SIEB & MEYER

drivemaster4

User Manual

D-00000244.6
2024-04-17

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1 About this Manual

This chapter describes symbols, signal words and abbreviations possibly used in this manual.

Note

You can download more documentation from the SIEB & MEYER website under https://www.sieb-meyer.com/downloads.

1.1 Illustration of Warnings

In this manual, the warnings listed below are used. Depending on their degree of risk, the risk levels listed below exist:

⚠ DANGER

Imminent risk of injury

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

→ Follow the instructions in this manual to avoid danger.

⚠ WARNING

Risk of injury

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

→ Follow the instructions in this manual to avoid danger.

⚠ CAUTION

Slight risk of injury

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

→ Follow the instructions in this manual to avoid danger.

NOTICE

Notice

Indicates a hazardous situation which, if not avoided, may result in property damage.

→ Follow the instructions in this manual to avoid danger.

2 General Information

This manual will give you basic knowledge of the functions and how to use the operating software *drivemaster4* with a SIEB & MEYER drive of the series SD4x.

The software allows to enter and change the performance parameters of the device in a systematical and clear way. In addition the functions for error diagnosis and application are described. Any made settings have an immediate effect on the operation of the drive. Besides the software provides different tools, which will help you to put the drive into operation, set its parameters and analyze its performance. Further information on the hardware of the individual drive can be found in the technical manual for this device.

Note

Read the hardware documentation of your device and pay attention to the safety instructions.

3 Installation

This chapter contains the following information:

- list with the hardware requirements to be met by the PC
- information on how to install and uninstall the software *drivemaster4*

Note
Install the software *drivemaster4* before connecting a device to the PC.

3.1 PC Hardware Requirements

The PC hardware to which the software will be installed must meet the following requirements:

Operating system:	Windows 7 or higher (32 bit and 64 bit)
Graphics card:	Windows compatible, SVGA resolution, Color
Hard disc:	free memory size approx. 400 Mbyte
Main storage:	at least 1 GByte
Interface:	network

3.2 Install *drivemaster4*

Take the following steps to install *drivemaster4*:

Note
If there are any applications from the software package *drivemaster4* installed on the PC, you must close these before starting the installation.

Note
You need administrator rights to install the software.

1. Download the latest version of the software *drivemaster4* from the Internet. This is located in the download area of the SIEB & MEYER website under www.sieb-meyer.de. (Please use the guest login.)
2. Start the installation: Double-click on the executable file setupDrivemaster4.exe.
3. Choose a destination directory (folder) and the Start menu entry.
4. Click on the button “Install” to start the installation.

✓ When the installation was successful, the installation program has created the program group SIEB & MEYER AG in the start menu.

3.3 Uninstall *drivemaster4*

Proceed as follows to uninstall the software *drivemaster4*:

Note

Before uninstalling the software, close all applications from the software package *drivemaster4*.

1. Navigate in the Start menu of your PC to the program group “SIEB & MEYER AG”.
2. Click on the entry “Uninstall drivemaster4” to start the uninstall wizard.
3. Follow the steps in the wizard until the uninstall process is finished.

Note

Additional files that have been saved after installation in the directories of the software are also deleted by the uninstall program, i.e. these files become lost. If additional files have been saved in a **newly** created directory in the installation path, these files will not be removed by the uninstall program. If necessary, these files must be deleted manually.

4 Basic Information

The following sections describe the basic working methods of the software *drivemaster4*. These include managing the SD4x devices in projects and parameter sets and working in the online or offline mode.

4.1 Projects

The software *drivemaster4* manages the SD4x devices by means of projects. A project is made up of one or more SD4x devices, the corresponding axes and parameter sets. (One device can have more than one axis.) In addition to the data, each project contains several settings made by the user.

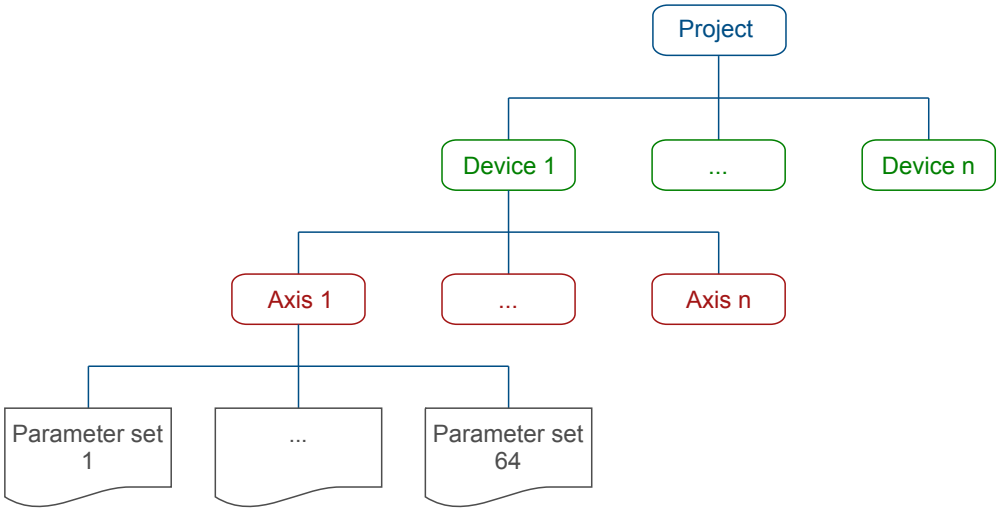


Fig. 1: Project structure

For each project a file is saved in the file system of the PC. Unless defined otherwise, you will find the project file in the Documents folder under *...\<Documents>\SIEBMEYER\drivemaster4\project*.

The project data are saved with the project name and the file extension *.dm4.

Note

Only rename project files in the *drivemaster4* software. Otherwise you can no longer open the project in the software.

The devices in a project can be allocated to real devices. That means, a project device is allocated to a real communication partner. Each axis of a device can manage up to 64 parameter sets but only one of them is active at a time.

4.2 Parameter Sets

Up to 64 parameter sets belong to one axis. Basically; there are two types of parameter sets: the active parameter set and the not active parameter sets. The axis is operated with the values defined in the active parameter set. All other parameter sets are not active.

The device status bar always display the active parameter set. If you edit another parameter set, the status bar has a yellow background.

In the following example, the parameter set P06 is active, but P04 is being edited at the moment:

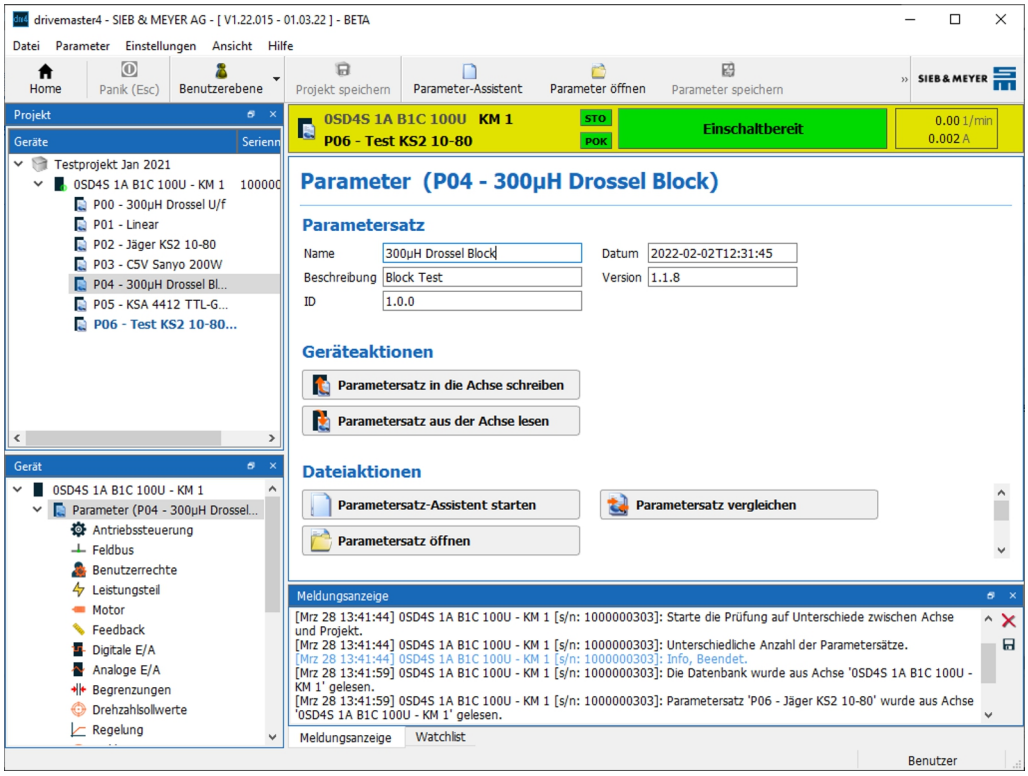


Fig. 2: Editing a non-active parameter set

4.3 Online/Offline Mode

The software *drivemaster4* offers two operating modes, the online mode and the offline mode.

When you open or create a project, the software asks for the desired mode. Within a project you can switch between the modes by click on the button “Go online” or “Go offline” in the tool bar.

4.3.1 Online Mode

In the online mode, the software communicates with the devices in your project. You can read and write parameters or parameter sets. All tools, like scope or data logger, are available.

Active parameter set

If you select the active parameter set of the current device, you work directly on the device. That means: When you change a parameter, the new value is applied locally in the project and simultaneously written into the device. Depending on the device status, the parameter is immediately active in the device.

When you switch from the offline mode into the online mode, the following dialog may appear:

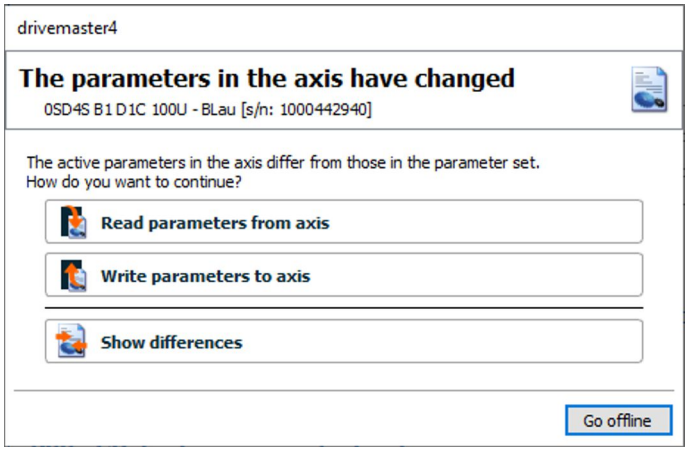


Fig. 3: Dialog window after parameter changes

It indicates differences between the device data and the project data. This dialog may also appear during operation, when the data differ.

Choose one of the following options:

- Read parameters from axis:
  The current parameter set is read from the device. The data are imported and saved in the local parameter set of the project.
- Write parameters to axis:
  The local parameter set of the project is written to the device and saved there.
- Show differences:
  The current parameter set is read from the device and compared with the local parameter set in the project. The differences are displayed in the following dialog.

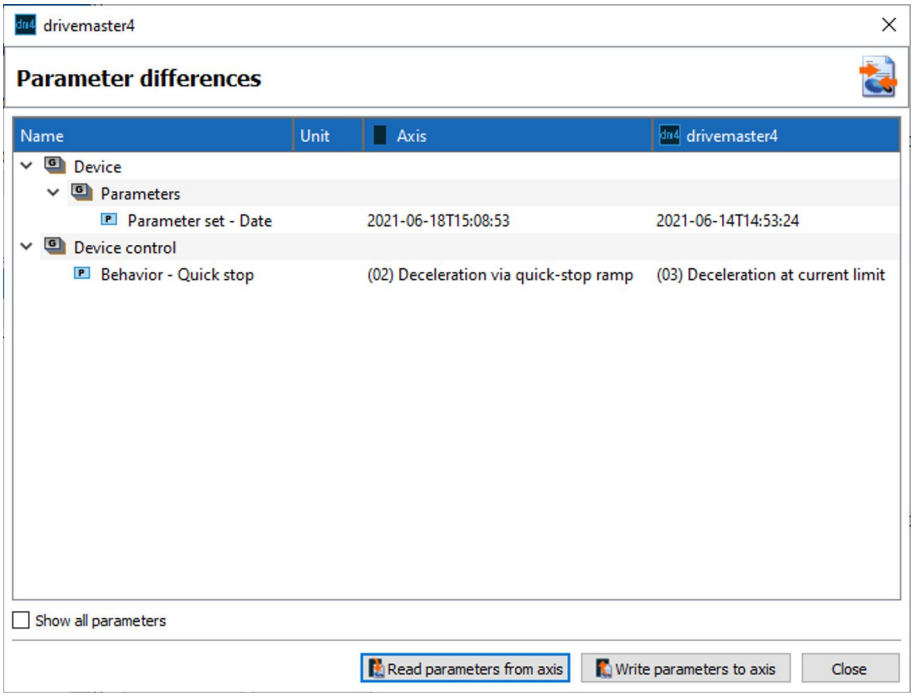


Fig. 4: Dialog window with parameter differences

The column “Axis” displays the values from the device; the column “drivemaster4” display the local values from the project. In the bottom right you also find the buttons “Read parameters from axis” and “Write parameters to axis”.

Not active parameter sets

In the online mode, the not active parameter sets are handled the same way as in the offline mode.

4.3.2 Offline Mode

In the offline mode, the software does not communicate with the devices in your project. You can read and write parameters or parameter sets only locally. Some tools, like scope or data logger, you can use only conditionally. In scope, for example, you can review saved recordings.

4.4 User Levels and Password Protection

The software *drivemaster4* provides different user levels with corresponding access rights and passwords.

The current user level is also set in the device. Depending on the user level the user interface shows or hides several elements. In the device the according read and write permissions are enabled.

Both the device and the software *drivemaster4* usually start with the lowest user level (=User).

The status bar indicates the current user level:

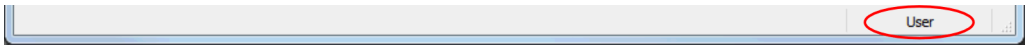


Fig. 5: Status bar of the software drivemaster4

5 User Interface

5.1 Start Page

The software *drivemaster4* opens with the following start page:

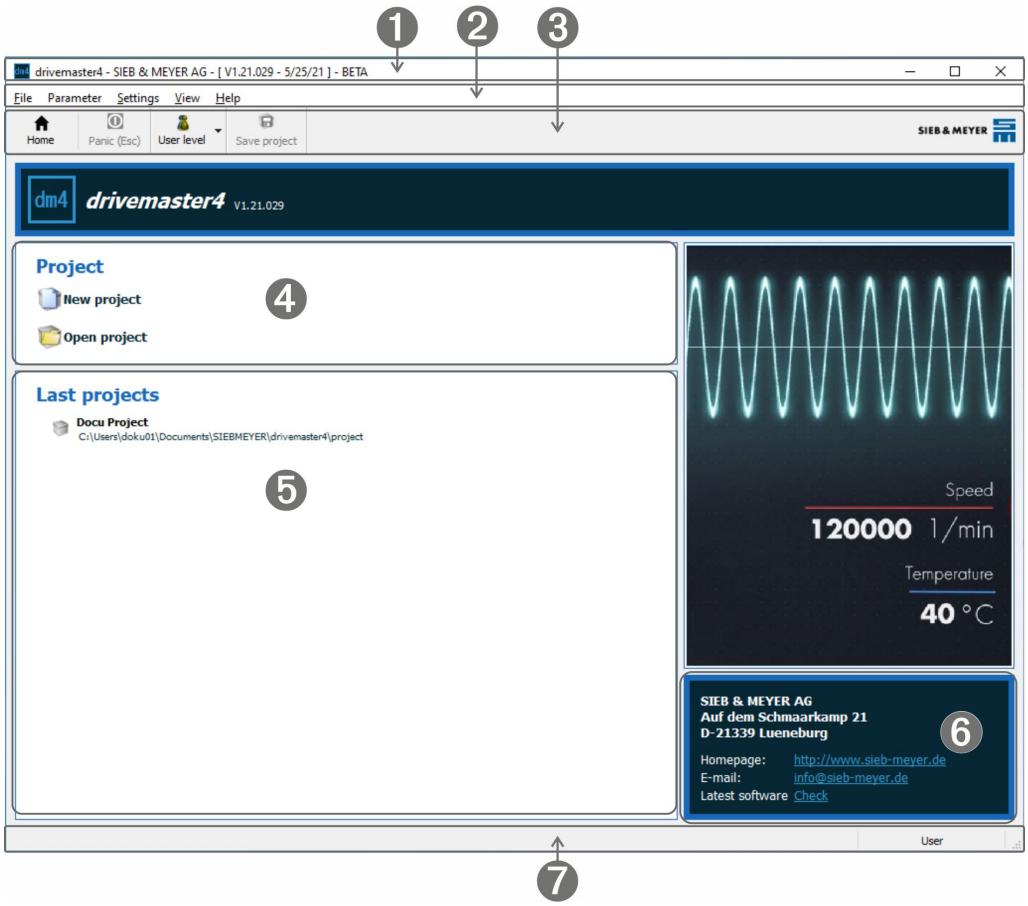


Fig. 6: Start page of the user interface

[1] Title bar

The title bar indicates the program name, the version number and the creation date of the software.

[2] Menu bar

The program menu looks similar to that of common Windows programs and provides all functions required for operating the software (see page 22).

[3] Tool bar

Using the buttons here you can directly access frequently used functions of the program menu (see page 26). When you rest the mouse pointer briefly on a button, a tooltip with the function appears.

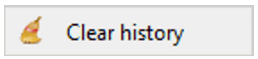
[4] Project

The software *drivemaster4* manages all devices by means of projects. Via the buttons in the area you can create a new project or open an existing project from the file system.

[5] Last projects

This area displays the last projects you have worked with. You can open one of these with one click.

If you do not want to see the last projects, right-click on the row “Last projects” and select “Clear history” from the context menu.



[6] Company information

This field displays information on the company SIEB & MEYER AG. In addition, you can check that you work with the current software version of *drivemaster4* via the point “Latest software”.

[7] Status bar

The status bar displays the current user level.

5.1.1 Create Project

In the software *drivemaster4* you create projects on the start page (home) via the button “New project”. As an alternative, you can also create or open a project via the menu “File”.

Fig. 7: Button “New project”

1. Click “New project”. A dialog appears. There you can enter a project name, a short description, a version number and the file path.

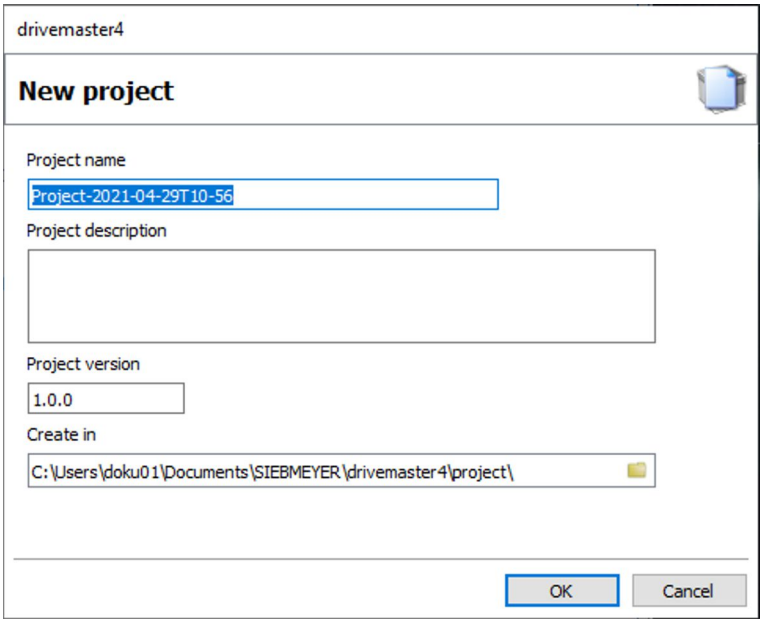


Fig. 8: Enter project data

2. After confirming the dialog, you must select the desired working method (online or offline) in the following dialog.

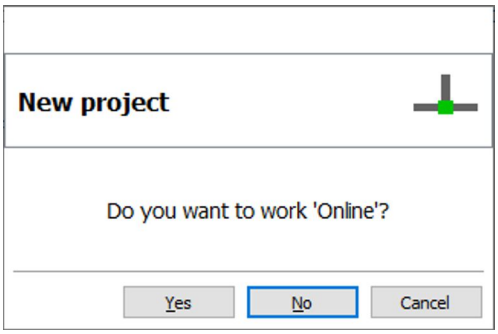


Fig. 9: Online mode or offline mode

In the online mode all changes to the parameters are written immediately to the device. In addition, tools like the object browser or scope are fully available. When you work offline, changed parameters are only saved locally in the parameter set, i.e. in the project.

3. After you have selected a working method, the project view opens. Use the buttons to add online and/or offline devices to your project.

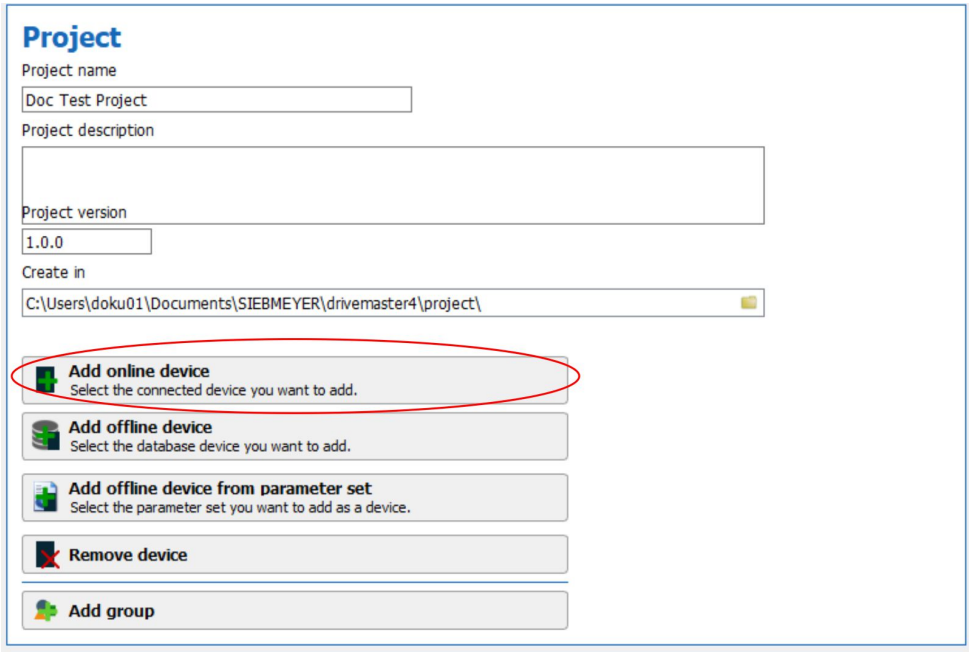


Fig. 10: Add online devices to the project

– **Add online device:** A wizard for the device selection appears. It displays all devices that were connected in the network when the wizard was started.

– **Add offline device:** A wizard for the device selection appears. It shows all devices available in the device database.

  Select your device via the list boxes in the top and change the comment, if required. Then, click on “Finish”.

– **Add offline device from parameter set:** Select a parameter set file from the file system. The *drivemaster4* software creates the according offline device with the parameter set from that file.

4. **Selecting an online device:** Select the desired device in the wizard. If you want to add more than one device, press and hold the CTRL key and select the desired devices with the mouse.

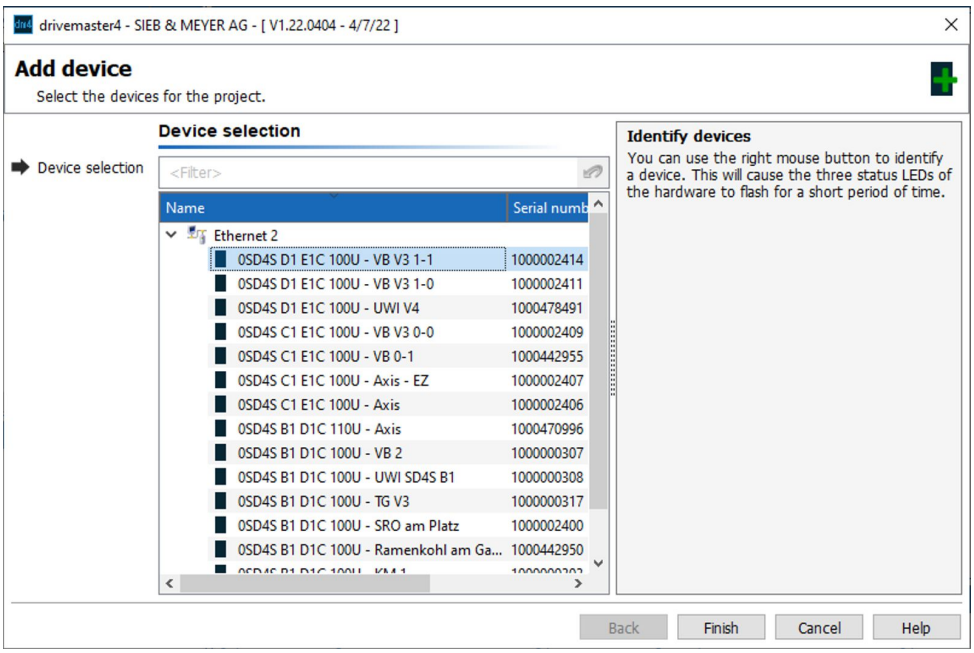


Fig. 11: Add device

> ***Tip***
>
> If you are not sure, which device is your device, you can right-click on a listed device to identify it. Then, the 3 status LEDs of the connected device will flash for a short time.

5. Save the project via the button or the menu “File → Save project”.

5.1.2 Open Project

On the start page, you can open the last used projects with a single click.

When a project is opened, the software creates a lock file (<project name>.dm4.lock) for the project. If this project is then opened by another *drivemaster4* instance, the other instance finds the lock file and opens the project in the read-only mode.

If the user of the second instance makes any changes, these will be displayed only locally in the project and will not be saved. Only the first instance, which had opened the project, has write access.

If, for any reason, the lock file still exists after closing the project, you can delete the file via the context menu of the project. For this purpose, right-click on the project and select the entry “Remove lock file”:

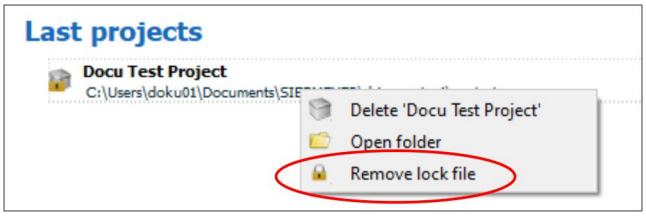
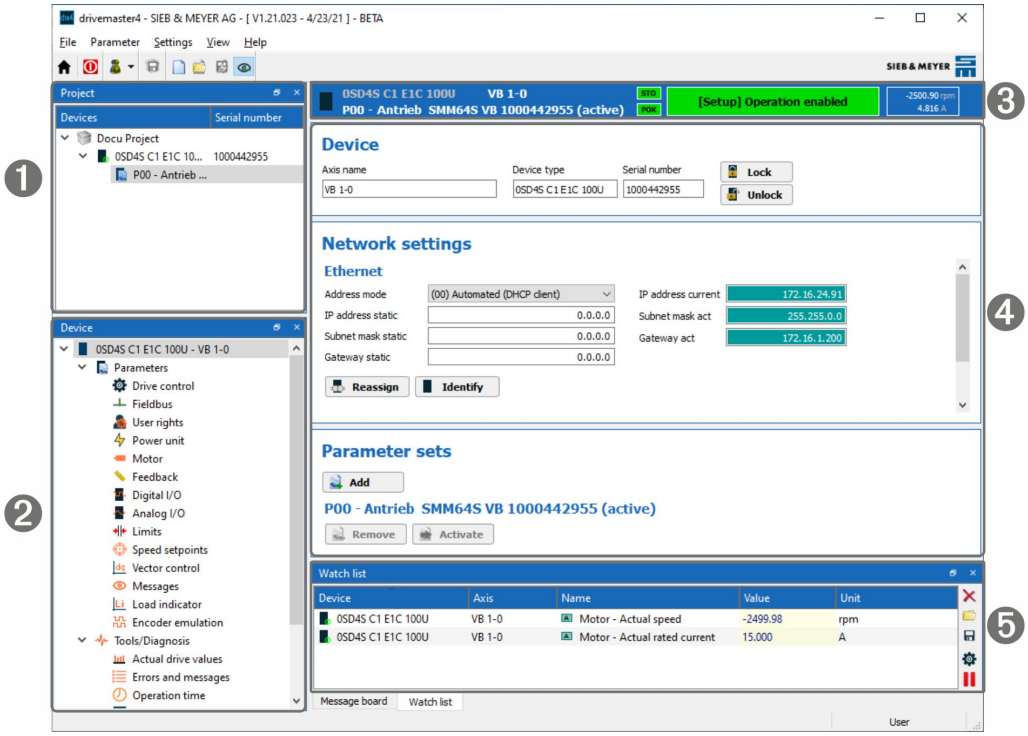


Fig. 12: Remove lock file

5.2 Project Page

The following figure shows the project view of the *drivemaster4* software.



[1] Project tree (p. 18)

The project with all devices and the respective parameter sets is displayed in a tree structure.

[2] Device tree (p. 21)

All elements for the parameterization, diagnosis and setup of the selected device are combined in pages and displayed in a tree structure.

[3] Device status (p. 21)

This bar displays the selected device, the active parameter set and the current device status.

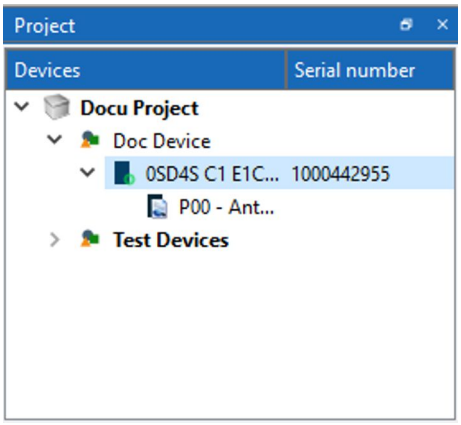
[4] Display area

In this area you can see and edit the selected page (project, parameter, diagnosis and setup pages).

[5] Message board (p. 27) and watch list (p. 27)

5.2.1 Project Tree

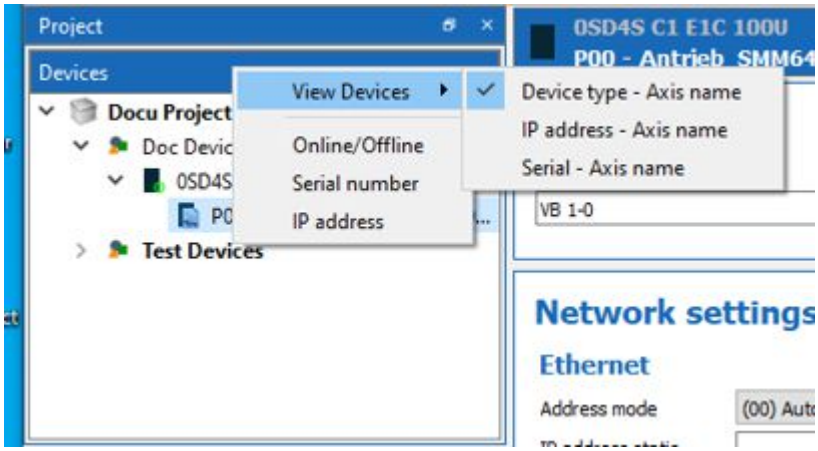
The area “Project” contains the devices and respective parameter sets in a tree structure. The top node of the tree is the project. In addition, you can organize the devices in groups as shown in the example to the right.



Tip

You can move devices and groups in the project tree simply by drag & drop.

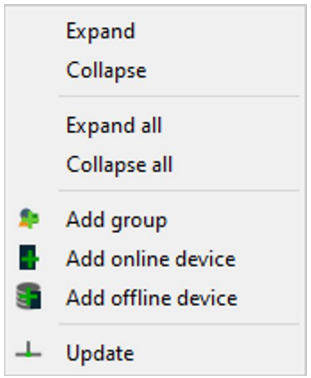
You can configure the view by means of a context menu (right-click on the title “Devices”):



With this menu you can hide and show more data (online/offline status, serial number and IP address). Via the entry “View devices” you select the data that shall be displayed for the devices in the tree structure.

Context menu of project

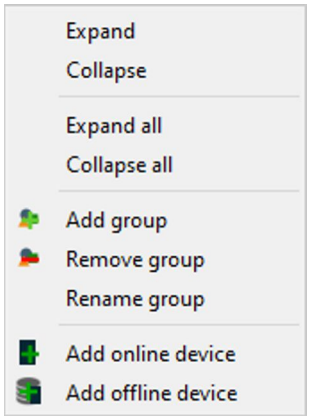
When you select the project node, you can edit the project via the buttons in the display area. As an alternative, you can use the context menu of the project node (right-click on the project node):



- **Expand/Collapse:** The project tree is expanded/collapsed.
- **Expand all/Collapse all:** All elements in the project tree are expanded/collapsed.
- **Add group:** Adds a new group in the project. A dialog appears, in which you can enter a name for the new group.
- **Add online device:** Opens a dialog to add a network connected device to the project.
- **Add offline device:** Opens a dialog to add a device from the internal device database to the project.
- **Update:** Triggers the search for online devices.

Context menu of group

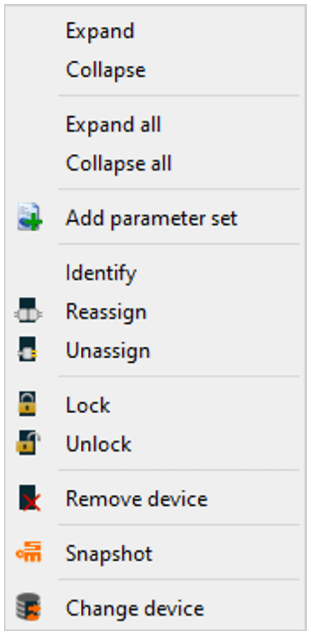
You can edit a device group via the context menu (right-click on the group).



- **Expand/Collapse:** The project group is expanded/collapsed.
- **Expand all/Collapse all:** All elements in the project group are expanded/collapsed.
- **Add group:** Adds a new group within the current group. A dialog appears, in which you can enter a name for the new group.
- **Remove group:** Removes the group with all included devices. A corresponding request is displayed.
- **Rename group:** Opens a dialog to rename the current group.
- **Add online device:** Opens a dialog to add a network connected device to the group.
- **Add offline device:** Opens a dialog to add a device from the internal device database to the group.

Context menu of device

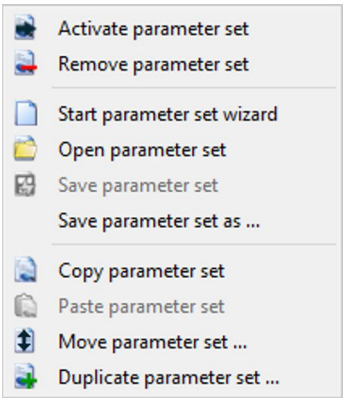
You can edit a device via the context menu (right-click on the device).



- **Expand/Collapse:** The device tree is expanded/collapsed.
- **Expand all/Collapse all:** All elements in the device tree are expanded/collapsed.
- **Add parameter set:** Opens a dialog to create and add a new parameter set.
- **Identify:** All 3 status LEDs of the device flash for a short time.
- **Reassign:** Opens a dialog to assign the project device to another hardware connected in the network.
- **Unassign:** Disconnects the connection to the hardware in the network.
- **Lock:** Locks the device for other *drivemaster4* instances. This applies to all writ operations.
- **Unlock:** Removes the write lock for the device. If the lock was set in another *drivemaster4* instance, you must enter a 4-digit code.
- **Remove device:** Removes the device from the project.
- **Snapshot:** Opens a dialog to create a snapshot. For further information refer to chapter 6.1 “Device ”, page 30.
- **Change device:** Opens a dialog to exchange the project device with another device from the internal device database.

Context menu of parameter set

You can edit a parameter set via the context menu (right-click on the parameter set).

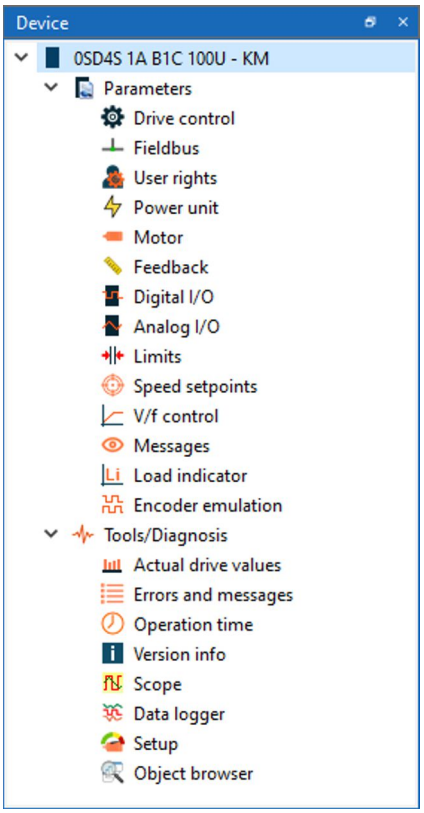


- **Activate parameter set:** Applies the current parameter set as active parameter set in the project and in the device.
- **Remove parameter set:** Removes the parameter set. If this is the active parameter set, you must activate another parameter set beforehand.
- **Start parameter set wizard:** Starts the parameter set wizard to change the current parameter set.
- **Open parameter set:** Opens a parameter set from the file system, which replaces the current parameter set.
- **Save parameter set:** Saves the current parameter set in the project. If you work in the online mode, the data are also saved in the device (flashed).
- **Copy parameter set:** Copies the selected parameter set into the clipboard.
- **Paste parameter set:** Pastes the previously copied parameter set at the cursor position. The parameter set at this position is replaced with the copied parameter set.
- **Move parameter set:** Opens a dialog to set a new parameter set number. The software presets the next available number. After confirming, the software moves the parameter set to the new position. If the entered number is already assigned to a parameter set, that parameter set will be overwritten. This menu item is hidden for the parameter set with number 0 and the active parameter set because both parameter sets must not be moved.
- **Duplicate parameter set:** Opens a dialog to set a new parameter set number. The software presets the next available number. After confirming, the software duplicates the selected parameter set at the set position. If the entered number is already assigned to a parameter set, that parameter set will be overwritten.

5.2.2 Device Tree

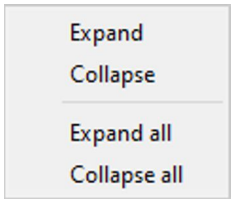
When you select a device in the project tree, the area “Device” displays all elements for parameterization, diagnosis and setup of the device in a tree structure.

For each entry the corresponding page is displayed in the display area.



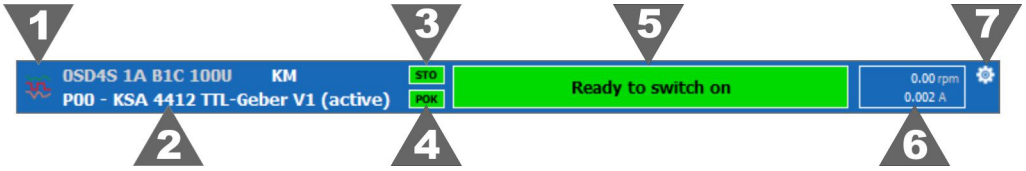
Context menu of device tree

- **Expand/Collapse:** The entry in the device tree is expanded/collapsed.
- **Expand all/Collapse all:** All elements under the tree entry are expanded/collapsed.



5.2.3 Device Status

The device status is always related to the parameter set that is active in the axis. If you edit a non-active parameter set, the device status bar has a yellow background.



[1] Symbol of the tool currently selected in the device tree

[2] The device selected in the project tree with axis name and active parameter set

[3] STO (safety circuit Safe Torque Off):

- Green: STO is not active.
- Yellow: STO is active.

[4] POK (Power supply status Power OK)

- Green: POK is active.
- Yellow: POK is not active.

[5] Device status:

- Green: All is OK.
- Yellow: A warning or message is present.
- Red: An error is present.

If the setup is active, the text Text “[Setup]” is displayed before the device status.

[6] Actual values: The field displays the actual speed and the actual current

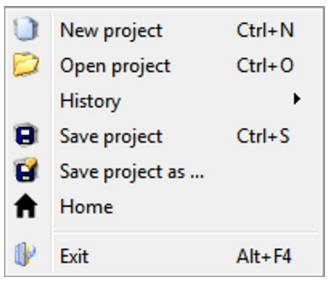
[7] Settings: If the current tool provides settings, a button to edit the settings is displayed here.

5.3 Menu Description

The program menu provides the following menu items:

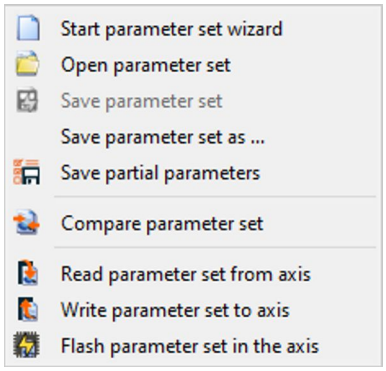
- File
- Parameter
- Settings
- View
- Help

5.3.1 Menu “File”



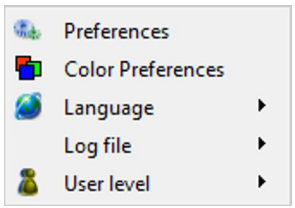
- **New project:** Opens a new project to manage one or more devices.
- **Open project:** Opens a dialog window to select and call an existing project in the file system.
- **History:** Displays the last five projects. You can open one of these with one click.
- **Save project:** Saves the current, changed project under the selected file name.
- **Save project as:** Saves a copy of the current project in a new file. Select a target directory for the file and enter a new file name. The new file name will also be the name of the project.
- **Home:** Closes the current project and switches to the start page of the program.
- **Exit:** Closes the program *drivemaster4*.

5.3.2 Menu “Parameter”



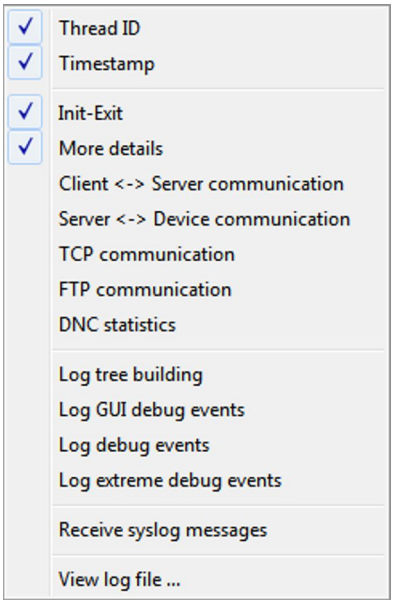
- **Start parameter set wizard:** Starts a wizard to newly create the current parameter set. At the end the old data are overwritten by the new ones. If you work in the online mode, you are requested to switch to the offline mode beforehand. Confirm this request.
- **Open parameter set:** Opens a dialog to select an existing parameter set file from the file system. If you work in the online mode, you are requested to switch to the offline mode beforehand. Confirm this request.
- **Save parameter set:** Saves the current parameter set in the project. If you work in the online mode, the data are also saved in the device (flashed).
- **Save parameter set as:** Saves a copy of the current parameter set in a new file. Select a target directory for the file and enter a file name.
- **Save partial parameters:** Opens a dialog to select individual parameters. Then, these parameters are saved in a parameter file. In the following saving dialog, select a target directory for the file and enter a file name. This menu item is hidden in lower user levels.
- **Compare parameter set:** Opens a dialog to compare two parameter files. By means of the selection lists in the top area you select the desired parameter sets in the project or in the file system.
- **Read parameter set from axis:** Reads the current parameter set from the device and transfers it to the project.
- **Write parameter set to axis:** Writes the current parameter set to the device.
- **Flash parameter set in the axis:** Saves the current parameter set in the device. (This applies only to the data the device contains at that moment.)

5.3.3 Menu “Settings”



- **Preferences:** Opens a dialog to select the messages that shall be displayed in the device status (p. 21).
- **Color preferences:** Opens a dialog, in which you can change the coloring of the *drivemaster4* user interface to your liking.
- **Language:** Opens the language selection. The selected language is immediately active.

- **Log file:** Via the submenu you can select the information to be displayed in the message board and to be saved in the log file.



- **User level:** Switches the user level.(see chapter 9.2 “Switch User Level”, page 75).

5.3.3.1 Color preferences

Via the menu “Settings → Color preferences” opens the dialog window “Application colors”. Here, you can adapt the coloring of the *drivemaster4* user interface to your liking.

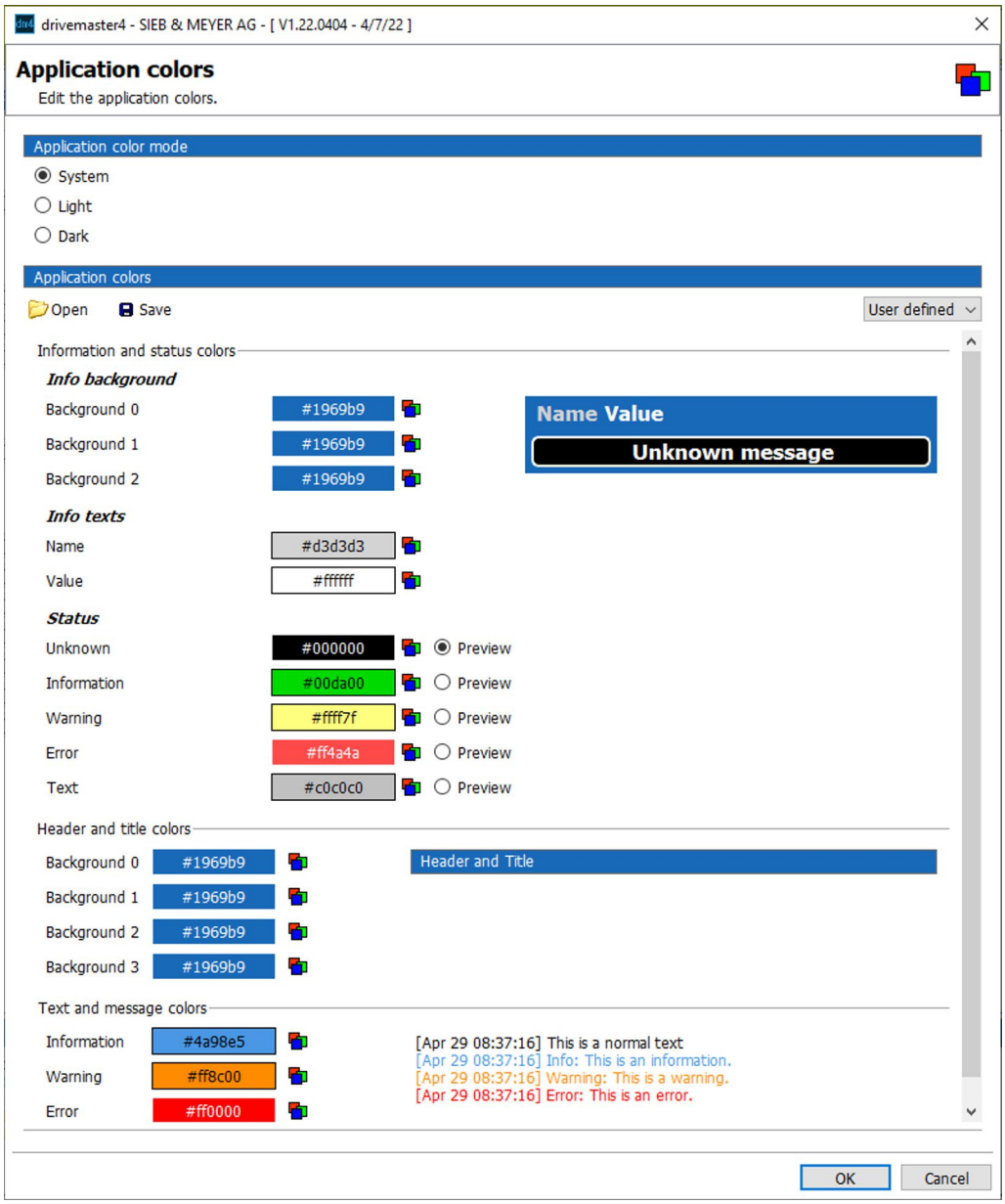


Fig. 13: Application colors

In the top area you can choose between a light and a dark background for the software. The setting “System” means that the software adopts the color mode from your Windows settings.

Below that you can set the desired color of the individual objects, each via the button .

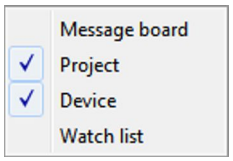
When you have finished the changes, you can save your color profile in the file system via the button “Save”. Via the button “Open” you can load a saved color profile.

In order to apply the adapted color profile to the user interface, click the button “OK”.

Note

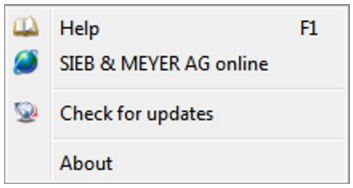
Some changes, for example the application color mode, are applied only after a software restart.

5.3.4 Menu “View”



Via the menu “View” you can display or hide some of the general elements the user interface provides. These are the message board, the project tree, the device tree and the watch list.

5.3.5 Menu “Help”



- **Help:** Opens the online help for the software *drivemaster4*.
- **SIEB & MEYER AG online:** Opens the website of SIEB & MEYER AG.
- **Check for updates:** Opens a dialog to download an update for the software *drivemaster4* directly from the SIEB & MEYER website.
- **About:** Displays version information of the software and the contact address of SIEB & MEYER AG.

5.4 Tool bar

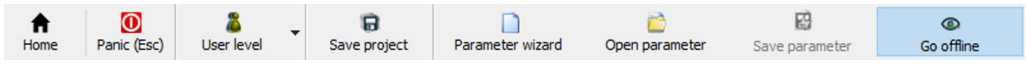


Fig. 14: Tool bar

The tool bar contains the most important functions from the main menu. In addition, the following two buttons are available here:

- **Panic (Esc):** This button shuts down the drive immediately (during setup).
- **Go online/offline:** Switches the working mode. In the online mode all changes to the parameters are written immediately to the device. In addition, tools like the object browser or scope are fully available. When you work offline, changed parameters are only saved locally in the parameter set, i.e. in the project.

Tip

A right-click on the tool bar opens a context menu. Here you can define the size of the icons and show or hide the button names.

5.5 Message Board

The message board displays messages and errors in detail since the software was started:

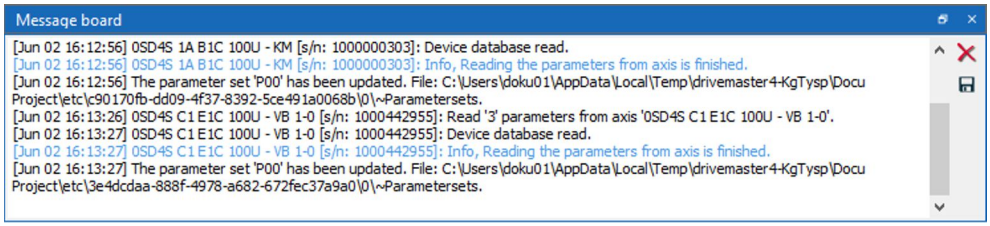


Fig. 15: Message board

Click this button to clear the message board.

Click this button to save the entries in a log file.

Via the menu “View” you can show or hide the message board.

5.6 Watch List

In the watch list you can permanently watch objects from the *drivemaster4* software, regardless of the page that is currently displayed. You can also edit the objects in the watch list.

Via the menu “View” you can show or hide the watch list.

In order to add objects to the watch list, proceed as follows: Open the context menu of the parameter, actual value or object (right-click on the displayed value). Select the entry “Add to watch list”. In the object browser you can also add objects to the watch list via drag & drop.

The objects in the watch list are displayed with the following properties: device name, axis name, object name, value and unit:

Fig. 16: Watch list

Click this button to clear the watch list window.

Click this button to load a saved watch list from the file system. The following dialog appears:

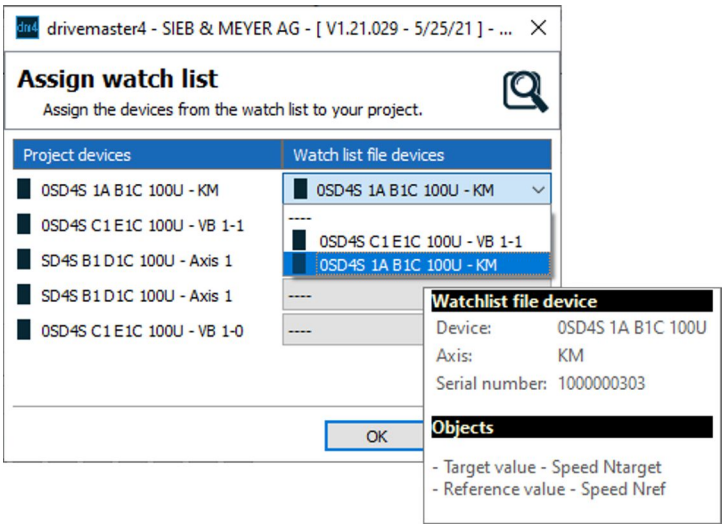


Fig. 17: Assign watch list

On the left side the project devices are displayed. The selection lists on the right side contain the devices from the watch list file. You can assign the objects from the file to any device in the project. When you rest the mouse pointer briefly on a device, a tooltip with the contained objects appears.

Click this button to save the object selection of the watch list in a file.

Click this button to change the view of the watch list. The simple list view is set by default. With the grouped list view all objects of an axis are combined. In addition, the device status is displayed at the group.

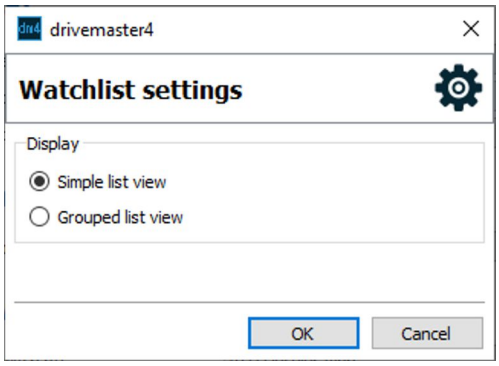


Fig. 18: Set view

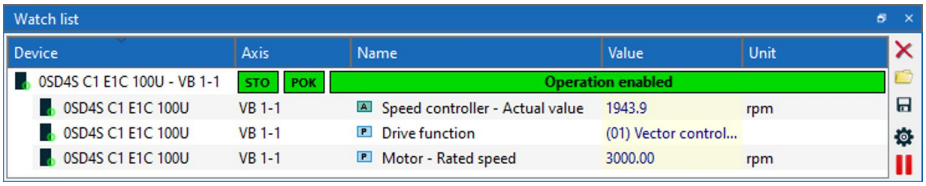


Fig. 19: Watch list with grouped list view

Click this button to pause the reading of the objects in the watch list.

Tip

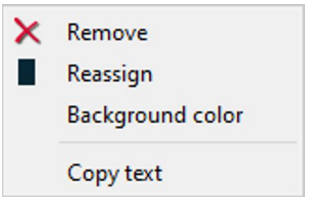
You can change the order of the objects in the watch list, for example alphabetically by device or name. For this purpose click into the header of the according table column. A small arrow symbol appears in the middle of the table cell. When you click into this table cell again, the objects will be ordered alphabetically according to the arrow direction.

Context menu

For the objects in the watch list, the following context menu appears (right-click on object).

Note

It is possible to select several objects and edit them via the context menu.



- **Remove:** Removes the selected object from the watch list.
- **Reassign:** Opens a dialog to assign the object to another device in the current project.
- **Background color:** Opens a dialog to change the background color of the object in the watch list.
- **Copy text:** Copies the content of the selected field to the clipboard.

6 Device Settings

When you select a device in the project tree and click on the top entry in the device tree, the device settings are displayed.

The display area is divided into the following 3 fields:

- Device
- Network settings
- Parameter sets

6.1 Device

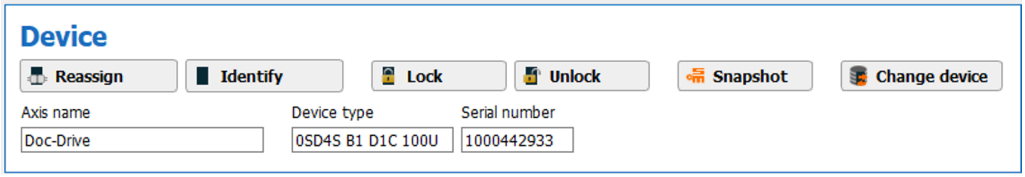


Fig. 20: Device configuration

In the field “Device” you can change the name of the axis. Press the enter key to confirm your input. The device type and the serial number are only displayed for your information and cannot be edited.

The following buttons are available:

- **Reassign:** Opens a dialog to assign the project device to another hardware connected in the network.
- **Identify:** All 3 status LEDs of the device flash for a short time. Click this button to check that the project device is connected with the right SD4x drive.
- **Lock:** Locks the device for other *drivemaster4* instances. This applies to all writ operations.
- **Unlock:** Removes the write lock for the device. If the lock was set in another *drivemaster4* instance, you must enter a 4-digit code.

- **Snapshot:** Opens a dialog to create a snapshot.
  A snapshot is an image of the current device status that you can send to the SIEB & MEYER service in case of problem. For this purpose, the project including all objects is saved in a ZIP file.

  In the following dialog you create and save the snapshot:

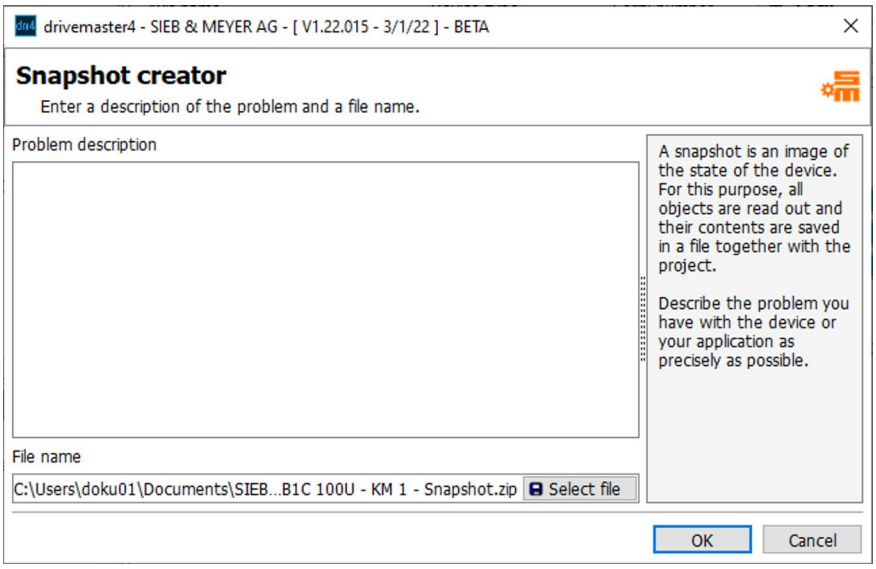


Fig. 21: Snapshot creator

Note

Enter a detailed description of the problem with your device or application in the field “Problem description” before you save the snapshot by click on “OK”.

- **Change device:** Opens a dialog to exchange the project device with another device from the internal device database.

6.2 Network Settings

In the network settings you configure the communication with the selected device.

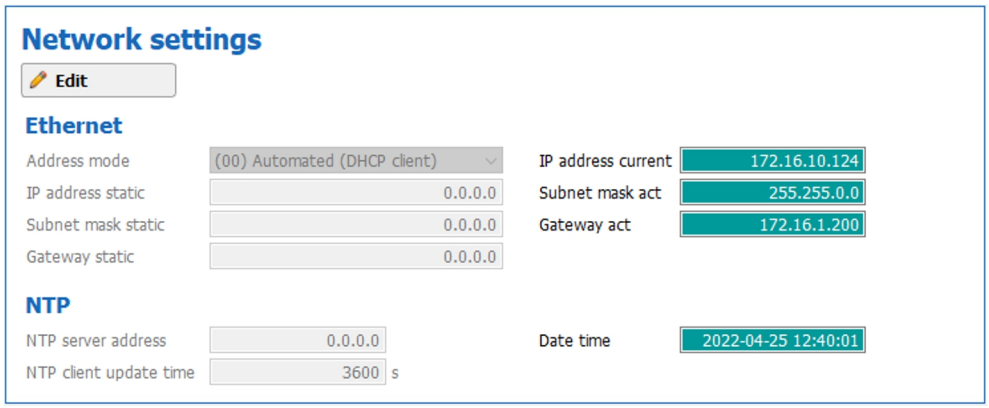


Fig. 22: Network settings

Note

At first you must click the button “Edit” to enable editing of the parameters for the network settings. When you have finished editing, click on the button “Apply” to activate the new network configuration.

Ethernet

The SD4x drive communicates with the operating software *drivemaster4* via Ethernet and IPv4 protocol.

Each device in an IPv4 network requires 3 parameters:

- IP address
- subnet mask
- standard gateway

In which way the SD4x drive receives these parameters, depends on the network and is controlled via the **address mode**. In the network settings you configure the communication parameters accordingly.

Note

Changes are not applied immediately but only after restarting the drive or unplugging and replugging the network cable.

For a detailed description, refer to the document “Drive Controller SD4x – Ethernet Configuration”.

NTP

NTP (Network Time Protocol) is a standard for clock synchronization. Here, you can set the IP address of the server and the update interval.

6.3 Parameter Sets

In this field you can add parameter sets to the current device. If the displayed parameter set is not the active one, you can remove it or activate it in the axis. In the online mode, you can also define how a parameter set is selected for the axis.

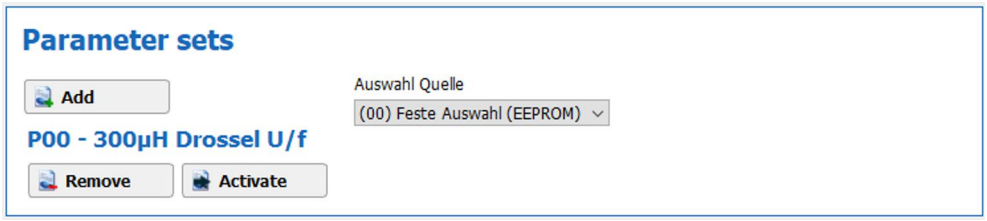


Fig. 23: Working with parameter sets

Add parameter set

When you add a parameter set, the following dialog appears:

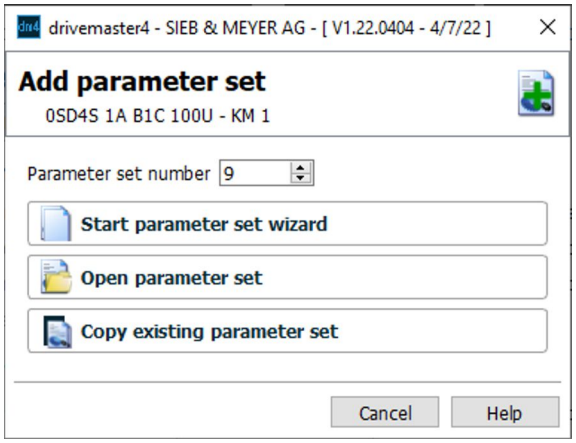


Fig. 24: Add parameter set

As parameter set number the software sets automatically the first number available. You have the following possibilities:

- Start parameter set wizard: Starts a wizard to create the new parameter set.
- Open parameter set: Opens a dialog to select an existing parameter set file from the file system.
- Copy existing parameter set: Opens a dialog to copy another parameter set of the device. You can edit the name, description and ID of the parameter set directly in that dialog.

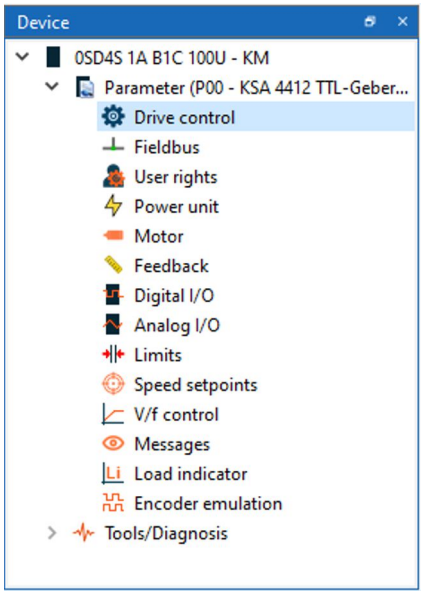
Select parameter set

In the online mode, the list “Selection source” is available. Use this list to determine how a parameter set for the axis is to be selected:

- Fixed selection (EEPROM): The user activates the desired parameter set in the user interface. The software saves the parameter set number for a possible restart.
- Digital inputs: The desired parameter set is determined by the connection of the digital inputs. If you wish to select the different parameter sets via the digital inputs, the control channel of all parameter sets must be set to “Digital inputs” (see parameter page “Drive control”). When the parameter set is changed via the digital inputs, the software displays a corresponding message that you must confirm.
- Bus system: The desired parameter set is selected via the object “Parameter set - Selection”. When the parameter set is changed via the bus system, the software displays a corresponding message that you must confirm.

7 Parameter

Under the node “Parameter” in the device tree, the software provides all parameters of the current parameter set combined in pages. Click on the desired entry in the tree structure to open the corresponding parameter page in the display area.



Note

When you work with several devices and parameter set in one project, make sure that you have selected the right parameter set before making any changes. The selected parameter set is always displayed in device status bar (p. 21).

When you select a device in the project tree and then click the group node “Parameter” in the device tree, the parameter set actions are available in the display area.

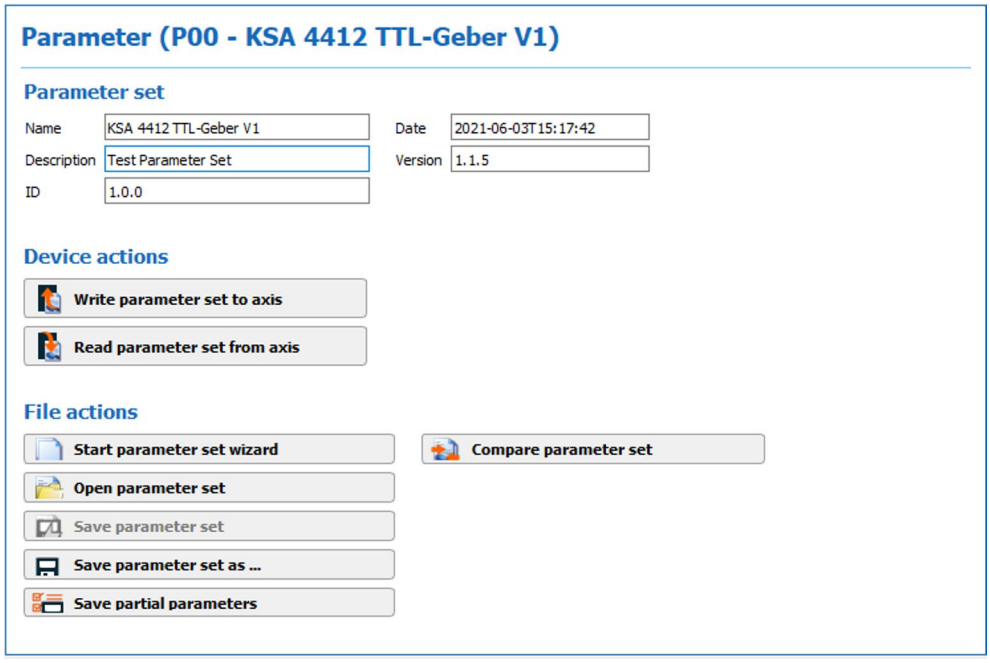


Fig. 25: Parameter set action

Parameter set

In this section you can edit the name, the description and the ID of the selected parameter set.

In addition, the date and time of the last change via the user interface and the version of the parameter set structure are displayed. Both values cannot be edited.

Device actions

If you work in the online mode, you can read write the parameter set via the buttons. Writing the parameter set is not possible, though, when the device is locked by another *drivemaster4* instance.

The parameter set actions are also available in the main menu under the item “Parameter”.

File actions

All file actions are also available in the main menu under the item “Parameter”. The following buttons are available here:

- **Start parameter set wizard:** Starts a wizard to newly create the current parameter set. At the end the old data are overwritten by the new ones. If you work in the online mode, you are requested to switch to the offline mode beforehand. Confirm this request.
- **Open parameter set:** Opens a dialog to select an existing parameter set file from the file system. If you work in the online mode, you are requested to switch to the offline mode beforehand. Confirm this request.
- **Save parameter set:** Saves the current parameter set in the project. If you work in the online mode, the data are also saved in the device (flashed).
- **Save parameter set as:** Saves a copy of the current parameter set in a new file. Select a target directory for the file and enter a file name.
- **Save partial parameters:** Opens a dialog to select individual parameters. Then, these parameters are saved in a parameter file. In the following saving dialog, select a target directory for the file and enter a file name. This menu item is hidden in lower user levels.
- **Compare parameter set:** Opens a dialog to compare two parameter files. By means of the selection lists in the top area you select the desired parameter sets in the project or in the file system.

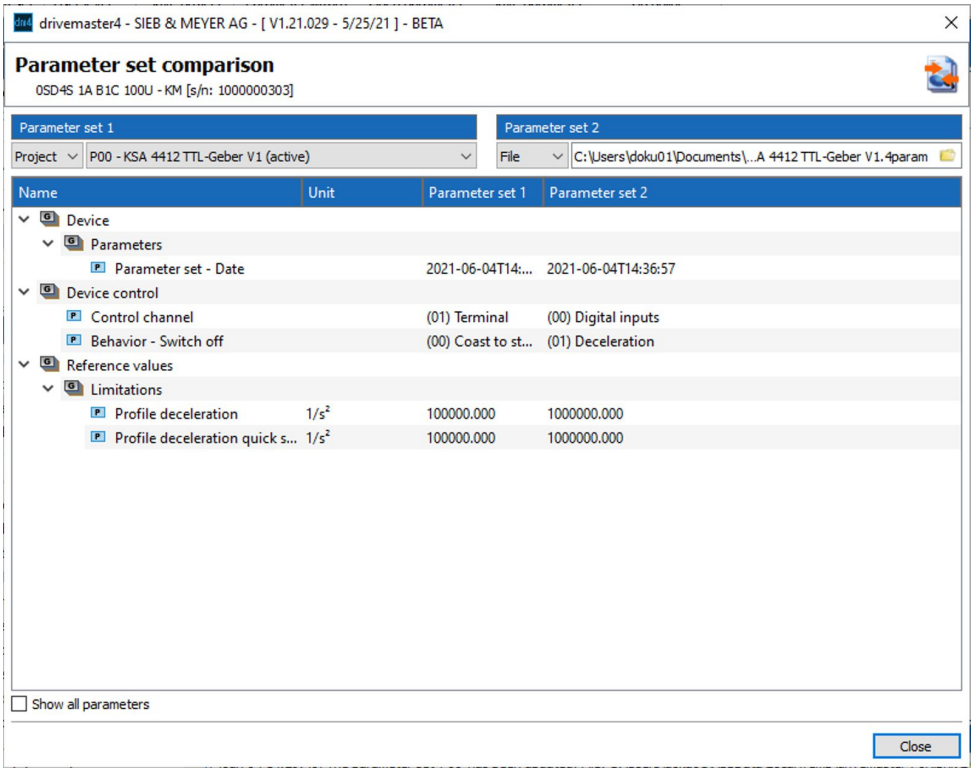


Fig. 26: Parameter set comparison

By default, the dialog displays only the differences. Via the checkbox n the bottom left corner you can display all parameter.

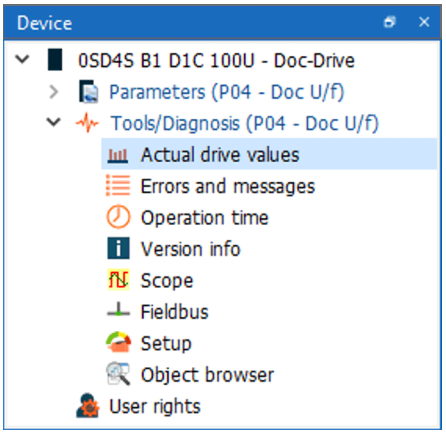
8 Tools/Diagnosis

The software *drivemaster4* provides different tools for setup and diagnosis of the device. You can find these tools in the device tree under the node “Tools/Diagnosis”.

Most tools are device-specific. Therefore you must first select a device in the project tree to display them.

Click on the desired entry in the tree structure to open the corresponding tool in the display area on the right side.

In order to fully use the tools, you must work in the online mode and select the active parameter set in the project tree.



The tool data logger is not device-specific. Therefore, you can also use the data logger to compare the data of different devices in the project. To open the data logger select the top node in the project tree. Then, you will find the data logger in the device tree under the node “Tools/Diagnosis”.

8.1 Actual Drive Values

This page displays all important data that describe the current status of the drive.

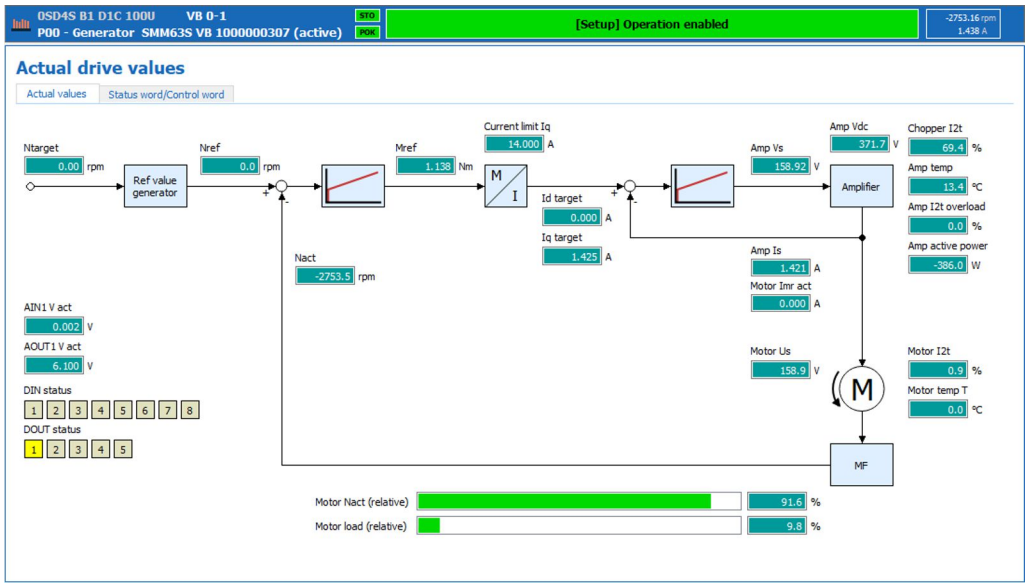
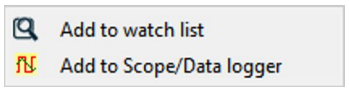


Fig. 27: Actual drive values

When you right-click on a value, the following context menu appears:

- **Add to watch list:** Adds the current object to the watch list.
- **Add to scope/data logger:** Adds the current object to the diagnosis tools scope (p. 42) and data logger (p. 70).



8.2 Errors and Messages

This page displays the errors and messages of the device. The error or message code is indicated in squared brackets.

In addition, you can display an error history and error statistics via the tabs in the top.

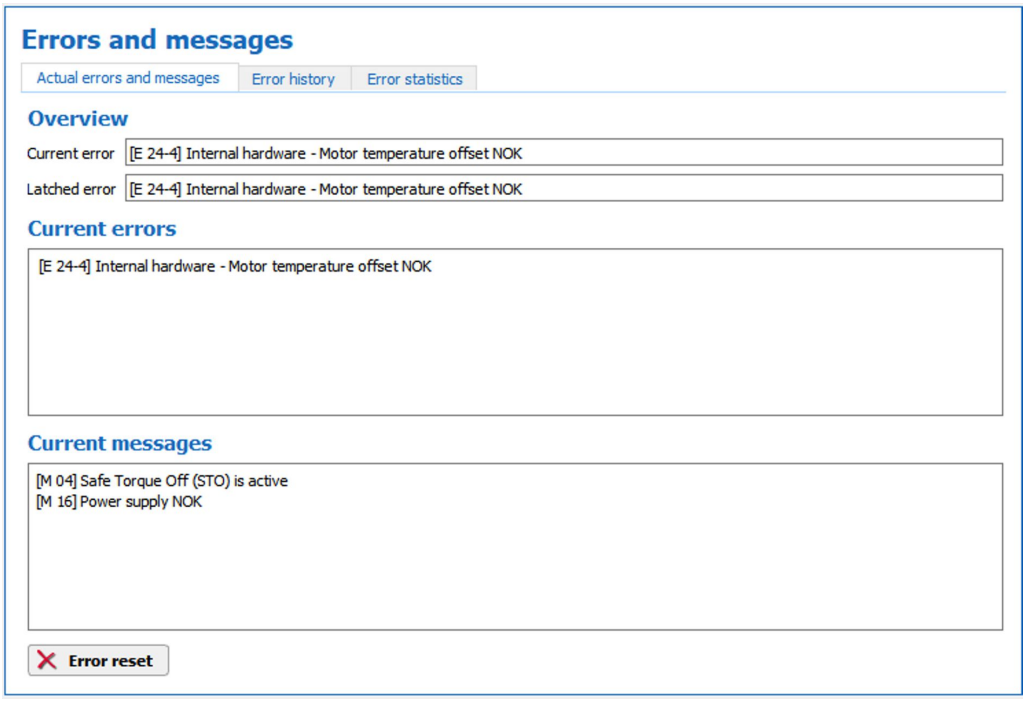


Fig. 28: Errors and messages

Overview

The field “Current error” displays the current error of the drive system, if present. This is the error of the highest priority.

The field “Latched error” displays the saved error of the drive control. This is the error that caused the last shutdown of the drive. When the error is reset, the saved error is also cleared.

Current errors

This field displays all current errors of the drive system.

Current messages

This field displays all current messages of the drive system.

Error reset

When an error is removed, it is saved. Via the button “Error reset” you can reset the saved error.

8.2.1 Error History

The error history lists the errors that occurred in the current device. The errors are displayed in descending order by date.

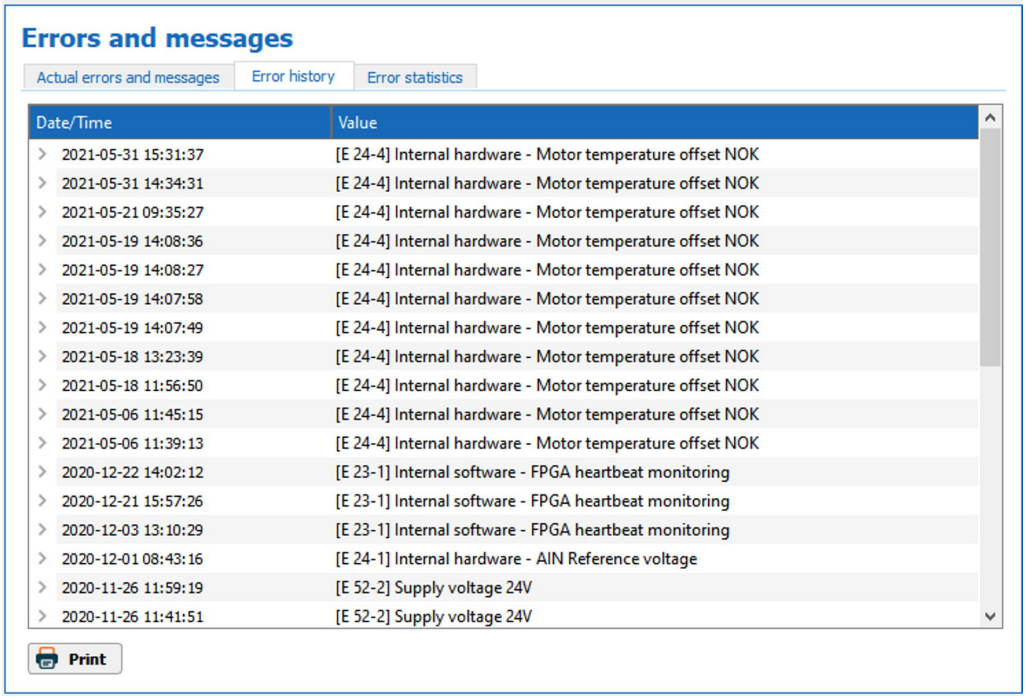


Fig. 29: Error history

You can click on the expansion arrow on the left to display additional information on the device status at the time of the error.

Print

Via the button “Print”, the printer dialog appears to print the error history. Select the page orientation and your printer in the print preview.

8.2.2 Error Statistic

The error statistics tab displays the frequency of each error that occurred in the current device. The most frequent error is at the top.

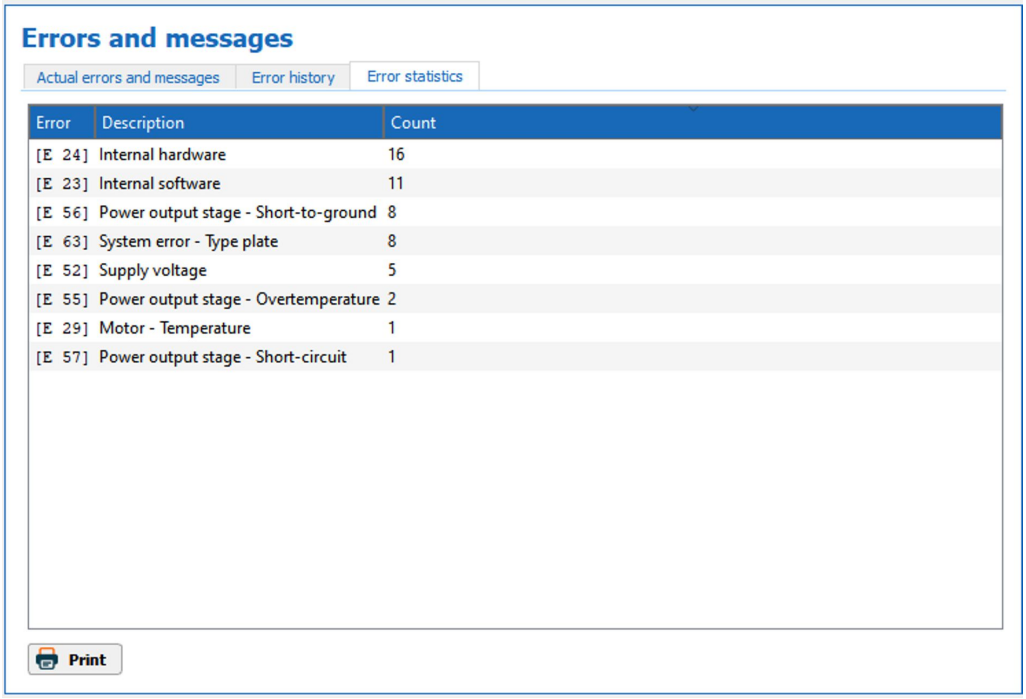


Fig. 30: Error statistics

Print

Via the button “Print”, the printer dialog appears to print the error statistics table. Select the page orientation and your printer in the print preview.

8.3 Operation Time

This page indicates the operating hours of the device and the respective parameter sets.

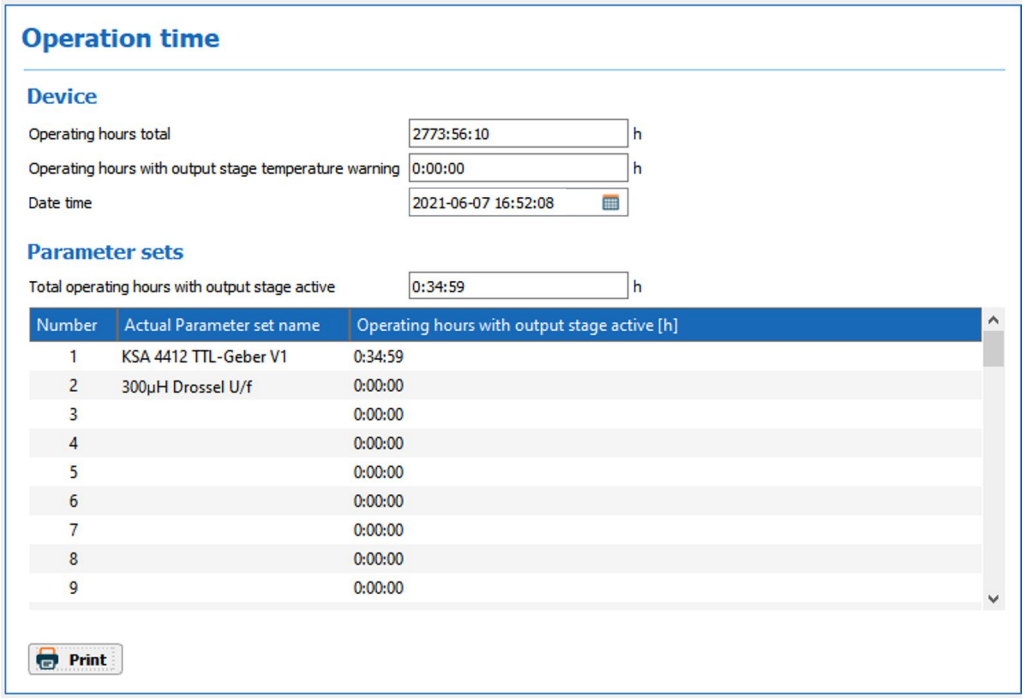


Fig. 31: Operation time

In addition, the page displays the date and time of the device. Click on the button in the field “Date time” to open a dialog, in which you can set the date and time of the device.

Print

Via the button “Print”, the printer dialog appears to print the operation time table. Select the page orientation and your printer in the print preview.

8.4 Version Info

This page displays all information on the hardware, software and logic as well as the current parameter set of the selected device.

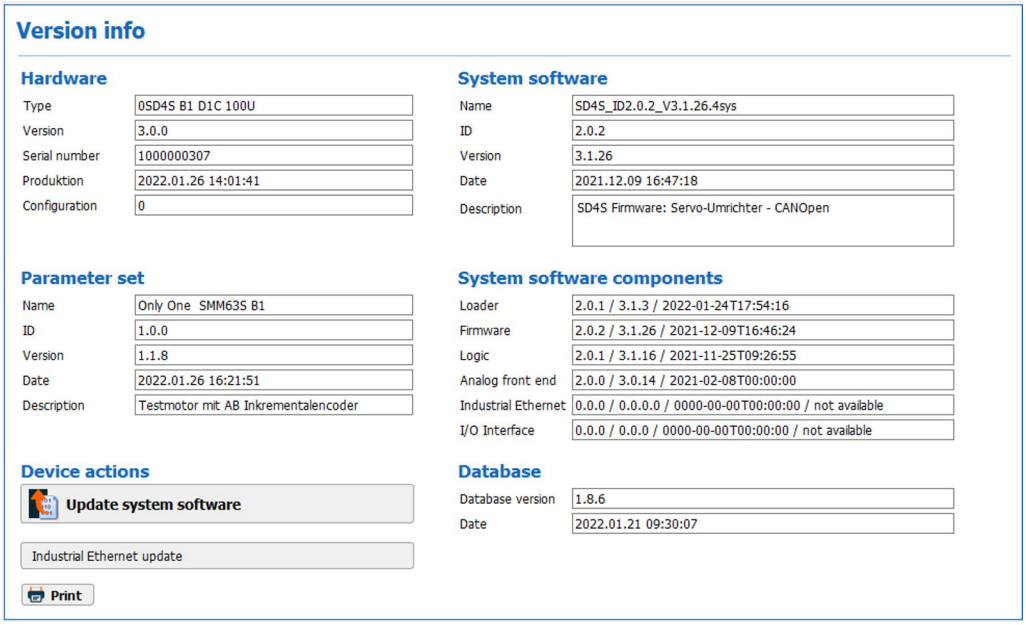


Fig. 32: Version information

Update system software

Via the button “Update system software” you can load a new system software from the file system into the device.

Industrial Ethernet update

Via the button “Industrial Ethernet update” you can update the firmware of your multiprotocol chip for the fieldbus communication, if required. For further information refer to the technical information “TIE_SD4_netX90-FirmwareUpdate.pdf”.

Note

The software disables the axis for the update.

Print

Via the button “Print”, the printer dialog appears to print the version information on this page. Select the page orientation and your printer in the print preview.

8.5 Scope

In the tool scope you can record up to 6 numerical objects and display the values as curve or table. The scope tool is intended for recording very fast processes, whereas the tool data logger (p. 70) is used to monitor slower processes over a longer period of time.

Scope recordings are carried out autonomously in the drive and can be controlled via several trigger functions. The scope tool has the following performance data:

- Up to 6 channels can be recorded simultaneously.
- Up to 1000 measured values can be recorded per channel.
- The maximum recording rate results from the system cycle of 16 kHz; it is 62.5 µs.
- The minimum recording time results from the maximum recording rate of 62.5 µs and the maximal 1000 measured values per channel; it is 62.5 ms.

8.5.1 User Interface

In scope, the user interface is divided into 6 areas:

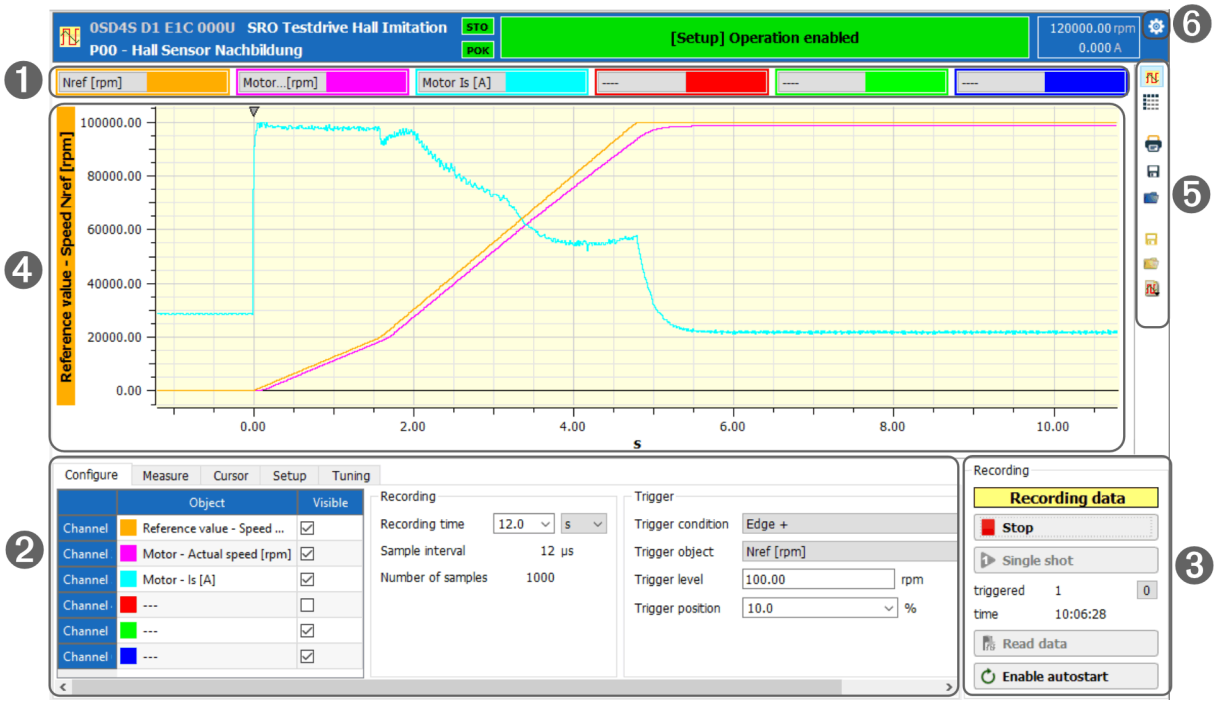


Fig. 33: Scope

[1] Recording channels (p. 44)

[2] Configuration and Evaluation (p. 44)

[3] Recording (p. 48)

[4] Measured values (p. 50)

[5] Action bar (p. 51)

[6] Settings (p. 52)

8.5.2 General Procedure

To record values in the scope tool, proceed as follows:

Configuration

At first, you must configure the recording. For this purpose take the following steps:

1. Select the objects to be recorded either using the selection lists above the graphic or the tab “Configure” (left table).
2. Set the recording time in the tab “Configure”.
3. Select a trigger condition in the tab “Configure” and set the according parameters.

Setup

If you want to record dynamic values of the motor, you can operate the motor via scope:

4. Switch to the tab “Setup”.
5. Select a function and the reference speed value and start the operation via the buttons below.

Start recording

After configuring you can start to record in the area “Recording”:

6. Start recording by click on the button “Start” or “Single shot”.
   a. Start: Recording of the selected curves is restarted continuously. With each trigger the measured values are loaded and displayed. Click the button “Stop” to stop recording.
   b. Single shot: If the trigger event occurs frequently, you can start a single recording. After reading, scope displays the values and switches to the status “Finished”. Then you can evaluate the measured values.

Evaluate measured values

7. After recording, you can evaluate the measured values as a graphic or as a table. You have the following options:
   a. **Switch view:** Via the buttons and you can switch between the graphic and the table view.
   b. **Zoom:** In order to zoom into the graphic, you must press and hold the left mouse button and draw a rectangle over the desired zoom area.

      Double-click on the graphic to reset the zoom.
   c. **Characteristic values:** Click on the tab “Measure” to see the calculated characteristic values.
   d. **Cursor values:** The measured values at the current cursor position are displayed in the colored area of each channel (above the graphic).

      Click on the tab “Cursor” to see the measured values of the current cursor position and two additional measuring cursors.

Archive measured values

8. Save or print the recording for later use.

8.5.3 Recording channels

In the area above the graphic, you can select up to 6 objects of the device to be recorded. Each of these object represents a channel then:

Fig. 34: Recording channels

As an alternative, you can also select the objects to be recorded in the tab “Configure”.

Note

When you move the mouse after recording over the graphic, the measured values at the current cursor position are displayed in the colored area of each channel.

8.5.4 Configuration and Evaluation

This area is divided into 5 tabs. In the tab “Configuration” you set the parameters for the desired recording. After recording you can evaluate measured values in the tabs “Measure” and “Cursor”. Via the tab “Setup” you can operate the drive. The tab “Tuning” provides some relevant parameters that you can change there directly.

8.5.4.1 Tab “Configure”

Here you select the objects to be recorded, the recording time and the trigger function.

Object selection

You can select up to 6 objects of the device to be recorded. Each of these object represents a channel then.

Select the objects to be recorded either using the selection lists above the graphic or directly in the configuration area:

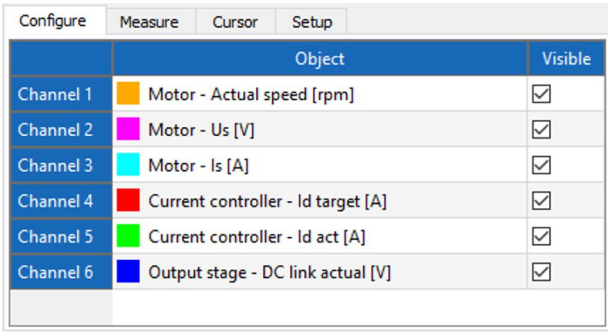


Fig. 35: Channel selection in configuration area

Double-click into the table cell to display the list with the selectable objects. Initially, the list contains a preselection of objects. If you want to record other objects, you can add these in the selection list. For this purpose you must navigate to the page with the desired object. Then, open the context menu of the object (right-click on displayed value) and select the entry “Add to scope/data logger”.

For more clarity, you can hide or show the curves via the checkboxes in the column “Visible”.

Recording time

The recording time is the time period between the first and the last measured value. You can freely choose the recording time but the value must be greater than the minimum recording time of 62.5 ms.

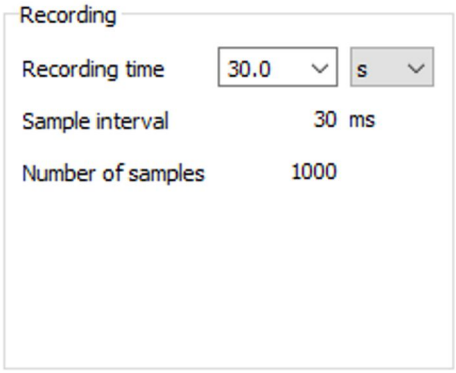


Fig. 36: Recording time

At first, you should select the unit (ms, s or min). Then, you can select the time period from a list or enter the desired value.

Based on the set recording time, the software calculates the sample interval and the number of samples. The sample interval is always a multiple of the minimum sample interval of 62.5 µs. It is selected so as to record as many measured values as possible within the recording time. The number of samples is limited to 1000 measured values.

Trigger

The trigger defines the end of the recording. There are different trigger conditions. The point in time of the trigger event is the zero point on the time axis. You must select the parameters “Trigger condition” and “Trigger position” in any case. Depending on the trigger condition other parameter may appear.

- **Trigger position**
  You can freely choose the position of the trigger event in the recording. The value is indicated in percent. A trigger position of 100 % means that the trigger event is located on the right edge o the recording. When you select a trigger position of 0 %, the trigger event is located on the left edge of the recording.

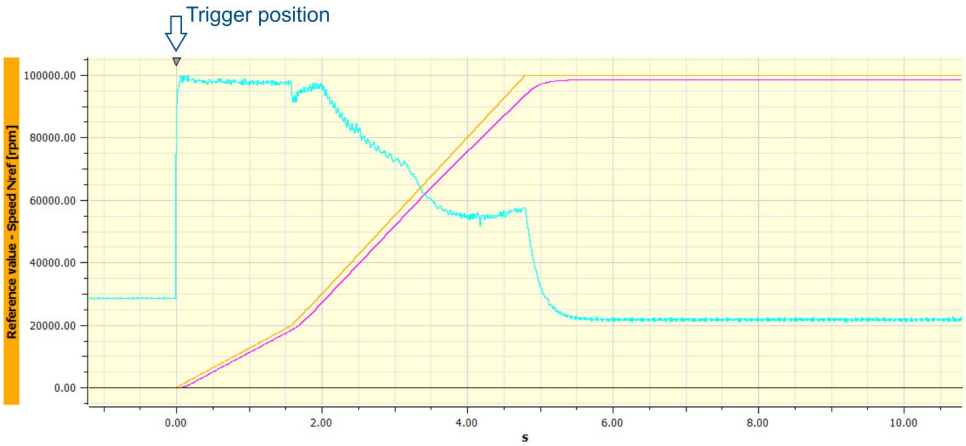


Fig. 37: Trigger position in the graphic

- **Trigger condition**
  You can choose one of the following trigger conditions:

Auto trigger As soon as the trigger is enabled, it is fired. There are no other parameters.

Edge + The trigger is enabled, when the value of the trigger object is below the trigger threshold. Then, the trigger is fired as soon as the trigger threshold has been reached or passed from below. In addition, you must set the trigger object and the trigger threshold. You can choose the trigger object from all objects that also can be recorded.

Edge − The trigger is enabled, when the value of the trigger object is above the trigger threshold. Then, the trigger is fired as soon as the trigger threshold has been reached or passed from above. In addition, you must set the trigger object and the trigger threshold. You can choose the trigger object from all objects that also can be recorded.

Error <> 0 The trigger is enabled, when no error is present (object 83: ERROR_CODE_DS402_LATCHED is 0). The trigger is enabled, when error is present (object 83: ERROR_CODE_DS402_LATCHED is not 0). There are no other parameters.

Error = value The trigger is enabled, when no error is present (object 83: ERROR_CODE_DS402_LATCHED is 0). The trigger is enabled, when the selected error is present (object 83: ERROR_CODE_DS402_LATCHED has the value of the error number). In addition, you must set the error number of the according error.

8.5.4.2 Tab “Measure”

For each channel, the software calculates several characteristic values and displays them in a table.

Configure | Measure | Cursor | Setup

	Object	Min. Val	Max. Val	Peak to Peak	Average	Standard deviation	True RMS	AC RMS
Channel 1	Motor - Actual speed [rpm]	-2055.05	2053.41	4108.45	-57.2062	1882.7246	1883.5935	1882.7246
Channel 2	Motor - Us [V]	2.8	94.6	91.8	79.569	15.633	81.090	15.633
Channel 3	Motor - Is [A]	0.993	5.058	4.065	5.00777	0.25076	5.01404	0.25076
Channel 4	Current controller - Iq target [A]	-5.025	5.025	10.050	0.16087	5.01254	5.01512	5.01254
Channel 5	Current controller - Iq act [A]	-5.203	5.173	10.377	0.15913	5.00991	5.01244	5.00991
Channel 6	Output stage - DC link actual [V]	368.2	380.2	12.0	374.602	2.688	374.611	2.688

Fig. 38: Measurements

Each channel is a series of measured values. In the following, the number of measured values is indicated with n. Individual measured values are $X_0, X_1 \ldots X_{n-1}$.

The following values are indicated for each channel:

Min. value The minimum value *minVal* is the smallest measured value of the series.

Max. value The maximum value *maxVal* is the greatest measured value of the series.

Peak to peak The range R is the difference between the maximum value and the minimum value.

$R = maxVal - minVal$

Average value The arithmetic average value is the sum of all measured values divided by their number.

$$\overline{X} = \frac{1}{n}\sum_{0}^{n-1} X_i$$

Standard deviation The standard deviation σ is the square root of the mean square deviation from the average value.

$$\sigma = \sqrt[2]{\frac{1}{n}\sum_{0}^{n-1}(X_i - \overline{X})^2}$$

True RMS The RMS value *trueRMS* is the square root of the average value of the quadratic measured values.

$$trueRMS = \sqrt[2]{\frac{1}{n}\sum_{0}^{n-1} X_i^2}$$

AC RMS The RMS value *AC RMS* has no offset or DC component. It is calculated from the root of the difference between the quadratic RMS value and the quadratic average value.

$$AC\ RMS = \sqrt[2]{trueRMS^2 - \overline{X}^2}$$

8.5.4.3 Tab “Cursor”

The current cursor under the mouse pointer and the two measuring cursors “Cursor 1” and “Cursor 2” define a point on the time axis each.

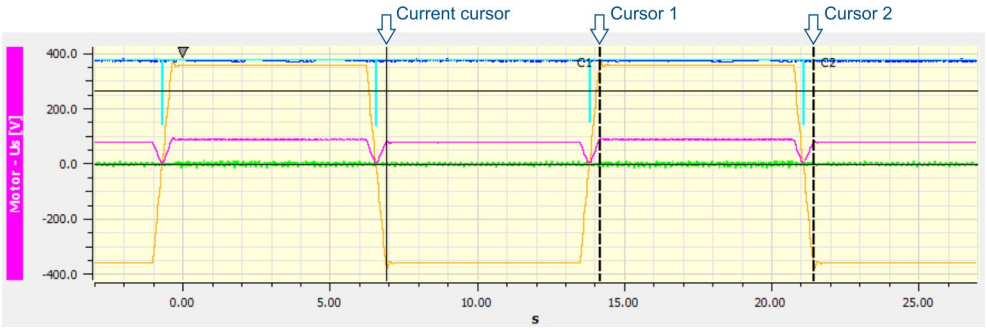


Fig. 39: Cursors in the graphic

These points in time together with the corresponding measured values of each channel are displayed in a table.

Configure | Measure | Cursor | Setup

	Object	Actual	Cursor 1	Cursor 2	Cur2-Cur1
Channel 1	Motor - Actual speed [rpm]	-2062.21	2062.55	-2064.02	-4126.57
Channel 2	Motor - Us [V]	85.3	93.4	82.7	-10.6
Channel 3	Motor - Is [A]	5.038	5.038	5.028	-0.010
Channel 4	Current controller - Id target [A]	0.000	0.000	0.000	0.000
Channel 5	Current controller - Id act [A]	-0.022	-0.022	-0.050	-0.028
Channel 6	Output stage - DC link actual [V]	380.2	371.9	374.3	2.4
Time	t [s]	6.900	14.160	21.420	7.260

Show cursors

Press shift + Left Mouse to move cursor.

Fig. 40: Cursor table

You can show or hide Cursor 1 and Cursor 2 via the checkboxes on the right. In order to move these cursors, press and hold the Shift key and click with the left mouse button into the graphic.

8.5.4.4 Tab “Setup”

Via this tab you can operate the drive while recording measured values in the scope tool.

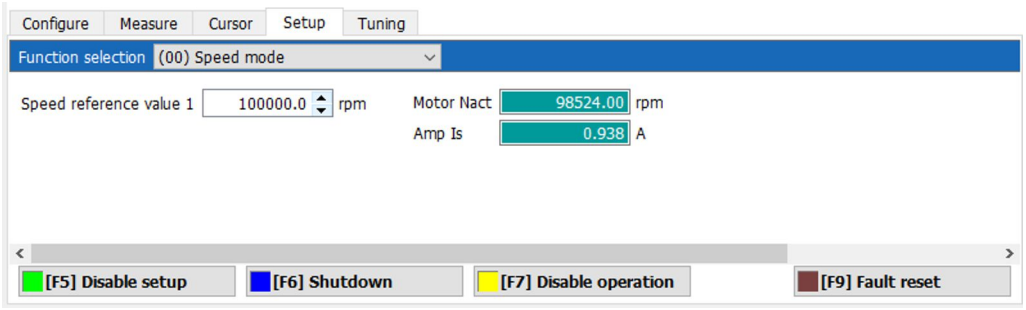


Fig. 41: Setup

The operating elements correspond to those from the setup tool, see chapter 8.8 “Setup”, page 65.

Note

The heartbeat settings from the setup tool are also active here.

8.5.4.5 Tab “Tuning”

Via this tab you can edit some relevant parameters for the drive configuration directly in the scope tool. New values are immediately applied in the parameter set and in the device.

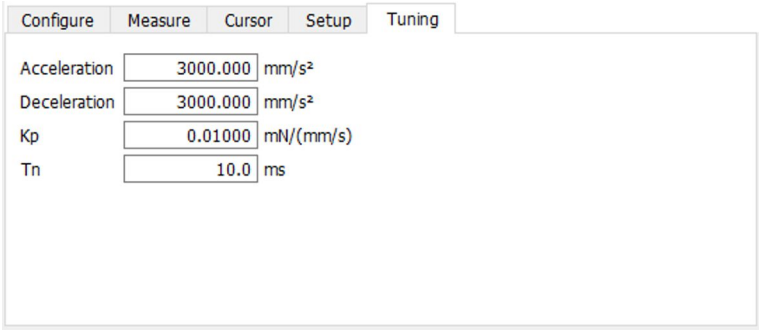


Fig. 42: Tuning

8.5.5 Recording

In this area you can start recording. In addition, the status of the scope tool is displayed here.

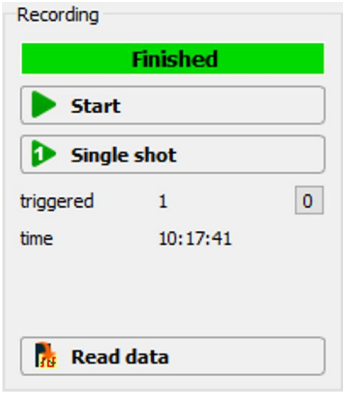


Fig. 43: Recording

Scope status

The status field shows the internal status of the scope tool. The following states may appear:

Idle	Recording is not active and there are no measured values of a previous recording available.
Pre trigger	In the period between start of the recording and the trigger point, data are recorded without the trigger being enabled. This is necessary so that there are always enough measured values before the trigger event.
Waiting for trigger	The trigger is enabled and the measuring data are recorded while waiting for the trigger condition.
Recording data	The trigger condition has fired and the remaining data between the trigger point and the end of recording are being recorded.
Finished	Recording is finished and the measured value are ready for evaluation.
Configuration error	Recording cannot be started because the *drivemaster4* software has generated a faulty scope configuration for the drive. Please, install the current version of the *drivemaster4* software.

Start and stop recording

Single shot	Starts a single recording. After recording, the measured data are displayed and the scope tool switches to the status “Finished”.
Start	Starts a permanent recording. When recording is finished, the measured values are displayed and the next recording is started.
Stop	The current recording is cancelled and the scope tool switches to the status “Idle”.

Trigger counter and last trigger time

This field displays how often the scope tool has triggered until now. The point in time of the last trigger is also indicated. Click the button on the right to reset the counter to 0.

Read available data

Via this button you can display measured data of a finished recording. This is useful, when the recording was not started from your *drivemaster4* software instance but, for example, by the scope auto start.

8.5.6 Measured values

This area displays the measured values of a recording.

Click the button in the action bar to display the measured values in a table:

	Motor Nact [rpm]	Motor Us [V]	Motor Is [A]	Id target [A]	Id act [A]	Amp Vdc [V]
-3.000 [s]	-1943.70	78.1	5.022	0.000	0.008	372.3
-2.970 [s]	-1944.77	77.8	5.017	0.000	-0.033	374.8
-2.940 [s]	-1943.25	77.9	5.034	0.000	-0.080	377.0
-2.910 [s]	-1944.95	77.7	5.010	0.000	0.072	379.3
-2.880 [s]	-1944.39	78.8	5.006	0.000	0.097	372.5
-2.850 [s]	-1942.11	79.5	5.035	0.000	0.000	375.7
-2.820 [s]	-1943.88	78.4	5.029	0.000	-0.006	378.1
-2.790 [s]	-1944.82	77.7	5.016	0.000	-0.023	370.2
-2.760 [s]	-1944.38	78.2	5.026	0.000	-0.071	374.6

Fig. 44: Table view

Click the button in the action bar to switch back to the graphic:

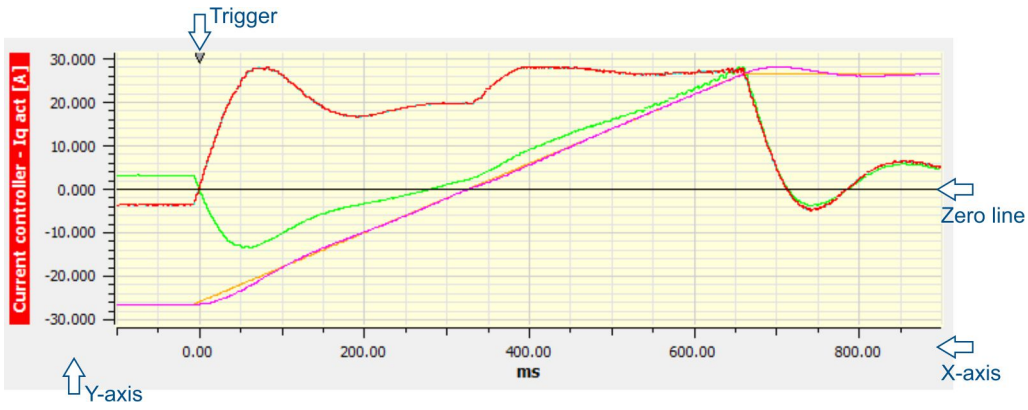


Fig. 45: Graphic view

X-axis with trigger

The X-axis always shows the time. The zero point of the time axis is the trigger point. This is also indicated with a small triangle at the top of the graphic.

Y-axis with active channel

All channels are displayed in the graphic but they do not necessarily have the same scaling. The number of the Y-axis belong to the active channel. To the left of the Y-axis is the name of the active channel with the corresponding background color.

In order to switch the active channel, click with the left mouse button on the desired recording channel above the graphic or in one of the tabs “Configure”, “Measure” or. “Cursor”.

Scaling of the Y-axis

The scaling of the Y-axis depends on different factors. The following basic rules apply:

- All curves have the same zero line on the Y-axis. Here applies:
  - If there are only positive measured values, the zero line is located at the bottom edge.
  - If there are only negative measured values, the zero line is located at the top edge.
  - If there are negative as well as positive measured values, the zero line is located in the middle.
- All curves with the same unit have the same scaling. This way, the reference and the actual value of the speed controller, for example, are scaled the same and you can compare them directly.
- Curves with similar maximum values have the same scaling: Even if 2 curves do not have the same unit, they can have the same scaling. Scope uses the same scaling for curves whose maximum values differ by up to 20 %.

Actions in the graphic

Zoom	*left mouse button + drag* You can zoom the graphic by defining a zoom rectangle. Position the mouse cursor at one corner of the zoom rectangle. Then, press and hold the left mouse button and drag the mouse cursor to the opposite corner. When you release the left mouse button, the marked area is zoomed in.
Reset zoom	*double-click (left mouse button)* Double-click on the graphic to reset the zoom and display the whole recording again.
Reset zoom stepwise	*CTRL + left mouse button* If you have zoomed the graphic several times, you can reset the zoom stepwise. Press and hold the CTRL key and click into the graphic using the left mouse button to reset one zoom step.
Move graphic	*middle mouse button + drag* When you have zoomed the graphic, you can move the displayed part. For this purpose press and hold the middle mouse button and drag the mouse cursor in the desired direction.

8.5.7 Action bar

To the right of the graphic you can find the action bar with several buttons. The following actions are available:

Display the recording as graphic.

Display the recording as table.

Print recording.

The print preview appears. Here you can select the page orientation and your printer.

Save recording to file:

A file selection dialog appears to save the recording. The following file formats are available:

- Scope data file (*.4sdt): The configuration and the measured values are saved.
- PDF file (*.pdf): A PDF file similar to a print-out is created.
- Comma separated values (*.csv): The measured values are written as ASCII file with commas as separators. You can import this file in MS Excel.

Load recording from file:

A scope data file (*.4sdt) is opened. It contains a complete recording with configuration and measured values.

Save configuration to file:

A scope configuration file (*.4scf) is saved. It contains only the current configuration.

Load configuration from file:

A scope configuration file (*.4scf) is opened. It contains a configuration only.

Default configuration:

Via this button you can load some frequently used scope configurations with one click.

8.5.8 Scope Settings

Click on the gear symbol in the device status bar to open the settings dialog. Here you can make global settings for the scope tool. There are two tabs.

Tab “Curves”

Here, you can change the color and the character style of each channel.

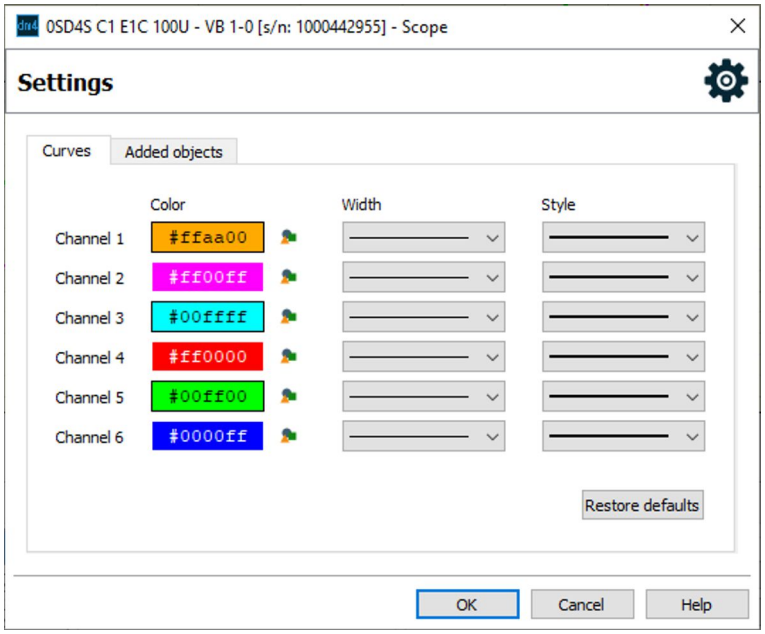


Fig. 46: Scope settings – curves

Click the button to choose a color for the channel.

Via the selection list “Width” you can change the line width. Via the selection list “Style” you can choose another line style.

Tab “Added objects”

Here, you can remove the additional objects that you or another user have added to scope.

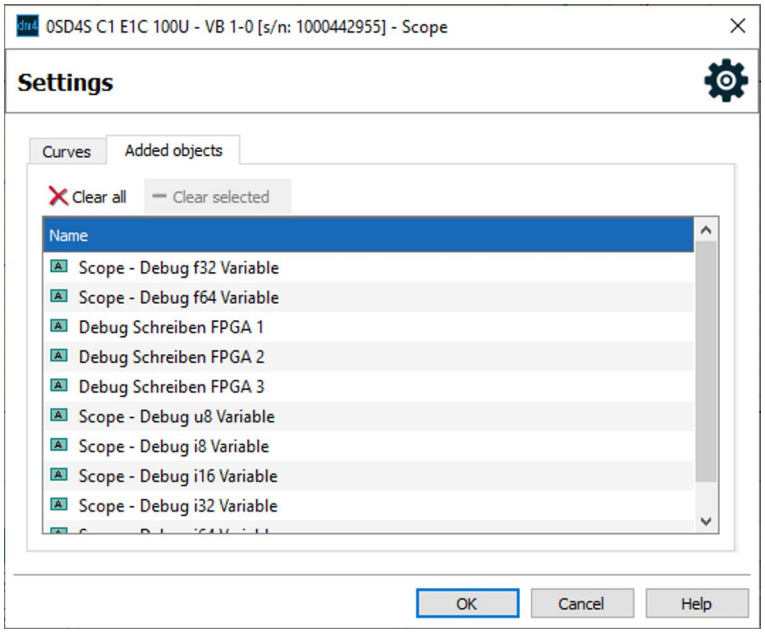


Fig. 47: Scope settings – added objects

Select one or more objects to remove them with the button “Clear selected” from the list. To remove all objects from the list, click the button “Clear all”.

8.6 Fieldbus

The diagnosis page “Fieldbus” logs the bus activities. For each fieldbus system a tab is provided in the top section.

Output window

Each message is displayed as a text line in the output window. If a message is received a second time, this message will be displayed in the same text line. Therefore, the messages in the output window are sorted in order of their first occurrence. New messages are always appended at the bottom of the entries in the output window.

The *drivemaster4* software can interpret some messages and displays there content in detail. These messages are marked with an arrow symbol at the left border of the output window.

The following messages are displayed:

- messages that were addressed to the drive and received by the drive as valid
- broadcast messages that were recognized as valid
- all messages sent by the drive

Messages that were not addressed to the drive or invalid messages are not displayed.

Clear

You can clear the output window by click on the button “Clear”. Afterwards, logging the detected messages is restarted.

Status display

If the selected bus system has a status, it is displayed in the lower part of the page.

8.6.1 CANopen Diagnosis

The following figure shows the logged telegrams on the CANopen diagnosis page. These are the PDO and SDO telegrams as well as the EMCY and NMT commands with their IDs and the last transmitted data. For the PDOs and SDOs the data content is listed in detail.

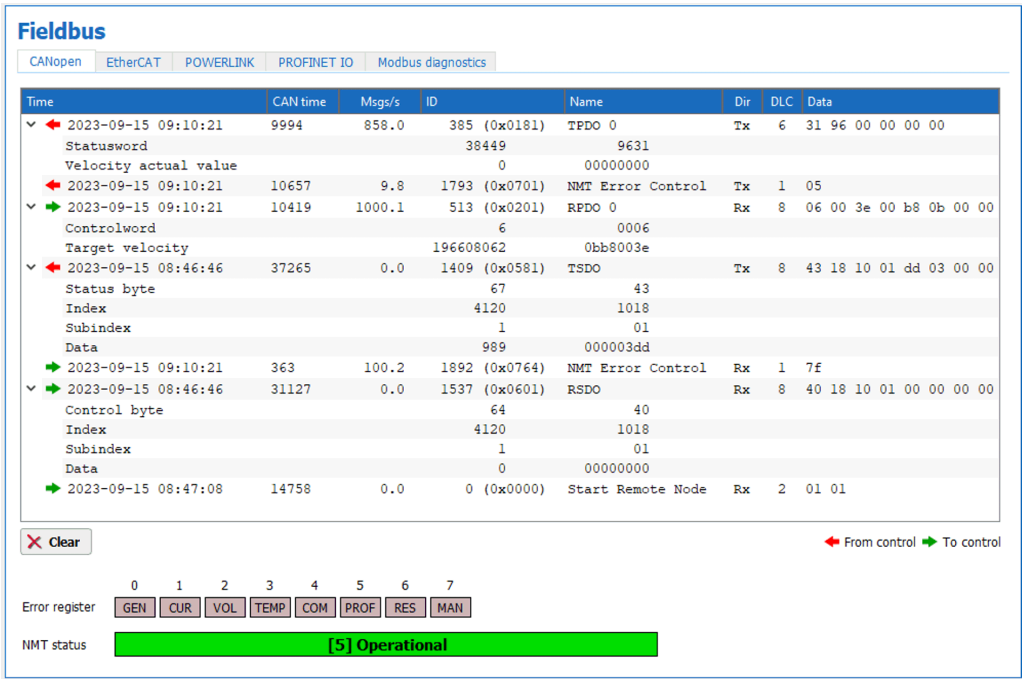


Fig. 48: Diagnosis page for CANopen

Output window

The output window displays all telegrams sent by the drive. Received telegrams are displayed when they were addressed to the drive or when they are broadcast messages. All telegrams addressed to other nodes in the CAN bus network are not displayed.

For the telegrams the following information is displayed in the output window:

Time System time of the drive when the telegram was received/transmitted: The time has a resolution of 1 second. With this information you can find out, if a telegram was not sent or received over a longer period of time.

CAN time CAN bus timer for Tx and Rx frames:
This value indicates the point in time when the beginning of the identifier field appeared on the CAN bus. The resolution is in µs as 16-bit counter. With the CAN time you can find out the order, in which two different telegrams were sent or received.

Msgs/s Number of sent or received telegrams per second

ID CAN ID of the telegram in decimal and hexadecimal format

Name Name or meaning of the CAN telegram

Dir telegram direction from the point of view of the drive:

- Rx: telegram was received by the drive.
- Tx: telegram was sent by the drive.

DLC Data Length Code – number of user data bytes in the telegram

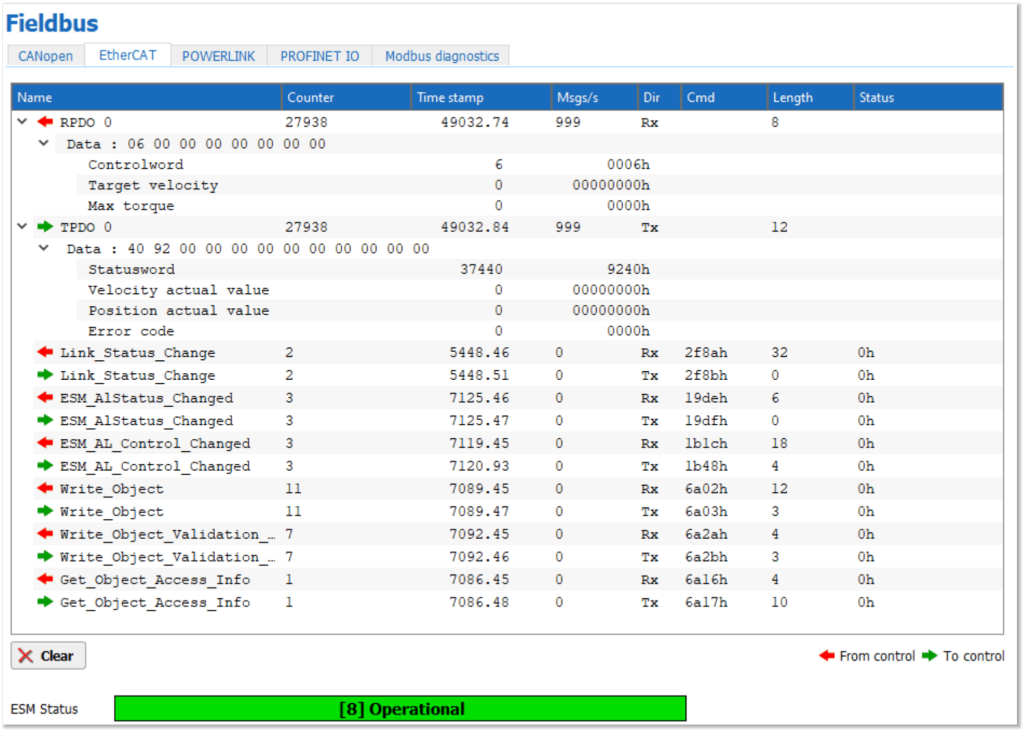
Data	Data of the telegram: If the *drivemaster4* software knows the data structure, it displays the interpreted data in the text lines below.

NMT status

This field displays the operational status of the bus system. The CAN bus can have the following states: Initialization, Pre-Operational, Operational and Stopped.

8.6.2 EtherCAT Diagnosis

The following figure shows the logged telegrams on the EtherCAT diagnosis page.



Name	Counter	Time stamp	Msgs/s	Dir	Cmd	Length	Status
RPDO 0	27938	49032.74	999	Rx		8	
Data : 06 00 00 00 00 00 00 00							
Controlword		6		0006h			
Target velocity		0		00000000h			
Max torque		0		0000h			
TPDO 0	27938	49032.84	999	Tx		12	
Data : 40 92 00 00 00 00 00 00 00 00 00 00							
Statusword		37440		9240h			
Velocity actual value		0		00000000h			
Position actual value		0		00000000h			
Error code		0		0000h			
Link_Status_Change	2	5448.46	0	Rx	2f8ah	32	0h
Link_Status_Change	2	5448.51	0	Tx	2f8bh	0	0h
ESM_AlStatus_Changed	3	7125.46	0	Rx	19deh	6	0h
ESM_AlStatus_Changed	3	7125.47	0	Tx	19dfh	0	0h
ESM_AL_Control_Changed	3	7119.45	0	Rx	1b1ch	18	0h
ESM_AL_Control_Changed	3	7120.93	0	Tx	1b48h	4	0h
Write_Object	11	7089.45	0	Rx	6a02h	12	0h
Write_Object	11	7089.47	0	Tx	6a03h	3	0h
Write_Object_Validation_...	7	7092.45	0	Rx	6a2ah	4	0h
Write_Object_Validation_...	7	7092.46	0	Tx	6a2bh	3	0h
Get_Object_Access_Info	1	7086.45	0	Rx	6a16h	4	0h
Get_Object_Access_Info	1	7086.48	0	Tx	6a17h	10	0h

Fig. 49: EtherCAT bus activities

Output window

You can unfold the lines of the cyclic telegrams RPDO x and TPDO x to see their individual parameterized objects.

The acyclic telegrams are displayed in pairs as request and response telegram. User data are not displayed because more than 1000 bytes could be transmitted here and therefore the readability would be lost.

The following information is displayed in the output window for the telegrams:

Name	telegram name
Counter	counter of telegram frequency
Timestamp	drive-internal time stamp
Msgs/s	number of sent telegrams per second

Dir	telegram direction from the point of view of the drive: ▸ Rx: telegram was received by the drive. ▸ Tx: telegram was sent by the drive.

Additional information for acyclic telegrams:

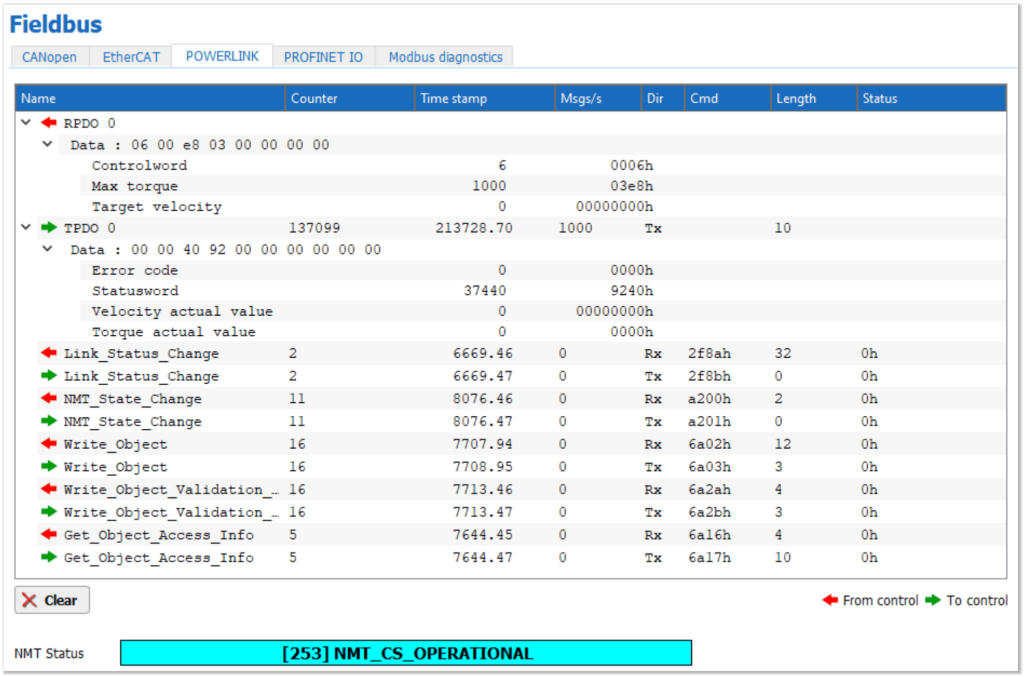
cmd	command number of acyclic telegram
Length	length of telegram in bytes
Status	error status for the execution of the command

ESM status

This field indicates the status of the EtherCAT state machine. The following states are possible: Init, Pre-Operational, Bootstrap, Safe-Operational, Operational.

8.6.3 POWERLINK Diagnosis

The following figure shows the logged telegrams on the POWERLINK diagnosis page.



Name	Counter	Time stamp	Msgs/s	Dir	Cmd	Length	Status
RPDO 0							
Data : 06 00 e8 03 00 00 00 00							
Controlword		6	0006h				
Max torque		1000	03e8h				
Target velocity		0	00000000h				
TPDO 0	137099	213728.70	1000	Tx		10	
Data : 00 00 40 92 00 00 00 00 00 00							
Error code		0	0000h				
Statusword		37440	9240h				
Velocity actual value		0	00000000h				
Torque actual value		0	0000h				
Link_Status_Change	2	6669.46	0	Rx	2f8ah	32	0h
Link_Status_Change	2	6669.47	0	Tx	2f8bh	0	0h
NMT_State_Change	11	8076.46	0	Rx	a200h	2	0h
NMT_State_Change	11	8076.47	0	Tx	a201h	0	0h
Write_Object	16	7707.94	0	Rx	6a02h	12	0h
Write_Object	16	7708.95	0	Tx	6a03h	3	0h
Write_Object_Validation_...	16	7713.46	0	Rx	6a2ah	4	0h
Write_Object_Validation_...	16	7713.47	0	Tx	6a2bh	3	0h
Get_Object_Access_Info	5	7644.45	0	Rx	6a16h	4	0h
Get_Object_Access_Info	5	7644.47	0	Tx	6a17h	10	0h

Fig. 50: POWERLINK bus activities

Output window

You can unfold the lines of the cyclic telegrams RPDO x and TPDO x to see their individual parameterized objects.

The acyclic telegrams are displayed in pairs as request and response telegram. User data are not displayed because more than 1000 bytes could be transmitted here and therefore the readability would be lost.

The following information is displayed in the output window for the telegrams:

Name	telegram name
Counter	counter of telegram frequency

Timestamp	drive-internal time stamp
Msgs/s	number of sent telegrams per second
Dir	telegram direction from the point of view of the drive: ▸ Rx: telegram was received by the drive. ▸ Tx: telegram was sent by the drive.

Additional information for acyclic telegrams:

cmd	command number of acyclic telegram
Length	length of telegram in bytes
Status	error status for the execution of the command

NMT status

This field displays the NMT status (POWERLINK communication status). The following states are possible:

- NMT_GS_OFF
- NMT_GS_INITIALISATION
- NMT_CS_NOT_ACTIVE
- NMT_CS_PRE_OPERATIONAL_1
- NMT_CS_PRE_OPERATIONAL_2
- NMT_CS_READY_TO_OPERATE
- NMT_CS_OPERATIONAL
- NMT_CS_STOPPED
- NMT_CS_BASIC_ETHERNET

8.6.4 PROFINET IO diagnosis

The following figure shows the logged telegrams on the PROFINET IO diagnosis page.

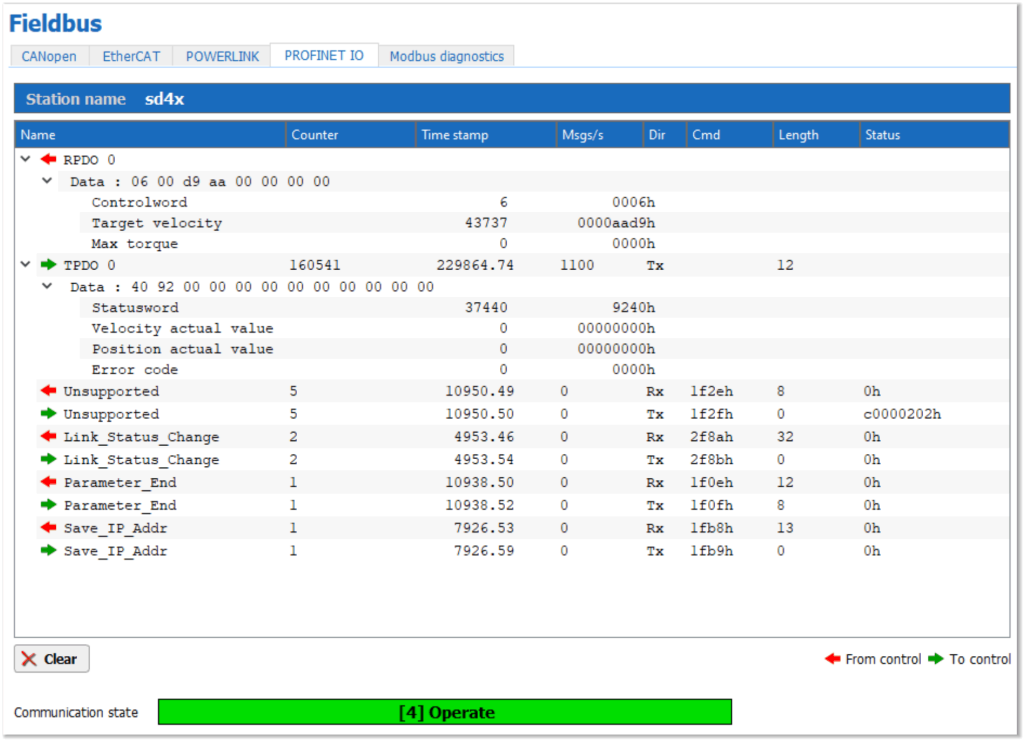


Fig. 51: PROFINET IO bus activities

Station name

The top line indicates the PROFINET IO station name.

Output window

You can unfold the lines of the cyclic telegrams RPDO x and TPDO x to see their individual parameterized objects.

The acyclic telegrams are displayed in pairs as request and response telegram. User data are not displayed because more than 1000 bytes could be transmitted here and therefore the readability would be lost.

The following information is displayed in the output window for the telegrams:

Name	telegram name
Counter	counter of telegram frequency
Timestamp	drive-internal time stamp
Msgs/s	number of sent telegrams per second
Dir	telegram direction from the point of view of the drive: ▸ Rx: telegram was received by the drive. ▸ Tx: telegram was sent by the drive.

Additional information for acyclic telegrams:

cmd	command number of acyclic telegram

Length	length of telegram in bytes
Status	error status for the execution of the command

Communication state

This field displays the communication status of the bus system. The following states are possible: Unknown, Offline, Stop, Idle and Operate.

Diagnostic data

In addition, the IP configuration as well as diagnostic data are displayed on the right side of the PROFINET IO diagnosis page.

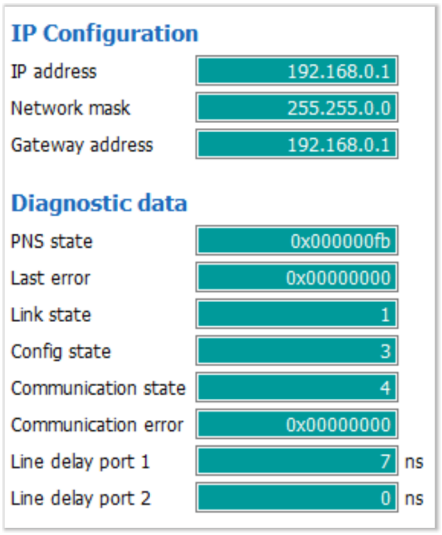


Fig. 52: IP configuration and diagnostic data

8.6.5 Modbus diagnostics

The diagnosis page for the Modbus communication displays for Modbus RTU and Modbus TCP the last command processed by the SD4x drive for each implemented Modbus function.

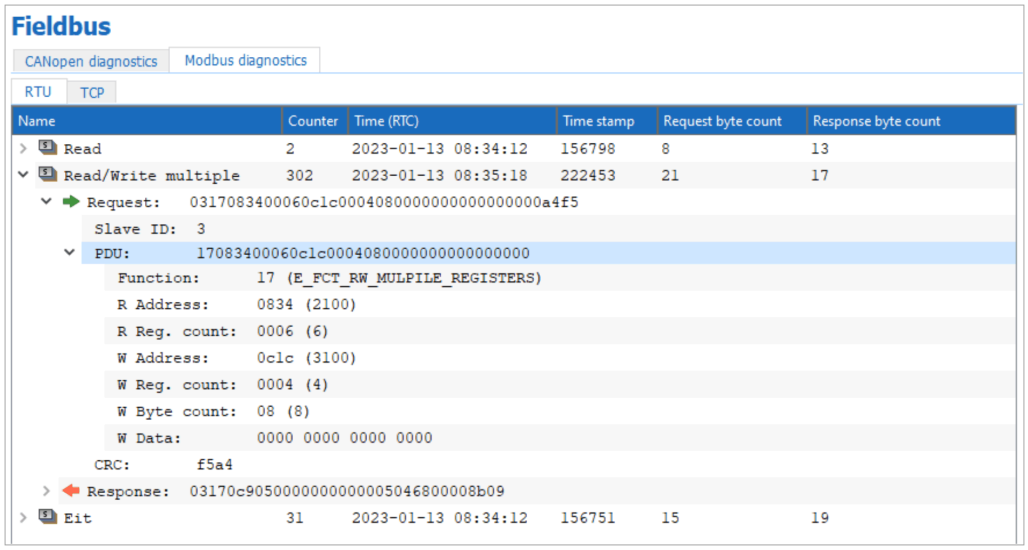


Fig. 53: Modbus bus activities (example of Modbus RTU)

You can unfold each command to see more details. If a certain command was not processed yet since starting the SD4x drive, this line is not displayed

Output window

The following information is displayed in the output window for the commands:

Name		Short name of the Modbus function
Counter		Number of commands of this type that were processed by the drive
Time (RTC)		Time (when the real time clock is set)
Timestamp		drive-internal time stamp
Request count	**byte**	Length of the request in bytes
Response count	**byte**	Length of the response in bytes

Diagnostic counters

In addition, RTU and TCP diagnostic counters are displayed on the right side of the Modbus diagnosis page.

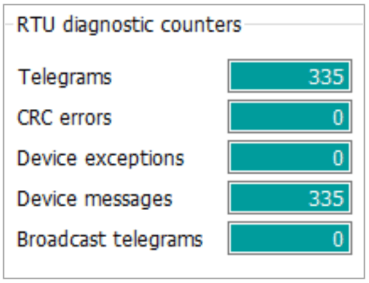


Fig. 54: RTU diagnostic counters

With Modbus RTU these are the same counters the master can request using the function “FC 08 Diagnostics”.

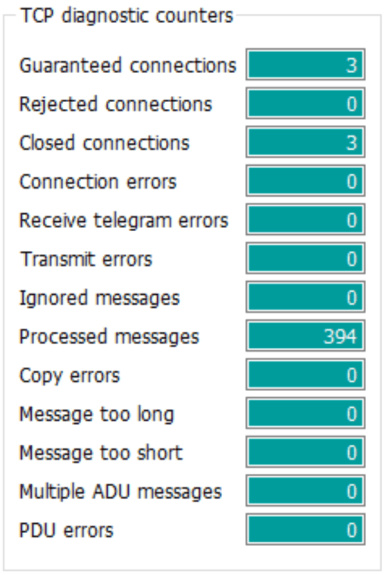


Fig. 55: TCP diagnostic counters

8.7 Object Browser

The object browser is a debug and diagnosis tool with access to the device-internal parameters and states in the device. These individual objects are combined and saved in a device-dependent object dictionary and are subject to different access rights according to the device status.

The object browser displays all visible objects of the selected drive in a table. The individual objects organized in appropriate categories:

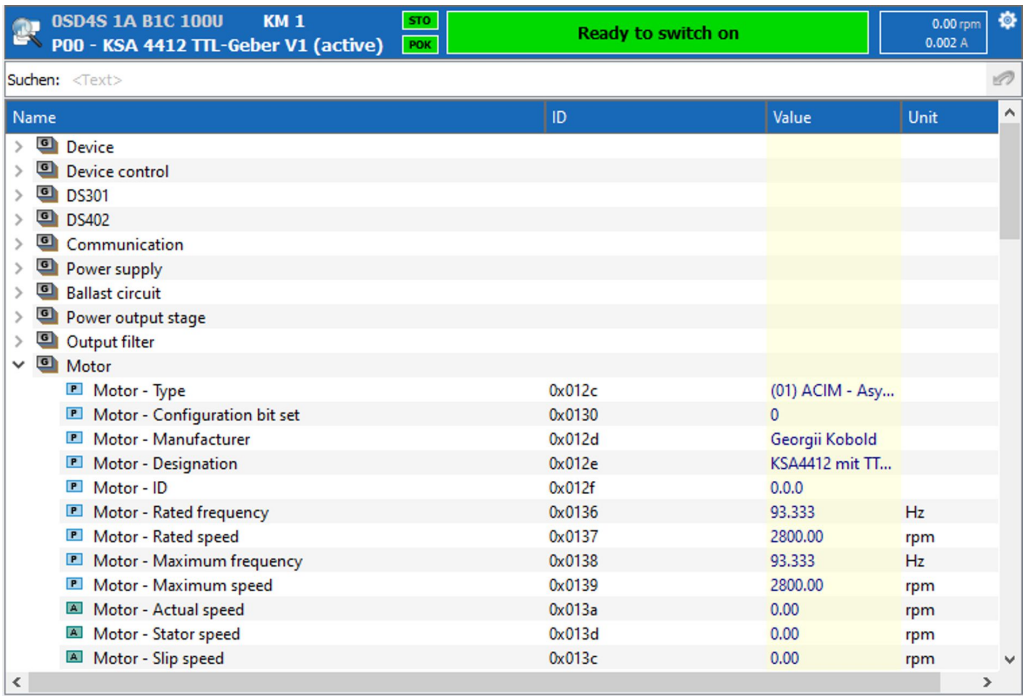


Fig. 56: Object browser

All objects listed in the object browser are read permanently and the current values (contents) are displayed. The reading of the objects is only terminated when the object browser is closed.

There are 4 types of objects:

- actual values A
- parameters P
- data base D
- objects O

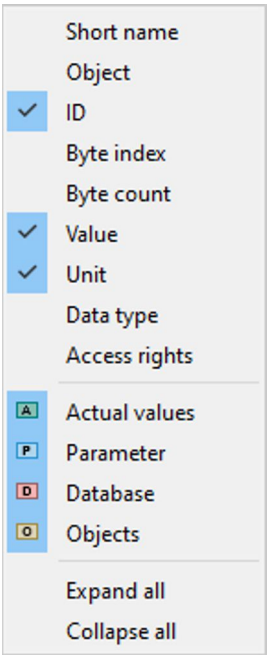
You can edit parameters and objects only. Actual values amd database objects are only displayed. When you rest the mouse pointer briefly on an object, a tooltip with the object details appears.

8.7.1 Find

Via the input field “Find:” you can search for an object. The software searches in the following columns: name, short name, object, ID and unit. However, only the columns that are shown are taken into account. Click on the button to the right to reset the search.

8.7.2 Columns and Details

Right-click into the header of the object table to display the following context menu.



1. In the top area you can show or hide the following object details:
   - **Short name:** short name of the object (used, for example, on the parameter and diagnosis pages of the *drivemaster4* software)
   - **Object:** internal name of the object
   - **ID:** identification number of the object
   - **Byte index:** index within the value
   - **Byte count:** number of used bytes
   - **Value:** current value
   - **Unit:** current unit
   - **Data type:** data type of the value
   - **Access rights:** access rights displayed as code
2. The area with the object types (actual values, parameters, database, objects) is a filter. Select only the object types that you want to see.
3. In the bottom area you can expand or collapse the nodes in the object tree. (This area is only available in the column “Name”.)

Column “ID”

In the column ID “ID” you can switch between a decimal and a hexadecimal representation.

Column “Value”

In the column “Value” you can open the following settings dialog via the last entry in the context menu:

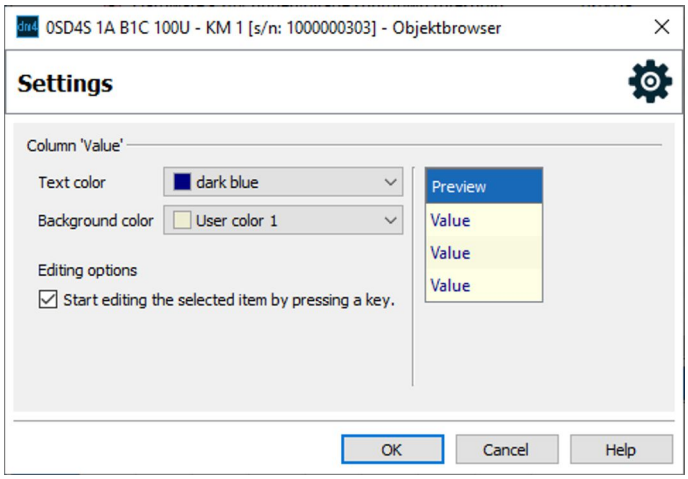


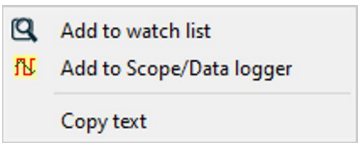
Fig. 57: Settings dialog for object values

Use the selection lists to change the background color and the text color for the value column.

If the checkbox below these is activated, you can change values directly. If not, you must double-click on a value to enable editing.

8.7.3 Context Menu of an Object

When you right-click on an object, the following context menu appears:



- **Add to watch list:** Adds the current object to the watch list (p. 27).
- **Add to scope/data logger:** Adds the current object to the diagnosis tools scope (p. 42) and data logger (p. 70).
- **Copy text:** Copies the name of the current object to the clipboard.

8.7.4 Change Values

Changing object values is restricted by the object variant and the device status. Click on an editable value to change it. Depending on your settings, you may have to double-click on the value to enable editing (see context menu value column (p. 63)).

For arrays, characteristic curves and CANopen objects, a double-click opens an editor in the bottom of the page. There, you can see the individual values and edit a value on double-click.

8.7.5 Settings in the Object Browser

Click on the gear symbol in the device status bar to open the following settings dialog of the object browser.

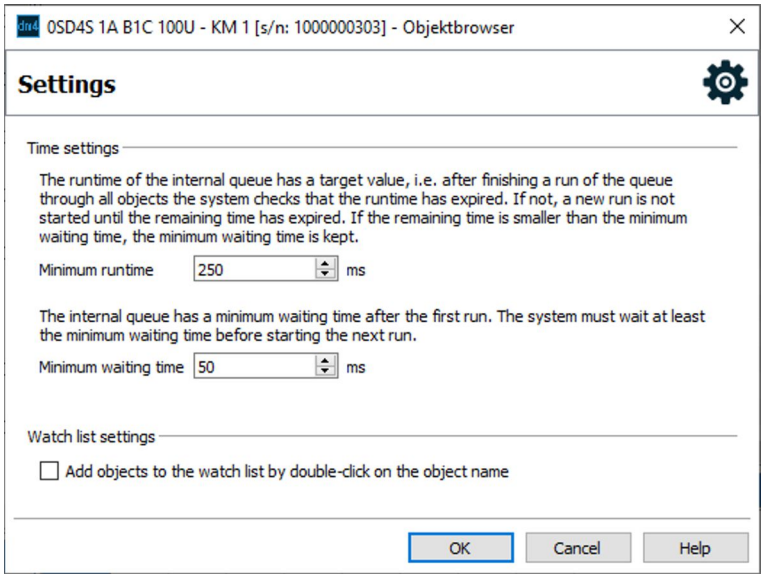


Fig. 58: Object browser settings

By means of the time settings you can control the reading speed and thus the data amount. For this purpose you can change the minimum processing time for a run through all objects and the minimum waiting time between two runs.

Via the checkbox below you can define that objects are applied to the watch list (p. 27) simply on double-click.

8.8 Setup

The setup tool provides functions for initial operation of the drive.

Note

When you position the drive via setup tool, keep in mind that the drive receives its commands from the PC now. That means, in case of an unexpected malfunction of the setup software, a movement started by the PC can not be stopped anymore.

In the setup tool, the user interface is divided into 4 areas:

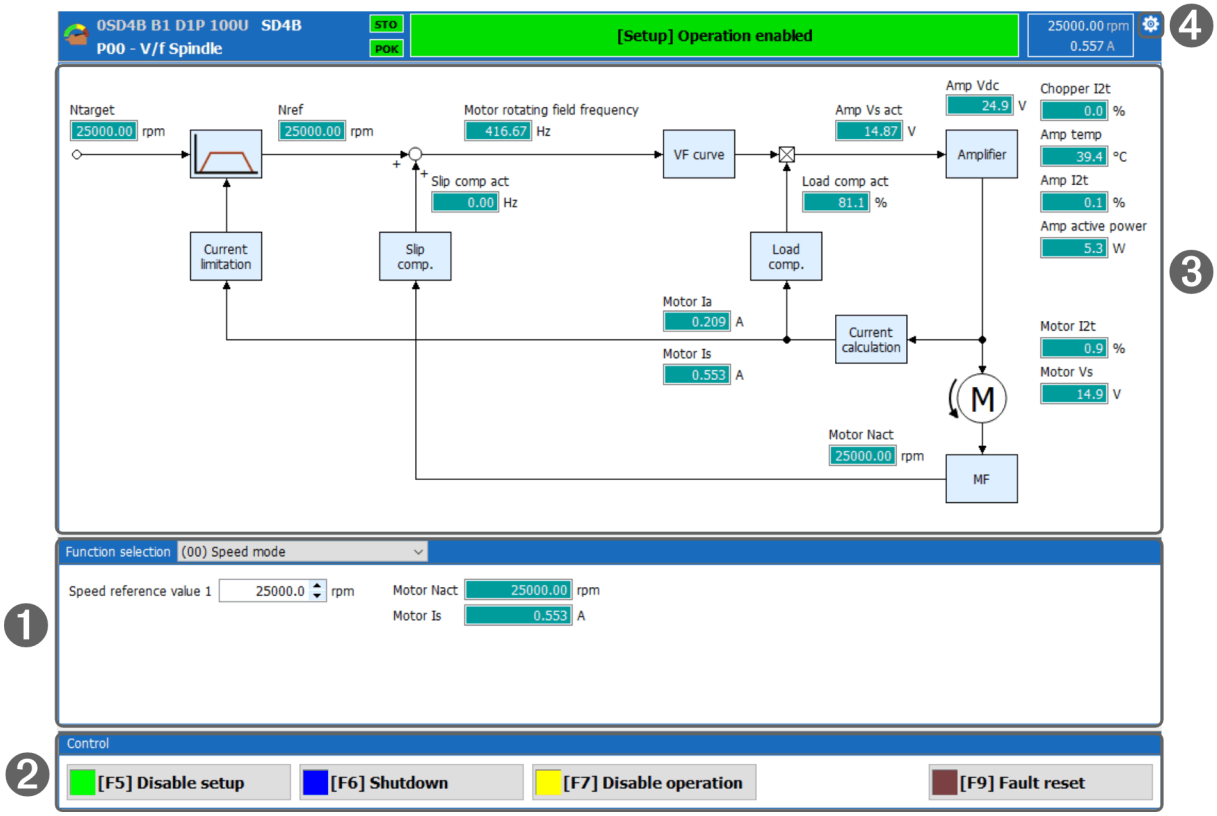


Fig. 59: Setup

[1] Function selection (p. 65)

[2] Control (p. 67)

[3] Display of the most important actual drive values

[4] Settings (p. 68)

8.8.1 Function Selection

In this area you select the function to be executed:

- (00) Speed mode
- (01) Reversing mode
- (02) Speed step mode
- (03) DC current mode
- (04) AC current mode

Note

You can edit the input fields as soon as the connection to the device is made (online mode) and the drive setup is active (click the button “Enable setup”).

Speed mode

This function allows operating the motor with the entered speed.

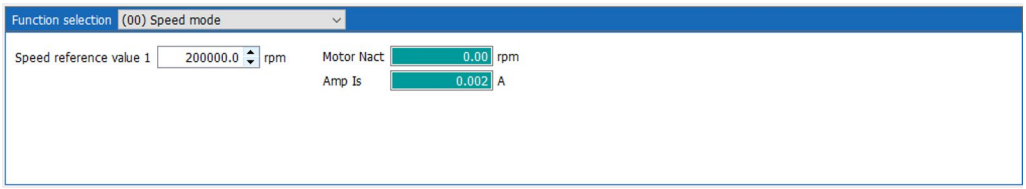


Fig. 60: Speed mode

In addition, the actual speed and the actual current are displayed to illustrate the current process.

You can change the speed reference value during operation. The new value is active immediately. For synchronous motors, you can additionally set a torque limitation.

Reversing mode

This function allows operating the motor cyclically with 2 speed reference values. The respective speed value is used for the specified time period.

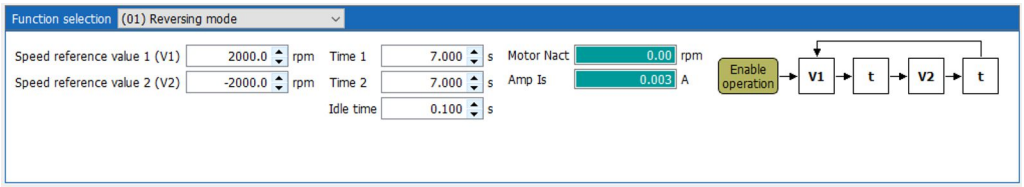


Fig. 61: Reversing mode

In addition, the actual speed and the actual current are displayed to illustrate the current process.

Sequence:

At first, the motor is driven with speed reference value 1 (V1) for the time 1. This is followed by the idle time (t) with speed 0 (if t = 0, there is no idle time). Then, the motor is driven with the speed reference value 2 (V2) for the time 2, followed again by the idle time (t). This cycle is repeated continuously.

Speed step mode

This function allows operating the motor with the entered speed for the entered time.

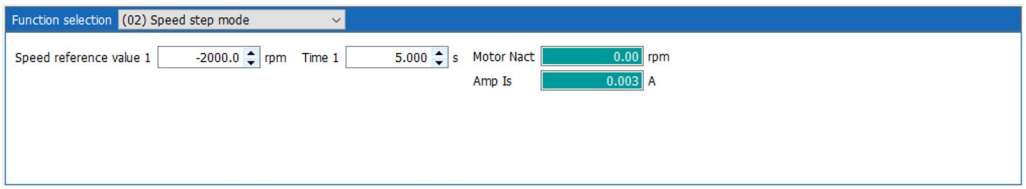


Fig. 62: Speed step mode

In addition, the actual speed and the actual current are displayed to illustrate the current process.

DC current mode

This function allows supplying the connected motor phase-dependent with a entered DC current.

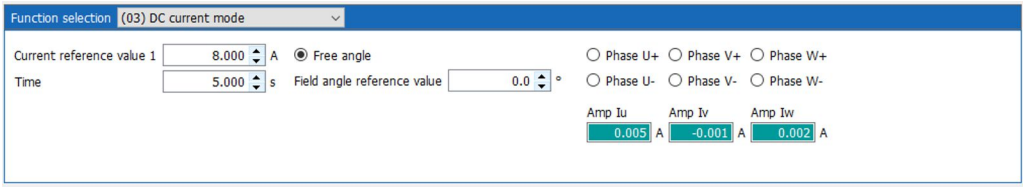


Fig. 63: DC current mode

In addition, the actual currents of the phases are displayed to illustrate the current process.

AC current mode

This function allows operating the motor cyclically with 2 current reference values and a specified speed. The respective current value is used for the specified time period.

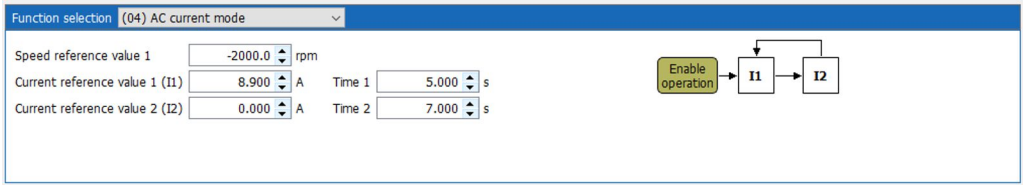


Fig. 64: AC current mode

The test function “AC current mode” is not suitable for motor operation but used for testing the power output stage with an inductive load.

Sequence:

At first, the motor is driven with current reference value 1 (I1) for the time 1. Then, the motor is driven with current reference value 2 (I2) for the time 2. This cycle is repeated continuously.

8.8.2 Control

Via the buttons in this section you can control the device via the setup tool. As an alternative, you can use the corresponding function keys indicated in the brackets.

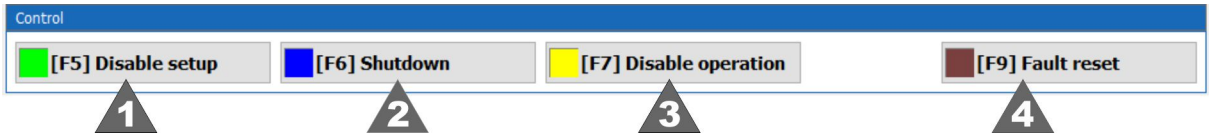


Fig. 65: Control

[1] Enable setup / Disable setup (F5)

[2] Switch on / Shutdown (F6)

[3] Enable operation / Disable operation (F7)

[4] Fault reset (F9)

Enable setup (F5)

It is necessary to activate the setup in the device to use the drive setup tool. Then, the drive does not receive its commands from a control system or a field bus anymore but from the software.

Disable setup (F5)

The control is returned from the PC/Software.

Switch on (F6)

“Switch on” means that current is supplied to the connected motor. You can switch on the drive via this button as soon as the drive setup is activated and no error occurred.

Shutdown (F6)

“Shutdown” means that the motor is not supplied with current anymore.

Enable operation (F7)

This button enables the selected function and the entered values in the drive. The function is executed now.

Note

You can stop the test anytime by click on the button in the tool bar. Then, the power output stage of the drive is switched off immediately. As an alternative, you can also press the ESC key.

Disable operation (F7)

This button disables the current function in the drive. The function is stopped now.

Fault reset (F9)

This button can only be used when there is an error in the device. As soon as this error is removed, it is saved and can be reset by click on the button “Fault reset”.

8.8.3 Settings in the Setup Tool

Click on the gear symbol in the device status bar to open the settings dialog for the setup tool.

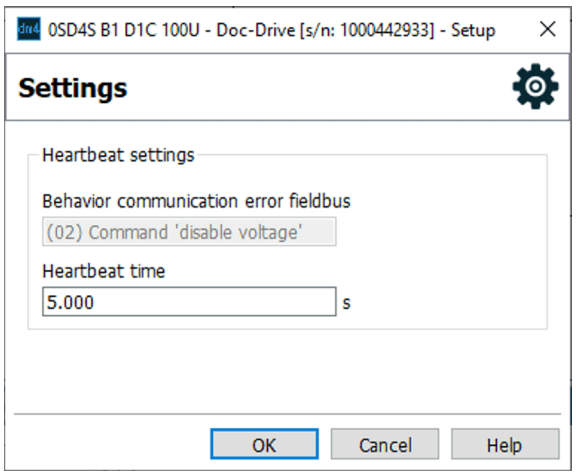


Fig. 66: Heartbeat settings

Here, you can set the time for heartbeat monitoring of the drive. By means of heartbeat monitoring, the drive detects whether the setup tool is still active or not. If the drive does not receive heartbeat messages within the set heartbeat time from the setup tool, it switches over to the corresponding fault status. This can prevent damage, which might be caused when the motor moves but the communication between drive and software is interrupted. In this case, the user has no access to the drive from the software anymore.

Whether heartbeat monitoring is active or not depends on the setting “Behavior communication error fieldbus”. You can define that on the parameter page “Drive control” or via object 87. If you select the value “(00) No reaction”, heartbeat monitoring is deactivated. All other values activate heartbeat monitoring.

When heartbeat monitoring is activated, you can edit the field for the heartbeat time. The default value for the heartbeat time is 5 s.

8.9 Data Logger

Using the data logger tool you can record and document up to 8 objects of one or more devices over a longer period of time.

To open the data logger select the top node in the project tree. Then, you will find the data logger in the device tree under the node “Tools/Diagnosis”. In the data logger tool, the user interface is divided into 3 areas:

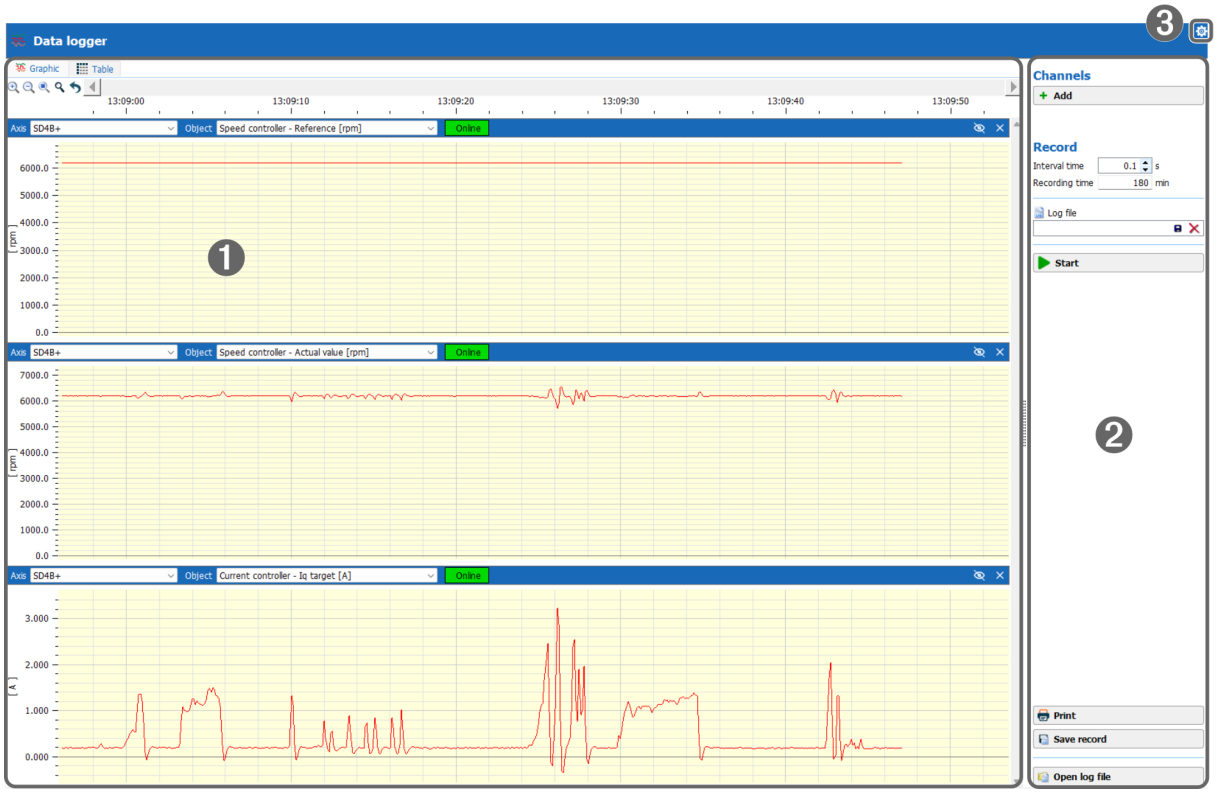


Fig. 67: Data logger

[1] Recording (p. 70)

[2] Actions (p. 71)

[3] Settings (p. 72)

8.9.1 Recording

A graphic displays 600 values across the visible length. If the curve reaches the right end of the graphic, the time axis is automatically scrolled forward.

Select axis and object

With the selection list “Axis” above each diagram you select the desired device axis in the project at first. Then, use the selection list “Object” to select the object to be recorded.

Initially, the object list contains a preselection of objects. If you want to record other objects, you can add these in the selection list. For this purpose you must navigate to the page with the desired object. Then, open the context menu of the object (right-click on displayed value) and select the entry “Add to scope/data logger”.

Table view

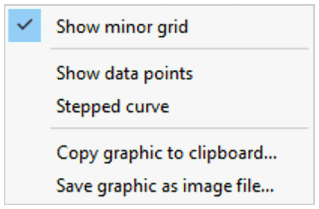
After setting the objects to be recorded, you can switch between the graphic view and the table view using the tabs in the top.

Remove graphic

In order to remove a graphic from the user interface, click the close button (X) in the top right corner of the according graphic.

Context menu

A right-click on a graphic opens a context menu with the following options:

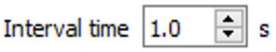


- **Show minor grid:** Displays the small grid in the graphic.
- **Show data points:** Shows the individual data points in the curve.
- **Stepped curve:** Activates a stepped view of the curve.
- **Copy graphic to clipboard...:** Copies the current curve to the clipboard.
- **Save graphic as image...:** Opens a dialog to save the current curve as image file (*.bmp).

8.9.2 Actions

The following buttons and actions are available in the action area.

Adds a graphic in the user interface. You can add up to 7 graphics below the first.



The interval time specifies the time between two values. You can set a value in the range between 0.1 s and 100 s. When you change the interval time, the recorded curves in all graphics are cleared and restarted.

If you have no log file specified, the value indicated here is the maximum recording time. This value cannot be changed.

In the section “Log file” you can log the data. Click the symbol and enter a name and a target directory for the log file.

The data are saved in ASCII format (measured values are divided by the tab character ASCII: 0x09). Click the button “Start” to start the data logging and click “Stop” to stop the data logging.

Click the button to delete the log file in the user interface; the file remains in the file system.

Starts the recording. If the graphics still show curves from the previous recording, they are cleared at first.

Stops the recording.

Print	Opens the printer dialog to print all graphics with the current curves. Select the page orientation and your printer in the print preview.
Save record	Saves all graphics with the current curves (file extension *.log or *.csv).
Open log file	Opens a saved recording (file extension *.log or *.csv) in the dialog “File viewer”. There you can analyze and print the recording as graphic or table just like in the data logger.

8.9.3 Settings in the Data Logger

Click on the gear symbol in the device status bar to open the settings dialog. Here you can make global settings for the data logger tool. There are two tabs.

Tab “Colors”

Here you can change the colors of the graphics.

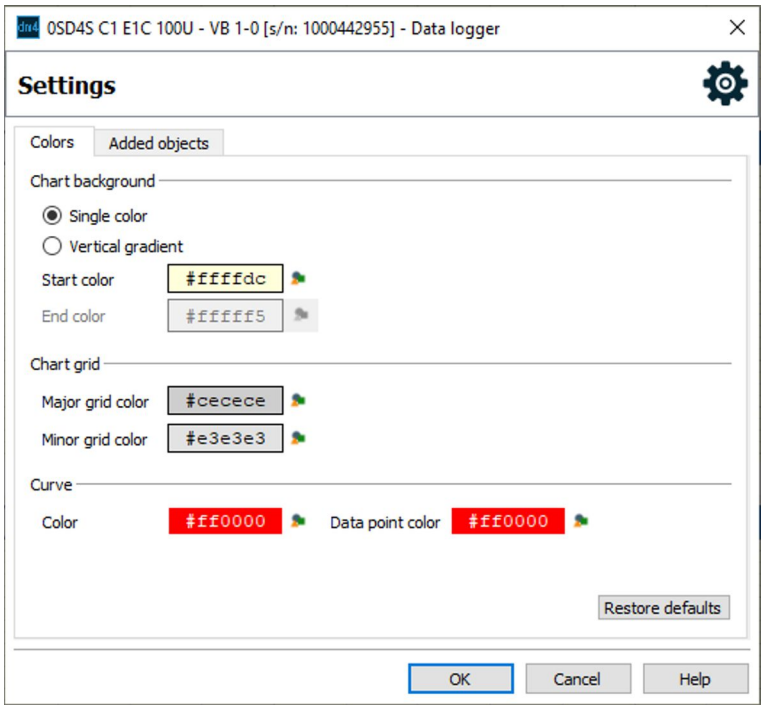


Fig. 68: Data logger settings – colors

Via the radio buttons in the top you can define a color gradient for the graphic background.

Click the button to change a color.

Tab “Added objects”

Here, you can remove the additional objects that you or another user have added to the data logger.

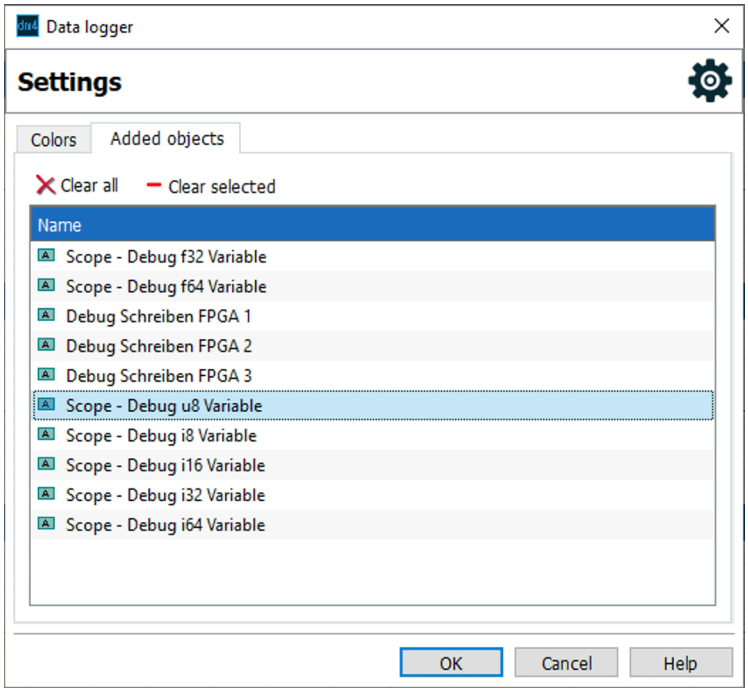


Fig. 69: Data logger settings – added objects

Select one or more objects to remove them with the button “Clear selected” from the list. To remove all objects from the list, click the button “Clear all”.

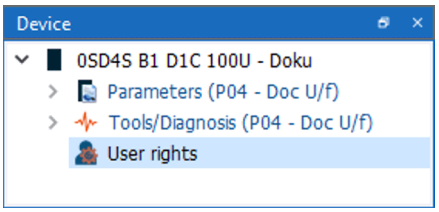
9 User Rights

With the software *drivemaster4* you can define passwords for different user groups and assign corresponding access rights. This way, you can protect specific functions (e.g. changing parameters) against unauthorized access. The passwords apply to the whole device and therefore to all parameter sets.

Note

On delivery, no passwords are assigned in the drives or in the software *drivemaster4*.

Switch to the page “User rights” in the device tree to define the passwords and access rights.



9.1 Assign User Rights

On the page “User rights” you can define passwords and access rights and create a user hierarchy with up to 3 user levels:

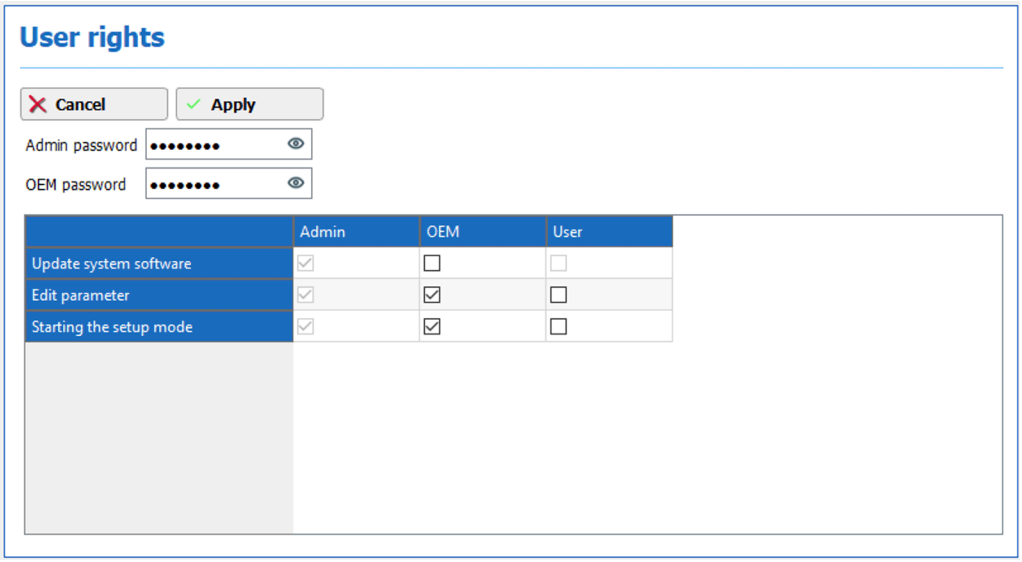


Fig. 70: Page "User rights"

The software provides the following 3 user levels:

User level	Description	Password
Admin	User with all predetermined access rights	Password with max. 8 characters
OEM	User with changeable access rights	Password with max. 8 characters
User	User with changeable access rights	No password

Consider the following items when assigning passwords:

- The password of the OEM level can only be assigned when you have already defined a password for the Admin level.
- The passwords of the OEM and the Admin levels must be different.
- If no password is assigned (i.e. the input field is left empty), the respective user level is not protected by password and the user automatically attains this user level.

If passwords are assigned, the following applies: When you are logged in as Admin, you can change the rights and passwords of all users. As OEM, you can change the rights of the User and your own password. As User, this page is write-protected.

9.2 Switch User Level

After starting the software *drivemaster4*, the user is logged in the currently lowest user level defined for the device.

Via this tool bar button you can switch the current user level any time.
The function is also available in the menu “Settings → User level”.

One click on the button calls the dialog “Login”:

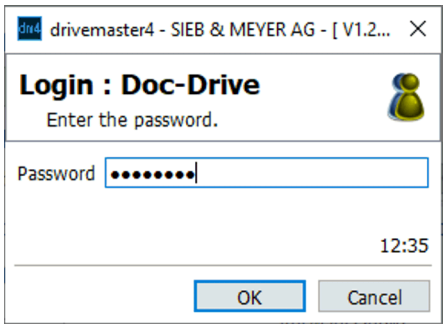
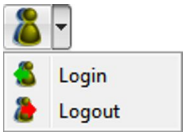


Fig. 71: Login dialog

Enter the password of the desired user level. If the password is correct, the software switches to the according user level.

When you expand the user level button in the tool bar via the arrow, a menu with the following items opens:

- Login: Opens the login dialog.
- Logout: Software switches to the lowest user level (=User).



The status bar indicates the current user level:

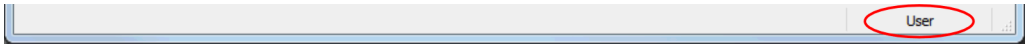


Fig. 72: Status bar of the software drivemaster4

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