CS INSTRUMENTS GmbH

Instruction manual

Consumption counter VA 520

with Display, 4 ... 20 mA and pulse output (galv. isolated)

Stationary

Flow and consumption measurement for compressed air and gases

I. Foreword

Dear customer,

thank you very much for deciding in favour of the VA 520. 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 VA 520 are only guaranteed in case of careful observation of the described instructions and notes

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1 Safety instructions

Please read carefully before starting the device!

Warning: Do not exceed the pressure range of 16 bar!

Observe the measuring range of the sensor!

Always observe the direction of flow when positioning the sensor!

The screwed fixture must be pressure tight.

It is absolutely necessary to avoid condensation on the sensor element or water drops in the measuring air as they may cause faulty measuring results.

The manufacturer cannot be held liable for any damage which occurs as a result of non-observance or non-compliance with these instructions. Should the device be tampered with in any manner other than a procedure which is described and specified in the manual, the warranty is cancelled and the manufacturer is exempt from liability.

The device is destined exclusively for the described application.

We offer no guarantee for the suitability for any other purpose and are not liable for errors which may have slipped into this operation manual. We are also not liable for consequential damage resulting from the delivery, capability or use of this device.

We offer you to take back the instruments of the instruments family VA 520 which you would like to dispose of.

Qualified employees from the measurement and control technology branch should only carry out adjustments and calibrations.

The consumption sensor VA 520 works according to the calorimetric measuring procedure.

Flammable gases

If this consumption sensor is used for measurement of flammable gases (e. g. natural gas and so on) we expressly would like to point out that the sensor has no DVGW admission, however, it can be used for measurements in natural gas. A DVGW admission is not mandatory.

The consumption sensor corresponds with the current state of technology and basically it can be used in any flammable and non-flammable gases.
If the sensor is used e.g. in the medium natural gas, the sensor will be adjusted for natural gas. The calibration protocol (inspection certificate) will be included in the scope of delivery.

The area outside the pipeline (ambient area of the sensor) must not be an explosive area.

The installation has to be carried out by authorized professionals.

2 Instruments description

The VA 520 is a compact consumption counter for compressed air and gases.

Special features:

- Optimum accuracy due to compact design
- Integrated in- and outlet section
- Less flow due to measuring section
- Integrated Display, Units free selectable. m^3/h, m^3/min, l/min, l/s, kg/h, kg/min, kg/s, cfm
- Modbus RTU (RS485) Interface
- Analogue output 4..20mA
- Pulse output galv. isolated.
-

CS Instruments Service Software

- Analogue output 4...20 mA scalable
- Selection of gas type (Air, Nitrogen, Argon, Nitrous oxide, CO2, Oxygen, Natural gas)
- Read out Service data
- Sensor diagnoses

3 Technical data

Measurement: **Flow and consumption**
Standard settings ex works:
DIN 1945, ISO 1217 at 20°C and 1000 mbar

Selectable Units **m³/h** (Standard settings ex works)
m³/min, l/min, l/s, ft/min, cfm, m/s, kg/h, kg/min, kg/s

Measuring principle: calorimetric measurement

Sensor: Pt45, Pt1000

Measuring medium: Air, gases

Operating temperature: -30 ... 80°C

Operating pressure: up to 16 bar, special version PN 40 (40 bar)

Power supply: 18 to 36 VDC

Power consumption: max. 5W

Digital output: RS 485 (Modbus RTU)

Analog output: 4...20 mA (see table below),
max. burden < 500 Ohm

Description	**Analogue output**	
VA 520 with integrated 1/4" meas. section	4… 20 mA =	0...90 l/min
VA 520 with integrated 1/2" meas. section	4… 20 mA =	0...90 m³/h
VA 520 with integrated 3/4" meas. section	4… 20 mA =	0...170 m³/h
VA 520 with integrated 1" meas. section	4… 20 mA =	0...290 m³/h
VA 520 with integrated 1 1/4" meas. section	4… 20 mA =	0...530 m³/h
VA 520 with integrated 1 1/2" meas. section	4… 20 mA =	0...730 m³/h
VA 520 with integrated 2" meas. section	4… 20 mA =	0…1195m³/h
VA 520 with integrated 2 1/2" meas. section	4… 20 mA =	0…2185m³/h
VA 520 with integrated 3" meas. section	4… 20 mA =	0…2910m³/h

Pulse output: pulse output potential free (dry contact)

passive: max. 48Vdc, 500mA

1 pulse pro m³ resp. pro l, Valency
adjustable with the display keys

Accuracy: ± 1,5 % m.v., ± 0,3 % f. s.*

Display: TFT 1.8 Resolution 220 x 176

Mounting thread: R 1/4", R1/2", R3/4", R1", R 1 1/4" R1 1/2", R 2" DIN EN 10226 (ISO 7-1)

Material: Stainless steel 1.4301 / 1.4404

Version with flange DIN EN 1092-1: Stainless steel 1.4404

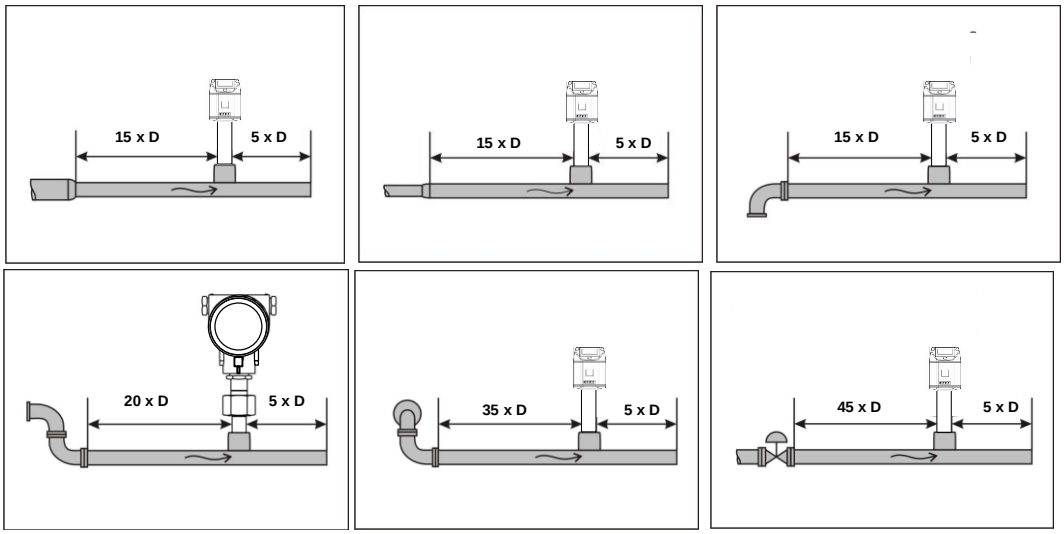
'* m.v. = measured values
f.s. = full scale

4 Installation Description

The following table shows the required inlet sections depending on the existing disturbance / flow disturbance.

Table of additionally required inlet sections

Flow obstruction **in front of** the measuring section	Minimum length inlet section (L1)	Minimum length outlet section (L2)
Slight curve (bend < 90°)	**12 x D**	**5 x D**
Reduction (pipe narrows towards the meas. section)	**15 x D**	**5 x D**
Expansion (pipe expands towards the meas. section)	**15 x D**	**5 x D**
90° bend or T-piece	**15 x D**	**5 x D**
2 bends á 90° on one level	**20 x D**	**5 x D**
2 bends á 90° 3-dimensional change of direction	**35 x D**	**5 x D**
Shut-off valve	**45 x D**	**5 x D**

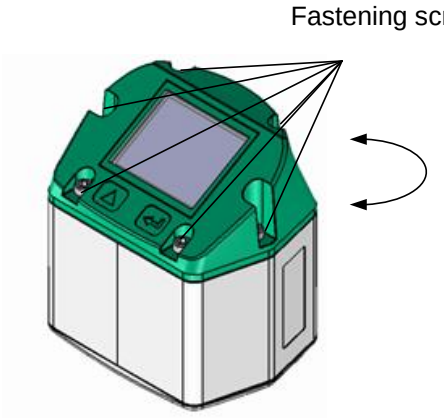


The respective minimum values required are indicated here. If it is not possible to observe the stipulated equalising sections, considerable deviations in the measuring results must be expected.

Attention:

The measuring sections of VA 520 consumption counters with 1 1/2" and 2" measuring section have reduced inlet and outlet sections. Please take into consideration the recommended inlet and outlet sections. Dimension please see page 9 and 10.

4.1 Displayhead Position



The Position of the Displayhead is twistable by 180 e.g. in case of reverse flow direction.
For this purpose the 6 fastening screws are to be released and the displayhead rotated 180°.

Caution:
It must be ensured that the connection plugs are still plugged and the gasket is installed correctly.

5 Flow measuring ranges

5.1 Flow air

Pipe size	Inner pipe Ø	Pipe size	VA 520	Consumption
Inch	mm		Meas. ranges from … to	Standard setting
1/4“	8,5	DN 8	0,8…90 l/min	l
1/2“	16,1	DN 15	0,2…90 m³/h	m³
3/4“	21,7	DN 20	0,3...170 m³/h	m³
1“	27,3	DN 25	0,5...290 m³/h	m³
1¼“	36,8	DN 32	0,7…530m³/h	m³
1 ½"	41,8	DN 40	1,0…730 m³/h	m³
2“	53,1	DN 50	2,0...1195 m³/h	m³
2 ½"	71,1	DN 65	4,0…2185 m³/h	m³
3“	81,9	DN 80	7,0…2910 m³/h	m³

Reference DIN 1945/ ISO 1217: 1000mbar /20°C; Air

5.2 Flow for different gases

		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		**90**	**90**	**170**	**290**	**530**	**730**	**1195**	**2185**	**2910**
Adjustment to DIN 1343: 0°C, 1013,25 mbar										
Air		**80**	**20**	**160**	**270**	**490**	**670**	**1100**	**2010**	**2675**
Argon	Ar	140	140	275	460	830	1140	1870	3415	4555
Carbon dioxide	CO_2	85	90	175	290	525	720	1185	2160	2880
Nitrogen	N_2	80	80	155	260	470	650	1060	1940	2590
Oxygen	O_2	85	85	165	280	505	695	1140	2080	2775
Nitrous oxide	N_2O	85	85	170	285	520	715	1170	2140	2855
Natural gas	NG	50	50	105	170	310	430	705	1290	1720

Other gases on request

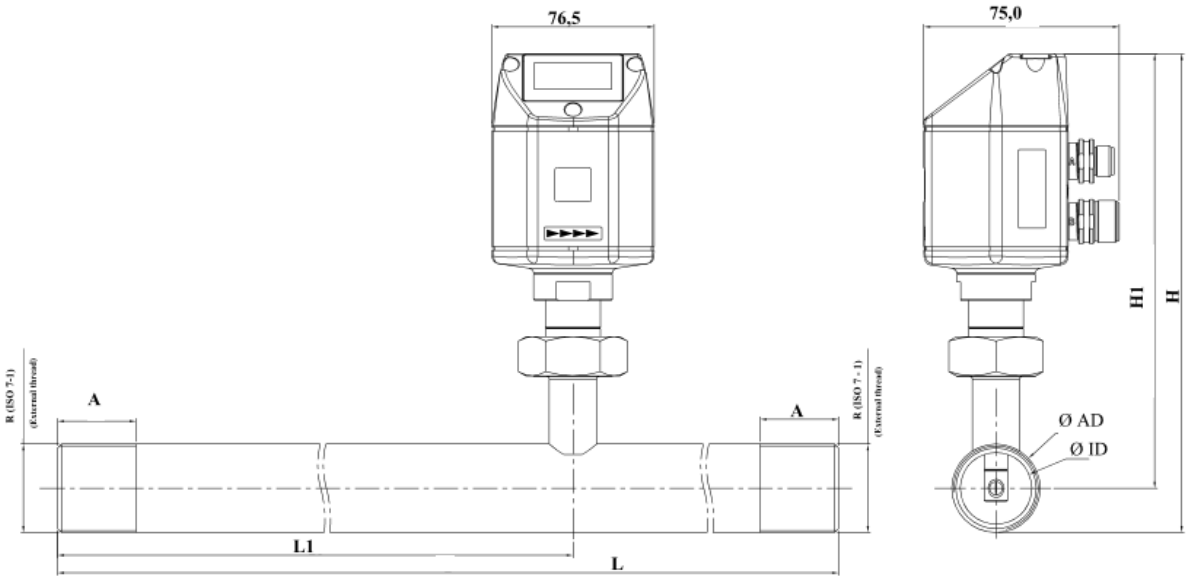
Please note:
The consumption sensor corresponds with the current state of technology and basically it can be used in any flammable and non-flammable gases.

If this consumption sensor is used for measurement of flammable gases (e.g. natural gas and so on) we expressly would like to point out that the sensor has no DVGW admission, however, it can be used for measurements in natural gas. A DVGW admission is not mandatory.

The area outside the pipeline (ambient area of the sensor) must not be an explosive area.

6 Dimensions

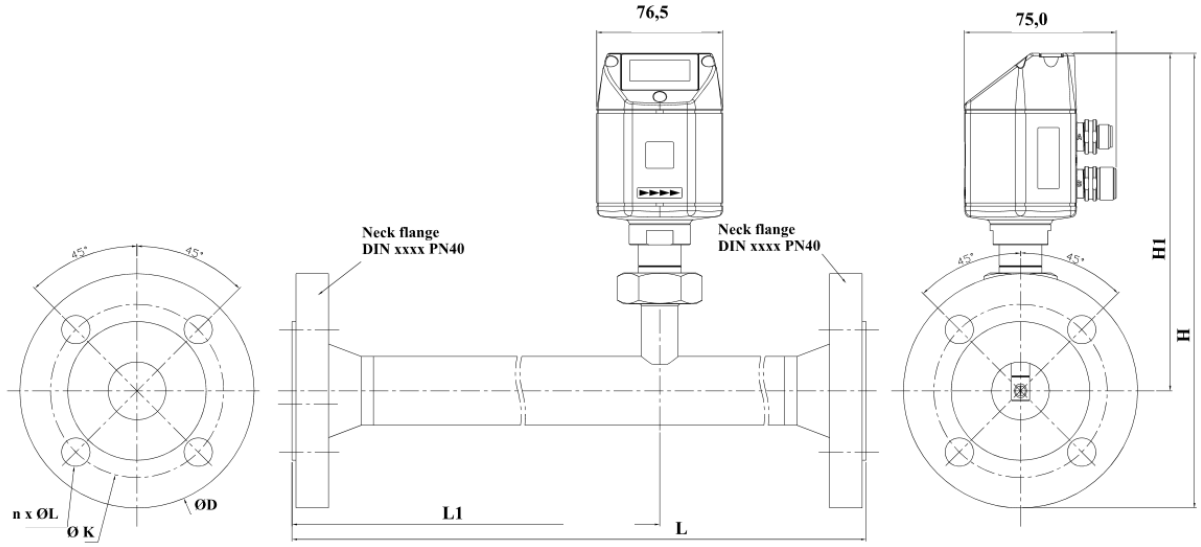
6.1 With measurement section and screw-in thread



	Pipe size	AD / ID (mm)	L (mm)	L1 (mm)	H (mm)	H1 (mm)	R	A (mm)
VA 520 1/4"	DN 8	13,7 / 8,5	194	137	176,6	166,3	R 1/4"	15
VA 520 1/2“	DN 15	21,3 / 16,1	300	210	177,0	166,3	R 1/2“	20
VA 520 3/4“	DN 20	26,9 / 21,7	475	275	179,8	166,3	R 3/4“	20
VA 520 1“	DN 25	33,7 / 27,3	475	275	183,2	166,3	R 1“	25
VA 520 1 1/4"	DN 32	42,4 / 36,0	475	275	187,5	166,3	R 1 1/4"	25
VA 520 1 1/2“	DN 40	48,3 / 41,9	475	275	190,5	166,3	R 1 1/2“	25
VA 520 2“	DN 50	60,3 / 53,1	475	275	196,5	166,3	R 2“	30

Order no. stainless steel 1.4404	Order no. stainless steel 1.4301	Description	**Analogue output**	
0695 1520	0695 0520	VA 520 with integrated 1/4" meas. section	4… 20 mA =	0...90 l/min
0695 1521	0695 0521	VA 520 with integrated 1/2" meas. section	4… 20 mA =	0...90 m³/h
0695 1522	0695 0522	VA 520 with integrated 3/4" meas. section	4… 20 mA =	0...170 m³/h
0695 1523	0695 0523	VA 520 with integrated 1" meas. section	4… 20 mA =	0...290 m³/h
0695 1526	0695 0526	VA 520 with integrated 1 1/4" meas. section	4… 20 mA =	0...530 m³/h
0695 1524	0695 0524	VA 520 with integrated 1 1/2" meas. section	4… 20 mA =	0...730 m³/h
0695 1525	0695 0525	VA 520 with integrated 2" meas. section	4… 20 mA =	0…1195m³/h

6.2 With measurement section and flange (Material stainless steel 1.4404):

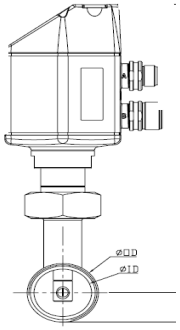


							Flange DIN EN 1092-1		
	Pipe size	**AD/ID (mm)**	**L (mm)**	**L1 (mm)**	**H (mm)**	**H1 (mm)**	**Ø D in mm**	**Ø K in mm**	**nxØL in mm**
VA 520 1/2“	DN 15	21,3 / 16,1	300	210	213,8	166,3	95	65	4 x 14
VA 520 3/4“	DN 20	26,9 / 21,7	475	275	218,8	166,3	105	75	4 x 14
VA 520 1“	DN 25	33,7 / 27,3	475	275	223,8	166,3	115	85	4 x 14
VA 520 1 1/4"	DN 32	42,4 / 36,0	475	275	263,3	166,3	140	100	4 x 18
VA 520 1 1/2“	DN 40	48,3 / 41,9	475	275	2 40,7	166,3	150	110	4 x 18
VA 520 2“	DN 50	60,3 / 53,1	475	275	248,2	166,3	165	125	4 x 18

Order-No.	Description	**Analogue output**	
0695 2521	VA 520 with integrated 1/2" meas. section with weld neck flange	4… 20 mA =	0...90 m³/h
0695 2522	VA 520 with integrated 3/4" meas. section with weld neck flange	4… 20 mA =	0...170 m³/h
0695 2523	VA 520 with integrated 1" meas. section with weld neck flange	4… 20 mA =	0...290 m³/h
0695 2526	VA 520 with integrated 1 1/4" meas. section with weld neck flange	4… 20 mA =	0...530 m³/h
0695 2524	VA 520 with integrated 1 1/2" meas. section with weld neck flange	4… 20 mA =	0...730 m³/h
0695 2525	VA 520 with integrated 2" meas. section with weld neck flange	4… 20 mA =	0…1195m³/h

7 Electrical wiring

7.1 Electrical wiring



- Connector plug A
- Connector plug B

Attention: Not required connections NC must not be connected to a voltage and/or to protection earth. Cut and insulate cables.

	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
Connector plug A	+VB	RS 485 (A)	-VB	RS 485 (B)	I+ 4..20 mA
Colours connection cables 0553 0104 (5 m) 0553.0105 (10 m)	brown	white	blue	black	grey
Connector plug B	NC	GND	DIR	Pulse galv. isolated	Pulse gavl. isolated
Colours pulse cables 0553 0106 (5 m) 0553.0107 (10 m)	brown	white	blue	black	grey

Legend:

-VB	Negative supply voltage 0 V
+VB	Positive supply voltage 12...36 VDC smoothed
I +	Current signal 4...20 mA – selected measured signal
RS 485 (A)	Modbus RTU A

Pulse	Pulse for consumption
NC	Must not be connected to a voltage and/or to protection earth. Please cut and isolate cables.
RS 485 (B)	Modbus RTU B

If no connection cable/ pulse cable is ordered the sensor will be supplied with a M12 connector plug. The user can connect the supply and signal cables as indicated in the connection diagram.

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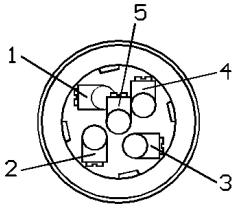
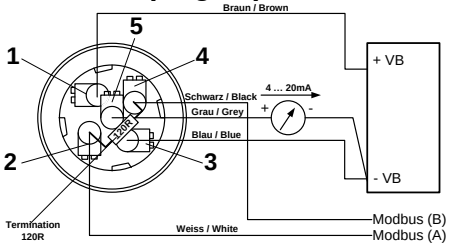


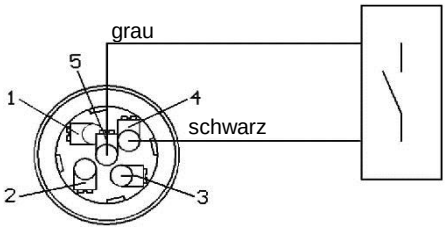
M12 Connector plug

View from back side (terminal side)

Connector plug A (M12 - A-coding)



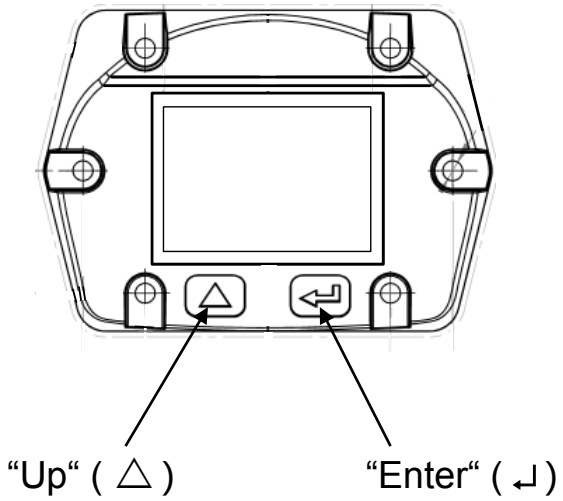
Connector plug B (M12 - A-coding)



Remark: If the sensor is placed at the end of the Modbus system a termination is required. The sensors have an internal switchable termination, therefore the 6 fastening screws from the lid are to be released and set the internal DIP Switch to “On”. It must be ensured that the connection plugs are still plugged and the gasket is installed correctly, see also chapter 4.5.

Alternatively, a 120R resistor can be installed in the plug between pin 2 and pin 4.

8 Operation

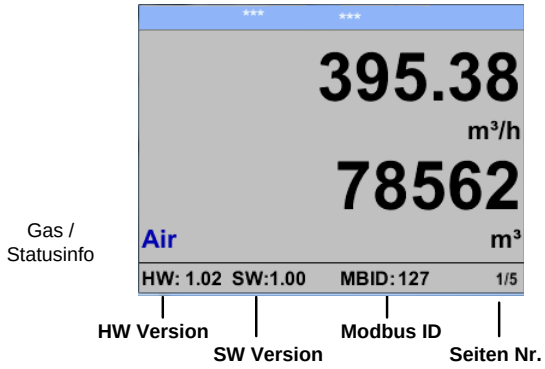


The operation of the VA 520 is done by the two capacitive key buttons Up (△) and Enter (↵)

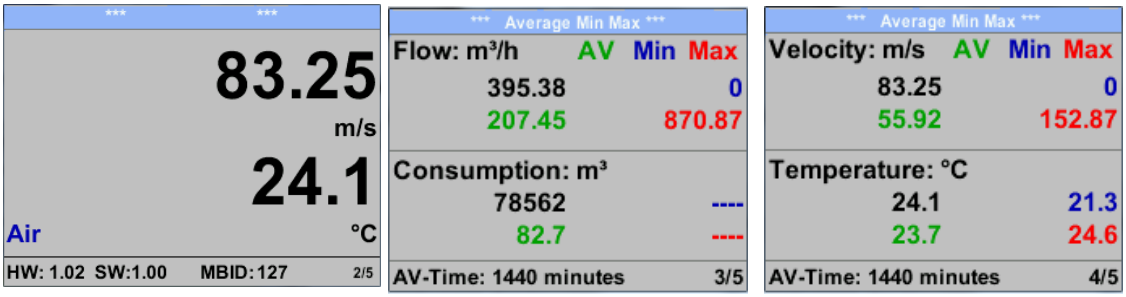
8.1 Initialization

After switching on the VA 520, the initialized screen is displayed followed by the main menu.

8.2 Main menu



Switching to pages 2-5 or back by pressing key „△ “



8.3 Settings

The settings menu could accessed by pressing the key **„OK“**.
But the access to the *settings menu* is password protected.

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*.
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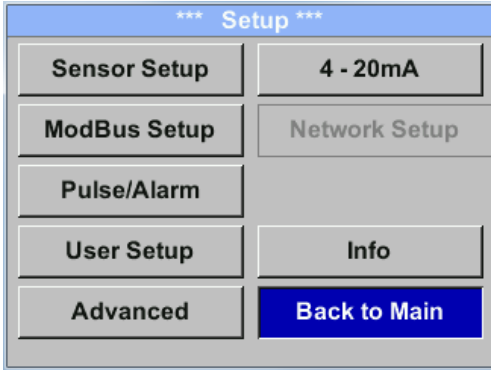
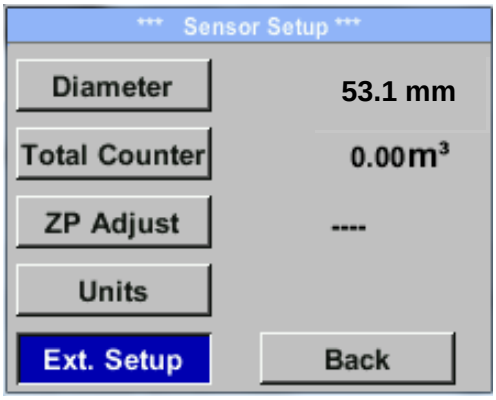


Selection of a menu item or to change a value is done with the key **„△ “**, a final move to the chosen menu item or takeover of the value change needs the confirmation by pressing the key ***„OK“***

8.3.1 Sensor Setup

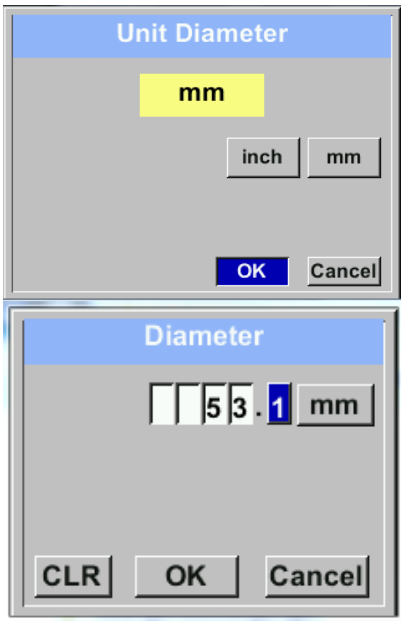
Setup → Sensor Setup



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

8.3.1.1 Input / change tube diameter

Setup → Sensor Setup→ Diameter



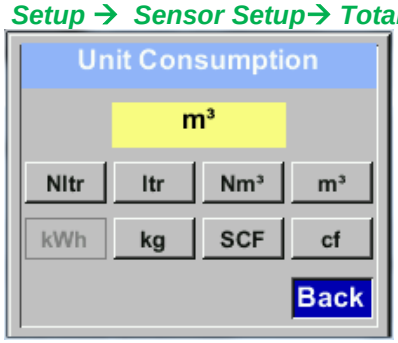
In order to change, e.g. the unit, first select by pressing key **„△ “** the field ***“Units”*** and then key “***OK”***.

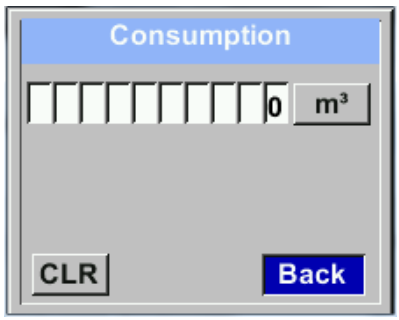
Select with the key **„△ “** the correct unit and then confirm selection by pressing 2x ***„OK“***.

Entering / changing the diameter
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“.***

8.3.1.2 Input / change consumption counter

Setup → Sensor Setup→ Total Counter





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“***.

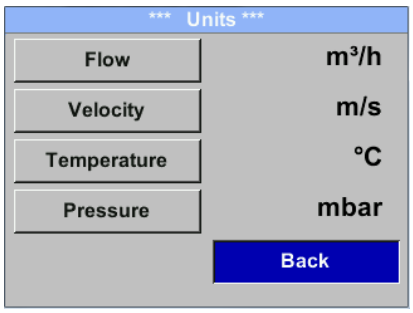
Entering / changing the consumption counter via button ***„△“***, select the respective position and activate the position with the ***"OK"*** button.
By pressing ***„△“*** the position value is incremented by 1. Complete with ***"OK"*** and activate next number position.

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



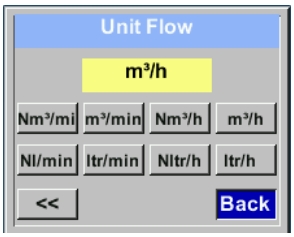
To make changes to the unit for the respective measurement value, first select by pressing ***„△“*** the field of the „measurement value“ and activate „it with ***„OK“*** .

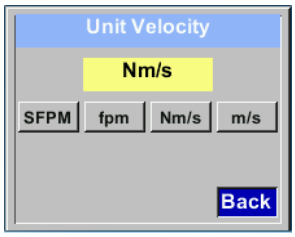
Selection of the new unit with ***„△“***

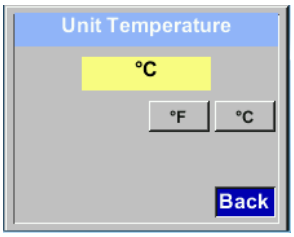
In case the quantity of units selectable are not presentable on one page, pleas move to next page by pressing ***„<<“*** .

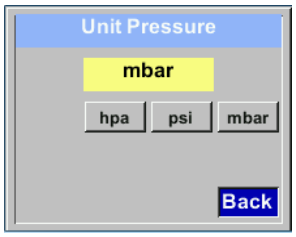
Confirm selection by pressing 2x ***„OK“***.

Procedure for all 4 measurement variables is analogous.





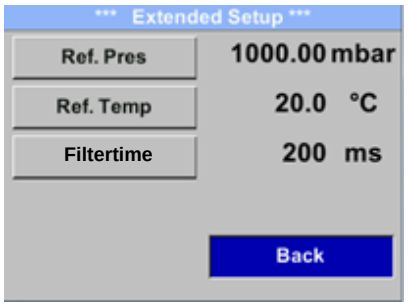




8.3.1.4 Definition of the reference conditions

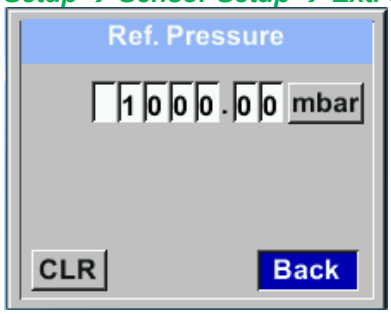
Here can be defined the desired measured media reference conditions for pressure and temperature.

Setup → Sensor Setup→ Ext. Setup

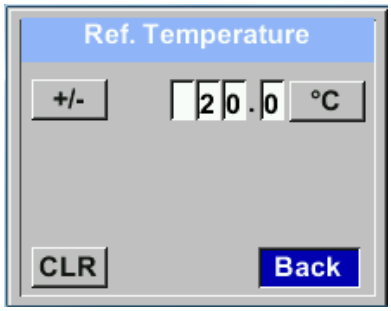


To make changes, first select a menu with button „△“ and confirm selection by pressing ***„OK“*** .

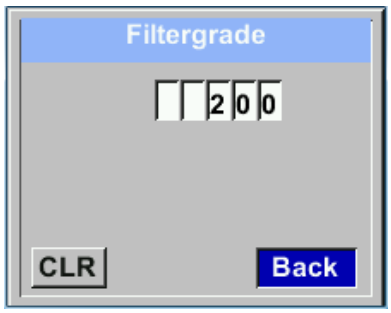
Setup → Sensor Setup → Ext. Setup → Ref.Pref



Setup → Sensor Setup→ Ext. Setup Setup → Ref.Temp



Setup → Sensor Setup→ Ext. Setup → Filtertime



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“***.

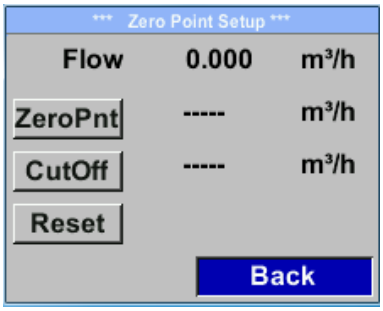
Input / change of the value by selecting the respective position with button ***„△“***and entering by pressing button ***„OK“*** .

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

Under point ***"Filtertime"*** together with the appropriate ***"Filter Grade"*** an attenuation can be defined.
Input values of 0 -10000 in [ms] are possible.

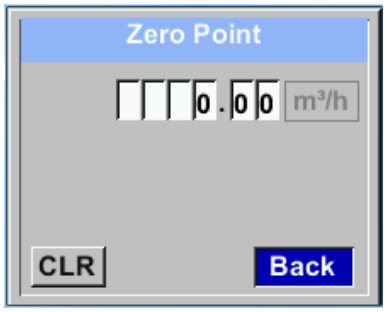
8.3.1.5 Setting of Zeropoint and Low-flow cut off

Setup → Sensor Setup→ ZP Adjust



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

Setup → Sensor Setup → ZP Adjust → ZeroPnt



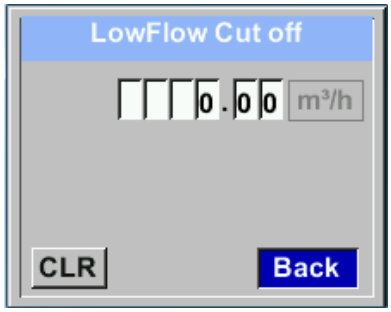
When, without flow, the installed sensor shows already a flow value of > 0 m³/h herewith the zero point of the characteristic could be reset.

For an input / change of the value select with the button „△“ the respective number position and activate it with ***„OK“***.

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



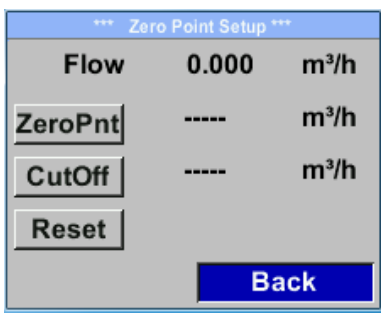
With the low-flow cut off activated, the flow below the defined "LowFlow Cut off" value will be displayed as 0 m³/h and not added to the consumption counter.

For an input / change of the value select with the button „△“ the respective number position and activate it with ***„OK“***.

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



By selection of ***„Reset“*** all settings for ***„ZeroPnt“*** and. ***„CutOff“*** are reset.

Menu item to be select with button „△“ and confirm the reset with ***„OK“*** .

Leave menu with button ***„Back“***

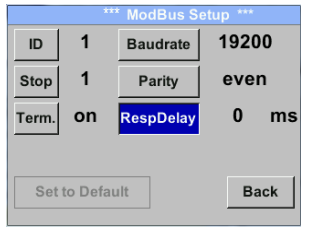
8.3.2 Modbus Setup

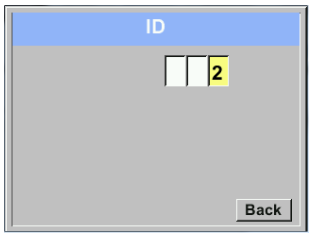
The Flow sensors VA 520 comes with a Modbus RTU Interface.
Before commissioning the sensor the communication parameters

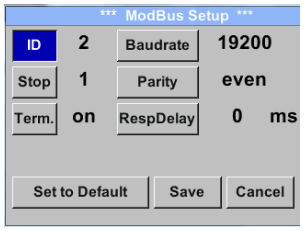
- Modbus ID, Baudrate, Parity und Stop bit

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

Setup → Sensor Setup→ 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 remaining information is analog.

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

Default values out of factory:

Modbus ID:	1
Baud rate:	19200
Stopbit:	1
Parity:	even

Remark: If the sensor is placed at the end of the Modbus system a termination is required. The sensors have an internal switchable termination, therefore the 6 fastening screws from the lid are to be released and set the internal DIP Switch to “On”. It must be ensured that the connection plugs are still plugged and the gasket is installed correctly, see also chapter 4.5.
Alternatively, a 120R resistor can be installed in the plug between pin 2 and pin 4.

8.3.2.1 Modbus Settings (2001…2005)

Modbus Register	Register Address	No.of Byte	Data Type	Description	Default Setting	Read Write	Unit /Comment
2001	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	Def ault	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
1269	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			

Remark:

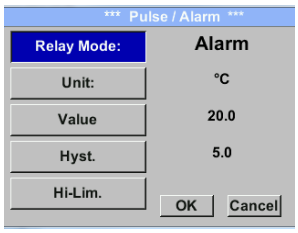
- **For DS400 / DS 500 / Handheld devices - Modbus Sensor Datatype**

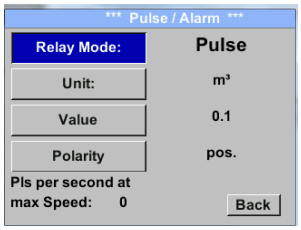
  „Data Type R4-32“ match with „Data Type Float“

- For more additional Modbus values please refer to VA5xx_Modbus_RTU_Slave_Installation_1.00_EN.doc

8.3.3 Pulse /Alarm

Setup → Sensor Setup→ Pulse/ Alarm





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

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.

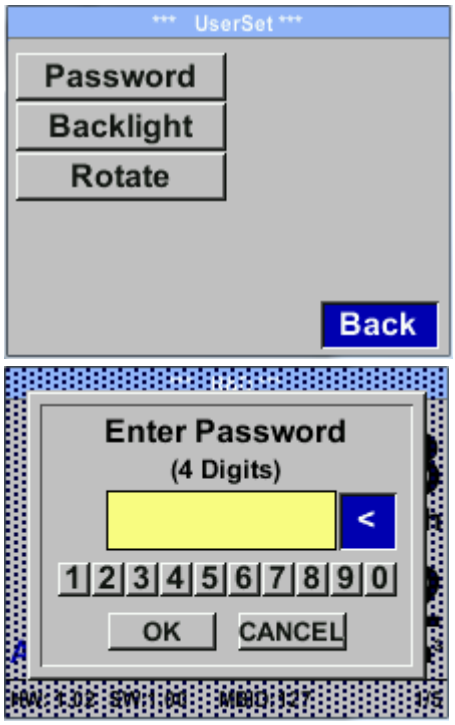
Pulse value	[m³ /h]	[m³ /min]	[l/min]
0.1 ltr / Pulse	1,8	0,3	300
1ltr / Pulse	18	3	3000
0.1m³ / Pulse	18000	300	300000
1 m³ / Pulse	180000	3000	3000000

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

Setup → Sensor Setup→ UserSet



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

With ***„Backlight“*** it is possible to adjust the backlight / display brightness.

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

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.

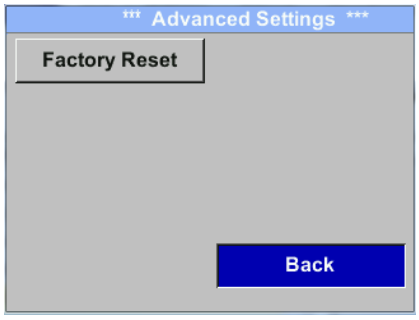
With ***„<“*** the last figure could be deleted.

Password input have to be inserted twice.

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

8.3.5 Advanced

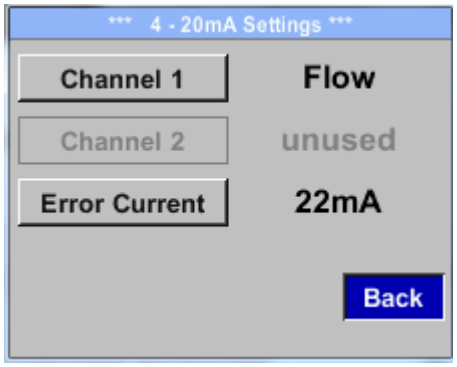
Setup → Sensor Setup→ Advanced



By pressing ***„Factory Reset“*** the sensor is set back to the factory settings.

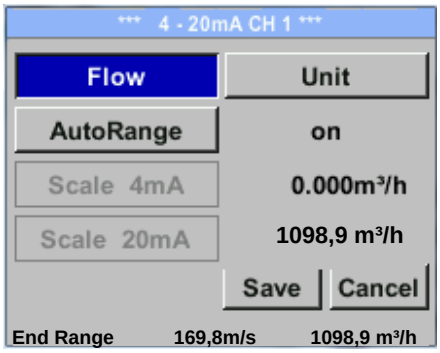
8.3.6 4 -20mA

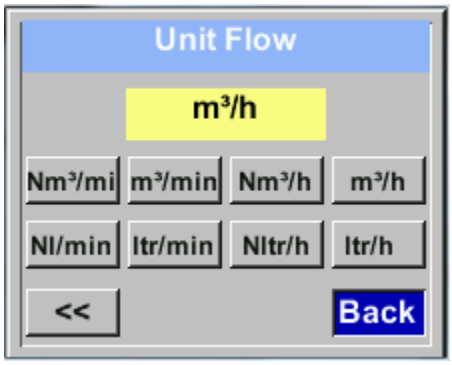
Setup → Sensor Setup→ 4-20mA



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

Setup → Sensor Setup→4-20mA → Channel 1





The 4-20 mA Analogue output of the Sensor VA 520 can be individually adjusted.

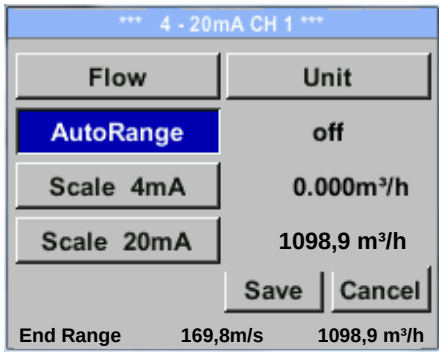
It is possible to assign following values ***„Temperature“***, ***„Flow rate***“ und ***„Flow“*** to the channel CH 1.

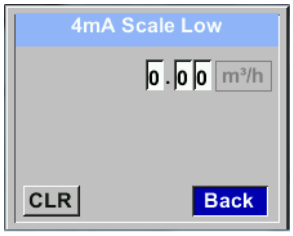
To make changes, first select the menu item with button ***„△“*** and confirm selection by pressing ***„OK“ .***
Moving between the different measurements values or to deactivate the 4-20mA with setting to ***„unused“*** by pressing ***„OK“***.

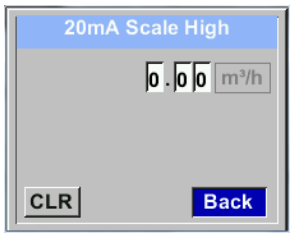
To the selected measurement value a corresponding / appropriate unit needs to be defined. Select ***„Unit“*** with ***„△“*** and open menu with ***„OK“.***
Select required unit with ***„△“*** and take over by pressing ***„OK“.***

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

„







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“*** .

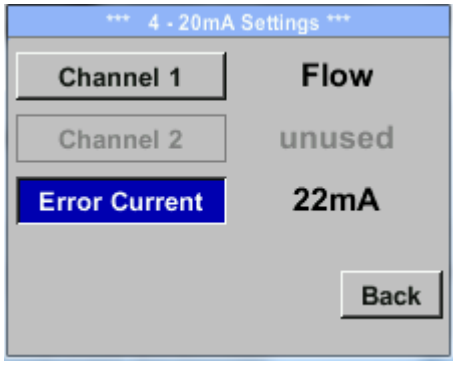
Input of the scaling values will be analogous as described before for value settings.

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***“.

Setup → Sensor Setup → 4 -20mA → Error Current



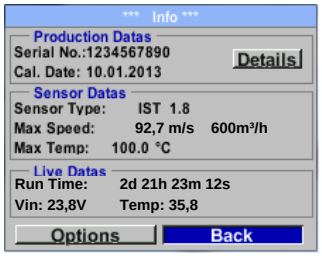
This determines what is output in case of an error at the analog output.

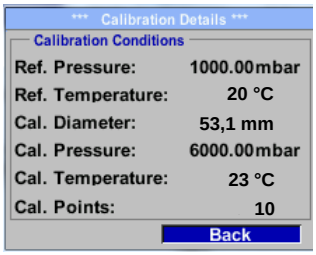
- 2 mA Sensor error / System error
- 22 mA Sensor error / System error
- None Output according Namur (3.8mA – 20.5 mA)
  < 4mA to 3.8 mA Measuring range under range
  >20mA to 20.5 mA Measuring range exceeding

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

8.3.7 VA 520 Info

Setup → Sensor Setup → Info





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.

9 Maintenance

The sensor head should be checked regularly for dirt and cleaned if necessary. Should dirt, dust or oil accumulate on the sensor element, a deviation will occur in the measuring value. An annual check is recommended. Should the compressed air be heavily soiled this interval must be shortened.

10 Cleaning of the sensor head

The sensor head can be cleaned by carefully moving it in warm water with a small amount of washing-up liquid. Avoid physical intervention on the sensor (e.g. using a sponge or brush). If soiling cannot be removed, service and maintenance must be carried out by the manufacturer.

11 Re-Calibration

If no customer specifications are given then we recommend to carry out calibration every 12 months. For this purpose the sensor must be sent to the manufacturer.

12 Spare parts and repair

For reasons of measuring accuracy spare parts are not available.
If parts are faulty, they must be sent to the supplier for repair.

If the measuring device is used in important company installations, we recommend keeping a spare measuring system ready.

13 Calibration

According to DIN ISO certification of the measuring instruments we recommend to calibrate and if applicable to adjust the instruments regularly from the manufacturer. The calibration intervals should comply with your internal specification. According to DIN ISO we recommend a calibration interval of one year for the instrument VA 520.

On request and additional payment, calibration-certificates could be issued.
The precision is given due to use DKD-certified flow meters and verifiable

14 Warranty

If you have reason for complaint we will of course repair any faults free of charge if it can be proven that they are manufacturing faults. The fault should be reported immediately after it has been found and within the warranty time guaranteed by us. Excluded from this warranty is damage caused by improper use and non-adherence to the instruction manual.

The warranty is also cancelled once the instrument has been opened - as far as this has not been mentioned in the instruction manual for maintenance purposes - or if the serial number in the instrument has been changed, damaged or removed.

The warranty time for the VA 520 is 12 months. If no other definitions are given the accessory parts have a warranty time of 6 months. Warranty services do not extend the warranty time.

If in addition to the warranty service necessary repairs, adjustments or similar are carried out the warranty services are free of charge but there is a charge for other services such as transport and packaging costs. Other claims, especially those for damage occurring outside the instrument, are not included unless responsibility is legally binding.

After sales service after the warranty time has elapsed

We are of course there for you even after the warranty time has elapsed. In case of malfunctions, please send us the instrument with a short-form description of the fault. Please do not forget to indicate your telephone number so that we can call you in case of any questions.

CS INSTRUMENTS GmbH

KONFORMITÄTSERKLÄRUNG

DECLARATION OF CONFORMITY

Wir / We: CS Instruments GmbH, Am Oxer 28c, 24955 Harrislee

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

Verbrauchs-/ Durchflusssensor VA 520
Flow Sensor VA500

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

Elektromagnetische Verträglichkeit Electromagntic compatibility	2004/108/EG 2004/108/EC
Niederspannungsrichtlinie Low Voltage Directive	2006/95/EG 2006/95/EC

Angewandte harmonisierte Normen:
Harmonised standards applied:

EMV-Anforderungen EMC requirements	**EN 61326-1: 2006-10 2013-07** **EN 61000-3-2 : 2015-3**
Niederspannungsrichtlinie Low Voltage directive	**EN 61010-1: 2010**

Anbringsjahr der CE Kennzeichnung: 15
Year of first marking with CE Label: 15

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

CE

Harrislee, den 05.10.2015

Wolfgang Blessing Geschäftsführer