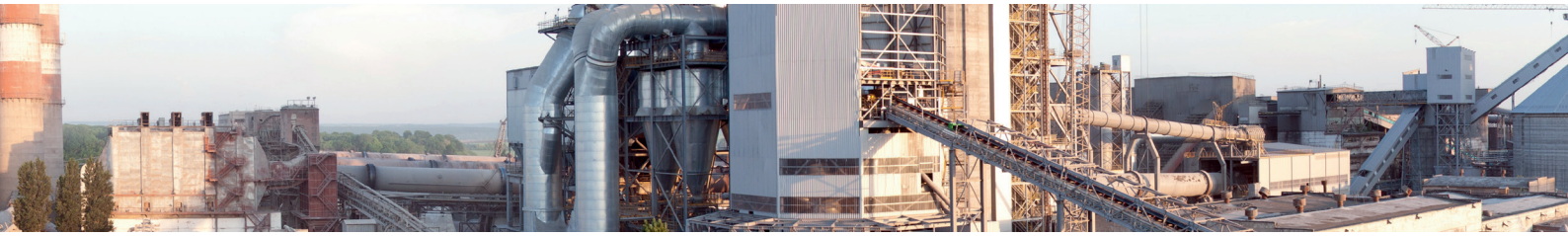
OPERATING INSTRUCTIONS

AirFlow P / AirFlow P-HT

VOLUME FLOW MEASUREMENT



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For the 1st use of the sensor, correct sensor type should be selected via the screen or the software. Software must be installed if needed.

1. SOFTWARE INSTALLATION

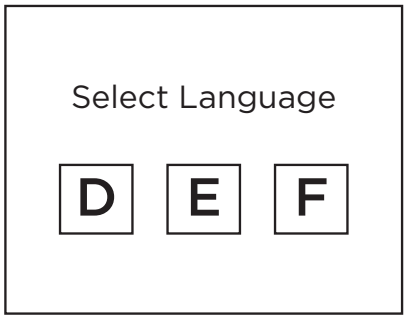
If you want to communicate with our sensor using our dedicated software, you need to download the latest version on our website and install it.

→ ***https://www.envea.global/solutions/process-optimization/dahs-software/***

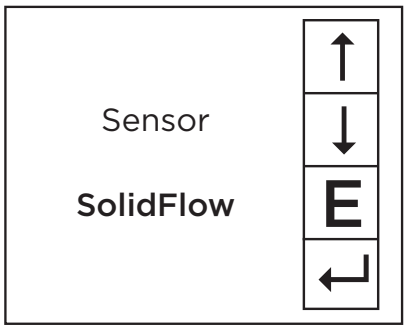
It might also be necessary to install drivers, also available on our website.

2. MSE 300-FH (WITH SCREEN)

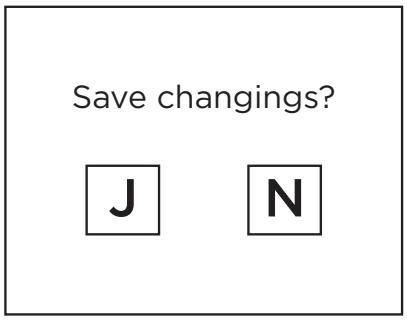
The display is touch-sensitive. Available keys are displayed directly in context. When the measuring system is first started, a query is initiated to select the language and sensor.



Initialization screen when the Evaluation unit in the field housing started first time.
Selection of the menu language: Deutsch, English, Français.



If a language has been selected, the sensor to be used must be selected. To be available:
SolidFlow 2.0, Paddy, PicoFlow, MaxxFlow HTC, DensFlow, SpeedFlow 2.0, SlideControl 2.0, ProSens, M-Sens 2, M-Sens 3, M-Sens WR, M-Sens WR2, AirFlow P.

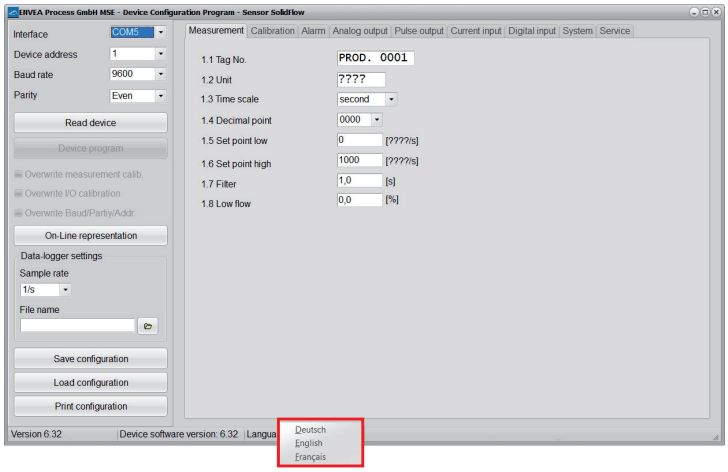


If any data has been changed, the change will only be taken into account when you exit the complete menu structure and answer [Yes] when asked if you wish to save the changes. Afterwards the start page appears.

3. MSE 300-DR / -DR2 (NO SCREEN)

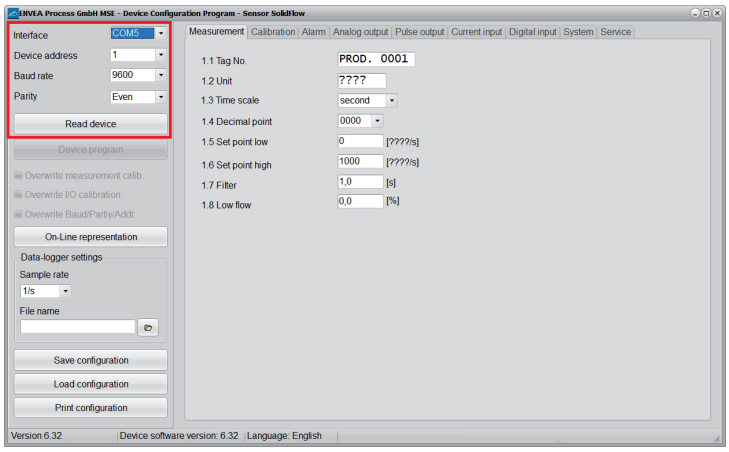
Our dedicated software must be used to connect to the sensor evaluation unit.

Select software language



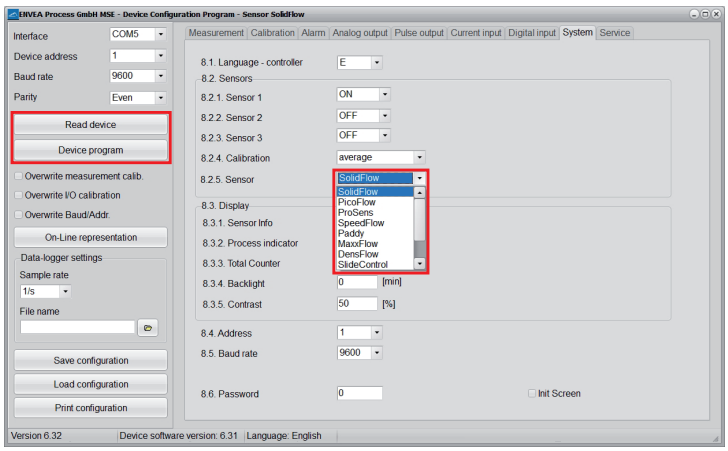
Right click on „Sprache/Language/Langue“ and select desired language.

Connect to sensor



Select the correct COM port and connect to the device using the „read device“ button.

Select correct sensor



In the menu „System“, under „Sensor“ (8.2.5 or 7.2.5), the correct sensor must be selected.

After selecting the sensor, check the box „Overwrite measurement calib.“ and confirm with the button „Device program“.

For more informations and details, please refer to the user manual of the sensor.

CONTENTS

Page

1. System overview

A measuring point consists of the components:

- Controller in the DIN Rail housing or field housing
- Double weld-on socket for sensor mounting
- Sensor (consisting of 2 × antenna, 1 × electronic box)
- Assembly instructions
- C1- or C3-Box **(optional)**

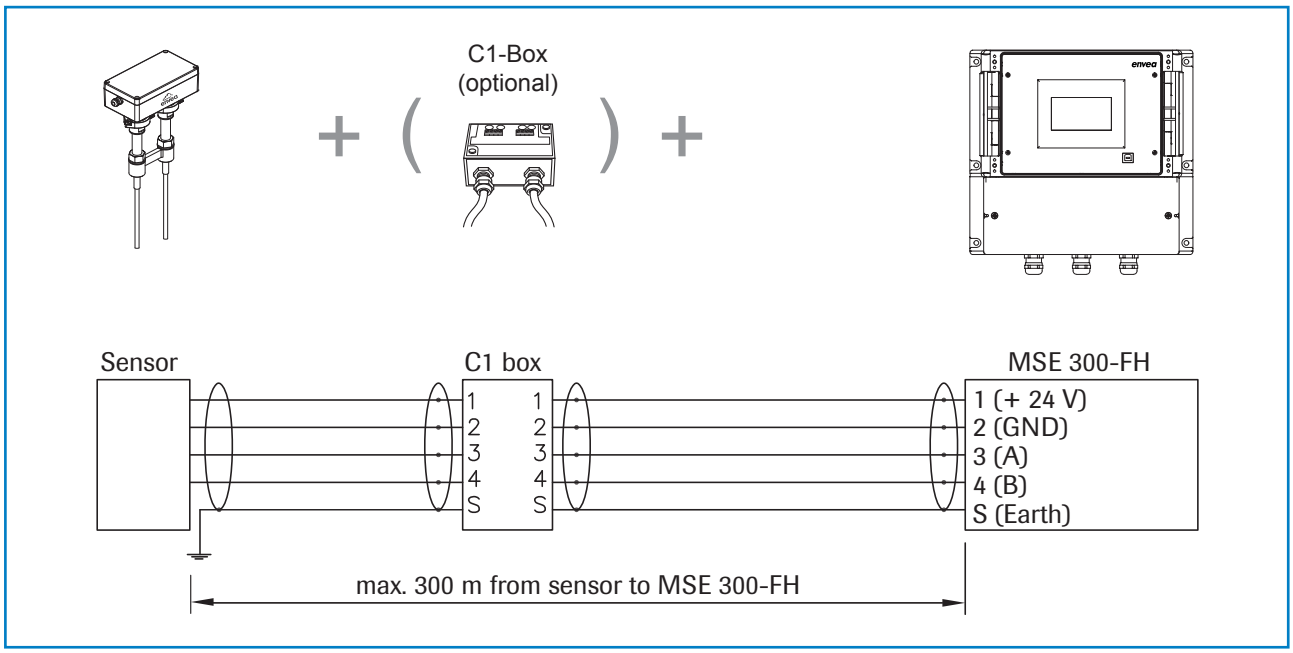


Fig. 1: Overview with C1-Box and MSE 300-FH

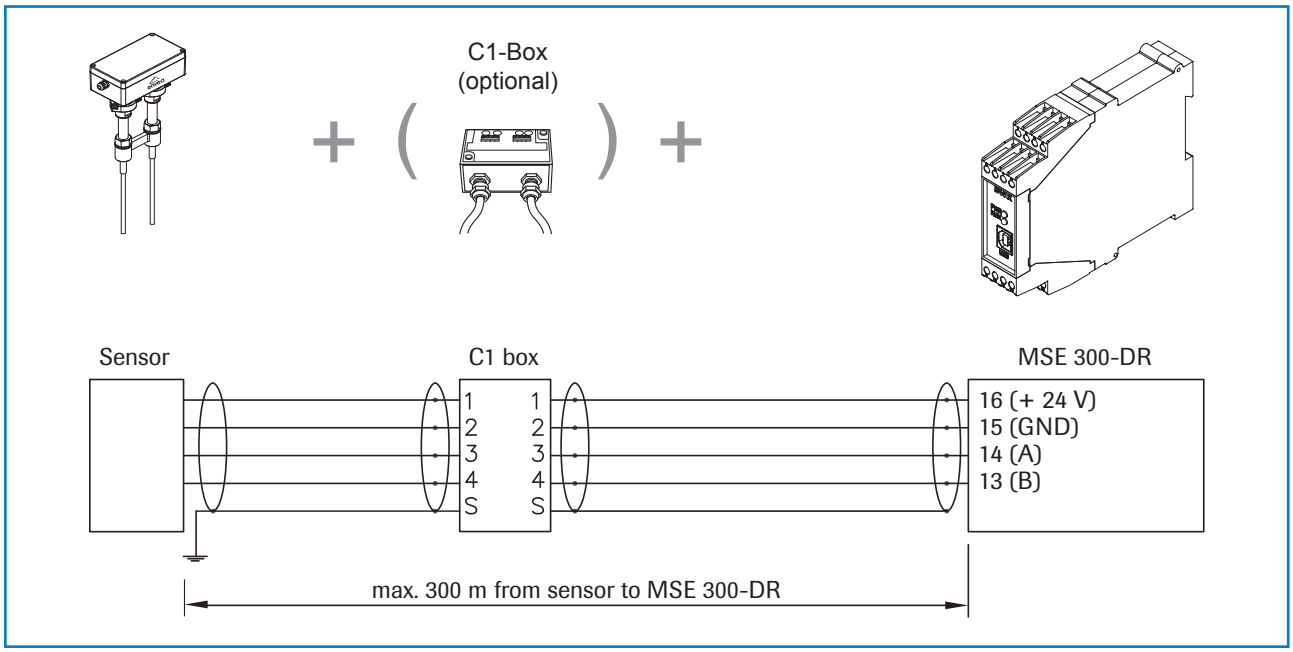


Fig. 2: Overview with C1-Box and MSE 300-DR

The system can be equipped with up to three sensors.
Accordingly, different C-Boxes (C1, C3) are used.

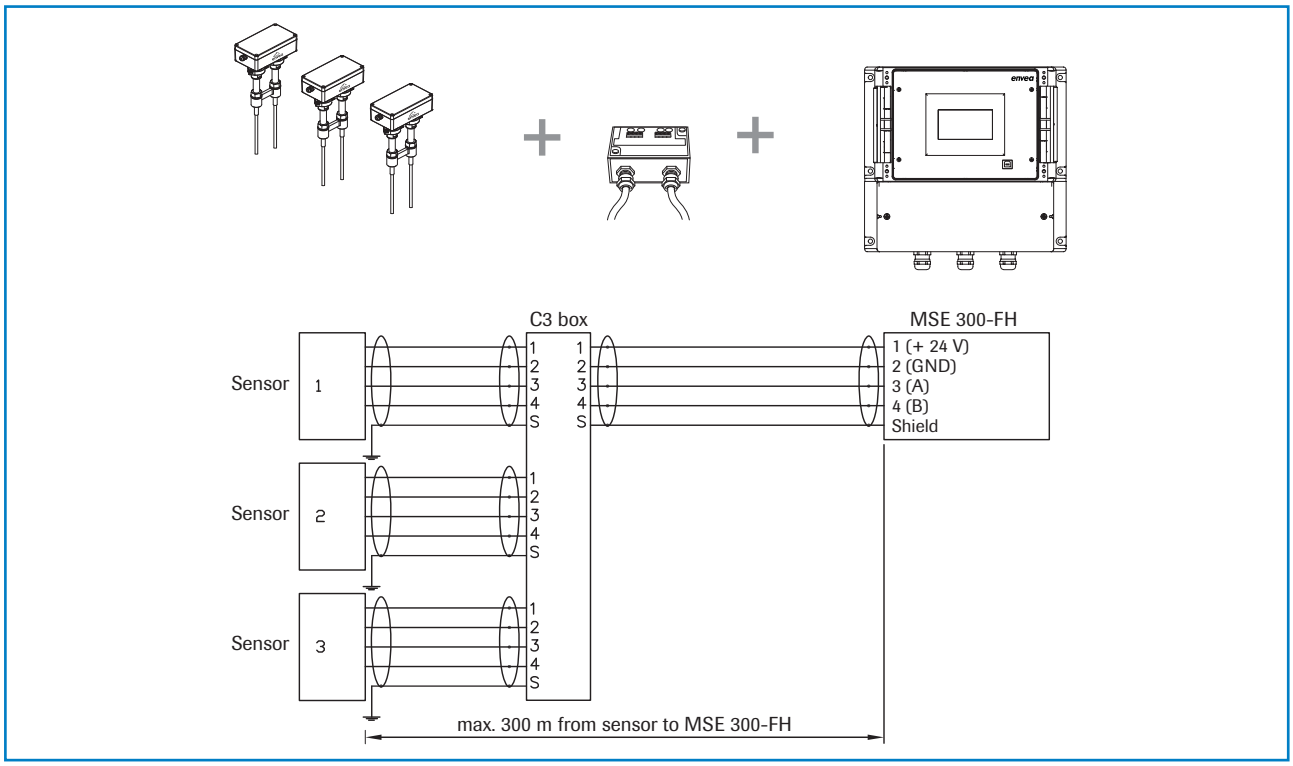


Fig. 3: Overview with C3-Box and MSE 300-FH

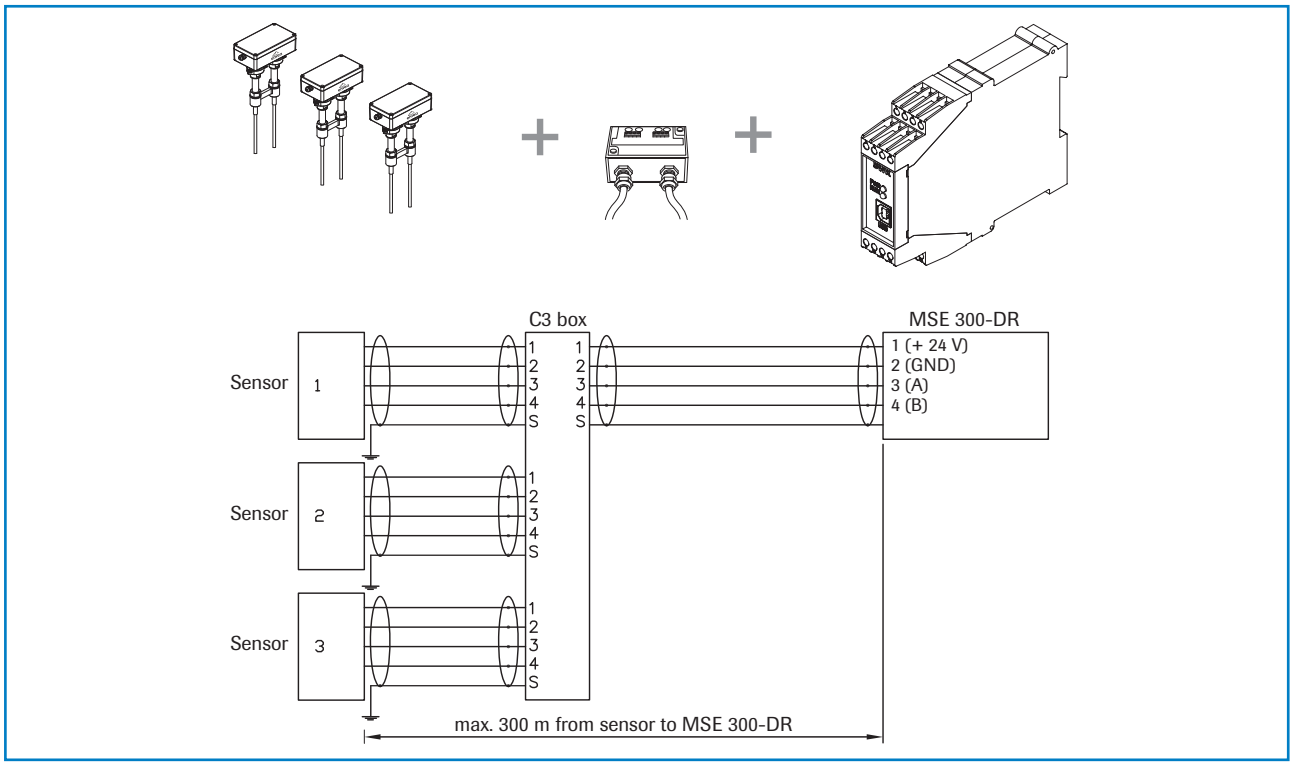


Fig. 4: Overview with C3-Box and MSE 300-DR

2. Function

The AirFlow P is a volumetric flow meter specially designed for dusty applications.

The sensor technology is based on the electrodynamic measuring principle. Every particle that flies past the rods within a radius of 300 mm generates an electrical signal. The signals from the two rods are further processed in the sensor‘s electronics box. The electronics box of the sensor correlates the received signals of both rods with each other and thus determines the velocity.

For an output of the volume flow, the area of the pipe to be monitored must be stored in the controller. The controller then calculates the measured velocity with the specified area ($A \times v = m^3/time$).

The AirFlow P can also be used for pure speed measurement.

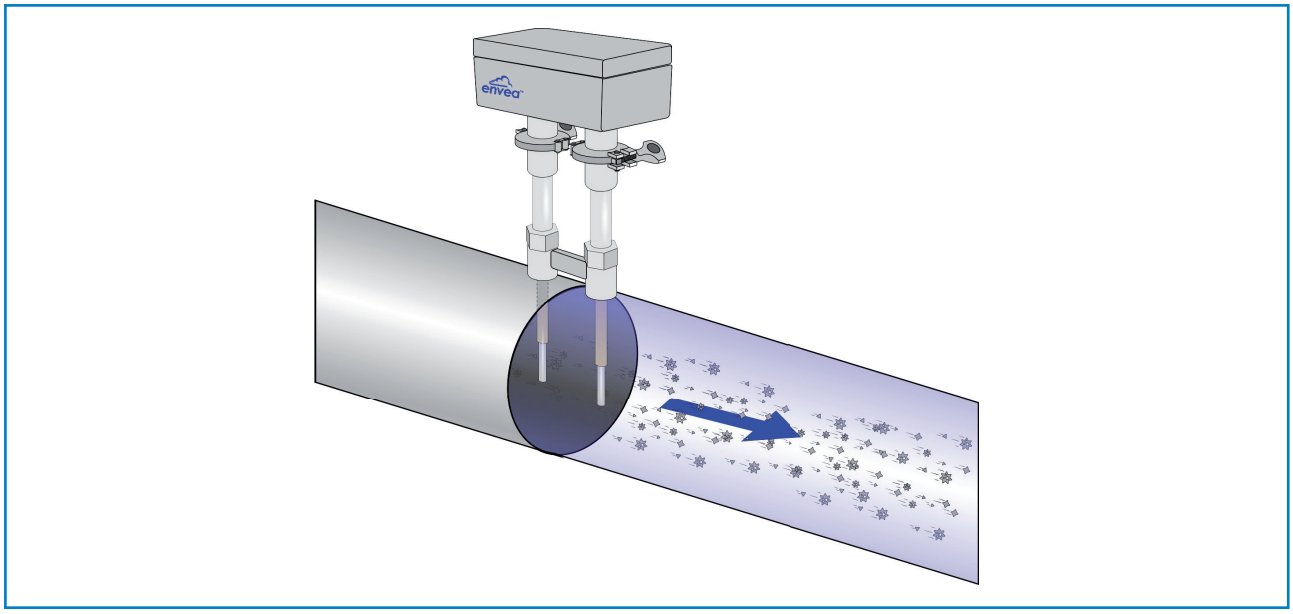


Fig. 5: AirFlow P in a pipeline

3. Safety

The measuring system has a state of the art, reliable design. It was tested and found to be in a perfectly safe condition when leaving the factory. Nevertheless, the system components may present dangers to personnel and items if they are not operated correctly.
Therefore, the operating manual must be read in full and the safety instructions followed to the letter.
If the device is not used correctly for its intended purpose the manufacturer's liability and warranty will be void.

3.1 Normal use

- The measuring system may only be installed in metallic pipes to measure the medium passing through them. It is not suitable for any other use or measuring system modifications.
- Only genuine spare parts and accessories from ENVEA Process may be used.

3.2 Identification of hazards

- Possible dangers when using the measuring system are highlighted in the operating instructions with 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 Occupational and operational safety

- The measuring system must be installed by trained and authorised personnel only.
- Protective equipment must be worn to avoid injuries caused by possible sharp edges on the measuring device.
- When using a cable with more than 4 cores, unused, open cores may cause sparking. Failure to comply with the specified connection parameters of the cable will result in loss of intrinsic safety. To prevent this, it is mandatory to use a 4-core shielded cable.Always ensure that the connection parameters of the cable are within the specification (Li, Ci). The shield of the cable must not be connected to the housing under any circumstances.
- When installed in an Ex zone, there is an increased risk of explosion, so it should always be ensured that there is no Ex zone when carrying out installation work.
- Improper installation work leads to an increased risk of explosion. The device must always be installed using the process-related seals and observing the torques. Mechanical stresses are to be avoided, for example through supported installation.
- In case of improper assembly, there is an increased risk of explosion due to escaping dusts.
- When installing the measuring device, there is a risk of injury due to crushing. To avoid this, installation work must always be carried out by two people.
- Improper mechanical stress (e.g. torsion) can cause damage to the device. To avoid this, the device should always be installed in accordance with all the instructions in the operating manual. The measuring device should also not be exposed to any vibrations if possible.

- If the device is operated under high pressured conditions, there is a risk of explosion. When cleaning or blowing out the pipe and when transporting material, always ensure that the permissible pressure according to the DGRL is not exceeded.
- Due to the process, hot components on the device can cause burns. It is strongly recommended to wear the appropriate protective equipment and to let the device cool down before working on it.
- Improper use of the device will result in a high risk to system safety, therefore the device must only be used as specified in the associated documentation.
- Make sure that the system is in a depressurised state during all maintenance, cleaning and inspection work on the pipelines or on the components of the device.
- Switch off the power supply for all maintenance, cleaning or inspection works on the sensor or on components. 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.

Risk of explosion, electric shock or damage due to incorrect or non-existent earthing

Incorrectly connected equipotential bonding can result in charges that can lead to explosions in an explosive atmosphere, electric shock or device damage.

- Connect equipotential bonding at all points provided on the device components.
- For all work on the device described in these operating instructions, ensure that the equipotential bonding is connected.
- Ensure that there is an earth connection via the power supply.
- Carry out regular checks of the earthing connections for correctness.

Risk of explosion from electrostatic charge when cleaning or blowing out

- No dangerous electrostatic charges may occur during cleaning and blowing out.

Standardization

- The provisions of IEC/EN 60079-17 must be observed during commissioning, installation and maintenance.

Risk of explosion or electric shock due to improper installation work

Improper assessment of the installation site and all other installation work in the hazardous area can cause serious damage to people and the company.

- Installation, commissioning, maintenance and testing may only be carried out by qualified personnel who have knowledge of the rules and regulations for potentially explosive areas, in particular:
  - types of protection
  - installation rules
  - zoning
  - applicable standards
  - local work safety regulations

Risk of electric shock when opening the evaluation unit

- Only open the housing if the system has previously been disconnected from the power supply.

Damage to the device due to improper mechanical stress

Improper handling (all mechanical stresses, e.g. torsion) can no longer guarantee pressure tightness.

- Tighten screw connections only with the torques specified in the operational instructions.

Risk of crushing with risk of injury when opening the lid

- Make sure to wear suitable protective equipment (e.g. gloves).

Risk of injury from sharp edges or splinters

- Make sure to wear suitable protective equipment (e.g. helmet, glasses, gloves, work shoes).

3.4 Maintenance

- For maintenance purposes, it is imperative that the device is de-energised and cooled down, otherwise there is an increased risk of explosion.
- Before working on the device or its components, it is essential to ensure that they are de-energised. Otherwise there is a risk of electric shock.
- The correct tool must be used to open the device, otherwise there is a risk of injury and crushing.
- Before opening the device or its components, it is imperative to ensure that there is no EX zone.
- During cleaning work on the device or in the process, there is an increased risk of explosion due to electrostatic discharges and excessive pressures.

3.5 Technical statement

The manufacturer reserves the right to change any technical data concerning technical developments, without prior notice. If any queries arise, ENVEA Process GmbH will be happy to inform customers of any possible changes made.

3.6 Reliability

For any additional information concerning product reliability, please contact ENVEA Process GmbH.

3.7 Storage conditions

Observe the following instructions during storage:

- To ensure shock resistance, store in original packaging.
- Do not remove protective discs or caps mounted on process connections. They prevent mechanical damage and contamination to the sealing surfaces.
- Protect from sunlight to avoid impermissibly high surface temperatures.
- Store in a dry and dust-free place.
- Do not store outside.

4. Mounting and installation

4.1 Supplied equipment

- Controller in the DIN Rail housing or field housing
- Double weld-on socket for sensor mounting
- Sensor (consisting of 2 x rods, 1 x electronic box)
- Assembly instructions
- C1- or C3-Box **(optional)**

4.2 Required tools

- Open-end wrench (36 mm)
- PZ 2 cross-recess screwdriver
- Suitable tools for the electrical connection

4.3 Determining the installation position

To determine the correct position of the AirFlow P, proceed as follows:

- The sensor can be used in round or angular pipes. In the case of horizontal or sloping pipelines, the installation should be carried out from above.
- Depending on the geometry and size of the line to be monitored, several sensors are used:
  - From a line size of 1500 mm 2 sensors are used.
  - From a line size of 3000 mm 3 sensors are used.
- If several sensors are required for one measuring point, all sensors are distributed evenly on the line at one installation height.

Optimally, the duct or pipeline continues horizontally or vertically upstream and downstream of the installation point, and fixtures such as bends, flaps or gate valves have a minimum distance to the sensor in both directions. (See Fig. 6)

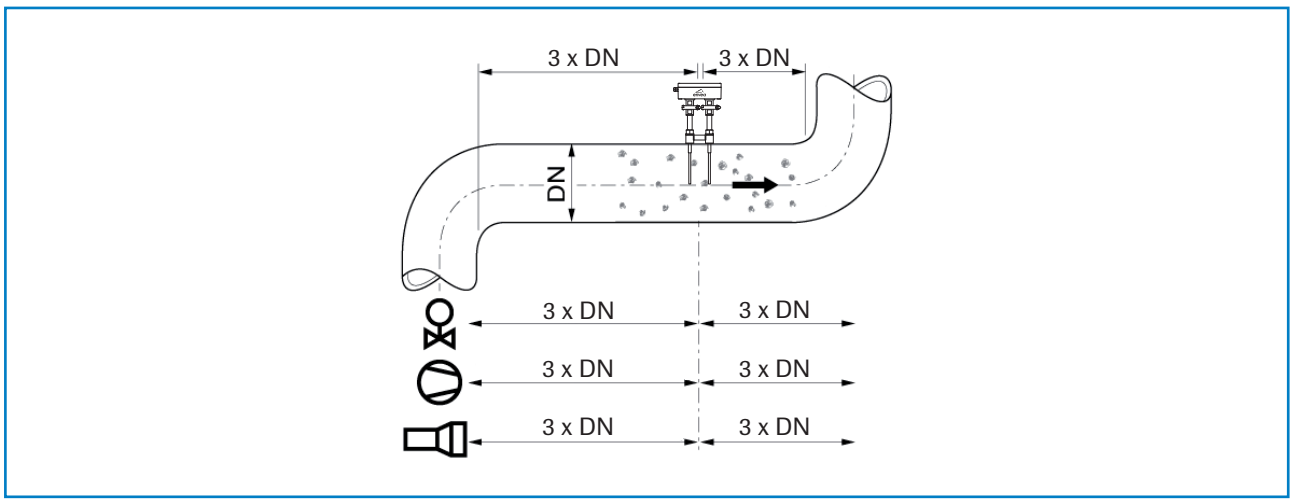


Fig. 6: Recommended distances to valves, etc. (DN = nominal diameter)

In applications where the mounting location requirements cannot be fully met, the best possible mounting position should be selected.

1. The AirFlow P should be installed so that the two rods of the sensor are aligned with the material flow.
2. In the vertical position, the cable gland should point downwards. The material flow direction can be set in the software. Flow direction information is printed on the sensor electronics shield.
3. In horizontal pipes with a round cross-section, the AirFlow P can be installed in any position above the horizontal axis (between 9 and 3 o'clock).
4. In horizontally running lines with a square cross-section, the installation can take place centrally at the top or at the side.
5. Even if the sensor is not impaired in its function by vibration, strong vibrations should be avoided as they can lead to the destruction of the electronics.
6. The sensor should not be exposed to direct sunlight, nor should it be used in areas with an ambient temperature of more than 60 °C.
7. The sensor rods must not have any contact with the opposite line wall or any other device! This would short-circuit the electrodynamic signal. To prevent this condition, the length of the rods can be shortened to a minimum length of 120 mm. The length of the rods is measured from the end of the screw-in thread.

   The ceramic sleeve must not be damaged in any way.
8. In any case, it must be ensured that no contact occurs due to bridging in the event of coating formation on the inner wall of the pipe.
9. For application with a smaller diameter than DN200, it is needed to fill in the questionaire, so ENVEA Process will shorten the rods to the correct length.

4.4 Installation in non-metallic lines

The sensor must be installed in a metallic duct to achieve sufficient shielding against electrical influences. In the case of non-metallic ducts, a sheathing of metal, a metal foil or a fine-meshed metal mesh with a length of approx. 5 times the pipe diameter must be made upstream and downstream of the measuring point. Furthermore, make sure that the duct and the sensor are well grounded.

4.5 Installation of the sensor

At the selected installation position, the double weld-on sleeve must be installed on the line wall and drilled out completely to the inner diameter of the sleeve. The sleeve must be installed with the material flow direction.

Attention!

- After drilling, it is essential to check whether any burr has formed on the drill edges as a result of drilling. Any burr that may have arisen in the pipe must be removed with an appropriate tool. If the burr is not removed, this can have an influence on the measuring results of the sensor!
- The two probes are then screwed in tightly. The connections are to be checked for tightness, appropriate sealing material is to be used.
- Once both probes are installed, the electronics box is pushed onto the probes and secured using the TriClamp connection. If the installation is correct, it should be possible to insert the connectors of the electronics box into the antennas with a perfect fit.
- If the sensor is not installed immediately, the sealing caps must be screwed in until the time of installation.

Attention!

- Use the correct tool (spanner size = S36)
- Use electrically conductive sealants
- Improper installation will void the warranty!
- Observe the seal on the TriClamp connections!

4.6 Dimensions

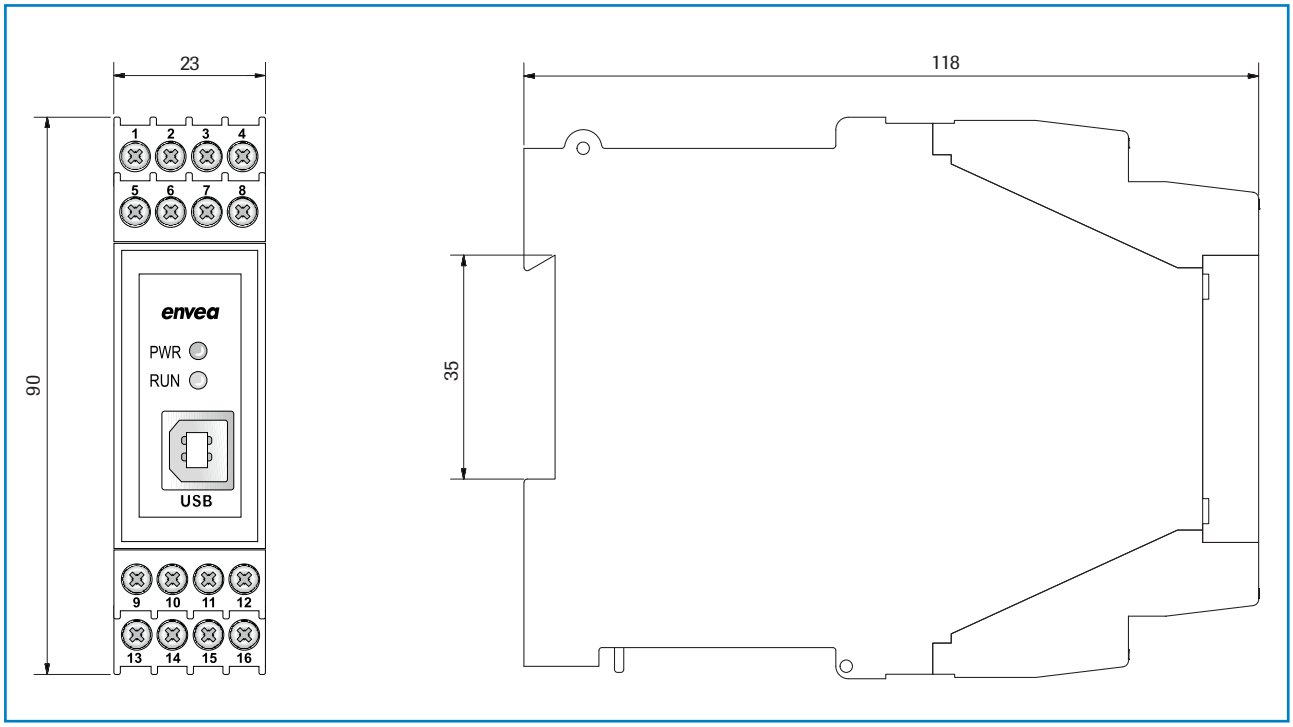


Fig. 7: Dimensions of the MSE 300-DR

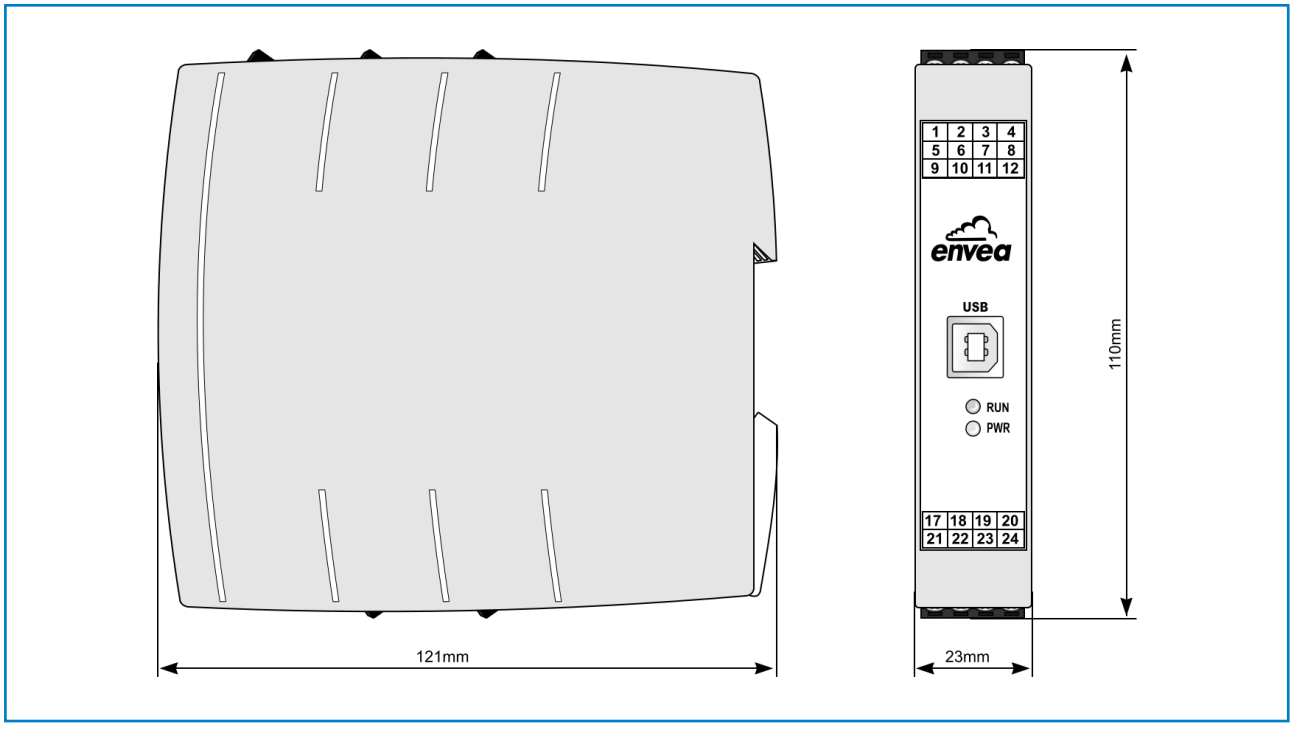


Fig. 8: Dimensions of the MSE 300-DR2

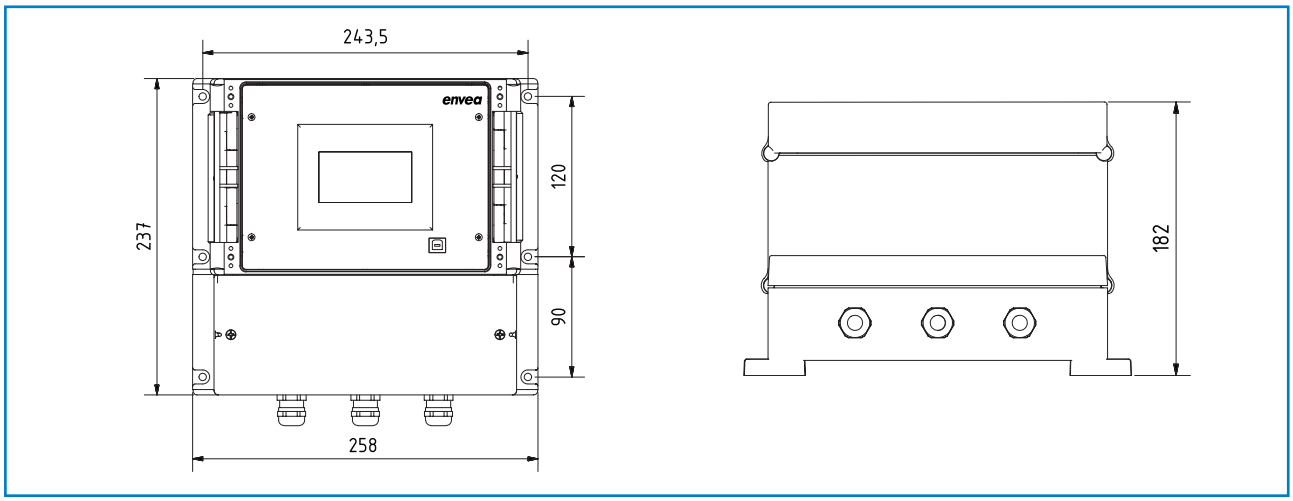


Fig. 9: Dimensions of the MSE 300-FH

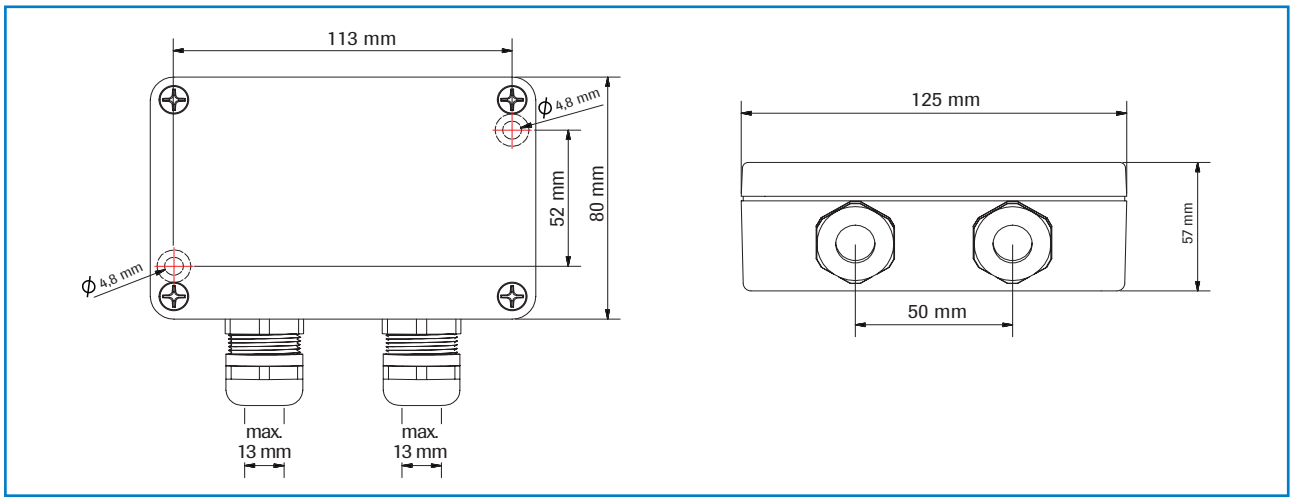


Fig. 10: Dimensions C1 box

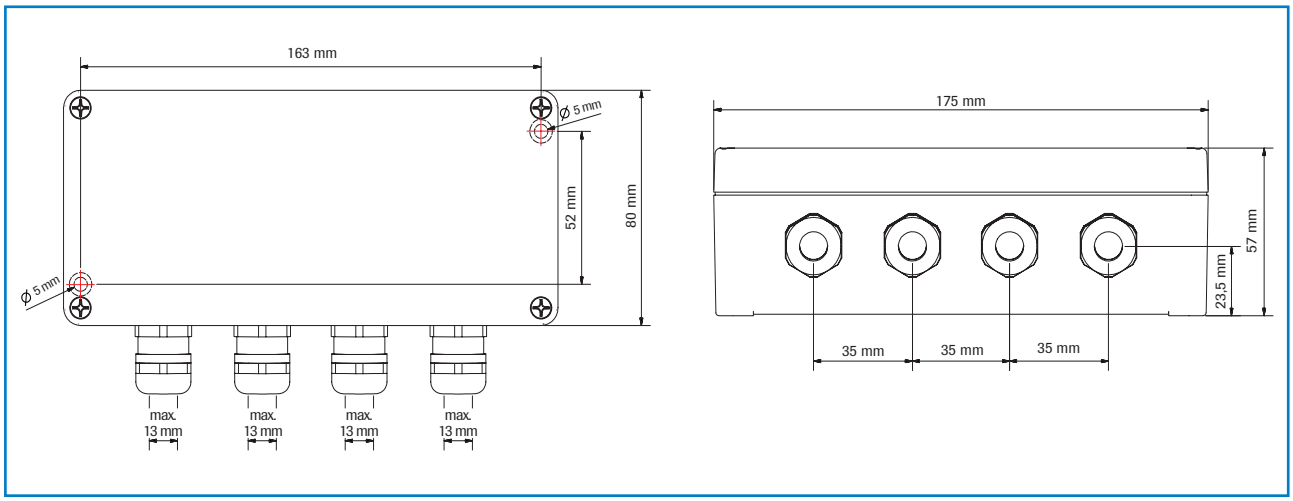


Fig. 11: Dimensions C3 box

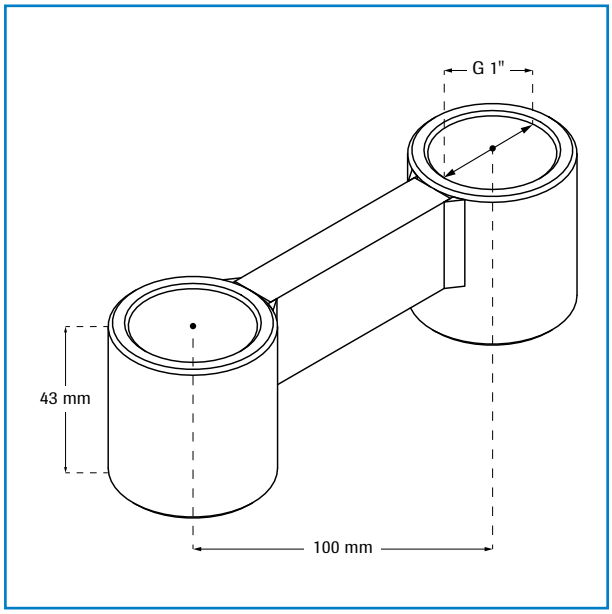


Fig. 12: Dimensions G 1“ double socket

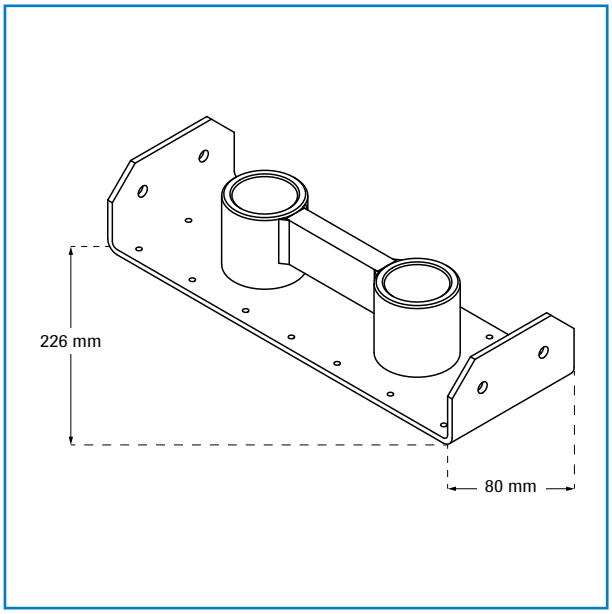


Abb. 13: Dimensions G 1"-double-screw on-socket for thin channels

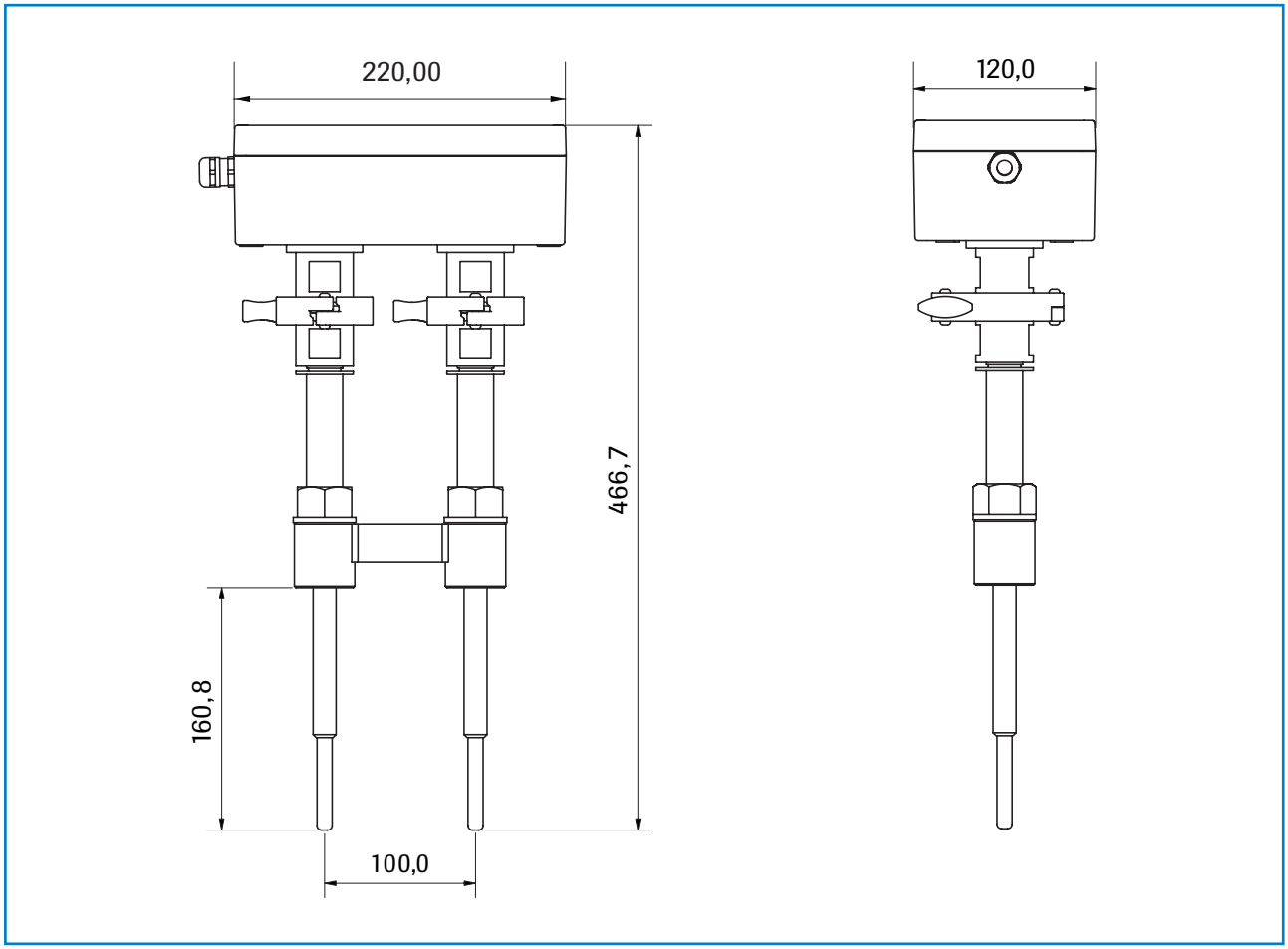


Fig. 14: Dimensions AirFlow P sensor

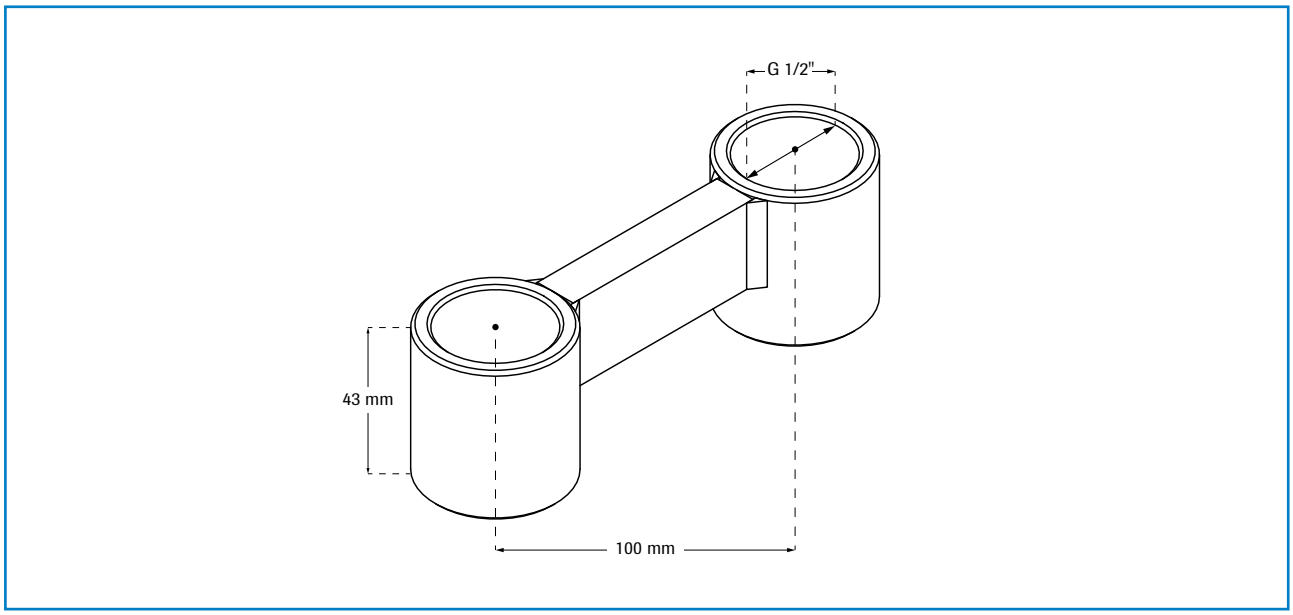


Fig. 15: Dimension G1 1/2“ double socket

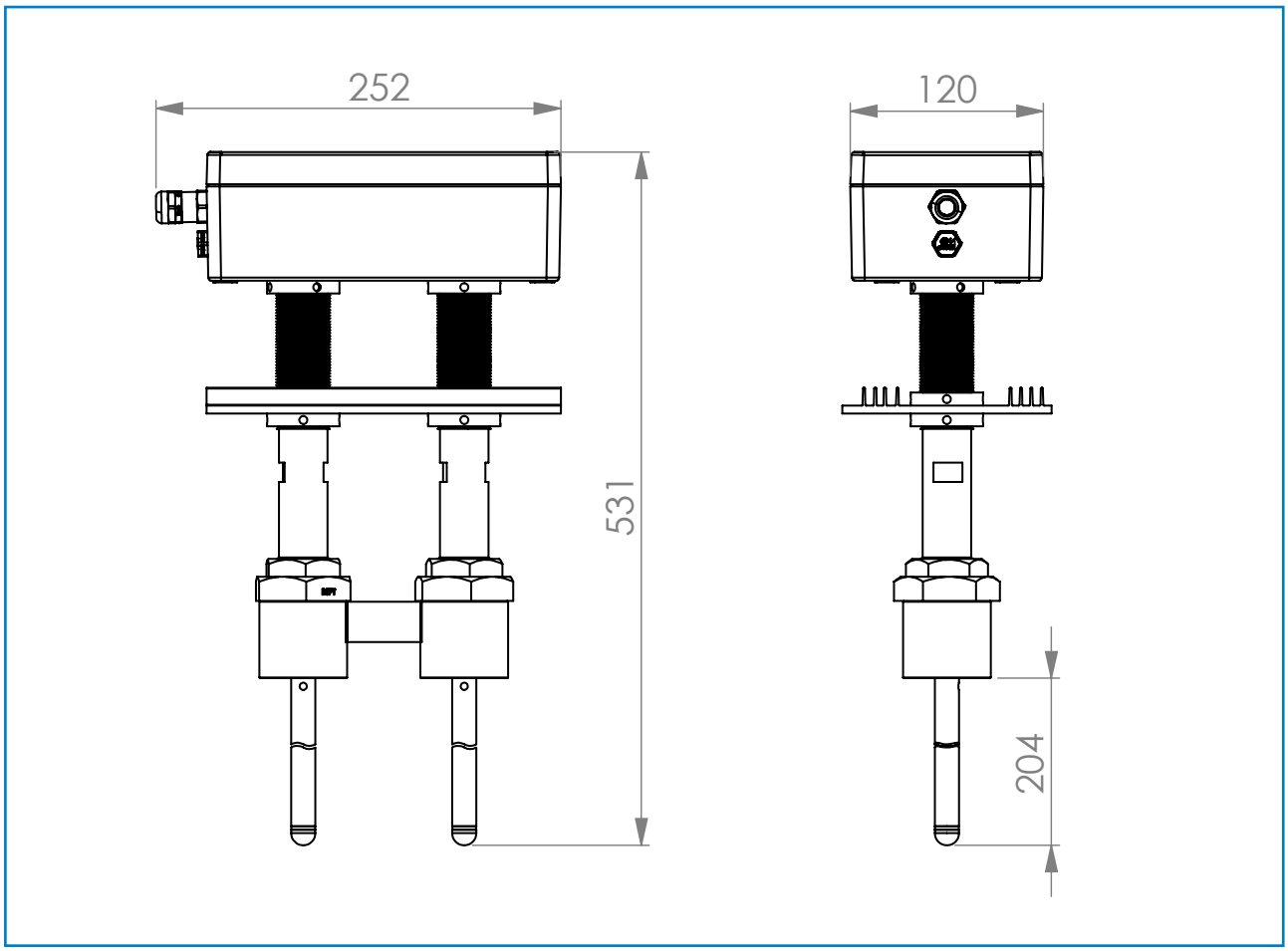


Fig. 16: Dimension AirFlow P-HT sensor

5. Electrical connection

Different variants of the Converter are available for the evaluation of the sensor signals. The **MSE 300-FH** variants are supplied in an IP65 housing and can be installed in a free environment according to the specification.
The **MSE 300-DR** variants are designed for installation in an electrical cabinet. The **MSE 300-DR2** is a variant of the MSE 300-DR and can be extended to a display as required. Only the standard variants of all Converters are described below. The converter can be installed at a maximum distance of 300 m from the sensor. A cable of type "Ölflex Classic 110 CY" is recommended. The cable should be four wired, twisted and shielded. A minimum cable cross-section of 0.75 mm² should be observed. For distances more than 150 m the cable cross-section should be adjusted.

5.1 Terminal layout MSE 300-DR

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)

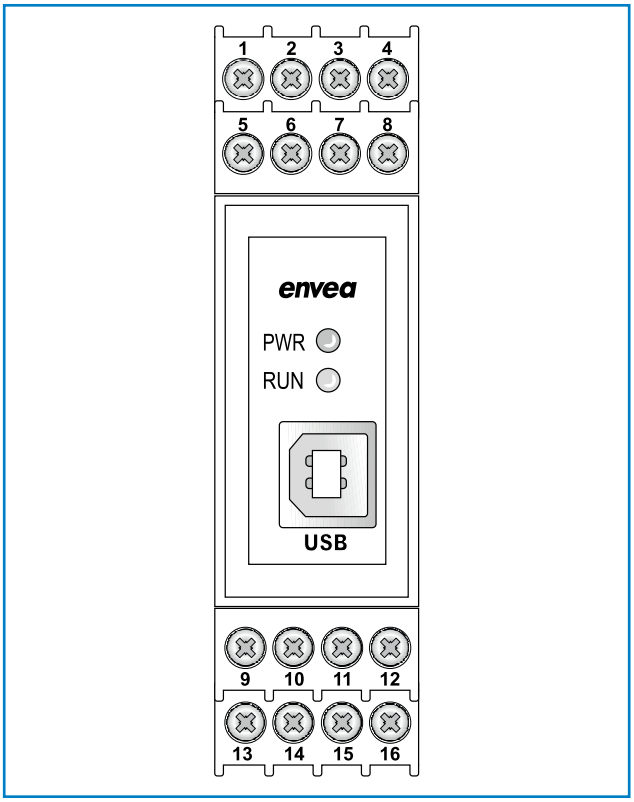


Fig. 15: Electrical connection of the MSE 300-DR

9 Digital pulse output (-)	10 Digital pulse output (+)	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 Terminal layout MSE 300-DR2

1 Alarm relay NO (make contact)	2 Alarm relay C	3 Alarm relay NC (break contact)	4 Not used
5 **1. Digital pulse output** (+)	6 **1. Digital pulse output** (-)	7 **2. Digital pulse output** (+)	8 **2. Digital pulse output** (-)
9 **1. Current output** + 4 ... 20 mA	10 **1. Current output** - 4 ... 20 mA	11 **2. Current output** + 4 ... 20 mA	12 **2. Current output** - 4 ... 20 mA

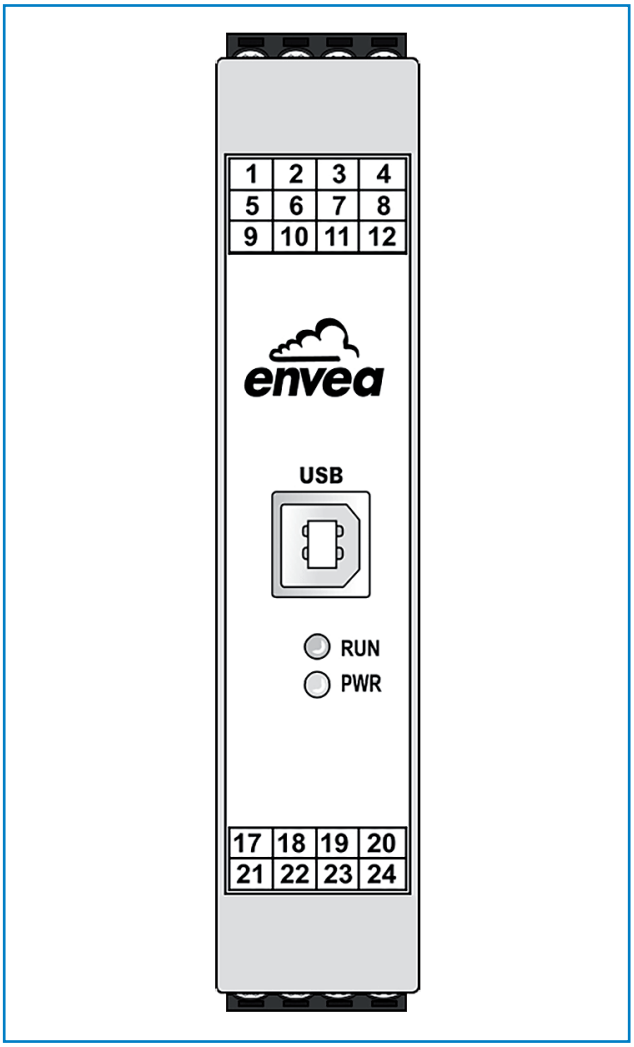


Fig. 16: Electrical connection MSE 300-DR2

17 **Sensor connection Cable 1 Power supply +24 V**	18 **Sensor connection Cable 2 Power supply 0 V**	19 Sensor connection Cable 3 RS 485 Data A	20 Sensor connection Cable 4 RS 485 Data B
21 Input Power supply + 24 V DC	22 Input Power supply 0 V DC	23 RS 485 Interface Data A	24 RS 485 Interface Data B

5.3 Terminal layout MSE 300-FH

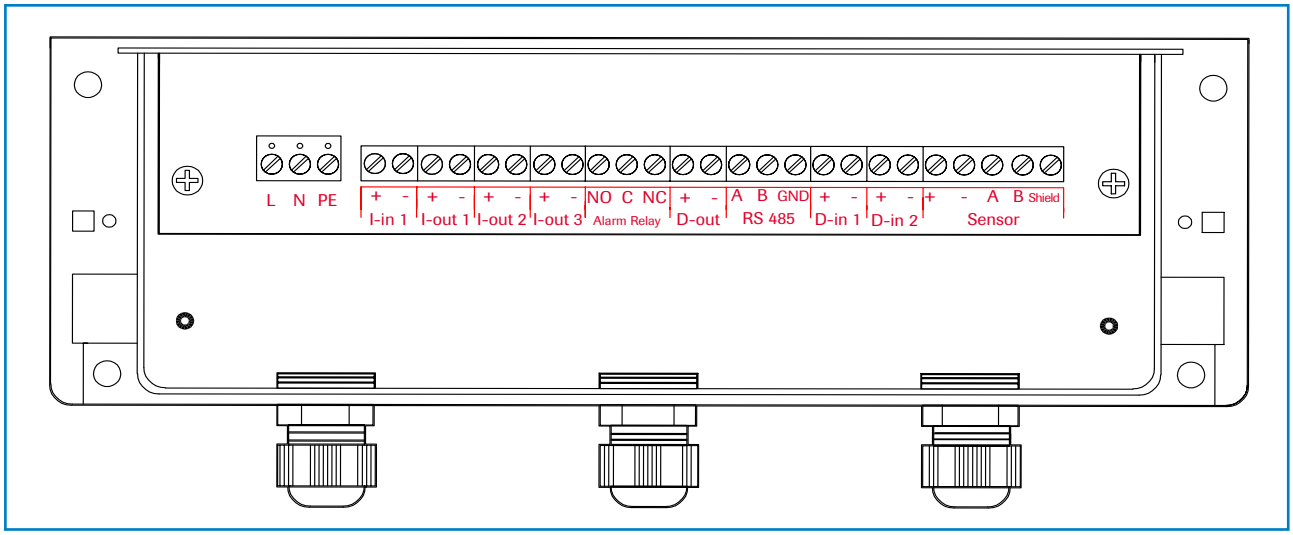


Fig. 17: Electrical connection of the MSE 300-FH

Evaluation unit			
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)	
PE		Earth	
Connections			
I-in1	+	Current input +	
	-	Current input -	
I-out1	+	Current output +	
	-	Current output -	
	Na	Not used	
	Na	Not used	
	Na	Not used	
	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	

5.4 Terminal layout of C-Boxes

It is not needed to install a C1-Box, the system also run without C1-Box.
The C1-Box could be installed in-between sensor and Evaluation unit. The C1-Box could be used to secure the sensor and Evaluation unit in case of electric error.
The C3 box is absolutely necessary as soon as more than one sensor is needed for a measuring point.

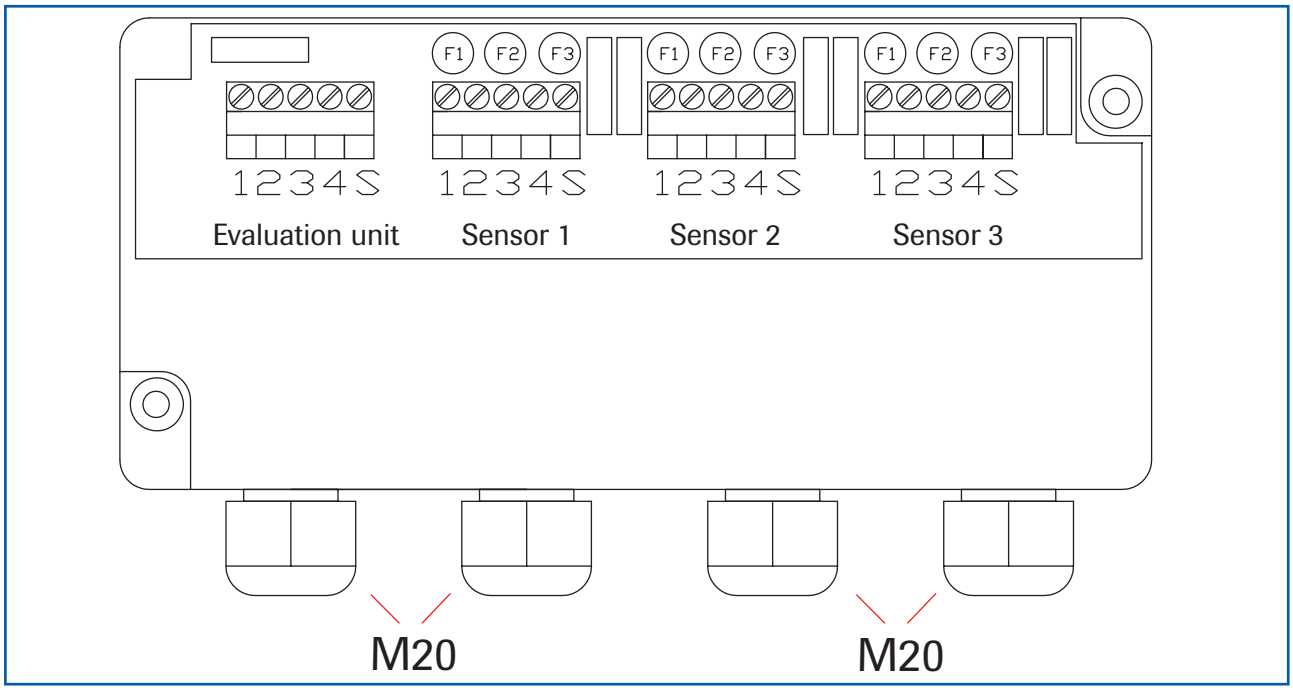


Fig. 18: Electrical connection C3-Box

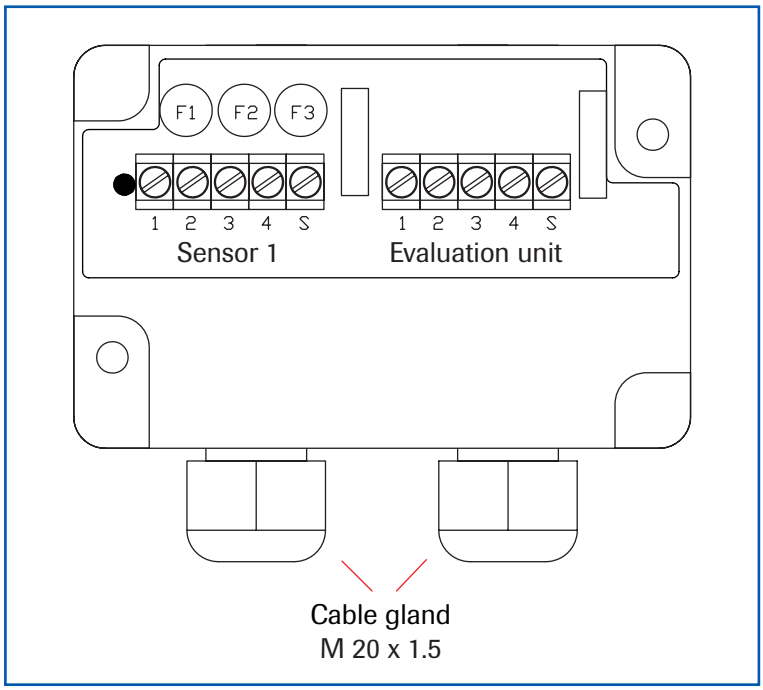


Fig. 19: Electrical connection C1-Box

Sensor 1 / 2 / 3
1 Power supply + 24 V
2 **Power supply 0 V**
3 RS 485, data A
4 RS 485, data B
S Shield

Evaluation unit
1 Power supply + 24 V
2 **Power supply 0 V**
3 RS 485, data A
4 RS 485, data B
S Shield

5.5 Electrical connection sensor

PIN 1: Power supply +

PIN 2: Power supply –

PIN 3: Modbus A

PIN 4: Modbus B

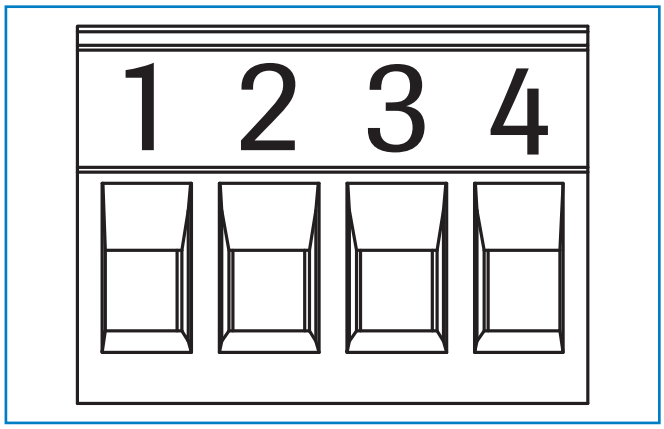


Fig. 20: Electrical connection of the plug connector

6. Operator interface

The Controller is a multi-sensor Controller. So it is strongly recommended to check before commissioning whether the correct sensor is selected under menu item **System**.

The operator interface differs depending on the system design:
- DIN Rail housing without touchscreen, operation via PC software
- Field housing with display, alternative operation via PC software
- One to three sensor system

In the following, the basic operation of the system will be described as a one sensor system without re-entering the differences between the various variants.

6.1 Differences between the individual variants of the Controllers

The controller MSE 300 is available in different versions:

- In field housing **[-FH]**, for installation outdoors
- In a DIN rail housing, for installation in the electrical cabinet

For the version in the DIN rail housing, an additional distinction is made between:

- **DR**: Standard DIN rail enclosure with static structure
- **DR2**: DIN rail housing with several output signals and preparation for modular extensions

The following overview shows the differences between the variants:

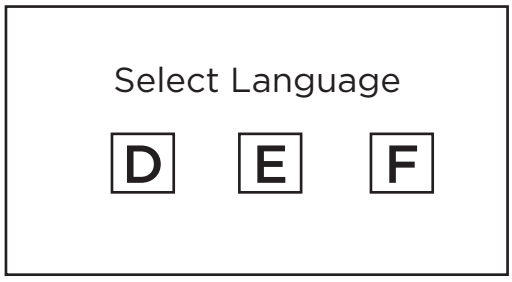
Function	MSE 300-FH	MSE 300-DR	MSE 300-DR2
Menu system			
• via PC software	yes	yes	yes
• via display	yes	no	yes
Multiple current outputs for density, velocity and throughput	yes	no	yes
Pulse output for the control of solenoid valves or for measured value output	yes	yes	yes
Alarm system relay output	yes	yes	yes
Remote control digital input	yes	no	yes
Autocorrect analogue input	yes	no	yes
Communication via Modbus	yes	yes	yes
Communication via Profibus	yes	no	yes
Totaliser display			
• via PC software	yes	yes	yes
• via display	yes	no	yes
Error output			
• on current output	yes	yes	yes
• at relay	yes	yes	yes
• via PC software	yes	yes	yes
• via display	yes	no	yes
• on status LED	no	yes	yes

The standard variants of the controller in the DIN Rail housing are configured exclusively via a USB connection and a PC program.
With the variant in the field housing and the modular extension of the MSE 300-DR2, all functions can be configured menu-driven via the touch-sensitive display.
Configuration via PC software is possible for all variants of the controller MSE 300.

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

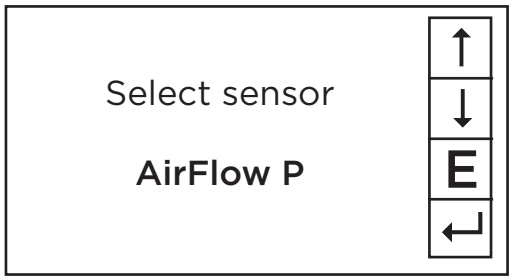
6.2 Configuration via Display

The display is touch-sensitive. Available keys are displayed directly in context. When the measuring system is started for the first time, a query is initiated to select the language and the sensor. If no selection is made, no further settings can be made and no measured values are output.



Initialization screen when the controller in the field housing started first time.

Selection of the menu language:
Deutsch, **E**nglish, **F**rançais

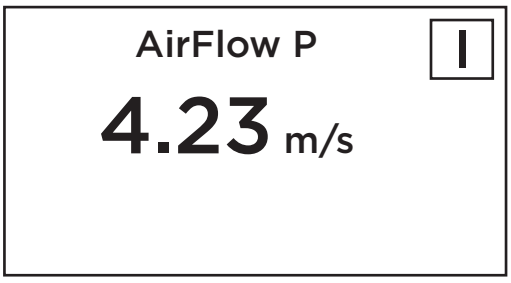


If a language has been selected, the sensor to be used must be selected.

To be available:

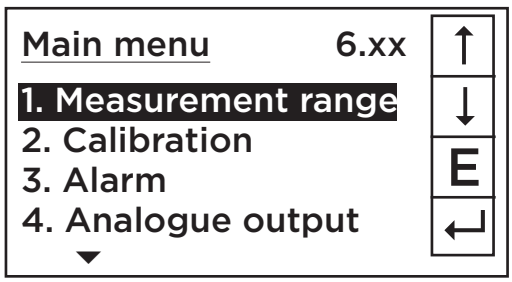
SolidFlow 2.0, Paddy, PicoFlow, MaxxFlow HTC, DensFlow, AirFlow P, SpeedFlow 2.0, SlideControl 2.0, ProSens, M-Sens 2, M-Sens 3, M-Sens WR, M-Sens WR2.

Afterwards the start page appears.



The start page in the display shows the following values:

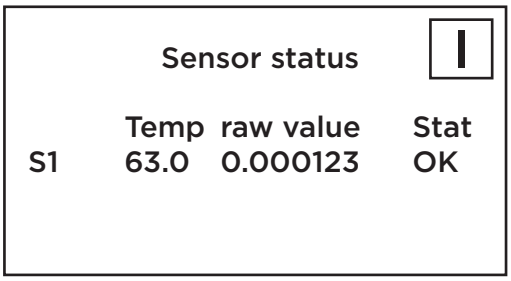
- Name „AirFlow P“, a freely selectable text describing material or measuring point
- Measured value, here in [m/s]
- The [I] key for Info



To enter the main menu, the display must be switched to button at any point for several seconds. The selection of submenus appears.

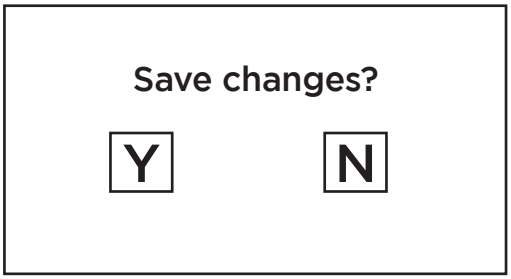
In the menus and input fields, the displayed keys can be used to browse, select, edit or reject:

- [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
- [8]: Select the function or confirm the input
- [C] for Clear: Delete a symbol or number.



The [I] key can be used to call up an information window.
The first window displays the raw values, temperature and the status of the sensor.

The error memory is displayed in the second window. The most recent error codes are always listed first. If an error code repeats itself, it will appear first, but will not be listed more than once.



If any parameter 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 clarity, no further presentation of the display menus is provided.
The display representations are derived directly from the menu structure in section 6.4.

Protection against unauthorized use:

If a password has been entered in menu **7. System** in **7.7 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 Configuration via PC-Software

With both the DIN Rail and field housing version, communication with a laptop or PC is optionally performed either at the terminals via an RS 485 or at the front via a USB interface.

✔ The **RS 485 connection** is attached to the MSE 300 in the field housing at the ModBus A (+) and ModBus B (-) terminals. On the DIN Rail version, these connections are no. 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
- Parity: even

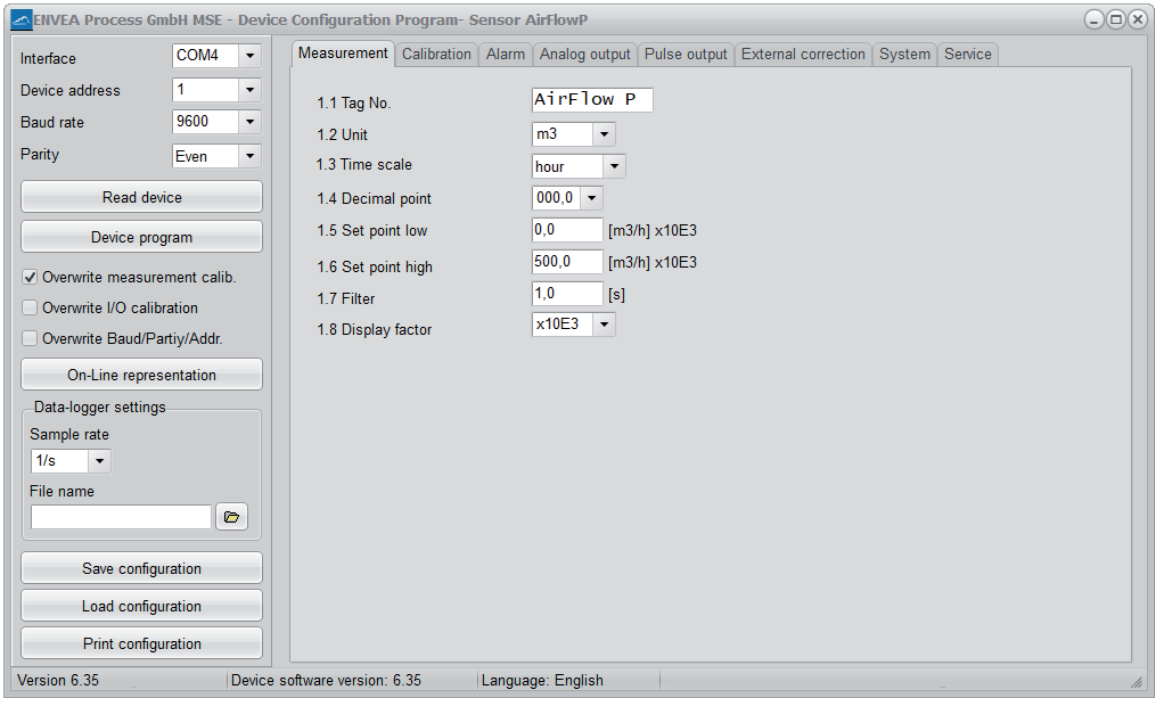
An RS 485 to USB adapter can be purchased from ENVEA Process.

✔ A standard USB-A-B cable is supplied for the USB connection to the DIN Rail version. The USB connection is a point-to-point connection that is BUS-enabled. 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
- Parity: even (parity can not be changed on the USB connection)

When connected to the PC for the first time, any interface drivers enclosed with the Evaluation unit 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. The COM port to be configured is displayed in the device manager.



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 controller.

The edited data is transmitted to the controller via “Program device”.
Critical data concerning the ModBus communication and the calibration must be confirmed before the parameters are transmitted to the controller:

✔ If, when saving the parameters in the controller, the system calibration data is changed, this action must be confirmed by checking “Overwrite measurement calib.”

✔ If parameters of the analogue output needs to be changed, this must be confirmed by checking “Overwrite I/O calibration”.

✔ If, when saving the parameters in the controller, the system interface parameters are changed, this must be confirmed by checking the selection “Overwrite /Parity/Addr.”

In addition, with the PC software,

- the parameters of the controller can be saved in a file (Save configuration)
- the parameters of the controller can be loaded from a file (Load configuration)
- the parameters of the controller can be printed via the set Windows standard printer (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)

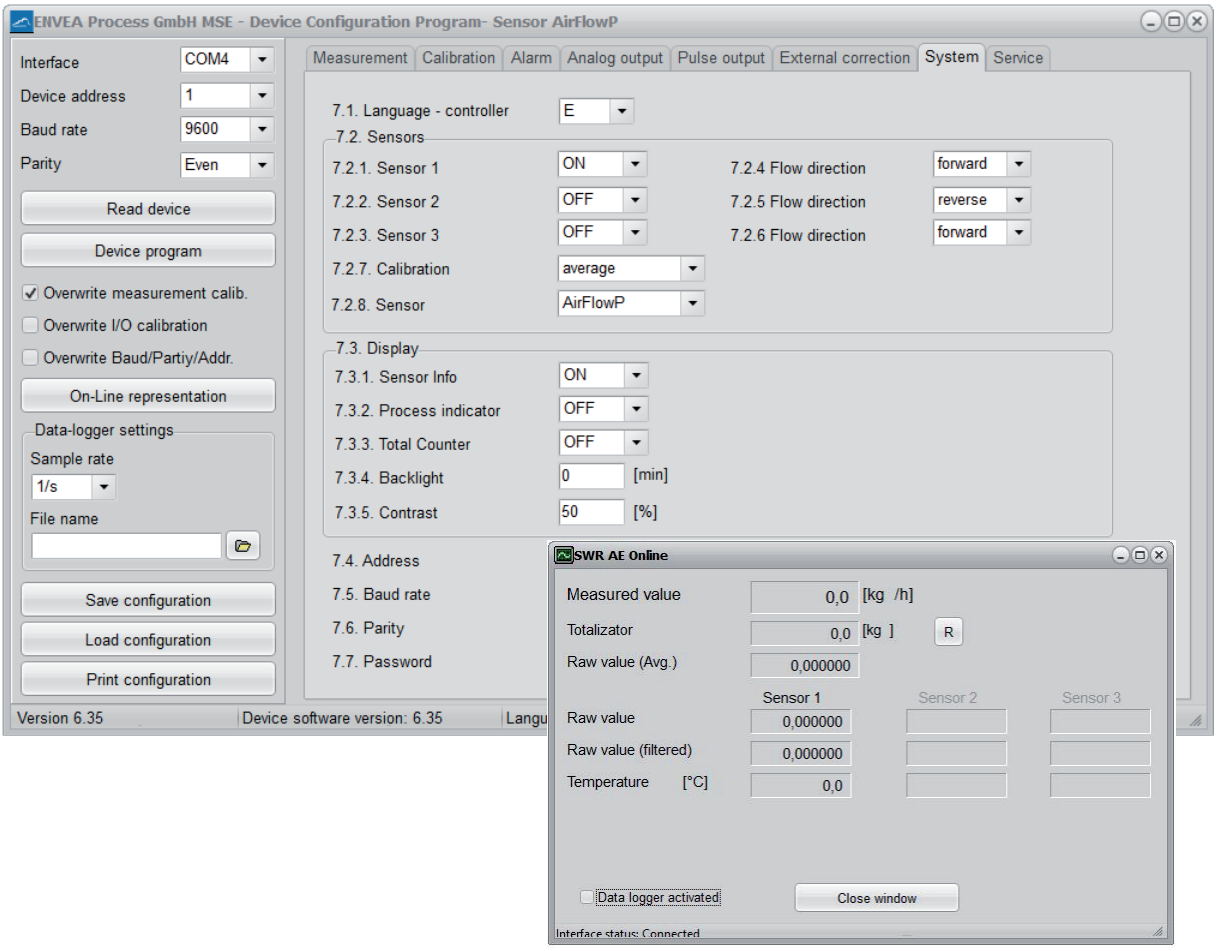
The software language can be set by right-clicking the “Sprache/Language/Langue” field in the bottom program line on “Deutsch/English/Français”.

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** under **7.7 Password**.

6.4 One or more sensor systems

Up to three sensors can be connected to a controller if, for example, a larger flow section needs to be monitored. In the Evaluation unit, 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 operating 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 Evaluation unit.

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:

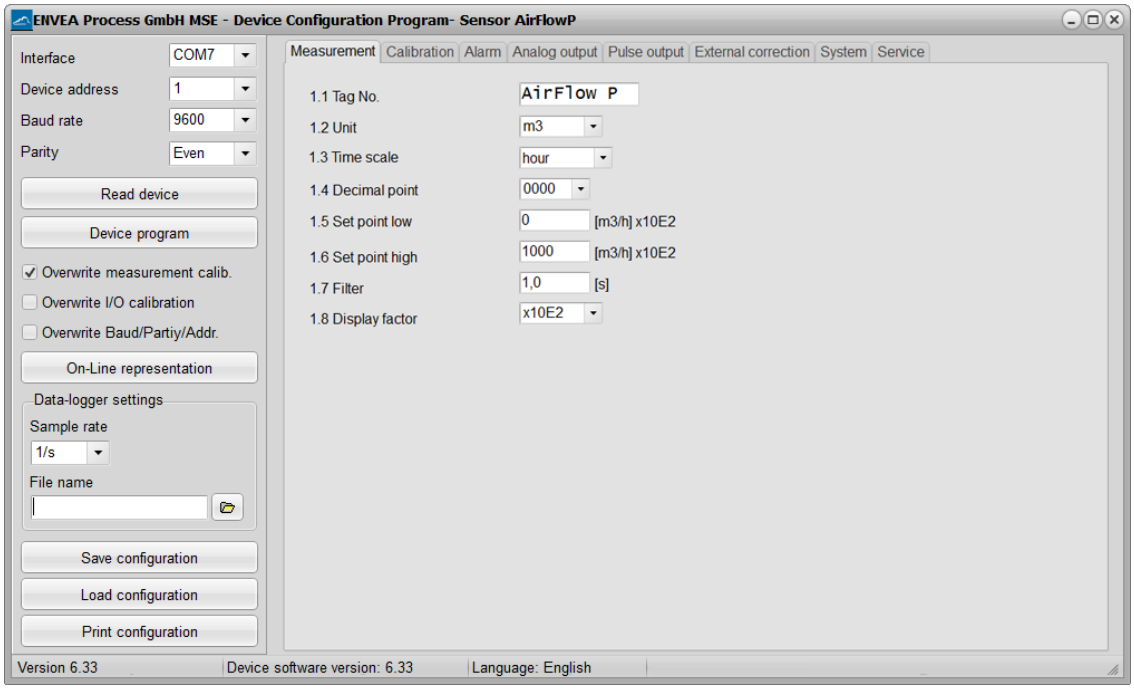
- The sensors must be activated in the controller (Menu **7. System**, **7.2 Sensors**)
- Activated sensors are addressed by the controller on the sensor side, digital bus at the following addresses:
  - Address 1 – sensor 1
  - Address 2 – sensor 2
  - Address 3 – sensor 3

- With delivery of a multi-sensor system the sensors will be preconfigured on the addresses 1 – 2 – 3 and noted in the controller as active.
- Sensors and Evaluation units, 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.

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:

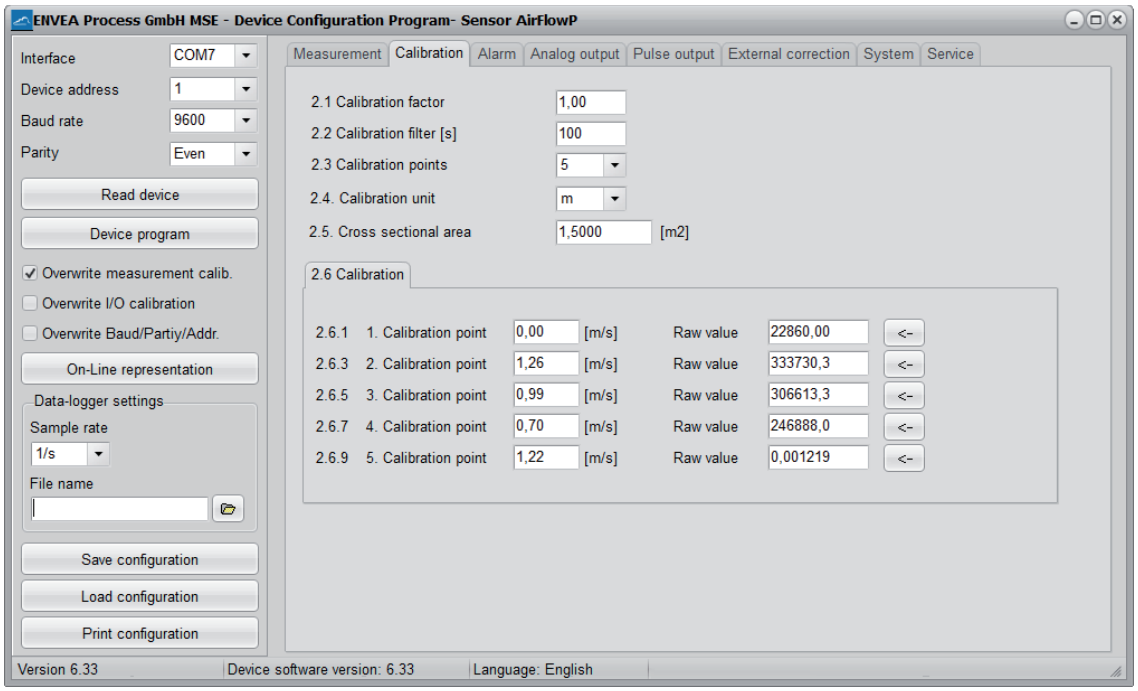
1. **Measurement range**
   Setting all relevant measuring range settings



1.1	Tag No.	**Input** Free text (10 characters)	Name of the measurement point or product.
1.2	Unit	**Selection:** m^3, l, hl, ml, ft^3, in^3	Desired unit for the air flow rate.
1.3	Time unit	**Selection:** h, min, s	Time base for air flow calculation.
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	Measured values under this value will not be displayed at the current output.
1.6	Set point high	**Input:** 0 ... 999	Measured values over this value will not be displayed at the current output.
1.7	Filter	**Input:** 0,0 ... 999,9 s	Filtering of measurement for the indicator and the output values.
1.8	Display factor	**Selection:** x1; x10; 10E2;....; x10E6	Factor for showing higher volume flow rates than 9999 m^3/h

2. Calibration

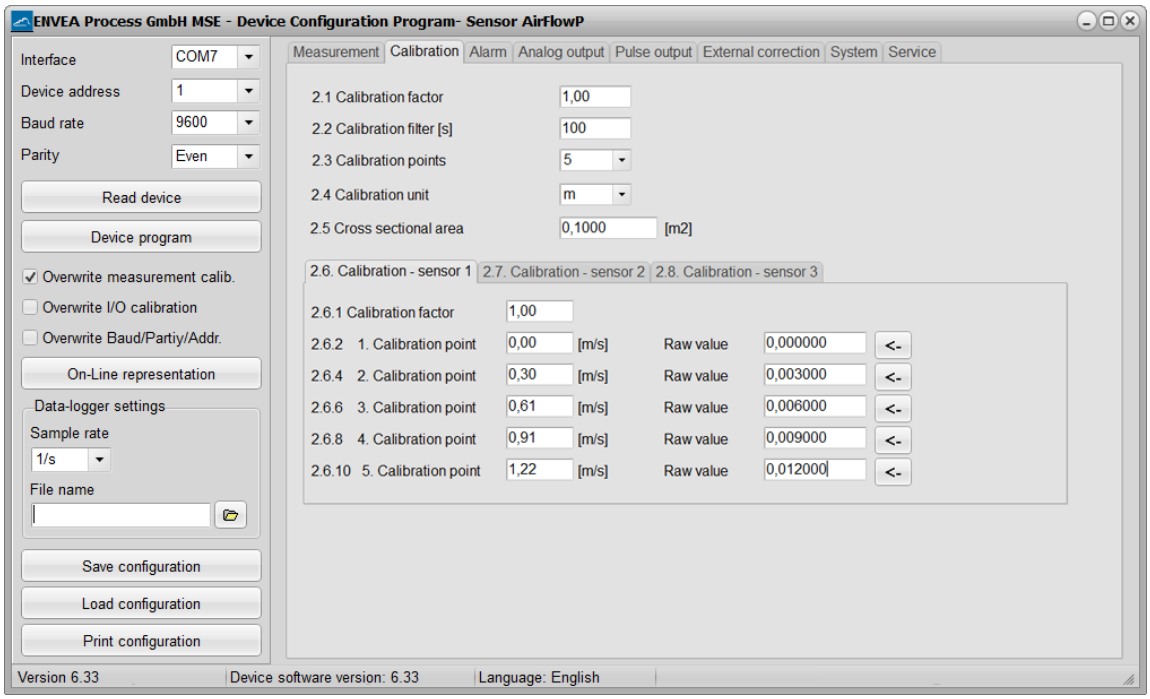
Deposit a calibration curve
Depending on the selection under 7.2.7 Calibration, the parameters to be entered are changing.



Average-Calibration

From the average value of all sensors, a common calibration table is created for volumeflow calculation.

2.1	Calibration factor	**Input:** 0,01 ... 9,99	Value for adjusting the measured speed.
2.2	Calibration filter [s]	**Input:** 1 s ... 9999 s	Filter time for recording the raw value during calibration. The measured over the set period of time measured over the set period of time are average value.
2.3	Calibration points	**Selection:** 2 ... 5	Number of calibration points for a linearisation in the operating range.
2.4	Calibration unit	**Selection:** m, ft	Selection of the velocity unit.
2.5	Cross-sectional area [m^2]	**Input:** 0 ... 92	Cross-sectional area of the pipe to be monitored line, for calculation of air volume (A × v =V)



Single calibration

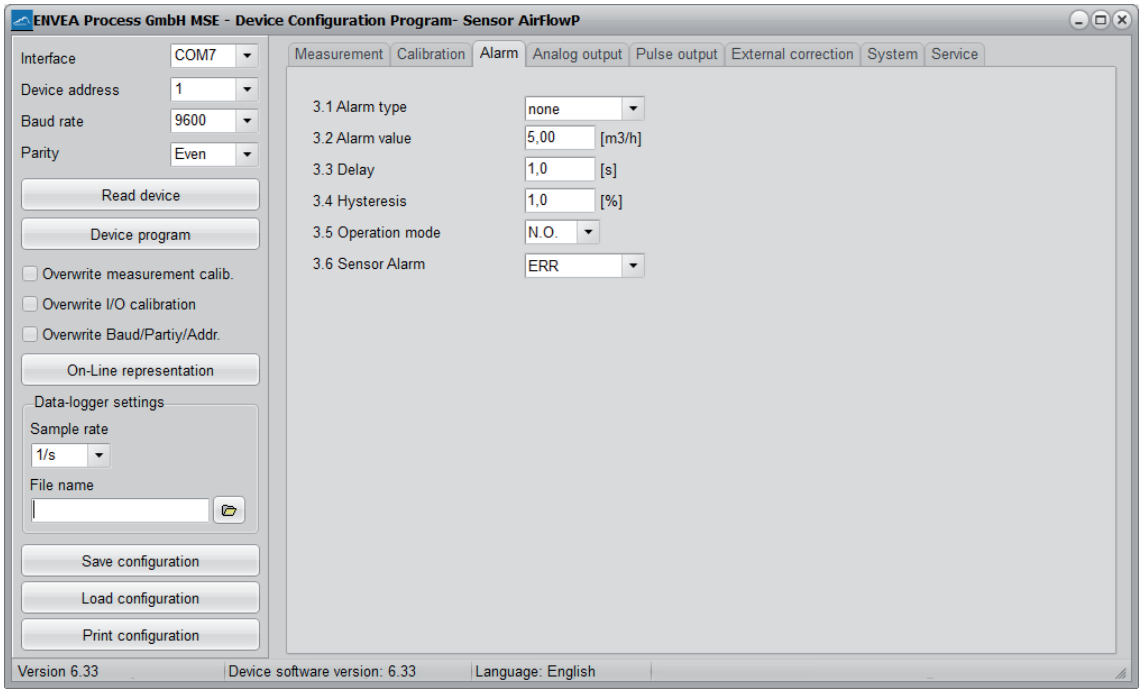
Each sensor is assigned an individual calibration table. Afterwards, a throughput calculation takes place on the basis of the individual throughput values.

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 [s]	**Input:** 1 ... 9999	Filter time for recording the raw value during calibration. It would be made an average out of the measured RAW-values
2.3	Calibration points	**Input:** 2 ... 5	Number of support points for a linearisation above the operating range.
2.4	Calibration unit	**Selection:** m, ft	Selection of the velocity unit.
2.5	Cross-sectional area [m^2]	**Input:** 0 ... 92	Cross-sectional area of the pipe to be monitored line, for calculation of air volume (A × v =V)

2.6	**Calibration sensor 1**	**Calibration sub-menu for sensor 1**	
2.6.1	Calibration factor	**Input:** 0,01 ... 9,99	Factor for the subsequent adjustment of the actual measurement of sensor 1.
2.6.2	P1 value	**Input:** measurement	Output measurement in the selected mass/time unit.
2.6.3	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.
2.7	**Calibration sensor 2**	**Calibration sub-menu for sensor 2**	
2.7.1	Calibration factor	**Input:** 0,01 ... 9,99	Factor for the subsequent adjustment of the actual measurement of sensor 2.
2.7.2	P1 value	**Input:** measurement	Output measurement in the selected mass/time unit.
2.7.3	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.
2.8	**Calibration sensor 3**	**Calibration sub-menu for sensor 3**	
2.8.1	Calibration factor	**Input:** 0,01 ... 9,99	Factor for the subsequent adjustment of the actual measurement of sensor 3.
2.8.2	P1 value	**Input:** measurement	Output measurement in the selected mas/time unit
2.8.3	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.

3. Alarm

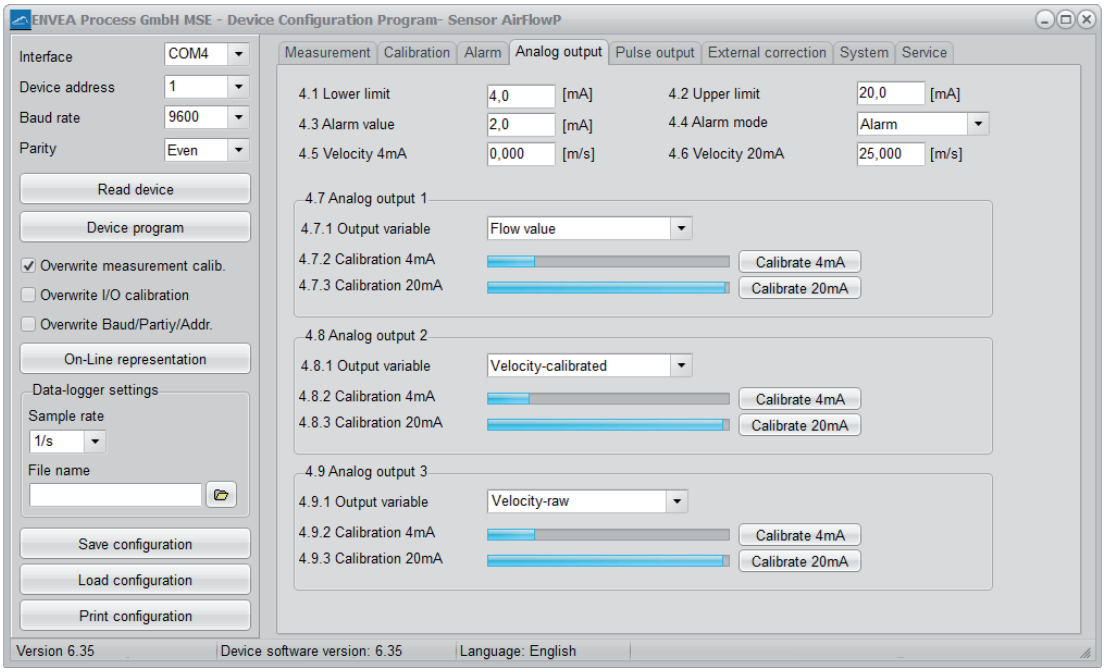
Settings for the alarm via the relay contacts



3.1	Alarm type	**Selection:** Min / Max / None	The relay is activated when the measured value exceeds the Max. limit or undershoots the Min. limit.
3.2	Alarm value	**Input:** 0 ... 999,9	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:** Working / closed current principle	**NC:** the relay is closed, as long as no alarm is active. **NO:** the relay is closed, if there is an alarm.
3.6	Sensor alarm	**Selection:** OFF / ERR / PROC	**Off:** Sensor or process indicators are not displayed at the relay. **ERR:** Serious internal sensor errors trigger an alarm at the relay. **PROC:** Serious internal sensor errors and process indicators trigger an alarm at the relay. Further information on the signalling levels ERR or PROC can in chapter Fault clearance.

4. Analogue output

Setting and calibrating the analogue output



4.1	Lower limit	**Input:** 0 ... 22 mA	Standard setting: 4 mA
4.2	Upper limit	**Input:** 0 ... 22 mA	Standard setting: 20 mA
4.3	Alarm value	**Input:** 0 ... 22 mA	Value to be output at pending alarm (Standard setting 2 mA)
4.4	Alarm mode	**Selection:** Alarm/ Freeze	**Alarm:** Alarm is output. Measurement value drops to 0, or current measurement value. **Freeze:** Last measurement value remains pending until fault rectification at the output signal.
4.5	Velocity 4 mA	**Input:** 0 ... 99,99 m/s	Velocity at 4 mA
4.6	Velocity 20 mA	**Input:** 0 ... 99,99 m/ s	Velocity at 20 mA
4.7	Analog output 1	**Submenu**	
4.7.1	Output Variable	**Selection:** Flow value/ Velocity-raw	**Flow value:** The calculated Airflow value will be output. (A × v = m^3/time) **Velocity-raw:** raw velaue of measured velocity will be output (m/s)

4.7.2 Calibration 4 mA	**Selection:** Setting the output current	Key functions can be used to set the current and equalise it to the receiver side.
4.7.3 Calibration 20 mA	**Selection:** Setting the output current	Key functions can be used to set the current and equalise it to the receiver side.
4.8 Analog output 1	**Submenu**	
4.8.1 Output Variable	**Selection:** Flow value / Velocity-raw	**Flow value:** The calculated Airflow value will be output. **Velocity-raw:** raw velaue of measured velocity will be output
4.8.2 Calibration 4 mA	**Selection:** Setting the output current	Key functions can be used to set the current and equalise it to the receiver side.
4.8.3 Calibration 20 mA	**Selection:** Setting the output current	Key functions can be used to set the current and equalise it to the receiver side.
4.9 Analog output 1	**Submenu**	
4.9.1 Output Variable	**Selection:** Flow value / Velocity-raw	**Flow value:** The calculated Airflow value will be output. **Velocity-raw:** raw velaue of measured velocity will be output
4.9.2 Calibration 4 mA	**Selection:** Setting the output current	Key functions can be used to set the current and equalise it to the receiver side.
4.9.3 Calibration 20 mA	**Selection:** Setting the output current	Key functions can be used to set the current and equalise it to the receiver side.

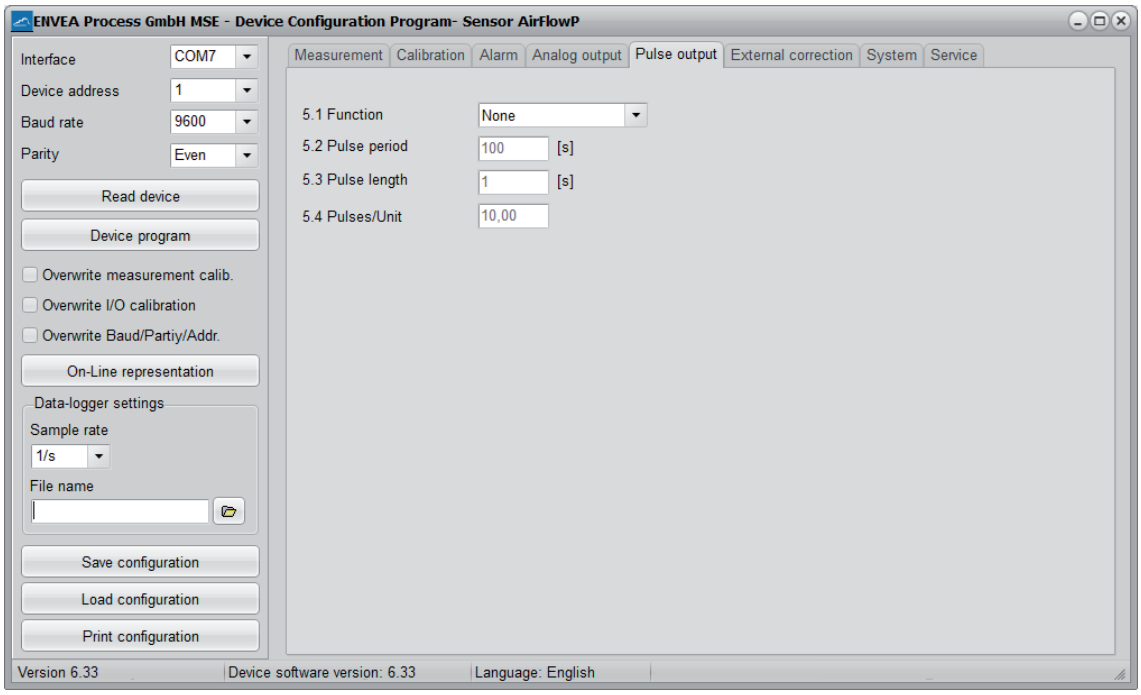
The current output can be calibrated so that the zero point (output of 4 mA) is set to the background noise of the measuring point. If the background noise decreases due to process changes, sensor wear or other ageing effects, a signal of less than 4 mA can be output at the analogue output. In this way, a zero offset can be detected (zero point drift).

If this function is not desired for process engineering reasons, the zero point must be specified for the calibration to a raw value of zero and/or the **4.1 MIN limit** set to 4 mA.

If the settings of the 4 mA or 20 mA signal are changed, a check mark must be placed by **Overwrite I/O calibration**.

5. Pulse output

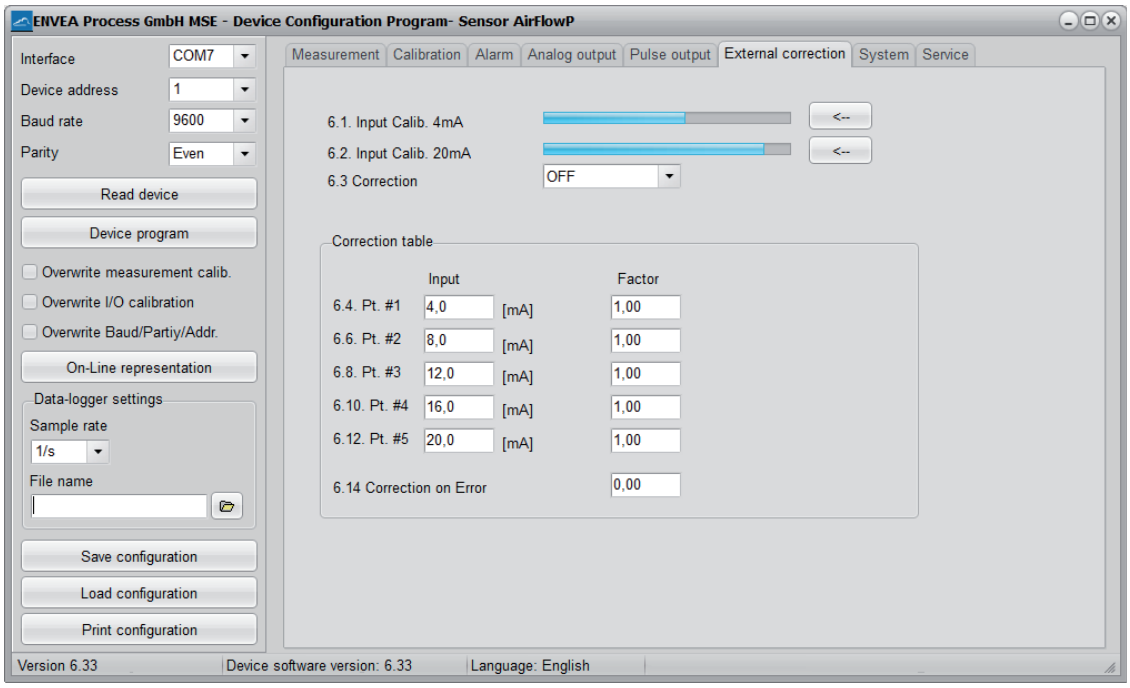
Passive signal for pulse cleaning.



5.1	Function	**Selection:** OFF | Cleaning	**OFF:** No pulse output **Cleaning:** Option for actuation of a solenoid value for pneumatic air flushing.
5.2	Pulse period	**Input:** 1 s ... 600 s	Duration between two pulses
5.3	Puls length	**Input:** 1 s ... 60 s	Length of the pulse

6. External Correction

Option for auto-correction by external current signal.

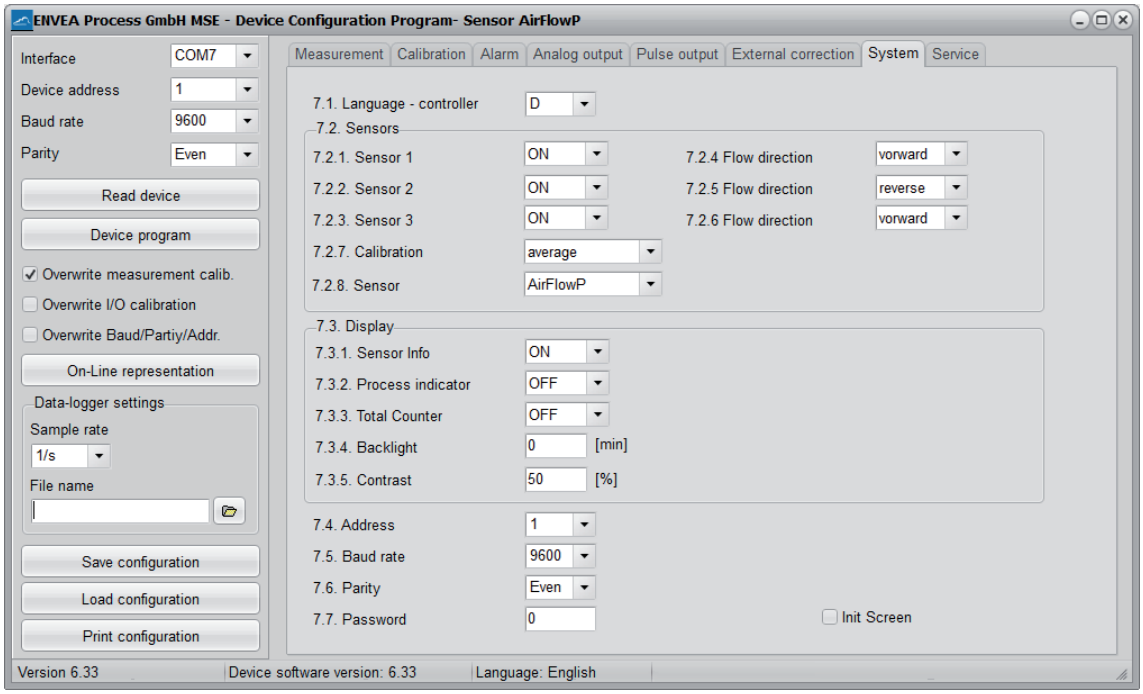


The signal is not electrically isolated.
If the connection is incorrect, the CPU of the controller may be destroyed. An external, galvanic isolation by means of a current disconnector or similar must be provided.

6.1	Input calib. 4 mA	**Selection:** Set input current	The 4 mA signal must be read in via key functions.
6.2	Input calib. 20 mA	**Selection:** Set input current	The 20 mA signal must be read in via key functions.
6.3	Correction	**Selection:** Current input / OFF	**Current input:** correction activated **OFF:** Correction deactivated
6.4	P1 input	**Input:** 4 mA ... 20 mA	Entry of the current that is to be used for the correction.
6.5	P1 factor	**Input:** 0,01 ... 10	Factor for subsequent adjustment of the actual measurement value.
6.n	Pn input	**Input:** 4 m A ... 20 mA	Option for further entry of current value and correction factors.
6.n	Pn factor	**Input:** 0,01 ... 10	
6.14	Correction on Error	**Input:** 0,01 ... 10	Factor for subsequent adjustment of the measured value, in case of faulty input currents (< 3.6 mA or > 21 mA).

7. System

Basic settings of the system and the controller

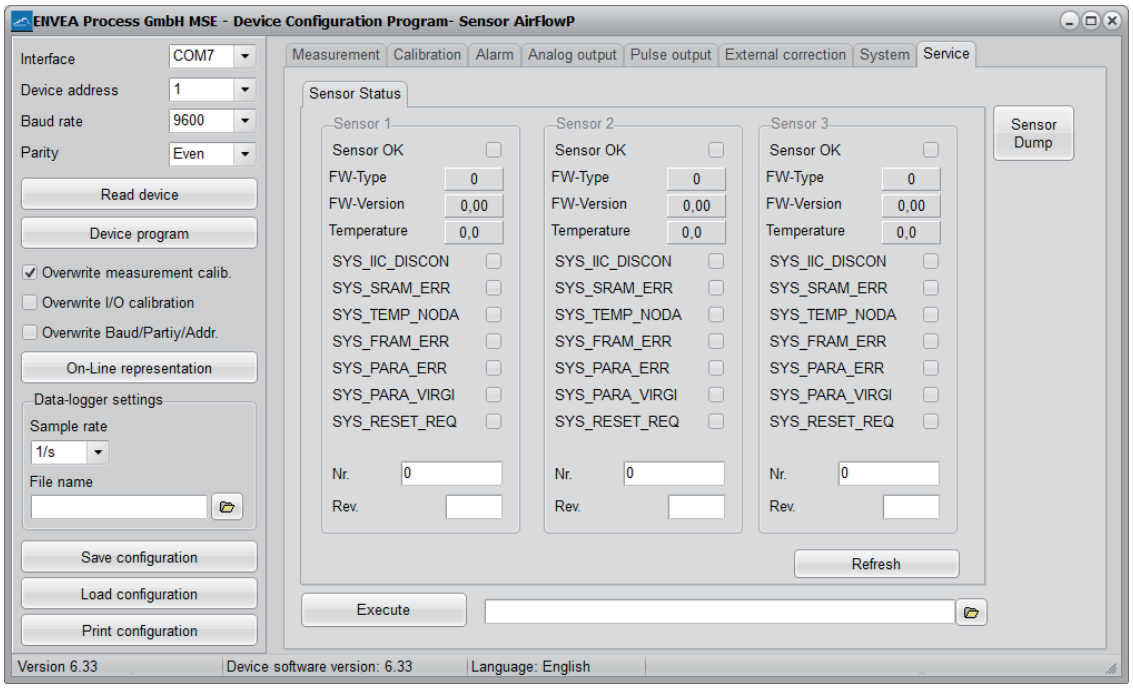


7.1	Language-controller	**Selection:** D/E/F	Selection of the language on the display of the Evaluation unit
7.2	Sensors	**Submenu**	
7.2.1	Sensor 1	**Selection:** ON/OFF **OFF:** Sensor is ignored	**ON:** Sensor is evaluated.
7.2.2	Sensor 2	**Selection:** ON/OFF **OFF:** Sensor is ignored	**ON:** Sensor is evaluated.
7.2.3	Sensor 3	**Selection:** ON/OFF	**ON:** Sensor is evaluated. **OFF:** Sensor is ignored
7.2.4	Flow direction	**Selection:** forward/reverse	Possibility of inversion in case of wrong installation **(sensor 1)**.
7.2.5	Flow direction	**Selection:** forward/reverse	Possibility of inversion in case of wrong installation **(sensor 2)**.
7.2.6	Flow direction	**Selection:** Single/Average	Possibility of inversion in case of wrong installation **(sensor 3)**.
7.2.7	Calibration	**Selection:** Single/Average	**Function only for multi-sensor systems!** **Single:** Each sensor is calibrated via an individual calibration table. Subsequently, a measured value calculation is performed based on the measured values of the individual sensors. (This function should only be used by trained ENVEA Process personnel). **Average:** The mean value from all activated sensors is stored in a common calibration table in a common calibration table for the calculation of the measured value.

7.2.8	Sensor	**Selection:** SolidFlow 2.0/Paddy/ PicoFlow/MaxxFlow HTC/ DensFlow/SpeedFlow 2.0 SlideControl 2.0/ ProSens/M-Sens 2/ M-Sens 3/M-Sens WR2/ AirFlow P	The Evaluation unit checks whether the connected to the matches with the sensor set for based on the set sensor the measured values are calculated and possible errors are displayed. Incorrect selection leads to communication denial.
7.3	Display	**Submenu**	
7.3.1	Sensor info	**Selection:** ON/OFF	**ON:** The key for querying sensor information is shown on the display. **OFF:** The key for querying sensor information is hidden on the display.
7.3.2	Process indicator	**Selection:** ON/OFF	**ON:** Process indicators are shown on the display and indicated on the DIN Rail by flashing twice. **OFF:** Process indicators are not output.
7.3.3	Totalizer	**Selection:** ON/OFF	**ON:** Totalizer value is shown on the display. **OFF:** Totalizer value is hidden.
7.3.4	Backlight	**Input:** 0 min ... 99 min	Display lighting in minutes 0 = Permanent lighting 99 = Time selection for lighting
7.3.5	Contrast	**Input:** 0 ... 100 %	In the event of an inadequate display, the contrast can be changed via the PC software, if necessary.
7.4	Adress	**Input:** 1 ... 255	ModBus address of Evaluation unit, if this is operated on a PLC or PC as a ModBus slave (RS485 connection).
7.5	Baud rate	**Selection:**	Communication speed of the Evaluation unit if 4800/9600/19200/38400 operated on a PLC or PC as a ModBus slave.
7.6	Parity	**Selection:** Even/Odd/None	The parity is set to even by default. The parity is important for further communication. A change of the parity is only valid after a restart of the power supply.
7.7	Password	**Input:** 0 ... 9999	0 = No password protection XXXX = Four digit password that is queried when calling up the menu on the display Automatic locking for five minutes after the last display input
7.8	Init Screen	**Selection:**	If Init Screen is selected, the Evaluation unit is reset to factory settings after the next voltage reset.

8. Service

Display of the sensor status



In menu **8. Service** the status of each connected sensor is displayed. FW type, FW version, temperature, serial number and possible hardware errors are automatically read in and displayed. In the case of a change of display, the PC software can be used to adjust the contrast, if necessary.

Only by instruction of trained personnel from ENVEA Process:

If a detailed error analysis is necessary, you can use the PC software by clicking on **Sensor Dump** to save a copy of all ModBus registers as a text file in the installation folder of the software. This is possible only with the PC software. In addition, a service program with deeper access to the sensors can be launched via the PC software. Only the information on the status of the individual sensors is output on the field housing display.

7. Start-up procedure

7.1 Basic start-up procedure

The sensor is an absolute measuring device and must be parametrised during the commissioning procedure.
The following points must be checked before parametrisation:

- The correct installation of the sensor in the conveyor line.
- The correct connection between the sensor and the Evaluation unit.
- A warm-up time of approx. 5 minutes before starting parametrisation and after switching on the sensor's power supply.

At the beginning of the calibration, it must be checked whether the correct sensor is selected under the menu item **7. System**. If the correct sensor has been selected, the desired measuring range and the physical unit are entered in **1. Measuring range**.

Once all parameters are correctly stored, the sensor transmits a measured value. No extensive calibration is required beyond the defined distance of both measurement antennas and the internal correlation of the measured values. Should the measured speed nevertheless deviate from a reference speed, the value can be adjusted via **2.1 Calibration factor**.

If the sensor deliver the process indicator P1000, the sensor is installed against the flow direction. In vertical position, the cable gland should face downwards. Information on the flow direction is located on the shielding plate of the sensor electronics.

Depending on the material flow direction, the measuring direction (forward/reverse) can be turned with the function **7.2.4 Flow direction** and the measurement can be carried out.

7.2 Datalogger function in the software

To determine the raw values via the Datalogger function of the PC software, a file path first must be stored. The file path and file name can be selected by clicking on the folder icon next to File name. If the file path is stored, the sample rate could still be changed, this is recommended for long recordings. For determining the raw values for a calibration point, the default setting of 1 (raw value)/second is recommended.

To start the datalogger, the **On-line representation** must be started. As soon as the checkbox on **Datalogger activated** is set in the on-line display, the recording starts and the log file is created in the background.

The data logger is only activated as long as the on-line representation is open. If the window of the on-line display or the entire software is closed, the data recording is aborted. If the data logger is activated, a message window also appears before the on-line representation is closed.

For an evaluation of the recorded log file, it must be opened with Excel or a similar program.

7.3 Adjusting the measurement values

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

Alarms	Throughput upper/lower limit values can be set in **3. Alarm**. A sensor monitoring alarm can also be activated here
Analogue output	The analogue output values are assigned in **4. Analogue output**. Upper and lower limits of the permitted power and fault current are set here. The analogue output is an active signal. In the field housing design, analogue output 2 + 3 are provided for the MaxxFlow HTC. All other sensors output their 4 ... 20 mA signal to analogue output 1.
Pulse output	In **5. Pulse output** there is an option to use different pulses. A cleaning pulse can be used for a possible pneumatic cleaning on the sensor.
Current input	In **6. Current input** different input currents can be stored. When the current is applied, the corresponding correction factor is applied to the measured value. The input current can also be equalised here.
System	In **7. System** functions such as selection of the menu language, the number of connected sensors and their average, direction of material flow for velocity measurement, the display screen or ModBus addressing and speed are summarised.

8. Error signalling

To monitor availability, comprehensive system diagnostic functions have been integrated to signal various errors:

1. Serious errors (ERR):
Serious errors (ERR) always set the current output to the configured alarm value. Technical problems affecting the sensor or the entire system that require replacement or repair of a component are displayed:

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

2. Process indicators (PROC):
Process indicators (PROC) merely report a violation of set parameters and should be viewed as information to improve the measurement process.
Process indicators are not output at the current output, however they can be shown on the display (field housing) or the RUN LED (DIN Rail) and optionally on the relay:

- Temperature instability in the sensor due to external thermal stress (overtemperature, low temperature)
- Overload of the sensor due to material flow (too much, too little)

Process indicators may also only show temporary abnormalities in the process, which can be prevented by optimising the sensor or delivery parameters.
Process indicators are not sensor errors, but rather provide information about optimisation potential at the measuring point.

Display	Display (field housing)	Run-LED (DIN Rail)	Relay (optional)	Current output
No error	Sensor status OK in the information display ([I] key)	Single flashing every second	Normal status	4 ... 20 mA
PROC (Process indicators)	Display with indicator code in the bottom display line, extended information via [I] key	Double flashing every second	Enabled if relay alarm option PROC is selected	4 ... 20 mA
ERR (Hardware error)	Display with error code in the bottom display line, extended information via [I] key	Triple flashing every second	Enabled if relay alarm option PROC or ERR is selected	2 mA (or alarm value set for the current output)

Error codes: Error and indicator codes are composed of the letter E (ERR = error) or P (PROC = process indicator) and a three-digit hexadecimal value from “000” to “FFF”. The cause can be determined via the displayed code.

Error timeout: In order not to complicate the start-up of a processing plant due to process and heating status errors, non-serious errors are only signalled at the outputs after approx. 5 minutes have elapsed following a reset of the measuring system. The timeout delay is indicated by a small “t” in the upper-left corner of the display (field housing only).

9. Maintenance

Warning!

- Switch the power supply off before performing any maintenance or repair work on the measuring system. The transport pipe must not be operational when replacing the sensor
- Repair and maintenance work may only be carried out by electricians.
- The system requires no maintenance.

10. Warranty

On condition that the operating conditions are maintained and no intervention has been made on the device and the components of the system are not damaged or worn, the manufacturer provides a warranty of 1 year from the date of delivery.

In the event of a defect during the warranty period, defective components will be replaced or repaired at ENVEA Process plant free of charge at the discretion of ENVEA Process. Replaced parts will become the property of ENVEA Process. If the customer requests that parts be repaired or replaced at its plant, the customer must pay the travel expenses for ENVEA Process service personnel.

ENVEA Process cannot accept any liability for damage not suffered by the goods themselves and in particular ENVEA Process cannot accept liability for loss of profit or other financial damages suffered by the customer.

11. Fault clearance

- **Warning!**
  The electrical installation may only be inspected by trained personnel.

Error	Cause	Action
Measuring system does not work. POW LED does not light up. RUN LED does not light up.	Power supply interrupted.	Check the power supply.
	Cable break.	Check the connection cables for a possible cable break.
	Defective fuse.	Replace fuse.
	Defective device.	Notify ENVEA Process and rectify the error as instructed on the telephone.
Measuring system does not work. POW LED does not light up. RUN LED does not light up.	Microprocessor does not start.	Switch the power supply off and on again. Remove programming cable.
Measuring system works. POW LED does not light up. RUN LED flashes twice or three times per cycle.	No sensor communication.	Sensor defective. Cable break between sensor and measuring system.
	Sensor connected incorrectly.	Check connection cable.
	Sensor defective.	Replace sensor.
	Sensor not receiving 24 V supply.	Make sure the power supply is connected.
	Excessive voltage drop in the supply cable to the sensor.	Check cable lengths.
	Error code available on the display.	Additional error diagnosis by error code.
Measuring system outputs incorrect values.	Calibration incorrect.	Perform a recalibration.
	Calibration shifted by abrasion on the sensor head.	Perform a recalibration.
Switch output relay chatters.	Hysteresis too low.	Increase hysteresis. Check for fault caused by external consumer.
Do not open sensor electronics. To do so will make the warranty void!		

11.1 Error codes

Type	Error code	DR flashing	Current	Description	Remedy
ERR	E0001	3	2 mA	Internal amplifier defective (DC offset)	Switch off power supply for at least 10 s, if not helpful: replace, check parameters
PROC	P0002	2	4...20 mA	Signal too small	Process stopped? Check parameters
ERR	E0004	3	2 mA	Defective speed electrode	Check parameters, set fixed speed or replace sensor
ERR	E0008	3	2 mA	Defective speed electrode	Check parameters, set fixed speed or replace sensor
ERR	E0010	3	2 mA	Asymmetrical speed signal	Check parameters, set fixed speed or replace sensor
PROC	P0020	2	4...20 mA	Inverted input signal on a channel	Check parameters, set fixed speed, replace sensor
PROC	P0040	2	4...20 mA	Measurement range exceeded	Set parameters, check process
PROC	P0080	2	4...20 mA	Measurement range exceeded	Set parameters, check process
PROC	P0100	2	4...20 mA	Poor result of individual measurement	Set parameters, set fixed speed, check process
PROC	P0200	2	4...20 mA	Periodic speed signal	Set parameters, set fixed speed, check process
PROC	P0400	2	4...20 mA	Speed too high, signal cannot be measured	Set parameters, set fixed speed, check process
PROC	P1000	2	4...20 mA	Negative speed measurement	Set parameters, configuration flags, set fixed speed, check process
PROC	P2000	2	4...20 mA	Empty calculation buffer	Wait, reset if necessary if not gone after some time

A detailed error description and subsequent troubleshooting can be carried out by trained ENVEA Process GmbH personnel.

12. Technical data

AirFlow P	
Power supply	24 V DC, fed by Evaluation unit
Measuring range	from 1 mg/m³
Speed range	1 m/s ... 100 m/s
Process temperature **Standard**	-20 ... +150 °C
Process temperature **high temperature**	-20 ... +800 °C
Ambient temperature	-20 ... +60 °C
Housing material	Aluminium
Sensor rod material	Stainless steel
Protection type	IP65
Dimensions **Standard**	252 × 467 x 120 mm (W × H × D)
Dimensions **high temperature**	252 × 531 x 120 mm (W × H × D)
Weight	5.5 kg
Evaluation unit MSE 300-FH	
Power supply	110/230 V, 50 Hz (optional 24 V DC)
Power consumption	20 W/24 VA
Protection category	IP65 to EN 60 529/10.91
Ambient operating temperature	-10 ... + 45°C
Dimensions	258 × 237 × 174 (W × H × D)
Weight	Approx. 2.5 kg
Interface	RS 485 (ModBus RTU)/USB
Cable screw connectors	3 × M20 (4.5–13 mm Ø)
Connection terminals cable cross-section	0.2–2.5 mm² [AWG 24-14]
Current output	3 × 4 ... 20 mA (0 ... 20 mA) load < 500 Ω (Active)
Relay contact	Max. rated load: 250 V AC Max. peak current: 6 A Max. rated load 230 V AC: 250 VA Max. breaking capacity DC1: 3/110/220 V: 3/0.35/0.2 A Min. switching load: 500 mW (10 V/5 mA)
Data backup	Flash memory
Pulse output	Open collector – max. 30 V, 20 mA

MSE 300-DR	
Power supply	24 V DC ± 10 %
Power consumption	20 W / 24 VA
Protection type	IP40 to EN 60 529
Ambient operating temperature	-10 ... +45 °C
Dimensions	23 × 90 × 118 (W × H × D)
Weight	Approx. 172 g
Interface	RS 485 (ModBus RTU) / USB
DIN Rail fastening	DIN 60715 TH35
Connection terminals cable cross-section	0.2 – 2.5 mm² [AWG 24-14]
Current output	1 × 4 ... 20 mA (0 ... 20 mA), load < 500 W (Active)
Relay contact	Max. rated load: 250 V AC Max. peak current: 6 A Max. rated load 230 V AC: 250 VA Max. breaking capacity DC1: 3/110/220 V: 3/0.35/0.2 A Min. switching load: 500 mW (10 V/5 mA)
Data backup	Flash memory
Pulse output	Open Collector – max. 30 V, 20 mA
MSE 300-DR2	
Power supply	24 V DC ± 10 %
Power consumption	20 W / 24 VA
Protection type	IP40 to EN 60 529
Ambient operating temperature	-10 ... +45 °C
Dimensions	23 × 110 x 121 (W × H × D)
Weight	Approx. 190 g
Interface	RS 485 (ModBus RTU) / USB
DIN Rail fastening	DIN 60715 TH35
Connection terminals cable cross-section	0.2 – 2.5 mm² [AWG 24-14]
Current output	1 × 4 ... 20 mA (0 ... 20 mA), load < 500 W (Active)
Relay contact	Max. rated load: 250 V AC Max. peak current: 6 A Max. rated load 230 V AC: 250 VA Max. breaking capacity DC1: 3/110) / 220 V: 3) / 0.35) / 0.2 A Min. swithing load: 500 mW (10 V) / 5 mA)
Data backup	Flash memory
Pulse output	2 × Open Collector – max. 30 V, 20 mA

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