



### **CMMT SERVO DRIVE COMMISSIONING WITH ALLEN-BRADLEY PLC THROUGH ETHERNET/IP NETWORK**

This Application Note Gives Detailed Procedure to Integrate CMMT Servo Drive With Allen-Bradley Controller in EtherNet/IP Communication Network. Also Described to Control the Servo Motor in Different Control Operational Modes.

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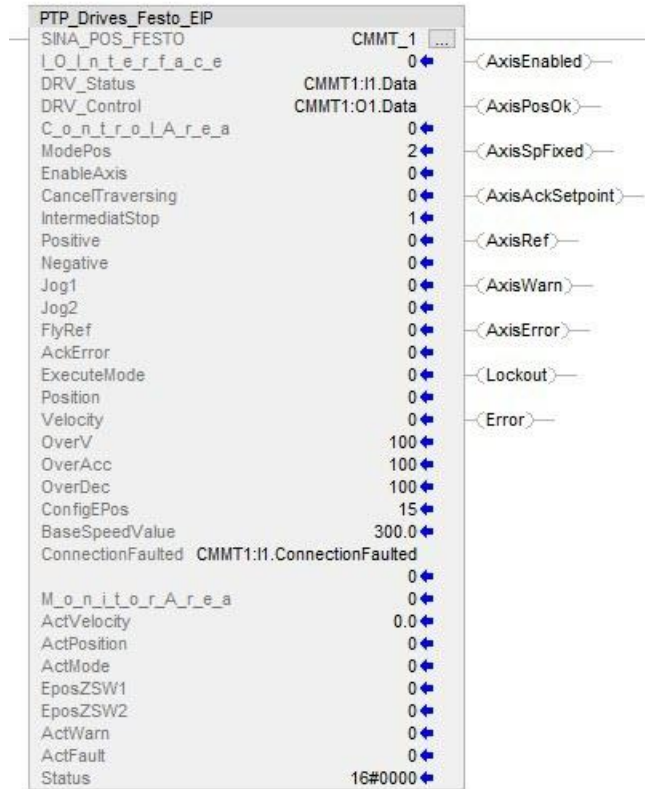
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## 1 Introduction

The main use of this application note is to describe the communication between CMMT Servo Drive and Allen-Bradley controller through EtherNet-IP network. The below function block is used to give the Position control command, Start command, Stop command, Jogging, Incremental jogging, Set homing reference & Move the axis to set homing reference point.

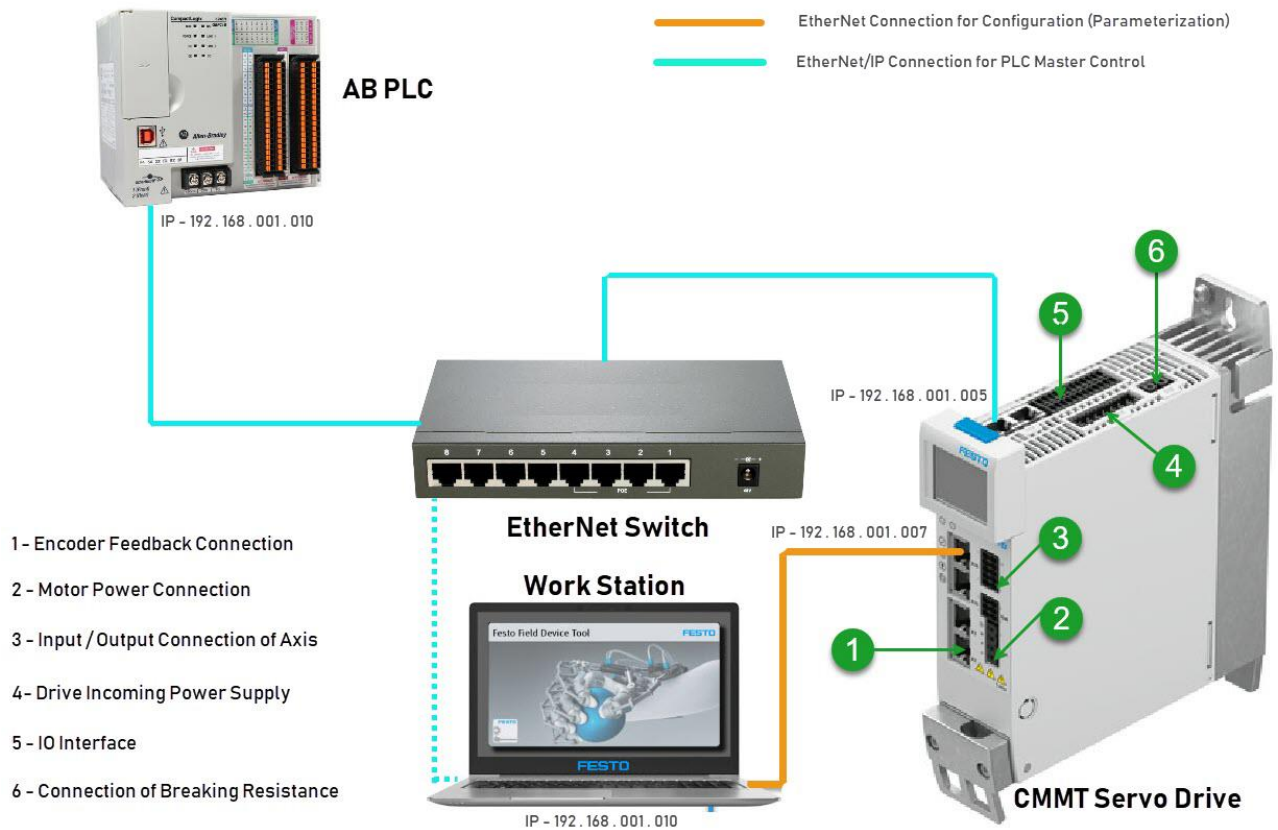


### 1.1 Hardware & Software Requirements

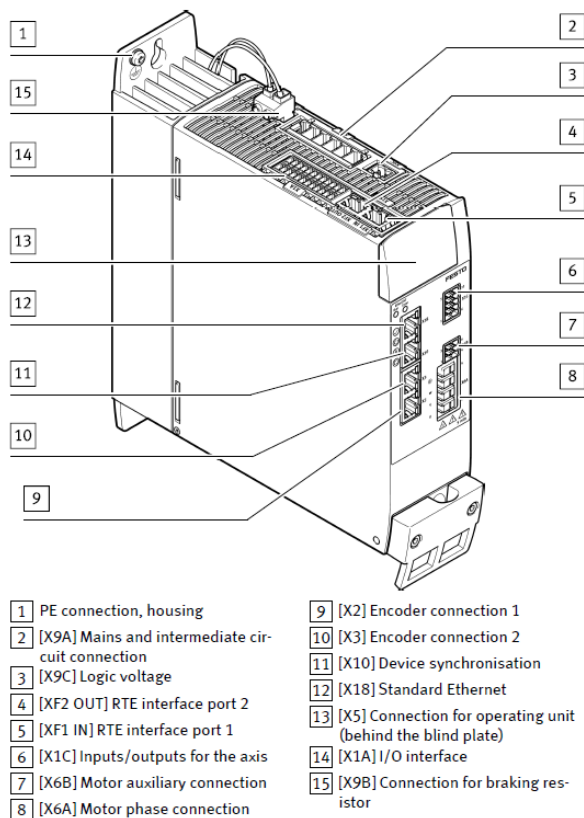
Device Name	Version (or) Part Number	Device Type
CMMT Drive	V16.0.14.24	Hardware
Servo Motor	Based on Application	Hardware
Motor Power Cable	Based on Application	Hardware
Motor Encoder Cable	Based on Application	Hardware
Servo Drive Connection Terminal Blocks	Based on Application	Hardware
EtherNet Cable	NEBC-R3G4-ES-1-S-R3G4-ET	Hardware
Allen-Bradley PLC	Version Free / Studio 5000 Platform	Hardware
Festo Automation Suite	V1.3.1.57	Software
Festo Field Device Tool	V2.9.10.55303	Software
Rockwell Studio 5000	Version Free	Software

Table 1.1: Hardware & Software Requirements

## 1.2 Communication Architecture



## 1.3 Hardware Over View of CMMT Servo Drive



## 2 Hardware Configuration

This chapter describes about the hardware configurations of PLC & CMMT servo drive.

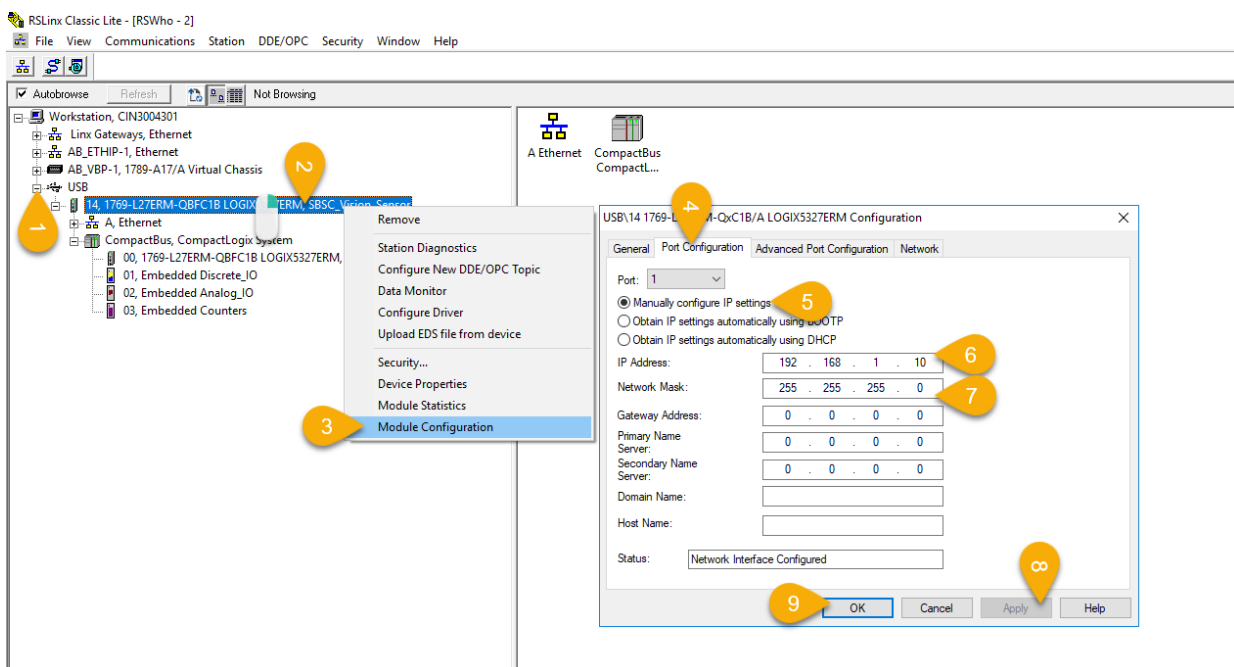
### 2.1 IP Address Configuration of Allen-Bradley PLC Using USB Serial Connection

Before making the IP address configuration in Allen-Bradley controller make sure user has connected USB type-B serial cable between PLC & PC. Once connection is done, Open RSLinx software from windows **Start > Rockwell Automation Software > RSLinx**.



#### Note

- This chapter explains IP address configuration of Allen-Bradley PLC via USB Serial cable. If USB cable is not available then the user can try to configure IP address via BootP-DHCP Tool by using MAC address with Ethernet cable as Shown in Chapter 2.2.



1. Expand the **“USB driver”** folder by clicking plus symbol of the folder.
2. Select the right controller and right click.
3. Select **“Module Configuration”** from right click menu.
4. Select **“Port Configuration”** tab from newly opened configuration window.
5. Select **“Manually configure IP settings”** to enable static IP mode in controller.
6. Enter the new **“IP address”** to the controller.
7. Enter the **“Subnet mask”** to the controller.
8. Click **“Apply”** to confirm the configuration.
9. Click **“OK”** to close the configuration window.



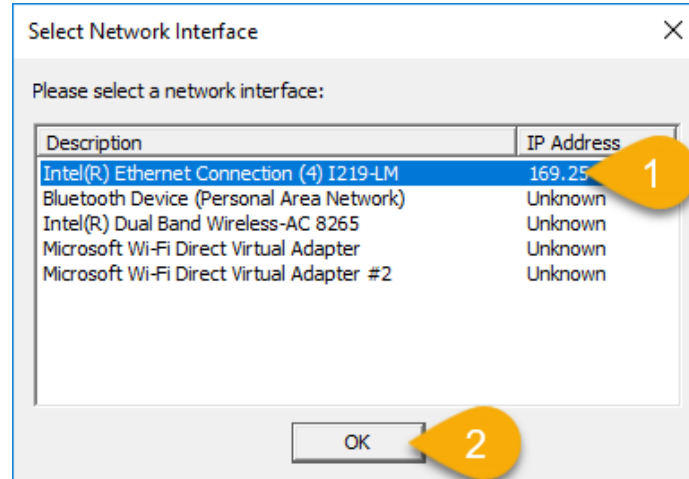
#### Note

- After IP address configuration power restart the controller to ensure static IP mode is enabled & to ensure correct IP address is assigned.

## 2.2 IP Address Configuration of Allen-Bradley PLC using EtherNet Connection

This step gives detailed explanation about IP address configuration of Allen-Bradley PLC through BootP-DHCP Tool by using LAN cable. This method of IP configuration will be used when Bootp or DHCP option are enabled in PLC communication settings. Note the MAC ID of the PLC before starting IP configuration process. The MAC ID of this sample code PLC is E4:90:69:BE:BF:5C.

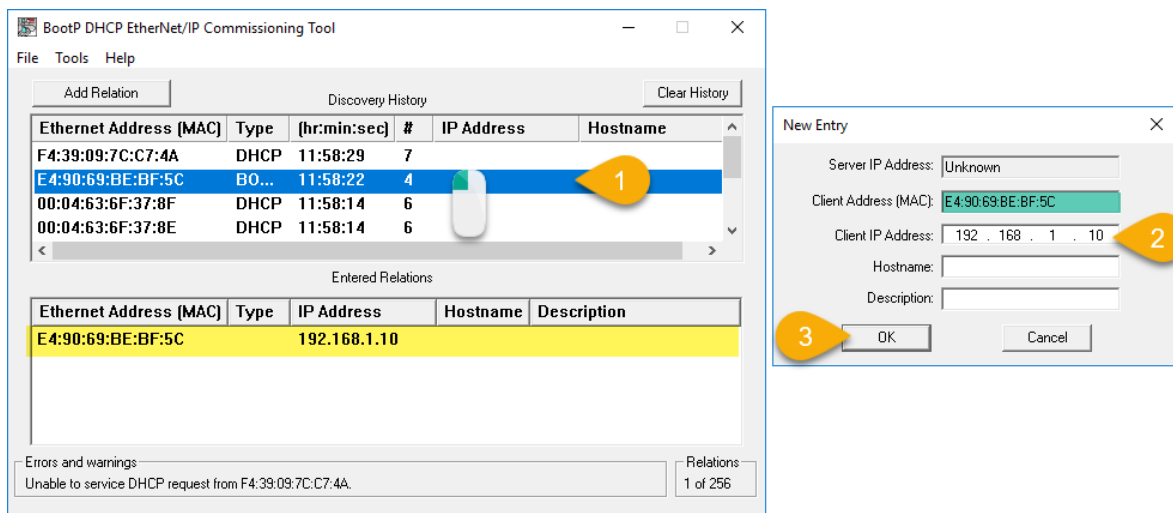
### Step -1



Open IP Configuration software from **“Windows” Start > Rockwell Software Tool > BootP-DHCP Tool**.

1. Select Network Interface Adapter card. Here selection was done for PC local LAN connection .
2. Select **“OK”** to conform the selection.

### Step - 2



1. Select **“MAC address”** of the user PLC which was noted initially.
2. Enter the new IP address of the PLC. PLC IP address series must be same series as CMMT drive IP.
3. Select **“OK”** button to confirm the new IP address.

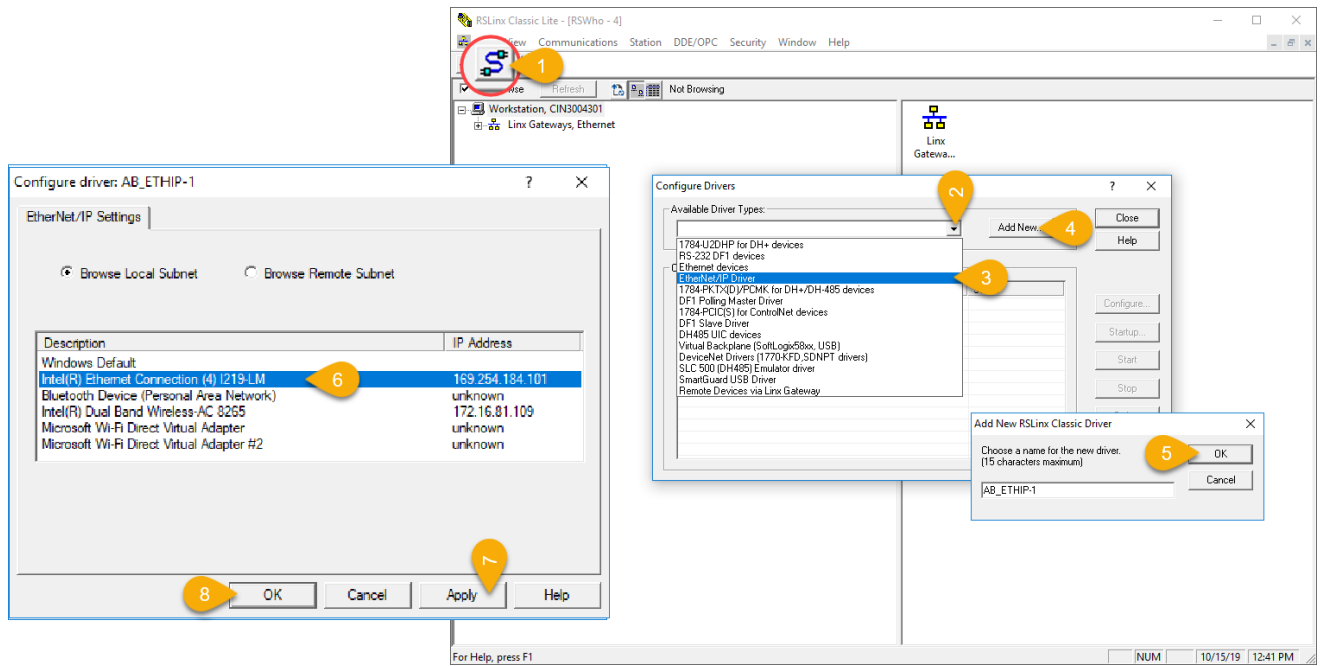


### Note

- Once IP address is conformed as highlighted in yellow color new IP address and its respective MAC ID will be updated in the Entered Relations window.
- At this point only IP address is assigned for PLC, But still the PLC communication setting is in BootP mode. It leads PLC to automatically erase its IP address during power restart. So Step-4 is important to avoid this situation.



### Step – 3



It's important to configure a drive in RSLink software to establish the connection with PLC. Open the RSLink software from **“Windows” Start > Rockwell Software > RSLink**.

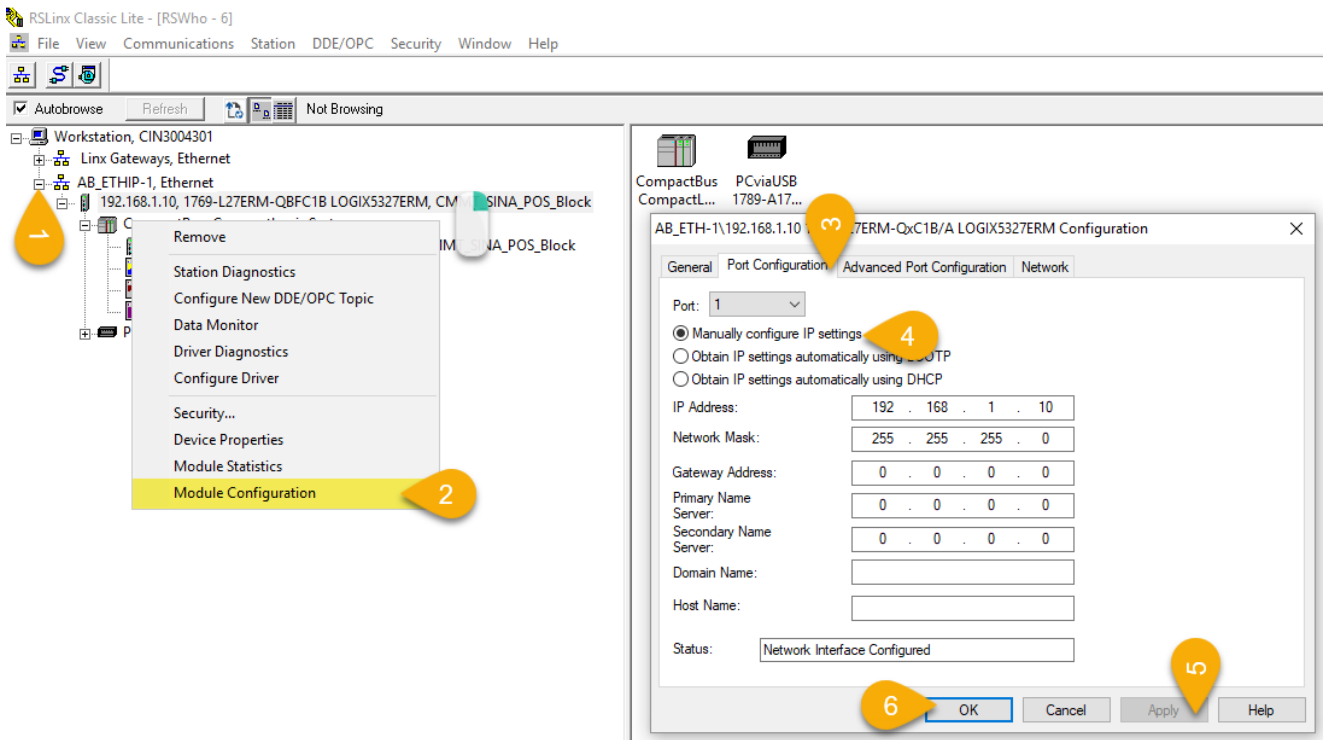
1. Select **“Configure Drives”** symbol from tool bar.
2. Click Drives **drop-down menu** from configure driver's window.
3. Select **“EtherNet/IP Drive”** from drop-down list.
4. Click **“Add New”** button from configure driver's window.
5. Click **“OK”** button with default name.
6. Select **EtherNet interface card**. Here selection is done for local LAN port by selecting **“Intel(R) Ethernet Connection (4) I219-LM”**.
7. Click **“Apply”** button to confirm the configuration.
8. Click **“OK”** button to confirm and close the configuration.



#### Note

- Make sure the IP series of user work station must be in same series as like PLC IP address series.

## Step – 4



This step will describe to change PLC EtherNet/IP port setting from BOOTP mode to Static IP mode.

1. Open the drive folder which created in previous step by clicking on plus symbol.
2. Select PLC Icon and right click to select “**Module Configuration**” option.
3. Select “**Port configuration**” tab from newly opened configuration window.
4. Select “**Manual configuration IP settings**” to enable static IP mode.
5. Click “**Apply**” button to confirm the changes.
6. Click “**OK**” to confirm and close the pop-up window.

PLC communication settings are done at this stage. Ensure once static IP mode is activated by restarting PLC.

## 2.3 IP Address Configuration of CMMT Drive Parametrizing Port - X18 ( Using FFT )

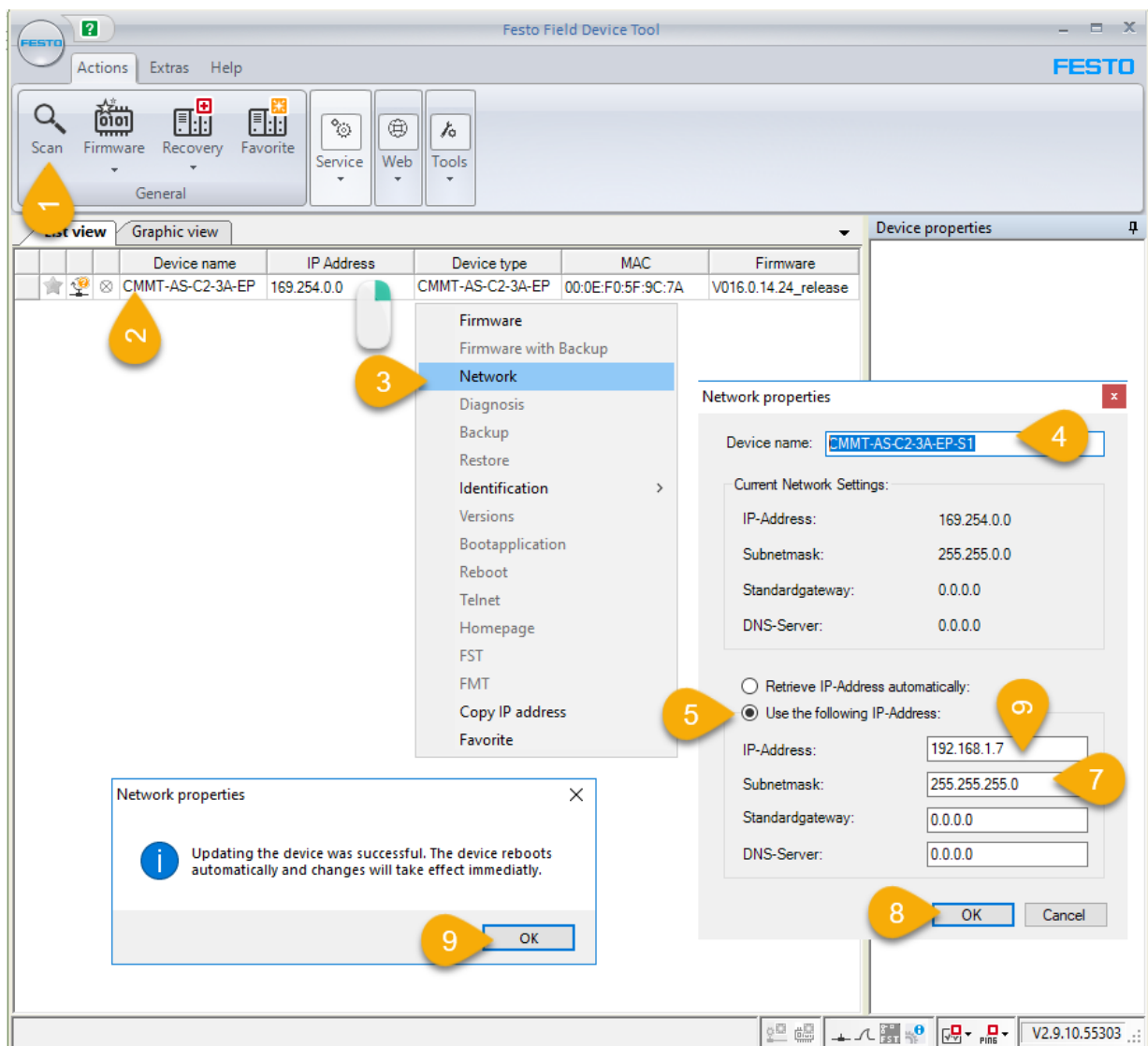
This chapter describes about IP address configuration of CMMT drive parametrizing port using Festo Field Device Tool.






### Note

- Before starting CMMT drive IP address configuration process make sure the hardware connection between PC & servo drive is done as per communication architecture shown in chap 1.2. In the chapter 1.2 yellow color connection is only for parametrization and after parametrization to establish connection with PLC, connect the PC with EtherNet switch as shown dotted blue color line.
- User can download the Festo Field Device Tool from Festo support portal website using below link.

[https://www.festo.com/net/en-gb\\_gb/SupportPortal/Default.aspx?tab=0&q=8004365](https://www.festo.com/net/en-gb_gb/SupportPortal/Default.aspx?tab=0&q=8004365)



After IP Address Configuration

List view		Graphic view					
				Device name	IP Address	Device type	MAC
				CMMT1	192.168.1.7	CMMT-AS-C2-3A-EP-S1	00:0E:F0:5F:9C:7A

Open the Festo Field Device Tool from following path **Windows Start > Festo Software > Festo Field Device Tool**



1. Select **"Scan Button"** to update the connected device list.
2. Select the correct drive from device list based on identifiers like Device name & MAC address of devices.
3. Right click the selected device & click the **"Network"** option from right click menu.
4. Enter the **"New name"** for the drive. It's an optional point by default drive name will be device type name.
5. Select **"Use following IP-Address"** option for enable static IP mode. By default the IP address mode will in Dynamic mode.
6. Enter the **new IP address** for the drive. Make sure the drive IP series must meet series of PLC IP address.
7. Enter the **subnet mask** value to define capacity of the network range. Above network configuration done for 255 devices.
8. Click **"OK"** to confirm configuration.
9. Click **"OK"** button from pop-up window to confirm the reboot the drive.

## 2.4 IP Address Configuration of CMMT Drive Parametrizing Port - X18 ( Using FAS )

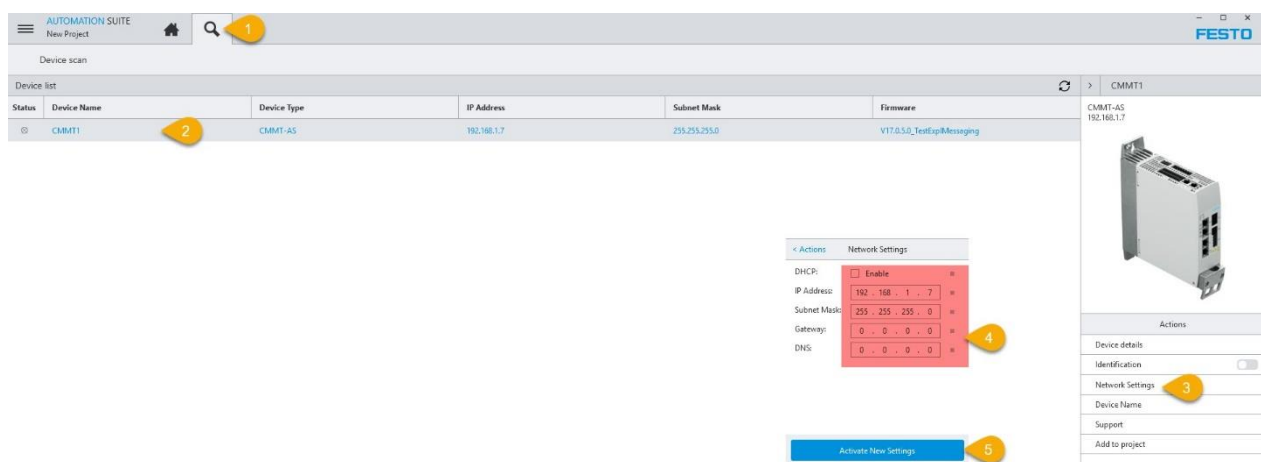
This chapter describes about IP address configuration of CMMT drive parametrizing port using Festo Automation Suite.



### Note

- Before starting CMMT drive IP address configuration process make sure the hardware connection between PC & servo drive is done as per communication architecture shown in chap 1.2. In the chapter 1.2 yellow color connection is only for parametrization and after parametrization to establish connection with PLC, connect the PC with Ethernet switch as shown dotted blue color line.
- User can download the Festo Automation Suite from Festo support portal website using below link.

[https://www.festo.com/net/en-gb\\_gb/SupportPortal/Default.aspx?tab=0&q=8074657](https://www.festo.com/net/en-gb_gb/SupportPortal/Default.aspx?tab=0&q=8074657)



1. Click “**Device Scan**” button from tool bar.
2. Select correct device by its name.
3. Select “**Network Setting**” from action window.
4. From network setting window **Uncheck the DHCP enable, Enter the new address** as per local network as highlighted in red colour.
5. Finally click “**Activate New Setting**” to update the changes.

## 2.5 CMMT Servo Drive Fundamental Configuration

### 2.5.1 Linear Axis Configuration

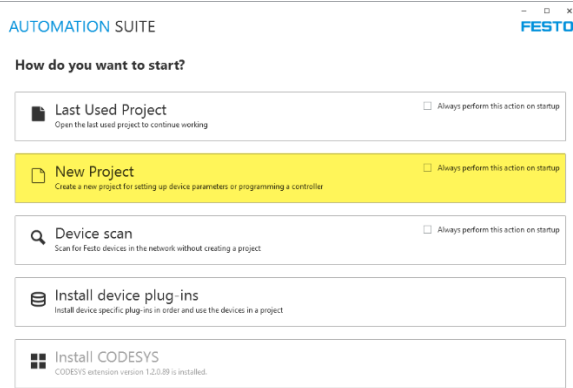


### Note

- If user looking for Rotary Axis configuration skip this chapter and jump to chapter – 2.5.2.

This chapter describe about parameterization of CMMT drive for linear axis to move 100 mm stock length with 0.50 m/s as base speed & current position as homing mode.

## Step – 1



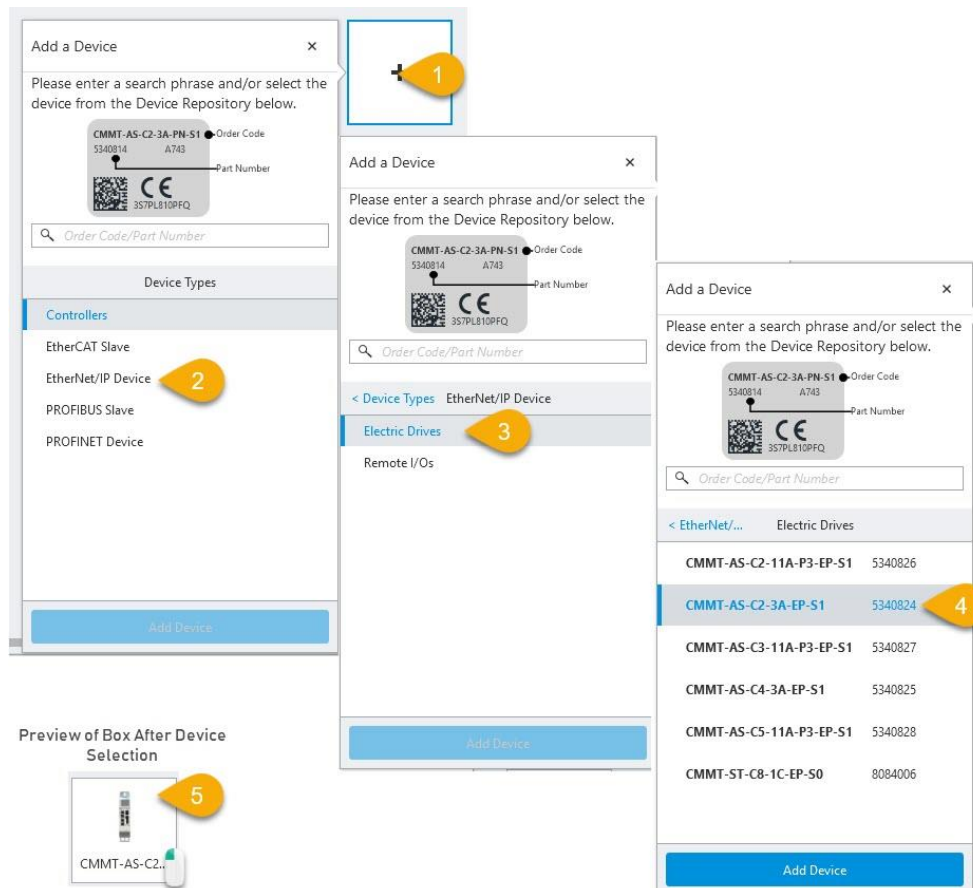
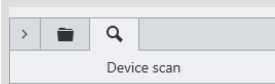
Open the Automation Suite software from Windows **Start > Festo Software > AUTOMATION SUITE** and select **“New Project”** from start-up menu.

## Step – 2



### Note

- Follow this step if drive is not in online. If drive is connected with PC as shown in Chapter 1.2 simply click Device scan from home ( Next to device Repository ) and online devices will be visible in available devices list. Select the correct device based on Its configured name & IP address then double click.



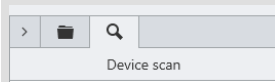
1. Select any empty device box and click add button.
2. Select **“EtherNet/IP Device”** from Add a Device menu.
3. Select **“Electric Drives”** from device type menu.

4. **Select correct drive part number** from electric drives list . As per this sample application CMMT-AS-C2-3A-EP-S1 is selected.
5. Double click the newly added drive to initialize configuration parameters.

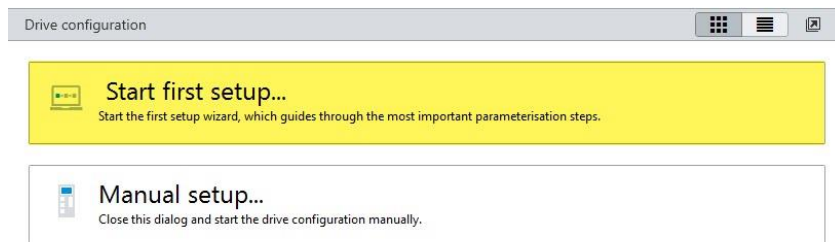


#### Note

- Follow the below step if drive is not in online. If drive is connected with PC as shown in Chapter 1.2 simply click Device scan ( Last Most in Right Side ) and online devices will be visible in available devices list. Select the correct device based on Its configured name & IP address.

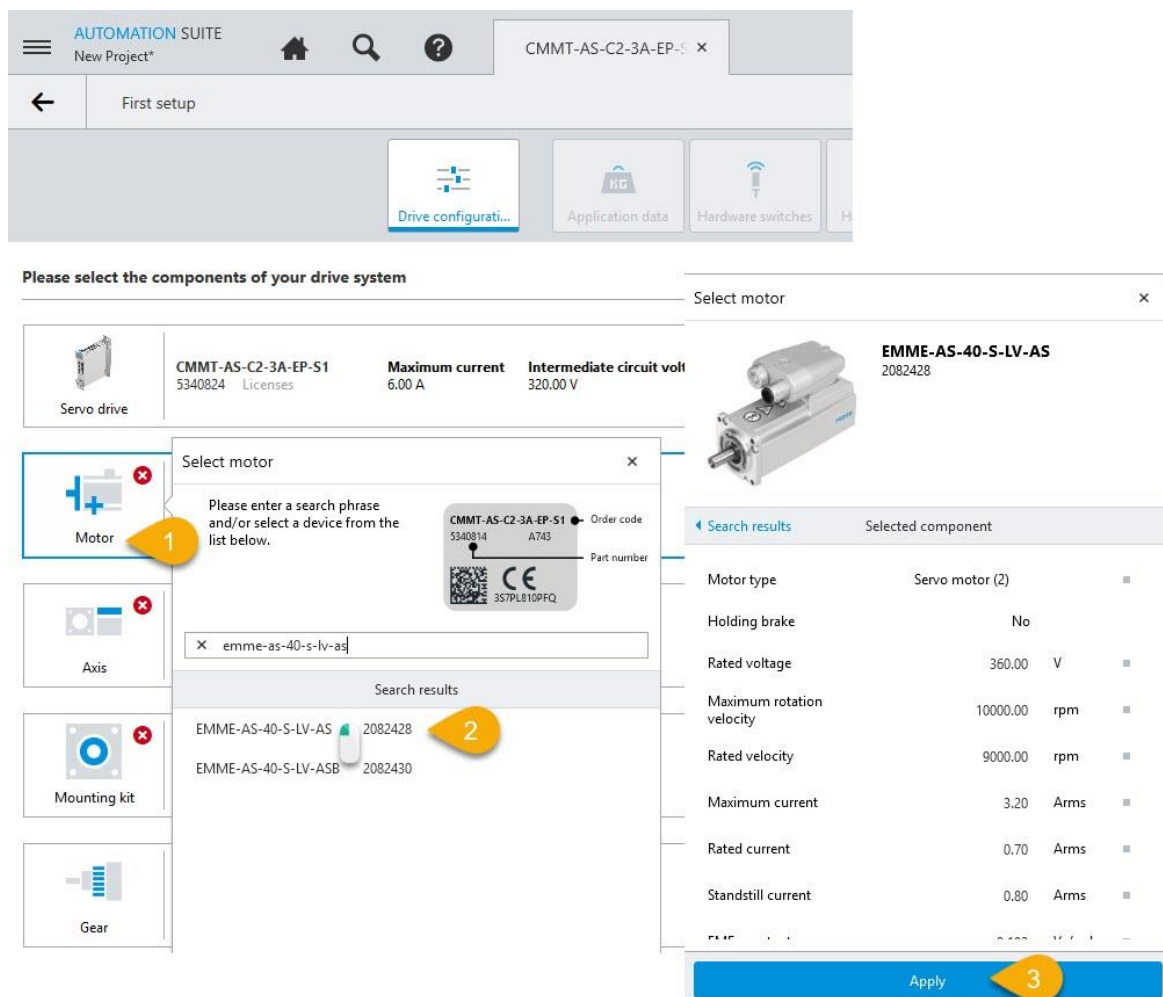


### Step – 3






Select **“Start first setup”** from drive configuration menu.

### Step – 4




1. Click **“Motor”** from components of drive system menu for specific motor model.
2. **Select correct motor** based on its **part number** and double click. As per this sample application “EMME-AS-40-S-LV-AS” motor is used.
3. Cross verify the motor parameters & click apply button to ensure motor configuration.

View of motor tab after configuration

	EMME-AS-40-S-LV-AS 2082428	Type Servo motor (2)	Holding brake No	Encoder protocol HiPerface (0)	Encoder type Single turn (1)	Voltage 360.00 V	 
Motor							

## Step – 5


Please select the components of your drive system



**CMMT-AS-C4-3A-EP-S1**  
 5340825 Licenses

**Maximum current**  
 12.00 A

**Intermediate circuit voltage**  
 320.00 V



**EMME-AS-40-S-LV-AS**


**Type**  
 Servo motor (2)

**Holding brake**  
 No

**Encoder protocol**  
 HiPerface (0)


**Encoder type**  
 Single turn (1)

**Voltage**  
 360.00 V



**Axis**

Please enter a search phrase and/or select a device from the list below.



**CMMT-AS-C4-3A-EP-S1**  
 5340814 A743  
 35TPL810PFQ

Order code  
Part number

Search results

- User defined linear axis
- User defined rotative axis
- DGE-8-%%-ZR 193739
- DGE-8-%%-ZR-HD12-GK 193739
- DGE-8-%%-ZR-HD8-GK 193739

Select axis

**User defined linear axis**

Search results Selected component

Current user unit Metric [m, m/s, ...] (6)

Motion Linear

Unlimited axis ☐ Active

Working stroke 100.00 mm

Feed constant 10.00 mm/r

Design axis Single axis (0)

Apply

This step describes about the axis type configuration. As specified initially here axis configuration is done for 100 mm in linear stock length. This configuration will change based on user application type.

## Step – 6

**Select mounting kit**

Please enter a search phrase and/or select a device from the list below.

Search results

Mounting kit	Order code
User defined mounting kit	559798
EAMM-A-A19-40A	558895
EAMM-A-A19-42A	559799
EAMM-A-A22-55A	558897
EAMM-A-A22-57A	558898
EAMM-A-A22-70A	3356796
EAMM-A-D100-100A	3356931
EAMM-A-D100-100A-S1	

**User defined mounting kit**

Search results

Selected component

Type

Inertia Coupling

Axial

10 kgm<sup>2</sup>

Apply

Gear ratio (total): 1:1

Back Next Finish

New Project: CMMT-AS-C2-3A-EP-S1 (Plug-in: CMMT-AS Plug-in V1.2.2.4) Festo Automation Suite V1.2.1.1

This step illustrates about mounting kit configuration. This configuration will vary depending on user application type. At the end of this step click next button to move to next level configuration.

## Step – 7

**Application data**

Axis mass

Application mass

Total mass

0.00 kg

10.00 kg


10.00 kg

Back Next Finish

Specify inertia value of user application. This parameter value will vary depend on application type. Click next button for next level configuration.



### Step -8

  
 Hardware switches

**Hardware switches**


---

Reference switch configuration	Deactivated (0)	■
Limit switches configuration	Not used (1)	■

Back
Next
Finish


Select the homing & maximum limit switch connection type. Click next button for next level configuration.

### Step – 9

  
 Homing method

**Homing method**


---

Method	<div style="display: flex; align-items: center;"> <div style="border-right: 1px solid #ccc; padding-right: 10px;">Current position (37)</div> <div style="text-align: center;">  </div> </div>	■
Nominal current limit value scaling factor	0.30	■
Move to axis zero point after homing	<input checked="" type="checkbox"/> Active	■

Back
Next
Finish

Select homing method. As per this sample application “**Current Position**” mode is selected. But user want to select homing mode depending on application requirement. Click next button for next level of configuration.

### Step – 10

  
 Software limits

**Software limits**

---

<div style="display: flex; align-items: center;"> <span style="border: 1px solid #ccc; padding: 2px 5px; margin-right: 5px;">⊕</span> Axis zero point offset         </div>	3.00	mm ■
Software limit positions active	<input checked="" type="checkbox"/> Active	■
<div style="display: flex; align-items: center;"> <span style="border: 1px solid #ccc; padding: 2px 5px; margin-right: 5px;">-</span> Negative software limit position         </div>	-3.00	mm ■
<div style="display: flex; align-items: center;"> <span style="border: 1px solid #ccc; padding: 2px 5px; margin-right: 5px;">+</span> Positive software limit position         </div>	97.00	mm ■

Back
Next
Finish

Here user can enable the maximum & minimum values of software limits as per application requirements. Finally click **“Finish”** button to complete the configuration.

### Step – 11

At this stage all the fundamental configurations of drive system are done. In case of any correction in parameter is required software tool will indicate number of **“correction parameters”** ( Right most top corner in FAS tool ) as shown in the below picture. So to correct parameter value click the **“Correction parameters”** button and click apply button to apply system generated recommended values.



## 2.5.2 Rotary Axis Configuration

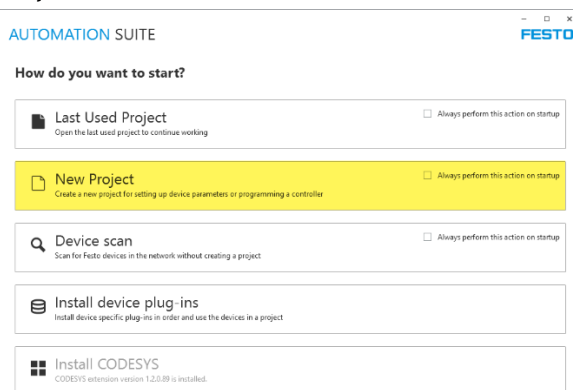
This chapter describe about parameterization of CMMT drive for rotary axis to move 1000 revolution forward and reverse with 1000 RPM base speed & current position as homing mode.



### Note

- If user looking for Linear Axis configuration skip this chapter and jump to chapter – 2.5.1.

### Step – 1



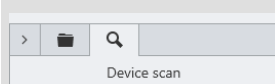
Open the Automation Suite software from Windows **Start > Festo Software > AUTOMATION SUIT** and select **“New Project”** from start-up menu.

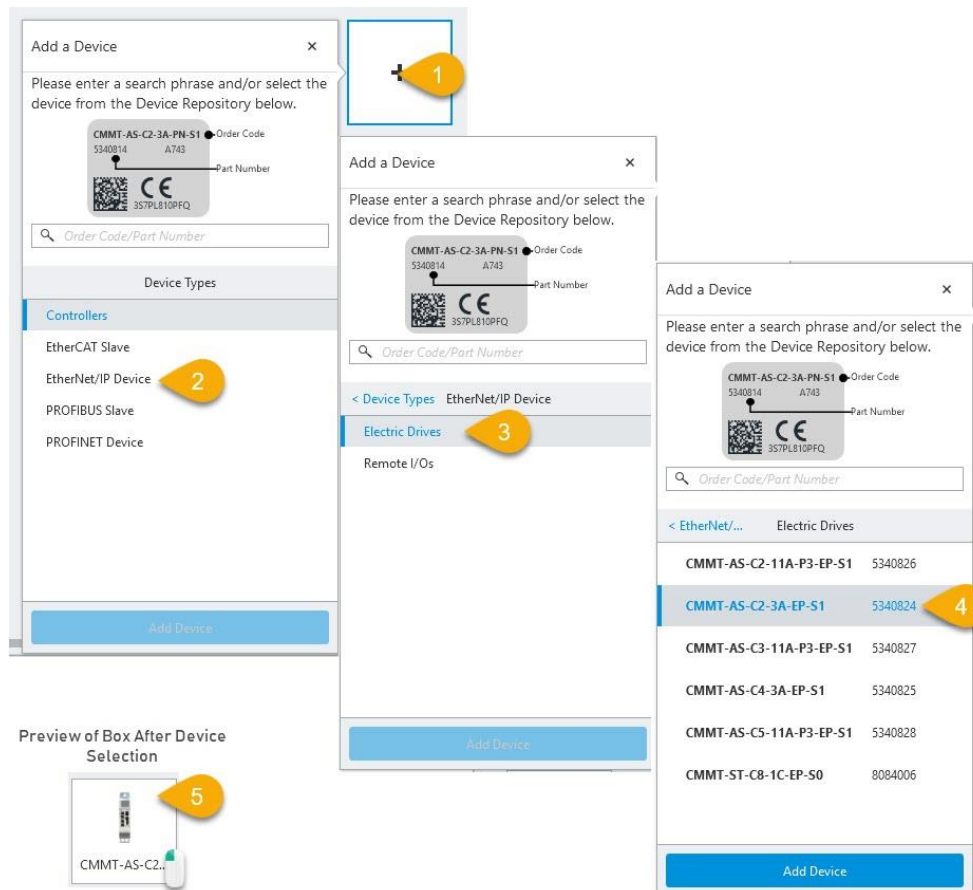
### Step – 2



### Note

- Follow this step if drive is not in online. If drive is connected with PC as shown in Chapter 1.2 simply click Device scan from home ( Next to device Repository ) and online devices will be visible in available devices list. Select the correct device based on Its configured name & IP address then double click.



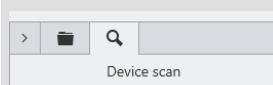


6. Select any empty device box and click add button.
7. Select “**EtherNet/IP Device**” from Add a Device menu.
8. Select “**Electric Drives**” from device type menu.
9. **Select correct drive part number** from electric drives list . As per this sample application CMMT-AS-C2-3A-EP-S1 is selected.
10. Double click the newly added drive to initialize configuration parameters.

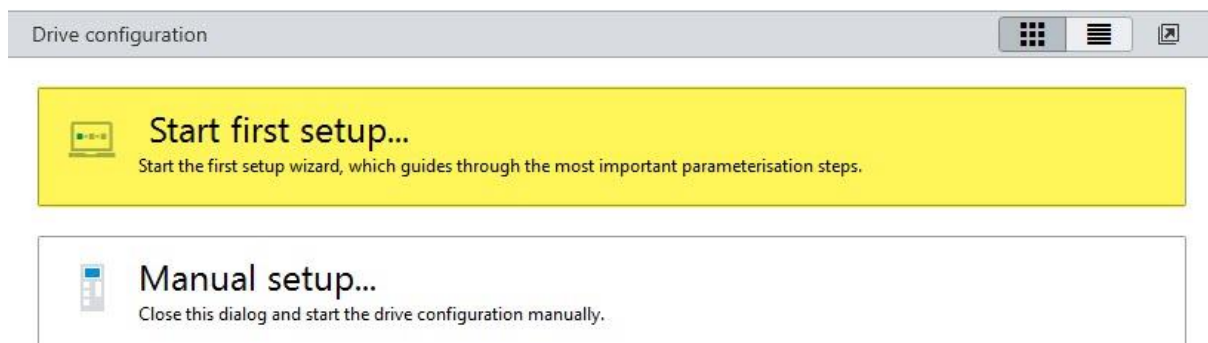


## Note

- Follow the below step if drive is not in online. If drive is connected with PC as shown in Chapter 1.2 simply click Device scan ( Last Most in Right Side ) and online devices will be visible in available devices list. Select the correct device based on Its configured name & IP address.



## Step – 3



Select “**Start first setup**” from drive configuration menu.

### Step – 4

## Step – 5

Please select the components of your drive system

Servo drive

**CMMT-AS-C2-3A-EP-S1**  
5340824 Licenses

**Maximum current**  
6.00 A

**Intermediate circuit voltage**  
320.00 V

Motor

Axis

Mounting kit

Gear

Select axis

Please enter a search phrase and/or select a device from the list below.

Order code/part number

Search results

User defined linear axis

User defined rotative axis

DGE-8-%%-ZR	193739
DGE-8-%%-ZR-HD12-GK	193739
DGE-8-%%-ZR-HD8-GK	193739

Select axis

User defined rotative axis

Search results

Selected component

Current user unit: Rev [rev, rpm, ...] (3)

Motion: Rotative

Unlimited axis: ☐ Active

Position range: 1000 r

Design axis: Single axis (0)

Apply

This step describes about the axis type configuration. As specified initially here axis configuration is done for 1000 rotation in forward & reverse. This configuration will change based on user application type.

## Step – 6

Motor

Axis

Mounting kit

Gear

Select mounting kit

Please enter a search phrase and/or select a device from the list below.

Order code/part number

Search results

User defined mounting kit

EAMM-A-A19-40A	559798
EAMM-A-A19-42A	558895
EAMM-A-A22-55A	559799
EAMM-A-A22-57A	558897
EAMM-A-A22-70A	558898
EAMM-A-D100-100A	3356796
EAMM-A-D100-100A-S1	3356931

Select mounting kit

User defined mounting kit

Search results

Selected component

Type: Axial

Inertia Coupling: 10 kgm<sup>2</sup>

Apply


Gear ratio (total): 1:1

Back Next Finish

New Project: CMMT-AS-C2-3A-EP-S1 (Plug-in: CMMT-AS-Plug-in V1.2.4) Festo Automation Suite V1.2.1.9

This step illustrates about mounting kit configuration. This configuration will vary depending on user application type. At the end of this step click next button to move to next level configuration.

### Step – 7


  
Application data

**Application data**

---

Axis mass moment of inertia 0.00 kgcm<sup>2</sup>


Application moment of inertia 1.00 kgcm<sup>2</sup>

Total mass moment of inertia 1.00 kgcm<sup>2</sup>

Back Next Finish

Specify inertia value of user application. This parameter value will vary depend on application type. Click next button for next level configuration.

### Step -8


  
Hardware switches

**Hardware switches**

---


Reference switch configuration Deactivated (0)

Limit switches configuration Not used (1)

Back Next Finish

Select the homing & maximum limit switch connection type. Click next button for next level configuration.

### Step – 9


  
Homing method

**Homing method**

---

Method Current position (37)


Nominal current limit value scaling factor 0.30

Move to axis zero point after homing ☒ Active

Back Next Finish

Select homing method. As per this sample application “**Current Position**” mode is selected. But user want to select homing mode depending on application requirement. Click next button for next level of configuration.

### Step – 10



Software limits

**Software limits**

---

☐ Axis zero point offset

Software limit positions active

☐ Negative software limit position

☐ Positive software limit position

r

☒ Active

r

r

Back

Next

Finish

Here user can enable the maximum & minimum values of software limits as per application requirements. Finally click **“Finish”** button to complete the configuration.

### Step – 11

At this stage all the fundamental configurations of drive system are done. In case of any correction in parameter is required software tool will indicate number of **“correction parameters”** ( Right most top corner in FAS tool ) as shown in the below picture. So to correct parameter value click the **“Correction parameters”** button and click apply button to apply system generated recommended values.



## 2.6 CMMT Drive Parameterisation for Integrate with PLC

This chapter will describe about parameterisation of CMMT drive to establish communication with PLC through Telegram 111. Also it describe some additional parameters like Factor group, Reference values, EtherNet/IP interface, User defined limits.

### Step – 1



#### Note

- Follow this step when drive is available for online connection. If drive is not available simply skip this step and jump to next step.

The screenshot shows the 'PARAMETERISATION' tab of the software. On the left, the drive 'CMMT1' (CMMT-AS-C2-3A-EP-S1) is shown with a 'Path: 192.150.3.7' and a 'Disconnect' button. A yellow callout points to the 'Connect' button. Below this, the 'Status When Drive is in On-line' section shows the drive as 'Connected' with a 'Disconnect' button. A yellow callout points to the 'Path' field. On the right, the 'Device Communication' window is open, showing a text input field with '192.168.1.7' and a list of 'Available Devices'. The list has columns: Status, Identify, Device Name, Device Type, and IP Address. One device is listed: CMMT1 (CMMT-AS) with IP 192.168.1.7. A yellow callout points to the 'Identify' column. At the bottom right, a blue button labeled '2 Use IP Address for Device Communication' is highlighted.

Status	Identify	Device Name	Device Type	IP Address
⊗	<input type="checkbox"/>	CMMT1	CMMT-AS	192.168.1.7

- Click the IP address “**Path**” from tool bar.
- Select the correct drive based on IP address & select “**Use IP Address for Device Communication**” button to assign path address.
- Click on “**Connect**” button to establish communication & status of the drive changes from Disconnected to Connected.

### Step – 2

#### Factor group

Current user unit

Metric [m, m/s, ...] (6)

Position



-6

Velocity



-3



Enter the Position & Velocity command scale factor value of fieldbus. User can reach the Factor group in Automation Suite from **PARAMETERISATION > Fieldbus > Factor group**.

Example - 1 PLC scale value is calculated below for move the linear axis 10 mm in 1 m/s speed.

Position Factor (-6) =  $10^{-6} = 0.000001 = 1\mu\text{m}$  Then For 10 mm = 1000000 Increment value in PLC

Velocity Factor (-3) =  $10^{-3} = 0.001 = 1\text{mm/s}$  Then for 1 m/s = 1000 Increment value in PLC

Example - 2 PLC scale value is calculated below for move the rotary axis 5 Rev in 100 RPM speed.

Position Factor (-6) =  $10^{-6} = 0.000001 \text{ Rev}$  Then For 5 Rev = 5000000 Increment value in PLC

Velocity Factor (-3) =  $10^{-3} = 0.001 \text{ RPM}$  Then for 100 RPM = 100000 Increment value in PLC



#### Note

- For more details about fieldbus scaling refer chapter name “**Scaling of internal units for the fieldbus**” in user manual.
- Different user unit can't be set for Position, Velocity, Acceleration & Jerk.
- The maximum value limit for 32 bit DINT data type variable is 2,147,483,647. So plan scaling factor within the limit.

### Step – 3

#### Reference values

Base value speed		<input type="text" value="0.50"/>	m/s	
Base value speed (controller)		<input type="text" value="3000.00"/>	rpm	
Base value acceleration		<input type="text" value="1.00"/>	m/s <sup>2</sup>	
Base value deceleration		<input type="text" value="1.00"/>	m/s <sup>2</sup>	

Enter the actual Base speed value, Acceleration & Deceleration values of the application in the respective numeric fields.



#### Note

- Base speed value does not affect the speed of the drive but it will effect on display value of the drive.
- The AOI tag “**BaseSpeedValue**” tag must have same value as the FAS parameter value that is (FAS = P1.11280701.0.0).

**Step – 4****EtherNet/IP interface****Configuration**

Activate DHCP	<input type="checkbox"/> Active	■
IP address	192 . 168 . 1 . 5	■
Subnet mask	255 . 255 . 255 . 0	■
Gateway address	0 . 0 . 0 . 0	■

Ether the IP address & Subnet mask for EtherNet/IP interface. This communication interface is used to establish connection with PLC to receive control command & to send signal feedbacks.

**Note**

- IP address series of EtherNet/IP interface must match with PLC IP address series to establish connection.

**Step – 5****Connection properties**

Telegram selection	Telegram (111) ▼	■
Current application class	Application class 1 (1)	■

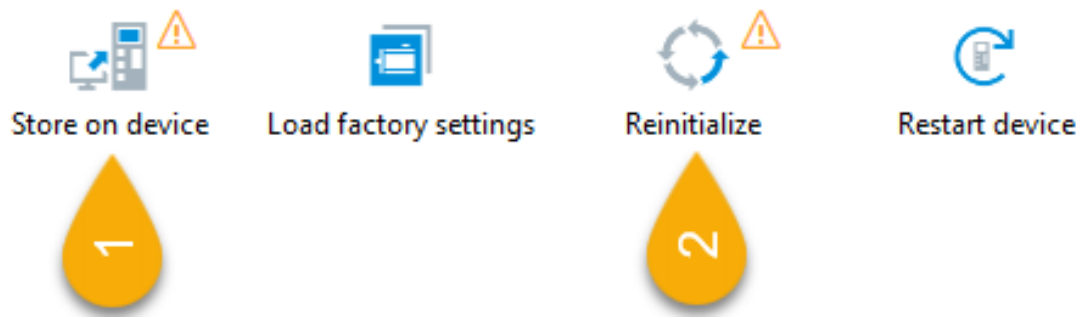
Select the connection properties as “**Telegram(111)**” from **PARAMETERISATION > Fieldbus > Connection properties**.

**Step – 6****Enable servo drive**

Activation via	<div> I/O and fieldbus (0) ▲  I/O and fieldbus (0)  I/O (1)  Fieldbus (2)  I/O and Plug-in (3)  Plug-in (4) </div>	■
----------------	--	---

Select the medium to enable the servo drive. The selection must be either “**I/O and fieldbus (0)**” or “**Fieldbus**” to control the drive through fieldbus.

**Step – 7**



1. Click the **“Store on device”** button to store all the parameters on drive memory.
2. Click the **“Reinitialize”** the button to initialize the drive.



**Note**

- The triangle warning symbol on both buttons indicates action required.
- All the modified parameters will automatically erase from drive during power restart If modified parameters are not stored in the drive.
- Its mandatory to reinitialize the drive for some parameter modification. If drive is not reinitialized the drive performance remains same as like previous configuration.

### 3 Software Configurations

This chapter describe about software configurations like AOI import in Studio 5000, CMMT EDS file import, Adding Generic Ethernet Module, Adding PTP\_DRIVES\_FESTO\_EIP AOI (Add-On Instruction) in program & IN OUT Tags configuration of AOI.

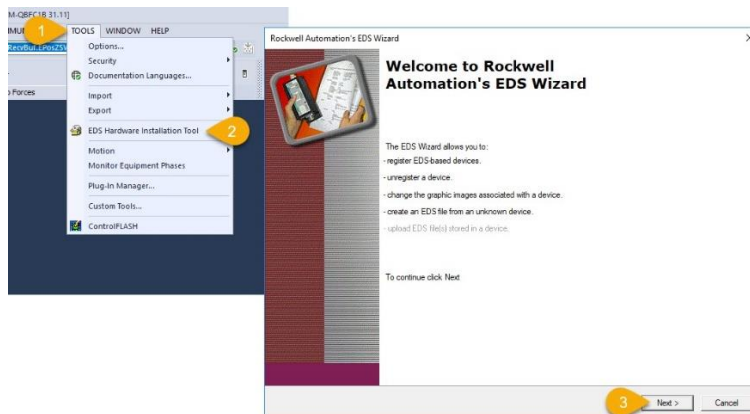


#### Note

- CMMT servo drive EDS file is available with this application note folder & Also user can able to download it from Festo Support Portal website.
- Skip Chapter - 3.1 & Chapter - 3.2 when Generic Ethernet module is used as hardware interface module instead of EDS module. Move to Chapter - 3.3.

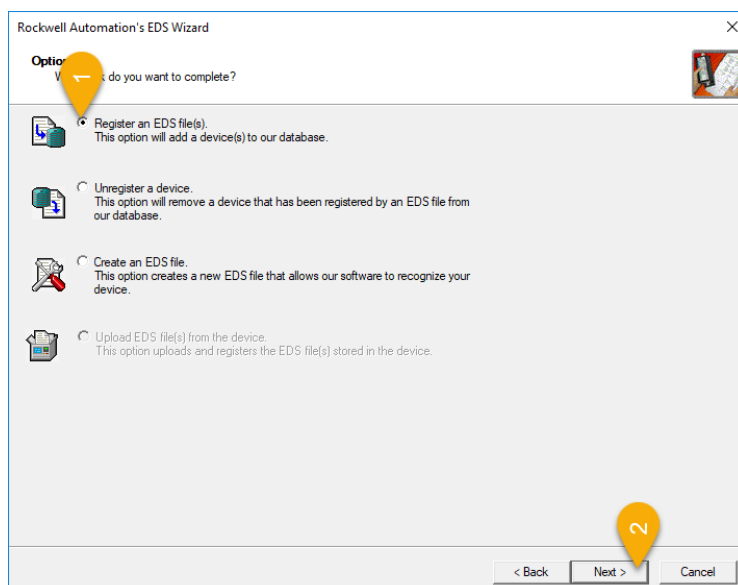
#### 3.1 Install CMMT Drive EDS File in Studio-5000

##### Step – 1



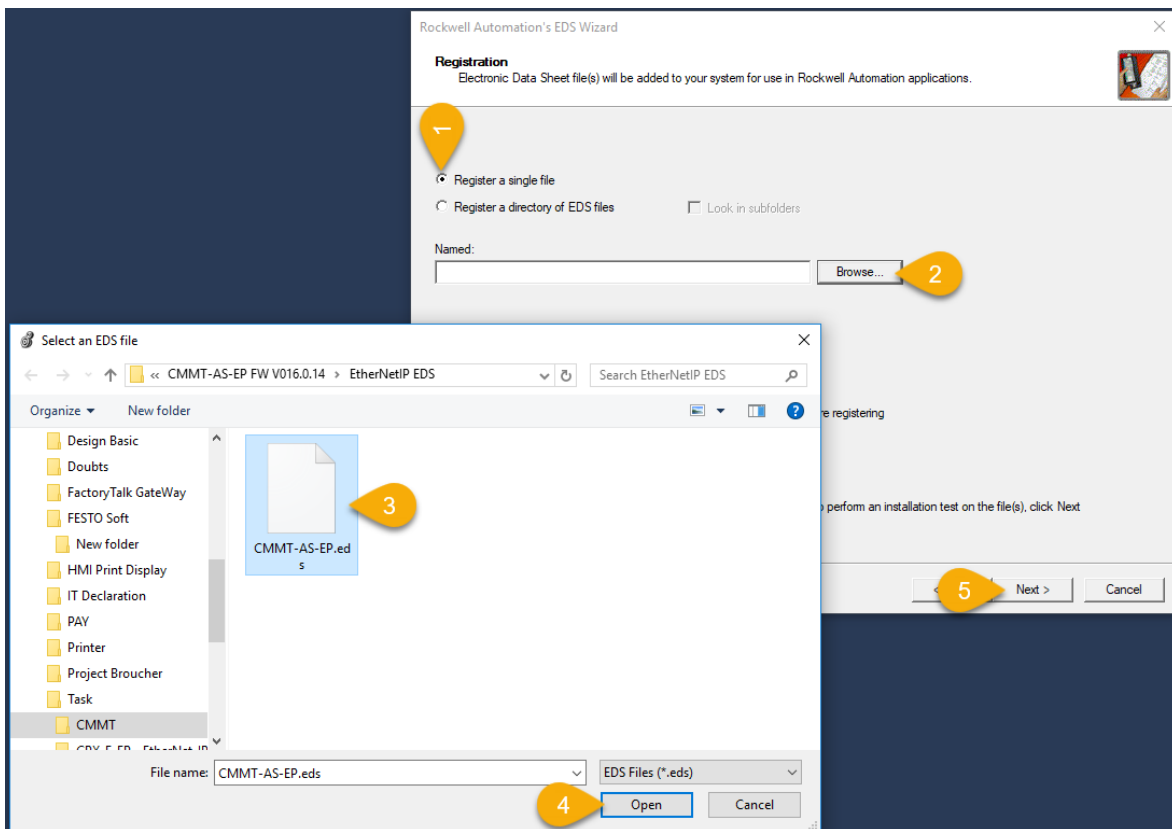
1. Click the “**Tools**” from tool bar.
2. Select “**EDS Hardware Installation Tool**” from tools drop-down menu.
3. Click “**Next**” from EDS installation wizard.

##### Step – 2



1. Select “**Register an EDS file(s)**” from the listed options.
2. Select “**Next**” for next level.

### Step – 3



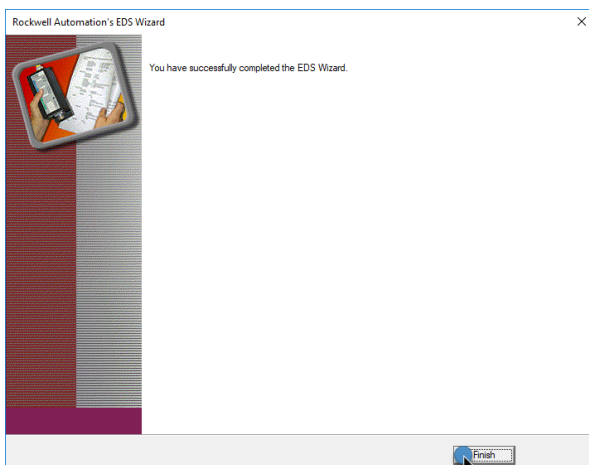
1. Select **“Register a single file”** from registration window.
2. Click **“Browse”** button to select EDS backup file.
3. Navigate to the EDS backup file saved location and select it.
4. Click **“Open”** button form EDS file selection window.
5. Click **“Next”** button from Registration window.



#### Note

- Simply click next button for upcoming configuration wizards and move to final window as shown in next step.

### Step – 4

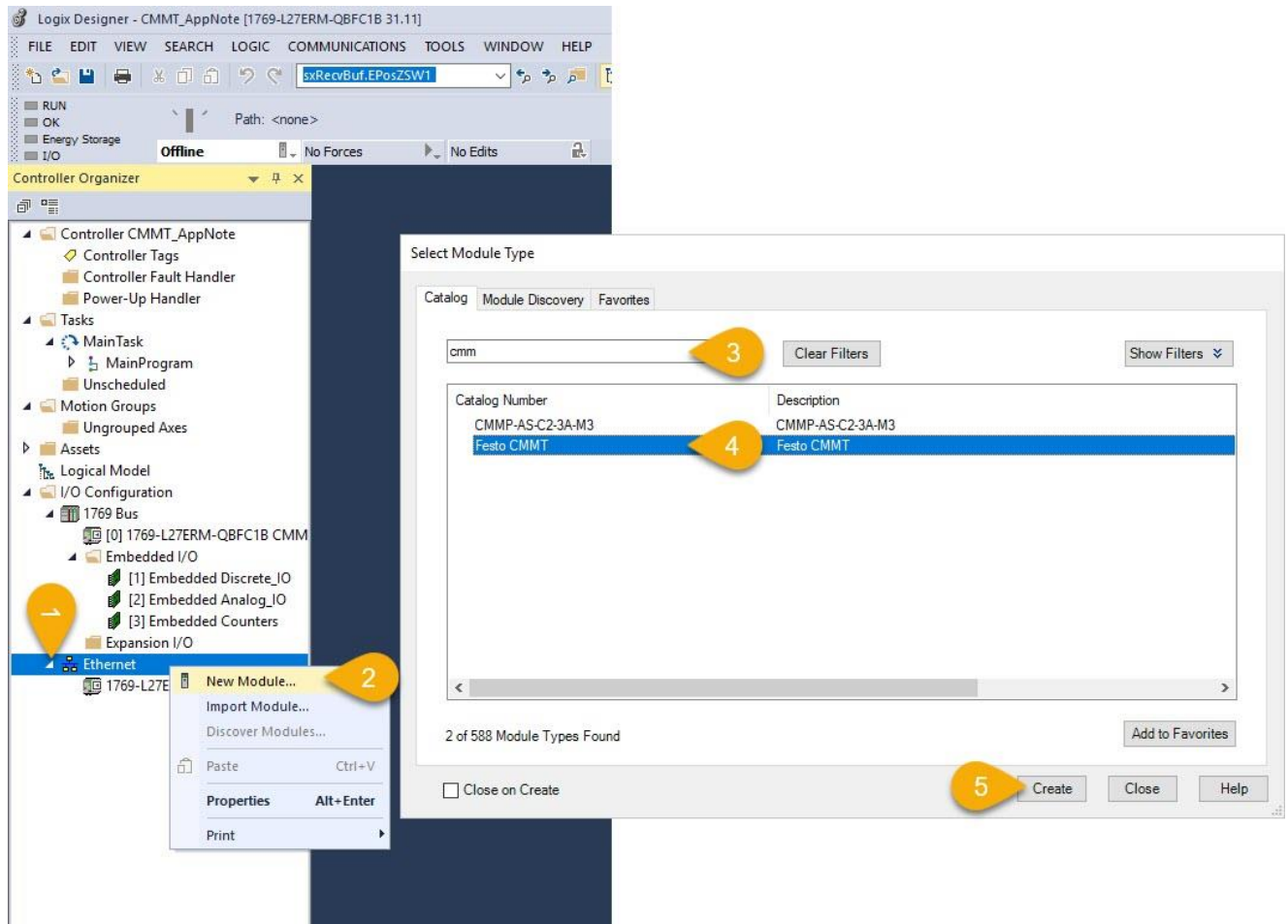


Click Next button to complete the insatllation of EDS file installation.

### 3.2 Add CMMT EDS File in Studio-5000 EtherNet Tree for Hardware Interface

This chapter will describe about adding CMMT drive communication module in Studio - 5000 tool.

#### Step – 1



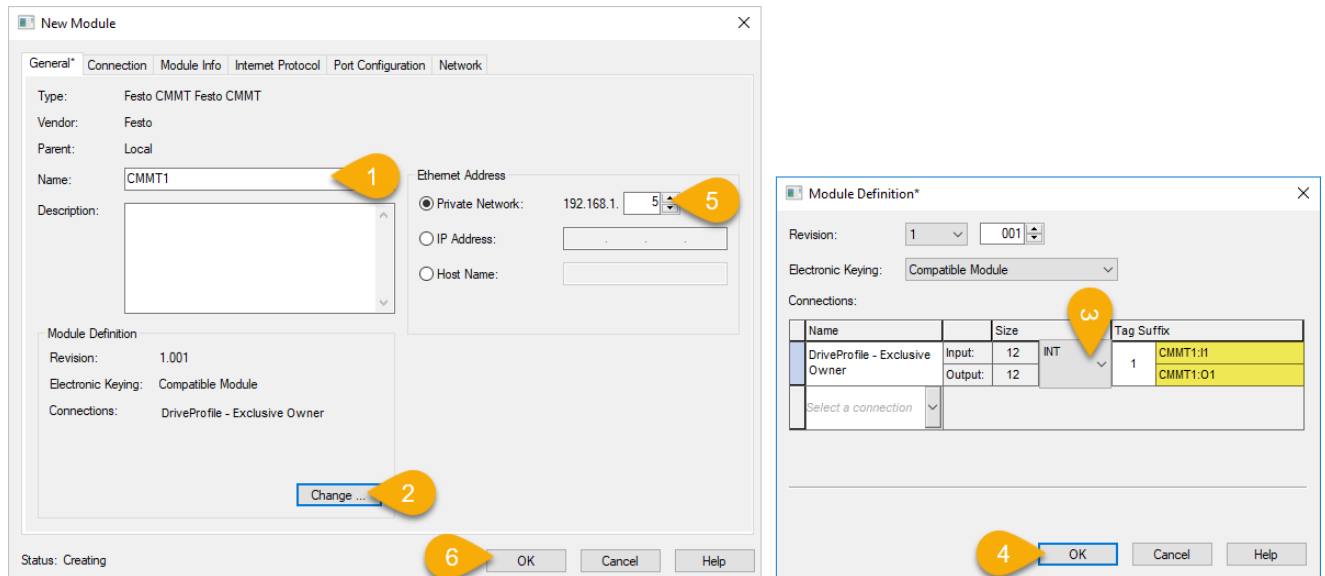
1. Select “**Ethernet**” folder from **controller organizer menu > I/O Configuration** and right click.
2. Select “**New Module**” from menu.
3. Type as **CMMT** in search tab.
4. Select “**Festo CMMT**” from search result.
5. Click “**Create**” to create CMMT interface module.



#### Note

- When using Generic Ethernet module instead of EDS module type as Generic in search tab & select “**ETHERNET-MODULE**” from search result.

## Step – 2



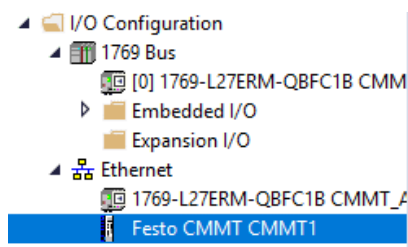
1. Enter the name of the module.
2. Click the **“Change”** button from module definition frame.
3. Select **“INT”** data type from module definition window.
4. Select **“OK”** button to confirm the configuration.
5. Enter the IP address of the drive (**Address of Interface Port – XF1**).
6. Click **“OK”** button to confirm the configuration.



### Note

- Select **“Private Network”** option of ethernet address when IP series starts as 192.168.1.xx & for different IP series select **“IP Address”** option.
- Names of the Input & Output tags will be displayed in controller tags list as highlighted in yellow color.

After completion of EDS file configuration the new module will be available in ethernet tree as shown below picture.

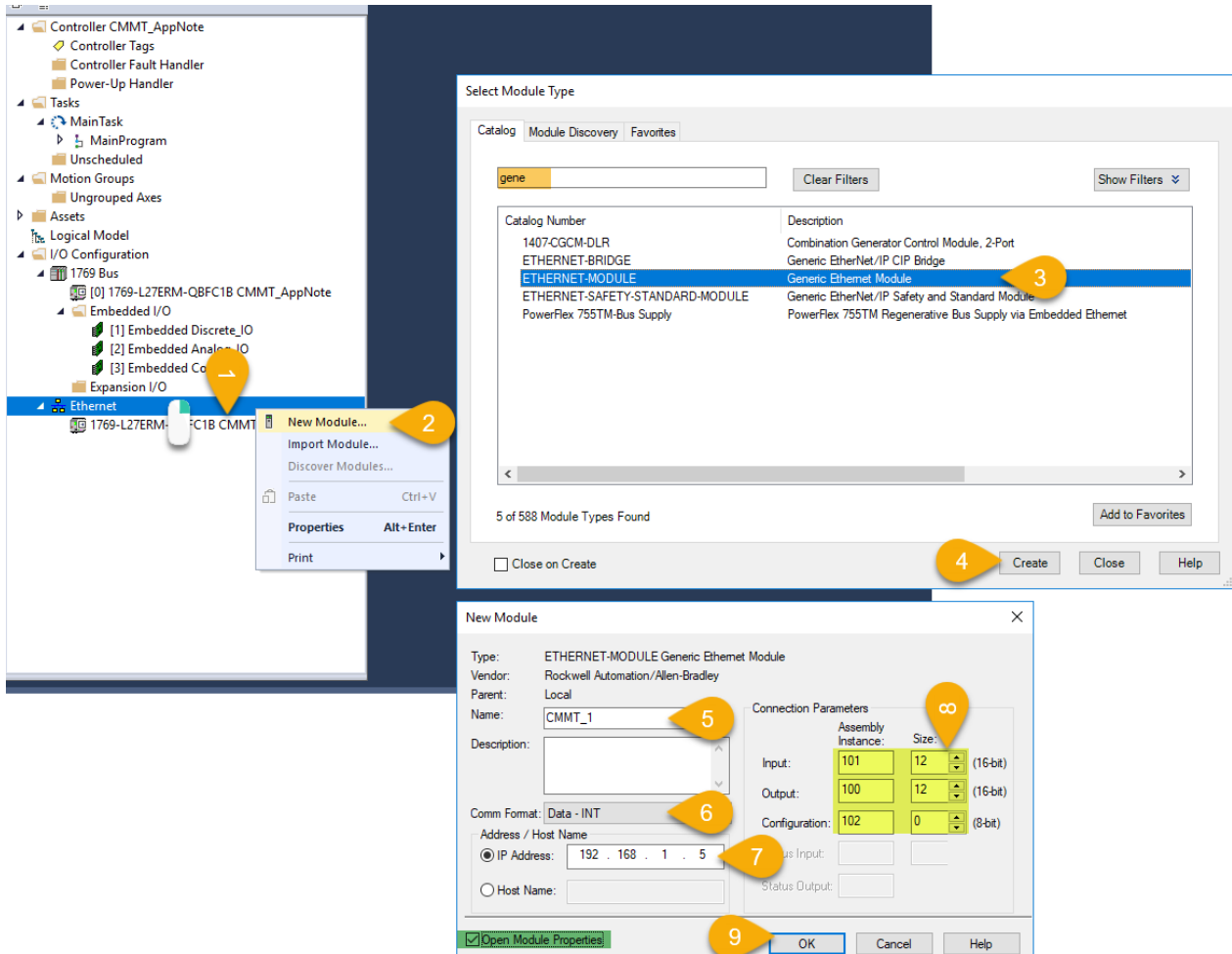


### 3.3 Add Generic EtherNet Module in Studio-5000 EtherNet Tree for Hardware Interface



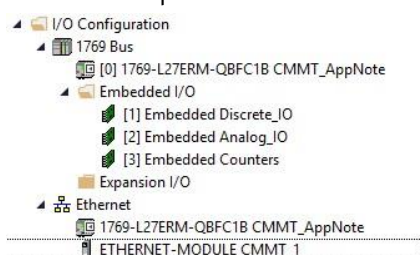
#### Note

- Skip this chapter when EDS used as Hardware interface module.



1. Select the “**Ethernet**” tree from controller organizer window
2. Select “**New Module**” option from right click menu.
3. Type the module name in search box as highlighted in orange colour & select the “**ETHERNET-MODULE**”.
4. Click “**Create**” button from select module type window.
5. Enter the name of the module in “**Name**” filed in New Module window.
6. Select the data format as “**Data – INT**”.
7. Enter the “**IP address**” of CMMT drive ( **Address of Interface Port – XF1** ).
8. Enter the **Assembly Instance & Size values** as highlighted in yellow colour.
9. Click “**OK**” to confirm the configuration. Once the OK button is click, Module property window will open automatically because “Open Module Properties” is selected default as highlighted in green colour.

After completion of Generic ethernet module configuration the new module will be available in ethernet tree as shown below picture.





### 3.4 Import PTP\_DRIVES\_FESTO\_EIP AOI in Studio – 5000

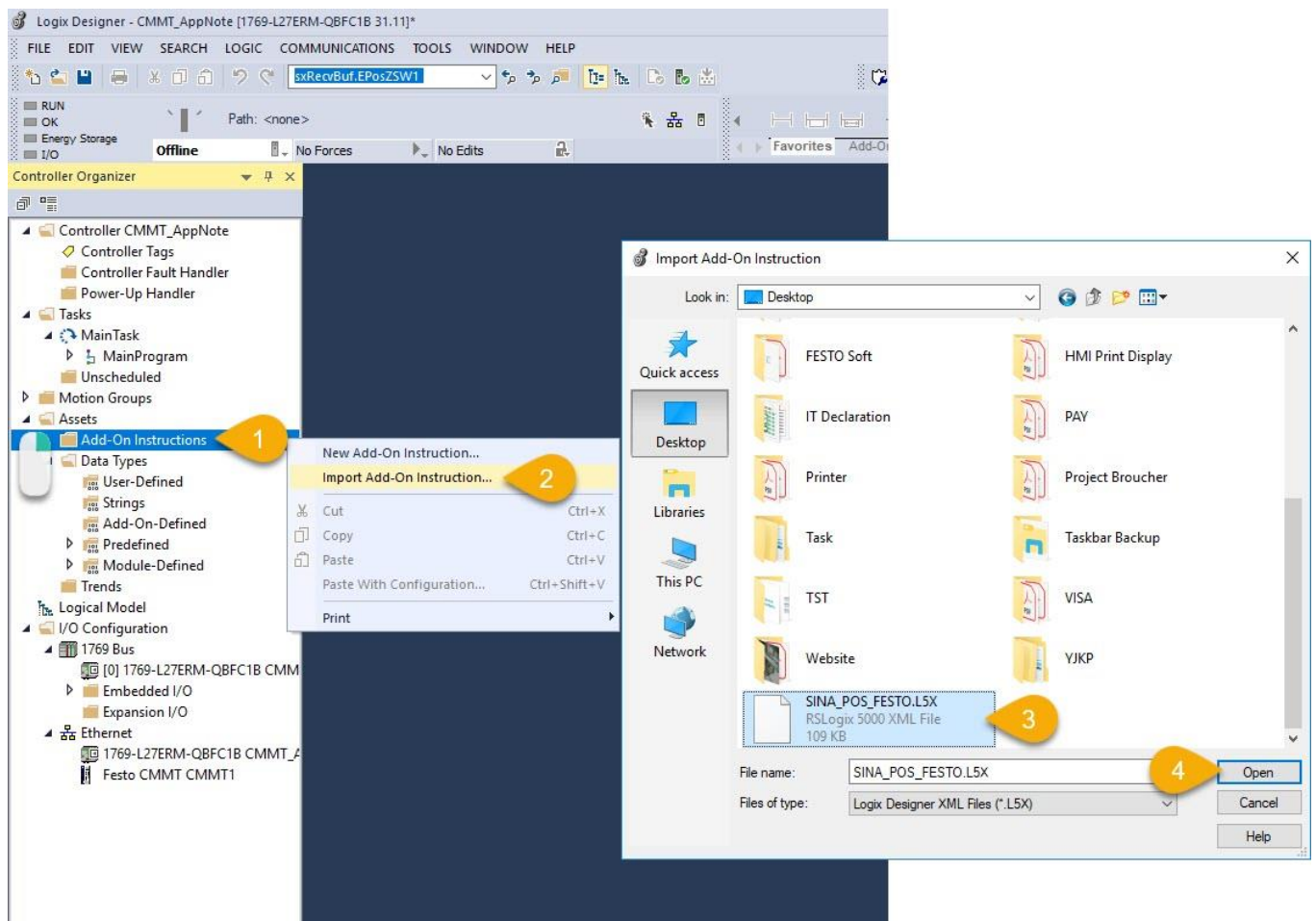
This chapter will describe about importing the PTP\_DRIVES\_FESTO\_EIP AOI file inside the PLC program.



#### Note

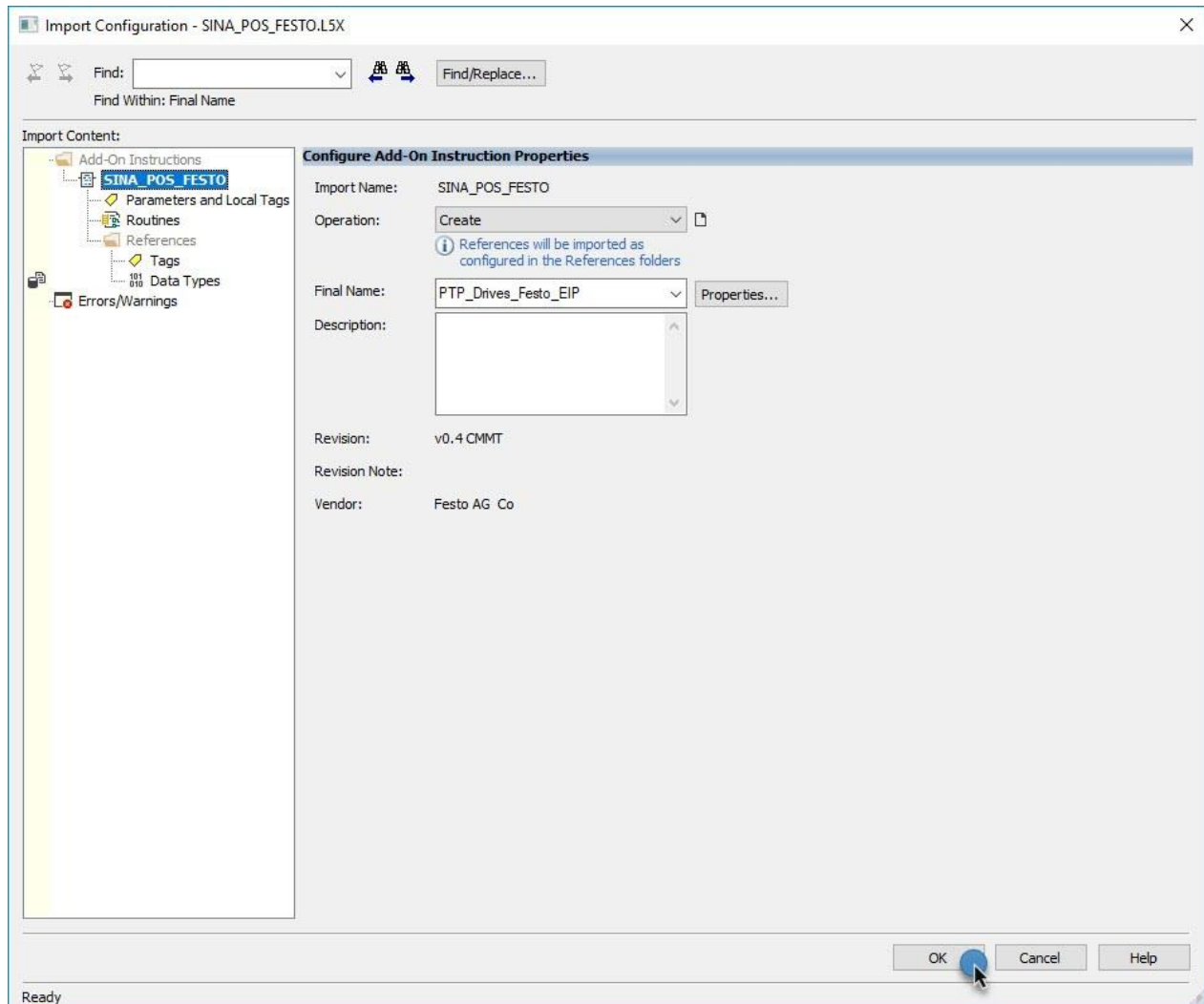
- User can find this AOI file in same folder of this document. Also user can download from FESTO Support portal.

#### Step – 1



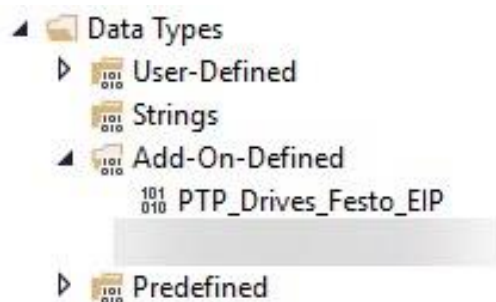
1. Select the **“Add-On Instructions”** folder from **controller organizer > Assets** and right click.
2. Select **“Import Add-On Instruction”** from right click menu.
3. Browse to the **PTP\_DRIVES\_FESTO\_EIP.L5X** export file saved location in workstation and select it.
4. Click **“Open”** button in import add-on instruction window.

## Step – 2



Click **“OK”** button in import configuration window.

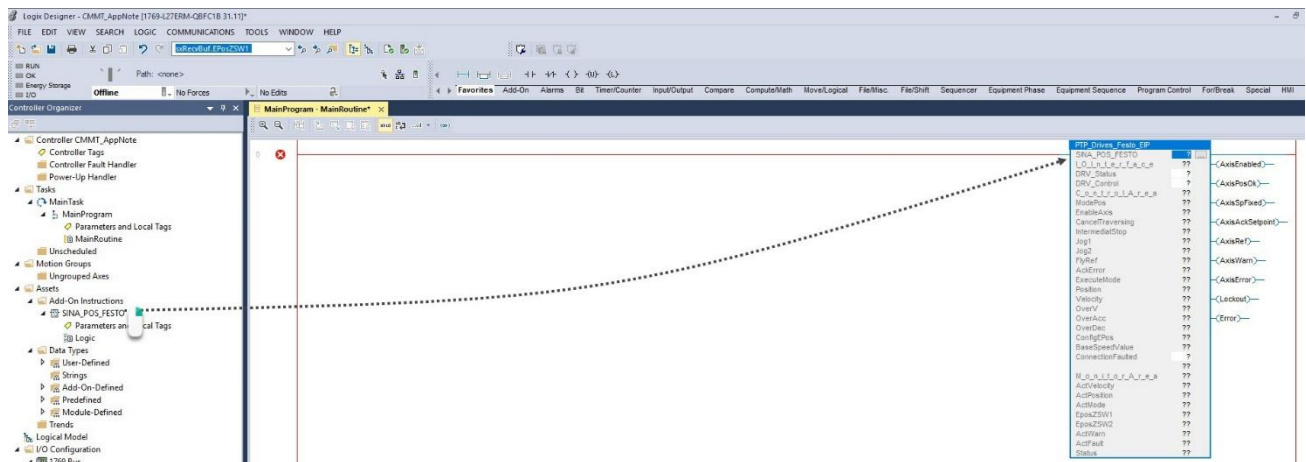
After successful import of AOI new PTP\_DRIVES\_FESTO\_EIP will be displayed in Add-On Instructions folder as shown in below picture.



### 3.5 Add PTP\_DRIVES\_FESTO\_EIP AOI in PLC Program

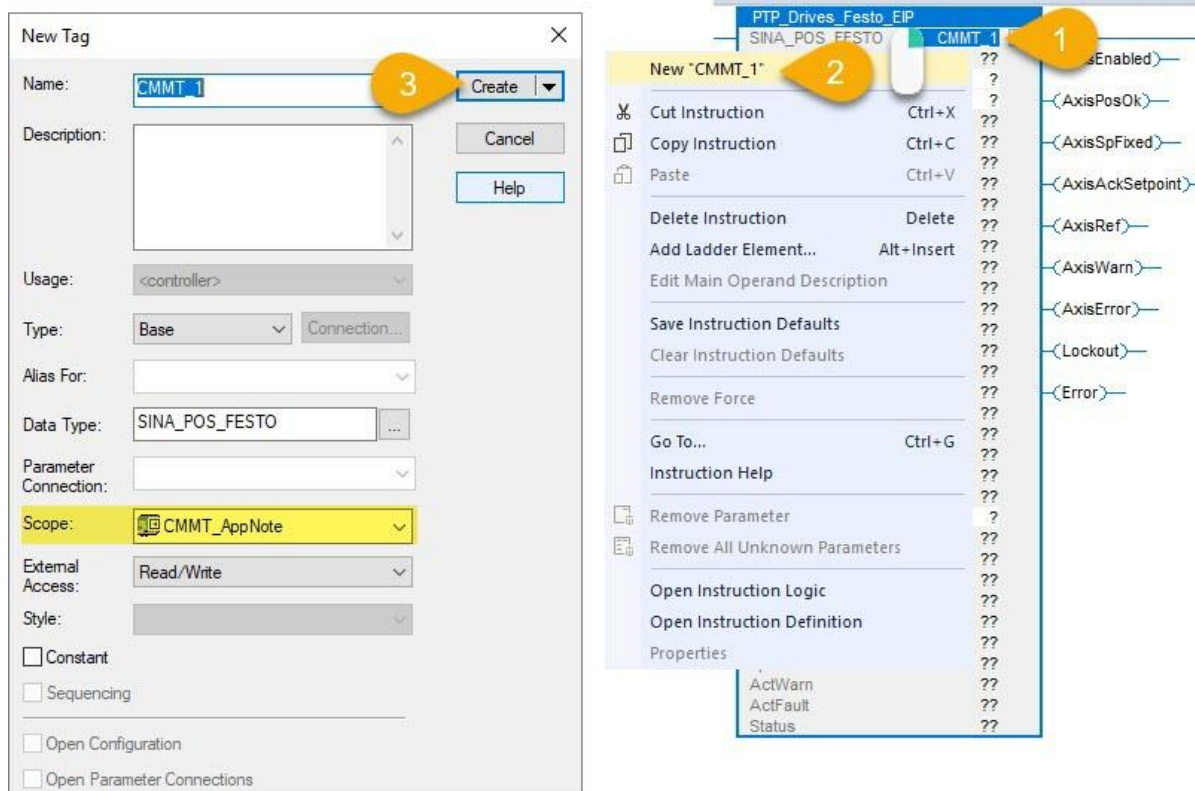
This chapter describes about adding AOI in program & assigning input & output tags.

#### Step – 1



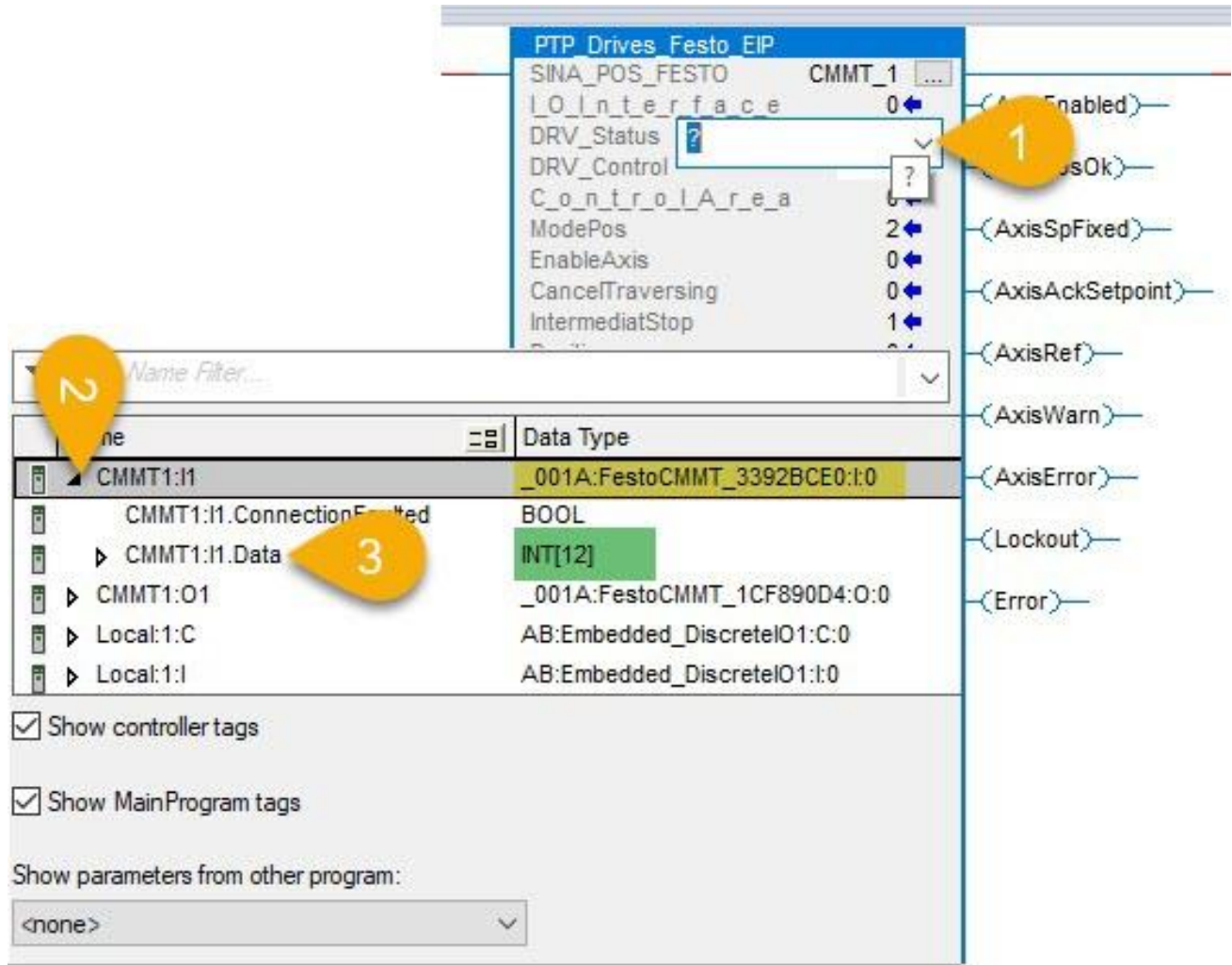
Drag and drop the AOI from Add-On Instruction folder to the empty ladder rung as shown in above image.

#### Step – 2



1. Enter the name of AOI & press enter.
2. Right click the entered name & select the first option “**New ( with tag name )**”.
3. Click “**Create**” button on new tag window to confirm the new tag creation. The yellow highlight indicates tag scope & select global or local scope depend on user program requirement.

### Step – 3



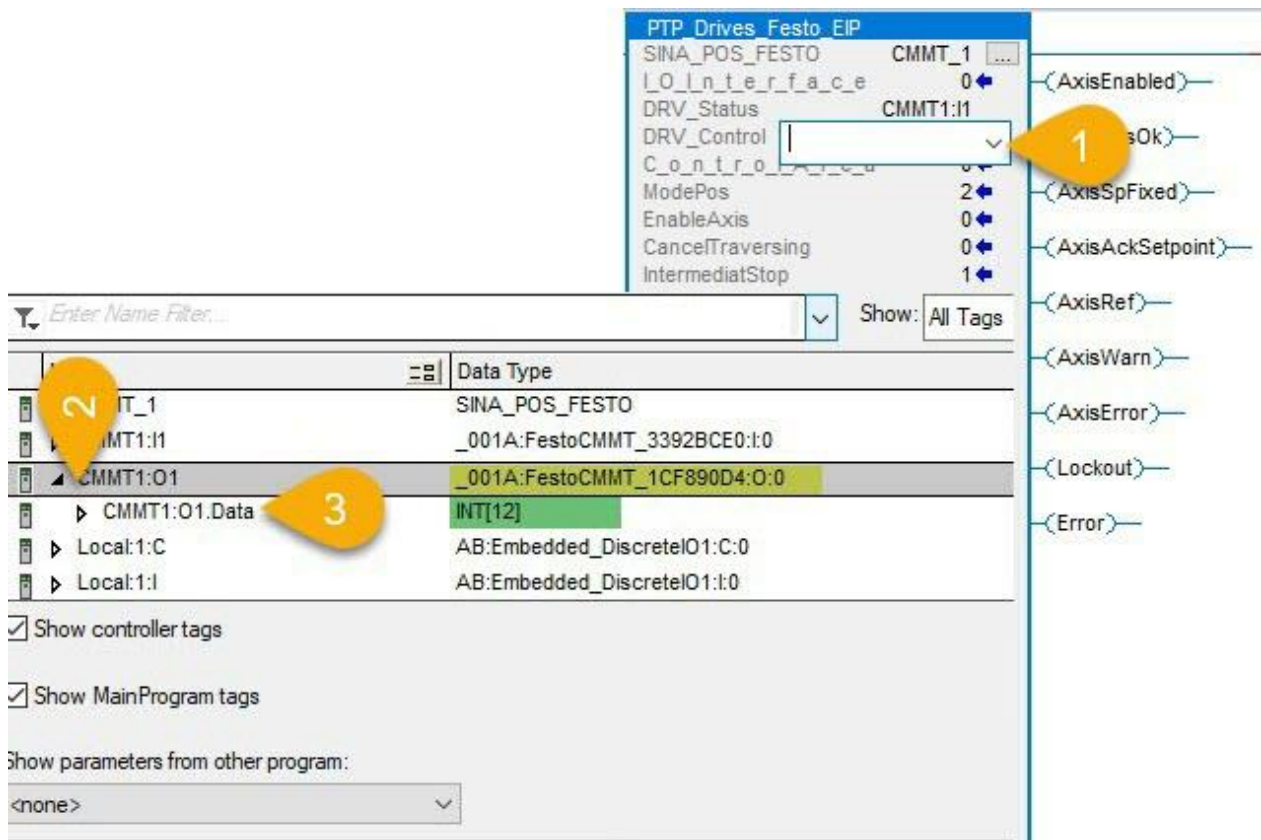
1. Click the drop-down arrow of the “**DRV\_Status**” tag.
2. Select the input tag of the CMMT communication module and click the folder explorer.
3. Select the **INT array with 12 length** from CMMT input structure tag.



#### Note

- The yellow color highlights the data type of the CMMT input tag when EDS file is used as Interface module & green color highlights actual data type of DRV\_Status interface tag. However user must select the tag “**INT Array with 12 length**” in both the cases ( EDS & Generic ).

#### Step – 4



1. Click the drop-down arrow of the “**DRV\_Control**” tag.
2. Select the output tag of the CMMT communication module and click the folder explore.
3. Select the **INT array with 12 length** from CMMT input structure tag & .



#### Note

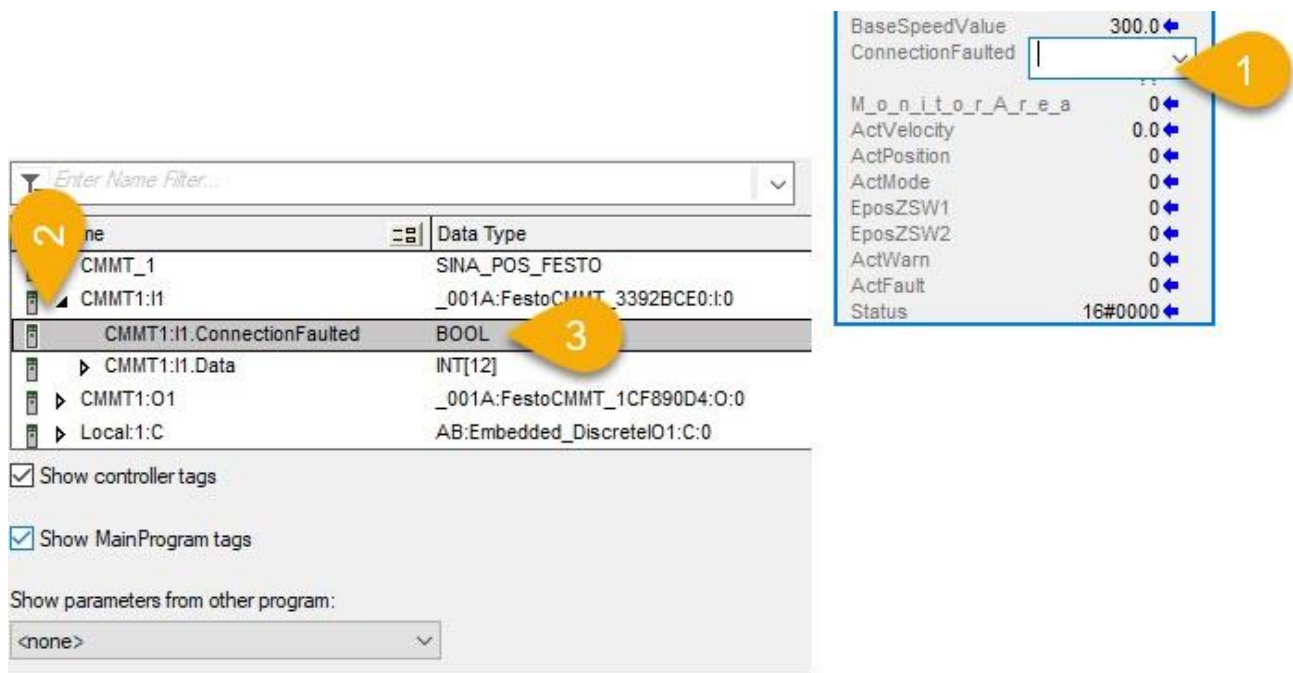
- The yellow color highlights data type of the CMMT output tag when EDS file is used as Interface module & green color highlights actual data type of DRV\_Control interface tag. However user must select the tag “**INT Array with 12 length**” in both the cases ( EDS & Generic ).

After completion of Steps 2 to 4 the preview of AOI looks like below.





## Step – 5



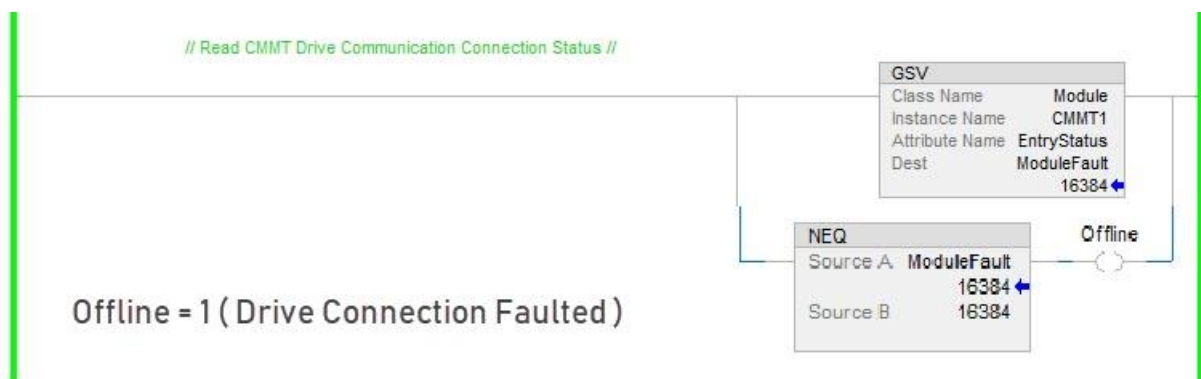
This step describe about tag assigning for connectionFaulted AOI tag.

1. Click the drop-down arrow of “**ConnectionFaulted**” tag to open variable browser window.
2. Select the CMMT input tag & click the explorer folder symbol.
3. Select the “**ConnectionFaulted**” BOOL tag from CMMT input structure to assign.



### Note

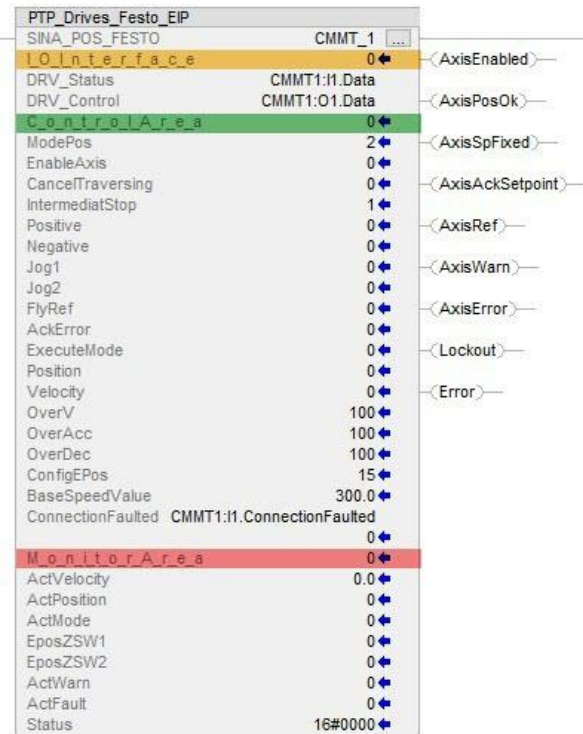
- When using EDS file as communication module ConnectionFaulted tag will be predefined with Input structure of module tags. But when Generic Module is used as interface module user has to write an external logic outside the AOI as shown below & assign that tag (Offline) as interface tag.



## 4 PTP\_DRIVES\_FESTO\_EIP AOI Introduction

This chapter describes about PTP\_DRIVES\_FESTO\_EIP AOI Input, Output tags details & AOI behaviour in different operating modes.

### 4.1 Introduction of PTP\_DRIVES\_FESTO\_EIP AOI



PTP\_DRIVES\_FESTO\_EIP AOI input & output tags are segregated as three different segments which are Hardware Interface tags, Control Area tags & Monitor area tags which are highlighted in orange, green & red colours respectively in the above figure.

Also this AOI is capable to control the drive in following modes

- Relative Position Mode
- Absolute Position Mode
- Go to Home/Reference using Festo Automation Suite Configuration
- Set Home to Current Position
- Traversing/Record Selection Mode
- Jog Mode
- Inching/Incremental Jog Mode.

### 4.2 IO Interface Area Tag Details

Interface Area Tags	Data Type	Function Description
DRV_Status	Array of INT[12]	Drive feedback hardware interface
DRV_Control	Array of INT[12]	Drive control hardware interface

### 4.3 Control Area Tag Details

Control Area Tags	Data Type	Function Description
ModePos	INT	Operating mode selection command 1=MDI Relative Pos. 2=MDI Absolute Pos. 4=Home FAS Config. 5=Home Current Pos. 6=Record Select 7=Jogging 8=Inching
EnableAxis	BOOL	Enable the axis command
CancelTraversing	BOOL	Cancel travel task ( 0 – Cancel Travel ) Ramp Stop @ 100% Set Deceleration Task is Rejected
IntermediatStop	BOOL	Interrupt travel task ( 0 – Interrupt Travel ) Ramp Stop @ Current Deceleration Task is NOT Rejected
Positive	BOOL	Travel positive direction ( 1 – Positive Selected )
Negative	BOOL	Travel negative direction ( 1 – Negative Selected )
Jog1	BOOL	Jog profile – 1 activate command ( 1 – Active ) Jog Negative Direction
Jog2	BOOL	Jog profile – 2 activate command ( 1 – Active ) Jog Positive Direction
FlyRef	BOOL	Select Reference Position ( 1 – Select Position ) Flying Referencing Active
AckError	BOOL	Clear error command ( 1 – Clear error )
ExecuteMode	BOOL	Execute the task ( 1 – Execute )
Position	DINT	Position Target Setpoint or Record table selection in traversing block mode  Position Target Value x FAS=P1.7841.0.0 Factor Group for Position = 10-6 = FAS P1.11280605.0.0 Target Position MDI  Example: Position Target Setpoint= 2500000 x 10 <sup>-6</sup> = 2500.000 mm



Control Area Tags	Data Type	Function Description
Velocity	DINT	<p>Velocity Target Setpoint</p> <p>Velocity in User Units While using MDI (Manual Data Input) Mode</p> <p>Velocity Target Setpoint  <math>\times</math>  FAS=P1.7842.0.0 Factor Group for Velocity = <math>10^{-3}</math>  <math>\times</math>  OverV  FAS=P1.1309.0.0 Velocity Override  =  FAS P1.11280605.0.0 Profile Velocity MDI</p> <p>Example1:  Velocity Target Setpoint = <math>50 \times 10^{-3} = 0.05 \text{ m/s}</math>  Example2:  Velocity Target Setpoint = <math>250 \times 10^{-3} = 0.25 \text{ m/s}</math></p>
OverV	INT	<p>Velocity override in % ( 0 to 199 % )</p> <p>OverV Value = 0-100%</p> <p>FAS=P1.1309.0.0 Velocity Override</p>
OverAcc	INT	<p>Acceleration override in % ( 0 to 100 % )</p> <p>OverAcc Target Value = 0-100%</p> <p><math>\times</math>  FAS P1.11280702.0.0 Base Value Acceleration  =  FAS P1.11280606.0.0 Acceleration MDI</p>
OverDec	INT	<p>Deceleration override in % ( 0 to 100 % )</p> <p>OverDec Target Value = 0-100%</p> <p><math>\times</math>  FAS P1.11280703.0.0 Base Value Deceleration  =  FAS P1.11280607.0.0 Deceleration MDI</p>
ConfigEPos	DINT	<p>Configuration command ( Bit – Granular )</p> <p>See section 4.3.1 for further details</p>
BaseSpeedValue	REAL	Base speed value for actual speed display. Enter the same value given for parameter ( P1.11280701.0.0 )
ConnectionFaulted	BOOL	Communication disconnected acknowledgement for AOI

#### 4.3.1 ConfigEPos Bit Description

ConfigEPos Bits	Function Description
Bit - 0	OFF2 ( Pulse Enable )
Bit - 1	OFF3 ( Pulse Enable )
Bit - 2	Software Limits Enable FAS=P1.112414140.0.0
Bit - 3	Hardware Limits Enable FAS=P1.112414150.0.0
Bit - 4	Probe Edge Evaluation

ConfigEPos Bits	Function Description
Bit - 5	Select Probe
Bit - 6	External Block Change (via BUS)
Bit - 7	-FW Pending - Signal Source Reference Mark
Bit - 8	-FW Pending - Continuous Setpoint Transfer MDI
Bit - 9	- FW Pending - DDS Bit 0
Bit - 10	- FW Pending - DDS Bit 1
Bit - 11	- FW Pending - DDS Bit 2
Bit - 12	- FW Pending - DDS Bit 3
Bit - 13	- FW Pending - DDS Bit 4
Bit - 14	- FW Pending - Parking Axis Selection
Bit - 15	Motor Brake 0=Close 1=Open
Bit - 16 to Bit - 29	Reserved
Bit - 30	STW2.8 Travel to Fixed Stop
Bit - 31	Reserved

#### 4.4 Monitor Area Tag Details

Monitor Area Tags	Data Type	Function Description
AxisEnabled	BOOL	Axis enabled feedback ( 1 – Enabled ) Drive Ready and Switched On/Enabled
AxisPosOk	BOOL	Axis reached target position ( 1 – Reached ) & Motion Complete
AxisSpFixed	BOOL	Setpoint is stationary feedback ( 1 – SP stationary )
AxisAckSetpoint	BOOL	Acknowledge setpoint ( 1 – Ack )
AxisRef	BOOL	Reference/Home is Completed ( 1 – Home Done )
AxisWarn	BOOL	Drive has warning message ( 1 – Warning Active )
AxisError	BOOL	Drive has error message ( 1 – Error Active )
Lockout	BOOL	Switching ON inhibited ( 1 – ON Inhibited )
ActVelocity	REAL	Actual velocity feedback ( Feedback value scaled by base speed value )
ActPosition	DINT	Axis actual position feedback
ActMode	INT	Actual mode selection feedback 1=MDI Relative Pos. 2=MDI Absolute Pos. 4=Home FAS Config. 5=Home Current Pos. 6=Record Select 7=Jogging 8=Inching
EposZSW1	INT	Status of Epos ZSW1 ( Bit – Granular ) See section 4.4.1 for further details

Monitor Area Tags	Data Type	Function Description
EposZSW2	INT	Status of Epos ZSW2 ( Bit – Granular ) See section 4.4.2 for further details
ActWarn	INT	Actual warning number
ActFault	INT	Actual fault number
Error	BOOL	AOI Fault Active
Status	INT	AOI Status Code: For more details refer chapter 4.4.3.

#### 4.4.1 Epos ZSW1 Bit Details

EPos ZSW1 Bits	Function Description
Bit - 0	Position Record Selected Bit 0
Bit - 1	Position Record Selected Bit 1
Bit - 2	Position Record Selected Bit 2
Bit - 3	Position Record Selected Bit 3
Bit - 4	Position Record Selected Bit 4
Bit - 5	Position Record Selected Bit 5
Bit - 6	Position Record Selected Bit 6
Bit - 7	Reserved
Bit - 8	Negative Hardware Limit Switch is Activated
Bit - 9	Positive Hardware Limit Switch is Activated
Bit - 10	Jogging Task is Active
Bit - 11	Homing Task is Active
Bit - 12	- FW Pending - Flying Reference Active
Bit - 13	Position Record Task is Active
Bit - 14	- FW Pending - MDI Setup Active
Bit - 15	MDI Mode is Active

#### 4.4.2 Epos ZSW2 Bit Details

EPos ZSW2 Bits	Function Description
Bit - 0	Tracking Mode Active
Bit - 1	Velocity Limit Active
Bit - 2	Ready to Accept new Setpoint
Bit - 3	- FW Pending - PrintMark OutSide Outer Window
Bit - 4	Axis is Moving Positive
Bit - 5	Axis is Moving Negative
Bit - 6	Negative Software Limit Switch is Activated
Bit - 7	Positive Software Limit Switch is Activated

<b>EPos ZSW2 Bits</b>	<b>Function Description</b>
Bit - 8	Actual Position <= CAM Position 1
Bit - 9	Actual Position <= CAM Position 2
Bit - 10	Direct Output 1 Via Traversing Block
Bit - 11	Direct Output 2 Via Traversing Block
Bit - 12	Fixed STOP Reached
Bit - 13	Fixed STOP Clamping Torque Reached
Bit - 14	Travel to Fixed STOP Active
Bit - 15	Traversing Task Active

#### 4.4.3 Diagnostic Messages

The function block gives multiple types of diagnostic messages. The following chapter will describes how to handle & solve them.

##### Function Block Faults

<b>Status Error Number</b>	<b>Case</b>	<b>Remedy</b>
16#7002	No Error	--
16#8401	Alarm message(s) in the drive	Check the error code in ActFaulted tag
16#8402	Switching ON Inhibited	Check whether axis is parked, Safety functions active & Parameter P10 <> 0
16#8403	- FW Pending - Flying Reference could NOT be Started	Check for pending alarms / faults in the drive
16#8600	Communication Disconnected	Check the communication connections/ setting between drive and PLC
16#8202	Incorrect Operating Mode Selected	Set ModePos tag value between 1 to 8
16#8203	Incorrect parameterization of the override inputs	Check the setting of override inputs
16#8204	Invalid traversing block number	Enter the traversing block number from 0 to 127

## 5 PTP\_DRIVES\_FESTO\_EIP AOI Functions

This chapter describes about the configuration of SIAN\_POS\_FESTO AOI for different operation modes, Enabling & Stopping the axis, Enabling hardware & software position limits as well as Actual speed monitoring.

### 5.1 Axis Enabling & Stopping

For axis enabling following tags must be in below configuration

- OFF2 & OFF3 of tag “**ConfigEPos**” bit 0 & 1 must be TRUE.
- “**AxisError**” & “**Lockout**” feedback tags must be FALSE to ensure drive is in ready state.
- “**ModePos**” value must be between 1 to 8.
- “**CancelTraversing**”(Reject traversing task) & “**IntermediateStop**”(intermediate stop) tags must be TRUE.
- “**EnableAxis**” must be TRUE & “**AxisEnabled**” feedback will goes to TRUE after enable.
- Toggle “**AckError**” control bit to clear any error in AOI.

### 5.2 Axis Software & Hardware Position Limits Enabling

“**ConfigEPOS tag bits 2 & 3**” are used to enable the software & hardware position limits respectively

- “**ConfigEPOS.2 = TRUE**” this means software position limit is active (Festo Automation Suite Parameter P1.112414140.0.0)
- “**ConfigEPos.3 = TRUE**” this means hardware position limit is active (Festo Automation Suite Parameter P1.112414150.0.0)

When software position limit is active please pay attention if the below parameters are configured correctly as per application requirement.

The screenshot shows the 'Axis configuration' window. On the left is a sidebar with the 'Axis' tab selected. The main configuration area includes the following settings:

- Reversing the direction of rotation:** A circular arrow icon and an 'Active' checkbox.
- Axis zero point offset:** A text input field containing '0.03' with a unit 'r'.
- Software limit positions active:** A checked 'Active' checkbox.
- Negative software limit position:** A highlighted yellow text input field containing '-0.03' with a unit 'r'.
- Positive software limit position:** A highlighted yellow text input field containing '999.97' with a unit 'r'.

### 5.3 Axis Actual Speed Monitoring

User can monitor the actual speed of the axis in the variable “**ActVelocity**”. The actual speed of the axis is scaled from 0 to 100% depending on base speed value of parameter number ( P1.11280701.0.0 ). So it is mandatory to feed the same value in input tag “**BaseSpeedValue**” of AOI as like parameter number ( P1.11280701.0.0 ).



#### Note

- Make sure the AOI input tag “**BaseSpeedValue**” & Festo Automation Suite parameter number ( P1.11280701.0.0 ) values are same. AOI will display wrong velocity value If both values are not equal. So enter the same value as given in Chapter-2.5 Step – 3.

## 5.4 AOI Mode of Operation

The PTP\_DRIVES\_FESTO\_EIP AOI will support following modes

- **ModePos – 1:** Relative Positioning
- **ModePos – 2:** Absolute Positioning
- **ModePos – 3:** Not Supported
- **ModePos – 4:** Home/Reference using Festo Automation Suite Configuration
- **ModePos – 5:** Home to Current Position
- **ModePos – 6:** Traversing/Record Select Mode
- **ModePos – 7:** Jog
- **ModePos – 8:** Inching/Incremental Jog Mode

### 5.4.1 Relative Positioning Mode [ModePos – 1]

1. Configuration for Relative Positioning Mode
  - Set the “**ModePos**” value to 1 & check the feedback tag “**ActMode**” has the same value as ModePos.
  - Enable axis by toggling “**EnableAxis**” command tag.
  - Axis must be referenced by toggling “**FlyRef**” command tag. User could also use other modes like mode 4 or 5 to set the reference point for an axis.
  - “**CancelTraversing**” and “**IntermediateStop**” command tags must be in true state.
  - Enter the percentage of Override acceleration, Override deceleration & Override velocity in “**Over-Acc**”, “**OverDec**” & “**OverV**” respective command tags.
  - The status tags “**AxisEnabled**” & “**AxisRef**” must be true. Also status tag “**Error**” must be false.
2. Sequence Command
  - Enter the Position command value in “**Position**” tag & Velocity command value in “**Velocity**” tag. To move axis in forward direction give position command in positive value & for moving axis in reverse direction give position command in negative value.
  - Toggle the “**ExecuteMode**” command tag to start motion task for configured parameter. Rising edge of ExecuteMode tag will start the command. So for every new position command tag want to toggle.
  - If task is successfully completed, it is acknowledge by rising edge of “**AxisPosOk**” status variable. Also if task completed unsuccessfully with an error “**AxisError**” status variable will indicate it by going false to true.
  - “**AxisSpFixed**” Status variable indicates the axis mobility status. If the axis is standby the “**Axis-SpFixed**” status variable will be high.



#### Note

- Refer the Chapter – 4 from the CMMT user manual to know the behavior of the drive in different operation modes.
- The existing running task command can be replaced by new task command only on mode 1 and 2.

### 5.4.2 Absolute Positioning Task [ModePos – 2]

1. Configuration for Absolute Positioning Mode
  - Set the “**ModePos**” value to 2 & check the feedback tag “**ActMode**” has the same value as ModePos.
  - Enable axis by toggling “**EnableAxis**” command tag.
  - Axis must be referenced by toggling “**FlyRef**” command tag. User could also use other modes like mode 4 or 5 to set the reference point for an axis.
  - “**CancelTraversing**” and “**IntermediateStop**” command tags must be in true state.
  - Enter the percentage of Override acceleration, Override deceleration & Override velocity in “**Over-Acc**”, “**OverDec**” & “**OverV**” respective command tags.
  - The status tags “**AxisEnabled**” & “**AxisRef**” must be true. Also status tag “**Error**” must be false.
2. Sequence Command

- Enter the Position command value in “**Position**” tag & Velocity command value in “**Velocity**” tag. Give the absolute position value. The drive will decide forward & reverse direction based on its current position.
- Toggle the “**ExecuteMode**” command tag to start motion task for configured parameter. Rising edge of ExecuteMode tag will take for task start command. So for every new position command tag want to toggle.
- If task is successfully completed, it is acknowledge by rising edge of “**AxisPosOk**” status variable. Also if task completed unsuccessfully with an error “**AxisError**” status variable will indicate it by going false to true.
- “**AxisSpFixed**” Status variable indicates the axis mobility status . If the axis is standby the “**AxisSpFixed**” status variable will be high.



**Note**

- Refer the Chapter – 4 from the CMMT user manual to know the behavior of the drive in different operation modes.
- The existing running task command can be replaced by new task command only on mode 1 and 2.

### 5.4.3 Home/Reference Point using Festo Automation Suite Configuration [ModePos – 4]

The reference point approach mode is used to move axis to home position.

1. Configuration for Reference Point Approach Mode
  - Set the “**ModePos**” value to 4 & check the feedback tag “**ActMode**” has the same value as ModePos.
  - The status tags “**AxisEnabled**” must be true & “**Error**” must be in false to ensure no error.
  - Axis must be in standstill state.
2. Sequence Command
  - All the required parameters for homing will be considered from Automation Suite configuration in “Homing Parameters” like Homing mode, velocity, acceleration & deceleration.
  - Toggle the “**ExecuteMode**” to start task.
  - “**AxisRef**” will become true once the axis finds reference point. If an error occurs during traveling motion, The output signal “**Error**” will become true .



**Note**

- Refer the Chapter – 4 from the CMMT user manual to know the behavior of the drive in different operation modes.

### 5.4.4 Home to Current Position [ModePos – 5]

This mode marks current position as reference point. This will be used when homing mode is selected as current position(37).

1. Configuration for Set Reference Point Mode
  - Set the “**ModePos**” value to 5 & check the feedback tag “**ActMode**” has the same value as ModePos.
  - The status tags “**AxisEnabled**” must be true & “**Error**” must be in false to ensure no error.
  - Axis must be in standstill state.
2. Sequence Command
  - Toggle the “**ExecuteMode**” to start task.
  - “**AxisRef**” will become true after execute command. If an error occurs, The output signal “**Error**” will be true.

**Note**

- Refer the Chapter – 4 from the CMMT user manual to know the behavior of the drive in different operation modes.

#### 5.4.5 Traversing/Record Selection Mode [ModePos – 6]

Traversing Block mode is implemented via the “Recode Table” of drive function. This mode retrieves parameters like Velocity, Position, Acceleration & Deceleration values from record table saved in the CMMT drive. It enables the creation of automatic programs, velocity mode, force mode, travel to fixed stop and outputs to be set and reset.

1. Configuration for Traversing Block Mode
  - Set the “**ModePos**” value to 6 & check the feedback tag “**ActMode**” has the same value as ModePos.
  - Enable axis by toggling “**EnableAxis**” command tag.
  - Axis must be reference by toggling “**FlyRef**” command tag.
  - “**CancelTraversing**” and “**IntermediateStop**” command tags must be in true state.
  - Enter the percentage of Override acceleration, Override deceleration & Override velocity in “**OverAcc**”, “**OverDec**” & “**OverV**” respective command tags.
  - The status tags “**AxisEnabled**” & “**AxisRef**” must be true. Also status tag “**Error**” must be false.
2. Sequence Command
  - Select the record table by entering the table number in “**Position**” command tag. The value must be between 0 to 127.
  - Toggle the “**ExecuteMode**” to start task.
  - If task is successfully completed, it is acknowledge by rising edge of “**AxisPosOk**” status variable. Also if task completed unsuccessfully with an error “**AxisError**” status variable will indicate it by going false to true.
  - “**AxisSpFixed**” Status variable indicates the axis mobility status . If the axis is standby the “**AxisSpFixed**” status variable will be high.

**Note**

- Refer the Chapter – 4 from the CMMT user manual to know the behavior of the drive in different operation modes.

#### 5.4.6 Jog Mode [ModePos – 7]

1. Configuration for Jog Mode
  - Set the “**ModePos**” value to 7 & check the feedback tag “**ActMode**” has the same value as ModePos.
  - Enable axis by toggling “**EnableAxis**” command tag.
  - Axis must be in standstill .
  - Velocity, Acceleration & Jerk values are taken from Automation Suite configuration under jog mode tab.
2. Sequence Command
  - “**Jog1**” & “**Jog2**” tags are used for Positive & Negative direction commands respectively.
  - The “ExecuteMode” signal is not required for jog mode.

**Note**

- Refer the Chapter – 4 from the CMMT user manual to know the behavior of the drive in different operation modes.



#### 5.4.7 Inching/Incremental Jog Mode [ModePos – 8]

Incremental jog mode will not work like ordinary jog mode. It will rotate the axis step by step forward or reverse based on direction selection, But ordinary jog mode rotates the axis continuously. All the configuration and command configurations are same as ModePos – 7 but only different is ModePos must select as 8 to choose incremental jog mode.



##### Note

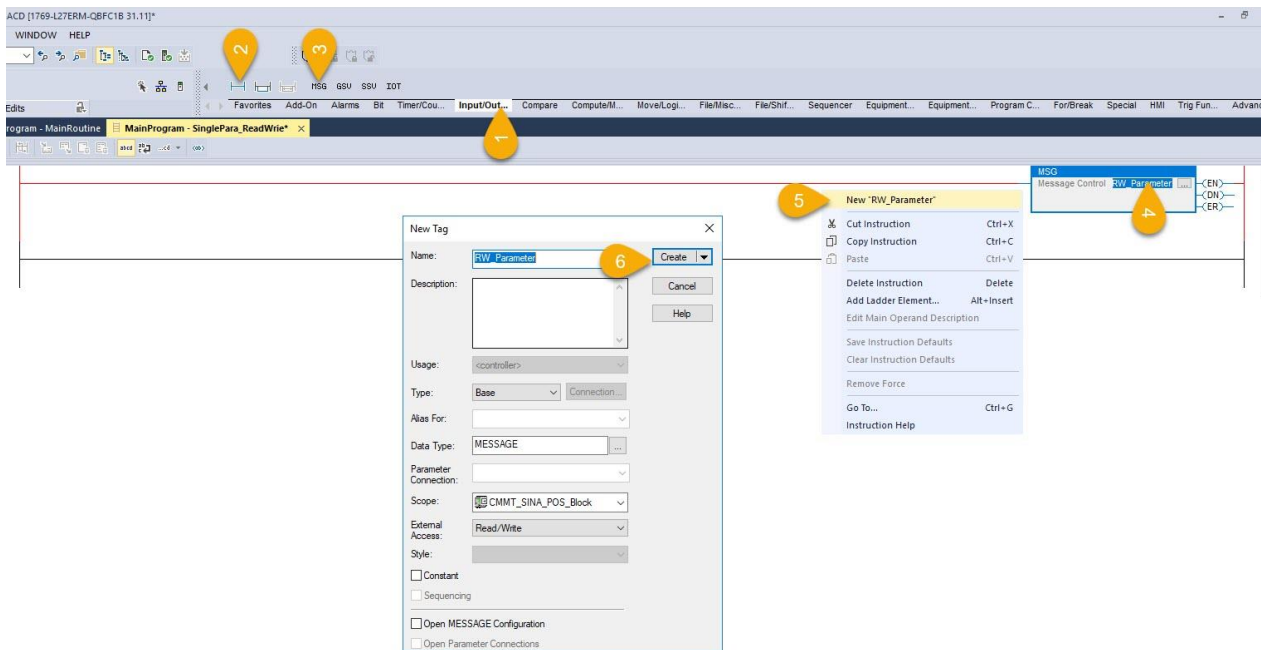
- The inching distance of positive & negative direction will be based on values set in parameters Relative Position Jog1 ( P1.214530.0.0) & Relative Position Jog2 ( P1.214538.0.0) respectively.

## 6 Single Parameter Read/Write

This chapter describes about read & write a single parameter in FESTO CMMT drive from Allen-Bradley PLC through EtherNet/IP network. Also detail explanation is given for Message instruction configuration in Studio-5000.

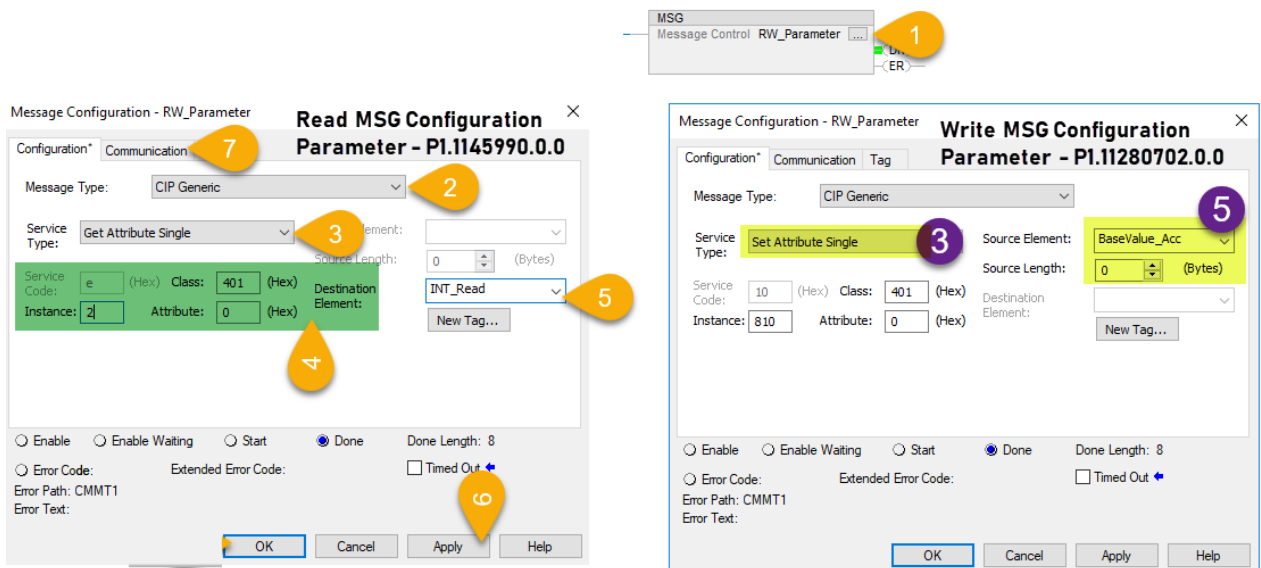
### 6.1 Message Instruction Configuration for Read or Write a Single Parameter

#### Step – 1



1. Go to “**Input/Output**” instruction tab in instruction pallet
2. Select create new rung button, Now user can see the new rung in red colour as shown in above picture.
3. Select “**MSG**” button to create new message instruction in rung.
4. Enter the tag name of the message instruction & right click.
5. Select “**New**” option from the right click menu.
6. Select “**Create**” button from new tag menu.

#### Step – 2



1. Click the **“browse”** button of the MSG instruction.
2. Set the **“Message Type”** as **“CIP Generic”**.
3. Set the **“Service Type”** as **“Get Attribute Single”** for Read Data & set **“Set Attribute Single”** for write data.
4. Enter the **Class (Always 401)**, Instance & Attribute value of the parameter. This value is common for both read & write message instruction. **Refer the PNUs Reference List table (Page No: 926) from CMMT drive user manual** to discover the Instance & Attribute values of each parameters. Below picture illustrate the identification tip.

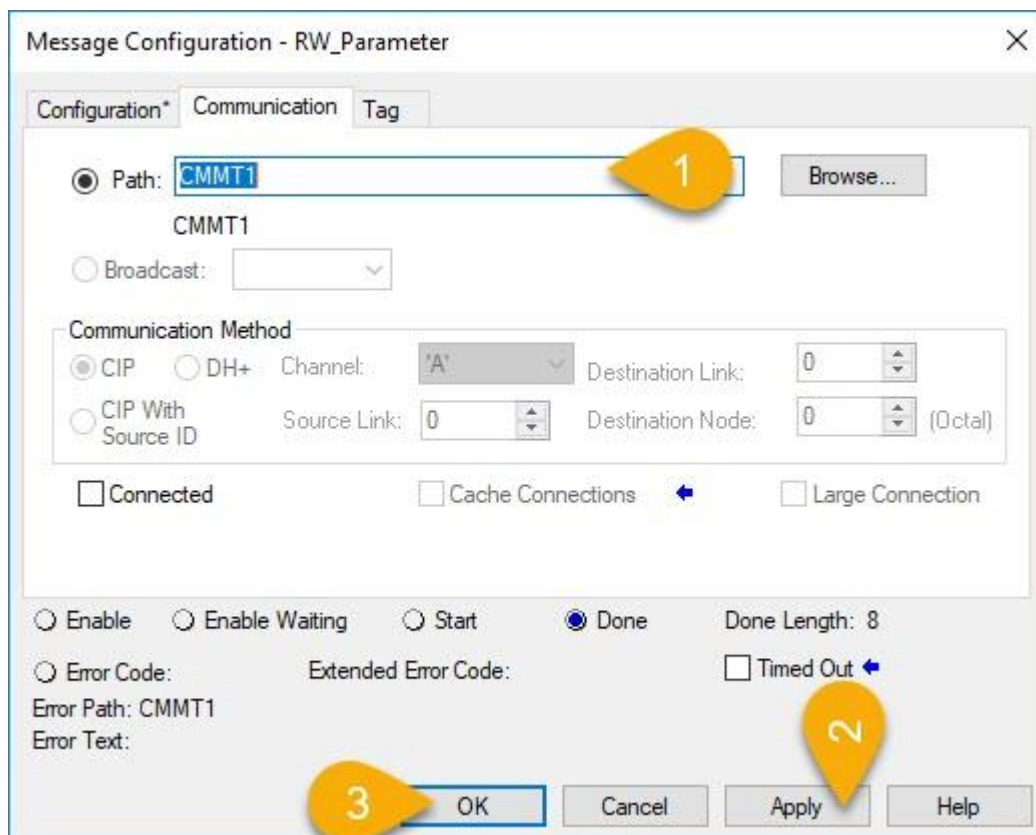
PNU	Name	Data type	Access	Parameter
<b>Profile specific parameters</b>				
847.0 ... 63	Warning number	Unsigned16	ro	P1.11280042.0-.0 ... 63

Whole Number Part of PNU Value is the "Instance" Value

Fractional Part of PNU Value is Attribute Value of MSG Instruction. If Attribute Value is an Array like (0..63) Enter the Array Element Number as

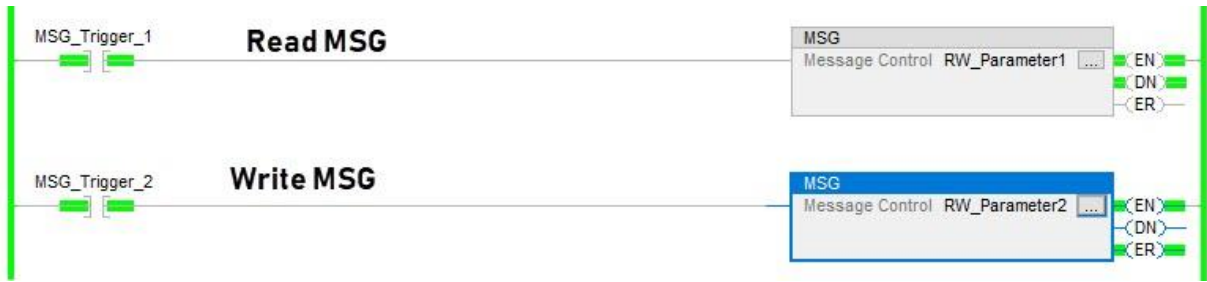
5. Assign the variables for read and write. For **reading a parameter**, variable must be assigned in **destination elements** of the MSG instruction with its corresponding data type and length & For **writing a parameter**, variable must be assign in **source elements** of the MSG instruction with its corresponding data type & length. Also specify the length of the write elements in **“Source Length”** tab of the MSG instruction.
6. Click **‘Apply’** button to confirm the configuration.
7. Click the **“Communication”** tab to configure the communication path of the MSG instruction.

### Step – 3



1. Click **“Browse”** button and select the communication interface module of CMMT drive.
2. Click **“Apply”** button to confirm the communication path.
3. Click **“OK”** button to confirm & close the MSG instruction configuration window.

#### Step – 4



Here is a sample code to trigger MSG instruction to read and write the parameters from CMMT drive.

After trigger command if MSG instruction is executed successfully then Done bit (DN) of the MSG will be True and Error bit (ER) will be False as like Read MSG rung. When MSG unsuccessful the Error bit (ER) will become true & Done bit (DN) become false as like Write MSG rung.



#### Note

- Parameter Read/Write logic works with CMMT drive Firmware Version V17.05.0 and above.