![Nanotec PLUG & DRIVE logo]

Application Note

Starting up a Nanotec Controller/Drive with Trio MC 4N-ECAT

Version 1.0.0

Contents

1   Prerequisites

The slave drive (Nanotec Controller) must be configured beforehand. Proper operation of the motor and the slave drive must be ensured before the example can be used. Make sure that the controller/drive operation is not hindered, e.g. by a stand-alone program running on the slave.

2   Hardware

- Trio MC4N-ECAT Mini Master
- Nanotec N5-1-1 controller/drive for brushless DC motors and stepper motors

3   Software

Motion Perfect, Version 4.3.3

4 Setup Communication

4.1 Connect to MC4N

1. Install Motion Perfect.
2. Connect the network card of your PC to the MC4N's Programming port via an Ethernet cable.
3. Use a second Ethernet cable to connect MC4N's EtherCAT port to the *EtherCAT IN* RJ45 port of N5-1-1.
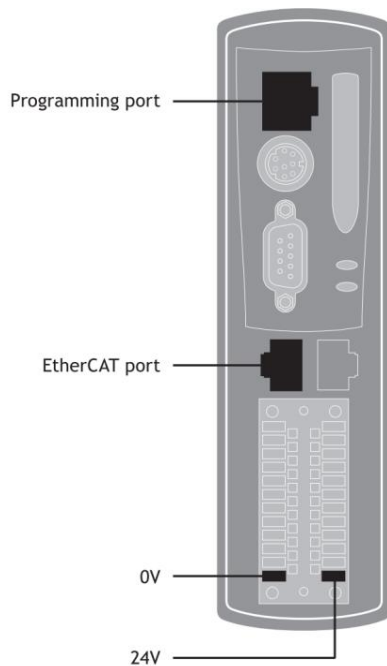

EtherCAT Connection Guide with Trio MC4N

4. Apply power to both N5-1-1 and MC4N.
5. Set the IP address of the network card of your PC as described in the next chapter and run the Motion Perfect software.

## 4.2 Setting the IP address of the network card

The IP address of a MC4N controller is per default 192.168.0.250 and the subnet mask is 255.255.255.0. You need to assign an IP address to the network card of your PC, that is in the same subnet as the MC4N controller. For example, set the network card's IP address to 192.168.0.249, as shown below.
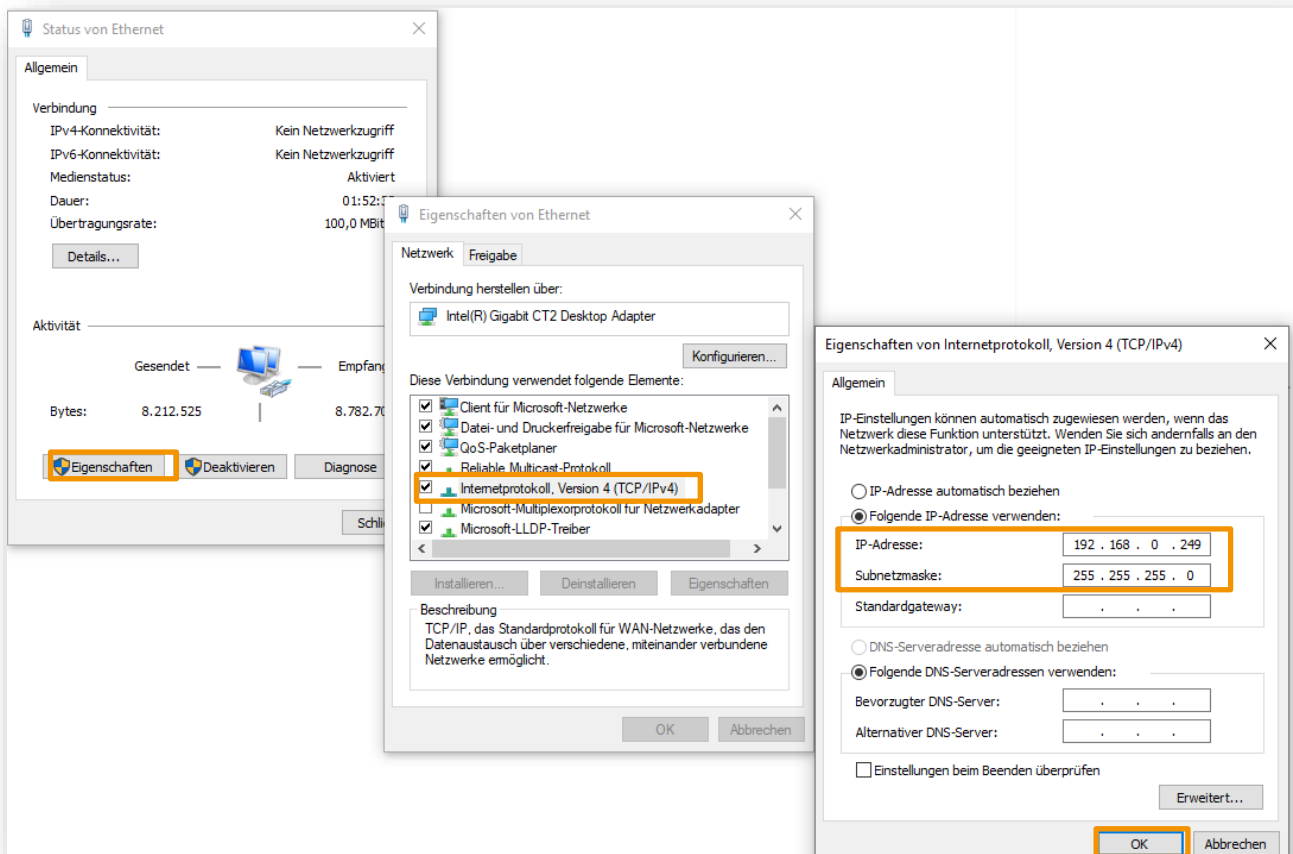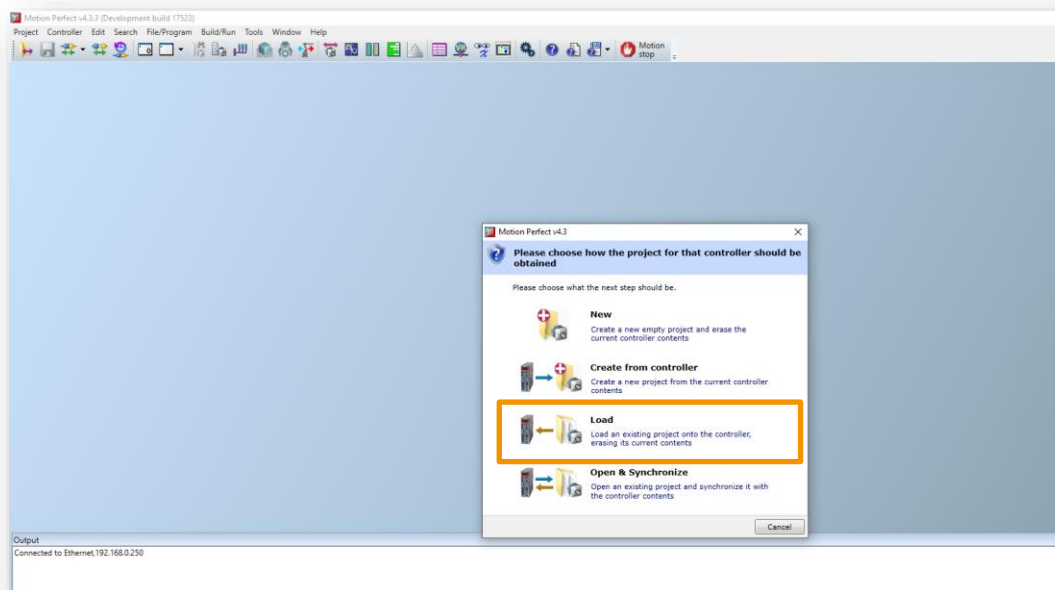
5 Loading a project and configuring the communication

5.1 Loading the example project

1. Download the example project from the Nanotec website **www.nanotec.com**.
2. Select in the **Connection** window the interface **Ethenet** and click on **Apply & Connect** to connect to MC4N in Sync mode.
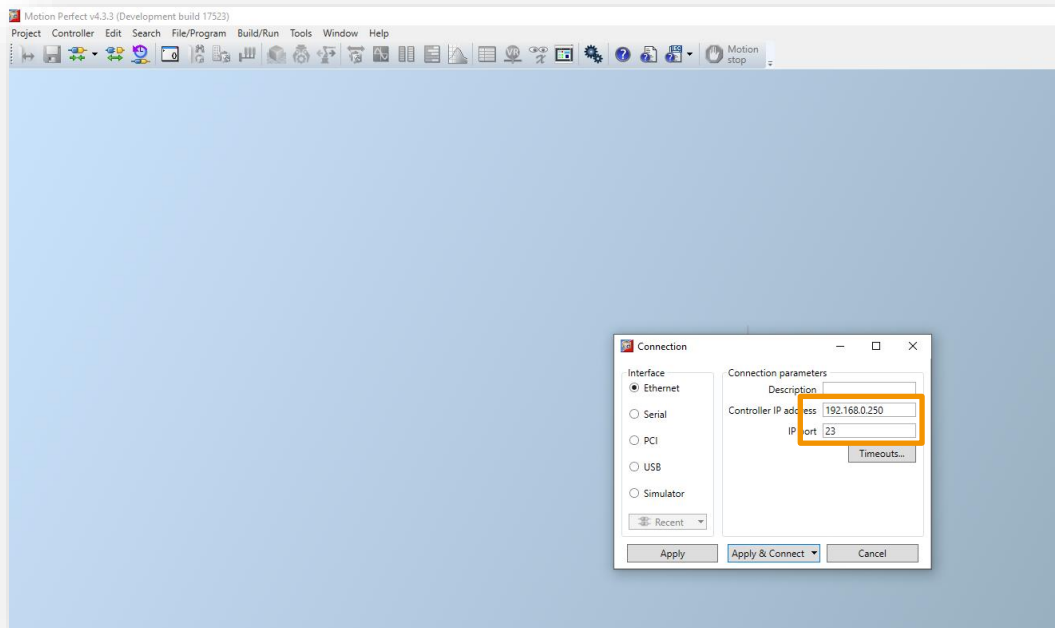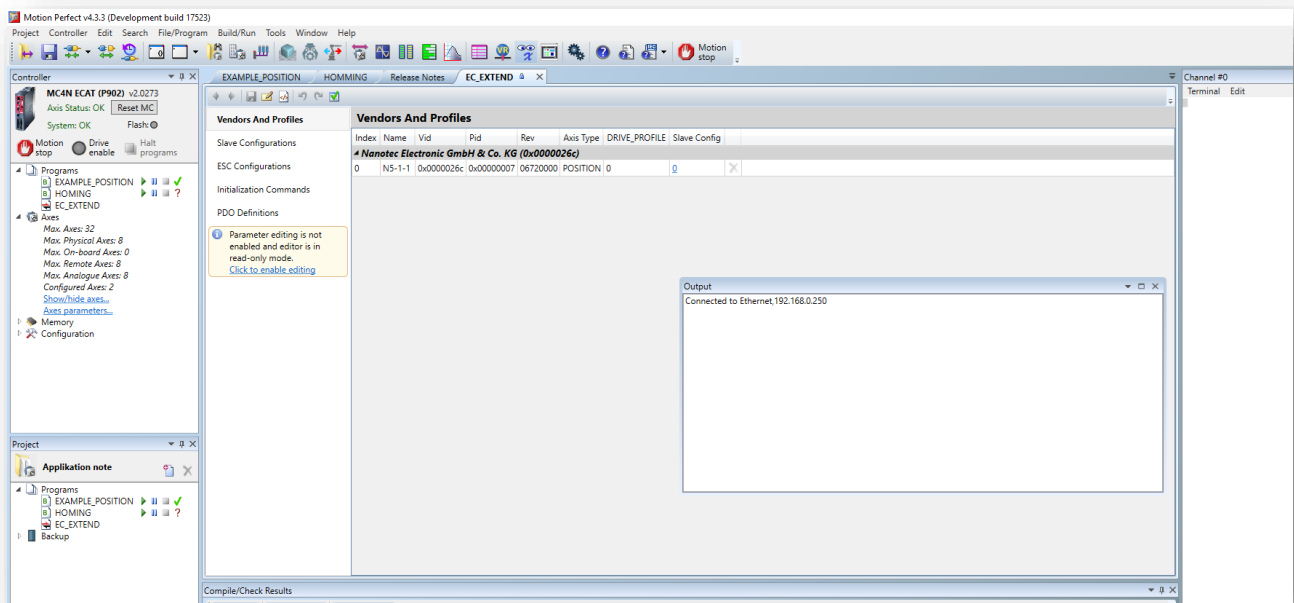

3. Click on **Load** to load the example project folder named "Application note"**.**

The folder contains three files, the configuration file *EC_EXTEND* and the example programs *EXAMPLE_POSITION* and *HOMING***.**
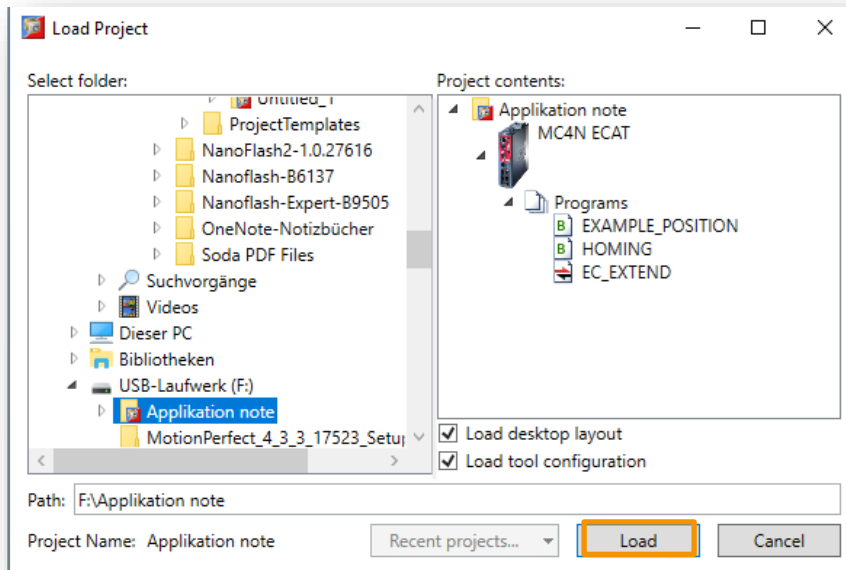
The picture below shows that the controller is now connected and the project named "Application note" has benn correctly loaded.

5.2 Setup EC_EXTEND

The *EC_EXTEND* file is a text file in XML-format containing configuration data for one or more EtherCAT slave devices. The file can be loaded onto the MC4N so that MC4N is able to interact with the EtherCAT devices whose configuration data is contained in the file. The contents of the file is used to extend the MC4N's built-in dictionary of EtherCAT devices.

Each Nanotec Controller has its own *identity object* (register 1018$_h$:00$_h$ in the object ditionary) which contains the following:

- vendor ID
- product code
- revision number

To read this object, use the software Plug&Drive Studio to connect to the Nanotec Controller.

In the tab **Object dictionary** search for the mentioned *identity object* and copy the values of the three entries, which you need to enter manually in *EC_EXTEND* later.
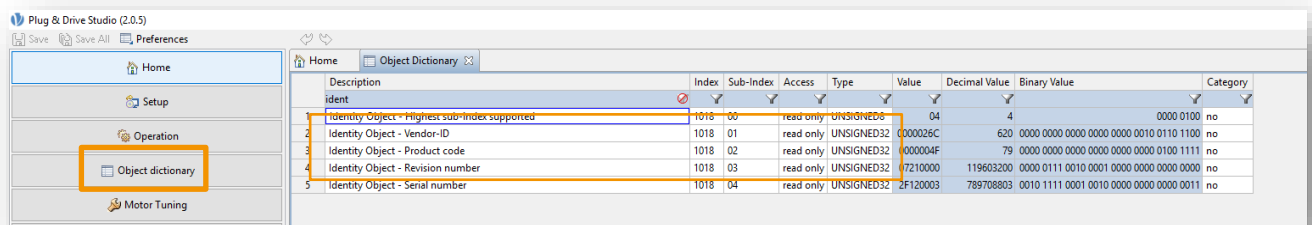
The three entries correspond to the *EC_EXTEND* parameters *Vid, Pid* and *Rev* respectively.

1. Open the *EC_EXTEND* file**.**

2. Add the values in *EC_EXTEND* and save.

5.3 Synchronize master and slave

1. Open the **Intelligent drives** configuration window.

2. Click **re-initialize the drives** to synchronize the master and slave controllers.
3. If Motion Perfect shows a "System error", you need to reset the MC4N to enable the connection to the Nanotec Controller. To do so, simply click on **Reset MC.**
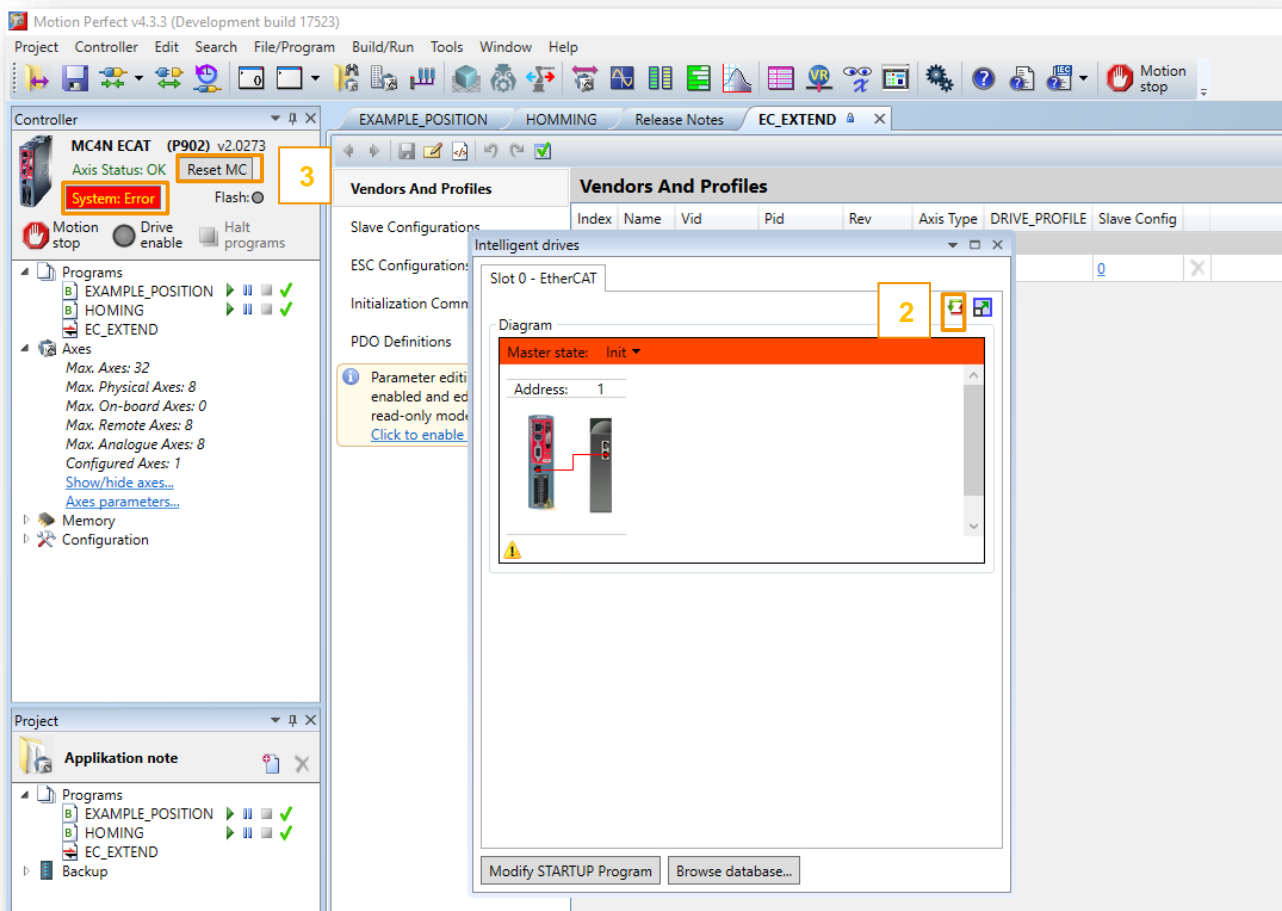
After the reset of the controller the **Intelligent drives** window shows that the master is synchronized to the slave Nanotec Controller, the Master state is **Operational**.
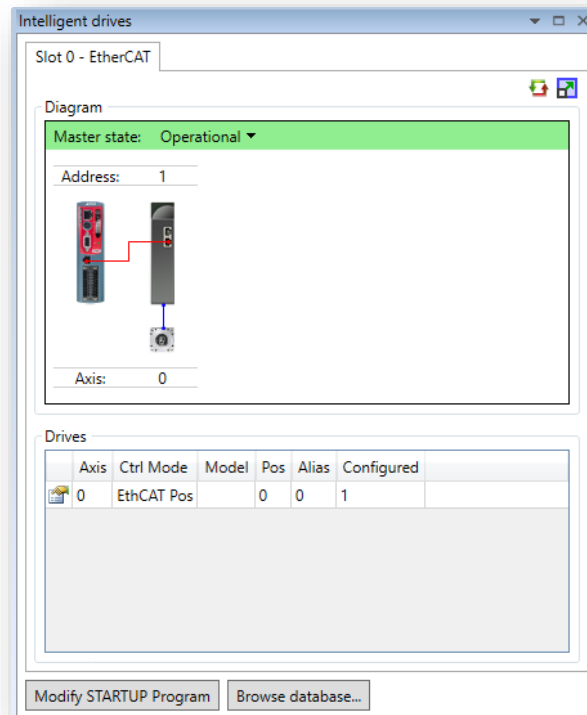
6 Description of the example project

6.1 HOMING

This example demonstrates the use of the homing mode.

You can use any of the homing methods described in the technical manual of the N5-1-1.
To select the homing method, enter the desired method number as a parameter of CO_WRITE_AXIS in the example code, click the save button and compile by clicking the question mark symbol.
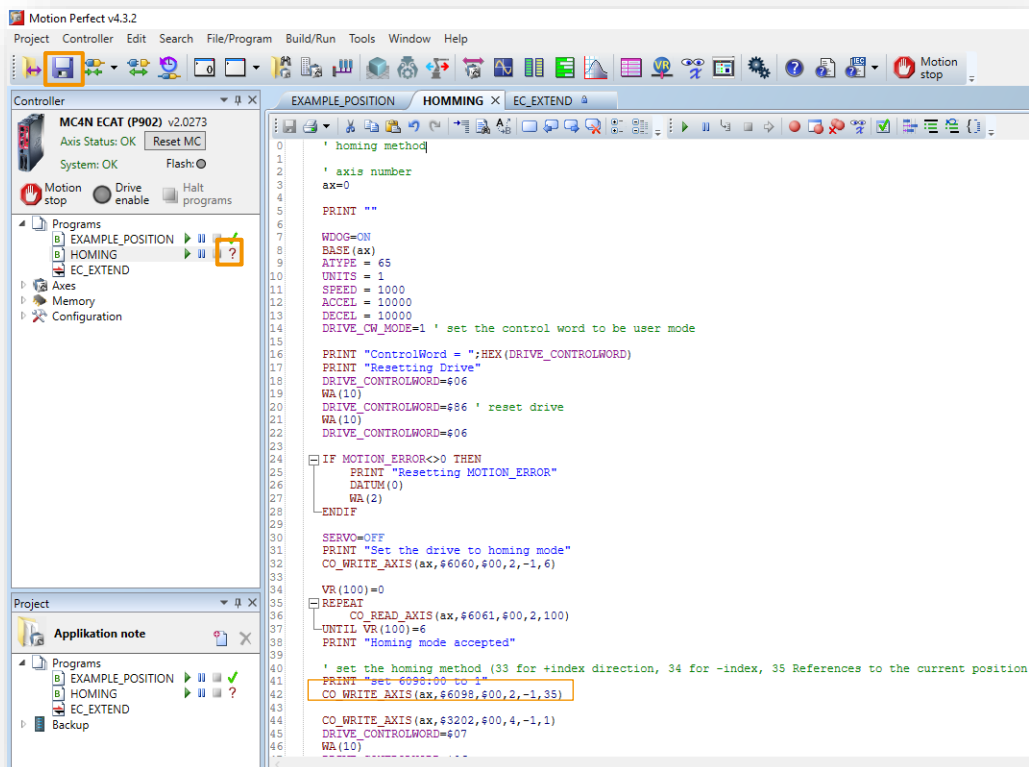
Without connecting additional external home switches, you can use the following methods:

CO_WRITE_AXIS(ax,$6098,$00,2,-1,33) : homing method 33, references to the next index pulse on the left.
CO_WRITE_AXIS(ax,$6098,$00,2,-1,34) : homing method 34, references to the next index pulse on the right.
The prerequisite for these two methods is that the connected motor is equipped with an encoder with an index pulse.
CO_WRITE_AXIS(ax,$6098,$00,2,-1,35) : homing method 35, references to the current position

6.2 EXAMPLE_POSITION

The program **EXAMPLE_POSITION** demonstrates the use of the position mode; the motor moves between two relative target positions.

To start the program, click on the **Start** symbol ▶ . The motor runs at the set speed (parameter SPEED, in motor revolutions per second) between the 2 target positions (argument of function MOVE, in motor revolutions) until you stop the program.

To stop the program, click the **Halt** icon ■.
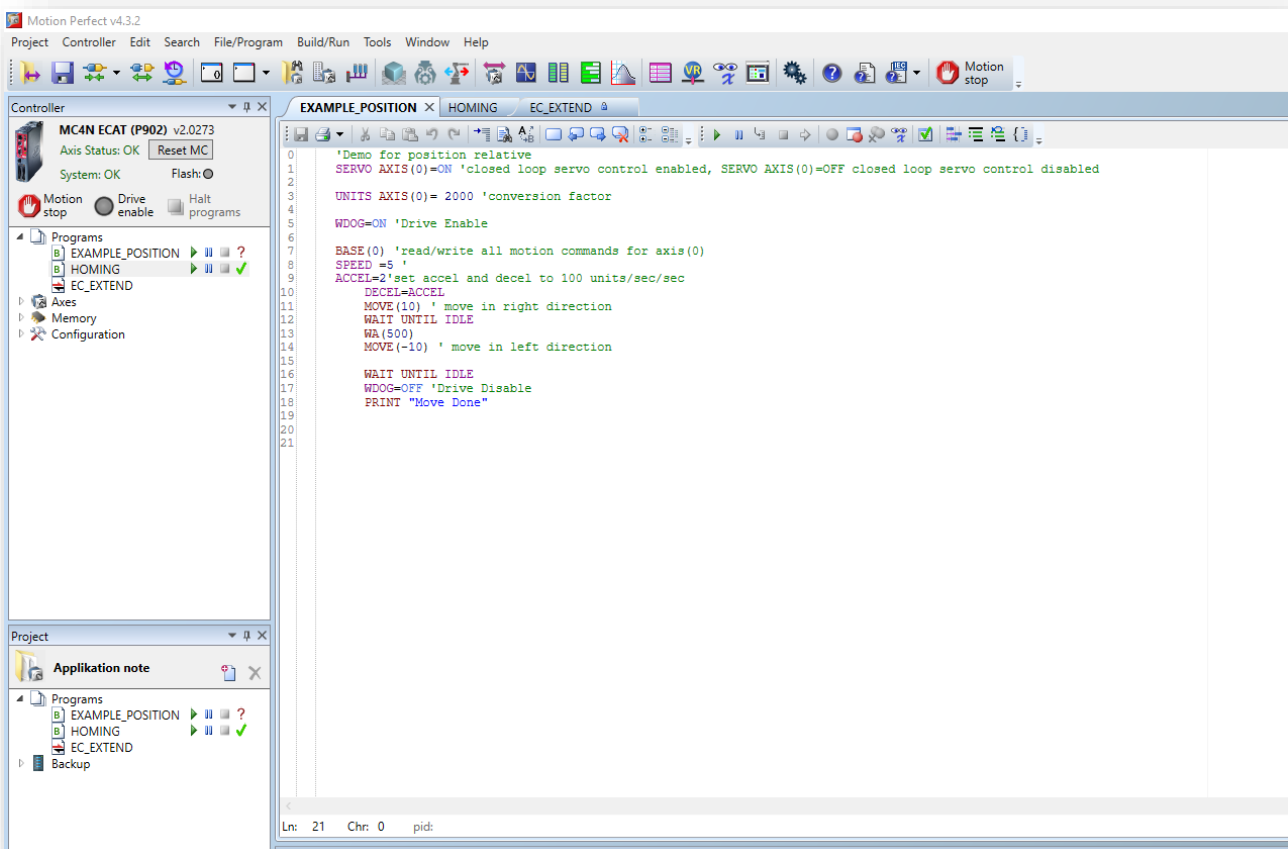
6.3 Checking the status of the slave

The tab **Status** shows the current status of the connected slave drive, giving data about the drive and motor including the drive status flags and stored alarms. A button is provided to reset the drive.

Double-clicking on a drive icon, a motor icon associated with a drive, or a line in the **Drives** grid will bring up the **EtherCAT device** window for the corresponding drive.
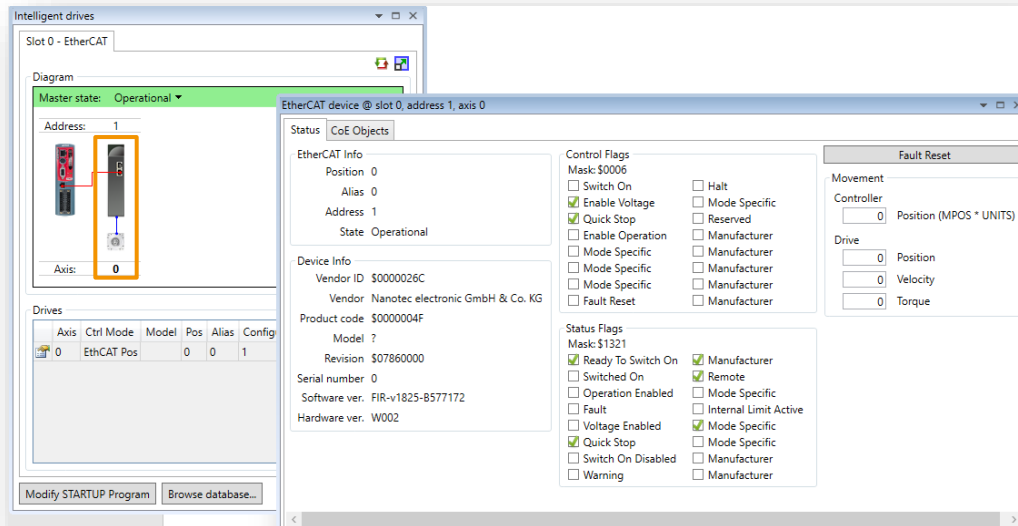
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