Lexium CT

Commissioning software
Software manual

V2.04, 08.2009

www.schneider-electric.com

Schneider Electric
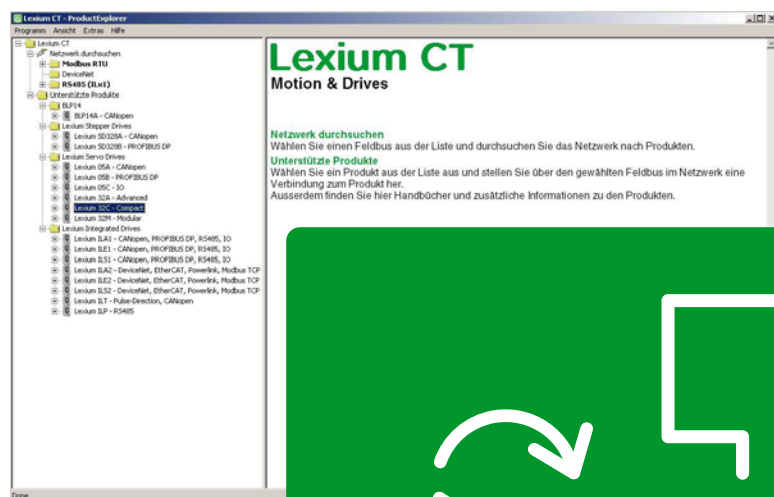
Important information

This manual is part of the product.

Carefully read this manual and observe all instructions.

Keep this manual for future reference.

Hand this manual and all other pertinent product documentation over to all users of the product.

Carefully read and observe all safety instructions and the chapter "Before you begin - safety information".

Some products are not available in all countries.
For information on the availability of products, please consult the catalog.

Subject to technical modifications without notice.

All details provided are technical data which do not constitute warranted qualities.

Most of the product designations are registered trademarks of their respective owners, even if this is not explicitly indicated.
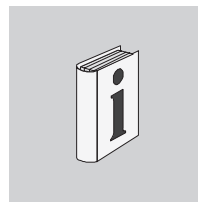
Table of Contents

About this manual

Source manuals The latest versions of the manuals can be downloaded from the Internet at:

http://www.schneider-electric.com

Corrections and suggestions We always try to further optimize our manuals. We welcome your suggestions and corrections.

Please get in touch with us by e-mail:
techcomm@schneider-electric.com.

Work steps If work steps must be performed consecutively, this sequence of steps is represented as follows:

■ Special prerequisites for the following work steps

▶ Step 1

◁ Specific response to this work step

▶ Step 2

If a response to a work step is indicated, this allows you to verify that the work step has been performed correctly.

Unless otherwise stated, the individual steps must be performed in the specified sequence.

Menu paths "⇒" If individual commands are mentioned, the manual describes the sequence of menus and command required to reach the corresponding menu item, separated by the symbol "⇒".
Example: "⇒ File ⇒ Save as".

Making work easier Information on making work easier is highlighted by this symbol:

Sections highlighted this way provide supplementary information on making work easier.

SI units SI units are the original values. Converted units are shown in brackets behind the original value; they may be rounded.

Example:
Minimum conductor cross section: 1.5 mm^2 (AWG 14)

Glossary Explanations of special technical terms and abbreviations.

Index List of keywords with references to the corresponding page numbers.

1   Introduction

1

1.1   General features

The Lexium CT commissioning software is an application program for PCs that allows you to commission and diagnose supported products.

The functions of the commissioning software automatically adapt to the products. Therefore, some functions may not be available. For details see the product manual.

The Lexium CT commissioning software consist of 3 different user interfaces:

- Lexium CT ProductExplorer

- Lexium CT M1

- Lexium CT M2

- Lexium CT M3

The "Lexium CT ProductExplorer" is used to scan fieldbus networks for products or to read information directly from supported products. The "Lexium CT ProductExplorer" provides additional information on the supported products such as the product manual or information from the Internet. If a device is found on the fieldbus network, it is possible to establish a connection with the product without additional connection settings. The "Lexium CT ProductExplorer" automatically selects the appropriate user interface for the product. The product is commissioned with "Lexium CT M1", "Lexium CT M2" or "Lexium CT M3".

Functions of the commissioning software

The functions of the commissioning software include:

- Scan various fieldbuses for devices

- Extensive information on connected devices

- Display and change device parameters

- Archive and duplicate device parameters

- Manual positioning of the motor

- Test input signals and output signals

- Record, evaluate and archive motion and signals

- Error diagnostics

- Optimize control performance (servo motors only)

Supported devices

The product manual of the specific device describes whether the commissioning software can be operated with the device.

You should be familiar with the Windows operating system to work with the commissioning software.

2   Before you begin - safety information

2

2.1   Qualification of personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. In addition, these persons must have received safety training to recognize and avoid hazards involved. These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused by using the product, by changing the settings and by the mechanical, electrical and electronic equipment of the entire system in which the product is used.

All persons working on and with the product must be fully familiar with all applicable standards, directives, and accident prevention regulations when performing such work.

2.2   Intended use

This product is a commissioning software and intended for industrial use according to this manual.

The commissioning software is designed to commission and diagnose supported products. The supported products are shown by the software user interface. Do not use the software to operate products.

The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements and the technical data.

The information on the intended use of the products must also be adhered to.

Any use other than the use explicitly permitted is prohibited and can result in hazards.

2.3   Hazard categories

Safety instructions to the user are highlighted by safety alert symbols in the manual. In addition, labels with symbols and/or instructions are attached to the product that alert you to potential hazards.

Depending on the seriousness of the hazard, the safety instructions are divided into 4 hazard categories.

⚠ DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

CAUTION

CAUTION used without the safety alert symbol, is used to address practices not related to personal injury (e.g. **can result** in equipment damage).

2.4   Basic information

⚠ DANGER

UNINTENDED CONSEQUENCES OF EQUIPMENT OPERATION

When the system is started, the drives are usually out of the operator's view and cannot be visually monitored.

- Only start the system if there are no persons in the hazardous area.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

INJURY AND DAMAGE TO SYSTEM COMPONENTS CAUSED BY UNEXPECTED RESPONSE

Incorrect use of the commissioning software may cause unexpected triggering or blocking of movements and signals.

- Run initial tests without coupled loads.
- Only use this tool if you have fully read and understood the corresponding manuals.
- Verify that a functioning button for EMERGENCY STOP is within reach.
- Do not operate the drive system with unknown settings or data.
- Anticipate movements in the incorrect direction or oscillation of the drive.
- Only start the system if there are no persons or obstructions in the hazardous area.
- Do not leave the activated system unattended.

Failure to follow these instructions can result in death, serious injury or equipment damage.

⚠ WARNING

LOSS OF CONTROL

Misoperation of the PC or the software may result in a loss of control of the system (no stop, unexpected responses).

- Verify that a functioning button for EMERGENCY STOP is within reach.
- Verify that the system is free and ready for the motion before connecting the system to the PC.

Failure to follow these instructions can result in death, serious injury or equipment damage.

2.5   Standards and terminology

Technical terms, terminology and the corresponding descriptions in this manual are intended to use the terms or definitions of the pertinent standards.

In the area of drive systems, this includes, but is not limited to, terms such as "safety function", "safe state", "fault", "fault reset", "failure", "error", "error message", "warning", "warning message", etc.

Among others, these standards include:

- IEC 61800 series: "Adjustable speed electrical power drive systems"

- IEC 61800-7 series: "Adjustable speed electrical power drive systems - Part 7-1: Generic interface and use of profiles for power drive systems - Interface definition"

- IEC 61158 series: "Industrial communication networks - Fieldbus specifications"

- IEC 61784 series: "Industrial communication networks - Profiles"

- IEC 61508 series: "Functional safety of electrical/electronic/programmable electronic safety-related systems"

Also see the glossary at the end of this manual.

3   Installation

3

Source of commissioning software   The latest version of the commissioning software is available for download from the internet.

http://www.schneider-electric.com

3.1   PC requirements

System requirements   The minimum hardware requirements for installation and operation of the software are:

- PC with operating system Windows 2000, Windows XP Professional or Windows Vista
- Approx. 200 MB of hard disk space
- 512 MB RAM
- Graphics card and monitor with a resolution of at least 1024x768 pixels
- Free serial interface (RS232) or free USB interface
- Local administrator rights
- Acrobat Reader 5.0 or later
- Internet connection (for initial installation and updates)

Required accessories • RS232 to RS485 converter or USB to RS485 converter

Interface	PC interface	Required fieldbus converter	Source
RS485	RS232	NuDAM ND-6520	http://www.acceed.com
RS485	USB	NuDAM ND-6530	http://www.acceed.com
CAN	Parallel	PCAN dongle, Peak	http://www.peak-system.com
CAN	USB	PCAN-USB, Peak	http://www.peak-system.com
PROFIBUS DP	PCMCIA	Siemens CP5611/13	www.ad.siemens.com
PROFIBUS DP	PCI	Siemens CP5611/12	www.ad.siemens.com
PROFIBUS DP	USB	PROFIusb PB-USB	http://www.softing.com
DeviceNet	USB	USB-to-CAN compact	www.ixxat.com

3.2   Installation

It is recommended to backup your data before installing new software.

▶ Verify the PC meets the requirements.

▶ Verify that you can connect to the internet.

▶ Start the installation via the file "LexiumCTInstall.exe".

◁ The following dialog box is displayed:

▶ Select the installation language from the listbox.

◁ The following dialog box is displayed:

Internet connection via proxy server   ■ Check whether your site uses a proxy server (if necessary, get in touch with your network administrator). If you are in a network that uses a proxy server to connect to the internet, proceed as follows:

▶ Check the "Edit Proxy settings" checkbox and click the "Next" button.

◁ The following dialog box is displayed:
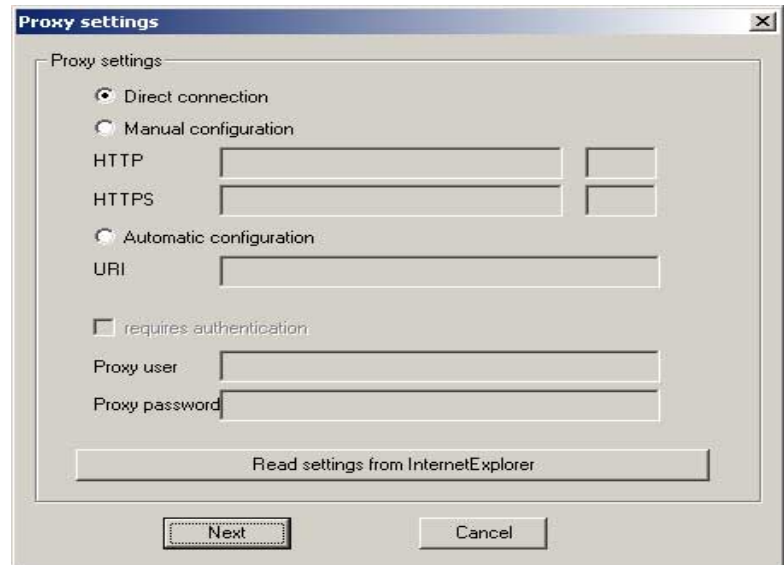
▶ Click "Read settings from Internet-Explorer" or enter the information for your proxy server in the appropriate fields. Please check back with your network administrator for the settings required for your network.

▶ Click "Next".

Internet connection without proxy server   ■ If you do not use a proxy server, proceed as follows:

▶ Click "Next" without checking the "Edit Proxy settings" checkbox or select "Direct connection" in the "Proxy settings" dialog box.

Selecting the used products
■ The correct proxy server settings have been entered and an internet connection has been established.

◁ The following dialog box is displayed:
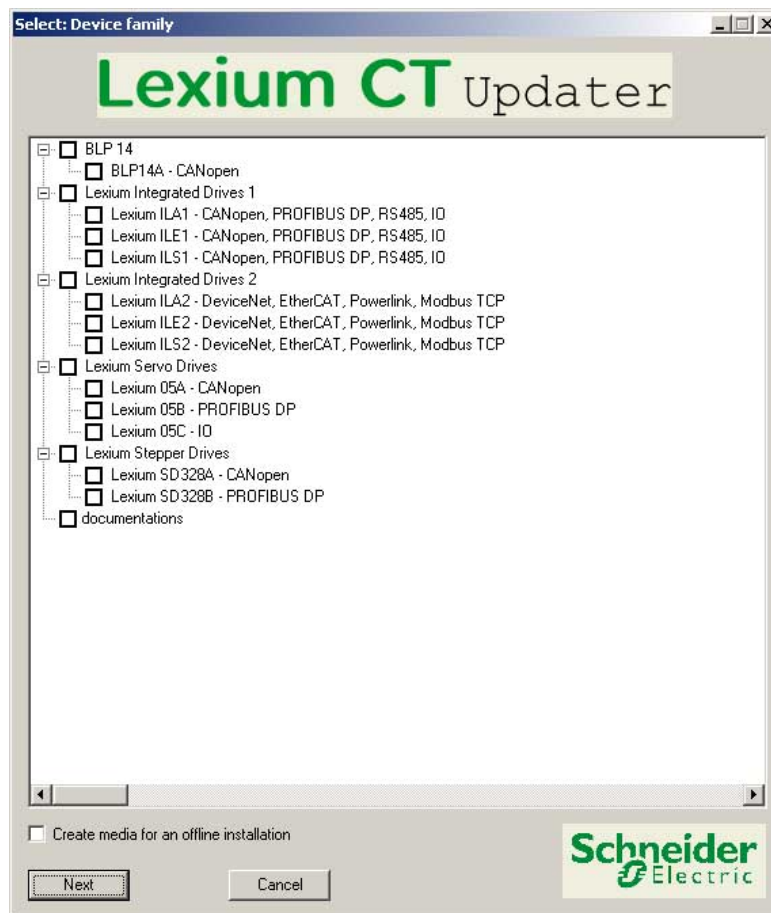
▶ Check each product that you want to commission with the commissioning software.

It is possible to add individual products to the list at a later point in time. To do so, choose "Internet Update" from the Windows Start menu (" ⇒ Start ⇒ Programs ⇒ Schneider Electric ⇒ Lexium CT").

The program is installed in the path "%ProgramFiles%\Schneider Electric\Lexium CT".

A shortcut is created in the Windows start menu for starting the commissioning software.

Creating media for offline installation
Check the "Create media for an offline installation" to create an up-to-date installation routine on your hard disk. This installation routine can be copied to another computer that does not have an internet connection (use a USB flash drive, for example).

If you have checked the "Create media for an offline installation" checkbox, the software will prompt you for a target folder. The offline installation requires up to 200 MB of free disk space.

4   Lexium CT ProductExplorer

4

The commissiong software can be started via the shortcut in the Windows Start menu (" $\Rightarrow$ Start $\Rightarrow$ Programs $\Rightarrow$ Schneider Electric $\Rightarrow$ Lexium CT").

4.1   The user interface

The following screenshot shows the user interface of the ProductExplorer.
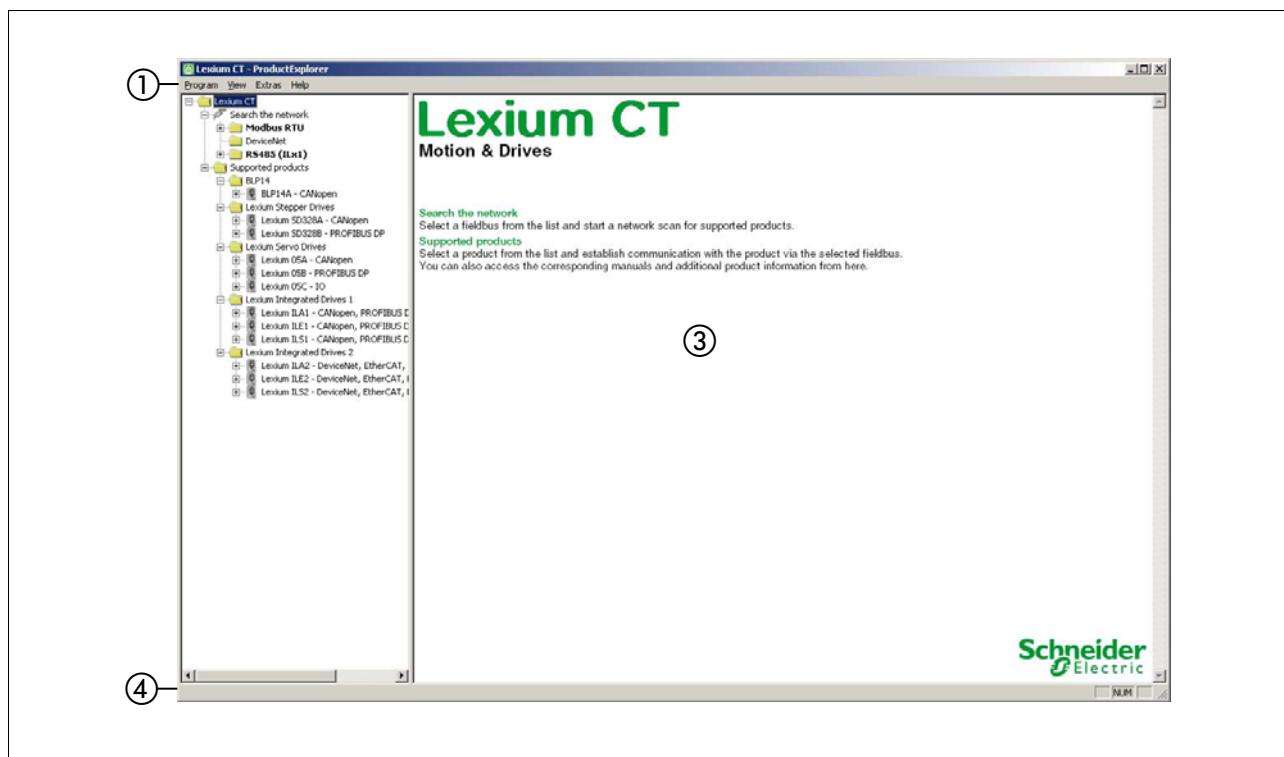
Figure 4.1   Elements of the ProductExplorer

(1)   Menu bar
(2)   Tree View
(3)   Detail View
(4)   Status bar

The functions of the commissioning software can be executed via the menu bar and, to a large degree, by means of right-clicking or double-clicking.

4.1.1   The menu bar

The menu bar provides access to the functions of the software. It structures the functions just like in other application programs.

If you move the mouse pointer over a button, the software displays a "Tooltip"; in addition, a short description of the function may be shown in the "status bar".

4.1.2   Tree View
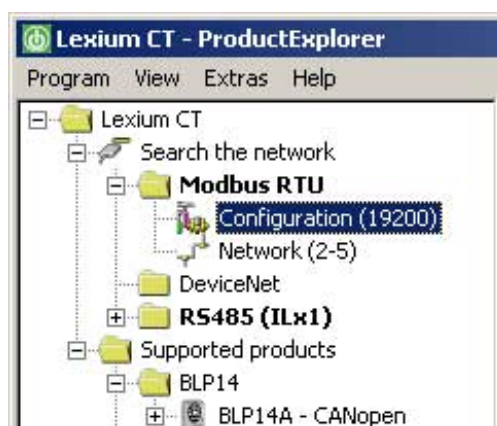
Figure 4.2   Tree View

The Tree View allows you to access the individual devices. The view is divided into two areas:

• Scanning the network

  The devices are grouped by fieldbus. You can scan a fieldbus network with different device types and unknown addresses. The devices found are shown in an overview list.

• Supported drives

  The devices are grouped by model. The available fieldbuses are shown below the product. In addition, you can access the corresponding manuals and product information.

4.1.3 Detail View

Figure 4.3   Detail View

The Detail View provides the following functions:

• Display of detailed information on devices found on the network

• Display of product manuals

• Access to online information on the products

4.2   First steps

Data interface   Depending on the product, data communication is performed via "Modbus RTU", "DeviceNet", "RS485 für ILx1", "CANopen DS301" or "Mobus TCP". RS485 is the standard commission interface; it is available for all products. Depending on the product, the RS485 protocol used is either a vendor-specific protocol (ILx1) or the "Modbus RTU" protocol.

Update   Updates are used to get the latest version of the software. You need access to the Internet to run an update. If you encounter problems during an update, have your Internet access checked by your network administrator. It is recommended to update the software at regular intervals.

The software can automatically check for available updates. If the software is running, a background process checks whether new updates are available. To use this function:

▶ Use the menu item "⇒ Extras ⇒ Settings"

◁ The following dialog box is displayed:
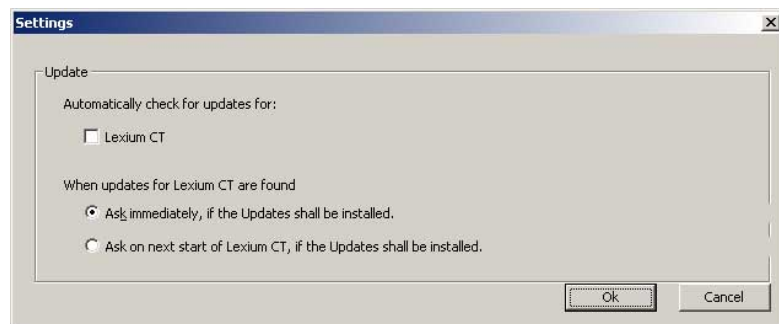
▶ Check the "Automatically check for updates for: -Lexium CT" checkbox.

▶ Depending on your preferences, the updates can be installed immediately or after the next start of the software.

To start an update manually:

▶ Save all data and exit the user interface of "Lexium CT M1", "Lexium CT M2" and "Lexium CT M3".

▶ Use the following menu item: "⇒ Help ⇒ Check for updates"

◁ The software prompts you for confirmation.

▶ Click "Yes".

◁ The "Lexium CT ProductExplorer" user interface is closed and the update process is started. The system displays the "Lexium CT Updater".

▶ Follow the instructions on page 17.

4.2.1   Connection prerequisites

Check the following before you establish the first connection:

• Have you switched on the product?

• Do you need a driver for the fieldbus converter used; if so, have you installed this driver?

• Did you properly connect all cables and fieldbus converters?

• Has the product been installed during the installation process?

4.2.2   Scanning the network

The Tree View to the left provides the function "Search the network". The function "Search the network" scans a defined address range on the network for products.

To scan the network:

▶ Double-click "Configuration" below the appropriate fieldbus protocol node.

◁ The following dialog box is displayed:
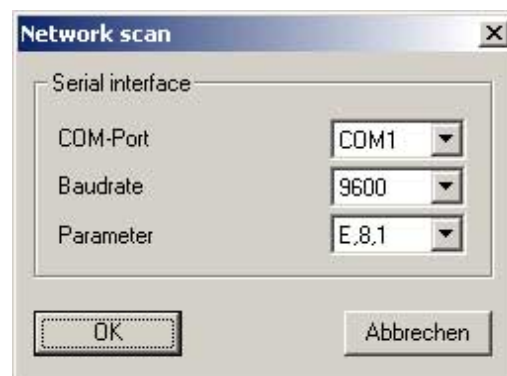
Figure 4.4   Network scan

▶ Set the values as required and click "OK".

▶ Right-click "Network" below the appropriate fieldbus protocol node and select "Configure the network scan".

◁ The following dialog box is displayed:

Figure 4.5   Network address scanning range

▶ Set the address range you want to scan and click "OK".

  If you have already set the network range, the range is automatically scanned when you click "Network". To select a different range, right-click "Network" and select "Configure the network scan".

◁ If one or more products are found, the software displays the window "Product found" with the data of the found products. If newer products are found, the "Detail View" displays detailed product information.
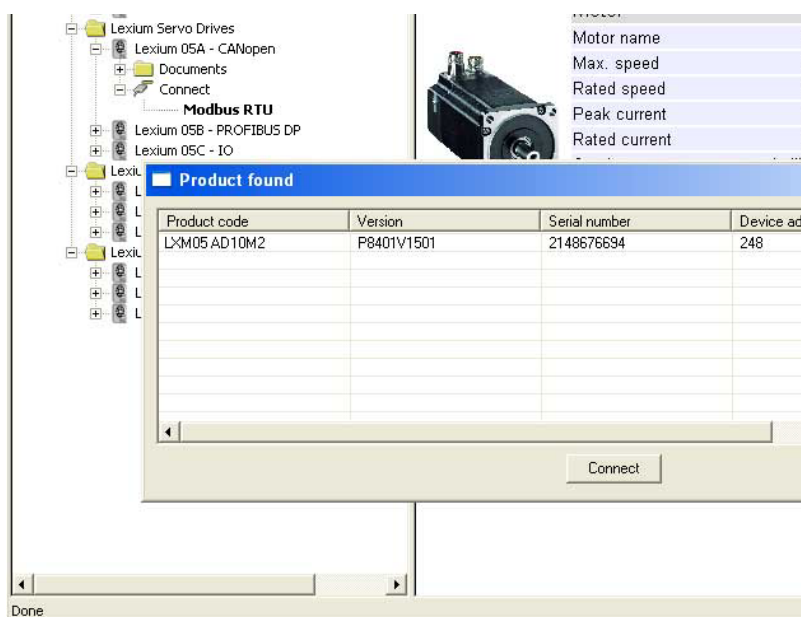
Figure 4.6   Products found

Connecting to devices found   ■ The network scan found one or more products.

▶ Select the desired product from the list and click the "Connect" button.

◁ The commissioning software display the user interface for the corresponding product. The connection settings are automatically made available in user interface. Click "Connect" once again.

4.2.3   Direct connection to supported products

If the connection data and the device type are known, you can directly establish a connection to the product.

▶ Double-click the fieldbus protocol to be used below the product name node.

◁ The following dialog box is displayed:
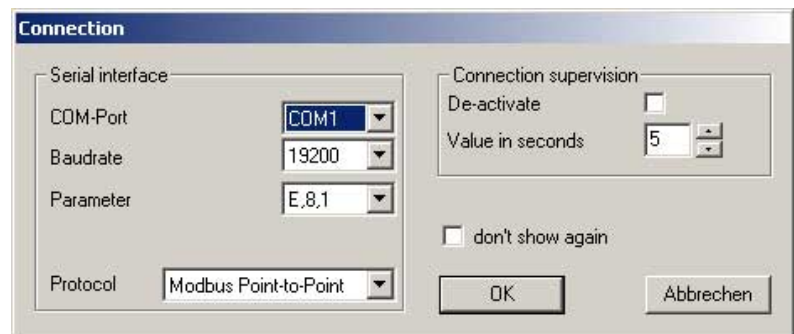
▶ Adjust the connection settings for your product and click "OK".

◁ If a product is found, the software displays a window with device information. At the same time, the "Detail View" provides detailed product information:
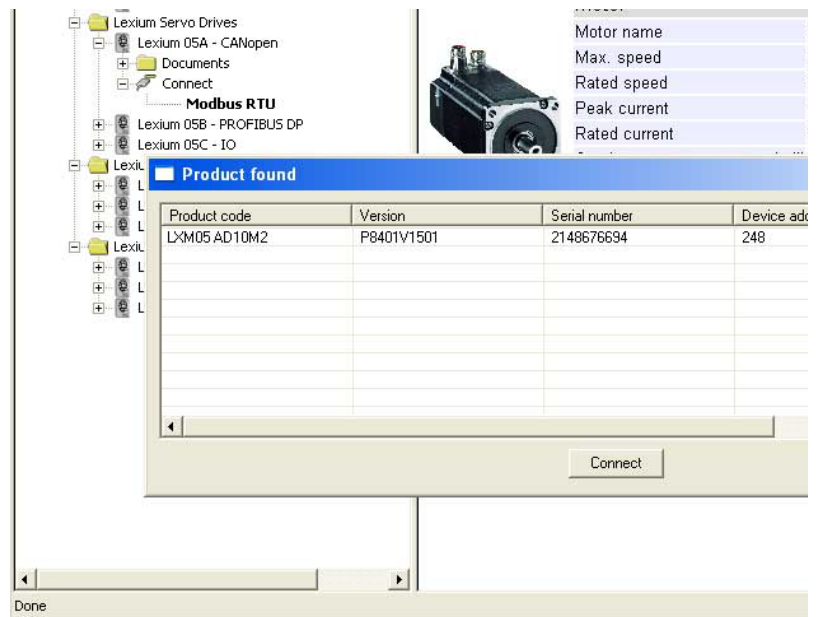
▶ Double-click a list entry in the "Product found" window to start the commissioning software for the corresponding product.

5   Lexium CT M1

Depending on the product, the "Lexium CT ProductExplorer" starts the "Lexium CT M1" software.

5.1   The user interface

The following screenshot shows the user interface of the commissioning software.
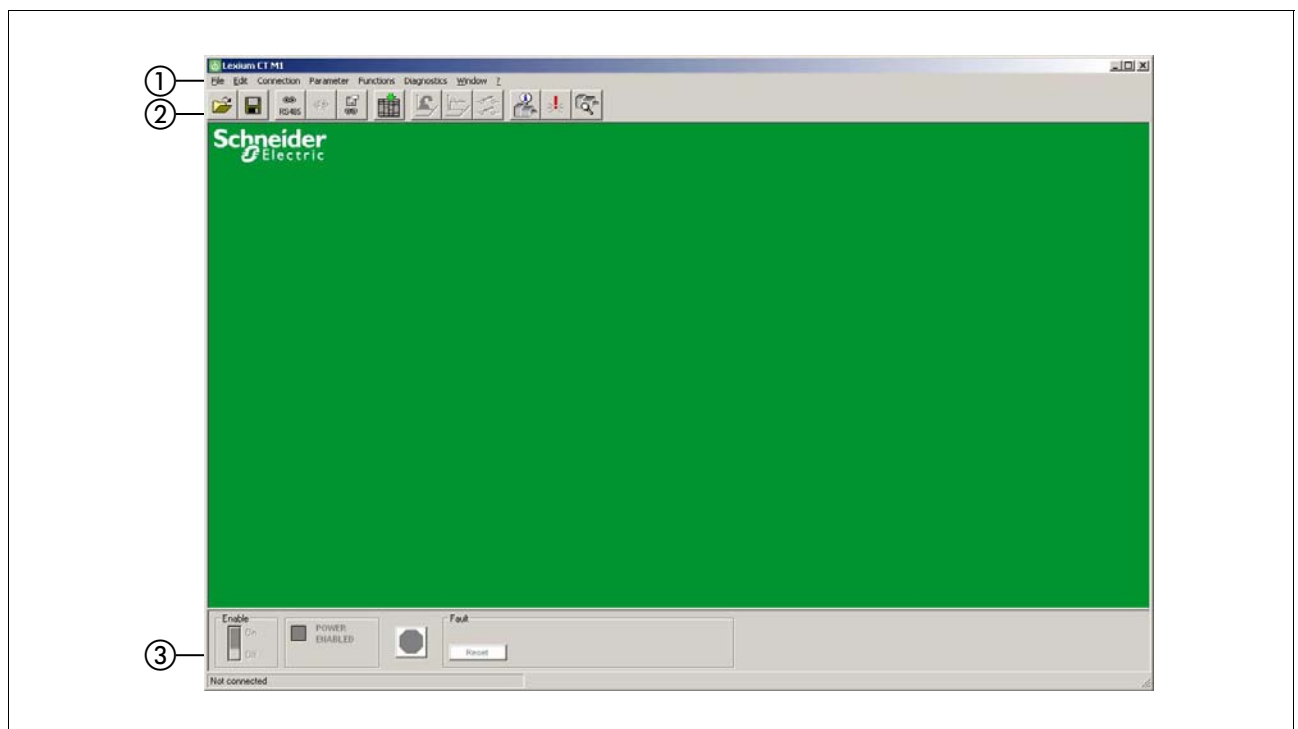
Figure 5.1   User interface Lexium CT M1

(1)   Menu bar
(2)   Toolbar
(3)   Control bar and status bar

The functions of the commissioning software can be accessed via the menu bar, the toolbar, the control bar and the status bar.

5.1.1 The menu bar

The menu bar adapts to the task at hand. It only contains the functions required for and possible in the current situation.

For example, if there is no connection to the device, the function "⇒ Connection ⇒ Disconnect" is not available.

5.1.2 The toolbar

The toolbar provides fast, single-click access to frequently used functions.

The buttons let you execute the following functions:
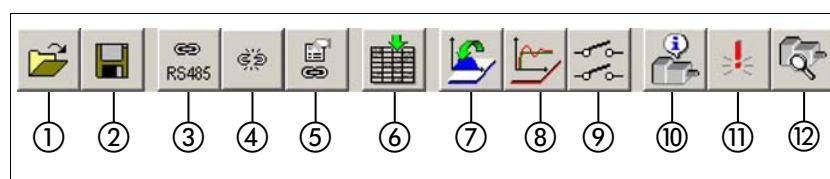
Figure 5.2   Toolbar

(1)   ⇒ File ⇒ Open...
(2)   ⇒ File ⇒ Save
(3)   ⇒ Connection ⇒ RS485 connection...
(4)   ⇒ Connection ⇒ Disconnect
(5)   ⇒ Connection ⇒ Options
(6)   ⇒ Parameter ⇒ Open parameter window...
(7)   ⇒ Functions ⇒ Operating modes...
(8)   ⇒ Functions ⇒ Record/Tuning...
(9)   ⇒ Functions ⇒ Inputs+Outputs...
(10)   ⇒ Diagnostics ⇒ Device info...
(11)   ⇒ Diagnostics ⇒ Error memory...
(12)   ⇒ Diagnostics ⇒ Object monitoring...

If you move the mouse pointer over a button, the software displays a "Tooltip"; in addition, a short description of the function may be shown in the "status bar".

5.1.3   Control bar and status bar

The control bar and the status bar allow you to access the device. The control bar and the status bar can be used to enable the power stage and display various status information.
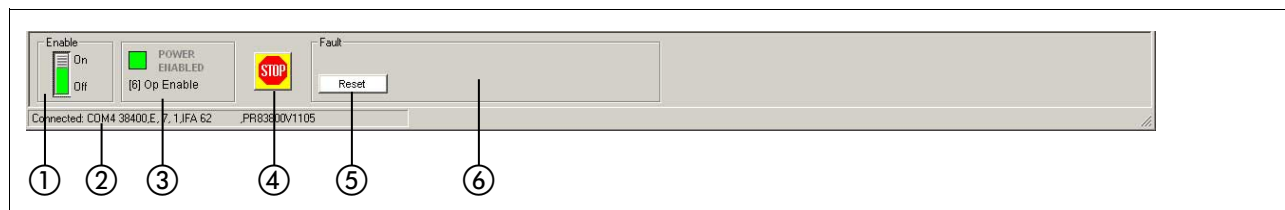
Figure 5.3   Control bar and status bar

(1)   Enable
(2)   Status information
(3)   Operating state
(4)   Stop
(5)   Reset
(6)   Current error

Enable   The switch "Enable" allows you to enable and disable the power stage of the device. For more information on enabling or disabling the power stage see the product manual of the device.

Status information   This information consists of:

- Line 1 shows whether the function "Halt" is active

- Line 2 displays the current motor position

- Line 3 shows the status of the access control

- Line 4 shows the control mode

Operating state   The commissioning software shows the current operating state of the connected device. For more information on the operating state see the product manual of the device.

Stop   The "Stop" button allows you to stop the motor with a "Quick Stop". For more information on "Quick Stop" see the product manual of the device.

Reset   The "Reset" button is used to acknowledge an error message. For more information on acknowledging error messages see the product manual of the device.

Current error   The field shows the currently active asynchronous error.

5.2   First steps

5.2.1   The first connection

The device must be connected to the PC via the data interface.

Use the menu item "⇒ Connection ⇒ RS485 connection...." to connect to the device. This opens the "Connection" dialog box.

The screenshot below shows an example.

Figure 5.4   Selecting the connection data

If you want to use a different fieldbus interface, selected it with the menu item "⇒ Connection ⇒ Options...":
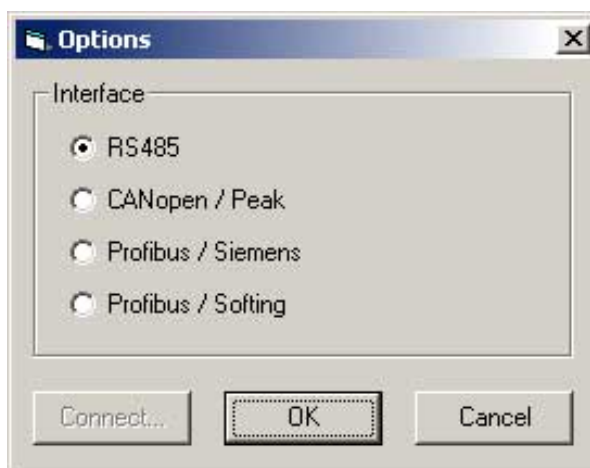
Connection   The device data is transferred to the PC when a connection is established. After transfer the commissioning software is connected to the device in online mode.

5.3   Parameter file

The device data can be saved to the PC and loaded.

On the PC, the device data is saved in a file, the parameter file.

The PC and the device do not have to be connected if you want to edit the parameter file.

Parameter files have the extension ".ifx". Even if there is no connection to the device, you can open and edit any device file on the PC. In addition to the parameter values, the file contains the contents of the error memory, the actual values and recorded data.

5.3.1   Saving a file

Device data can be saved to a parameter file on the PC to archive it for maintenance and service purposes. This also allows you to quickly commission additional devices of the same device version.

To save a parameter file on the PC, use the menu items"$\Rightarrow$ File $\Rightarrow$ Save..." or "$\Rightarrow$ File $\Rightarrow$ Save as...."

It is recommended to save all device data in the form of a parameter file after you have commissioned a device. This way the device can be put back into operation immediately after a repair.

5.3.2   Opening a file

Use the menu item "$\Rightarrow$ File $\Rightarrow$ Open..." to open a parameter file on the PC.

If there is a connection to the device, the commissioning software checks whether the parameter file is compatible with the device.

If the parameter file is compatible with the device, the stored parameter values of the parameter file are compared to the parameter values of the device. Differences are highlighted by a colored background.

If the parameter file is not compatible with the device, the loading process is canceled and an error message is displayed.

5.3.3   Transferring device data

Device data can be transferred between the device and the PC only if there is a connection. It is possible to transfer all parameters or groups of parameters.

NOTE: In a first step, the commissioning software transfers modified parameters to the RAM memory of the device. They remain there until the controller supply voltage is switched off . Note that the device data must be saved separately to the **EEPROM memory** so they are permanently available to the product.

5.3.4   Exporting parameters

The device parameters that can be written can be saved as a .csv file for further processing. This function can be accessed via the menu item "⇒ File ⇒ Export parameters...".

The file is saved with the extension ".csv". You can open and edit this file Microsoft Excel, for example.

5.3.5   Printing parameters

The menu item "⇒ File ⇒ Print parameters..." allows you to print the device data. The printed data is arranged in groups:

- Config
- RS485
- Settings
- Motion
- I/O
- Homing
- Manual
- DataSet
- ProgIO0
- ProgIO1
- ProgIO2
- ProgIO3

In addition, the device type, serial number and information on the software are printed.

5.4   Parameterization

The data of a device can be edited in the "Parameter" window. A connection to the device is not required. The parameter values of a file can be modified in off-line mode and transferred to the device at a later point in time.

5.4.1   Opening the parameter window

Use the menu item "⇒ Parameter ⇒ Open parameter window..." to open the Parameter window.
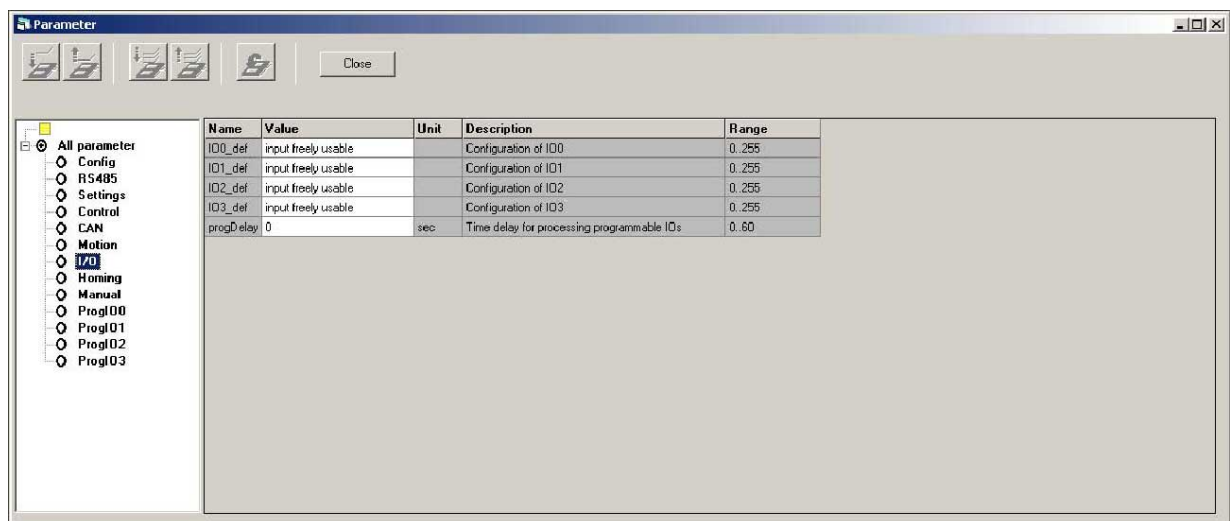
Figure 5.5   Parameter window

The screenshot shows the parameter window. The contents of this window depends on the device version. However, the structure is the same for all versions. The left pane shows items, the associated parameters are displayed in the right pane.

Parameters of a group   The parameter window shows the parameters associated with the selected item. The list shows the names, values, unit, a description, the range and the Modbus address.

Changing parameter values   The value of a parameter is changed in the "Value" column. Values with a gray background are read-only and cannot be modified.

Modified values that have not been transferred to the device are highlighted by a colored background. At the same time the parameter group to which the parameter belongs is highlighted by a red exclamation mark. As soon as the values have been transmitted to the device, the exclamation mark is cleared.

To change a parameter value, you can enter the new value directly or choose it from a list.

Checking the value range   The commissioning software checks whether the parameter values entered are in the permissible value range. If the value entered is not in the valid range, the value is not accepted.

5.4.2   Transferring parameter values

Device data can be transferred between the device and the PC only if there is a connection. It is possible to transfer all parameters or groups of parameters.

NOTE: In a first step, the commissioning software transfers modified parameters to the RAM memory of the device. They remain there until the controller supply voltage is switched off . Note that the device data must be saved separately to the **EEPROM memory** so they are permanently available to the product.

When the controller supply voltage for the device is switched on, the device data is automatically copied from the EEPROM to the RAM. The devices only operate with the data contained in the RAM.

The data exchange between the device and the PC is controlled by the following menu items and buttons.

Menu items   The menu items "⇒ Parameter ⇒ Send parameter group to drive" and "⇒ Parameter ⇒ Send all parameters to drive" allow you to transmit parameter values from the PC to the device.

The menu items "⇒ Parameter ⇒ Load parameter group from drive" and "⇒ Parameter ⇒ Load all parameters from drive" are used to transmit parameter values from the device to the PC.

Buttons   The buttons let you execute the following functions:

Figure 5.6   Buttons for data transmission

(1)   ⇒ Parameter ⇒ Send parameter group to drive
(2)   ⇒ Parameter ⇒ Load parameter group from drive
(3)   ⇒ Parameter ⇒ Send all parameters to drive
(4)   ⇒ Parameter ⇒ Load all parameters from drive
(5)   ⇒ Parameter ⇒ Save device parameters in EEPROM

Not all parameters can be transferred in operating state "Operation Enable". Parameter values that cannot be transferred are highlighted by a colored background.

5.4.3   Restoring the factory settings

Use the menu item "⇒ Parameter ⇒ Reset to factory settings" to restore the factory settings of the parameters.

Figure 5.7   Restoring the factory settings

After confirmation with "OK", the device parameters are reset to the factory setting.

5.5   Functions

The "Functions" menu provides access to the following functions:

- Operating modes
- Recording and tuning
- Inputs and outputs

The screenshots below may be different or unavailable in your system due to different functionalities of the devices.

5.5.1   Changing the operating state

The device can now be set to operating state 6 "Operation Enable" with the commissioning software. In this operating state the power stage of the device is enabled. To do so, click the "Enable" switch. For more information on enabling or disabling the power stage see the product manual of the device.

The device must be in operating state 6 "Operation Enable" for the functions of the commissioning software to be executed.

5.5.2   Operating modes

Use the menu item "$\Rightarrow$ Functions $\Rightarrow$ Operating modes..." to start the "Operating modes" function.

The various operating modes can be selected from the tabs in the Operating Modes window.

The window is subdivided into two sections:

- Tab for the selected operating mode and for setting specific parameters (top section)
- Display of some status information (bottom section)

The user can switch between the tabs in the Operating Modes window without interfering with a currently active operating mode.

Device monitoring   During movements, the connection to the device is cyclically monitored. If the connection between the PC and device is lost, the motor stops within the cycle time.

The commissioning software cannot be exited while a movement is running.

The operating modes are described in detail in the product manuals. Therefore, this manual does not describe the details of the operating modes.

Profile Position   In Profile Position operating mode, a movement with an adjustable motion profile is performed from a start position to a target position. The value of the target position can be specified as either a relative or an absolute position.

You can set a motion profile with values for acceleration ramp, deceleration ramp and target speed.

Figure 5.8   Operating mode Profile Position

Profile Velocity   In the operating mode Profile Velocity, the drive accelerates to an adjustable target speed of rotation. You can set a motion profile with values for acceleration and deceleration ramps.
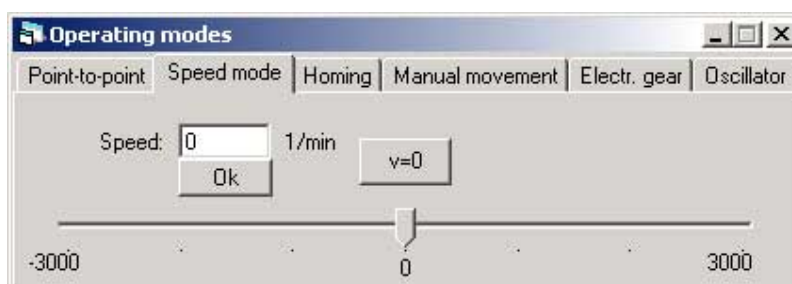
Figure 5.9   Operating mode Profile Velocity

Homing   The operating mode Homing establishes an absolute position reference between the motor position and a defined axis position. Homing can be carried out by a means of a reference movement or by position setting.
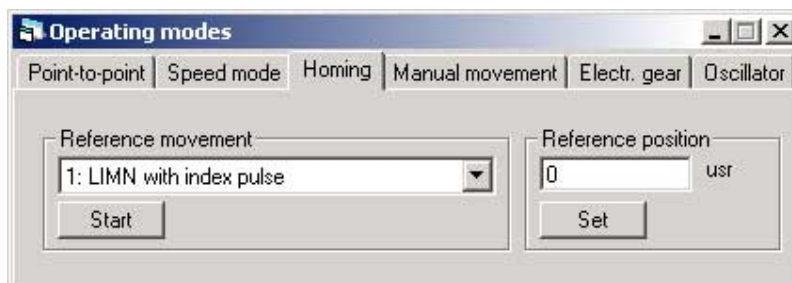
Figure 5.10   Operating mode Homing

Jog　　　The motor is moved at slow or fast jog velocity with the buttons. The motor moves as long as the button is held down. When you release the button, the motor is decelerated to a standstill.
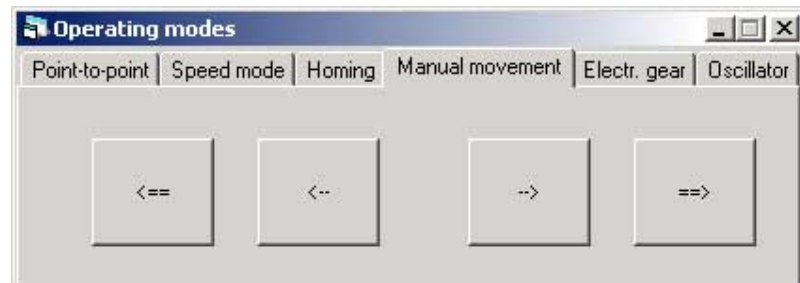
Figure 5.11　　Operating mode Jog

Electronic Gear　　　In the operating mode Electronic Gear, reference signals are supplied in the form of A/B signals or pulse/direction signals. A new position reference value is calculated on the basis of these reference value signals plus an adjustable gear ratio.
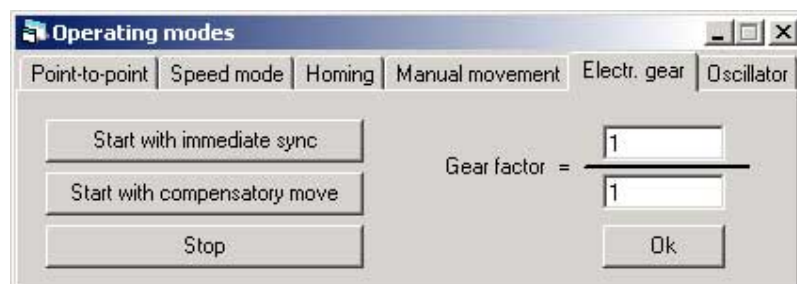
Figure 5.12　　Operating mode Electronic Gear

Oscillator

⚠ WARNING

UNEXPECTED MOVEMENT

In this operating mode, an unknown voltage value at the analog input may cause an unexpectedly high speed of rotation of the motor.

•   Observe the voltage value at the analog input when starting the operating mode .

Failure to follow these instructions can result in death, serious injury or equipment damage.

In the Oscillator operating mode, the motor is moved corresponding to a voltage-dependent reference speed of rotation. There are two options:

•   Selection of speed of rotation directly in the window by entering the value or using the slider.

•   Supply of the value via the analog input ANA1. The voltage value can also be set in the "Inputs+Outputs" window for this option.

The actual movement is started or stopped with the "Start" and "Stop" buttons.

Figure 5.13   Operating mode Oscillator

Speed Control

⚠ **WARNING**

UNEXPECTED MOVEMENT

In this operating mode, an unknown voltage value at the analog input may cause an unexpectedly high speed of rotation of the motor.

• Observe the voltage value at the analog input when starting the operating mode .

Failure to follow these instructions can result in death, serious injury or equipment damage.

In the operating mode Speed Control, the motor is moved corresponding to a voltage-dependent reference velocity. There are two options:

• Selection of the value directly in the window by entering the value or using the slider

• Supply of the value via the analog input ANA1. The voltage value can also be set in the "Inputs+Outputs" window for this option.

The actual movement is started or stopped with the "Start" and "Stop" buttons.

Figure 5.14   Operating mode Speed Control

Current control

⚠ **WARNING**

UNEXPECTED MOVEMENT

In this operating mode, an unknown voltage value at the analog input may cause an unexpectedly high speed of rotation of the motor.

• Observe the voltage value at the analog input when starting the operating mode .

Failure to follow these instructions can result in death, serious injury or equipment damage.

In the Current Control operating mode, the motor is moved corresponding to a voltage-dependent reference current. There are two options:

• Selection of current directly in the window by entering the value or using the slider

• Supply of the value via the analog input ANA1. The voltage value can also be set in the "Inputs+Outputs" window for this option.

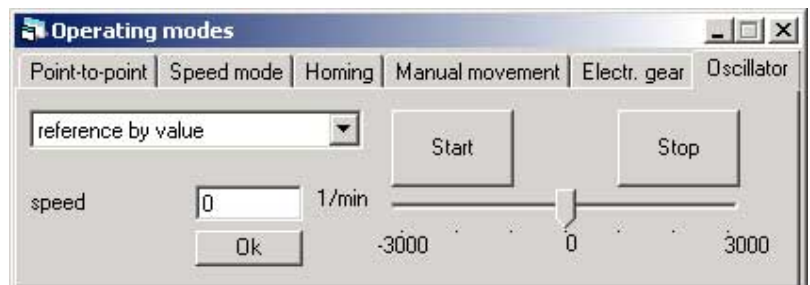The actual movement is started or stopped with the "Start" and "Stop" buttons.

Figure 5.15   Operating mode Current Control

Autotuning

> ### ⚠ WARNING
>
> **UNEXPECTED MOVEMENT**
>
> Autotuning moves the motor in order to tune the control loops. Incorrect parameters may cause unexpected movements or the loss of monitoring functions.
>
> - Check the parameters `AT_dir` and `AT_dis`. The distance required for the deceleration ramp must also be taken into account.
>
> - Verify that the parameter `LIM_I_maxQSTP` for Quick Stop is correctly set.
>
> - If possible, use the limit switches.
>
> - Verify that a functioning button for EMERGENCY STOP is within reach.
>
> - Verify that the system is free and ready for the movement before starting the function.
>
> **Failure to follow these instructions can result in death, serious injury or equipment damage.**

Autotuning determines the friction torque as a constantly acting load torque and considers it in the calculation of the moment of inertia of the entire system.

Figure 5.16   Autotuning

5.5.3   Recording and optimizing

Introduction   The commissioning software provides the "Recording/Tuning" function for visualizing internal device data during movements. The connected device stores the movement data to an internal memory for a defined recording period and then sends it to the PC. The PC processes the data and displays them in the form of charts or tables.

Recorded data can be saved on the PC, see chapter 5.3.1 "Saving a file", and can be archived or printed for documentation purposes.

Use the menu item "⇒ Functions ⇒ Record/Tuning..." to start the "Record" function.
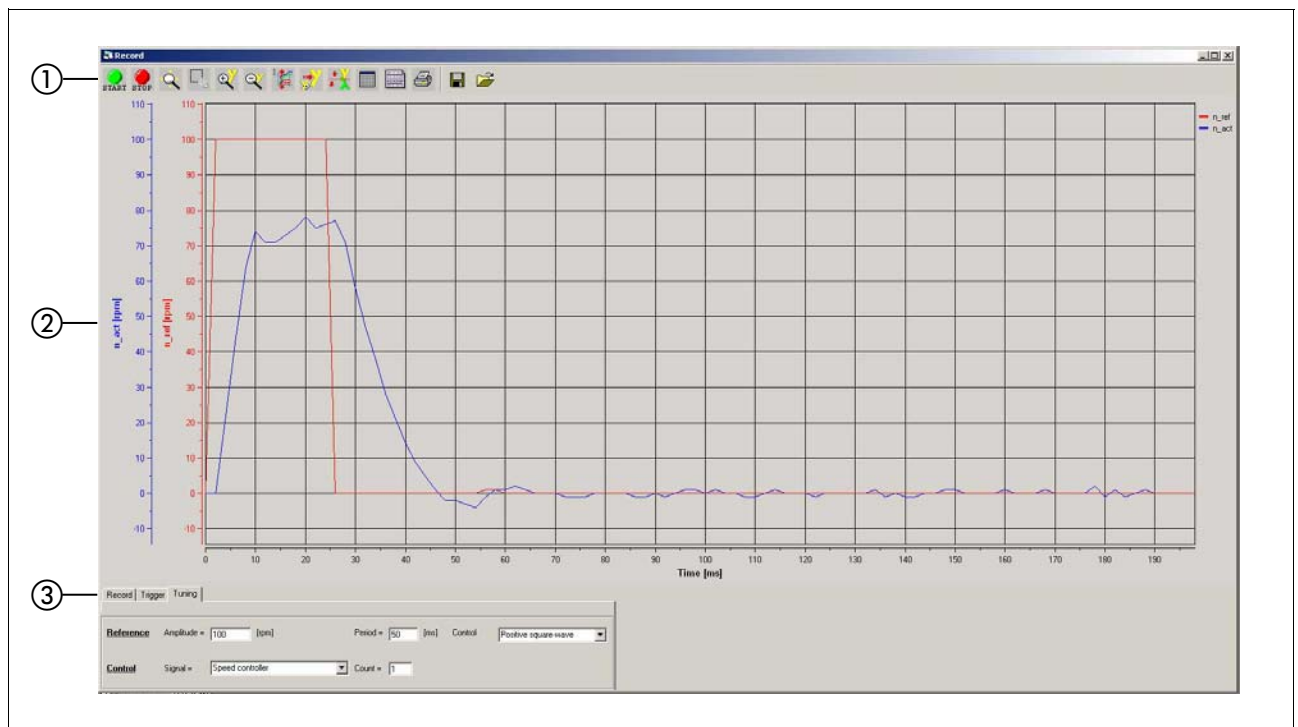
Figure 5.17   Recording

Elements of the Record window:

(1)   Buttons
(2)   Chart with the recorded data
(3)   Tabs for recording, trigger and tuning

Chart   A chart is only recorded if at least one parameter was selected.

Each of the selected parameters is shown in a distinct color.
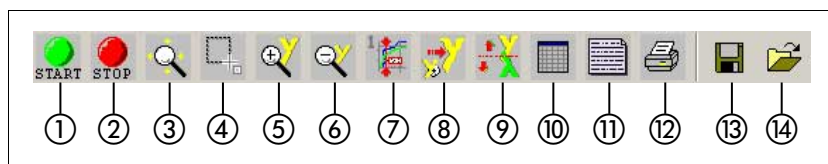
Buttons

Figure 5.18   Buttons

(1)   Start recording
(2)   Stop recording
(3)   Manual zoom, infinitely variable zoom of x axis and y axis
(4)   Zoom box
(5)   Zoom in, y axis
(6)   Zoom out, y axis
(7)   1st display of values for a specific point in time
(8)   Reset zoom, auto zoom
(9)   Invert y axis
(10)   Display table of recorded values
(11)   Enter comment
(12)   Print recording
(13)   Save recording
(14)   Open recording

Tab "Record"   The "Record" tab allows you to configure the recording function.
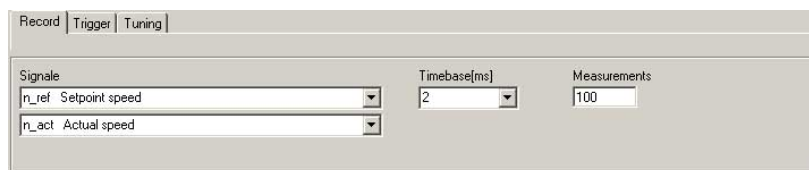
Figure 5.19   Tab Record

The "Parameters" dropdown lists allow you to select the desired parameters.

The "Timebase" dropdown list is used to set the time resolution. The smaller the "Timebase" value, the shorter the maximum recording time.

The desired number of measurement points is entered in the "Measurements" field. A maximum of 100 measurements can be taken during one recording run.

Tab "Trigger"   The desired triggering for the recording is configured on the "Trigger" tab. Recording starts once the specified condition is met.

Figure 5.20   Tab Trigger

The parameter to be monitored is selected from the "Trigger" dropdown list.

The condition the selected parameter must meet for the recording to be started is selected from the "Condition" dropdown list.

Enter a decimal value in the "Value" field; this is the comparison value for the condition the parameter must meet for recording to start.

The "use mask" checkbox allows you to indicate whether the value that is read out is masked before it is compared to the value specified for the condition.

The Mask function allows you to 'hide' individual bits of an actual value before it is compared to the comparison "Value". The mask is entered in hexadecimal notation. Each digit of the hex value describes 4 bits so that the 8 hex values represent all of 32 possible bits of a value. The actual value of the monitored parameter is added to the mask (binary addition). If the result matches the specified comparison value, recording is started.

For example, if the value 0x00000005 is set, this means that only bit 0 and bit 3 are used for comparison to the comparison "Value".

The delay for starting recording after the condition has been satisfied is defined in the "Delay" field.

Tab "Tuning"   Movements, for example a positive step, can be triggered on the "Tuning" tab. They can be evaluated for graphic optimization.

Tuning can only be started if the "Enable" switch is set to "On".
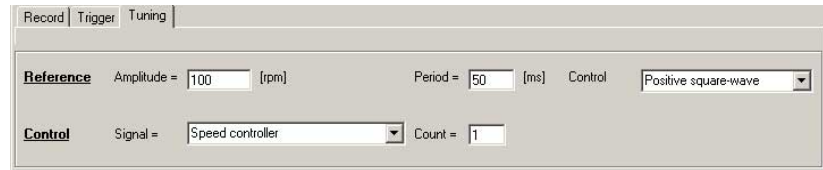
Figure 5.21   Tab Tuning

The "Amplitude" field is used to set the maximum amplitude of the reference value.

The duration of a period is set in the "Period" field.

The signal type for the reference value is set in the "Signal type" dropdown list.

The controller to be used is set in the "Type" dropdown list.

The number of periods is specified in the "Count" field.

Start recording   Use the "Start recording" button to start recording.

The recorded data is sent to the PC. The data is then visualized.

5.5.4   Inputs and outputs

> # ⚠ WARNING
>
> **UNINTENDED BEHAVIOR CAUSED BY FORCING**
>
> Forcing of signals may cause unexpected movements or responses of the system.
>
> • Only use the function if you are fully familiar with the effects of the signals.
>
> • Only use the function if there are no persons or obstructions in the hazardous area.
>
> **Failure to follow these instructions can result in death, serious injury or equipment damage.**

The screenshots below may be different or unavailable in your system due to different functionalities of the devices.

The function "Inputs+Outputs" is used to monitor and visualize the analog and digital inputs as well as the digital outputs.

Use the menu item "⇒ Functions ⇒ Inputs+Outputs..." to start the function "Inputs+Outputs".

Figure 5.22   Inputs and outputs

Forcing   The "Forcing" function lets you directly set specific digital inputs, specific digital outputs and the voltage at the analog inputs directly. The currently available signal is disabled during this process. For example, this option can be used to apply the specified voltage via the analog input in the operating mode "Oscillator".

5.6 Diagnostics

The software provides a range of diagnostics and information functions for troubleshooting in various windows.

5.6.1 Device information

Use the menu item "⇒ Diagnostics ⇒ Device info..." to display information on the device.
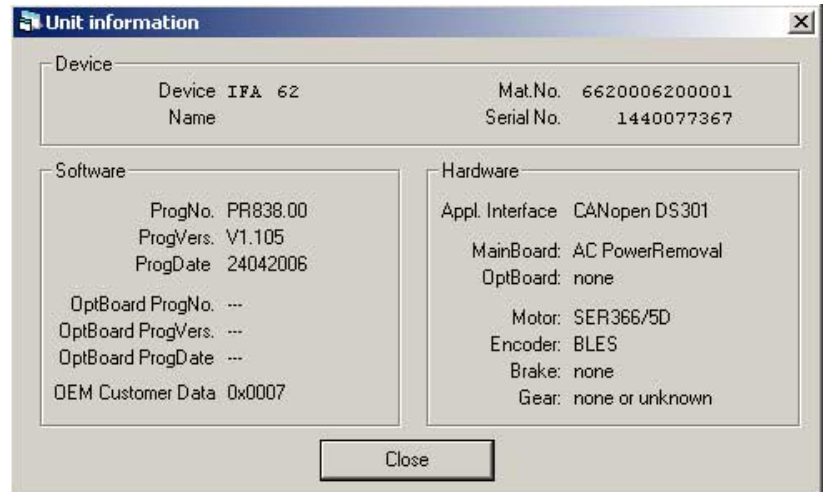
Figure 5.23   Device info

The device information window provides information such as device type or serial number for diagnostics and service purposes.

5.6.2   Error memory

See the product manual for information on the error memory.

Use the menu item "⇒ Diagnostics ⇒ Error memory..." to display the error memory.


```
Error memory                                                                    ×

Cause of last interruption:       None

F-Nr K #Rep Age  Info       Text

0111 3 3    6    00000000 Following error
0116 2 0    6    00000000 Fieldbus: Node guarding/watchdog or clear
0157 1 1    4    00000000 LIMP causes interruption or Quick-Stop
0116 2 0    3    00000000 Fieldbus: Node guarding/watchdog or clear
0157 1 4    3    00000000 LIMP causes interruption or Quick-Stop
0149 1 0    1    00000000 RS485 interface: framing error
0115 1 0    1    00000000 Field bus protocol error



Later errors below
                             Delete memory     Read out again        Close
```

Figure 5.24   Reading the error memory

The "Delete memory" button clears the error memory and the list of errors displayed.

The "Read out again" button updates the error list.

The "Close" button closes the "Error memory" window.

Current error   The current error, for example limit switch (LIMP/LIMN/REF), is displayed in the left part of the window.

Last error   The current value of the operating hours meter and the error messages are displayed in the right part of the window.

The "Error history" table shows the error messages in chronological order. The "Device status" column consists of:
(error time)-(detailed error number)-(error class)

The "Additional information" table provides additional information on the error for every error message.

Delete error memory   Use the menu item "⇒ Diagnostics ⇒ Delete error memory..." or the button "Delete error memory" to clear the "Error History".

5.6.3 Monitoring parameters

Use the menu item "⇒ Diagnostics ⇒ Object monitoring..." to monitor selected parameters of the device.
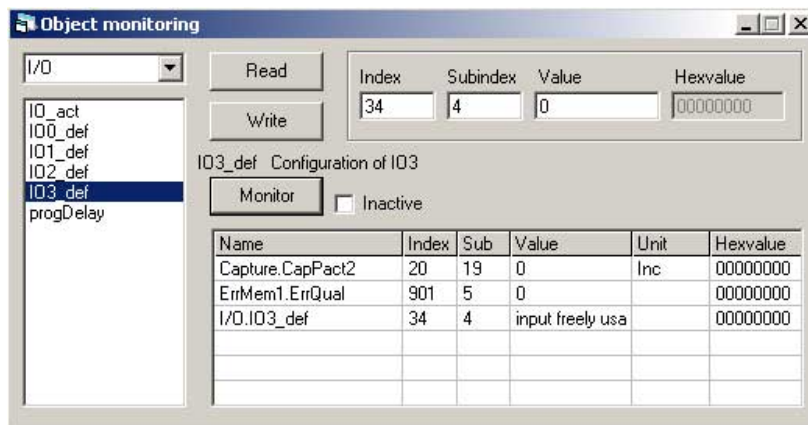
Figure 5.25   Monitoring parameters

The parameter to be monitored is selected from the list. Click the "Monitor" button to include the parameter data in the table. You can add several parameters to the table for monitoring.

A value can be written directly to a parameter with the "Write" button.

6   Lexium CT M2

Depending on the product, the "Lexium CT ProductExplorer" starts the "Lexium CT M2" software.

6.1   The user interface

The following screenshot shows the user interface of the commissioning software.
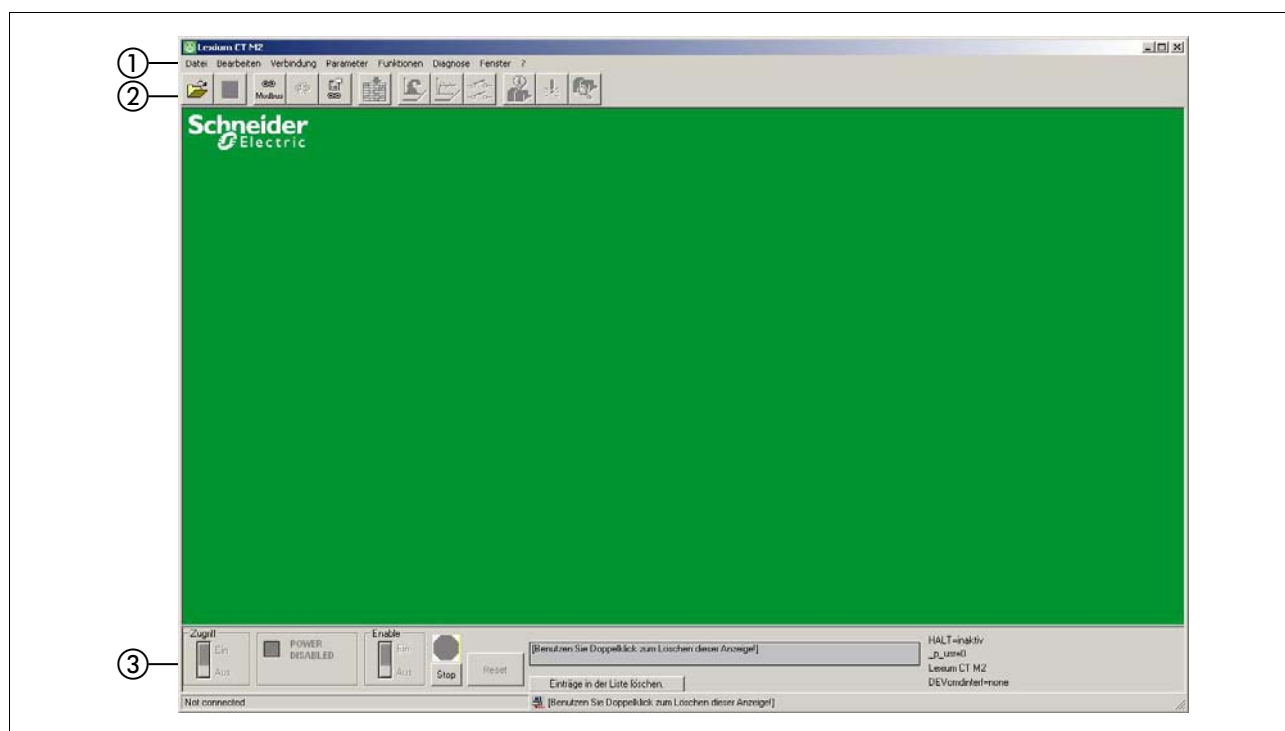
Figure 6.1   User interface Lexium CT M2

(1)   Menu bar
(2)   Toolbar
(3)   Control bar and status bar

The functions of the commissioning software can be accessed via the menu bar, the toolbar, the control bar and the status bar.

6.1.1 The menu bar

The menu bar adapts to the task at hand. It only contains the functions required for and possible in the current situation.

For example, if there is no connection to the device, the function "⇒ Connection ⇒ Disconnect" is not available.

6.1.2 The toolbar

The toolbar provides fast, single-click access to frequently used functions.

The buttons let you execute the following functions:
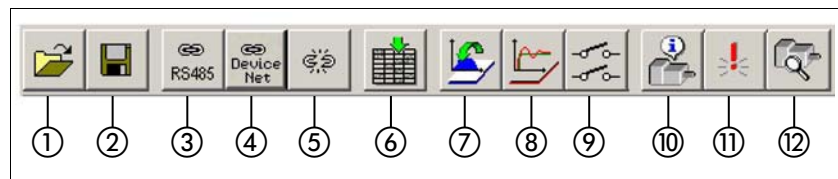
Figure 6.2 Toolbar

(1)   ⇒ File ⇒ Open...
(2)   ⇒ File ⇒ Save
(3)   ⇒ Connection ⇒ RS485 connection...
(4)   ⇒ Connection ⇒ CAN connection
(5)   ⇒ Connection ⇒ Disconnect
(6)   ⇒ Parameter ⇒ Open parameter window...
(7)   ⇒ Functions ⇒ Operating modes...
(8)   ⇒ Functions ⇒ Recoding/Tuning...
(9)   ⇒ Functions ⇒ Inputs+Outputs...
(10)   ⇒ Diagnostics ⇒ Device info...
(11)   ⇒ Diagnostics ⇒ Error memory...
(12)   ⇒ Diagnostics ⇒ Object monitoring...

If you move the mouse pointer over a button, the software displays a "Tooltip"; in addition, a short description of the function may be shown in the "status bar".

6.1.3   Control bar and status bar

The control bar and the status bar allow you to access the device. The control bar and the status bar can be used to enable the power stage and display various status information.

Figure 6.3   Control bar and status bar

(1)	Access control
(2)	Operating state
(3)	Enable
(4)	Stop
(5)	Reset
(6)	Current error
(7)	Communication errors
(8)	Status information

Access control   The commissioning software receives access control via the "Access" button. For more information on access control, see the product manual of the device.

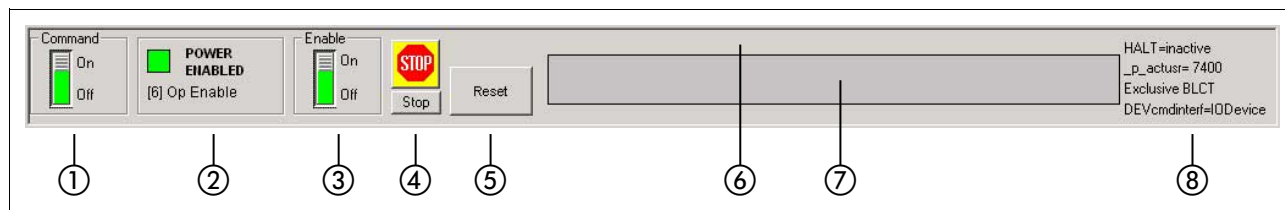*Operating state*   The commissioning software shows the current operating state of the connected device. For more information on the operating state see the product manual of the device.

Enable   The switch "Enable" allows you to enable and disable the power stage of the device. For more information on enabling or disabling the power stage see the product manual of the device.

Stop   The "Stop" button allows you to stop the motor with a "Quick Stop". For more information on "Quick Stop" see the product manual of the device.

Reset   The "Reset" button is used to acknowledge an error message. For more information on acknowledging error messages see the product manual of the device.

Current error   The field shows the currently active asynchronous error.

Communication error   The field shows the communication errors (synchronous errors) in chronological order.

Status information   This information consists of:

- Line 1 shows whether the function "Halt" is active

- Line 2 displays the current motor position

- Line 3 shows the status of the access control

- Line 4 shows the control mode

6.2   First steps

6.2.1   The first connection

The device must be connected to the PC via the data interface.

Use the menu item "⇒ Connection ⇒ RS485 connection...." to connect to the device. This opens the "Connection" dialog box.

The screenshot below shows an example.
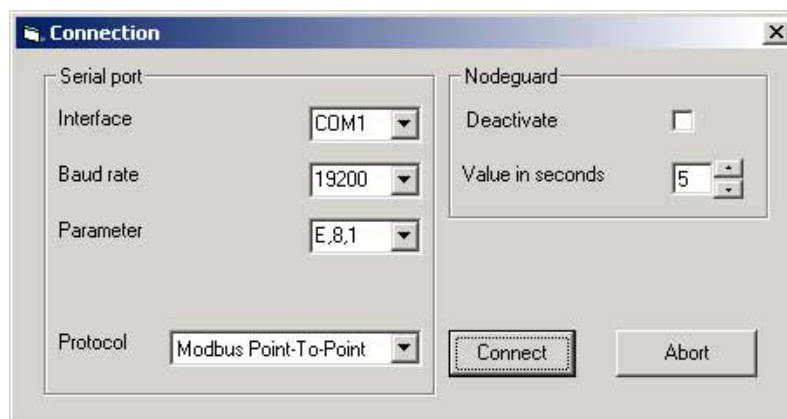
Figure 6.4   Selection of the connection data with RS485

Settings   The "Modbus Point-to-Point" protocol must be used when the device is directly connected to the PC.

The "Modbus Multidrop" protocol must be used if the device is in a network in which multiple devices are interconnected. The corresponding Modbus address must be set.

The setting of the Modbus address and the rate of transmission are described in the product manual of the device.

In devices with DeviceNet support CAN may be selected for the connection instead of RS485. If the connection over CAN is selected, the following window opens:
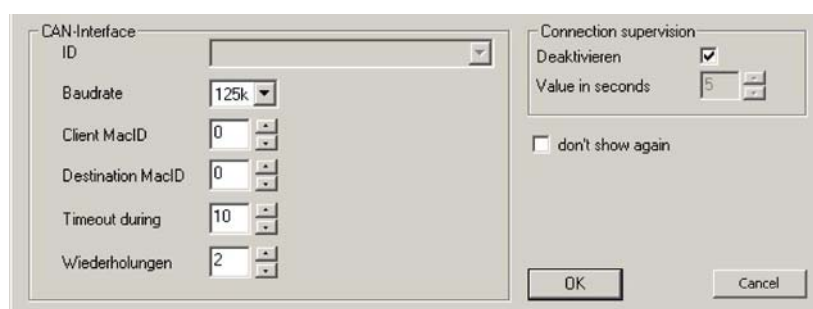
Figure 6.5   Selection of the connection data with CAN

If you check the "don't show again" checkbox, this dialog box is not displayed the next time the CAN connection is selected. In such a case, the connection is immediately established with the specified settings.

Connection   The device data is transferred to the PC when a connection is established. After transfer the commissioning software is connected to the device in online mode.

Start-up message   The commissioning software displays a start-up message depending on the device. For example, in the case of new devices or devices were reset to the factory settings, the commissioning software displays the following information.

Figure 6.6   Start-up message

6.3   Parameter file

The device data can be saved to the PC and loaded.

On the PC, the device data is saved in a file, the parameter file.

The PC and the device do not have to be connected if you want to edit the parameter file.

Parameter files have the extension ".blx". Even if there is no connection to the device, you can open and edit any device file on the PC. In addition to the parameter values, the file contains the contents of the error memory, all actual values and recorded data.

6.3.1   Saving a file

Device data can be saved to a parameter file on the PC to archive it for maintenance and service purposes. This also allows you to quickly commission additional devices of the same device version.

To save a parameter file on the PC, use the menu items"$\Rightarrow$ File $\Rightarrow$ Save..." or "$\Rightarrow$ File $\Rightarrow$ Save as...."

It is recommended to save all device data in the form of a parameter file after you have commissioned a device. This way the device can be put back into operation immediately after a repair.

6.3.2   Opening a file

Use the menu item "$\Rightarrow$ File $\Rightarrow$ Open..." to open a parameter file on the PC.

If there is a connection to the device, the commissioning software checks whether the parameter file is compatible with the device.

If the parameter file is compatible with the device, the stored parameter values of the parameter file are compared to the parameter values of the device. Differences are highlighted by a colored background.

If the parameter file is not compatible with the device, the loading process is canceled and an error message is displayed.

6.3.3   Transferring device data

Device data can be transferred between the device and the PC only if there is a connection. It is possible to transfer all parameters or groups of parameters.

NOTE: In a first step, the commissioning software transfers modified parameters to the RAM memory of the device. They remain there until the controller supply voltage is switched off . Note that the device data must be saved separately to the **EEPROM memory** so they are permanently available to the product.

6.3.4   Exporting parameters

The device parameters that can be written can be saved as a .csv file for further processing. This function can be accessed via the menu item "⇒ File ⇒ Export parameters...".

The file is saved with the extension ".csv". You can open and edit this file Microsoft Excel, for example.

6.3.5   Printing parameters

The menu item "⇒ File ⇒ Print parameters..." allows you to print the device data. The printed data is arranged in groups.

In addition, the device type, serial number and information on the software are printed.

6.4 Parameterization

The data of a device can be edited in the "Parameter" window. A connection to the device is not required. The parameter values of a file can be modified in off-line mode and transferred to the device at a later point in time.

6.4.1 Opening the parameter window

Use the menu item "⇒ Parameter ⇒ Open parameter window..." to open the Parameter window.
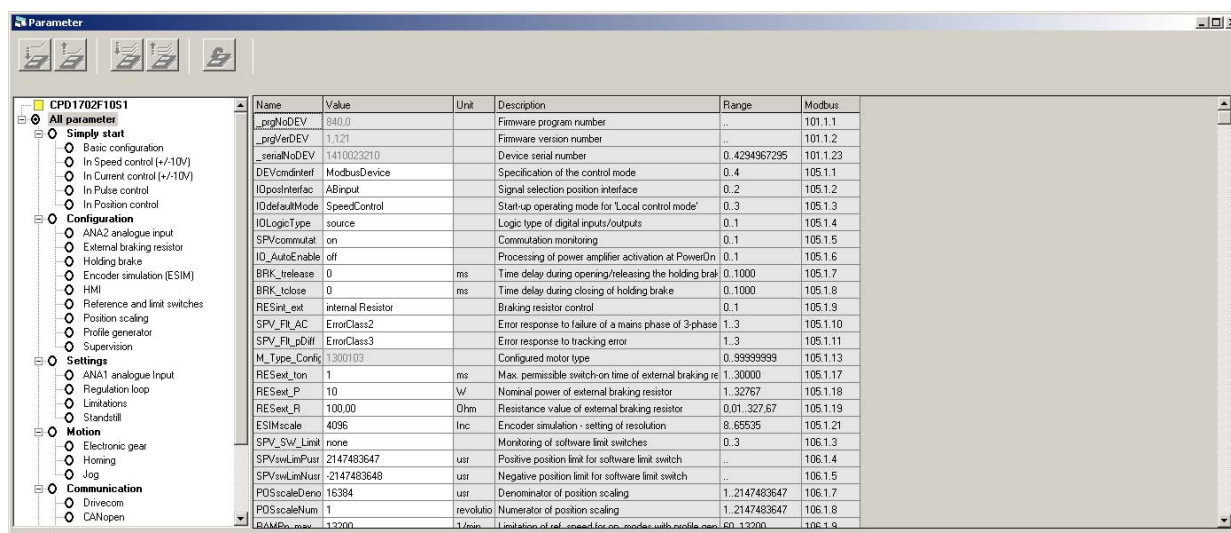

Figure 6.7   Parameter window

The screenshot shows the parameter window. The contents of this window depends on the device version. However, the structure is the same for all versions. The left pane shows items, the associated parameters are displayed in the right pane.

Parameters of a group   The parameter window shows the parameters associated with the selected item. The list shows the names, values, unit, a description, the range and the Modbus address.

Changing parameter values   The value of a parameter is changed in the "Value" column. Values with a gray background are read-only and cannot be modified.

Modified values that have not been transferred to the device are highlighted by a colored background. At the same time the parameter group to which the parameter belongs is highlighted by a red exclamation mark. As soon as the values have been transmitted to the device, the exclamation mark is cleared.

To change a parameter value, you can enter the new value directly or choose it from a list.

Checking the value range   The commissioning software checks whether the parameter values entered are in the permissible value range. If the value entered is not in the valid range, the value is not accepted.

6.4.2   Transferring parameter values

Device data can be transferred between the device and the PC only if there is a connection. It is possible to transfer all parameters or groups of parameters.

NOTE: In a first step, the commissioning software transfers modified parameters to the RAM memory of the device. They remain there until the controller supply voltage is switched off . Note that the device data must be saved separately to the **EEPROM memory** so they are permanently available to the product.

When the controller supply voltage for the device is switched on, the device data is automatically copied from the EEPROM to the RAM. The devices only operate with the data contained in the RAM.

The data exchange between the device and the PC is controlled by the following menu items and buttons.

Menu items   The menu items "⇒ Parameter ⇒ Send parameter group to drive" and "⇒ Parameter ⇒ Send all parameters to drive" allow you to transmit parameter values from the PC to the device.

The menu items "⇒ Parameter ⇒ Load parameter group from drive" and "⇒ Parameter ⇒ Load all parameters from drive" are used to transmit parameter values from the device to the PC.

Buttons   The buttons let you execute the following functions:

Figure 6.8   Buttons for data transmission

(1)   ⇒ Parameter ⇒ Send parameter group to drive
(2)   ⇒ Parameter ⇒ Load parameter group from drive
(3)   ⇒ Parameter ⇒ Send all parameters to drive
(4)   ⇒ Parameter ⇒ Load all parameters from drive
(5)   ⇒ Parameter ⇒ Save device parameters in EEPROM

Not all parameters can be transferred in operating state "Operation Enable". Parameter values that cannot be transferred are highlighted by a colored background.

6.4.3   Restoring the factory settings

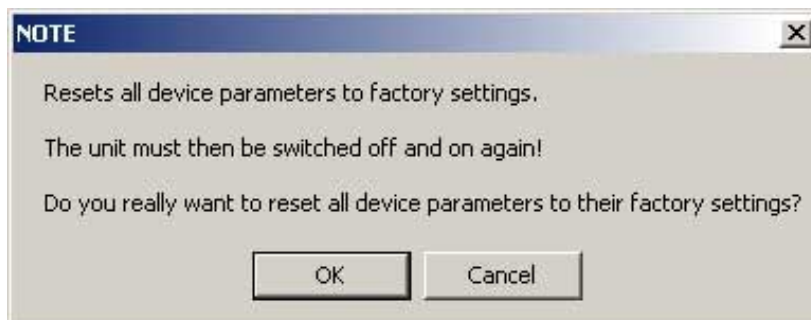Use the menu item "⇒ Parameter ⇒ Reset to factory settings" to restore the factory settings of the parameters.

Figure 6.9   Restoring the factory settings

After confirmation with "OK", the device parameters are reset to the factory setting.

6.4.4   Resetting user-defined parameters

Use the menu item "⇒ Parameter ⇒ Reset user parameters" to reset the user-defined parameters to their factory settings. User-defined parameters include all parameters except for (if applicable):

- Communication parameters
- Definition of direction of rotation
- Signal selection position interface
- Device control
- Logic type
- Start-up operating mode
- Encoder simulation (ESIM) settings
- Motor type
- Processing of motor encoder position
- I/O functions

Figure 6.10   Resetting user-defined parameters

After confirmation with "OK", the user-defined parameters are reset to the factory settings. The new values of the user-defined parameters are not saved to the EEPROM!

6.4.5   Calculating controller parameters

Use the menu item "$\Rightarrow$ Parameter $\Rightarrow$ Calculate controller parameter" to reset the control loop parameters to the factory settings.
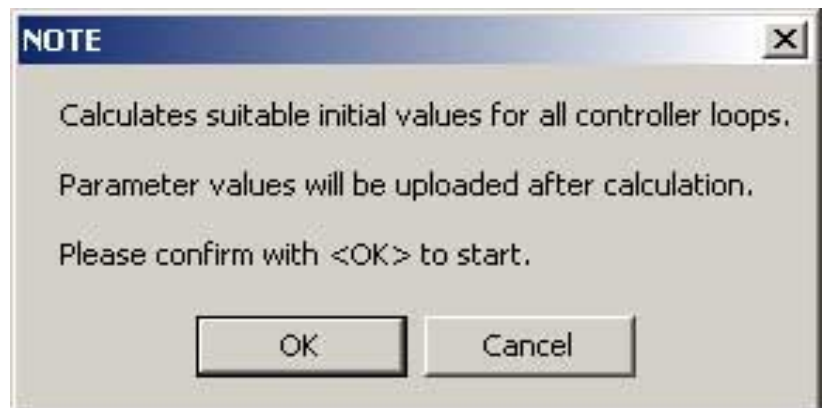

Figure 6.11   Resetting the controller parameters

When you confirm with "OK", the controller parameters for the velocity controller and the position controller are reset.

6.5   Functions

The "Functions" menu provides access to:

- Operating modes
- Recording and tuning
- Inputs and outputs

The screenshots below may be different or unavailable in your system due to different functionalities of the devices.

6.5.1   Changing the operating state

An exclusive access is required for controlling the device with the commissioning software. Use the "Exclusive access" switch on the control and status bar to access the device. When the device is accessed, the software displays a warning which must be confirmed with a key combination. For more information on access control, see the product manual of the device.

The device can now be set to operating state 6 "Operation Enable" with the commissioning software. In this operating state the power stage of the device is enabled. To do so, click the "Enable" switch. For more information on enabling or disabling the power stage see the product manual of the device.

The device must be in operating state 6 "Operation Enable" for the functions of the commissioning software to be executed.

6.5.2   Operating modes

Use the menu item "⇒ Functions ⇒ Operating modes..." to start the "Operating modes" function.

The various operating modes can be selected from the tabs in the Operating Modes window.

The window is subdivided into two sections:

- Tab for the selected operating mode and for setting specific parameters (top section)
- Display of some status information (bottom section)

The user can switch between the tabs in the Operating Modes window without interfering with a currently active operating mode.

Device monitoring   During movements, the connection to the device is cyclically monitored. If the connection between the PC and device is lost, the motor stops within the cycle time.

The commissioning software cannot be exited while a movement is running.

The operating modes are described in detail in the product manuals. Therefore, this manual does not describe the details of the operating modes.

Profile Position In Profile Position operating mode, a movement with an adjustable motion profile is performed from a start position to a target position. The value of the target position can be specified as either a relative or an absolute position.

You can set a motion profile with values for acceleration ramp, deceleration ramp and target speed.

Figure 6.12   Operating mode Profile Position

Profile Velocity In the operating mode Profile Velocity, the drive accelerates to an adjustable target speed of rotation. You can set a motion profile with values for acceleration and deceleration ramps.
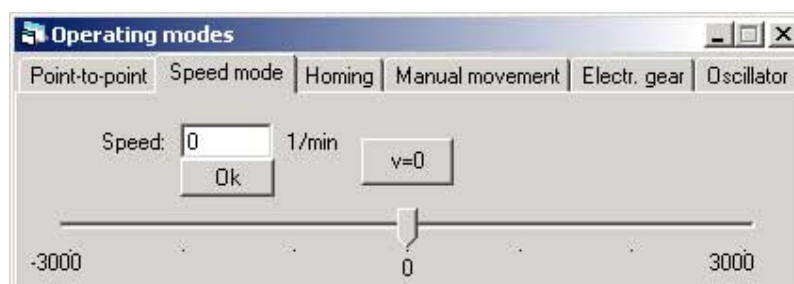

Figure 6.13   Operating mode Profile Velocity

Homing The operating mode Homing establishes an absolute position reference between the motor position and a defined axis position. Homing can be carried out by a means of a reference movement or by position setting.
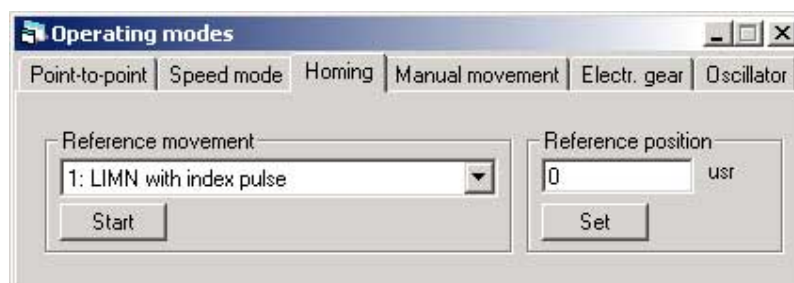

Figure 6.14   Homing tab

Jog The motor is moved at slow or fast jog velocity with the buttons. The motor moves as long as the button is held down. When you release the button, the motor is decelerated to a standstill.
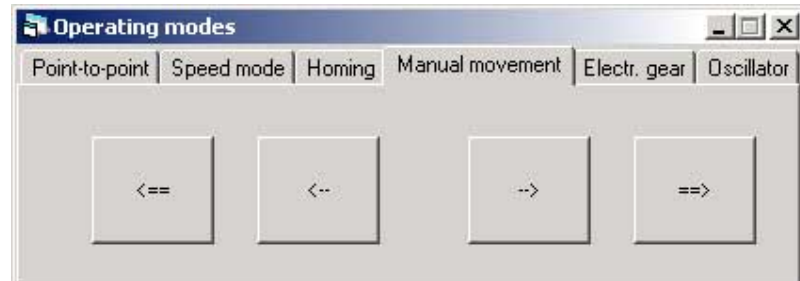

Figure 6.15   Operating mode Jog

Electronic Gear In the operating mode Electronic Gear, reference signals are supplied in the form of A/B signals or pulse/direction signals. A new position reference value is calculated on the basis of these reference value signals plus an adjustable gear ratio.
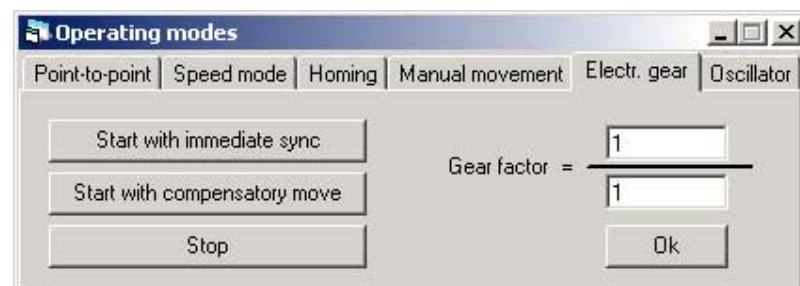

Figure 6.16   Operating mode Electronic Gear

Oscillator

⚠ **WARNING**

UNEXPECTED MOVEMENT

In this operating mode, an unknown voltage value at the analog input may cause an unexpectedly high speed of rotation of the motor.

• Observe the voltage value at the analog input when starting the operating mode .

Failure to follow these instructions can result in death, serious injury or equipment damage.

In the Oscillator operating mode, the motor is moved corresponding to a voltage-dependent reference speed of rotation. There are two options:

• Selection of speed of rotation directly in the window by entering the value or using the slider.

• Supply of the value via the analog input ANA1. The voltage value can also be set in the "Inputs+Outputs" window for this option.

The actual movement is started or stopped with the "Start" and "Stop" buttons.

Figure 6.17   Operating mode Oscillator

Speed Control

⚠ **WARNING**

UNEXPECTED MOVEMENT

In this operating mode, an unknown voltage value at the analog input may cause an unexpectedly high speed of rotation of the motor.

- Observe the voltage value at the analog input when starting the operating mode .

Failure to follow these instructions can result in death, serious injury or equipment damage.

In the operating mode Speed Control, the motor is moved corresponding to a voltage-dependent reference velocity. There are two options:

- Selection of the value directly in the window by entering the value or using the slider

- Supply of the value via the analog input ANA1. The voltage value can also be set in the "Inputs+Outputs" window for this option.

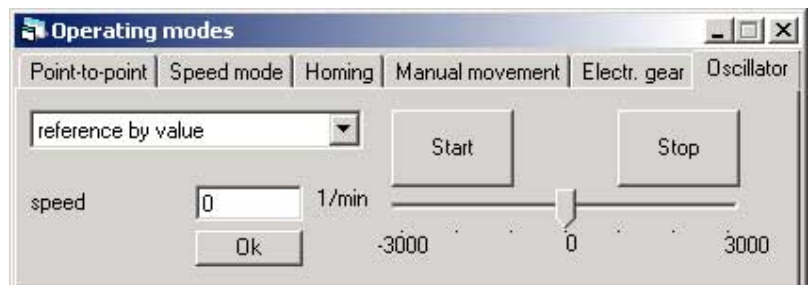The actual movement is started or stopped with the "Start" and "Stop" buttons.

Figure 6.18   Operating mode Speed Control

Current control

⚠ WARNING

UNEXPECTED MOVEMENT

In this operating mode, an unknown voltage value at the analog input may cause an unexpectedly high speed of rotation of the motor.

• Observe the voltage value at the analog input when starting the operating mode .

Failure to follow these instructions can result in death, serious injury or equipment damage.

In the Current Control operating mode, the motor is moved corresponding to a voltage-dependent reference current. There are two options:

• Selection of current directly in the window by entering the value or using the slider

• Supply of the value via the analog input ANA1. The voltage value can also be set in the "Inputs+Outputs" window for this option.

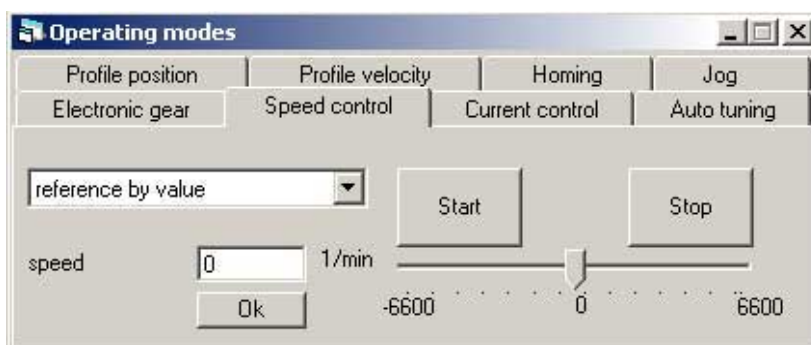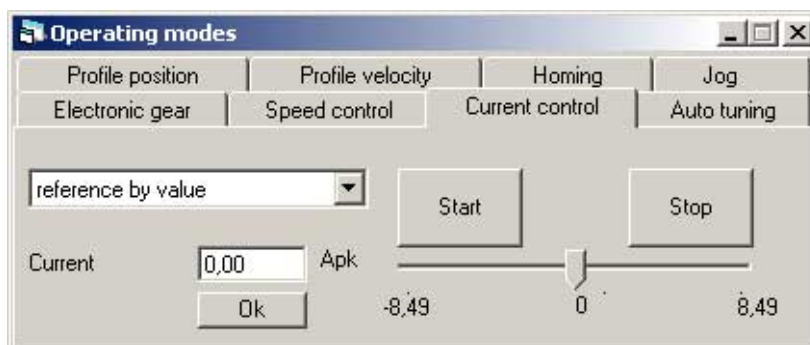The actual movement is started or stopped with the "Start" and "Stop" buttons.

Figure 6.19   Operating mode Current Control

Autotuning

⚠ WARNING

UNEXPECTED MOVEMENT

Autotuning moves the motor in order to tune the control loops. Incorrect parameters may cause unexpected movements or the loss of monitoring functions.

- Check the parameters `AT_dir` and `AT_dis`. The distance required for the deceleration ramp must also be taken into account.

- Verify that the parameter `LIM_I_maxQSTP` for Quick Stop is correctly set.

- If possible, use the limit switches.

- Verify that a functioning button for EMERGENCY STOP is within reach.

- Verify that the system is free and ready for the movement before starting the function.

Failure to follow these instructions can result in death, serious injury or equipment damage.

Autotuning determines the friction torque as a constantly acting load torque and considers it in the calculation of the moment of inertia of the entire system.
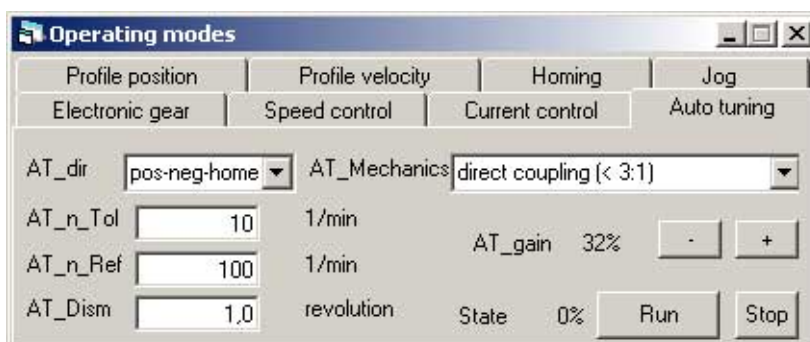

Figure 6.20   Autotuning

6.5.3 Recording and optimizing

Introduction   The commissioning software provides the "Recording/Tuning" function for visualizing internal device data during movements. The connected device stores the movement data to an internal memory for a defined recording period and then sends it to the PC. The PC processes the data and displays them in the form of charts or tables.

Recorded data can be saved on the PC, see chapter 6.3.1 "Saving a file", and can be archived or printed for documentation purposes.

Use the menu item "⇒ Functions ⇒ Record/Tuning..." to start the "Record" function.
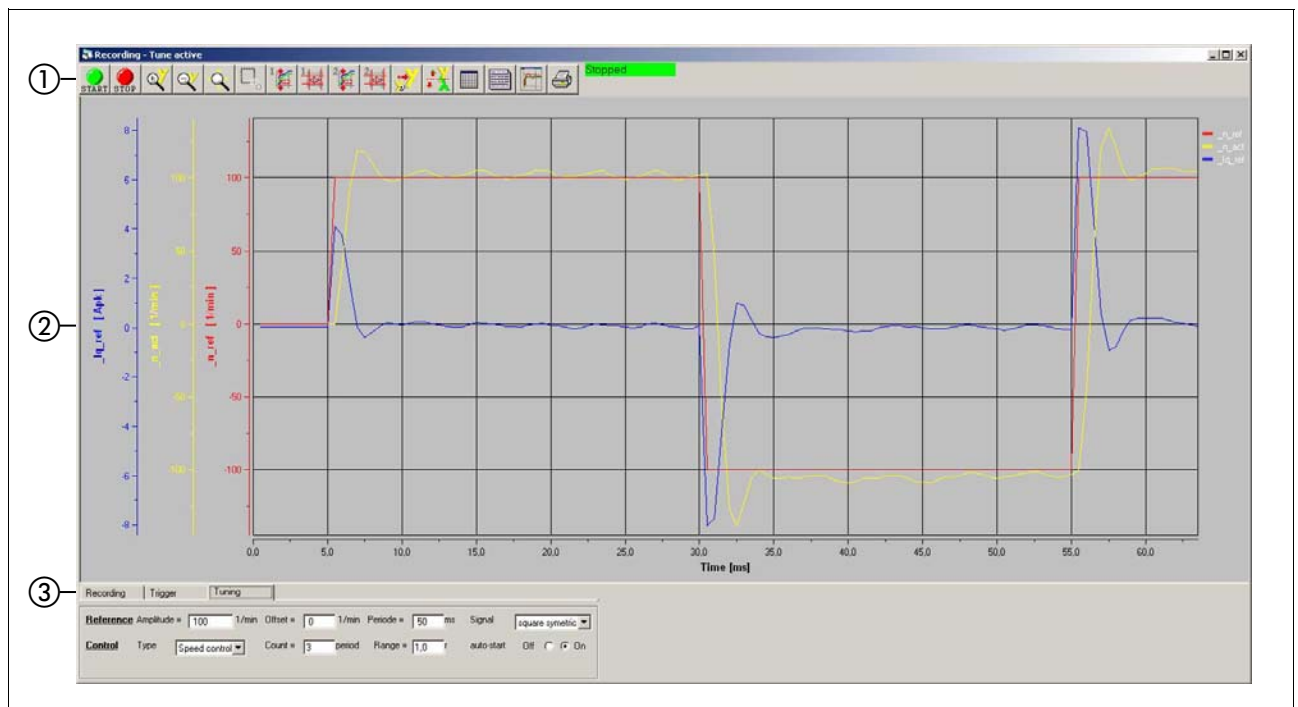

Figure 6.21   Recording

Elements of the Record window:

(1)   Buttons
(2)   Chart with the recorded data
(3)   Tabs for recording, trigger and tuning

Chart   A chart is only recorded if at least one parameter was selected.

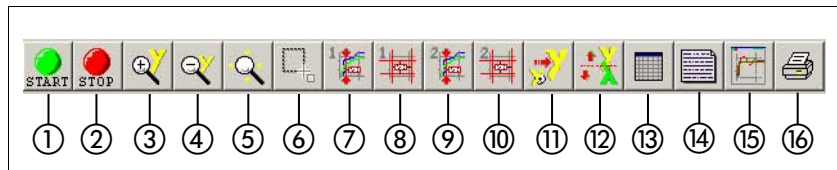Each of the selected parameters is shown in a distinct color.

Buttons

Figure 6.22   Buttons

(1)   Start recording
(2)   Stop recording
(3)   Zoom in, y axis
(4)   Zoom out, y axis
(5)   Infinitely variable zoom, x axis and y axis
(6)   Zoom selected rectangle
(7)   1st display of values for a specific point in time
(8)   Change displayed values for first display
           (x and y value, x value, y value, period, peak/peak value)
(9)   2nd display of values for a specific point in time
(10)   Change displayed values for second display
           (x and y value, x value, y value, period, peak/peak value)
(11)   Restore original display
(12)   Invert y axis
(13)   Display table of recorded values
(14)   Enter description
(15)   Show/hide configuration
(16)   Print recording

"Recording" tab   The desired recording is configured in the "Recording" tab.

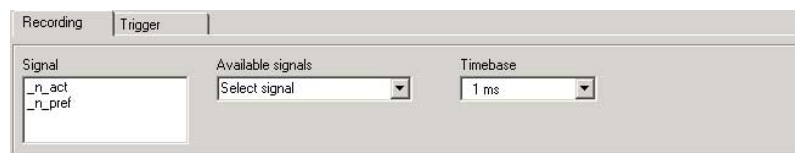Figure 6.23   Recording tab

The desired parameters are selected in the "Available parameters" input field. A maximum of 4 parameters can be selected. If a parameter is no longer required, it can be deselected by a double-click on the name of the parameter.

The desired recording increment is select in the "Time base" input field. The smaller the "Time base" the smaller the maximum recording time.

"Trigger" tab   The desired triggering for the recording is configured in the "Trigger" tab.
The recording starts once the specified event has occurred.

Figure 6.24   Trigger tab

The parameters for monitoring are selected in the "Trigger" input field.

The event that the selected parameter must meet to start the recording
is selected in the "Event" input field.

The decimal whose comparison value the parameter must meet to start
the recording is selected in the "Comparison value" input field.

If "Binary AND" or "Binary OR" is selected as the event, the "Mask" input
field is opened.

The Mask function offers the option of hiding individual bits of an actual
value before it is compared with the "Comparison value". The mask is in-
put in the hexadecimal system. Every position of the hex value de-
scribes 4 bits that through the 8 hex values shows all of the maximum 32
possible bits of a value. The actual value of the monitored parameter
added to the mask in binary form. If the revenue matches the specified
comparison value, the recording is deleted.

For example, if the value 00000005 is set, this means that only bit 0 and
bit 3 are used for comparison with the "comparison value".

The delay with which the recording is to be started after the condition
has been met is set in the "time" input field. If a value with a minus sign
is input, the recording is started before the selected event occurs.

Tab "Tuning"   Movements, for example a positive step, can be triggered on the "Tun-
                  ing" tab. They can be evaluated for graphic optimization.

                  Tuning can only be started if the "Exclusive access" and "Enable"
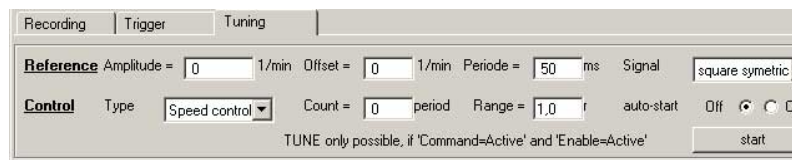   switches are set to "On".

Figure 6.25   Tab Tuning

                  The "Amplitude" field is used to set the maximum amplitude of the ref-
                  erence value.

                  The offset of the amplitude in positive or negative direction can be set in
                  the "Offset" field.

                  The duration of a period is set in the "Period" field.

                  The signal type for the reference value is set in the "Signal type" drop-
                  down list.

                  The controller to be used is set in the "Type" dropdown list.

                  The number of periods is specified in the "Count" field.

                  The maximum number of revolutions that can be triggered by tuning can
                  be set in the "Range" field. This value can, for example, help to avoid a
                  movement to a mechanical stop.

                  The "Auto-start" radio button allows you to link the execution of the tun-
                  ing movement and the start of recording. If the option is set to "Off", the
                  software displays a Start button. The Start button lets you trigger the tun-
                  ing movement separately from starting the recording. Settings that you
                  may have made on the "Trigger" tab are lost if you set "Auto-start" to
                  "On".

Start recording Use the "Start recording" button to start recording.

                  The recorded data is sent to the PC. The data is then visualized.

6.5.4   Inputs and outputs

> **⚠ WARNING**
>
> **UNINTENDED BEHAVIOR CAUSED BY FORCING**
>
> Forcing of signals may cause unexpected movements or responses of the system.
>
> • Only use the function if you are fully familiar with the effects of the signals.
>
> • Only use the function if there are no persons or obstructions in the hazardous area.
>
> **Failure to follow these instructions can result in death, serious injury or equipment damage.**

The screenshots below may be different or unavailable in your system due to different functionalities of the devices.

The function "Inputs+Outputs" is used to monitor and visualize the analog and digital inputs as well as the digital outputs.

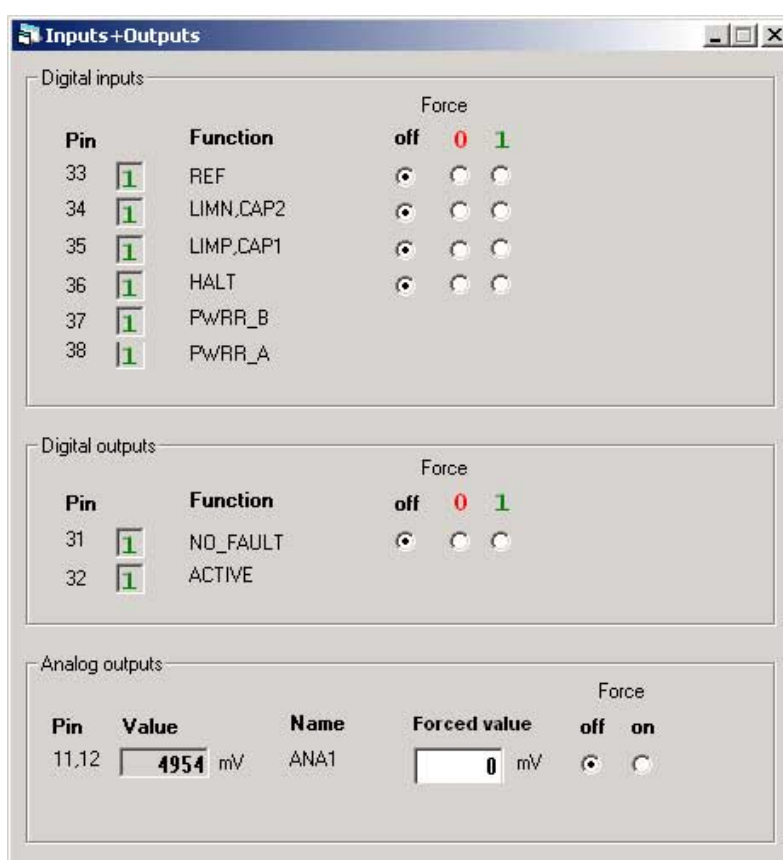Use the menu item "⇒ Functions ⇒ Inputs+Outputs..." to start the function "Inputs+Outputs".

Figure 6.26   Inputs and outputs

Forcing   The "Forcing" function lets you directly set specific digital inputs, specific digital outputs and the voltage at the analog inputs directly. The currently available signal is disabled during this process. For example, this option can be used to apply the specified voltage via the analog input in the operating mode "Oscillator".

6.6 Diagnostics

The commissioning software provides a range of diagnostics and information functions for troubleshooting in various windows.

6.6.1 Device information

Use the menu item "⇒ Diagnostics ⇒ Device info..." to display information on the device.
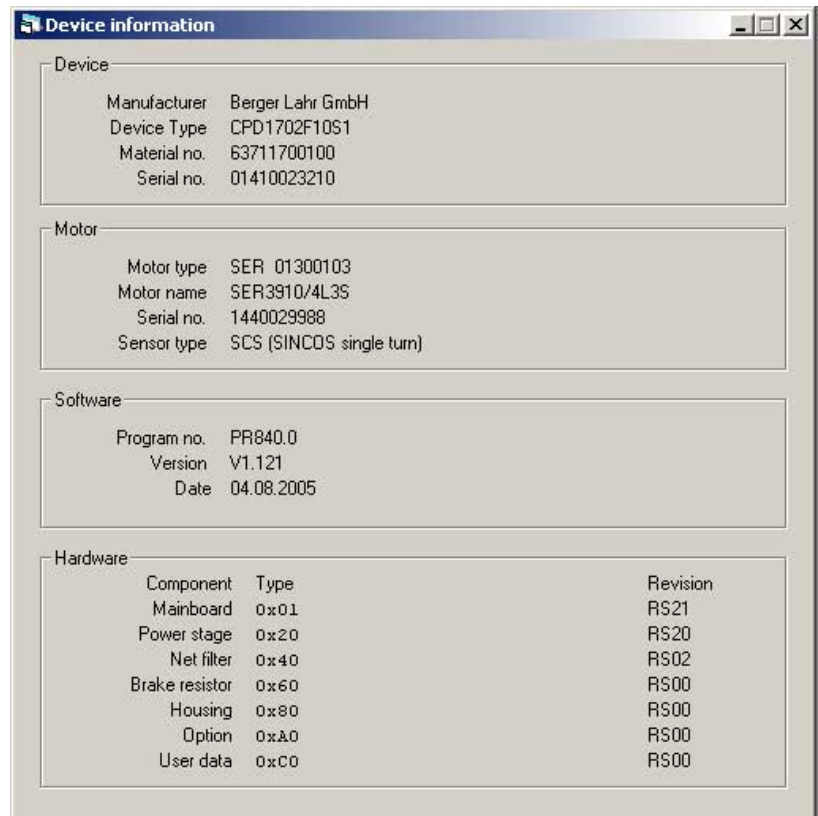

Figure 6.27   Device info

The device information window provides information such as device type or serial number for diagnostics and service purposes.

6.6.2   Error memory

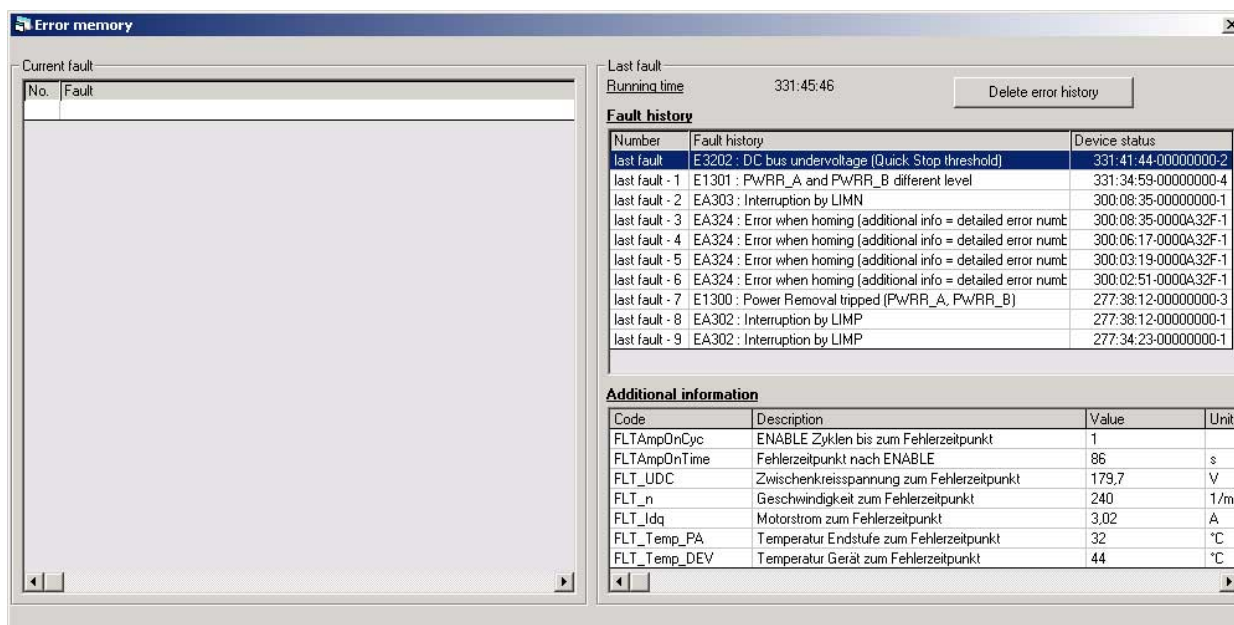Use the menu item "⇒ Diagnostics ⇒ Error memory..." to display the error memory.

Figure 6.28   Reading the error memory

Current error	The current error, for example limit switch (LIMP/LIMN/REF), is displayed in the left part of the window.
Last error	The current value of the operating hours meter and the error messages are displayed in the right part of the window.
	The "Error history" table shows the error messages in chronological order. The "Device status" column consists of: (error time)-(detailed error number)-(error class)
	The "Additional information" table provides additional information on the error for every error message.
Delete error memory	Use the menu item "⇒ Diagnostics ⇒ Delete error memory..." or the button "Delete error memory" to clear the "Error History".

6.6.3   Monitoring parameters

Use the menu item "⇒ Diagnostics ⇒ Object monitoring..." to monitor selected parameters of the device.
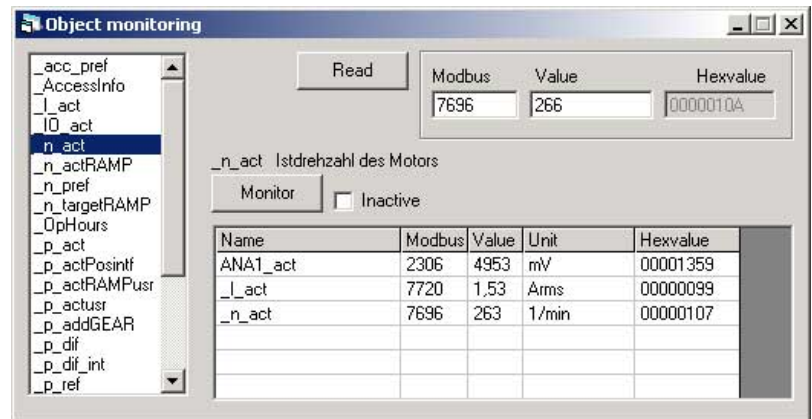

Figure 6.29   Monitoring parameters

The parameter to be monitored is selected from the list. Click the "Monitor" button to include the parameter data in the table. You can add several parameters to the table for monitoring.

A parameter can also be monitored if you enter the Modbus address. The current value is displayed directly in the Value field.

7   Lexium CT M3

Depending on the product, the "Lexium CT ProductExplorer" starts the "Lexium CT M3" software.

7.1   The user interface

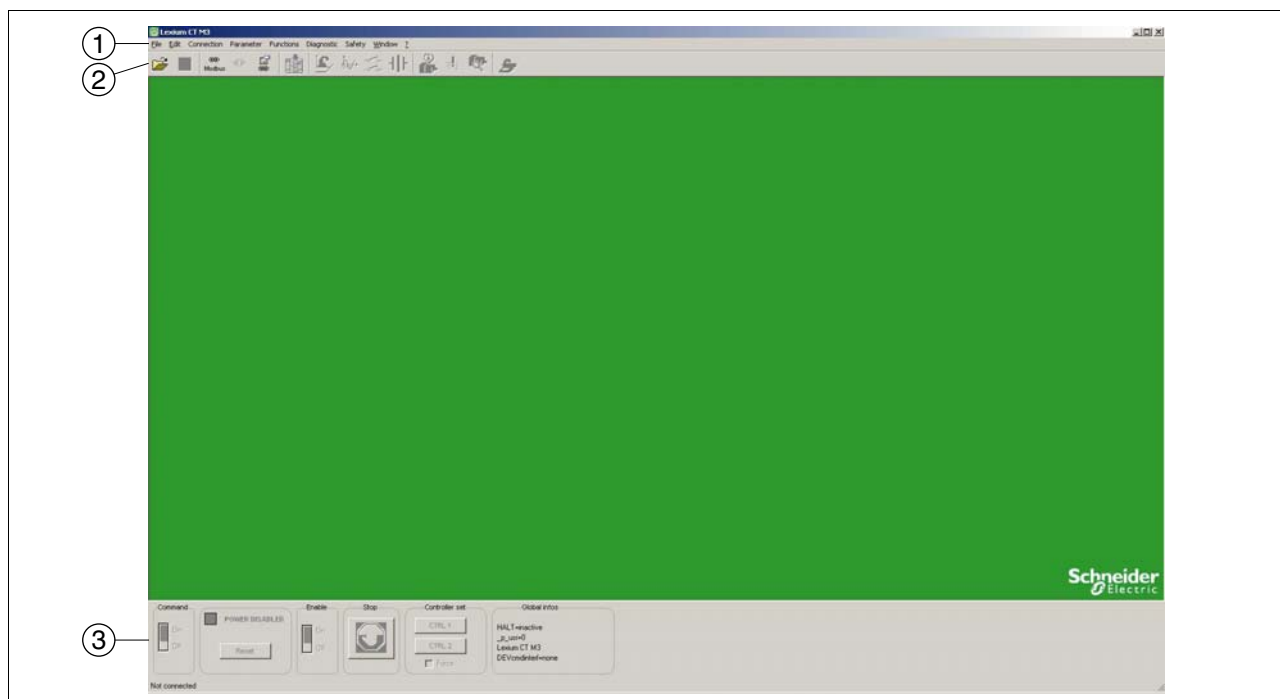The following screenshot shows the user interface of the commissioning software.

Figure 7.1   User interface Lexium CT M3

(1)   Menu bar
(2)   Toolbar
(3)   Control bar and status bar

The functions of the commissioning software can be accessed via the menu bar, the toolbar, the control bar and the status bar.

7.1.1 The menu bar

The menu bar adapts to the task at hand. It only contains the functions required for and possible in the current situation.

For example, if there is no connection to the device, the function "$\Rightarrow$ Connection $\Rightarrow$ Disconnect" is not available.

7.1.2 The toolbar

The toolbar provides fast, single-click access to frequently used functions.
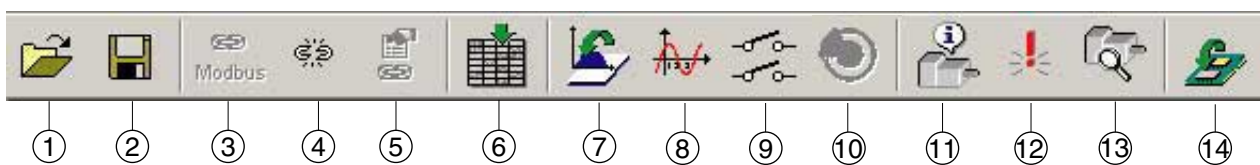
The buttons let you execute the following functions:

Figure 7.2   Toolbar

(1) $\Rightarrow$ File $\Rightarrow$ Open...
(2) $\Rightarrow$ File $\Rightarrow$ Save
(3) $\Rightarrow$ Connection $\Rightarrow$ Modbus RS485 connection...
(4) $\Rightarrow$ Connection $\Rightarrow$ Select connection...
(5) $\Rightarrow$ Connection $\Rightarrow$ Disconnect
(6) $\Rightarrow$ Parameter $\Rightarrow$ Open parameter window...
(7) $\Rightarrow$ Functions $\Rightarrow$ Operating modes...
(8) $\Rightarrow$ Functions $\Rightarrow$ Recoding/Tuning...
(9) $\Rightarrow$ Functions $\Rightarrow$ Inputs+Outputs...
(10) $\Rightarrow$ Functions $\Rightarrow$ Release holding brake...
(11) $\Rightarrow$ Diagnostics $\Rightarrow$ Device info...
(12) $\Rightarrow$ Diagnostics $\Rightarrow$ Error memory...
(13) $\Rightarrow$ Diagnostics $\Rightarrow$ Object monitoring...
(14) $\Rightarrow$ Parameter $\Rightarrow$ Save device parameters in EEPROM

If you move the mouse pointer over a button, the software displays a "Tooltip"; in addition, a short description of the function may be shown in the "status bar".

7.1.3   Control bar and status bar

The control bar and the status bar allow you to access the device. The control bar and the status bar can be used to enable the power stage and display various status information.
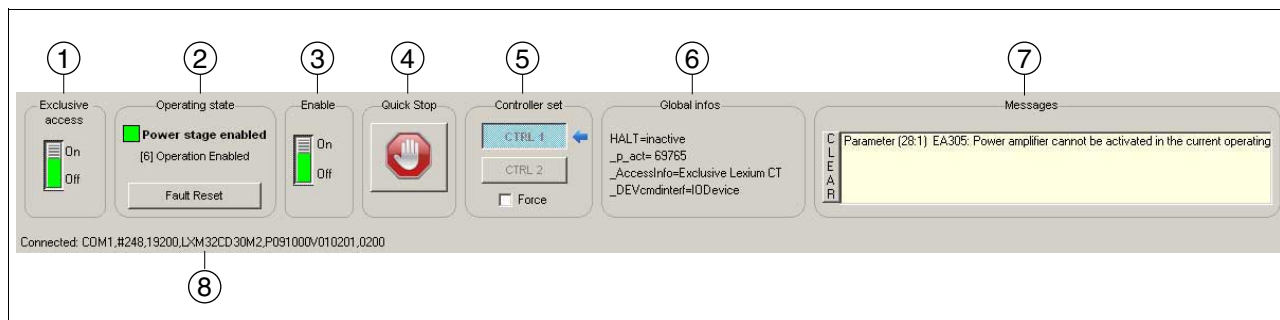

Figure 7.3   Control bar and status bar

(1)	Access control
(2)	Operating state
(3)	Enable
(4)	Stop
(5)	Switching controller parameter sets
(6)	Global status information
(7)	Communication errors
(8)	Status bar

Access control   The commissioning software receives access control via the "Access" button. For more information on access control, see the product manual of the device.

Operating state   The commissioning software shows the current operating state of the connected device. For more information on the operating state see the product manual of the device.

Enable   The switch "Enable" allows you to enable and disable the power stage of the device. For more information on enabling or disabling the power stage see the product manual of the device.

Stop   The "Stop" button allows you to stop the motor with a "Quick Stop". For more information on "Quick Stop" see the product manual of the device.

Controller parameter set   The buttons "CTRL 1" and "CTRL 2" allow you to switch between the two controller parameter sets. The "Force" checkbox lets you force the change.

Status information   This information consists of:

• Line 1 shows whether the function "Halt" is active

• Line 2 displays the current motor position

• Line 3 shows the status of the access control

• Line 4 shows the control mode

Communication error   The field shows the communication errors (synchronous errors) in chronological order.

Status bar   The status bar provides information on the communication connection and its status.

7.2 First steps

7.2.1 The first connection

The device must be connected to the PC via the data interface.

Use the menu item "⇒ Connection ⇒ RS485 connection...." to connect to the device. This opens the "Connection" dialog box.

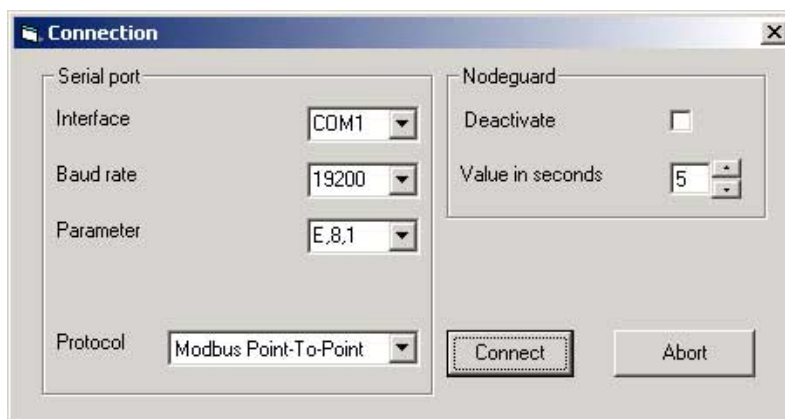The screenshot below shows an example.

Figure 7.4   Selection of the connection data with RS485

Settings   The "Modbus Point-to-Point" protocol must be used when the device is directly connected to the PC.

The "Modbus Multidrop" protocol must be used if the device is in a network in which multiple devices are interconnected. The corresponding Modbus address must be set.

The setting of the Modbus address and the rate of transmission are described in the product manual of the device.

In devices with DeviceNet support CAN may be selected for the connection instead of RS485. If the connection over CAN is selected, the following window opens:
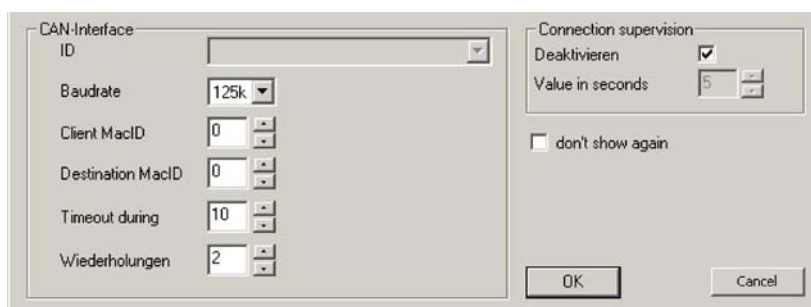

Figure 7.5   Selection of the connection data with CAN

If you check the "don't show again" checkbox, this dialog box is not displayed the next time the CAN connection is selected. In such a case, the connection is immediately established with the specified settings.

Connection   The device data is transferred to the PC when a connection is established. After transfer the commissioning software is connected to the device in online mode.

Start up / Cyclic Message

The function "Start up / Cyclic Message" cyclically reads messages from the product. The messages are displayed in a table at the right of the screen.

The table is displayed automatically whenever a new message is read. You can also display the window via the toolbar.

If you click an entry, the software displays a window with additional information on the message. Depending on the message, buttons are provided. These buttons allow you to confirm messages or send commands to the device.

Simply Start Wizard

The "Simply Start Wizard" guides you through the commissing steps. The individual steps are listed in chronological order. Click one of the buttons to get directly to the appropriate window where you can make the necessary settings.

7.3   Parameter file

The device data can be saved to the PC and loaded.

On the PC, the device data is saved in a file, the parameter file.

The PC and the device do not have to be connected if you want to edit the parameter file.

Parameter files have the extension ".se3". Even if there is no connection to the device, you can open and edit any device file on the PC. In addition to the parameter values, the file contains the contents of the error memory, all actual values and recorded data.

7.3.1   Saving a file

Device data can be saved to a parameter file on the PC to archive it for maintenance and service purposes. This also allows you to quickly commission additional devices of the same device version.

To save a parameter file on the PC, use the menu items"⇒ File ⇒ Save..." or "⇒ File ⇒ Save as...."

It is recommended to save all device data in the form of a parameter file after you have commissioned a device. This way the device can be put back into operation immediately after a repair.

7.3.2   Opening a file

Use the menu item "⇒ File ⇒ Open..." to open a parameter file on the PC.

If there is a connection to the device, the commissioning software checks whether the parameter file is compatible with the device.

If the parameter file is compatible with the device, the stored parameter values of the parameter file are compared to the parameter values of the device. Differences are highlighted by a colored background.

If the parameter file is not compatible with the device, the loading process is canceled and an error message is displayed.

7.3.3 Exporting parameters

The device parameters that can be written can be saved as a .csv file for further processing. This function can be accessed via the menu item "⇒ File ⇒ Export parameters...".

The file is saved with the extension ".csv". You can open and edit this file Microsoft Excel, for example.

7.3.4 Printing parameters

The menu item "⇒ File ⇒ Print parameters..." allows you to print the device data. The printed data is arranged in groups.

In addition, the device type, serial number and information on the software are printed.

7.4   Parameterization

The data of a device can be edited in the "Parameter" window. A connection to the device is not required. The parameter values of a file can be modified in off-line mode and transferred to the device at a later point in time.

7.4.1   Opening the parameter window

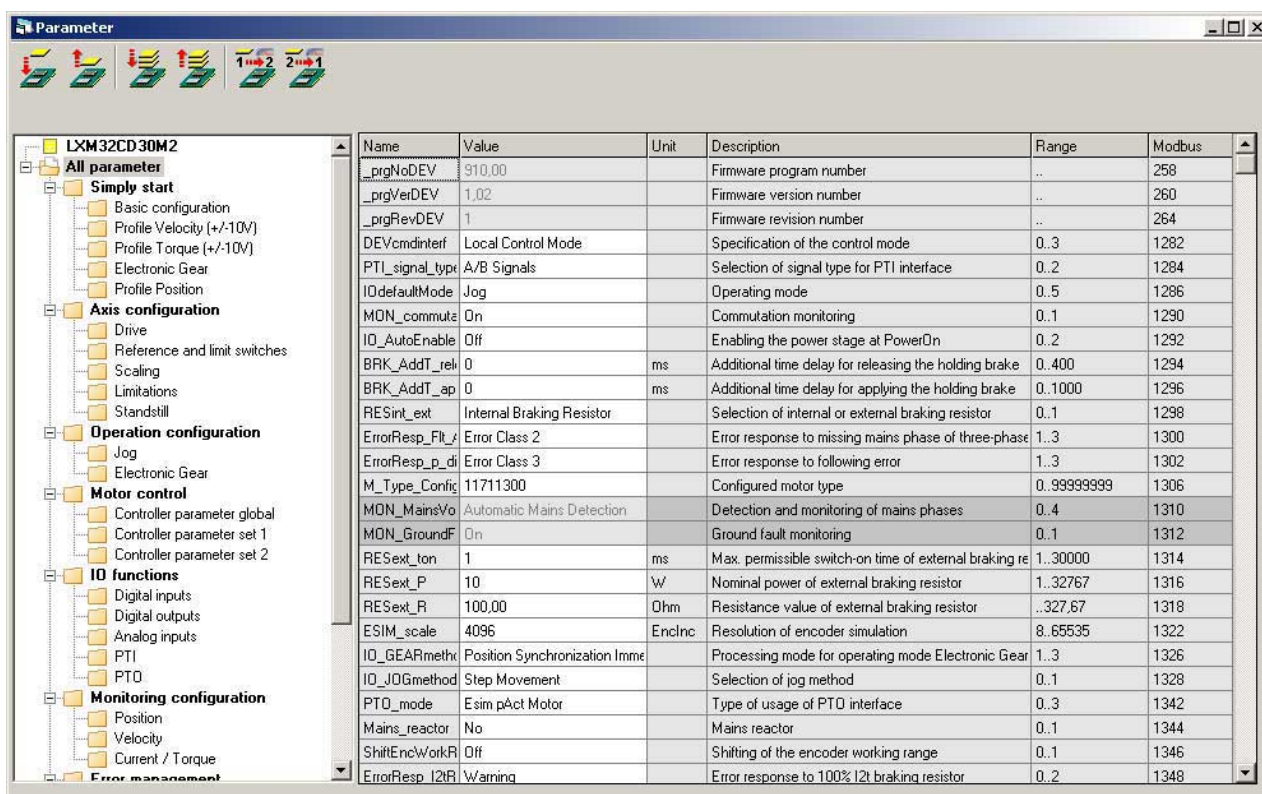Use the menu item "⇒ Parameter ⇒ Open parameter window..." to open the Parameter window.

Figure 7.6   Parameter window

The screenshot shows the parameter window. The contents of this window depends on the device version. However, the structure is the same for all versions. The left pane shows items, the associated parameters are displayed in the right pane.

Parameters of a group   The parameter window shows the parameters associated with the selected item. The list shows the names, values, unit, a description, the range and the Modbus address.

Changing parameter values   The value of a parameter is changed in the "Value" column. Values with a gray background are read-only and cannot be modified.

Modified values that have not been transferred to the device are highlighted by a colored background. At the same time the parameter group to which the parameter belongs is highlighted by a red exclamation mark. As soon as the values have been transmitted to the device, the exclamation mark is cleared.

To change a parameter value, you can enter the new value directly or choose it from a list.

Checking the value range   The commissioning software checks whether the parameter values entered are in the permissible value range. If the value entered is not in the valid range, the value is not accepted.

7.4.2   Transferring parameter values

Device data can be transferred between the device and the PC only if there is a connection. It is possible to transfer all parameters or groups of parameters.

NOTE: In a first step, the commissioning software transfers modified parameters to the RAM memory of the device. They remain there until the controller supply voltage is switched off . Note that the device data must be saved separately to the **EEPROM memory** so they are permanently available to the product.

When the controller supply voltage for the device is switched on, the device data is automatically copied from the EEPROM to the RAM. The devices only operate with the data contained in the RAM.

The data exchange between the device and the PC is controlled by the following menu items and buttons.

Menu items   The menu items "⇒ Parameter ⇒ Send parameter group to drive" and "⇒ Parameter ⇒ Send all parameters to drive" allow you to transmit parameter values from the PC to the device.

The menu items "⇒ Parameter ⇒ Load parameter group from drive" and "⇒ Parameter ⇒ Load all parameters from drive" are used to transmit parameter values from the device to the PC.

Buttons   The buttons let you execute the following functions:
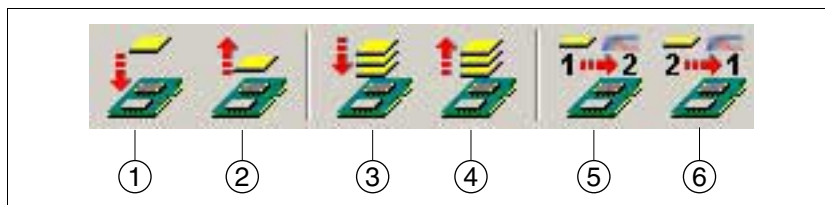

Figure 7.7   Buttons for data transmission

(1)   ⇒ Parameter ⇒ Send parameter group to drive
(2)   ⇒ Parameter ⇒ Load parameter group from drive
(3)   ⇒ Parameter ⇒ Send all parameters to drive
(4)   ⇒ Parameter ⇒ Load all parameters from drive
(5)   ⇒ Parameter ⇒ Copy "Controller parameter set 1" to "Controller parameter set 2"
(6)   ⇒ Parameter ⇒ Copy "Controller parameter set 2" to "Controller parameter set 1"

Not all parameters can be transferred in operating state "Operation Enable". Parameter values that cannot be transferred are highlighted by a colored background.

7.4.3   Restoring the factory settings

Use the menu item "⇒ Parameter ⇒ Reset to factory settings" to restore the factory settings of the parameters.

Figure 7.8   Restoring the factory settings

After confirmation with "OK", the device parameters are reset to the factory setting.

7.4.4   Resetting user-defined parameters

Use the menu item "⇒ Parameter ⇒ Reset user parameters" to reset the user-defined parameters to their factory settings. User-defined parameters include all parameters except for (if applicable):

- Communication parameters
- Definition of direction of rotation
- Signal selection PTI interface
- Device control
- Logic type
- Start-up operating mode
- Encoder simulation (ESIM) settings
- Motor type
- Processing of motor encoder position
- I/O functions
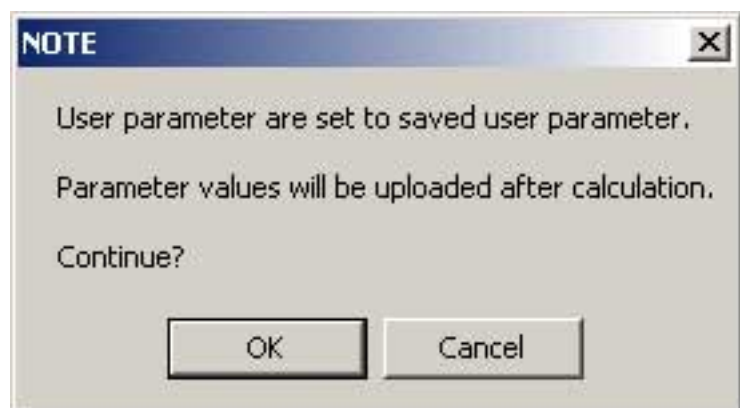
Figure 7.9   Resetting user-defined parameters

After confirmation with "OK", the user-defined parameters are reset to the factory settings. The new values of the user-defined parameters are not saved to the EEPROM!

7.4.5   Calculating controller parameters

Use the menu item "$\Rightarrow$ Parameter $\Rightarrow$ Calculate controller parameter" to reset the control loop parameters to the factory settings.
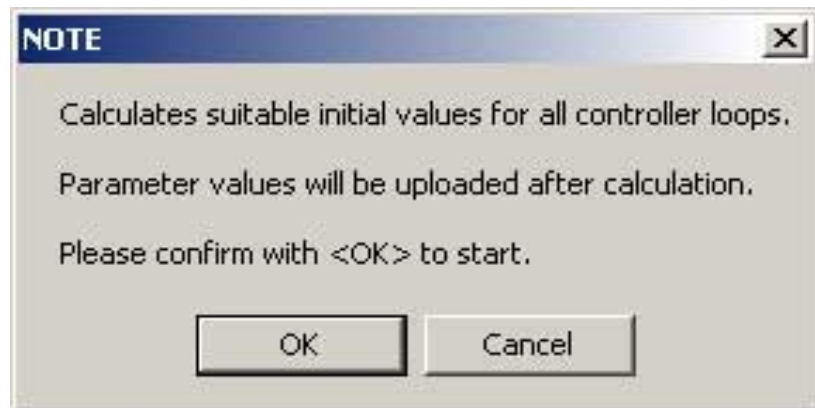
Figure 7.10   Resetting the controller parameters

When you confirm with "OK", the controller parameters for the velocity controller and the position controller are reset.

7.5   Functions

The "Functions" menu provides access to:

- Operating modes
- Recording and tuning
- Inputs and outputs
- Setting the encoder position
- Fast position capture
- Releasing the holding brake

7.5.1   Changing the operating state

An exclusive access is required for controlling the device with the commissioning software. Use the "Exclusive access" switch on the control and status bar to access the device. When the device is accessed, the software displays a warning which must be confirmed with a key combination. For more information on access control, see the product manual of the device.

The device can now be set to operating state 6 "Operation Enable" with the commissioning software. In this operating state the power stage of the device is enabled. To do so, click the "Enable" switch. For more information on enabling or disabling the power stage see the product manual of the device.

The device must be in operating state 6 "Operation Enable" for the functions of the commissioning software to be executed.

7.5.2   Operating modes

The screenshots below may be different or unavailable in your system due to different functionalities of the devices.

Use the menu item "⇒ Functions ⇒ Operating modes..." to start the "Operating modes" function.

The various operating modes can be selected from the tabs in the Operating Modes window.

The window is subdivided into two sections:

- Tab for the selected operating mode and for setting specific parameters (top section)
- Display of some status information (bottom section)

The user can switch between the tabs in the Operating Modes window without interfering with a currently active operating mode.

Device monitoring   During movements, the connection to the device is cyclically monitored. If the connection between the PC and device is lost, the motor stops within the cycle time.

The commissioning software cannot be exited while a movement is running.

The operating modes are described in detail in the product manuals. Therefore, this manual does not describe the details of the operating modes.

Profile Position   In the operating mode Profile Position, a movement with an adjustable motion profile is performed from a start position to a target position. The value of the target position can be specified as either a relative or an absolute position.

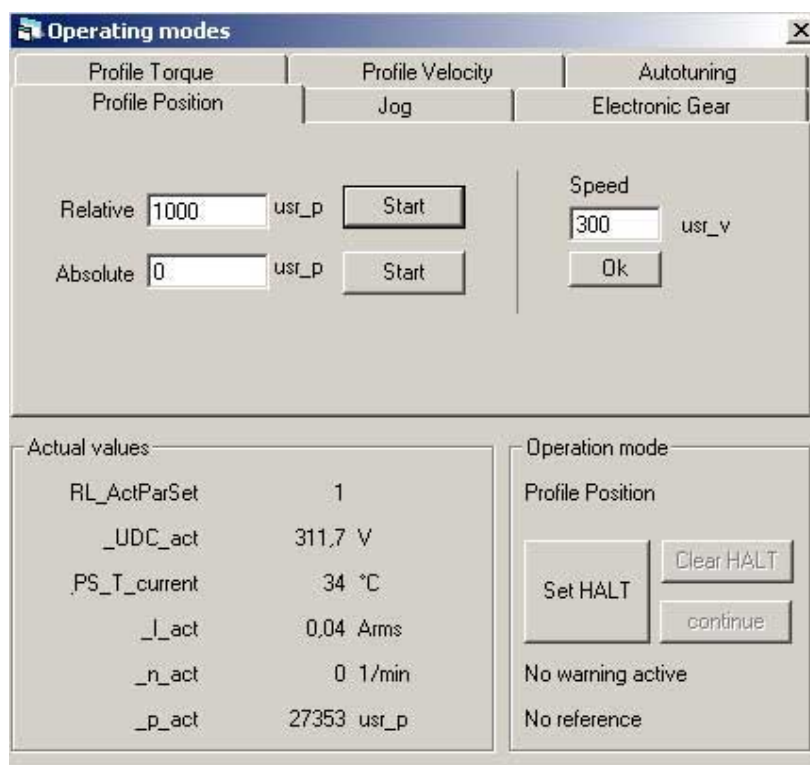You can set a motion profile with values for acceleration ramp, deceleration ramp and target velocity.

Figure 7.11   Operating mode Profile Position

Profile Velocity

⚠ **WARNING**

UNEXPECTED MOVEMENT

In this operating mode, an unknown voltage value at the analog input may cause an unexpectedly high speed of rotation of the motor.

• Observe the voltage value at the analog input when starting the operating mode .

Failure to follow these instructions can result in death, serious injury or equipment damage.

In the operating mode Profile Velocity, the drive accelerates to an adjustable target speed of rotation. You can set a motion profile with values for acceleration and deceleration ramps. There are two ways of specifying values via the commissioning software:

• Selection of the value directly in the window by entering the value or using the slider

• Supply of the value via the analog input ANA1. The voltage value can also be set in the "Inputs+Outputs" window for this option.

The actual movement is started or stopped with the "Start" and "Stop" buttons.
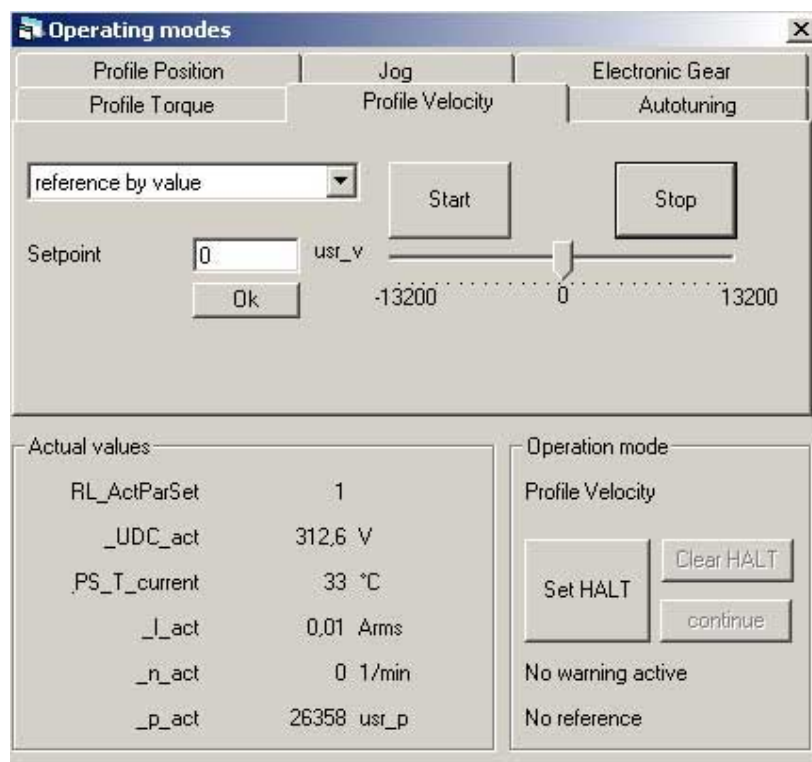
Figure 7.12   Operating mode Profile Velocity

Homing   The operating mode Homing establishes an absolute position reference between the motor position and a defined axis position. Homing can be carried out by a means of a reference movement or by position setting.
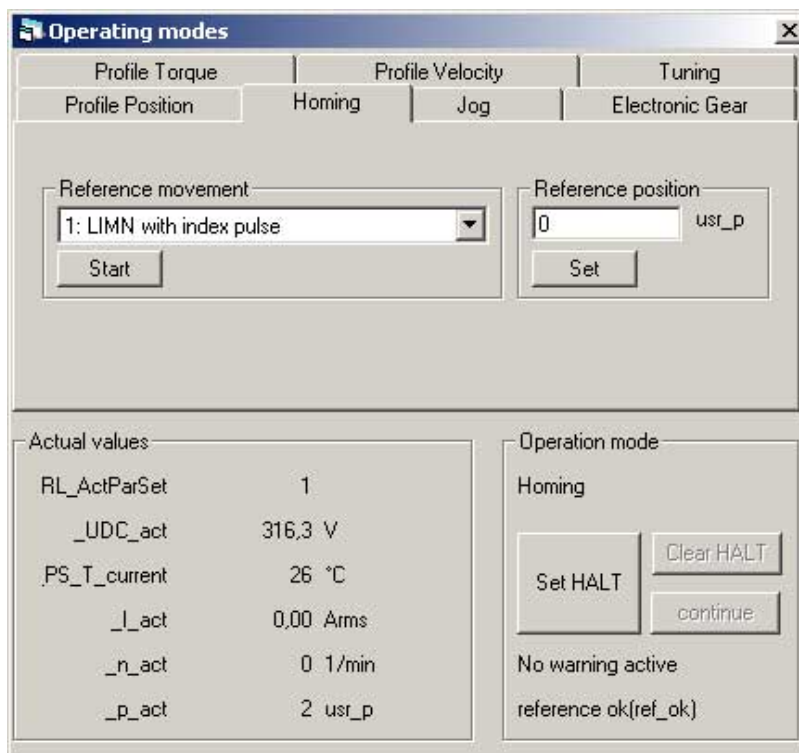

Figure 7.13   Tab Homing

Jog   The motor is moved at slow or fast jog velocity with the buttons. The motor moves as long as the button is held down. When you release the button, the motor is decelerated to a standstill.
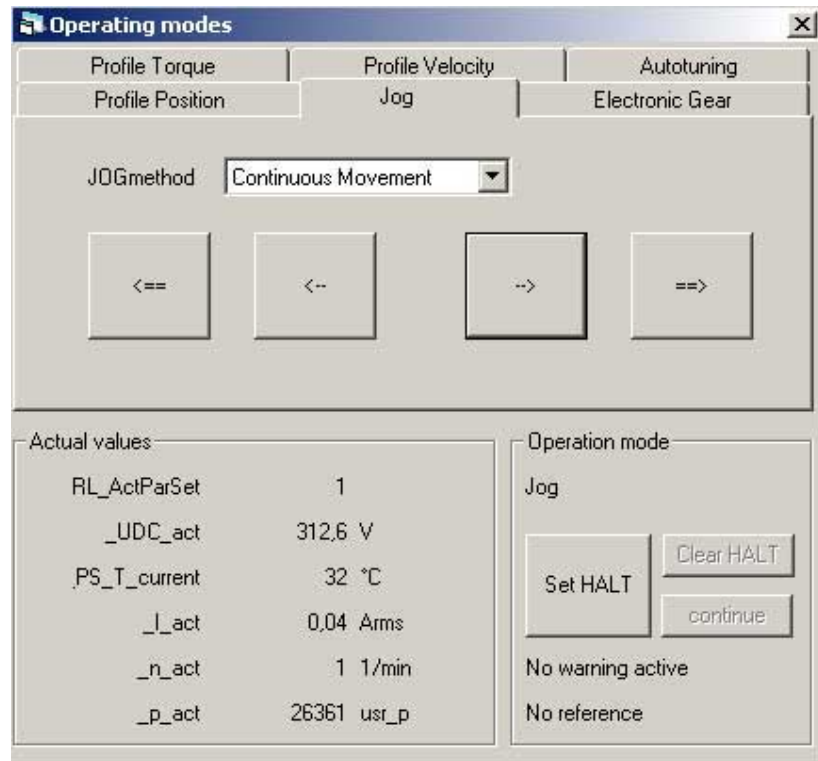

Figure 7.14   Operating mode Jog

Electronic Gear　In the operating mode Electronic Gear, reference signals are supplied in the form of A/B signals or pulse/direction signals. A new position reference value is calculated on the basis of these reference value signals plus an adjustable gear ratio.
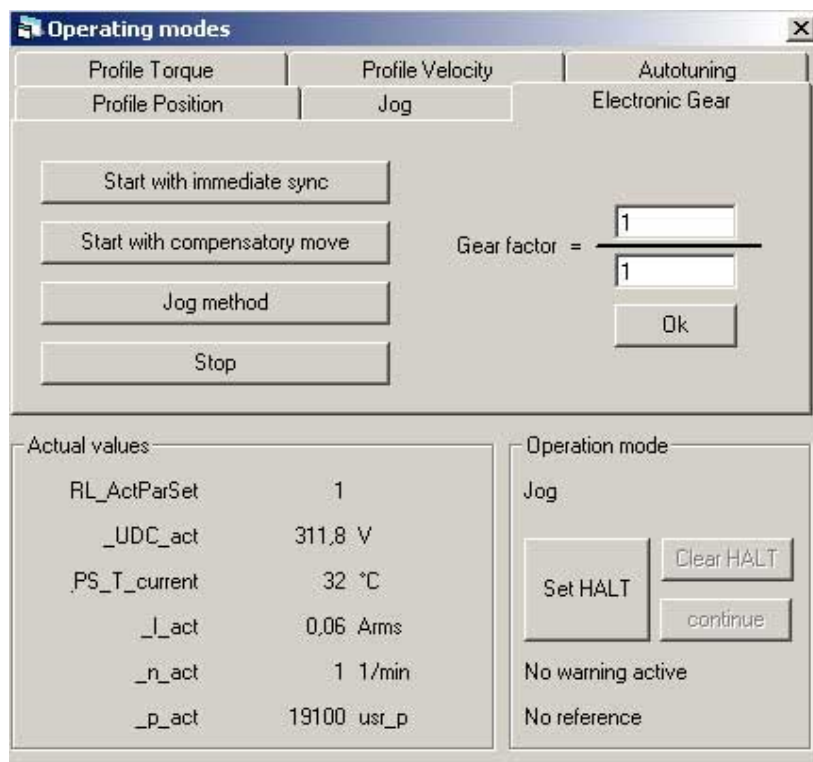
Figure 7.15　Operating mode Electronic Gear

Profile Torque

⚠ **WARNING**

UNEXPECTED MOVEMENT

In this operating mode, an unknown voltage value at the analog input may cause an unexpectedly high speed of rotation of the motor.

- Observe the voltage value at the analog input when starting the operating mode .

Failure to follow these instructions can result in death, serious injury or equipment damage.

In the operating mode Profile Torque, the motor is moved depending on a voltage-dependent torque value. There are two options:

- Selection of the torque directly in the window by entering the value or using the slider

- Supply of the value via the analog input ANA1. The voltage value can also be set in the "Inputs+Outputs" window for this option.

The actual movement is started or stopped with the "Start" and "Stop" buttons.
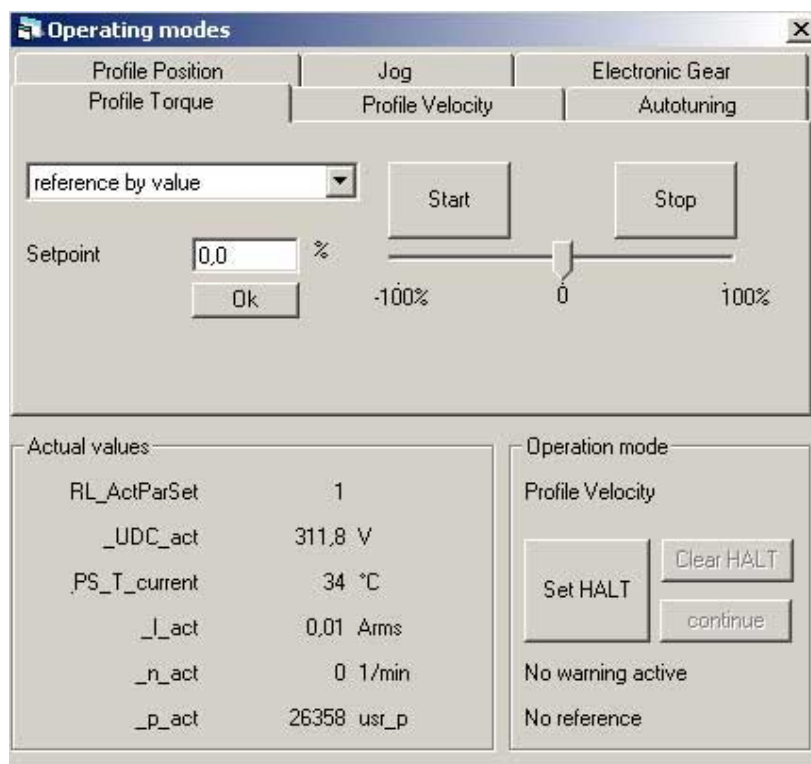
Figure 7.16   Operating mode Profile Torque

Autotuning

⚠ **WARNING**

UNEXPECTED MOVEMENT

Autotuning moves the motor in order to tune the control loops. Incorrect parameters may cause unexpected movements or the loss of monitoring functions.

- Check the parameters AT_dir and AT_dis. The distance required for the deceleration ramp must also be taken into account.

- Verify that the parameter LIM_I_maxQSTP for Quick Stop is correctly set.

- If possible, use the limit switches.

- Verify that a functioning button for EMERGENCY STOP is within reach.

- Verify that the system is free and ready for the movement before starting the function.

Failure to follow these instructions can result in death, serious injury or equipment damage.

Autotuning determines the friction torque as a constantly acting load torque and considers it in the calculation of the moment of inertia of the entire system.

There are 2 types of autotuning. The corresponding button lets you switch between the two types.

- Easy

  Easy autotuning lets you perform autotuning even if you do not have a profound knowledge of the controller parameters.

- Comfort

  Comfort is intended for advanced users who are familiar with controller parameters and their effects. Comfort allows you to set certain values manually. See the product manual for a description of these values.

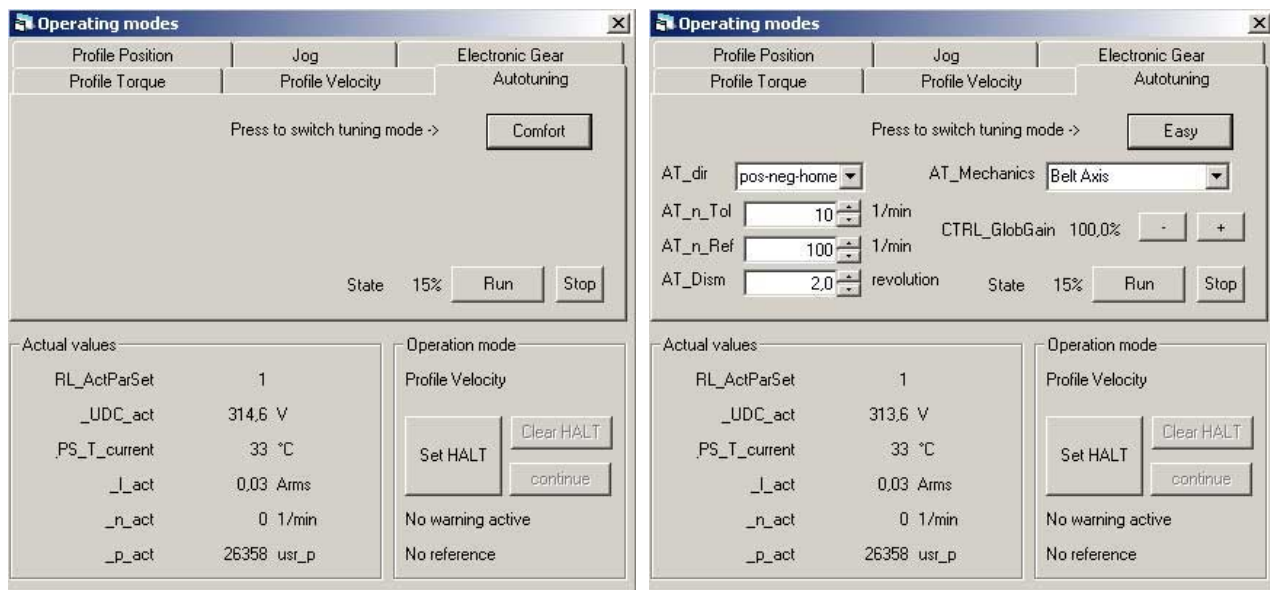The button "Run" starts autotuning.

Figure 7.17   Autotuning

7.5.3   Recording and optimizing

Introduction   The commissioning software provides the "Recording/Tuning" function for visualizing internal device data during movements. The connected device stores the movement data to an internal memory for a defined recording period and then sends it to the PC. The PC processes the data and displays them in the form of charts or tables.

Recorded data can be saved on the PC, see chapter 7.3.1 "Saving a file", and can be archived or printed for documentation purposes.

Use the menu item "⇒ Functions ⇒ Record/Tuning..." to start the "Record" function.

Figure 7.18   Recording

Elements of the Record window:

(1)   Buttons
(2)   Chart with the recorded data
(3)   Tabs for recording, trigger and tuning

Chart   A chart is only recorded if at least one parameter was selected.

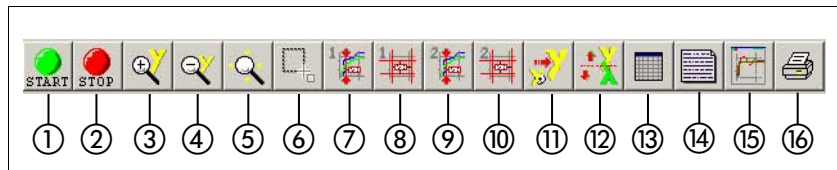Each of the selected parameters is shown in a distinct color.

Buttons

Figure 7.19   Buttons

(1)   Start recording
(2)   Stop recording
(3)   Zoom in, y axis
(4)   Zoom out, y axis
(5)   Infinitely variable zoom, x axis and y axis
(6)   Zoom selected rectangle
(7)   1st display of values for a specific point in time
(8)   Change displayed values for first display
           (x and y value, x value, y value, period, peak/peak value)
(9)   2nd display of values for a specific point in time
(10)   Change displayed values for second display
           (x and y value, x value, y value, period, peak/peak value)
(11)   Restore original display
(12)   Invert y axis
(13)   Display table of recorded values
(14)   Enter description
(15)   Show/hide configuration
(16)   Print recording

"Recording" tab   The desired recording is configured in the "Recording" tab.
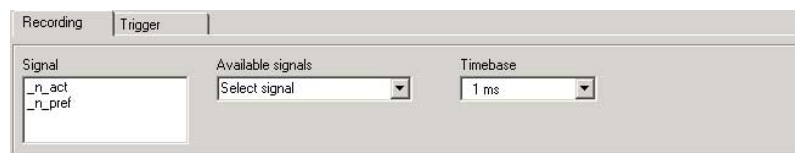

Figure 7.20   Recording tab

The desired parameters are selected in the "Available parameters" input field. A maximum of 4 parameters can be selected. If a parameter is no longer required, it can be deselected by a double-click on the name of the parameter.

The desired recording increment is select in the "Time base" input field. The smaller the "Time base" the smaller the maximum recording time.

"Trigger" tab The desired triggering for the recording is configured in the "Trigger" tab. The recording starts once the specified event has occurred.

Figure 7.21   Trigger tab

The parameters for monitoring are selected in the "Trigger" input field.

The event that the selected parameter must meet to start the recording is selected in the "Event" input field.

The decimal whose comparison value the parameter must meet to start the recording is selected in the "Comparison value" input field.

If "Binary AND" or "Binary OR" is selected as the event, the "Mask" input field is opened.

The Mask function offers the option of hiding individual bits of an actual value before it is compared with the "Comparison value". The mask is input in the hexadecimal system. Every position of the hex value describes 4 bits that through the 8 hex values shows all of the maximum 32 possible bits of a value. The actual value of the monitored parameter added to the mask in binary form. If the revenue matches the specified comparison value, the recording is deleted.

For example, if the value 00000005 is set, this means that only bit 0 and bit 3 are used for comparison with the "comparison value".

The delay with which the recording is to be started after the condition has been met is set in the "time" input field. If a value with a minus sign is input, the recording is started before the selected event occurs.

Tab "Tuning"   Movements, for example a positive step, can be triggered on the "Tuning" tab. They can be evaluated for graphic optimization.

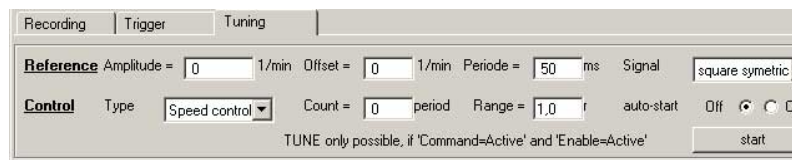Tuning can only be started if the "Exclusive access" and "Enable" switches are set to "On".

Figure 7.22   Tab Tuning

The "Amplitude" field is used to set the maximum amplitude of the reference value.

The offset of the amplitude in positive or negative direction can be set in the "Offset" field.

The duration of a period is set in the "Period" field.

The signal type for the reference value is set in the "Signal type" dropdown list.

The controller to be used is set in the "Type" dropdown list.

The number of periods is specified in the "Count" field.

The maximum number of revolutions that can be triggered by tuning can be set in the "Range" field. This value can, for example, help to avoid a movement to a mechanical stop.

The "Auto-start" radio button allows you to link the execution of the tuning movement and the start of recording. If the option is set to "Off", the software displays a Start button. The Start button lets you trigger the tuning movement separately from starting the recording. Settings that you may have made on the "Trigger" tab are lost if you set "Auto-start" to "On".

Start recording   Use the "Start recording" button to start recording.

The recorded data is sent to the PC. The data is then visualized.

7.5.4   Inputs and outputs

> ### ⚠ WARNING
>
> **UNINTENDED BEHAVIOR CAUSED BY FORCING**
>
> Forcing of signals may cause unexpected movements or responses of the system.
>
> • Only use the function if you are fully familiar with the effects of the signals.
>
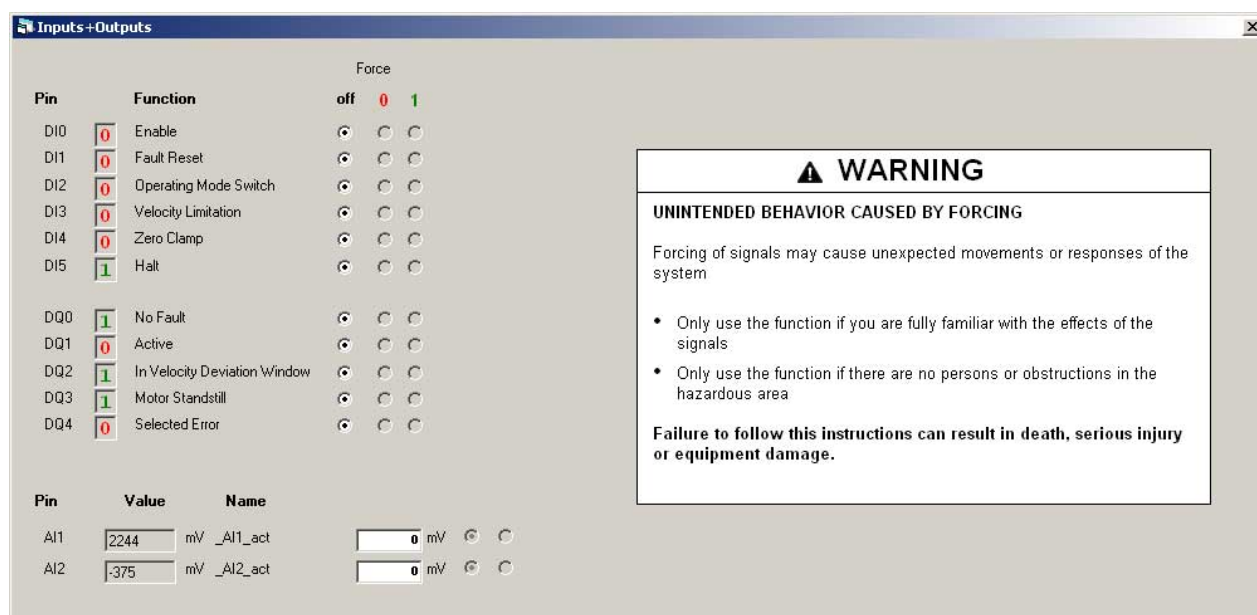> • Only use the function if there are no persons or obstructions in the hazardous area.
>
> **Failure to follow these instructions can result in death, serious injury or equipment damage.**

The screenshots below may be different or unavailable in your system due to different functionalities of the devices.

The function "Inputs+Outputs" is used to monitor and visualize the analog and digital inputs as well as the digital outputs.

Use the menu item "⇒ Functions ⇒ Inputs+Outputs..." to start the function "Inputs+Outputs".

Forcing   The "Forcing" function lets you directly set specific digital inputs, specific digital outputs and the voltage at the analog inputs directly. The currently available signal is disabled during this process. For example, this option can be used to apply the specified voltage via the analog input in the operating mode "Oscillator".

7.5.5 Setting the encoder position

Setting an absolute position

When starting up, the device reads the absolute position of the motor from the encoder. The current absolute position can be read with the parameter `_p_absENCusr`.

When the motor is at a standstill, the current mechanical motor position can be defined as the new absolute position of the motor with the parameter `ENC_pabsusr`. The value can be set with the power stage enabled or disabled. Setting the absolute position also shifts the position of the index pulse of the encoder and the index pulse of the encoder simulation.
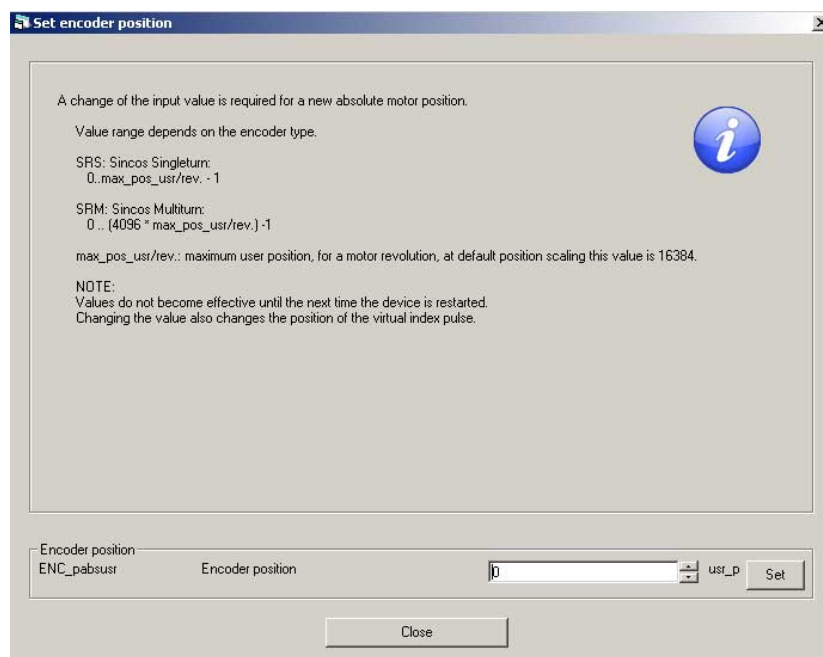
Figure 7.23   Dialog box Set Encoder Position

7.5.6 Releasing the holding brake

<div style="border: 1px solid black;">

⚠ WARNING

UNEXPECTED MOVEMENT

Manual release of the holding brake or an error may cause an unexpected movement in the system.

- Switch off the voltage at the inputs $\overline{STO\_A}$ and $\overline{STO\_B}$ to avoid an unexpected restart of the motor.

- Take appropriate measures to avoid damage caused by the falling loads.

- Only run the test if there are no persons or obstacles in the hazardous area.

Failure to follow these instructions can result in death or serious injury.

</div>

if the motor is equipped with a holding brake, you can use the menu item "⇒ Functions ⇒ Release holding brake..." to manually release the holding brake.

7.6   Diagnostics

The commissioning software provides a range of diagnostics and information functions for troubleshooting in various windows.

7.6.1   Device information

Use the menu item "⇒ Diagnostics ⇒ Device info..." to display information on the device.

Figure 7.24   Device information

The device information window provides information such as device type or serial number for diagnostics and service purposes.

7.6.2 Error memory

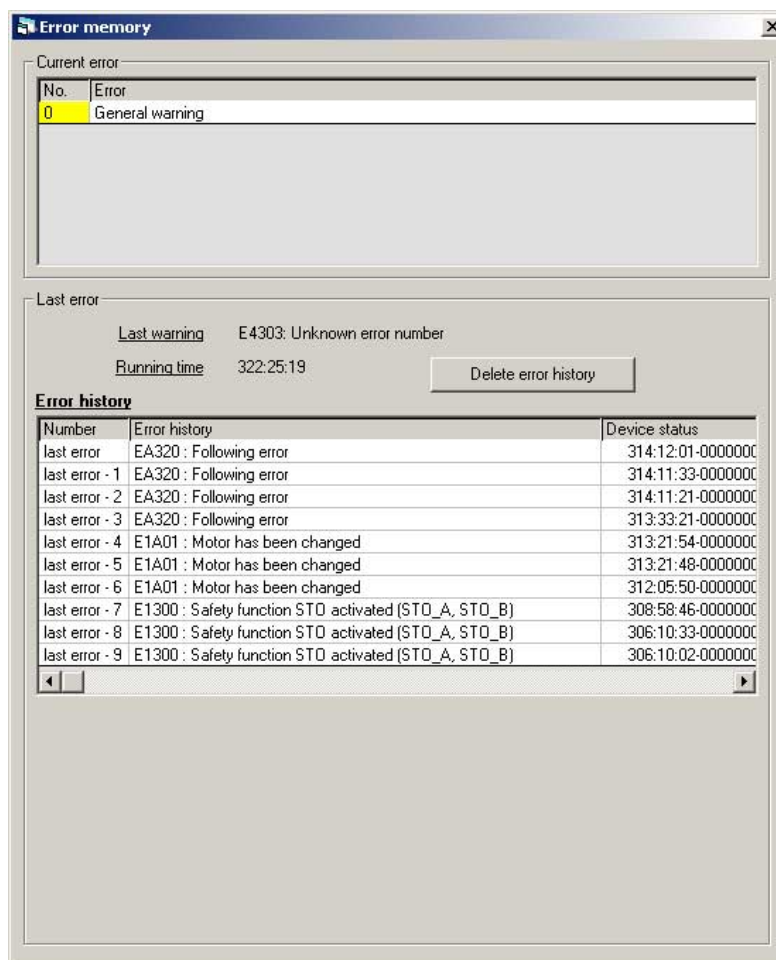Use the menu item "⇒ Diagnostics ⇒ Error memory..." to display the error memory.

Figure 7.25   Reading the error memory

Current error   The current error, for example limit switch (LIMP/LIMN/REF), is displayed in the left part of the window.

Last error   The current value of the operating hours meter and the error messages are displayed in the right part of the window.

The "Error history" table shows the error messages in chronological order. The "Device status" column consists of:
(error time)-(detailed error number)-(error class)

The "Additional information" table provides additional information on the error for every error message.

Delete error memory   Use the menu item "⇒ Diagnostics ⇒ Delete error memory..." or the button "Delete error memory" to clear the "Error History".

7.6.3   Monitoring parameters

Use the menu item "$\Rightarrow$ Diagnostics $\Rightarrow$ Object monitoring..." to monitor selected parameters of the device.
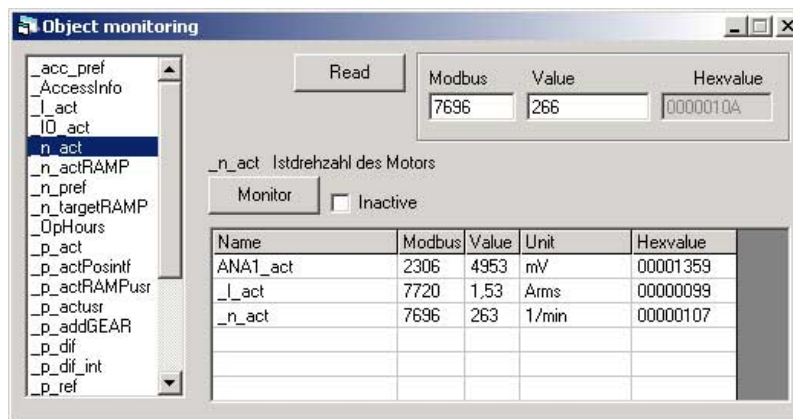

Figure 7.26   Monitoring parameters

The parameter to be monitored is selected from the list. Click the "Monitor" button to include the parameter data in the table. You can add several parameters to the table for monitoring. Double-click a parameter in the table to remove it.

A parameter can also be monitored if you enter the Modbus address. The current value is displayed directly in the Value field.

8   Diagnostics and troubleshooting

8

8.1   Error indication

Overview

The commissioning software provides a range of diagnostics and information functions for error detection and troubleshooting in various windows and panes.:

- Diagnostics functions for the device
  $\Rightarrow$ Diagnostics $\Rightarrow$ Device info (see 5.6.1 "Device information" and 6.6.1 "Device information")

- Error information on the device
  $\Rightarrow$ Diagnostics $\Rightarrow$ Error memory (see 5.6.2 "Error memory" and 6.6.2 "Error memory")

- Monitoring parameters
  $\Rightarrow$ Diagnostics $\Rightarrow$ Object monitoring (see 5.6.3 "Monitoring parameters" and 6.6.3 "Monitoring parameters")

- Error information that is permanently displayed on the control bar.

Error indication

The cause of an error is displayed:

- At the device by means of the device-specific equipment such as LED or segment displays

- By the error response of the device itself

- In the commissioning software as an error message in the control bar and as the last error message in the error memory

  Error information is displayed on the control bar along with the specific error message plus additional information.

Resetting an error message

The additional information can be deleted by a double-click, but remain available in the error history.

The error message can be reset with the "Reset" button after the cause of the error has been corrected.

9   Glossary

9

9.1   Units and conversion tables

The value in the specified unit (left column) is calculated for the desired unit (top row) with the formula (in the field).

Example: conversion of 5 meters [m] to yards [yd]
5 m / 0.9144 = 5.468 yd

9.1.1   Length

	in	ft	yd	m	cm	mm
in	-	/ 12	/ 36	* 0.0254	* 2.54	* 25.4
ft	* 12	-	/ 3	* 0.30479	* 30.479	* 304.79
yd	* 36	* 3	-	* 0.9144	* 91.44	* 914.4
m	/ 0.0254	/ 0.30479	/ 0.9144	-	* 100	* 1000
cm	/ 2.54	/ 30.479	/ 91.44	/ 100	-	* 10
mm	/ 25.4	/ 304.79	/ 914.4	/ 1000	/ 10	-

9.1.2   Mass

	lb	oz	slug	kg	g
lb	-	* 16	* 0.03108095	* 0.4535924	* 453.5924
oz	/ 16	-	* $1.942559*10^{-3}$	* 0.02834952	* 28.34952
slug	/ 0.03108095	/ $1.942559*10^{-3}$	-	* 14.5939	* 14593.9
kg	/ 0.45359237	/ 0.02834952	/ 14.5939	-	* 1000
g	/ 453.59237	/ 28.34952	/ 14593.9	/ 1000	-

9.1.3   Force

	lb	oz	p	dyne	N
lb	-	* 16	* 453.55358	* 444822.2	* 4.448222
oz	/ 16	-	* 28.349524	* 27801	* 0.27801
p	/ 453.55358	/ 28.349524	-	* 980.7	* $9.807*10^{-3}$
dyne	/ 444822.2	/ 27801	/ 980.7	-	/ $100*10^{3}$
N	/ 4.448222	/ 0.27801	/ $9.807*10^{-3}$	* $100*10^{3}$	-

9.1.4   Power

	HP	W
HP	-	* 746
W	/ 746	-

9.1.5 Rotation

	min^{-1} (RPM)	rad/s	deg./s
min^{-1} (RPM)	-	* π / 30	* 6
rad/s	* 30 / π	-	* 57.295
deg./s	/ 6	/ 57.295	-

9.1.6 Torque

	lb·in	lb·ft	oz·in	Nm	kp·m	kp·cm	dyne·cm
lb·in	-	/ 12	* 16	* 0.112985	* 0.011521	* 1.1521	* 1.129*10^6
lb·ft	* 12	-	* 192	* 1.355822	* 0.138255	* 13.8255	* 13.558*10^6
oz·in	/ 16	/ 192	-	* 7.0616*10^{-3}	* 720.07*10^{-6}	* 72.007*10^{-3}	* 70615.5
Nm	/ 0.112985	/ 1.355822	/ 7.0616*10^{-3}	-	* 0.101972	* 10.1972	* 10*10^6
kp·m	/ 0.011521	/ 0.138255	/ 720.07*10^{-6}	/ 0.101972	-	* 100	* 98.066*10^6
kp·cm	/ 1.1521	/ 13.8255	/ 72.007*10^{-3}	/ 10.1972	/ 100	-	* 0.9806*10^6
dyne·cm	/ 1.129*10^6	/ 13.558*10^6	/ 70615.5	/ 10*10^6	/ 98.066*10^6	/ 0.9806*10^6	-

9.1.7 Moment of inertia

	lb·in^2	lb·ft^2	kg·m^2	kg·cm^2	kp·cm·s^2	oz·in^2
lb·in^2	-	/ 144	/ 3417.16	/ 0.341716	/ 335.109	* 16
lb·ft^2	* 144	-	* 0.04214	* 421.4	* 0.429711	* 2304
kg·m^2	* 3417.16	/ 0.04214	-	* 10*10^3	* 10.1972	* 54674
kg·cm^2	* 0.341716	/ 421.4	/ 10*10^3	-	/ 980.665	* 5.46
kp·cm·s^2	* 335.109	/ 0.429711	/ 10.1972	* 980.665	-	* 5361.74
oz·in^2	/ 16	/ 2304	/ 54674	/ 5.46	/ 5361.74	-

9.1.8 Temperature

	°F	°C	K
°F	-	(°F - 32) * 5/9	(°F - 32) * 5/9 + 273.15
°C	°C * 9/5 + 32	-	°C + 273.15
K	(K - 273.15) * 9/5 + 32	K - 273.15	-

9.1.9 Conductor cross section

AWG	1	2	3	4	5	6	7	8	9	10	11	12	13
mm^2	42.4	33.6	26.7	21.2	16.8	13.3	10.5	8.4	6.6	5.3	4.2	3.3	2.6

AWG	14	15	16	17	18	19	20	21	22	23	24	25	26
mm^2	2.1	1.7	1.3	1.0	0.82	0.65	0.52	0.41	0.33	0.26	0.20	0.16	0.13

9.2 Terms and Abbreviations

See chapter 2.5 "Standards and terminology" for information on the pertinent standards on which many terms are based. Some terms and abbreviations may have specific meanings with regard to the standards.

Asynchronous error — Error which is detected and signaled by the internal monitoring unit of the controller.

Device data — The term device data refers to the parameter values of a device. They are stored in the EEPROM of the device to avoid loss in case of a power outage.

Direction of rotation — Rotation of the motor shaft in a positive or negative direction of rotation. Positive direction of rotation is when the motor shaft rotates clockwise as you look at the end of the protruding motor shaft.

DOM — The **D**ate **o**f **m**anufacturing on the nameplate of the device is shown in the format DD.MM.YY, for example 31.12.06 (December 31, 2006).

Error class — Classification of errors into groups. The different error classes allow for specific responses to errors, for example by severity.

Error — Discrepancy between a computed, observed or measured value or condition and the specified or theoretically correct value or condition.

Factory setting — Factory settings when the product is shipped

Fatal error — In the case of fatal error, the product is no longer able to control the motor so that the power stage must be immediately disabled.

Fault — Fault is a state that can be caused by an error. Further information can be found in the pertinent standards such as IEC 61800-7, ODVA Common Industrial Protocol (CIP).

Fault reset — A function used to restore the drive to an operational state after a detected error is cleared by removing the cause of the error so that the error is no longer active (transition from operating state "Fault" to state "Operation Enable").

LED — Light Emitting Diode

Limit switch — Switches that signal overtravel of the permissible range of travel.

Node guarding — Monitoring of the connection to the slave at an interface for cyclic data traffic.

Parameter — Device data and values that can be set by the user.

Power stage — The power stage controls the motor. The power stage generates current for controlling the motor on the basis of the positioning signals from the controller.

RS485 — Fieldbus interface as per EIA-485 which enables serial data transmission with multiple devices.

Synchronous error — Error signaled by the controller if it is unable to execute a command received from the master.

Warning — If the term is used outside the context of safety instructions, a warning alerts to a potential problem that was detected by a monitoring function. A warning is not an error and does not cause a transition of the operating state.

10 Index