

R45C IIUU Process Data Function

February 9th, 2026

This document covers the installation and use of a function for Siemens's TIA Portal software package. This function handles cyclic IO-Link Process Data In from a Banner R45C-KII-IIQ or R45C-KUU-UUQ sensor via an IO-Link Master to a Siemens PLC. The function covers parsing and display of the R45C-KII-IIQ sensor Process Data.

Components

Banner R45C IIUU Library v16.zal16

There are two methods for the process 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 manufacturer's IO-Link masters.

Installation Instructions

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



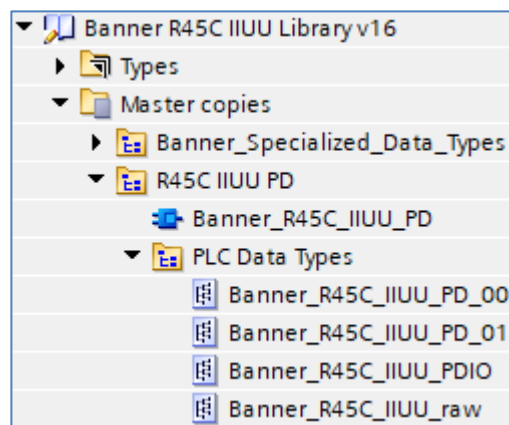
3. Switch the "Files of type" to Compressed libraries. Go to the location of the compressed library.
4. Press the Open button and the library will be uncompressed and opened.
5. The library is now accessible in the Libraries tab in v16 or greater.

Setup of R45C-KII-IIQ with a Banner DXMR

1. Go to Device and Networks to configure the DXMR. Add the DXMR if it has yet to be added to the system.
2. Open the IO-Link Generic Devices and select the proper module. The 8/8 byte option has been selected for port 1. Make note of the I and Q addresses for the Slot 2 which represents Port 1. Slot 2 starts are I1. The other number needed I5 (this value is calculated by adding 4 to the previous number [I1 here]). The data for the port start at that point (I5). The previous four bytes represents Port Status, Process Data In Size, and Process Data Out Size. The Q address is also necessary. Slot 2 starts at Q1, while the second number needed is Q3 (calculated by adding 2 to the previous number).

Module	Rack	Slot	I address	Q address	Type
▼ dxm	0	0			1-port Device
▶ Interface	0	0 X1			dxm
Banner IO-Link Master Info_1	0	1	68...76		Banner IO-Link Master Info
IO-Link In/Out 8/ 8 Byte + Status_1	0	2	1...12	1...22	IO-Link In/Out 8/ 8 Byte ...

3. Drag the Banner_R45C_IIUU_PD to the Program Blocks area.
4. Drag the four items from PLC Data Types to the PLC Data Types folder in the Siemens PLC.
5. Drag the necessary tags from Banner_Specialized_Data_Types. The tag used in this example is "Banner_8in" and "Banner_8out". These tags represent the full raw process data along with port information.
6. Go to PLC Tags. Create four tags. Two of the tags use the Banner Specialized tags while the other two use the "Banner_R45C_IIUU_raw" data types. The I and Q addresses calculated previously are used.



Name	Data type	Address
▶ R45C UUII IOLM1 01 PDI	"Banner_8In"	%I1.0
▶ R45C UUII IOLM1 01 inRaw	"Banner_R45C_IIUU_raw"	%I5.0
▶ R45C UUII IOLM1 01 PDO	"Banner_8Out"	%Q1.0
▶ R45C UUII IOLM1 01 outRaw	"Banner_R45C_IIUU_raw"	%Q3.0

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

8. In the new data block, create a new tag to represent the parsed Process Data for R45C-KII-IIQ. The tag name again calls out the type of sensor, the IO-Link Master, and the port number. Use the data type “Banner_R45C_IIUU_PDIO” for the new tag.

▼ R45C IOLM1 01 PD	"Banner_R45C_IIUU_PDIO"
■ ▼ Data 0	"Banner_R45C_IIUU_PD_00"
■ PDI - Measurement 1	Real
■ PDI - Measurement 2	Real
■ PDO - Output 1	Real
■ PDO - Output 2	Real
■ ▼ Data 1	"Banner_R45C_IIUU_PD_01"
■ PDI - Measurement 1	Real
■ PDI - Scale 1	SInt
■ PDI - Switching Signal 1	SInt
■ PDI - Measurement 2	Real
■ PDI - Scale 2	SInt
■ PDI - Switching Signal 2	SInt
■ PDO - Output 1	Real
■ PDO - Output 2	Real

9. Add the “Banner_R45C_IIUU_PD” function to an OB ladder. Link “PDI” to the raw Process Data variable from step 6. Link the “PD” to the parsed Process Data variable from step 7. Link “PDO” to the raw Process Data variable from step 6.

The last variable, “PDI Config”, allows the function to correctly interpret the Process Data.

There are two ways to achieve this goal. We can simply type in the correct number for “PDI Config” (see Fig. 1), or we can link this function to the R45C IIUU Data Function Block (see Fig. 2). See Appendix A for more information about R45C IIUU Process Data.

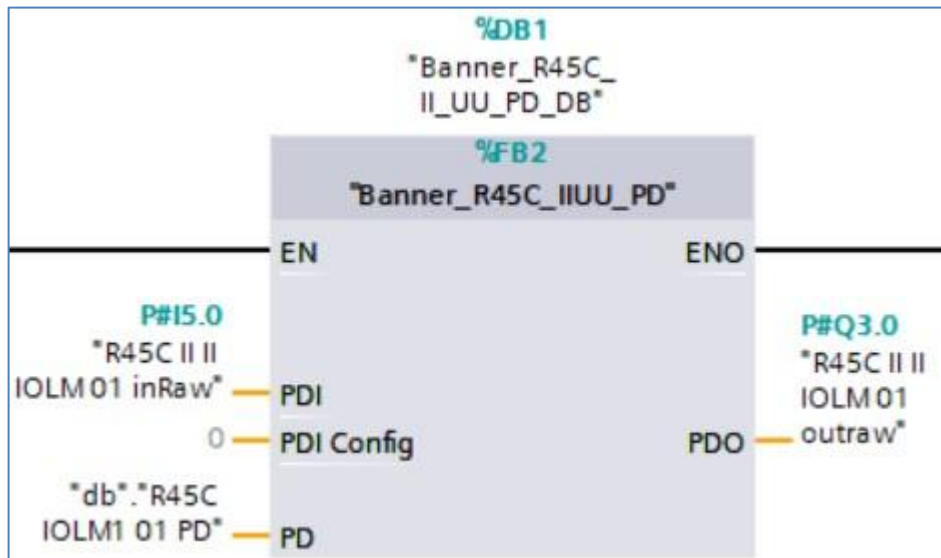


Figure 1: Hand typed correct numbers for PDI Config

NOTE: if you type in the incorrect number, you will get incorrectly displayed Process Data information.

PDI Config: the options here are “0” (Analog Value) and “1” (Digital Measuring Sensor). The default is “0”.

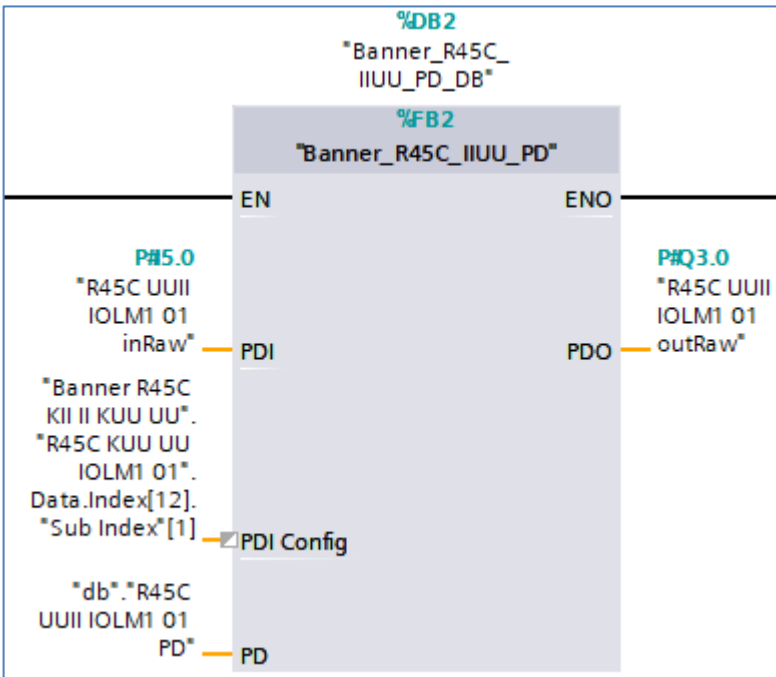
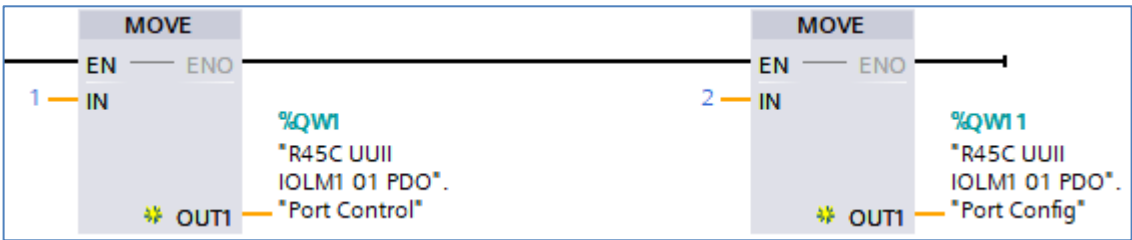


Figure 2: Linking Operational Mode variable to R45C IIUU Parameter Data Function Block

10. The final step is to configure the IO-Link output control. This is done by sending a 1 to Port Control and a 2 to Port Config. Both parameters are part of the tag created in step 6 “R45C UUII IOLM1 01 PDO”.

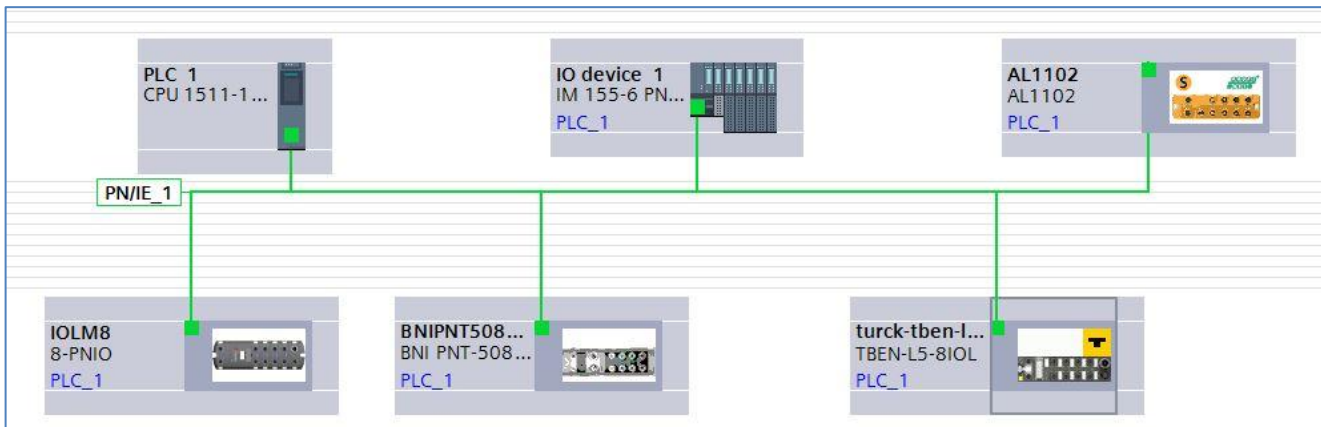
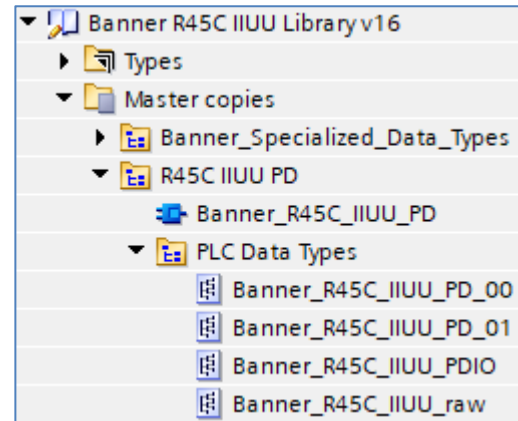


- 11. Process Data setup is complete.
- 12. Compile and download the configuration to the PLC, then go online. Open the “db” data block and click Monitor all. You should see parsed R45C IIUU Process Data In.

▼ R45C UUII IOLM1 01 PD	"Banner_R45C_IIUU_PDIO"	
■ ▼ Data 0	"Banner_R45C_IIUU_PD_00"	
■ PDI - Measurement 1	Real	0.0
■ PDI - Measurement 2	Real	0.0
■ PDO - Output 1	Real	6.0
■ PDO - Output 2	Real	5.4
■ ► Data 1	"Banner_R45C_IIUU_PD_01"	

Setup of R45C-KII-IIQ with other IO-Link Masters

1. The Banner IO-Link Library will now be in the Global Library List. Expand the Master copies section. The R45C IIUU PD folder contains elements for both Process Data.
2. Drag Banner_R45C_IIUU_PD to the Program Blocks area under your PLC.
3. Drag the four Data Types from PLC Data Types folder to the PLC Data Types area under your PLC.
4. 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.



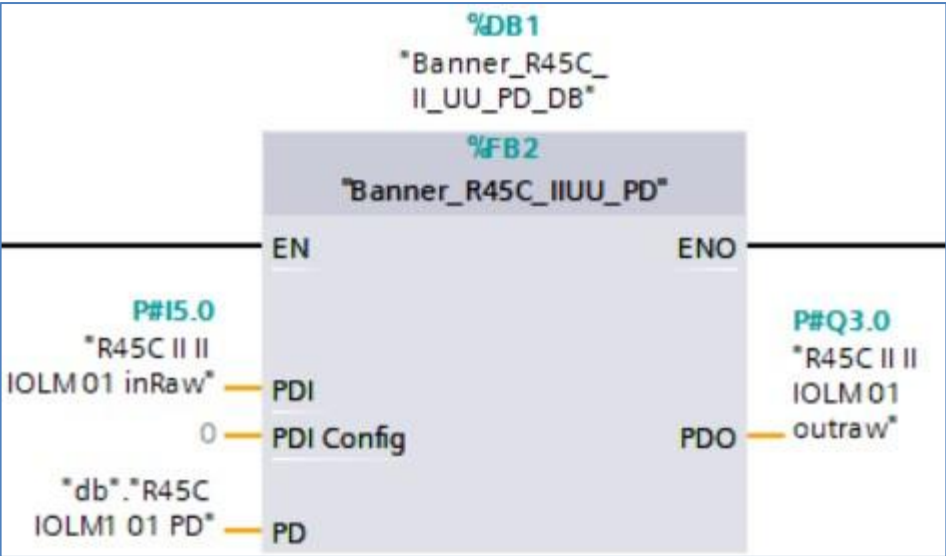
5. Click on the relevant device and configure the IO-Link Master as necessary. Refer to the documentation for the IO-Link Master. Recall that a R45C IIUU requires 8 bytes of space for the Process Data in and out.
6. Record the "I" and "Q" addresses where this R45C IIUU Process Data is to be stored, as the address will be required in the next step. In this example, 8 bytes of Process Data In for port 1 on the IO-Link Master will be stored starting at I5. The Q addresses starts at Q3.
7. Go to PLC Tags. Add a new tag table, if desired, then create a new tags to represent the raw Process Data from the IO-Link Master. In this example the tag "R45C II II IOLM1 01 inRaw" and "R45C II II IOLM1 outRaw" was created using a Data Type of "Banner_R45C_IIUU_raw". This naming convention calls out the type of sensor in question as well as the specific IO-Link Master and port number where the sensor is connected. A different IO-Link Master might be named IOLM2 or IOLM3, for instance, and other specific sensors may be connected to different port numbers.

▶ R45C II II IOLM01 inRaw	"Banner_R45C_IIUU_raw"	%I5.0
▶ R45C II II IOLM01 outraw	"Banner_R45C_IIUU_raw"	%Q3.0

8. Go to Program blocks. Add a new Data block if necessary. In this example the new data block is named "Banner IO-Link Data".
9. In the new data block, create a new tag to represent the parsed Process Data for the R45C-KII-IIQ. The tag name again calls out the type of sensor, the IO-Link Master, and the port number. Use the data type "Banner_R45C_IIUU_PDIO" for the new tag.

▼ R45C IOLM1 01 PD	"Banner_R45C_IIUU_PDIO"
■ ▼ Data 0	"Banner_R45C_IIUU_PD_00"
■ PDI - Measurement 1	Real
■ PDI - Measurement 2	Real
■ PDO - Output 1	Real
■ PDO - Output 2	Real
■ ▼ Data 1	"Banner_R45C_IIUU_PD_01"
■ PDI - Measurement 1	Real
■ PDI - Scale 1	SInt
■ PDI - Switching Signal 1	SInt
■ PDI - Measurement 2	Real
■ PDI - Scale 2	SInt
■ PDI - Switching Signal 2	SInt
■ PDO - Output 1	Real
■ PDO - Output 2	Real

10. Add the “Banner_R45C_IIUU_PD” function to an OB ladder. Link the “PDI” to the raw Process Data variables from step 7. Link the “PD” to the parsed Process Data variable from step 9. Link the “PDO” to the raw Process Data variables from step 7. For the “PDI Config” can either have the value manually entered or link to the PDI Config value form the Parameter Data Function Block. See Appendix A for the manual option. Linking to the Parameter Data is shown in the image below.



11. Process Data setup is complete.
12. Compile and download the configuration to the PLC, then go online. Open the “Banner IO-Link Data” data block and click Monitor all. Expand “R45C UUII IOLM1 01 PD” and then Data 0.

▼ R45C UUII IOLM1 01 PD	"Banner_R45C_IIUU_PDIO"	
■ ▼ Data 0	"Banner_R45C_IIUU_PD_00"	
■ PDI - Measurement 1	Real	0.0
■ PDI - Measurement 2	Real	0.0
■ PDO - Output 1	Real	6.0
■ PDO - Output 2	Real	5.4
■ ▶ Data 1	"Banner_R45C_IIUU_PD_01"	

Appendix A**R45C-IIUU Process Data**

The R45C IIUU has 8 bytes of Process Data In and Out, as shown below.

Process Data Input Configuration = 0 (Analog Value)

ProcessDataIn "Process Data Input" id=PD_ProcessDataIn

bit length: 64

data type: 64-bit Record (subindex access not supported)

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	32	32-bit Integer						Measurement Value 1	The measurement device value
5	0	32-bit Integer						Measurement Value 2	The channel 2 measurement device value

ProcessDataOut "Process Data Output" id=PD_ProcessDataOut

bit length: 64

data type: 64-bit Record (subindex access not supported)

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	32	32-bit Integer						Analog Output Value 1	The value to output to the channel 1 analog output
2	0	32-bit Integer						Analog Output Value 2	The value to output to the channel 2 analog output

ProcessDataOut "Process Data Output" id=PD_ProcessDataOutDMS

bit length: 64

data type: 64-bit Record (subindex access not supported)

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	32	32-bit Integer						Analog Output Value 1	The value to output to the channel 1 analog output
2	0	32-bit Integer						Analog Output Value 2	The value to output to the channel 2 analog output

Process Data Input Configuration = 1 (Digital Measuring Sensor)

ProcessData id=PD_ProcessDataWithDMS (condition V_Vendor_Specific_Configuration.1 == 1)

ProcessDataIn "Process Data Input" id=PD_ProcessDataInDMS

bit length: 64

data type: 64-bit Record (subindex access not supported)

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	48	16-bit Integer						Measurement Value 1	The measurement device value
2	40	8-bit Integer						Measurement Scale 1	The channel 1 measurement device scale
4	32	Boolean						SSC1.1 - Switching Signal	Indicates the detection status of an object or measurement value within a window.
5	16	16-bit Integer						Measurement Value 2	The channel 2 measurement device value
6	8	8-bit Integer						Measurement Scale 2	The channel 2 measurement device scale
8	0	Boolean						SSC2.1 - Switching Signal	Indicates the detection status of an object or measurement value within a window.