Application Note

FESTO

Configuration of CMMT-AS-…-EC/PN to run 3rd party motor

This document describes how to configure and run 3rd party motors in combination with CMMT-AS-..-EC/PN drive.

CMMT-AS-…-EC
CMMT-AS-…-PN

Title ....Configuration of CMMT-AS-..-EC to run 3rd party motor

Version 1.20

Document no. 100179

Original ....en

Author ....Festo

Last saved 21.02.2019

Copyright Notice

This documentation is the intellectual property of Festo AG & Co. KG, which also has the exclusive copyright. Any modification of the content, duplication or reprinting of this documentation as well as distribution to third parties can only be made with the express consent of Festo AG & Co. KG.

Festo AG & Co KG reserves the right to make modifications to this document in whole or in part. All brand and product names are trademarks or registered trademarks of their respective owners.

Legal Notice

Hardware, software, operating systems and drivers may only be used for the applications described and only in conjunction with components recommended by Festo AG & Co. KG.

Festo AG & Co. KG does not accept any liability for damages arising from the use of any incorrect or incomplete information contained in this documentation or any information missing therefrom.

Defects resulting from the improper handling of devices and modules are excluded from the warranty.

The data and information specified in this document should not be used for the implementation of safety functions relating to the protection of personnel and machinery.

No liability is accepted for claims for damages arising from a failure or functional defect. In other respects, the regulations with regard to liability from the terms and conditions of delivery, payment and use of software of Festo AG & Co. KG, which can be found at www.festo.com and can be supplied on request, shall apply.

All data contained in this document do not represent guaranteed specifications, particularly with regard to functionality, condition or quality, in the legal sense.

The information in this document serves only as basic information for the implementation of a specific, hypothetical application and is in no way intended as a substitute for the operating instructions of the respective manufacturers and the design and testing of the respective application by the user.

The operating instructions for Festo products can be found at www.festo.com/sp.

Users of this document (application note) must verify that all functions described here also work correctly in the application. By reading this document and adhering to the specifications contained therein, users are also solely responsible for their own application.

Table of contents

1 Components/Software used

Type/Name	Version Software/Firmware	Date of manufacture
CMMT-AS-C2-3A-EC-S1	--	--
EMMB-AS-40-01-S	--	--
Automation Suite	1.1.0.210	--
CMMT-AS Plug-in (Pre-release)	1.1.0.22	--

Table 1.1 : Components/Software used

1.1 Topology of the tested system

1 Bus/network
2 Power switch
3 Circuit breaker/fuses
4 Power supply unit for logic voltage supply 24 V DC (PELV)
5 External braking resistor (optional)
6 Servo drive CMMT-AS
7 Servo motor
8 PC with Ethernet connection for parameterisation

Any types of 3rd party motors are supported if it is compatible in electrical specification and interface of position sensors
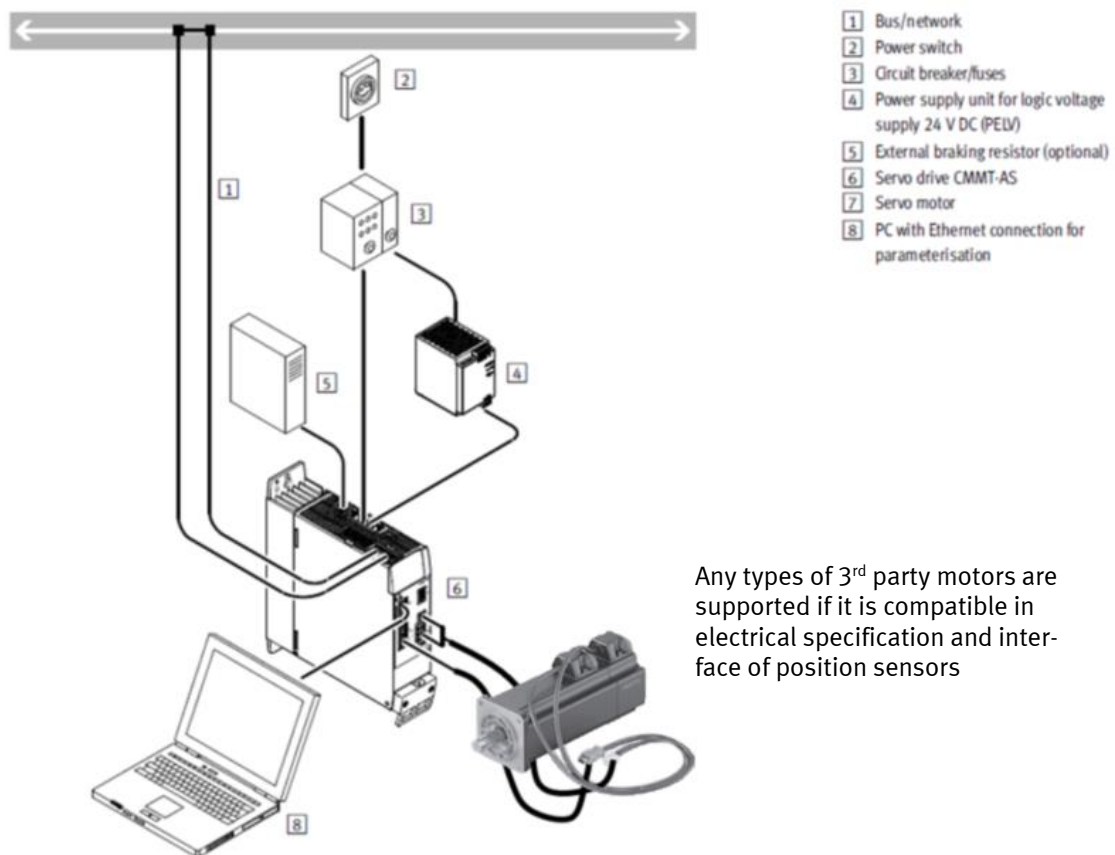
Figure 1.1 : overview of tested system

Please refer to the picture above and make sure all wires are correctly placed and connected.

To configure and run systems for commissioning, it is necessary to install named software in the table 1.1 above on your laptop or other PC system which you will do commissioning with.

If there are known technical properties of motor existing and if it is compatible in electrical specification and interface of positioning sensor, it will be possible to connect and run it with CMMT drive.

Please note that all cables has to be disconnected before the CMMT drive is firstly configured and particularly until it has all right parameters in Encoder configuration.

2 Application Description

This part of the documentation describes a connectivity and configuration of the motor drive CMMT-AS-...-EC with a 3rd party motors. It will explain you what mainly important parameters are and how to do your own commissioning with several steps as per standardized work flow.

3 Important physical properties of motor for configuration

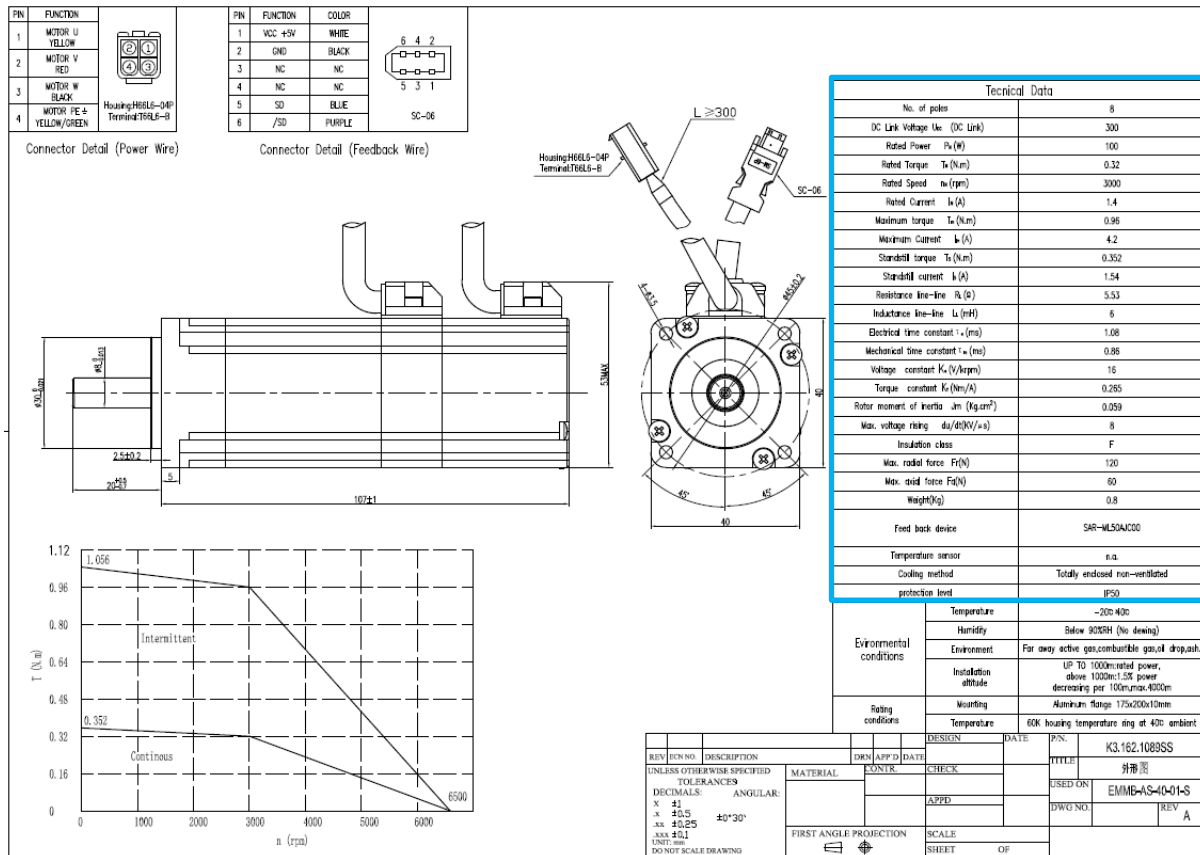*Example of drawing and specification of motor)*

Connector Detail (Power Wire)

PIN	FUNCTION
1	MOTOR U YELLOW
2	MOTOR V RED
3	MOTOR W BLACK
4	MOTOR PE ± YELLOW/GREEN

Housing:H66L6-04P Terminal:T66L6-B

Connector Detail (Feedback Wire)

PIN	FUNCTION	COLOR
1	VCC +5V	WHITE
2	GND	BLACK
3	NC	NC
4	NC	NC
5	SD	BLUE
6	/SD	PURPLE

SC-06

Housing:H66L6-04P Terminal:T66L6-B

SC-06

L ≥300

Tecnical Data

No. of poles		8
DC Link Voltage Uie (DC Link)		300
Rated Power	Pe (W)	100
Rated Torque	Te (N.m)	0.32
Rated Speed	ne (rpm)	3000
Rated Current	Ie (A)	1.4
Maximum torque	Te (N.m)	0.96
Maximum Current	Ib (A)	4.2
Standstill torque	Ts (N.m)	0.352
Standstill current	Ib (A)	1.54
Resistance line-line	RL (Ω)	5.53
Inductance line-line	LL (mH)	6
Electrical time constant τe (ms)		1.08
Mechanical time constant τm (ms)		0.86
Voltage constant Ke (V/krpm)		16
Torque constant Kt (Nm/A)		0.265
Rotor moment of inertia Jm (Kg.cm²)		0.059
Max. voltage rising da/dt(KV/=s)		8
Insulation class		F
Max. radial force Fr(N)		120
Max. axial force Fa(N)		60
Weight(Kg)		0.8
Feed back device		SAR-ML50AJC00
Temperature sensor		n.a.
Cooling method		Totally enclosed non-ventilated
protection level		IP50

Environmental conditions	Temperature	-20℃ 40℃
	Humidity	Below 90%RH (No dewing)
	Environment	Far away active gas,combustible gas,oil drop,ash.
	Installation altitude	UP TO 1000m:rated power, above 1000m:1.5% power decreasing per 100m,max.4000m
Rating conditions	Mounting	Aluminum flange 175x200x10mm
	Temperature	60K housing temperature ring at 40℃ ambient

REV	ECN NO.	DESCRIPTION	DRN	APP'D	DATE	DESIGN		DATE	P/N.	K3.162.1089SS
									TITLE	升带图
UNLESS OTHERWISE SPECIFIED TOLERANCES DECIMALS: ANGULAR: X ±1 .x ±0.5 ±0°30' .xx ±0.25 .xxx ±0.1 UNIT: mm DO NOT SCALE DRAWING			MATERIAL		CONTR.	CHECK				
								USED ON	EMMB-AS-40-01-S	
			FIRST ANGLE PROJECTION			APPD		DWG NO.		REV A
						SCALE				
						SHEET		OF		

Figure 3-1 : example drawing and technical specification of motor

In the specification data of motor you need to be sure if you have all physical properties ready to configure your motor in CMMT drive. Please see following summaries to do cross check all relevant parameters are ready.

Required parameter list)

No	Name	Description	Unit
1	**Motor Type**	Always need to set EC motor	N/A
2	**Holding Brake**	It is determined when you select type of motor	Yes/No
3	**Rated Voltage**	Rated input voltage to selected motor	Volt
4	**Max. rotation speed**	Maximum reachable rotation speed of motor	Rpm
5	**Rated rpm**	Nominal rotation speed of motor	Rpm
6	**Max. current**	Maximum current of motor at Max. Torque	A
7	**Rated current**	Nominal current of motor at nominal torque	A
8	**Torque constant**	How much torque output per current input	Nm/A
9	**Time constant I^t**	Time constant influences to overload detection	s
10	**Pole pairs**	Number of pole pairs (Number of poles / 2)	--
11	**Winding resistance**	Specific Property by design	Ohm
12	**Winding inductance**	Specific Property by design	H
13	**Motor inertia**	Specific Property by design	Kgcm2
14	**Encoder selection**	Selection from 9 different encoder protocol	--
15	**Encoder type**	Single turn, Multi turn, Relative	--
16	**Temperature sensor**	Selection from 17 different temp sensor types	--

4 Preparation of cables(example for EMMB as 3rd party motor)

4.1 Power and Brake cable extensions

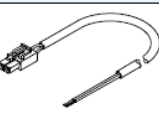You can use any items from the list of standard power or brake cables.

Ordering data		Cable length [m]	Part No.	Type
Motor cable				
	Standard			
		2.5	5219193	NEBM-H6G4-K-2.5-Q13N-LE4
		5	5219194	NEBM-H6G4-K-5-Q13N-LE4
		7.5	5219195	NEBM-H6G4-K-7.5-Q13N-LE4
		10	5219196	NEBM-H6G4-K-10-Q13N-LE4
	Suitable for use with energy chains			
		2.5	5219197	NEBM-H6G4-E-2.5-Q13N-LE4
		5	5219198	NEBM-H6G4-E-5-Q13N-LE4
		7.5	5219199	NEBM-H6G4-E-7.5-Q13N-LE4
		10	5219200	NEBM-H6G4-E-10-Q13N-LE4

Ordering data		Cable length [m]	Part No.	Type
Connecting cable for brake				
	Standard			
		2.5	5219201	NEBM-H7G2-K-2.5-Q14N-LE2
		5	5219202	NEBM-H7G2-K-5-Q14N-LE2
		7.5	5219203	NEBM-H7G2-K-7.5-Q14N-LE2
		10	5219204	NEBM-H7G2-K-10-Q14N-LE2
	Suitable for use with energy chains			
		2.5	5219205	NEBM-H7G2-E-2.5-Q14N-LE2
		5	5219206	NEBM-H7G2-E-5-Q14N-LE2
		7.5	5219207	NEBM-H7G2-E-7.5-Q14N-LE2
		10	5219208	NEBM-H7G2-E-10-Q14N-LE2

Figure 4-1 : standard extension cables of EMMB motor

When using this cable, you just need some modification on wire-end and shield of cable so that it can securely contact at cable clamp of CMMT drive.
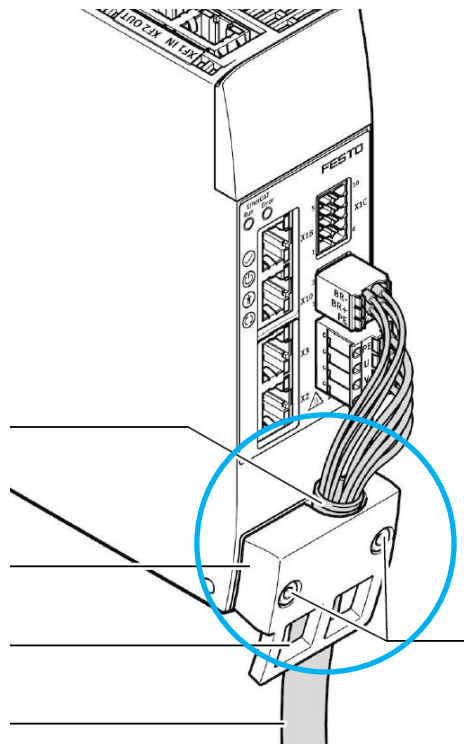
Figure 4-2 : cable clamp of CMMT drive

A shield part of power and brake cable need to have a complete contact with clamp of CMMT drive as shown in the Figure 4-2.

4.2 Encoder cable extensions

A wiring information below shows you how to produce a special extension cable for an encoder of your EMMB motor to CMMT drive.

As CMMT drive has a standard connection physically with standard RJ-45 shape, one end of your encoder extension cable need to be specially produced to fit into it.

Type : SC-06M (Maker : SUNCHU)
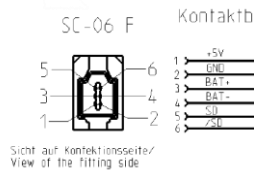
Type : RJ-45 (Maker : no specific)
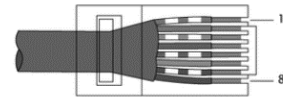
Pin No	Description	Connectivity	Pin No	Description
1	+5V		1	n.c.
2	GND		2	n.c.
			3	Sense+
3	BAT+		4	DATA
4	BAT-		5	/DATA
			6	Sense-
5	SD		7	VCC
6	/SD		8	GND

In case when external battery for encoder back up is connected, it need to be specially wired on Pin 3 and 4 respectively.

➔ **Note**

Any Cables which is not yet released as a standard need to be tested individually as quality of encoder signal is a big influencing factor to the quality or performance of running system.

Therefore, it is highly recommended to use the same or higher quality cable than standard extension parts and test it with appropriate method.

A wiring example above is in case of an encoder communication protocol Nikon-A and other types of encoder can have different allocation in its design of extension cable.

Therefore, please contact your Festo partner when you are planning to run unexperienced 3rd party motor with CMMT drive and if you are unsure about a technology of your motor.

5 Configuration of parameters in Automation Suite

5.1 Creation of new project

1. please create a new project to parameterize a drive component.
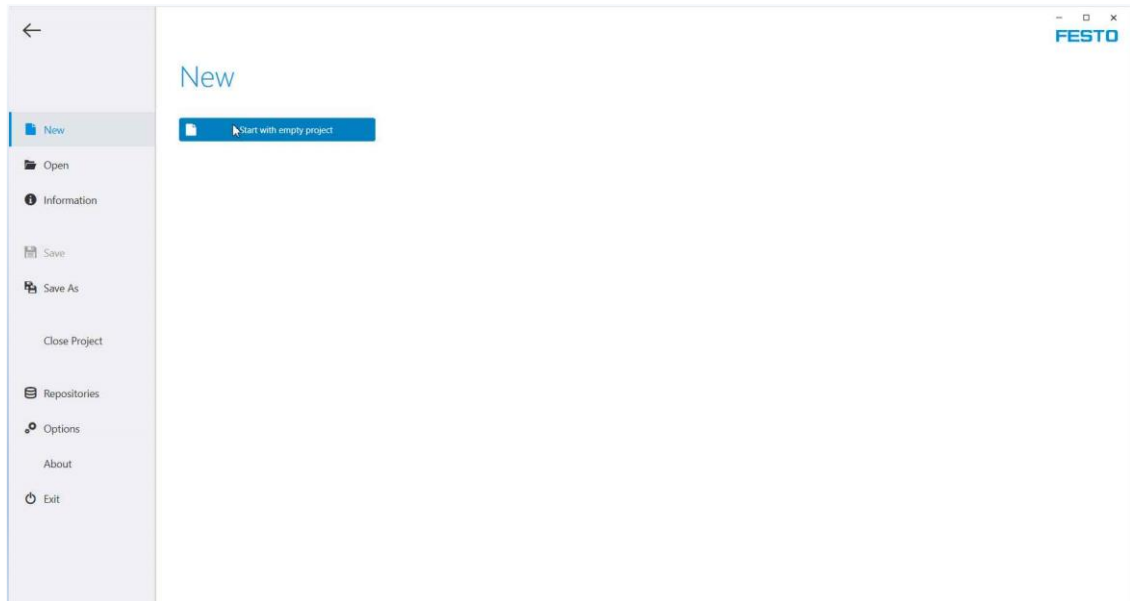
If you click **"Start with empty project"**, you can create a blank project template which allows you to add any of drive component or complete automation with CPX-E system

5.2 Creation of drive component

1. please create a new component just by clicking + sign and you will get another pop up to select desirable component to add
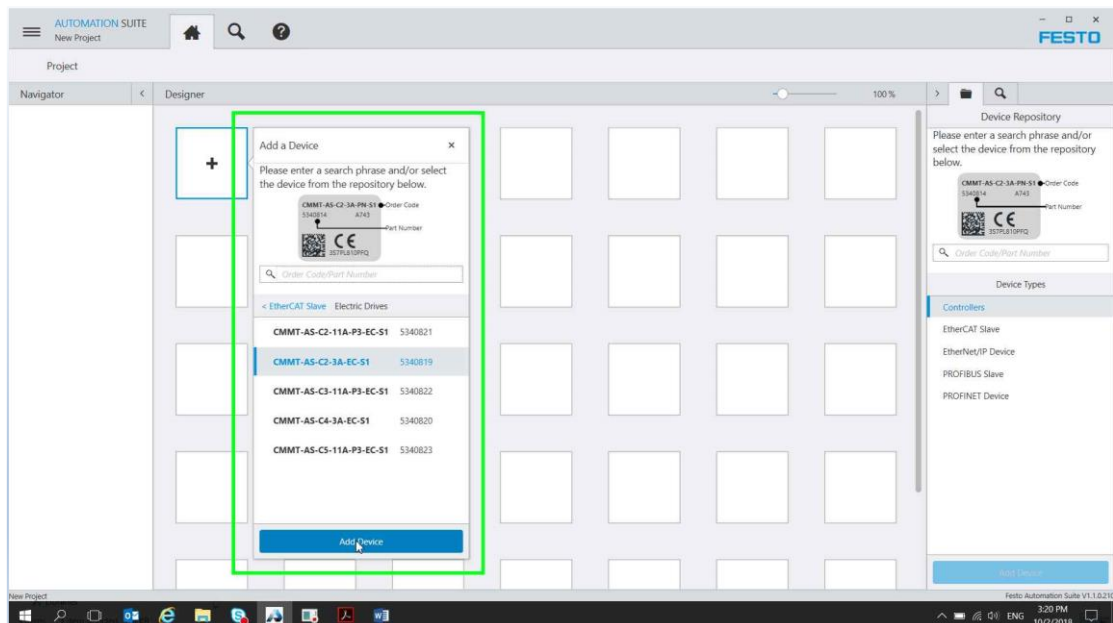
After selecting a component in the list, click "Add Device". You will have your component ready to open and able to rename your component by right click on your component icon.

Please see the next page how you change a component name and how to do the next step to start configuring parameter.

2. If you click right mouse button on icon as below, you can rename your component for easier iden-
tification during the commissioning.
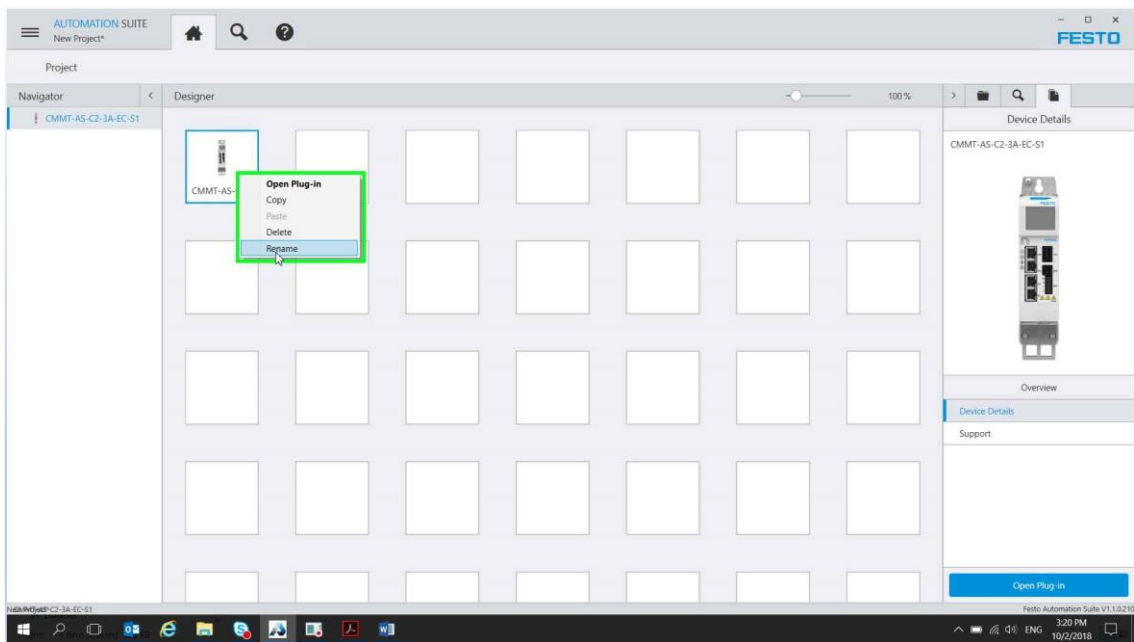
3. please double click icon to start initializing parameter set to be able to input application parame-
ters
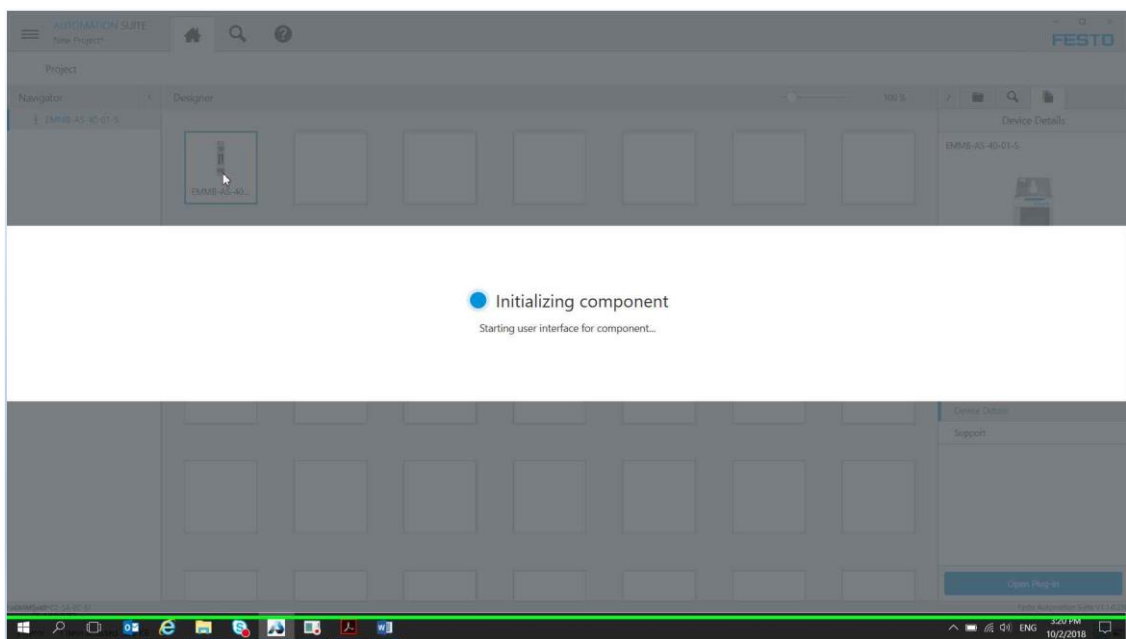
After some seconds, you will have complete new window that allow you to start your parameterization
with support of easy configuration Wizard
please see the next page how you able to start your configuration.

5.3   Input application parameters

1. Please click "Start First Setup" to be able to start Wizard for easier basic configuration of parameter
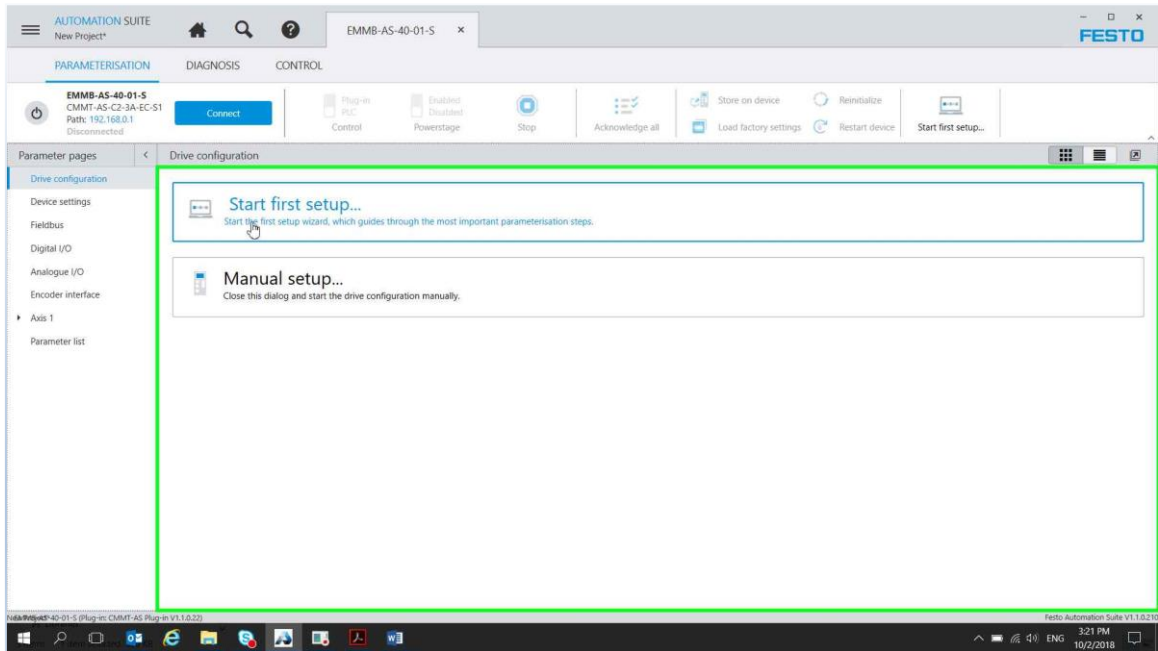
In some second, you will get some new window as below.
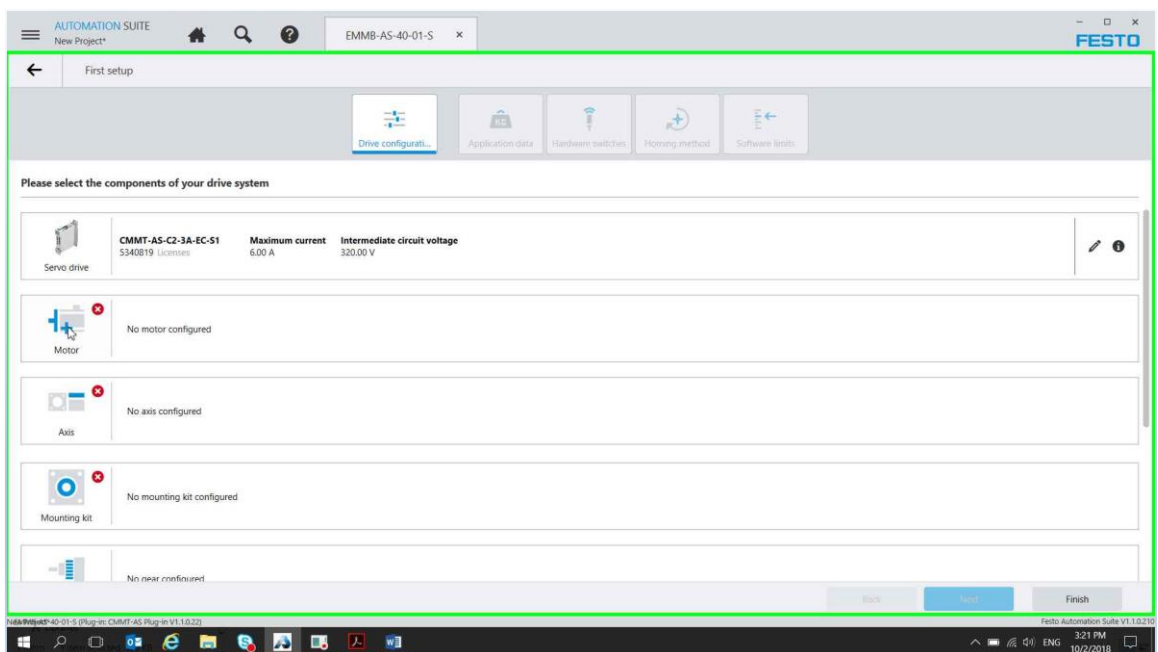
Firstly it will shows some icons and windows that helps you configurating hardware and its base properties.

In this step, you can configure which motor you have in your application and its physical properties on pop up window, which type of mechanical axis or system you have and which types of mounting interface you currently have.

In case if you have any gear box in your application, please add that component as well to be able to set correct parameter of mechanical transmissions.

2. In parameterizing of motor, you can enter all relevant physical properties of motor on pop up window as below.
   Please be careful with units on every individual parameters.
   If you click "Apply" once after you put all base parameter of motor, it will automatically calculate your base parameter of closed loop control and this will be reflected directly.
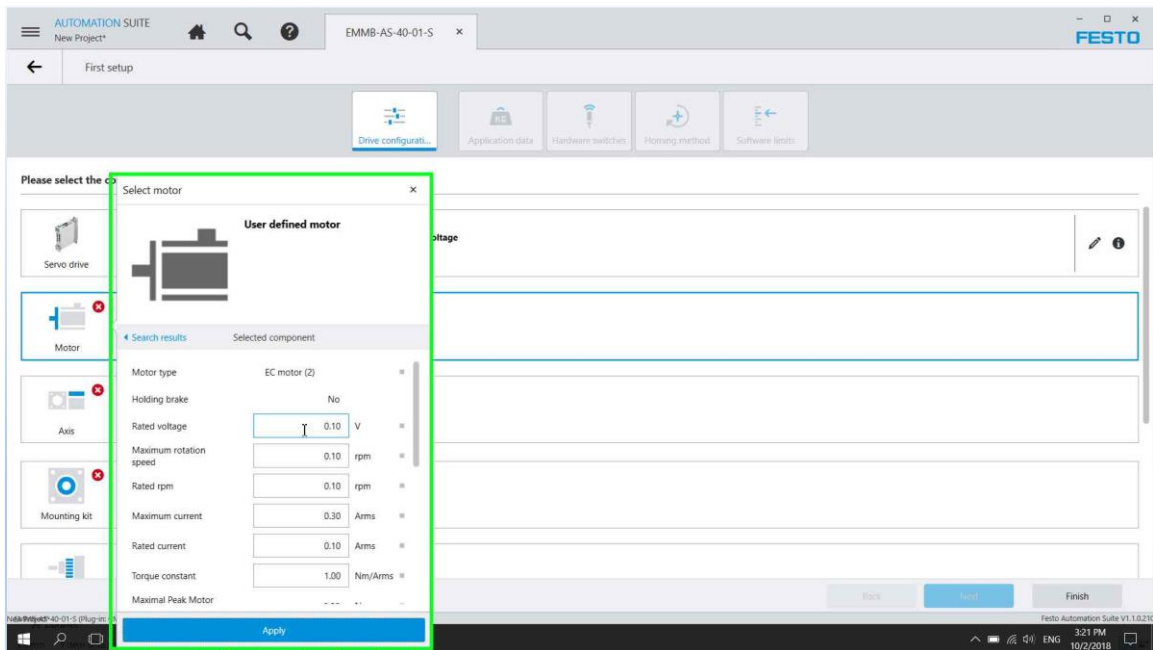
3. In parameterizing of axis, you can choose either from standard list of axes or user defined linear/rotary axis depending on your application.
   When you click "Apply", relevant parameters of mechanic will be automatically added as a base values for your commissioning.
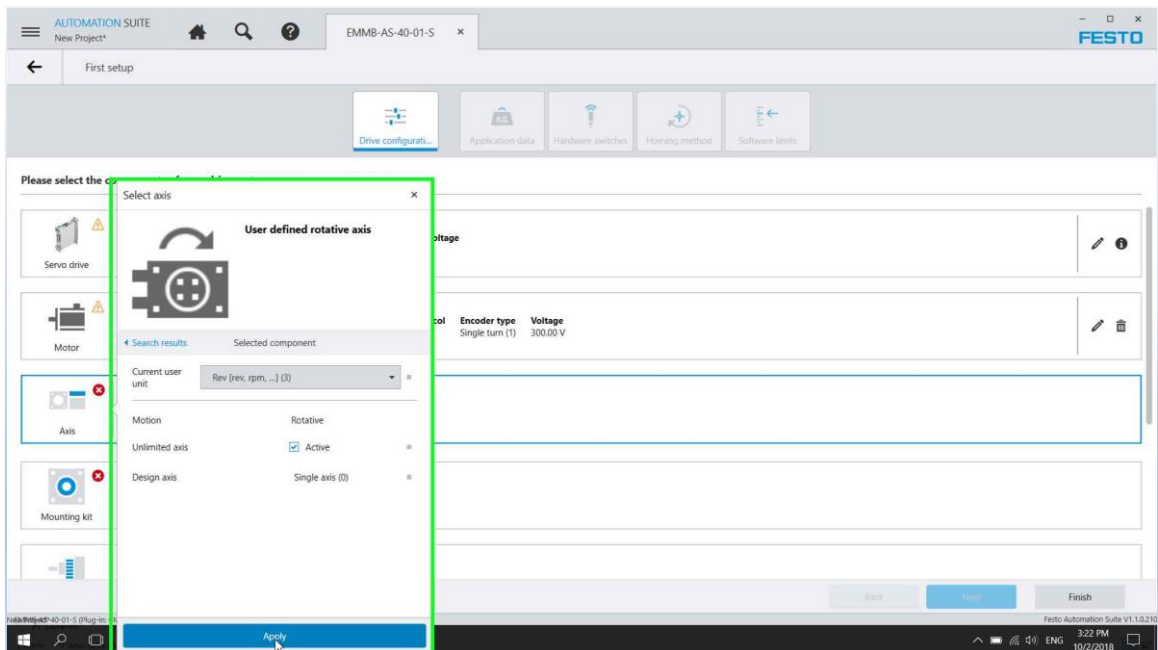
4. In parameterizing of mounting kit, you can choose either from standard list of mounting kit compatible with selected axis type or your own mounting kit customized by any reason.
When you click "**Apply**", relevant parameters of mounting kit will be automatically loaded as a base value for your commissioning.
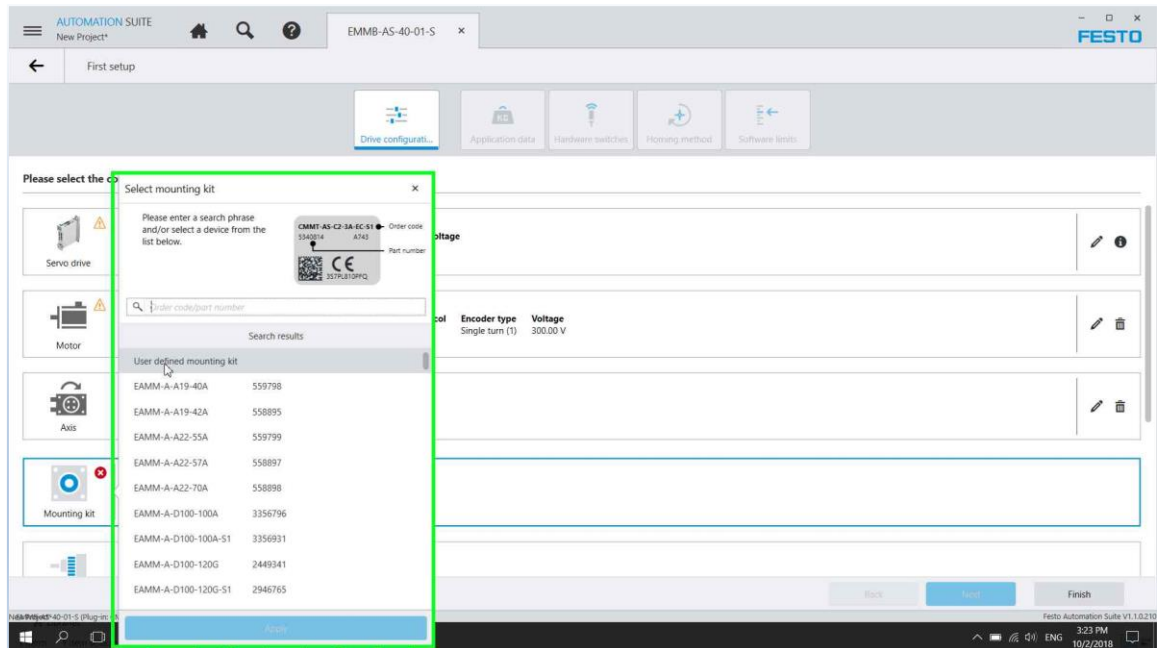
5. You can do 4 additional simplified steps for basic configuration of your application.
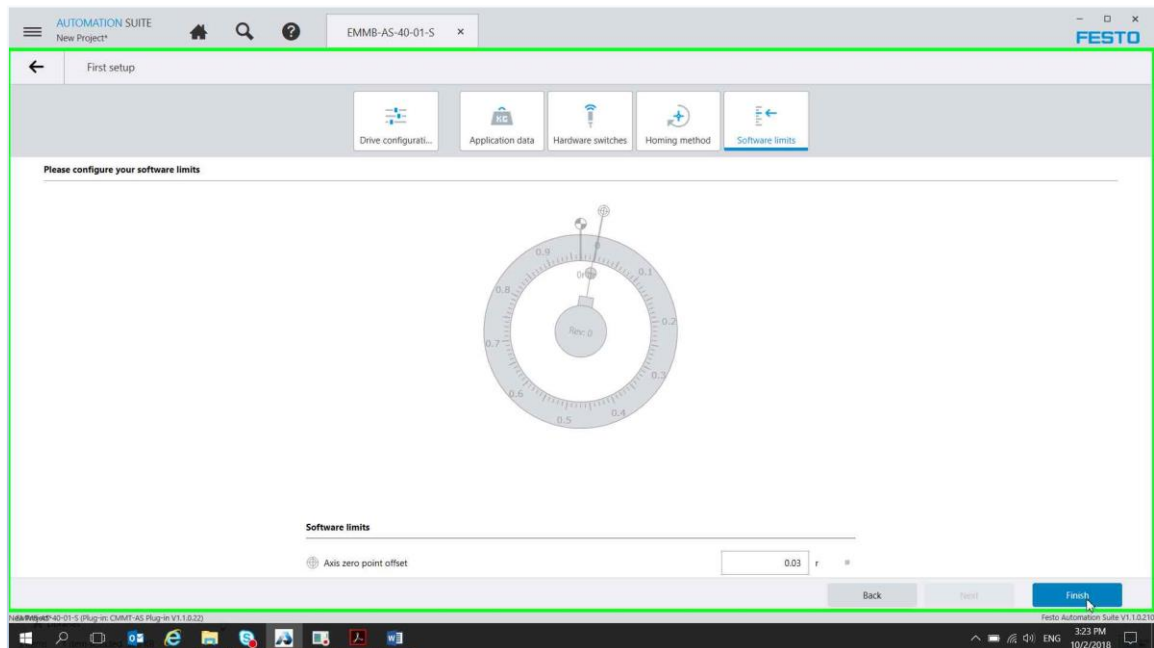
5-1) Application Data – application mass moment of inertia and rotation polarity of motor

Application Note – Configuration of CMMT-AS-...-EC to run 3rd party motor – 1.20
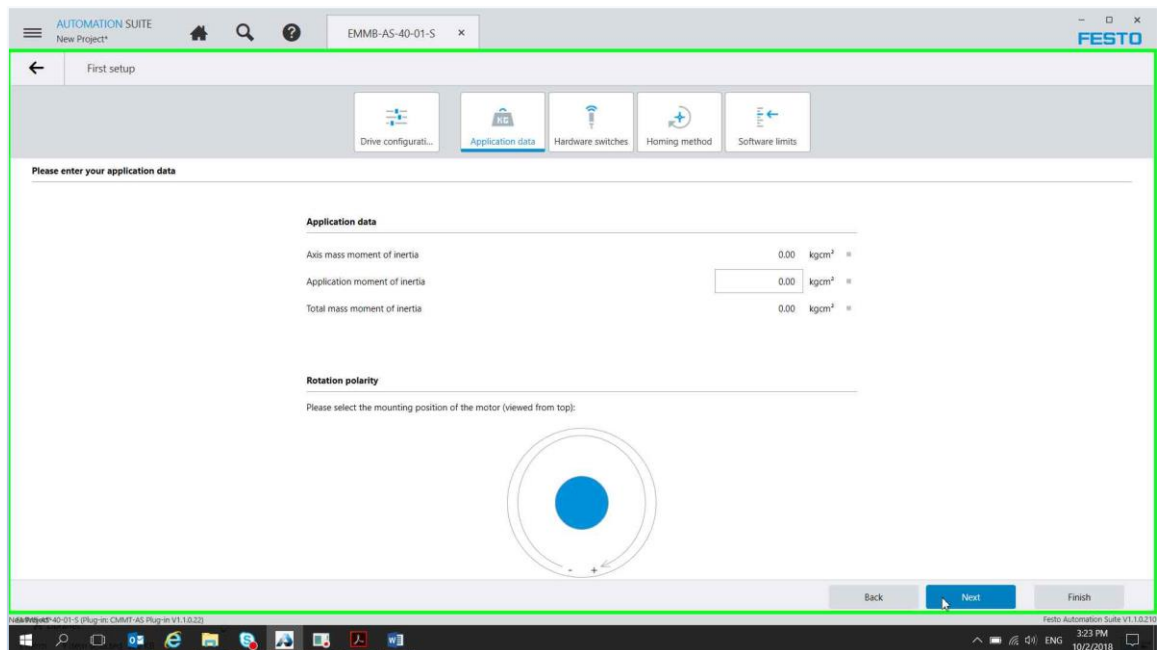
5-2) Hardware Switches – reference switch and hardware limit switches
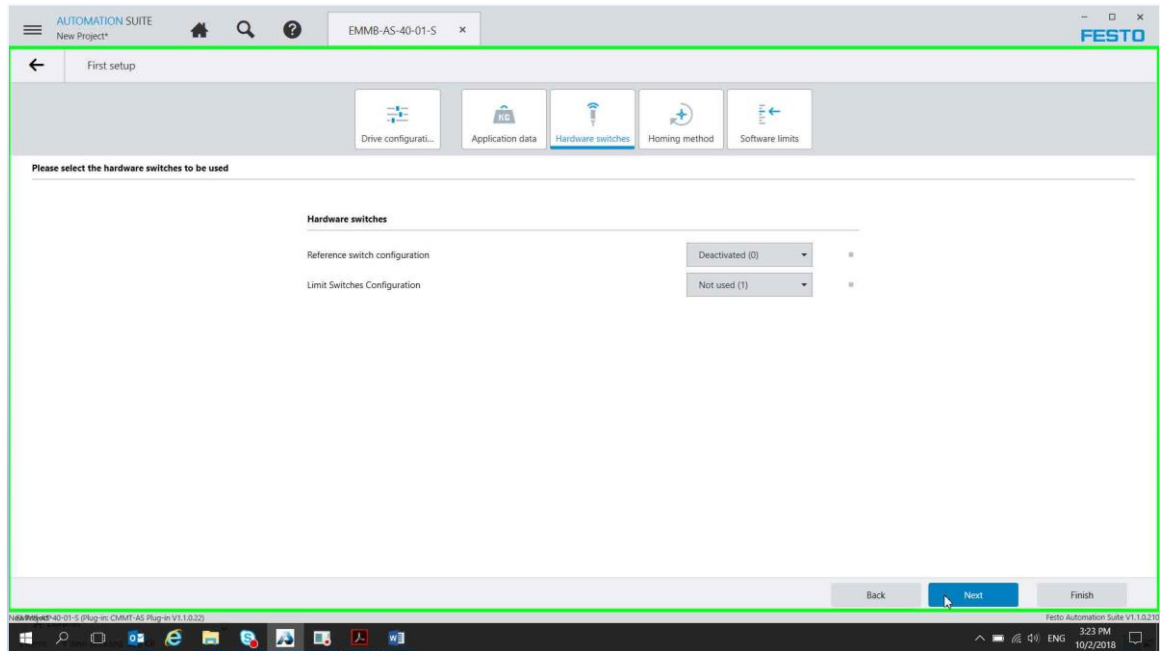
5-3) Homing method – how to carry out your reference run from defined methods
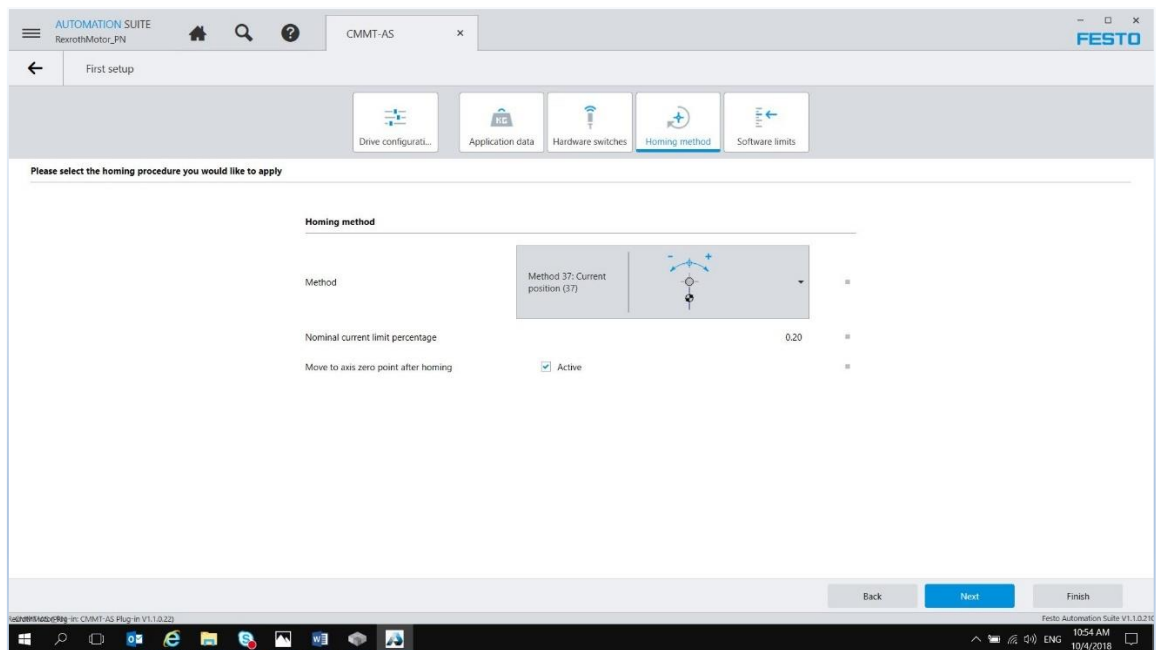
5-4) Software Limits – set software limit for safety

if you finish this step of configuration, you are basically ready to run your system with some additional check-up of your hardware status following on the next step.

5.4 Connection of cables and signal status check

Before connecting your encoder cable to CMMT drive, you need to proceed following steps first to secure your motor from any unexpected damage by electrical shock.

1. Please try to connect to the device with right IP setting on your laptop.
   When it is being connected, the information will shows you that all data of your project is applied and synchronized with your CMMT drive.
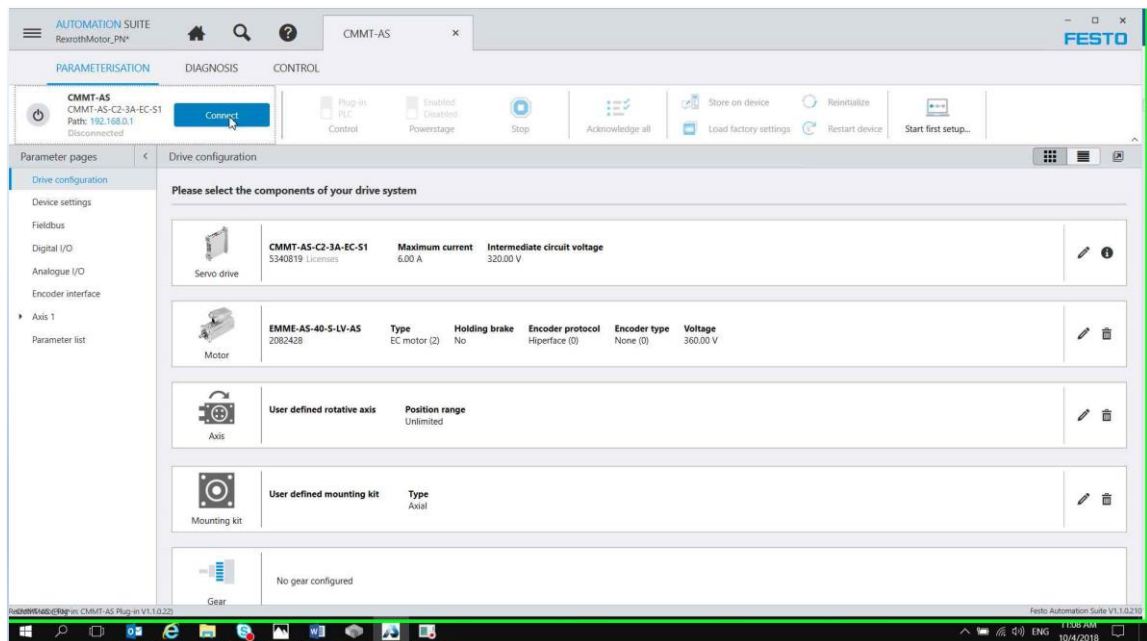
2. Once it is connected, please store parameter by clicking "Store on Device" not to lose any data after reset of your device.
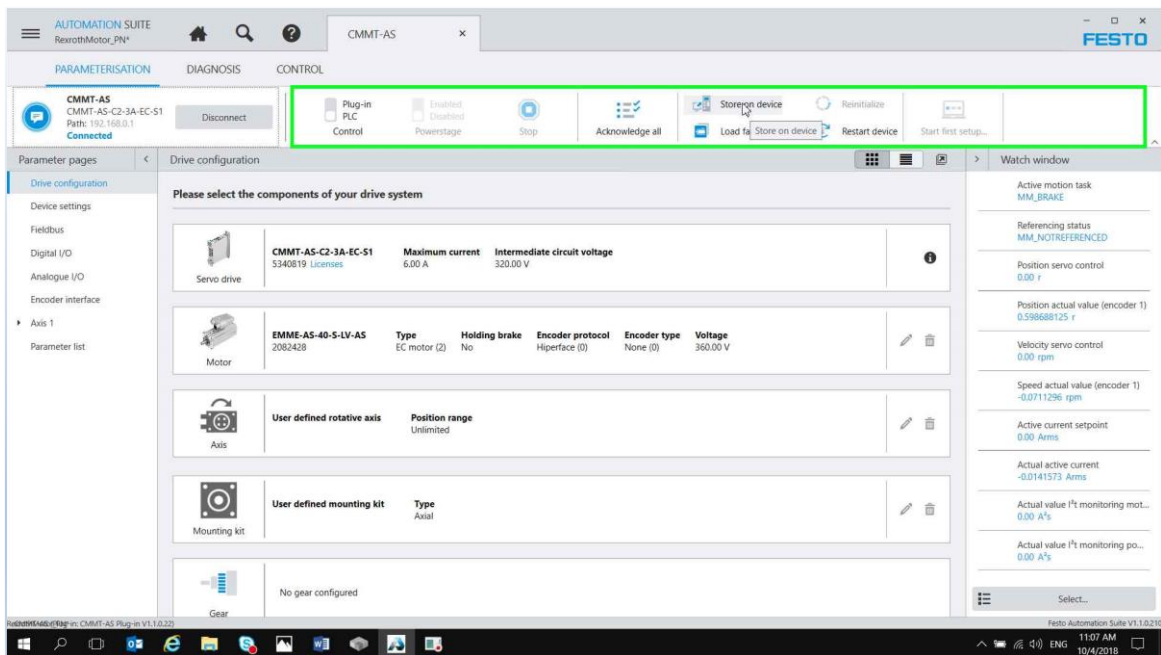
3. Once it is completely stored, you need to power off your CMMT drive and connect encoder cable to be able to get position feedback from your motor. Before you to enable motor and run it, you need to be sure that your encoder give you a right values by reading actual value on the screen or tracing it with graphs.
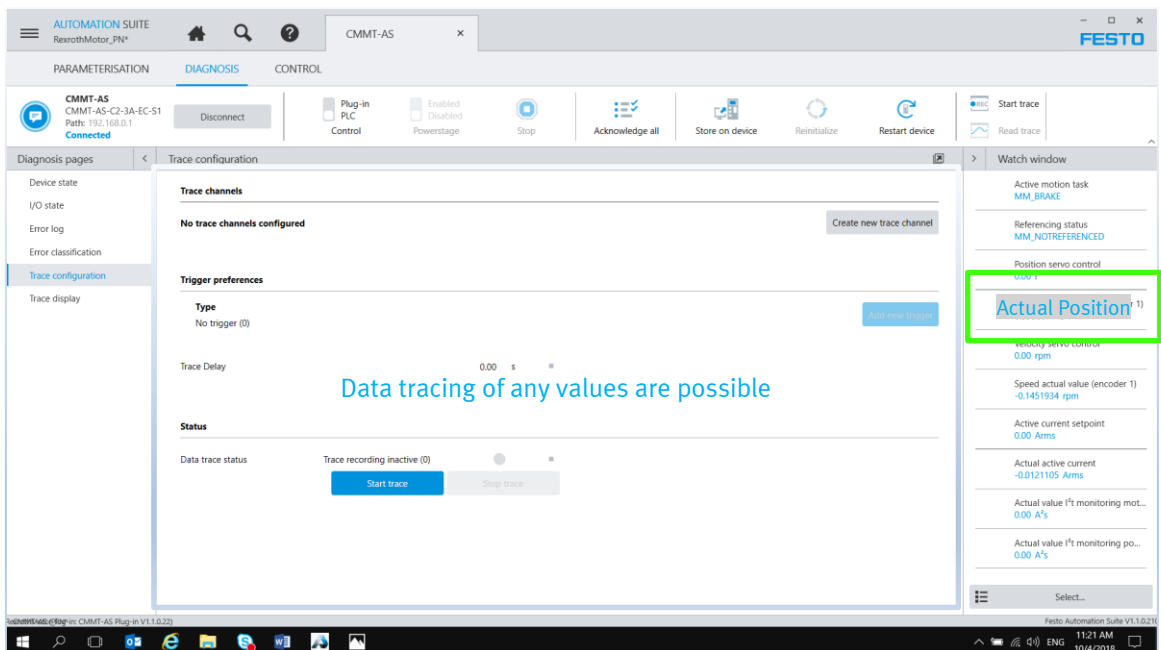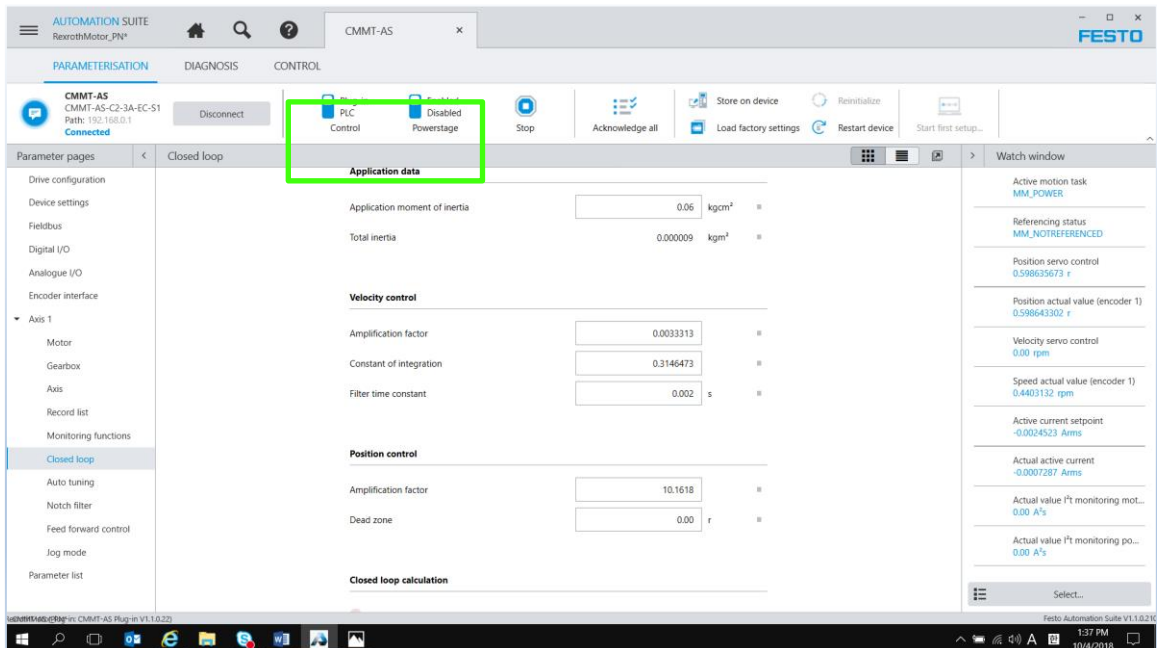

In the Diagnosis tap, you can use either tracing function or reading directly your position value on displays.

When everything works fine, you are now ready to enabling your motor and do the first run.

5.5 Make the first run

To run prepared system with Automation Suite, it is necessary to set control active and power stage active as well.


And after that you can do any of manual operation in Control tap as below.
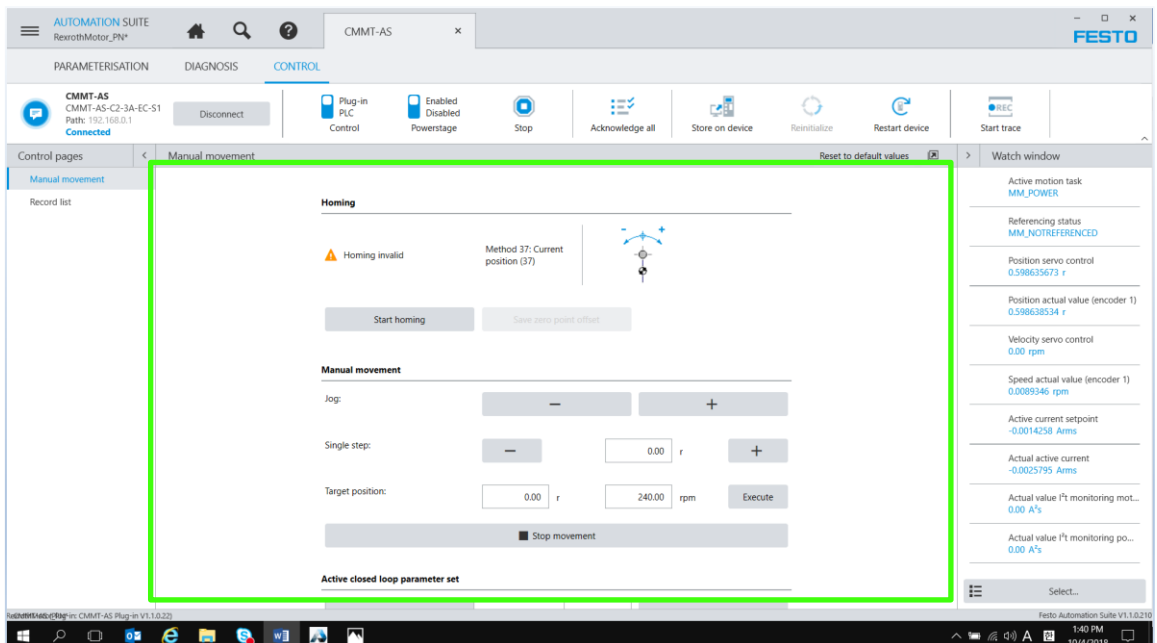
In this mode, you can do reference run of motor, storing zero point offset, jog movement, single step movement and target positioning movement with directly entry of target absolute position and maximum target speed of travel in motion. Also you can do test three different set of closed loop control parameter if you have multiple sets of parameter ready on your application set up.

5.6 Optimization of closed loop control parameters
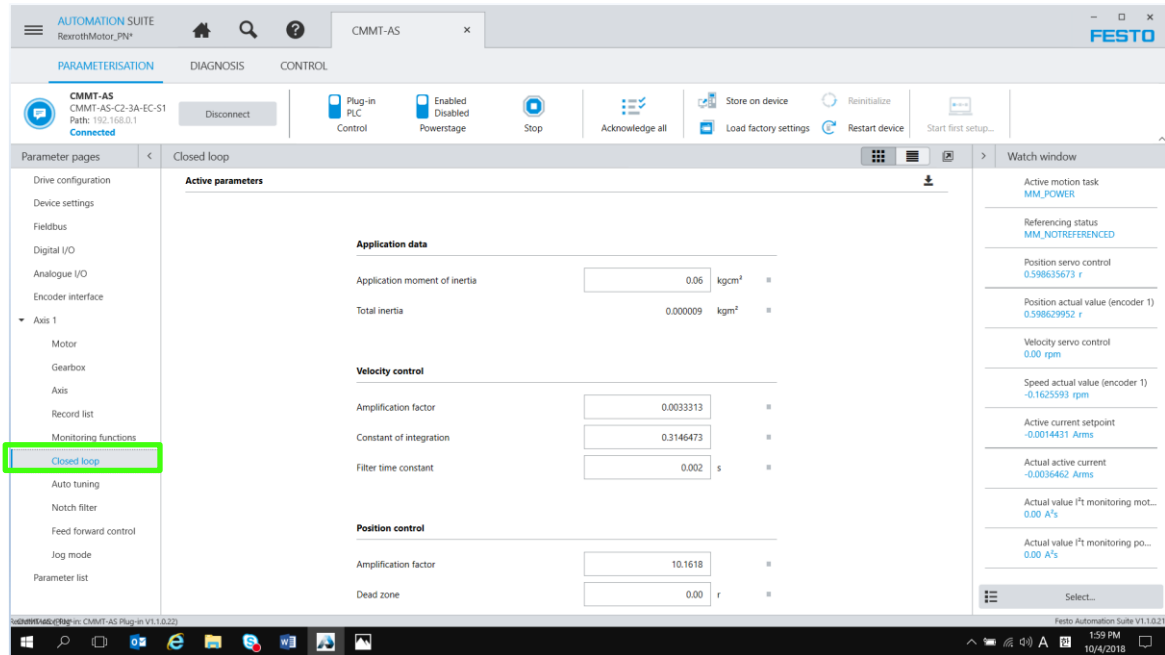
In the closed loop parameter, you can adjust and optimize your application.

In case you need to tune your current regulator, you can go expert mode parameter and adjust parameters directly. As incorrect close loop parameter can damage your motor, it is recommended to use base parameter calculated by plug-in automatically when start up your first operation.