



Translation of the original operating instructions

EN

Flowgas TMS 300

| FLOW |



The completeness and accuracy of this documentation have been carefully checked. We reserve the right to make technical changes at any time. These changes may result in deviations from the information provided in this documentation.

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1 General information

For the sake of simplicity, this documentation refers to the product "Flowgas TMS 300" simply as the **product**.

1.1 Documentation

This documentation provides important warnings, safety precautions, and instructions for the safe and proper operation of the product.

- ▷ Before operating the product, read this documentation carefully and ensure that you fully understand its contents.
- ▷ Always keep this documentation readily available for reference purposes.

1.2 Symbols and labels used

The following markings and symbols are used in this documentation:

Labeling/symbol	Usage
Text	Important text passages are highlighted
text	Control elements Flowgas TMS 300
Text	User interface software
Text > Text > Text	User interface click path
 2 Security	Cross-reference to text passage, figure or chapter
•	Enumeration, list element
▷	Call to action as part of an instruction. Can also be numbered.
✓	Final or intermediate result of an action instruction
✗	Final or intermediate result of an instruction that has not been achieved
!	Note on an intermediate result

Table 1: Symbols and labels used

1.3 Safety instructions and notes

	DANGER Indicates an imminent danger. Death or very serious injuries may result.
	WARNING Indicates a potentially dangerous situation. Death or serious injury may result.
	CAUTION Indicates a potentially dangerous situation. Slight or minor injuries may result.
	NOTICE Indicates a potentially dangerous situation. Material or environmental damage may result.
	NOTE Indicates important information, application tips, and useful information for proper working.

2 Security

The product has been designed, manufactured, and functionally tested in accordance with applicable safety regulations.

To ensure operational safety, please observe the following:

- Chapter "Intended use"
- Chapter "Organizational measures to be taken by the operator"
- Chapter "Residual hazards"

Regardless of the instructions provided in this manual, all applicable country-specific occupational health and safety regulations must be observed.

2.1 Intended use

The operational safety of the product supplied is only guaranteed if it is used as intended.

The product enables continuous flow measurement according to the thermal mass flow principle.

Any use beyond or deviating from this is considered improper use. The manufacturer accepts no liability for any resulting damage.

Intended use also includes:

- Adherence to the supplied documentation
- Compliance with all inspection and maintenance requirements specified by the manufacturer

Reasonably foreseeable misuse or improper handling are:

- Contact with liquids
- Contact with steam, aggressive gases or hazardous substances
- Use as a climbing aid
- Operation outside the technical specifications
- Tampering with the product in any way that does not comply with the intended and described procedures
- Standard version: Use in potentially explosive atmospheres



NOTICE

Use with combustible gases

The product complies with the current state of the art and is generally suitable for use with combustible and non-combustible gases.

When using the product to measure combustible gases (e.g., natural gas), please note that the sensor does not have DVGW approval. However, DVGW approval is not mandatory for this application.

The area outside the pipeline (area surrounding the probe) must not be an Ex zone.

2.2 Organizational measures of the operator

The product may only be used if it is in perfect technical condition. It may no longer be used if it has been technically modified or damaged.

Instructions

The information on commissioning, operation, and maintenance provided in these instructions must be followed. These instructions should always be kept accessible with the product.

Personnel

People working on the product must read these instructions, particularly the chapter entitled "2 Security", before starting work. This also applies to people who only work occasionally.

2.3 Residual risks



DANGER

Risk of injury due to insufficiently qualified personnel

Improper handling of the product can lead to serious personal injury and damage to property. All work described in these instructions may only be carried out by qualified specialists.

Qualified personnel are persons with appropriate training and in-depth knowledge of measurement, control, regulation and compressed air technology. They must also be familiar with the applicable national regulations, standards and directives and be able to assess risks independently.



WARNING

Danger during operation outside the specified limit values

Exceeding or falling below the permissible operating, storage or transportation limits can endanger people and property. There is a risk of malfunctions and operating faults as well as falsified measurement results.

- ▷ Only operate the product within the limit values specified on the rating plate and in the technical data.
- ▷ Observe the permissible storage and transportation conditions.



WARNING

Risk of injury due to unauthorized modifications

Unauthorized device modifications can cause injuries and lead to the loss of the operating permit. Operation is only permitted with original components.

- ▷ Unauthorized modifications are not permitted and lead to the exclusion of any warranty and liability by the manufacturer (Senseca).



CAUTION

Danger due to malfunction of the product

Incorrect installation or inadequate maintenance can lead to malfunctions that impair the function of the product and can lead to dangerous misinterpretations.

- ▷ Observe all applicable national regulations and safety regulations during installation and operation.



CAUTION

Risk of burns from heated components

Hot process gases in the pipe can cause the components of the product (e.g., sensor shaft or measuring section) to heat up significantly.

- ▷ Only touch the components when they have cooled down.
- ▷ Wear suitable protective gloves if necessary.



NOTICE

Measurement errors caused by contaminants in the measurement medium

Contaminants can lead to malfunctions or disruptions.

- ▷ The plant operator must ensure that the measuring medium meets the required purity standards and that appropriate cleaning and maintenance intervals are observed.
- ▷ The manufacturer (Senseca) accepts no warranty or liability for incorrect use.

3 Flowgas TMS 300

3.1 Product overview

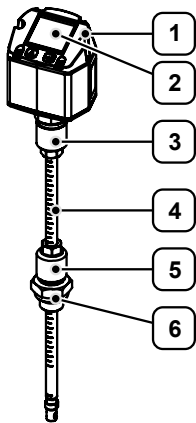


Figure 1: Flowgas TMS 300 (Example)

- | | | | |
|---|-------------------|---|-----------------|
| 1 | Housing | 4 | Sensor shaft |
| 2 | Screen | 5 | Clamping sleeve |
| 3 | Sensor shaft head | 6 | Connection nut |

3.2 Product description

The product is a flow sensor for continuous measurement of flow, consumption and temperature in gas lines ¹. It is designed for use in compressed air and gas mixtures and provides reliable measurement results even under humid operating conditions.

The housing protects the product from environmental influences and allows it to be used in different operating environments.

The product can be integrated into pipes of various sizes and installed in both horizontal and vertical pipes. Typical applications include consumption measurement in compressed air systems, compressor performance monitoring and efficiency analyses in gas and compressed air networks.

3.3 Type plate

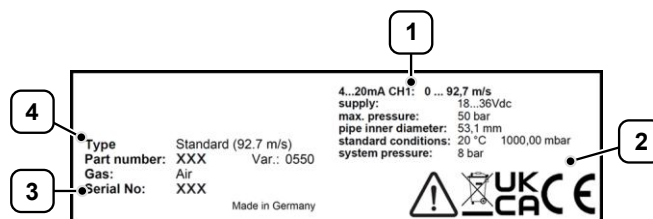


Figure 2: Type plate (example)

- | | | | |
|---|----------------------------------|---|------------------------|
| 1 | Technical data | 3 | Material/serial number |
| 2 | Conformity/certification marking | 4 | Product name |

3.4 Scope of delivery

Depending on the model ordered, the scope of delivery includes the following components:

- Flowgas TMS 300
- Positioning key

¹ The "Pressure" option is available as an option.

- 120-Ω resistor for bus termination or, alternatively, an M12 connector for electrical termination of the bus
- Calibration certificate
- Translation of the original operating instructions

3.5 Applicable documents

Zusätzlich zu dieser Translation of the original operating instructions können je nach Produktausführung weitere Unterlagen erforderlich sein.



NOTE

In addition to the basic registers, the device provides further registers. Further information on this can be found in the "Operating instructions - Modbus installation".

4 Transportation and storage

**NOTE**

Improper transportation, storage and commissioning are accident-prone and can cause damage or malfunctions to the delivered product, for which the manufacturer (Senseca) does not grant any liability or warranty.

4.1 Delivery

Transport damage

- ▷ Check the delivered components for any visible transportation damage.
- ▷ Report any transportation damage to the following parties immediately:
 - the carrier
 - the manufacturer's customer service (Senseca)
- ▷ Ensure that the product is handled properly during transportation.

Packaging

- ▷ Keep the original packaging for any future transportation or storage.

4.2 Storage

To avoid damage due to environmental influences, the product must be stored properly when not in use.

- ▷ If possible, store the product in its original packaging.
- ▷ Store the product in dry, dust-free rooms.
- ▷ Keep the product away from direct sunlight, heat sources, and corrosive or aggressive chemicals.

5 Installation and commissioning



DANGER

Risk of injury due to pressurized components

Escaping medium can cause serious injuries.

- ▷ To minimize potential hazards, do not work directly above the product, but to the side of it.
- ▷ Secure the housing by hand during assembly and disassembly.



CAUTION

Risk of burns due to heated piping

Hot air, gases or gas mixtures can heat up the piping considerably.

- ▷ Only touch pipes when they have cooled down.
- ▷ Wear suitable protective gloves if necessary.



CAUTION

Danger from commissioning a damaged product

If a damaged product is installed or put into operation, it may result in functional failures, electrical hazards, or mechanical risks.

- ▷ Before each commissioning, inspect the product, accessories, and all supply lines for visible damage, loose parts, or missing components.
- ▷ Immediately take any defective product out of operation immediately.

5.1 General installation instructions



WARNING

Danger due to system pressure

Even at low system pressures (from 2-3 bar), there is a risk of injury due to uncontrolled escaping pressure medium.

The following also applies for operating pressures > 10 bar:

- ▷ Use elastomer sealing rings with metal backing.
- ▷ Use a high-pressure safety device.

	Flow obstacle	Inlet section (L1)	Outlet section (L2)
1	Low curvature (bend < 90°)	12 x DN	5 x DN
2	Reduction (pipe narrows towards the measuring section)	15 x DN	5 x DN
3	Expansion (pipe expands towards the measuring section)	15 x DN	5 x DN
4	90° bend / T-piece	15 x DN	5 x DN
5	2 x bend (90°) 1-dimensional change of direction	20 x DN	5 x DN
6	2 x bends (90°) 3-dimensional change of direction	35 x DN	5 x DN
7	Shut-off valve	45 x DN	5 x DN

Table 2: Required minimum lengths

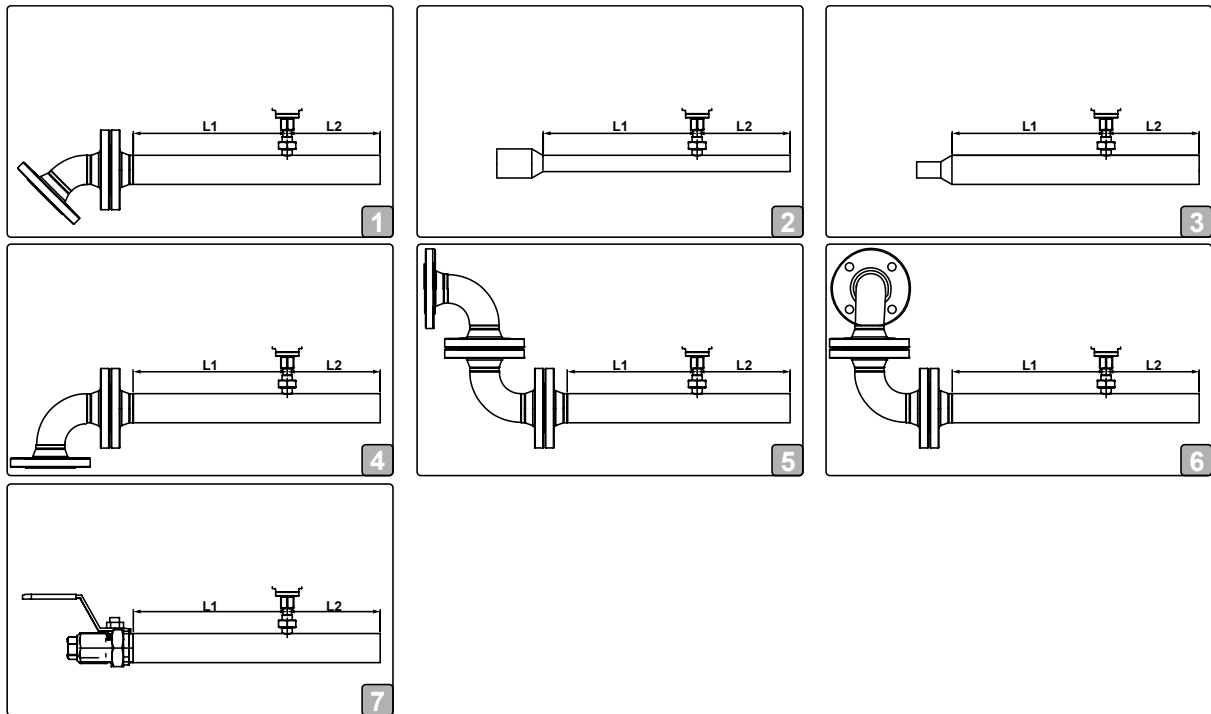


Figure 3: Flow obstacles in front of the measuring section (example)

5.2 Set up measuring point

Setting up the measuring point

The sensor is installed via a ball valve. For the specific design of the mounting thread, see chapter "11.1 Technical data".

- ▷ Select a suitable installation location for the measuring point.
- ▷ Set up the measuring point correctly.
 - ⓘ Contact customer service if the system cannot be depressurized to set up the measuring point.
 - ⓘ Use stainless steel piping for the connection.
- ▷ Check the installation for leaks and a secure fit.



NOTE

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

- Weld-on socket with ball valve
- Tapping clamp with ball valve (Further information on this can be found in the "Installation instructions - Tapping clamp").

5.3 Assemble product

Installing the sensor

Materials

- Supplied O-ring
- ▷ Close the ball valve.
- ▷ Check that the retaining ring attached to the sensor head is undamaged and correctly fitted.
- ▷ Slide the connecting nut completely over the sensors.
 - ⓘ Take care not to damage the retaining ring or the sensors.
- ▷ Provide the mounting thread with suitable sealing material that matches the flow medium.
- ▷ Screw the sensor (SW 32) pressure-tight into the ball valve.
- ▷ Tighten the connection nut.
 - ⓘ Tightening torque: 25-30 Nm
 - ⓘ **Caution:** The sensor shaft is not yet fixed.

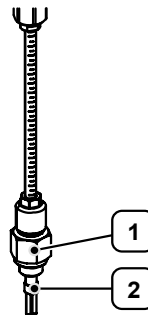


Figure 4: Installing the sensor (example)

- 1 Connection nut 2 Circlip

Aligning the sensor

Before fixing the sensor, the insertion depth and the angular position must be set correctly.

Tools

- Positioning key
- ▷ Push the sensor shaft in towards the center of the pipe.
- ▷ Set the sensor probes to the center of the pipe.
 - ⓘ **Insertion depth = X + Y**
(X= 0.5*OD; Y= length of ball valve; OD= outside diameter)
- ▷ To ensure correct measured values, align the sensor with a **maximum** angular deviation of **±2°**.
 - ⓘ Reference point = tip of positioning key
 - ⓘ Measurement inaccuracies are to be expected if the alignment is imprecise.
- ▷ Observe the direction of flow indicated on the product (direction arrow flow direction).
 - ⓘ Depending on the product variant, the direction arrow is attached as a sticker on the measuring section, on the housing or on the sensor shaft.
- ▷ Tighten the clamping sleeve (SW 17).
 - ⓘ Tightening torque: 25-30 Nm
 - ⓘ The alignment of the sensor must not be changed when tightening. If the alignment does change, check the setting depth and alignment again and correct them if necessary.

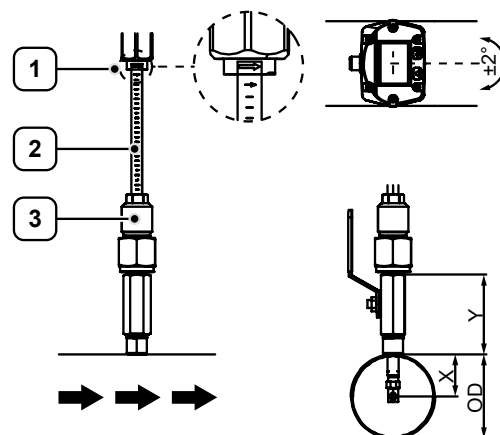


Figure 5: Aligning the sensor (example)

- 1 Direction arrow flow direction 3 Clamping sleeve
2 Depth scale

5.4 Complete the installation work

Aligning the sensor housing

The housing cover can be rotated by 180°, e.g. when the flow direction is reversed.

- ▷ Loosen the screws.
- ▷ Rotate the housing cover by 180°.
- ▷ Refit the screws.
- ▷ Ensure that the seals are seated correctly to avoid leaks and malfunctions.
 - ❗ If necessary, the display can be rotated using the software. Further information can be found in chapter "7.1 Set up basic settings".

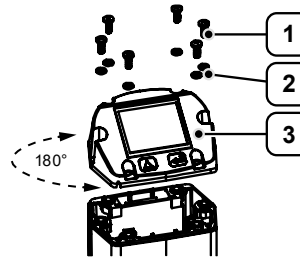


Figure 6: Rotating the housing cover (example)

- | | |
|--------------|-----------------|
| 1 Screw (6x) | 3 Housing cover |
| 2 Seal (6x) | |



CAUTION

Incorrect assembly

Interrupted plug connections or leaks can lead to malfunctions.
Incorrect installation can invalidate the operating license.

- ▷ Ensure that all connecting cables are plugged in and the seal is fitted correctly.

Check installation

- ▷ After installation, check the pressure-tight installation of the sensor.
- ▷ Ensure that the pipework is clean after installation.

5.5 Connect product



DANGER

Danger to life due to electrical voltage

During installation, maintenance, or in the event of a malfunction, conductive parts that can be touched may carry dangerous voltages. Contact with live parts can result in serious injury or death.

- ▷ Perform work on electrical connections only when the power supply is turned off.
- ▷ Secure the product against accidental restarting.
- ▷ Work on electrical systems or equipment may only be performed by qualified electricians or by trained personnel under the direction and supervision of a qualified electrician.
- ▷ Check all electrical connections before commissioning and regularly during operation.



NOTICE

Wiring - general notes

- ▷ Keep stripping lengths as short as possible.
- ▷ Close unused cable entries with end caps.
- ▷ Use shielded connection cables.
- ▷ Use cables with a cross-section $\geq 0,25 \text{ mm}^2$.
- ▷ Tightening torque for cap nut (cable gland): 9 Nm



NOTICE

Permissible loads and voltages

The permissible loads and voltages must be observed when connecting. Failure to do so may result in damage to the connection or malfunctions.

- ▷ Observe the permissible loads and voltages when connecting.
- ▷ Further information can be found in chapter "11.1 Technical data".

Produkt elektrisch anschließen



CAUTION

Gefahr durch unbeabsichtigte elektrische Verbindung

Nicht verwendete Anschlüsse (Not Connected (NC)) dürfen nicht mit Potenzial oder Erde verbunden werden.

- ▷ Schneiden Sie nicht benötigte Leitungen ab und isolieren Sie sie sicher.



CAUTION

Kommunikationsstörungen oder Ausfall der Datenübertragung

Wird das Produkt am Ende eines Modbus-Systems eingesetzt, ist eine Abschlussterminierung erforderlich.

- ▷ Aktivieren Sie die Abschlussterminierung mittels DIP-Schalter.

Abschlussterminierung setzen

Prerequisite

- Das Produkt ist spannungsfrei geschaltet.
- Das Produkt ist gegen Wiedereinschalten gesichert.

- ▷ Demontieren Sie den Gehäusedeckel.
- ▷ Setzen Sie den internen DIP-Schalter auf "ON".
- ▷ Montieren Sie den Gehäusedeckel.
- ▷ Achten Sie auf den korrekten Sitz der Dichtungen, um Undichtigkeiten und Funktionsstörungen zu vermeiden.

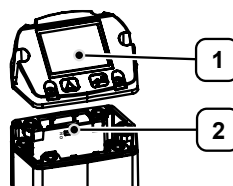


Figure 7: Abschlussterminierung setzen (Beispiel)

1 Gehäusedeckel

2 DIP-Schalter

Elektrischer Anschluss

Alle für den Betrieb erforderlichen Anschlüsse befinden sich auf der Rückseite des Gehäuses.

- ▷ Schließen Sie alle erforderlichen elektrischen Verbindungen am Produkt an.
 - ❗ Sofern keine Anschluss- oder Impulsleitung bestellt wurde, wird der Sensor mit M12-Anschlusssteckern geliefert.
- ▷ Beachten Sie die länderspezifischen Vorschriften zur elektrischen Sicherheit.

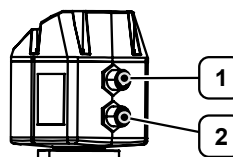


Figure 8: Produkt elektrisch anschließen (Beispiel)

1 Anschlussstecker A

2 Anschlussstecker B

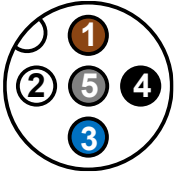
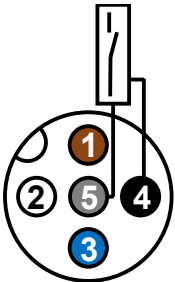
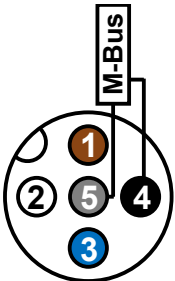
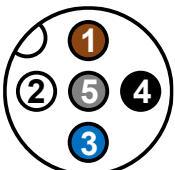
Bezeichnung	Belegung	Aderfarbe	Stecker
A Spannungsversorgung	Pin 1 (VB+ (positive Spannungsversorgung))	braun	
	Pin 2 (Modbus (A))	weiß	
	Pin 3 (VB- (negative Spannungsversorgung GND))	blau	
	Pin 4 (Modbus (B))	schwarz	
	Pin 5 (I+ (Analogausgang))	grau	
B Richtung / Impuls	Pin 1 (Not Connected)	braun	
	Pin 2 (GND)	weiß	
	Pin 3 (Richtungseingang)	blau	
	Pin 4 (Impuls / Alarm)	schwarz	
	Pin 5 (Impuls / Alarm)	grau	
B M-Bus (optional)	Pin 1 (Not Connected)	braun	
	Pin 2 (GND)	weiß	
	Pin 3 (Richtungseingang)	blau	
	Pin 4 (M-Bus)	schwarz	
	Pin 5 (M-Bus)	grau	
B IO-Link (optional)	Pin 1 (VB+ (positive Spannungsversorgung))	braun	
	Pin 2 (Not Connected)	weiß	
	Pin 3 (VB- (negative Spannungsversorgung GND))	blau	
	Pin 4 (C / Q)	schwarz	
	Pin 5 (Not Connected)	grau	

Table 3: Steckerbelegung

Modbus TCP Ethernet (optional)

- Connection cable: Cat 6

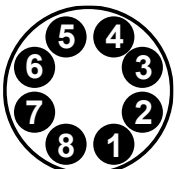
Designation	Plug type	Assignment	Plug
Modbus TCP Ethernet Power over Ethernet (PoE)	M12 (x-coded)	Pin 1-2 (data line)	
		Pins 3-4 (data line)	
		Pins 5-6 (PoE cable)	
		Pins 7-8 (PoE cable)	

Table 4: Pin assignment

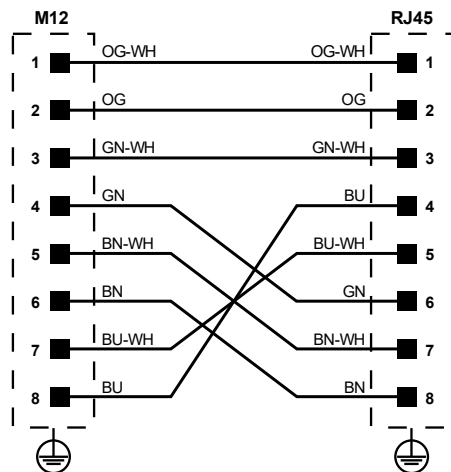


Figure 9: Wiring diagram Modbus TCP Ethernet (T568B wiring standard)

5.6 Initial commissioning

Produkt in Betrieb nehmen

- ▷ Connect the product to the power supply.
 - ✓ Nach dem Anlegen der Spannungsversorgung führt das Produkt eine Initialisierung durch.



NOTE

Um die geforderte Messgenauigkeit sicherzustellen, ist zu Beginn jeder Messung eine Nullpunktanpassung erforderlich.

Further information can be found in chapter "8.1.1 Carry out zero point adjustment".

5.7 Switching on and off

Switching on

- ▷ Connect the product to the power supply.
 - ✓ After connecting the power supply, the product performs a device initialization that takes about 3 seconds.
 - ⓘ The main view appears automatically after the device initialization is complete and serves as the starting point for all further operating procedures.

Switching off

- ▷ Disconnect the product from the power supply.
 - ✓ The device switches itself off.

6 Operation

6.1 Control elements

The user interface is operated using the two capacitive buttons.

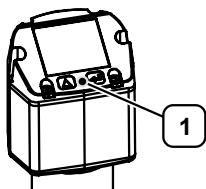


Figure 10: Control elements (example)

1 Capacitive buttons

Select menu items

- ▷ Select menu items with the Δ button.
- ▷ Confirm your selection with the $\checkmark$ ("OK") button.

Selecting digit positions

- ▷ Select a desired digit position with the Δ button .
- ▷ Activate the digit position with the $\checkmark$ button .
 - ⓘ Press the Δ button to increase the value at the active position by 1.
 - ⓘ Press the $\checkmark$ button to confirm the value at the active position.



NOTE

For devices without an integrated screen, the user interface is operated exclusively via the service software.

Further information on this can be found in the "Operating instructions - Service software".

6.2 User interface

The following user interface is displayed each time the product is started.

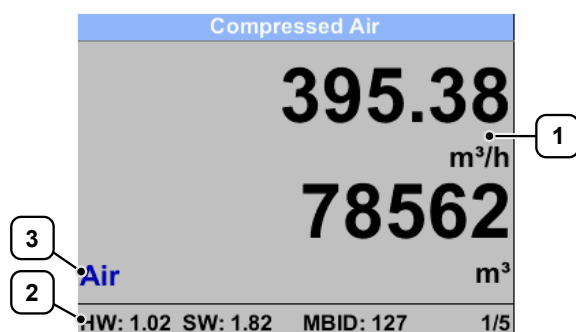


Figure 11: User interface | Main view (example)

1 Measured value

2 Status line

3 Gas type / status message

Status bar

Various information is displayed in the status bar:

- Hardware version
- Software version
- Modbus ID

7 Configuration

Open main menu

The main menu is the starting point for all central functions of the product.



NOTE

The main menu is password-protected.

Further information can be found in chapter "[7.1 Set up basic settings](#)".

- ▷ Tap the **OK** button.
- ▷ Enter the password.
 - ! Password on delivery: **0000**
 - ✓ The main menu opens.

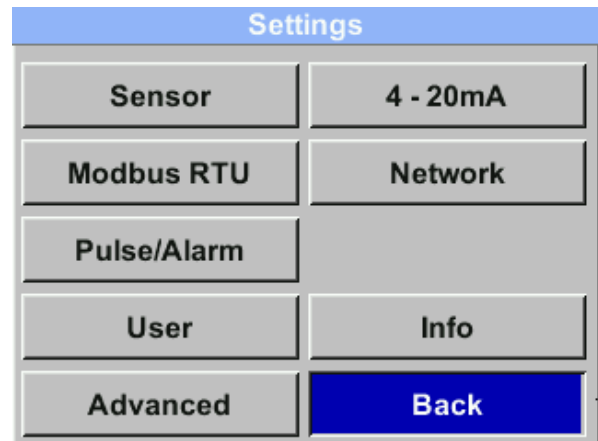


Figure 12: Open main menu (example)

7.1 Set up basic settings

Open user settings

- ▷ Select the **User** button.

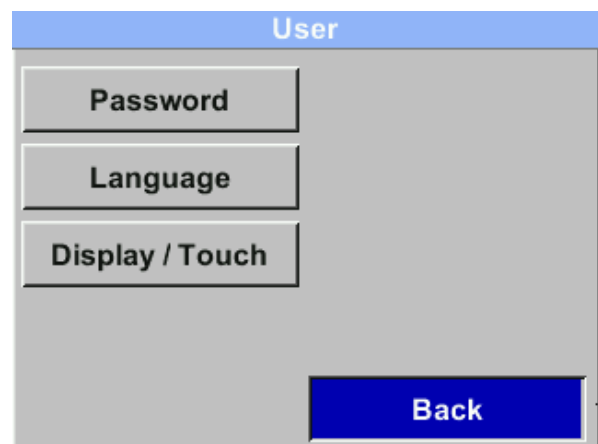


Figure 13: Open user settings (example)

Activate access protection

The main menu can be password-protected against unauthorized access.

- ▷ Select the Password button.
- ▷ Enter the desired password.
 - ❗ The password must be a four-digit numeric code.
 - ❗ Password on delivery: **0000**
- ▷ Repeat the entry for confirmation.
- ▷ Make a note of the password in a safe place.
 - ❗ **If lost:** Contact customer service to reset the password.



Figure 14: Entering a new password (example)

Set language

German, English, Spanish and French are currently available as language settings.

- ▷ Select the Language button.
- ▷ Select the desired settings.

Set display

A reduced screen brightness value and a short screen switch-off time help to minimize energy consumption.



NOTICE

Burn-in of the display

High, continuous display brightness can cause the display to burn in, among other things. Dimming the display helps to reduce this risk.

- ▷ Select the Display / Touch button.
 - ❗ If the Rotate screen function is activated, the display is rotated by 180°.
 - ❗ If the Key lock function is activated, operation is only possible after restarting and calling up the main menu within 10 seconds.
- ▷ Select the desired settings.

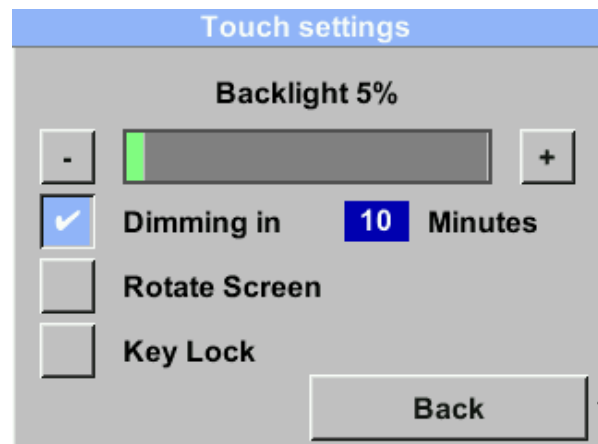


Figure 15: Setting the display (example)

7.2 Adjust configuration settings



CAUTION

Danger due to incorrect calibration

Improper adjustment of the parameters can lead to considerable deviations in the measured values.

- ▷ Parameters may only be adjusted by qualified specialists with expert knowledge of the system and the monitored gases.

Configuration

Open sensor settings

- ▷ Select the **Sensor** button.
 - ✓ The menu for configuring the sensor settings opens.

Figure 16: Set sensor parameters (example)

Adjusting the inner pipe diameter

The internal pipe diameter must be entered for correct measurement.

- ▷ Select the **Diameter** button.
- ▷ Select the desired settings.

Figure 17: Adjust inner pipe diameter (example)

Parameters	Factory setting
Pipe inner diameter	53.1 mm

Table 5: Factory settings Inner tube diameter

Adjust consumption meter reading

The consumption meter reading can be adjusted and reset to zero manually if required.

- ▷ Select the **Consumption** button.
- ▷ Select the desired setting.
- ▷ Select the button with the currently displayed unit (e.g. m³) to set the desired unit.
 - ✓ The text on the button adapts to the selected unit.
- ▷ Select the **CLR** button to manually reset the consumption counter to zero.

Figure 18: Adjust consumption meter reading (example)

**NOTE**

When the maximum value (1.000.000.000 [units]) is reached, the meter reading is automatically reset to zero.

Customize units

The system of units and measured variables can be adapted to country-specific specifications or individual requirements.

- ▷ Select the **Units** button.
- ▷ Select the desired settings.
 - ✓ The display units are adopted according to the selection and displayed correctly in all relevant areas.

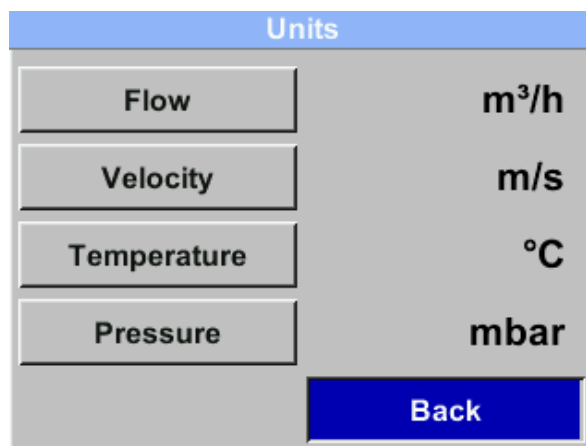


Figure 19: Customize units (example)

Adjusting reference conditions

To calculate the volume and consumption values correctly, the desired reference conditions for pressure and temperature must be defined.

- ▷ Select the **Advanced** > **Reference standard** command.
- ▷ Select the desired settings.
 - ⓘ Alternatively, 0 °C and 1013 hPa (= standard cubic meters) can be set as reference conditions.
 - ⓘ Operating pressure or operating temperature must **not be** entered as reference conditions.
- ▷ Select the **Default** button to restore the factory settings.

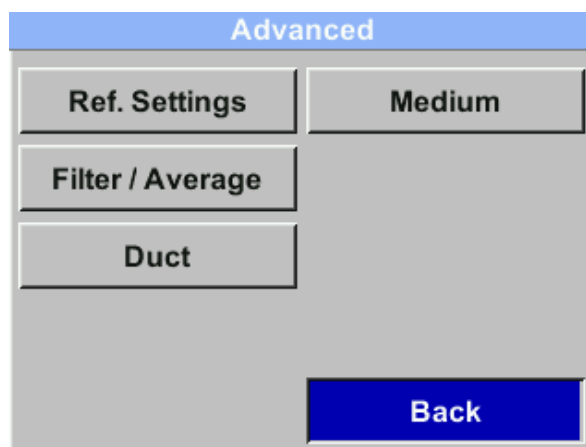


Figure 20: Adjusting reference conditions (example)

**NOTE**

In the Filter/Average menu item, both the attenuation of the measurement signal and the averaging period can be set.

It may be necessary to adjust the filter type for certain measurement applications:

- Normal: for general measurements
- Fast: for applications with very rapid changes in measured values
- Slow: for measurements after the compressor (pulsating flow)

7.3 Set interface parameters

Setting Modbus parameters (RTU)

For communication via the RS485 interface (Modbus RTU), the communication parameters must be adjusted before commissioning.

- ▷ Select the **Modbus RTU** button.
- ▷ Select the desired settings.
- ▷ Select the **Default** button to restore the factory settings.

Figure 21: Setting Modbus parameters (example)

Parameters	Factory setting
ID	1
Baud rate	19200
Stop bit	1
Parity	even
Data format	ABCD (Big Endian)

Table 6: Modbus factory settings

Set Modbus TCP parameters (optional)

Prerequisite

- Optional Modbus TCP interface available

The optional Modbus TCP interface enables communication via the Modbus TCP protocol. The Modbus device address (unit identifier) can be selected in the range 1-247.

- ▷ Select the **Network** button.
- ▷ Select the **IP address** button to establish a connection to a computer.
 - ❗ DHCP activated: automatic integration into existing network without the need for manual configuration.
 - ❗ DHCP deactivated: manual integration into existing network (assignment of a static IP address).
- ▷ Select the desired settings.
- ▷ Select the **Modbus TCP** button to set the Modbus TCP parameters.
- ▷ Select the desired settings.
- ▷ Select the **Default** button to restore the factory settings.

Figure 22: Setting Modbus TCP parameters (example)

Function code	Description
03	Read holding register
16	Write multiple registers

Table 7: Supported Modbus function codes

Parameters	Factory setting
ID	1
port	502
Data format	ABCD (Big Endian)
Timeout	10 s

Table 8: Factory settings Modbus TCP

Set M-Bus parameters (optional)

Prerequisite

- Optional M-Bus interface available

The optional M-Bus interface enables communication with consumption meters and control systems via the M-Bus protocol. The M-Bus address can be selected in the range 1-250. Both the primary address and the secondary address (ID) can be searched for automatically in the M-Bus system.



NOTICE

Value Information Field (VIF)

The product supports the following VIF encodings:

- **Primary VIF** (factory setting): Encoding is performed in accordance with the M-Bus specification. The unit and multiplier are stored separately in standardized codes. The values and units are permanently configured and cannot be changed.
For further information, see "Table 10: Factory settings for transmitted values".
- **Plain Text VIF**: Measured values, units, and scaling (if applicable) are transmitted together as an ASCII character string. The values can be configured at the factory or on site using the service software.

- Select the **M-Bus** button.
- Select the **Address** button to set the primary M-Bus address.
 - ⓘ The secondary M-Bus address (ID) is fixed and cannot be changed.
- Select the desired settings.
- Select the **Baud rate** button to set the baud rate.
 - ⓘ The baud rate can be selected with the values 2400, 4800 or 9600.
- Select the desired settings.
- Select the desired VIF encoding.
 - ⓘ Primary VIF: **Units as string** deactivated (factory setting).
 - ⓘ Plain Text VIF: Activate the **Units as** string option.

Figure 23: Setting M-Bus parameters (example)

Parameters	Factory setting
Primary M-Bus address	1
Baud rate	2400
ID	Serial number
Medium	Depending on application (gas or compressed air)
Manufacturer identification	CSI
VIF coding	Primary VIF

Table 9: Factory settings Communication parameters

Value	Designation	Unit
1	Consumption	m

Configuration

Value	Designation	Unit
2	Flow rate	m³/h
3	Gas temperature	°C
4 ¹	System pressure	bar

Table 10: Factory settings for transmitted values

Set IO-Link parameters (optional)

Prerequisite

- Optional IO-Link interface available

The IO-Link option enables digital communication between the device and the control system. Device parameters can be read out, set and diagnostic information transmitted.

Required for configuration:

- IO-Link-capable master port
- Suitable IODD file (IO Device Description)



NOTICE

IODD file

The device-specific IODD file can be accessed via the IODD Finder of the IO-Link Community.

Basics for the configuration:

- Standard sensor cable, 3-wire, max. 20 m (according to specification)
- Supported mode: SDCI
- Connection to IO-Link master port required
- Integration via IODD file
- Parameterization and diagnostics possible via IO-Link engineering tools or control system

Designation	Value
Transmission type	COM 2 (38.4 kBaud)
Specification	V1.1
SDCI standard	IEC 61131-9 CDV
Profile	Identification and Diagnosis (0x4000)
SIO mode	No
Required master port class	A
Process data analog	4
Process data binary	---
Minimum process cycle time	20.4 ms

Table 11: Interface parameters (IO-Link)

¹ Only available in conjunction with "Pressure" option.

7.4 Set output parameters

Configuring an electrically isolated output

The galvanically isolated output can be defined as a pulse or alarm output.

- ▷ Select the Pulse/Alarm > Relay function command to set the output type.
- ▷ Select the desired settings.

Figure 24: Configure galvanically isolated output (example)

Parameter	Description
Unit	Defines unit
Value	Defines alarm value or pulse value ¹
Hysteresis	Defines desired hysteresis - Exceeding: Alarm when value is exceeded - Fall below: Alarm when value falls below
Polarity	Defines the switching status - positive = 0 --> 1 (output: open --> closed) - negative = 1 --> 0 (output: closed --> open)

Table 12: Parameters for output configuration

Pulse output

A maximum of 50 pulses per second can be output. The pulses are output with a delay of 1 second.

Pulse value	m³/h	m³/min	l/min
0.1 l/pulse	18	0,3	300
1 l/pulse	180	3	3000
0.1 m³/pulse	18 000	300	300 000
1 m³/pulse	180 000	3 000	3 000 000

Table 13: Maximum flow rates for pulse output



NOTE

Inputs of pulse values that do not allow a display for the upper range value are not permitted. In this case, the input is rejected and an error message is displayed.

¹ The lowest pulse value is based on maximum consumption and 50 Hz pulse frequency.

Configuration

Configuring the analog output

The measuring range of the analog output (4-20 mA) can be freely configured.

- ▷ Select the 4 - 20 mA button.
- ▷ Select the Channel 1 button to configure the measured value and scaling.
 - ❗ A measured value (temperature, speed, or flow) can be assigned to each channel.
 - ❗ Scaling can be performed automatically (Auto Scaling = on) or manually (Auto Scaling = off). With automatic scaling, this is calculated based on the pipe diameter, the maximum valid measuring range of the product, and the reference conditions.
- ▷ Select the desired settings.
- ▷ Select the Error Current button to specify which value is output at the analog output in the event of an error.
- ▷ Select the desired settings.

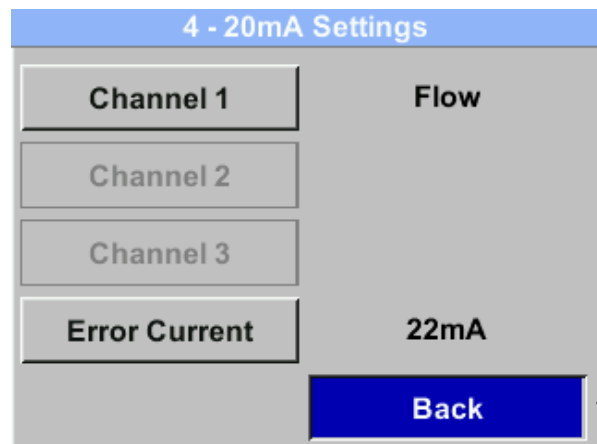


Figure 25: Configuring the analog output (example)

Setting	Meaning
2 mA	Sensor error / System error
22 mA	Sensor error / system error
None	Output according to NAMUR (3.8 mA - 20.5 mA) • < 4 mA - 3.8 mA = measurement range undershoot • > 20 mA - 20.5 mA = measurement range exceeded

Table 14: Output values for error current

Output	Factory setting
Channel 1	0... Maximum flow rate [m³/h] (For maximum flow rate, see chapter "11.1 Technical data")
Channel 2 ¹	-20...+100 °C

Table 15: Factory settings for analog output

¹ Only available in conjunction with the "analog output board" option.

8 Consumption measurement

8.1 Adjust measurement parameters



CAUTION

Danger due to incorrect calibration

Improper adjustment of the parameters can lead to considerable deviations in the measured values.

- ▷ Parameters may only be adjusted by qualified specialists with expert knowledge of the system and the monitored gases.

Open sensor settings

- ▷ Select the **Sensor** button.
 - ✓ The menu for configuring the sensor settings opens.

Sensor	
Diameter	100.5 mm
Total Counter	0.00 m ³
ZP Adjust	----
Units	Pressure
Advanced	Back

Figure 26: Set sensor parameters (example)

8.1.1 Carry out zero point adjustment

Preparing the zero point adjustment

A zero point adjustment only provides reliable measurement results under stable conditions. It must be carried out with the system pressure applied and without flow.

- ▷ Make sure that there is no flow in the pipe.
 - ⓘ To do this, apply system pressure to the product.
- ▷ Then start the zero point adjustment via the user interface on the sensor.

Perform zero point adjustment



NOTE

If the sensor displays a flow value greater than 0 m³/h without flow, the zero point of the characteristic curve can be set at this point.

- ▷ Select the command **Zero point > Zero point**.
- ▷ Follow the steps displayed to adjust the zero point.
 - ✓ After successful zero point adjustment, the differential pressure value DeltaPressure is displayed on the user interface with **0.00 hPa**.
 - ⓘ The sensor can be reset to the factory setting using the Reset button.

Zero Point Setup	
Δ Pressure	0 hpa
ZeroPnt	cal. 0 days ago
CutOff	----- m ³ /h
Reset	Back

Figure 27: Performing zero point adjustment (example)

8.1.2 Adjust creep suppression

Adjusting creeping flow suppression

Creeping flow suppression ensures that flow values below the defined "low flow cut-off" value are displayed as 0 m³/h and are not included in the consumption meter. In this way, very low flow values that can no longer be reliably measured are suppressed.

- ▷ Select the command **Zero point** > **Creeping** quantities.
- ▷ Select the desired setting.

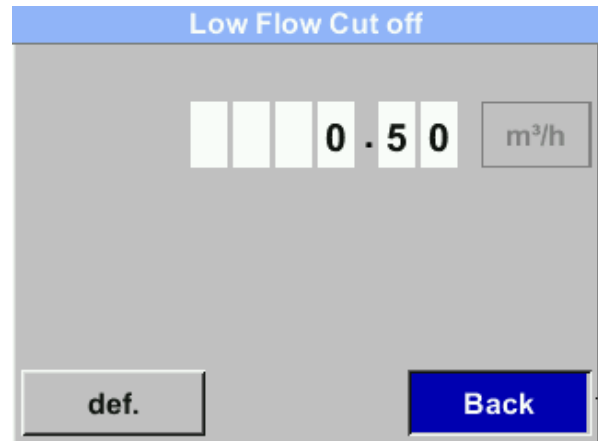


Figure 28: Adjust creeping flow suppression (example)

8.2 Perform the measurement

Query measurement data

Several views are available on the home screen to display the measured values.

- ▷ Select the  button to switch to the next view.

Average Min. Max.			
Flow: m³/h	AV	Min	Max
395.38			0
207.45			870.87
Total Counter: m³			
78562			
82.7			
AV-Time:	1440 Minutes		3/5

Figure 29: Average value view (example)

9 Maintenance and servicing



CAUTION

Safety instructions

- ▷ The product may only be serviced by a qualified electrician.
- ▷ Work on the electrical equipment of the product may only be carried out by qualified electricians or by instructed persons under the direction and supervision of a qualified electrician in accordance with the electrotechnical regulations.
- ▷ Spare parts must comply with the technical requirements specified by the manufacturer (Senseca). This is always guaranteed with original spare parts.



NOTICE

Measurement errors caused by contaminants in the measurement medium

Contaminants can lead to malfunctions or disruptions.

- ▷ The plant operator must ensure that the measuring medium meets the required purity standards and that appropriate cleaning and maintenance intervals are observed.
- ▷ The manufacturer (Senseca) accepts no warranty or liability for incorrect use.



NOTE

Unless expressly described otherwise, only begin maintenance and servicing work after

- the product has been disconnected from the power supply,
- the product has been switched off and secured against being switched on again.

9.1 Clean product

Cleaning the housing

If the housing is dirty, clean it with solvent-free cleaning agents.

- ▷ Use a slightly damp, lint-free cloth to clean the housing regularly.
- ▷ Check the product for damage and corrosion.

Cleaning the screen

If the screen is dirty, clean it with solvent-free cleaning agents.

- ▷ Use a slightly damp, lint-free cloth to clean the screen regularly.

Cleaning the sensor

Prerequisite

- The product is de-energized and freely accessible.
- The system is depressurized.

Contamination on the sensors can lead to measurement deviations.

Depending on the ambient conditions, deposits can form at different rates.

The user is responsible for determining suitable maintenance intervals.

- ▷ Close the ball valve.
- ▷ Loosen the connection nut.
- ▷ Remove the sensor from the measuring section.
- ▷ Clean the sensor by swirling it in water, a non-aggressive cleaning agent or isopropanol or in an ultrasonic bath.
- ▷ Dry the sensor with compressed air.
- ▷ Screw the sensor (SW 32) pressure-tight into the measuring section.
- ▷ Observe the direction of flow indicated on the product (flow direction arrow).
 - ❗ Depending on the product variant, the direction arrow is attached as a sticker on the measuring section, on the housing or on the sensor shaft.
- ▷ Check the installation for leaks and a secure fit.
- ▷ Tighten the connection nut.
 - ❗ Tightening torque: 25-30 Nm
- ▷ Align the sensor.
 - ❗ Further information can be found in chapter "→ 5.3 Assemble product".

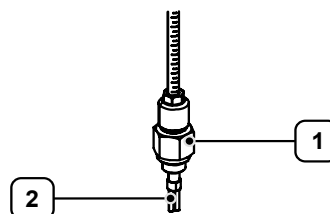


Figure 30: Cleaning the sensor (example)

1 Connection groove 2 Measuring sensor

9.2 Check cables



DANGER

Danger to life due to electrical voltage

During installation, maintenance, or in the event of a malfunction, conductive parts that can be touched may carry dangerous voltages. Contact with live parts can result in serious injury or death.

- ▷ Perform work on electrical connections only when the power supply is turned off.
- ▷ Secure the product against accidental restarting.
- ▷ Work on electrical systems or equipment may only be performed by qualified electricians or by trained personnel under the direction and supervision of a qualified electrician.
- ▷ Check all electrical connections before commissioning and regularly during operation.



CAUTION

Danger from commissioning a damaged product

If a damaged product is installed or put into operation, it may result in functional failures, electrical hazards, or mechanical risks.

- ▷ Before each commissioning, inspect the product, accessories, and all supply lines for visible damage, loose parts, or missing components.
- ▷ Immediately take any defective product out of operation immediately.

Check cables

Prerequisite

- The product is de-energized and freely accessible.

The electrical cables of the product must be checked regularly by a qualified person.

The user is responsible for determining suitable maintenance intervals.

▷ Check the electrical cables for damage.

9.3 Check mechanical components and connections

Check mechanical components and connections

The mechanical and electrical connections of the system must be checked for tightness, integrity and leak tightness.

The operator is responsible for determining suitable intervals.

Prerequisite

- The product is de-energized and freely accessible.
- ▷ Check all connections and joints for tightness and visible leaks.
- ▷ Carefully tighten any loose connections.
- ▷ Check for wear, cracks or leaks.
- ▷ Check the clamping points of the electrical installation for firm contact and freedom from corrosion.
- ▷ Carry out a leak test of the entire system.

9.4 Perform calibration

Observe calibration intervals

The operator is responsible for determining suitable intervals.

Increased maintenance or calibration may be necessary, particularly under the following conditions:

- Extreme ambient temperatures (especially low temperatures)
- Contact with humidity or condensed compressed air outside the intended use
- Mechanical stress, e.g., due to impact or overload
- Interventions for maintenance or repair purposes

▷ Observe the specifications of the quality management system (QM manual).

- ❗ The calibration interval must be defined dynamically - preferably using a procedure anchored in the QM system. Without corresponding specifications, the determination is risk-based and based on economic considerations.

Frequent recalibration: higher operating costs

Rare recalibration: risk of invalid measurement results

▷ Always have the product calibrated after special operating conditions.

Have a factory calibration performed

▷ Send the product to the manufacturer (Senseca).

- ❗ An identical replacement product should be kept in stock for use in critical systems.

▷ Select the **Info** button to display the calibration conditions.

Calibration Conditions	
Ref. Pres	1000.00mbar
Ref. Temp	0.00°C
Diameter	0.00mm
Pressure	6000.00mbar
Temperature	0.00°C
Executing	Standard
Back 3/3	

Figure 31: Display calibration conditions (example)

9.5 Update software

9.5.1 Download software package

- ▷ Visit the manufacturer's homepage at (Senseca).
- ▷ Download the appropriate software package.
 - ❗ The current hardware and software versions along with the serial number are displayed under the **About** tab.
- ▷ Save the software package in the desired target directory or on the desired USB storage device.

9.5.2 Establish connection

- ▷ Connect the service/diagnostic interface (RS485) of the product to your computer.
 - ❗ Further information can be found in chapter " 5.5 Connect product".



NOTICE

Avoiding inconsistent data

The product is locked during an active connection with the computer. This prevents changes to the product and protects against inconsistent or incomplete data transfers.

- ▷ Do not disconnect manually during data transfer.

9.5.3 Performing a software update

The software update is carried out via the service software.

- ▷ If necessary, contact customer service.

9.6 Error states

9.6.1 Correct error states

Correcting error states

Warnings continue to allow measurement without affecting the measured value. Measurement is not possible in the event of errors.

- ▷ Contact customer service if necessary.

Message	Description	Remedy
Low voltage	Supply voltage < 18 V. Sensor cannot measure properly. No measured values are available for flow rate, consumption and speed.	▷ Check the supply voltage. ▷ Ensure that it is within the range of 18... 36 V DC.
Internal error	Internal read error, e.g. on the EEPROM or AD converter.	▷ Restart the sensor. ▷ If the error persists, contact customer service.
Temp out of range	Media temperatures outside the specified temperature range. Media temperatures outside the specified temperature range result in measured values outside the sensor limits.	▷ Check the media temperature. ▷ Ensure that it is within the specified temperature range.
Low voltage 4-20 mA	Supply voltage < 17.5 V. A minimum supply voltage of 17.5 V is required for sensors with galvanically isolated 4-20 mA output.	▷ Check the wiring of the 4-20 mA output.
Not calibrated	Error message is issued if an incorrect gas is selected in the sensor settings. The sensor is calibrated for the specific application.	▷ Check the gas selection in the settings. ▷ Select the gas calibrated for the sensor.
Pressure Error	Error message if the signal is faulty or the internal pressure sensor is defective.	▷ Check the function of the sensor. ▷ If the error persists, contact customer service.
Heater error	Error message if the signal is faulty or the internal heater sensor is defective.	▷ Check the function of the sensor. ▷ If the error persists, contact customer service.

Message	Description	Remedy
Next cal. elapsed	Period for next calibration exceeded.	▷ Carry out a calibration of the sensor.

Table 16: Error and status messages

9.6.2 Restore factory settings

Restoring the factory settings

If necessary, the product can be reset to the factory settings to restore the delivery status.

- ▷ Select the **Advanced** > **Factory reset** command.

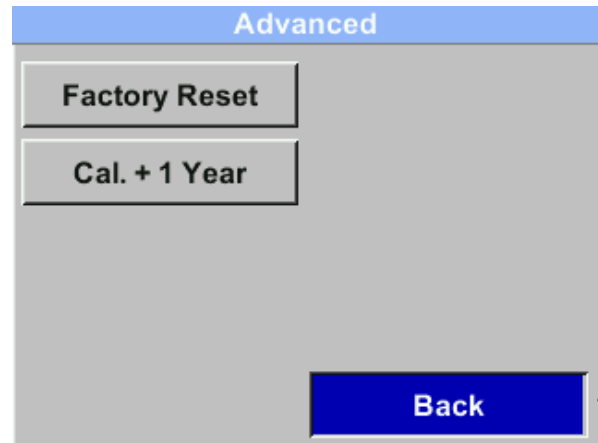


Figure 32: Restore factory settings (example)

9.7 Customer service

For rapid processing by customer service

Prerequisite

- Material number (product rating plate)
 - Serial number (product rating plate)
- ▷ Describe the problem as precisely as possible.
- ▷ Make a note of any error messages displayed.
- ▷ Inform customer service about:
- When does the problem occur?
 - How often does it occur?
 - What changes were last made to the product, the configuration, or the environment?

10 Decommissioning and disposal

Decommissioning

Decommissioning is defined as an extended period of non-use of the components. The components must then be protected from external influences.

- ▷ If necessary, disconnect the components from the power supply.
- ▷ Properly package the components if they will not be used for an extended period.
- ▷ Store the components in a manner that prevents exposure to significant temperature fluctuations. Resulting condensation can lead to moisture buildup and cause corrosion.

Disposal

Parts and components that have reached the end of their service life, e.g. due to wear, corrosion and mechanical stress, must be properly disposed of after disassembly, in accordance with national regulations.

The product and packaging contain recyclable materials that must not be disposed of with residual waste.

- ▷ Separate the components after recycling.
 - ❗ Disposal code according to the European Waste Catalog (EWC) 16 02 14, electrical and electronic devices and their components.
- ▷ Dispose of the components in an environmentally responsible manner, in accordance with local regulations or through a certified disposal company.



NOTE

Information on environmentally responsible disposal can be obtained from local authorities, or certified disposal companies.

- ▷ Alternatively, you can return the product to the manufacturer (Senseca) at the end of its service life.

11 Appendix

11.1 Technical data

Parameters	Specification	Unit
Weight	~ 3.0	kg
Power supply	18... 36 V SELV 5 W Optional: PoE according to IEEE 802.3af, Class 2 (3.84...6.49 W)	V DC
Fuse	T2.5L, 2.5 A / 125 V, slow-blow (Device protection through integrated fuse against overcurrent)	
Power consumption	Max. 5	W
Electrical connection	Via connection plug	
Measuring range	Depending on version: • Low speed model: max. 50 • Standard version: max. 92.7 • Max Speed version: max. 185 • High Speed version: max. 224 [Flow velocity (compressed air ¹)]	m/s
Measuring principle	Thermal mass flow sensor	
Response time	(t ₉₀): < 3 s	
Measurement accuracy	±1.5% of measured value, ±0.3% of final value	
Repeatability	0.25% of measured value (when installed correctly)	
Accuracy specifications	Based on: • Ambient temperature: 22 °C ±2 °C • System pressure: 6 bar	
Measured variables	• Flow • Total consumption • Pressure • Temperature • Speed	
Operating pressure	-1...+50	bar
Mounting thread	Depending on model: • G ½" • NPT ½" • PT ½"	
Screen	Optional: • TFT color display • Size: 1.8 • Resolution: 320 x 240 pixels	
Digital output	• RS485 (Modbus-RTU), according to EIA/TIA-485 standard • Modbus TCP Ethernet (optional) • M-Bus (optional) • IO-Link (optional)	
Analog output	1 x 4...20 mA active (not galvanically isolated), R _L < 500 Ω	
Pulse output	Galvanically isolated; potential-free switching contact; max. 48 V DC, 150 mA; max. 50 Hz	
Alarm output	Galvanically isolated; max. 48 V DC, 150 mA; NC (normally closed)	
Area of application	Indoor	
Degree of contamination	2	

¹ based on ISO 1217 at 1000 mbar and 20 °C

Appendix

Parameters	Specification	Unit
Ambient temperature	-20...+70	°C
Storage temperature	-40...+80	°C
Humidity	Max. 90% relative humidity, non-condensing	
Altitude rating	Up to 4000 m above sea level (Use above 2000 m only with appropriately approved power supply)	
Protection class	IP65	

Table 17: Technical data | Flowgas TMS 300

Parameters	Specification	Unit
Measuring medium	- Compressed air (at least ISO 8573-1 (particle-moisture-oil) class 5-6-4) - Technical gases	
Materials in contact with media	Stainless steel 1.4404	
Media temperature	-30...+110	°C
Media humidity	max. 95% relative humidity, non-condensing	

Table 18: Technical data | Measuring medium

11.2 Dimensions

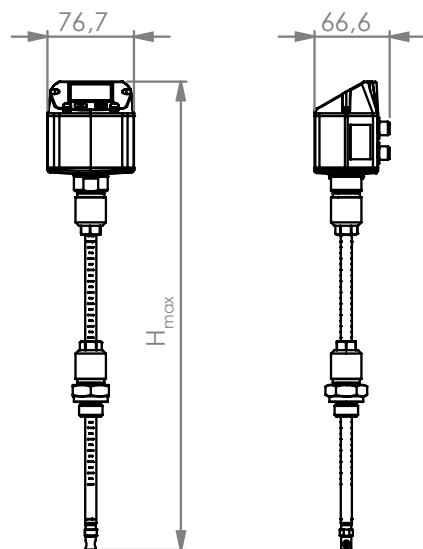


Figure 33: Dimensions

Shaft length	H _{max}	Unit
120	316.0	mm
160	356.0	mm
220	416.0	mm
300	496.0	mm
400	596.0	mm
500	696.0	mm
600	796.0	mm
700	896.0	mm

Table 19: Maximum height (H_{max}) depending on shaft length

11.3 Measuring ranges

Measuring tube (inner diameter)		Volume flow $v_{\max} = 50 \text{ m/s}$							
[inch]	[mm]	Com-pressed air* ¹	Com-pressed air** ²	Ar**	CO ₂ **	N ₂ **	O ₂ **	N ₂ O**	Natural gas (NG)**
1/4"	6,0	2,5	2,3	4,0	2,5	2,3	2,4	2,5	1,5
	10,0	8,1	7,4	12,6	8,0	7,4	7,7	7,9	4,8
	15,0	21,0	19,3	32,8	20,8	19,3	20,0	20,6	12,4
1/2"	16,1	24,6	22,6	38,4	24,3	22,6	23,4	24,1	14,6
3/4"	21,7	48,1	44,2	75,1	47,6	44,2	45,8	47,1	28,4
1"	25,0	65,9	60,6	103,1	65,2	60,6	62,8	64,6	39,0
	26,0	71,7	65,9	112,1	70,9	65,9	68,3	70,3	42,4
	27,3	79,7	73,2	124,5	78,8	73,2	75,9	78,1	47,1
	28,5	87,4	80,4	136,6	86,5	80,4	83,3	85,7	51,7
	30,0	97,6	89,7	152,6	96,6	89,7	93,0	95,7	57,7
1 1/4"	32,8	118,0	108,5	184,5	116,8	108,5	112,5	115,8	69,8
	36,0	143,6	132,1	224,6	142,1	132,1	136,9	140,9	85,0
	36,3	146,2	134,5	228,6	144,7	134,5	139,4	143,4	86,5
1 1/2"	39,3	172,9	159,0	270,4	171,1	159,0	164,9	169,6	102,3
	40,0	179,4	164,9	280,4	177,5	164,9	171,0	175,9	106,1
	41,9	196,9	181,0	307,8	194,8	181,0	187,7	193,1	116,5
	43,1	210,1	193,2	328,5	207,9	193,2	200,3	206,1	124,3
	45,8	238,4	219,3	372,8	235,9	219,3	227,3	233,8	141,1
	50,0	286,3	263,3	447,6	283,3	263,3	272,9	280,8	169,4
2"	51,2	300,6	276,4	469,9	297,4	276,4	286,5	294,8	177,9
	53,1	323,7	297,6	506,1	320,3	297,6	308,6	317,5	191,5
	54,5	341,4	313,9	533,8	337,8	313,9	325,5	334,8	202,0
	57,5	382,3	351,6	597,8	378,4	351,6	364,5	375,0	226,3
	60,0	417,3	383,8	652,5	413,0	383,8	397,9	409,3	247,0
	64,2	479,5	441,0	749,8	474,6	441,0	457,2	470,3	283,8
	65,0	492,2	452,6	769,5	487,1	452,6	469,2	482,7	291,2
2 1/2"	70,3	577,8	531,3	903,4	571,8	531,3	550,9	566,7	341,9
	71,1	591,0	543,5	924,1	584,9	543,5	563,5	579,7	349,7
	76,1	678,7	624,1	1061,2	671,7	624,1	647,1	665,7	401,6
	80,0	751,9	691,4	1175,5	744,1	691,4	716,8	737,4	444,9
3"	82,5	799,6	735,3	1250,2	791,3	735,3	762,3	784,2	473,2
	84,9	846,8	778,7	1324,0	838,0	778,7	807,3	830,5	501,1
	90,0	952,7	876,1	1489,6	942,8	876,1	908,3	934,4	563,8
	100,0	1177,6	1082,9	1841,2	1165,4	1082,9	1122,7	1155,0	696,9
4"	107,1	1352,4	1243,7	2114,5	1338,4	1243,7	1289,4	1326,4	800,3
	110,0	1426,6	1311,9	2230,5	1411,8	1311,9	1360,2	1399,2	844,2
	125,0	1844,5	1696,1	2883,8	1825,3	1696,1	1758,5	1809,0	1091,5
5"	133,7	2110,1	1940,5	3299,2	2088,2	1940,5	2011,8	2069,6	1248,7
6"	150,0	2659,2	2445,4	4157,6	2631,6	2445,4	2535,3	2608,1	1573,6

¹ * Reference conditions: according to ISO 1217 (20 °C, 1000 mbar)

² ** Reference conditions: according to ISO 2533 (0 °C, 1013.25 mbar)

Appendix

Measuring tube (inner diameter)		Volume flow $v_{\max} = 50 \text{ m/s}$							
[inch]	[mm]	Com-pressed air ^{*1}	Com-pressed air ^{**2}	Ar ^{**}	CO ₂ ^{**}	N ₂ ^{**}	O ₂ ^{**}	N ₂ O ^{**}	Natural gas (NG) ^{**}
	159,3	2999,2	2758,0	4689,2	2968,0	2758,0	2859,4	2941,6	1774,8
	182,5	3941,1	3624,2	6161,8	3900,1	3624,2	3757,4	3865,4	2332,1
	190,0	4271,6	3928,2	6678,7	4227,3	3928,2	4072,6	4189,6	2527,8
8"	200,0	4738,8	4357,7	7409,0	4689,5	4357,7	4517,9	4647,7	2804,2
	206,5	5051,8	4645,6	7898,4	4999,3	4645,6	4816,4	4954,8	2989,4
10"	250,0	7413,2	6817,1	11590,4	7336,1	6817,1	7067,7	7270,8	4386,8
	260,4	8052,4	7404,9	12589,8	7968,7	7404,9	7677,1	7897,7	4765,0
12"	300,0	10687,7	9828,3	16710,1	10576,6	9828,3	10189,6	10482,4	6324,5
	309,7	11390,0	10474,2	17808,1	11271,6	10474,2	10859,2	11171,2	6740,1
	339,6	13695,5	12594,2	21412,7	13553,1	12594,2	13057,2	13432,4	8104,4
	400,0	19000,4	17472,6	29706,8	18802,9	17472,6	18114,9	18635,4	11243,6
	500,0	29688,1	27300,9	46416,9	29379,5	27300,9	28304,5	29117,7	17568,1
	600,0	42750,8	39313,3	66840,4	42306,5	39313,3	40758,4	41929,6	25298,0
	700,0	58188,6	53509,8	90977,1	57583,9	53509,8	55476,8	57070,8	34433,4
	800,0	76001,4	69890,3	118827,3	75211,6	69890,3	72459,4	74541,4	44974,3
	900,0	96189,3	88454,9	150390,8	95189,7	88454,9	91706,5	94341,5	56920,6
	1000,0	118752,2	109203,6	185667,6	117518,1	109203,6	113217,9	116471,0	70272,3

Table 20: Upper range values | version Low Speed; [Nm³/h]

Measuring tube (inner diameter)		Volume flow $v_{\max} = 92,7 \text{ m/s}$							
[inch]	[mm]	Com-pressed air ^{*3}	Com-pressed air ^{**4}	Ar ^{**}	CO ₂ ^{**}	N ₂ ^{**}	O ₂ ^{**}	N ₂ O ^{**}	Natural gas (NG) ^{**}
1/4"	6,0	4,7	4,3	7,4	4,7	4,3	4,5	4,6	2,8
	10,0	14,9	13,7	23,4	14,8	13,7	14,2	14,7	8,8
	15,0	38,9	35,8	60,9	38,5	35,8	37,1	38,2	23,0
1/2"	16,1	45,6	41,9	71,3	45,1	41,9	43,4	44,7	27,0
3/4"	21,7	89,1	81,9	139,3	88,2	81,9	84,9	87,4	52,7
1"	25,0	122,2	112,4	191,1	120,9	112,4	116,4	119,9	72,3
	26,0	132,9	122,2	207,8	131,5	122,2	126,5	130,3	78,6
	27,3	147,7	135,8	230,9	146,1	135,8	140,6	144,8	87,4
	28,5	162,0	149,0	253,3	160,3	149,0	154,3	158,9	95,9
	30,0	180,9	166,4	282,9	179,0	166,4	172,3	177,5	107,1
1 1/4"	32,8	218,8	201,2	342,1	216,5	201,2	208,4	214,6	129,5
	36,0	266,3	244,9	416,4	263,5	244,9	253,6	261,2	157,6
	36,3	271,1	249,3	423,9	268,3	249,3	258,2	265,9	160,4
1 1/2"	39,3	320,6	294,8	501,3	317,3	294,8	305,3	314,5	189,7
	40,0	332,6	305,8	519,9	329,1	305,8	316,7	326,2	196,8
	41,9	365,0	335,6	570,6	361,2	335,6	347,6	358,0	216,0
	43,1	389,5	358,2	609,0	385,4	358,2	382,0	382,0	230,5

³ * Reference conditions: according to ISO 1217 (20 °C, 1000 mbar)

⁴ ** Reference conditions: according to ISO 2533 (0 °C, 1013.25 mbar)

Measuring tube (inner diameter)		Volume flow $v_{\max} = 92,7 \text{ m/s}$							
[inch]	[mm]	Com-pressed air**1	Com-pressed aircom-pressed air**2	Ar**	CO ₂ **	N ₂ **	O ₂ **	N ₂ O**	Natural gas (NG)**
2"	45,8	442,0	406,5	691,1	437,4	406,5	421,0	261,6	261,6
	50,0	530,8	488,1	829,8	525,2	488,1	505,5	520,6	314,1
	51,2	557,2	512,4	871,2	551,4	512,4	530,7	546,5	329,7
	53,1	600,1	551,8	938,2	593,8	551,8	571,5	588,6	355,1
	54,5	632,9	582,0	989,5	626,3	582,0	602,7	620,8	374,5
	57,5	708,9	651,9	1108,3	701,5	651,9	675,8	695,2	419,5
2 1/2"	60,0	773,7	711,5	1209,7	765,6	711,5	736,8	758,9	457,9
	64,2	889,1	817,6	1390,0	879,8	817,6	846,7	872,0	526,1
	65,0	912,5	839,1	1426,6	902,9	839,1	869,0	895,0	540,0
	70,3	1071,2	985,1	1674,8	1060,0	985,1	1020,2	1050,7	633,9
	71,1	1095,8	1007,7	1713,1	1084,3	1007,7	1043,5	1074,7	648,4
	76,1	1258,3	1157,2	1967,3	1245,2	1157,2	1198,3	1234,2	744,6
3"	80,0	1394,0	1281,9	2179,4	1379,4	1281,9	1327,5	1367,2	824,9
	82,5	1482,5	1363,3	2317,7	1466,9	1363,3	1411,8	1454,0	877,2
	84,9	1570,0	1443,7	2454,5	1553,5	1443,7	1495,1	1539,8	929,0
	90,0	1766,4	1624,3	2761,6	1747,9	1624,3	1682,1	1732,4	1045,3
4"	100,0	2183,3	2007,8	3413,5	2160,5	2007,8	2079,2	2141,4	1292,0
	107,1	2507,4	2305,7	3920,1	2481,1	2305,7	2387,8	2459,2	1483,7
	110,0	2645,0	2432,3	4135,3	2617,3	2432,3	2518,9	2594,2	1565,2
5"	125,0	3419,6	3144,7	5346,3	3383,8	3144,7	3256,6	3353,9	2023,6
	133,7	3912,2	3597,6	6116,5	3871,3	3597,6	3725,7	3837,0	2315,1
6"	150,0	4930,2	4533,7	7708,0	4878,6	4533,7	4695,1	4835,4	2917,4
	159,3	5560,5	5113,3	8693,4	5502,3	5113,3	5295,3	5453,6	3290,4
	182,5	7306,7	6719,2	11423,6	7230,3	6719,2	6958,3	7166,4	4323,8
	190,0	7919,6	7282,8	12381,8	7836,8	7282,8	7542,0	7767,5	4686,5
8"	200,0	8785,7	8079,2	13735,8	8693,8	8079,2	8366,8	8616,9	5199,0
	206,5	9366,0	8612,9	14643,2	9268,0	8612,9	8919,4	9186,1	5542,4
10"	250,0	13744,0	12638,9	21487,8	13600,2	12638,9	13088,7	13480,0	8133,1
	260,4	14929,1	13728,7	23340,6	14772,9	13728,7	14217,2	14642,3	8834,4
12"	300,0	19815,0	18221,7	30979,4	19607,7	18221,7	18870,1	19434,3	11725,6
	309,7	21117,1	19419,1	33015,1	20896,1	19419,1	20110,1	20711,4	12496,1
	339,6	25391,4	23349,7	39697,7	25125,7	23349,7	24180,6	24903,6	15025,5
	400,0	35226,7	32394,1	55074,4	34858,0	32394,1	33546,9	34549,9	20845,6
	500,0	55041,6	50615,8	86053,8	54465,7	50615,8	52417,0	53984,3	32571,2
	600,0	79260,0	72886,8	123917,4	78430,6	72886,8	75480,5	77737,4	46902,5
	700,0	107881,6	99207,0	168665,4	106752,8	99207,0	102737,4	105809,2	63839,5
	800,0	140906,6	129576,5	220297,7	139432,2	129576,5	134187,6	138199,7	83382,2
	900,0	178334,9	163995,2	278814,3	176468,9	163995,2	169831,2	174909,1	105530,6
	1000,0	220166,6	202463,2	344215,1	217862,8	202463,2	209668,2	215937,1	130284,7

Table 21: Upper range values | version Standard; [Nm³/h]

Appendix

Measuring tube (inner diameter)		Volume flow $v_{\max} = 185,0 \text{ m/s}$							
[inch]	[mm]	Com-pressed air ^{*1}	Com-pressed aircom-pressed air ^{**2}	Ar ^{**}	CO ₂ ^{**}	N ₂ ^{**}	O ₂ ^{**}	N ₂ O ^{**}	Natural gas (NG) ^{**}
1/4"	6,0	9,4	8,7	14,7	9,3	8,7	9,0	9,2	5,6
	10,0	29,8	27,4	46,6	29,5	27,4	28,4	29,2	17,6
	15,0	77,7	71,4	121,4	76,9	71,4	74,1	76,2	46,0
1/2"	16,1	91,0	83,7	142,2	90,0	83,7	86,7	89,2	53,8
3/4"	21,7	177,8	163,5	278,0	176,0	163,5	169,5	174,4	105,2
1"	25,0	243,9	224,3	381,3	241,3	224,3	232,5	239,2	144,3
	26,0	265,2	243,9	414,6	262,4	243,9	252,8	260,1	156,9
	27,3	294,7	271,0	460,8	291,7	271,0	281,0	289,1	174,4
	28,5	323,3	297,3	505,5	320,0	297,3	308,3	317,1	191,3
	30,0	361,1	332,0	564,5	357,3	332,0	344,3	354,1	213,7
1 1/4"	32,8	436,7	401,6	682,8	432,2	401,6	416,3	428,3	258,4
	36,0	531,5	488,7	831,0	526,0	488,7	506,7	521,3	314,5
	36,3	541,1	497,6	845,9	535,4	497,6	515,8	530,7	320,2
1 1/2"	39,3	639,8	588,4	1000,4	633,2	588,4	610,0	627,6	378,6
	40,0	663,7	610,3	1037,7	656,8	610,3	632,7	650,9	392,7
	41,9	728,4	669,8	1138,9	720,8	669,8	694,5	714,4	431,0
	43,1	777,3	714,8	1215,4	769,3	714,8	741,1	762,4	460,0
	45,8	882,2	811,2	1379,3	873,0	811,2	841,1	865,2	522,0
2"	50,0	1059,2	974,1	1656,1	1048,2	974,1	1009,9	1038,9	626,8
	51,2	1112,1	1022,6	1738,7	1100,5	1022,6	1060,2	1090,7	658,1
	53,1	1197,6	1101,3	1872,4	1185,1	1101,3	1141,8	1174,6	708,7
	54,5	1263,1	1161,6	1974,9	1250,0	1161,6	1204,3	1238,9	747,5
	57,5	1414,7	1300,9	2211,8	1400,0	1300,9	1348,7	1387,5	837,1
	60,0	1544,1	1420,0	2414,2	1528,1	1420,0	1472,2	1514,5	913,7
	64,2	1774,3	1631,7	2774,1	1755,9	1631,7	1691,6	1740,2	1050,0
2 1/2"	65,0	1821,0	1674,6	2847,2	1802,1	1674,6	1736,2	1786,1	1077,6
	70,3	2137,9	1966,0	3342,5	2115,6	1966,0	2038,2	2096,8	1265,1
	71,1	2186,8	2011,0	3419,0	2164,1	2011,0	2084,9	2144,8	1294,0
	76,1	2511,2	2309,3	3926,3	2485,1	2309,3	2394,2	2463,0	1486,0
	80,0	2781,9	2558,2	4349,5	2753,0	2558,2	2652,3	2728,5	1646,2
3"	82,5	2958,5	2720,6	4625,6	2927,8	2720,6	2820,6	2901,7	1750,7
	84,9	3133,1	2881,2	4898,6	3100,6	2881,2	2987,1	3073,0	1854,1
	90,0	3525,1	3241,7	5511,5	3488,5	3241,7	3360,8	3457,4	2086,0
	100,0	4357,2	4006,9	6812,5	4311,9	4006,9	4154,1	4273,5	2578,4
4"	107,1	5003,9	4601,5	7823,5	4951,9	4601,5	4770,7	4907,8	2961,1
	110,0	5278,6	4854,1	8253,0	5223,7	4854,1	5032,6	5177,2	3123,6
	125,0	6824,5	6275,7	10670,0	6753,6	6275,7	6506,4	6693,4	4038,4
5"	133,7	7807,5	7179,7	12207,0	7726,4	7179,7	7443,7	7657,5	4620,1
	150,0	9839,0	9047,9	15383,2	9736,8	9047,9	9380,5	9650,0	5822,3

¹ * Reference conditions: according to ISO 1217 (20 °C, 1000 mbar)

² ** Reference conditions: according to ISO 2533 (0 °C, 1013.25 mbar)

Measuring tube (inner diameter)		Volume flow $v_{\max} = 185,0$ m/s							
[inch]	[mm]	Com-pressed air ^{*1}	Com-pressed aircom-pressed air ^{**2}	Ar ^{**}	CO ₂ ^{**}	N ₂ ^{**}	O ₂ ^{**}	N ₂ O ^{**}	Natural gas (NG) ^{**}
	159,3	11096,9	10204,6	17349,9	10981,6	10204,6	10579,7	10883,7	6566,7
	182,5	14581,9	13409,4	22798,7	14430,4	13409,4	13902,4	14301,8	8628,9
	190,0	15805,1	14534,2	24711,1	15640,8	14534,2	15068,5	15501,5	9352,7
8"	200,0	17533,5	16123,6	27413,4	17351,3	16123,6	16716,3	17196,7	10375,5
	206,5	18691,7	17188,7	29224,2	18497,4	17188,7	17820,6	18332,6	11060,9
10"	250,0	27428,8	25223,2	42884,5	27143,7	25223,2	26150,4	26901,8	16231,1
	260,4	29793,8	27398,1	46582,2	29484,2	27398,1	28405,2	29221,4	17630,6
12"	300,0	39544,5	36364,7	61827,4	39133,6	36364,7	37701,5	38784,8	23400,7
	309,7	42143,0	38754,3	65890,2	41705,1	38754,3	40179,0	41333,5	24938,4
	339,6	50673,3	46598,7	79227,1	50146,7	46598,7	48311,6	49699,8	29986,2
	400,0	70301,3	64648,4	109915,3	69570,8	64648,4	67024,9	68950,8	41601,2
	500,0	109845,8	101013,2	171742,6	108704,3	101013,2	104726,4	107735,6	65001,8
	600,0	158177,9	145459,0	247309,4	156534,3	145459,0	150806,1	155139,3	93602,6
	700,0	215297,7	197985,8	336615,6	213060,5	197985,8	205263,8	211161,8	127403,5
	800,0	281205,2	258593,7	439661,2	278283,1	258593,7	268099,7	275803,2	166404,6
	900,0	355900,4	327282,7	556446,2	352202,1	327282,7	339313,7	349063,4	210605,9
	1000,0	439383,1	404052,7	686970,6	434817,4	404052,7	418905,8	430942,5	260007,2

Table 22: Upper range values | version Max Speed; [Nm³/h]

Measuring tube (inner diameter)		Volume flow $v_{\max} = 224,0$ m/s							
[inch]	[mm]	Com-pressed air ^{*3}	Com-pressed aircom-pressed air ^{**4}	Ar ^{**}	CO ₂ ^{**}	N ₂ ^{**}	O ₂ ^{**}	N ₂ O ^{**}	Natural gas (NG) ^{**}
1/4"	6,0	11,4	10,5	17,8	11,3	10,5	10,9	11,2	6,7
	10,0	36,1	33,2	56,4	35,7	33,2	34,4	35,4	21,4
	15,0	94,1	86,5	147,0	93,1	86,5	89,7	92,2	55,7
1/2"	16,1	110,2	101,3	172,2	109,0	101,3	105,0	108,0	65,2
3/4"	21,7	215,3	198,0	336,7	213,1	198,0	205,3	211,2	127,4
1"	25,0	295,3	271,6	461,7	292,2	271,6	281,5	289,6	174,7
	26,0	321,1	295,3	502,0	317,8	295,3	306,1	314,9	190,0
	27,3	356,9	328,2	557,9	353,1	328,2	340,2	350,0	211,2
	28,5	391,5	360,0	612,1	387,4	360,0	373,2	384,0	231,7
	30,0	437,2	402,0	683,6	432,7	402,0	416,8	428,8	258,7
1 1/4"	32,8	528,7	486,2	826,7	523,3	486,2	504,1	518,6	312,9
	36,0	643,5	591,8	1006,1	636,8	591,8	613,5	631,2	380,8
	36,3	655,1	602,4	1024,3	648,3	602,4	624,6	642,5	387,7
1 1/2"	39,3	774,7	712,4	1211,3	766,7	712,4	738,6	759,8	458,5
	40,0	803,6	739,0	1256,4	795,2	739,0	766,1	788,2	475,5
	41,9	882,0	811,0	1378,9	872,8	811,0	840,9	865,0	521,9

³ * Reference conditions: according to ISO 1217 (20 °C, 1000 mbar)⁴ ** Reference conditions: according to ISO 2533 (0 °C, 1013.25 mbar)

Appendix

Measuring tube (inner diameter)		Volume flow $v_{\max} = 224,0 \text{ m/s}$							
[inch]	[mm]	Com-pressed air**1	Com-pressed aircom-pressed air**2	Ar**	CO ₂ **	N ₂ **	O ₂ **	N ₂ O**	Natural gas (NG)**
	43,1	941,2	865,5	1471,6	931,4	865,5	897,3	923,1	557,0
	45,8	1068,1	982,2	1670,0	1057,0	982,3	1018,4	1047,6	632,1
2"	50,0	1282,5	1179,4	2005,2	1269,2	1179,4	1222,8	1257,9	758,9
	51,2	1346,5	1238,2	2105,2	1332,5	1238,2	1283,7	1320,6	796,8
	53,1	1450,1	1333,5	2267,1	1435,0	1333,5	1382,5	1422,2	858,1
	54,5	1529,4	1406,4	2391,2	1513,5	1406,4	1458,1	1500,0	905,0
	57,5	1712,9	1575,2	2678,1	1695,1	1575,2	1633,2	1680,0	1013,6
	60,0	1869,6	1719,3	2923,2	1850,2	1719,3	1782,5	1833,7	1106,4
	64,2	2148,4	1975,6	3359,0	2126,1	1975,6	2048,3	2107,1	1271,3
2 1/2"	65,0	2204,9	2027,6	3447,4	2182,0	2027,6	2102,2	2162,6	1304,8
	70,3	2588,6	2380,4	4047,2	2561,7	2380,4	2467,9	2538,8	1531,8
	71,1	2647,8	2434,9	4139,8	2620,3	2434,9	2524,4	2596,9	1566,8
	76,1	3040,6	2796,1	4754,0	3009,0	2796,1	2898,9	2982,2	1799,3
3"	80,0	3368,4	3097,5	5266,4	3333,4	3097,5	3211,4	3303,7	1993,3
	82,5	3582,2	3294,2	5600,7	3545,0	3294,2	3415,2	3513,4	2119,8
	84,9	3793,6	3488,6	5931,3	3754,2	3488,6	3616,8	3720,8	2244,9
	90,0	4268,2	3925,0	6673,3	4223,9	3925,0	4069,3	4186,2	2525,8
4"	100,0	5275,8	4851,5	8248,6	5220,9	4851,6	5029,9	5174,4	3122,0
	107,1	6058,8	5571,6	9472,8	5995,8	5571,6	5776,4	5942,4	3585,3
	110,0	6391,3	5877,4	9992,8	6324,9	5877,4	6093,5	6268,6	3782,1
5"	125,0	8263,2	7598,7	12919,4	8177,3	7598,8	7878,1	8104,4	4889,8
	133,7	9453,4	8693,3	14780,3	9355,2	8693,3	9012,9	9271,8	5594,1
6"	150,0	11913,2	10955,3	18626,2	11789,4	10955,3	11358,0	11684,4	7049,7
	159,3	13436,3	12355,9	21007,4	13296,6	12355,9	12810,1	13178,1	7951,0
	182,5	17656,0	16236,3	27604,9	17472,5	16236,3	16833,1	17316,8	10448,0
	190,0	19137,0	17598,2	29920,4	18938,1	17598,2	18245,1	18769,3	11324,4
8"	200,0	21229,7	19522,7	33192,4	21009,1	19522,7	20240,3	20821,9	12562,8
	206,5	22632,1	20812,3	35385,0	22396,9	20812,3	21577,3	22197,3	13392,6
10"	250,0	33211,0	30540,6	51925,1	32865,9	30540,6	31663,2	32573,0	19652,8
	260,4	36074,6	33173,9	56402,2	35699,7	33174,0	34393,4	35381,6	21347,3
12"	300,0	47880,9	44030,8	74861,2	47383,3	44030,9	45649,4	46961,1	28333,8
	309,7	51027,2	46924,2	79780,5	50497,0	46924,3	48649,1	50047,0	30195,6
	339,6	61355,7	56422,1	95929,0	60718,1	56422,3	58496,2	60177,1	36307,5
	400,0	85121,6	78277,0	133086,6	84237,0	78277,2	81154,5	83486,4	50371,1
	500,0	133002,5	122307,8	207947,8	131620,4	122308,1	126803,9	130447,5	78704,9
	600,0	191523,6	176123,3	299444,9	189533,3	176123,7	182597,6	187844,3	113335,0
	700,0	260684,8	239723,3	407577,7	257975,9	239724,0	248535,6	255677,0	154261,5
	800,0	340486,3	313108,0	532346,4	336948,1	313108,8	324618,0	333945,5	201484,4
	900,0	430928,0	396277,3	673750,9	426450,0	396278,4	410844,6	422649,7	255003,8
	1000,0	532009,9	489231,3	831791,3	526481,5	489232,6	507215,6	521789,8	314819,5

Table 23: Upper range values | version High Speed; [Nm³/h]

**NOTICE****Use with combustible gases**

The product complies with the current state of the art and is generally suitable for use with combustible and non-combustible gases.

When using the product to measure combustible gases (e.g., natural gas), please note that the sensor does not have DVGW approval. However, DVGW approval is not mandatory for this application.

The area outside the pipeline (area surrounding the probe) must not be an Ex zone.

11.4 Register assignment

Register	Address	Number of bytes	Data type	Description	Standard	Access	Unit/ Comment
2001	2000	2	uInt16	Modbus ID	1	Read-Write	Modbus ID 1...247
2002	2001	2	uInt16	Baud rate	4	Read-Write	0 = 1200 1 = 2400 2 = 4800 3 = 9600 4 = 19200 5 = 38400 6 = 57600 7 = 115200
2003	2002	2	uInt16	Parity	1	Read-Write	0 = none 1 = even 2 = odd
2004	2003	2	uInt16	Number of stop bits		Read-Write	0 = 1 stop bit 1 = 2 stop Bit
2005	2004	2	uInt16	Word Order	0xABCD	Read-Write	0xABCD = Big Endian 0xCDAB = Middle Endian
2069	2068	4	float	Pressure Type (Relative / Absolute)		Read-Write	0 = Relative 1 = Absolute

Table 24: Value register | Modbus

Register	Address	Number of bytes	Data type	Description	Standard	Access	Unit/ Comment
1101	1100	4	float	Flow in m³/h		Read-Only	
1109	1108	4	float	Flow in Nm³/h		Read-Only	
1117	1116	4	float	Flow in m³/min		Read-Only	
1125	1124	4	float	Flow in Nm³/min		Read-Only	
1133	1132	4	float	Flow in ltr/h		Read-Only	
1141	1140	4	float	Flow in Nltr/h		Read-Only	
1149	1148	4	float	Flow in ltr/min		Read-Only	
1157	1156	4	float	Flow in Nltr/min		Read-Only	
1165	1164	4	float	Flow in ltr/s		Read-Only	
1173	1172	4	float	Flow in Nltr/s		Read-Only	

Appendix

Register	Address	Number of bytes	Data type	Description	Standard	Access	Unit/ Comment
1181	1180	4	float	Flow in cfm		Read-Only	
1189	1188	4	float	Flow in Ncfm		Read-Only	
1197	1196	4	float	Flow in kg/h		Read-Only	
1205	1204	4	float	Flow in kg/min		Read-Only	
1213	1212	4	float	Flow in kg/s		Read-Only	
1221	1220	4	float	Flow in kW		Read-Only	
1269	1268	4	uint32	Consumption m³ before comma	x	Read-Only	
1275	1274	4	uint32	Consumption in Nm³ before the decimal point	x	Read-Only	
1281	1280	4	uint32	Consumption ltr before comma	x	Read-Only	
1287	1286	4	uint32	Consumption Nltr before comma	x	Read-Only	
1293	1292	4	uint32	Consumption cf before comma	x	Read-Only	
1299	1298	4	uint32	Consumption Ncf before comma	x	Read-Only	
1305	1304	4	uint32	Consumption kg before comma	x	Read-Only	
1311	1310	4	uint32	Consumption kWh before comma	x	Read-Only	
1347	1346	4	float	Velocity m/s			
1355	1354	4	float	Velocity Nm/s			
1363	1362	4	float	Velocity Ft/min			
1371	1370	4	float	Velocity NFt/min			
1419	1418	4	float	GasTemp °C			
1427	1426	4	float	GasTemp °F			

Table 25: Value register | Basis

Register	Address	Number of bytes	Data type	Description	Standard	Access	Unit/ Comment
1475	1474	4	float	System pressure mBar	x	Read-only	Value depending on register "Pressure type" setting
1481	1480	4	float	System pressure Bar		Read-only	
1487	1486	4	float	System pressure PSIr		Read-only	

Register	Address	Number of bytes	Data type	Description	Standard	Access	Unit/ Comment
1057	1056	4	float	Delta P		Read-only	Unit as defined in sensor

Table 26: Value register | "Pressure" option

Senseca Germany GmbH

Lauterbachstr. 57 ½ | 64307 Eggenfelden | GERMANY

Tel. +49 8721 9668 - 0 | info@senseca.com

www.senseca.com