

EHPS Gripper Control with Allen-Bradley PLC through Festo IO-Link Master

This Application Note Explains about Controlling the EHPS Gripper Module Through Festo IO-Link Master in Allen-Bradly PLC. User can able to change the gripper mode, Open & Close the Gripper Arms by using this sample code.

EHPS

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1 Introduction

This application note demonstrate the controlling of EHPS gripper module with Allen-Bradley PLC. Using the sample code user can able to open & close position of the gripper arms. Also able to change the gripper operating mode, Latch data, Store data, Reset the direction, Teach the gripping position, Teach new end position & reset the errors.



Note

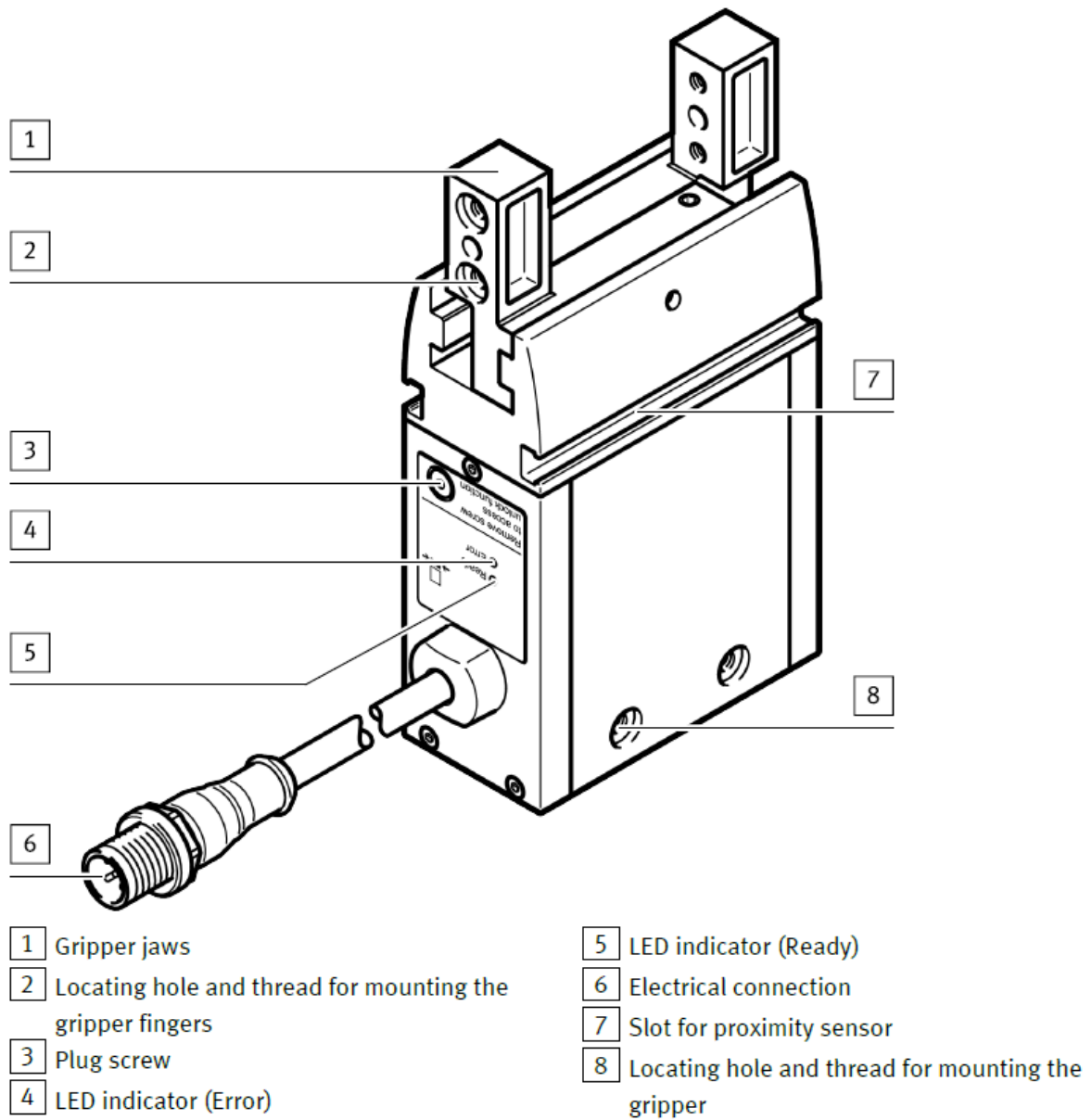
- For demonstration of this application note, Here we have used Festo CPX-AP-I-4IOL-M12 as IO-Link Master.

1.1 Hardware & Software Requirements

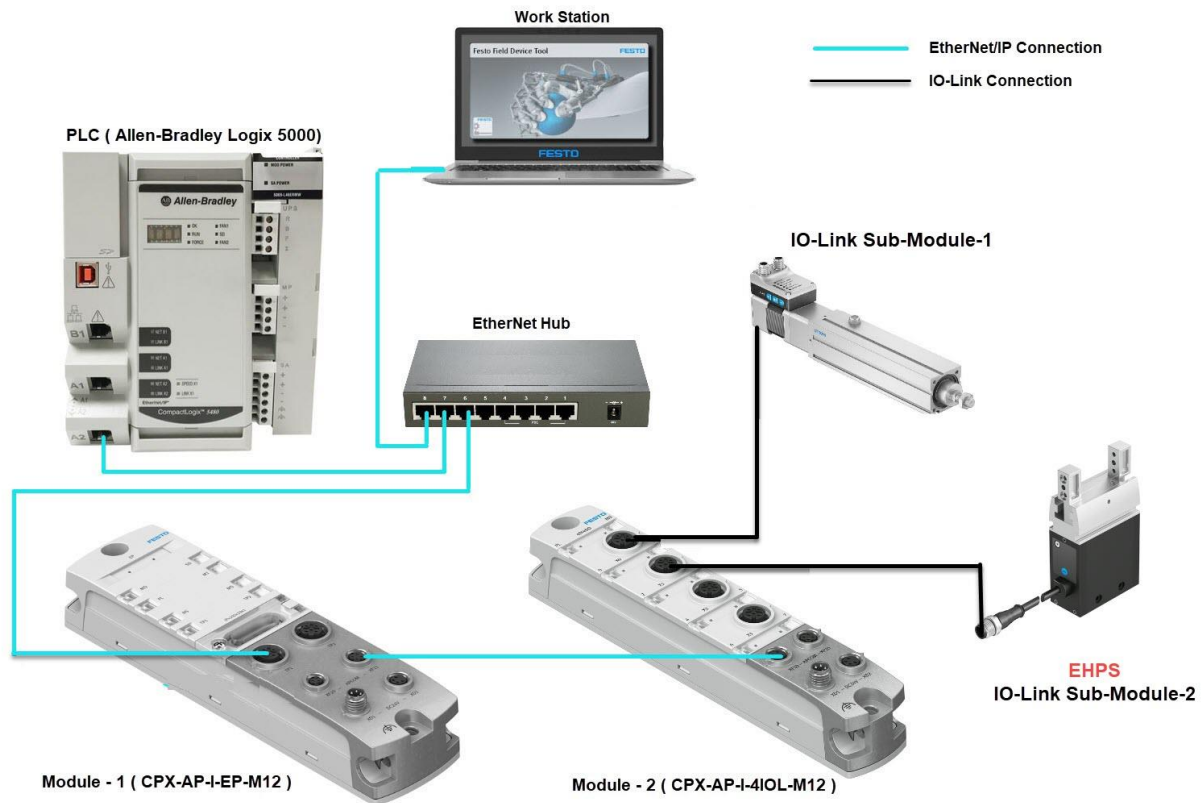
Device Name	Part Number	Version Software/Firmware	Device Type
Gripper – EHPS	EHPS-25-A-LK	Latest	Hardware
Festo IO-Link Master	CPX-AP-I-4IOL-M12	V1.1.3 & Above	Hardware
Festo CPX-AP-I Head Module	CPX-AP-I-EP-M12	V1.2.2 & Above	Hardware
CPX Module Connecting Cable	NEBC-D8G4-ES-0.3-N-S-D8G4-ET	-	Hardware
CPX Module Power Cable	NEBL-M8G4-E-5-N-LE4	-	Hardware
Allen-Bradley PLC	Studio – 5000 Platform	Version Free	Hardware
Rockwell Studio – 5000 Designer	9324-RLD700NXENE	Version Free	Software
Festo Field Device Tool	-	Latest	Software
Internet Explorer	-	Latest	Software

Table 1.1: 1 Components/Software used

1.2 Hardware Overview



1.3 Communication Architecture

**Note**

- Communication Architecture may change depend on user CPX-AP-I expansion modules. The above structure shown for demonstration.

2 Hardware Configuration

2.1 Allen-Bradley PLC IP Address Configuration

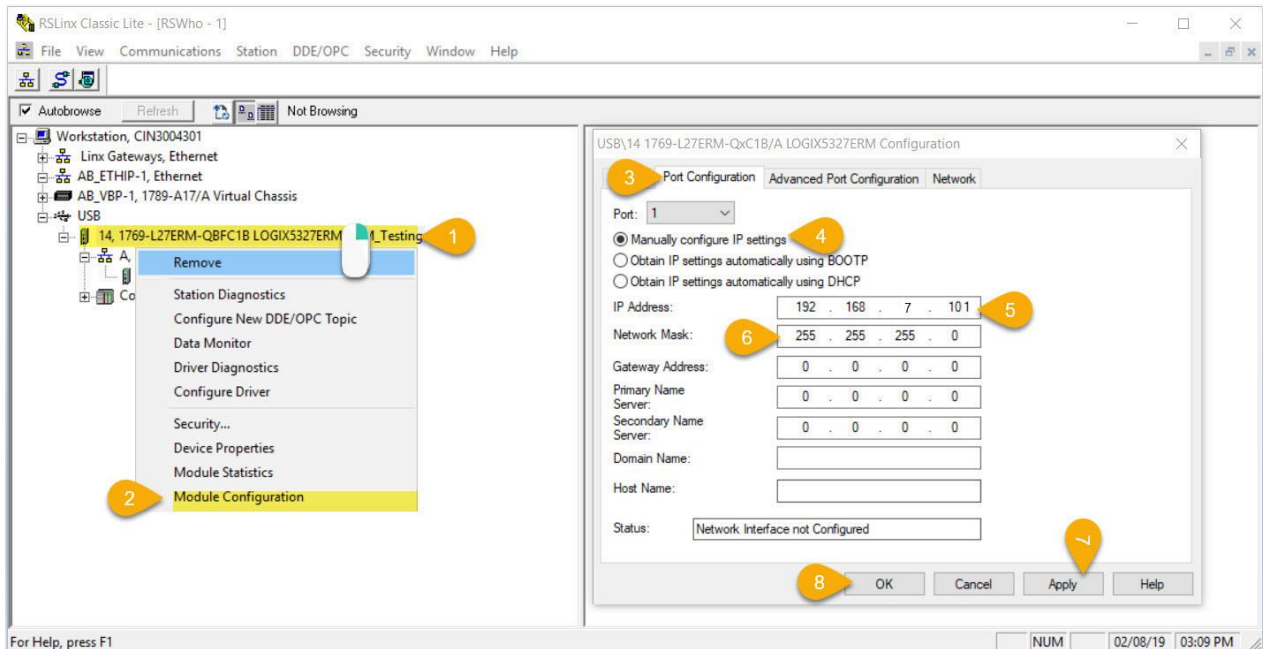
Connect the USB cable (9300-USBCBL-ABHR2) between PLC port & work station computer. Open RSLinx Software. Once USB connection communication is healthy user will see the “USB” symbol on RSLinx software.



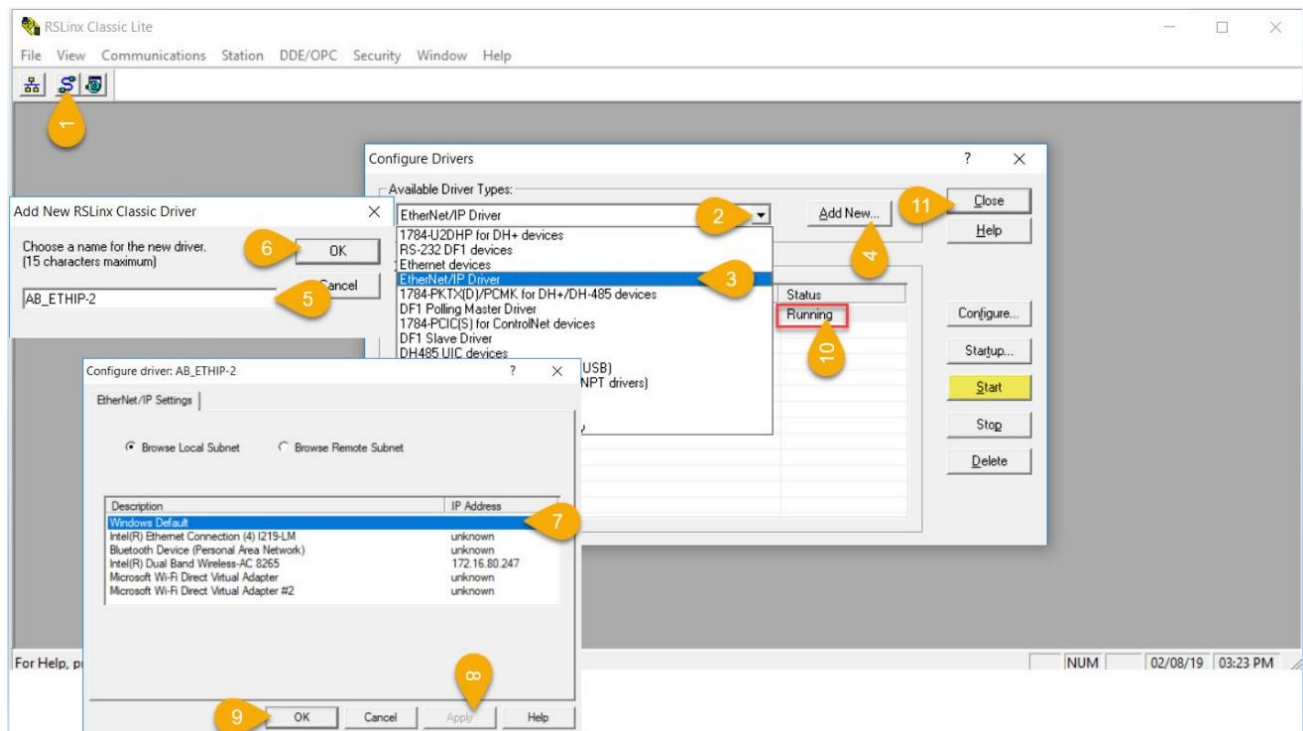
Note

Ignore Chapter 2.1 in case integration of ehps module with existing running project file and jump to Chapter 2.2.

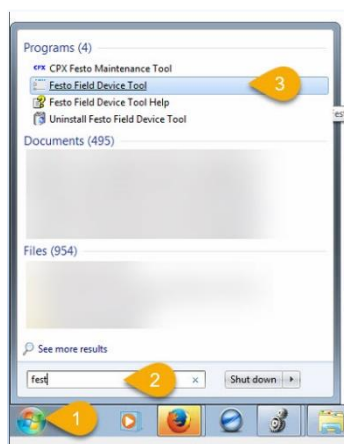
Step – 1



1. **Explore “USB” folder** on RSLinx software and **select controller** with right click on mouse. In this case controller is 1769-L27ERM.
2. From right click menu select **“Module Configuration”** option. At this stage new module configuration window will open.
3. Select **“Port Configuration”** tab.
4. Select **“Manual configuration IP setting”** option. Once Manual option selected IP Address & Network Mask field will be available for editing.
5. Enter the **IP Address** of the PLC.
6. Enter the **Network Mask** of PLC. Other addressing option depend upon users network configuration. IP Address & Network Mask are the minimum required configuration for establishing communication.
7. Click **“Apply”** button.
8. Click **“OK”** button.

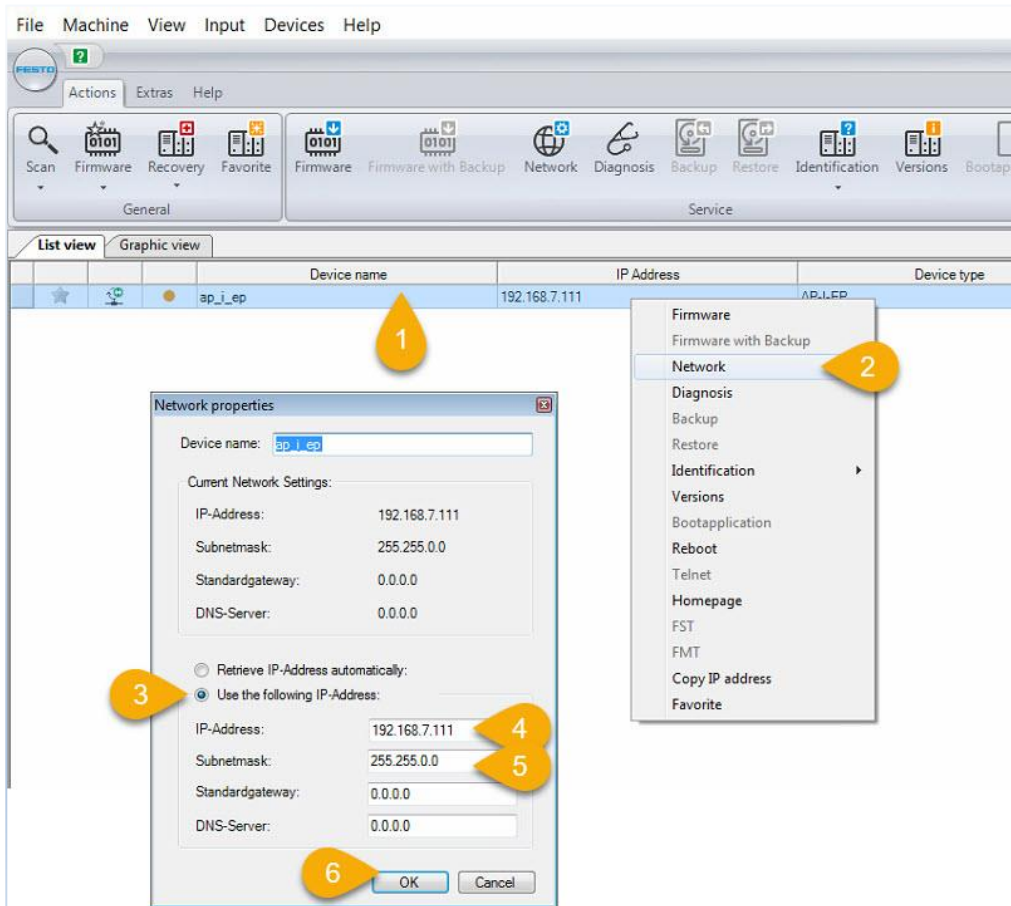
Step – 2

1. Select **“Configure Drive”** Icon.
2. From configuration driver’s window select **dropdown menu**.
3. Select **“EtherNet/IP Driver”** from the driver list.
4. Select **“Add New”** Button.
5. **Enter the Name** of the driver. Its optional user can also go with default name.
6. Select **“OK”** Button.
7. Select **“Windows Default”** Ethernet driver from the list so it will take workstation inbuilt system configured IP address. If user using any type of converter like Ethernet to USB, user need to select correct driver name for that mode of interface.
8. Click **“Apply”** button to apply change.
9. Click **“OK”** button to ensure the configuration.
10. Check the created driver status is in **“Running”**. If not in running status select the driver and click the start button.
11. Select **“Close”** button once all above configurations are done.

2.2 Festo CPX-AP-I-EP Head Module IP Address Configuration**Step – 1**

1. Click **“Start”** button of Windows.
2. Type the name **“Festo”** in search box.
3. Select **“Festo Field Device Tool”** from search result.

Step – 2

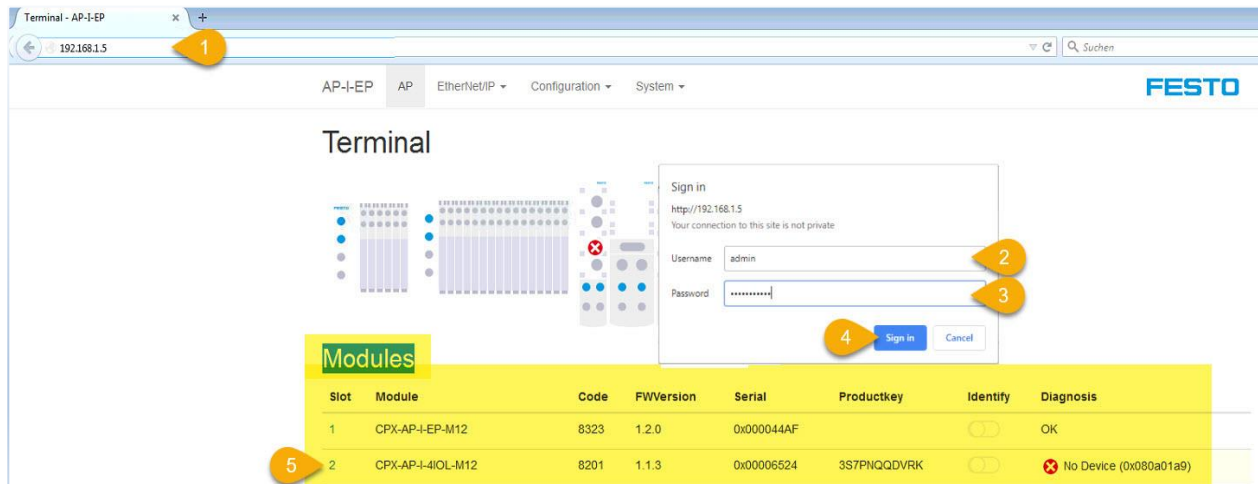


1. Select the correct CPX-AP-I-EP head module from the device list & right click.
2. Select **“Network”** option from right click menu.
3. Select **“Use the following IP-Address”** option from Network properties window.
4. Enter the actual IP Address of CPX-AP-I-EP in **“IP-Address”** data entry field.
5. Enter actual subnet mask value of CPX-AP-I-EP in **“Subnetmask”** data entry field.
6. Click **“OK”** to confirm the configuration & Close the network window.

2.3 Festo CPX-AP-I-4IO-M12 IO-Link Master Port Configuration for Activation

Step – 1

The web server configuration shows connection details of connected modules, Description of module, Firmware details, Serial number & Product key. As per this application note we have connected two number of modules.



1. Open internet browser and type the IP address of the CPX-AP-I-EP module.
2. Enter the **“Username”** as admin in Sign-in pop-up window.
3. Enter the CPX-AP-I-EP product key as password. Product key is available in module name plate.
4. Press **“Sign in”** button on Sign in pop-up window.
5. Select the CPX-AP-I-4IOL-M12 IO-Link module where the EHPS Gripper unit is connected.

**Note**

- Once Login completed successfully list of connected modules will be available as highlighted in yellow color.

Step – 2

User have to do the below configurations for the IO-Link port where EHPS Gripper module is connected.

**Note**

- This is an sample configuration. User have to do the same configuration for the port connected with EHPS.

Assign the parameter as like below green highlighted to activate an IO-Link port.

2	CPX-AP-I-4IOL-M12	8201	1.1.3	0x00006524	3S7PNQQDVRK		OK
Parameter Object (0x0F)							
Instance	AP Id/Instance	Parameter	Startup	Value			
10	20022:0	Setup monitoring load supply (PL) 24 V DC	yes	Load supply monitoring active, diagnosis suppressed in case of switch-of			
11	20049:0	Nominal Cycle Time (Port 0)	yes	as fast as possible			
12	20049:1	Nominal Cycle Time (Port 1)	yes	as fast as possible			
13	20049:2	Nominal Cycle Time (Port 2)	yes	as fast as possible			
14	20049:3	Nominal Cycle Time (Port 3)	yes	as fast as possible			
15	20050:0	Enable diagnosis of IO-Link device lost (Port 0)	yes	☒			
16	20050:1	Enable diagnosis of IO-Link device lost (Port 1)	yes	☒			
17	20050:2	Enable diagnosis of IO-Link device lost (Port 2)	yes	☒			
18	20050:3	Enable diagnosis of IO-Link device lost (Port 3)	yes	☒			
19	20071:0	Port Mode (Port 0)	yes	IOL_AUTOSTART			
20	20071:1	Port Mode (Port 1)	yes	DEACTIVATED			
21	20071:2	Port Mode (Port 2)	yes	DEACTIVATED			
22	20071:3	Port Mode (Port 3)	yes	DEACTIVATED			

Once port activation completed successfully feedback parameters update the port status as highlighted in yellow and pink highlighted parameters for inactive port feedback values.

35	20074:0	Port status information (Port 0)	OPERATE
36	20074:1	Port status information (Port 1)	DEACTIVATED
39	20075:0	Revision ID (Port 0)	17
40	20075:1	Revision ID (Port 1)	0
43	20076:0	Port transmission rate (Port 0)	COM2
44	20076:1	Port transmission rate (Port 1)	NOT_DETECTED
47	20077:0	Actual cycle time in 100 us (Port 0)	28
48	20077:1	Actual cycle time in 100 us (Port 1)	0
51	20078:0	Actual VendorID (Port 0)	310
52	20078:1	Actual VendorID (Port 1)	0
55	20079:0	Actual DeviceID (Port 0)	403
56	20079:1	Actual DeviceID (Port 1)	0
59	20108:0	InputDataLength (Port 0)	2
60	20108:1	InputDataLength (Port 1)	0

Select variant for CPX-AP-I-4IOL-M12.

68	20109:2	OutputDataLength (Port 2)	0
69	20109:3	OutputDataLength (Port 3)	0
-	20090:0	Variant selection	yes
			CPX-AP-I-4IOL-M12 Variant 8 CPX-AP-I-4IOL-M12 Variant 8 CPX-AP-I-4IOL-M12 Variant 8 OE CPX-AP-I-4IOL-M12 Variant 2 CPX-AP-I-4IOL-M12 Variant 2 OE CPX-AP-I-4IOL-M12 Variant 4 CPX-AP-I-4IOL-M12 Variant 4 OE CPX-AP-I-4IOL-M12 Variant 16
CPX-AP-I-4DI4DO-M12-5P	8197	1.43.10	0x00003
VMPAL-EPL-AP	8224	1.43.12	0x00003



Note

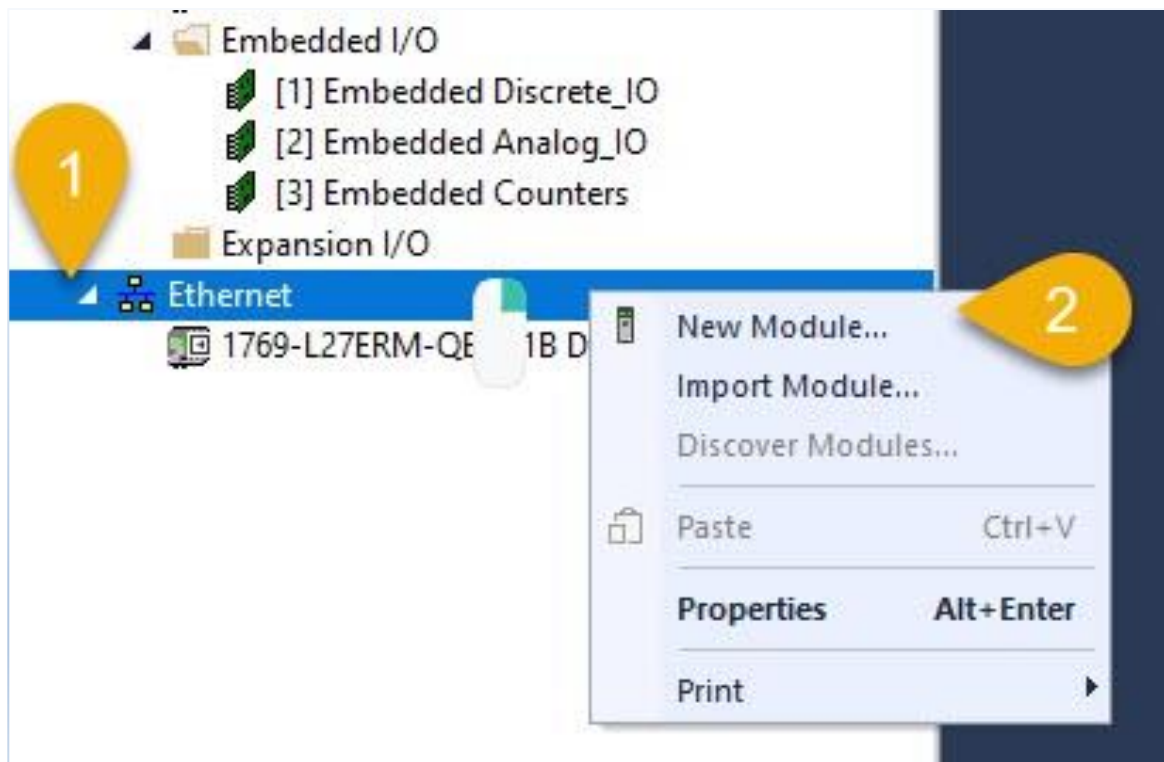
- Variants ending with OE will not allow the host controller to control module outputs.

3 Software Configuration

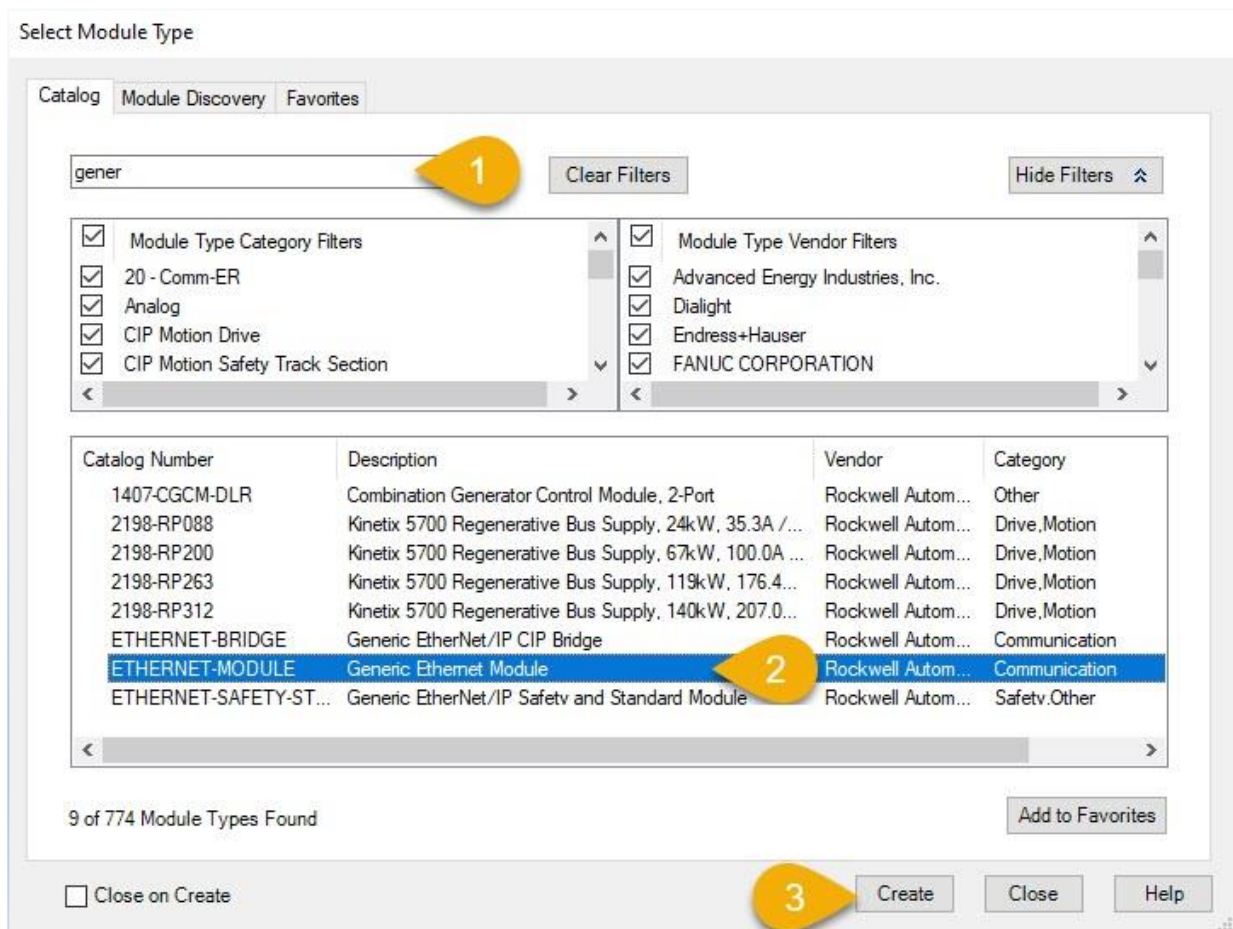
**Note**

- If user decides to use **Generic EtherNet** module as target device communication module then follow the Chapter – 3.1.
- If user decides to use **EDS file** as target device communication module then follow the Chapter – 3.2.

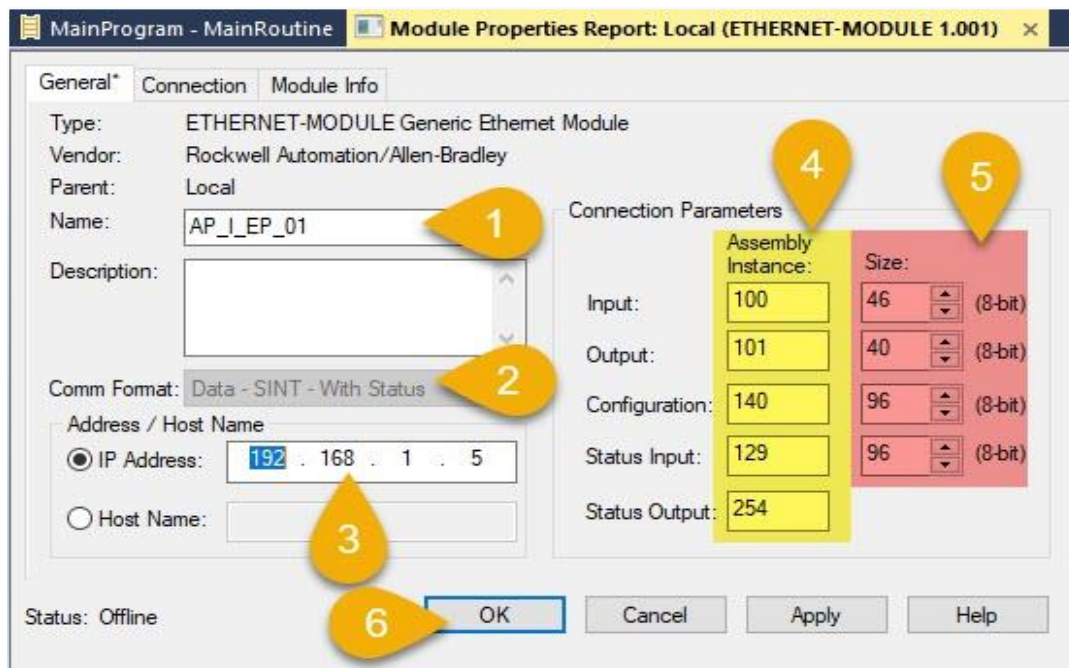
3.1 Use Generic EtherNet as Destination Device Communication Module

Step – 1

1. Select “**Ethernet**” folder from controller organizer menu.
2. Select “**New Module**” from right click menu.

Step – 2

1. Enter keyword “**gener**” in search box to short list the devices.
2. Select “**ETHERNET-MODULE**” from device list.
3. Click “**Create**” button to generate the selected module.

Step – 3

1. Enter the name of the interface module. This given will be the tag name for this module which will available in controller tag folder after successful configuration.
2. Select **“Data-SINT-With Status”** from the communication format drop down menu.

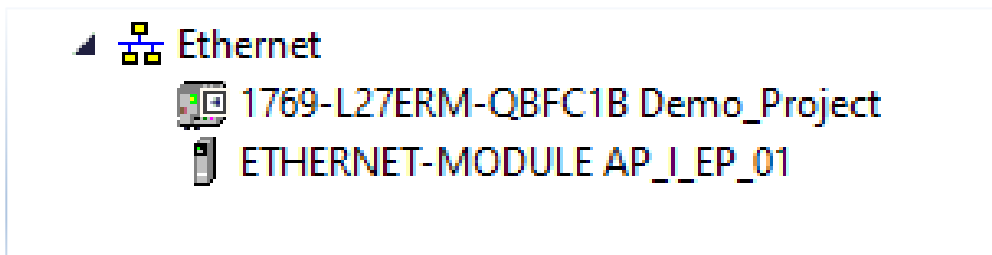


Note

- Communication format can be select as **“Data-INT-With Status”** or **“Data-DINT-With Status”** based on user requirement but user have to enter the correspondent Instance value & IO size values. User can able to find instance & IO size values from CPX-AP-I-EP web configuration portal.
- If the communication format is **“Data-INT-With Status”** then user have to note the IO size values of 102, 103, 129 & 140.
- If the communication format is **“Data-DINT-With Status”** then user have to note the IO size values of 104, 105, 129 & 140.

3. Enter the IP address of the CPX-AP-I-EP head module.
4. Enter the assembly instance values for SINT format as highlighted in yellow colour. If its other data format instance values will be change as given in point – 2.
5. Enter the memory size for each instance in red highlighted boxes. The length of the instance will change based on user network configuration & data format selection.
6. Finally click **“OK”** button the complete the configuration.

Once the Generic Module configured successfully the module will be available in Ethernet tree as shown in below picture.

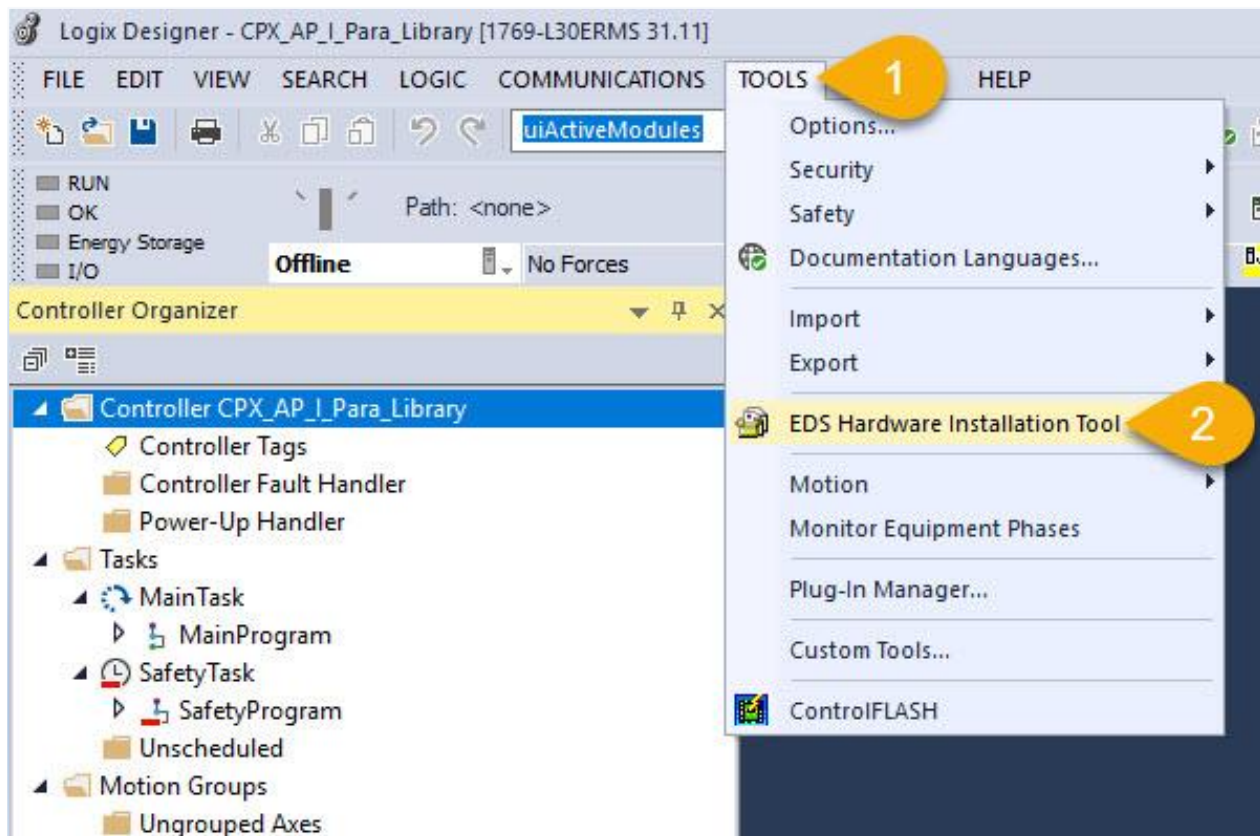


3.2 Use EDS File as Destination Device Communication Module

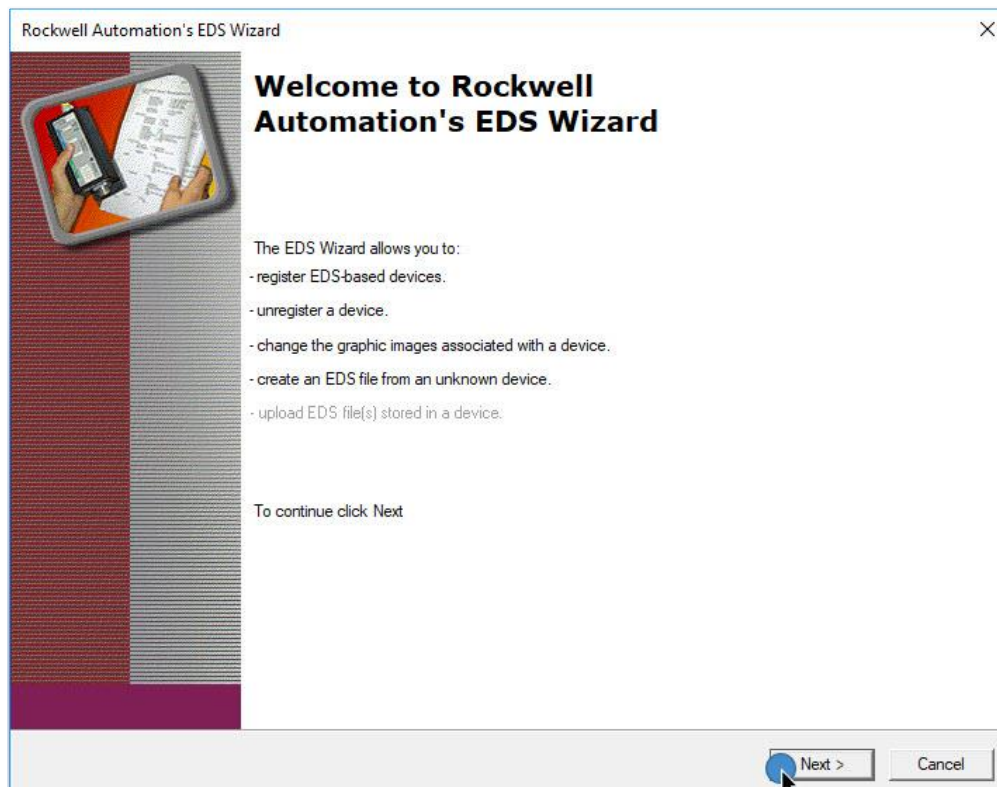


Note

- Skip this chapter in case while considering Generic EtherNet module as communication Interface module for destination device & refer the chapter – 3.1.

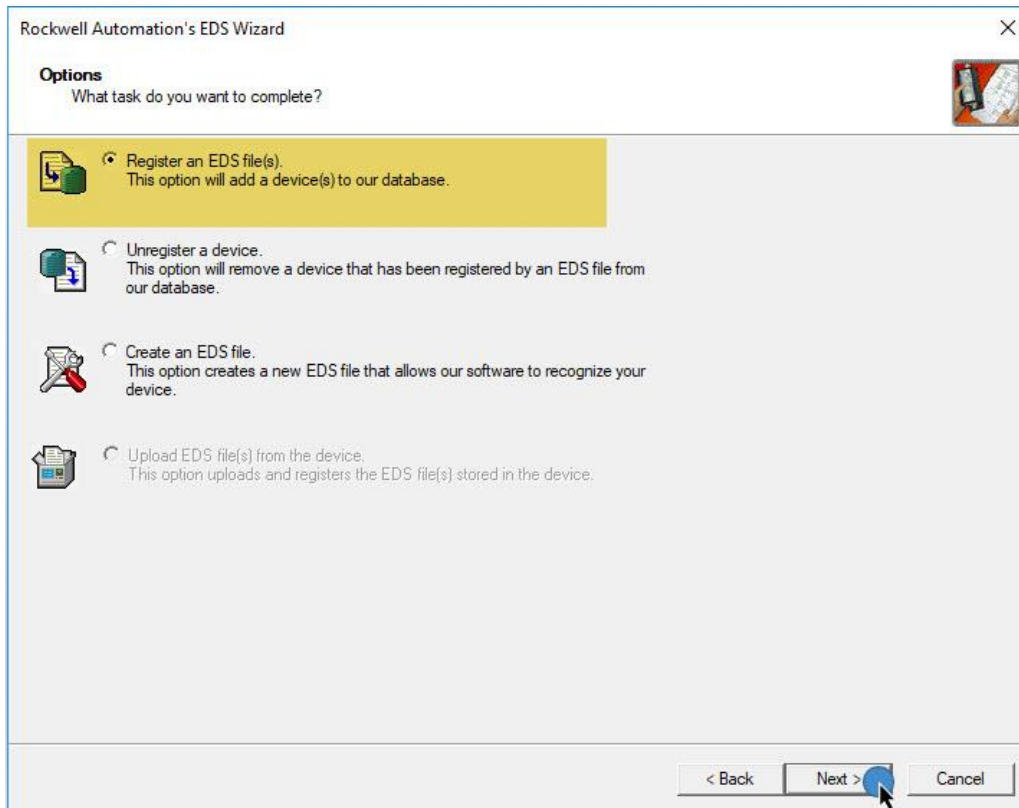
Step – 1

1. Select **"TOOLS"** from tool bar.
2. Select **"EDS Hardware Installation Tool"** from tools list.

Step – 2

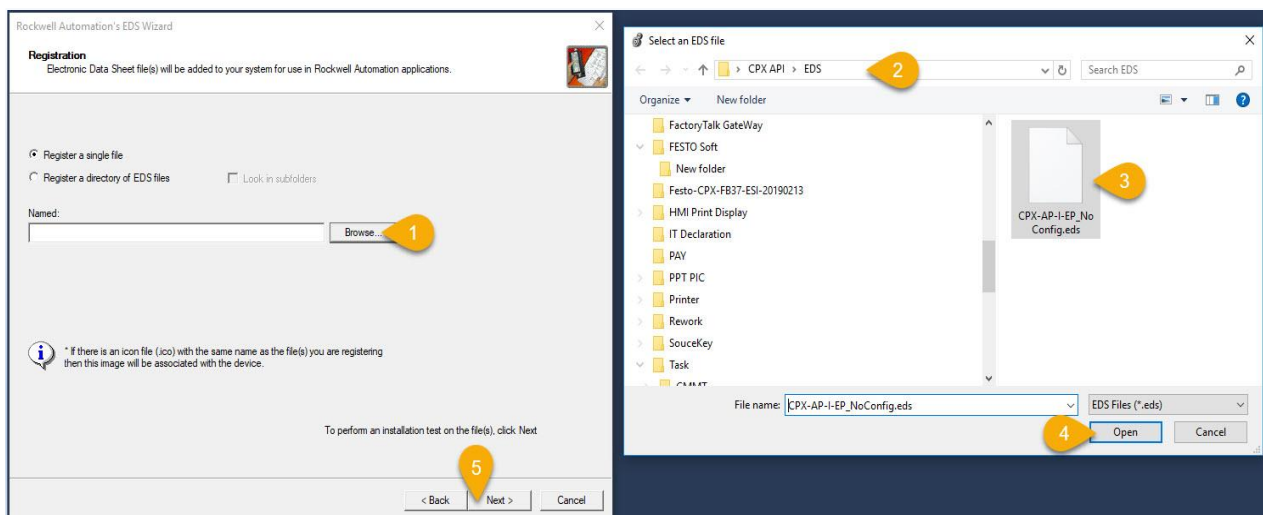
Click **“Next”** Button from EDS Wizard.

Step – 3



Ensure option -1 **“Register an EDS File(s)”** selected and click **“Next”** button.

Step – 4

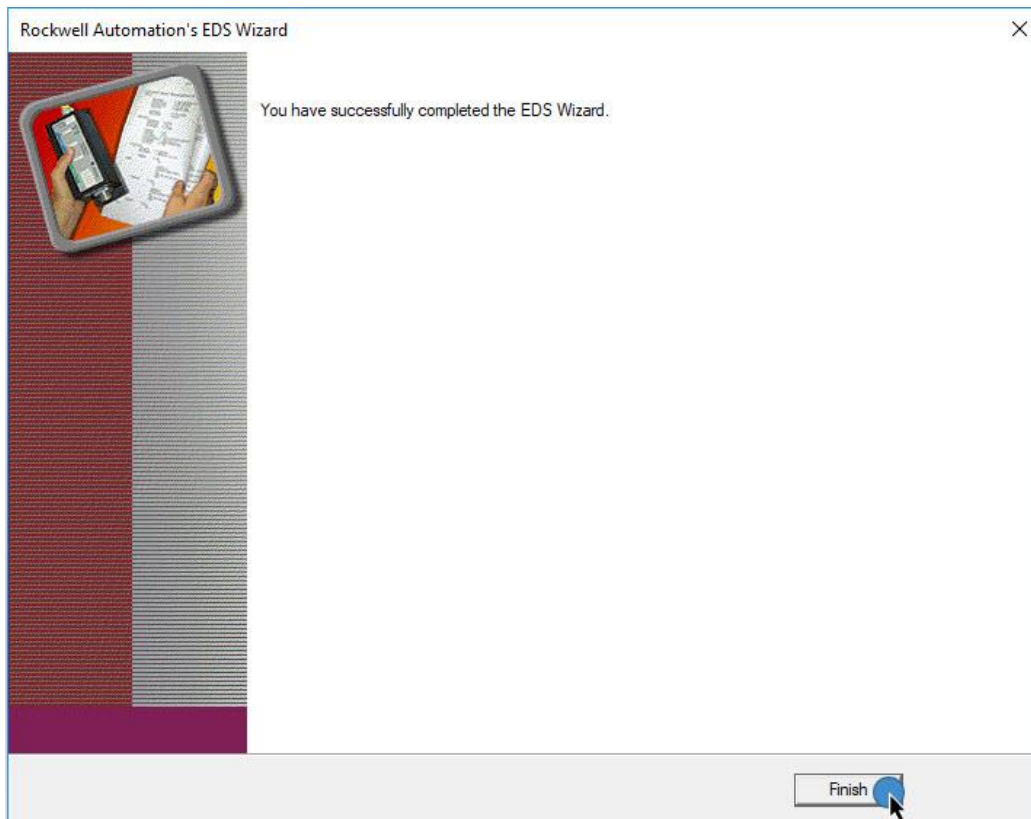


1. Select **“Browse”** button from Registration window.
2. Browse EDS file saved folder directory. Which we done on chapter 2.3.
3. Select EDS file from the folder.
4. Click **“Open”** button.
5. Click **“Next”** button.

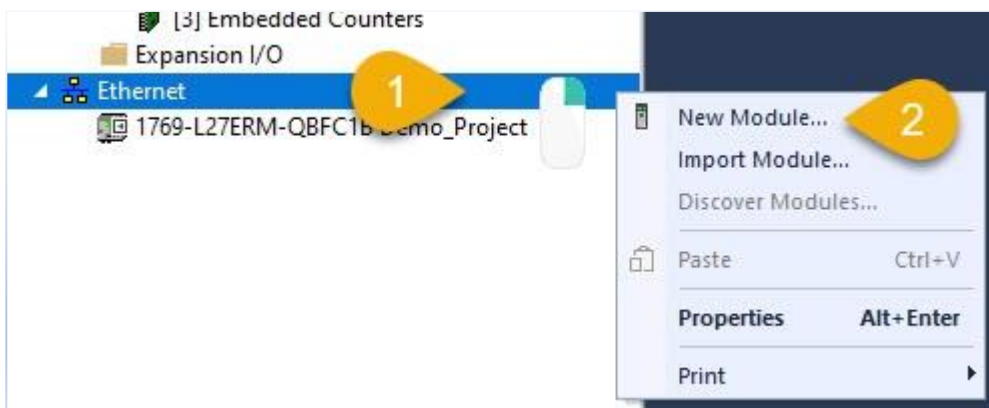


Note

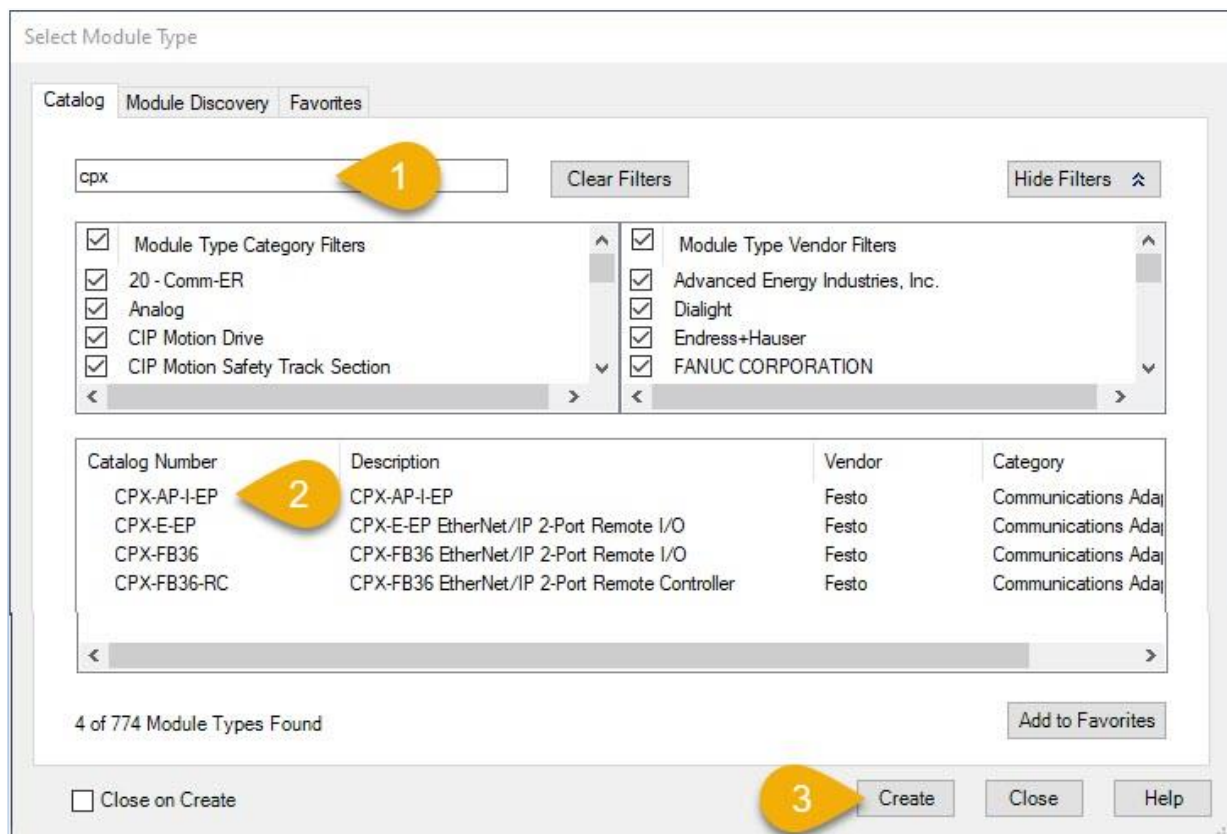
- Simply click next option for upcoming all wizards until reach finish wizard.

Step – 5

Click finish button after successful completion of EDS file. Now the CPX-AP-I-EP module will be available in Ethernet/IP interface modules gallery.

Step – 6

1. Select the **"Ethernet"** folder from studio-5000 controller organizer menu & right click.
2. Select **"New Module"** from right click menu.

Step – 7

1. Type as **“cpx”** in search box to filter the list of device.
2. Select **“CPX-AP-I-EP”** from device list.
3. Click **“Create”** button.

Step – 8

The 'New Module' dialog box is shown with the 'General' tab selected. The left sidebar contains a tree view with 'General*' (annotated with 1), 'Connection', 'Module Info', 'Internet Protocol', 'Port Configuration', and 'Network'. The main area has the following fields:

- Type: CPX-AP-I-EP CPX-AP-I-EP
- Vendor: Festo
- Parent: Local
- Name: AP_I_EP_01 (annotated with 2)
- Description: (empty text area)
- Ethernet Address:
 - ☒ Private Network: 192.168.1. 5 (annotated with 3)
 - ☐ IP Address: (empty)
 - ☐ Host Name: (empty)
- Module Definition:
 - Revision: 1.001
 - Electronic Keying: Compatible Module
 - Connections: I/O Con. Fixed SINT 16
- Change ... button (annotated with 4)

Status: Creating. Buttons: OK, Cancel, Help.

1. Select **"General"** tab from new module window.
2. Enter the name of the interface module in name field. This name will be the tag name for this module.
3. Select **"Private Network"** option & enter the last octal value of IP address.

**Note**

- Incase if the user has different IP address series other than 192.168.1.xxx then go with second option "IP Address".

4. Click **"Change"** button to configure the length of IO's of the interface module.

Step – 9

The 'Module Definition*' dialog box is shown. It has fields for Revision (1, 001), Electronic Keying (Compatible Module), and Connections. The Connections table is as follows:

Name	Input	Size	Tag Suffix
Exact I/O size (annotated with 1)	46	SINT	1 AP_I_EP_01:I
	40		AP_I_EP_01:O
I/O Con. Fixed SINT 16			
I/O Con. Fixed SINT 32			
I/O Con. Fixed SINT 64			
I/O Con. Fixed DINT 64			
I/O Con. Fixed DINT 128			
I/O Con. Fixed DINT 488/4			
StatusOnly Data			
Diagnostic Data			
Listen Only			
Exact I/O size (annotated with 2)			

Buttons: OK, Cancel, Help. Annotations: 3 points to the 'SINT' column, 4 points to the 'Input' column.

1. Select dropdown button to select instance type.
2. Select “**Exact I/O size**” option from drop down menu.
3. Select “**SINT**” data type.

**Note**

- Communication format can be select as “**INT**” or “**DINT**” based on user requirement but user have to enter the correspondent Instance IO size. User can able to find instance & IO size values from CPX-AP-I-EP web configuration portal.
- If the communication format is “**INT**” then user have to note the IO size values of 102, 103 & 129.
- If the communication format is “**DINT**” then user have to note the IO size values of 104, 105 & 129.

4. Enter the Input & Output IO size in yellow highlighted box given in assembly instance view. The length of the IO’s will change based on user network configuration & data format selection.

Step – 10

Module Definition*

Revision: 1 001

Electronic Keying: Compatible Module

Connections:

Name	Input	Output	Size	Tag Suffix
Exact I/O size	4	4	SINT	1 AP_I_EP_01:I1 AP_I_EP_01:O1
Diagnostic Data	96	0	SINT	2 AP_I_EP_01:I2 <none>
IO Con. Fixed SINT 16				
IO Con. Fixed SINT 32				
IO Con. Fixed SINT 64				
IO Con. Fixed DINT 64				
IO Con. Fixed DINT 128				
IO Con. Fixed DINT 488/4				
StatusOnly Data				
Diagnostic Data				

OK Cancel Help

1. Select dropdown button to select instance type.
2. Select “**Diagnostic Data**” option from drop down menu.
3. Select “**SINT**” data type. User can also select INT or DINT as communication format. But user have to enter correct data size based on data format. The size of the diagnostic data will be SINT in web configuration portal. So user have to convert the diagnostic data size based on data type selection.
4. Enter the Input size in yellow highlighted box which noted on Chapter – 2.3 step – 2.
5. Click “**OK**” to complete the configuration.

Step – 11

New Module

General

Type: CPX-AP-I-EP CPX-AP-I-EP
Vendor: Festo
Parent: Local
Name: AP_I_EP_01
Description:

Ethernet Address
☒ Private Network: 192.168.1.5
☐ IP Address:
☐ Host Name:

Module Definition
Revision: 1.001
Electronic Keying: Compatible Module
Connections: Exact I/O size
Diagnostic Data

Change ...

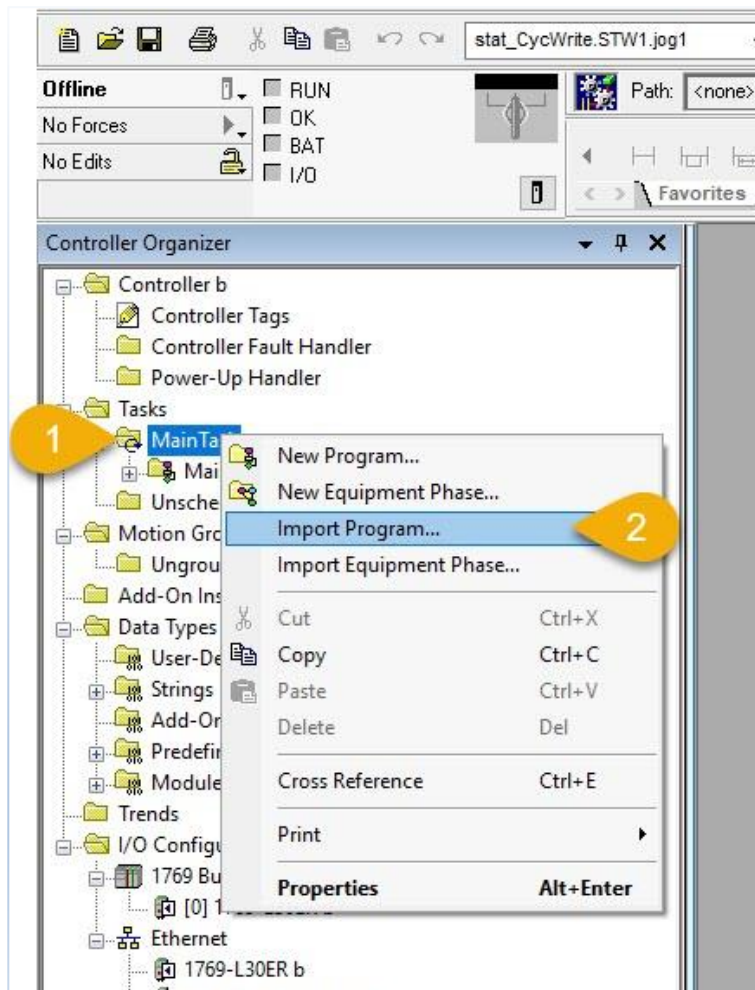
Status: Creating

OK Cancel Help

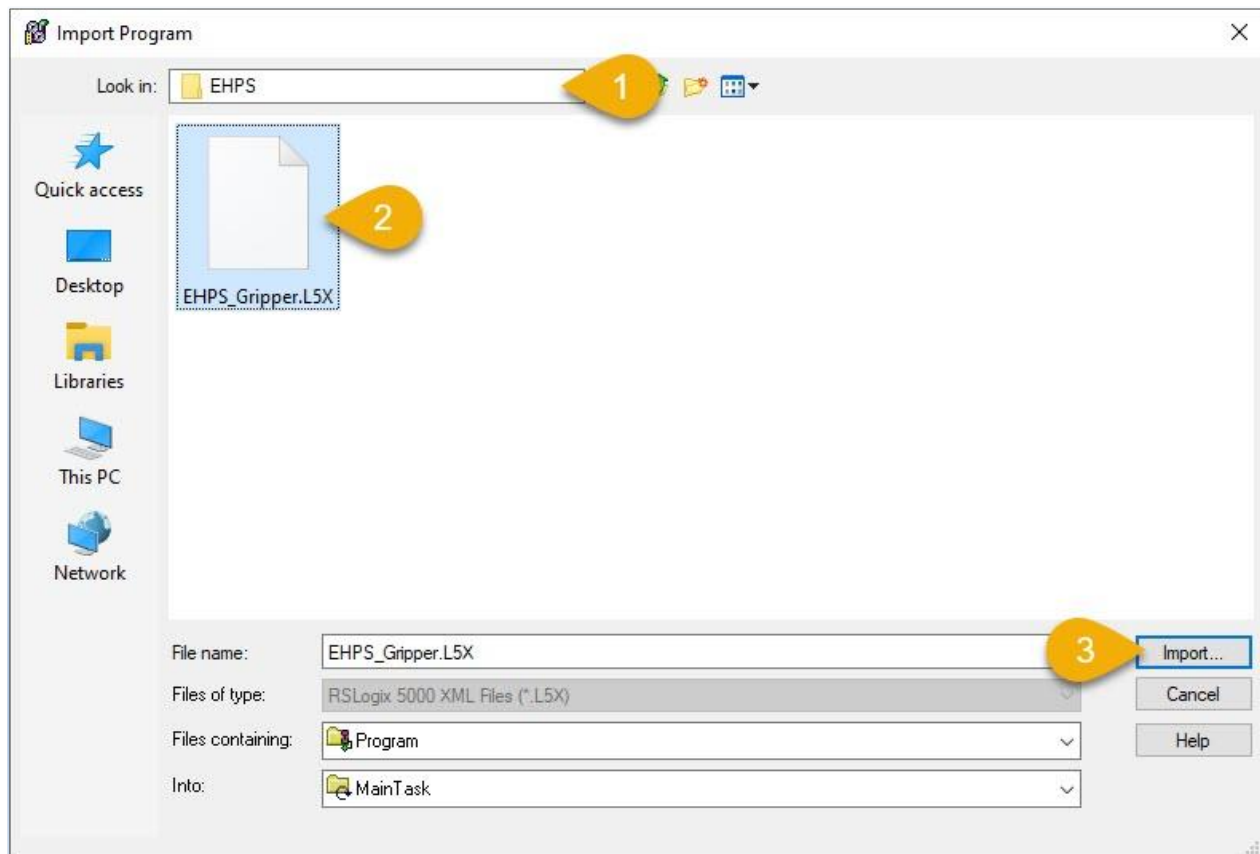
Finally click the **“OK”** button to complete the configuration.

3.3 Import Sample Code .L5X File into Running Project

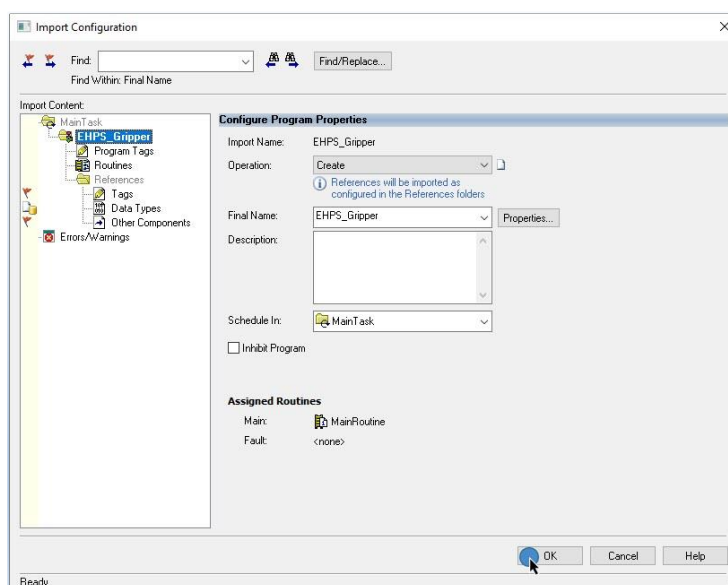
Step – 1



1. Select a **“Task folder”** and right click.
2. Select **“Import Program”** option from the right click menu.

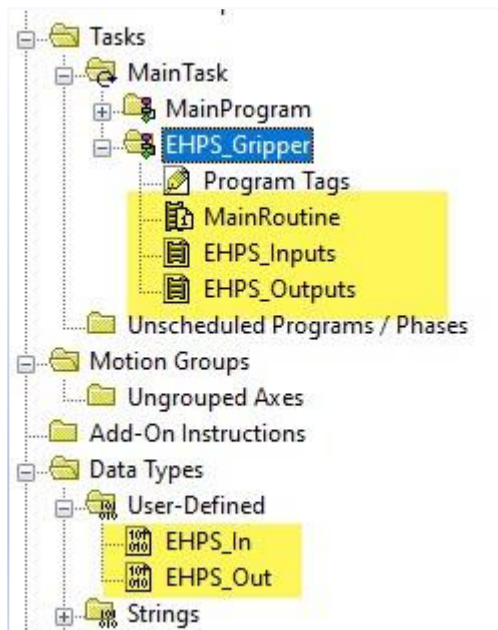
Step – 2

1. Navigate to EHPS sample code folder saved folder.
2. Select “EHPS_Gripper.L5X” file in the folder.
3. Click “Import” button to import the sample code.

Step – 3

Click “OK” button to initiate the import process.

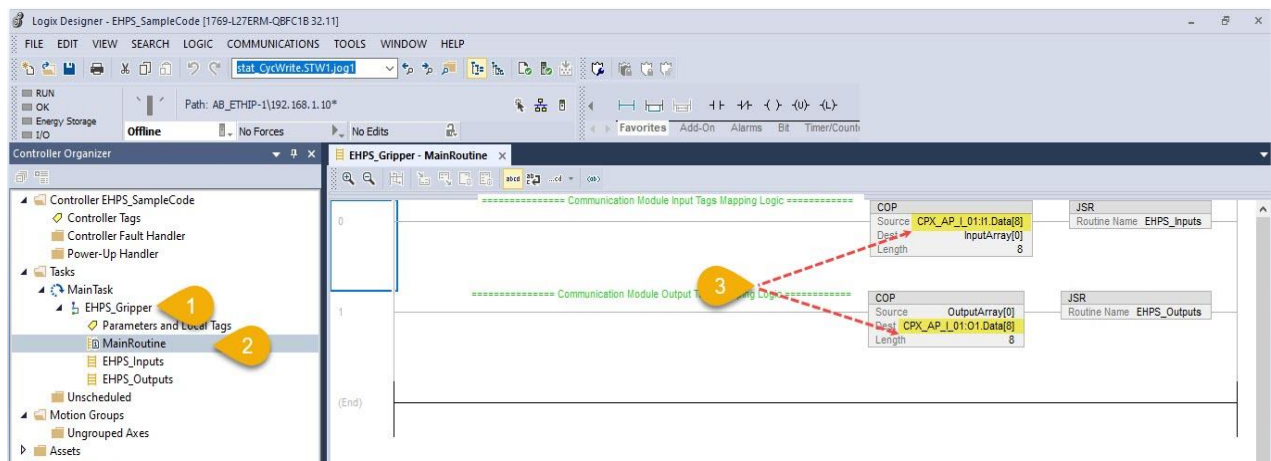
Once the import process completed successfully the new program routines and UDT’s will be available as like below highlighted.



3.4 Sample Code Initial Configuration

Step – 1

Mapping the Interface module Input and Output tags for sample code.



1. Expand the “**EHPS_Gripper**” program folder.
2. Double click the “**MainRoutine**”.
3. Map the Input and Output communication module interface tag in COP instruction which created in chapter – 3.1 or 3.2 & download program in PLC.

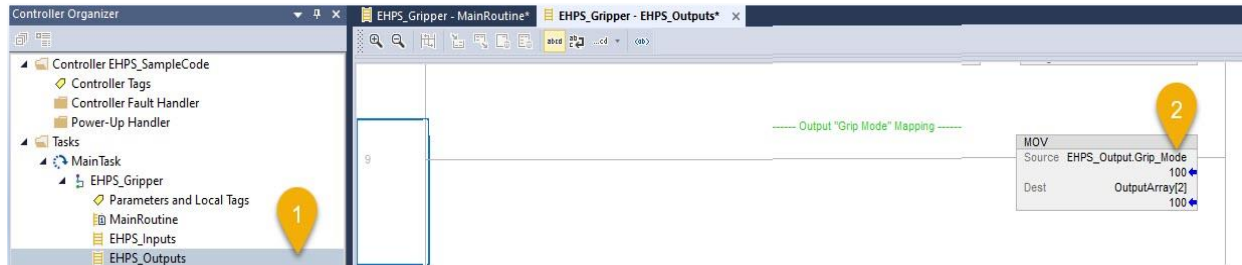


Note

- Refer Technical Appendix – A to know how find the correct IO element in communication interface tag array for user module position.

Step – 2

Gripper Mode Configuration



1. Open the “EHPS_Outputs” routine.
2. Go to rung number 9 & enter the gripper mode value in the tag “EHPS_Output.Grip_Mode”. (0 – Invalid, 100 – Universal, 60 – External Gripping, 70 – Internal Gripping)

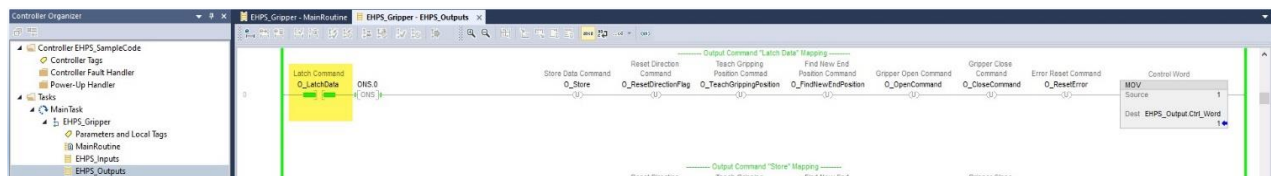
Step – 3



Go to rung number 12 & enter the gripper force value in the tag “EHPS_Output.Grip_Force”.

Step – 4

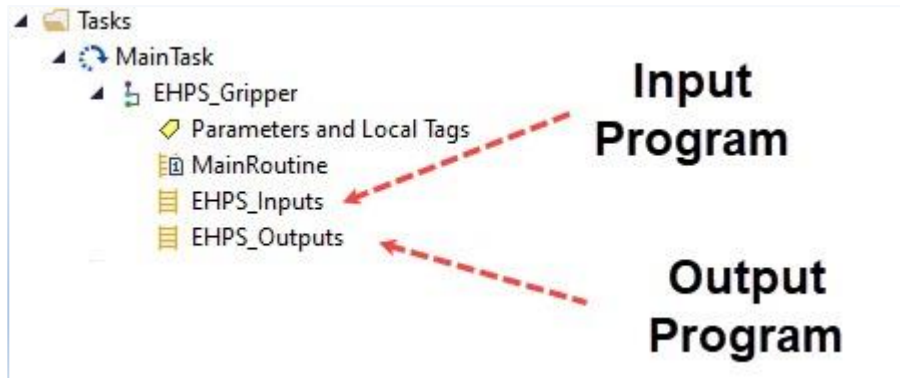
Finally Latch the Data



Make O_LatchData as True to write the new modified parameter in target device.

4 Sample Code Program Structure & Example Functions

User can find the Input & Output programs in below routines



4.1 EHPS Status/Input Tag Details

Input Tag Name	Data Type	Description
Sts_Error	BOOL	True – Device in error state.
Sts_DirectionCloseFlag	BOOL	True – Gripper arm movement completed with close direction
Sts_DirectionOpenFlag	BOOL	True – Gripper arm movement completed with open direction
Sts_LatchDataOK	BOOL	True – Acknowledgement of modified parameters wrote successfully
Sts_UnifiedPositionFlag	BOOL	True – Unified position state
Sts_ClosedPositionFlag	BOOL	True – Gripper arms in closed position
Sts_GrippedPositionFlag	BOOL	True – Gripper is in gripping position
Sts_OpenedPositionFlag	BOOL	True – Gripper arms in open position
Sts_Ready	BOOL	True – Module is in ready to operate state
Error_Number	INT	Diagnostic error code. Refer below table for error code details.
ACT_Pos	INT	Actual position of the gripper arms.

Error Code Details:

Diagnostic message Hex (Dec)	Device status	Error	Possible cause	Remedy	"Error-Count" ¹⁾
0x0 (0)		"Status ok, device is ready"			No
0x100 (256)	Outside the specification	"Power supply error"	– Actuator supply not connected – Cable break – Actuator supply not sufficient	Testing the actuator supply voltage	Yes
0x101 (257)	Out of specification (drive can no longer be moved)	"Temperature too high"	– Ambient temperature too high – Gripper has overload	ensure adequate pressurisation/cooling/connection	Yes
0x102 (258)	Out of specification (drive can no longer be moved)	"Temperature too low"	Ambient temperature too low	ensure sufficient operating temperature	Yes
0x010A (266) ²⁾	Outside the specification	"Actuator under voltage during movement"	– Actuator supply unstable – Line resistance increased (faulty supply cable) – Power supply not sufficiently designed for peak loads, faulty supply cables	– Check gripping force, check power supply and peak load – Manual acknowledgement of error message necessary	No

0x300 (768)	Outside the specification	"ControlWord not plausible"	Wrong value in "ControlWord"	Checking the value in the "ControlWord"	No
0x301 (769)	Outside the specification	"GrippingPosition not plausible"	Incorrect value in parameter "GrippingPosition"	Check the parameter "GrippingPosition"	No
0x302 (770)	Outside the specification	"GrippingForce not plausible"	Incorrect value in parameter "GrippingForce"	Check the parameter "GrippingForce"	No
0x304 (772)	Outside the specification	"GrippingTolerance not plausible"	Incorrect value in parameter "GrippingTolerance"	Check the parameter "GrippingTolerance"	No
0x305 (773)	Failure	"Reference position error"	Gripper has no reference position	Service Festo SE & Co. KG	Yes
0x306 (774)	Outside the specification	"GrippingMode not plausible"	Incorrect value in parameter "GrippingMode"	Check the parameter "GrippingMode"	No
0x307 (775)	Motion task cannot be executed	"Drive command cannot be executed"	Multiple travel commands in the same direction	Reset "ResetDirectionFlag" direction flag or send movement command in the other direction	No
0x308 (776)	Outside the specification	"WorkpieceNo not plausible"	Incorrect value in parameter "WorkpieceNo"	Check the parameter "WorkpieceNo"	No

4.2 EHPS Control/Output Tag Details

Output Tag Name	Data Type	Description
O_LatchData	BOOL	True – Write the modified parameters in device.
O_Store	BOOL	True – Store the written parameters in device.
O_ResetDirectionFlag	BOOL	True – Reset the direction flag.
O_TeachGrippingPosition	BOOL	True – Teach the gripping position.
O_FindNewEndPosition	BOOL	True – Find the new end position.
O_OpenCommand	BOOL	True – Gripper arms open command.
O_CloseCommand	BOOL	True – Gripper arms close command.
O_ResetError		True – Reset the error in device.

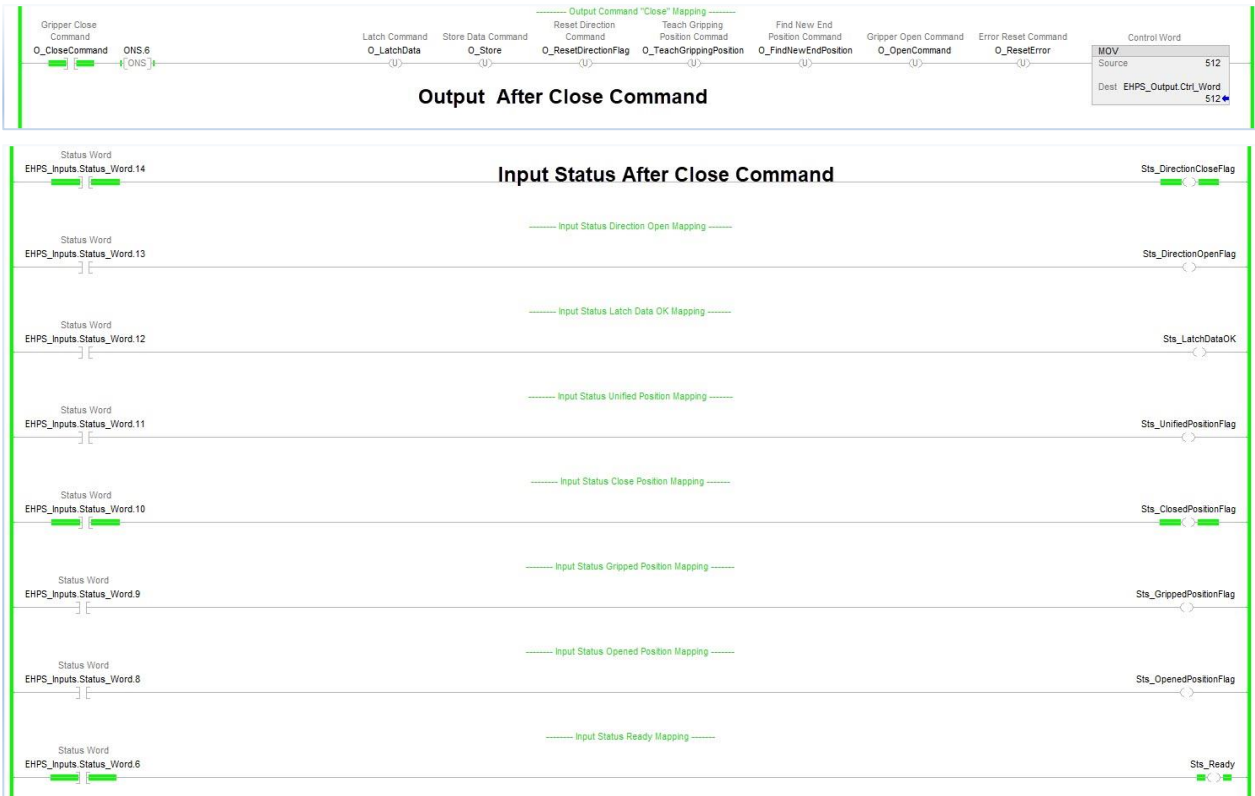
Output Tag Name	Data Type	Description
EHPS_Output.Grip_Mode	SINT	Gripper mode 000 – Invalid 100 – Universal mode 060 – External Gripping 070 – Internal Gripping
EHPS_Output.Work_NO	SINT	Work Number
EHPS_Output.Grip_Pos	INT	Gripping Position
EHPS_Output.Grip_Force	SINT	Gripper force
EHPS_Output.Grip_Tol	SINT	Gripper tolerance

4.3 Gripper Close Command

Before Close Command



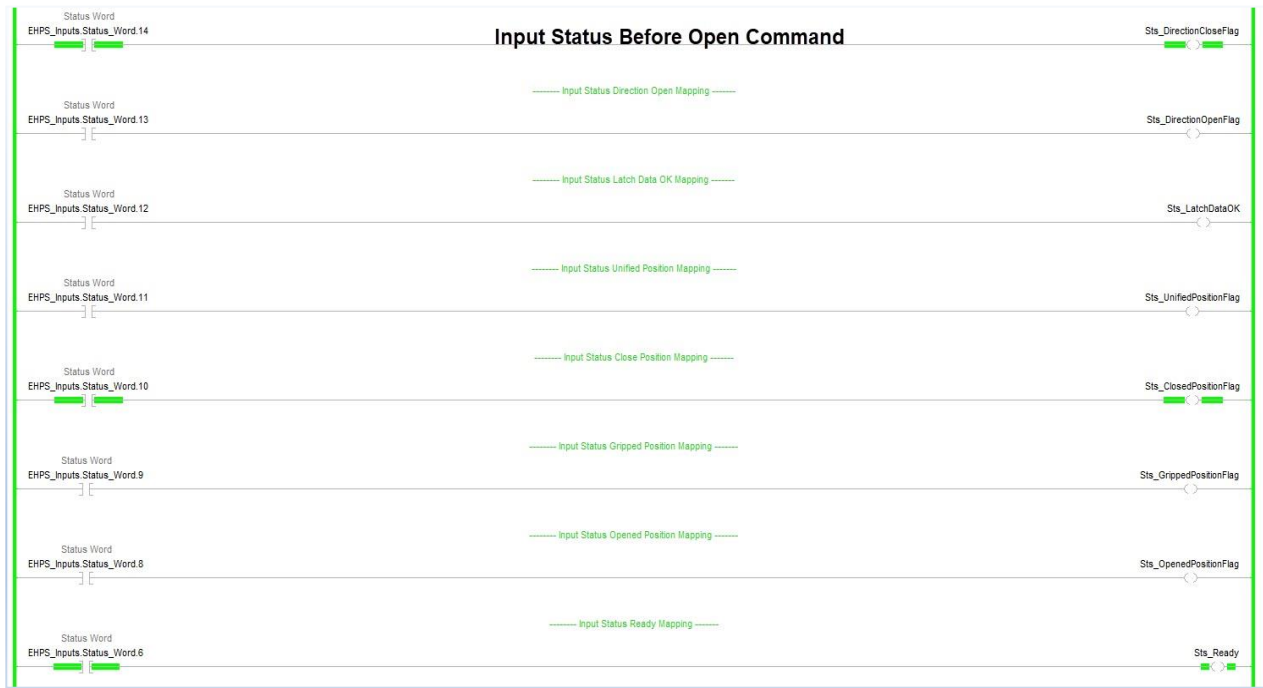
After Close Command



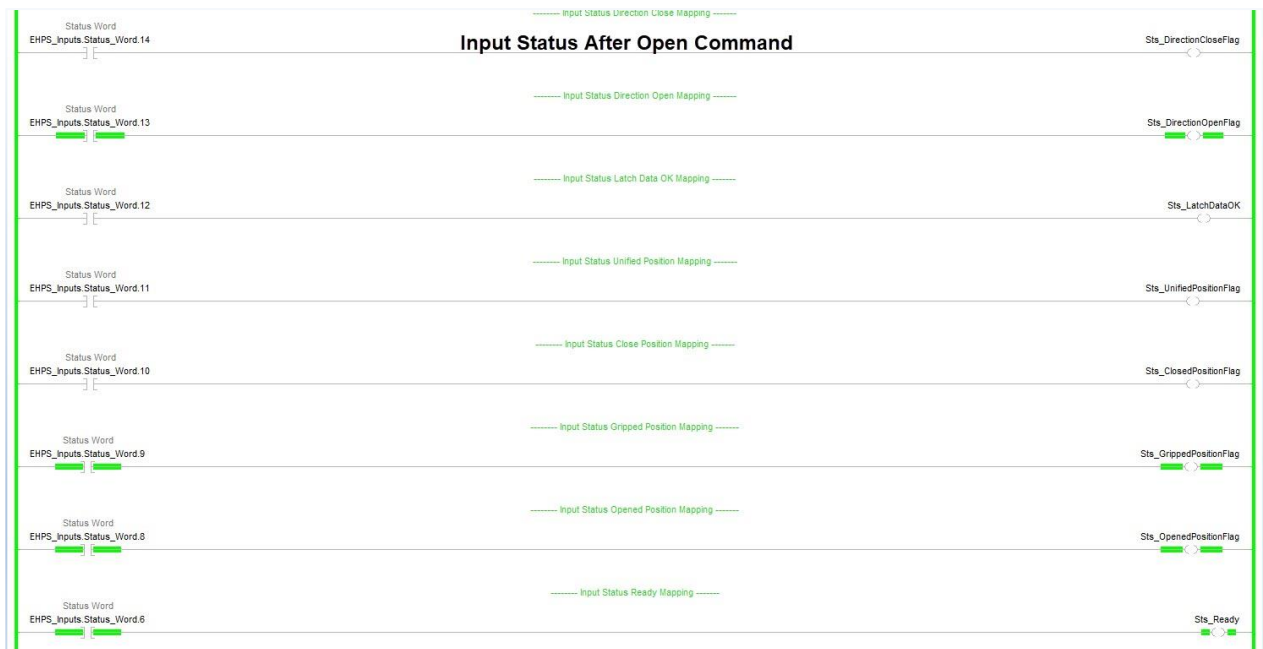
4.4 Gripper Open Command

Before Open Command





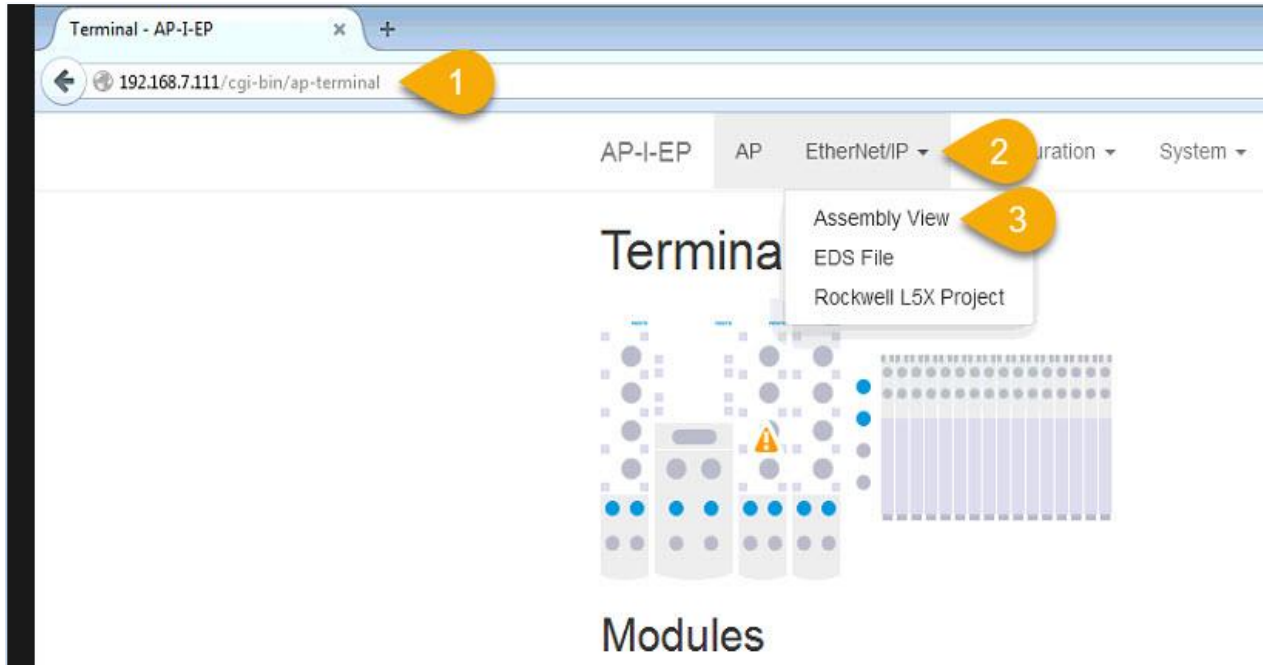
After Open Command



A Technical appendix

A.1 Find Module IO Element Position in IO Interface Array

Step – 1



1. Open a web browser and enter the IP address of the CPX-AP-I-EP module.
2. Click "**EtherNet/IP**" from tool bar.
3. Select "**Assembly View**" from drop-down list.

Step – 2

AP-I-EP AP EtherNet/IP Modbus TCP Configuration System **FESTO**

Assembly View

100 - Input Exact SINT (46 Bytes) 1

Search:

Offset (bit)	Bit length	Module	Channel	Datatype	Name
0	64	2	0	USINT[8]	Module 2 - CPX-AP-I-4IOL-M12 - Port 0
64	64	2	1	USINT[8]	Module 2 - CPX-AP-I-4IOL-M12 - Port 1
128	64	2	2	USINT[8]	Module 2 - CPX-AP-I-4IOL-M12 - Port 2
192	64	2	3	USINT[8]	Module 2 - CPX-AP-I-4IOL-M12 - Port 3
256	8	2	4	USINT	Module 2 - CPX-AP-I-4IOL-M12 - Port 4

2

Calculator

Standard

64 ÷ 8 =

8

MC MR M+ M- MS M*

% CE C $\frac{\square}{\square}$

$\frac{1}{x}$ x^2 $\sqrt[3]{x}$ $\div$

7 8 9 $\times$

4 5 6 $-$

1 2 3 $+$

$\pm/\square$ 0 . $=$

CPX_AP_I_01:I1.ConnectionFaulted 0 Decimal BOOL

CPX_AP_I_01:I1.Data {...} Decimal SINT[46]

CPX_AP_I_01:I1.Data[0] 0 Decimal SINT

CPX_AP_I_01:I1.Data[1] 8 Decimal SINT

CPX_AP_I_01:I1.Data[2] 0 Decimal SINT

CPX_AP_I_01:I1.Data[3] 0 Decimal SINT

CPX_AP_I_01:I1.Data[4] 0 Decimal SINT

CPX_AP_I_01:I1.Data[5] 0 Decimal SINT

CPX_AP_I_01:I1.Data[6] 0 Decimal SINT

CPX_AP_I_01:I1.Data[7] 0 Decimal SINT

CPX_AP_I_01:I1.Data[8] 35 Decimal SINT

CPX_AP_I_01:I1.Data[9] 64 Decimal SINT

CPX_AP_I_01:I1.Data[10] 0 Decimal SINT

CPX_AP_I_01:I1.Data[11] 0 Decimal SINT

CPX_AP_I_01:I1.Data[12] 0 Decimal SINT

CPX_AP_I_01:I1.Data[13] 0 Decimal SINT

CPX_AP_I_01:I1.Data[14] 0 Decimal SINT

CPX_AP_I_01:I1.Data[15] 0 Decimal SINT

CPX_AP_I_01:I1.Data[16] 0 Decimal SINT

CPX_AP_I_01:I1.Data[17] 0 Decimal SINT

CPX_AP_I_01:I1.Data[18] 0 Decimal SINT

CPX_AP_I_01:I1.Data[19] 0 Decimal SINT

CPX_AP_I_01:I1.Data[20] 0 Decimal SINT

CPX_AP_I_01:I1.Data[21] 0 Decimal SINT

CPX_AP_I_01:I1.Data[22] 0 Decimal SINT

CPX_AP_I_01:I1.Data[23] 0 Decimal SINT

CPX_AP_I_01:I1.Data[24] 0 Decimal SINT

CPX_AP_I_01:I1.Data[25] 0 Decimal SINT

CPX_AP_I_01:I1.Data[26] 0 Decimal SINT

1. Select **"100 - Input Exact SINT"** from assembly view drop-down menu.
2. Open the calculator and enter bit offset value as numerator and data type number of bits as denominator. Divide the values and the result will be the starting input element number of the device.

Step – 3

Assembly View

101 - Output Exact SINT (33 Bytes) 1

Search:

Offset (bit)	Bit length	Module	Channel	Datatype	Name
0	64	2	0	USINT[8]	Module 2 - CPX-AP-I-4IOL-M12 - Port 0
64	64	2	1	USINT[8]	Module 2 - CPX-AP-I-4IOL-M12 - Port 1
128	64	2	2	USINT[8]	Module 2 - CPX-AP-I-4IOL-M12 - Port 2
192	64	2	3	USINT[8]	Module 2 - CPX-AP-I-4IOL-M12 - Port 3
256	1	3	0	BOOL	Module 3 - CPX-AP-I-4DI4DO-M8-3P - Output 0
257	1	3	1	BOOL	Module 3 - CPX-AP-I-4DI4DO-M8-3P - Output 1
258	1	3	2	BOOL	Module 3 - CPX-AP-I-4DI4DO-M8-3P - Output 2
259	1	3	3	BOOL	Module 3 - CPX-AP-I-4DI4DO-M8-3P - Output 3

2

CPX_AP_I_01:O1.Data	{...} Decimal	SINT[33]
CPX_AP_I_01:O1.Data[0]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[1]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[2]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[3]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[4]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[5]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[6]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[7]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[8]	1 Decimal	SINT
CPX_AP_I_01:O1.Data[9]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[10]	100 Decimal	SINT
CPX_AP_I_01:O1.Data[11]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[12]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[13]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[14]	1 Decimal	SINT
CPX_AP_I_01:O1.Data[15]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[16]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[17]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[18]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[19]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[20]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[21]	0 Decimal	SINT
CPX_AP_I_01:O1.Data[22]	0 Decimal	SINT

Calculator

Standard

64 ÷ 8 =

8

MC MR M+ M- MS M*

% CE C <=>

1/x x² √x ÷

7 8 9 ×

4 5 6 -

1 2 3 +

+/- 0 . =

3. Select **"101 - Output Exact SINT"** from assembly view drop-down menu.
4. Open the calculator and enter bit offset value as numerator and data type number of bits as denominator. Divide the values and the result will be the starting output element number of the device.