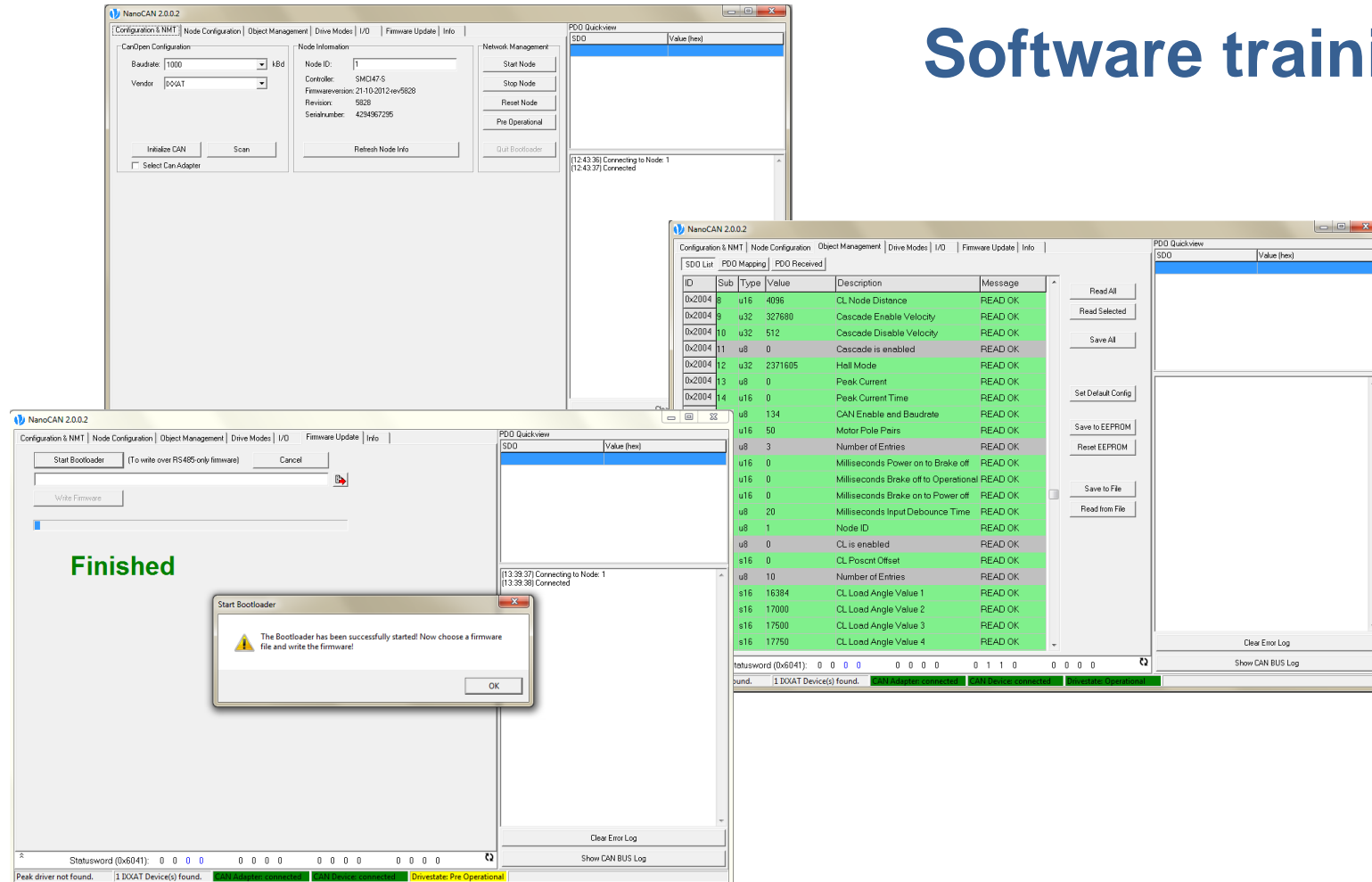
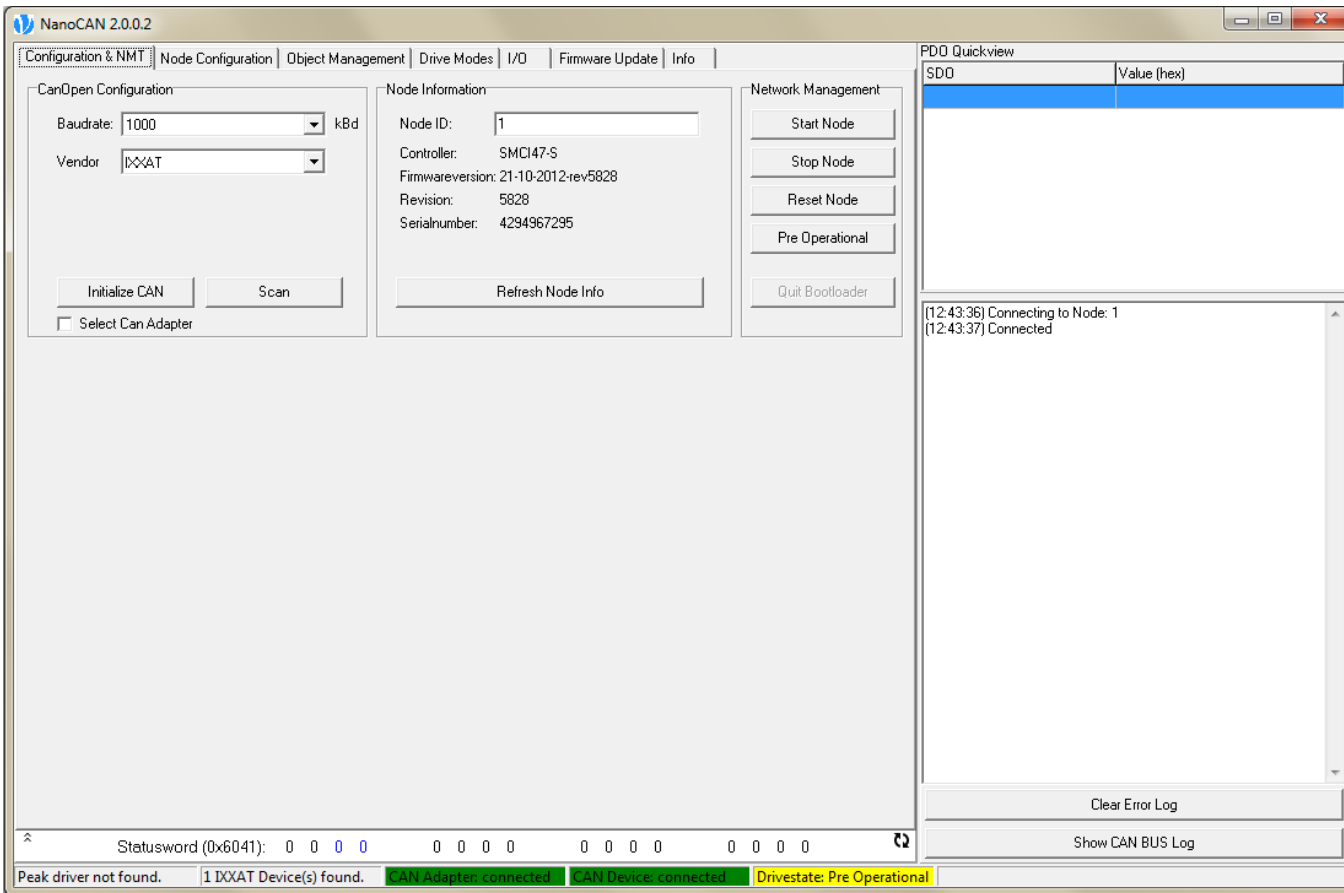


Software training

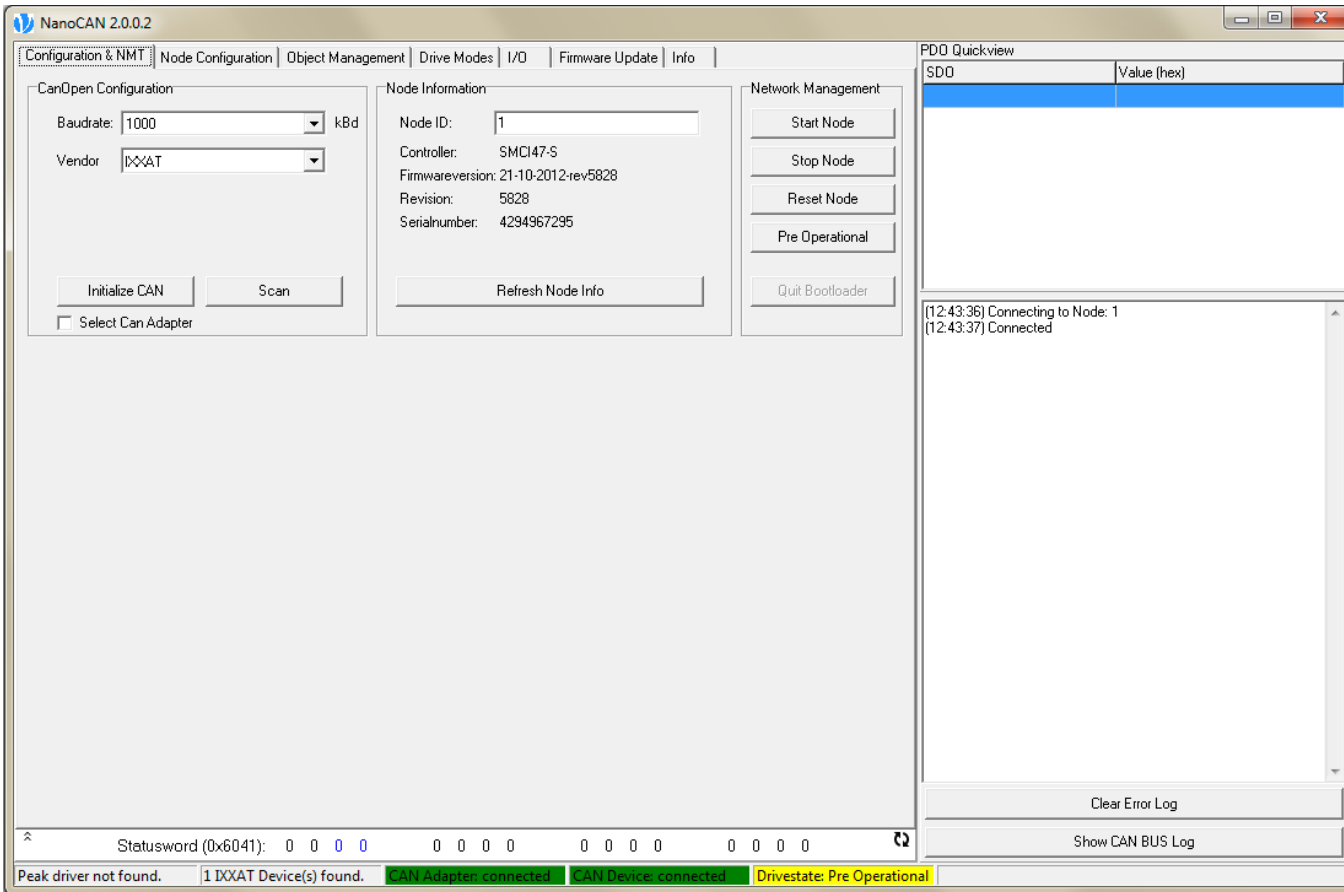




NanoCAN is a useful tool for:

- Testing
- Troubleshooting
- Firmware updates

Our controllers are always CAN slaves. Therefore, we do not have as many possibilities as in NanoPro. The main work is done by the CAN Master (Beckhoff, Siemens, etc.).



The start tab of NanoCAN is similar to the Communication tab of NanoPro.

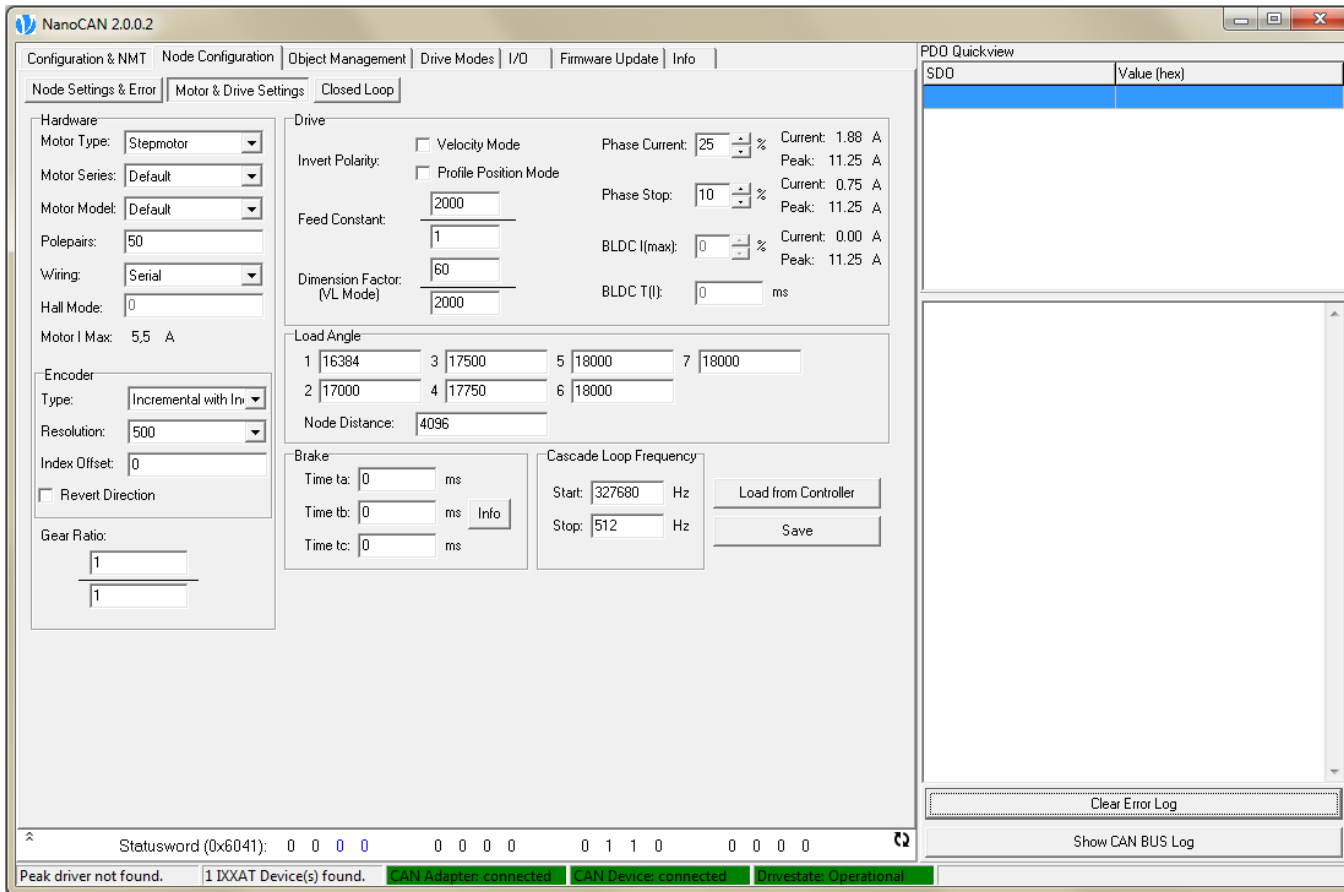
Its main function is to establish the communication to the controller.

The bottom of the screen shows the states of the drive and the communication.

Motor & Drive Settings:

These are the main settings of the motor:

- Phase current
- Hardware
- Encoder
- Brake (only SMCI47-S)
- BLDC parameters
- Display properties



The screenshot shows the NanoCAN 2.0.0.2 software interface. The 'Node Configuration' tab is active, and the 'Motor & Drive Settings' sub-tab is selected. The interface is divided into several sections:

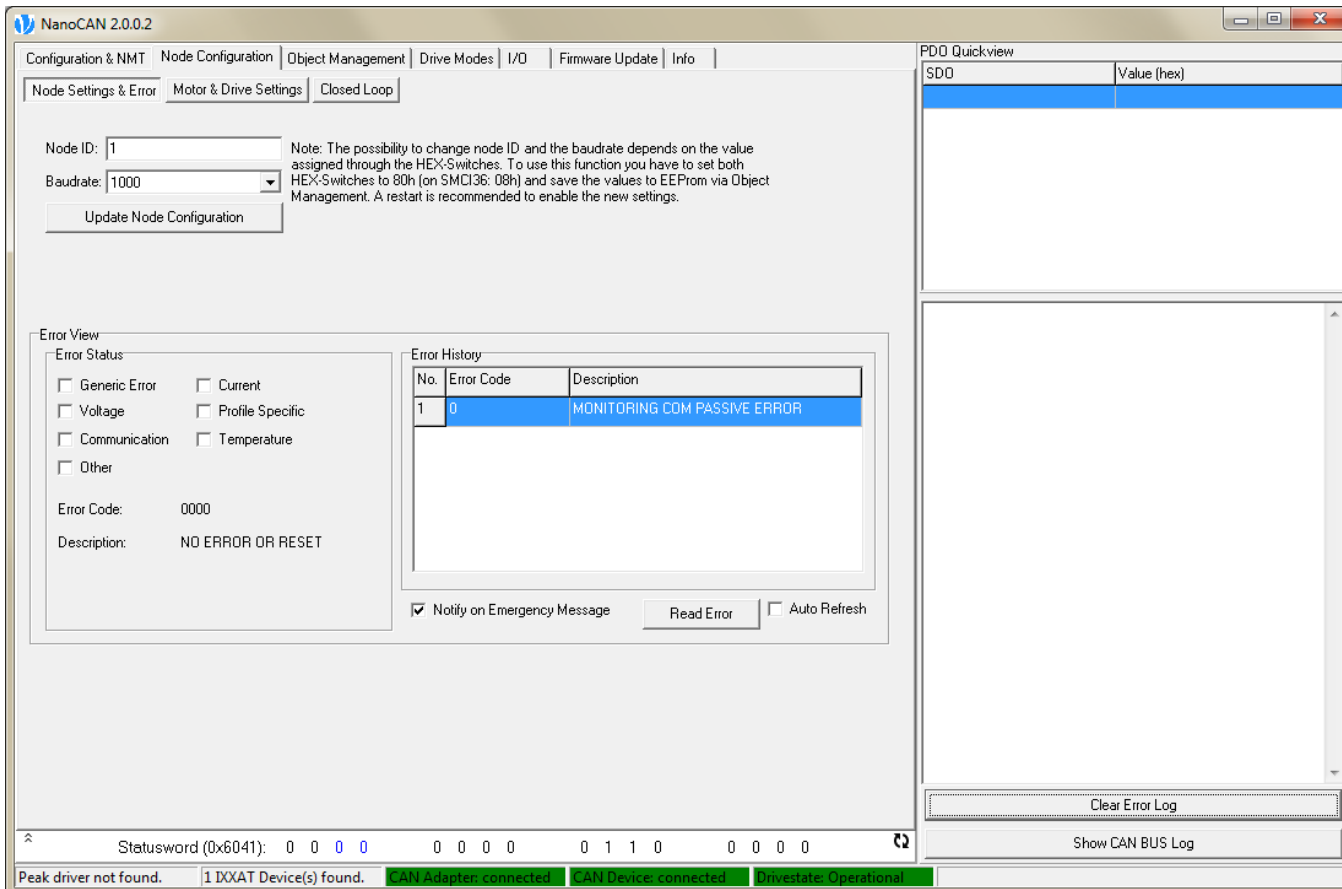
- Hardware:** Motor Type (Stepmotor), Motor Series (Default), Motor Model (Default), Polepairs (50), Wiring (Serial), Hall Mode (0), Motor I Max (5.5 A).
- Encoder:** Type (Incremental with Inv), Resolution (500), Index Offset (0), Revert Direction (unchecked), Gear Ratio (1/1).
- Drive:**
 - Invert Polarity:** Velocity Mode (unchecked), Profile Position Mode (unchecked).
 - Feed Constant:** 2000.
 - Dimension Factor (VL Mode):** 60.
 - Phase Current:** 25 % (Current: 1.88 A, Peak: 11.25 A).
 - Phase Stop:** 10 % (Current: 0.75 A, Peak: 11.25 A).
 - BLDC I(max):** 0 % (Current: 0.00 A, Peak: 11.25 A).
 - BLDC T(I):** 0 ms.
- Load Angle:** 1 (16384), 2 (17000), 3 (17500), 4 (17750), 5 (18000), 6 (18000), 7 (18000).
- Node Distance:** 4096.
- Brake:** Time ta (0 ms), Time tb (0 ms), Time tc (0 ms), Info button.
- Cascade Loop Frequency:** Start (327680 Hz), Stop (512 Hz), Load from Controller button, Save button.

At the bottom, the status bar shows: Statusword (0x6041): 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0. Below this, it indicates: Peak driver not found. 1 IXXAT Device(s) found. CAN Adapter: connected. CAN Device: connected. Drivestate: Operational.

Node Settings & Error:

You can change the Node ID and baud rate here.

In addition, you can read out active errors and the error history.



The screenshot shows the NanoCAN 2.0.0.2 software interface. The main window has a menu bar with 'Configuration & NMT', 'Node Configuration', 'Object Management', 'Drive Modes', 'I/O', 'Firmware Update', and 'Info'. Below the menu bar are three tabs: 'Node Settings & Error', 'Motor & Drive Settings', and 'Closed Loop'. The 'Node Settings & Error' tab is active, showing fields for 'Node ID' (set to 1) and 'Baudrate' (set to 1000). A note states: 'Note: The possibility to change node ID and the baudrate depends on the value assigned through the HEX-Switches. To use this function you have to set both HEX-Switches to 80h (on SMCI36: 08h) and save the values to EEPROM via Object Management. A restart is recommended to enable the new settings.' Below these fields is an 'Update Node Configuration' button. The 'Error View' section is also visible, showing 'Error Status' with checkboxes for 'Generic Error', 'Current', 'Voltage', 'Profile Specific', 'Communication', 'Temperature', and 'Other'. The 'Error Code' is 0000 and the 'Description' is 'NO ERROR OR RESET'. The 'Error History' table shows one entry: '1 0 MONITORING COM PASSIVE ERROR'. At the bottom, there is a status bar with a 'Statusword (0x6041): 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0' and a row of status indicators: 'Peak driver not found.', '1 IXXAT Device(s) found.', 'CAN Adapter: connected', 'CAN Device: connected', and 'Drivestate: Operational'.

Node Configuration

Node ID: 1
Baudrate: 1000

Note: The possibility to change node ID and the baudrate depends on the value assigned through the HEX-Switches. To use this function you have to set both HEX-Switches to 80h (on SMCI36: 08h) and save the values to EEPROM via Object Management. A restart is recommended to enable the new settings.

Update Node Configuration

Error View

Error Status

- ☐ Generic Error
- ☐ Current
- ☐ Voltage
- ☐ Profile Specific
- ☐ Communication
- ☐ Temperature
- ☐ Other

Error Code: 0000
Description: NO ERROR OR RESET

Error History

| No. | Error Code | Description |
|-----|------------|------------------------------|
| 1 | 0 | MONITORING COM PASSIVE ERROR |

☒ Notify on Emergency Message ☐ Auto Refresh

Clear Error Log

Show CAN BUS Log

Statusword (0x6041): 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0

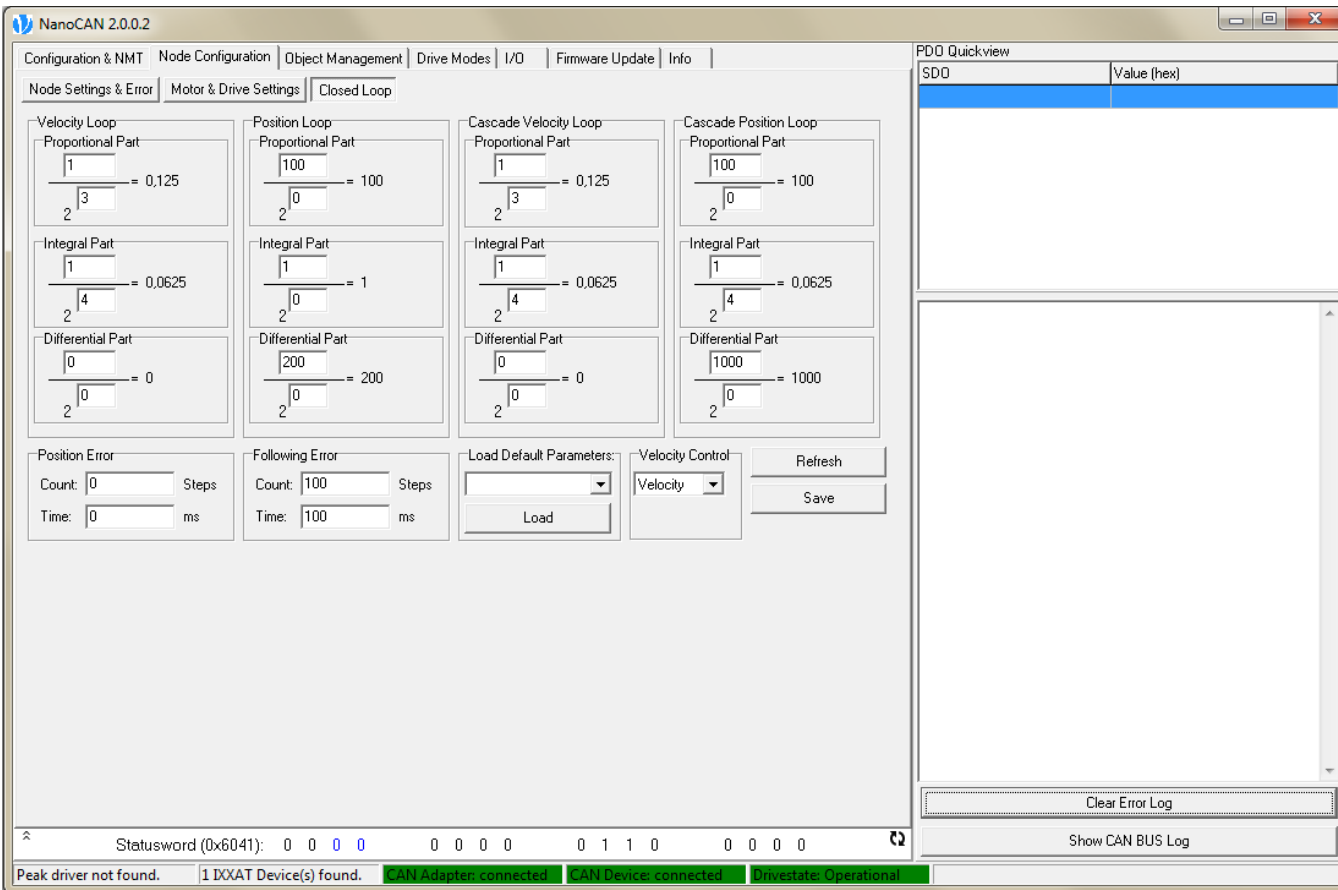
Peak driver not found. 1 IXXAT Device(s) found. CAN Adapter: connected CAN Device: connected Drivestate: Operational

Closed Loop:

This tab is equivalent to the CL-Parameter tab in NanoPro.

- PID parameters
- Position error
- Following error

The only difference is that you cannot start the Wizard here.



The screenshot shows the NanoCAN 2.0.0.2 software interface. The 'Closed Loop' tab is selected, displaying configuration parameters for four control loops: Velocity Loop, Position Loop, Cascade Velocity Loop, and Cascade Position Loop. Each loop has proportional, integral, and differential gain settings. The status bar at the bottom indicates 'Peak driver not found', '1 IXXAT Device(s) found', 'CAN Adapter: connected', 'CAN Device: connected', and 'Drivestate: Operational'.

Configuration & NMT | **Node Configuration** | Object Management | Drive Modes | I/O | Firmware Update | Info

Node Settings & Error | Motor & Drive Settings | **Closed Loop**

Velocity Loop
Proportional Part: $\frac{1}{2} \frac{1}{3} = 0,125$
Integral Part: $\frac{1}{2} \frac{4}{4} = 0,0625$
Differential Part: $\frac{0}{2} \frac{0}{0} = 0$

Position Loop
Proportional Part: $\frac{100}{2} \frac{0}{0} = 100$
Integral Part: $\frac{1}{2} \frac{0}{0} = 1$
Differential Part: $\frac{200}{2} \frac{0}{0} = 200$

Cascade Velocity Loop
Proportional Part: $\frac{1}{2} \frac{3}{3} = 0,125$
Integral Part: $\frac{1}{2} \frac{4}{4} = 0,0625$
Differential Part: $\frac{0}{2} \frac{0}{0} = 0$

Cascade Position Loop
Proportional Part: $\frac{100}{2} \frac{0}{0} = 100$
Integral Part: $\frac{1}{2} \frac{4}{4} = 0,0625$
Differential Part: $\frac{1000}{2} \frac{0}{0} = 1000$

Position Error
Count: 0 Steps
Time: 0 ms

Following Error
Count: 100 Steps
Time: 100 ms

Load Default Parameters: [Dropdown] **Load**

Velocity Control: [Dropdown] **Velocity** **Refresh** **Save**

PDO Quickview

| SDO | Value (hex) |
|-----|-------------|
| | |

Statusword (0x6041): 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0

Peak driver not found. 1 IXXAT Device(s) found. CAN Adapter: connected CAN Device: connected Drivestate: Operational

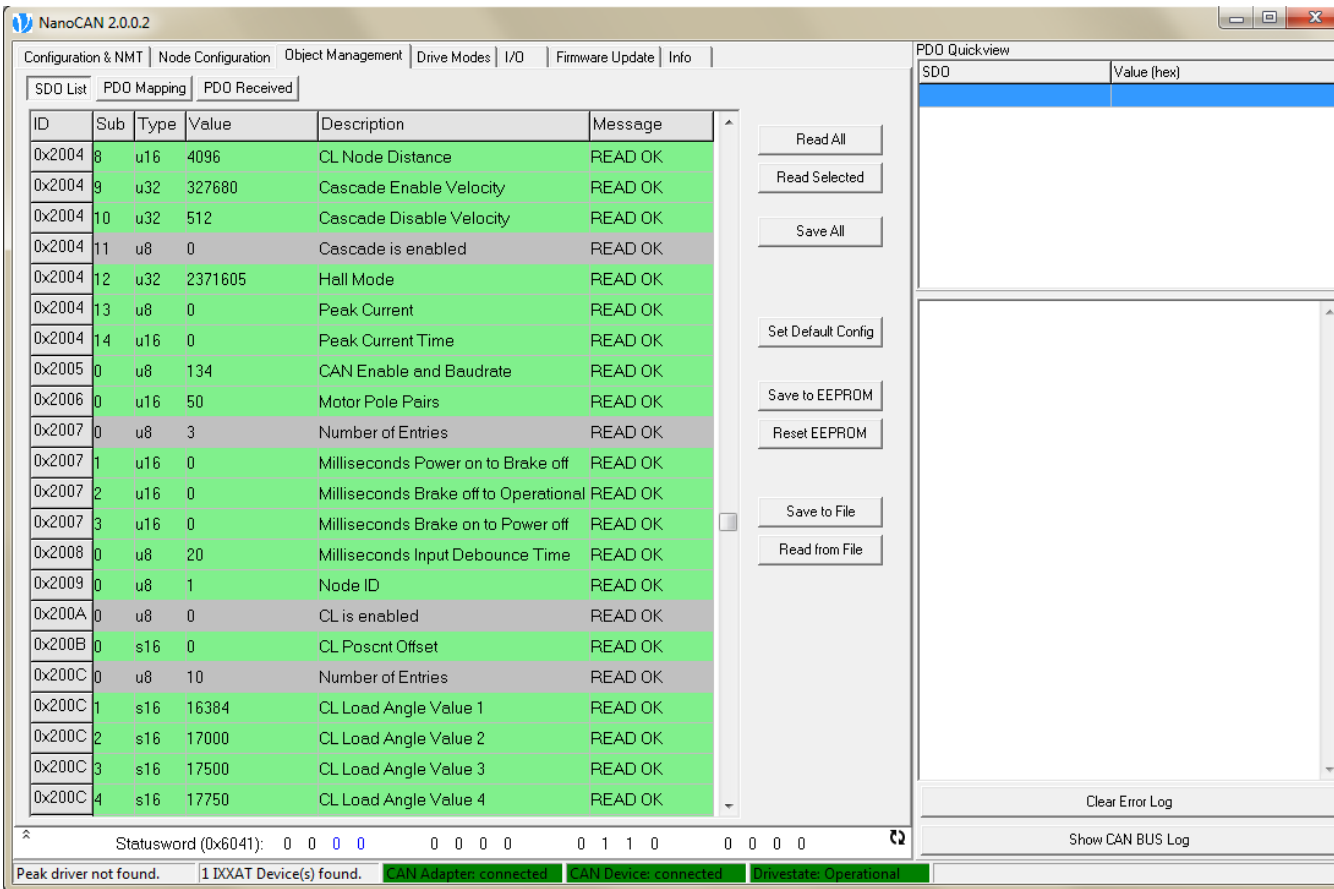
Clear Error Log
Show CAN BUS Log

SDO List:

All parameters of the controller can be found in the SDO list.

This is like a register:
each parameter has an address, a data type and a value.

The addresses and most of the data types are standardized in the CANopen protocol.



NanoCAN 2.0.0.2

Configuration & NMT | Node Configuration | Object Management | Drive Modes | I/O | Firmware Update | Info

SDO List | PDO Mapping | PDO Received

| ID | Sub | Type | Value | Description | Message |
|--------|-----|------|---------|---------------------------------------|---------|
| 0x2004 | 8 | u16 | 4096 | CL Node Distance | READ OK |
| 0x2004 | 9 | u32 | 327680 | Cascade Enable Velocity | READ OK |
| 0x2004 | 10 | u32 | 512 | Cascade Disable Velocity | READ OK |
| 0x2004 | 11 | u8 | 0 | Cascade is enabled | READ OK |
| 0x2004 | 12 | u32 | 2371605 | Hall Mode | READ OK |
| 0x2004 | 13 | u8 | 0 | Peak Current | READ OK |
| 0x2004 | 14 | u16 | 0 | Peak Current Time | READ OK |
| 0x2005 | 0 | u8 | 134 | CAN Enable and Baudrate | READ OK |
| 0x2006 | 0 | u16 | 50 | Motor Pole Pairs | READ OK |
| 0x2007 | 0 | u8 | 3 | Number of Entries | READ OK |
| 0x2007 | 1 | u16 | 0 | Milliseconds Power on to Brake off | READ OK |
| 0x2007 | 2 | u16 | 0 | Milliseconds Brake off to Operational | READ OK |
| 0x2007 | 3 | u16 | 0 | Milliseconds Brake on to Power off | READ OK |
| 0x2008 | 0 | u8 | 20 | Milliseconds Input Debounce Time | READ OK |
| 0x2009 | 0 | u8 | 1 | Node ID | READ OK |
| 0x200A | 0 | u8 | 0 | CL is enabled | READ OK |
| 0x200B | 0 | s16 | 0 | CL Poscnt Offset | READ OK |
| 0x200C | 0 | u8 | 10 | Number of Entries | READ OK |
| 0x200C | 1 | s16 | 16384 | CL Load Angle Value 1 | READ OK |
| 0x200C | 2 | s16 | 17000 | CL Load Angle Value 2 | READ OK |
| 0x200C | 3 | s16 | 17500 | CL Load Angle Value 3 | READ OK |
| 0x200C | 4 | s16 | 17750 | CL Load Angle Value 4 | READ OK |

Buttons: Read All, Read Selected, Save All, Set Default Config, Save to EEPROM, Reset EEPROM, Save to File, Read from File

SDO Quickview: SDO, Value (hex)

Statusword (0x6041): 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0

Peak driver not found. 1 IXXAT Device(s) found. CAN Adapter: connected. CAN Device: connected. Drivestate: Operational

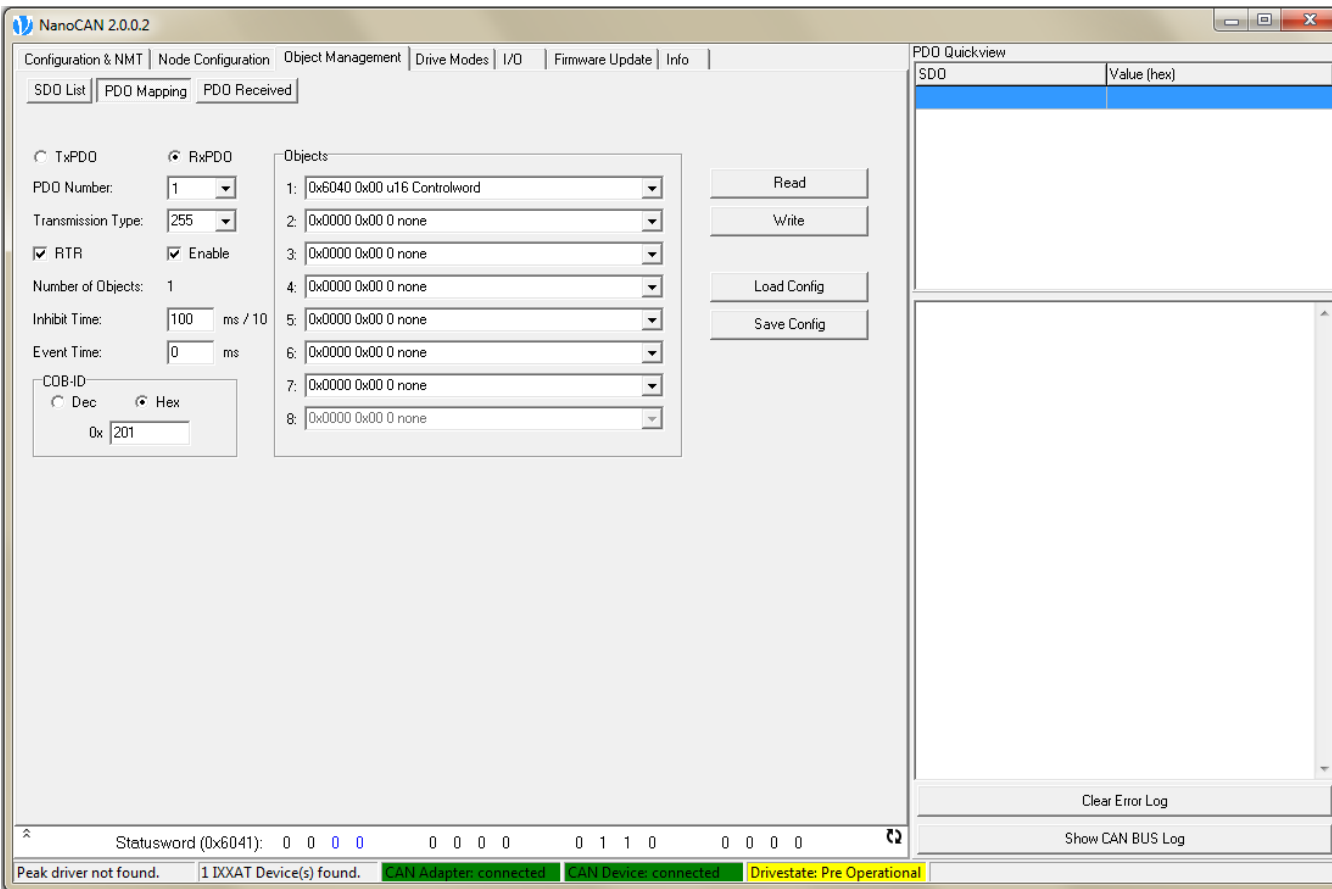
Clear Error Log, Show CAN BUS Log

You can read out and save all values of the controller.

PDO Mapping:

This page is for the PDO mapping.

This means you decide which SDOs you want the controller to send or read automatically.

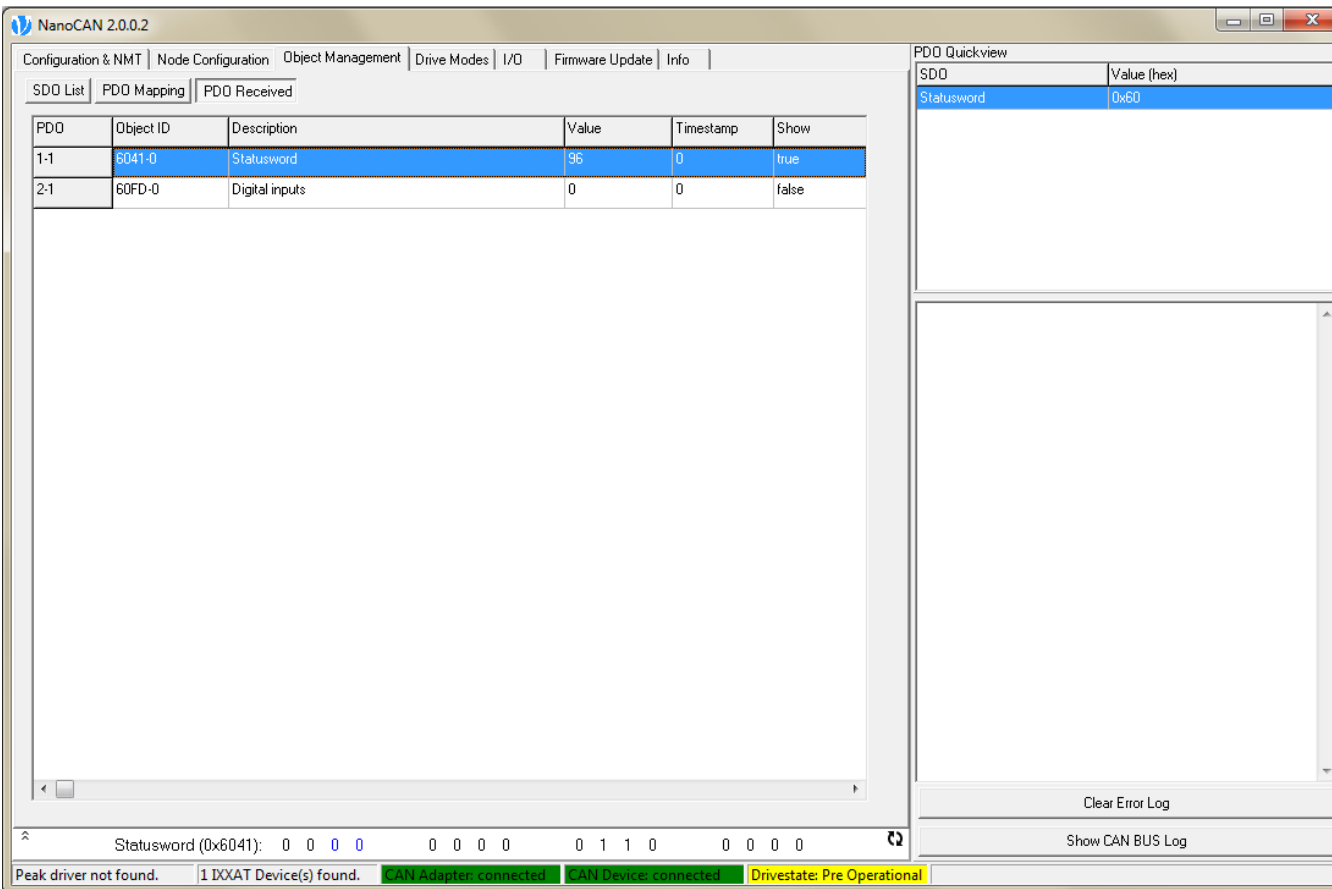


The main communication between master and our controllers takes place with PDO messages.

PDO Received:

This page gives an overview of all the mapped PDOs.

You can also decide if and which PDOs you want to see in the small window at the top right of the NanoCAN screen.



The screenshot shows the NanoCAN 2.0.0.2 software interface. The main window has a tabbed interface with 'Object Management' selected. Inside this tab, there are three sub-tabs: 'PDO List', 'PDO Mapping', and 'PDO Received'. The 'PDO Received' sub-tab is active, displaying a table of received PDOs.

| PDO | Object ID | Description | Value | Timestamp | Show |
|-----|-----------|----------------|-------|-----------|-------|
| 1-1 | 6041-0 | Statusword | 96 | 0 | true |
| 2-1 | 60FD-0 | Digital inputs | 0 | 0 | false |

At the bottom of the main window, there is a status bar showing the Statusword (0x6041) as 0 0 0 0 0 0 0 1 1 0 0 0 0 0. Below this, a green bar indicates the system status: 'Peak driver not found. 1 IXXAT Device(s) found. CAN Adapter: connected CAN Device: connected Drivestate: Pre Operational'.

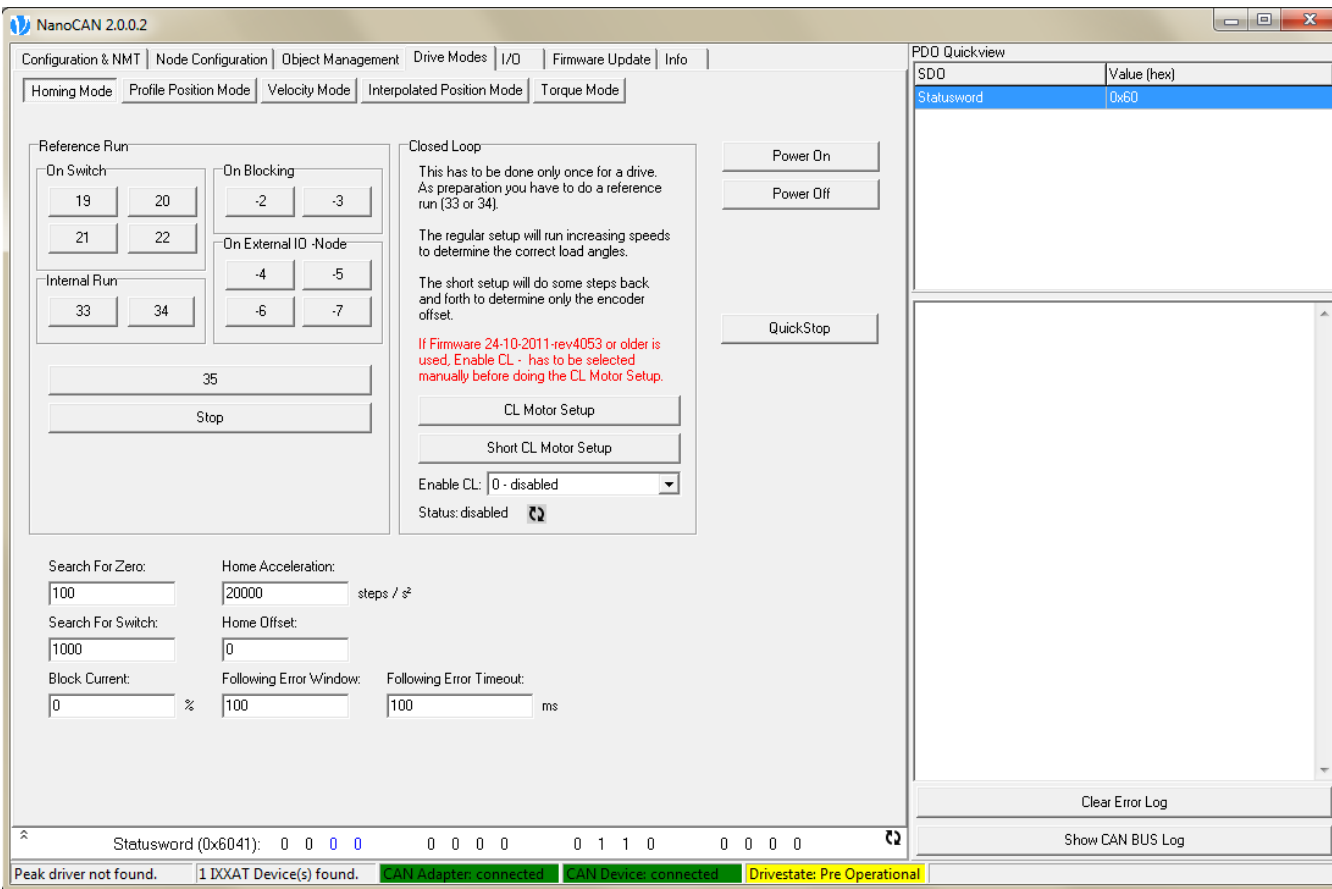
On the right side of the main window, there is a 'PDO Quickview' panel. It has a table with two columns: 'SDO' and 'Value (hex)'. The first row shows 'Statusword' with a value of '0x60'. Below this table are two buttons: 'Clear Error Log' and 'Show CAN BUS Log'.

Homing Mode:

On this page you can test all the different homing (reference) modes.

- Internal homing
- External homing
- Homing on block
- Homing without movement

In addition, it is possible to carry out the Closed Loop setup and to switch to closed loop mode.



The screenshot shows the NanoCAN 2.0.0.2 software interface with the 'Drive Modes' tab selected. The interface is divided into several sections:

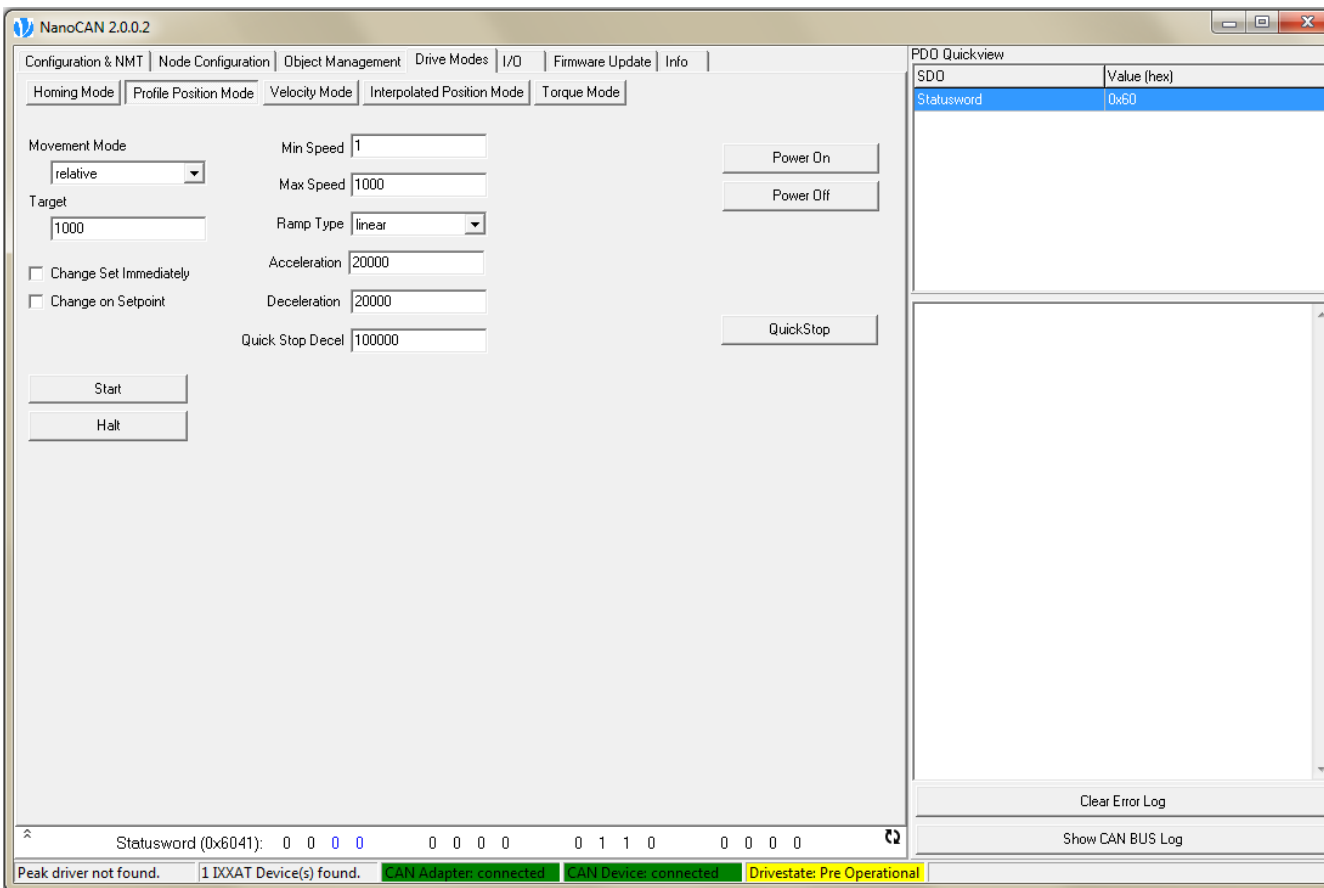
- Configuration & NMT**: Includes tabs for Homing Mode, Profile Position Mode, Velocity Mode, Interpolated Position Mode, and Torque Mode.
- Reference Run**: Contains buttons for 'On Switch' (19, 20, 21, 22), 'On Blocking' (-2, -3), 'On External IO -Node' (-4, -5, -6, -7), and 'Internal Run' (33, 34). There is also a 'Stop' button and a '35' button.
- Closed Loop**: Contains a 'Power On' button, a 'Power Off' button, and a 'QuickStop' button. It also has a 'CL Motor Setup' button, a 'Short CL Motor Setup' button, and a dropdown menu for 'Enable CL' (currently set to '0 - disabled'). The status is 'Status: disabled'.
- Search For Zero**: Includes a text input for 'Search For Zero' (100) and a 'Home Acceleration' field (20000 steps / s²).
- Search For Switch**: Includes a text input for 'Search For Switch' (1000) and a 'Home Offset' field (0).
- Block Current**: Includes a text input for 'Block Current' (0) and a percentage sign.
- Following Error Window**: Includes a text input for 'Following Error Window' (100) and a 'Following Error Timeout' field (100 ms).
- SDO Quickview**: A table showing SDO values. The first row is 'Statusword' with a value of '0x60'.
- Clear Error Log** and **Show CAN BUS Log** buttons.
- Statusbar**: At the bottom, it shows 'Statusword (0x6041): 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0' and 'Peak driver not found. 1 IXXAT Device(s) found. CAN Adapter: connected CAN Device: connected Drivestate: Pre Operational'.

Homing Mode:

Test the position mode relative and absolute.

They are equivalent to these modes in NanoPro.

A change in the target position can be set immediately or when the first position is reached.



NanoCAN 2.0.0.2

Configuration & NMT | Node Configuration | Object Management | Drive Modes | I/O | Firmware Update | Info

Homing Mode | Profile Position Mode | **Velocity Mode** | Interpolated Position Mode | Torque Mode

Target Velocity: 1000 Set Target Velocity

Min Velocity: 60

Max Velocity: 25000

Acceleration: 20000 steps/sec 1 sec

Deceleration: 20000 steps/sec 1 sec

Quick Stop: 50000 steps/sec 1 sec

Power On

Power Off

QuickStop

Current Speed: 0 Start

Refresh ☐ Auto Refresh Stop

Halt

PDO Quickview

| SDO | Value (hex) |
|------------|-------------|
| Statusword | 0x60 |

Clear Error Log

Show CAN BUS Log

Statusword (0x6041): 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0

Peak driver not found. 1 IXXAT Device(s) found. CAN Adapter: connected CAN Device: connected Drivestate: Pre Operational

Homing Mode:

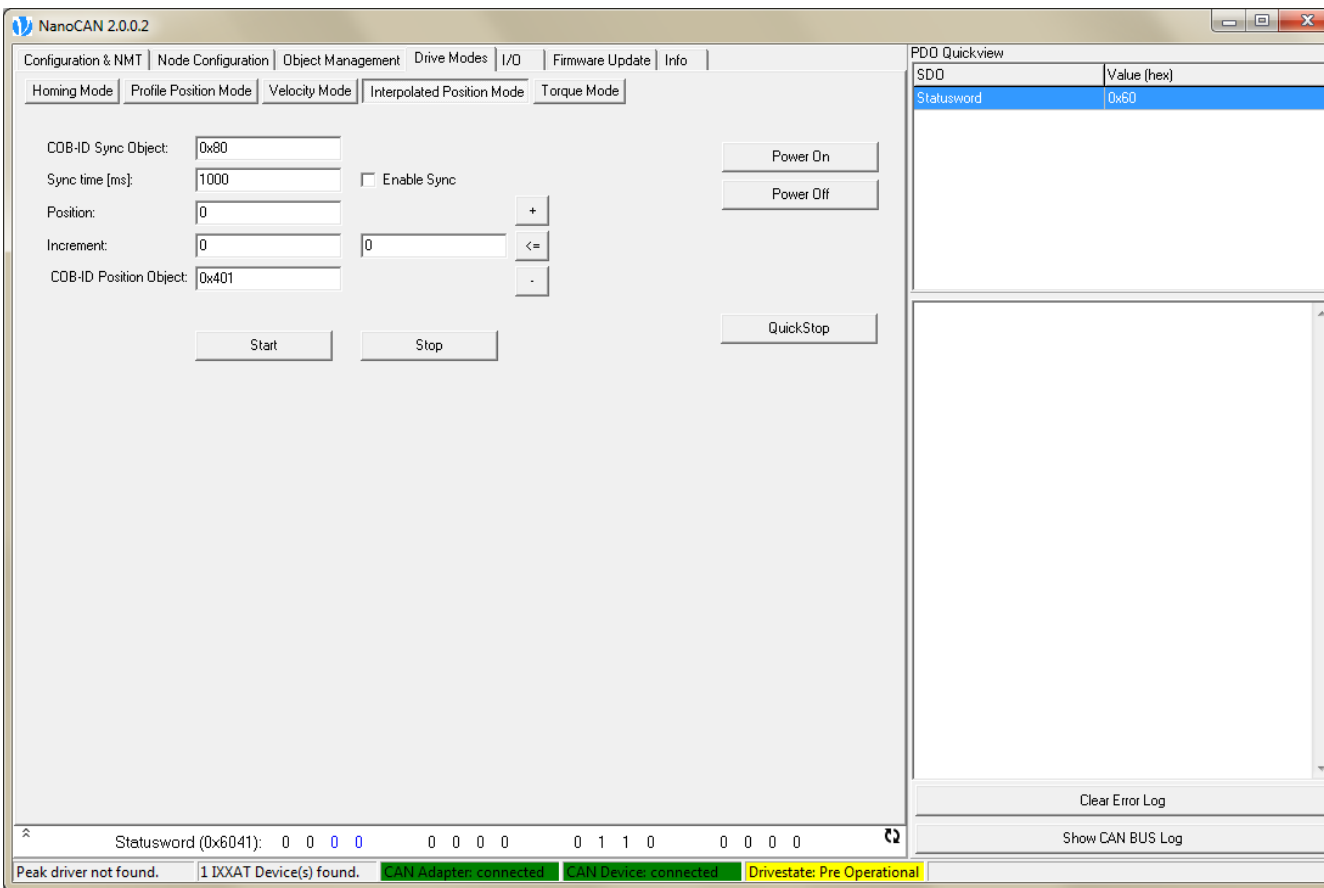
Test the speed mode.

This is equivalent to the speed mode in NanoPro.

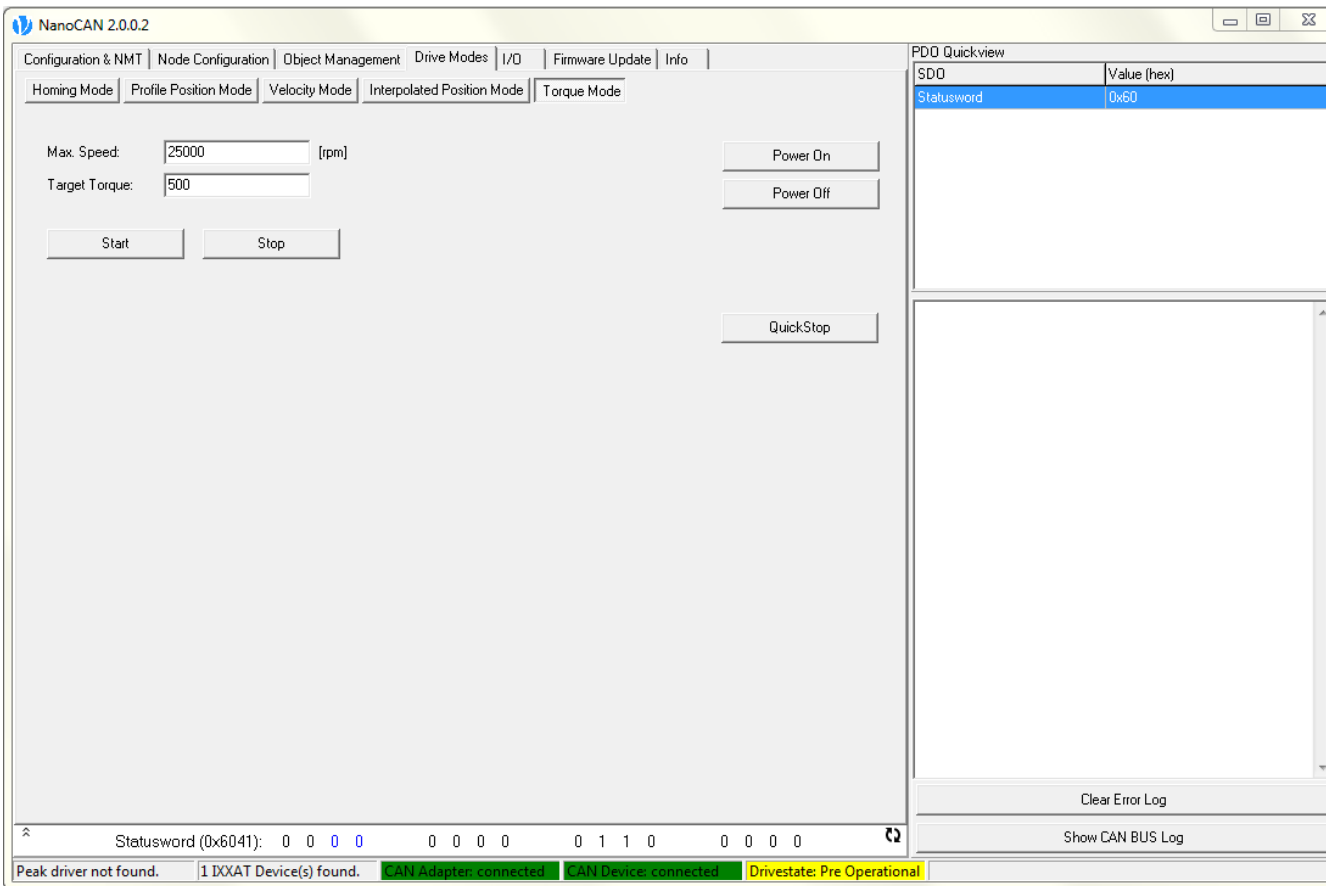
Interpolated Position Mode:

This mode is designed to synchronize two or more motors.

The master sends a new position every timestamp. The controller calculates the speed to get to this position before the new position is set.



This mode must not be combined with Closed Loop.



Torque Mode:

The behavior of the torque mode is equal to NanoPro.

But the maximum torque is set as a value, not with the analogue input. In addition, a maximum speed can be defined.

Closed Loop is necessary.

NanoCAN 2.0.0.2

Configuration & NMT | Node Configuration | Object Management | Drive Modes | I/O | Firmware Update | Info

Digital Input

☐ Digital Input 1 ☐ Digital Input 4

☐ Digital Input 2 ☐ Digital Input 5 ☐ Auto Refresh

☐ Digital Input 3 ☐ Digital Input 6

Debounce Time: 20 ms

Digital Output

☐ Digital Out 1 ☐ Firmware Used

☐ Digital Out 2 ☐ Firmware Used ☐ Auto Refresh

☐ Digital Out 3 ☐ Firmware Used

☐ Auto Set

Analog Input

Analog Input Nr.: 1

Current Value: 586

☐ Auto Refresh

Max Value: 0

Min Value: 0

Delta: 1

Pos. Delta: 1

Neg. Delta: 1

☐ Global Interrupt Enable

PDO Quickview

| SDO | Value (hex) |
|------------|-------------|
| Statusword | 0x60 |

Statusword (0x6041): 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0

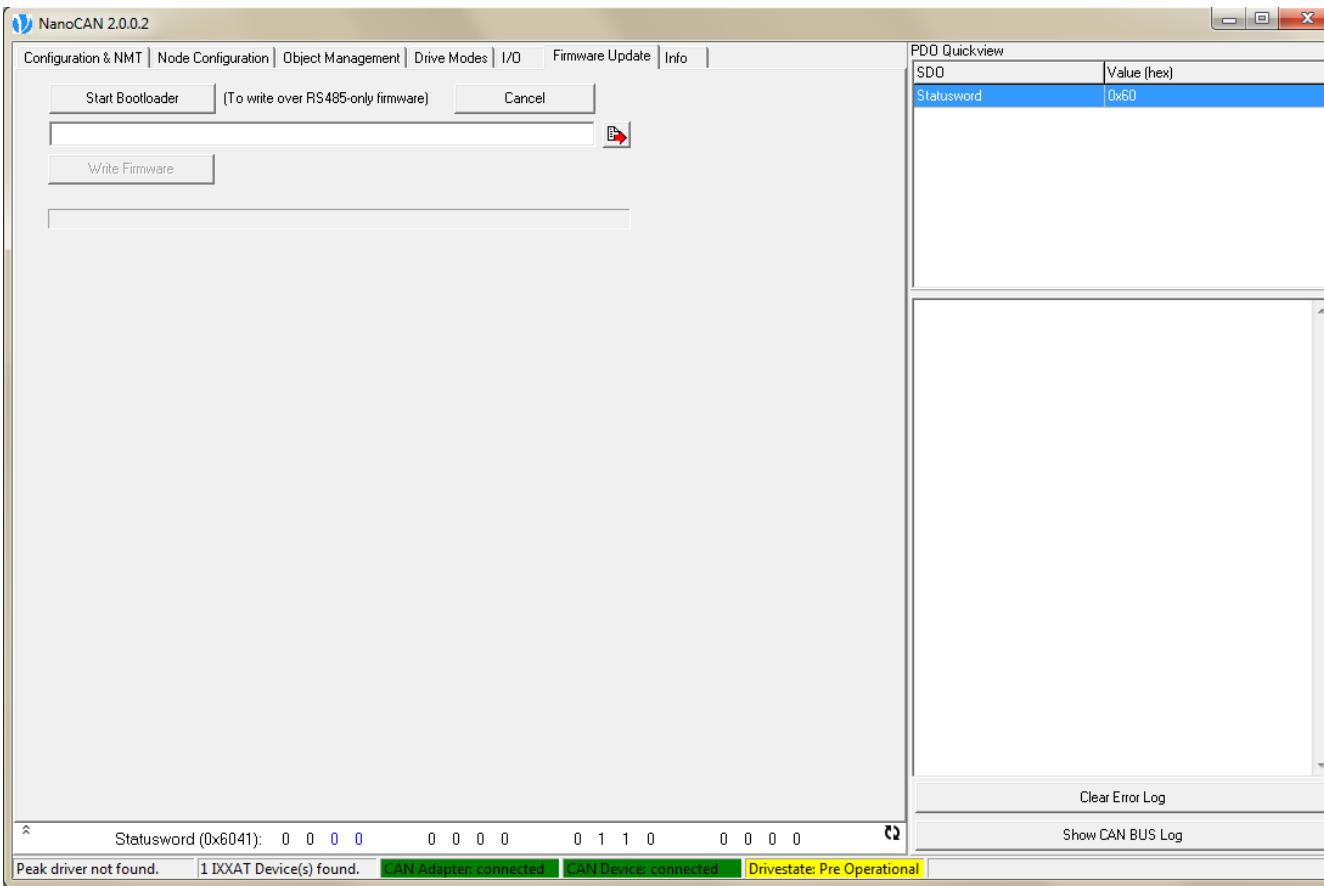
Peak driver not found. 1 IXAT Device(s) found. CAN Adapter: connected CAN Device: connected Drivestate: Pre Operational

This tab shows the status of the inputs and outputs.

Ranges and a filter for the analogue input can be set.

The analogue input cannot be used by the controller in CANopen, but it is possible to read out the value on the input through a SDO.

The digital inputs also cannot be used by the firmware, besides input 6, which is the limit and reference switch.

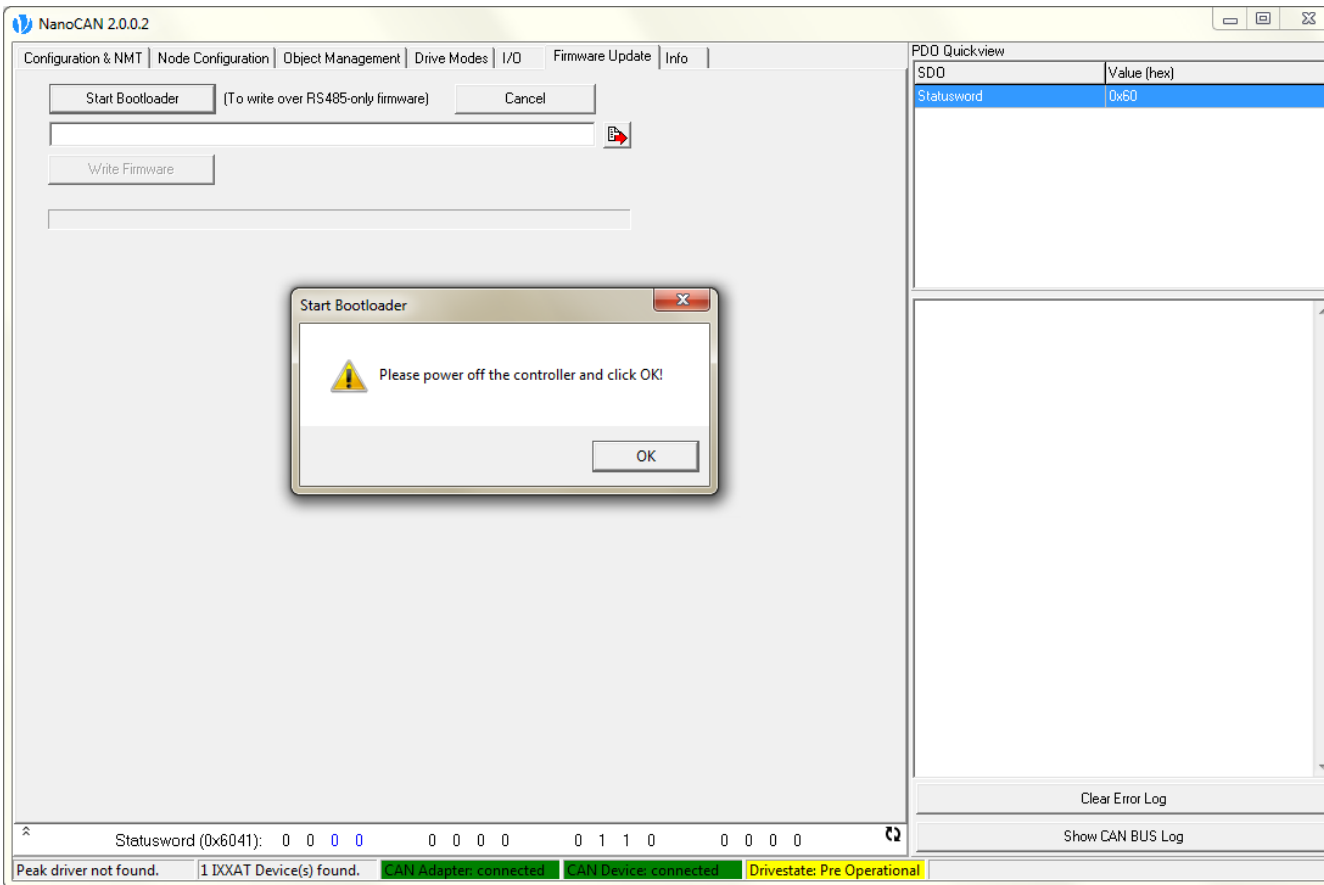


This tab is set for firmware updates and changes.

As opposed to NanoPro, NanoCAN has no data file with firmware versions. You need a firmware file.

A firmware update is possible to newer versions or for a change from RS485 to CANopen. This is very important for controllers which support RS485 and CANopen.

Special firmware is available through our support team.



To change from RS485 to CANopen, please use the "Start Bootloader" function and follow the instructions.

NanoCAN 2.0.0.2

Configuration & NMT | Node Configuration | Object Management | Drive Modes | I/O | Firmware Update | Info

Start Bootloader (To write over RS485-only firmware) Cancel

Write Firmware

Start Bootloader

⚠ Please click OK and power on the controller afterwards!

OK

PDO Quickview

| SDO | Value (hex) |
|------------|-------------|
| Statusword | 0x60 |

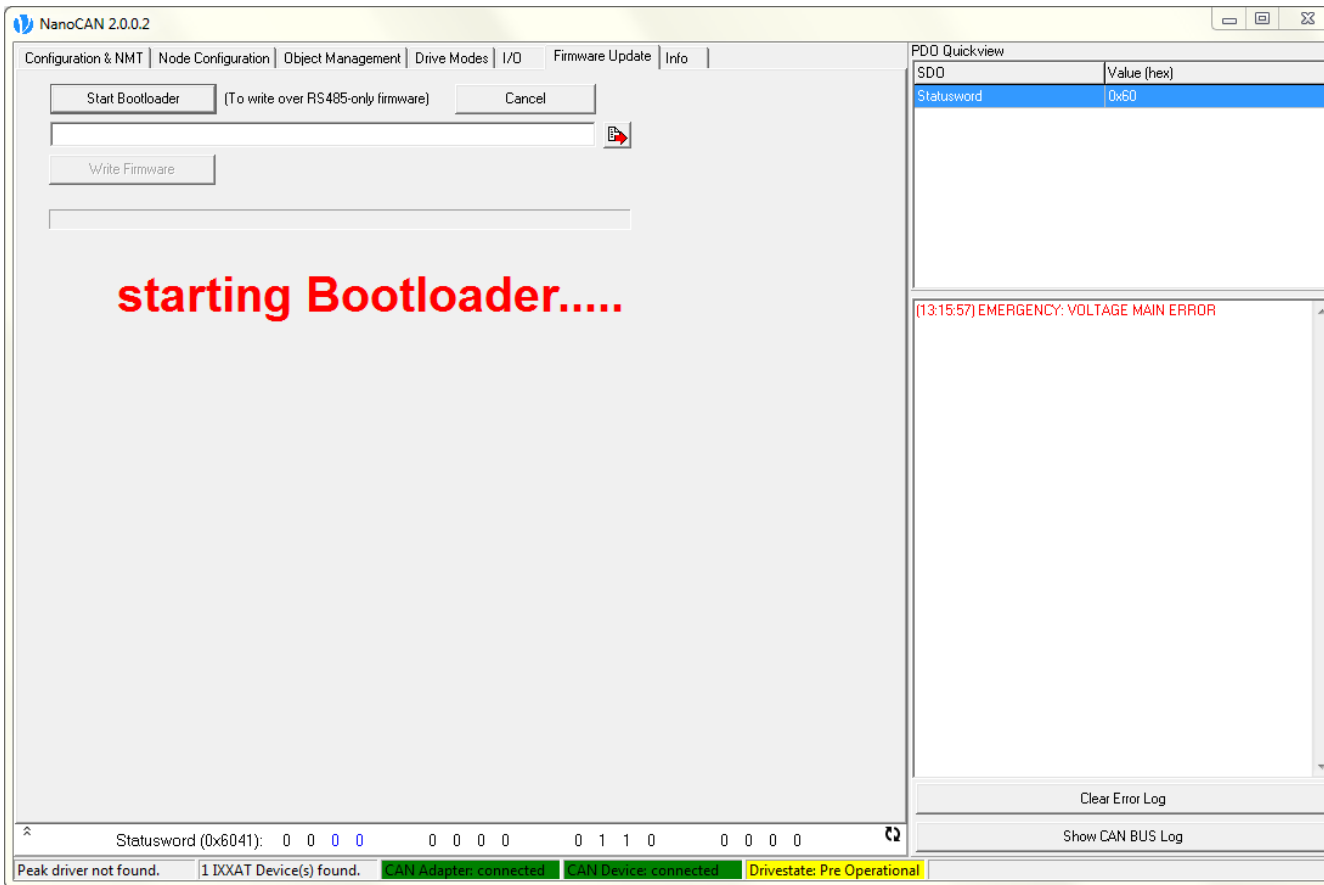
(13:15:57) EMERGENCY: VOLTAGE MAIN ERROR

Clear Error Log

Show CAN BUS Log

Statusword (0x6041): 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0

Peak driver not found. 1 IXAT Device(s) found. CAN Adapter: connected CAN Device: connected Drivestate: Pre Operational



The bootloader will be started.

NanoCAN 2.0.0.2

Configuration & NMT | Node Configuration | Object Management | Drive Modes | I/O | Firmware Update | Info

Start Bootloader (To write over RS485-only firmware) Cancel

Write Firmware

Finished

Start Bootloader

⚠ The Bootloader has been successfully started! Now choose a firmware file and write the firmware!

OK

PDO Quickview

| SDO | Value (hex) |
|-----|-------------|
| | |

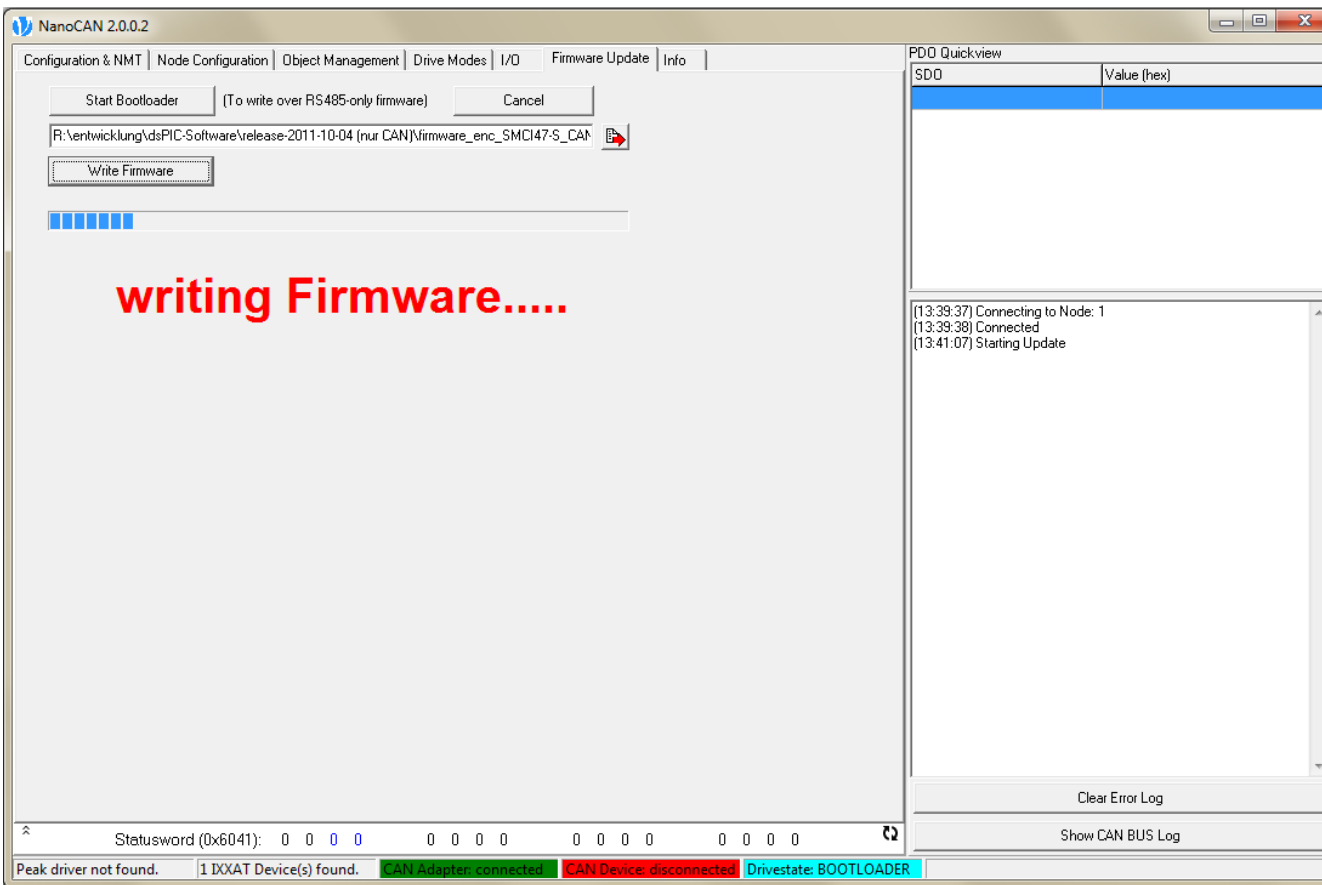
(13:39:37) Connecting to Node: 1
(13:39:38) Connected

Clear Error Log

Show CAN BUS Log

Statusword (0x6041): 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

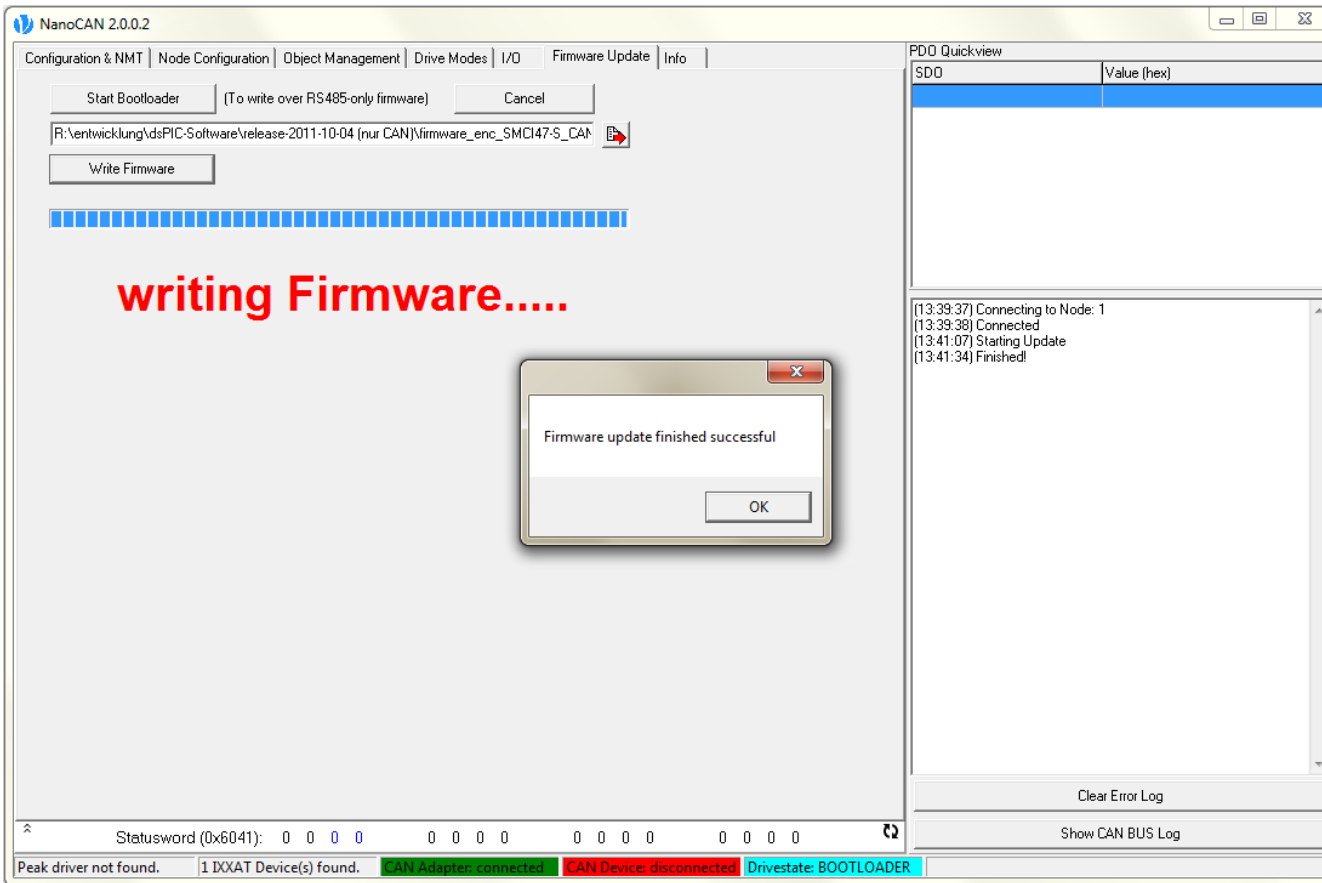
Peak driver not found. 1 IXAT Device(s) found. CAN Adapter: connected CAN Device: connected Drivestate: Pre Operational



This is the entrance point if you just want to update your CANopen firmware to a newer version.

Upload the firmware and click on “Write Firmware”.

The update may take 1-2 minutes.



At the end you will get a message that the update was successful.

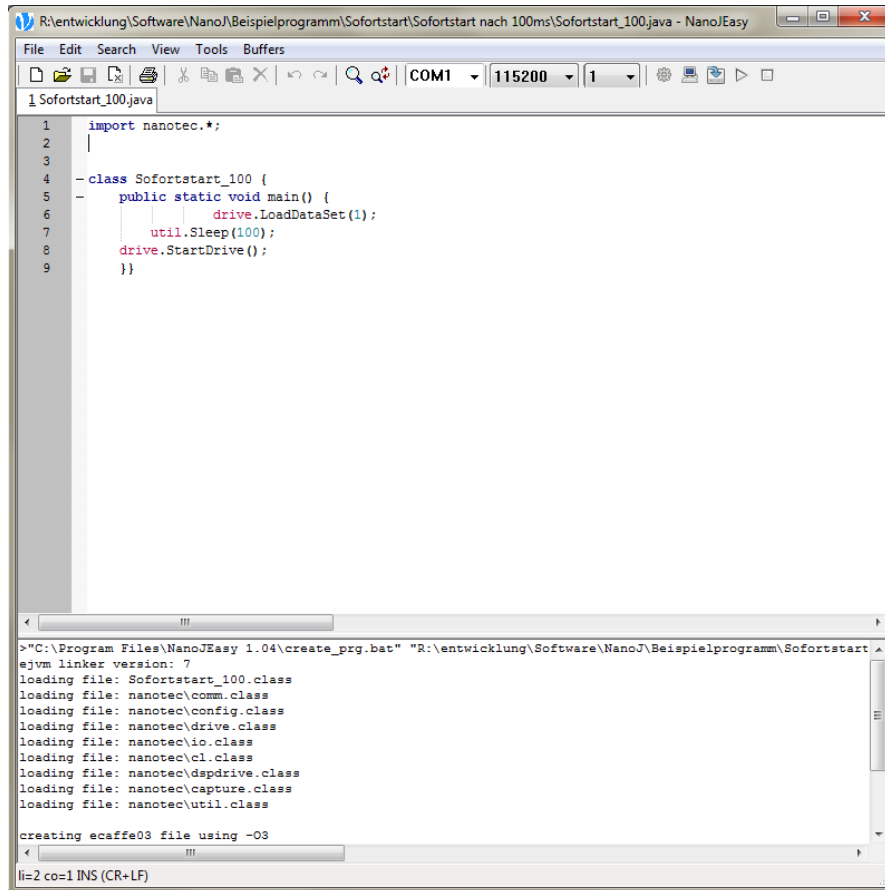
Here are some typical problems you may face at the customer site:

Here are some typical problems you may face at the customer site:

? NanoCAN does not find my controller.

Here are some typical problems you may face at the customer site:

- ? NanoCAN cannot find my controller.
- ! The customer might not be using the necessary terminating resistor between CAN+ and CAN- (120 ohm).



The screenshot shows the NanoJEasy application window. The title bar indicates the file path: R:\entwicklung\Software\NanoJ\Beispielprogramm\Sofortstart\Sofortstart nach 100ms\Sofortstart_100.java - NanoJEasy. The menu bar includes File, Edit, Search, View, Tools, and Buffers. The toolbar contains icons for file operations and execution. The main text area displays the following Java code:

```
1 import nanotec.*;
2
3
4 -class Sofortstart_100 {
5 -    public static void main() {
6         drive.LoadDataSet(1);
7         util.Sleep(100);
8         drive.StartDrive();
9     }
10 }
```

Below the code editor is a console window showing the execution process:

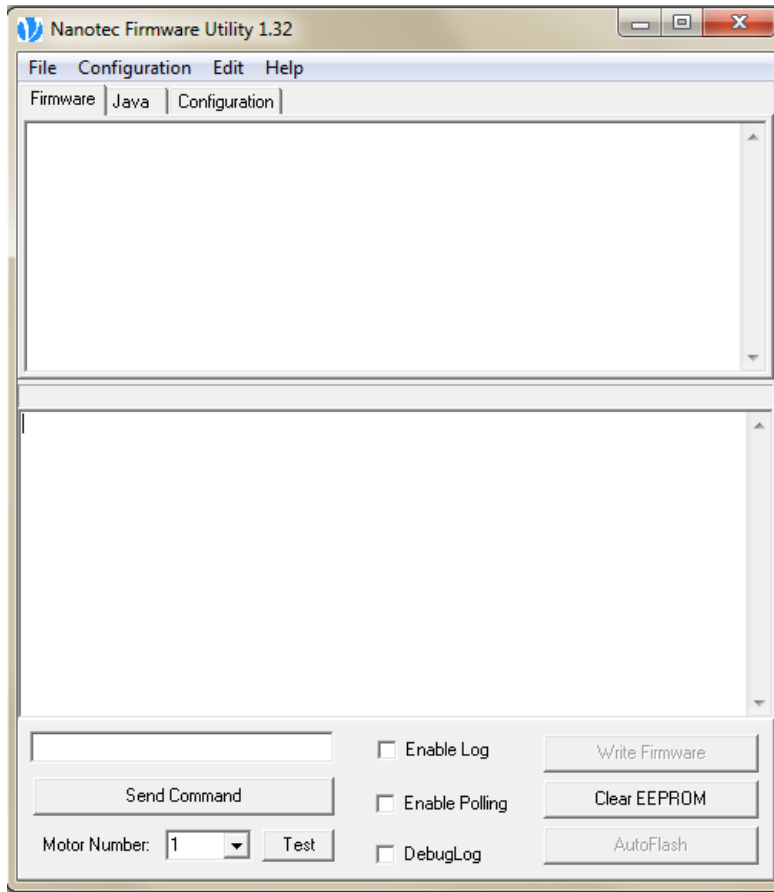
```
>"C:\Program Files\NanoJEasy 1.04\create_prg.bat" "R:\entwicklung\Software\NanoJ\Beispielprogramm\Sofortstart
ejvm linker version: 7
loading file: Sofortstart_100.class
loading file: nanotec\comm.class
loading file: nanotec\config.class
loading file: nanotec\drive.class
loading file: nanotec\io.class
loading file: nanotec\cl.class
loading file: nanotec\dspdrive.class
loading file: nanotec\capture.class
loading file: nanotec\util.class
creating ecaffe03 file using -O3
li=2 co=1 INS (CR+LF)
```

NanoJEasy is a small but very useful tool to implement some PLC functions into our devices. (only with serial communication)

NanoJEasy is based on the Java-programming language. The program runs in the background parallel to the firmware.

The provided functions are, for example, read out of the inputs, position or status. With this information it is possible to trigger a reaction, like starting or stopping a profile, changing the speed, setting an output, etc.

The small example above starts profile 1 at the moment the controller is switched on.



The Firmware Utility is a firmware updating tool. It is useful if the update with NanoPro did not work properly.

You can find this tool together with the most commonly used firmware files and a step-by-step manual in the troubleshooting area of our homepage.



**Thanks for
your attention!**

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