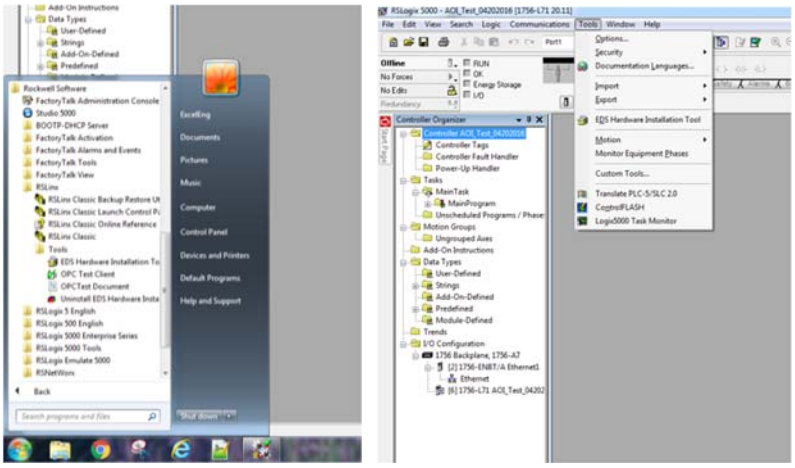
Comtrol_ICE2_ISDU AOI

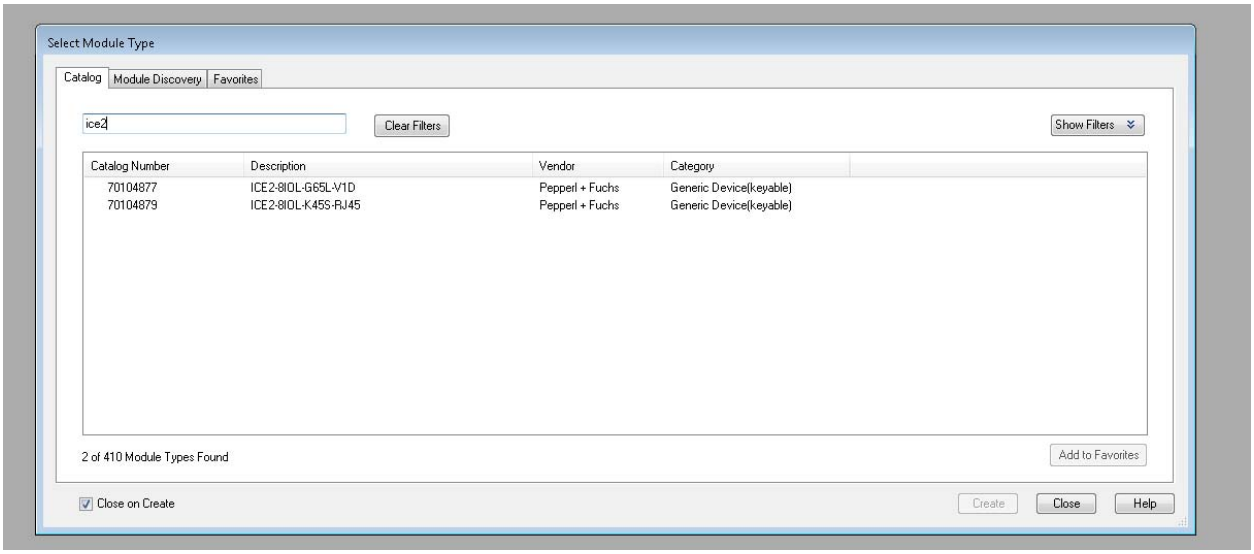
Installation and Configuration Guide

Contents

EDS Installation 2
Module Installation 4
AOI Rung Import 6
Manual AOI Installation 9
Creating an AOI Instance 11
Using the ISDU AOI 13
Requesting Port Data 13
Single, Variable Sized, ISDU Request 13
Multiple, 10 byte, ISDU Requests (Batch Requests) 14
Additional Configuration for the AOI 14
Configuring the Single Response Parsing 14
AOI Status Parameters 15
AOI Configuration Faults 17
Invalid Port Number 18
Unequal Path Configuration 18
Port Data Request Start Timed Out 18
Port Data Request MSG Fault 18
Single Request Start Timed Out 18
Single Request MSG Fault 18
Single Request Configuration Error 18
Single Request Response is Invalid 19
Batch Request Start Timed Out 19
Batch Request MSG Fault 19
Invalid Number of Batch Requests 19
Batch Request x Configuration Error 19
Batch Request x Response is Invalid 20

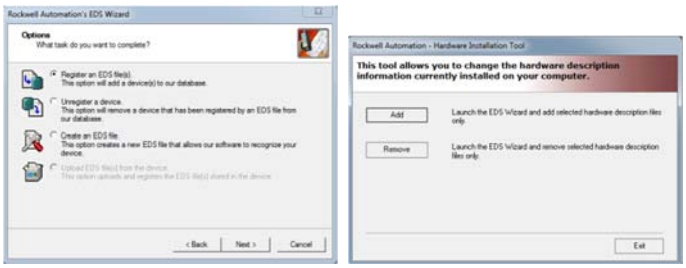
EDS Installation



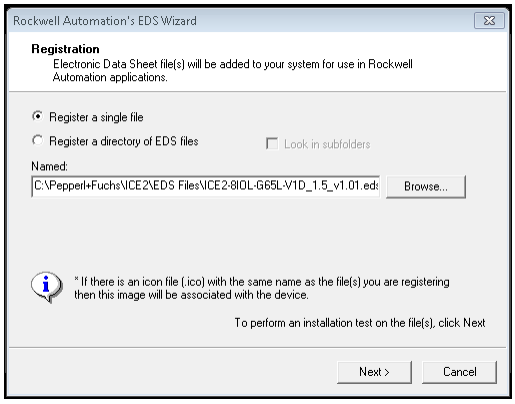


To install an EDS (Electronic Datasheet), the EDS Hardware Installation Tool is used. To access this program, either select it from RSLinx → Tools in the program menu, or from the Tool dropdown menu in RSLogix 5000. Once the installation tool is running, perform the following procedure:

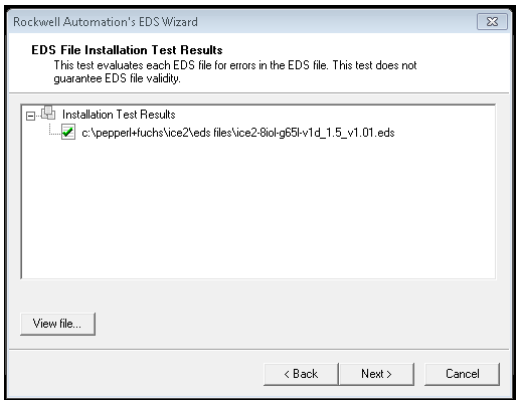
1. Select “Register an EDS file(s)” and press Next. NOTE: In the RSLinx version of the installation tool, press the Add button. The remaining steps are identical between the two program versions.



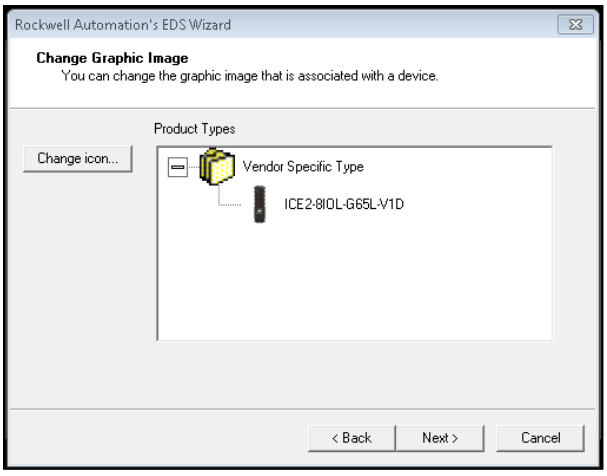
2. Select “Register a single file.”
3. Enter the path to the EDS, or press Browse and navigate to the EDS file, then press Open.
4. Press Next.

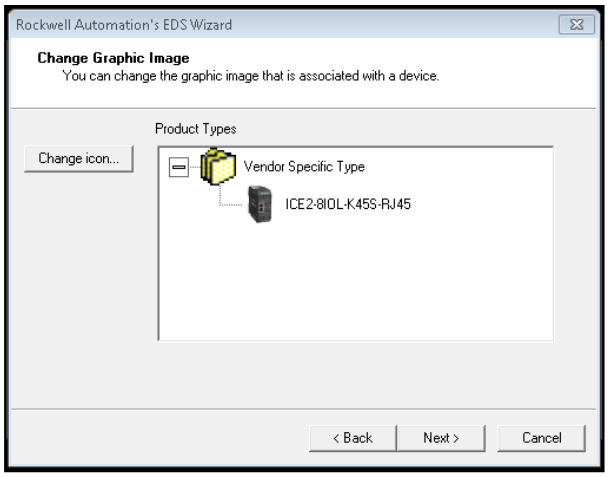


5. EDS File Installation Test Results should show a green check mark if the EDS is valid.



6. Continue pressing Next until the installation wizard is complete.



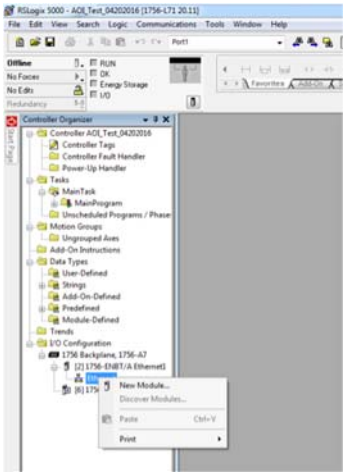


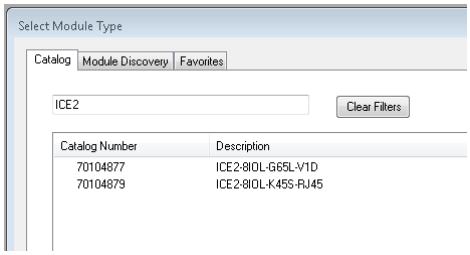
7. To add another EDS, repeat steps 1 – 6. When finished, exit the Installation Tool.
8. Rockwell software may need to be restarted to see the new EDS files.

Module Installation

Once the EDS is installed, a user may install the module in RSLogix either by module discovery, or by selecting the appropriate module from a list.

1. In the I/O Configuration tree, right-click on the Ethernet connection to the IO-Link module.
    a. Select New Module.
    b. Enter Comtrol into the search box. This will display only Comtrol modules.
    c. Choose the desired module, then press the Create button.



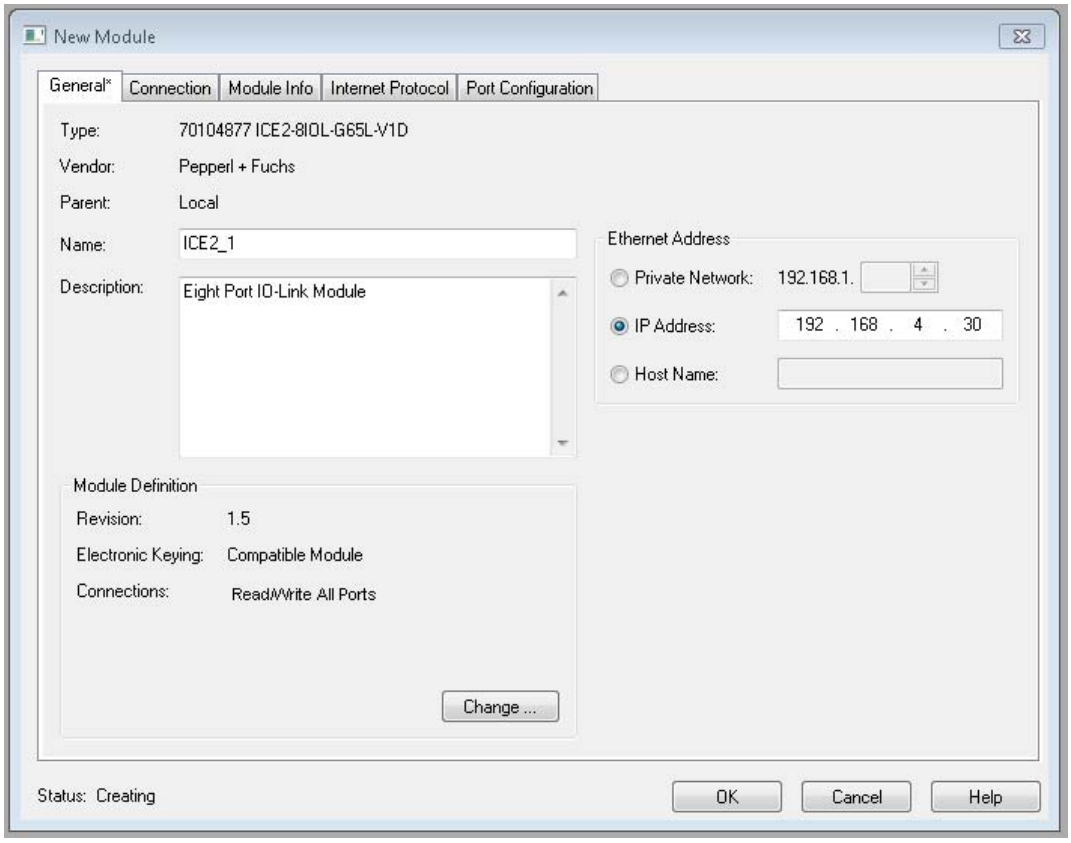


–OR-

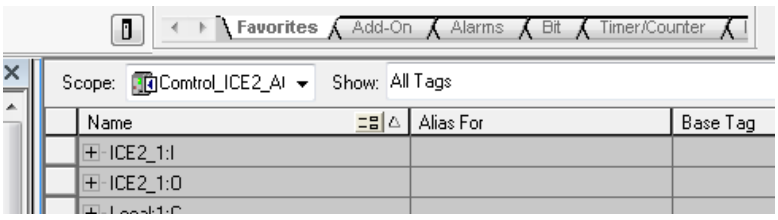
d. Select Discover Module. This option is only available if RSLogix is online with the PLC.

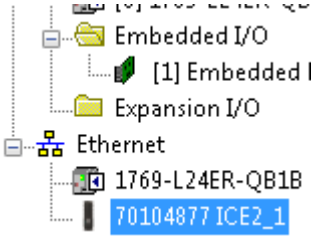
e. Select the detected module, then press Create.

2. Give the module a name, description, and IP address. If the module was discovered, the IP address will already be supplied.



3. Modify other settings, if desired, and then press OK. The module will be added to the tree, and I/O tags will be added to the Controller Tags.

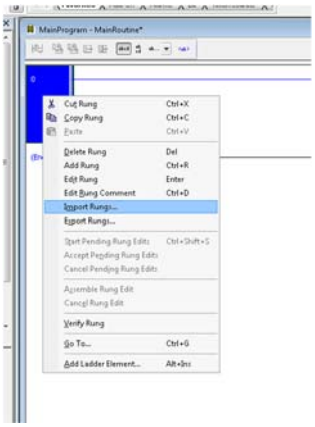




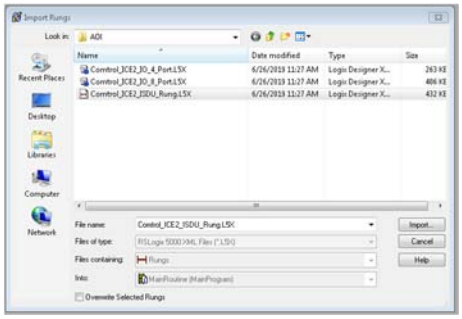
AOI Rung Import

Unlike most AOIs, the Comtrol_ICE2_ISDU AOI should be imported as a full rung. This will preserve the message instruction configuration. Should the entire rung be unavailable, see the Manual Installation section for the correct message instruction settings.

1. Right-click on the left side of the rung where the AOI should be inserted, and select “Import Rungs…”

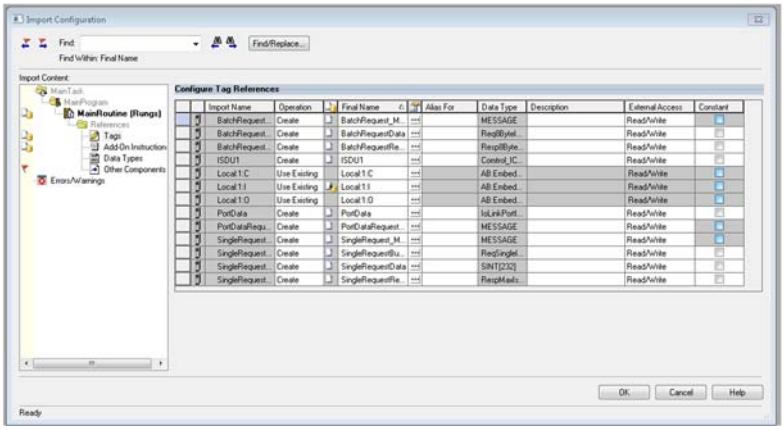


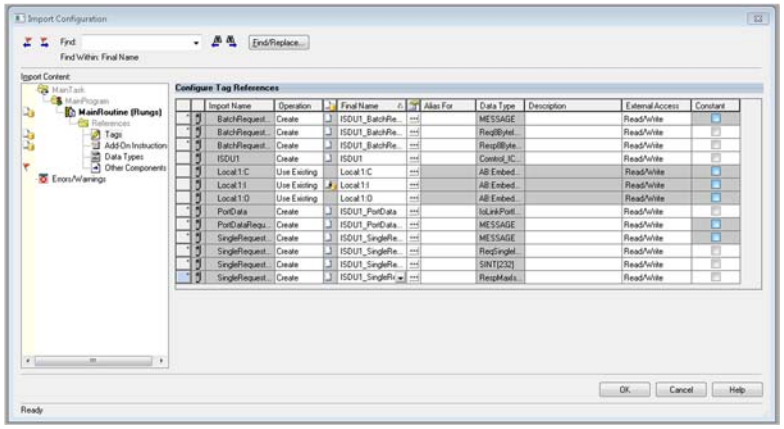
2. Select Comtrol_ICE2_ISDU_Rung.L5X.

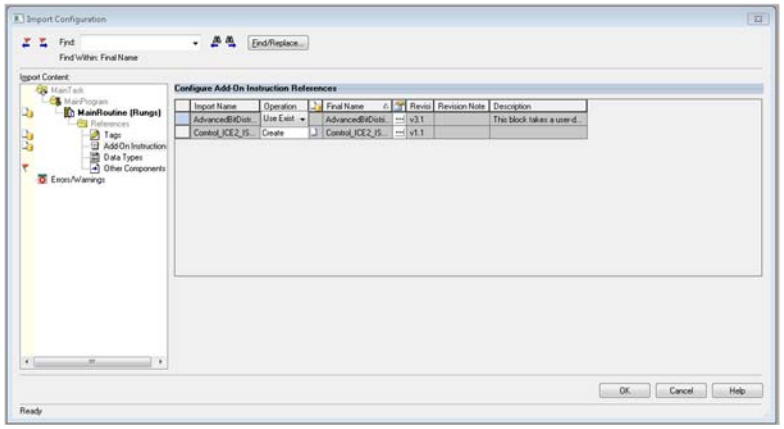


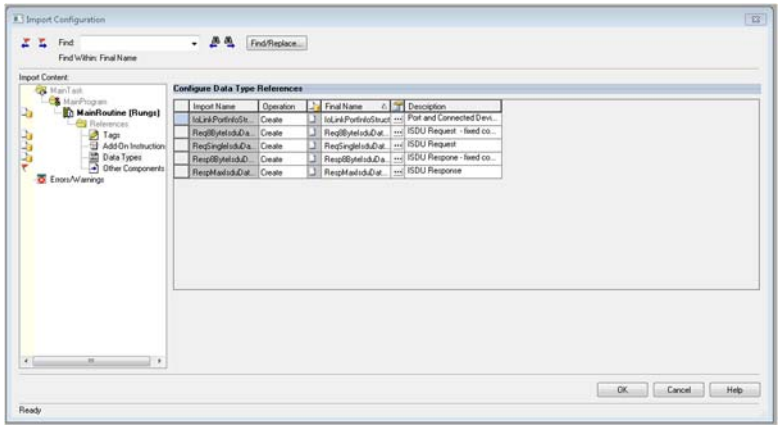
3. Review the import configuration and correct any errors. Errors are marked by red flags, and are typically listed in the Errors/Warnings section of AOI Import.
    a. In particular, pay attention to the Tags section. Editing values in the Final Name column will allow the user to update the final tag names.
        - The default backing tag name is ISDU1, which must be changes if there is more than one instance of the AOI.
        - It is recommended that the other tags be prepended with the chosen backing tag name, to distinguish from other instances of the ISDU AOI.
    b. Pay close attention to entries in any of the sections that have the operation “Use Existing” set. Items in the Tags section should be set to Create, otherwise conflicts may occur. The Add-On Instruction References and Data Types may be set to “Use Existing” if the ISDU or another Comtrol AOI has been installed previously.
    c. In the Other Components section, click on the Final Name item, then select the down arrow.

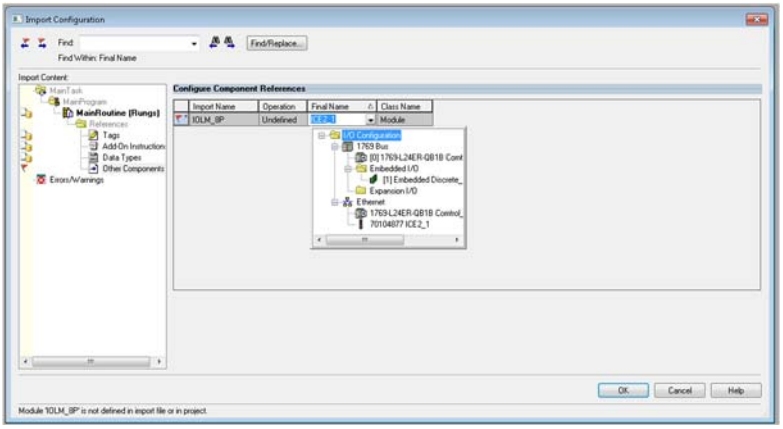
d. Choose the IO-Link Master in the I/O tree. This will map the AOI to the correct device.

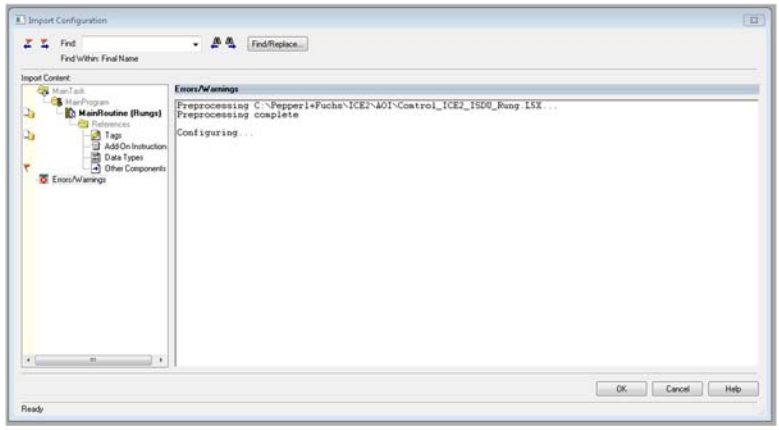







Import Configuration
Find:
Find/Replace...
Find Within: Final Name
Import Content:
MainTask
MainProgram
MainRoutine (Rungs)
References
Tags
Add-On Instruction
Data Types
Other Components
Errors/Warnings
Configure Data Type References
Import Name
Operation
Final Name
Description
Create
ISDU Request - fixed co...
ISDU Request
ISDU Response - fixed co...
ISDU Response
OK
Cancel
Help
Ready


Import Configuration
Find:
Find/Replace...
Find Within: Final Name
Import Content:
MainTask
MainProgram
MainRoutine (Rungs)
References
Tags
Add-On Instruction
Data Types
Other Components
Errors/Warnings
Configure Component References
Import Name
Operation
Final Name
Class Name
IOLM_BP
Undefined
Module
I/O Configuration
1769 Bus
Embedded I/O
Expansion I/O
Ethernet
OK
Cancel
Help
Module 'IOLM_BP' is not defined in import file or in project.

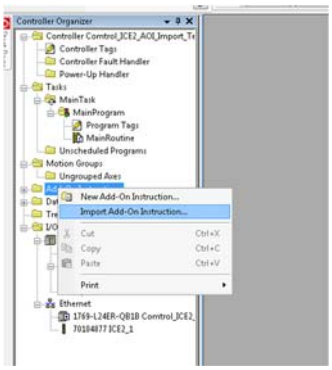

Import Configuration
Find:
Find/Replace...
Find Within: Final Name
Import Content:
MainTask
MainProgram
MainRoutine (Rungs)
References
Tags
Add-On Instruction
Data Types
Other Components
Errors/Warnings
Errors/Warnings
Preprocessing C:\Pepperl+Fuchs\ICE2\AOI\Comtrol_ICE2_ISDU_Rung.L5X...
Preprocessing complete
Configuring...
OK
Cancel
Help
Ready

e. When all errors have been corrected, click OK. The AOI rung will now appear in the PLC program. If the process was done correctly, the rung should have no ‘e’s, and the AOI should have no question marks.

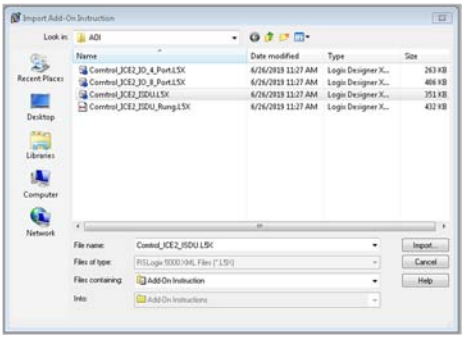
Manual AOI Installation

If the entire rung cannot be imported, use the following steps to import the AOI. NOTE: ISDU AOIs installed in this manner must be instantiated following the instructions in Creating an AOI Instance.

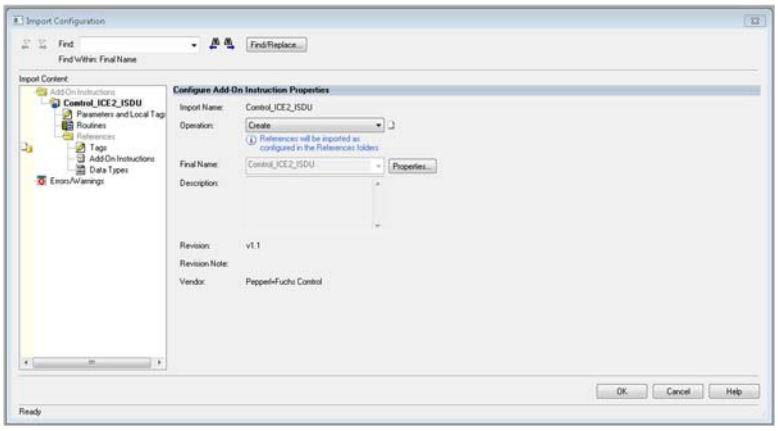
1. Right-click on Add-On Instructions in the Controller Organizer. Select Import Add-On Instruction.

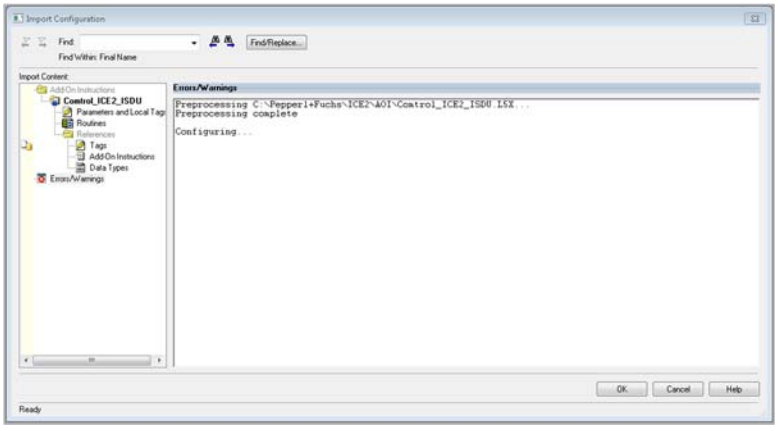


2. Select Comtrol_ICE2_ISDU.L5X.

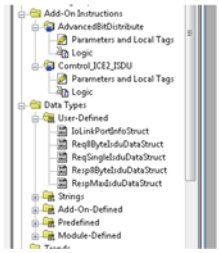


3. Review the import configuration and correct any error, then press OK. Errors are marked by red flags, and are typically listed in the Errors/Warnings section of AOI Import.





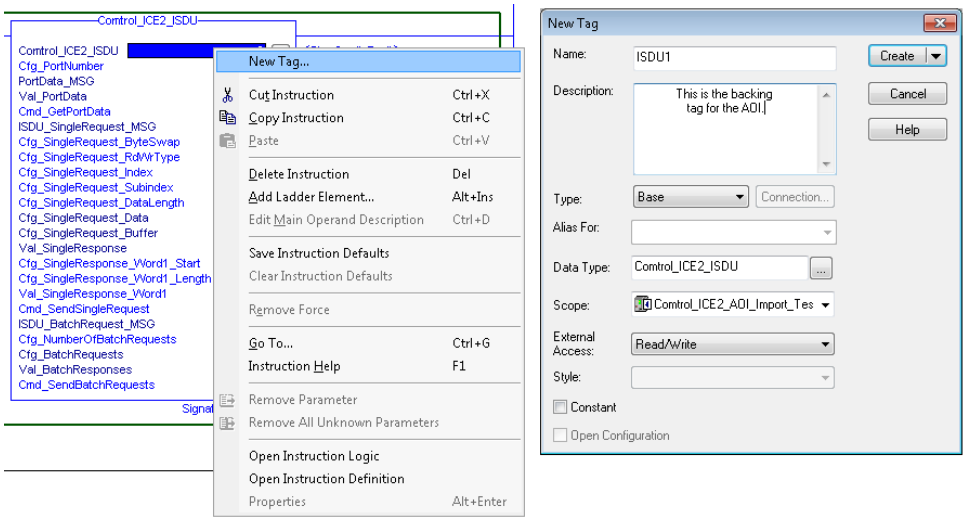
4. The Comtrol_ICE2_ISDU and AdvancedBitDistribute AOIs are added to the tree.



Creating an AOI Instance

1. To use the AOI, simply drag it from the Controller Organizer to desired position in the program logic. This will create a new instance of the AOI.

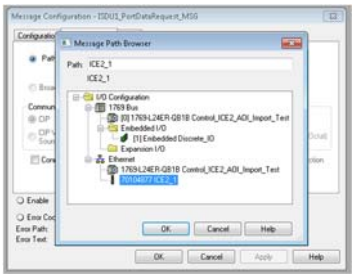
2. A backing tag must be made for the new AOI, to store data. To create a backing tag:
    a. Right-click the "?" next to the Comtrol_ICE2_ISDU parameter on the AOI faceplace, and select "New Tag…"
    b. In the popup, name the new instance.
    c. Add a description, if desired.
    d. Ensure that the tag is in the desired scope (Controller vs. Program).
    e. Do not change the datatype, or else the AOI will not work correctly.
    f. Press Create.
    g. All default configuration values for the AOI will be automatically generated. These may be changed during configuration.



3. Using the same method as with the backing tag, all remaining parameters with question marks must be given storage tags.

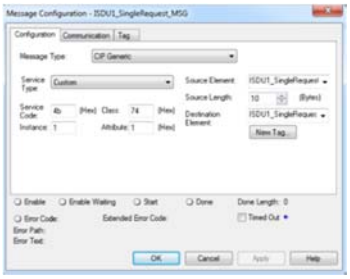
Parameter	Data Type	Notes
PortData_MSG	MESSAGE	Tag must be created as controller scope.
Val_PortData	IoLinkPortInfoStruct	
ISDU_SingleRequest_MSG	MESSAGE	Tag must be created as controller scope.
Cfg_SingleRequest_Data	SINT[x]	x is between 1 and 232, and represents the maximum data bytes that can be sent as part of a single ISDU request.
Cfg_SingleRequest_Buffer	ReqSingleIsduDataStruct	
Val_SingleResponse	RespMaxIsduDataStruct	
ISDU_BatchRequest_MSG	MESSAGE	Tag must be created as controller scope.
Cfg_BatchRequests	Req8ByteIsduDataStruct[10]	
Val_BatchResponses	Resp8ByteIsduDataStruct[10]	

4. Each MESSAGE parameter must be configured.
    a. Click on the ellipses button (…) to the right of the MESSAGE parameter.
    b. Under the Communication tab, use the “Browse…” button to select the IO-Link Master module.

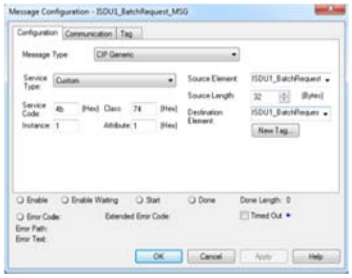


    c. Under the Configuration tab, make the settings match the values below.

PortData_MSG



ISDU_SingleRequest_MSG



ISDU_BatchRequest_MSG

5. The AOI should now be functional. If ‘e’s are still present on the left side of the rung, review the above steps and make any necessary corrections.

Using the ISDU AOI

Requesting Port Data

To obtain detailed port data:

1. Set Cfg_PortNumber to a value between 1 and 8, corresponding to the port to be communicated with.
2. Set Cmd_GetPortData to 1. This parameter may be referenced via <Backing Tag Name>.Cmd_GetPortData. NOTE: AOI is triggered on the rising edge of Cmd_GetPortData. This parameter must be reset to 0 before it can be used again.
3. Sts_PortDataRequest_InProcess should go TRUE.
4. Wait until either Sts_PortDataRequest_Done or Sts_PortDataRequest_Error are set.
5. If Sts_PortDataRequest_Done is set, read port data from the Val_PortData storage tag.
6. In the event of an error, check Sts_ConfigFaultCode and the PortData_MSG tag for detailed debugging information.
7. When finished, reset Cmd_GetPortData to 0.

Single, Variable Sized, ISDU Request

To create a Single ISDU Request:

1. Set Cfg_PortNumber to a value between 1 and 8, corresponding to the port to be communicated with.
2. Set Cfg_SingleRequest_ByteSwap, Cfg_SingleRequest_RdWrType, Cfg_SingleRequest_Index, Cfg_SingleRequest_Subindex, and Cfg_SingleRequest_DataLength for the request header.
3. Put request data, if any, in the Cfg_SingleRequest_Data storage tag.
4. Set Cmd_SendSingleRequest to 1. This parameter may be referenced via <Backing Tag Name>.Cmd_SendSingleRequest. NOTE: AOI is triggered on the rising edge of Cmd_SendSingleRequest. This parameter must be reset to 0 before it can be used again.

5. Sts_SingleRequest_InProcess should go TRUE.
6. Wait until either Sts_SingleRequest_Done or Sts_SingleRequest_Error is set.
7. If Sts_SingleRequest_Done is set, read port data from the Val_SingleResponse storage tag.
8. In the event of an error, check Sts_ConfigFaultCode, Val_SingleResponse and the ISDU_SingleRequest_MSG tag for detailed debugging information. Additionally, the Cfg_SingleRequest_Buffer storage tag contains the assembled message sent to the IO-Link device.
9. When finished, reset Cmd_SendSingleRequest to 0.

Multiple, 10 byte, ISDU Requests (Batch Requests)

The user may choose to send a set of up to 10, 10 byte (not including header) batch requests, using the following method:

1. Set Cfg_PortNumber to a value between 1 and 8, corresponding to the port to be communicated with.
2. Set Cfg_NumberOfBatchRequests. Must be a value between 1 and 10.
3. Using the Cfg_BatchRequests storage tag, fill in the byteSwap, rdWrType, index, subindex, dataLength, and data values for each request. NOTE: Requests must be supplied, in order, starting at index 0 of the Cfg_BatchRequests storage tag. Failure to do so may lead to unsent requests.
4. Set Cmd_SendBatchRequests to 1. This parameter may be referenced via <Backing Tag Name>.Cmd_SendBatchRequests. NOTE: AOI is triggered on the rising edge of Cmd_SendBatchRequests. This parameter must be reset to 0 before it can be used again.
5. Sts_BatchRequest_InProcess should go TRUE.
6. Wait until either Sts_BatchRequest_Done or Sts_BatchRequest_Error is set.
7. If Sts_BatchRequest_Done is set, read port data from the Val_BatchResponse storage tag.
8. In the event of an error, check Sts_ConfigFaultCode, Val_BatchResponses and the ISDU_BatchRequest_MSG tag for detailed debugging information.
9. When finished, reset Cmd_SendBatchRequest to 0.

Additional Configuration for the AOI

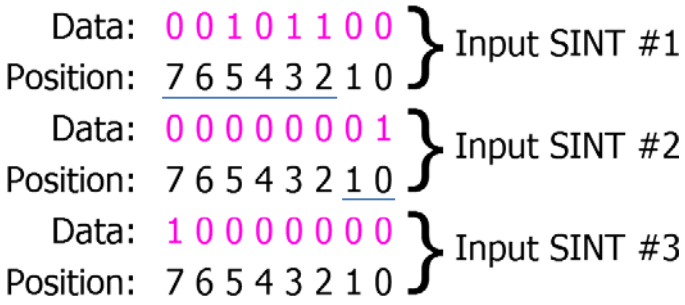
Configuring the Single Response Parsing

The AOI can extract one word of data from the response from a single request. To extract the word:

1. Double-click the number next to the Cfg_SingleResponse_Word1_Start parameter.
2. Set the parameter to the position of the desired bit. The position will be a number from 0 to the Cfg_SingleRequest_DataLength * 8 – 1.
3. Double-click the number next to the Cfg_SingleResponse_Word1_Length parameter.
4. Set the parameter to the number of bits in the data to be parsed. This must be between 0 and 32.

5. The value of the parsed data will be shown in Val_ SingleResponse_Word1.
6. To use this bit elsewhere in the program logic, navigate to the AOI backing tag, then use the plus sign (+) to expand it. The bit value will be called <Backing Tag Name>. Val_ SingleResponse_Word1.

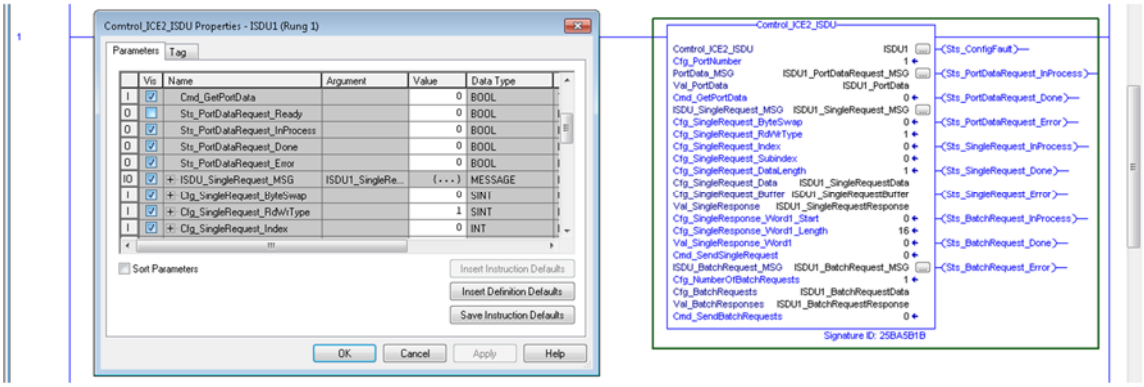
Example:
The response from a single request has data of interest in the first three SINTs of data.



To extract the data, first note that is it 10 bits long. That is less than one word (32 bits). Set Cfg_SingleResponse_Word1_Start to 2, and Cfg_SingleResponse_Word1_Length to 10. The result, located in Val_SingleResponse_Word1, is 75 (01001011 binary = 75 decimal).

AOI Status Parameters

To access the full list of AOI parameters, included status tags that are not normally visible, left-click on the ellipses (…) button located in the upper-right corner of the AOI. Parameters are located beneath the Parameters tab.



AOI Status		
Tag Name	**Description**	**Visible**
Sts_ConfigFault	Flag that indicates that there is a configuration fault in the AOI.	x
Sts_ConfigFaultCode	Code that indicates which configuration fault is active. See AOI Configuration Faults for details.	--
Sts_PortDataRequest_Ready	Port Data Request is not in progress; block does not have an Invalid Port Number or Unequal Path Configuration Fault.	--
Sts_PortDataRequest_InProcess	Port Data Request is in progress.	x
Sts_PortDataRequest_Done	Port Data Request is complete, result is available in Val_PortData.	x
Sts_PortDataRequest_Error	Port Data Request has failed. See Sts_ConfigFaultCode and PortData_MSG parameter for details.	x
Sts_SingleRequest_Ready	Single ISDU Request is not in progress; block does not have an Invalid Port Number or Unequal Path Configuration Fault.	--
Sts_SingleRequest_InProcess	Single ISDU Request is in progress.	x
Sts_SingleRequest_Done	Single ISDU Request is complete, result is available in Val_SingleResponse.	x
Sts_SingleRequest_Error	Single ISDU Request has failed. See Sts_ConfigFaultCode and ISDU_SingleRequest_MSG parameter for details.	x
Sts_BatchRequest_Ready	Batch ISDU Request is not in progress; block does not have an Invalid Port Number or Unequal Path Configuration Fault.	--
Sts_BatchRequest_InProcess	Batch ISDU Request is in progress.	x
Sts_BatchRequest_Done	Batch ISDU Request is complete, result is available in Val_BatchResponses.	x
Sts_BatchRequest_Error	Batch ISDU Request has failed. See Sts_ConfigFaultCode and ISDU_BatchRequest_MSG parameter for details.	x

AOI Configuration Faults

The Sts_ConfigFaultCode is an array of bits, each of which corresponds to a type of error. Multiple errors may be active at once.

Error Code Flag Bit	Description
0	Invalid Port Number
1	Unequal Path Configuration
2	Port Data Request Start Timed Out
3	Port Data Request MSG Fault. See MSG instruction for details.
4	Not Used
5	Single Request Start Timed Out
6	Single Request MSG Fault. See MSG instruction for details.
7	Single Request Configuration Error
8	Single Request Response is invalid.
9	Batch Request Start Timed Out
10	Batch Request MSG Fault. See MSG instruction for details.
11	Invalid number of batch requests. Must be between 1 and 10.
12	Batch Request 1 Configuration Error
13	Batch Request 2 Configuration Error
14	Batch Request 3 Configuration Error
15	Batch Request 4 Configuration Error
16	Batch Request 5 Configuration Error
17	Batch Request 6 Configuration Error
18	Batch Request 7 Configuration Error
19	Batch Request 8 Configuration Error
20	Batch Request 9 Configuration Error
21	Batch Request 10 Configuration Error
22	Batch Request 1 Response is Invalid
23	Batch Request 2 Response is Invalid
24	Batch Request 3 Response is Invalid
25	Batch Request 4 Response is Invalid
26	Batch Request 5 Response is Invalid
27	Batch Request 6 Response is Invalid
28	Batch Request 7 Response is Invalid
29	Batch Request 8 Response is Invalid
30	Batch Request 9 Response is Invalid
31	Batch Request 10 Response is Invalid

Invalid Port Number

Possible Causes:

Cfg_PortNumber is less than 1 or greater than 8. NOTE: The ISDU AOI is used by both 4-port and 8-port devices; it is possible to set a non-existent port and not receive this error.

Unequal Path Configuration

Possible Causes:

MSG parameter path configurations are not identical. NOTE: Whether or not the user intends to use them, all MSG types must be configured.

Port Data Request Start Timed Out

Possible Causes:

A port data request has been triggered, but the associated message instruction has not been enabled within 2 seconds. This typically indicates that the PLC logic has hung.

Port Data Request MSG Fault

Possible Causes:

The PortData_MSG instruction has faulted. For details, click on the ellipses (…) button next to the parameter.

Single Request Start Timed Out

Possible Causes:

A single ISDU request has been triggered, but the associated message instruction has not been enabled within 2 seconds. This typically indicates that the PLC logic has hung.

Single Request MSG Fault

Possible Causes:

The ISDU_SingleRequest_MSG instruction has faulted. For details, click on the ellipses (…) button next to the parameter.

Single Request Configuration Error

This error is caused when a single ISDU request is not configured correctly.
Possible Causes:

Cfg_SingleRequest_ByteSwap is less than 0 or greater than 2.

Bits 0 – 3 of Cfg_SingleRequest_RdWrType are less than 0 or greater than 4.

Cfg_SingleRequest_DataLength is less than 0, greater than 232, or is larger than the storage tag used to hold single ISDU request data.

Bits 4 - 7 of Cfg_SingleRequest_RdWrType do not equal 0.

Single Request Response is Invalid

This fault occurs when a fault status is returned, or unexpected header data is received.
Possible Causes:

The response has returned status code 1, an In Process status for non-blocking requests. The AOI produces blocking requests, so this status should never occur.

The response has returned status code 3, indicating that the connected device rejected the request.

The response has returned status code 4, indicating that request timed out.

The returned byte-swap bits 0 – 3 do not match the requested byte-swap.

The returned rdWrType does not match the requested rdWrType.

The returned index does not match the requested index.

The returned subindex does not match the requested subindex.

The returned data length does not match the requested datalength.

Batch Request Start Timed Out

Possible Causes:

A batch ISDU request has been triggered, but the associated message instruction has not been enabled within 2 seconds. This typically indicates that the PLC logic has hung.

Batch Request MSG Fault

Possible Causes:

The ISDU_BatchRequest_MSG instruction has faulted. For details, click on the ellipses (…) button next to the parameter.

Invalid Number of Batch Requests

Possible Causes:

Cfg_NumberOfBatchRequests is less than 0 or greater than 10.

Batch Request x Configuration Error

This error is caused when a request x, where x is 1 – 10, of a set of batch requests is not configured correctly.
Possible Causes:

Cfg_SingleRequest_ByteSwap is less than 0 or greater than 2.

Bits 0 – 3 of Cfg_SingleRequest_RdWrType are less than 0 or greater than 4.

Cfg_SingleRequest_DataLength is less than 0, greater than 232, or is larger than the storage tag used to hold single ISDU request data.

Bits 4 - 7 of Cfg_SingleRequest_RdWrType do not equal 0.

Batch Request x Response is Invalid

This fault occurs when a fault status is returned, or unexpected header data is received, for request x, where x is 1 - 10.

Possible Causes:

The response has returned status code 1, an In Process status for non-blocking requests. The AOI produces blocking requests, so this status should never occur.

The response has returned status code 3, indicating that the connected device rejected the request.

The response has returned status code 4, indicating that request timed out.

The returned byte-swap bits 0 – 3 do not match the requested byte-swap.

The returned rdWrType does not match the requested rdWrType.

The returned index does not match the requested index.

The returned subindex does not match the requested subindex.

The returned data length does not match the requested datalength.