

### **CMMT Library for Emerson DeltaV using EtherNet/IP**

This application note gives detailed explanation of the library and sample project for Festo Servo Drive CMMT with Emerson DeltaV using EtherNet/IP.

CMMT-AS

CMMT-ST

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# 1 Introduction

This application note explains how to integrate the Festo Servo Drive CMMT with Emerson DeltaV using EtherNet/IP protocol. Integration and function blocks are available for Telegram 1 (Basic Velocity Control) and Telegram 111 (Position Control).

The CMMT-AS servo drive is used as an example. But the configuration in DeltaV will remain same for CMMT-ST servo drive with EtherNet/IP.

Similarly, PK controller is used in the example. The PDT, LDT and signal configuration for EIOC will remain same. The signal configuration in VIM2 needs to be matched accordingly.

The application note has the description for the following:

- Festo Automation Suite
  - Field bus communication settings
  - Axis Configuration
- Emerson DeltaV (PK Controller)
  - EtherNet/IP communication settings in DeltaV Explorer.
  - Input and Output configuration of CMMT in DeltaV Explorer.
  - Integration of Festo CMMT DeltaV library in DeltaV Explorer and Graphics Studio.
  - Description on the working of each element in the Festo CMMT DeltaV library.
  - Sample project to demonstrate different CMMT modes.

## 1.1 Hardware & Software Requirements

| Type/Name               | Version Software/Firmware |
|-------------------------|---------------------------|
| Emerson DeltaV          | v15.FP3 Build 9405        |
| Festo Automation Suite  | v2.11.0.657               |
| CMMT-AS Plug-in for FAS | v2.11.1.7                 |

Table 1.1: Software used

| Type/Name                    | Model/Firmware |
|------------------------------|----------------|
| CMMT-AS-C4-3A-MP-S1          | V36.12.0.133   |
| EMMT-AS-60-S-LS-RMB          | -              |
| Simplex PK100 Controller     | 15.3.0.9408.xr |
| Netgear GS308 Network Switch | v3             |

Table 1.2: Hardware used

## 1.2 System Architecture

The following system architecture is used in the sample project and uses EtherNet/IP for communication between Festo Servo Drive CMMT-AS and Emerson PK controller:

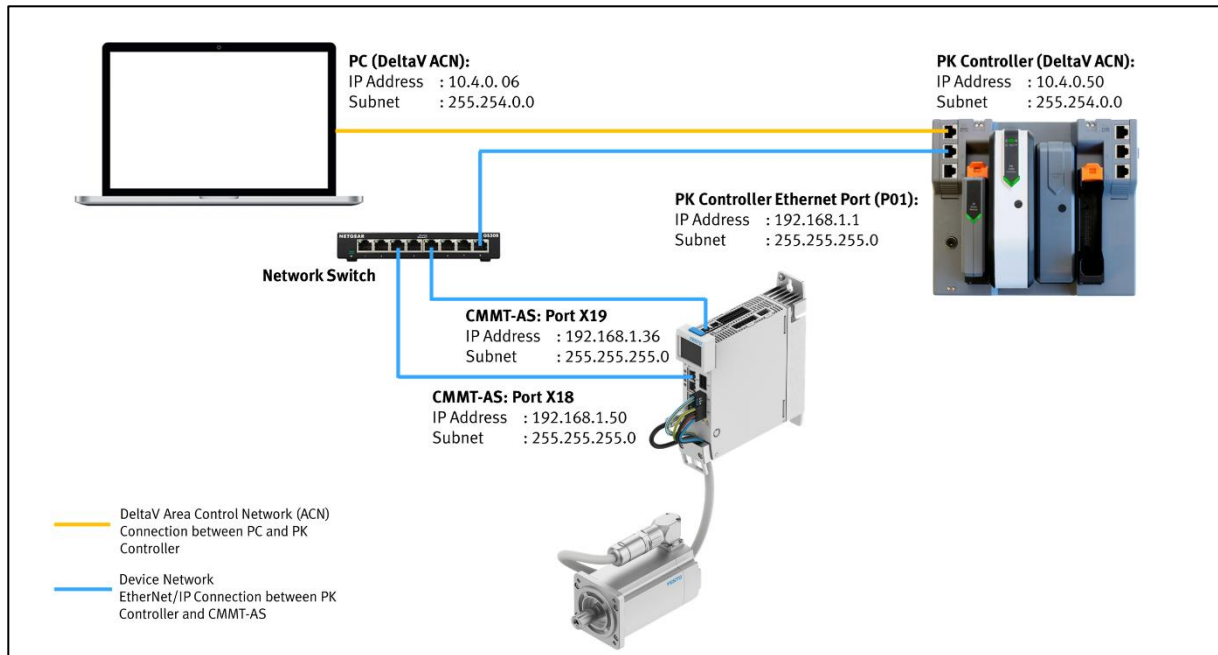
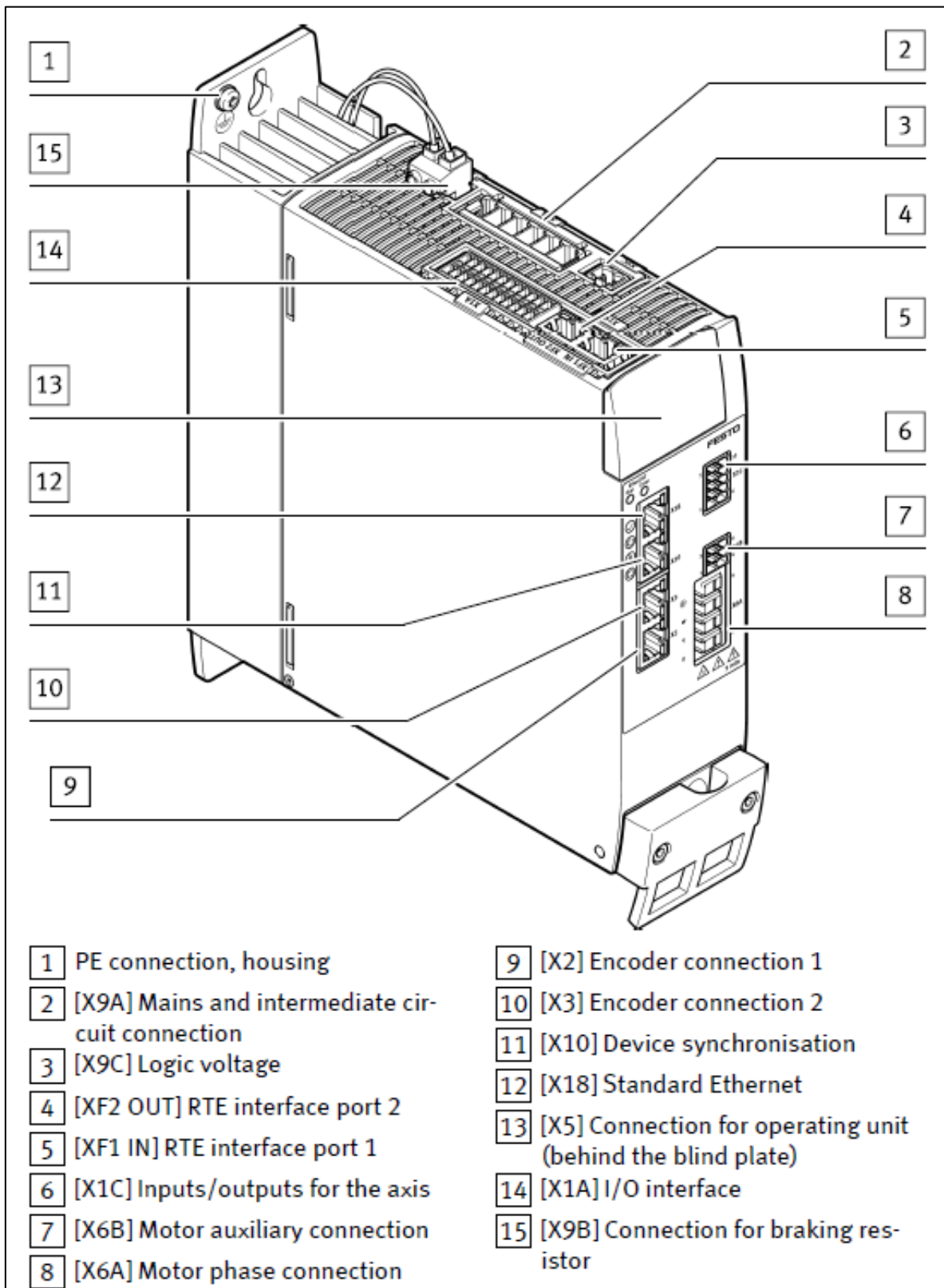


Figure 1-1 System Architecture

### 1.3 Hardware Overview of CMMT-AS Servo Drive



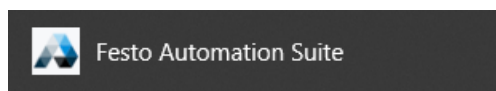
## 2 CMMT Servo Drive Configuration

### 2.1 CMMT-AS Servo Drive Plug-in

This chapter describes the procedure for installing the CMMT-AS Plug-in in Festo Automation Suite. The plug-in is required for parameterization and operation of the CMMT-AS device from Festo Automation Suite.

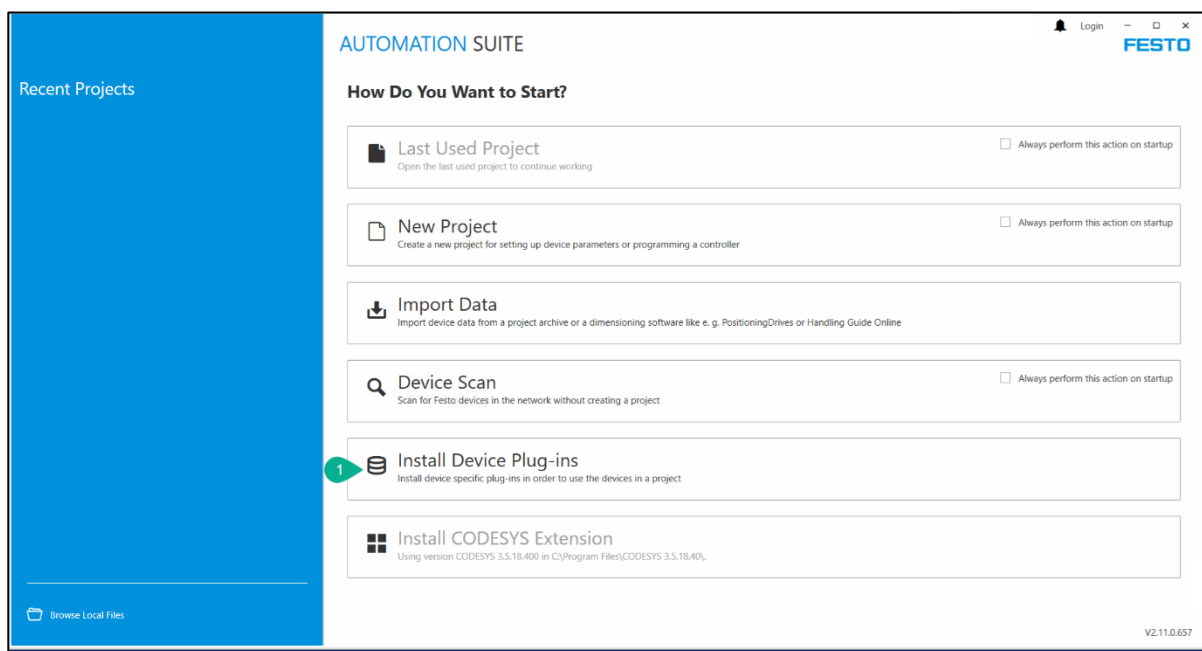
#### **Step 1:**

Open **Festo Automation Suite** software (Windows Start >> Festo Software >> Festo Automation Suite).

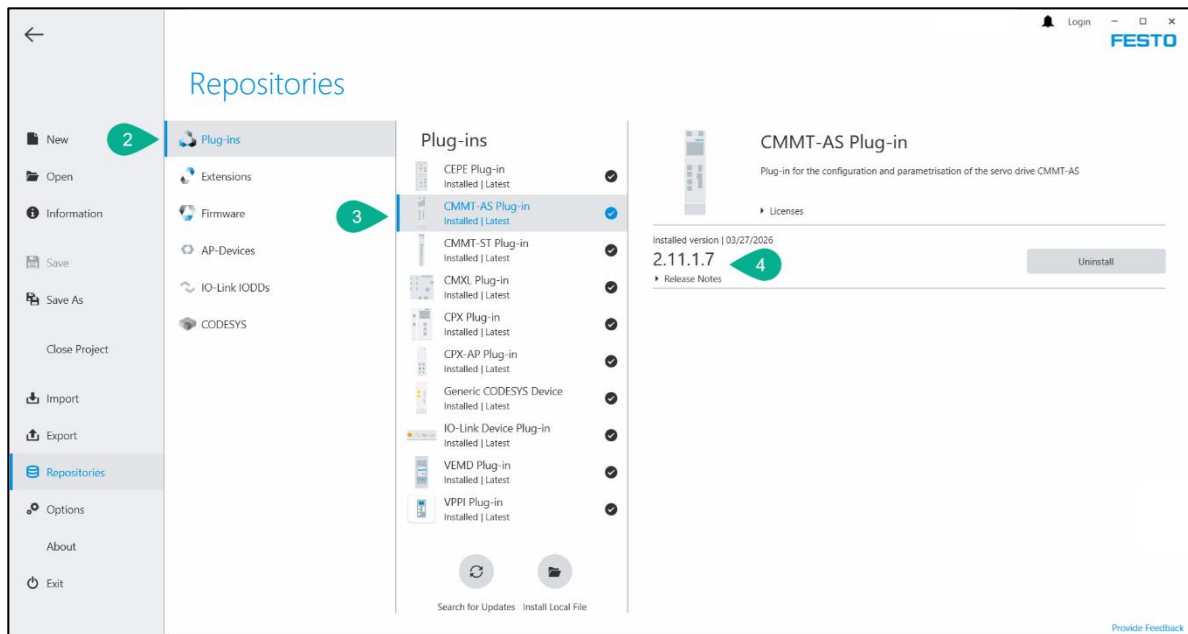


#### **Step 2:**

You need to install the CMMT-AS plug-in to connect, parameterize and operate your CMMT-AS device from Festo Automation Suite.



1. Click on **Install Device Plug-ins**. FAS will navigate to the **Repositories** page.



2. Click on **Plug-ins**.
3. Click on **CMMT-AS Plug-in**.
4. Install the latest available plug-in for CMMT-AS.

## 2.2 IP Address Configuration of CMMT Port X18

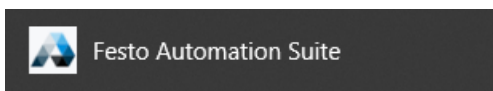
It is recommended to use “XF1 IN” of port X19 for controlling the CMMT using DeltaV. The IP address for port X19 needs to be set through fieldbus parameterization option in FAS CMMT plug-in (Step 5 of Section 2.3.2). This chapter describes about IP address configuration of CMMT servo drive port X18 using Festo Automation Suite.



### Note

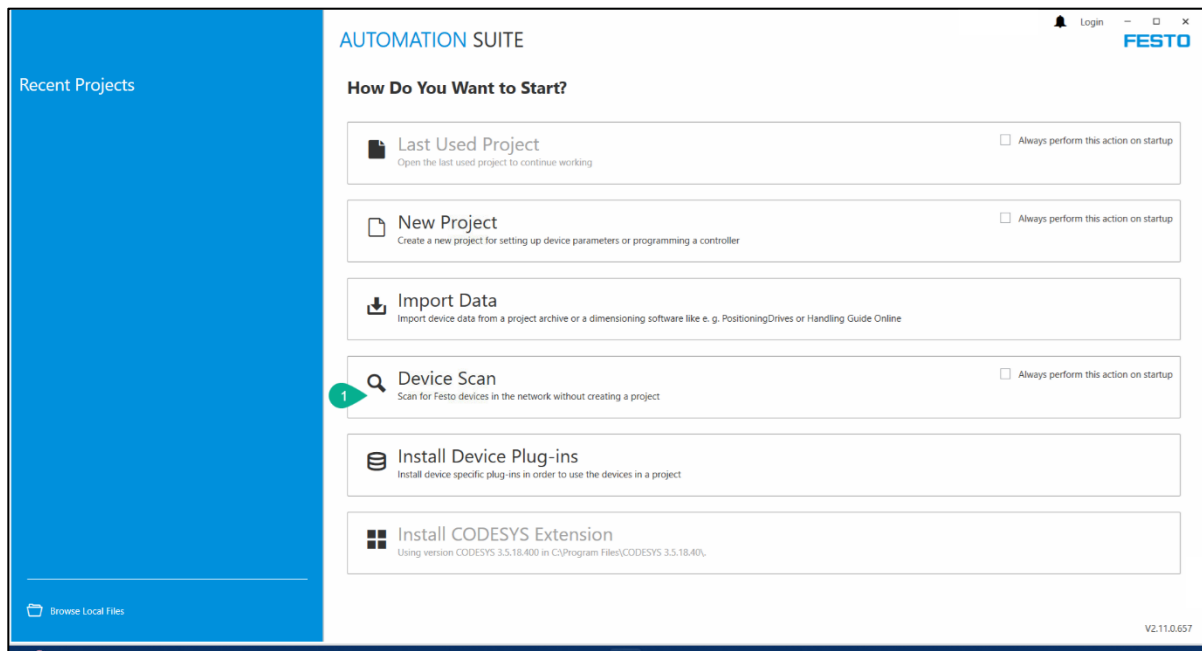
1. Before beginning the CMMT port X18 IP address configuration procedure, ensure that the hardware connection between the PC and the servo drive has been made as per your system architecture.

### Step 1



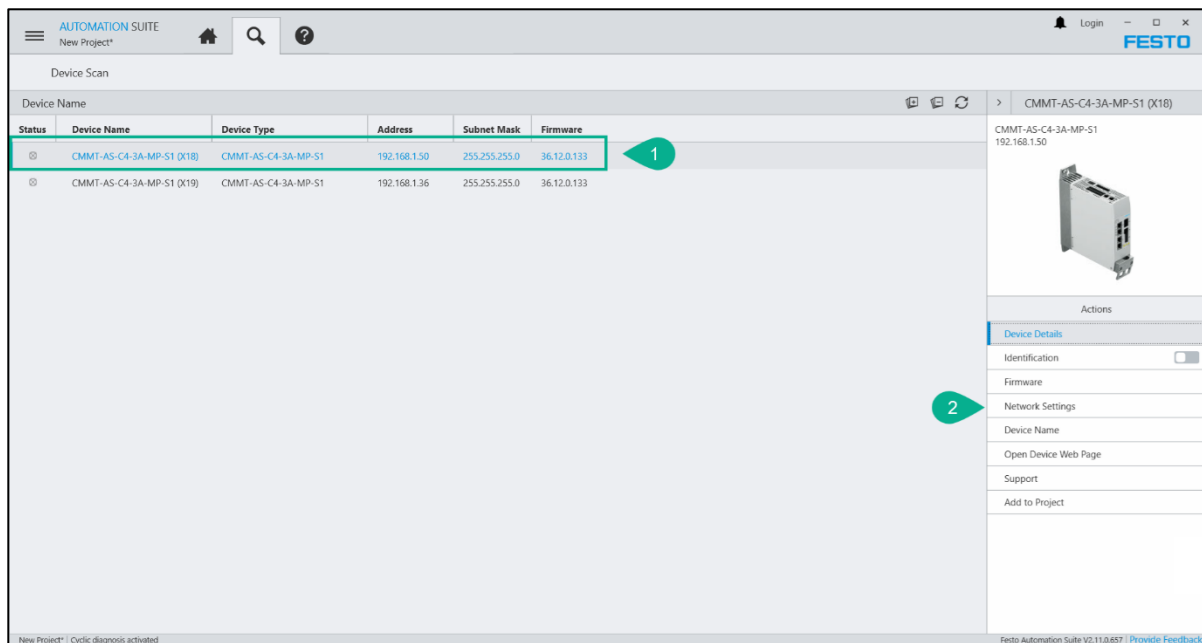
1. Open **Festo Automation Suite** software (Windows Start >> Festo Software >> Festo Automation Suite).

## Step 2

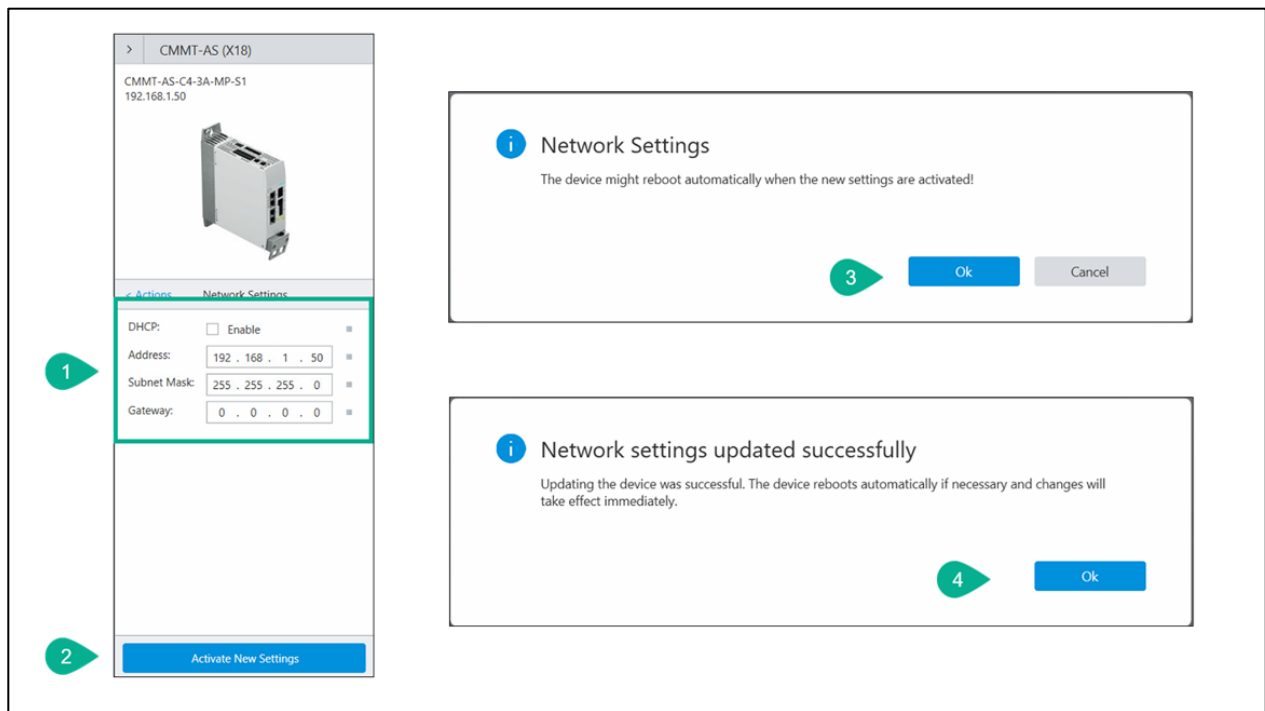


1. Click on **Device Scan** button from toolbar.

## Step 3



1. Select correct device by its name with extension "X18".
2. Click on Network Settings from action window.

**Step 4**

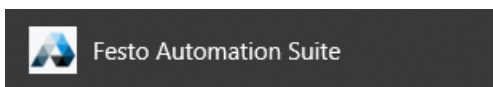
1. Uncheck the DHCP enable, Enter the new IP Address & Subnet Mask as per local network.
2. Click “Activate New Settings” to update the changes.
3. Click “OK” to confirm the change of “Network Settings”.
4. Click “OK” to confirm.

**2.3 CMMT-AS Servo Drive Fundamental Configuration****2.3.1 Servo Drive Selection**

➔

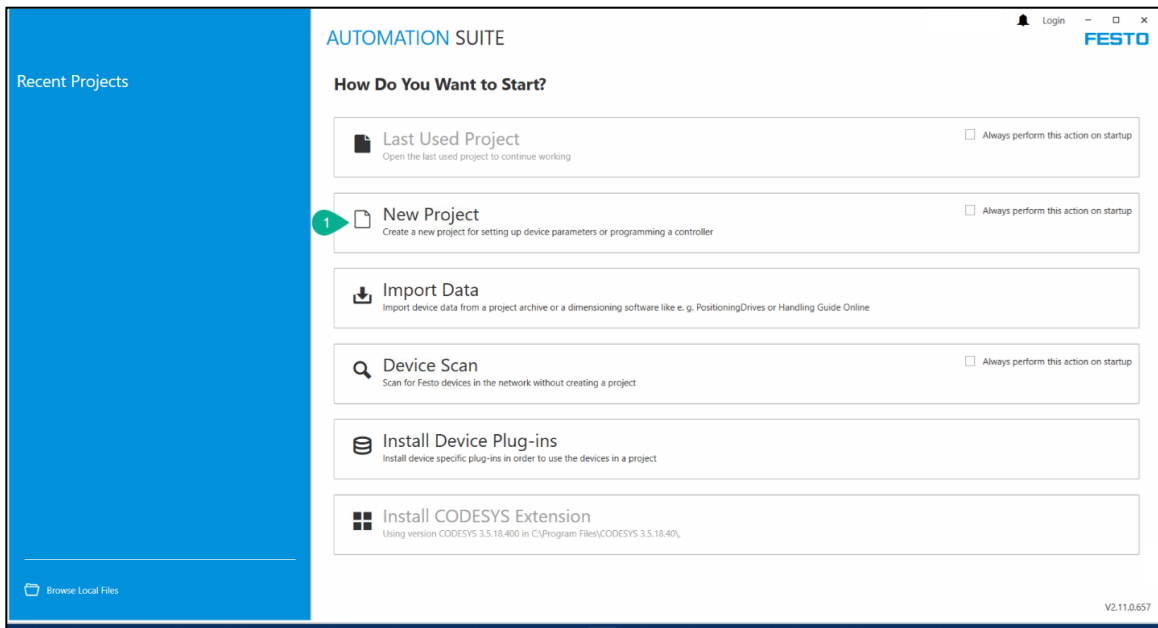
**Note**

- Follow the steps 1 to 4 if drive is not connected to FAS.
- If drive is connected with PC as shown in Chapter 1.2, click Device scan from home as mentioned in Chapter 2.2 Step 2, and skip to Step 4.

**Step 1**

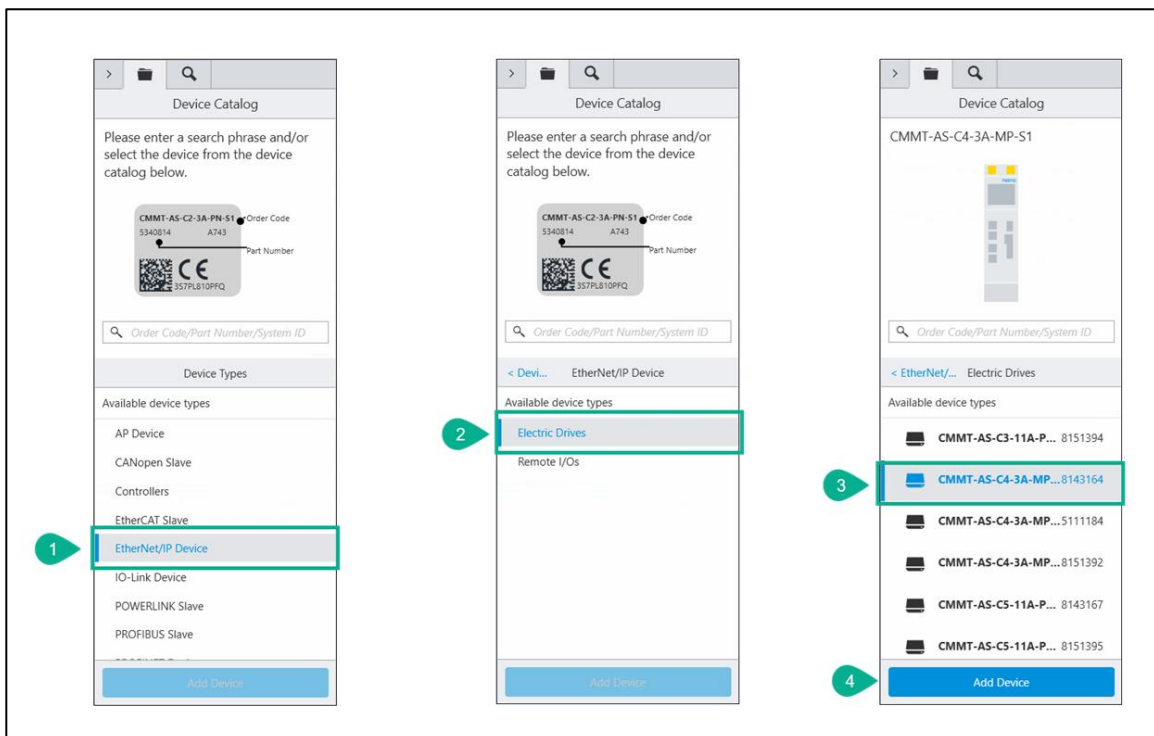
1. Open **Festo Automation Suite** software (Windows Start >> Festo Software >> Festo Automation Suite).

## Step 2



1. Click on “New Project” from the start-up menu.

## Step 3



2. Click on “Ethernet/IP Device” in the device catalog.
3. Select “Electric Drives”.
4. Select correct drive “Part Number” from electric drives list or enter either the “Part Number or Order Code” as shown above image in “Search Box”. We have used “CMMT-AS-C4-3A-MP-S1” as an example for this application note.
5. After selecting the drive click on “Add Device”.

**Step 4**

The screenshot shows the FESTO AUTOMATION SUITE interface during a device scan. The main window displays a table of discovered devices with columns for Status, Device Name, Device Type, Address, Subnet Mask, and Firmware. Two devices are listed, both of type CMMT-AS-C4-3A-MP-S1. The first device has IP 192.168.1.50 and the second has IP 192.168.1.36. A progress bar at the bottom indicates the status of the device initialization process, with steps labeled 1 through 6. A sidebar on the right shows the details for the selected device, including its name, IP address, and a list of actions. The 'Add to Project' button is highlighted with a green circle and the number 2.

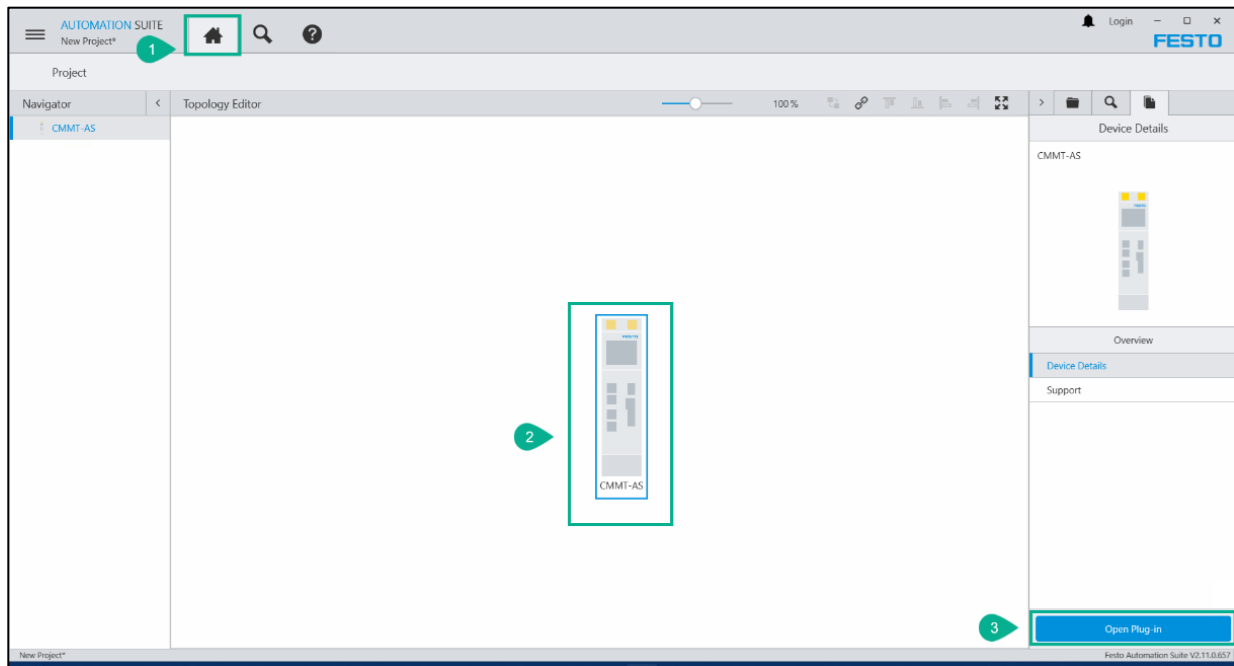
| Status | Device Name               | Device Type         | Address      | Subnet Mask   | Firmware    |
|--------|---------------------------|---------------------|--------------|---------------|-------------|
| ⊗      | CMMT-AS-C4-3A-MP-S1 (X18) | CMMT-AS-C4-3A-MP-S1 | 192.168.1.50 | 255.255.255.0 | 36.12.0.133 |
| ⊗      | CMMT-AS-C4-3A-MP-S1 (X19) | CMMT-AS-C4-3A-MP-S1 | 192.168.1.36 | 255.255.255.0 | 36.12.0.133 |

Progress Bar Steps:

1. Select the correct device based on its configured name & IP address.
2. Click "Add to Project".
3. Device Plug-in initialization will start.
4. Device initializing will start.
5. Once Plug-in and device are initialized, device will start to import the description data.
6. Once device is imported click on "OK" to confirm the successful device import.

1. Select the correct device based on its configured name & IP address.
2. Click "Add to Project".
3. Device Plug-in initialization will start.
4. Device initializing will start.
5. Once Plug-in and device are initialized, device will start to import the description data.
6. Once device is imported click on "OK" to confirm the successful device import.

## Step 5



1. Go to “Project” tab.
2. Double click on the newly added drive to initialize configuration parameters.
3. Alternately you can click on the drive and then click on “Open Plug-in” to initialize configuration parameters.

### 2.3.2 Linear Axis Configuration

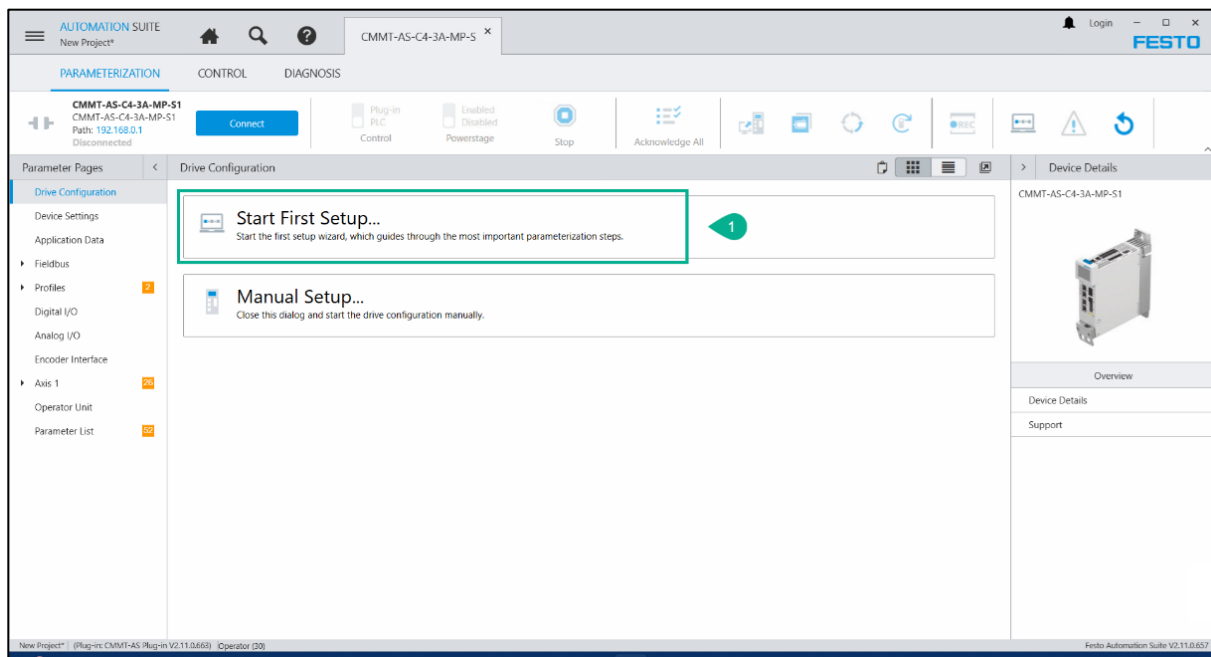


#### Note

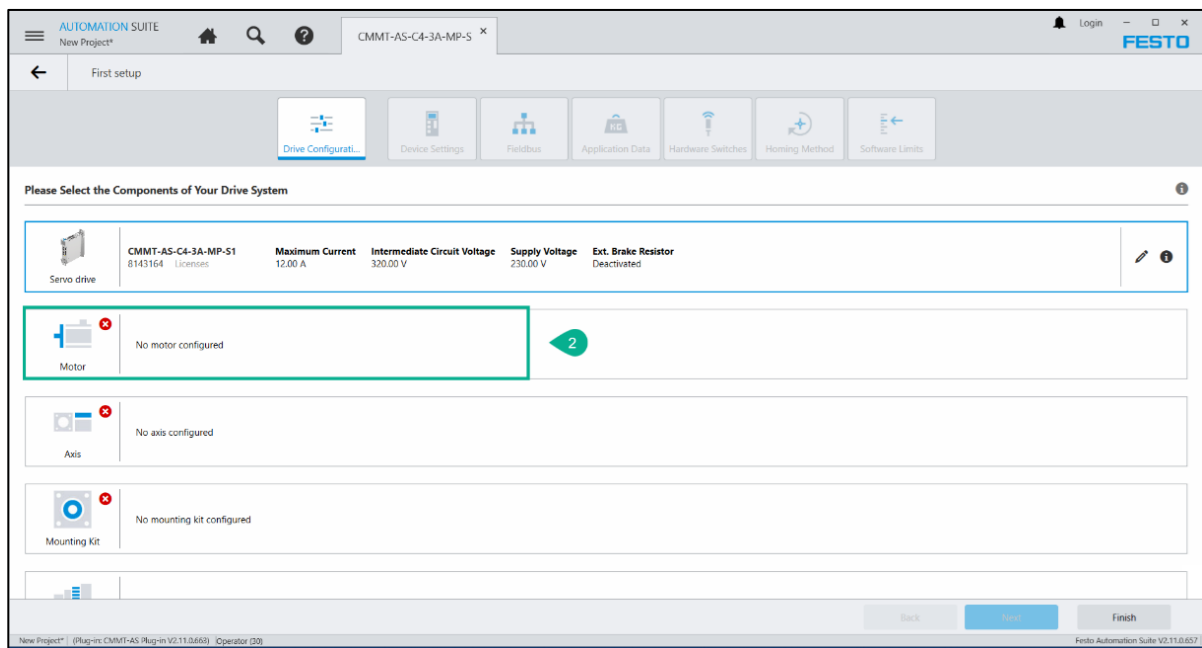
- If the user is looking for Rotary Axis configuration skip this chapter and jump to Section 2.3.3.
- Only Position Control (Telegram 111) is recommended to be used with Linear Axis since Telegram 1 needs to be operated with unlimited axis, i.e., no software position limits.

This section describes the parameterization of the CMMT drive for a linear axis to move 100 mm stroke length with 0.50 m/s as base velocity and current position as homing mode.

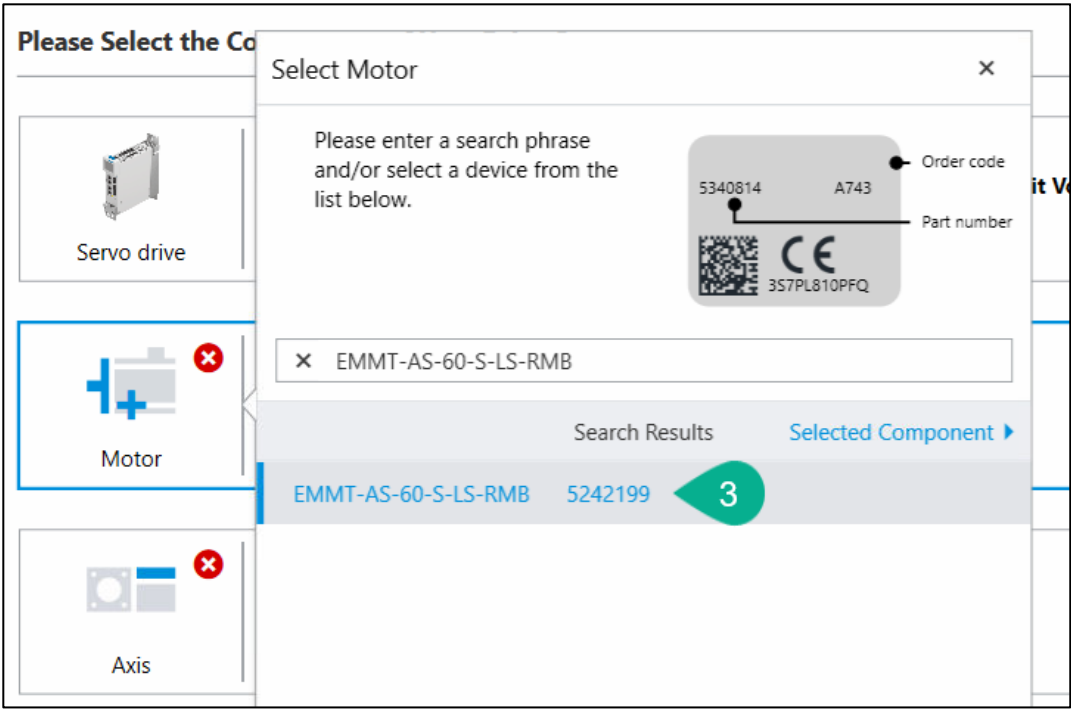
## Step 1: Motor Configuration



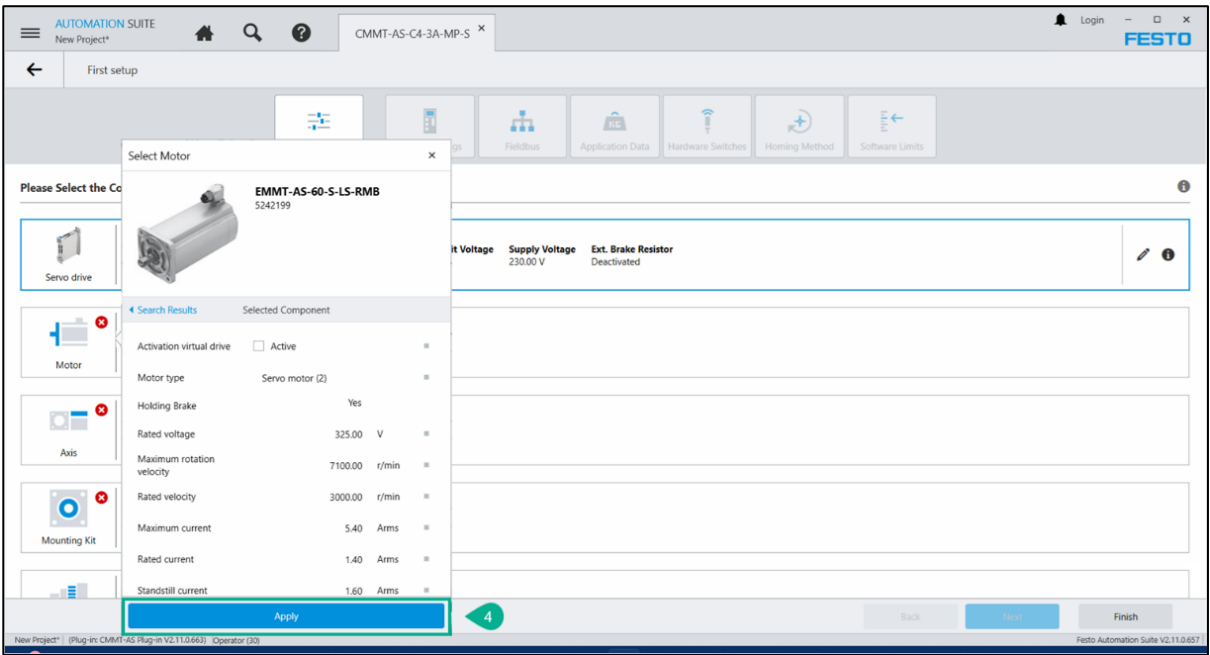
1. Click on “Start First Setup” option from drive configuration menu.



2. Click on “Motor” to add the motor component



3. Select the correct motor from the list of available motors. We will add the “EMMT-AS-60-S-LS-RMB” motor as an example.



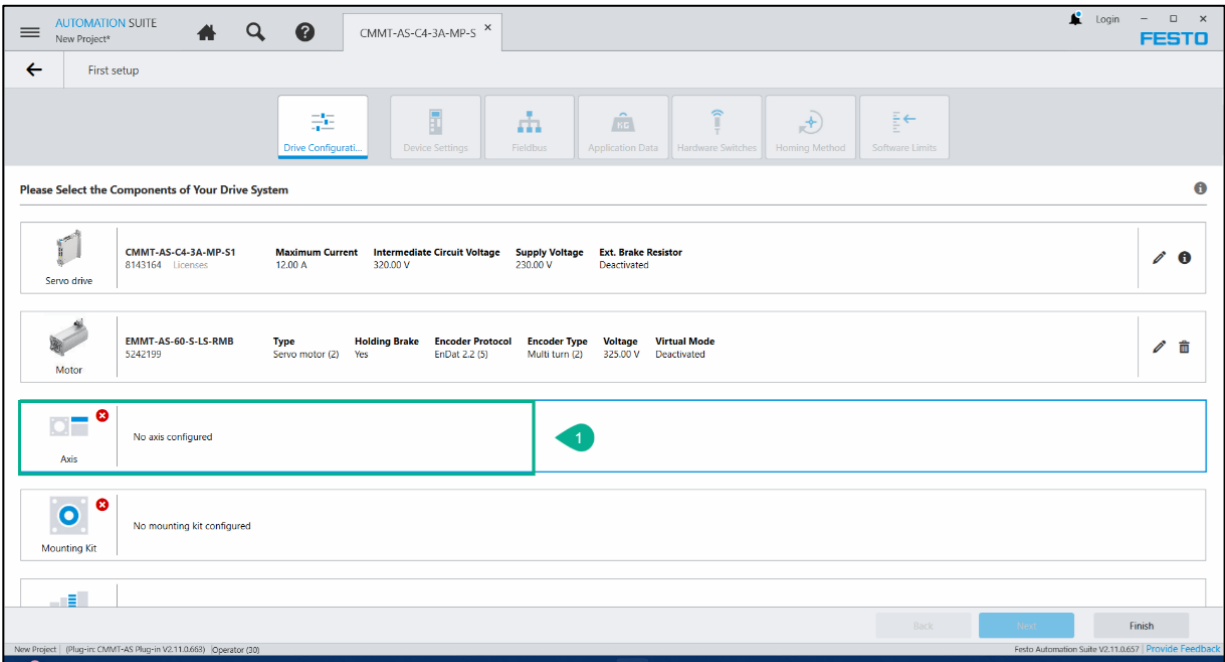
4. After selecting the motor click Apply to add motor to project.

|                                                                                     |                                       |                                |                             |                                          |                                       |                            |                                    |
|-------------------------------------------------------------------------------------|---------------------------------------|--------------------------------|-----------------------------|------------------------------------------|---------------------------------------|----------------------------|------------------------------------|
|  | <b>EMMT-AS-60-S-LS-RMB</b><br>5242199 | <b>Type</b><br>Servo motor (2) | <b>Holding Brake</b><br>Yes | <b>Encoder Protocol</b><br>EnDat 2.2 (5) | <b>Encoder Type</b><br>Multi turn (2) | <b>Voltage</b><br>325.00 V | <b>Virtual Mode</b><br>Deactivated |
| Motor                                                                               |                                       |                                |                             |                                          |                                       |                            |                                    |

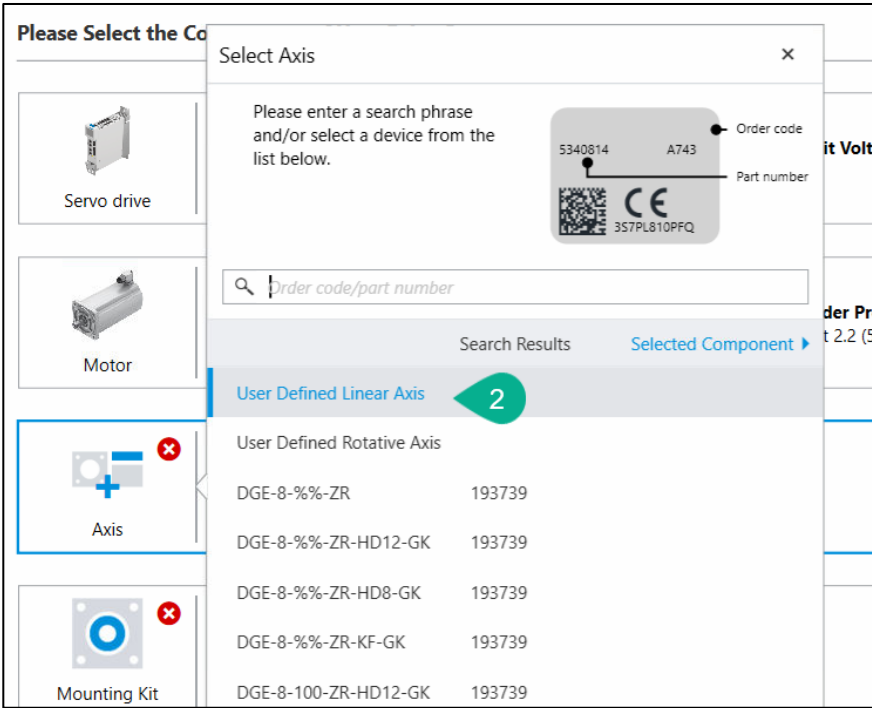
5. The motor tab will look as shown above after configuration.

**Step 2: Axis Configuration**

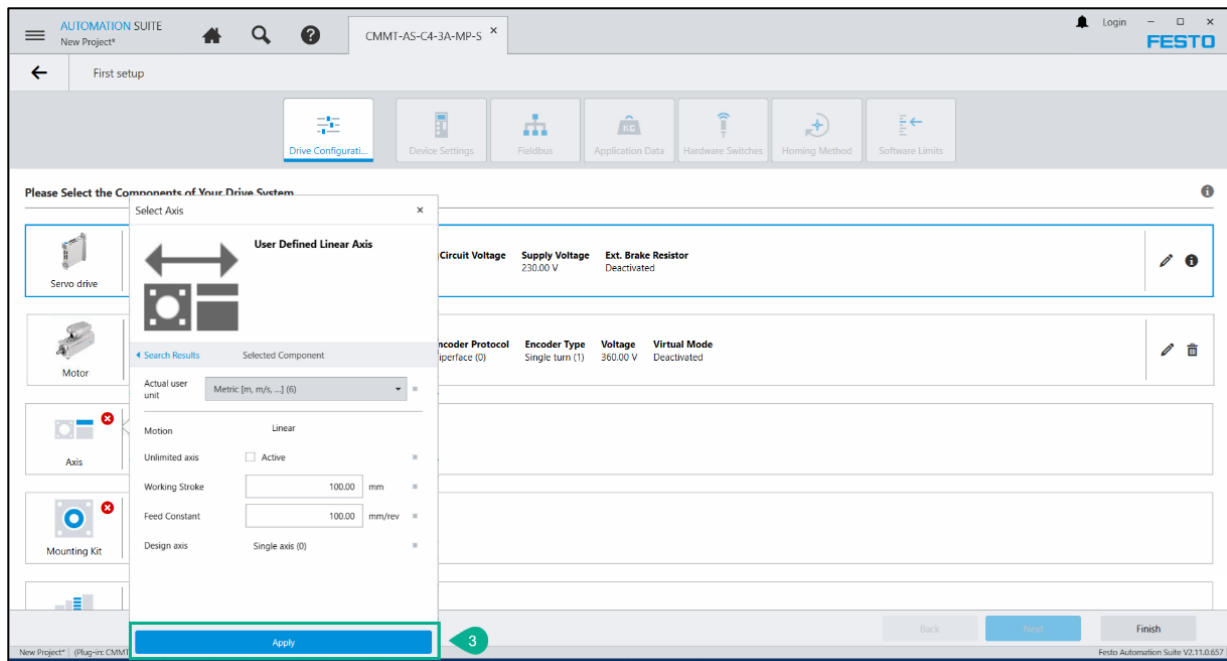
This step describes the axis type configuration. We are configuring 100 mm linear stroke length for this example. This configuration needs to be done as per user system design.



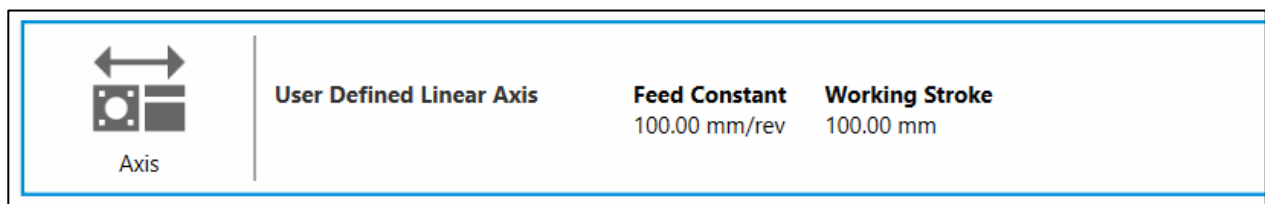
- 1. Click on “Axis” to add the required axis to project.



- 2. Select the required axis from the available list. For this example we will select “User Defined Linear Axis”.

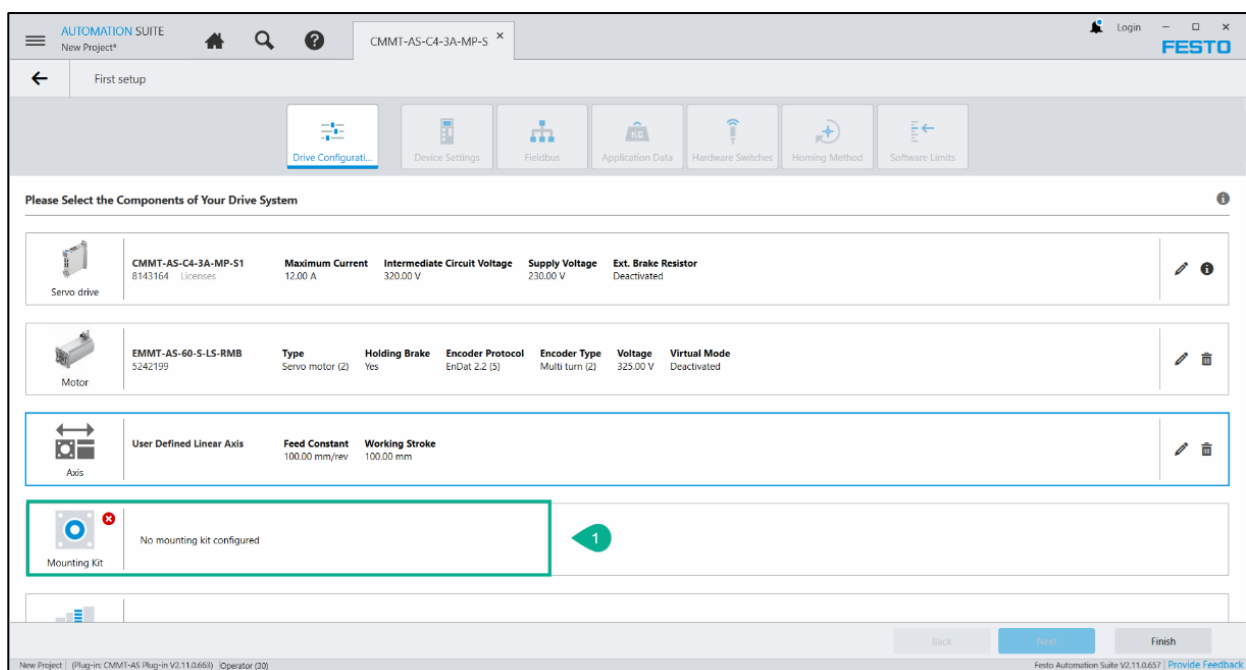


3. After selecting the axis enter the needed configuration details. Click “Apply” to add the axis to project.

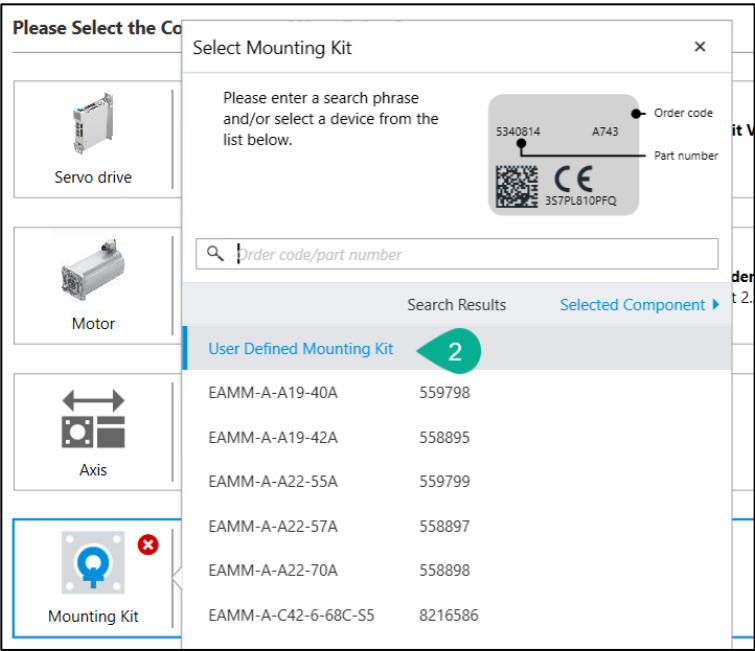


4. The Axis tab will look as shown above after configuration.

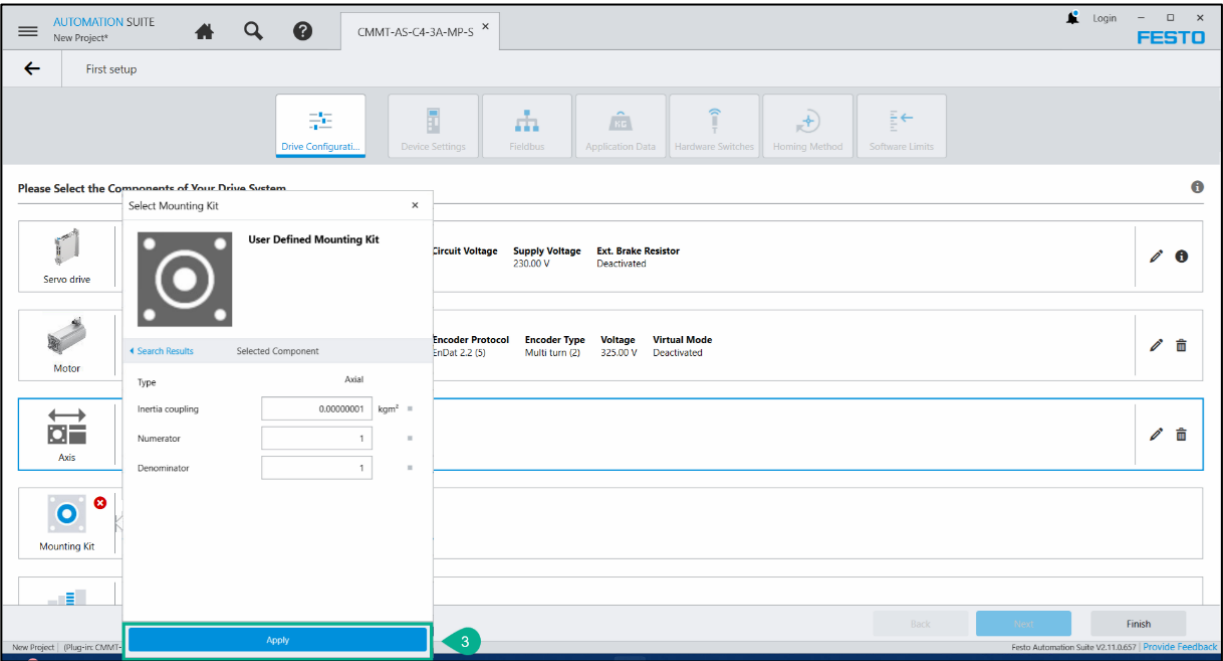
## Step 3: Mounting Kit Configuration



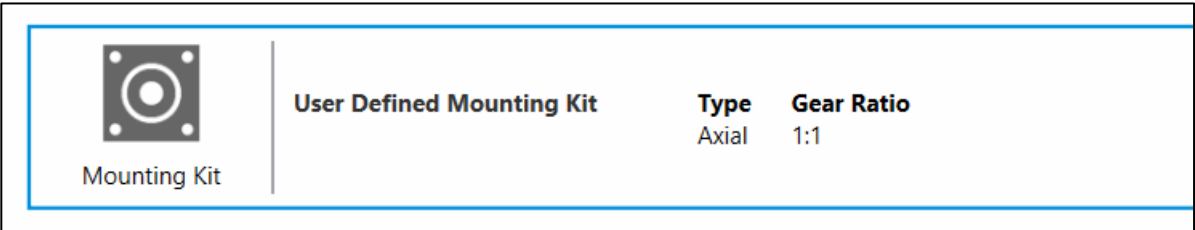
1. Click on “Mounting Kit” to add a new mounting kit to the project.



2. Select the required mounting kit. For this example we will select “User Defined Mounting Kit”.

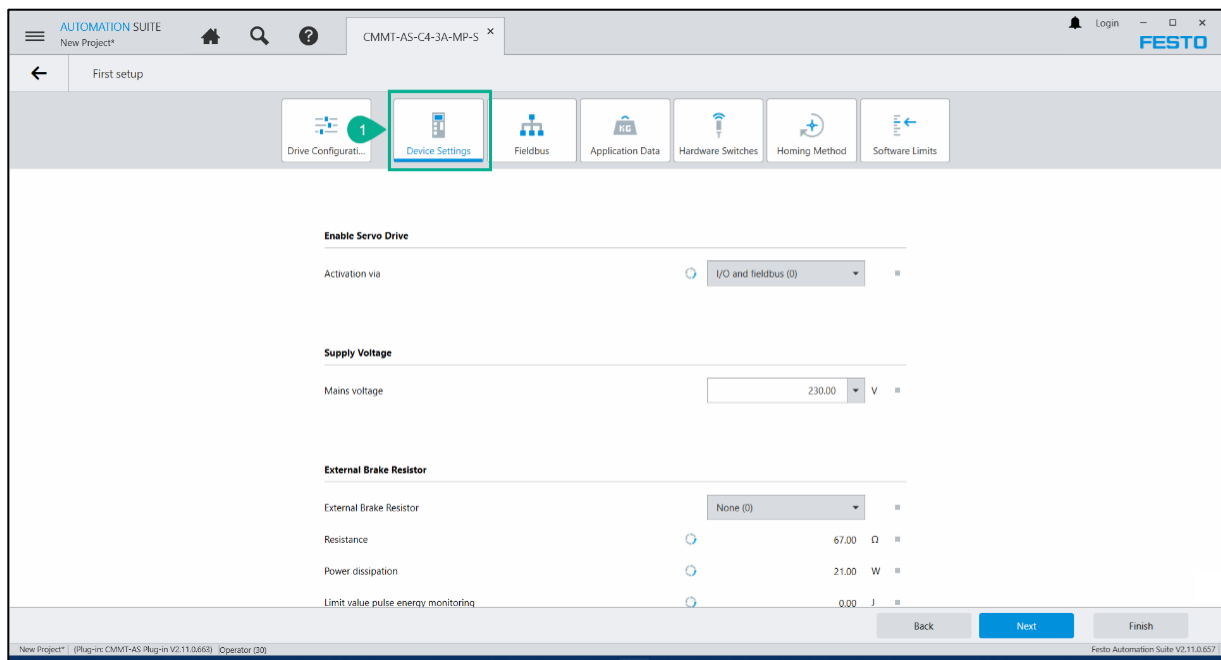


3. After selecting the Mounting kit enter the required configuration details. Click “Apply” to add mounting kit to project.

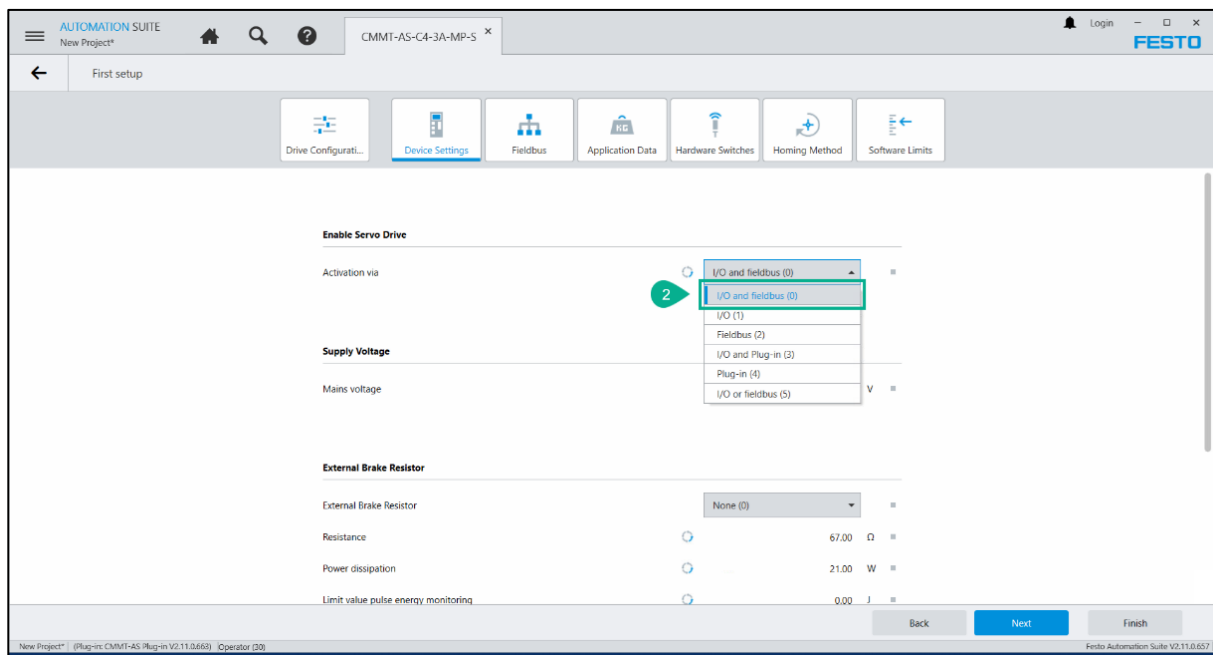


4. The Mounting Kit tab will look as shown above after configuration.

## Step 4: Device Settings

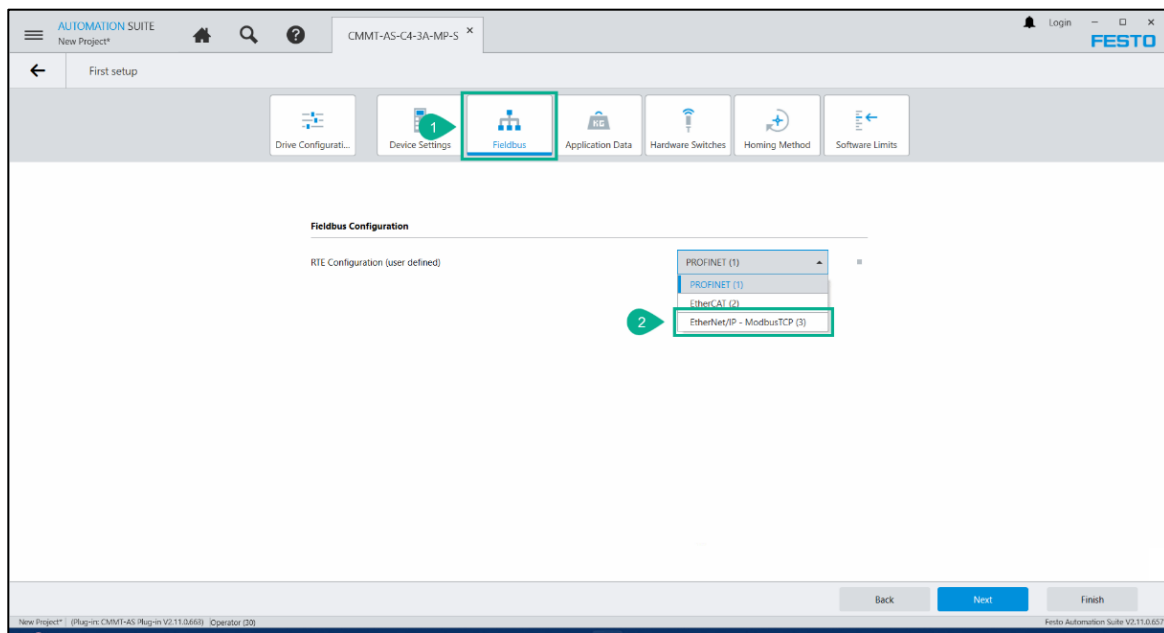


1. Click on “Device Settings” to configure available servo drive options.

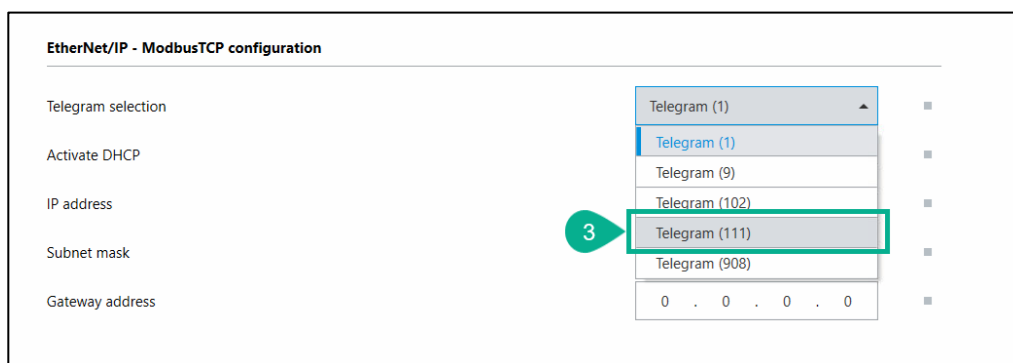


2. Select Activation Via as “I/O and fieldbus (0)”.

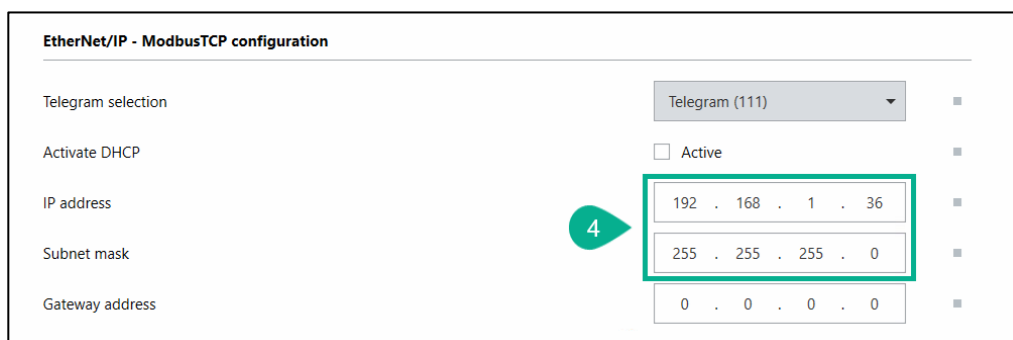
## Step 5: Fieldbus Configuration



1. Click on “Fieldbus” to configure the communication protocol and related settings.
2. Select “EtherNet/IP – ModbusTCP (3)” option from the RTE Configuration option.



3. In EtherNet/IP – Modbus Configuration select “Telegram (111)” from Telegram Selection drop-down list.



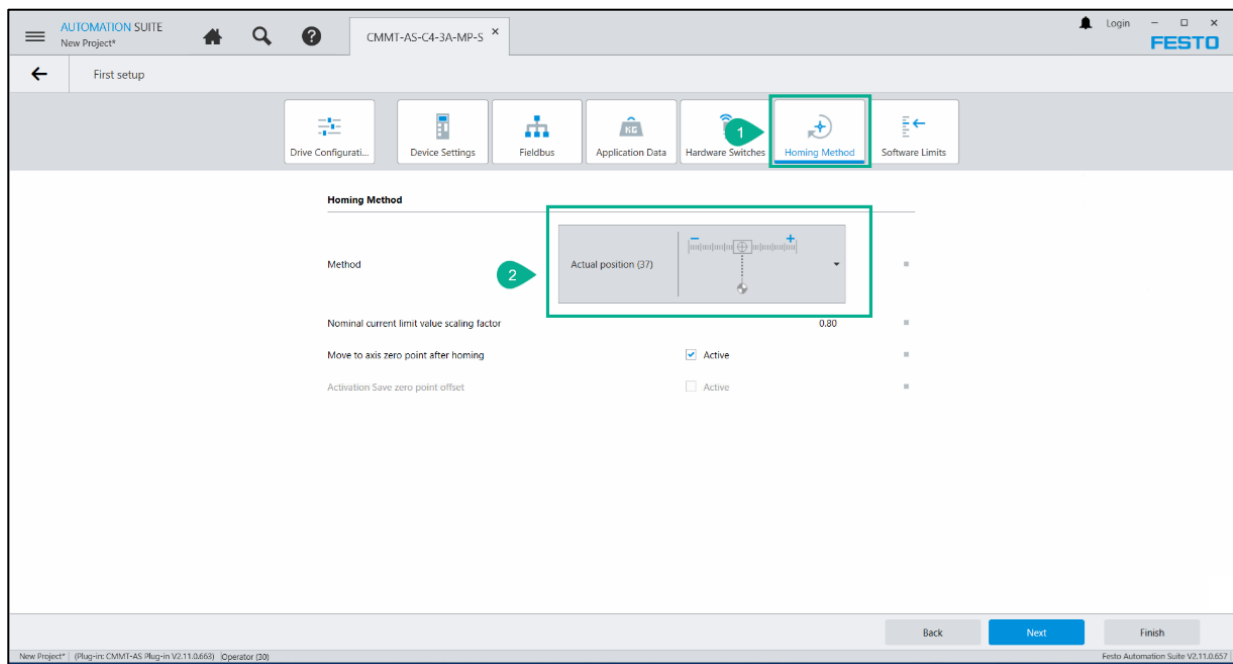
4. Enter the IP address & Subnet mask for EtherNet/IP – ModbusTCP Configuration. This will be the IP address assigned to Port X19 of the CMMT. This communication interface is used to establish connection with PLC to receive control command and to send signal feedback.

## Step 6: Enter Inertia Value

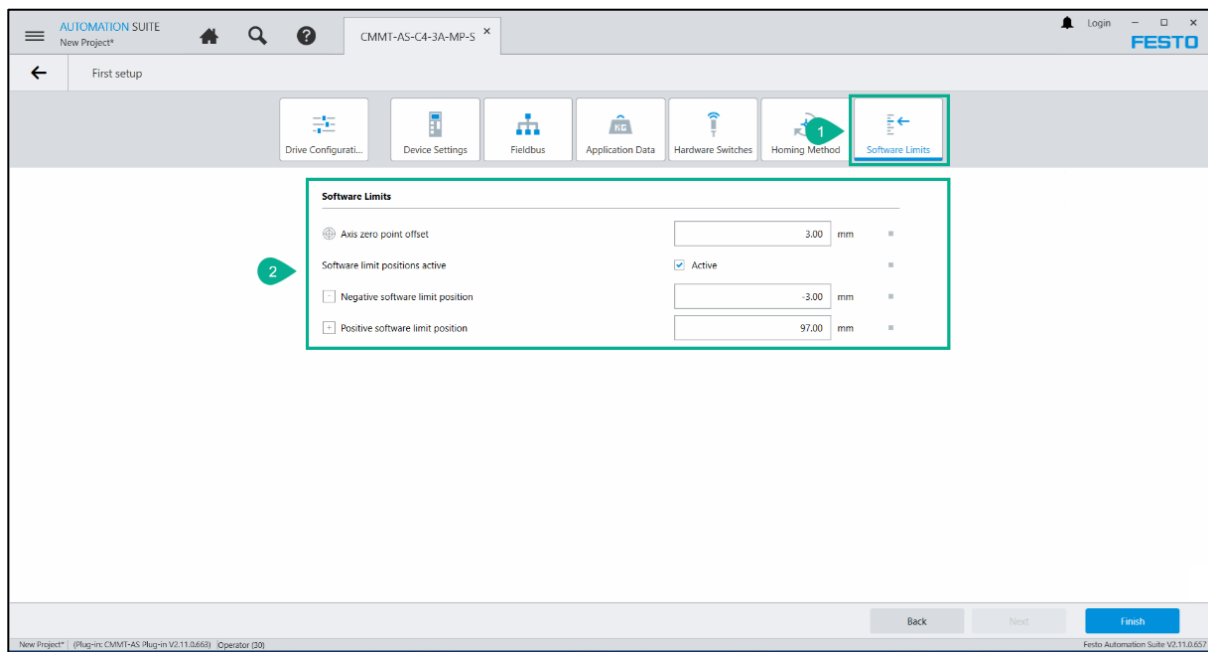
1. Click on “Application Data”.
2. Enter the inertia value of user application.

## Step 7: Hardware Switches Configuration

1. Click on “Hardware Switches”.
2. Select the appropriate options as per your system design.

**Step 8: Homing Method**

1. Click on “Homing Method”.
2. We have selected “Actual Position (37)” option for this example. Select the appropriate option as per your system design.

**Step 9: Software Limits Configuration**

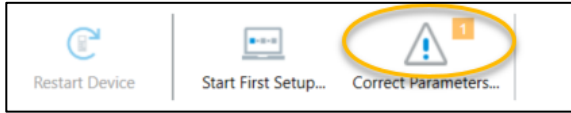
1. Click on “Software Limits”.
2. User can enable the maximum and minimum values of Software Limit as per their system design.

### Step 10: Correct Parameters

At this stage all the mandatory settings for the drive system are done. If, during the process, any parameter was configured incorrectly, the “Correct Parameters” ( Right most top corner in FAS tool ) option will display a number. The number corresponds to the number of parameters which were wrongly configured.

To correct parameter value click the “Correct Parameters” button and then the Apply button.

FAS will generate and apply recommended values for the configuration.



### 2.3.3 Rotary Axis Configuration for Position Control (Telegram 111)

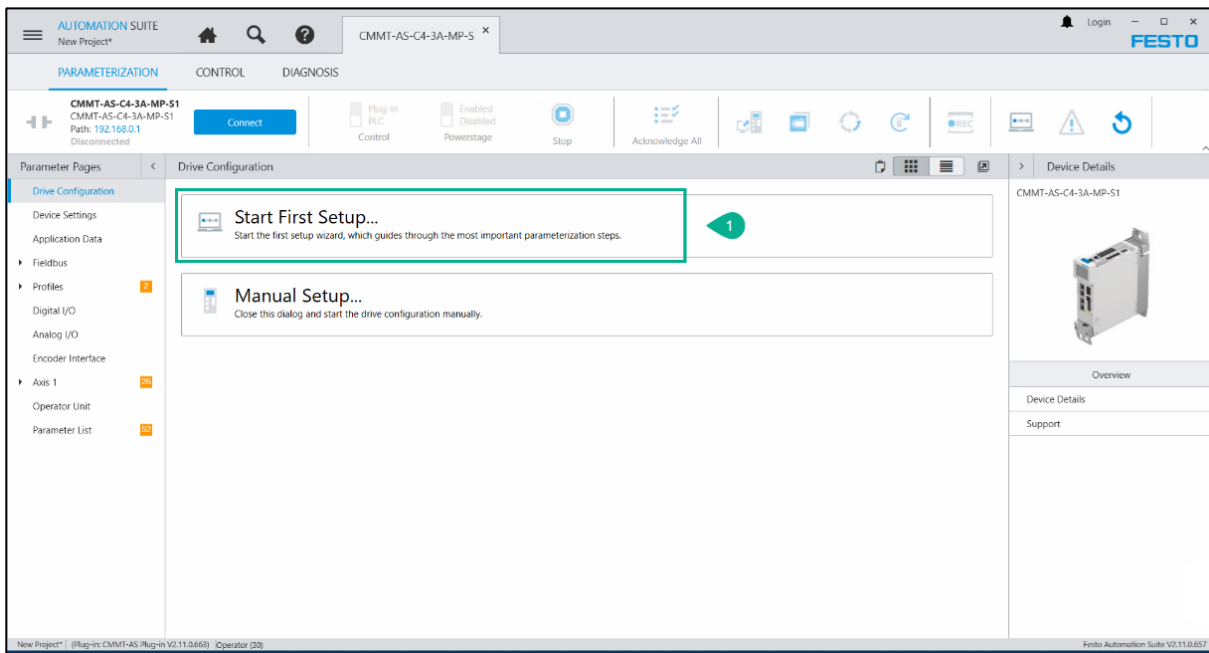


#### Note

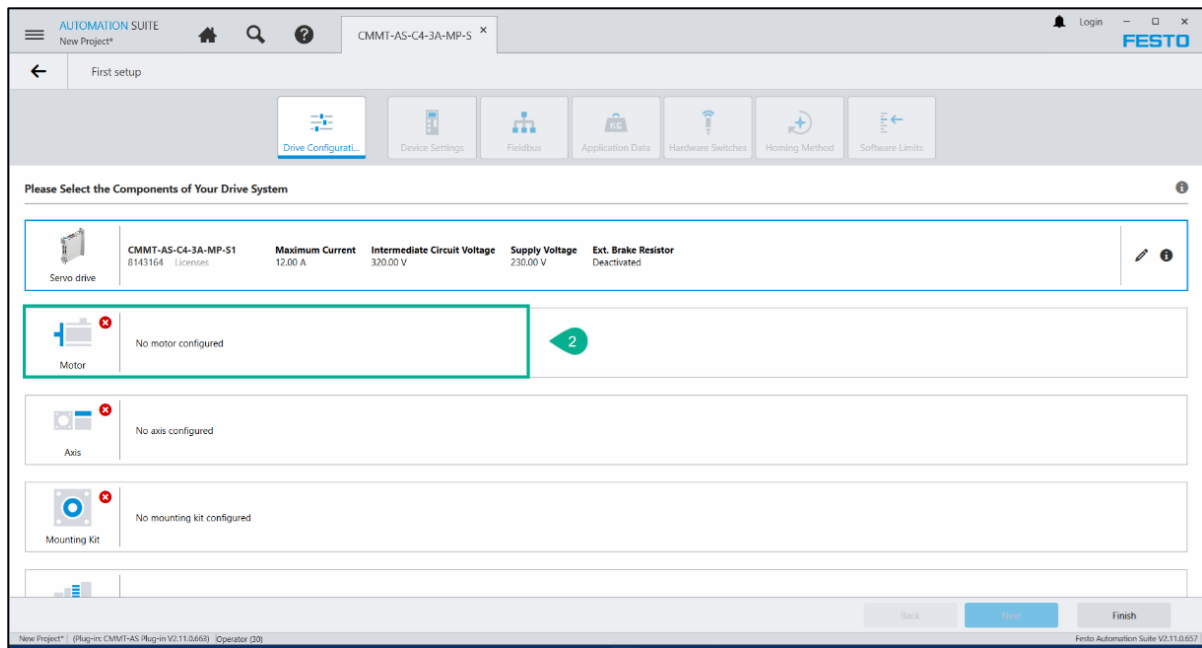
- If the user is looking for Linear Axis configuration skip this chapter and jump to Section 2.3.2.

This chapter describes the parameterization of the CMMT drive for Position Control (Telegram 111). The rotary axis is set to move 1000 revolution forward and reverse with 1000 RPM base speed & current position as homing mode.

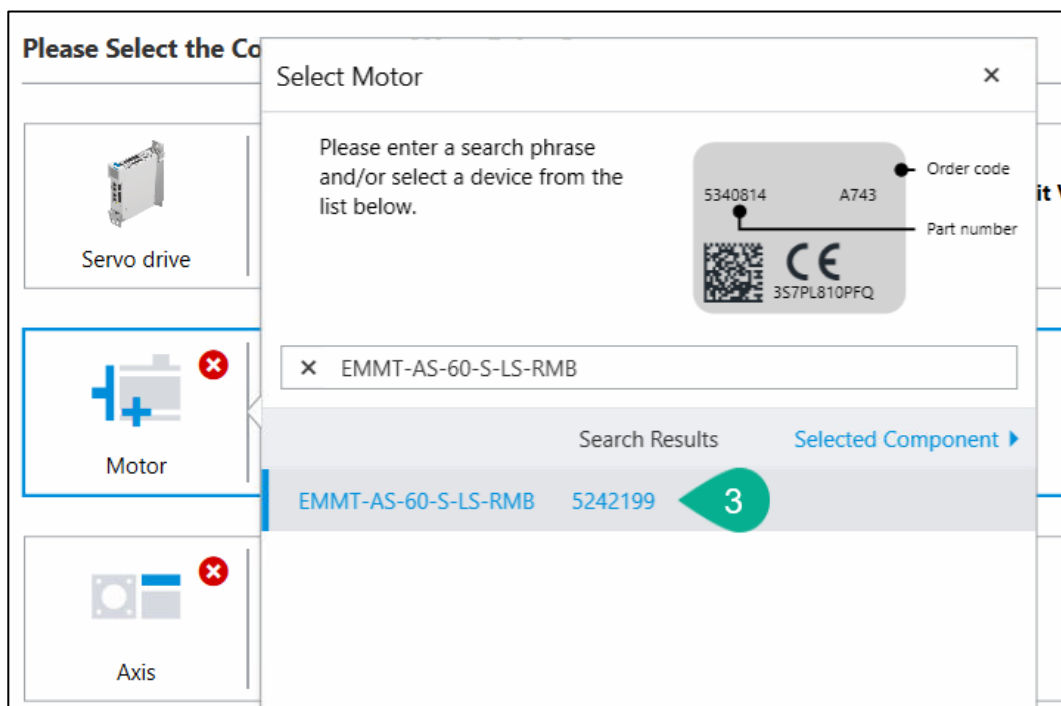
#### Step 1:



1. Click on “Start First Setup” option from drive configuration menu.

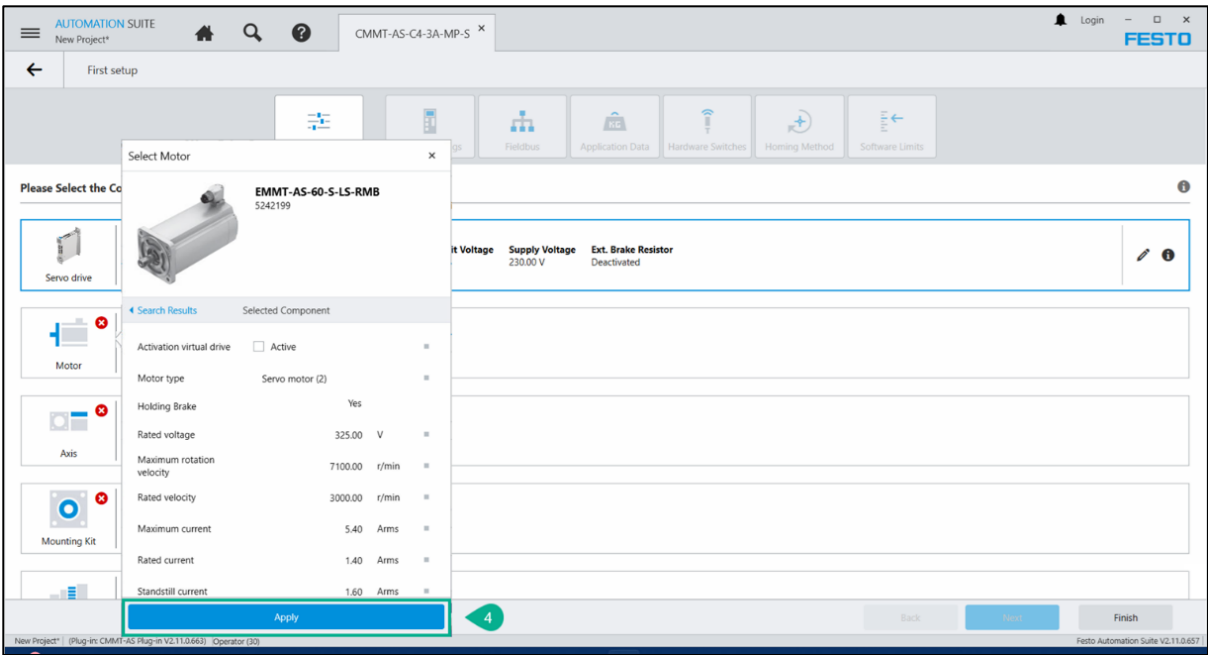


- Click on “Motor” to add the motor component



- Select the correct motor from the list of available motors. We will add the “EMMT-AS-60-S-LS-RMB” motor as an example.

CMMT Servo Drive Configuration



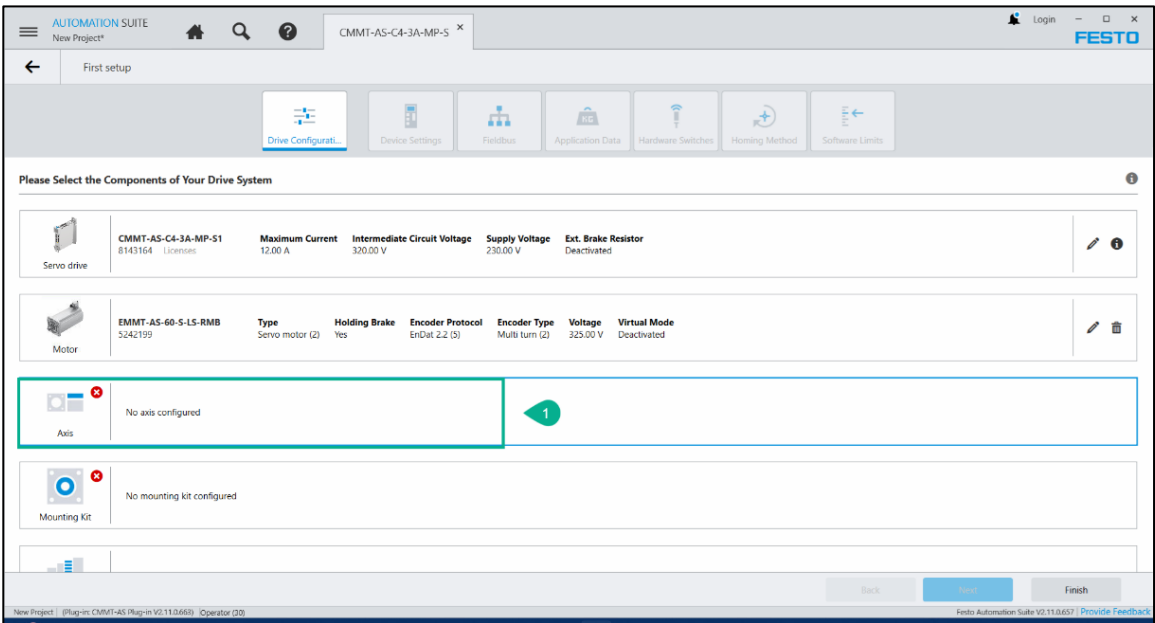
4. After selecting the motor click Apply to add motor to project.

|                                                                                    |                                       |                                |                             |                                          |                                       |                            |                                    |
|------------------------------------------------------------------------------------|---------------------------------------|--------------------------------|-----------------------------|------------------------------------------|---------------------------------------|----------------------------|------------------------------------|
|  | <b>EMMT-AS-60-S-LS-RMB</b><br>5242199 | <b>Type</b><br>Servo motor (2) | <b>Holding Brake</b><br>Yes | <b>Encoder Protocol</b><br>EnDat 2.2 (5) | <b>Encoder Type</b><br>Multi turn (2) | <b>Voltage</b><br>325.00 V | <b>Virtual Mode</b><br>Deactivated |
| Motor                                                                              |                                       |                                |                             |                                          |                                       |                            |                                    |

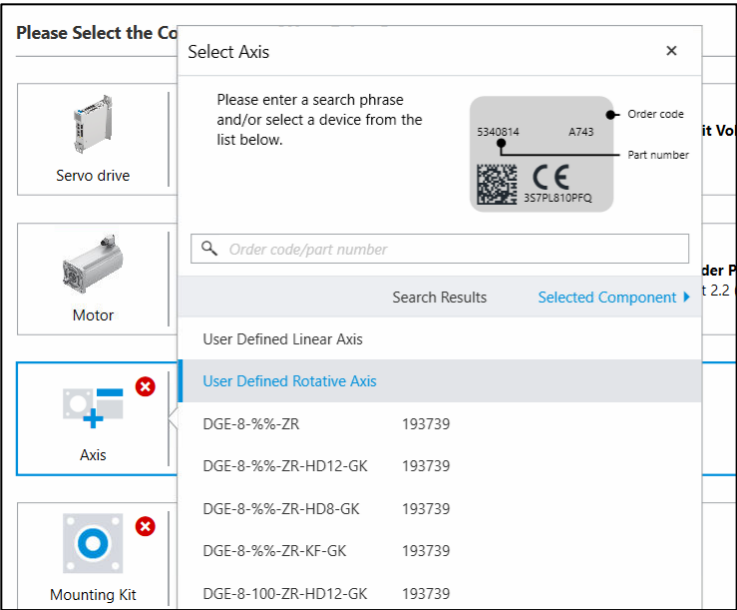
5. The motor tab will look as shown above after configuration.

Step 2: Axis Configuration

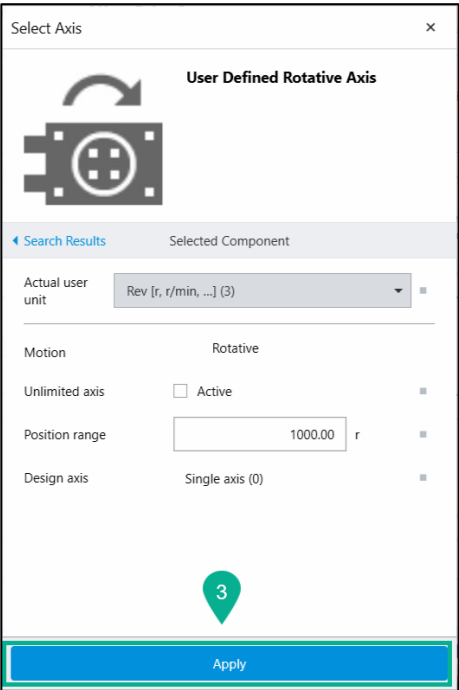
This step describes the axis type configuration. The axis configuration is done for 1000 rotations in forward and reverse. This configuration needs to be done as per user system design.



1. Click on “Axis” to add the required axis to project.



2. Select the required axis from the available list. For this example we will select “User Defined Linear Axis”.

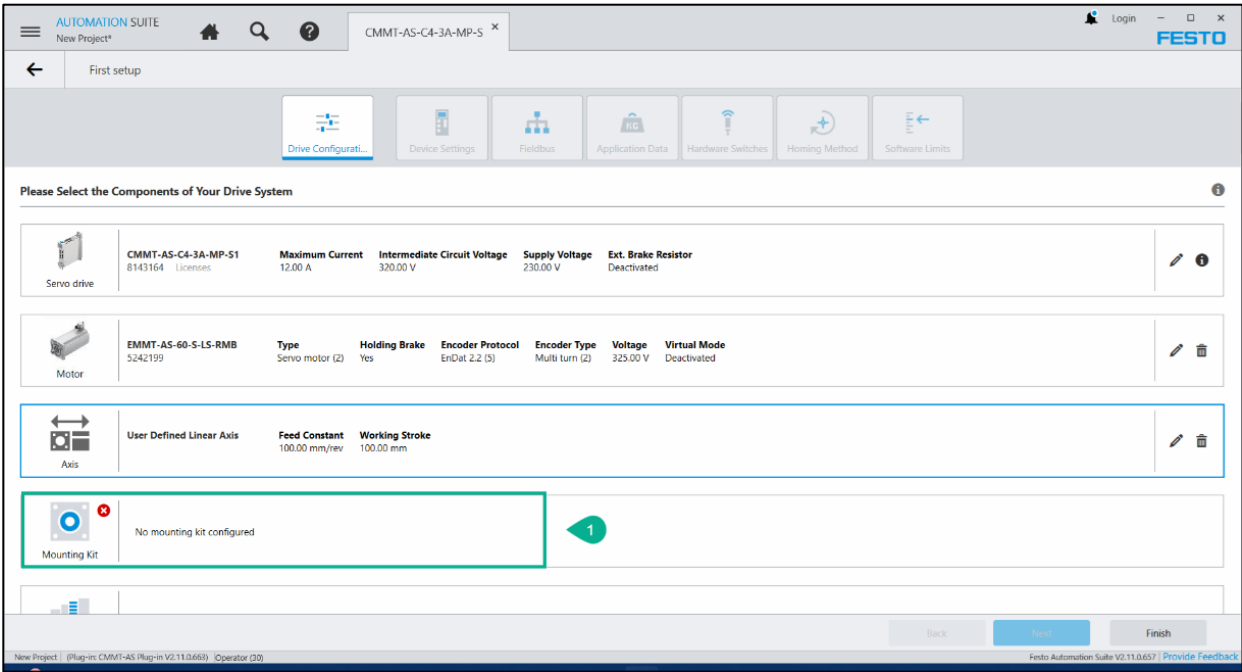


3. After selecting the axis enter the needed configuration details. Click “Apply” to add the axis to project.
- a. The “Unlimited axis” option needs to be enabled if the user is going to operate CMMT in velocity control (telegram 1) mode.

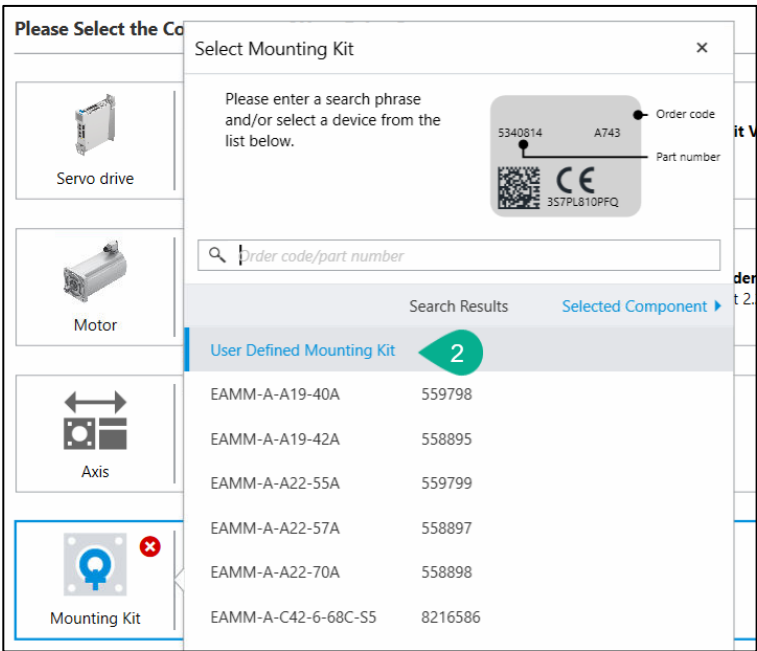


4. The Axis tab will look as shown above after configuration.

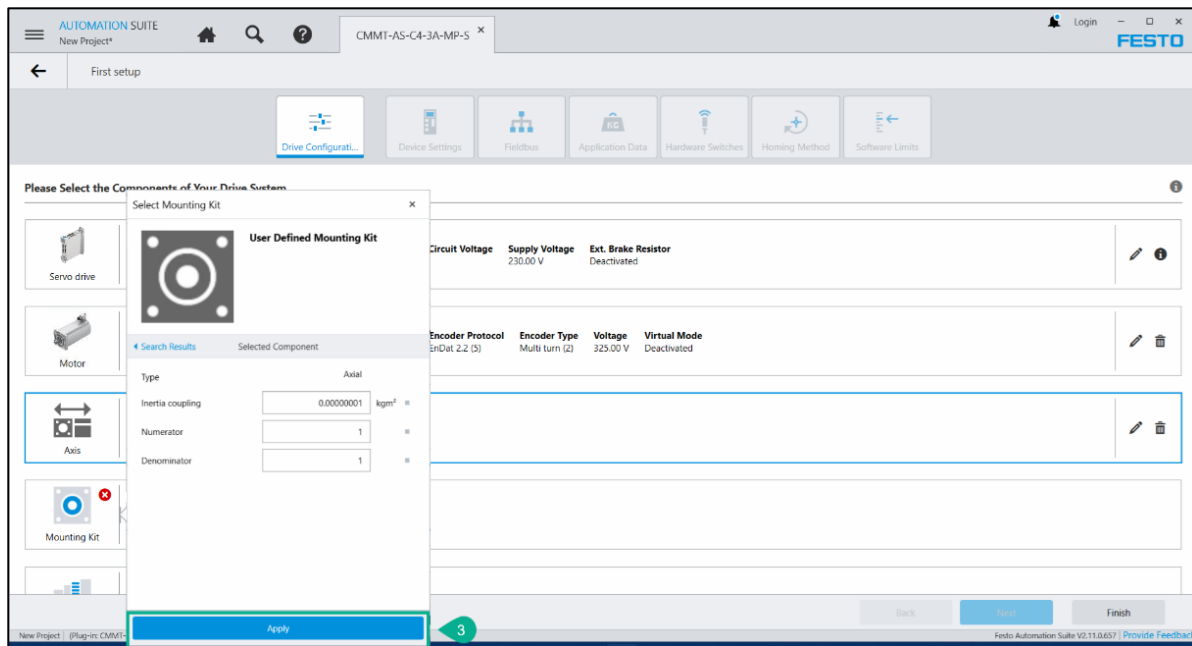
Step 3: Mounting Kit Configuration



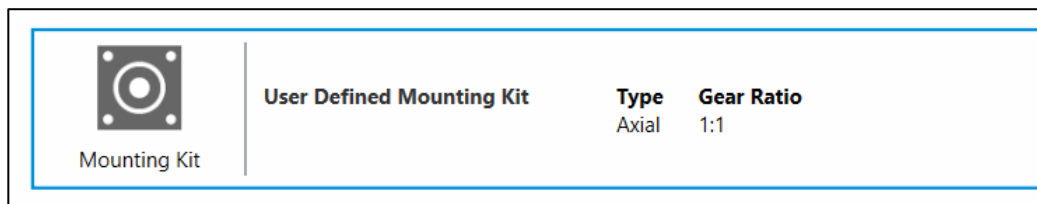
- Click on “Mounting Kit” to add a new mounting kit to the project.



- Select the required mounting kit. For this example we will select “User Defined Mounting Kit”.

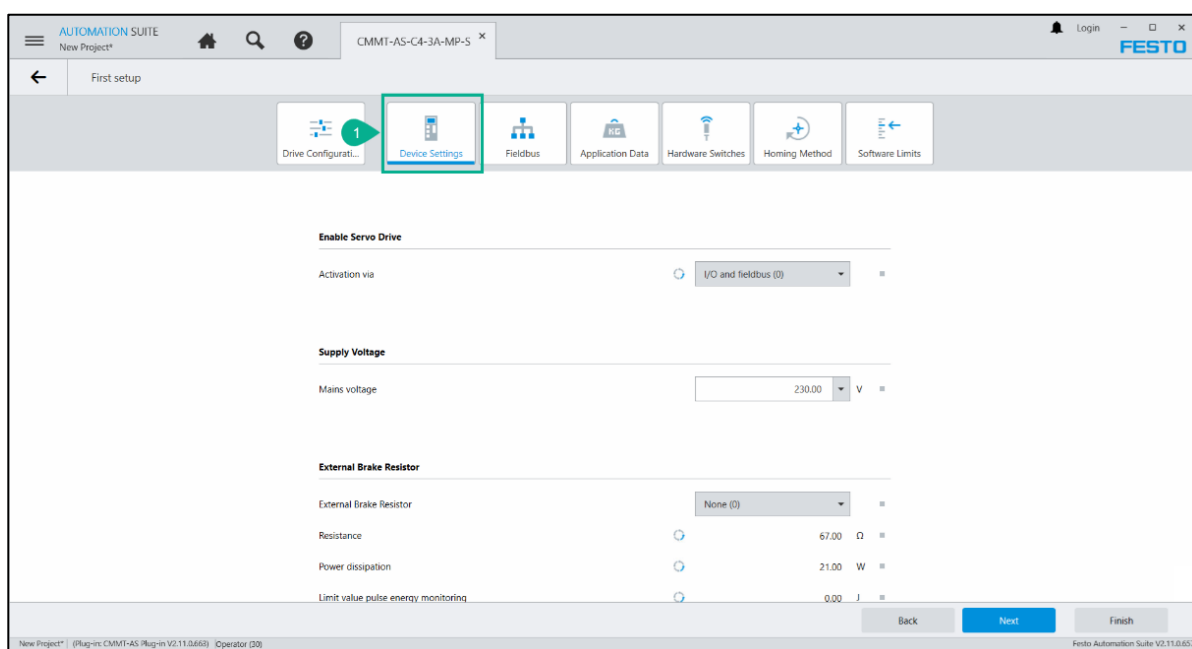


- After selecting the Mounting kit enter the required configuration details. Click “Apply” to add mounting kit to project.

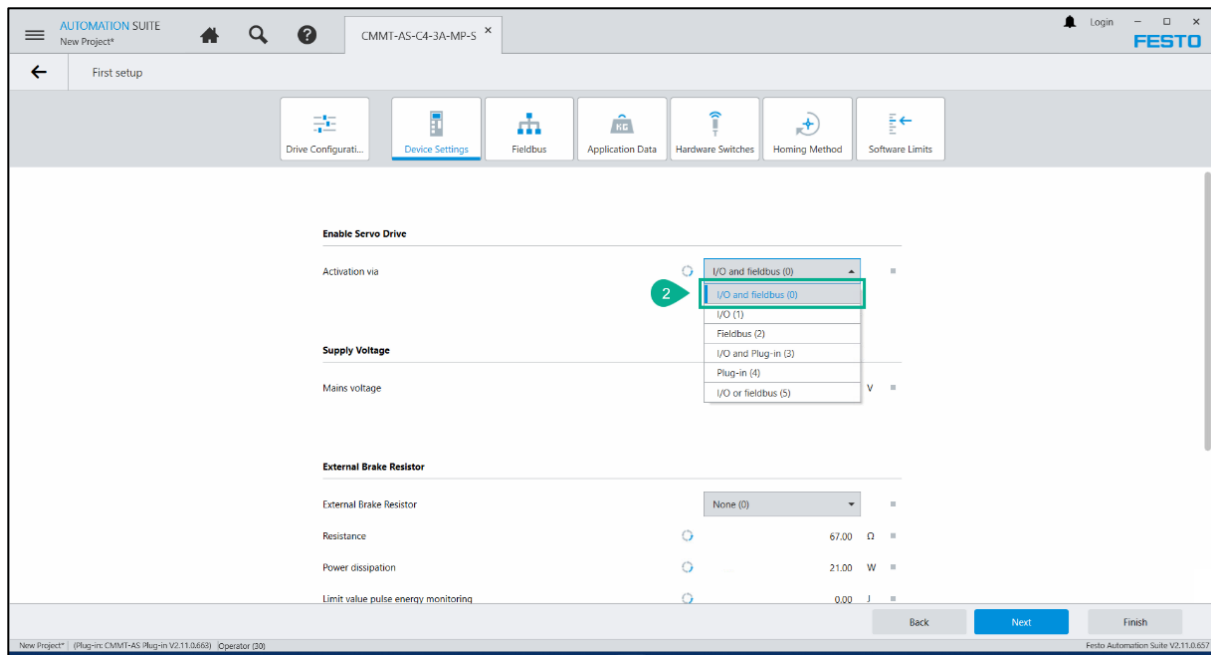


- The Mounting Kit tab will look as shown above after configuration.

#### Step 4: Device Settings

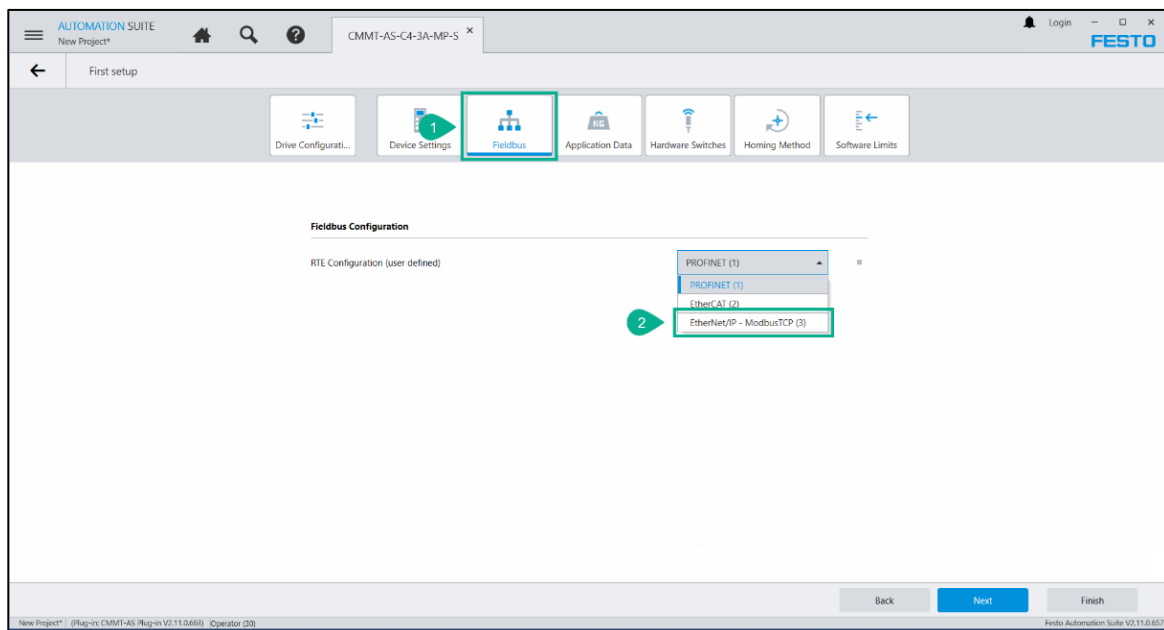


- Click on “Device Settings” to configure available servo drive options.

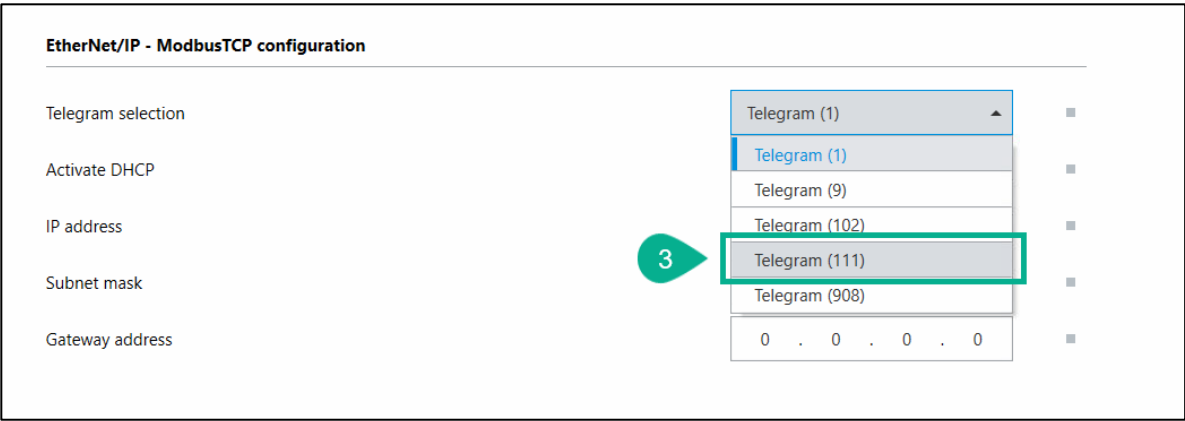


2. Select Activation Via as “I/O and fieldbus (0)”.

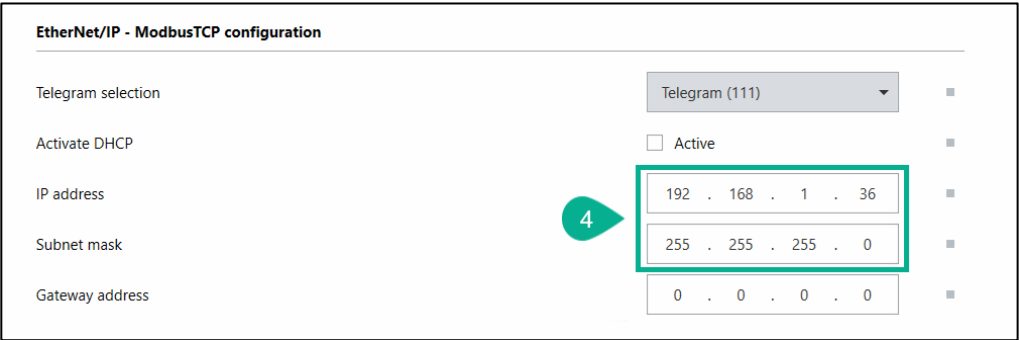
### **Step 5: Fieldbus Configuration**



1. Click on “Fieldbus” to configure the communication protocol and related settings.
2. Select “EtherNet/IP – ModbusTCP (3)” option from the RTE Configuration option.

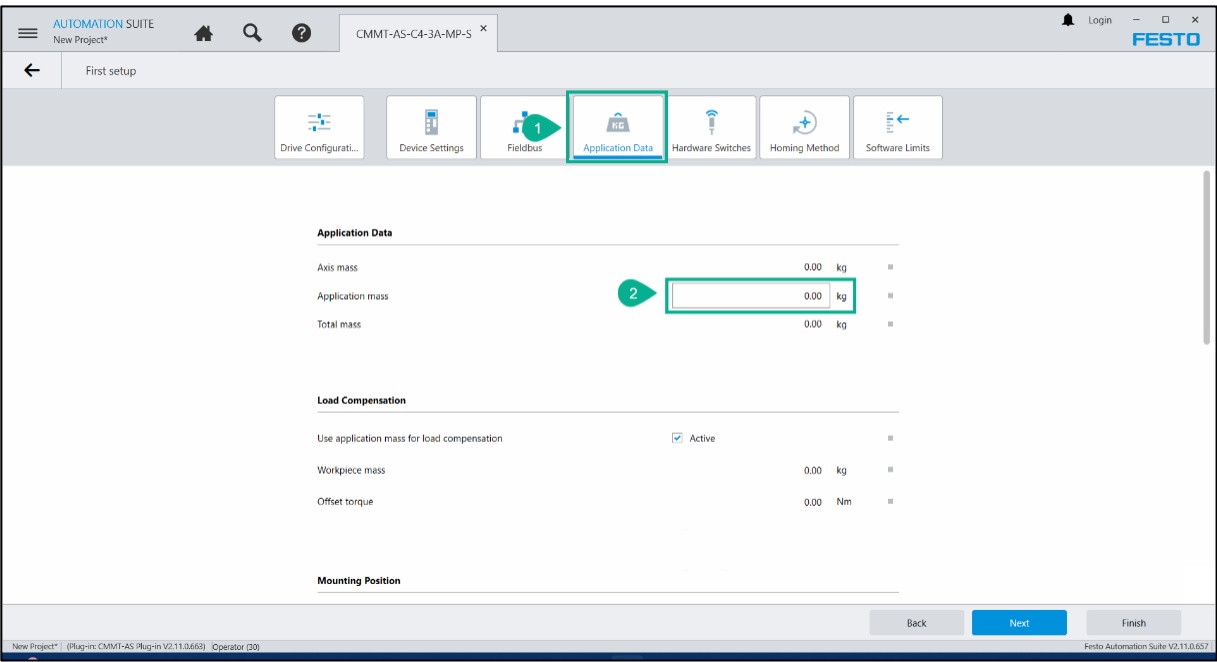


3. In EtherNet/IP – Modbus Configuration select “Telegram (111)” Telegram Selection drop-down list.



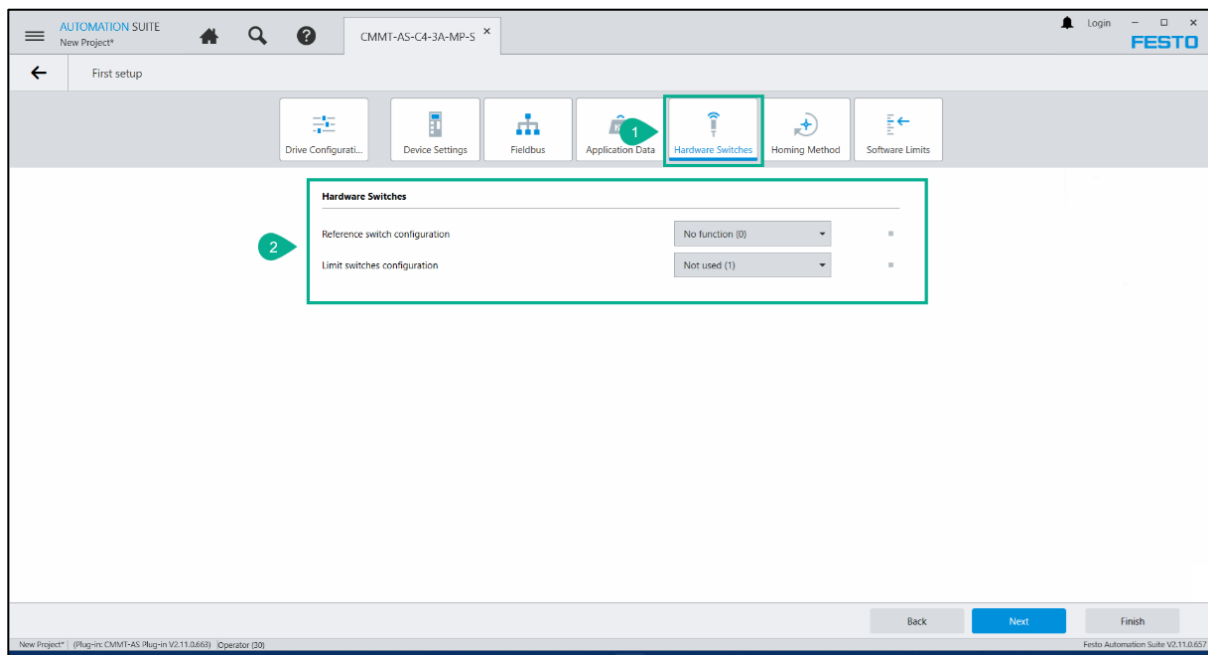
4. Enter the IP address & Subnet mask for EtherNet/IP – ModbusTCP Configuration. This will be the IP address assigned to Port X19 of the CMMT. This communication interface is used to establish connection with PLC to receive control command and to send signal feedback.

**Step 6: Enter Inertia Value**



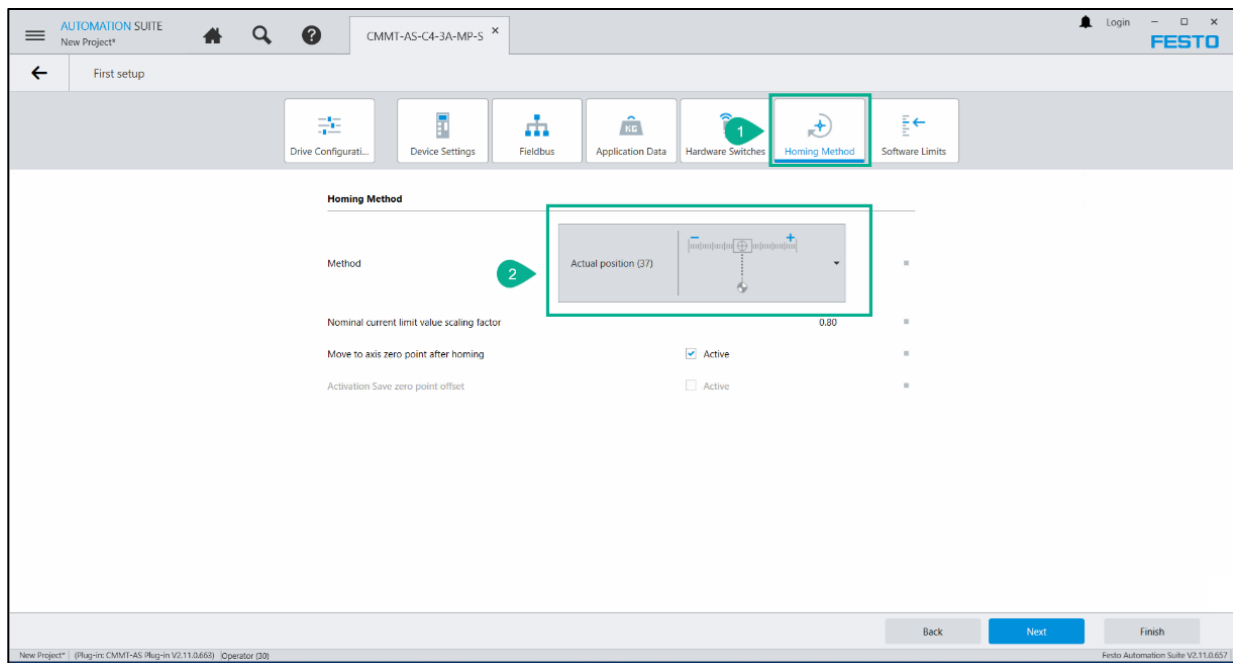
1. Click on “Application Data”.
2. Enter the inertia value of user application.

## Step 7: Hardware Switches Configuration

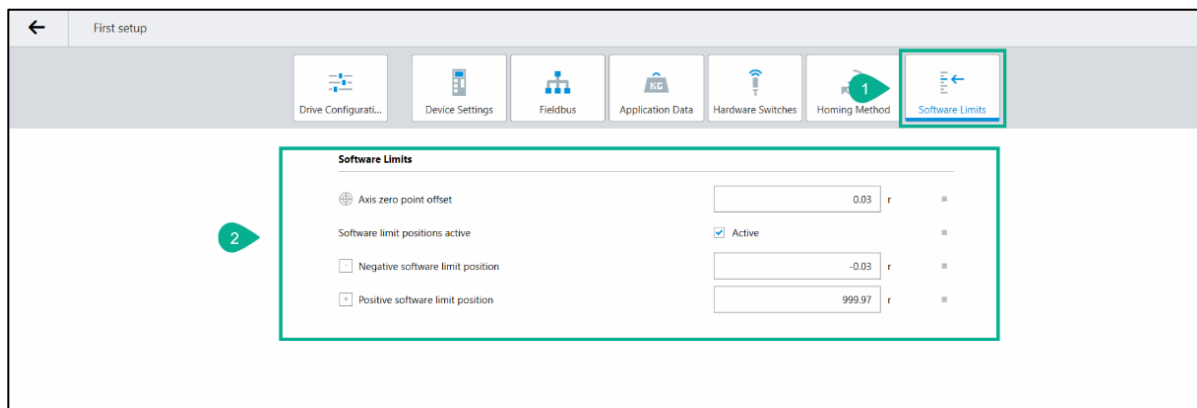


1. Click on “Hardware Switches”.
2. Select the appropriate options as per your system design.

## Step 8: Homing Method



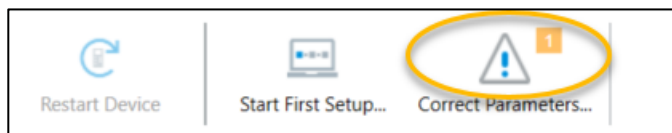
1. Click on “Homing Method”.
2. We have selected “Actual Position (37)” option for this example. Select the appropriate option as per your system design.

**Step 9: Software Limits Configuration**

1. Click on “Software Limits”.
2. User can enable the maximum and minimum values of Software Limit as per their system design.
3. The software limits need to be disabled if the user is going to operate CMMT in velocity control (telegram 1) mode.

**Step 10: Correct Parameters**

At this stage all the mandatory settings for the drive system are done. If, during the process, any parameter was configured incorrectly, the “Correct Parameters” (Right most top corner in FAS tool ) option will display a number. The number corresponds to the number of parameters which were wrongly configured. To correct parameter value click the “Correct Parameters” button and then the Apply button. FAS will generate and apply recommended values for the configuration.



## 2.3.4 Rotary Axis Configuration for Basic Velocity Control (Telegram 1)

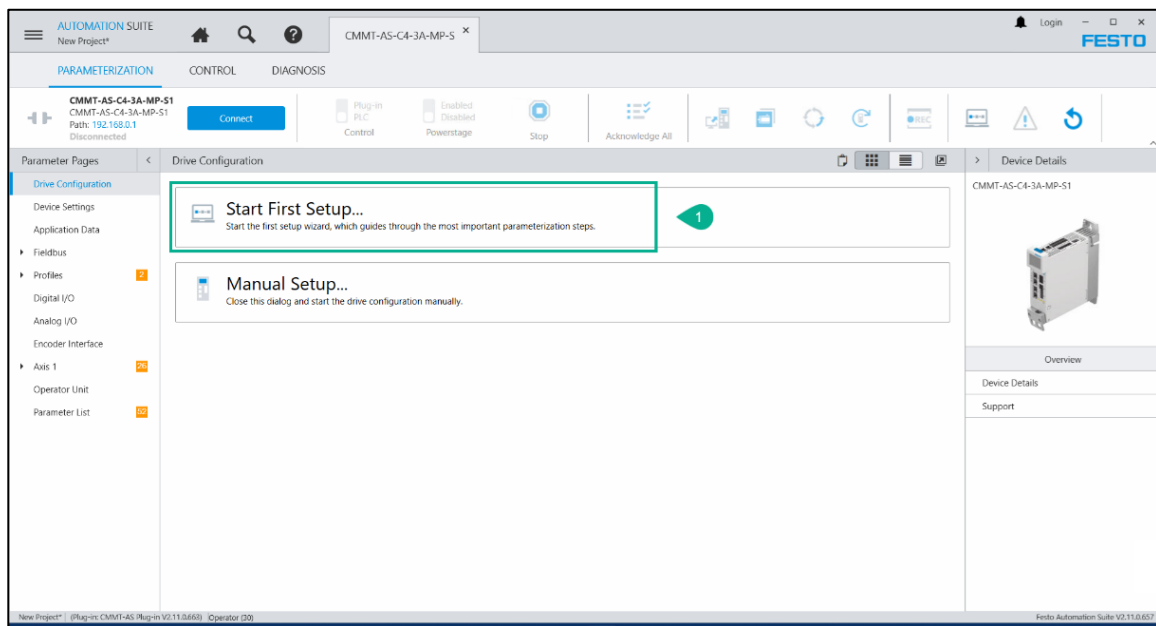


### Note

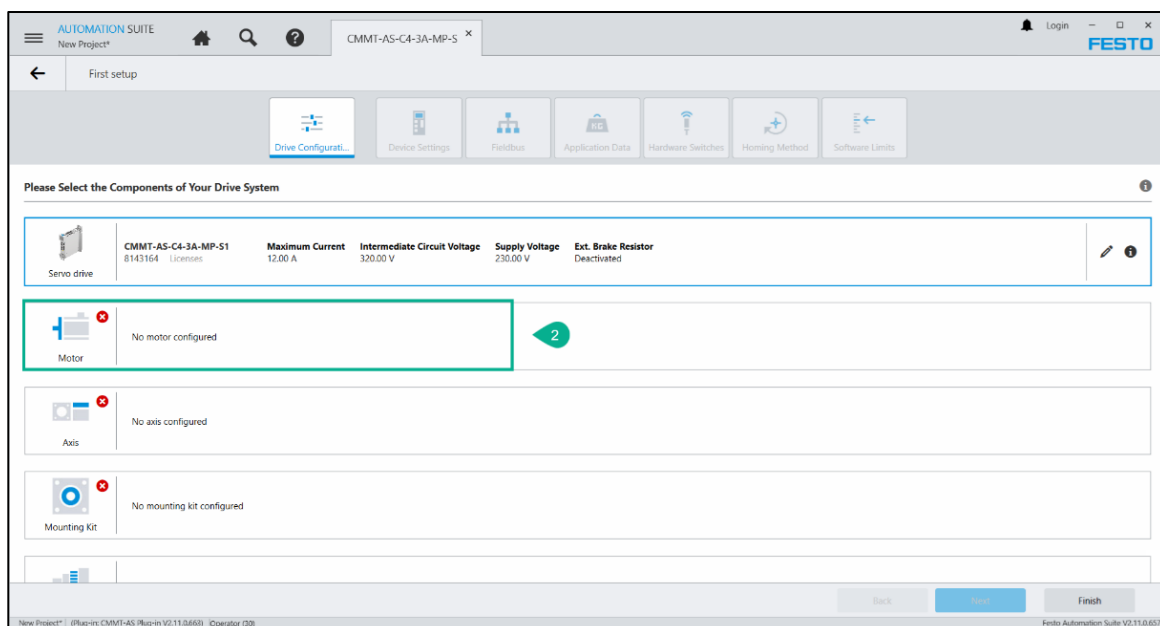
- If the user is looking for Linear Axis configuration skip this chapter and jump to Section 2.3.2.

This chapter describes the parameterization of the CMMT drive for Basic Velocity Control (Telegram 1). The rotary axis is set to unlimited axis and software limit positions are deactivated.

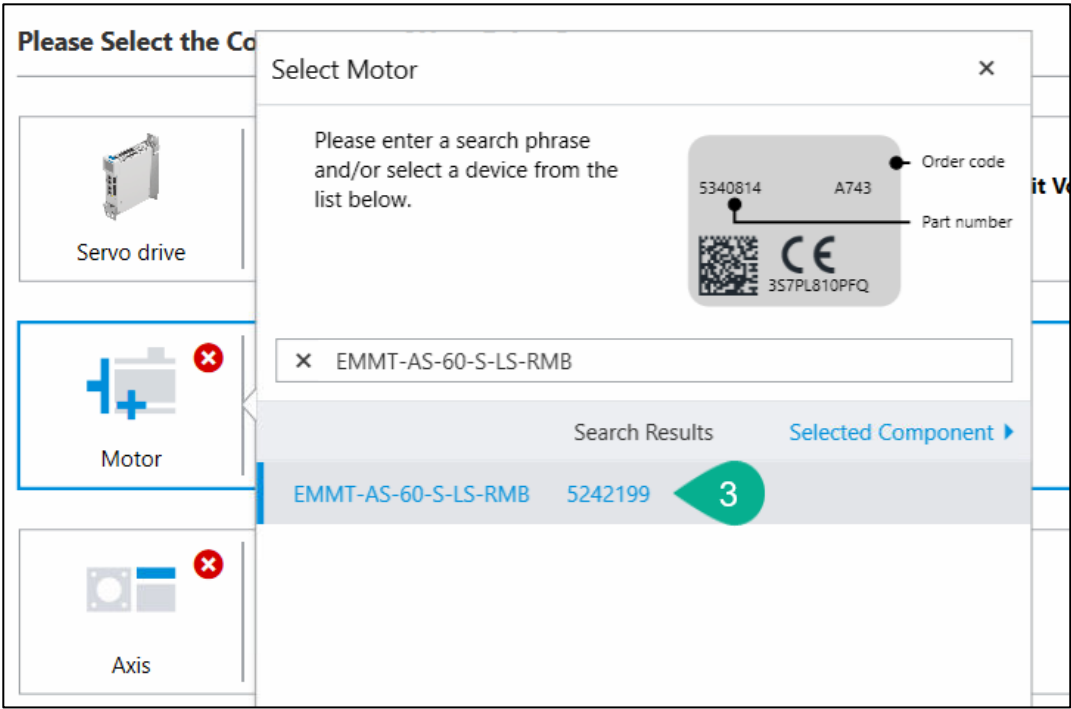
### Step 1:



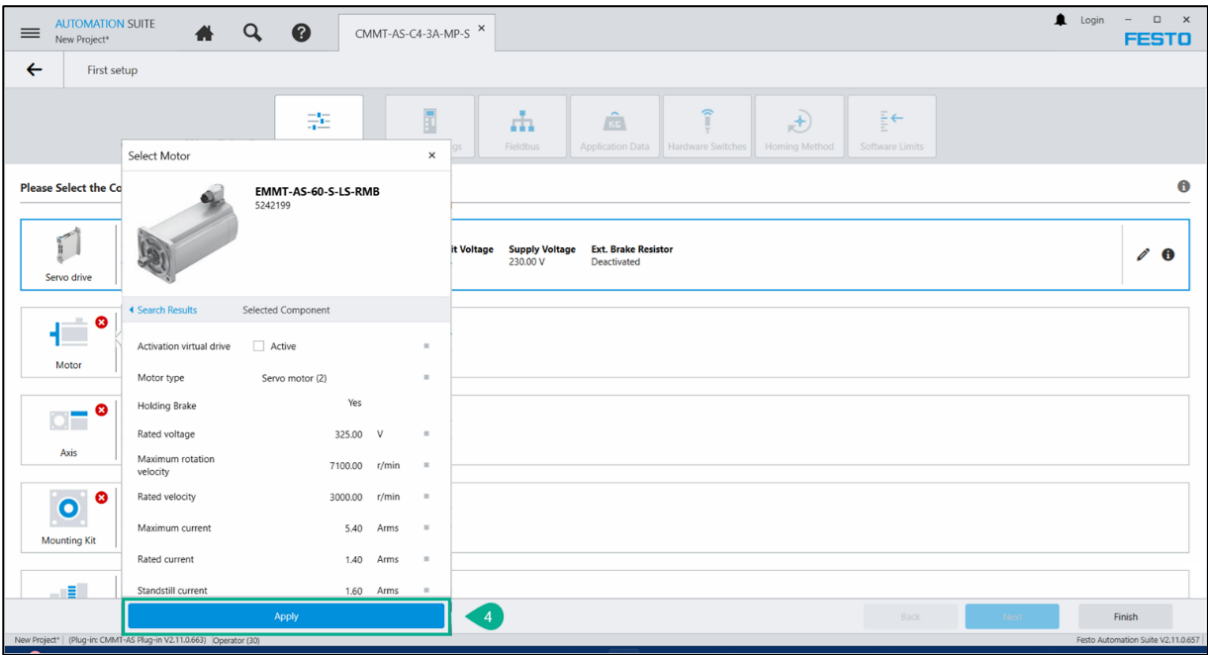
1. Click on “Start First Setup” option from drive configuration menu.



2. Click on “Motor” to add the motor component



3. Select the correct motor from the list of available motors. We will add the “EMMT-AS-60-S-LS-RMB” motor as an example.



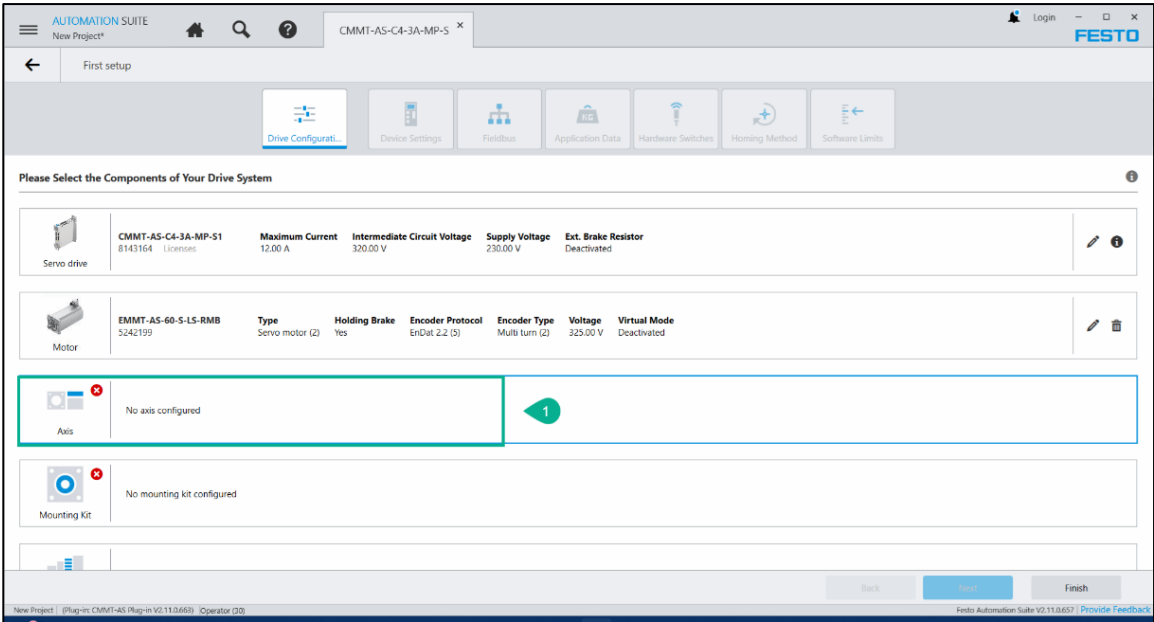
4. After selecting the motor click Apply to add motor to project.

|                                                                                     |                                       |                                |                             |                                          |                                       |                            |                                    |
|-------------------------------------------------------------------------------------|---------------------------------------|--------------------------------|-----------------------------|------------------------------------------|---------------------------------------|----------------------------|------------------------------------|
|  | <b>EMMT-AS-60-S-LS-RMB</b><br>5242199 | <b>Type</b><br>Servo motor (2) | <b>Holding Brake</b><br>Yes | <b>Encoder Protocol</b><br>EnDat 2.2 (5) | <b>Encoder Type</b><br>Multi turn (2) | <b>Voltage</b><br>325.00 V | <b>Virtual Mode</b><br>Deactivated |
| Motor                                                                               |                                       |                                |                             |                                          |                                       |                            |                                    |

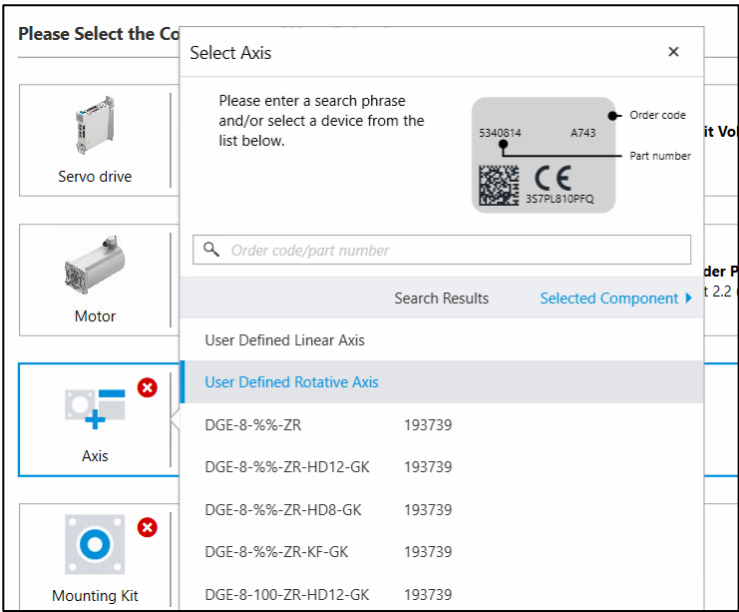
5. The motor tab will look as shown above after configuration.

Step 2: Axis Configuration

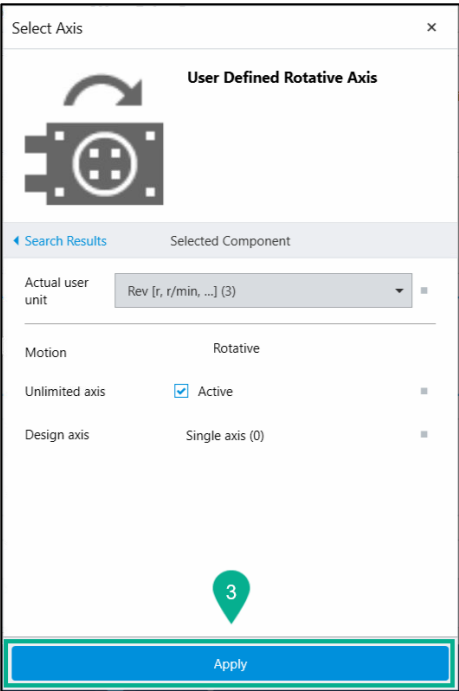
This step describes the axis type configuration. The axis configuration is done for 1000 rotations in forward and reverse. This configuration needs to be done as per user system design.



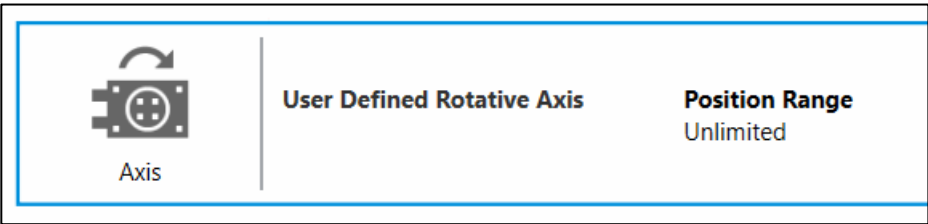
- 1. Click on “Axis” to add the required axis to project.



- 2. Select the required axis from the available list. For this example we will select “User Defined Linear Axis”.

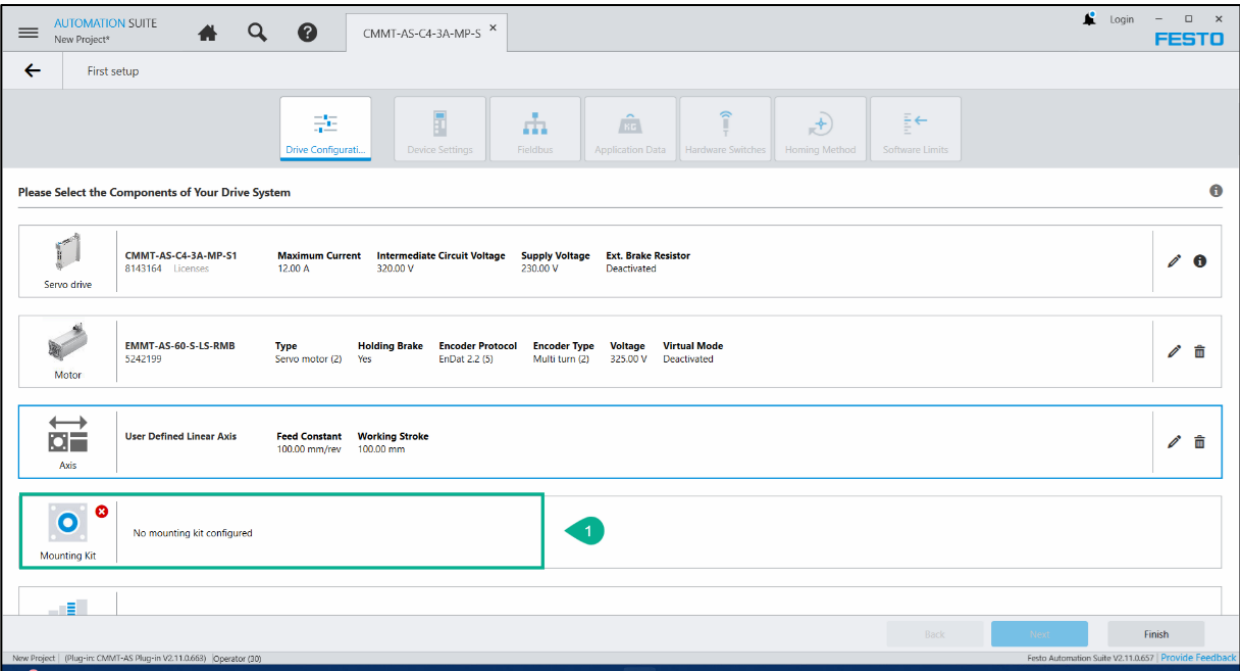


3. After selecting the axis, enable the “Unlimited axis” option. Click “Apply” to add the axis to project.

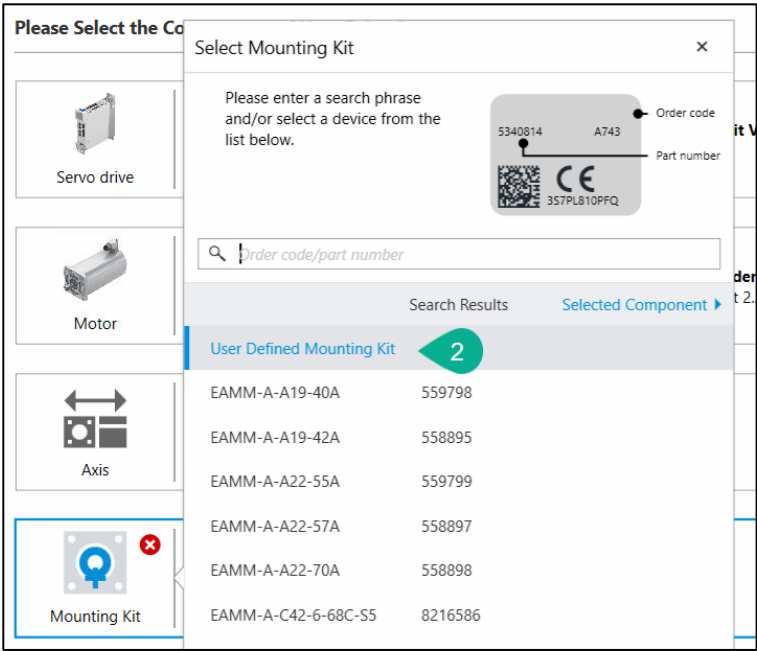


4. The Axis tab will look as shown above after configuration.

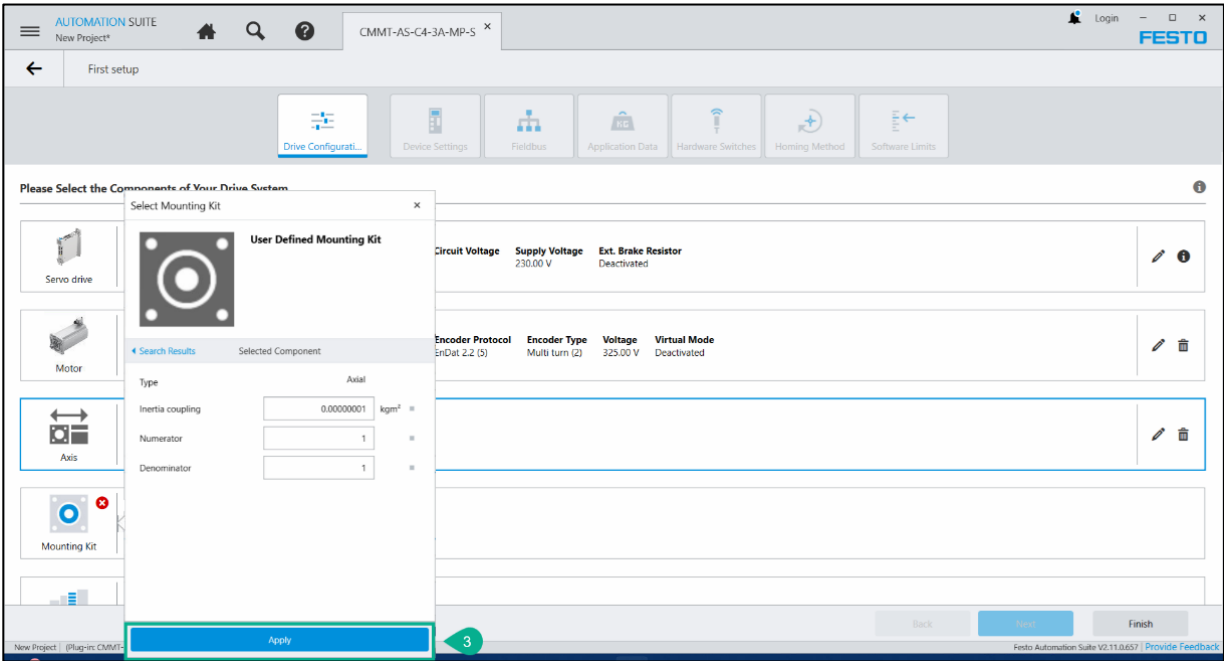
**Step 3: Mounting Kit Configuration**



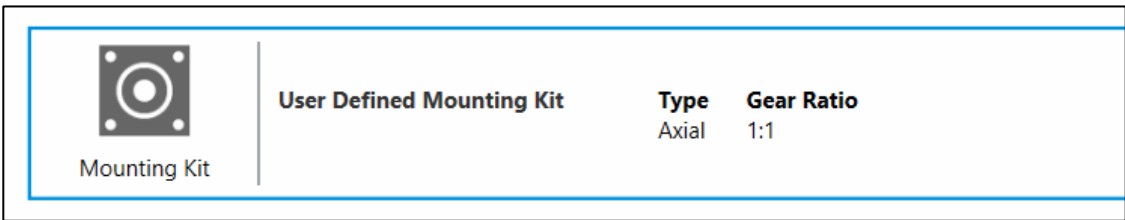
1. Click on “Mounting Kit” to add a new mounting kit to the project.



2. Select the required mounting kit. For this example we will select “User Defined Mounting Kit”.

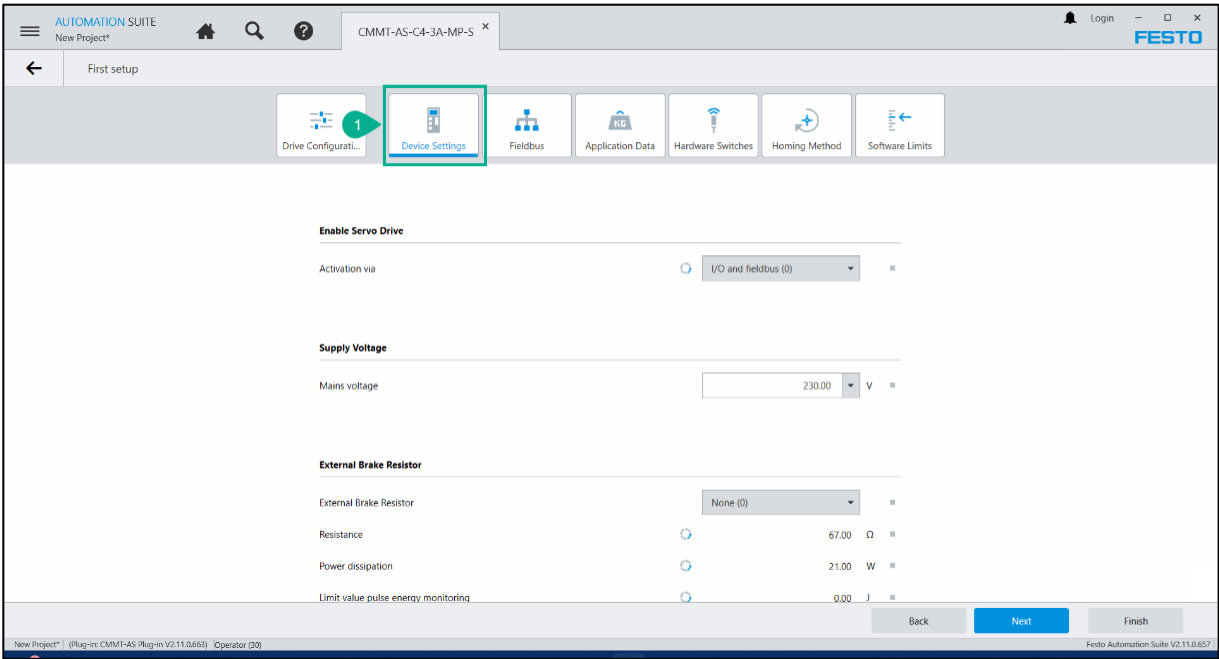


3. After selecting the Mounting kit enter the required configuration details. Click “Apply” to add mounting kit to project.

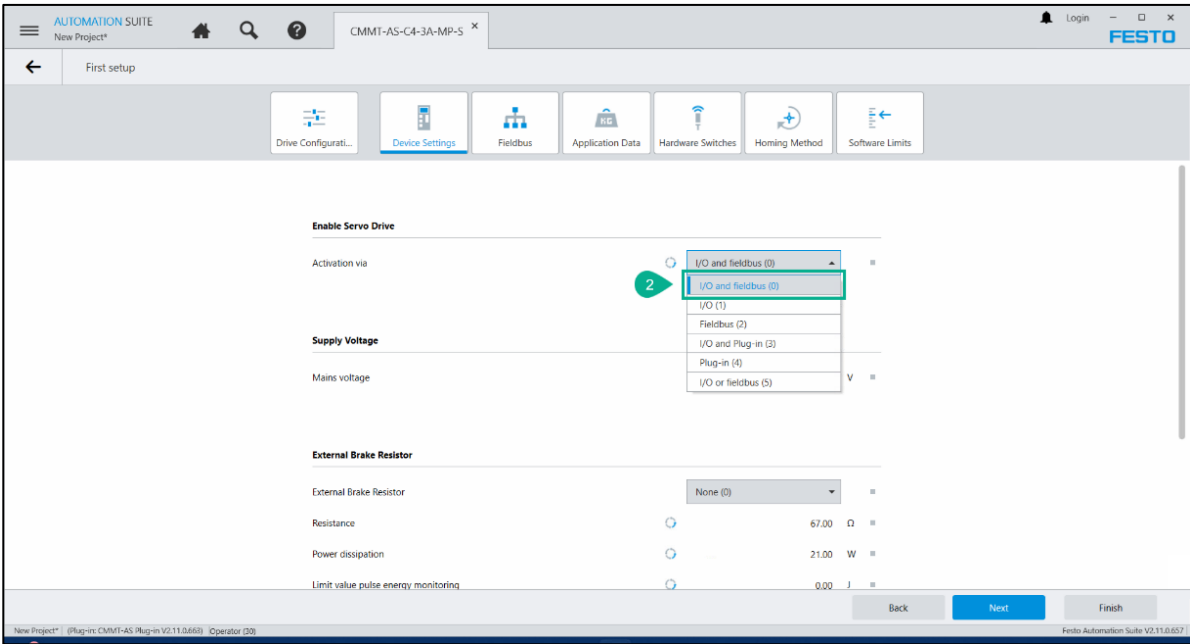


4. The Mounting Kit tab will look as shown above after configuration.

**Step 4: Device Settings**

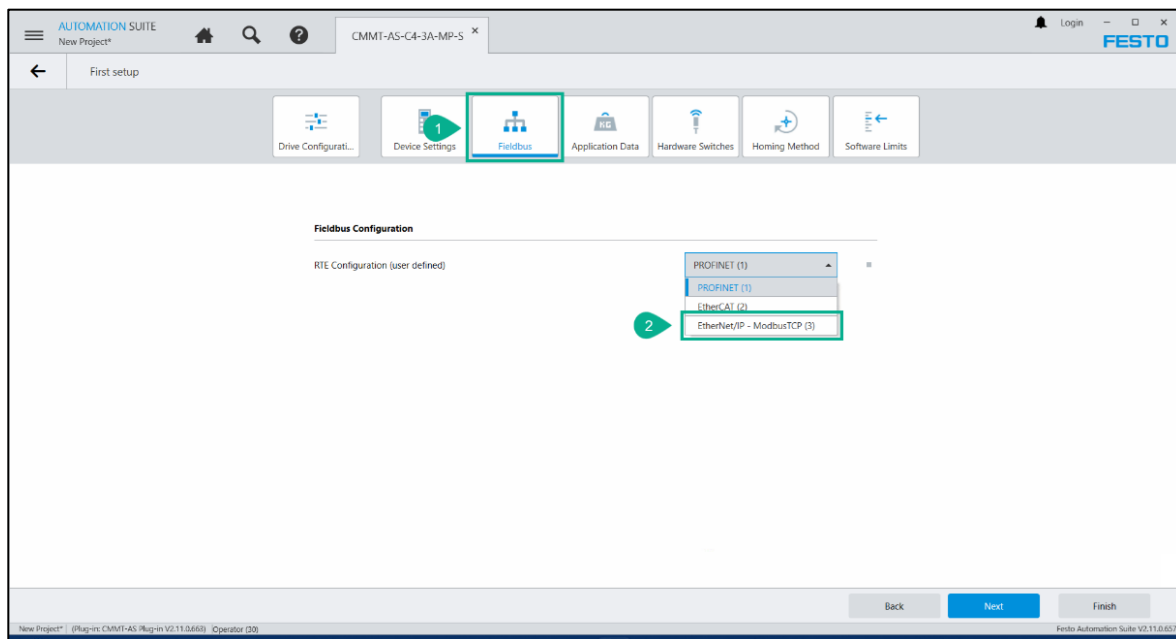


1. Click on “Device Settings” to configure available servo drive options.

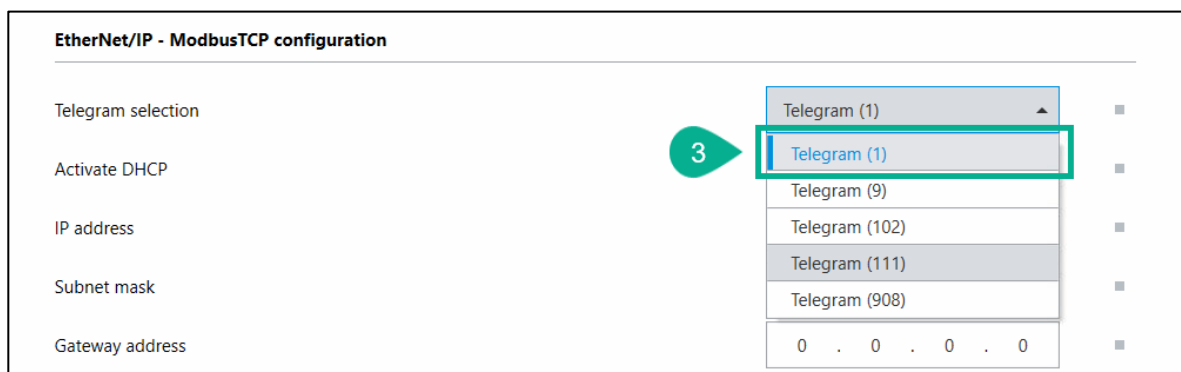


2. Select Activation Via as “I/O and fieldbus (0)”.

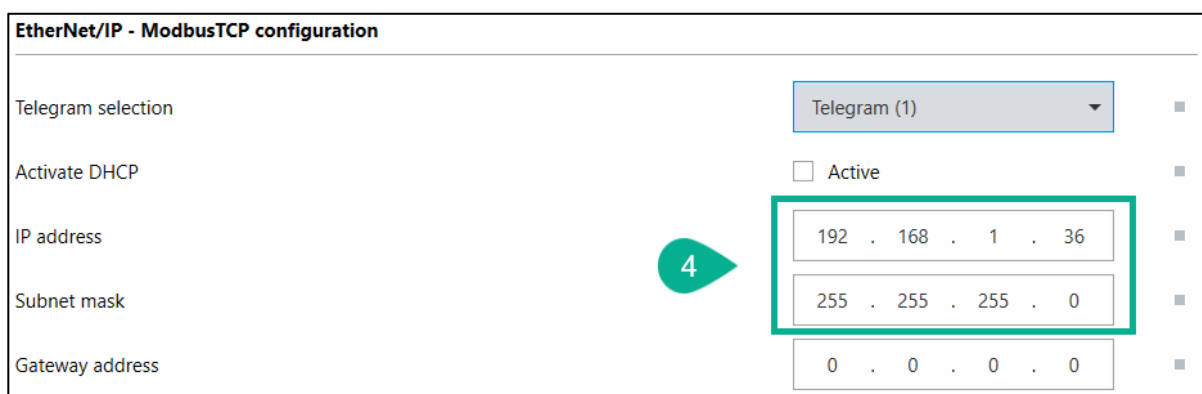
## Step 5: Fieldbus Configuration



1. Click on “Fieldbus” to configure the communication protocol and related settings.
2. Select “EtherNet/IP – ModbusTCP (3)” option from the RTE Configuration option.



3. In EtherNet/IP – Modbus Configuration select “Telegram (111)” Telegram Selection drop-down list.



4. Enter the IP address & Subnet mask for EtherNet/IP – ModbusTCP Configuration. This will be the IP address assigned to Port X19 of the CMMT. This communication interface is used to establish connection with PLC to receive control command and to send signal feedback.

**Step 6: Enter Inertia Value**

**Application Data**

Axis mass moment of inertia 0.00 kgcm²

Application moment of inertia 0.00 kgcm²

Total mass moment of inertia 0.00 kgcm²

**Rotation Polarity**

Reversing direction of motion ☐ Active

Back Next Finish

1. Click on “Application Data”.
2. Enter the inertia value of user application.

**Step 7: Hardware Switches Configuration**

**Hardware Switches**

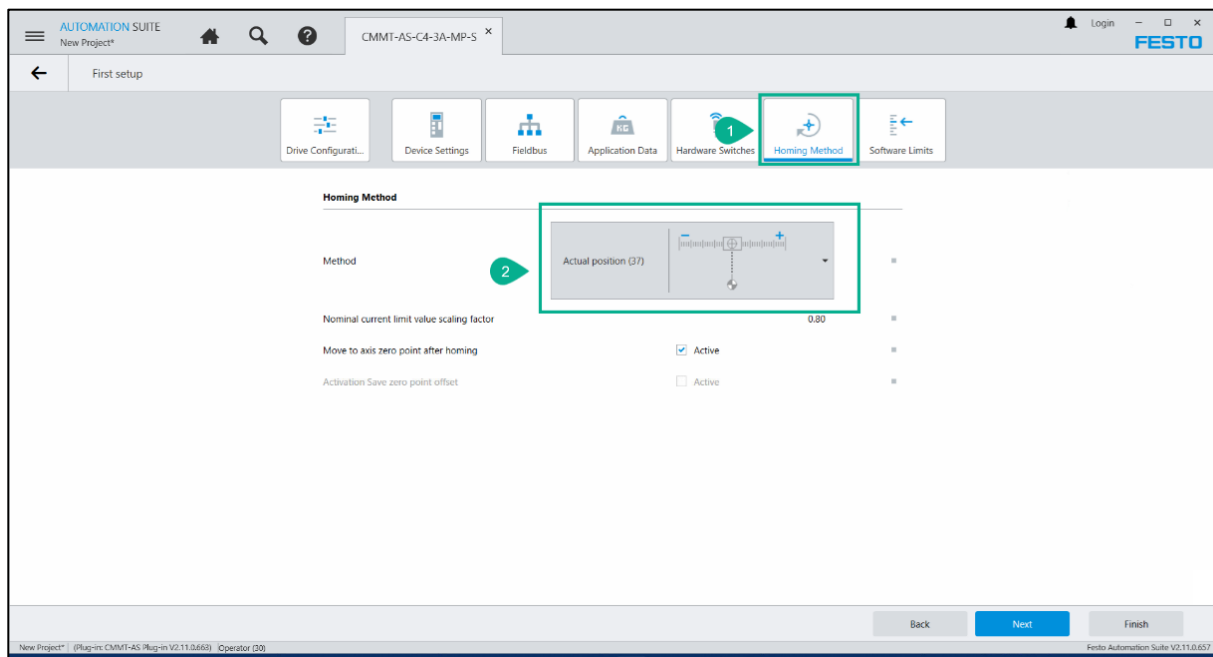
Reference switch configuration No function (0)

Limit switches configuration Not used (1)

Back Next Finish

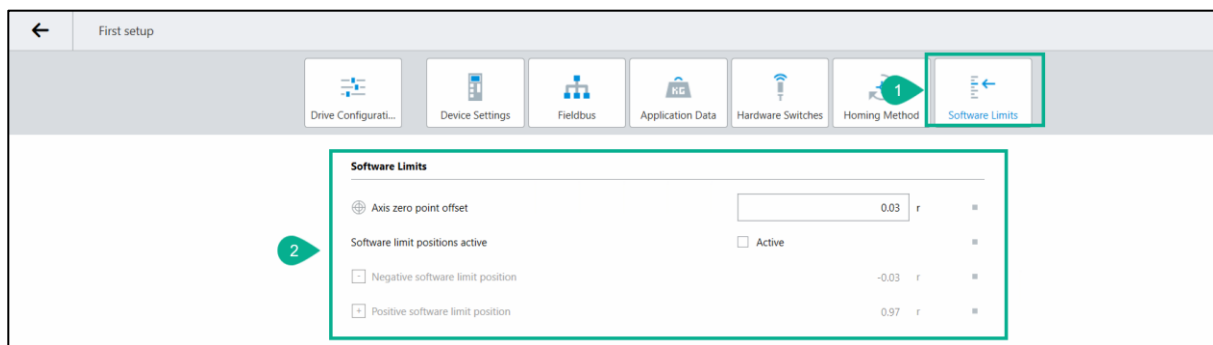
1. Click on “Hardware Switches”.
2. Set the options as “No function (0)” and “Not used (1)” respectively.

## Step 8: Homing Method



1. Click on “Homing Method”.
2. We have selected “Actual Position (37)” option for this example. Select the appropriate option as per your system design.

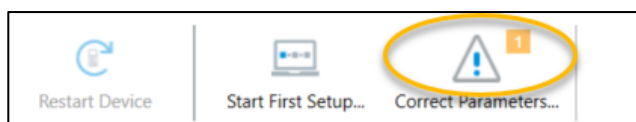
## Step 9: Software Limits Configuration



1. Click on “Software Limits”.
2. Disable the “Software limits positions active” option.

## Step 10: Correct Parameters

At this stage all the mandatory settings for the drive system are done. If, during the process, any parameter was configured incorrectly, the “Correct Parameters” (Right most top corner in FAS tool) option will display a number. The number corresponds to the number of parameters which were wrongly configured. To correct parameter value click the “Correct Parameters” button and then the Apply button. FAS will generate and apply recommended values for the configuration.



### 2.3.5 CMMT Drive Parameterization for Integration with Controller

This chapter describes:

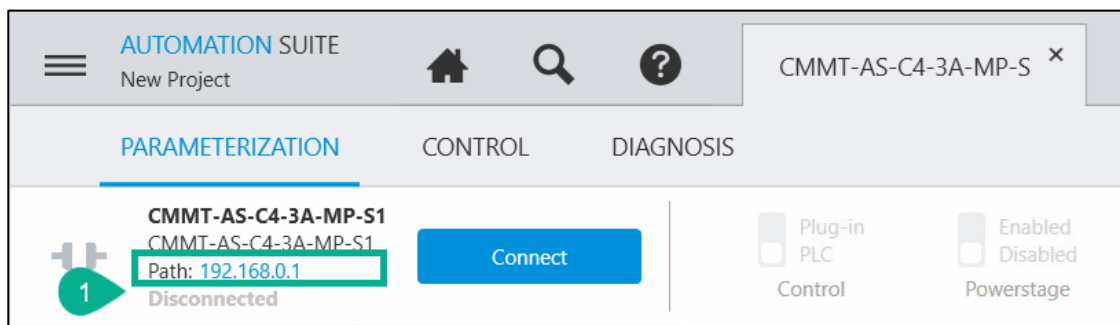
1. Parameterization of CMMT drive to establish communication with PK Controller.
2. Some additional parameters like Factor group, Reference values, EtherNet/IP interface, User defined limits are explained as well.

#### Step 1:

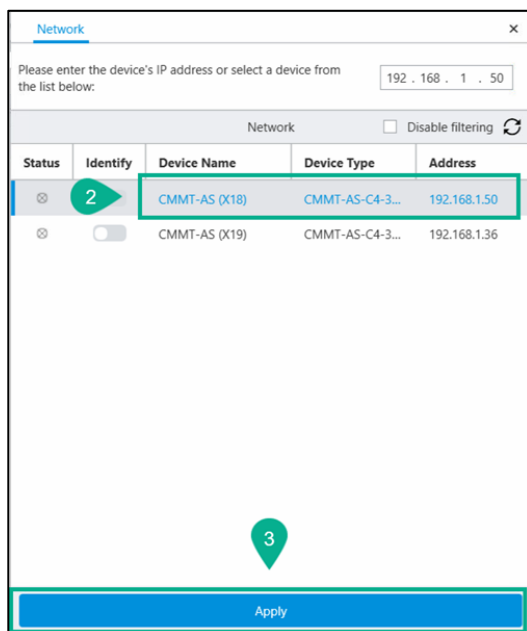


#### Note

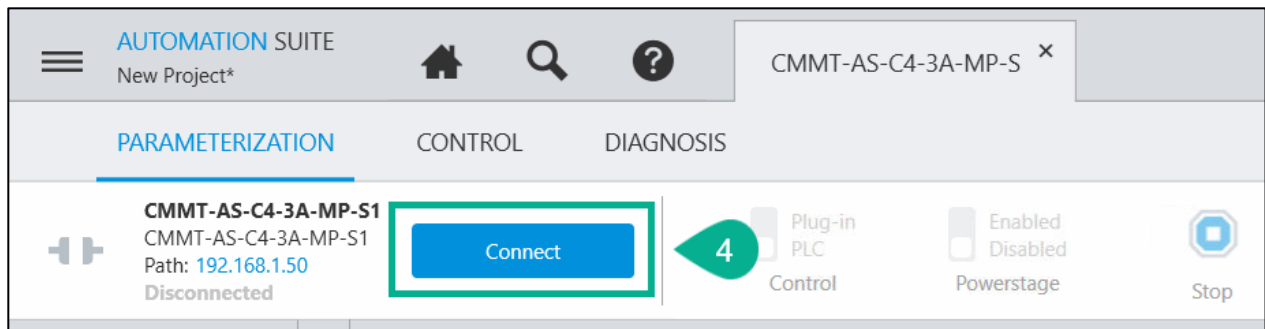
- Follow this step when drive is available for online connection. If drive is not available skip and jump to next step.



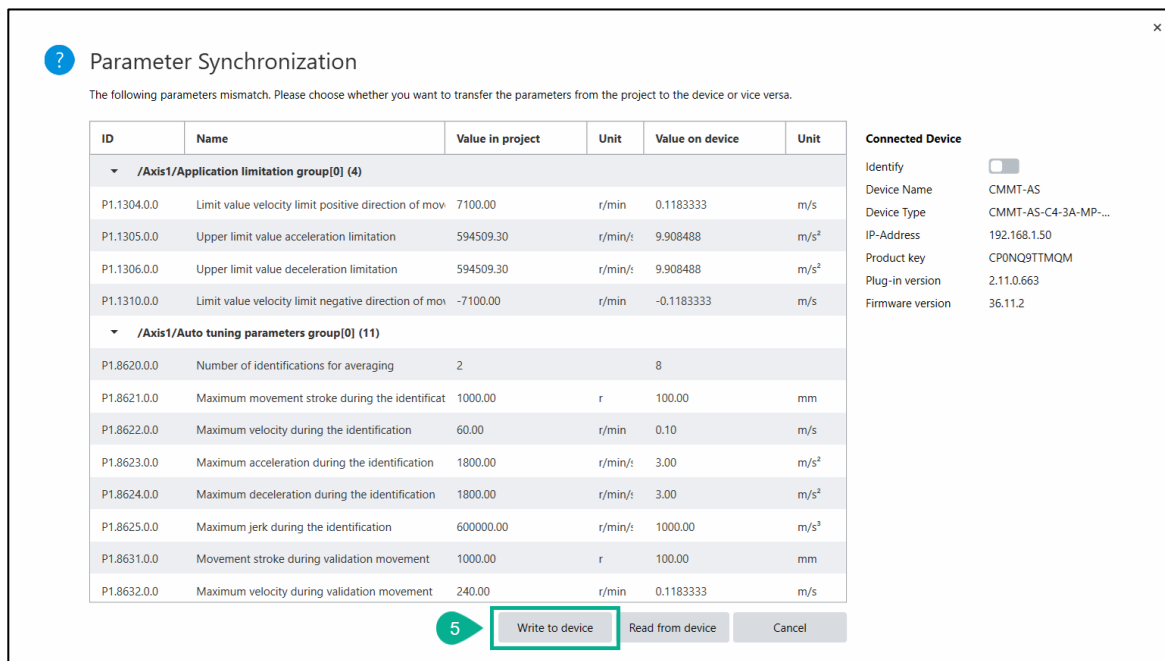
1. Click the IP Address “Path” from tool bar.



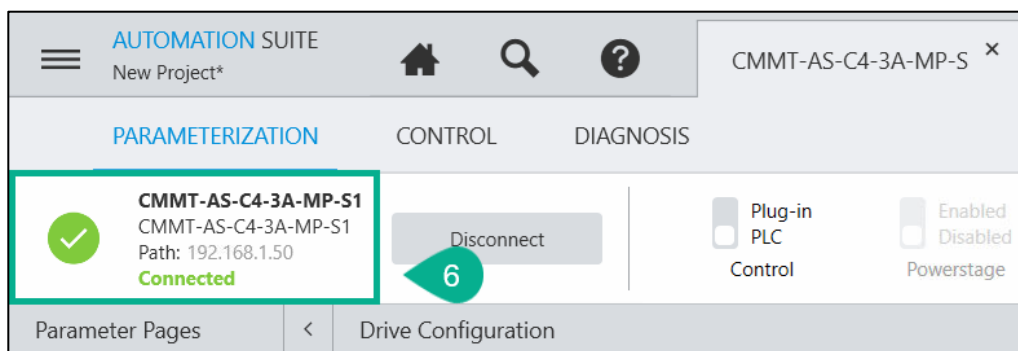
2. Select the correct drive's X18 port based on IP address.
3. Click on “Apply”.



- Click on “Connect” to establish communication with the drive.



- Click on “Connect” to establish communication with the drive.



- The status of the drive changes from “Disconnected” to “Connected”.

**Step 2: Entering “Factor Group” values for Position and Velocity**

1. Navigate to “**Parameter Pages > Profiles > PROFIdrive > Factor Group**”.

**1. 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 = 10000 Increment value in DeltaV

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

**2. 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 DeltaV

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

➔

**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.

### Step 3: Store on Device



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



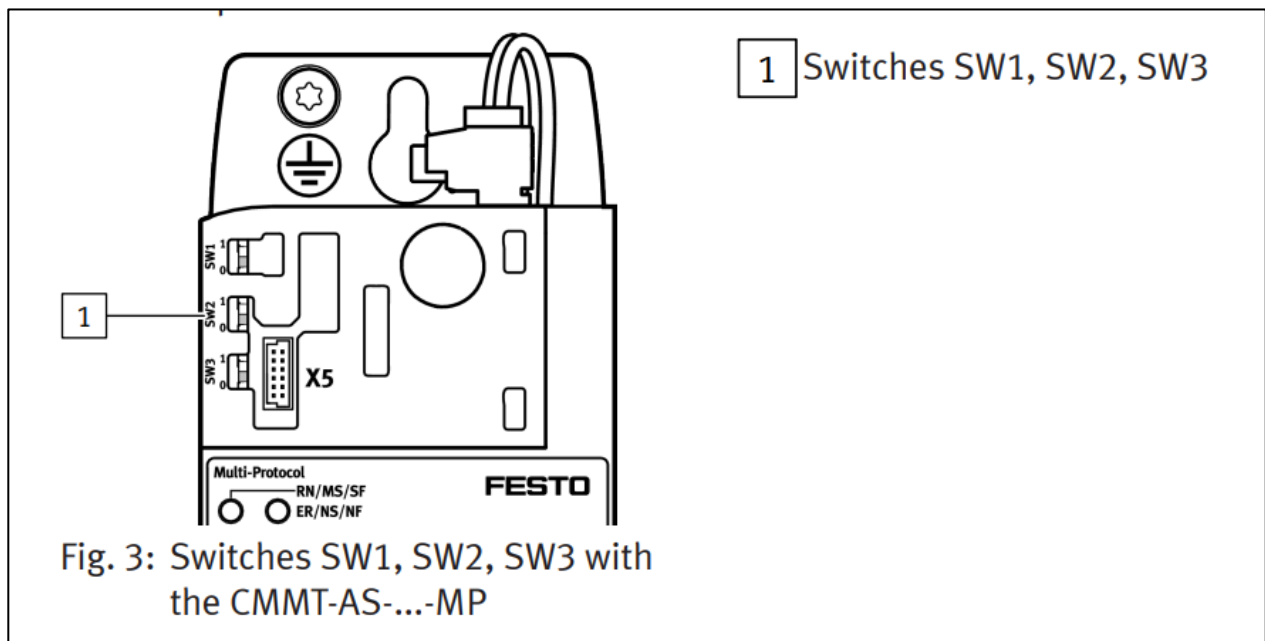
#### Note

- The triangle warning symbol on both buttons indicates action required.
- If modified parameters are not saved on the drive, all modified parameters will be automatically restored to the previous values on power cycle.
- Its mandatory to reinitialize the drive when certain parameters are modified. If drive is not reinitialized the drive parameter will remain unchanged.

## 2.4 CMMT-AS Servo Drive Fieldbus Configuration

The CMMT-AS-...-MP product variant supports several bus protocols. The following options are available for setting the protocol:

3. Automatic detection by the CMMT-AS-...-MP
4. Configuration in the CMMT-AS plug-in
5. Direct specification via SW1 to SW3



### 2.4.1 Switch Setting for Protocol Selection

| Protocol                             | Size 3 | Size 2 | Size 1 |
|--------------------------------------|--------|--------|--------|
| Auto (detection or parameterisation) | 0      | 0      | 0      |
| PROFINET                             | 0      | 0      | 1      |
| EtherCAT                             | 0      | 1      | 0      |
| EtherNet/IP                          | 0      | 1      | 1      |

The switches can be adjusted with a small slotted head screwdriver.  
The switch position is evaluated once when the device is started.



#### Note

- For configuration through the FAS CMMT-AS plug-in all switches should be in 0 position.
- User can use either method to configure fieldbus protocol for CMMT-AS-...-MP.
- If the user selects EtherNet/IP protocol via switch setting; must select **“EtherNet/IP or ModbusTCP”** as RTE Configuration (refer Chapter 2.3.2 Step 5).

### 3 CMMT I/O Configuration in DeltaV

This chapter details the procedure for PK controller, and CMMT I/O configuration of the in Emerson DeltaV v15. The database configuration is done in “DeltaV Explorer” application.

#### 3.1 Controller Configuration

This section details the procedure for configuration to be done in the PK controller in DeltaV Explorer application.

The PDT, LDT, and signal configuration will remain same for EIOC.

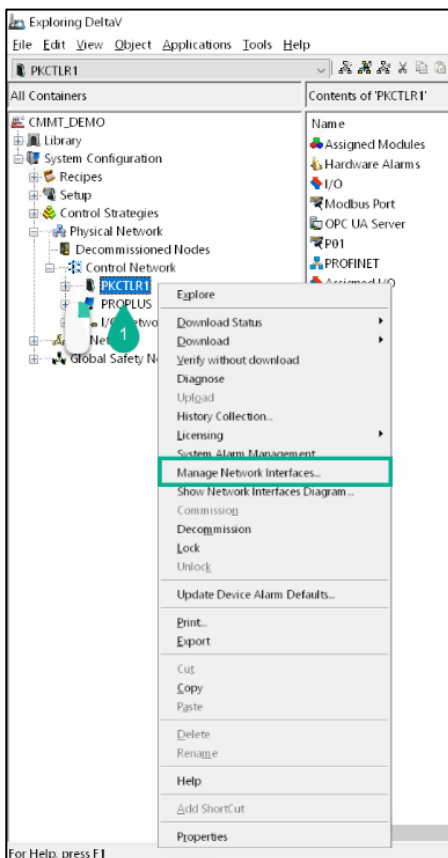
The configuration for VIM2 needs to be done using the VIMnet explorer application. The assembly instances, byte size and signal configuration needs to be kept same as shown with the PK controller example.



#### Note

- The steps for network settings described in this section are considering the system architecture in Section 2.3 for simplex PK controller. Some settings may vary in user system depending on system design.
- It is assumed that the PK Controller/EIOC/VIM2 is configured and commissioned as per the user system design if the system architecture in Section 2.3 is not being used.

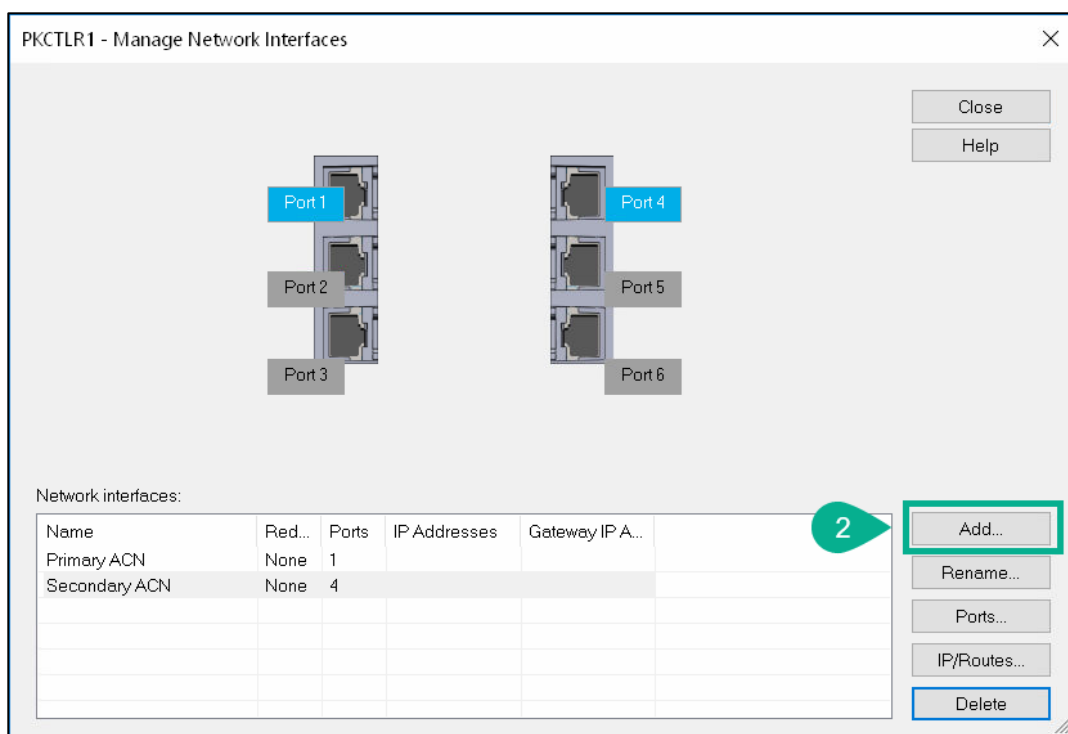
##### 3.1.1 PK Controller Configuration



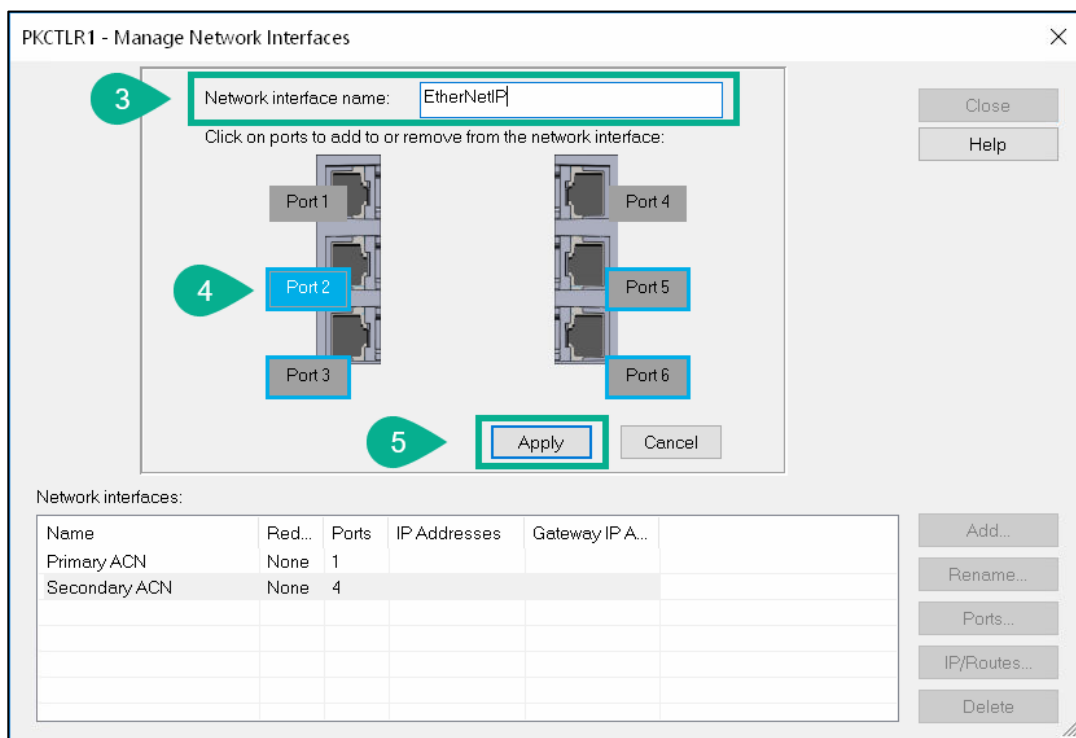
Open DeltaV Explorer from following path: **Windows Start > DeltaV Engineering > DeltaV Explorer**

1. Right-click the PK Controller and click on “**Manage Network Interfaces...**”.

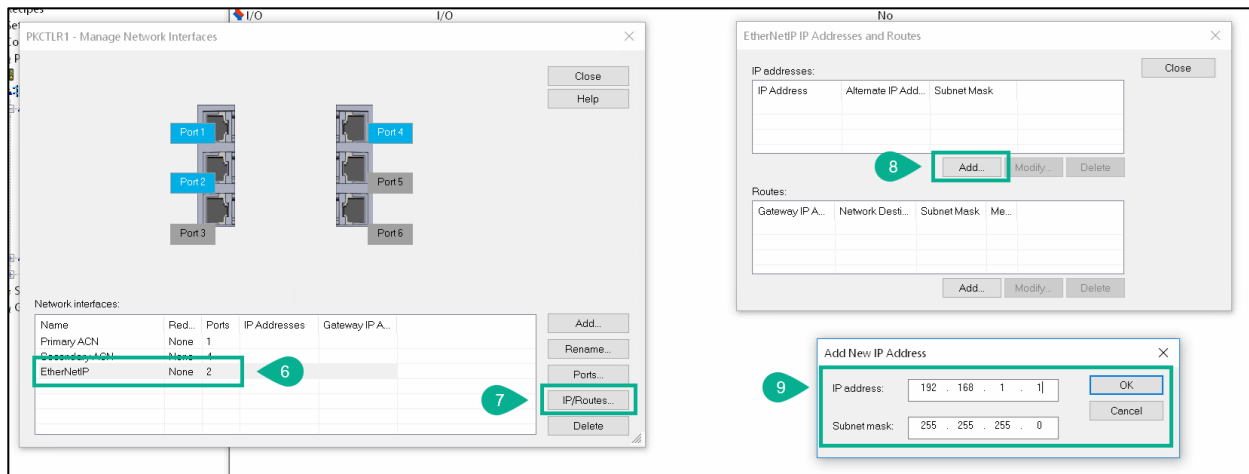




2. Click on Add button.

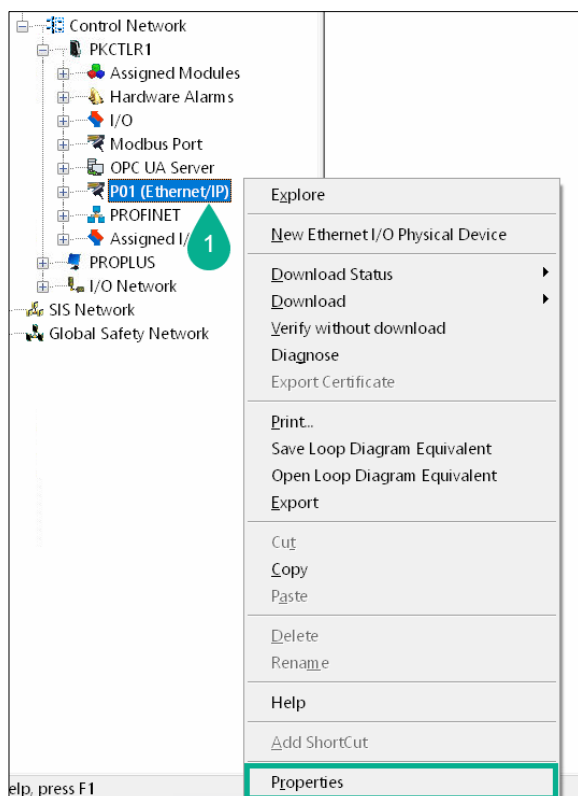


3. Enter the Network interface name.
4. Select the PK controller port to which the network interface will be bound. In this example, we have selected "Port 2".
5. Click on "Apply" button.



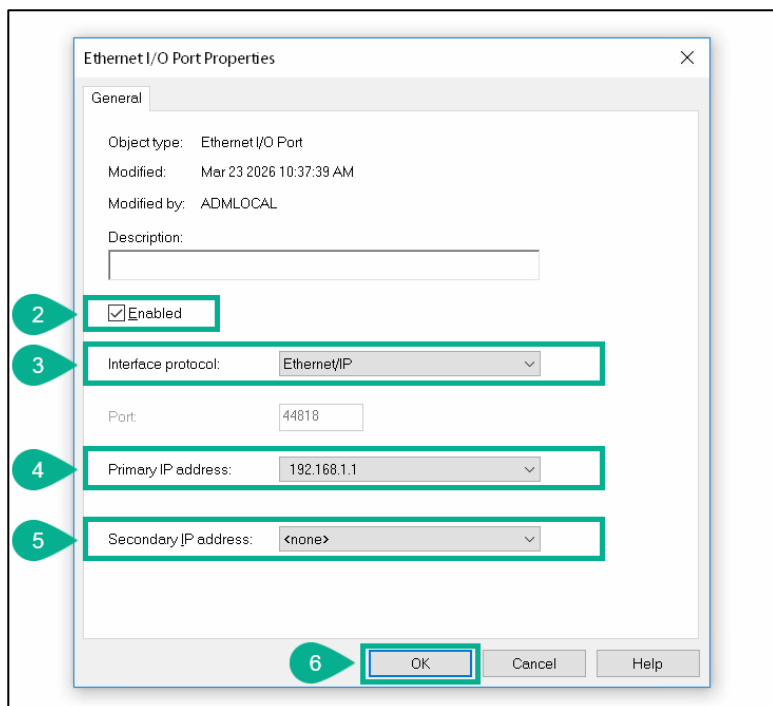
6. Click on the Network interface name for EtherNet/IP.
7. Click on “IP/Routes” button to open the “EtherNetIP IP Addresses and Routes” dialog.
8. Click on “Add” button to open the dialog to add New IP Address.
9. Enter the IP address and Subnet mask to be set for the EtherNet/IP port of PK controller and click on “OK”.

## 3.1.2 P01 Configuration



Expand the PK Controller tree by clicking on the “+” symbol.

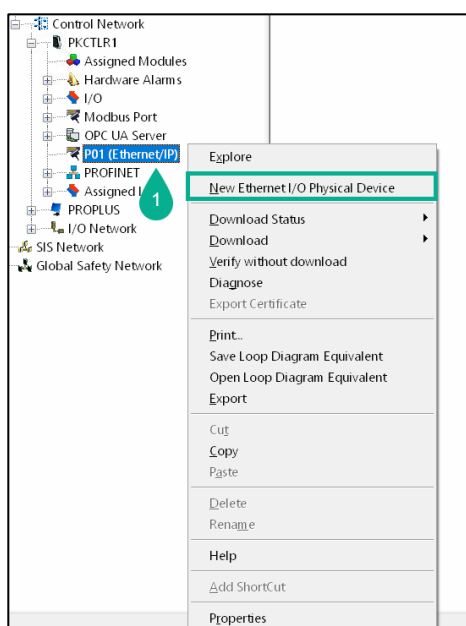
1. Right-click on P01 (Ethernet/IP) and click on “**Properties**”.



2. Check the **“Enabled”** box in **“General”** tab to enable P01.
3. Set the Interface protocol to **“Ethernet/IP”**.
4. Select Primary IP address from the network interface we set in previous step.
5. Select Secondary IP address from the network interface if set in previous step.
6. Click **“OK”** on the property dialog box to apply settings.

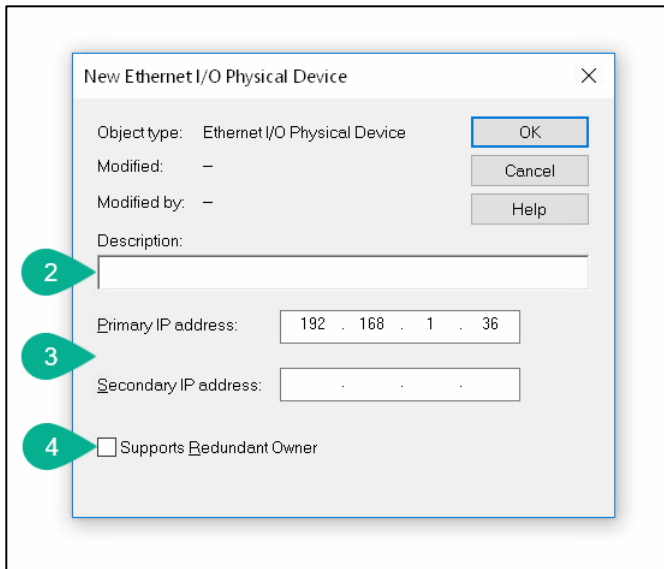
## 3.2 Physical Device (PDT) Configuration

### Step 1 – Creating a new Physical Device



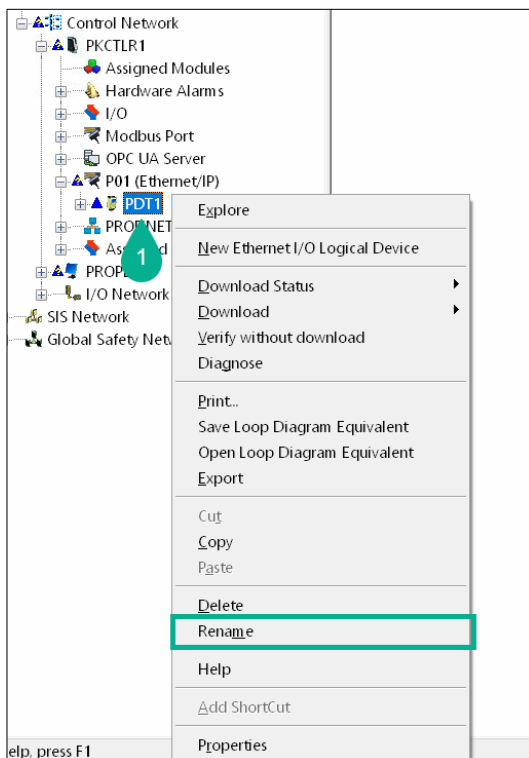
Following is the procedure to create a new Physical Device

1. Right-click on P01 (Ethernet/IP) and click on **“New Ethernet I/O Physical Device”**.



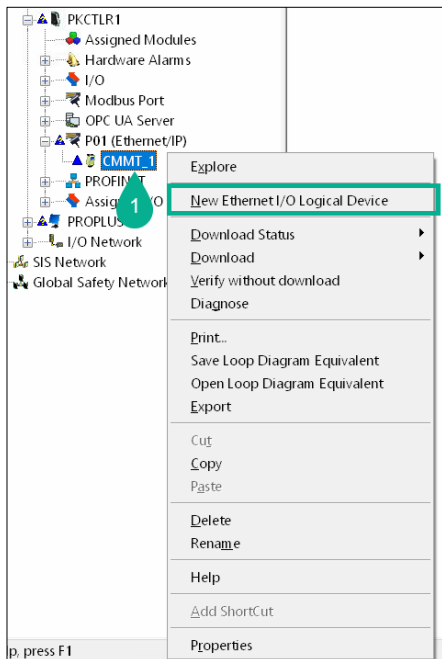
2. Enter description for the physical device (setting this property is optional).
3. Set **“Primary IP Address”** same as that of the CMMT servo drive Port X19. In this example, we have set the IP address for Port X19 on CMMT to **“192.168.1.36”**. Keep the Secondary IP address field blank.
4. Keep the **“Supports Redundant Owner”** option unchecked.
5. Click **“OK”** on the property dialog box to apply settings.

## Step 2 – Naming a Physical Device



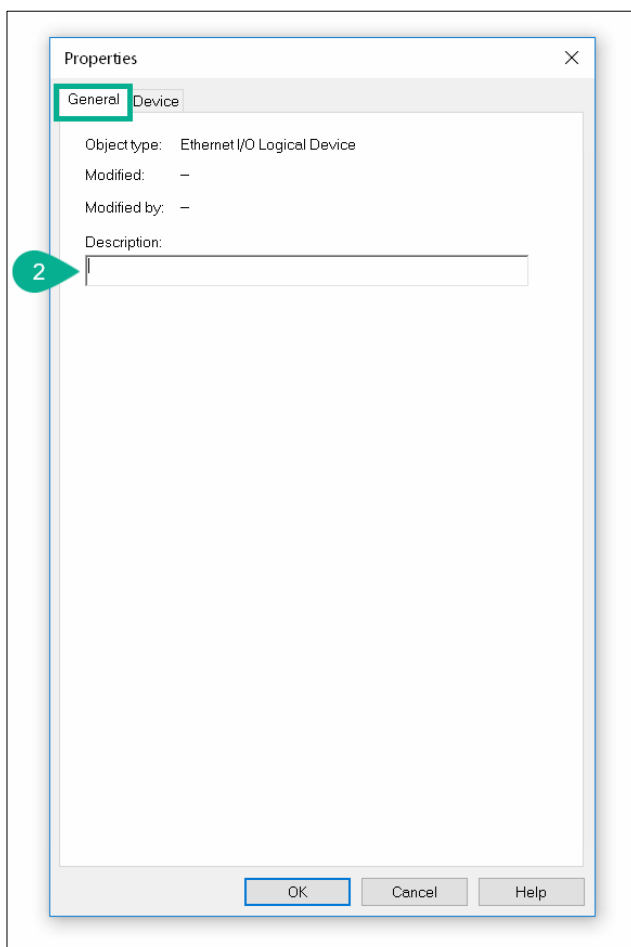
1. Right-click on the Physical Device (PDT1 in this example) and click on **“Rename”**.
2. You can name the Physical Device per the project naming philosophy while adhering DeltaV standard practices and restrictions.
3. For this example, we will name the physical device **“CMMT\_1”**.

### 3.3 Logical Device (LDT) Configuration

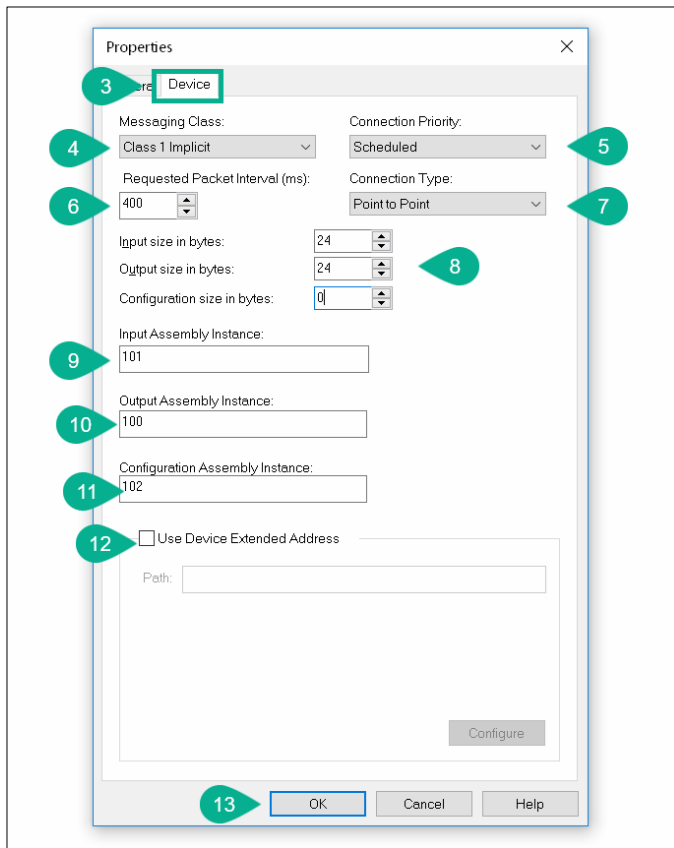


Following is the procedure to create a new Logical Device:

1. Right-click on the physical device and click on **“New Ethernet I/O Logical Device”**.



2. In **“General”** tab, enter description for the logical device (setting this property is optional).



3. Click on **“Device”** tab.
4. Set messaging class to **“Class 1 Implicit”**.
5. Set connection priority to **“Scheduled”**.
6. Set requested packet interval (ms) to **“400”**.
7. Set connection type to **“Point to Point”**.
8. Set the Input Size to **“24”** bytes, Output Size to **“24”** bytes, and Configuration Size to **“0”** bytes. These values are fixed for all CMMTs and should be entered correctly.
9. Set Input Assembly Instance to **“101”**. This value is fixed for all CMMTs and should be entered correctly.
10. Set Output Assembly Instance to **“100”**. This value is fixed for all CMMTs and should be entered correctly.
11. Set Configuration Assembly Instance to **“102”**. This value is fixed for all CMMTs and should be entered correctly.
12. Keep **“Use Device Extended Address”** option unchecked.
13. Click **“OK”** on the property dialog box to create the logical device.

### 3.4 CMMT Signal Configuration

#### 3.4.1 Signal Configuration for Basic Velocity Control (Telegram 1)

The CMMT EtherNet/IP signal configuration is same as the Telegram 1 which is a Siemens specific extension of PROFIDrive (Siemens Telegram 1).

It consists of 4 bytes of input data and 4 bytes of output data.

Following is the snapshot of signal configuration for CMMT. This configuration will remain same for all CMMTs.

| Contents of 'LDT1' |                                |              |                  |                         |             |               |            |
|--------------------|--------------------------------|--------------|------------------|-------------------------|-------------|---------------|------------|
| Name               | Description                    | Device Tag   | Signal Direction | Data Type               | Byte Offset | Byte Order    | Word Order |
| SIGNAL001          | Status Word 1 (ZSW1)           | CMMT1_ZSW1   | Input            | 16 bit unsigned integer | 0           | Little Endian | Normal     |
| SIGNAL002          | Actual Speed Value (NIST_A)    | CMMT1_NISTA  | Input            | 16 bit signed integer   | 2           | Little Endian | Normal     |
| SIGNAL003          | Control Word 1 (STW1)          | CMMT1_STW1   | Output           | 16 bit unsigned integer | 0           | Little Endian | Normal     |
| SIGNAL004          | Speed Setpoint Value (NSOLL_A) | CMMT1_NSOLLA | Output           | 16 bit signed integer   | 2           | Little Endian | Normal     |

Following is a snapshot of Telegram 1 signals for CMMT:

| BASIC SPEED CONTROL                           |       |         |                      |                 |                 |                 |                 |                                         |                                 |                                           |                           |                               |                                |                                                      |                         |                             |                            |                                                |
|-----------------------------------------------|-------|---------|----------------------|-----------------|-----------------|-----------------|-----------------|-----------------------------------------|---------------------------------|-------------------------------------------|---------------------------|-------------------------------|--------------------------------|------------------------------------------------------|-------------------------|-----------------------------|----------------------------|------------------------------------------------|
| NOTE: Telegram 1 is direct copy of PROFIDrive |       |         |                      |                 |                 |                 |                 |                                         |                                 |                                           |                           |                               |                                |                                                      |                         |                             |                            |                                                |
| STATUS                                        | WORD1 | ZSW1    | B15                  | B14             | B13             | B12             | B11             | B10                                     | B9                              | B8                                        | B7                        | B6                            | B5                             | B4                                                   | B3                      | B2                          | B1                         | B0                                             |
|                                               |       |         | Device specific      | Device specific | Device specific | Device specific | Device specific | ZSW1.10<br>Setpoint Reached or Exceeded | ZSW1.9<br>PLC Control Requested | ZSW1.8<br>Velocity Error within Tolerance | ZSW1.7<br>Warning Present | ZSW1.6<br>Switch On Inhibited | ZSW1.5<br>Quick Stop Activated | ZSW1.4<br>Coast Stop Activated                       | ZSW1.3<br>Fault Present | ZSW1.2<br>Operation Enabled | ZSW1.1<br>Ready To Operate | ZSW1.0<br>Ready to Switch On                   |
| CONTROL                                       | WORD2 | NST_A   | Actual Speed Value   |                 |                 |                 |                 |                                         |                                 |                                           |                           |                               |                                |                                                      |                         |                             |                            |                                                |
|                                               |       |         | WORD1                | STW1            | Device specific | Device specific | Device specific | Device specific                         | Device specific                 | STW1.10<br>Control By PLC                 | Jog 2                     | Jog 1                         | STW1.7<br>Fault Reset          | STW1.6<br>Enable Velocity Setpoint<br>FAS P1.1147060 | Unfreeze Ramp Generator | Enable Ramp Generator       | STW1.3<br>Enable Operation | STW1.2<br>Quick Stop Disable<br>FAS P1.1147020 |
|                                               | WORD2 | NSOLL_A | Speed Setpoint Value |                 |                 |                 |                 |                                         |                                 |                                           |                           |                               |                                |                                                      |                         |                             |                            |                                                |
|                                               |       |         |                      |                 |                 |                 |                 |                                         |                                 |                                           |                           |                               |                                |                                                      |                         |                             |                            |                                                |

### 3.4.2 Signal Configuration for Position Control (Telegram 111)

The CMMT EtherNet/IP signal configuration is same as the Telegram 111 which is a Siemens specific extension of PROFIDrive (Siemens Telegram 111).

It consists of 24 bytes of input data and 24 bytes of output data.

Following is the snapshot of signal configuration for CMMT. This configuration will remain same for all CMMTs.

| Name      | Description                          | Device Tag      | Signal Direction | Data Type               | Byte Offset | Byte Order    | Word Order |
|-----------|--------------------------------------|-----------------|------------------|-------------------------|-------------|---------------|------------|
| SIGNAL001 | Status Word 1 (ZSW1)                 | CMMT1_ZSW1      | Input            | 16 bit unsigned integer | 0           | Little Endian | Normal     |
| SIGNAL002 | Positioner Status Word 1 (POS_ZSW1)  | CMMT1_POS_ZSW1  | Input            | 16 bit unsigned integer | 2           | Little Endian | Normal     |
| SIGNAL003 | Positioner Status Word 2 (POS_ZSW2)  | CMMT1_POS_ZSW2  | Input            | 16 bit unsigned integer | 4           | Little Endian | Normal     |
| SIGNAL004 | Status Word 2 (ZSW2)                 | CMMT1_ZSW2      | Input            | 16 bit unsigned integer | 6           | Little Endian | Normal     |
| SIGNAL005 | Status Word Messages (MELDW)         | CMMT1_MELDW     | Input            | 16 bit unsigned integer | 8           | Little Endian | Normal     |
| SIGNAL006 | Actual Position A (XIST_A)           | CMMT1_XISTA     | Input            | 32 bit signed integer   | 10          | Little Endian | Normal     |
| SIGNAL007 | Rotational Speed Value B (NIST_B)    | CMMT1_NISTB     | Input            | 32 bit signed integer   | 14          | Little Endian | Normal     |
| SIGNAL008 | Active Fault Number (FAULT_CODE)     | CMMT1_FLT_CODE  | Input            | 16 bit unsigned integer | 18          | Little Endian | Normal     |
| SIGNAL009 | Active Warning Number (WARN_CODE)    | CMMT1_WARN_CODE | Input            | 16 bit unsigned integer | 20          | Little Endian | Normal     |
| SIGNAL010 | Control Word 1 (STW1)                | CMMT1_STW1      | Output           | 16 bit unsigned integer | 0           | Little Endian | Normal     |
| SIGNAL011 | Positioner Control Word 1 (POS_STW1) | CMMT1_POS_STW1  | Output           | 16 bit unsigned integer | 2           | Little Endian | Normal     |
| SIGNAL012 | Positioner Control Word 2 (POS_STW2) | CMMT1_POS_STW2  | Output           | 16 bit unsigned integer | 4           | Little Endian | Normal     |
| SIGNAL013 | Control Word 2 (STW2)                | CMMT1_STW2      | Output           | 16 bit unsigned integer | 6           | Little Endian | Normal     |
| SIGNAL014 | Override                             | CMMT1_OVRD      | Output           | 16 bit signed integer   | 8           | Little Endian | Normal     |
| SIGNAL015 | MDI Target Position (MDI_TARPOS)     | CMMT1_MDI_TRPS  | Output           | 32 bit signed integer   | 10          | Little Endian | Normal     |
| SIGNAL016 | MDI Velocity (MDI_VELOCITY)          | CMMT1_MDI_VEL   | Output           | 32 bit signed integer   | 14          | Little Endian | Normal     |
| SIGNAL017 | MDI Acceleration (MDI_ACC)           | CMMT1_MDI_ACC   | Output           | 16 bit signed integer   | 18          | Little Endian | Normal     |
| SIGNAL018 | MDI Deceleration (MDI_DEC)           | CMMT1_MDI_DEC   | Output           | 16 bit signed integer   | 20          | Little Endian | Normal     |

Following is a snapshot of Telegram 111 signals for CMMT:

| PIP MODE                                                                                 |                             |                                                                              |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
|------------------------------------------------------------------------------------------|-----------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------|
| NOTE: Telegram 111 is a SIEMENS specific extension of PROFIDrive. (Siemens telegram 111) |                             |                                                                              |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
|                                                                                          | B15                         | B14                                                                          | B13                                                                          | B12                                                           | B11                                                                                                     | B10                                                                                                        | B9                                                                                                                                                                                                                   | B8                                                                                                     | B7                                                                                       | B6                                                                              | B5                                                                              | B4                                                                                                                                 | B3                                                                                                                              | B2                                                          | B1                                                                 | B0                                                                        |                                                                   |                    |
| WORD0                                                                                    | ZSW1                        | ZSW1.15<br>Drive<br>Decelerating                                             | ZSW1.14<br>Drive<br>Accelerating                                             | ZSW1.13<br>Drive<br>Stopped<br>Active/Fault<br>FAS PI.1147021 | ZSW1.12<br>Traverse Task<br>Acknowledged<br>Active/Fault<br>FAS PI.1147021                              | ZSW1.11<br>Reference/Home<br>Completed<br>Active/Fault<br>FAS PI.1147021                                   | ZSW1.10<br>Traverse Task<br>Motion Complete<br>Active/Fault<br>FAS PI.1147021                                                                                                                                        | ZSW1.9<br>PLC<br>Control<br>Requested                                                                  | ZSW1.8<br>Following Error<br>Within<br>Tolerance Range<br>Active/Fault<br>FAS PI.1147021 | ZSW1.7<br>Warning<br>On Inhibited<br>Lockout<br>Active/Fault<br>FAS PI.1147021  | ZSW1.6<br>Switch<br>On Inhibited<br>Lockout<br>Active/Fault<br>FAS PI.1147021   | ZSW1.5<br>Quick<br>Stop<br>Not Active<br>Active/Fault<br>FAS PI.1147021                                                            | ZSW1.4<br>Coast<br>Stop<br>Not Active<br>Active/Fault<br>FAS PI.1147021                                                         | ZSW1.3<br>Fault<br>Active<br>Active/Fault<br>FAS PI.1147021 | ZSW1.2<br>Operation<br>Enabled<br>Active/Fault<br>FAS PI.1147021   | ZSW1.1<br>Ready<br>To Operate<br>Safely<br>Active/Fault<br>FAS PI.1147021 | ZSW1.0<br>Ready<br>To Switch On<br>Active/Fault<br>FAS PI.1147021 |                    |
|                                                                                          | POS_ZSW1<br>or<br>Epos_ZSW1 | POS_ZSW1.15<br>MDI<br>Active Selection<br>0-Record Mode<br>1-Direct Mode     | POS_ZSW1.14<br>Setup<br>Active                                               | POS_ZSW1.13<br>Position<br>Record Task<br>Is Active           | Reserved B12                                                                                            | POS_ZSW1.11<br>Jogging<br>Task<br>Is Active                                                                | POS_ZSW1.10<br>Jogging<br>Task<br>Is Active                                                                                                                                                                          | POS_ZSW1.9<br>Positive Hardware<br>Limit Switch<br>Is Activated                                        | POS_ZSW1.8<br>Negative Hardware<br>Limit Switch<br>Is Activated                          | Reserved B7                                                                     | POS_ZSW1.6<br>Position<br>Record<br>Selected<br>BB 6                            | POS_ZSW1.5<br>Position<br>Record<br>Selected<br>BB 5                                                                               | POS_ZSW1.4<br>Position<br>Record<br>Selected<br>BB 4                                                                            | POS_ZSW1.3<br>Position<br>Record<br>Selected<br>BB 3        | POS_ZSW1.2<br>Position<br>Record<br>Selected<br>BB 2               | POS_ZSW1.1<br>Position<br>Record<br>Selected<br>BB 1                      | POS_ZSW1.0<br>Position<br>Record<br>Selected<br>BB 0              |                    |
| WORD2                                                                                    | POS_ZSW2<br>or<br>Epos_ZSW2 | POS_ZSW2.15<br>Traversing<br>Task Is<br>Active                               | POS_ZSW2.14<br>Fixed Stop<br>Move Is<br>Active                               | POS_ZSW2.13<br>Fixed Stop<br>Clamping Torque<br>Reached       | POS_ZSW2.12<br>Fixed Stop<br>Stroke<br>Reached                                                          | POS_ZSW2.11<br>Direct Output 2<br>Via<br>Positioning Record                                                | POS_ZSW2.10<br>Direct Output 1<br>Via<br>Positioning Record                                                                                                                                                          | POS_ZSW2.9<br>Position Trigger<br>Switch 1                                                             | POS_ZSW2.8<br>Position Trigger<br>Switch 0                                               | POS_ZSW2.7<br>Positive<br>Software Limit<br>Switch Is Reached<br>FAS PI.1147020 | POS_ZSW2.6<br>Negative<br>Software Limit<br>Switch Is Reached<br>FAS PI.1147020 | POS_ZSW2.5<br>Axis Is<br>Moving<br>Negative                                                                                        | POS_ZSW2.4<br>Axis Is<br>Moving<br>Positive                                                                                     | Reserved B3                                                 | POS_ZSW2.2<br>Serpent Point<br>Reached                             | POS_ZSW2.1<br>Velocity<br>Limit<br>Is Active                              | POS_ZSW2.0<br>Tracking<br>Mode<br>Is Active                       |                    |
|                                                                                          | ZSW2                        | Sign Of Life                                                                 |                                                                              |                                                               | ZSW2.11<br>Power Stage<br>Active                                                                        | Device<br>specific                                                                                         | Device<br>specific                                                                                                                                                                                                   | ZSW2.8<br>Fixed Stop<br>Move Is Active<br>(No Faults Mapping)                                          | Device<br>specific                                                                       | Device<br>specific                                                              | Device<br>specific                                                              | Device<br>specific                                                                                                                 | Device<br>specific                                                                                                              | Device<br>specific                                          | Device<br>specific                                                 | Device<br>specific                                                        | Device<br>specific                                                | Device<br>specific |
| WORD4                                                                                    | MELDW                       | Reserved B15                                                                 | Reserved B14                                                                 | Pulses<br>Enabled                                             | Drive<br>Ready                                                                                          | Controller<br>Enable                                                                                       | Reserved B10                                                                                                                                                                                                         | Reserved B9                                                                                            | Speed Setpoint -<br>Actual Deviation<br>Within tolerance                                 | No alarm, thermal<br>overload, power<br>off                                     | No motor<br>over-<br>temperature alarm                                          | Variable signaling<br>function                                                                                                     | Reserved B4                                                                                                                     | Setpoint[1] +<br>speed threshold<br>value 2                 | Setpoint[2] +<br>speed threshold<br>value 3                        | Torque [Nm] +<br>torque threshold<br>value 1                              | 0 = Ramping<br>Active<br>1 = Ramping<br>Completed                 |                    |
| WORD5                                                                                    | ADT_A                       | Actual Position Value<br>Active/Fault<br>FAS PI.1147021                      |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD6                                                                                    | ADT_A                       | Actual Velocity Value<br>Active/Fault<br>FAS PI.1147021                      |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD7                                                                                    | ADT_B                       | Active Fault Number<br>Active/Fault<br>FAS PI.1147021                        |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD8                                                                                    | ADT_C                       | Active Warning Number<br>Active/Fault<br>FAS PI.1147021                      |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD9                                                                                    | FAULT_CODE                  | Not Used                                                                     |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD10                                                                                   | WARN_CODE                   | Not Used                                                                     |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD11                                                                                   | Reserved                    |                                                                              |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD0                                                                                    | STW1                        | Device<br>specific                                                           | Device<br>specific                                                           | Device<br>specific                                            | STW1.12<br>Release<br>Holding Brake<br>Config[POS.15]<br>Interlock<br>FAS PI.1147020                    | STW1.11<br>Home/Reference<br>Task<br>Start                                                                 | STW1.10<br>Control<br>By<br>PLC<br>FAS PI.1147020                                                                                                                                                                    | STW1.9<br>FAS PI.1147020                                                                               | STW1.8<br>FAS PI.1147020                                                                 | STW1.7<br>Fault<br>Acknowledge<br>Active/Fault<br>FAS PI.1147021                | STW1.6<br>Traverse Task<br>Acknowledge<br>Active/Fault<br>FAS PI.1147021        | STW1.5<br>Intermediate<br>Stop Disable<br>Ramp Stop @<br>Current Decel<br>Task-Not Requested<br>IntermediateStop<br>FAS PI.1147021 | STW1.4<br>Traversing<br>Task Enable<br>Ramp Stop @<br>Current Decel<br>Task-Not Requested<br>CancelTraversing<br>FAS PI.1147021 | STW1.3<br>Enable<br>Operation                               | STW1.2<br>Quick Stop<br>Disable<br>Config[POS.1]<br>FAS PI.1147020 | STW1.1<br>Coast Stop<br>Disable<br>Config[POS.0]<br>FAS PI.1147020        | STW1.0<br>Power<br>Stage Pules<br>Enable<br>FAS PI.1147020        |                    |
|                                                                                          | POS_STW1<br>or<br>Epos_STW1 | POS_STW1.15<br>MDI<br>Selection<br>0-Record Mode<br>1-Direct Mode            | POS_STW1.14<br>Signal<br>Setup<br>Selected                                   | Reserved B13                                                  | POS_STW1.12<br>Continuous<br>Position Setpoint<br>Transfer Enable<br>Config[POS.8]<br>FAS<br>PI.1147021 | Reserved B11                                                                                               | POS_STW1.10 and POS_STW1.9<br>0 = Module Position Mode - Shortest Path<br>1 = Module Position Mode - Only Positive Path<br>2 = Module Position Mode - Only Negative Path<br>3 = Module Position Mode - Shortest Path | POS_STW1.8<br>Direct Mode Absolute<br>Positioning<br>Active                                            | Reserved B7                                                                              | POS_STW1.6<br>Position<br>Record<br>Select<br>BB 6                              | POS_STW1.5<br>Position<br>Record<br>Select<br>BB 5                              | POS_STW1.4<br>Position<br>Record<br>Select<br>BB 4                                                                                 | POS_STW1.3<br>Position<br>Record<br>Select<br>BB 3                                                                              | POS_STW1.2<br>Position<br>Record<br>Select<br>BB 2          | POS_STW1.1<br>Position<br>Record<br>Select<br>BB 1                 | POS_STW1.0<br>Position<br>Record<br>Select<br>BB 0                        |                                                                   |                    |
| WORD2                                                                                    | POS_STW2<br>or<br>Epos_STW2 | POS_STW2.15<br>Hardware Limits<br>Enable<br>Config[POS.3]<br>FAS-PI.11243415 | POS_STW2.14<br>Software Limits<br>Enable<br>Config[POS.2]<br>FAS-PI.11243416 | Reserved B13                                                  | Reserved B12                                                                                            | POS_STW2.11<br>Touch Probe Edge<br>0 = Rising edge<br>1 = Falling edge<br>Config[POS.4]<br>FAS-PI.11243417 | POS_STW2.10<br>Select Touch Probe<br>0 = Probe 1 Active<br>1 = Probe 2 Active<br>Config[POS.5]<br>FAS-PI.11243418                                                                                                    | POS_STW2.9<br>Start Reference Search<br>0 = positive direction<br>1 = negative direction               | POS_STW2.8<br>Reference Select<br>1 = Ramping Reference<br>0 = Search Reference          | Reserved B7                                                                     | Reserved B6                                                                     | POS_STW2.5<br>Jogging<br>1 = Incremental<br>0 = velocity                                                                           | Reserved B4                                                                                                                     | Reserved B3                                                 | POS_STW2.2<br>Reference Cam<br>Active<br>Config[POS.4]             | POS_STW2.1<br>Reference<br>Point                                          | POS_STW2.0<br>Tracking<br>Mode<br>Active                          |                    |
|                                                                                          | STW2                        | Master<br>Sign Of Life                                                       |                                                                              |                                                               | Motor Switchover<br>Completed                                                                           | Reserved B10                                                                                               | Global<br>Trigger Command                                                                                                                                                                                            | STW2.8<br>Travel to<br>Fixed Endstop<br>Enable<br>Config[POS.3]<br>TravelToFixedStop<br>FAS PI.1147020 | Parking Axis<br>Enable                                                                   | Reset<br>Component                                                              | Global<br>Start                                                                 | DDS<br>BB 4                                                                                                                        | DDS<br>BB 3                                                                                                                     | DDS<br>BB 2                                                 | DDS<br>BB 1                                                        | DDS<br>BB 0                                                               |                                                                   |                    |
| WORD4                                                                                    | OVERRIDE                    | Position Velocity Override                                                   |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD5                                                                                    | MDI_TARPOS                  | MDI (Manual Data Input) Position Target<br>Position<br>FAS PI.1147020        |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD6                                                                                    | MDI_TARPOS                  | MDI (Manual Data Input) Velocity Target<br>Velocity<br>FAS PI.1147020        |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD7                                                                                    | MDI_VELOCITY                | MDI (Manual Data Input) Percent Acceleration<br>OverDec<br>FAS PI.1147020    |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD8                                                                                    | MDI_VELOCITY                | MDI (Manual Data Input) Percent Deceleration<br>OverDec<br>FAS PI.1147020    |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD9                                                                                    | MDI_ACC                     | Not Used                                                                     |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD10                                                                                   | MDI_DEC                     | MDI (Manual Data Input) Percent Deceleration<br>OverDec<br>FAS PI.1147020    |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
| WORD11                                                                                   | Reserved                    |                                                                              |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |
|                                                                                          |                             | Not Used                                                                     |                                                                              |                                                               |                                                                                                         |                                                                                                            |                                                                                                                                                                                                                      |                                                                                                        |                                                                                          |                                                                                 |                                                                                 |                                                                                                                                    |                                                                                                                                 |                                                             |                                                                    |                                                                           |                                                                   |                    |

## 3.5 DeltaV ACN Configuration

The DeltaV ACN is configured during DeltaV software package installation and doesn't need to be updated for integrating devices.

### 3.6 Verifying Communication using “Diagnostics – DeltaV” Application

Perform a full download of the PK Controller. Right-click on the PK Controller and click on “Diagnose”.

The screenshot shows the DeltaV System tree on the left and the 'Contents of P01' dialog box on the right. The tree shows the hierarchy: DeltaV System > Decommissioned Nodes > Control Network > PROPLUS > PKCTLR1 > I/O > P01. A green callout '1' points to the 'P01' node. The 'Contents of P01' dialog box shows a table with the following data:

| Name   | Description           | Value       |
|--------|-----------------------|-------------|
| CMMT_1 | Physical Device       | GOOD        |
| Olnteg | Overall Integrity     | GOOD        |
| PType  | Protocol Type         | Ethernet/IP |
| Status | Device Network Status | Good        |

A green callout '2' points to this table. Below the table, there is a 'Process History View' section showing a list of events.

1. In “Diagnostics - DeltaV” application, right-click “P01” and click on “Display Port Statistics”.
2. Ensure that all values in highlighted box 2 are Good and protocol type is set to EtherNet/IP.

The screenshot shows the 'Ethernet I/O Port Statistics' dialog box. The title bar is 'Ethernet I/O Port Statistics'. The main area shows the path 'PKCTLR1/P01/ETHERNETIP'. There are 'Close' and 'Reset' buttons on the right. A table displays the following statistics:

| Statistics             | Value |
|------------------------|-------|
| Messages Received      | 357   |
| Messages Sent          | 0     |
| Device Connections     | 1     |
| Receive Failures       | 0     |
| Send Failures          | 0     |
| Device Error Responses | 0     |
| Device Timeouts        | 0     |

A green callout '3' points to the 'Device Connections' row, and a green callout '4' points to the rows for 'Messages Received', 'Messages Sent', 'Receive Failures', 'Send Failures', 'Device Error Responses', and 'Device Timeouts'.

3. In the dialog box, check that “Device Connections” shows 1 or greater number. This means that the CMMT is communicating with the PK Controller. You should also be able to see some values in “Messages Received” and “Messages Sent” parameters.
4. Ensure that the values in highlighted box 4 are zero. If the values for these parameters are changing, it means there is an error in communication between the CMMT and PK Controller.

## 4 CMMT Library Configuration in DeltaV

### 4.1 Importing Library for Basic Velocity Control (Telegram 1)

The library consists of following four components which need to be imported in numerical sequence:

1. Composite Template
2. Control Module Class
3. Control Module Template
4. Graphics

Subsequent sections have detailed procedure to import each of the components which must be imported sequentially.



#### Caution

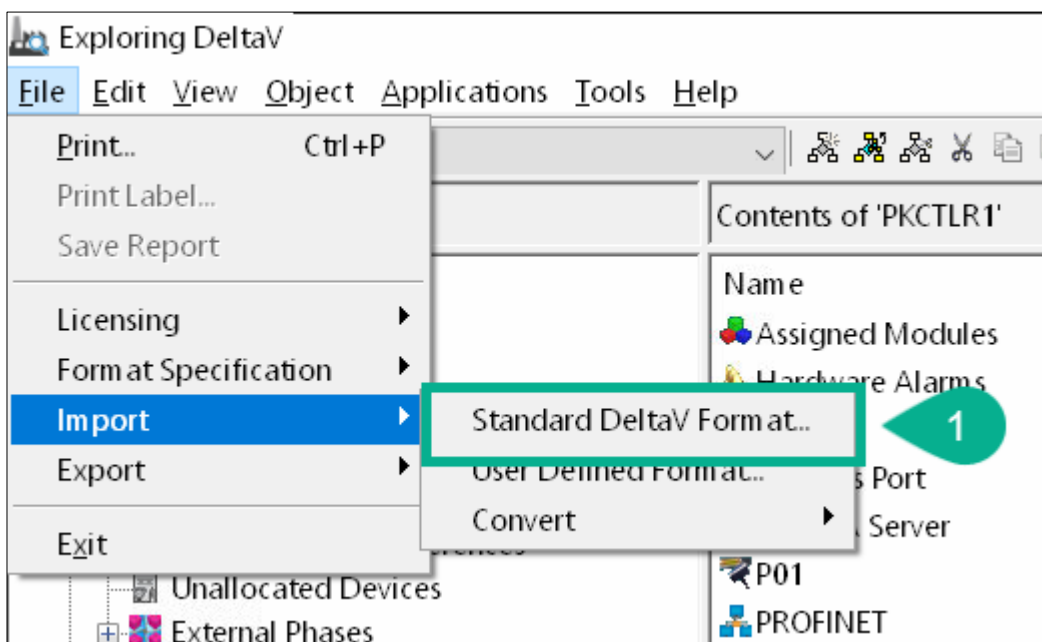
##### Import procedures must be strictly followed

- This library can be imported as is only in DeltaV v15.FP3 Build 9405. Separate process exists to import library in higher DeltaV version.
- Import procedure described in this document must be followed strictly to avoid errors or unintended changes to other configuration. Library should be imported by expert personnel if importing on a production system.
- It is recommended to take a backup of entire existing database before importing the library. This will help in restoring the last working configuration in case there are any issues while importing the library.

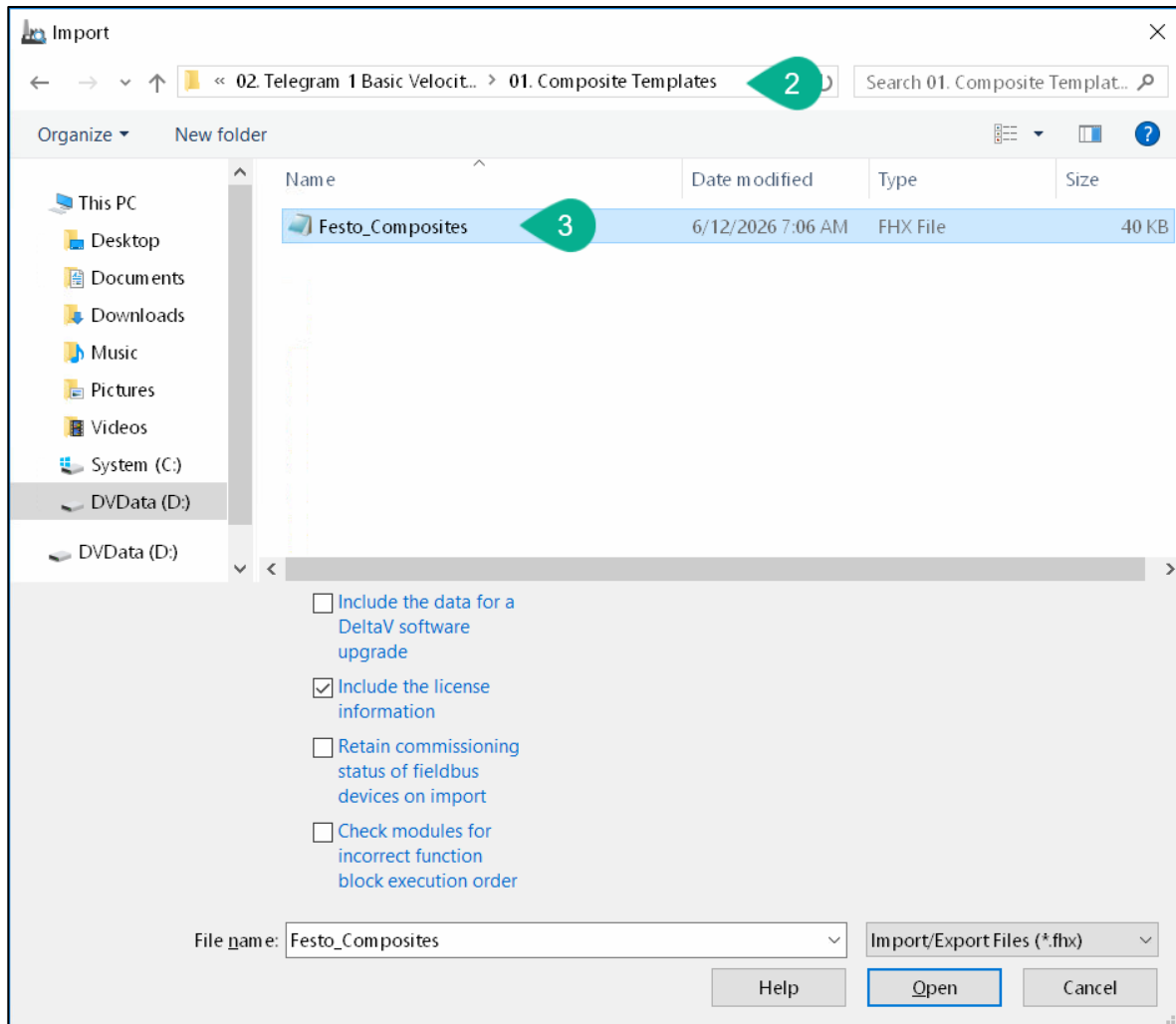
#### 4.1.1 Importing “Composite Templates” Component

Follow the procedure detailed below to import composite templates used in the control modules.

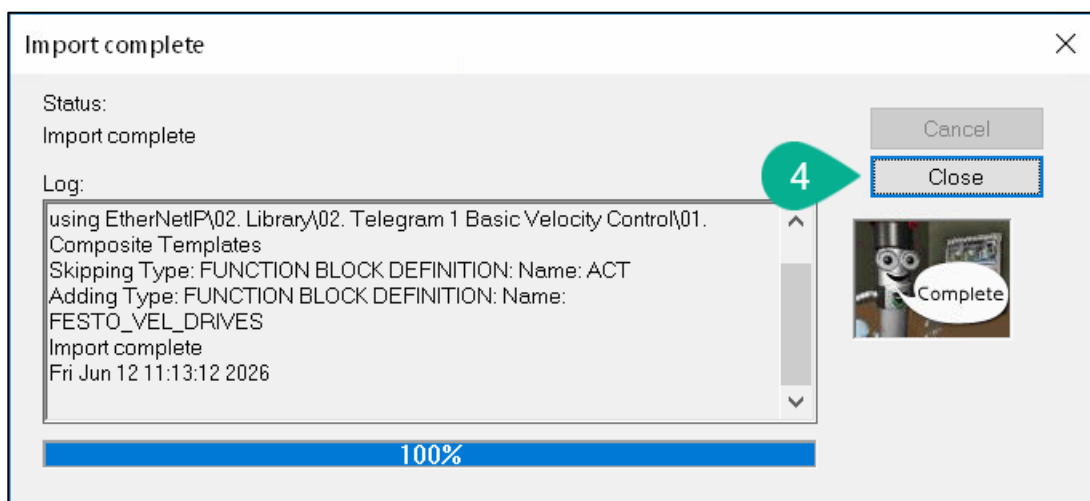
##### Step 1: Importing Composite Templates



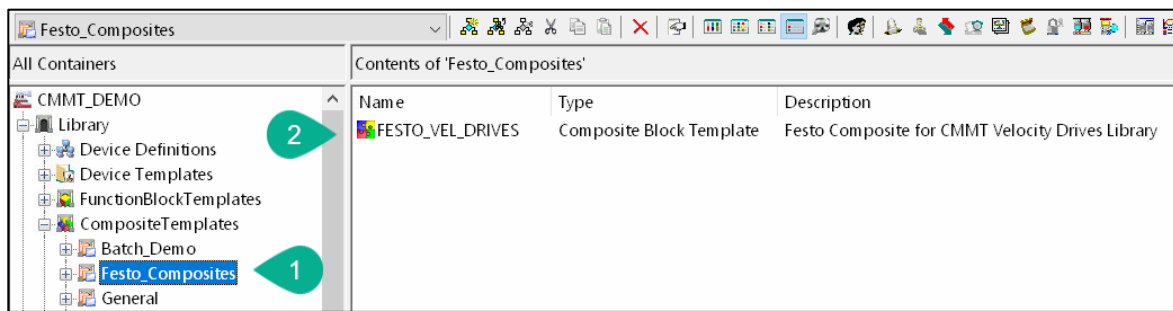
1. Click on “File -> Import -> Standard DeltaV Format...”.



2. In the Import dialog box, navigate to the **“02. Library -> 02. Telegram 1 Basic Velocity Control -> 01. Composite Templates”** folder.
3. Select **“Festo\_Composites”** file and click on **“Open”**.



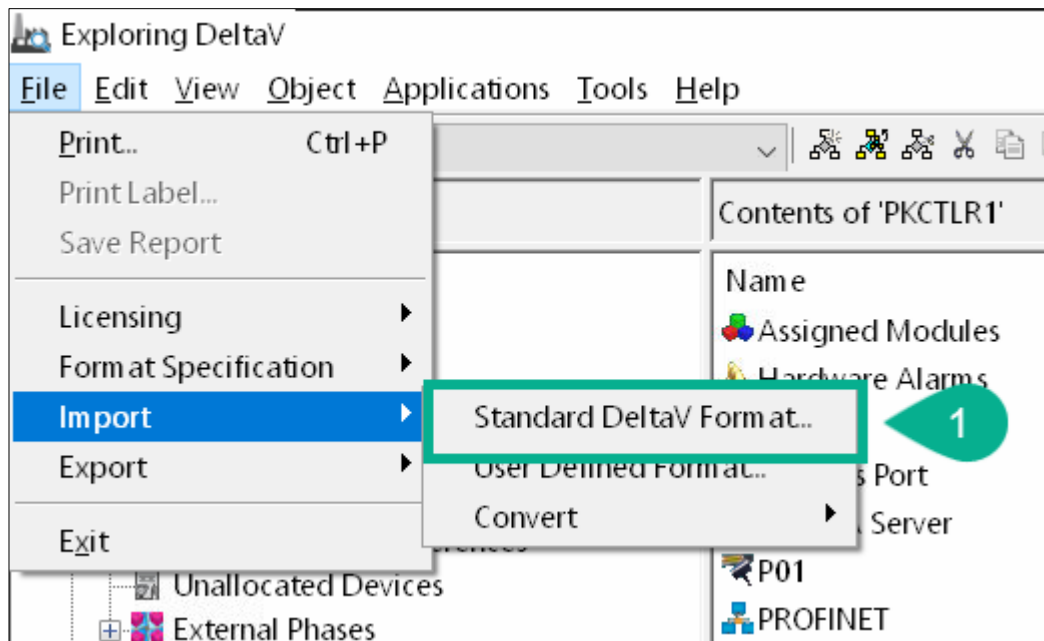
4. The Import process should start now. If you get a pop-up asking if you want to replace any existing item in the library; click on **“No to all”**. This will retain all the current library items and create a new item for the composite templates in the library. Ensure there are no errors during the import.

**Step 2: Verify Composite Templates Import was Successful**

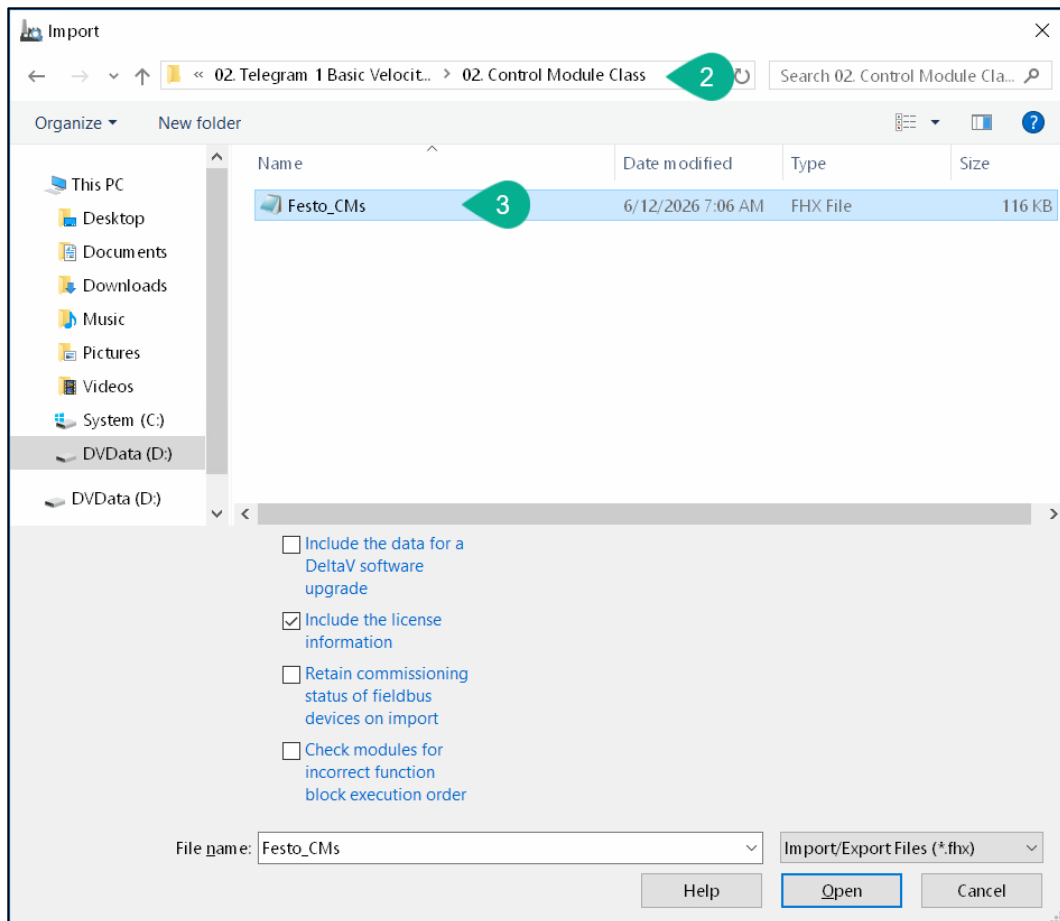
1. After import has completed successfully, you should see the **“Festo”** folder under **“Library -> CompositeTemplates -> Festo\_Composites”**.
2. **“Festo\_Composites”** folder should contain **“FESTO\_VEL\_DRIVES”** composite template.

**4.1.2 Importing “Control Module Class” Component**

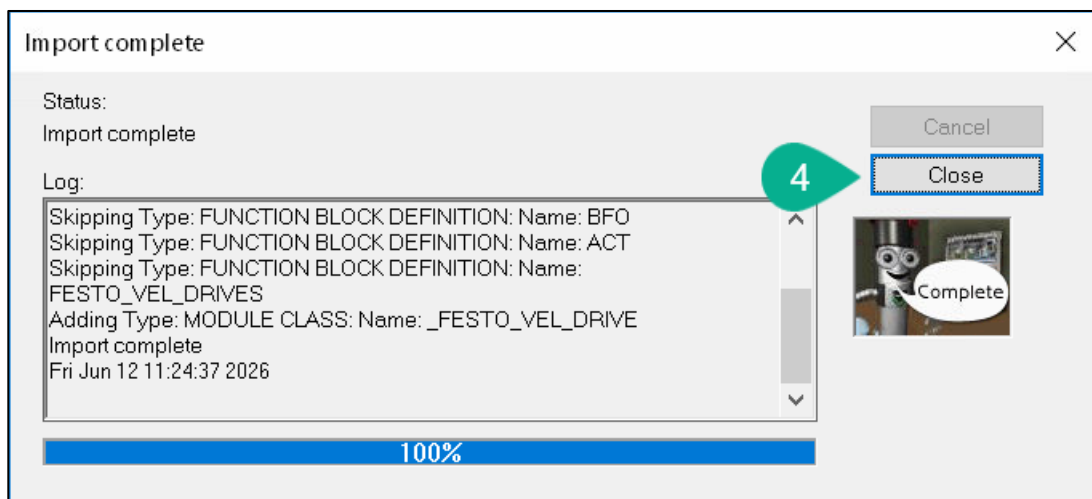
Follow the procedure detailed below to import control module class.

**Step 1: Importing Control Module Class**

1. Click on **“File -> Import -> Standard DeltaV Format...”**.

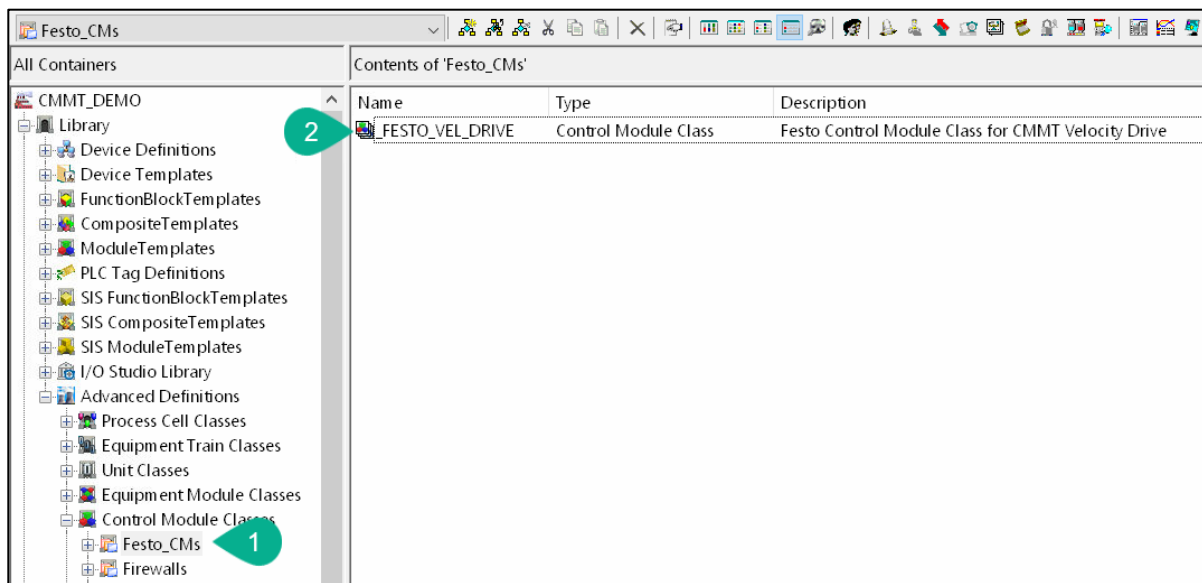


2. In the Import dialog box, navigate to the **“02. Library -> 02. Telegram 1 Basic Velocity Control -> 02. Control Module Class”** folder.
3. Select **“Festo\_CM.s”** file and click on **“Open”**.



4. The Import process should start now. If you get a pop-up asking if you want to replace any existing item in the library; click on **“No to all”**. This will retain all the current library items and create a new item for the control module class in the library. Ensure there are no errors during the import.

## Step 2: Verify Control Module Class Import was Successful

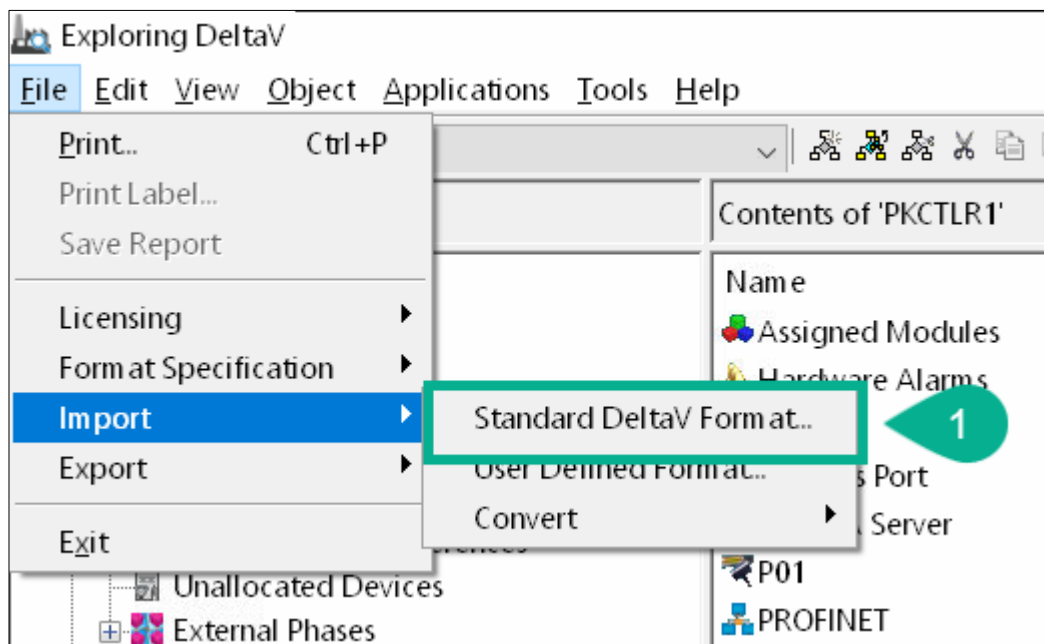


1. After import has completed successfully, you should see the **"Festo\_CMs"** folder under **"Library -> Advanced Definitions -> Control Module Classes"**.
2. **"Festo\_CMs"** folder should contain **"\_FESTO\_VEL\_DRIVE"** control module class.

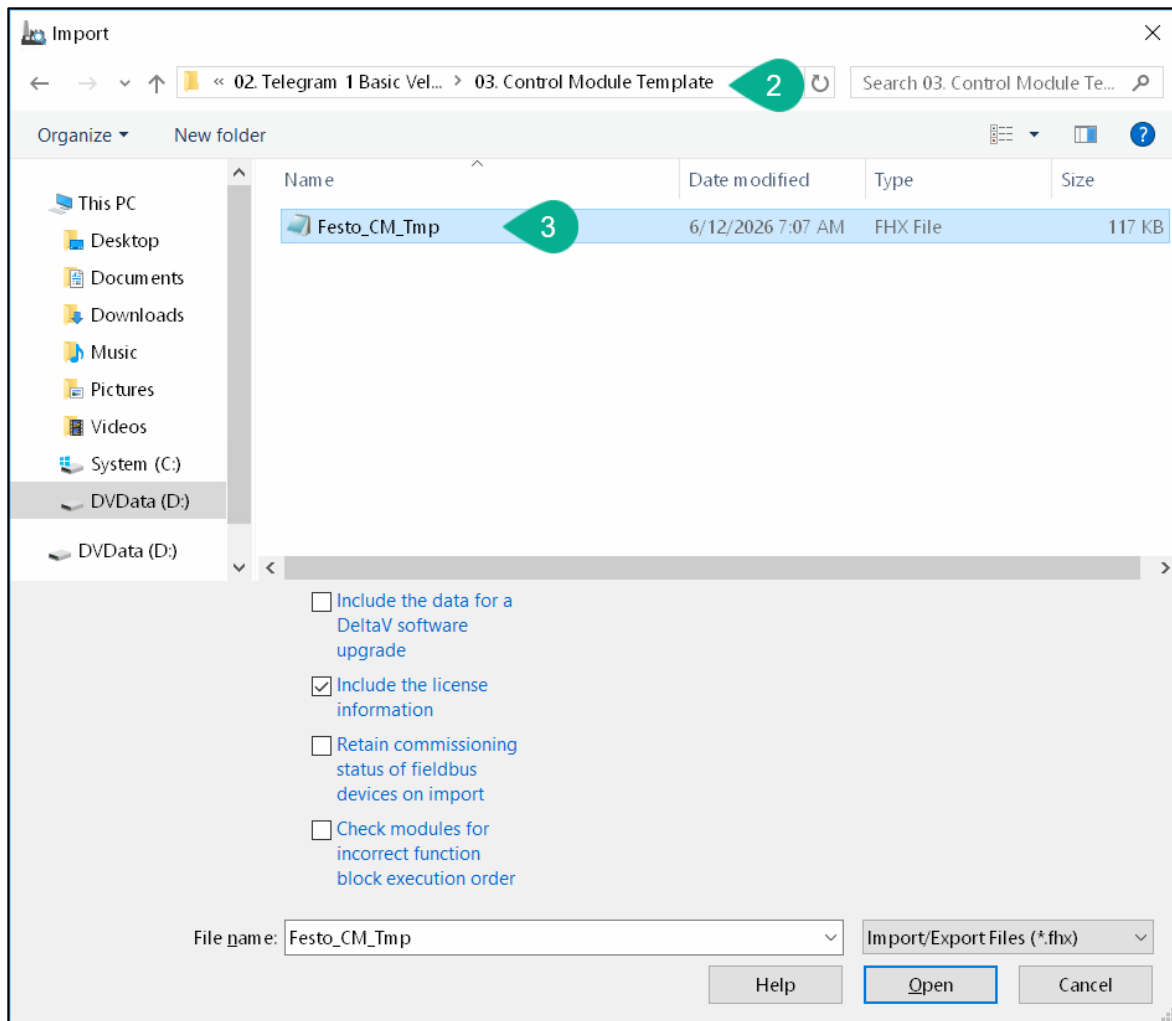
### 4.1.3 Importing "Control Module Template" Component

Follow the procedure detailed below to import control module template of the previously imported control module class.

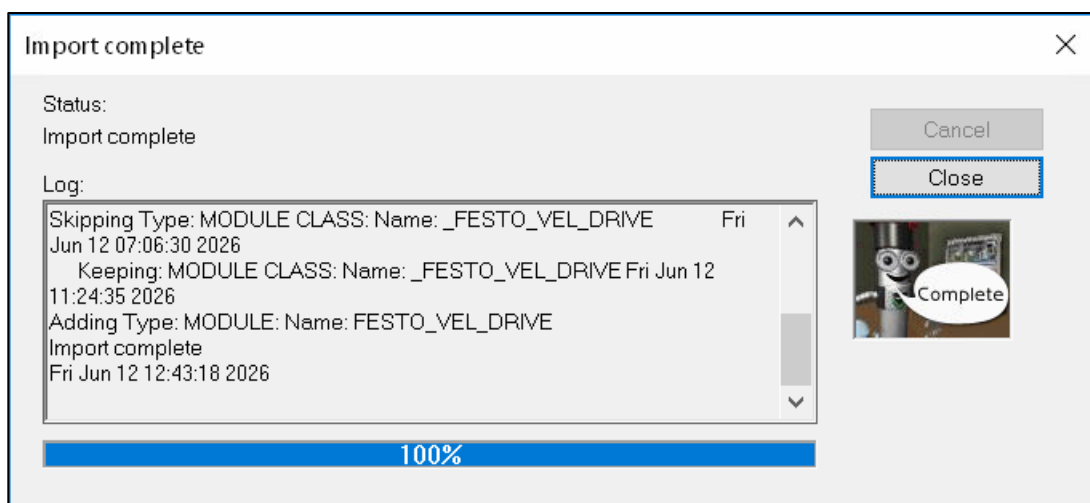
## Step 1: Importing Control Module Template



1. Click on **"File -> Import -> Standard DeltaV Format..."**.

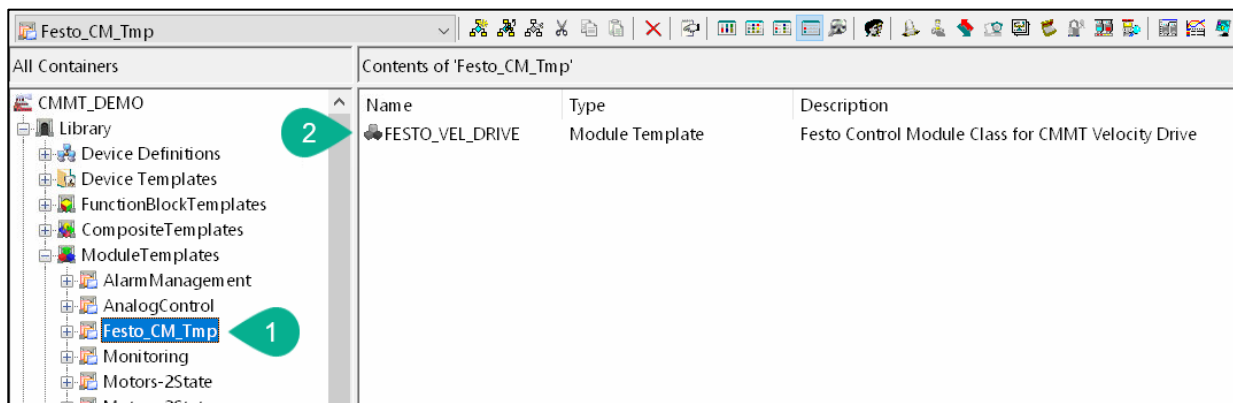


2. In the Import dialog box, navigate to the **“02. Library -> 02. Telegram 1 Basic Velocity Control -> 03. Control Module Template”** folder.
3. Select **“Festo\_CM\_Tmp”** file and click on **“Open”**.



4. The Import process should start now. If you get a pop-up asking if you want to replace any existing item in the library; click on **“No to all”**. This will retain all the current library items and create a new item for the control module template in the library. Ensure there are no errors during the import.

## **Step 2: Verify Control Module Template Import was Successful**

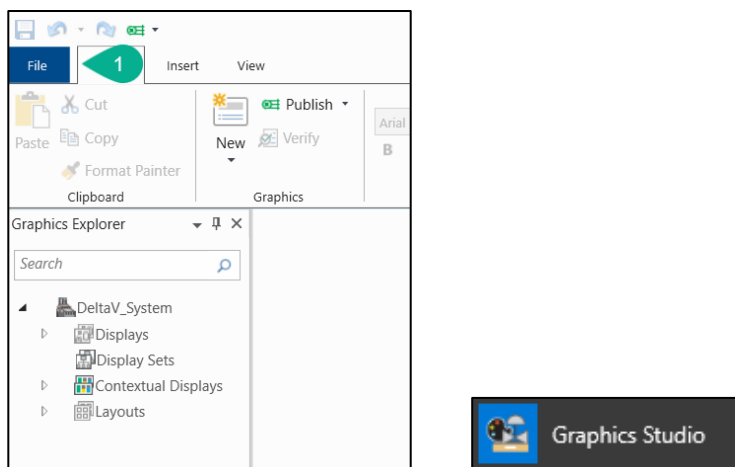


1. After import has completed successfully, you should see the **“Festo\_CM\_Tmp”** folder under **“Library -> Module Templates”**.
2. **“Festo\_CM\_Tmp”** folder should contain the **“FESTO\_VEL\_DRIVE”** module template.

### **4.1.4 Importing “Faceplate” Component**

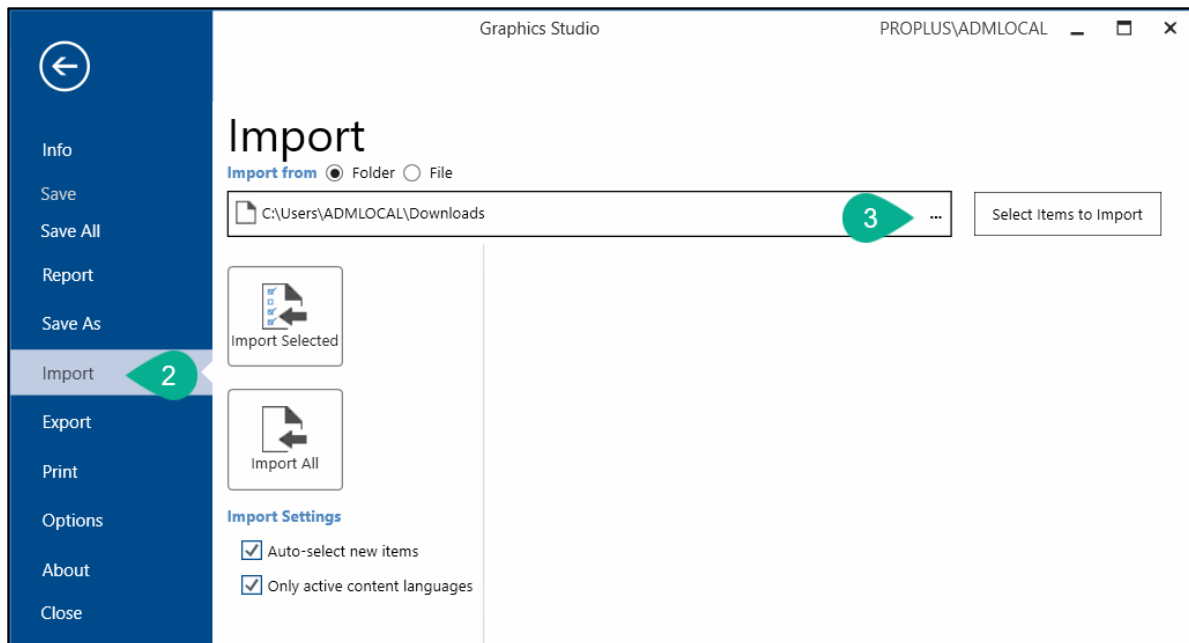
Follow the procedure detailed below to import faceplates for the control module class.

## **Step 1: Importing Faceplates**

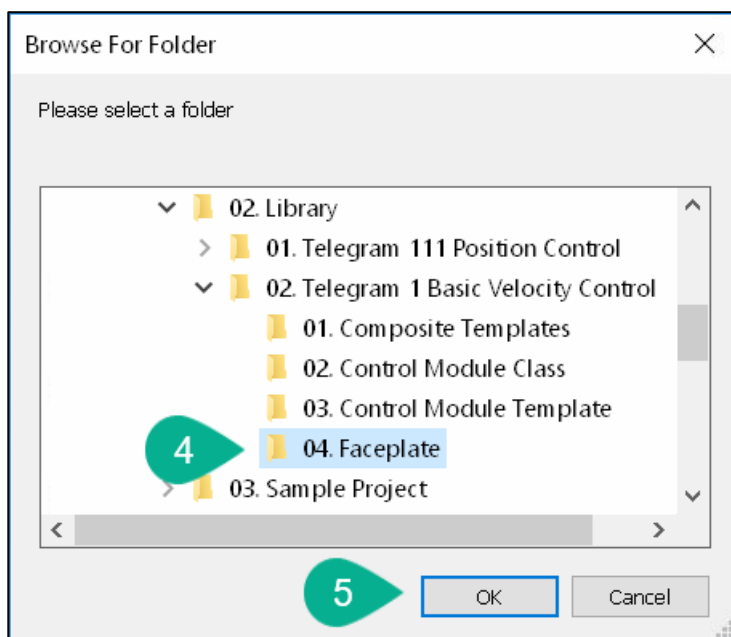


Open Graphics Studio from following path **Windows Start > DeltaV Engineering > Graphics Studio**

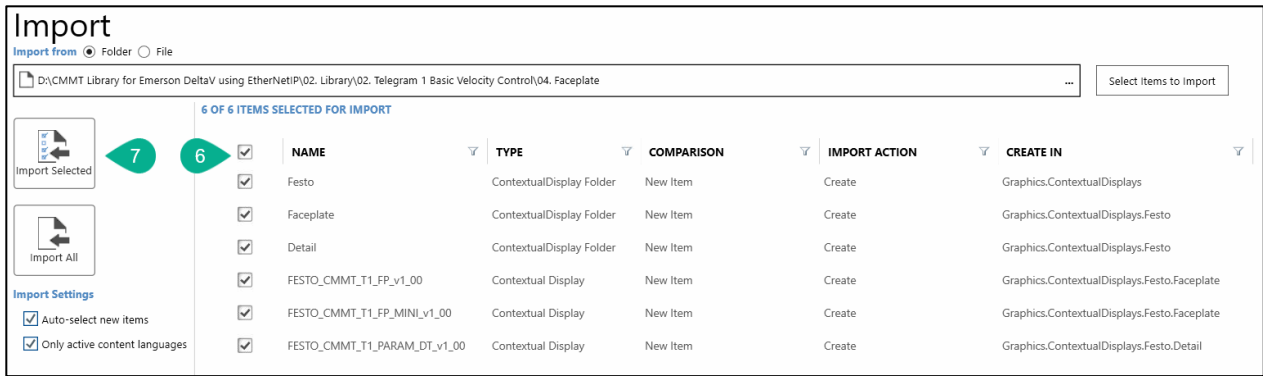
1. Click on **“File”** tab.



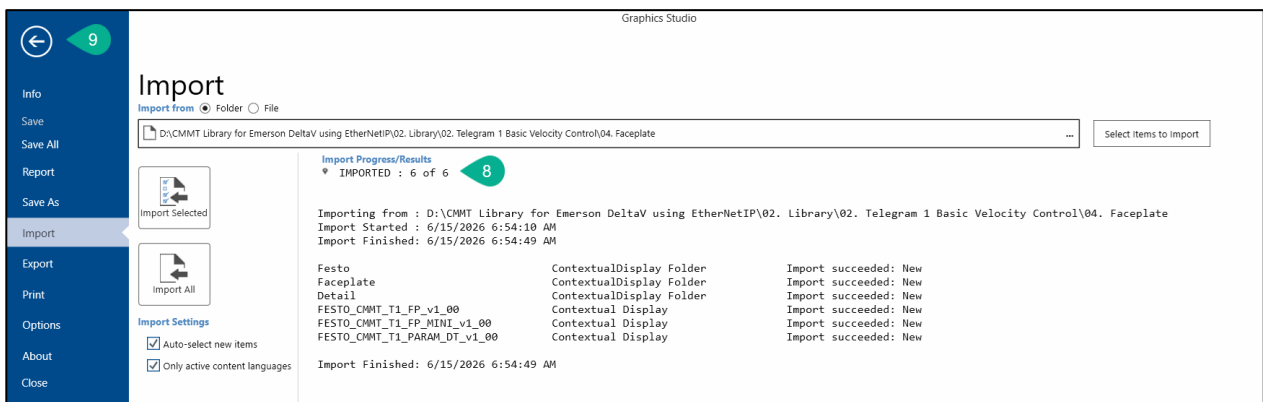
2. Click on **"Import"**.
3. Click on **"..."** to open **"Browse For Folder"** dialog box.



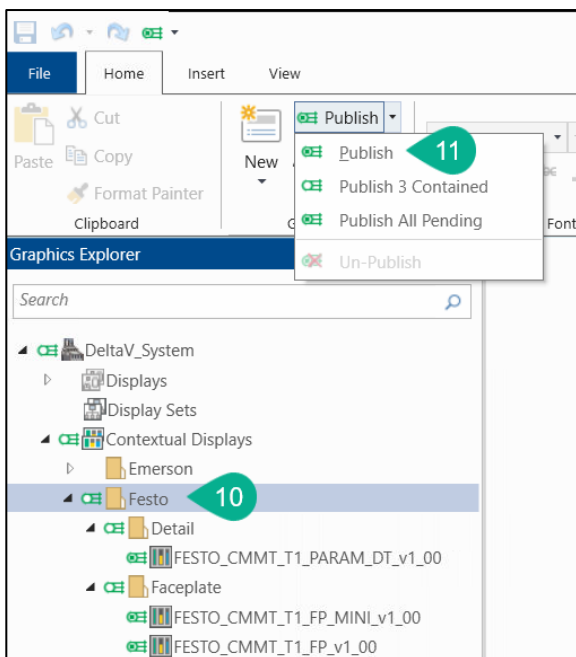
4. Navigate to and select the **"02. Library -> 02. Telegram 1 Basic Velocity Control -> 04. Faceplate"** folder in the library.
5. Click on **"OK"**. This will load all the faceplates.



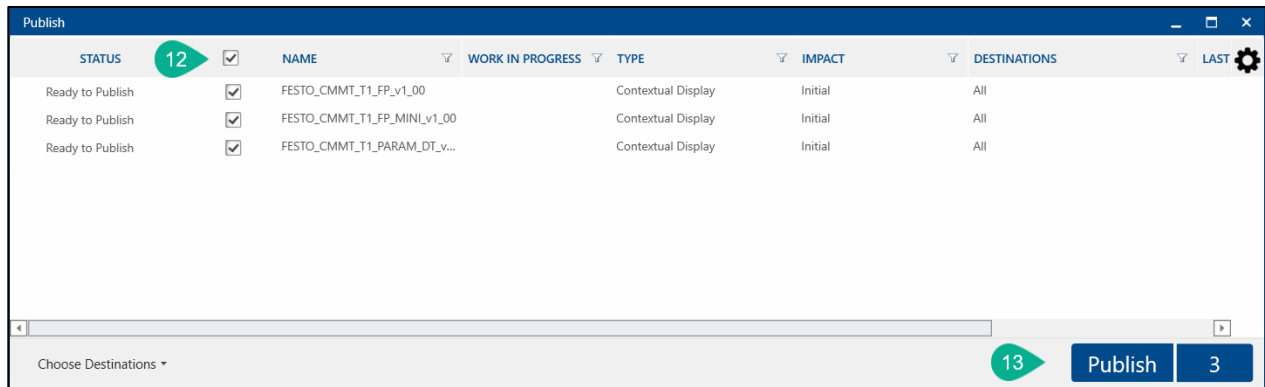
6. Ensure the checkbox for all items is checked.
7. Click on **“Import Selected”**. This will begin the import process.



8. Ensure the import process has completed successfully.
9. Click on the back arrow to return to home screen of Graphics Studio.



10. Navigate to **“DeltaV\_System -> Contextual Displays”** and select **“Festo”** folder.
11. Click on **“Publish”**.



12. Ensure the checkbox next to all faceplates is checked.

13. Click on “Publish”.

## 4.2 Importing Library for Position Control (Telegram 111)

The library consists of following four components which need to be imported in numerical sequence:

1. Named Sets
2. Composite Templates
3. Control Module Class
4. Control Module Template

Subsequent sections have detailed procedure to import each of the components which must be imported sequentially.



### Caution

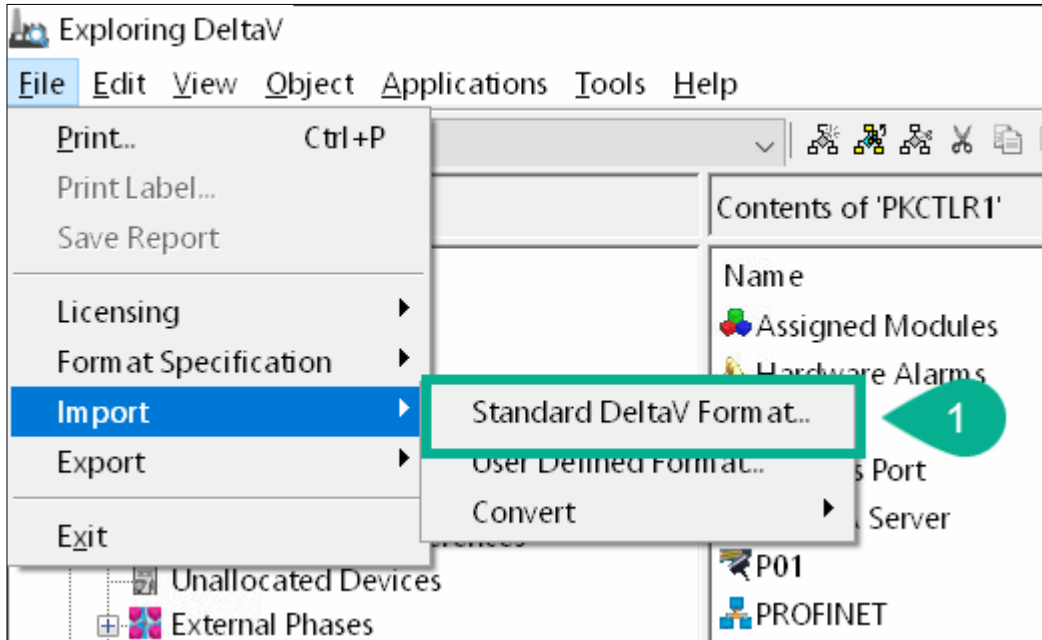
#### Import procedures must be strictly followed

- This library can be imported as is only in DeltaV v15.FP3 Build 9405. Separate process exists to import library in higher DeltaV version.
- Import procedure described in this document must be followed strictly to avoid errors or unintended changes to other configuration. Library should be imported by expert personnel if importing on a production system.
- It is recommended to take a backup of entire existing database before importing the library. This will help in restoring the last working configuration in case there are any issues while importing the library.

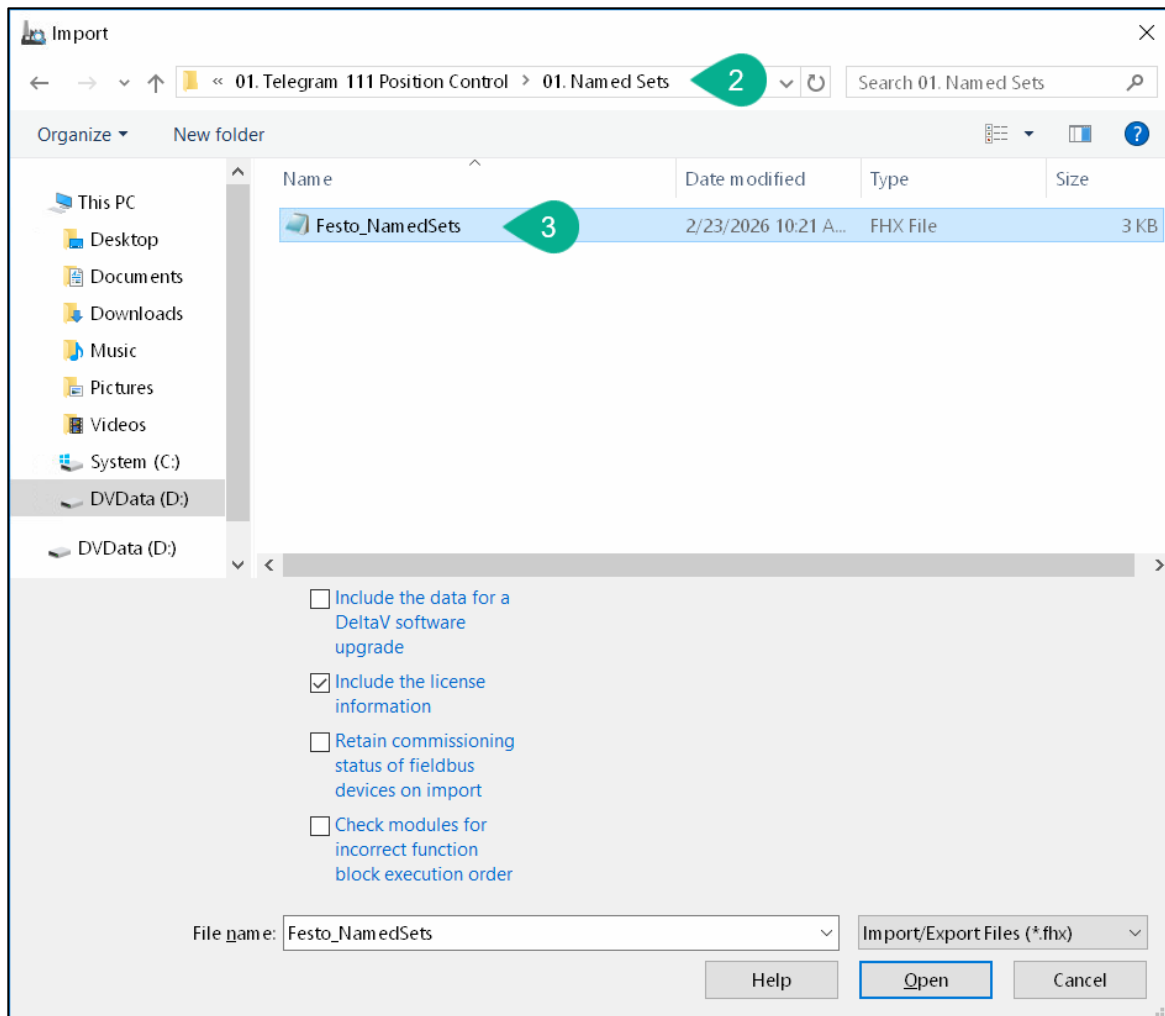
#### 4.2.1 Importing “Named Sets” Component

Follow the procedure detailed below to import named sets used in the control modules.

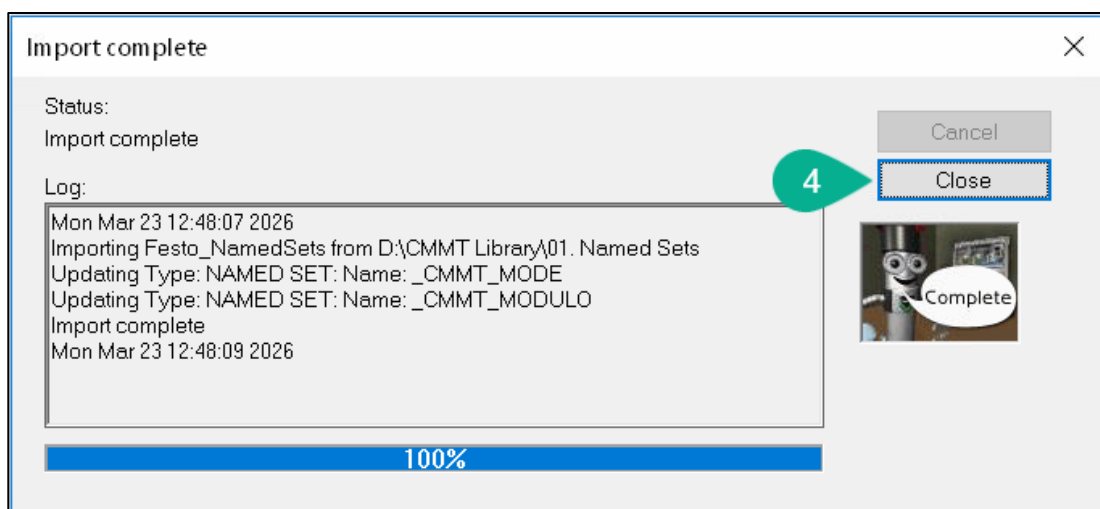
##### **Step 1: Importing Named Sets**



1. Click on “File -> Import -> Standard DeltaV Format...”.

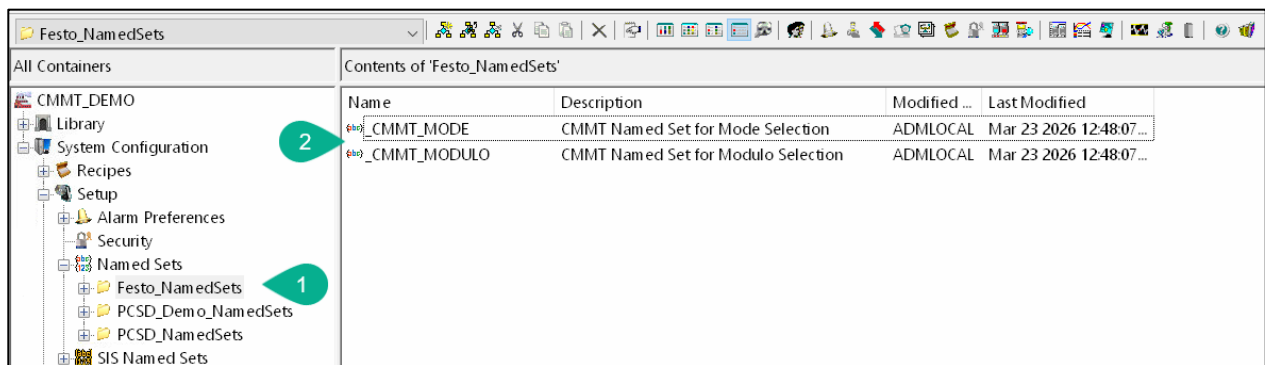


2. In the Import dialog box, navigate to the **“02. Library -> 01. Telegram 111 Position Control -> 01. Named Sets”** folder.
3. Select **“Festo\_NamedSets”** file and click on **“Open”**.



4. The import process should start now. If you get a pop-up asking if you want to replace any existing item in the library; click on **“No to all”**. This will retain all the current library items and create a new item for the named sets in the library. Ensure there are no errors during the import.

## Step 2: Verify Named Sets Import was Successful

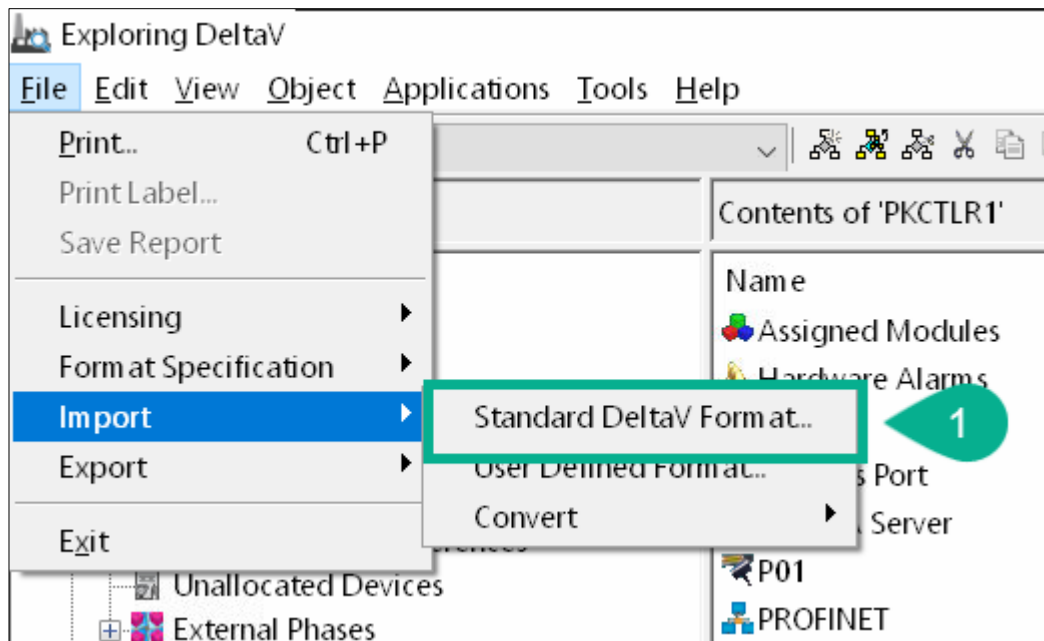


1. After import has completed successfully, you should see the **"Festo\_NamedSets"** folder under **"System Configuration -> Setup -> Named Sets"**.
2. **"Festo\_NamedSets"** folder should contain **"\_CMMT\_MODE"**, and **"\_CMMT\_MODULO"** named sets.

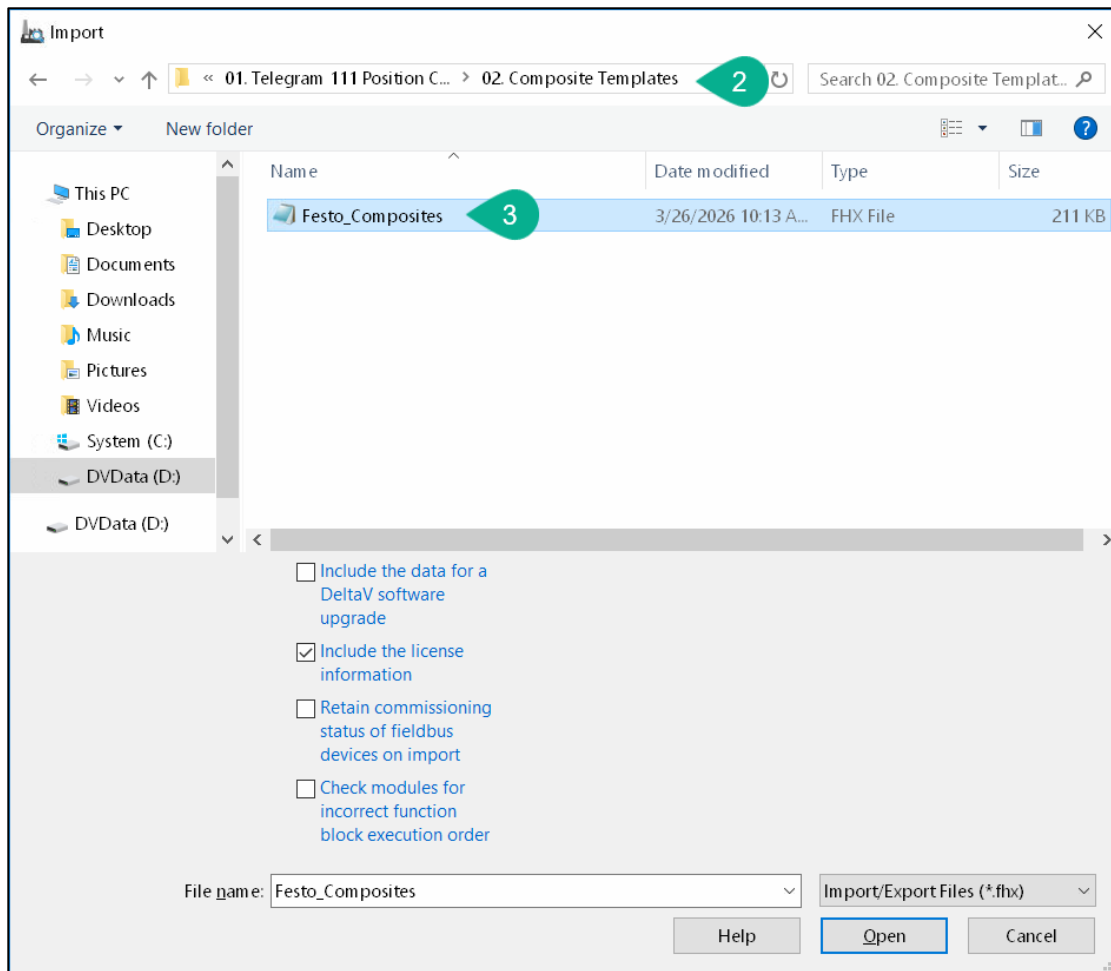
### 4.2.2 Importing "Composite Templates" Component

Follow the procedure detailed below to import composite templates used in the control modules.

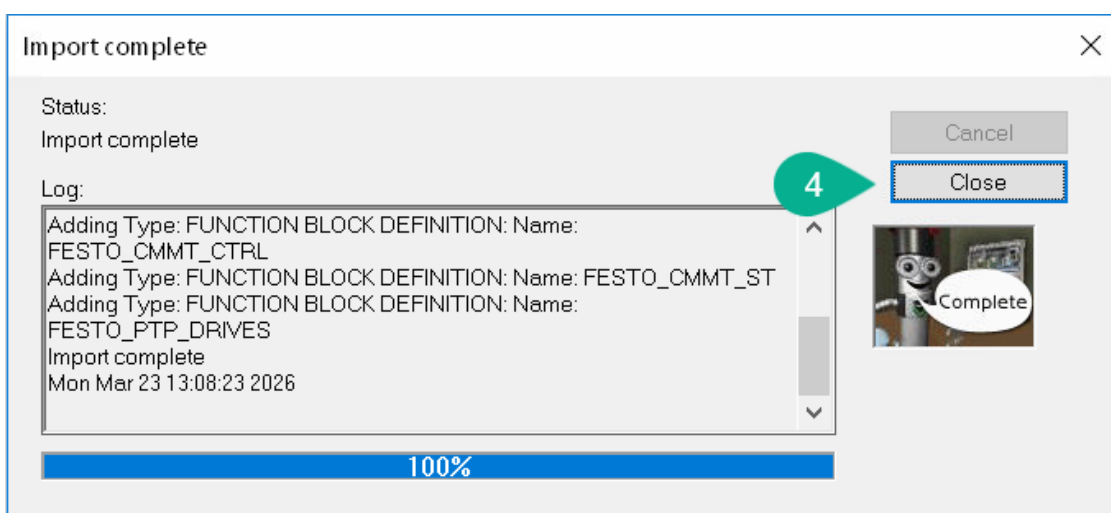
#### Step 1: Importing Composite Templates



1. Click on **"File -> Import -> Standard DeltaV Format..."**.

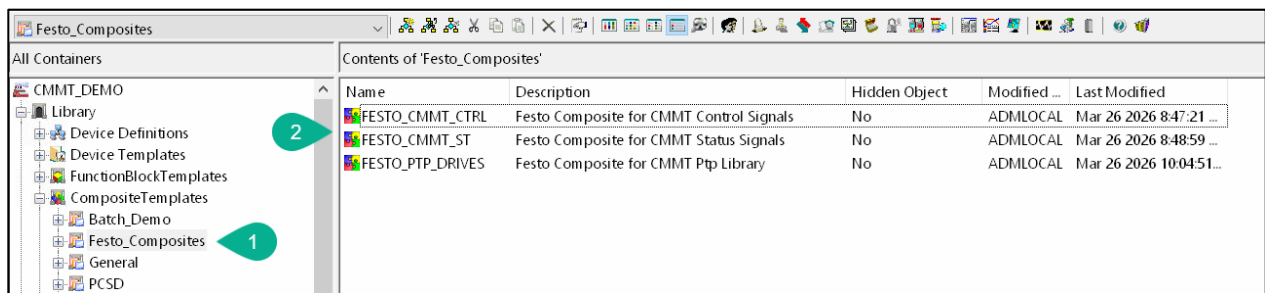


2. In the Import dialog box, navigate to the **“02. Library -> 01. Telegram 111 Position Control -> 02. Composite Templates”** folder.
3. Select **“Festo\_Composites”** file and click on **“Open”**.



4. The Import process should start now. If you get a pop-up asking if you want to replace any existing item in the library; click on **“No to all”**. This will retain all the current library items and create a new item for the composite templates in the library. Ensure there are no errors during the import.

## Step 2: Verify Composite Templates Import was Successful

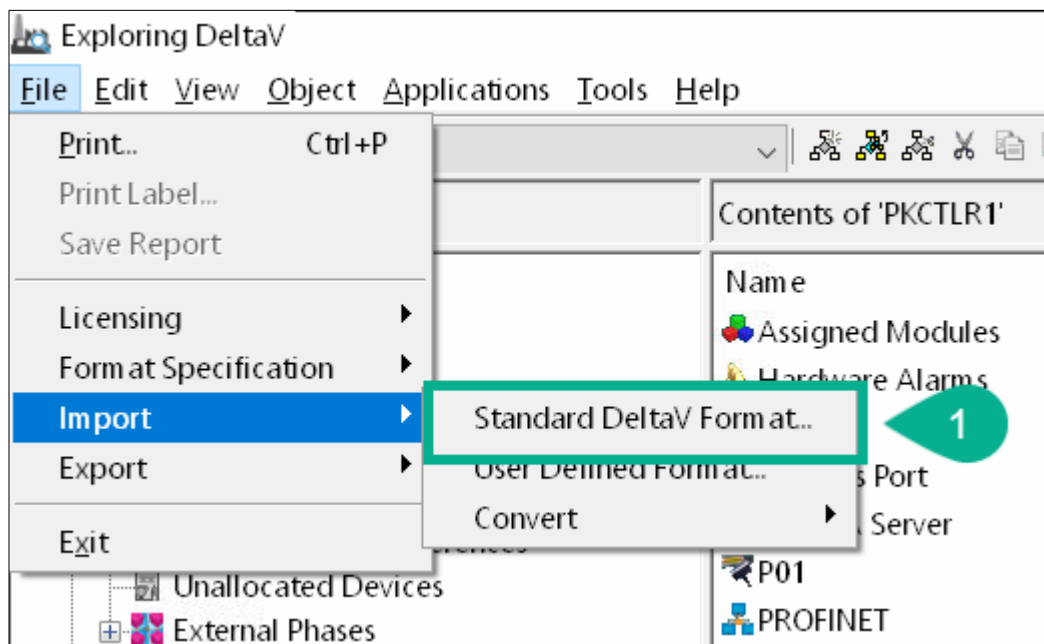


1. After import has completed successfully, you should see the **“Festo”** folder under **“Library -> CompositeTemplates -> Festo\_Composites”**.
2. **“Festo\_Composites”** folder should contain **“FESTO\_CMMT\_CTRL”**, **“FESTO\_CMMT\_ST”**, and **“FESTO\_PTP\_DRIVES”** composite templates.

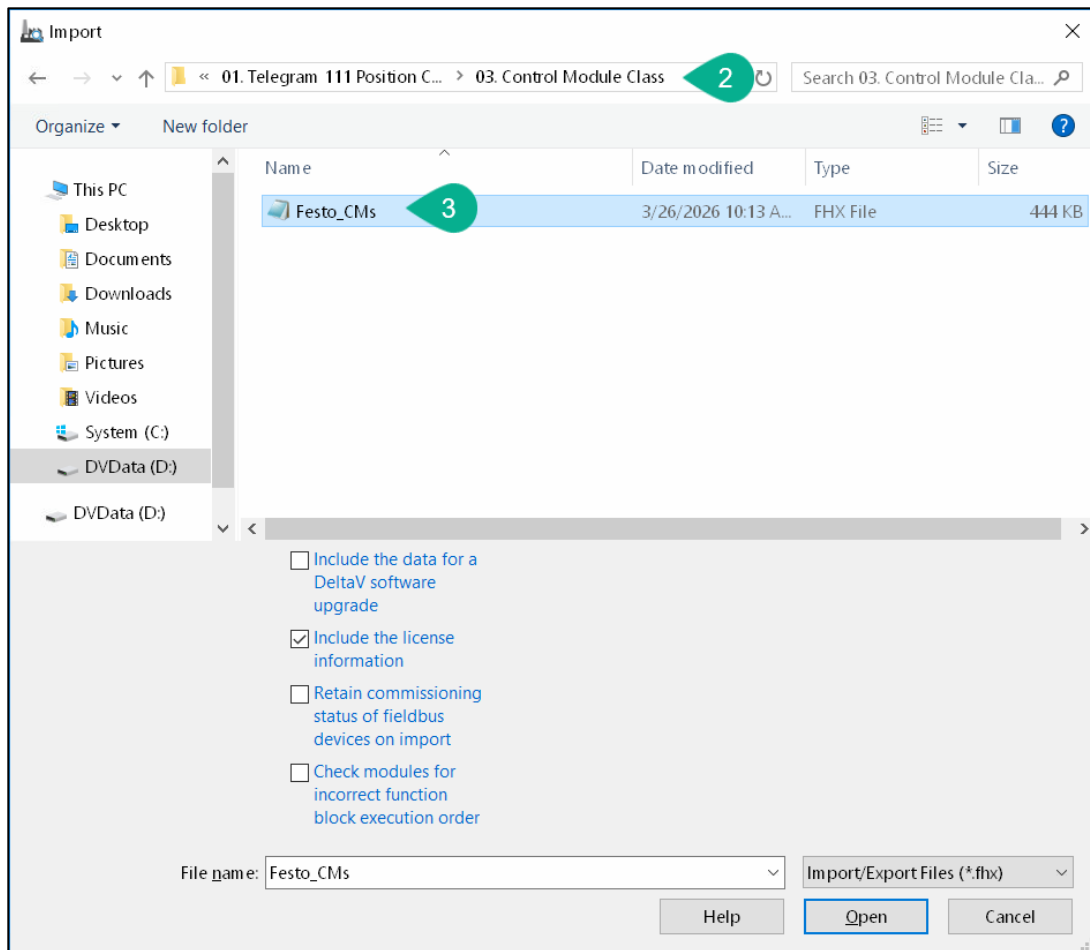
### 4.2.3 Importing “Control Module Class” Component

Follow the procedure detailed below to import control module class.

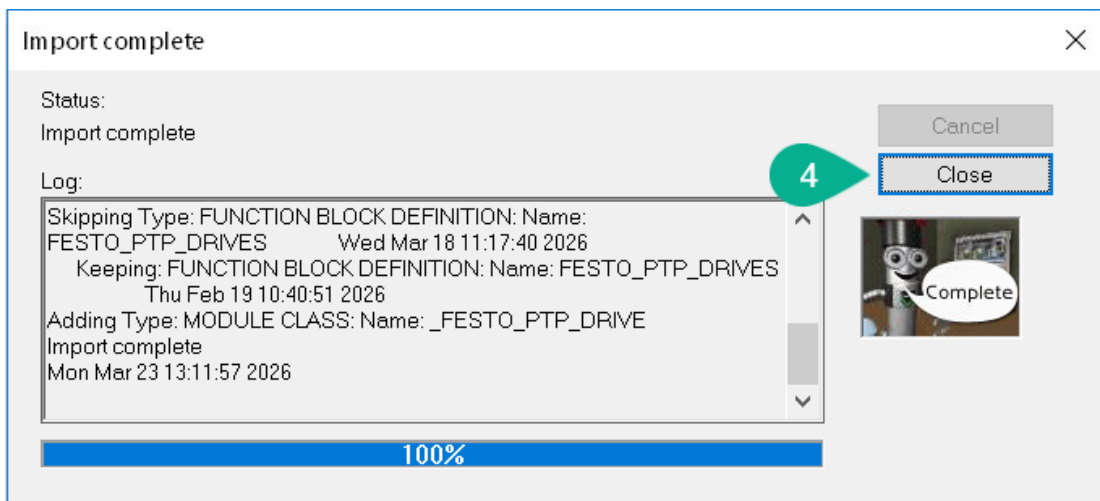
#### Step 1: Importing Control Module Class



1. Click on **“File -> Import -> Standard DeltaV Format...”**.

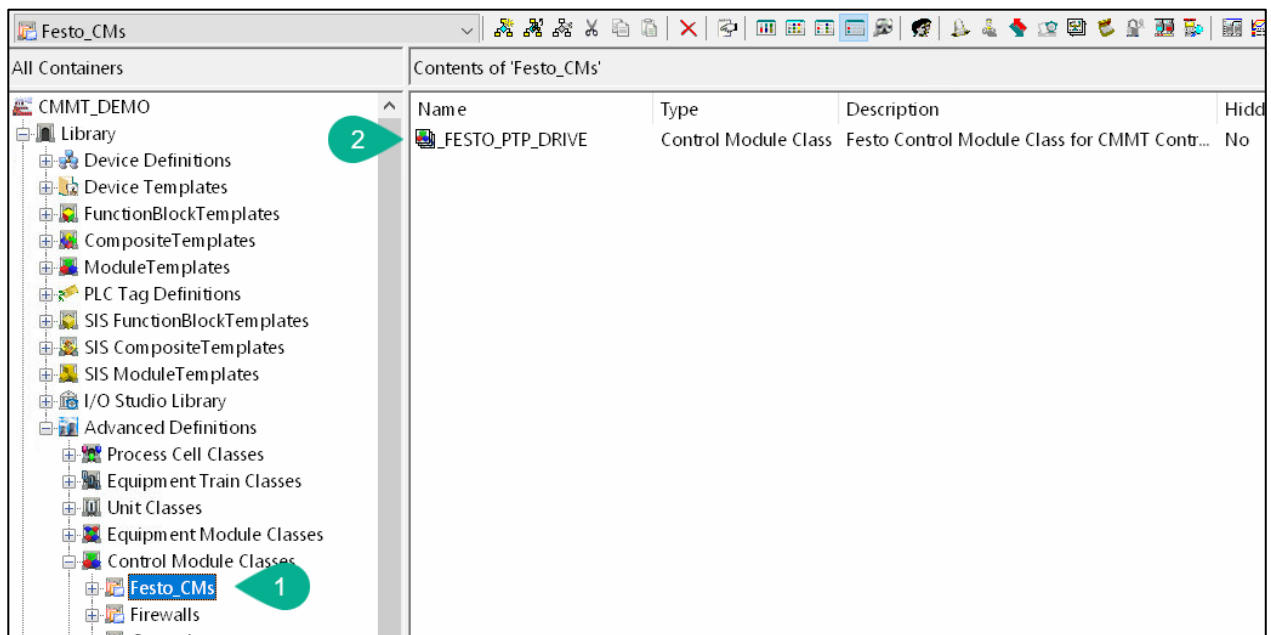


2. In the Import dialog box, navigate to the “02. Library -> 01. Telegram 111 Position Control -> 03. Control Module Class” folder.
3. Select “Festo\_CMs” file and click on “Open”.



4. The Import process should start now. If you get a pop-up asking if you want to replace any existing item in the library; click on “No to all”. This will retain all the current library items and create a new item for the control module class in the library. Ensure there are no errors during the import.

## Step 2: Verify Control Module Class Import was Successful

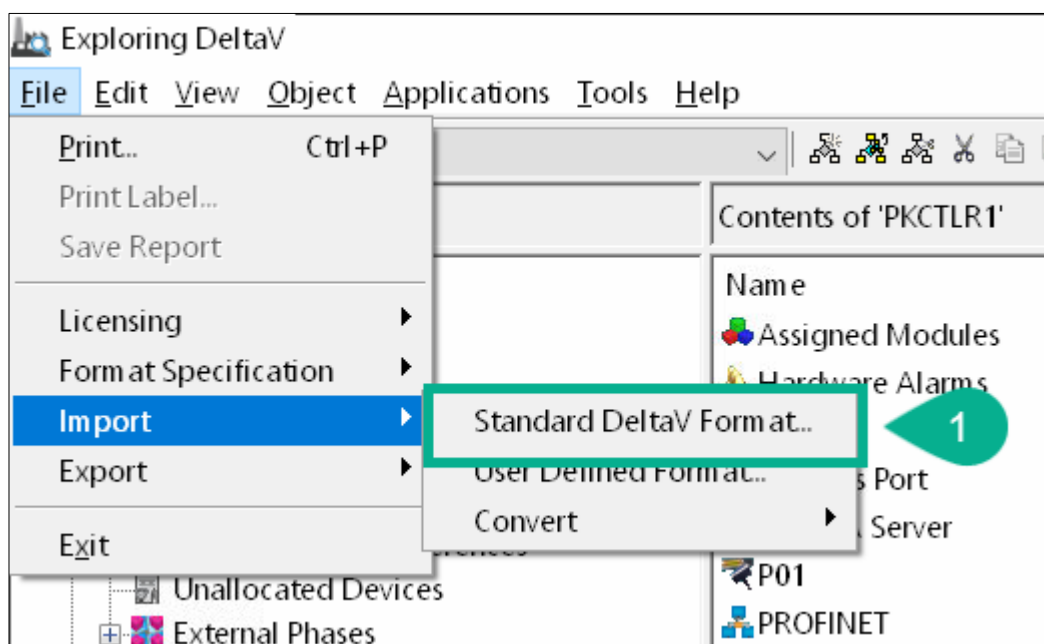


1. After import has completed successfully, you should see the “**Festo\_CM's**” folder under “**Library -> Advanced Definitions -> Control Module Classes**”.
2. “**Festo\_CM's**” folder should contain “**\_FESTO\_PTP\_DRIVE**” control module class.

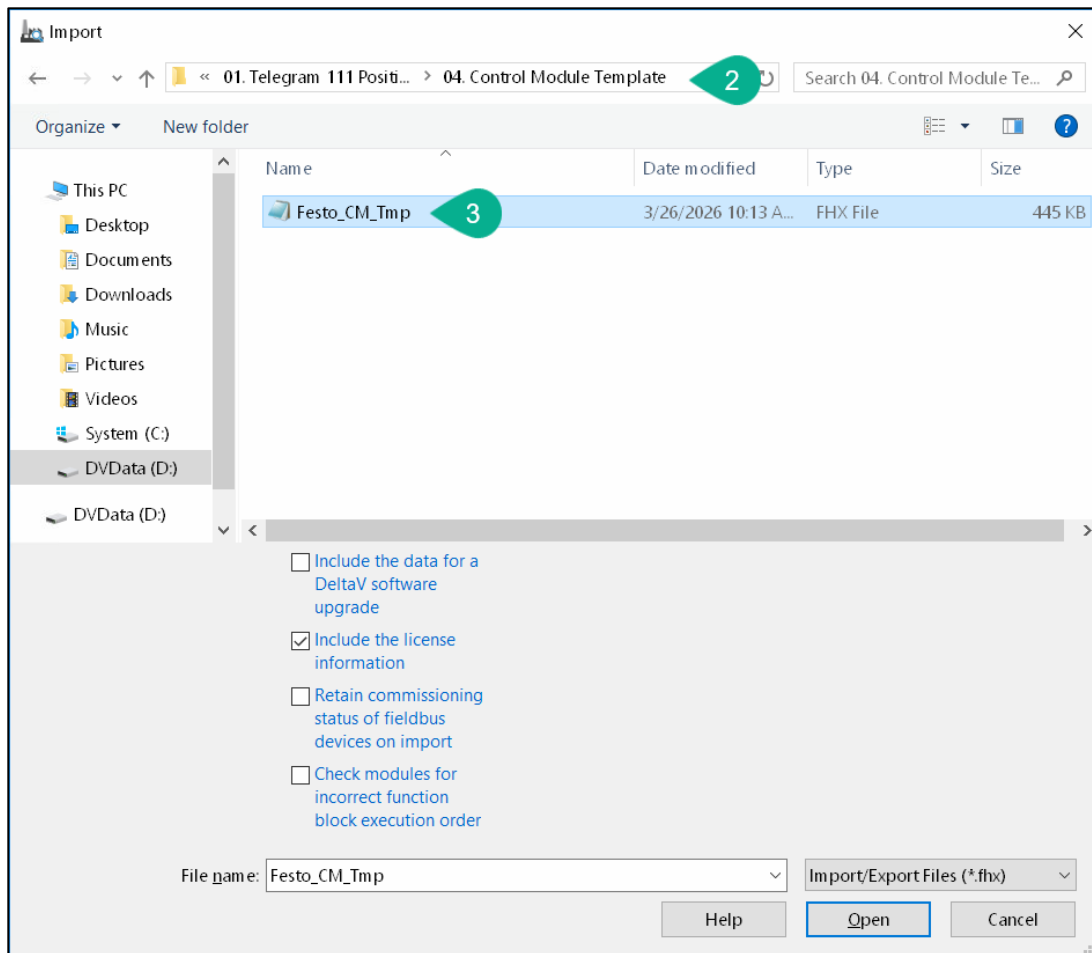
### 4.2.4 Importing “Control Module Template” Component

Follow the procedure detailed below to import control module template of the previously imported control module class.

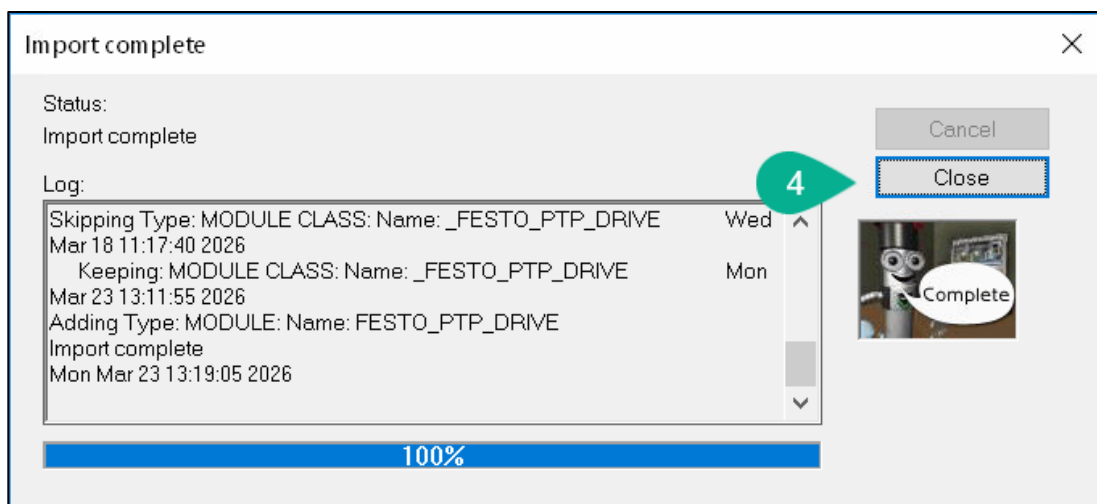
## Step 1: Importing Control Module Template



1. Click on “**File -> Import -> Standard DeltaV Format...**”.

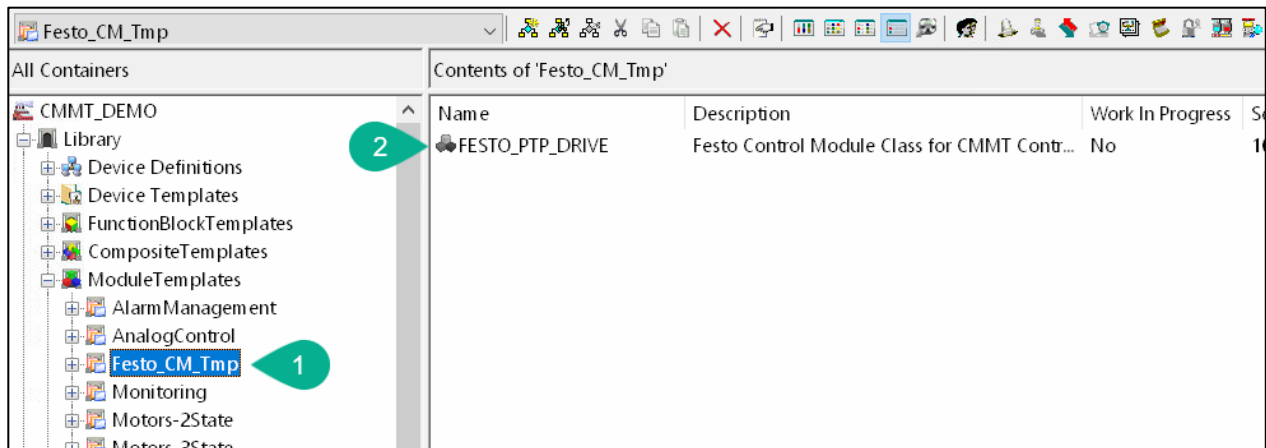


2. In the Import dialog box, navigate to the **“02. Library -> 01. Telegram 111 Position Control -> 04. Control Module Template”** folder.
3. Select **“Festo\_CM\_Tmp”** file and click on **“Open”**.



4. The Import process should start now. If you get a pop-up asking if you want to replace any existing item in the library; click on **“No to all”**. This will retain all the current library items and create a new item for the control module template in the library. Ensure there are no errors during the import.

## **Step 2: Verify Control Module Template Import was Successful**



1. After import has completed successfully, you should see the **“Festo\_CM\_Tmp”** folder under **“Library -> Module Templates”**.
2. **“Festo\_CM\_Tmp”** folder should contain the **“FESTO\_PTP\_DRIVE”** module template.

## 5 CMMT Control Module Instance Configuration in Emerson DeltaV

### 5.1 Configuration for Basic Velocity Control (Telegram 1) Control Module

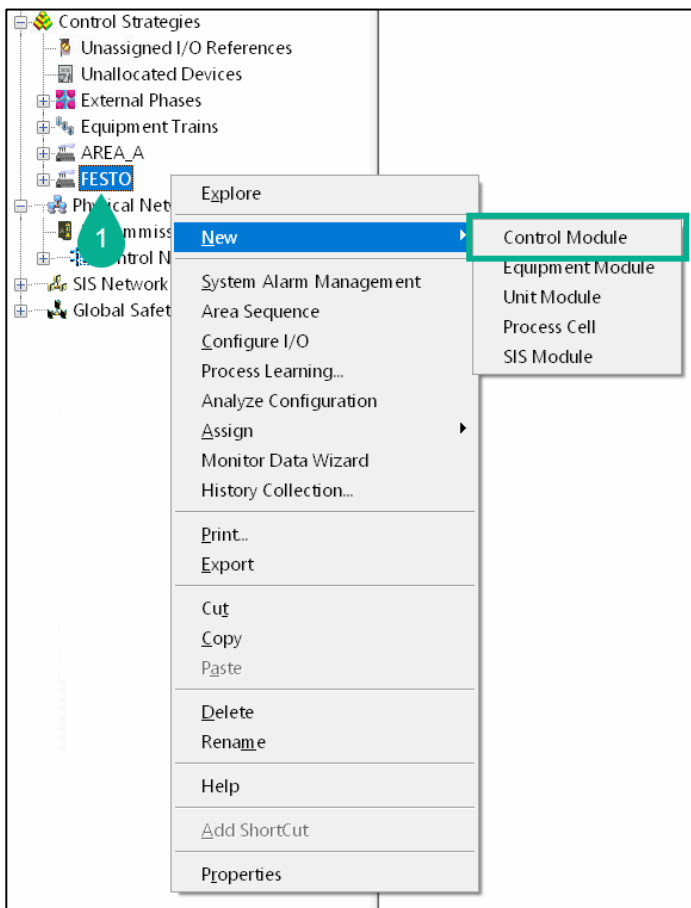
This section details the procedure to configure CMMT control module for basic velocity control in DeltaV.



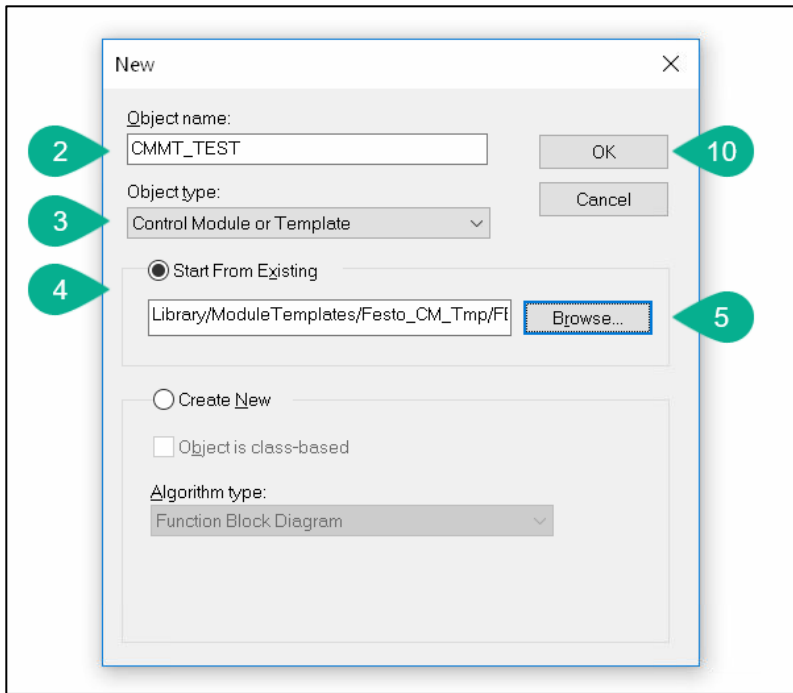
#### Note

- The control module configuration is specific to the device configuration used in this application note.
- The control module configuration may vary based on the actual device configuration.
- Any changes to the sample project components and library in the production system should be done by expert personnel.

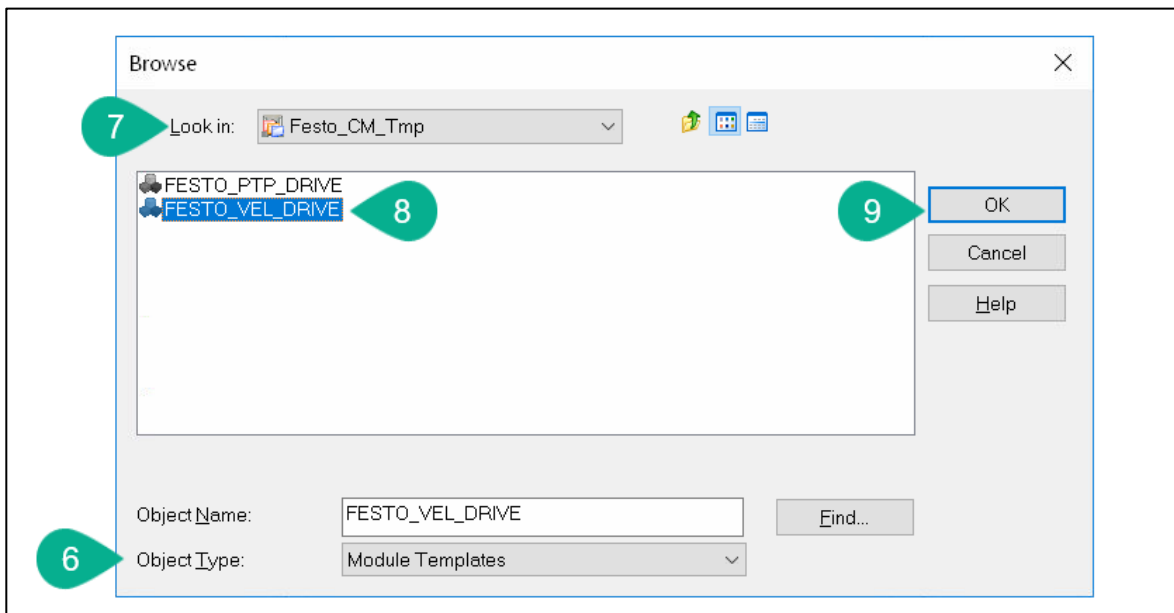
#### Step 1: Creating Control Module Instance using Module Template



1. Right-Click the area under control strategies where you want to create the control module instance. Hover on **"New"** and click on **"Control Module"**.



2. Enter the control module name as per project philosophy in “**Object name**” field.
3. Select object type as “**Control Module or Template**”.
4. Select “**Start From Existing**” radio button.
5. Click on the “**Browse**” button. Field next to the browse button will be blank initially.



6. In the “**Browse**” pop-up dialog box, select object type as “**Module Templates**”.
7. Navigate to “**Festo\_CM\_Tmp**” folder.
8. Select template “**FESTO\_VEL\_DRIVE**”.
9. Click on “**OK**”.
10. Once template is selected, you should be able to see a detailed path in the field next to the browse button. Click on “**OK**”. The control module instance should be created and visible in the area now.

**Step 2: Configuring CMMT Control Module Instance**

| All Containers                                                                                                                                                                                                                                                                                                                                                       |  | Contents of 'CMMT_TEST' |                     |                           |            |                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------|---------------------|---------------------------|------------|-------------------------|
|                                                                                                                                                                                                                                                                                                                                                                      |  | Name                    | Type                | Parameter Value           | Filtering  | Parameter Type          |
| CMMT_DEMO<br>Library<br>System Configuration<br>Recipes<br>Setup<br>Control Strategies<br>Unassigned I/O References<br>Unallocated Devices<br>External Phases<br>Equipment Trains<br>AREA_A<br>FESTO<br><b>CMMT_TEST</b><br>Physical Network<br>Decommissioned Nodes<br>Control Network<br>PKCTRL1<br>PROPLUS<br>I/O Network<br>SIS Network<br>Global Safety Network |  | CMMT_FAULT              | New Alarm           |                           |            |                         |
|                                                                                                                                                                                                                                                                                                                                                                      |  | COMM_FAULT              | Communication Error |                           |            |                         |
|                                                                                                                                                                                                                                                                                                                                                                      |  | VERSION                 | Parameter Shortcut  | 1                         | <On-lin... | 32 bit unsigned integer |
|                                                                                                                                                                                                                                                                                                                                                                      |  | ACK_ERROR               | Parameter Shortcut  | False                     | <Com...    | Boolean                 |
|                                                                                                                                                                                                                                                                                                                                                                      |  | COAST_STOP              | Parameter Shortcut  | False                     | <Com...    | Boolean                 |
|                                                                                                                                                                                                                                                                                                                                                                      |  | ENABLE                  | Parameter Shortcut  | True                      | <Com...    | Boolean                 |
|                                                                                                                                                                                                                                                                                                                                                                      |  | ENABLE_AXIS             | Parameter Shortcut  | False                     | <Com...    | Boolean                 |
|                                                                                                                                                                                                                                                                                                                                                                      |  | ENB_MOVEMENT            | Parameter Shortcut  | False                     | <Com...    | Boolean                 |
|                                                                                                                                                                                                                                                                                                                                                                      |  | RAPID_STOP              | Parameter Shortcut  | False                     | <Com...    | Boolean                 |
|                                                                                                                                                                                                                                                                                                                                                                      |  | DEV_COMM                | Parameter Shortcut  | PKCTRL1/P01/CMMT_1/STATUS | <Com...    | External Reference      |
|                                                                                                                                                                                                                                                                                                                                                                      |  | NIST_A_SP               | Parameter Shortcut  | CMMT1_NISTA/FIELD_VAL     | <Com...    | External Reference      |
|                                                                                                                                                                                                                                                                                                                                                                      |  | NSOLL_A                 | Parameter Shortcut  | CMMT1_NSOLLA/OUT          | <Com...    | External Reference      |
|                                                                                                                                                                                                                                                                                                                                                                      |  | STW1                    | Parameter Shortcut  | CMMT1_STW1/OUT            | <Com...    | External Reference      |
|                                                                                                                                                                                                                                                                                                                                                                      |  | ZSW1                    | Parameter Shortcut  | CMMT1_ZSW1/FIELD_VAL      | <Com...    | External Reference      |
|                                                                                                                                                                                                                                                                                                                                                                      |  | BASE_VELOCITY           | Parameter Shortcut  | 0                         | <Com...    | Floating point          |
|                                                                                                                                                                                                                                                                                                                                                                      |  | GR_DEN                  | Parameter Shortcut  | 1                         | <Com...    | Floating point          |
|                                                                                                                                                                                                                                                                                                                                                                      |  | GR_NUM                  | Parameter Shortcut  | 1                         | <Com...    | Floating point          |
|                                                                                                                                                                                                                                                                                                                                                                      |  | VELOCITY                | Parameter Shortcut  | 0                         | <Com...    | Floating point          |
|                                                                                                                                                                                                                                                                                                                                                                      |  | OUT_SCALE               | Parameter Shortcut  | -7100.00 to 7100.00 RPM   | <Com...    | Scaling                 |
|                                                                                                                                                                                                                                                                                                                                                                      |  |                         |                     |                           |            |                         |

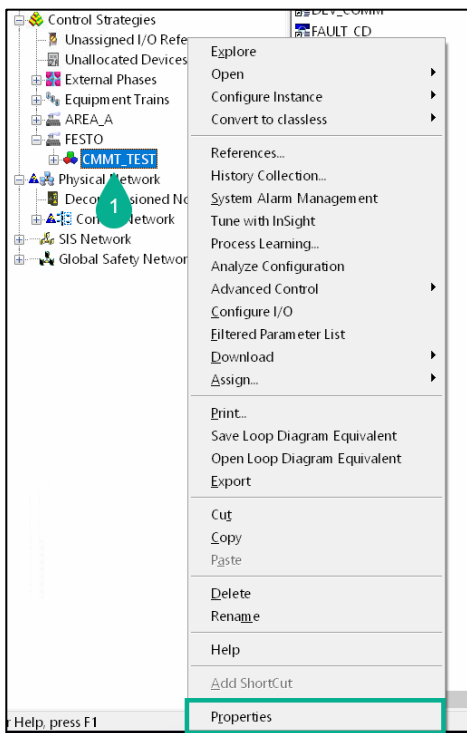
The CMMT control module has external reference parameters which need to be configured with the signal tag of the corresponding DST of the signals. By default, all of these parameters are configured as “#IGNORE”, i.e., they are not linked to any DST parameter.

Following are the details to configure parameters of the CMMT control module:

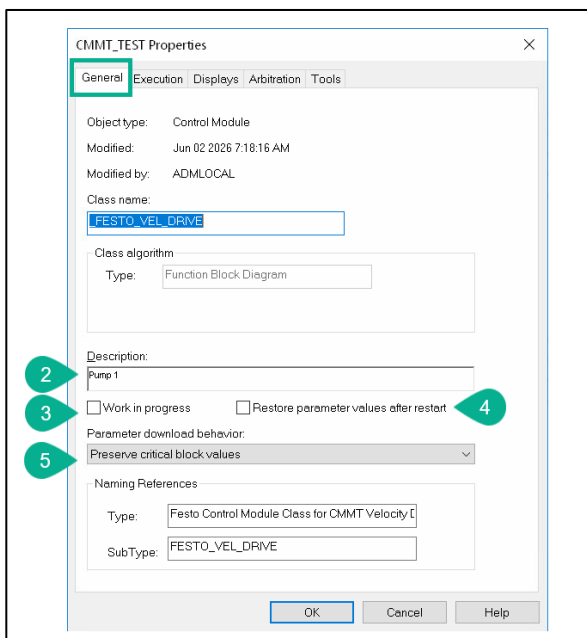
| Control Module Parameter | DST Reference                                                                                                                                   |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| DEV_COMM                 | <b>Controller Name/P01/PDT Name/STATUS</b>                                                                                                      |
| ZSW1                     |  SIGNAL001    Status Word 1 (ZSW1)    CMMT1_ZSW1             |
| NIST_A_SP                |  SIGNAL002    Actual Speed Value (NIST_A)    CMMT1_NISTA     |
| STW1                     |  SIGNAL003    Control Word 1 (STW1)    CMMT1_STW1            |
| NSOLL_A                  |  SIGNAL004    Speed Setpoint Value (NSOLL_A)    CMMT1_NSOLLA |

Table 5.1: Control module parameters

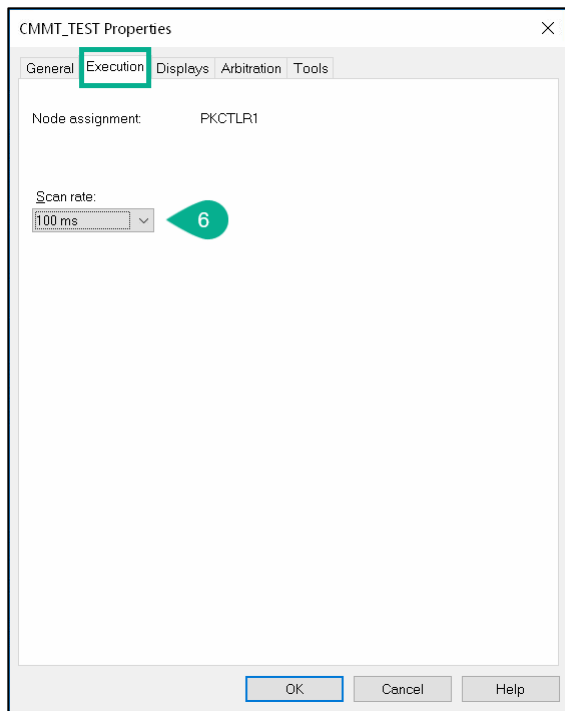
### Step 3: Configuring Control Module Properties



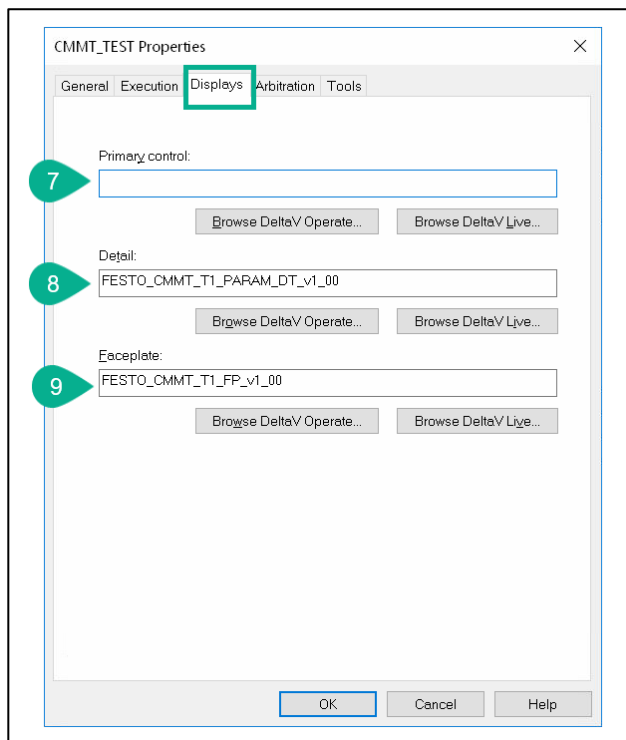
1. Right-click on “CMMT\_TEST” control module. Click on “Properties”.



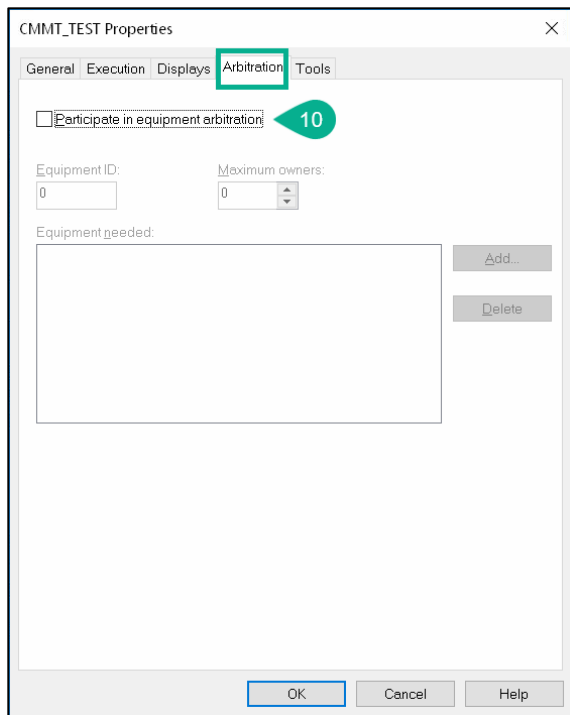
2. In “General” tab, set the “Description” parameter as per project philosophy
3. Checkbox for “Work in Progress” can be checked/unchecked based on if the module configuration is complete.
4. Set “Restore parameter values after restart” based on project philosophy. In this example, we will be leaving it unchecked.
5. Select “Parameter download behavior” option as per project philosophy. In this example, we will be selecting the default value “Preserve critical block values”.



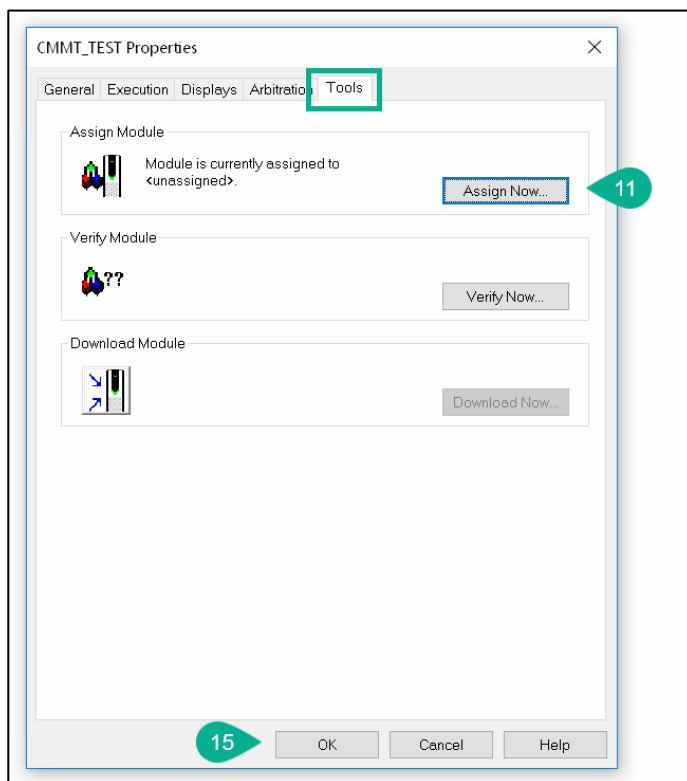
6. Click on the **“Execution”** tab. The scan rate of the module is set to **“100 msec”**. It is recommended to not change the scan rate.



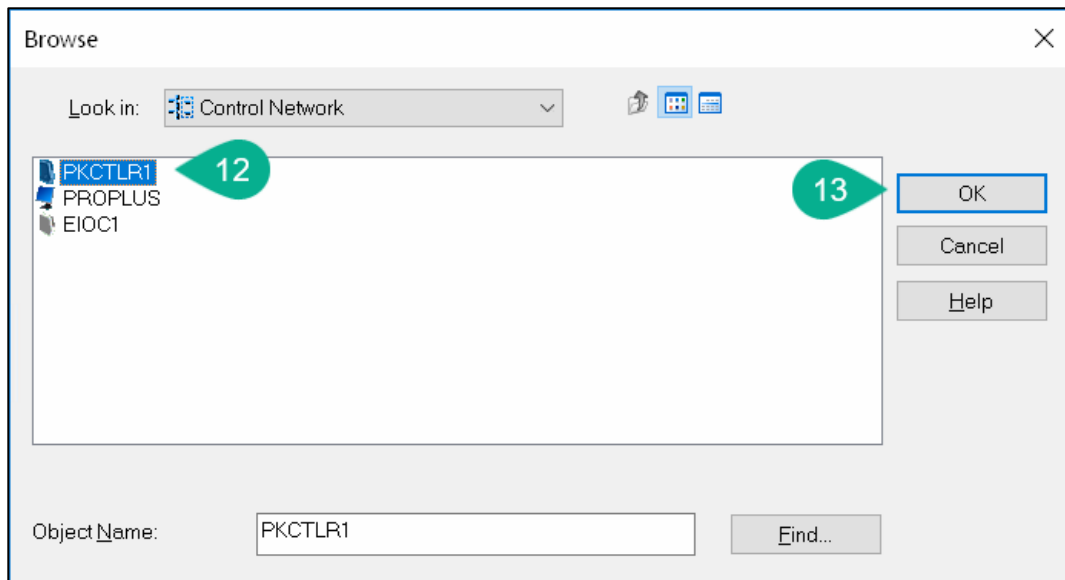
7. Click on the **“Displays”** tab. Enter the DeltaV Live graphics on which the CMMT will be displayed in **“Primary control”** field. This parameter is used by the faceplate to navigate to the display name entered.
8. The detail faceplate “FESTO\_CMMT\_T1\_PARAM\_DT\_v1\_00” is linked to the control module by default via the control module class. Do not make any changes to the **“Detail”** field.
9. The faceplate “FESTO\_CMMT\_T1\_FP\_v1\_00” is linked to the control module by default via the control module class. Do not make any changes to the **“Faceplate”** field.



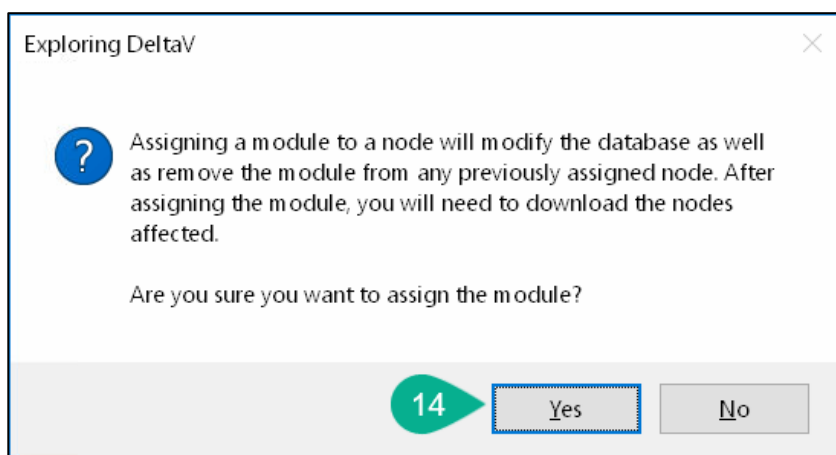
10. Click on **“Arbitration”** tab. Set the properties according to the Batch requirements (if used in a Batch process).



11. Click on the **“Tools”** tab. Click on **“Assign Now...”** button.



12. Select the PK Controller **"PKCTRL1"** (or the PK Controller which you are using for device configuration)
13. Click on **"OK"** in the browse dialog box.



14. Click on **"Yes"**.
15. Click on **"OK"** in the CMMT\_TEST Properties dialog box to apply settings to the control module.

## 5.2 Configuration for Position Control (Telegram 111) Control Module

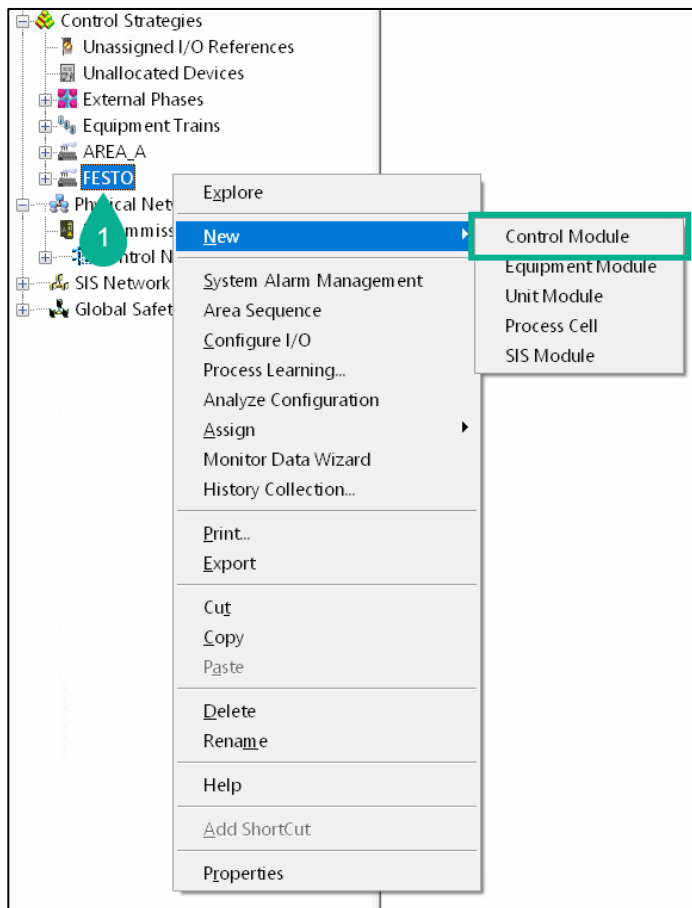
This section details the procedure to configure CMMT control module in DeltaV.



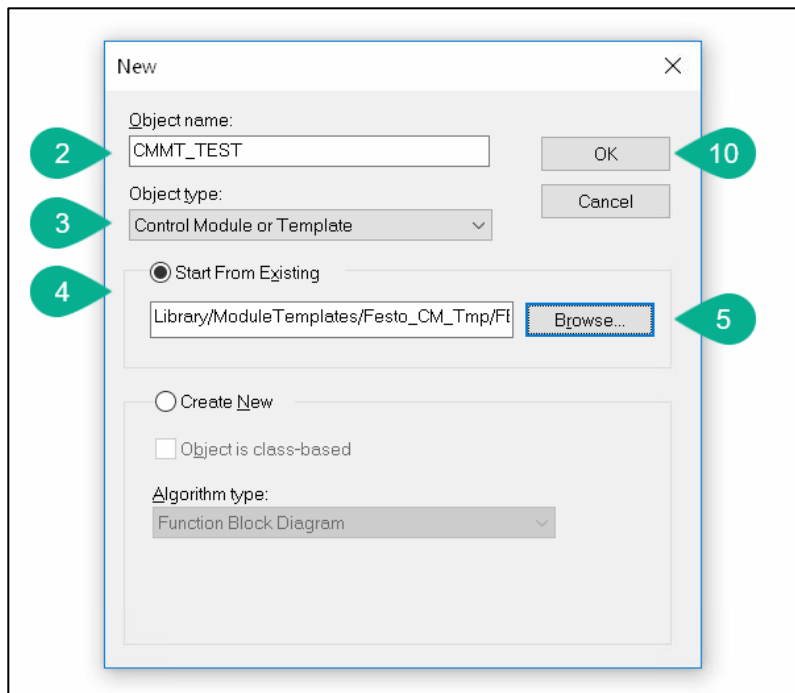
### Note

- The control module configuration is specific to the device configuration used in this application note.
- The control module configuration may vary based on the actual device configuration.
- Any changes to the sample project components and library in the production system should be done by expert personnel.

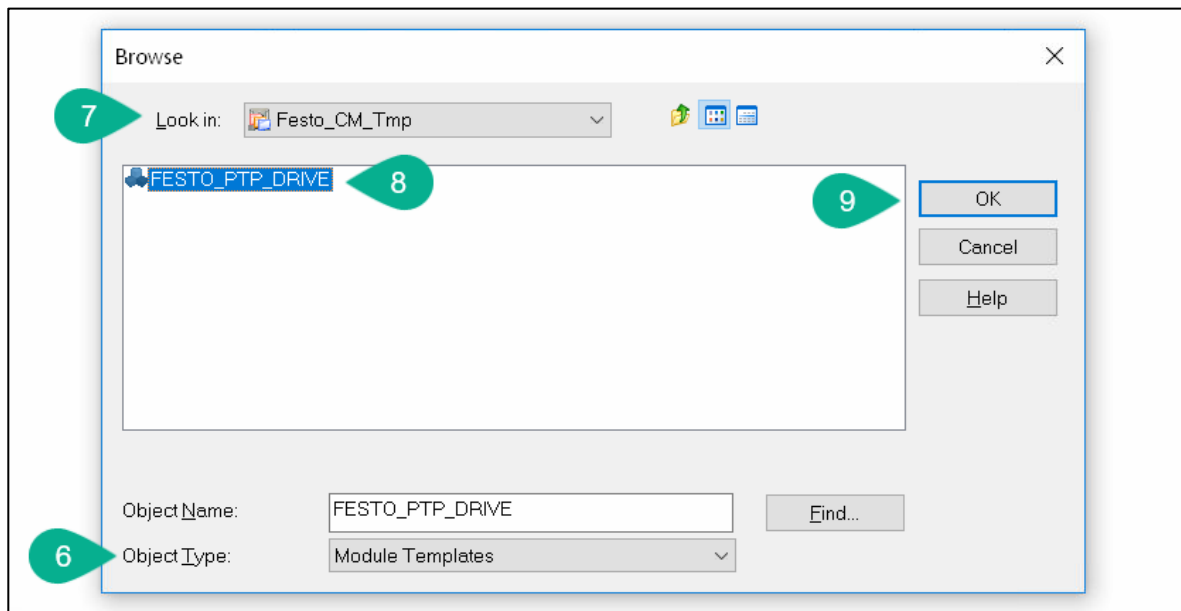
### Step 1: Creating Control Module Instance using Module Template



1. Right-Click the area under control strategies where you want to create the control module instance. Hover on **"New"** and click on **"Control Module"**.



2. Enter the control module name as per project philosophy in “**Object name**” field.
3. Select object type as “**Control Module or Template**”.
4. Select “**Start From Existing**” radio button.
5. Click on the “**Browse**” button. Field next to the browse button will be blank initially.



6. In the “**Browse**” pop-up dialog box, select object type as “**Module Templates**”.
7. Navigate to “**Festo\_CM\_Tmp**” folder.
8. Select template “**FESTO\_PTP\_DRIVE**”.
9. Click on “**OK**”.
10. Once template is selected, you should be able to see a detailed path in the field next to the browse button. Click on “**OK**”. The control module instance should be created and visible in the area now.

**Step 2: Configuring CMMT Control Module Instance**

CMMT\_TEST

All Containers

CMMT\_DEMO

Library

System Configuration

Recipes

Setup

Control Strategies

Unassigned I/O References

Unallocated Devices

External Phases

Equipment Trains

AREA\_A

FESTO

CMMT\_TEST

Physical Network

Decommissioned Nodes

Control Network

SIS Network

Global Safety Network

Contents of 'CMMT\_TEST'

| Name           | Parameter Value           | Filtering  | Parameter Type          | Group Name |
|----------------|---------------------------|------------|-------------------------|------------|
| CMMT_FAULT     |                           |            |                         |            |
| COMM_FAULT     |                           |            |                         |            |
| MOD_ERR        |                           |            |                         |            |
| DEV_COMM       | PKCTLR1/P01/CMMT_1/STATUS | <Com...    | External Reference      |            |
| FAULT_CD       | CMMT1_FLT_CODE/FIELD_VAL  | <Com...    | External Reference      |            |
| MDI_ACC        | CMMT1_MDI_ACC/OUT         | <Com...    | External Reference      | I/O        |
| MDI_DEC        | CMMT1_MDI_DEC/OUT         | <Com...    | External Reference      | I/O        |
| MELDW          | CMMT1_MELDW/FIELD_VAL     | <Com...    | External Reference      |            |
| OVERRIDE       | CMMT1_OVRD/OUT            | <Com...    | External Reference      | I/O        |
| POS_STW1       | CMMT1_POS_STW1/OUT        | <Com...    | External Reference      | I/O        |
| POS_STW2       | CMMT1_POS_STW2/OUT        | <Com...    | External Reference      | I/O        |
| POS_ZSW1       | CMMT1_POS_ZSW1/FIELD_VAL  | <Com...    | External Reference      |            |
| POS_ZSW2       | CMMT1_POS_ZSW2/FIELD_VAL  | <Com...    | External Reference      |            |
| STW1           | CMMT1_STW1/OUT            | <Com...    | External Reference      | I/O        |
| STW2           | CMMT1_STW2/OUT            | <Com...    | External Reference      | I/O        |
| VERSION        | 1                         | <On-lin... | 32 bit unsigned integer | Operating  |
| WARN_CD        | CMMT1_WARN_CODE/FIELD_VAL | <Com...    | External Reference      |            |
| ZSW1           | CMMT1_ZSW1/FIELD_VAL      | <Com...    | External Reference      |            |
| ZSW2           | CMMT1_ZSW2/FIELD_VAL      | <Com...    | External Reference      |            |
| MDI_TARPOS_O   | CMMT1_MDI_TRPS/OUT        | <Com...    | External Reference      | I/O        |
| MDI_VELOCITY_O | CMMT1_MDI_VEL/OUT         | <Com...    | External Reference      | I/O        |
| NIST_B_IN      | CMMT1_NISTB/FIELD_VAL     | <Com...    | External Reference      |            |
| XIST_A_IN      | CMMT1_XISTA/FIELD_VAL     | <Com...    | External Reference      |            |

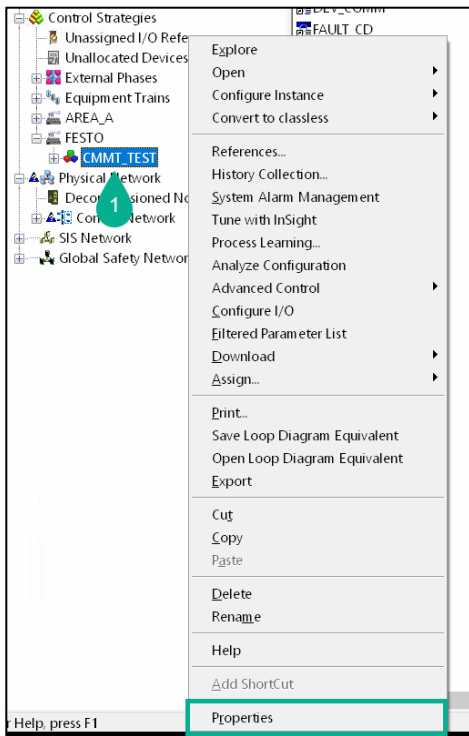
The CMMT control module has external reference parameters which need to be configured with the signal tag of the corresponding DST of the signals. By default, all of these parameters are configured as “#IGNORE”, i.e., they are not linked to any DST parameter.

Following are the details to configure parameters of the CMMT control module:

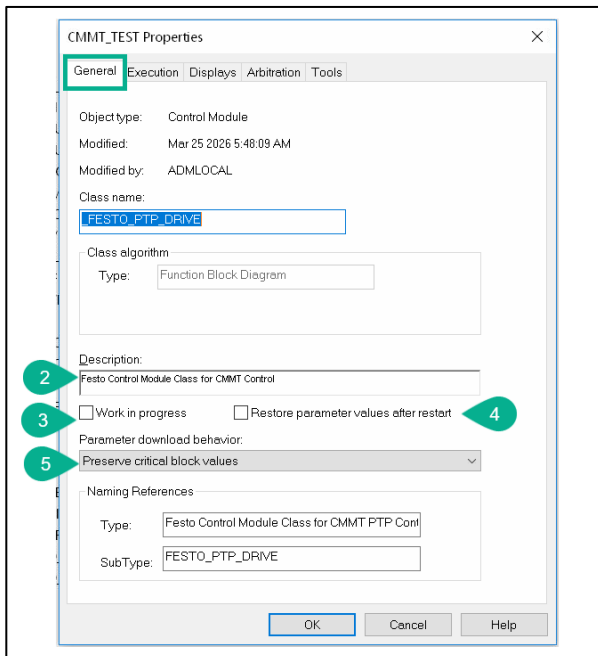
| Control Module Parameter | DST Reference                                                                                                                                               |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DEV_COMM                 | <b>Controller Name/P01/PDT Name/STATUS</b>                                                                                                                  |
| ZSW1                     |  SIGNAL001      Status Word 1 (ZSW1)      CMMT1_ZSW1                       |
| POS_ZSW1                 |  SIGNAL002      Positioner Status Word 1 (POS_ZSW1)      CMMT1_POS_ZSW1    |
| POS_ZSW2                 |  SIGNAL003      Positioner Status Word 2 (POS_ZSW2)      CMMT1_POS_ZSW2    |
| ZSW2                     |  SIGNAL004      Status Word 2 (ZSW2)      CMMT1_ZSW2                       |
| MELDW                    |  SIGNAL005      Status Word Messages (MELDW)      CMMT1_MELDW              |
| XIST_A_IN                |  SIGNAL006      Actual Position A (XIST_A)      CMMT1_XISTA                |
| NIST_B_IN                |  SIGNAL007      Rotational Speed Value B (NIST_B)      CMMT1_NISTB         |
| FAULT_CD                 |  SIGNAL008      Active Fault Number (FAULT_CODE)      CMMT1_FLT_CODE       |
| WARN_CD                  |  SIGNAL009      Active Warning Number (WARN_CODE)      CMMT1_WARN_CODE     |
| STW1                     |  SIGNAL010      Control Word 1 (STW1)      CMMT1_STW1                      |
| POS_STW1                 |  SIGNAL011      Positioner Control Word 1 (POS_STW1)      CMMT1_POS_STW1  |
| POS_STW2                 |  SIGNAL012      Positioner Control Word 2 (POS_STW2)      CMMT1_POS_STW2 |
| STW2                     |  SIGNAL013      Control Word 2 (STW2)      CMMT1_STW2                    |
| OVERRIDE                 |  SIGNAL014      Override      CMMT1_OVRD                                 |
| MDI_TARPOS_O             |  SIGNAL015      MDI Target Position (MDI_TARPOS)      CMMT1_MDI_TRPS     |
| MDI_VELOCITY_O           |  SIGNAL016      MDI Velocity (MDI_VELOCITY)      CMMT1_MDI_VEL           |
| MDI_ACC                  |  SIGNAL017      MDI Acceleration (MDI_ACC)      CMMT1_MDI_ACC            |
| MDI_DEC                  |  SIGNAL018      MDI Deceleration (MDI_DEC)      CMMT1_MDI_DEC            |

Table 5.2: Control module parameters

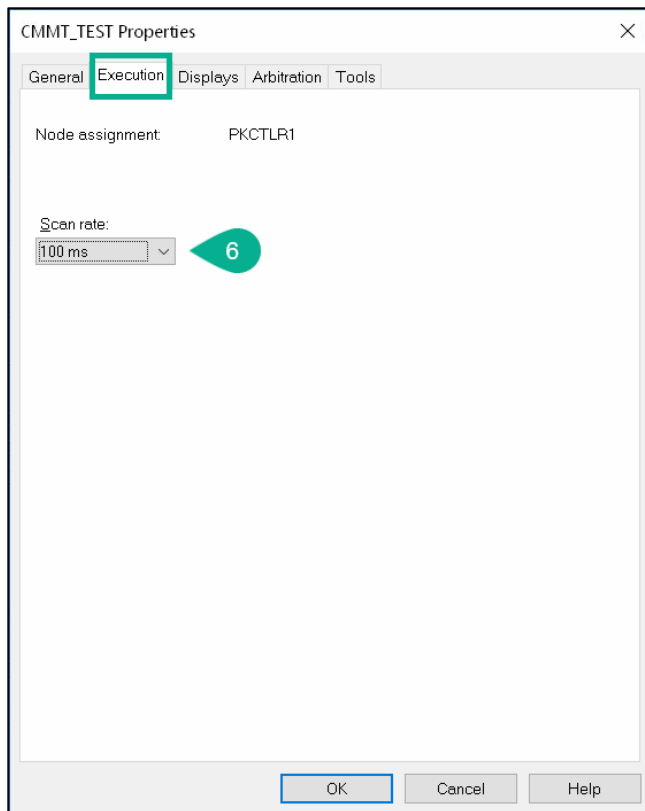
### Step 3: Configuring Control Module Properties



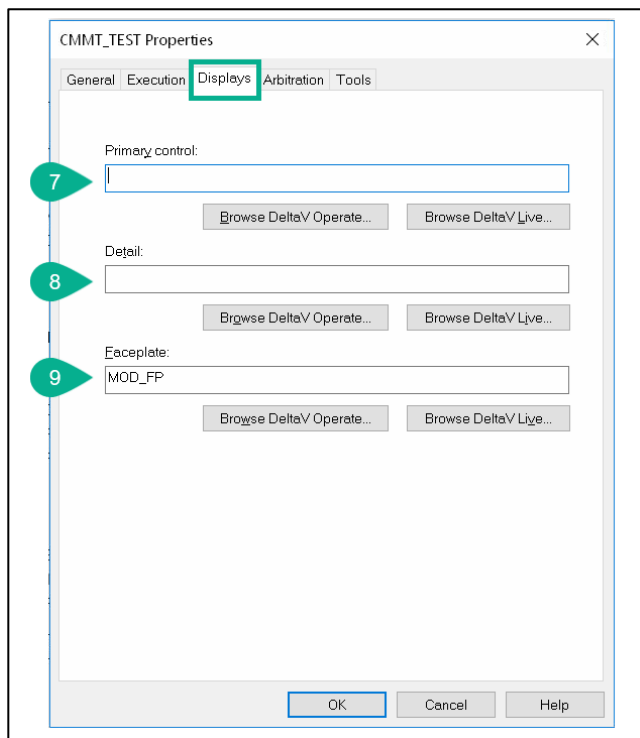
1. Right-click on “CMMT\_TEST” control module. Click on “Properties”.



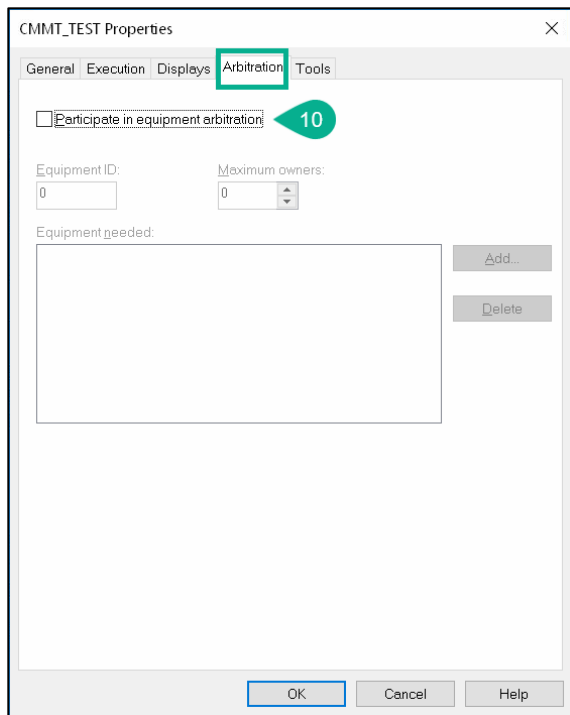
2. In “General” tab, set the “Description” parameter as per project philosophy
3. Checkbox for “Work in Progress” can be checked/unchecked based on if the module configuration is complete.
4. Set “Restore parameter values after restart” based on project philosophy. In this example, we will be leaving it unchecked.
5. Select “Parameter download behavior” option as per project philosophy. In this example, we will be selecting the default value “Preserve critical block values”.



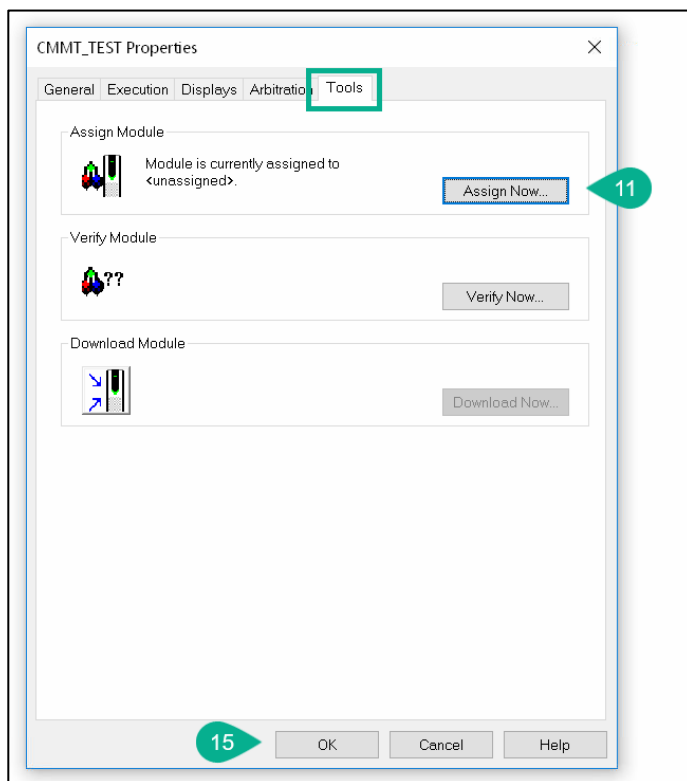
6. Click on the **“Execution”** tab. The scan rate of the module is set to **“100 msec”**. It is recommended to not change the scan rate.



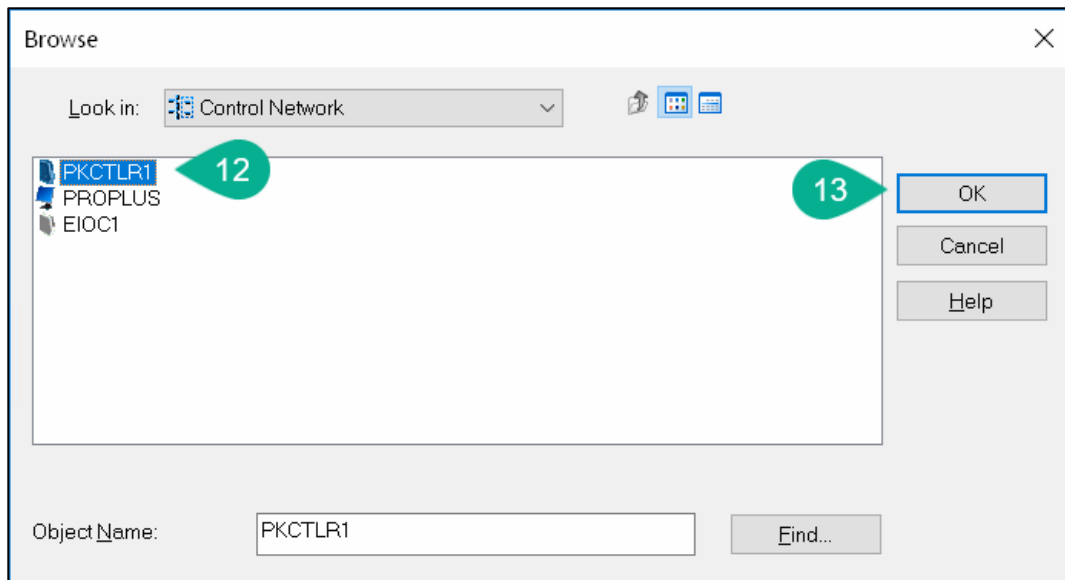
7. Click on the **“Displays”** tab. Enter the DeltaV Live graphics on which the CMMT will be displayed in **“Primary control”** field. This parameter is used by the faceplate to navigate to the display name entered.
8. The control module does not have a corresponding Detail faceplate. Leave the **“Detail”** field blank.
9. The control module does not have a corresponding Faceplate. Leave the **“Faceplate”** field unchanged.



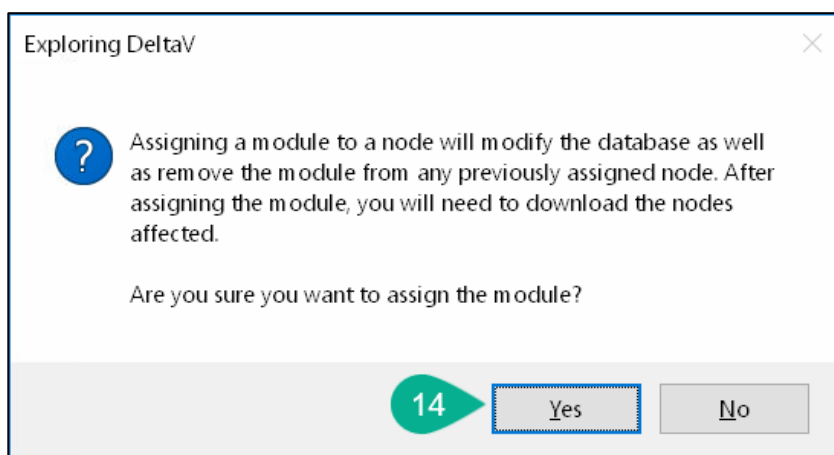
10. Click on **“Arbitration”** tab. Set the properties according to the Batch requirements (if used in a Batch process).



11. Click on the **“Tools”** tab. Click on **“Assign Now...”** button.



12. Select the PK Controller **"PKCTRL1"** (or the PK Controller which you are using for device configuration)
13. Click on **"OK"** in the browse dialog box.



14. Click on **"Yes"**.
15. Click on **"OK"** in the CMMT\_TEST Properties dialog box to apply settings to the control module.

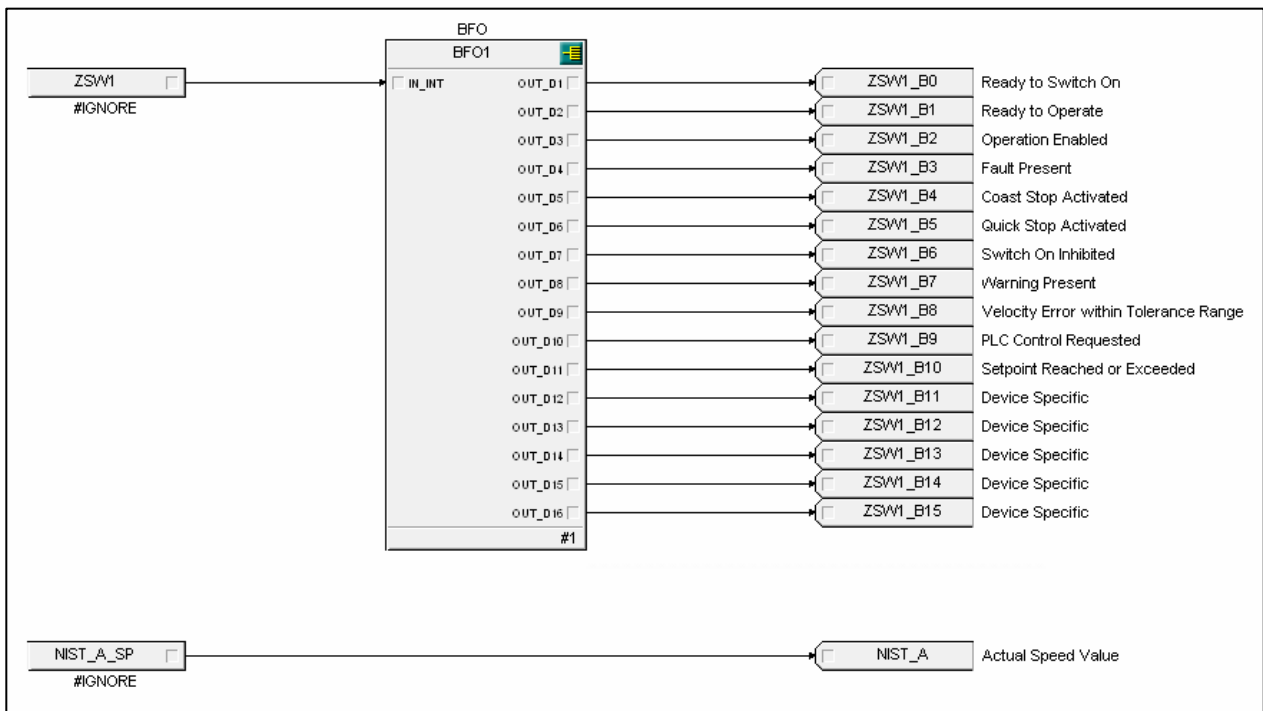
## 6 Elements in the CMMT Library

The control module class “**\_FESTO\_PTP\_DRIVE**” is the heart of the CMMT library. It brings together all the different elements such as Named Sets, Function Blocks and parameters into a single control module.

Each control module instance created from this class can be used to control one CMMT-AS servo drive. Internally the control module class is segregated into 3 sections which are described subsequently.

### 6.1 Elements in Basic Velocity Control (Telegram 1) Library

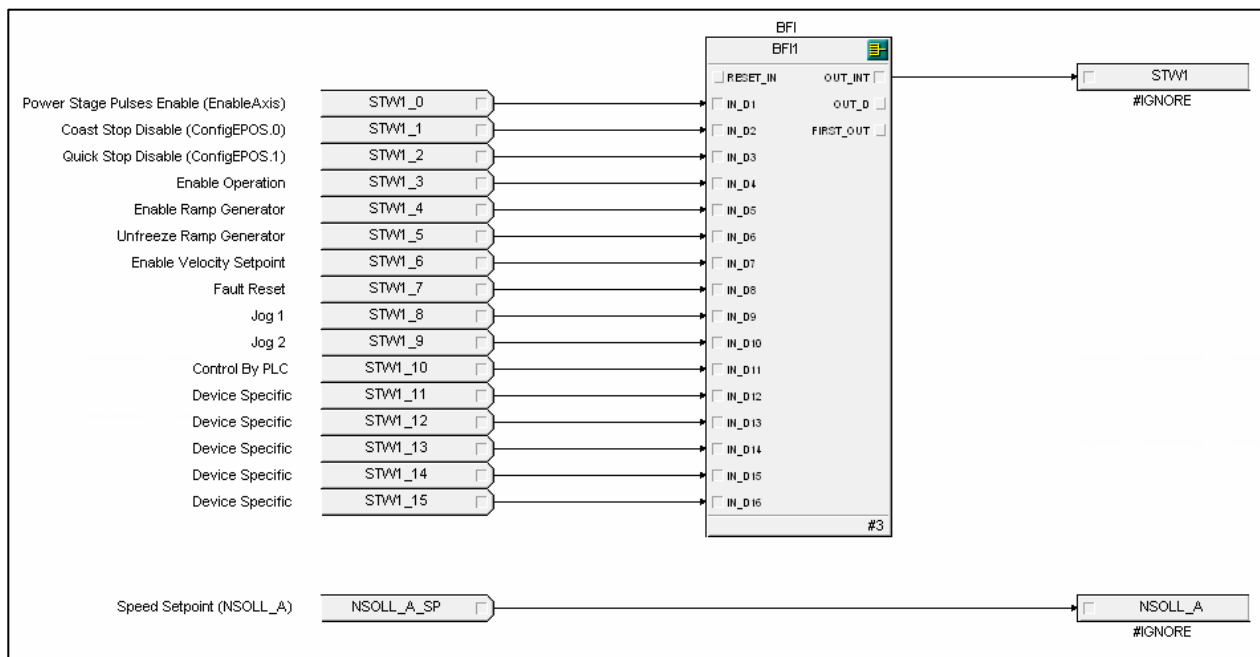
#### 6.1.1 CMMT Status Signals



The status signals read input values from the CMMT-AS. The values are read from the input signals configured in the CMMT physical device. These signals are then split into their individual component values based on Siemens Telegram 1 for PROFIDrive.

The individual signal values are then used in the “**FESTO\_VEL\_DRIVE**” composite (function block). These values can also be referenced in other control modules and DeltaV Live graphic as needed by the user.

### 6.1.2 CMMT Control Signals



The control signals write output values to the CMMT-AS from DeltaV. The individual signal values are written internally from the **"FESTO\_VEL\_DRIVE"** composite (function block) to the internal control module parameters. These values are then merged into their 16-bit integer values based on Siemens Telegram 1 for PROFIDrive. The values are written to the output signals configured in the CMMT physical device.

These values can also be referenced in DeltaV Live graphic as needed by the user. It is recommended not to write to the individual signal values from other control modules since it would interfere with the functioning of the **"FESTO\_VEL\_DRIVE"** composite logic.

### 6.1.3 CMMT Control Function Block

The **"FESTO\_VEL\_DRIVE"** function block is used for controlling velocity of the drive.



Following table gives a detailed explanation of input and output parameters of the function block.

#### 6.1.4 Input and Output Interface

##### Function Block Input Parameters

| Parameter Name | Data Type              | Function Description                                                                                                                                  |
|----------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| EN             | Boolean                | Enable the function block. This a soft input in DeltaV to enable or disable the function block execution.                                             |
| DEV_COMM       | External Reference     | Reference the CMMT PDT communication status                                                                                                           |
| ENABLE_AXIS    | Boolean                | Drive Enable ( ON/OFF1 )<br><b>1</b> = Enable Drive<br><b>0</b> = Ramp Down & Disable drive                                                           |
| COAST_STOP     | Boolean                | Drive coast (OFF 2)<br><b>1</b> = No Coasting<br><b>0</b> = Coasting. Power output stage is deactivated (OFF2). The drive coasts to a stop.           |
| RAPID_STOP     | Boolean                | Fast stop (OFF 3)<br><b>1</b> = No Fast Stop<br><b>0</b> = Brake drive to standstill with fast stop and then deactivate the power output stage (OFF3) |
| ENB_MOVEMENT   | Boolean                | Enable rotational speed setpoint value<br><b>1</b> = Enable                                                                                           |
| ACK_ERROR      | Named Set              | Reset Active Faults<br><b>1</b> = Reset Faults                                                                                                        |
| VELOCITY       | Floating Point Integer | Speed setpoint as per actual user unit                                                                                                                |
| BASE_VELOCITY  | Floating Point Integer | Base Value Velocity. User can find the value from the parameter P1.11280701.0.0                                                                       |
| BV_SCALE       | Scaling Parameter      | Automatically calculate from “OUT_SCALE” parameter. No configuration needed.                                                                          |
| GR_NUM         | Floating Point Integer | Numerator of the overall gear ratio (drive side). User can find the value from the parameter P1.1242.0.0                                              |
| GR_DEN         | Floating Point Integer | Denominator of the overall gear ratio (drive side). User can find the value from the parameter P1.1243.0.0                                            |

Table 6.1: Function Block Input Parameters descriptions

### 6.1.5 Function Block Output Parameters

| Parameter Name | Data Type              | Function Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ENO            | Boolean                | Function block enabled status.<br><b>TRUE</b> = Function block enabled<br><b>FALSE</b> = Function block disabled                                                                                                                                                                                                                                                                                                                                                                                 |
| RDY_FOR_OP     | Boolean                | Ready to Start Feedback<br><b>TRUE</b> = Ready to Switch On                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| AXIS_ENABLED   | Boolean                | Axis enabled feedback<br><b>TRUE</b> = Drive Ready and Switched On/Enabled                                                                                                                                                                                                                                                                                                                                                                                                                       |
| AXIS_ERROR     | Boolean                | Error Active<br><b>TRUE</b> = Drive has an error message                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| LOCKOUT        | Boolean                | ON Inhibited<br><b>TRUE</b> = Switching ON Inhibited                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| ACT_VELOCITY   | Floating Point Integer | Actual velocity feedback value ( Feedback value scaled by base velocity value )                                                                                                                                                                                                                                                                                                                                                                                                                  |
| OUT_SCALE      | Scaling Parameter      | <ol style="list-style-type: none"> <li>1. Enter the velocity limit in positive direction of movement (P1.1304.0.0) in 100% of scale field.</li> <li>2. Enter the velocity limit in negative direction of movement (P1.1310.0.0) in 0% of scale field.</li> <li>3. Enter the user unit velocity (P1.7852.0.0) in Engineering unit field. The Decimal places field is set to “2” by default. This can be adjusted as per preference, but it is recommended to keep at 2 decimal places.</li> </ol> |
| STATUS         | Floating Point Array   | Diagnostic message decimal number                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

Table 6.2: Function Block Output Parameters descriptions

### 6.1.6 Diagnostic Messages

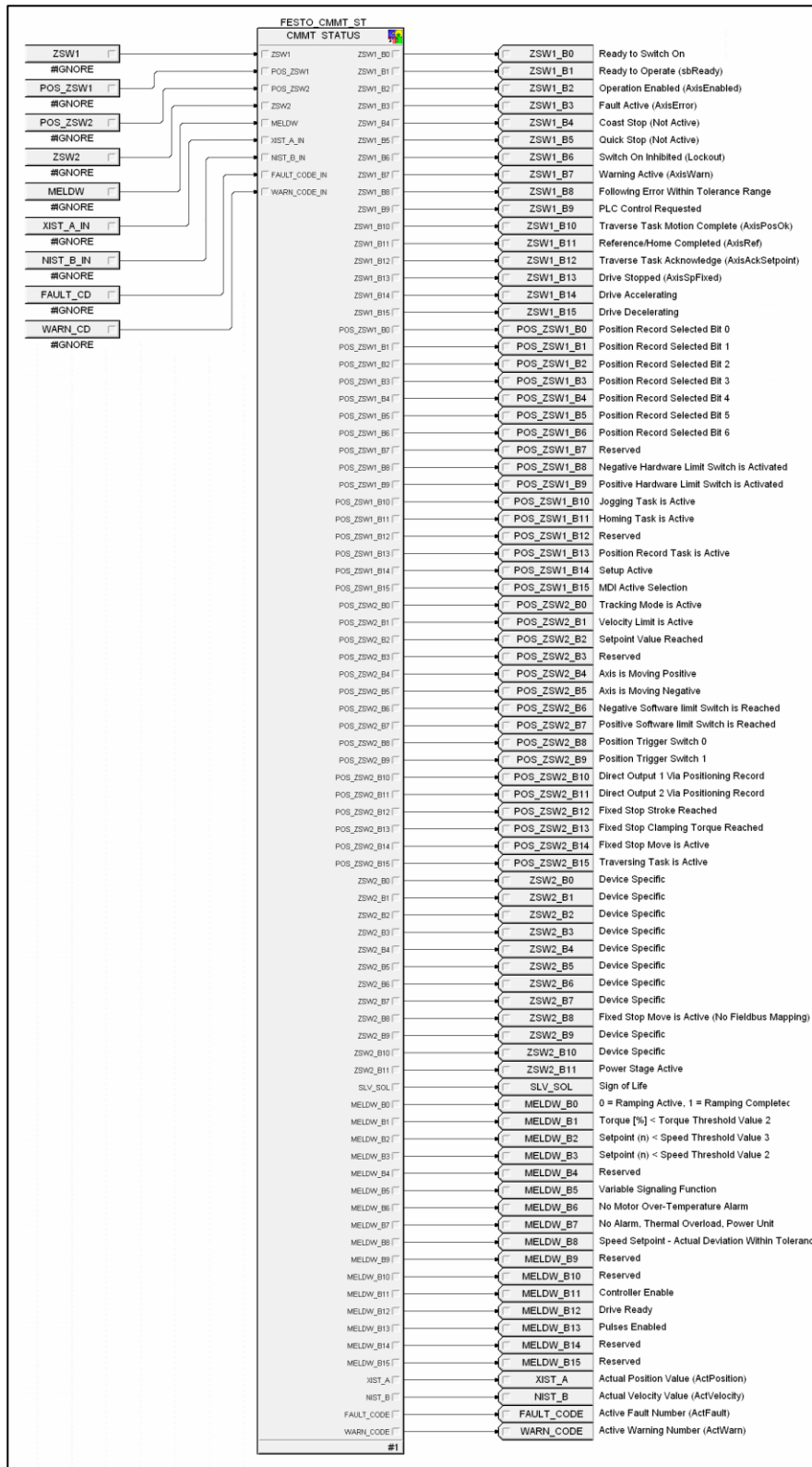
The function block gives multiple types of diagnostic messages. The following table describes the diagnostic messages and their remedies.

| Status Error Number | Diagnostic Message            | Remedy                                                                                                                                                                                                                              |
|---------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 28674               | No Error                      | -                                                                                                                                                                                                                                   |
| 33793               | Alarm message(s) in the drive | Check the error code in drive/FAS                                                                                                                                                                                                   |
| 33794               | Switching ON is Inhibited     | The switch-on lock is active. The drive is in the status S1 Switching On Inhibited. Switching on is only possible with the following command sequence: OFF (OFF1) and no coasting (no OFF2) and no fast stop (no OFF3) and then ON. |
| 33795               | No entry error                | Set the base value velocity and/or gear ratio as per FAS                                                                                                                                                                            |
| 34304               | Communication Disconnected    | Check the communication connections/ setting between drive and controller                                                                                                                                                           |

Table 6.3: Error codes descriptions

## 6.2 Elements in Position Control (Telegram 111) Library

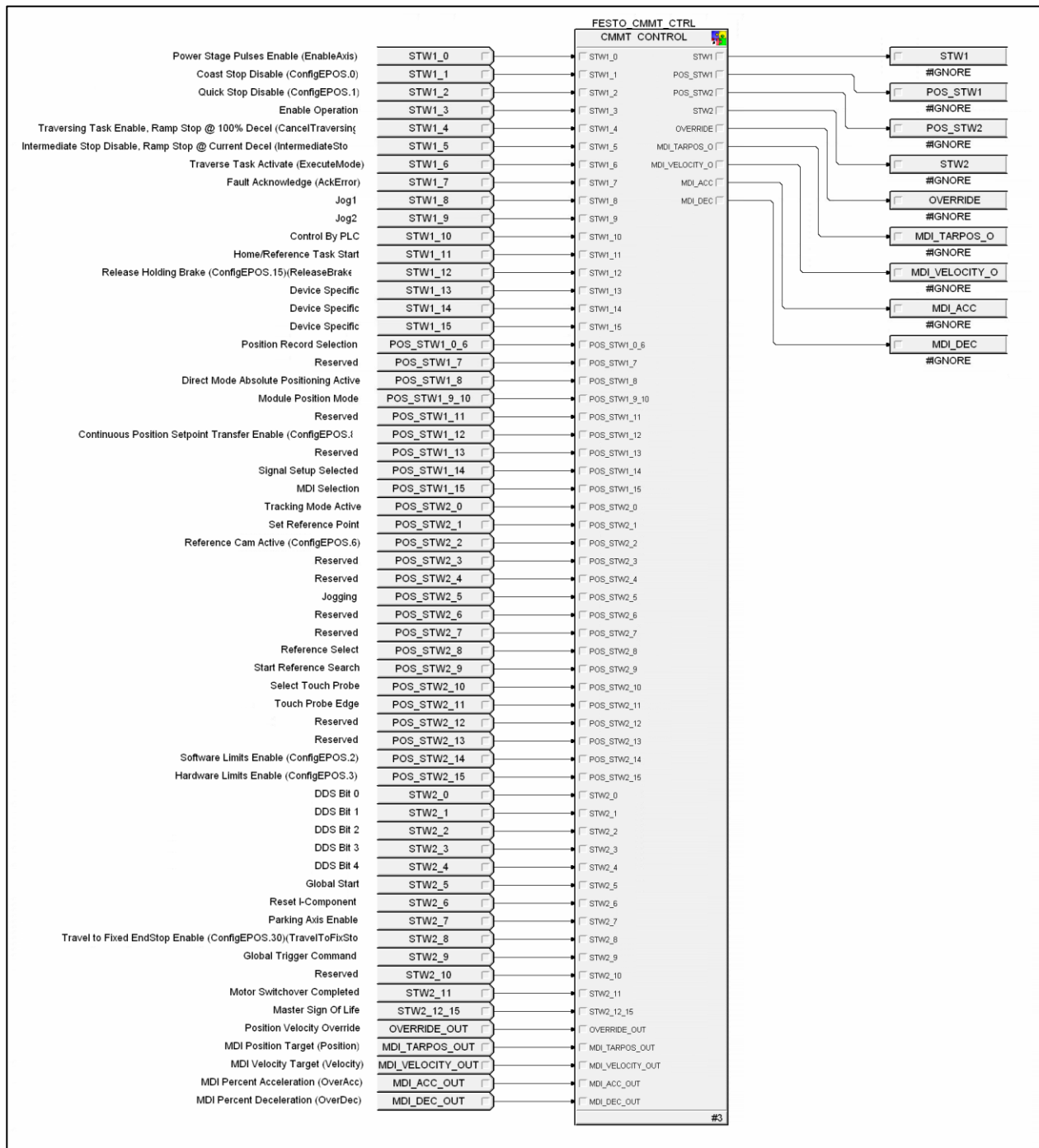
### 6.2.1 CMMT Status Signals



The status signals read input values from the CMMT-AS. The values are read from the input signals configured in the CMMT physical device. These signals are then split into their individual component values based on Siemens Telegram 111 for PROFIDrive.

The individual signal values are then used in the **"FESTO\_PTP\_DRIVES"** composite (function block). These values can also be referenced in other control modules and DeltaV Live graphic as needed by the user.

## 6.2.2 CMMT Control Signals



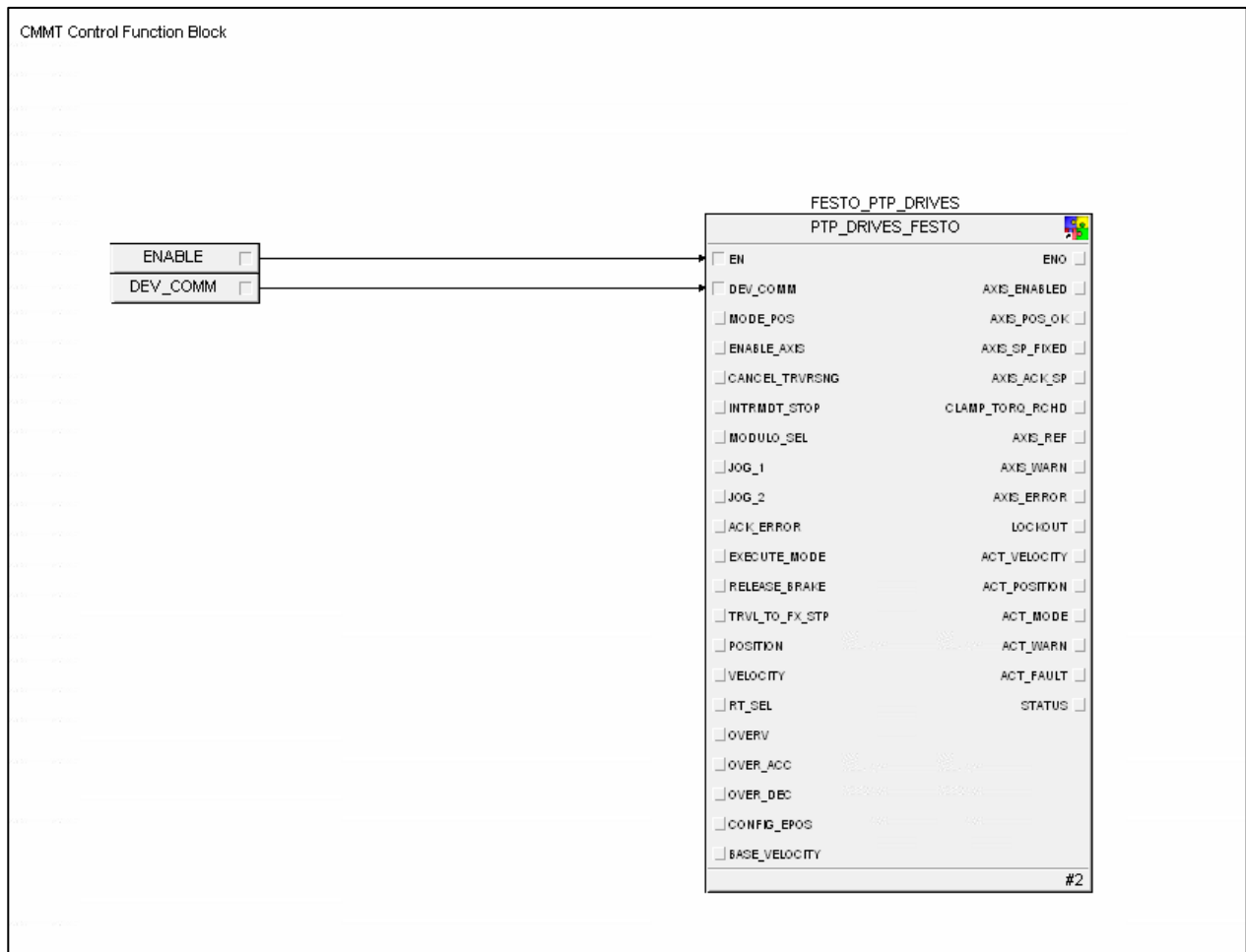
The control signals write output values to the CMMT-AS from DeltaV. The individual signal values are written internally from the **"FESTO\_PTP\_DRIVES"** composite (function block) to the internal control module parameters. These values are then merged into their 16-bit unsigned integer values based on Siemens Telegram 111 for PROFIDrive. The values are written to the twelve 16-bit unsigned integer output signals configured in the CMMT physical device.

These values can also be referenced in DeltaV Live graphic as needed by the user. It is recommended not to write to the individual signal values from other control modules since it would interfere with the functioning of the **"FESTO\_PTP\_DRIVES"** composite logic.

### 6.2.3 CMMT Control Function Block

The FESTO\_PTP\_DRIVES function block is used for controlling the drive in the following modes:

1. ModePos – 1: Relative Positioning
2. ModePos – 2: Absolute Positioning
3. ModePos – 3: Setup Mode
4. ModePos – 4: Home/Reference using Festo Automation Suite Configuration
5. ModePos – 5: Home to Current Position
6. ModePos – 6: Traversing/Record Select Mode
7. ModePos – 7: Jog
8. ModePos – 8 : Inching/Incremental Jog Mode



Following table gives a detailed explanation of input and output parameters of the function block.

## 6.3 Input and Output Interface

### 6.3.1 Function Block Input Parameters

| Parameter Name | Data Type          | Function Description                                                                                                                                                                                                                                                                       |
|----------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EN             | Boolean            | Enable the function block. This a soft input in DeltaV to enable or disable the function block execution.                                                                                                                                                                                  |
| DEV_COMM       | External Reference | Reference the CMMT PDT communication status                                                                                                                                                                                                                                                |
| MODE_POS       | Named Set          | Select the operating mode for CMMT. It has following values:<br>1 = Relative Positioning<br>2 = Absolute Positioning<br>3 = Setup Mode<br>4 = Home/Reference using FAS<br>5 = Home to Current Position<br>6 = Traversing/Record Select Mode<br>7 = Jog<br>8 = Inching/Incremental Jog Mode |
| ENABLE_AXIS    | Boolean            | <b>TRUE</b> - Enable the axis<br><b>FALSE</b> – Disable the axis.                                                                                                                                                                                                                          |
| CANCEL_TRVRSNG | Boolean            | <b>FALSE</b> – Cancel Travel Task<br>Ramp Stop @ 100% Set Deceleration<br>Task is Rejected                                                                                                                                                                                                 |
| INTRMDT_STOP   | Boolean            | <b>FALSE</b> – Interrupt Travel Task<br>Ramp Stop @ Current Deceleration<br>Task is NOT Rejected                                                                                                                                                                                           |
| MODULO_SEL     | Named Set          | Select the travel direction.<br>0 = Shortest Path<br>1 = Positive Path<br>2 = Negative Path                                                                                                                                                                                                |
| JOG_1          | Boolean            | <b>TRUE</b> – Drive jogs in positive direction                                                                                                                                                                                                                                             |
| JOG_2          | Boolean            | <b>TRUE</b> – Drive jogs in negative direction                                                                                                                                                                                                                                             |
| ACK_ERROR      | Boolean            | <b>TRUE</b> – Acknowledge all errors                                                                                                                                                                                                                                                       |
| EXECUTE_MODE   | Boolean            | <b>TRUE</b> – Execute the task                                                                                                                                                                                                                                                             |
| RELEASE_BRAKE  | Boolean            | <b>TRUE</b> – Release servo motor brake                                                                                                                                                                                                                                                    |
| TRVL_TO_FX_STP | Boolean            | <b>TRUE</b> – Enable travel to fix stop mode                                                                                                                                                                                                                                               |

| Parameter Name | Data Type               | Function Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| POSITION       | 32-bit signed integer   | <p>Enter setpoint for Position Target.</p> <p>The position target setpoint is calculated as follows:<br/>           Position Target Setpoint=<br/>           (Position Target Value) x (Factor Group for Position)</p> <p>Example:<br/>           Position Target Setpoint=<br/> <math>2500000 \times 10^{-6} = 2.500000 \text{ cm}</math></p>                                                                                                                                                            |
| VELOCITY       | 32-bit signed integer   | <p>Enter setpoint for Velocity Target.</p> <p>Velocity in User Units While using MDI (Manual Data Input) Mode</p> <p>Profile Velocity MDI =<br/>           (Velocity Target Setpoint) x (Factor Group for Velocity) x<br/>           (Velocity Override)</p> <p>Example1:<br/>           Velocity Target Setpoint = <math>50 \times 10^{-3} \times 1 = 0.05 \text{ m/s}</math></p> <p>Example2:<br/>           Velocity Target Setpoint = <math>250 \times 10^{-3} \times 1 = 0.25 \text{ m/s}</math></p> |
| RT_SEL         | 16-bit unsigned integer | Enter the value of record set to be used from the record table.                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| OVERV          | 16-bit signed integer   | <p>Velocity override in % ( 0 to 199 % )</p> <p>OVERV Value = 0-100%</p> <p>FAS = P1.1309.0.0</p>                                                                                                                                                                                                                                                                                                                                                                                                         |
| OVER_ACC       | 16-bit signed integer   | <p>Acceleration override in % ( 0 to 100 % )</p> <p>Acceleration MDI =<br/>           (OVER_ACC Target Value) x Value Acceleration</p>                                                                                                                                                                                                                                                                                                                                                                    |
| OVER_DEC       | 16-bit signed integer   | <p>Deceleration override in % ( 0 to 100 % )</p> <p>Deceleration MDI =<br/>           (OVER_DEC Target Value) x (Base Value Deceleration)</p>                                                                                                                                                                                                                                                                                                                                                             |
| CONFIG_EPOS    | 32-bit unsigned integer | <p>Configuration command</p> <p>See Chapter 5.3.2 for further details</p>                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| BASE_VELOCITY  | Floating Point Integer  | Base speed value for actual speed display. Enter the same value given for parameter “P1.11280701.0.0” in FAS                                                                                                                                                                                                                                                                                                                                                                                              |

Table 6.4: Function Block Input Parameters descriptions

**6.3.2 Function Block Output Parameters**

| Parameter Name  | Data Type               | Function Description                                                                                                                                                                                                                                                |
|-----------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ENO             | Boolean                 | Function block enabled status.<br><b>TRUE</b> = Function block enabled<br><b>FALSE</b> = Function block disabled                                                                                                                                                    |
| AXIS_ENABLED    | Boolean                 | Axis enabled feedback<br><b>TRUE</b> = Drive Ready and Switched On/Enabled                                                                                                                                                                                          |
| AXIS_POS_OK     | Boolean                 | <b>TRUE</b> = Axis reached target position and motion completed                                                                                                                                                                                                     |
| AXIS_SP_FIXED   | Boolean                 | <b>TRUE</b> = Setpoint is stationary feedback                                                                                                                                                                                                                       |
| AXIS_ACK_SP     | Boolean                 | <b>TRUE</b> = Acknowledge Setpoint                                                                                                                                                                                                                                  |
| CLAMP_TORQ_RCHD | Boolean                 | <b>TRUE</b> = Clamp Torque Reached                                                                                                                                                                                                                                  |
| AXIS_REF        | Boolean                 | <b>TRUE</b> = Referencing/Homing Completed                                                                                                                                                                                                                          |
| AXIS_WARN       | Boolean                 | Warning Active<br><b>TRUE</b> = Drive has a warning message                                                                                                                                                                                                         |
| AXIS_ERROR      | Boolean                 | Error Active<br><b>TRUE</b> = Drive has an error message                                                                                                                                                                                                            |
| LOCKOUT         | Boolean                 | ON Inhibited<br><b>TRUE</b> = Switching ON Inhibited                                                                                                                                                                                                                |
| ACT_VELOCITY    | Floating Point Integer  | Actual velocity feedback value ( Feedback value scaled by base velocity value )                                                                                                                                                                                     |
| ACT_POSITION    | 32-bit signed integer   | Axis actual position feedback value                                                                                                                                                                                                                                 |
| ACT_MODE        | 16-bit signed integer   | Actual mode selection feedback value:<br>1 = Relative Positioning<br>2 = Absolute Positioning<br>3 = Setup Mode<br>4 = Home/Reference using FAS<br>5 = Home to Current Position<br>6 = Traversing/Record Select Mode<br>7 = Jog<br>8 = Inching/Incremental Jog Mode |
| ACT_WARN        | 16-bit unsigned integer | Actual warning number                                                                                                                                                                                                                                               |
| ACT_FAULT       | 16-bit unsigned integer | Actual error number                                                                                                                                                                                                                                                 |
| STATUS          | 16-bit unsigned integer | Diagnostic message decimal number                                                                                                                                                                                                                                   |

Table 6.5: Function Block Output Parameters descriptions

### 6.3.3 CONFIG\_EPOS Bit Details

| CONFIG_EPOS Bit  | 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                          |
| 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                                       |

Table 6.6: CONFIG\_EPOS Bit descriptions

### 6.3.4 Diagnostic Messages

The function block gives multiple types of diagnostic messages. The following table describes the diagnostic messages and their remedies.

| Status Error Number | Diagnostic Message                                   | Remedy                                                                       |
|---------------------|------------------------------------------------------|------------------------------------------------------------------------------|
| 28674               | No Error                                             | -                                                                            |
| 33793               | Alarm message(s) in the drive                        | Check the error code in ACT_FAULT parameter                                  |
| 33794               | Switching ON is Inhibited                            | Check whether axis is parked, Safety functions active and Parameter P10 <> 0 |
| 33795               | - FW Pending - Flying Reference could NOT be Started | Check for pending alarms / faults in the drive                               |
| 34304               | Communication Disconnected                           | Check the communication connections/ setting between drive and controller    |
| 33282               | Incorrect Operating Mode Selected                    | Set MODE_POS parameter value between 1 and 8                                 |
| 33283               | Incorrect parameterization of the over-ride inputs   | Check the settings in override input parameters                              |
| 33284               | Invalid traversing block number                      | Enter the traversing block number from 0 to 127                              |

Table 6.7: Error codes descriptions

## 7 CMMT Drive Position Control (FESTO\_PTP\_DRIVES Functions)

This chapter provides details about the configuration needed to be done in the “FESTO\_PTP\_DRIVES” function block (composite) in the “\_FESTO\_PTP\_DRIVE” control module class.

These settings need to be done to use the CMMT operation modes, enabling and stopping the axis, enabling hardware & software position limits, and actual velocity monitoring.

### 7.1 Enabling and Stopping the Axis

For enabling the axis following parameters need to be configured as detailed:

1. “CONFIG\_EPOS” Bit 0 and Bit 1 (OFF2 and OFF3) must be set to TRUE.
2. “AXIS\_ERROR” and “LOCKOUT” output tags must be FALSE to ensure drive is in ready state.
3. “MODE\_POS” parameter value must be between 1 to 8.
4. “CANCEL\_TRVRSNG” (Reject traversing task) and “INTRMDT\_STOP” (Intermediate Stop) parameters must be set to TRUE.
5. “ENABLE\_AXIS” must be set to TRUE and “AXIS\_ENABLED” feedback should become TRUE after enabling the drive.
6. Toggle “ACK\_ERROR” control bit to clear any error in the function block.

### 7.2 Enabling Hardware and Software Position Limits

Bit 2 and Bit 3 of the “CONFIG\_EPOS” parameter are used to enable the software & hardware position limits respectively.

1. To enable the software position limit (Festo Automation Suite parameter P1.112414140.0.0), the CONFIG\_EPOS parameter Bit 2 needs to be set to TRUE
2. To enable the hardware position limit (Festo Automation Suite parameter P1.112414150.0.0), the CONFIG\_EPOS parameter Bit 3 needs to be set to TRUE

When software position limit is active, verify if following parameters are configured correctly as per application requirement:

| Axis Configuration                                                                                                   |                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Reversing direction of motion                                                                                        |  <input type="checkbox"/> Active |
| Axis zero point offset                                                                                               | <input type="text" value="0.03"/> r                                                                                 |
| Software limit positions active                                                                                      | <input type="checkbox"/> Active                                                                                     |
|  Negative software limit position | -0.03 r                                                                                                             |
|  Positive software limit position | 0.97 r                                                                                                              |

### 7.3 Axis Actual Velocity Monitoring

User can monitor the actual velocity of the axis using the “ACT\_VELOCITY” parameter. The actual velocity of the axis is scaled from 0 to 100% depending on the base velocity value of parameter number ( P1.11280701.0.0 ). It is mandatory to enter the same value in input parameter “BASE\_VELOCITY” of the function block.



#### Note

- Ensure that the function block input tag “BASE\_VELOCITY” and Festo Automation Suite parameter number ( P1.11280701.0.0 ) values are same. Function block will display wrong velocity value If both values are not equal.

## 7.4 FESTO\_PTP\_DRIVES Modes of Operation

The FESTO\_PTP\_DRIVES block provides following modes of operation for the drive:

- **MODE\_POS – 1:** Relative Positioning
- **MODE\_POS – 2:** Absolute Positioning
- **MODE\_POS – 3:** Setup Mode
- **MODE\_POS – 4:** Home/Reference using Festo Automation Suite Configuration
- **MODE\_POS – 5:** Home to Current Position
- **MODE\_POS – 6:** Traversing/Record Select Mode
- **MODE\_POS – 7:** Jog
- **MODE\_POS – 8 :** Inching/Incremental Jog Mode

### 7.4.1 Relative Positioning Mode [MODE\_POS – 1]

#### 1. Configuration Required for Relative Positioning Mode

- Set the “MODE\_POS” value to 1.
- Check if “AXIS\_REF” status parameter is True. If not true, the user can use mode 4 or 5 to set the reference point for drive axis.
- Enable axis by toggling “ENABLE\_AXIS” parameter to True.
- Set “CANCEL\_TRVRSNG” and “INTRMDT\_STOP” parameters to True.
- Enter the percentage of override acceleration, override deceleration and override velocity in “OVER\_ACC”, “OVER\_DEC” and “OVERV” parameters respectively.
- The status parameters “AXIS\_ENABLED”, and “AXIS\_REF” must be True.

#### 2. Sequence to Execute Relative Positioning Command

- Enter the position target value in “POSITION” parameter and velocity value in “VELOCITY” parameter. To move axis in forward direction, the position target value must be positive and for moving axis in reverse direction it should be negative.
- Toggle the “EXECUTE\_MODE” parameter to start motion task for configured parameter. The command is executed only on the rising edge of EXECUTE\_MODE parameter. Hence, the EXECUTE\_MODE parameter needs to be toggled to execute a new position command. Verify if the feedback tag “ACT\_MODE” has the same value as MODE\_POS.
- User will receive execute command accepted handshake signal from “AXIS\_ACK\_SP” parameter.
- If task is completed successfully, it is acknowledged by rising edge of “AXIS\_POS\_OK” parameter. If the task completion is unsuccessful (with an error) “AXIS\_ERROR” parameter will be changed to True.
- “AXIS\_SP\_FIXED” parameter indicates the axis mobility status . If the axis is in standby then “AXIS\_SP\_FIXED” parameter will be True.



#### Note

- The existing running task command can be replaced by new task command only on Mode 1 and 2.

### 7.4.2 Absolute Positioning Mode [MODE\_POS – 2]

#### 1. Configuration Required for Absolute Positioning Mode

- Set the “MODE\_POS” value to 2.
- Check if “AXIS\_REF” status parameter is True. If not true, the user can use mode 4 or 5 to set the reference point for drive axis.
- Enable axis by toggling “ENABLE\_AXIS” parameter to True.
- Set “CANCEL\_TRVRSNG” and “INTRMDT\_STOP” parameters to True.
- Enter the percentage of override acceleration, override deceleration and override velocity in “OVER\_ACC”, “OVER\_DEC” and “OVERV” parameters respectively.
- The status parameters “AXIS\_ENABLED”, and “AXIS\_REF” must be True.

#### 2. Sequence to Execute Absolute Positioning Command

- Enter the position target value in “POSITION” parameter and velocity value in “VELOCITY” parameter. To move axis in forward direction, the position target value must be positive and for moving axis in reverse direction it should be negative.
- Toggle the “EXECUTE\_MODE” parameter to start motion task for configured parameter. The command is executed only on the rising edge of EXECUTE\_MODE parameter. Hence, the EXECUTE\_MODE parameter needs to be toggled to execute a new position command. Verify if the feedback tag “ACT\_MODE” has the same value as MODE\_POS.
- User will receive execute command accepted handshake signal from “AXIS\_ACK\_SP” parameter.
- If task is completed successfully, it is acknowledged by rising edge of “AXIS\_POS\_OK” parameter. If the task completion is unsuccessful (with an error) “AXIS\_ERROR” parameter will be changed to True.
- “AXIS\_SP\_FIXED” parameter indicates the axis mobility status . If the axis is in standby then “AXIS\_SP\_FIXED” parameter will be True.



#### Note

- The existing running task command can be replaced by new task command only on Mode 1 and 2.

### 7.4.3 Setup Mode [MODE\_POS – 3]

#### 1. Configuration Required for Setup Mode

- Set the “MODE\_POS” value to 3.
- Check if “AXIS\_REF” status parameter is True. If not true, the user can use mode 4 or 5 to set the reference point for drive axis.
- Enable axis by toggling “ENABLE\_AXIS” parameter to True.
- Set “CANCEL\_TRVRSNG” and “INTRMDT\_STOP” parameters to True.
- Enter the percentage of override acceleration, override deceleration and override velocity in “OVER\_ACC”, “OVER\_DEC” and “OVERV” parameters respectively.
- The status parameters “AXIS\_ENABLED”, and “AXIS\_REF” must be True.

## 2. Sequence to Execute Setup Mode Command

- Motion dynamics are defined via the “POSITION”, “VELOCITY”, “OVERV”, “OVER\_ACC” and “OVER\_DEC” parameters.
- Motion is started by means of a positive edge at “EXECUTE\_MODE”. The motion command is acknowledged via the “AXIS\_ACK\_SP” parameter. A handshake mechanism can be programmed in this way. Check if the feedback parameter “ACT\_MODE” has the same value as MODE\_POS.
- If a drive error has occurred during motion, this is indicated via the “AXIS\_ERROR” output.

### 7.4.4 Home/Reference using Festo Automation Suite Configuration [MODE\_POS – 4]

#### 1. Configuration Required for Reference Point Approach Mode

- Set the “MODE\_POS” value to 4.
- The status parameter “AXIS\_ENABLED” must be True.
- Axis must be in standstill state

#### 2. Sequence to Execute Reference Point Approach Mode Command

- All the parameter values necessary for homing will be fetched from Automation Suite configuration in “Homing Parameters” like homing mode, velocity, acceleration, and deceleration.
- Toggle the “EXECUTE\_MODE” to start task. Verify if the parameter “ACT\_MODE” has the same value as MODE\_POS.
- “AXIS\_REF” will become true once the axis finds reference point. If an error occurs during traveling motion, warning will be generated.

### 7.4.5 Home to Current Position [MODE\_POS – 5]

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

#### 1. Configuration Required for Homing to Current Position

- Set the “MODE\_POS” value to 5.
- The status parameter “AXIS\_ENABLED” must be True.
- Axis must be in standstill state

#### 2. Sequence to Execute Reference Point Approach Mode Command

- Toggle the “EXECUTE\_MODE” to start task. Verify if the parameter “ACT\_MODE” has the same value as MODE\_POS.
- “AXIS\_REF” will become true once the homing is completed successfully. If an error occurs during traveling motion, warning will be generated.

### 7.4.6 Traversing Record Selection Mode [MODE\_POS – 6]

Traversing Block mode is implemented via the “Record Table” function of the drive. This mode retrieves parameters like Velocity, Position, Acceleration & Deceleration values from record set 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 Required for Traversing Block Mode**

- Set the “MODE\_POS” value to 6.
- Check if “AXIS\_REF” status parameter is True. If not true, the user can use mode 4 or 5 to set the reference point for drive axis.
- Enable axis by toggling “ENABLE\_AXIS” parameter to True.
- Set “CANCEL\_TRVRSNG” and “INTRMDT\_STOP” parameters to True.
- Enter the percentage of override acceleration, override deceleration and override velocity in “OVER\_ACC”, “OVER\_DEC” and “OVERV” parameters respectively.
- The status parameters “AXIS\_ENABLED”, and “AXIS\_REF” must be True.

**2. Sequence to Execute Traversing Block Command**

- Select the record table by entering the table number in “RT\_SEL” parameter. The value must be between 0 to 127.
- Toggle the “EXECUTE\_MODE” parameter to start motion task for configured parameter. The command is executed only on the rising edge of EXECUTE\_MODE parameter. Hence, the EXECUTE\_MODE parameter needs to be toggled to execute a new command. Verify if the feedback parameter “ACT\_MODE” has the same value as MODE\_POS.
- User will receive execute command accepted handshake signal from “AXIS\_ACK\_SP” parameter.
- If task is completed successfully, it is acknowledged by rising edge of “AXIS\_POS\_OK” parameter. If the task completion is unsuccessful (with an error) “AXIS\_ERROR” parameter will be changed to True.
- “AXIS\_SP\_FIXED” parameter indicates the axis mobility status . If the axis is in standby then “AXIS\_SP\_FIXED” parameter will be True.

**Note**

- Refer Chapter 4 and 10 from the CMMT user manual to know behavior of the drive in different operation modes.

**7.4.7 Jog Mode [MODE\_POS – 7]****1. Configuration Required for Jog Mode**

- Set the “MODE\_POS” value to 7. Verify if the feedback parameter “ACT\_MODE” has the same value as MODE\_POS.
- Enable axis by toggling “ENABLE\_AXIS” parameter to True.
- Axis must be in standstill state.
- Velocity, Acceleration & Jerk values are taken from Festo Automation Suite configuration under Jog Mode tab

**2. Sequence to Execute Jog Command**

- “JOG\_1” and “JOG\_2” tags are used to jog the drive in positive and negative directions respectively.
- The “EXECUTE\_MODE” parameter rising edge is not required for jog mode.

**Note**

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

#### 7.4.8 Inching/Incremental Jog Mode [MODE\_POS – 8]

Incremental jog mode does not work like ordinary jog mode. It rotates the axis forward or reverse in steps or increments based on direction selected. Ordinary jog mode (Mode 7) rotates the axis continuously.

All the configuration and command configurations are same as ModePos – 7 but only difference is that MODE\_POS value must be 8 for incremental jog mode.



##### Note

- The inching distance of positive and 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.

#### 7.4.9 Set procedure for CMMT-AS in “Travel to fixed Stop” with FESTO\_PTP\_DRIVES function block

The drive MODE\_POS needs to be in absolute or relative positioning mode (MODE\_POS = 1 or 2)

##### 1. Configuration Required for Travel to fixed Stop using Absolute Positioning Mode

- Set the “MODE\_POS” value to 2. Verify if the feedback parameter “ACT\_MODE” has the same value as MODE\_POS.
- Check if “AXIS\_REF” status parameter is True. If not true, the user can use mode 4 or 5 to set the reference point for drive axis.
- Enable axis by toggling “ENABLE\_AXIS” parameter to True.
- Set “CANCEL\_TRVRSNG” and “INTRMDT\_STOP” parameters to True.
- Set the “TRVL\_TO\_FX\_STP” parameter to True.
- Enter the percentage of override acceleration, override deceleration and override velocity in “OVER\_ACC”, “OVER\_DEC” and “OVERV” parameters respectively.
- The status parameters “AXIS\_ENABLED”, and “AXIS\_REF” must be True.
- Set the Clamping Torque as per application requirement.

##### 2. Sequence to Execute Traversing Block Command

- Enter the position target value in “POSITION” parameter and velocity value in “VELOCITY” parameter. To move axis in forward direction, the position target value must be positive and for moving axis in reverse direction it should be negative.
- Toggle the “EXECUTE\_MODE” parameter to start motion task for configured parameter. The command is executed only on the rising edge of EXECUTE\_MODE parameter. Hence, the EXECUTE\_MODE parameter needs to be toggled to execute a new position command. Verify if the feedback tag “ACT\_MODE” has the same value as MODE\_POS.
- User will receive execute command accepted handshake signal from “AXIS\_ACK\_SP” parameter.
- If task is completed successfully, it is acknowledged by rising edge of “AXIS\_POS\_OK” parameter. If the task completion is unsuccessful (with an error) “AXIS\_ERROR” parameter will be changed to True.
- “AXIS\_SP\_FIXED” parameter indicates the axis mobility status. If the axis is in standby then “AXIS\_SP\_FIXED” parameter will be True.
- The “CLAMP\_TORQ\_RCHD” parameter will change to True to acknowledge the clamping torque has been reached.



##### Note

- If clamping torque is reached before the position is reached the no error will be displayed.

The “FESTO\_PTP\_DRIVES” function block does not provide a parameter to set the torque setpoint. The torque setpoint, called as Clamping Torque [Nm], can be set through Festo Automation Suite parameter P1.526801.0.0. The maximum allowed clamping torque is related to the “User defined limits” section in FAS CMMT Plug-in. Parameter “P1.852.0.0” for “Torque: lower limit value” and parameter “P1.853.0.0” for “Torque: upper limit value” in the Axis tabs.

| Homing Method                        |                                                                                                                   | Homing Parameters                                                                                                                                                                                                                                                                                                                                                                                 |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------|------------------|-----------------|-------|------|--------|----------|--------|------|--------|----------|---------|-------|--------|----------|
| Method                               | <div>Actual position (37)</div>  | <table border="1"> <thead> <tr> <th></th> <th>Velocity [r/min]</th> <th>Accel. [r/min/s]</th> <th>Jerk [r/min/s²]</th> </tr> </thead> <tbody> <tr> <td>Crawl</td> <td>3.00</td> <td>600.00</td> <td>60000.00</td> </tr> <tr> <td>Search</td> <td>6.00</td> <td>600.00</td> <td>60000.00</td> </tr> <tr> <td>Running</td> <td>30.00</td> <td>600.00</td> <td>60000.00</td> </tr> </tbody> </table> |                    | Velocity [r/min] | Accel. [r/min/s] | Jerk [r/min/s²] | Crawl | 3.00 | 600.00 | 60000.00 | Search | 6.00 | 600.00 | 60000.00 | Running | 30.00 | 600.00 | 60000.00 |
|                                      | Velocity [r/min]                                                                                                  | Accel. [r/min/s]                                                                                                                                                                                                                                                                                                                                                                                  | Jerk [r/min/s²]    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Crawl                                | 3.00                                                                                                              | 600.00                                                                                                                                                                                                                                                                                                                                                                                            | 60000.00           |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Search                               | 6.00                                                                                                              | 600.00                                                                                                                                                                                                                                                                                                                                                                                            | 60000.00           |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Running                              | 30.00                                                                                                             | 600.00                                                                                                                                                                                                                                                                                                                                                                                            | 60000.00           |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Move to axis zero point after homing | <input checked="" type="checkbox"/> Active                                                                        | Homing timeout                                                                                                                                                                                                                                                                                                                                                                                    | 60.00 s            |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Activation Save zero point offset    | <input checked="" type="checkbox"/> Active                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Axis Configuration                   |                                                                                                                   | Stop Deceleration                                                                                                                                                                                                                                                                                                                                                                                 |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Reversing direction of motion        | <input type="checkbox"/> Active                                                                                   | Deceleration (stop ramp)                                                                                                                                                                                                                                                                                                                                                                          | 12000.00 r/min/s   |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Axis zero point offset               | 0.03 r                                                                                                            | Jerk (stop ramp)                                                                                                                                                                                                                                                                                                                                                                                  | 600000.00 r/min/s² |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Software limit positions active      | <input type="checkbox"/> Active                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Negative software limit position     | -0.03 r                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Positive software limit position     | 0.97 r                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| User Defined Limits                  |                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Velocity: lower limit value          | -7100.00 r/min                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Velocity: upper limit value          | 7100.00 r/min                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Torque: lower limit value            | -2.214 Nm                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Torque: upper limit value            | 2.214 Nm                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Active current: lower limit value    | -5.40 Arms                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |
| Active current: upper limit value    | 5.40 Arms                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                  |                  |                 |       |      |        |          |        |      |        |          |         |       |        |          |

## 8 CMMT Drive Basic Velocity Control (FESTO\_VEL\_DRIVE Functions)

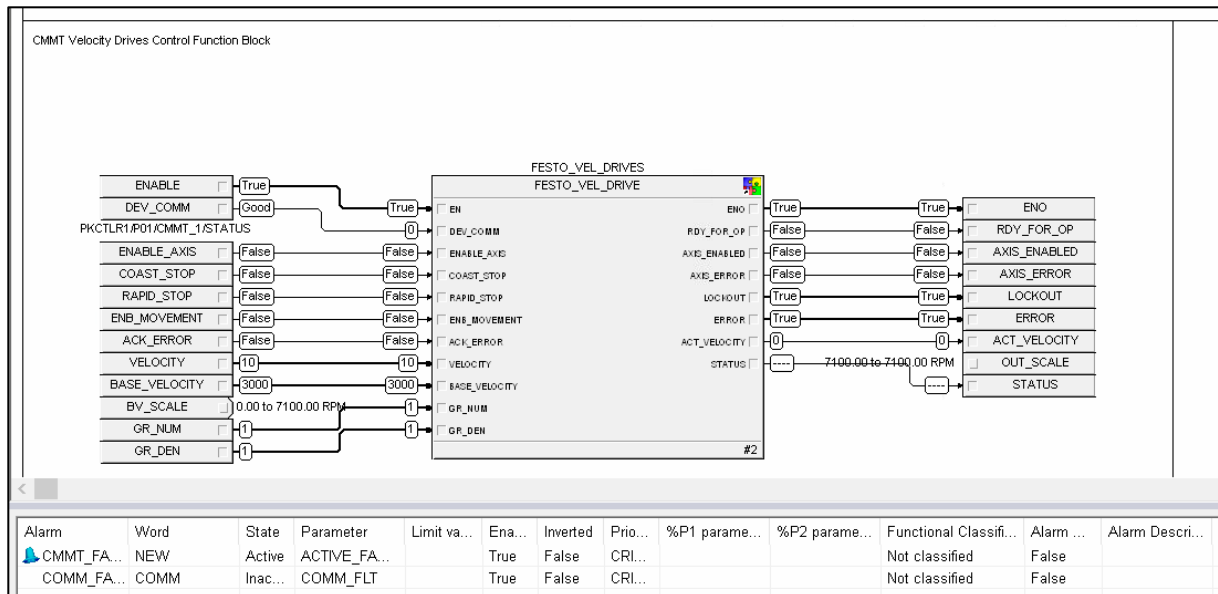
### 8.1 Control Module Configuration

| All Containers                                                                                                                                                                                                                                                                                                                                                       | Contents of 'CMMT_TEST' |                     |                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|---------------------------|
| CMMT_DEMO<br>Library<br>System Configuration<br>Recipes<br>Setup<br>Control Strategies<br>Unassigned I/O References<br>Unallocated Devices<br>External Phases<br>Equipment Trains<br>AREA_A<br>FESTO<br><b>CMMT_TEST</b><br>Physical Network<br>Decommissioned Nodes<br>Control Network<br>PKCTRL1<br>PROPLUS<br>I/O Network<br>SIS Network<br>Global Safety Network | Name                    | Type                | Parameter Value           |
|                                                                                                                                                                                                                                                                                                                                                                      | CMMT_FAULT              | New Alarm           |                           |
|                                                                                                                                                                                                                                                                                                                                                                      | COMM_FAULT              | Communication Error |                           |
|                                                                                                                                                                                                                                                                                                                                                                      | VERSION                 | Parameter Shortcut  | 1                         |
|                                                                                                                                                                                                                                                                                                                                                                      | ACK_ERROR               | Parameter Shortcut  | False                     |
|                                                                                                                                                                                                                                                                                                                                                                      | COAST_STOP              | Parameter Shortcut  | False                     |
|                                                                                                                                                                                                                                                                                                                                                                      | ENABLE                  | Parameter Shortcut  | True                      |
|                                                                                                                                                                                                                                                                                                                                                                      | ENABLE_AXIS             | Parameter Shortcut  | False                     |
|                                                                                                                                                                                                                                                                                                                                                                      | ENB_MOVEMENT            | Parameter Shortcut  | False                     |
|                                                                                                                                                                                                                                                                                                                                                                      | RAPID_STOP              | Parameter Shortcut  | False                     |
|                                                                                                                                                                                                                                                                                                                                                                      | DEV_COMM                | Parameter Shortcut  | PKCTRL1/P01/CMMT_1/STATUS |
|                                                                                                                                                                                                                                                                                                                                                                      | NIST_A_SP               | Parameter Shortcut  | CMMT1_NISTA/FIELD_VAL     |
|                                                                                                                                                                                                                                                                                                                                                                      | NSOLL_A                 | Parameter Shortcut  | CMMT1_NSOLLA/OUT          |
|                                                                                                                                                                                                                                                                                                                                                                      | STW1                    | Parameter Shortcut  | CMMT1_STW1/OUT            |
|                                                                                                                                                                                                                                                                                                                                                                      | ZSW1                    | Parameter Shortcut  | CMMT1_ZSW1/FIELD_VAL      |
|                                                                                                                                                                                                                                                                                                                                                                      | BASE_VELOCITY           | Parameter Shortcut  | 0                         |
|                                                                                                                                                                                                                                                                                                                                                                      | GR_DEN                  | Parameter Shortcut  | 1                         |
|                                                                                                                                                                                                                                                                                                                                                                      | GR_NUM                  | Parameter Shortcut  | 1                         |
|                                                                                                                                                                                                                                                                                                                                                                      | VELOCITY                | Parameter Shortcut  | 0                         |
|                                                                                                                                                                                                                                                                                                                                                                      | OUT_SCALE               | Parameter Shortcut  | -7100.00 to 7100.00 RPM   |

1. Configure the correct DST reference in “NIST\_A\_SP”, “NSOLL\_A”, “STW1”, “ZSW1”, and “DEV\_COMM” parameters.
2. Set “ENABLE” parameter to True if you want the function block to be enabled by default.
3. Enter the gear ratio numerator value in “GR\_NUM” parameter. User can find the value from the FAS parameter P1.1242.0.0
4. Enter the gear ratio denominator value in “GR\_DEN” parameter. User can find the value from the FAS parameter P1.1243.0.0
5. Enter the base velocity value in “BASE\_VELOCITY” parameter. User can find the value from the FAS parameter P1.11280701.0.0
6. The “OUT\_SCALE” parameter has following fields which need to be configured.
  - a. Enter the velocity limit in positive direction of movement (P1.1304.0.0) in 100% of scale field.
  - b. Enter the velocity limit in negative direction of movement (P1.1310.0.0) in 0% of scale field.
  - c. Enter the user unit velocity (P1.7852.0.0) in Engineering unit field. The Decimal places field is set to “2” by default.
  - d. This can be adjusted as per preference, but it is recommended to keep at 2 decimal places.
7. Enter the Velocity value within a range that is twice the range of the Base value velocity. The velocity setpoint can also be changed when the drive is in run condition.
8. Assign the control module to PKCTRL1 and download the controller and ProPlus.
9. The drive can be operated either from control studio or from DeltaV Live using the module faceplate.

## 8.2 Operating the CMMT drive from Control Studio

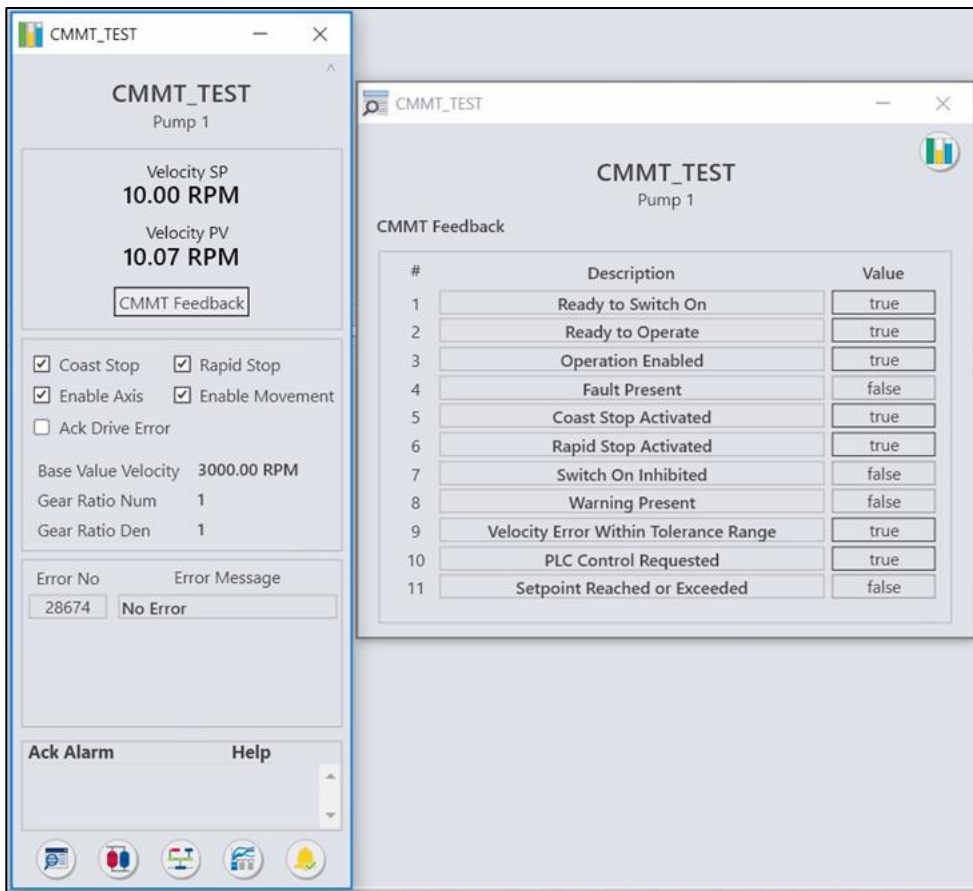
Open the control module in online view with control studio.



1. Set "ENABLE" parameter to True to enable the function block.
2. Pulse the "ACK\_ERROR" parameter if "AXIS\_ERROR" is present. If "AXIS\_ERROR" becomes False, you can continue with further steps. If it remains True, check the drive/FAS for error.
3. Set the "RAPID\_STOP" parameter to True. If "RAPID\_STOP" parameter is set to False, then drive will stop the axis with deceleration time.
4. Set the "COAST\_STOP" to True. If "COAST\_STOP" parameter is set to False, then immediate stop (Emergency Stop) is active.
5. Set the "ENABLE\_AXIS" parameter to True to enable the drive. "AXIS\_ENABLED" parameter will return a value of True indicating that the drive has been enabled.
6. Set the "ENB\_MOVEMENT" parameter to True to give the run command to the drive. Changing the parameter to False will send a STOP command to the drive.
7. The "VELOCITY" parameter can be changed to change the velocity setpoint.

### 8.3 Operating the CMMT drive from DeltaV Live using Faceplate

Open the control module faceplate in DeltaV Live.



1. Check the “Ack Drive Error” checkbox to acknowledge any drive errors. This will send a pulse signal to the CMMT and reset to unchecked (0) value.
2. Click on the “CMMT Feedback” button to open the detail faceplate with feedback status signals from the CMMT.
3. Check the “Coast Stop” parameter. If “Coast Stop” parameter is unchecked, then immediate stop (Emergency Stop) is active. The “#5 Coast Stop Activated” parameter in detail faceplate will show the status from the drive.
4. Check the “Rapid Stop” parameter. If “Rapid Stop” parameter is unchecked, then drive will stop the axis with deceleration time. The “#6 Rapid Stop Activated” parameter in detail faceplate will show the status from the drive.
5. Check the “Enable Axis” parameter enable the drive. “#2 Ready to Operate” and “#3 Operation Enabled” parameter will return a value of TRUE indicating that the drive has been enabled.
6. Check the “Enable Movement” parameter to give the run command to the drive. Unchecking the parameter will send a STOP command to the drive.
7. The “Velocity SP” parameter can be changed to change the velocity setpoint. The “Velocity PV” parameter provides the feedback from CMMT.

## 9 Importing the Sample Project in DeltaV

The sample project comprises of two configuration components, viz., PK Controller, and Control Module Instance. This section details the procedure to import the sample project into Emerson DeltaV.

The sample project consists of following components which need to be imported in numerical sequence (if importing entire sample project from scratch):

1. PK Controller
2. Control Module Instance

Subsequent sections have detailed procedure to import each of the components and need to be imported sequentially.



### Note

1. It is assumed that all the library elements of the “CMMT Library for Emerson DeltaV using EtherNet/IP” are imported as per Chapter 4 before the sample project is imported.



### Caution

#### Import procedures must be strictly followed

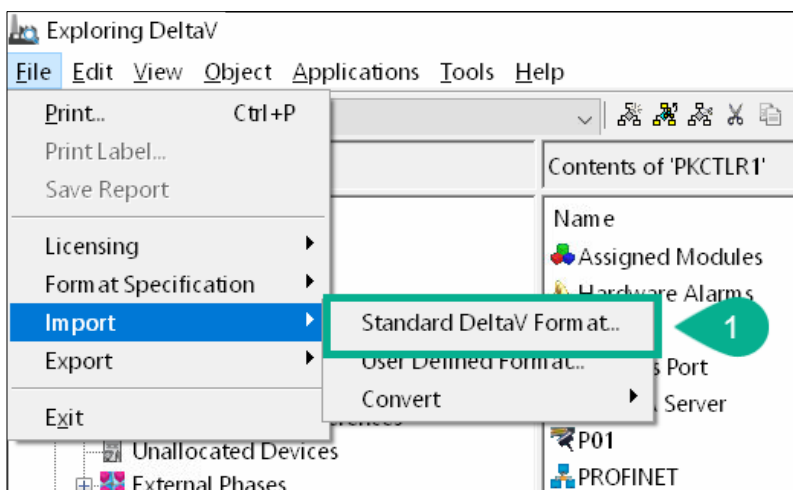
- The sample project can be imported as is only in DeltaV v15.FP3 Build 9405. Separate process exists to import library in higher DeltaV version. For importing in lower DeltaV versions, the headers in “.fhx” export files need to be changed according to user system.
- Import procedure described in this document must be followed strictly to avoid errors or unintended changes to other configuration.
- It is recommended to take a backup of entire existing database before importing the library.

## 9.1 Importing Sample Project for Basic Velocity Control (Telegram 1)

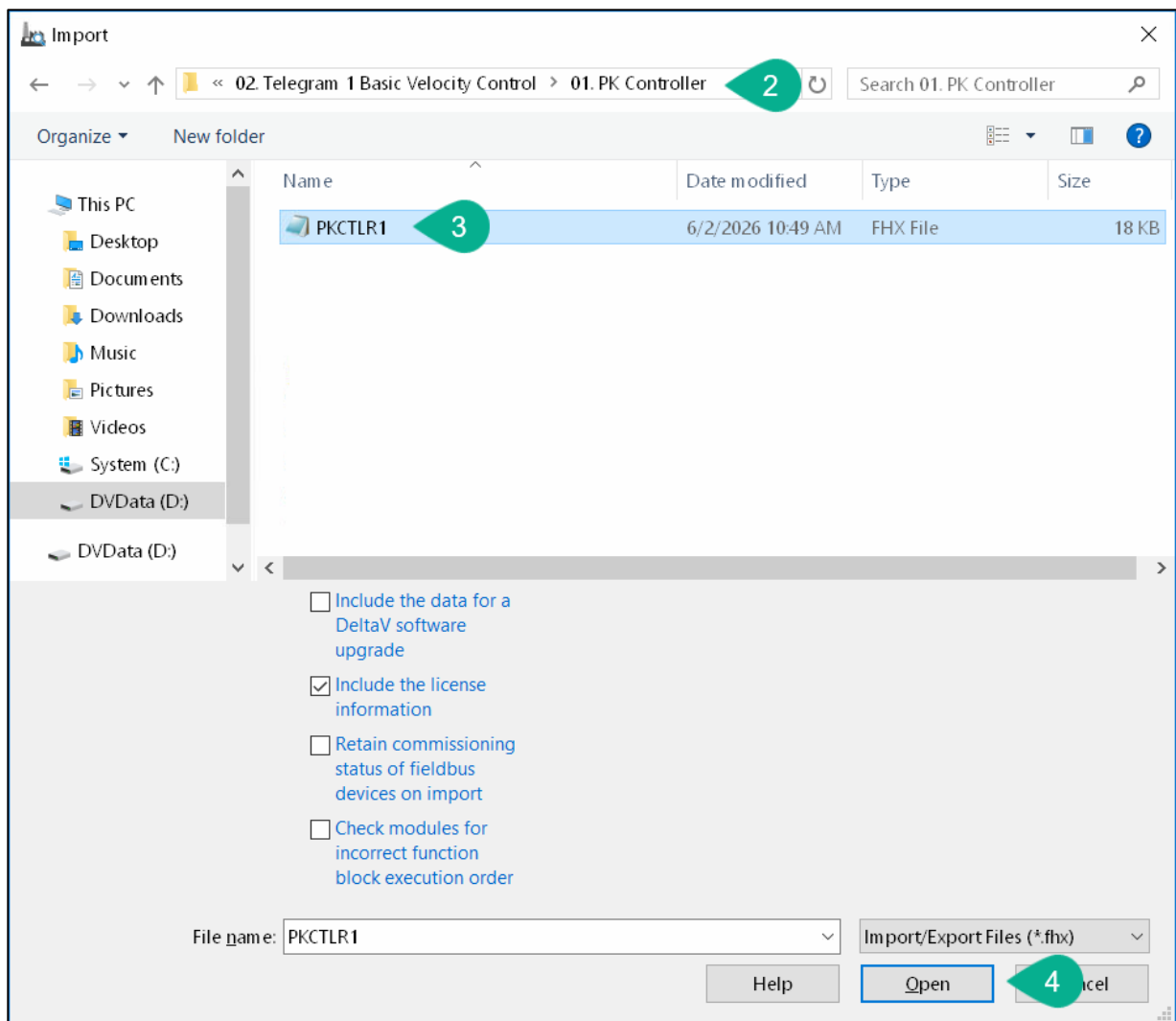
### 9.1.1 Importing “PK Controller” Component from the Sample Project

Ensure that there is no other controller named “**PKCTLR1**” to avoid naming conflict. Follow the procedure detailed below to import entire PK Controller configuration with PDT, LDT and signals.

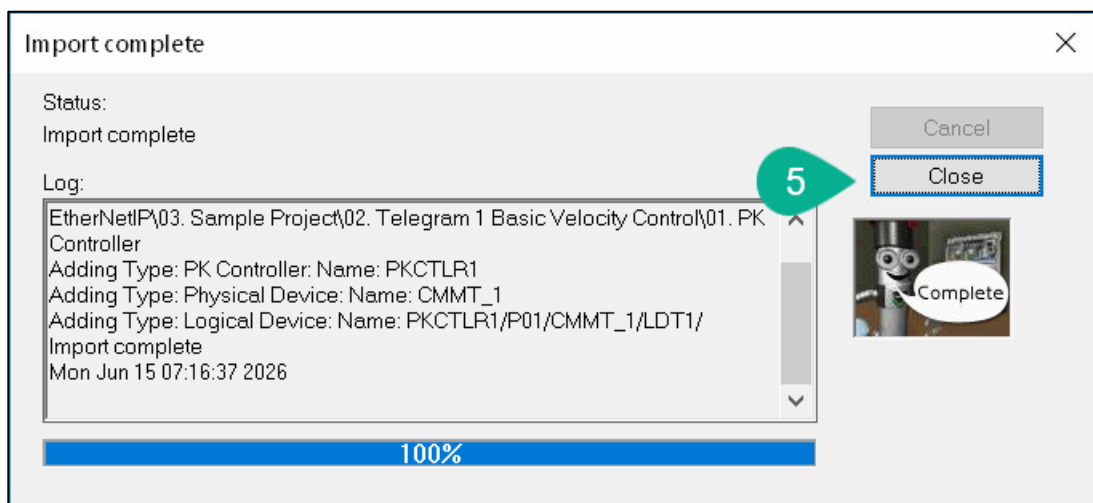
#### Step 1: Import PK Controller Configuration



1. Navigate to “**File -> Import**”. Click on “**Standard DeltaV Format...**”



2. In the “Import” dialog box, navigate to the “03. Sample Project -> 02. Telegram 1 Basic Velocity Control -> 01. PK Controller” folder in the sample project.
3. Select “PKCTRL1”.
4. Click on “Open” to begin the import process.

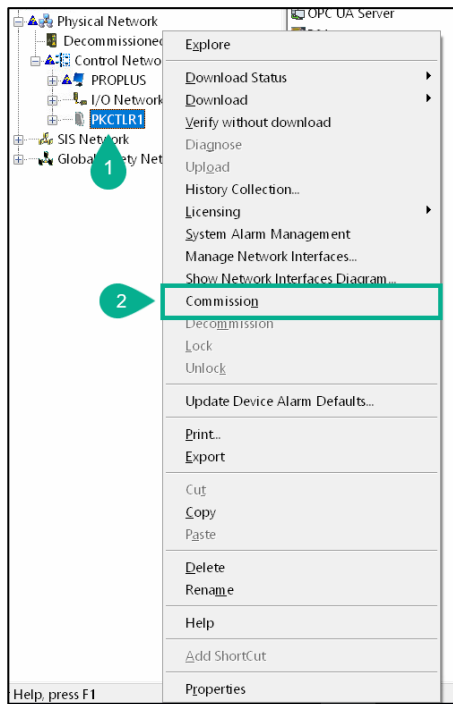


5. Ensure the import was successfully completed and click on close.

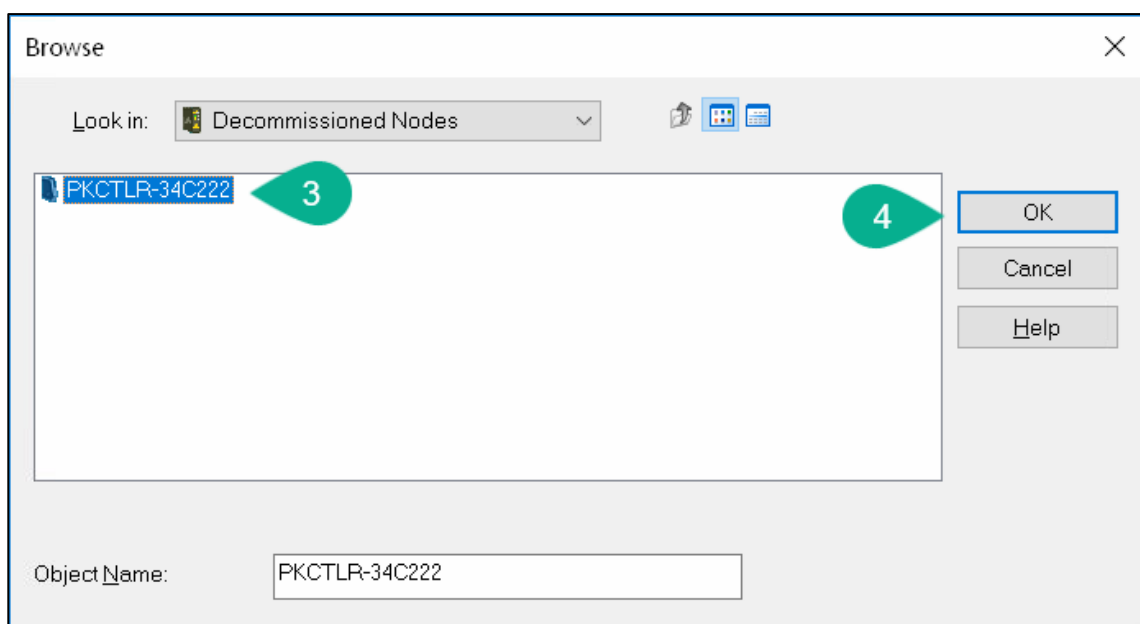
### **Step 2: Verify Imported PK Controller Configuration**

After successful import, verify the PKCTRL1, P01(Ethernet/IP) port, CMMT\_1 (physical device), LDT1 (logical device) and Device Signal configuration (Refer Section 3.4.1 to verify configuration settings).

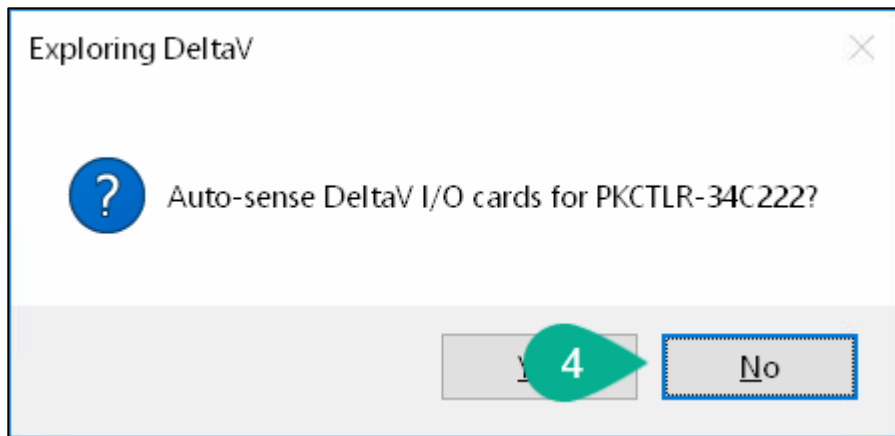
### **Step 3: Commission PK Controller**



1. Right-click on the “PKCTRL1”.
2. Click on “Commission”.



3. Select the PK Controller you want to commission.
4. Click on “OK”.

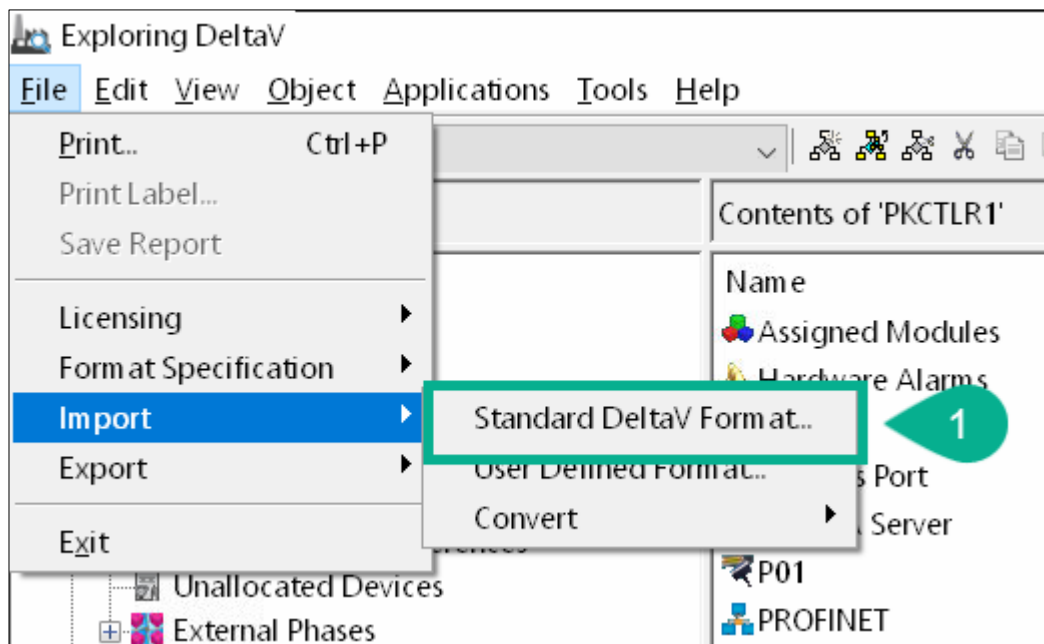


5. Click on **"No"** to not auto-sense cards connected to the PK Controller.

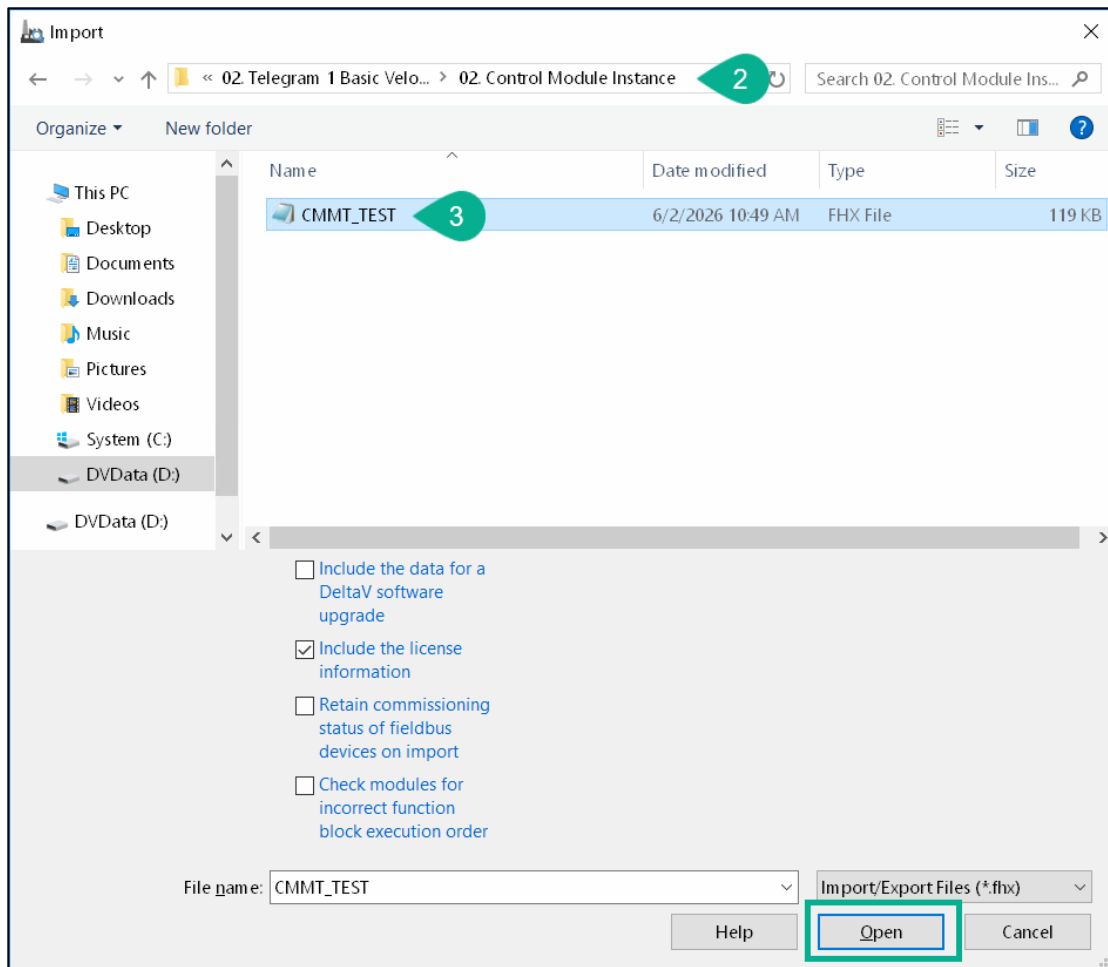
### 9.1.2 Importing "Control Module Instance" Component from the Sample Project

Follow the procedure detailed below to import the CMMT control module instance for the sample project.

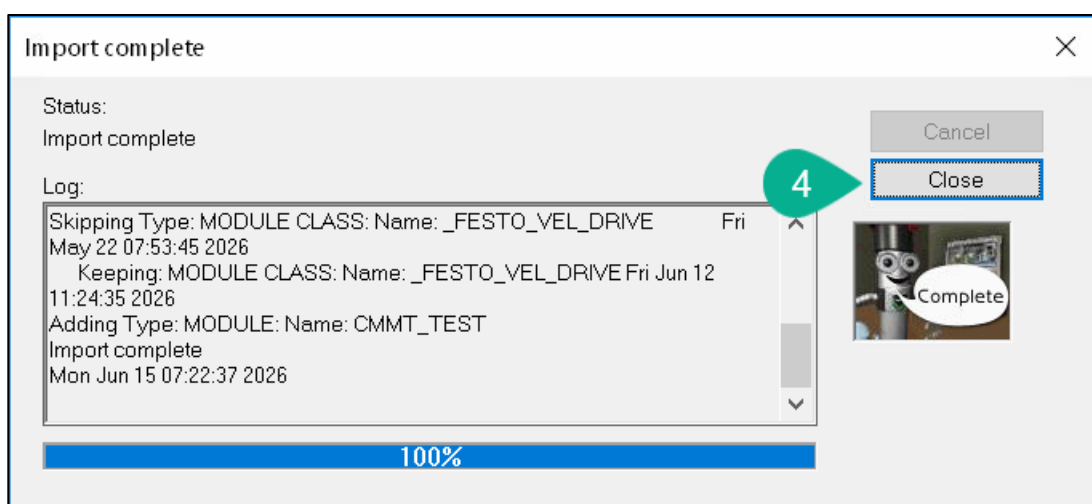
#### Step 1: Importing Control Module Instances



1. Navigate to **"File -> Import"**. Click on **"Standard DeltaV Format..."**

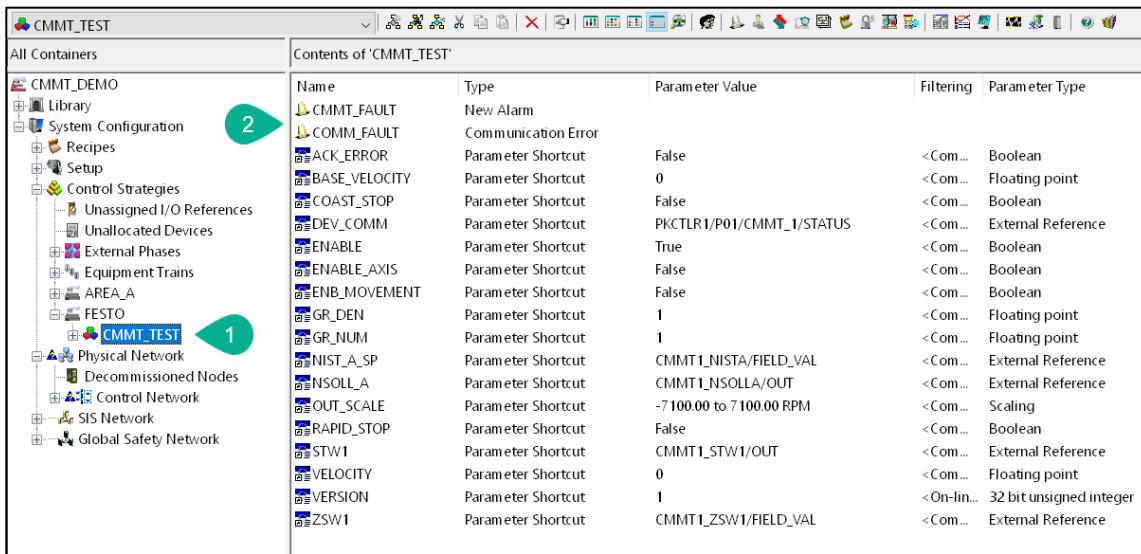


2. In the Import dialog box, navigate to the **"03. Sample Project -> 02. Telegram 1 Basic Velocity Control -> 02. Control Module Instances"** folder in the sample project.
3. Select **"CMMT\_TEST"** file and click on **"Open"**.



4. The Import process should start now. If you get a pop-up asking if you want to replace any existing item in the library; click on **"No to all"**. This will retain all the current library items. Ensure there are no errors during the import.

## Step 2: Verify Control Module Instance Import was Successful



| Name          | Type                | Parameter Value           | Filtering  | Parameter Type          |
|---------------|---------------------|---------------------------|------------|-------------------------|
| CMMT_FAULT    | New Alarm           |                           |            |                         |
| COMM_FAULT    | Communication Error |                           |            |                         |
| ACK_ERROR     | Parameter Shortcut  | False                     | <Com...    | Boolean                 |
| BASE_VELOCITY | Parameter Shortcut  | 0                         | <Com...    | Floating point          |
| COAST_STOP    | Parameter Shortcut  | False                     | <Com...    | Boolean                 |
| DEV_COMM      | Parameter Shortcut  | PKCTRL1/P01/CMMT_1/STATUS | <Com...    | External Reference      |
| ENABLE        | Parameter Shortcut  | True                      | <Com...    | Boolean                 |
| ENABLE_AXIS   | Parameter Shortcut  | False                     | <Com...    | Boolean                 |
| ENB_MOVEMENT  | Parameter Shortcut  | False                     | <Com...    | Boolean                 |
| GR_DEN        | Parameter Shortcut  | 1                         | <Com...    | Floating point          |
| GR_NUM        | Parameter Shortcut  | 1                         | <Com...    | Floating point          |
| NIST_A_SP     | Parameter Shortcut  | CMMT1_NISTA/FIELD_VAL     | <Com...    | External Reference      |
| NSOLLA_A      | Parameter Shortcut  | CMMT1_NSOLLA/OUT          | <Com...    | External Reference      |
| OUT_SCALE     | Parameter Shortcut  | -7100.00 to 7100.00 RPM   | <Com...    | Scaling                 |
| RAPID_STOP    | Parameter Shortcut  | False                     | <Com...    | Boolean                 |
| STW1          | Parameter Shortcut  | CMMT1_STW1/OUT            | <Com...    | External Reference      |
| VELOCITY      | Parameter Shortcut  | 0                         | <Com...    | Floating point          |
| VERSION       | Parameter Shortcut  | 1                         | <On-lin... | 32 bit unsigned integer |
| ZSW1          | Parameter Shortcut  | CMMT1_ZSW1/FIELD_VAL      | <Com...    | External Reference      |

1. After import has completed successfully, you should see the **“FESTO”** area under **“System Configuration -> Control Strategies”**.
2. **“FESTO”** area should contain the **“CMMT\_TEST”** module instance.

## Step 3: Download PK Controller Configuration

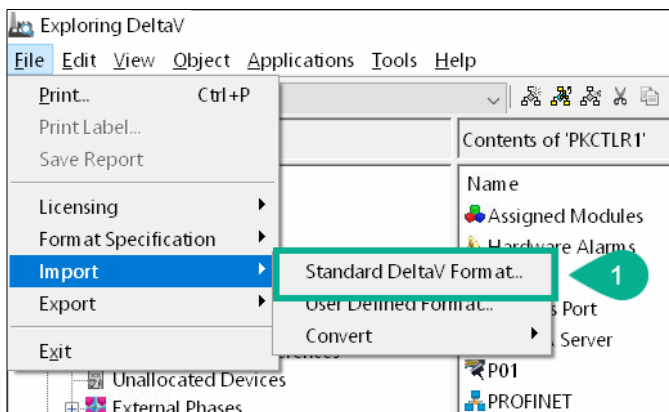
After completing sections 9.1.1, and 9.1.2 perform a total download of **“PKCTRL1”**. Download **“PROPLUS”** if needed.

## 9.2 Importing Sample Project for Position Control (Telegram 111)

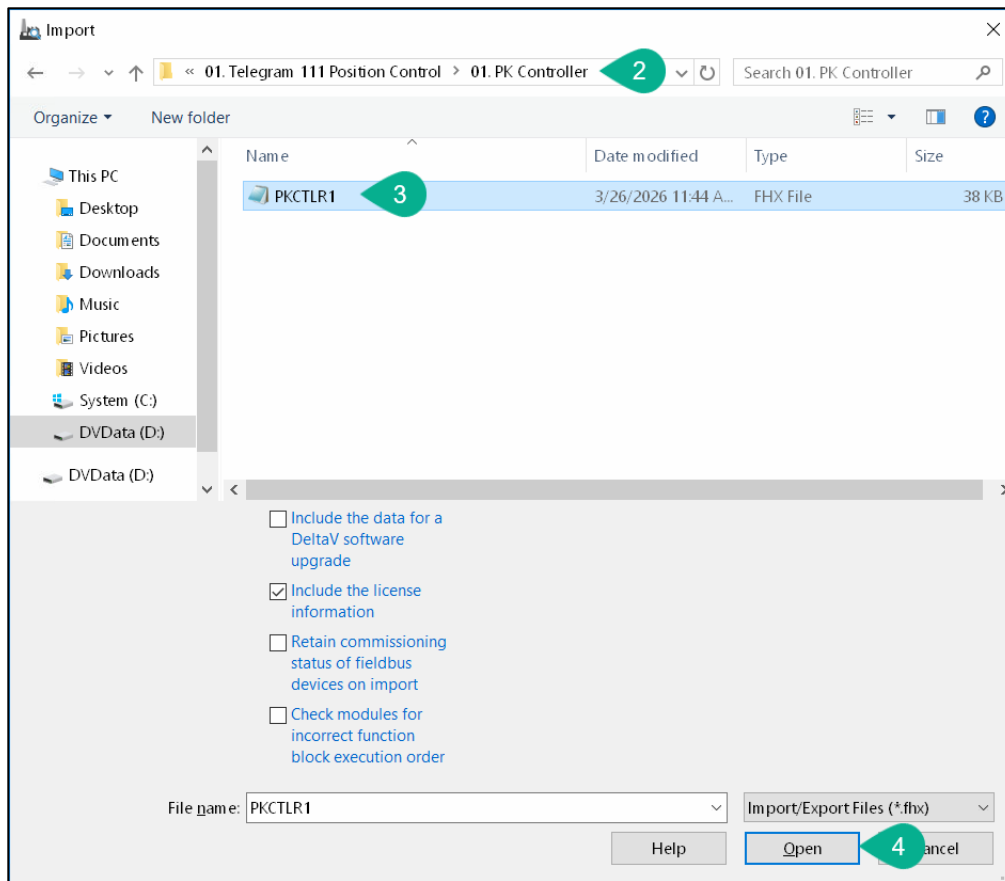
### 9.2.1 Importing “PK Controller” Component from the Sample Project

Ensure that there is no other controller named **“PKCTRL1”** to avoid naming conflict. Follow the procedure detailed below to import entire PK Controller configuration with PDT, LDT and signals.

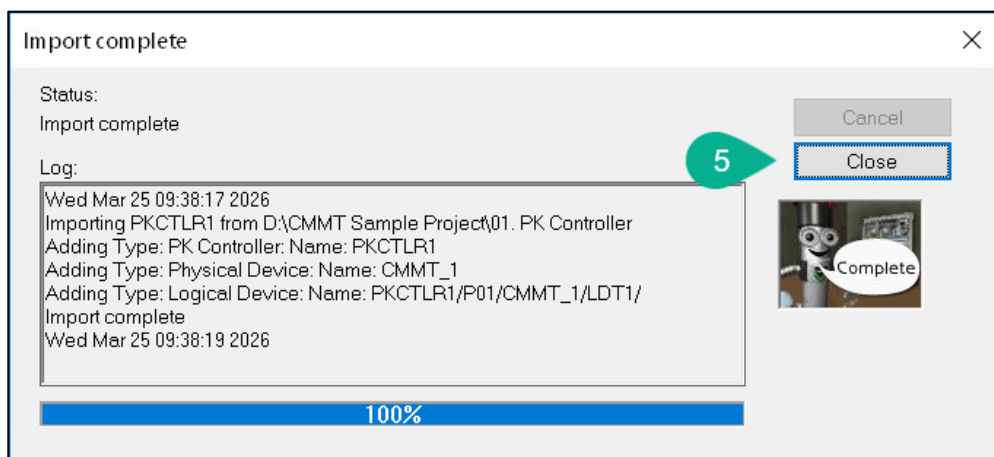
## Step 1: Import PK Controller Configuration



1. Navigate to **“File -> Import”**. Click on **“Standard DeltaV Format...”**



2. In the “Import” dialog box, navigate to the “03. Sample Project -> 01. Telegram 111 Position Control -> 01. PK Controller” folder in the sample project.
3. Select “PKCTLR1”.
4. Click on “Open” to begin the import process.

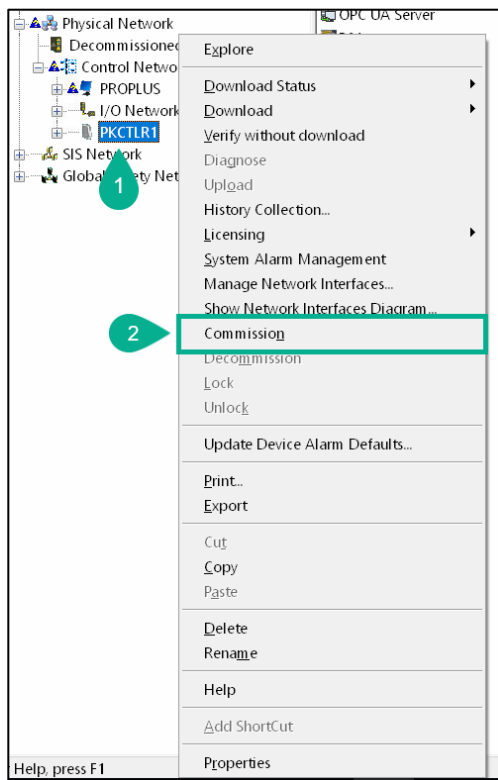


5. Ensure the import was successfully completed and click on close.

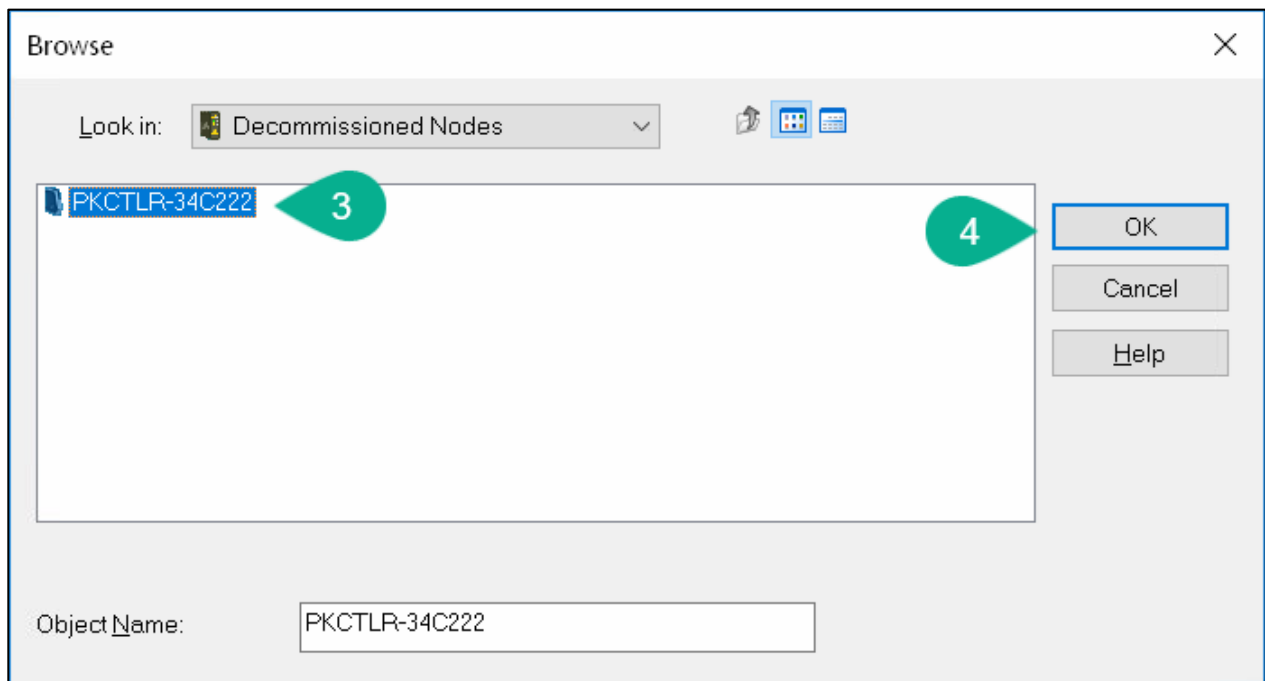
### **Step 2: Verify Imported PK Controller Configuration**

After successful import, verify the PKCTLR1, P01(Ethernet/IP) port, CMMT\_1 (physical device), LDT1 (logical device) and Device Signal configuration (Refer Section 3.4.2 to verify configuration settings).

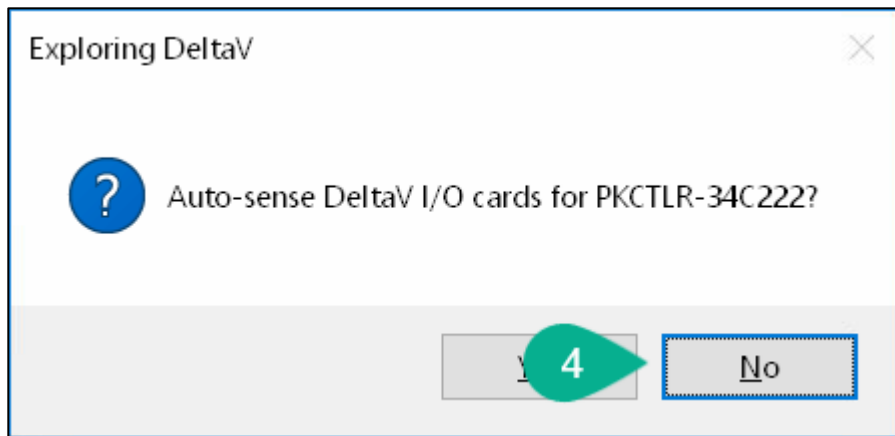
### Step 3: Commission PK Controller



1. Right-click on the “PKCTLR1”.
2. Click on “Commission”.



3. Select the PK Controller you want to commission.
4. Click on “OK”.

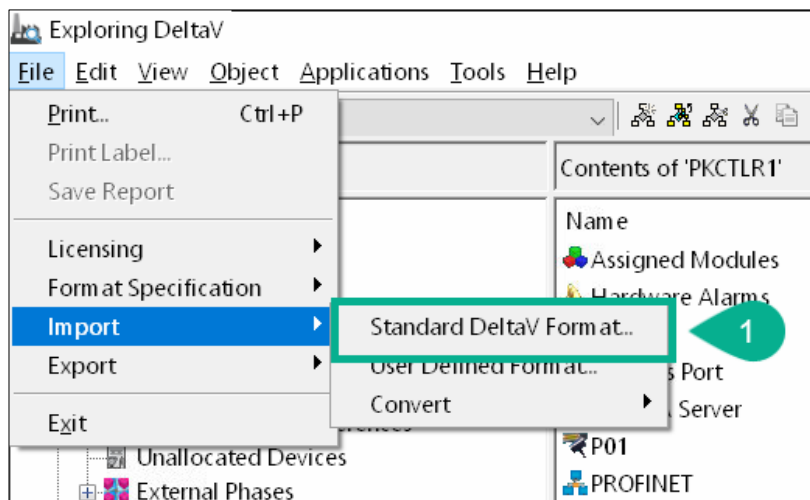


5. Click on **“No”** to not auto-sense cards connected to the PK Controller.

### 9.2.2 Importing “Control Module Instance” Component from the Sample Project

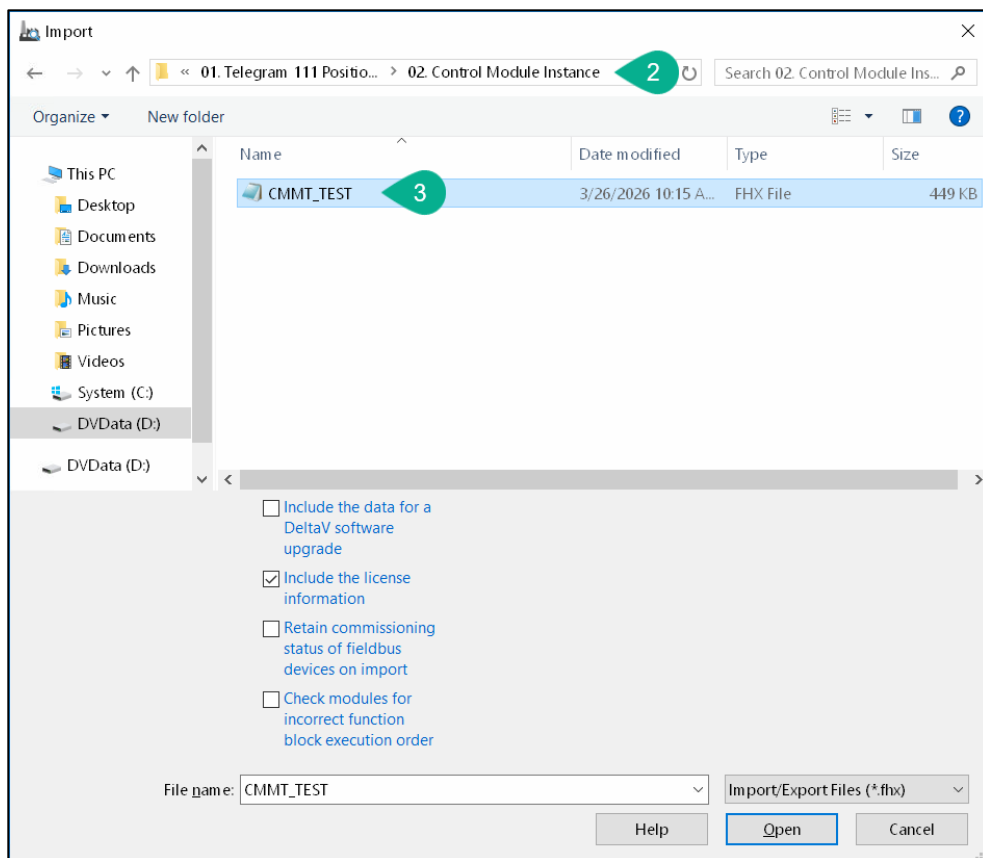
Follow the procedure detailed below to import the CMMT control module instance for the sample project.

#### **Step 1: Importing Control Module Instances**

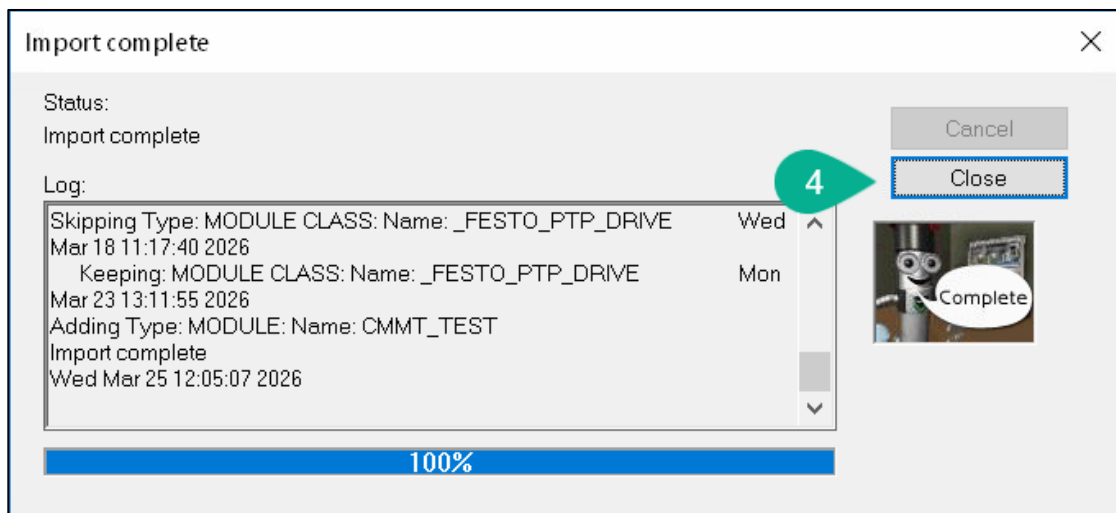


1. Navigate to **“File -> Import”**. Click on **“Standard DeltaV Format...”**

## Importing the Sample Project in DeltaV



2. In the Import dialog box, navigate to the **“03. Sample Project -> 01. Telegram 111 Position Control -> 02. Control Module Instance”** folder in the sample project.
3. Select **“CMMT\_TEST”** file and click on **“Open”**.



4. The Import process should start now. If you get a pop-up asking if you want to replace any existing item in the library; click on **“No to all”**. This will retain all the current library items. Ensure there are no errors during the import.

## Step 2: Verify Control Module Instance Import was Successful

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1. After import has completed successfully, you should see the **"FESTO"** area under **"System Configuration -> Control Strategies"**.
2. **"FESTO"** area should contain the **"CMMT\_TEST"** module instance.

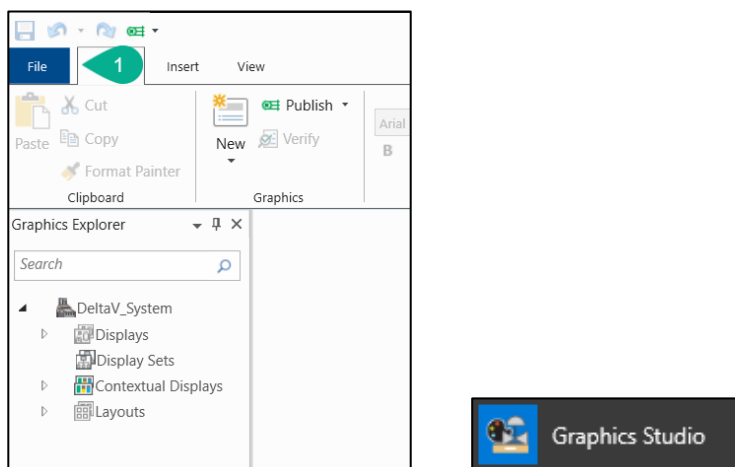
## Step 3: Download PK Controller Configuration

After completing sections 9.2.1, and 9.2.2 perform a total download of **"PKCTRL1"**. Download **"PROPLUS"** if needed.

### 9.2.3 Importing "Graphics" Component from the Sample Project

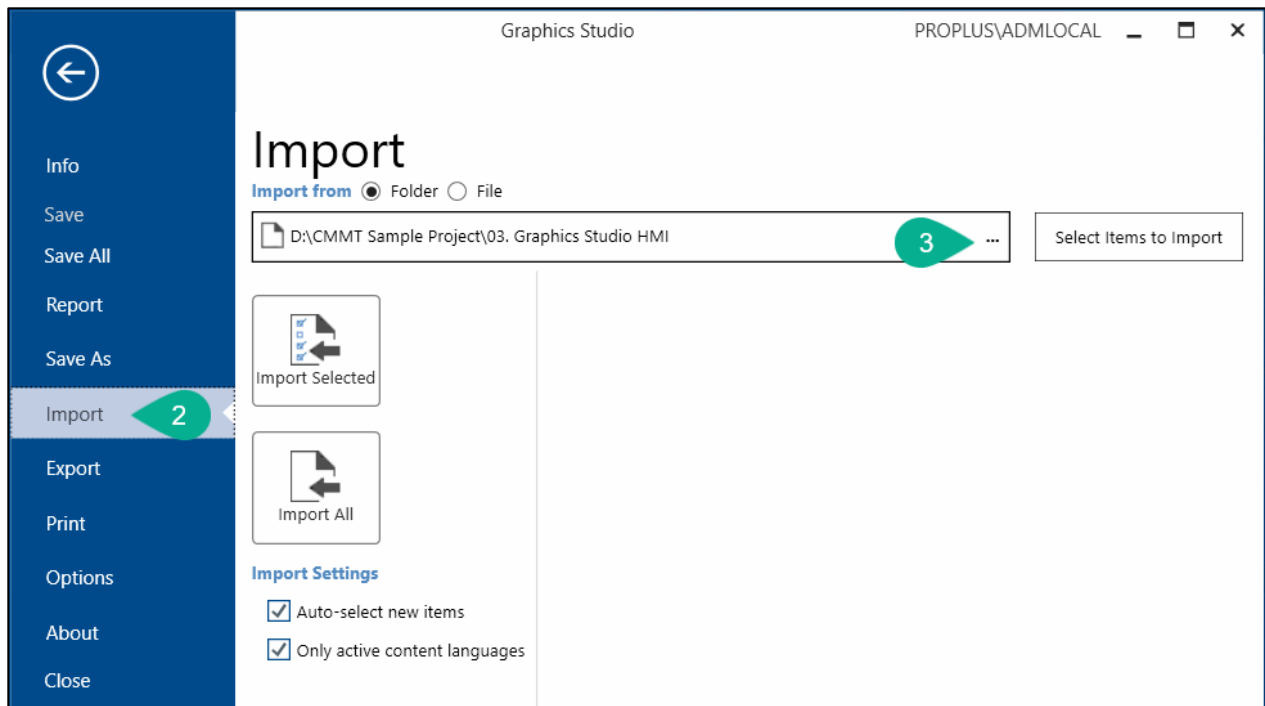
Follow the procedure detailed below to import demo graphic.

## Step 1: Importing Graphics

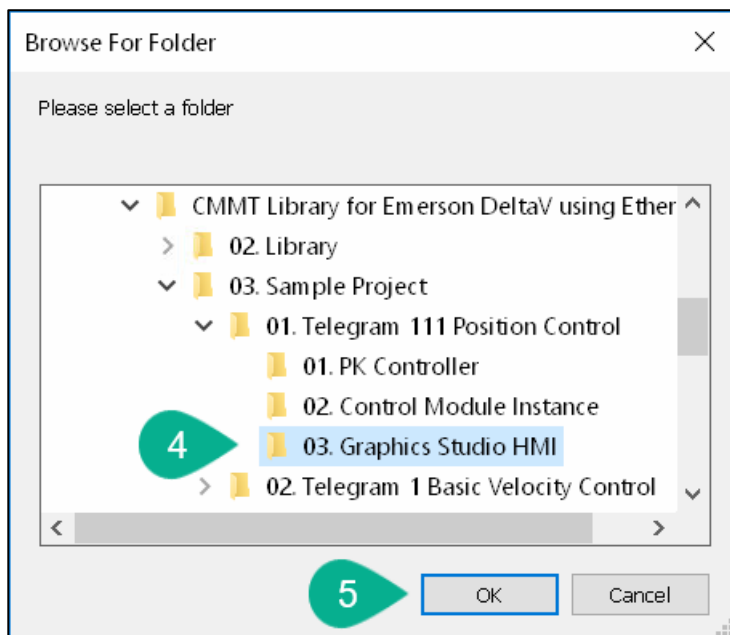


Open Graphics Studio from following path **Windows Start > DeltaV Engineering > Graphics Studio**

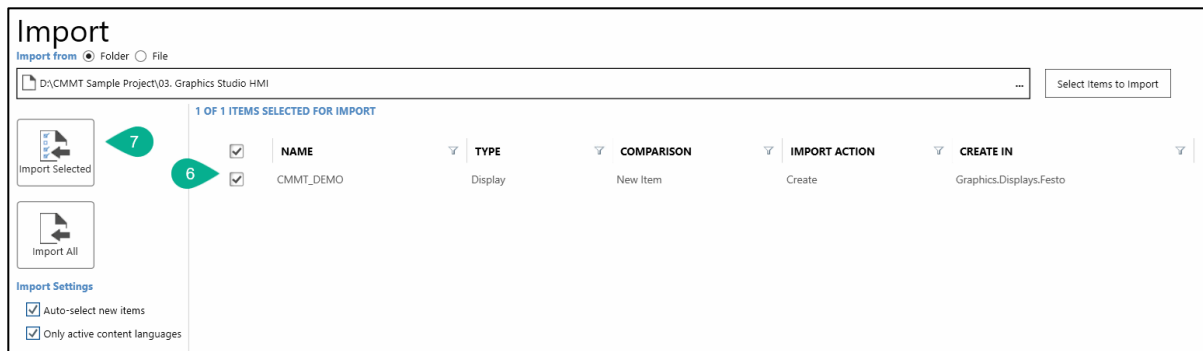
1. Click on **"File"** tab.



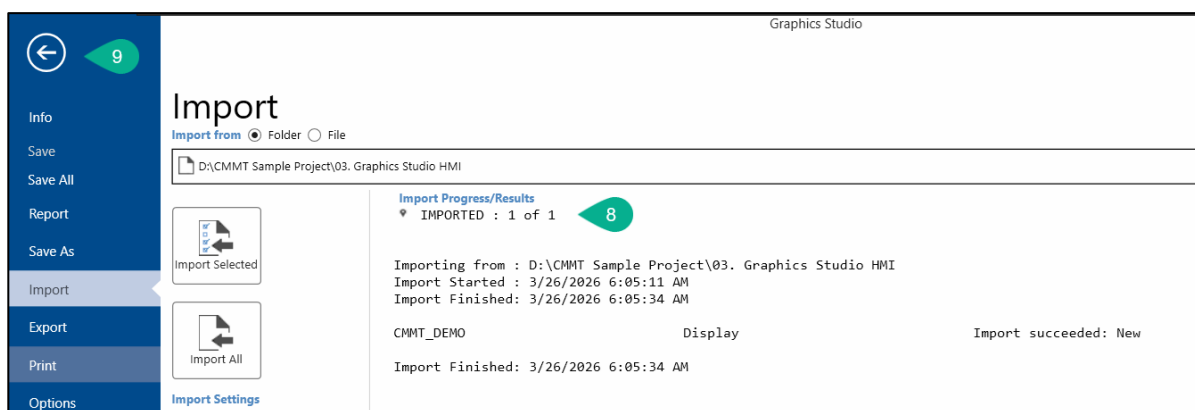
2. Click on **“Import”**.
3. Click on **“...”** to open **“Browse For Folder”** dialog box.



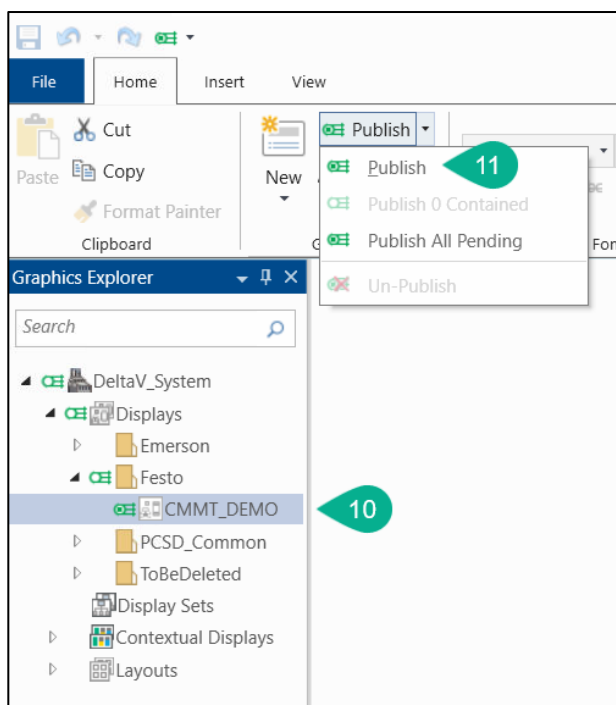
4. Navigate to and select the **“03. Sample Project -> 01. Telegram 111 Position Control -> 03. Graphics Studio HMI”** folder in the library.
5. Click on **“OK”**. This will load the **“CMMT\_DEMO”** graphic.



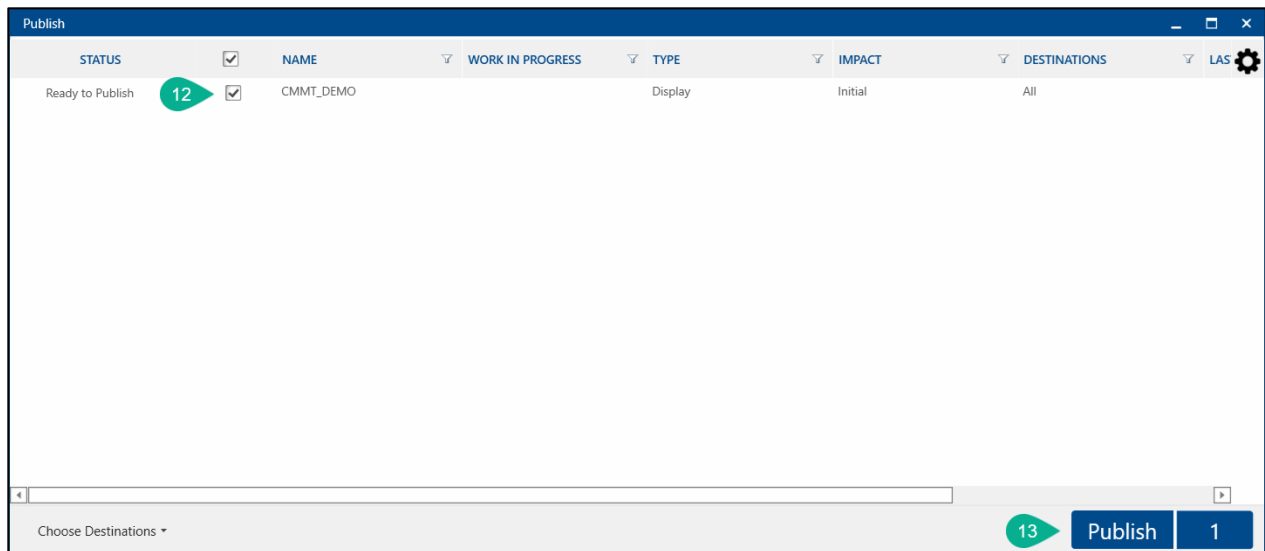
6. Ensure the checkbox for **“CMMT\_DEMO”** graphic is checked.
7. Click on **“Import Selected”**. This will begin the import process.



8. Ensure the import process has completed successfully.
9. Click on the back arrow to return to home screen of Graphics Studio.



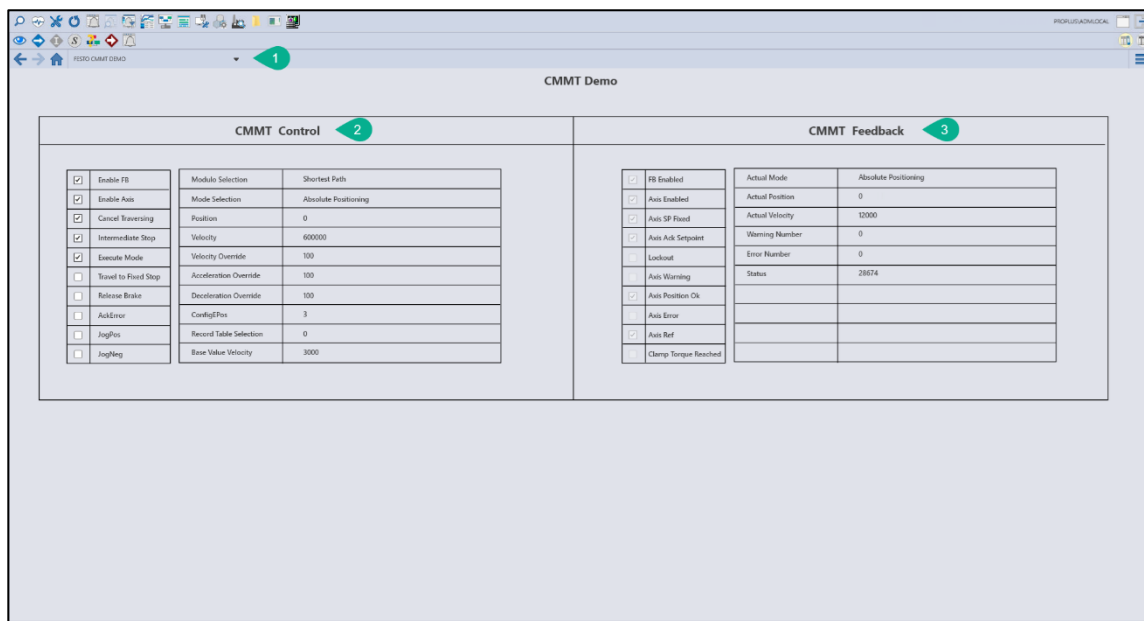
10. Navigate to **“DeltaV\_System -> Displays -> Festo”** and select **“CMMT\_DEMO”** graphic.
11. Click on **“Publish”**.



12. Ensure the checkbox next to “CMMT\_DEMO” graphic is checked.
13. Click on “Publish”.

### 9.2.4 Viewing Graphics in DeltaV Live

The graphics can be used to test the CMMT configuration and communication in DeltaV.



Open DeltaV Live from following path **Windows Start > DeltaV Operator > DeltaV Live**

1. Click on the graphics flat list and navigate to the “FESTO CMMT DEMO” graphics in the drop-down list.
2. Set the control parameters based on the settings required to execute different modes as described in Chapter 6 and 7.
3. Feedback parameters can be monitored to verify if the command was executed successfully.

