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Introduction

This manual is intended to provide new users with a step-by-step guide to establish communication between an In-Sight 8900 series camera and Rockwell PLCs using Ethernet/IP protocol.

Required Software

- Cognex In-Sight Vision Suite version 24.4.2 or newer
- Rockwell Studio 5000

Material

- In-Sight 8900 Series Camera
- Lens
- Ethernet Cable, X-coded M18-8 to RJ45
- Class 3 Power over Ethernet (PoE) power supply or Class 3 PoE network switch
- Allen Bradley PLC (Rockwell) with power supply as required
- CAT6E preferred network cables for connecting the PC/network switch and PLC/network switch

Download Needed Files

EDS Files

An EDS file (Electronic Data Sheet) is a standardized text file used in industrial automation to describe the communication properties and features of a device in a particular industrial network or protocol. It serves as a 'data sheet' for configuring and integrating a device within a networked system.

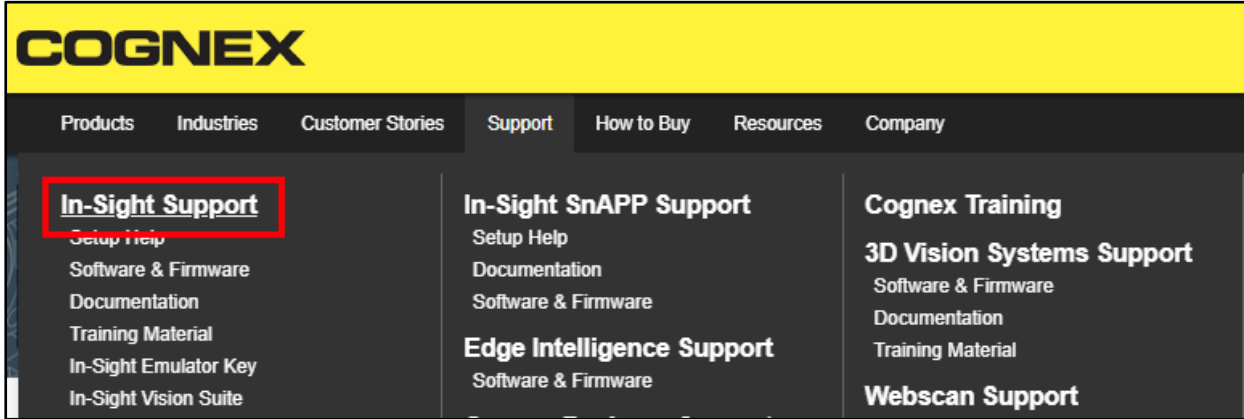
The In-Sight EDS files are installed with the In-Sight Vision Suite download and can be found on your computer.

AOP Files

An AOP (Add-On Profile) is a software extension or plug-in used in industrial automation systems to simplify the integration and configuration of a specific device or module within a control system, particularly for communication over industrial protocols like EtherNet/IP, DeviceNet, or others supported by Rockwell Automation (Allen Bradley).

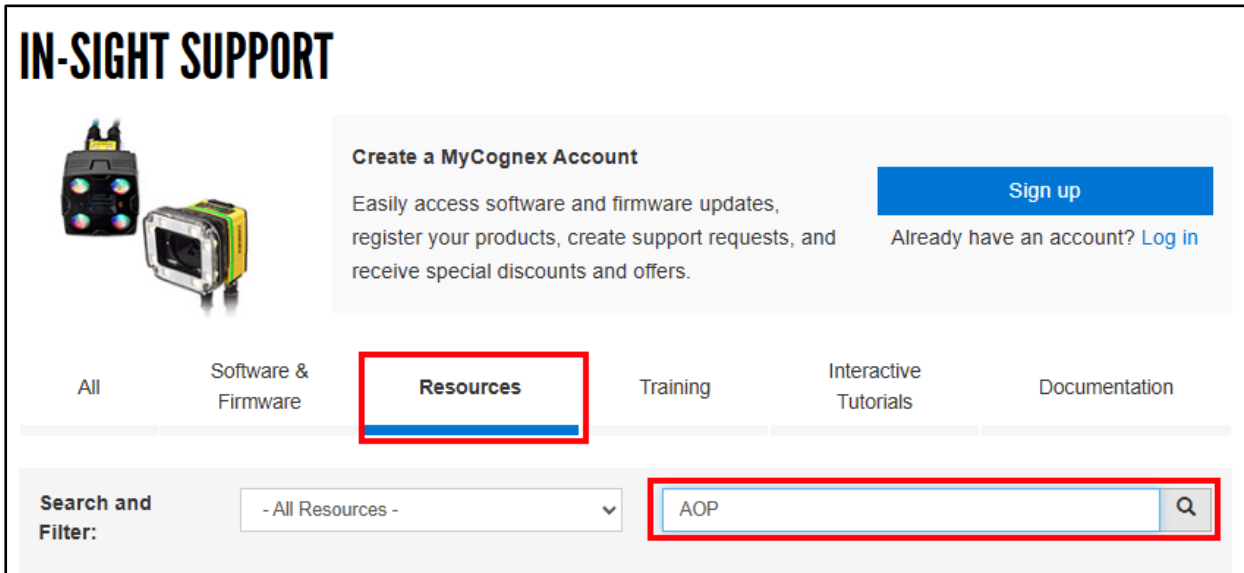
AOP files can be downloaded from Cognex.com.

1. Navigate to the **In-Sight Support** page on Cognex.com.



The In-Sight Support page displays.

2. On the **Resources** tab, enter **AOP** in the **Search and Filter** field and press the **<Enter>** key.



3. Select **Cognex Add-on Profile (AOP)** from the list.

FILE NAME	FILE TYPE	FILE SIZE	DATE
Integration notes of In-Sight Gen 2 camera with PLCs running RSLogix	.pdf	3.2MB	8/25/2017
Cognex Add-on Profile (AOP) Version 1.31.08	.zip	491.1MB	9/13/2024

4. Click the **Download** button.

COGNEX AOP (ADD ON PROFILE) VERSION 1.31.08

1.31.08 adds support for the latest Cognex releases – In-Sight L38 Series

Supports all the below In-Sight systems:

- In-Sight L38 Series
- In-Sight 2000 Series
- In-Sight 2800 Series
- In-Sight 3800 Series
- In-Sight D900 Series
- In-Sight 5700 Series
- In-Sight 7000, 7500 Series
- In-Sight Micro Series (added Maj Rev 12)
- In-Sight 3D-L4000 Series

The following DataMan products are also supported:

- DataMan 60 Series
- DataMan 200, 260, 280, 290 Series
- DataMan 300, 390 Series
- DataMan 500 Series
- DataMan 8000 Series

Detailed information for installing the AOP is contained in the [Integration of RSLogix and In-Sight](#) guide. This guide includes:

- How to install new cameras with the AOP.
- How to update cameras currently installed with EDS generated profiles over to use the AOP.
- How to send data back and forth between camera/PLC.
- Reference to the assembly I/O.

File Type: .zip
File Size: 491.1MB
Version: 1.31.08
Release Date: 9/13/2024

Download [Email a Link](#)

5. Unzip and copy the downloaded folder to your PC.

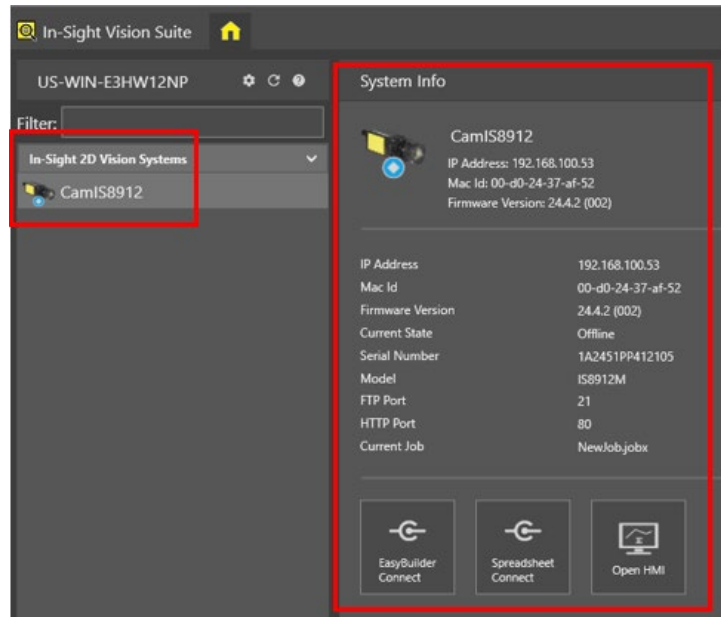
In-Sight Camera Preparation

Install and run the **In-Sight Vision Suite software**, it is recommended to have **version 24.4.2** or later to work with the In-Sight 8900 cameras.

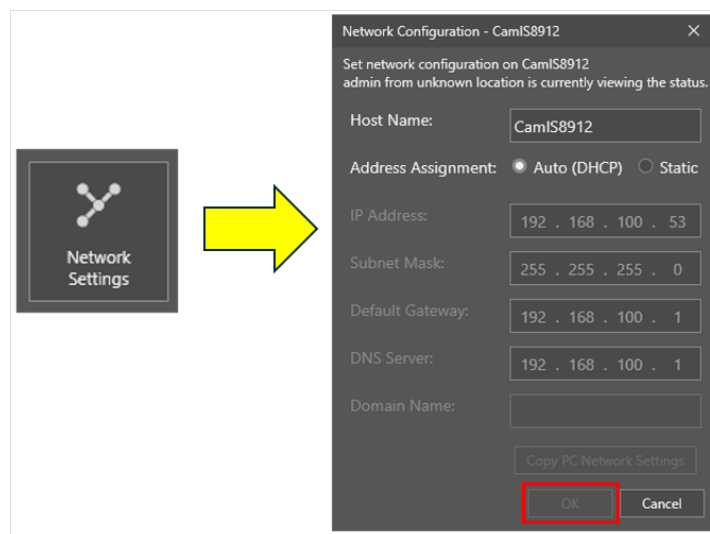
NOTE: The latest version of the In-Sight Vision Suite software can be found on the In-Sight Support page on Cognex.com. <https://support.cognex.com/en/downloads/in-sight/software-firmware>.

1. In the *Device Panel* select your camera from the In-Sight 2D Vision Systems list.

If it is the first time that the camera is connected to the PC, it is recommended to configure the network properties for the computer.

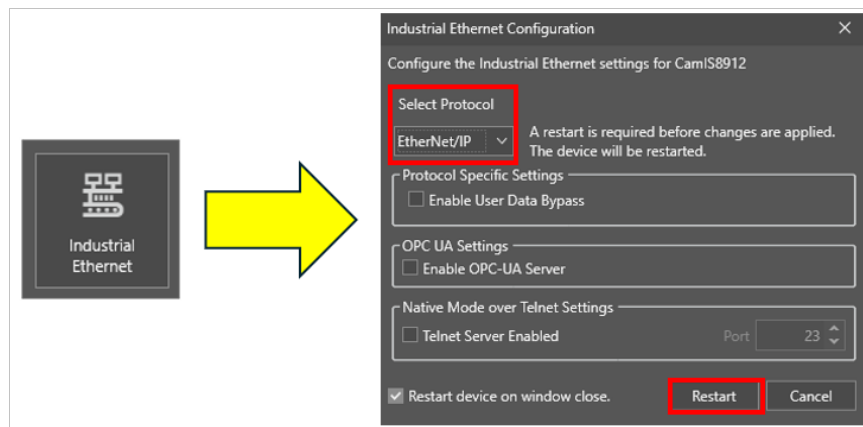


2. This can be done by using the **Network Settings** button in the Utilities panel. A window with the current properties of the camera opens.
3. Make the required changes and click the **OK** button.

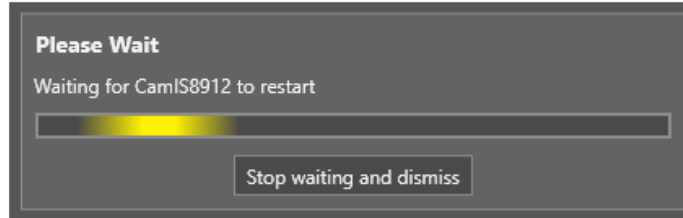


Once the equipment has been configured with its network properties, the industrial protocol must be selected, in this case it is **Ethernet/IP**.

- The selection is made via the **Industrial Ethernet** button, the configuration window displays, select *EtherNet/IP* from the **Select Protocol** drop-down menu. To accept the changes, click the **Restart** button.



- The camera reboots to apply the changes internally and for the industrial protocol to be active.



PLC Configuration

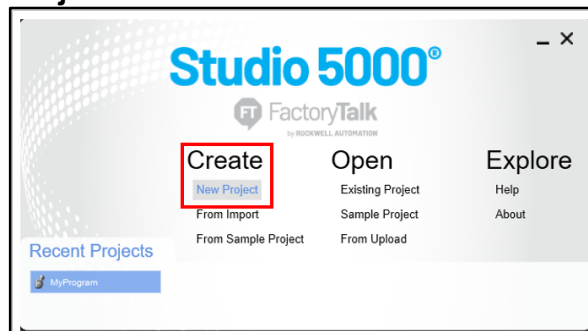
Create a Rockwell Project

Regardless of the programming method in the camera, basic configuration is required on the PLC to establish communication with the In-Sight 8900 series camera.

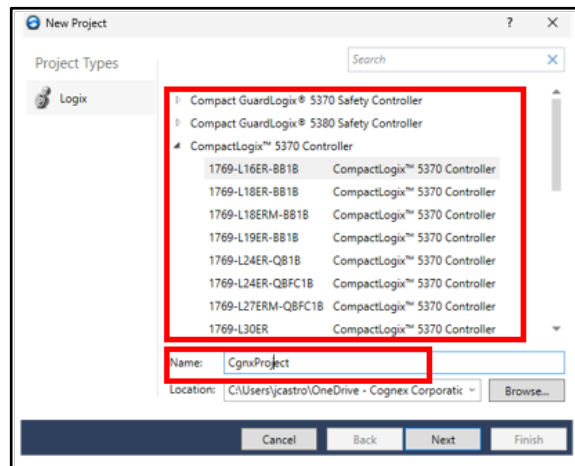
Electronic Data Sheets (EDS) are text files that use various network configuration tools to identify In-Sight vision systems in a network. These EDS files are then imported into the corresponding software.

Follow these steps to create a new Rockwell project:

1. Open **Rockwell Studio 5000**.
2. Select **Create - New Project**.

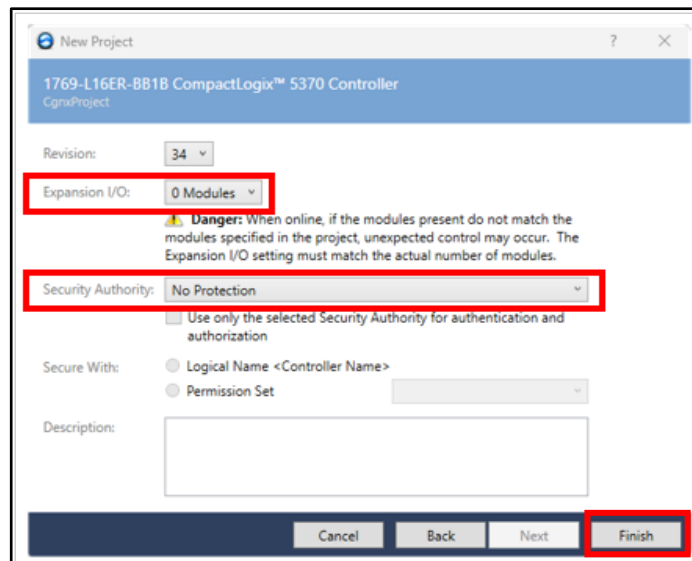


3. Select your PLC from the list, enter the **Name** of the project you want to create and click the **Next** button.

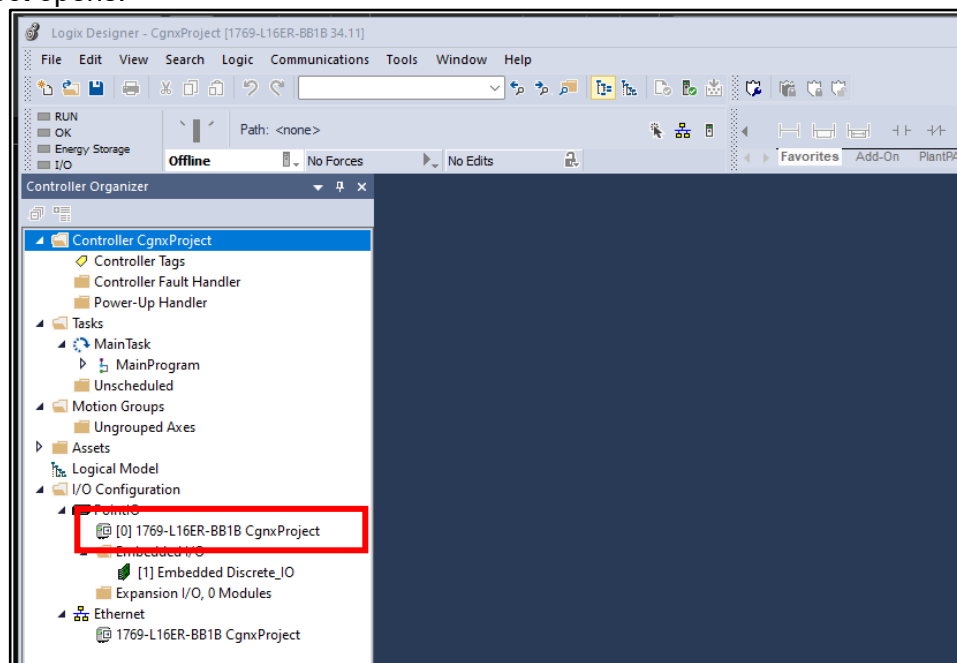


4. Select the appropriate Expansion I/O and Security Authority options, in this example we use:
 - Expansion I/O = *0 Modules*
 - Security Authority = *No Protection*

5. Click the **Finish** button.



The new project opens.

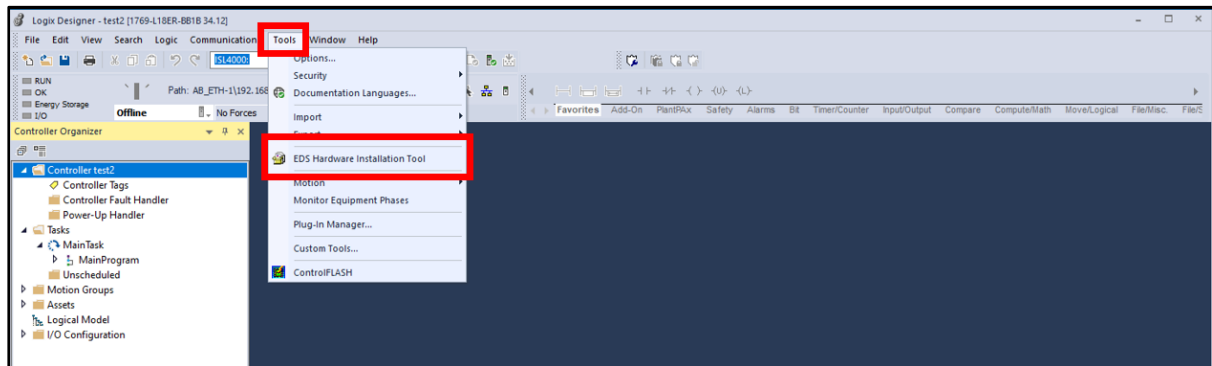


Installing the EDS Files

Make sure you are Offline.

To install the EDS file included with your In-Sight Vision System, follow these steps:

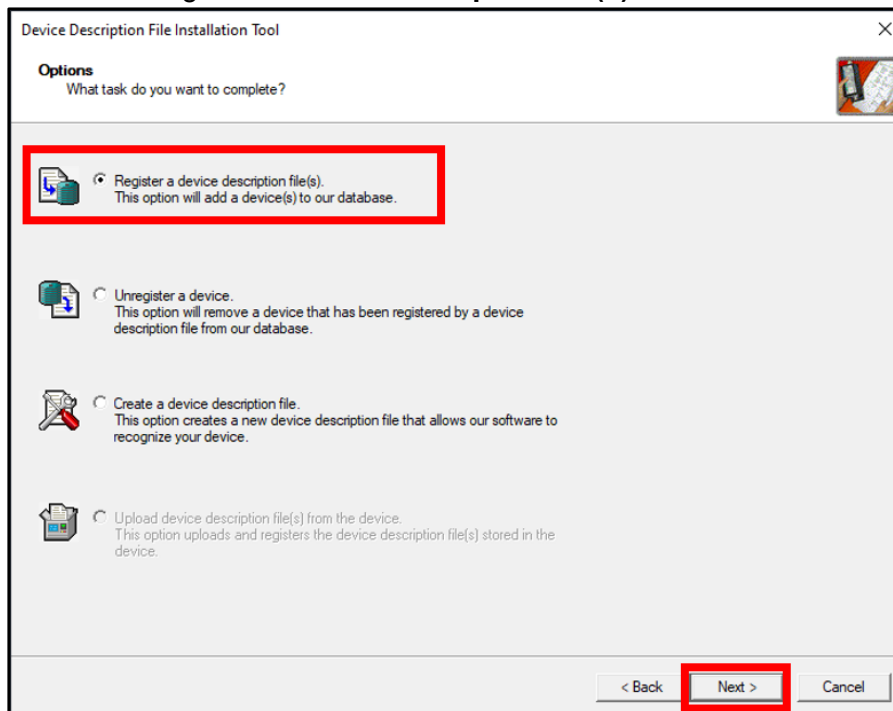
1. From Rockwell Studio 5000, open the **Tools** menu and select **EDS Hardware Installation Tool** from the list.



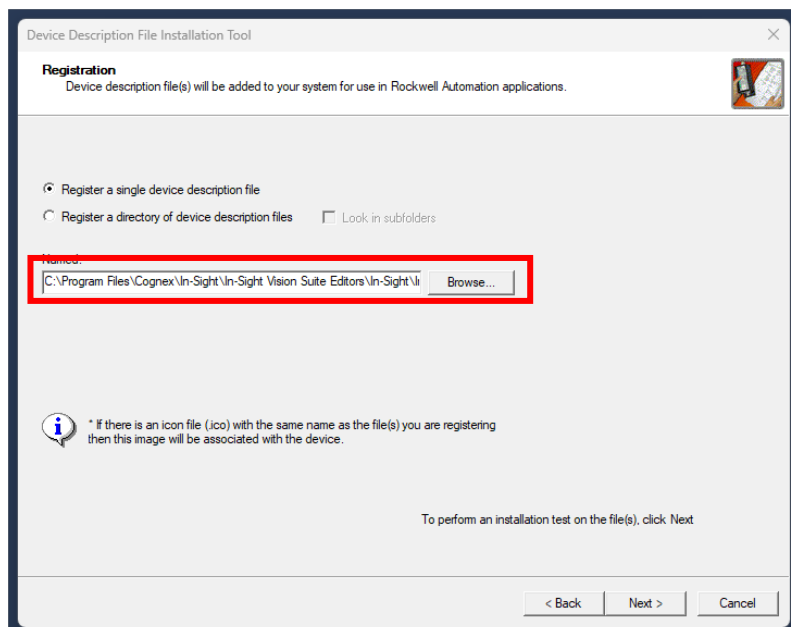
2. Click the **Next** button.



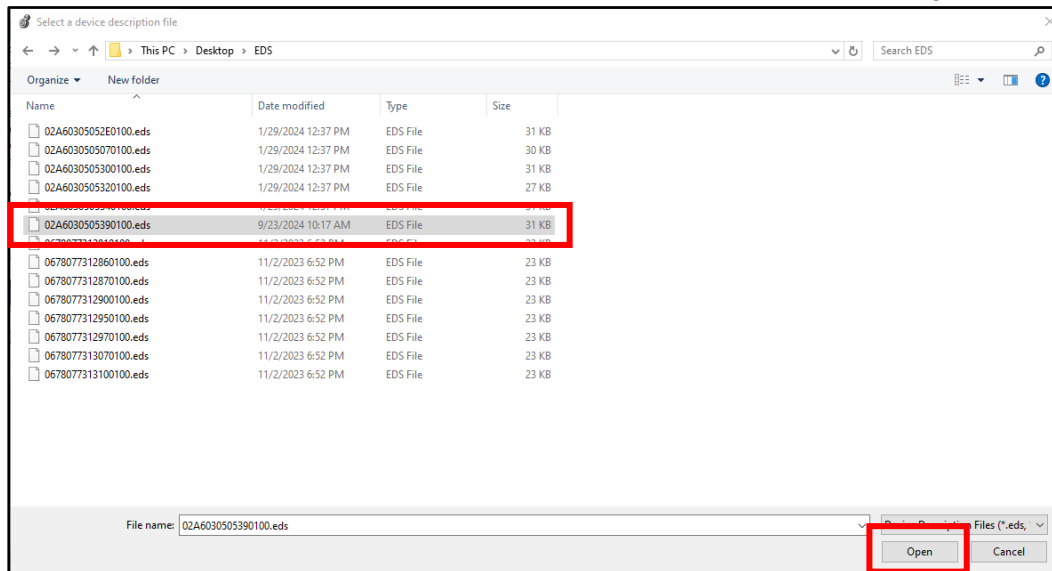
3. Select the **Register a device description file(s)** radio button and click the **Next** button.



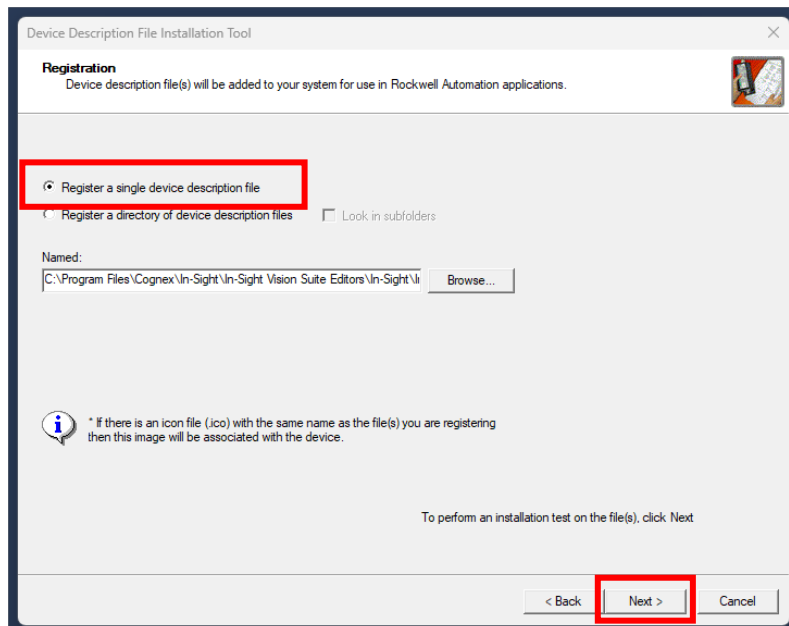
4. Click the **Browse** button and navigate to the EDS file location on your PC:
C:\Program Files\Cognex\In-Sight\In-Sight Vision Suite Editors\In-Sight\In-Sight\24.4.2\FFP\EDS



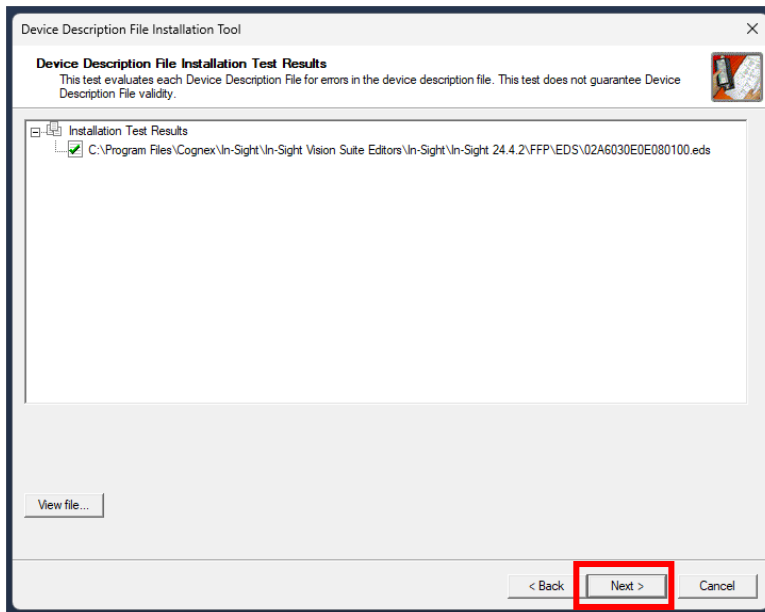
5. Select the file **02A6030E0E080100.eds**, close the Browse window using the **Open** button.



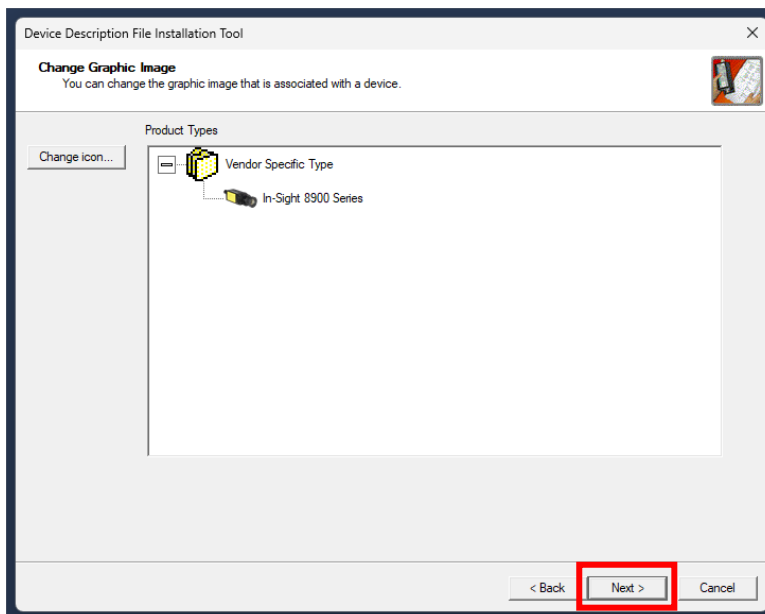
6. Select the **Register a single device description file** radio button and click the **Next** button.



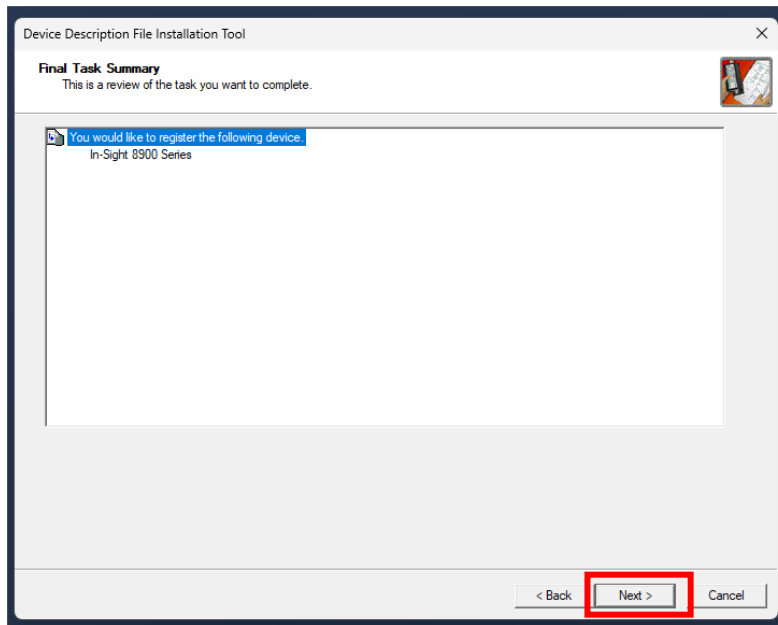
- Click the **Next** button.



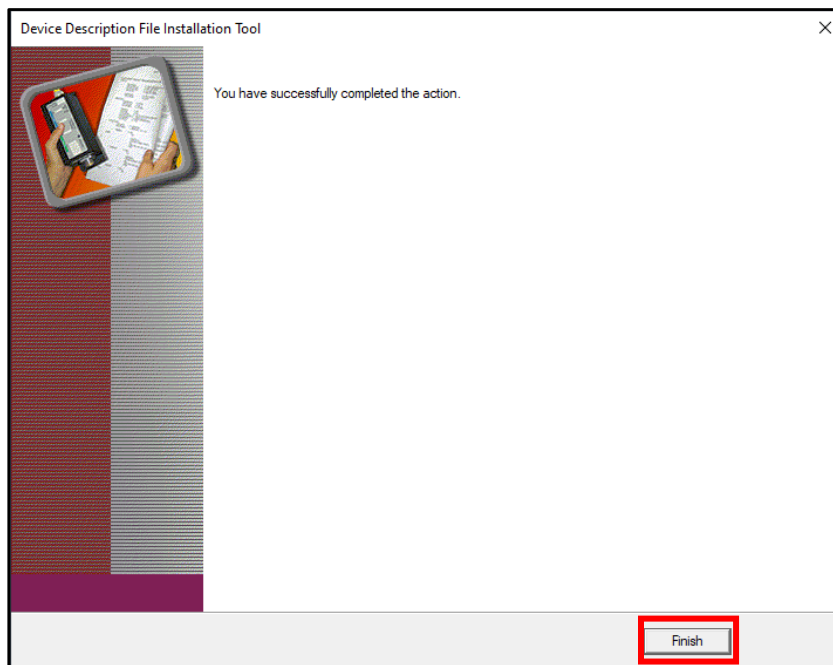
- Click the **Next** button.



9. Click the **Next** button.



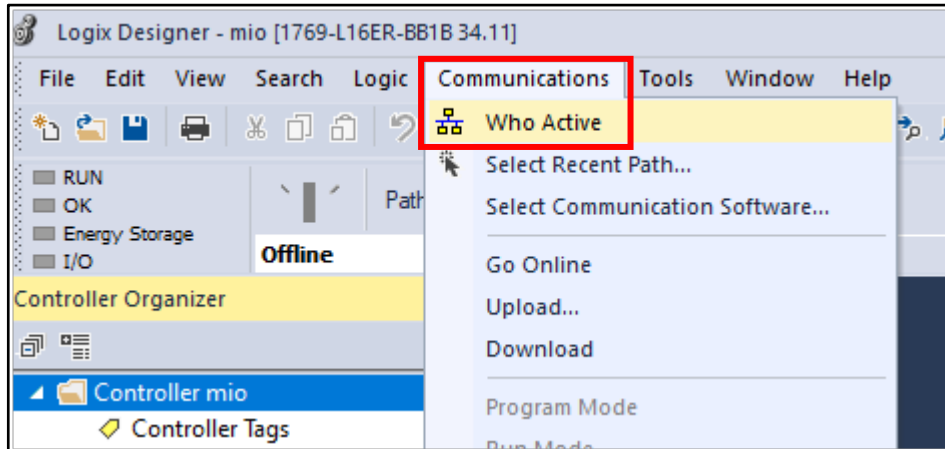
10. Click the **Finish** button.



Verify EDS Installation

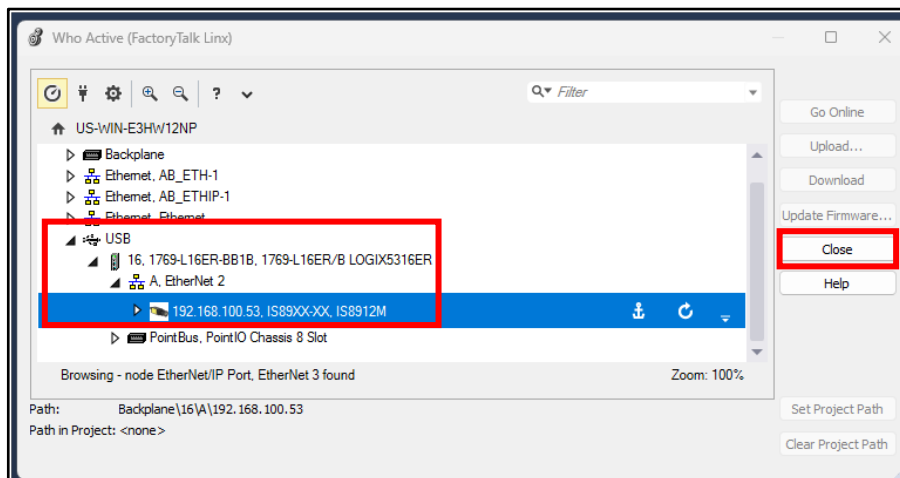
Open Rockwell Studio 5000.

1. In the project window, open the **Communications** menu and select **Who Active** from the list.



2. In the window that appears, select the PLC connection that you are using and search for the device.

NOTE: In this example USB is used, but depending on the connection used you can search by Ethernet connection.

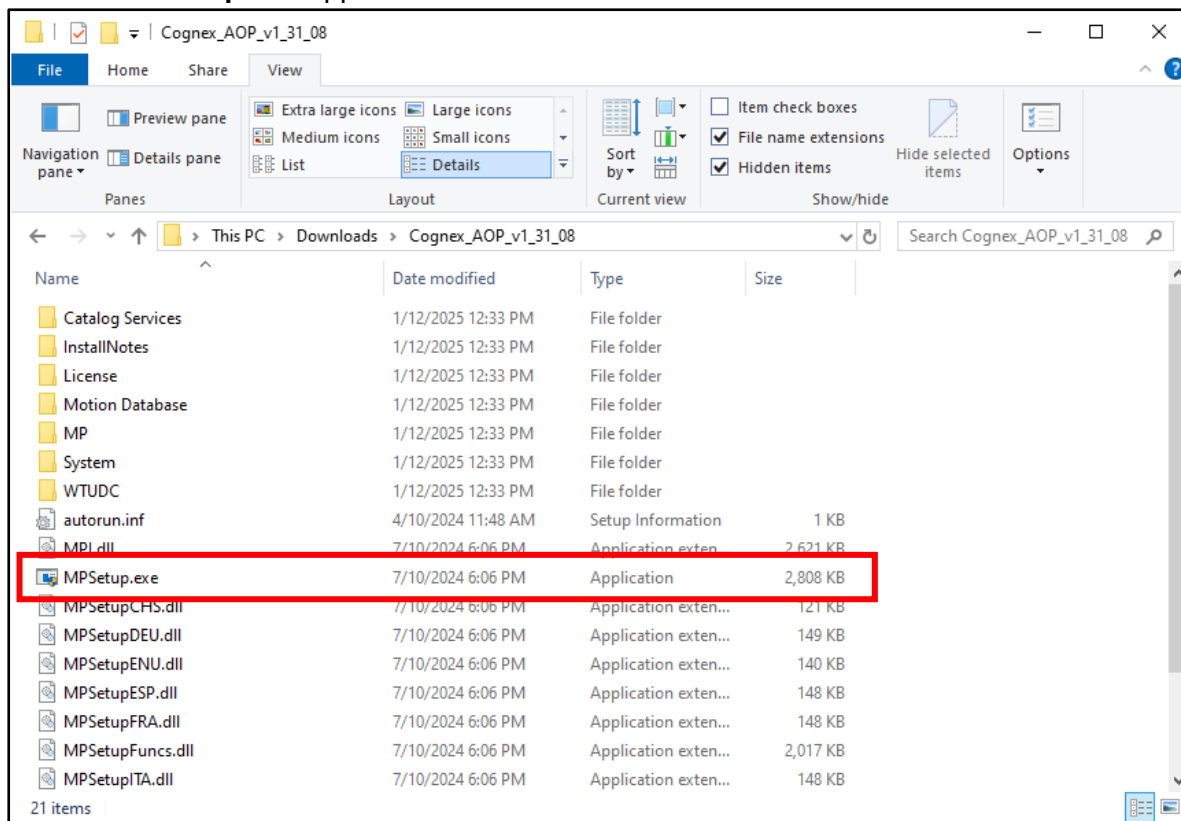


3. Click the **Close** button to close the Who Active window.

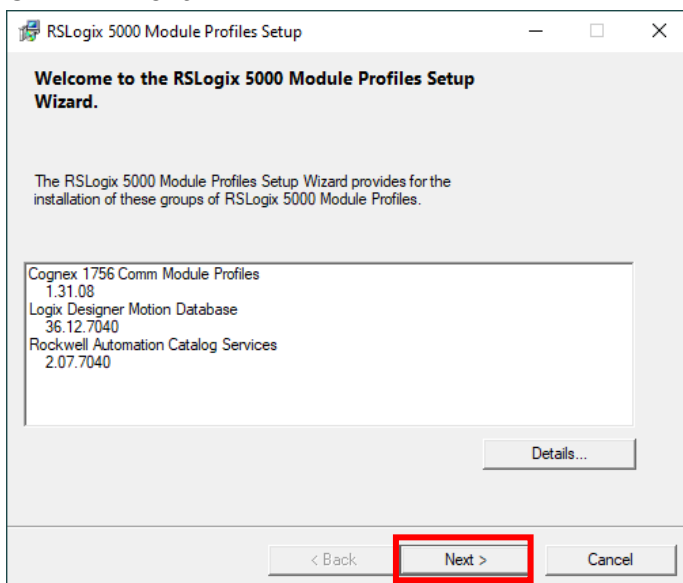
AOP Installation

Make sure all Rockwell Software is shut down to not interfere with the installation.

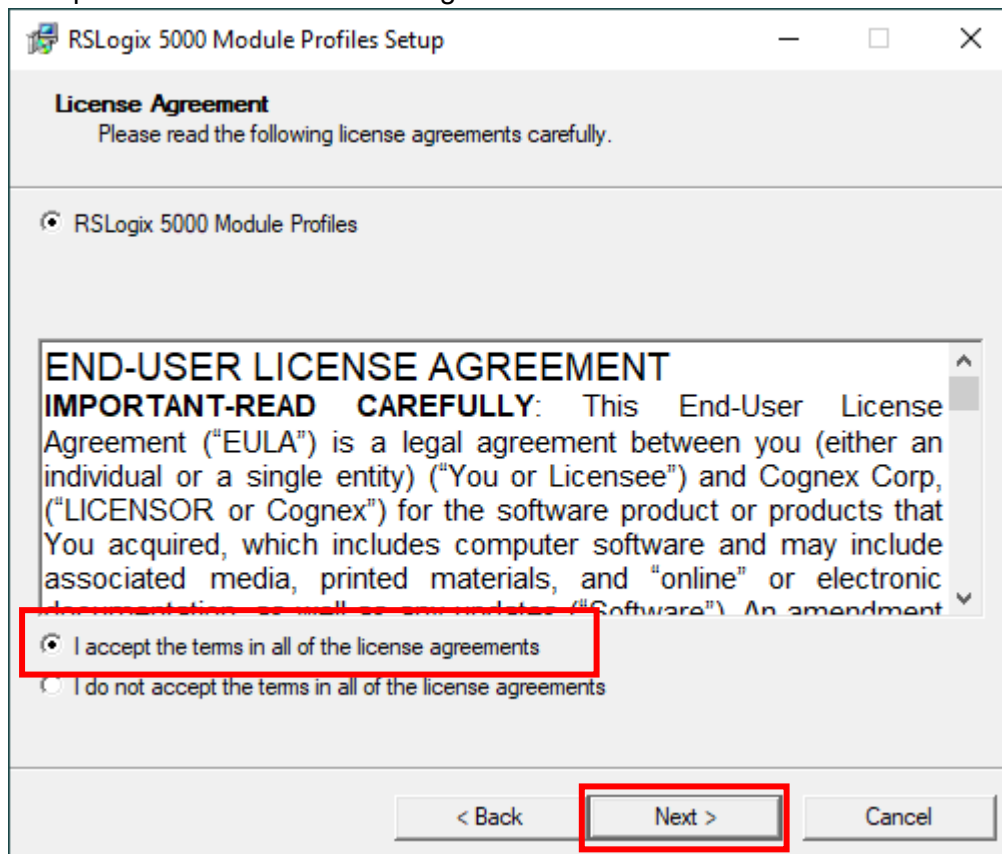
1. Run the **MPSetup.exe** application from the Downloaded and Extracted folder.



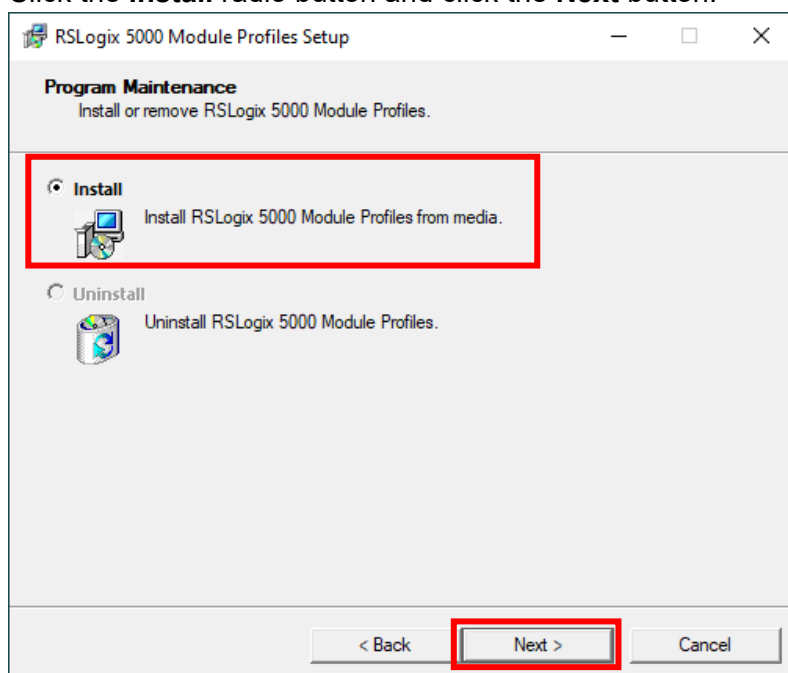
2. Click the **Next** button.



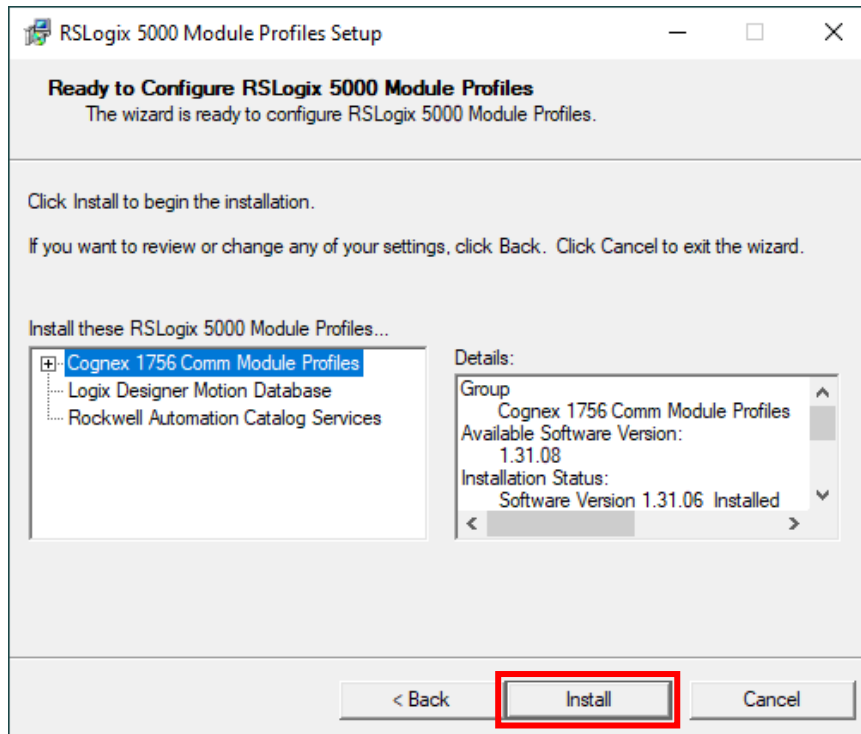
3. Accept the terms of the license agreements and click the **Next** button.



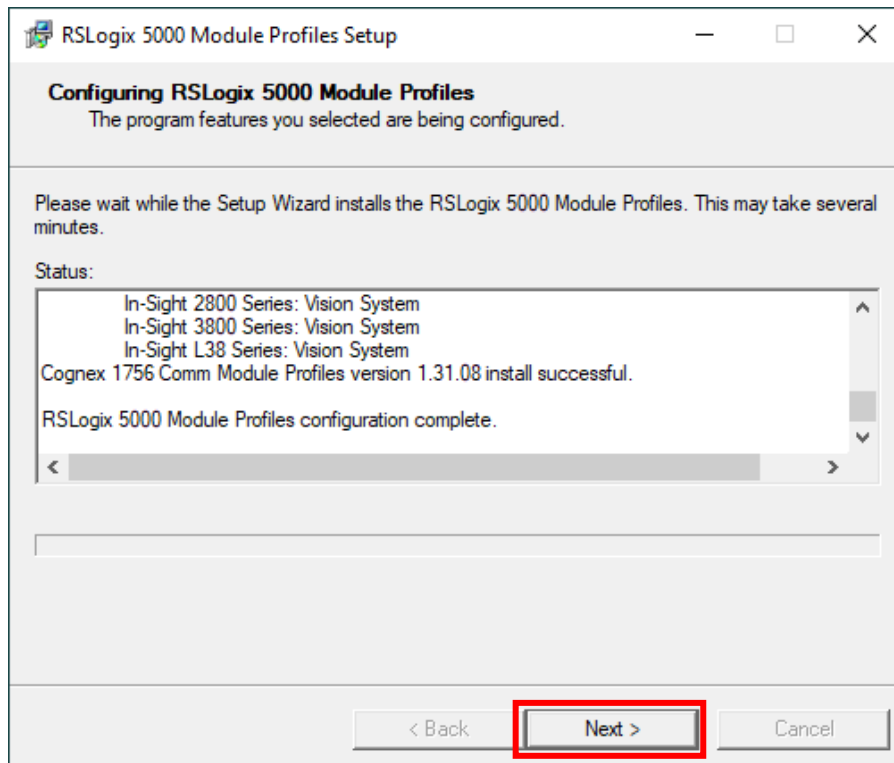
4. Click the **Install** radio button and click the **Next** button.



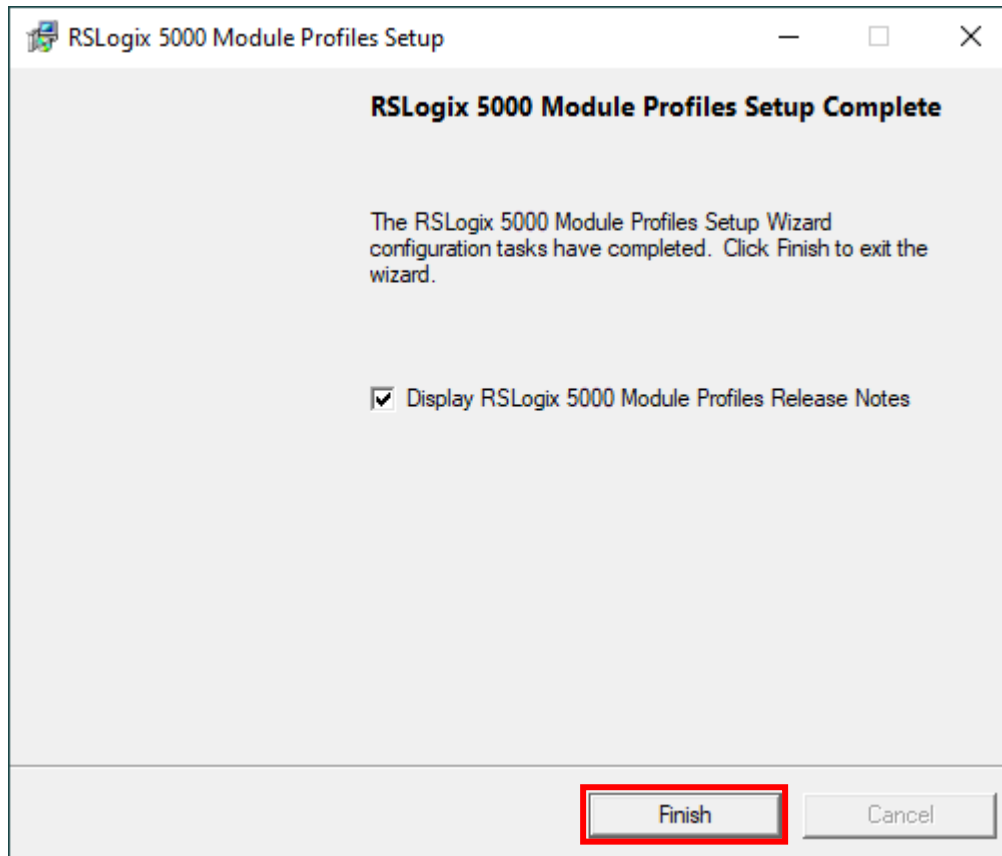
5. Click the **Install** button.



6. Click the **Next** button.



7. Click the **Finish** button.

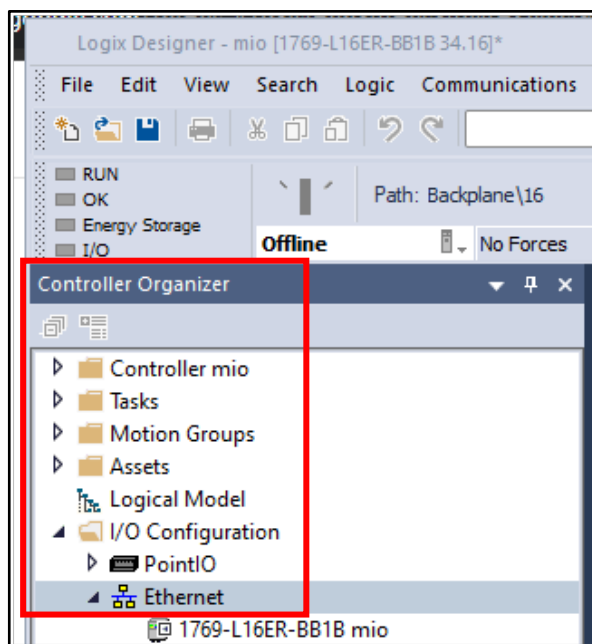


8. Restart the PC.
NOTE: AOPs reside on the computer they are installed on.

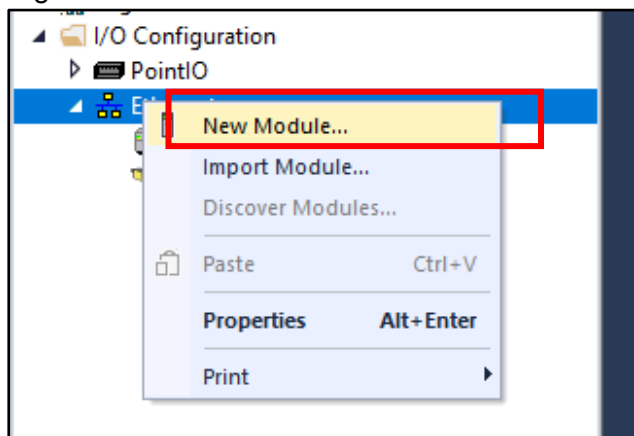
Add a Camera to the PLC Network Device

Confirm that the PLC is Offline.

1. Have Studio 5000 software open and in the corresponding project.
2. From the **Controller Organizer** menu, navigate to **I/O Configuration – Ethernet**.

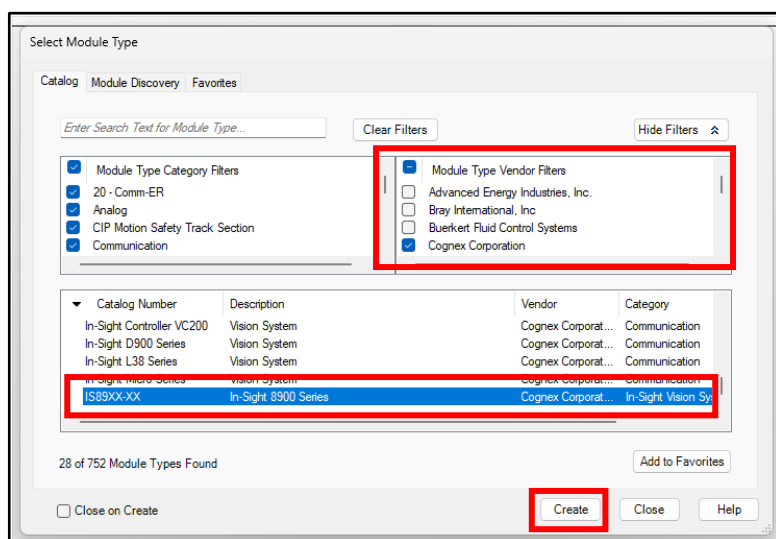


3. Right-click on **Ethernet** and select **New Module** from the fly-out list.



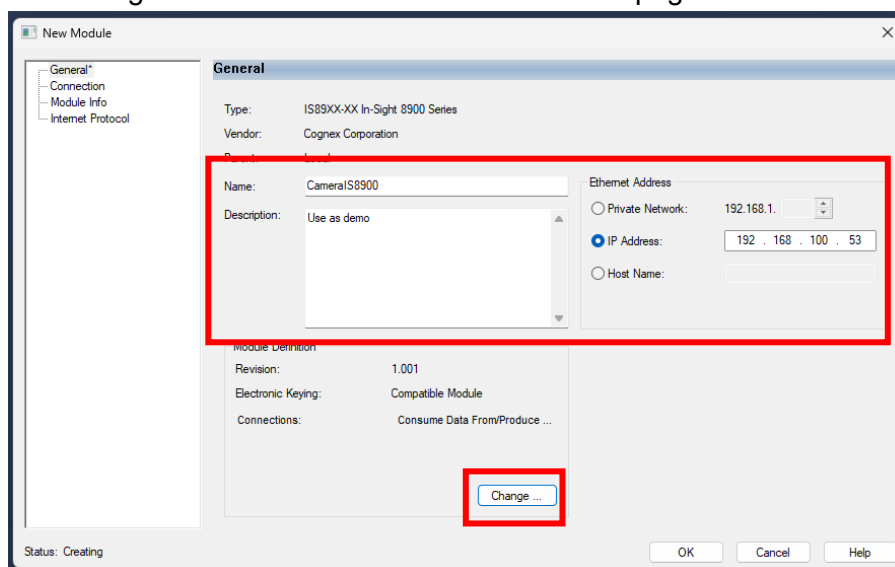
In the window that displays search for your camera. The easiest way is to filter through the vendors, disable all options and search only by **Cognex Corporation**.

4. Check the **Cognex Corporation** checkbox.
5. Select **IS89XX-XX** from the Catalog Number column.
6. Click the **Create** button.



The New Module – General Properties window opens.

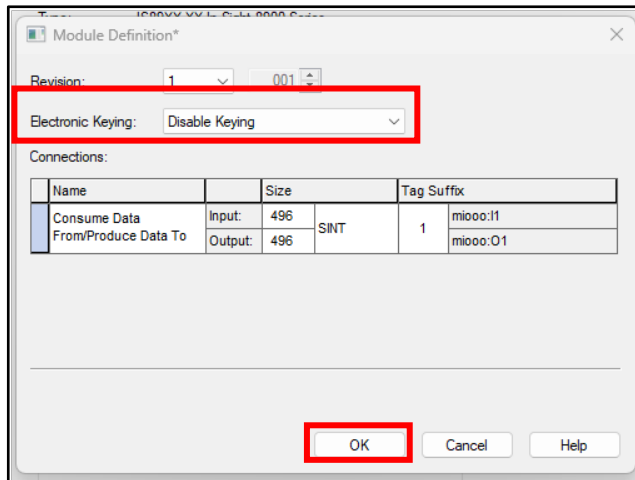
7. Enter the following information:
 - Unique name for the device (ex. CameraIS8900).
 - Description.
 - Set the Ethernet Address to the camera's IP address. This can be verified in the In-Sight Vision Suite software on the Home page.



8. To edit the **Module Definition**, click the **Change** button.

A new window opens.

9. In the **Electronic Keying** drop-down list select **Disable Keying**.



10. Click the **OK** button.

What is RPI?

Requested Packet Interval is a setting used in industrial protocol like EtherNet/IP to determine how often data is exchanged between a Controller (PLC) and a Device (like the camera) on a network. It's like setting a heartbeat for communication.

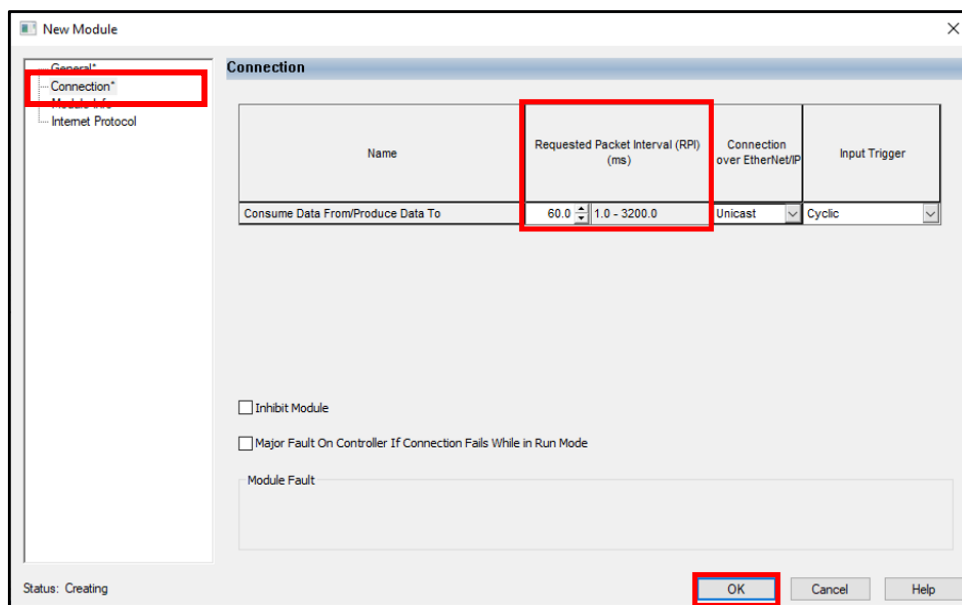
This value is relevant for applications since it is the time in which the PLC makes requests to update the information of the device in the data tables generated by the PLC. The value will depend on the particular application; it is recommended that it is a third of the time it takes the camera to process each image.

It is recommended that this value is not less than 60 ms. The smaller this value, the greater the network traffic which consequently leaves less bandwidth in the network, causing disconnections of some devices within the control network where the PLC is located.

Why is RPI Important?

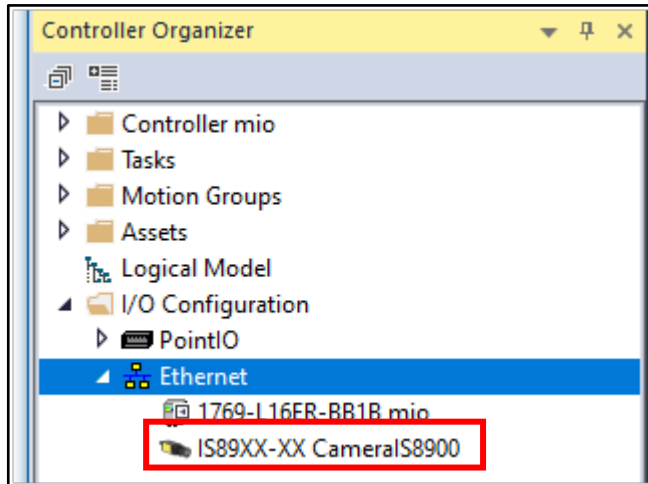
- **System Performance:** A faster RPI (lower number, e.g., 10ms) means more frequent updates, which is good for applications requiring precise, high-speed control, such as motion control or real-time monitoring.
- **Network Traffic:** A slower RPI (higher number, e.g., 100ms) reduces the frequency of communication, which helps to lower network traffic and prevent overload.
- **Balance:** You need to balance the RPI setting based on the application's speed requirements and the network's capacity.

1. In the **New Module** window, select the **Connection** option in the left-side window and change the **Requested Packet Interval (RPI)** value to 60 ms.
2. Click the **OK** button.



3. Close the remaining windows.

The camera should appear in the **Controller Organizer** panel.

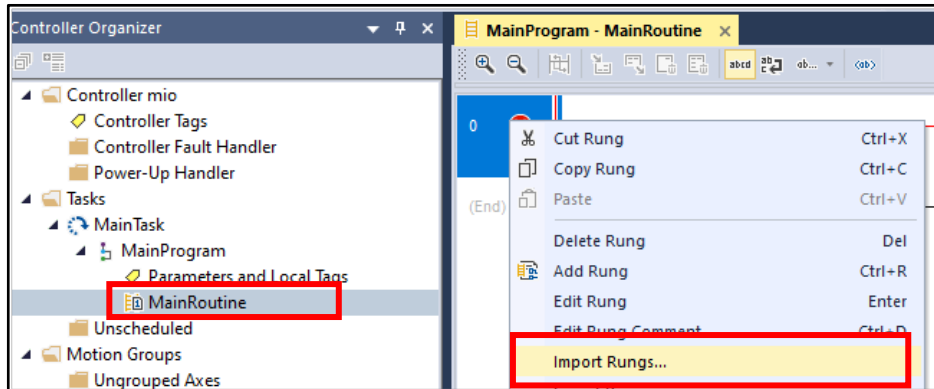


Creating the Data Structure

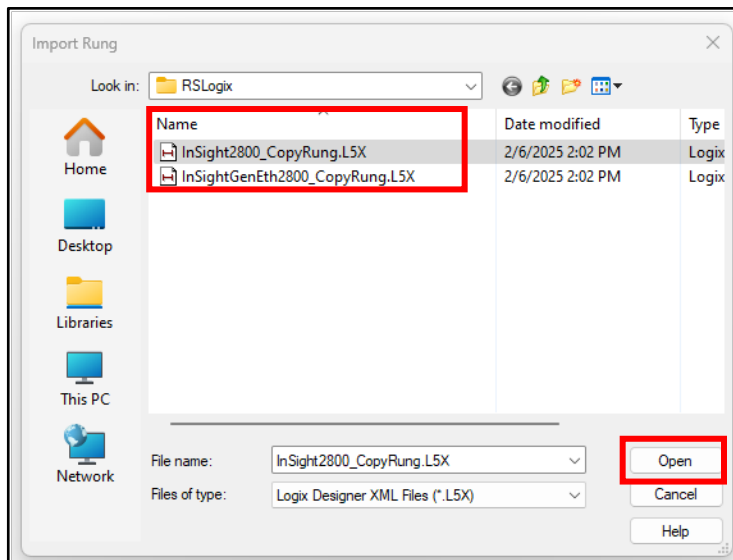
After you add the vision system to your RSLogix project, you can use the L5X import file to create structured data for the connection.

Follow the steps below to create the data structure:

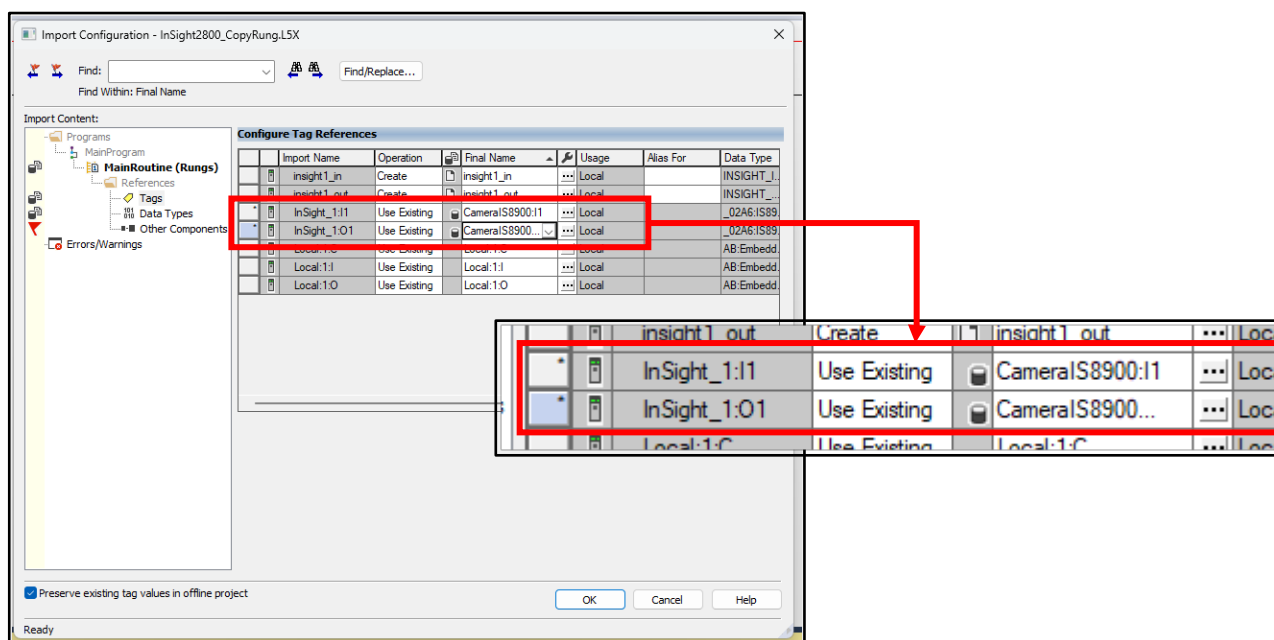
1. From **the Controller Organizer** select a routine to import the LX5 into the ladder program. On an available step of the program, right-click and select **Import Rungs** from the fly-out list.



2. The Import Rung window displays. Navigate to the LX5 files, select either file in the following directory:
C:\Program Files\Cognex\In-Sight\In-Sight Vision Suite Editors\In-Sight\In-Sight 24.4.1\FFP\RSLogix
3. Click the **Open** button.

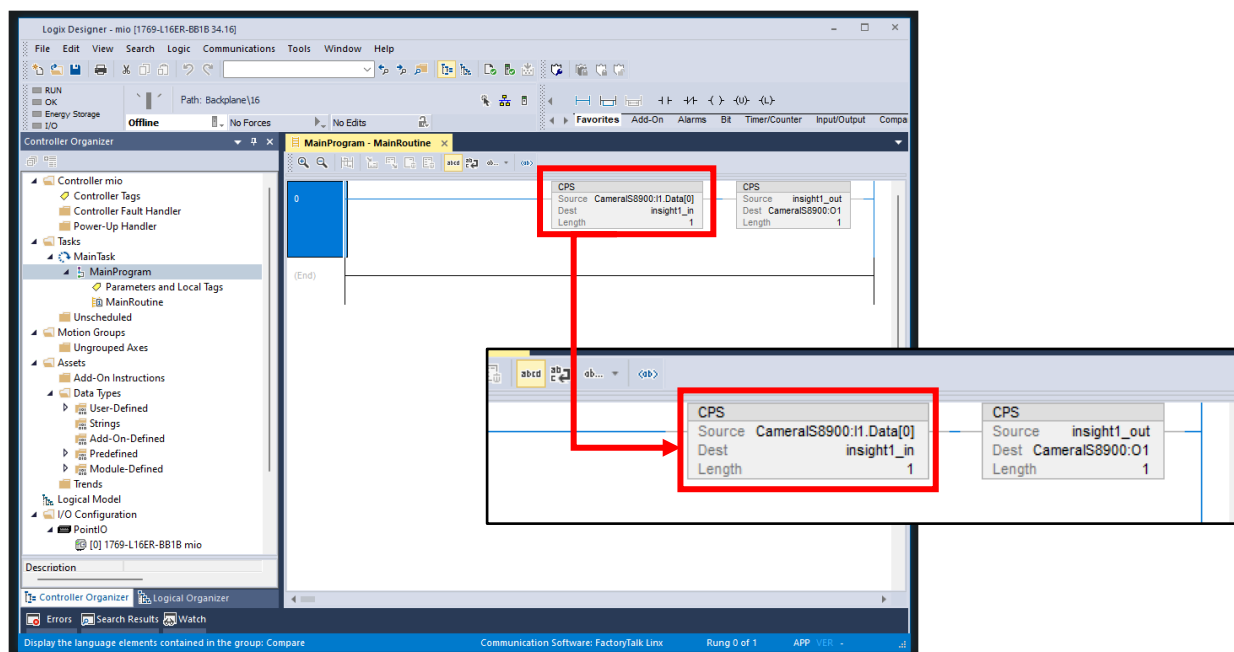


- Assign InSight_1:11 and InSight_1:O1 to the device that was created for the camera.



- Click the **OK** button to finish the Import process.

The **CPS** instructions should appear in the ladder program.



NOTE: When writing your ladder program, reference the items in the structured data variables; the previous Copy Rung automatically moves the data to and from the structured data instances to the EtherNet/IP connection.

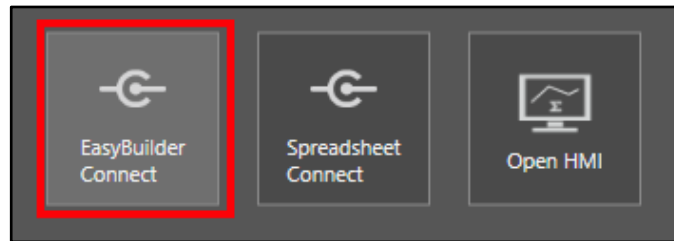
EasyBuilder Interface

This section outlines the minimum steps required to prepare the camera for imaging, send and receive data from the camera to the PLC using the EasyBuilder interface.

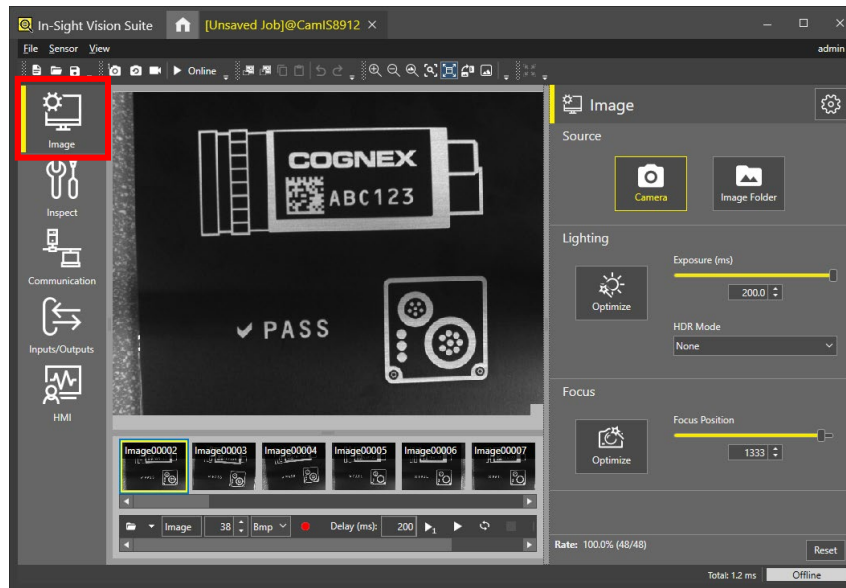
To check the sequence of steps in the PLC for Spreadsheet you should go to page 30.

NOTE: The steps to prepare the camera for network connection (Page 5) must be completed prior to these steps.

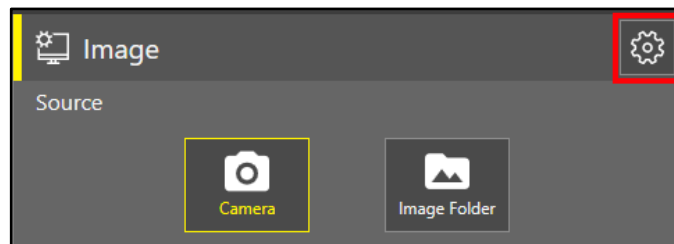
1. In the In-Sight Vision Suite software, select your camera and click the **EasyBuilder Connect** button to connect to the EasyBuilder interface.



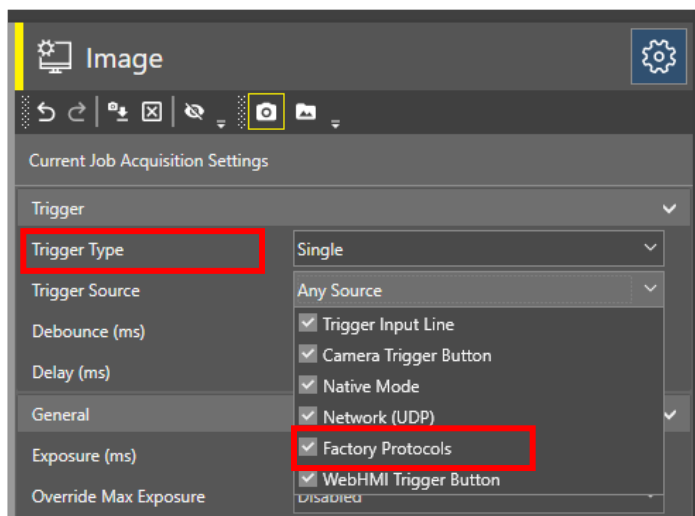
EasyBuilder opens and the **Image** step is active.



2. Click the **Cog** in the upper right corner to access the **Advanced Image** settings.



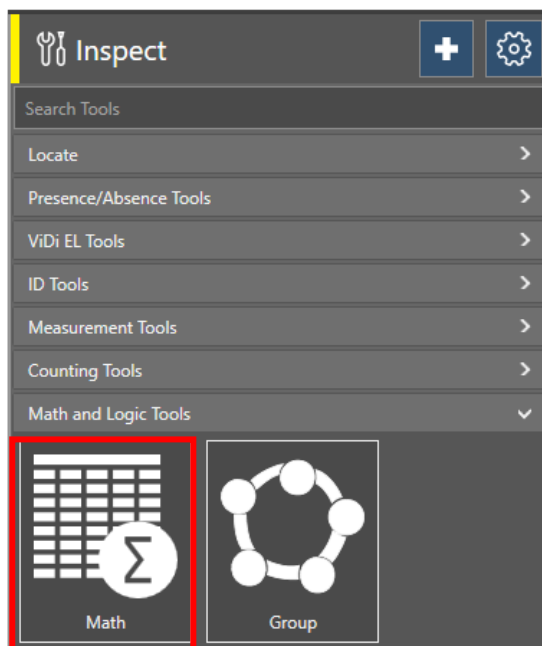
3. Verify that the **Factory Protocols** option is checked in the **Trigger Type** settings.



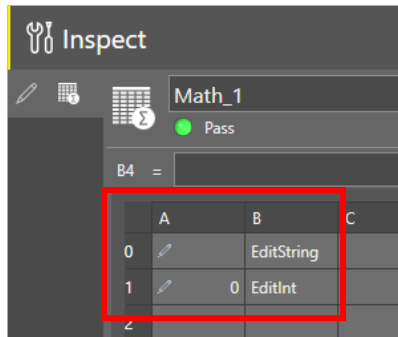
4. Select the **Inspect** step from the left-side panel.



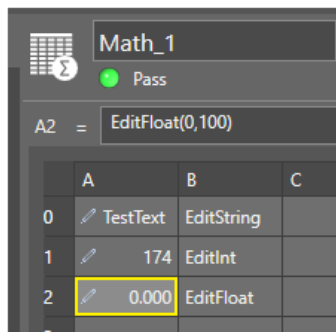
5. Open the Math and Logic Tools to add a **Math tool**.



- In cell **B0** enter the **EditString(8)** function and in cell **B1** the **EditInt(0.255)** function.
NOTE: This will place two tools in the Math tool that allow you to edit text and integers. These cells will function as elements that are sent to the PLC.



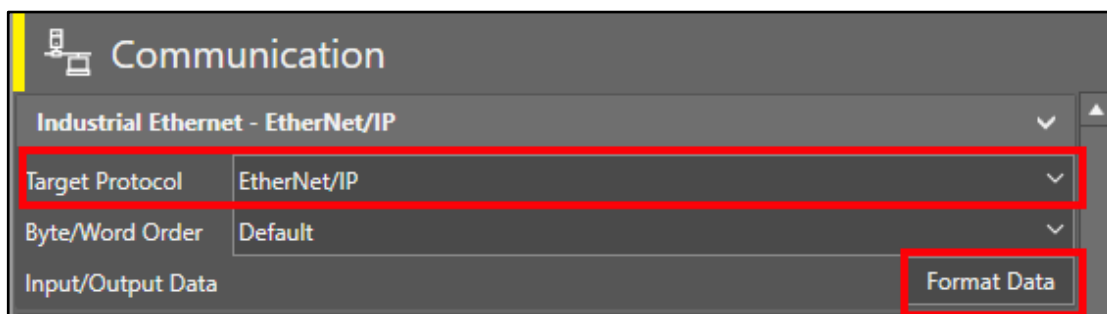
- Enter data in Cells **A0** and **A1**, in this example we use the data from "TestText" as the string and the value of 174 as the integer value.
- Additionally, in Cell **A2** enter an **EditFloat(0.100)** function that will serve to receive the REAL or FLOAT type data sent by the PLC to the camera.



- Select the **Communication** step from the left-side panel.

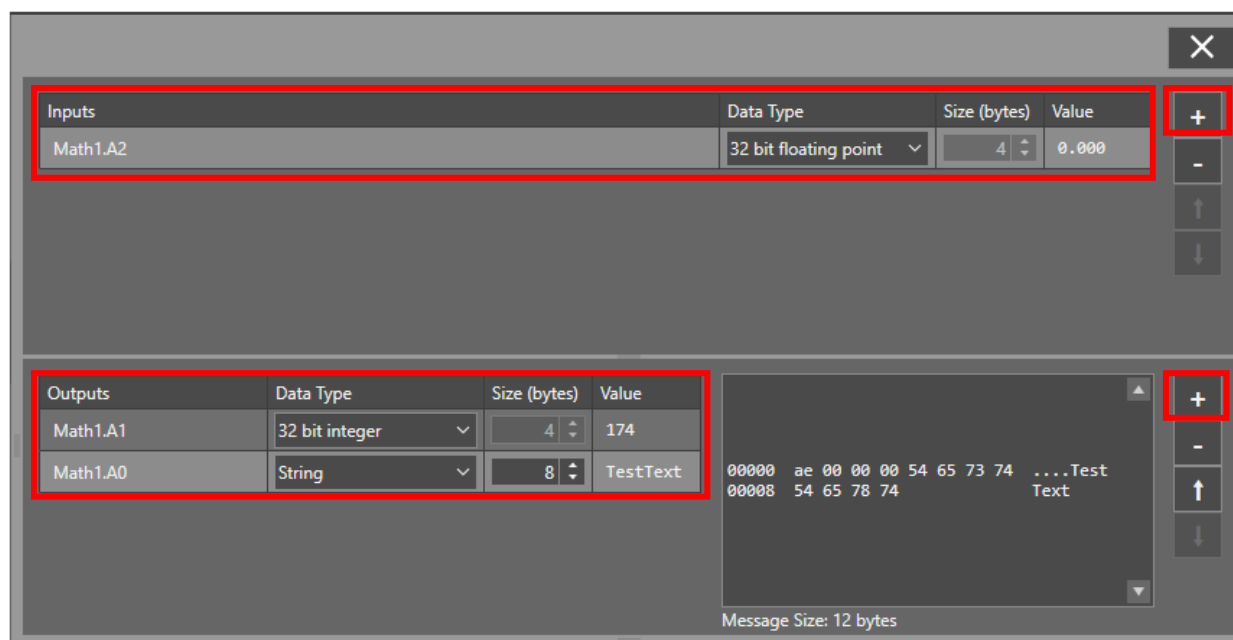


- The Communication settings open. Select **EtherNet/IP** from the **Target Protocol** drop-down list and click the **Format Data** button.

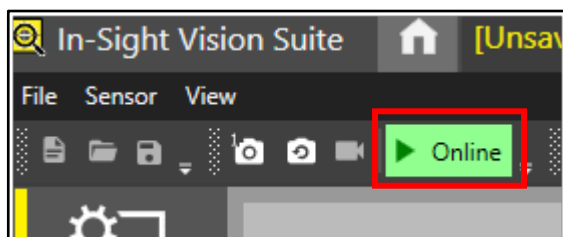


11. Click the **Inputs +** button to add an input:
 - **Math1.A2** with a Data Type of *32 bit floating point*
12. Click the **Outputs +** button to add the output:
 - **Math1.A1** with a Data Type of *32 bit Integer*
13. Repeat step 12 to add the second output:
 - **Math1.A0** with a Data Type of *String*

It is important to observe the order of the data since in this way the PLC will receive it.



14. Click the **Online** button to place the camera online.



15. Continue to the PLC Verification section on page 34.

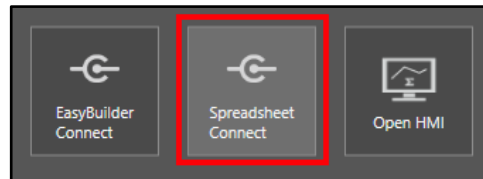
Spreadsheet Interface

This section outlines the minimum steps required to prepare the camera for imaging, send and receive data from the camera to the PLC using the Spreadsheet interface.

To check the sequence of steps in the PLC for EasyBuilder you should go to page 26.

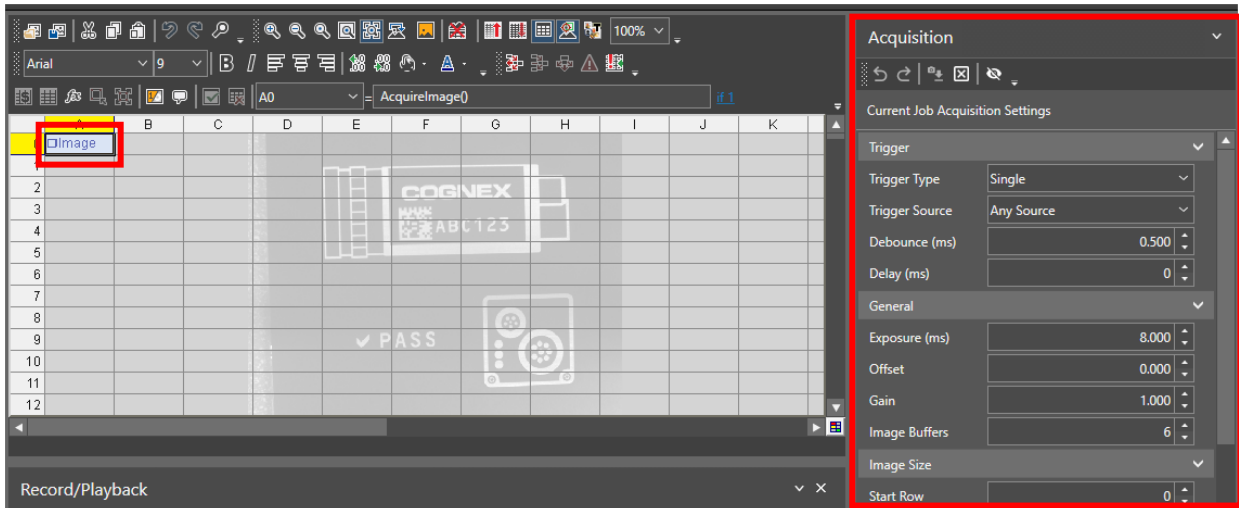
NOTE: The steps to prepare the camera for network connection (Page 5) must be completed prior to these steps.

1. In the In-Sight Vision Suite software, select your camera and click the **Spreadsheet Connect** button to connect to the Spreadsheet interface.

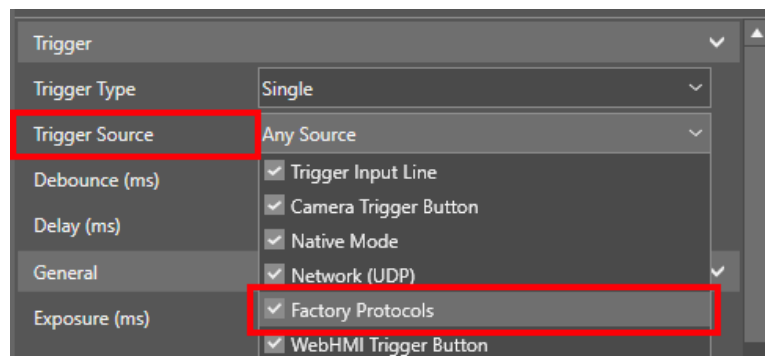


The Spreadsheet interface opens.

2. Double-click cell **A0** to open the Image properties.
The Image properties open.



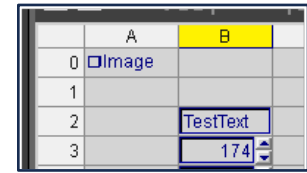
3. Verify that the **Factory Protocols** option is checked in the **Trigger Source** settings.



4. Enter the following functions in the indicated cells:

- Cell **B2** = *EditString*
- Cell **B3** = *EditInt*

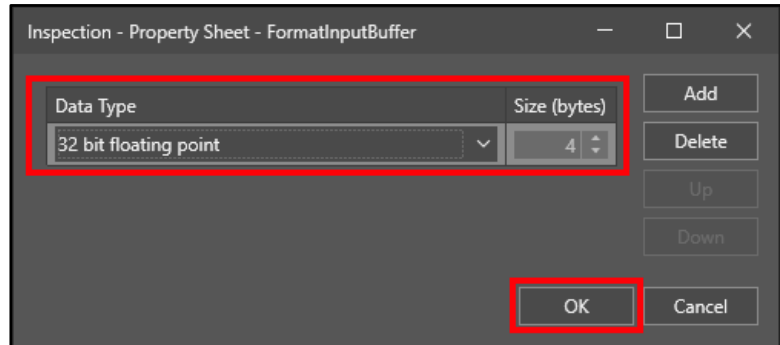
NOTE: It is not necessary to modify anything in the property sheet that appear in each of the functions, you just click the OK button in each of them.



	A	B
0	Image	
1		
2		TestText
3		174

5. Enter data in Cells **B2** and **B3**, in this example we use the data from "TestText" as the string and the value of 174 as the integer value.

6. In cell **B6** enter the **FormatInputBuffer** function, this function is responsible for organizing the data that is sent from the PLC. Select the Data Type of 32 bit floating point.



Inspection - Property Sheet - FormatInputBuffer

Data Type	Size (bytes)
32 bit floating point	4

Buttons: Add, Delete, Up, Down, OK, Cancel

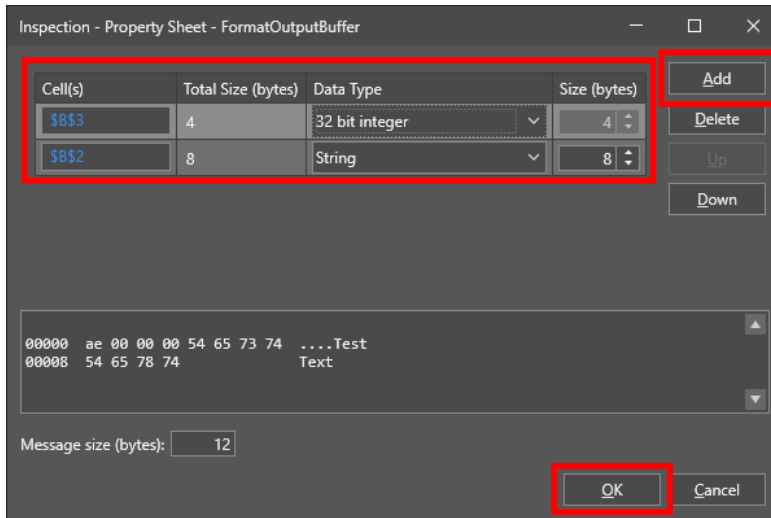
7. Click the **OK** button.

8. In cell **B7** enter the **FormatOutputBuffer** function.

9. Click the **Add** button and enter the following information:

- Cell **B3** = 32 bit integer
- Cell **B2** = String with a length of 8 bytes

NOTE: The order in which the data is placed in the buffer must be considered, since this is the order they arrive to the PLC.



Inspection - Property Sheet - FormatOutputBuffer

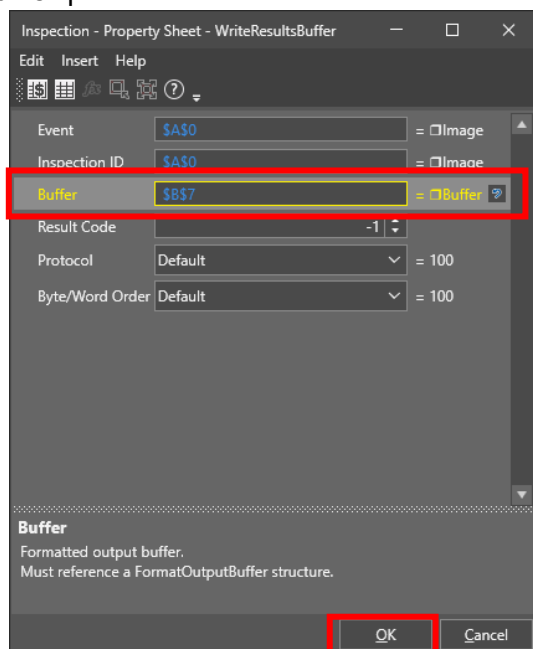
Cell(s)	Total Size (bytes)	Data Type	Size (bytes)
\$B\$3	4	32 bit integer	4
\$B\$2	8	String	8

Buttons: Add, Delete, Up, Down, OK, Cancel

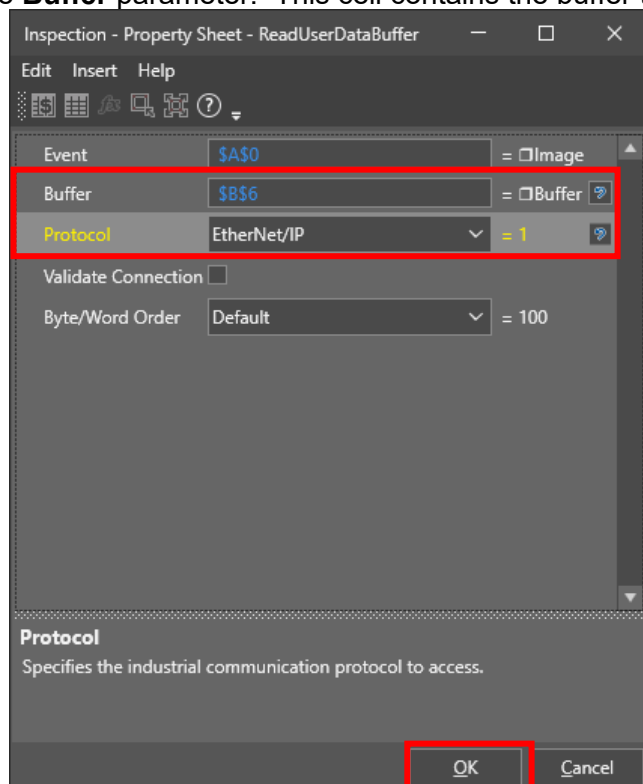
Message size (bytes): 12

10. Click the **OK** button.

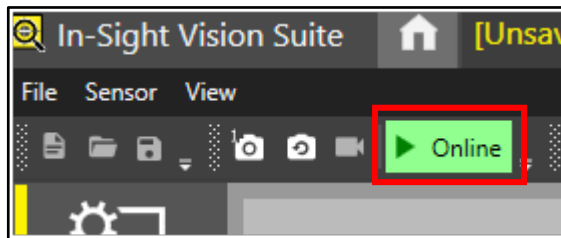
11. In cell **D7** enter the **WriteResultBuffer** instruction, in the property sheet enter cell **B7** in the **Buffer** parameter. This cell contains the buffer that must be *sent* to the PLC.



12. Click the **OK** button.
13. In cell **D6** enter the **ReadUserDataBuffer** instruction, in the property sheet enter cell **B6** in the **Buffer** parameter. This cell contains the buffer that is *received* from the PLC.



14. In the **Protocol** parameter select **EtherNet/IP**.
15. Click the **OK** button.
16. In cell **B4** enter the **GetBufferData(D6,0)** statement, the value of **D6** is the cell that contains the buffer read instruction that comes from the PLC and the ZERO indicates that it is the first element of the buffer, if the buffer has more elements the value of ZERO is changed to the value of the index of the element that is in the buffer, the first incident is ZERO, the second element is ONE and so on.
17. Click the **Online** button to place the camera online.



18. Go to the PLC Verification section on page 34.

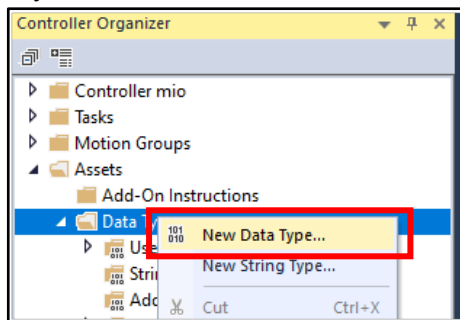
Verification from the PLC

Once the input and output data has been configured in the camera, the following steps must be performed to verify that the data can reach and leave the PLC to the camera.

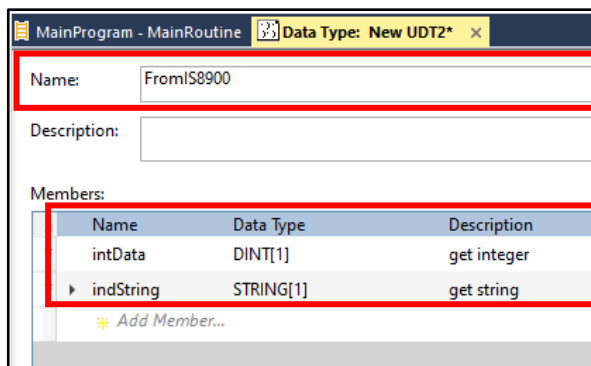
PLC Preparation

Open Rockwell Studio 5000, a new Data Type must be added to the project to *receive* the arrival data to the PLC.

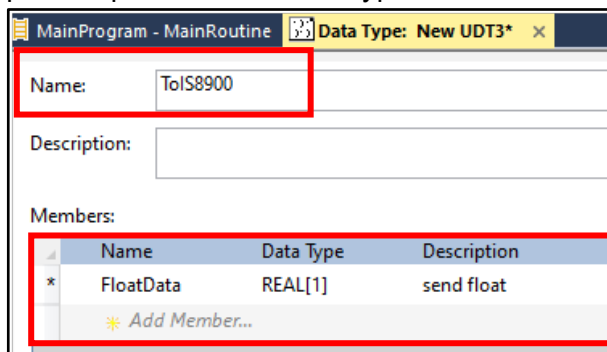
1. In the **Controller Organizer** panel, right-click **Data Type** and select **New Data Type** from the fly-out list.



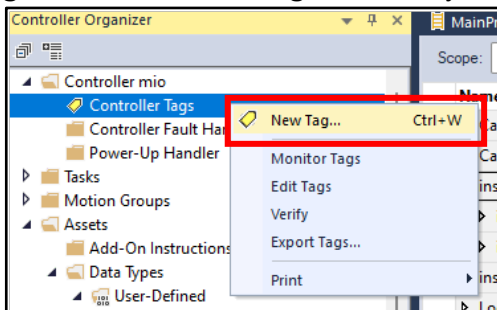
2. Add **Members** that correspond to the **Integer** and **String** sent by the camera.



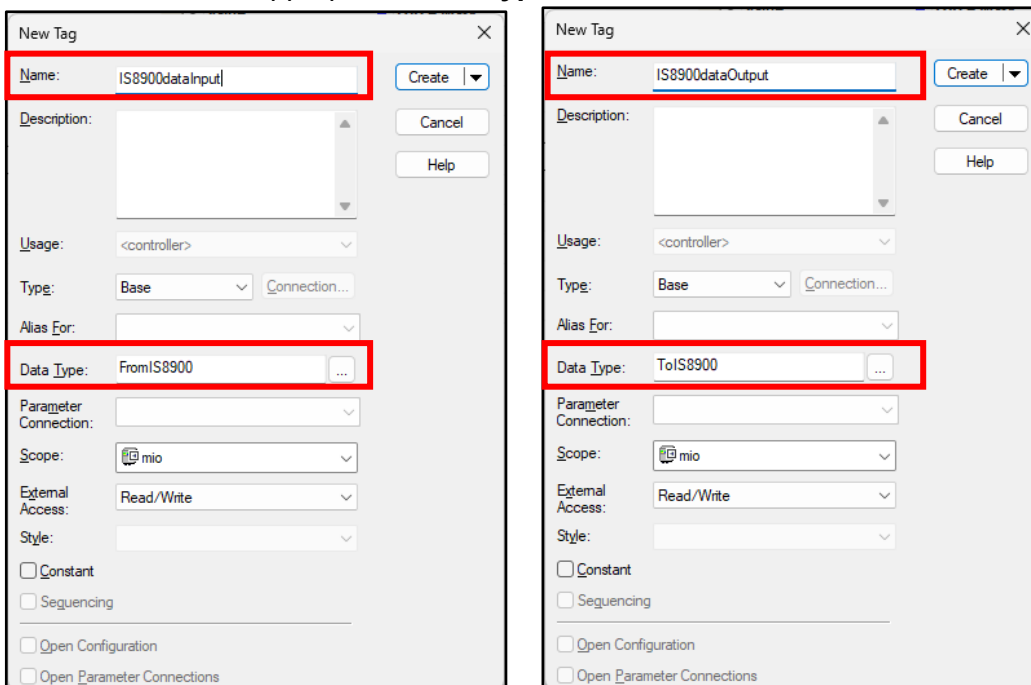
3. Click the **OK** button to finish the process of creating the input Data Type.
4. Repeat step 1 to add a Data Type that will *send* information to the camera.



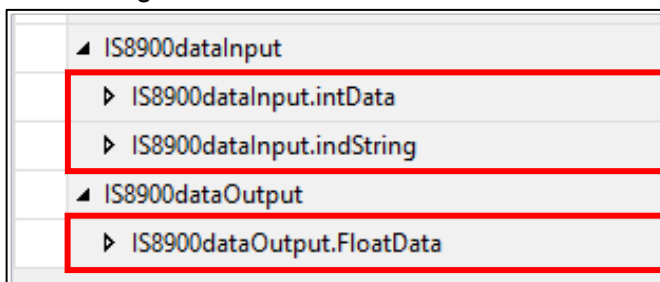
5. Click the **OK** button.
6. From the **Controller Organizer** panel, you must add new **Tags**. Right-click on **Controller Tags** and select **New Tag** from the fly-out list.



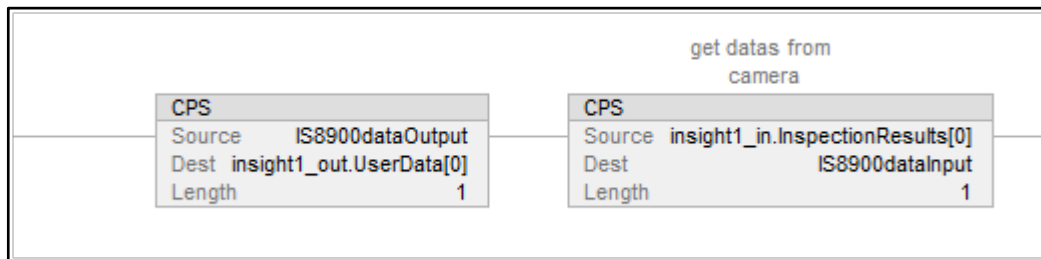
7. Two tags must be created, one for the *Input Data* and one for the *Output Data*. Care must be taken to select the appropriate **Data Type**.



8. Once each of the tags has been created, it must be verified that they appear in the list of Controller Tags.



9. In the ladder program enter a new programming line containing a pair of CPS instructions, one is responsible for reading the *Input* data and the other for the *Output* data.



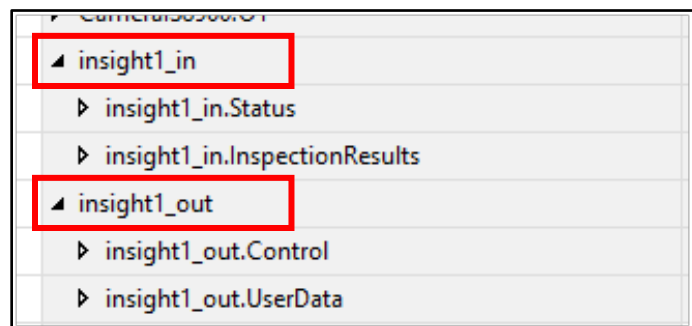
10. Download the program into the PLC and put it in **Run** mode.

Trigger Verification

This procedure works for both the EasyBuilder and Spreadsheet interface. The camera must be in **Online** mode and the PLC must be in **Run** mode to execute the following steps.

1. From the **Controller Tags** table, locate the *insight1_in* and *insight1_out* tags. In these two elements you will find all the tags of the Instances required for communication between the camera and the PLC.

NOTE: The description of each is found in the Application Development manual for the EasyBuilder and Spreadsheet interface, which can be found in the Help menu of the In-Sight Vision Suite software.

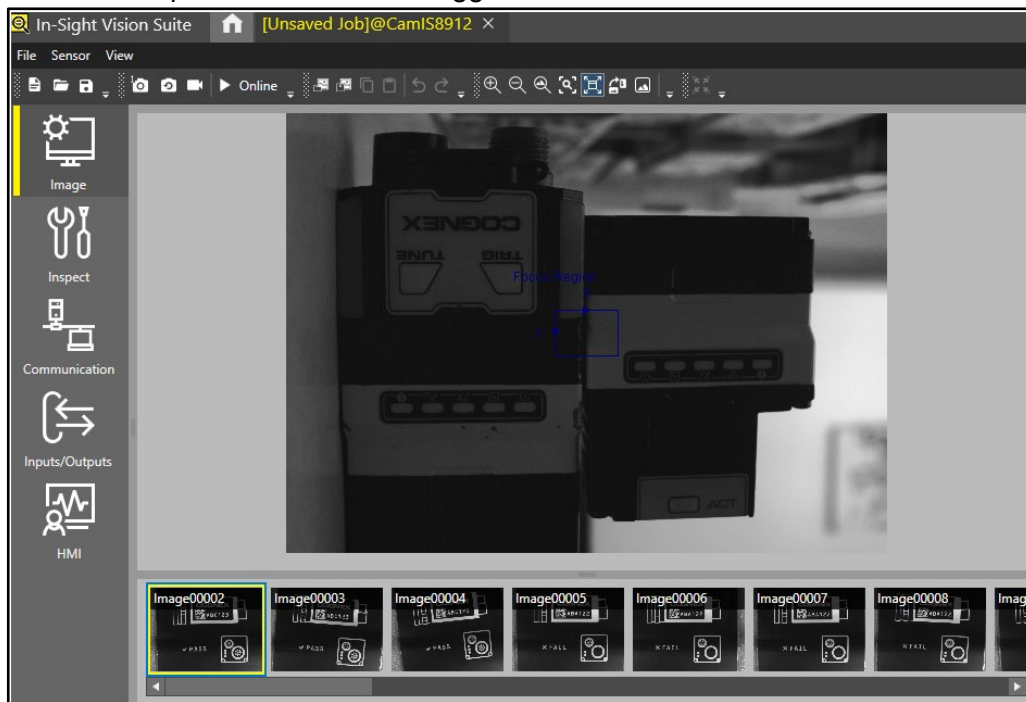


2. Performing the trigger requires following an activation sequence in the control bits, The **TriggerEnable** signal must first be enabled (1) and left on, then the **Trigger** control signal must be enabled (1).

insight1_out	{...}
insight1_out.Control	{...}
insight1_out.Control.TriggerEnable	1
insight1_out.Control.Trigger	0

insight1_out	{...}
insight1_out.Control	{...}
insight1_out.Control.TriggerEnable	1
insight1_out.Control.Trigger	1

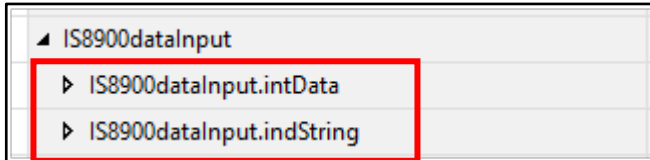
3. After this sequence, the camera triggers!



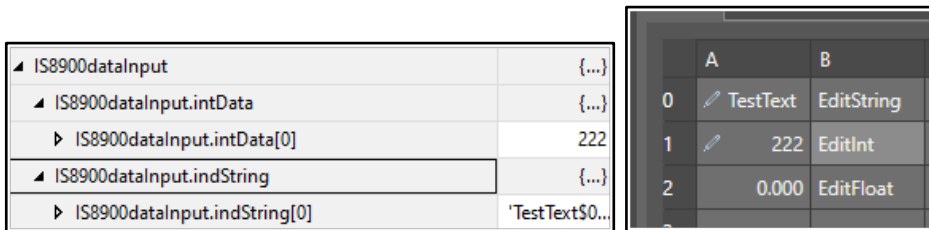
PLC Input Data Verification

This procedure works for both EasyBuilder and Spreadsheet. The receipt of data depends on the Main Event that captured the image, so it is necessary to have previously executed the trigger verification steps and programming in EasyBuilder or Spreadsheet as appropriate.

1. From the **Controller Tags** table you must locate the previously created IS8900dataInput tags. In this data, the *Integer* and *String* were registered.



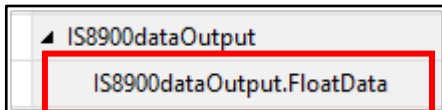
2. After capturing the image, the data must be updated in each of the elements of this tag. The data that displays will correspond to the data placed in the *EditInt* and *EditString* tools that were created previously.



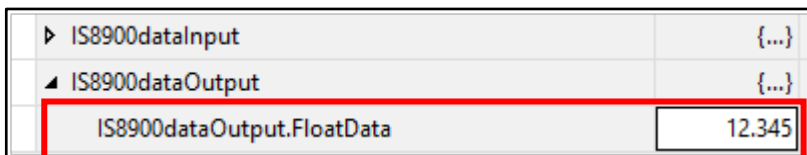
PLC Output Data Verification

This procedure works for both EasyBuilder and Spreadsheet. The receipt of data depends on the Main Event that captured the image, so it is necessary to have previously executed the trigger verification steps and programming in EasyBuilder or Spreadsheet as appropriate.

1. From the **Controller Tags** table you must locate the previously created IS8900dataOutput tag. In this data, the *Float Data* was registered.



2. Enter a value in the IS8900dataOutput.FloatData tag.



3. Locate the insight1_out tag. Control.SetUserData and set the value to **1**, this will indicate that the user value is ready to be placed.

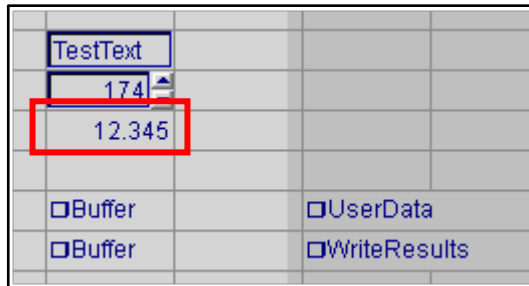
▲ insight1_out	{...}
▲ insight1_out.Control	{...}
insight1_out.Control.TriggerEnable	1
insight1_out.Control.Trigger	1
insight1_out.Control.BufferResultsEnable	0
insight1_out.Control.InspectionResultsAck	0
insight1_out.Control.ExecuteCommand	0
insight1_out.Control.Reserved0_5	0
insight1_out.Control.Reserved0_6	0
insight1_out.Control.SetOffline	0
▶ insight1_out.Control.Reserved_Byte1	0
insight1_out.Control.SetUserData	1

The camera has several **ACK**-type control bits that help to confirm that an instruction has been received, in this case it is the insight1_in bit.

The Status.SetUserDataAck bit should change to **1** when the statement is accepted.

▲ insight1_in.Status	{...}
insight1_in.Status.TriggerReady	0
insight1_in.Status.TriggerAck	0
insight1_in.Status.Reserved0_2	0
insight1_in.Status.AcqError	0
insight1_in.Status.OfflineReason0	0
insight1_in.Status.OfflineReason1	0
insight1_in.Status.OfflineReason2	0
insight1_in.Status.Online	0
insight1_in.Status.Reserved1_0	0
insight1_in.Status.InspectionCompleted	0
insight1_in.Status.ResultsBufferOverrun	0
insight1_in.Status.ResultsValid	0
insight1_in.Status.CommandExecuting	0
insight1_in.Status.CommandCompleted	0
insight1_in.Status.CommandFailed	0
insight1_in.Status.Error	0
insight1_in.Status.SetUserDataAck	0

4. Since the function of reading the data buffer entering the camera is referenced to the trigger, it will be necessary to carry out the trigger process described above.
5. When the procedure has been carried out, the data written in the PLC must be projected in the camera program containing the GetBufferData function in the Spreadsheet, or the parameter or control set in the camera's input buffer in EasyBuilder.



Main Program Code

For this guide, this was the test program carried out.

