

Safety Controller ISD Function

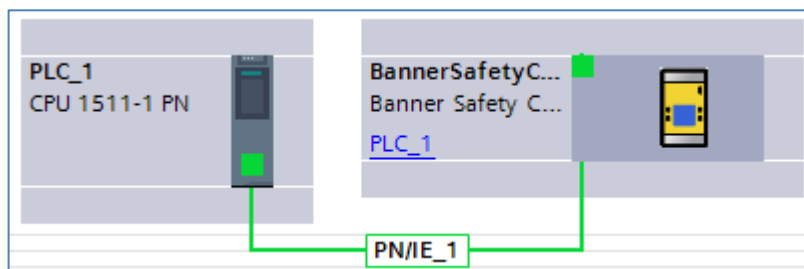
This document covers the installation and use of a Function Block for Siemens's TIA Portal software package. This Function Block manages the parsing of data collected by the Banner Safety Controller from a banner device that supports ISD.

Tia Library

Banner SC10, SC26, and XS26 Tools.zal14

Installation Instructions

1. Open a project.
2. Go to Devices and Networks and add a Banner Safety Controller. You should get something like below image.

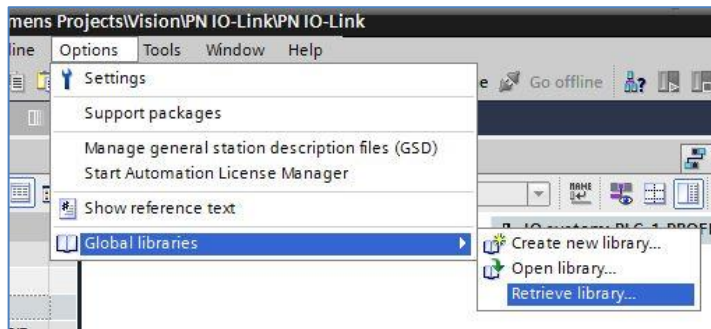


*Note: For more information on making this connection, see section 12.7 of the XS/SC26 and SC10 Safety Controller manual, PN 174868, found on www.bannerengineering.com.

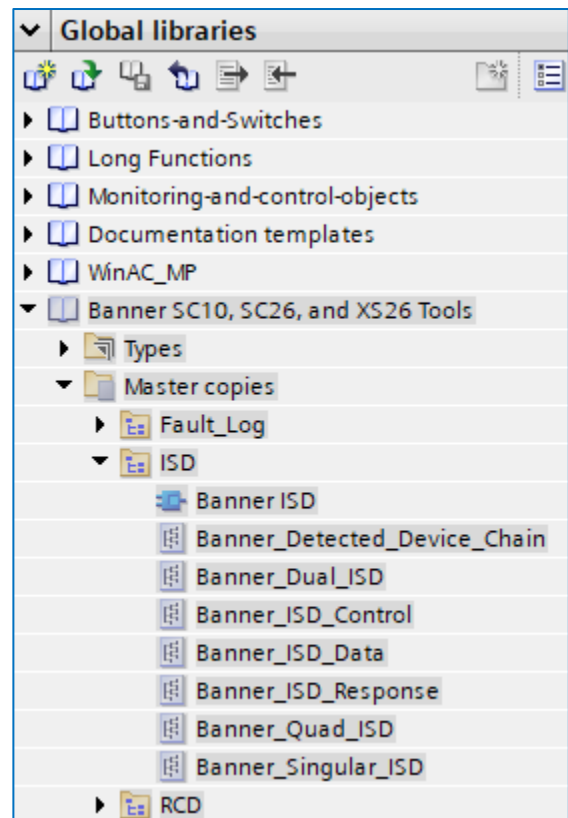
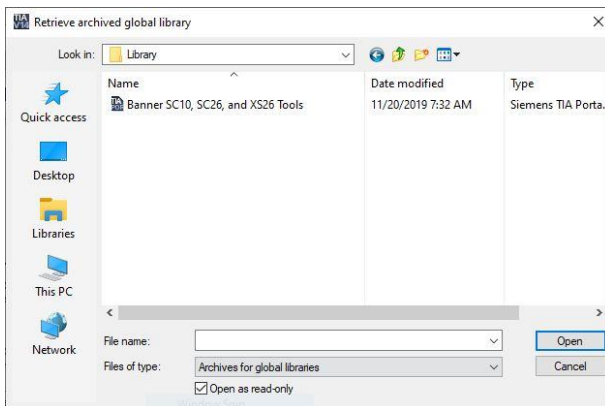
3. Go to the module options for the Safety Controller, add the ISD Status Information Modules 4 Chain. Take note of the %I address for the module for use later.

ISD Status Information Module 4 Chain_1	0	20	72...199
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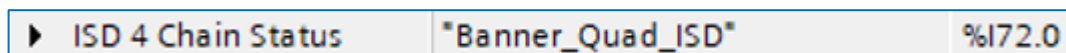
4. Go to Options → Global Libraries → Retrieve Library.



5. Select the Banner SC10, SC26, and XS26 Tools Library and Click Open.



6. The Banner SC10, SC26, and XS26 Tools Library will now be in the Global Library List. Expand the Master copies section. The ISD folder contains elements for sending and receiving ISD information from the safety controller.
7. The SC10 can have up to 4 ISD Channels. Add the data type Banner_Dual_ISD if Chains 1 or 2 are being used. If 3 or 4 chains are used, use the data type Banner_Quad_ISD instead.
8. Go to PLC Tags and create a new tag. In this example the data type “Banner_Quad_ISD” is used.



9. If the tag is expanded, Chains 1 and 2 data will be displayed first followed by 3 and 4 but only if Quad has been selected. If the live data is being shown, the current data will be displayed. In the example below there are 3 ISD devices that are part of Chain 1.

SC10				
	Name	Data type	Address	Monitor value
1	▼ ISD 4 Chain Status	"Banner_Quad_ISD"	%I72.0	
2	C1 Device Count	USInt	%IB72	3
3	Element_1	USInt	%IB73	0
4	Element_2	USInt	%IB74	0
5	Element_3	USInt	%IB75	0
6	C2 Device Count	USInt	%IB76	0
7	Element_4	USInt	%IB77	0
8	Element_5	USInt	%IB78	0
9	Element_6	USInt	%IB79	0
10	► C1 Device On Off Status	Array[1..32] of Bool	%I80.0	
11	► C2 Device On Off Status	Array[1..32] of Bool	%I84.0	
12	► C1 Fault Status	Array[1..32] of Bool	%I88.0	
13	► C2 Fault Status	Array[1..32] of Bool	%I92.0	
14	► C1 Marginal Status	Array[1..32] of Bool	%I96.0	
15	► C2 Marginal Status	Array[1..32] of Bool	%I100.0	
16	► C1 Alert Status	Array[1..32] of Bool	%I104.0	
17	► C2 Alert Status	Array[1..32] of Bool	%I108.0	
18	► C1 Reset Status	Array[1..32] of Bool	%I112.0	
19	► C2 Reset Status	Array[1..32] of Bool	%I116.0	
20	► C1 Actuator Recognized	Array[1..32] of Bool	%I120.0	
21	► C2 Actuator Recognized	Array[1..32] of Bool	%I124.0	

10. The various elements can be expanded to give data for the Chain. The On Off Status shows that unit 2 in the ISD chain is the only one that is currently in a safe state. Units 1 and 2 (there are three units in the system for this example) are currently in the unsafe state.

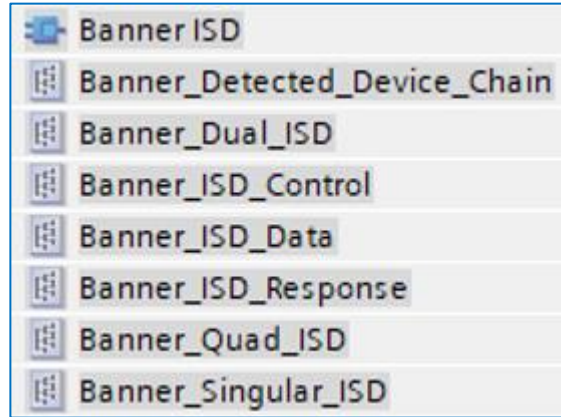
▼ C1 Device On Off Status	Array[1..32] of Bool	%I80.0	
C1 Device On Off Status[1]	Bool	%I80.0	<input type="checkbox"/> FALSE
C1 Device On Off Status[2]	Bool	%I80.1	<input checked="" type="checkbox"/> TRUE
C1 Device On Off Status[3]	Bool	%I80.2	<input type="checkbox"/> FALSE
C1 Device On Off Status[4]	Bool	%I80.3	<input type="checkbox"/> FALSE
C1 Device On Off Status[5]	Bool	%I80.4	<input type="checkbox"/> FALSE
C1 Device On Off Status[6]	Bool	%I80.5	<input type="checkbox"/> FALSE
C1 Device On Off Status[7]	Bool	%I80.6	<input type="checkbox"/> FALSE

11. The setup of required items are complete.

Optional Acyclic Setup

Below are the instructions for setting up the optional Acyclic information. This allows for the individual data of an ISD device in a Chain to be gathered.

1. Go to the Global Libraries.
2. Drag Banner ISD to the Program Blocks area under your PLC.
3. Drag Banner_Detected_Device_Chain, Banner_ISD_Control, Banner_ISD_Data, and Banner_ISD_Response into the PLC data types folder in the TIA Portal.
4. Select the Safety Controller and switch to Device View. Add the ISD Individual Status Information Module to the Safety Controller. Make note of the %I and %Q addresses for the two added modules.



ISD Status Information Module 4 Chain_1	0	20	72...199	
▼ ISD Individual Status Information Module_1	0	21		
ISD Device Information Request	0	21 IS...		76...81
ISD Device Information Response	0	21 IS...	200...223	

5. Go to PLC Tags. Then go to the tag table used earlier and create two new tags to represent the ISD Response, Data type "Banner_ISD_Response" and ISD Control, Data type "Banner_ISD_Control".

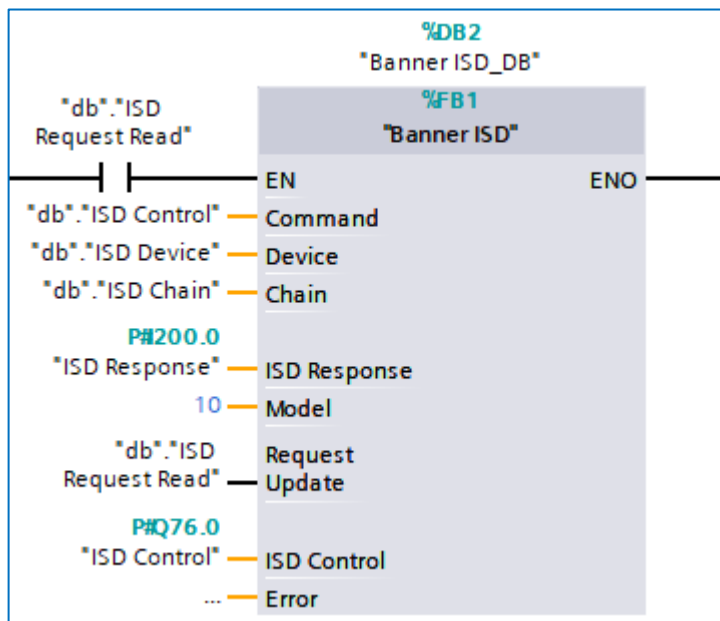
SC10				
		Name	Data type	Address
1	DI	ISD 4 Chain Status	"Banner_Quad_ISD"	%I72.0
2	DI	ISD Response	"Banner_ISD_Response"	%I200.0
3	DI	ISD Control	"Banner_ISD_Control"	%Q76.0

6. Go to Program blocks and add a new Data block if necessary. In this example the new data block is named "db".

7. In the new data block, create four new tags. These tags will be used to request data via the Safety Controller from an ISD device. There is one tag that states the Chain that should be used, one tag for the device in the Series, one tag for what process to Control, and finally one tag to activate the actual read process.

db		
	Name	Data type
1	Static	
2	ISD Request Read	Bool
3	ISD Chain	USInt
4	ISD Device	USInt
5	ISD Control	USInt

8. Add the “Banner ISD” Function to an OB ladder. Link the tags created in the previous steps to the function block as shown.



9. Setup of optional Acyclic data complete. See next section for how to use Banner ISD Function Block.

Using the Banner ISD Function

This section will show how to use the optional “Banner ISD” function block. This block allows for acyclic communication to the SC10 Safety Controller. Acyclic communication is used to gather data from the safety controller. It can gather individual device information.

1. Open the Database “DB”.
2. Set the “ISD Chain” and “ISD Device” as needed. If Device 2 on Chain 1 data should be updated, the “ISD Chain” and “ISD Device” are set to these values.

ISD Chain	USInt	0	1
ISD Device	USInt	0	2

3. Next set the “ISD Control” value. The SC10 only allows for a Control value of 1.

ISD Control	USInt	0	1
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4. Finally, the “ISD Request Read” is set to True. This activates the Function Block. When the Function block has completed its operation “ISD Request Read” is set to false.
5. Open the database Banner ISD DB (this was created when the FB was added). Click “Monitor all” to get the current information from the PLC.
6. The “Banner ISD DB” Error tag tells the user how the last read request performed. If the Error tag value is 0 the read was successful. If a value of 1 to 3 is seen in the Error tag, then an issue occurred during operation.

InOut	
Request Update	Bool
ISD Control	"Banner_ISD_Control"
Error	UInt

- Error 1: Chain not set for 1 through 4.
- Error 2: Device not set to 1 through 32.
- Error 3: Communications error to selected Series and device. Series or Device is not wired into system.

7. Parsed ISD Data is stored in the Device Data tag.

Banner ISD_DB			
	Name	Data type	Start value
1	▼ Input		
2	■ Device	USInt	0
3	■ Chain	USInt	0
4	■ ▶ SiRF Response	"Banner_SC_ISD_Re..	
5	Output		
6	▼ InOut		
7	■ Request Update	Bool	false
8	■ SiRF Control	"Banner_SC_ISD_Co..	
9	■ Error	UInt	0
10	▼ Static		
11	■ Lock	UInt	0
12	■ ▶ Device Data	"Banner_SiRF_ISD_..	
13	■ Requested Chain	UInt	0
14	■ Requested Device	UInt	0

■ ▼ Device Data	"Banner_SiRF_ISD_...	
■ Safety Input Fault	Bool	false
■ Reserved	Bool	false
■ Sensor not Paired	Bool	false
■ ISD Data Error	Bool	false
■ Wrong Actuator	Bool	false
■ Marginal Range	Bool	false
■ Actuator Detected	Bool	false
■ Output Error	Bool	false
■ Input 2	Bool	false
■ Input 1	Bool	false
■ Local Reset Expect...	Bool	false
■ Operating Voltage ..	Bool	false
■ Operating Voltage ..	Bool	false
■ Output 2	Bool	false
■ Output 1	Bool	false
■ Power Cycle Requir...	Bool	false
■ With Fault Tolerant...	Bool	false
■ Local Reset Unit	Bool	false
■ Cascadable	Bool	false
■ High Coding Level	Bool	false
■ Teach-in Remaining	USInt	0

8. Store this data into another tag as needed.