Instruction manual

Leak meter with camera

LD 500 / LD 510

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2 Foreword

Dear Customer,

thank you for purchasing our leak meter with camera **LD 500**.
The new leak meter LD 500 with integrated camera and leakage calculation are ideal measuring instruments which help to find and document even smallest leakages (0.1 l/min corresponds to approx. 1 € p. a.) easily even in far distances.

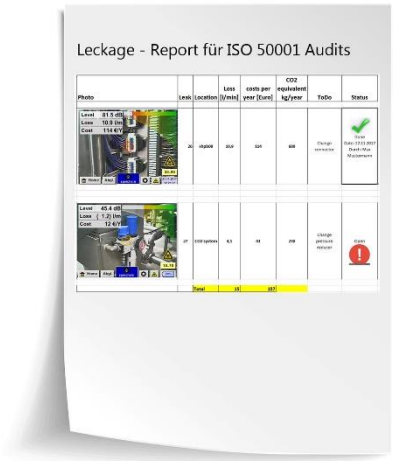
The **LD 510** is the worldwide first leak meter with an additional freely assignable sensor input for all CS sensors. In addition to the leakage measurement and detection also all necessary measurements with regards to dew point, flow, pressure, and temperature ... can be carried out

Main functions:

- **Tracking and location of leaks**
  - compressed air, gas, steam and vacuum systems
  - condensate drain
  - seals
  - refrigeration systems

- **Documentation / storage of leaks with**
  - Image of the leak position
  - Date / Time
  - Description of the leakage position with indication of company / department or hall / machine
  - Size of the leak in liters / min (units adjustable)
  - Leakage costs per year in € (currency freely definable)

Remark: By means of the additional available CS leak Reporter (Order No .: 0554 0105) detailed reports with summary totals, subtotals (departments / warehouses etc)) as well as history reports (for temporal / continuous improvements) could be created.



3 Safety instructions

3.1 About this document

- Read through carefully this documentation and familiarize yourself with the product before putting it to use. Pay particular attention to the safety warnings to prevent injury and product damage.
- Keep this documentation to hand for easy reference when needed.
- Pass on this documentation to any subsequent users of the product.

3.2 Ensuring safety

- Only use the product as intended and within the parameters specified in the technical data. Do not use force for operating..
- Never measure with the device at or near live/energized parts!
  During leak detection on electrical systems, please maintain a sufficient safety distance to avoid dangerous electric shocks!
- Avoid any direct contact with hot and/or rotating parts.
- Always switch on the device before putting on the headphones! At high signal levels (bar graph headphones in the red area), the volume can be correspondingly large. The sensitivity setting can be used to reduce the volume.
- Never point the laser directly into the eyes! Absolutely devoid a direct irradiation of the eyes of humans and animals!
  Laser module: corresponds to DIN EN 60825-1: 2015-07 Class 2 (<1mW)
- Observe the prescribed storage and operating temperatures.
- Improper handling or violence will void the warranty.
- Any kind of interventions on the device, as far as they do not correspond to the intended and described procedures, lead to the warranty expiration and to the disclaimer.
- The device is intended solely for the described purpose.

3.3 Environmental protection

- Disposal of faulty rechargeable batteries / empty batteries in accordance with applicable legal regulations
- Lead back the product after the end of the period of use to the separate collection for electric and electronic devices (observe local regulations) or return the product to CS Instruments GmbH & Co.KG for disposal.

CS Instruments GmbH & Co.KG makes no warranty as to its suitability for any particular purpose and assumes no liability for any errors contained in this manual. Nor for consequential damages in connection with the delivery, performance or use of this device.

4 General function description

When gases escape from leaks in piping systems (leaking screw connections, corrosion, etc.), noises are generated in the ultrasonic range. With the LD 500 even the smallest leaks, which are inaudible to the human ear and not visible due to their size, can be located several meters away.

The inaudible ultrasound is converted to audible frequencies in addition to the display emission level shown in the display. With the convenient, sound-proof headphones, these sounds can be heard even in noisy environments.

In addition, the new LD500 device calculates the costs associated with leaks, providing additional transparency about the state of the system under test or the potential cost savings.
The loss is displayed in l / min as well as in a freely selectable currency. The cost per liter or per cubic meter of compressed air can be stored in the device.

The professional measuring instrument LD500 finds typical application in leak detection in compressed air systems and leak testing of pressure less systems.

With the help of an integrated laser pointer, which serves as a targeting, the leak can be pinpointed.

Depending on the leakage, the appropriate accessories may be used to increase the sensitivity of the LD500 to use, available accessories are:

- Acoustic trumpet
- Focus tube with focus tip
- Gooseneck
- Parabolic mirrorarabol

5 Technical data LD500

Dimensions	263 x 96 x 280 mm (incl. Pre-Amp module and acoustic trumpet)
Weight	0,55 kg incl. Pre-Amp module and acoustic trumpet , complete set with transportation case ca.3,0 kg
Frequency range	40kHz (+/- 2kHz)
Power supply	Internal 7.4 V lithium-ion battery
Operating time	> 9 h (continuous operation)
Operating temperature	-5 °C to +40 °C
Charging	Ext. battery charger (included in the scope of delivery)
Charging time	approx. 1.5 h
Storage temperature	-20 °C to +50 °C
Laser	Wavelength 645-660nm, output < 1mW (Laser class 2)
Connections	3.5 mm jack for headphones, power jack for connecting an external charger USB Connection
Display	3.5“-Touchpanel TFT transmissiv
Interface	USB for data export / -import, SW update etc.
Datalogger	4 GB-Memory card (Micro SD Class 4)
Sensitivity	min: 0,1l/min at 6bar / 5m Distance

6 Device components and controls

6.1 LD 500

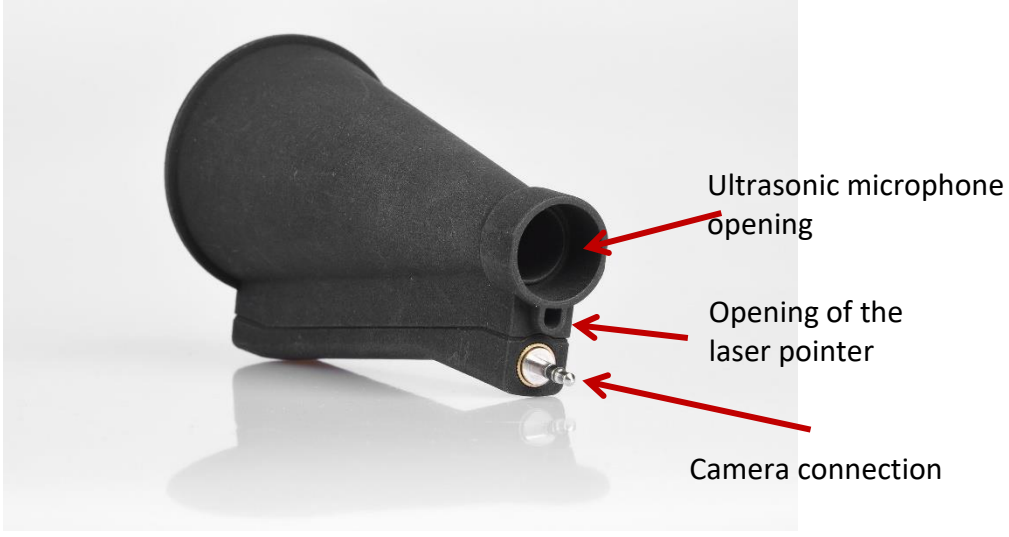
Picture 1

Picture 2

6.2 Pre Amplifier module

Picture 3

6.3 Acoustic trumpet with camera



Picture 4

6.4 Focus tube with focus tip

Picture 5

6.5 Gooseneck (Optional)

Picture 6

6.6 Assembly with acoustic trumpet

The acoustic trumpet allows acoustic amplification by bundling the sound waves and specifies the location of the leak. Due to the special construction of the integrated laser pointer is still usable. The camera is integrated on the bottom of the acoustic trumpet and is electrically connected to the preamplifier module via the jack plug.
Assembling is done by plugging the individual components until easy locking audible (plug in to the stop).
The components are removed in the reverse order; for unlocking the preamplifier module, the release button must also be pressed.

Picture 7

6.7 Assembly with focus tube with focus tip

The focus tube with focus tip is used to detect very small leaks, to accurately locate them.
Just like the acoustic trumpet, the tube can be plugged into the preamplifier with ultrasonic receiver.
The use of the camera is **no longe**r possible.

The components are removed in the reverse order; for unlocking the preamplifier module, the release button must also be pressed.

Picture 8

7 Commissioning / Applikation LD 500 or LD510

	Please first observe the safety instructions in section 3

7.1 Switch on

Hold down the power button for about 1 second, the power will turn on, and a start-up sequence will appear on the display. Pressing the button again switches the device off again.

On-Off button, see device components and controls

7.2 Headphone Volume Loud / Volume Down

The volume keys increase or decrease the volume in the headphone in 16 levels.
Continuously pressing the button automatically increases / decreases the value.

Volume up / down buttons for headphone volume, see device components and controls

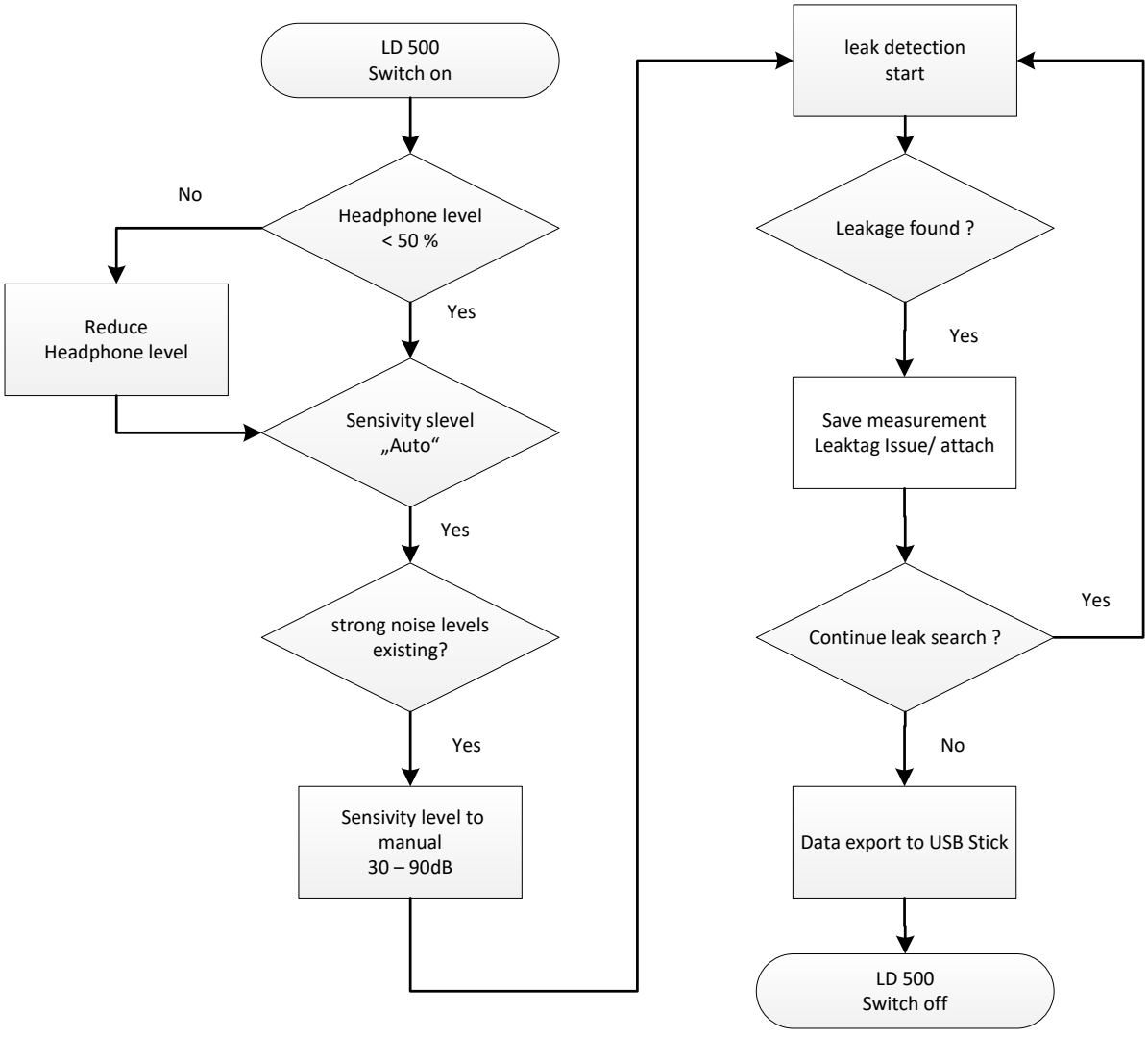
Please make sure the headphone level is <50% before putting on the headphones.

7.3 Sensitivity level

When starting a leak detection or after switching on the sensitivity level "Auto" should be selected.
In the case of strong noise levels from the environment it can be switched to a manually adjustable gain level, see chapter 9.1 „Setting of Sensitivity level“

Manual sensitivity level at measurement start: 30 – 90dB

7.4 Procedure leak detection / measurement



Picture 9

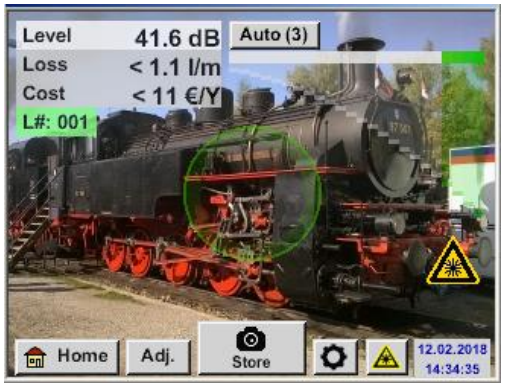
8 Operation

The operation is largely self-explanatory and menu-driven via the touch panel.
The selection of the respective menu items occur via short "tapping" with the finger or a soft round pen.

<u>Attention</u>: Please use no pens or other objects with sharp edges!
The foil can be damaged!

Inputs or changes can be made with all white deposit fields

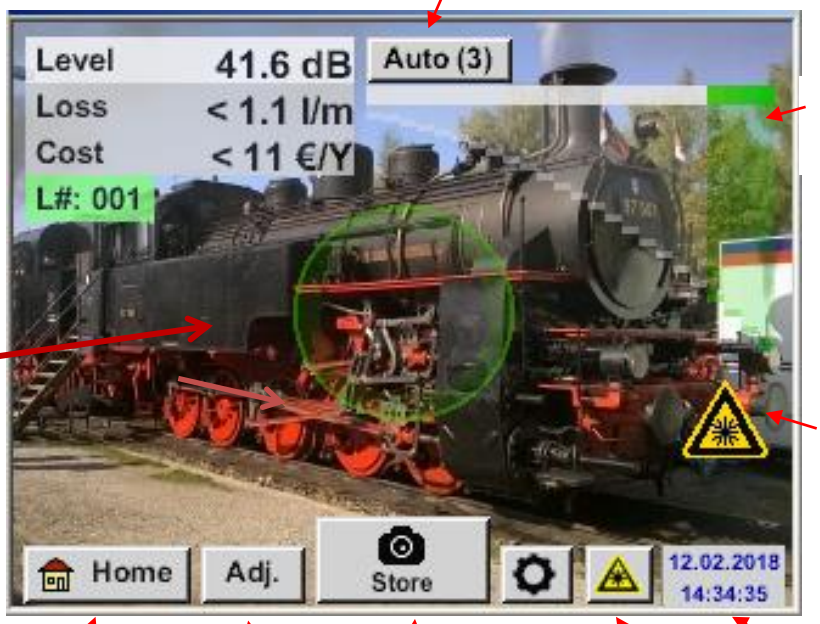
8.1 Initialization



After switching on the LD 500, the initialization takes place and then switch to leakage display

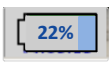
8.2 Screen Leckage

8.3 The following picture shows and describes the display elements.



Date / Time:

Battery condtion indicator

Battery condition: 

Power supply connected and battery is charging:

9 Settings

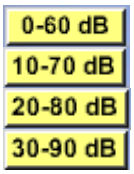
The operation is largely self-explanatory and menu-driven via the touch panel.
The selection of the respective menu items occur via short "tapping" with the finger or a soft round pen.

<u>Attention</u>: Please use no pens or other objects with sharp edges!
The foil can be damaged!

9.1 Sensitivity settings

In order to cover a measuring range from the smallest leaks (0.1 l / min) up to large leaks, the **LD 500** has different measuring sensitivity levels:

- 0 – 60dB
- 10 – 70dB
- 20 – 80dB
- 30 – 90dB



for smallest leakages starting from 0.1 l/min

for bigger leakages up to max. 50 l/min

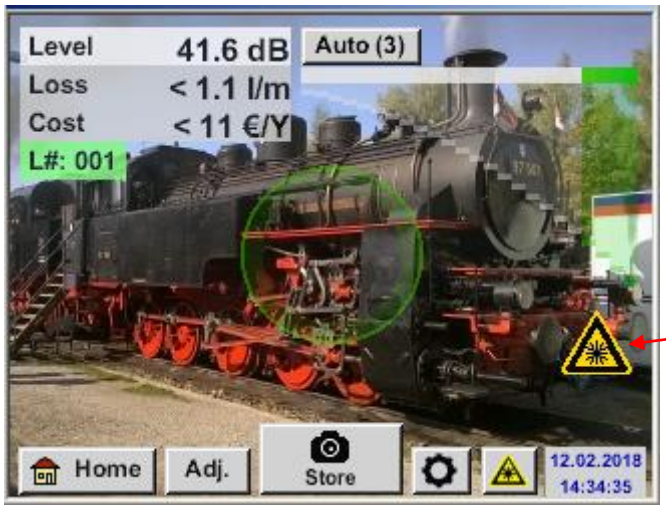
Remark: In case of high noise level to switch to next lower sensitivity level.

These steps can be selected manually by pressing the ***„ Sensitivity“*** button.Levels are changed to the next level each time they are pressed.
The***„Auto“***

setting allows you to automatically switch to the preferred sensitivity level for the LD 500. However, this requires a min. measuring time of 2 seconds.
Auto(1) correspond to 0–60dB , Auto (2) to 10-70dB, Auto(3) to 20-80dB and Auto(4) to 30-90dB.

9.2 Laser On/Off

The laser pointer can only be switched on or off via the laser on / off button in the display (not via the membrane keypad). When switched on, the display shows a laser warning symbol.



Laser „On“ Icon

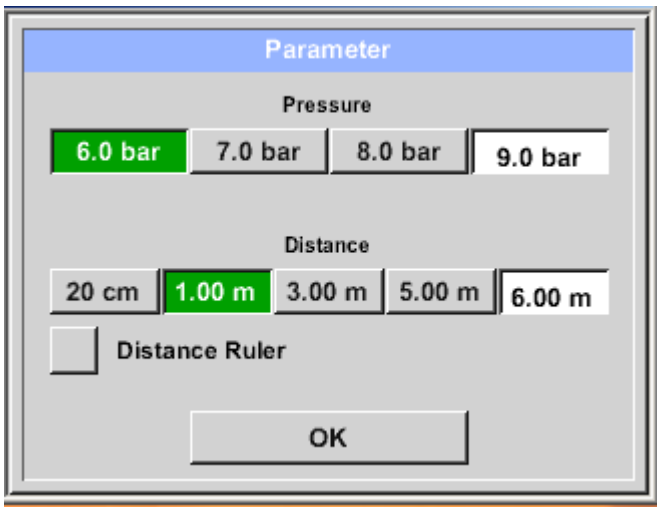
Please note the warnings for laser operation! V Avoid direct / indirect (via reflexion) irradiation of the eyes in humans and animals!

9.3 Parameters for measurement

To get correct readings, the parameters

- Existing pressure
- Distance to measuring point

are needed. By pressing the key **„Parameter“** in the display, the parameter input window is opened.



The pressure entry can be made by selecting one of the 3 predefined values or via the text field.
Max. Permissible pressure value is 10bar.
In case of higher pressures, please insert 10bar)

For the distance input, there are 4 predefined values or a text field for the measurement-specific distance entry.
Selection **„20cm“** is reserved for the measurement with the focus tube with focus tip.
Currently the max. Measuring distance is 6.00 m.

Note: Distance refers to distance from measuring point to acoustic trumpet or focus tube with focus tip.
Appropriate input range is 1m to 6m for acoustic trumpet , for focus tube with focus tip fixed to 20cm.

Pressure input range is 0.3bar to max. 10bar, for vacuum leakages -0.1bar to -1bar.

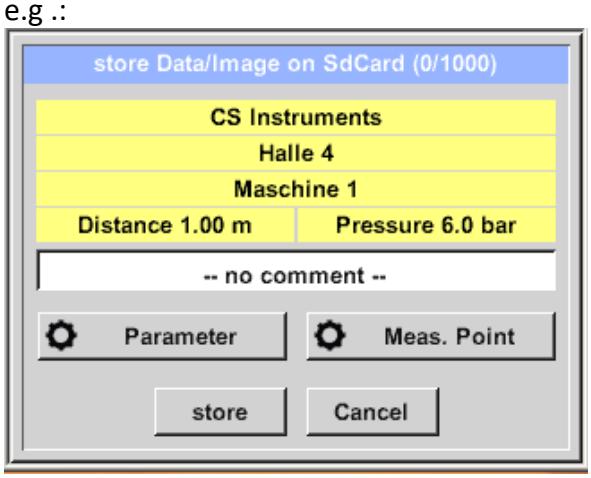
9.4 Storing oft he measurement

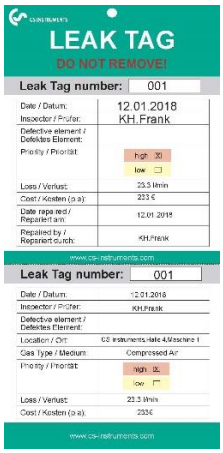
To store the measurements please press either the button **„Store“** on the foil keypad, see chapter Device components and controls , or by button **„Store“**

in the display.

All data are stored on to the inetrnal SD card.

After pressing one of the two **„Store“** keys, the corresponding information for the measuring point must be completed. The measuring point information of the last stored storage (company, building and location) is displayed, the numbering of the leaking day is increased by 1.
e.g .:



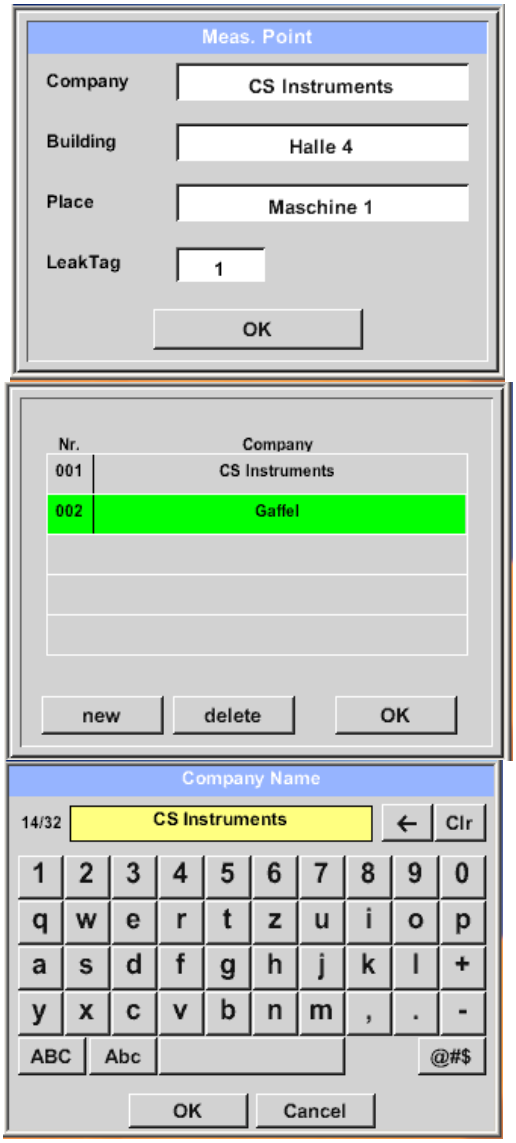


If necessary, fill out the LeakTag-form and attach it to the measuring location.

Please use correct LeakTag-number.

9.4.1 Measuring point designation / selection

Store ➔ Meas. Point



All information about the measuring point can be changed by selecting the corresponding text field or the stored measuring points can be loaded from the internal database.

Then a menu opens with the available / saved entries.
When selecting a saved value, select it (highlighted in green) and then take over with ***„OK“***.

If a new entry is necessary, the input menu opens after pressing the ***„new“*** button.

Input is accepted via ***„OK“***.

This procedure is analogous to enter the information for company, building and location.

Using the ***„delete“*** button, individual entries can be deleted too.

9.4.2 Parameter of measurement (Re-Check)

Store ➔ Parameter

At this point, it is again possible to check and correct the parameters „Pressure" and „Distance".

Changing the parameters gives new values for leakage and cost.
Execution of the corrections see description chapter 9.3

9.4.3 Comment

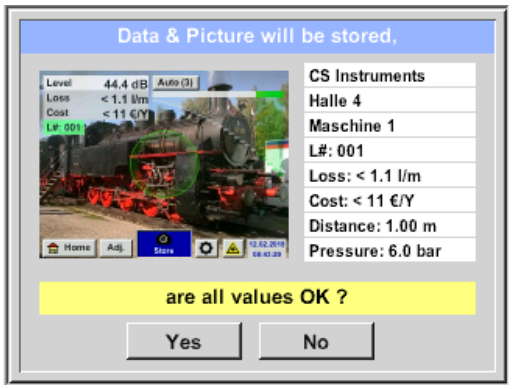
Store ➔ Textfield Comment

In addition to the details of the measuring point with company, building and location, it is possible to enter a comment (up to 32 characters).

To do this, select the text field ***„Comment“*** and enter the comment.

9.4.4 Storing measurement data to internal SD-card

Speichern ➔ store



Before final storage of the measurement on the internal SD card, a summary is created and the correctness is queried once more for safety.

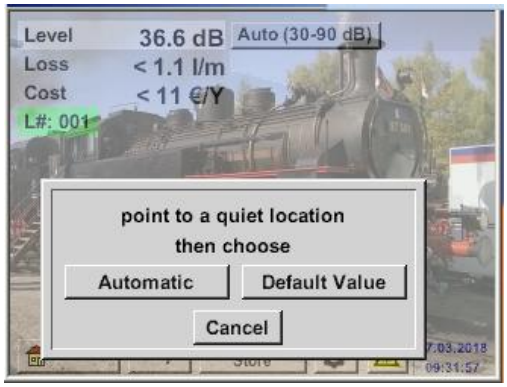
Storage is done with the ***„Yes“*** key.

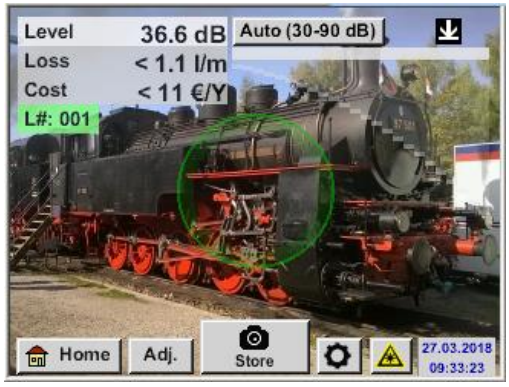
The ***„No“*** key returns to the previous menu.

9.5 ZeroPoint adjustment

In high noise environments, an adjustment can be made to reduce it. This automatic process is carried out by pressing the ***„Adj.“*** key in the display.

Adj. ➔





For this adjustment, the LD 500 should point to a quiet point and the adjustment should be started by pressing the ***„Automatic“*** " button.

If a ZeroPoint adjustments was performed the following icon is displayed.

To withdraw the ZeroPoint Adjustment e.g. for a new measurement in a quieter location, please press button ***„Default Value“.***

10 Basic settings menu LD 500

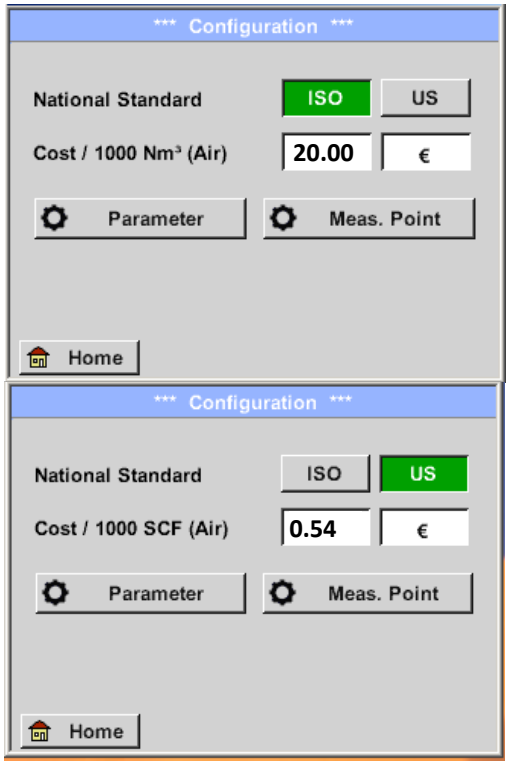
Home

With the button ***„Home“*** you access the basic menu of the LD 500.

Return to measurement by pressing ***„Leckage“*** –button.

10.1 Configuration

Home → Configuration



By selecting the national standard of ***„ISO“*** or ***„US“*** you can store your production cost for ***„1000 Nm³“*** or. ***„1000 SCF“.*** These inputs are used as the basis for the cost calculation.

The basic costs are entered via the text box ***„Cost / 1000 Nm³“*** for **„ISO“** or **„Cost / 1000 SCF“** for ***„US“***.

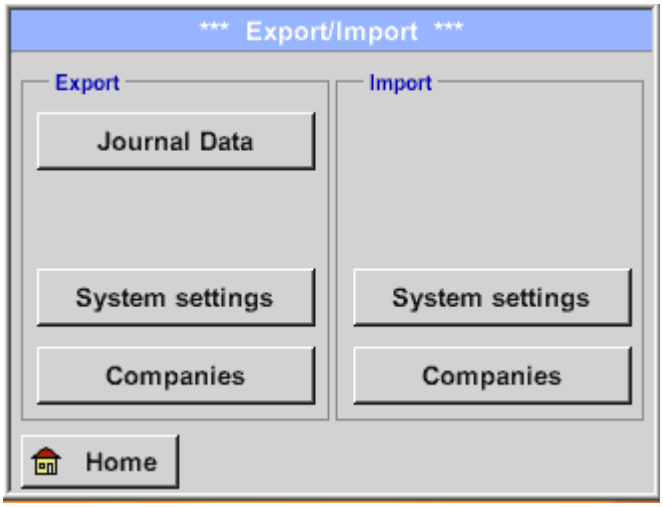
The currency of the production costs can be stored as text in the text field. ***„Currancy“.***

The inputs ***„Parameter“*** and ***„Meas. Point“*** Follow the same procedure as described in chapter 9.3.

Acceptance of the values and return to the basic settings menu is done by pressing the ***„Home“.*** Button.

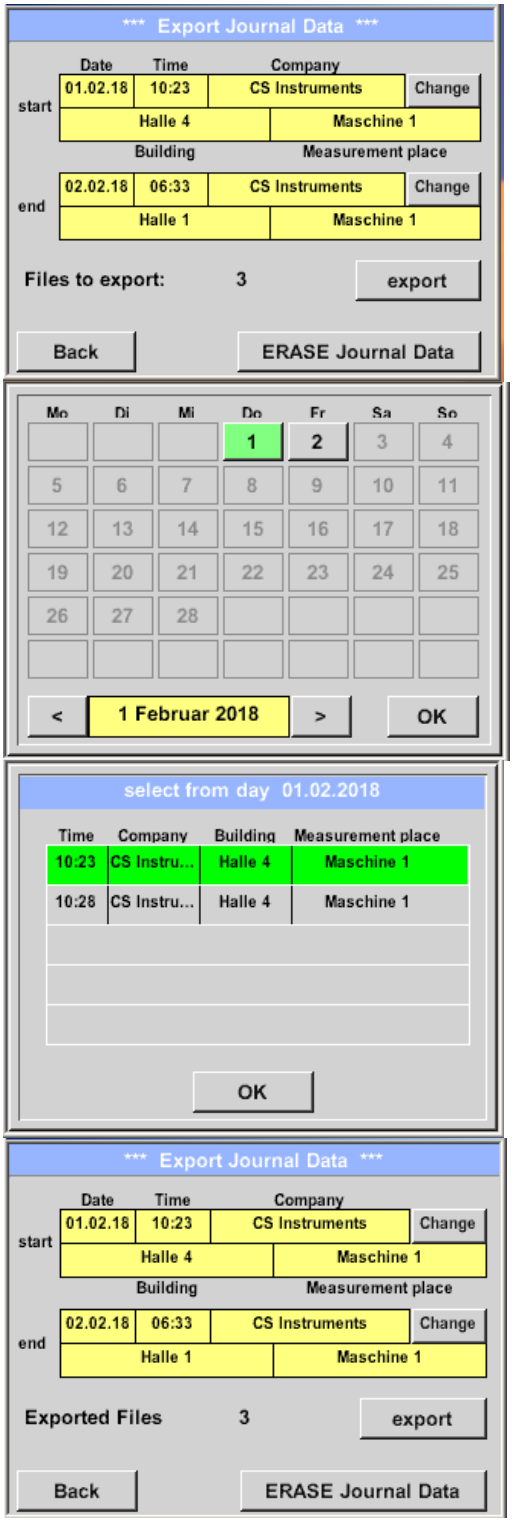
10.2 Export/Import

With *Export / Import*, recorded "journal data" can be transferred to a USB stick, system settings and measuring points can be exported as well as imported.



10.2.1 Export „Journal Data“

Export / Import → Export → Journal Data



With the help of the ***„Change*** -button you can set a period between ***„Start“*** and ***„End“***.

Stored measurement data that lies within this period will be exported.

The selected date is always highlighted in green and the dates of the Sundays are - as in the calendar - red.

For days on which measurement data was recorded, the date numbers are visually exalted

If several measurements have been recorded on a date, they will appear after the date selection.
Now you can easily select the desired recording.
With ***„OK“***. the start or end time is taken over.

Press the ***„Export“***- button to transfer the selected data to the USB stick
In the example given, 3 measurements are exported.

With ***„ERASE Journal Data“*** the Journal Database is deleted.
For verification is still a security question.

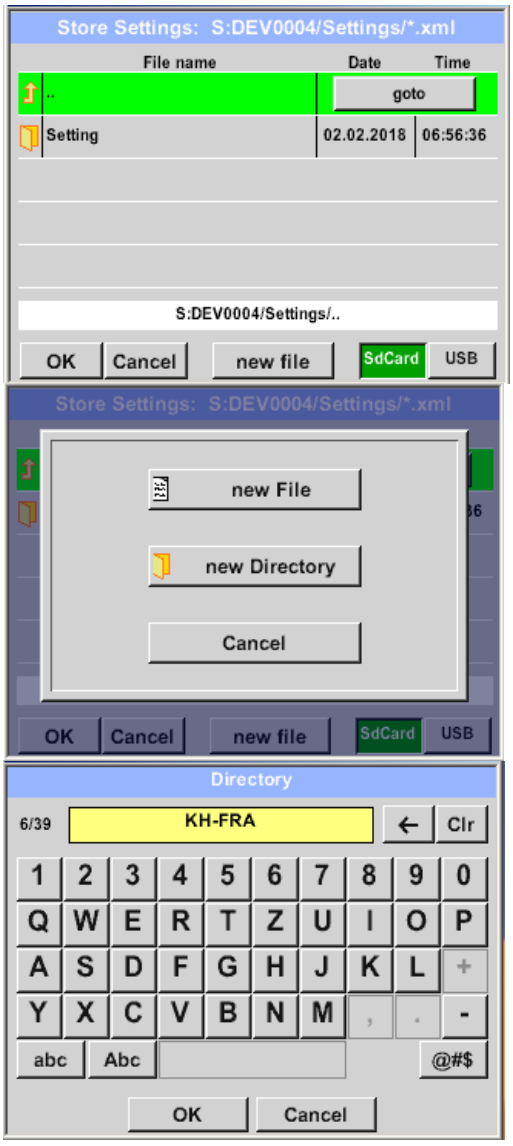
With ***„Back“*** you return to the main menu.

Attention: With ***„ERASE Journal Data“*** all journal data are deleted.

10.2.2 Export of System settings

This feature is especially relevant to the version LD 510, here for storing the external sensor settings as well as e.g. display option for charts, sensor value etc.

Export / Import → Export → System settings



Here the definition of the storage location takes place
.Selection for internal SD card with activation of key ***„SdCard“*** or on USB stick with key ***„USB“***.
The selection of the desired folder is made by selecting and activating with ***„goto“*** button.

If a new directory is required, this is done by pressing ***„new File“***, this can be created by selecting ***„ new Directory“***

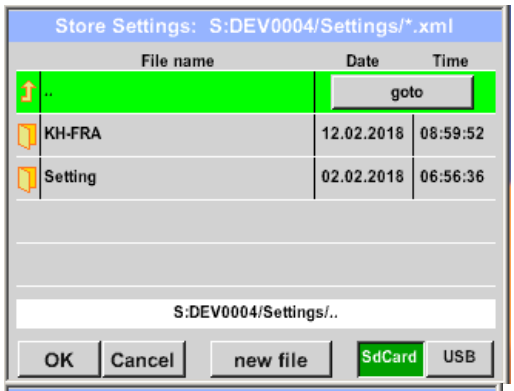
Saving a system file with a new name takes place analogously, then the key ***„new File“*** must be pressed

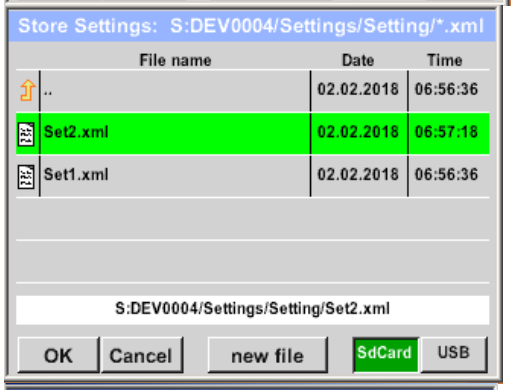
Entries are to be confirmed with ***„OK“.***

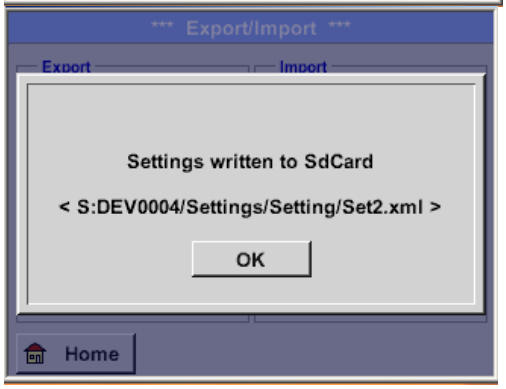
With ***„Cancel“*** you return to the previous menu.

10.2.3 Import of system settings

Export / Import → Import → System settings







Sequence of directory and file selection is analogous to file export.
Selection of internal SD card with activation of key ***„SdCard“*** or on USB stick with key ***„USB“***.

The selection of the desired folder is made by selecting and activating with the ***„goto“*** button, then select corresponding system file.

Selection to be confirmed with ***„OK“.***

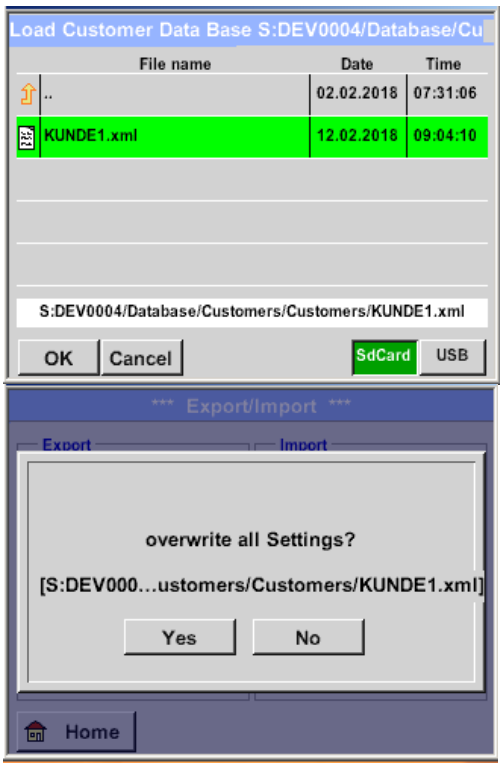
Since system-relevant changes are made here, a confirmation prompt is issued, which must be confirmed with ***„OK“***.

10.2.4 Firmendatenbank exportieren / importieren

These functions allow the stored measuring point descriptions (companies, buildings and location) to be exported as an XML file or to be imported from another LD 500 exported database.
That means it is also possible to create and import the database externally, but the prerequisite is the correct format of the XML file.

Export / Import → Export → Customers

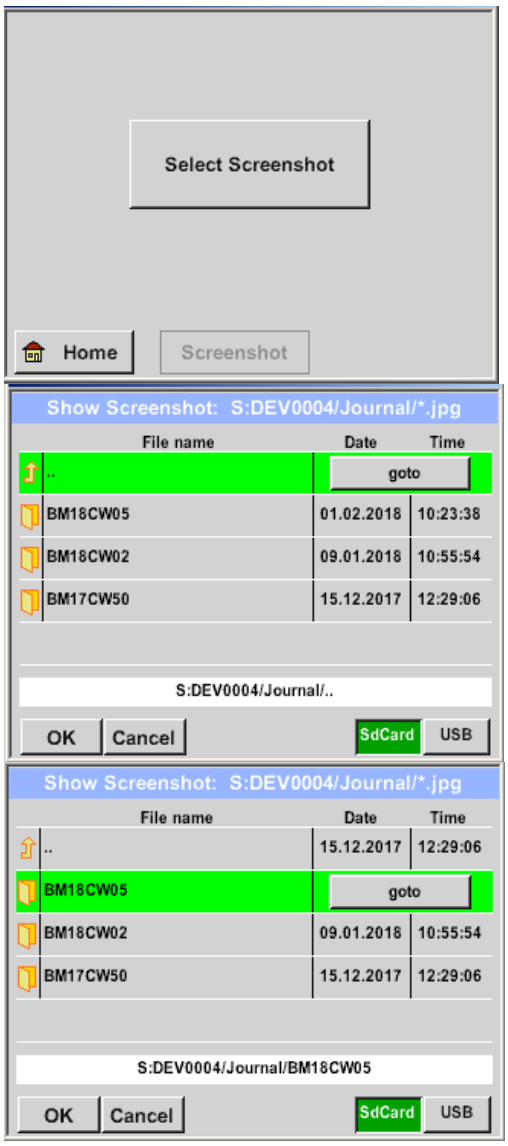
Export / Import → Import → Customers



As data changes are made during importing, a confirmation question needs to be confirmed with "***„Yes“***.

10.3 View bitmaps

View Bitmaps → Select Screenshoot



This allows the stored pictures (measurement pictures) on the SD-Card or USB Stick to load and shown in the display again.

Please press button „Select Screenshot“ and select the required picture (bitmap).

The pictures are stored and organized in different directories

The directory structure is year / calendar week

Designation: BMyyCWxx
yy = Year xx = calender week

The selection of the desired folder is made by selecting and activating with the ***„goto“***button.

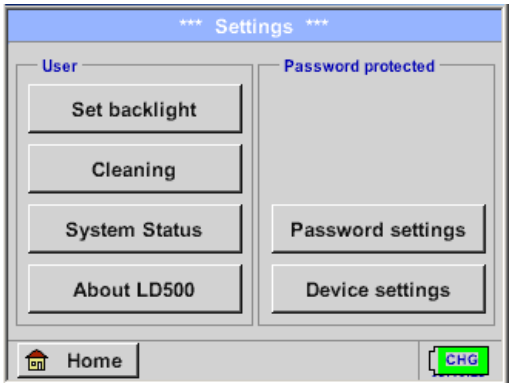
Select the desired image and then display with ***„OK“***.

10.4 Device Settings

The settings are all protected by a password!

Settings or changes are generally confirmed with OK!

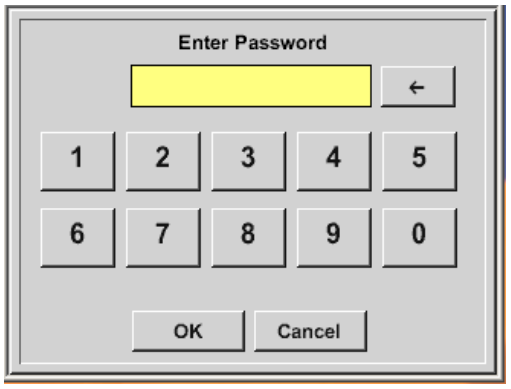
Remark:
If you go back to main menu and then again one of the setting menus is called, you must enter the password again.



Overview of the *Settings*

10.4.1 Passwort-Einstellung

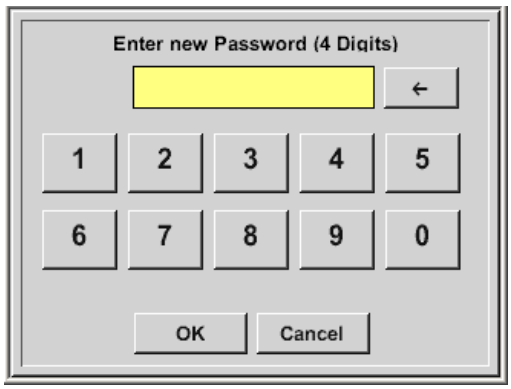
Settings ➔ Passwort Settings



Factory settings for password at the time of delivery: 0000 (4 times zero).

If required, the password can be changed in the *Password settings*.

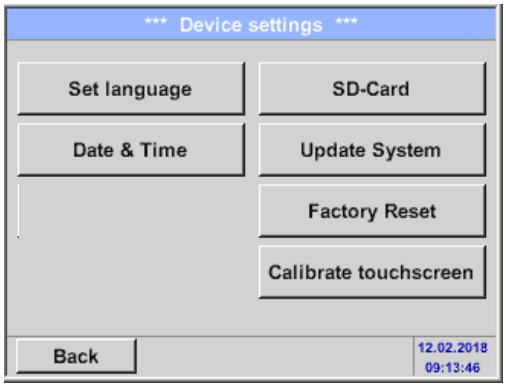
The new password must be entered two times in a row and in each case confirmed with *OK*



If an incorrect password is entered there appears *Enter password* or *New password repeat* in red font.
If you can't remember the password, please use Master password in order to enter a new password.
Remark:
The master password is supplied together with the instrument's documentation.

10.4.2 Device Settings

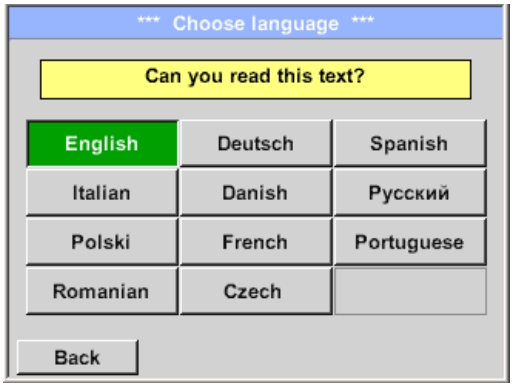
Settings ➔ Device settings



Overview of *Device settings*

10.4.2.1 Language

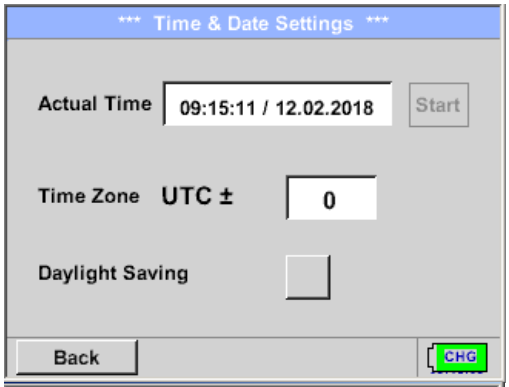
Settings ➔ Device settings ➔ Set language



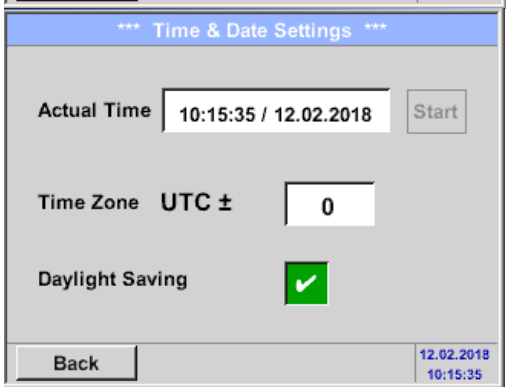
Here you can select one of 11 languages for the LD 500.

10.4.2.2 Date & Time

Settings ➔ Device settings ➔ Date & Time



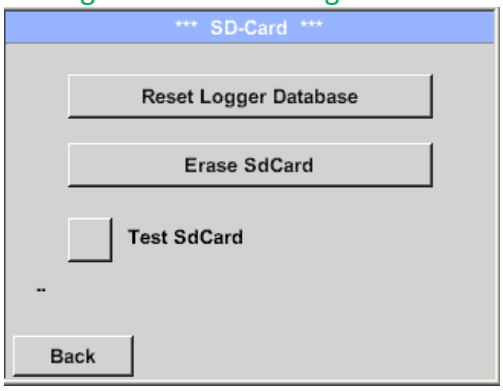
By pushing the *Time Zone* description field and enter the correct *UTC*, you can set the correct time all over the world.



The summer and wintertime switchover is realized by pushing the *Daylight Saving* button.

10.4.2.3 SD-Card

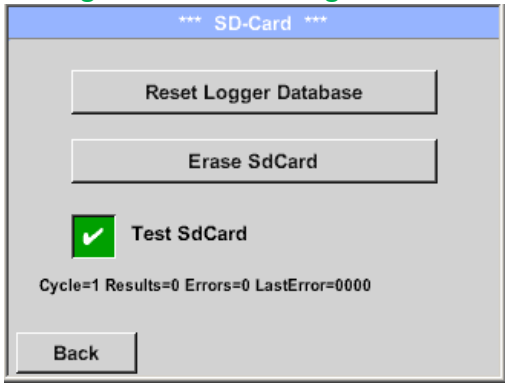
Settings ➔ Device settings ➔ SD-Card ➔ Reset Logger Database
Settings ➔ Device settings ➔ SD-Card ➔ Erase SdCard



By pressing *Reset Logger Database* all actual stored data on SD-Card will be blocked for use in LD500 / LD510. Nevertheless all data are still stored and available for external use only.

By pressing *Erase SdCard* all Data on the SD-Card will be deleted.

Settings ➔ Device settings ➔ SD-Card ➔ Test SdCard



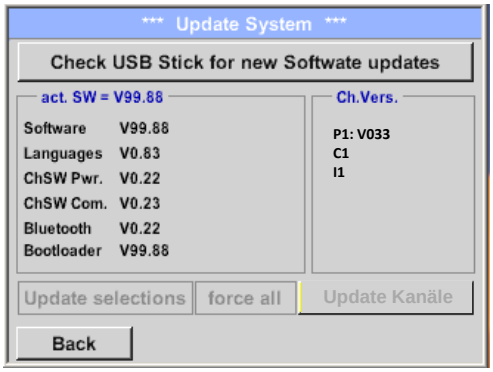
With activation of *Test SdCard* data are written and read to and from the SD-card.

The number of test cycles, as well as possible errors and error codes are display in the status line.

Press the *Back* button to returns to the device settings menu.

10.4.2.4 System update

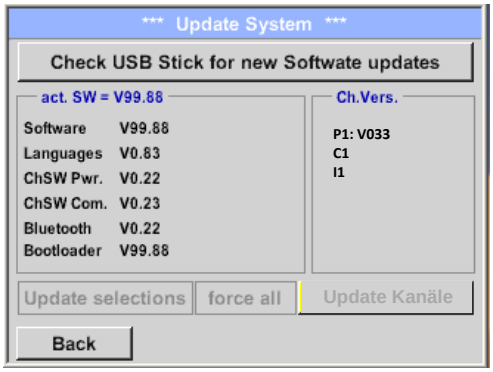
Settings ➔ Device settings ➔ System-Update



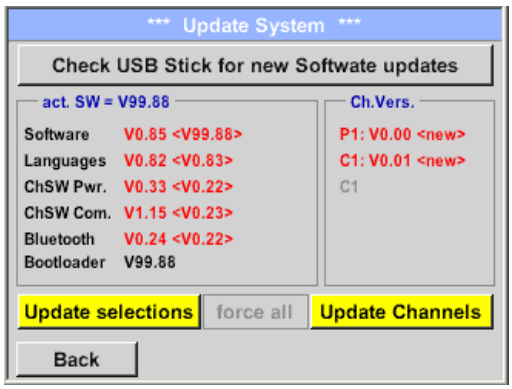
Overview of *System-Update*-Functions.

10.4.2.4.1 Check for Updates

Settings ➔ Device settings ➔ System-Update➔ check USB-Stick for new Updates



f after pressing the button *"Check USB Stick for new Software updates"* the following messages appear in the window, is the LD 500 is not properly connected to the USB flash drive or there are no files available.



I If the LD 500 is correctly connected to the USB stick and there are new versions of the individual SW Parts, the new versions are marked in red.

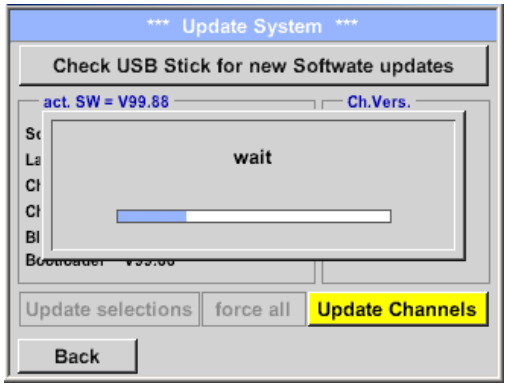
The update is started by pressing the „***Update Selection"***. button.

If it is required to install an older software version, you have press the button ***„Force all"***

10.4.2.4.2 Update Channels

Settings ➔ Device settings ➔ System-Update ➔ Update-Channels

If there is an update either for the internal and external channel (LD 510 only), it must be started separately



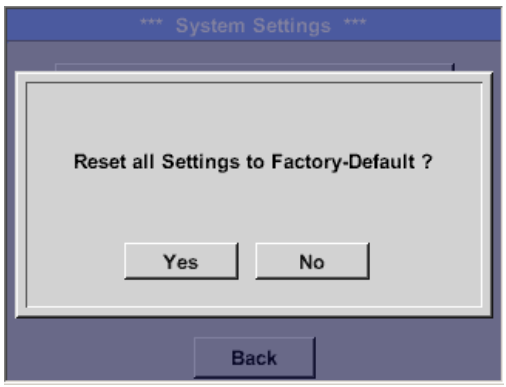
Update for *Channels* LD 500.

Important:
If the *Reboot system* button appears after the update, it must be pushed to restart the LD 500!

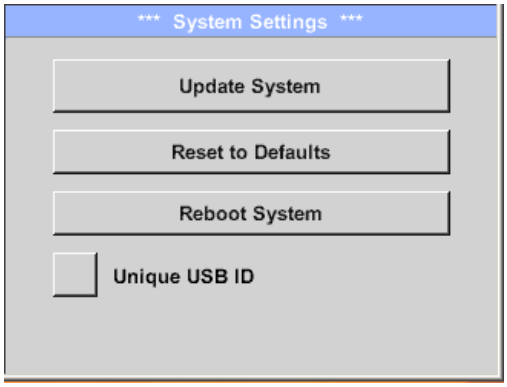
10.4.2.5 Factory Reset

10.4.2.5.1 Standard Einstellungen wiederherstellen

Settings ➔ Device settings ➔ System ➔ Reset to Defaults



Bevor the settings are changed to the production default settings a safety prompt is displayed and must be confirmed by pressing the button ***„Yes“***.



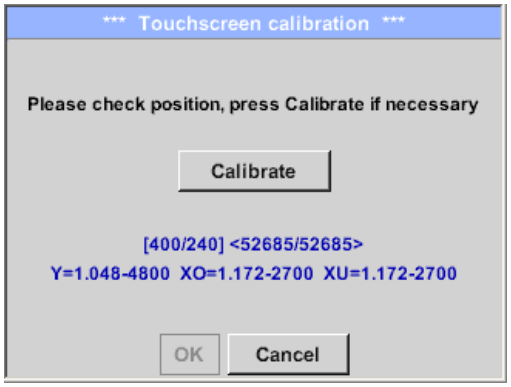
If needed with ***„Reboot System“*** the LD 500 could be started(reboot) here

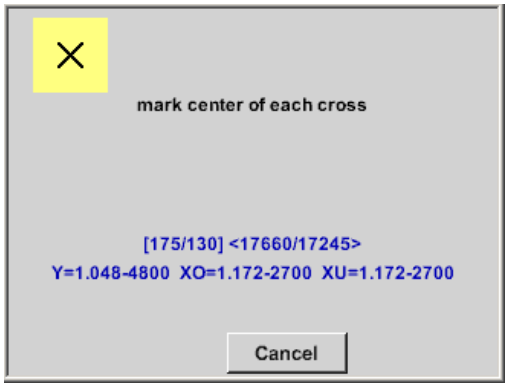
10.4.2.5.2 Unique USB ID

For connections with the PC, a status and therefore a unique USB ID can be defined here. Relevant for simultaneous connection of several USB devices to the PC.

10.4.2.6 Calibration of touchpanel

Settings ➔ Device settings ➔ calibrate touchscreen





If necessary, the touch-screen calibration can be changed here.

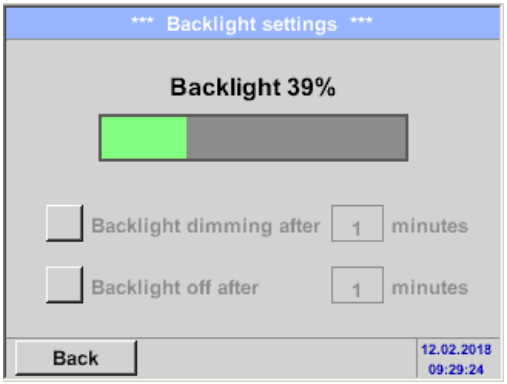
Push *Calibrate* and it appears, 1. left above,2. bottom right, 3. bottom left, 4.right above and 5. in the middle, a calibration cross that must be pushed consecutively.

If the calibration finished positive a message *"Calibration successful"* appears and have to be confirmed with *OK*.

Is this not the case, so you can repeat the calibration with the help of the Cancel and *Calibrate* buttons.

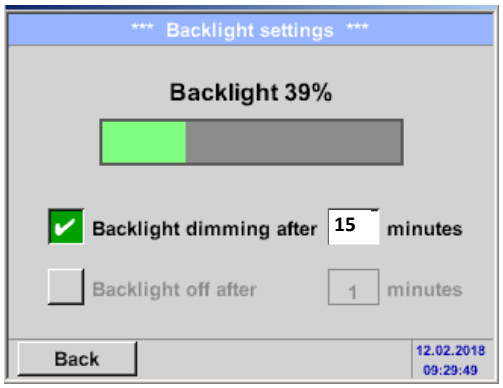
10.4.3 Set backlight brightness

Settings ➔ Set backlight



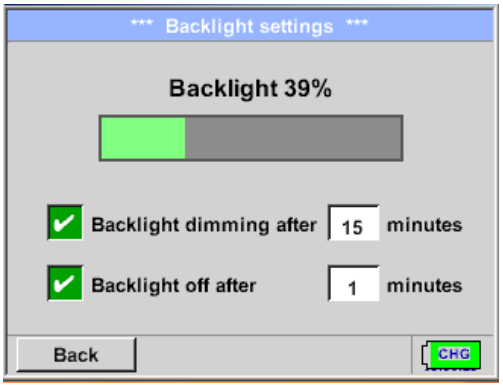
Here you adjust the desired *Backlight* (15-100%) of the display directly.

E.g. *Backlight* to 39 %



With the help of the *Backlight dimming after* button, after a definable time interval (here after 15 minutes), the *Backlight* can be reduced to the minimum.

As soon as the dimmed screen is operated again, the *Backlight* is committed automatically on the last set value before dimming.



To reduce the energy consumption (device runtime), you can switch off the display backlight by setting ***"Backlight off after".***

Remark:

At the first touch, the *Backlight* in our example is reset to 39%, after that a "normal" function operation is possible.

<u>Important</u>:

If the *Backlight dimming after* button is not activated, then the *Backlight* stays permanently on, in the currently set brightness.

10.4.4 Cleaning

Settings ➔ Cleaning

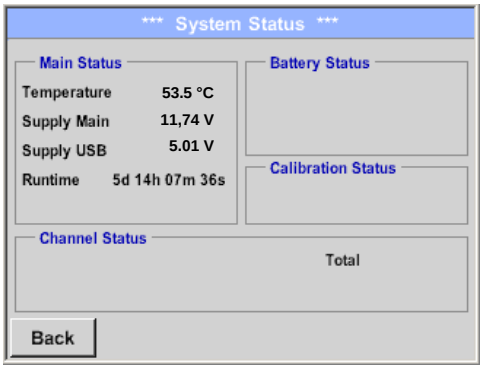
This function can be used for cleaning the touch panel during running measurements.

If one minute is not enough time to clean, the process can be repeated at any time.

Is the cleaning faster finished, then you can push the *to abort press long* button (for one or two seconds) to cancel.

10.4.5 System-Status

E Settings ➔ System-Status



The menu item ***"System status"*** provides information about the power supply voltages and an operating hour counter.

10.4.6 About LD 500/LD510

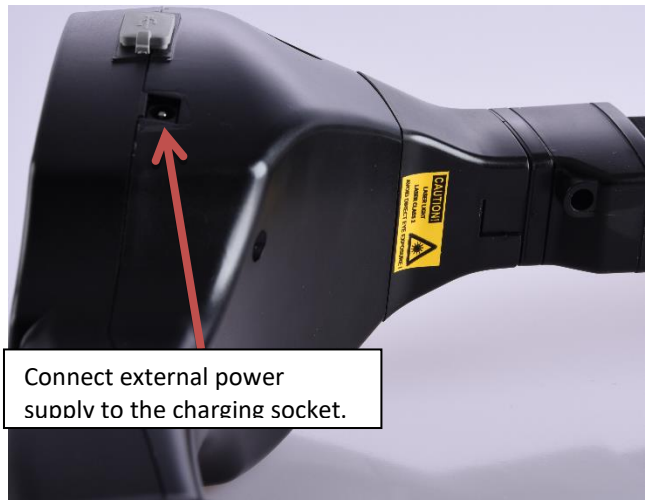
Settings ➔ about LD 500

Brief description of the Hardware and Software Version, as well as the Serial Number of the LD 500.

Under options, you can buy four additional, different functions, if you have not done this by ordering.

11 Charging the batteries

The battery is charged within the device. For this, the supplied plug-in power supply is connected to the built-in charging socket of the LD 500 and the 230V socket.



The LD 500 checks the charging status of the battery and starts the charging process automatically if necessary.

11.1 Protection of exhaustive discharge

Z To protect the Li-ION accumulator of exhaustive discharge the device is switching off automatically if a cell voltage of 6,4V will be reached.

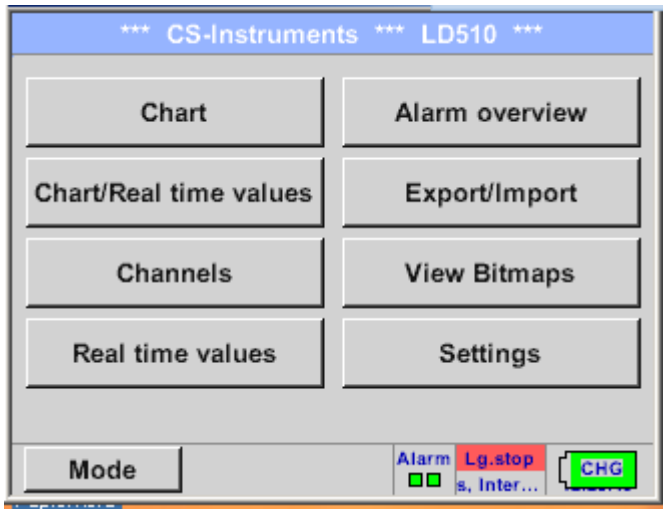
12 LD 510

12.1 Selection External sensor

The use of an ***„external Sensors“*** requires to switch to its mode**.**

Home ➔ Mode ➔ Externer Sensor

Home menu for external sensor connection



12.2 Input signals ext. sensor LD510

Input signals		
Current signal (0 – 20 mA / 4 – 20 mA) internal or external power supply	Measuring range	0 – 20 mA / 4 – 20 mA
	Resolution	0,0001 mA
	Accuracy	± 0,03 mA ± 0,05 %
	Input resistance	50 Ω
Voltage signal (0 - 1V)	Measuring range	0 - 1 V
	Resolution	0,05 mV
	Accuracy	± 0,2 mV ± 0,05 %
	Input resistance	100 kΩ
Voltage signal (0 - 10 V / 30 V)	Measuring range	0 - 10 V/30 V
	Resolution	0,5 mV
	Accuracy	± 2 mV ± 0,05 %
	Input resistance	1 MΩ
RTD Pt100	Measuring range	-200 - 850 °C
	Resolution	0,1 °C
	Accuracy	± 0,2 °C at -100 - 400 °C ± 0,3 °C (further range)
RTD Pt1000	Measuring range	-200 - 850 °C
	Resolution	0,1 °C
	Accuracy	± 0,2 °C at -100 - 400 °C ± 0,3 °C (further range)
Pulse	Measuring range	minimal pulse length 100 µs frequency 0 - 1 kHz max. 30 VDC

12.3 Cable cross section

12.3.1 Sensor circuit points/Output signal:

AWG26, cable cross-sections: 0,14 mm2

12.4 Connection diagrams of the different sensor types

12.4.1 Connector pin assignment for all sensors at PI 500

The interface connector to be used is a ODU Medi Snap 8 pin – Reference: K11M07-P08LFD0-6550
.

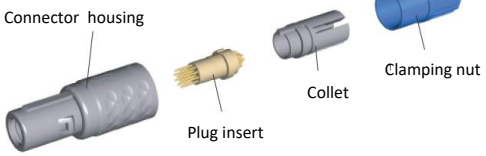
Available connection cables at CS-Instruments are:

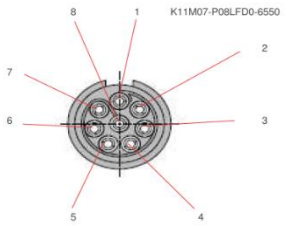
ODU with Open ends: Order no 0553 0501, cable length: 5 m.
Order no 0553 0502, cable length: 10 m.

ODU with M12 Connector: Order no 0553 0503, cable length: 5 m.

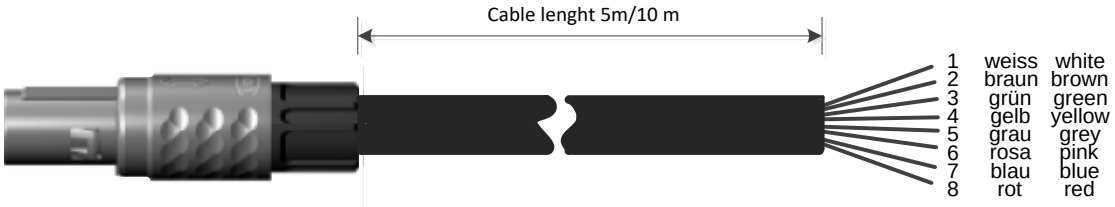
Extension cable (ODU/ODU): Order no 0553 0504, cable length: 10 m.

Connection scheme:



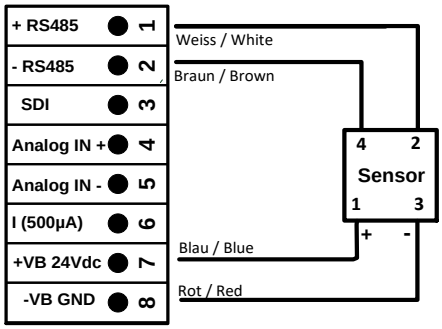


View on welding pins of Medi Snap Connector



+ RS485 ● 1	White	**+ RS485**
- RS485 ● 2	Brown	**- RS485**
SDI ● 3	Green	**SDI** (CS-internal data transmission for all Dew point and Flow sensor FA/ VA 400)
Analog IN + ● 4	Yellow	**ANALOG IN +**
Analog IN - ● 5	Grey	**ANALOG IN –**)
I (500µA) ● 6	Pink	**STROMQUELLE 500 µA**
+VB 24Vdc ● 7	Blue	**+VB, 24V DC Power supply for sensor**
-VB GND ● 8		**-VB, GND Sensor**

12.4.2 Connection for CS dew point- and consumption sensors, series FA/VA 5xx

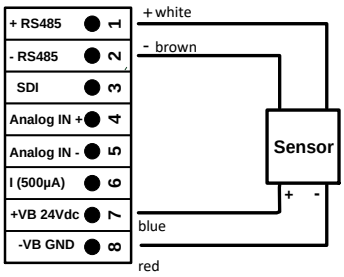


LD 510

FA 510
FA 500
VA 500
VA 520

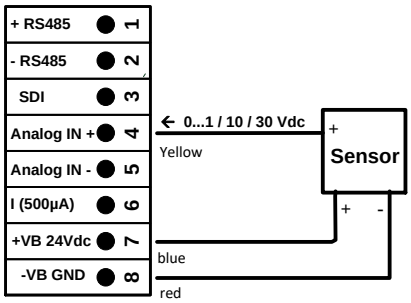
The digital data transmission between LD 510 and the sensors FA 500/ FA 510 and VA 500/520 occurs via RS 485 (Modbus).

12.4.3 Connection with RS485

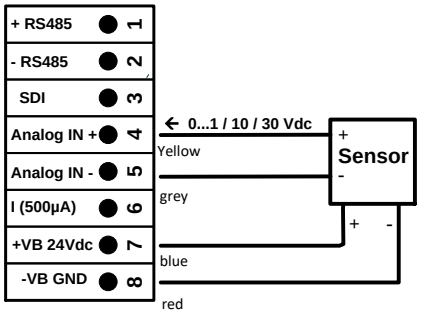


Sensor with RS485 Interface

12.4.4 Three- and four-wire power supply 0 - 1/10/30 VDC

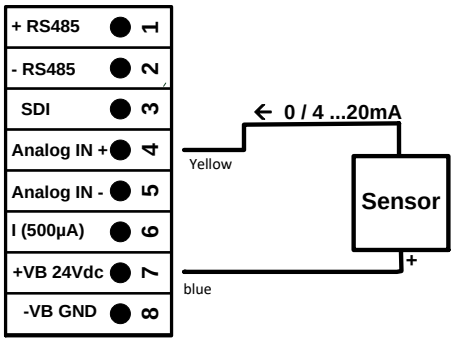
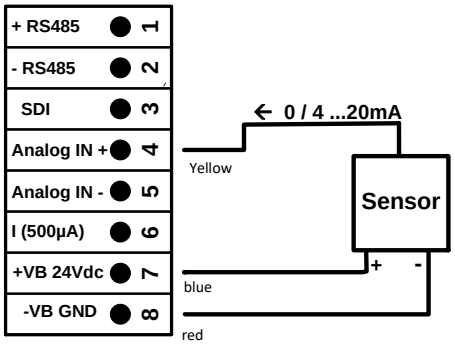
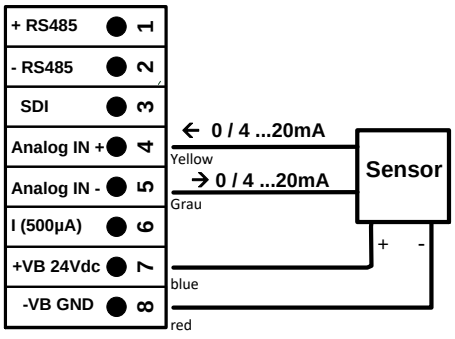


Sensor with voltage output in 3-wire technology

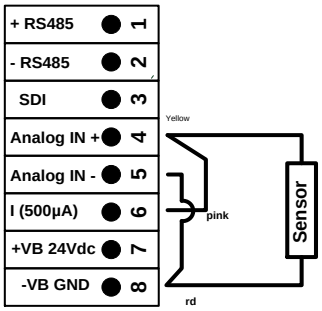
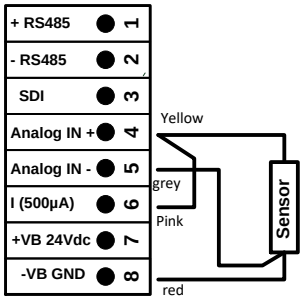
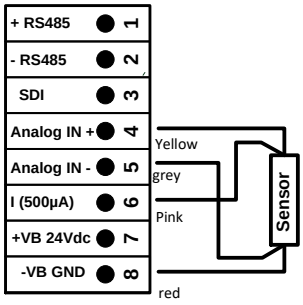


Sensor with voltage output in 4-wire technology

12.4.5 Analogue two-, three-, and four-wire current signal

Sensors with 4 - 20 mA-output in 2-wire technology	
	**LD 510**
Sensors with 4 - 20 mA output in 3-wire technology	
	**LD 510**
Sensors with 4 - 20 mA output in 4-wire technology	
	**LD 510**

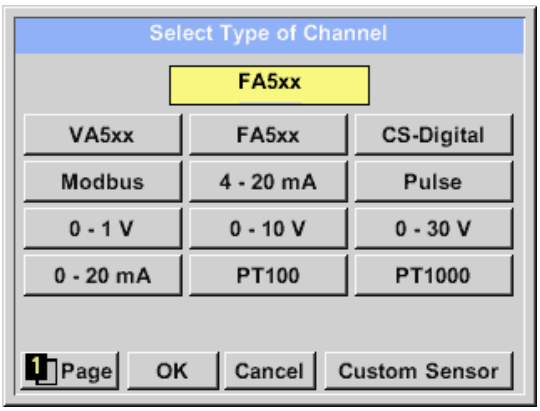
12.4.6 Two-, three- and four-wire connector pin assignments for PT100/PT1000/KTY81

	**2-wire PT100/PT1000/KTY81**
	**3-wire PT100/PT1000/KTY81**
	**4-wire PT100/1000/KTY81**

12.5 Dew Point Sensor FA 500 / FA 510 of type FA 5xx (RS 485 Modbus)

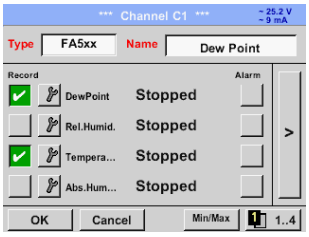
First step: choose an unused sensor digital channel
External sensor ➔ Settings ➔ Sensor settings ➔ C1

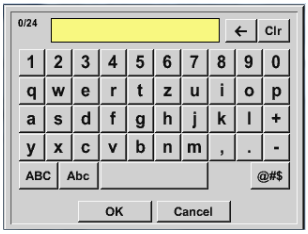
Second step: choose type FA 5xx
External sensor ➔ Settings ➔ Sensor settings ➔ C1 ➔ Type description field ➔ FA 5xx



Now the *Type **FA 5xx*** is selected for the FA 5xx series and confirmed by pressing the *OK* button.

External sensor ➔ Settings ➔ Sensor settings ➔ C1 → text field “Name”

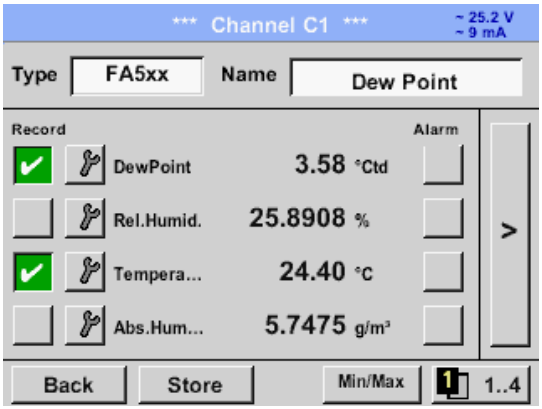




Input of a name, please enter the text field ***„Name“.***

It is possible to enter a name with max. 24 characters.

Confirmation by pressing the ***OK***-button.

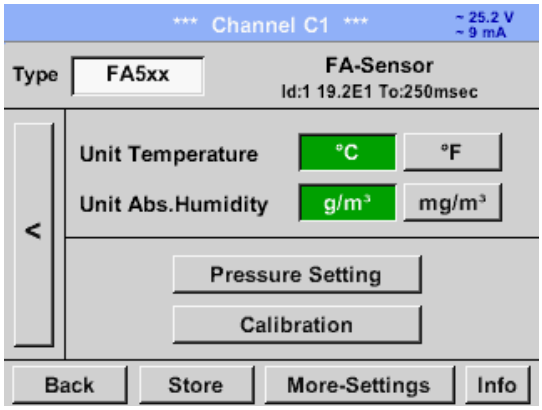


The connection with the FA 5xx sensor is done after confirmation by pressing *“OK”.*

12.5.1 Settings Dew point sensor FA 500 FA 510

12.5.1.1 Unit selection for temperature and humidity

External sensor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page)

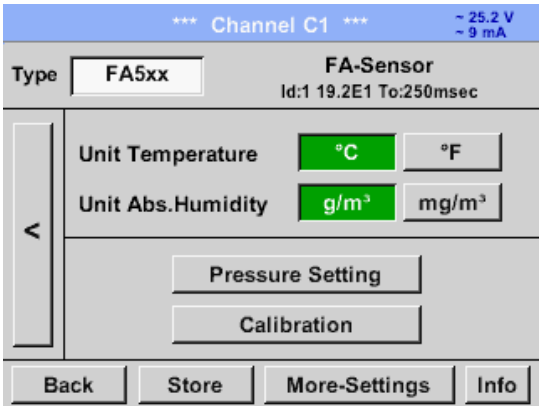


Unit selection for temperature and humidity by pressing the button *°C, °F, g/m³* or *mg/m³.*

Confirm the settings by pressing the *OK* button.

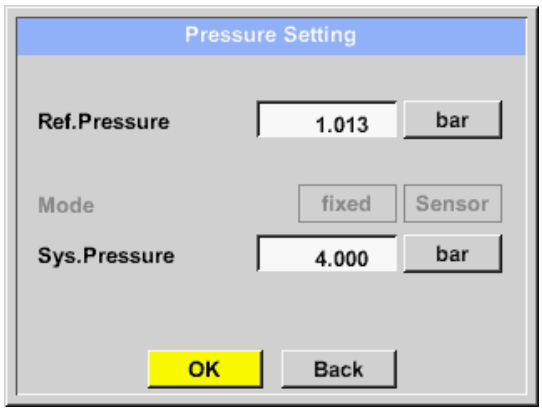
12.5.1.2 Definition of the System pressure (relative pressure value)

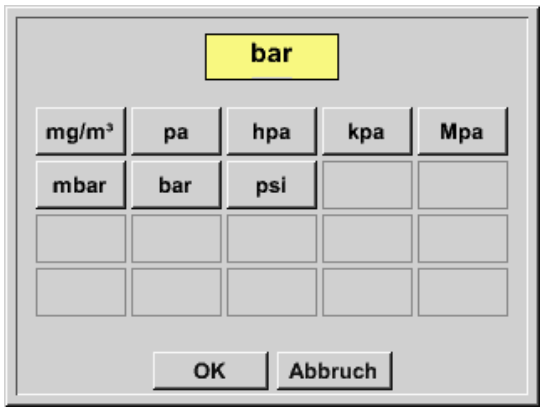
External sensor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page)➔Pressure Setting



The system pressure is inderted by entering the values in the corresponding text field. The unit can be freely selected, selection menu is opened by pressing the corresponding button units

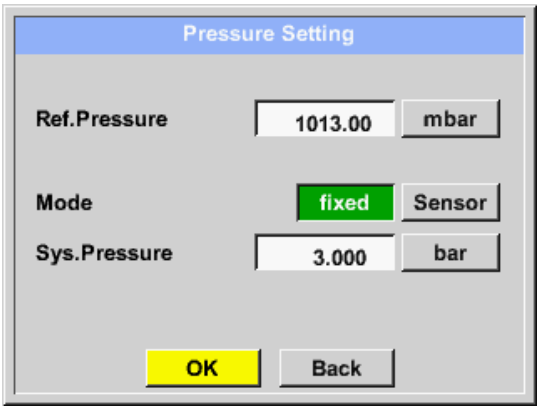
Confirm the settings by pressing the *OK* button.





12.5.1.3 Definition of Reference pressure (absolute pressure value)

External sensor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page)➔Pressure Setting ➔ Text field Ref.Pressure



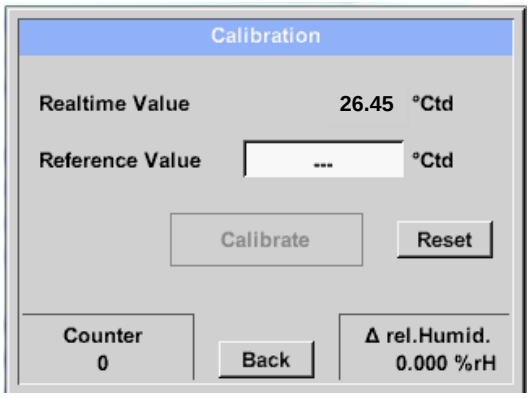
Reference pressure is the pressure for that the dew point in relaxation will be back-calculated.

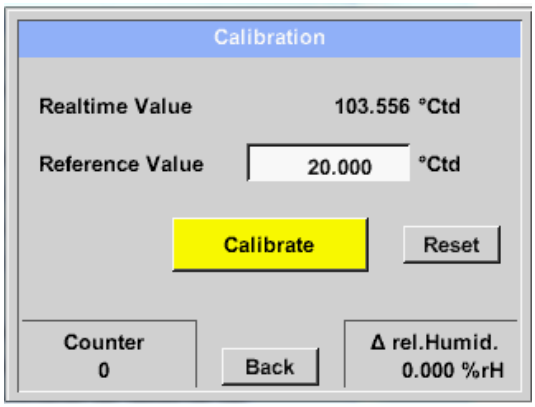
Default- Value is 1013 mbar (Atm. Pressure).

Confirm the settings by pressing the *OK* button.

12.5.1.4 Calibration

External sensor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page)➔ Calibration





Here, a one-point calibration can be performed.

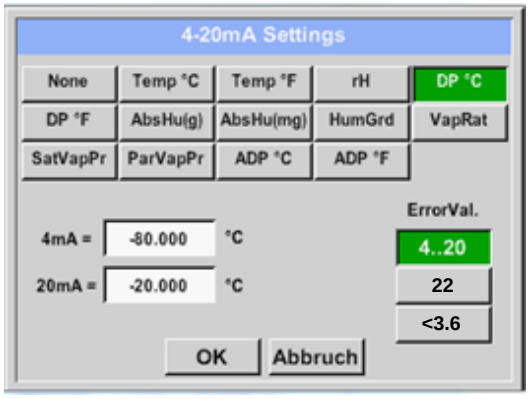
For that purpose, please enter in the text box *"Reference Value"* the new correct dew point value.

Then by pressing the "Calibration" button taking over the inserted reference value.

Calibration can be put back to factory setting by pressing *„Reset“*.

12.5.1.5 More Settings Analogue output 4-20mA

External sensor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page)➔ More-Settings ➔ 4-20mA



This menu allows the adjustment / assignment of the measurement value and the scaling of the analogue output.

Selection of the measurement value by selecting the appropriate measured value key in this example, *"DP ° C"* for dew point ° Ctd.

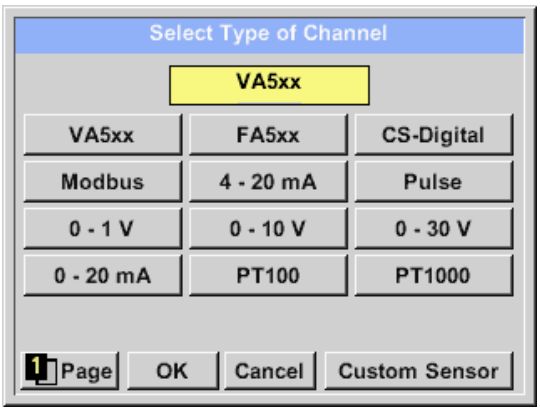
In text fields *"4mA"* and *"20mA"* the appropriate scaling values are entered, here from -80 ° Ctd (4mA) to -20 ° Ctd
(20mA).
With *"Error Val"* is determined what is output in case of error at the analog output.

- <3.6 Sensor error / System error
- 22 Sensor error / System error
- 4..20 Output according Namur (3.8mA – 20.5 mA)
  < 4mA to 3.8 mA Measuring range under range
  >20mA to 20.5 mA Measuring range exceeding

12.6 Flow sensor of type VA 5xx (RS 485 Modbus)

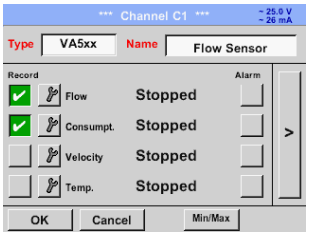
First step: choose an unused sensor digital channel
External sensor ➔ Settings ➔ Sensor settings ➔ C1

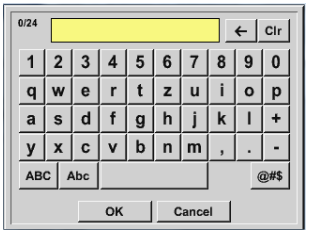
Second step: choose type VA 5xx
External sensor ➔ Settings ➔ Sensor settings ➔ C1 ➔ Type description field ➔ VA 5xx



Now the *Type **VA 5xx*** is selected for the VA 5xx series and confirmed by pressing the *OK* button.

External sensor ➔ Settings ➔ Sensor settings ➔ C1 ➔ Name description field

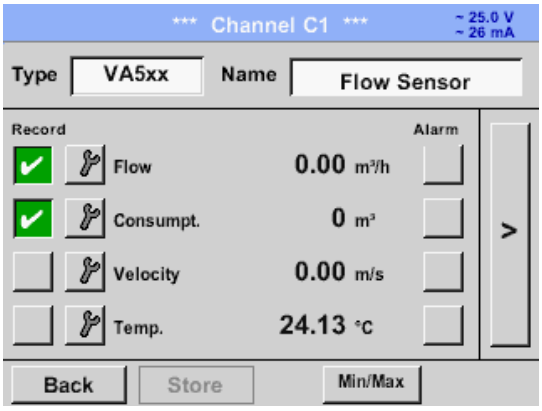




Input of a name, please enter the text field ***„Name“.***

It is possible to enter a name with max. 24 characters.

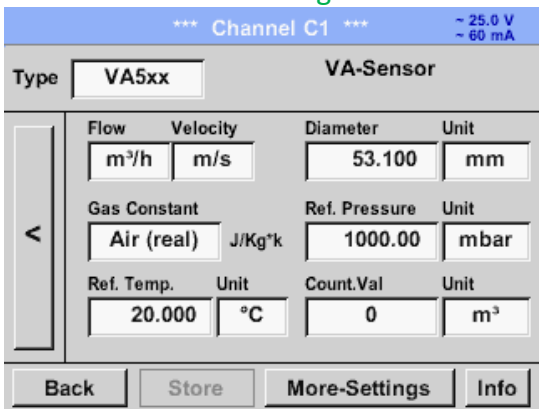
Confirmation by pressing the ***OK***-button.



The connection with the VA 5xx sensor is done after confirmation by pressing *“OK”.*

12.6.1 Settings for Flow sensor VA 5xx

External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page)



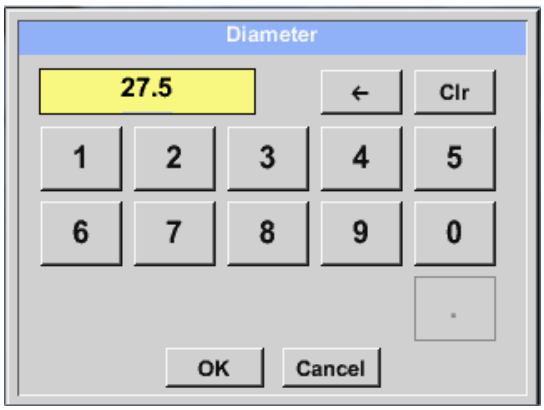
For each text field could be the either a value or a unit be set.

Settings by entering the text field and then input a value or select the unit for the appropriate field.

In case of VA 520 and VA 570 with integrated measuring section the diameter and diameter unit field are not access able.

12.6.1.1 Diameter settings (only for VA 500 or VA 550)

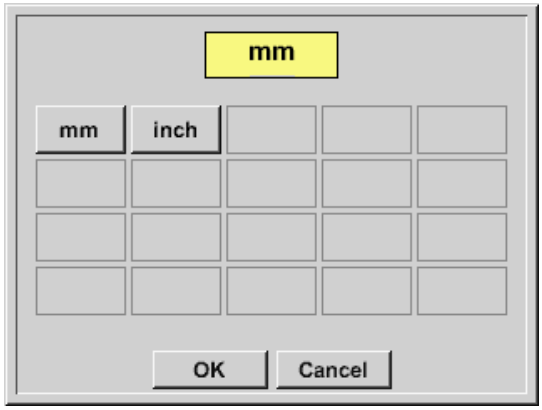
External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page) ➔ diameter description field
External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page) ➔ diameter unit description field



Important:
Only for VA 500 or VA 550 possible to change the *inner diameter*

Here the "***inner diameter***" is set to 27.5mm.

Please confirm by pressing the *OK* button and go back with ***arrow left (1.page).***

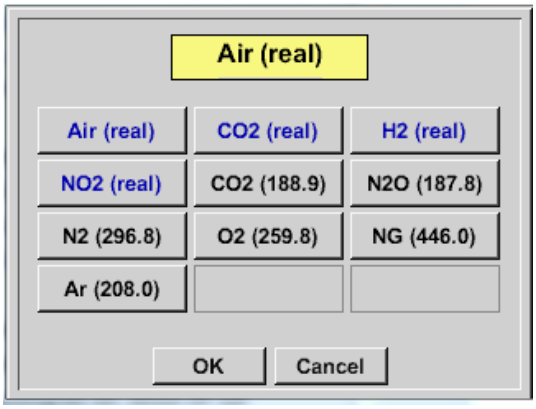


After pressing the *Unit* Text fields following units bare selectable.

Important:
The *inner diameter* should be entered as precisely as possible, because otherwise the measurement results are not correct!
There is no uniform standard for the tube inner diameter!
(Please, inquire at the manufacturer or measure by your own!)

12.6.1.2 Gas Constant settings

External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page) ➔ Gas Constant description field



All gases marked in blue and with (real) have
been a real gas calibration curve stored in the sensor.

Select the gas you require and confirm selection by pressing *OK* button.

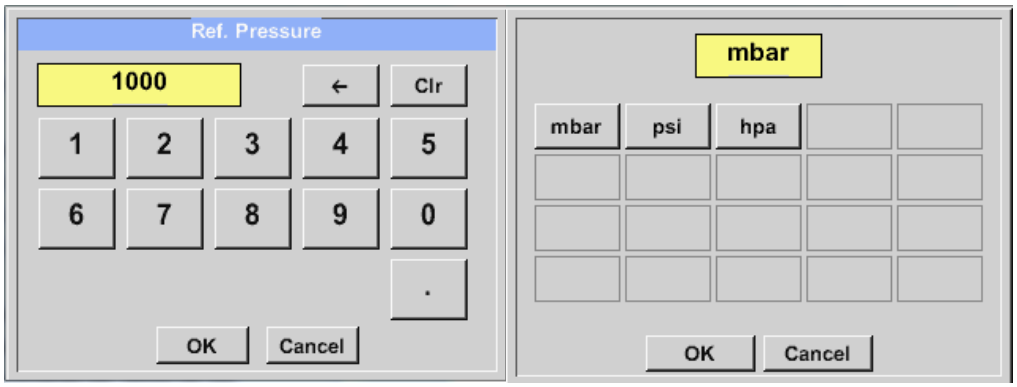
Attention:

Reference temperature and reference pressure (factory setting 20 °C, 1000 hPa):
All volume flow values (m³/h) and consumption values indicated in the display are related to 20 °C, 1000 hPa (according to ISO 1217 intake condition)
0 °C and 1013 hPa (= standard cubic meter) can also be entered as a reference.
Do not enter the operation pressure or the operation temperature under reference conditions!

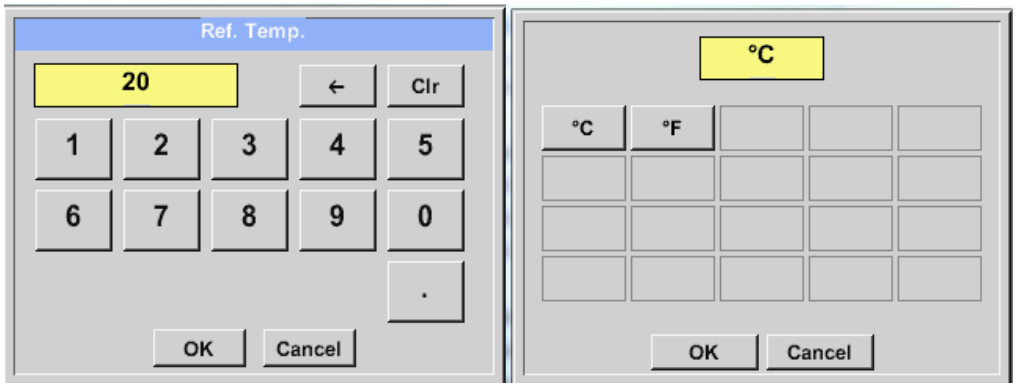
12.6.1.3 Definition of the reference conditions

Here, the desired measured media reference conditions for pressure and temperature can be defined

External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page) ➔ Ref. Pressure description field
External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page) ➔ Ref. Pressure Unit description field

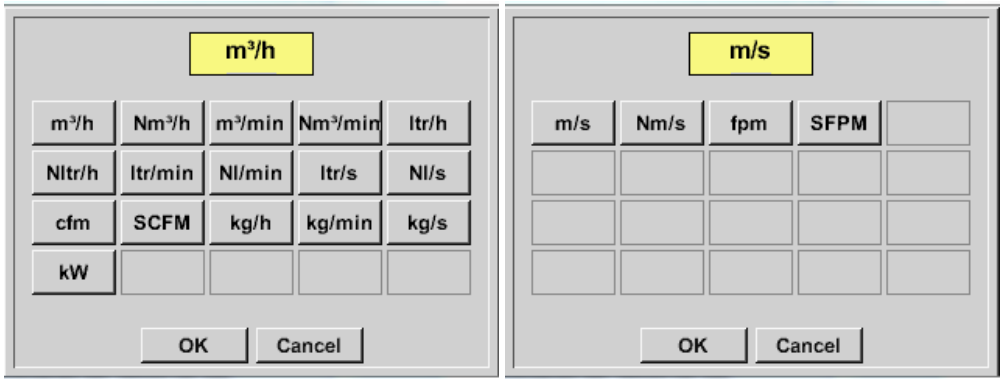


External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page) ➔ Ref. Temp. description Field
External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page) ➔ Ref. Temp. Unit description Field



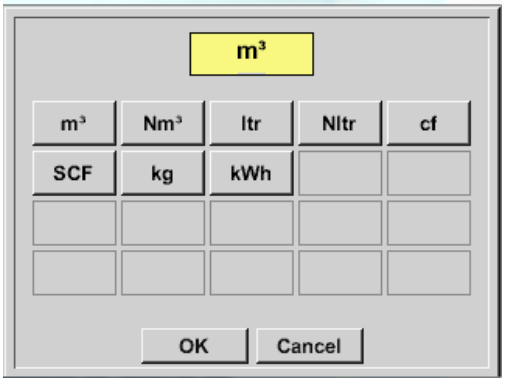
12.6.1.4 Definition Unit of flow and velocity

External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page) ➔ Flow description Field
External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page) ➔ Velocity description Field



12.6.1.5 Definition consumption counter value and consumption unit

External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page) ➔ Count Val. description Field
External senor ➔ Settings ➔ Sensor settings ➔ C1➔ arrow right (2.page) ➔ Count Val. Unit description Field

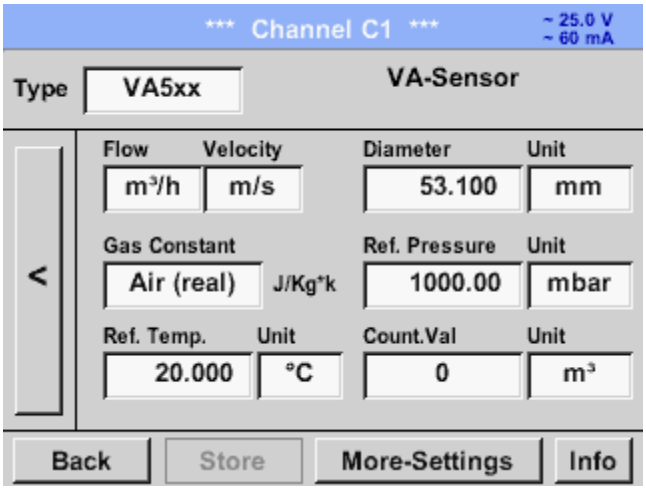


The sensor allows taking over a starting counter value. Inserting the value by entering the *"Count. Val."* text field.

In the Count. Val. Unit field different units could be used. Selection by activation of the *"Count. Val. Unit"* text field

In case the counter value unit will be changed only the consumption counter value will be recalculated to the appropriate unit.

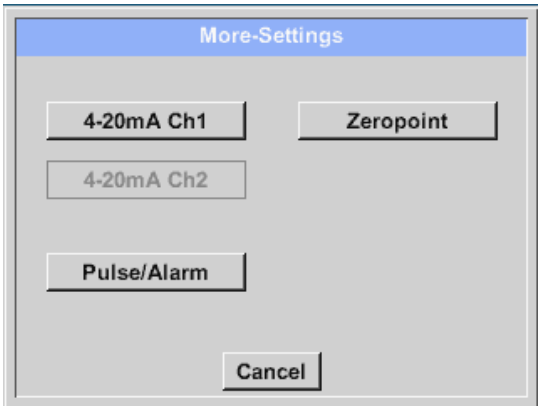
Selection to confirm selection by pressing *OK* button.



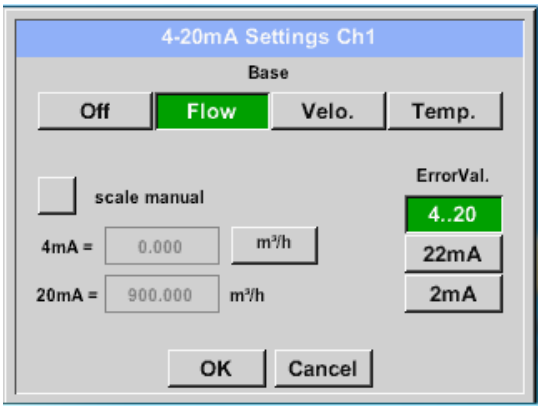
Remark:
After confirmation with *OK*, the font is black again and the values and settings are accepted

12.6.1.6 Settings analogue output 4-20mA of VA 5xx

External senor ➔ Settings ➔ Sensor settings ➔ C1➔ More-Settings ➔ 4-20mA Ch1

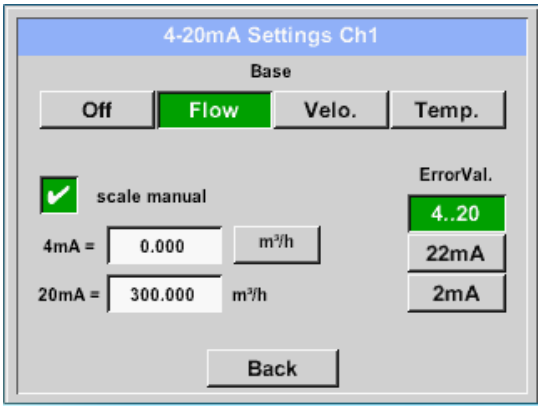


This menu allows the adjustment / assignment of the measurement value and the scaling of the analogue output by pressing the*"4-20mA Ch1"* button.



Selection of the analogue output measurement value by activating the appropriate measured value key in this example, *"Flow"*.
Possible outputs are flow, velocity and temperature.
In case of no use, please select "*Off".*

The analogue output scaling have to possibilities, automatic scaling (default) and a manual scaling by the user. Auto scaling is based on the calibration settings, means 4mA is set to zero and the 20mA value is based on the max. settings here 900m³/h



A "manual scaling" needs an activation of the "*scale manual"* button.
In text fields *"4mA"* and *"20mA"* the appropriate scaling values are entered, here from zero m³h (4mA) to 300 m³/h (20mA).

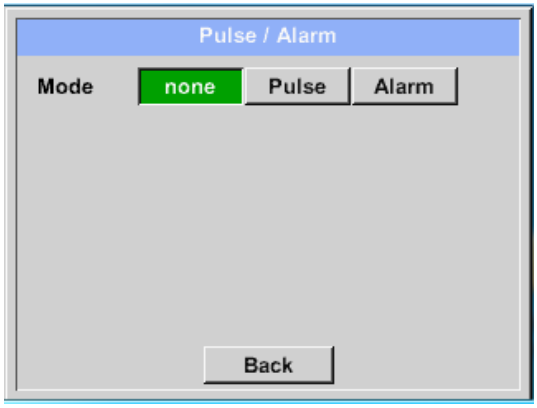
With *"Error Val"* it is determined what is the output in case of an error at the analogue output.

- 2 mA Sensor error / System error
- 22 mA Sensor error / System error
- 4..20 Output according Namur (3.8mA – 20.5 mA)
  < 4mA to 3.8 mA Measuring range under range
  >20mA to 20.5 mA Measuring range exceeding

Inputs / changes to be confirmed with *"OK"* button. Return to main menu with *"Back".*

12.6.1.7 Settings Pulse / Alarm output of VA 5xx

External senor ➔ Settings ➔ Sensor settings ➔ C1➔ More-Settings ➔ Pulse / Alarm

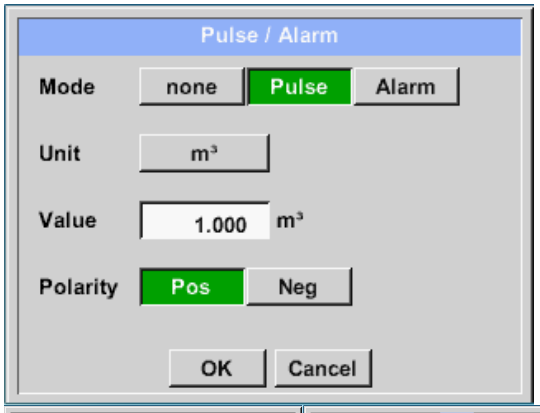


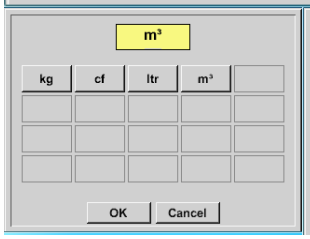
The pulse output of the VA 5xx could be set functionally as pulse output or alarm output.

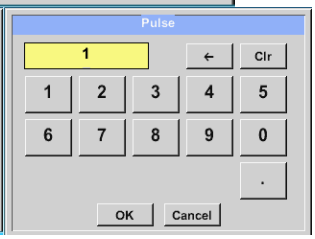
Function to activate by pressing either the *"Pulse"* or *"Alarm"* button.

In case of no use, please select *"none"*.

External senor ➔ Settings ➔ Sensor settings ➔ C1➔ More-Settings ➔ Pulse







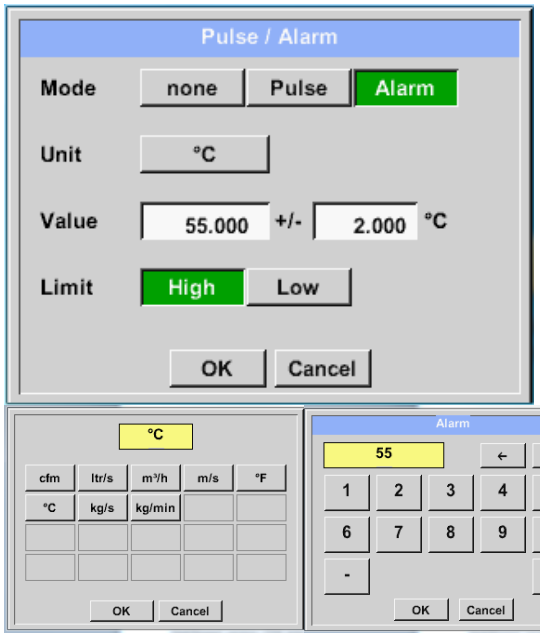
To set up the pulse first the unit and the measurement value have to be defined.

Unit selection by pressing *"unit"* button and choice one of the possible units *"kg"*, *"cf"*, *"ltr"* or *"m³"*).

Pulse weight setting by entering the text field *"Value"*.
Here with defined 1 pulse per m³ and with positive polarity.

With ***„Polarity"*** the switching state could be defined.
Pos. = 0➔ 1 neg. 1➔ 0

External senor ➔ Settings ➔ Sensor settings ➔ C1➔ More-Settings ➔ Alarm



In case of use the pulse output as alarm following definitions needs to be set:

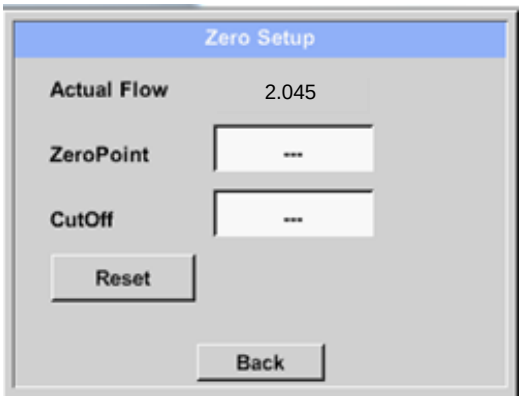
Unit selection by pressing *"unit"* button and choice one of the possible units *"cfm", "ltr/s", "m³/h", "m/s" ", "°F ", "°C" ", "kg/s" or "*, *"kg/min"*).

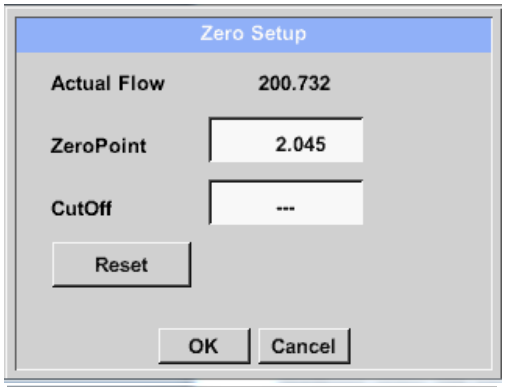
Alarm value setting by entering the text fields *"Value"*.

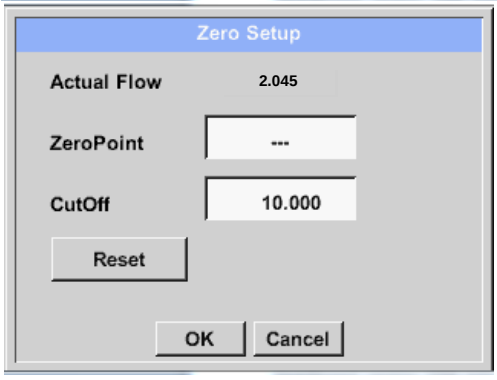
The limits ***„High***" or ***„Low"*** defines when the alarm is activated, selecting by pressing the appropriate button
High: Value over limit

12.6.1.8 Settings ZeroPoint or Low Flow Cut off for VA 5xx

External senor ➔ Settings ➔ Sensor settings ➔ C1 ➔ More-Settings ➔ Zeropoint







With these function following adjustments for the sensor VA 5xx could be done:

Zeropoint:
When, without flow, the installed sensor shows already a flow value of > 0 m³/h herewith the zero point of the characteristic could be reset

Cutoff:
With the low-flow cut off activated, the flow below the defined "LowFlow Cut off" value will be displayed as 0 m³/h and not added to the consumption counter.

For Zero Point the text field " ZeroPoint" to enter and insert the displayed actual flow, here 2.045

12.7 Type Modbus

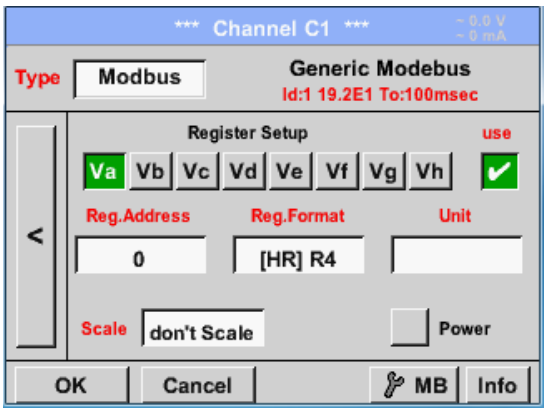
12.7.1 Selection and activation of Sensor-Type Modbus

First Step: First step: choose an unused sensor channel
External sensor ➔ Settings ➔ Sensor settings ➔ C1

Second step: choose type Modbus
External sensor ➔ Settings ➔ Sensor settings ➔ C1 ➔ Type description field ➔ Modbus

Third step: confirm with *OK*.

External sensor ➔ Settings ➔ Sensor settings ➔ C1 ➔ arrow right (2.page) ➔Va ➔ use

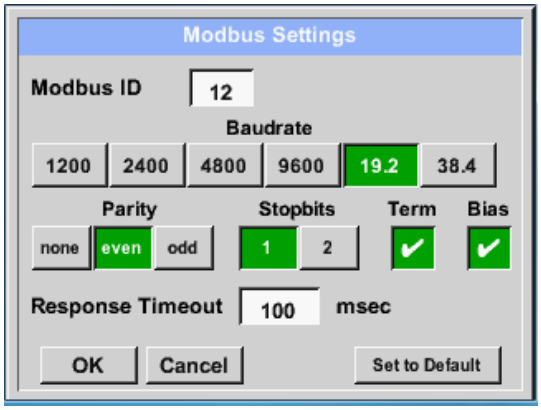


Via Modbus, it is possible to read out up to 8 Register-Values (from Input or Holding Register) of the sensor.

Selection by the Register Tabs *Va –Vh* and activation by pressing of the corresponding *Use* button.

12.7.1.1 Modbus Settings

External sensor ➔ Settings ➔ Sensor settings ➔ C1 ➔ arrow right (2.page) ➔ Modbus Settings ➔ID -text field



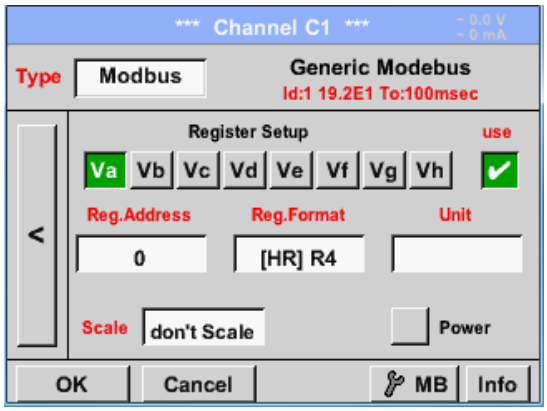
Please insert here the specified *Modbus ID* of the sensor, allowed values are *1 -247*, (e.g. here *Modbus ID = 12)*

For setting the Modbus ID on the sensor, please see sensor-datasheet.
In addition in the menu are the serial transmission settings *Baudrate, Stopbit, Paritybit* and *Timeout* time to define.
.
In case that the LD 510 is the end of the RS485 bus system with activating *Term-* & *Bias-* button the required termination and biasing could be activated.

Confirmation by pressing ***OK*** button.

For resetting to the default values please press *Set to Default.*

External sensor ➔ Settings ➔ Sensor settings ➔ C1 ➔ Reg. Address description field

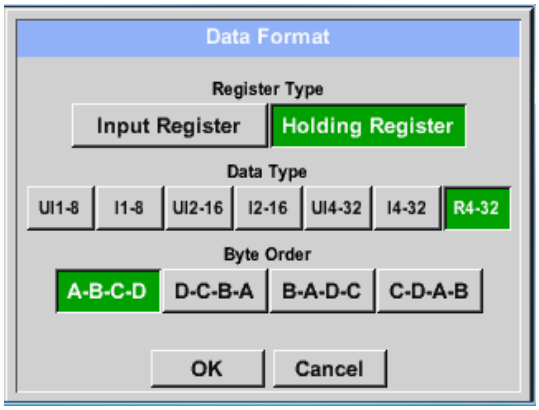


The measurement values are kept in the registers of the sensor and can be addressed via Modbus and read by the PI 500
This requires setting the desired register addresses in the PI 500

Entering the register / data address is here in decimal with 0-65535

Important:
Required is the correct *register-address*.
It should be noted that the register-number could be different to the register-address (Offset). For this, please consult the sensor data sheet.

External sensor ➔ Settings ➔ Sensor settings ➔ C1 ➔ Reg. Format description field



With the buttons *Input Register* and *Holding Register* the corresponding Modbus-register type will be selected.

The number format and transmission order of each value needs to be defined by *Data Type* and *Byte Order.* Both have to be applied in correct combination.

Supported Data types:

Data Type:	UI1(8b)	= unsigned Integer	=>	0	- 255
	I1 (8b)	= signed integer	=>	-128	- 127
	UI2 (16b)	= unsigned Integer	=>	0	- 65535
	I2 (16b)	= signed integer	=>	-32768	- 32767
	UI4 (32b)	= unsigned Integer	=>	0	- 4294967295
	I4 (32b)	= signed integer	=>	-2147483648	- 2147483647
	R4 (32b)	= floating point number			

Byte Order:

The size of each Modbus-register is 2 Byte. For a 32 bit value two Modbusregister will be read out by the DS500. Accordingly for a 16bit Value only one register is read.

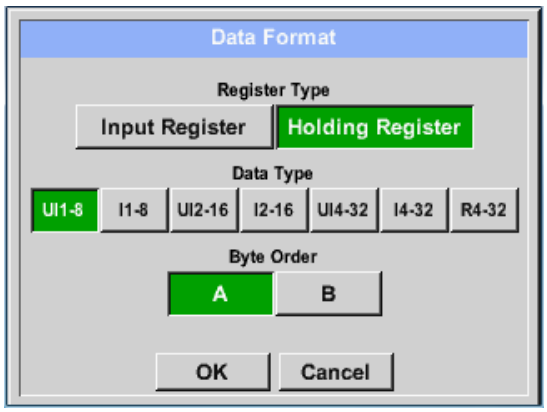
In the Modbus Specification, the sequence of the transmitted bytes is not defined clearly. To cover all possible cases, the byte sequence in the DS500 is adjustable and must adapted to the respective sensor. Please consult here for the sensor datasheet.

e.g.: High byte before Low Byte, High Word before Low Word etc.

Therefore the settings have to be made in accordance to the sensor data sheet.

Example:

Holding Register - UI1(8b) - Value: 18

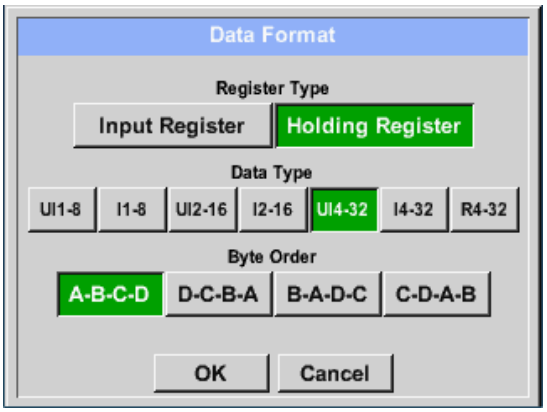


Selection Register Type *Holding Register*, Data Type *U1(8b)* und Byte Order *A / B*

	HByte	LByte
18 =>	00	12

Data Order	1. Byte	2. Byte
A	00	12

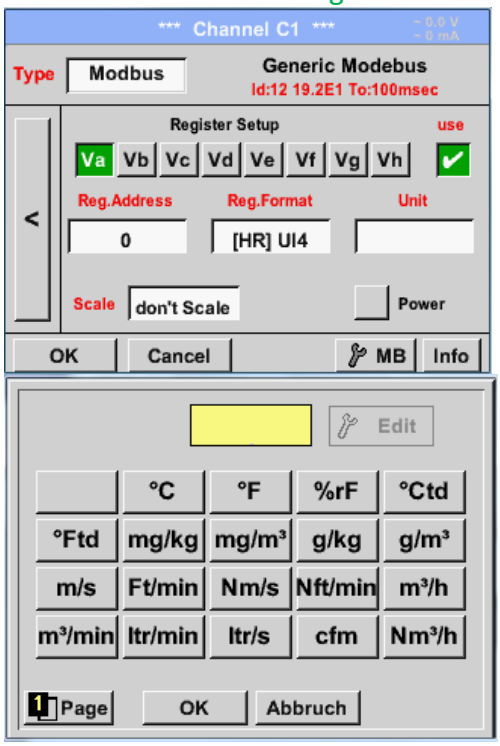
Holding Register – UI4(32) - Value: 29235175522 → AE41 5652



Selection Register Type *Holding Register*, Data Type *U1(32b)* und Byte Order *A-B-C-D*

	HWord		LWord	
	HByte	LByte	HByte	LByte
29235175522 =>	AE	41	56	52

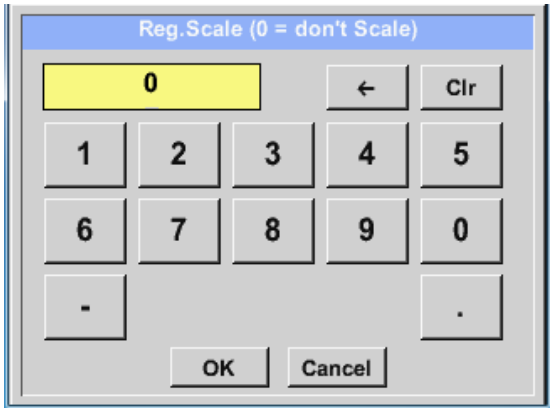
External sensor → Settings → Sensor settings → C1 → Unit- description field



By pressing the description field *Unit* the list with the available units appear

Please select the unit by pressing the respective button e.g. *m³/h.*
For validation of the unit, please push the button *OK*
To move through the list please press the button *Page.*
In case the unit is **not** available it is possible to create a user defined unit.
Therefore, please select one of the *User_X* buttons.

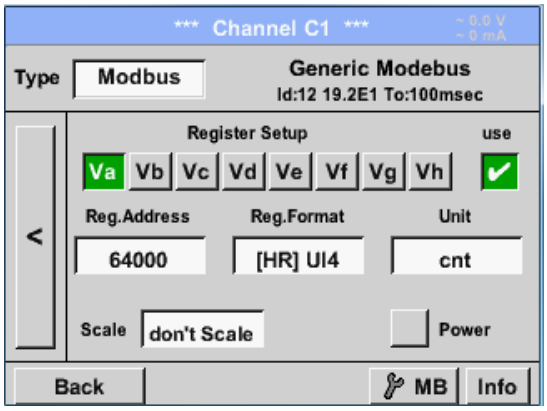
External sensor ➔ Settings ➔ Sensor settings ➔ C1 ➔ Scale- description field



The use of this factor allows adapting the output value by the same.

By default or value = 0 no scaling is applied and displayed in the field is *don't scale*

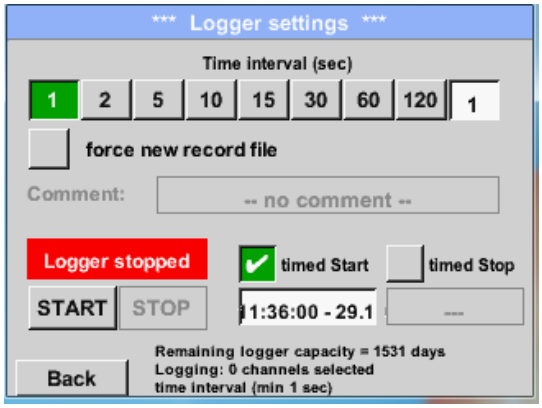
External sensor ➔ Settings ➔ Sensor settings ➔ C1 ➔ OK



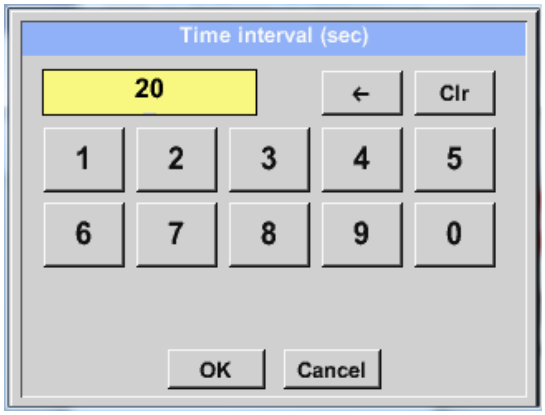
By pressing the *OK* button, the inputs are confirmed and stored.

12.8 Data logger Settings

External sensor ➔ Settings ➔ Logger settings



In the top row you can select the predefined *Time intervals* 1, 2, 5, 10, 15, 30, 60 and 120 seconds for recording.



A different, individual *Time interval* can be entered in the highlighted white description field right at the head, where the currently set *Time interval* is always displayed.

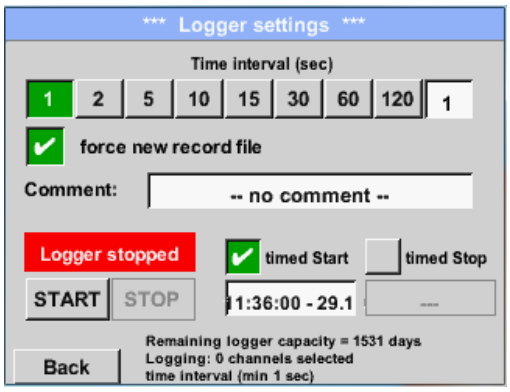
Remark:
The largest possible *Time interval* is 300 seconds.

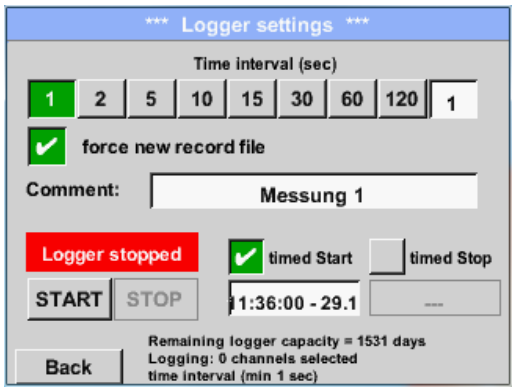
Remark:

If more than 12 measurement data are recorded at the same time, the smallest possible time interval of the data logger is 2 seconds.

In addition, if more than 25 measurement data are recorded at the same time, the smallest possible time interval of the data logger is 5 seconds.

External sensor ➔ Settings ➔ Logger settings ➔ force new Record File button
or
External sensor ➔ Settings ➔ Logger settings ➔ force new Record File button ➔ Comment description field



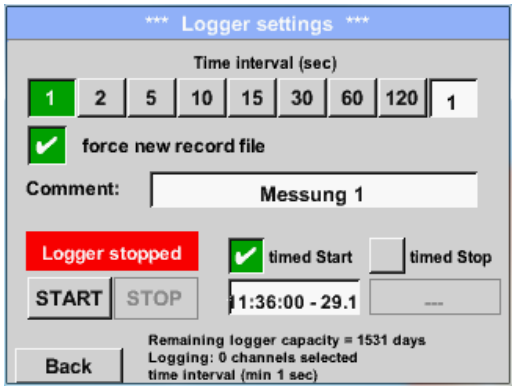


A new recording file will be created by pushing the *force new record file* button and a name or comment can be entered by the choice of the *Comment* description field.

Important:

If a new recording file should be created, the *force new record file* button

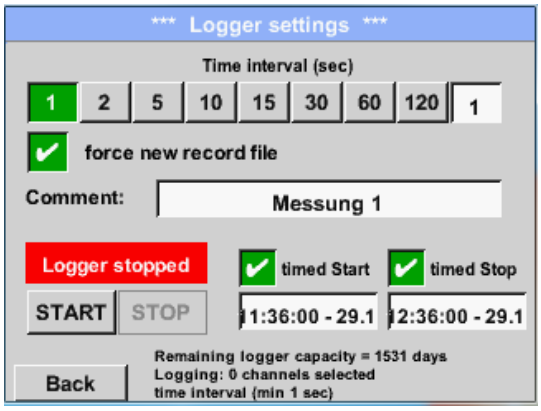
Main menu ➔ Settings ➔ Logger settings ➔ timed Start button



By pushing the *timed Start* button and then the date/time description field below, the date and the start time can be set for a data logger recording.

Remark:
If the start time is activated, it will automatically be set at the current time plus a minute.

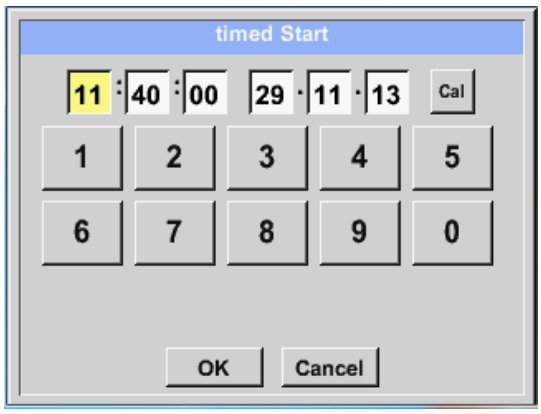
External senor ➔ Settings ➔ Logger settings ➔ timed Stop button



By pushing the *timed Stop* button and then the date/time description field below, the date and the stop time can be set for a data logger recording.

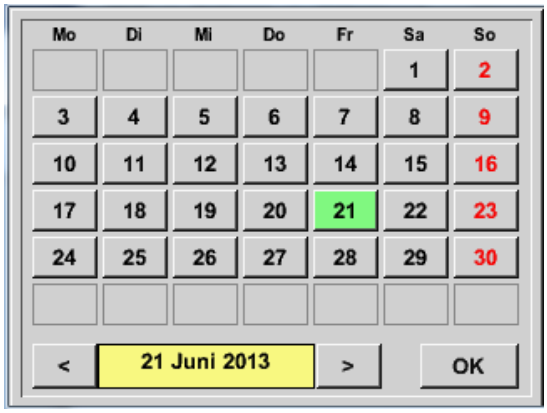
Remark:
If the stop time activated, it will automatically be set to the current time plus an hour.

External senor ➔ Settings ➔ Logger settings ➔ timed Start button/timed Stop button ➔ Date/Time description field



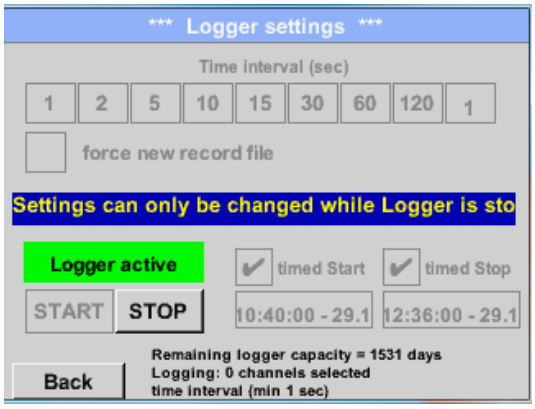
After pushing the *date/time description field* a window will appear where the yellow marked area of the time or date can always be set and changed.

External senor ➔ Settings ➔ Logger settings ➔ timed Start button/timed Stop button ➔ Date/Time description field ➔ Cal button



With the *Cal* button the desired date can be easily select from the calendar.

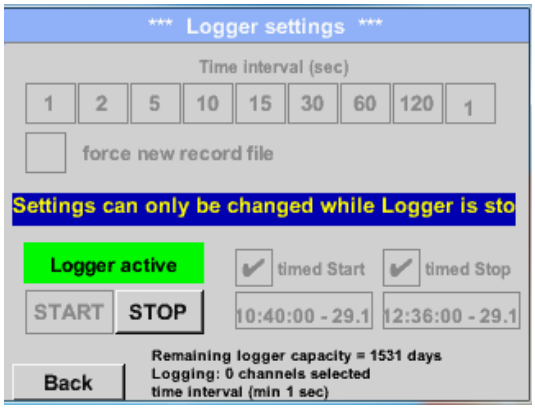
External senor ➔ Settings ➔ Logger settings ➔ Start button



After the start and stop time activation and the created settings, the *Start* button will be pushed and the data logger is armed.

The data logger starts the recording at the set time!

External senor ➔ Settings ➔ Logger settings ➔ Start button/Stop button



The data logger can be started without activated time settings, use the *Start* and *Stop* buttons for activate and disable.
Left below there will be shown how many values are recorded and how long there still can be recorded.

Remark:

<u>Important</u>:

If a new recording file should be created, the *force new record file* button must be activated.
Otherwise, the last applied recording file is used.

13 Scope of delivery

The LD 500 is available either as a single unit or in a set. The set contains all the components and accessories that are protected in a a rugged and shock-resistant transport case.

.

In der nachfolgenden Tabelle sind die Komponenten mit ihren Bestellnummern aufgelistet.

Description	Order no.r
Set LD 500 consisting of:	**0601 0105**
LD 500 leak detector with acoustic trumpet, and integrated camera, 100 leak tags for marking the leakages on site	0560 0105
Sound-proof headset	0554 0104
Focus tube with focus tip	0530 0104
Battery charger(AC adapter plug)	0554 0009
Transportation case	0554 0106
Helix cable for connecting the ultrasonic sound sensor	0200 01402

CS INSTRUMENTS GmbH & Co. KG

KONFORMITÄTSERKLÄRUNG

DECLARATION OF CONFORMITY

Wir / We: CS Instruments GmbH & Co.KG, Am Oxer 28c, 24955 Harrislee

Erklären in alleiniger Verantwortung, dass das Produkt
Declare under our sole responsibility that the product

Leckage-Suchgeräte mit Kamera LD 500 / LD 510
Leak meters with camera LD 500 / LD 510

den Anforderungen folgender Richtlinien entsprechen:
We hereby declare that above mentioned components comply with requirements of the following EU directives

Elektromagnetische Verträglichkeit Electromagnetic compatibility	2014/30/EU 2014/30/EC
RoHS (Restriction of certain Hazardous Substances)	2011/65/EC

Angewandte harmonisierte Normen:
Harmonised standards applied

EMV-Anforderungen EMC requirements	**EN 55011: 2011-04** **EN 61326-1: 2013-07**

Anbringungsjahr der CE Kennzeichnung: 18
Year of first marking with CE Label: 18

Das Produkt ist mit dem abgebildeten Zeichen gekennzeichnet.
The product is labled with the indicated mark.

CE

Harrislee, den 12.02.2018

Wolfgang Blessing Geschäftsführer

Diese Erklärung beinhaltet keine Zusicherung von Eigenschaften.
Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

PONY
Pony Testing International Group

报告编号(Report ID): H11133012221D~1

锂电池UN38.3测试报告

Lithium Battery UN38.3 Test Report

样品名称 (Sample Description)	Lithium-ion Battery 238700
委托单位 (Applicant)	Jauch Quartz GmbH-Batteries
生产单位 (Manufacturer)	Jauch Quartz GmbH-Batteries

No.: H11133012221D
Code: ssak93kqv

PONY 谱尼测试
Pony Testing International Group
www.ponytest.com

13-DCNV-2

Report ID: H11133012221D~1 Page 1 of 11

PONY
Pony Testing International Group

I、 SAMPLE DESCRIPTION

Sample Name	Lithium-ion Battery		Battery Type	238700	
Client	Jauch Quartz GmbH-Batteries				
Manufacturer	Jauch Quartz GmbH-Batteries				
Nominal Voltage	7.2V	Rated Capacity	2600mAh	Limited Charge Voltage	8.56±0.025V
Charge Current	1250mA	Maximum Continuous Charge Current	2600mA	End Charge Current	100mA
Cut-off Voltage	5.5V	Maximum Discharge Current	5200mA	Use	---
Cells Number	2PCS	Cell Model	18650	Rated Capacity	2600mAh
Manufacturer of cell	Samsung SDI Co., Ltd				
Chemical component	Li-Ion				
Client date	2013-11-12		Finished date	2013-12-02	

II、 REFERENCE METHOD

《United Nations Recommendations On The Transport Of Dangerous Goods, Manual Of Tests And Criteria》(ST/SG/AC.10/11/Rev.5/Amend.1).

III、 TEST ITEM

1. Altitude simulation
2. Thermal test
3. Vibration
4. Shock
5. External short circuit
6. Impact
7. Overcharge
8. Forced discharge

IV、 CONCLUSION

ITEM	SAMPLE NUMBER	STANDARD	CONCLUSION
Altitude simulation	N1~N4 C1~C4	UN38.3	PASS
Thermal test			PASS
Vibration			PASS
Shock			PASS
External short circuit			PASS
Impact	N9~N13		PASS
Overcharge	N5~N8 C5~C8		PASS
Forced discharge	N14~N23 C9~C18		PASS

The submitted battery and component cell were complied with the UN Manual of Tests and Criteria, Part III, sub-section 38.3.

Prepared by: Pony Yuan Kun Checked by: chengpeng Approved by: Piyou

Approval Date: December 2, 2013

PONY 谱尼测试
Pony Testing International Group

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