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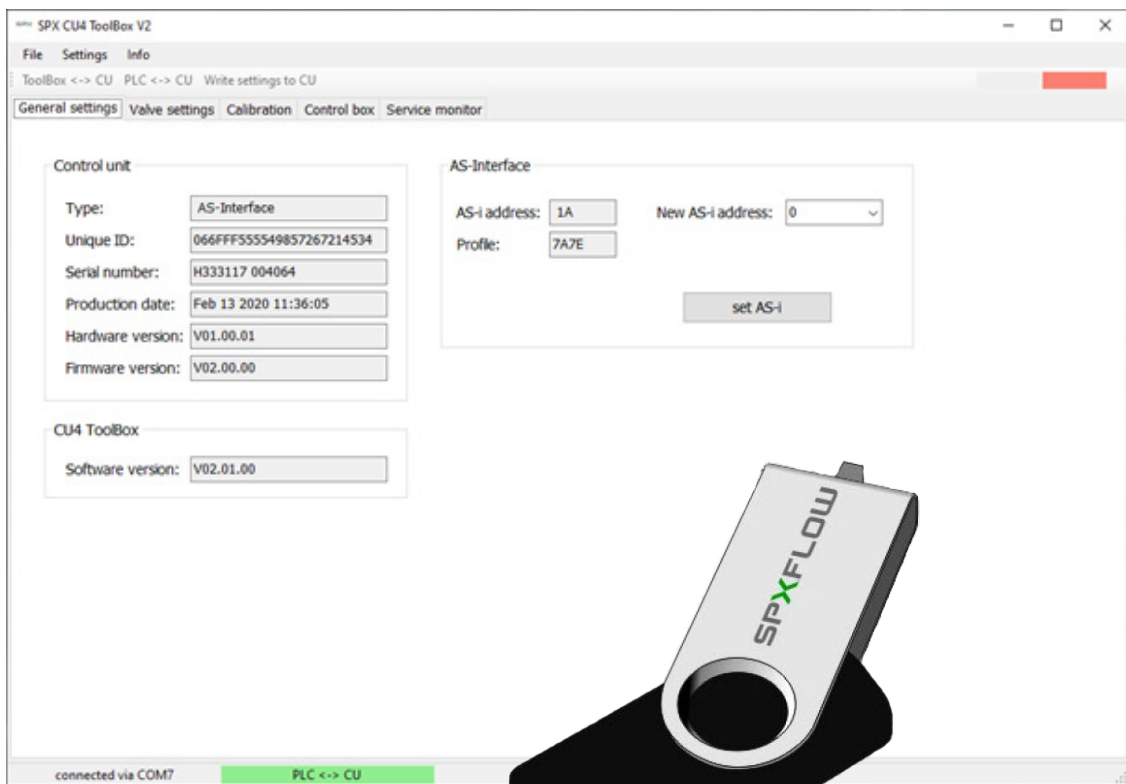
ToolBox Service & Maintenance
Software for Control Unit CU4plus AS-interface / Direct Connect

CONTROL PROGRAM FOR WINDOWS® OPERATING SYSTEMS

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.

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CU4plus_ToolBox_V2

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Content

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References:

[1]   Instruction Manual CU4plus AS-interface control unit

[2]   Instruction Manual CU4plus Direct Connect control unit

READ AND UNDERSTAND THIS MANUAL PRIOR TO USING
THE SERVICE AND MAINTENANCE SOFTWARE!

1.   Abbreviations and Definitions

CSV	Comma Separated Values (standard file format)
CU	Control Unit for Process Valves
NC	Normally Closed (valve)
NO	Normally Open (valve)
PC	Personal Computer or Laptop Computer
PLC	Programmable Logic Controller
USB	Universal Serial Bus

2.   Safety Instructions

2.1. Sentinels

	Danger!	Direct danger which can lead to severe bodily harm or to death.
	Caution!	Dangerous situation which can lead to bodily harm and/or material damage.
	Note	Important technical information or recommendation.

These special safety instructions point directly to the respective handling instructions. They are accentuated by the corresponding symbol. Please read the instructions carefully to which the sentinels refer. Continue handling the control unit and the control software only after having read these instructions.

2.2. Intended Use

The SPX CU4 ToolBox V2 Service and Maintenance Software for CU4plus V2 is only intended for parameterisation, diagnosis and maintenance of CU4plus V2 control units. Use beyond this does not comply with the regulations and SPX FLOW shall not be held responsible for any damage resulting from this non-observance. The operator bears the full risk. Intended use also means the observance of operating, service and maintenance conditions.

3. Installation Guide

For the installation and startup of the ToolBox Service and Maintenance Software for CU4plus and of the USB/Serial Converter on your computer you have to perform the following steps:

3.1. Connection to PC and Installation of Software

Before connecting the USB/Serial Converter to your PC for the first time, install the ToolBox Service and Maintenance Software for CU4plus V2 and the necessary drivers.

To be authorized to install programs you may have to be logged in as administrator or user with administrator rights.

If the Microsoft® .NET Framework is not installed on your Laptop/PC or if you have a version older than 3.5, it is necessary to update your installation. The setup package will attempt to install it (internet access required). This procedure will take several minutes.

For the installation of the program and drivers it is not necessary to be connected to the internet.

Please make sure that the USB/Serial Converter is **not** connected to your PC. Insert the Memory Stick and start the program "CU4plus-ToolBox-Setup V2". This program will guide you through the necessary installation steps.

To connect the USB/Serial Converter to the PC, use the standard USB cable provided. Connect it to the USB port of the converter and to an USB port of your computer and start your program.

In some Windows versions the operating system is not able to automatically find the folder with the required driver information. In these cases, they have to be identified manually.

3.2. Software Updates

The right software is the ToolBox Service and Maintenance Software for CU4plus on your PC. For updates please contact your regional SPX FLOW company.

If you intend to install a new version, download the zip file and extract it in a local file of your computer. Then start the program. XXX stands for the current version number. The program will guide you through the necessary installation steps.
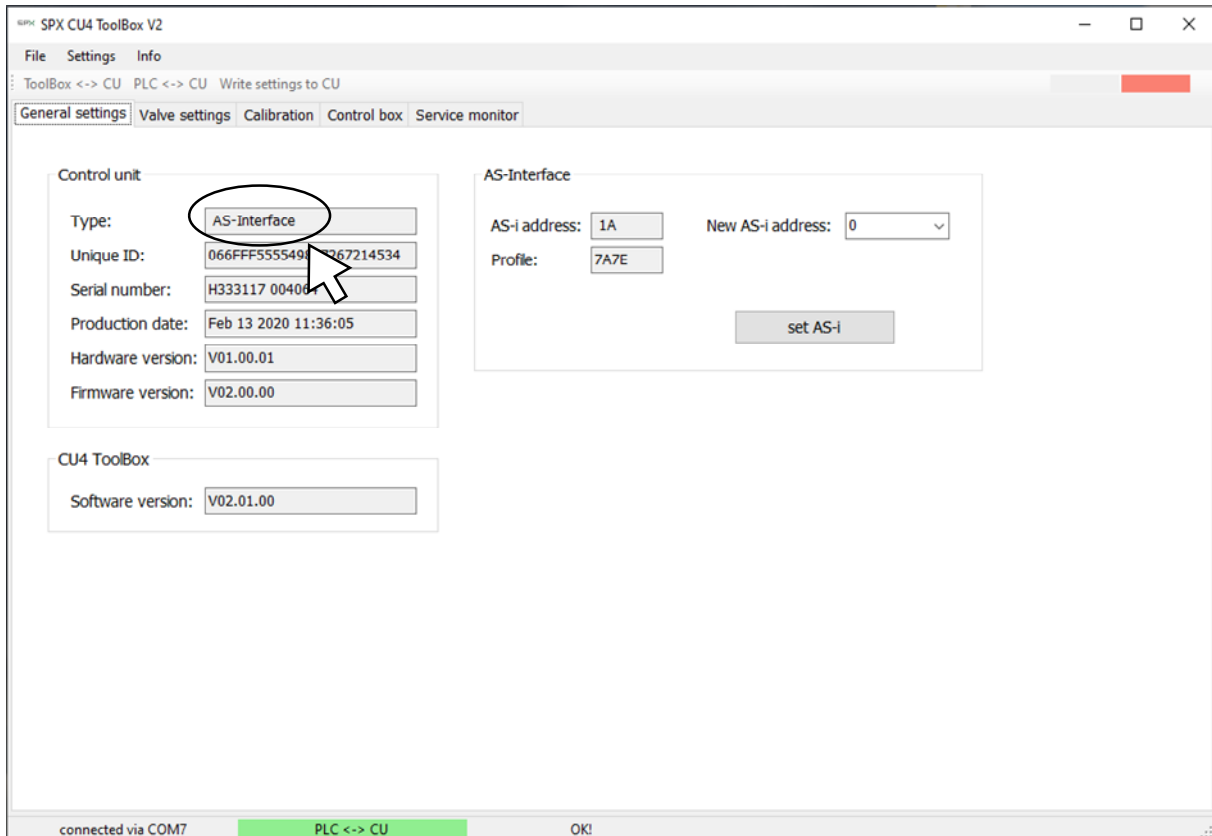
4. User Guide

4.1. General

4.1.1. CU4plus for AS-interface

Connecting a CU4plus V2 Control unit for AS-interface via the USB/Serial Converter to your PC and starting the program CU4_ToolBox V2, the following window will open:

Picture opening window: CU4plus-AS-interface CU connected

The text in the "Type:" field identifies the connected CU as a AS-interface version. On the right side of the window you find the function to change the AS-interface address.
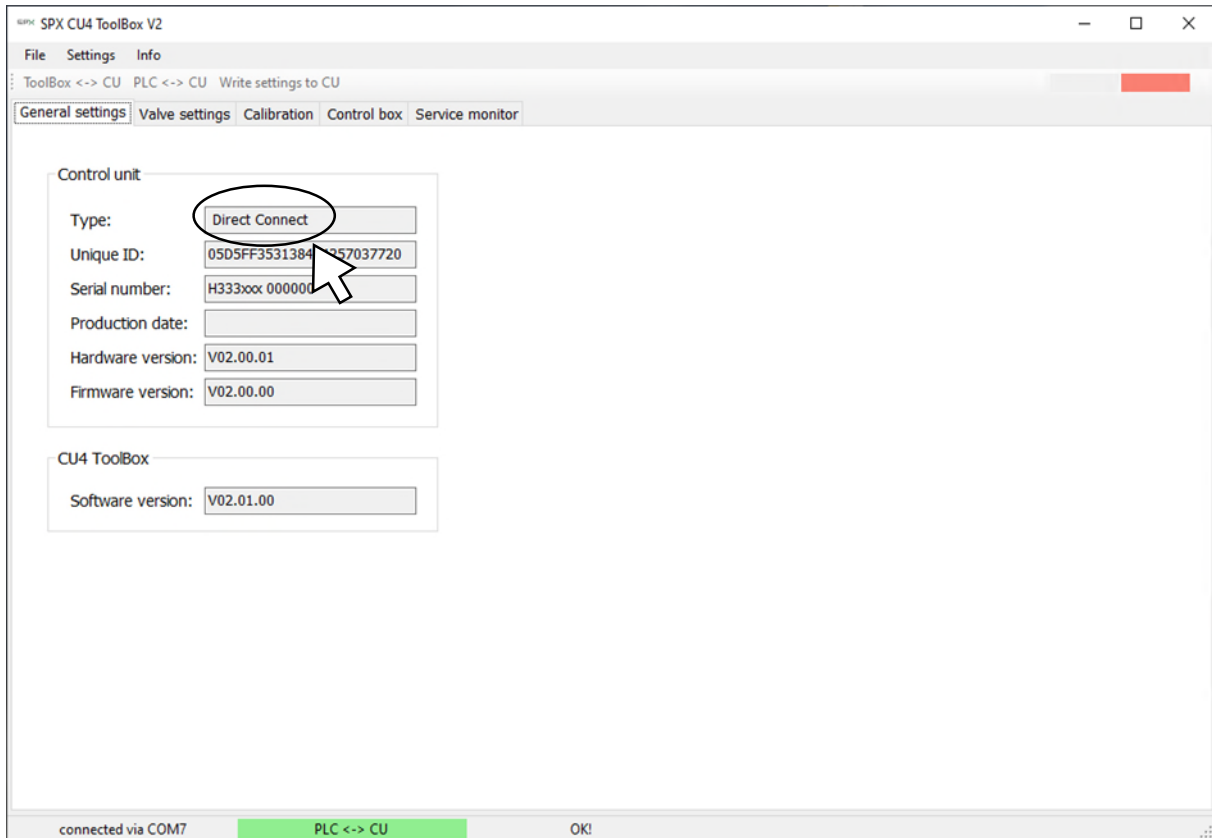
The information given in this window is described in detail in chapter 4.3.1. and following chapters of this manual.

4.1.2. CU4plus Direct Connect

When connecting a CU4plus DC V2 control unit to your PC and starting the program a window such as the following one will open:
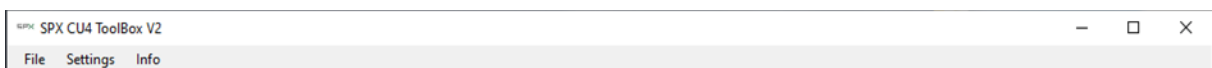

Picture opening window: CU4plus-DC CU connected

The program identifies the connected CU as a Direct Connect version, displayed in the text field "Type:".

4.1.3. Menu bar

The menu bar is in the upper part of the window. Here you all find the drop-down menus for the functional areas.
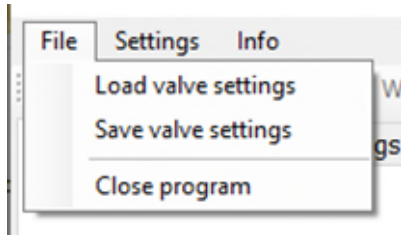

Picture Menu bar

4.1.4. File menu

Picture File menu

- Load valve setting
  This option allows to load predefined valve settings for storage in the control units. Valve setting files are binary files and have the file extension .cu4vs.

- Save valve settings
  If valve settings have been set with the help of the ToolBox program (tab "Valve settings"), they can be stored on your PC for duplication in other control units. Valve setting files are binary files and have the file extension .cu4vs.

- Close program
  This function updates the .ini file and closes the program.

4.1.5. Settings menu
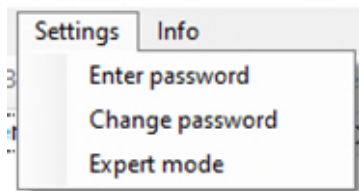
Picture Settings menu

- Enter Password
  If write access to the control unit is required a password has to be entered first to make write functions accessible.

- Change Password
  If installed for the first time the factory setting of the password ("00000000") should be changed here.

- Expert Mode
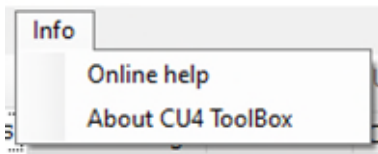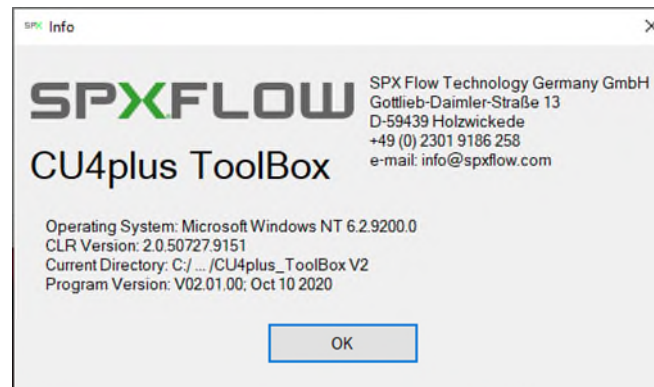 In "Expert Mode" some additional information are accessible.

4.1.6. Info menu

Picture Info Menu

- Online help
  Here a brief description of the functions of the program is given.

- About CU4 ToolBox
  Here information about the program and its environment are displayed which are **necessary for service requests**.


Picture About box

4.2. Program modes

There are two modes to work with the ToolBox Service and Maintenance Software for CU4plus V2. In "Read Only Mode" information of the control unit **can be read out, only**. **Modifications** of the parameterisation of the unit **cannot be made.** In "Read/Write Mode" it is possible to make changes and store these in the control unit.

4.2.1. Read Only Mode

The actual status of the "Read Only Mode" is shown by the red bar in the upper right corner of the program window. The status line displays "PLC <-> CU" on green background.
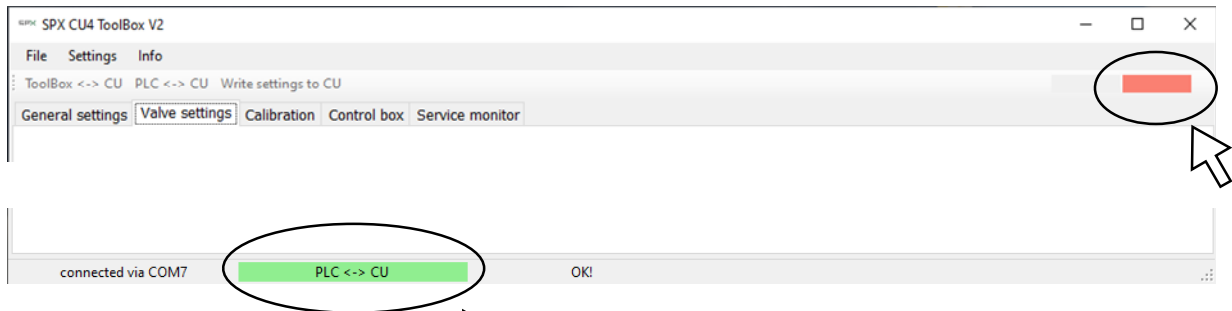
Picture CU4plus ToolBox in Read Only Mode

⚠️ Please note that in this mode it is possible to change the AS-i address of the unit which may cause unwanted reactions of the valve.
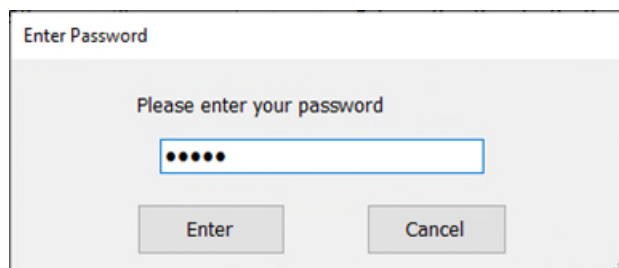
4.2.2. Read/Write Mode

If Read/Write mode is active, the bar in the upper right corner is green.

Picture CU4plus ToolBox in Read/Write Mode

4.2.3. Enter Password

To enter the Read/Write Mode of the ToolBox Software it is mandatory to enter the password via the pulldown menu item "Settings -> Enter Password".
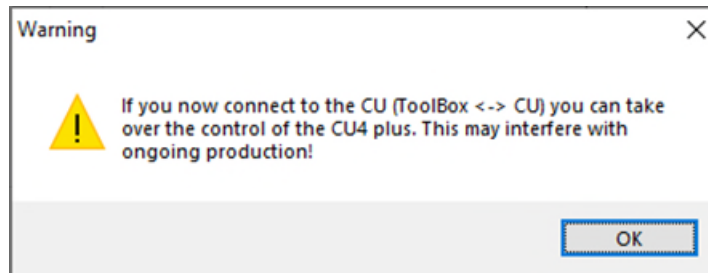

Picture Enter Password menu

After having entered the correct password, the following warning is issued, as it will now be possible to change settings in the connected control unit.

DANGER If you proceed, make sure that the process valve is disconnected from any potentially dangerous material flow.

Picture Warning window

If you press the button "ToolBox <-> CU", you will take over control of the CU and will be able to operate the valves. The text in the status line of the program changes to "ToolBox <-> CU" on yellow background. You can return control to the PLC at any time by pressing the button "PLC <-> CU".
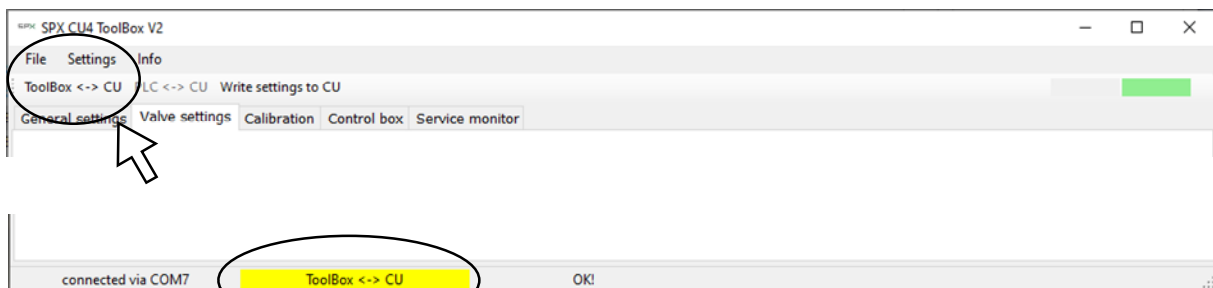
Picture CU4plus ToolBox controls the CU

After a longer period without transaction between the control program and the CU, the connection will be interrupted, and control will automatically be returned to the PLC. This may also happen when the PC enters a sleep mode.

If data is written to the CU, the main CPU performs a restart to ensure data integrity. If data recording is performed during a write access, it will therefore be stopped.
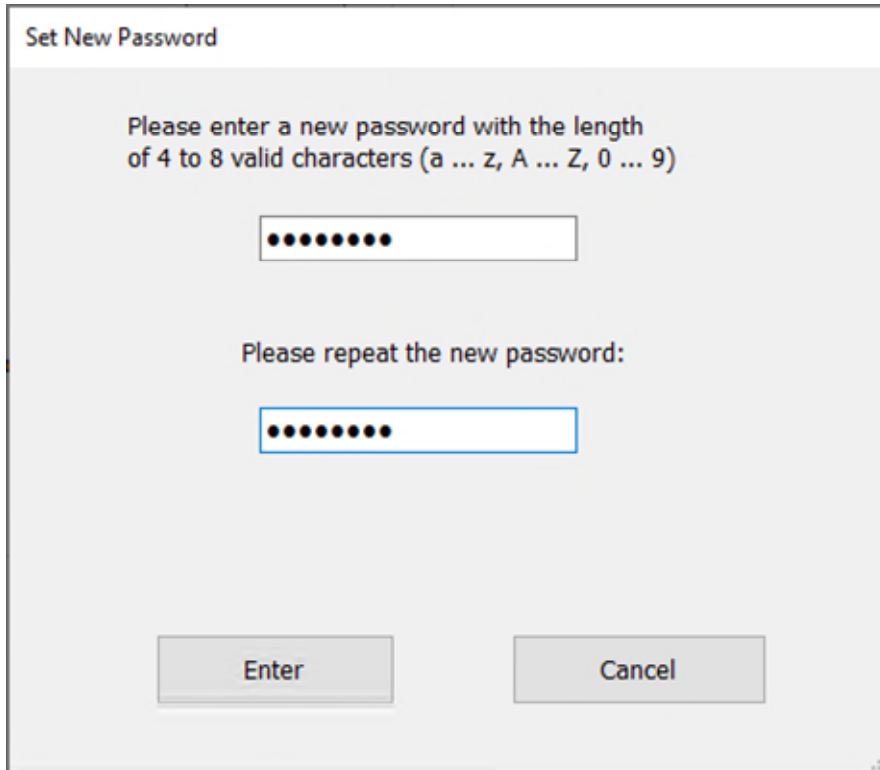
If you use the program for the first time, after installation you should change the default password to your own so that only authorised personnel can enter the Read/Write Mode of the ToolBox program. Keep the memory stick with the installation software in a safe place.

4.2.4. Change Password

Picture Set New Password menu

4.2.5. Expert Mode

In Expert Mode advanced functions are enabled.

To activate the "Expert mode" click on the corresponding entry in the "Settings" menu. The program will show the activation with a hook in the menu and a yellow bar in the upper right corner of the program window.
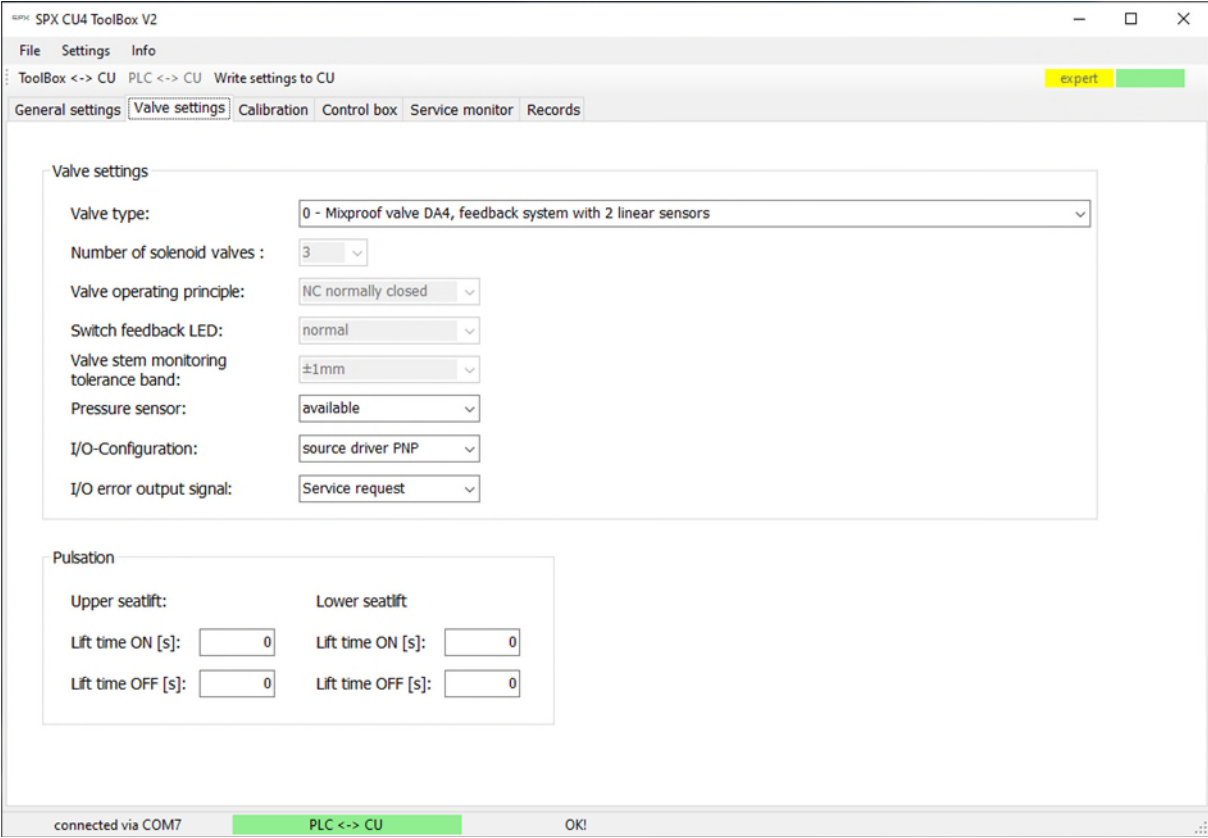

Picture Expert mode active

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With active Expert Mode, the tab "Valve settings" shows options for valve pulsation. These options are only displayed if the selected valve type supports the function.

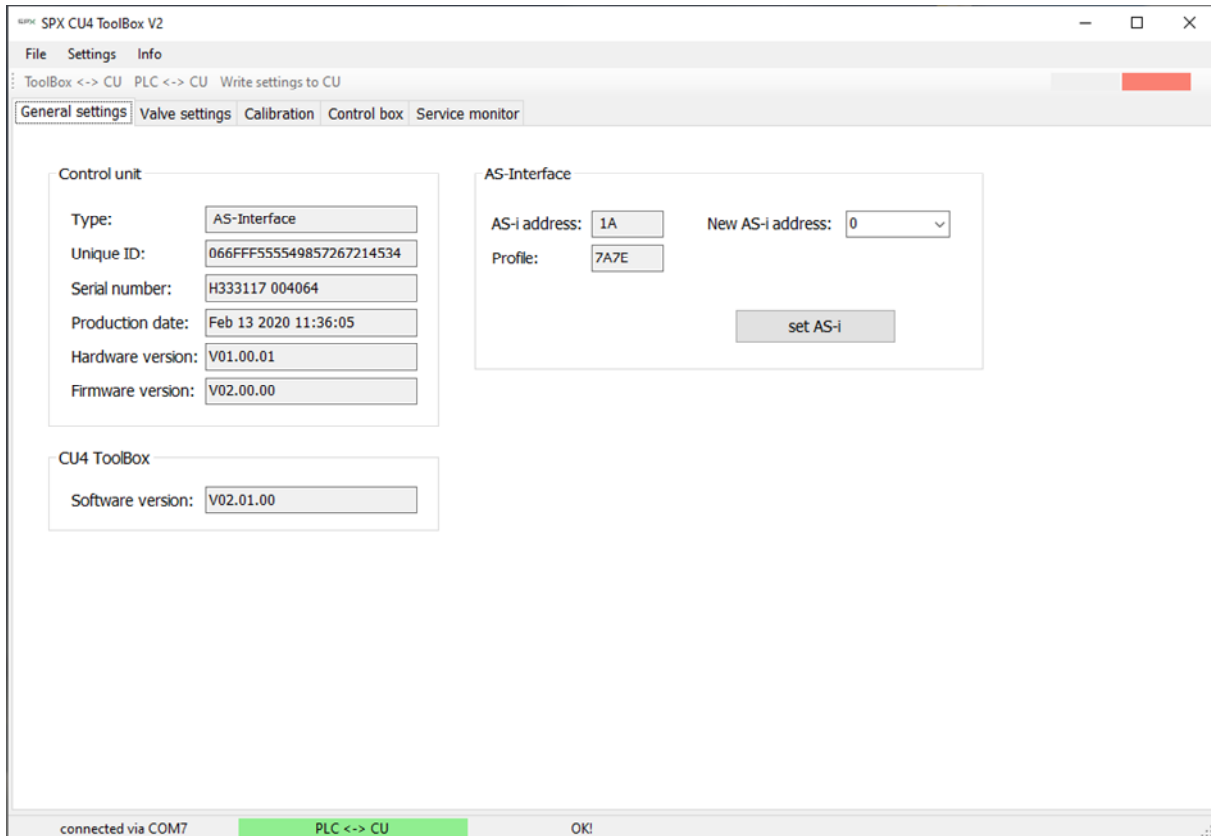Picture Tab Valve settings with options for valve settings visible

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4.3. Parameterization of the Control Unit

4.3.1. Tab "General Settings"

The program displays the basic information of the CU4plus control unit.

In the AS-interface version of the control unit, the function to change the AS-interface address is indicated on the right side of the window.

Picture Tab General settings

The following information is displayed (left side of the window):

- Type   Type of the CU
- Unique ID   ID of the main processor, cannot be modified.
- Serial number   Serial number of the CU.
- Production date   Production date and time of the CU.
- Firmware version Current firmware version, can be updated.
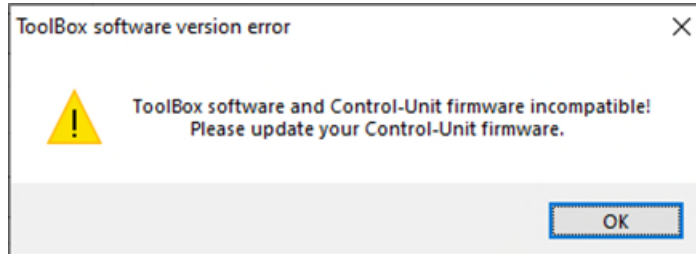- Hardware version Hardware version of the CU.

Additionally, the version of the installed CU4 ToolBox software is indicated:

- Software version Software version of your ToolBox software.

If firmware and software versions are not compatible, a warning message is displayed.

Picture ToolBox software and CU-Firmware are not compatible.

In case of an AS-interface control unit, the following AS-interface relevant information is displayed on the right side of the window:

- AS-i Address   The current AS-interface address of the slave.
- Profile   The slave profile of the AS-interface slave.

An addressing tool or an AS-interface Master is usually used to change the AS-interface address. It is also possible to employ the ToolBox software as addressing tool. For this purpose, select the new AS-i address in the select box and activate the "set AS-i" button.

This addressing procedure is not identical to the standard addressing procedure of AS-interface.

The status line of the window shows the port which has been chosen automatically by the operating system to connect to the USB/Serial converter on the left side. It also shows the device controlling the CU. This may either be the PLC (i.e. the control of the machine, green background) or the ToolBox (yellow background). It finally shows status information (OK or Error). Detailed list of messages, see chapter 5.2.

4.3.2. Tab "Valve Settings"

The program reads the actual settings of the connected control unit and displays the following information, depending on the CU type:

- Valve type: The selected valve type is shown.
    For details please refer to [1] or [2]
- Number of solenoid valves: depending on the valve type, No between 1 and 3
- Valve operating principle: NC or NO
- Switch feedback LED: normal or inverted
- Valve stem monitoring
    tolerance band: ±1, ±3 or ±5mm
- Pressure sensor: either available or not available

AS-interface control unit

- Watchdog: a watchdog can be configured that shuts down the solenoids in case of communication loss.

Direct Connect control unit

- I/O-Configuration: choose the type of I/O-source driver
either PNP for positive active driver (default)
or NPN for negative active driver
- I/O error output signal   a short circuit on an output line signals
Service request if activated
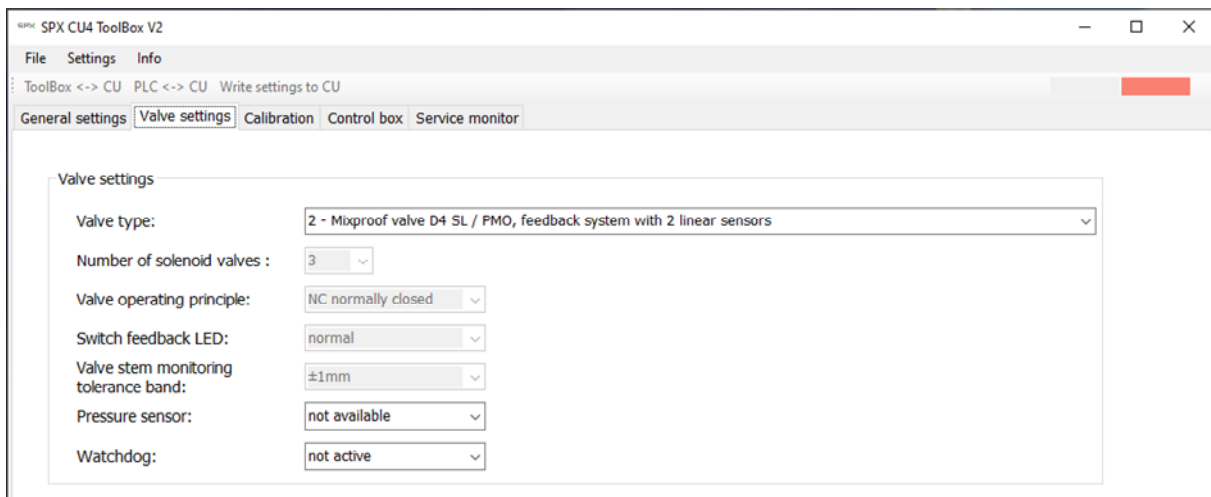
Picture Tab Valve settings: CU4plus-AS-interface CU connected
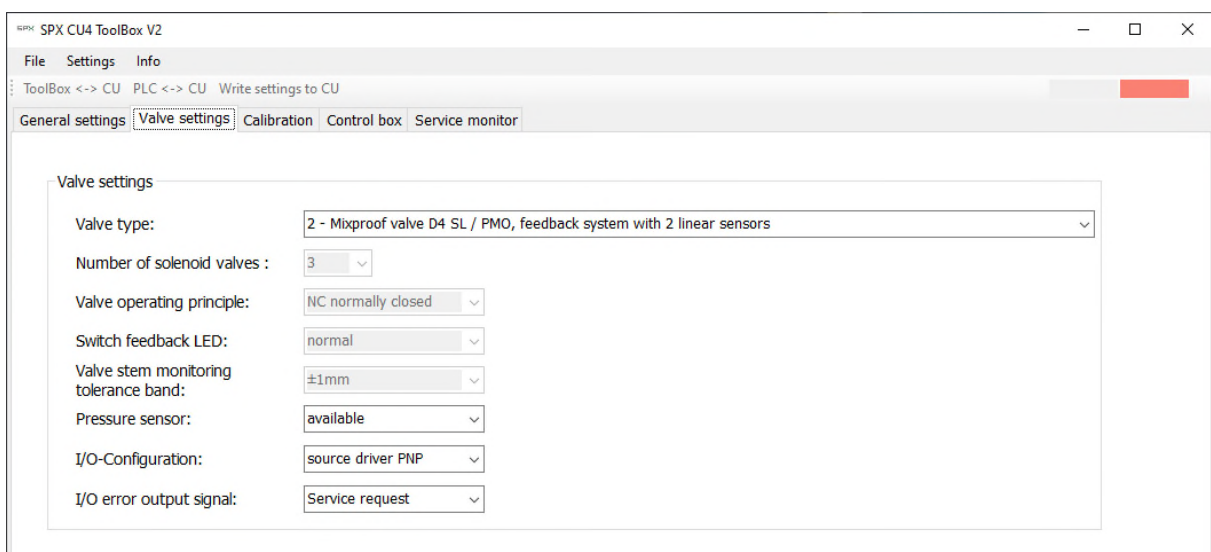
Picture Tab Valve settings: CU4plus-DC CU connected

If parameters are to be modified, it is necessary to change to Read/Write Mode (see chapter 4.2.2 of this manual).

In the Read/Write Mode the parameters in this tab are selectable. Depending on the selected valve type, all or some of the other selections are also made available.

As soon as a new parameter is selected, the message "Data changed" appears in the status line of the program. This indicates that the button "Write Settings to CU" should be pressed in order to transfer the newly selected parameter setting to the control unit and store it permanently.
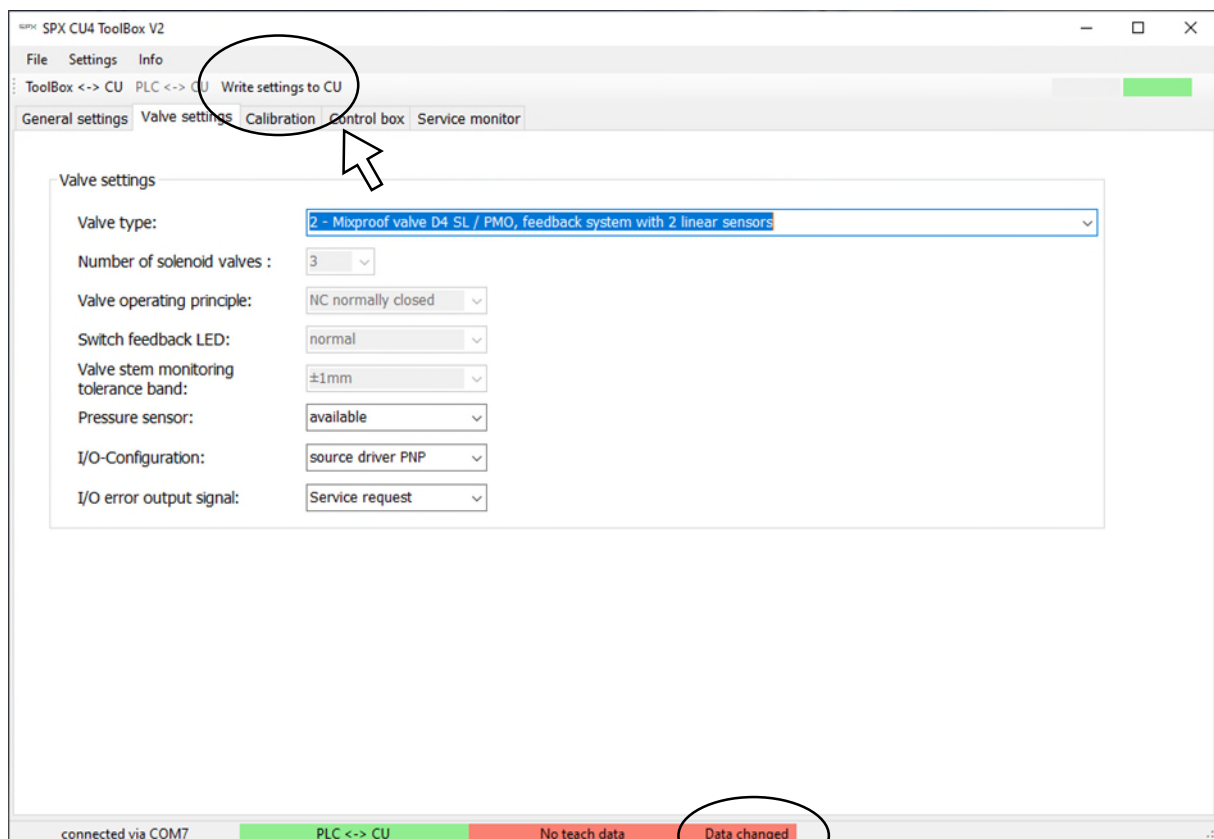
Picture Tab Valve settings with changed parameter

For details of the parameterisation for different valve types, refer to [1] or [2].

The data selected here can be stored in a file on your PC via the function "File -> Save valve settings". Valve setting files have the file extension .cu4vs.

⚠ If new settings are stored in the CU, the CU will perform a reset and, thus, go offline from the PLC / AS-interface network for a short period.

👍 If a new valve type is selected or other parameters are changed, calibration data may become obsolete. It will be necessary to perform a new teach.

4.3.3. Tab "Calibration"

Depending on the selected valve type, the teach-in of the valve stem position sensors are displayed in this window. The position value corresponds to about 1 mm. Additionally, the actual status of the valve is shown.
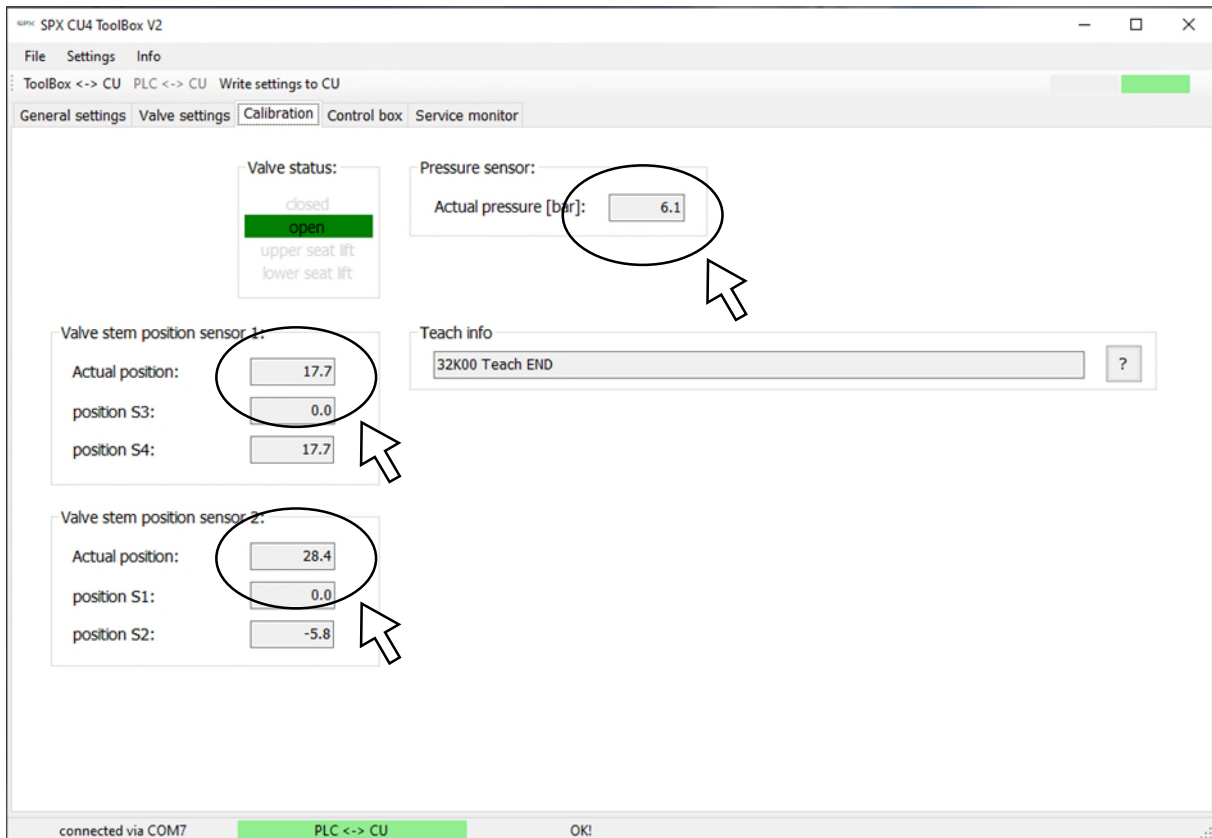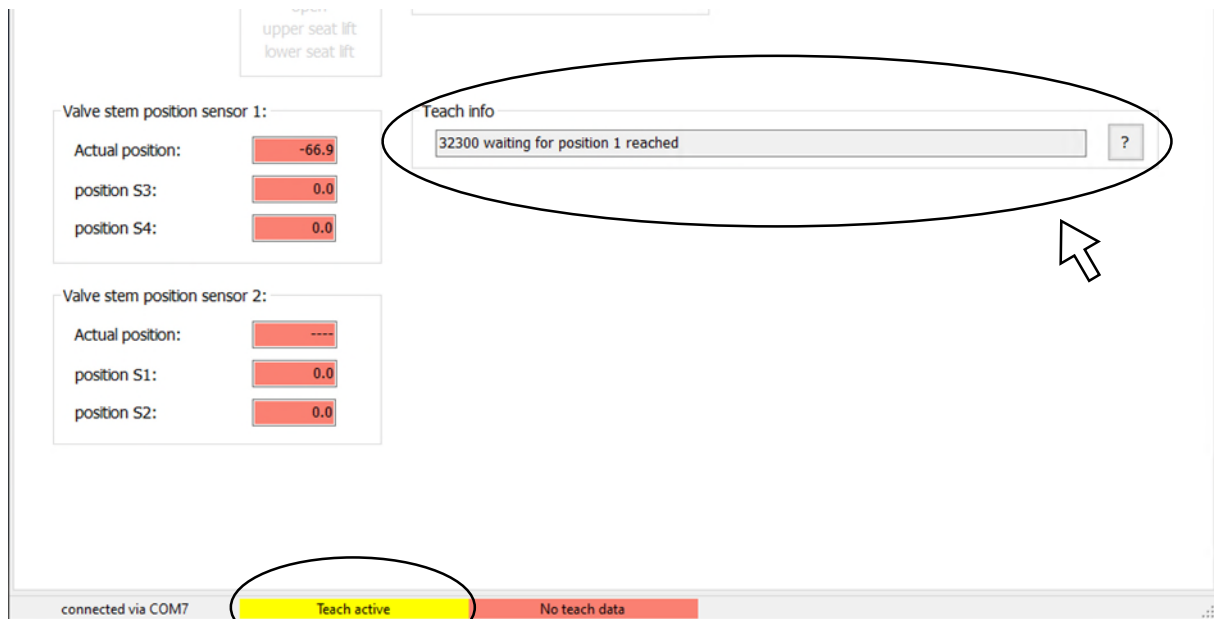

Picture Tab Calibration with actual information

The actual pressure and the actual position are automatically updated by the program if the CU is connected.

Picture Tab Calibration with Information while Teach active

If this tab is selected during "Teach", it is possible to follow the procedure in the "Teach Info" text field. If the teach procedure is not successfully completed, a diagnosis information is given. If the teach procedure does not receive the signals expected it times out after approx. 30s.

The teach procedure can only be started by pressing the teach button on the CU for more than 3 seconds.

With this tab the teach procedure can be monitored. The teach mode must be activated by the button on the control unit itself. The progress of the teach process is shown in the window "Teach Info". When the Teach process has finished successfully, the text "Teach END" is displayed. If the Teach process has encountered an error (e.g. Sensor 3 and Sensor 4 exchanged), the text "Teach ERROR" is displayed.
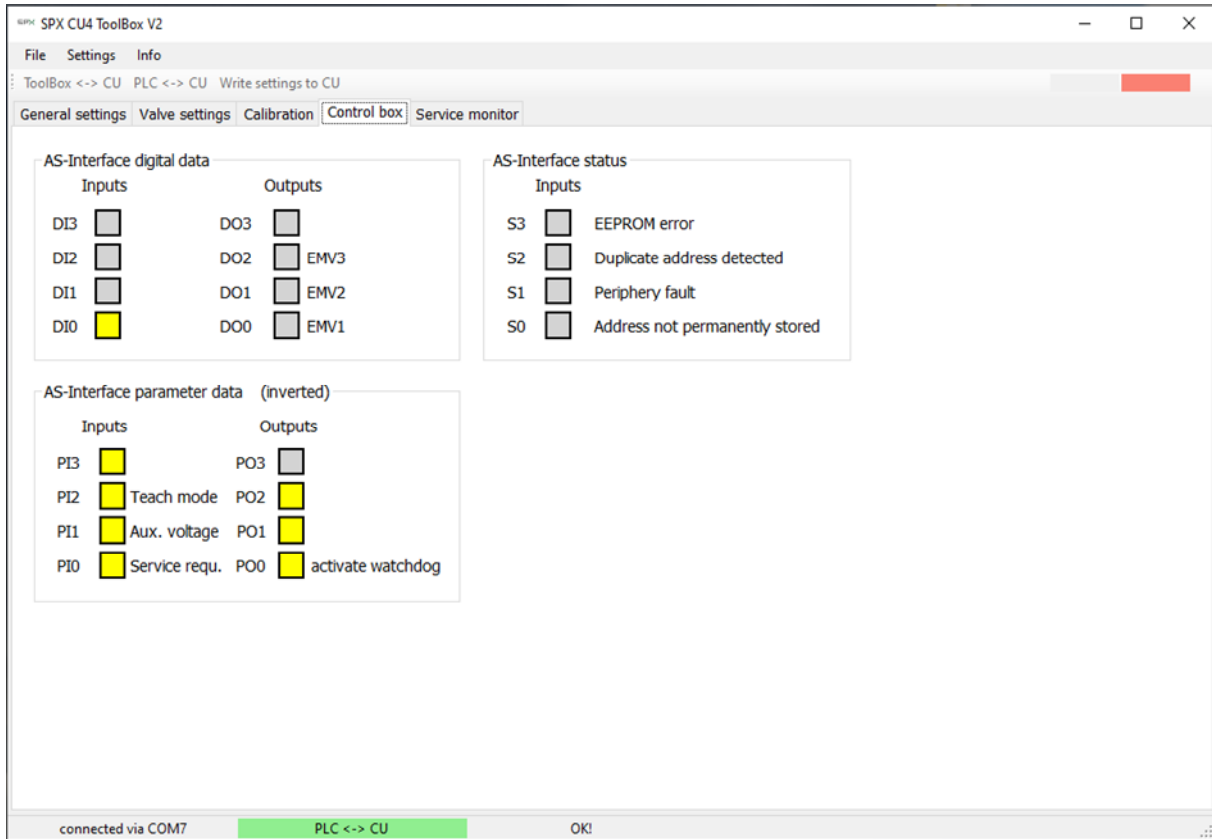
Since the teach data is generated in the CU itself, it is not necessary to save it by pressing the button "Write Settings to CU".
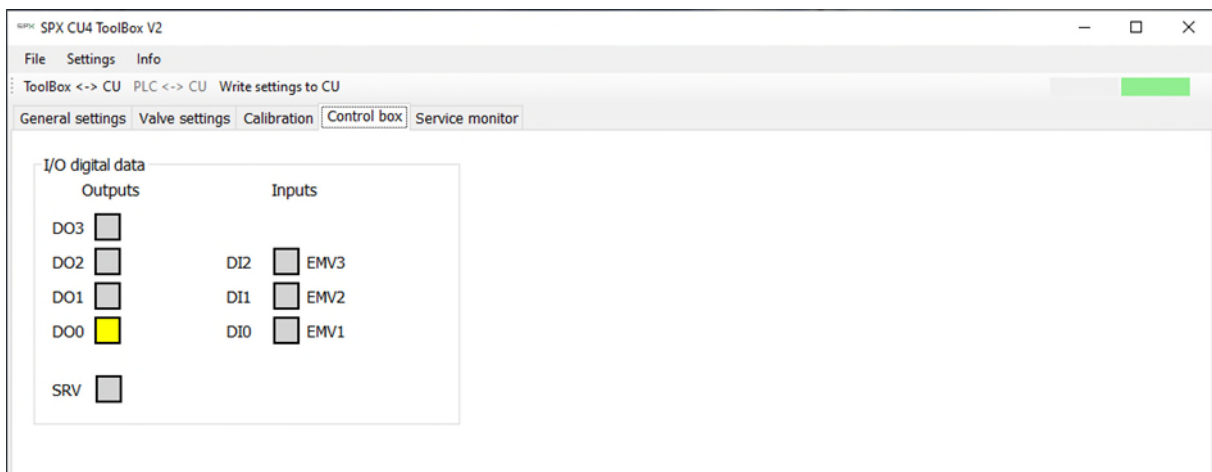
4.3.4. Tab "Control Box"

This tab shows the data exchanged between the PLC / AS-interface master and the control unit.

Picture Tab Control box: CU4plus-AS-interface CU connected

Picture Tab Control box: CU4plus-DC CU connected

In Read/Write Mode it is possible to operate the valves (see chapter 4.2).

Some AS-interface masters do not support the independent communication of parameter inputs and parameter outputs. It, therefore, may occur that the parameter input data differs when viewed via the ToolBox or via the AS-interface master.

4.3.5. Tab "Service Monitor"

This tab displays some diagnostic data and the service settings of the CU.
In Read/Write Mode it is possible to change service settings. A value equal zero disables the corresponding service signalling.

Having changed parameters it is necessary to press the enter key.

The diagnostic data comprise:

- The operating hours of the CU.
- The number of strokes that the main valve has performed.
- The last activation time of the main valve (i.e. the time in ms that the valve needs to travel from 0% to 100%).
- The last reaction time (activation) of the main valve (i.e. the time in ms that the valve needs from the time the command arrives to the time the valve leaves its current position).
- The last deactivation time of the main valve (i.e. the time in ms that the valve needs to travel from 100% to 0%).
- The last reaction time (deactivation) of the main valve (i.e. the time in ms that the valve needs from the time the command arrives to the time the valve leaves its current position).
- The number of strokes of the two seat lift valves.
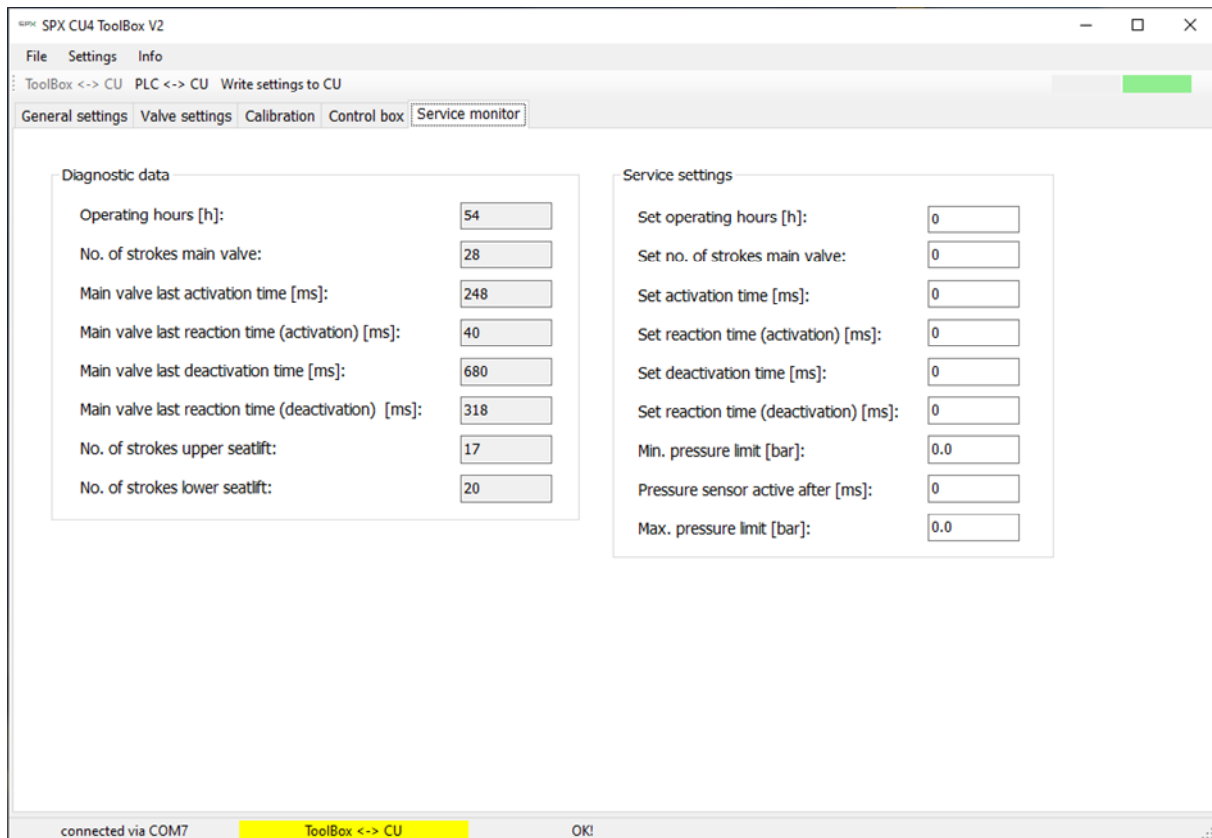
Picture Tab Service monitor

The service settings comprise limit values for the diagnostic data. If these limit values are exceeded a service request is issued to the PLC / AS-interface master. Additionally, the yellow LED on the CU shines. On a CU4plus DC CU the Service Request output is set. A CU4plus AS-interface CU sets the PI0 Parameter PI0. This information can also be followed on the "Control Box" tab.

The limit value that triggered the service request is highlighted with yellow background to make it easier to identify the cause of the request. A corresponding message will also appear in the status line.

> In order to minimize write cycles for the EEPROM, the current diagnostic data is saved about every 6 minutes. In case of a power loss it may, therefore, happen that some diagnostic data (i.e. events that occurred during the last minutes) is lost.

It is possible to reset the diagnostic data operating hours and number of strokes on the left side of the window by pressing the button "Reset Diagnostic Data" (shown in "Expert Mode", only).

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Picture Tab Service monitor with as service request active

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