User manual

HCSTool

Parameterization and Analysis Tool for Digital Amplifier Cards of HCS GmbH

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1 General Information

1.1 Copyright

The information in the present document is subject to change without prior notice. HCS do not assume any liability for the occurrence of any errors in the present user manual.

The general instructions and the safety information included in the present user manual have to be observed at all times!
The breakdown of components, or the software, may lead to unpredictable behavior of any kind of electronic tool. Corresponding secondary measures will have to be taken to ensure safety at any rate. This applies especially to applications which might be critical to safety.
In doing so, any legal provisions and safety standards have to be observed at all times.
Necessary risk analyses have to be carried out and suitable protective measures have to be taken prior to use and start-up.
In case of non-compliance of these instructions, no liability can be accepted for the occurrence of any damage.
HCS do not assume any liability for the use of the software in question as well as any errors or misusage that may arise in this connection.
This software is not a calibrated software. HCS do not assume any liability for any possible display errors.

1.2 Introduction

The Software HCSTool is featuring state of the art programming. Our software development team is constantly continuing to further develop this software.

1.3 General Use

The HCSTool is used for the adjustment and configuration of units by the HCS company.
The HCSTool features

- a graphical interface,
- a multimeter display and
- an oscilloscope display.

The oscilloscope and the multimeter are neither calibrated nor gauged, both displays only serve to graphically illustrate the internal measured and calculated values.
The HCSTool is neither designed nor suitable for monitoring functions.

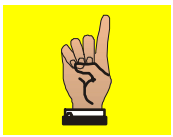
2 Safety

2.1 Safety first!

2.1.1 Signs and Symbols

The safety instructions and information given in this user manual have to be observed by any means and at all times.

Texts under this symbol indicate a potential danger for life and limb, if the instructions are not strictly adhered to.



Texts under this symbol indicate a potential risk of damage to the equipment or other system components, if the instructions are not strictly adhered to.

TIP

Texts under this symbol include advice and useful information to simplify handling.

Please read this user manual thoroughly prior to starting up.

2.1.2 Warnings

The HCSTool must not be used:

- In case of visible damage to the hardware connected.
- In case of damaged electrical connections.
- In case of malfunction.
- After improper use, handling or storage.

In these cases, the unit has to be shut down and secured against unintentional restart. When used in applications with high safety standards, or if required by accident prevention regulations, it is, in case of error (emergency stop), indispensable to separate the amplifier modules from the magnets by means of contact-based measures.
In these cases it is not sufficient to switch off the signal “ENABLE”. Hydraulic and/or mechanical safety measures have to be applied, in order to switch off the system safely (e. g. by switching valves with position monitoring).
Following procedure is recommended, if the magnets have to be switched off:

- All set values should preferably be zeroed. A comparable magnet as used in the valves has to be switched into the electrical circuit instead of them. Thus, errors at the amplifier are prevented by open output and input ports.
- The enabling signal at the amplifier module has to be zeroed during the switching off.

During installation and startup, particular attention has to be paid to the correct planning and implementation of the wiring. The latter has to be checked before applying the supply voltage. Safety installations and limit switches have to be activated and functional, in order to prevent collisions. In doing so, all safety regulations have to be observed. It is recommended to monitor the error signal “Error”.

Faults may occur when:

- The factory setting is modified
- Operational parameters (e. g. supply voltage, connecting of improper signals to inputs or outputs, environmental conditions, wiring, connection of improper loads such as motors, contactors, relays, ohmic loads etc.) are disregarded
- Errors in control units connected in series and set values occur
- Errors in subsequent hydraulic units occur
- Connections of magnets are removed

2.2 General Information

Please take notice of our General Terms and Conditions of Business, which can be obtained upon request.

2.2.1 Inquiries and Orders

In case of orders, please indicate the complete ordering code.
Inquires and orders are to be addressed to the companies listed below under “distributors and partners”. These companies are our official distributors and partners. We reserve the right to forward all direct inquiries to our distributors and partners. Nevertheless, we are pleased to be at your disposal for any inquiries and technical support.

2.2.2 Distributors and Partners

HCS HYDRAULIC CONTROL SYSTEMS GMBH
Neuffener Str. 29
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Tel: (+49) 7025 – 911 007
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Askims Verkstadsväg 15
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Per-Anders.Kallden@pmchydraulics.se
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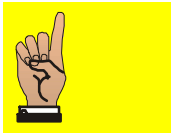
lharley@hsaus.com.au
www.hsaus.com.au

2.2.3 Service and Repairs

Do not try to repair the connected hardware yourself or to modify the software HCSTool. After repairs resp. software update, reconciliation measures may have to be carried out, which can only be performed by appropriately trained and authorized personnel. Products in need of repair can be sent to the addresses mentioned under item “2.2.2 Distributors and Partners”. Please enclose as full and detailed a description as possible of the errors and causes leading to the error. In your documents, you should also always indicate the serial number. By doing so, you achieve a fast and reliable execution and the observance of warranty. In case of need resp. of faults and malfunctions of the hardware, the companies and partners listed under item “2.2.2 Distributors and Partners” will give you instructions by telephone or in writing, before you send in a hardware for a checkup. Experienced and trained staff is at your disposal for after-sales service and repairs to the product. If you need any assistance, please contact the companies mentioned under item “2.2.2 Distributors and Partners”.

2.2.4 Cleaning, Storage and Transportation

Please store and transport the hardware only in its original packaging. Thus, it is safely protected against mechanical damage as well as electrostatic discharge (ESD). If a cleaning should be necessary, we recommend you to send in the hardware via one of the addresses mentioned under item “2.2.2 Distributors and Partners”.



Unpacking and handling has to be carried out by accordingly trained personnel only. The hardware has to be protected against damage by ESD.

2.2.5 Delivery State

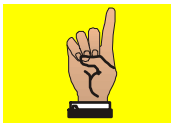
The software is delivered in operational condition. It is ready for use after correct installation and adjustment of the parameters to the application.

3 Installation

3.1 System Requirements – Minimum Requirement

CPU:	1GHz
RAM:	256MB
Hard Disk Space:	50MB
Operating System:	Windows 2000, Windows 98, WindowsXP, Windows ME, Windows7, Windows8
CD Drive:	optional
Graphics Card:	1024x768x16Bit
Mouse:	required
Either:	
Serial Interface	COMx
And/or	
USB port	1x

Before the HCSTool can be installed and started, NET Framework 2.0 or a higher version must be installed.



First of all, .NET Framework 2.0 or a higher version must be installed.

3.2 Prepare Installation

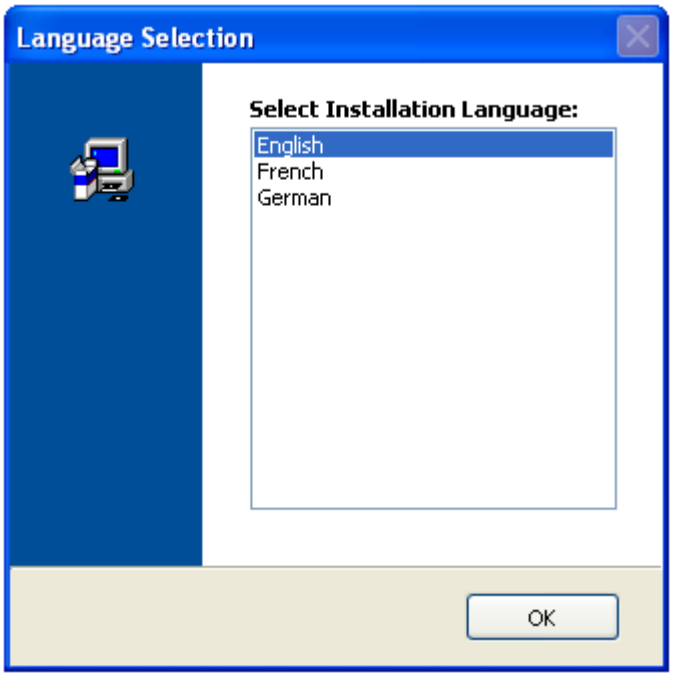
Before starting the software HCSTool, it must be installed on the PC or Laptop. The installation file appears on the HCS-CD in the folder HCSTool. A computer expert or an IT department can help you with any problems or assist you with the installation. Information about system requirements can be found in section “3.1 System Requirements – Minimum Requirement”.

Example for installation:

Step 1: Insert HCS-CD
Step 2: Open Explorer or similar program
Step 3: Select CD drive and open it
Step 4: Open folder HCSTool
Step 5: Start Setup_DAC_DMA_x.x.xx.xxx.exe (x stands for the version)

3.3 Start Installation

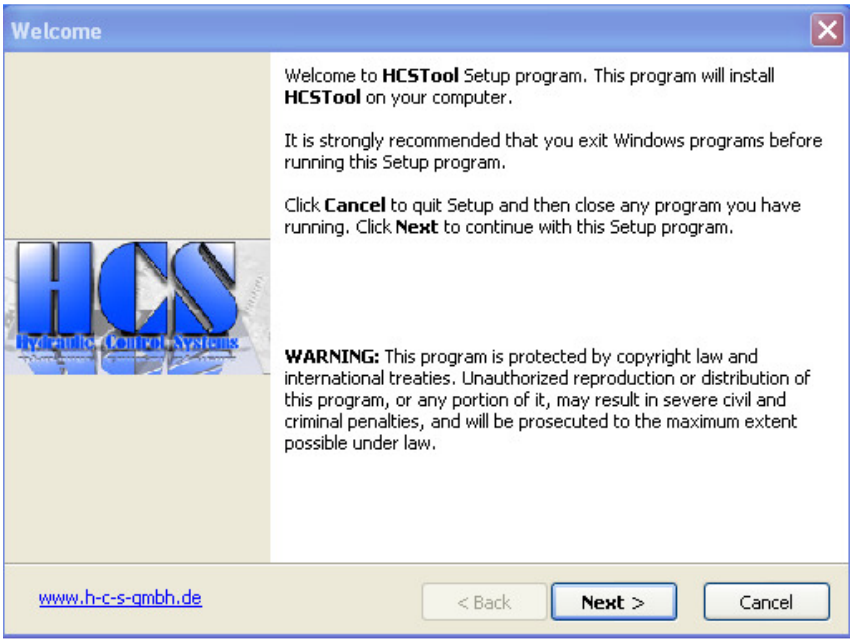
After successful start of “Setup_DAC_DMA_x.x.xx.xxx.exe” (x stands for the version), the window “(1) Installation: Language” opens. There you select the language, in which the program HCS Tool is to be installed. After successful installation, it is possible to subsequently adapt the language of communication with the HCSTool. After selection, you confirm with the button “OK”.



(1) Installation: Language

3.4 Installation, the Welcome Window

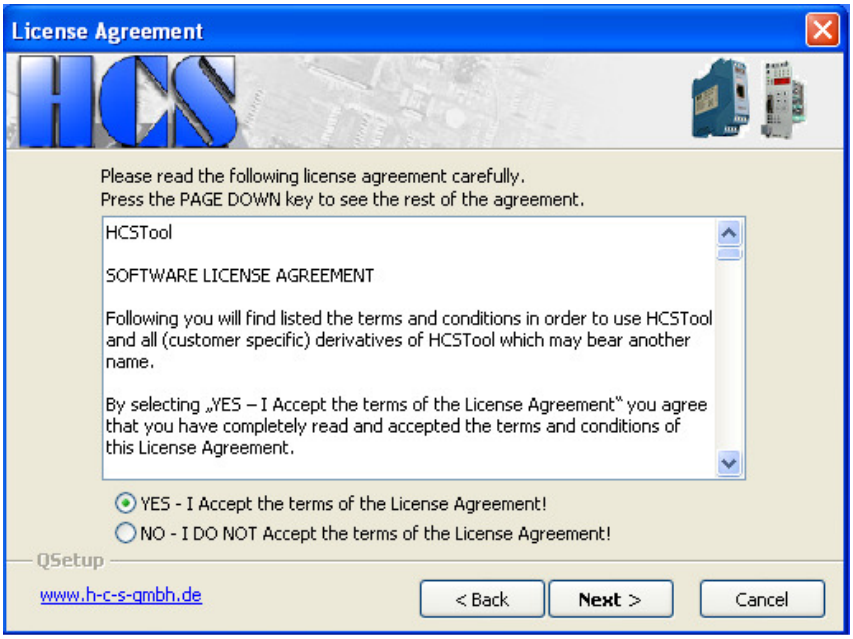
The window “(2) Installation: Welcome and Warning” opens automatically. It contains information about the software installation. The button “Next” continues the installation. The button “Cancel” stops and cancels the installation.



(2) Installation: Welcome and Warning

3.5 Installation, the License Agreement

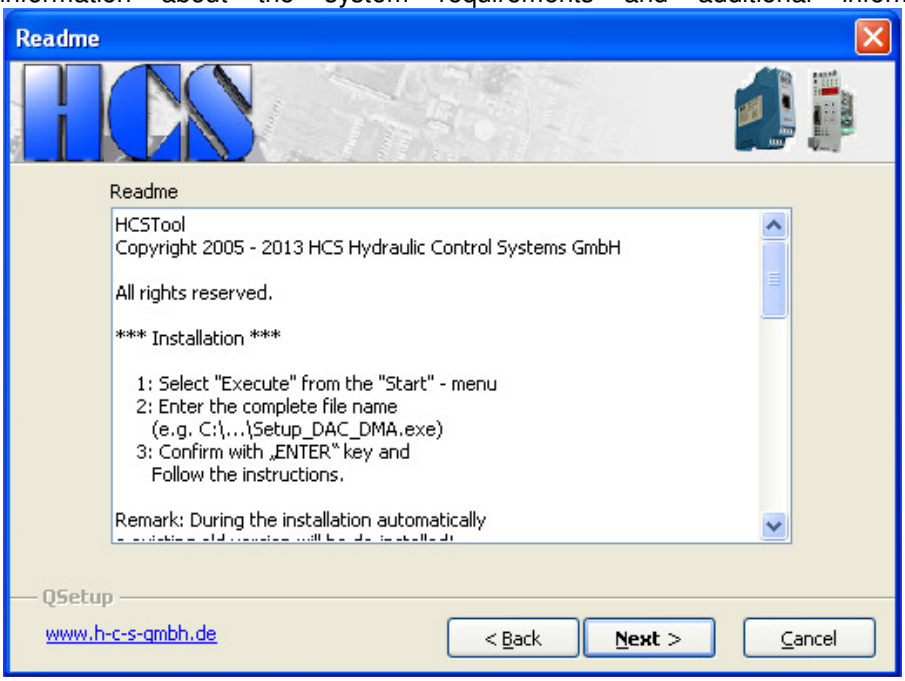
When the installation is continued, the window “(3) Installation: License Agreement” opens. This window contains information about the license agreement. In order to continue with the installation, the license agreement has to be accepted. In order to accept the license agreement, the selection: “Yes, I accept the terms of the License Agreement” has to be selected. Following the approval, the button “Next” appears and, after confirmation, the installation is continued. By the button “Back” you go back one installation step. The button “Cancel” stops and cancels the installation.



(3) Installation: License Agreement

3.6 Installation, Read Me

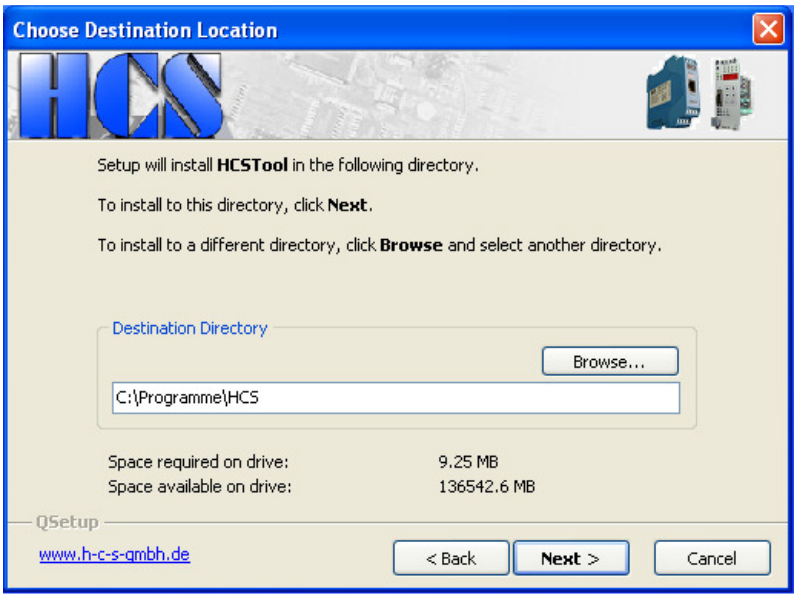
When the installation is continued, the window “(4) Installation: Read Me” will open. This window contains information about the system requirements and additional information about the installation.



(4) Installation: Read Me

3.7 Installation, the Installation Directory

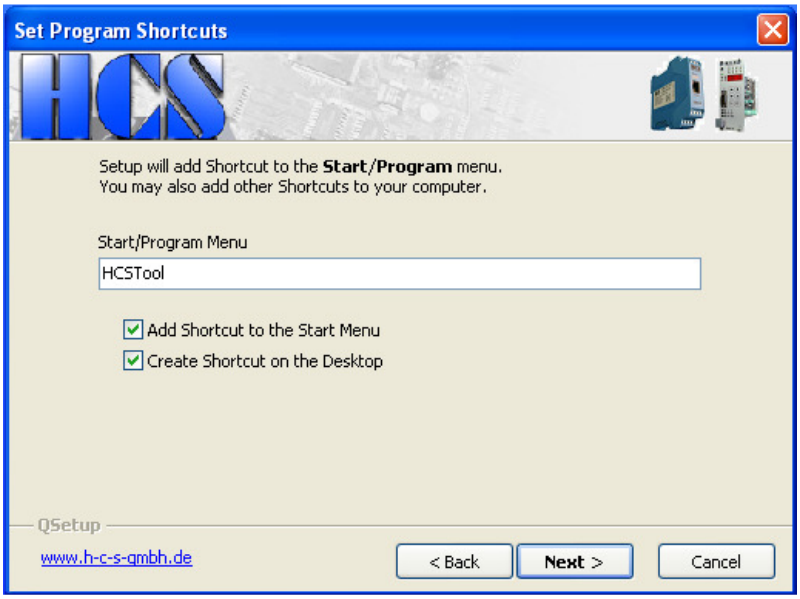
In this window “(5) Installation: Choose Destination Location” the installation directory is selected. As standard, HCSTool is installed to C:\Programs\HCS. However, this directory and this drive depend on the PC and the operating system used. In order to change the installation directory, you click on the button “Browse”. In case of further questions, please ask an IT expert or an IT department for help. In order to continue the installation, please click on the button “Next”. By clicking on the button “<Back”, you go back one installation step. The button “Cancel” stops and cancels the installation.



(5) Installation: Choose Destination Location

3.8 Installation, the Program Shortcuts

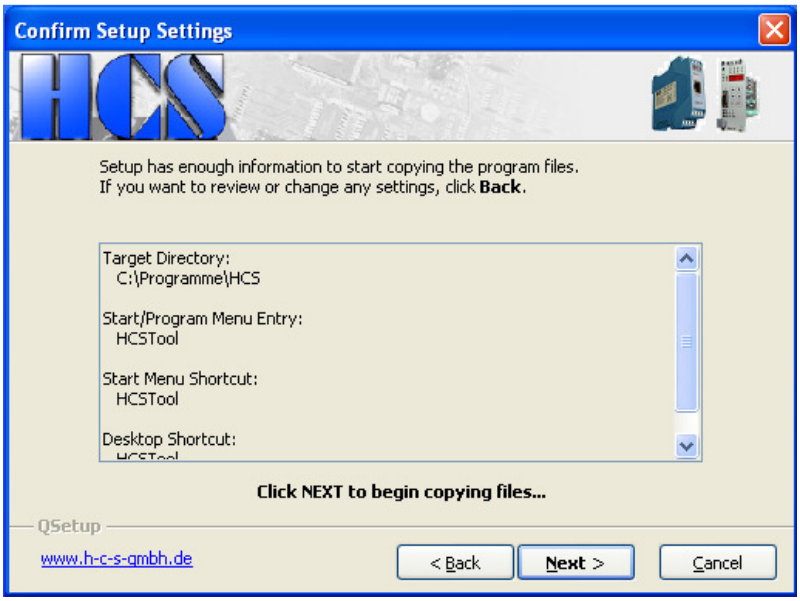
In the window “(6) Installation: Set Program Shortcuts” you can define whether or not to create a shortcut on the desktop. Moreover, you have the selection to add a shortcut to the start menu. If this is not wanted, you click on the little checkmark in front of the selection and deactivate the shortcut. In order to continue the installation, the button “Next>” has to be clicked. By clicking on the button “<Back”, you go back one installation step. The button “Cancel” stops and cancels the installation.



(6) Installation: Set Program Shortcuts

3.9 Installation, the Confirmation of Settings

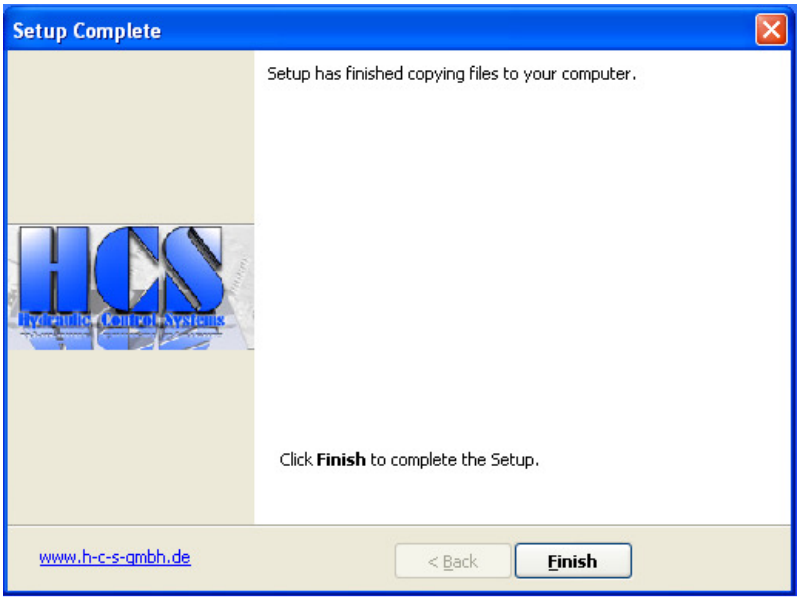
In the window “(7) Installation: Confirm Setup Settings” all important installation points are summarized once again. In this example, the installation directory: C:\Programme\HCS was selected. Besides, the HCSTool symbol is deposed in the start menu and on the desktop. In order to continue the installation, the button “Next>” has to be clicked. By clicking on the button “<Back”, you go back one installation step. The button “Cancel” stops and cancels the installation.



(7) Installation: Confirm Setup Settings

3.10 Setup Complete

After successful installation of all the files, the window “(8) Setup Complete” will open.
In order to complete the installation, please click on the button “Finish”.

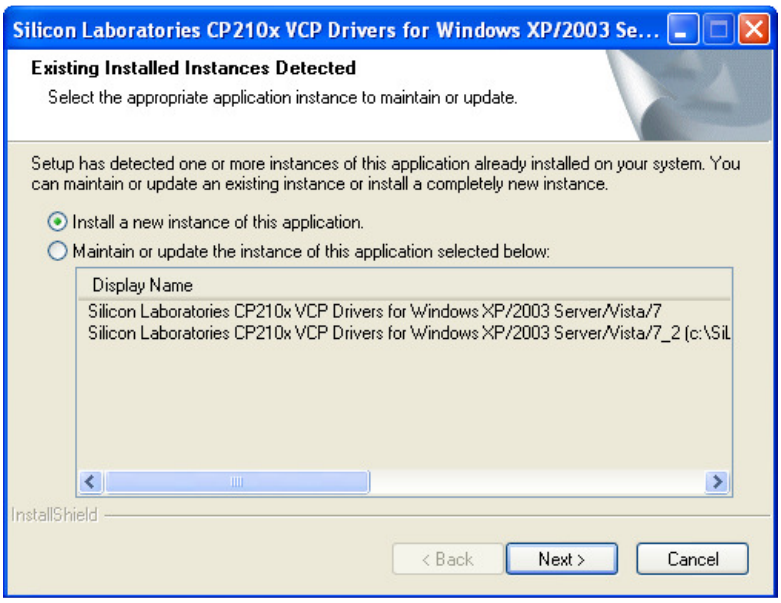


(8) Setup Complete

3.11 USB Driver Installation

3.11.1 Driver, USB Port

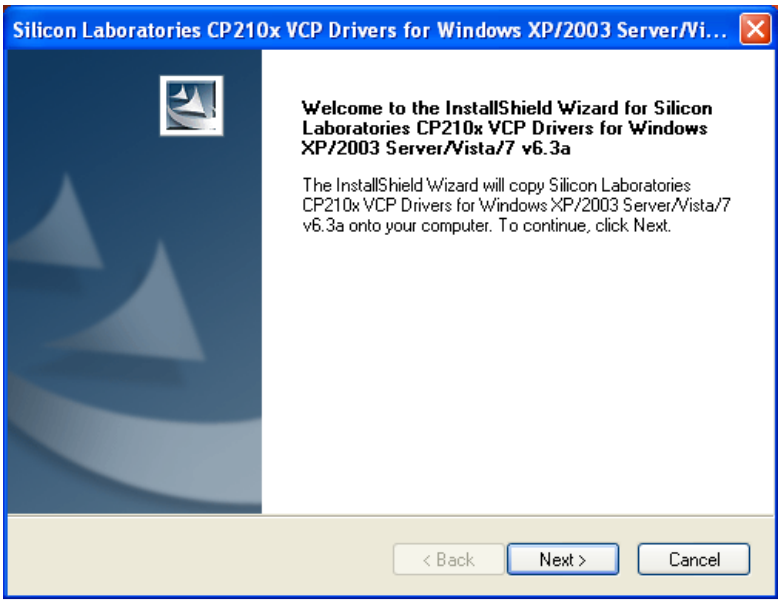
After HCSTool has been installed successfully, another window will open. Next, the driver for the adapter USB-DMA is installed.
The following sections describe the installation process and guide you through it.
If an older or equal driver version has already been installed, the following window: “(9) Installation: Driver Update” will open. By clicking on the button “Next>”, the installation will be continued. The button “Cancel” stops and cancels the installation.



(9) Installation: Driver Update

3.11.2 Driver: Start Window

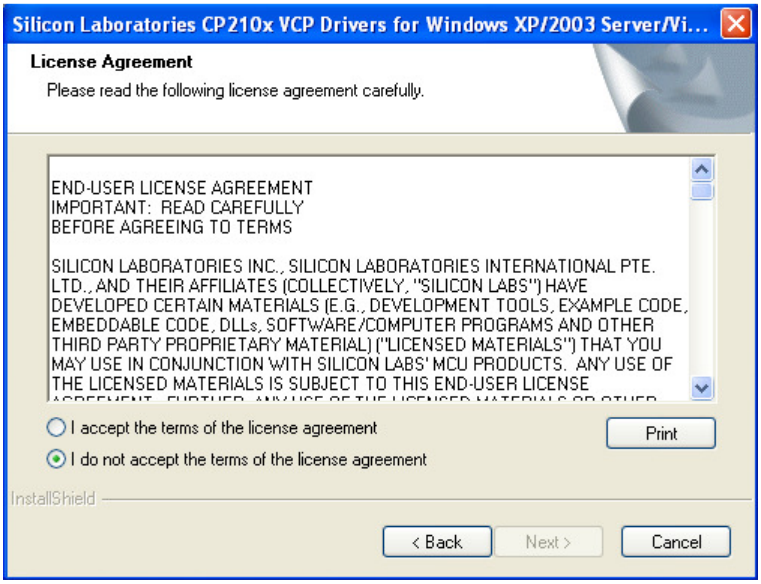
The picture “(10) Installation: Driver: Start Window” shows the start window, which will open as soon as the installation of the driver for the USB-DMA-adapter has started. The window includes general information about the type of driver and the operating system for which the driver is designated. By clicking on the button “Next>”, the installation will be continued. The button “Cancel” stops and cancels the installation.



(10) Installation: Driver: Start Window

3.11.3 Driver, License Agreement

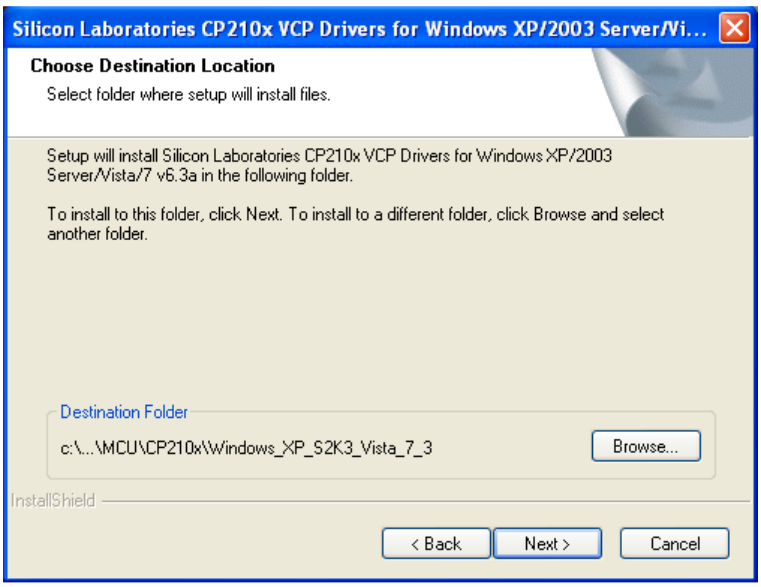
When the installation is continued, the window “(11) Setup: Driver: License Agreement” will open. This window includes information about the license agreement. In order to be able to continue with the installation, you have to accept the license agreement. In order to accept the license agreement, you have to choose the selection “I accept the terms of the license agreement”. After acceptance, the button “Next” will appear, and by confirming it the installation will continue. By clicking on the button “<Back”, you go back one installation step. The button “Cancel” stops and cancels the installation.



(11) Setup: Driver: License Agreement

3.11.4 Driver, Installation Directory

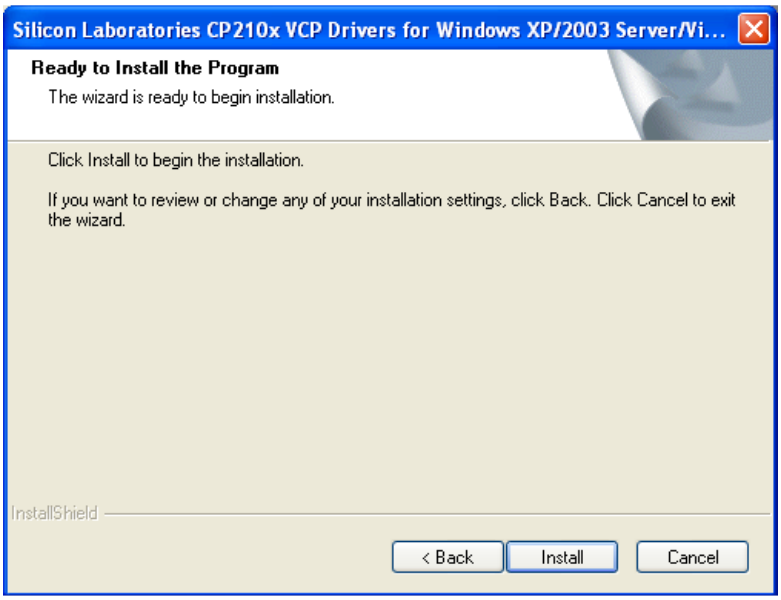
In the window “(12) Installation: Driver: Choose Destination Location” the installation directory is selected. As standard, the driver is installed on C:\Programs\Silabs\MCU\CP210x\Windows_XP_S2K3_Vista_7_3. However, this directory and this drive unit depend on the PC and the operating system being used. In order to change the installation directory, you click on the button “Browse”. In case of any further questions, please ask an IT expert or an IT department for help. By clicking on the button “Next>”, the installation will be continued. By clicking on the button “<Back”, you go back one installation step. The button “Cancel” stops and cancels the installation.



(12) Installation: Driver: Choose Destination Location

3.11.5 Driver, Start Installation

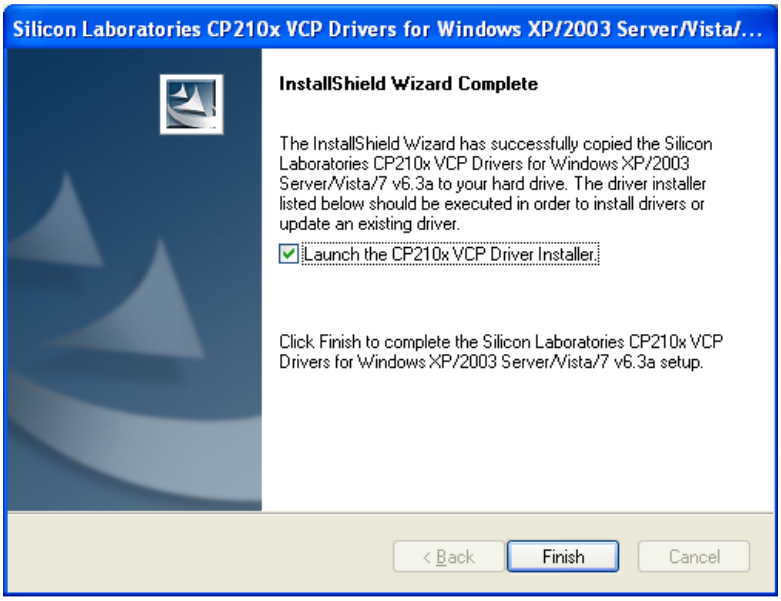
The window “(13) Installation: Driver: Start Installation” indicates once again that the driver is now being installed. Only after confirmation by clicking on the button “Install”, the driver will finally be installed. By clicking on the button “<Back”, you go back one installation step. The button “Cancel” stops and cancels the installation.



(13) Installation: Driver: Start Installation

3.11.6 Driver, Complete

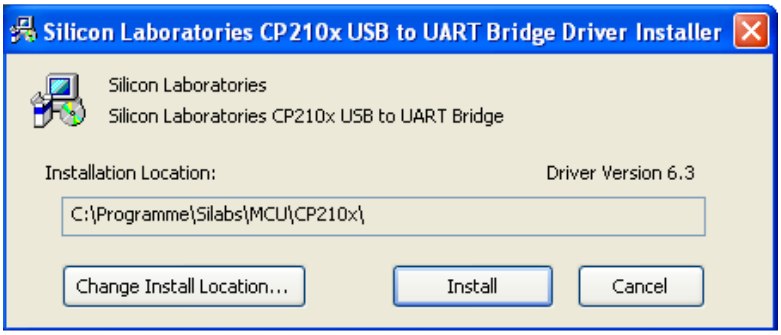
The window “(14) Installation: Driver: Successfully Completed” shows the successful installation of the driver. The green checkmark preceding “Launch the CP210x VCP Driver Installer” has to be activated. The button “Finish” completes the Installation.



(14) Installation: Driver: Successfully Completed

3.11.7 USB Driver Hardware

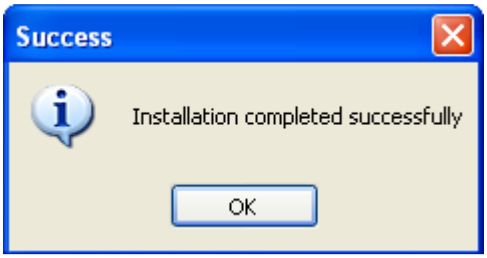
After the section “3.3 Start Installation” has been completed successfully, the window “(15) Installation: Driver: USB Driver” will open.
The button “Install” installs the hardware driver for the PC resp. the conversion from USB to the serial interface. The button “Cancel” cancels the process.



(15) Installation: Driver: USB Driver

3.11.8 USB Driver Hardware Successful

After successful installation of the driver, the window “(16) Installation: Driver: USB Driver Completed Successfully” opens.



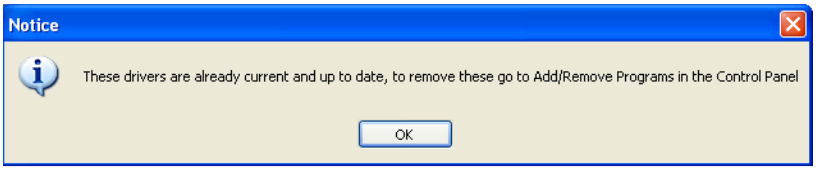
(16) Installation: Driver: USB Driver Completed Successfully

3.12 Installation, Warnings and Errors

Should the window “(17) Installation: Driver: Warning: Driver is Already Installed” open, the current driver is already installed and need not be installed once again. The button “OK” finishes the installation.

Should the window “(18) Installation: Driver: Windows: No Driver Installed” open, no driver has been installed, although an USB-DMA-adapter has already been connected. In this case, the following steps have to be taken:

1. disconnect the USB-DMA-adapter from the PC
2. finish the window: “(18) Installation: Driver: Windows: No Driver Installed” by clicking on the button “Cancel” and
3. install the driver as described in section “3.3 Start Installation”.



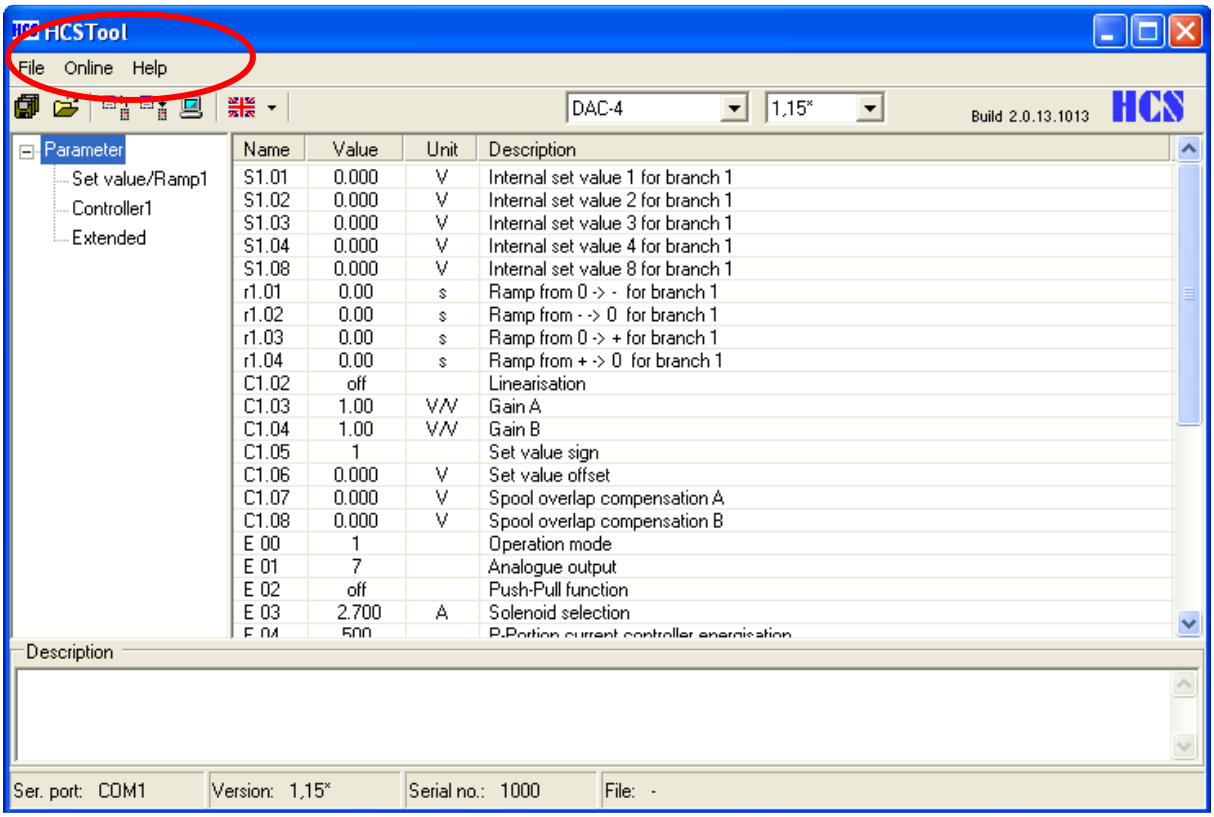
(17) Installation: Driver: Warning: Driver is Already Installed

(18) Installation: Driver: Windows: No Driver Installed

4 Start Window

As soon as HCSTool is started, the start window will open. Picture “(19) *HCSTool Start Window*” shows the start window. The menu line of the start window contains the selections “File” “Online” and “Help”. The following sections describe and explain these three menu items.

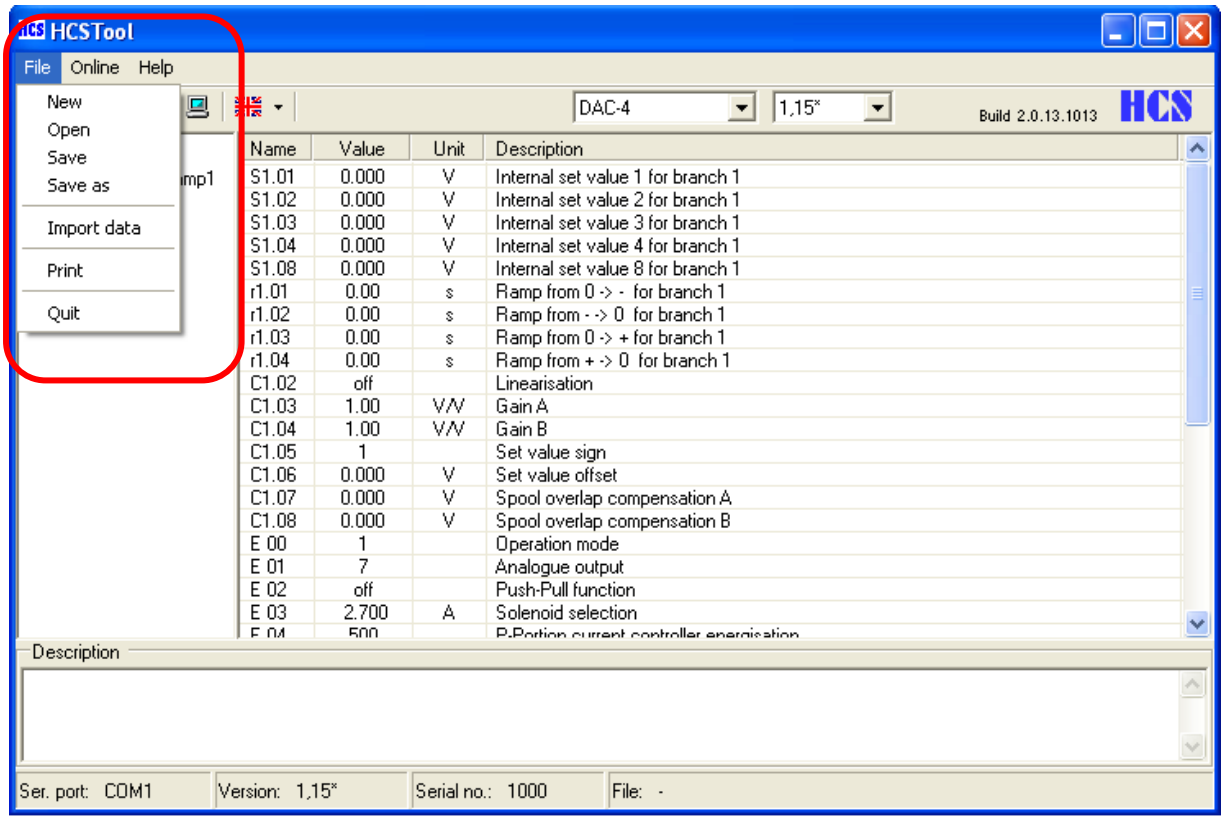
For the following sections and explanations, no unit is connected to HCSTool. Therefore, it is not possible to overwrite any parameters in a unit.



(19) HCSTool Start Window

5 Select: File

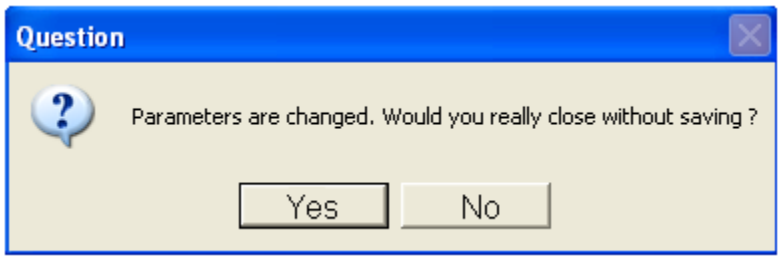
The menu item File contains: “New”, “Open”, “Save”, “Save as”, “Import Data”, “Print” and “Quit”. Picture “(20) Select File” shows these possibilities of selection. A mouse click on File shows the possible selections.



(20) Select File

5.1 File -> New

With the selection “File: New” you can create a new parameter file. If parameters have been changed already, a warning will now appear. Picture “(21) Question: Close without saving?” shows this warning. If the warning is confirmed with “Yes”, any values fixed so far will be reset to “Default” and deleted. As no unit has been connected so far, the value of the unit is not being changed.
You cancel the process by clicking on the selection “No”.

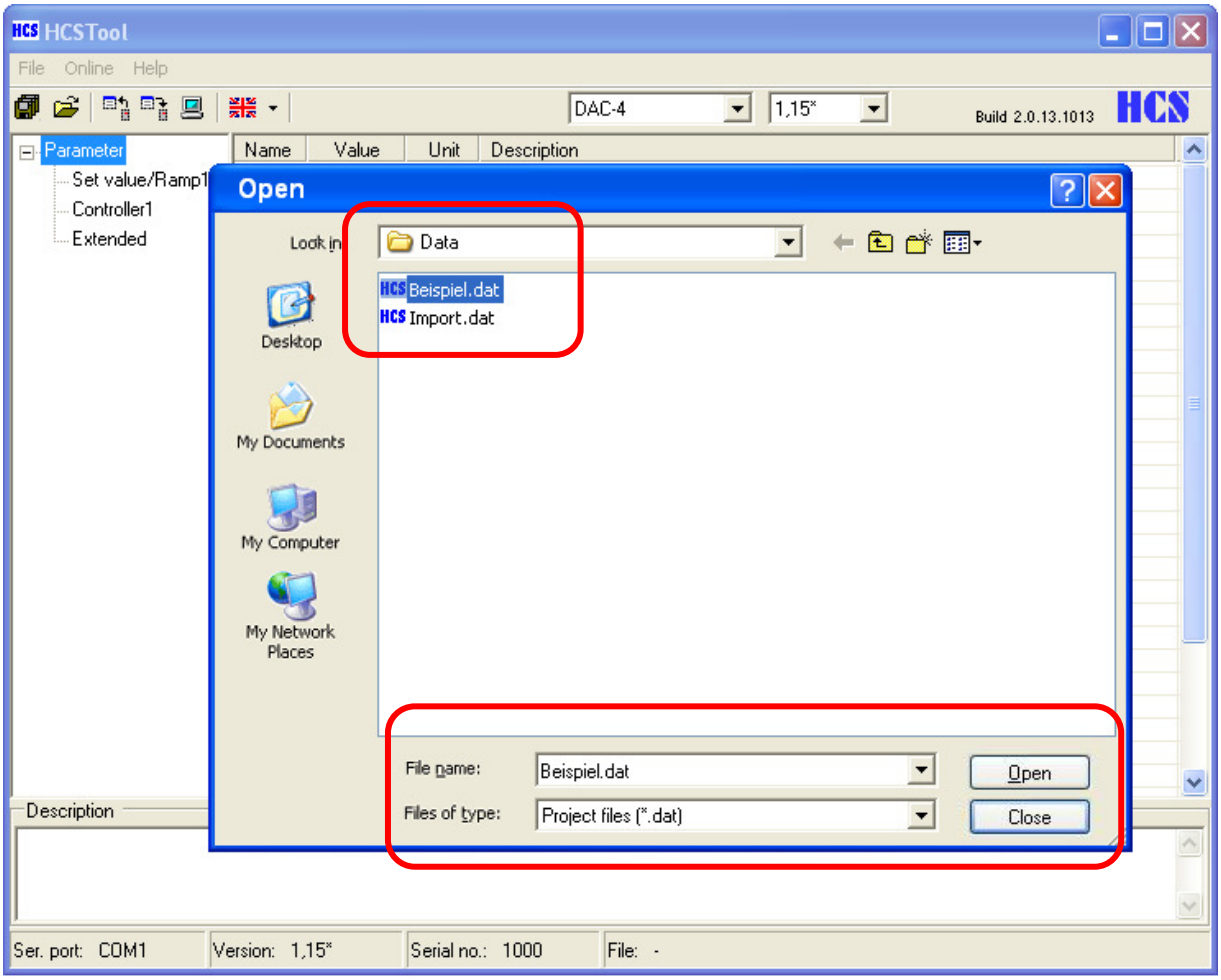


(21) Question: Close without saving?

5.2 File-> Open

If a parameter file has been saved, it can be loaded with the menu item: “File: Open”. To do so, you click with the mouse button on “File: Open”. A window as can be seen in picture “(22) File: Open” will open. In this picture, a file named “Beispiel.dat” has already been saved, which can now be opened. First, the file has to be selected with a mouse click. A mouse click on the button “Open” will now open the file. The button “Cancel” will cancel the process.

TIP Parameter Files have the file ending “dat”, and only these files can be loaded.

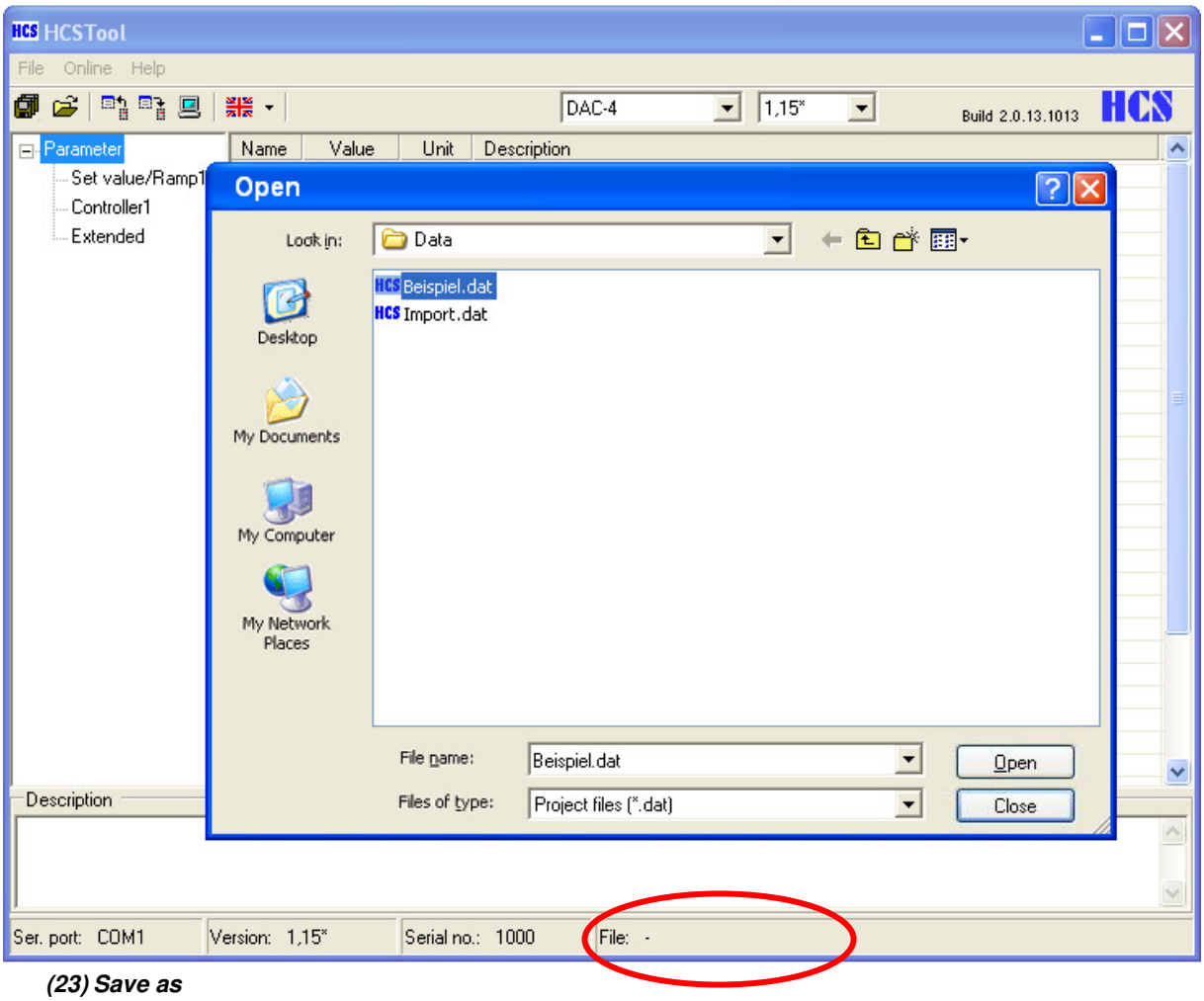


(22) File: Open

5.3 File -> Save

If a parameter file has to be saved, the menu item “File: Save” can be used. A distinction whether a file has already been opened or not must be made. This can be seen in the start window at the bottom on the right side. In picture “(23) Save as” at the bottom on the right side is written: “File: -”. Picture “(23) Save as” shows the window which will open if no file has yet been opened. If, for example, the menu item “File” indicates “C:\Programs\HCSTool\Data\File” or another file with its file path, then a file has already been opened. A mouse click on “File: Save” will overwrite this file without warning.

TIP To avoid an accidental writing resp. overwriting of file, please use “File Save as”.



(23) Save as

5.4 File -> Save as

In order to avoid an accidental writing resp. overwriting of file, please use “File Save as”. A mouse click on “File Save as” will always open the window “(23) Save as”. Now, you only have to enter the file name and click on Save. Cancel will cancel the process.

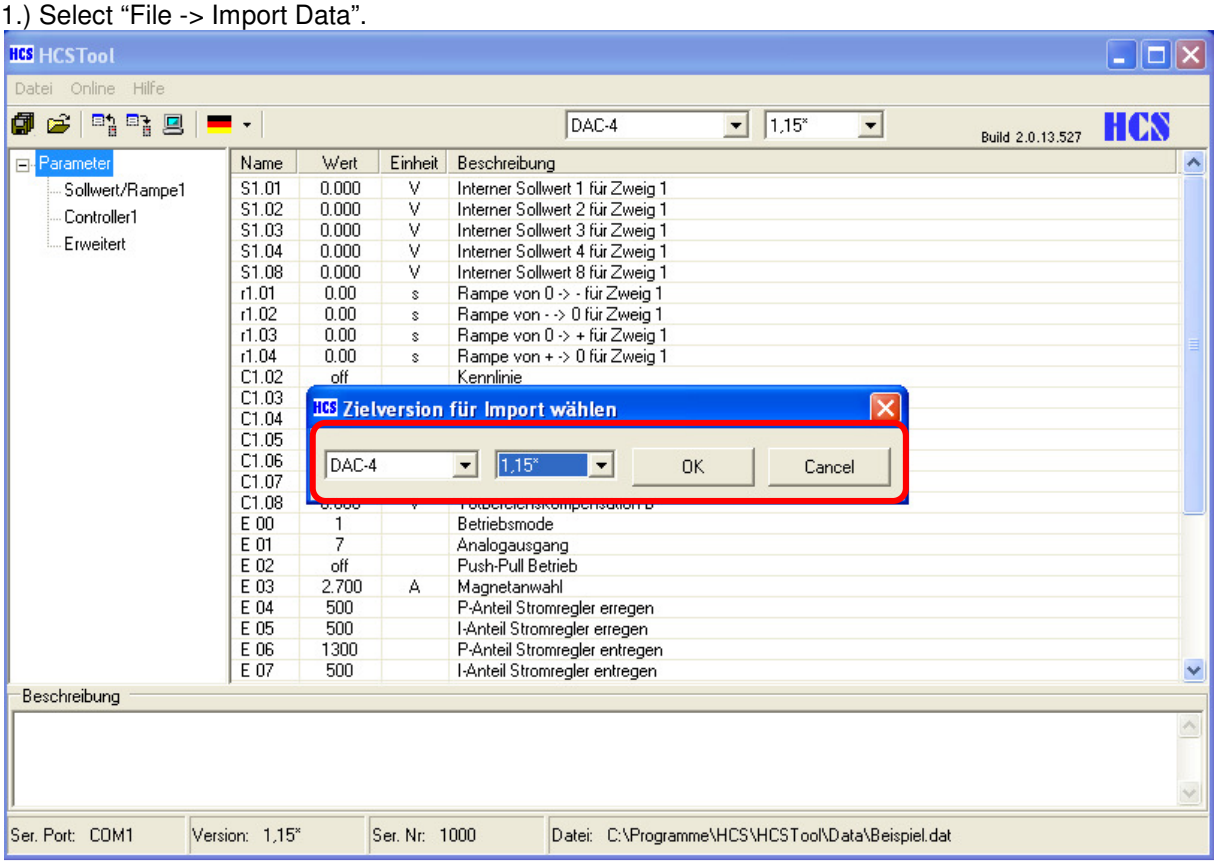
5.5 File -> Import Data

This is necessary if e.g. you want to transmit a set of parameters, i.e. a parameter file, from an old software version into a newer software version. It may also be necessary to use the same setting parameters in another software version.
HCSTool prevents a download of another software version. The software version on the target hardware must be identical to the software version preset in HCSTool.
There are following two possibilities in this connection:

- You enter the parameters by hand into a parameter file opened with “File New”.
- You use the function “Import Data”. This means that you want to transmit data out of a known parameter file for specific software into a new file, for another software version.

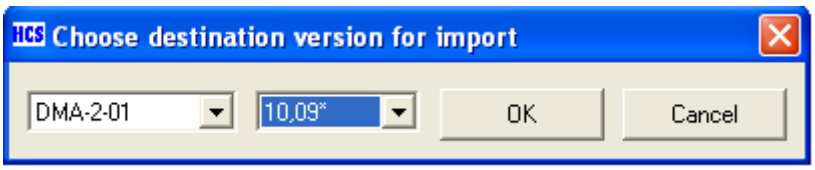
As soon as you click with your mouse on “File: Import Data” in the menu item, a new window will open. Picture “(24) Import Data” shows this window.

1.) Select “File -> Import Data”.



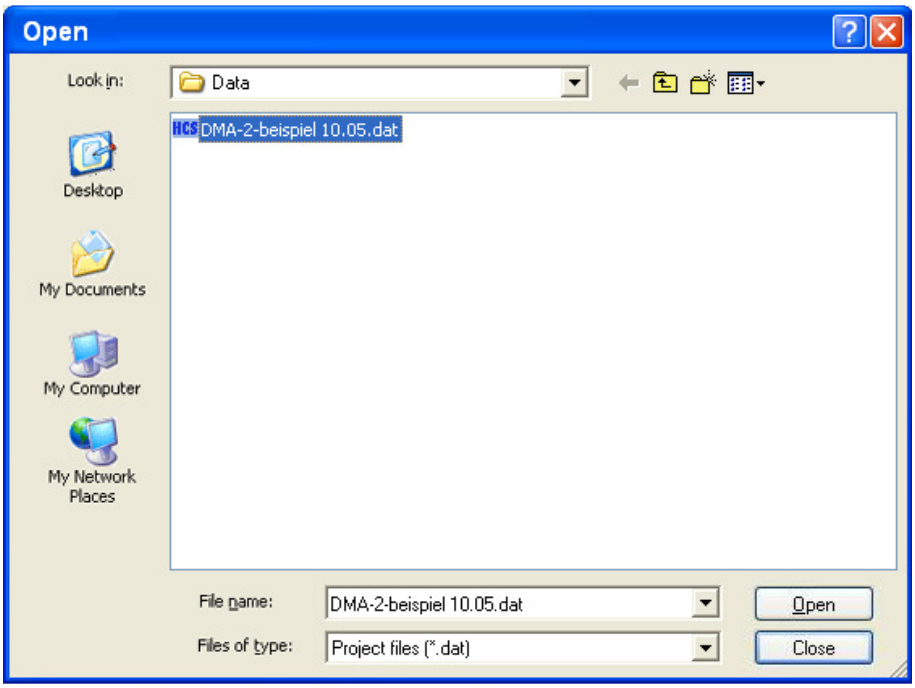
(24) Import Data

2.) Now the destination version is selected. To do so, you have to select the type and software version of the destination unit. In this example here: DMA-2-01 with the destination unit software version V10.09* “(25) Determine Destination Version”.
This step has to be confirmed with “OK”. The process is cancelled with “Cancel”. If the process is continued (“OK”), a window will open which can be seen in picture “(22) File: Open”.



(25) Determine Destination Version

3.) As third step, the existing parameter file has then to be opened. This has already been described in section “5.2 File-> Open”. After the file has been opened, it will be imported automatically. In this example here: a parameter file for a DMA with version V10.05. See picture “(26) Example File open for import”.



(26) Example File open for import

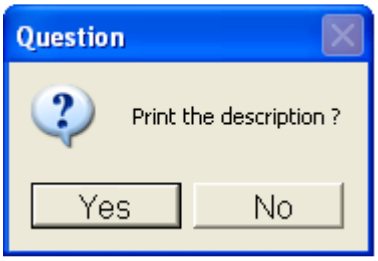
4.) As last step, the user has to control the imported parameters once again.
Due to the different software versions, some parameters may show other or invalid values. If parameters are marked in “Red”, they cannot be transmitted correctly into the new software version.
Possible reasons: The parameter was reset onto another value which is backed up by the source software, but not the destination software. Another reason may be that a value has not been translated correctly. It is also possible that the file to be imported is damaged.

Attention: All parameters have to be controlled once again after import. Especially those parameters, which are marked in “Red” after import, have to be re-edited in any case.

5.6 File -> Print

If you want to print the parameters, you can do so with “File Print”. The window “(27) HCSTool: Print with Description” will appear. In this window you can decide whether you also want to print the description you added in section “9.1.2 Text Field Description“. By clicking with the mouse on the button “Yes”, you add the description to the print window.
You avoid this with button “No”.

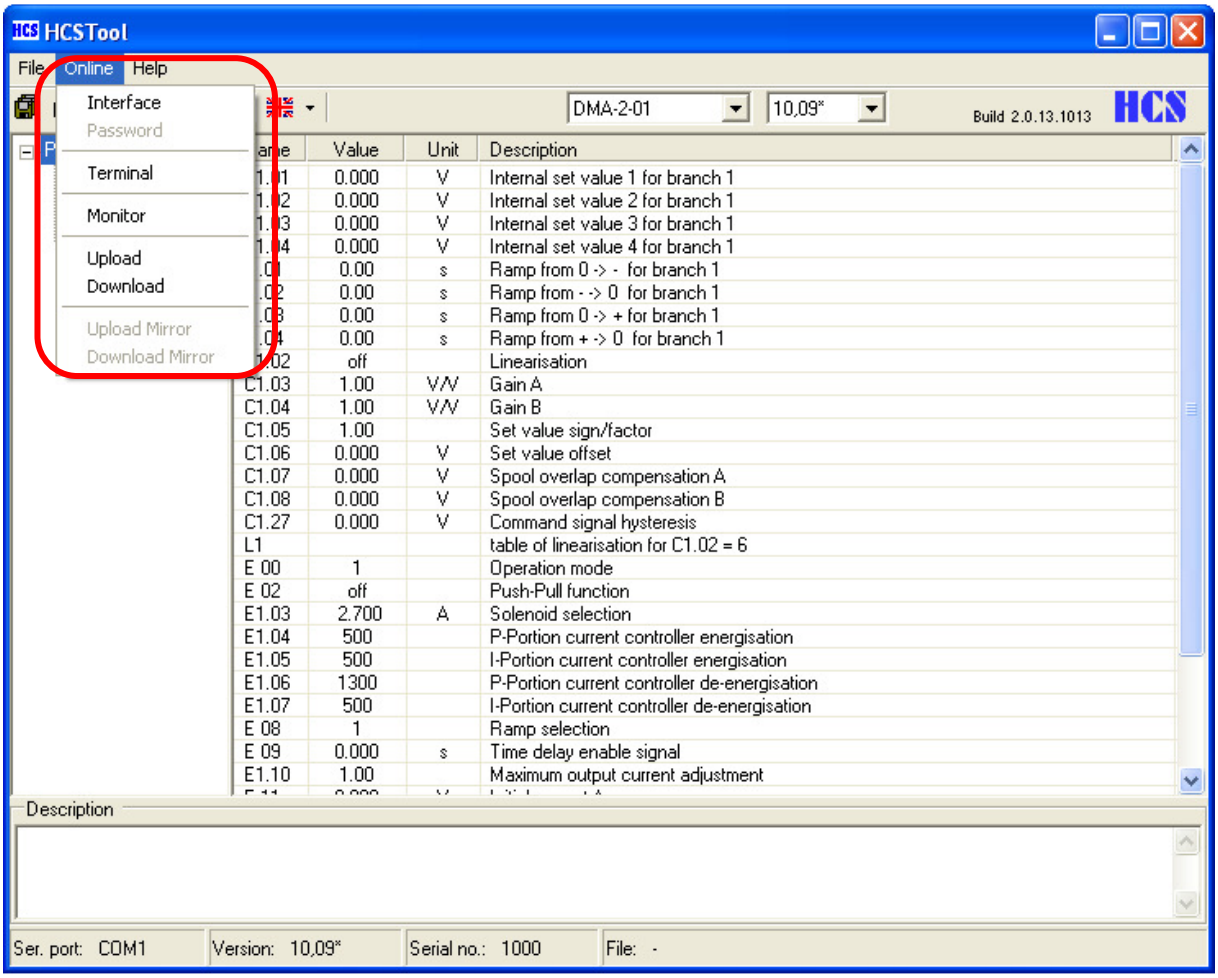
TIP Please take more detailed descriptions of the single parameters from the instructions of the unit.



(27) HCSTool: Print with Description

6 Selection Online

Menu item “Online” has 8 sub-items. Picture “(28) Online” shows these sub-items. The following sections describe: “Interface”, “Password”, “Terminal”, “Monitor”, “Upload”, “Download”, “Upload Mirror” and “Download Mirror”.



(28) Online

6.1 Online -> Interface

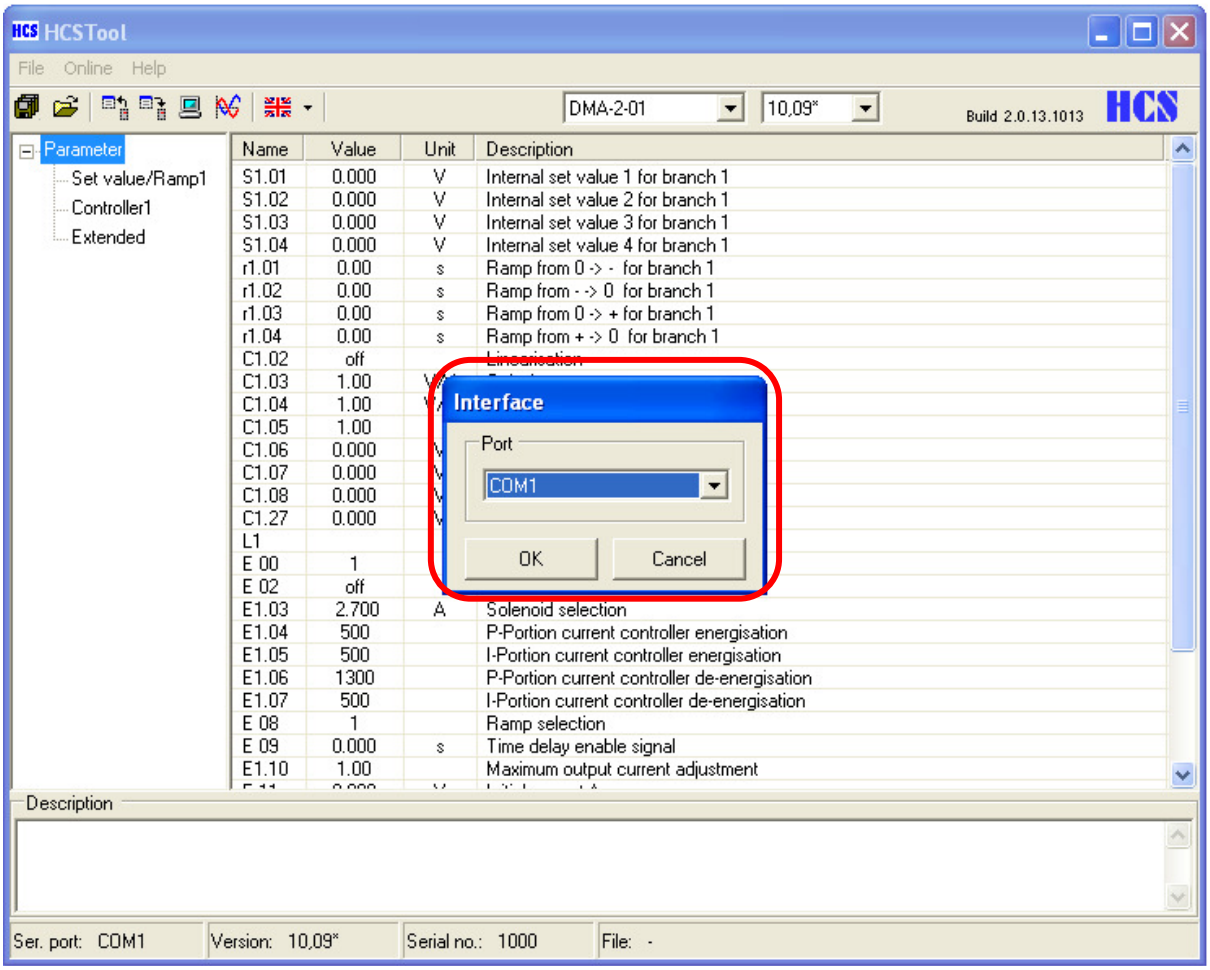
In order to be able to connect a unit with HCSTool at all, the unit has to be supplied with power and connected with the laptop or PC. Next, you have to select the correct interface of the PC. Picture “(29) Interface” shows the window which will open when you select the menu item “Online Interface”. Now you have to select the correct interface. If you cannot make a selection in this window resp. if the window is empty, no serial interface has been installed on the PC or the laptop. A computer expert or an IT department may help you here. If you can select from a range of several interfaces and you are not sure which interface the unit is connected to, you can carry out an “upload” at one available interface after the other, please see “6.6 Online -> Upload” in this connection.

Attention: As soon as the connection is made, parameters can be overwritten on the unit!

TIP

If a DAC-USB- or a DMA-USB-cable has been installed and connected to the PC, this connection is listed here as COMx (x stands for a number).

In order to select the interface, please click with your mouse on “OK”. “Cancel” will cancel the process. For further explanations about the successful connection of assemblies with HCSTool, please see section “6.3 Online -> Terminal”.



(29) Interface

6.2 Online -> Password

If the unite used has password protection, the password can be entered under “Online Password”. The password protection is destined to protect parameters which should not be modified by an untrained user.

6.3 Online -> Terminal

Normally, this item is not needed by the user. It is provided for service purposes only. Should you require more detailed information, please contact your nearest service representative.

6.4 Online -> Monitor

Picture “(30) Monitor” shows the monitor. In order to open the monitor at all, following conditions have to be fulfilled:

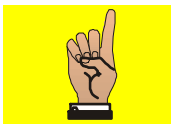
- Selection of the correct serial interface, see section “6.1 Online -> Interface”.
- The unit is connected to the PC by a serial cable or by USB.
- The unit has to be supplied with energy. This can be recognized by the green Power LED of the unit.

Attention: The unit can execute movements on the machine if “Enable” is activated.

Further information on the connection of the unit to the PC or the laptop is contained in the user manual of the unit.

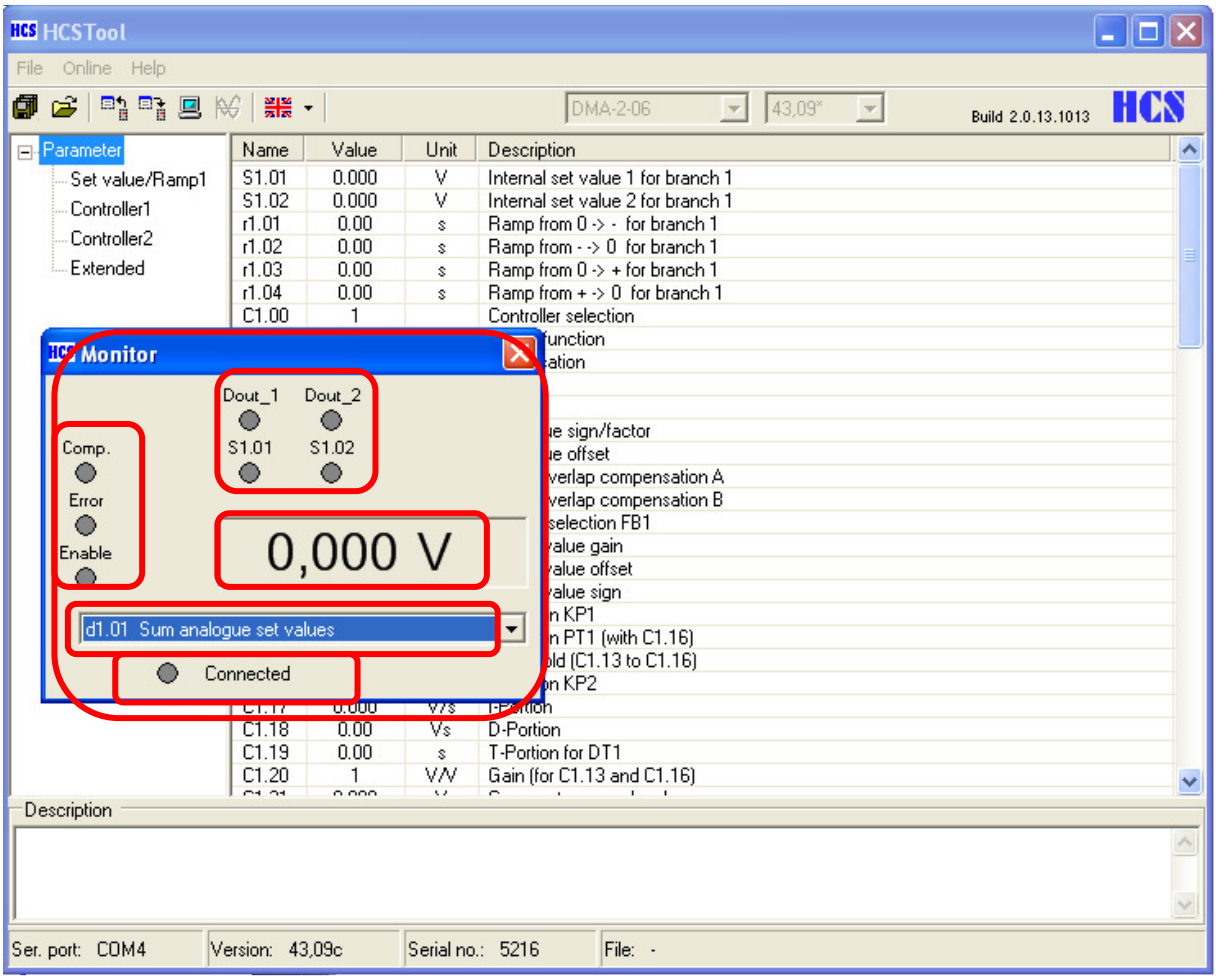
When HCSTool has been successfully connected to the unit, the internal measured values of the unit can be retrieved via the monitor function. At the bottom of the window as can be seen in picture “(30) Monitor” there is a status bar: “Connected”. This status bar has to light up in green at regular intervals, several times per second. Only then a unit is connected successfully with HCSTool. The display value at start condition depends on the unit. However, it normally begins with “d1.01 sum of analogue SW”. A mouse click on this value will open the selection of those internal display values that can be displayed. A mouse click on the desired display value will then show this display value.
Furthermore, there are several status displays. “Error” will appear in “red”, if errors at the unit have occurred. “Enable” will appear in “green”, if the enable signal is present at the unit. As soon as the unit changes its status, this will be shown on the monitor of HCSTool.

In picture “(30) Monitor” you can also see other status lights. Number and denomination of the lights change, depending on the unit and the software version running on it.
It is important to say that “Enable” has to be activated, so that the unit can calculate and then display internal values via the enable function.



The display values on the monitor can only be updated resp. calculated, if “Enable” is activated.

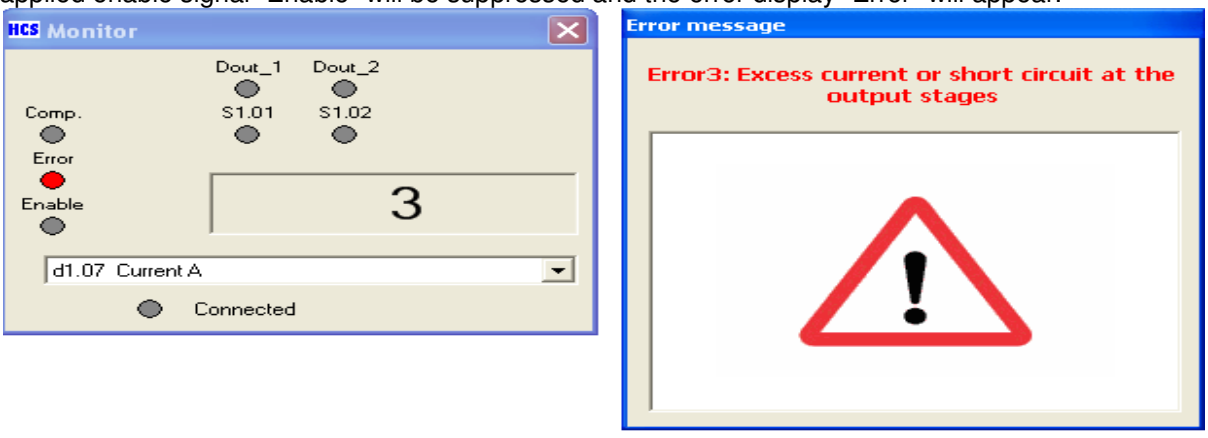
Below is an example:
Two digital set values, “S1.01” and “S1.02”, exist of the selected unit “DMA-2-06”, software version “v43,09”. Besides, Dout_1 and Dout_2 and “Comp” (comparator) do also exist.
In this example, no “Enable” is applied. In the initial stage, all displays have a grey background.
If the digital set value S1.01 input is now changing from logic ZERO to logic ONE, the display S1.01 will show a “yellow” background.



(30) Monitor

6.5 Online -> Monitor with Error Display

When an error or a malfunction at a connected unit occurs, it can be analyzed in the monitor window. For this purpose, the HCSTool monitor function has to be activated.
Picture “(31) Monitor with Error Display” shows such an indicated error. The unit goes into a fault condition, an applied enable signal “Enable” will be suppressed and the error display “Error” will appear.



(31) Monitor with Error Display

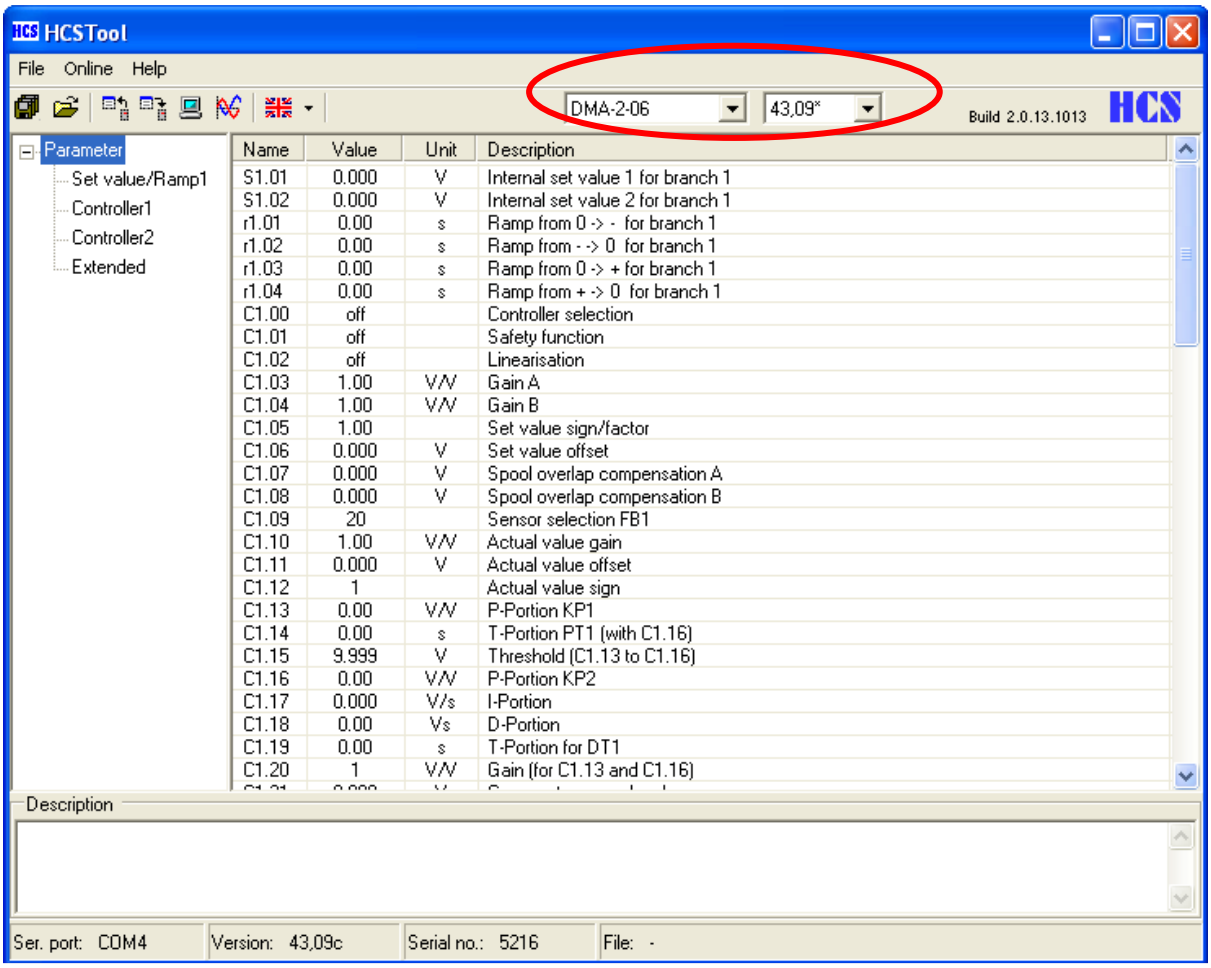
6.6 Online -> Upload

The function of “Online -> Upload” is primarily to read a complete parameter set out of the unit. A mouse click on “Online -> Upload” will trigger an automatic process. This process includes three steps:

1. The unit will automatically be connected to HCSTool.
2. The parameters will be read automatically by the unit and entered into HCSTool.
3. HCSTool will select the unit version and the software version by itself and will change the display.

In picture “(32) Upload” the unit “DMA-2-06” and the software version “43,09*” have been automatically recognized and selected.

A faulty “Upload” will be indicated by an error message, as can be seen in picture “(33) Error Version”. Here, a reason may be that one of the conditions mentioned under “6.4 Online -> Monitor” has not been fulfilled.



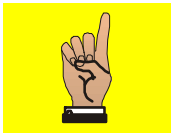
(32) Upload

(33) Error Version

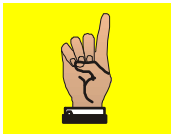
6.7 Online -> Download

The function of “Online -> Download” is primarily to transmit a complete set of parameters into the unit. The function “Online -> Download” is the counterpart of “Online -> Upload”. “Online Upload” has already been described in section “6.6 Online -> Upload”. The download process is an automatic process, too, a mouse click on “Online Download” will trigger following three steps:

1. The unit will be connected to PC or laptop.
2. HCSTool will automatically check whether the unit version and the software version of the unit are identical to the one selected in HCSTool.
3. Message: “Do you really want to overwrite all parameters in the target device?”. See picture “(34) Question: Overwrite”.
4. After confirmation of the message in picture “(34) Question: Overwrite” with “Yes”, the parameters will be automatically transmitted to the unit and the parameters contained therein will be overwritten.



During execution of a download, all parameters of the unit will be overwritten.



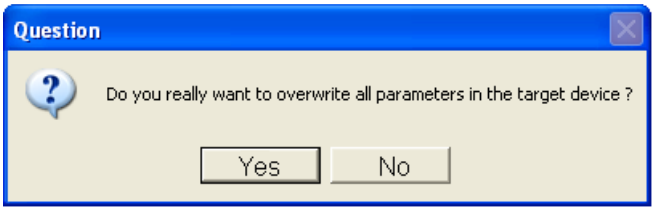
For security reasons, parameters of a unit can only be overwritten during execution of a download, if their software version is identical to the one selected in HCSTool.

Typical errors

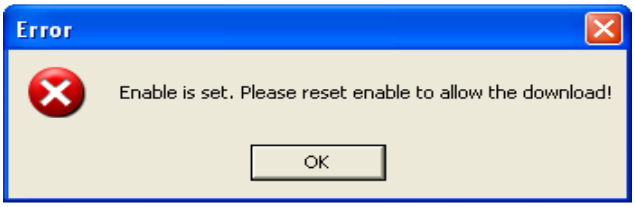
Picture “(33) Error Version”: The unit has not been connected successfully to the PC. A download can only be successful, if all items mentioned in section “6.3 Online -> Terminal” have been fulfilled.

Picture “(35) Error: Enable is set” means that enable has been activated on the unit. It is indispensable to remove enable, otherwise no parameters can and will be written automatically.

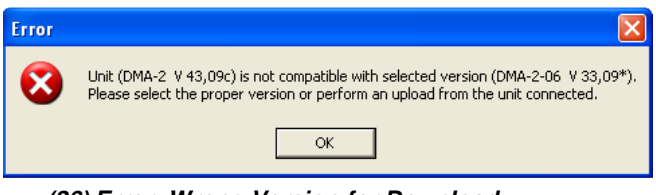
Picture “(36) Error: Wrong Version for Download” means that there have been attempts to load another incompatible software on the connected unit. In such a case, section “5.5 File -> Import Data” will help.



(34) Question: Overwrite



(35) Error: Enable is set



(36) Error: Wrong Version for Download

6.8 Online -> Read Mirror

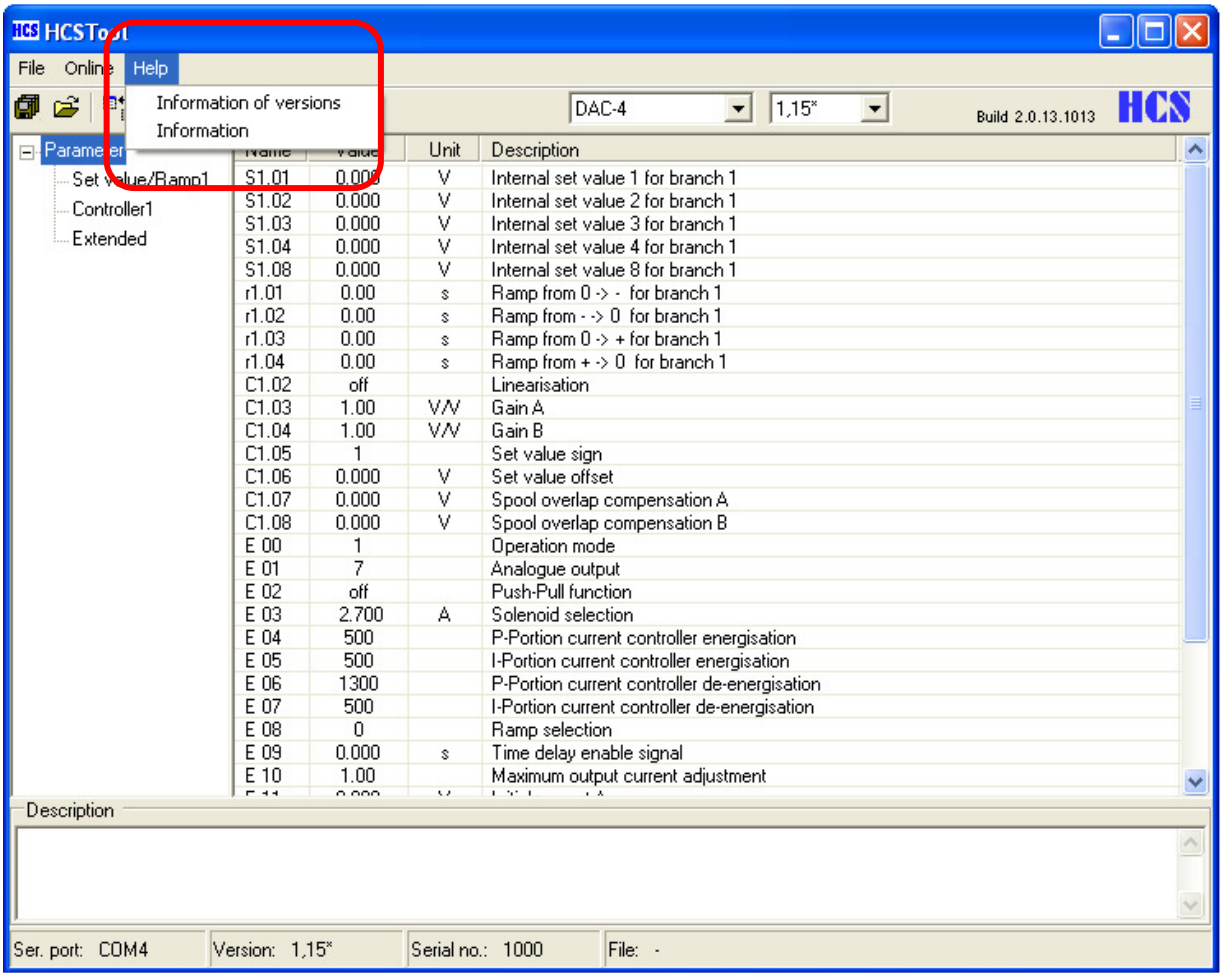
This function is only available for unit type DAC-4. The DAC-4 user manual describes the function of the mirror memory in more detail. With the command “Read Mirror” the parameters will be loaded from the so-called mirror memory of the connected unit into HCSTool.

6.9 Online -> Write Mirror

This function is only available for unit type DAC-4. The DAC-4 user manual describes the function of the mirror memory in more detail. With the command “Write Mirror” the parameters of HCSTool will be loaded into the connected unit and overwrite the mirror memory contained in it.

7 Selection: Help

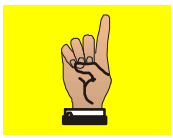
Under the menu item “Help” you will find “Information of Versions” and “Information”. The following sections describe these two menu items. In picture “(37) Help” you will find these possible selections.



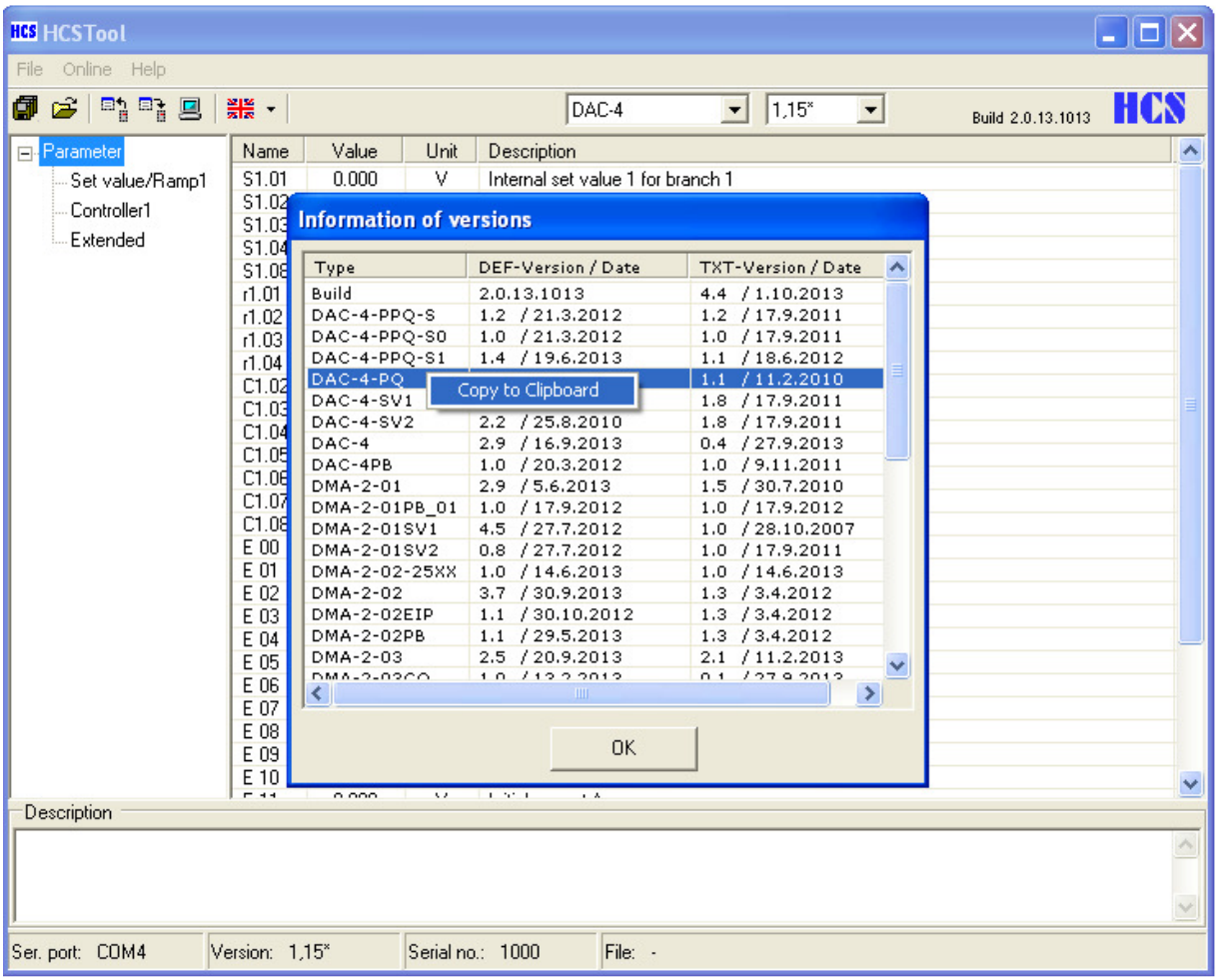
(37) Help

7.1 Help -> Information of Versions

In “Information of Versions” you will find an overview of the unit resp. the versions of the definition files “Def-Files” and the corresponding parameter text files “TxT-Files”. These files were added by HCSTool during installation and describe the parameters in the various assemblies. Picture “(38) Information of Versions” shows a little overview of the versions. By using the right mouse button, the content of the window “Information of Versions” can be put in the clipboard and be added again as text e. g. to an email.



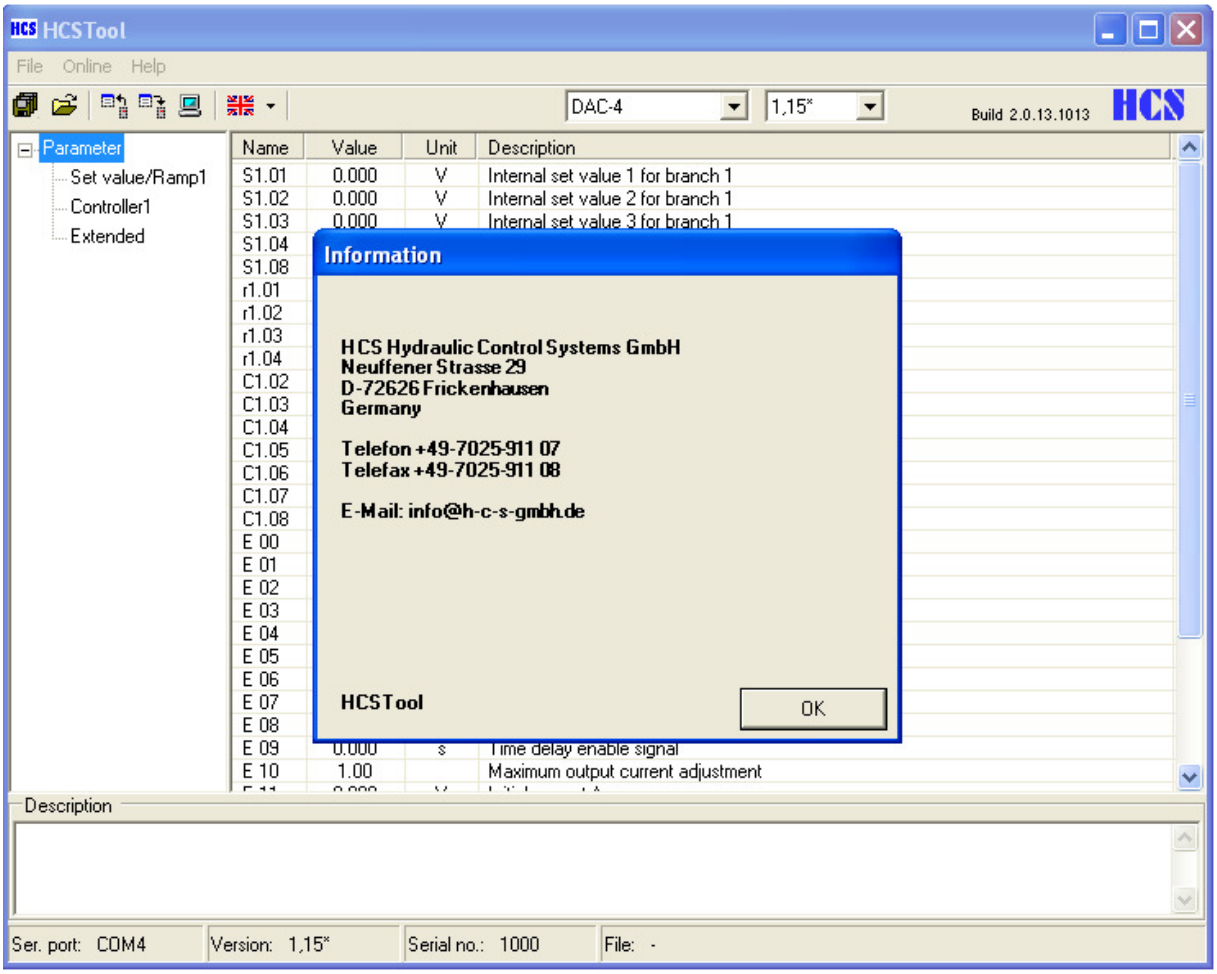
Any unauthorized modification of these files is not permitted.



(38) Information of Versions

7.2 Help -> Information

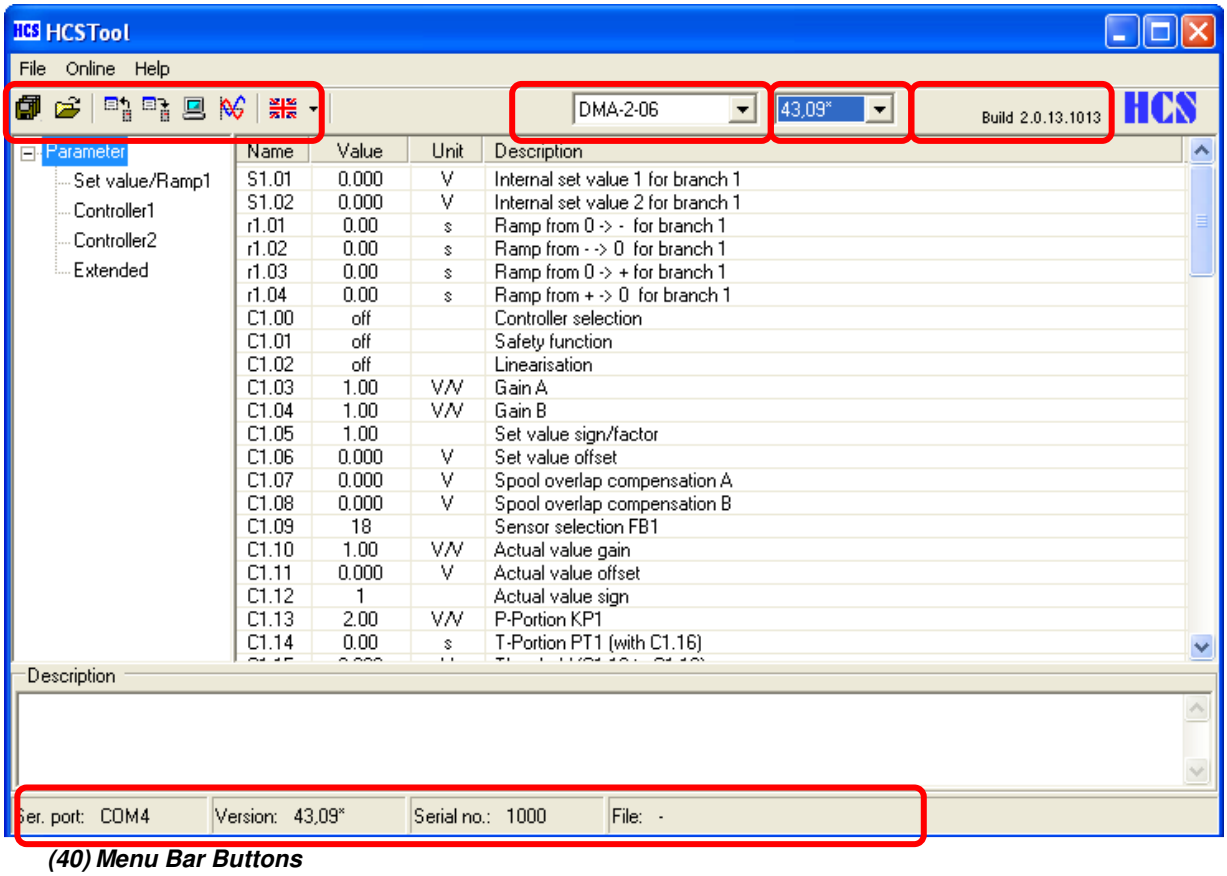
Picture “(39) Information” shows the window which will open, if you make a mouse click on “Help Information”. There, you will find the owner of the software resp. contact details.



(39) Information

8 The Menu Bar Buttons

This section explains the buttons: “Save Parameter”, “Open Parameter File”, Read Parameters from the Device”, “Write Parameter into the Device”, “Monitor for the Display of Internal Values”, “Oscilloscope Function”, “Language”, “Unit Type”, “Unit Software” and what they are used for. You see further information such as “Build”, Version”, “Ser. Port.”, “Version”, “Serial No.” and “File”. Picture “(40) Menu Bar Buttons” shows all this information.



(40) Menu Bar Buttons

8.1 Menu Bar Button: Save Parameter

This function is t he same as mentioned under section “5.3 File -> Save” and saves the parameters. See picture “(40) Menu Bar Buttons”.

8.2 Menu Bar Button: Open Parameter File

This function is the same as mentioned under section “5.2 File-> Open” and opens a parameter file. See picture “(40) Menu Bar Buttons”.

8.3 Menu Bar Button: Read Parameters from the Device

This function is the same as mentioned under section “6.6 Online -> Upload” and starts the automatic upload. See picture “(40) Menu Bar Buttons”.

8.4 Menu Bar Button: Write Parameters into the Device

This function is the same as mentioned under section “6.7 Online -> Download” and starts the automatic download. See picture “(40) Menu Bar Buttons”.

8.5 Menu Bar Button: Monitor for Display of Internal Values

This function is the same as described under section “6.4 Online -> Monitor” and indicates the internal values. See picture “(40) Menu Bar Buttons”.

8.6 Menu Bar Button: Oscilloscope Function

If the oscilloscope function is available for the connected device, this button is selectable. This function will start the oscilloscope. You will find further information in section “10 Oscilloscope”.

8.7 Menu Bar Button: Language

This menu item selects the language. You can choose between English, German and French. See item “(40) Menu Bar Buttons”.

8.8 Menu Bar Button: Unit Type

This menu item serves to preselect the unit type. See item “(40) Menu Bar Buttons”.

8.9 Menu Bar Button: Unit Software

This menu item serves to preselect the software version of the unit. See item “(40) Menu Bar Buttons”.

8.10 Additional Information: Build

This information serves to display which software version HCS Tool has.

8.11 Additional Information: Ser. Port

This information serves to display which serial interface has been selected.

8.12 Additional Information: Version

This information serves to display which software version the connected unit has. This value is only available after successful upload. See section “6.6 Online -> Upload”.

8.13 Additional Information: Serial No.

This information serves to display which serial number the connected unit has. This value is only available after successful upload. See section “6.6 Online -> Upload”.

8.14 Additional Information: File

This information serves to display which file has been opened or saved. This value is only available after successful saving or opening of a parameter file. See section “5.2 File-> Open” and section “5.3 File -> Save”.

9 Change of Parameters

9.1 Selection and Sorting of Parameters

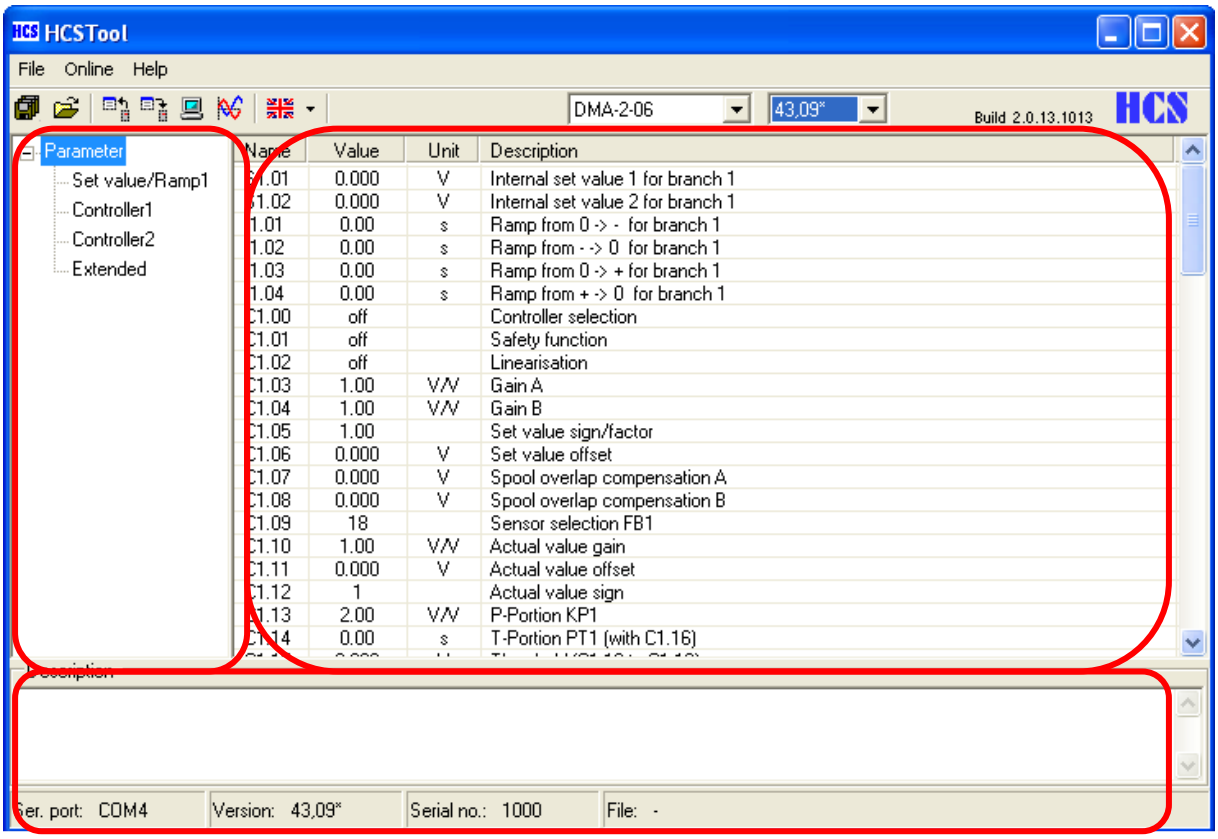
In picture “(41) Selection and Sorting of Parameters” the window is divided into three parts.
The left part of the window shows various headings concerning the sorting of parameters. Each parameter heading indicates a particular group of parameters. The various parameters, which are visible in the right window, are hidden under each heading.
The headings concerning the sorting of parameters, which can be seen in picture “(41) Selection and Sorting of Parameters”, “Set Value/Ramp 1”, “Controller1”, “Controller2” and “Extended” may vary between the various assemblies and operating modes. These headings concerning the sorting of parameters will change according to unit version, unit software version and unit operating mode.

9.1.1 Example for the Sorting of Parameters

A mouse click on “Set Value/Ramp1” will change the right side of the window in picture “(41) Selection and Sorting of Parameters” and will only show those parameters which influence the fixed set values and the ramp function.

A mouse click on “Controller1” will change the right side of the window in picture “(41) Selection and Sorting of Parameters” and will only indicate the parameters of the first controller. Accordingly, the heading “Controller 2” contains the parameters of controller2.

A mouse click on “Extended” will change the right side of the window in picture “(41) Selection and Sorting of Parameters” and indicates the available “extended Parameters”.



(41) Selection and Sorting of Parameters

TIP Please take more detailed descriptions on the various parameters from the user manual of the unit.

9.1.2 Text Field Description

In the lower part of the window in picture “(41) Selection and Sorting of Parameters”, the user can add his own information to the set of parameters in text form. By selecting this window with the mouse you can add your texts in this window.

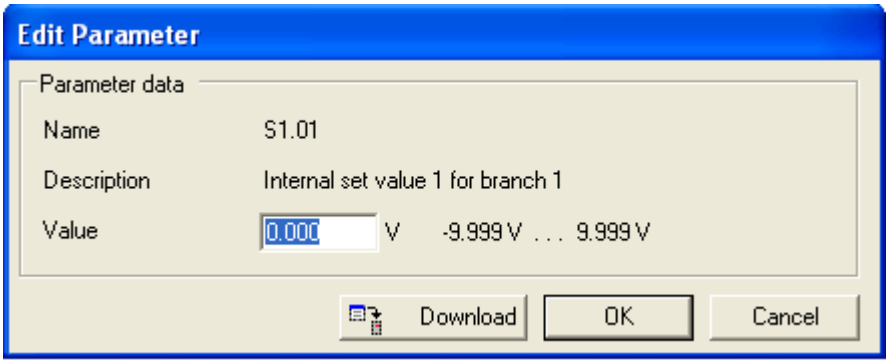
TIP Here, you can describe the set of parameters in more detail, so that a later assignment concerning a special setting will be easier.

In picture “(41) Selection and Sorting of Parameters” the window is divided into two parts.
The right side of the window shows the parameters which are available at the selected version. A mouse click on one parameter will open another window. The contents of this window are parameter specific.

9.2 Example for the Change of a Parameter

Example:
A double click on parameter S1.01 in picture “(41) Selection and Sorting of Parameters” opens the picture “(42) HCS: Parameters at the Example of S1.01”. This window contains various types of information:

Name:	Shows the abbreviation of the parameter, in this example S1.01.
Description:	Short, more detailed explanation of the parameter.
Edit Field:	In this field, the parameter value can be entered.
Value Range:	Shows the minimal and maximal possible input value. In the example, values between -9,999 and +9,999 can be set.
Download:	Transfers the value indicated in the edit field into the unit and takes this value also into the current set of parameters in HCSTool.
OK:	Closes the window, applies the value into the set of parameters in HCSTool, but does not transfer the value into the unit.
Cancel:	Cancels the process, the previously set value remains unchanged.



(42) HCS: Parameters at the Example of S1.01

10 Oscilloscope

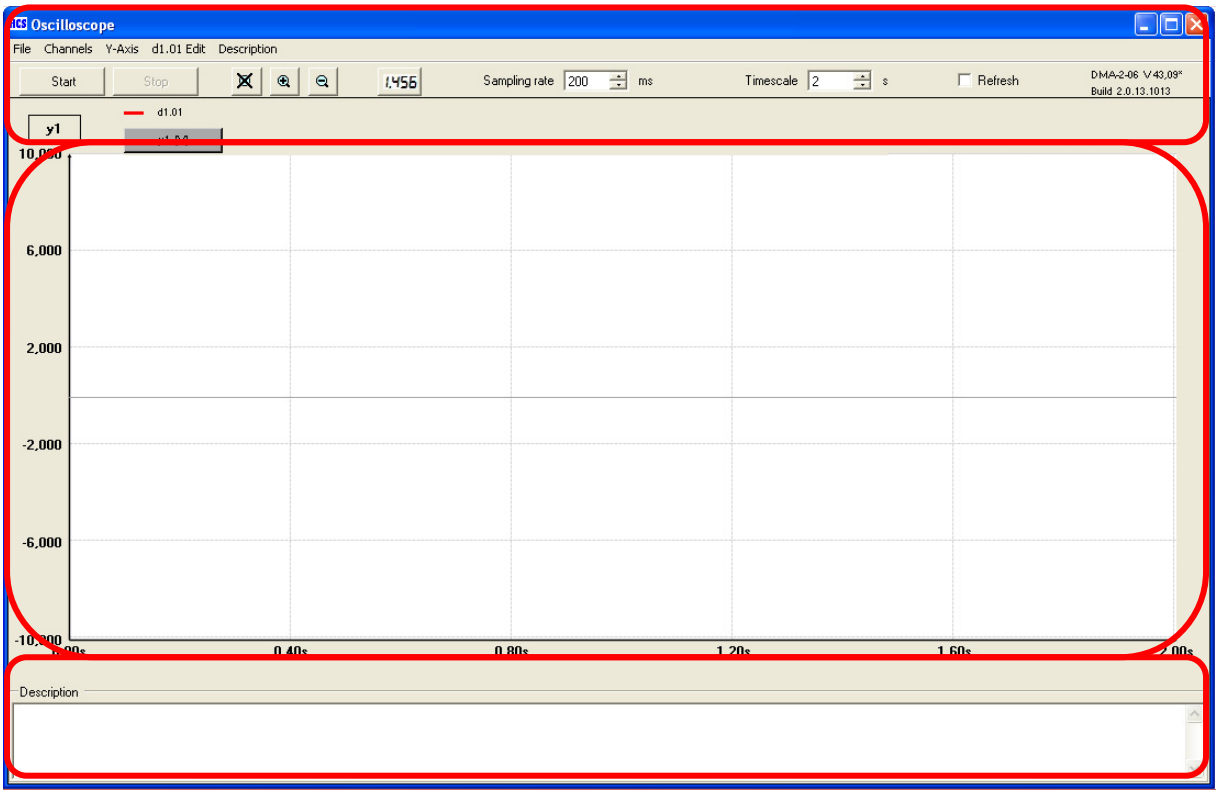
The oscilloscope can be used in order to picture signals and internal measured values time wise. Please note that this function is not possible with all assemblies and software versions.

A mouse click on the symbol “Oscilloscope Function” in picture “(40)Menu Bar Buttons” will open the oscilloscope. In picture “(43) Oscilloscope: Start Screen Oscilloscope” you see the start window. The following sections will describe the functions and the menu structure.

10.1 Start Window

The start window is divided into three parts:

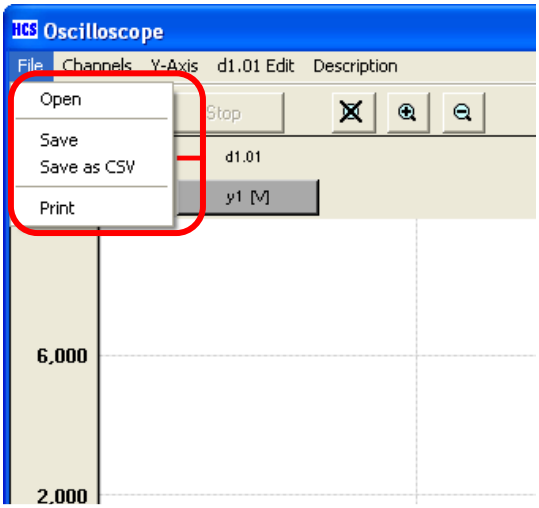
- control and configuration
- display area and
- user description



(43) Oscilloscope: Start Screen Oscilloscope

10.2 File

Under the menu item File you will find: Open, Save, Save as CSV and Print. In picture “(44) Oscilloscope: File” you can see these menu items.



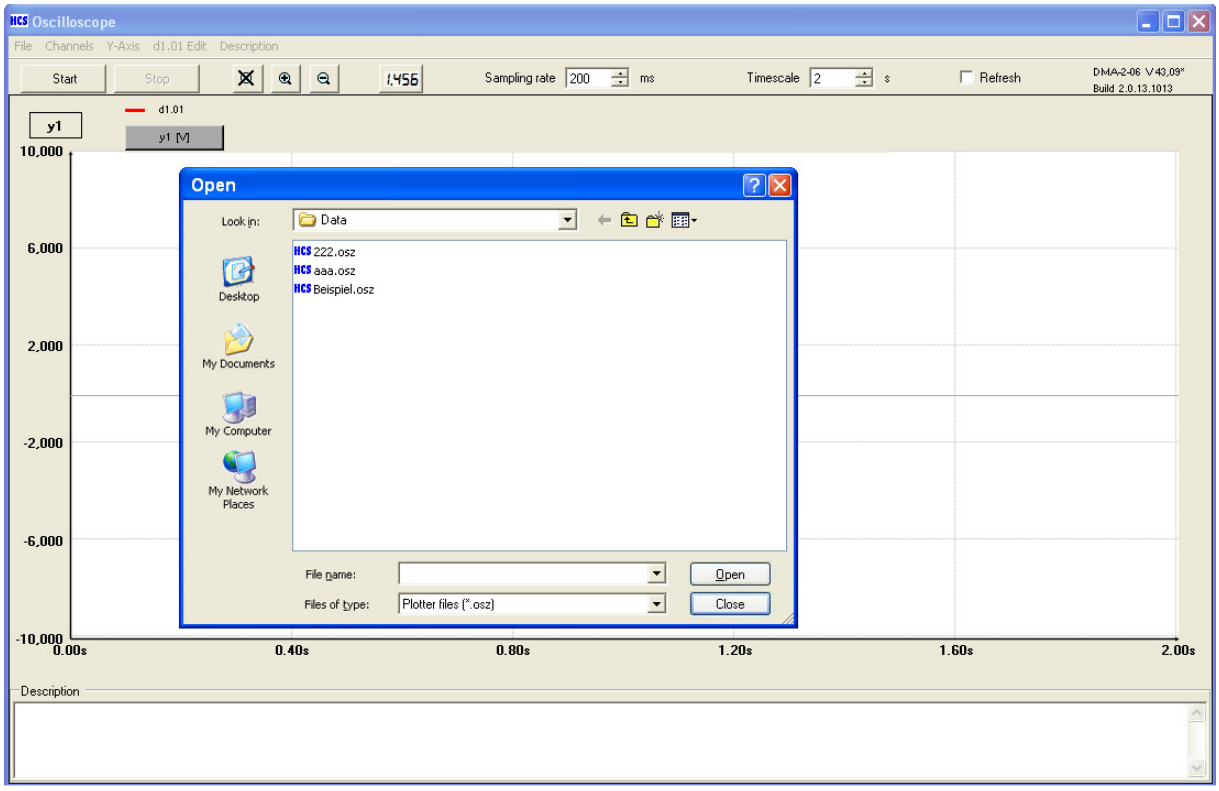
(44) Oscilloscope: File

10.2.1 File -> Open

A mouse click on “File Open” will open the function, in which you can open and download oscilloscope graphs that have previously been saved. Picture “(45) Oscilloscope: File: Open” shows the selection window.

TIP

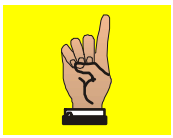
Oscilloscope Files have the file ending “osz”, and only these ones can be downloaded.



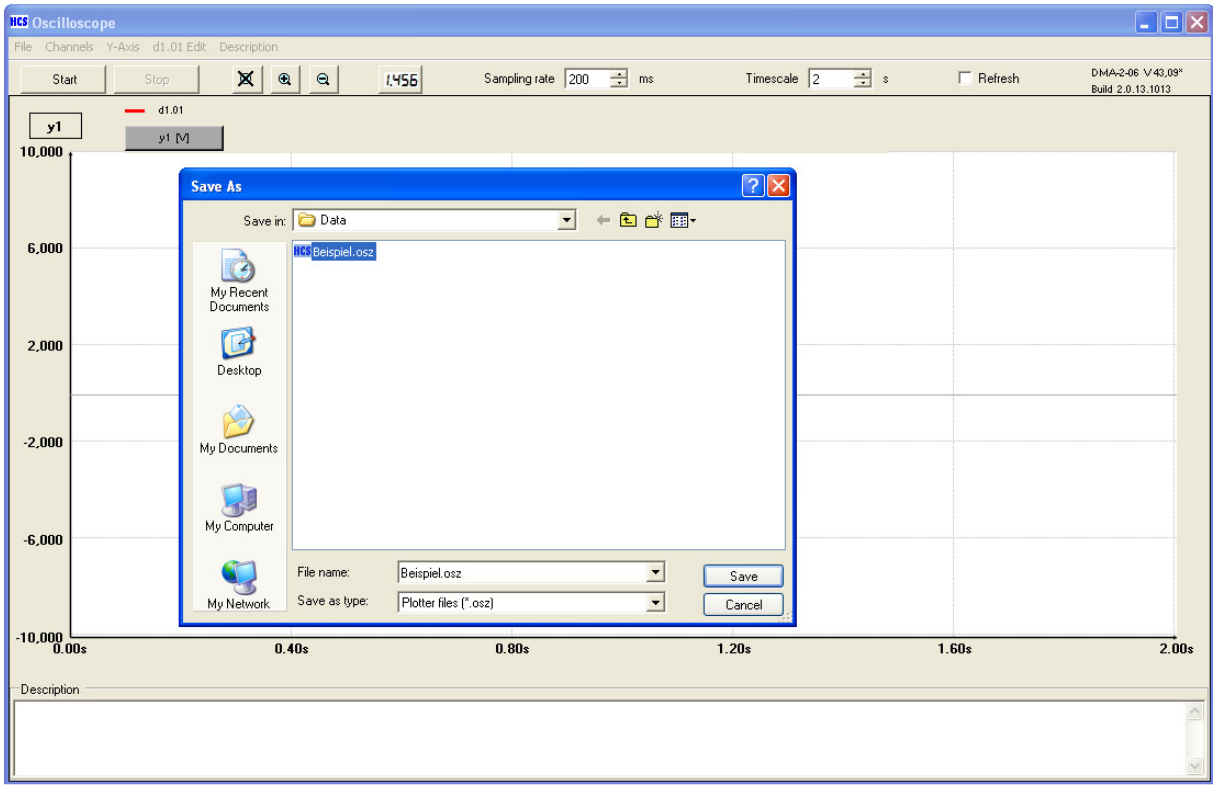
(45) Oscilloscope: File: Open

10.2.2 File -> Save

If you have registered a graph, you can save it with the function “File Save”. In picture “(46) Oscilloscope: File Save” you see the window which will open if you click with your mouse on “File Save”. In addition to the graphic file “osz”, another file will be put in the same directory. It will automatically receive the same term, but with the ending “dat”. This dat-file contains the complete set of parameters which is currently contained in HCSTool. This dat-file can be opened as described in section “5.2 File-> Open”.



In order to ensure that the set of parameters in HCSTool and the connected unit is identical, a previous synchronization between the latter two is necessary.

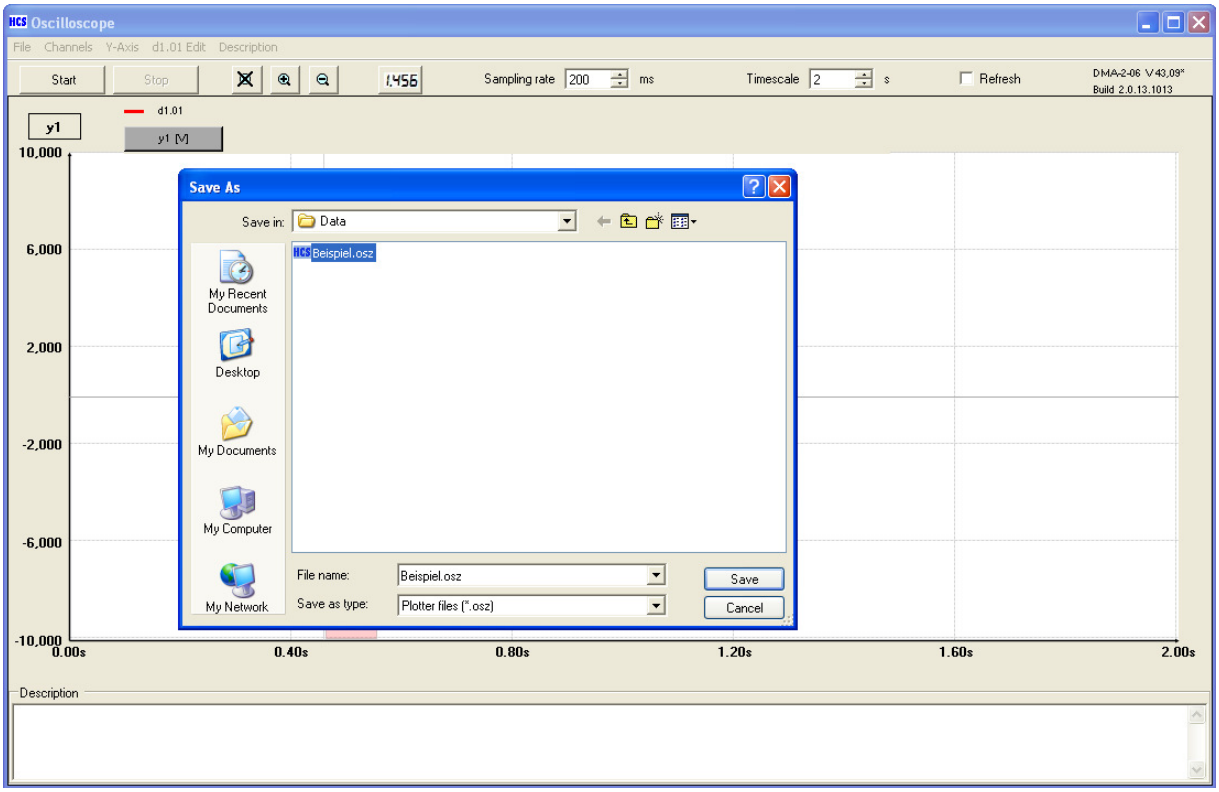


(46) Oscilloscope: File Save

10.2.3 File -> Save as CSV

Another possibility to save the recorded graph is under “File: Save as CSV”. In picture “(47) Oscilloscope: File: Save as CSV” you see the window which will open if you click with your mouse on “File: Save as CSV”.

TIP The file in CSV format cannot be opened in HCSTool, but instead in any program supporting the CSV format.



(47) Oscilloscope: File: Save as CSV

10.2.4 Structure of the CSV Format

The CSV format is structured as follows:

line 1: structure of columns
line 2: date of recording
line 3: number of graphic points
line 4: first graphic point

The columns are always structured in the same way:

column 1: time in clear text: in hours: minutes: seconds: milliseconds
column 2: time in clear text: in milliseconds
column 3: measuring point of measuring channel 1 -> visible at all times
column 4: measuring point of measuring channel 2-> visible only when channel 2 has been recorded
column 5: measuring point of measuring channel 3-> visible only when channel 3 has been recorded
column 6: measuring point of measuring channel 4-> visible only when channel 4 has been recorded

TIP The separator sign of the columns is a semicolon.

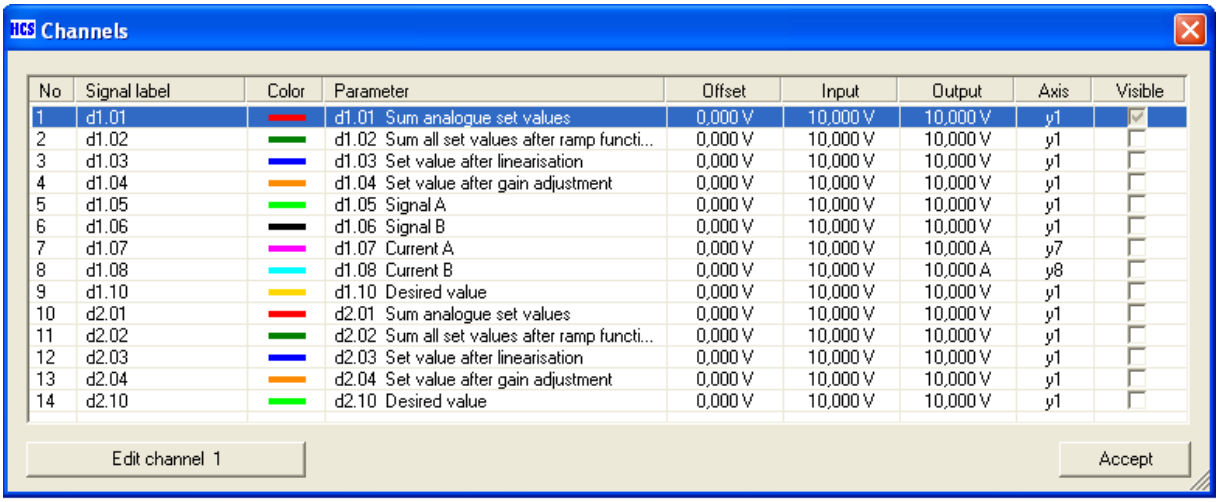
Example:
In the following example, 4 channels have been recorded: “d1.01”, “d1.04”, “d1.08” and “d1.11”. The start date of recording was 12.03.2013. The number of graphic points is 9 points. Below you can now see the contents of the file.

```
Timestamp;Milliseconds;d1.01;d1.04;d1.08;d1.11
12.03.2013  @ Start Date
9  @ Number of Graphic Points
00:00:00:0    ;    0;  3,4016970;  1,7115300;  0,3009339;  0,0000000
00:00:00:35   ;   35;  3,8814630;  1,9483610;  0,3604285;  0,0311298
00:00:00:82   ;   82;  4,3551240;  2,1882440;  0,4214063;  0,0451688
00:00:00:129  ;  129;  4,8361110;  2,4250750;  0,4830434;  0,0402857
00:00:00:176  ;  176;  5,3079410;  2,6619060;  0,5453397;  0,3882073
00:00:00:223  ;  223;  5,7816030;  2,8981260;  0,6078008;  0,8276873
00:00:00:268  ;  268;  6,2393950;  3,1312950;  0,6682842;  1,2079590
00:00:00:315  ;  315;  6,6971860;  3,3638530;  0,7318989;  1,6425560
00:00:00:360  ;  360;  7,1635230;  3,5890860;  0,7932064;  2,1278150
```

10.3 Channels

A mouse click on Channels will open the window “(49) Oscilloscope: Y-Axis”. In this window you can select the channels you want. A maximum of 4 channels can be recorded at the same time. The window shows all internal measured values available. The selection depends on the unit, software version and operating mode. The window is divided into the columns: No., Signal label, Color, Parameter, Offset, Input, Output, Axis and Visible. A mouse click on the button “Apply” will now apply all settings made. A mouse click on “Edit Channel 1” will open the window “(52) Oscilloscope: Channels, Edit Channel”. For further information on the various columns, please refer to section “10.5 Edit Channel 1 to X”.

TIP A channel can be made visible in a very simple way with default settings in the main window. Just activate the channel in the field “Visible” with your mouse.



(48) Oscilloscope: Channels

10.4 Y-Axis

With this function you can predefine up to 10 different Y-axes. This enables the user to define his individual axes, which are customized to the process. The picture “(49) Oscilloscope: Y-Axis” shows the window which will open after a mouse click on the button “Y.-axis”. This window contains the following columns: No., Dec., Min., Max., Unit as well as the buttons “Edit axis” and “Accept”.

Explanation of the titles of the columns:

No:: The index of the y-axis, which can be seen in picture “(48) Oscilloscope: Channels” under Axis. 1 to 10 columns can be defined.

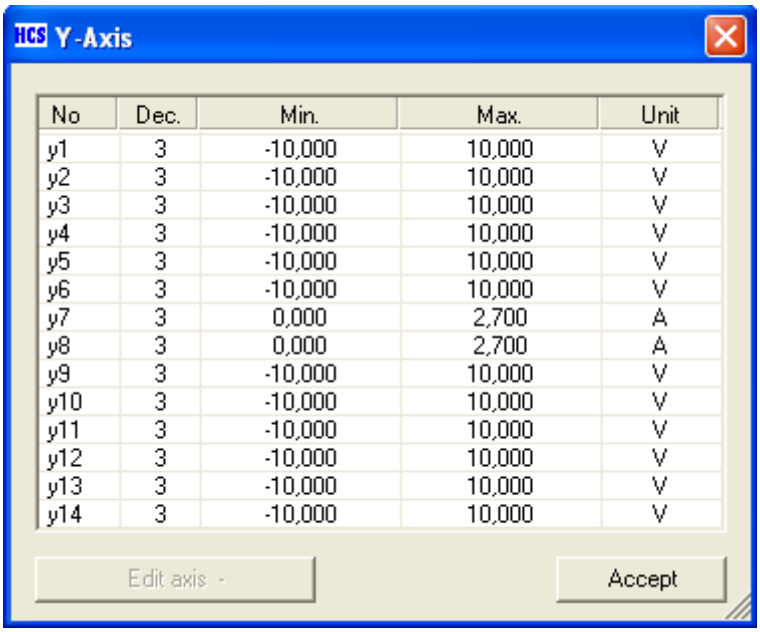
Dec.: Abbreviation for decimal places. Default is 3 decimal places.

Min.: The minimum value of the y-axis.

Max.: The maximum value of the y-axis.

Unit: The unit of the y-axis.

In order to edit a y-axis, you first select this line with a mouse click and then click the button “Edit axis”. Section “10.4.1 Y-Axis -> Edit Axis” describes the window which will open then.

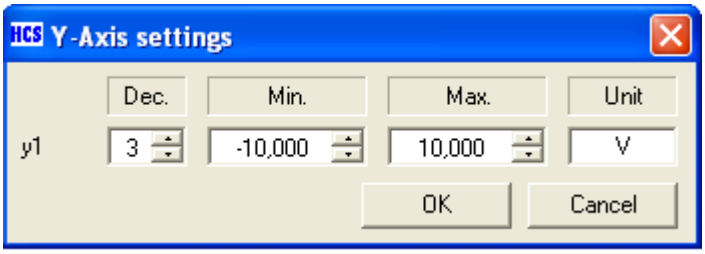


(49) Oscilloscope: Y-Axis

10.4.1 Y-Axis -> Edit Axis

This section follows up section “10.4 Y-Axis”. The picture “(50) Oscilloscope: Y-Axis: Setting of Y-Axis” shows the window which will open if you click with your mouse on the button “Edit axis”. In the window “(50) Oscilloscope: Y-Axis: Setting of Y-Axis” you can see following columns:

No. Y-Axis:	The consecutively numbered y-axis 1.10.
Dec.:	The number of decimal places to be displayed.
Min.:	The minimum value of the y-axis.
Max.:	The maximum value of the y-axis.
Unit:	The unit of the y-axis, which can be determined individually.



(50) Oscilloscope: Y-Axis: Setting of Y-Axis

Picture “(51) Oscilloscope: Example of an Individual, Process-Related y-Axis” shows an individual definition of a y-axis. Later, this can be allocated to a certain measuring channel. For further information, please see section “10.5 Edit Channel 1 to X”.

(51) Oscilloscope: Example of an Individual, Process-Related y-Axis

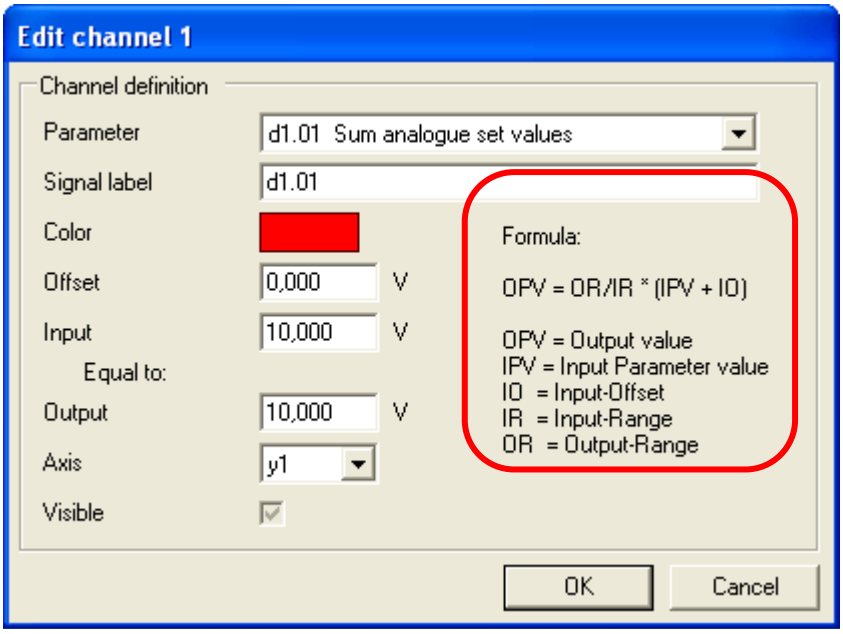
10.5 Edit Channel 1 to X

Picture “(52) Oscilloscope: Channels, Edit Channel” shows the picture which will open if you click with your mouse in the oscilloscope start window “(43) Oscilloscope: Start Screen Oscilloscope” on the button “d1-01 Edit”. Besides, the same window as mentioned in section “10.3 Channels” will open as well. In the window “(52) Oscilloscope: Channels, Edit Channel” you can make following settings: Selection of the Parameter, Signal label, Color, Offset, Input, Output, Axis, Visible, OK and Cancel.

TIP Via the formula, the user can induce an automatic conversion and display of the measurement signal of the unit into his process-related units.

For your explanation:

Parameter:	With this setting, the desired internal measured value can be selected.
Signal label:	Here, you can freely chose a name. E. g. for d1.01 -> “Set value”.
Color:	This is the color in which the graph will be recorded in the main window.
Offset, Input:	IO, IVP. They are used in order to move and to calculate the graph before they are pictured in the oscilloscope. The formula, which is used to calculate the initial value, is shown in the window “(52) Oscilloscope: Channels, Edit Channel”.
Output:	OVP. Initial value of the calculation, this value will then be recorded in the main window.
Axis:	This value determines the y-axis which will be selected for this channel.
Visible:	Makes the internal measured value visible and records it in the oscilloscope.
OK:	Applies the settings made and closes the window.
Cancel:	Cancels the settings made and closes the window.



(52) Oscilloscope: Channels, Edit Channel

10.5.1 Example for the Conversion of an Output Signal

Assuming you want to record a pressure curve and hereby use the actual value signal d1.11:
At 0 bar the input voltage is for d1.11 = 2V.
At 400 bar the voltage will reach d1.11 = 10 V.

Output signal: OPV = $\frac{OR}{IR}$ · (IPV + IO)

Input signal: IPV = d1.11

Offset: IO = -2,00V

Output range: OR = (400bar – 0bar) = 400bar

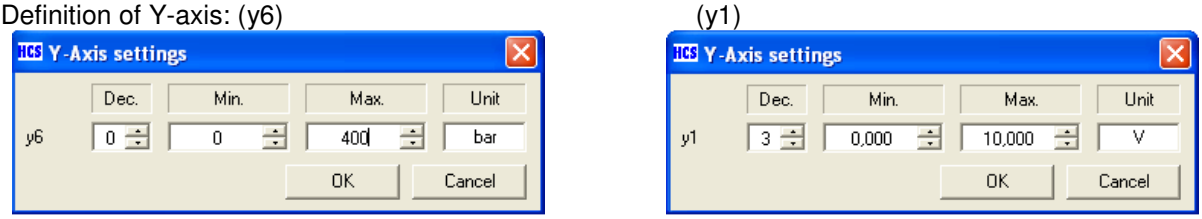
Input range: IR = (10,00V – 2,00V) = 8,00V

OPV = $\frac{400bar}{8,00V}$ · (d1.11 – 2,00V)

Value chart:

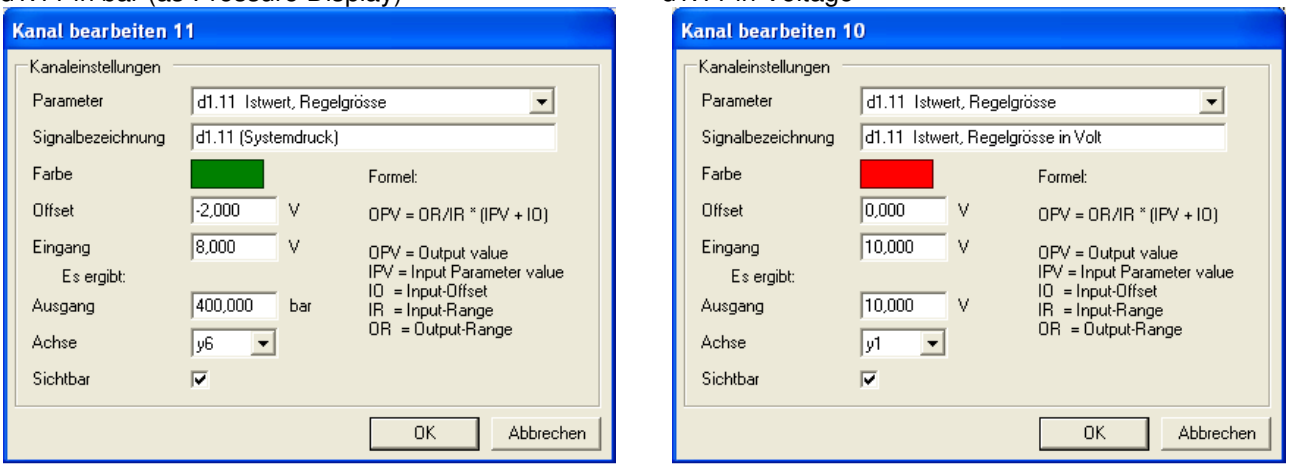
OPV (in bar)	d1.11 (in Volt)
Pressure negative (does not make sense)	<2,00 V
0 bar	2,00 V
50 bar	3,00 V
200 bar	6,00 V
400 bar	10,00 V

Definition of Y-axis: (y6) (y1)



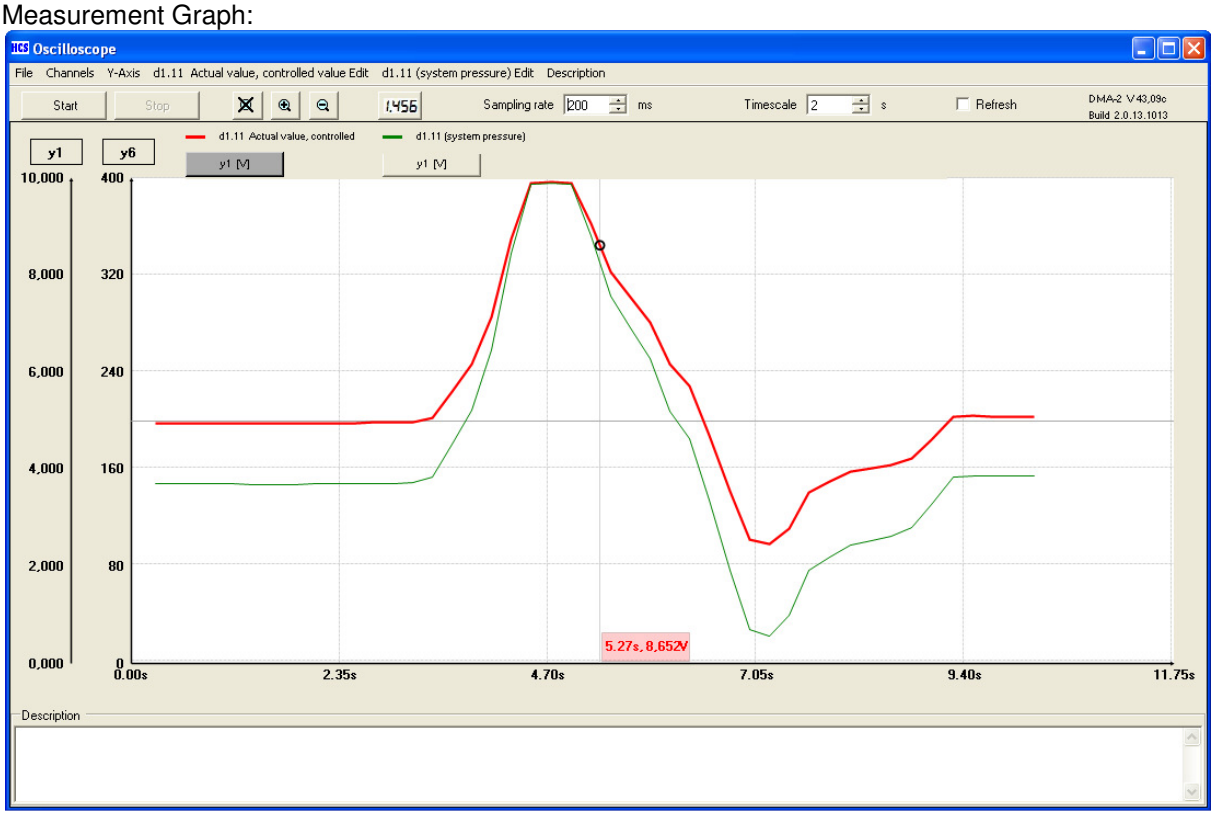
(53) Oscilloscope: Example Definition of Y-axis

Definition of Channels:
d1.11 in bar (as Pressure Display) d1.11 in Voltage



(54) Oscilloscope: Example Definition of Channels

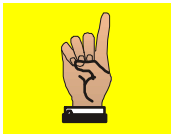
Measurement Graph:



(55) Oscilloscope: Example Measurement Graph

10.6 Description

A mouse click in the oscilloscope main window according to picture “(43) Oscilloscope: Start Screen Oscilloscope” on the button “Description” will open the window shown in picture “(56) Oscilloscope: Description”. When you open the window for the first time, it is empty. For a better description, this window does already show some entries. The user is completely free to edit any data and information in this window.



Descriptions can only be edited in text form. Graphics, charts and the like cannot be edited.

In order to close the window, you click on the “Red X” at the top of the window. The text will then automatically be edited into the main window of the oscilloscope “(43) Oscilloscope: Start Screen Oscilloscope”.
It is also possible to write directly in the area below the graph under Description of picture “(43) Oscilloscope: Start Screen Oscilloscope”. However, only a few lines will appear in the main window, because space is limited there.

(56) Oscilloscope: Description

10.7 Oscilloscope Buttons

This section describes the buttons: “Start”, “Stop”, “Zoom_All”, “Zoom_In”, “Zoom_Out”, “Multimeter”, “Sampling Rate”, “Timescale” and “Refresh”. Moreover, in this section you will find a reference to the “X-axis”, “Y-axis” as well as to the field “Description”. The picture “(57) Oscilloscope: Recorded Graphs” shows a graph that has already been recorded. In this example, the channels: “d1.01”, “d1.04”, “d1.08” and “d1.11” have been selected. Section “10.3 Channels” describes how to select and adjust channels. As you can see, two different Y-axes have been selected. Chapter “10.4 Y-Axis” describes how to select and edit the Y-axes. Every graph has a different color, for a better and clearer visibility. The selection of colors is described in section “10.3 Channels” as well.

10.7.1 Button: Start

My mouse click on the button “Start” will start the recording. This button is only available, if the oscilloscope is not in recording mode.

10.7.2 Button: Stop

My mouse click on the button “Stop” will stop the recording. This button is only available, if the oscilloscope is in recording mode.

10.7.3 Button: Zoom_All


This button is only available, if the oscilloscope is not recording. A mouse click on this button will automatically modify the X-axis and the Y-axis to the whole range of recording.

Example:
You set the X-axis on 20 seconds and start recording. Refresh is not activated. Recording will stop after 100 seconds. The X-axis is now standing on 80 to 100 seconds. A mouse click on the button Zoom_All will modify the X-axis from 0 to 100 seconds and will thus show the entire recording range.

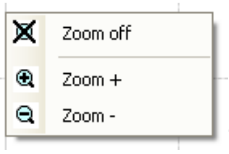
10.7.4 Button: Zoom_IN


This button is only available if the oscilloscope is not recording. A mouse click on this button will modify the X-axis (timescale) and will automatically zoom in the recording. If the cursor is placed, the time range around the cursor is magnified. If no curser is placed, the area around the centre of recording is being zoomed. The timescale will change up to the minimum value.

10.7.5 Button: Zoom_Out

This button is only available, if the oscilloscope is not recording. A mouse click on this button will modify the X-axis (timescale) and will automatically zoom in the recording. If the cursor is placed, the time range around the cursor is minimized. If no cursor is placed, the area around the centre of recording is being zoomed. The timescale will change up to the maximum value (Zoom_All).
If the mouse zoom function is activated, you get to the previous view with this button.

10.7.6 Mouse: Zoom via the Mouse Zoom Function



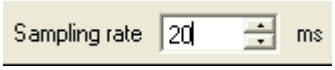
This button is only available if the oscilloscope is not recording. By holding down the left mouse button, you can mark any rectangle within the recording range. The recording range will then be adapted to this rectangle. With the button Zoom_Out you will get back to the previous view. Please also see section “10.11 Zoom with Mouse Buttons”.

10.7.7 Button: Multimeter

Picture “(61) Oscilloscope: Multimeter” shows the window with the multimeter. In this example, 4 channels have been selected. The number of active channels determines the size of the window and the number of measured values to be seen. Exactly the channels that are recorded are being displayed as well. The multimeter is running parallel to the oscilloscope. The multimeter can be opened or closed, irrespective of whether the oscilloscope is started or stopped. The multimeter does not have any options or settings which can be modified or adapted.

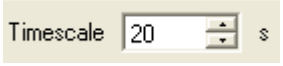
TIP The multimeter display will only run if the oscilloscope has been started.

10.7.8 Field: Sampling Rate



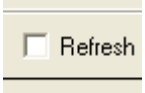
The sampling rate indicates in which periods of time the channels of the unit will be scanned and displayed. A shorter time than 20ms is technically impossible.

10.7.9 Field: Timescale



The field Timescale sets the X-axis. For example, if you enter “200” in this field and confirm with the Enter key on the keyboard, the X-axis will automatically be adjusted to 200 seconds.
This field always refers to seconds.

10.7.10 Button: Refresh



The button Refresh can only be modified when the oscilloscope is stopped. When the oscilloscope is running, recording, Refresh is activated and the graph reaches the highest value on the X-axis, the entire graph will be deleted and the process is starting from the beginning. The recording time will not increase. Only one image at a time will be recorded, deleted and started again. The Refresh function can be used for recording over a longer period of time with some reservation, as the graph is being deleted over and over again.

10.8 Example for Operation

We recommend the following procedure:

Step 1: Open oscilloscope	Section: 8.6	Menu Bar Button: Oscilloscope Function
Step 2: Define Y-axes	Section: 10.4	Y-Axis
Step 3: Select channels	Section: 10.3	Channels
Step 4: Set the sampling rate	Section: 10.7.8	Field: Sampling Rate
Step 5: Set the timescale	Section: 10.7.9	Field: Timescale
Step 6: Refresh -> No	Section: 10.7.10	Button: Refresh
Step 7: Start	Section: 10.7.1	Button: Start
Step 8: Stop	Section: 10.7.2	Button: Stop
Step 9: Edit description	Section: 10.6	Description
Step 10: Save data	Section: 10.2.2	File -> Save

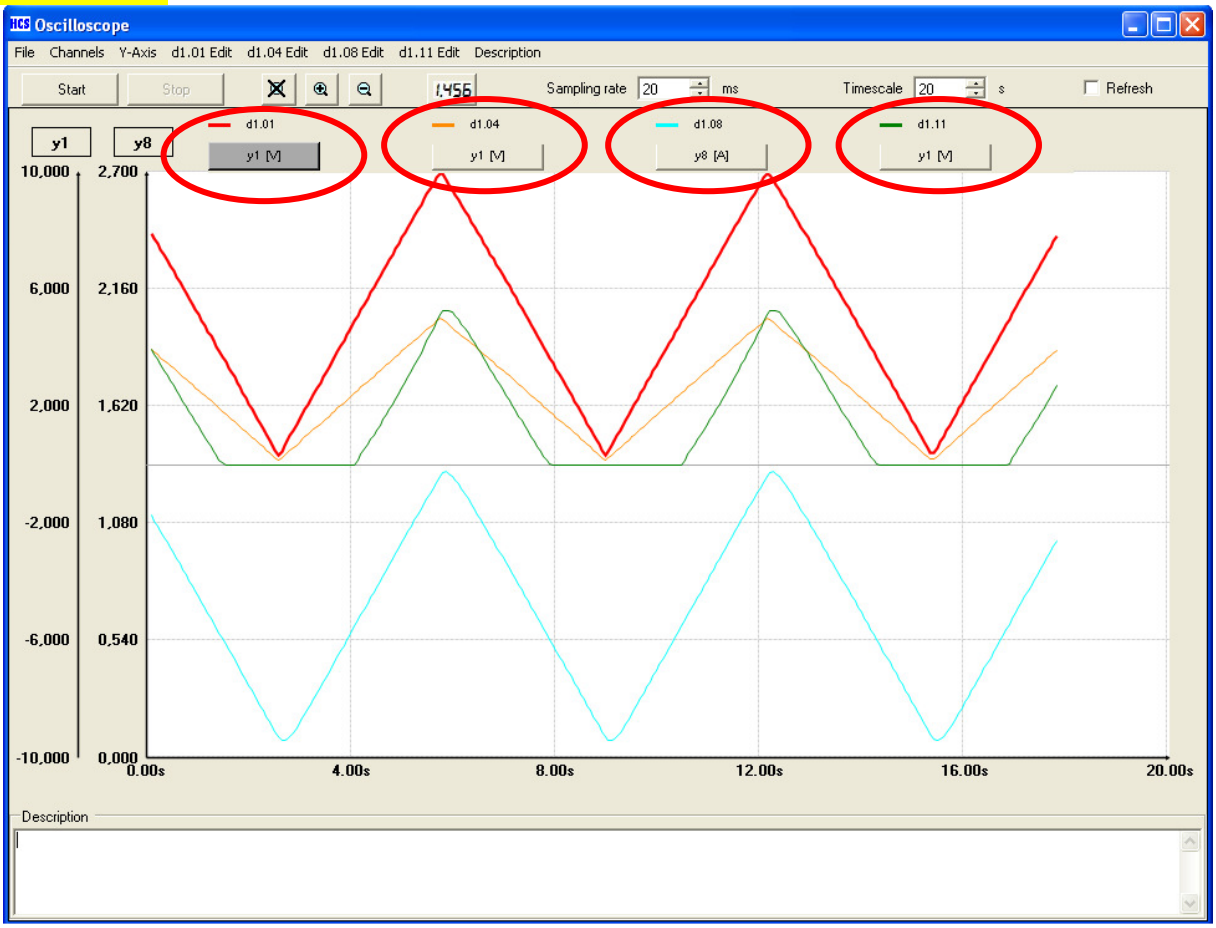
10.9 Graph Selection

Picture "(57) Oscilloscope: Recorded Graphs" shows four recorded graphs. The channels have been named according to the names of the unit, i. e.:

- d1.01 (Red),
- d1.03 (Orange),
- d1.08 (Light Blue)
- d1.11 (Green).

By selecting these four channels, four buttons with corresponding names and corresponding axes have been created automatically.

TIP A mouse click on one of these buttons will raise the graph and draw it more thickly automatically.



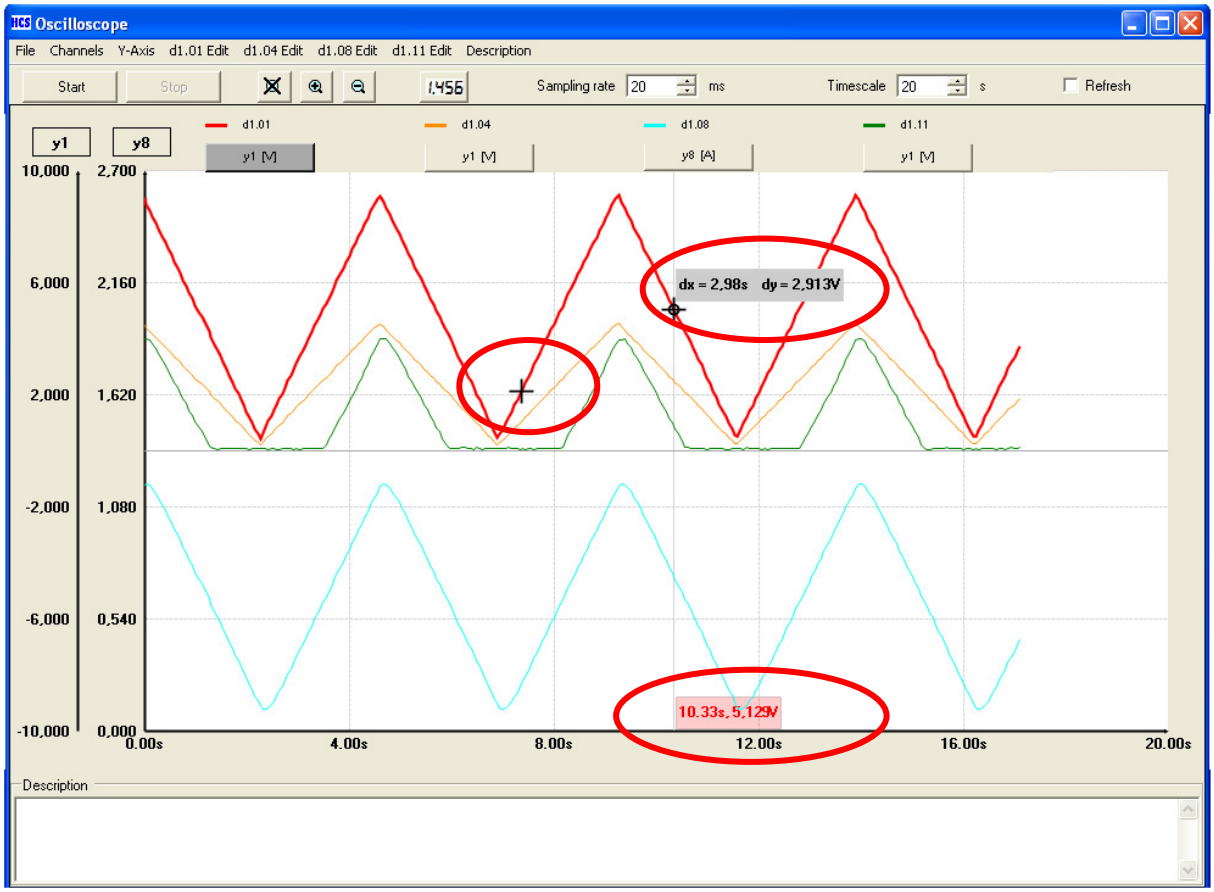
(57) Oscilloscope: Recorded Graphs

10.10 Cursor, Marker

You can set two markers. In order to set a marker on a graph, you have to select the correct graph. Please also see section “10.9 Graph Selection”. In the example according to picture “(58) Oscilloscope: Cursor” a marker has been set on graph “d1.01” (Red). You can now run with your mouse pointer along the graph and read the voltage and time difference values to the marker.
The set marker shows a voltage of 2,216V at 7,35s.
The cursor shows a voltage of 5,129V at 10,33s.
At 13,31 s, the cursor shows a voltage of 6,587V.
Next to the cursor, the distance to the marker is displayed in grey, dx = 4,01s and dy = 5,223V.

“dX” is the time change from marker to curser.
“dY” is the voltage change from marker to cursor.

If you now move the mouse pointer over the graph, the corresponding X- and Y-values will be automatically displayed at the bottom of the graph. Only the value to the active graph is displayed.



(58) Oscilloscope: Cursor

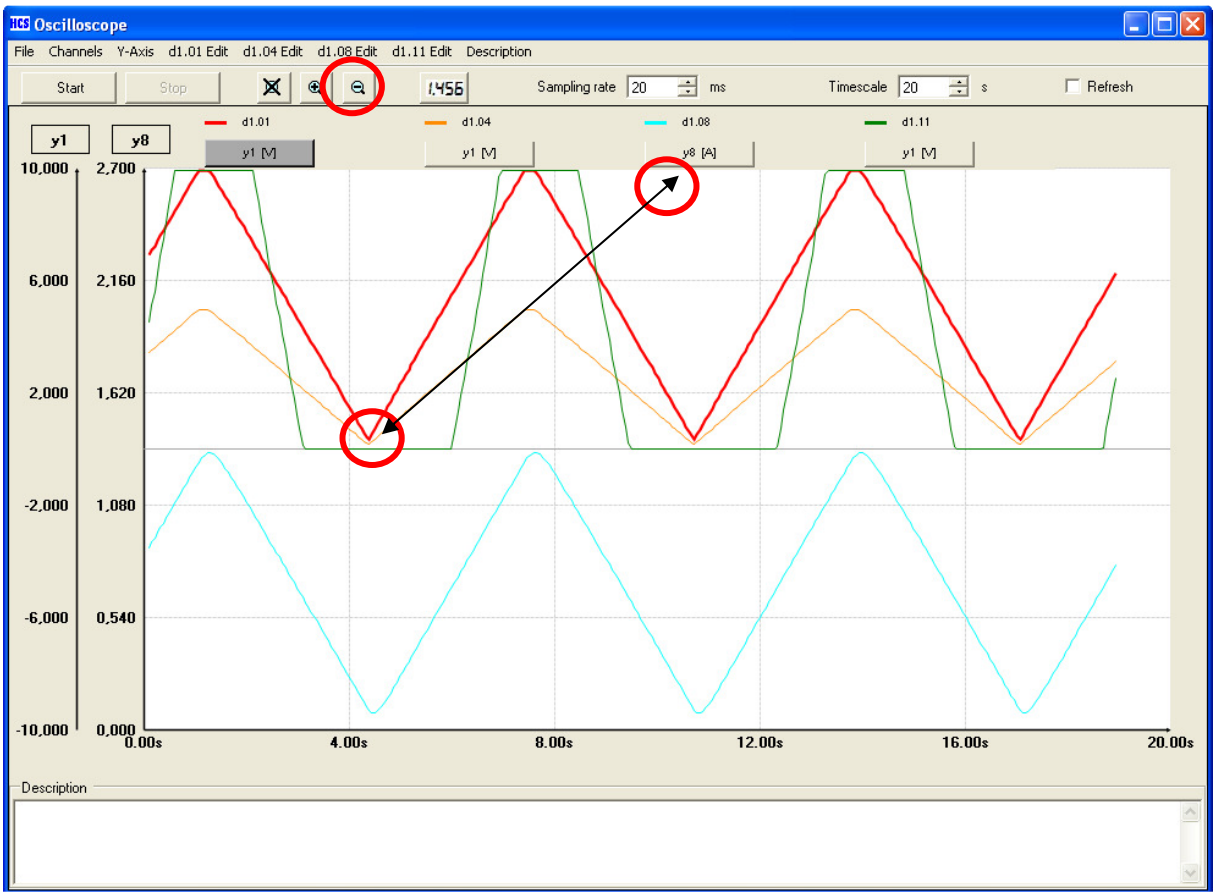
10.11 Zoom with Mouse Buttons

Another possibility of zooming is to use the mouse buttons.

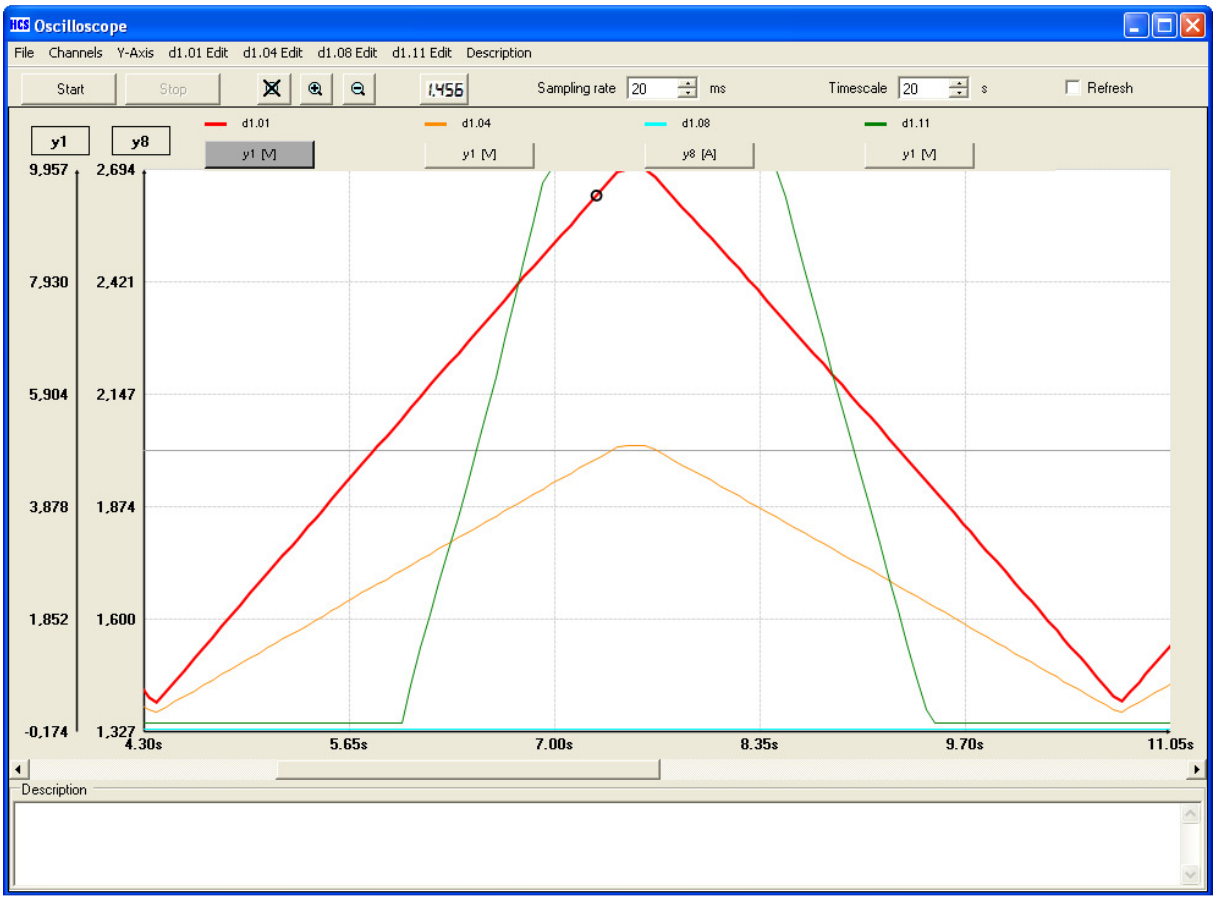
TIP You go to any desired position, press the right mouse button and hold it down until you reach the second position. Then you release the mouse button.

The zoom will automatically be carried out between the two points. Picture “(59) Oscilloscope: Zoom with Mouse Buttons” shows how this zoom is being used. Picture “(60) Oscilloscope: Zoom” shows the result arising out of picture “(59) Oscilloscope: Zoom with Mouse Buttons”.

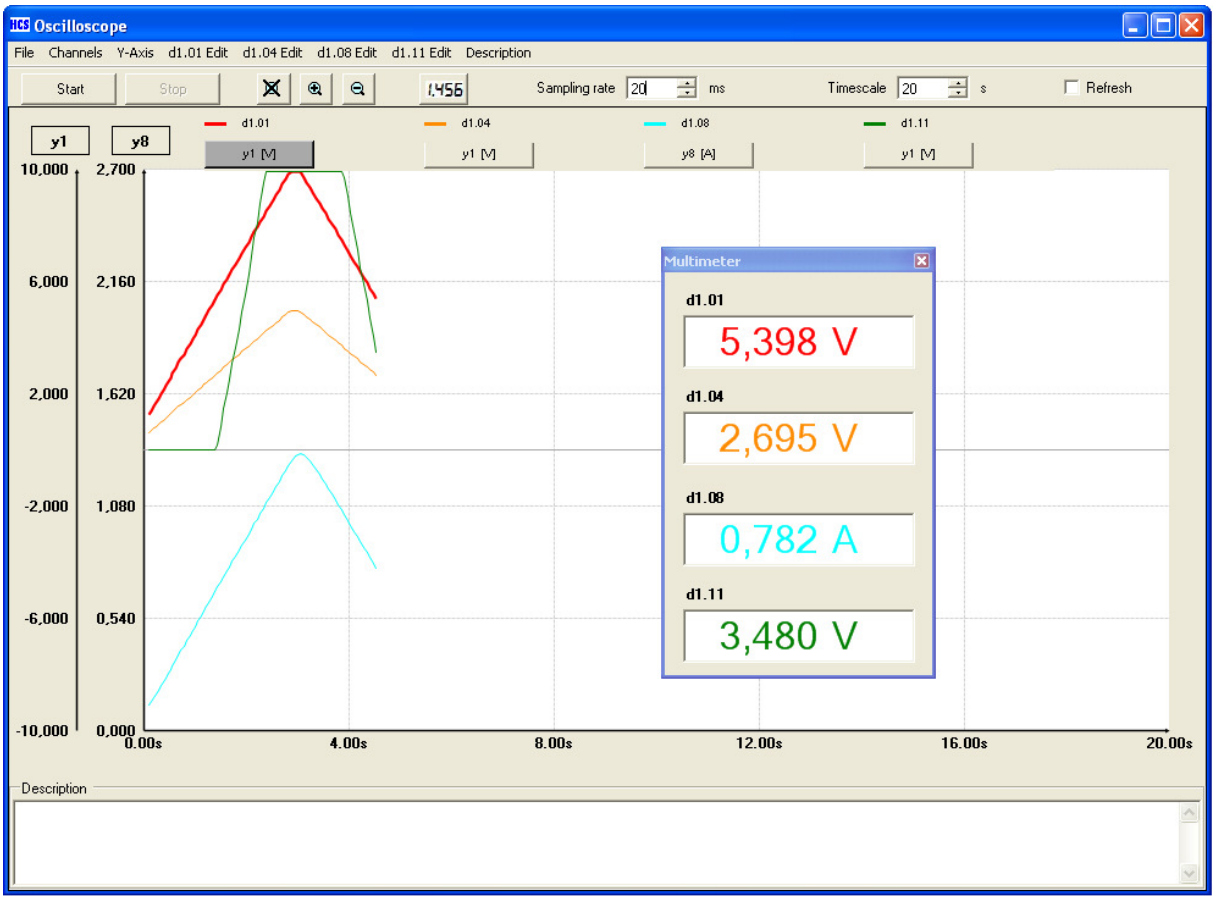
You get the previous view by pressing the Zoom_Out button. Please also see “10.7.5 Button: Zoom_Out”.



(59) Oscilloscope: Zoom with Mouse Buttons



(60) Oscilloscope: Zoom



(61) Oscilloscope: Multimeter

11 RS232 - DMA Cable

Order number for 2,5m: 1 860 002 00

12 RS232 - DAC Cable

Order number for 2,0m: 1 860 004 00

13 USB-DMA Cable

The company HCS GmbH has developed a special cable for the connection of a DMA with the PC. The Picture “(62) USB-DMA Cable” shows this cable. The cable is available in 3 different standard lengths.

Order number for 2,5m: 1 860 016 00
Order number for 3,0m: 1 860 031 00
Order number for 10 m: 1 860 018 00

(62) USB-DMA Cable

14 USB - DAC Cable

The construction is the same as for the DMA-USB cable, but with an additional intermediate adapter for the transition to the SUB-D RS232 interface of DAC-4.

Order number for 2,5m: 1 860 017 00
Order number for 10m: 1 860 019 00