

Festo_Positioning_Basic library – System example and Festo Automation Suite (FAS)

Commissioning of a selected system with the Festo_Positioning_Basic library is explained step by step, so that it's successfully integrated into the user program.

FPosB

TitleSystem example and FAS
Version 1.30
Document no. 100102
Originalen
AuthorFesto

Last saved 14.06.2021

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1 Components/Software used

Type/Name	Version Software/Firmware	Date of manufacture
Firmware CPX-E-CEC-M1-PN	3.1.4	--
TargetSupportPackage CPX	3.5.15.286	--
Firmware CMMT-ST	19.0.3.93	--
CMMT-ST (Softmotion)	4.0.19.1	--
Codesys	V3.5 SP15 patch 4	--
Festo Automation Suite	V2.1.1.1	--
FPosB.lib	3.5.10.43	--
Codesys Softmotion	4.8.0.0	--

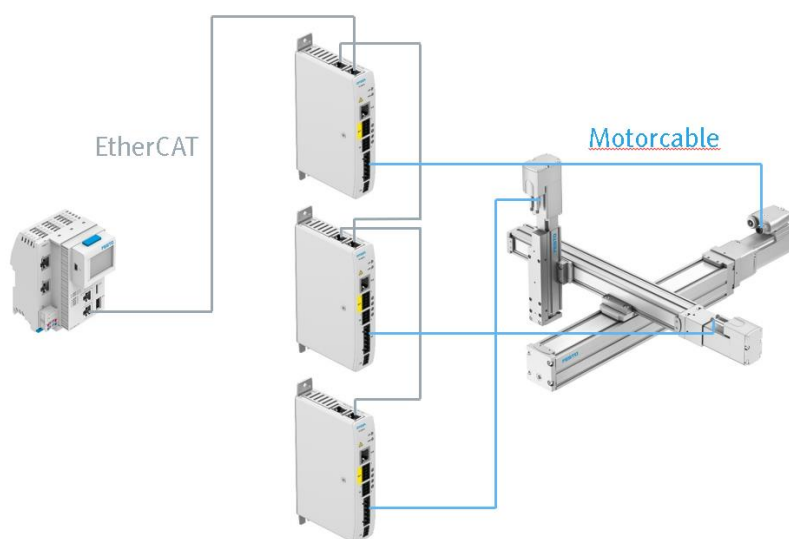
Table 1.1: 1 Components/Software used

1.1 Layout of the sample system

The application note is based on a system which consists of the following components:

System components	
Controller	CPX-E-CEC-M1-PN
Servo drives	CMMT-ST-C8-1C-EX-S0
Gantry	ELGCs + EGSC
Motors (2D gantry)	EMMS-STs

Table 2: Labelling



The controllers are connected to the control system via a EtherCAT. The parametrisation of the CMMT-STs is done with Festo Automation Suite. The parameters of the EtherCAT are configured directly in Codesys accordingly to the physical connection.

Details and further electrical and mechanical installation instructions are included in the documentation for the respective components.

2 Configuring the servo drives with Festo Automation Suite (FAS)

All three controllers have to be configured in FAS. Parameters configuration depends on the respective system. Only the most important settings are shown below. All other settings must be matched to the respective application by the user.

FAS with the respectively current plugin for the CMMT-ST is required for the sample project. Both files can be loaded from the support portal.

Support Portal

Please select a category on the left or use the search.

Search

servo drive CMMT-ST-C8-1C-EC-S0
8084005





DNC-125-100-PPV-A

183501 R408
pmax. 12 bar

Part number Series
Order code

→ Contact

→ Product conformity

→ Terms and conditions of use for electronic documentation



servo drive CMMT-ST-C8-1C-EC-S0
8084005

→ Display in the catalogue

→ CAD / EPLAN

→ Spare parts catalogue

→ Technical data

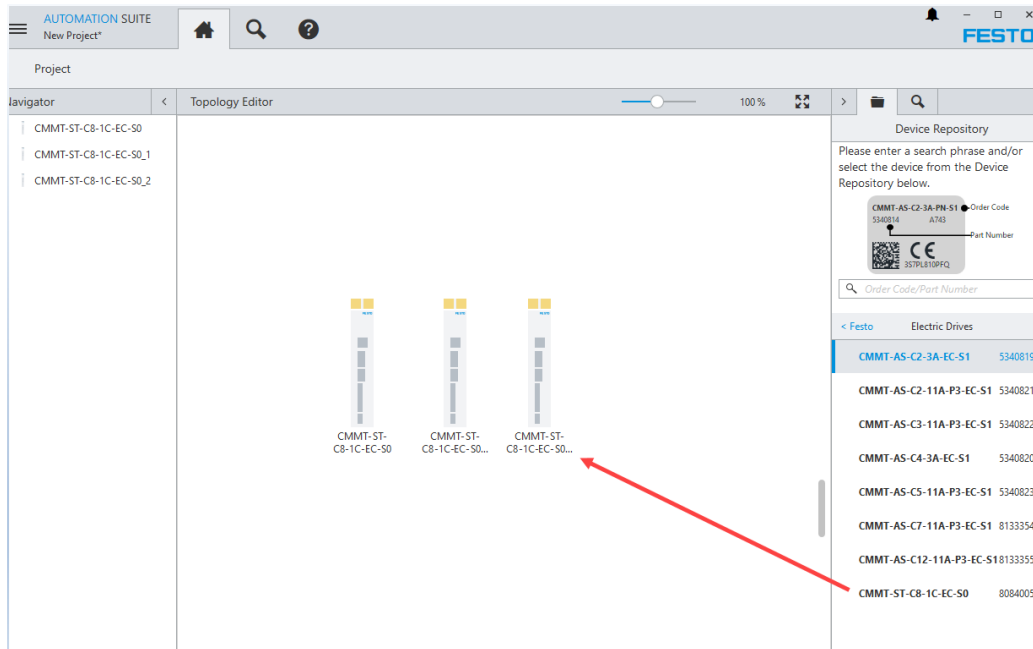
→ Create download package

Top 3 Product information [2] Technical documentation [5] Certificates [3] **Software [15]** Expert knowledge [10] Training [0]

Description	Version	
Commissioning [2]		
Festo Automation Suite - Plug-in Plug-in for the configuration and parametrisation of the servo drive CMMT-ST ⊕ Supported systems: - servo drive CMMT-ST-C8-1C-EC-S0 (8084005) - servo drive CMMT-ST-C8-1C-EC-S0 (8084005)	2.1.1.11 26/01/2021	→ Commissioning → File and language versions
Festo Automation Suite Parameterisation, programming and maintenance of electronic devices by Festo ⊕ System Requirements: - Windows 7 - Windows 10 Version 1607 or higher	2.1.1.1 03/02/2021	→ Commissioning → File and language versions

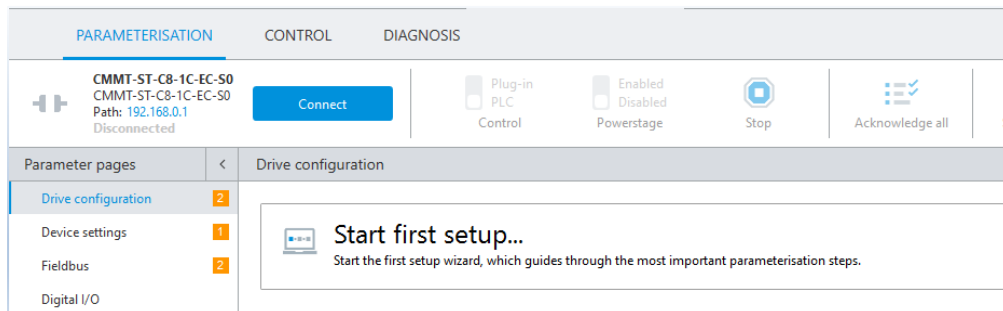
2.1 Configuring servo drives

1. Start the Festo Automation Suite and add 3 CMMT-STs into the topology editor simply by drag-and-drop. They are parametrized accordingly to the used components.

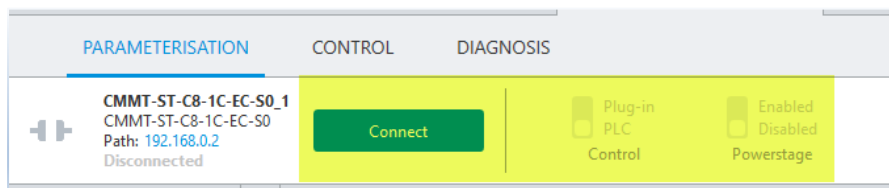


For T- and H-gantries you have to parametrize a servo drives with an unlimited user-defined axis, because these kinematics are not included in the FAS.

2. Double click on one CMMT-ST. Start the “Start first setup...” wizard. Follow the steps and finish the wizard.

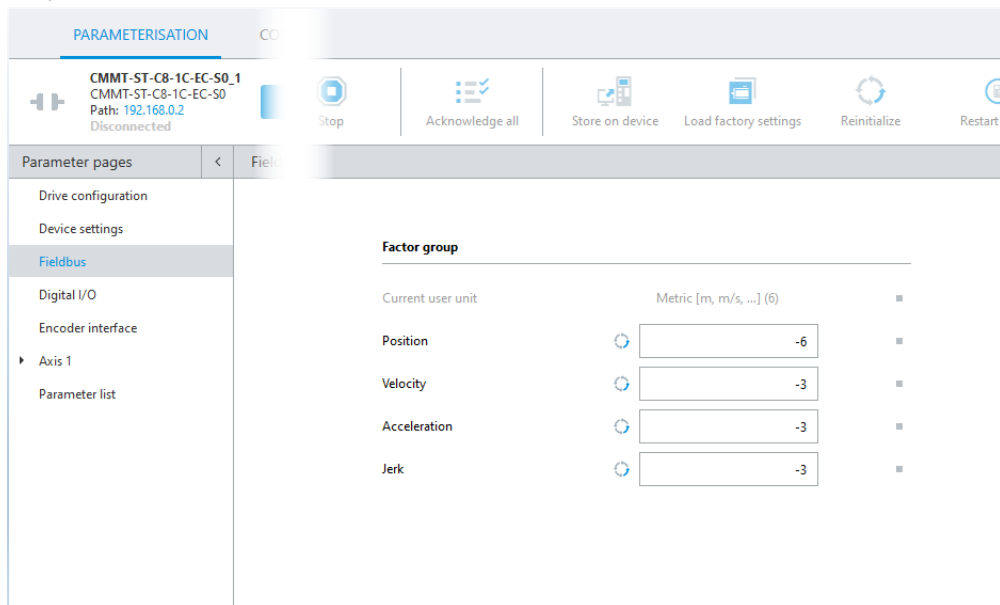


After loading the configuration on the CMMT, it should be now already be possible to control the axis with FAS.



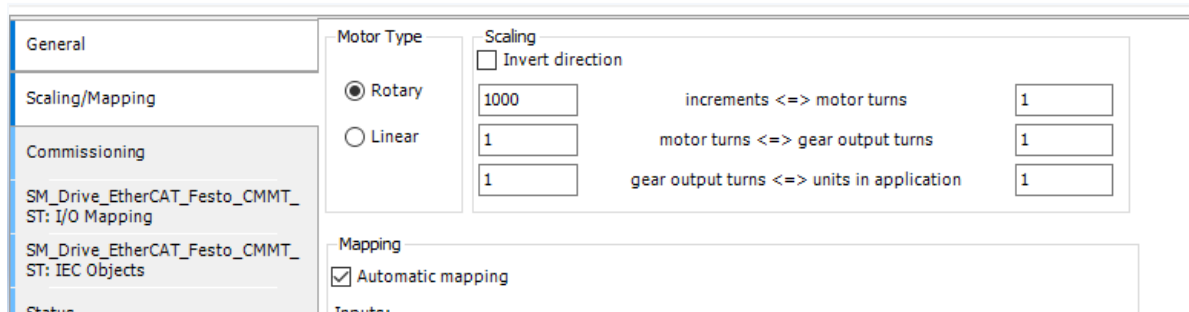
In the following only the most important steps to be able to control it with the FPosB.

- Factor group setting in FAS and scaling/mapping in Codesys.
Keep the values with the default setting.



Softmotion is using only position values. In this case CMMT will send position values in μm over the bus to our PLC.

The scaling/mapping in Codesys of our CMMTs is already pre-configured to convert μm into mm. The system in Codesys will work with Softmotion unit, which are mm. No needs to change anything here.



4. Dynamic limits drives

By default the settings for the softmotion drives are set to quite low values

Please check these limits and adapt them according to your application.

They should be always a little bit higher, than the dynamics used in application to avoid running into limits because of small overshoots.

For T- and H-gantries the velocity of the drives must be multiplied with $\sqrt{2}$ because of the transformation. For diagonal travel, only one motor is active. In order to achieve the corresponding path speed, this motor must rotate faster by the corresponding factor.

5. Initial homing settings

Independently of the used homing method (can be changed and adapted in FPosB), the following settings should be used. If you have a T- or H-gantry, these settings are mandatory.

Method: negative or positive stop.

Deactivate “Move to axis zero point after homing”, if you have a T- or H-gantry.

With a method like „negative stop” the parameter “Nominal current limit value scaling factor” becomes active and can be used by the FPosB for different homing methods.

	Velocity [m/s]	Accel. [m/s²]	Jerk [m/s³]
Crawl	0,005	1,00	100,00
Search	0,01	1,00	100,00
Running	0,05	1,00	100,00

Nominal current limit value scaling factor	0,1502584
Limit position detection time monitoring window	0,20 s
Homing timeout	60,00 s

If you keep the homing method as “Current position” by default, this values stays inactive. Later on you won’t be able to change homing methods with FPosB.

6. FAS parameter and FPosB settings for homing of single axes

Like in the previous step described, homing on negative or positive stop or any other method, which activates the option “nominal current limit value scaling factor”, should be selected and loaded on the servo drive.

Homing methods can be changed with the library.

In the case of the homing method for single axes, several peculiarities must be observed when entering the settings in FAS and FPosB. Above all this involves the position after successful homing.

FAS:

Homing method

Method: Negative stop (-17)

Move to axis zero point after homing: ☒ Active 1

Axis configuration

Reversing the direction of rotation: ☐ Active

Axis zero point offset: 3,00 mm 2

Software limit positions active: ☐ Active

Negative software limit position: -3,00 mm 3

Positive software limit position: 297,00 mm

FPosB:

```

(*****HOMING_CONFIG*****)
g_stHoming : FPosB.HOMING_CONFIG := (
  xSetHomingCornerAsOrigin := FALSE,           // Set the Coordinat Ori
  eHomingCorner            := FPosB.eCorner1, // Homing Corner for H/T
  stParkDynamic           := (lrVel:= 30, lrAcc:= 1000, lrDec:= -1000)
  areHomingPosSingleAxis := {FPosB.eHWLlimitsMin, FPosB.eHWLlimitsMax}
  arlrUserHomingPos       := [0,0,0,0,0,0], // Homing Pos define from
  arxExcludeAxis          := [0,1,1,0,0,0], // Exclude Axis for the Ho
  ariHomingOrder          := [1,2,3,1,1,1], // Set the Homing order fo
  areHomingMethodeSingleAxis := [0,0,0,0,0,0], // Homingmethode for the
  arxSaveHomingOffsetToEncoder:= [0,0,0,0,0,0], // Only Triger it in the
  xMoveToParkPos          := FALSE,           // Move to ParkPos after Hom
  xPortalAlreadyHomed     := true,            // Preset the System Homed-l
  stParkPos               := ( lrX:= 3, lrY:= 0, lrZ:= 0,           // i
                               lrA:= 0, lrB:= 0, lrC:= 0,
                               lrU:= 0, lrV:= 0, lrW:= 0),

```

```

(*****KINEMATIK_CONFIG*****)
g_stKinematic      := FPosB.KINEMATIK_CONFIG := (
    eKinematicType      := FPosB.eXY_Gantry,      // Kinematic Type
    stAddAxesConfig      := ( xAbcAxesAsOrientationAxes := FALSE,
                               unToolLength          := (ar0_2 := [0,
                               eOriConv                := SMC_ORI_CONVE
    eH_GantryBeltLock     := FPosB.eH_MOTOR_SIDE,   // Beltlock of the H-Por
    //Software Limits
    stKinematicSWLimit    := (stMin:= (lrX:= -2, lrY:= -3,   lrZ:= -1,   lrA:= -1080,
                               lrU:= -1080,
                               stMax:= (lrX:= 296, lrY:= 193, lrZ:= 47,   lrA:= 1080,
                               lrU:= 1080,
    // Hardware Limits
    stKinematicHWLimit    := (stMin:= (lrX:= -3, lrY:= -5,   lrZ:= -2,   lrA:= -1085,
                               lrU:= -1085,
                               stMax:= (lrX:= 297, lrY:= 195, lrZ:= 48,   lrA:= 1085,
                               lrU:= 1085,

```

It's recommended to deactivate "Software limit positions active" in FAS (3) and to keep control of the limitations only with the FPosB.

This is also to avoid any issues with other settings like the "Axis zero point offset" in FAS (2). This value is overwritten by the minimum HWLimit of the corresponding axis in FPosB. Software limits in FAS might be invalid after changing limits in FPosB and cause problems.

The effects of the individual settings is shown in the following table:

FAS single axis	Codesys FPOSB.lib Config			
Go to axis zero point	HW limit, min.	Park pos.	Move to park pos.	Position MCS
FALSE	-3	3	FALSE	-3
FALSE	-3	3	TRUE	3
TRUE	-3	3	FALSE	0
TRUE	-3	3	TRUE	3

7. Closed-loop parameters for H- and T-gantries.

For all selectable Festo components, which are controlled as single axes, closed loop parameters are calculated automatically based on the application data.

H- and T-gantries are not available as a plug-in in FAS.

Here you have to configure a user defined unlimited axis with the right feed constant for each servo drive.

Example: EXCM-30

Please select the components of your drive system

	CMMT-ST-C8-1C-EC-S0 8084005 Licenses	Maximum current 10,00 A	Intermediate circuit voltage 48,00 V	Supply voltage 24,00 V
	EMMS-ST-42-S-SE-G2 1370471	Type Stepper motor (1)	Holding brake No	Encoder protocol Incremental (4)
				Encoder type Relative (3)
		Voltage 48,00 V		
	User defined linear axis	Feed constant 38,00 mm/r	Working stroke Unlimited	
	User defined mounting kit	Type Axial		

But the calculated closed loop parameters are not really suitable in this case.

They need to be optimized manually. Please contact your local Festo support in this case.