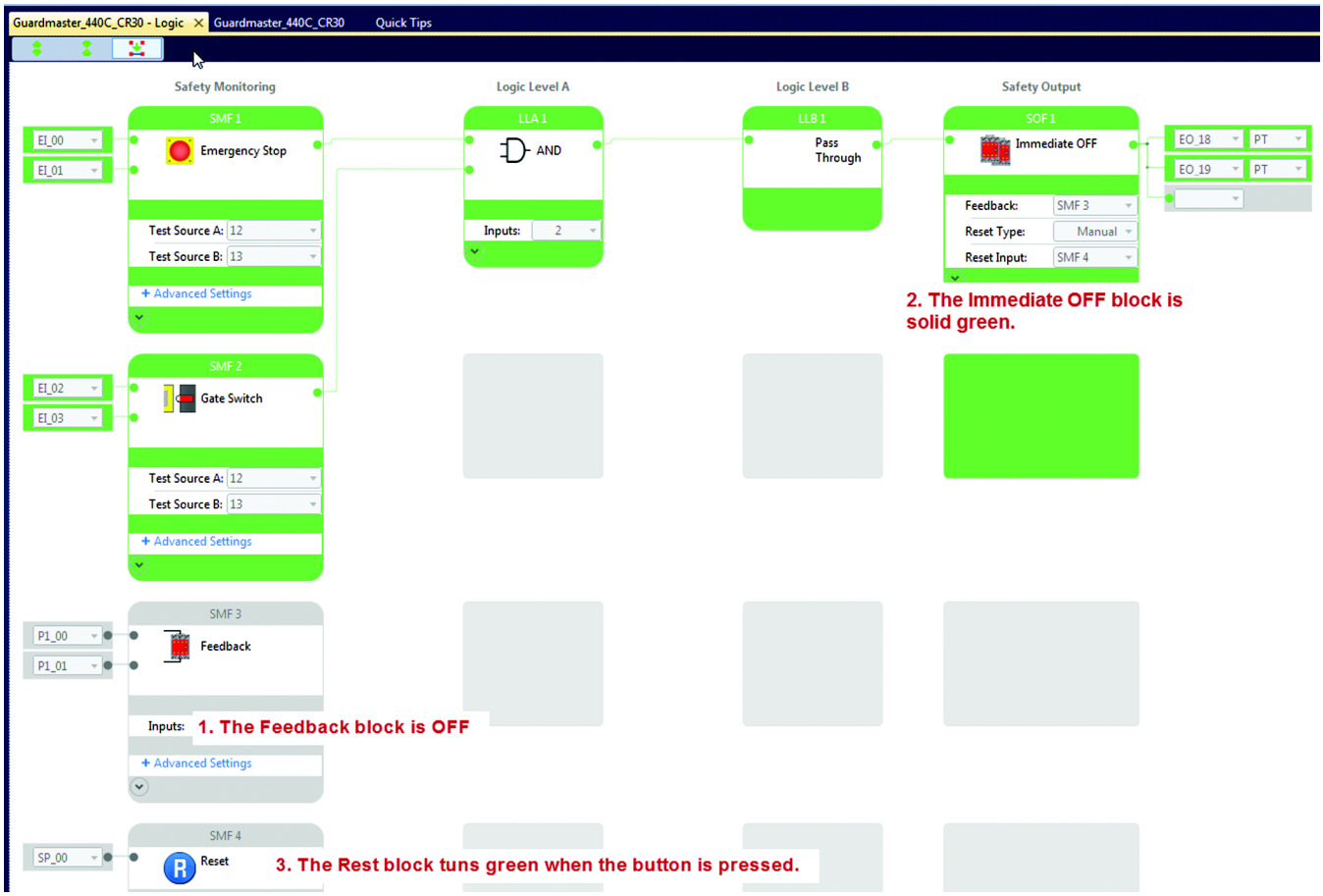
Verify Operation

1. Open the Logic editor in the CCW.



2. Confirm the LEDs are ON. The run LED is flashing.

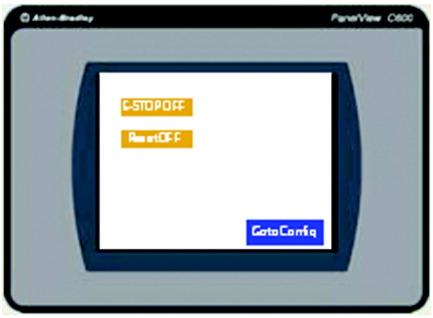
3. Press and release the reset button on the PanelView C600 within 0.5 to 3 s



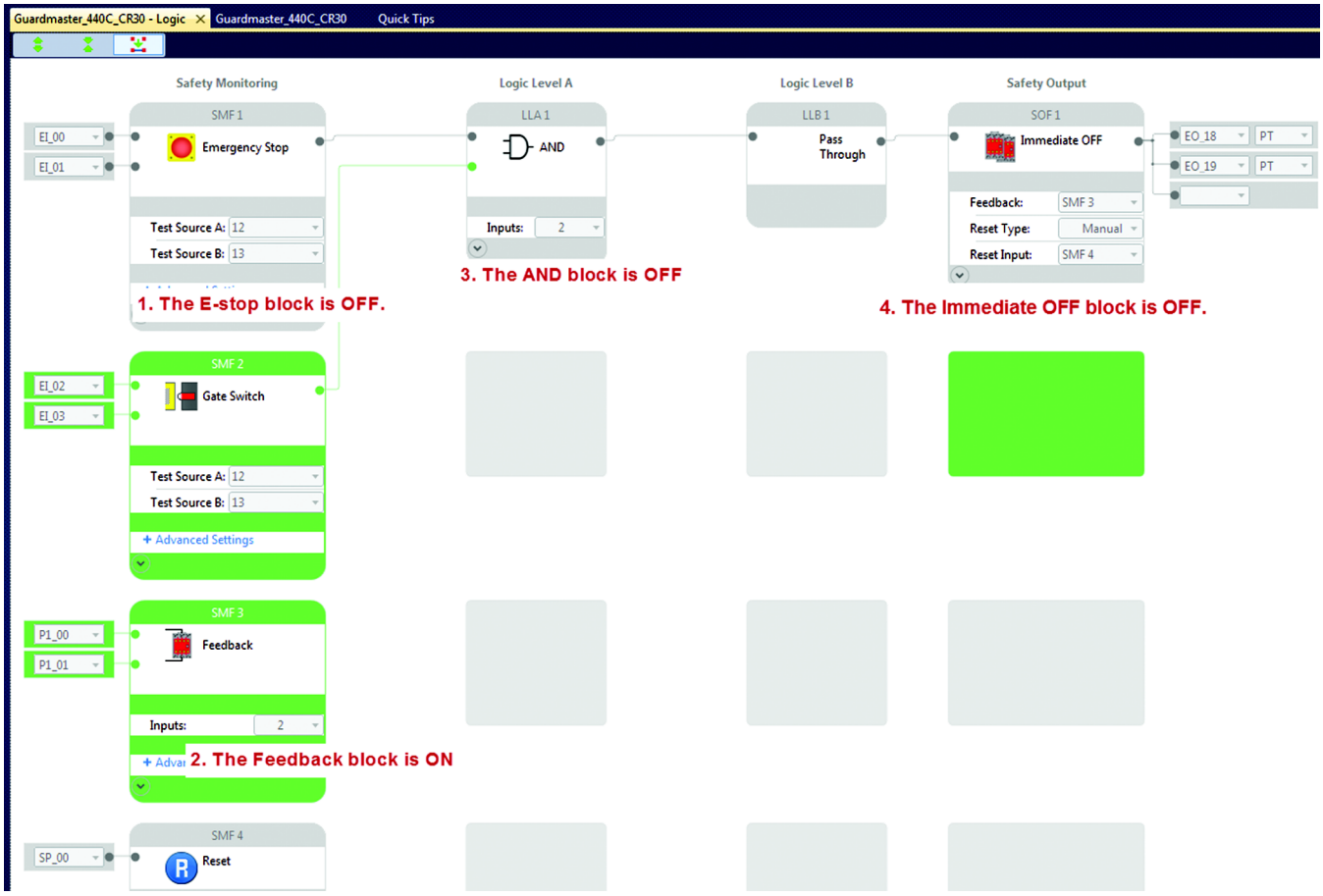
4. Confirm the LEDs.

5. Press the e-stop button.

The e-stop on the PanelView turns orange and shows OFF.



The Logic diagram shows the e-stop, AND and immediate OFF block are grey, and the feedback block is green.

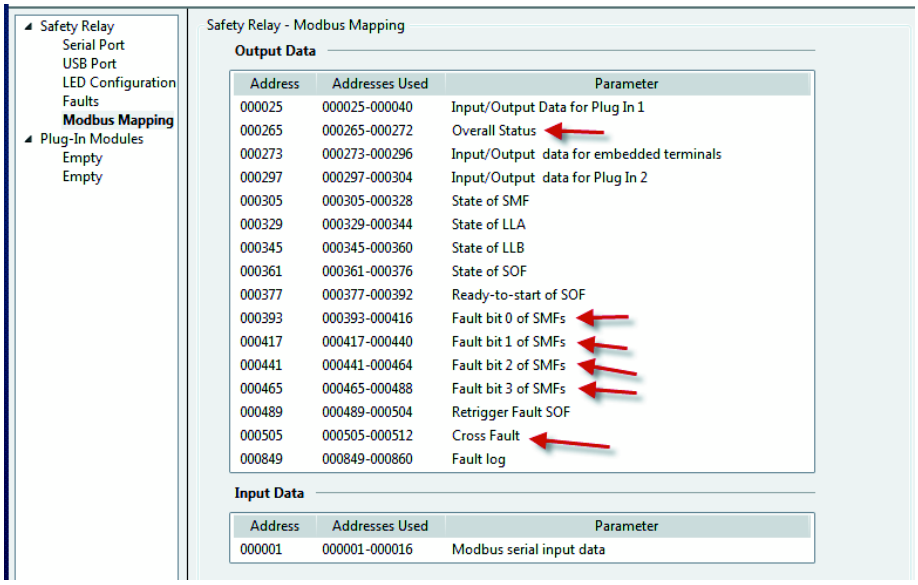


The LEDs are as follows:

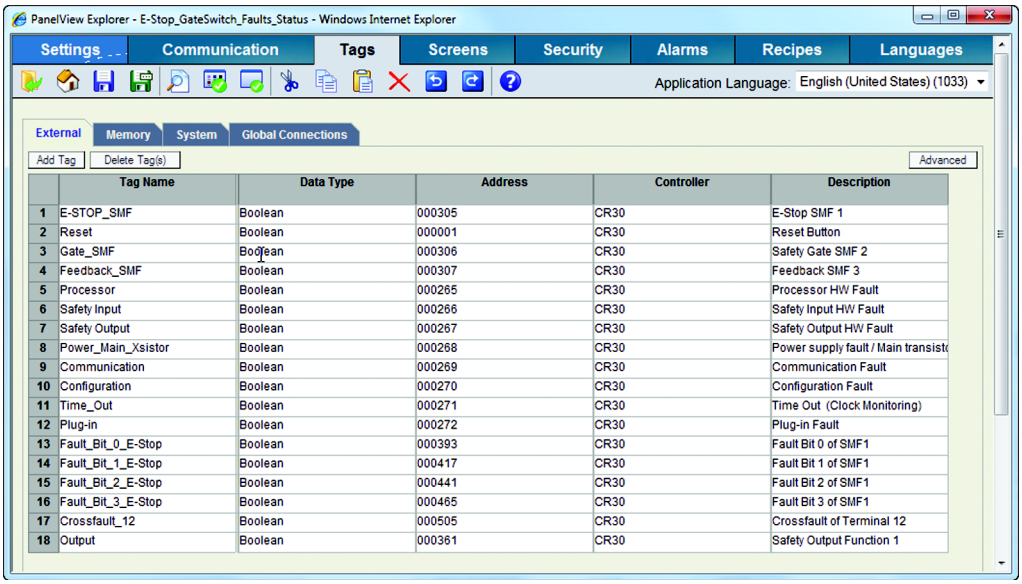
Fault and Status Reporting

In this section, we will configure the PanelView C600 to display the status and faults in the safety system.

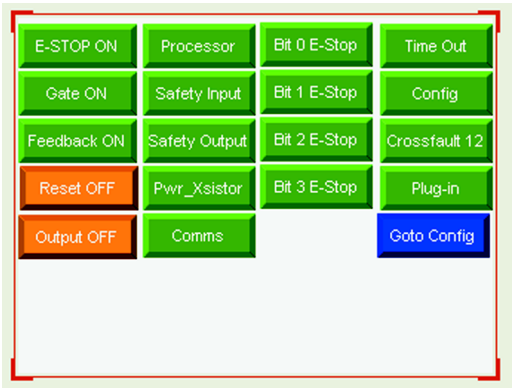
1. The Modbus Mapping addresses for Status and faults is shown below.



2. Add the following tags to the PanelView C600.

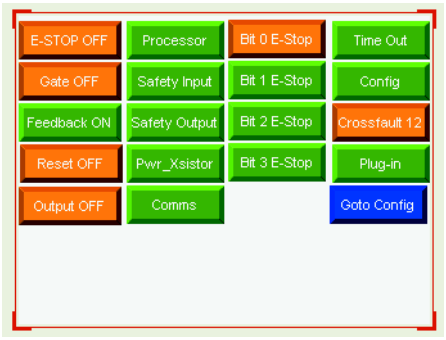


3. Add the multi-state indicators for the faults.



4. Press the reset button to get the outputs on.
Create a short-circuit from terminal 0 to terminal 1.

5. The PanelView C600 will look like this.



Crossfault 12 – a crossfault occurred on terminal 12, which is Input Test Pulse A.

E-STOP OFF – since Input Test Pulse A is used by the e-stop SMF, it turns OFF.

Gate OFF – since Input Test Pulse A is also used by the Gate SMF, it turns OFF.

The fault causes the Output to turn OFF.

Bit 0 for e-stop provides the message on the “At least one circuit shorted to 24V or another input circuit” when the mouse is moved over the e-stop or Gate SMF on the CCW.

Remove the short circuit and cycle the e-stop and gate switch. The Guardmaster 440C-CR30 is now ready for the reset button.

Rockwell Automation Support

Rockwell Automation provides technical information on the web to assist you in using its products. At http://www.rockwellautomation.com/support, you can find technical manuals, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools. You can also visit our Knowledgebase at http://www.rockwellautomation.com/knowledgebase for FAQs, technical information, support chat and forums, software updates, and to sign up for product notification updates.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect℠ support programs. For more information, contact your local Allen-Bradley distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

Installation Assistance

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

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html, or contact your local Rockwell Automation representative.

New Product Satisfaction Return

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

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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

Publication 440C-QS001A-EN-P– February 2014