EN

Competence in Solids

SWR engineering

MaxxFlow HTC

Measurement of high mass flow rates for bulk solids

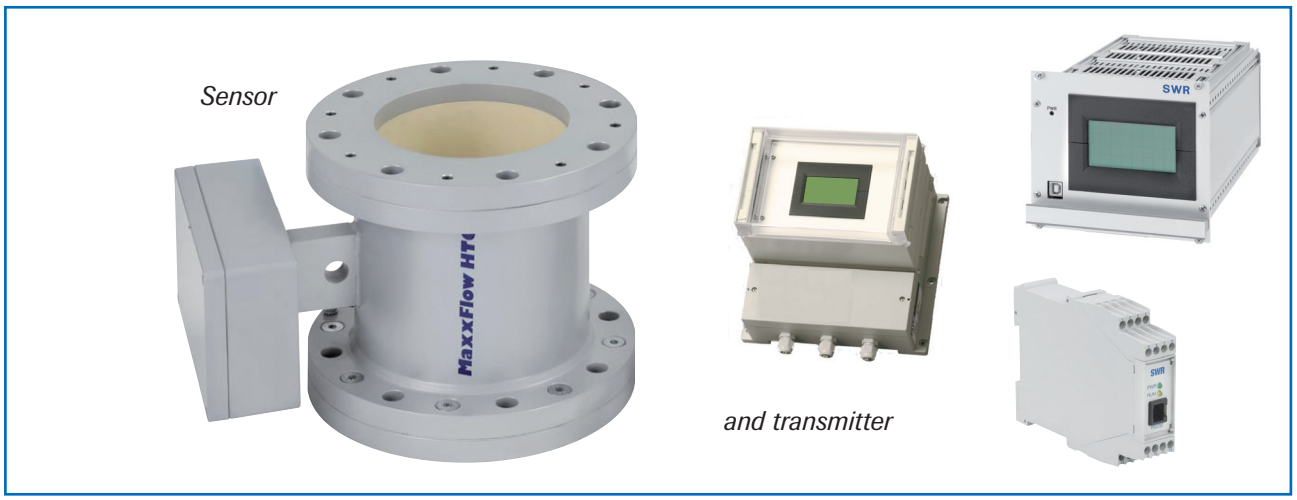
Operating Instructions

SWR engineering Messtechnik GmbH

CONTENTS

1. System Overview

A MaxxFlow HTC measuring system consists of:



2. Functionality

- MaxxFlow HTC is a measuring system especially developed for the measurement of high mass flow rates in free fall applications.
- MaxxFlow HTC works with the latest microprocessor technology. By special capacitive coupling of an electromagnetic wave, a homogeneous measuring field is created inside the sensor.
- The electromagnetic wave inside the sensor interacts with the solid particles.
  The signals are evaluated regarding frequency and amplitude.
- The speed measurement is implemented by correlation. Two sensors are capturing the correlation signals.
- The measuring unit consists of the sensor (measuring pipe) and the transmitter.

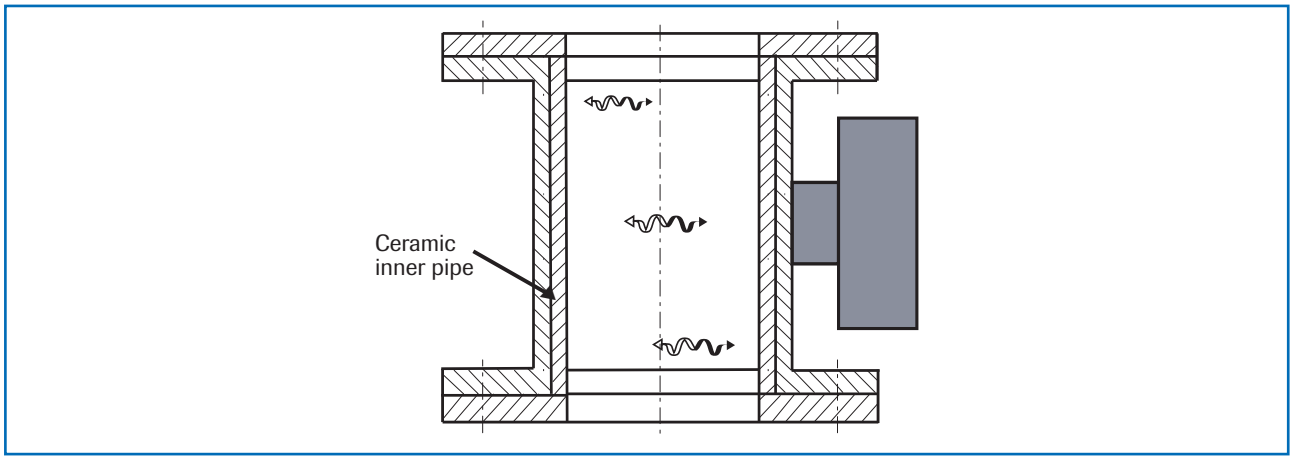


Fig. 2: Coupling of the electromagnetic waves

3. Safety

The MaxxFlow HTC was designed, built and tested for safety and is shipped in this condition. Components within the supplied system could be hazardous if not unpacked, installed, connected and commissioned by authorised and qualified persons. All operating instructions must be read and understood before handling the system. Failure to do so will cause the warranty to be revoked.

3.1 Normal Use

- The measuring system must be installed for measuring mass flow rate only. Other usage or modifications of the measuring system are not permitted.
- Only original spare parts and accessories of SWR engineering must be used.

3.2 Identification of Hazards

- Possible hazards when using the measuring system are marked by the following symbols:

Warning!

- This symbolises a situation where personal safety is at risk if used in an improper manner.

Attention!

- This symbolises the possible damage to the system, if used in an improper manner.

3.3 Operational Safety

- The measuring system must be installed by trained and authorised personnel only.
- In case of maintenance-work on the pipe or on components of the MaxxFlow HTC, make sure that the piping is in unpressurized condition.
- Switch off the supply voltage for all maintenance, cleaning or inspection works on the sensor or on components within the MaxxFlow HTC. Follow the notes of the chapter maintenance.
- The components and electrical connections must be checked for damages regularly. If a damage is found it is to be repaired before further operation of the instruments.

3.4 Technical Statement

- The manufacturer reserves the right to change any technical data without prior notice. If any queries arise SWR engineering will be happy to inform customers of any possible changes made.

4. Mounting and Installation

4.1 Supplied Equipment

- Transmitter in field mounted enclosure, 19” rack version or DIN rail enclosure
- Sensor
- Operating Instructions

4.2 Required Tools

- Appropriately sized spanner or ring spanner
- Tools for electrical connections

4.3 Mounting of the Sensor

The sensor has to be mounted as follows:

- Select a location on the pipe, vertical or inclined locations. Ensure that the connection box cable glands are pointing downwards.
- Ensure that the correct distance is selected from control devices, e. g. rotary valves, etc. As this will determine velocity criteria, (see fig. 3).

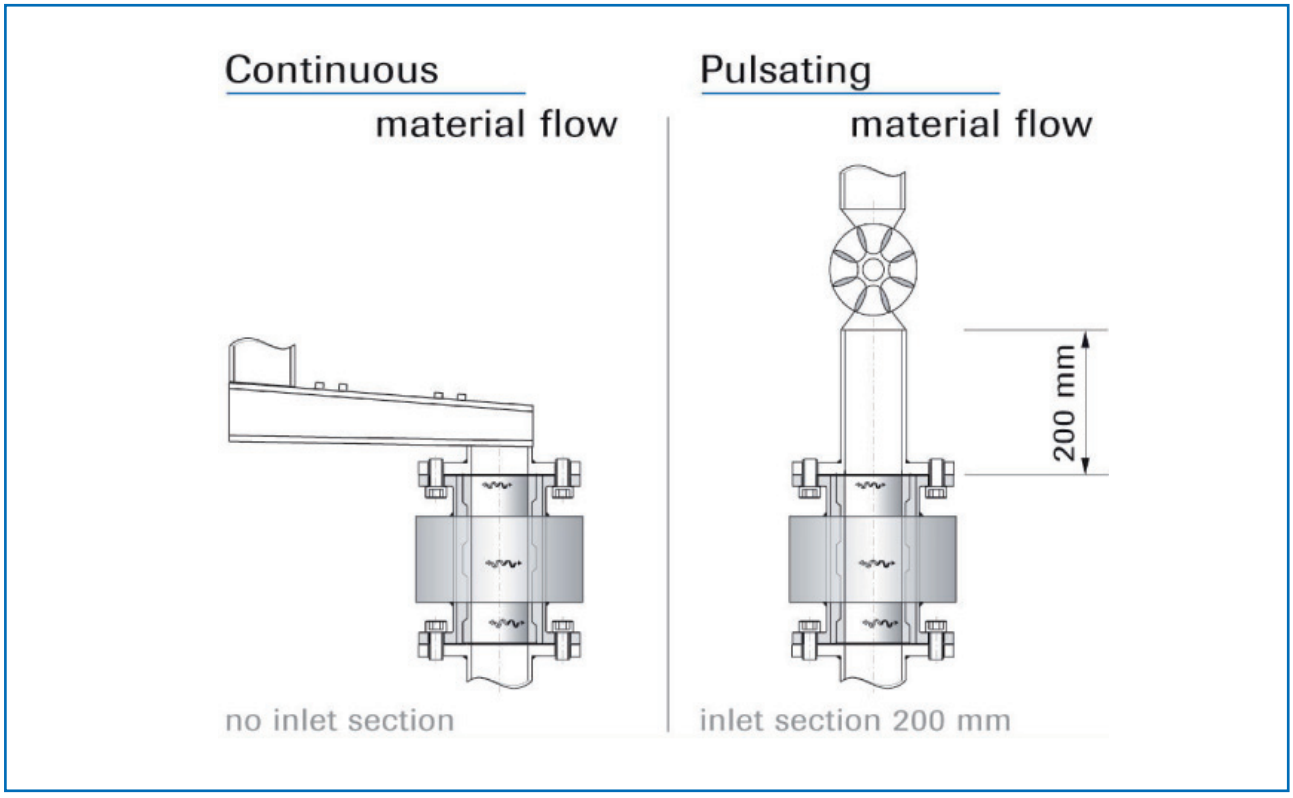


Fig. 3: Minimal distances of the sensor to control devices

Installations in angular pipes are as well possible. If you are unsure contact SWR staff.

Attention!

- Before installation check that flange alignment is correct and there is no residual debris within the sensor.

Fig. 4: Mounting of the measuring tube

- Depending on cable on size, the maximum distance between sensor and transmitter is 300 m.

It is recommended to install the transmitter in any switching room, control room or any other shielded area to protect from dust, humidity, temperature, vibration or any other influences.

Fig. 5: Transmitter

4.4 Overview of Connections between Sensor and Transmitter

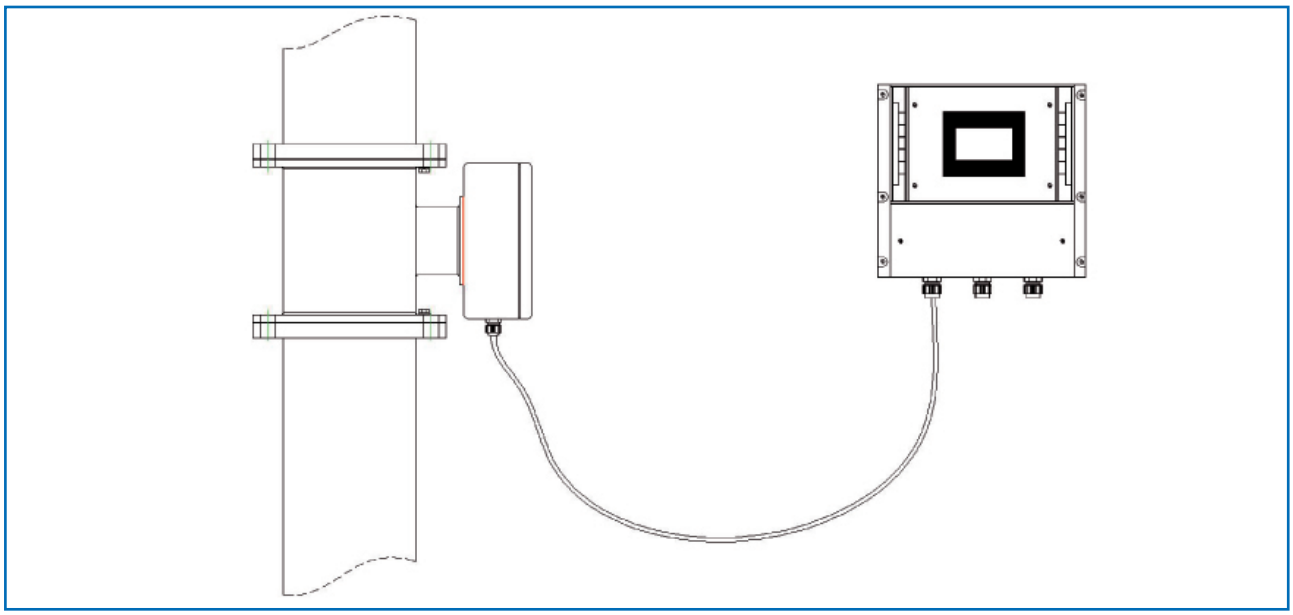


Fig. 6: Wiring of the sensor pipe and transmitter

Depending on cable cross sectional area, the maximum distance between sensor and transmitter is 300 m. A four (4) core shielded cable should be used.

4.5 Use in Ex Hazardous Areas

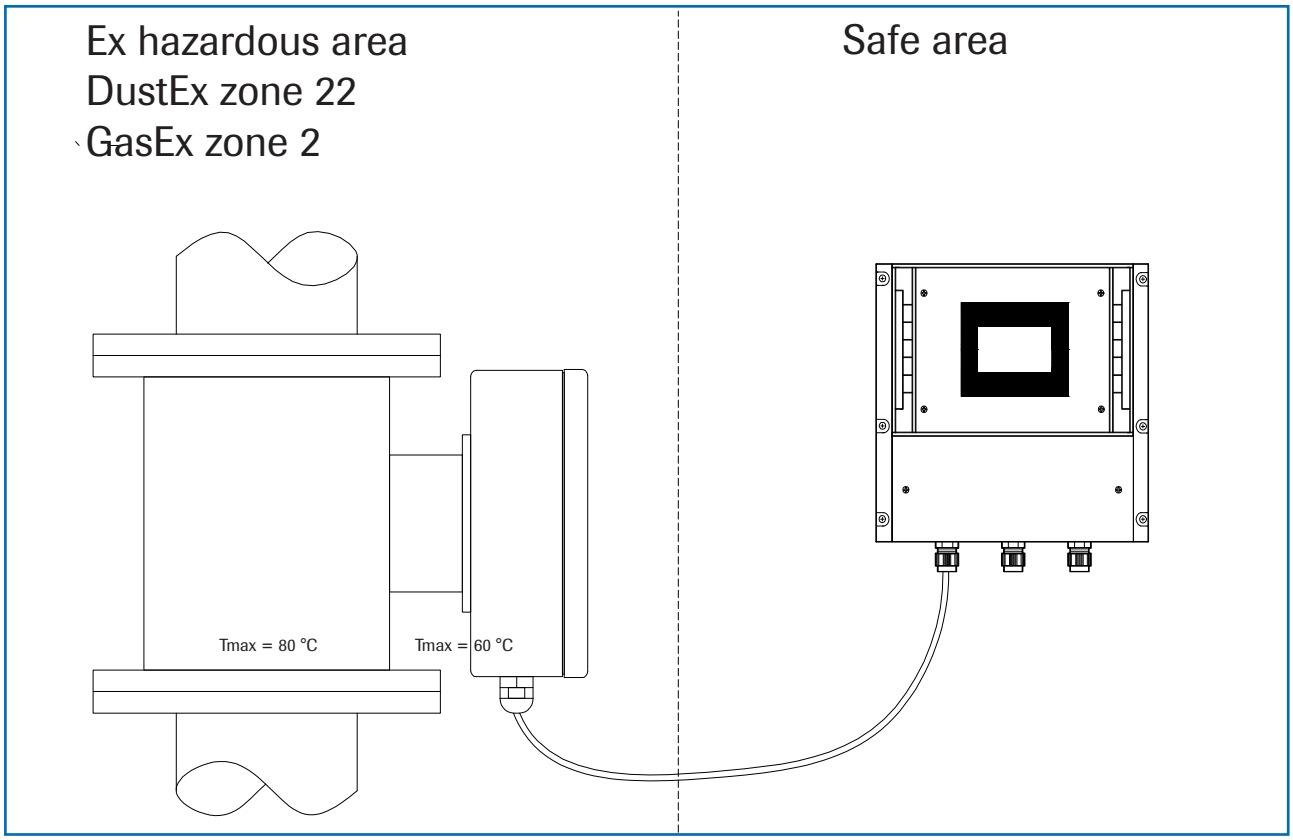
Marking DustEx: **II 3D Ex tD A21**

Zone 22: 0 °C ≤ $T_{prozess}$ ≤ 80 °C

- Equipment group: 2
- Equipment category: 3
- For combustible mixtures of air and dust
- IP 65
- Maximum surface temperature 84 °C with Ta = 60 °C

Marking GasEx: **II 3G Ex e IIC T4**

- Equipment group: 2
- Equipment category: 3
- Zone 2
- For combustible mixtures of air and gas
- Allowable process temperature 0 to 80 °C
- Temperature class, T4
- Maximum surface temperature 84 °C with Ta = 60 °C



5. Electrical Connection

5.1 Version Field Housing

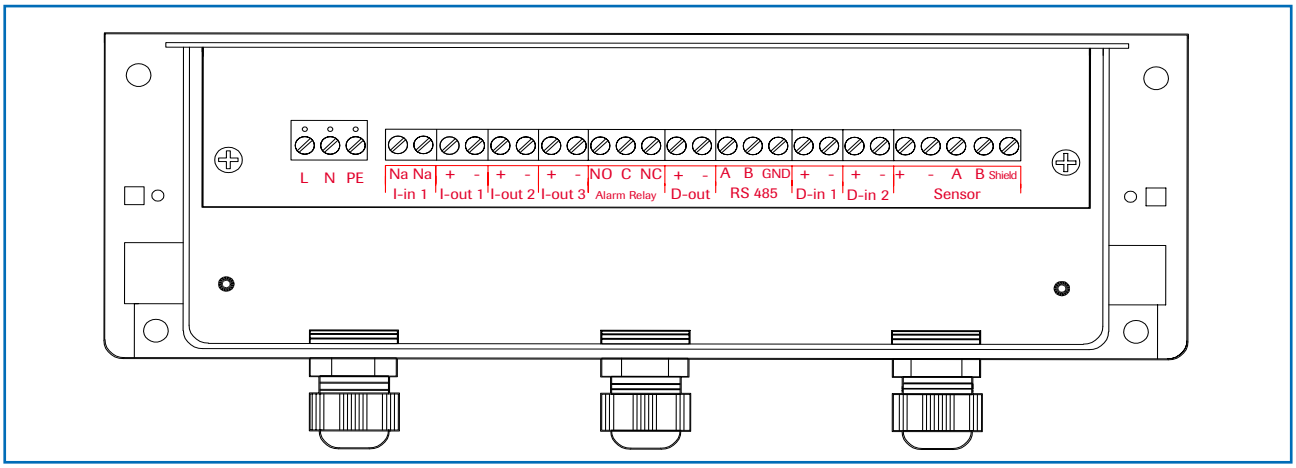


Fig. 8: Electrical Connection

Transmitter			
Terminal No.		**Connection**	
Connection of the power supply			
L / +24 V		Input power supply 230 V / 50 Hz, 110 V / 60 Hz (optional 24 V DC)	
N / 0 V		Input power supply 230 V / 50 Hz, 110 V / 60 Hz (optional 24 V DC)	
PE		Protective Earth	
Connections			
I-in 1	Na	not available	
	Na	not available	
I-out 1	+	Current Output 4 ... 20 mA +	Flow
	-	Current Output 4 ... 20 mA - (GND)	
I-out 2	+	Current Output 4 ... 20 mA +	Density
	-	Current Output 4 ... 20 mA - (GND)	
I-out 3	+	Current Output 4 ... 20 mA +	Velocity
	-	Current Output 4 ... 20 mA - (GND)	
Alarm Relay	NO	Isolated Relay Contact NO (make contact)	
	C	Isolated Relay Contact COM (common contact)	
	NC	Isolated Relay Contact NC (break contact)	
D-out	+	Digital Output (+)	
	-	Digital Output (-)	
RS 485	A	RS 485 Interface Data A (+)	
	B	RS 485 Interface Data B (-)	
	GND	RS 485 Interface Ground	
D-in 1	+	Digital Interface 1 (+)	
	-	Digital Interface 1 (-)	
D-in 2	+	Digital Interface 2 (+)	
	-	Digital Interface 2 (-)	
Sensor	+	Power supply 24 V (+)	Cable No. 1
	-	Power supply GND	Cable No. 2
	A	RS 485 Data A	Cable No. 3
	B	RS 485 Data B	Cable No. 4
	Shield	Shield	Shield

5.2 Version 19” Rack Mounted Transmitter

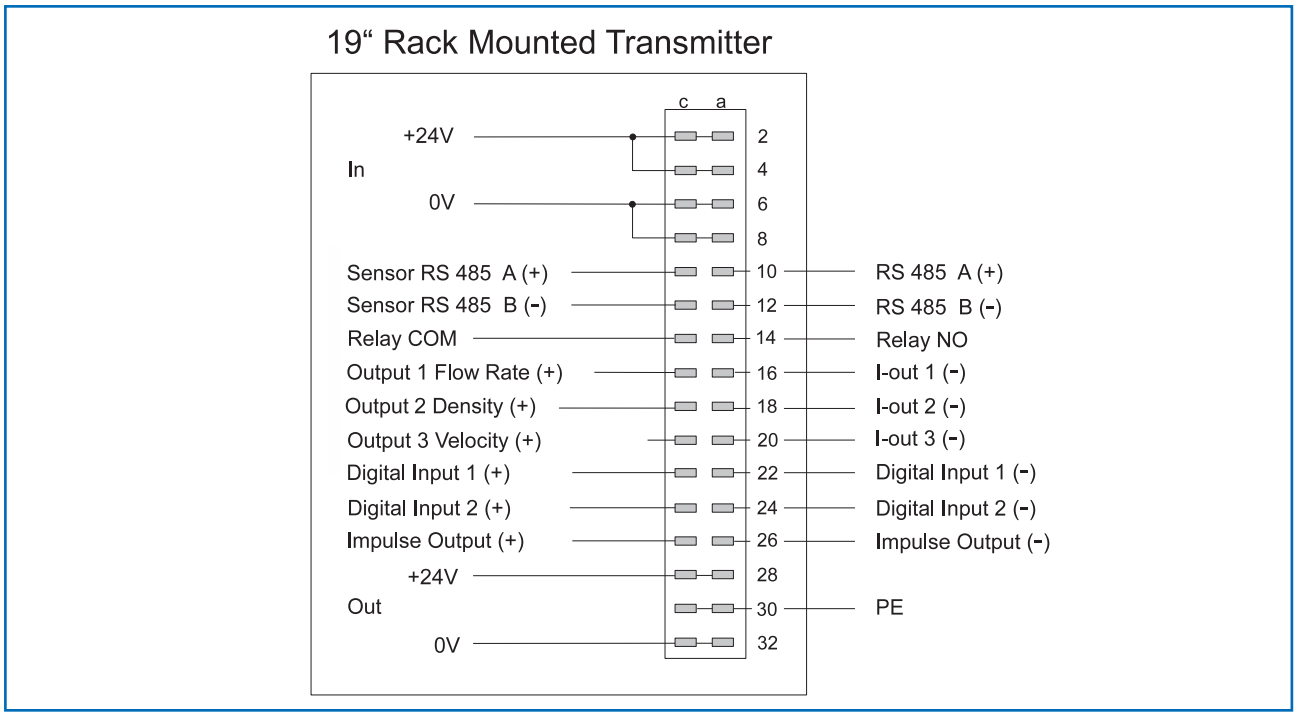
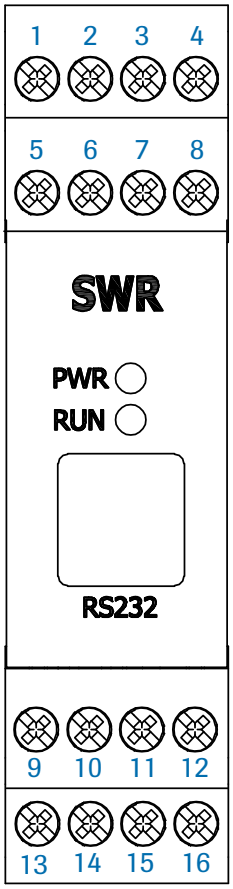


Fig. 9: Electrical Connection

Transmitter		
Terminal		**Function**
Connection of Power Supply		
+ 24 V DC	2 a/c + 4 a/c	Input Power Supply + 24 V DC
0 V GND	6 a/c + 8 a/c	Input Power Supply GND
PE	30 a/c	Protective Earth
Terminals		
RS 485 System / PC	10 a	RS 485 Interface Data A (+)
	12 a	RS 485 Interface Data B (-)
Relay NO	14 a	Relay Contact 1
	14 c	Relay Contact 2
Current Output 1 Flow Rate	16 a	4 ... 20 mA I-out 1 (-)
	16 c	4 ... 20 mA I-out 1 (+)
Current Output 2 Density	18 a	4 ... 20 mA I-out 2 (-)
	18 c	4 ... 20 mA I-out 2 (+)
Current Output 3 Velocity	20 a	4 ... 20 mA I-out 3 (-)
	20 c	4 ... 20 mA I-out 3 (+)
Digital Input 1	22 a	Dig. In 1 (-)
	22 c	Dig. In 1 (+)
Digital Input 2	24 a	Dig. In 2 (-)
	24 c	Dig. In 2 (+)
Impulse Output	26 a	Dig. Out (-)
	26 c	Dig. Out (+)
Sensor Connections	**28 a/c**	**Output Power Supply 24 V DC**
	32 a/c	**Output Power Supply 0 V GND**
	10 c	**Output RS 485 Interface Data A (+)**
	12 c	**Output RS 485 Interface Data B (-)**

5.3 Version DIN Rail Transmitter

1 Current output - 4 ... 20 mA	**2** Current output + 4 ... 20 mA	**3** Input power supply 0 V DC	**4** Input power supply + 24 V DC
5 not available	**6** Alarm relay NC	**7** Alarm relay C	**8** Alarm relay NO



9 not available	**10** not available	**11** RS 485- Interface data B	**12** RS 485- Interface data A
13 **Sensor connection cable 4** RS 485 data B	**14** **Sensor connection cable 3** RS 485 data A	**15** **Sensor connection cable 2** Power supply 0 V	**16** **Sensor connection cable 1** Power supply + 24 V

6. Commissioning

Please check again:

- That all connections between the sensor and transmitter are correct.
- That the sensor is correctly installed.
- If there are problems at this stage, please contact your local distributor or SWR directly.
- Apply power to the system. Wait for a warm up period of fifteen (15) minutes before starting any adjustments.

There are different possibilities to commission MaxxFlow HTC:
Nearly every MaxxFlow application is based on free falling or sliding material, so the velocity could be assumed as a constant. Therefore it is recommended to use the fixed velocity option because this will be the most reliable operation mode.

a. calibration via full-adjusting
Switch on fixed velocity option and ensure that RMS-A (root mean square of velocity signal A) is higher than NST (no signal threshold) during flow condition.
If necessary proceed a zero calibration, than fill up the sensor with material and proceed a full calibration (Menu 2.1.3). Assumed the falling height has been set correctly (Menu 1.7), this should result in a real flow indication now. If there is still some deviation adjust the flow value from now on with the calibration factor.

Zero calibration: Start zero-point calibration (Menu 2.1.1) in no-flow condition with empty pipe. Insure that the pipe is really empty.

b. Calibration via calibration factor and reference
Switch on fixed velocity option and ensure that RMS-A is higher than NST during flow condition.
If necessary proceed a zero calibration.
It is not necessary to proceed any full calibration or flow calibration, you are able to work with the factory setting. For calibration you only have to adjust the calibration factor (Menu 2.2) according to a comparison of a reference value with the flow indication. The calibration factor could be calculated using this formula:

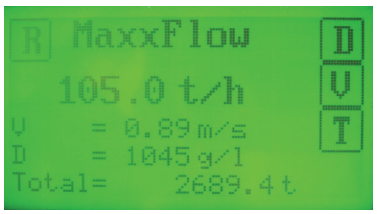
$$\frac{\text{Reference value}}{\text{MaxxFlow HTC indication}} \times \text{actual calibration factor} = \text{new calibration factor}$$

c. Calibration via working point
Switch on fixed velocity option and ensure that RMS-A is higher than NST during flow condition.
If necessary proceed a zero calibration.
For this kind of calibration you need 2 measuring points. Measuring point 1 must be the zero point, Measuring point 2 would be the working point (Menu 2.1.2).
The working point should be set while a stable operating flow is given and the flow value is known. After later weighing this value can be adjust via the corrector factor.

Basic function	At least a two-point-calibration (normally zero and max) is sufficient for the density measurement. The velocity measurement, if used in fact, is firmly defined as an absolute measurement by the distance of the sensor plates and does not have to be calibrated.
Zero-point	Start zero-point calibration in no-flow condition with empty pipe. Insure that the pipe is really empty.
Operating-point	Start operating-point calibration during flow condition with known flow value. It is possible to edit this value at a later time.
Analog output 1	Current output flow rate. The measuring range is adjusted in menu point 3.1.1. 0 = 4 mA Max = 20 mA
Analog output 2	Current output density. The measuring range is adjusted in menu point 3.2.1. 0 = 4 mA Max = 20 mA
Analog output 3	Current output speed. The measuring range is adjusted in menu point 3.3.1. 0 = 4 mA Max = 20 mA
Filter	The filter values visible in the analog output configuration are used to smooth the continuous analogue output trend.

7. Standard Indication of MaxxFlow HTC

7.1 Transmitter with Display



The standard display shows the actual flow rate as well as measuring values of density, velocity and the totaliser value.

With four touch screen buttons, further indication and configuration information is available:

R Reset totaliser, choose OK or NO

D Density, further informations about density measurement, back with **M** (mass flow)

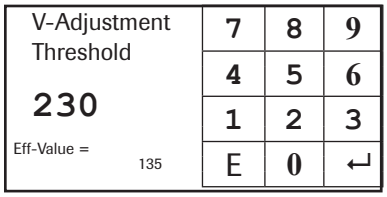
V Velocity, further information about speed measurement, back with **M** or press **S** (speed) for velocity configuration.

S V-Adjustment, various settings for speed measurement.

1. Threshold

   It defines the noise level of the RMS values (root mean square values) of the velocity signals.
   All values below will be ignored for speed measurement resp. with activated fix-velocity the output will switch to 0 m/s.

   Possible values 1 - 65535, cancel with **E** (ESC)

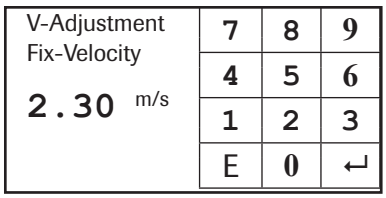


2. Display of the actual RMS value of velocity signals

3. Fix-velocity

   Setting of fix-velocity value, this will replace automatically the parameter falling height.

   Possible values 1 - 99.99, cancel with **E** (ESC)



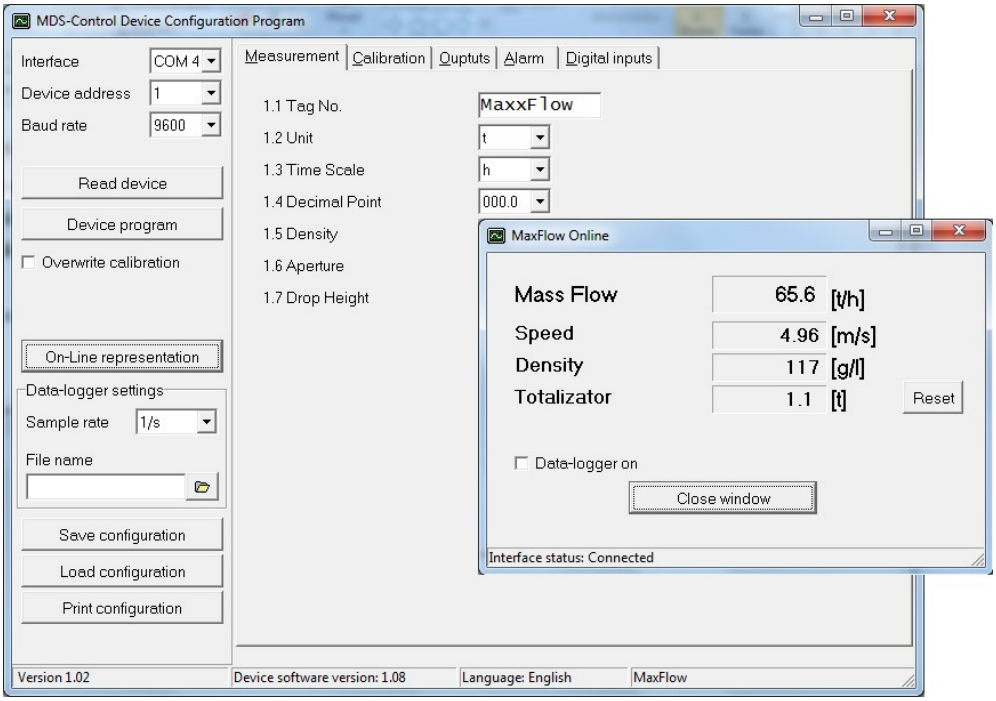
4. Vfix

   Fix-Velocity **On / Off**

T Displays the temperature of the sensor electronics.

7.2 PC-Software

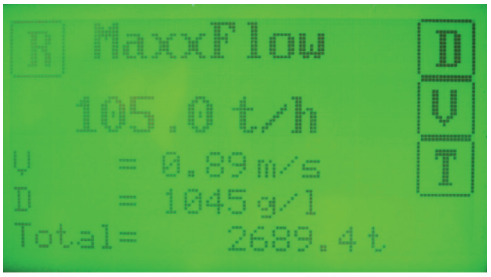
For systems without display a PC-Software is available.
The default display showing is represented here by the online representation.



The basic settings for using the software are described in a later chapter.

In the following the menu navigation via display will be describe. These menu points are the same like in the PC-Software, so the using is derives therefrom.

8. Structure Main Menu MaxxFlow HTC

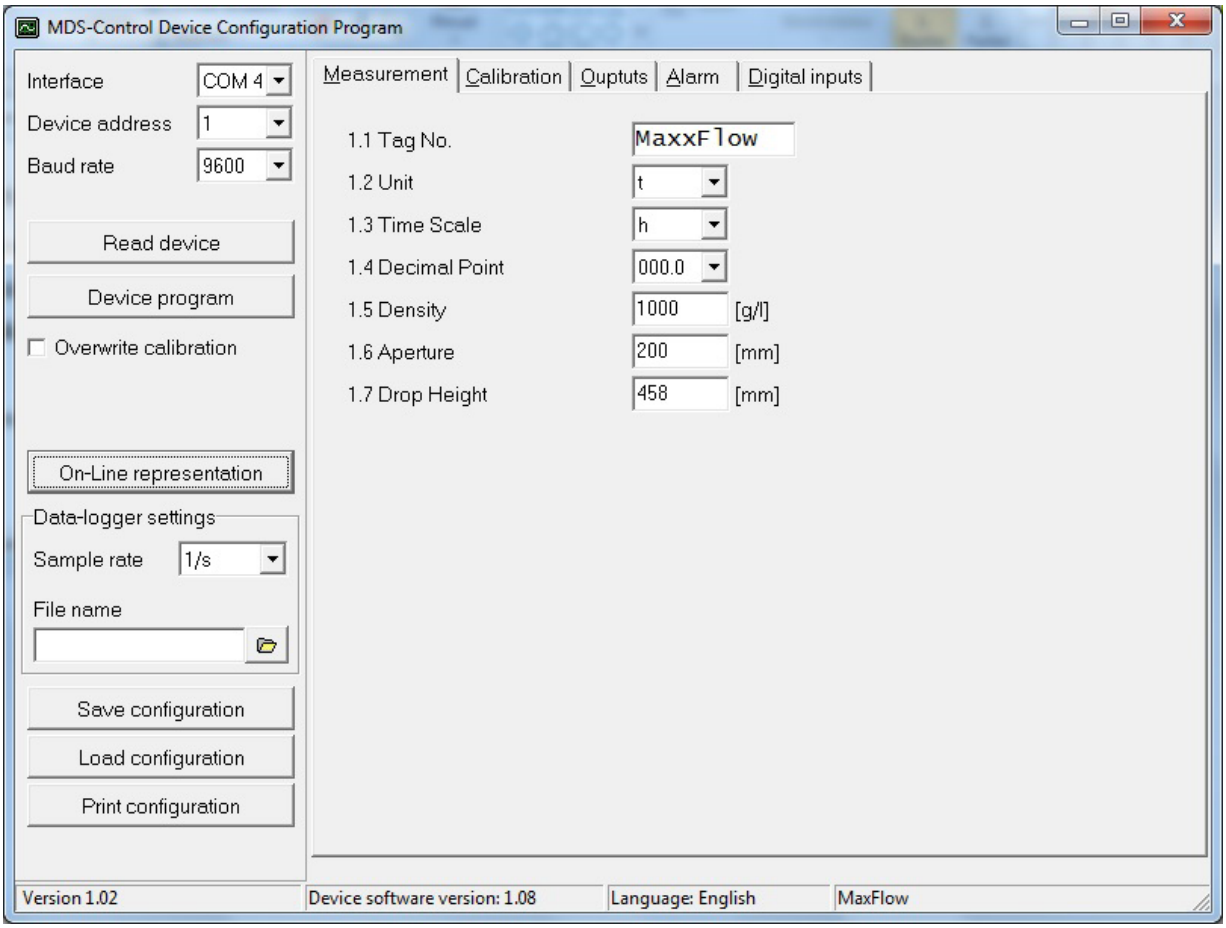


Switch to main menu: Press any pad of the touchscreen for about a few seconds until the menu appears.

1. Measurement	
1.1 Tag	Name (10 characters)
1.2 Unit	Select: g / kg / t
1.3 Time Unit	Select: h / min / s
1.4 Dec. Point	Position of dec. point
1.5 Density	Range 1 --- 3000 g/l
1.6 Aperture	Range 10 --- 300 mm
1.7 Drop Height	Range 10 --- 9999 mm
2. Calibration	
2.1 Sensor Calibration	Adjusting the measured value to material and mounting situation.
2.1.1 Zero Point	… for the empty sensor
2.1.2 Operating Point	… with material flowing
2.1.3 Full Calibration	… with filled sensor
2.2 Current Input	Adjustment of current input for external correction
2.2.1 Calibration 4 mA	Factory setting, no adjustment required
2.2.2 Calibraton 20 mA	Factory setting, no adjustment required
2.3 Factor	Correction factor density, Range 0.01 --- 9.99
2.4 Interpolation Points	Amount of interpolation points for linearization (max. 3)
2.5 Interpolation Table	Linearization characteristic
2.6 Min. Load	Suppression of conveying dropouts during auto acquisition
2.7 Interpolation Point 1	
2.7.1 Raw Value	Non-linearized flow rate
2.7.2 Calibrated Value	Linearized flow rate
2.7.3 Auto Acquisition	Automatic calibration with a weighed mass
2.8 Interpolation Point 2	Same as interpolation point 1

3.	**Outputs**	
3.1	**Flow Rate**	
3.1.1	**at 20 mA**	End of measuring range
3.1.2	**Filter**	Range: 0.1 --- 99.9 s (Standard: 1 s)
3.1.3	**Calibration 4 mA output**	Factory setting, no adjustment required
3.1.4	**Calibration 20 mA output**	Factory setting, no adjustment required
3.2	**Density**	Select: density or velocity
3.2.1	**at 20 mA**	End of measuring range
3.2.2	**Filter**	Range: 0.1 --- 99.9 s (Standard: 1 s)
3.2.3	**Calibration 4 mA output**	Factory setting, no adjustment required
3.2.4	**Calibration 20 mA output**	Factory setting, no adjustment required
3.3	**Velocity**	Select: density or velocity
3.3.1	**at 20 mA**	End of measuring range
3.3.2	**Filter**	Range: 0.1 --- 99.9 s (Standard: 1 s)
3.3.3	**Calibration 4 mA output**	Factory setting, no adjustment required
3.3.4	**Calibration 20 mA output**	Factory setting, no adjustment required
3.4	**Alarm**	
3.4.1	**Type**	Select: Minimum or maximum alarm
3.4.2	**Value**	Flow value triggering an alarm
3.4.3	**Delay**	Range: 0.1 --- 99.9 s
3.4.4	**Hysteresis**	Threshold for resetting the alarm
3.4.5	**Output**	Select alarm: Alarm or sensor busy
3.4.6	**Mode**	Select relais mode: NO / NC
3.4.7	**Sensor alarm**	Select: ON / OFF
3.5	**Impuls Output**	
3.5.1	**Pulse / Mass**	Desired number of pulses per mass unit counted by the totalizer
4.	**Digitale Inputs**	
4.1	**Digital Input 1**	
4.1.1	**Function**	Selection of function none / zero adjustment / full adjustment
4.1.2	**Direction**	Select: direct / inverted
4.1.3	**Filter**	Range: 0.1 --- 99.9 s
4.2	**Digital Input 2**	
4.2.1	**Function**	Selection of function none / zero adjustment / full adjustment
4.2.2	**Direction**	Select: direct / inverted
4.2.3	**Filter**	Range: 0.1 --- 99.9 s
5.	**System**	
5.1	**Baud Rate**	Select: 4800 / 9600 / 19200 / 38400
5.2	**Address**	Range: 1 --- 250
5.3	**Contrast**	Contrast adjustment
5.4	**Language**	Select: D / F / E

9. Using the PC-Software



Interface Choice of the serial interface in the PC (COM 1 ... COM 12)

ModBus address Address of the appealed transmitter in the ModBus (1 ... 255)

Baud rate Information of the Baud rate for serial communication (4800 / 9600 / 19200 / 38400 Bd - Standard 9600 Bd)

Device read All parameters are read from the transmitter linked with the PC and are shown.

Device program The changed parameters are written in the transmitter and are stored there.

Without putting of the brand calibration headline,
if all changes are taken over **without** calibrating data in menu point 4.

With putting of the brand calibration headline,
if the changes of the calibrating data from menu 4 are also sent to the transmitter.

Online-representation Online-representation of the measuring values on the PC:

Mass Flow: Announcement of the measuring value in phys. units.

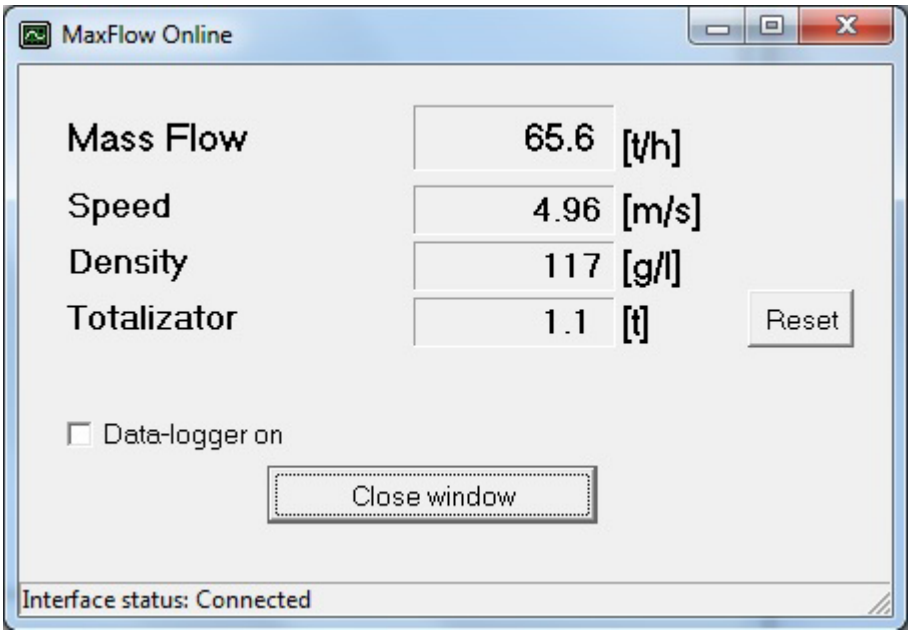
Speed: Notification of the fix- or the real-speed.

Density: Announcement of the measuring density in phys. units.

Totalizator: Throughput counter as a calibrating aid.

Reset: Put back of the totalizer on 0.

Data-logger on: After the input of a file name and the choice of the memory rate, the data are stored in the CSV format. Afterwards these data can be worked on with Excel or a similar program and be analyzed.



Data-logger setting Information of the memory rate 1/s, 20/s, 10/min . . . for saving data.
For using data-logger it is necessary to set a file name before.

File name Set file path and name for saving the CSV data.

Save configuration Save hole configuration of the transmitter on the PC.

Load configuration Load configuration for transmitter which is stored on PC.

Print configuration Print the actual configuration of the transmitter in table format.

Language With pressure the right mouse key on Language in the lowest task strip, appears the linguistic choice: D / F / E .

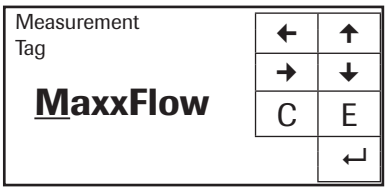
10. System Adjustments in Detail

1. MEASUREMENT

1.1 Tag

Freely selectable notation, max. 10 characters.

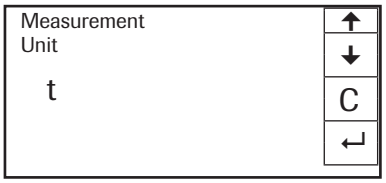
With ↑ and ↓ select characters, with ← and → select place of the character (1...10); with C delete the respective character, with E leave without changes, and with ↵ confirm and leave the menu level.



1.2 Unit

Selection of the mass unit: g / kg / t

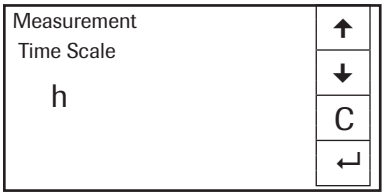
With ↑ and ↓ select according to the display, with C leave the menu without any change, with ↵ confirm and leave the menu level.



1.3 Time Unit

Select of the time unit - Choose: h / min / s
/ s per second
/ min per minute
/ h per hour

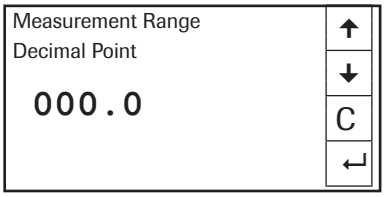
With ↑ and ↓ select the time unit with C leave the menu without any change, with ↵ confirm and leave the menu level.



1.4 Decimal Point

Adjust the decimal place in the display.

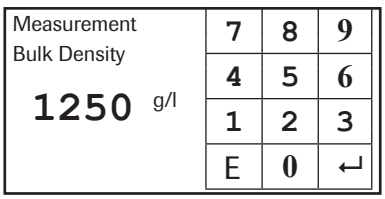
With ↑ and ↓ select according to the display, with C leave the menu without any change, with ↵ confirm and leave the menu level.



1.5 Density

Set bulk density in g/l (= kg/m³), possible range 1 to 3000 g/l.

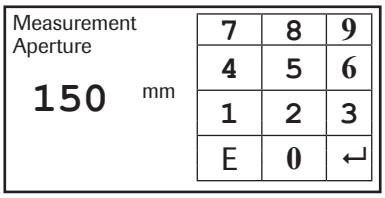
Enter the value, with C leave the without changes, with ↵ confirm and leave the menu level.



1.6 Aperture

Set value of inner pipe diameter.

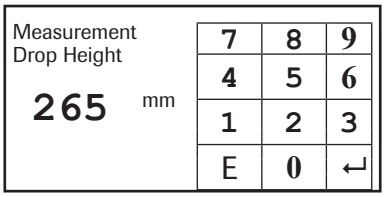
Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.



1.7 Drop Height

Enter drop height, this will calculate fixed-velocity value automatically.

Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.

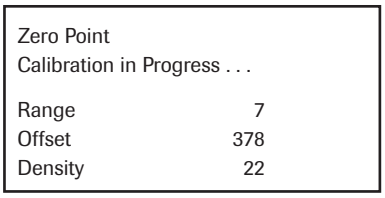


2. CALIBRATION

2.1 Sensor Calibration

2.1.1 Zero Point

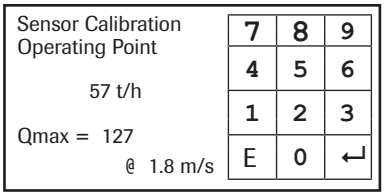
Insure that the pipe is empty.
Start zero adjustment with [OK].
Cancel with [NO].



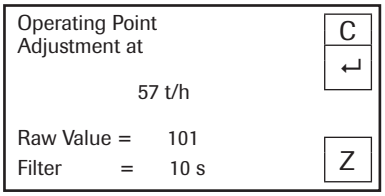
2.1.2 Operating Point

Enter known flow rate.

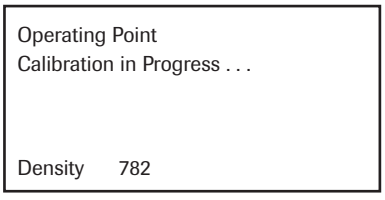
Enter the value, with [E] leave without changes, with [↵] confirm and go to the next window.



Change filter value with [Z],
confirm adjustment values with [↵].



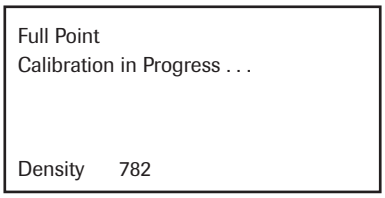
Display during calibration procedure.



2.1.3 Full Calibration

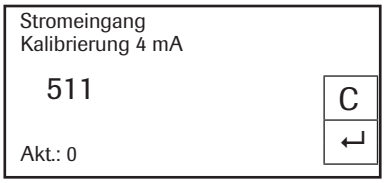
Calibration with 100 % filled pipe in no-flow condition.

Set full calibration with [OK].
Cancel with [NO] .

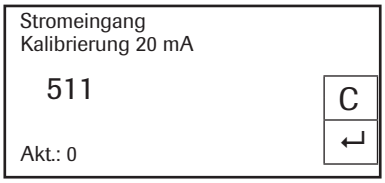


2.2 Stromeingang

2.2.1 Kalibrierung 4 mA

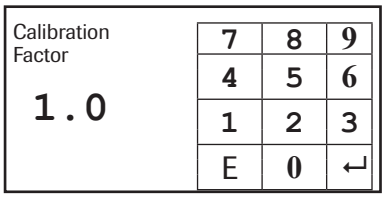


2.2.2 Kalibrierung 20 mA



2.3 Factor

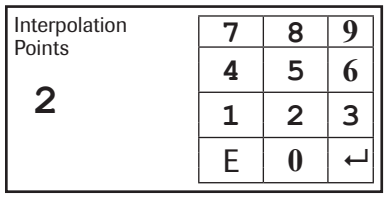
Correction factor affects directly the density measurement.
0.01 to 9.99
Default 1.0
Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.



2.4 Interpolation Points

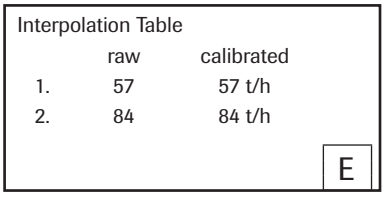
Set amount of required interpolation points; maximum 3 points are possible.

Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.



2.5 Interpolation Table

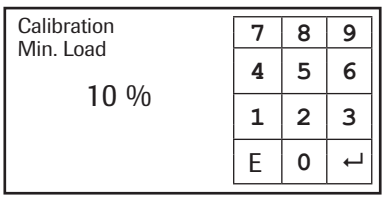
Display of the calibrated points.
Back with [E].



2.6 Min. Load

Suppresses conveying breaks during Auto Acquisition.

Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.

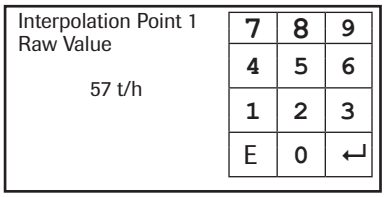


2.7 Interpolation Point 1

2.7.1 Raw Value

Manual interpolation.
This is the non-linearized flow value.

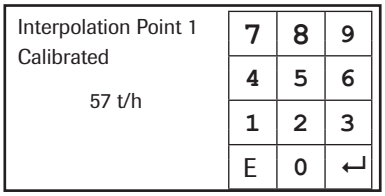
Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.



2.7.2 Calibrated

Manual interpolation.
Linearized flow value.

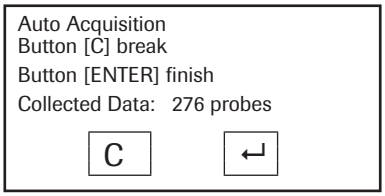
Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.

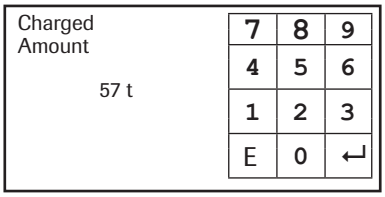


2.7.3 Auto Acquisition

Enables a calibration by means of a weighed mass. The collection of data starts with entering this menu point, but only flow rates above the min. load value will be counted.

Finish with [↵], enter the conveyed mass and confirm with [↵] . Press [E] to leave menu point without any changes.





2.8. / 2.9 Interpolation point 2 / 3 same as point 1

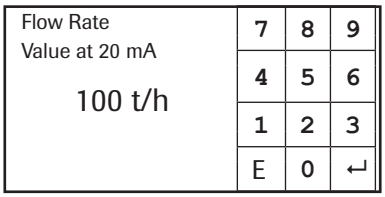
3. OUTPUTS

3.1 Output 1 Flow Rate

3.1.1 at 20 mA

Enter end of measuring range, this will comply to 20 mA.

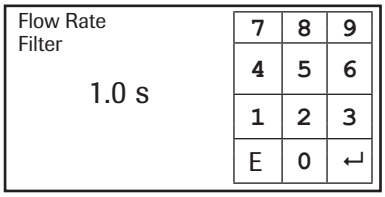
Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.



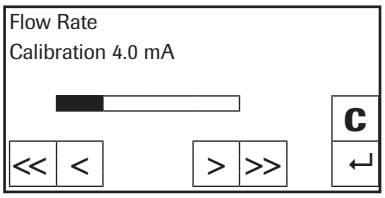
3.1.2 Filter

Adjustable damping for the flow rate.
Range: 0.1 . . . 99.9 s (Standard 1 s)

Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.



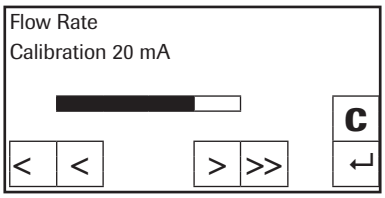
3.1.3 Calibration 4 mA



All current outputs were calibrated at the factory.
If necessary recalibration with multimeter is possible.

With [<<] and [>>] adjust fast, with [<] and [>] adjust slowly the current to 4 mA. With [↵] confirm and leave the menu level, with [C] leave the menu without any change.

3.1.4 Calibration 20 mA

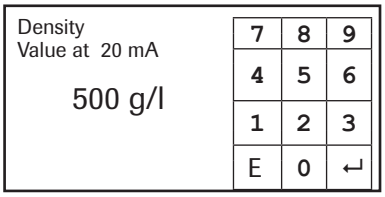


All current outputs were calibrated at the factory.
If necessary recalibration with multimeter is possible.

With [<<] and [>>] adjust fast, with [<] and [>] adjust slowly the current to 4 mA. With [↵] confirm and leave the menu level, with [C] leave the menu without any change.

3.2. Output 2 Density

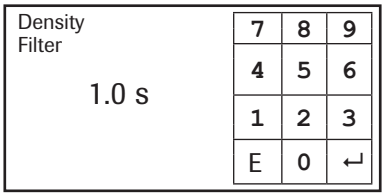
3.2.1 at 20 mA



Enter end of measuring range, this will comply to 20 mA.

Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.

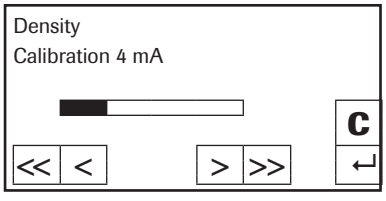
3.2.2 Filter



Adjustable damping for the density.
Range: 0.1 . . . 99.9 s (Standard 1 s)

Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.

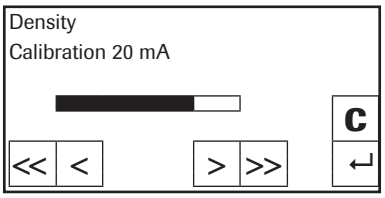
3.2.3 Calibration 4 mA



All current outputs were calibrated at the factory.
If necessary recalibration with multimeter is possible.

With [<<] and [>>] adjust fast, with [<] and [>] adjust slowly the current to 4 mA. With [↵] confirm and leave the menu level, with [C] leave the menu without any change.

3.2.4 Calibration 20 mA

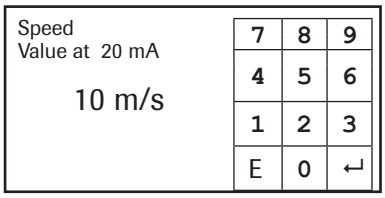


All current outputs were calibrated at the factory.
If necessary recalibration with multimeter is possible.

With [<<] and [>>] adjust fast, with [<] and [>] adjust slowly the current to 4 mA. With [↵] confirm and leave the menu level, with [C] leave the menu without any change.

3.3 Output 3 Speed

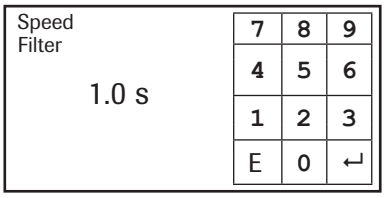
3.3.1 at 20 mA



Enter end of measuring range, this will comply to 20 mA.

Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.

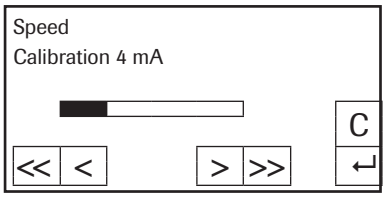
3.3.2 Filter



Adjustable damping for the velocity.
Range: 0.1 . . . 99.9 s (Standard 1 s)

Enter the value, with [E] leave without changes, with [↵] confirm and leave the menu level.

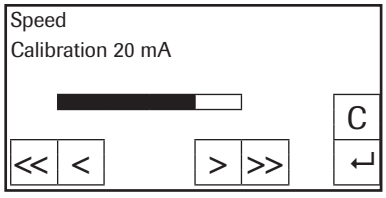
3.3.3 Calibration 4 mA



All current outputs were calibrated at the factory.
If necessary recalibration with multimeter is possible.

With [<<] and [>>] adjust fast, with [<] and [>] adjust slowly the current to 4 mA. With [↵] confirm and leave the menu level, with [C] leave the menu without any change.

3.3.4 Calibration 20 mA



All current outputs were calibrated at the factory.
If necessary recalibration with multimeter is possible.

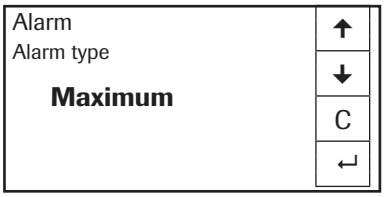
With [<<] and [>>] adjust fast, with [<] and [>] adjust slowly the current to 4 mA. With [↵] confirm and leave the menu level, with [C] leave the menu without any change.

3.4 ALARM

3.4.1 Type

Upper and lower limit value. Affects relays.

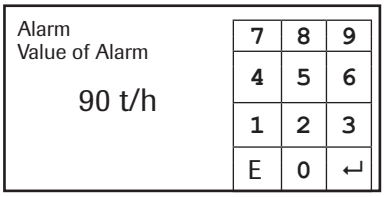
With ↑ and ↓ select according to your significance, with C leave the menu without any change, with ↵ confirm and switch to a deeper menu level.



3.4.2 Value of Alarm

Flow value for the alarm.

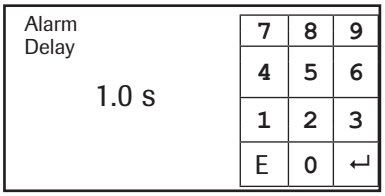
With E leave the menu without any change, with ↵ confirm and leave the menu level.



3.4.3 Delay

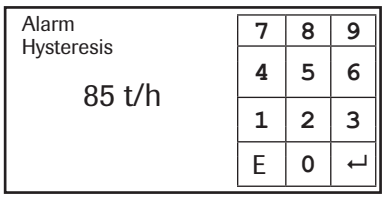
Threshold value how long the value must be over or under the limit until the alarm relay reacts.
Range: 0.1 ... 99.9 s

With C leave the menu without any change, with ↵ confirm and leave the menu level.



3.4.4 Hysteresis

Threshold for resetting the alarm.
Range: 0 ... 500 t/h
With E leave the menu without any change, with ↵ confirm and leave the menu level.



3.4.5 Output

Alarm / calibration active

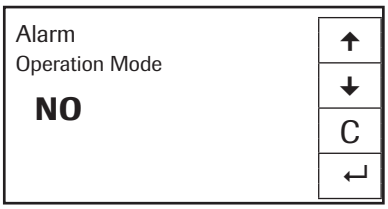
Selection of signalisation mode using the relay either as “Alarm” or “Sensor busy” for auto calibration unit.

With ↑ and ↓ select according to the display, with C leave the menu without any change, with ↵ confirm and leave the menu level.

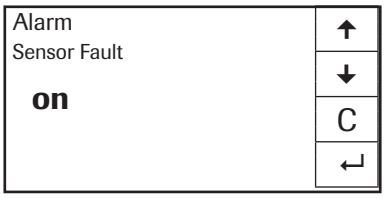
3.4.6 Mode

Choice of the contact work or interruption.
NO - Working current
NC - Static current

With ↑ and ↓ select according to the display, with C leave the menu without any change, with ↵ confirm and leave the menu level.



3.4.7 Sensor Fault

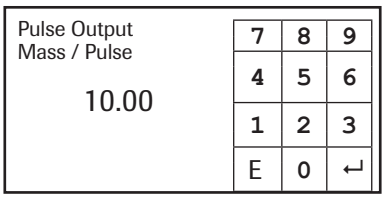


On / Off
Affects to alarm relay.

With ↑ and ↓ select according to the display, with C leave the menu without any change, with ↵ confirm and leave the menu level.

3.5 Pulse Output

The pulse output is potential free (optocoupler), wiring see page 29.



3.5.1 Amount of Pulses / Mass Unit

Type desired number of pulses per mass unit. This should not exceed 50 Hz.

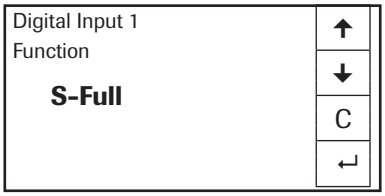
Input with the count keyboard. With E leave the menu without any change, with ↵ confirm and leave the menu level.

4. DIGITAL INPUTS

The digital inputs are potential free (optocoupler), wiring see page 29.

4.1 Digital Input 1

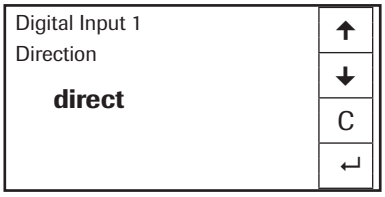
4.1.1 Function



Digital input for a trigger signal to start zero or full calibration.
Select input function.
None / S-Zero / S-Full

Possibility to start calibration with an external signal. With ↑ and ↓ select according to the display, with C leave the menu without any change, with ↵ confirm and leave the menu level.

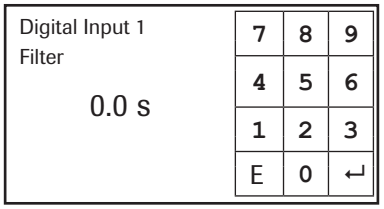
4.1.2 Direction



Direct / Inverted

With ↑ and ↓ select according to the display, with C leave the menu without any change, with ↵ confirm and leave the menu level.

4.1.3 Filter



Idle time after activation.

With E leave the menu without any change, with ↵ confirm and leave the menu level.

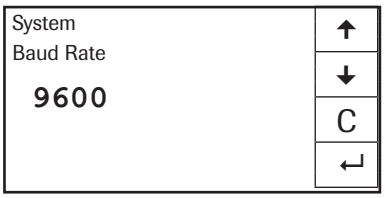
4.2 Digital Input 2 — Same as Digital Input 1

5. SYSTEM

5.1 Baud Rate

Baud Rate Setting
Select: 4800 / 9600 / 19200 / 38400

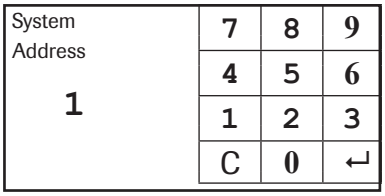
With [↑] and [↓] select Baud Rate, with [C] leave the menu without any change,
with [↵] confirm and leave the menu level.



5.2 ModBus-Address

Set 1 . . . 250

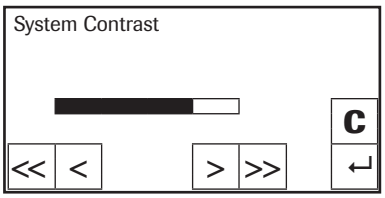
With [E] leave the menu without any change,
with [↵] confirm and leave the menu level.



5.3 Contrast

Display contrast for a better legibility.

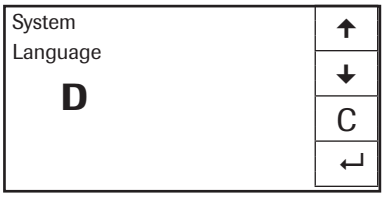
With [<<] and [>>] adjust fast, with [<] and [>] adjust slowly to the required contrast.
With [↵] confirm and leave the menu level,
with [C] leave the menu without any change.



5.4 Language

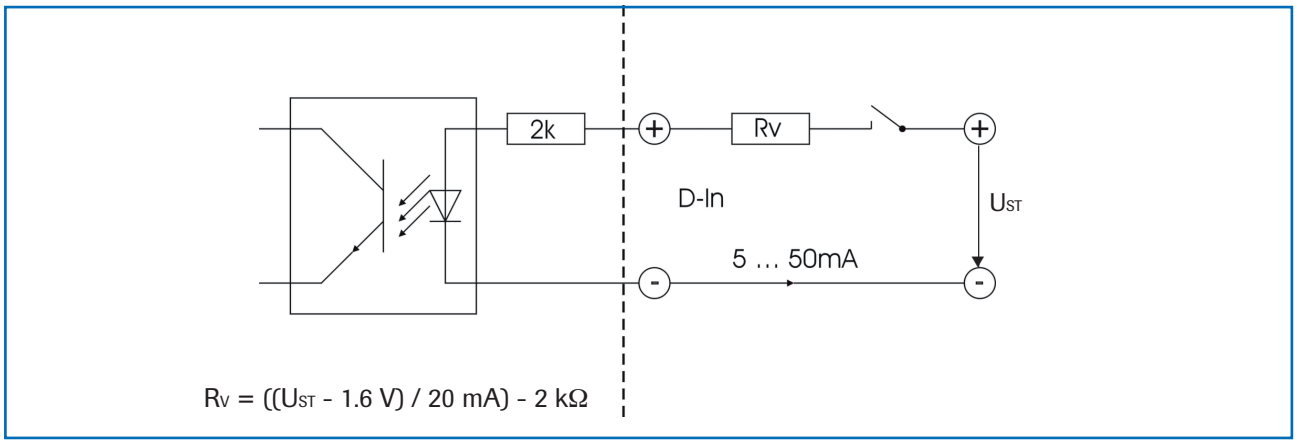
Language selection.
Choose: D / F / E

With [↑] and [↓] select language, with [C] leave the menu without any change,
with [↵] confirm and leave the menu level.

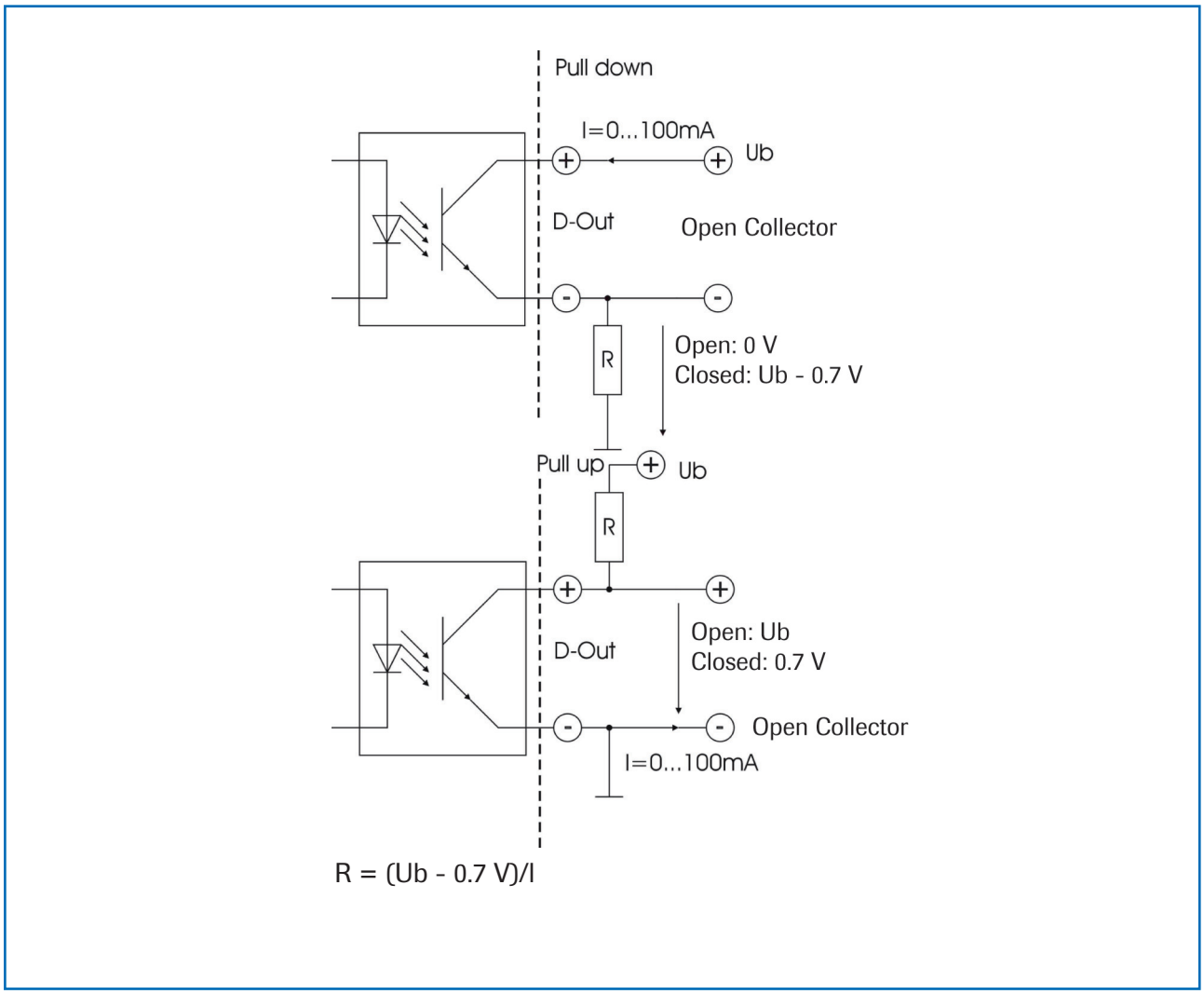


11. Connection Examples

11.1 Digital Input



11.2 Impulse Output



12. Maintenance

Warning!

- Beware of live terminals when opening enclosure.
- Ensure power is disconnected before undertaking any maintenance.
- Repairs and maintenance must only be carried out by trained authorised persons.

13. Warranty

Warranty is for one (1) year. It starts from the delivery date. The warranty is valid as long as the system has been installed and commissioned according to the Operating Instructions and there is no sign of any wear or mechanical damage.

In the case of defects during the warranty period, all defective components will be repaired / replaced. The parts that are replacing the defective parts, remain the property of SWR. If the costumer requires the warranty work to be executed at their premises, then the costumer will pay for costs of the SWR engineer to be on their site.

SWR is not responsible for any damage to the customer's process and is not responsible for any loss of profit due to that damage.

14. Trouble Shooting

- **Warning!**
  The electrical installation must be carried out by qualified, authorised persons.

Problem	Cause	Solution
System does not operate.	No power.	Check power supply.
	Cable break.	Check for continuity.
	Defective device.	Replace fuses in enclosure.
Outputs are the wrong values.	Incorrect calibration.	Re calibrate the system.
Sensor error.	Sensor connections incorrect.	Check wiring connections.
	Sensor failure.	Replace sensor.
Do not open sensor electronics. To do so will make the warranty void.		

15. Technical Data

Sensor	
Housing	St52, powder coated (optional stainless steel 1.4571) NW 100 / 150 / 200, flange according EN 1092-1 / PN 10
Inner pipe	Ceramic (Al_2O_3)
Protection category	IP 65, ATEX: Cat. 3D
Environment temperature	Sensor pipe: -20 ... + 120 °C Sensor electronic: 0 ... + 60 °C
Max. working pressure	1 bar (optional 10 bar)
Working frequency	88 kHz
Transmitting power	Max. 2 mW
Weight	Depending to model
Accuracy	+/- 3 % (based on end of measuring range)
Transmitter (version field housing)	
Power supply	110 / 240 V AC, 50 Hz, 24 V DC
Power consumption	20 W 24 VA
Protection category	IP 65 according EN 60 529/10.91
Dimensions	258 x 237 x 174 (W x H x D)
Weight	Approx. 2.5 kg
Terminal clamp wire size	0.2 - 2.5 mm² [AWG 24-14]
Cable Glands	3 x M16 (4.5 - 10 mm Ø)
Alarm output Error output	Relay with toggle switch - max. 250 V AC, 1 A
Transmitter (version 19" rack system)	
Power supply	24 V DC
Power consumption	12.5 W
Protection category	IP 30 according EN 60 529/10.91
Dimensions	19" rack system, 3HE, 28TE, L = 227 mm
Weight	Approx. 1 kg
Connection	Connector (DIN 41612), Typ B, 32-pol., connector
Alarm output	Relay NC - max. 250 V AC, 1 A
Transmitter (version DIN rail)	
Power supply	24 V DC ± 10 %
Power consumption	20 W 24 VA
Protection category	IP 40 according EN 60 529
Operating temperature	-10 ... +45 °C
Dimensions	23 x 90 x 118 (W x H x D)
Weight	Approx. 172 g
DIN Rail mounting	DIN 60715 TH35
Terminal clamp wire size	0.2 - 2.5 mm² [AWG 24-14]
Current output signal	4 ... 20 mA (0 ... 20 mA), load < 500 Ω
Alarm output	Relay with switching contact - Max. 250 V AC, 1 A
Data backup	Flash
Additional Data	
Operating temperature	-10 ... +45 °C
Current outputs	3 x 4 ... 20 mA (0 ... 20 mA), load < 500 Ω
Digital inputs	2 x Ri 2 kΩ, 5 - 50 mA
Data storage	Flash Memory
Impulse output	Open Collector - Max. 30 V, 20 mA
USB interface	2.0
RS 485 interface	ModBus-Protocol

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