

Banner IOL Parameter Data Function Block

This document covers the installation and use of a function block for Siemen's TIA Portal software package. This function block handles acyclic IO-Link commands to and from a Banner IO-Link Device and allows the user to easily change the IO-Link Device Parameter Data.

Each Banner IO-Link Device Parameter Data function block is meant to be used alongside an IO-Link Master Control function block. This paper describes how to set up both blocks.

Components

Banner IOL Parameter.zal16

There are two methods for parameter data. The first is used when creating a connection to Banner's IO-Link masters. The second set of instructions are for systems using other manufacturers' IO-Link masters.

When using another manufacturer's IO-Link Master download the Siemens LIOLink Library (from the Siemens website). Use version v7.2 for TIA Portal v16 or v17, and v7.3 for v18+.

Open Global Library Instructions

1. Open a project.
2. Go to the Open Global Library option in the Libraries tab in TIA Portal v16 or greater.



3. Switch the “Files of type” to Compressed libraries. Go to the location of the compressed library.
4. Press the Open button and the library will be uncompressed and opened.
5. The library is now accessible in the Libraries tab in v16 or greater.

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Setup of IO-Link Device with a Banner DXMR Device

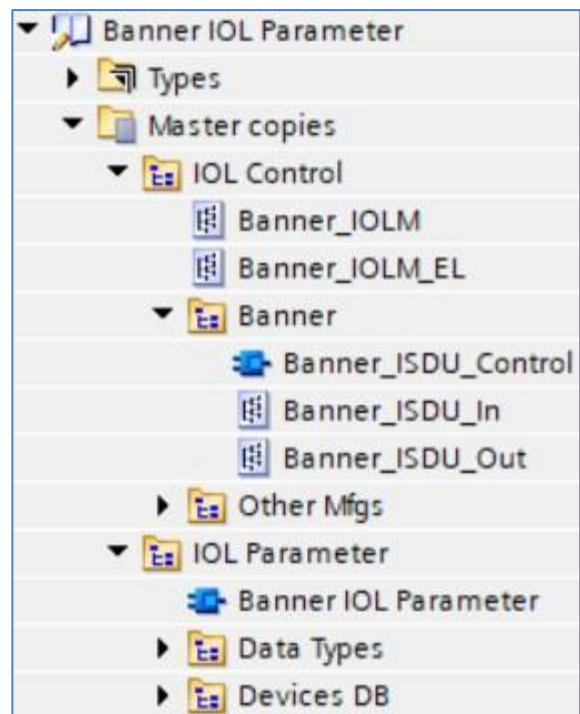
1. Go to Device and Networks to configure the DXMR. Add the DXM it has yet to be added to the system.
2. Add Banner IO-Link Master Info to Slot 1. This sets the DXMR for IO-Link mode.

Banner IO-Link Master Info_1	0	1	1...9	Banner IO-Link Master Info
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3. Open the IO-Link ISDU folder. Select the IO-Link ISDU 190/190 Byte option. Make note of the I address for Slot 10. The inputs data starts at I185 while the outputs data starts at Q185 for this example.

IO-Link ISDU 190/190 Byte_1	0	10	185...380	185...380	IO-Link ISDU 190/190 Byte
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4. Switch to the Libraries Tab. The Banner IOL Parameter Library should already be opened (See previous section if it is not).
5. Expand the "Master copies" folder.
6. Expand the "IOL Control" folder.
7. Drag the Banner_IOLM and Banner_IOLM_EL to the PLC Data Types area under your PLC.
8. Open the Banner folder and drag the Banner_ISDU_Control to the "Program blocks" area.
9. Also move the Banner_ISDU_In and Banner_ISDU_Out to the "PLC Data Types" area.
10. Now expand the "IOL Parameter" folder.
11. Move the "Banner IOL Parameter" to the Program blocks area.
12. Expand the "Data Types" folder.
13. Move all the data types to the "PLC Data Types" area.
14. Finally open the "Devices DB".
15. Look for the Banner IO-Link Device that a



- parameter data connection will be created too. Move that database to the "Program blocks" area. This example will use "Banner Q5X2K" (found in Sensors).
16. The database will have two items in it. The "Q5X2K Rules" tells the Function Block how the data is organized. The "Q5X2K IOLM1 01" is the location the data is saved into by the Function Block. This tag can/should be renamed by the user. If multiple Q5X2K units are in the system this tag should have copies made of it. One for each Q5X2K in the system.

Name	Data type
▼ Static	
■ ► Q5X2K Rules	"Banner IOL Rules Array"
■ ▼ Q5X2K IOLM1 01	"Banner IOL Device"

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17. Go to PLC Tags. Create two tags. The first tag “IOLM1 ISDU In” and the second tag is “IOLM1 ISDU Out”. Use the %I and %Q values from step 3.

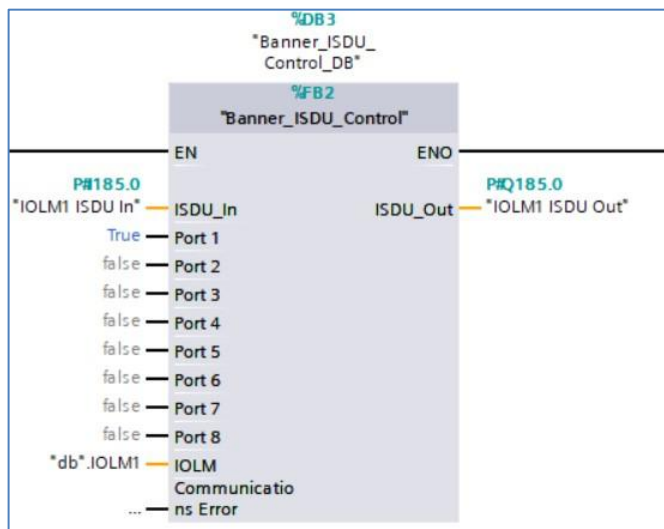
▶ IOLM1 ISDU In	*Banner_ISDU_In*	%I185.0
▶ IOLM1 ISDU Out	*Banner_ISDU_Out*	%Q185.0

18. Go to Program blocks. Add a new Data block if necessary (can use the device db that was imported). In this example the new data block is named “db”.

19. Create a tag with the type of “Banner_IOLM”. This example uses IOLM1.

db	
Name	Data type
▼ Static	
▶ IOLM1	*Banner_IOLM*

20. Next add the “Banner_ISDU_Control” function block to a ladder rung. You will be prompted to make a new data block. Accept this. You now must define the input variables for this function block: ISDU_In, ISDU_Out, and IOLM. Also set which ports the Function Block will interact with by changing the Port # to True. In this example only Port 1 will be used so that is the only one set to True. Only set a Port to True is the sensor/device is present and the parameter data Function block is configured for this device.



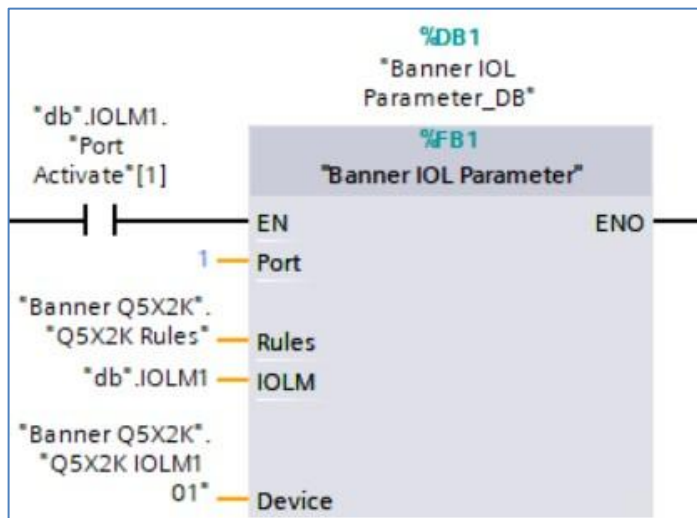
21. Link the IOLM variable to the database IOLM tag created in step 19. While ISDU_In and ISDU_Out are linked to variables created in step 17.

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22. Now add the “Banner IOL Parameter” function block to a ladder rung. You will be prompted to make a new data block. Accept this. Type in the port number for the device, then link the “IOLM” variable to the IO-Link master variable created in step 19.

The Rules and Device need to be linked to the tags from the “Banner Q5X2K” database pulled in during step 15 and 16.

As a last step, the Port Activate (which is part of the IOLM tag from step 19) bit is added on the same rung as the “Banner IOL Parameter” function block to ensure orderly behavior. The IO-Link Master function block will cycle through all ports, giving each connected device function block a time to operate.



23. Setup of Parameter Data for a Banner DXMR is complete.
24. Go to Page 11 for information on how to use the Function Block.

Setup of Banner IOL Parameter with other IO-Link Masters

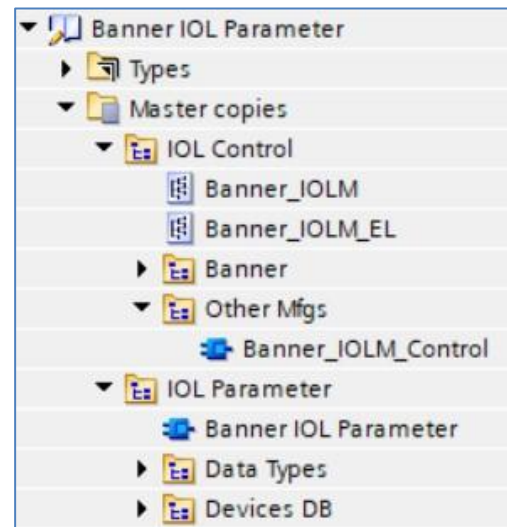
Additional Component Needed

Siemens LIOLink V7.2 Library for TIA Portal V16 or V17 (downloadable on Siemens website)

Siemens LIOLink V7.3 Library for TIA Portal V18+ (downloadable on Siemens website)

Installation Instructions

1. The Banner IOL Parameter Library will now be in the Global Library List. Expand the “Master copies” folder.
2. Expand the “IOL Control” folder.
3. Drag the Banner_IOLM and Banner_IOLM_EL to the “PLC Data types” folder.
4. Expand the “Other Mfgs” folder.
5. Move the Banner_IOLM_LIOLink to the area under “Program Blocks”.
6. Now expand the “IOL Parameter” folder.
7. Move the “Banner IOL Parameter” to the Program blocks area.
8. Expand the “Data Types” folder.
9. Move all the data types to the “PLC Data Types” area.
10. Finally open the “Devices DB”.
11. Look for the Banner IO-Link Device that a parameter data connection will be created to. Move the database to the “Program blocks” area. This example will use “Banner Q5X2K”.
12. The database will have two items in it. The “Q5X2K Rules” tells the Function Block how the data is organized. The “Q5X2K IOLM1 01” is the location the data is saved into by the Function Block. This tag can/should be renamed by the user. If multiple Q5X2K units are in the system this tag should have copies made of it. One for each Q5X2K in the system.

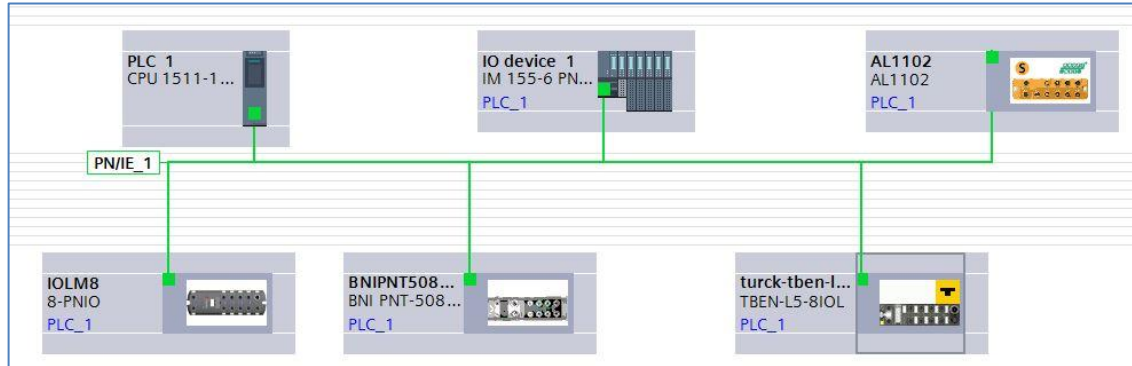


Name	Data type
▼ Static	
■ ► Q5X2K Rules	"Banner IOL Rules Array"
■ ▼ Q5X2K IOLM1 01	"Banner IOL Device"

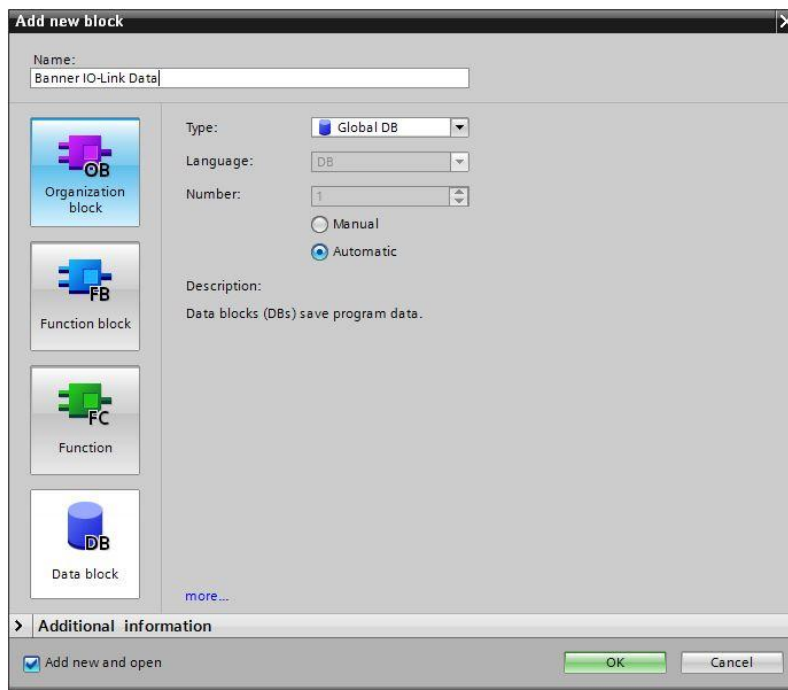
13. Now we must bring the Siemens-made IO_LINK_DEVICE function block or LIOLink function block specific to your PLC into our project. This example will use IO_LINK_DEVICE. This can be found in a Siemens IO-Link Library. See their website for more details. Once that library is retrieved and opened, drag IO_LINK_DEVICE to the Program Blocks area under your PLC.

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14. Go to “Devices and networks” to configure the system, as necessary. Below is an example of what a configuration might look like. This example shows 5 different IO-Link Masters connected to the same PLC.



15. Go to Program blocks. Add a new Data block if necessary. In this example the new data block is named “Banner IO-Link Data”.



16. In the new data block, create a new tag to represent the IO-Link Master, using the data type “Banner_IOLM”. This example uses the tag name “IOLM1”. A different IO-Link Master might be called IOLM2 or IOLM3, for instance.

Banner IO-Link Data		
	Name	Data type
1	Static	
2	IOLM1	"Banner_IOLM"

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- Next add the “Banner_IOLM_Control” function block to an OB ladder. You will be prompted to make a new data block. You now must define the input variables for this function block.

Defining an input variable for the last input, Communications Error, is optional.

The Client Access Point (CAP) varies, depending on the specific IO-Link Master used.

IO-Link Master	CAP
Balluff (BNI PNT-508-105-Z015)	255
Control (IOLMPN8P)	255
ifm (AL1102)	46080
Siemens (CM 4xIO-Link)	227
Turck (TBEN-L5-8IOL)	251

The ID Control state variable should be “true” if using an IO-Link Master from ifm; otherwise, it should be set to “false”.

All Ports that will be accessed by the Function Block set them to “true”. In this example only Port 1 will be set to “true”. Only set to “true” if sensor/device is present and the parameter data function block is configured for this device.

Link the “IOLM” input variable to the tag created in step 16.

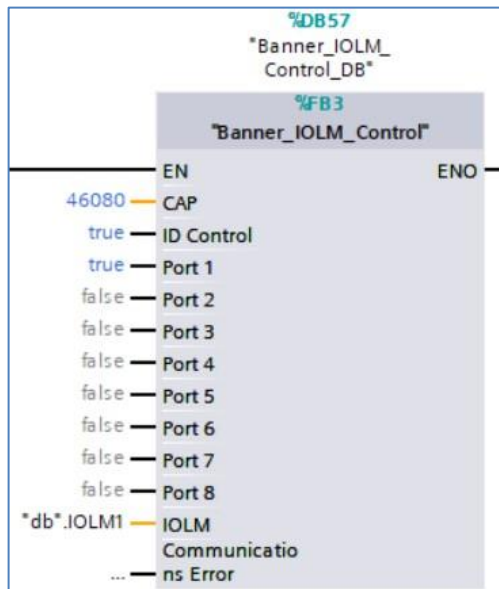


Figure 1: An example using an ifm IO-Link Master

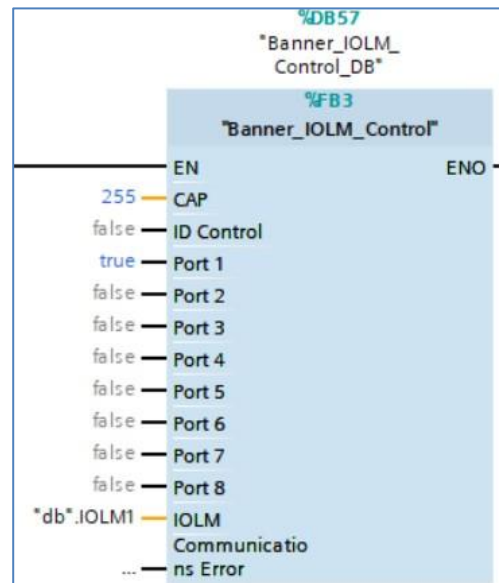


Figure 2: An example using a Balluff IO-Link Master

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18. The ID Control true/false state is linked to an array called “ID_Array”, found in “Banner_IOLM_Control_DB”. This array contains the Hardware ID property of the PROFINET configuration.

See Appendix A for more information on how to find the correct value for your specific IO-Link Master.

In the case of an IO-Link Master from ifm, each port has a different Hardware ID and each number must be entered into the correct place. The example shown in Figure 3 is of an IO-Link device connected to port 6 of an ifm IO-Link Master. The ifm IO-Link Master’s port 6 Hardware ID is entered into the “ID_Array[6]” slot. This full array of different Hardware IDs, based on port used, is used when the “ID Control” variable is set to true (i.e. only when the IO-Link Master is from ifm).

IO-Link Masters from other vendors use a single Hardware ID value for all ports. In this case, the Hardware ID is entered into the “ID_Array[1]” slot of the array, regardless of the port to which the device is connected. This array is ignored (but the [1] slot is still important) when the “ID Control” variable is set to false.

▼ ID_Array	Array[1..8] of HW_IO	
■ ID_Array[1]	HW_IO	0
■ ID_Array[2]	HW_IO	0
■ ID_Array[3]	HW_IO	0
■ ID_Array[4]	HW_IO	0
■ ID_Array[5]	HW_IO	0
■ ID_Array[6]	HW_IO	279
■ ID_Array[7]	HW_IO	0
■ ID_Array[8]	HW_IO	0

Figure 3: The ID_Array when using an ifm IO-Link Master; device attached to port 6

▼ ID_Array	Array[1..8] of HW_IO	
■ ID_Array[1]	HW_IO	309
■ ID_Array[2]	HW_IO	0
■ ID_Array[3]	HW_IO	0
■ ID_Array[4]	HW_IO	0
■ ID_Array[5]	HW_IO	0
■ ID_Array[6]	HW_IO	0
■ ID_Array[7]	HW_IO	0
■ ID_Array[8]	HW_IO	0

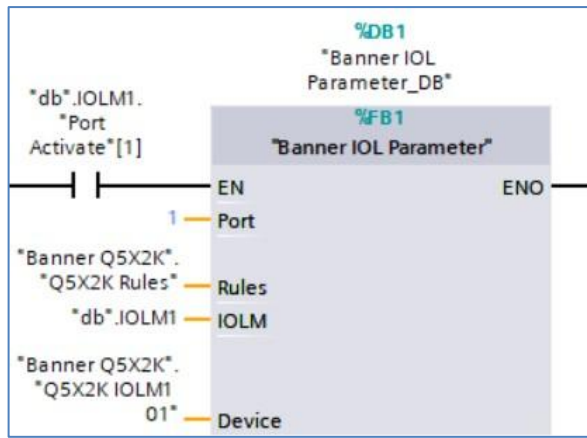
Figure 4: The ID_Array when using a Balluff IO-Link Master; device attached to any port (only ID_Array[1] is used)

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19. Now add the “Banner IOL Parameter” function block to an OB ladder. You will be prompted to make a new data block. Type in the port number for the device, then link the “IOLM” variable to the IO-Link master variable created in step 15.

The Rules and Device need to be linked to the tags from the “Banner Q5X2K” database pulled in during steps 11 and 12.

As a final step, the Port Activate bit is added on the same rung as the Banner IOL Parameter function block to ensure orderly behavior. The IO-Link Master function block will cycle through all ports, giving each connected device function block a time to operate.



20. Setup of Parameter Data for IO-Link Master is complete.
21. Go to next page for information on how to use the Function Block.

Banner IOL Parameter Data Function Block

Using the Banner IOL Parameter Function Block

The Banner IOL Parameter function block will automatically gather data for all IO-Link devices in the system when first powered on. Parameter data is an acyclic process and can take some time to complete. The initial read is complete when the “Initial Global Read” tag is set to “true”. This flag can be set to false to request another full global read of all parameter data for an IO-Link device. The flag is found in the tag that is part of the pulled in database from the library. This example uses the Q5X2K database. The tag is in the “Data type” “Banner IOL Device”. There should be one tag of “Banner IOL Device” for each device in the system. If you have 3 Q5X2K sensors then copy the “Q5X2K IOLM1 01” until you have three copies of it. One for each device. Rename them as needed for the system.

Name	Data type	Monitor value
▼ Static		
▀ Q5X2K Rules	"Banner IOL Rules Array"	
▀ ▼ Q5X2K IOLM1 01	"Banner IOL Device"	
▀ Initial Global Read	Bool	TRUE
▀ Command	USInt	0

The Data section in “Banner IOL Device” should be expanded. Now the Index should also be expanded. Now the Index array is fully visible. Start at index[2] each line is labeled. These labels represent the IO-Link Indices in the device. Read only indices will have a “ro” in the comment. Write only has a “wo”. Everything with neither a “ro” or a “wo” is Read Write capable. See the image below for an example of this.

Q5X2K IOLM1 01	"Banner IOL Device"		
Initial Global Read	Bool	TRUE	
Command	USInt	0	
▼ Data	"Banner IOL Device Index"		
▀ ▼ Index	Array[0..40] of "Banner IOL Devi...		
▀ ▸ Index[0]	"Banner IOL Device SubIndex"		
▀ ▸ Index[1]	"Banner IOL Device SubIndex"		
▀ ▸ Index[2]	"Banner IOL Device SubIndex"		Direct Parameters (ro)
▀ ▸ Index[3]	"Banner IOL Device SubIndex"		Standard Command (wo)
▀ ▸ Index[4]	"Banner IOL Device SubIndex"		Device Access Locks
▀ ▸ Index[5]	"Banner IOL Device SubIndex"		Serial Number
▀ ▸ Index[6]	"Banner IOL Device SubIndex"		Teach Channel
▀ ▸ Index[7]	"Banner IOL Device SubIndex"		Teach Status (ro)
▀ ▸ Index[8]	"Banner IOL Device SubIndex"		BDC1 Setpoints
▀ ▸ Index[9]	"Banner IOL Device SubIndex"		BDC1 Configuration
▀ ▸ Index[10]	"Banner IOL Device SubIndex"		BDC2 Setpoints
▀ ▸ Index[11]	"Banner IOL Device SubIndex"		BDC2 Configuration

A Global Read can be started by either entering a 1 into the Command or setting the “Initial Global Read” to false. A singular Index read is started by entering the index number into Command. As an example, if “BDC1 Setpoints” should be updated then entering an eight into the Command does the Read operation for that Index. The Data in the index is now updated. Expand the index to see the data.

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The Write operation requires a few steps to complete. Start by expanding the Index that will be updated. For this example, “BDC1 Setpoints” will be used.

▼ Index[8]	*Banner IOL Device SubIndex*		BDC1 Setpoints
■ ▼ Sub Index	Array[0..34] of UDInt		
■ Sub Index[0]	UDInt	0	
■ Sub Index[1]	UDInt	472	SP1
■ Sub Index[2]	UDInt	0	SP2. In FGS teach, defines the 2nd switchpoint. In other modes,

Change all the “Sub Index” values that need to be updated. This example changes SP1 from 472 to 480.

▼ Index[8]	*Banner IOL Device SubIndex*		BDC1 Setpoints
■ ▼ Sub Index	Array[0..34] of UDInt		
■ Sub Index[0]	UDInt	0	
■ Sub Index[1]	UDInt	480	SP1

The Command needs to be set for the Write command to be updated. Take the index number and add 40 to it. This is the value that needs to be entered into the Command value. Here the value 48 (40 + 8) is entered and the device is updated.

▼ Q5X2K IOLM1 01	*Banner IOL Device*	
■ Initial Global Read	Bool	TRUE
■ Command	USInt	48

The Command value will be set back to 0 after the operation is completed. When the Command is set back to 0 look at the “Communications Error” tag from the “Banner_IOLM_Control” or “Banner_ISDU_Control” database. This tells the user if the write operation was successful or not.

▼ Q5X2K IOLM1 01	*Banner IOL Device*	
■ Initial Global Read	Bool	TRUE
■ Command	USInt	0

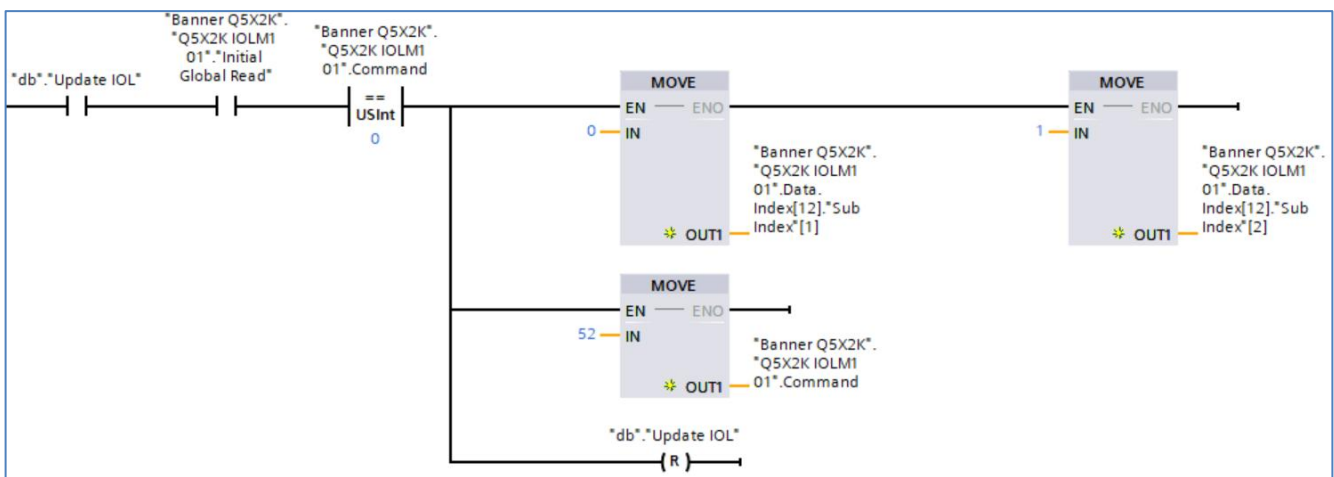
Communications Error	Bool	false	TRUE
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The previous section went through the steps of how to manually read and write the data. This section will show an example of how the update could happen when programmed. The user will need to come up with some logic that determines when the update should occur. This logic should not be able to be continuously activated.

***NOTE:** Parameter Data is meant to be updated infrequently. The data is stored in EEPROM that has a limited number of writings available. Exceeding this limit can cause the IO-Link device to error out. Each Index data element has a separate counter for this. If the application requires very quick Index writes, contact Banner Engineering to discuss. Never need to worry about Reads, however.

Example Logic for IO-Link Parameter Data Update



In this example the “db.Update IOL” represents the logic that triggers the parameter data update. Here it is just a simple Boolean value; however, it will likely be more complex in the actual system. Next is a normally open contact that is checking that the “Initial Global Read” has been set to true. This ensures that the system has read all the parameter data correctly. If the parameter data has yet to be read then the data cannot be update yet. Next is an Equal comparison check. This looks at the Command variable for the function block. If Command is already processing a command/operation wait until that is completed before trying to do another command/operation. Finally, all the data for one Parameter Data Index can be adjusted as needed. In this example the Sub-Index[1] (Response Speed) and Sub-Index[2] (Gain) are updated to the necessary values for the system. Command has a 52 sent to it which represent Index 12 (remember writes are activated by adding 40 to the Index number). The Boolean used to activate the routine it turned off. It may be necessary to handle this in another way depending on the logic used to activate this process. The Banner IOL Parameter Function Block will update the IO-Link device to the new parameters.

Banner IOL Parameter Data Function Block

Appendix A

IO-Link Master Hardware ID Numbers

The Hardware ID number used in “ID_Array” in the “Banner_IOLM_Control_DB” function block is not trivial to find. Each manufacturer uses the Hardware Identifier of a slightly different subcomponent as the value required for our purposes. Furthermore, the particular Hardware Identifier numbers will change based on the number of devices in your configuration. These pictures show which subcomponent’s Hardware ID is relevant to the function block.

In each case, click on the hardware device from the “Devices & Networks” view. Click on “Properties”, then click on “System Constants” to see the screen shots below.

Balluff

Use the Hardware Identifier from the “BNI_PNT-508-105-Z015_1” Hw_SubModule. Type this number into the [1] slot of the ID_Array found in the “Banner_IOLM_Control_DB” data block.

The screenshot shows the Siemens SIMATIC Manager interface. The top part displays a 3D model of the device. The right pane shows the 'Device overview' table. The bottom pane shows the 'Properties' window for the device, with the 'System constants' tab selected. The table below lists the hardware identifiers for various components, with the entry 'BNI_PNT-508-105-Z015_1' highlighted in red.

Module	Rack	Slot	I address	Q address
BNI_PNT-508-105-Z015	0	0		
PN-IO	0	0 X1		
BNI_PNT-508-105-Z015_1	0	1		
IOL_I/O_32/32 byte_1	0	2	324...355	320...351
	0	3		
	0	4		
	0	5		
	0	6		
	0	7		
	0	8		
	0	9		
	0	10		
	0	11		

Name	Type	Hardware identi.	Used by	Comment
BNI_PNT-508-105-Z015-PN-IO-port_1_-M12	Hw_Interface	306	PLC_1	
BNI_PNT-508-105-Z015-PN-IO-port_2_-M12	Hw_Interface	307	PLC_1	
BNI_PNT-508-105-Z015-PN-IO	Hw_Interface	305	PLC_1	
BNI_PNT-508-105-Z015-Proxy	Hw_SubModule	304	PLC_1	
BNI_PNT-508-105-Z015-Head	Hw_SubModule	308	PLC_1	
BNI_PNT-508-105-Z015-BNI_PNT-508-105-Z015_1	Hw_SubModule	309	PLC_1	

Figure 2: Balluff BNI005H. Type this value into the “ID_Array[1]” location.

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Control

Use the Hardware Identifier from the “Head” Hw_SubModule. Type this number into the [1] slot of the ID_Array found in the “Banner_IOLM_Control_DB” data block.

The screenshot displays the HW Config interface for an IOLM8 [8-PNIO] device. The 'Device overview' table on the right provides a hierarchical view of the hardware configuration:

Module	Rack	Slot	I address	Q address	Type
IOLM8	0	0			IO-Link Master
Interface	0	0 X1			IO-Link Interface
IO-Link In/Out 32 bytes_1	0	1	68...99	64...95	IO-Link In/Out
IO-Link In/Out 32 bytes_2	0	2	100...131	96...127	IO-Link In/Out
IO-Link In/Out 32 bytes_3	0	3	132...163	128...159	IO-Link In/Out
IO-Link In/Out 32 bytes_4	0	4	164...195	160...191	IO-Link In/Out
IO-Link In/Out 32 bytes_5	0	5	196...227	192...223	IO-Link In/Out
IO-Link In/Out 32 bytes_6	0	6	228...259	224...255	IO-Link In/Out
IO-Link In/Out 32 bytes_7	0	7	260...291	256...287	IO-Link In/Out
IO-Link In/Out 32 bytes_8	0	8	292...323	288...319	IO-Link In/Out
IO-Link In/Out 32 bytes_9	0	9			IO-Link In/Out
IO-Link In/Out 32 bytes_10	0	10			IO-Link In/Out

The 'System constants' table at the bottom lists the hardware identifiers for the device components:

Name	Type	Hardware identi.	Used by	Comment
IOLM8-Interface-Port_1	Hw_Interface	274	PLC_1	
IOLM8-Interface-Port_2	Hw_Interface	275	PLC_1	
IOLM8-Interface	Hw_Interface	273	PLC_1	
IOLM8-Proxy	Hw_SubModule	272	PLC_1	
IOLM8-Head	Hw_SubModule	276	PLC_1	

Figure 3: Control IOLM8 PNIO. Type this value into the “ID_Array[1]” location.

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Turck

Use the Hardware Identifier from the “Basic_1” Hw_SubModule. Type this number into the [1] slot of the ID_Array found in the “Banner_IOLM_Control_DB” data block.

The screenshot shows the Siemens STEP 7 HW Config interface. The main window displays a rack with the Turck TBEN-L5-8IOL module. The 'Device overview' table on the right lists the modules. The 'System constants' table at the bottom lists hardware identifiers, with 'tben-Basic_1' highlighted in red, showing a hardware identifier of 301.

Module	Rack	Slot	I address	Q address	Type
tben	0	0			Module
PN-HO	0	0 X1			PN-HO
Basic_1	0	Basic	33...36	33...34	Basic_1
	0	IO-Lin...			IO-Lin...
	0	IO-Lin...			IO-Lin...
	0	IO-Lin...			IO-Lin...
	0	IO-Lin...			IO-Lin...
	0	IO-Lin...			IO-Lin...
IN 32 BYTE/OUT 32 BYTE_1	0	IO-Lin...	356...387	352...383	IN 32 BYTE/OUT 32 BYTE_1
	0	IO-Lin...			IO-Lin...
	0	Diagn...			Diagn...
	0	IO-Lin...			IO-Lin...

Name	Type	Hardware identi.	Used by	Comment
tben-PN-HO-Port_1	Hw_Interface	298	PLC_1	
tben-PN-HO-Port_2	Hw_Interface	299	PLC_1	
tben-PN-HO	Hw_Interface	297	PLC_1	
tben-Proxy	Hw_SubModule	296	PLC_1	
tben-Head	Hw_SubModule	300	PLC_1	
tben-Basic_1	Hw_SubModule	301	PLC_1	

Figure 3: Turck TBEN-L5-8IOL. Type this value into the “ID_Array[1]” location.

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Siemens

Use the Hardware Identifier from the “CM_4xIO-Link_1” Hw_SubModule. Type this number into the [1] slot of the ID_Array ID_Array found in the “Banner_IOLM_Control_DB” data block.

The screenshot displays the Siemens SIMATIC Manager HW Config interface. The main window shows a rack configuration for 'Rack_0' with slots 0 through 7. Slot 1 is occupied by a 'CM 4xIO-Link_1' module. The 'Device overview' table on the right lists the modules and their addresses. The 'Properties' tab for 'CM 4xIO-Link_1' is active, showing a table of hardware identifiers. The value '292' is highlighted in the 'Hardware identi.' column for the 'siolm-CM_4xIO-Link_1' entry.

Module	Rack	Slot	I address	Q address	Type
siolm	0	0			IM
PROFINET interface	0	0 X1			PR
CM 4xIO-Link_1	0	1	1...32	1...32	CM
Server module_1	0	2			Se
	0	3			
	0	4			
	0	5			
	0	6			
	0	7			
	0	8			
	0	9			
	0	10			
	0	11			
	0	12			
	0	13			
	0	14			
	0	15			
	0	16			

Name	Type	Hardware identi.	Used by	Comment
siolm-CM_4xIO-Link_1	Hw_SubModule	292	PLC_1	

Figure 4: Siemens CM 4xIO-Link Master on ET-200SP. Type this value into the “ID_Array[1]” location.

Banner IOL Parameter Data Function Block

ifm

Use the Hardware Identifier from the port to which the IO-Link Device you wish to control is connected Hw_SubModule. Each port is a different Hardware identifier. You will need to populate the ID_Array, found in the “Banner_IOLM_Control_DB” data block, with the correct values. In the example below, port 6 on the master has a Hardware ID of “279”. Thus, the [6] entry in the ID_Array variable should be set to “279”.

The screenshot displays the SIMATIC Manager interface. On the left, a rack diagram shows the ifm AL1102 module. The main window is divided into two panes. The top pane, titled 'Device overview', contains a table with the following data:

Module	Rack	Slot	I address	Q addr...
AL1102	0	0		
X1	0	0 X1		
8 Ports_1	0	1		
IO-Link Master	0	1 1		
	0	1 2		
	0	1 3		
	0	1 4		
	0	1 5		
	0	1 6		
IO-Link In 2 Byte + PQI	0	1 7	68...70	
	0	1 8		
	0	1 9		

The bottom pane shows the 'Properties' window for the selected 'IO-Link In 2 Byte + PQI' module. The 'System constants' tab is active, displaying a table of hardware identifiers:

Name	Type	Hardware identi.	Used by	Comment
AL1102-8_Ports_1-IO-Link_In__2_Byte_+_PQI	Hw_SubModule	279	LC_1	

The row for 'AL1102-8_Ports_1-IO-Link_In__2_Byte_+_PQI' is highlighted with a red box, indicating the hardware identifier 279.

Figure 5: ifm AL1102: each port on the ifm IO-Link Master has its own Hardware ID. Type these values into the correct “ID_Array[x]” location, where ‘x’ is the port number in question ([6] here, as the ports are labeled 2 through 9).