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Introduction

This manual is intended to provide new users with a step-by-step guide for establishing communication between an In-Sight 8900 series camera and SIEMENS PLCs using the Profinet protocol.

Required Software

- Cognex In-Sight Vision Suite version 24.4.2 or newer
- Siemens TIA Portal

Necessary 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.
- SIEMENS PLC with power supply as required.
- CAT6E preferred network cables for connecting the PC/network switch and PLC/network switch.

Download Needed Files

GSD Files

A GSD file (General Station Description) is a description of an IO device provided by the device manufacturer. The contents of the GSD consist of configuration information, parameters, modules, diagnostic and alarms, and vendor and device identification. It serves as a 'data sheet' for configuring and integrating a device within a networked system.

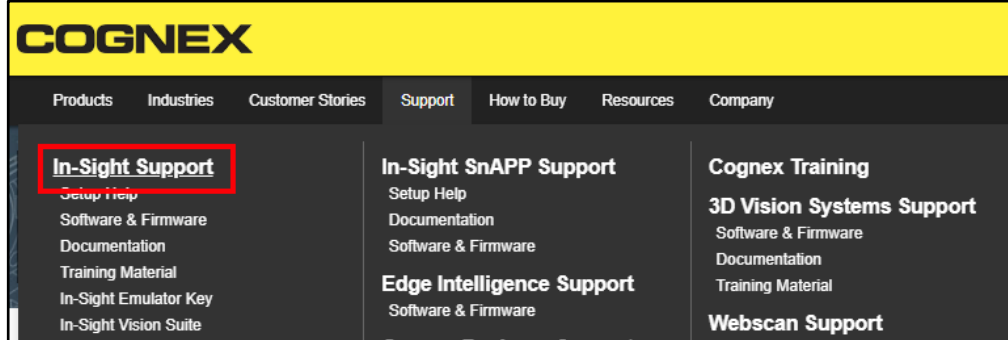
GSD files can be downloaded from Cognex.com

TIA Portal Integration Guide and Tag Generator

The TIA Portal Integration Guide is an integration guide for adding various Cognex products to a Siemens PLC using the TIA Portal software. Also included is a spreadsheet for generating all of the tags for the various control and status modules.

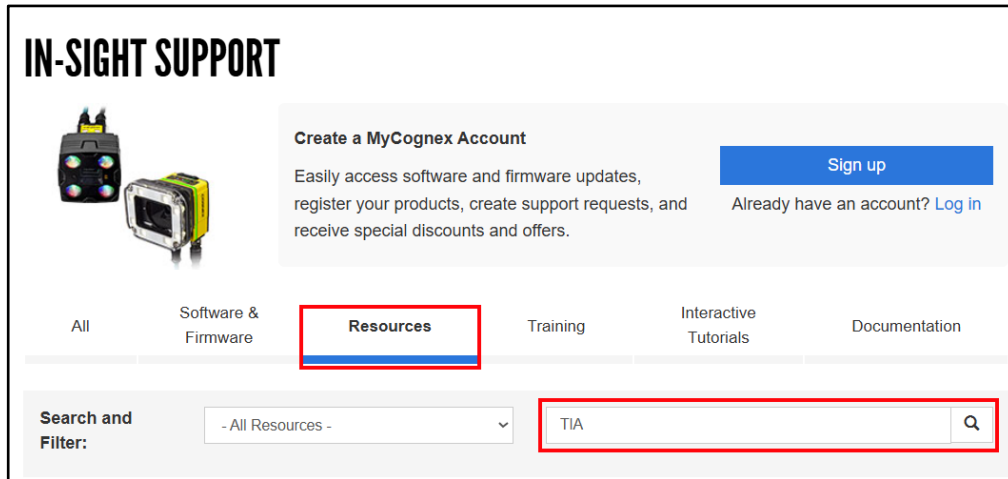
The TIA Portal Integration Guide can be downloaded from Cognex.com.

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



The In-Sight Support page displays.

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



3. Select **TIA Portal Integration Guide and Tag Generator** 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
TIA Portal Integration Guide and Tag Generator	.zip	2.1MB	3/18/2025

4. Click the **Download** button.

TIA PORTAL INTEGRATION GUIDE AND TAG GENERATOR

An integration guide for adding various Cognex products to a Siemens PLC using the TIA Portal software.

Also included is a spreadsheet for generating all of the tags for the various control and status modules. The following products are now covered:

In-Sight Explorer products (versions 4.x, 5.x, & 6.x)

In-Sight Vision Suite Products

SnApp

Dataman Products

ViDi PC

CC24 & VC5

File Type: .zip

File Size: 2.1MB

Version: 3.0

Release Date: 3/18/2025

[Download](#)

[Email a Link](#)

5. Copy this folder to the PLC programming PC.
6. Extract the files. Make note of the file location.

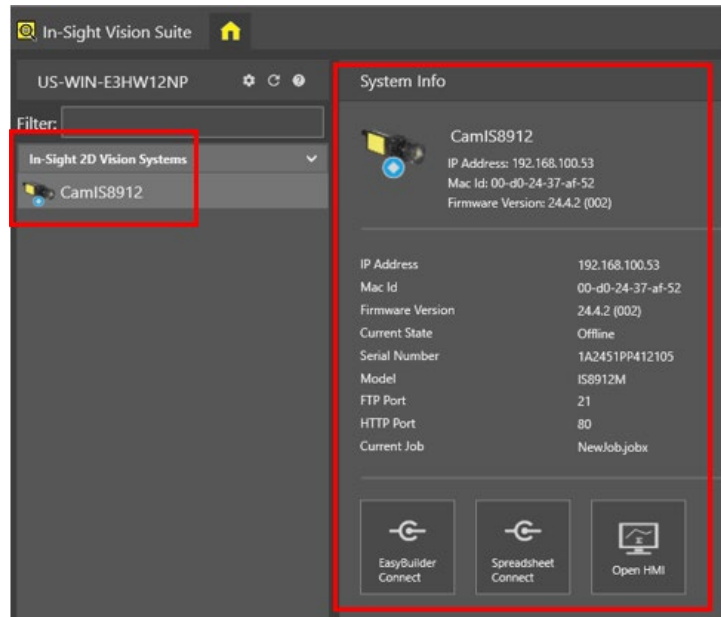
In-Sight Camera Preparation

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.

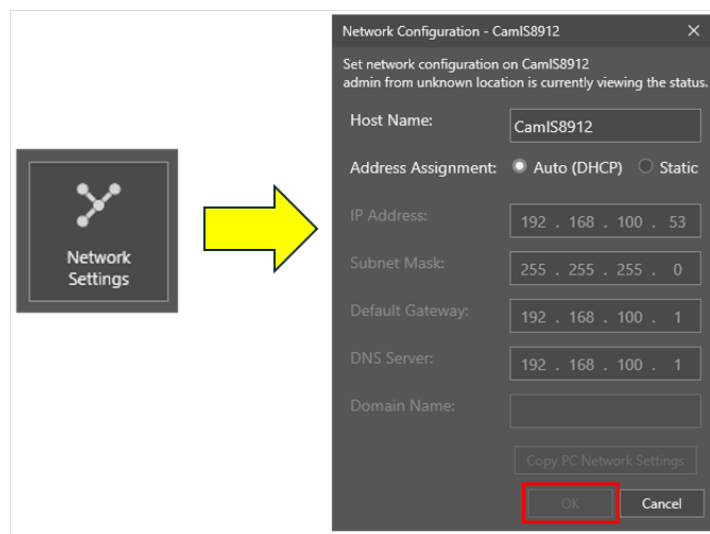
NOTE: The latest version of the In-Sight Vision Suite software can be found on the In-Sight Support page on Cognex.com. <https://support.cognex.com/en/downloads/in-sight/software-firmware>.

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.

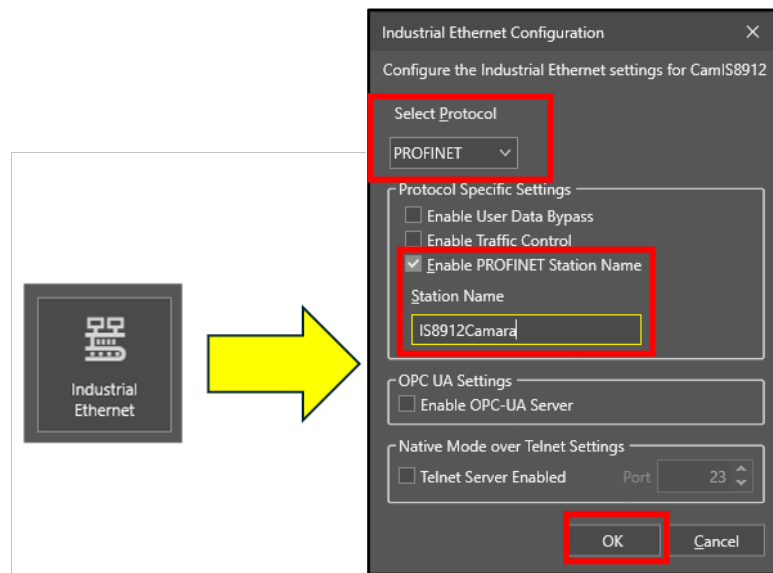


2. This can be done by using the **Network Settings** button in the Utilities panel. A window with the current properties of the camera opens.
3. Make the required changes and click the **OK** button.

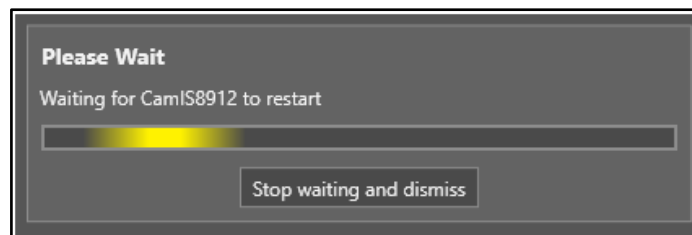


Once the equipment has been configured with its network properties, the industrial protocol must be selected, in this case it is **PROFINET**.

4. The selection is made via the **Industrial Ethernet** button in the Utilities, the configuration window displays, select **PROFINET** from the **Select Protocol** drop-down menu.
5. Check the **Enable PROFINET Station Name** checkbox and enter the camera name in the **Station Name** field.
6. To accept the changes, click the **Restart** button.



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



PLC Configuration

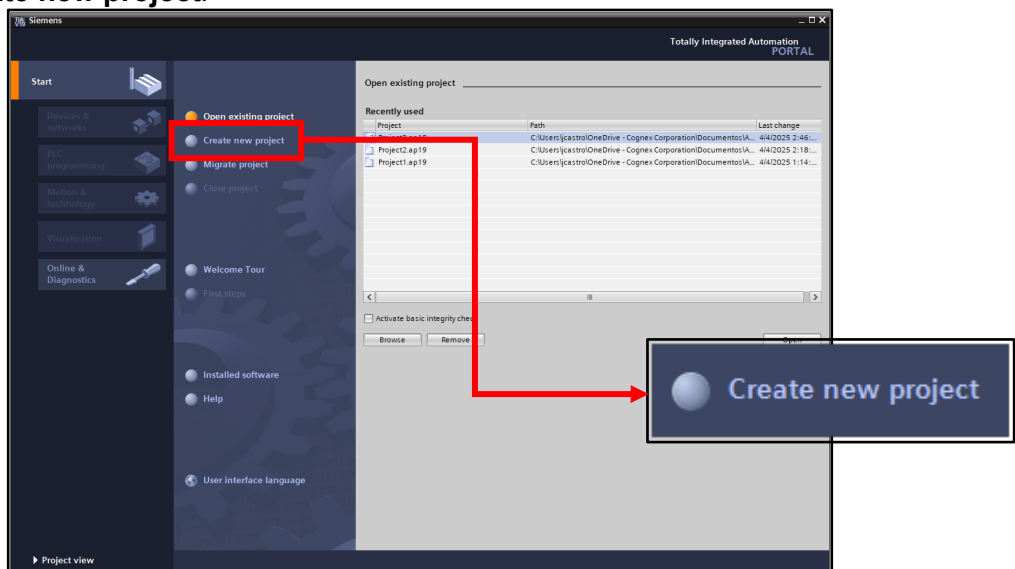
Create project in PLC

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.

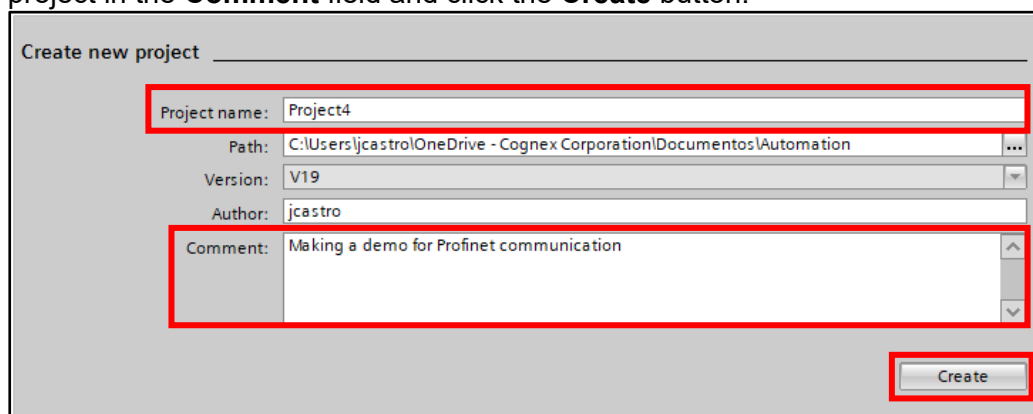
To execute this series of steps, the PLC must be connected to the network where the camera is located.

Follow these steps to create a new project:

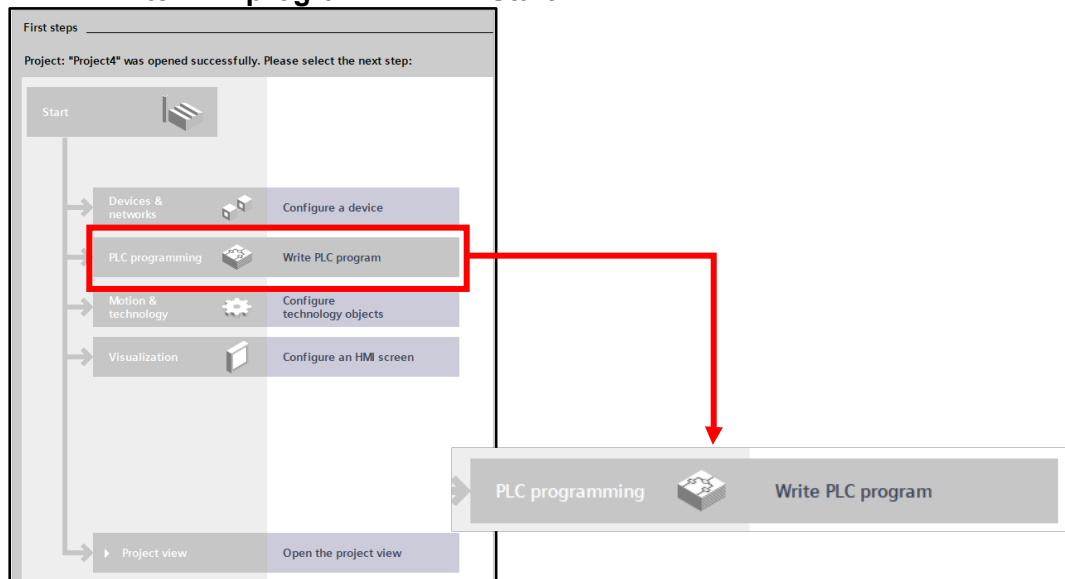
1. Open the **Siemens TIA Portal** software.
2. Select **Create new project**.



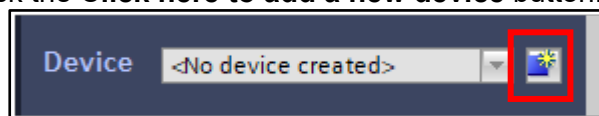
3. Enter the name of the project in the **Project Name** field, a description that corresponds to the project in the **Comment** field and click the **Create** button.



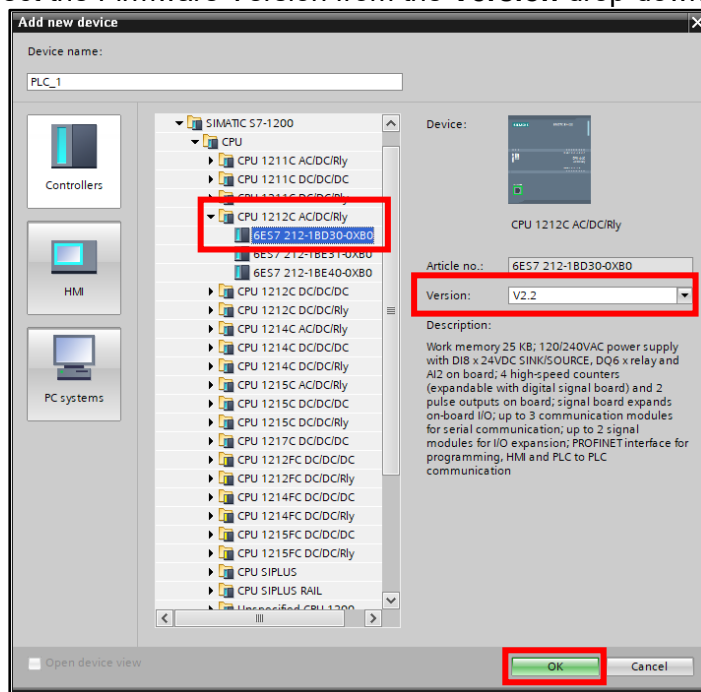
4. Select the **Write PLC program** from the **Start** menu.



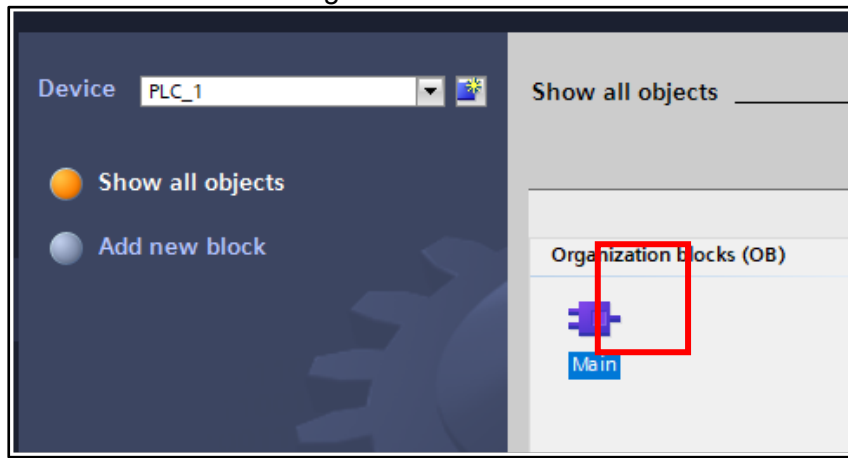
5. Click the **Click here to add a new device** button.



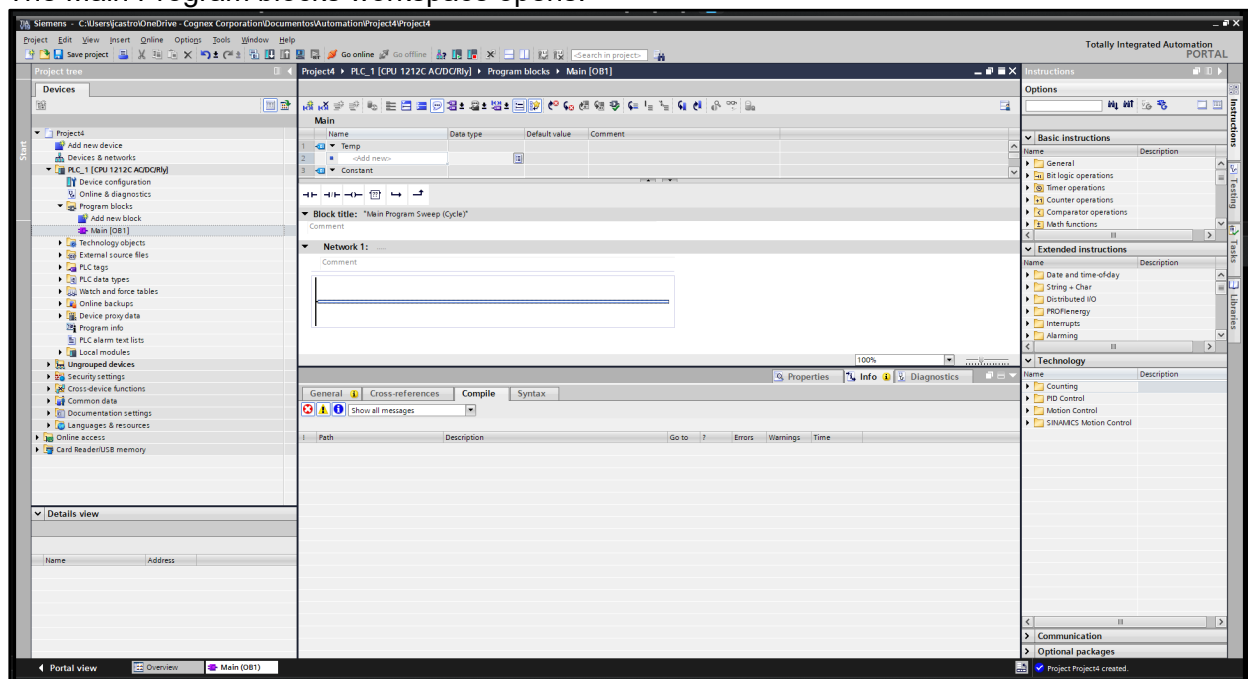
6. Select the model and type of CPU that corresponds to the PLC you have.
7. Select the Firmware Version from the **Version** drop-down list.



8. Click the **OK** button.
9. Double-click the **Main** organization block icon.



The Main Program blocks workspace opens.



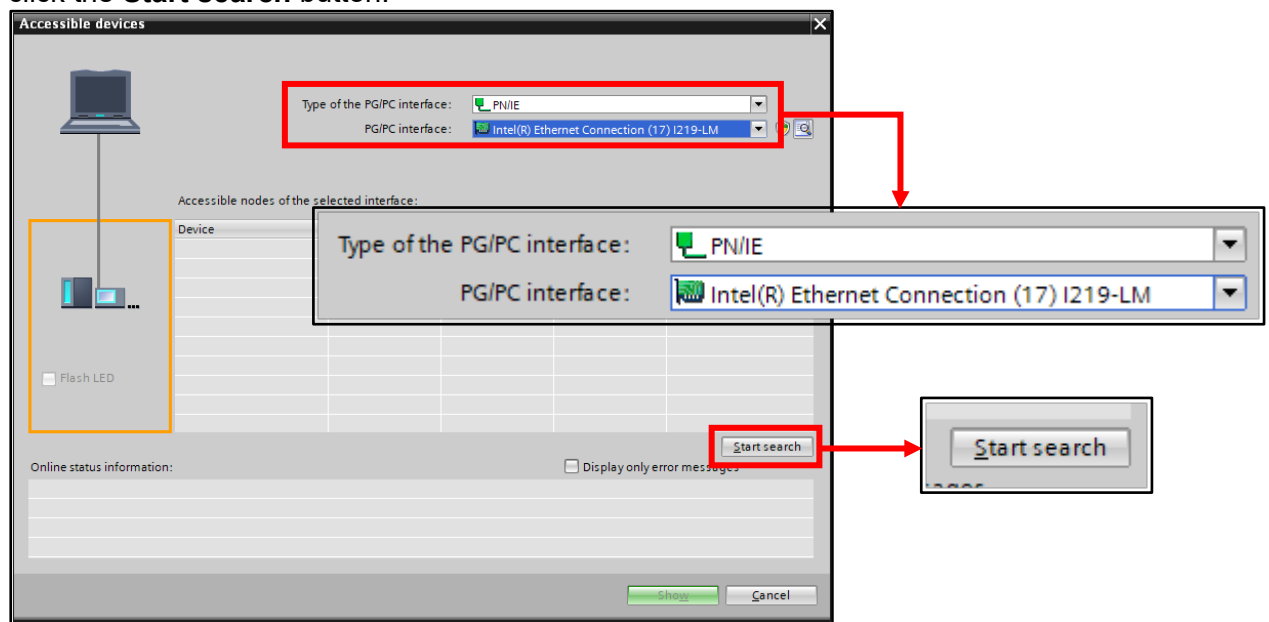
Assign IP Address to the PLC

With the project created, you must locate the PLC with which you want to work and assign the appropriate characteristics in its network configuration so that it can work together with the camera.

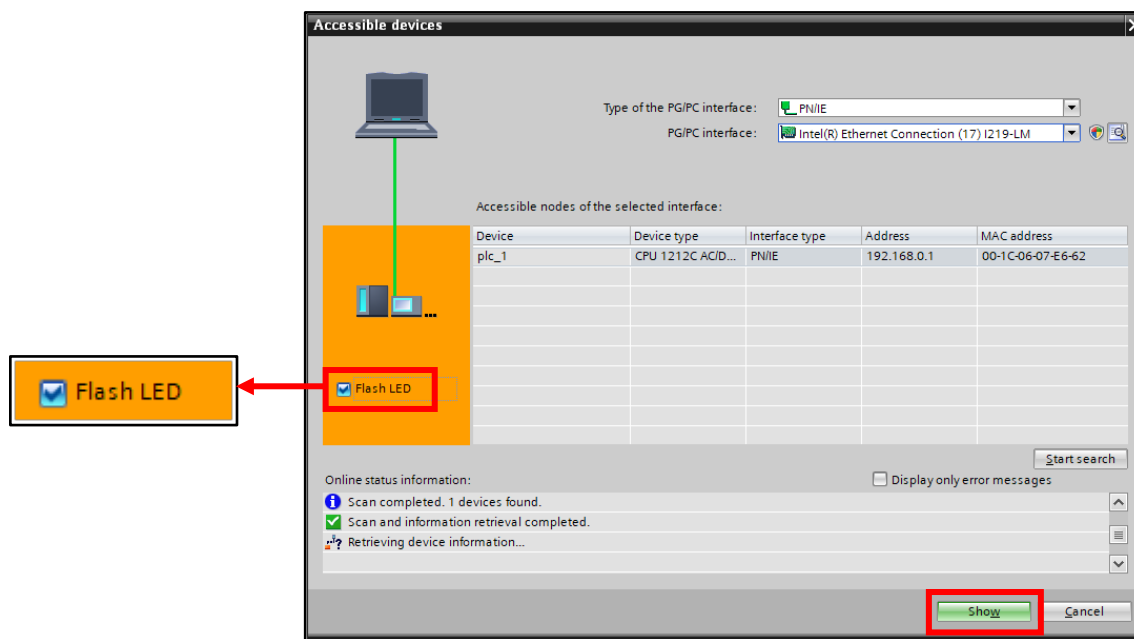
1. From the Tool bar, click the **Accessible devices** button.



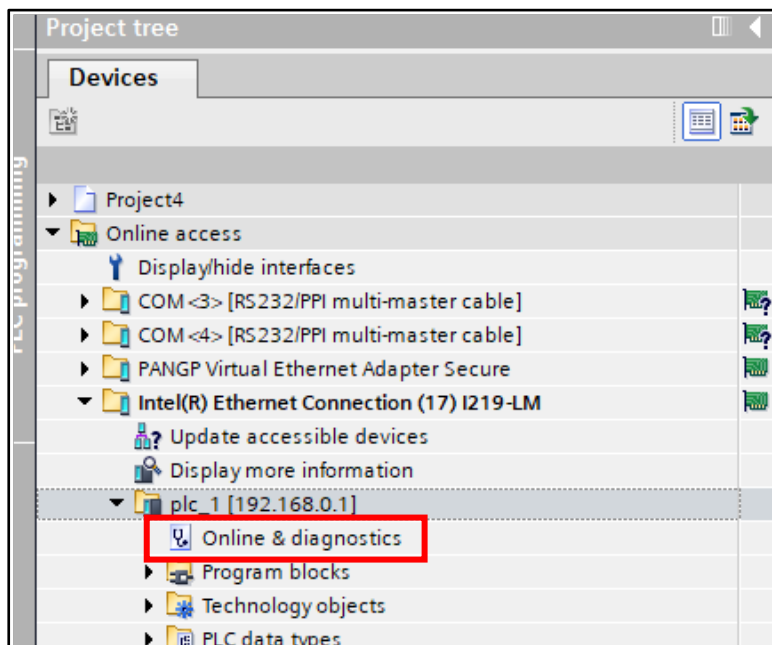
2. Select for the appropriate network connection where the PC is connected to the PLC and click the **Start search** button.



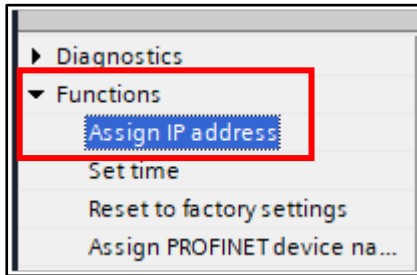
- If you have several PLCs in the list, select one and check the **Flash LED** checkbox, this will allow you to locate the PLC since the selected PLC LEDs will flash.



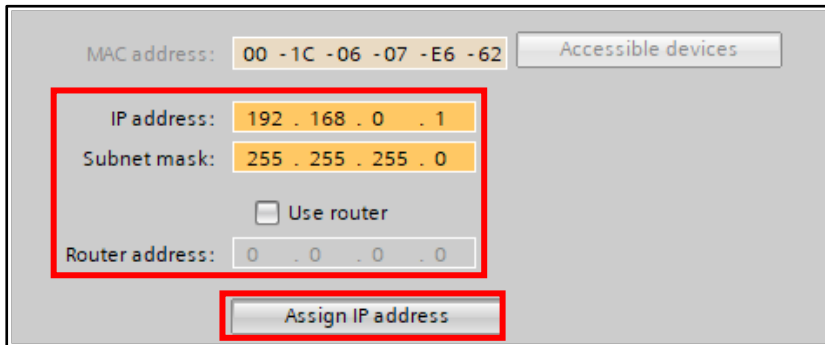
- Uncheck the **Flash LED** checkbox and click the **Show** button.
The selected PLC will display in the Project tree.
- Double-click the **Online & diagnostics** setting.



6. In the central window of the project, the characteristics of the PLC are displayed in the tree menu search by *Assign IP address*.



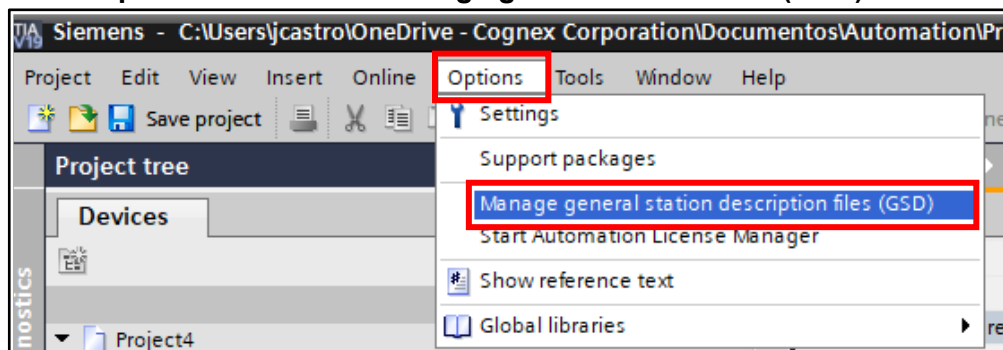
7. Place the appropriate IP address and mask that is within the network characteristics on the camera and PC that is used for programming. Click the **Assign IP address** button.



GSD Installation

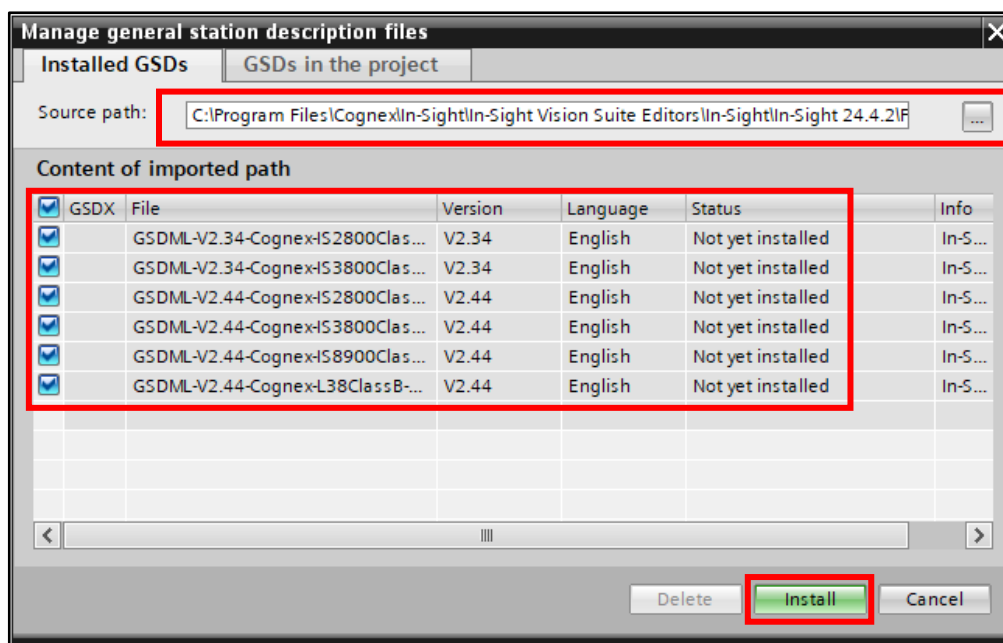
NOTE: Confirm the PLC is Offline.

1. Navigate to the downloaded GSD Files.
2. From the **Options** menu select **Manage general station files (GSD)** from the fly-out list.

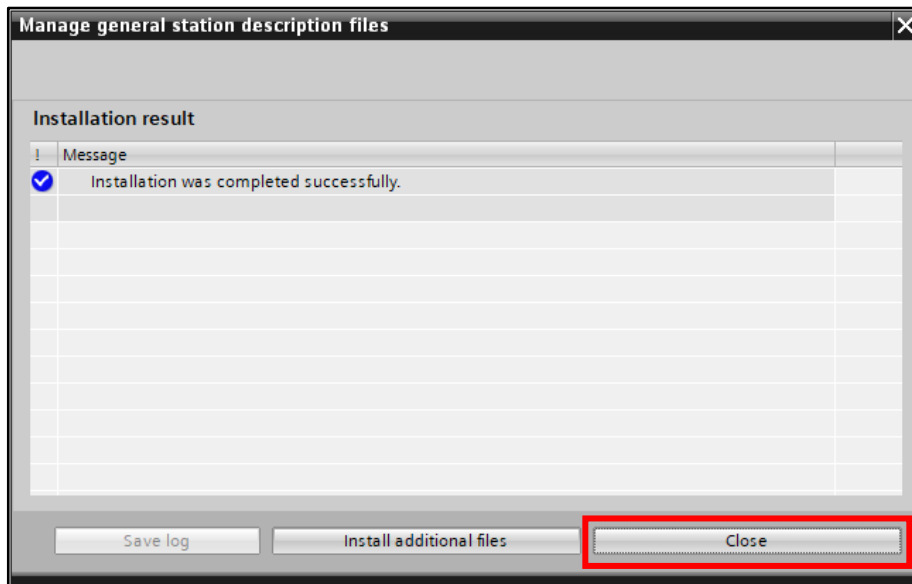


3. Click the **ellipsis** button and navigate to the GSD **Source Path** on your PC, check all options and click the **Install** button.

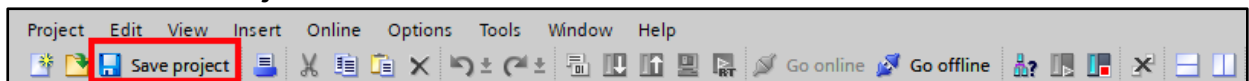
C:\Program Files\Cognex\In-Sight\In-Sight Vision Suite Editors\In-Sight\In-Sight 24.4.2\FPP\GSD\



4. Click the **Close** button.



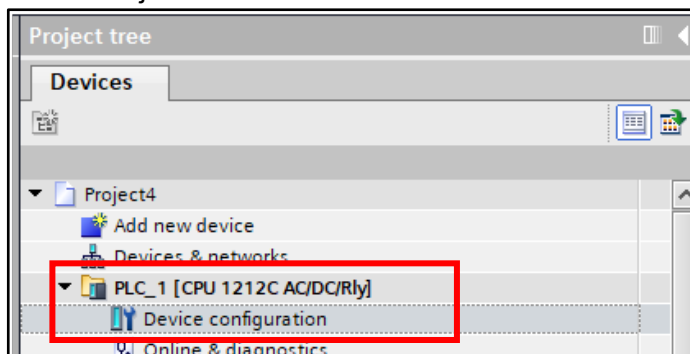
5. Click the **Save Project** button.



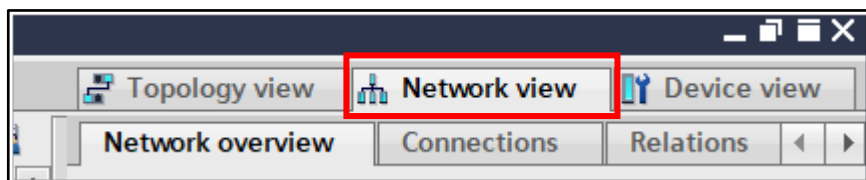
Add the Camera Device to the PLC Network

NOTE: Confirm that the PLC is Offline.

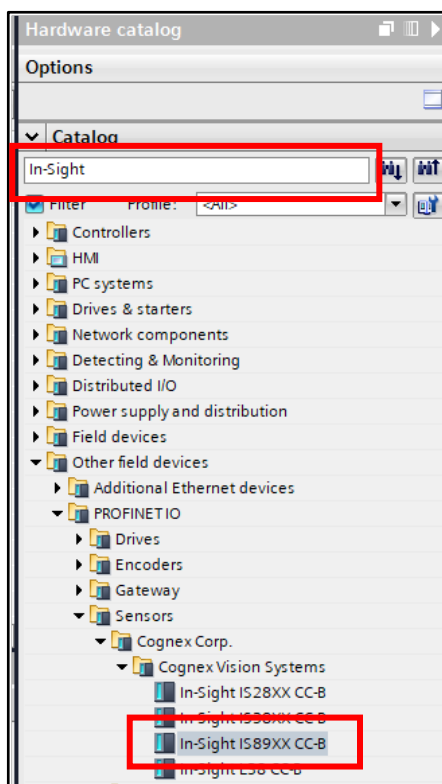
1. From the Project Tree search for the PLC and double-click **Device configuration**.



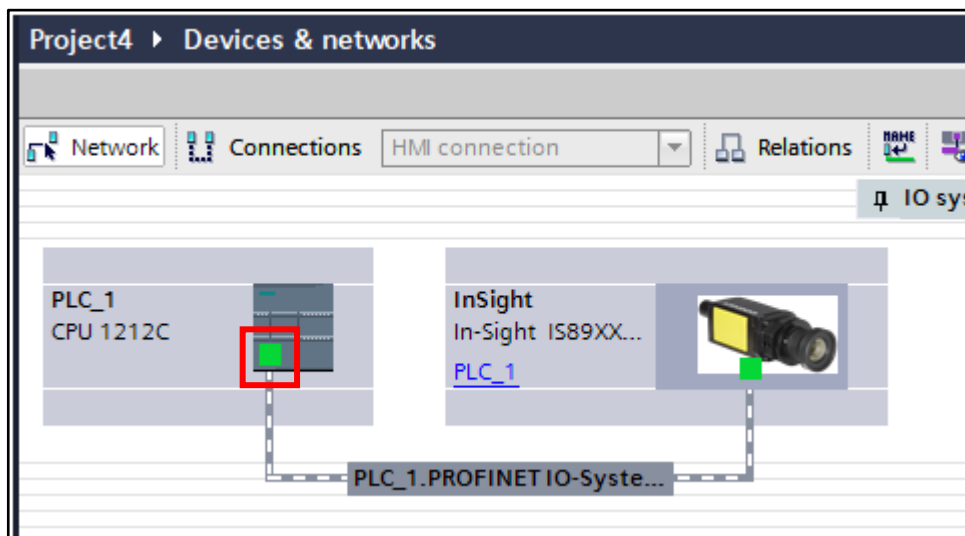
2. Select the **Network view** tab.



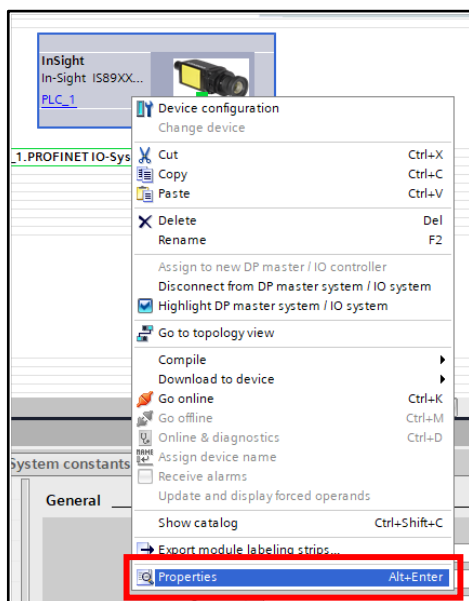
3. From the **Hardware catalog** tab search for *In-Sight* and select *In-Sight IS89XX-XX-B* in the device list.



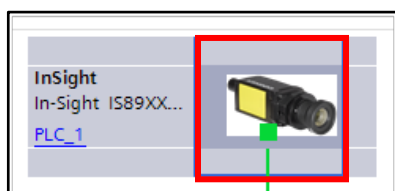
4. Drag and drop the device into the Device & networks window and connect it to the PLC's ethernet port.



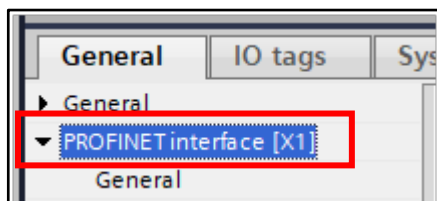
5. Right-click on the camera device and select **Properties** from the fly-out list.



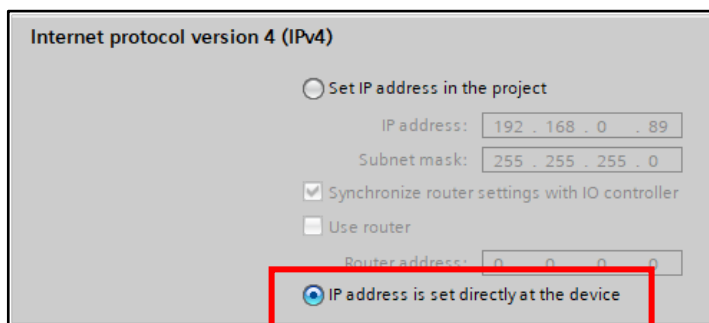
6. Click the camera icon to display the **General** properties.



7. Select **PROFINET interface [X1]** from the **General** properties list.

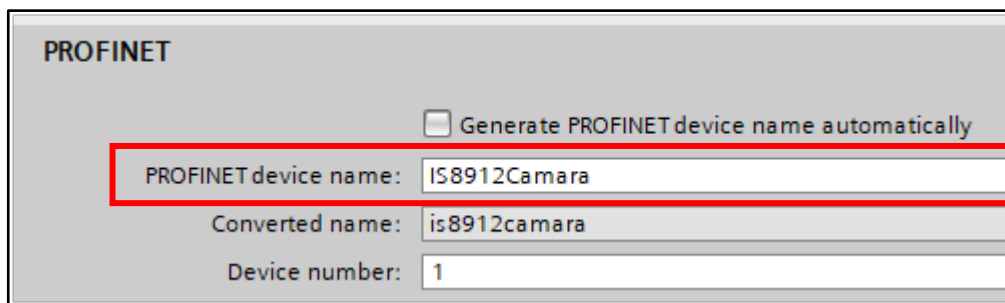


8. Scroll down to the **Internet protocol version 4 (IPv4)** properties and click the **IP address is set directly at the device** radio button.



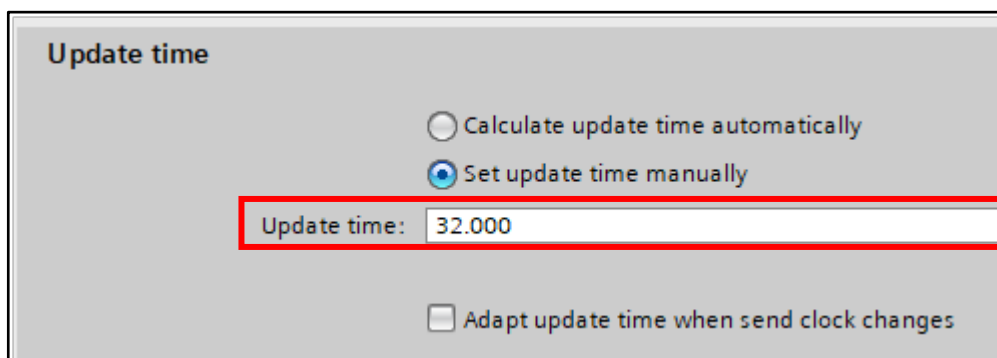
9. Scroll down to the **PROFINET** settings and enter the name of the device in the **PROFINET device name** field.

NOTE: The name is the one given in the procedure where the Profinet communication is enabled in the camera from the In-Sight Vision Suite software.

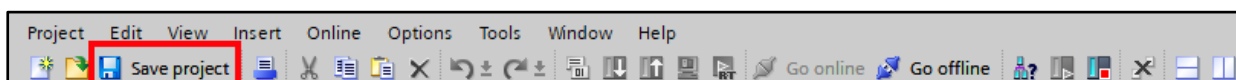


10. Scroll down to the **Update Time** setting and set the **Update Time** accordingly.

NOTE: It is advisable to set a value between 32 and 128, this is the amount of ms it takes for the PLC to update the data between the camera and the PLC.



11. Click the **Save Project** button.



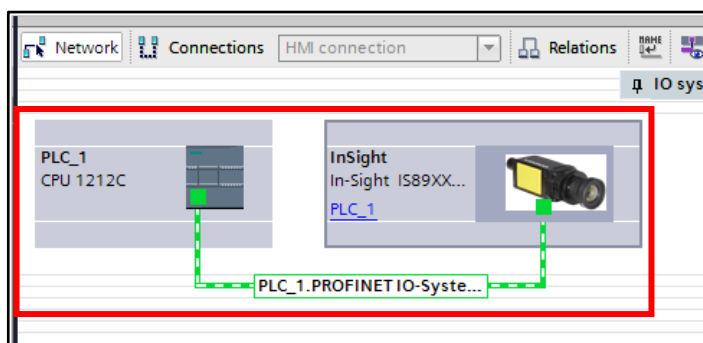
12. Click the **Compile** button.



13. Click the **Download to Device** button.



The PLC and the In-Sight device are now connected on the Network.



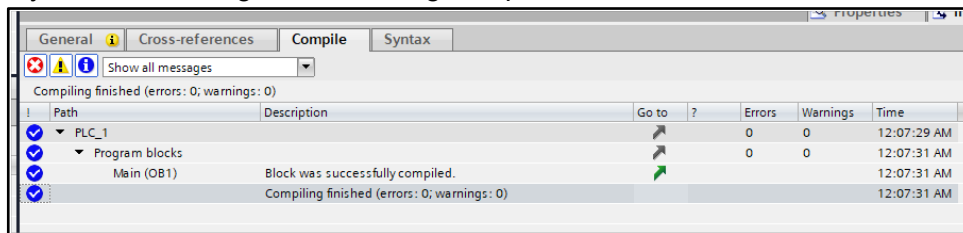
Download the Configuration to the PLC

To execute this procedure, it must be ensured that the camera, the PLC and the computer are configured within the same network segment.

1. **Compile** your current project.



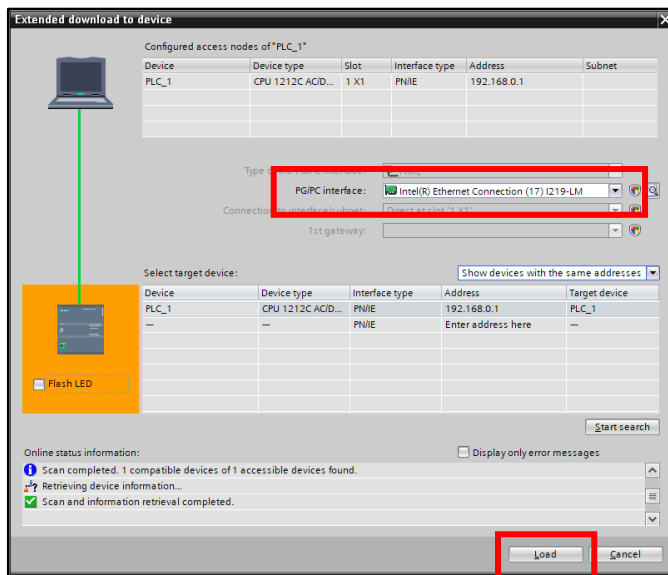
2. Verify that no messages exist during compilation.



3. Click the **Download to Device** button.

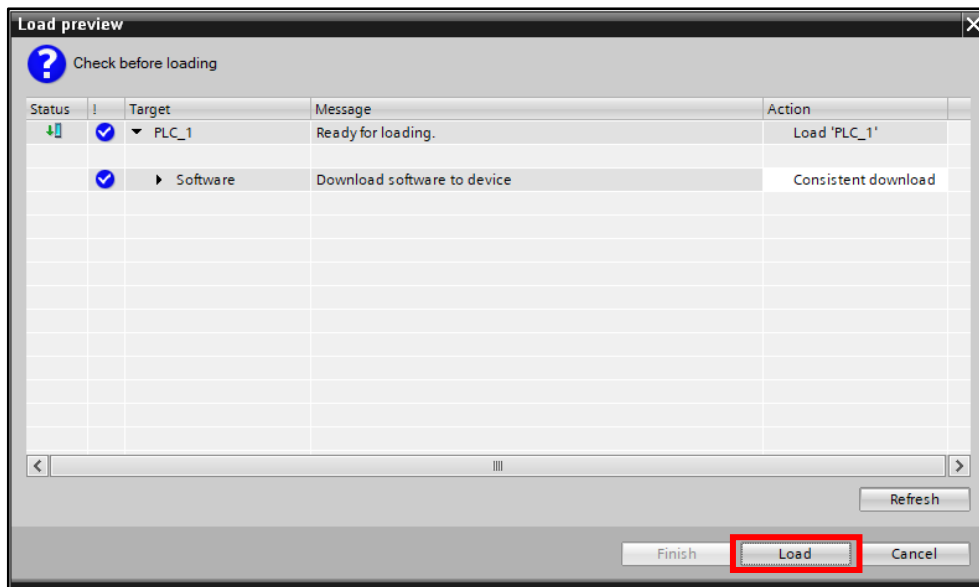


4. Select the appropriate connection in the **PG/PC interface** drop-down list and click the **Start search** button.

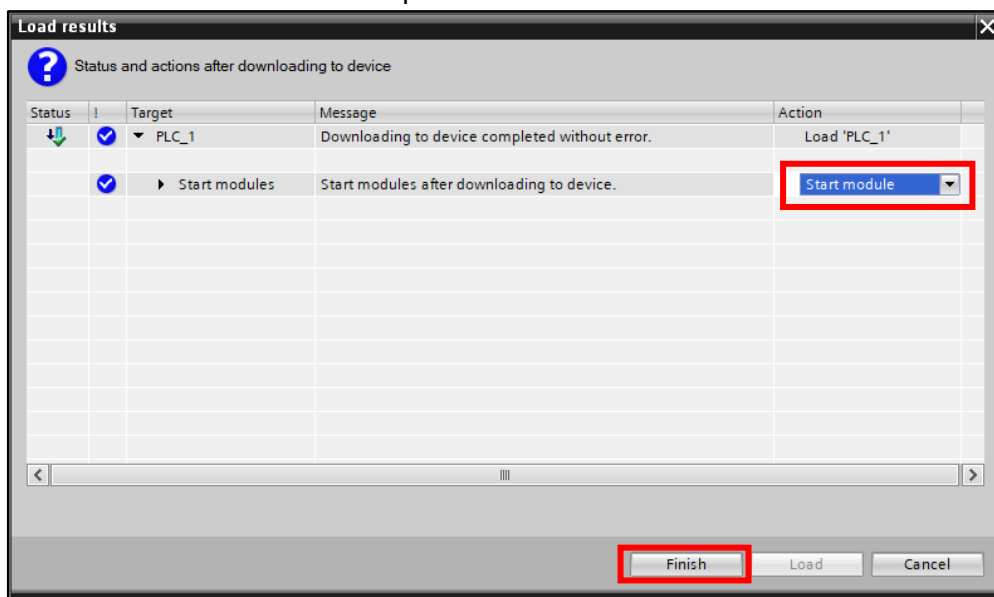


5. Once the successful connection is made the device will display in the **Select target device** list, select the device, and click the **Load** button.

6. Click the **Load** button.



7. Select **Start Module** from the drop-down list and click the **Finish** button.



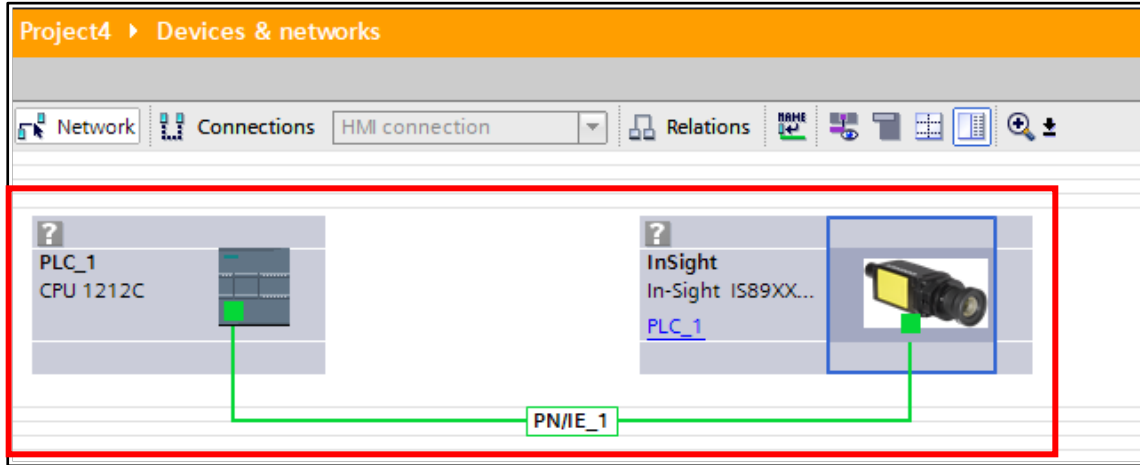
8. Click the **Go Online** button.



9. Click the **Start CPU** button.



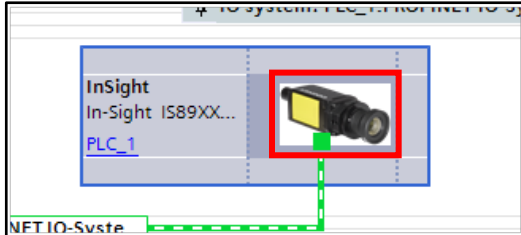
When the connection is properly established between the PLC and the camera, the communication line changes to solid green.



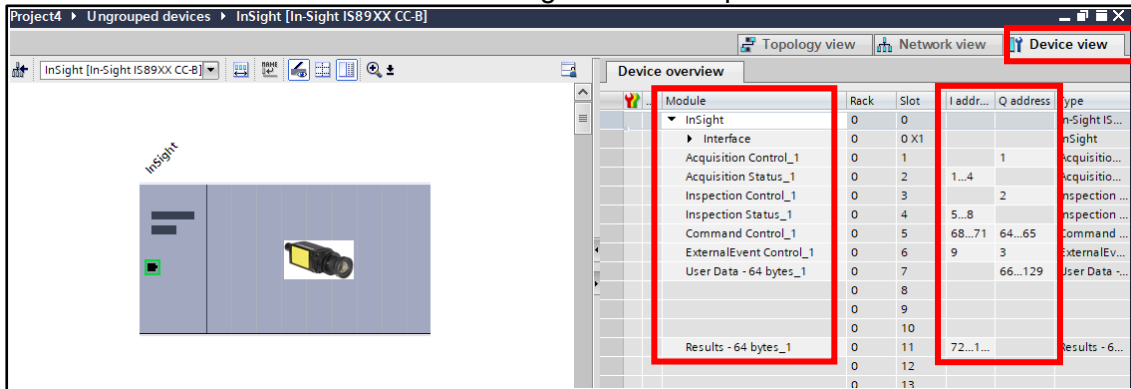
Tag Creation

NOTE: Confirm that the PLC is Offline.

1. From **Network view** double-click on the camera device.



The **Device view** tab opens. Note the starting I and Q addresses, these are the start addresses that will be entered into the Tag Generator Spreadsheet.



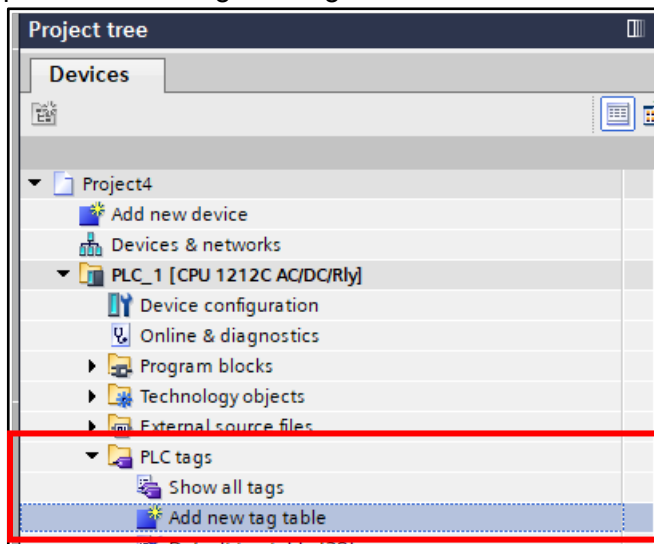
2. Navigate to the location of the **PROFINET Tag Generator spreadsheet** on the PC.
3. Open the spreadsheet and navigate to the appropriate **In-Sight** tab.
NOTE: The Control and Status modules match what is in the spreadsheet. Note the spreadsheet has tabs for a wide range of Cognex products.
4. Enter the **In-Sight 8900** camera name in cell **B2**.
5. Edit the yellow fields in the Spreadsheet to match the I and Q addresses.

Module	Rack	Slot	I address	Q address	Type
In-Sight	0	0			In-Sight IS - CX CC-B
Interface	0	0 X1			In-Sight
Acquisition Control_1	0	1		1	Acquisition Control
Acquisition Status_1	0	2	1...4		Acquisition Status
Inspection Control_1	0	3		2	Inspection Control
Inspection Status_1	0	4	5...8		Inspection Status
Command Control_1	0	5	68...71	64...65	Command Control
ExternalEvent Control_1	0	6	9	3	ExternalEvent Contr.
User Data - 64 bytes_1	0	7		66...129	User Data - 64 bytes
	0	8			
	0	9			
	0	10			
Results - 64 bytes_1	0	11	72...139		Results - 64 bytes

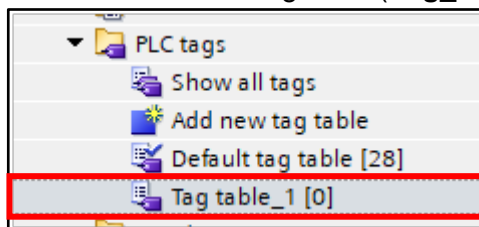
Module Name	Start Address
Acquisition Control Module	1
Acquisition Status Module	1
Inspection Control Module	2
Inspection Status Module	6
Command Control Input Module (Q Address)	64
Command Control Output Module (I Address)	68
Soft Event Control Module (Q Address)	3
External Event Status Module (I Address)	10
User Data Module (up to 4 modules)	66
Inspection Results Module (up to 4 modules)	72

6. Copy cells **F5 – H87** in the spreadsheet.
7. Return to the **Siemens TIA Portal**.

8. Expand the PLC tags setting and double-click **Add new tag table**.



9. Double-click the new Tag table (**Tag_table_1[0]**) to open.



A new tag table opens.

Tag table_1								
	Name	Data type	Address	Retain	Acces...	Writa...	Visibl...	Comment
1	<Add new>			☐	☒	☒	☒	

10. Select the first three cells in the table.

Tag table_1								
	Name	Data type	Address	Retain	Acces...	Writa...	Visibl...	Comment
1	<Add new>			☐	☒	☒	☒	

11. Right-click and select **Paste**.

The Tag Table populates the information.

Tag table_1								
	Name	Data type	Address	Retain	Acces...	Writa...	Visibl...	Comment
1	IS8912-TriggerEnable	Bool	%Q1.0	☐	☒	☒	☒	
2	IS8912-Trigger	Bool	%Q1.1	☐	☒	☒	☒	
3	IS8912-ClearExposureComplete	Bool	%Q1.2	☐	☒	☒	☒	
4	IS8912-Set Offline	Bool	%Q1.7	☐	☒	☒	☒	
5	IS8912-TriggerReady	Bool	%I1.0	☐	☒	☒	☒	
6	IS8912-TriggerAck	Bool	%I1.1	☐	☒	☒	☒	
7	IS8912-ExposureComplete	Bool	%I1.2	☐	☒	☒	☒	
8	IS8912-AcquisitionError	Bool	%I1.3	☐	☒	☒	☒	
9	IS8912-Offline Reason	Bool	%I1.4	☐	☒	☒	☒	
10	IS8912-Offline Reason(1)	Bool	%I1.5	☐	☒	☒	☒	
11	IS8912-Offline Reason(2)	Bool	%I1.6	☐	☒	☒	☒	
12	IS8912-Online	Bool	%I1.7	☐	☒	☒	☒	
13	IS8912-AcquisitionID	Int	%IW3	☐	☒	☒	☒	
14	IS8912-BufferResultsEnable	Bool	%Q2.0	☐	☒	☒	☒	
15	IS8912-InspectionResultsAck	Bool	%Q2.1	☐	☒	☒	☒	
16	IS8912-SetUserData	Bool	%Q2.2	☐	☒	☒	☒	
17	IS8912-ExecuteCommand/JobL...	Bool	%Q2.3	☐	☒	☒	☒	
18	IS8912-ClearError	Bool	%Q2.7	☐	☒	☒	☒	
19	IS8912-Reserved	Bool	%I6.0	☐	☒	☒	☒	
20	IS8912-InspectionCompleted	Bool	%I6.1	☐	☒	☒	☒	
21	IS8912-ResultsBufferOverrun	Bool	%I6.2	☐	☒	☒	☒	
22	IS8912-ResultsValid	Bool	%I6.3	☐	☒	☒	☒	

In the table the following items are listed (this list is valid for IS8900):

Tag table_1			
	Name	Data type	Address
1	MyInSight-TriggerEnable	Bool	%Q1.0
2	MyInSight-Trigger	Bool	%Q1.1
3	MyInSight-ClearExposureComplete	Bool	%Q1.2
4	MyInSight-SetOffline	Bool	%Q1.7
5	MyInSight-TriggerReady	Bool	%I1.0
6	MyInSight-TriggerAck	Bool	%I1.1
7	MyInSight-ExposureComplete	Bool	%I1.2
8	MyInSight-MissedAcq	Bool	%I1.3
9	MyInSight-OfflineReason(0)	Bool	%I1.4
10	MyInSight-OfflineReason(1)	Bool	%I1.5
11	MyInSight-OfflineReason(2)	Bool	%I1.6
12	MyInSight-Online	Bool	%I1.7
13	MyInSight-AcquisitionID	Int	%IW2
14	MyInSight-BufferResultsEnable	Bool	%Q2.0
15	MyInSight-InspectionResultsAck	Bool	%Q2.1
16	MyInSight-SetUserData	Bool	%Q2.2
17	MyInSight-ExecuteCommand/JobLoad	Bool	%Q2.3
18	MyInSight-ClearError	Bool	%Q2.7
19	MyInSight-SystemBusy	Bool	%I5.0
20	MyInSight-InspectionCompleted	Bool	%I5.1
21	MyInSight-ResultsBufferOverrun	Bool	%I5.2
22	MyInSight-ResultsValid	Bool	%I5.3
23	MyInSight-CommandExecuting	Bool	%I5.4
24	MyInSight-CommandCompleted	Bool	%I5.5
25	MyInSight-CommandFailed	Bool	%I5.6
26	MyInSight-SetUserDataAck	Bool	%I5.7
27	MyInSight-JobPass	Bool	%I6.0
28	MyInSight-TestRunReady	Bool	%I6.1
29	MyInSight-Error	Bool	%I6.7
30	MyInSight-ErrorCode	Int	%IW7
31	MyInSight-CommandInput	Byte	%IB68
32	MyInSight-CommandOutput	Int	%QW64
33	MyInSight-SoftEvent[0]	Bool	%Q9.0
34	MyInSight-SoftEvent[1]	Bool	%Q9.1
35	MyInSight-SoftEvent[2]	Bool	%Q9.2
36	MyInSight-SoftEvent[3]	Bool	%Q9.3
37	MyInSight-SoftEvent[4]	Bool	%Q9.4
38	MyInSight-SoftEvent[5]	Bool	%Q9.5
39	MyInSight-SoftEvent[6]	Bool	%Q9.6

Tag table_1			
	Name	Data type	Address
40	MyInSight-SoftEvent[7]	Bool	%Q9.7
41	MyInSight-SoftEventAck[0]	Bool	%I3.0
42	MyInSight-SoftEventAck[1]	Bool	%I3.1
43	MyInSight-SoftEventAck[2]	Bool	%I3.2
44	MyInSight-SoftEventAck[3]	Bool	%I3.3
45	MyInSight-SoftEventAck[4]	Bool	%I3.4
46	MyInSight-SoftEventAck[5]	Bool	%I3.5
47	MyInSight-SoftEventAck[6]	Bool	%I3.6
48	MyInSight-SoftEventAck[7]	Bool	%I3.7
49	MyInSight-UserData[0]	Byte	%QB66
50	MyInSight-UserData[1]	Byte	%QB67
51	MyInSight-UserData[2]	Byte	%QB68
52	MyInSight-UserData[3]	Byte	%QB69
53	MyInSight-UserData[4]	Byte	%QB70
54	MyInSight-UserData[5]	Byte	%QB71
55	MyInSight-UserData[6]	Byte	%QB72
56	MyInSight-UserData[7]	Byte	%QB73
57	MyInSight-UserData[8]	Byte	%QB74
58	MyInSight-UserData[9]	Byte	%QB75
59	MyInSight-UserData[10]	Byte	%QB76
60	MyInSight-UserData[11]	Byte	%QB77
61	MyInSight-UserData[12]	Byte	%QB78
62	MyInSight-UserData[13]	Byte	%QB79
63	MyInSight-UserData[14]	Byte	%QB80
64	MyInSight-UserData[15]	Byte	%QB81
65	MyInSight-InspectionID	Int	%IW72
66	MyInSight-InspectionResultsCode	Int	%IW74
67	MyInSight-InspectionResults[0]	Byte	%IB76
68	MyInSight-InspectionResults[1]	Byte	%IB77
69	MyInSight-InspectionResults[2]	Byte	%IB78
70	MyInSight-InspectionResults[3]	Byte	%IB79
71	MyInSight-InspectionResults[4]	Byte	%IB80
72	MyInSight-InspectionResults[5]	Byte	%IB81
73	MyInSight-InspectionResults[6]	Byte	%IB82
74	MyInSight-InspectionResults[7]	Byte	%IB83
75	MyInSight-InspectionResults[8]	Byte	%IB84
76	MyInSight-InspectionResults[9]	Byte	%IB85
77	MyInSight-InspectionResults[10]	Byte	%IB86
78	MyInSight-InspectionResults[11]	Byte	%IB87

79	MyInSight-InspectionResults[12]	Byte	%IB88
80	MyInSight-InspectionResults[13]	Byte	%IB89
81	MyInSight-InspectionResults[14]	Byte	%IB90
82	MyInSight-InspectionResults[15]	Byte	%IB91

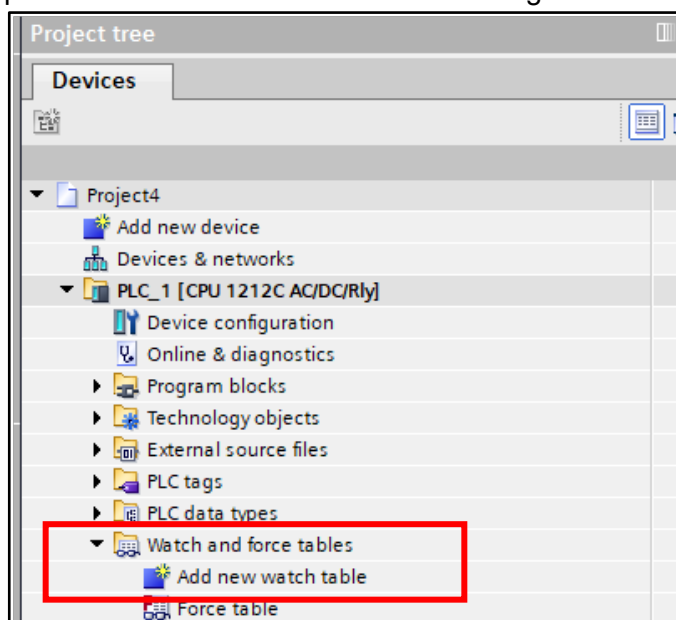
The above is the complete list of the added tags, but if you want to have only the basic elements, it would be the following list:

Project4 ▸ PLC_1 [CPU 1212C AC/DC/Rly] ▸ PLC tags ▸ Tag table_1 [18]

Tag table_1

	Name	Data type	Address	Retain	Acces...	Writa...	Visibl...
1	TriggerEnable	Bool	%Q1.0	☐	☒	☒	☒
2	Trigger	Bool	%Q1.1	☐	☒	☒	☒
3	SetOffline	Bool	%Q1.7	☐	☒	☒	☒
4	TriggerAck	Bool	%I1.1	☐	☒	☒	☒
5	ExposureComplete	Bool	%I1.2	☐	☒	☒	☒
6	AcquisitionError	Bool	%I1.3	☐	☒	☒	☒
7	Online	Bool	%I1.7	☐	☒	☒	☒
8	AcquisitionID	Int	%IW3	☐	☒	☒	☒
9	InspectionResultsAck	Bool	%Q2.1	☐	☒	☒	☒
10	SetUserData	Bool	%Q2.2	☐	☒	☒	☒
11	InspectionCompleted	Bool	%I5.1	☐	☒	☒	☒
12	ResultsBufferOverrun	Bool	%I5.2	☐	☒	☒	☒
13	ResultsValid	Bool	%I5.3	☐	☒	☒	☒
14	SetUserDataAck	Bool	%I5.7	☐	☒	☒	☒
15	UserData	Byte	%QB66	☐	☒	☒	☒
16	InspectionID	Int	%IW72	☐	☒	☒	☒
17	Results	Byte	%IB76	☐	☒	☒	☒
18	TriggerReady	Bool	%I1.0	☐	☒	☒	☒

12. Expand the **Watch and force tables** setting and double-click **Add new watch table**.

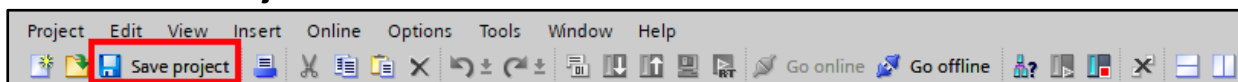


13. Enter the following items.

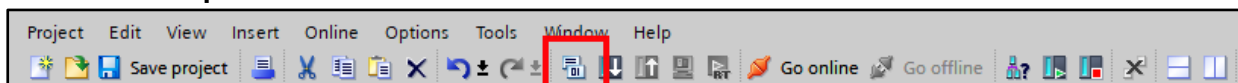
Project4 ▶ PLC_1 [CPU 1212C AC/DC/Rly] ▶ Watch and force tables ▶ Watch

	Name	Address	Display format	Monitor value
1	"TriggerEnable"	%Q1.0	Bool	
2	"TriggerReady"	%I1.0	Bool	
3	"Trigger"	%Q1.1	Bool	
4	"TriggerAck"	%I1.1	Bool	
5	"ExposureCompl..."	%I1.2	Bool	
6	"AcquisitionError"	%I1.3	Bool	
7	"Online"	%I1.7	Bool	
8	"SetOffline"	%Q1.7	Bool	
9	"InspectionComp..."	%I5.1	Bool	
10	"ResultsBufferOv..."	%I5.2	Bool	
11	"ResultsValid"	%I5.3	Bool	
12	"InspectionResult..."	%Q2.1	Bool	
13	"UserData"	%QB66	Hex	
14	"SetUserData"	%Q2.2	Bool	
15	"SetUserDataAck"	%I5.7	Bool	
16	"AcquisitionID"	%IW3	DEC+/-	
17	"InspectionID"	%IW72	DEC+/-	
18	"Results"	%IB76	Hex	

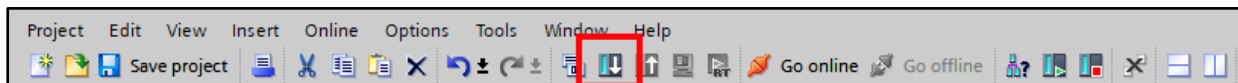
14. Click the **Save Project** button.



15. Click the **Compile** button.



16. Click the **Download to Device** button.



17. Click the **Go Online** button to place the PLC online.

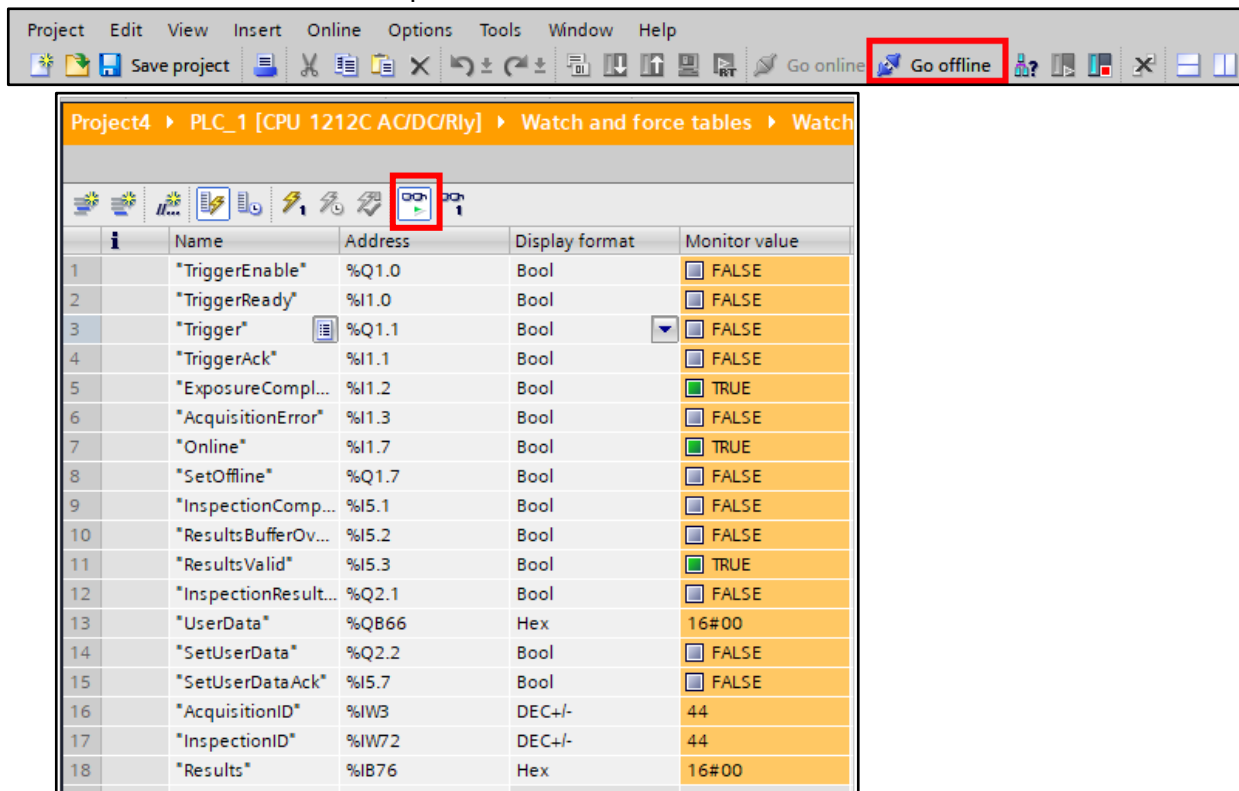


18. Click the **Monitor all** button to display the Tag values.

Project4 ▶ PLC_1 [CPU 1212C AC/DC/Rly] ▶ Watch and force tables ▶ Watch

	Name	Address	Display format	Monitor value
1	"IS8912-TriggerEnable"	%Q1.0	Bool	☐ FALSE
2	"IS8912-TriggerReady"	%I1.0	Bool	☐ FALSE
3	"IS8912-Trigger"	%Q1.1	Bool	☐ FALSE
4	"IS8912-TriggerAck"	%I1.1	Bool	☐ FALSE

19. Click the **Go Offline** button to place the PLC offline.



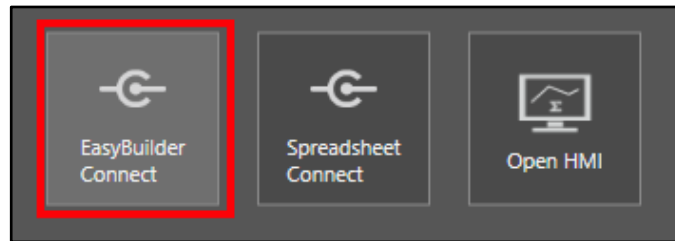
EasyBuilder Interface

This section describes a series of minimum steps to be able to prepare the camera for imaging, send and receive data from the camera to the PLC using the EasyBuilder interface.

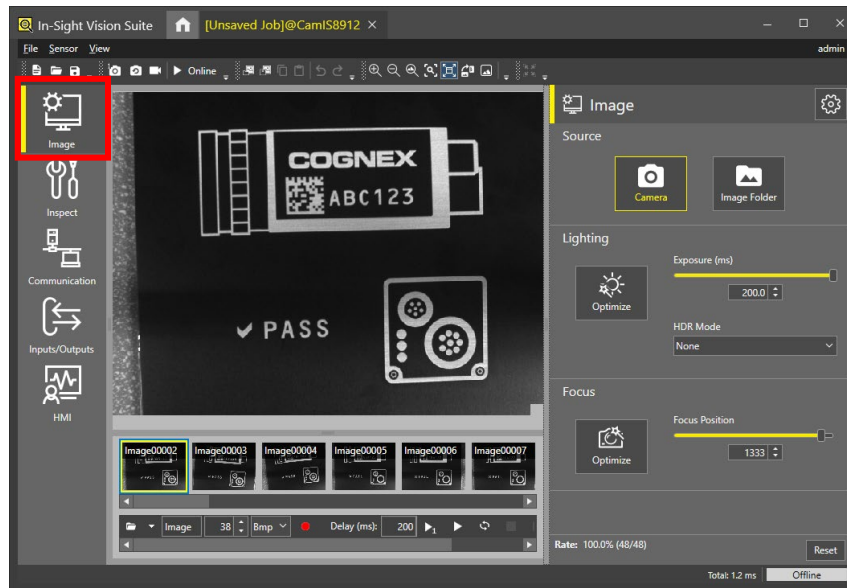
To check the sequence of steps in the Spreadsheet interface you should go to page 33.

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

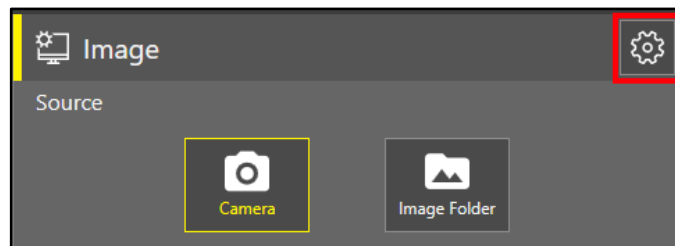
1. In the In-Sight Vision Suite software, select your camera and click the **EasyBuilder Connect** button to connect to the EasyBuilder interface.



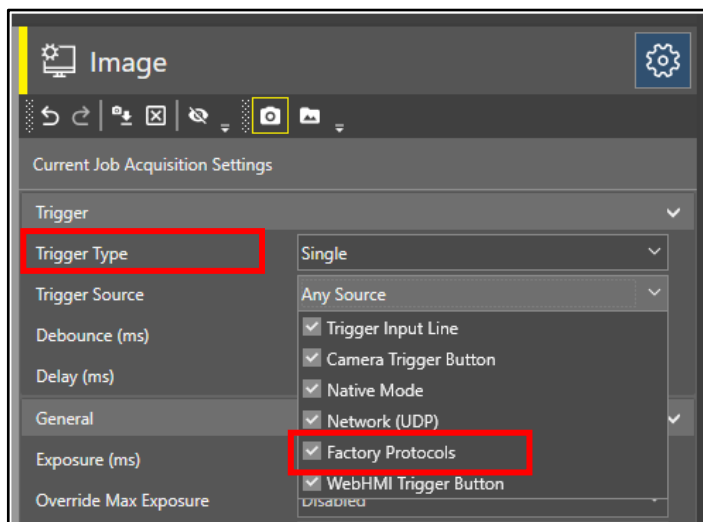
EasyBuilder opens and the **Image** step is active.



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



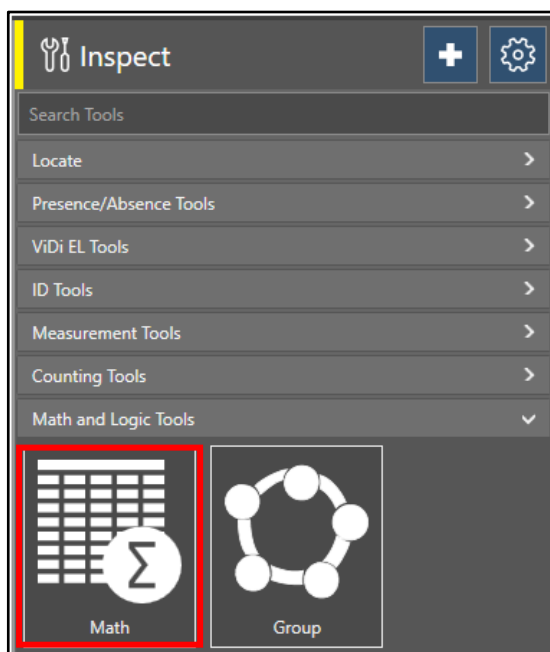
3. Verify that the **Factory Protocol** option is checked in the **Trigger Type** options.



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



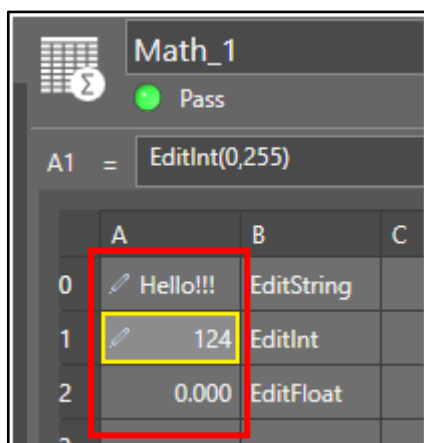
5. Open the Math and Logic Tools to add a **Math** tool.



6. In cell **A0** enter the **EditString(8)** function and in cell **A1** 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.

7. Enter data in Cells **A0** and **A1**, in this example we use the data of "Hello!!!" as the string and the value of 123 as the integer value.

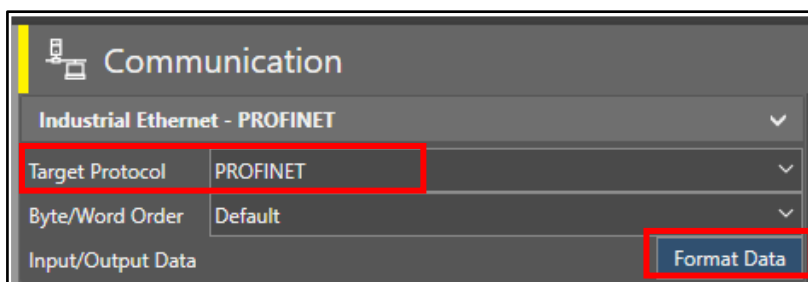


8. In cell **A3** enter the function **EditInt(-100,100)**.
9. From the left panel select the **Communications** step.



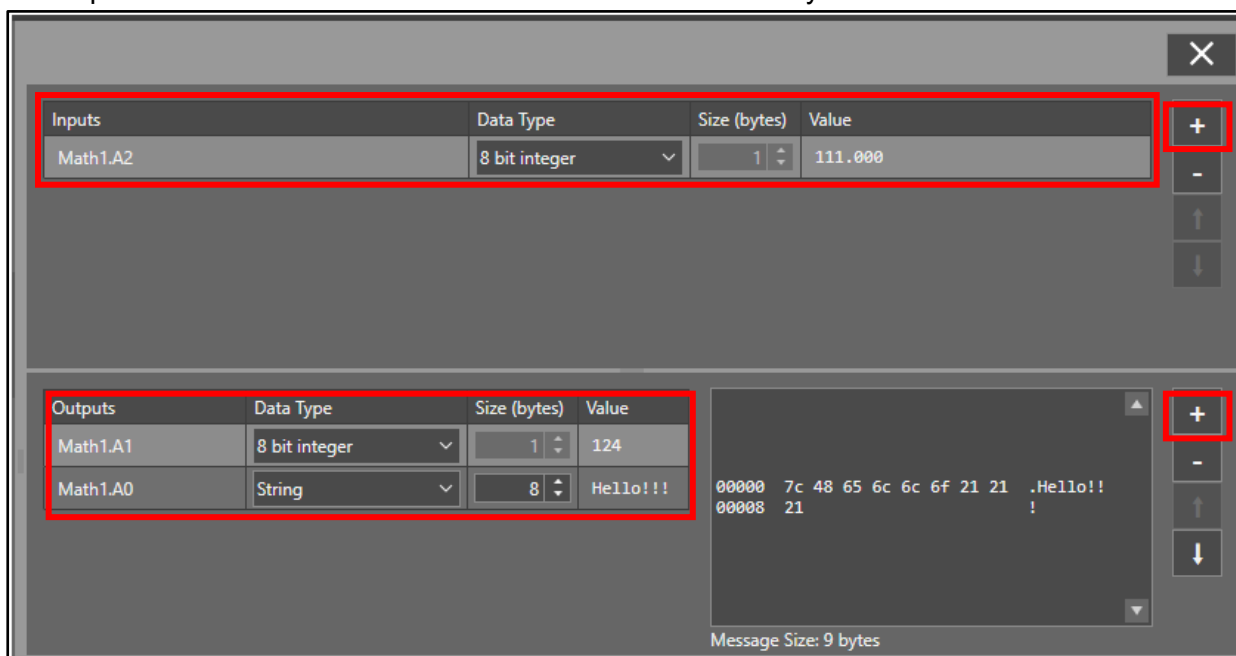
The Communications settings open.

10. Select **PROFINET** from the Target Protocol drop-down list and click the **Format Data** button.

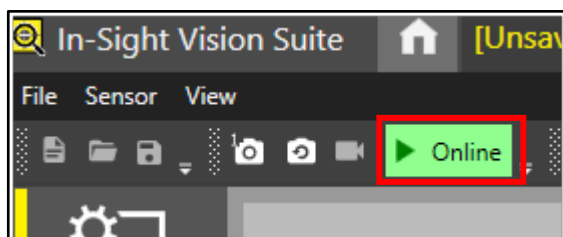


11. Click the **Inputs +** button to add an input:
 - **Math1.A2** with a Data Type of *8 bit integer*
12. Click the **Outputs +** button to add the output:
 - **Math1.A1** with a Data Type of *8 bit integer*
13. Repeat step 12 to add the second output:
 - **Math1.A0** with a Data Type of *String*

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 37.

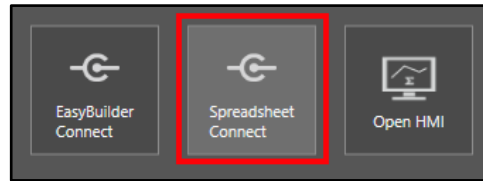
Spreadsheet Interface

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 EasyBuilder interface you should go to page 29.

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

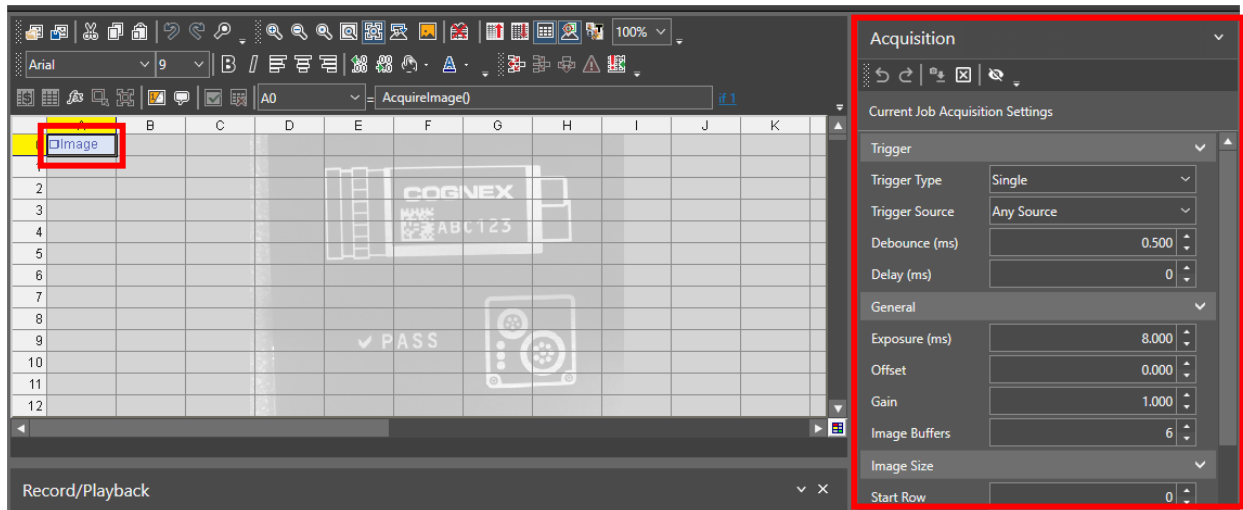
1. In the In-Sight Vision Suite software, select your camera and click the **Spreadsheet Connect** button to connect to the Spreadsheet interface.



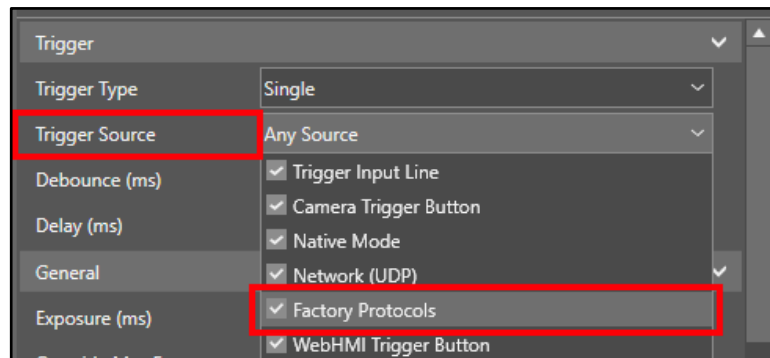
The Spreadsheet interface opens.

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

The Image properties open.



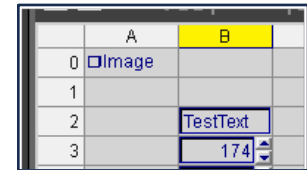
3. Verify that the **Factory Protocols** option is checked in the **Trigger Source** settings.



4. Enter the following functions in the indicated cells:

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

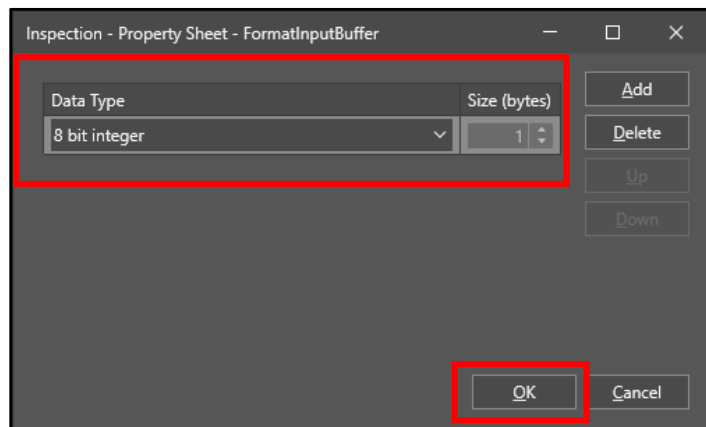
NOTE: It is not necessary to modify anything in the property sheet that appear in each of the functions, you just click the OK button in each of them.



	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** place the **FormatInputBuffer** function, this function is responsible for organizing the data that is sent from the PLC.
Select the Data Type of *8 bit integer*.



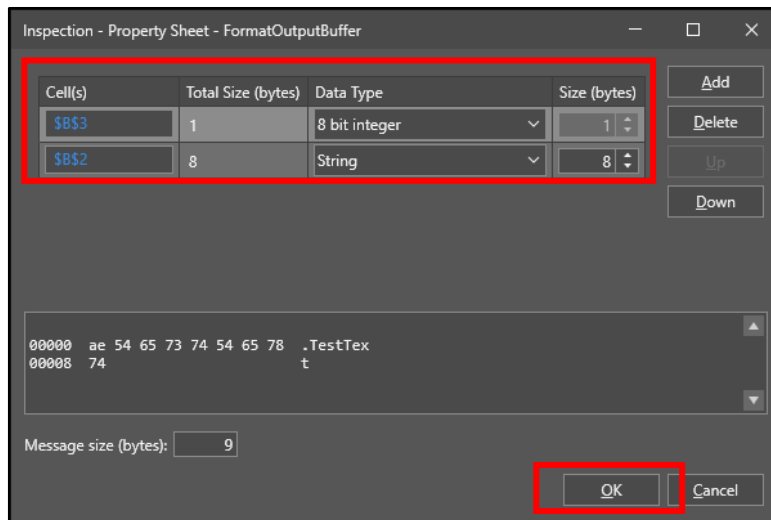
7. Click the **OK** button.

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

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

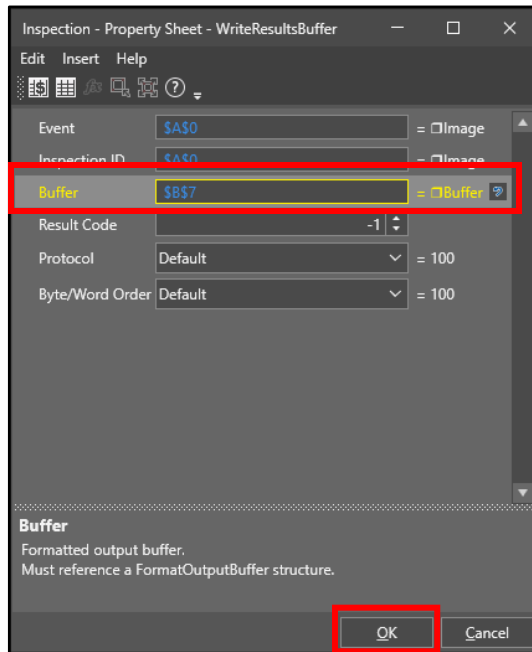
- Cell **B3** = *8 bit integer*
- Cell **B2** = *String with a length of 8 bits*

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

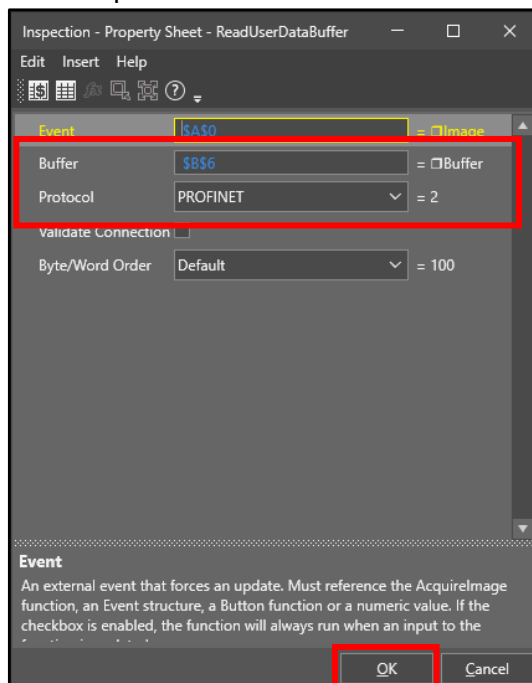


10. Click the **OK** button.

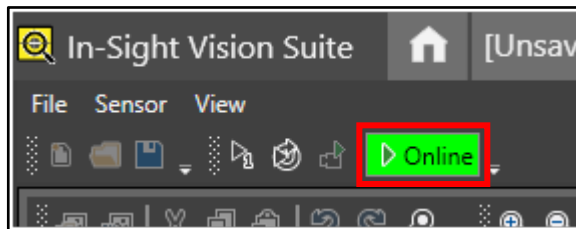
11. In cell **D7** enter the **WriteResultBuffer** instruction, in the property sheet enter cell **B7** in the Buffer parameter. This cell contains the buffer that must be *sent* to the PLC.



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** property select **PROFINET**.
15. Click the **OK** button.
16. In cell **B4** place 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 37.

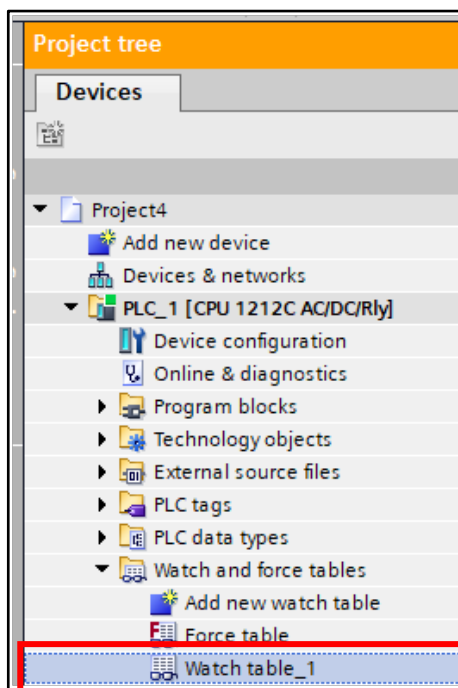
Verification from the PLC

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.

Trigger Verification

This procedure works for both the EasyBuilder and Spreadsheet interface. The camera must be in **Online** mode; the PLC must be in **Run** mode and the software **Online** to execute the following steps. For the time being, the check will be done manually.

1. In the Project tree select **Watch table_1** from the **Watch and force tables** setting. This table was created in previous steps.



2. Force the **TriggerEnable** and **Trigger** values to **TRUE**.

Project4 > PLC_1 [CPU 1212C AC/DC/Rly] > Watch and force tables > Watch table_1						
	i	Name	Address	Display format	Monitor value	Modify value
1		"TriggerEnable"	%Q1.0	Bool	☐ FALSE	TRUE
2		"TriggerReady"	%I1.0	Bool	☐ FALSE	
3		"Trigger"	%Q1.1	Bool	☐ FALSE	TRUE

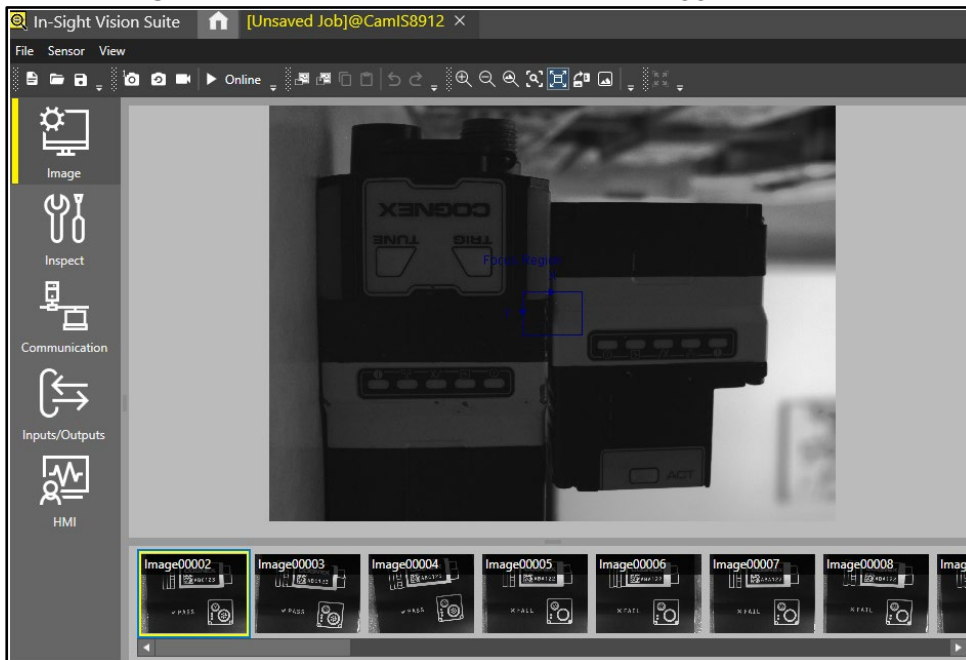
- Click the **Monitor all** button.



- Click the **Modify all selected values once and now** button.



- In the **In-Sight Vision Suite** software the camera triggers!



- To reimage the TriggerEnable and Trigger values to values of FALSE and repeat from step 2 of this sequence.

In general, the image taking process would be:

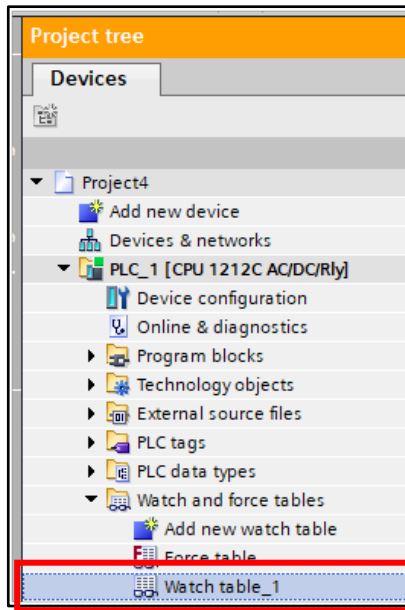
- Set **TRUE** to **TriggerEnable**.
- Camera places **TRUE** on **TriggerEnableAck**.
- Set **TRUE** to **Trigger** to take image.
- Camera answers with **TRUE** in **TriggerAck**.
- Set the **TriggerEnable**, **Trigger** control signals to **FALSE**.
- The camera will set to **FALSE** in **TriggerEnableAck**, **TriggerAck**.

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.

The camera must be in **Online** mode; the PLC must be in **Run** mode and the software **Online** to execute the following steps.

1. In the Project tree select **Watch table_1** from the **Watch and force tables** setting. This table was created in previous steps.



2. In the **UserData** parameter, enter the integer data, since the first data field corresponds to a number of this type of data, click the **Modify all selected values once and now** button.

The screenshot shows the 'Watch table_1' table with the following data:

	Name	Address	Display format	Monitor value	Modify value	
1	"TriggerEnable"	%Q1.0	Bool	☐ FALSE		☐
2	"TriggerReady"	%I1.0	Bool	☐ FALSE		☐
3	"Trigger"	%Q1.1	Bool	☐ FALSE		☐
4	"TriggerAck"	%I1.1	Bool	☐ FALSE		☐
5	"ExposureCompl..."	%I1.2	Bool	☒ TRUE		☐
6	"AcquisitionError"	%I1.3	Bool	☐ FALSE		☐
7	"Online"	%I1.7	Bool	☒ TRUE		☐
8	"SetOffline"	%Q1.7	Bool	☐ FALSE		☐
9	"InspectionComp..."	%I5.1	Bool	☒ TRUE		☐
10	"ResultsBufferOv..."	%I5.2	Bool	☐ FALSE		☐
11	"ResultsValid"	%I5.3	Bool	☒ TRUE		☐
12	"InspectionResult"	%Q2.1	Bool	☐ FALSE		☐
13	"UserData"	%QB66	DEC	0	111	☒
14	"SetUserData"	%Q2.2	Bool	☐ FALSE		☐
15	"SetUserDataAck"	%I5.7	Bool	☐ FALSE		☐

The 'UserData' row (row 13) is highlighted with a red box, and the 'Modify all selected values once and now' button (lightning bolt icon) is also highlighted with a red box.

- Set the **SetUserData** value to **TRUE**, and click the **Modify all selected values once and now** button. The camera should answer with **SetUserDataAck** to **TRUE**, this indicates that it has *received* the request.

13	"UserData"	%QB66	DEC	111	111		
14	"SetUserData"	%Q2.2	Bool	☒ TRUE	TRUE		
15	"SetUserData..."	%I5.7	Bool	☒ TRUE			

Since the instruction to receive data by Profinet depends on the camera triggering in order to update the data it is necessary to perform the Trigger procedure in the camera. For this it is required to place the value of **TriggerEnable** and **Trigger** in values of **TRUE**, the camera must respond with the ACK signals corresponding to each one.

- Click the **Modify all selected values once and now** button, to be able to send and update the table.

Project4 > PLC_1 [CPU 1212C AC/DC/Rly] > Watch and force tables > Watch table_1							
	Name	Address	Display format	Monitor value	Modify value		
1	"TriggerEnable"	%Q1.0	Bool	☒ TRUE	TRUE		
2	"TriggerReady"	%I1.0	Bool	☒ TRUE			
3	"Trigger"	%Q1.1	Bool	☒ TRUE	TRUE		
4	"TriggerAck"	%I1.1	Bool	☒ TRUE			
5	"ExposureCompl..."	%I1.2	Bool	☒ TRUE			
6	"AcquisitionError"	%I1.3	Bool	☐ FALSE			
7	"Online"	%I1.7	Bool	☒ TRUE			
8	"SetOffline"	%Q1.7	Bool	☐ FALSE			
9	"InspectionComp..."	%I5.1	Bool	☒ TRUE			
10	"ResultsBufferOv..."	%I5.2	Bool	☐ FALSE			
11	"ResultsValid"	%I5.3	Bool	☒ TRUE			
12	"InspectionResult..."	%Q2.1	Bool	☐ FALSE			
13	"UserData"	%QB66	DEC+/-	111	111		
14	"SetUserData"	%Q2.2	Bool	☒ TRUE	TRUE		
15	"SetUserDataAck"	%I5.7	Bool	☒ TRUE			

- To update the value you want to send, the **Trigger** and **SetUserData** control bits must be set to **FALSE** to for the **Modify all selected values once and now** button to be active.

A2	=	GetBufferData(\$T\$89,0)		
	A	B	C	
0	 Hello!!!	EditString		
1	 124	EditInt		
2	111.000	EditFloat		

The process for sending data would be as follows:

- Update data to send (**UserData**).
- Set **UserData** Control Bit to **TRUE**.
- The camera will respond with **TRUE** in **SetUserDataAck**.
- Set **TRUE** to **TriggerEnable**.
- Camera places **TRUE** on **TriggerEnableAck**.
- Set **TRUE** to **Trigger** to take the image and send the data to the camera.
- Camera answers with **TRUE** in **TriggerAck**.
- Set the **UserData**, **TriggerEnable**, **Trigger** control signals to **FALSE**.
- The camera will set to **FALSE** in **UserDataAck**, **TriggerEnableAck**, **TriggerAck**.

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.

The camera must be in **Online** mode the PLC must be in **Run** mode and the software **Online** to execute the following steps.

Since data has already been entered in the **EditInt** and **EditString** controls, which serve as outputs from the camera to the PLC when performing the data writing process (explained in the previous section), not only data is sent, but the PLC also performs the reading.

In our case an 8-bit Integer and an 8-byte string are being sent, the data will begin to arrive in the **Results** tag, from there all the data placed in the output buffer of the camera will be received, in our case it will only be necessary to create additional tags to receive the equivalent of the string.

1. Add the missing **ResultString** tags to receive the *Char* data.

	Name	Data type	Address
1	TriggerEnable	Bool	%Q1.0
2	Trigger	Bool	%Q1.1
3	SetOffline	Bool	%Q1.7
4	TriggerAck	Bool	%I1.1
5	ExposureComplete	Bool	%I1.2
6	AcquisitionError	Bool	%I1.3
7	Online	Bool	%I1.7
8	AcquisitionID	Int	%IW3
9	InspectionResultsAck	Bool	%Q2.1
10	SetUserData	Bool	%Q2.2
11	InspectionCompleted	Bool	%I5.1
12	ResultsBufferOverrun	Bool	%I5.2
13	ResultsValid	Bool	%I5.3
14	SetUserDataAck	Bool	%I5.7
15	UserData	Byte	%QB66
16	InspectionID	Int	%IW72
17	Results	Byte	%IB76
18	TriggerReady	Bool	%I1.0
19	ResultsString0	Char	%IB77
20	ResultsString1	Char	%IB78
21	ResultsString2	Char	%IB79
22	ResultsString3	Char	%IB80
23	ResultsString4	Char	%IB81
24	ResultsString5	Char	%IB82
25	ResultsString6	Char	%IB83
26	ResultsString7	Char	%IB84

2. Add the new items (**ResultsValid** and **Results**) in the Watch table.

Project4 ▶ PLC_1 [CPU 1212C AC/DC/Rly] ▶ Watch and force tables ▶ Watch table_1

	Name	Address	Display format	Monitor value	Modify value	
1	*TriggerEnable*	%Q1.0	Bool	TRUE	TRUE	☒ ⚠
2	*TriggerReady*	%I1.0	Bool	TRUE		☐
3	*Trigger*	%Q1.1	Bool	TRUE	TRUE	☒ ⚠
4	*TriggerAck*	%I1.1	Bool	TRUE		☐
5	*ExposureCompl...	%I1.2	Bool	TRUE		☐
6	*AcquisitionError*	%I1.3	Bool	FALSE		☐
7	*Online*	%I1.7	Bool	TRUE		☐
8	*SetOffline*	%Q1.7	Bool	FALSE		☐
9	*InspectionComp...	%I5.1	Bool	TRUE		☐
10	*ResultsBufferOv...	%I5.2	Bool	FALSE		☐
11	*ResultsValid*	%I5.3	Bool	TRUE		☐
12	*InspectionResult...	%Q2.1	Bool	FALSE		☐
13	*UserData*	%QB66	DEC+/-	111	111	☒ ⚠
14	*SetUserData*	%Q2.2	Bool	TRUE	TRUE	☒ ⚠
15	*SetUserDataAck*	%I5.7	Bool	TRUE		☐
16	*AcquisitionID*	%IW3	DEC+/-	52		☐
17	*InspectionID*	%IW72	DEC+/-	52		☐
18	*Results*	%IB76	DEC	124		☐
19	*ResultsString0*	%IB77	Character	'H'		☐
20	*ResultsString1*	%IB78	Character	'e'		☐
21	*ResultsString2*	%IB79	Character	'l'		☐
22	*ResultsString3*	%IB80	Character	'l'		☐
23	*ResultsString4*	%IB81	Character	'o'		☐
24	*ResultsString5*	%IB82	Character	'l'		☐
25	*ResultsString6*	%IB83	Character	'l'		☐
26	*ResultsString7*	%IB84	Character	'l'		☐

When data is available to read by the PLC, the **ResultsValid** control bit is set to **TRUE**.

The data entered in the Tags and Watch corresponds to the camera's output buffer.

Outputs	Data Type	Size (bytes)	Value
	8 bit integer	1	
Math1.A0	String	8	!!llo!!!

00000	7c 48 65 6c 6c 6f 21 21	.Hello!!
00008	21	!

Message Size: 9 bytes