Application Note

FESTO

Commissioning of CMMT-AS in Festo Automation Suite with CPX-E-CEC-M1-PN

This application note describes step by step how you configure a CMMT-AS-EC with CPX-E-CEC-M1-PN in Automation Suite and how you can use the SoftMotion libraries.

CMMT-AS-EC

100278

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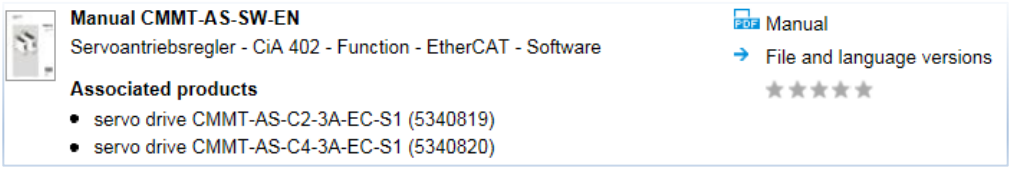
1 Components/Software/ IP address

Type/Name	Version Software/Firm-ware	IP address	Subnet mask
CMMT-AS	FW 014.0.7.121	192.168.0.20	255.255.255.0
CPX-E-CEC-M1-PN	FW 1.1.18	192.168.0.10	255.255.255.0
Laptop	--	192.168.0.200	255.255.255.0
Festo Automation Suite	V 1.2.1.16	--	--
CMMT-AS Plug-in	V 1.2.0.25	--	--
CPX Plug-in	V 1.2.0.74	--	--

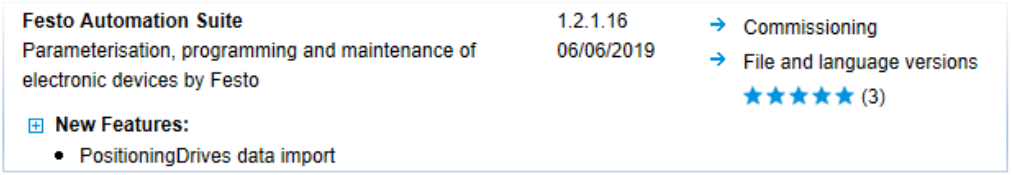
Table 1.1: 1 Components/Software used

1.1 Recommended manuals / XML / Plug-in / function blocks

A) CMMT-AS Manual

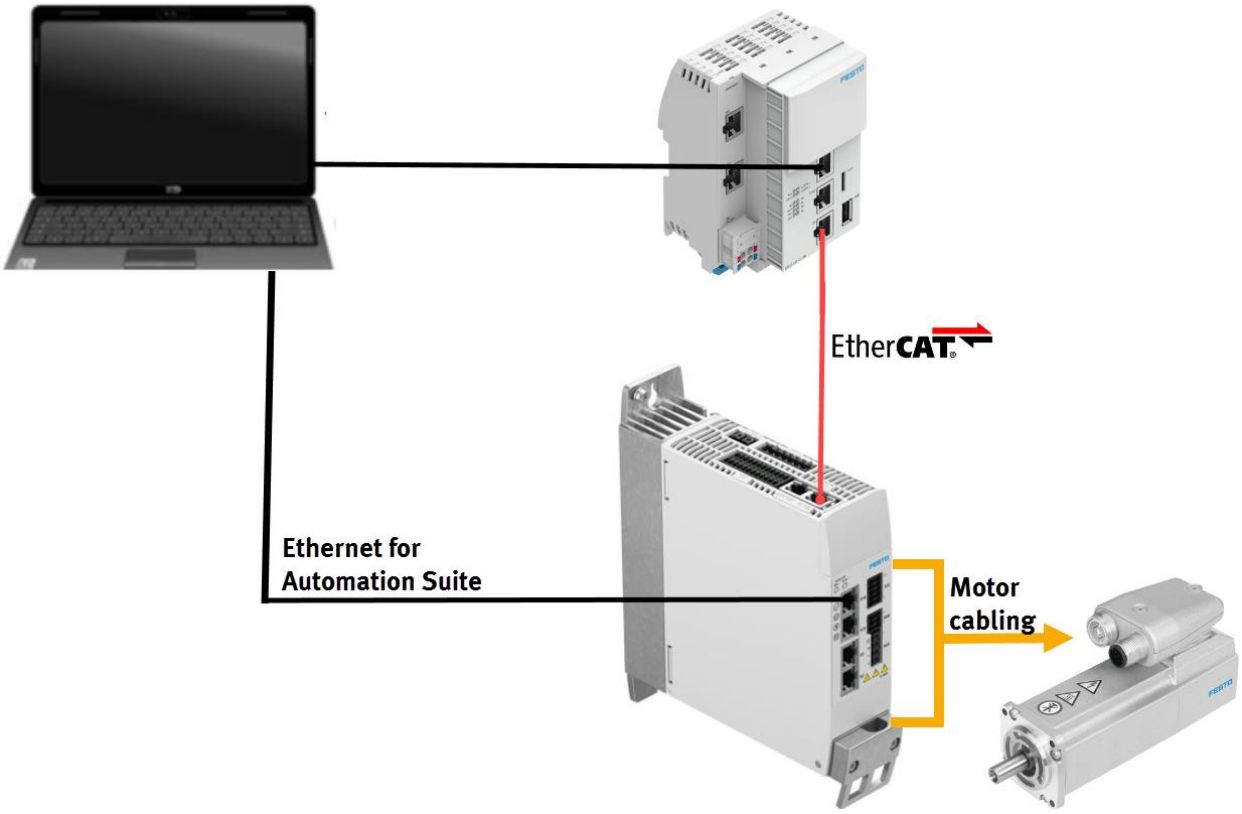


B) Festo Automation Plug-in



Source:
https://www.festo.com/net/en-gb_gb/SupportPortal/default.aspx?q=5340819&tab=4&s=t#result

1.2 Network topology



Festo offers M12-RJ45, RJ45-RJ45 and M12-M12 connecting cables for the Ethernet communication:

Type code	Part number	Description
NEBC-D12G4-ES-0.5-S-D12G4-ET	8040446	M12-M12 -› 0,5m
NEBC-D12G4-ES-1-S-D12G4-ET	8040447	M12-M12 -› 1m
NEBC-D12G4-ES-3-S-D12G4-ET	8040448	M12-M12 -› 3m
NEBC-D12G4-ES-5-S-D12G4-ET	8040449	M12-M12 -› 5m
NEBC-D12G4-ES-10-S-D12G4-ET	8045450	M12-M12 -› 10m
NEBC-D12G4-ES-1-S-R3G4-ET	8045451	M12-RJ45 -› 1m
NEBC-D12G4-ES-3-S-R3G4-ET	8045452	M12-RJ45 -› 3m
NEBC-D12G4-ES-5-S-R3G4-ET	8045453	M12-RJ45 -› 5m
NEBC-D12G4-ES-10-S-R3G4-ET	8040454	M12-RJ45 -› 10m
NEBC-R3G4-ES-1-S-R3G4-ET	8040455	RJ45-RJ45 -› 1m

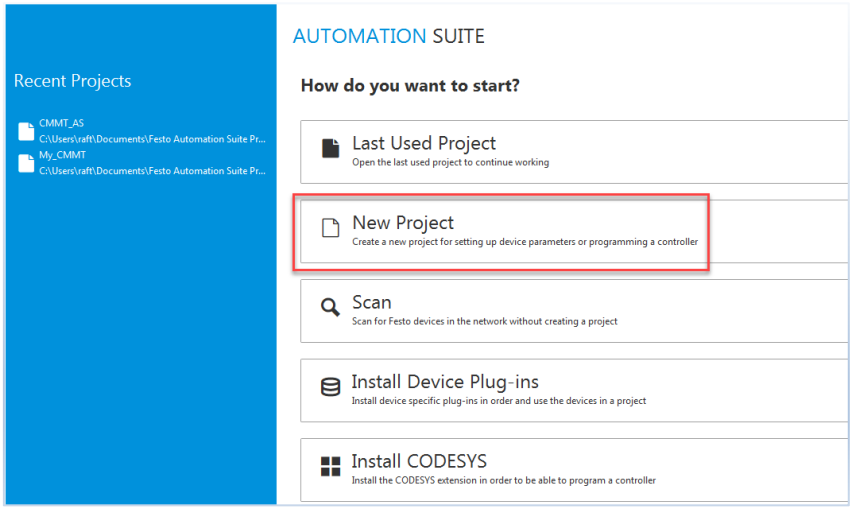
Table 1.2: Connecting cables

More information:
https://www.festo.com/net/en-gb_gb/SupportPortal/default.aspx?q=8040446&tab=3

2 The first steps in Automation Suite

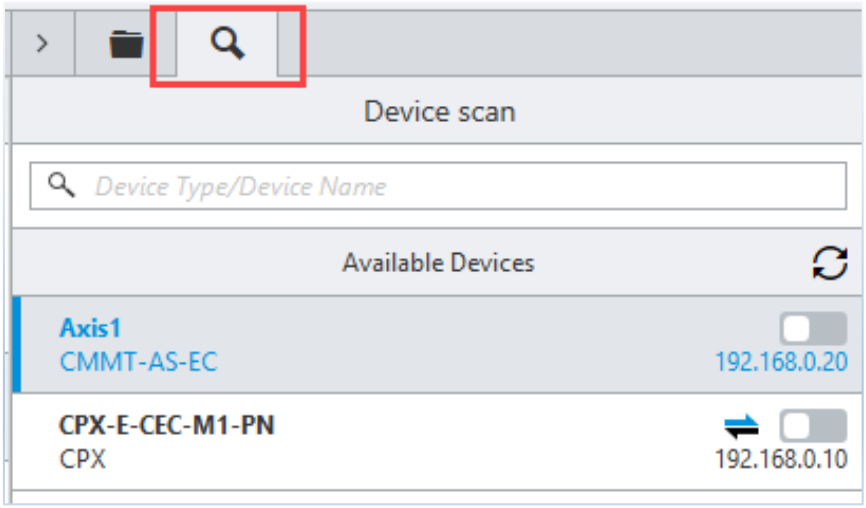
2.1 Creating a new project

Step 1: After starting Automation Suite you have the possibility to open your recent projects or to create a new project:



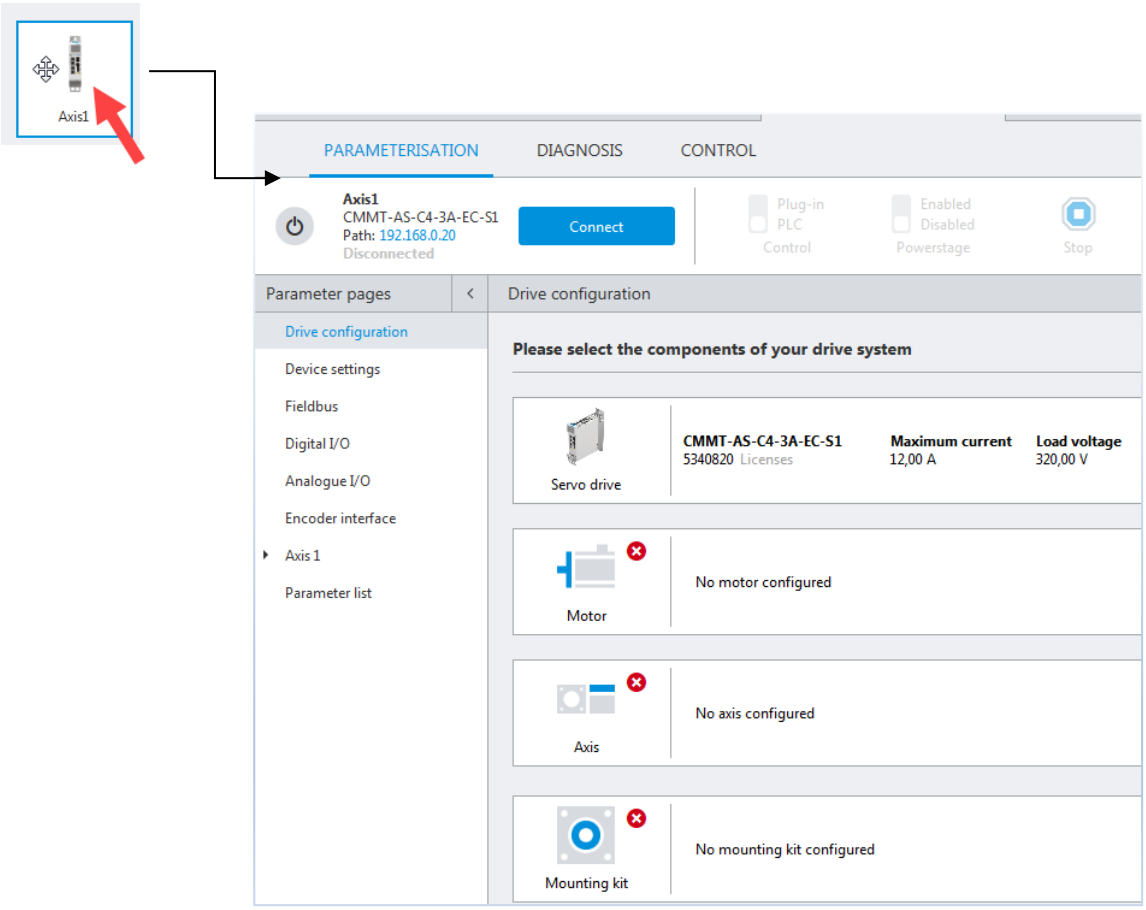
2.2 Step by step commissioning of CMMT-AS

Step 2: Searching for the connected CMMT-AS via the **smaller** loupe, because then you can drag and drop the connected devices to your project directly

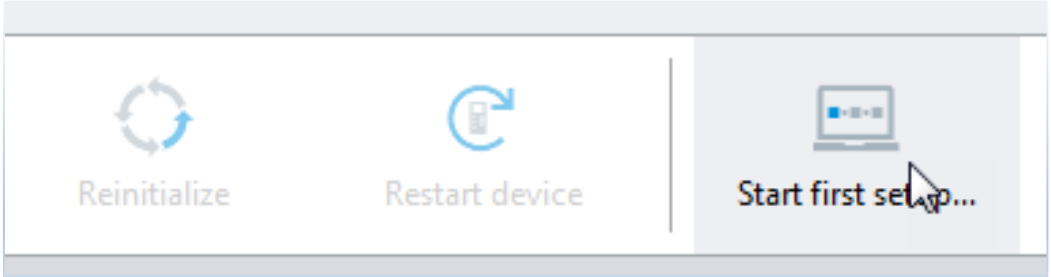


Step 3: Drag and Drop the CMMT-AS to your new project

Step 4: Open the CMMT-AS configuration view via double click on Axis1

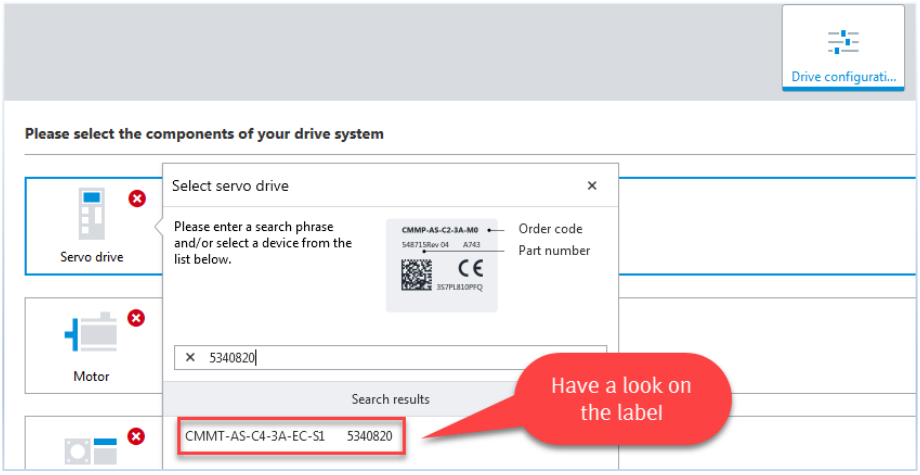


Step 5: Use the Wizard for an easy and fast configuration

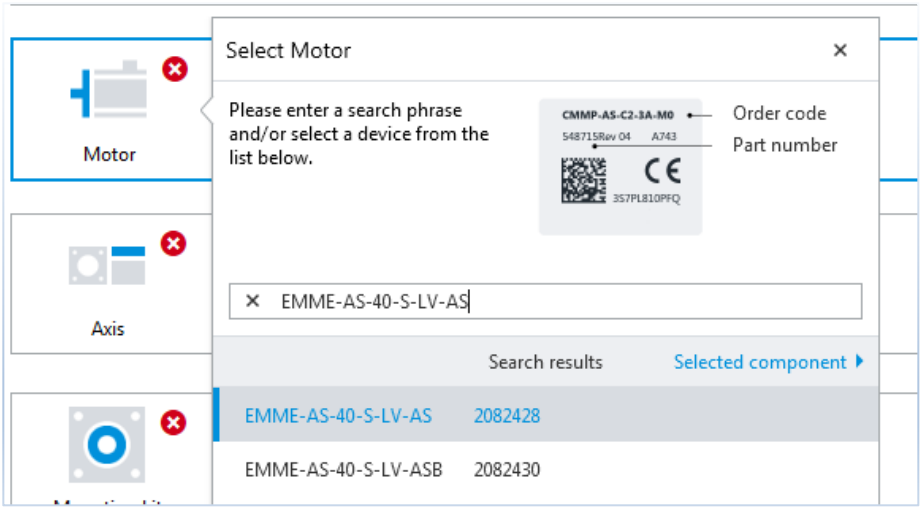


Step 6: Start the configuration step by step

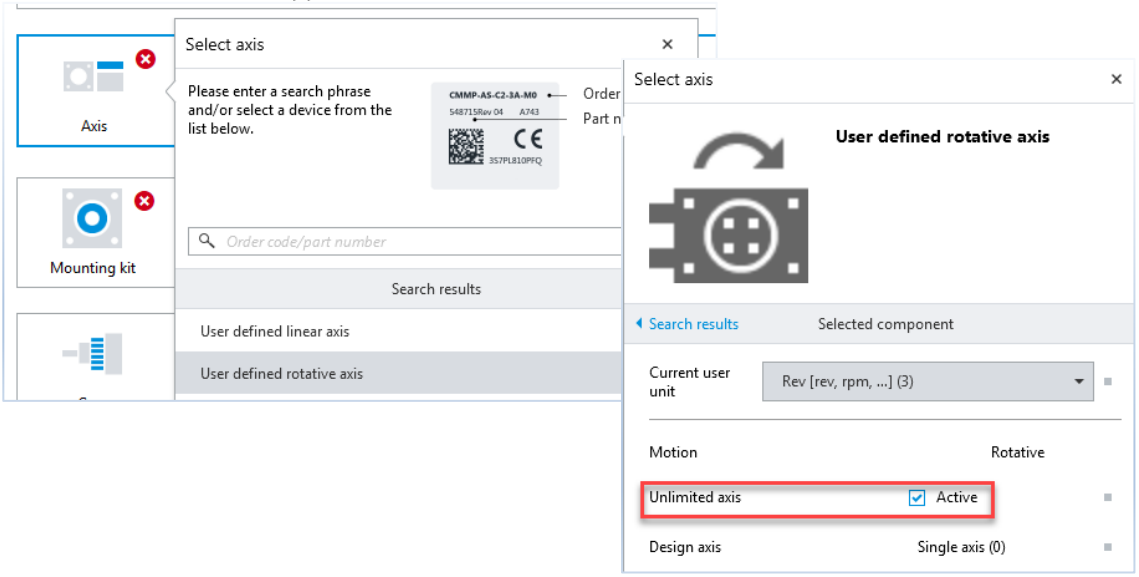
A) Choose the Servo drive (Optional step, if you didn't drag and drop the Online available device)



B) Choose the connected motor

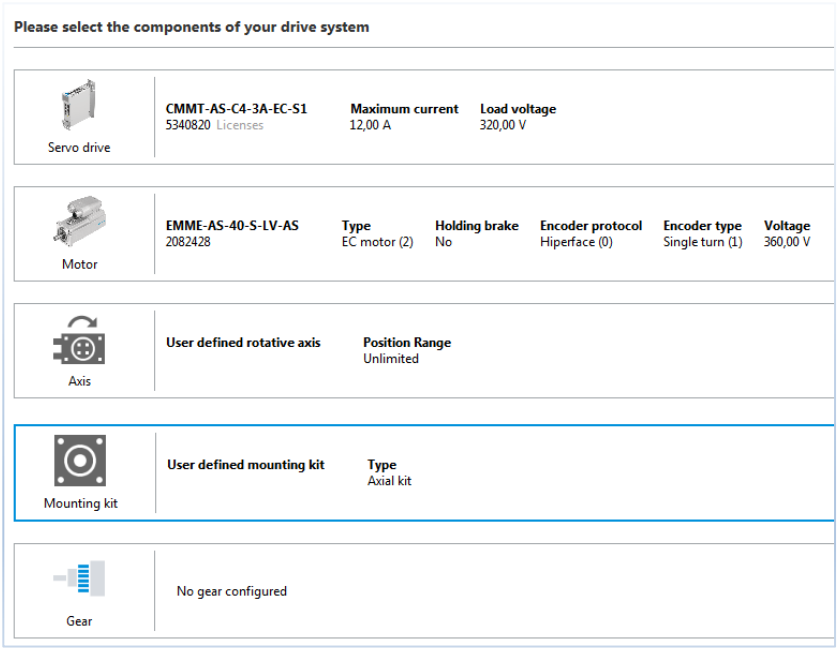


C) Define the axis **(-> In this application we are working with an unlimited user defined rotative axis)**



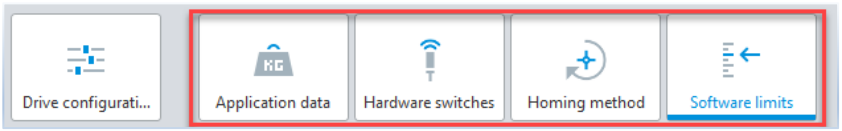
D) Define the mounting kid **(-> In this application we are using no mounting kit)**

Step 7: After the basic configuration is finished the options for Application data, Hardware switches, Homing method and Software limits are available

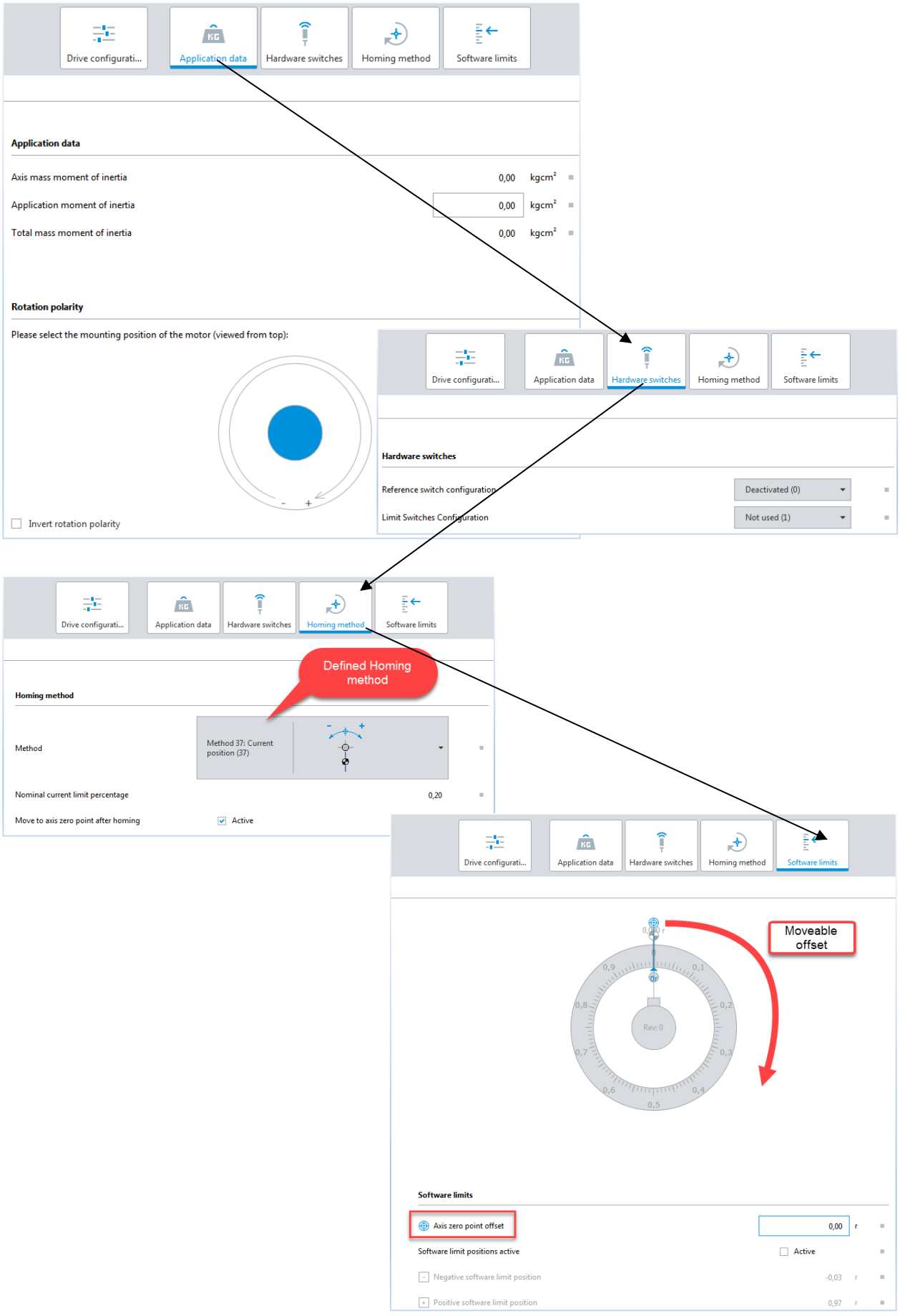


You have access to this parameters via the “Next” button which appears on the lower right corner

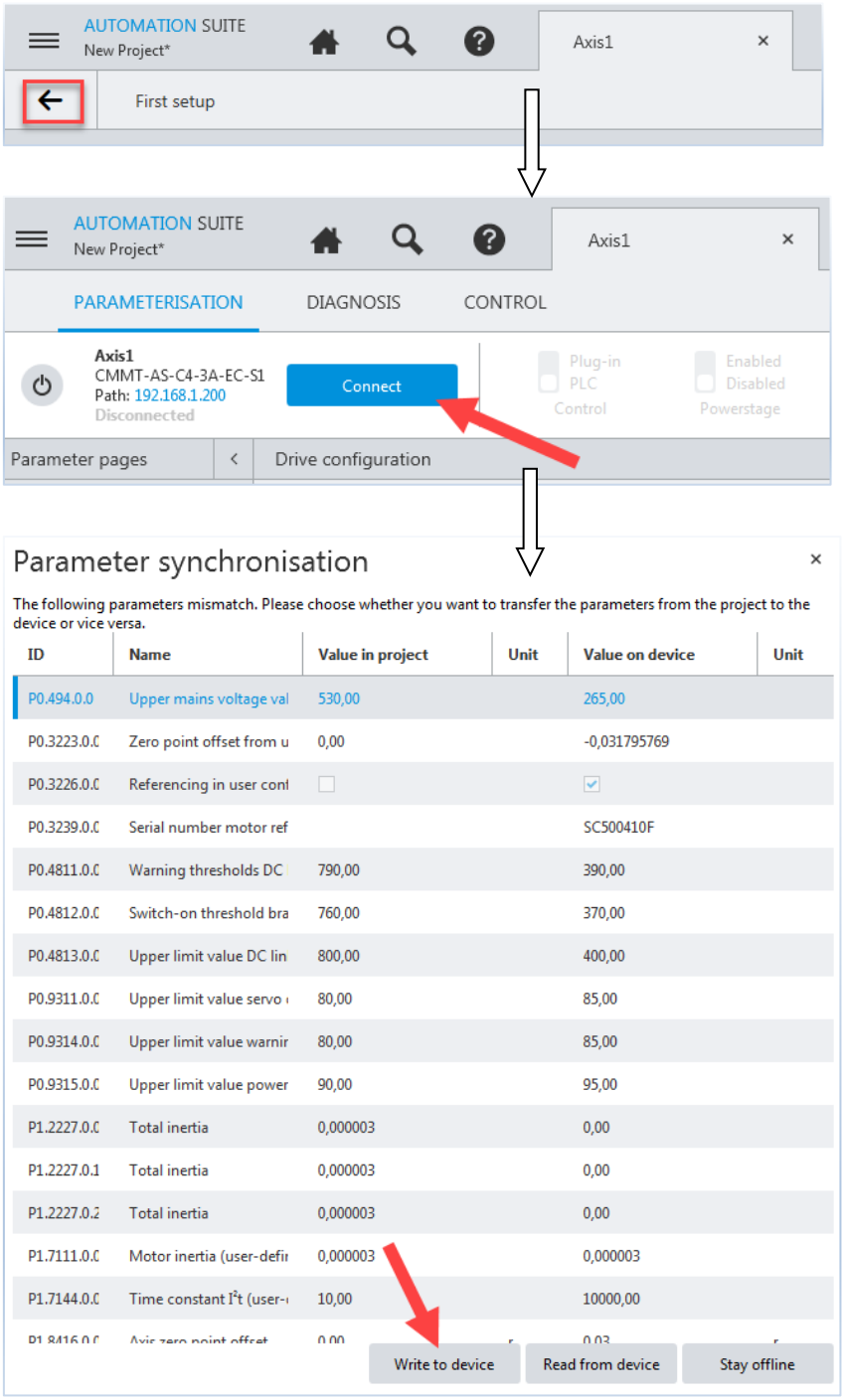
Or per direct click in the upper menu



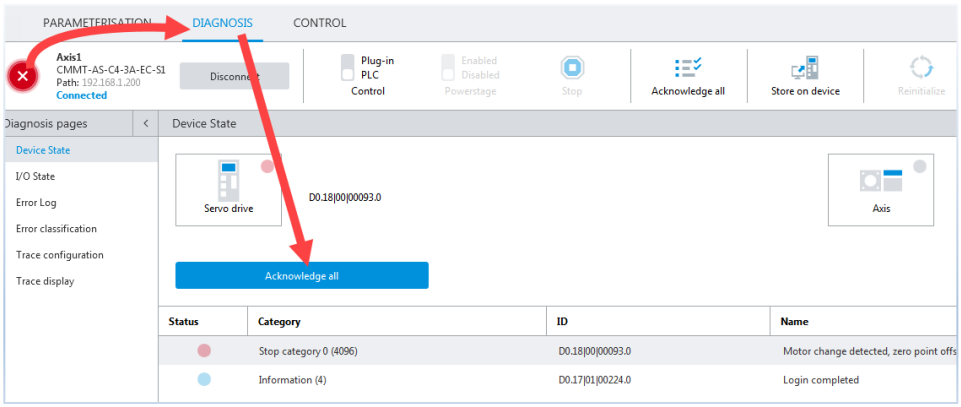
In this application we have used the following settings:



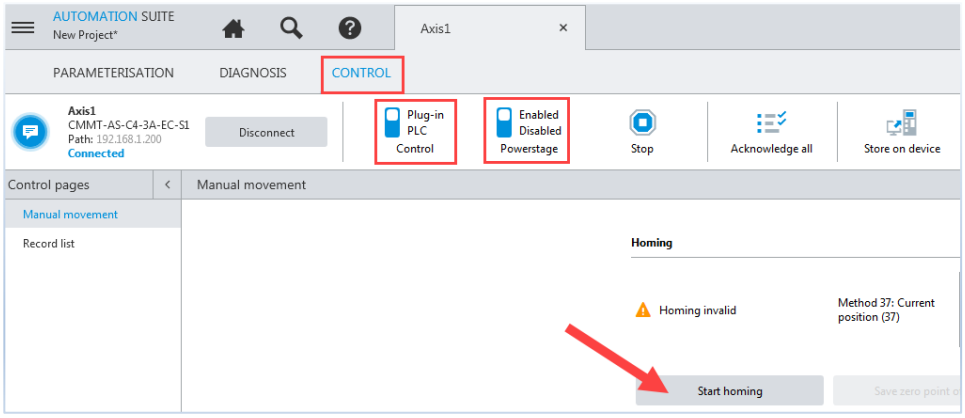
Step 8: Close the Wizard and download everything to the motor controller

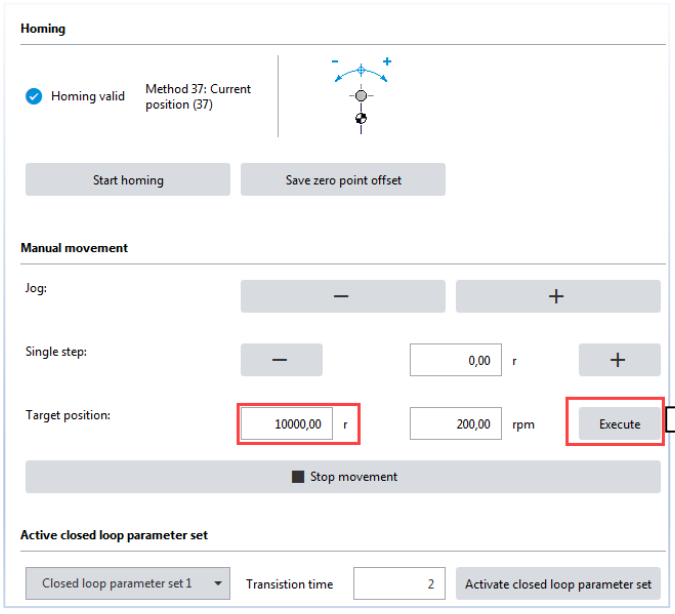


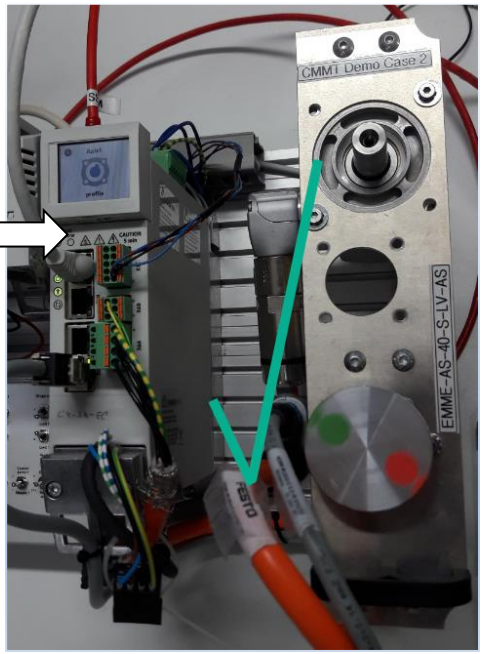
Step 9: If the CMMT-AS was in use already then, because of the changes some diagnosis messages can occur. You can delete them here:



After that you can do for testing purpose a Homing and some movements

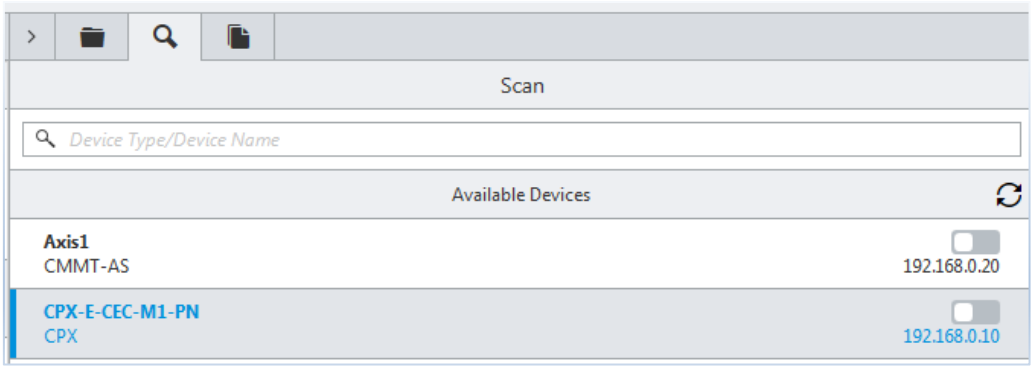




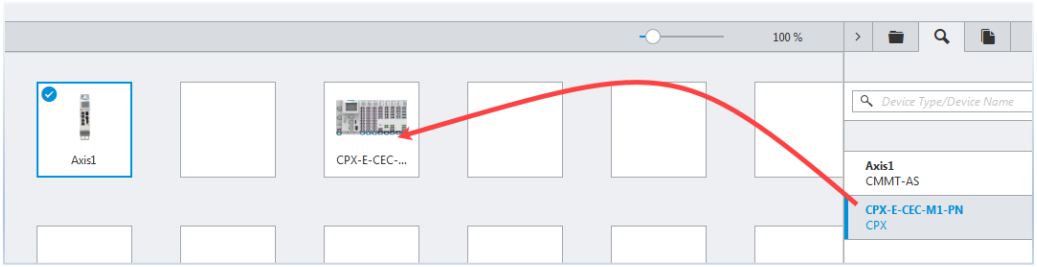


2.3 Step by Step commissioning of CPX-E-CEC-M1-PN

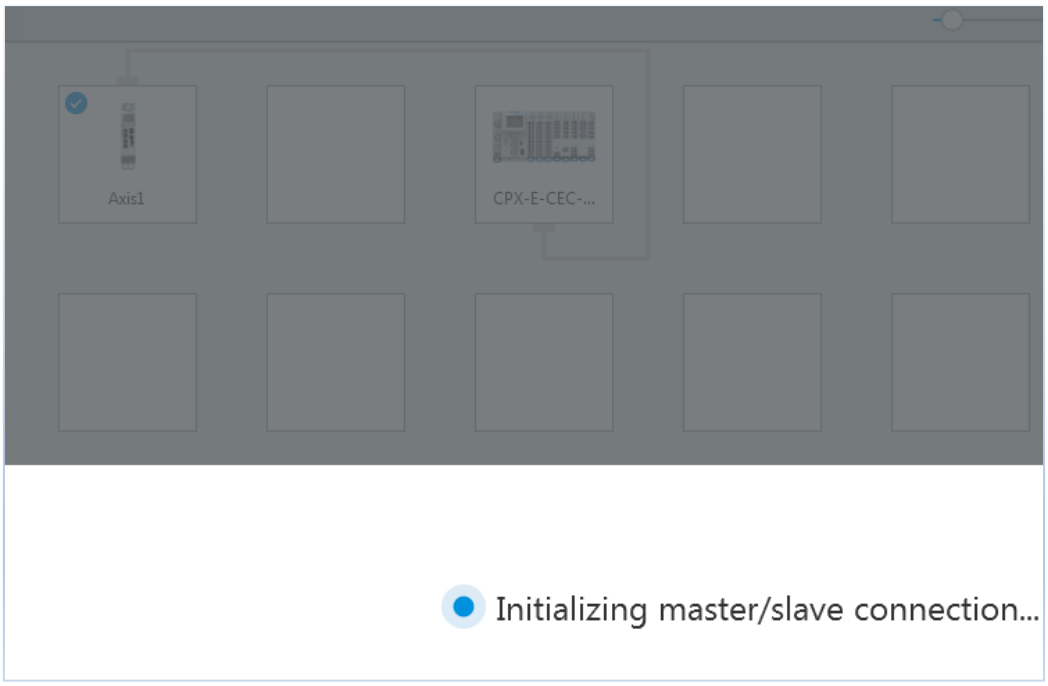
Step1: Searching for the connected CPX-E-CEC-M1-PN via the **smaller** loupe, because then you can drag and drop the connected the devices to your project



Step2: Drag and drop the CPX-E-CEC-M1-PN to your project



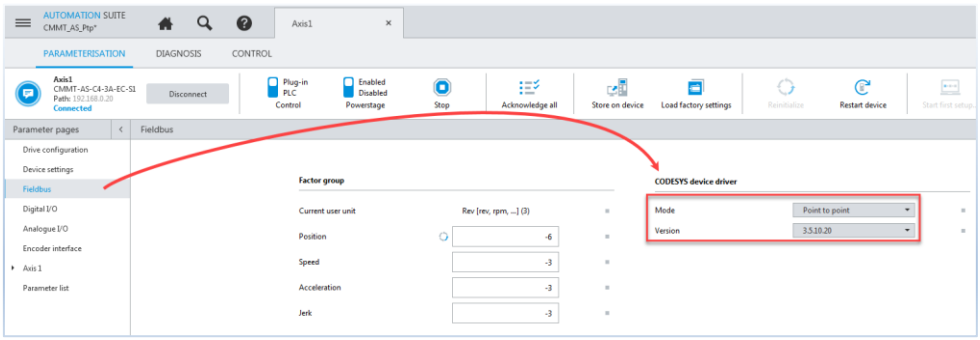
Step3: To establish a EtherCAT communication path you must draw a line between master and slave



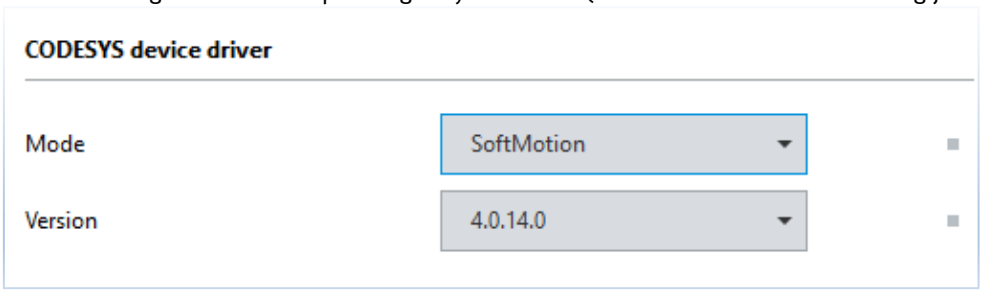
The result could look like this:

Important

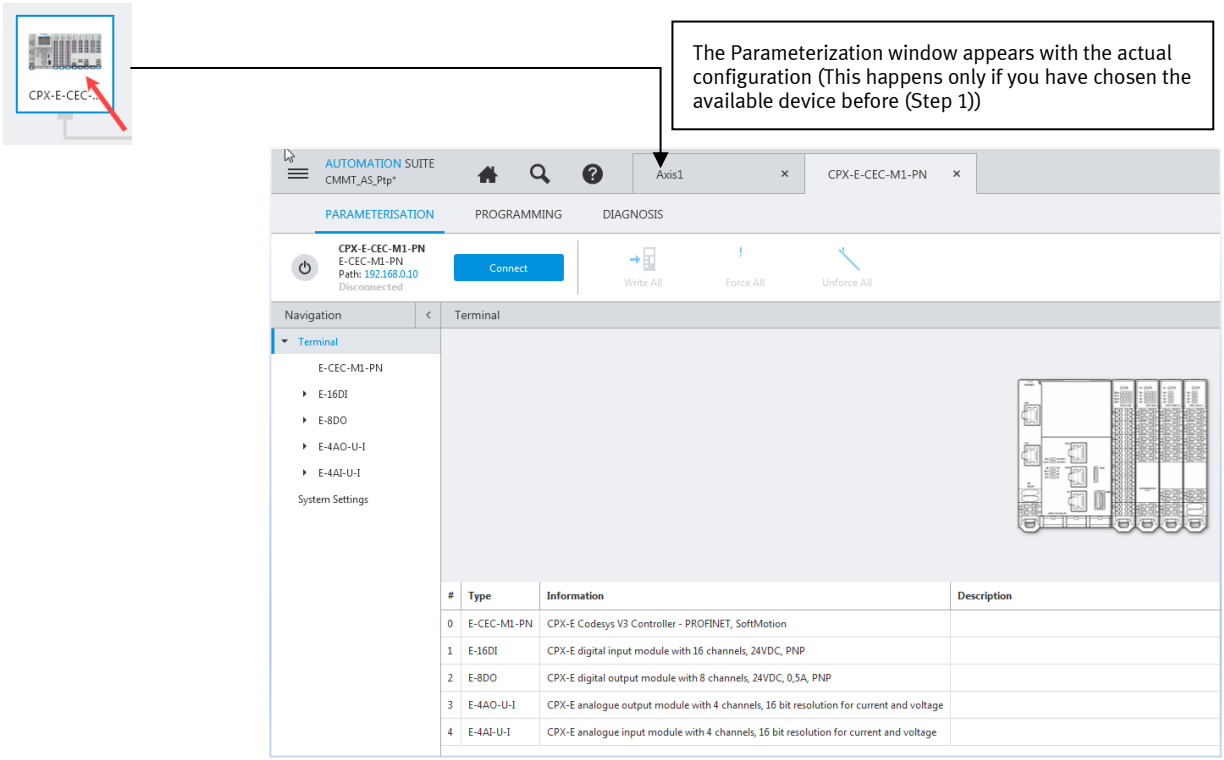
After you have established an EtherCAT communication following new option appears at CMMT-AS -> **Fieldbus**



You can change the mode depending on your needs (In this document we are using just **SoftMotion**):

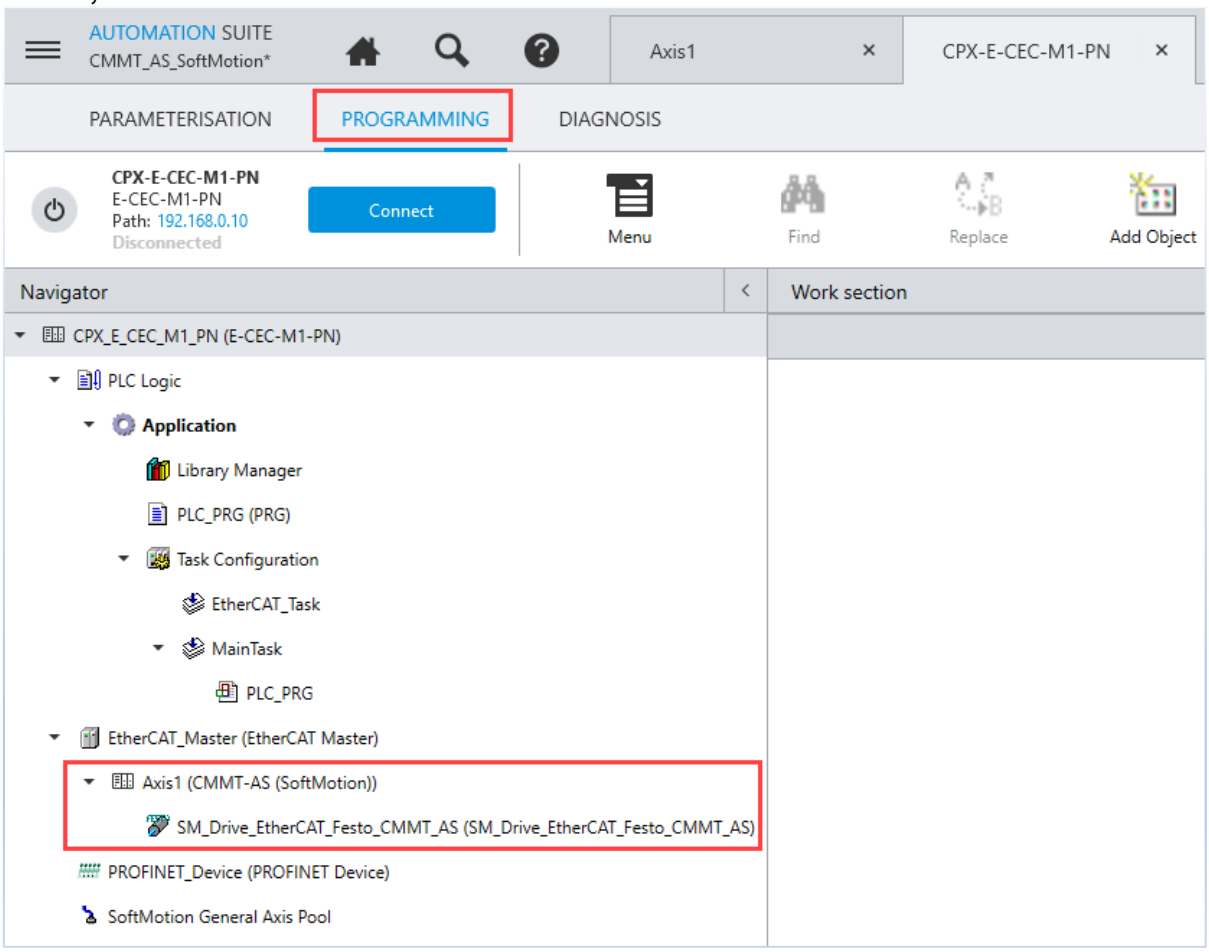


Step4: Open the CPX-E-CEC-M1-PN Codesys view via double click

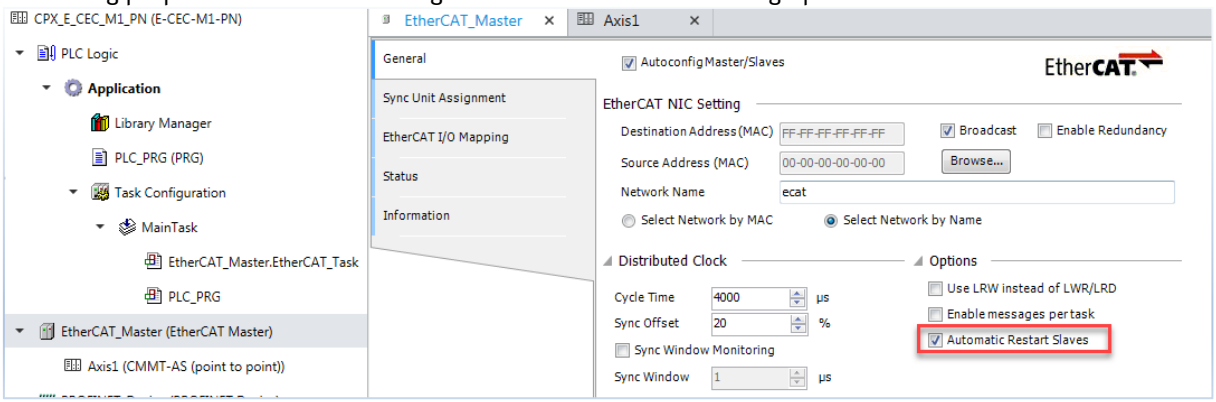


Step5: Open the Programming tab

If you have established the EtherCAT communication, then the system recognizes the CMMT-AS automatically



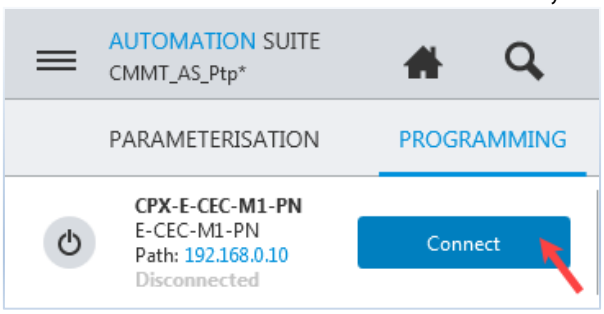
Step6: For testing purpose and easier handling in EtherCAT activate following option



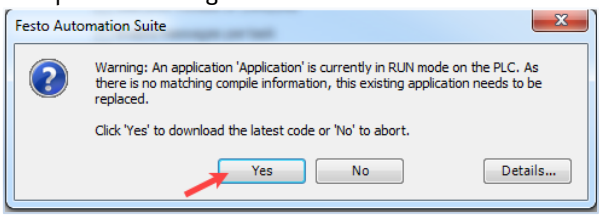
Automatic Restart Slaves means that in the event of communication breakdown the master tries to restart the slaves cyclically till everything is running again.

Step7: Download the project to the PLC and check if the EtherCAT communication is running

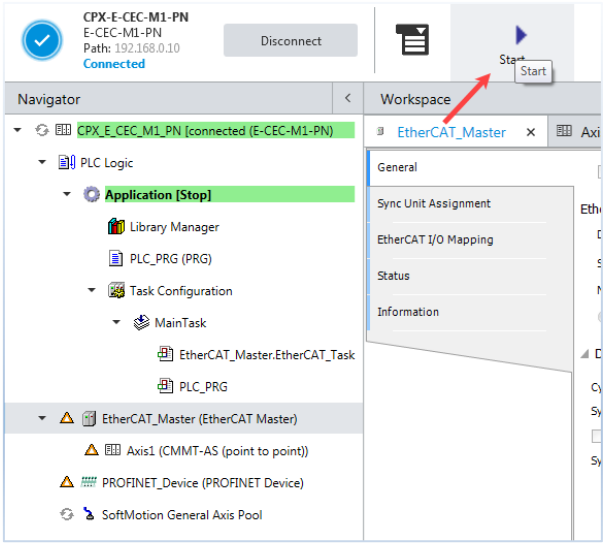
A) Connect to device to start download automatically



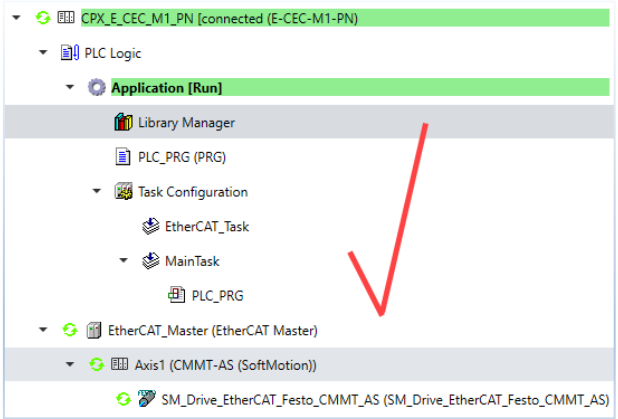
B) Accept the Warning



C) Switch PLC to Run Mode

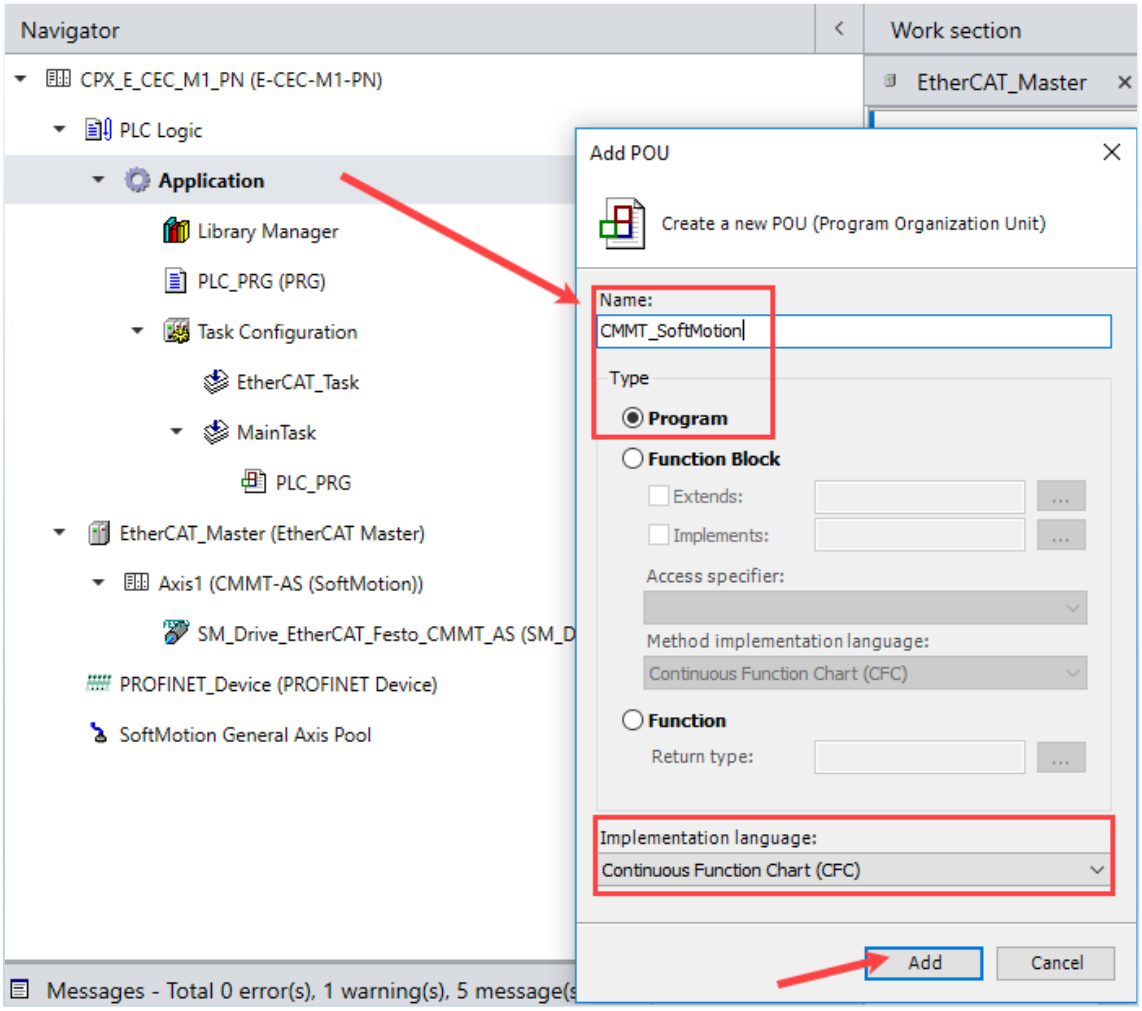


D) Check result (Green = EtherCAT is running)

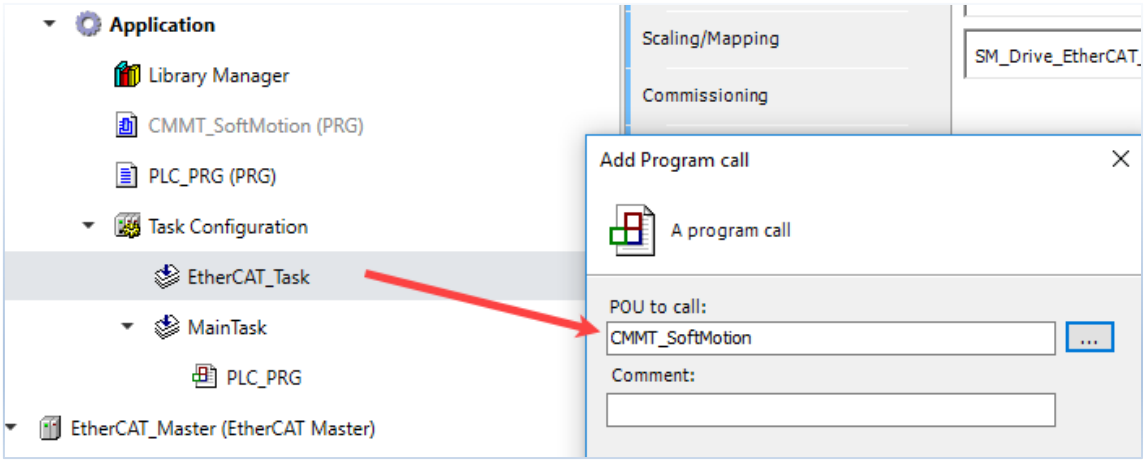


2.4 Using the SoftMotion function blocks

Step1: Add e.g. a CFC program



Step2: Call the CFC (PRG) in the EtherCAT Task



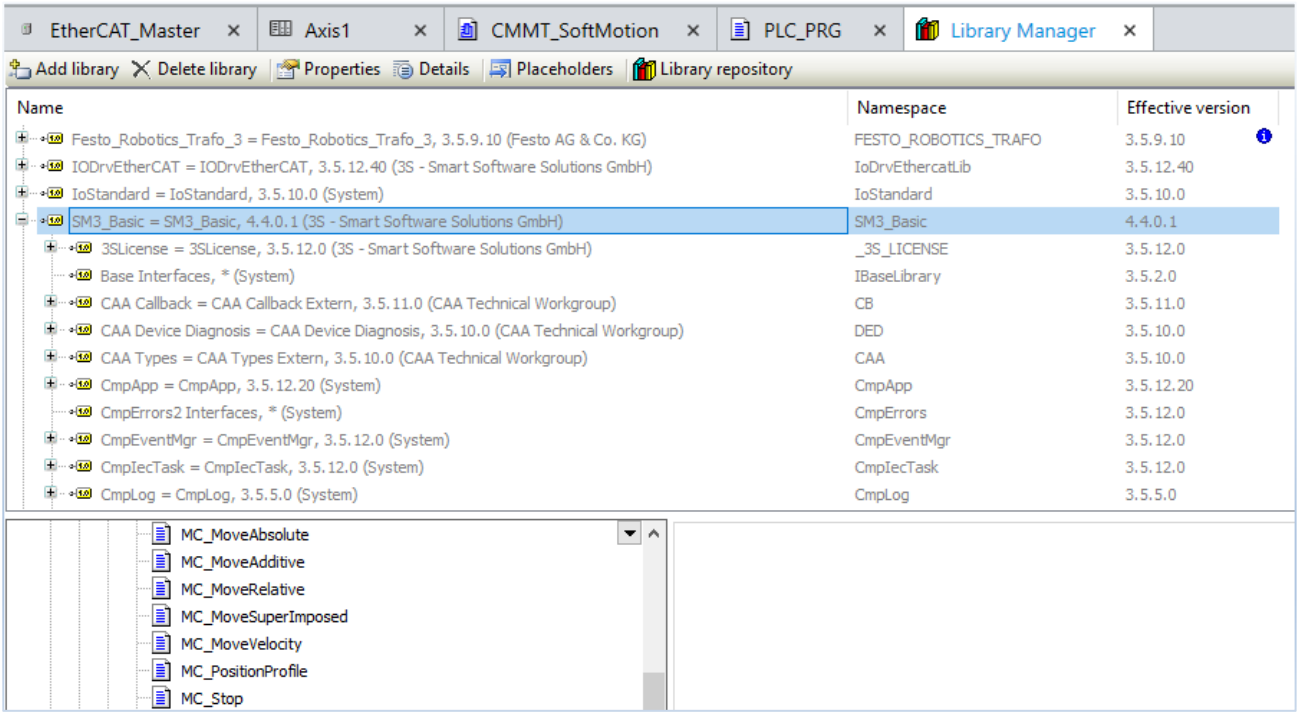
Note

PLCopen FB's must be called in the EtherCAT Task to work synchronously. If the PLCopen FB's are not called within this task they will simply not work correctly

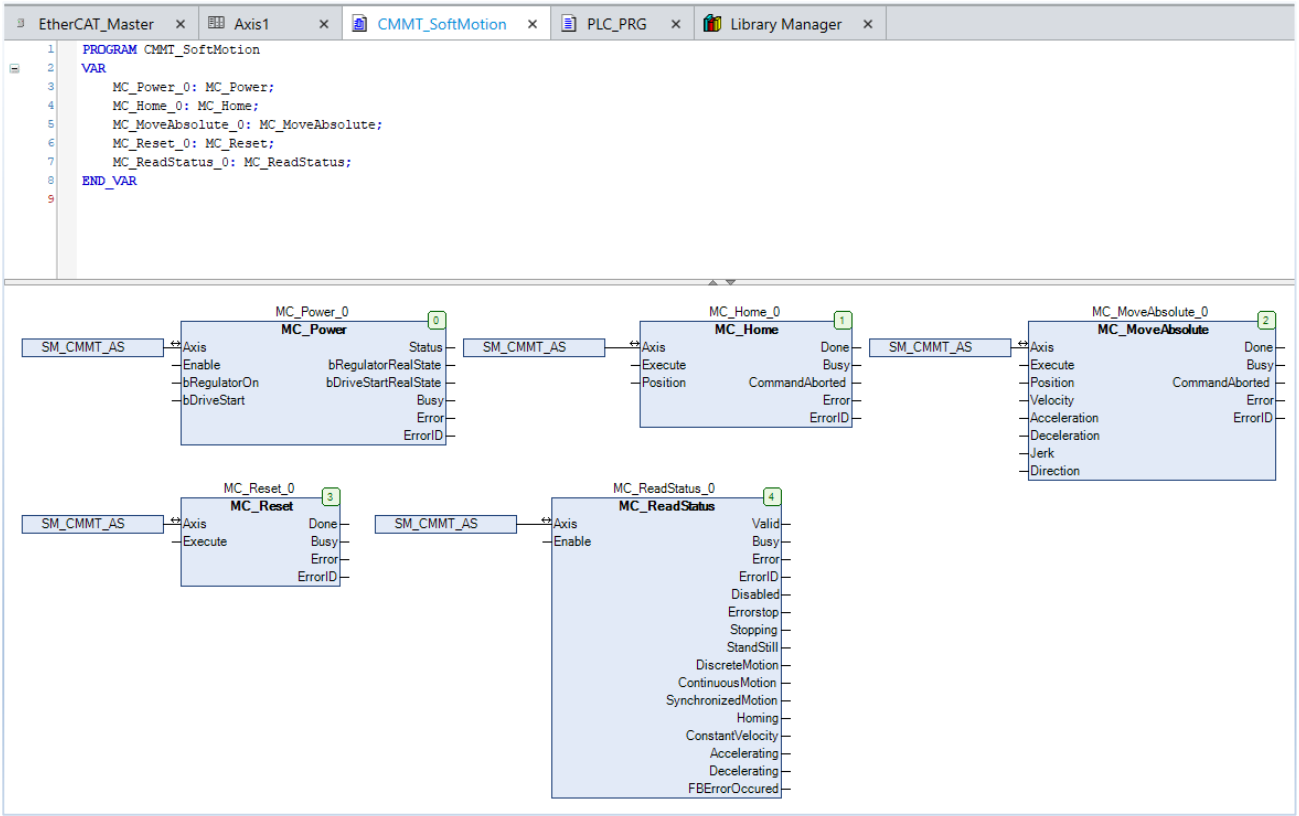
Step3: Integrate the Festo SoftMotion function blocks in your CFC (PRG)

Note

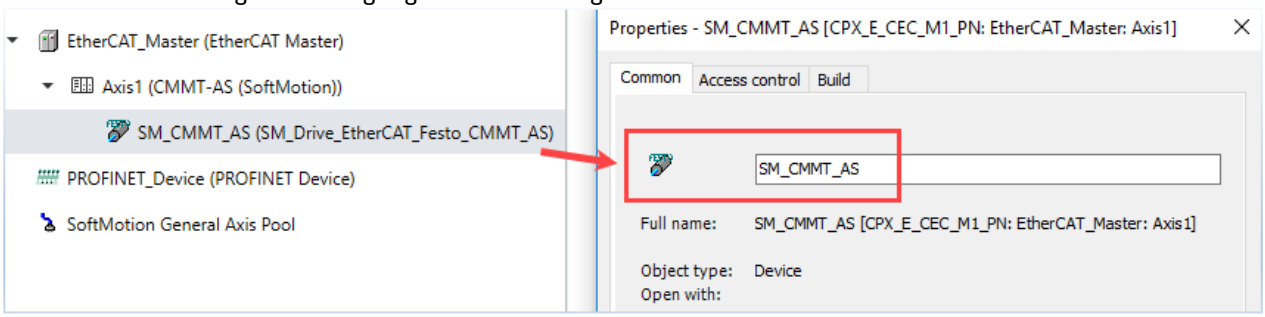
You can find available FB's in the Library Manager. They are included in the CPX-E-CEC-M1-PN package



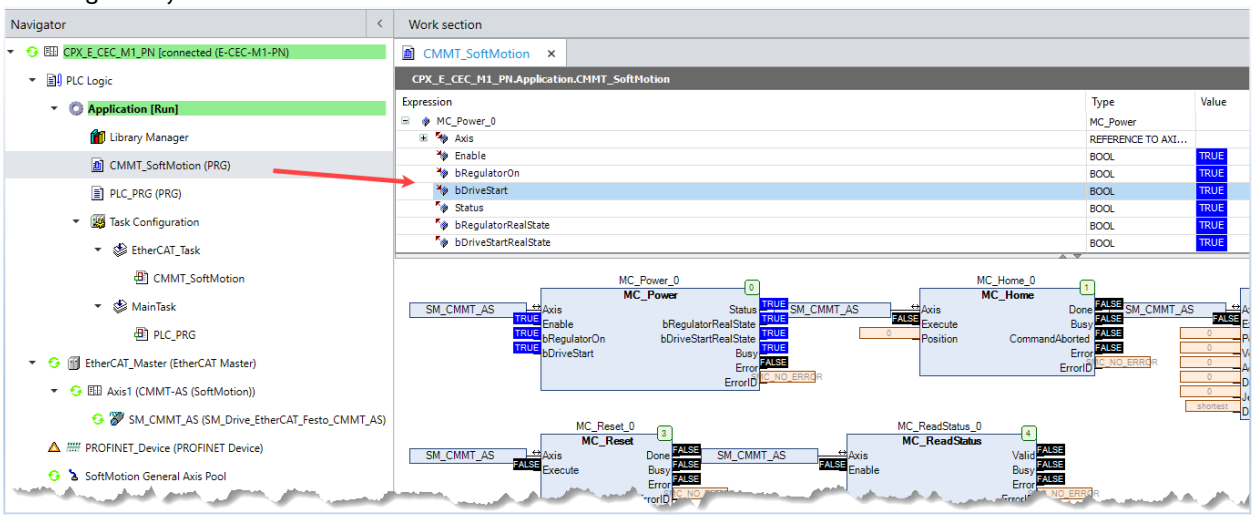
A simple testing program (without variables) could look like this:



For an easier handling in CFC language we have changed the name of the SM drive:

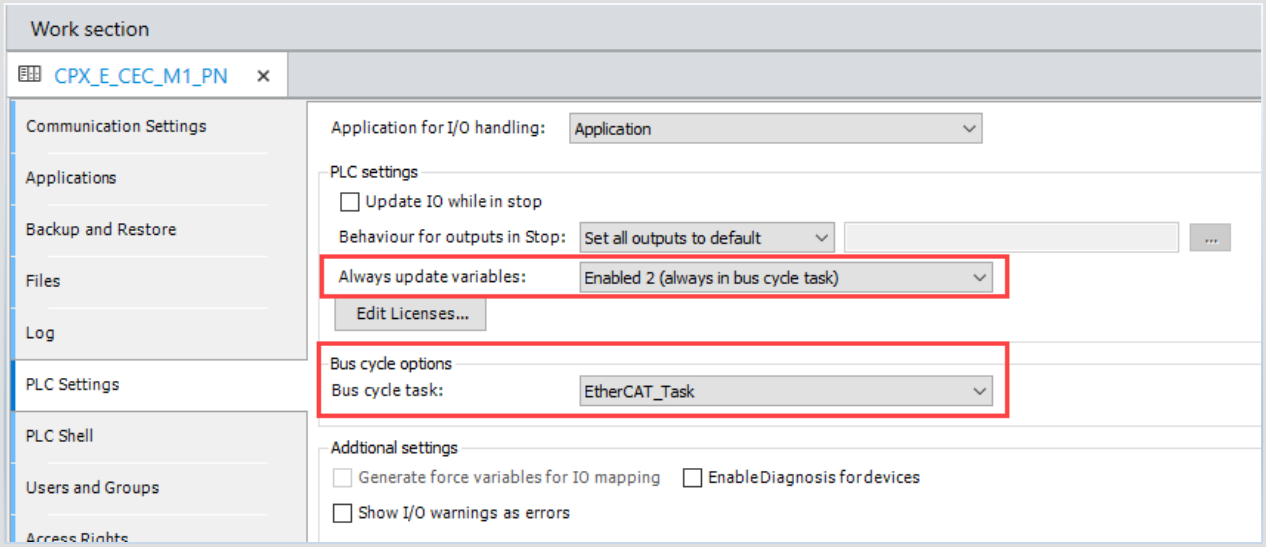


After download you could use for testing the internal FB variables in Online Mode, but be aware that the handling is very uncomfortable:



Note

If you change the settings in the PLC like following:

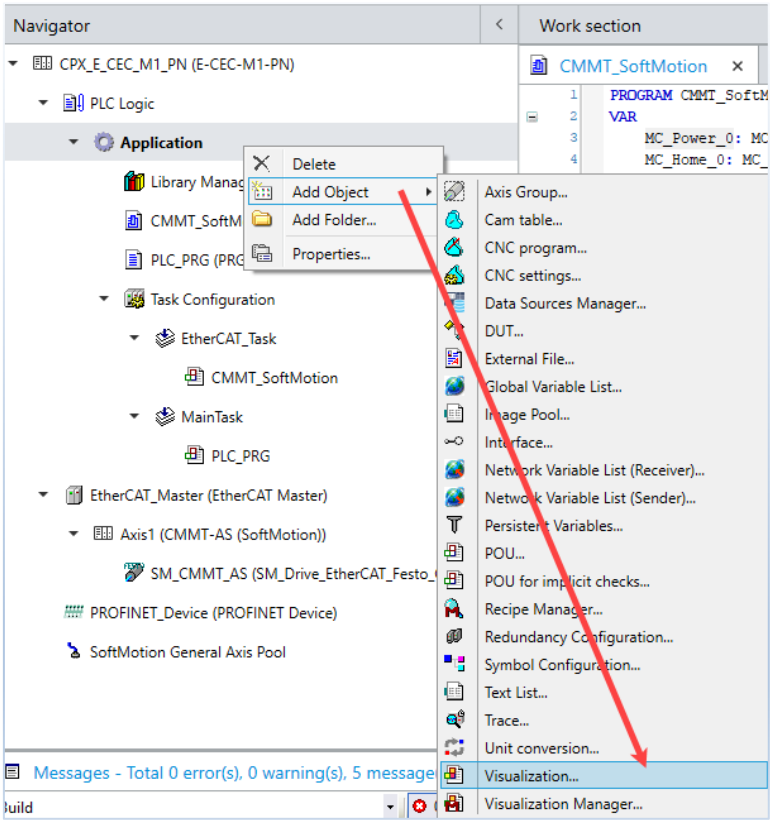


then you ensure that unused I/O variables (which are not used in a programming code) are updated too and that the Bus cycle task is using always the EtherCAT Task. To avoid problems during testing such options are recommended.

2.4.1 Creating a visualisation

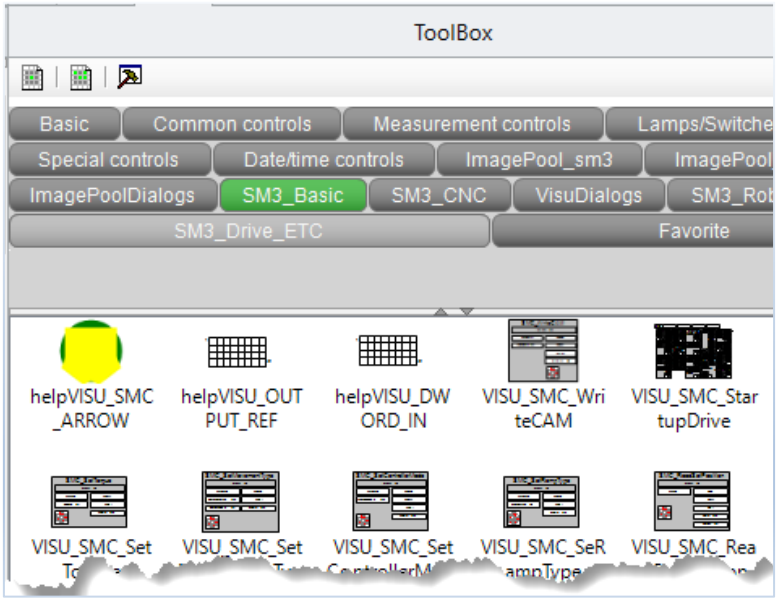
To make the testing easier you can use the available FB visualisation elements.

Step1: Add visualization

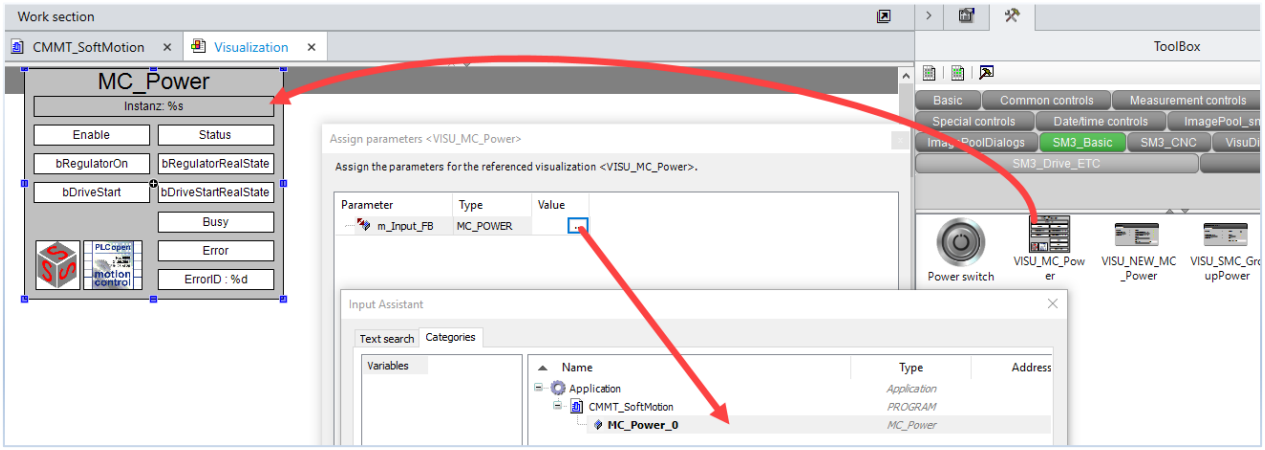


Step2: Drag and drop the Visualisation element which you want to use from the SoftMotion library **and** link the Visu elements to the corresponding function blocks

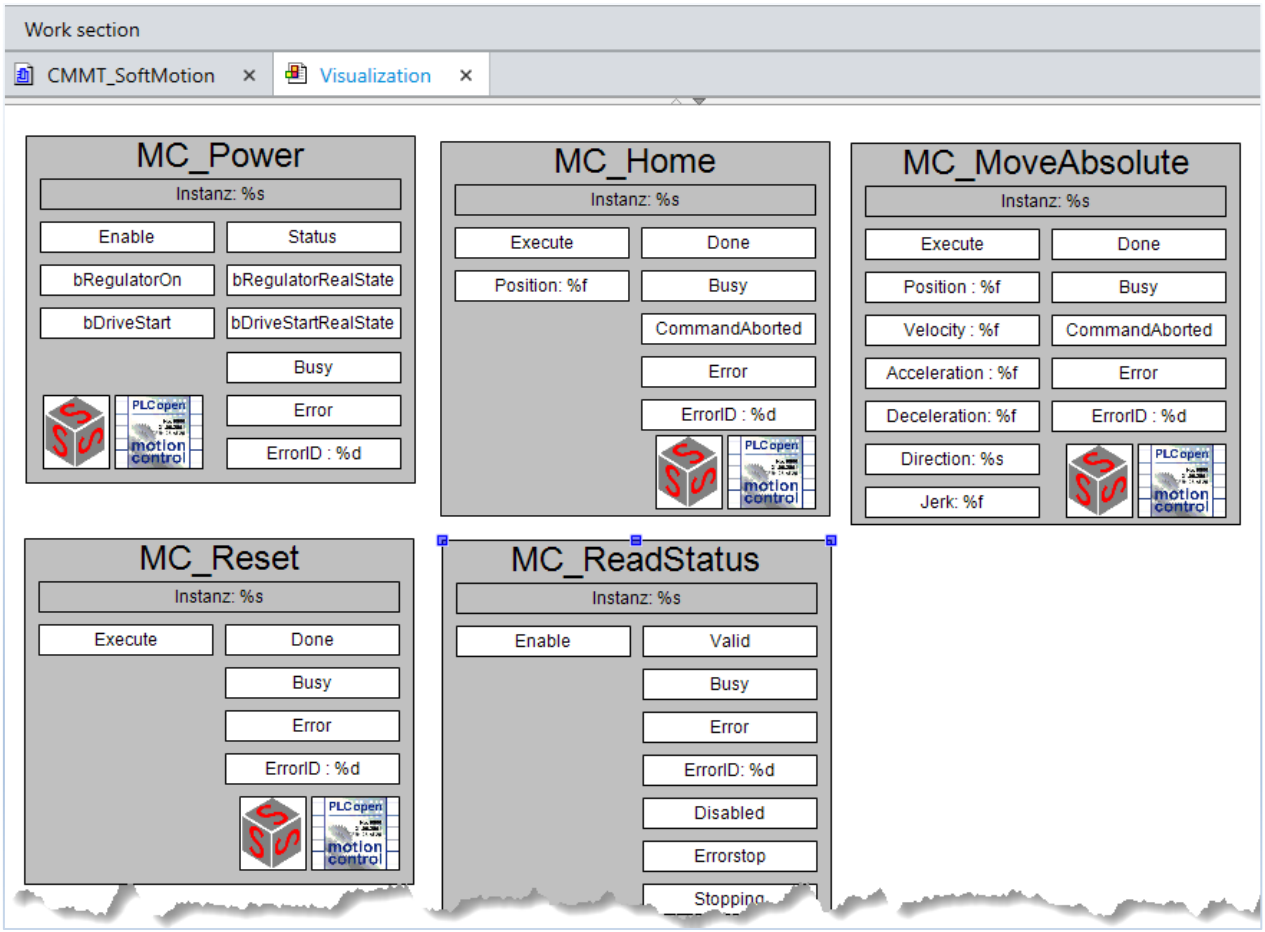
You will find all Visu SM elements in the ToolBox:



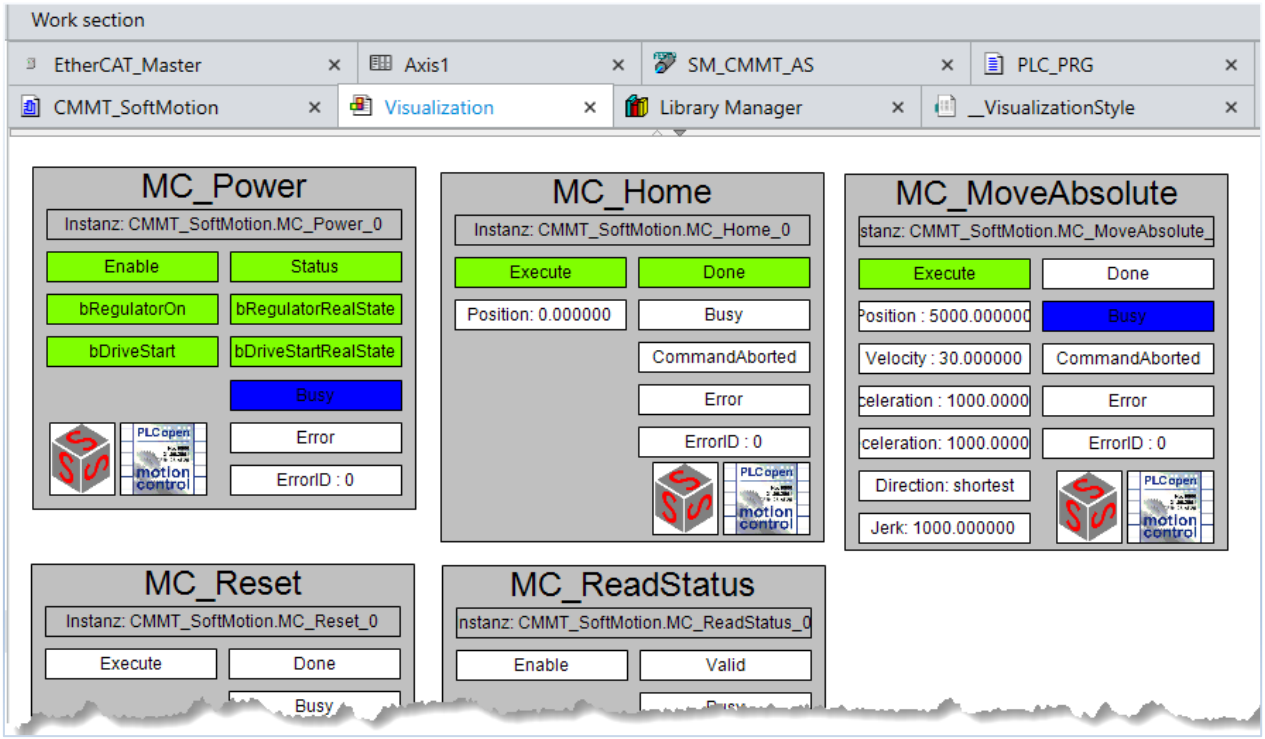
The linking process looks like this:



An easy visualization could look like this:

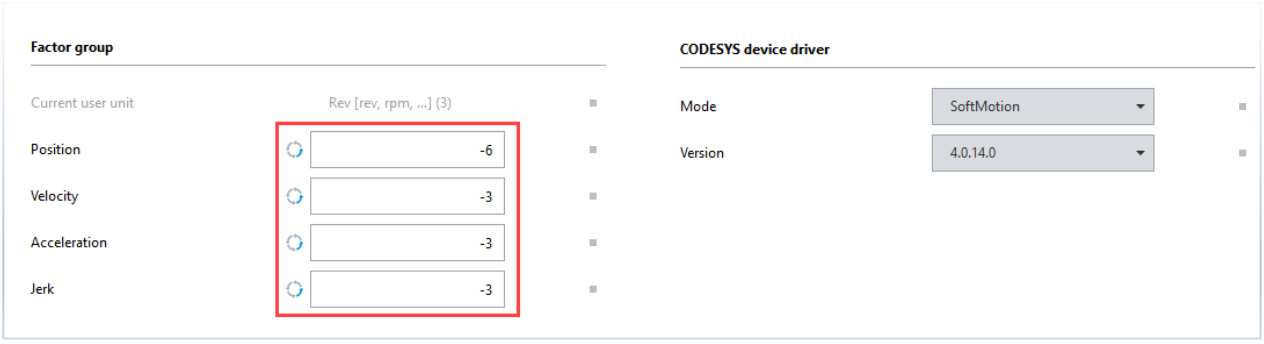


Step 3: Test your visualization in Online Mode:

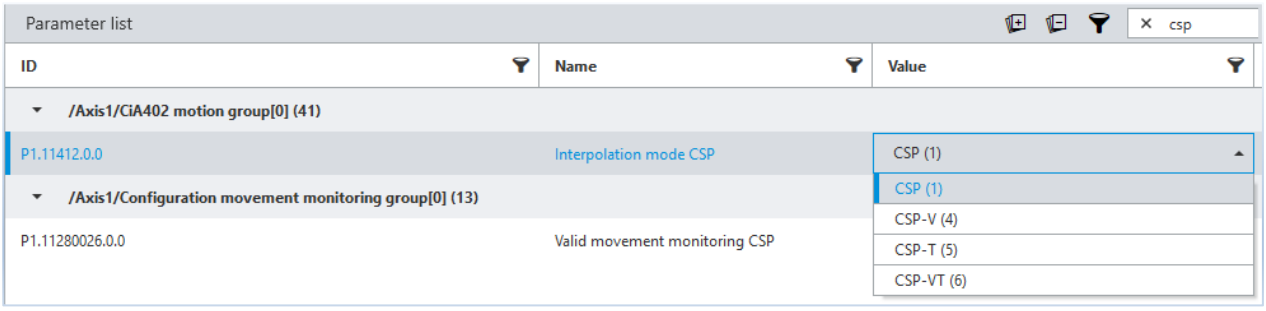


2.5 Excurse Scaling

If you are using SoftMotion per default the factor group has following values:



As default we are using following mode:



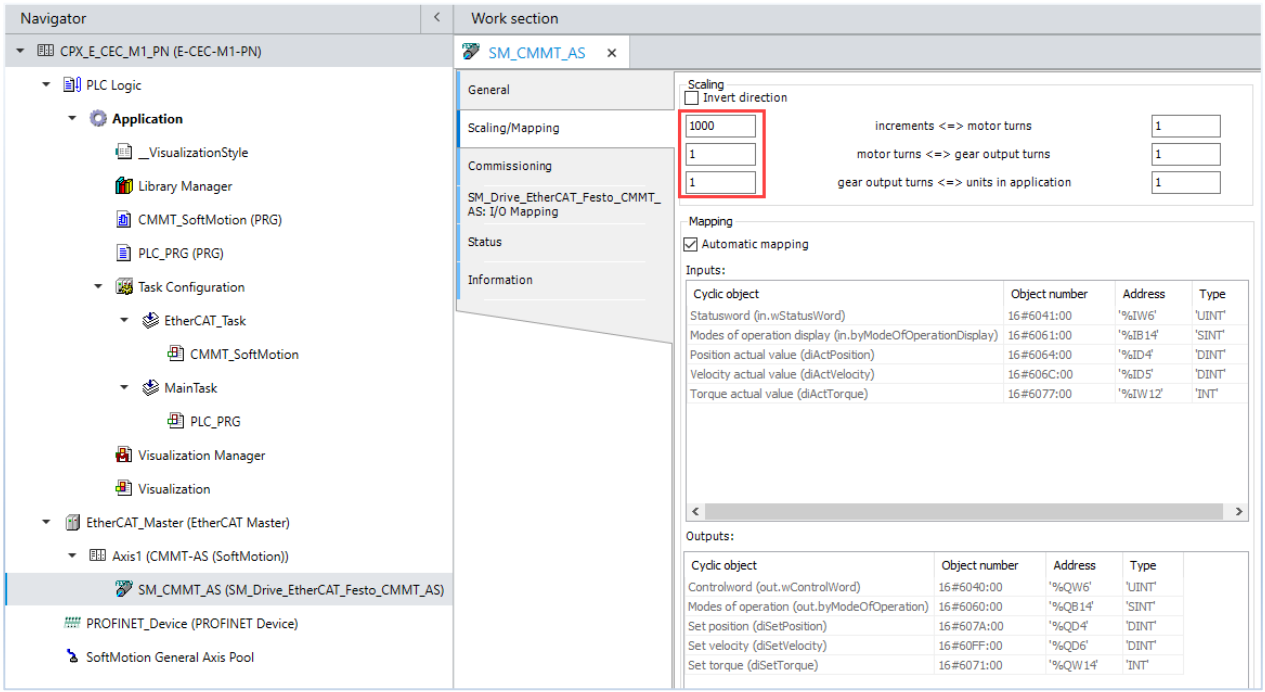
CSP (1) = Cyclic synchronized positioning mode = operating mode 8

For operating mode 8 we only need the factor group value of the position. The user unit in FAS is 'meter' for linear movements. A typical value for the resolution is 10^-6. It is recommended to work with this value. Depending on the system configuration this value could be different. You can also change this value manually, but be aware if you make this value 'coarser' then the drive will also deteriorate in his running behavior.

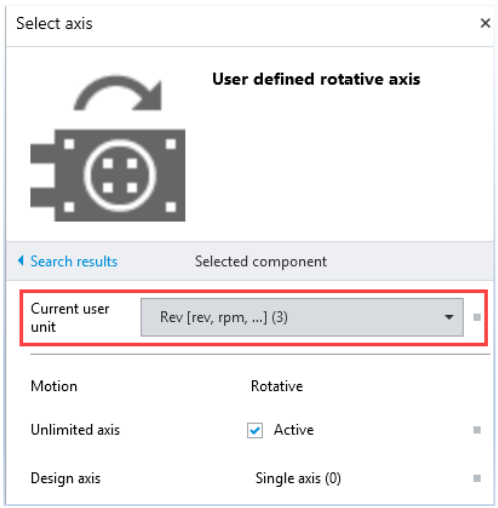
If you use the factor group of FAS then you have the advantage that you no longer have to be worry about the feed constants and any used gears.

The derived parameters of speed, acceleration and jerk have no influence in operating mode 8. The basis for these values is the Factor group of the position

In a Codesys SoftMotion project per default the scaling is done like following:



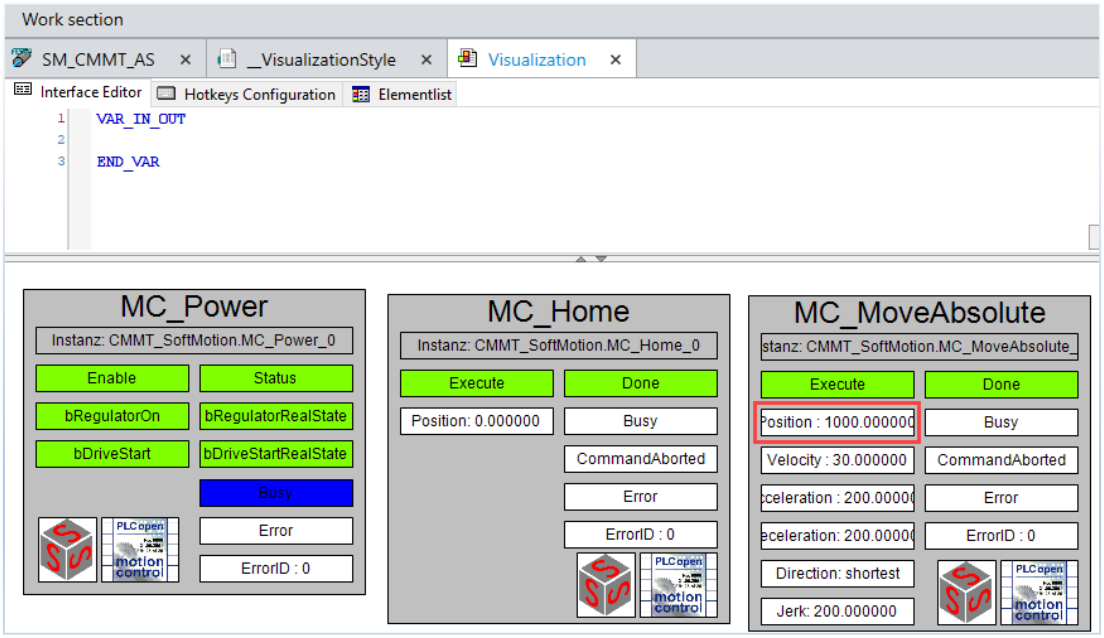
In this application note project we have used following unit

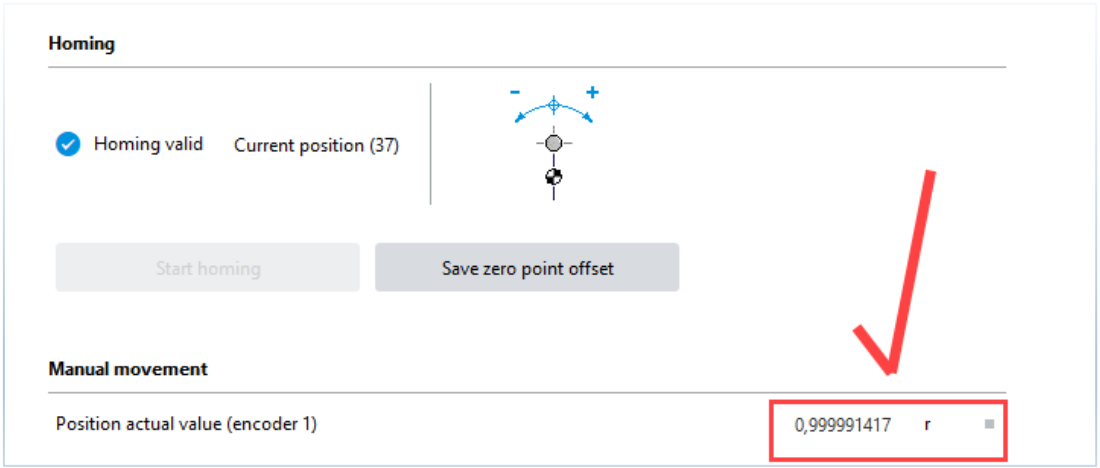


A) That means 1 revolution (360°) in Codesys has a Position value of 1000

The reference remains with the factor group 'Position' in FAS and the principle is unit/s

➔ In our case **resolution/s:**
0,000001 (Factor CMMT) * 1000 (Scaling Codesys) = 0,001 * 1000 = 1 revolution





B) The velocity in operating mode 8 is using the same factor group like the position. That means if you enter e.g. a value of 3000 in Codesys then the velocity has a value of around 180 rpm

In our case that means: 0,000001 * 1000 * 3000 = 3/s = 180 rpm