

QS18 CV D DV E EV FP LP RV R Process Data Function

October 1st, 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 QS18 CV D DV E EV FP LP R or RV sensor via an IO-Link Master to a Siemens PLC. The function covers parsing and display of the QS18 sensor Process Data In.

Components

Banner QS18 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.



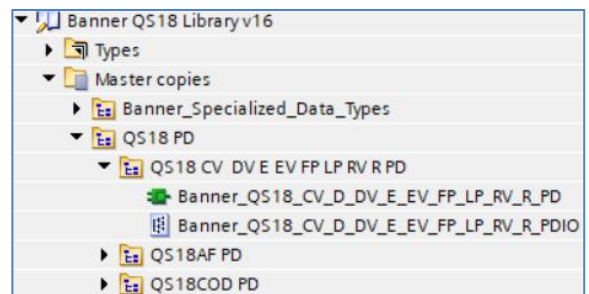
3. Switch the “Files of type” to Compressed libraries. Go to the location of the compressed library.
4. Press the Open button and the library will be uncompressed and opened.
5. The library is now accessible in the Libraries tab in v16 or greater.

Setup of QS18 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 4/4 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 1. The other number needed is %I5. 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	264...272		Banner IO-Link Master Info
IO-Link In/Out 4/ 4 Byte + Status_1	0	2	1...8	1...18	IO-Link In/Out 4/ 4 Byte + S

4. Drag the Banner_QS18_CV_D_DV_E_EV_FP_LP_RV_R_PDIO to the PLC Data Types area under your PLC. Drag the Banner_QS18_CV_D_DV_E_EV_FP_LP_RV_R_PD to the Program Blocks area.
5. Drag the necessary tags from Banner_Specialized_Data_Types. The tags used in this example is "Banner_4in" and "Banner_4out". This tag represents the full raw process data along with port status information.
6. Go to PLC Tags. Create four tags. Two of the tags are for the full data structure while the second set represents the raw Process Data from the IO-Link Master. In this example, Tag table_1 was created, the tags "QS18 IOLM1 01 PDI" and "QS18 IOLM1 01 PDO" was created using a Data Type of "Banner_4In" and "Banner_4Out". 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 2 is tied to this new tag. The second set of tags use "QS18 IOLM1 01 inRaw" and "QS18 IOLM1 01 outRaw". These are the tags that will be used in the Function block.



Name	Data type	Address
▶ QS18 IOLM1 01 PDI	"Banner_4In"	%I1.0
▶ QS18 IOLM1 01 PDO	"Banner_4Out"	%Q1.0
QS18 IOLM1 01 inRaw	UDInt	%ID4
QS18 IOLM1 01 outRaw	USInt	%QB3

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 In and Out for our QS18. The tag name again calls out the type of sensor, the IO-Link Master, and the port number. Use the data type “Banner_QS18_CV_D_DV_E_EV_FP_LP_RV_R_PDIO” for the new tag.

▼ QS18 IOLM1 01 PD	"Banner_QS18_CV_D_DV_E_EV_FP_LP_RV_R_PDIO"
■ Output State	Bool
■ Health State	Bool
■ Marginal Light State	Bool
■ Marginal Dark State	Bool
■ Normalized Signal Strength	UInt
■ Signal	UInt
■ Count	UInt
■ Duration	UInt
■ Events per Minute	UInt
■ EmitterLED	Bool

9. Add the “Banner_QS18_CV_D_DV_E_EV_FP_LP_RV_R_PD” function to an OB ladder. Link the “Process Data In” and the “Process Data Out” to the raw process data variable from step 6. The tag name again calls out the type of device, IO-Link Master, and the port number. The “QS18 Process Data” needs to be linked to the variable created in step 8. It was called “db.” “QS18 IOLM1 01 PD” for this example.

The last variable, “PDI Config”, allow the function to correctly interpret the Process Data. In the case of QS18. This function needs to know what choice has been made in QS18 for this Operational Mode variable.

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 QS18 Function to the QS18 Data Function Block (see Fig. 2). See Appendix A for more information about QS18 Process Data.

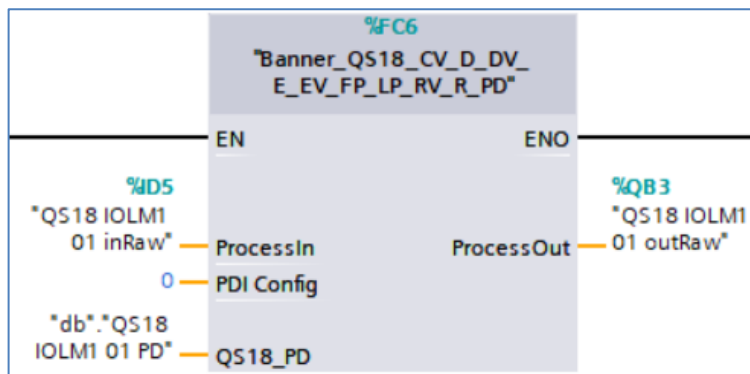


Figure 1: Hand typed correct numbers for PDI Config

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

PDI Config: the options here are “0” (Standard Five and Signal), “1” (Standard Five and Count), “2” (Standard Five and Duration), and “3” (Standard Five and Events Per Minute). The default is “0”.

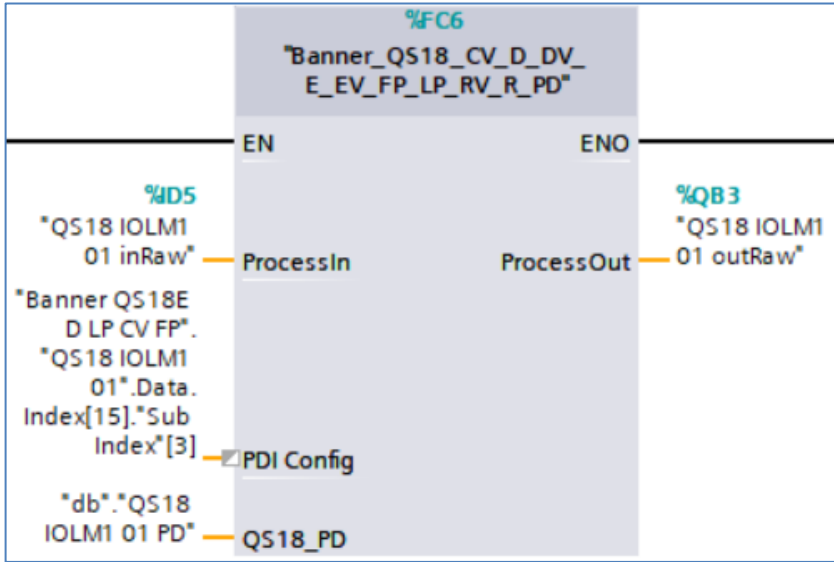
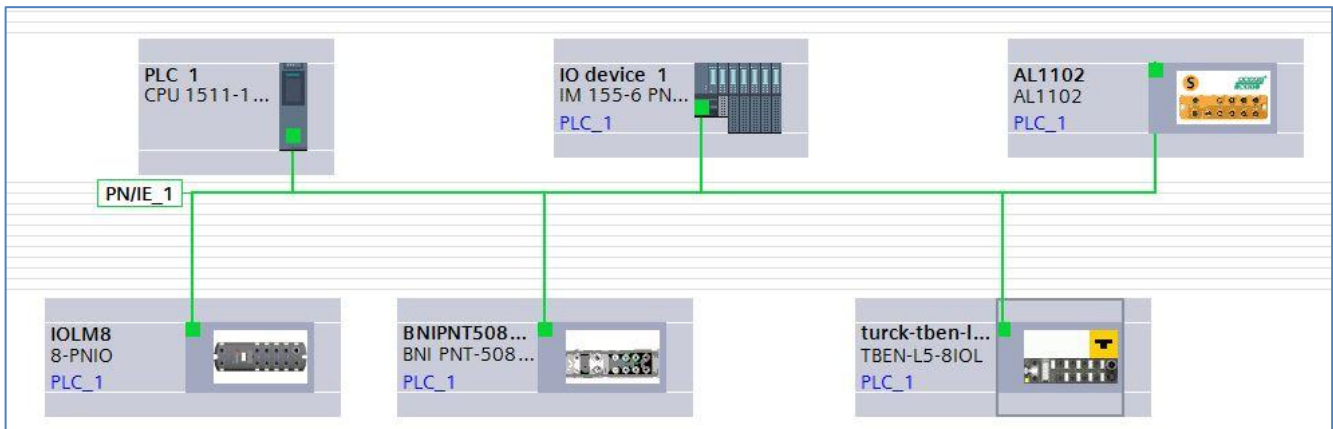
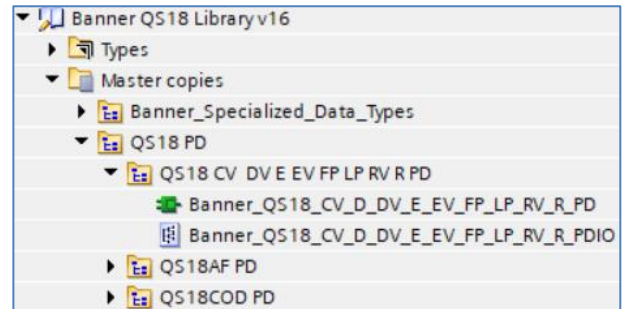


Figure 2: PDI Config variable to QS18 Parameter Data Function Block

- 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 “QS18 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 QS18 Process Data In, shown below.

Setup of QS18 with other IO-Link Masters

1. The Banner QS18 Library will now be in the Global Library List. Expand the Master copies section.
2. Drag Banner_QS18_CV_D_DV_E_EV_FP_LP_RV_R_PD to the Program Blocks area under your PLC.
3. Drag the Banner_QS18_CV_D_DV_E_EV_FP_LP_RV_R_PDIO 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.



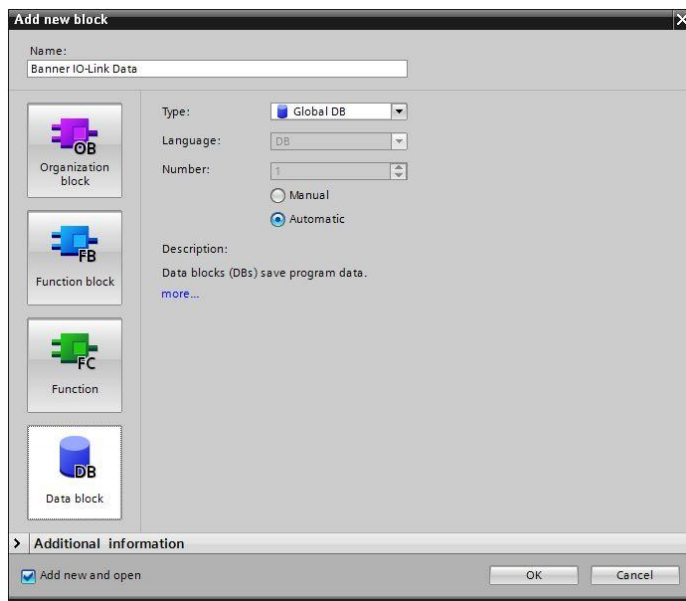
5. Click on the relevant device and configure the IO-Link Master as necessary. Refer to the documentation for the IO-Link Master. Recall that a QS18 requires 4 bytes of space for the Process Data In and 1 byte of space for the Process Data Out.
6. Record the "I" and "Q" addresses where this QS18 Process Data In and Out are to be stored, as these addresses will be required in the next step. In this example, 4 bytes of Process Data In for port 6 on the IO-Link Master will be stored starting in I5. The 1 byte of Process Data Out will be stored at "Q3". In the case of the opposed mode QS18, the PDI is linked to the receiver while the PDO is linked to the emitter.

7. Go to PLC Tags. If desired, add a new tag table, then create a new tag to represent the raw Process Data from the IO-Link Master. The QS18 has both Process Data In and Process Data Out. In this example, the tag “QS18 IOLM1 01 inRaw” was created using a Data Type of “UDInt”. 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 IOLM2, 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. Similarly, a new tag is created for the raw Process Data Out. This one is just a single byte, and we used the name “QS18 IOLM1 01 outRaw”. The “Q” address is from step 6.

QS18 IOLM1 01 inRaw	UDInt	%ID5
QS18 IOLM1 01 outRaw	USInt	%QB3

For the QS18 E or EV opposed mode setup, the PDI is linked to the receiver sensor and the PDO is linked to the emitter.

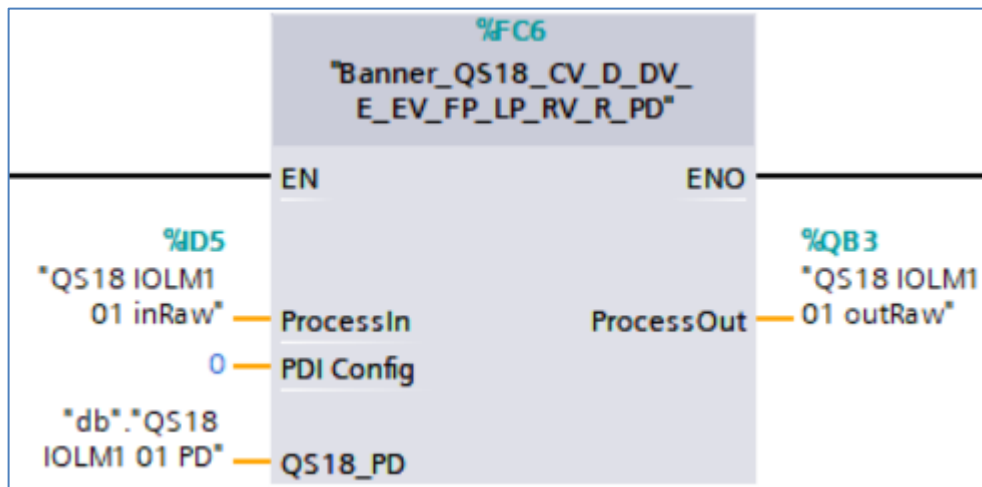
8. Go to Program blocks. Add a new Data block if necessary. In this example the new data block is named “Banner IO-Link Data”.



9. In the new data block, create a new tag to represent the parsed Process Data (In and Out) for our QS18. The tag name again calls out the type of sensor, the IO-Link Master, and the port number. Use the data type “Banner_QS18_CV_D_DV_E_EV_FP_LP_RV_R_PDIO” for the new tag.

▼ QS18 IOLM1 01 PD		"Banner_QS18_CV_D_DV_E_EV_FP_LP_RV_R_PDIO"
■	Output State	Bool
■	Health State	Bool
■	Marginal Light State	Bool
■	Marginal Dark State	Bool
■	Normalized Signal Strength	UInt
■	Signal	UInt
■	Count	UInt
■	Duration	UInt
■	Events per Minute	UInt
■	EmitterLED	Bool

10. Add the “Banner_QS18_CV_D_DV_E_EV_FP_LP_RV_R_PD” function to an OB ladder. Link the “ProcessIn” to the raw Process Data In variable from step 7. PDI Config is set based on the Process Data Input selection. This can be a constant or a user-controlled variable. See Appendix A. Link the “ProcessOut” to the raw Process Data Out variable from step 7. Link the function to the parsed Process Data variable from step 9. The first example below shows a single QS18 sensor.



Remember if setting up an opposed mode system the PDO is linked to the Emitter out data, while the PDI is linked to the Receiver input data.

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 QS18 Process Data In.