

Simplified Motion Series Control With Festo PLC through EtherCAT IO-Link Master

This Application Note Explanation about Simplified Motion Terminal's(EMCS-ST,EGSS-BS, ELGS-TB/ -BS, ELGE-TB, ERMS, EPCS-BS, EPCE-TB) Axis IN/OUT Control, Read/Write Parameters & Read Diagnostic Data

EPCE
EPCS-BS
EGSS
ELGS-BS
ELGS-TB
ELGE
ERMS

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1 Introduction

This application note demonstrate the controlling of simplified motion series like EMCS-ST, EGSS-BS, ELGS-TB/-BS, ELGS-TB, ERMS, EPCS-BS & EPCE-TB with Festo PLC. The Library has 3 AOI variants based on its function. The “**SMS_Festo_Advance**” includes to access all advanced parameters, The “**SMS_Festo_Basic**” has access to few mandatory parameters & The “**SMS_Festo_IO**” has only basic function to control the axis IN & Out movements.

SMS_Advanced		SMS_Festo_Basic		SMS_Festo_IO	
RefINPUTS	xEnabled	RefINPUTS	xEnabled	RefINPUTS	xEnabled
xEnable	RefOUTPUTS	xEnable	RefOUTPUTS	xEnable	RefOUTPUTS
uinNodeAddress	xWriteActive	uinNodeAddress	xWriteActive	xMoveIN	xStateIn
byModuleNumber	xWriteDone	byModuleNumber	xWriteDone	xMoveIntermediate	xStateIntermediate
byChannelNumber	xReadActive	byChannelNumber	xReadActive	xMoveOut	xStateOut
xMoveIN	xStateIn	xMoveIN	xStateIn	xQuitError	xStateMove
xMoveIntermediate	xStateIntermediate	xMoveIntermediate	xStateIntermediate	xPowerSMS	xError
xMoveOut	xStateOut	xMoveOut	xStateOut	xUserInterfaceLock	uiLocalError
xQuitError	xStateMove	xQuitError	xStateMove	bySpeedOut	diCurrentPosition
xPowerSMS	xError	xPowerSMS	xError	bySpeedIN	diCurrentSpeed
xUserInterfaceLock	uiLocalError	xUserInterfaceLock	uiLocalError	byForce	diCurrentForce
bySpeedOut	diCurrentPosition	bySpeedOut	diCurrentPosition	xReferenceDirection	diDDTemperature
bySpeedIN	diCurrentSpeed	bySpeedIN	diCurrentSpeed	xExecuteReference	diDDCurrent
byForce	diCurrentForce	byForce	diCurrentForce	reStartPressPosition	diDDVoltage
xReferenceDirection	diDDTemperature	xReferenceDirection	diDDTemperature	reIntermediatePosition	diDDCyclesTotal
xExecuteReference	diDDCurrent	xExecuteReference	diDDCurrent	reEndPosition	diDDCyclesSinceReset
reStartPressPosition	diDDVoltage	reStartPressPosition	diDDVoltage	xAutoStoreActive	diDDMileageTotal
reIntermediatePosition	diDDCyclesTotal	reIntermediatePosition	diDDCyclesTotal	xStoreParameters	diDDMileagesSinceReset
reEndPosition	diDDCyclesSinceReset	reEndPosition	diDDCyclesSinceReset	xReadDiagnosticData	diNumOfStorageOperation
xAutoStoreActive	diDDMileageTotal	xAutoStoreActive	diDDMileageTotal	xResetCounterMileage	
xStoreParameters	diDDMileagesSinceReset	xStoreParameters	diDDMileagesSinceReset	aErrorCode	
xReadDiagnosticData	diNumOfStorageOperation	xReadDiagnosticData	diNumOfStorageOperation		
xResetCounterMileage		xResetCounterMileage			
aErrorCode		aErrorCode			

“**SMS_Festo_Advanced**” AOI is capable to control the motion system like IN & OUT function, Error reset, Enable power stage of drive, Parameters read & write, Also to read the diagnostic data from the drive unit.



Note

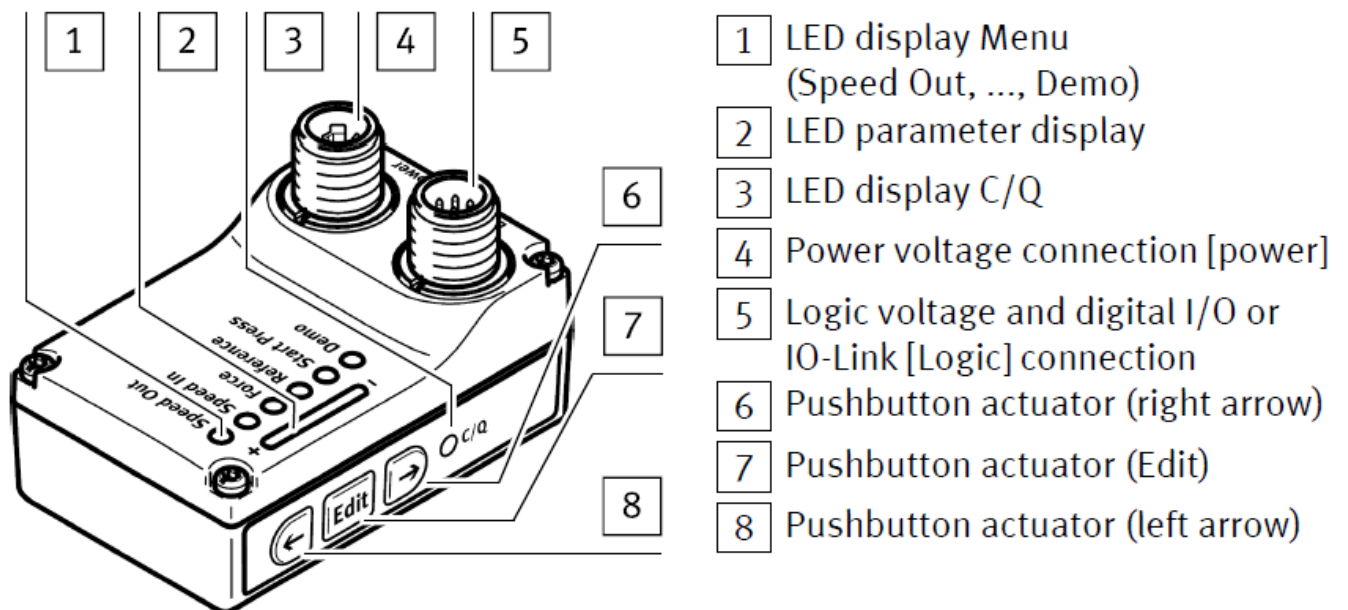
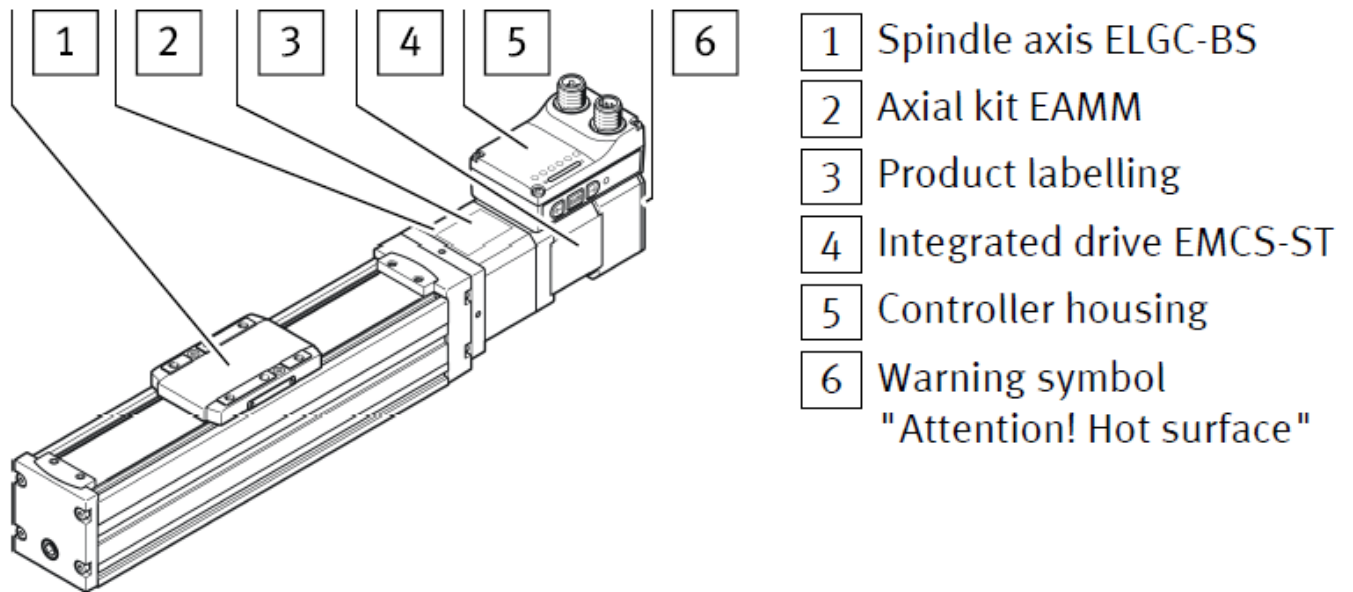
- For demonstration of this application note, Here we have used Festo CPX-AP-I-4IOL-M12 as IO-Link Master.

1.1 Hardware & Software Requirements

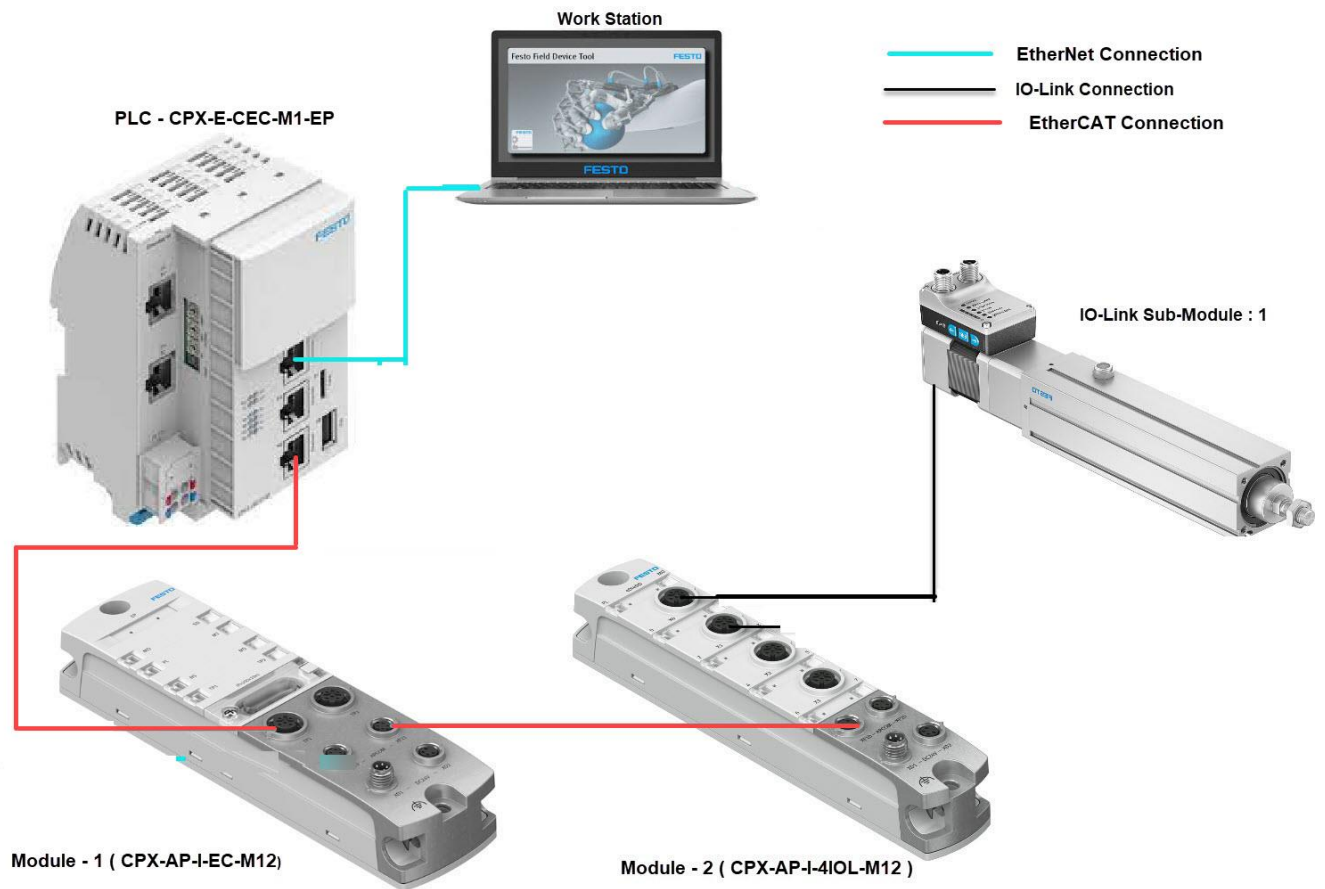
Device Name	Part Number	Version Soft-ware/Firmware	Device Type
Any Simplified Motion Series (EMCS-ST, EGSS-BS, ELGS-TB/-BS, ELGS-TB, ERMS, EPCS-BS & EPCE-TB)	-	Latest	Hardware
Festo IO-Link Master	CPX-AP-I-4IOL-M12	V1.1.3 & Above	Hardware
Festo CPX-AP-I Head Module	CPX-AP-I-EC-M12	V1.2.2 & Above	Hardware
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
Festo PLC CPX-E-CEC-M1-EP	4252744	Version Free	Hardware
Festo SMS V2 Library	-	SMS V2	Software
Festo CodeSys	-	V3.5 SP15 Patch 4	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 Festo CPX-E-CEC-M1-EP PLC IP Address Configuration

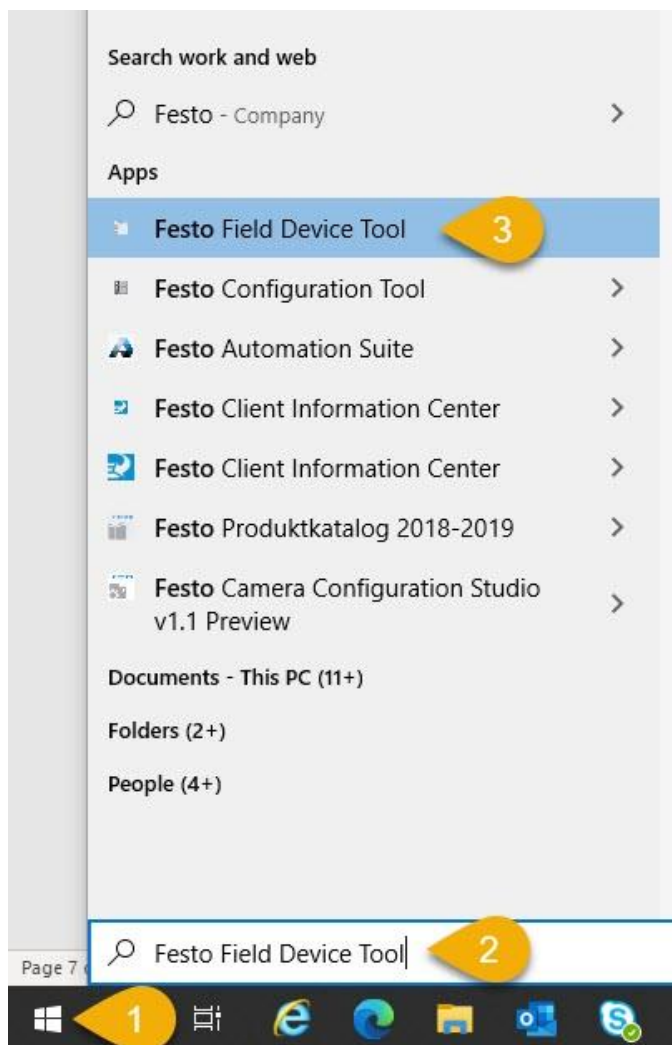


Note

The IP address of the PLC can be configured in two methods. One is using the rotary switch for 192.168.1.xxx series & another one is using the Festo field device tool for any IP series.

This chapter explains how to configure the IP address of the CPX-E-CEC-M1-EP PLC using the Festo Field Device Tool.

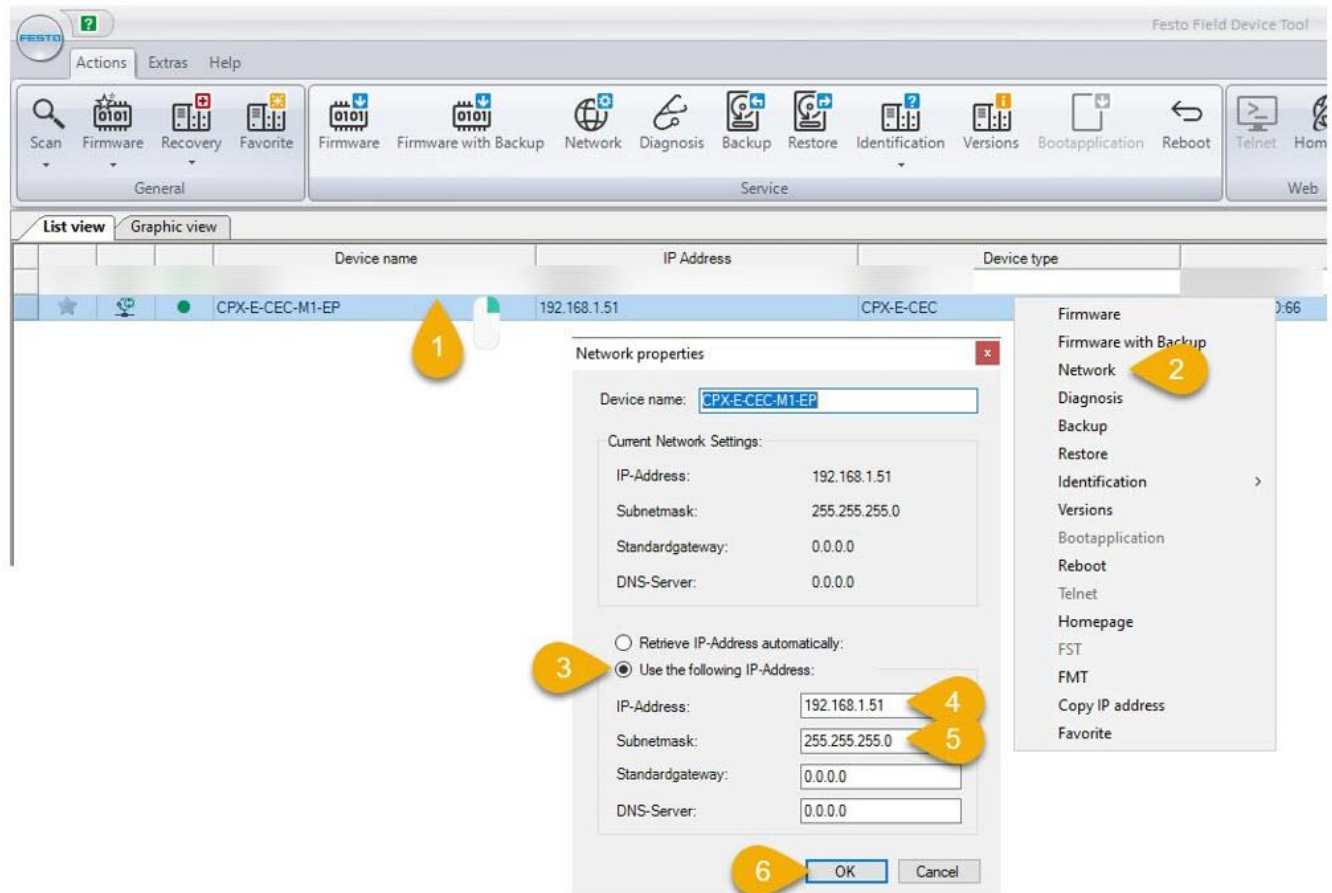
Step – 1



1. Click the “**Start**” button of windows.
2. Enter “**Festo Field Device Tool**” in search box or user can navigate to **Start > Festo Software > Festo Field Device Tool**.
3. Click the software to open it.

Step – 2**Note**

- Make sure the PLC and work station communication cables are connected as shown in Chapter – 1.3.
- Make sure all three rotary switches are configured as 0.0.0.



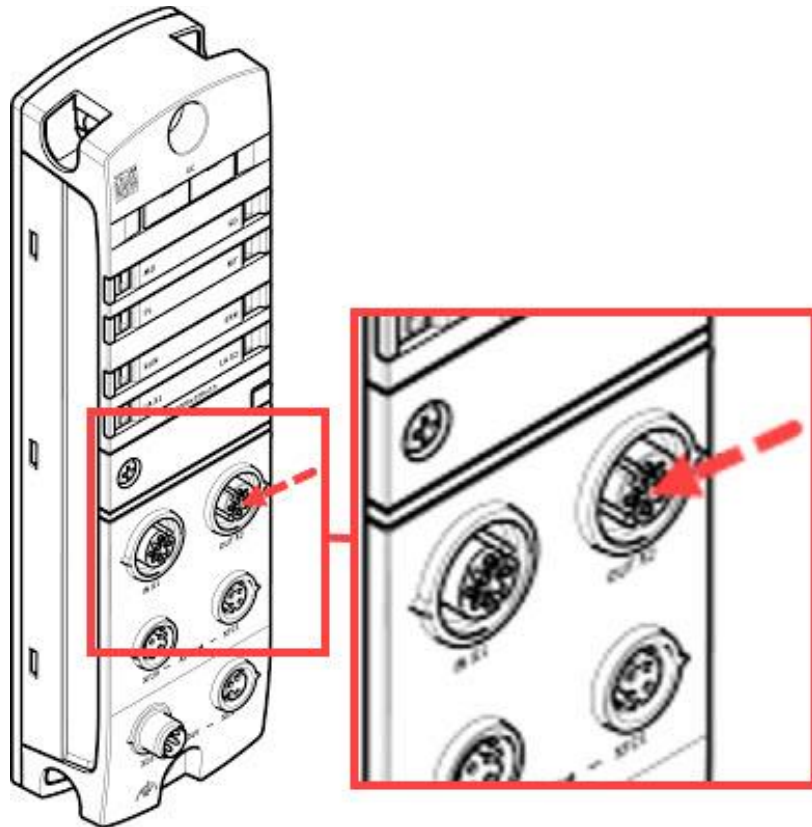
1. Select the CPX-E-CEC-M1-EP PLC from the connected device list in Festo Field Device Tool & right click.
2. Select “**Network**” option from the right click menu.
3. Select “**Use the following IP-Address**” for static IP mode.
4. Enter the “**IP address**” of the PLC.
5. Enter the “**Subnet Mask**” of the PLC.
6. Click “**OK**” to confirm the configuration & close the configuration window.

**Note**

- After the new IP address configuration power restart the PLC once to activate the new static IP address.

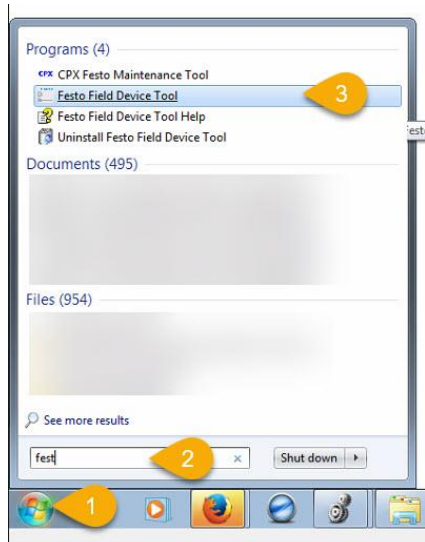
2.2 Festo CPX-AP-I-4IO-M12 IO-Link Master Port Configuration for Activation

Step – 1

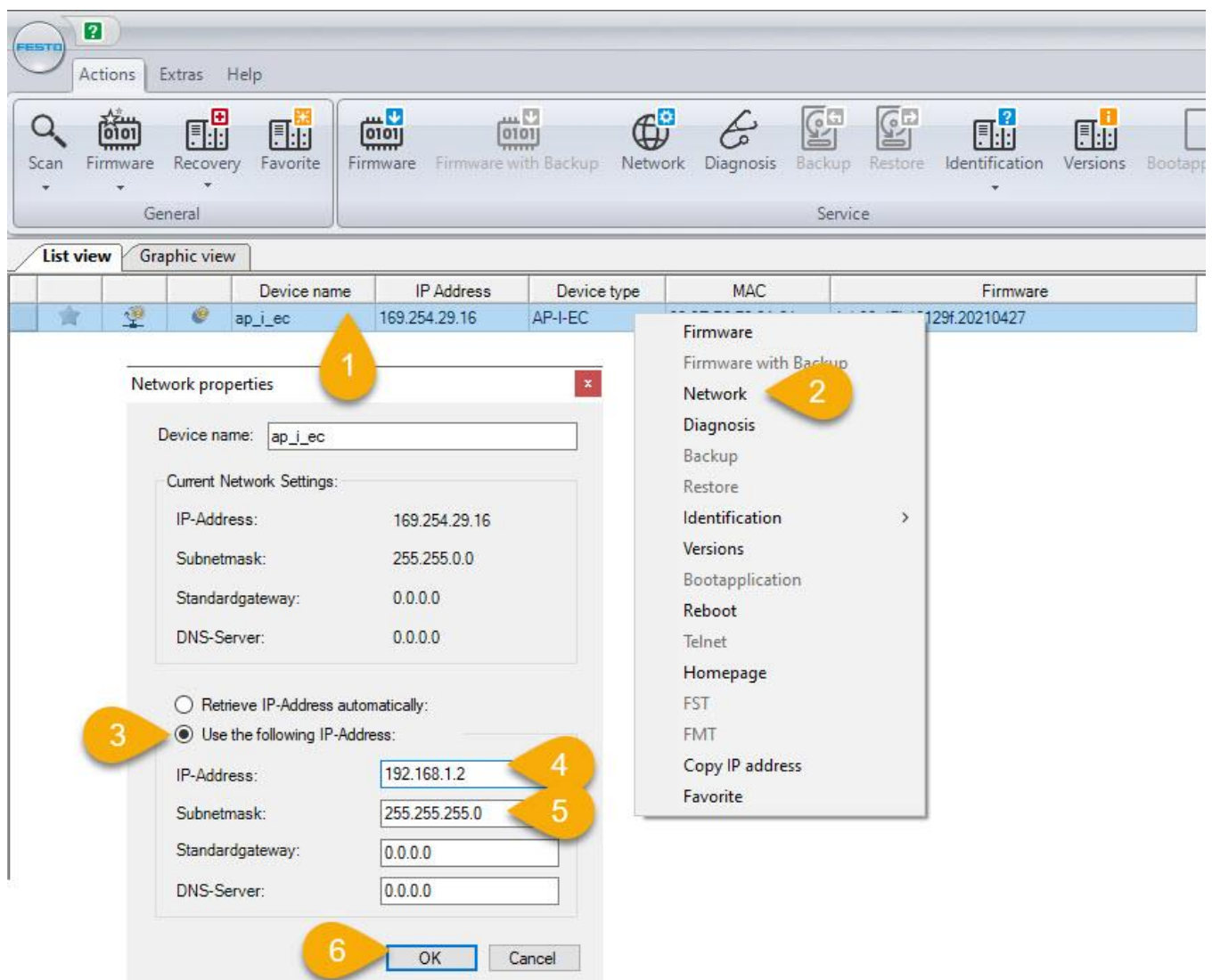


Connect the communication cable in X2 port. Make sure the communication cable is directly connected with workstation & avoid ethernet hub's.

Step – 2



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

Step – 3

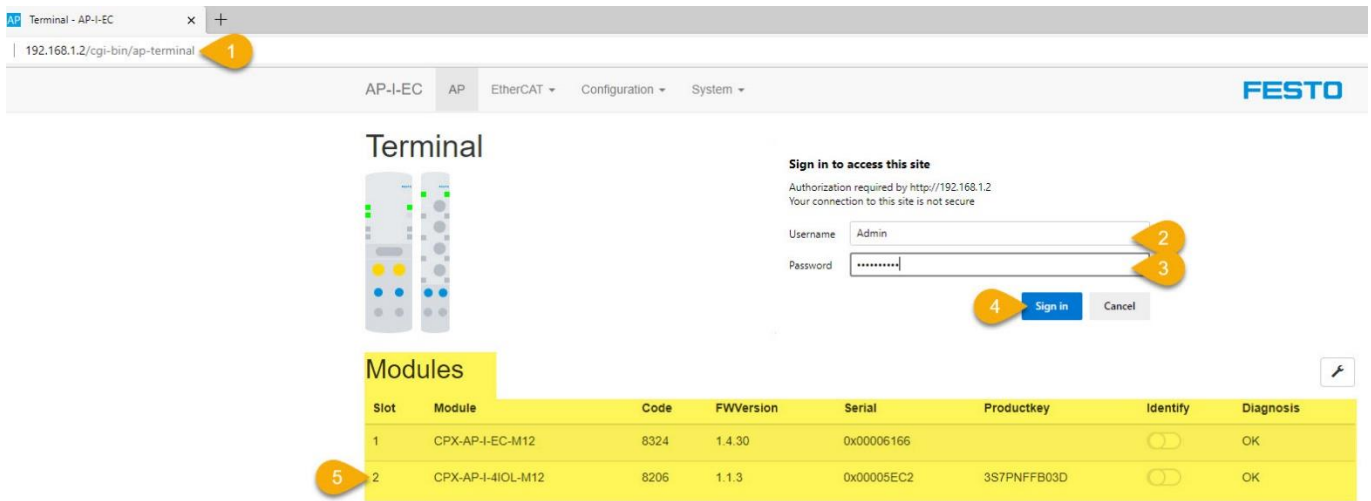
1. Select the correct CPX-AP-I-EP head module from the device list & right click.
2. Select **“Network”** option from right click menu.
3. Select **“Use the following IP-Address”** option from Network properties window.
4. Enter the actual IP Address of CPX-AP-I-EP in **“IP-Address”** data entry field. As per this sample code the IP address is “192.168.1.2”.
5. Enter actual subnet mask value of CPX-AP-I-EP in **“Subnetmask”** data entry field. As per this sample code the Subnet mask address is “255.255.255.0”.
6. Click **“OK”** to confirm the configuration & Close the network window.

**Note**

- After the new IP address configuration don't power restart the CPX-AP-I module to avoid the new dynamic IP address.

Step – 4

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-EC module.
2. Enter the “**Username**” as admin in Sign-in pop-up window.
3. Enter the CPX-AP-I-EC 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 SMS control unit is connected.



Note

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

Step – 5

User have to do the below configurations for the IO-Link port where SMS control unit is connect.

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
23	20072:0	Validation & Backup (Port 0)	yes	Type compatible Device V1.1, Backup + Restore
24	20072:1	Validation & Backup (Port 1)	yes	No Device check
25	20072:2	Validation & Backup (Port 2)	yes	No Device check
26	20072:3	Validation & Backup (Port 3)	yes	No Device check
27	20073:0	Nominal Vendor ID (Port 0)	yes	0
28	20073:1	Nominal Vendor ID (Port 1)	yes	0
29	20073:2	Nominal Vendor ID (Port 2)	yes	0
30	20073:3	Nominal Vendor ID (Port 3)	yes	0
31	20080:0	DeviceID (Port 0)	yes	0
32	20080:1	DeviceID (Port 1)	yes	0
33	20080:2	DeviceID (Port 2)	yes	0
34	20080:3	DeviceID (Port 3)	yes	0

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

Hardware Configuration

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 selection as 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 32	
		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-4IOL-M12 Variant 16 OE	
		CPX-AP-I-4IOL-M12 Variant 32	
		CPX-AP-I-4IOL-M12 Variant 32 OE	



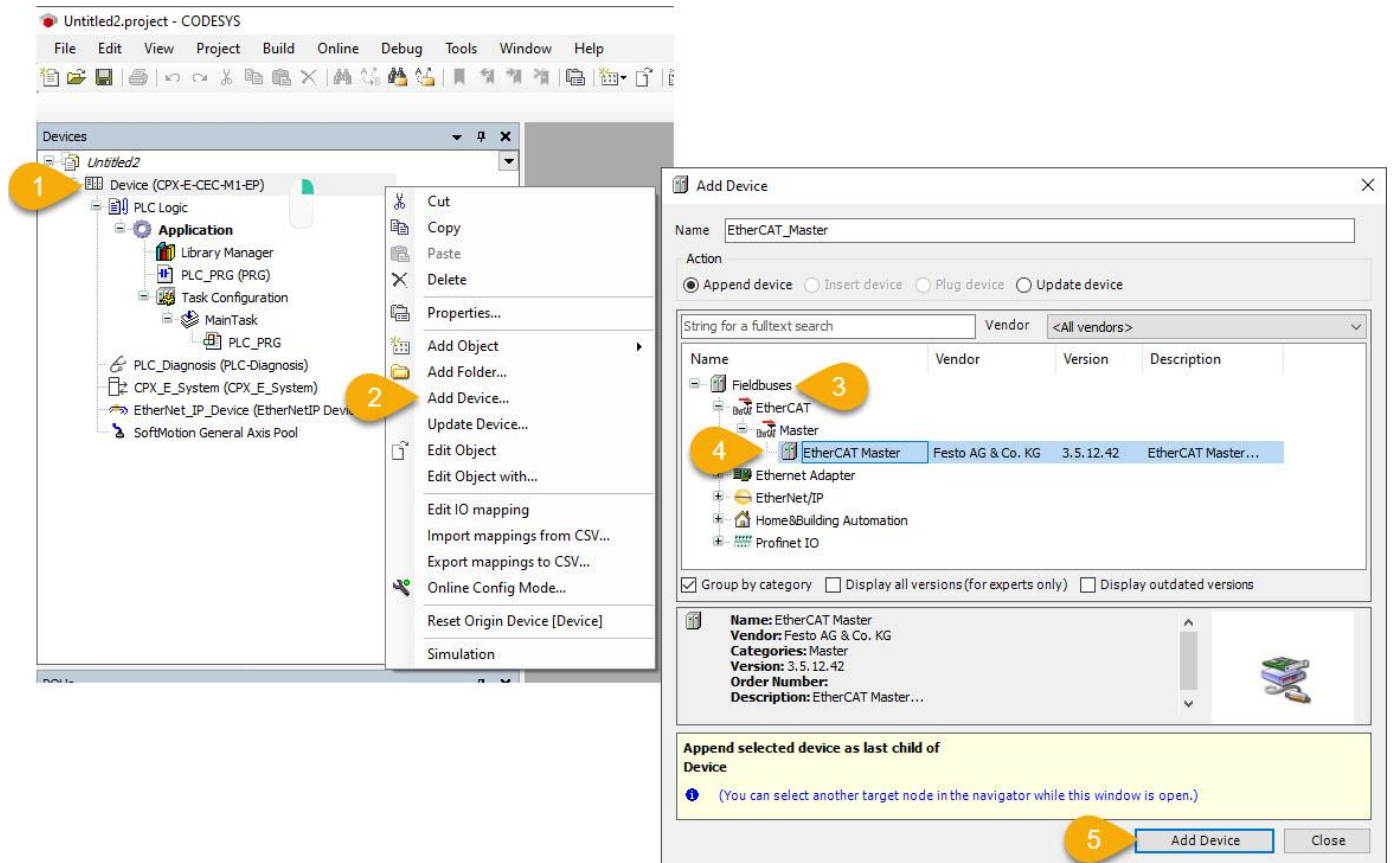
Note

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

3 Software Configuration

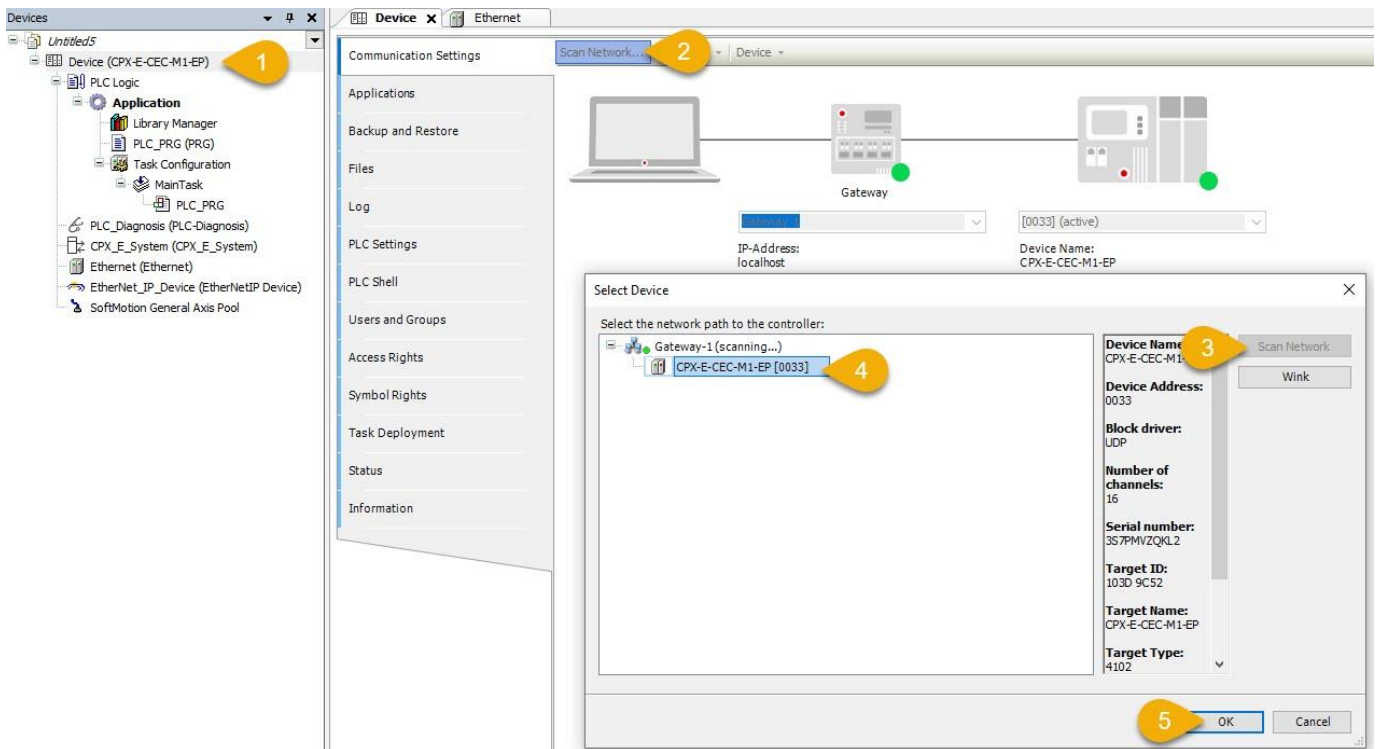
3.1 EtherCAT Master & Slave Module Configuration in Festo CodeSys

Step – 1



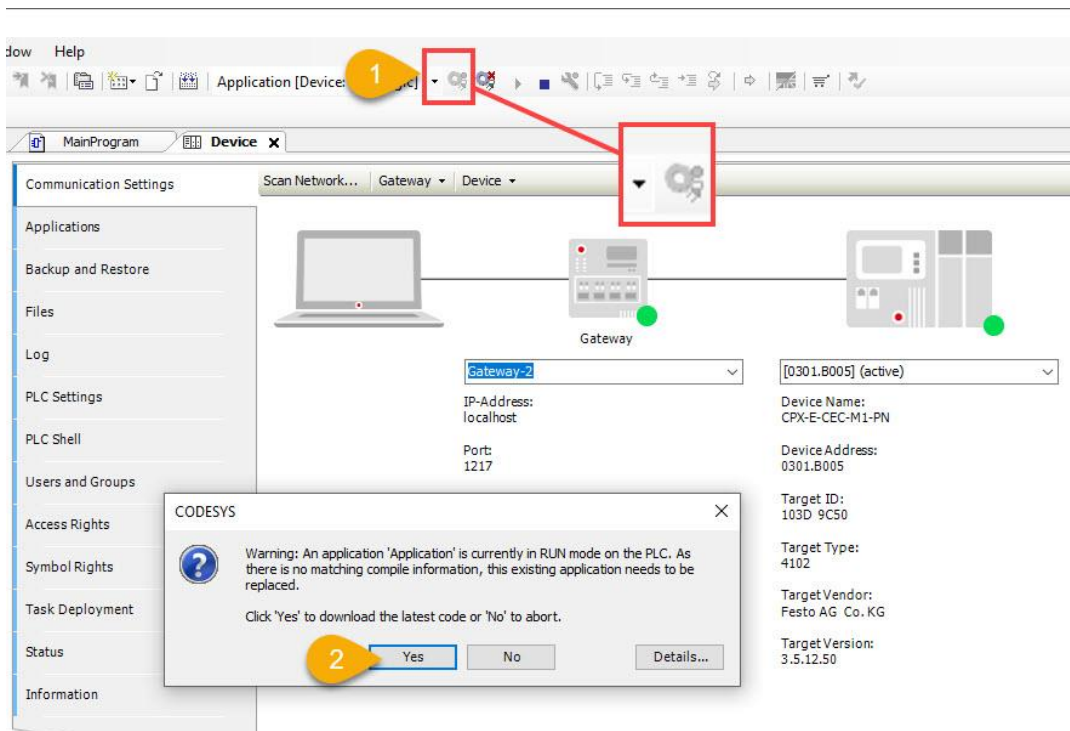
1. Select the **"Device"** folder with PLC model name & right click.
2. Select **"Add Device"** from the right click menu.
3. Select **"Fieldbuses"** folder from Add Device window.
4. Select **"EtherCAT Master"** module from EtherCAT Adapter.
5. Click **"Add Device"** button from add device window.

Step – 2

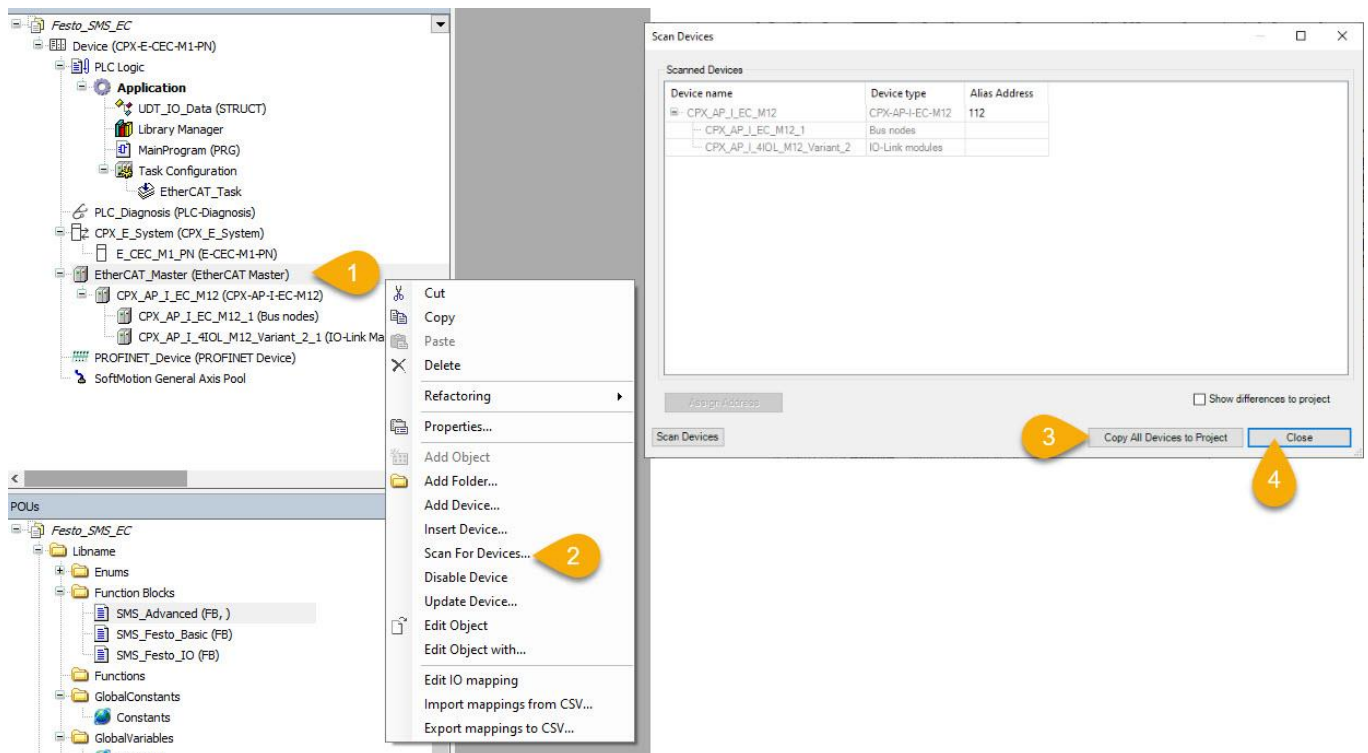


1. Double click the “**Device (CPX-E-CEC-M1-EP)**” from the device list.
2. Select the “**Scan Network**” from the Communication setting tab.
3. Click “**Scan Network**” from the select device window.
4. Select the active PLC from the scan list.
5. Click “**OK**” to confirm the selected PLC path.

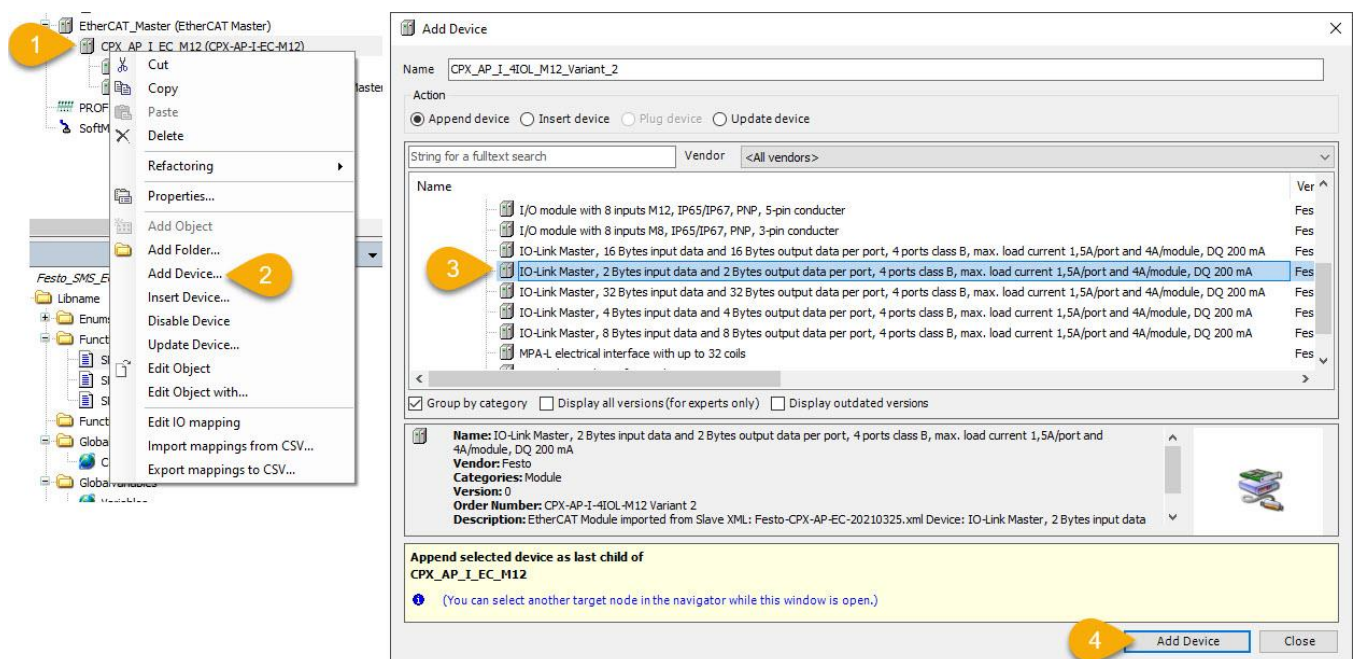
Step – 3



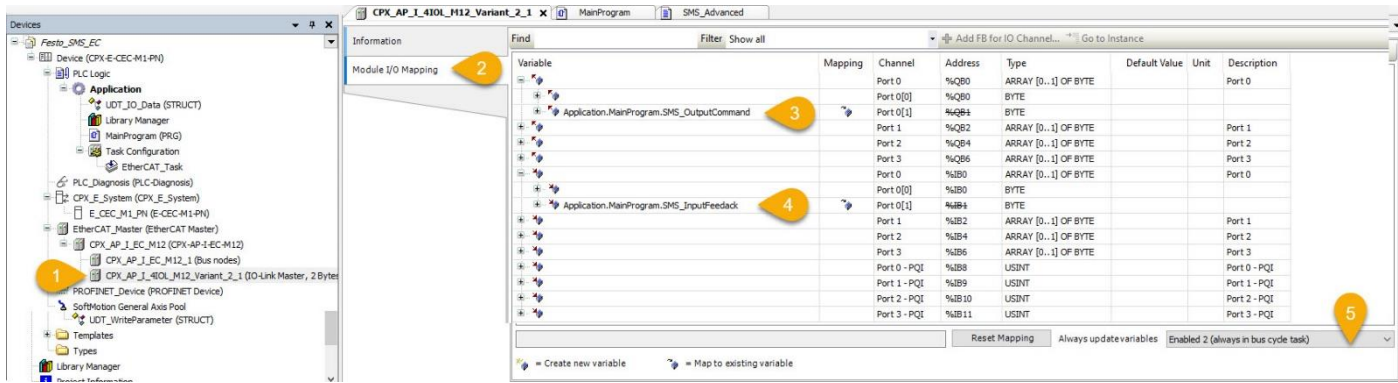
1. Click the **Log IN** button from tool bar or user can select the Log IN through short cut key Alt+F8.
2. Click “**Yes**” option from log IN pop-up window.

Step – 4

1. Select “**EtherCAT Master**” module & right click which created in step – 1.
2. Select “**Scan For Devices**” from right click menu.
3. Select “**Copy All Devices to Project**” from scan devices window.
4. Select “**Close**” after copy the devices.

Step – 5

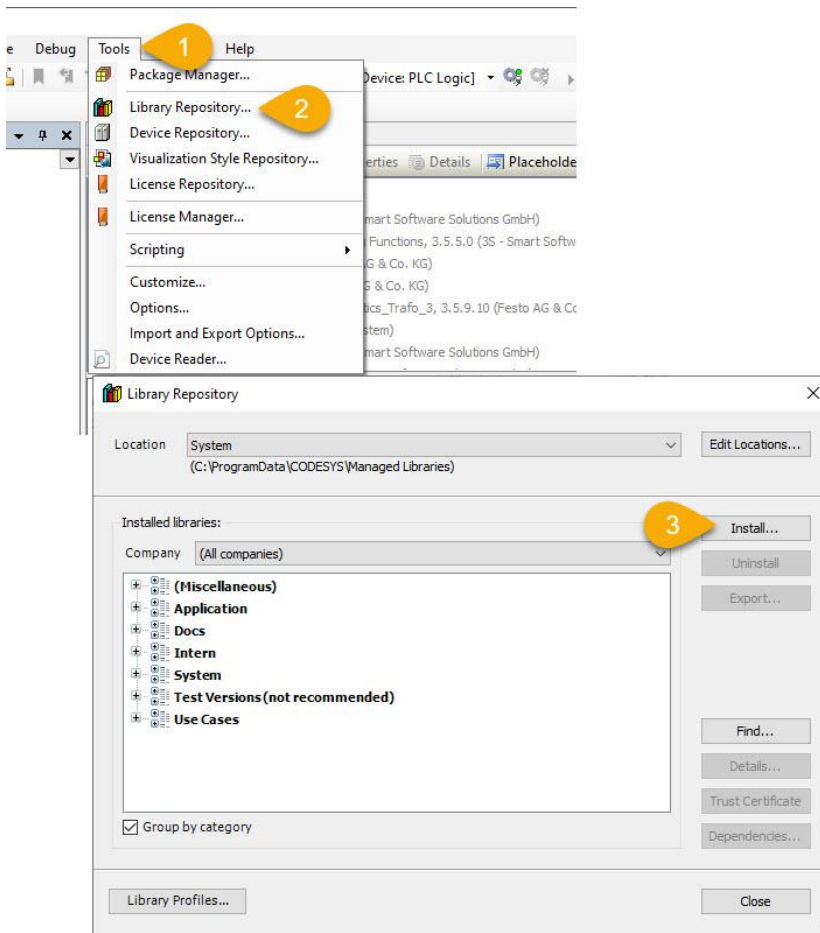
1. Select “**CPX-AP-I-EC-M12**” head module and right click.
2. Select “**Add Devices**” from right click menu.
3. Manually select “**IO-Link Master**” module from device list based on user byte size requirement.
4. Click “**Add Device**” button from add device window.

Step – 6

1. Select “**CPX-AP-I-4IOL-M12**” module and double click to open it.
2. Click “**Module IO Mapping**” from CPX-AP-I-4IO-M12 module property.
3. Select array element based on port number & map a BYTE tag for output. This tag will be output command link tag between PLC & target device.
4. Select array element based on port number & map a BYTE tag for Input. This tag will be Input feedback link tag between PLC & target device.
5. Select “**Always in bus cycle task**” to update variables.

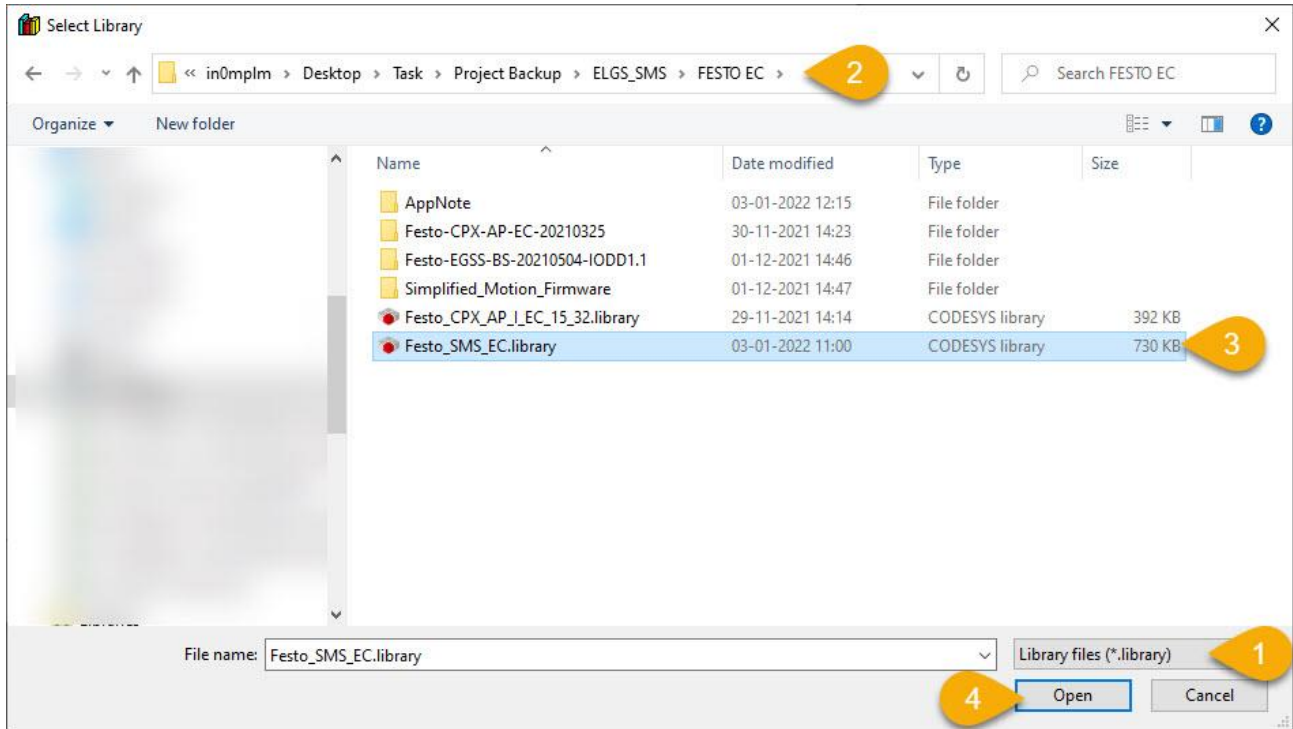
**Note**

- Refer Chapter-A1 to know how to find correct IO elements.

3.2 Import “Festo_SMS_EC_Library” into CodeSys Runtime Project**Step – 1**

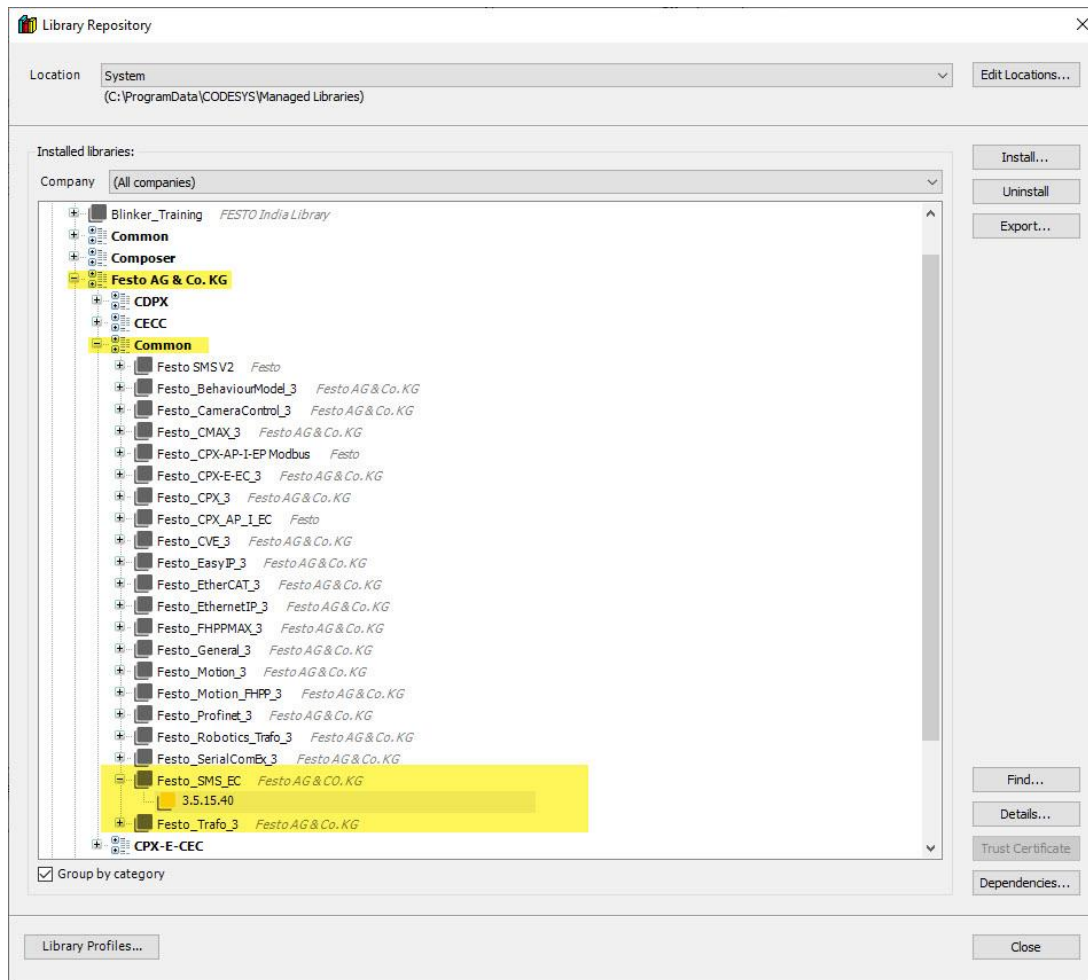
1. Open the Codesys runtime project and select **“Tools”** option from the tool bar.
2. Select **“Library Repository”** from the Tools menu.
3. Click **“Install”** button from Library Repository window.

Step – 2

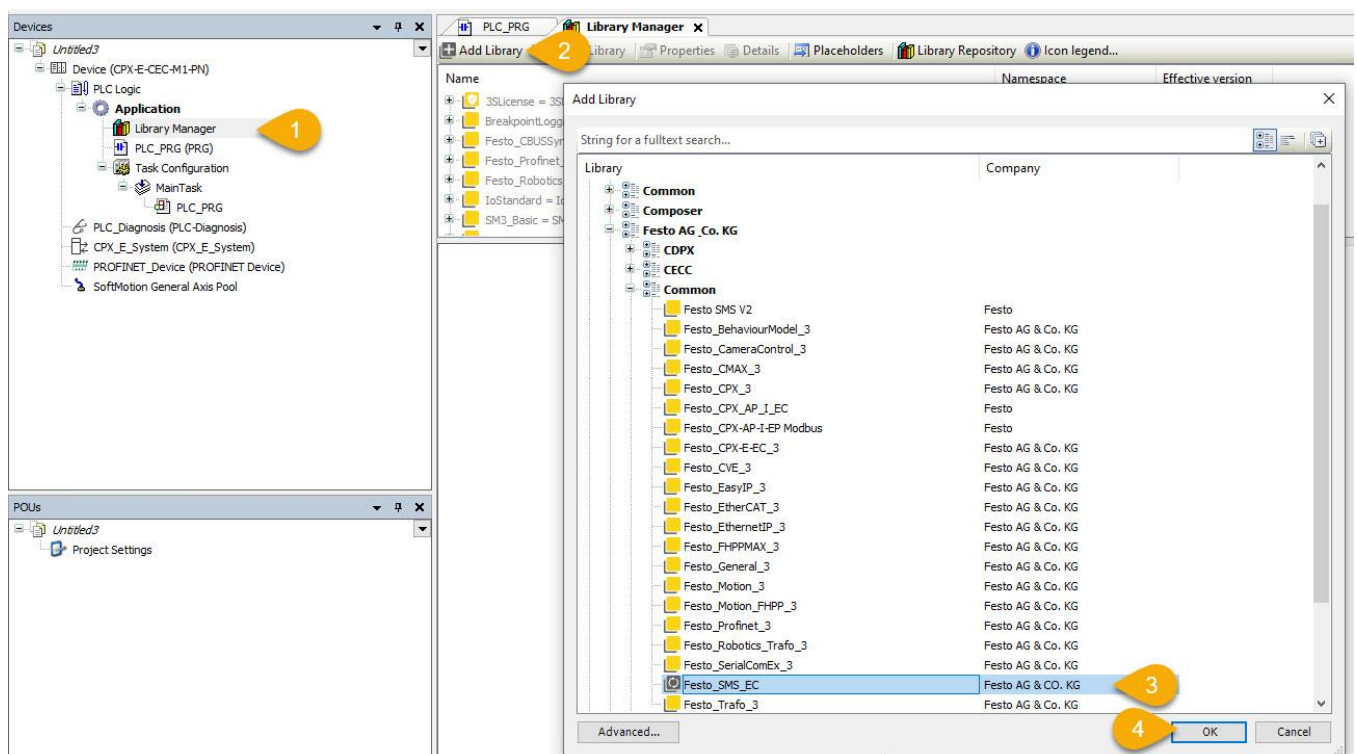


1. Select **“Library files”** from file type drop-down menu.
2. Navigate to the SMS library saved folder.
3. Select **“Festo_SMS_EC.library”** file.
4. Click **“Open”** button.

Once the “Festo_SMS_V2” library installed successfully then the library elements will be available in Installed libraries list. (**Application > Festo AG. Co. KG > Common > Festo_SMS_EC**)



3.3 Add “Festo_SMS_V2” Library in CodeSys Library Manager

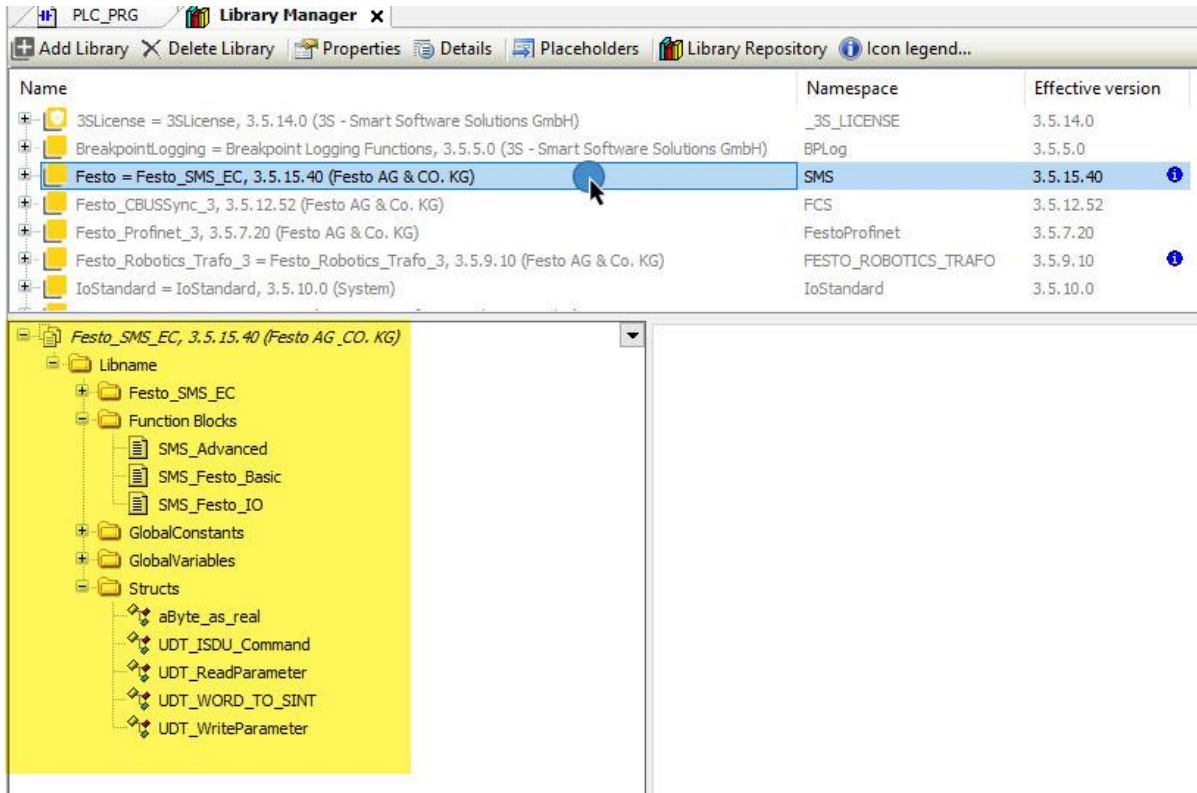


1. Double click the “Library Manager” from device menu.
2. Click “Add Library” button in Library Manager window.

Browse for Festo_SMS_V2 library in installed library list. (**Application > Festo AG. Co. KG > Common > Festo_SMS_EC**)

3. Click “OK” button to add the file.

Once successfully library added successfully the library elements will be available like below yellow highlight.



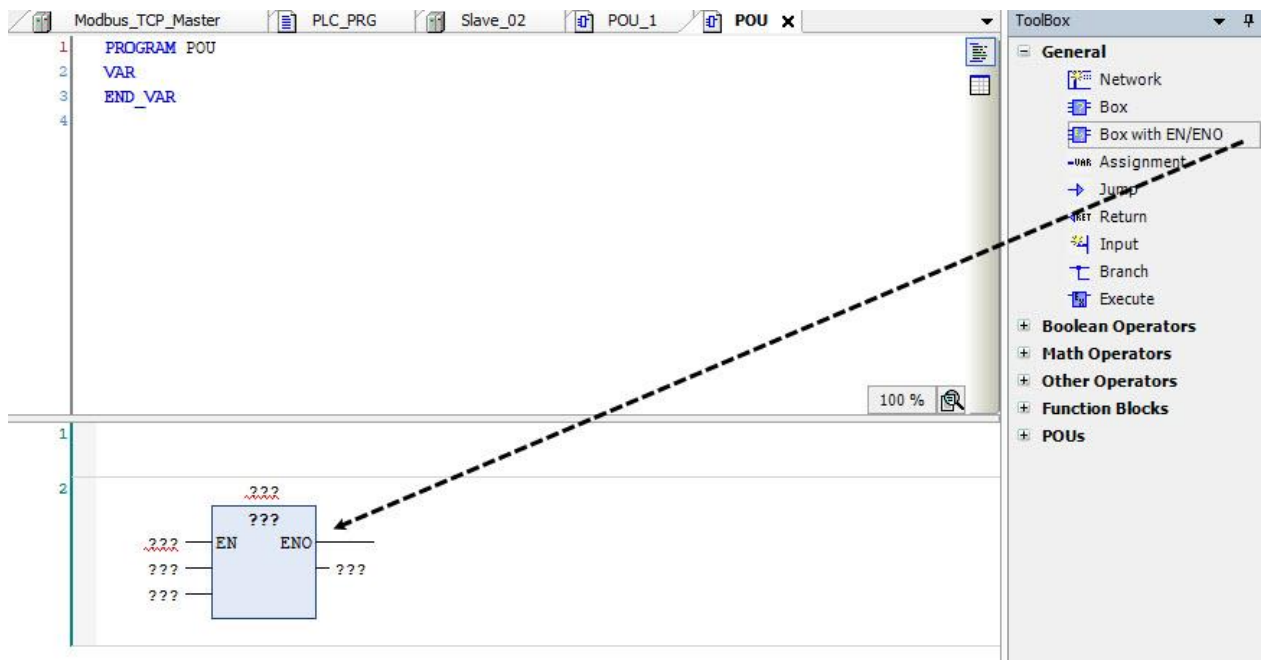
3.4 Configure “SMS_Festo_Advanced” Function Block Input & Output Interface Tags



Note

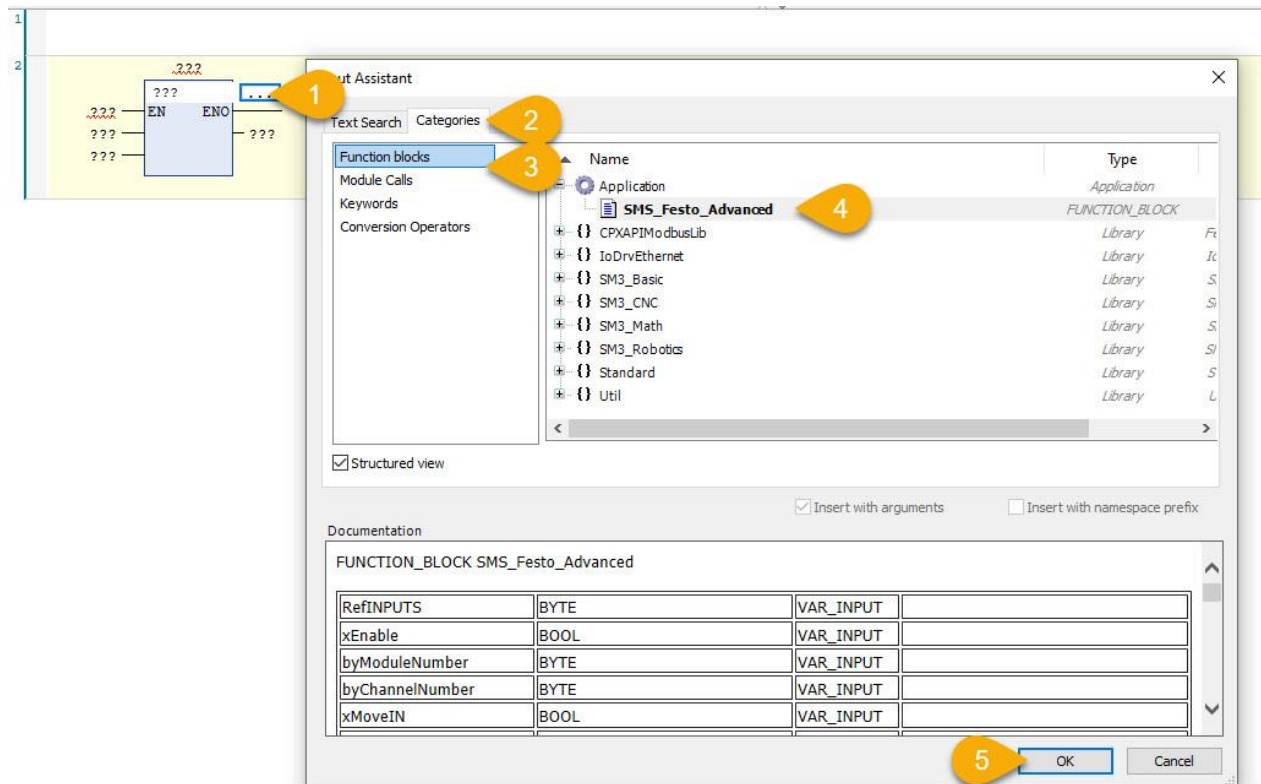
- Follow the same procedure for “SMS_Festo_Basic” & “SMS_Festo_IO” AOI’s interface tags.

Step – 1



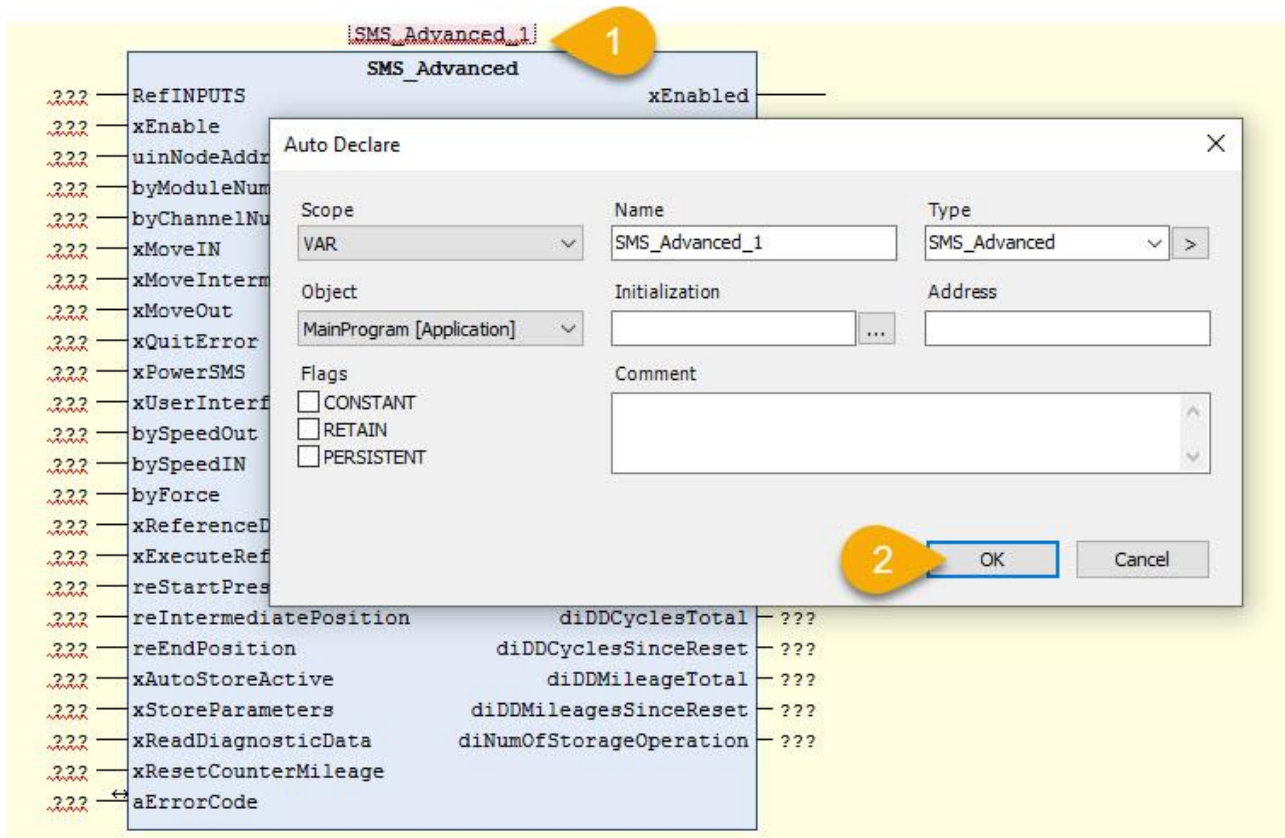
Drag & Drop the “Box with EN/EO” block from tool box to program area.

Step – 2



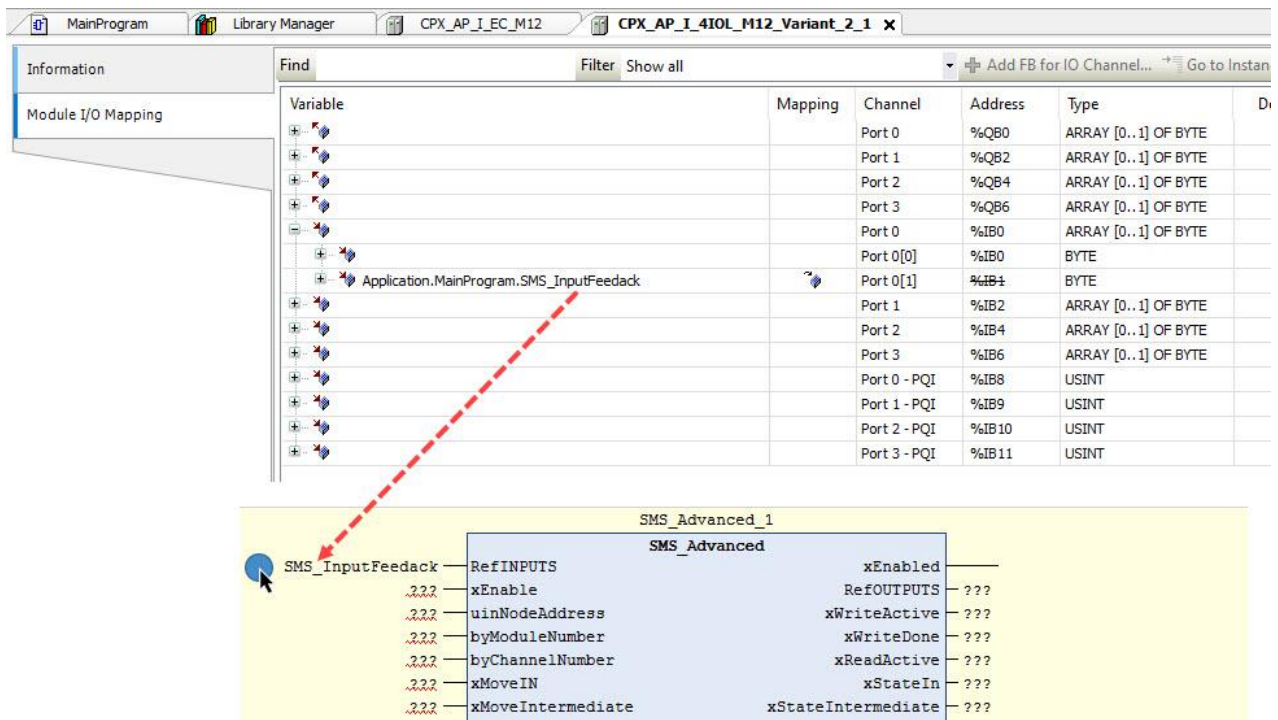
1. Click the “**Browse**” button of the empty block.
2. Click “**Categories**” from Input Assistant window.
3. Select “**Function Blocks**” from categories list.
4. Select “**SMS_Festo_Advanced**” from Application folder.
5. Click “**OK**” to confirm the selection.

Step – 3



1. Enter the name of the FB instance & press enter key for Auto declare the tag name.
2. Click **“OK”** button from the auto declare window.

Step – 3



Assign the Feedback BYTE tag on RefINPUTS input. The same tag which assigned on Chapter -3.1 Step – 6.

Step – 4

The screenshot shows the 'Find' window with the following table:

Variable	Mapping	Channel	Address	Type
		Port 0	%QB0	ARRAY [0..1] OF BYTE
		Port 0[0]	%QB0	BYTE
		Port 0[1]	%QB1	BYTE
		Port 1	%QB2	ARRAY [0..1] OF BYTE
		Port 2	%QB4	ARRAY [0..1] OF BYTE
		Port 3	%QB6	ARRAY [0..1] OF BYTE

The 'SMS_Advanced_1' block is shown with the following variables:

Variable	Value
RefINPUTS	xEnabled
xEnable	RefOUTPUTS
uinNodeAddress	xWriteActive
byModuleNumber	xWriteDone
byChannelNumber	xReadActive
xMoveIN	xStateIn

Assign the Command BYTE tag on RefOUTPUTS . The same tag which assigned on Chapter -3.1 Step – 6.

Step – 5

The 'Auto Declare' dialog box is shown with the following fields:

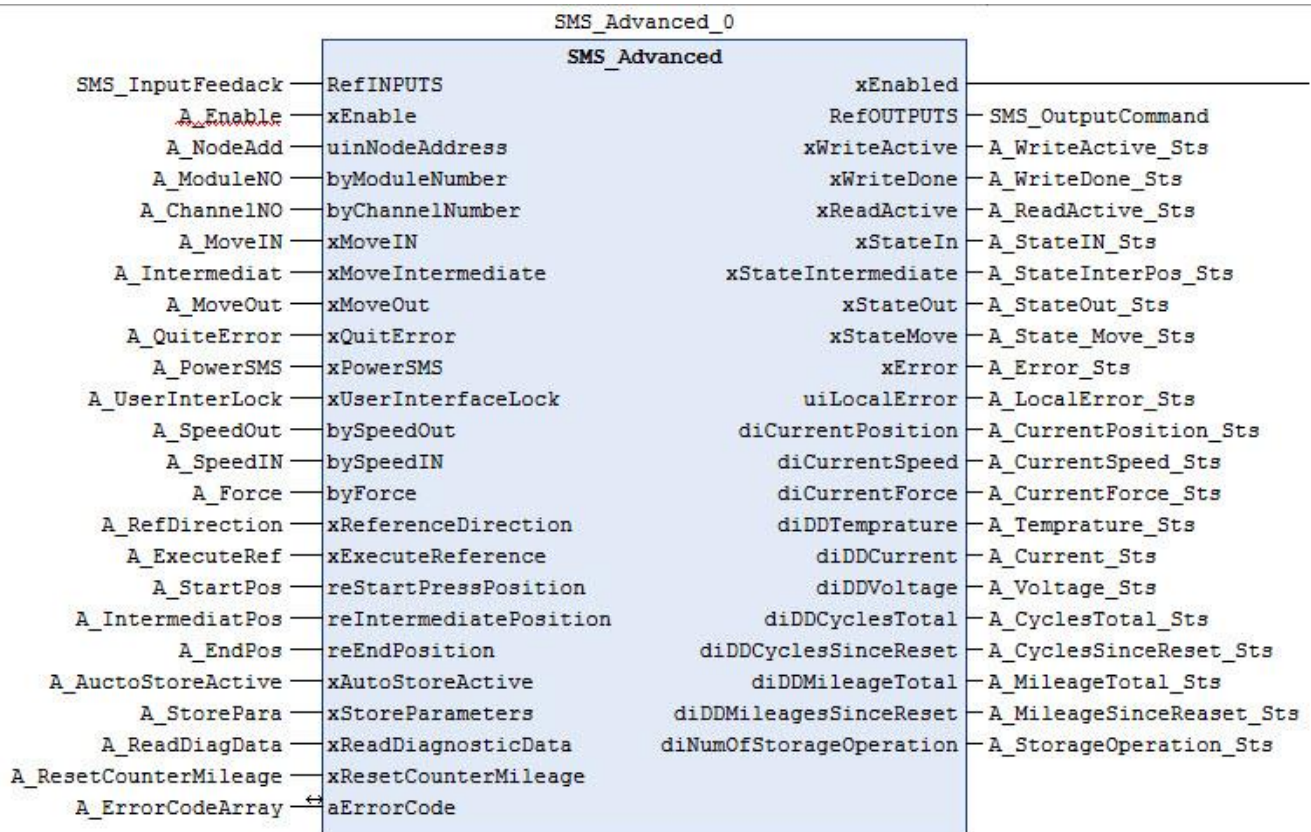
- Scope: VAR
- Name: A_Enable
- Type: BOOL
- Object: MainProgram [Application]
- Initialization:
- Address:
- Flags: ☐ CONSTANT, ☐ RETAIN, ☐ PERSISTENT
- Comment:

1. Enter the tag name for “**xEnable**” input tag & press enter to open Auto Declare window.
2. Click “**OK**” to confirm the entered tag name.

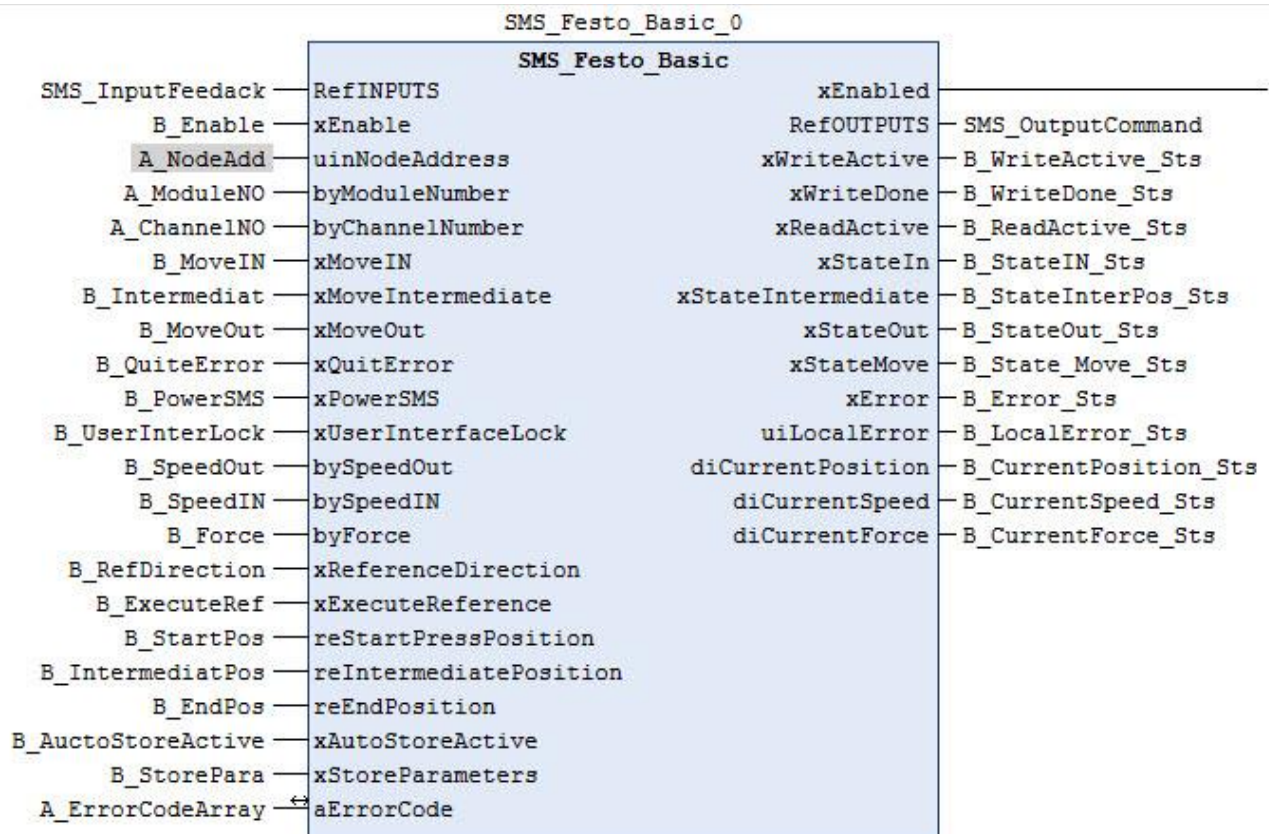
**Note**

- Repeat Step – 5 for different input & output tags in function block.

Once all steps completed successfully the “**SMS_Festo_Advanced**” AOI will be look like below.



Once all steps completed successfully the “**SMS_Festo_Basic**” AOI will be look like below.



Once all steps completed successfully the “**SMS_Festo_IO**” AOI will be look like below.



4 SMS_Festo_Advanced AOI Interface Tag Details

4.1 IO_Interface Tag Details

Tag Name	Data Type	Function Description
RefINPUTS	BYTE	Feedback data from SMS. (Data Read from SMS to Controller)
RefOUTPUTS	BYTE	Command data to SMS. (Data Write from Controller to SMS)

4.2 Control Tag Details

Tag Name	Data Type	Function Description
xEnable	BOOL	True - Enable AOI function
uinNodeAddress	UINT	Node Address of the Target Device
byModuleNumber	BYTE	SMS Connected Module Number From Head Module Value Start From 1
byChannelNumber	BYTE	SMS Connected Channel Number From First Port Value Start From 0
xMoveIN	BOOL	TRUE - SMS moves inwards FALSE - SMS Stops
xMoveIntermediate	BOOL	TRUE - SMS Moves to Intermediate Position FALSE - SMS Stops
xMoveOut	BOOL	TRUE - SMS moves outwards FALSE - SMS Stops
xQuitError	BOOL	TRUE - Reset Error Messages
xPowerSMS	BOOL	TRUE - Enable power stage of SMS
xUserInterfaceLock	BOOL	TRUE - lock user interface of SMS control unit
bySpeedOut	BYTE	1 - 10% (default) Axis outwards move speed 2 - 20% 3 - 30% 4 - 40% 5 - 50% 6 - 60% 7 - 70% 8 - 80% 9 - 90% 10 - 100%
bySpeedIN	BYTE	1 - 10% (default) Axis inwards move speed 2 - 20% 3 - 30% 4 - 40% 5 - 50% 6 - 60% 7 - 70% 8 - 80% 9 - 90% 10 - 100%

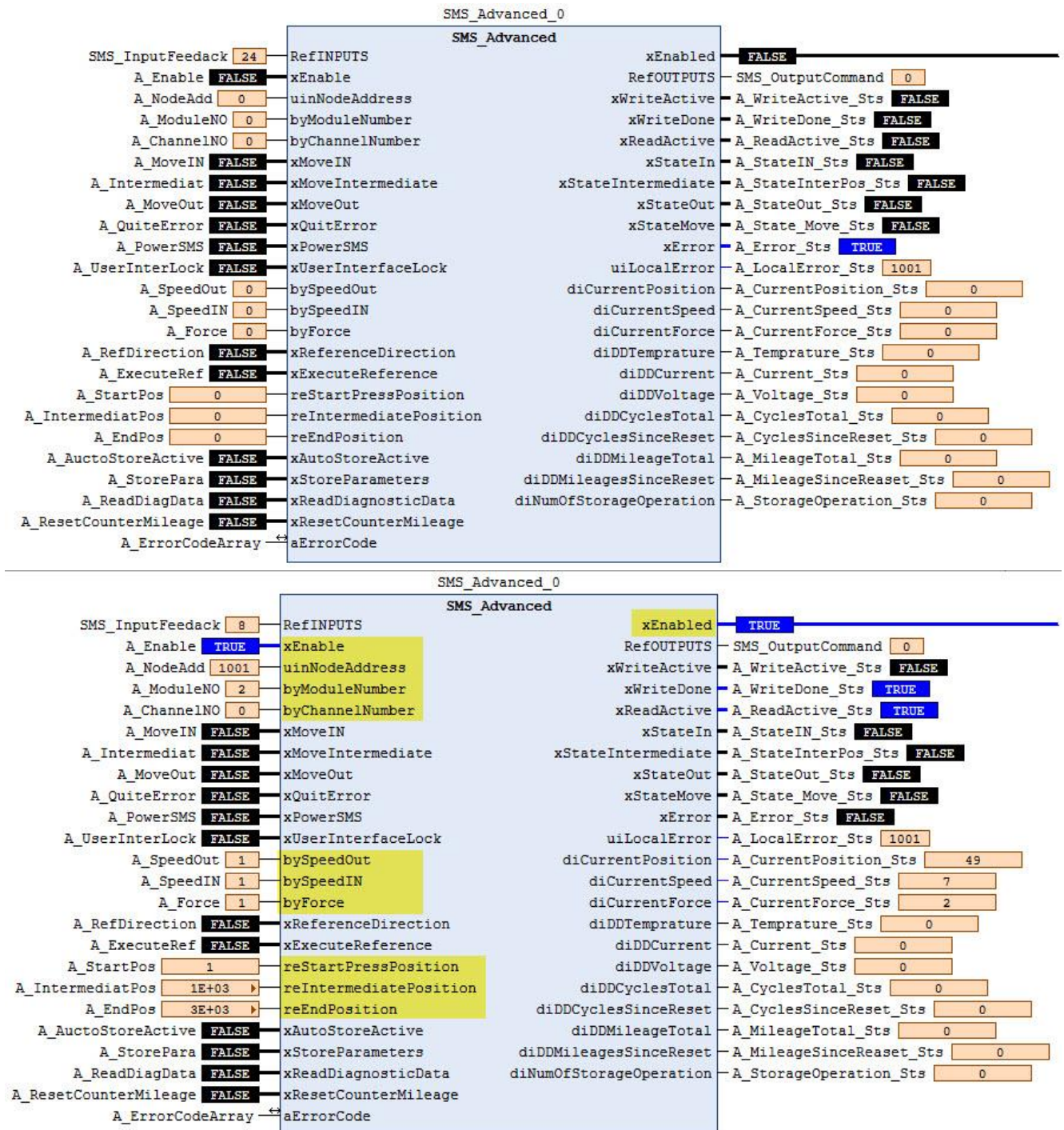
Tag Name	Data Type	Function Description
byForce	BYTE	1 - 10% (default) Axis moving force 2 - 20% 3 - 30% 4 - 40% 5 - 50% 6 - 60% 7 - 70% 8 - 80% 9 - 90% 10 - 100%
xReferenceDirection	BOOL	TRUE - Motor averted FALSE - Motor side
xExecuteReference	BOOL	TRUE – Start Homing
reStratPressPosition	REAL	Defines point on stroke, actuator starts force controlled movement – defined as distance to the reference position. linear drive :-unit: [mm]-gradient: 0.01 rotative drive :-unit: [°]-gradient: 0.1
reIntermediatePosition	REAL	Defined intermediate position linear drive :-unit: [mm]-gradient: 0.01 rotative drive :-unit: [°]-gradient: 0.1
reEndPosition	REAL	Defined end position linear drive :-unit: [mm]-gradient: 0.01 rotative drive :-unit: [°]-gradient: 0.1
xAutoStoreActive	BOOL	TRUE – Automatically stores the last downloaded parameters in the SMS.
xStoreParameters	BOOL	TRUE – Manually stores the last downloaded parameters in the SMS.
xReadDiagnosticData	BOOL	TRUE - Update value of outputs: diDDTemperature diDDCurrent diDDVoltage diDDCyclesTotal diDDCyclesSinceReset diDDMileageTotal diDDMileageSinceReset
xResetCounterMileage	BOOL	TRUE - Resets values of parameters “ O_DDCyclesSinceReset ”

4.3 Monitor Tag Details

Tag Name	Data Type	Function Description
xEnabled	BOOL	TRUE - AOI function enabled.
xWriteActive	BOOL	TRUE - Executing parameter write function.
xWriteDone	BOOL	TRUE - Last parameter wrote Successful.
xReadActive	BOOL	TRUE - Parameter read function is active.
xStateIn	BOOL	TRUE - SMS axis reached IN position.
xStateIntermediate	BOOL	TRUE - SMS axis reached Intermediate position.
xStateOut	BOOL	TRUE - SMS axis reached OUT position.
xStateMove	BOOL	TRUE – SMS axis at moving condition. FALSE – SMS axis at ideal condition.
xError	BOOL	TRUE - SMS module in error state.
uinLocalError	UINT	AOI Local Error 1001 – “ In_SpeedIN ” Parameter limit out of range error. 1002 – “ In_SpeedOut ” Parameter limit out of range error. 1003 – “ In_Force ” Parameter limit out of range error. 1004 – “ Read_Para ” Error. 1005 - “ Write_Para ” Error.
diCurrentPosition	DINT	Axis current position feedback Linear drive: -unit: [mm]-gradient: 0.01 Rotative drive: -unit: [°]-gradient: 0.1
diCurrentSpeed	DINT	Axis current speed feedback Linear drive: unit [mm/s]-gradient: 0.01 Rotative drive: unit [rpm]-gradient: 0.1
diCurrentForce	DINT	Axis current force feedback Linear drive: unit [N]-gradient: 0.01 Rotative drive: unit [Nm]-gradient: 0.1
diDDTemperature	INT	SMS module current temperature feedback Unit: [°C].
diDDCurrent	DINT	SMS module present value of current Unit: [A].
diDDVoltage	DINT	SMS module present voltage feedback Unit: [V].
diDDCyclesTotal	DINT	Sum value of total number of axis movement cycle count.
diDDCyclesSinceReset	DINT	Number of axis movement cycle count since reset command.
diDDMileageTotal	DINT	Total number of movement cycle in engineering unit Linear drive: unit [km], 0.000001. Rotative drive: unit [r], 0.001.
diDDMileageSinceReset	DINT	Number of axis movement engineered value since reset command. Linear drive: unit [km], 0.000001. Rotative drive: unit [r], 0.001.
diNumOfStorageOperation	DINT	Total number of auto store operation done so fare.
aErrorCode	WORD[16]	Error code of SMS module.

5 Sample Code

5.1 Initial Setup



- Enter the SMS connected head module EtherCAT node address in “**uinNodeAddress**” input tag.
- Enter the SMS connected module number in “**bymoduleNumber**” input tag. Head module number Starts at 1.
- Enter the SMS connected IO-Link master channel number in “**byChannelNumber**” input tag.
- Enable SMS power stage by toggling “**xPowerSMS**” control tag by false to true.
- Enter the user preferred values for the control tags **bySpeedOut**, **bySpeedIN**, **byForce**, **reStartpress Position**, **reIntermediatePosition** & **reEndPosition**.
- Once All entered parameters values writing are successful then the monitor tag “**xWriteDone**” will be in true state.

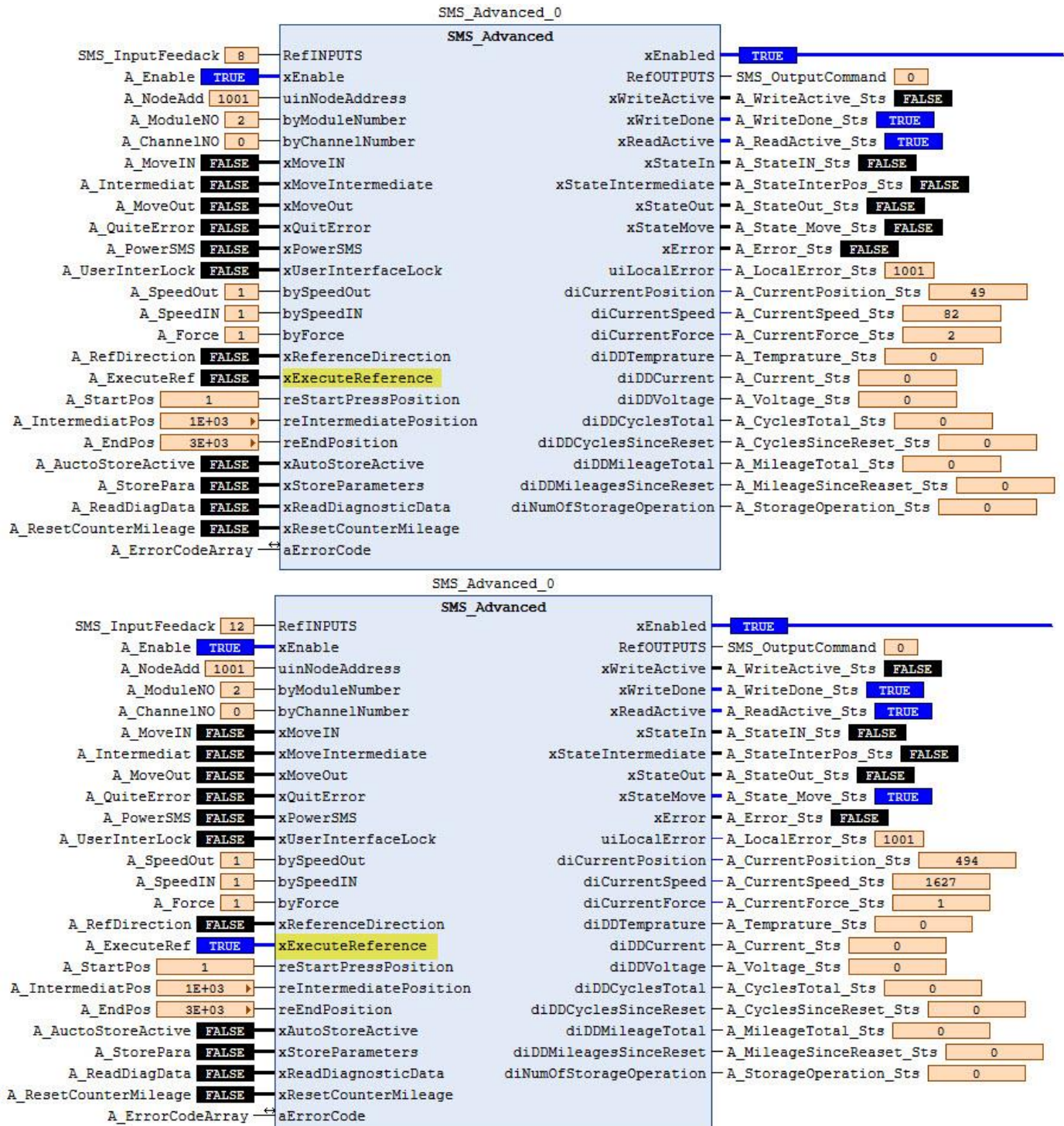
- Toggle the “**xEnable**” control tag from false to true. If function block enabled “**xEnabled**” tag will update the status by turning into true.



Note

- After enabling the function block user have to give a reset command to clear the local error 1001. Reset command can give through input tag “**xQuitError**” by toggling false to true.

5.2 Axis Homing

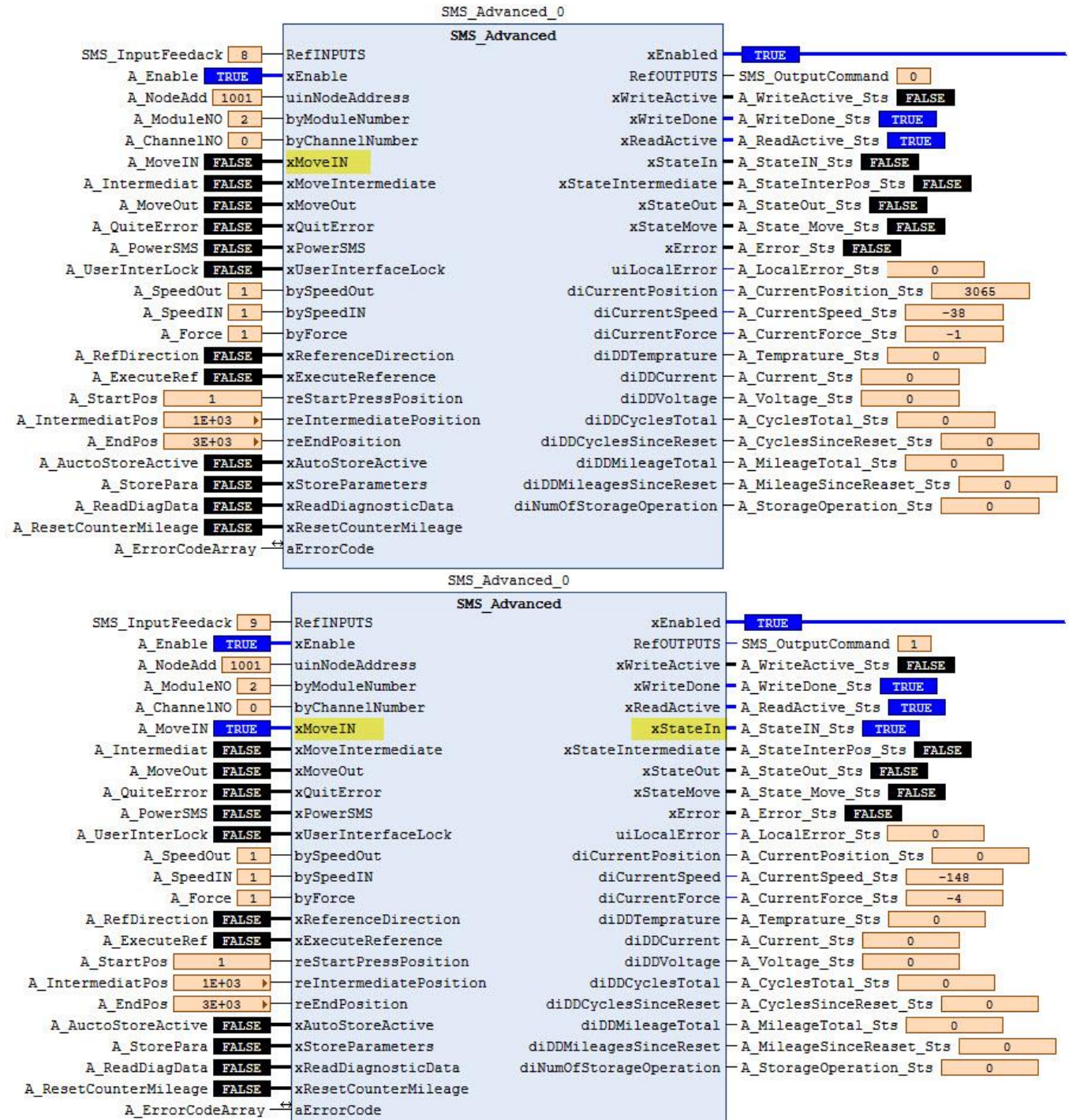


Toggle the “**xExecuteReference**” control tag from false to true. At this stage axis start move towards home position so initially status tag “**xStateMove**” will be ON and then “**xStateOut**”.

**Note**

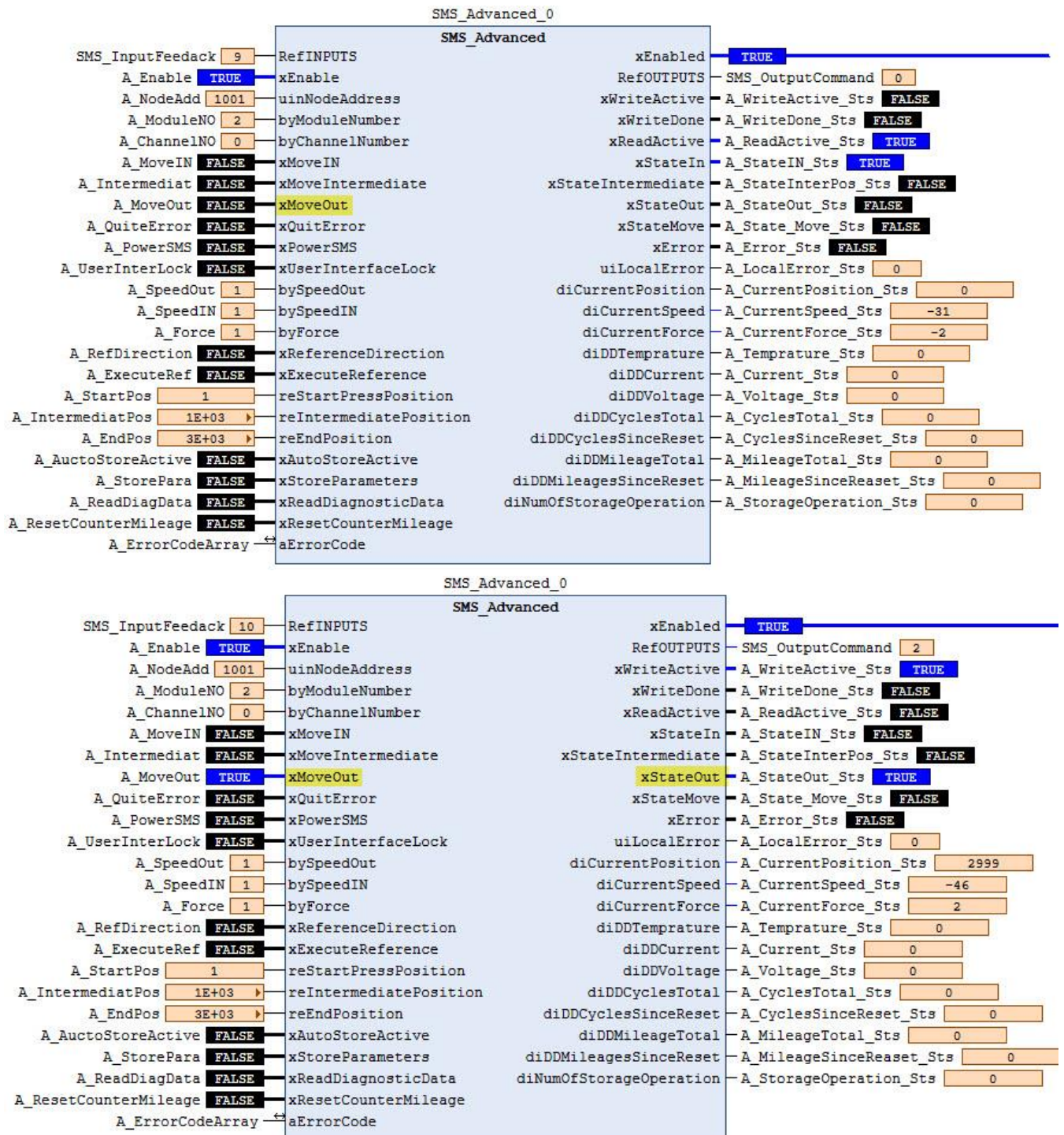
- If user want to change the homing direction then user can change direction by toggling the input tag “xReferenceDirection” from False to True before the reference command.

5.3 Axis Move to Inwards



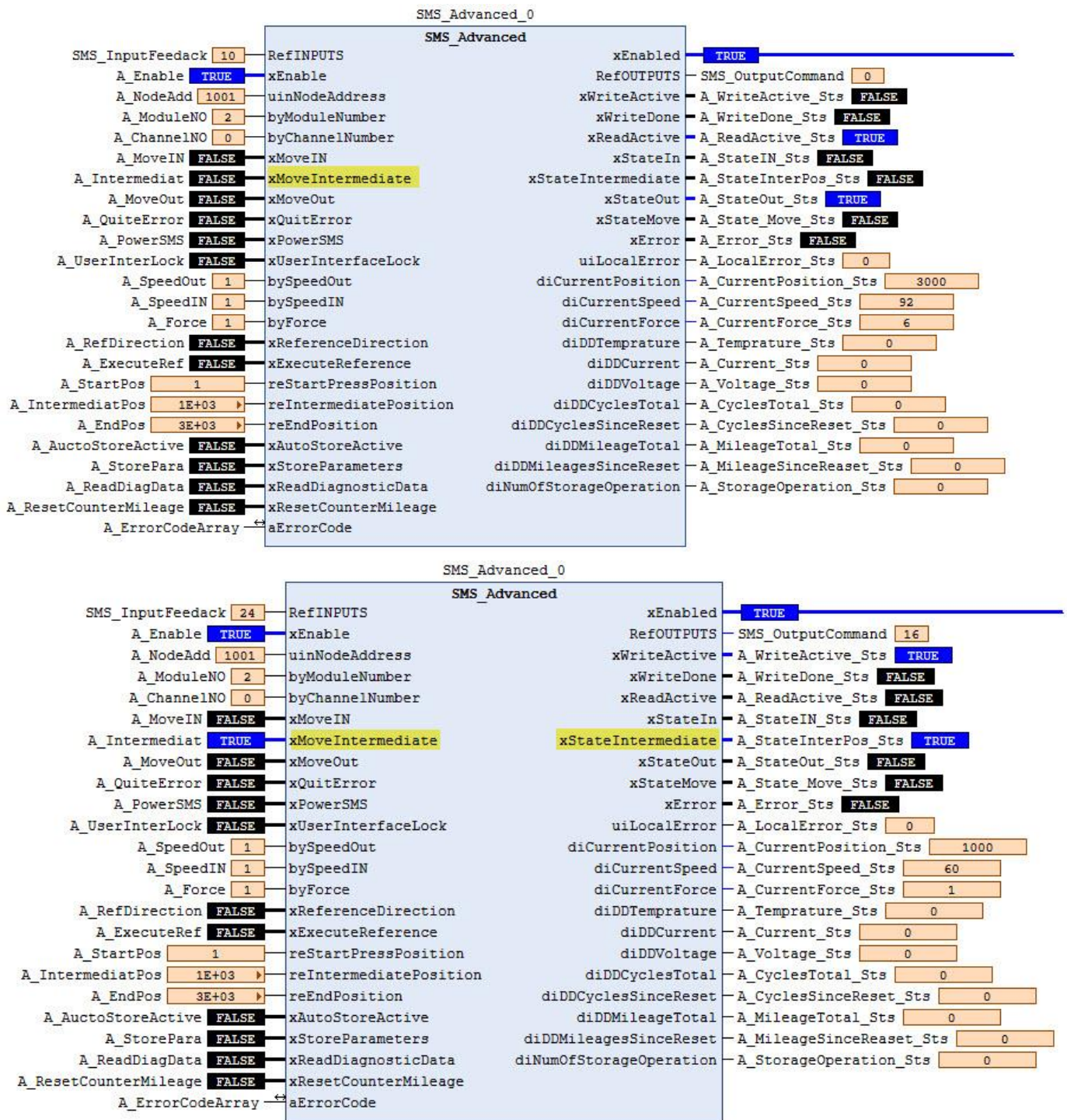
- Toggle control tag “xMoveIN” from false to true to move the axis towards IN direction. Once axis reach IN position status tag “xStatusIn” will be true.

5.4 Axis Move to Outwards



- Toggle control tag **"xMoveOut"** from false to true to move the axis towards Out direction. Once axis reach Out position status tag **"xStateOut"** will be true.

5.5 Axis Move to Intermediate



- Toggle control tag **"xMoveIntermediate"** from false to true to move the axis towards intermediate position. Once axis reach intermediate position status tag **"xStateIntermediate"** will be true.

A Technical appendix

A.1 Find IO Array Element Position for SMS Connected Port

As per this application note SMS module is connected in port – 0 of the IO-Link master module in slot position – 2. Below is the procedure to find the correct array elements for input & output.

Assign interface tag in the array element as highlight in red colour & select array element based on channel number as highlight in yellow colour.

Variable	Mapping	Channel	Address	Type	Default Value	Unit	Description
		Port 0	%QB0	ARRAY [0..1] OF BYTE			Port 0
		Port 0[0]	%QB0	BYTE			
Application.MainProgram.SMS_OutputCommand		Port 0[1]	%QB1	BYTE			
		Port 1	%QB2	ARRAY [0..1] OF BYTE			Port 1
		Port 2	%QB4	ARRAY [0..1] OF BYTE			Port 2
		Port 3	%QB6	ARRAY [0..1] OF BYTE			Port 3
		Port 0	%IB0	ARRAY [0..1] OF BYTE			Port 0
		Port 0[0]	%IB0	BYTE			
Application.MainProgram.SMS_InputFeedack		Port 0[1]	%IB1	BYTE			
		Port 1	%IB2	ARRAY [0..1] OF BYTE			Port 1
		Port 2	%IB4	ARRAY [0..1] OF BYTE			Port 2
		Port 3	%IB6	ARRAY [0..1] OF BYTE			Port 3
		Port 0 - PQI	%IB8	USINT			Port 0 - PQI
		Port 1 - PQI	%IB9	USINT			Port 1 - PQI
		Port 2 - PQI	%IB10	USINT			Port 2 - PQI
		Port 3 - PQI	%IB11	USINT			Port 3 - PQI