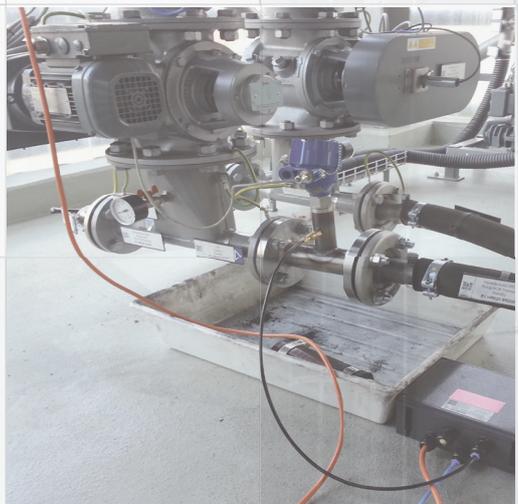
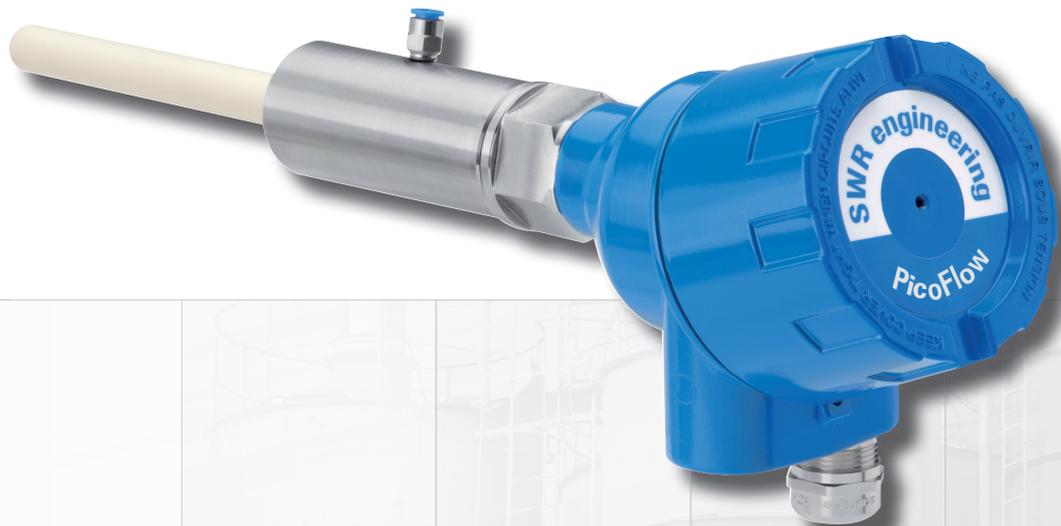
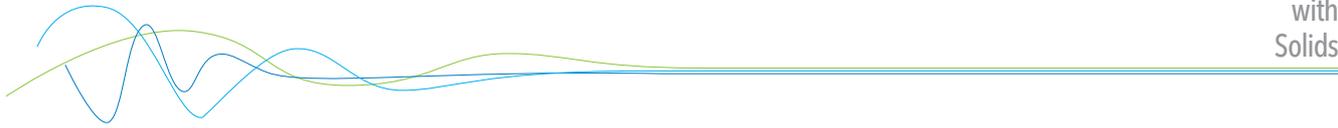


PicoFlow

Monitoring of solids
for small solid / air ratios





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1. System overview

The PicoFlow measuring system consists of a:



The system can be equipped with up to three sensors.

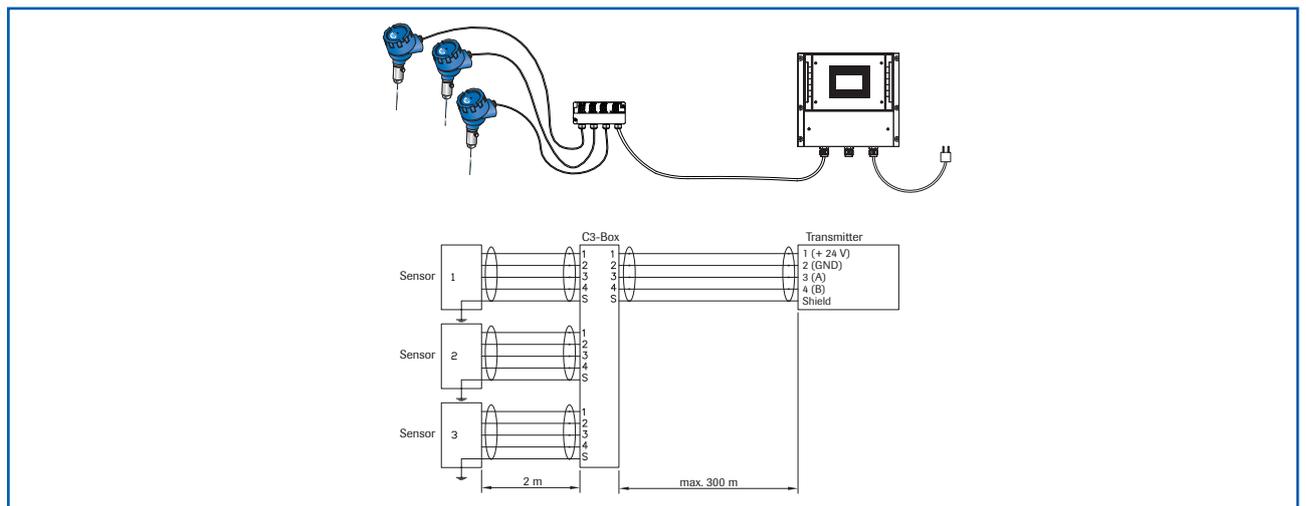


Fig. 1: Overview with C3-box and field housing transmitter

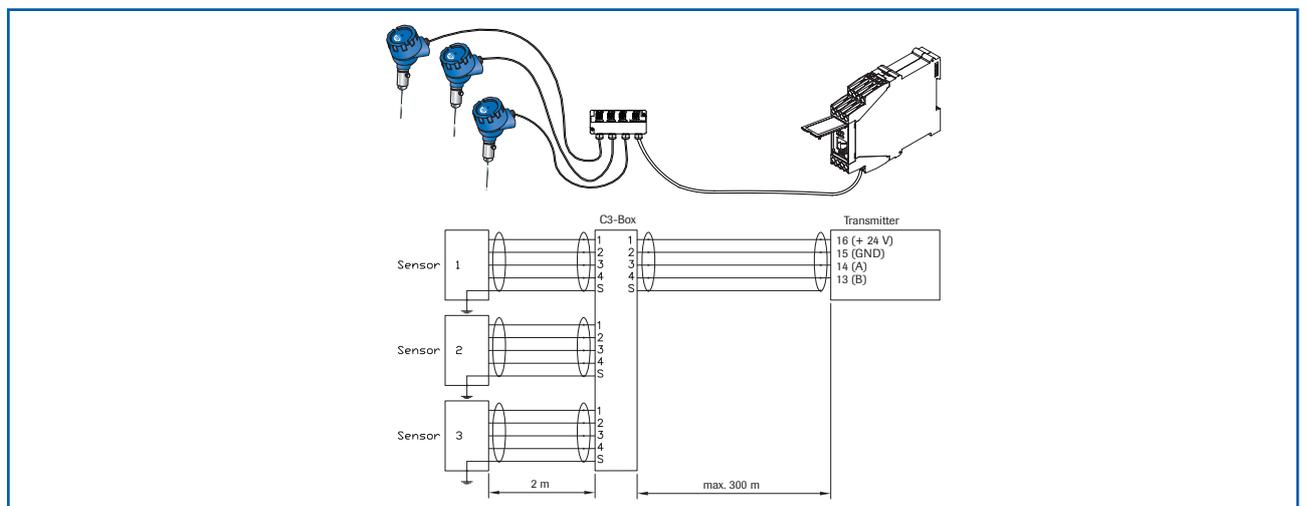
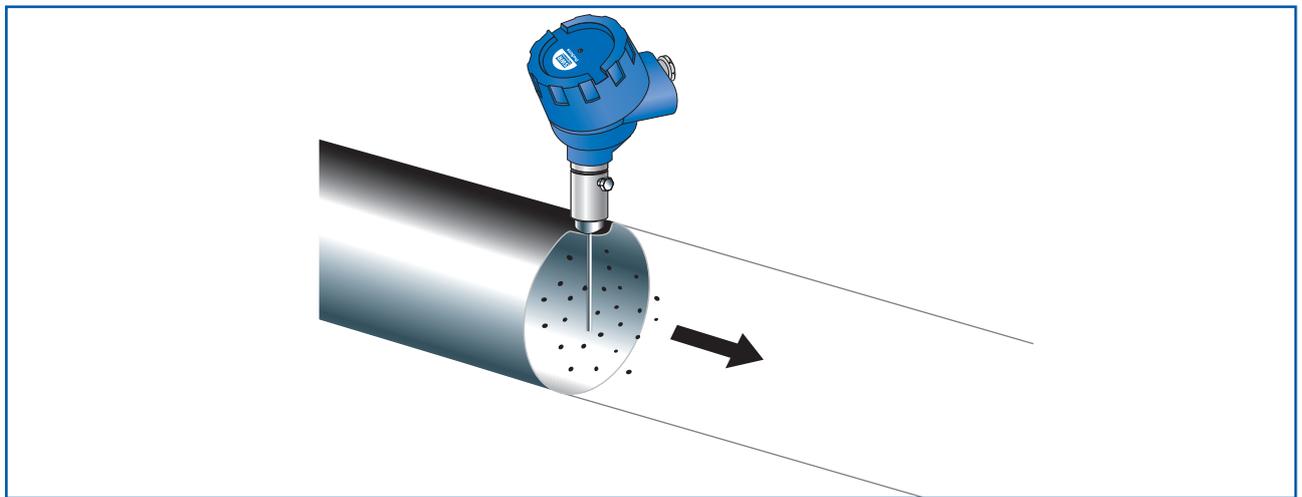


Fig. 2: Overview with C3-box and DIN rail transmitter

2. Function

- The PicoFlow is a measuring system which has been specially developed for measuring the quantity of pneumatically conveyed solids.
- It is used for very small solid / air ratios.
- The intrusive sensor probe is made of solid stainless steel and has an additional ceramic coating.
- The sensor works on electrodynamic principles. Each particle flowing past the probe generates a charge signal. The sum of all individual signals is temporally proportional to the quantity of solids.
- Each measurement point consists of a sensor and a transmitter.



3. Safety

The PicoFlow 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 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 may only be installed for measuring the low flow rate in metallic pipes.
- 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 PicoFlow, make sure that the piping is in unpressurized condition.
- Switch off the power supply for all maintenance, cleaning or inspection works on the sensor or on components within the PicoFlow. Follow the notes of the chapter maintenance.
- Caution, if welding is required on the pipe, remove sensor.
- 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 concerning technical developments, 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 Delivery range:

- Transmitter in the DIN rail housing or field housing
- Weld-on sensor accommodation with air purge connection inclusive dummy plug
- Sensor
- Operating instructions

4.2 Auxiliary

- Drill \varnothing 27 mm for steel
- 36 mm open-end spanner for sensor-hexagon

4.3 Mounting of the sensor

Proceed as follows to install the sensor:

- Decide on the installation position on the pipe. It should be installed from the top on horizontal or angled pipelines.
- The probe length should be at least half of the diameter. The maximum probe length is 450 mm.
- The distances apply to vertical and horizontal installations.
- Ensure that the measurement point is an adequate distance from valves, manifolds, blowers and bucket wheel feeders and other measurement ports such as those for pressure and temperature sensors, etc.

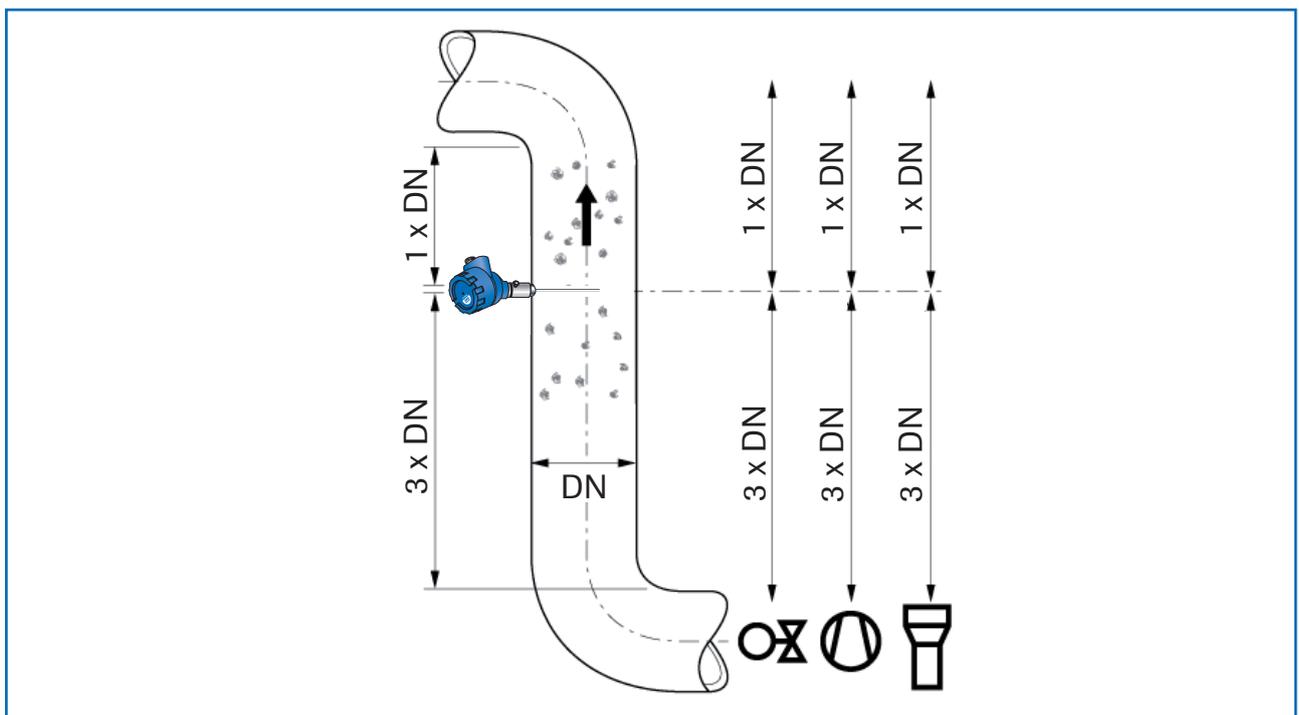


Fig. 4: Recommended distances to bends ($DN =$ duct diameter) and built-ins.

- Weld the sensor accommodation to the duct.
- Drill the hole of 27 mm diameter through sensor accommodation.



Attention!

- After drilling it is essential to check whether the drill bit has caused any burr on the borehole edges. Any burr on the pipe must be removed using a suitable tool. If the burr is not removed it may affect the sensor's calibration.
- If the sensor is not installed immediately, insert a sealing plug until it is installed. Use a 36 mm open-ended spanner to tighten the sealing plug.
- Remove the sealing plug to insert the sensor.
- The sensor is delivered with a probe length adapted to the pipe diameter.
- The sensor is then inserted through the sensor receptacle and fixed.
- If purge air must be used, the connection is via a M5 connection nipple. Use purge air with a pressure of 1.2 . . . 1.5 bar (abs.).



4.4 Mounting the transmitter

- The entire transmitter can be installed at a maximum distance of 300 m from the sensor. The housing is prepared for installation on a DIN rail according to DIN EN 60715 TH35.

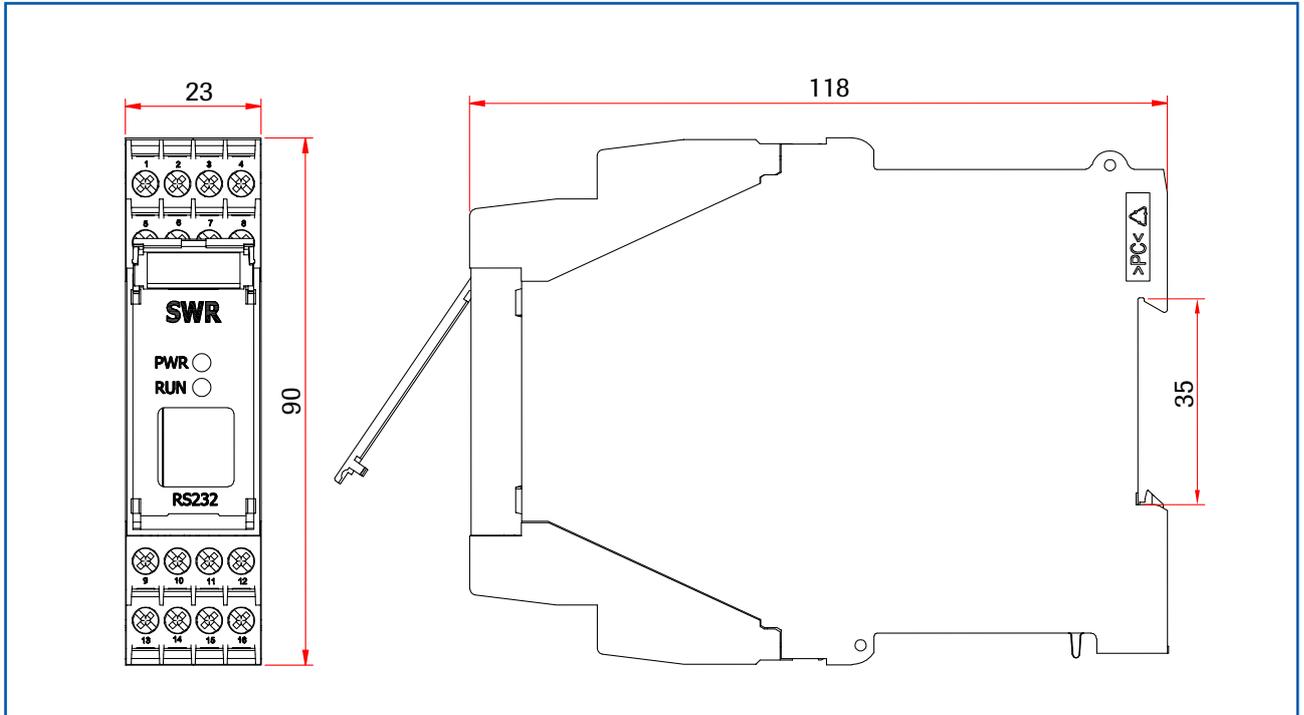


Fig. 5: DIN rail housing for the transmitter

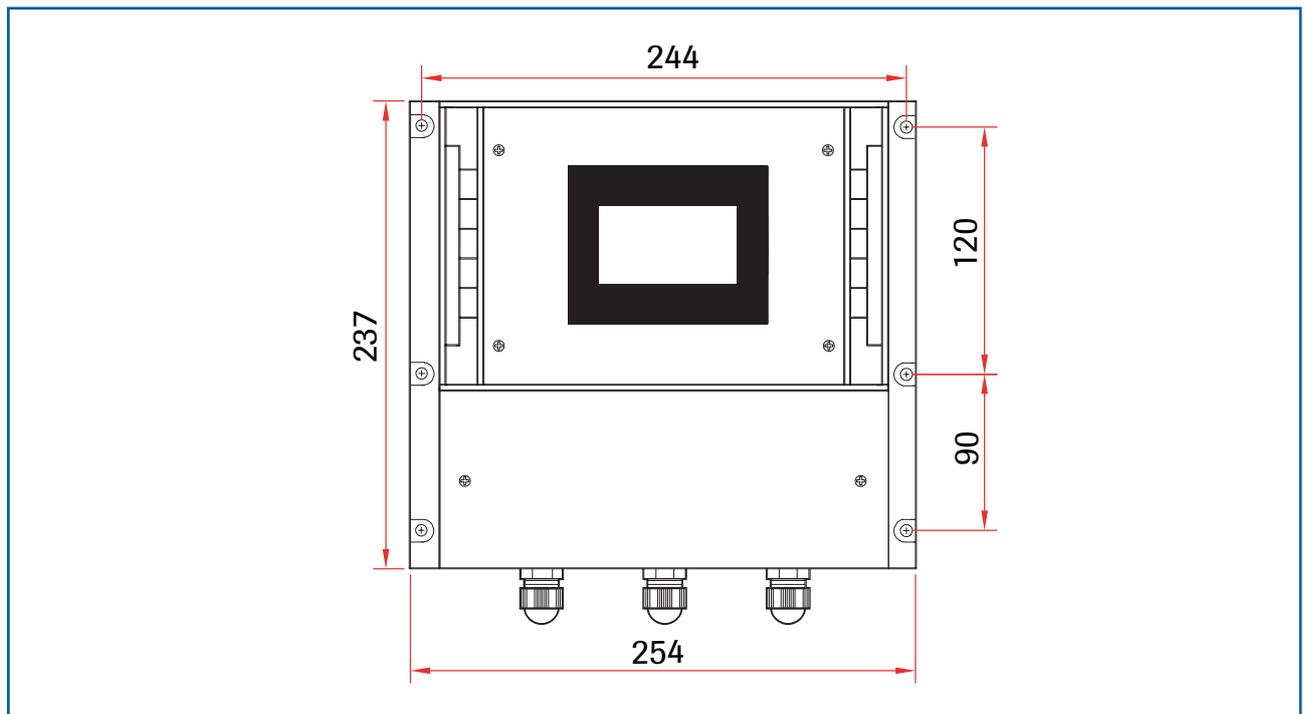


Fig. 6: Field housing for the transmitter

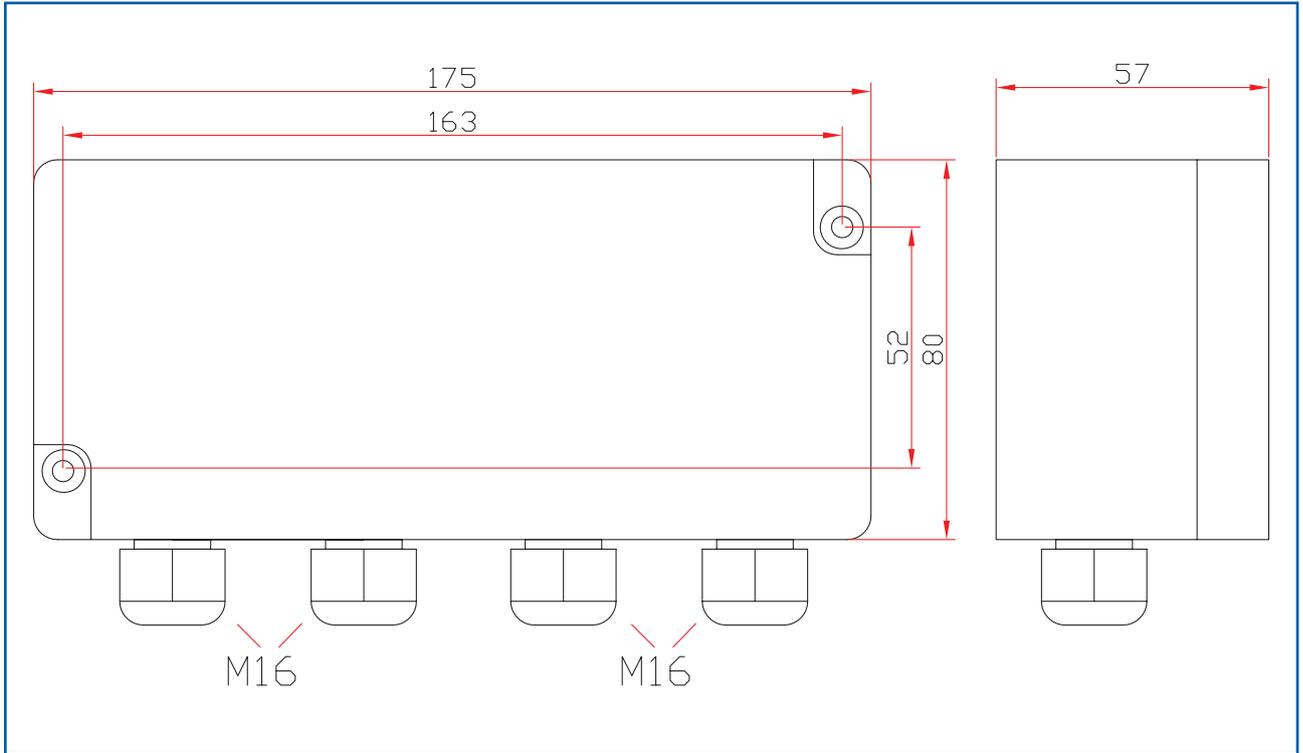


Fig. 7: C3-box dimensions

4.5 Use in hazardous areas

Dust explosion zone identification:

II 1/2D Ex tD IP 65 T84 °C

Zone 20: $0\text{ °C} \leq T_{\text{process}} \leq 80\text{ °C}$

Zone 21: $-10\text{ °C} \leq T_{\text{amb}} \leq 60\text{ °C}$

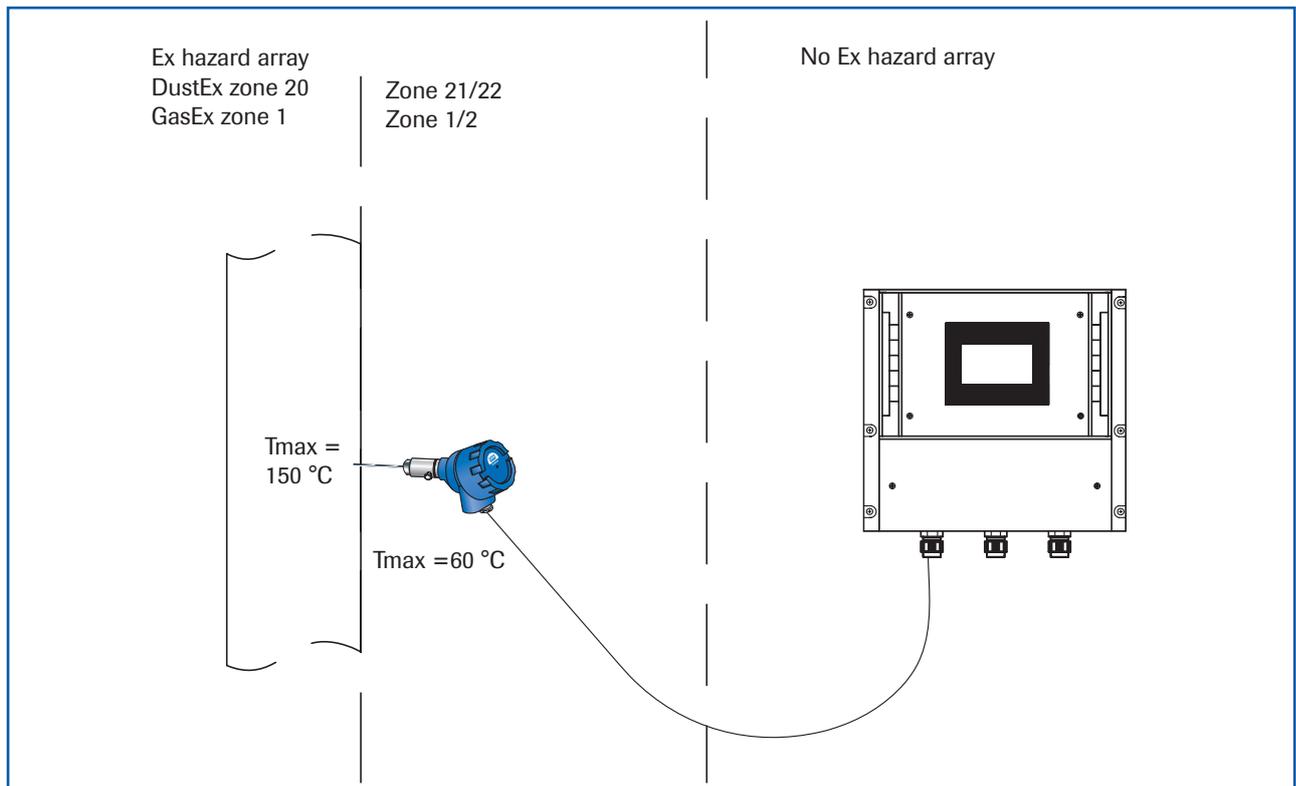
- Equipment group 2
- Equipment category: 1/2
- Waveguide window zone 20 / housing zone 21
- For explosive mixtures of air and combustible dust
- IP code 65
- Maximum surface temperature 84 °C at $T_a = 60\text{ °C}$

Gas explosion zone identification:

II 1/2D Ex tD A20/21 IP 65 T84 °C

II 2G Ex d IIC T5/T3

- Equipment group 2
- Equipment category: 2
- Zone 1
- For explosive mixtures of air and combustible gases
- IP code 65
- Permitted process temperature 0 to 150 °C
- Temperature class T3
- Maximum surface temperature 84 °C at $T_a = 60\text{ °C}$



5. Electrical connection

5.1 DIN rail terminal layout

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 used	6 Alarm relay NC (break contact)	7 Alarm relay C	8 Alarm relay NO (make contact)

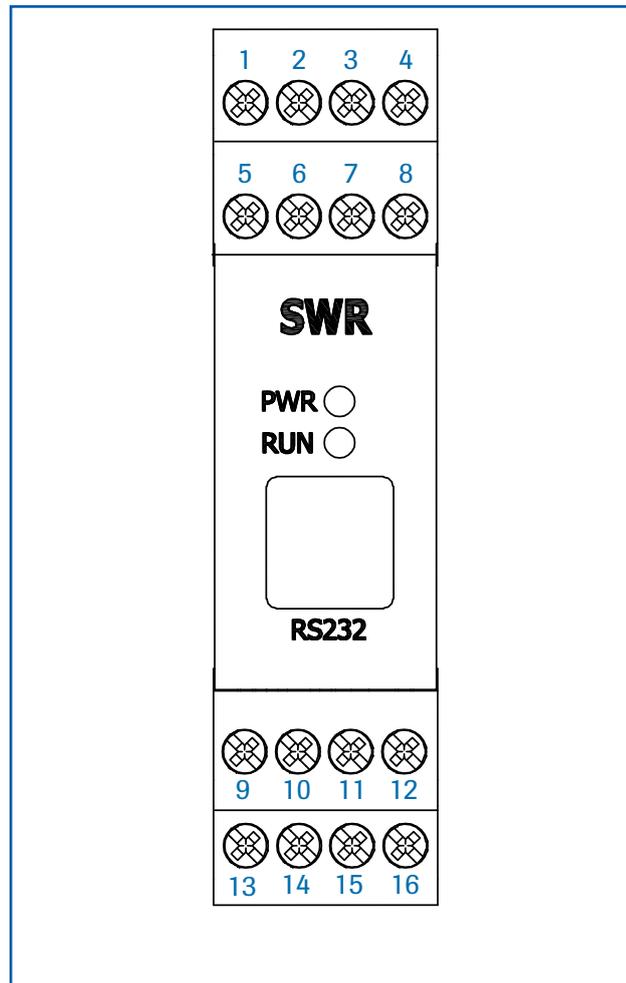


Fig. 9: Electrical connection of the transmitter

9 Not used	10 Not used	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



5.2 Field housing terminal layout

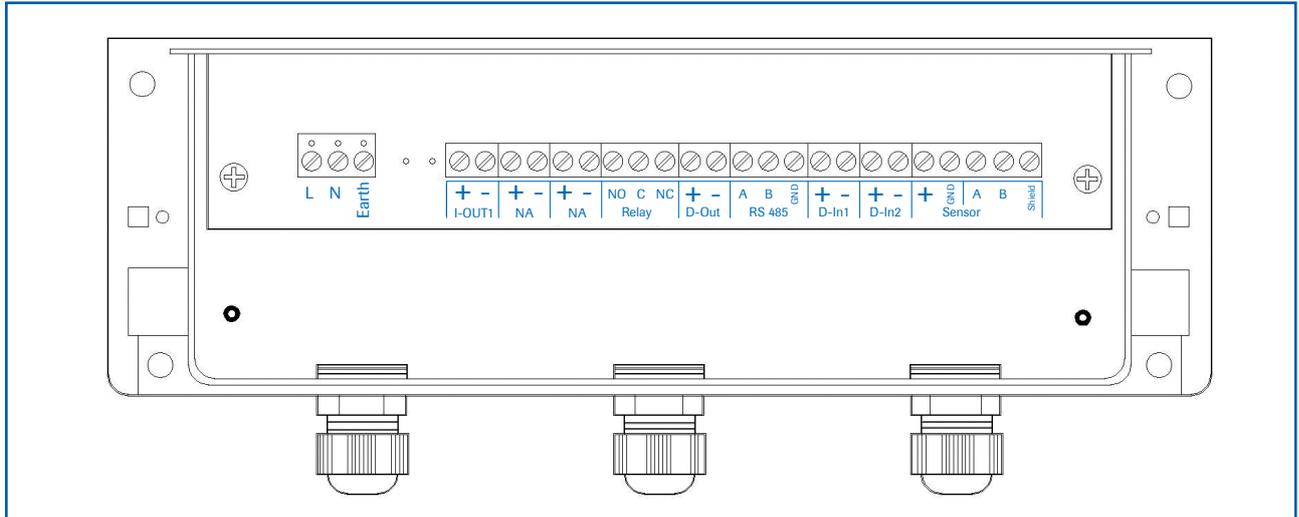


Fig. 10: Electrical connection

Transmitter			
Terminal No.	Connection		
Power supply connection			
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)		
Earth	Earth		
Connections			
I-out1	+	Current output +	
	-	Current output -	
	Na	Not used	
Min. / Max. relay	NO	Floating change-over contact NO (make contact)	
	C	Floating change-over contact C (common conductor)	
	NC	Floating change-over contact NC (break contact)	
D-out	+	Digital pulse output +	
	-	Digital pulse output -	
RS 485	A	RS 485 interface data A	
	B	RS 485 interface data B	
	GND	RS 485 interface ground	
D-in1	+	Digital interface 1 (+)	
	-	Digital interface 1 (-)	
D-in2	+	Digital interface 2 (+)	
	-	Digital interface 2 (-)	
Sensor	+	Power supply + 24 V	Cable no. 1
	GND	Power supply 0 V	Cable no. 2
	A	RS 485 data A	Cable no. 3
	B	RS 485 data B	Cable no. 4
	Shield	Shield	Shield

5.3 C3-box terminal layout

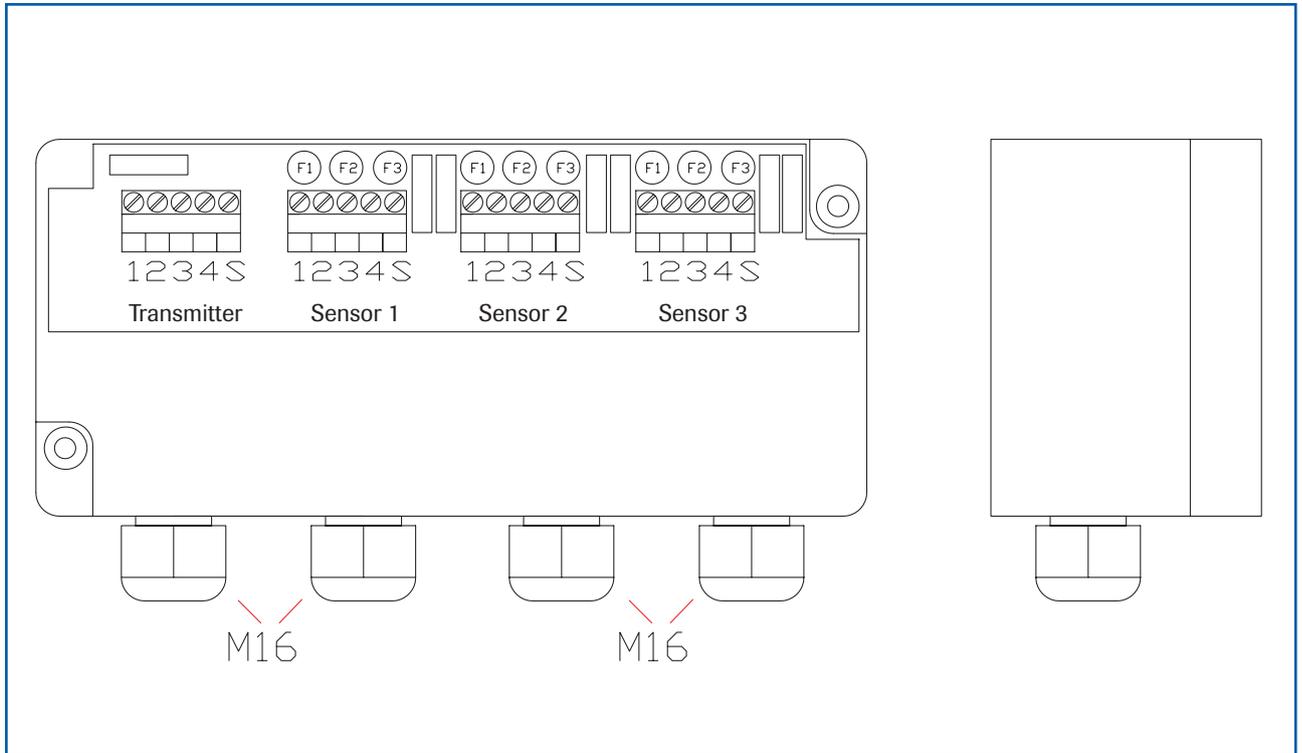


Fig. 11: Electrical connection

6. Operator interface

The operator interface differs depending on the system design:

- DIN rail housing without display, operation via PC software
- Field housing with display, alternative operation via PC software
- One to three sensor system

First of all, the different system versions are described below. Following that, the basic operation of the PicoFlow system as a one sensor system is then described without going back over the different versions.

6.1 Differences between the DIN rail and field housing transmitter

The transmitter in the DIN rail housing is only a part of the functions available in the field housing. The following overview clarifies the differences between the two versions.

Function	Field housing	DIN rail
Menu system		
• via PC software	yes	yes
• via display	yes	no
Measurement value display current output	yes	yes
Measurement value display pulse output	yes	no
Alarm system relay output	yes	yes
Remote control digital input	yes	no
Autocorrect analogue input	yes	no
Totaliser display	yes	
• via PC software	yes	yes
• via display	yes	no
Error output		
• on current output	yes	yes
• at relay	yes	yes
• via PC software	yes	yes
• via display	yes	no
• on status LED	no	yes

The transmitter in the DIN rail can only be configured via a serial connection and a PC program. On the transmitter in the field housing, all functions can be configured by menu via the touch-sensitive display. The field housing transmitter can also be configured by PC.

The menu items on the display and in the PC software are numbered uniformly so that they can be referred to later on.

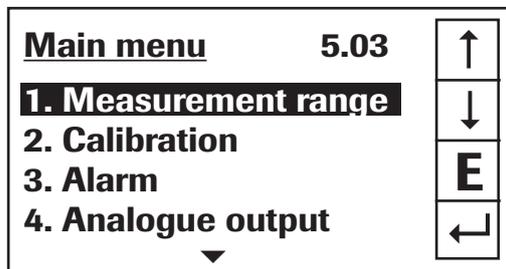
6.2 Display

If just the display is used, all the main functions can be controlled via the display. The display is touch-sensitive and available keys are displayed directly in context.



The start page display the following values:

- Tag No "PicoFlow", freely selectable text which describes the material or the measuring point
- Measurement, here in [kg/s]
- Totaliser value since the last totaliser reset, here in [kg]
- [I] key for info
- [R] key for totaliser reset



To access the menus, press and hold any area of the display for several seconds.

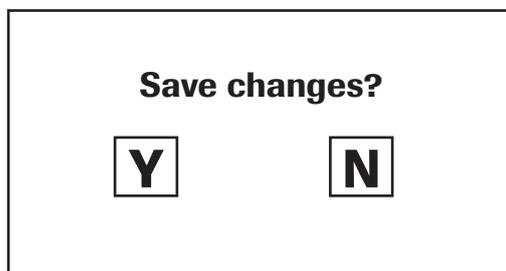
The sub-menu selection will be displayed:

In the menus and input fields, the displayed keys can be used to browse, select, edit or reject:

- Arrow: Scroll down the page, Select an option, Select a position in the input text
- [E] for ESC: Interrupt the function without making any changes
- Return: Select the function or confirm the input
- [C] for Clear: Delete a symbol or number.

Sensor status			
	Temp	Raw value	Stat
S1	----	123.0123	OK
S2	----	213.0213	OK
S3	----	321.0321	OK
Average value		219.0219	
		3728.25 kg	

With button [I] an information window can be opened, in which raw value, temperature and sensor status can be checked.



If any data has been changed, the change will only be taken into account when you exit the complete menu structure and answer [Yes] when asked if you wish to save the changes.

For reasons of simplicity, a further display menu screen has been dispensed with.

The display screens are directly derived from the menu structure in chapter 6.5.

Protection against unauthorised use:

If, a password has been entered in menu **7. System** in **7.6. Password**, which is different to the "0000" default setting, you will be asked to enter a password when attempting to access the menus. After the password has been successfully entered, the menus will be unlocked for approx. 5 minutes (from the last menu entry).

6.3 PC interface

With the DIN rail version, communication with a laptop or PC is performed either on the terminals via an RS 485 or at the front via an RS 232 interface. The field housing version is connected to the terminals via an RS 485 interface or at the front via USB.

- ✓ The **RS 485 connection** is attached to the transmitter in the field housing at the ModBus A (+) and ModBus B (-) terminals on the DIN rail version, these connections are nos. 12 and 11, accordingly.

RS 485 is a bus connection; the ModBus address and the baud rate can be set on the device. Upon delivery, the communication parameters are set to:

- ModBus address 1
- Baud rate 9600, 8, E,1

An RS 485 to USB adapter can be purchased from SWR.

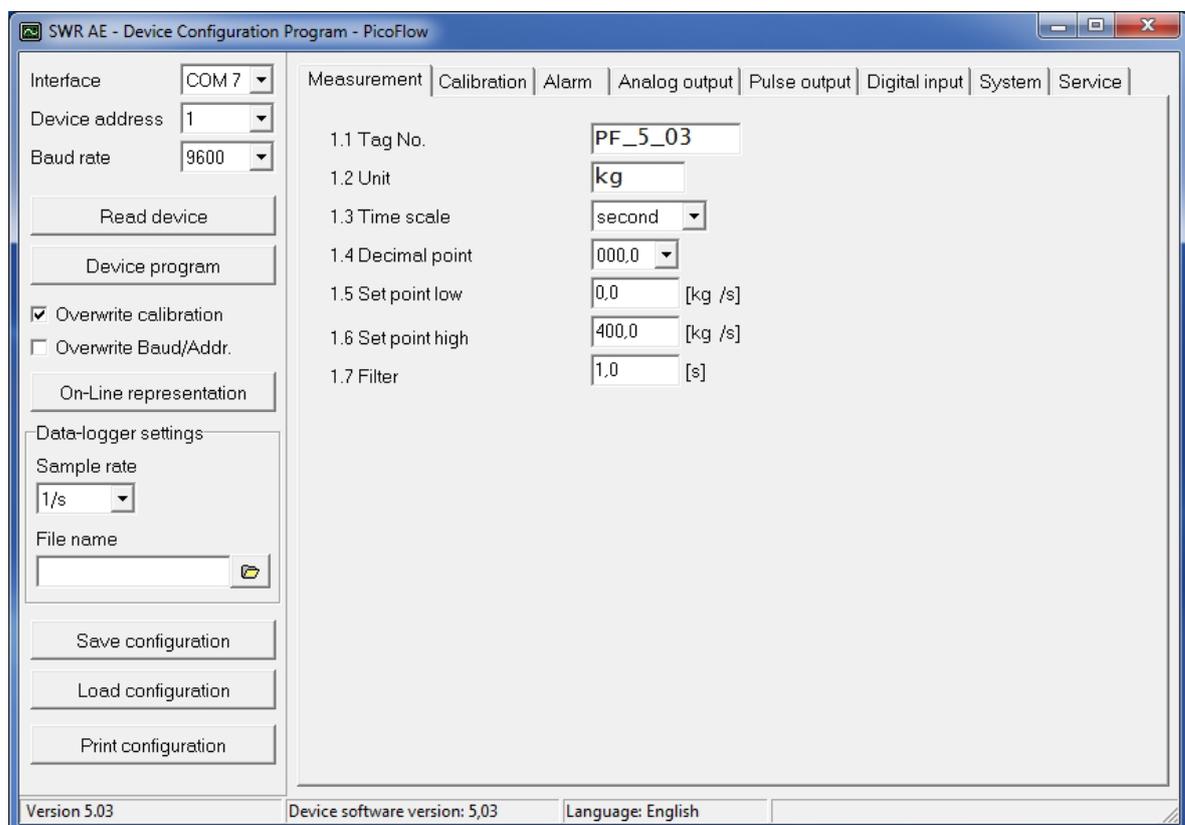
- ✓ For the **RS 232 connection** to the DIN rail version, a special cable and USB converter are supplied. **USB** uses a standard USB-A-B cable.

RS 232 and USB are point-to-point connections which are not bus-compatible. The ModBus address and baud rate for the front connections cannot be changed and are always:

- ModBus address 1 (or the device answers to all addresses)
- Baud rate 9600, 8, E,1

When connected to the PC for the first time, any interface drivers enclosed with the transmitter must be installed.

After starting the software, the communication parameters must first be entered accordingly. These can be found in the top left of the program window.



Communication is established by clicking on "Read device". The acknowledgement message "Parameter read in" is displayed. If an error message is displayed instead, check the communication parameters and cable connections between the PC and the transmitter.

The edited data is transmitted to the transmitter via “Device program”.

Critical data concerning the ModBus communication and the calibration must be confirmed before the parameters are transmitted to the transmitter:

- ✓ If, when saving the the parameters in the transmitter, the system calibration data is changed, this action must be confirmed by checking “Overwrite calibration”.
- ✓ If, when saving the the parameters in the transmitter, the system interface parameters are changed, this must be confirmed by checking the selection “Overwrite Baud/Addr.”.

In addition, with the PC software,

- the transmitter parameters can be saved in a file (Save configuration)
- the transmitter parameters can be loaded from a file (Load configuration)
- the transmitter parameters can be printed (Print configuration)
- the measured values can be logged in a data logger file (enter the file name and storage rate, and activate the data logger on the online display)

The software language can be set by right-clicking the “Sprache/Language/Langue” field in the bottom program line on “German/English/French”.

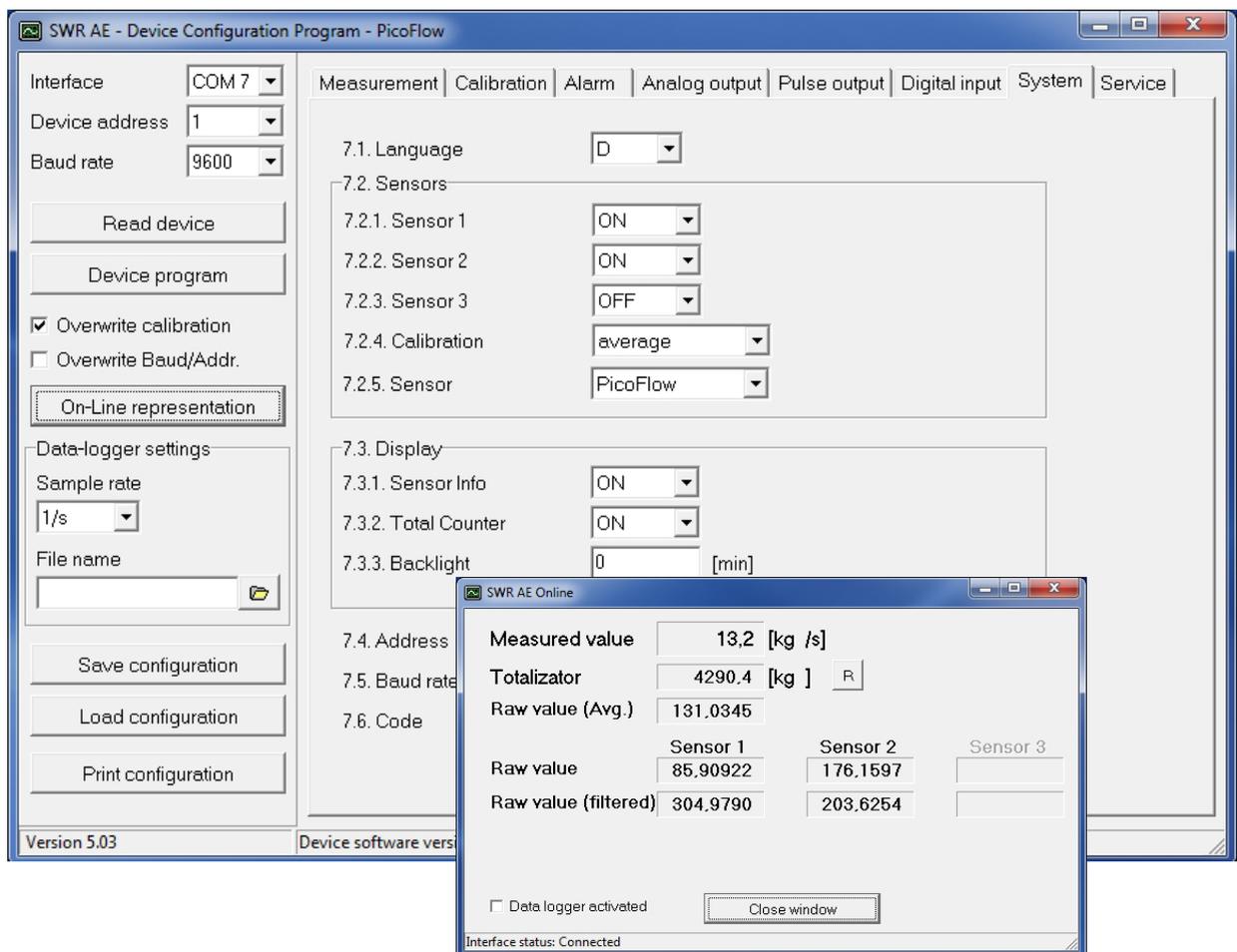
Protection against unauthorised use:

The PC interface does not have a password prompt as it is assumed that only authorised personnel will have access to the PC and the software. However, the password to operate the display can be read and changed in menu **7. System** in **7.6. Password**.

6.4 One or more sensor system

Up to three sensors can be connected to a transmitter if, for example, a larger flow section needs to be illuminated. In the transmitter, the corresponding number of sensors will then be registered and a joint average value will be calculated from their measurements.

The sensors are registered in menu 7 (System):



The multi-sensor function has no effect on the service and will not be explained in the following document.

If multiple sensors are used, this will only affect the application of sensors and the monitoring of sensors by the transmitter.

The presence of multiple sensors makes itself felt on the online-display and on the info area of the display.

For the construction of a multi-sensor system note the following:

- The sensors must be activated in the transmitter (Menu Service, 7.2 Sensors)
- Activated sensors are addressed by the transmitter on the sensor side, digital bus at the following addresses:
 - Address 1 – sensor 1
 - Address 2 – sensor 2
 - Address 3 – sensor 3

- With delivery of a multi-sensor system the sensors will be preconfigured on the addresses 1 – 2 – 3 and noted in the transmitter as active.
- Sensors and transmitters, which are not preconfigured for a multi-sensor system always have address 1, only sensor 1 will be activated.
- Sensors which are inserted afterwards in a system must be adjusted by means of an separate service software to the required address.
- The correct address will be factory-preset when ordering spare parts with specified sensor number.

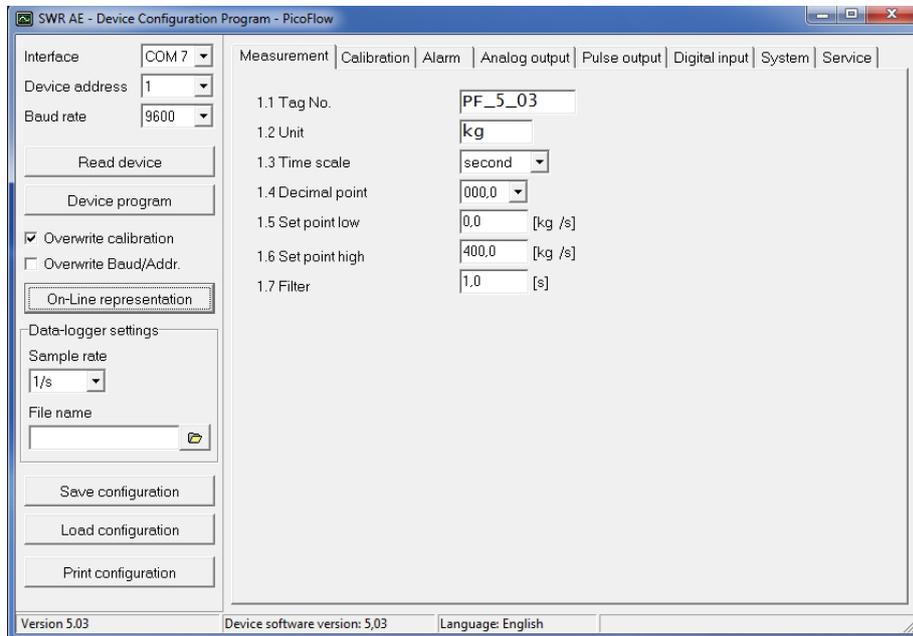
Procedure with a multi-sensor system with no pre-configured sensors:

Always note:

- Disconnection of power before electrical mounting!
- Specify the necessary number of sensors of a measuring point (see example with 3 Sensors)
- Connection of power supply and C3-Box to the transmitter
- Activation of 3 sensors see menu 7.2 (configuration software or display)
- Connection of sensor 3 to the transmitter: the sensor logs in as sensor 1
- For setting the sensor on address 3 use the service software, the sensor will log in as sensor 3
- For setting sensor 2 on address 2, it is the same procedure
- Connect at last Sensor 1

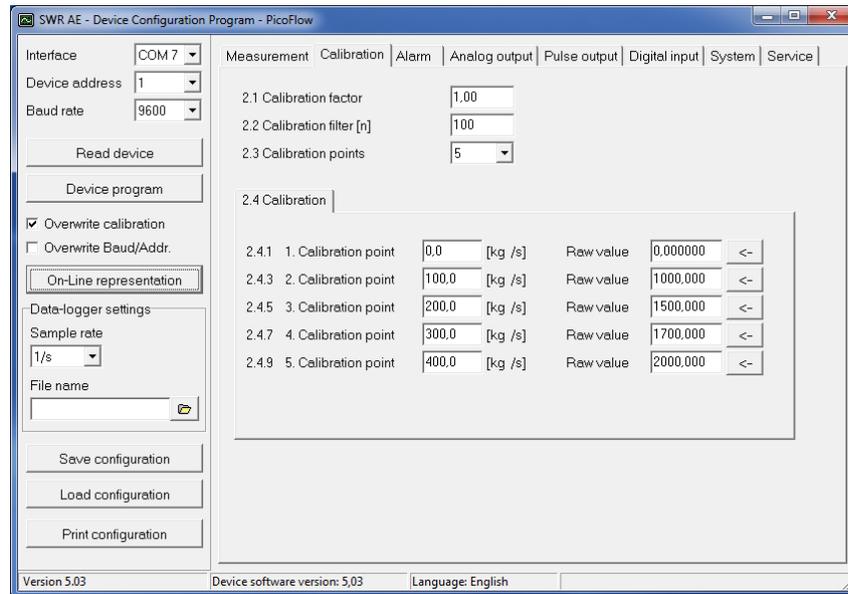
6.5 Menu structure

The menu structure supports the user when adjusting the measuring range, the calibration, the measurement values and the choice of additional functions. In this connection, the numbering both on the display and in the PC interface is identical:



1. Measurement range

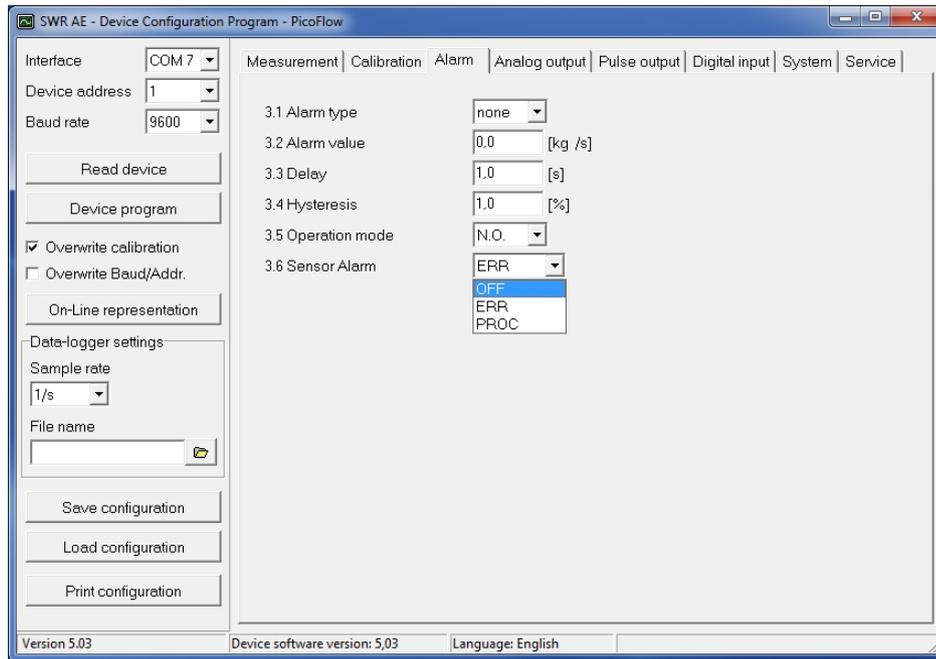
- | | | |
|--------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.1 Tag No. | Input: Free text (10 characters) | Name of the measurement point or product. |
| 1.2 Unit | Input: Unit text, e. g. kg | Required mass flow unit. |
| 1.3 Time scale | Selection: hour / minute /second | time base for the integration by the totaliser and the pulse output. |
| 1.4 Decimal point | Selection: 0000, 0.000, 00.00, 000.0 | Number representation and decimal point-accuracy in the measurement menu. |
| 1.5 Set point low | Input: 0 ... 9999 | Throughput rates under this value will not be displayed at the current output. This does not concern the display indicator, totaliser or pulse output. |
| 1.6 Set point high | Input: 0 ... 9999 | Throughput rates above this value will not be displayed at the current output. This does not concern the display indicator, totaliser or pulse output. |
| 1.7 Filter | Input: 0.0 s ... 999.9 s | Filtering of measurement for the indicator and the output values. |



2. Calibration

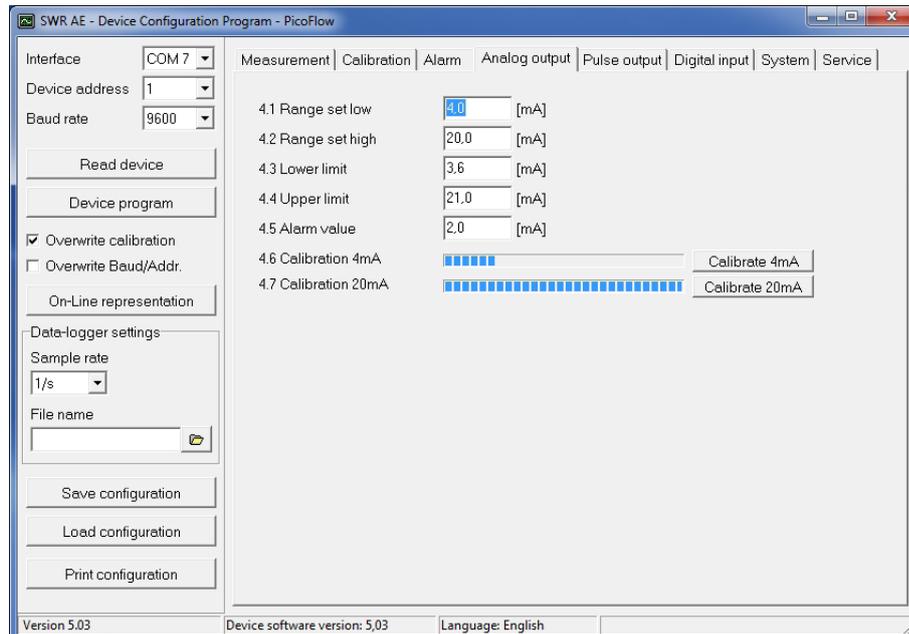
- | | | | |
|---------|-------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.1 | Calibration factor | input: 0.01 ... 9.99 | Factor for the subsequent adjustment of the actual measurement. All measurements are scaled by this factor. |
| 2.2 | Calibration filter | Input: n = 1 ... 9999 | Average number n for the raw value when performing a calibration. n values are combined into an average value with PT1 character, in order to obtain a more stable representation.

This filter also affects the representation of the calculated raw value in the online window. |
| 2.3 | Calibration points
(support points) | Input: 2 ... 5 | Number of support points for a linearisation above the operating range. |
| 2.4 | Calibration | Calibration sub-menu | |
| 2.4.1 | P1 value | Input: Measurement | Output measurement in the selected mass/time unit. |
| (2.4.2) | P1 calibration | Transfer: Raw value | Transfer of the current raw value (filtered) from the mass flow with the key [←].
The value can also be entered directly. |
| | ... (depending on the number of support points) | | For additional support points (depending on [2.3]), additional value pairs can be set. |
| 2.4.n | Pn value | Input: Measurement to be displayed | |
| (2.4.n) | Pn calibration | Transfer: Current raw value | |



3. Alarm

3.1	Alarm type	Selection: Min/Max/none	The relay is operated if the measurement exceeds or falls below the max. limit or min. limit.
3.2	Alarm value	Input: 0 ... 999.9 in the selected unit	limit value for monitoring Min. or Max.
3.3	Delay	Input: 0.1 ... 99.9 s	The value must permanently exceed or fall below the set limit during this time.
3.4	Hysteresis	Input: 0,1 ... 99.9 %	The alarm continues for as long as the measurement is not smaller or larger than the limit value plus or minus hysteresis.
3.5	Operation mode	Selection: NC / NO	NC: the relay is closed while there is no alarm. NO: the relay is closed, if there is an alarm.
3.6	Sensor Alarm	Selection: OFF / ERR / PROC	OFF: Sensor or process errors will not activate the relay. ERR: Serious sensor errors lead to an alarm on the relay. PROC: not supported. More informations to the signal levels ERR or PROC will be found in section 7.3 error detection.



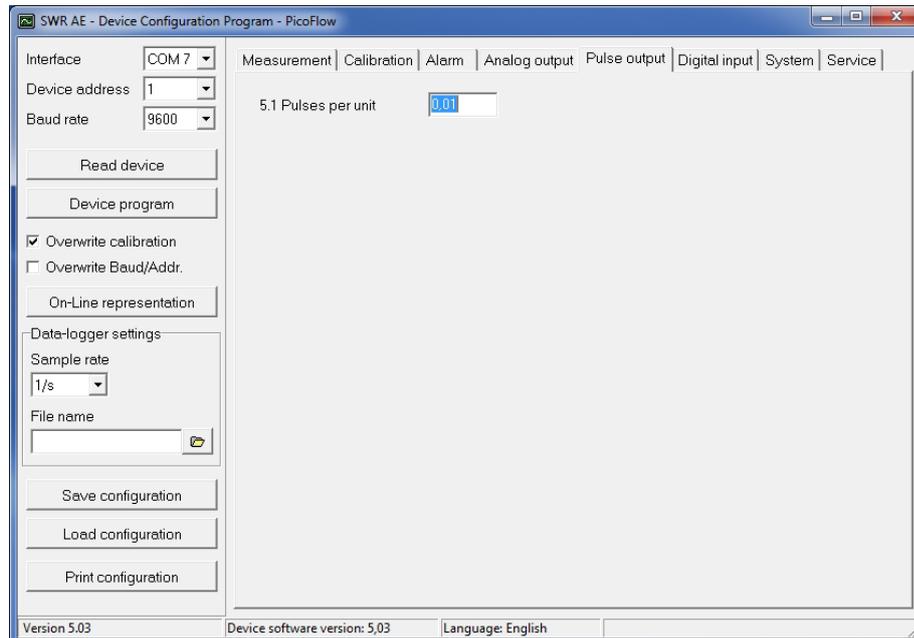
4. Analog output

- | | | | |
|-----|-------------------|-----------------------------------------|-----------------------------------------------------------------------------|
| 4.1 | Range set low | Input: 0 ... 22 mA | (Standard: 4 mA) |
| 4.2 | Range set high | Input: 0 ... 22 mA | (Standard: 20 mA) |
| 4.3 | Lower limit | Input: 0 ... 22 mA | (Standard: 3.6 mA) |
| 4.4 | Upper limit | Input: 0 ... 22 mA | (Standard: 20 mA) |
| 4.5 | Alarm value | Input: 0 ... 22 mA | (Standard: 3 mA) |
| 4.6 | Calibration 4 mA | Selection:
Set output current | The current can be set via key functions and adjusted at the receiving end. |
| 4.7 | Calibration 20 mA | Selection:
Set output current | The current can be set via key functions and adjusted at the receiving end. |

The current output can be calibrated this way that the zero point (output of 4 mA) is set to the noise level of the measuring point.

If the noise level goes down due to process changes, sensor-layer or other effects of aging, the output will be less than 4 mA and the zero offset can be detected. (zero drift)

If this function is not required because of process-technical reasons, the zero point must be set during calibration on a raw value of zero and/or the MIN-limit (4.3) is to be set to 4 mA.



5. Pulse output

5.1 Pulses per unit

Input: 0.01... 99.9

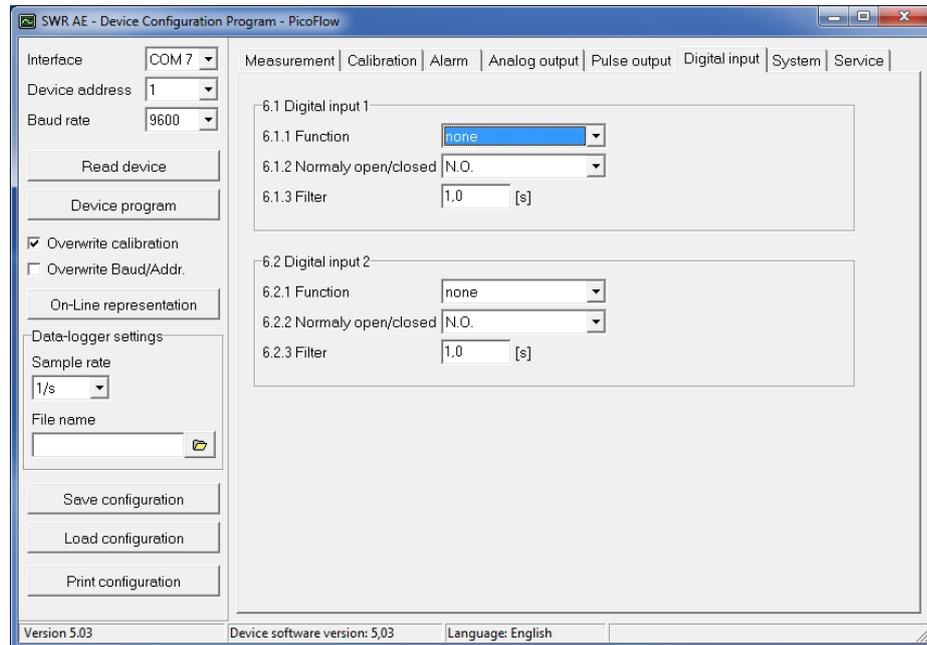
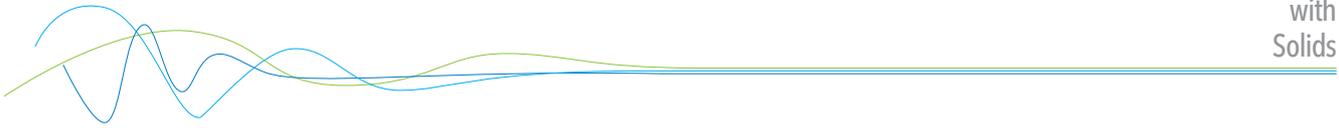
The set number of pulses is emitted for each mass unit.

e. g.: Tonnes are selected as the mass unit, 10 is selected as the number of pulses per mass unit:

$$1000 \text{ kg}/10 = 100 \text{ kg.}$$

A pulse will be emitted every 100 kg.

To improve readability, for connected systems (SPC, PLC, counters, etc.) the maximum pulse frequency is 50 Hz. If the number of pulses to be emitted per second exceeds this frequency, they will be emitted with a delay.



6. Digital input

6.1 Digital input 1

6.1.1 Function

Selection:

none / reset totaliser /
AutoCal

One of the functions can be
executed remotely via the digital input.

6.1.2 Normally open / closed
(working direction)

Selection: NO / NC

If necessary, invert the value of the
input level.

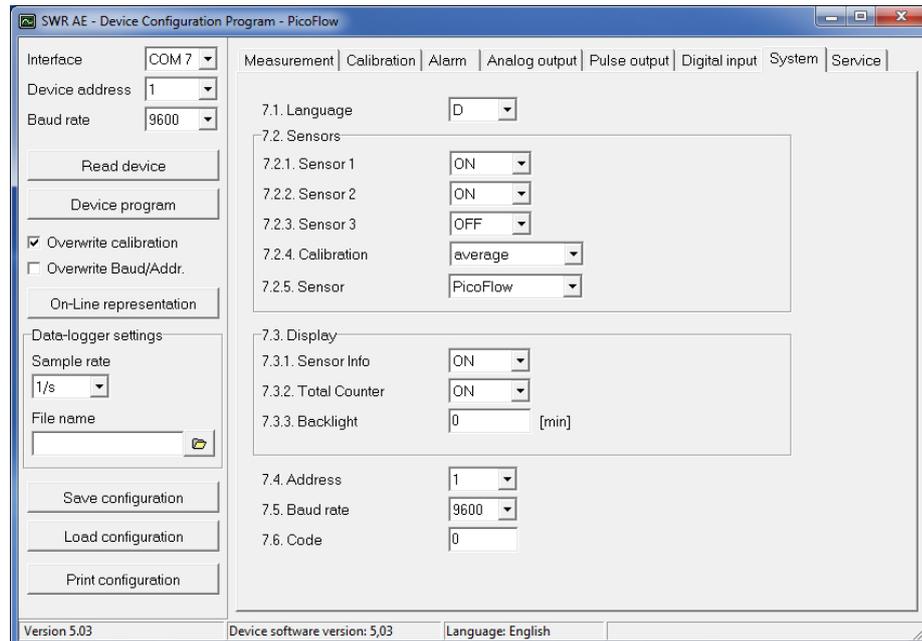
6.1.3 Filter

Input: 0.1... 99.9 s

Time during which the requested signal must
remain pending.

6.2 Digital input 2

As digital input 1



7. System

7.1 Language

Selection: D / E / F

7.2 Sensors

Sensor function and calibration

7.2.1 Sensor 1

Selection: On / Off

On: Sensor is evaluated
Off: Sensor is ignored

7.2.2 Sensor 2

Selection: On / Off

On: Sensor is evaluated
Off: Sensor is ignored

7.2.3 Sensor 3

Selection: On / Off

On: Sensor is evaluated
Off: Sensor is ignored

7.2.4 Calibration

Selection: Single / Average

This function is used only for multi-sensor systems!

Single: Calibration of single sensors:

Each sensor will be converted from raw value to mass flow by an individual calibration table, after that a mean value is generated by the throughput of the sensors.
(This function should only be used by trained personnel of SWR.)

Average: Calibration by the average value from raw values:

The throughput will be calculated with a common calibration table after forming the average from raw values.

7.2.5	Sensor	Selection: SolidFlow / PicoFlow	The transmitter verifies the availability of registered sensors on the selected type, calculates the measurement values on this basis and signals if necessary corresponding errors. Incorrect sensor selection leads to a refusal to communicate.
7.3.	Display		
7.3.1	Sensor info	Selection: On / Off	Show/hide Info key
7.3.2	Total Counter	Selection: On / Off	Display/do not display totaliser value
7.3.3	Backlight	Input: 0 ... 99	Display lighting in minutes 0 = continuously 1... 99 min
7.4	Baud rate	selection: 4800/9600/19200/ 38400 baud	Communication speed of the transmitter if operated on a PLC or PC as a ModBus-slave.
7.5	Address	Input: 1... 255	ModBus address of transmitter, if operated on a PLC or PC as a slave.
7.6	Code		

7. Start-up procedure

7.1 Basic start-up

Upon delivery, the sensor is not calibrated to the product to be measured and must be parameterised when started up. During the process, the mass flows measured by the sensor will be assigned to the display values and output quantities required by the user.

The following points must first be checked:

- Check sensor is flush with the internal surface of the pipeline.
- The correct connection between the sensor and the transmitter.
- A warm-up time of approx. 5 minutes before starting calibration and after switching on the sensor's power supply.

The expected flow rate must first be determined for the measurement point, and the required measuring range and physical units must be entered in **menu 1 (Measurement)**.

The system is then calibrated on at least two operating points (one empty measurement and one operating point) in **menu 2 (Calibration)**:

Min point	While there is no mass flow, the 1st point is set to 0 and the calibration for the zero point is performed.
Max point	During normal conveyance, the 2nd point is set to a known flow rate and calibration is also performed. The value can be corrected afterwards during weighing.

The device has thus performed its basic function and the measurements are displayed.

Additional support points If non-linearities occur when measuring with different flow rates, up to 5 support points can be selected in **menu 2 (Calibration)**. These support points can then be calibrated with different flow rates.

7.2 Adjusting the measurement values

The system's additional functions can be set in the following menus:

Alarms	Values for flow rate lower or upper limits can be set in menu 3 (Alarm) . A sensor monitoring alarm can also be activated here.
Analogue output	The assignment of the analogue output values will be in menu 4 (Analogue output) . Here the corresponding output value will be assigned to the required measuring range (4 ... 20 mA). Upper and lower limits of the permitted power and power in the event of failure are set here. Power output can also be calibrated here.
Pulse output	An internal totaliser function integrates the mass flow over time. In menu 5 (Pulse output) , the pulse output can be configured, so that the system emits pulses corresponding to a defined conveyed mass.
Digital input	In menu 6 (Digital input) various functions and their working direction can be assigned to the system's digital inputs.
System	In menu 7 (System) , functions such as selection of the menu language, the number of connected sensors and their average, the display screen or ModBus addressing and speed are summarised.
Totaliser	The entire flow volume since the last totaliser reset can be read with the totaliser function. A reset can be performed via an external control cable (see menu 6 (Digital input)) or directly via the Display by pressing the R symbol (see menu 7 (System)).

7.3 Error signalling

For monitoring the availability a wide range of functions for self-diagnostics were integrated, in order to signal various errors:

Fatal errors (ERR) lead to a failure of the entire system and always set the current output of the system to alarm value and can optionally activate the relay:

- Failure of the communication to a sensor (sensor failure)
- Failure of a subcomponent of a sensor (temperature monitoring, heating control, memory, data consistency etc. on the sensor)
- Inconsistency of signal paths in the sensor (the amplifier stages, DC offsets, sampling rate)

Type of fault	Display (Field housing)	Run-LED (DIN rail)	Relay (optional)	Current output
No fault	Sensor status OK on the information display (Button [I])	Single flash every second	Normal state	4 ... 20 mA
ERR	Display with error code in the bottom display line; advanced information on key [I]	Triple flash every second	Activated, when Relais-Alarm-Option ERR is chosen	2 mA (or for the current output adjusted, chosen alarm value)

Error codes are composed of the letter S, supplemented by a 3-digit hexadecimal value from „000” to „FFF”. In this code, single errors will be signalled in the different bit positions.

Time Out error: In order not to complicate the start up of a process plant by process- or heating status errors, nonfatal errors will be signalled only after a period of about 5 minutes after a reset of the measuring system at the outputs. The time-out period is visible in a small “t” in the left upper corner of the display (field housing only).

7.4 Compatibility

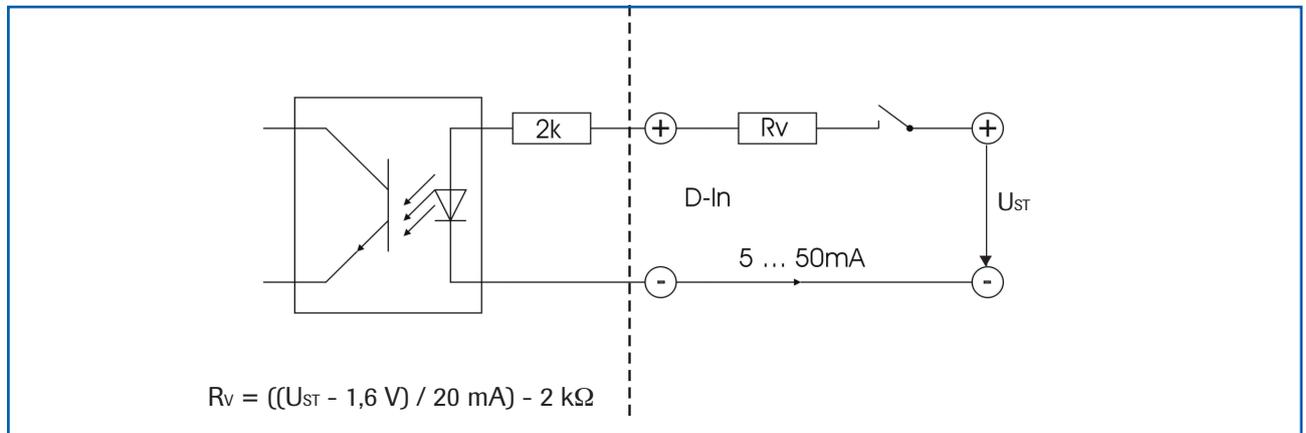
For the PicoFlow systems two different software versions for the transmitter and associated PC software are available.

The two versions are not compatible to one another.

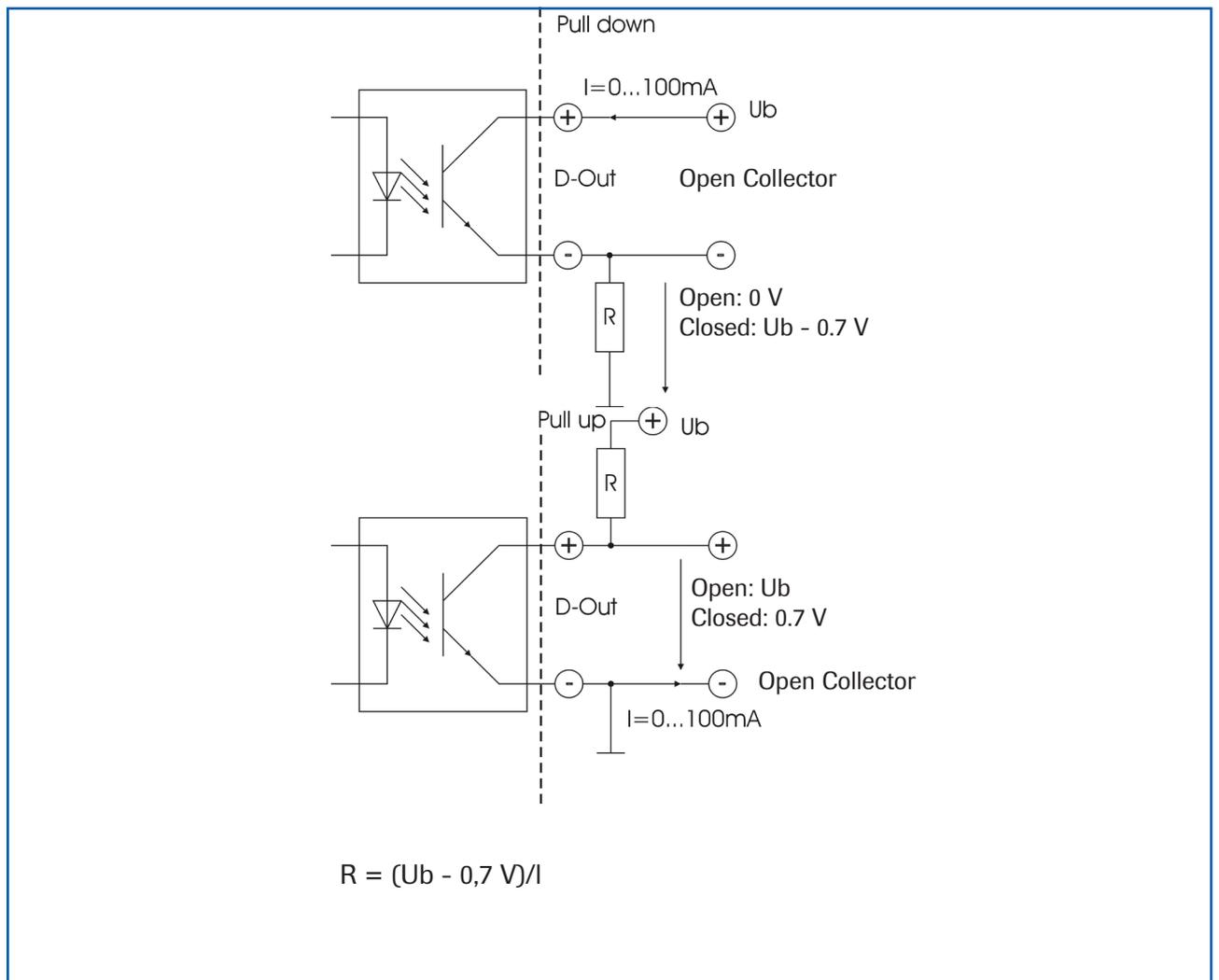
Sensor	Transmitter (Field housing or DIN rail)	PC software
All PicoFlow	(Pre-version based on PS)	(Pre-version based on PS)
	V.5.03	V.5.03

8. Connection examples

8.1 Digital input



8.2 Impulse output



9. Maintenance



Warning!

- Switch off the power supply for all maintenance or repair works on the measuring system. The tube must not be in operation during a sensor exchange.
- Repair and maintenance work must be carried out by trained or expert personnel only.
- The system is maintenance-free.

10. Warranty

Warranty is granted for one year starting from delivery date under the condition that the operating instructions have been followed, no interventions on the appliances have been made and the components of the system show no mechanical damage or wear resistance.

In case of a defect during the warranty period, defective components are repaired or are replaced free of charge. Replaced parts turn into the property of SWR. If desired by the customer that the parts should be repaired or replaced in its factory, then the customer has to take over the costs for the SWR-service staff.

SWR is not responsible for damage, which did not develop at the delivery article; especially SWR is not responsible for escaped profit or other financial damages of the customer.

11. Troubleshooting



Warning!

- The electrical installation must only be checked by expert personnel.

Problem	Cause	Measure
Measuring system does not work. POW LED off. RUN LED off.	Power supply interrupted.	Check the power supply.
	Break of cable.	Check the connecting cables for a possible break of a cable.
	Fuse defective.	Exchange the fuse.
	Device defective.	Please call SWR for further instructions.
Measuring system does not work. POW LED on. RUN LED off.	Microprocessor does not start.	Power supply switch off and switch on. Program cables remove.
Measuring system works. POW LED on. RUNLED flashes three times each cycle.	No sensor communication.	Sensor damaged. Cable break between sensor and measuring system.
	Sensor wrong connected.	Check cable.
	Sensor damaged.	Replace sensor.
	No 24 Volt supply on sensor. Voltage drop on the supply line too highly.	Assure power supply. Examine cable lengths.
Measuring system outputs wrong values.	Calibration not correct.	New calibration.
	Calibration shifted by abrasion on front end of sensor.	New calibration.
Relay output - Relay flickering.	Hysteresis too small.	Increase hysteresis, check effects caused by external devices.

Do not open, as otherwise the warranty claim expires!

12. Technical data

Sensor / Sensor accommodation	
Housing	Aluminium
Protection category	IP 66
Operating temperature	-20 ... + 60 °C (max. 150 °C)
Max. working pressure	2 bar, optional 10 bar
Weight	1.5 kg
Sensor rod	Material: ceramic protected stainless steel; max. 450 mm
Accuracy	± 5 % in calibrated range
Transmitter field housing	
Power supply	110 / 230 V AC 50 Hz (optional 24 V DC)
Power consumption	20 W / 24 VA
Protection category	IP 65 to EN 60 529/10.91
Operating temperature	-10 ... +45 °C
Dimensions	258 x 237 x 174 (W x H x D)
Weight	Approx. 2.5 kg
Interface	RS 485 / RS 232 C (ModBus)
Cable glands	3 x M16 (4.5 - 10 mm Ø)
Screw terminals	0.2 - 2.5 mm ² [AWG 24-14]
Current output signal	4 ... 20 mA (0 ... 20 mA), load < 500 Ω
Measurement value alarm relay output	Relay with switching contact - Max. 250 V AC, 1 A
Data storage	Flash
Pulse output	Open Collector - Max. 30 V, 20 mA
Transmitter DIN Rail	
Power supply	24 V DC ± 10 %
Power consumption	20 W / 24 VA
Protection category	IP 40 to 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 mm ² [AWG 24-14]
Current output signal	4 ... 20 mA (0 ... 20 mA), load < 500 Ω
Measurement value alarm relay output	Relay with switching contact - Max. 250 V AC, 1 A
Data storage	Flash

