MCV3.0 ET @ TwinCat3 (NC) configuration

Summary

This application note describes the necessary steps to control a FAULHABER MC V 3.0 ET version using a TwinCat based PLC. The MC is connected via its EtherCAT port to the PLC.

Applies To

MC 5005 S ET, MC 5010 S ET, MC 5004 P ET and
MCS ET

Licensing

EtherCAT is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Related FAULHABER Documents

Document	Description
Motion Manager 6	Instruction Manual for FAULHABER Motion Manager PC software
Quick start description	Description of the first steps for commissioning and operation of FAULHABER Motion Controllers
Drive functions	Description the operating modes and functions of the drive
Com Manual EtherCAT	Description of the EtherCAT services implemented in a FAULHABER MotionController

Description

This example shows the necessary steps for the implementation of a Faulhaber MC3 ET controller using a Beckhoff TwinCat3 environment.

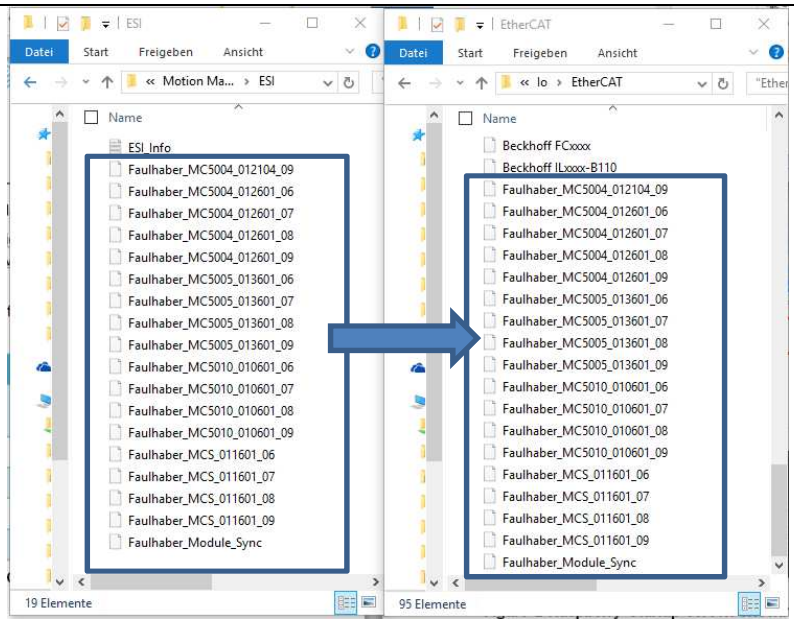
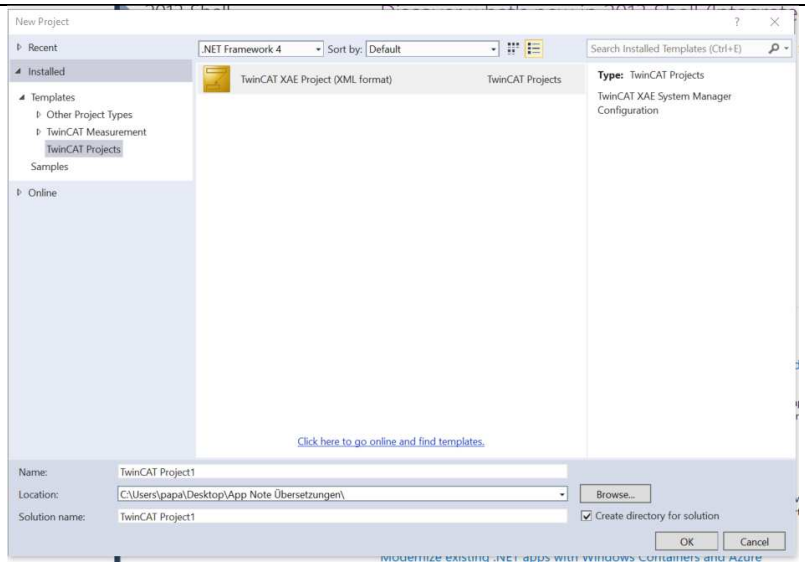
Therefore the application note is divided into two parts.

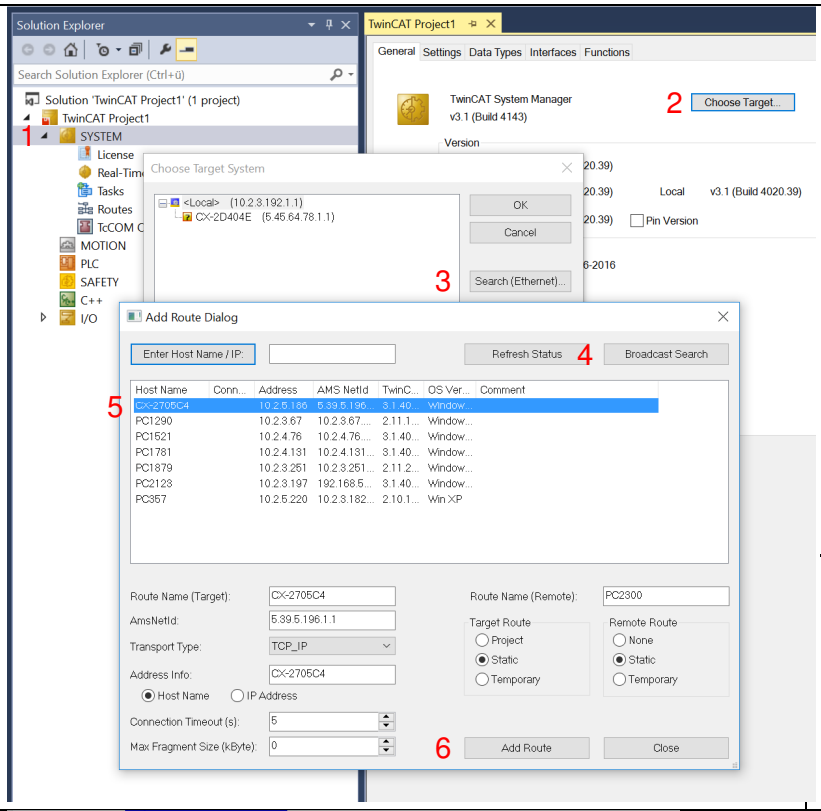
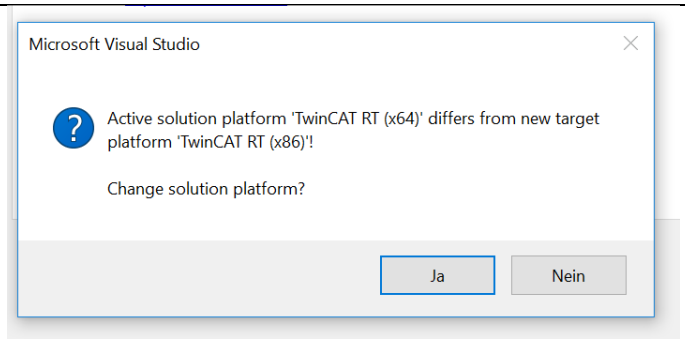
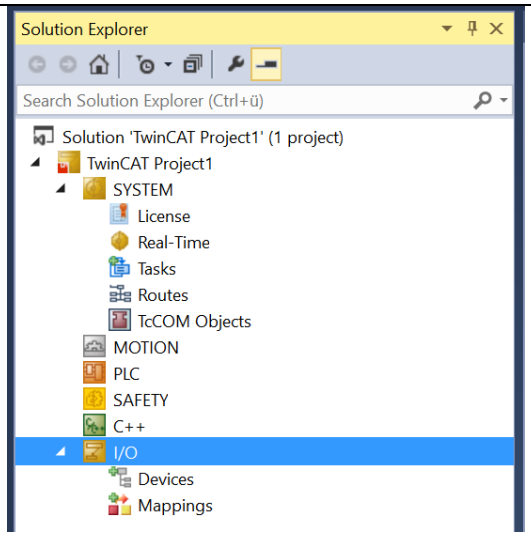
1. Implementation of Faulhaber MC3.0 ET into TwinCat 3
2. Configuring Motion Controller as NC axis

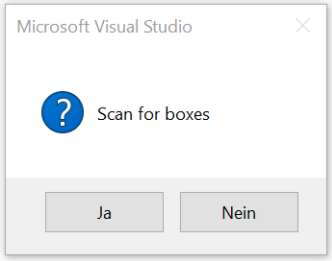
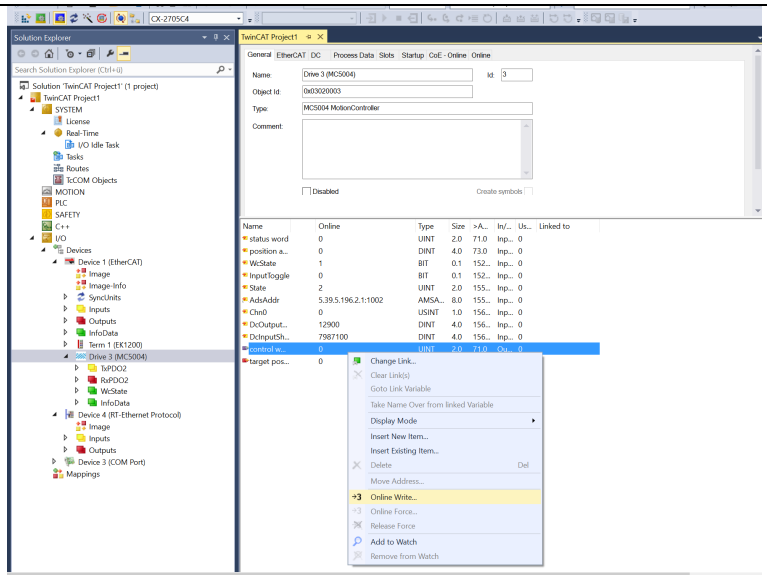
The general implementation of the MC is independent of configuration as a NC axis.

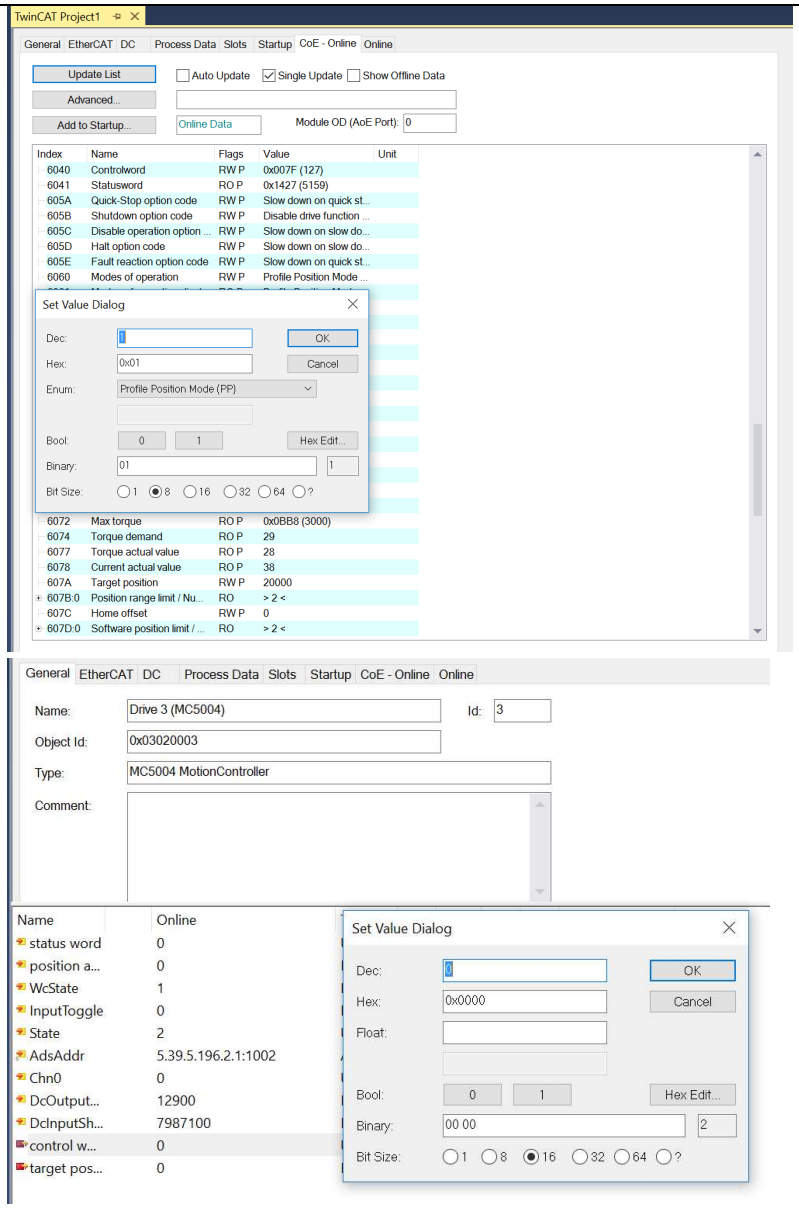
➔ It is possible to run the MC without a NC kernel on top

Implementation of Faulhaber MC3.0 ET into TwinCat 3

Nr	Screenshot	Description
1		- Ensure that the latest Motion Manager version is installed - Import all .xml files from the Motion Manager to the TwinCat file system - Start TwinCat engineering environment Link to MoMan .xml Files: C:\ProgramFiles(x86)\Faulhaber\Motion Manager 6\ESI Link to TwinCat file System: C:\TwinCAT\3.1\Config\Io\EtherCAT This step is only necessary, if there was an update of the .xml files and for the first implementation of the Faulhaber components into TwinCat.
2		- Create a new TwinCat solution

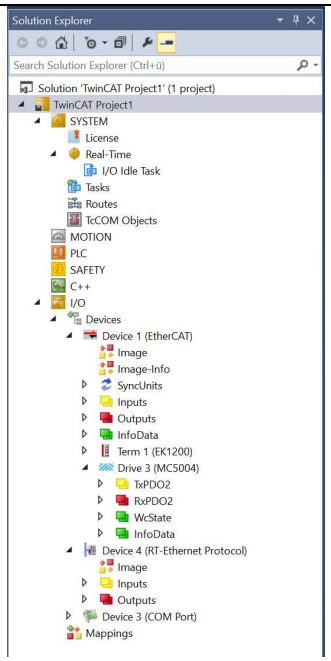
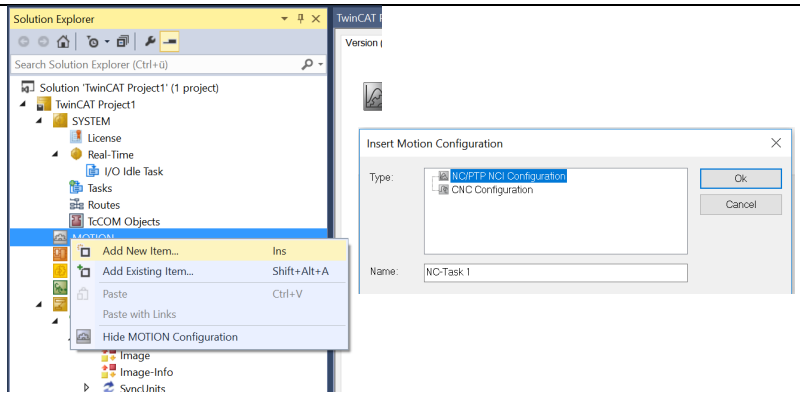
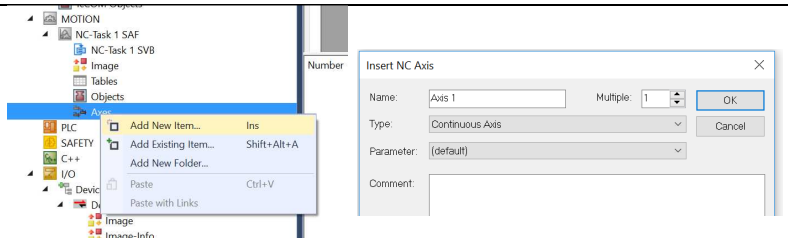
3		Choose your target system: 1. Open the System configuration 2. „Choose Target System“ 3. „Search“ for devices 4. Mostly the „Broadcast search“ finds every plc which is connected to your TCP_IP network 5. Select your target system 6. Add your target system route <u>Beckhoff default account information</u> User: administrator Password: 1
4		- Switch to platform solution Now you are in remote control mode of your PLC. For the further configuration, ensure that your plc is in “config Mode” 
5		- Open the I/O configuration and scan for devices by right clicking on „devices“

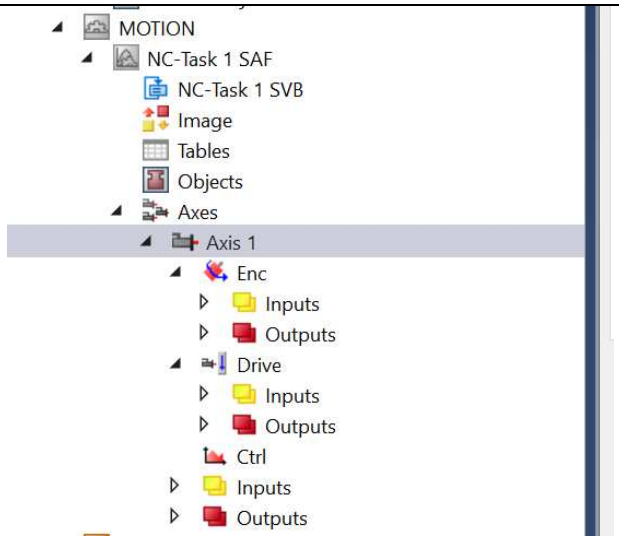
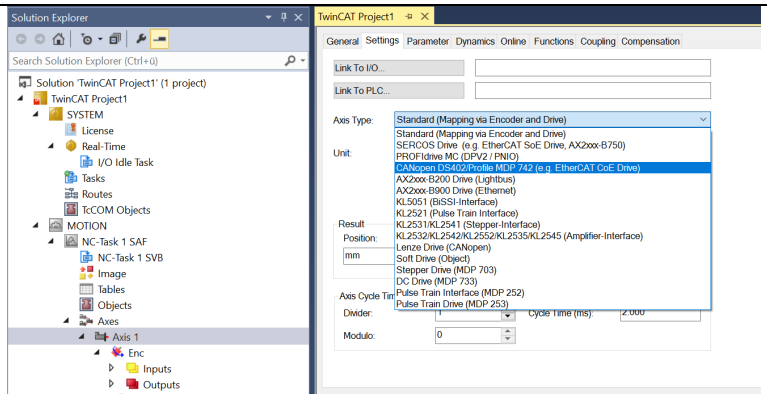
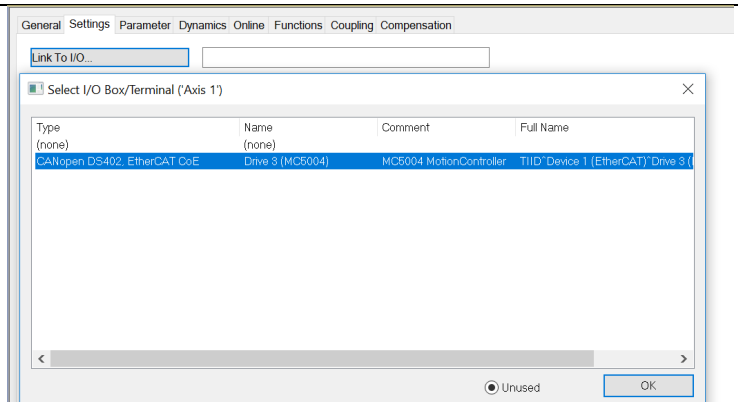
6		- Confirm the search for boxes Depended on the TwinCat version, the software recognizes the MC and is going to ask, if you would like to link the controller to a NC axis. Chapter “2. Configure Motion Controller as NC axis” will show, how to link the MC to the NC axis, manually and additional configurations.
7		- Activate configuration After the configuration is activated, the PLC changes to run mode. You could also switch back to config mode (blue) and activate the free run. Configuration changes are only possible in config mode of the plc. Every time the configuration has changed, it has to be reactivated.
8		The Drive configuration offers you acces e.g. to the PDO Mapping, Controller Object browser online Data (CoE), Process data, … From that point, it is possible to control the MC manually, by writing online values.

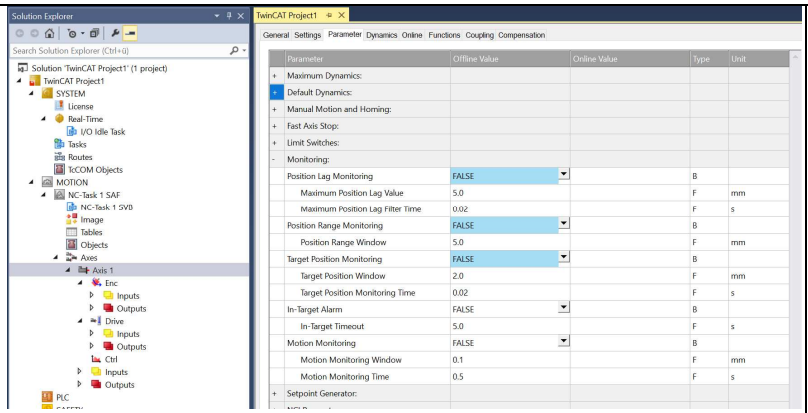
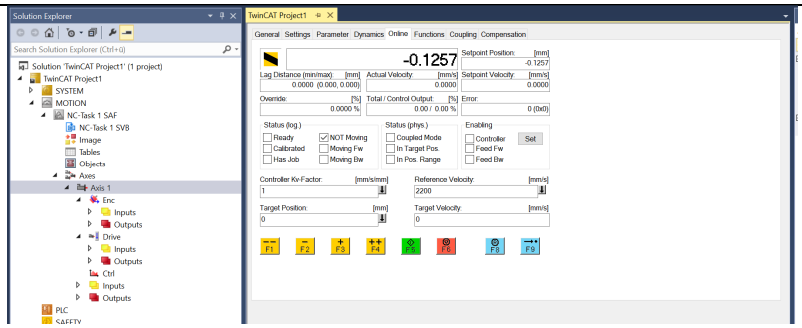
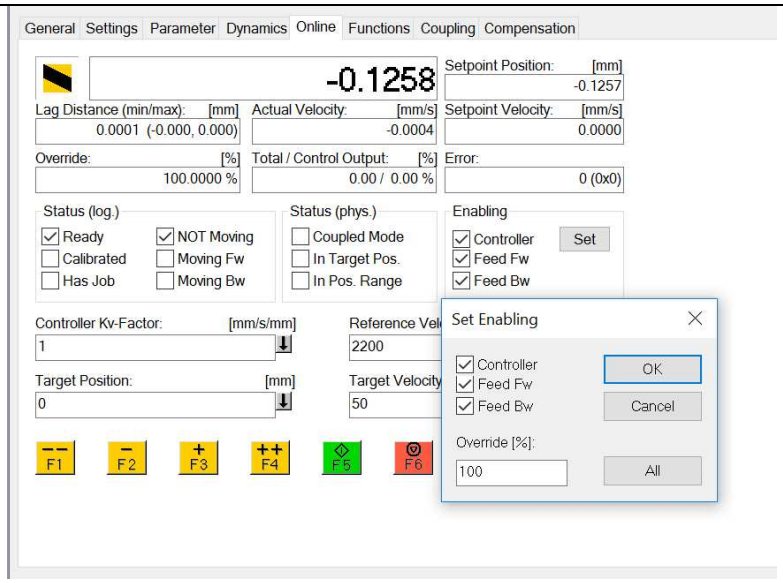
9		Test run:
		- Change Modes of Operation (Object 0x6060.00) := 1 (PP Mode)
		- Enable the power stage by writing following commands to the controlword
		  ○ 0x6040 := 0x0006
		  ○ 0x6040 := 0x0007
		  ○ 0x6040 := 0x000F
		- Set Target Position to 4096
		- Start positioning (Controlword := 0x005F)
		
		The Motor should execute a relative positioning of 4096 Inc.

From now on it is possible to link the controller mapping to the plc program and run the drive without a NC axis.

Configuring Motion Controller as NC axis

Nr	Screenshot	Description
1		Initial state: - Run through step 1-6 of “Implementation of Faulhaber MC3.ET into TwinCat3” - Set Modes of Operation 0x6060 := 8 (CSP)
2		- Add New Motion Item - Add NC/PTP NCI Configuration
3		- Add New NC Axes Item - Add New Continuous Axis

4		The NC axis has been added successfully. Settings of NC axis: The NC axis is a virtual numerical controlled axis. Therefore there are 3 major configuration categories. *Axis1* contains the general configuration of the NC axis e.g. link to the I/O device, definition of the axis type (DSP402,…), monitoring functions of the NC axis etc. *Enc* contains the NC-Encoder configuration e.g. scaling factor mm/inc, soft position limits etc. *Drive* contains the NC-Drive configuration e.g. Invert motor polarity, reference velocity etc. For more detailed information, take a look at https://infosys.beckhoff.com/
5		- Configure the NC axis type as CANopen (DSP 402 CoE)
6		- Link the NC axis to Faulhaber I/O device

7		- For the first test run, set all Monitoring functions of Axis 1 to FALSE - Activate the configuration 
8		The online View allows you to control the NC axis manually - Enter Target velocity >0
9		- Enable the NC state machine Now it is possible to run the Motor with F1 – F4 Implementation of Faulhaber MC3 ET in TwinCat environment as NC axis is finished successfully

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