T30R Analog Process Data Function

January 7th, 2026

This document covers the installation and use of a function for Siemen's TIA Portal software package. This function handles cyclic IO-Link Process Data In from a Banner T30R Analog sensor via an IO-Link Master to a Siemens PLC. The function covers parsing and display of the T30R sensor Process Data In.

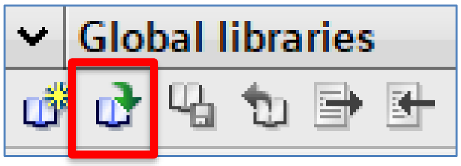
Components

Banner T30R 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.

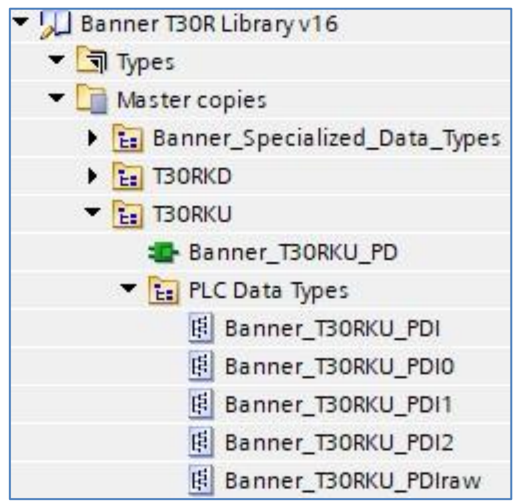


3. Switch the "Files of type" to Compressed libraries. Go to the location of the compressed library.
4. Press the Open button and the library will be uncompressed and opened.
5. The library is now accessible in the Libraries tab in v16 or greater.

Setup of T30RKU 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. Add Banner IO-Link Master Info to Slot 1. This sets the DXMR for IO-Link mode.
3. 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 address for the Slot 2 which represents Port 1. Slot 2 starts are 10. The other number needed is I14. The data for the port start at that point (I14). The previous four bytes represents Port Status, Process Data In Size, and Process Data Out Size.

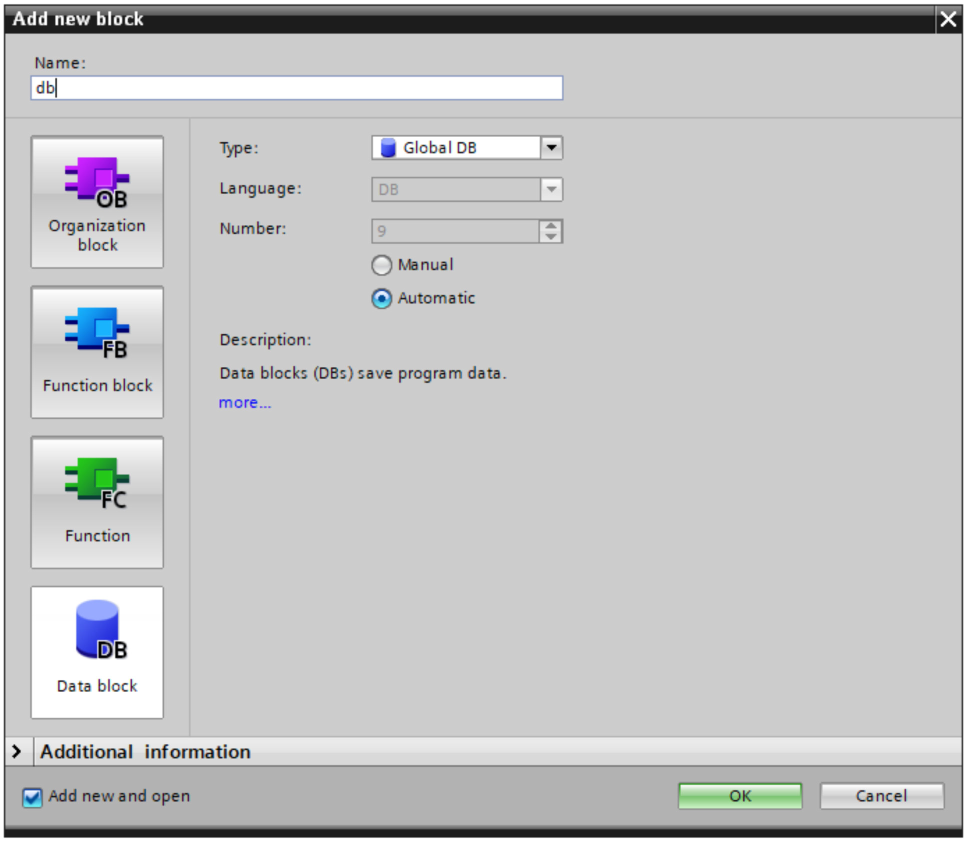
Module	Rack	Slot	I address	Q address	Type
dxm	0	0			1-port Device
Interface	0	0 X1			dxm
Banner IO-Link Master Info_1	0	1	1...9		Banner IO-Link Master Info
IO-Link In/Out 8/ 8 Byte + Status_1	0	2	10...21	1...22	IO-Link In/Out 8/ 8 Byte + Status



4. Drag the Banner_T30RKU_PDI, Banner_T30RKU_PDI0, Banner_T30RKU_PDI1, Banner_T30RKU_PDI2, and Banner_T30RKU_PDIraw to the PLC Data Types area under your PLC.
5. Drag the Banner_T30RKU_PD to the Program Blocks area.
6. Drag the necessary tag from Banner_Specialized_Data_Types. The tag used in this example is "Banner_8in". This tag represents the full raw process data along with port status information.
7. Go to PLC Tags. Create two tags. One tag is for the full data structure while the second creates a tag to represent the raw Process Data from the IO-Link Master. In this example, Tag table_1 was created, then the tag "T30RKU IOLM1 01 PDI" was created using a Data Type of "Banner_8In". 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. The "I" address found in step 3 is tied to this new tag. The second is "T30RKU IOLM1 01 inRaw" of the type "Banner_T30KRU_PDIraw". This is the tag that will be used in the Function block.

Name	Data type	Address
T30RKU IOLM1 01 PDI	"Banner_8In"	%I10.0
T30RKU IOLM1 01 iRaw	"Banner_T30RKU_PDIraw"	%I14.0

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



9. In the new data block, create a new tag to represent the parsed Process Data In for our T30RKU. The tag name again calls out the type of sensor, the IO-Link Master, and the port number. Use the data type "Banner_T30RKU_PDI" for the new tag.

10. Add the “Banner_T30RKU_PD” function to an OB ladder. Link the “PDIraw” raw process data variable from step 5. The tag name again calls out the type of device, IO-Link Master, and the port number. The “T30RKU PD” needs to be linked to the variable created in step 7. It was called “db”.”T30RKU IOLM1 01 PD” for this example.

    The last variable, “Process Data Layout”, allow 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 entries (see Fig. 1), or we can link this T30RKU Function to the T30RKU Data Function Block Data (see Fig. 2). See Appendix A for more information about LM Process Data.

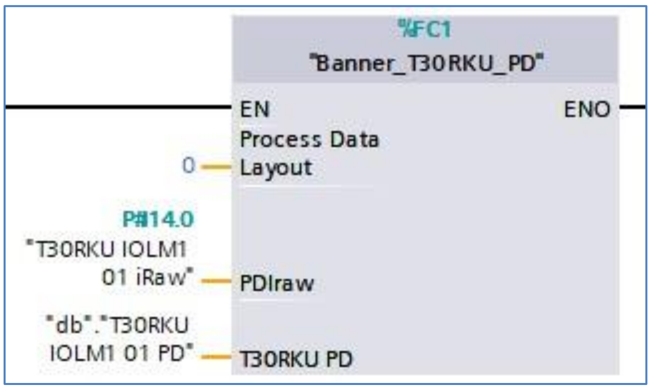


Figure 1: Hand typed correct numbers for Process Data Layout

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

Process Data Layout: the options here are “0” (Digital Measurement), “1” (Distance and Excess Gain), and “2” (Distance and Excess Gain with Binary Data). The default is “0”.

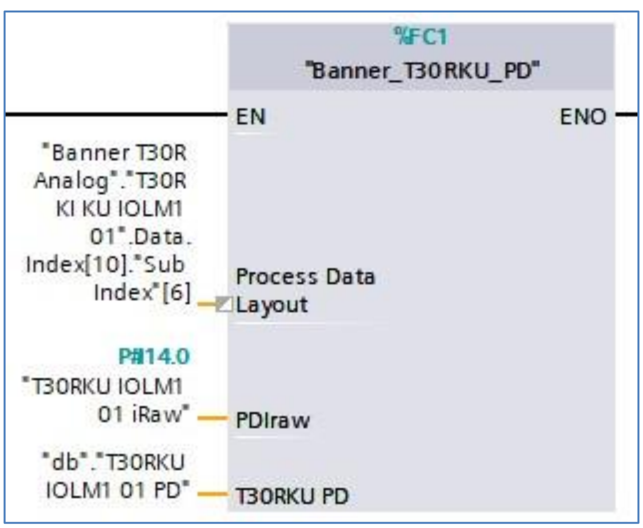
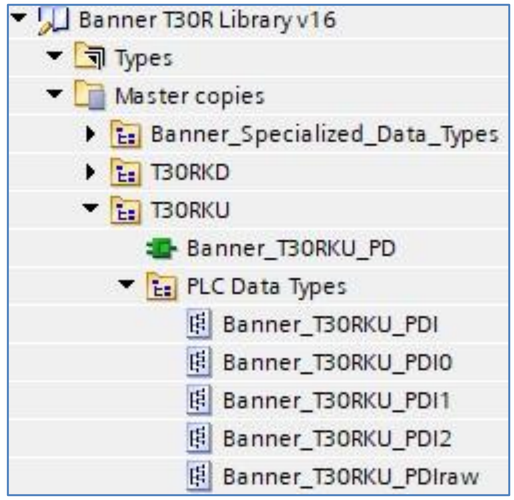


Figure 2: Linking Process Data Layout variable to T30RKU Parameter Data Function Block

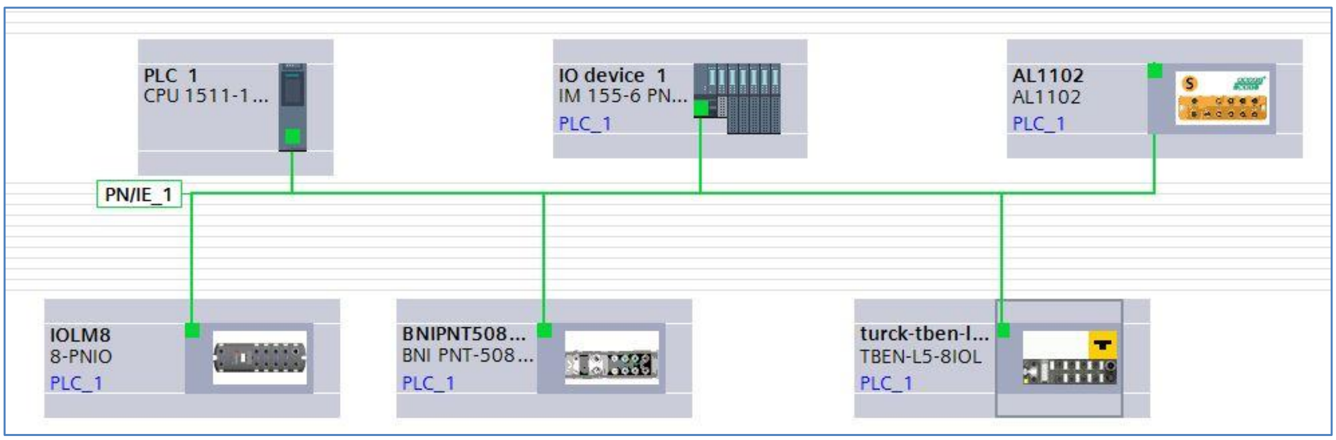
11. Process Data setup is complete.
12. Compile and download the configuration to the PLC, then go online. Open the “db” data block and click Monitor all. You should see parsed T30RKU Process Data In, like that shown below.

Name	Data type	Monitor value
▼ Static		
▶ IOLM1	"Banner_IOLM"	
▼ T30RKU IOLM1 01 PD	"Banner_T30RKU_PDI"	
▼ Set 0	"Banner_T30RKU_PDI0"	
Distance Measurement Value	UDInt	1870
Measurement Scale	UInt	253
Stability	Bool	TRUE
BDC1 State	Bool	TRUE
AO1 State	Bool	TRUE
▶ Set 1	"Banner_T30RKU_PDI1"	
▶ Set 2	"Banner_T30RKU_PDI2"	

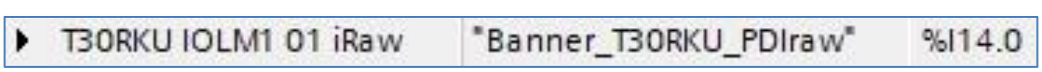
Setup of T30R Analog with other IO-Link Masters



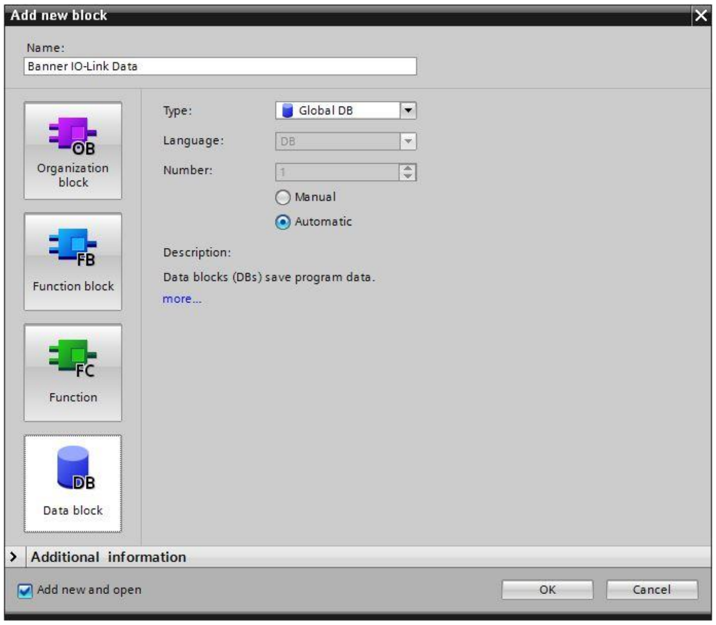
1. The Banner T30R Library will now be in the Global Library List. Expand the Master copies section. Open the T30RKU folder.
2. Drag Banner_T30RKU_PD to the Program Blocks area under your PLC.
3. Drag Banner_T30RKU_PDI, Banner_T30RKU_PDIraw, Banner_T30RKU_PDI0, Banner_T30RKU_PDI1, and Banner_T30RKU_PDI2 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 T30RKU requires 6 bytes of space for the Process Data In.
6. Record the "I" address where this T30RKU Process Data In is to be stored, as the address will be required in the next step. In this example, 6 bytes of Process Data In for port 5 on the IO-Link Master will be stored in I2 through I7.
7. Go to PLC Tags. Add a new tag table, then create a new tag to represent the raw Process Data from the IO-Link Master. In this example, Tag table_1 was created, then the tag "T30RKU IOLM2 04 PDI" was created using the custom Data Type of "Banner_T30RKU_PDIraw". 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 IOLM1 or IOLM3, for instance, and other specific sensors may be connected to different port numbers. The "I" address found in step 6 is tied to this new tag.



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 our T30RKU. The tag name again calls out the type of sensor, the IO-Link Master, and the port number. Use the data type “Banner_T30RKU_PDI” for the new tag.

10. Add the "Banner_T30RKU_PD" function to an OB ladder. Link the "PDIraw" raw process data variable from step 7. The tag name again calls out the type of device, IO-Link Master, and the port number. The "T30RKU PD" needs to be linked to the variable created in step 9. It was called "db"."T30RKU IOLM1 01 PD" for this example.

    The last variable, "Process Data Layout", allow 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 entries (see Fig. 1), or we can link this T30RKU Function to the T30RKU Data Function Block Data (see Fig. 2). See Appendix A for more information about LM Process Data.

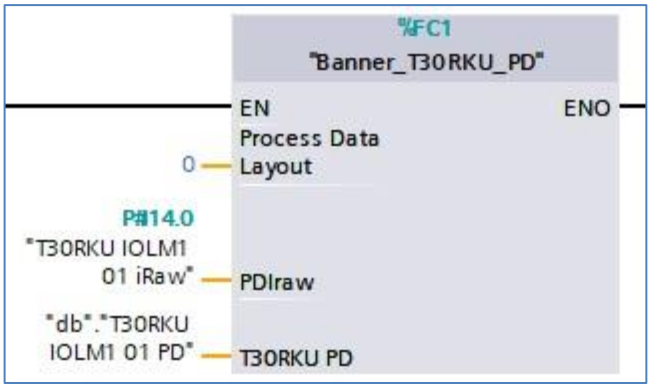


Figure 3: Hand typed correct numbers for Process Data Layout

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

Process Data Layout: the options here are "0" (Digital Measurement), "1" (Distance and Excess Gain), and "2" (Distance and Excess Gain with Binary Data). The default is "0".

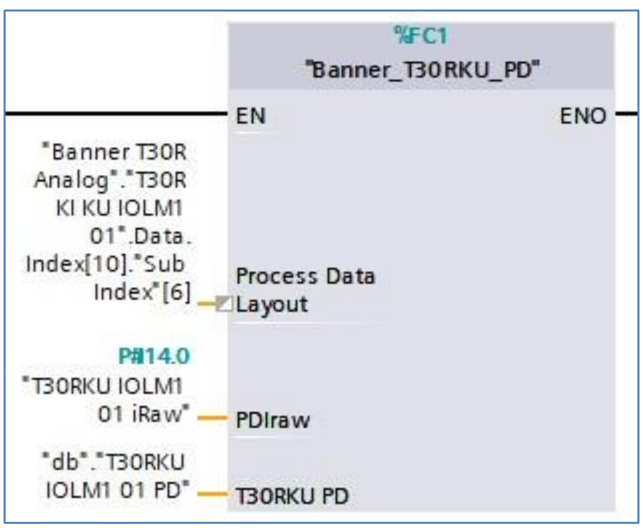


Figure 4: Linking Process Data Layout variable to T30RKU Parameter Data Function Block

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. You should see parsed T30RKU Process Data In, like that shown below.

Banner IO-Link Data

	Name	Data type	Start value	Monitor value
1	Static			
2	T30RKU IOLM2 Port 4	"Banner_T30RKU_PDI"		
3	Set 0	"Banner_T30RKU_PDI0"		
4	Distance Measurement Value	UDInt	0	5641
5	Measurement Scale	UInt	0	1
6	Stability	Bool	false	FALSE
7	BDC1 State	Bool	false	TRUE
8	AO1 State	Bool	false	TRUE
9	Set 1	"Banner_T30RKU_PDI1"		
10	Set 2	"Banner_T30RKU_PDI2"		

Appendix A T30RKU Process Data

The T30RKU Analog has 6 bytes of Process Data In, as shown below. There are three modes for this Process Data In, called: Digital Measurement Sensor (mode 0, the default), Distance and Excess Gain (mode 1), and Distance and Excess Gain with Binary Data (mode 2). The default mode, Digital Measurement Sensor, is shown first. In this mode, the Process Data In includes the distance measurement value, the measurement scale, the stability indicator, the state of discrete output 1, and the state of analog output 1.

ProcessDataIn "Process Data Input" id=PD_ProcessDataInMeasurement

bit length: 48
data type: 48-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	16	32-bit Integer						Distance Measurement Value	Process Data Distance Measurement
2	8	8-bit Integer						Measurement Scale	The measurement device scale
3	2	Boolean	false = No Target or Marginal, true = Valid					Stability	Stability State
4	1	Boolean	false = Inactive, true = Active					BDC1 State	BDC1 State
5	0	Boolean	false = Inactive, true = Active					AO1 State	AO1 State

Figure 5: PDI Mode 0, " Digital Measurement Sensor "

This Process Data is mapped to a specific group of PROFINET addresses. The 48-bits of Process Data In encode five separate pieces of information.

This function intelligently parses this Process Data into its component pieces.

The "Distance and Excess Gain" mode for the T30RKU Process Data In is shown below.

ProcessDataIn "Process Data Input" id=PD_ProcessDataInDistanceAmplitude

bit length: 48
data type: 48-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	16	32-bit Integer						Distance Measurement Value	Process Data Distance Measurement
2	0	16-bit UInteger						Excess Gain Measurement Value	Process Data Excess Gain Measurement

Figure 2: PDI Mode 1, " Distance and Excess Gain "

The “Distance and Excess Gain with Binary Data” mode for the T30RKU Process Data In is shown below.

ProcessDataIn "Process Data In" id=PD_ProcessDataInMeasurement

bit length: 32
data type: 32-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	16	16-bit Integer						Measurement Value	The measurement device value
2	8	8-bit Integer						Measurement Scale	The measurement device scale
3	2	Boolean	false = No target or Marginal, true = Stable					Stability	Stability state
4	1	Boolean	false = Inactive, true = Active					Channel 2 Output State	Channel 2 Output State
5	0	Boolean	false = Inactive, true = Active					Channel 1 Output State	Channel 1 Output State

Figure 3: PDI Mode 2, "Distance and Excess Gain with Binary Data"