



This document will show you how to install and use two Siemens PLC function blocks to activate a Virtual Reset or Cancel Delay on a Banner XS26 FID2 Safety Controller. We will be using the Totally Integrated Automation (TIA) Portal software package for Siemens PLCs. Please see the XS26 Manual for information on the Virtual Reset or Cancel Delay feature.

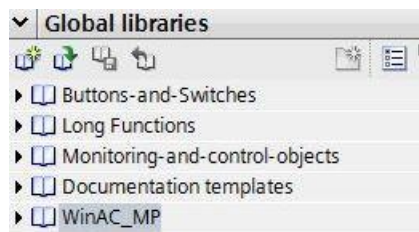
Components

Library: Banner XS26 Tools

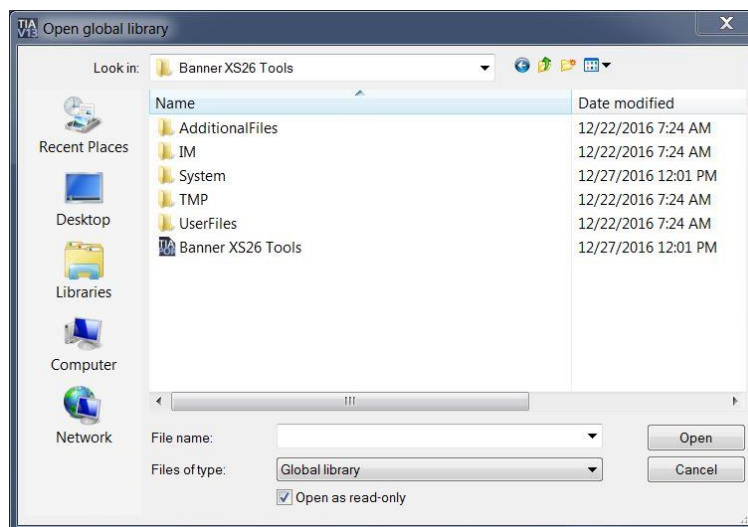
Installation Process

This section describes how to install the PLC Data Types from the Banner XS26 Tools library into TIA Portal.

1. Open up a project and select the Library tab on the right hand side of TIA portal.
2. Expand the Global libraries option and press the Open Global Library button as shown by example below.



3. A standard windows selection box will appear. Navigate to the correct file location and select the **Banner XS26 Tools** file. This is the library that contains the Reset and Cancel Delay function blocks. Press the Open button to load the library.



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4. Expand the **Banner XS26 Tools library**. Drag the either the Banner XS26 Multiple RCD Control or Banner XS26 Single RCD Control function block to the Program Blocks area of the project.



5. The program blocks folder will look similar to the image below after the function blocks have been moved. It is not necessary to have both Multiple and Singular function blocks in a project. Your application will dictate which one to use.



6. Now that the function blocks have been successfully added to the project the next sections will show how the Banner XS26 Multiple RCD Control and Banner XS26 Single RCD function blocks are used. Review how both function blocks work and choose the one that makes the most sense for your application.



Banner XS26 Multiple RCD Control function block – How to Use

This section shows how to use the Banner XS26 Multiple RCD Control function block. This function block activates the Reset or Cancel Delay (RCD) function in the XS26 controller. It is able to activate multiple RCD routines simultaneously. The RCD function requires the Actuation Code for the controller. If the Actuation Code is incorrect the RCD function will not work.

1. Add a XS26 Safety Controller via Devices and Networks if necessary. Device View in the Device Overview area should show something similar to the below image. This shows how all of the information is being sent back and forth from the PLC and the XS26 Safety Controller.

Device overview						
	Module	Rack	Slot	I address	Q address	Type
	xs26	0	0			XS26
	I	0	0 X1			xs26
	4 Status Bytes, Bits 0..31_1	0	1	2...5		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_2	0	2	6...9		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_3	0	3	10...13		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_4	0	4	14...17		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_5	0	5	18...21		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_6	0	6	22...25		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_7	0	7	26...29		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_8	0	8	30...33		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_9	0	9	34...37		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_10	0	10	38...41		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_11	0	11	42...45		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_12	0	12	46...49		4 Status Bytes, Bits 0..31
	8 Bytes Virtual On/Off/ME Data_1	0	13		256...263	8 Bytes Virtual On/Off/ME Data
	2 Bytes RCD Data_1	0	14		264...265	2 Bytes RCD Data
	2 Byte RCD Actuation Code_1	0	15		266...267	2 Byte RCD Actuation Code
	RCD Data Feedback Register_1	0	16	256...257		RCD Data Feedback Register
	RCD Passcode Feedback Register_1	0	17	258...259		RCD Passcode Feedback Register
	Fault Log Buffer Module_1	0	18	260...559		Fault Log Buffer Module
	System Information Module_1	0	19	50...79		System Information Module



2. At this point it is necessary to get data from the XS26 Software. Open up the project for XS26.
 - a. Go to the Industrial Ethernet tab as shown by the example below.

Equipment		Functional View		Wiring Diagram		Ladder Logic		Industrial Ethernet		Configuration Summary			
Profinet ▾		Clear All		Auto Configure		Virtual Status Outputs ▾							
Byte:Bit	User-Defined		Faults		Inputs						Outputs		
	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Slot 9	Slot 10	Slot 11	Slot 12	
0:0	VMR1 reset needed	+	System Lockout	+	Track M0:GS1	+	+	+	+	Track M0:SO1	+	+	
0:1	+	+	Track Any Input Fault	+	+	+	+	+	+	+	+	+	
0:2	+	+	Track Output Fault All	+	+	+	+	+	+	+	+	+	
0:3	+	+	+	+	+	+	+	+	+	+	+	+	
0:4	+	+	+	+	+	+	+	+	+	+	+	+	
0:5	+	+	+	+	+	+	+	+	+	+	+	+	
0:6	+	+	+	+	+	+	+	+	+	+	+	+	
0:7	+	+	+	+	+	+	+	+	+	+	+	+	
1:0	+	+	+	+	+	+	+	+	+	+	+	+	
1:1	+	+	+	+	+	+	+	+	+	+	+	+	
1:2	+	+	+	+	+	+	+	+	+	+	+	+	
1:3	+	+	+	+	+	+	+	+	+	+	+	+	
1:4	+	+	+	+	+	+	+	+	+	+	+	+	
1:5	+	+	+	+	+	+	+	+	+	+	+	+	
1:6	+	+	+	+	+	+	+	+	+	+	+	+	
1:7	+	+	+	+	+	+	+	+	+	+	+	+	
2:0	+	+	+	+	+	+	+	+	+	+	+	+	
2:1	+	+	+	+	+	+	+	+	+	+	+	+	
2:2	+	+	+	+	+	+	+	+	+	+	+	+	
2:3	+	+	+	+	+	+	+	+	+	+	+	+	
2:4	+	+	+	+	+	+	+	+	+	+	+	+	
2:5	+	+	+	+	+	+	+	+	+	+	+	+	
2:6	+	+	+	+	+	+	+	+	+	+	+	+	
2:7	+	+	+	+	+	+	+	+	+	+	+	+	
3:0	+	+	+	+	+	+	+	+	+	+	+	+	

- b. First make sure that the pull down tab has Profinet selected. If it does not then change the option to Profinet. It will be necessary to download the Network and Configuration settings. See XS26 Manual for more information.
- c. There are two screens for Profinet. Virtual Status Outputs and Virtual Status Inputs. Reset and Cancel Delay requires the Virtual Status Inputs screen. The Virtual Status Inputs screen is shown below (only a portion of the screen is shown).

Profinet ▼ Clear All Auto Configure Virtual Non-Safety Inputs ▼											
On/Off, Mute Enable				Reset, Cancel Delay				Actuation Code			
				Control		Feedback		Control		Feedback	
Byte:Bit	Slot 13	Byte:Bit	Slot 13	Byte:Bit	Slot 14	Byte:Bit	Slot 16	Word	Slot 15	Word	Slot 17
0:0		4:0		0:0	VMR1	0:0	VMR1	0	0	0	0
0:1		4:1		0:1		0:1					
0:2		4:2		0:2		0:2					
0:3		4:3		0:3		0:3					

- d. The above information is needed along with the Device View information shown on the previous page. As an example let's look at VMR1 under the Reset, Cancel Delay Control column. It lists Slot 14, Byte 0, and Bit 0. This translates to %Q264.0 in the PLC. The other items on this list are converted in a similar manner.



3. Create the variables to be used by the PLC to control the function block. Below are examples of how to label the variables. These will be used in all of the examples. Feel free to change the names as necessary for you project.

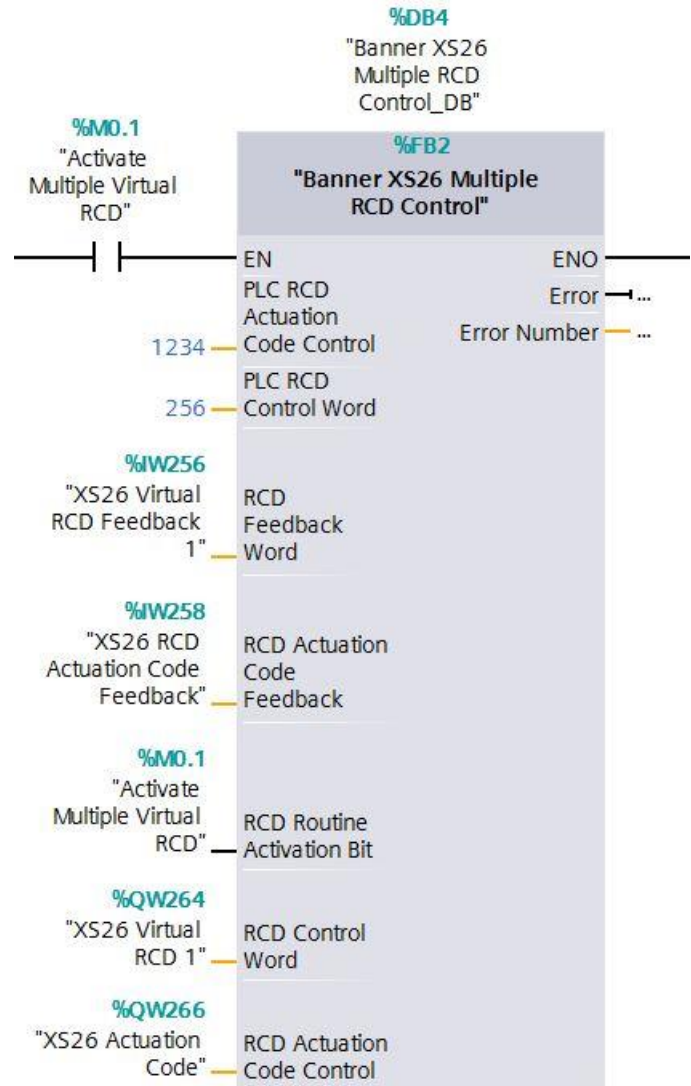
XS26						
	Name	Data type	Address	Retain	Visibl...	Acces...
1	Activate Single Virtual RCD	Bool	%M0.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Activate Multiple Virtual RCD	Bool	%M0.1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	XS26 Virtual RCD 1	Word	%QW264	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	XS26 Virtual RCD Feedback 1	Word	%IW256	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	XS26 RCD Actuation Code	Word	%QW266	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	XS26 RCD Actuation Code Feedback	Word	%IW258	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	XS26 Virtual RCD 1 Bit 0	Bool	%Q264.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8	XS26 Virtual RCD Feedback 1 Bit 0	Bool	%I256.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

- a. Activate Multiple Virtual RCD:
This tag controls when to run the function block Banner XS26 Multiple RCD Control. The programmer will create logic that turns this variable on. The function block will turn this variable off after the function is completed.
- b. XS26 Virtual RCD 1:
This is the variable name for %QW264. This is the word location for the XS26 Reset, Cancel Delay Control VMR1. The programmer will turn on the necessary bit inside of this word. When the Banner XS26 Multiple RCD Control function block is activated the activated Reset or Cancel Delay functions in the XS26 controller will be complete.
- c. XS26 Virtual RCD Feedback 1:
This is the variable name for %IW256. The value in this location states which of the Reset or Cancel Delays have been activated.
- d. XS26 RCD Actuation Code:
This is the variable name for %QW266. The Actuation Code for the XS26 needs to be placed into this location. Only when the correct Actuation Code is placed here will the Reset or Cancel Delay begin in the XS26 controller.
- e. XS26 RCD Actuation Code Feedback:
This is the variable name for %IW258. After the Reset or Cancel Delay successfully completes will the Actuation Code be placed into this location in the XS26 controller. The PLC waits for the Actuation Code here. If it never appears then the Reset or Cancel Delay failed.



4. To the right is an example of what the logic will look like in TIA Portal. Below the various links that are necessary for the Function Block are described.

- a. PLC RCD Actuation Code Control: This is linked to either a variable or a constant with the Actuation Code that the XS26 controller is expecting. In the example a constant value has been entered.
- b. PLC RCD Control Word: This is linked to either a variable or a constant that represents which Reset or Cancel Delays the XS26 controller should activate. The example uses a constant; however, a variable is more flexible and should be used most of the time.
- c. RCD Feedback Word: This is linked to the variable XS26 Virtual RCD Feedback 1 created in the above step. This directly links the information from the XS26 controller to this Function Block.
- d. RCD Actuation Code Feedback: This is linked to the variable XS26 RCD Actuation Code Feedback created in the above step. This directly links the information from the XS26 controller to this Function Block.
- e. RCD Routine Activation Bit: This is linked to the variable Activate Multiple Virtual RCD. This variable controls when the function block is active.
- f. RCD Control Word: This is linked to variable XS26 Virtual RCD 1. The PLC RCD Control Word will be moved into this location telling the XS26 controller which Reset or Cancel Delays need to be activated.
- g. RCD Actuation Code Control: This is linked to variable XS26 RCD Actuation Code. The PLC RCD Actuation Code Control will be moved into this location telling the XS26 the Actuation Code being used.



5. The Function block setup is complete. Again, all tags names shown are for reference feel free to change the names as necessary.



Banner XS26 Single RCD Control function block – How to Use

This section shows how to use the Banner XS26 Single RCD Control function block to activate the Reset or Cancel Delay (RCD) function in the XS26 controller. It is able to activate a single RCD routine and requires the Actuation Code for the controller. If the Actuation Code is incorrect the RCD function will not succeed.

1. Add a XS26 Safety Controller via Devices and Networks if necessary. Device View in the Device Overview area should show something similar to the below image. This shows how all of the information is being sent back and forth from the PLC and the XS26 Safety Controller.

Device overview						
	Module	Rack	Slot	I address	Q address	Type
	xs26	0	0			XS26
	I	0	0 X1			xs26
	4 Status Bytes, Bits 0..31_1	0	1	2...5		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_2	0	2	6...9		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_3	0	3	10...13		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_4	0	4	14...17		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_5	0	5	18...21		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_6	0	6	22...25		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_7	0	7	26...29		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_8	0	8	30...33		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_9	0	9	34...37		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_10	0	10	38...41		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_11	0	11	42...45		4 Status Bytes, Bits 0..31
	4 Status Bytes, Bits 0..31_12	0	12	46...49		4 Status Bytes, Bits 0..31
	8 Bytes Virtual On/Off/ME Data_1	0	13		256...263	8 Bytes Virtual On/Off/ME Data
	2 Bytes RCD Data_1	0	14		264...265	2 Bytes RCD Data
	2 Byte RCD Acutation Code_1	0	15		266...267	2 Byte RCD Acutation Code
	RCD Data Feedback Register_1	0	16	256...257		RCD Data Feedback Register
	RCD Passcode Feedback Register_1	0	17	258...259		RCD Passcode Feedback Register
	Fault Log Buffer Module_1	0	18	260...559		Fault Log Buffer Module
	System Information Module_1	0	19	50...79		System Information Module



2. At this point it is necessary to get data from the XS26 Software. Open up the project for XS26.
 - a. Go to the Industrial Ethernet tab. You should see something similar to the below image.

Equipment Functional View Wiring Diagram Ladder Logic Industrial Ethernet Configuration Summary											
Profinet Clear All Auto Configure Virtual Status Outputs											
Byte:Bit	User-Defined		Faults		Inputs						
	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8	Slot 9	Slot 10	Slot 11
0:0	VMR1 reset needed	+	System Lockout	+	Track M0:GS1	+	+	+	+	Track M0:SO1	+
0:1	+	+	Track Any Input Fault	+	+	+	+	+	+	+	+
0:2	+	+	Track Output Fault All	+	+	+	+	+	+	+	+
0:3	+	+	+	+	+	+	+	+	+	+	+
0:4	+	+	+	+	+	+	+	+	+	+	+
0:5	+	+	+	+	+	+	+	+	+	+	+
0:6	+	+	+	+	+	+	+	+	+	+	+
0:7	+	+	+	+	+	+	+	+	+	+	+
1:0	+	+	+	+	+	+	+	+	+	+	+
1:1	+	+	+	+	+	+	+	+	+	+	+
1:2	+	+	+	+	+	+	+	+	+	+	+
1:3	+	+	+	+	+	+	+	+	+	+	+
1:4	+	+	+	+	+	+	+	+	+	+	+
1:5	+	+	+	+	+	+	+	+	+	+	+
1:6	+	+	+	+	+	+	+	+	+	+	+
1:7	+	+	+	+	+	+	+	+	+	+	+
2:0	+	+	+	+	+	+	+	+	+	+	+
2:1	+	+	+	+	+	+	+	+	+	+	+
2:2	+	+	+	+	+	+	+	+	+	+	+
2:3	+	+	+	+	+	+	+	+	+	+	+
2:4	+	+	+	+	+	+	+	+	+	+	+
2:5	+	+	+	+	+	+	+	+	+	+	+
2:6	+	+	+	+	+	+	+	+	+	+	+
2:7	+	+	+	+	+	+	+	+	+	+	+
3:0	+	+	+	+	+	+	+	+	+	+	+

- b. Make sure that the pull down tab has Profinet selected. If not, change the option to Profinet. It will be necessary to download the Network and Configuration settings. See XS26 Manual for more information.
- c. There are two screens for Profinet, Virtual Status Outputs and Virtual Status Inputs. Reset and Cancel Delay requires the Virtual Status Inputs screen. The Virtual Status Inputs screen is shown below (only a portion of the screen is shown).

Profinet Clear All Auto Configure Virtual Non-Safety Inputs											
On/Off, Mute Enable				Reset, Cancel Delay				Actuation Code			
				Control		Feedback		Control		Feedback	
Byte:Bit	Slot 13	Byte:Bit	Slot 13	Byte:Bit	Slot 14	Byte:Bit	Slot 16	Word	Slot 15	Word	Slot 17
0:0		4:0		0:0	VMR1	0:0	VMR1	0	0	0	0
0:1		4:1		0:1		0:1					
0:2		4:2		0:2		0:2					
0:3		4:3		0:3		0:3					

- d. The above information is needed along with the Device View information shown on the previous page. As an example let's look at VMR1 under the Reset, Cancel Delay Control column. It lists Slot 14, Byte 0, and Bit 0. This translates to %Q264.0 in the PLC. The other items on this list are converted in a similar manner.



3. Create the variables to be used by the PLC to control the function block. Below is an example of how to label the variables. These will be used in all of the examples. Feel free to change the names as necessary for you project.

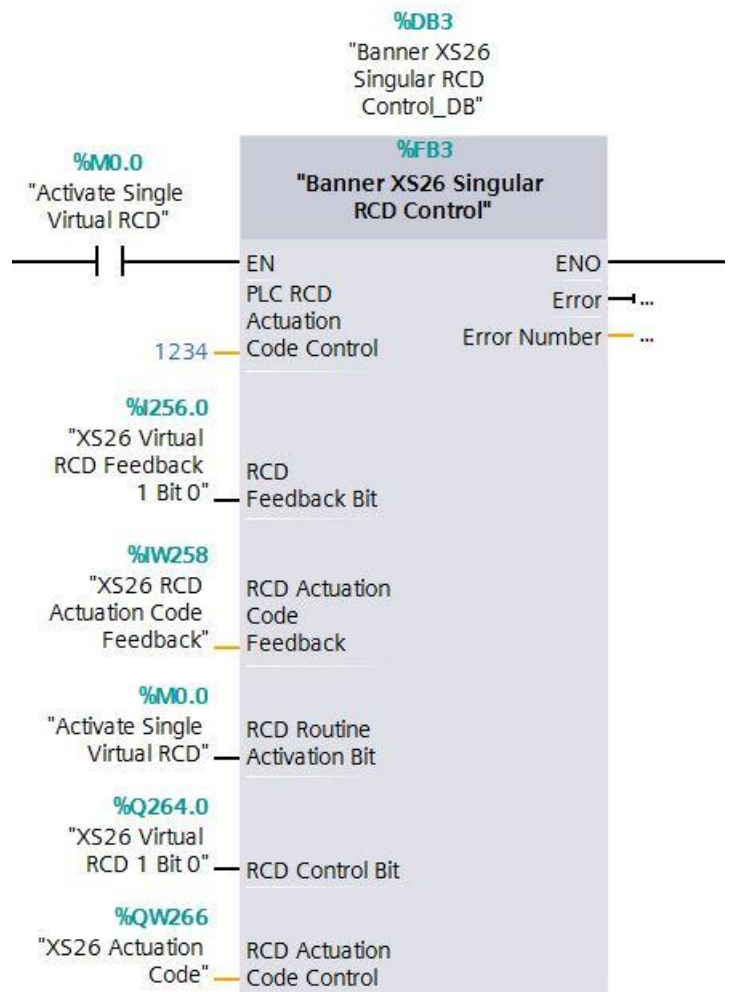
XS26						
	Name	Data type	Address	Retain	Visibl...	Acces...
1	Activate Single Virtual RCD	Bool	%M0.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Activate Multiple Virtual RCD	Bool	%M0.1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	XS26 Virtual RCD 1	Word	%QW264	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	XS26 Virtual RCD Feedback 1	Word	%IW256	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	XS26 RCD Actuation Code	Word	%QW266	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	XS26 RCD Actuation Code Feedback	Word	%IW258	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	XS26 Virtual RCD 1 Bit 0	Bool	%Q264.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8	XS26 Virtual RCD Feedback 1 Bit 0	Bool	%I256.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

- a. Activate Single Virtual RCD:
This tag controls when to run the function block Banner XS26 Multiple RCD Control. The programmer will create logic that turns this variable on. The function block will turn this variable off after the function is completed.
- b. XS26 RCD Actuation Code:
This is the variable name for %QW266. The Actuation Code for the XS26 needs to be placed into this location. Only when the correct Actuation Code is placed here will the Reset or Cancel Delay begin in the XS26 controller.
- c. XS26 RCD Actuation Code Feedback:
This is the variable name for %IW258. After the Reset or Cancel Delay successfully completes the Actuation Code will be placed into this location in the XS26 controller. The PLC waits for the Actuation Code here. If does not happen then the Reset or Cancel Delay failed.
- d. XS26 Virtual RCD 1 Bit 0:
This is the variable name for %Q264.0. This is the bit location for the XS26 Reset, Cancel Delay Control VMR1. The programmer will turn on the necessary bit inside of this word. When the Banner XS26 Single RCD Control function block is activated the activated Reset or Cancel Delay functions in the XS26 controller will be done.
- e. XS26 Virtual RCD Feedback 1 Bit 0:
This is the variable name for %I256.0. The value in this location states which of the Reset or Cancel Delays have been activated.



4. To the right is an example of what the logic will look like in TIA Portal. Below are the various links that are necessary for the Function Block are described.

- PLC RCD Actuation Code Control: This is linked to either a variable or a constant with the Actuation Code that the XS26 controller is expecting. In the example a constant value has been entered.
- RCD Feedback Bit: This is linked to the variable XS26 Virtual RCD Feedback 1 Bit 0 created in the above step. This directly links the information from the XS26 controller to this Function Block.
- RCD Actuation Code Feedback: This is linked to variable XS26 RCD Actuation Code Feedback created in the above step. This directly links the information from the XS26 controller to this Function Block.
- RCD Routine Activation Bit: This is linked to the variable Activate Single Virtual RCD. This variable controls when the function block is active.
- RCD Control Bit: This is linked to variable XS26 Virtual RCD 1 Bit 0. The PLC RCD Control Word will be moved into this location telling the XS26 controller which Reset or Cancel Delays need to be activated.
- RCD Actuation Code Control: This is linked to variable XS26 RCD Actuation Code. The PLC RCD Actuation Code Control will be moved into this location telling the XS26 the Actuation Code being used.



5. Function block setup is complete. Again, all tags names shown are for reference feel free to change the names as necessary.



Appendix A

This section will go over the function block for Multiple RCD one rung at a time.

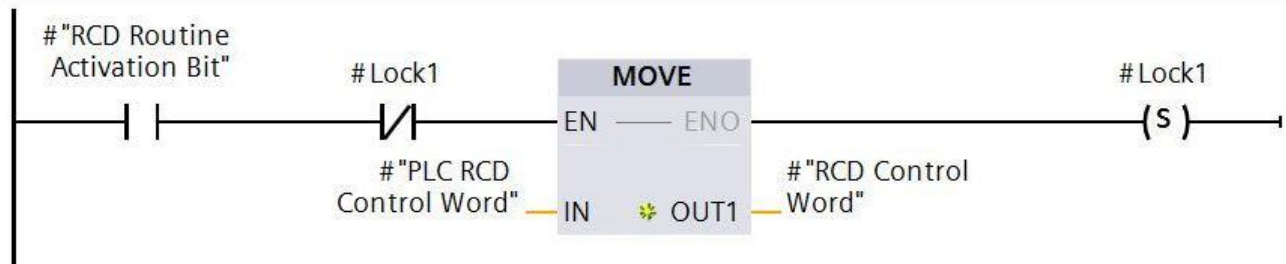
1. Network 1 sends the PLC Control Word to the RCD Control Word. What this means is the PLC tells the XS26 controller which of the Virtual Reset or Cancel Delays it should activate.

▼ **Block title:** Banner XS26 Reset or Cancel Delay Function

► Function that goes through Reset or Cancel Delay operations for a multiple Reset or Cancel Delays.

▼ **Network 1:** Element 1

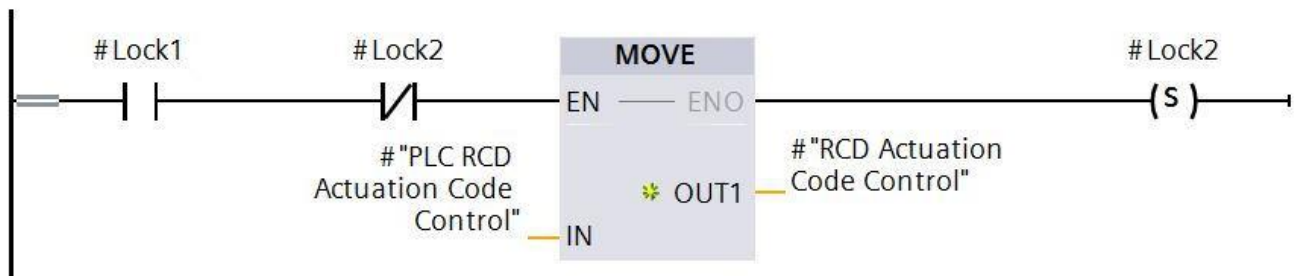
Pass the compiled PLC RCD Control Word to the the Safety Controller.



2. Network 2 sends the PLC RCD Actuation Code Control to the RCD Actuation Code Control. The XS26 will only activate the Virtual Reset or Cancel Delay if the correct Actuation Code is sent to it.

▼ **Network 2:** Element 2

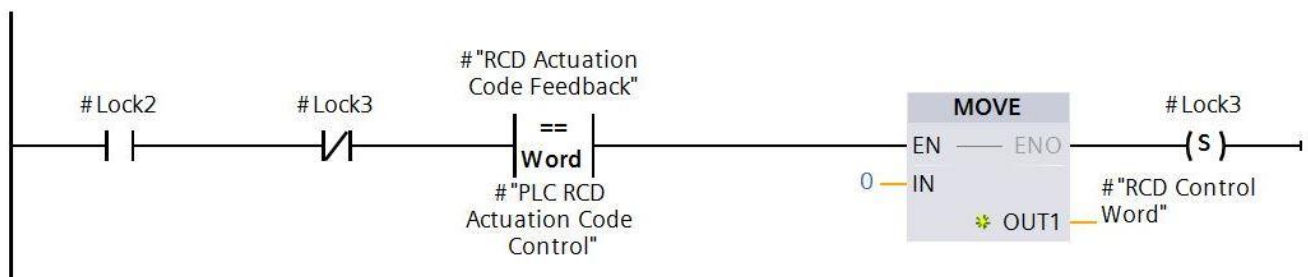
▼ Pass the store PLC Actuation Code to the Safety Controller. If the code does not match the one configured in the Safety Controller The Reset or Cancel Delay operation will not happen.



3. Network 3 waits until the RCD Actuation Code Feedback is the equal to the value sent by PLC.

▼ **Network 3:** Element 3

▼ The Safety Controller will set the RCD Actuation Code Feedback to the PLC RCD Actuation Code Control value if the code sent from the PLC matches the one stored in the Safety Controller. This also signifies that that RCD completely successfully.



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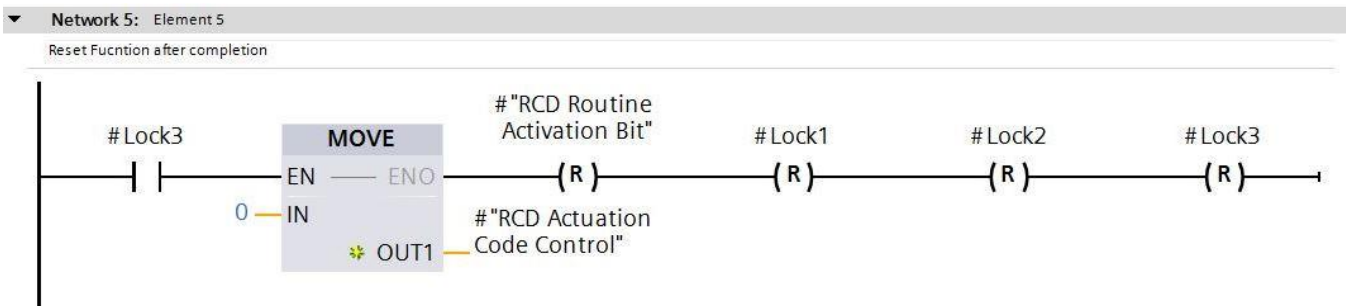
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- Network 4 starts a timer. If the Actuation Code Feedback condition is not met in 4 seconds trigger the error variable.



- Network 5 resets the RCD Actuation Code to zero and resets variables used to control sequencing.



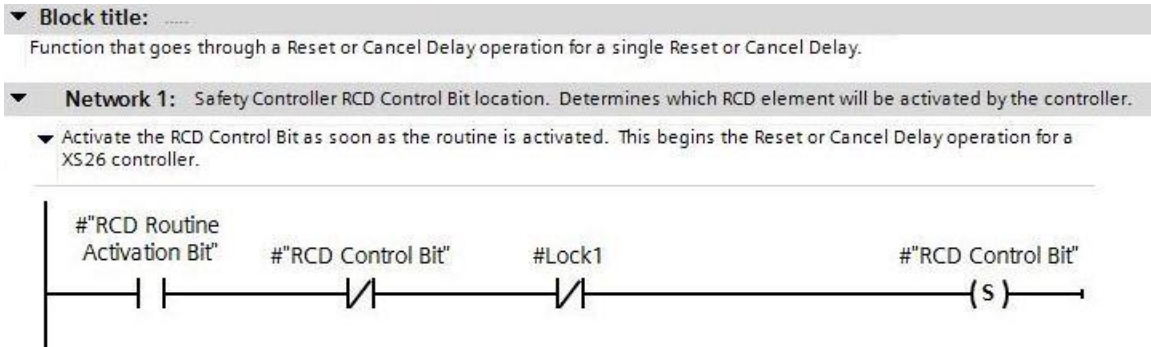
- Explanation of the function block is complete.



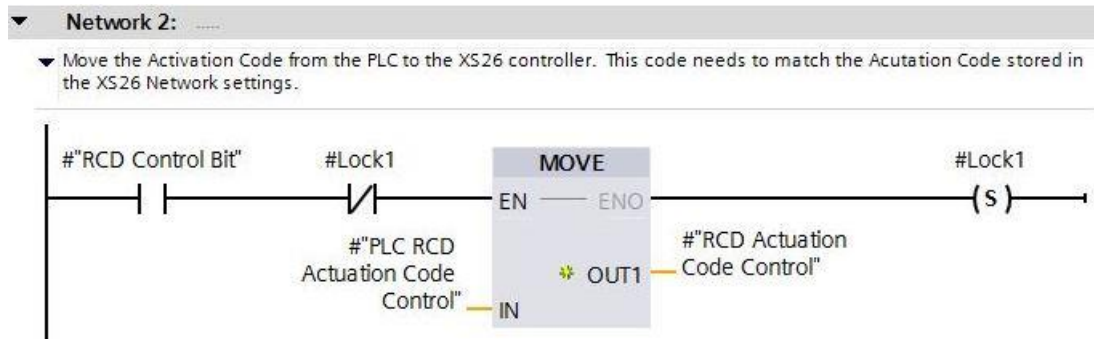
Appendix B

This section will go over the function block for Single RCD one rung at a time.

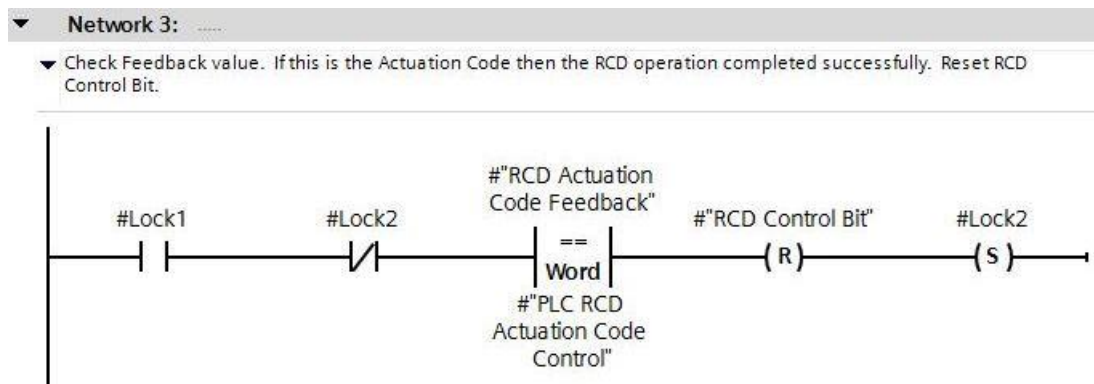
1. Network 1 turns on the bit that tells the XS26 controller which Virtual Reset or Cancel Delay to activate.



2. Network 2 sends the PLC RCD Actuation Code Control to the RCD Actuation Code Control. The XS26 will only activate the Virtual Reset or Cancel Delay if the correct Actuation Code is sent to it.

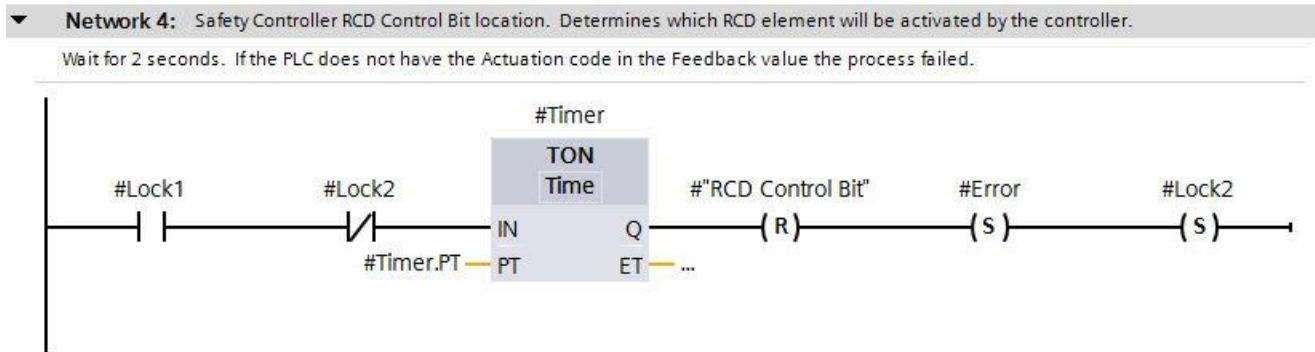


3. Network 3 waits until either the RCD Actuation Code Feedback is the equal to the value sent.

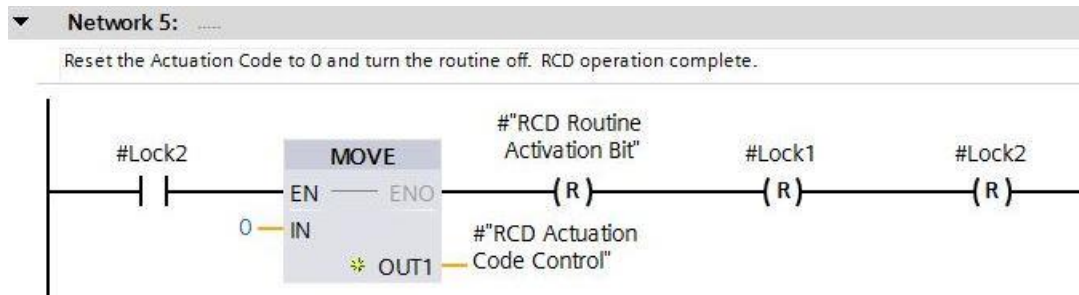




- Network 4 starts a timer. If the Actuation Code Feedback condition is not met in 2 seconds trigger the error variable.



- Network 5 resets the RCD Actuation Code to zero and resets variables used to control sequencing.



- Explanation of the function block is complete.