

R95C 4B4UI Process Data Function

January 12th, 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 to a Banner R95C 4B4UI light via an IO-Link Master from Siemens PLC. The function covers parsing and display of the R95C 4B4UI sensor Process Data.

Components

Banner R90C R95C R130C Hubs v16.zal16

There are two methods for 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 manufacturers' 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.



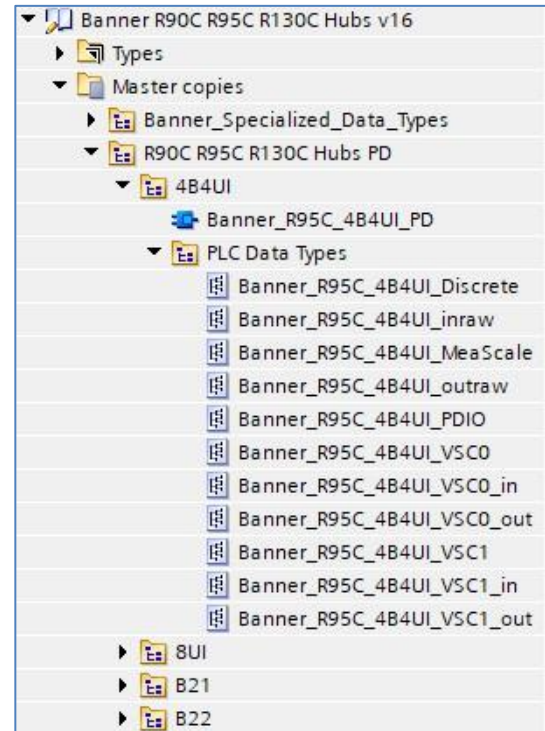
3. Switch the “Files of type” to Compressed libraries. Go to the location of the compressed library.
4. Press the Open button and the library will be uncompressed and opened.
5. The library is now accessible in the Libraries tab in v16 or greater.

Setup of R95C 4B4UI 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 32/32 byte is required for R95C 4B4UI. Make note of the I and Q address for Slot 2 which represents Port 1 (%I10 & %Q1).

IO-Link In/Out 32/32 Byte + Status_1	0	2	10...45	1...46	IO-Link In/Out 32/32 Byte + Status
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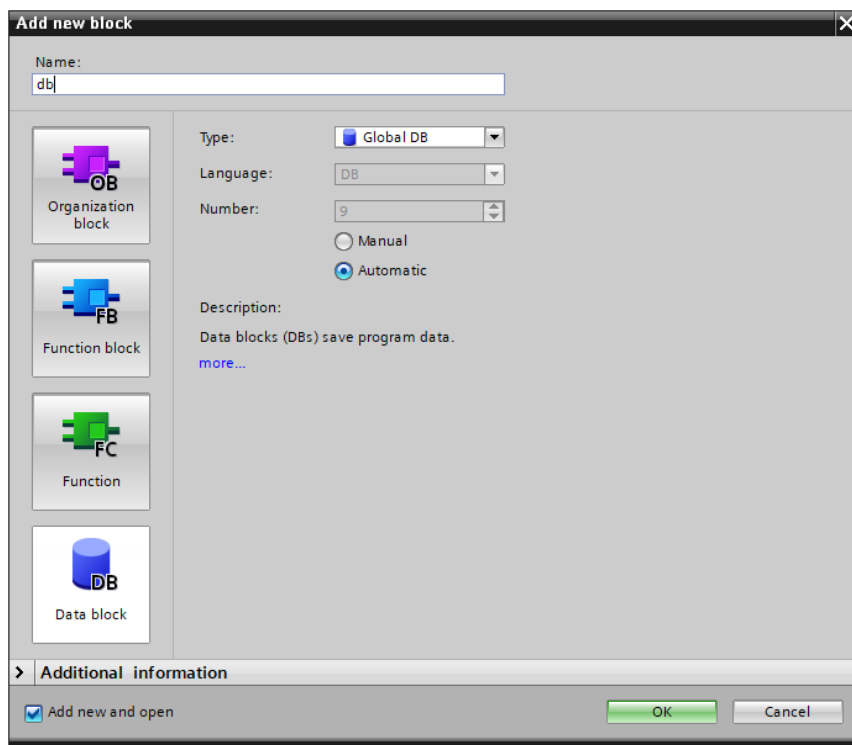
4. Drag the necessary tag from Banner_Specialized_Data_Types. The tag used in this example is "Banner_32In" and "Banner_32out". These tags represent the full raw process data along with port information.
5. Drag the necessary files from the 4B4UI Folder under the R90C R95C R130C Hubs PD folder.
 - a. Move Banner_R95C_4B4UI_Discrete, Banner_R95C_4B4UI_inraw, Banner_R95C_4B4UI_MeaScale, Banner_R95C_4B4UI_outraw, Banner_R95C_4B4UI_PDIO, Banner_R95C_4B4UI_VSC0, Banner_R95C_4B4UI_VSC0_in, Banner_R95C_4B4UI_VSC0_out, Banner_R95C_4B4UI_VSC1, Banner_R95C_4B4UI_VSC1_in, and Banner_R95C_4B4UI_VSC1_out to the PLC Data Types area.
 - b. Move Banner_R95C_4B4UI_PD to the Program Blocks area.



6. Go to PLC Tags. Create four tags. Two tags are for the full data structure while the second set is a tag to represent the raw Process Data from the IO-Link Master. In this example, Tag table_1 was created, then the tag "R95C 4B4UI IOLM1 01 PDI" was created using a Data Type of "Banner_32In", while the "R95C 4B4UI IOLM1 01 PDO" created with Data Type of "Banner_32Out". This naming convention calls out the type of device 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" and "Q" address found in step 3 (%I10 & %Q2) is tied to these tags. The second set created are "R95C 4B4UI IOLM1 01 inRaw" and "R95C 4B4UI IOLM1 01 outRaw". Link inRaw tag to the "I" address found in step 3 plus 4 (%I14) and the outRaw tag to the "Q" address found in step 3 plus 2(%Q4).

Name	Data type	Address
▶ R95C 4B4UI IOLM1 01 PDI	"Banner_32In"	%I10.0
▶ R95C 4B4UI IOLM1 01 inRaw	"Banner_R95C_4B4UI_inraw"	%I14.0
▶ R94C 4B4UI IOLM1 01 PDO	"Banner_32Out"	%Q2.0
▶ R95C 4B4UI IOLM1 01 outRaw	"Banner_R95C_4B4UI_outraw"	%Q4.0

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 In for our R95C 4B4UI. The tag name again calls out the type of sensor, the IO-Link Master, and the port number. Use the data type "Banner_R95C_4B4UI_PDIO" for the new tag.

▼ R95C 8UI IOLM1 01 PD	"Banner_R95C_4B4UI_PDIO"
■ ▶ 0-Analog Value	"Banner_R95C_4B4UI_VSC0"
■ ▶ 1-Digital Measuring Sensor	"Banner_R95C_4B4UI_VSC1"

9. Add the “Banner_R95C_4B4UI_PD” function to an OB ladder. Link the “PDI” to the tag “R95C 4B4UI IOLM1 01 inRaw” created from step 6. Link “R95C 4B4UI PD” to the tag “db.R95C 4B4UI IOLM1 01 PD” created from step 8.

The last variable, “PDI Config”, allows the function to correctly interpret the Process Data In. In the case of the R95C 4B4UI, there are two user-selected modes for the Process Data Out. This function needs to know what choice has been made in the R95C 4B4UI for this PDI Config variable.

There are two ways to achieve this goal. We can simply type in the correct number for Operational Mode (see Fig. 1), or we can link this R95C 4B4UI Process Data Function to the R95C 4B4UI Parameter Data Function Block (see Fig. 2). See Appendix A for more information about R95C 4B4UI Process Data Out.

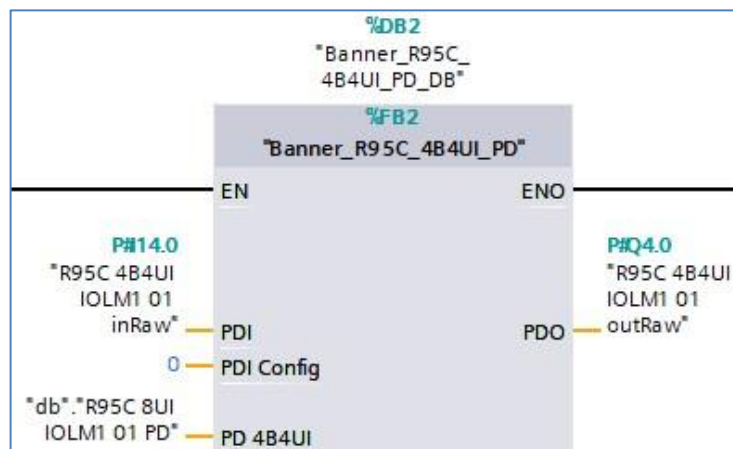


Figure 1: Hand type correct number for Operational Mode

NOTE: if you type in the incorrect number (i.e. it does not match the display module, R95C 4B4UI, current Operational Mode configuration) you will get incorrectly displayed Process Data Out information.

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

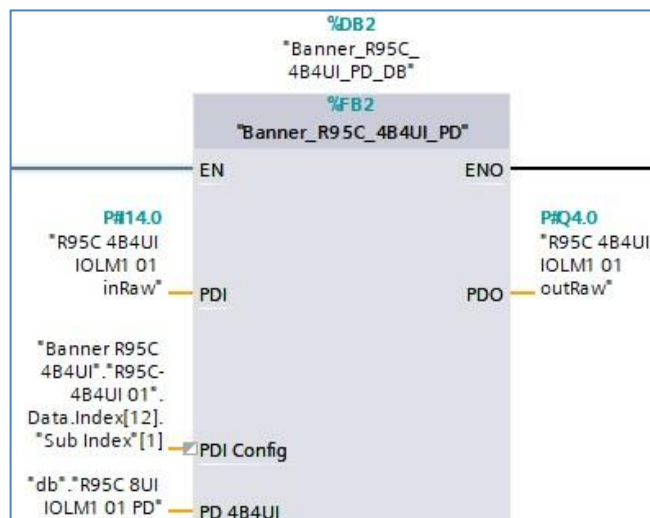
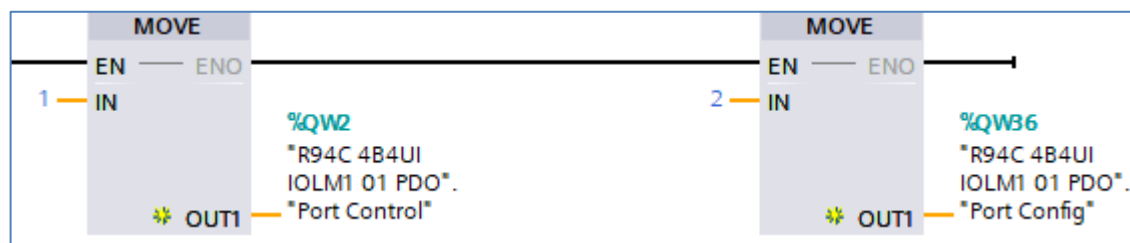


Figure 2: Linking PDI Config variable to R95C Parameter Data Function Block

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 "R95C 4B4UI IOLM1 01 PDO".

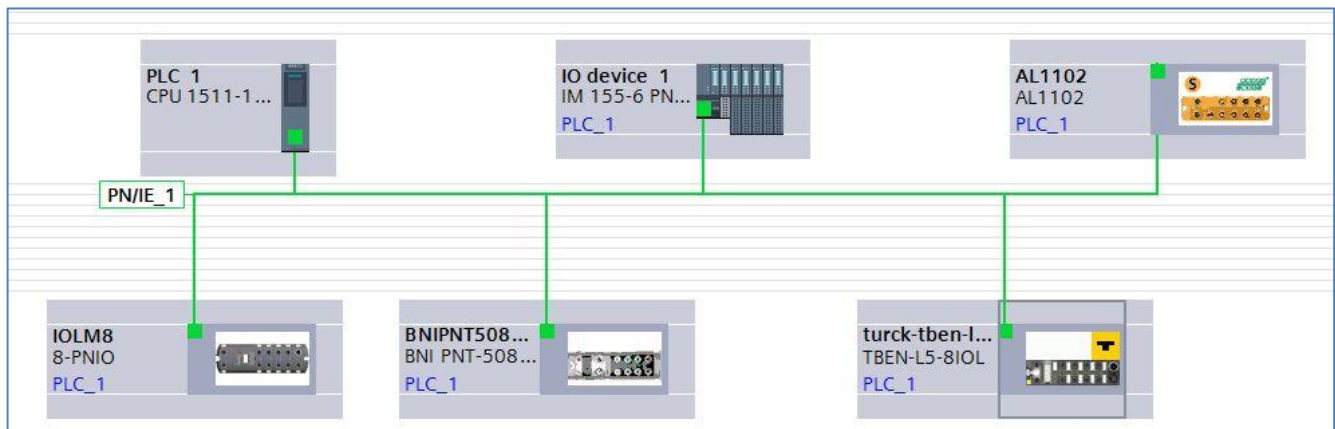
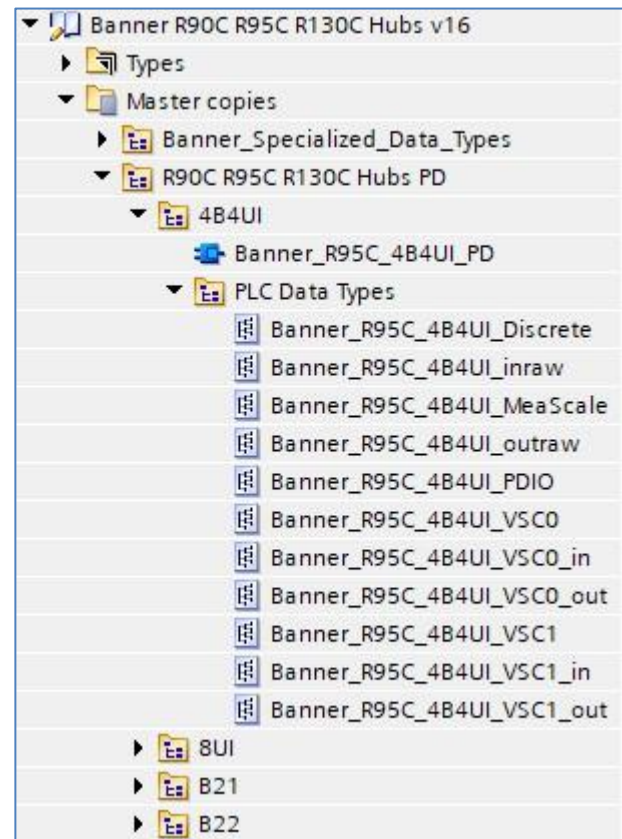


11. Process Data setup is complete.
12. Compile and download the configuration to the PLC, then go online. Open the "db" data block and click Monitor all. You can now control the R95C 4B4UI via the data located here.

▼ R95C 8UI IOLM1 01 PD	"Banner_R95C_4B4UI_PDIO"	
■ ▼ 0-Analog Value	"Banner_R95C_4B4UI_VSC0"	
■ ▼ PDI	"Banner_R95C_4B4UI_VSC0_in"	
■ ▼ Port State	Array[1..4] of "Banner_R95C_4B4UI_Discrete"	
■ ▶ Port State[1]	"Banner_R95C_4B4UI_Discrete"	
■ ▼ Port State[2]	"Banner_R95C_4B4UI_Discrete"	
■ Discrete1	Bool	TRUE
■ Discrete2	Bool	FALSE
■ ▶ Port State[3]	"Banner_R95C_4B4UI_Discrete"	
■ ▶ Port State[4]	"Banner_R95C_4B4UI_Discrete"	
■ ▼ Measurement	Array[1..4] of DInt	
■ Measurement[1]	DInt	0
■ Measurement[2]	DInt	15
■ Measurement[3]	DInt	0
■ Measurement[4]	DInt	0
■ ▼ Analog	Array[5..8] of DInt	
■ Analog[5]	DInt	12542
■ Analog[6]	DInt	11
■ Analog[7]	DInt	14
■ Analog[8]	DInt	13
■ ▼ PDO	"Banner_R95C_4B4UI_VSC0_out"	
■ ▶ Port State	Array[1..4] of "Banner_R95C_4B4UI_Discrete"	
■ ▶ Analog	Array[5..8] of DInt	
■ ▶ 1-Digital Measuring Sensor	"Banner_R95C_4B4UI_VSC1"	

Setup of R95C 4B4UI with other IO-Link Masters

1. The Banner R95C Hubs Library will now be in the Global Library List. Expand the Master copies section.
2. Drag Banner_R95C_4B4UI_PD to the Program Blocks area under your PLC.
3. Move Banner_R95C_4B4UI_Discrete, Banner_R95C_4B4UI_inraw, Banner_R95C_4B4UI_MeaScale, Banner_R95C_4B4UI_outraw, Banner_R95C_4B4UI_PDIO, Banner_R95C_4B4UI_VSC0, Banner_R95C_4B4UI_VSC0_in, Banner_R95C_4B4UI_VSC0_out, Banner_R95C_4B4UI_VSC1, Banner_R95C_4B4UI_VSC1_in, and Banner_R95C_4B4UI_VSC1_out to the PLC Data Types area.
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.

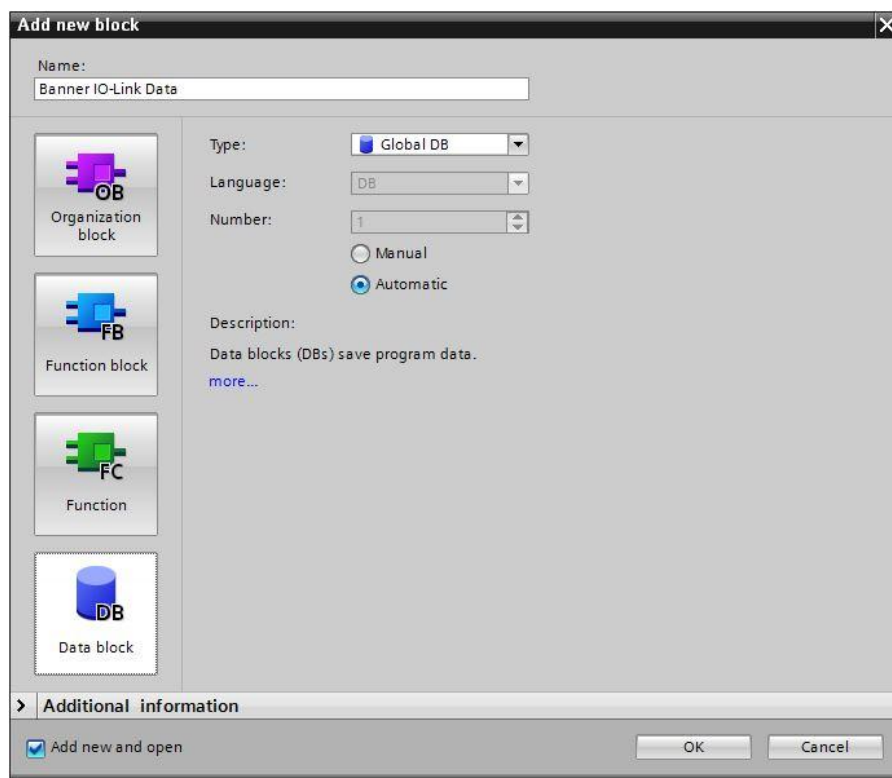


5. Click on the relevant device and configure the IO-Link Master as necessary. Refer to the documentation for the IO-Link Master. Recall that a R95C requires 29 bytes of space for the Process Data In and 9 bytes of space for the Process Data Out.
6. Record the "I" and "Q" address where this R95C Process Data is to be stored, as the address will be required in the next step. In this example, 32 bytes of Process Data In for port 1 on the IO-Link Master will be stored starting at I68 while the Process Data out starts at Q68.

7. Go to PLC Tags. Add a new tag table, then create a new tag to represent the raw Process Data to be sent to the IO-Link Master. In this example, Tag table_1 was created, then the tag “R95C 4B4UI IOLM1 01 inRaw” was created using a Data Type of “Banner_R95C_4B4UI_inraw”. Also create a tag for the outputs called “R95C 4B4UI IOLM1 01 outRaw” was created using a Data Type of “Banner_R95C_4B4UI_outraw”. 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. Reference IO-Link Documentation for addressing. This example uses %I68 and %Q68.

▶ R95C 4B4UI IOLM1 01 inRaw	"Banner_R95C_4B4UI_inraw"	%I68.0
▶ R95C 4B4UI IOLM1 01 outRaw	"Banner_R95C_4B4UI_outraw"	%Q68.0

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 In for our R95C 4B4UI. The tag name again calls out the type of sensor, the IO-Link Master, and the port number. Use the data type “Banner_R95C_4B4UI_PDIO” for the new tag.

▼ R95C 8UI IOLM1 01 PD	*Banner_R95C_4B4UI_PDIO*
■ ▶ 0-Analog Value	*Banner_R95C_4B4UI_VSC0*
■ ▶ 1-Digital Measuring Sensor	*Banner_R95C_4B4UI_VSC1*

Add the “Banner_R95C_4B4UI_PD” function to an OB ladder. Link the “PDI” to the raw Process Data variable from step 7. Link “R95C 4B4UI PD” to the parsed Process Data variable from step 9.

The last variable, “PDI Config”, allow the function to correctly interpret the Process Data In. In the case of the R95C 4B4UI, there are four user-selected modes for the Process Data In. This function needs to know what choice has been made in the R95C 4B4UI for this “PDI Config” variable.

There are two ways to achieve this goal. We can simply type in the correct number for “PDI Config” (see Fig. 3), or we can link this R95C 4B4UI Process Data Function to the R95C 4B4UI Parameter Data Function Block (see Fig. 4). See Appendix A for more information about R95C 4B4UI Process Data.

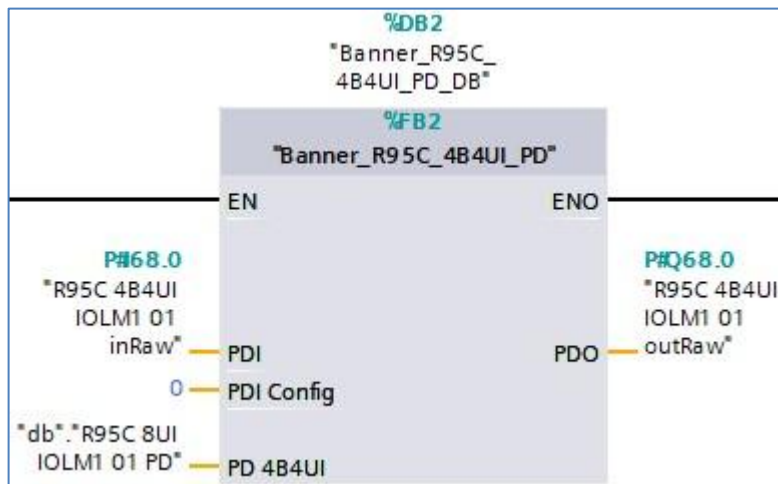


Figure 3: Hand type correct number for Operational Mode

NOTE: if you type in the incorrect number (i.e. it does not match the display module, R95C 4B4UI, current Operational Mode configuration) you will get incorrectly displayed Process Data information.

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

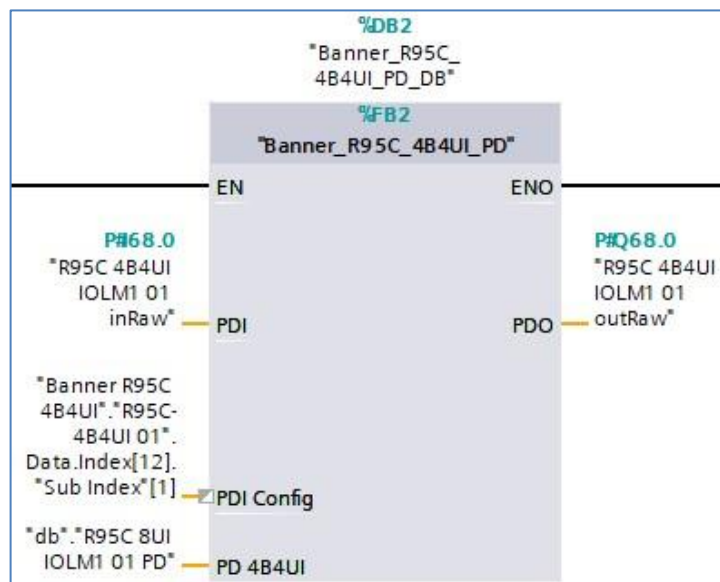


Figure 4: Linking Operational Mode variable to SD50 Parameter Data Function Block

10. Process Data setup is complete.
11. 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 R95C 4B4UI Process Data In, like that shown below.

▼ R95C 8UI IOLM1 01 PD	*Banner_R95C_4B4UI_PDIO*	
■ ▼ 0-Analog Value	*Banner_R95C_4B4UI_VSCO*	
■ ▼ PDI	*Banner_R95C_4B4UI_VSCO_in*	
■ ▼ Port State	Array[1..4] of *Banner_R95C_4B4UI_Discrete*	
■ ► Port State[1]	*Banner_R95C_4B4UI_Discrete*	
■ ▼ Port State[2]	*Banner_R95C_4B4UI_Discrete*	
■ Discrete1	Bool	TRUE
■ Discrete2	Bool	FALSE
■ ► Port State[3]	*Banner_R95C_4B4UI_Discrete*	
■ ► Port State[4]	*Banner_R95C_4B4UI_Discrete*	
■ ▼ Measurement	Array[1..4] of DInt	
■ Measurement[1]	DInt	0
■ Measurement[2]	DInt	15
■ Measurement[3]	DInt	0
■ Measurement[4]	DInt	0
■ ▼ Analog	Array[5..8] of DInt	
■ Analog[5]	DInt	12542
■ Analog[6]	DInt	11
■ Analog[7]	DInt	14
■ Analog[8]	DInt	13
■ ▼ PDO	*Banner_R95C_4B4UI_VSCO_out*	
■ ► Port State	Array[1..4] of *Banner_R95C_4B4UI_Discrete*	
■ ► Analog	Array[5..8] of DInt	
■ ► 1-Digital Measuring Sensor	*Banner_R95C_4B4UI_VSC1*	

Figure 5: Analog Value Mode Process Data Out (Operational Mode = 0)

Appendix A

R95C 4B4UI Process Data Out

The R95C 4B4UI has 29 bytes of Process Data In and 9 bytes of Process Data Out, mapped into 2 different modes, as shown below.

First is Analog Value (mode 0).

ProcessDataIn "Process Data Input" id=PD_ProcessDataIn									
bit length: 232 data type: 232-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	0	Boolean	false = Inactive, true = Active					Port1 Discrete1 Input State	true (1) = Discrete1 Input Active. Note - even if Discrete1 is configured as an output, the active state will be reflected at the input
2	1	Boolean	false = Inactive, true = Active					Port1 Discrete2 Input State	true (1) = Discrete2 Input Active. Note - even if Discrete2 is configured as an output, the active state will be reflected at the input
3	2	Boolean	false = Inactive, true = Active					Port2 Discrete1 Input State	true (1) = Discrete1 Input Active. Note - even if Discrete1 is configured as an output, the active state will be reflected at the input
4	3	Boolean	false = Inactive, true = Active					Port2 Discrete2 Input State	true (1) = Discrete2 Input Active. Note - even if Discrete2 is configured as an output, the active state will be reflected at the input
5	4	Boolean	false = Inactive, true = Active					Port3 Discrete1 Input State	true (1) = Discrete1 Input Active. Note - even if Discrete1 is configured as an output, the active state will be reflected at the input
6	5	Boolean	false = Inactive, true = Active					Port3 Discrete2 Input State	true (1) = Discrete2 Input Active. Note - even if Discrete2 is configured as an output, the active state will be reflected at the input
7	6	Boolean	false = Inactive, true = Active					Port4 Discrete1 Input State	true (1) = Discrete1 Input Active. Note - even if Discrete1 is configured as an output, the active state will be reflected at the input
8	7	Boolean	false = Inactive, true = Active					Port4 Discrete2 Input State	true (1) = Discrete2 Input Active. Note - even if Discrete2 is configured as an output, the active state will be reflected at the input
9	8	32-bit Integer						Process Data Measurement 1	Process Data Measurement 1 Value
10	40	32-bit Integer						Process Data Measurement 2	Process Data Measurement 2 Value
11	72	32-bit Integer						Process Data Measurement 3	Process Data Measurement 3 Value
12	104	32-bit Integer						Process Data Measurement 4	Process Data Measurement 4 Value
13	136	24-bit Integer						Measurement Value - Analog in 1	If The Mode of Analog In = Voltage, Process Data Input = value*0.001V, If The Mode of Analog In = Current, Process Data Input = value*0.000001A
14	160	24-bit Integer						Measurement Value - Analog in 2	If The Mode of Analog In = Voltage, Process Data Input = value*0.001V, If The Mode of Analog In = Current, Process Data Input = value*0.000001A
15	184	24-bit Integer						Measurement Value - Analog in 3	If The Mode of Analog In = Voltage, Process Data Input = value*0.001V, If The Mode of Analog In = Current, Process Data Input = value*0.000001A
16	208	24-bit Integer						Measurement Value - Analog in 4	If The Mode of Analog In = Voltage, Process Data Input = value*0.001V, If The Mode of Analog In = Current, Process Data Input = value*0.000001A

ProcessDataOut "Process Data Output" id=PD_ProcessDataOut

bit length: 72

data type: 72-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	0	Boolean	false = Off, true = On					Port1 Discrete1 Output State	true (1) = Discrete1 Output Active
2	1	Boolean	false = Off, true = On					Port1 Discrete2 Output State	true (1) = Discrete2 Output Active
3	2	Boolean	false = Off, true = On					Port2 Discrete1 Output State	true (1) = Discrete1 Output Active
4	3	Boolean	false = Off, true = On					Port2 Discrete2 Output State	true (1) = Discrete2 Output Active
5	4	Boolean	false = Off, true = On					Port3 Discrete1 Output State	true (1) = Discrete1 Output Active
6	5	Boolean	false = Off, true = On					Port3 Discrete2 Output State	true (1) = Discrete2 Output Active
7	6	Boolean	false = Off, true = On					Port4 Discrete1 Output State	true (1) = Discrete1 Output Active
8	7	Boolean	false = Off, true = On					Port4 Discrete2 Output State	true (1) = Discrete2 Output Active
9	8	16-bit Integer						Analog Out Value 1	If Voltage = Enter mV value, If Current = Enter uA value
10	24	16-bit Integer						Analog Out Value 2	If Voltage = Enter mV value, If Current = Enter uA value
11	40	16-bit Integer						Analog Out Value 3	If Voltage = Enter mV value, If Current = Enter uA value
12	56	16-bit Integer						Analog Out Value 4	If Voltage = Enter mV value, If Current = Enter uA value

Here is the information for Digital Measuring Sensor mode (mode 1).

ProcessDataIn "Process Data Input" id=PD_ProcessDataInDMS									
bit length: 232 data type: 232-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	0	Boolean	false = Inactive, true = Active					Port1 Discrete1 Input State	true (1) = Discrete1 Input Active. Note - even if Discrete1 is configured as an output, the active state will be reflected at the input
2	1	Boolean	false = Inactive, true = Active					Port1 Discrete2 Input State	true (1) = Discrete2 Input Active. Note - even if Discrete2 is configured as an output, the active state will be reflected at the input
3	2	Boolean	false = Inactive, true = Active					Port2 Discrete1 Input State	true (1) = Discrete1 Input Active. Note - even if Discrete1 is configured as an output, the active state will be reflected at the input
4	3	Boolean	false = Inactive, true = Active					Port2 Discrete2 Input State	true (1) = Discrete2 Input Active. Note - even if Discrete2 is configured as an output, the active state will be reflected at the input
5	4	Boolean	false = Inactive, true = Active					Port3 Discrete1 Input State	true (1) = Discrete1 Input Active. Note - even if Discrete1 is configured as an output, the active state will be reflected at the input
6	5	Boolean	false = Inactive, true = Active					Port3 Discrete2 Input State	true (1) = Discrete2 Input Active. Note - even if Discrete2 is configured as an output, the active state will be reflected at the input
7	6	Boolean	false = Inactive, true = Active					Port4 Discrete1 Input State	true (1) = Discrete1 Input Active. Note - even if Discrete1 is configured as an output, the active state will be reflected at the input
8	7	Boolean	false = Inactive, true = Active					Port4 Discrete2 Input State	true (1) = Discrete2 Input Active. Note - even if Discrete2 is configured as an output, the active state will be reflected at the input
9	8	32-bit Integer						Process Data Measurement 1	Process Data Measurement 1 Value
10	40	32-bit Integer						Process Data Measurement 2	Process Data Measurement 2 Value
11	72	32-bit Integer						Process Data Measurement 3	Process Data Measurement 3 Value
12	104	32-bit Integer						Process Data Measurement 4	Process Data Measurement 4 Value
13	136	16-bit Integer						Measurement Value 5	The channel 5 measurement device value
14	152	7-bit Integer						Measurement Scale 5	The channel 5 measurement device scale
15	159	Boolean						SSC5.1 - Switching Signal	Indicates the detection status of an object or measurement value within a window.
16	160	16-bit Integer						Measurement Value 6	The channel 6 measurement device value
17	176	7-bit Integer						Measurement Scale 6	The channel 6 measurement device scale
18	183	Boolean						SSC6.1 - Switching Signal	Indicates the detection status of an object or measurement value within a window.
19	184	16-bit Integer						Measurement Value 7	The channel 7 measurement device value
20	200	7-bit Integer						Measurement Scale 7	The channel 7 measurement device scale
21	207	Boolean						SSC7.1 - Switching Signal	Indicates the detection status of an object or measurement value within a window.
22	208	16-bit Integer						Measurement Value 8	The channel 8 measurement device value
23	224	7-bit Integer						Measurement Scale 8	The channel 8 measurement device scale
24	231	Boolean						SSC8.1 - Switching Signal	Indicates the detection status of an object or measurement value within a window.

ProcessDataOut "Process Data Output" id=PD_ProcessDataOutDMS

bit length: 72

data type: 72-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	0	Boolean	false = Off, true = On					Port1 Discrete1 Output State	true (1) = Discrete1 Output Active
2	1	Boolean	false = Off, true = On					Port1 Discrete2 Output State	true (1) = Discrete2 Output Active
3	2	Boolean	false = Off, true = On					Port2 Discrete1 Output State	true (1) = Discrete1 Output Active
4	3	Boolean	false = Off, true = On					Port2 Discrete2 Output State	true (1) = Discrete2 Output Active
5	4	Boolean	false = Off, true = On					Port3 Discrete1 Output State	true (1) = Discrete1 Output Active
6	5	Boolean	false = Off, true = On					Port3 Discrete2 Output State	true (1) = Discrete2 Output Active
7	6	Boolean	false = Off, true = On					Port4 Discrete1 Output State	true (1) = Discrete1 Output Active
8	7	Boolean	false = Off, true = On					Port4 Discrete2 Output State	true (1) = Discrete2 Output Active
9	8	16-bit Integer						Analog Out Value 1	If Voltage = Enter mV value, If Current = Enter uA value
10	24	16-bit Integer						Analog Out Value 2	If Voltage = Enter mV value, If Current = Enter uA value
11	40	16-bit Integer						Analog Out Value 3	If Voltage = Enter mV value, If Current = Enter uA value
12	56	16-bit Integer						Analog Out Value 4	If Voltage = Enter mV value, If Current = Enter uA value