![bürkert FLUID CONTROL SYSTEMS]

Instruction manual
Flow / consumption Sensor
Type 8008

I. Foreword

Dear customer,

thank you very much for deciding in favour of the Type 8008. 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 Type 8008 are only guaranteed in case of careful observation of the described instructions and notes

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II. Table of Content

1 Pictograms and Symbols

General Warning symbol (Danger, Warning, Caution)

General note

Installation- and Instruction manual to consider (on Nameplate)

Installation- and Instruction manual to consider

2 Signalwords according ISO 3864 and ANSI Z 535

Danger!   Imminent danger
As a consequence of incorrect handling: serious personal injury or death

Warning!   Possible harzard
As a consequence of incorrect handling: possible serious injury or death

Caution!   Imminent hazard
As a consequence of incorrect handling: possible personal injury or damage

Note!   Possible harzard
As a consequence of incorrect handling: possible personal injury or damage

Important!   Additional notes, information, tips
As a consequence of incorrect handling: Disadvantages in operation and maintenance, no danger

3 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

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

This instruction manual has to be available at any time at the operation site of the DS 500.

Ensure that the Type 8008 operates within the permissible and listed limits on the nameplate. Otherwise there is a risk to human and material, and it may occur functional and operational disturbances

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

Warning!
Risk of injury in case of inadequate qualification!
Improper handling can result in significant personal injury and damage.
All activities described in this operating instructions manual must be carried out only by qualified personnel qualifications described below.

Professionals (Technical staff)

The technical staff is based on his education/training, his knowledge of measurement and control technology as well of the local regulations, standards and guidelines in the position to do the work as described and to identify the possible hazards.

Special working conditions require further appropriate knowledge, e.g. of aggressive media.

Caution!

Malfunction of Type 8008

Faulty installation and insufficient maintenance may lead to malfunctions of the Va 570, which may affect the display and open to misinterpretation.

Danger!

Inadmissible operating parameters!

By exceeding or falling short of limits there is a risk for people and material, in addition there may occur further functional and operational disturbances.

Measures:

- Make sure that the Type 8008 operates only within the permissible and listed limits on the nameplate
- Ensure the operation within the performance data of Type 8008 in connection with the application
- Do not exceed the admissible storage and transportation temperature.

Additional safety information:

- When installing and operating the relevant national regulations and safety rules must also be observed.

3.1   Intended Use

The instrument described in this manual is exclusively to use for measuring the thermal mass flow of gases. At the same time, the gas temperature is measured too.
The Type 8008 can be configured for measuring a predetermined range of pure gases or of gas mixtures.

Improper or incorrect use the operational reliability will be canceled. The manufacturer is not liable for any damage resulting by improper or incorrect use.

3.2   Installation and commissioning

- Installation, electrical installation, commissioning, operation and maintenance of the device must only be carried by qualified personnel, which were authorized by the plant operator.
  The personnel must read the operating instructions and understand and follow their instructions.

- If carrying out welding work on the pipeline the grounding of the welding unit is not allowed to be done over the Type 8008 itself.

- The installer has to ensure that the Type 8008 is connected according to the electrical connection diagrams properly. The sensor must be grounded, unless special protective measures have been taken (e.g. galvanically isolated power supply)

- The existing/ applicable national regulations governing opening and repair of the device have to be applied.

- The device fulfills the general safety requirements in accordance with EN 61010-1, the EMC requirements of IEC / EN 61326 and NAMUR recommendation NE 43.

4 Technical data

Measures:	mass flow, consumption flow speed, temperature
Measuring principle:	thermal mass flow sensor
Medium temperature range:	-40 ... 180°C Probe
Operating temperature range:	-20 ... 70 °C
Operating pressure:	50 bar
Power supply:	18 … 36 VDC
Power consumption:	max. 5W
Output:	Modbus RTU (acc. EIA/TIA-485 Standard) 2 x 4...20 mA active (optional passive) RL < 500Ohm galvanically isolated pulse (Pulse weight freely selectable, Alarm max. 48Vdc 0,5A, optional: Modbus TCP, HART, ProfibusDP, Profi Net,
Accuracy: Standard version* (m.v. of meas. value) (f.s. of full scale)	± 1,5 % m.v. ± 0,3 % f.s.
Accuracy indications:	referred to ambient temperature 22°C +/-2°C, system pressure 6bar
Response time:	t90 < 3s
Display:	**2**" TFT Color Display (320 x 240)
Screw in thread:	G 1/2" ISO 228, NPT 1/2", R 1/2", PT 1/2"
Material:	Housing aluminum die cast, probe stainless steel1,4571
Protection class	IP67

* Reference conditions for Temperature and pressure can be freely set, standard conditions are 0 ° and 1013 mbar.

4.1 Signal circuits

4.1.1 Modbus

- According Standard EIA/TIA-485

4.1.2 Current output

4.1.2.1 Aktive

- Galvanically isolated
- 4 … 20 mA
- R_L < 500 Ohm

4.1.2.2 Passive

- Galvanically isolated
- 4 … 20 mA
- R_L < 500 Ohm
- Vin 12-36Vdc

4.1.3 Pulse

- Galvanically isolated (dry contact)
- Passive: 48Vdc , 500 mA
- Max. pulse output freq. 50Hz

4.1.4 Alarm

- Galvanically isolated (dry contact)
- Max. 48Vdc, 500mA

4.2 Measuring range flow Type 8008

|		1/4"	1/2"	3/4"	1"	1 ¼"	1 ½"	2"	2 ½"	3"
		Analog output 20mA	Analog output 20mA	Analog output 20mA	Analog output 20mA	Analog output 20mA	Analog output 20mA	Analog output 20mA	Analog output 20mA	Analog output 20mA
		l/min	[m³/h]	[m³/h]	[m³/h]	[m³/h]	[m³/h]	[m³/h]	[m³/h]	[m³/h]
Reference DIN1945/ ISO 1217: 20°C, 1000 mbar (Reference during calibration)										
Air	Low Speed	25	20	45	75	140	195	320	550	765
	Standard	50	45	85	145	265	365	600	1025	1420
	Extended	105	90	175	290	530	730	1195	2050	2840
	Maximum	130	110	215	355	640	885	1450	2480	3440
Adjustment to DIN 1343: 0°C, 1013,25 mbar										
Air	Low Speed	25	20	40	70	130	180	295	505	705
	Standard	50	40	80	135	240	335	550	945	1305
	Extended	100	80	160	270	485	670	1100	1885	2610
	Maximum	120	100	195	325	590	815	1330	2280	3165
Argon (Ar)	Low Speed	45	35	75	120	220	305	505	865	1200
	Standard	85	70	135	230	415	570	935	1605	2225
	Extended	170	140	275	460	830	1140	1870	3205	4440
	Maximum	205	170	335	555	1005	1385	2265	3880	5380
Carbon dioxide (CO₂)	Low Speed	25	20	45	75	140	195	320	545	760
	Standard	50	45	85	145	260	360	590	1015	1405
	Extended	105	90	175	290	525	720	1185	2030	2810
	Maximum	130	105	210	350	635	875	1430	2455	3405
Nitrogen (N₂)	Low Speed	25	20	40	70	130	180	295	505	705
	Standard	50	40	80	135	240	335	550	945	1305
	Extended	100	80	160	270	485	670	1100	1885	2610
	Maximum	120	100	195	325	590	815	1330	2280	3165
Oxygen f (O₂)	Low Speed	25	20	45	75	135	185	305	525	730
	Standard	50	40	80	140	250	345	570	980	1355
	Extended	100	85	165	280	505	695	1140	1955	2710
	Maximum	125	105	205	340	610	845	1380	2365	3280
Nitrous oxide (N₂O)	Low Speed	25	20	45	75	140	190	315	540	750
	Standard	50	40	85	140	260	355	585	1005	1395
	Extended	105	85	170	285	520	715	1170	2010	2785
	Maximum	125	105	210	345	630	865	1420	2435	3375
Natural gas (NG)	Low Speed	15	15	25	45	85	115	190	325	450
	Standard	30	25	50	85	155	215	355	605	840
	Extended	60	50	105	170	310	430	705	1210	1680
	Maximum	75	65	125	210	380	520	855	1465	2035

Other gases on request

[2] Referred to DIN 1945/ ISO 1217 (20°C 1000mbar) and compressed air
[3] Adjusted to DIN 1343: 0°C, 1013mbar

5 Dimensions

5.1 Dimension Type 8008 Thread-version
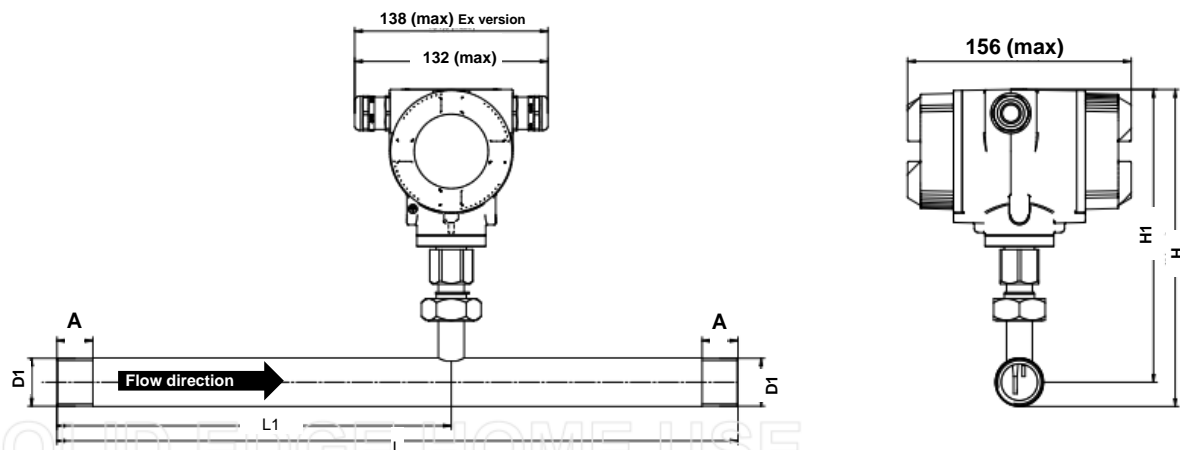
Type 8008 thread version							
Connection thread	Outer pipe dia. [mm]	Inner pipe dia. [mm]	L [mm]	L1 [mm]	H [mm]	H1 [mm]	A [mm]
1/2"	21,3	16,1	300	210	176,4	165,7	20
3/4"	26,9	21,7	475	275	179,2	165,7	20
1"	33,7	27,3	475	275	182,6	165,7	25
1 1/4"	42,4	36	475	275	186,9	165,7	25
1 1/2"	48,3	41,9	475**	275	189,9	165,7	25
2"	60,3	53,1	475**	275	195,9	165,7	30

** Attention: Shortend inlet section! Please observe the recommended minimium inlet section (lenght = 10x inner diameter)

5.2 Dimension Type 8008 Flanged-version
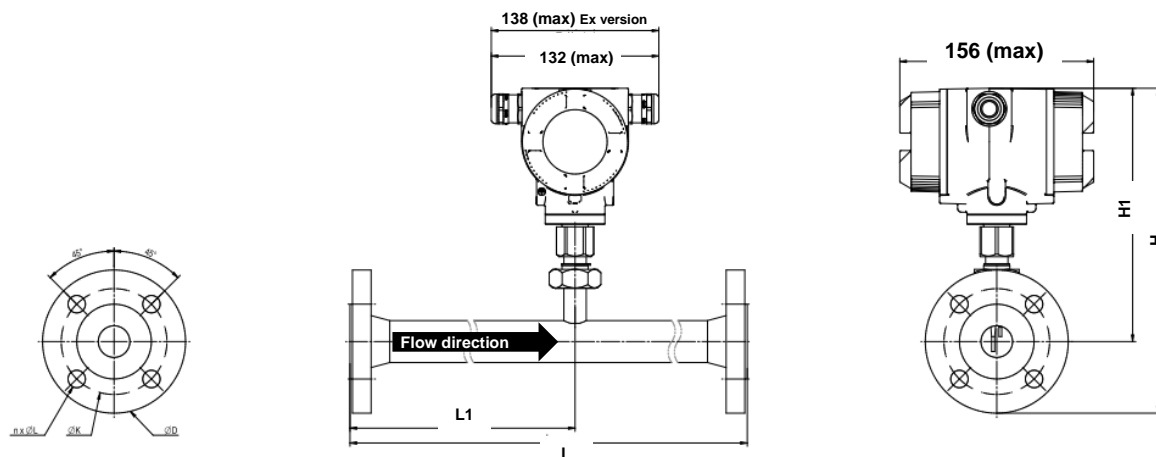
| VA 570 flanged version									
							Flange DIN EN 1092-1		
Measuring section	**Outer pipe dia. [mm]**	**Inner pipe dia. [mm]**	**L [mm]**	**L1 [mm]**	**H [mm]**	**H1 [mm]**	**ØD [mm]**	**ØK [mm]**	**n x ØL**
DN 15	21,3	16,1	300	210	213,2	165,7	95	65	4 x 14
DN 20	26,9	21,7	475	275	218,2	165,7	105	75	4 x 14
DN 25	33,7	27,3	475	275	223,2	165,7	115	85	4 x 14
DN 32	42,4	36	475	275	235,7	165,7	140	100	4 x 18
DN 40	48,3	41,9	475**	275	240,7	165,7	150	110	4 x 18
DN 50	60,3	53,1	475**	275	248,2	165,7	165	125	4 x 18
DN 65	76,1	68,9	475	275	268,2	175,7	185	145	8 x 18
DN 80	88,9	80,9	475	275	275,7	175,7	200	160	8 x 18
** Attention: Shortened inlet section! Please observe the recommended minimum inlet section (length = 10x inner diameter)									

6 Installation

6.1 Pipe/tube requirements

- Correctly sized gaskets
- Correct aligned flanges and gaskets
- Diameter mismatch at the pipe junctions should be avoided but must be less than 1mm. For further information see ISO 14511
- Ensure clean pipes after installation

6.2 Inlet / outlet runs

The principle of thermal Mass flow measurement is very sensitive against disturbances. Therefore, it is necessary to ensure the recommended inlet and outlet runs.

Table Inlet / Outlet runs

Flow obstruction before the measurement section	Min length Inlet run (L1)	Min length Outlet run (L2)
Slight curve (ellbow < 90°)	**12 x D**	**5 x D**
Reduction (Pipe narrows to the measurement section)	**15 x D**	**5 x D**
Expansion (Pipe expands to the measurement section)	**15 x D**	**5 x D**
90° ellbow or T-piece	**15 x D**	**5 x D**
2x ellbow á 90° in einer Ebene	**20 x D**	**5 x D**
2x ellbow á 90° 3-dimensional	**35 x D**	**5 x D**
Control valve	**45 x D**	**5 x D**
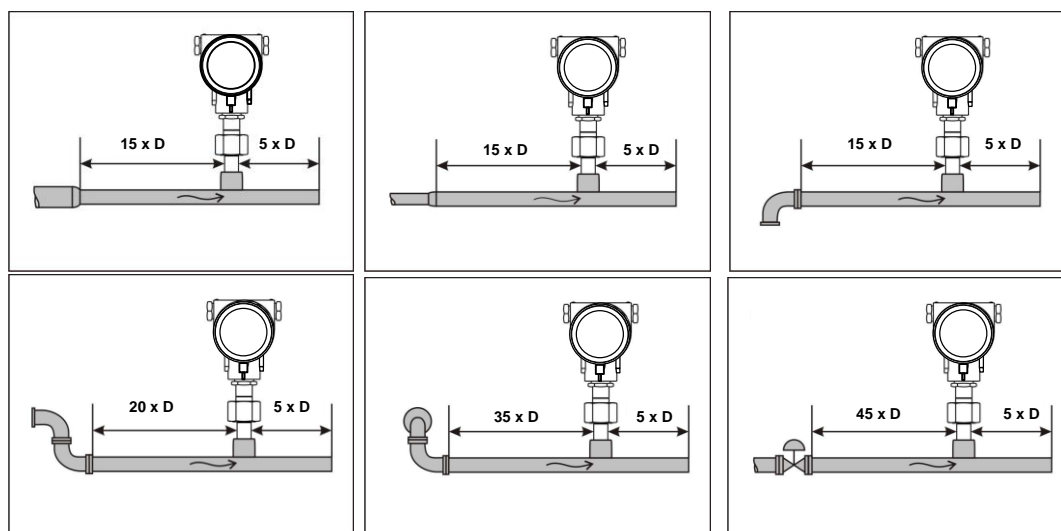
The values represent the min.lenghts. In case the min. inlet / outlet runs could not be ensured, it must be expected to get increased or significant d
eviations of the measurement values.

Type 8008 English V1.17

6.2.1 Installation of Type 8008

The sensor Type 8008 is pre-supplied with the measuring section.

⚠️ An installation at customer site is only allowed in the unpressurized state of the system
The connecting nut is tightened to a torque of 25 -30 Nm.
Tightness of the connection must be checked and ensured.

Important: **Please check flow direction, see therefore label on measuring section and pictures of chapter 5.1 and chapter 5.2**

6.3 Alignment Display (Housing)

The sensor housing Type 8008 can be turned in both directions, max. 345 °. For this purpose, the housing-connecting nut must be opened. The housing can be rotated to the desired position, a bigger rotaion angle is prevented by internal stop pins.
After that, the housing-connecting nut is firmly retighten

Housing connection nut
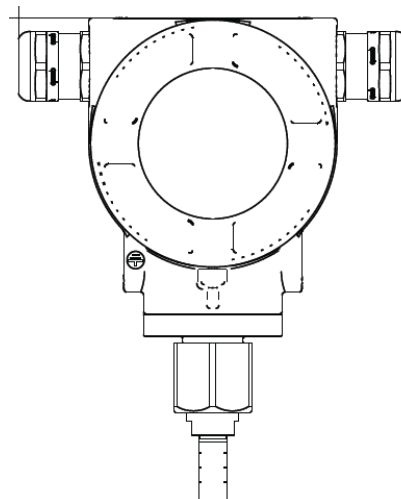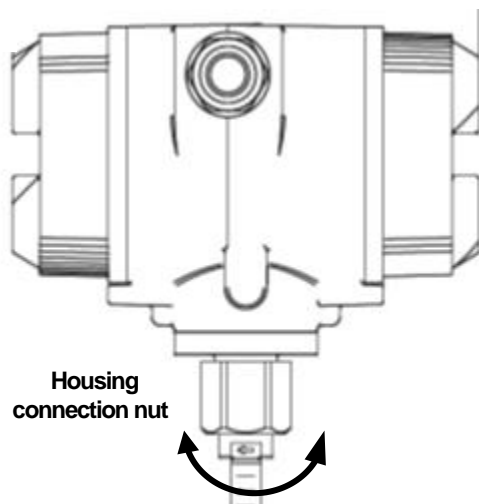
⚠️ **Loosen the housing connection nut only, do not unscrew it completely!**

6.4 Tightening torques

To secure and guarantee of the function and tightness following tightening torques have to be applied, see table 1.

Table 1

| Pos	Description	Tightening torque [Nm]
20	Type 8008 Cover with glass	3
30	Type 8008 Cover closed	3
50	Grub screw with hexagon socket M4x6 DIN 914 A2	2
130	Type 8008 Nut	15
150	Cylinderhead screw DIN 6912 - M5x10 A2-70	4
240	V-MS-Ex-d 1 875 2000 50 2 03	8
250	RN16M20KNP	8

7 Connection diagram

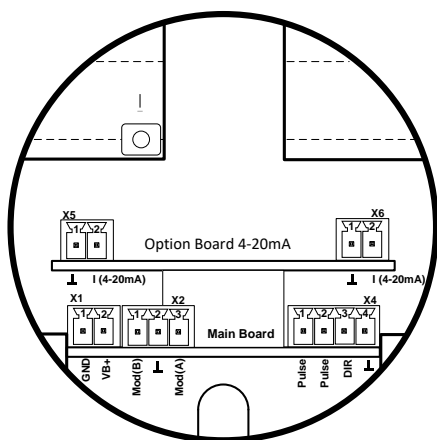## 7.1 Cable glands - clamping ranges

For ensuring the tightness and strain relief, connector cables with the following diameters must be used.

Type 8008 clamping range :   Ø5-9mm

7.2 Connector pin assignment
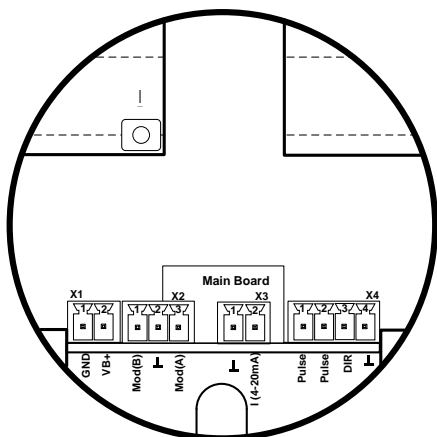
 Standard version with 1x analogue output (not galvanically isolated)

 Version with option board 2x analogue outputs galvanically isolated

| Connector	Pin	Signal description
X1 Power supply	1	VB - (GND)
	2	VB+ (12V – 36 Vdc)
X2 Modbus	1	Modbus (B)
	2	Modbus shield
	3	Modbus (A)
X3 urrent output	1	I- Active
	2	I+ Active
X4 Direction / Pulse	1	Pulse / Alarm *
	2	Pulse / Alarm *
	3	Direction input
	4	GND
X5 Current output 1	1	I- Active**
	2	I+ Active**
X6 Current output 2	1	I- Active**
	2	I+ Active**

* Outputs are galvanically isolated.

** The Current outputs, X5 and X6, are optional as passive output available too.

7.3 Wire cnnection

7.3.1 General:

- Wiring to be done in strainless state only.
- Length of cable skinning to be minimized
- Not used cable entries must be closed with end caps
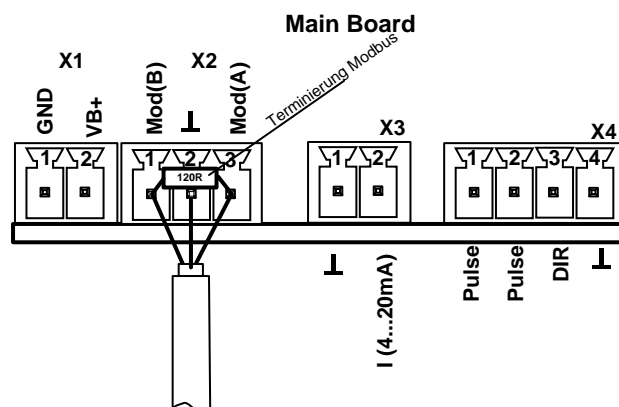- Use of cables with cross section of >= 0.25mm²
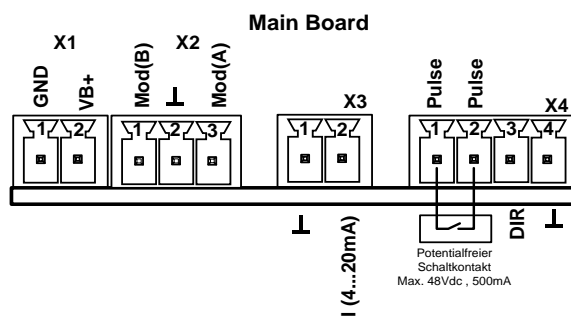
7.3.2 Power supply

Main Board
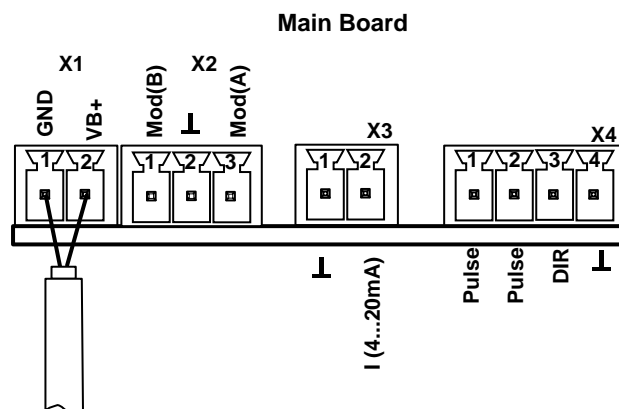
7.3.3 Modbus (termination):

If the sensor placed at the end oft he Modbus system a termination is required.

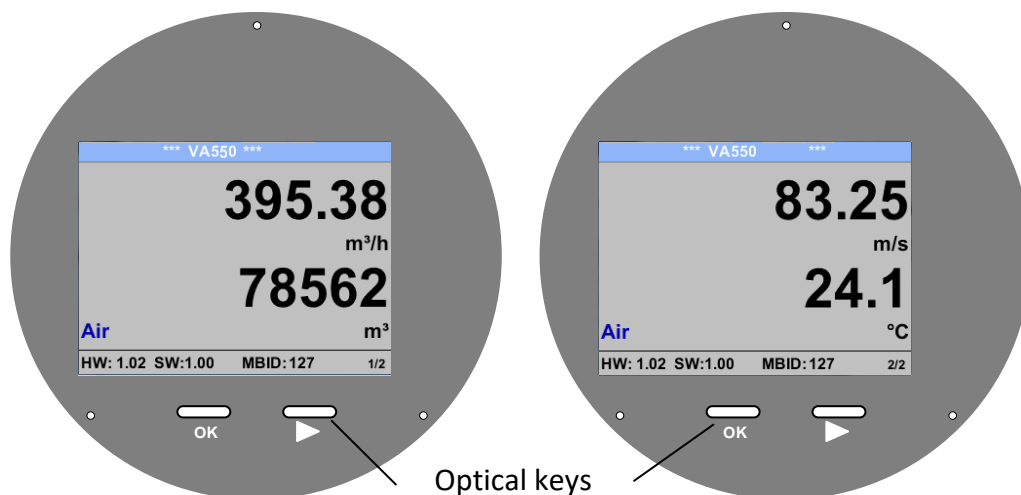Therfore the enclosed 120R resistor ist o be connected at Pin 1 and Pin 3 of connector „X2"

Main Board

7.3.4 Pulse Output

Main Board

8   Operation Type 8008

The operation of the Type 8008 are carried out by 2 optical keys through the glass cover Thus, the Type 8008 can be operated from the outside without opening the cap.

Optical keys

Selection of the individual menu items is done by pressing the "**>"** and confirm by pressing "**OK**".

Inputs or changes can be made with all white deposit fields, selcted filed will be highlighted with yellow background.
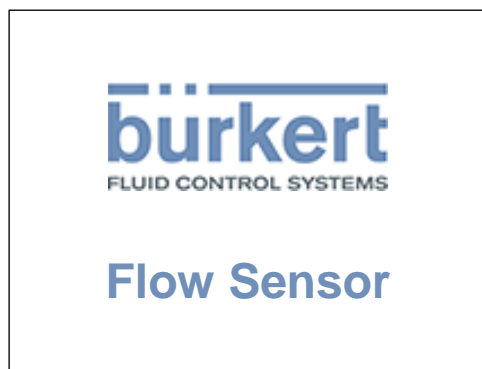
Words in green font refer mainly to the pictures in the section of the chapter, but also on important menu paths or menu items that are related to are in green font.

The menu navigation is generally in a green font!

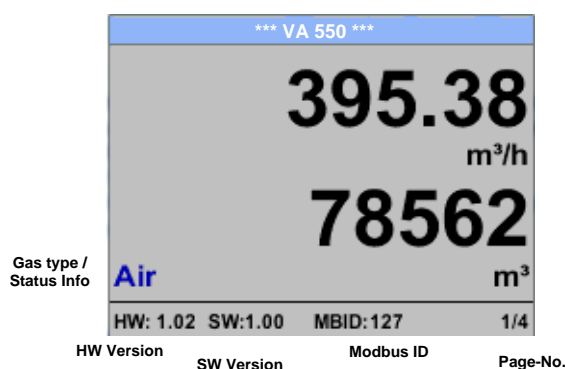The table of contents and chapter references in blue font contain links to the respective chapter title.

8.1 Main menu (Home)
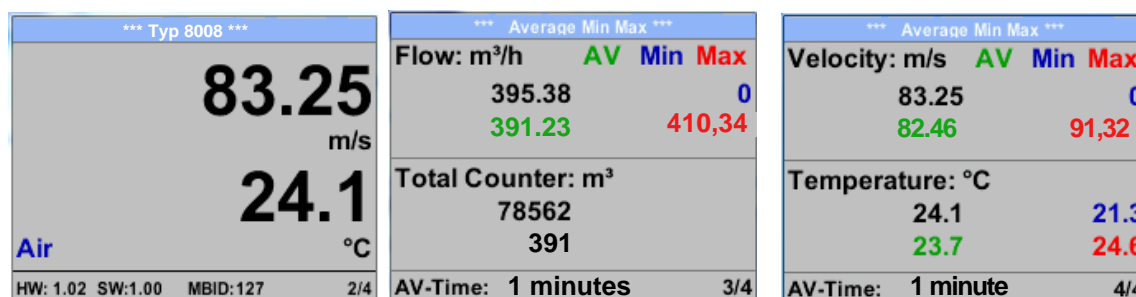
8.1.1 Intialization

After switching on the Type 8008 the initialized screen is displayed followed by the main menu.

8.2 Main menu

Switching to pages 2-4 or back by pressing key „△ "

AV-Time (Period for average value calculation) could be changed under *Sensor Setup.-Advanced– AV-Time*
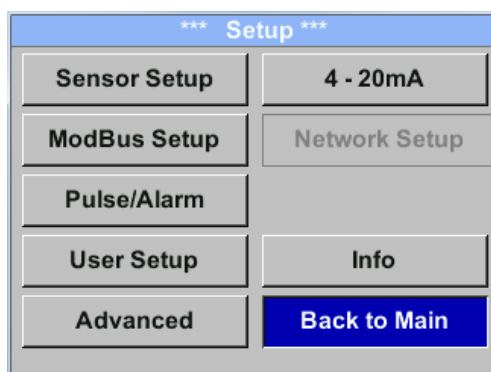
8.3 Settings

The settings menu could accessed by pressing the key **„OK"**.

But the access to the *settings menu* is password protected.

<table>
<tr>
<td>

Enter Password
(4 Digits)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |

OK   CANCEL

HW: 1.02 SW: 1.00   MBID: 127

</td>
<td>

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

If required the password could be changed at *Setup–User setup-Password*.
.

</td>
</tr>
<tr>
<td>

*** Setup ***

Sensor Setup	4 - 20mA
ModBus Setup	Network Setup
Pulse/Alarm	
User Setup	Info
Advanced	**Back to Main**

</td>
<td>

Selection of a menu item or to change a value is done with the key „△ ", a final move to the chosen menu item or takeover of the value change needs the confirmation by pressing the key **„OK"**

</td>
</tr>
</table>

Type 8008 English V1.17   **Page 20 of 34**

8.3.1   Sensor Setup

Setup → Sensor Setup

|		
*** Sensor Setup ***		
Diameter	53.1 mm	
Total Counter	0.00 m³	
ZP Adjust	----	
Units		
Ext. Setup	**Back**	

For changes, first select the menu item with key *„△ "* **and** then confirm it with *"OK".*

8.3.1.1   Input / change tube diameter

For Type 8008 not adjustable (suspended) as voted on included measuring section with corresponding pipe diameter.
.

8.3.1.2 Input / change consumption counter

Setup → Sensor Setup→ Total Counter → Unit button
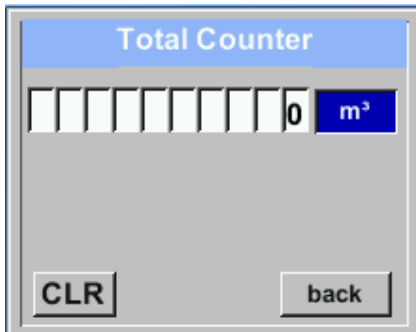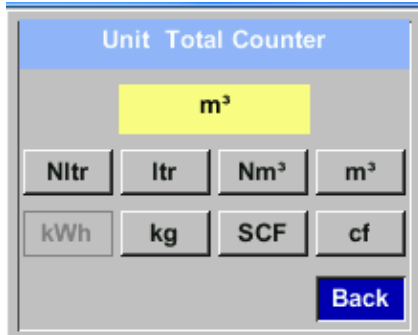
In order to change, e.g. the unit, first select by pressing key „△ " the button *"Unit"* and then key "*OK"*.

Select with the key „△ " the correct unit and then confirm selection by pressing 2x *„OK"*.

Entering / changing the consumption counter via button „△ ", select the respective position and activate the position with the *"OK"* button.
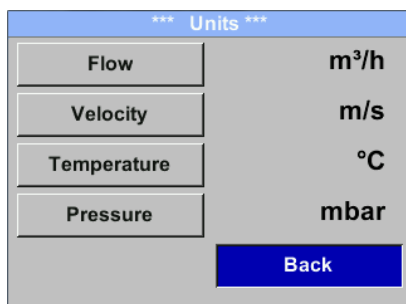By pressing „△ " the position value is incremented by 1. Complete with *"OK"* and activate next number position.

Confirm entry by pressing *„OK".*

Important!
When the counter reach 100000000 m³ the counter will be reset to zero.

8.3.1.3 Definition of the units for flow, velocity, temperature and pressure

Setup → Sensor Setup→ Units

To make changes to the unit for the respective measurement value, first select by pressing „△ " the field of the „measurement value" and activate „it with *„OK"* .

Selection of the new unit with „△ "

In case the quantity of units selectable are not presentable on one page, pleas move to next page by pressing *„<<"* .

Confirm selection by pressing 2x *„OK"*.

Procedure for all 4 measurement-variables is analogous.

Type 8008 English V1.17
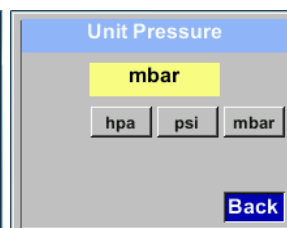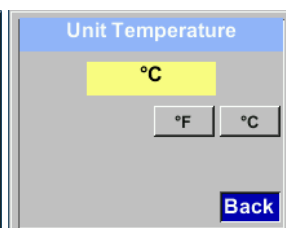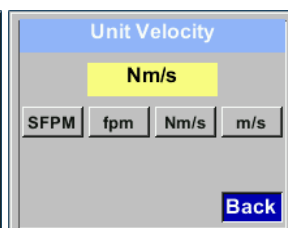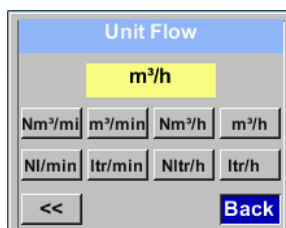
8.3.1.4   Definition of the reference conditions

Here can be defined the desired measured media reference conditions for pressure and temperature and times for the filter and averaging.

- Factory pre-setting for reference temperature and reference pressure are 20 °C, 1000 hPa
- All volume flow values (m³/h) and consumption values indicated in the display are
  related to 20 °C and 1000 hPa (according to ISO 1217 intake condition)
- Alternatively 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!**

Setup → Sensor Setup→ Advanced

*** Extended Setup ***	
Ref. Pres	1000.00 mbar
Ref. Temp	20.0 °C
Filtertime	200 ms
AV-Time	1 min
	back
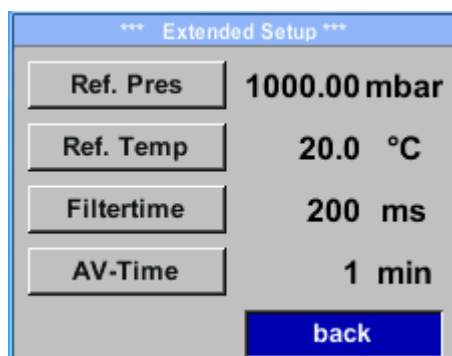
To make changes, first select a menu with button „△" and confirm selection by pressing *„OK"* .

Setup → Sensor Setup → Advanced → Ref.Pref

Ref. Pres

`1000.00` **hpa**

CLR **OK** **Cancel**

In order to change, e.g. the unit, first select by pressing key *„△ "* the field *"Units"* and then key "*OK"*.

Select with the key *„△ "* the correct unit and then confirm selection by pressing 2x *„OK"*.

Input / change of the value by selecting the respective position with button *„△ "* and entering by pressing button *„OK"* .

By pressing *„△ "* the position value is incremented by 1. Complete with *"OK"* and activate next number position.

Procedure for changing the reference temperature is the same.

Setup → Sensor Setup→ Advanced → Ref.Temp

Ref. Temp

+/- `20.0` **°C**

CLR **back**

Setup → Sensor Setup→ Advanced → Filtertime

Filtertime

`200`

CLR **back**

Under item *"Filtertime" "* an attenuation can be defined.
Input values of 0 -10000 in [ms] are possible

Setup → Sensor Setup→ Advanced → AV-Time

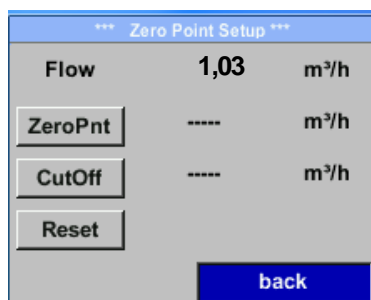**AV-Time**

`1`

CLR **OK** **Cancel**

The time period for averaging can be entered here.

Input values of -1440 1 [minutes] are possible.
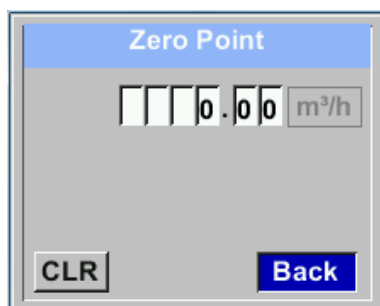
For average values see display window 3 + 4

8.3.1.5 Setting of Zeropoint and Low-flow cut off

Setup → Sensor Setup→ ZP Adjust

*** Zero Point Setup ***	To make changes, first select a menu with button *„△"* and confirm selection by pressing *„OK"* .
Flow **1,03** m³/h	
ZeroPnt ----- m³/h	
CutOff ----- m³/h	
Reset	
back	

*Setup → Sensor Setup → ZP Adjust → ZeroPnt*

Zero Point	When, without flow, the installed sensor shows already a flow value of > 0 m³/h herewith the zero point of the characteristic could be reset.
0 . 0 0 m³/h	For an input / change of the value select with the button *„△"* the respective number position and activate it with *„OK"*.
CLR **Back**	By pressing *„△"* the position value is incremented by 1. Confirm the input with *„OK"* and activate next number position.
	Leave menu with button *„Back"*

Setup → Sensor Setup → ZP Adjust → CutOff
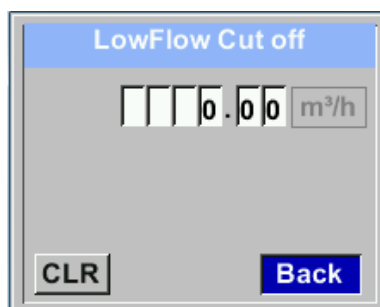
|	
LowFlow Cut off	With the low-flow cut off activated, the flow below the defined "LowFlow Cut off" value will be displayed as 0 m³/h and not added to the consumption counter.
0 . 0 0 m³/h	For an input / change of the value select with the button *„△"* the respective number position and activate it with *„OK"*.
CLR **Back**	By pressing *„△"* the position value is incremented by 1. Confirm the input with *„OK"* and activate next number position.
	Leave menu with button *„Back"*

Setup → Sensor Setup → ZP Adjust t → Reset
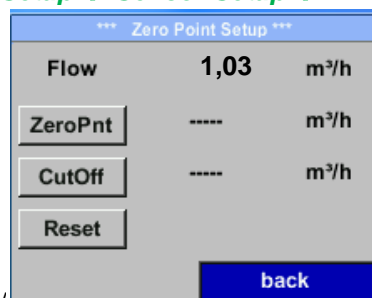
*** Zero Point Setup ***	By selection of *„Reset"* all settings for *„ZeroPnt"* and. *„CutOff"* are reset.
Flow **1,03** m³/h	
ZeroPnt ----- m³/h	Menu item to be select with button *„△"* and confirm the reset with *„OK"* .
CutOff ----- m³/h	
Reset	Leave menu with button *„Back"*
back	

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8.3.2 Modbus Setup

The Flow sensors Type 8008 comes with a Modbus RTU Interface.
Before commissioning the sensor the communication parameters

- Modbus ID, Baudrate, Parity und Stop bit

must be set in order to ensure the communication with the Modbus master.

Settings → Modbus Setup

For changes, e.g. the sensor ID,
first select by pressing key *„△"* the field
"ID" and then key "*OK"*.

Select the desired position by pressing the
">" and select with *"OK*" button.

Change values by pressing the *„△"* values
takeover by pressing *"OK".*

Inputs for baudrate, stopbit and parity is
done analogue.

By means of the button "Byte Order" it is
possible to change the data format (Word
Order). Possible formats are "ABCD" (Little
Endian) and "CDAB" (Middle Endian)

Saving the changes by pressing *"Save",*
therefore select it with key *„△"* and then
confirm it with *"OK".*

Default values out of factory: Modbus ID: 1
Baud rate: 19200
Stopbit: 1
Parity: even
Byte Order: ABCD

Remark: If the sensor placed at the end of the Modbus system a termination is required.
Therefore the enclosed 120R resistor is to be connected at Pin 1 and Pin 3 of connector „X2"

8.3.2.1 Modbus Settings (2001…2005)

Modbus Register	Register Address	No.of Byte	Data Type	Description	Default Setting	Read Write	Unit /Comment
e	2000	2	UInt16	Modbus ID	1	R/W	Modbus ID 1…247
2002	2001	2	UInt16	Baudrate	4	R/W	0 = 1200 1 = 2400 2 = 4800 3 = 9600 4 = 19200 5 = 38400
2003	2002	2	UInt16	Parity	1	R/W	0 = none 1 = even 2 = odd
2004	2003	2	UInt16	Number of Stopbits		R/W	0 = 1 Stop Bit 1 = 2 Stop Bit
2005	2004	2	UInt16	Word Order	0xABCD	R/W	0xABCD = Big Endian 0xCDAB = Middle Endian

8.3.2.2 Values Register (1001 …1500)

Modbus Register	Register Address	No.of Byte	Data Type	Description	Default	Read Write	Unit /Comment
1101	1100	4	Float	Flow in m³/h		R	
1109	1108	4	Float	Flow in Nm³/h		R	
1117	1116	4	Float	Flow in m³/min		R	
1125	1124	4	Float	Flow in Nm³/min		R	
1133	1132	4	Float	Flow in ltr/h		R	
1141	1140	4	Float	Flow in Nltr/h		R	
1149	1148	4	Float	Flow in ltr/min		R	
1157	1156	4	Float	Flow in Nltr/min		R	
1165	1164	4	Float	Flow in ltr/s		R	
1173	1172	4	Float	Flow in Nltr/s		R	
1181	1180	4	Float	Flow in cfm		R	
1189	1188	4	Float	Flow in Ncfm		R	
1197	1196	4	Float	Flow in kg/h		R	
1205	1204	4	Float	Flow in kg/min		R	
1213	1212	4	Float	Flow in kg/s		R	
1221	1220	4	Float	Flow in kW		R	

Modbus Register	Register Address	No.of Byte	Data Type	Description	Default	Read Write	Unit /Comment
e	1268	4	UInt32	Consumption m³ before comma	x	R	
1275	1274	4	UInt32	Consumption Nm³ before comma	x	R	
1281	1280	4	UInt32	Consumption ltr before comma	x	R	
1287	1286	4	UInt32	Consumption Nltr before comma	x	R	
1293	1292	4	UInt32	Consumption cf before comma	x	R	
1299	1298	4	UInt32	Consumption Ncf before comma	x	R	
1305	1304	4	UInt32	Consumption kg before comma	x	R	
1311	1310	4	UInt32	Consumption kWh before comma	x	R	
1347	1346	4	Float	Velocity m/s			
1355	1354	4	Float	Velocity Nm/s			
1363	1362	4	Float	Velocity Ft/min			
1371	1370	4	Float	Velocity NFt/min			
1419	1418	4	Float	GasTemp °C			
1427	1426	4	Float	GasTemp °F			

8.3.3 Pulse /Alarm

Setup → Sensor Setup→ Pulse/ Alarm

Relay Mode:	Alarm
Unit	°C
Value	20.0
Hyst.	5.0
Hi-Lim.	OK Cancel

*** Pulse / Alarm ***	
Relay Mode:	Alarm
Unit:	°C
Value	20.0
Hyst.	5.0
Hi-Lim.	OK Cancel

*** Pulse / Alarm ***	
Relay Mode:	Pulse
Unit:	m³
Value	0.1
Polarity	pos.
Pls per second at max Speed: 0	Back

The galvanically isolated output can be defined as pulse- or alarm output.
Selection of field *„Relay Mode"* with key *„△"* and change modus by pressing key *„OK".*

For alarm output following units could be chosen: kg/min, cfm, ltr/s, m³/h, m/s, °F, °C and kg/s.
„Value" defines the Alarm value, *„Hyst."* defines the desired hysteresis and with *„Hi-Lim"* or. *„Lo-Lim"* the alarm settings when the alarm is activated
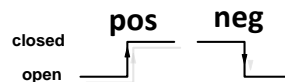Hi-Lim: Value over limit
Lo-Lim: Value under limit

For the pulse output following units could be chosen: kg, cf, ltr and m³.
The pulse value definition to be done in menu *„Value"* (0.1, 1, 10, 100).
With *„Polarity"* the switching state could be defined.
Pos. = 0→ 1 neg. 1→ 0

pos   **neg**
closed
open

8.3.3.1 Pulse output

The maximum frequency for pulse output is 50 pulses per second (50Hz).
The Pulse output is delayed by 1 second.

| Pulse value	[m³ /h]	[m³ /min]	[l/min]
0.1 ltr / Pulse	18	0,3	300
1ltr / Pulse	180	3	3000
0.1m³ / Pulse	18000	300	300000
1 m³ / Pulse	180000	3000	3000000

Table 1 Maximum flow for pulse output

Entering pulse values that are not allow a presentation to the full scale value, are not allowed. Entries are discarded and error message displayed.

8.3.4 User Setup

8.3.4.1 Password

Settings → UserSetup → Password
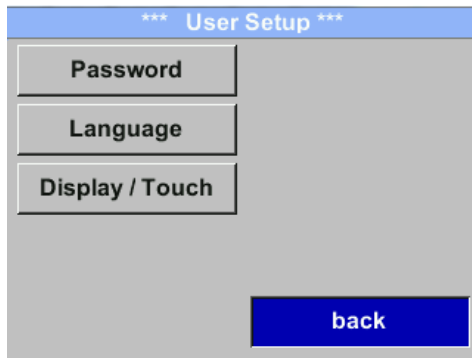
To make changes, first select a menu with button „**>**" and confirm selection by pressing *„OK"* .

It is possible to define a password. The required password length is 4 digits. Please select with button „**>**" a figure and confirm it with *„OK"* .Repeat this 4 times.
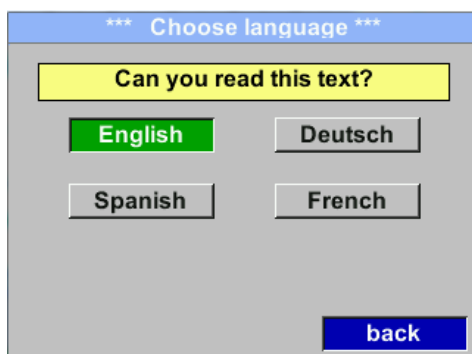
With *„<"* the last figure could be deleted. Password input have to be inserted twice.

Confirmation of input/password by pressing *„OK".*

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

8.3.4.2 Language
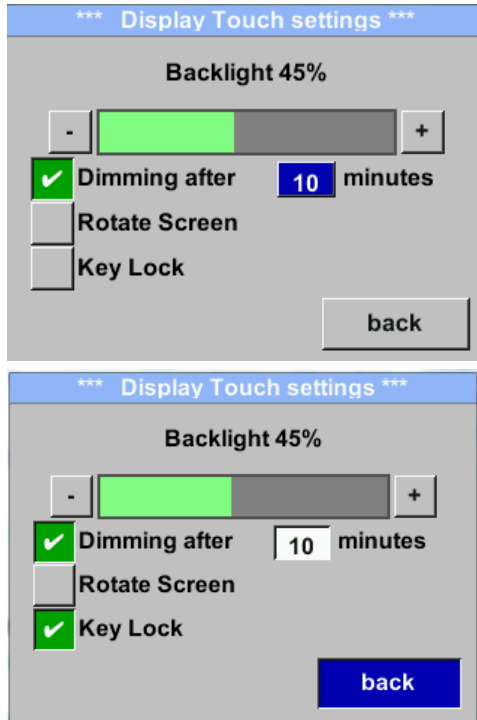
Settings → UserSetup → Language

Currently 4 languages have been implemented and could be selected with button „**>**".

Change of language by confirming with *"OK"*. Leaving the menu with button *"back".*

8.3.4.3 Display / Touch

Settings → UserSetup → Display / Touch

With the button *„-"* and with button *„+"* it is possible to adjust the backlight / display brightness.The actual / adjusted backlight brightness is showed in the graph *„Backlight."*

By activation *"Dimming after"* and entering a time a display dimming could be set.

With *„Rotate Screen"* the display information could be rotated by 180°.

By activation of *„Key Lock"* the operation of the sensor locked.

Unlocking the keyboard is only possible by restarting the sensor and calling the operating menu within the first 10s. To do this, use the *"OK"* button to enter the operating menu during this period
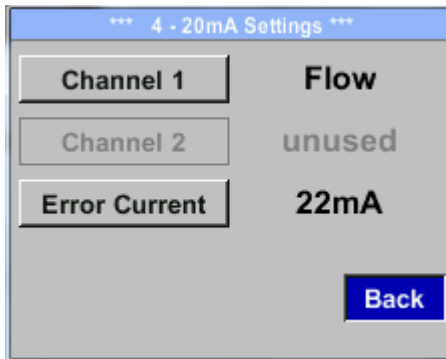
8.3.5 Advanced

Settings → Advanced
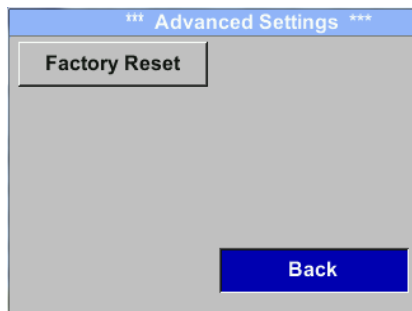
By pressing *„Factory Reset"* the sensor is set back to the factory settings.
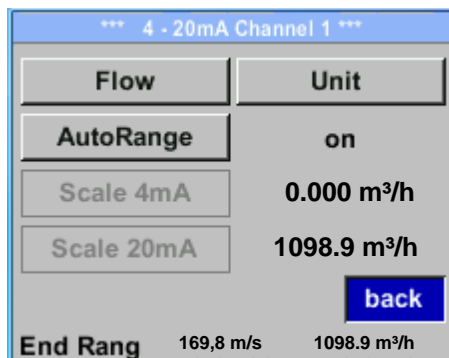
8.3.6   4 -20mA

Settings → 4-20mA

To make changes, first select a menu with button „△" and confirm selection by pressing „*OK*" .

Settings → 4-20mA → Channel 1

The 4-20 mA Analogue output of the Sensor Type 8008 can be individually adjusted.

It is possible to assign following values „*Temperature*", „*Velocity*" und „*Flow*" to the channel CH 1.

To make changes, first select the value item with button „△" .and confirm
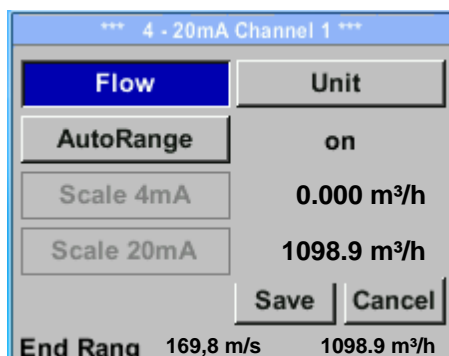Moving between the different measurements values or to deactivate the 4-20mA with setting to „*unused*" by pressing „*OK*".
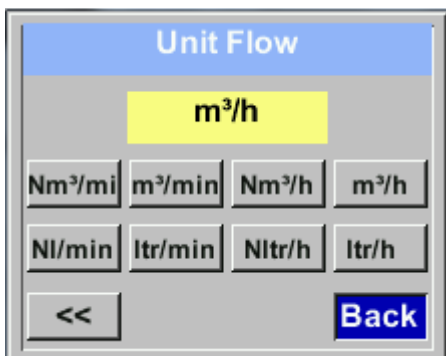
To the selected measurement value a corresponding / appropriate unit needs to be defined. Select „*Unit*" with „△" and open menu with „*OK*".
Select required unit with „△" and take over by pressing „*OK*".

Here e.g. for the measurement value Flow, procedure for the other measurements values is analog.

For saving the changes done press button „*Save*" to discard the changes press button "*Cancel*".

Leaving the menu with „*Back*".

![burkert FLUID CONTROL SYSTEMS logo]

Settings → 4-20mA → Channel 1 → AutoRange

```
*** 4 - 20mA CH 1 ***
Flow              Unit
AutoRange         off
Scale  4mA        0.000m³/h
Scale  20mA       1098,9 m³/h
                  Save   Cancel
End Range   169,8m/s      1098,9 m³/h
```

```
4mA Scale Low
0 . 0 0  m³/h
CLR           Back
```

```
20mA Scale High
0 . 0 0  m³/h
CLR           Back
```

The scaling of the 4-20mA channel can be done automatically "Auto Range = on" or manual "AutoRange = off" .

With button „△" select the menu item „AutoRange" select with „OK" the desired scaling method. (Automatically or manually)

In case of *AutoRange = off* with „*Scale 4mA"* und „*Scale 20mA"* the scale ranges needs to be defined.

Select with button „△" the item „Scale 4mA" or „Scale 20mA" and confirm with „OK" .

Input of the scaling values will be analogous as described before for value settings.

Using „*CLR"* clears up the complete settings at once.

For „*Auto on"* , the max. scaling is calculated based on the inner tube diameter, max. measurement range and the reference conditions settings.

Take over of the inputs with „*Save"* and leaveing the menu with „*Back"*.

Settings → 4-20mA → Error Current

```
*** 4 - 20mA Settings ***
Channel 1         Flow
Channel 2         unused
Error Current     22mA
                  Back
```

This determines what is output in case of an error at the analog output.

- 2 mA   Sensor error / System error
- 22 mA   Sensor error / System error
- None   Output according Namur (3.8mA – 20.5 mA)
  < 4mA to 3.8 mA Measuring range under range
  >20mA to 20.5 mA Measuring range exceeding

To make changes first select a menu item "Current Error" with button „△" and then select by pressing the „*OK"* the desired mode

For saving the changes done press button „*Save"* to discard the changes press button *"Cancel".*

Leaving the menu with „*Back"*.

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8.3.7 Type 8008 Info

Setup → Sensor Setup → Info

```
*** Info ***
Production Datas
Serial No.:1234567890        Details
Cal. Date: 10.01.2013
Sensor Datas
Sensor Type:    IST 1.8
Max Speed:      92,7 m/s   600m³/h
Max Temp:   100.0 °C
Live Datas
Run Time:     2d 21h 23m 12s
Vin: 23,8V        Temp: 35,8
     Options            Back
```

Here you get a brief description of the sensor data incl. the calibration data.

Under *Details,* you are able to see in addition the calibration conditions.

```
*** Calibration Details ***
Calibration Conditions
Ref. Pressure:        1000.00mbar
Ref. Temperature:        20 °C
Cal. Diameter:        53,1 mm
Cal. Pressure:        6000.00mbar
Cal. Temperature:        23 °C
Cal. Points:              10
                    Back
```