



IO-Link Generic Device Parameter Data Add-On Instruction Guide, v4 12/13/2022

This document covers the installation and use of an Add-On Instruction (AOI) for the Logix Designer software package from Rockwell Automation. This AOI handles acyclic IO-Link commands to and from a Generic IO-Link device. This AOI has two User Defined Tag data types.

This IO-Link Device Parameter Data AOI is meant to be used alongside a v4 Banner IO-Link Master AOI.

Components

Banner_IOL_Generic_Param_v4.L5X

UDT's Packaged with the AOI

Banner_IOL_Generic_v4

Banner_IOL_Port_v4

NOTE:

This Banner IO-Link Device Parameter AOI is useless on its own.

It is intended to be linked to a v4 Banner IO-Link Master AOI to function.

Other AOIs Available Separately

Banner has AOI files for controlling Banner IO-Link devices and for a variety of IO-Link Masters. Banner also has AOI files for easily handling Banner device Process Data.

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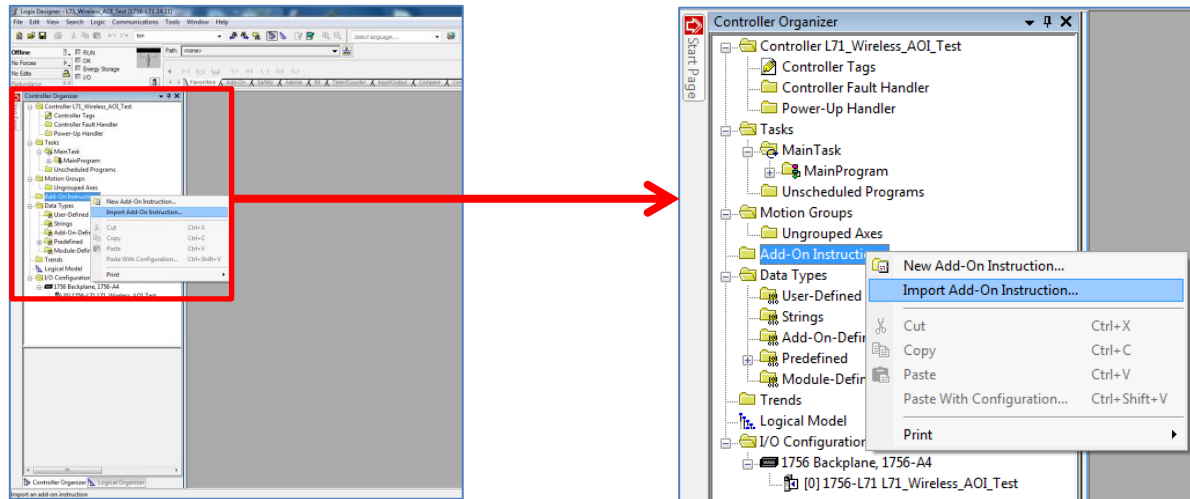
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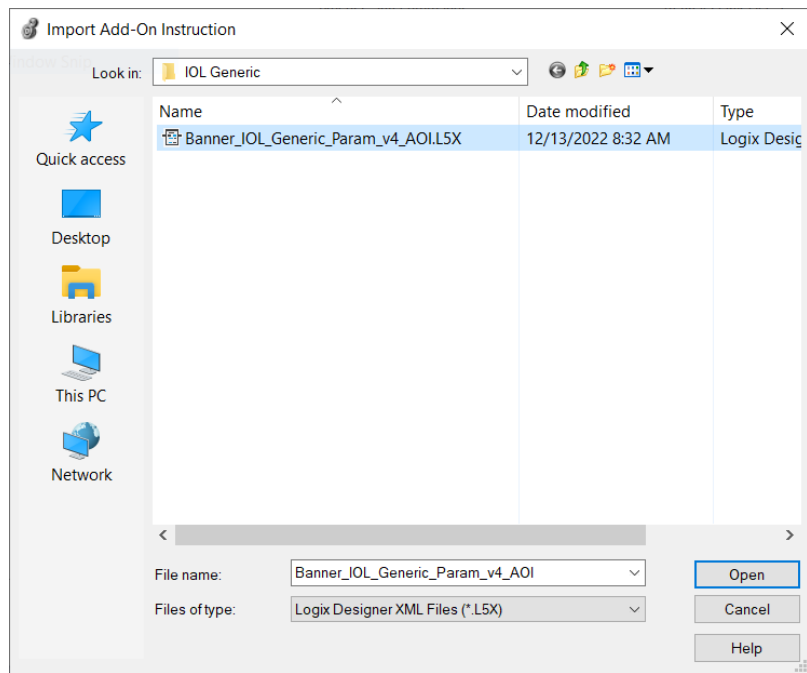
1. Installation Process

This section describes how to install the AOI in Logix Designer software.

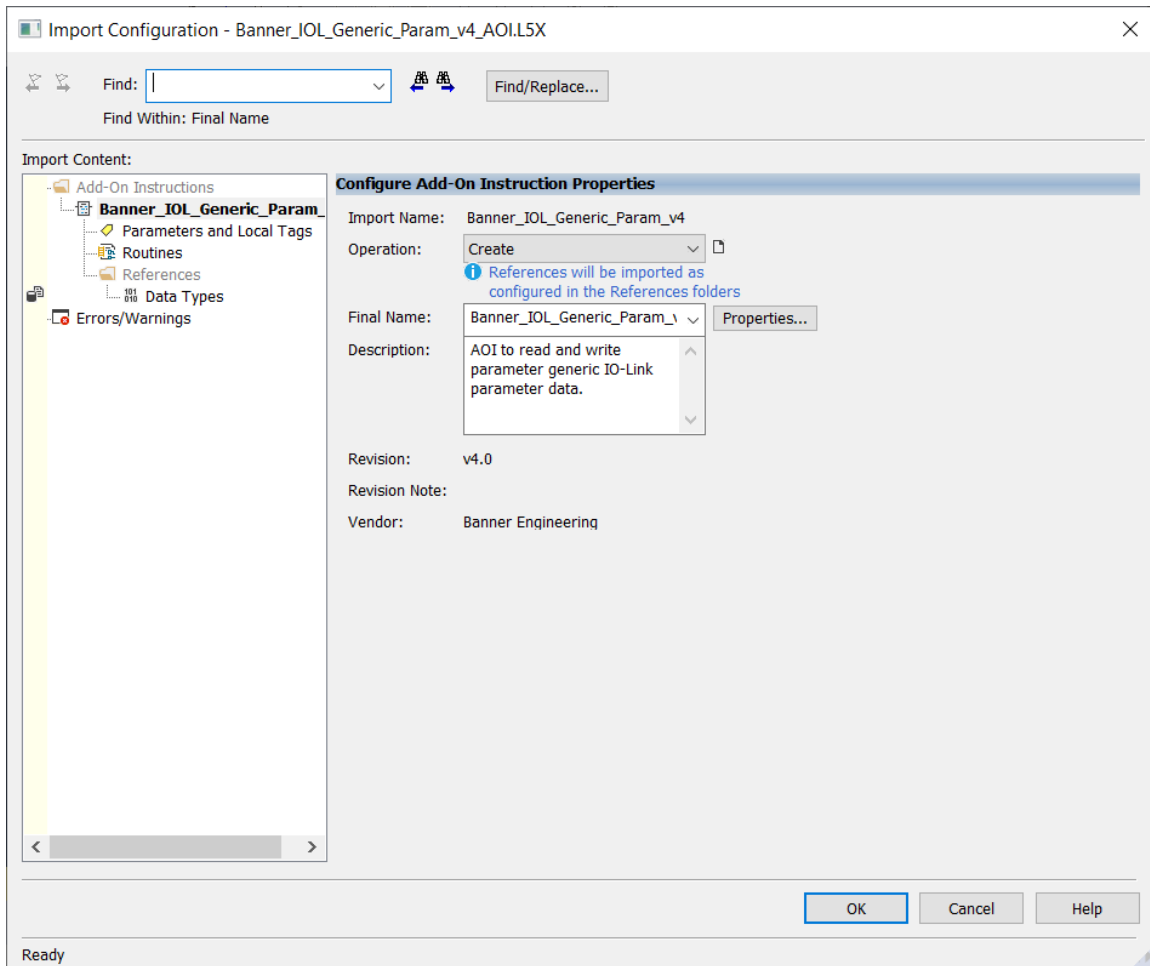
1. Open a project.
2. In the Controller Organizer window, right-click on the Add-On Instruction folder. Select the Import Add-On Instruction option.



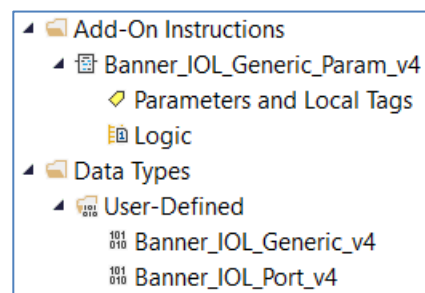
3. Navigate to the correct file location and select the AOI to be installed. In this example the "Banner_IOL_Generic_Param_v4.L5X" file will be selected. Click the Open button.



4. The Import Configuration window will pop up. The default selection will create all the necessary items for the AOI. Click the OK button to complete the import process.



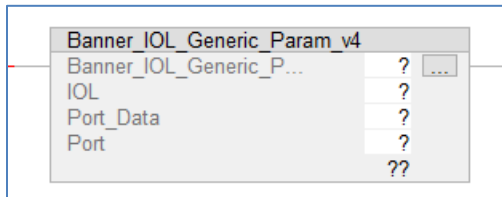
5. The AOI is added to the Controller Organizer window and should look like the picture at left.
6. AOI installation into the Logix Designer software is complete.



2. Configuring the AOI

Make sure to add and configure Banner IO-Link Master AOI to your program before using this AOI.

1. Add the “Banner_IOL_Generic_Param_v4” AOI to your ladder logic program. For each of the question marks shown in the instruction we need to create and link a new tag array. The AOI includes new types of User Defined Tag (UDT): custom arrays of tags meant specifically for this AOI.



2. In the AOI, right-click on the question mark on the line labeled “Banner_IOL_Generic_Param_v4”. Click New Tag. In this example, we’ll use the name “IOLM2_04_Status”. The example naming convention accounts for this being a Generic IO-Link device connected to IO-Link Master #2, port #4, in our program. More masters could be named IOLM1, IOLM3, and different sensors could be connected at other port numbers, etc.

The “EnableIn” and “EnableOut” variables are ladder logic rung status bits automatically added to all AOIs.

- Now click on the question mark on the line labeled "IOL". Click New Tag. In this example, we'll use the name "IOLM2_04". This array of tags includes all the variables required to do a read or write to a Generic IO-Link device.

New Parameter or Tag [X]

Name: Create ▼

Description: Cancel

Usage: Local Tag ▼

Type: Base ▼ Connection...

Alias For: ▼

Data Type: Banner_IOL_Generic ...

Parameter Connection: ▼

Scope: MainProgram ▼

External Access: Read/Write ▼

Style: ▼

☐ Constant

☐ Sequencing

☐ Open Configuration

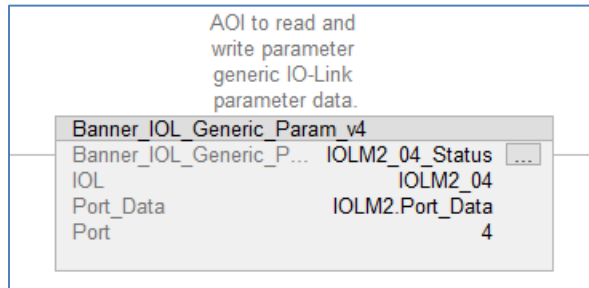
☐ Open Parameter Connections

Name	Value
▲ IOLM2_04	{...}
▶ IOLM2_04.Index	0
▶ IOLM2_04.Sub_Index	0
▶ IOLM2_04.Data_Length	0
IOLM2_04.Activate	0
IOLM2_04.RW	0
IOLM2_04.Busy	0
IOLM2_04.Done	0
IOLM2_04.Reset	0
IOLM2_04.Clear_Data	0
▶ IOLM2_04.Data	{...}

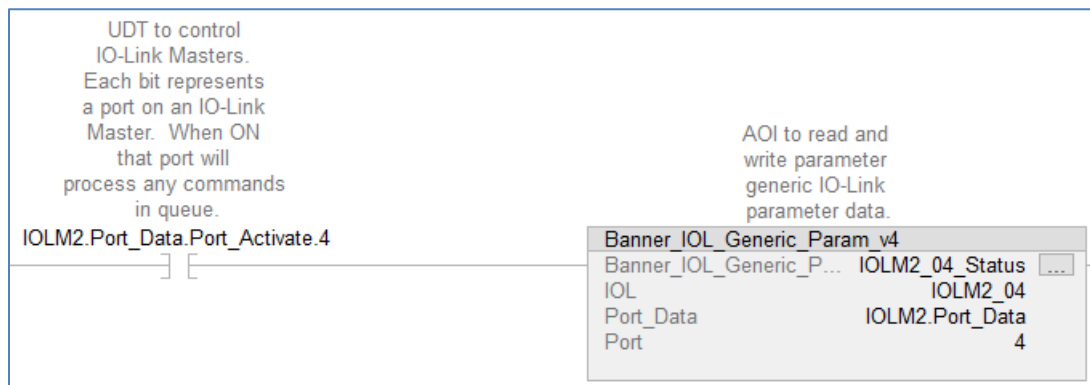
3. Linking the Device AOI to the Master AOI

The third tag in the Banner IOL Generic AOI is meant to be tied into the IO-Link Master AOI.

1. For the “Port_Data” line, choose the relevant IO-Link Master AOI’s “Port_Data” variable. In this example, we choose “IOLM2.Port_Data”.
2. For the last line of the AOI, “Port”, type in a number equal to the IO-Link Master port number to which the IO-Link device is connected. In this example, the device is on port 4.



3. The IO-Link Generic Device AOI is now linked to the IO-Link Master AOI. Add an Examine On instruction to the beginning of the ladder rung and tie it to the IO-Link Master AOI’s “Port_Activate” bit corresponding to the port number to which the IO-Link Device is connected. In this example the IO-Link Device Pro is on port 4 of the IO-Link Master named IOLM2, so the bit “IOLM2.Port_Data.Port_Activate.4” is used.



4. Using the Paired IO-Link Master and Device Parameter Data AOIs

The goal for this section is to show how to access ISDU data.

1. Start by examining the IODD file for the IO-Link device that will be accessed. Check if Sub-Index access is possible or not.

Variable "BDC1 Setpoints" index=60 id=V_BDC1_Setpoints

description: The reference value used for sensor switching (See IOL Smart Sensor Profile 9.2.5)

data type: 32-bit Record (subindex access not supported)

access rights: rw

dynamic

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	16	16-bit UInteger						Setpoint SP1	Switch point
2	0	16-bit UInteger						Setpoint SP2	In FGS teach, defines the second switching point. In other teach modes, SP2 is unused and must be written to 0.

octet	0	1	2	3
bit offset	31 - 24	23 - 16	15 - 8	7 - 0
subindex	1	1	2	2
element bit	15 - 8	7 - 0	15 - 8	7 - 0

Example of Index that does not allow Sub-Index Access

2. Monitor the tag created on page 4 "IOLM2_04". This tag controls the operation of the AOI.
3. Enter in the Index value. If the Index will be Read then the "Data_Length" is optional. If the index will be written to then the "Data_Length" must be set to the number of bytes. The "Sub-Index" will have a value of zero since the entire Index will be accessed. This example shows the Read operation.

Name	Value
▲ IOLM2_04	{...}
▸ IOLM2_04.Index	60
▸ IOLM2_04.Sub_Index	0
▸ IOLM2_04.Data_Length	4
IOLM2_04.Activate	0
IOLM2_04.RW	0
IOLM2_04.Busy	0
IOLM2_04.Done	1
IOLM2_04.Reset	0
IOLM2_04.Clear_Data	0

4. With the Index, Sub_Index, and Data_Length value entered place a 1 into Activate. This will start the IO-Link operation at the next available opportunity (the "Banner_DXMR90_IOLM_v4" control when this occurs).
5. After the operation is complete the Activate is turned off and the Done bit is turned on.

6. Since a Read operation was done then the information for the IO-Link Device is stored in the Data array. Open this array tag to see the data. The data will need to be parsed based on the IODD file for the Device. In this case Data[0] and Data[1] represent "Setpoint SP1". The value is calculated by taking $256 * 4 + 76$ which equals 1100. This value is in .1 mm increments, so the true value is 110 mm.

Name	Value
▾ IOLM2_04.Data	{...}
▸ IOLM2_04.Data[0]	4
▸ IOLM2_04.Data[1]	76
▸ IOLM2_04.Data[2]	0
▸ IOLM2_04.Data[3]	0

7. The Write operation is like the Read operation. The example will change the setpoint from 1100 to 1200. Normally the value would be 4 and 176. The issue is that most AB PLC's only have SINT's as a data type. This means that 176 is not a viable value. The actual decimal value is -80. It can be advantageous to use HEX instead of Decimal for this. Just keep this issue in mind.

Name	Value	Name	Value
▾ IOLM2_04.Data	{...}	▾ IOLM2_04.Data	{...}
▸ IOLM2_04.Data[0]	4	▸ IOLM2_04.Data[0]	16#04
▸ IOLM2_04.Data[1]	-80	▸ IOLM2_04.Data[1]	16#b0
▸ IOLM2_04.Data[2]	0	▸ IOLM2_04.Data[2]	0
▸ IOLM2_04.Data[3]	0	▸ IOLM2_04.Data[3]	0

8. The above has shown how to do complete Index read and write operations.
 9. Next steps will show how to do Sub-Index reads and writes.

10. Check the IODD file for the IO-Link Index that will be accessed. This example shows an ISDU data for a Q4X sensor. The "Switchpoint Logic" sub-index is what will be accessed in this example.

Variable "BDC1 Configuration" index=61 id=V_BDC1_Configuration

description: Parameter coding of the Setpoint and Switchpoint parameter. (See IOL Smart Sensor Profile 9.2.6)
 data type: 32-bit Record
 access rights: rw
 dynamic

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	24	8-bit UInteger	0 = Light Operate (LO), 1 = Dark Operate (DO)	0				Switchpoint Logic	Set LO/DO selection
2	16	8-bit UInteger	1 = One-Point BGS, 128 = Two-Point static BGS, 129 = Dynamic BGS, 130 = One-Point Window (FGS), 131 = Dual Teach	128				BDC Mode	Defines how the binary switching information is created depending on Setpoint parameters (SP1, SP2) and the current measurement value
3	0	16-bit UInteger		0				Hysteresis	Unused (must be written as 0)

octet	0	1	2	3
bit offset	31 - 24	23 - 16	15 - 8	7 - 0
subindex	1	2	3	3
element bit	7 - 0	7 - 0	15 - 8	7 - 0

11. The Index is changed to 61 while the Sub_Index is set to 1. Finally, the Data_Length is set to 1.

Name	Value
▲ IOLM2_04	{...}
▶ IOLM2_04.Index	61
▶ IOLM2_04.Sub_Index	1
▶ IOLM2_04.Data_Length	1
IOLM2_04.Activate	0
IOLM2_04.RW	0
IOLM2_04.Busy	0
IOLM2_04.Done	0
IOLM2_04.Reset	0
IOLM2_04.Clear_Data	0

12. As in the previous section the response appears in the Data area. The only difference is that only 1 sub-index of data is retrieved.

Name	Value
▲ IOLM2_04.Data	{...}
▶ IOLM2_04.Data[0]	0

13. Sub-Index Write is done in the same manner as a complete write. In this example, The switch is switched from Light Operate to Dark Operate.

Name	Value
▲ IOLM2_04	{...}
▶ IOLM2_04.Index	61
▶ IOLM2_04.Sub_Index	1
▶ IOLM2_04.Data_Length	1
IOLM2_04.Activate	0
IOLM2_04.RW	1
IOLM2_04.Busy	0
IOLM2_04.Done	1
IOLM2_04.Reset	0
IOLM2_04.Clear_Data	0
▲ IOLM2_04.Data	{...}
▶ IOLM2_04.Data[0]	1

14. The Read and Write operations for both a Complete operation and Sub-Index operation have been shown.