

Safety Controller XS26 ISD Function

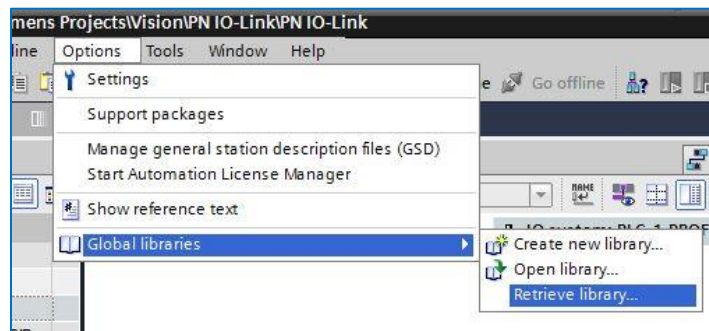
This document covers the installation and use of a Function for Siemens's TIA Portal software package. This Function handles ISD communications from a Banner Safety Controller to a Banner device that handles ISD commands. The Function covers parsing of data from the ISD device. This document will focus on setting up the ISD Function with a XS26 safety controller. It can also be used with a SC10 safety controller. The setup is very similar between the two models. There are a few Data Types that are used only with one of the safety controllers.

Components

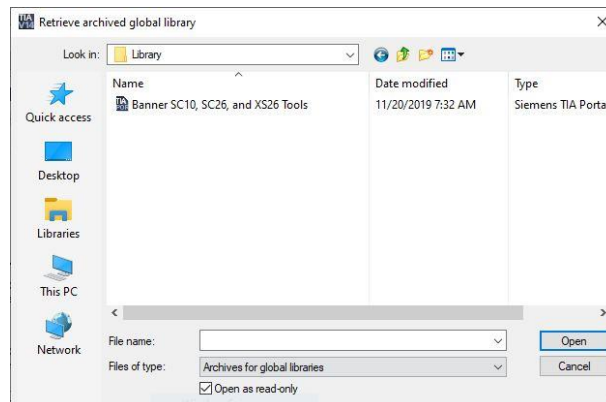
Banner SC10, SC26, and XS26 Tools.zal14

Installation Instructions

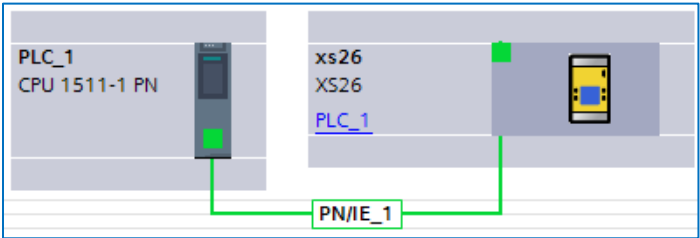
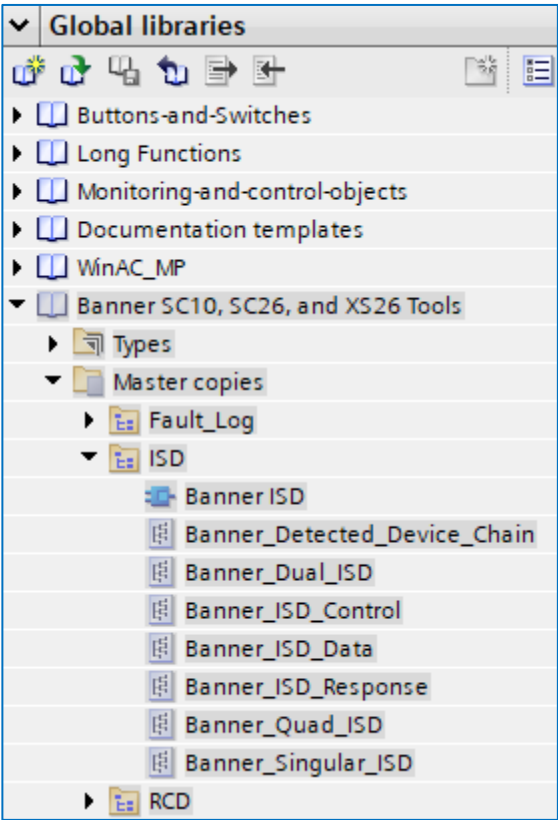
1. Open a project.
2. Go to Options > Global Libraries > Retrieve Library.



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















- 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.
 - Drag Banner ISD to the Program Blocks area under your PLC.
 - Drag Banner_Detected_Device_Chain, Banner_Dual_ISD, Banner_ISD_Control, Banner_ISD_Data Banner_ISD_Response, Banner_Quad_ISD, and Banner_Singular_ISD to the PLC Data Types area under your PLC.
 - Go to Devices and networks and add a XS26 safety controller. 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, 174868 (found on www.bannerengineering.com)








- Select the Safety Controller and switch to Device View.
- Add the ISD Status Information Modules and ISD Individual Status Information Module to the Safety Controller. Add either the ISD Status Information Module 4 Chain or 8 Chain. If using 4 or less chains use the 4 Chain module; otherwise, use the 8 Chain module. Make note of the %I and %Q addresses for the modules used in the system. Below example shows both being addressed.

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	
ISD Status Information Module 8 Chain_1	0	22	224...479	
ISD Specific Chain Information Module_1	0	23	502...533	

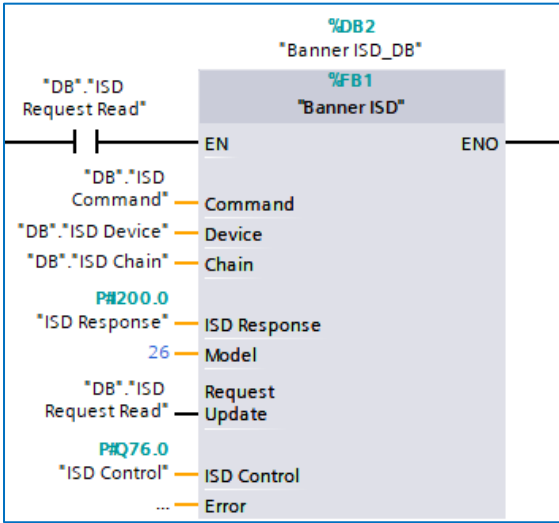
10. Go to PLC Tags. Add a new tag table, then create three new tags to represent the ISD Response, ISD Control, and ISD Channel Status. In this example, “SafetyController” database was created, then the tag “ISD Response” and “ISD Control” were created. Either the ISD 4 Chain Status or the ISD Chain # Status tags will be used. The ISD 4 Chain Status has all the information for the first four chains in it. This uses the ISD Status Information Module 4 Chain connection (Slot 20). Alternatively, the Chains can be added individually using the Banner_Singular_ISD and referencing the data from ISD Status information Module 8 Chain (Slot 23). Each Chain has 32 bytes of information. Reference the %I and %Q from above to these tags (Step 9).

SafetyController			
	Name	Data type	Address
1	 ISD Response	"Banner_ISD_Response"	%I200.0
2	 ISD Control	"Banner_ISD_Control"	%Q76.0
3	 ISD 4 Chain Status	"Banner_Quad_ISD"	%I72.0
4	 ISD Chain 1 Status	"Banner_Singular_ISD"	%I224.0
5	 ISD Chain 2 Status	"Banner_Singular_ISD"	%I256.0
6	 ISD Chain 3 Status	"Banner_Singular_ISD"	%I288.0
7	 ISD Chain 4 Status	"Banner_Singular_ISD"	%I320.0
8	 ISD Chain 5 Status	"Banner_Singular_ISD"	%I352.0
9	 ISD Chain 6 Status	"Banner_Singular_ISD"	%I384.0
10	 ISD Chain 7 Status	"Banner_Singular_ISD"	%I416.0
11	 ISD Chain 8 Status	"Banner_Singular_ISD"	%I448.0
12	 ISD Device Detected	"Banner_Detected_Device_Chain"	%I502.0

11. Go to Program blocks. Add a new Data block if necessary. In this example the new data block is named “DB”.
12. 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 for the Device in the Chain, the command that should be send (1 for ISD Device data, 2 for List of Devices in a Chain), and finally one tag (ISD Request Read in this example) to activate the actual read process.

DB		
	Name	Data type
	Static	
	ISD Request Read	Bool
	ISD Command	USInt
	ISD Chain	USInt
	ISD Device	USInt

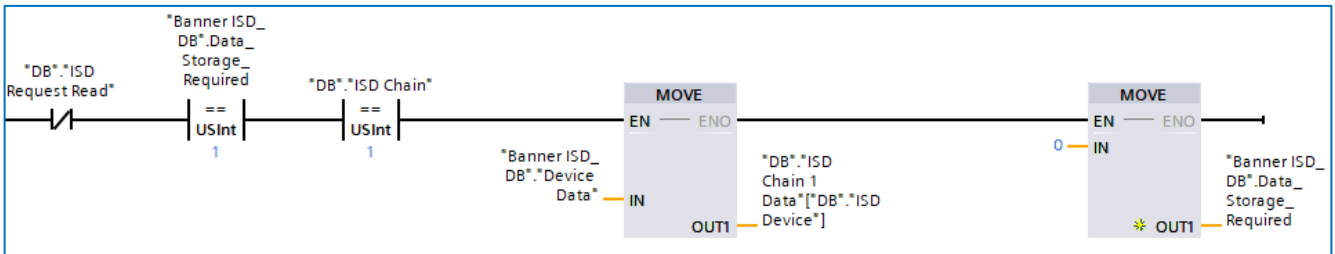
- for a SC10 controller while 26 is used for a SC26 or XS26.



14. Steps 15 and 16 are optional. These steps show how to take the read data and store it into an array data structure that corresponds to the chain and device counts in the user's system.
15. Open a Siemens Database (this example uses DB). Create an array of "Banner_ISD_Data". This array represents an ISD Chain. The array should have a size that represents the number of devices connected to the ISD Chain. An SC10 unit can have up to 2 Chains while the XS26 can have up to 8 Chains (ensure the model you have allows for ISD communications). The array's length should match the length of ISD chain. Example below shows two ISD Chain with varying number of devices in the chains.

▶ ISD Chain 1 Data	Array[1..2] of "Banner_ISD_Data"
▶ ISD Chain 2 Data	Array[1..4] of "Banner_ISD_Data"

16. Return to the OB ladder. Code like the below needs to be added. This code moves the read data into the correct array that was created in the previous step.

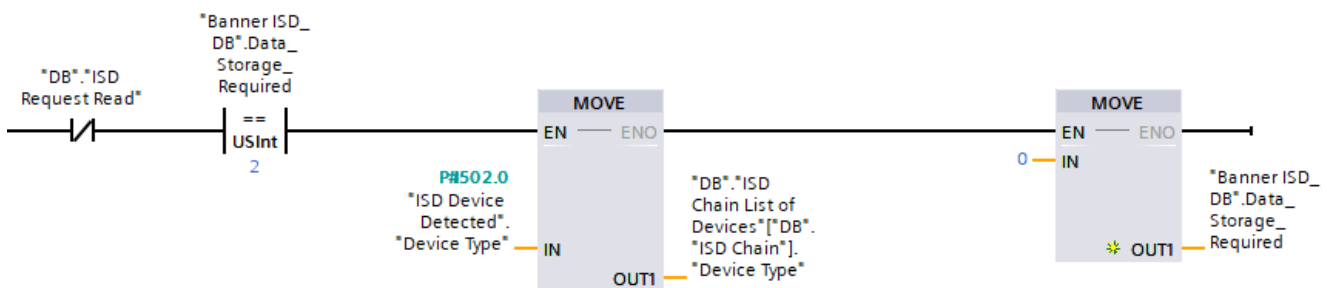


17. Repeat steps 15 and 16 for every Chain in the system.

18. Steps 19 and 20 are optional. These steps show how to take the read data and store it into an array data structure that corresponds to a chain in the user's system.
19. Open a Siemens Database (this example uses DB). Create an array of "Banner_Detected_Device_Chain". This array should have a length that corresponds to the number of chains being used in the system. This example shows an array of length 4, which is used if the number of chains configured in the Safety Controller is 4.

► ISD Chain List of Devices Array[1..4] of "Banner_Detected_Device_Chain"

20. Return to the OB ladder. Code like the below needs to be added. This automates the data storage of the List of Devices information. Use additional logic to ensure the array index is not exceeded. A PLC error can occur otherwise.



21. Repeat step 20 for every chain used in the system.
22. Compile and download the configuration to the PLC, then go online.
23. Setup is complete.

Using the Banner ISD Function

Cyclic ISD Data

The tags created in step 10 of the Installation section generates cyclic data. The data gives data of specific ISD chains in the system.

1. Go to the SafetyController PLC tags and expand one of the Chain status variables created. The example shown shows a singular chain worth of data.

▼ ISD Chain 1 Status	"Banner_Singular_ISD"	%I224.0
Device Count	USInt	%IB224
Element 1	USInt	%IB225
Element 2	USInt	%IB226
Element 3	USInt	%IB227
▶ Device On Off Status	Array[1..32] of Bool	%I228.0
▶ Fault Status	Array[1..32] of Bool	%I232.0
▶ Marginal Status	Array[1..32] of Bool	%I236.0
▶ Alert Status	Array[1..32] of Bool	%I240.0
▶ Reset Status	Array[1..32] of Bool	%I244.0
▶ Actuator Recognized	Array[1..32] of Bool	%I248.0
▶ Series Status	Array[1..32] of Bool	%I252.0

2. Data updates in real time since this information is taken directly from the Safety Controller.
3. Each of these data elements (Device On Off Status to Series Status) is an array that can be expanded. Each sub-variable represents the status of specific ISD device in the chain.

Acyclic ISD Data

Another job of the Function Block is making all the Banner ISD device values appear in the PLC tag arrays as if the ISD devices spoke Profinet. Reading from the and writing to the Banner ISD device becomes as easy as changing tag values in the PLC. All the complicated work of translating from Profinet to ISD is handled automatically, behind the scenes.

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

DB		
	Name	Data type
▼	Static	
■	ISD Request Read	Bool
■	ISD Command	USInt
■	ISD Chain	USInt
■	ISD Device	USInt


3. Next the "ISD Command" must have a value entered. Enter a 1 to gather the data for a specific Device on a Chain, or a 2 to gather all the devices on a specific chain. If a command of 2 is used the value in Device will not be used.
4. Next 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 or 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 8.
- Error 2: Device not set to 1 through 32.
- Error 3: Communications error to selected Series and device. Chain or Device is not wired into system.

7. Parsed ISD Device Data (Command 1) is stored in the Device Data tag.

Banner ISD_DB		
	Name	Data type
[-]	▼ Input	
[-]	■ Device	USInt
[-]	■ Chain	USInt
[-]	■ ▶ ISD Response	"Banner_ISD_Respo..."
[-]	■ Model	USInt
[-]	Output	
[-]	▼ InOut	
[-]	■ Request Update	Bool
[-]	■ ISD Control	"Banner_ISD_Contr..."
[-]	■ Error	UInt
[-]	▼ Static	
[-]	■ Lock	UInt
[-]	■ ▶ Device Data	"Banner_ISD_Data"



▼	Device Data	"Banner_ISD_Data"
■	Safety Input Fault	Bool
■	Reserved	Bool
■	Sensor not Paired	Bool
■	ISD Data Error	Bool
■	Wrong Actuator	Bool
■	Marginal Range	Bool
■	Actuator Detected	Bool
■	Output Error	Bool
■	Input 2	Bool
■	Input 1	Bool
■	Local Reset Expected	Bool
■	Operating Voltage Warning	Bool
■	Operating Voltage Error	Bool
■	Output 2	Bool
■	Output 1	Bool

8. This parsed data is what is optionally moved into another array data type to store the data. See steps 15 and 16 in Installation Instructions.

9. "ISD Chain # Data" information is stored in the database "DB" (for this example).

