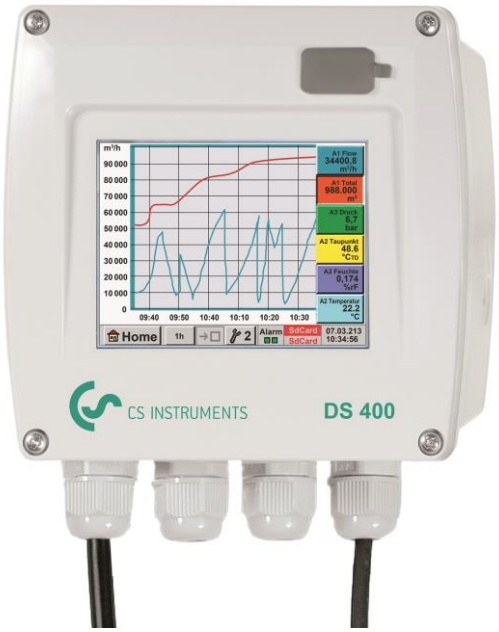
EN English

Installation and operating instructions

intelligent paperless recorder DS400



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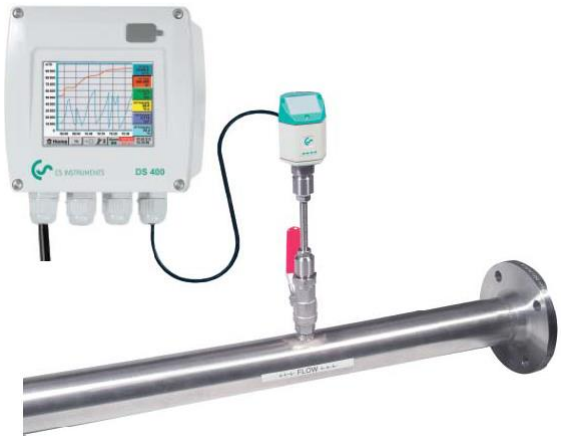

Short-form instruction manual flow station

Short-form instruction manual dew point set

I. Foreword

Dear customer,

thank you very much for deciding in favour of the DS 400. Please read this installation and operation manual carefully before mounting and initiating the device and follow our advice. A riskless operation and a correct functioning of the DS 400 are only guaranteed in case of careful observation of the described instructions and notes

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1 Safety instructions

Please check whether this manual corresponds with the device type.

Please attend to all notes indicated in this instruction manual. It contains essential information which has to be followed during installation, operation and maintenance. Therefore this instruction manual has to be read categorically by the technician as well as by the responsible user/qualified personnel before installation, initiation and maintenance.

This instruction manual has to be available at any time at the operation site of the DS 400.

Regional and national regulations respectively, have to be observed in addition to this instruction manual if necessary.

In case of any obscurities or questions with regard to this manual or the instrument please contact CS Instruments GmbH.

Warning!

Supply voltage!

Contact with supply voltage carrying non-insulated parts may cause an electric shock with injury and death.

Measures:

- Note all applicable regulations for electrical installations (e. g. VDE 0100)!
- **Carry out maintenance only in strain less state!**
- All electric works are only allowed to be carried out by authorized qualified personnel.

Warning!

Inadmissible operating parameters!

Undercutting and exceeding respectively of limit values may cause danger to persons and material and may lead to functional and operational disturbances.

Measures:

- Make sure that the DS 500 is only operated within the admissible limit values indicated on the type label.
- Strict observance of the performance data of the DS 400 in connection with the application.
- Do not exceed the admissible storage and transportation temperature.

Further safety instructions:

- Attention should also be paid to the applicable national regulations and safety instructions during installation and operation.
- The DS 400 is not allowed to be used in explosive areas.

Additional remarks:

- Do not overheat the instrument!
- Change of battery and SD-Card are only allowed to be carried out by authorized qualified personnel and in strain less state

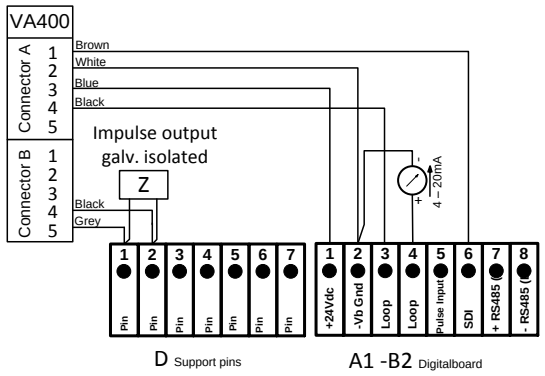
Attention!

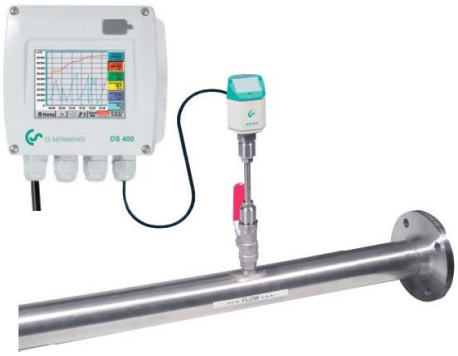
Malfunctions at the DS 400!

Faulty installation and insufficient maintenance may lead to malfunctions of the DS 400 which may affect the measuring results and which may lead to misinterpretations.

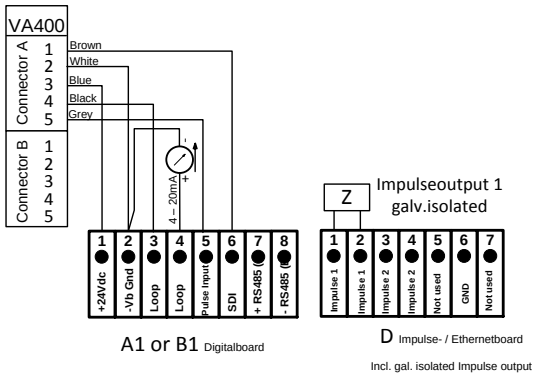
2 Short-form instruction manual Flow station DS 400 with VA 400 consumption

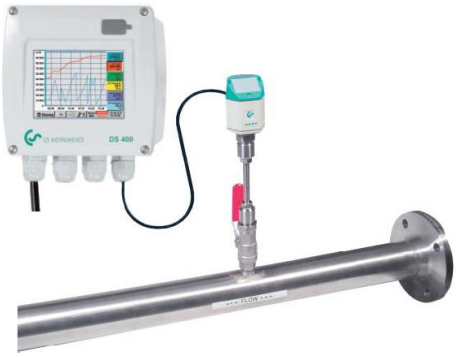
2.1 Connection diagram for variant “Standard”





2.2 Connection diagram for variant “Ethernet” (galv. Isolated Impulse output intr. on Ethernet PCB)

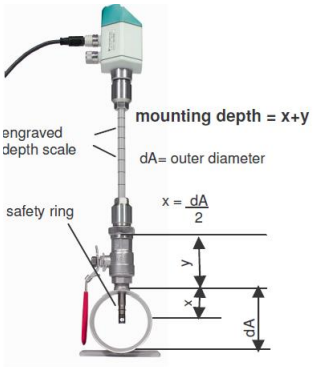




Mounting depth

Please read carefully before starting the device!
1. Do not exceed pressure range > 50 bar
2. Observe flow direction of the sensor
3. Adapter sleeve must be tightened with a torque of 20-30 Nm
4. Observe minimum values for the inlet section (15 x inner diameter) and for the outlet section (5 x inner diameter)

For further information please see instruction manual VA 400.

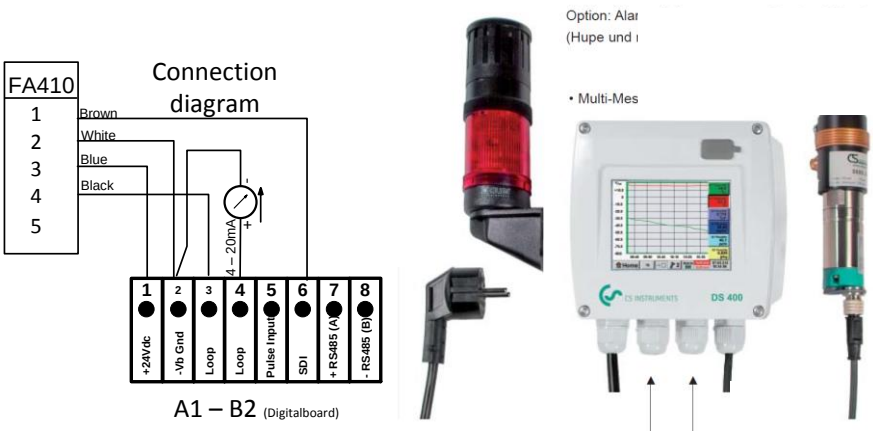


Necessary adjustments (see chapter 12.2.2 Sensor settings)

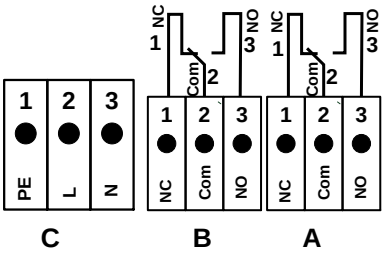
- Adjust inner diameter of the pipe (menu sensor adjustment/consumption) DS4300 automatically scales the analogue output 4…20 mA to the respective values for m³/h, m³/min and so on.

- 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!

3 Short-form instruction manual dew point set FA 410 with alarm



Power supply alarm connection:



NC and COM are connected at:
- alarm
- power failure
- sensor break

Please read carefully before starting the device!
1. Attention: Do not exceed pressure range of > 50 bar with standard version. (Up to 350 bar in case of special version).
2. Important: Before installation briefly bleed the compressed air in order to remove condensate and particles. This prevents soiling of FA 410. Standing air leads to long measuring times.

Dew point set Ds 400 with FA 410 with alarm unit (option)
- Dew point set ready for plug in and fully configurated, no further adjustments necessary .

- Alarm values are programmed on our premises:
  Dew point set -20…+50 °Ctd to alarm 1: 8 °Ctd, alarm 2: 12 °Ctd
  Dew point set -80…+20 °Ctd to alarm 1: -40 °Ctd, alarm 2: -35 °Ctd
  in case of alarm unit option: Alarm 1 continuous red light
  Alarm 2 buzzer

The alarm values can easily be changed within the DS 400

(Settings → Sensor settings →A1 → Alarm see also chapter 12.2.2.4 Alarm-Settings).

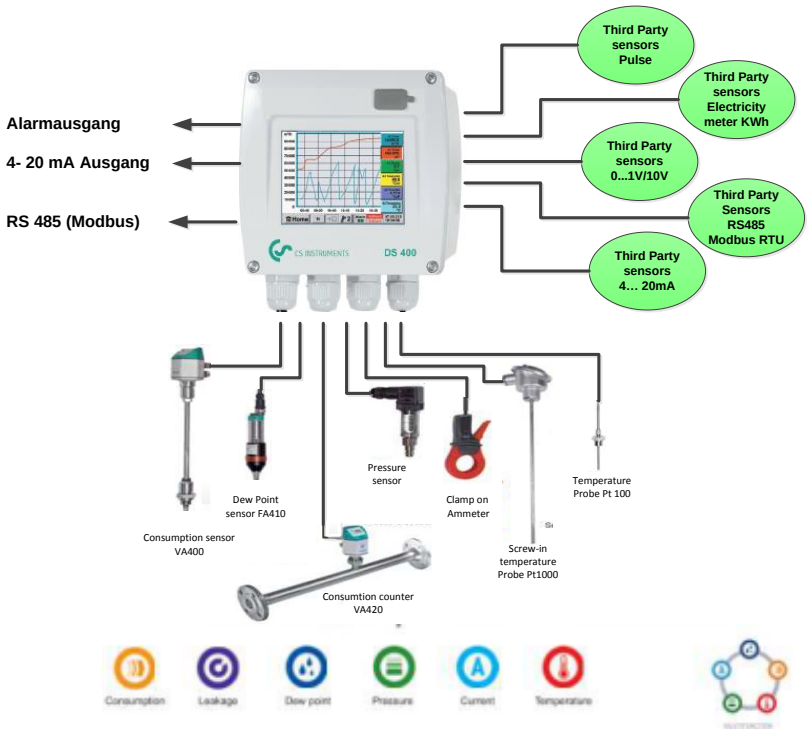
4 Application area

Our long-term hands-on experience in measurement and control technology was implemented in the new DS 400.

From recording of the measured data, automatic sensor identification, indication on a big colour screen, alerting, storage up to remote read-out via web server, all that is possible with DS 400. By means of the CS-Soft, software alarms can be sent via SMS or e-mail.

On the big 3.5' colour screen with touch panel all information is available at a glance.
The operation is very easy. All measured values, measured curves and threshold exceedings are indicated. The progression of the curve, since the beginning of the measurement, can be viewed by an easy slide of the finger.

The huge difference to ordinary paperless chart recorders reveals in the easy initiation as well as in the evaluation of the measured data. All sensors are identified directly and powered by DS 400. Everything is matched and tuned.



Versatile:
Up to 4 sensors, incl. all CS sensors (consumption, dewpoint, pressure, current, KTY, PT 100, PT 1000) are identified automatically by DS 400. Optional analogue sensors (0/4 - 20 mA, 0 - 1/10/30 V, pulse) can be configured easily and quickly. Digital sensors can be connected via RS 485, Modbus RTU and SDI.

Flexible:
Network-compatible and worldwide remote data transmission via Ethernet, integrated web server.

Alarm relay / fault indication:
Up to 4 threshold values can be configured freely and allocated to 2 different alarm relay. Collective alarms are possible.

5 Technical data DS 400

CE	
Dimensions of housing	118 x 115 x 98 mm, IP44
Connections	5 x PG12 for sensors and supply, alarm relay 1 x RJ 45 Ethernet connection
Version panel mounting	Cutout panel 92 x 92 x 75 mm
Weight	545 g
Material	Kunststoff , Frontfolie Polyester
Sensor inputs	4 (2x2) sensor inputs for analogue and digital sensors freely allocable. Digital CS sensors for dew point and consumption with SDI interface FA/VA 400 Series. Digital third-party sensors RS 485/Modbus RTU, other bus systems realizable on request. Analogue CS sensors for pressure, temperature, clamp-on ammeters preconfigured. Analogue third-party sensors 0/4 – 20 mA, 0 - 1/10/30 V, pulse, Pt100/Pt1000, KTY.
Power supply for sensors	Output voltage:: 24 VDC ± 10% Output current: a.) Digital-Board 120mA continuous operation / channel b.) Analog-Board 120mA continuous operation for both channels Maximum output current over all channels: 280mA
Interfaces	USB stick USB 2.0), Ethernet TCP RS 485 Modbus RTU, SDI (Serial data Interface) other bus systems on request, web server optional
Outputs	Outputs 2 relay (max. switching voltage: 380 VAC / 30 VDC, Switching current: min. 10mA, max. 3A) alarm management, relay freely programmable, collective alarm. Analogue output, pulse in case of sensors with own signal output looped, like e. g. VA/FA Series.
Power supply	100 – 240 VAC/50 – 60 Hz, max.power input: 23VA, special version 24 VDC
Colour screen	3.5“-Touchpanel TFT transmissive, graphics, curves, statistics
Accuracy	See sensor specifications
Operating temperature	0 – 50 °C
Storage temperature	-20 bis +70°C
Optionally	Data Logger, Memory size 4 GB SD memory card (micro SD class4)
Optionally	Ethernet- and RS 485 Interface (Modbus Protocol)
Optionally	Webserver
Optionally	Galv. Isolated Impulse output (2x)

6 Input signal

Input signal		
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	± 0,003 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

7 Cable cross-section

7.1 Power supply 100 - 240 VAC, 50 - 60 Hz, special version 24 VDC:

AWG12 – AWG24, cable cross-sections: 0,2 - 2,5 mm^2

7.2 Sensor circuit points/Output signal:

AWG16 – AWG28, cable cross-sections: 0,14 - 1,5 mm^2

8 Panel / Wall mounting

The instrument can either been mounted into a panel or - if ordered with the optional wall casing - on a wall. Please refer to the drawings below for details.

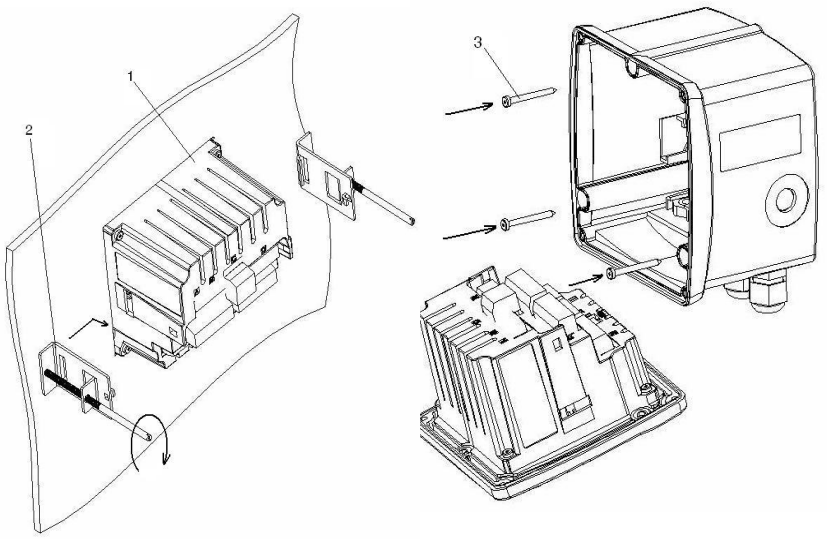


Figure: Panel and wall mountable housing

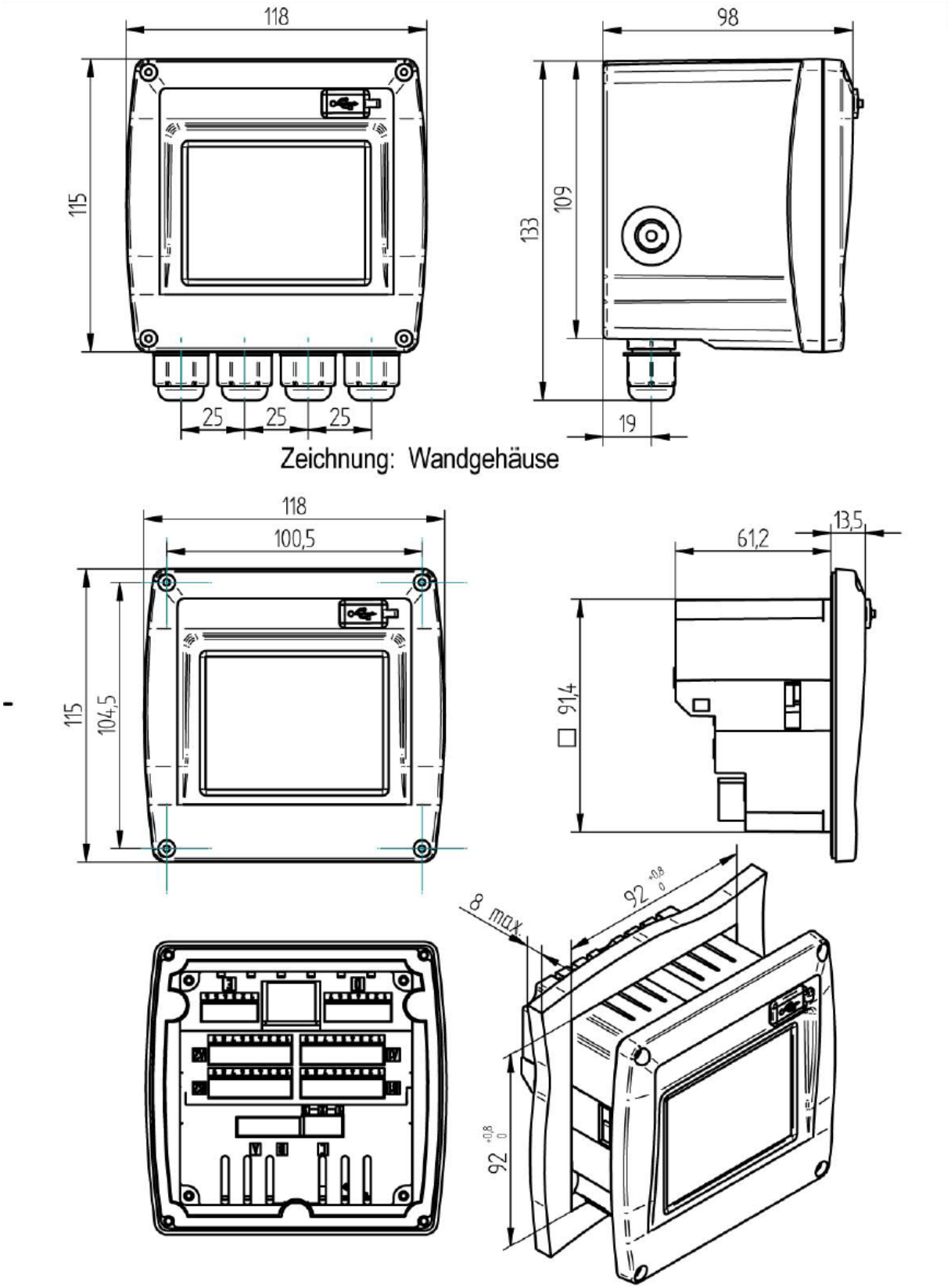
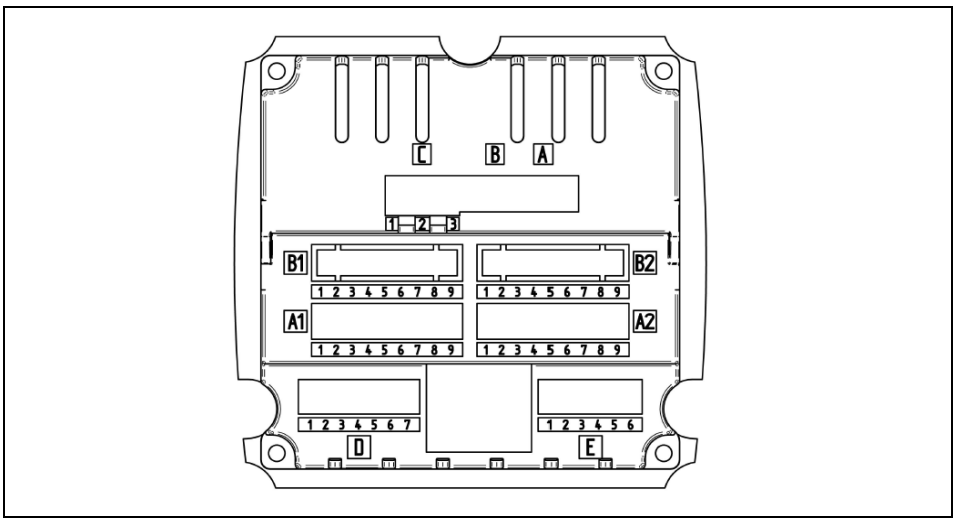
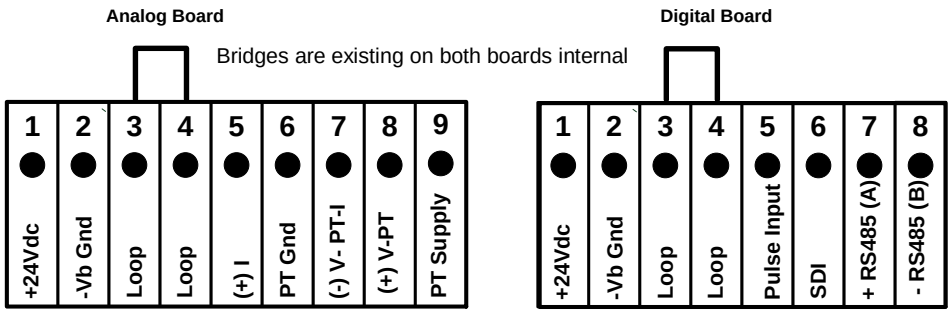


Figure : Housing for panel mounting

9 Connection diagrams DS 400



9.1 Connections Inputs „A1 – B2“ (Analog- und Digital-Channels)



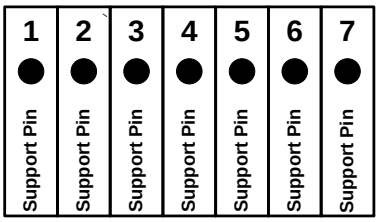
Depending on selected variant following combinations are possible:

combination / Channel	1	2	3	4	5	6
A1	D	D	D	A	A	A
A2	D	D	D	A	A	A
B1		D	A		A	D
B2		D	A		A	D

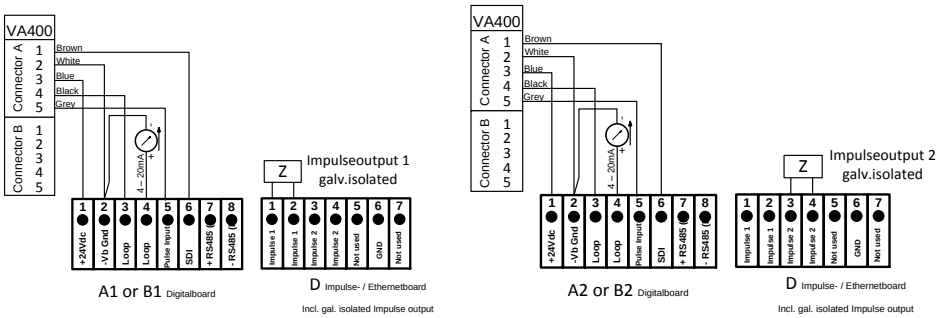
D = Digital-Channel A = Analog-Channel

9.2 Connection input „D“ (galv. isolated Impulse output / Impulse signal forwarding support pins)

9.2.1 Basic version (Support pins for impulse forwarding)



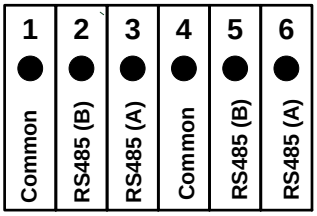
9.2.2 Option gal. isolated impulse



For systems with 2 digital boards (2x2 digital channels) on pulse output 1 could be used either pulse input A1 or B1, as well as for pulse output 2 either pulse input A2 or B2.

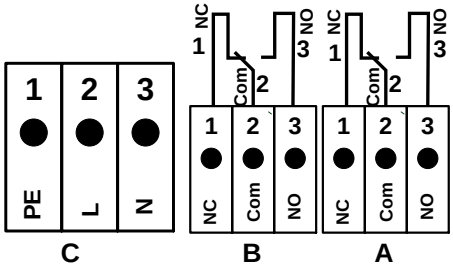
It is not possible pulse to switch pulse input A1 or B1 on pulse output 2 or pulse input A2 or B2 on pulse output 1.
Parallel wiring of the pulse inputs A1 and A2 u.B1 u.B2 is not allowed.

9.3 Connection input „E“ (RS485 -- Modbus) (incl. in option Ethernet)



9.4 Connection inputs „A - C“ ´Power supply and 2x Alarmrelais

Power supply: 100 - 240 VAC 50 – 60 Hz
2 x Alarm relays, max. 230VAC, 6A



NC and COM are connected at:
- alarm
- power failure
- sensor break

10 Connection diagrams of the different sensor types

By/With consumption sensors and dew point sensors from CS Instruments there is the possibility to provide values as analogue current signal 4 – 20 mA for further working process.
The measurement/reading of the current signal for an external PLC/ZLT or external third-party display is explained in the connection diagrams.

BY using of the CS Instruments connection cables 0553.0104 or 0553.0105 please follow pining

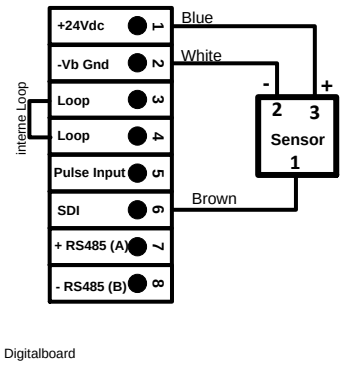
	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
Connection cable	brown	white	blue	black	grey
Connector (A) VA400	SDI	- VB	+ VB	+I (4-20mA)	NC* pulse active not galv. isolated
Connector (A) VA400	SDI	- VB	+ VB	+I (4-20mA)	NC*
Connector FA400/410	SDI	- VB	+ VB	+I (4-20mA)	NC*
Connectior FA415/416	SDI	- VB	+ VB	NC*	NC*

* NC = Not Connected

The following connection diagrams in Chapter 10 apply to A1 to B2!

FA serial: dew point sensors from CS Instruments
VA serial: consumption sensors from CS Instruments

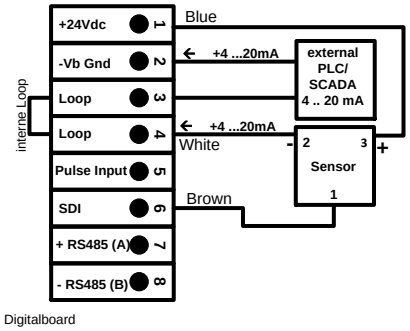
10.1 Anschluss CS Taupunktsensoren Serie FA 415/FA 300



DS 400

The digital data transmission between DS 500 and the dewpoint sensors FA 415 and FA 300 occur via the SDI bus line.

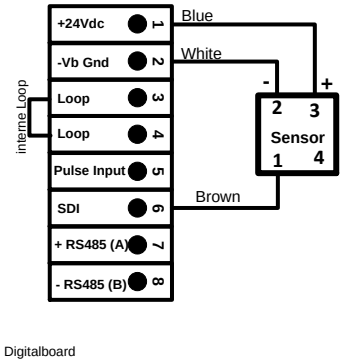
It´s possible to connect the FA 300/FA 425 alternatively as 4 – 20 mA analogue sensor in 2-wire technology



Connection diagram
DS 400 by using analogue output 4 -20mA on external PLC/ SCADA

Please make sure that the circuit is closed in any case

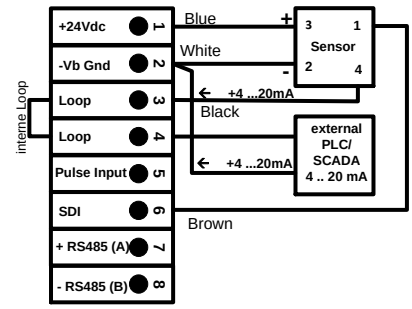
10.2 Connection for dew point- and consumption sensors, serial FA/VA 400



DS 400

FA 410
FA 400
VA 400
VA 420

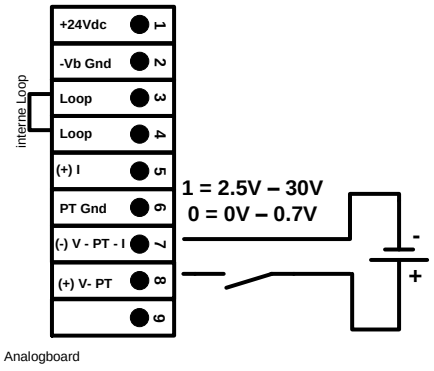
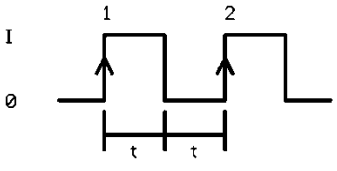
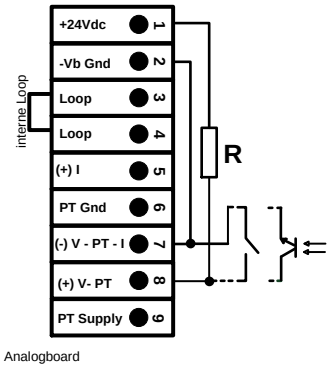
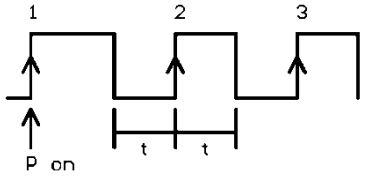
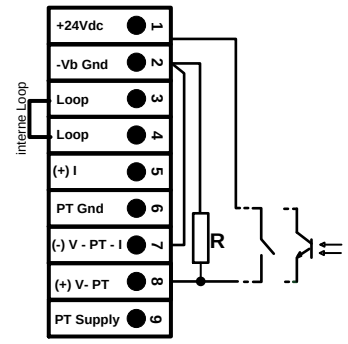
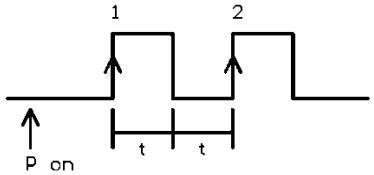
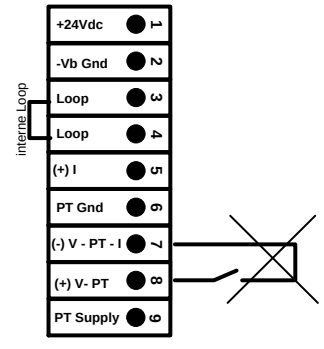
The digital data transmission between DS 400 and the sensors FA 400/410 and VA 400/420 occurs via the SDI bus line.



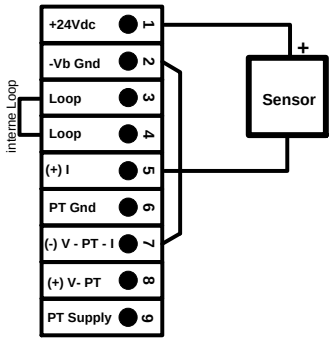
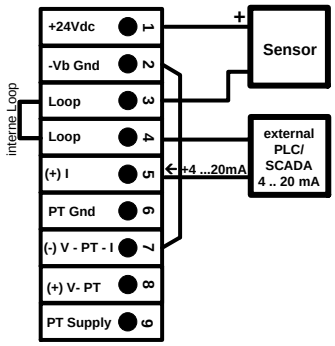
Connection diagram
DS 400 by using analogue output 4 -20mA on external PLC/ SCADA

Please make sure that the circuit is closed in any case

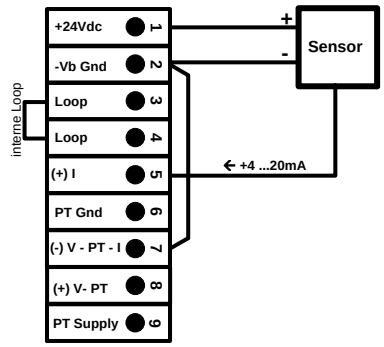
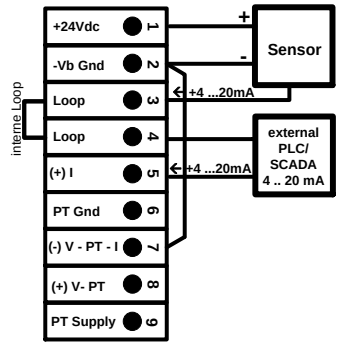
10.3 Connection pulse sensors

		signal level 0: low = 0 – 0,7 VDC signal level 1: high = 2,5 – 30 VDC t = 400 µs max. frequency (duty cycle 1:1) = 1000 Hz input resistance: min. 100 kilo ohm
		external essential R = 4K7 **<u>Attention</u>:** The DS 400 is counting a consumption unit, by switching „power on“.
		external essential R = 4K7
		It won’t work!

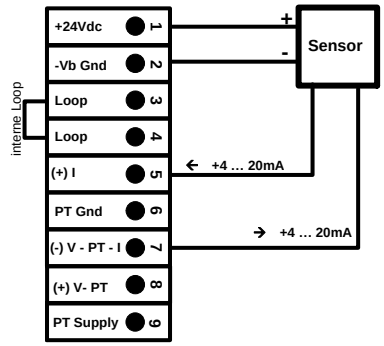
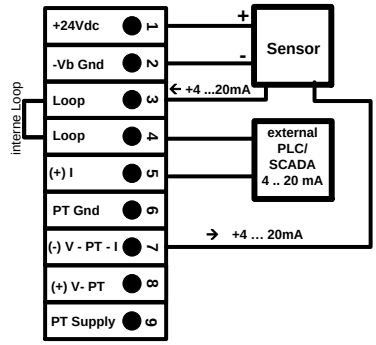
10.4 Analogue two-, three-, and four-wire current signal

Sensors with 4 - 20 mA output in 2-wire technology	
	**DS 400**
	**DS 400 with ext. 4 -20mA routing** Please make sure that the circuit is closed in any case. (e.g. CS pressure sensors 1,6/16/40/100/250/400 bar or temperature sensors with integrated measuring transformer 4 - 20 mA)

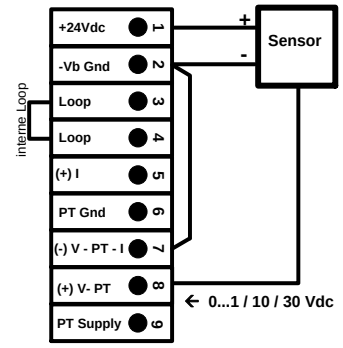
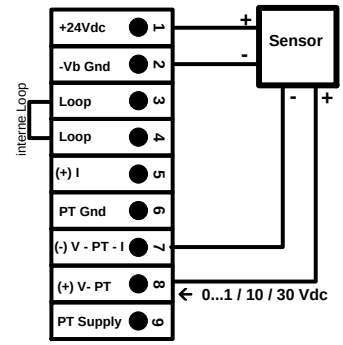
Connection diagrams of the different sensor types

Sensors with 4 - 20 mA output in 3-wire technology	
 Analogboard	. **DS 400**
 Analogboard	**DS 400 with ext. 4 -20mA routing** Please make sure that the circuit is closed in any case.

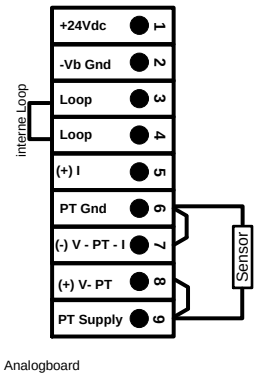
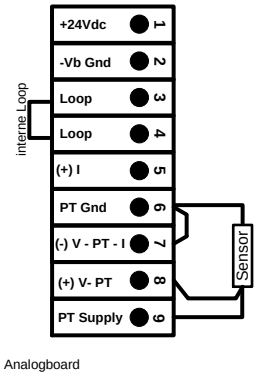
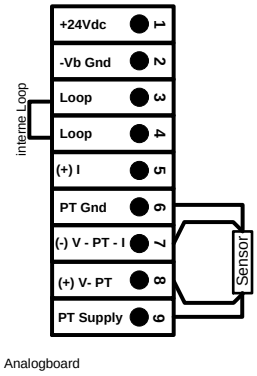
Connection diagrams of the different sensor types

Sensors with 4 - 20 mA output in 4-wire technology	
 Analogboard	**DS 400**
 Analogboard	**DS 400 with ext. 4 -20mA routing** Please make sure that the circuit is closed in any case.

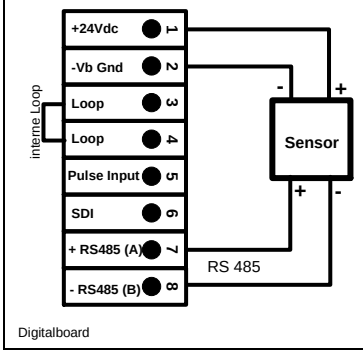
10.5 Three- and four-wire power supply 0 - 1/10/30 VDC

 Analogboard	**Sensor with voltage output in 3-wire technology**
 Analogboard	**Sensor with voltage output in 4-wire technology**

10.6 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/PT1000/KTY81**

10.7 Connection with RS485

	**Sensor with RS485 Interface**

11 Connect the DS 400 with a PC

Important:

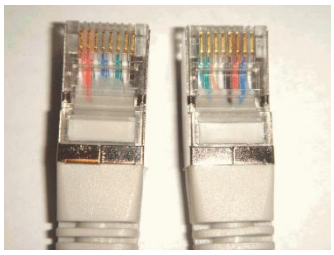
The IP addresses of PC and DS 400 must be statically assigned (DHCP off) and have to be in the same network.

If the IP-address of the DS 400 has changed, you have to reboot!

Remark:

IP-address of the DS 400: See chapter, 12.2.4.3 Network-Settings
Reboot the DS 400: See chapter, 12.2.4.7.5 Factory-Reset

The DS 400 can be connected with the PC by a crossover cable, which has a RJ45 plug on each side, or an Ethernet cable with a crossover adapter.



Crossover-Cable with RJ45-plug

Crossover-Adapter

After connecting the DS 400 via a suitable cable to the PC, you can make graphical and tabular data evaluations with the CS Soft Basic software.

Windows PC's, network settings:

Windows 7:

Start ➔ Control Panel ➔ Network and Sharing Center ➔ adapter ➔ Networking ➔ Properties ➔ Internet Protocol Version 4 (TCP/IPv4) ➔ Use the Following IP address ➔ enter IP address and Subnet mask

After this: OK ➔ OK ➔ Close

Windows Vista:

Start ➔ Control Panel ➔ Network and Sharing Center ➔
Network connection ➔ Networking➔ Properties ➔ Internet Protocol Version 4 (TCP/IPv4) ➔ Use the Following IP address ➔ enter IP address and Subnet mask

After this: OK ➔ OK ➔ Close

Windows XP:

Start ➔ Properties ➔ Control Panel ➔ Network connection ➔ Networking ➔ Properties ➔ Internet Protocol Version 4 (TCP/IPv4) ➔ Use the Following IP address ➔ enter IP address and Subnet mask

After this: OK ➔ OK ➔ Close

12 Operation DS 400

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.

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

After sensors are connected, they also have to be configured.

Inputs or changes can be made with all white deposit fields.
The measured values can be represented as a curve or values.

Words in green font refer mainly to the pictures in the section of the chapter, but also on important menu paths or menu items that are related to are in green font.

The menu navigation is generally in a green font!

The table of contents and chapter references in blue font contain links to the respective chapter title.

12.1 Main menu (Home)

From the main menu, you can reach every available item.

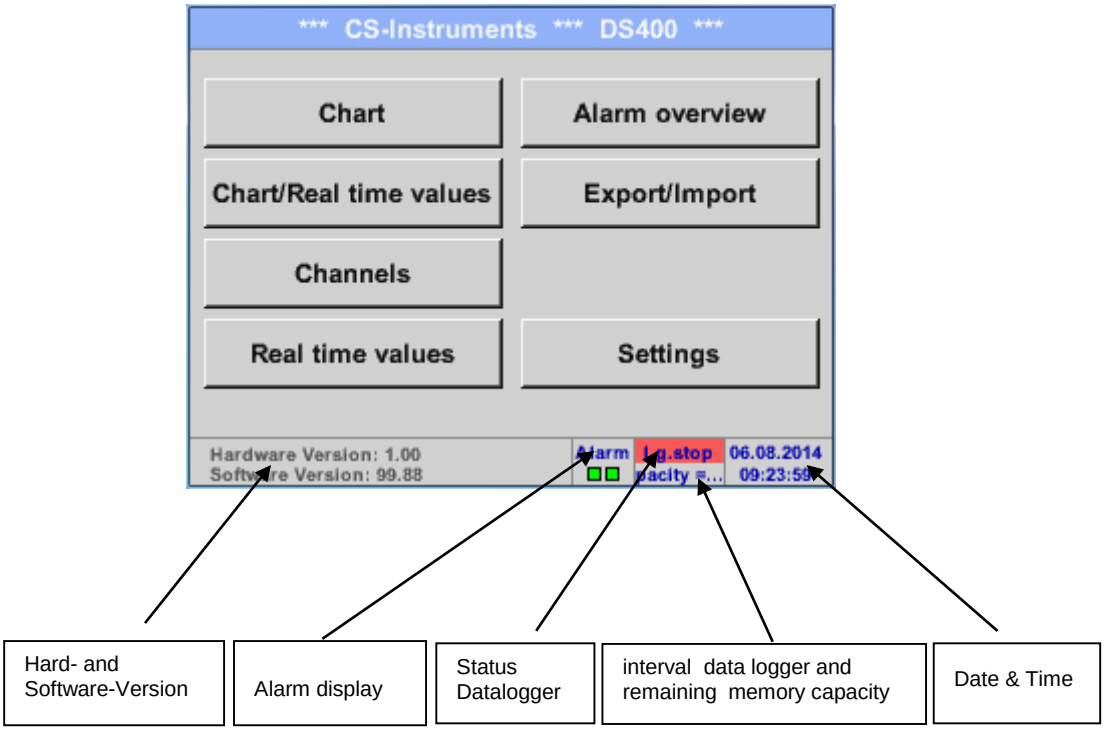
12.1.1 Initialization

After switching on the DS 400 all channels are initialized and the main menu will appear.

Attention:
For the first initiation, there may be no channels preset!

Please see chapter 12.2.2 Sensor Settings then select appropriate configurations and set!

12.1.2 Main menu after initialization



Important:
Before the first sensor setting is made, the language and time should be set!

Remark:
Chapter 12.2.4.1 Language
Main ➔ Settings ➔ Device Settings ➔ Set Language

Chapter 12.2.4.2 Date & Time
Main ➔ Settings ➔ Device Settings ➔ Date & Time

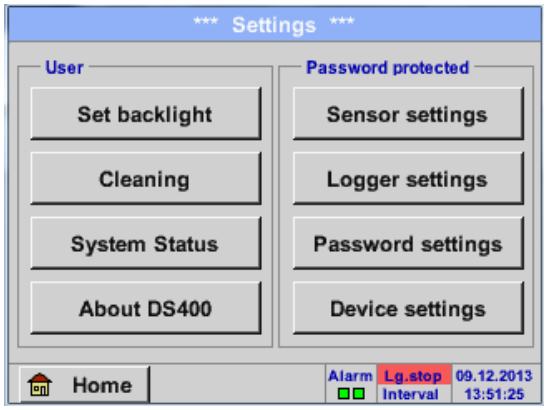
12.2 Settings

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.

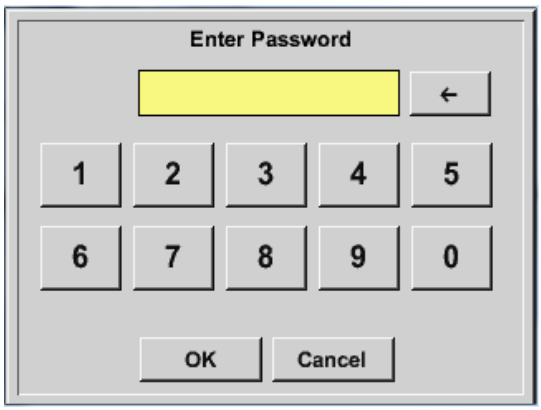
Main menu ➔ Settings



Overview of the *Settings*

12.2.1 Password-Settings

Main menu ➔ Settings ➔ Password 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.

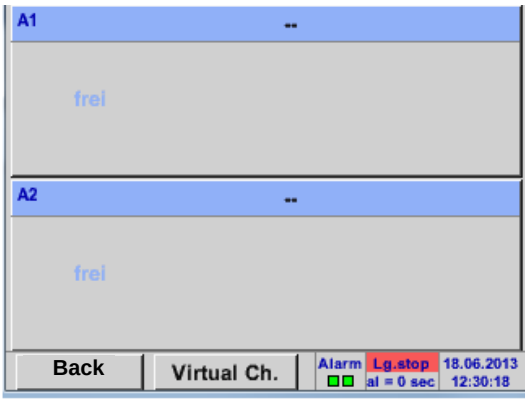
If you can't remember the password, please use Master password in order to enter a new password.

Remark:
The master password is supplied together with the instrument's documentation.

12.2.2 Sensor-Settings

Important:
Sensors from CS Instruments are generally pre-configured and can be connected directly to a free sensor channel!

Main menu ➔ Settings ➔Sensor settings



An overview of the available channels appears after entering the password.
Depending on the version 2 or 4 channels.

Remark:
Usually no channels preset!

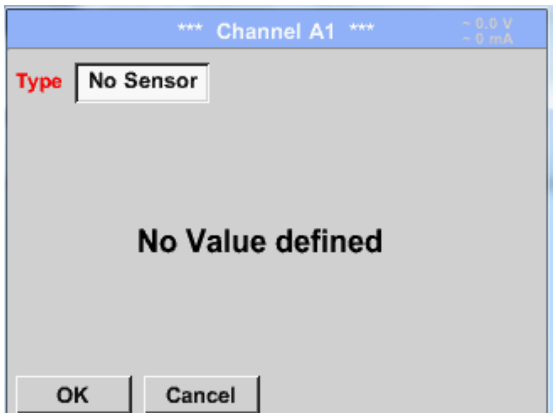
Remark:
Depending on selected variant following combinations are possible:

combination / Channel	1	2	3	4	5	6
A1	D	D	D	A	A	A
A2	D	D	D	A	A	A
B1		D	A		A	D
B2		D	A		A	D

D = Digital-Channel A = Analog-Channel

12.2.2.1 Choice of the sensor type (For example type CS-Digital sensor)

Main menu ➔ Settings ➔ Sensor settings ➔ A1

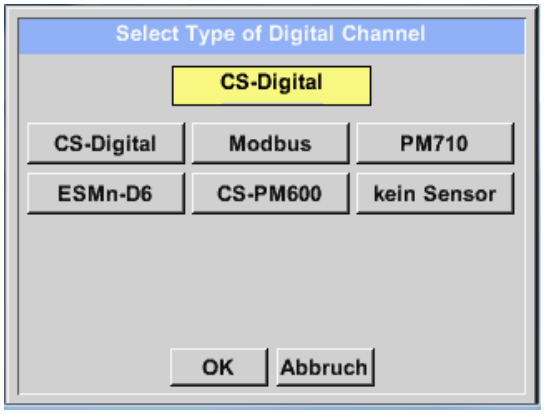


If still no sensor has been configured, the *Type* ***No Sensor*** appears.

By pushing the description field *Type* ***No Sensor*** the list of sensor types appears (see next step).

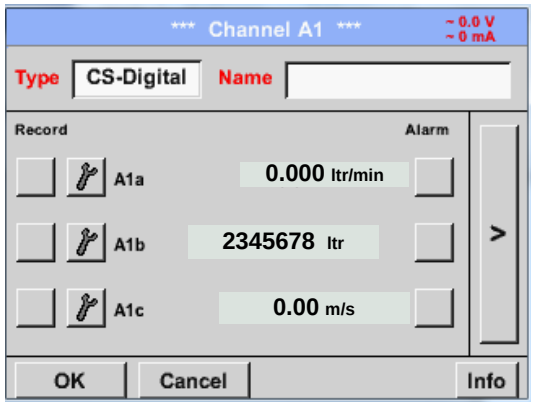
Sensor-Settings / Label and set the description fields

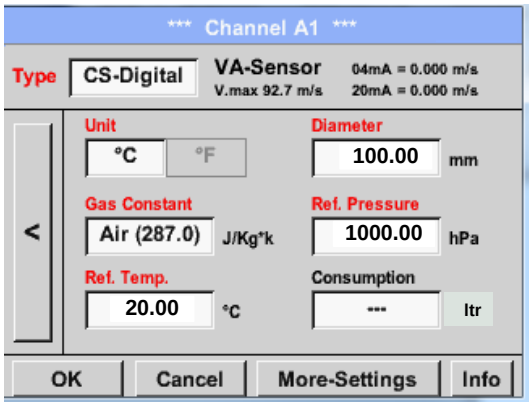
Main menu ➔ Settings ➔ Sensor settings ➔ A1➔ Type description field ➔ CS-Digital

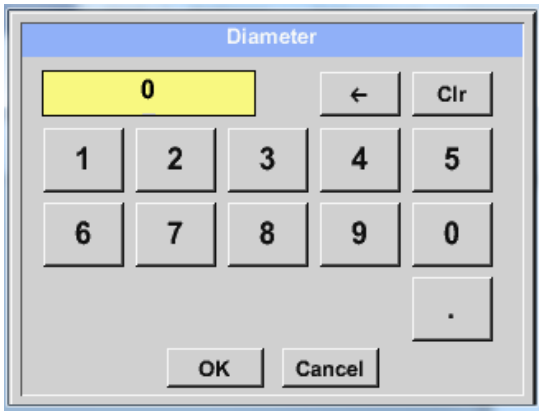


Now the *Type* ***CS-Digital*** is selected for the VA/FA 400 series and confirmed by pressing the *OK* button.

Main menu ➔ Settings ➔ Sensor settings ➔ A1➔ arrow right (2.page) ➔ diameter description field







<u>Important:</u>
The *inner diameter* of flow tube can be entered here, if this was not automatically correctly set.

In case of a sensor change the ***consumption value*** of the old sensor could be transferred.

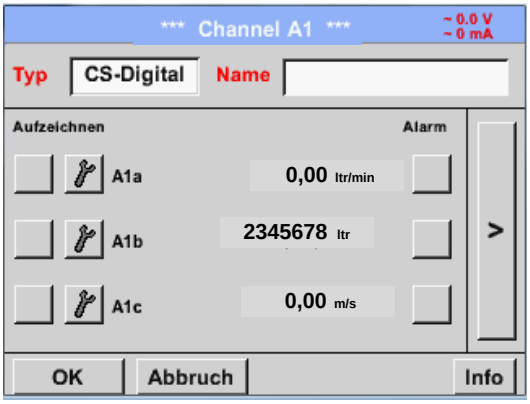
Please confirm by pressing the *OK* button and go back with ***arrow left (1.page).***

<u>Important:</u>

The *inner diameter* should be entered as precisely as possible, because otherwise the measurement results are not correct!

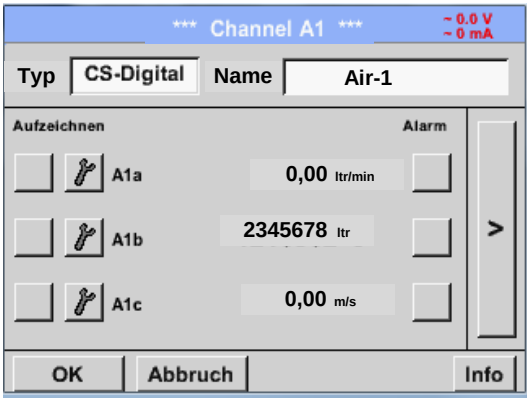
There is no uniform standard for the tube inner diameter!
(Please, inquire at the manufacturer or measure by your own !)

Main menu ➔ Settings ➔ Sensor settings ➔ A1



Now you can enter a *Name.*

Main menu ➔ Settings ➔ Sensor settings ➔ A1



After defining the *name* and confirmation with *OK*, the sensor configuration is completed.

More **options of sensor settings**, see Chapterl 12.2.2.5 bis 12.2.2.8!

See also chapter 12.2.2.7 Label and setting the description fields

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

Attention:

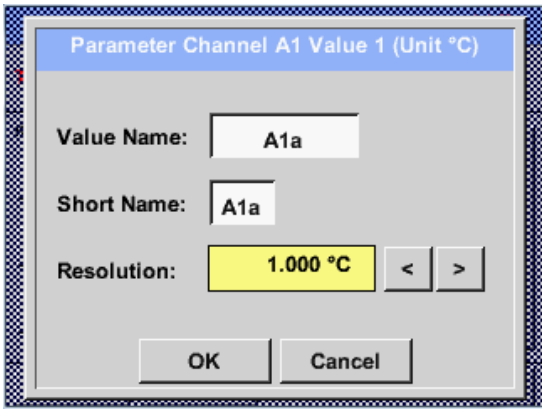
Reference temperature and reference pressure (factory setting 20 °C, 1000 hPa):
All volume flow values (m³/h) and consumption values indicated in the display are related to 20 °C, 1000 hPa (according to ISO 1217 intake condition)
0 °C and 1013 hPa (= standard cubic meter) can also be entered as a reference.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

12.2.2.2 Name the measurement data and define the decimal places

Remark:
The *Resolution* of the decimal places, the *Short Name* and *Value Name* are found under the **Tool button**!

Tool Button:

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ Tool Button

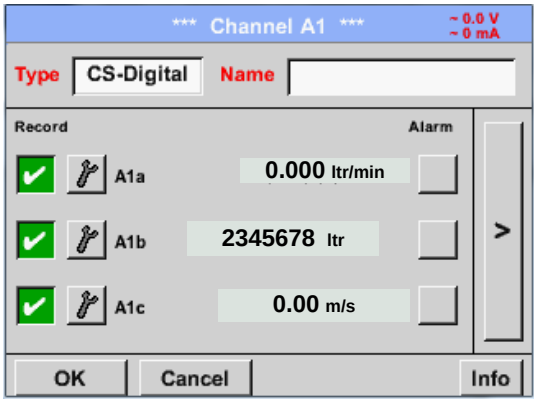


For the recorded *Value* there can be entered a *Name* with 10 characters and later in menu item *Graphics/Real time values* it is easier to identify it.
Otherwise the *Name* is, for example, A1a.
The channel name is *A1* and *a* is the first measurement data at the channel, the Second *b* and the Third *c*.
The *Resolution* of the decimal places is simply adjustable by pushing right and left (0 to 5 decimal places).

See chapter 12.2.2.7 Label and setting the description fields

12.2.2.3 Recording measurement data

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ Record Button



Use the *Record* buttons to select the measurement data that will be stored by **activated data logger**.

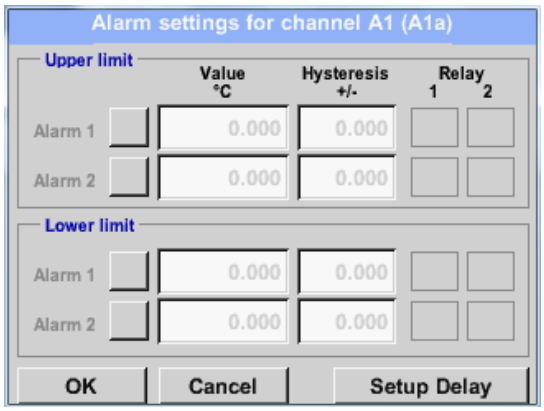
Attention:

Before the selected measurement data are recorded, the data logger must be activated after the settings(See chapter 12.2.1.2 Logger settings (data logger)**).**

12.2.2.4 Alarm-Settings

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ ➔ Alarm-Button

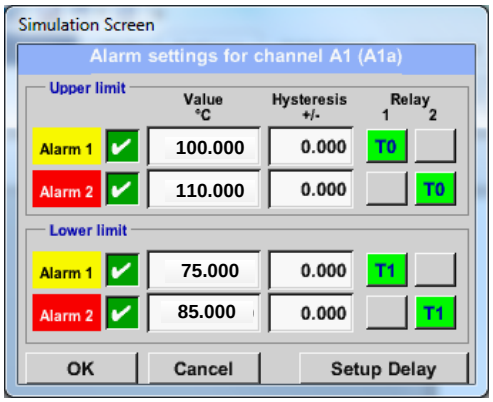
By pushing an alarm button, the following window appears:



In the alarm settings an *Alarm 1* and *Alarm 2* incl. *Hysteresis* can be entered for each channel.

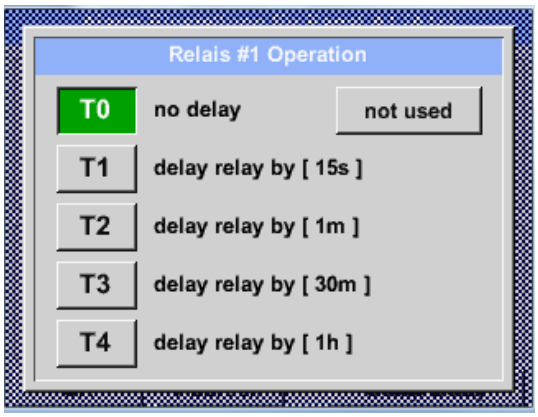
In the menu *Alarm overview* (can be reached from the main menu), the alarm settings are clearly represented.

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ ➔ *Alarm*-Button ➔ *Alarm-1*- und *Alarm-2*-buttons + *Relais*-buttons



E.g. set the *Alarm 1* to relay 1 and the *Alarm 2* to relay 2.

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ *Alarm*-Button ➔ *Relay*-buttons

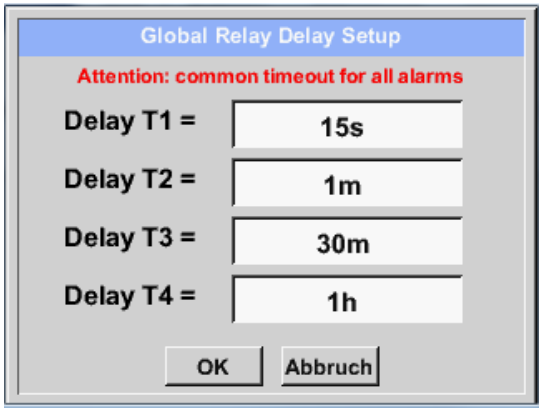


It is possible to select from 5 different delays.

T0 is preset to no delay.

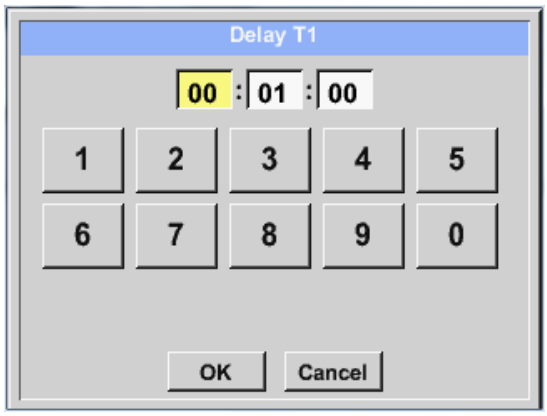
The delays (T1 to T4) are free definable but are common valid for all relays.

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ *Alarm*-Button ➔ *Setup Delay*



The delays (T1 to T4) are free definable but are common valid for all relays.

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ *Alarm*-Button ➔ description field Delay T1



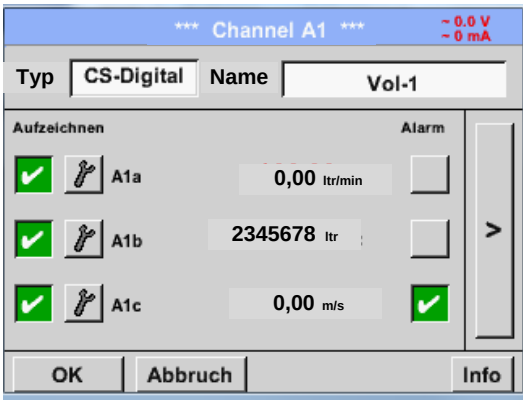
By changing the text field values the new delay time could be defined. Here for *Delay T1.*

Delay T0 is preset and can't be changed and it is an immediate alarm.

Confirmation by pressing the *OK* button.

Same procedure for the remaining delay times T2-T4 is to apply.

Main menu ➔ Settings ➔ Sensor settings ➔ A1

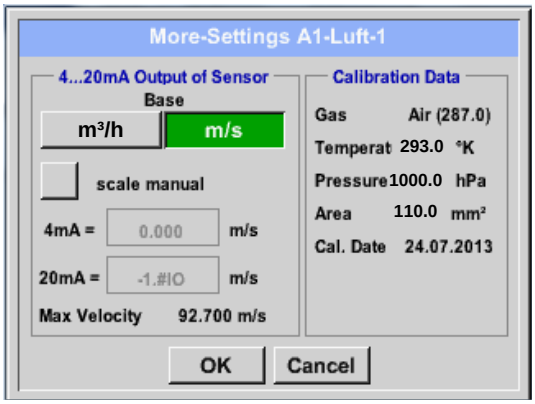


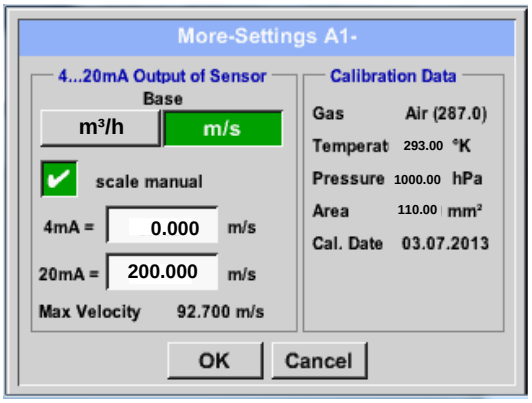
After the alarm activation at channel A1.

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

12.2.2.5 More Settings (scale analogue output)

Main menu ➔ Settings ➔ Sensor settings ➔ A1➔ arrow right (2.page) ➔ More settings





In *More-Settings*, you can define whether the 4 - 20 mA analogue output of the sensor based on the flow rate or velocity.

The green highlighted description field is selected!

In addition, you can push the *scale manual* button and set the measuring range.

After confirming with *OK*, the settings are assumed.

Remark:
More-Settings only for type **CS-Digital** available!

The settings finished by pushing the OK button!

Remark:

After confirming with *OK*, the font is black again and the values and settings are accepted.

12.2.2.6 Dew Point Sensor of Type CS-Digital

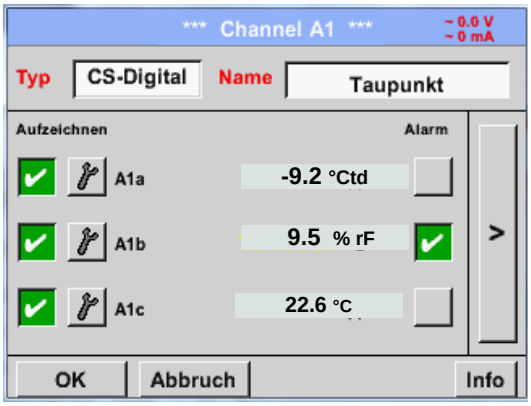
First step: choose an unused sensor channel
Main menu ➔ Settings ➔ Sensor settings ➔ A1

Second step: choose type CS-Digital
Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ Type description field ➔ CS-Digital

Third step: confirm with *OK* two times

Now, a *Name* (See chapter 12.2.2.7 Label and setting the description fields)**, the alarm settings** (See chapter 12.2.2.4 Alarm settings) **and recording settings** (See chapter 12.2.2.3 Recording measurement data)**, and the *Resolution* of the decimal places** (See chapter 12.2.2.2 Name measurement data and define the decimal places) **can be determined.**

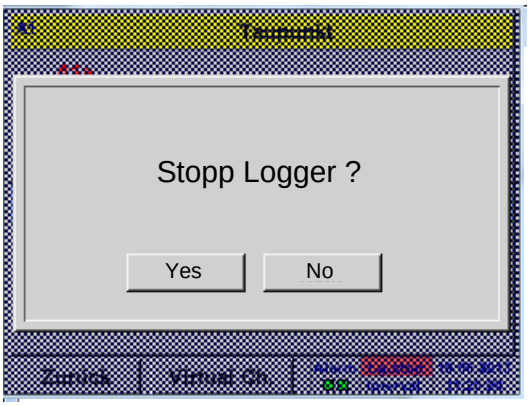
Main menu ➔ Settings ➔ Sensor settings ➔ A1



The DS 400 detects, if the connected sensor is a flow or dewpoint sensor of **CS Instruments** and set the CS-Digital subtype automatically correct.

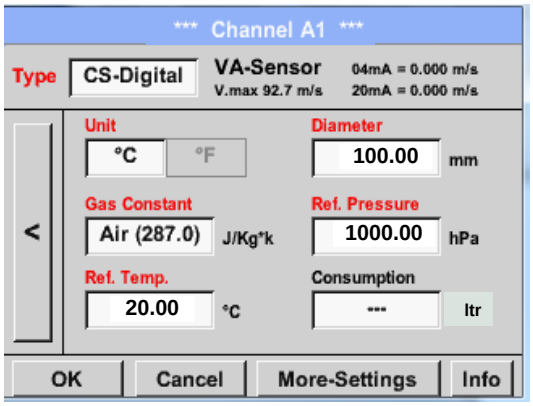
12.2.2.7 Label and setting the description fields

Main menu ➔ Settings ➔ Sensor settings ➔ A1



If the data logger is activated, the following window will appear and via pushing *Yes* it can be disabled.
(Only activated, if already settings and recordings are made)

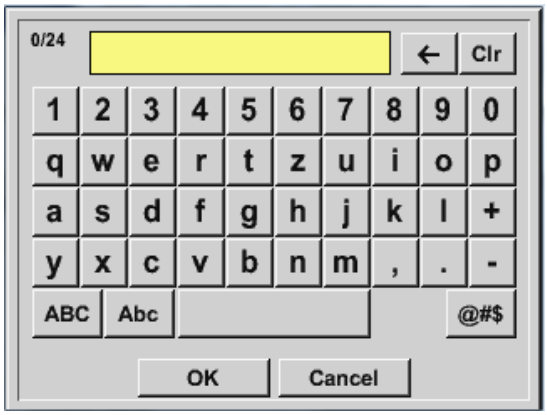
Remark:
If sensor settings are defined or changed, the data logger must be stopped.



Changes or entries can be made by pressing the highlighted white fields.

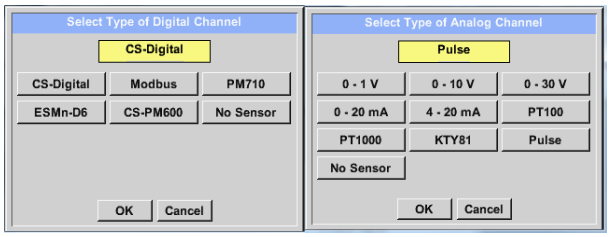
The *Alarm* (See chapter 12.2.2.4 Alarm settings) **and *Record* buttons** (See chapter 12.2.2.3 Recording measurement data)**, the *Resolution* of the decimal places and *Short Name* or *Value Name*** (See chapter 12.2.2.2 Name measurement data and define the decimal places)**, and the *More-Settings*** (See chapter 12.2.2.5 More-Settings (scale analogue output)) **are all described in chapter 12.2.2 Sensor settings.**

Main menu ➔ Settings ➔ Sensor settings ➔ A1➔ description field Name



It is possible to enter a name with 24 characters.

Main menu ➔ Settings ➔ Sensor settings ➔ A1➔ description field Type

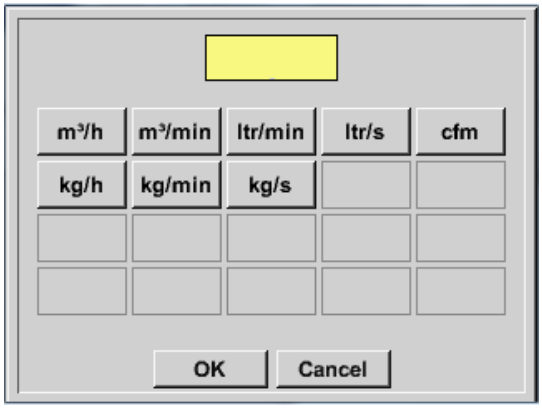


You can choose the following options, after pushing the *Type* description field.

(shown in figure)

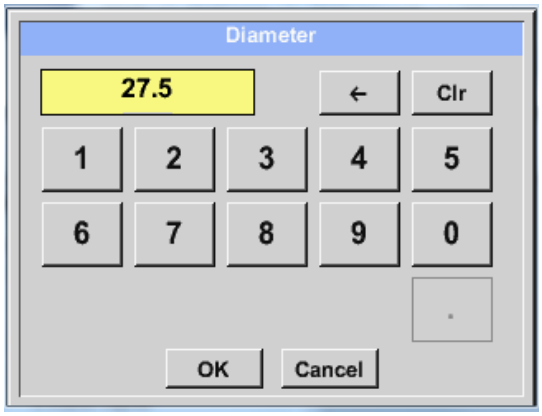
See also chapter [12.2.2.8 Configuration of Analogue Sensors]

Main menu ➔ Settings ➔ Sensor settings ➔ A1➔ description field Unit



A preset selection of suitable *Units*.

Main menu ➔ Settings ➔ Sensor settings ➔ A1➔ arrow right (2.page) ➔ description field of numerical value



Important:

The *inner diameter* of flow tube can be entered here, if this was not automatically correctly set.

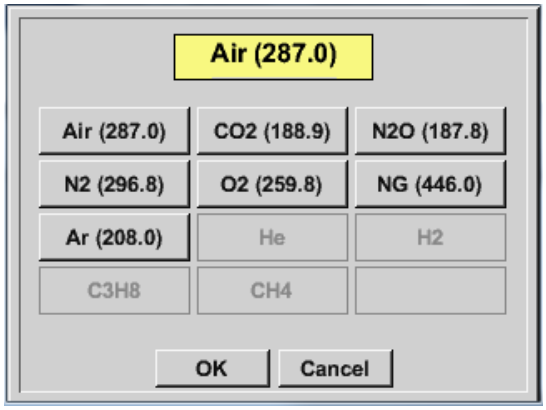
Inner *diameter* is entered here for example 27.5 mm.

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!

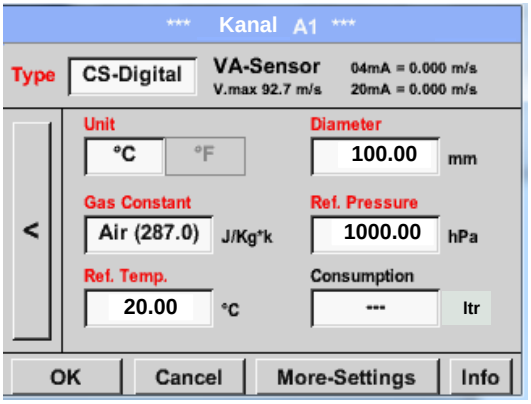
(Please, inquire at the manufacturer or measure by your own!)
Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ arrow right (2.page ➔ Gas Constant description field



A preset selection of suitable *Gas Constants*.

In the same way as here in chapter 12.2.2.7 Label and set the description fields described, the remaining description fields can be labeled.

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ arrow right (2.page)



The red labeled description fields indicate, that different values, such as the *Diameter* and the *Type,* have been changed or added.

See also chapter 12.2.2.1 Choice of the sensor types (For example type CS-Digital sensor)

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

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!

12.2.2.8 Configuration of Analog-Sensors

Applicable only at DS 400 variants with an analog board equipped.

A brief overview of the possible *Type* of settings with examples.

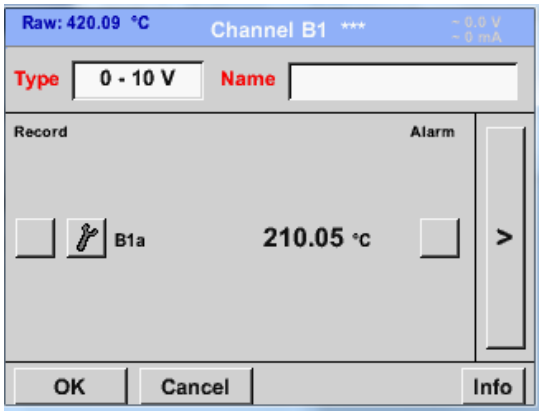
Except *CS-Digital*, see chapter 12.2.2.1 Choice of the sensor types (For example type CS-Digital sensor) and 12.2.2.6 Dewpoint sensor with type CS-Digital.

The *Alarm* (See chapter 12.2.2.4 Alarm settings) **and *Record* buttons** (See chapter 12.2.2.3 Recording measurement data)**, the *Resolution* of the decimal places and *Short Name* or *Value Name*** (See chapter 12.2.2.2 Name measurement data and define the decimal places)**, and the *More-Settings*** (See chapter 12.2.2.5 More-Settings (scale analogue output)) **are all described in chapter 12.2.2 Sensor settings.**

The caption of description fields, see chapter 12.2.2.7 Label and setting the description fields.

12.2.2.8.1 Type 0 - 1/10/30 Volt und 0/4 – 20 mA

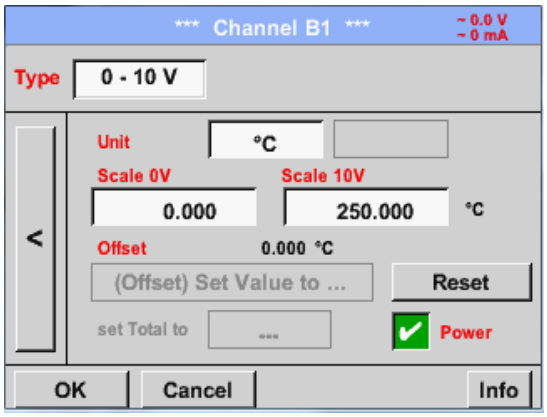
Main menu ➔ Settings ➔ Sensor settings ➔ B1 ➔ Type description field ➔ 0 - 1/10/30 V



Please see the scale of the sensor (here for example Type **0 - 10V** corresponds to 0 - 250 ° C) from the data sheet of the connected sensor.

By *Scale 0V* enter the lower and by *Scale10V* the upper scale value.

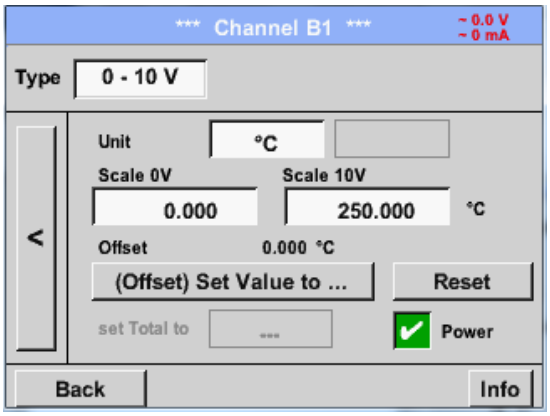
Main menu ➔ Settings ➔ Sensor settings ➔ B1 ➔ arrow right (2.page)



By *Scale 0V* enter the lower and by *Scale10V* the upper scale value

The *Sensor Supply Voltage* is switched On, if it´s required by the sensor type, otherwise off (no green hook).

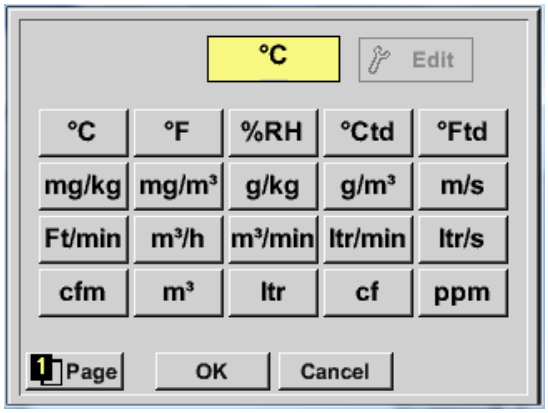
Please confirm by pressing the *OK* button.

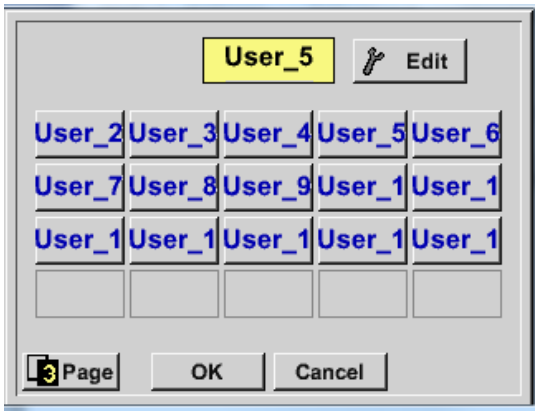


It is possible to define a Offset-Value. With the *Set Value to*-button *(Offset*) you enter it.
The positive or negative difference of the *Offset* will be displayed.

By pressing the *Reset*-button the *Offset* will be deleted.

Main menu ➔ Settings ➔ Sensor settings ➔ B1 ➔ arrow right (2.page)➔ description field Unit





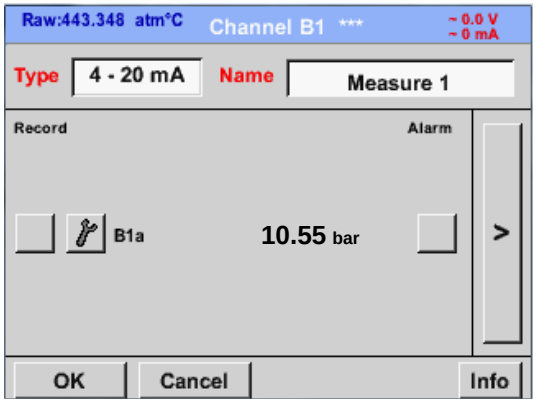
A preset selection of suitable units by ***Type*** *0 - 1/10/30 V* and *0/4...20 mA*.

The different pages could be displayed by pressing the *Page*-button.

In addition *User* specific units could be defined

Here with the *Edit* button could analog to *description field* a User unit be defined.

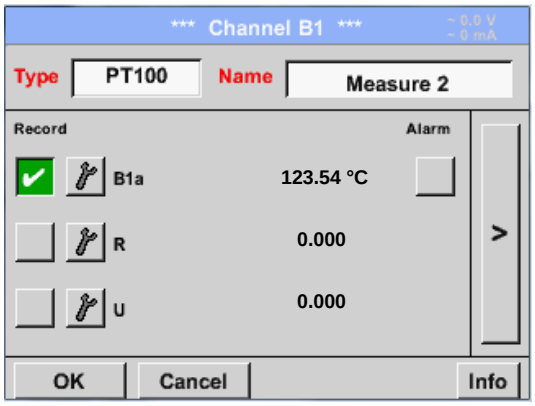
Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ Type description field ➔0/4 - 20 mA

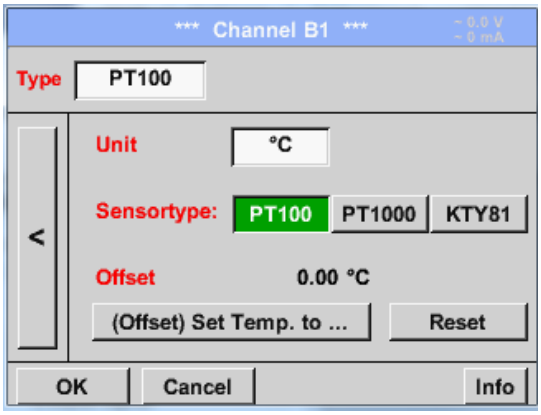


Here for example *Type* **4 - 20 mA**.

12.2.2.8.2 *Type PT100x and KTY81*

Main menu ➔ Settings ➔ Sensor settings ➔ B1 ➔ Type description field ➔ PT100x



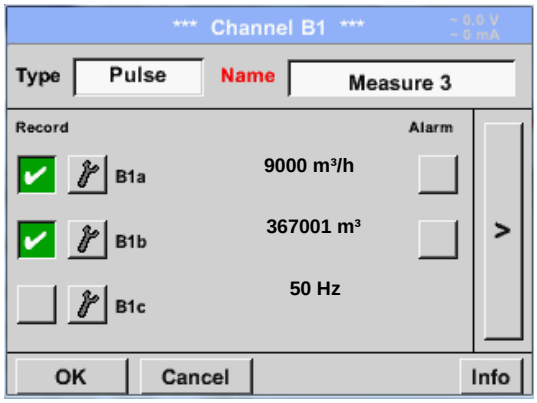


Here the sensor type *PT100* and the *Unit* in °C are chosen, alternatively the sensor types *PT1000* and *KTY81*, as well as the Unit °F can be selected.

More setting options, see chapter 12.2.2.8.1 Type 0 - 1/10/30 Volt and 0/4 - 20 mA

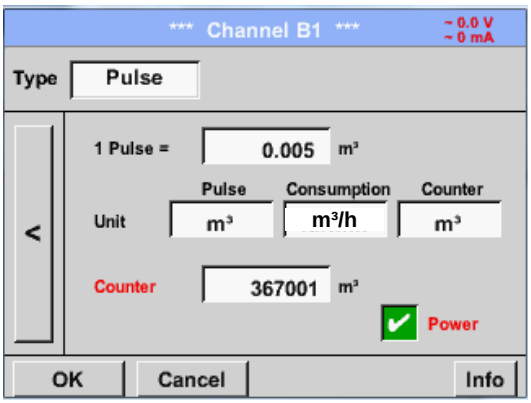
12.2.2.8.3 Type Pulse (Pulse ration)

Main menu ➔ Settings ➔ Sensor settings ➔ B1 ➔ Type description field ➔ Type description field ➔ Pulse

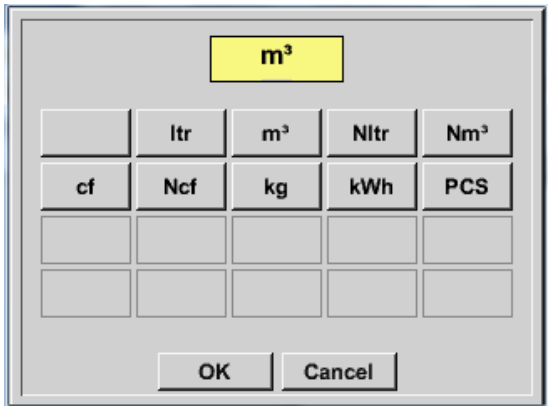


Typically the value with unit of **1 Pulse** is standing on the sensor and can directly entered to the ***1 Pulse =*** description field.

Remark:
Here, all description fields are already labeled or occupied.



Main menu ➔ Settings ➔ Sensor settings ➔ B1 ➔ arrow right (2.page) ➔ Unit Pulses



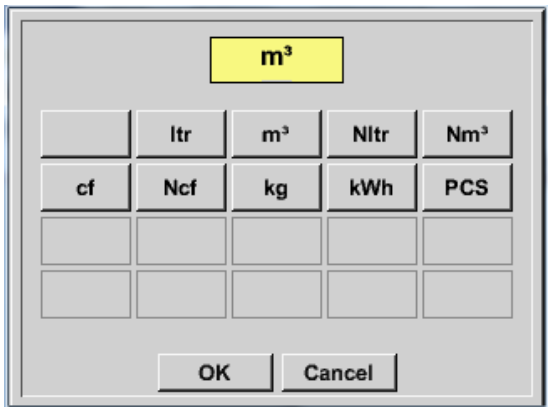
By *Unit Pulse* you can choose between a flow volume or a power consumption unit.

Main menu ➔ Settings ➔ Sensor settings ➔ B1 ➔ arrow right (2.page) ➔ Unit Consumption

Unit of current *Consumption* by *Type* **Pulse**

Remark:
Example with the unit cubic meters / hour.

Main menu ➔ Settings ➔ Sensor settings ➔ B1 ➔ arrow right (2.page) ➔ Unit Counter



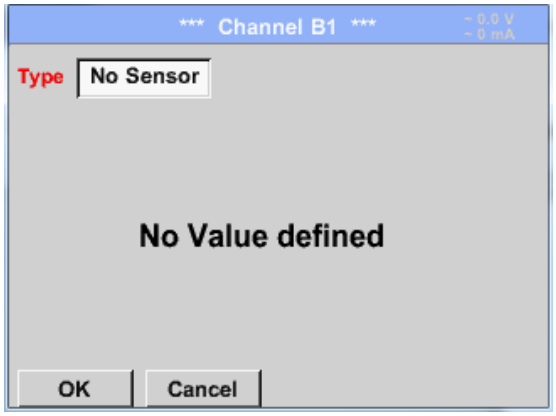
The available Units for the Unit of Counter by *Type* **Pulse**

The **counter** can be set any time to any value you need.

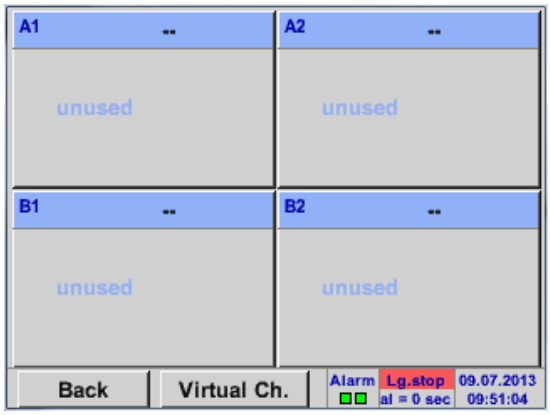
More setting options, see chapter 12.2.2.8.1 Type 0 - 1/10/30 Volt and 0/4 - 20 mA!

12.2.2.8.4 Type „No Sensor“

Main menu ➔ Settings ➔ Sensor settings ➔ A2 ➔ Type description field ➔ No Sensor



Is used to declare a not currently needed channel as *No Sensor defined*.



If you go to *Type **No Sensor** Back*, channels will appear as *unused*.

12.2.2.9 Type Modbus

12.2.2.9.1 Selection and activation of Sensor-Type Modbus

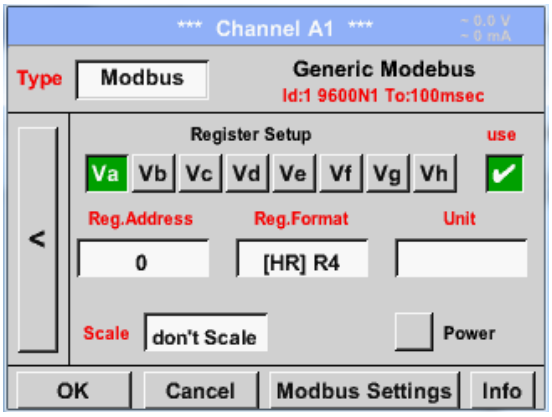
First Step: First step: choose an unused sensor channel
Main menu ➔ Settings ➔ Sensor settings ➔ A1

Second step: choose type Modbus
Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ Type description field ➔ Modbus

Third step: confirm with *OK* .

Now, a *Name* (See chapter 12.2.2.7 Label and setting the description fields)**, can be determined.**

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ arrow right (2.page) ➔Va ➔ use

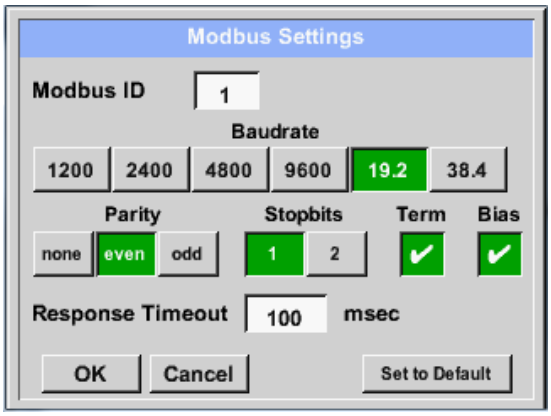


Via Modbus it is possible to read out up to 8 Register-Values (from Input or Holding Register) of the sensor.

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

12.2.2.10 Modbus Settings

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ arrow right (2.page) ➔ Modbus Settings ➔ID - Textfield



Please insert here the specified *Modbus ID* of the sensor, allowed values are *1 -247*, (e.g.. here *Modbus ID = 22)*

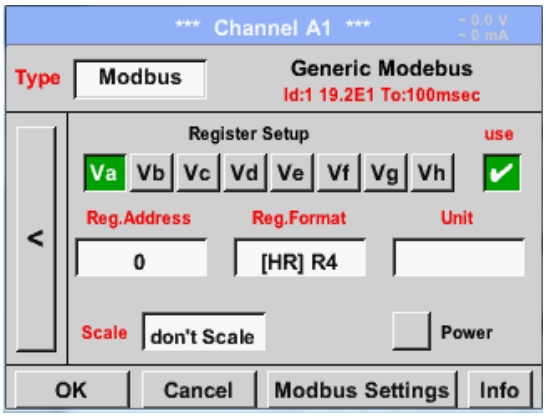
For setting the Modbus ID on the sensor please see sensor-datasheet.

In addition in the menu are the serial transmission settings *Baudrate, Stoppbit, Paritybit* and *Timeout* time to define.
.
In case that the DS400 is the end of the RS485 bussystem 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.*

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ Reg. Address description field

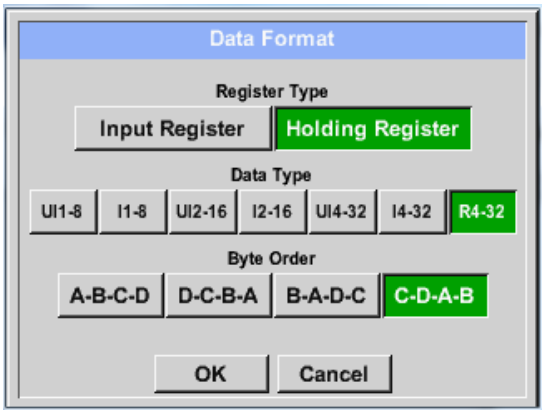


The measurement values are kept in the registers of the sensor and can be addressed via Modbus and read by the DS400.
This requires to set the desired register addresses in the DS400.

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.

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ 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)	= floasting 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.

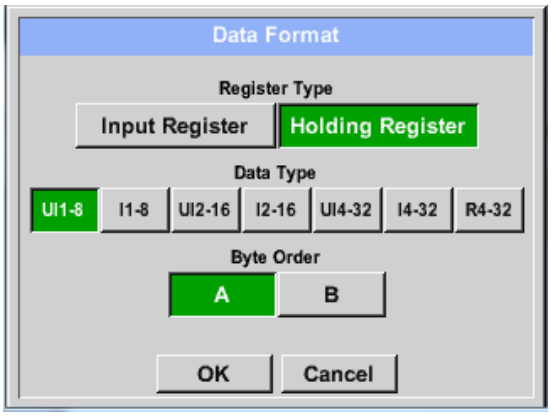
In the Modbus Specification the sequence of the transmitted bytes is not defined clearly. To cover all possible cases, the byte sequence in the DS500 is adjustable and must adapted to the respective sensor. Please consult here for the sensor datasheet.

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.

Beispiele :

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

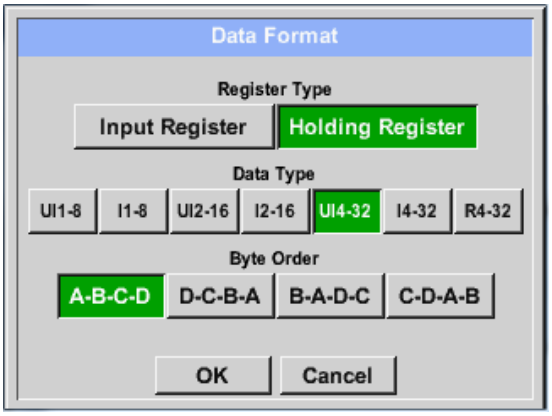


Selection Register Type *Holding Register*,
Data Type *U1(8b)* und Byte Order *A / B*

	HByte	LByte
18 =>	00	12

Data Order	1. Byte	2. Byte
A	00	12
B	12	00

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

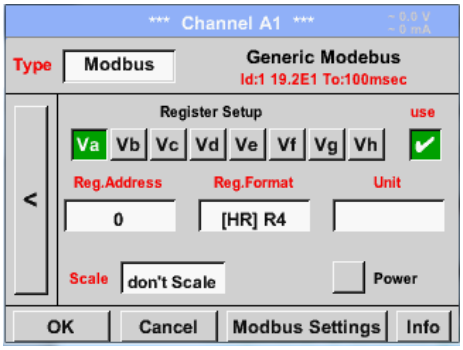


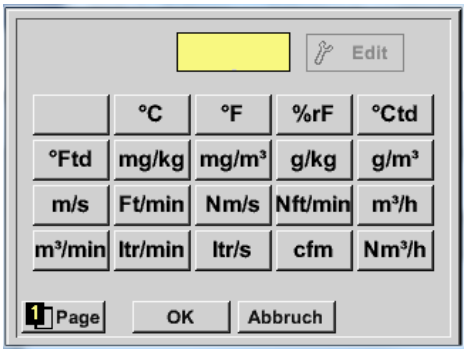
Selection Register Type *Holding Register*,
Data Type *U1(32b)* und Byte Order *A-B-C-D*

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

Data Order	1.Byte	2.Byte	3.byte	4.Byte
A-B-C-D	AE	41	56	52
D-C-B-A	52	56	41	AE
B-A-D-C	41	AE	52	56
C-D-A-B	56	52	AE	41

Main menu → Settings → Sensor settings → A1 → Unit- description field

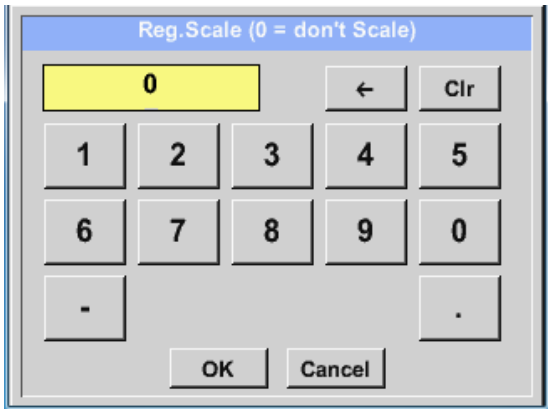




By pressing the description field *Unit*
the list with the available units appear

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..

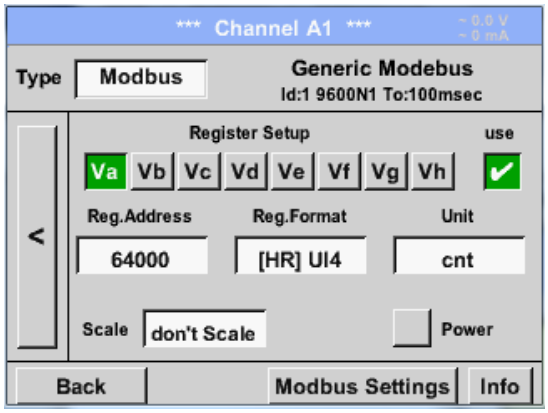
Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ Scale- description field



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

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

Main menu ➔ Settings ➔ Sensor settings ➔ A1 ➔ OK



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

12.2.2.11 Custom Sensor

With regular use of different sensors or sensor settings it is possible, based on a basic sensors a so called predefined sensors-settings (Custom Sensor) to save and to read it back.
Stored are all settings of the sensor except recording button and alarm settings..

Attention !

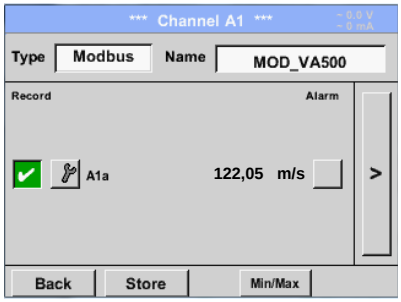
When applying the settings on different channels then the sensor name, value name and short name are inserted multiple times. Unfortunately, this must be checked and changed manually.

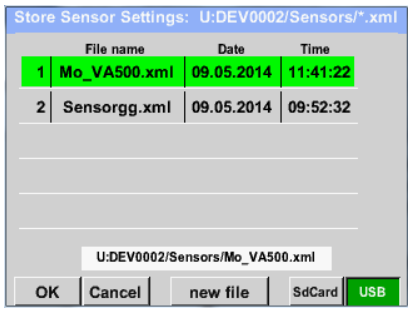
Main menu ➔ Settings ➔ Sensor Settings

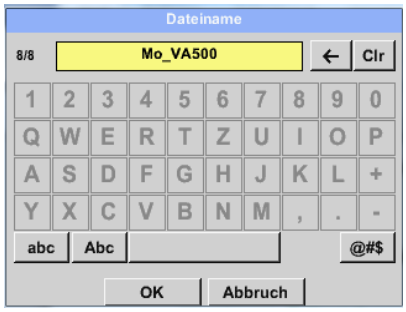
Settings fort he Base Sensor should be done accordingly chapter 8.3.2.1 to 8.3.2.8.

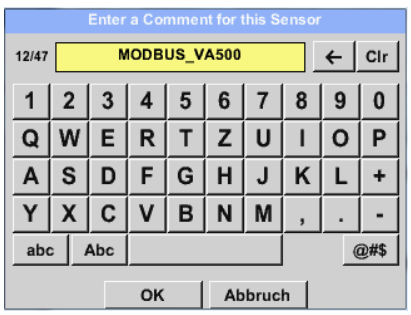
12.2.2.11.1 Sensor settings saving

Main menu ➔ Settings ➔ Sensor Settings ➔ Store









All already saved sensor settings will be displayed, depending on the location USB or SdCard selected.

Changing of the location by pressing button USB or SdCard

Location/path is: DEV0002/Sensors

By choosing one of t e listed files their content will be overwritten by keeping the filename.

By choosing button new file a menu for inserting/defining the filename appears.
The file name lenght is limited **to 8 chars**.

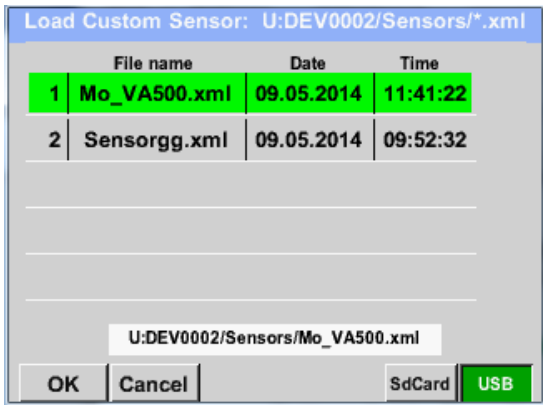
Confirm with OK

In addition to each file a comment/description could be addedd

After confirming with OK the file is stored on the selected location.

12.2.2.11.2Sensor settings import

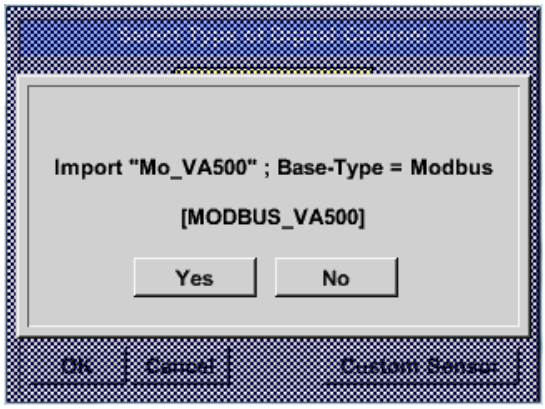
Main menu ➔ Settings ➔ Sensor Settings➔ A1 ➔ Type Textfield ➔ Custom Sensor



All already saved sensor settings will be displayed, depending on the location USB or SdCard selected.

Changing of the location by pressing button USB or SdCard

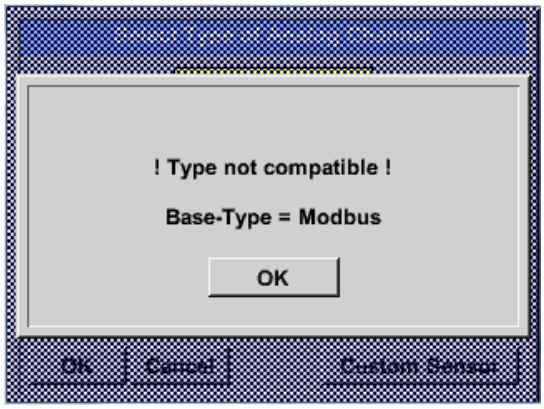
Then select the required sensor setting file and confirm it with OK .



For a short verification the basetyp of sensor and also the comment stored is displayed

By pressing OK the data (settings) are imported.

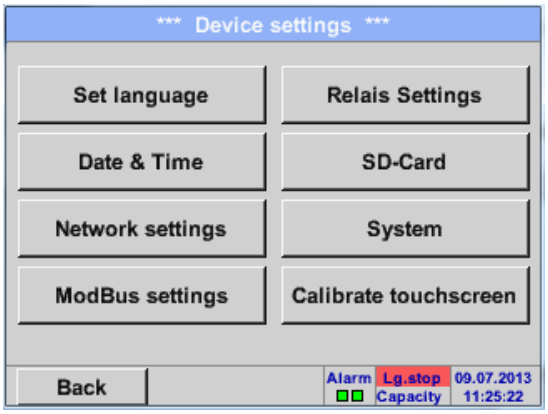
If necessary the naming, recording- and alarm-settings needs to be adapted..



In case a wrong (not compatible) Sensortype (analogue / digital) has selected a error message will be displayed.

12.2.3 Device Settings

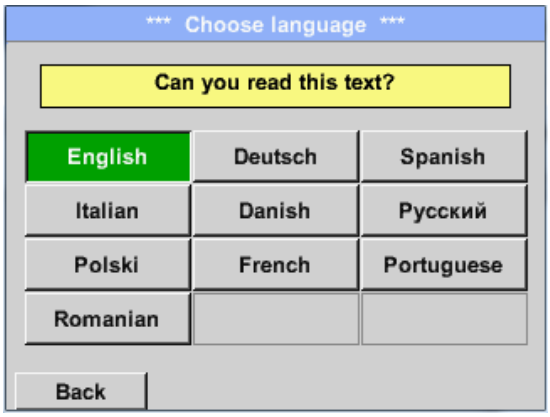
Main menu ➔ Settings ➔ Device settings



Overview of *Device settings*

12.2.3.1 Language

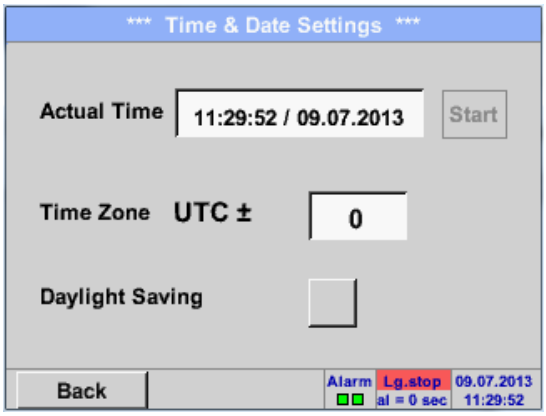
Main menu ➔ Settings ➔ Device settings ➔ Set language



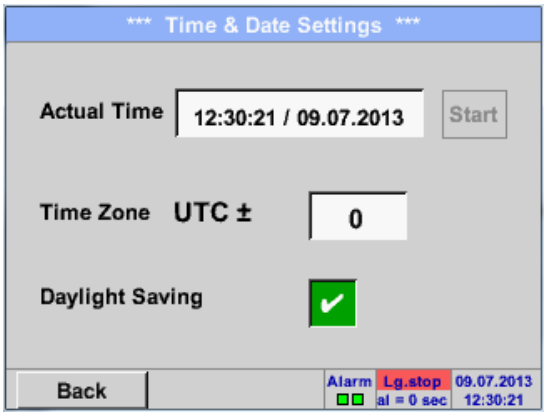
Here you can select one of 10 languages for the DS 400.
.

12.2.3.2 Date & Time

Main menu ➔ Settings ➔ Device settings ➔ Date & Time



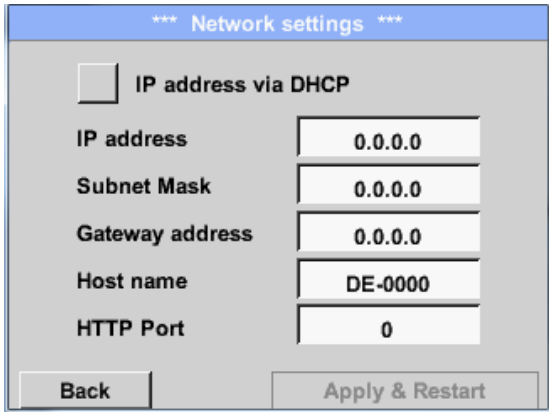
By pushing the *Time Zone* description field and enter the correct *UTC*, you can set the correct time all over the world.



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

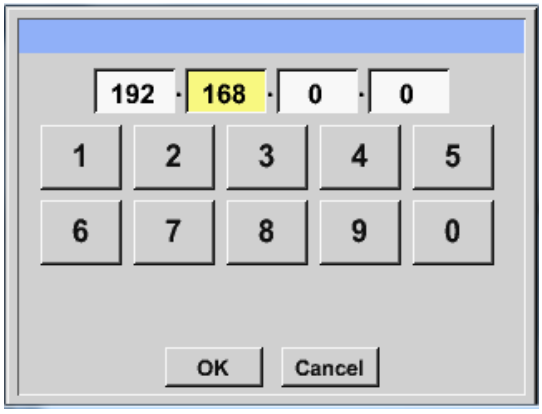
12.2.3.3 Network-Settings

Main menu ➔ Settings ➔ Device settings ➔ Network-Settings



Here you can set up and made a connection, with or without *DHCP*, to a computer.

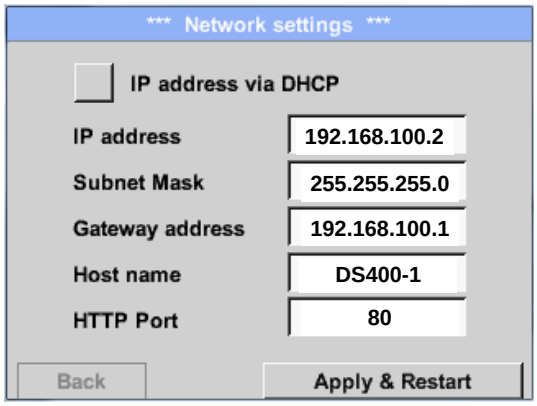
Remark:
With activated DHCP (green hook), the automatic integration of the DS 400 in an existing network is possible, without a manual configuration.



After pushing, for example the *IP address* description field, the command window appears, where in the selected yellow area a partial *IP address* can be entered manually.

The *Host name* can be entered or changed by pushing the description field.

Subnet Mask and Gateway address are entered in the same way!
Label Host name, see chapter 12.2.2.7 Label and setting the description fields**!**



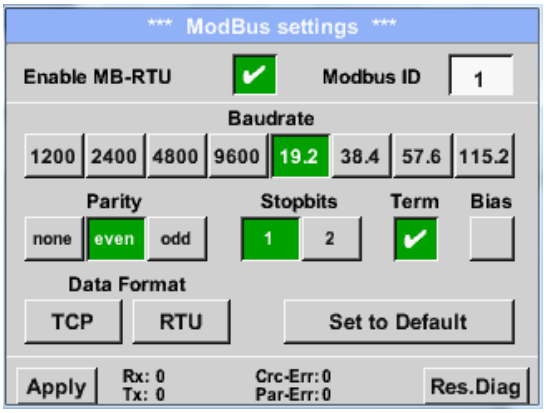
For example a *IP-Address* out of address range of the class C-Net

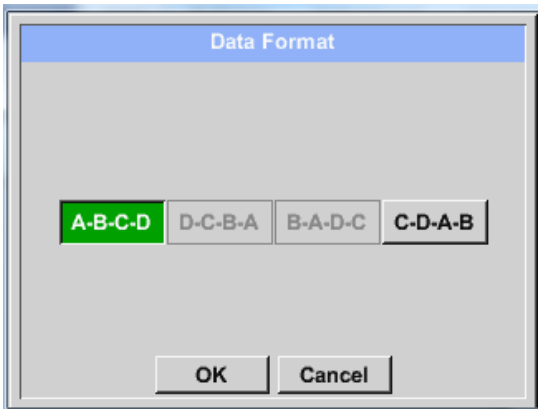
Remark:
Private Address range Class A-Net
10.0.0.0 to 10.255.255.255
Private Address range Class B-Net
72.16.0.0 to 172.31.255.255
Private Address range Class C-Net
192.168.0.0 to 192.168.255.255
Subnet Mask: e. g. 255.255.255.0

12.2.3.4 ModBus (Slave)

With the *RS485 ModBus* interface customer specific systems (GLT, SPS, Scada) could be connected to the DS 400.

Main menu ➔ Settings ➔ Device settings ➔ ModBus settings





In this menu the transmission parameter *Modbus ID, Baudrate, Stoppbit und Parity* will be set. With activation of *Enable Modbus RTU(RS485)* the Modbus is enabled.

By pressing *Set to Default* the default values will be set.

Default values:	Baudrate:	19200
	Stoppbit:	1
	Parity:	even

In case that the DS400 is the end of the RS485 bussystem with activating *Term-* & *Bias-* button the required termination and biasing could be activated.

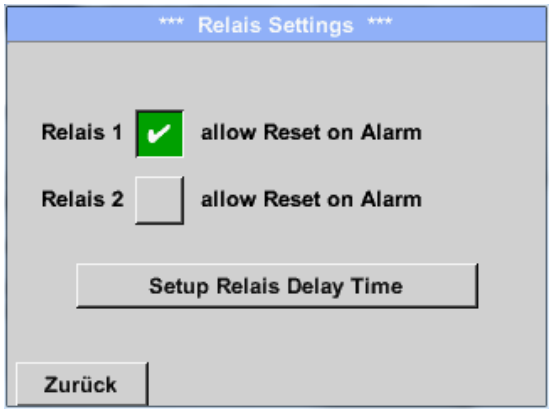
By pressing *TCP* or *RTU* you are able to change the word order of the data.

Default value for both is C-D-A-B

Every change have to be confirmed by pressing *Apply* – button.

12.2.3.5 Relay Settings

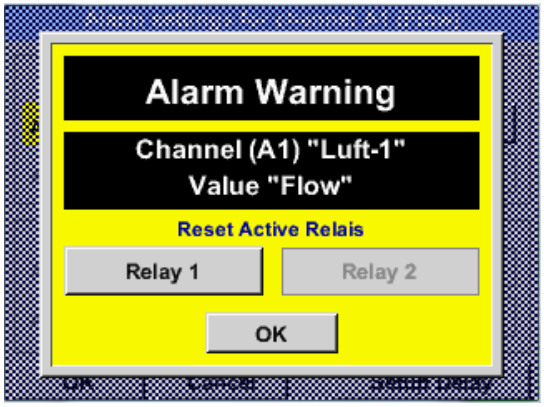
Main menu ➔ Settings ➔ Device settings ➔Relais-Settings



By activated *relais* button it is allowed / possible to turn off the corresponding alarm relays in the popup appearing in alarm case.

Setting is only possible in the password protected *Device Settings* menu.

Default values at delivery are **not allowed**. .



In an alarm case e.g. here alarm 1(Yellow) for channel A1 a popup will be displayed.

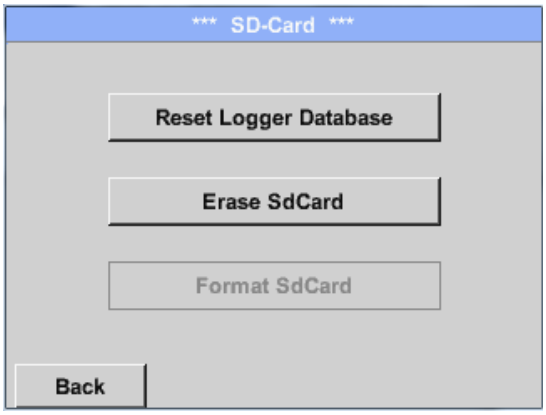
If in the Relay Settings the turning off of Relay 1 was allowed by pressing Relay 1 button switches this off.

By confirming with OK the popup will be closed.

12.2.3.6 SD-Card

Main menu ➔ Settings ➔ Device settings ➔ SD-Card ➔ Reset Logger Database

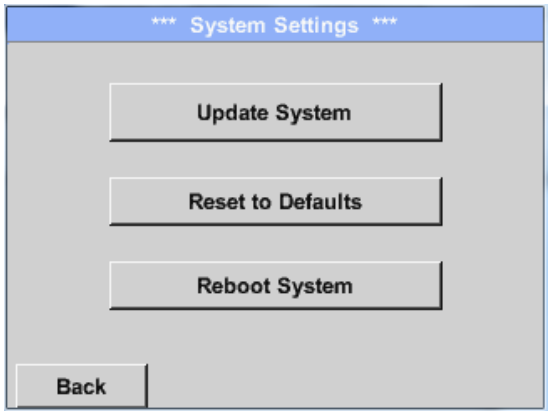
Main menu ➔ Settings ➔ Device settings ➔ SD-Card ➔ Erase SdCard



By pressing *Reset Logger Database* all actual stored data on SD-Card will be blocked for use in DS 400. 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.

12.2.3.7 System



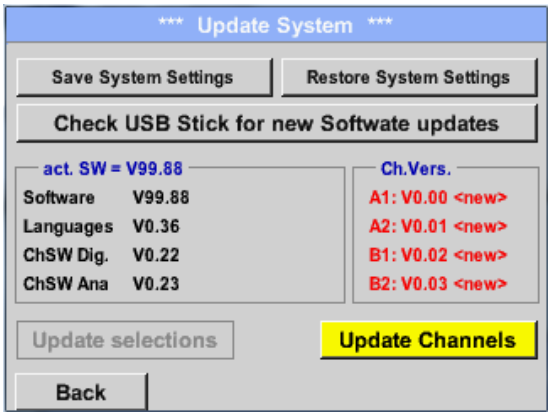
Overview of the System features

Important:
Before the update, save the *System setting* on a USB stick!

Remark:
The highlighted yellow fields shows, which kind of update is available!

12.2.3.7.1 System update

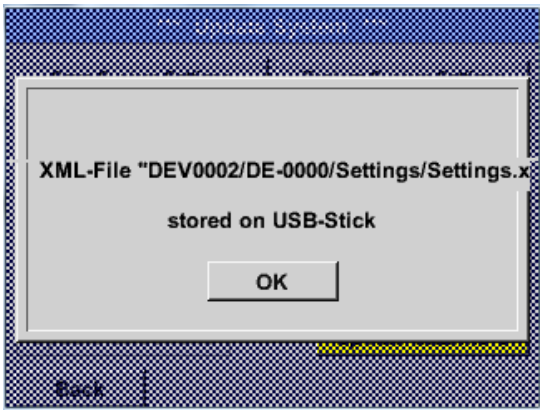
Main menu ➔ Settings ➔ Device settings ➔ System ➔ System-Update



Overview of the Update System features

12.2.3.7.2 Save System Settings

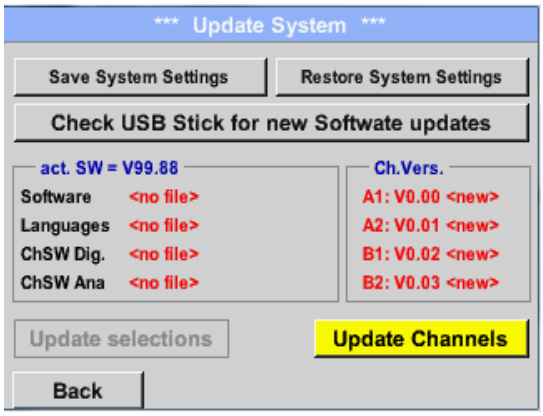
Main menu ➔ Settings ➔ Device settings ➔ System ➔ System-Update ➔ Save System Settings



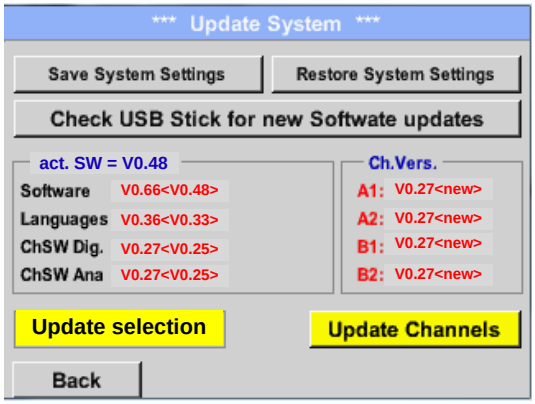
Stores the *channel* and *system settings* in XML format on a USB stick.

12.2.3.7.3 Check for new Software updates (USB)

Main menu ➔ Settings ➔ Device settings ➔ System ➔ Update System ➔ Check USB Stick for new Software updates



If after pushing the *Check USB Stick for new Software updates* button the following messages in the window appears, the DS 400 is not connected properly with the USB stick or no files are available.
.



If the DS 400 is correctly connected to USB, the font will be black and left the different update options (with a green hook) are showed.

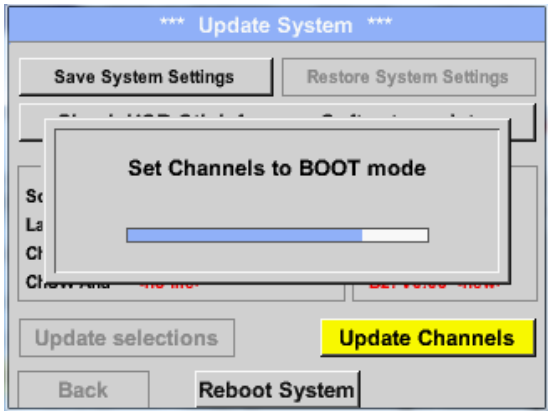
And right aside it shows the current (old) and another (new) available versions

Main menu ➔ Settings ➔ Device settings ➔ System Update ➔ System ➔ Update selections

DS 400 update for all selected options (software, fonts, etc.).

Important:
If the *Reboot system* button after the update appears, he must be pushed to restart the DS 400!

Main menu ➔ Settings ➔ Device settings ➔ System ➔ Update System ➔ Update Channels

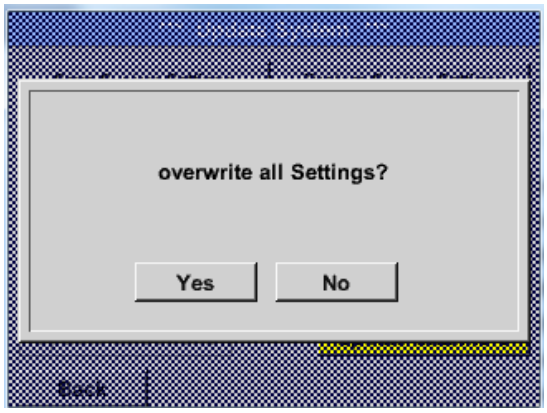


Update for the available *channels* of the DS 400.

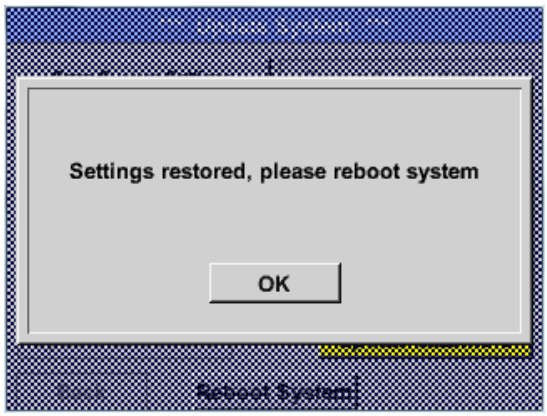
Important:
If after the channel update the *Reboot system* button appears, it has to be pushed to restart the DS 400!

12.2.3.7.4 Restore System Settings

Main menu ➔ Settings ➔ Device settings ➔ System ➔ Update System ➔ Restore System Settings



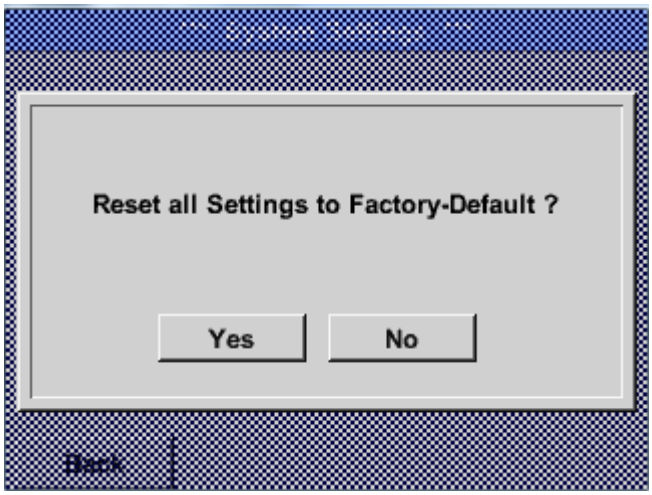
With the help of the *Restore System Settings* button the channel and system settings can be reset to the last saved version.

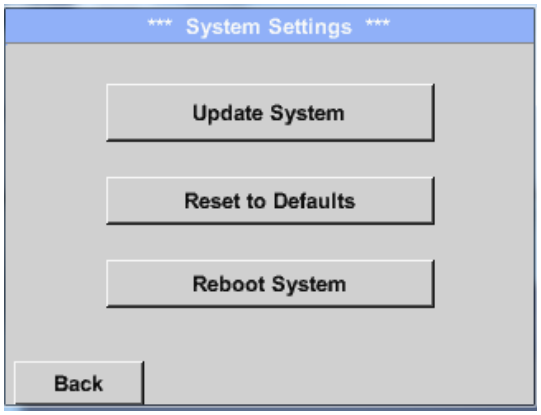


Important:
If the channel and system settings have been reset you have to push *OK* and then the *Reboot system* button.

12.2.3.7.5 Factory Reset

Main menu ➔ Settings ➔ Device settings ➔ System ➔ Reset to Defaults

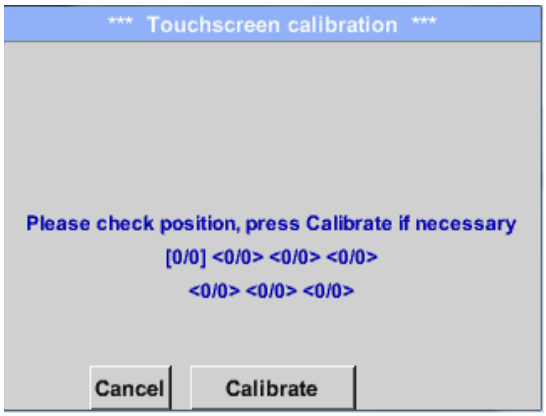




Reboot the *System* here, if you need it!

12.2.3.8 Calibrate touch-screen

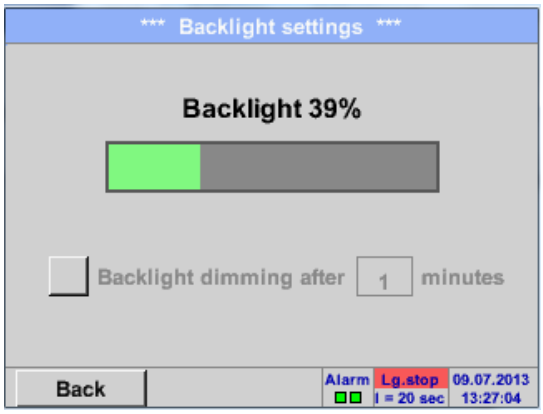
Main menu ➔ Settings ➔ Device settings ➔ calibrate touchscreen



If necessary, the touch-screen calibration can be changed here.
Push *Calibrate* and it appears, 1. left above, 2. bottom right and 3. in the middle, a calibration cross that must be pushed consecutively.
If the calibration finished and the touch-screen display averaged, you can confirm with *OK*.
Is this not the case, so you can repeat the calibration with the help of the Cancel and *Calibrate* buttons.

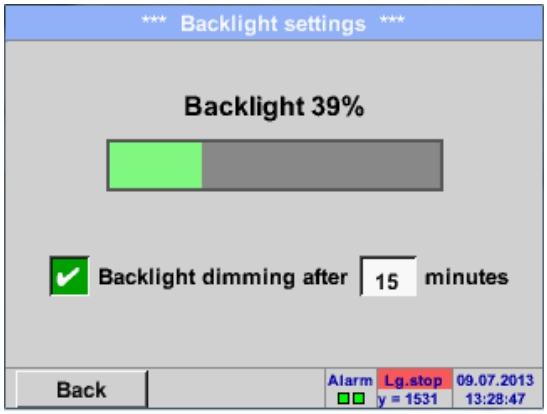
12.2.4 Set backlight

Main menu ➔ Settings ➔ Helligkeit



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.

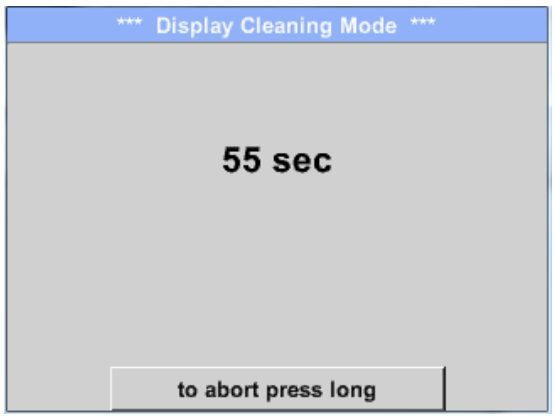
As soon as the dimmed screen is operated again, the *Backlight* is committed automatically on the last set value before dimming.

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

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

12.2.5 Cleaning

Main menu ➔ Settings ➔ Cleaning



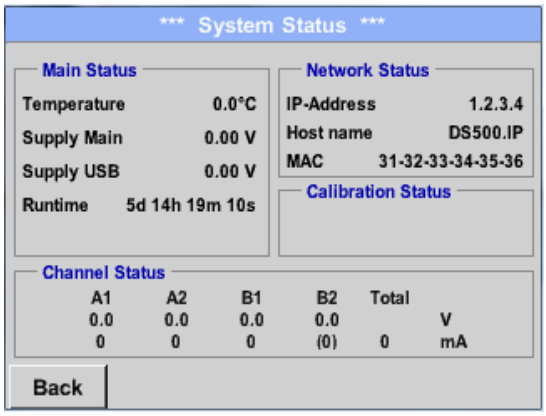
This function can be used for cleaning the touch panel during running measurements.

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.

12.2.6 System-Status

Main menu ➔ Settings ➔ System-Status



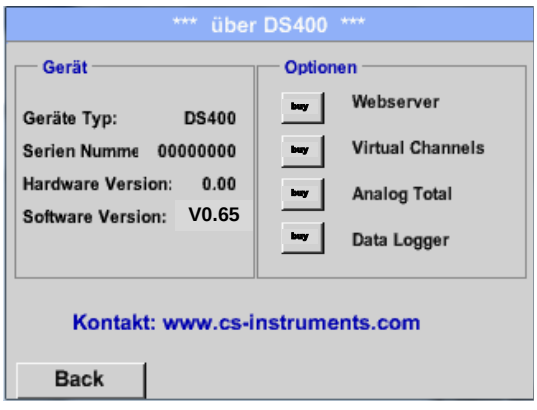
The function System Status offers an overview, fitting voltages and currents on the individual and the entire channels, as well as the power supply of the power supply units.

In addition, it offers the most important network information, such as *IP*, *host name* and *MAC*.

By the *Runtime,* you always know how long the DS 400 was in total in operation.

12.2.7 About DS 400

Main menu ➔ Settings ➔ About DS 400



Brief description of the Hardware and Software Version, as well as the Serial Number of the DS 400.

Under options, you can buy four additional, different functions, if you haven't done this by ordering.

12.2.8 Virtual Channels (optional)

The option „Virtual Channels“ offers 4 additional channels (no HW Channels) where it is possible to display calculations of each single HW-Channel, virtual channels and free defined constants as well. For each „Virtual Channel“ are 8 calculations each with of 3 operands and 2 operations possible.

Possible cases are calculation of:

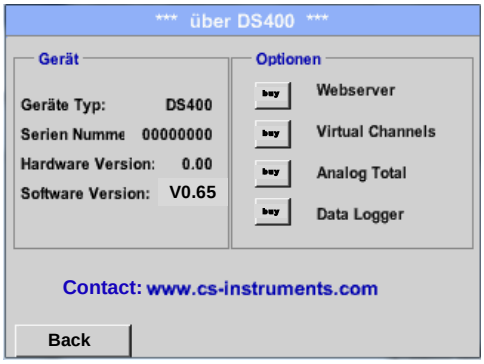
- Specific performance of a compressor(s)
- Complete consumption of a compressor(or the sum of several compressors)
- Energycost etc.

An example for a specific performance calculation see chapter 12.2.6.6

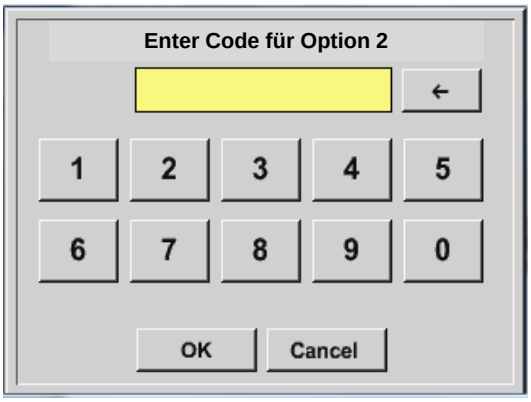
12.2.8.1 Option „Virtual Channels“ activation

After purchasing of the option „Virtual Channels“ the functionality have to be activated first.

Main menu ➔ Settings ➔ About DS 400



Contact:

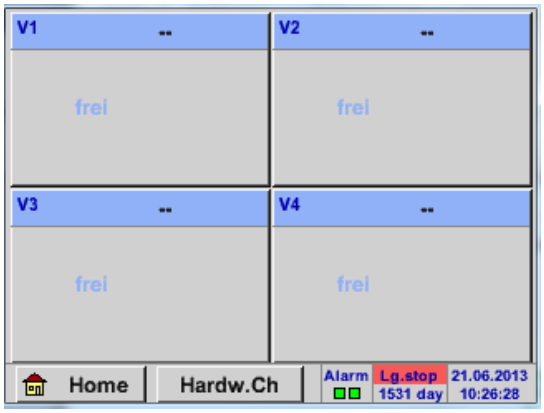


Please push the button Buy for „Virtual Channels“ and you will requested to insert the key-code received

Please enter the Key-Code in the text-field and activate the option by pushing the button *OK*

12.2.8.2 Virtual Channels Einstellung

Main menu ➔ Settings ➔ Sensor Settings ➔ Virtual Channels

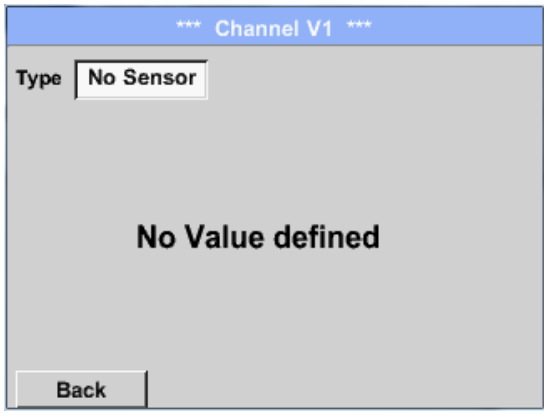


After pushing the button „*Virtual Channels*“ in the Sensor Settings menue an overview with the 4 available “*Virtual Channels*” is displayed.

Remark:
By default all channels are without settings.
.

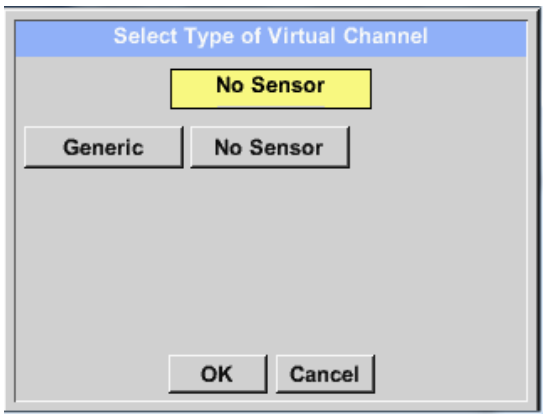
12.2.8.3 Selection of Sensor-type

Main menu ➔ Settings ➔ Sensor Settings ➔ Virtual Channels ➔ V1



By pushing the description field *Type **No Sensor*** the list of sensor types appears (see next step).

Main menu ➔ Settings ➔ Sensor Settings ➔ Virtual Channels ➔ V1 ➔ Type description field

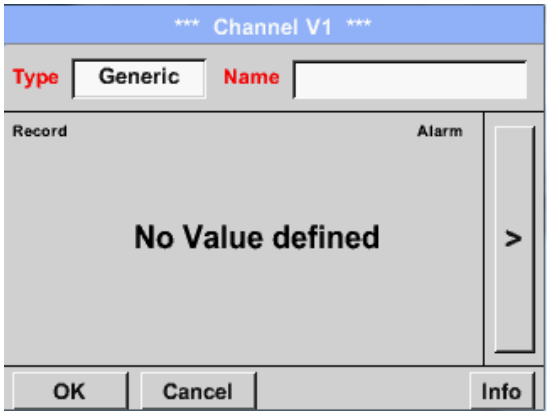


If still no sensor has been configured, the *Type **No Sensor*** appears.

By pushing the button **Generic** the virtual channel is selected.
Pushing the button **No Sensor** will reset the virtual channel.

Confirmation of selection is done by pressing the button **OK.**

Main menu ➔ Settings ➔ Sensor Settings ➔ Virtual Channels ➔ V1 ➔ Name description field



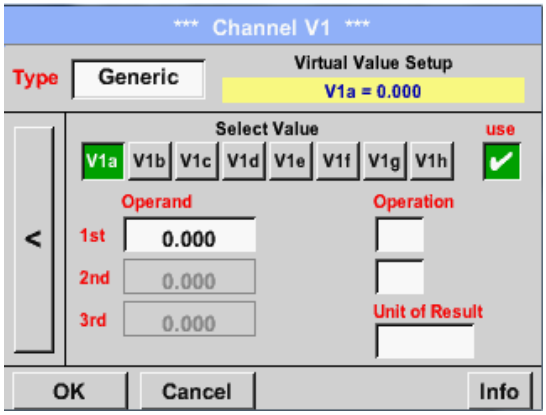
By pushing the Text field *Name* a Sensor name could be inserted.

12.2.8.4 Configuration of each single virtual value

Each virtual channel includes 8 individual calculated values where every value has to be activated separately.

12.2.8.4.1 Activation of a single virtual value

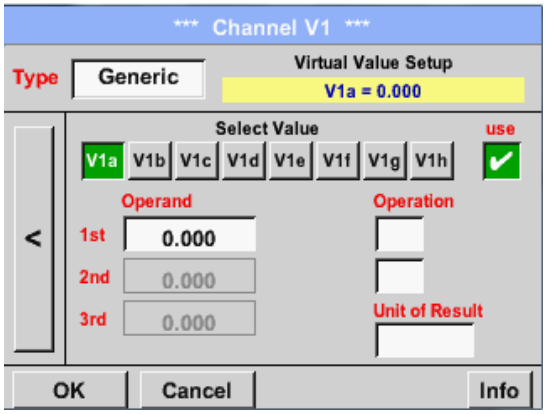
Main menu ➔ Settings➔ Sensor Settings ➔ Virtual Channels ➔ V1 ➔ arrow right(2.page)➔ V1a➔ Use



Every virtual value has to activated by selecting the respective *Value-Button* e.g. *V1a* and pushing of the *Use Button*.

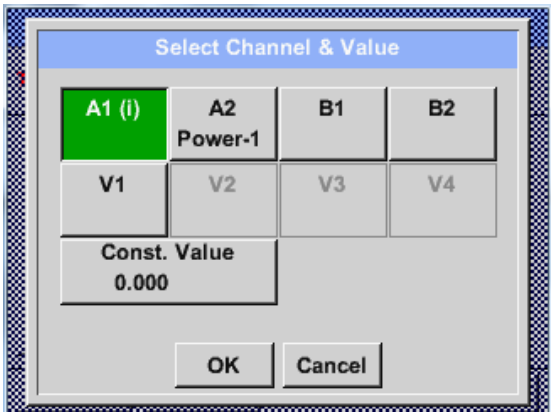
12.2.8.4.2 Definition of Operands

Main menu ➔ Settings➔ Sensor Settings ➔ Virtual Channels ➔ V1 ➔ arrow right(2.page) ➔ 1stOperand

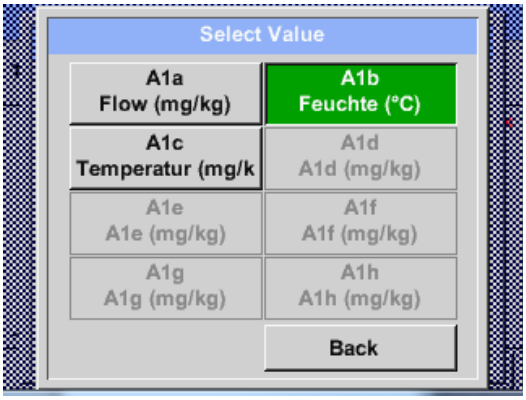


By accessing the text field *1st Operand*
The list with all channels (HW and virtual channels) and const. Value appears.

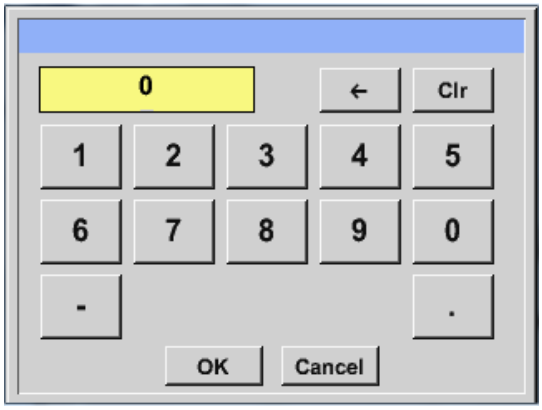
Main menu ➔ Settings➔ Sensor Settings ➔ Virtual Channels ➔ V1 ➔ arrow right(2.page) ➔ 1stOperand ➔ A1



By pressing a button either for HW-, virtual channel or const. Value e.g. *A1* a list of all available measurement channels or measurement values will appear.



Pressing the respective channel button e.g. *A1b* will select the measurement channel



Pressing the button *const. Value* requests the input of the *const. Value* into the text field.
With button *OK* the value will validated

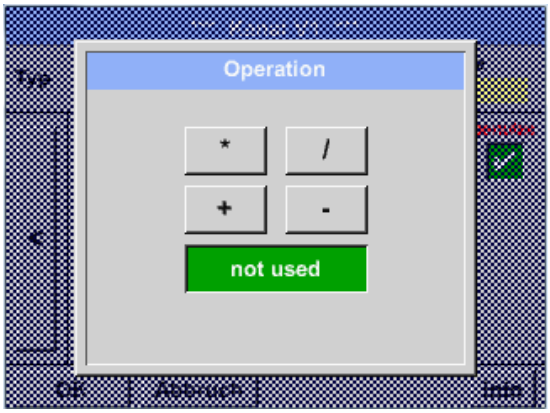
With the buttons ← and *Clr* it is possible to correct the input.

Button ← deletes the last figure
Button *Clr* clears the whole field

This approach is analogous to the other operands. (1st Operand, 2nd Operand and 3rd Operand) .

12.2.8.4.3 Definition of Operations

Main menu ➔ Settings➔ Sensor Settings ➔ Virtual Channels ➔ V1 ➔ arrow right (2.page) ➔ 1st Operation



By accessing the text field *1st Operation* the list with all available operands appears.

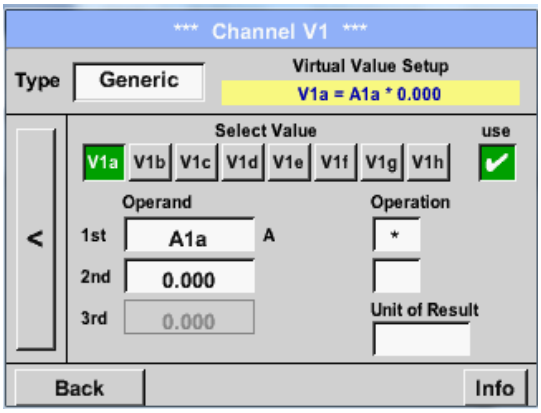
Selecting and validation of the operand by pressing the respective operand.

Pressing of the button *not used* deactivates the operation of the dedicated operand.

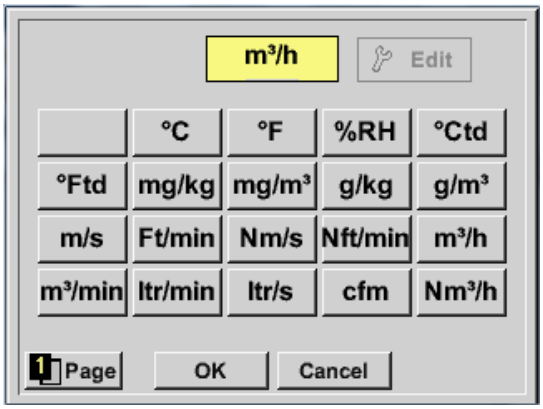
This approach is analogous for both operations (1st Operation and 2nd Operation)

12.2.8.4.4 Definition of Unit

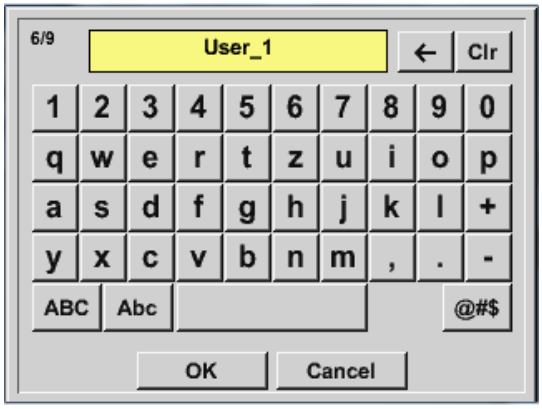
Main menu ➔ Settings➔ Sensor Settings ➔ Virtual Channels ➔ V1 ➔ arrow right (2.page) ➔ Unit



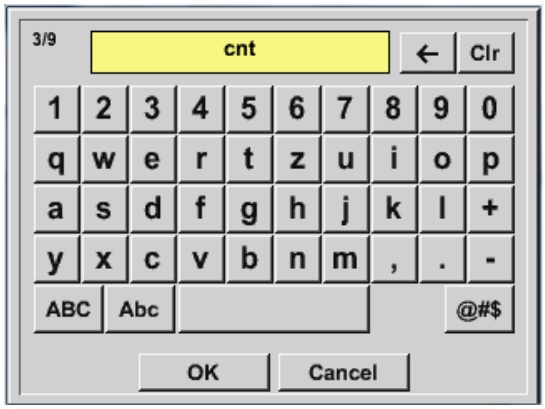
By accessing the text field *Unit of Result* the list with all available units appears



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.



By pressing the button *Edit* you enter the menu for inserting the new Unit.



Then define the unit and confirm it with the button *OK* .

With the buttons ← and *Clr* it is possible to correct the input.

Button ← deletes the last figure
Button *Clr* clears the whole field

Important

Each calculation allows you the use of maximum 3 operands and 2 operations.

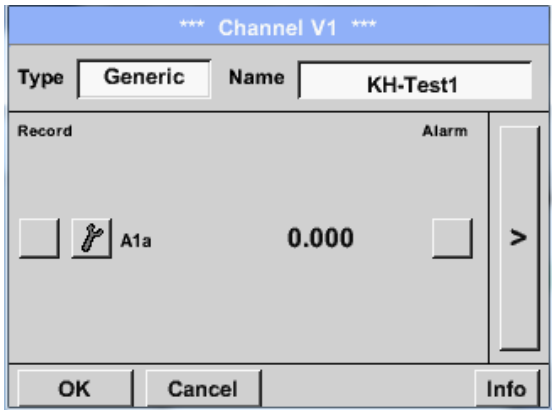
The calculation is then based on following formula:

Example: **V1a = (1st Operand 1st operation 2nd Operand) 2nd operation 3rd Operand**

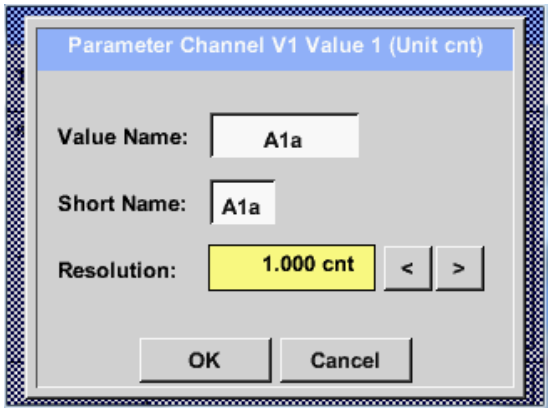
V1a = (A1c – A2a) * 4.6

12.2.8.5 Value name, resolution of decimal places and recording of values

Main menu ➔ Settings➔ Sensor Settings ➔ Virtual Channels ➔ V1 ➔ Tool-Button



The *Resolution* of the decimal places, the *Short Name* and *Value Name* are found under the **Tool button**

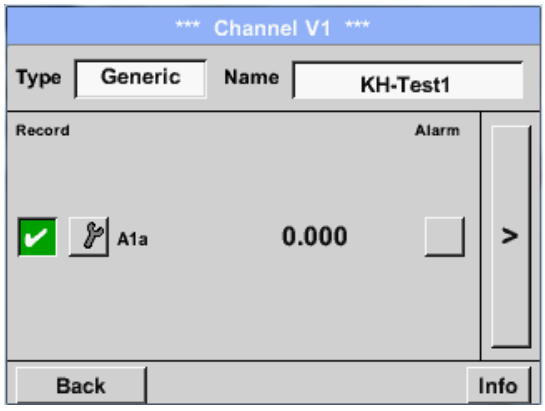


For the recorded *Value* there can be entered a *Name* with 10 characters and later in menu item *Graphics/Real time values* it is easier to identify it.

Default names are e.g. *V1a*.
V1 is the Channelme, *a* is the first measureing value of channel V1, *b* is the second measuring value and *c* the third etc.

The *Resolution* of the decimal places is simply adjustable by pushing right and left

Main menu ➔ Settings➔ Sensor Settings ➔ Virtual Channels ➔ V1 ➔ Record Button



Use the *Record* buttons to select the measurement data that will be stored by **activated data logger**.

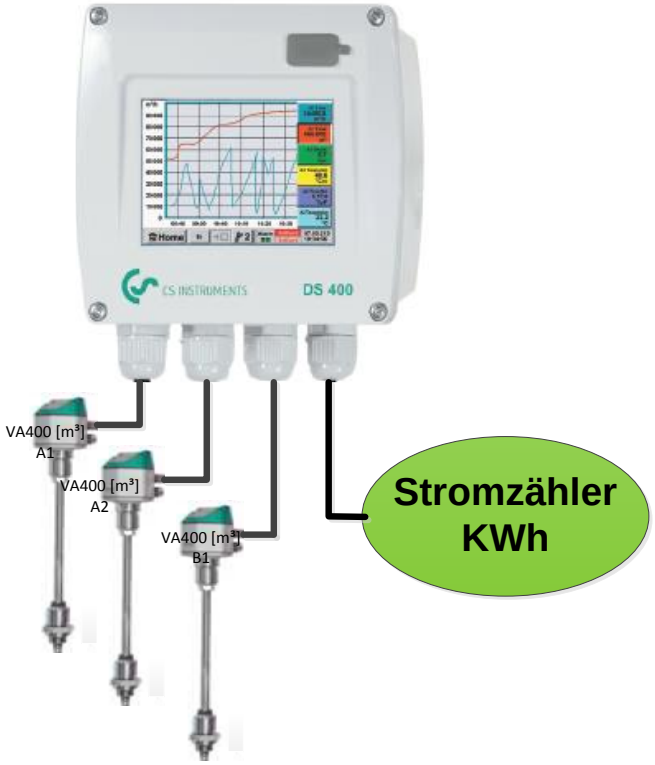
Attention:

Before the selected measurement data are recorded, the data logger must be activated after the settings(See chapter 12.2.12 Logger settings (data logger))**.**
See also chapter 12.2.2.2 Name the measurement and 12.2.2.3 Recording measurement data

12.2.8.6 Calculation Example „Specific Performance“

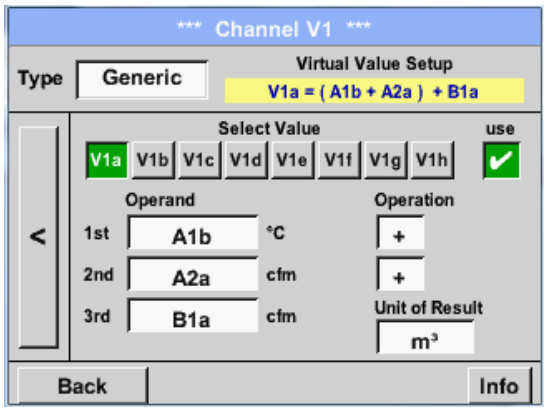
As an example we assume a compressor system with 3 single compressors.

The consumption measurements are done with consumption sensors VA400 at the inputs A1 – B1 & and an electric meter at input B2.



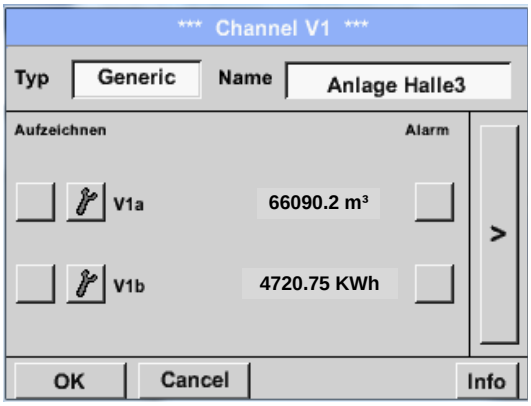
Calculated are the complete consumption of air and energy as well as the "specific performance" of the entire system .

Main menu ➔ Settings➔ Sensor Settings ➔ Virtual Channels ➔ V1 ➔ arrow right (2.page) ➔ V1a ➔ Use



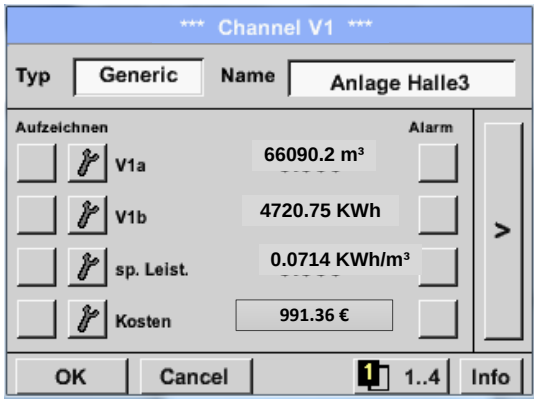
Selection and Input of the operands and operations see chapter 12.2.5.4.2 and chapter 12.2.5.4.3.

Result in *V1a* is the sum of consumption sensor *A1* + *A2* + *B1* see range “result”.
For this example it is *66090,2 m³*



Result in *V1b* is the energy consumption read out from the energy counter.

V1a → complete Air consumption
V1b → energy consumption

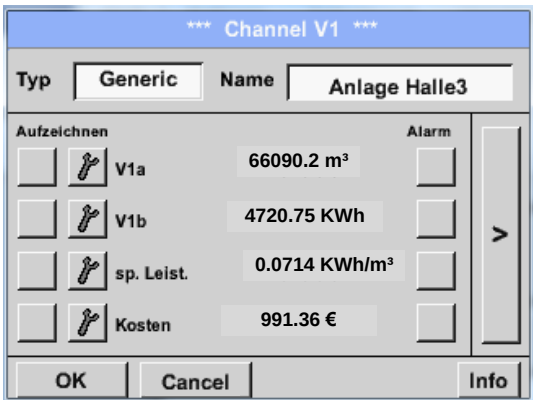


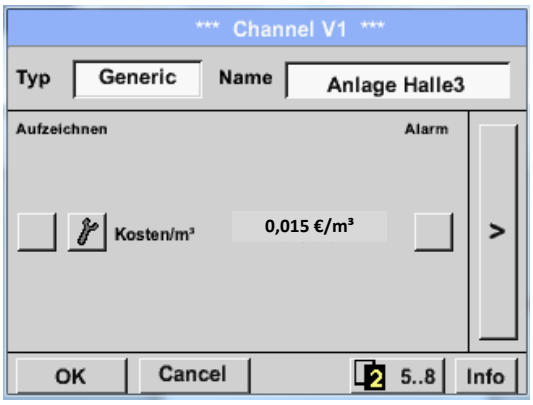
Calculation of the *specific. Perfor.* Is done in *V1c* with *V1c* = *V1b* / *V1a*
For this example it is 0,072 KWh/m³

Calculation of energy cost complete in *V1d* with *V1d* = *B2* * *0.21*. For this example it is 991,36 €

Energy cost per m³ produced air is done in V1e with *V1e* = *V1c* * *0.21*

Due to more as 4 values used in virtual channel V1 the result range is splitted into 2 pages. To move between the pages please press the *page button*





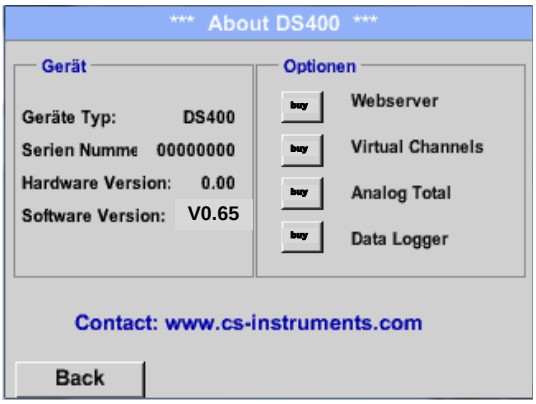
12.2.9 Analog Total (optional)

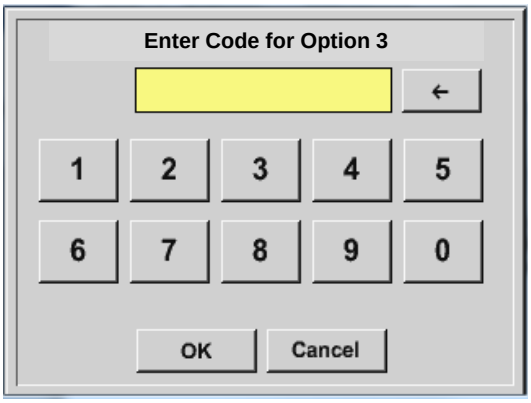
The Option „**Analog Total**“ offers the possibility of a consumption measurement also for sensors with analogen outputs e.g.: 0-1/10/30V and 0/4 – 20mA.

12.2.9.1 Option „Analog Total“ activation

After purchasing of the option „Analog Total“ the functionality has to be activated first.

Main menu ➔ Settings ➔ about DS 400





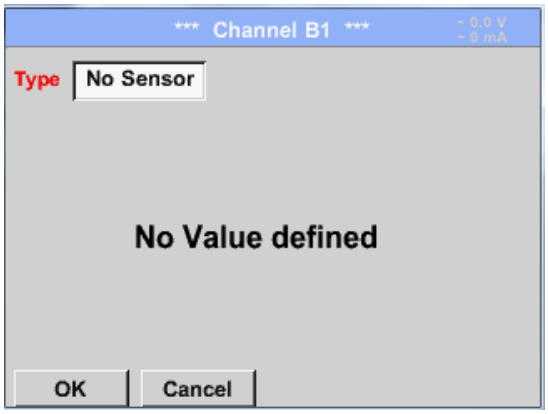
Please push the button *Buy* for „Analog Total“ and you will requested to insert the key-code received
.

Please enter the Key-Code in the text-field and activate the option by pushing the button *OK.*

12.2.9.2 Selection of sensor type

See also chapter 12.2.2.8 Configuration of analog sensors

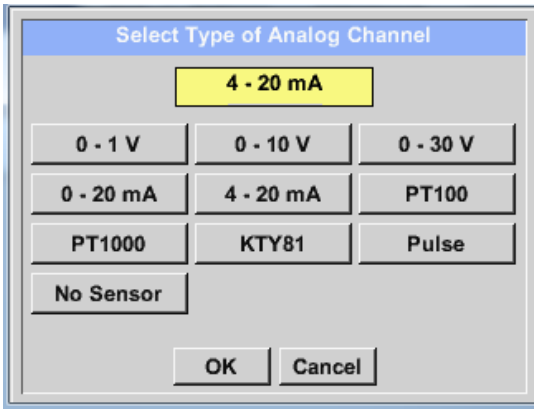
Main menu ➔ Settings ➔ Sensor Settings ➔ B1



If still no sensor has been configured, the *Type **No Sensor*** appears.

By pushing the description field *Type **No Sensor*** the list of sensor types appears (see next step).

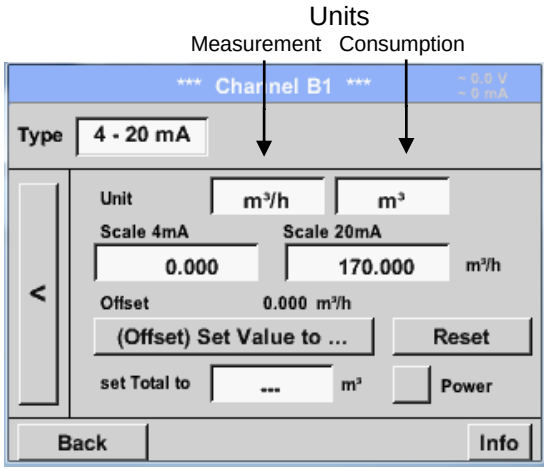
Main menu ➔ Settings ➔ Sensor Settings ➔ B1➔ Type description field



By pushing the button of the required sensor button e.g. 4 -20mA the sensor is selected. Pushing the button **No Sensor** will reset the selection.

Confirmation of selection is done by pressing the button **OK.**

Main menu ➔ Settings ➔ Sensor Settings ➔ B1➔ arrow right (2.page)



Selection of the units by pushing the text fields for the corresponding measurement and consumption units.
In addition, you can push the *scale buttons* for the min. and max. scaling values and set the measuring range.
Here we have *0 m³/h* for 4 mA and *170m³/h* for 20mA
In addition it si possible to enter a starting value for consumption entering *set Total to* field e.g. to take over value from an old counter.

Confirmation of the inputs by pushing button *OK*

Remark:

The textfield „Unit-Consumption“ is only editable in case of measurement values(Units) with volume per time unit and thus also the consumption calculation.

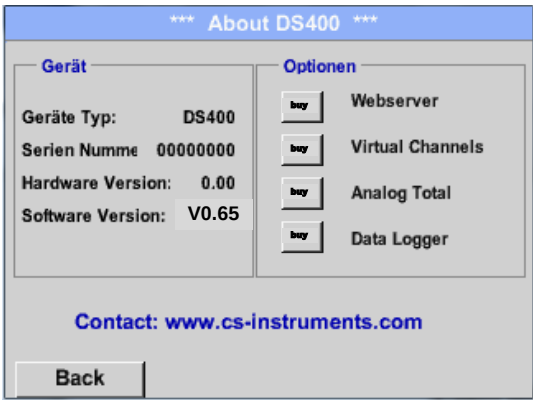
For labeling and setting of the description fields see also chapter 12.2.2.7 Label and set the description fields

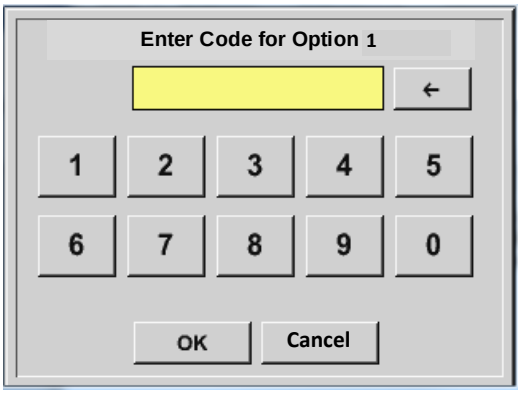
12.2.10 Webserver (optional)

After purchasing of the option „Webserver“ the functionality have to be activated first.

12.2.10.1 Option „Webserver“ activation

Main menu ➔ Settings ➔ about DS 400





Please push the button *Buy* for „Webserver“ and you will requested to insert the key-code received
.

Please enter the Key-Code in the text-field and activate the option by pushing the button *OK.*

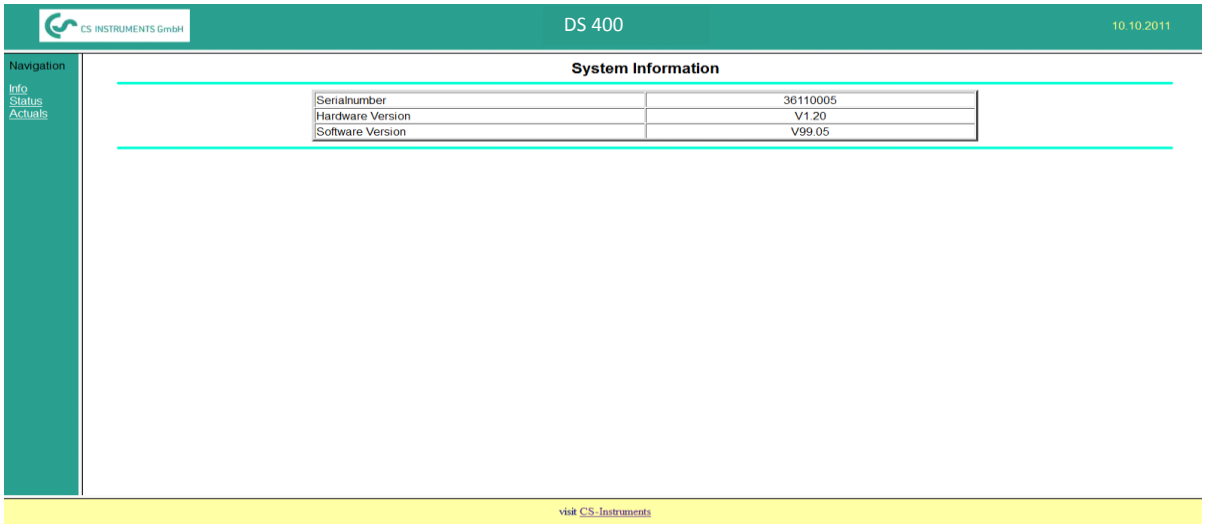
With an Internet-Explorer and the IP-address of your DS 400, you can check the following options worldwide:

http:// <IP-address of the DS 400>

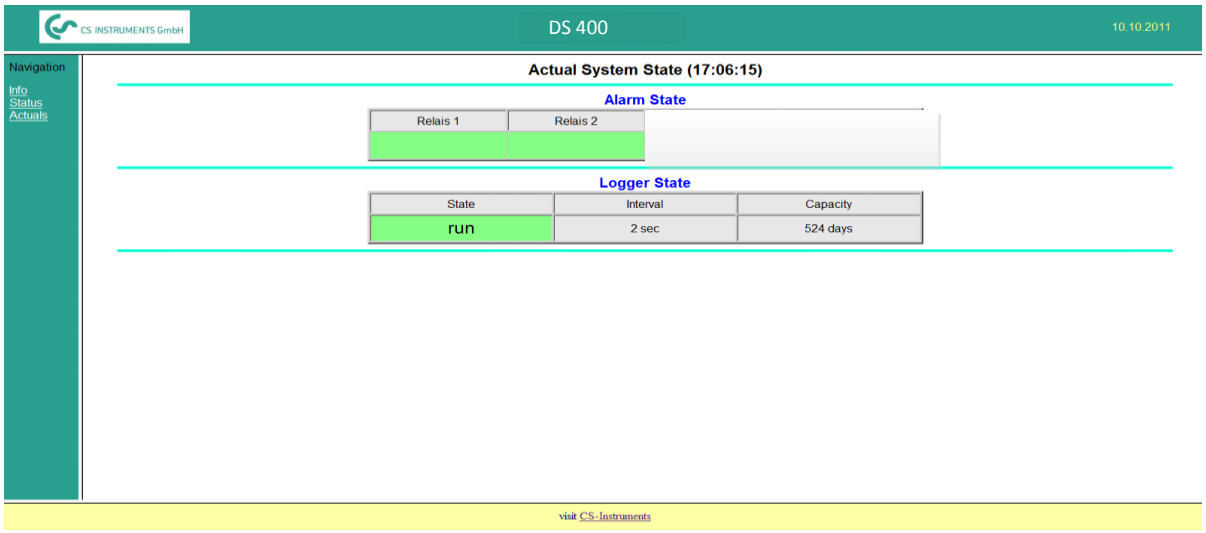
Remark:
The IP-address of the DS 400 yon can see in the chapters 12.2.7 System Status and 12.2.4.3 Network settings

Webserver

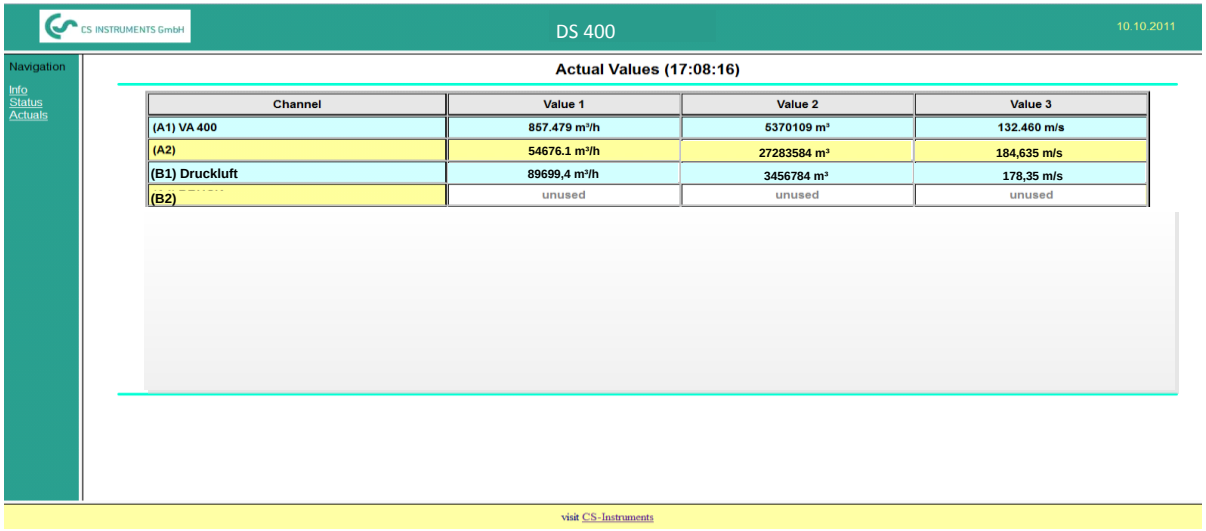
Info:



Staus:



Actuals:

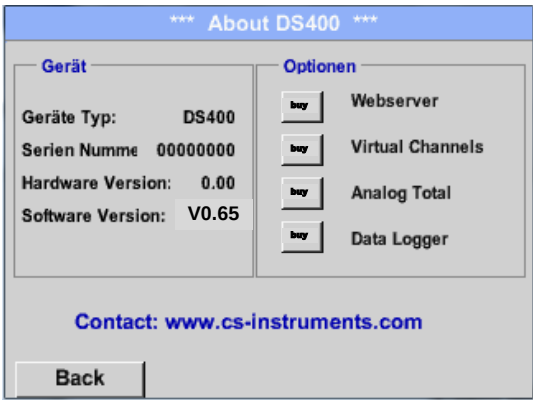


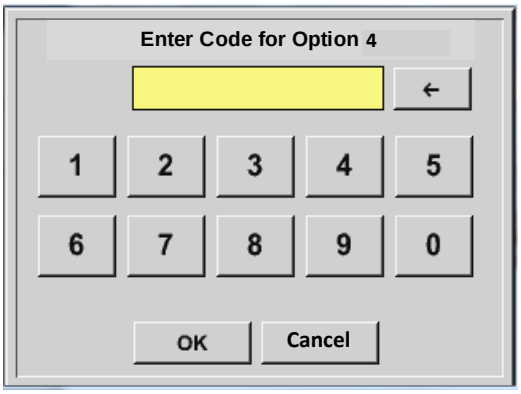
12.2.11 Data Logger (optional)

After purchasing of the option „Data logger“ the functionality have to be activated first.

12.2.11.1 Option „Data Logger“ activation

Main menu ➔ Settings ➔ about DS 400



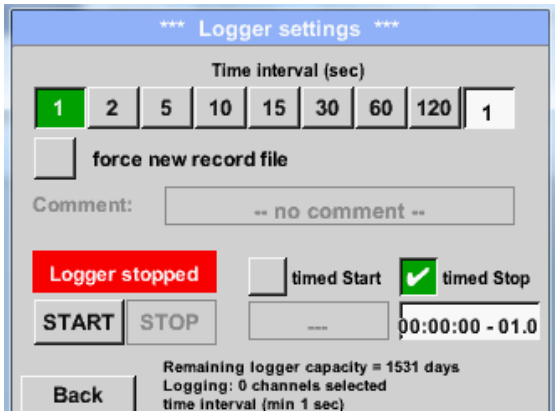


Please push the button *Buy* for „Data logger“ and you will requested to insert the key-code received
.

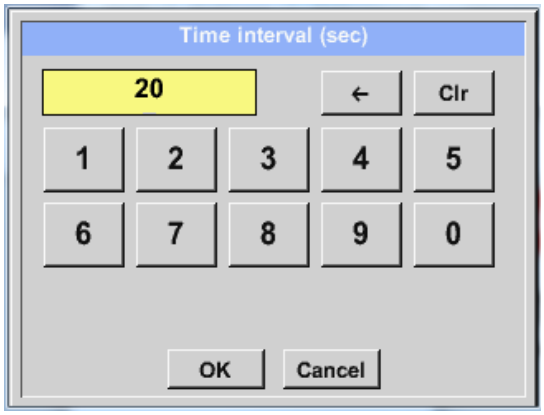
Please enter the Key-Code in the text-field and activate the option by pushing the button *OK.*

12.2.11.2 Data logger Settings

Main menu ➔ 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.

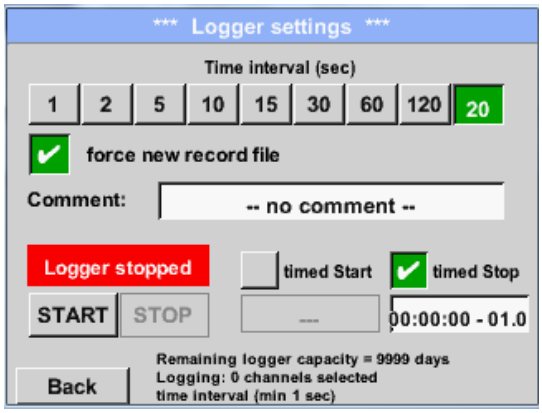
Remark:
The largest possible *Time interval* is 300 seconds.

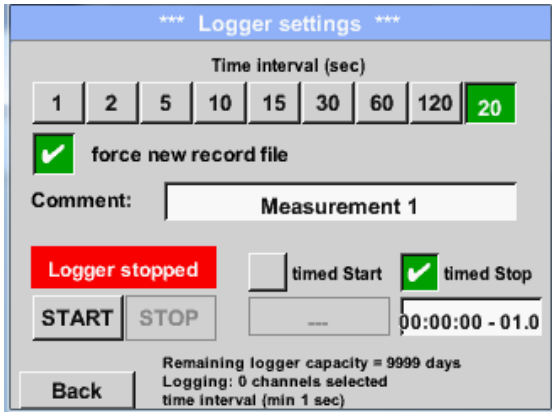
Remark:

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

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

Main menu ➔ Settings ➔ Logger settings ➔ force new Record File button
or
Main menu ➔ Settings ➔ Logger settings ➔ force new Record File button ➔ Comment description field



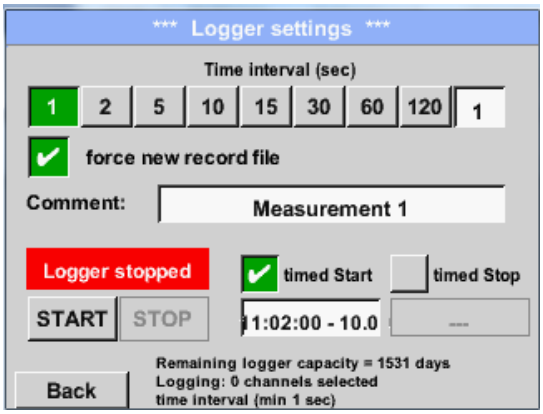


A new recording file will be created by pushing the *force new record file* button and a name or comment can be entered by the choice of the *Comment* description field.

<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.

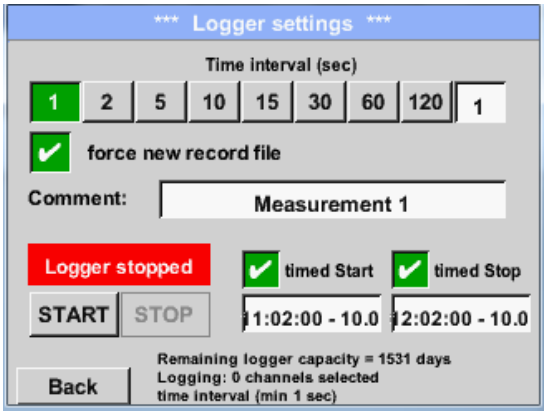
Main menu ➔ Settings ➔ Logger settings ➔ timed Start button



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.

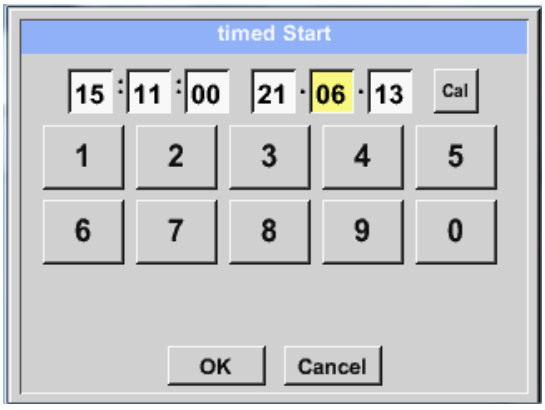
Main menu ➔ Settings ➔ Logger settings ➔ timed Stop button



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.

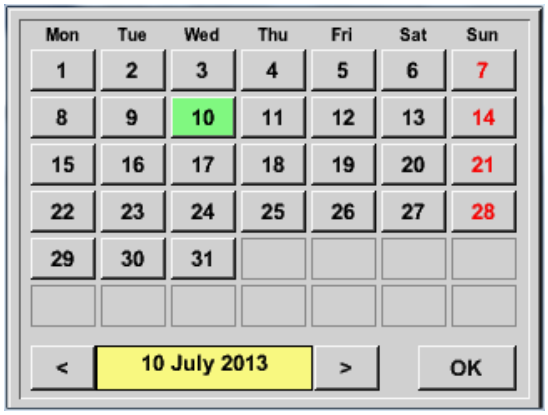
Remark:
If the stop time activated, it will automatically be set to the current time plus an hour.

Main menu ➔ 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.

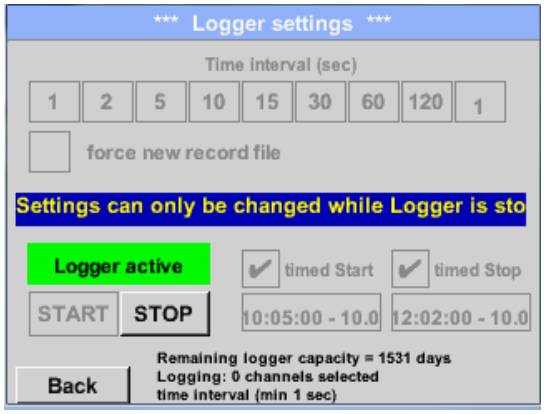
Main menu ➔ Settings ➔ Logger settings ➔ timed Start button/timed Stop button
➔ Date/Time description field ➔ Cal button



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

.

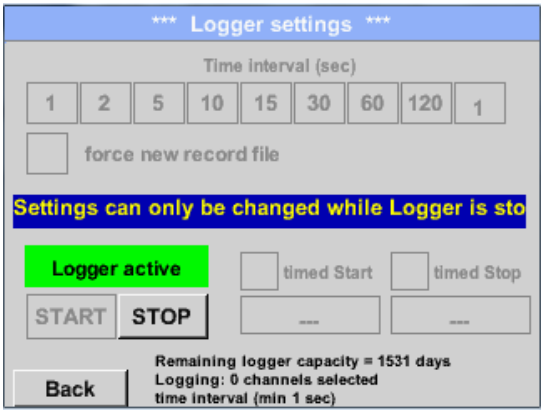
Main menu ➔ Settings ➔ Logger settings ➔ Start button



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!

Main menu ➔ 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:
The settings cannot be changed, if the data logger runs.

Important:

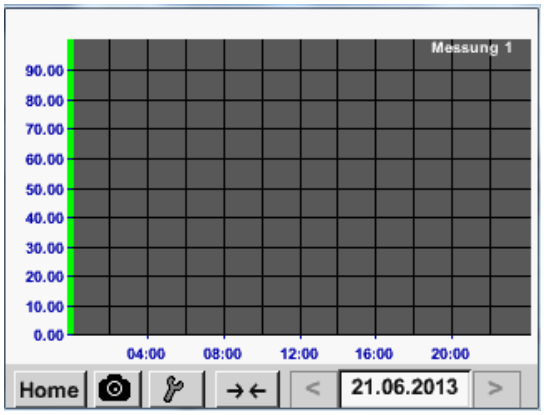
If a new recording file should be created, the *force new record file* button must be activated. Otherwise, the last applied recording file is used.

12.3 Chart

Main menu ➔ Chart

Attention:
In the *Chart* there can be represented only records that have already finished!

Current records can be seen in *Chart/Real time values*.
(See chapter 12.4 Chart/Real time values)

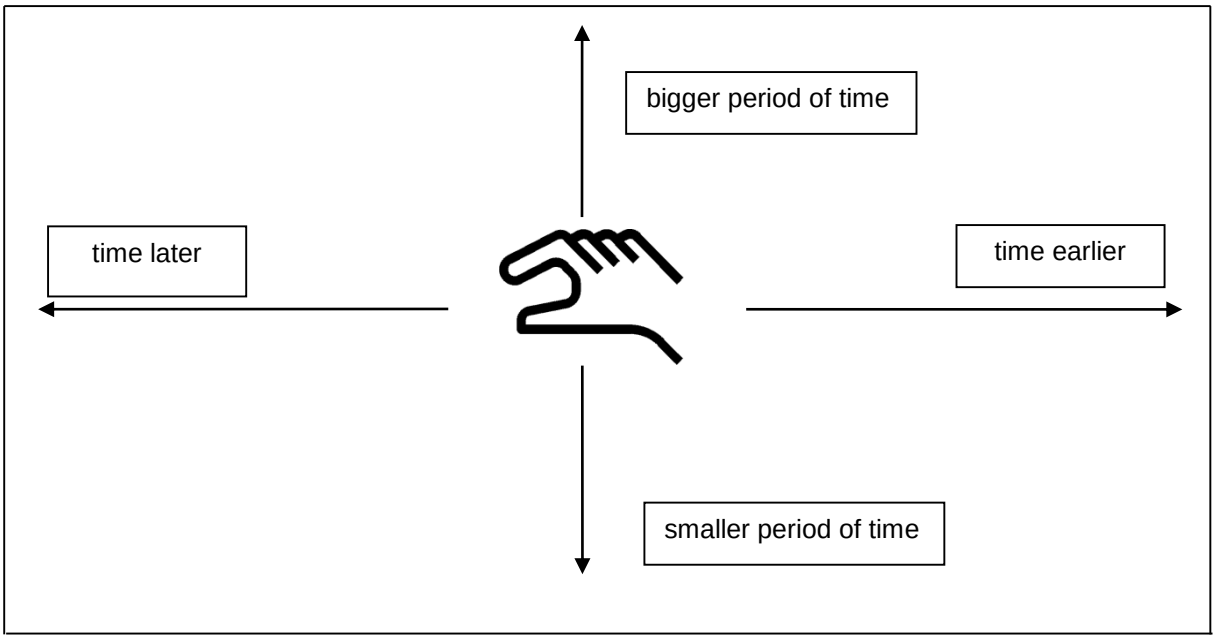


Running measurement, there are no values represented!

Zoom and scroll options in the time domain of the *Chart*:

→←	Maximal an entire day can be represented (24h).
←→	The smallest possible range is represented, depending on the time interval of the recording.

Additional zooming and scrolling options in *Chart* and *Chart/Real time values:*



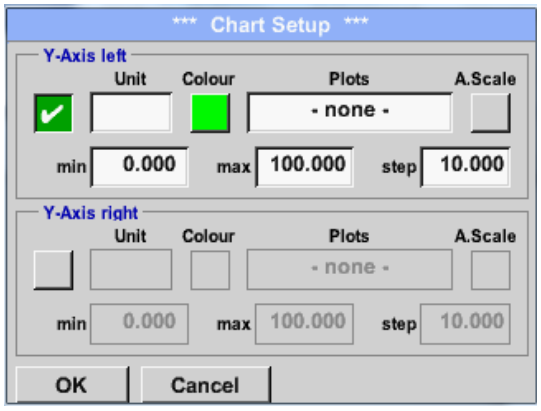
Main menu ➔ Chart ➔ Date description field

By pushing the date description field (center bottom) the calendar, from which the appropriate date can be selected conveniently, appears.

Stored measuring data can be select here by *time* (*START* and *STOP*), *Comment* and *File name* (contains English date).

Main menu ➔ Chart ➔ Setup

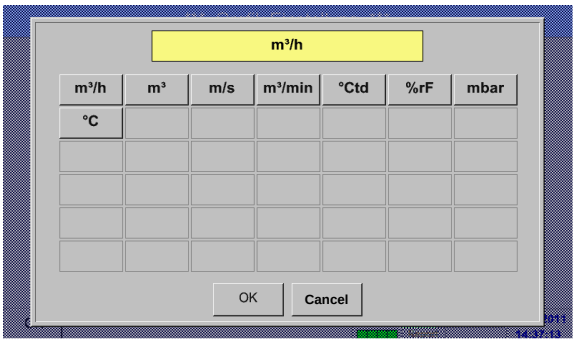
In the *Setup,* you can make up to four different y-axis labels and in addition choose a *Unit*, the grid (*min*, *max*, *step*) and several channels (*Plots*) and a *Colour*.



The y-axis *left.* is already enabled, you can choose a *Colour* for it.

Remark:
Grid setting is already possible at this point, but later when a record is selected it is more reasonable!

Main menu ➔ Chart ➔ Setup ➔ Unit description field



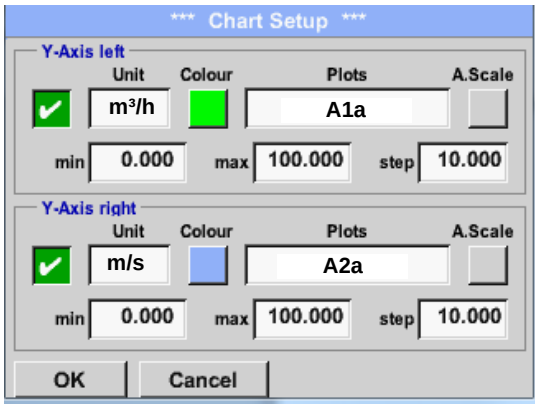
Select the *Unit* of the represented recording from the menu.

Main menu ➔ Chart ➔

Now, the grid can be set with *min*, *max*, and *step*.

By pushing the *A.Scale*-button a calculated auto-scaling will be defined.

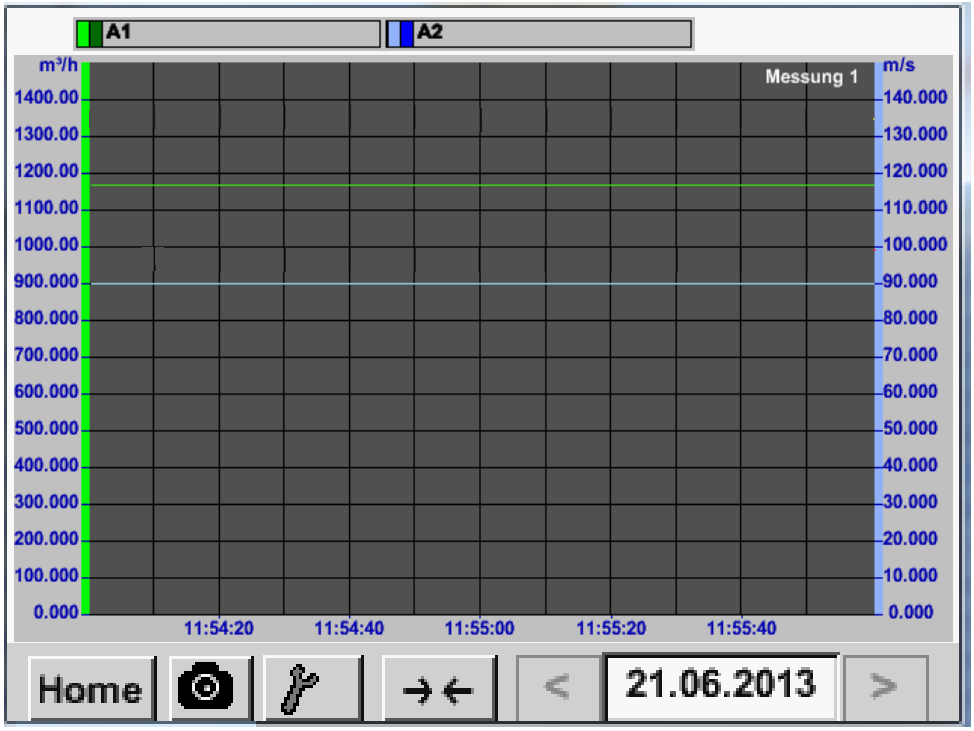
In the same way the remaining y-axes can be labelled!



Two different grid settings with various *Units* and *Colours*.

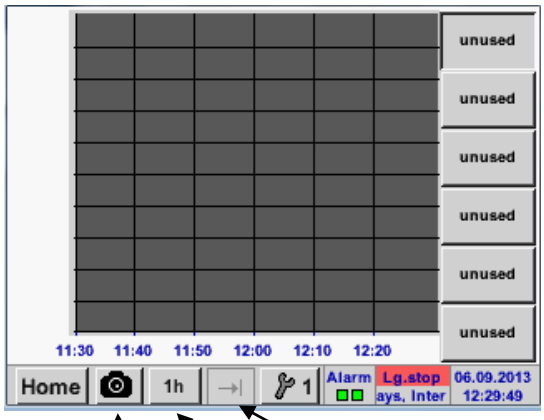
Hauptmenü ➔ Grafik

Chart


A1
A2
m³/h
m/s
Messung 1
1400.00
1300.00
1200.00
1100.00
1000.00
900.000
800.000
700.000
600.000
500.000
400.000
300.000
200.000
100.000
0.000
140.000
130.000
120.000
110.000
100.000
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.000
11:54:20
11:54:40
11:55:00
11:55:20
11:55:40
Home
<
21.06.2013
>

12.4 Chart / Real time values

Main menu ➔ Chart/Real time values



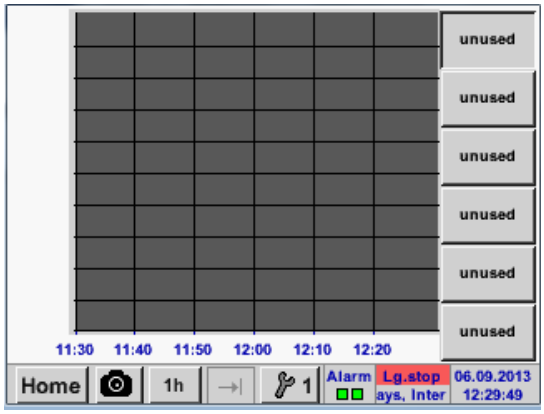
One or more channels for the recording and presentation of measured data can be selected here, such as a dew point sensor or several different sensors.

After pushing this button currently recorded measurement data in the current time range are represented.

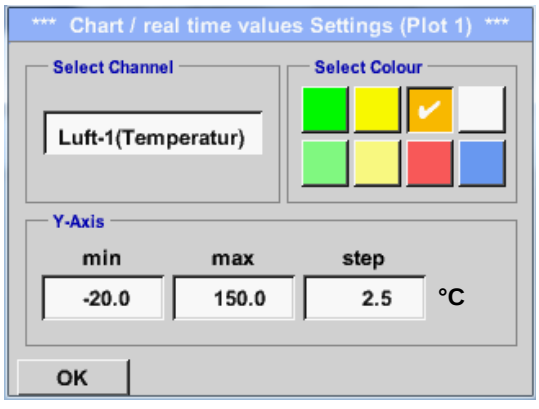
Quick access to predefined time periods 24 h, 8 h, 1 h, 15 min and 2 min. At the push of a button the chart for the selected time range is displayed.

Screenshot button for saving the screen on an USB Stick or SD Card.

Main menu ➔ Chart/Real time values ➔ #1- #6



In this menu item, up to twelve channels (depending on the version of the DS 400) can be activated at the same time and viewed in *Main ➔ Chart/Real time values*.

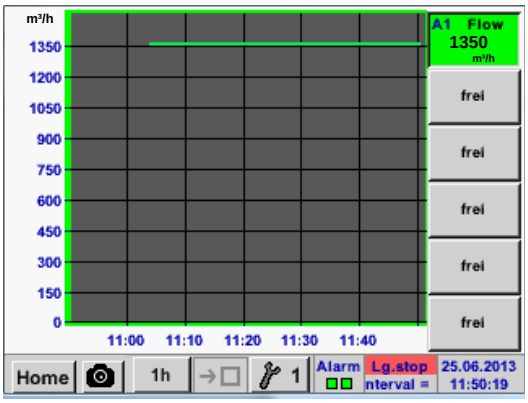


Here the channel A1 chosen.

For each channel, you can select a value to be represented in the *Chart* and one to display (2. values).

In addition, it can be set, like in *Main ➔ Chart*, a *colour* and the grid (*min*, *max*, *step*) of the y-axis.

Hauptmenü ➔ Grafik/aktuelle Werte



Channel A1:
Elected the flow as *Chart*
.

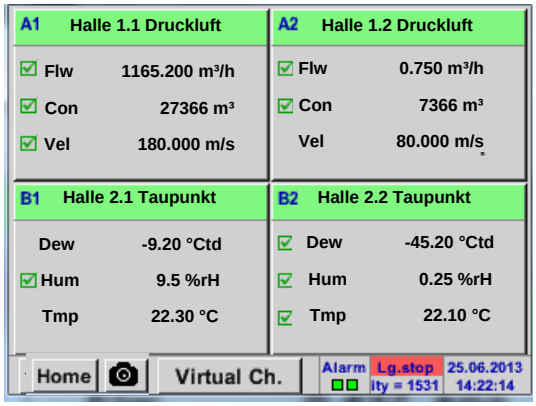
If several channels are logged, all charts will be displayed, but there is only the y-axis of the selected channel visible.

If there is no grid entered in the setup , *min* will be 0, *max* 100 and *step* 10

In the same way the remaining setups can be set!

12.5 Channels

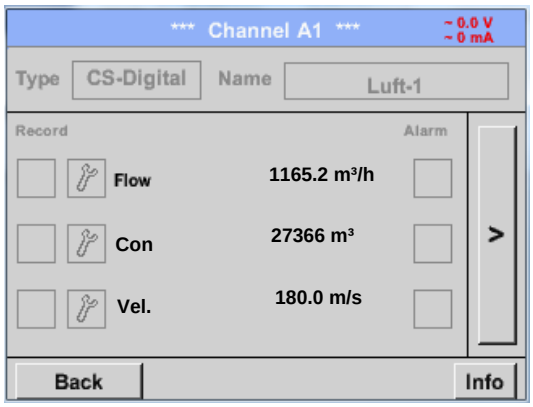
Main menu ➔ Channels



The overview of *Real time values* shows the current measured values of all connected sensors.

Exceeds or falls below the set alarm limits, the respective measured value flashes yellow (*alarm 1*) or red (*alarm 2*).

Main menu ➔ Channels ➔ A1

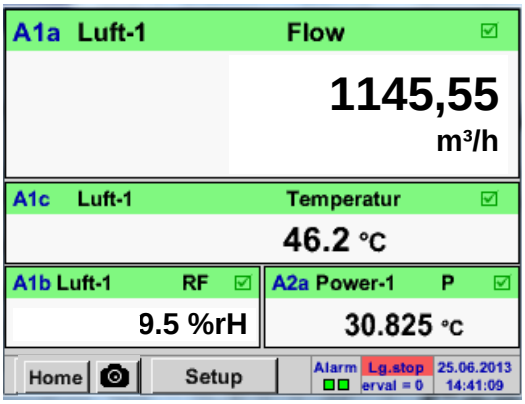


Each channel can be selected and the settings viewed and checked, but **no changes** can be made here.

Remark:
Please, make changes in the *Settings*!

12.6 Real time values

Main menu ➔ Real time values

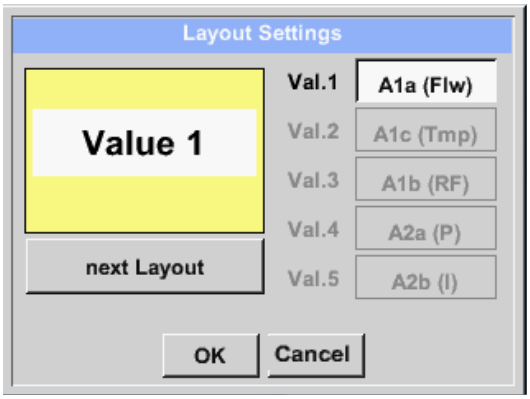


The view *Real time values* allows to display of 1 to 5 free definable measurement values.

By exceeding the upper- or lower alarm levels the respective measurement value flashes yellow for *Alarm-1* or red for *Alarm-2*.

Remark:
Changes for display settings have to be done in the *Setup* menu!

Main menu ➔ Real time values ➔ Setup ➔ next Layout

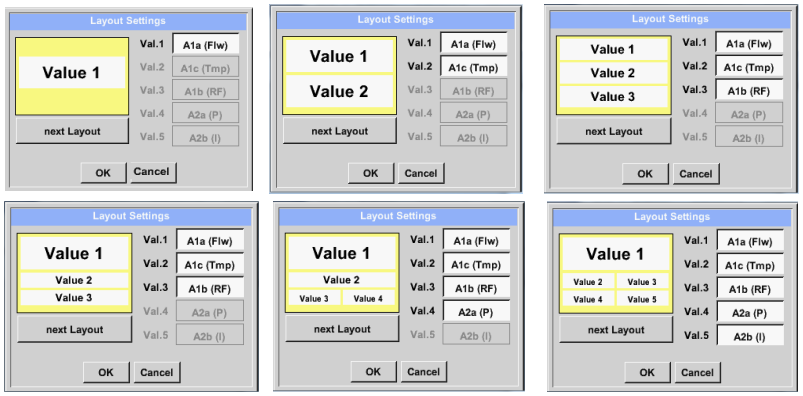


Here, by pressing *next Layout* –button it is possible to select the wanted layout.

You can choose between 6 different layouts showing 1-5 measurements. see below.

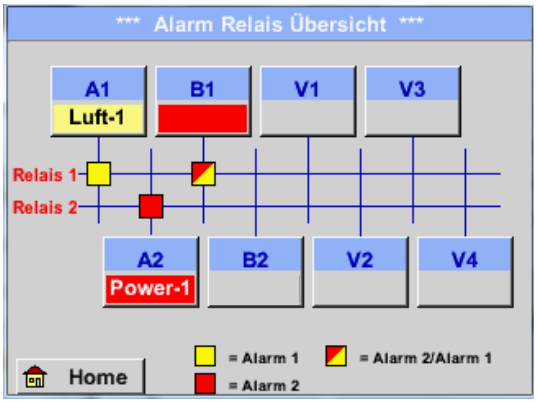
The values to be displayed could be selected in the *Val.1 to Val.5* description fields.

Different variantes :



12.7 Alarm-Overview

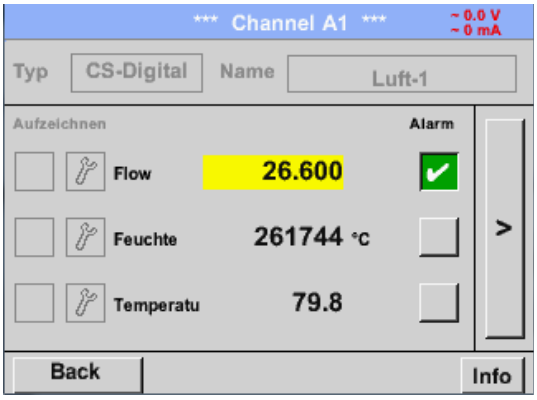
Main menu ➔ Alarm-Overview



In the Alarm overview, you can immediately see whether there is an *alarm 1* or *alarm 2*.
You can see also in other menu items:
Main ➔ Real time values and
Main ➔ *Settings* ➔ *Sensor settings*
The channel name will appear yellow invers (*alarm 1*) or inverse red (*alarm 2*).
In addition, you can see which relay had been set for the channel as the *alarm 1* or *alarm 2*.
This is indicated by the yellow and red or red/yellow squares on the intersections between measuring channel and relay.

Here *Alarm-1* for Channel A1 and *Alarm-2* for channel A2 and B1!

Main menu ➔ Alarm-Overview➔ A1



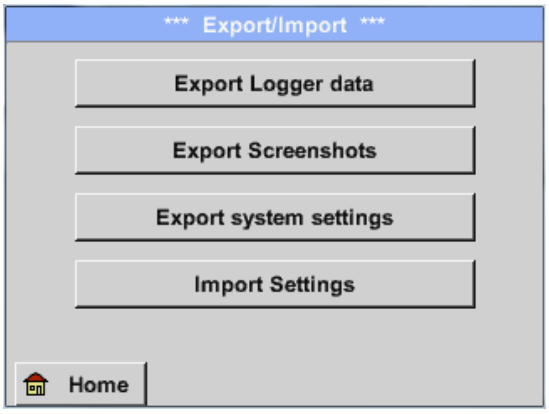
Like in *Main* ➔ *Real time values*, individual channels can be selected here,
to detect which and how much the value has exceeded or below the alarm range.

Remark:
The alarm parameters can be set and/or modified here.

12.8 Export /Import

Recorded data can be transferred to a USB stick, by using *Export/ Import*.

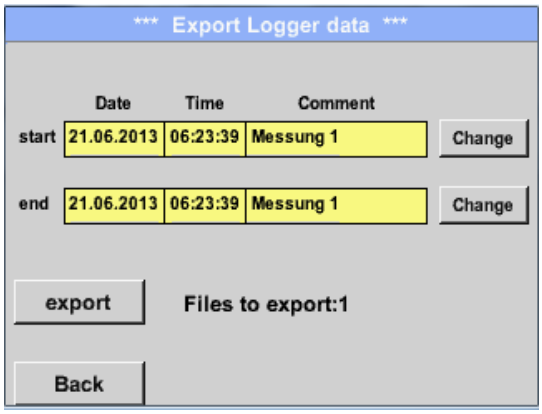
Main menu ➔ Export / Import



With *Export Logger data, Export Screenshots* and *Export system settings* the recorded measurement data, screenshots and saved settings can be transferred to a USB stick.

With *Import Settings* saved system settings could be imported from USB stick or SD card.

Main menu ➔ Export data ➔ Export Logger data

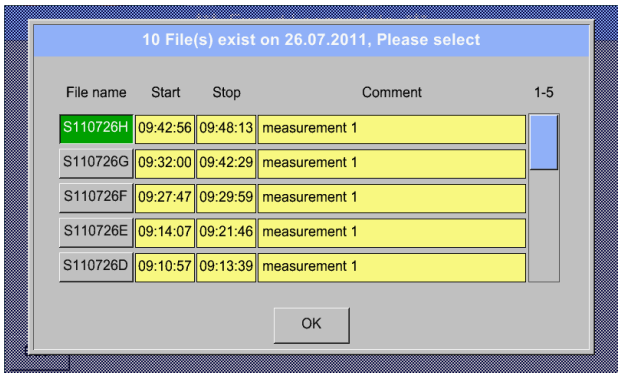


Use the *Change* buttons to adjust a period between *start* and *end*. Stored measurement data in this period are exported.

Main menu ➔ Export data ➔ Export Logger data ➔ Change

The selected date is always green, and the date numbers of the Sundays are red, like in the calendar.

On days, where measurement data were recorded, the date numbers are optical highlighted.



If there have been recorded several measurements on the same date, they appear after the date selection with *OK*.

Now a recording can be selected comfortable.

Main menu ➔ Export data ➔ Export Logger data ➔ export

The measurement data of the selected period are exported to a USB stick.

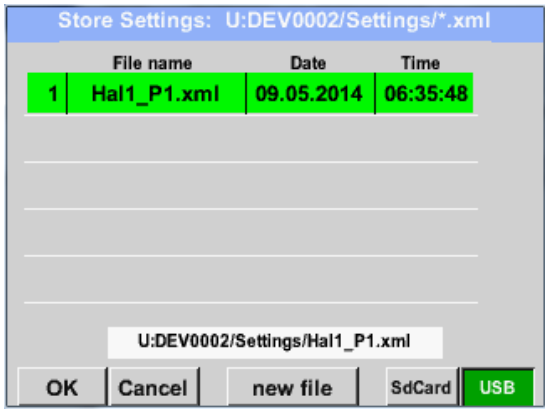
Main menu ➔ Export data ➔ Export system settings

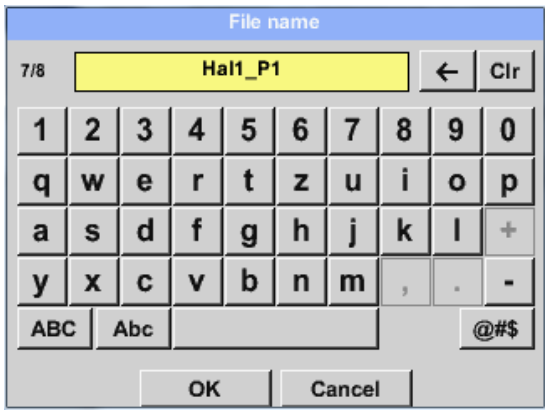
By using *Export system settings*, all existing sensor settings can be exported to a USB stick.

12.8.1 Export System Settings

Main menu ➔ Export/Import ➔ Export system settings

By using *Export system settings*, all existing sensor settings can be exported to a USB stick or SD-card.





All already saved system settings will be displayed, depending on the location USB Stick or SD-Card..

Location/ path is : DEV0002/Settings

In case an existing file will be selected the content will be overwritten with the new settings after confirming with OK .

New File storage:

Select the location for storing by pressing the button USB or SDCard.

By choosing button new file a menu for inserting/defining the filename appears.

The file name lenght is limited **to 8 chars**.

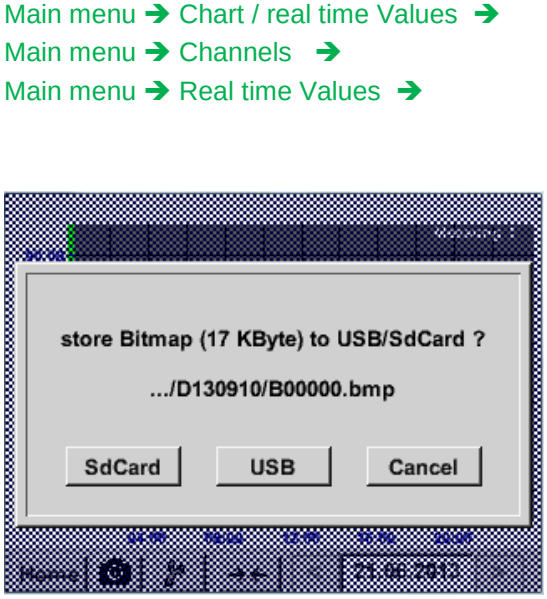
File save/confirm with: OK ➔ OK

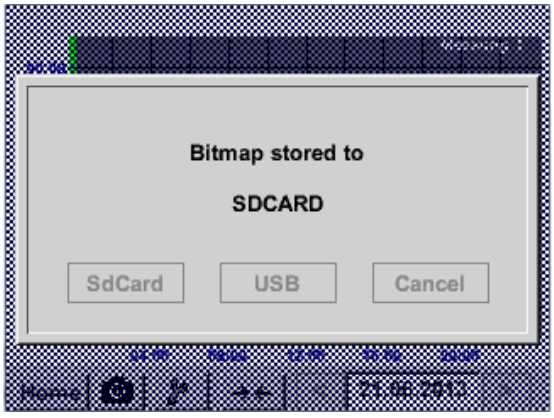
12.9 Screenshot function

This function allows you to store a copy of the screen of the menus Chart, Chart / Real time Values, Channels and Real time Values to a USB-Stick or SD-Card. Mainly foreseen to save not logged data.

12.9.1 Screenshot saving

Main menu ➔ Chart ➔
Main menu ➔ Chart / real time Values ➔
Main menu ➔ Channels ➔
Main menu ➔ Real time Values ➔





here, the location of USB stick or SD card can be selected.

Screenshots are stored in directories defined per day and here numbered consecutively.

Directory naming; DYYMMTT
D=fix(für Date)
YY = Year
MM= Month
TT= Day

Path: DEV0002/Hostname/Bitmap

For Hostname see
Main menu ➔Settings➔System Status

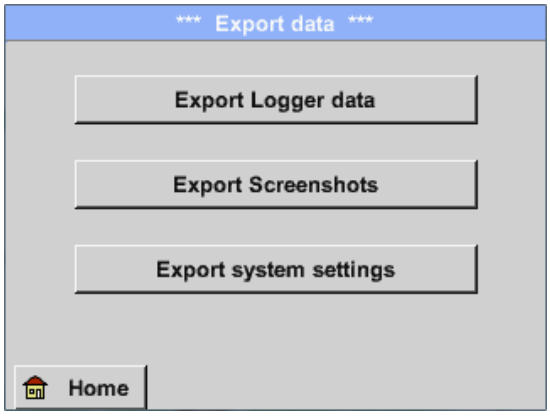
Example: first Screenshot 10. September 2013

\\DEV0002/DE-4001/Bitmap/D130910/B00000.bmp

12.9.2 Screenshots export

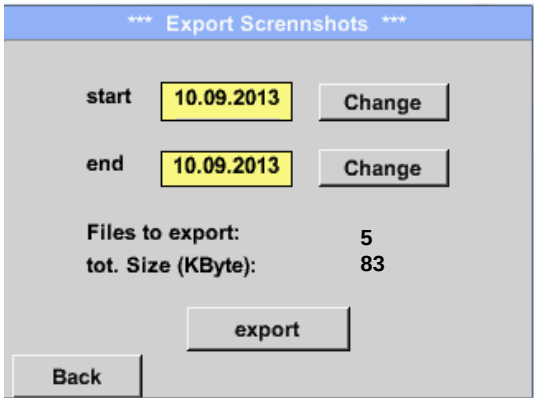
The screenshots stored on the SD card can be exported to a USB stick

Main menu ➔ Export Data



With *Export Screenshots* the recorded screenshots data can be transferred to a USB stick.

Main menu ➔ Export Data ➔Export Screenshots



Use the *Change* buttons to adjust a period between *start* and *end*. Stored bitmaps data in this period are exported.

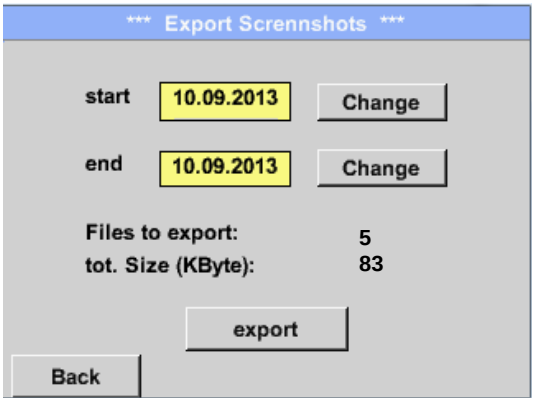
Main menu ➔ Export Data ➔ Export Screenshots ➔ Change

The selected date is always green, and the date numbers of the Sundays are red, like in the calendar.

On days, where measurement data were recorded, the date numbers are optical highlighted.

Screenshot export

Main menu ➔ Export Data ➔ Export Screenshots ➔ Export



The screenshots of the selected period are exported to a USB stick.

Version: 30/07/2014, V1.23

CS Instruments GmbH

Konformitätserklärung

Multi-Messgerät **DS 400**

Die CS Instruments GmbH als Hersteller erklärt hiermit, dass o.g. Messgerät den Anforderungen folgender Richtlinien entspricht:

Elektromagnetische Verträglichkeit	**2004/108/EG**
Niederspannungsrichtlinie	**2006/95/EG**

Zur Beurteilung des Gerätes wurden folgende Normen herangezogen:

Elektromagnetische Verträglichkeit

Störaussendung:	**EN 61326-1: 2013-07** **EN 61000-3-2 : 2006-10**
Störfestigkeit:	**EN 61326-1: 2013-07**

Niederspannungsrichtlinie

Sicherheit	**EN 61010-1: 2010-06**

Anbringungsjahr der CE-Kennzeichnung: 13

Das Produkt ist mit dem abgebildeten Zeichen gekennzeichnet CE

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Tannheim , 23.August 2013

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