CS INSTRUMENTS GmbH & Co. KG

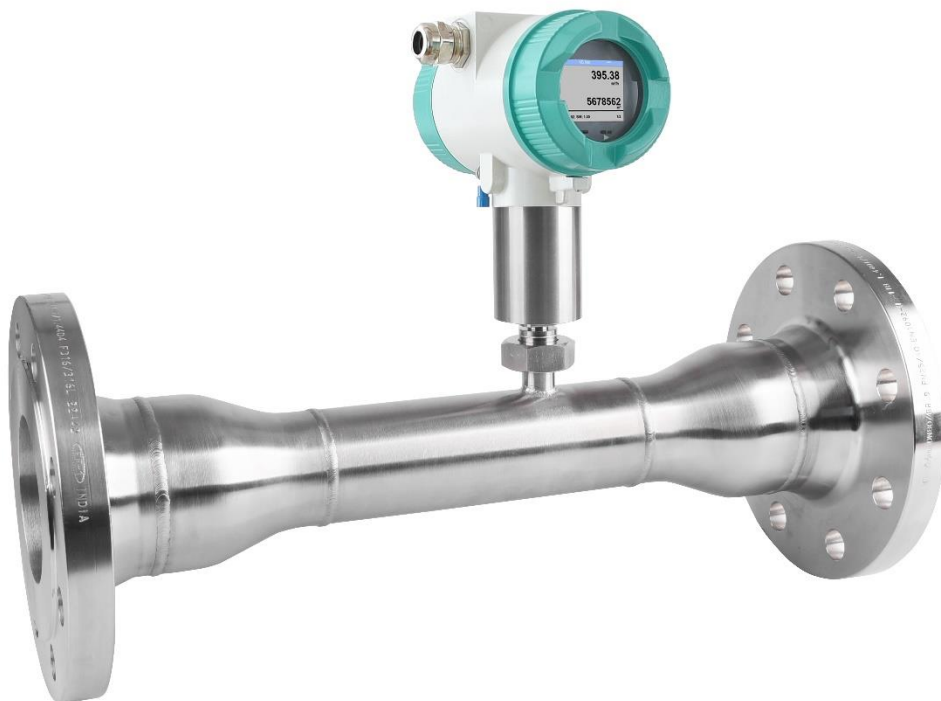EN

Operating Instructions

Flow Sensor VD 570

(for wet compressed air)

I. Foreword

Read these operating instructions carefully and completely before installation, commissioning and maintenance work. Follow the instructions to ensure safe operation and proper functioning.

The operating instructions must always be available at the place of use. It is not permissible to make only individual pages available.

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II. Table of Contents

1   Scope of delivery

- Flow sensor VD 570 with integrated measuring section
- Calibration certificate
- These operating instructions

2   Type plate
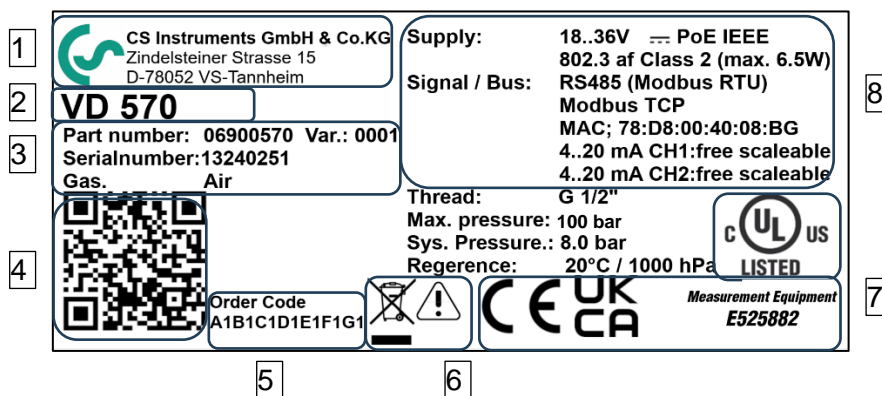
1 – Manufacturer Info

2 – Sensor name

3 – Order numbers, serial number, production date

4 – 2D QR code

5 – Order Code

6 – Warning notice "Operating instructions must be observed".

7 – Conformity/certification marking

8 – Electrical connection data: e.g. available inputs and outputs, supply voltage

3 Device overview
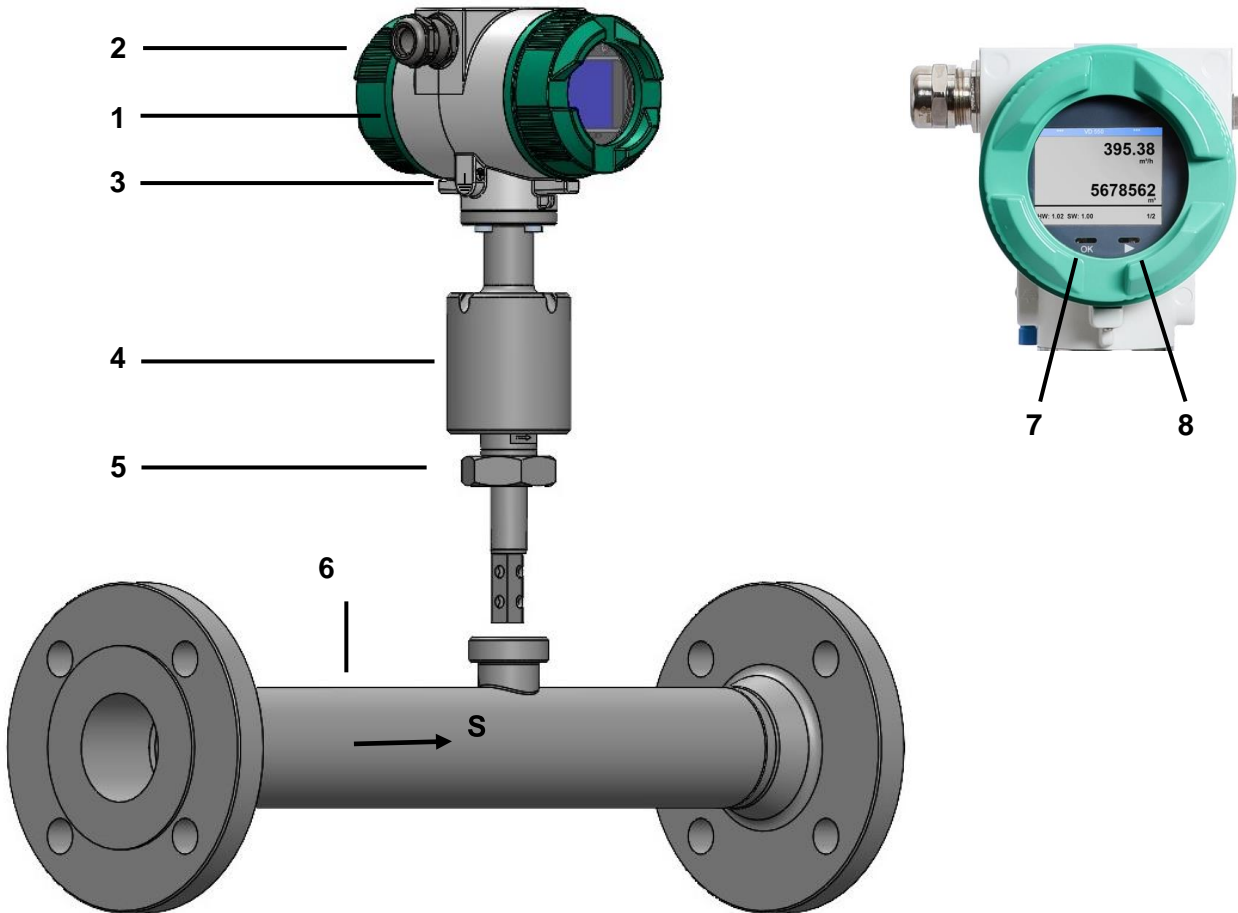
1. Sensor case with Display (350° rotatable)

2. Cable gland (Sensor cable input)

3. Symbol PE / PE Connection

4. Pressure sensors case

5. Lock/connection nut

6. Measuring section

7. -Button for selection menu item (>)

8. ENTER-/OK button

S -- Flow direction

4 Pictograms and Symbols

4.1 Warning Symbols

General Warning symbol (Danger, Warning, Caution)

General note

Installation- and Instruction manual to consider (on Nameplate)

Installation- and Instruction manual to consider

4.2 Electrical symbols

Symbol	Meaning
---	DC Current
∼	AC Currrent
∼	DC- abd AC Cusrrent
⏚	**Earth connection** An earthed terminal that is earthed from the user's point of view via an earthing system..
⏚	**Potential equalization connection (PE: Protective earth)** Earthing terminals that must be earthed before other connections can be made.

5 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

6 Intended use

Flow sensor VD 570 is a measuring probe for flow and consumption measurement of gaseous fluids (air, nitrogen) in pipes (dynamic pressure/differential pressure measurement).

Application areas: Immediately after the compressor (wet side), at high temperatures (up to 85 °C) and/or fast processes (approx. 100 ms), such as for measuring the capacity of compressors, compressed air audits or for measuring the efficiency of compressed air systems.

It can furthermore be used both indoors and outdoors.

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

Operation is only permitted under the following circumstances:

- Only use the sensor indoors

  The sensor must be protected from direct sunlight, rain, splash water and excessive dust.
- Installation only behind a functioning water separator.
- In horizontal lines (recommended) or in risers
- With undisturbed flow in compliance with the required calming sections upstream and downstream of the sensor.
- With the zero point adjustment made correctly and the flow medium specified.
- Up to the maximum permissible flow velocity (224 m/s / 600 m/s).
- According to the technical data and approved ambient conditions.

7 Use contrary to the intended purpose

Misuse when used as a climbing aid! The flow sensor can be damaged. Danger of slipping. Select the installation location so that the flow sensor cannot be used as a climbing aid. Never use the flow sensor as a step or climbing aid.

You will get faulty measurement results with an impermissible installation position. No condensation is allowed on the sensor measuring tips. Condensation or water drops on the sensor element lead to faulty measurement results. Do not install the flow sensor with the measuring tips pointing upwards or in downpipes.

The flow sensor is not suitable for measuring leakage rates.

Measuring range start values only begin at 2 m/s..

8 Safety provisions

8.1 General safety instructions

Important notes for installation and maintenance personnel

The flow sensor may only be installed by trained specialists with knowledge and experience in compressed air and electrical engineering.

Electrical connection, commissioning and maintenance may only be carried out by qualified electricians in accordance with the electrotechnical regulations (DIN EN 50110-1, DIN EN 60204-1 and so on). Prerequisite: Technical training and knowledge of technical standards, EU directives and EU regulations.

Observe applicable national accident prevention regulations and ordinances. Observe measures of general occupational health and safety, such as through the wearing of suitable and prescribed personal protective equipment (PPE).

Only the manufacturer is permitted to perform repairs and adjustments.

Obligations of the installer and system operator

The flow sensor must be checked and maintained regularly by a trained and qualified individual.

Cleaning (the measuring obstacle if required) and maintenance intervals are to be determined by the system operator in accordance with DIN-ISO certification – frequency depending on ambient conditions and anticipated considerations.

Calibration: As part of the DIN ISO certification, have the flow sensor calibrated at regular intervals. The calibration cycles should be based on your internal specifications.

Remove the flow sensor for calibration and send to CS Instruments GmbH & Co.KG.

Keep an identical replacement sensor ready for use in systems that are essential for operation.

NOTE

▶ Without the consultation and approval of CS Instruments GmbH & Co.KG, the warranty claim is void in case of conversion work which is not listed in these operating instructions. This symbol is located at points in the operating instructions where special attention must be paid to ensure that the guidelines, regulations, instructions and the correct procedure for the work are observed and that damage and destruction are prevented.

Obligations of the installer of the system: The installer of the system is responsible for the safety of the system in which the VD 570 is installed. Pay particular attention to the technical data and ambient conditions (chapter 8) and the information on the electrical connection and prescribed connection cables (chapter 11).

Only use flow sensor VD 570 according to its intended purpose.

Risk of injury and accidents when operating outside the permissible ambient/operating conditions or operating temperatures due to overpressure or faulty installation. The pipeline pressure may be **up to 100 bar / 1450 psig** depending on the application. Ensure that the flow sensor is only operated within the permissible limit values (→ type plate, specified max. PS pressure) and that the measuring range full scales are taken into account (→ table chapter measuring range)

Risk of injury due to unauthorised unit modifications, incorrect installation or damaged components. The operating licence expires in these cases. **Operation is only permitted with original components.** Only operate the flow sensor when it is completely assembled. Do not operate a damaged sensor, and prevent further use of the sensor until it is repaired. The sensor must be checked and maintained regularly by trained and qualified individuals. Device modifications are not permitted and release the manufacturer from any warranty and liability.

Dirt particles in the compressed air will cause measurement errors. Dirt particles and liquids can contaminate the measuring tips of the sensor and lead to malfunction or failure. The system operator must ensure the prescribed purity of the fluids approved for the application as well as appropriate cleaning and maintenance intervals. The manufacturer provides no warranty and accepts no liability of any kind with regard to misuse.

Explosion hazard in potentially Ex-protective zones due to ignition of explosives when sparks are generated.

In Ex-protective zones please use the Sensor VD 570 Ex..

Ensure clean compressed air without harmful components. Harmful components include explosive or chemically unstable gases and vapours, acid or base-forming substances such as ammonia, chlorine or hydrogen sulphide and condensates or oils and oil vapours.

Password protection for settings menu: Password protection is provided to protect against unauthorised entries/settings of the system parameters.
For setting the password → chapter 13.3.5.1.

Danger of burns from hot sensor shaft. Hot air/gas/gas mixtures in the pipe can warm up or heat the sensor shaft of the flow sensor. Only touch the sensor shaft when it has cooled down. If applicable, use protective gloves.

Danger to life from escaping compressed air if it is directed at people, especially at high pressure. Shut off the compressed air line and check that it is depressurized. Ensure proper installation..

Danger if the applicable regulations for electrical installations are not observed. For electrical installation, observe the applicable regulations, e.g. DIN EN 50110-1. In Germany observe in particular VDE 0100 in the relevant parts. Observe local regulations. Before working on the electrical installation, switch off all supply circuits, switch off the mains fuse and secure against being switched on again. Ensure voltage-free status. Operate the flow sensor only with permissible connection cables for the mains supply and bus connection → technical data. Establish the electrical connection according to the wiring diagram (→ chapter 11).

Exercise due care when handling packaging materials. Comply with applicable safety and accident prevention regulations. Keep packaging material out of reach of children (choking hazard if small parts are swallowed).

Seals/sealants: As a suitable sealant for the screw connections of the ball valve or flow sensor, sealing rings made of copper or aluminium, elastomer sealing rings with metal backing, sealing tape/sealing cord or other equivalent sealants that meet the demands of the required, necessary compressed air quality can be used. For operating pressures >16 bar, generally use elastomer sealing rings with metal backing.

8.2 Environmental protection

The flow sensor and also the packaging contain recyclable materials that must not be disposed of in the residual waste. At the end of use, dispose of the packaging materials and flow sensor in an environmentally friendly manner in accordance with the regulations in your country.

The operating materials and auxiliary materials consumed and any parts that are replaced during operation of the flow sensor must be disposed of in accordance with environmental protection regulations.
Germany: Disposal code according to the Waste Catalogue Ordinance **(AVV) 16 02 14, e**lectrical and electronic devices and their components

9 Product information

9.1 Product feature

Flow sensor VD 570 is a flow meter for gaseous fluids (air, nitrogen).

Advantages

- Integrated display with indication of flow, consumption, speed, temperature and pressure
- Units can be selected as required: m³/h, m³/min, l/min, l/s, kg/h, kg/min, kg/s, cfm, bar, psi, °C of °F
- Two-button input on the display
- Modbus of RTU interface (RS-485)
- Optional: Ethernet Interface (Modbus-TCP) / PoE (Power over Ethernet)
- 1x analogue output 4...20 mA, adjustable for the flow, pressure, temperature or speed parameters
- Switching/alarm output, galvanically isolated

9.2 Function

Dieser Durchflusssensor für Druckluft misst die This flow sensor for compressed air measures the flow velocity in the centre of the pipe directly after the compressor at high temperatures (up to 180 °C) and/or with fast processes (100 ms).

Based on the mass flow rate, the sensor control calculates the consumption data (based on the differential pressure/dynamic pressure at the sensor tip and the set pipe diameter). This consumption data can be read out directly at the operating unit, output at the analogue output or transmitted to a control centre using a bus system.

Undisturbed flow and the required calming sections in the measuring range are essential for a precise measurement result → chapter 9.

10 Technical data

10.1 Technical data and ambient conditions

Parameters	Flow, total consumption, pressure, temperature, speed
Sensor principle	Differential pressure
Measuring span	1:100 (1..300)
Measuring range	Up to 600 **m/s*** Compressed air 0.04 ... 500 mBar Differential pressure for gases
Accuracy	±1,5 % m.v.**, ±0,3 % f.s.**
Response time	T 99: < 1 second
Temperature of the medium	-30...85 °C/-22...185 °F
Ambient temperature	-20...70 °C/-4…158 °F
Storage temperature	-40...80 °C/-40…176 °F
Pollution level	2
Relative humidity (transport, storage, operation)	99.9% rH, non-condensing (installation after functioning water separator) ISO 8573-1:2010 Water class 5 (7 °Ctd)
Operating pressure	Max. 30 bar (435 psig). At medium temperature <=85 °C Max. 100 bar (1450 psig). At medium temperature <=50 °C
Compressed air requirements min.	ISO 8573-1 (Partikel-Feuchte-Öl) 5-6-4
Pressure accuracy	0.5% f. s. .** (at 20 °C/68 °F)
Installation length/shaft lengths	220 mm (standard length) or 400mm.
Mounting thread	G ½" or NPT ½"
Power supply	18 to 36 VDC via SELV supply, 5 W or Power over Ethernet according to IEEE 802.3af, class 2 (3.84...6.49 W). Fuse protection in supply unit T2.5L 125V If used at an altitude above 2000m, the power supply unit must also be approved for this altitude.
Power consumption	Max. 6.5 W
Signal output	Modbus-RTU (RS-485) 1x AO 4…20 mA (Durchfluss, Druck, Temperatur oder Geschwindigkeit) Optional: Modbus-TCP Ethernet / Ethernet PoE MBus 2x 4..20 mA galv.isolated

Measured values with Modbus-TCPTTCP	Volume flow (m³/min, m³/h, cfm,...) Meter reading (m³, cf,...) Temperature (°C, °F) Pressure (bar, MPa, mbar, psi,...) Air velocity (m/s, fpm)
Electrical connection	Via cable glands to internal connector
Protection class	IP 67

*   with reference to ISO 1217 with 1000 mbar/14.50 psi at 20 °C/68 °F
**   m.v. = from measured value | f. s. = from full scale

10.2 Measuring ranges

Restrictions
Not suitable for measuring leakage rates (measuring range only starts at
2 m/s)

Measuring ranges for VD570 compressed air

(ISO 1217:1000 mbar, 20 °C)

Inner pipe diameter			2…224 m/s measuring range initial values (Start / End)	
Inchl	mm	DN	m³/h	(cfm)
¾"	21,7	DN 20	2…215	1,2…127
1"	27,3	DN 25	3,2…357	1,9…210
1 ¼"	36,0	DN 32	5,7…644	3,4…379
1 ½"	41,9	DN 40	8…886	4,7…522
2"	53,1	DN 50	13…1450	8…853
2 ½"	68,9	DN 65	23…2484	13…1462
3"	80,9	DN 80	31…3440	18…2025

10.3 Dimensions

10.4 Measuring section with Thread
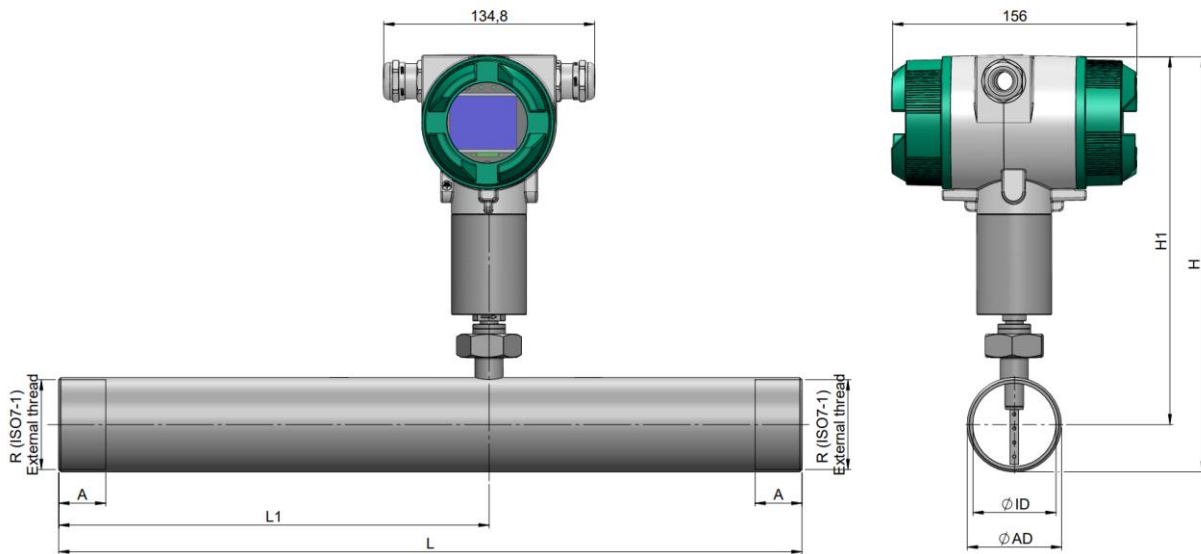
VD570 Version	Pipe sizee	AD / ID (mm)	L (mm)	L1 (mm)	H (mm)	H1 (mm)	R	A (mm)
VD 570 1/2"	DN 15	21,3 / 16,1	300	210	246,2	235,5	R 1/2"	20
VD 570 1/2"	DN 20	26,9 / 21,7	475	275	249	235,5	R 3/4"	20
VD 570 1"	DN 25	33,7 / 27,3	475	275	252,4	235,5	R 1"	25
VD 570 1 1/4"	DN 32	42,4 / 36,0	475	275	256,7	235,5	R 1 1/4"	25
VD 570 1 1/4"	DN 40	48,3 / 41,9	475	275	259,7	235,5	R 1 1/2"	25
VD 570 2"	DN 50	60,3 / 53,1	475	275	265,7	235,5	R 2"	30

10.5 Measuring section with flange (Material stain less steel 1.4404):
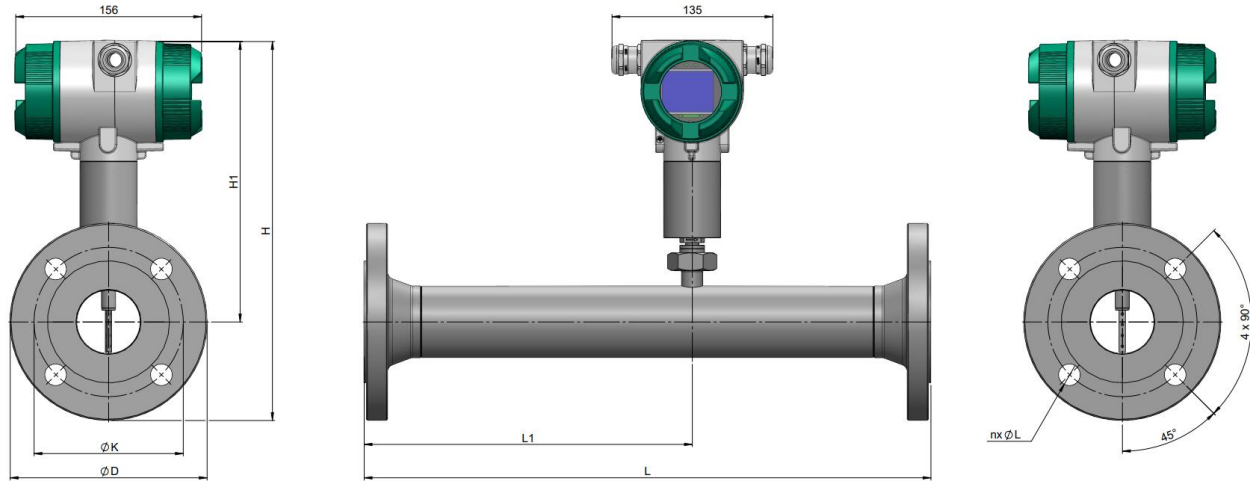
VD570 Version	Piper size	AD/ID (mm)	L (mm)	L1 (mm)	H (mm)	H1 (mm)	Flange EN 1092-1		
							Ø D in mm	Ø K in mm	nxØL in mm
VD 570 1/2"	DN 15	21,3 / 16,1	300	210	283	235,5	95	65	4 x 14
VD 570 1/2"	DN 20	26,9 / 21,7	475	275	288	235,5	105	75	4 x 14
VD 570 1"	DN 25	33,7 / 27,3	475	275	293	235,5	115	85	4 x 14
VD 570 1 1/4"	DN 32	42,4 / 36,0	475	275	305,5	235,5	140	100	4 x 18
VD 570 1 1/4"	DN 40	48,3 / 41,9	475	275	310,5	235,5	150	110	4 x 18
VD 570 2"	DN 50	60,3 / 53,1	475	275	318	235,5	165	125	4 x 18
VD 570 3"	DN 65	76,1 / 68,9	475	275	328	235,5	185	145	8 x 18
VD 570 3"	DN 80	88,9 / 80,9	475	275	335,5	235,5	200	160	8 x 18

10.6 Reduce measuring section with flange (Material stain less steel 1.4404):
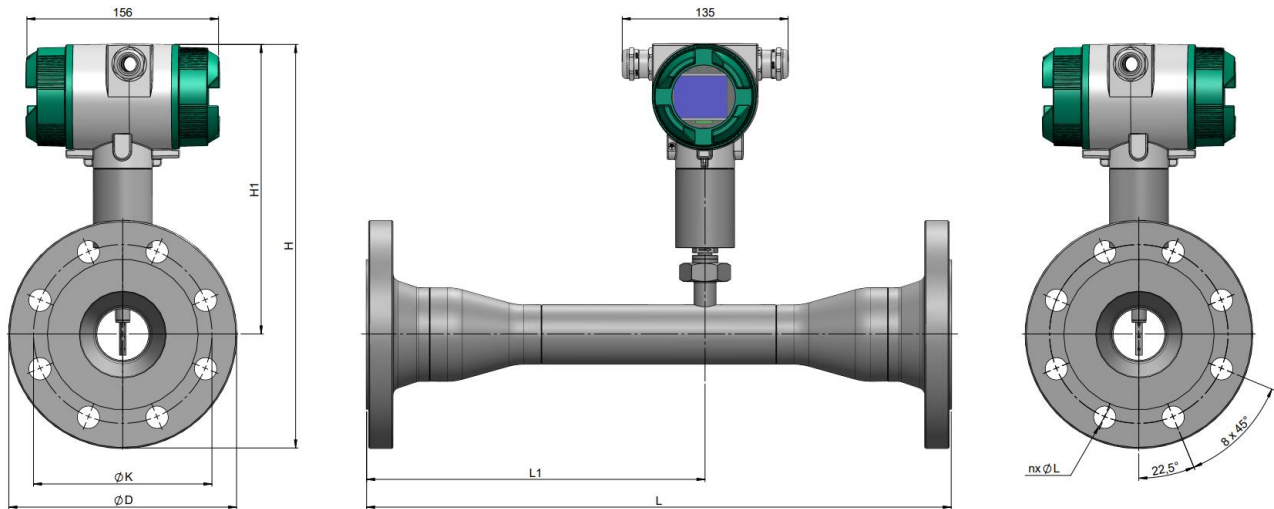
VD570 Version	Pipe	Reduction	AD/ID (mm)	L (mm)	L1 (mm)	H (mm)	H1 (mm)	Flansch EN 1092-1		
								Ø D in mm	Ø K in mm	nxØL in mm
VD 570 1/2"	DN 25	DN25 - DN15	21,3 / 16,1	475	275	293	235,5	115	85	4 x 14
VD 570 1/2"	DN 32	DN32 – DN20	26,9 / 21,7	475	275	305,5	235,5	140	100	4 x 18
VD 570 1"	DN 40	DN40 – DN25	33,7 / 27,3	475	275	310,5	235,5	150	110	4 x 18
VD 570 1 1/4"	DN 50	DN50 – DN32	42,4 / 36,0	475	275	318	235,5	165	125	4 x 18
VD 570 1 1/4"	DN 65	DN65 – DN40	48,3 / 41,9	475	275	328	235,5	185	145	8 x 18
VD 570 2"	DN 80	DN80 – DN50	60,3 / 53,1	475	275	335,5	235,5	200	160	8 x 18
VD 570 3"	DN 100	DN100 -DN65	76,1 / 68,9	475	275	363	245,5	235	190	8 x 22

11 Installation preparations

11.1 Placement of the flow sensor, pipes

- To ensure precise measurement results, the VD 570 must be properly installed in the pipe.

- Only use correctly dimensioned seals suitable for the flow medium.

- Avoid diameter jumps in the pipe (inlet section) at the joints (max. 1 mm). For more information
→ ISO 14511:2019-01.

- Observe specified flow direction → sensor shaft with scaling and flow direction arrows on the sensor head.

- After the installation work, ensure that the pipe is clean.

- Condensation or water drops on the sensor element lead to faulty measurement results. For this reason, do not install the flow sensor with the measuring tips pointing upwards or in downpipes.

11.2 Necessary inlet and outlet sections

NOTE

▶ The principle of thermal mass flow measurement applied here is sensitive to flow disturbances and turbulence.
To maintain the accuracies specified in the data sheets, the sensor must be inserted centrally in a straight piece of pipe at a point with undisturbed flow.
Undisturbed flow is achieved when a sufficiently long section upstream of the sensor (inlet section) and downstream of the sensor (outlet section) that is absolutely straight and without any points of disturbance such as edges, seams, bends and so on is provided.
When placing the sensor, take note of the necessary inlet and outlet sections. Only on this basis are precise measurement results possible.
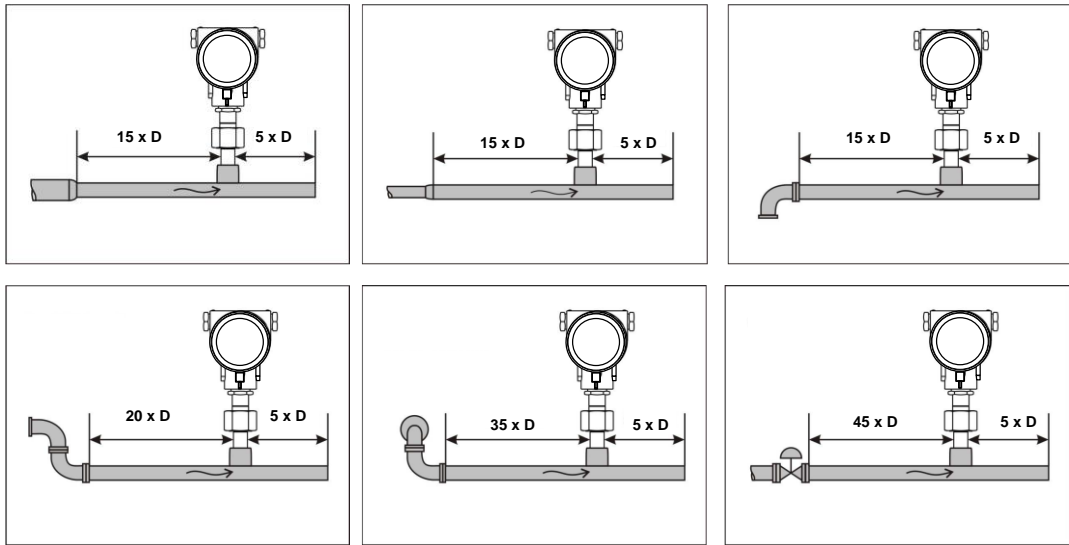
NOTE

▶ The following figures show the respective required minimum lengths of the calming sections. If the sections are shortened, increased deviations of the measurement results need to be calculated → Avoid shortened sections.

Required inlet and outlet sections in the measuring pipe range

inlet and outlet sections: D = inner pipe diameter

Flow obstacle in front of the measuring section	Minimum length Inlet section (L1)	Minimum length Outlet section (L2)
Low curvature (bend < 90°)	12 x D	5 x D
Reduction (pipe narrows to the measuring section)	15 x D	5 x D
Extension (pipe extends to the measuring section)	15 x D	5 x D
90° bend or T-piece	15 x D	5 x D
Two bends at 90° in one plane	20 x D	5 x D
Two bends at 90° Three-dimensional change of direction	35 x D	5 x D
Shut-off valve	45 x D	5 x D

12   Installation VD 570

The VD 570 sensor is supplied pre-assembled together with the measuring section.

- Installation by the customer is only permitted when the system is depressurized
- Check that the VD 570 is correctly installed in the measuring section, the flow direction arrow must point in the correct direction.
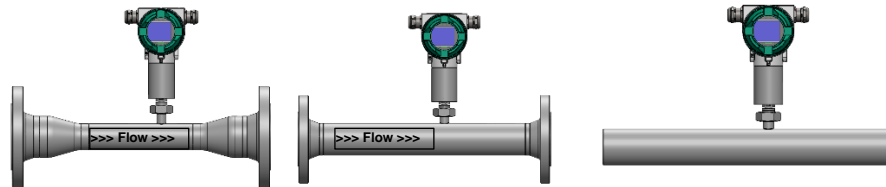
- The connection nut must be tightened to a torque of 25 - 30 Nm.
- Check and ensure that the connections are tight.

12.1 Bedieneinheit drehen

The VD 570 sensor housing can be rotated in both directions, max. 345°. To do this, the locking screw must be loosened. The housing can then be rotated to the desired position; over-rotation is prevented by the internal stop.

Then tighten the locking screw again.

Locking screw

13 Electrical connection

Work on the electrical system may only be carried out by qualified electricians or other competent persons. For electrical installation, observe the applicable regulations, e.g. DIN EN 50110-1. In Germany observe in particular VDE 0100 in the relevant parts or other national regulations accordingly.

13.1 Cable gland, permissible cable diameters

To ensure tightness and strain relief, connecting cables with the following cable diameters must be used.

VD 570 Standard permissible cable diameters: Ø 5- 9mm

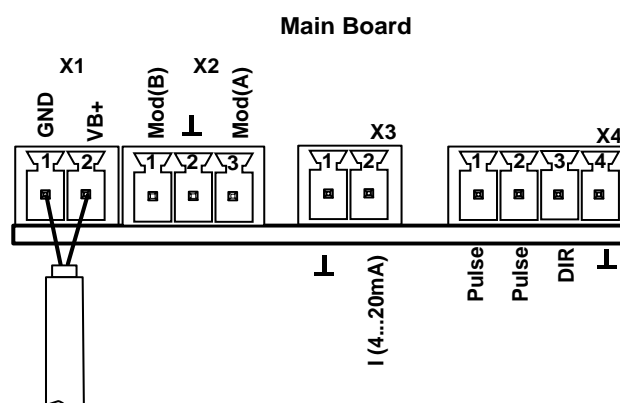VD 570 Ex permissible cable diameters: Ø5-10mm

Tightening torque for cable gland cap nut: 9 Nm

## 13.2 Wiring

13.2.1 General:
- Only carry out wiring in a de-energized state.
- Minimize the length of the insulation stripping
- Unused cable entries must be sealed with end caps
- Use of shielded cables
- Use cables with cross-sections of >= 0.25mm²

13.2.2 Power supply

13.2.3 Modbus RTU

If the sensor is used at the end of the Modbus system, termination is required.
To do this, please connect the enclosed 120R resistor to the connections, pin 1 and pin

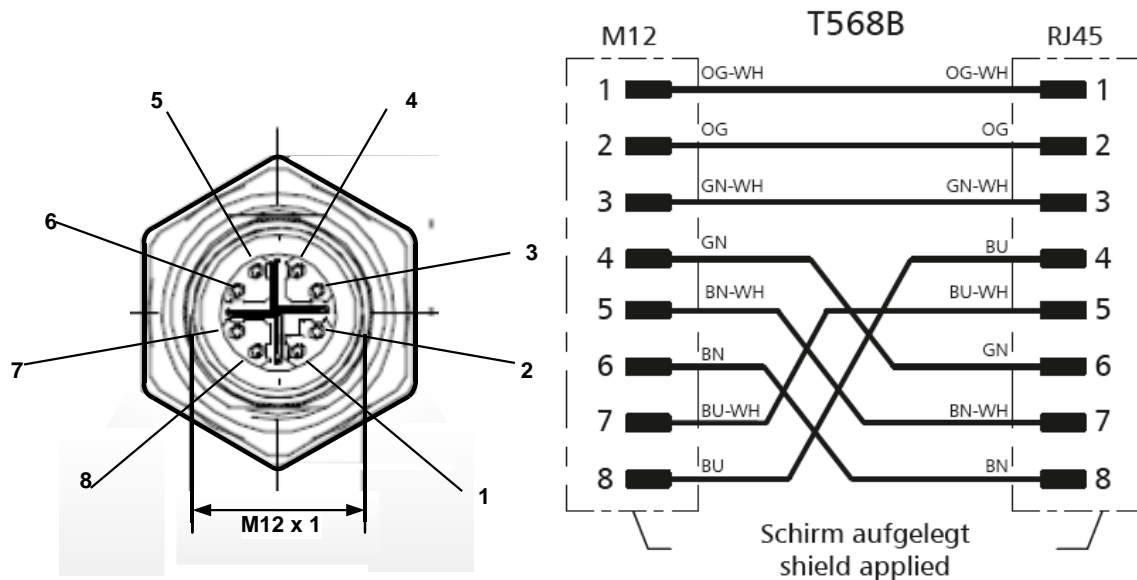**Main Board**

3 of connector "X2".
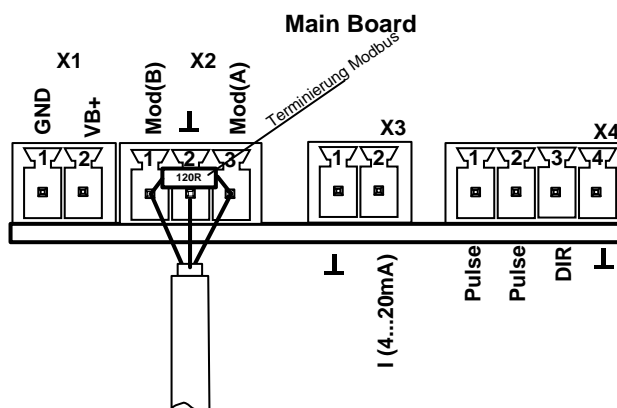
13.2.4 Modbus TCP (Ethernet) Optional PoE*

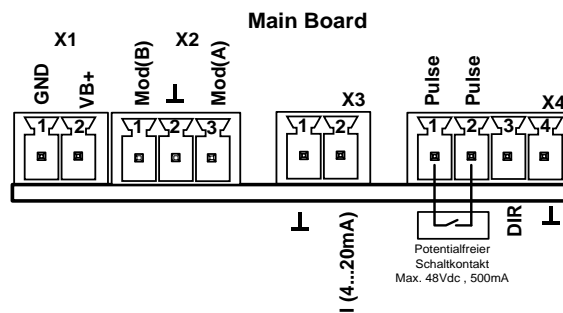<u>M12 x-coded</u>
Data LINES: 1,2 und 3,4
PoE LINES: 5,6 und 7,8
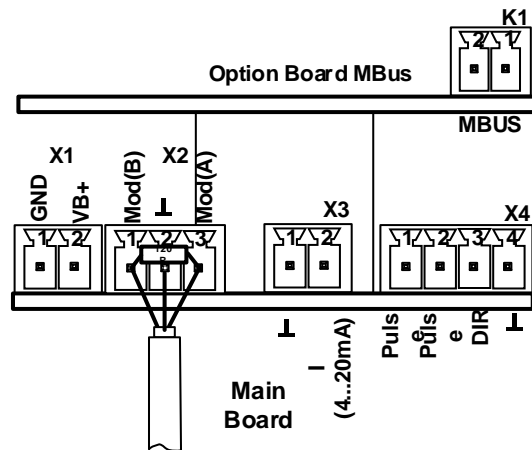

Connection cable: Cat 6.

*PoE: Power over Ethernet

13.2.5 Pulse output

13.2.6 Option MBus

13.2.7 Option 2x 4…20mA (galv. isolated)
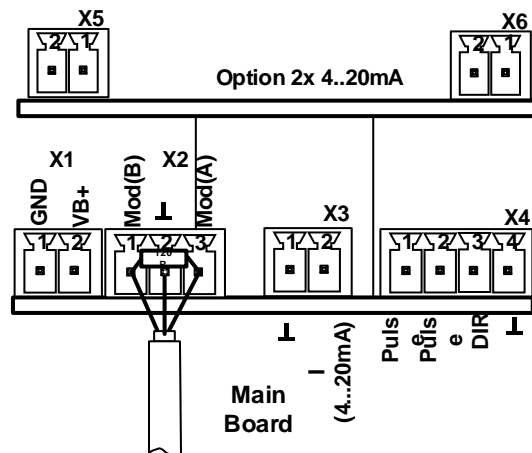
Connector	Pin	Signal description
X1 Power supply	1	VB - (GND)
	2	VB+
X2 Modbus	1	Modbus (B)
	2	Modbus shield
	3	Modbus (A)
X3 urrent output	1	I- Active
	2	I+ Active
X4 Direction / Pulse	1	Pulse / Alarm *
	2	Pulse / Alarm *
	3	Direction input
	4	GND
X5 Current output 1	1	I- Active**
	2	I+ Active **
X6 Current output 2	1	I- Active **
	2	I+ Active **
K1 MBus	1	MBus
	2	MBus

* Outputs are galvanically isolated.

** The Current outputs, X5 and X6, are optional.(Active and passive version available.)

14 Commissioning

WARNING

Danger from pressurised components.

▶ Ensure sufficient and safe compressed air quality with a compressed air system. If operating pressures are too low over an extended period of time, the flow velocity in the pipe increases sharply. This can lead to major impairments in the compressed air preparation. Install a compressed air system to prevent this.

▶ When commissioning for the first time, ensure that the operating pressure is adapted to the consumer network.

14.1 Sensor switch on

1. Ensure that the flow sensor is correctly connected.

2. After the power supply is applied (initial start or after a reset), the reset), the VD 570 flow sensor switches on and performs a device initialization for approx.. 2...3 seconds.

14.2 Zero point adjustment

The VD 570 flow sensor measures the flow velocity (differential pressure principle) in the middle of the pipe.

To achieve the required measuring accuracy, the sensor must first be zeroed at the start of measurement.

1. Pressurize the sensor with system pressure
2. Ensure that there is no flow.
3. Then start the zero point calibration on the sensor.--> Chapter 13 "Operation".
4. The system can then be put into operatio

RECOMMENDATION

▶ Carry out zero point adjustment every 180 days to ensure precise measurement results

15 Operation VD 570

Remark: Only for version with display

The operation of the Vd 570 are carried out by 2 optical keys through the glass cover Thus, the VD 570 can be operated from the outside without opening the cap.

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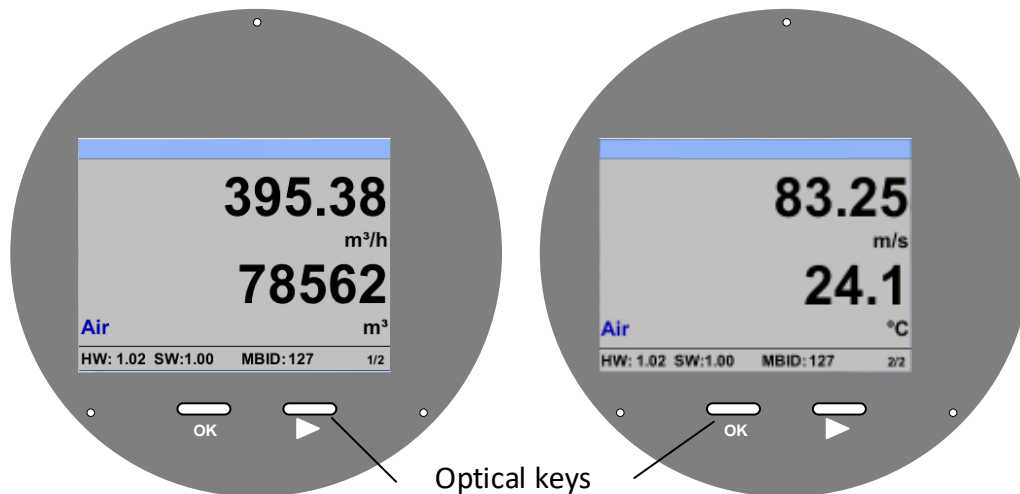
Selection of the individual menu items is done by pressing the "**>**" and confirm by pressing "**OK**".

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.
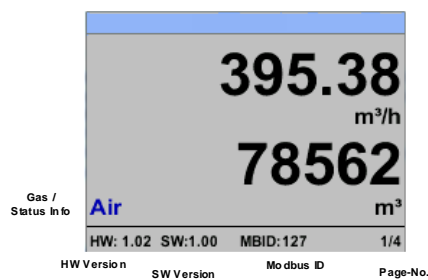
15.1 Main menu (Home)

15.1.1 Intialization

After switching on the VD 570, the initialized screen is displayed followed by the main menu.

15.2 Main menu

Switching to pages 2-4 or back by pressing key „**>**"
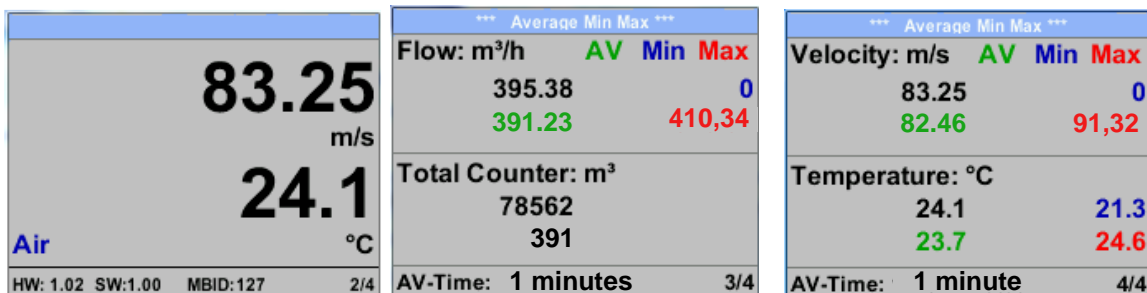
AV-Time (Period for average value calculation) could be changed under *Sensor Setup.-Advanced– AV-Time*

15.3 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).
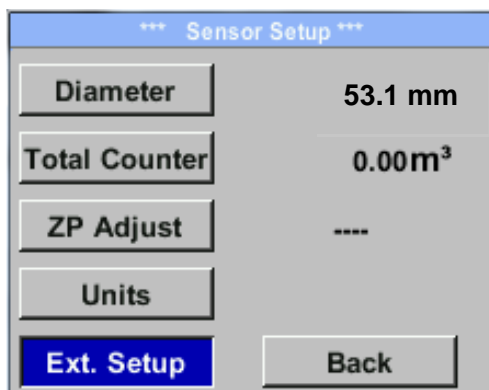
If required the password could be changed at *Setup–User setup-Password*.

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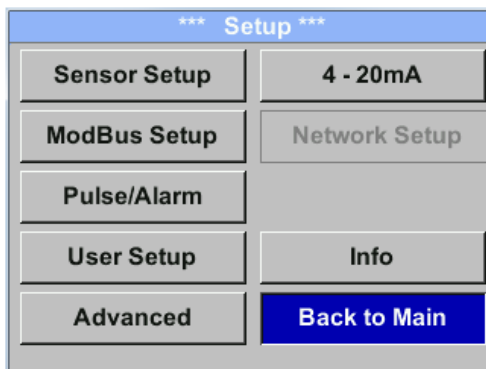
Selection of a menu item or to change a value is done with the key **„>"**, a final move to the chosen menu item or takeover of the value change needs the confirmation by pressing the key **„OK"**

15.3.1 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".*

15.3.1.1 Input / change tube diameter

For VD 570 not adjustable (suspended) as voted on included measuring section with corresponding pipe diameter..

15.3.1.2 Input / change consumption counter

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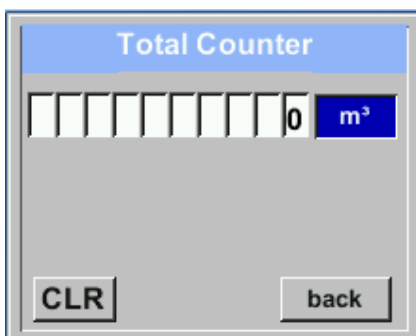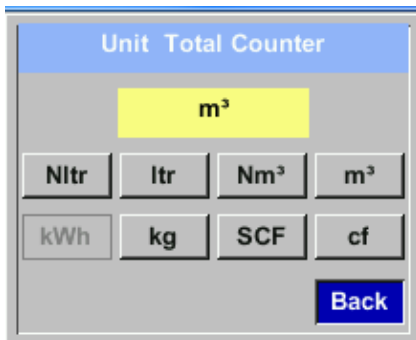
In order to change, e.g. the unit, first select by pressing key *„>"* the button *"Unit"* and then key "*OK*".

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

Important!

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

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

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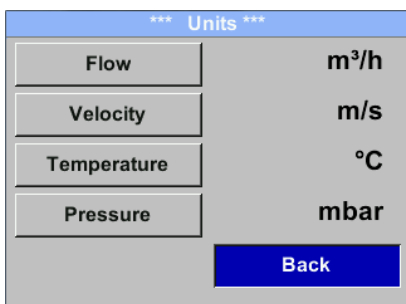
To make changes to the unit for the respective measurement value, first select by pressing *„>"* the field of the „measurement value" and activate „it with *„OK"* .

Selection of the new unit with *„>"*

In case the quantity of units selectable are
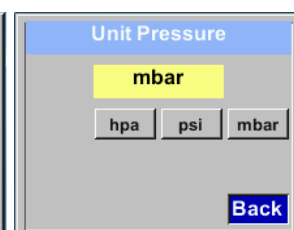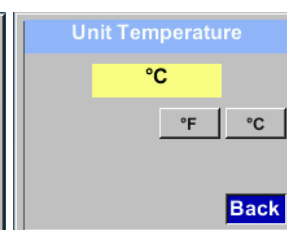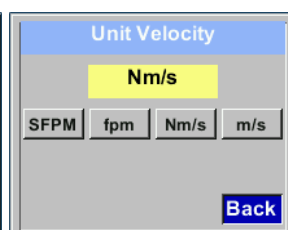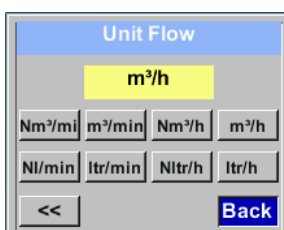
15.3.1.4 Definition of the reference conditions

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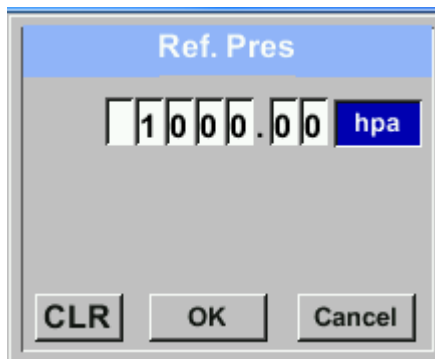
In order to change, e.g. the unit, first select by pressing key *„>"* the field *"Units"* and then key "*OK"*.

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

Setup → Sensor Setup→ Advanced → Ref.Temp
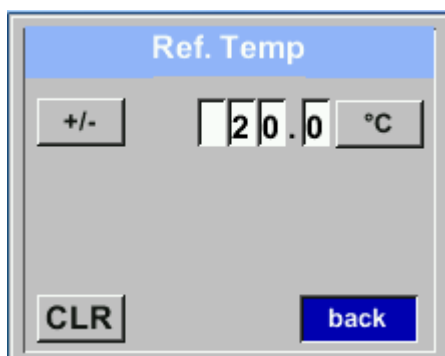
Input / change of the value by selecting the respective position with button *„>"*and entering by pressing button *„OK".*

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

15.3.1.5 Setting of Zeropoint and Low-flow cut off

Setup → Sensor Setup→ ZP Adjust →

<table>
<tr><td colspan="2">**Zero Point Setup**</td></tr>
<tr><td>**DeltaPressure**</td><td>----- hpa</td></tr>
<tr><td>ZeroPnt</td><td>180 days remaining</td></tr>
<tr><td>CutOff</td><td>----- m³/h</td></tr>
<tr><td>Reset</td><td>**Back**</td></tr>
</table>

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

Setup → Sensor Setup → ZP Adjust → ZeroPnt

<table>
<tr><td colspan="2">**Zero Point Setup**</td></tr>
<tr><td>**DeltaPressure**</td><td>----- hpa</td></tr>
<tr><td>ZeroPnt</td><td>1 0 days remaing</td></tr>
<tr><td>CutOff</td><td>----- m³/h</td></tr>
<tr><td>**Reset**</td><td>Back</td></tr>
</table>

<table>
<tr><td colspan="2">**Zero Point Setup**</td></tr>
<tr><td>**DeltaPressure**</td><td>----- hpa</td></tr>
<tr><td>ZeroPnt</td><td>180 days remaining</td></tr>
<tr><td>CutOff</td><td>----- m³/h</td></tr>
<tr><td>**Reset**</td><td>Back</td></tr>
</table>

If the sensor shows the message *CalZeroPnt"* " on the display, a zero point calibration should be carried out, see also chapter 12.2 "Zero point calibration".

> The zero point calibration must be carried out under system pressure and without flow

⚠

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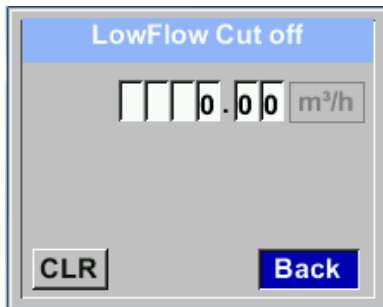
With the low-flow cut off activated, the flow below the defined "LowFlow Cut off" value will be displayed as 0 m³/h and not added to the consumption counter.

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

Setup → Sensor Setup → ZP Adjust t → Reset
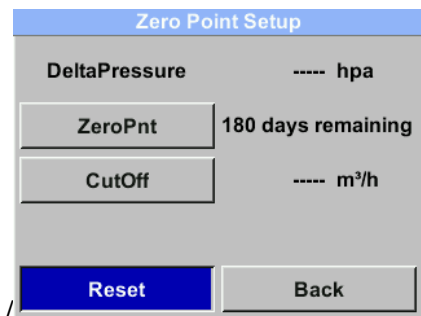
By selection of *„Reset"* all settings for *„ZeroPnt"* and. *„CutOff"* are reset.

Menu item to be select with button *„>"* and confirm the reset with *„OK"* .

15.3.2 Modbus RTU

15.3.2.1 Setup

The Flow sensors VD 570 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, select with key „△" the field *"ID"* and then pressing "*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

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"

15.3.3 Modbus TCP (Optional)

15.3.3.1 Setup

The Flow sensors VD 570 comes optional with a Modbus TCP Interface (HW Interface:M12 x 1 X-coded connector).

Device supports with this option the Modbus TCP protocol for communication with SCADA systems. TCP port is set to 502 by default. Port can be changed at the sensor or using PC Service Software

Modbus device address (Unit Identifier) can be set in the range of 1- 247.
Specification and description of the Modbus protocol is free to download on: www.modbus.org.

Supported Modbus commands (functions):

Command	Code	Description
Function Code	3	(Read holding register)
Function code	16	(Write multiple registers)

For more details, please see **VA 5xx Modbus RTU_TCP Installation in the actual version**

Settings → Network Setup

Network	
IP Address:	192.168.001.002
Hostname:	VA_ETH_Simulation
MAC Address:	78:d8:00:40:00:00
IP Address	ModbusTCP
	Back

15.3.3.1.1 Network Setup DHCP

Settings → Network Setup Settings → IP Address

*** IP Address Setup ***	
DHCP	✔
IP Address	192.168.172.010
Subnet	255.255.255.000
Gateway	192.168.172.001
Advanced	Save	Cancel

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

Remark:

With activated DHCP the automatic integration of the sensor in an existing network is possible, without a manual configuration.

Storing of settings by pressing *"Save"*

15.3.3.1.2 Network Settings static IP

Settings → Network Setup Settings → IP Address→ IP Address
Settings → Network Setup Settings → IP Address→ Subnet
Settings → Network Setup Settings → IP Address→ Gateway

For manual (static) IP, the *"IP Address",* *"Subnet"* and *"Gateway"* selection keys must be selected and activated with *"OK".*

The first data field of the selection, in this case the IP address, is then marked (red).

Confirm with *"OK"* the corresponding input menu is opened.

By means of *">"*, the next data field is changed.

Store the settings by *„Save"*

15.3.3.1.3 Modbus TCP Settings

Settings → Network Setup Settings → IP Address → MB TCP

Settings → Network Setup Settings → IP Address → ID
Settings → Network Setup Settings → IP Address → Port

For changes, e.g. the sensor ID,

select with key *„>"* the field *"ID"* and then

pressing "*OK"*.

Select the desired position by pressing the

">" and select it with *"OK*" button.

Change values by pressing the *„>"* values

takeover by pressing *"OK".*

Input for the port is done analogue.

By means of the button *"Byte Format"* it is

15.3.3.2 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 6 = 57600 7 = 115200
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

.3   **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
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_TCP_Installation_in the actual version.

15.3.4 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

15.3.4.1 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.

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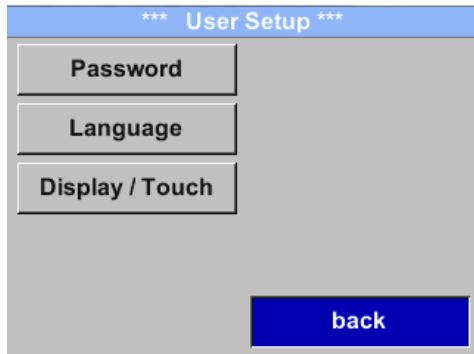
To make changes, first select a menu with button „*>*" and confirm selection by pressing „*OK*" .

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.

15.3.5.2 Language
Settings → UserSetup → Language
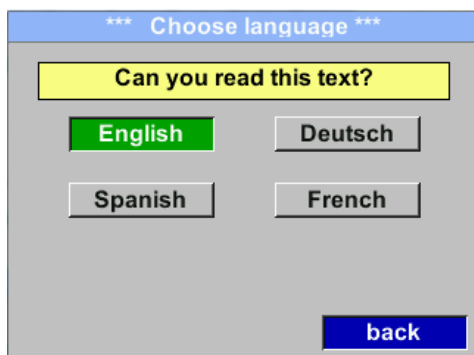
Currently 4 languages have been implemented and could be selected with button „*>*".

Change of language by confirming with *"OK"*.

15.3.5.3 Display / Touch

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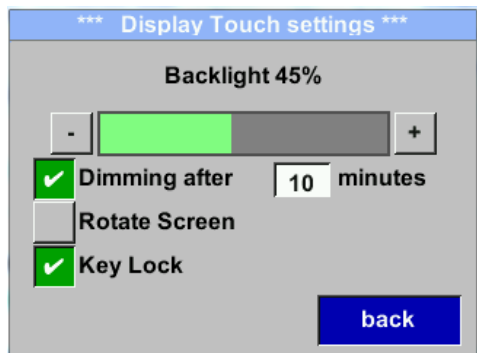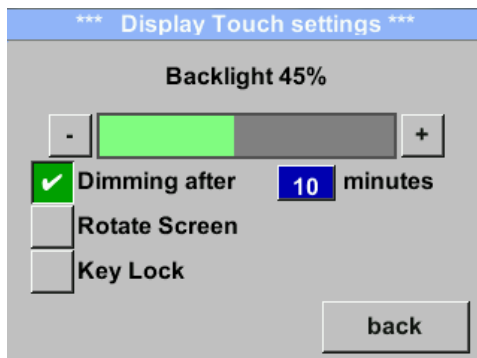
With the button *„-"* and with button *„+"* it is possible to adjust the backlight / display brightness. The actual / adjusted backlight brightness is showed in the graph *„Backlight."*

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°.

15.3.6 Advanced

Settings → Advanced

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

15.3.7 4 -20mA
Settings → 4-20mA

Channel 1	**Flow**
Channel 2	unused
Error Current	**22mA**
	Back

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

Settings → 4-20mA→ Channel 1

*** 4 - 20mA Channel 1 ***

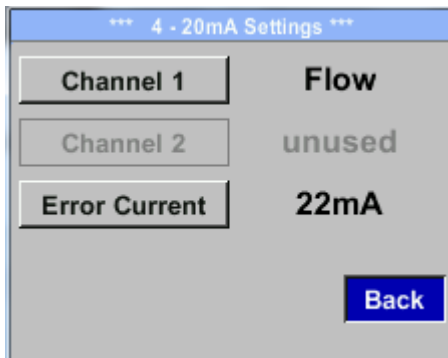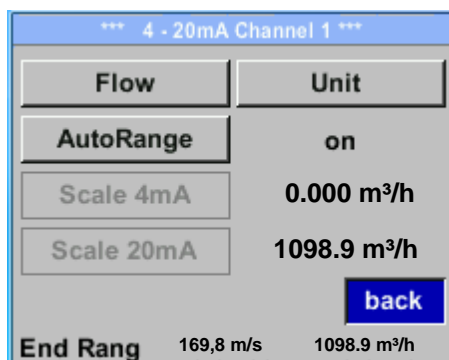|	
Flow	**Unit**
AutoRange	on
Scale 4mA	0.000 m³/h
Scale 20mA	1098.9 m³/h
	back

End Rang 169,8 m/s   1098.9 m³/h

Unit Flow

m³/h

Nm³/mi	m³/min	Nm³/h	m³/h
Nl/min	ltr/min	Nltr/h	ltr/h
<<			Back

*** 4 - 20mA Channel 1 ***

Flow	**Unit**
AutoRange	on
Scale 4mA	0.000 m³/h
Scale 20mA	1098.9 m³/h
	Save Cancel

End Rang 169,8 m/s   1098.9 m³/h

The 4-20 mA Analogue output of the Sensor VD 570 can be individually adjusted.

It is possible to assign following values *„Temperature"*, *„Velocity"* und *„Flow"* to the channel CH 1.
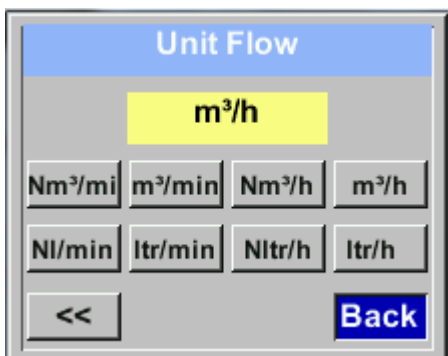
To make changes, first select the value item with button *„>"* and confirm.
Moving between the different measurements values or to deactivate the 4-20mA with setting to *„unused"* by pressing *„OK"*.
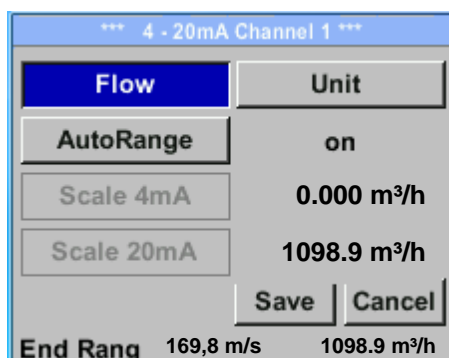
To the selected measurement value a corresponding / appropriate unit needs to be defined. Select *„Unit"* with *„>"* and open menu with *„OK".*
Select required unit with *„>"* and take over by pressing *„OK".*

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

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.

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

Remark:

Default setting VD 570 for analogue output is   Channel 1:0…max. flow [m³/h]
Default settings for VD 570 with option board analogue output   Channel 1:0…max. flow [m³/h]
                                                                 Channel 2: -20°C … 100°C]

For max. flow see label on Sensor.

15.3.8 VD 570 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.

15.4 MBus

15.4.1 Change of communication settings

The communication settings Primary-address and baud rate could be changed directly at the sensor, in case sensor has a display, or with the PC Service software (Order-No. 0554 2007).

Settings → M-Bus

```
***   Settings ***
 Sensor Setup      4 - 20mA
 ModBus Setup       M-Bus
 Pulse/Alarm
  User Setup         Info
  Advanced       Back to Main
```

Settings → M-Bus → Adr

Possible inputs are values from 1-255 (Default setting = 1)

```
***   M-Bus ***
 Adr   1   Baudrate    2400
 ID    123456
  [ ] Units as String

                       back
```

```
    Primary Address

          [ ][ ][1]

 CLR                   back
```

With „>" select the button „Adr" and confirm it with „*OK*.

Select the desired position by pressing the button „△" and select it with "*OK*" button.

Change values by pressing „>" with step of 1, taking the value by confirming with "*OK*".
Move to next position with „>"

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

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

Settings → M-Bus → Baudrate

Possible values are 2400, 4800 and 9600 Baud (Default setting = 2400).

```
***   M-Bus ***
 Adr   1   Baudrate    2400
 ID    123456
  [ ] Units as String

                       back
```

Baudrate change by pressing the button „*OK*"

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

Leaving the menu with „*Back*".

15.4.2 Coding VIF (Value Information Field)

The Sensor offers two possibilities for coding the Value Information Field (VIF).

- Primary VIF (The units and multiplier correspond to MBus specification 4.8 chapter 8.4.3
- Plain Text VIF ((units are transmitted as ASCCII characters. So units that are not included in MBus specification chapter 8.4.3 are possible

Download:

https://m-bus.com/downloads

15.4.3 Default Settings communication

Primary Address*:   1
ID: Serial number of Sensor
Baud rate*:   2400
Medium*:   depending on medium (Gas or Compressed Air)
Manufacturer ID: CSI
VIF coding: Primary VIF

Both addresses, Primary address and ID, could be searched in the M-Bus system automatically.

15.4.4 Default values transmitted

Value 1 with [Unit]*:   Consumption [m³]
Value 2 with [Unit]*:   Flow [m³/h]
Value 3 with [Unit]*:   Gas temperature [°C]

*All Values could be changed / preset in production or with CS Service software (Order-No. 0554 2007)

16 Error messages

16.1 Errors messages

- **Low Voltage**
  Bei einer Versorgungsspannung kleiner 18V wird die Warnmeldung „**Low Voltage**"
  angezeigt.Dies bedeutet der Sensor kann nicht mehr ordnungsgemäß arbeiten / messen
  und somit stehen keine Messwerte für Duchfluss, Verbrauch sowie Geschwindigkeit zur
  Verfügung.

- **Internal Error**
  In the case of this **"Internal Error**" message, the sensor has detected an internal read error
  on e.g. EEProm , AD converter etc..

- **Temp out of Range**
  If the media temperature is outside the specified temperature range, the status message
  status message **"Temp out of Range".** This leads to incorrect measured values (outside
  the sensor specification)

- **Low Voltage 4-20mA**
  For sensors with a galvanically isolated 4-20mA output, a minimum supply voltage of 17.5V
  is required. If the voltage falls below this, the error message **"Low Voltage 4-20mA"** is
  displayed

Error messages:
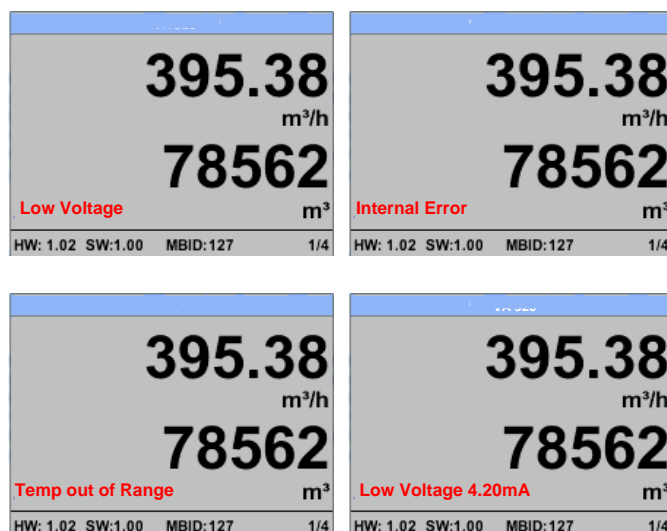
17 Supplementary Documentation

- Supplementary Documentation for Ex-Version:

  Flow / Consumption Sensor VD 550 Ex / VD 70 Ex - Ex-Documentatio

18 DECLARATION OF CONFORMITY

KONFORMITÄTSERKLÄRUNG

DECLARATION OF CONFORMITY

Wir CS Instruments GmbH & Co.KG
We Gewerbehof 14, 24955 Harrislee

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

Verbrauchs-/ Durchflusssensor VD 570
Flow Sensor VD 570

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

Elektromagnetische Verträglichkeit Electromagntic compatibility	2014/30/EU 2014/30/EC
RoHS (Restriction of certain Hazardous Substances)	2011/65/EC & 2015/863/EC

Angewandte harmonisierte Normen:
Harmonised standards applied:

EMV-Anforderungen EMC requirements	**EN 55011:2016 + A2:2021-04** **EN 61326-1: 2013-07**
RoHS (Restriction of certain Hazardous Substances)	**EN IEC 63000:2018**

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

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Harrislee, den 22.04.2024

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Wolfgang Blessing Geschäftsführer

VD 570 EN V1.00   **52**