FAULHABER

Quick Start Manual

MC 5010

MC 5005

QUICK-START

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from improper use of the equipment.

The relevant regulations regarding safety engineering
and interference suppression as well as the requirements
specified in this document are to be noted and followed
when using the software.

Subject to change without notice.

The respective current version of this technical manual is
available on FAULHABER's internet site:
www.faulhaber.com

Content

FAULHABER

1   Overview

The Quick Start manual is intended for users who are commissioning a motor on the FAULHABER Motion Controller for the first time.

By means of the USB interface, FAULHABER Motion Controllers can be commissioned in just a few steps. The preconditions for this are:

- The current version of the FAULHABER Motion Manager (version 6) must be installed.
- A FAULHABER Motion Controller MC 5010/MC 5005 must be available, including the necessary connection cables.
- One of the supported motors (DC, BL, or LM motor) must be available.

2 Install Motion Manager

FAULHABER Motion Controllers, generation 3, are configured using the free FAULHABER Motion Manager software, version 6 onwards.

ℹ The necessary drivers for communication via the USB port are installed during installation of the Motion Manager.

3 Connecting the hardware

> For BL and LM motors the connections M1 and M2 must be made (see chap. 3.2, p. 7).
> For DC motors the connections M1 and M3 must be made (see chap. 3.3, p. 9).

3.1 Prepare supply connection

1. Prepare the connection cables for the electronics power supply U_p (X4) and the motor power supply U_{mot} (X5) as specified in the connector pin assignment.

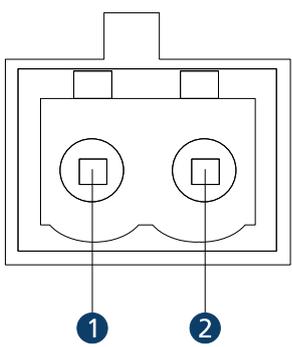*Tab. 1: Pin assignment for the power supply of the controller (X4)*

	Pin	Designation	Meaning
	1	GND	Ground
	2	U_P	Supply voltage of the controller
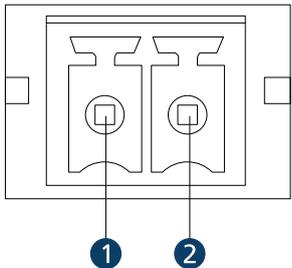
Tab. 2: Pin assignment for the power supply of the motor (X5)

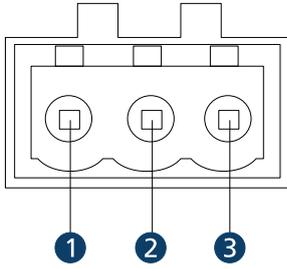|	Pin	Designation	Meaning
	1	GND	Ground
	2	U_{mot}	Supply voltage of the motor

3.2 Prepare the motor connection for BL and LM motors

1. Prepare the motor connection (BL and LM motors):

   - Data on the pin assignment of the motor can be found on the data sheet for the motor.
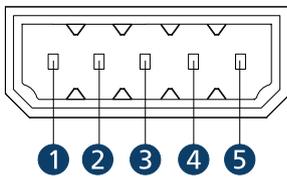
Tab. 3: Pin assignment of the BL motor connection (M1)

Pin	Designation	Meaning
1	Motor A	Connection to motor phase A
2	Motor B	Connection to motor phase B
3	Motor C	Connection to motor phase C

Tab. 4: Pin assignment of the sensor connection (M2)

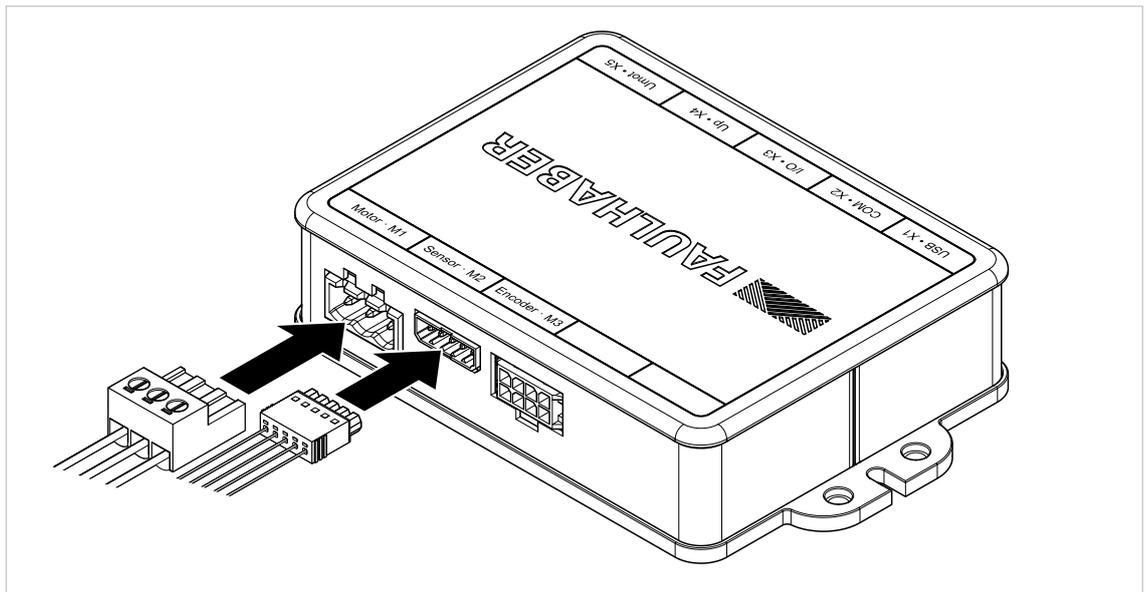| Pin	Designation	Meaning
1	U_{DD}	Power supply for the sensor
2	GND	Ground
3	Sens A	Hall sensor A
4	Sens B	Hall sensor B
5	Sens C	Hall sensor C

2. Plug the power supply connection cables and the USB connection into the Motion Controller.

3. Plug the motor connection cables into the Motion Controller.

ℹ️ The supply voltage must be within the range 12 V … 50 V. At 24 V, the initial current consumption of the Motion Controller will be at approx. 40 mA.
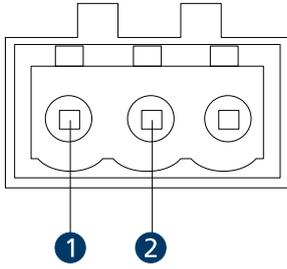
3.3 Preparing the motor connection for DC motors

1. Prepare the motor connection (DC motors):

   ▪ Data on the pin assignment of the motor can be found on the data sheet for the motor.

Tab. 5:   Pin assignment of the DC motor connection (M1)

	Pin	Designation	Meaning
	1	Motor +	Connection to the motor plus pole
	2	Motor −	Connection to the motor minus pole

Tab. 6:   Pin assignment for incremental encoder with line driver (M3)

	Pin	Designation	Meaning
	1	U_{DD}	Power supply for the incremental encoder
	2	GND	Ground
	3	$\overline{\text{Channel A}}$	Encoder channel A (logically inverted signal)
	4	Channel A	Encoder channel A
	5	$\overline{\text{Channel B}}$	Encoder channel B (logically inverted signal)
	6	Channel B	Encoder channel B
	7	$\overline{\text{Index}}$	Encoder index (logically inverted signal)
	8	Index	Encoder index
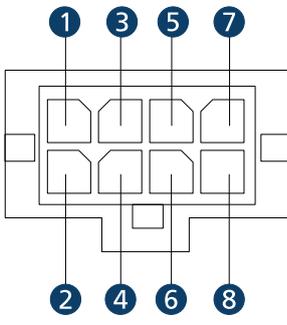
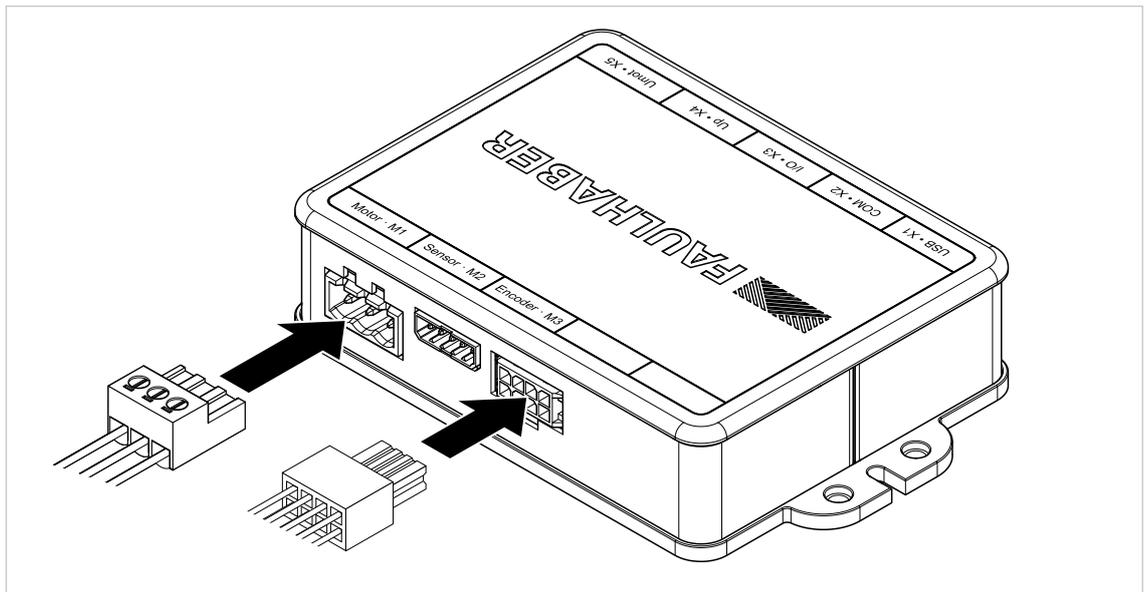**i** If an encoder is used without a line driver, the inverted signals can be left open.

2. Plug the power supply connection cables and the USB connection into the Motion Controller.
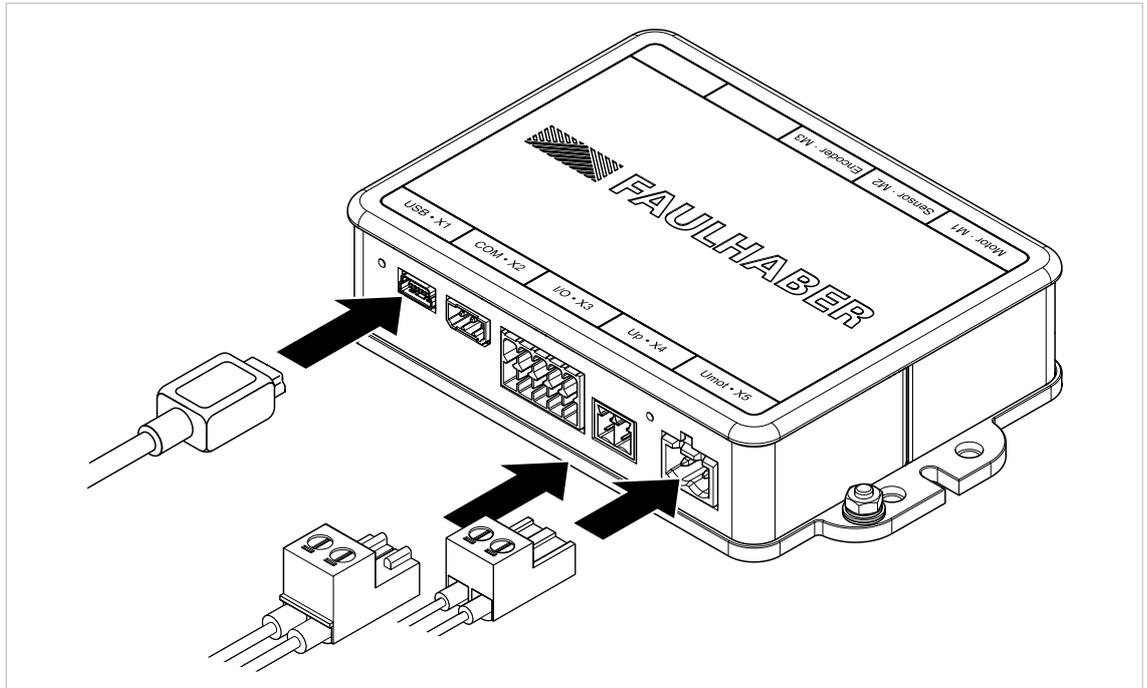
3. Plug the motor connection cables into the Motion Controller.

ℹ The supply voltage must be within the range 12 V … 50 V. At 24 V, the initial current consumption of the Motion Controller will be at approx. 40 mA.

4 Establish communication with the Motion Controller

At the beginning, the connection wizard in the Motion Manager is used to establish the first contact with the Motion Controller. The **Create connection** wizard can be found in the quick access bar at the left edge of the screen, in the commissioning category.

1. Start the connection wizard.

2. In the connection wizard, select the interface to be used (here the USB port).
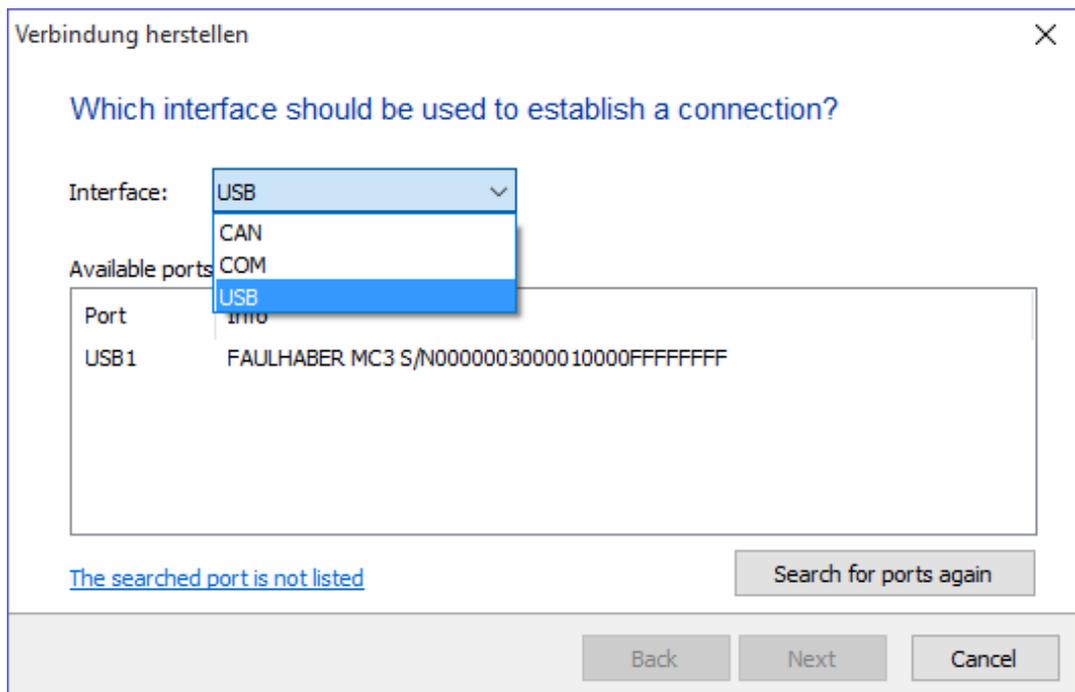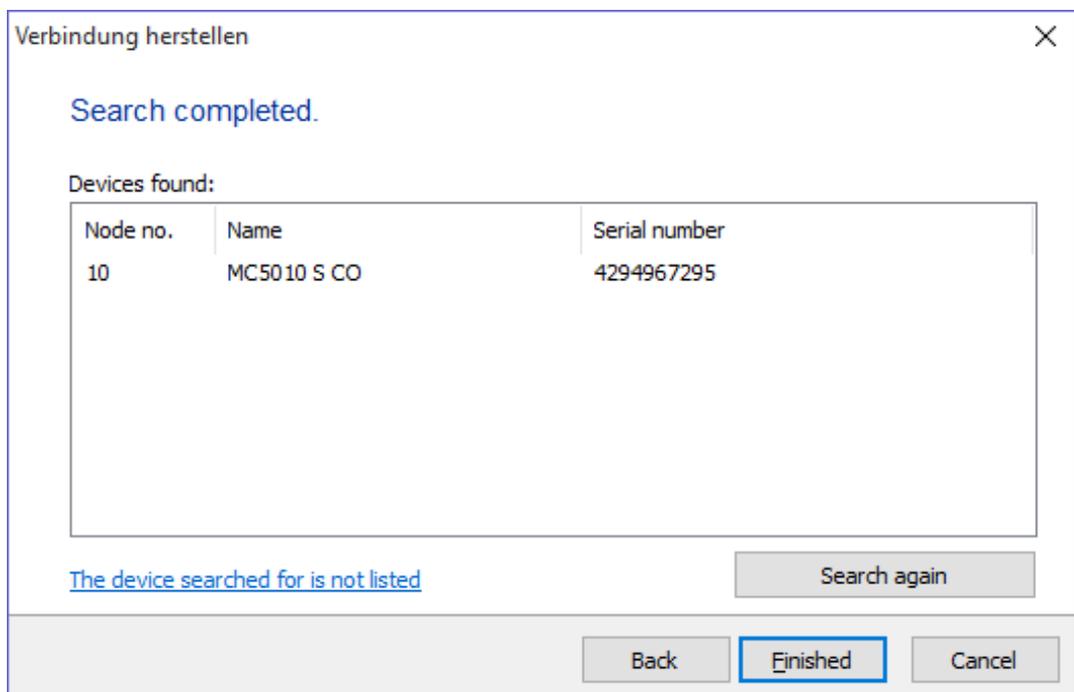

⮩ The Motion Manager searches through the USB ports for connected FAULHABER USB devices.

⮩ The Motion Manager shows an overview of the FAULHABER USB devices found.

3. Select the desired USB device and confirm with the *Search* button.

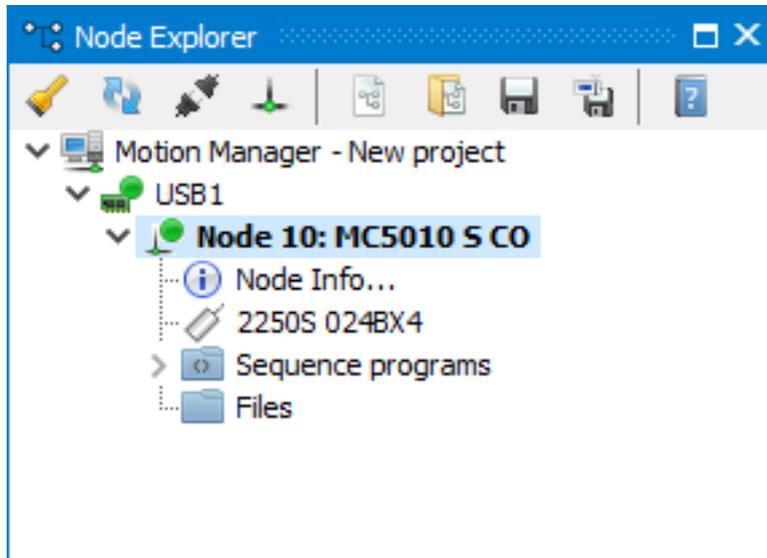# Establish communication with the Motion Controller
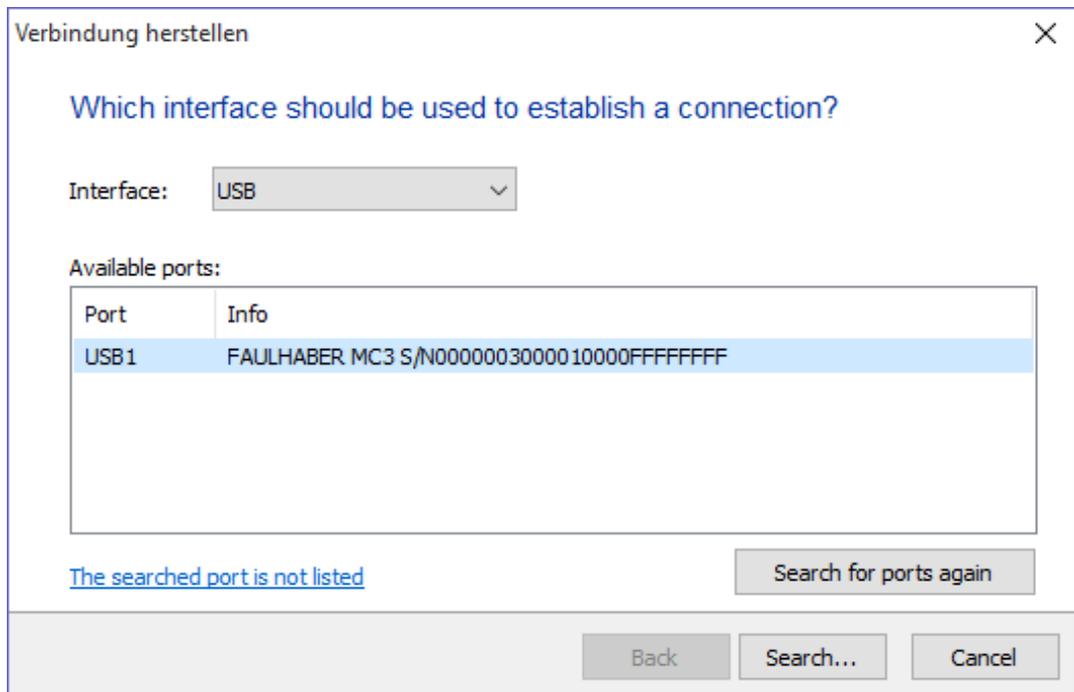
4. If a device was found, accept the connection settings with *Finish*.

↪ Communication is now established.

↪ The controller will appear in the Node Explorer of the Motion Manager.

Establish communication with the Motion Controller

ℹ️ When the controller is commissioned for the first time, there will not yet be any motor data set. No motor type is shown in the Node Explorer of the FAULHABER Motion Manager. Instead of a connected motor, the **Select Motor** instruction is displayed next to the motor symbol.

5 Configure the motor

5.1 Select the motor type

Before the Motion Controller can be used, the correct motor data must first be entered. In just a few steps, the motor selection wizard in the Motion Manager leads through the selection of the correct motor type and sensor system.

▶ Select the motor type. The input required is:

- Type of the motor (BL, DC or linear BL)

- Dimensions of the motor

- Winding variant
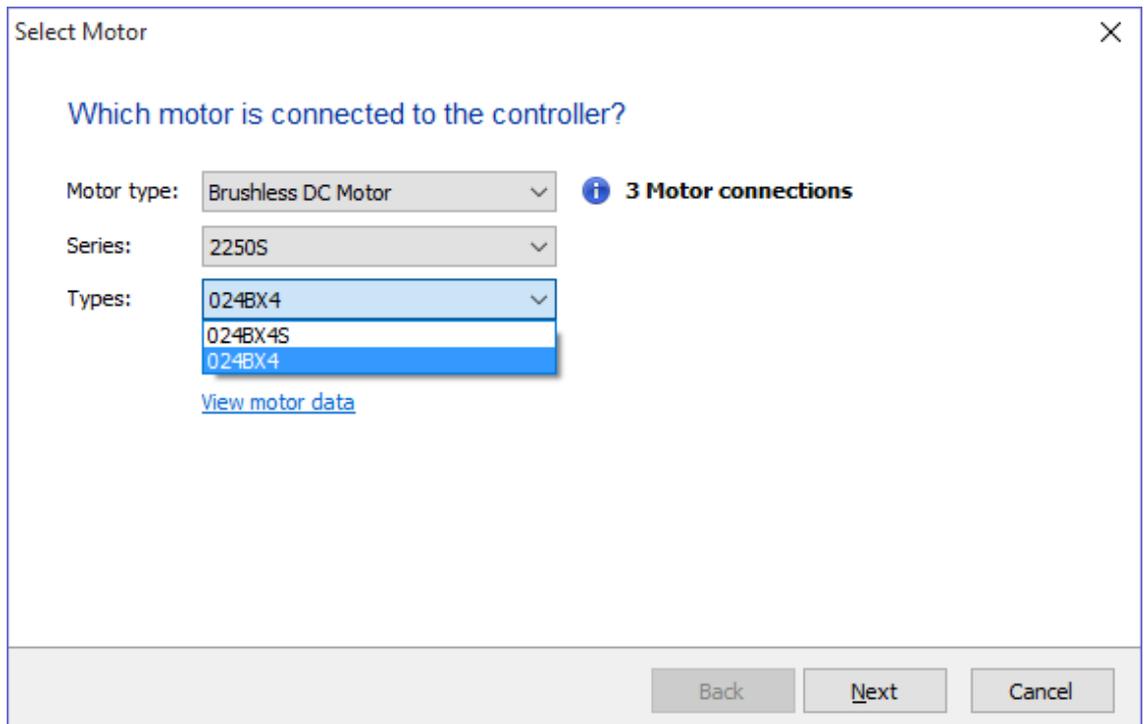
5.2 Select the sensor type

Before the Motion Controller can be used, the correct motor data must first be entered. In just a few steps, the motor selection wizard in the Motion Manager leads through the selection of the correct motor type and sensor system.

For controlled operation of the motor, the FAULHABER Motion Controller always requires a suitable sensor system. There are two connection options available to do so.

ℹ️ BL motors with analogue Hall signals are connected to the sensor input (M2). DC motors with IE encoders are connected to the encoder input (M3). In addition, it is permissible to operate BL motors with digital Hall signals + IE encoders or BL motors with AES encoders.

5.2.1 Set a BL motor with analogue Hall sensors / LM motor with analogue Hall sensors

1. Select the connected sensor systems and confirm with *Next*.

Configure the motor

2. Select the purpose for which the sensor systems will be used.

```
Select Motor                                                          ✕

   Assignment of encoder systems

   Actual value          Source

   Commutation angle:    [ Analogue Hall sensors              ⌄ ]
                         Commutation type: Sinus commutation

   Velocity:             [ Analogue Hall sensors              ⌄ ]

   Position:             [ Analogue Hall sensors              ⌄ ]




                                   [  Back  ]  [  Next  ]  [  Cancel  ]
```
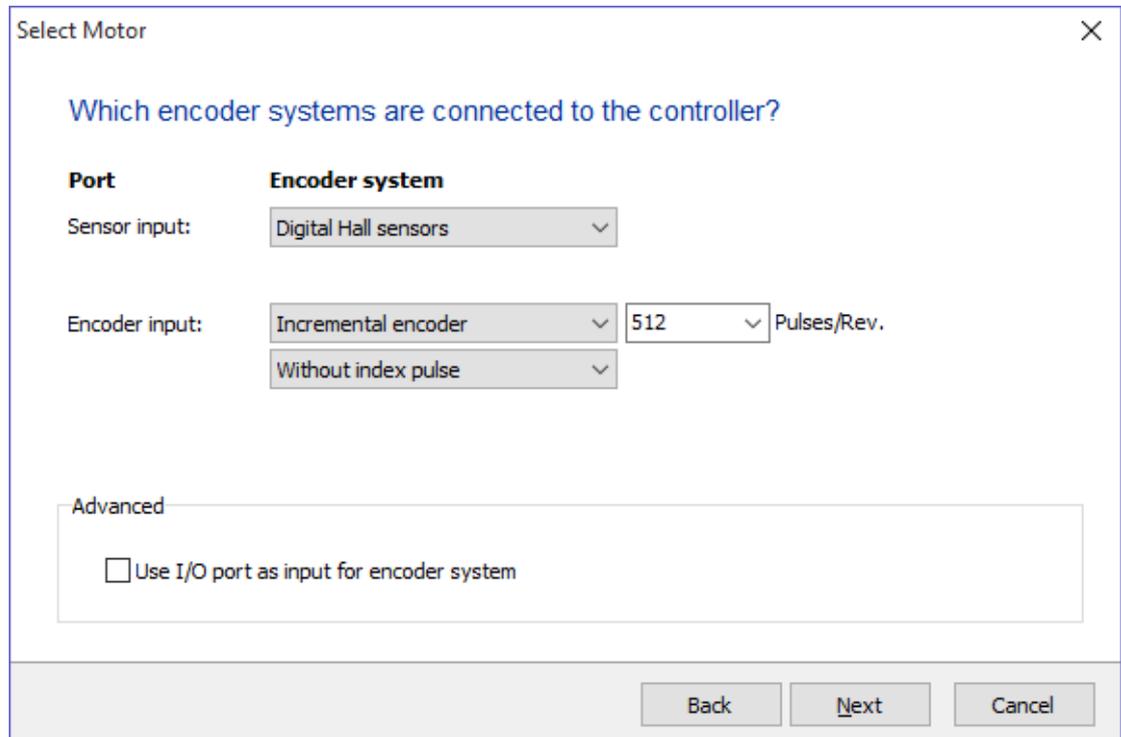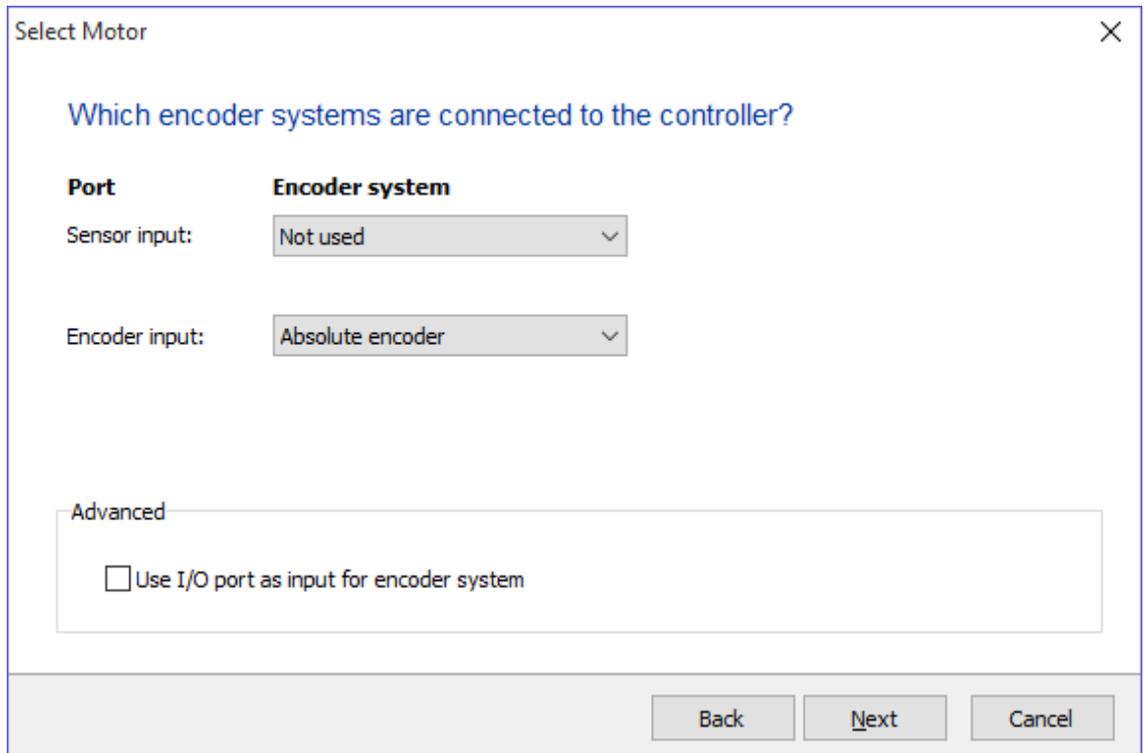
5.2.2   Set a BL motor with digital Hall sensors and incremental encoders

1. Select the connected sensor systems and confirm with *Next*.

2. Select the purpose for which the sensor systems will be used.

5.2.3 Set a BL motor with AES encoder

1. Select the connected sensor systems and confirm with *Next*.

2. Select the purpose for which the sensor systems will be used.

5.2.4 Set a DC motor with incremental encoder

1. Select the connected sensor systems and confirm with *Next*.

2. Select the purpose for which the sensor systems will be used.

5.3 Adapting the overvoltage control to the motor supply voltage

▶ Set the limit value of the overvoltage controller according to the currently applied supply voltage of the motor.

If the motor is operated later with a different supply voltage, the value of the **Motor supply upper threshold** object should be adjusted accordingly. This can be performed in the Motion Manager via **Configuration - Drive Functions**.

5.4   Transfer configuration

▶   Check the configuration and click on *Transfer configuration* to transfer it to the Motion Controller.

## 5.5 Adjusting Hall sensor (only for analogue Hall sensors)

i For brushless motors with analogue Hall signals, an adjustment of the Hall signals is offered as a final step. For this purpose the motor is operated at various speeds for a few seconds.

At the start of the adjustment you must confirm that the shaft is free to rotate.

1. Start the adjustment by clicking on **Start adjustment of the Hall sensor signals**.
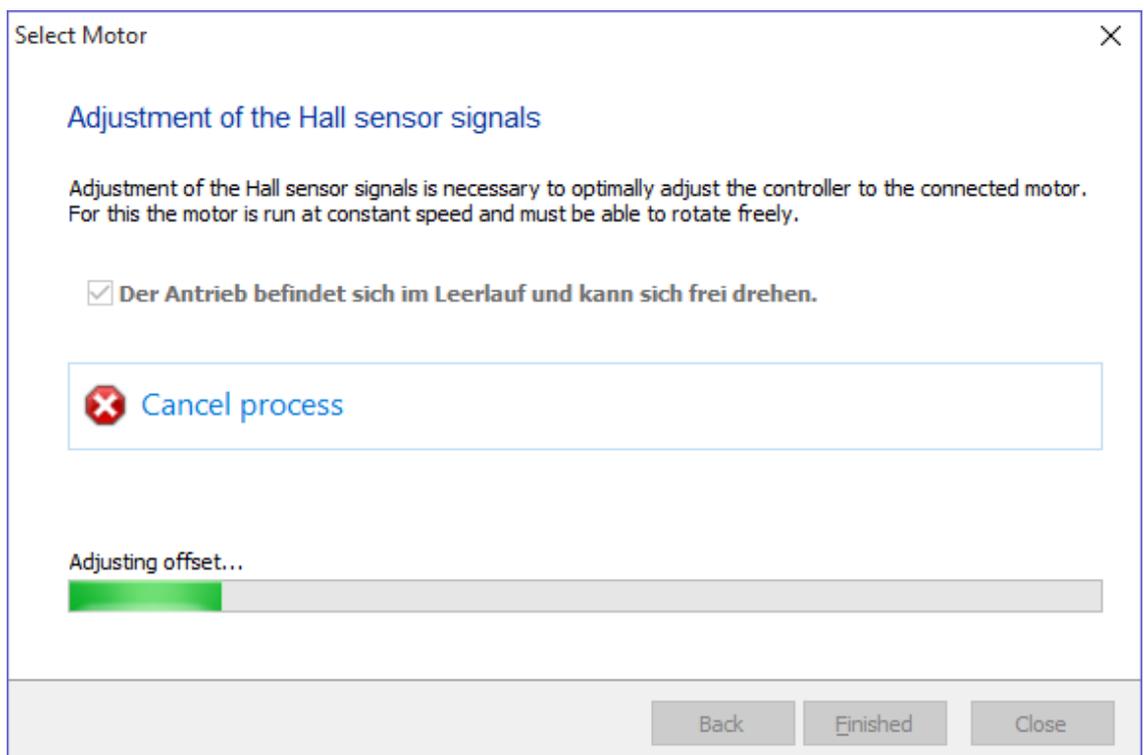
2. At the end of the process, click on **Yes** to permanently save the transferred values for the sensors and the basic data for the motor into the Motion Controller.
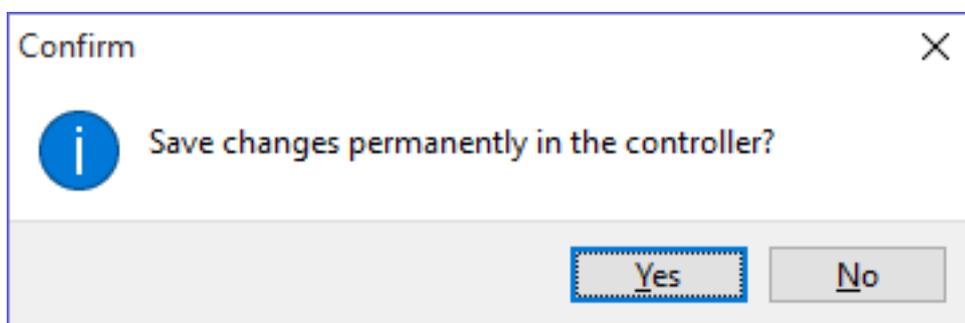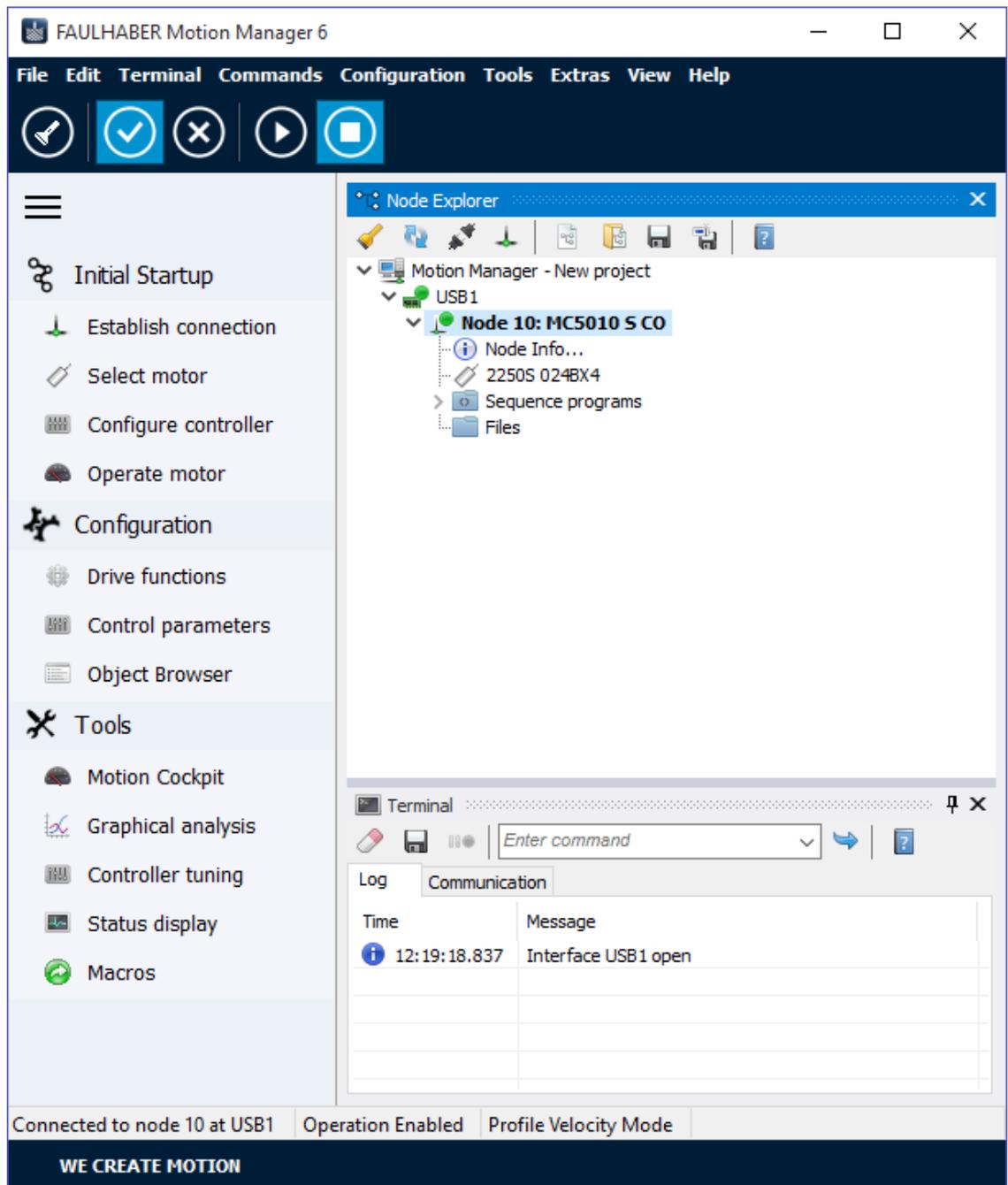
6 Commissioning

After the wizards for establishing the connection and selection of the motor have been successfully completed, the first commissioning of the drive system is already done.

The motor selection and adjustment of the Hall sensor signals can be repeated at any time. The set motor is shown in the Node Explorer of the FAULHABER Motion Manager.
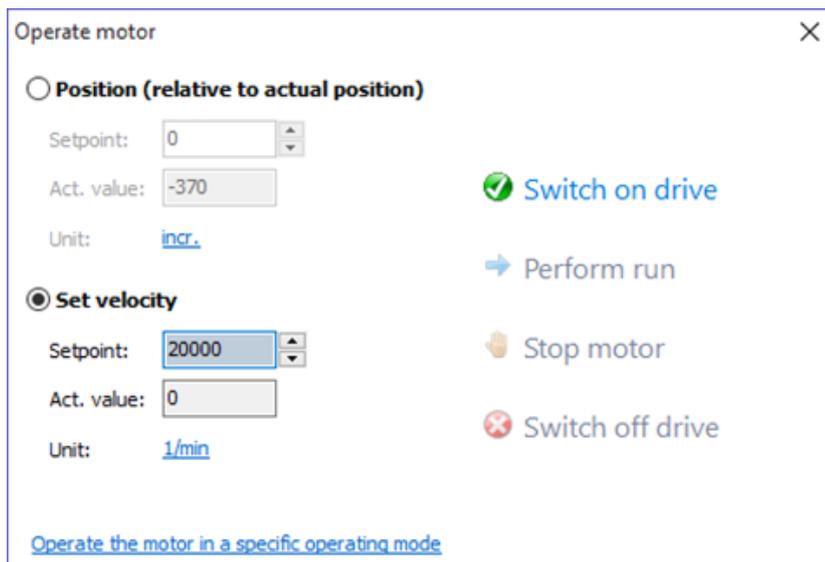
7 Operate motor

The *Operate motor* dialogue in the quick access bar in the commissioning category allows the motor to be operated simply without going more deeply into the many available configuration options.

1. Select *Operate motor* in the quick access bar.

2. Select the operating mode.
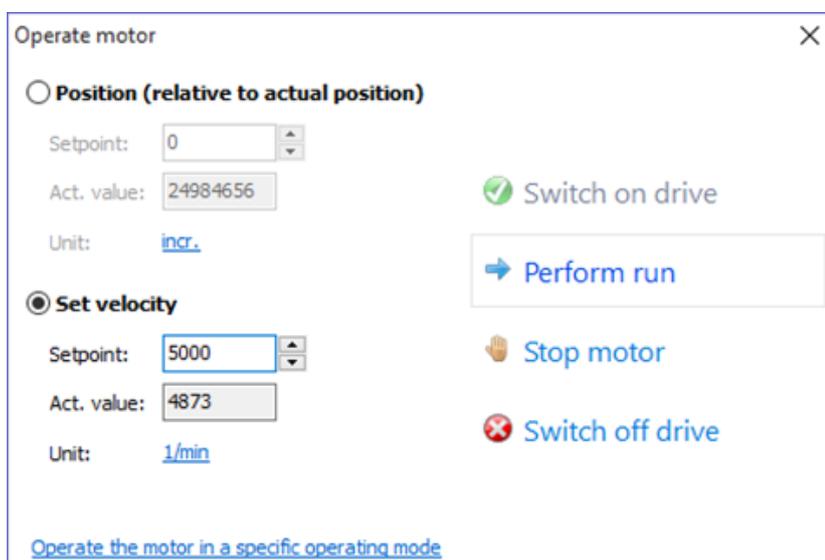

3. Switch on drive.

4. Enter set value.

5. Click on *Perform run* to start the drive.

> **i** Click on *Stop motor* to stop the motor. The control remains active.

6. Click on *Switch off drive* to switch off the output stage.

8 Upgrading the firmware

The firmware update function integrated in the Motion Manager permits checking and updating the firmware on the connected FAULHABER control.

ℹ️ A firmware update can be performed only via the interface that is supported by the connected control as the update interface.
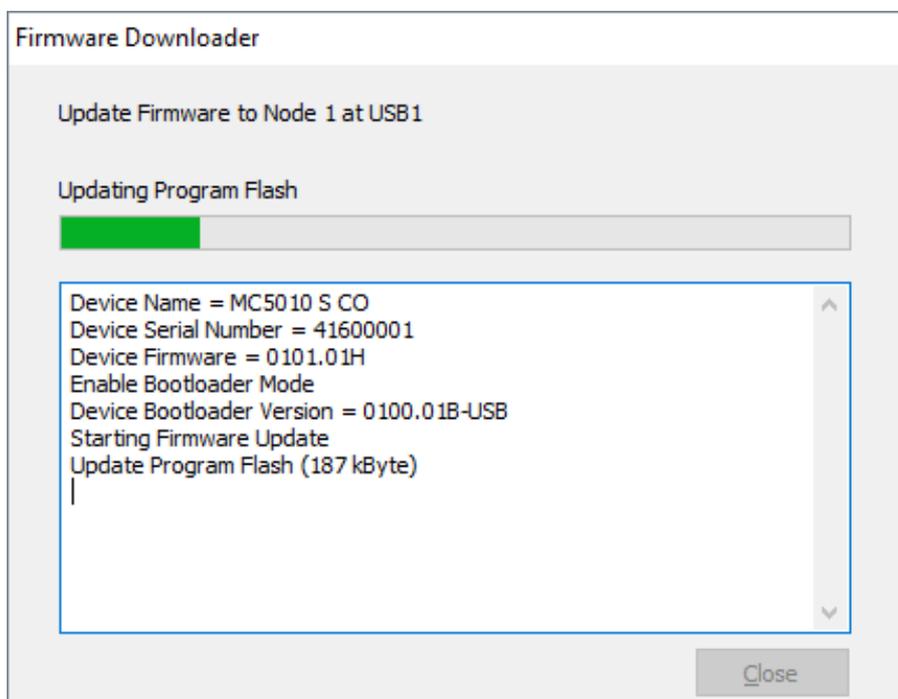
1. Click on the *Extras Firmware update* menu item to call up the Firmware Update function.

   ↳ Select from two functions in the **Firmware update** window:

Function	Description
Check for update	A check is made whether there is an update available for the current device firmware. If there is an update available it can be used to update the device firmware.
Load firmware file	A firmware file supplied separately by FAULHABER can be loaded and transferred to the control.

2. Check displayed update info.

ℹ️ The parameter area is updated only if necessary. In this case, the user is given the opportunity to save the data in a parameter file first.

3. Start download.

Firmware Downloader

Update Firmware to Node 1 at USB1

Updating Program Flash

```
Device Name = MC5010 S CO
Device Serial Number = 41600001
Device Firmware = 0101.01H
Enable Bootloader Mode
Device Bootloader Version = 0100.01B-USB
Starting Firmware Update
Update Program Flash (187 kByte)
|
```

Close

ℹ️ Whilst the download is in progress, the status LED lights up red. If the download fails, another download attempt can be made using the Motion Manager. If the download was not successful, the red status LED will be lit.

Once the new firmware has been loaded successfully, the status LED reverts to green flashing mode. The Motion Manager closes the download and reports successful completion.
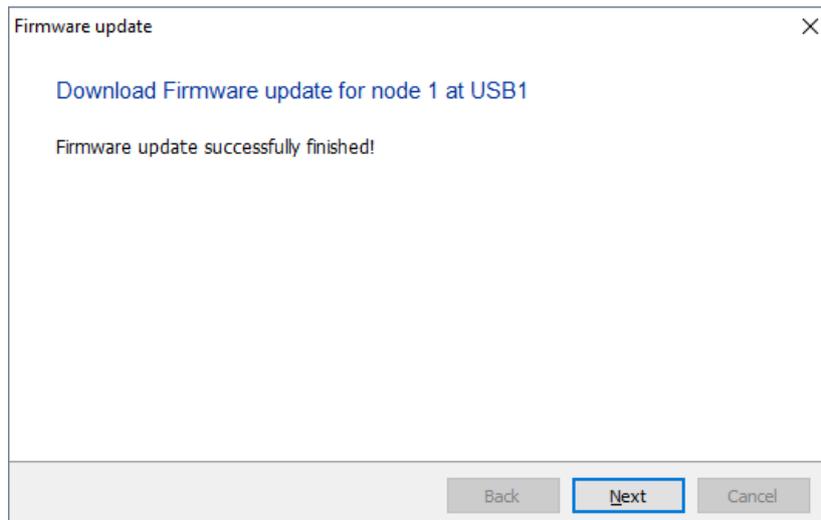
4. Conclude download:

If the parameter area was updated, further optional steps are offered upon completion of the download process:

- With EtherCAT devices: access to updated ESI file for the EtherCAT master
- Possibility to copy a previously stored user configuration back onto the drive

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