

Festo_Positioning_Basic library – System example and Festo Configuration Tool (FCT)

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

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1 Components/Software used

Type/Name	Version Software/Firmware	Date of manufacture
Firmware CPX-CEC-M1-V3	2.0.x	--
TargetSupportPackage	3.5.7.x	--
Firmware CMMS-ST	1.4.0.1.10	--
Codesys	V3.5 SP7 patch 2	--
FPOSB.lib	3.5.7.26	--

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-CEC-M1-V3
Controller	CMMS-ST-C8-7-G2
2D gantry	EXCM-30-300-260-KF-SB-B3-E4
Motors (2D gantry)	EMMS-ST-42-SS-SEB-G2
Z-axis	EGSK-20-25-6P
Motor (Z-axis)	EMMS-ST-42-S-SEB-G2

Table 2: Labelling

- 1 CPX-CEC-M1-V3
- 2 EGSK + EMMS-ST
- 3 EXCM + EMMS-ST
- 4 CMMS-ST

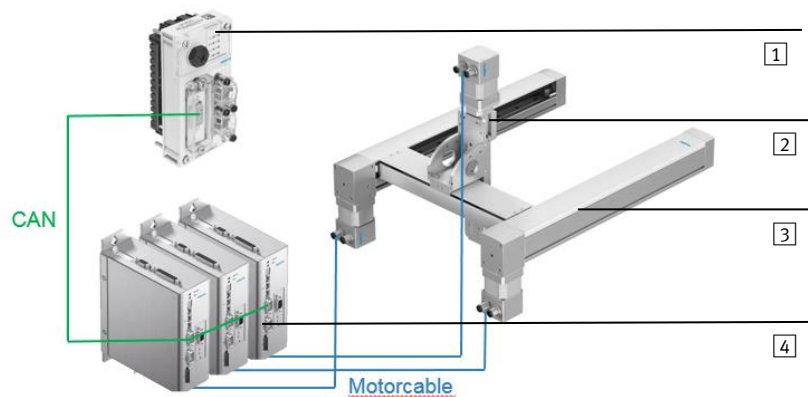


Figure 1.1: Insert image name

The controllers are connected to the control system via a CAN cable. The CAN address and the CAN bit rate must be specified for the system by the user. The control system's parameters are configured directly in Codesys, whereas the DIP switches are used to configure the CMMS-ST.

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

2 Configuring the controllers with FCT

All three controllers have to be configured in FCT. 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.

FCT with the respectively current plugin for the CMMS-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

Find

Help

DNC-125-100-PPV-A

163501 R408
pmax. 12 bar

Part number Series
Order code

→ Contact

→ Product conformity

→ Terms and conditions of use for electronic documentation

→ Support Community *new!*

Motor controller CMMS-ST-C8-7-G2
572211

System Navigator

→ Display in the catalogue

→ CAD / EPLAN

→ Spare parts catalogue

→ Technical data

→ Create download package

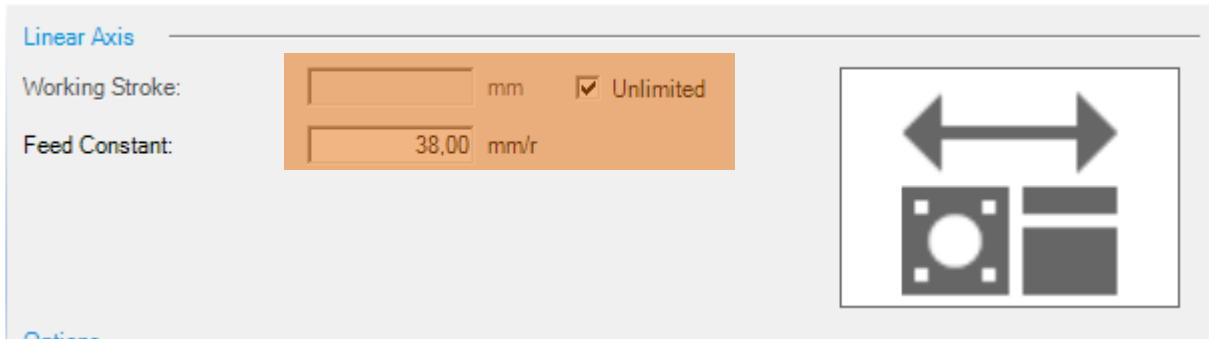
Top 3 Product information [23] Technical documentation [10] Certificates [4] **Software [17]** Expert knowledge [16] Training [1]

Description	Version	Filter result
FCT - Festo Configuration Tool CMMP-AS, CMMS-AS and CMMS-ST with Chinese language support Configuration and commissioning software for the following motor controllers: ● CMMP-AS Plugin (V1.2.2.1) for CMMP-AS (FW	30/11/2011	→ Commissioning → File and language versions ★★★★★ (26)

2.1 Configuring the controllers for the 2D gantry

Both of the controllers for the 2D gantry are configured at the same time.

1. Since the 2D gantry is not available as an axis, a user-defined axis is selected with the corresponding feed constant and unrestricted.



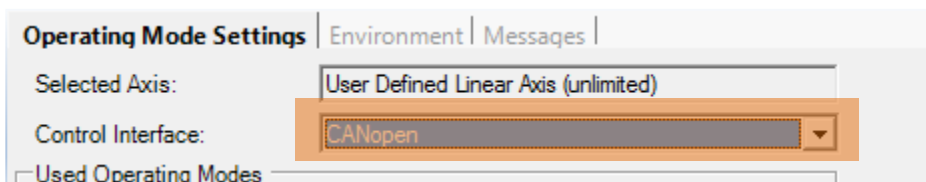
Linear Axis

Working Stroke: mm ☒ Unlimited

Feed Constant: mm/r

Options

2. The interface is CANopen.



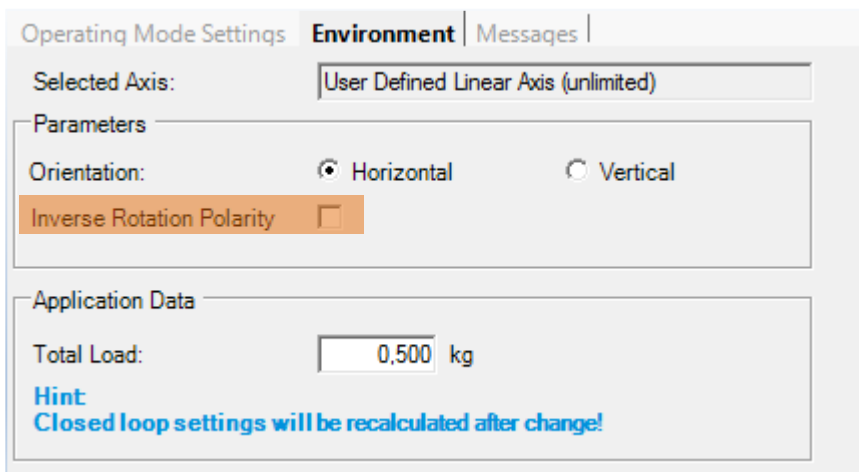
Operating Mode Settings | Environment | Messages |

Selected Axis:

Control Interface:

☐ Used Operating Modes

3. Inverse rotation polarity in FCT may not be used.



Operating Mode Settings | **Environment** | Messages |

Selected Axis:

Parameters

Orientation: ☒ Horizontal ☐ Vertical

Inverse Rotation Polarity ☐

Application Data

Total Load: kg

Hint:
Closed loop settings will be recalculated after change!

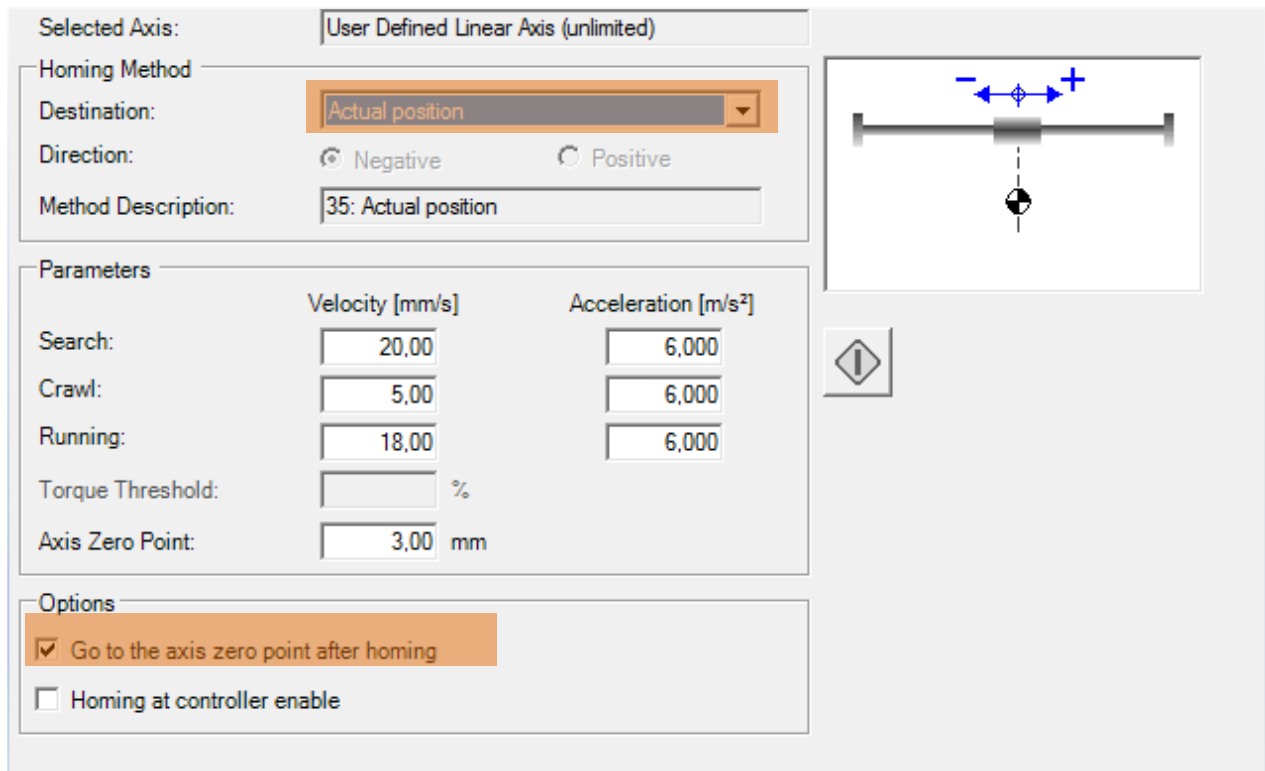
4. Homing of the 2D gantry is controlled by a corresponding module from the library. Parameters like velocity, acceleration etc. are set here.

Important:

The “Go to axis zero point after homing” option must be activated.

This applies to all CMMS and CMMP controllers when using 2D gantries and linear gantries.

The value of the axis zero point in FCT has no influence because it’s overwritten internally by the library.



Selected Axis: User Defined Linear Axis (unlimited)

Homing Method

Destination: Actual position

Direction: ☒ Negative ☐ Positive

Method Description: 35: Actual position

Parameters

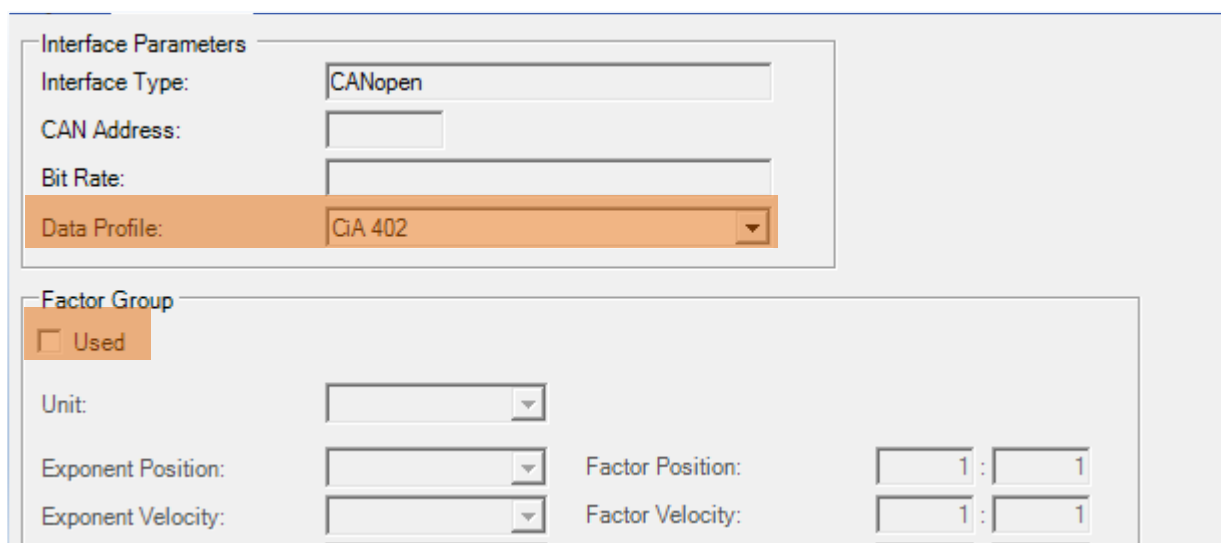
	Velocity [mm/s]	Acceleration [m/s ²]
Search:	20,00	6,000
Crawl:	5,00	6,000
Running:	18,00	6,000
Torque Threshold:		%
Axis Zero Point:	3,00 mm	

Options

☒ Go to the axis zero point after homing

☐ Homing at controller enable

5. The data profile of the CAN interface must be set to CiA 402. The factor group is not used.



Interface Parameters

Interface Type: CANopen

CAN Address:

Bit Rate:

Data Profile: CiA 402

Factor Group

☒ Used

Unit:

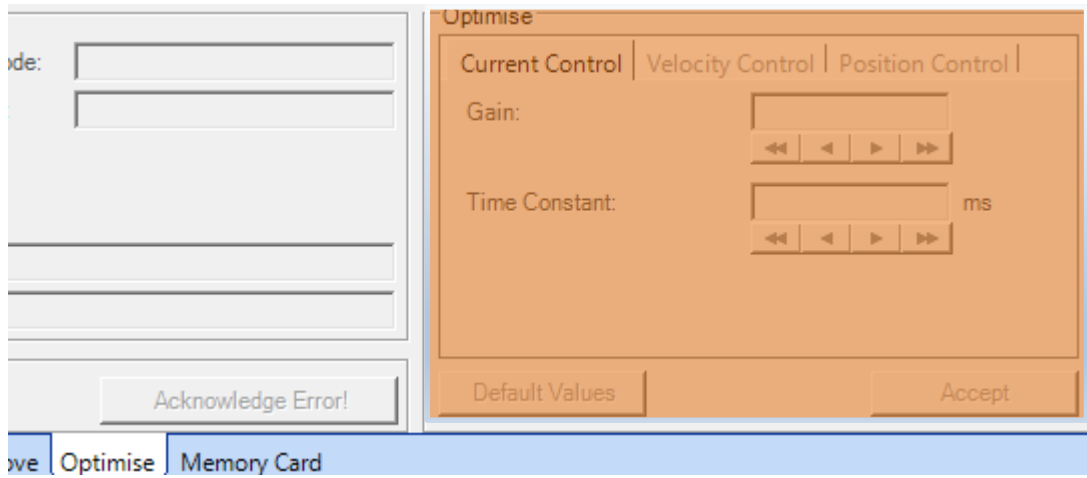
Exponent Position:

Exponent Velocity:

Factor Position: 1 : 1

Factor Velocity: 1 : 1

6. Due to the fact that user-defined axes are involved, no serviceable controller parameters are included in FCT. These controller parameters have to be manually adjusted. The easiest way to do this is by means of online optimisation, because the effects of the change are immediately apparent.



1. Download the parameters to the controllers and save them.



2.2 Parameters configuration for the Z-axis / single axis

The basic settings have already been explained in the previous section, and thus only the differences are explained here. These settings and peculiarities apply in general to single axes within a system.

1. Since we're dealing with a single axis with known Festo components, the components are selected accordingly.

Drive Configuration

Change...Delete

Controller

Controller Type:	CMMS-ST-C8-7-G2
Option Slot:	Empty
Load Voltage:	24V



Motor

Motor Type:	EMMS-ST-42-S-SEB-G2
Gear:	None
Brake:	Yes



Axis

Axis Type:	EGSK-20-25-6P
Gearbox:	None
Parallel Mount:	No



2. Homing parameters are configured as desired – in this example homing to block and without travel to the axis zero point.

Selected Axis:

Homing Method

Destination:

Direction: ☒ Negative ☐ Positive

Method Description:

Parameters

	Velocity [mm/s]	Acceleration [m/s²]
Search:	4,00	0,200
Crawl:	4,00	0,200
Running:	4,00	0,200
Torque Threshold:	100 %	
Axis Zero Point:	0,00 mm	

Options

☐ Go to the axis zero point after homing

☐ Homing at controller enable

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

FCT single axis		Codesys FPOSB.lib Config			
Axis zero point	Go to axis zero point	HW limit, min.	Park pos.	Move to park pos.	Position MCS
0	False	-3	3	False	-3
0	False	-3	3	True	3
0	True	-3	3	False	0
0	True	-3	3	True	3

Table 2.1: Labelling

The setting for the axis zero point is 0 mm in FCT for all variants. The difference is activation of travel to the axis zero point.

The hardware limit and the park position are the same in Codesys and the difference is activation of travel to the park position.

As soon as travel to the park position is activated, the axis is in the same position in both cases after homing (in this case 3 mm).

If it's deactivated, the position depends on whether or not travel to the axis zero point has been activated in FCT. The axis either stops at the hardware limit or advances to the specified axis zero point.

The effects of the individual settings are shown in the above table.

Important: The physical positions always coincide with the MCS position.

In order to avoid misunderstandings, it's advisable to use one of the first two variants.

3. Controller data are automatically calculated to sensible values by FCT.

Calculated Closed Loop Settings for the configured System

Current Control	Velocity Control
Gain: 9,17	Gain: 0,11
Time Constant: 1,61 ms	Time Constant: 11,21 ms
	Actual Velocity Filter: 2,00 ms

Position Control	Application Data
Gain: 0,31	Total Load: 2,500 kg
Max. Correction Velocity: 50,00 mm/s	Inertia Ratio: 1,3
Dead Range: 0,00 mm	

Soft Middle Hard

Calculate

Enable Editing

Download the parameters to the controller and save them.

s