
EN

# Operating Instructions Flow Sensor VD 550

(for wet compressed air)

T-Nr.:

# 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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**Impressum**

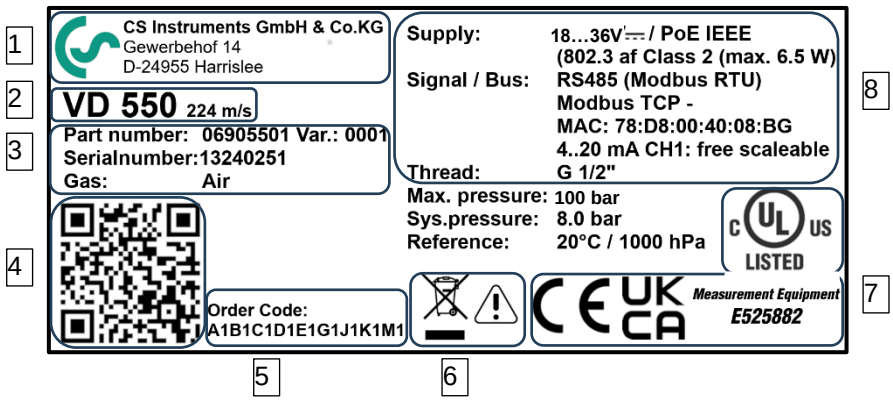
Translation of the original German instructions. VD 550 | DE | V1.00

# II. Table of contens

# 1 Scope of delivery

- Flow sensor VD 550
- Alignment wrench
- Calibration certificate
- These operating instructions

# 2 Type plate




1 - Manufacturer info

2 - Sensor name

3 - Order number, serial number, production date

4 - 2D QR code

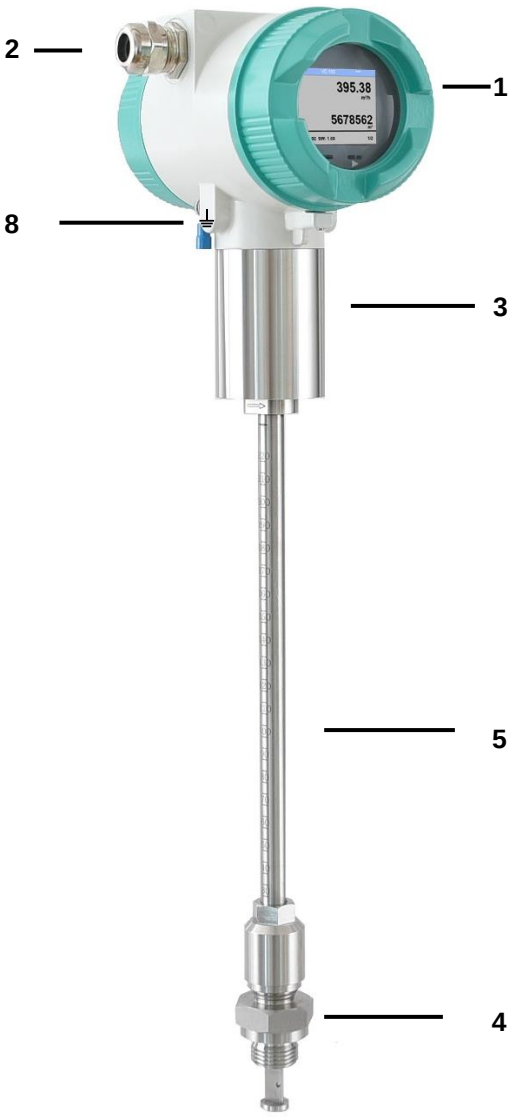
5 - Order code

6 - Warning "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 (345° rotatable)
2. Cable gland ( Sensor cable input))
3. Pressure sensors case
4. Flock nutr
5. Shaft with scaling
6. -Button for selection menu item (>)
7. ENTER-/OK button
8. PE Symbol / - connection

# 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**<br>An earthed terminal that is earthed from the user's point of view via an earthing system.. |
|  | **Potential equalization connection (PE: Protective earth)**<br>Earthing terminals that must be earthed before other connections can be made. |

# 5 Signalwords according ISO 3864 and ANSI Z 535

| | |
|---|---|
| Danger! | Imminent danger<br>As a consequence of incorrect handling: serious personal injury or death |
| Warning! | Possible harzard<br>As a consequence of incorrect handling: possible serious injury or death |
| Caution! | Imminent hazard<br>As a consequence of incorrect handling: possible personal injury or damage |
| Note! | Possible harzard<br>As a consequence of incorrect handling: possible personal injury or damage |
| Important! | Additional notes, information, tips<br>As a consequence of incorrect handling: Disadvantages in operation and maintenance, no danger |

# 6 Intended use

The VD 550 consumption sensor is used for continuous flow measurement based on a dynamic pressure/differential pressure measurement.

The VD 550 can be configured to measure a predefined selection of pure gases or gas mixtures.

Consumption measurement of gases such as air (also wet compressed air), technical gases etc. as well as explosive gases such as natural gas, methane, propane and hydrogen with ATEX approval.

It can furthermore be used both indoors and outdoors.

Improper or unintended use may jeopardize operational safety. The manufacturer is not liable for any damage arising from this.

**Zulässig ist ein Betrieb nur in folgenden Fällen:**

- 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 precise positioning of the measuring tips of the sensor on the centre of the pipe.
- With correctly aligned sensor at angular deviation not exceeding 2° (recommended installation position with 15° inclination to the horizontal).
- With the zero point adjustment made correctly, the inner diameter set and the flow medium specified.
- Up to the maximum permissible flow velocity -See type plate
- According to the technical data and approved ambient conditions.
- With correct calibration

# 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.

**The flow sensor is not suitable for measuring leakage rates.**

# 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 550 is installed. Pay particular attention to the technical data and ambient conditions (chapter 7) and the information on the electrical connection and prescribed connection cables (chapter 10).

Only use flow sensor VD 550 for 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 in the appendix). In **application areas >16 bar/>232 psig, a high-pressure protection** is required.

**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.**

Please use the VD 550 Ex sensor in explosion-protected areas.

**Password protection for settings menu:** Password protection is provided to protect against unauthorised entries/settings of the system parameters. For setting the password → chapter 11.3.5.1.

**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 at the installation site with a G ½" or NPT ½" ball valve already installed. If a ball valve has not yet been installed, depressurise the system and check the depressurised state. Install G ½" or NPT ½" ball valve (depending on version) according to the specification. 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 10).

**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.

## 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**, electrical and electronic devices and their components

# 9 Technical data

## 9.1 Technical data and ambient conditions

| | |
|---|---|
| Measured variables | Flow rate, total consumption, pressure, temperature, speed |
| Sensor principle | Differential pressure |
| Measuring range | Up to 600 **m/s*** Compressed air<br>0.04 ... 500 mBar Differential pressure for gases |
| Accuracy | ±1.5 % of m |
| **Repeatability:** | 0.25% of the measured value with correct installation |
| **Accuracy data:** | related to.<br>Ambient temperature :22°C +/-2°C,<br>System pressure:: 6 bar |
| Media temperature<br>(measurment tip) | -30 ...180 °C / -40 … 356 °F (Standard)<br>-30 ...85 °C / -40 … 185 °F (EX-Version) |
| Ambient temperature | -20 ... 70 °C / -4 … 140 °F |
| Storage temperature | -40 ... 80 °C / -40 ... 176 °F |
| Pollution level | 2 |
| Relative humidity<br>Transportation, storage<br>Operation | 99.9% rH, non-condensing<br>(installation after functioning water separator)<br>ISO 8573-1:2010 Water class 5 (7 °Ctd) |
| Operating pressure | Up to 100 bar (1450 psig)<br>Provide additional high pressure protection for pressures >16 bar (>232 psig) |
| Compressed air requirements min. | ISO 8573-1 (particle moisture oil) 5-6-4 |
| Installation length / shaft lengths | 220 mm (standard length), 400 mm |
| Mounting thread | G ½" or NPT ½" |
| Power supply | 18 to 36 VDC via SELV supply,<br>5 W or Power over Ethernet in accordance with IEEE 802.3af, class 2 (3.84 ... 6.49 W).<br>Fuse protection in supply unit T2.5L 125V<br>If used at an altitude of over 2000 m, the power supply unit must also be approved for this altitude |
| Power consumption | Max. 6.5W |
| Signalausgang | Modbus-RTU (RS-485)<br>Optional: Modbus-TCP Ethernet<br>1x AO 4…20 mA RL<500Ohm<br>Optional 2x 4.20mA galvanically isolated<br>MBus |

| | |
|---|---|
| | (flow rate, temperature or speed)<br>Alarm output ; 48Vdc/0.5A (NC-normally closed)<br>Pulse output: 48Vdc/0.5A |
| Protection class | IP 67 |
| Display: | **2**“ TFT Color-Display (320 x 240) |
| Material | Die-cast aluminum housing<br>Sensor tube stainless steel 1.4404 |

* based on ISO 1217 with 1000 mbar / 14.50 psi at 20 °C / 68 °F
** v. M. = from measured value | v. E. = from final value

## 9.2 Signal circuits

### 9.2.1 Modbus

- According to standard EIA/TIA-485

### 9.2.2 Current output

#### 9.2.2.1 Active

- Galvanically isolated
- 4 ... 20 mA
- $R_L$ < 500 Ohm

#### 9.2.2.2 Passive

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

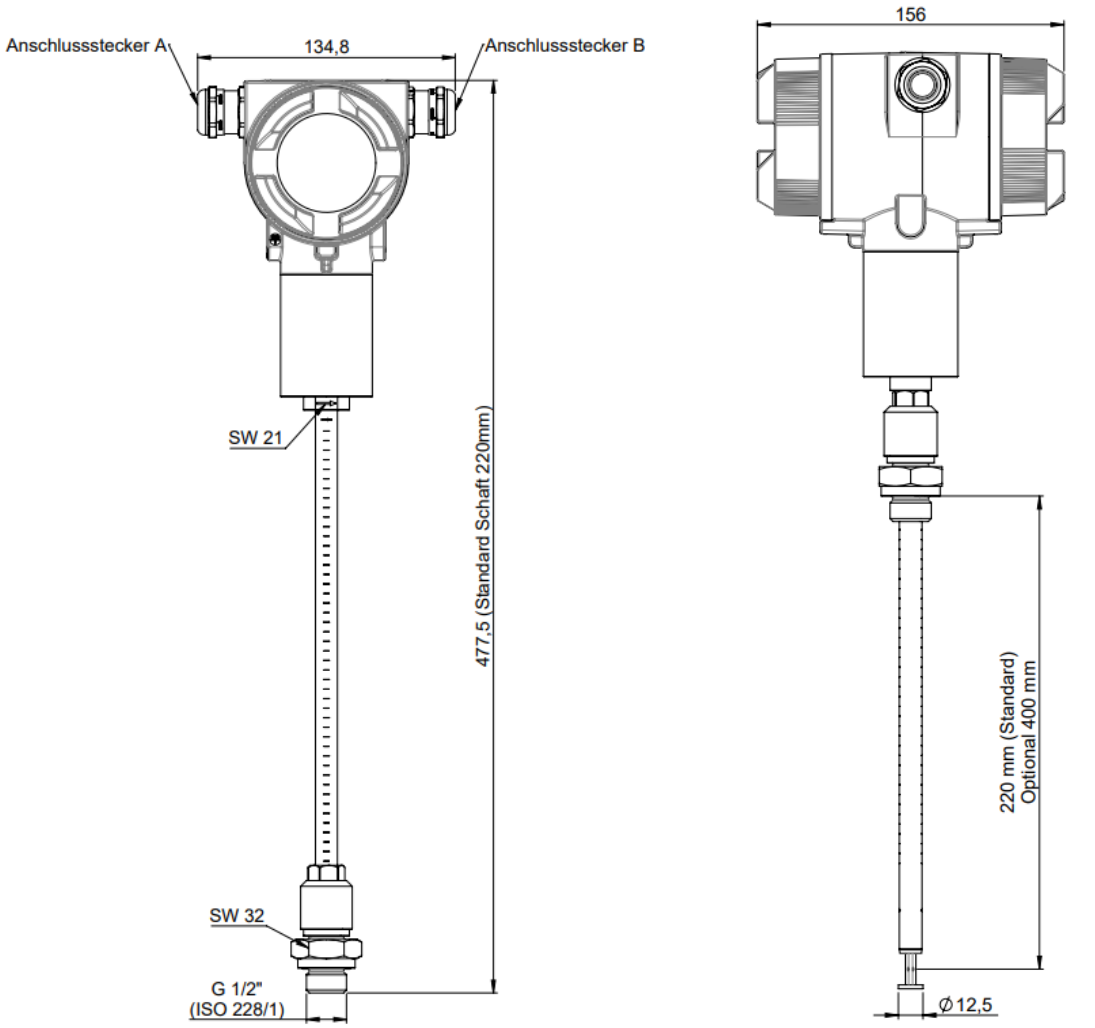
### 9.2.3 Impulse

- Galvanically isolated / potential-free switching contact
- Passive: 48Vdc , 500 mA
- Max. Pulse output frequency 50Hz

### 9.2.4 Alarm

- Galvanically isolated
- Max. 48Vdc, 500mA

## 9.3 Dimensions VD 550



### 9.4 Measuring ranges flow rate VD 550

The VD 550 volumetric flow sensor is available in 3 different versions:

- High-speed version up to max. flow velocity of 224 m/s
- Ultra High Speed versionup to max. flow velocity of 600 m/s
- Version A3 0.04 ... 500 mBar differential pressure (gases)

The probes are **preset** for an internal pipe diameter **of 53.1 mm**.

| | Measuring range | Analog output Scaling |
|---|---|---|
| • High speed version | 0...1450 m³/h | 4mA = 0 m³/h, 20mA = 1450 m³/h |
| • Ultra Speed version | 0...3884 m³/h | 4mA = 0 m³/h, 20mA = 7903884 m³/h |

If the sensors are used in **other** pipe diameters, the corresponding inside diameter must first be entered for versions with a display.

The corresponding measuring range end values can be found in chapter 7.4.

**Example:**

Pipe 1", inner diameter 25mm

| | Measuring range | Analog output Scaling |
|---|---|---|
| • High speed version | 0...295 m³/h | 4mA = 0 m³/h, 20mA = 295 m³/h |
| • Ultra Speed version | 0...790 m³/h | 4mA = 0 m³/h, 20mA = 790 m³/h |

To change the inner pipe diameter and adjust the scaling of the 4... 20mA analog output, see chapter 11 "Operation"

### 9.4.1 Measuring range end values „224 m/s“

| Measuring tube Inner diameter | | Volume flow (measuring range end value in Nm³/h) | | Max |
|---|---|---|---|---|
| Închl | mm | **Air 2)** | **Air 3)** | **m/s** |
| 3/4" | **21,7** | 215 | 198 | 224,0 |
| **1"** | **25,0** | 295 | 272 | 224,0 |
| | **26,0** | 321 | 296 | 224,0 |
| | **27,3** | 357 | 328 | 224,0 |
| | **28,5** | 391 | 360 | 224,0 |
| | **30,0** | 437 | 402 | 224,0 |
| 1 1/4" | **32,8** | 529 | 487 | 224,0 |
| | **36,0** | 644 | 592 | 224,0 |
| | **36,3** | 655 | 603 | 224,0 |
| 1 1/2" | **39,3** | 775 | 713 | 224,0 |
| | **40,0** | 804 | 740 | 224,0 |
| | **41,9** | 886 | 816 | 224,0 |
| | **43,1** | 941 | 866 | 224,0 |
| | **45,8** | 1068 | 983 | 224,0 |
| 2" | **50,0** | 1283 | 1180 | 224,0 |
| | **51,2** | 1346 | 1239 | 224,0 |
| | **53,1** | 1450 | 1335 | 224,0 |
| | **54,5** | 1529 | 1408 | 224,0 |
| | **57,5** | 1713 | 1577 | 224,0 |
| | **60,0** | 1870 | 1721 | 224,0 |
| | **64,2** | 2148 | 1977 | 224,0 |
| 2 1/2" | **65,0** | 2205 | 2029 | 224,0 |
| | **70,3** | 2589 | 2383 | 224,0 |
| | **71,1** | 2648 | 2437 | 224,0 |
| | **76,1** | 3041 | 2799 | 224,0 |
| | | | | |
| | | | | |

| Measuring tube Inner diameter | | Volume flow (measuring range end value in Nm³/h) | | Max |
|---|---|---|---|---|
| Inchl | mm | **Airt 2)** | **Air 3)** | **m/s** |
| 3" | **80,0** | 3364 | 3097 | 224,0 |
| | **82,5** | 3582 | 3297 | 224,0 |
| | **84,9** | 3794 | 3492 | 224,0 |
| | **90,0** | 4268 | 3929 | 224,0 |
| 4" | **100,0** | 5276 | 4856 | 224,0 |
| | **107,1** | 6059 | 5577 | 224,0 |
| | **110,0** | 6391 | 5883 | 224,0 |
| 5" | **125,0** | 8263 | 7606 | 224,0 |
| | **133,7** | 9453 | 8701 | 224,0 |
| 6" | **150,0** | 11913 | 10965 | 224,0 |
| | **159,3** | 13436 | 12367 | 224,0 |
| | **182,5** | 17656 | 16251 | 224,0 |
| | **190,0** | 19137 | 17614 | 224,0 |
| 8" | **200,0** | 21230 | 19540 | 224,0 |
| | **206,5** | 22632 | 20831 | 224,0 |
| 10" | **250,0** | 33211 | 30568 | 224,0 |
| | **260,4** | 36075 | 33204 | 224,0 |
| 12" | **300,0** | 47881 | 44070 | 224,0 |
| | **309,7** | 51027 | 46966 | 224,0 |
| | **339,6** | 61356 | 56473 | 224,0 |
| | **400,0** | 85122 | 78347 | 224,0 |
| | **500,0** | 133003 | 122417 | 224,0 |
| | **600,0** | 191524 | 176281 | 224,0 |
| | **700,0** | 260685 | 239938 | 224,0 |
| | **800,0** | 340487 | 313388 | 224,0 |
| | **900,0** | 430929 | 396632 | 224,0 |
| | **1000,0** | 532011 | 489669 | 224,0 |

[2)] Based on DIN 1945 / ISO 1217 (20°C, 1000mbar) and compressed air.

[3)] Setting to DIN 1343: 0°C, 1013.25 mbar

### 9.4.2 Measuring range end values „600 m/s“

| Measuring tube Inner diameter | | Volume flow (measuring range end value in Nm³/h) | | Max |
|---|---|---|---|---|
| Zoll | mm | **Airt** [2] | **Air** [3] | **m/s** |
| 3/4" | **21,7** | 578 | 531 | 600,0 |
| **1"** | **25,0** | 791 | 727 | 600,0 |
| | **26,0** | 860 | 791 | 600,0 |
| | **27,3** | 956 | 879 | 600,0 |
| | **28,5** | 1048 | 964 | 600,0 |
| | **30,0** | 1171 | 1077 | 600,0 |
| 1 1/4" | **32,8** | 1416 | 1302 | 600,0 |
| | **36,0** | 1724 | 1585 | 600,0 |
| | **36,3** | 1755 | 1614 | 600,0 |
| 1 1/2" | **39,3** | 2075 | 1908 | 600,0 |
| | **40,0** | 2152 | 1979 | 600,0 |
| | **41,9** | 2374 | 2183 | 600,0 |
| | **43,1** | 2521 | 2318 | 600,0 |
| | **45,8** | 2861 | 2631 | 600,0 |
| 2" | **50,0** | 3435 | 3158 | 600,0 |
| | **51,2** | 3607 | 3316 | 600,0 |
| | **53,1** | 3884 | 3571 | 600,0 |
| | **54,5** | 4097 | 3767 | 600,0 |
| | **57,5** | 4588 | 4218 | 600,0 |
| | **60,0** | 5008 | 4605 | 600,0 |
| | **64,2** | 5755 | 5291 | 600,0 |
| 2 1/2" | **65,0** | 5906 | 5430 | 600,0 |
| | **70,3** | 6934 | 6376 | 600,0 |
| | **71,1** | 7092 | 6521 | 600,0 |
| | **76,1** | 8145 | 7489 | 600,0 |
| | | | | |
| | | | | |

| Measuring tube Inner diameter | | Volume flow (measuring range end value in Nm³/h) | | Max |
|---|---|---|---|---|
| Zoll | mm | **Air** [2] | **Air** [3] | **m/s** |
| 3" | **80,0** | 9012 | 8286 | 600,0 |
| | **82,5** | 9595 | 8822 | 600,0 |
| | **84,9** | 10162 | 9344 | 600,0 |
| | **90,0** | 11433 | 10512 | 600,0 |
| 4" | **100,0** | 14132 | 12994 | 600,0 |
| | **107,1** | 16229 | 14922 | 600,0 |
| | **110,0** | 17120 | 15741 | 600,0 |
| 5" | **125,0** | 22134 | 20351 | 600,0 |
| | **133,7** | 25321 | 23282 | 600,0 |
| 6" | **150,0** | 31910 | 29340 | 600,0 |
| | **159,3** | 35990 | 33091 | 600,0 |
| | **182,5** | 47293 | 43484 | 600,0 |
| | **190,0** | 51260 | 47131 | 600,0 |
| 8" | **200,0** | 56865 | 52285 | 600,0 |
| | **206,5** | 60621 | 55738 | 600,0 |
| 10" | **250,0** | 88958 | 81793 | 600,0 |
| | 260,4 | 96628 | 88845 | 600,0 |
| 12" | **300,0** | 128252 | 117922 | 600,0 |
| | **309,7** | 136680 | 125690 | 600,0 |
| | **339,6** | 164345 | 115130 | 600,0 |
| | **400,0** | 228004 | 209670 | 600,0 |
| | **500,0** | 356256 | 327610 | 600,0 |
| | **600,0** | 513009 | 471758 | 600,0 |
| | **700,0** | 698262 | 642116 | 600,0 |
| | **800,0** | 912017 | 838682 | 600,0 |
| | **900,0** | 1154271 | 1061458 | 600,0 |
| | **1000,0** | 1425026 | 1310441 | 600,0 |

[2] Bezogen auf DIN 1945 / ISO 1217 (20°C, 1000mbar) und Druckluft.

[3] Einstellung auf DIN 1343: 0°C, 1013,25 mbar

# 10 Installation / Assembly

## 10.1 Placement of the flow sensor, pipelines

- To ensure precise measurement results, the VD 550 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.

## 10.2 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**

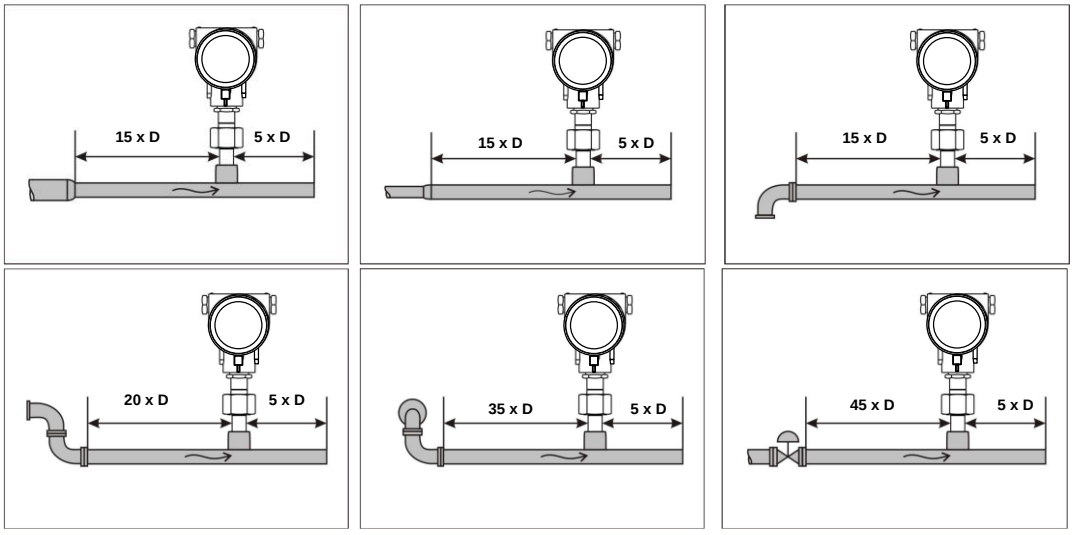
▶ The following figures show the respective required minimum lengths of the calming sections. If the sections are shortened, increased deviations of the measurement results need to be calculated → Avoid shortened sections.

## 10.3 Inlet / outlet 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 |




The required minimum values are specified in each case. If the specified settling distances cannot be adhered to, increased to considerable deviations in the measurement results must be expected

## 10.4 Installation VD 550

The sensor is installed via a ½" ball valve.

If no suitable measuring point with ball valve ½" is available, there are the following options for setting up a measuring point

When using the consumption sensor in systems with operating pressure >16 bar, the use of a high-pressure safety device is required for safety reasons.

### 10.4.1 ½" welded nipple with ball valve

**Important:**

Ensure that the system is shut down, i.e. depressurized.

**Note for installation with ball valve:**
Ball valve R 1/2", DN 15
Passage ball valve minimum Ø15 mm

### 10.4.2 Spot drilling collar with ball valve


In case the system could not be shut down, means to be set depressurized, there could be used the CS spot drilling collar (Order-No. 0530 1108) and drilling jig (Order-No. 0530 1108) to drill through the ball valve.

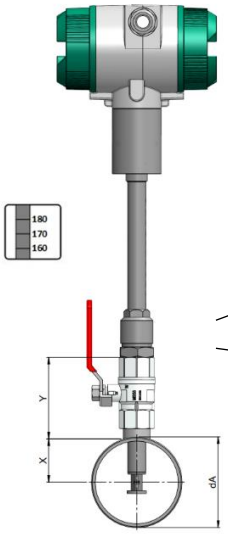
## 10.5 Installation of the sensor

### 10.5.1 Mounting the VD 550 in the ball valve

### 10.5.2 Installation instructions

- The sensor must be screwed into the ball valve in a pressure-tight manner (tightening torque 25...30 Nm).
- Before fixing the sensor, set the insertion depth and align the angular position. Observe the safety instructions.
- If necessary, turn the display head of the control unit (→ Chapter 8.7) or rotate the display (if the reading direction is upside down, rotate the LCD > Chapter 11 "Operation").
- Ensure that the retaining ring attached to the sensor head is undamaged and correctly fitted.
- After aligning the sensor, tighten the clamping sleeve with a torque of 25 ... 30 Nm (SW 17).
- Correct zero point adjustment

Calculation mounting depth::




T Plunge depth
dA Outer diameter
X dA/2
Y Ball valve height

**Plunge depth (setting dimension)**
**T= X + Y**

Adapter sleeve

Connection nut

Flow direction setting

**WARNING**
**Components under high pressure! Risk of injury if the flow sensor is not installed in a pressure-tight manner.**

▶ After installation, be sure to check and ensure the pressure tightness of the connection. Do not work directly over the sensor, but next to it to minimise possible hazards.

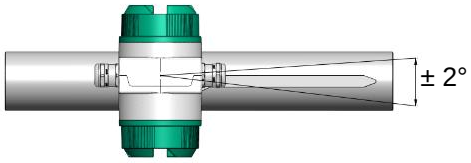
**Note**

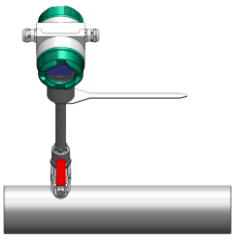
▶ Do not change the orientation of the sensor when tightening the connecting nut ] and clamping sleeve, If this still happens, check the setting depth and alignment again and correct them if necessary..

1. Close the ball valve.
2. Push the connecting nut completely over the measuring tips . Do not damage the safety ring when doing so.
3. Apply sealing material to the thread of the G ½" or NPT ½" screw connection of the connecting nut. Only use suitable sealing material that matches the flow medium.
4. Screw the flow sensor with the G ½" or NPT ½" screw connection of the connecting nut into the ball valve (size 32) and tighten with a tightening torque of 25...30 Nm. The sensor shaft is not yet fixed in place. Do not damage the measuring tips of the sensor.

**Sensor Adjustment**

To ensure correct measured values, a maximum angle deviation of ±2° is permitted.



**Reference point = tip of the alignment key**

5. **Set the measuring tip of the sensor to the centre of the pipe and align them.**
   To do this, insert the sensor shaft in the direction of the pipe centre according to the depth scale (setting value = X + Y) and align with an **angular deviation of no more than ± 2°**. Observe the flow direction according to the directional arrows.

**NOTE**

▶ Use the alignment key supplied for correct directional positioning. In relation to the ideal position, the angular deviation should not exceed ±2°. If the alignment is imprecise, measurement inaccuracies are to be expected.

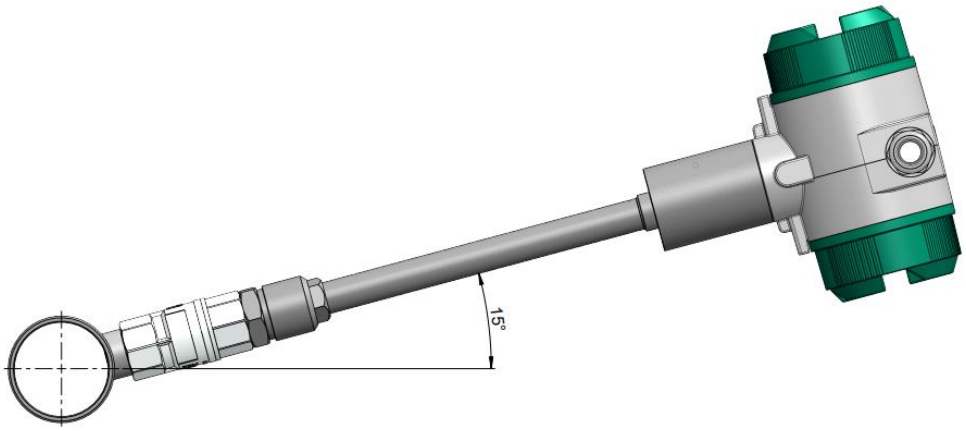
6. Tighten the sensor shaft with the clamping sleeve with a tightening torque of 25...30 Nm..

## 10.6 Installation angle for installation locations with potential water incidence

**Notes**

**Faulty measurement results with impermissible installation position. Condensation or water drops on the sensor element lead to faulty measurement results. No condensation is allowed on the sensor measuring tips.**

- Avoid installation locations that could potentially accumulate water.
- Do **not** install the flow sensor with the measuring tips pointing upwards, since any condensate/water that forms can no longer flow off.
- Do **not** install the flow sensor in a downpipe.
- Installation in a riser is possible in general.




1. We recommend installing the flow sensor at an angle of at least 15 degrees.
   In installation positions >15°, any condensate or water can drip off properly.
2. Carrying out zero point adjustment see chapter 11.2 and 13.3.1.5

## 10.7 Alignment of housing / display

The VD 550 sensor housing can be rotated in both directions, max. 345°. To do this, the locking screw in 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.

.

# 11 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.

## 11.1 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.

## 11.2 Zero point adjustments

The VD 550 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. Loosen the clamping sleeve
2. Ensure that there is no flow by pulling the sensor out up zo the stopper.
3. Pressurize the sensor with system pressure, open the ball valve if necessary..
4. To ensure that there is no flow during zero point calibration, we recommend closing the ball valve again
5. It is essential that the sensor is aligned parallel to the pipe using the alignment key supplied before zero point calibration..
6. After correct alignment wait 20 seconds.
7. Then start the zero point calibration on the sensor→ chapter Operation
8. after zero-point calibration, the sensor tip must be reinstalled in the pipe without changing the alignment. → chapter 10.5

**RECOMMENDATION**

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

# 12 Connection diagram

## 12.1 Cable glands - clamping ranges

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

| | |
|---|---|
| VD 550 Standard clamping range : | Ø 5- 9mm |
| VD 550 Ex clamping range : | Ø5-10mm |

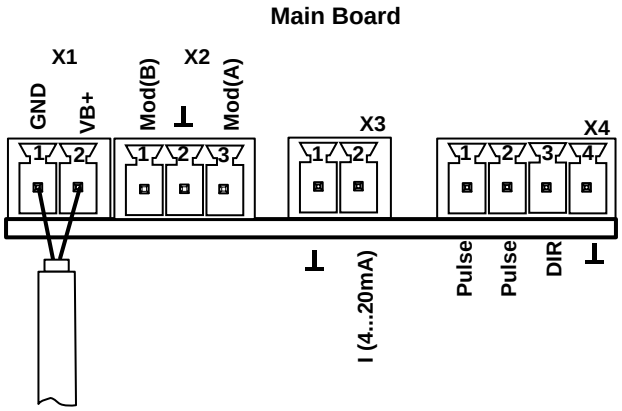
Tightening torque for cable gland cap nut: 9 Nm

## 12.2 Wire connection

### 12.2.1 General:

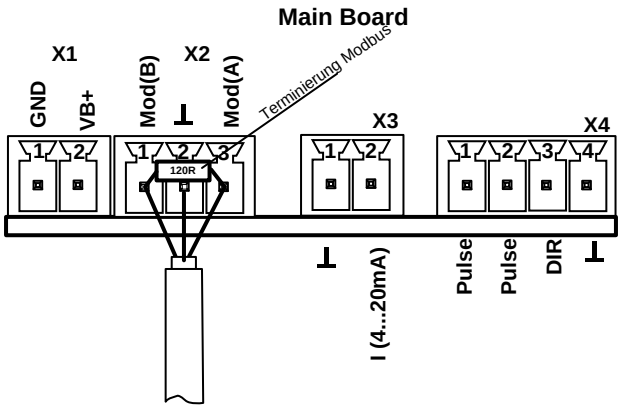
- Wiring to be done in strainless state only.
- Length of cable skinning to be minimized
- Not used cable entries must be closed with end caps
- Use of shielded cables
- Use of cables with cross section of >= 0.25mm²

### 12.2.2 Power supply



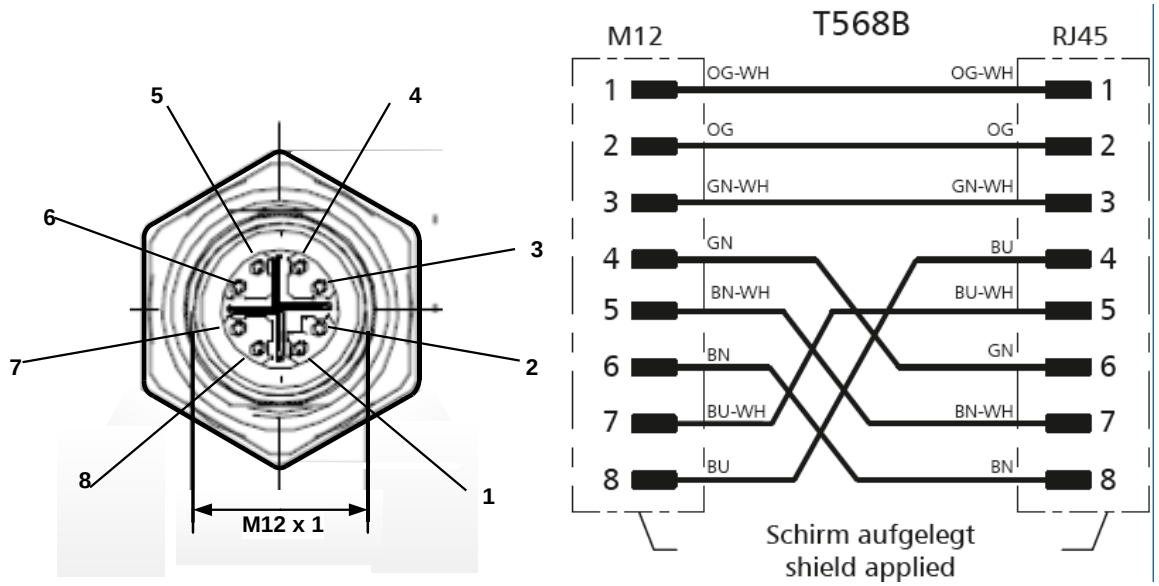

### 12.2.3 Modbus RTU:

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“



### 12.2.4 Modbus TCP (Ethernet) Optional PoE

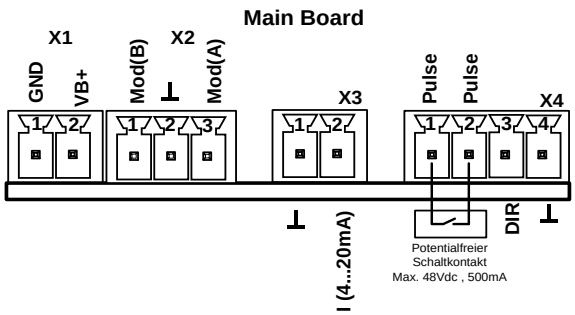
M12 x-coded
Data LINES: 1,2 und 3,4
PoE LINES: 5,6 und 7,8



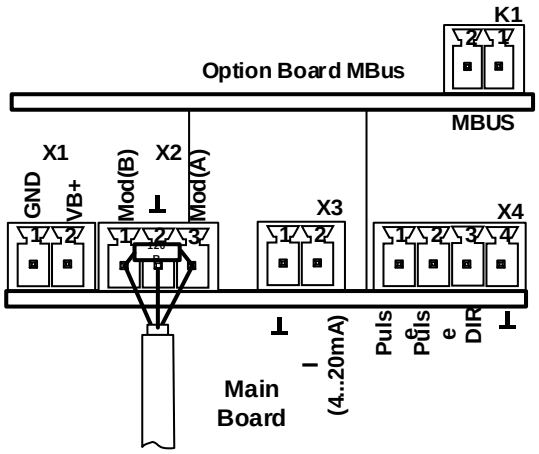

**Connection cable:** Cat 6.

*PoE: Power over Ethernet

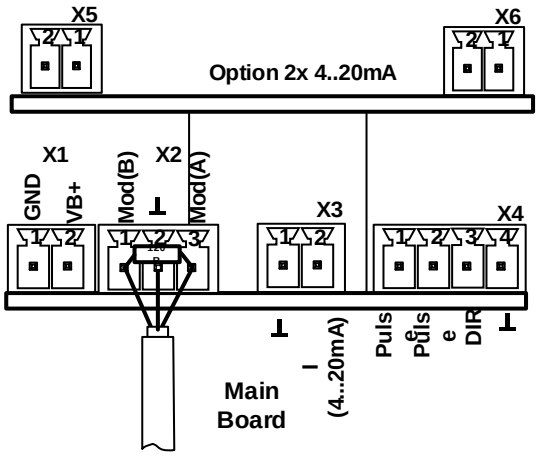
### 12.2.5 Pulse Output



### 12.2.6 Option MBus




### 12.2.7 Option 2x 4..20mA (galv. getrennt)



| Connector | Pin | Signal Deskription |
|---|---|---|
| **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 |

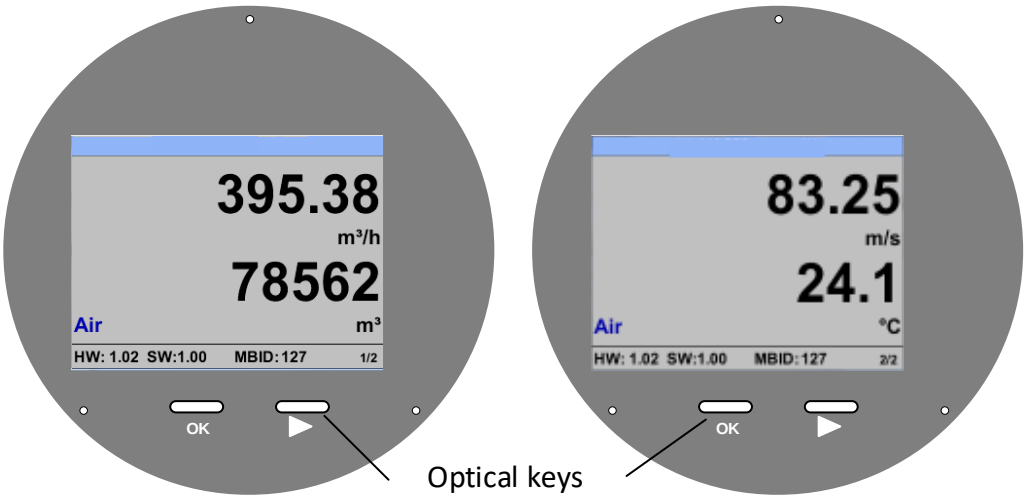
* Outputs are galvanically isolated.

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

# 13 Operation VD 550

**Note:** Only for version with display

The VD 550 is operated using 2 optical buttons, which are operated directly via / through the glass cover. This means that the VD 550 can be operated from the outside without opening the cover.




The individual menu items are selected using the ">" button and confirmed by pressing the **"OK"** button

Information or changes can be made in all fields with a white background; the selection for input is indicated by a yellow background color.

Words in *green* mainly refer to the figure(s) in the chapter section. But also important menu paths or menu items that are related to it are
marked in *green letters*.

The menu navigation is generally in *green font*!

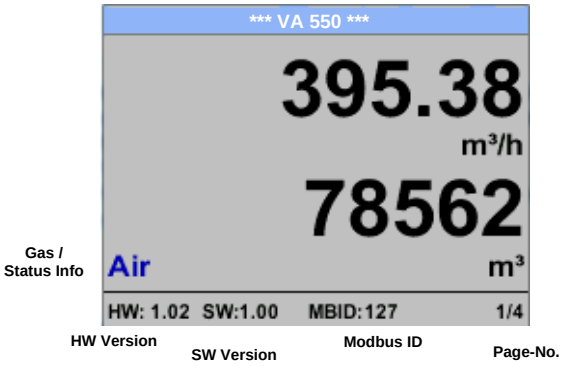
The table of contents and the chapter references in blue font contain links to the respective chapter headings.

## 13.1 Main menu (Home)

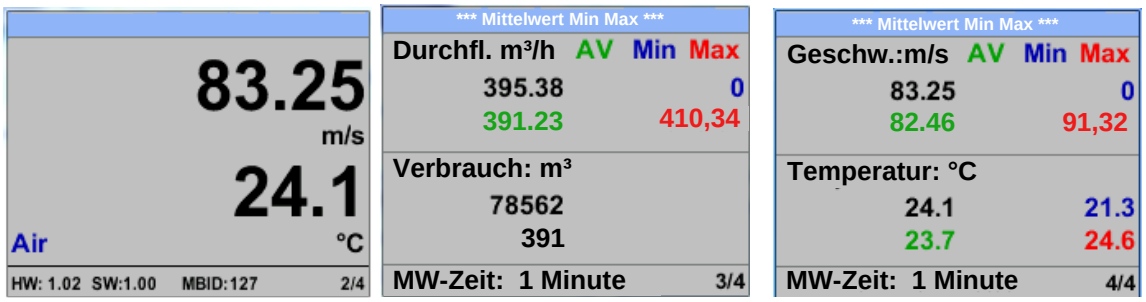
### 13.1.1 Initialization


After switching on the VD 550, initialization takes place, see right, followed by the main menu..

## 13.2 Main menu after switching on




Switching to pages 2-4 or back by pressing key „>
“



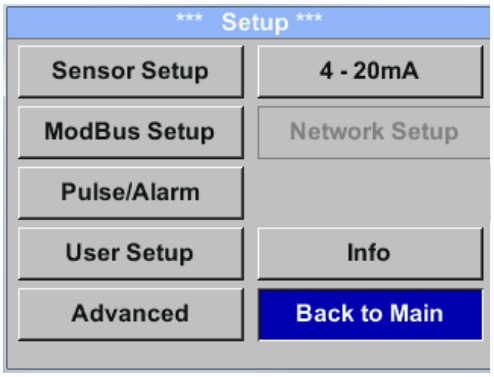

AV-Time (Period for average value calculation) could be changed under *Sensor Setup.-Advanced–AV-Time*

## 13.3 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).

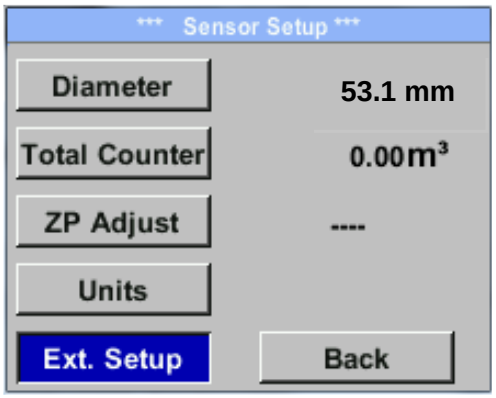
If required the password could be changed at *Setup–User setup-Password*.
.




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“***

### 13.3.1 Sensor Settings

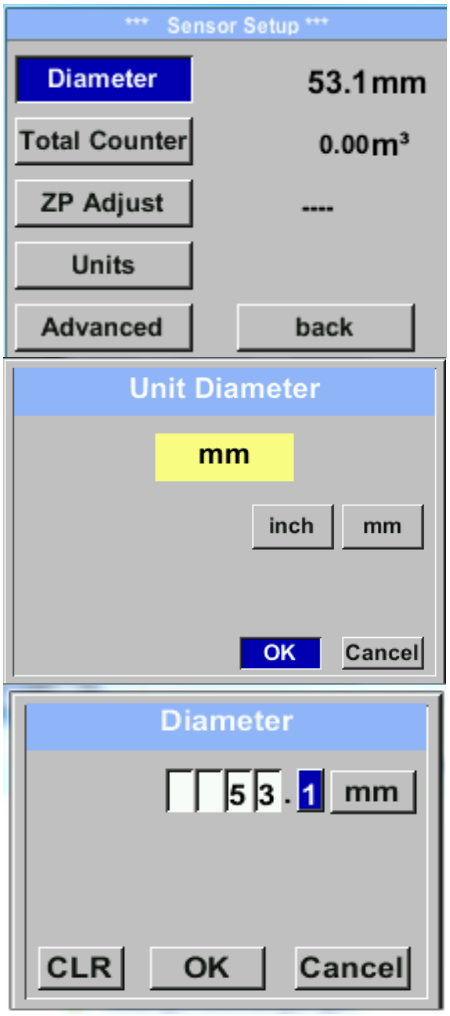
***Setup → Sensor***




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

#### 13.3.1.1 Input / change tube diameter

***Settings → Sensor → Diameter***




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

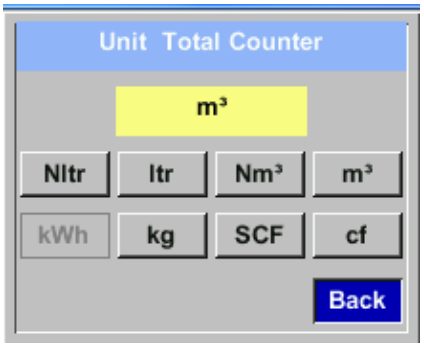
Select with the key ***„>“*** the correct unit and then confirm selection by pressing 2x ***„OK“***.

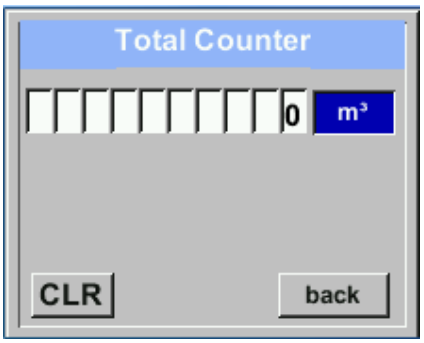
Entering / changing the diameter
via button ***„>“***, select the respective position and activate the position with the ***"OK"*** button.
By pressing ***„>“*** the position value is incremented by 1. Complete with ***"OK"*** and activate next number position.
Confirming entry by pressing ***„OK“.***

.

### 13.3.1.2 Input / change consumption counter

***Settings → Sensor → Total Counter → Unit button***




In order to change, e.g. the unit, first select by pressing key *„>“* the button ***“Unit”*** and then key “***OK”***.

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

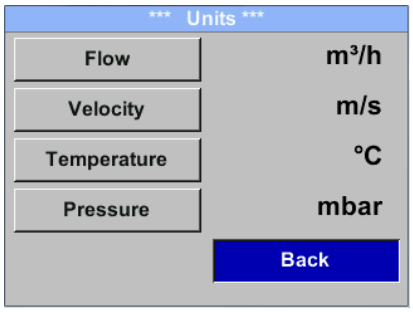
Entering / changing the consumption counter via button *„>“*, select the respective position and activate the position with the ***"OK"*** button.
By pressing *„>“* the position value is incremented by 1. Complete with ***"OK"*** and activate next number position.

Confirm entry by pressing ***„OK“.***

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

### 13.3.1.3 Definition of the units for flow, velocity, temperature and pressure

***Settings → Sensor → Units***



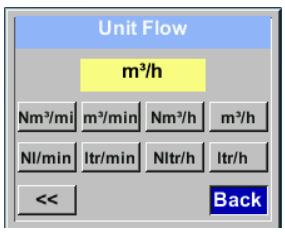

To make changes to the unit for the respective measurement value, first select by pressing *„>“* the field of the „measurement value“ and activate „it with ***„OK“*** .

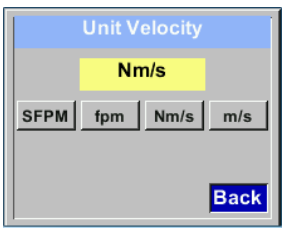
Selection of the new unit with *„>“*

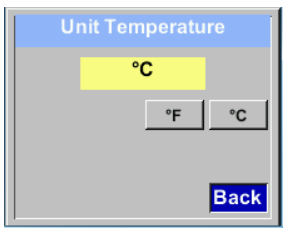
In case the quantity of units selectable are not presentable on one page, pleas move to next page by pressing ***„<<“***.

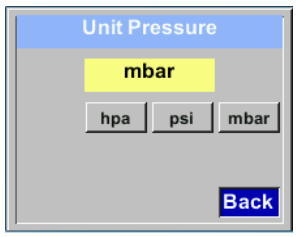
Confirm selection by pressing 2x ***„OK“***.

Procedure for all 4 measurement-variables is analogous.



#### 13.3.1.4 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.

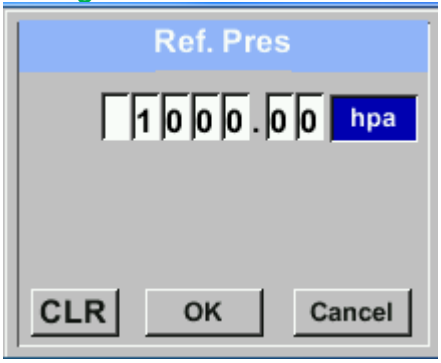
**Note**

- 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!**

***Settings → Sensor → Advanced→ Ref. settings→ Ref. pressure***


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

***Settings → Sensor → Advanced → Ref. settings→ Ref.Pref***




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

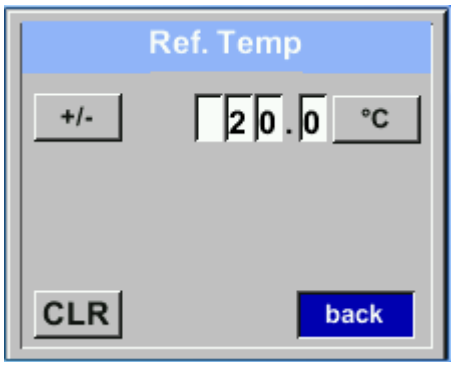
Select with the key „>“ the correct unit and then confirm selection by pressing 2x ***„OK“***.

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

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

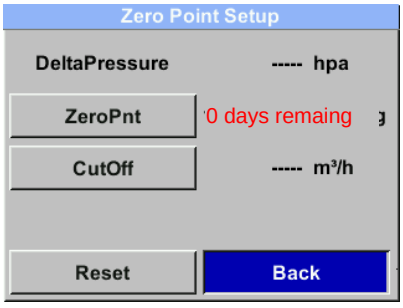
Procedure for changing the reference temperature is the same.

***Settings → Sensor → Advanced → Ref. settings → Ref.Temp***



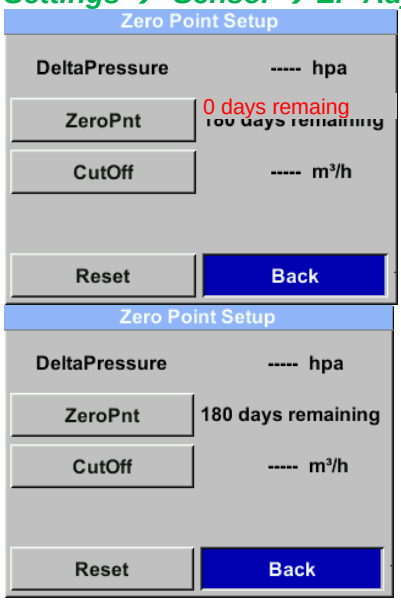
### 13.3.1.5 Setting of Zeropoint and Low-flow cut off

***Settings → Sensor → ZP Adjust***




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

***Settings → Sensor → ZP Adjust → ZeroPnt***

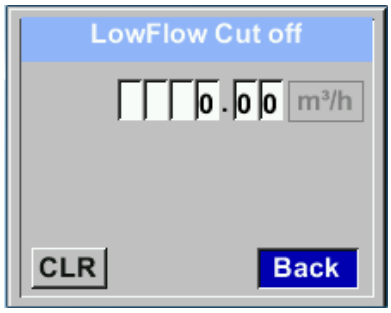



If the sensor shows the message ***„CalZeroPnt“*** n the display, a zero point calibration should be carried out, see also chapter 9 and 11 "Zero point calibration"..

For zero point calibration, pull the sensor out completely as far as it will go

Select the ***"ZeroPnt"*** button and start the calibration with ***„OK“***.

***Settings → Sensor → ZP Adjust → CutOff***



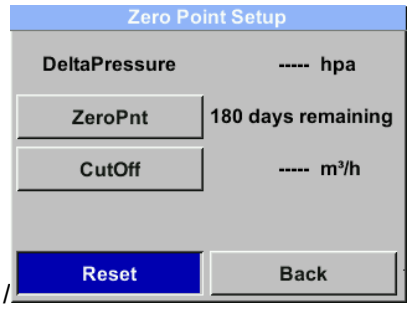

With the low-flow cut off activated, the flow below the defined "LowFlow Cut off" value will be displayed as 0 m³/h and not added to the consumption counter.

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“***

***Settings → Sensor → 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“***

/

## 13.3.2 Modbus RTU

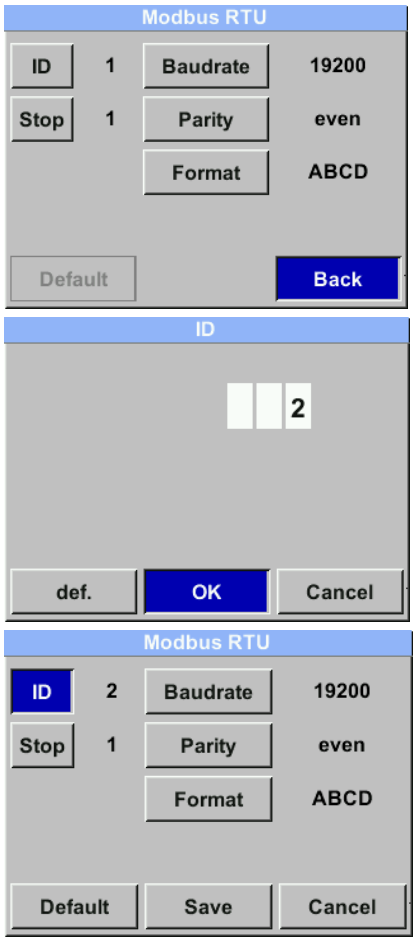
### 13.3.2.1 Setup

The Flow sensors VD 550 comes with a Modbus RTU Interface.
Before commissioning the sensor the communication parameters

- Modbus ID, Baud rate, Parity und Stop bit

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

***Settings → Modbus RTU***




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

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

Change values by pressing the ***„>“*** values takeover by pressing ***"OK".***

Inputs for baudrate, stopbit and parity is done analogue.

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

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

Reset to the default settings by activating ***" Default"-***

**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“

### 13.3.3 Modbus TCP (Optional)

#### 13.3.3.1 Setup

The Flow sensors VD 550 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

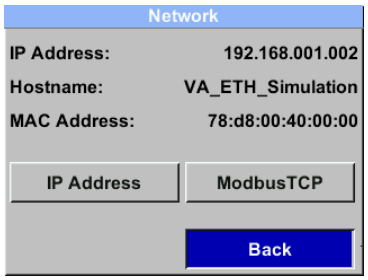
Modbus device address (Unit Identifier) can be set in the range of 1- 247.
Specification and description of the Modbus protocol is free to download on: www.modbus.org.

Supported Modbus commands (functions):

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

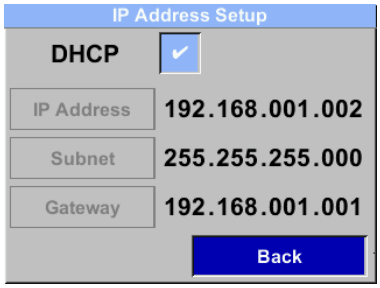
For more details, please see **VA 5xx Modbus RTU_TCP Installation in it actual version**

***Settings → Network***




##### *13.3.3.1.1 Network Setup DHCP*

***Settings → Network → IP Address***



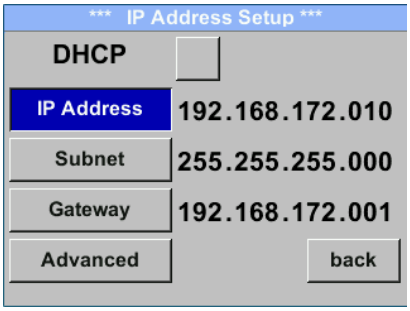

Here you can set up and made a connection, with or without *DHCP*, to a computer.

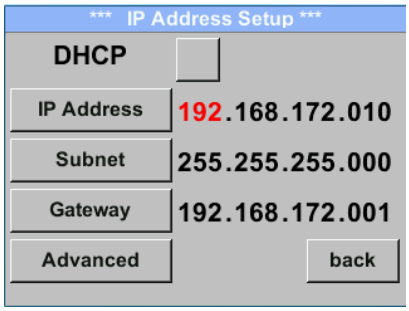
**Remark:**
With activated DHCP the automatic integration of the sensor in an existing network is possible, without a manual configuration.

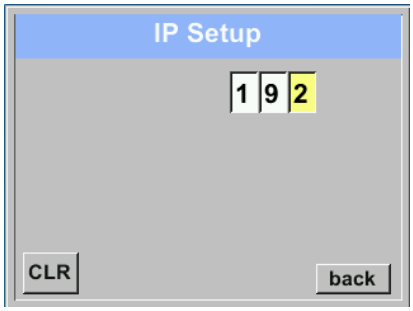
Storing of settings by pressing ***"Save"***

### 13.3.3.1.2 Network Settings static IP

***Settings → Network → IP Address → IP Address***
***Settings → Network → IP Address → Sub Netz***
***Settings → Network → 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).

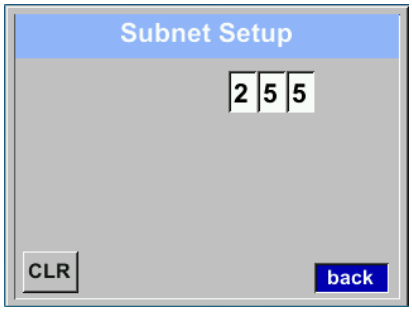
Confirm with ***"OK"*** the corresponding input menu is opened.

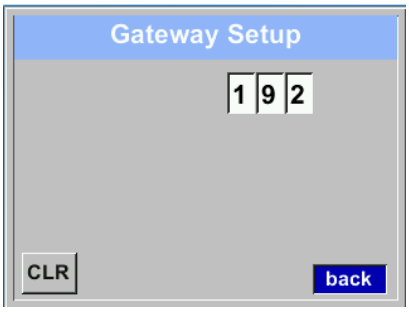
By means of ***">"***, the next data field is changed.

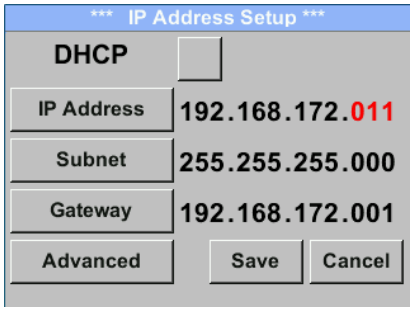
Select the desired position with the ***">"*** key and activate it with the ***"OK"*** key.

Change the values with the ***">"*** key, and accept the values with the ***"OK"*** key.

Procedure for ***"Subnet"*** and ***"Gateway"*** is analogous.



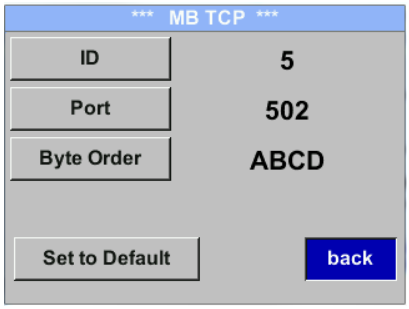



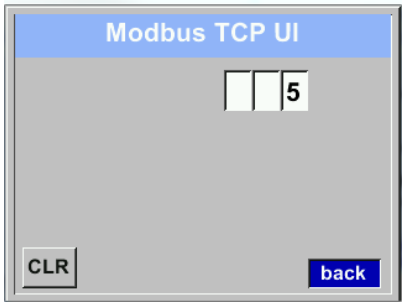

Store the settings by ***„Save“***

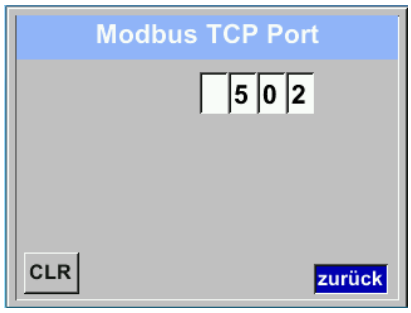
### *13.3.3.1.3 Modbus TCP Settings*

***Settings → Network → IP Address → MB TCP***




***Settings → Network → IP Address → ID***
***Settings → Network → IP Address → Port***




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".***

Input for the port is done analogue.

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

Saving the changes by pressing ***"Save",*** therefore select it with key ***„>“*** and then confirm it with ***"OK".***
Reset to the default settings by activating ***"Set to Default"-***

#### 13.3.3.2 Modbus Settings (2001…2005)

| Modbus Register | **Register Adresse** | 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<br>1 = 2400<br>2 = 4800<br>3 = 9600<br>4 = 19200<br>5 = 38400 |
| 2003 | 2002 | 2 | UInt16 | Parity | 1 | R/W | 0 = none<br>1 = even<br>2 = odd |
| 2004 | 2003 | 2 | UInt16 | Number of Stopbits | | R/W | 0 = 1 Stop Bit<br>1 = 2 Stop Bit |
| 2005 | 2004 | 2 | UInt16 | Word Order | 0xABCD | R/W | 0xABCD = Big Endian<br>0xCDAB = Middle Endian |

#### 13.3.3.3 Values Register (1001 …1500)

| **Modbus Register** | **Register Adresse** | **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 | |

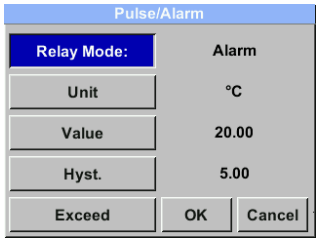
| Modbus Register | Register Adresse | No.of Byte | Data Type | Description | Default | Read Write | Unit /Comment |
|---|---|---|---|---|---|---|---|
| 1269 | 1268 | 4 | UInt32 | Consumption m³ before comma | x | R | |
| 1275 | 1274 | 4 | UInt32 | Consumption Nm³ before comma | x | R | |
| 1281 | 1280 | 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 | | | |

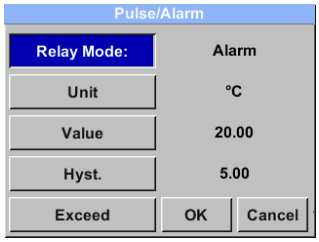
**Remark:**

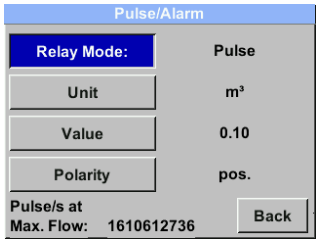
- For DS400 / DS 500 / Handheld devices - Modbus Sensor Datatype „Data Type R4-32“ match with „Data Type Float“
- For more additional Modbus values please refer to VA5xx_Modbus_RTU_TCP Installation in its actual version

### 13.3.4 Pulse /Alarm

***Setup → Sensor → 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"*** .
Lowest value is depending on max. flow of sensor and the max frequency of pulse output of 50Hz.

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


#### 13.3.4.1 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 |

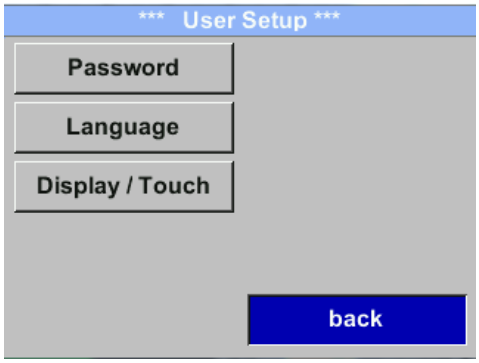
**Table 1 Maximum flow for pulse output**

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

## 13.3.5 User Settings

### 13.3.5.1 Password

***Settings → User → Password***





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

It is possible to define a password. The required password length is 4 digits.
Please select with button „>“ a figure and confirm it with ***„OK“*** .Repeat this 4 times.

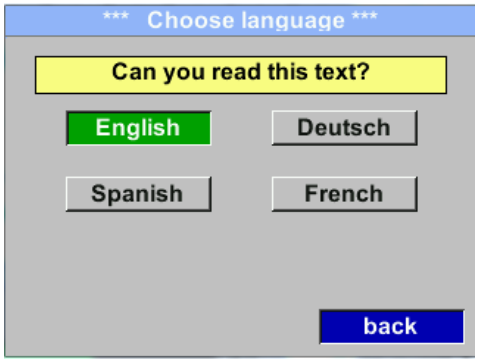
With ***„<“*** the last figure could be deleted.
Password input have to be inserted twice.

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

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

### 13.3.5.2 Language

***Settings → User → Language***

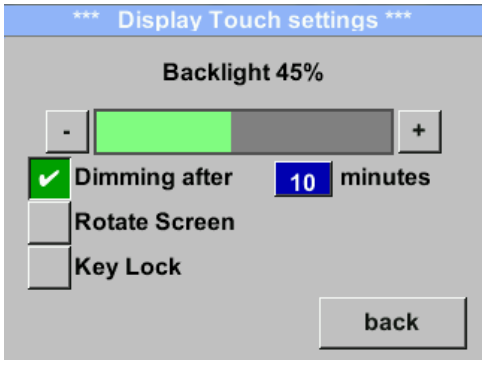


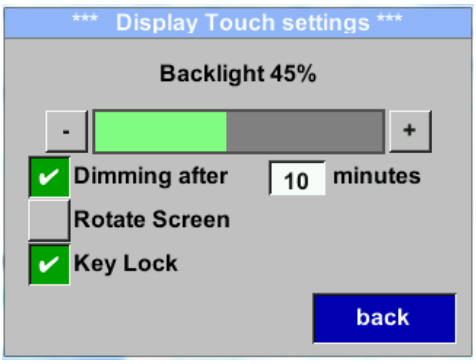

Currently 4 languages have been implemented and could be selected with button „>“.

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

### 13.3.5.3 Display / Touch

*Settings → User → Display / Touch*




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

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

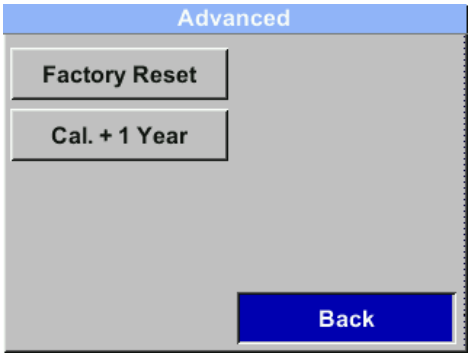
With *„Rotate Screen“* the display information could be rotated by 180°.

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

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

### 13.3.6 Advanced

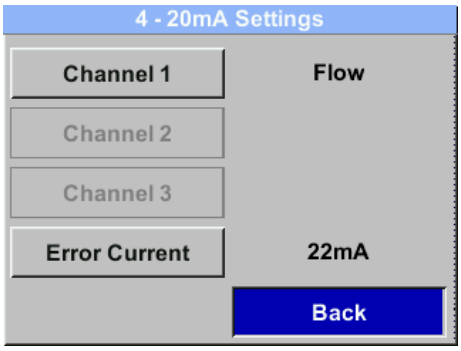
*Settings → Advanced*




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

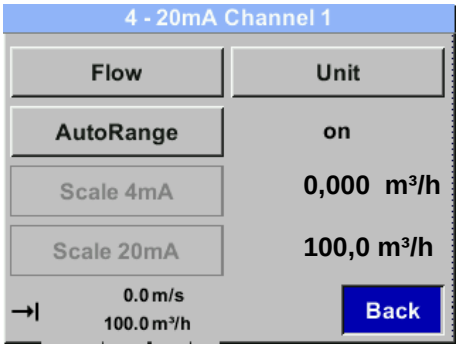
### 13.3.7 4 -20mA

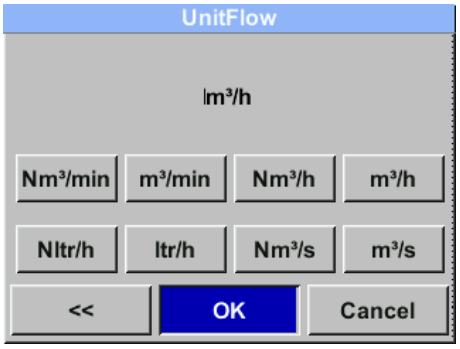
*Settings → 4-20mA*

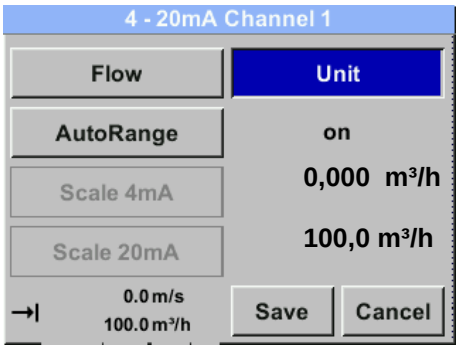



To make changes, first select a menu with button „>“ and confirm selection by pressing ***„OK“*** .

*Settings → 4-20mA → Channel 1*




The 4-20 mA Analogue output of the Sensor VD 550 can be individually adjusted.

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

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

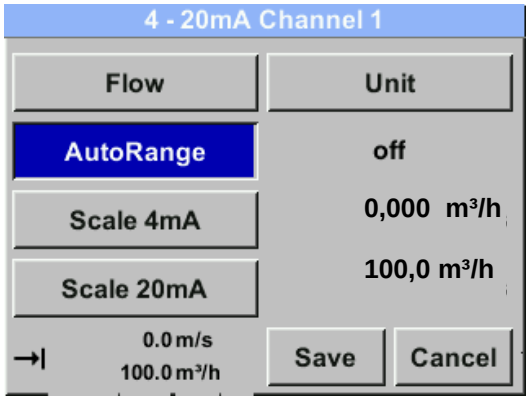
To the selected measurement value a corresponding / appropriate unit needs to be defined. Select ***„Unit“*** with „>“ and open menu with ***„OK“.***
Select required unit with „>“ and take over by pressing ***„OK“.***

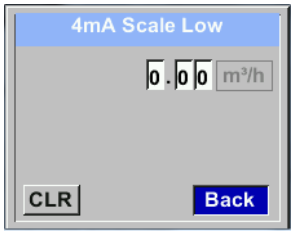
Here e.g. for the measurement value Flow, procedure for the other measurements values is analog.

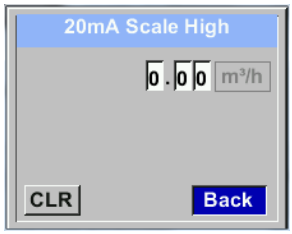
For saving the changes done press button ***„Save“*** to discard the changes press button ***“Cancel”.***

Leaving the menu with ***„Back“***.

***Settings → 4-20mA → Channel 1 → AutoRange***




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

With button ***„>“*** select the menu item „AutoRange“ select with ***„OK“*** the desired scaling method. (Automatically or manually)

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

Select with button ***„>“*** the item „Scale 4mA“ or „Scale 20mA“ and confirm with ***„OK“*** .

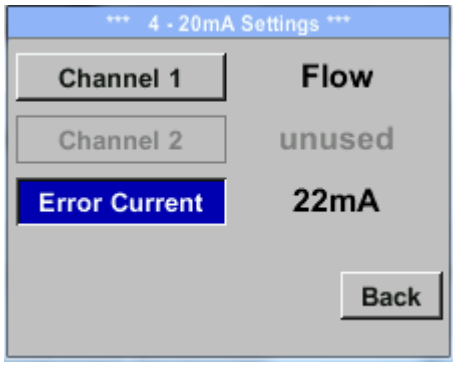
Input of the scaling values will be analogous as described before for value settings.

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

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

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

***Settings → 4-20mA → Error Current***




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

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

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

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

Leaving the menu with ***„Back***“.

**Bemerkung:**

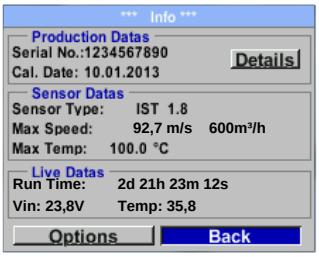
Voreinstellung VD 550 für Analogausgang ist — Kanal 1:0...max. Durchfluss [m³/h]

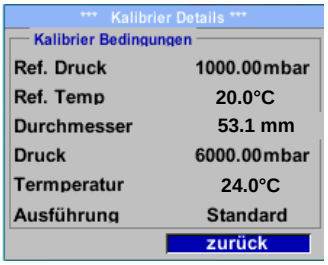
Voreinstellung VD 550 mit Optionskarte Analogausgang — Kanal 1:0...max. Durchfluss [m³/h] Kanal 2: -20°C ... 100°C]

Max. Durchfluss siehe Etikett am Sensor

### 13.3.8 VD 550 Info

***Setup → Sensor Setup → Info***




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

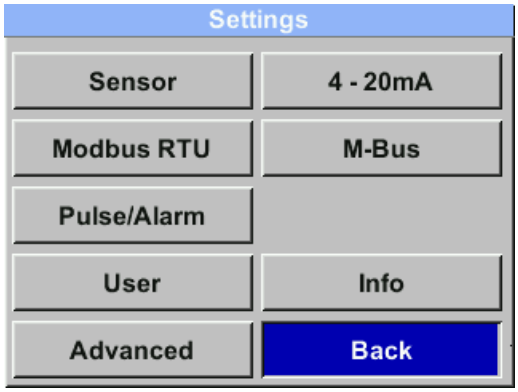
Under ***Details,*** you are able to see in addition the calibration conditions.

## 13.4 MBus

### 13.4.1 Change of communication settings

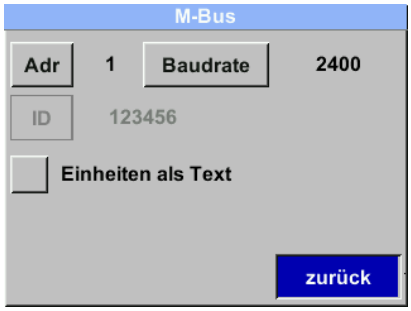
The communication settings Primary-address and baud rate could be changed directly at the sensor, in case sensor has a display, or with the PC Service software (Order-No. 0554 2007).

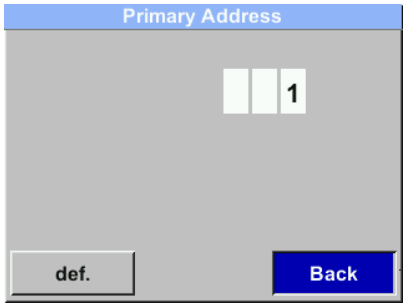
***Settings → M-Bus***




***Settings → M-Bus → Adr***

Possible inputs are values from1-247 (Default setting = 1)




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.

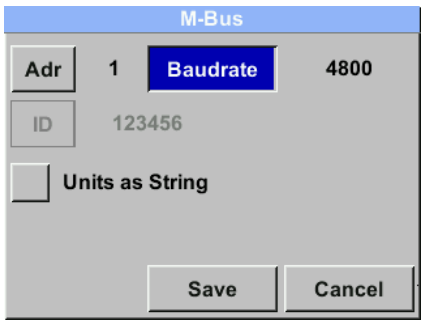
For saving the changes done press button ***„Save“*** to discard the changes press button ***“Cancel”.***

Leaving the menu with ***„Back***“.

**Remark:** Secondary address “ID” is not changeable the ID is fixed.

***Settings → M-Bus →Baudrate***

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

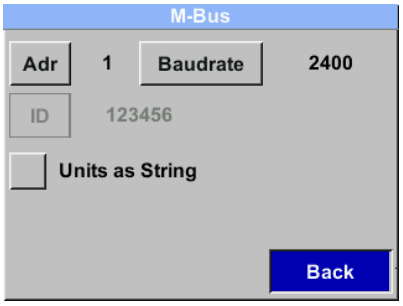


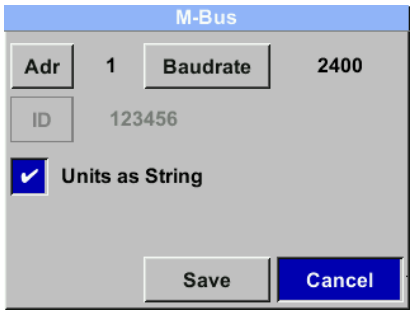

Baudrate change by pressing the button ***„OK“***

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

Leaving the menu with ***„Back***“.

### 13.4.2 Coding VIF (Value Information Field)




The Sensor offers two possibilities for coding the Value Informaition 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

Switch to Plain Text VIF by activation of ***„Units as String“.***

### 13.4.3 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.

### 13.4.4 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)

# 14 Error messages

- **Low Voltage**

If the supply voltage is less than 18V, the warning message ***„Low Voltage“*** is displayed.
This means that the sensor can no longer work / measure correctly and thus there are none measured values for flow, consumption and speed are available.

- **Internal Error**

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

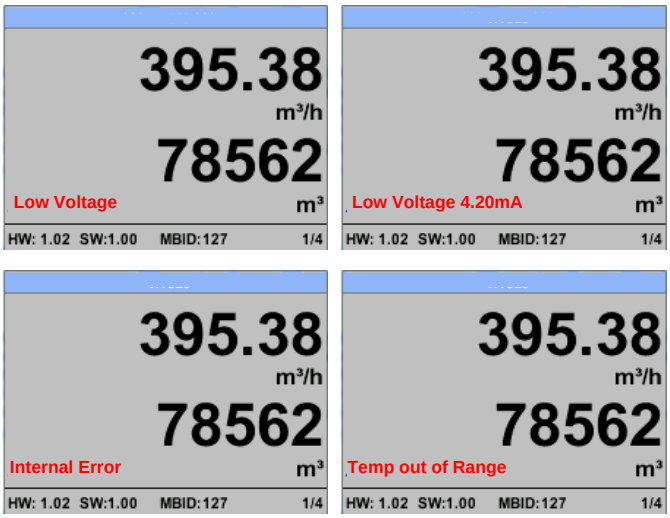
- **Temp out of Range**

At media temperatures outside the specified temperature range, the status message ***„Temp out of Range“*** occurs.
This temperature overshoot leads to incorrect measurement values (outside the sensor specification).

- **Low Voltage 4-20mA**

For sensors with a galvanically isolated 4-20mA output, a min. Supply voltage of 17.5V is required. If this value is undershot, the error message ***„Low Voltage 4-20mA“*** is displayed.

**Error messages:**




# 15 Supplementary Documentation

- Supplementary Documentation for Ex-Version:

  Flow / Consumption Sensor VD 550 Ex / VD5 70 Ex - Ex-Documentation

## 16 Declaration of Conformity

# KONFORMITÄTSERKLÄRUNG

DECLARATION OF CONFORMITY

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

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

Verbrauchs-/ Durchflusssensor VD 550
Flow Sensor VD 550

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

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

Angewandte harmonisierte Normen:
Harmonised standards applied:

| | |
|---|---|
| EMV-Anforderungen<br>EMC requirements | **EN 55011:2016 + A2:2021-04**<br>**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.

CE

Harrislee, den 22.04.2024

Wolfgang Blessing Geschäftsführer