

Simply a question of
better measurement



SCHMIDT® Flow Sensor
SS 20.400
Instructions for Use

SCHMIDT® Flow Sensor SS 20.400

Table of Contents

| | | |
|----|---|----|
| 1 | Important Information | 3 |
| 2 | Application Range | 4 |
| 3 | Mounting Instructions | 5 |
| 4 | Electrical Connection..... | 10 |
| 5 | Signalizing | 15 |
| 6 | Startup | 18 |
| 7 | Information on Continuous Operation | 18 |
| 8 | Service Information..... | 19 |
| 9 | Technical Data..... | 22 |
| 10 | Declarations of Conformity | 23 |

Imprint:

Copyright 2021 **SCHMIDT Technology GmbH**

All rights reserved

Revision: 504301.02G

Errors and technical modifications subject to change

1 Important Information

These instructions for use contain all required information for a fast commissioning and a safe operation of **SCHMIDT® Flow sensors** of the **SS20.400** type.

- These instructions for use must be read completely and observed carefully, before putting the unit into operation.
- Any claims under the manufacturer's liability for damage resulting from non-observance or non-compliance with these instructions will become void.
- Tampering with the device in any way whatsoever - with the exception of the designated use and the operations described in these instructions for use - will forfeit any warranty and exclude any liability.
- The unit is designed exclusively for the use described below (see *chapter 2*). In particular, it is not designed for direct or indirect protection of personal and machinery.
- **SCHMIDT Technology** cannot give any warranty as to its suitability for certain purpose and cannot be held liable for errors contained in these instructions for use or for accidental or sequential damage in connection with the delivery, performance or use of this unit.

Symbols used in this manual

In the following section, all the symbols used in this manual are explained.



Danger warnings and safety instructions - read carefully!

The non-observance of these instructions may lead to personal injury or malfunction of the device.

General information

All dimensions are indicated in mm.

2 Application Range

The **SCHMIDT® Flow sensor SS 20.400** (article number: 518210) is designed for stationary use in clean rooms, air ducts or air shafts under atmospheric pressure conditions and clean environmental conditions.

The sensor measures flow velocity of the measuring medium as standard velocity¹ w_N (unit: m/s) relative to standard pressure of 1,013.25 hPa and standard temperature of 20 °C. The output signal is linear and independent of pressure and temperature of the medium.

Optionally the sensor is able to measure both directions (see *chapter 5*).

The decisive characteristics of the product are listed below:

- Measuring task
 - Measurement of flow velocity
 - Detection of flow direction (bidirectional version)
- Application examples
 - Laminar-flow monitoring in cleanrooms
 - Monitoring of room cross-flow
 - Cooling air monitoring
 - Flow measurement in test benches



Only suitable for use in clean gases.

In particular, the medium to be measured must not contain oils, residue forming substances or abrasive particles.



When transporting the sensor or when carrying out not approved cleaning measures, always place the protective cap on the sensor.



The **SCHMIDT® Flow sensor SS 20.400** is designed for applications inside closed rooms and is not suitable for outdoor use.

¹ Corresponds to the actual velocity under standard conditions.

3 Mounting Instructions

For installation the following accessories are available:

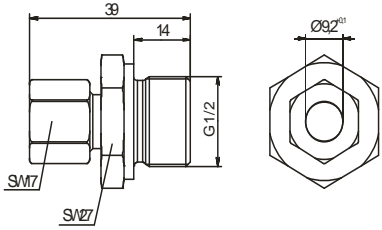
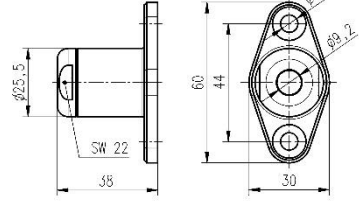
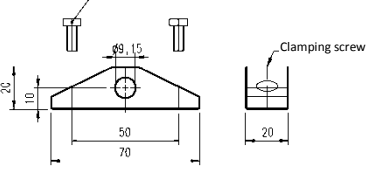
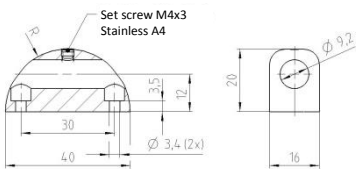
| Type / art. no. | Drawing | Assembly |
|---|--|--|
| Compressing fitting 532160 |  | <ul style="list-style-type: none"> - Immersion sensor - Pipe (typ.) - Wall - Screwing into a clamp² - Material: Stainless steel 1.4571 Clamp collar PTFE |
| Wall mounting flange 520181 |  | <ul style="list-style-type: none"> - Immersion sensor - Wall (plain surface) - Attachment with: 2 screws M5³ - Material: Stainless steel 1.4404 PTFE O-ring Viton |
| Wall mounting bracket (an. Aluminium) 503895 |  | <ul style="list-style-type: none"> - Room-to-room overflow - Wall (plain surface) - Attachment with: 2 screws M5 x 12 - Material: Aluminium, anodised |
| Wall mounting bracket (stainless steel) 551740 |  | <ul style="list-style-type: none"> - Room-to-room overflow - Wall (plain surface) - Attachment with: 2 screws M5 x 12 - Material: Stainless steel 1.4404 |

Table 1

All mounting fixtures fasten the sensor by means of frictional clamping on the sensor tube. This enables stepless positioning of the sensor in the holder both axially in direction of the longitudinal sensor axis (immersion depth) as well as in rotational direction around the same axis (tilting).

- The angle of tilt⁴ to flow direction should not exceed $\pm 5^\circ$ in order to avoid significant measuring errors ($> 1\%$).

² Commercially available welding stud (not included in delivery) must be welded.

³ Countersunk head, not included in the delivery.

⁴ Deviation between measuring direction of sensor head and flow direction.

- In inhomogeneous, laminar flow fields (e.g. a quasi-parabolic speed profile in a tube), the sensor tip should be positioned at the place at which the highest speed occurs (adjustment of the immersion depth see Figure 3-1) since this point has normally the largest distance to interfering elements such as boundary surfaces.

If correctly mounted, both the compression fitting and the wall mounting flange are tight up to a gauge pressure of 500 mbar⁵.



The customer himself must ensure that the sensor is protected against an unintentional pressing out caused by the overpressure.

Tube-related flow

Installation in a flow guiding tube is carried out by means of a compression fitting (532160, see Figure 3-1):

- Screw the threaded part of the compression fitting into the pipe union (hexagon AF 27). Unscrew the spigot nut (AF17) to such an extent that the sensor can be inserted without jamming.
- Introduce sensor into the compression fitting until its tip is located in the middle of the tube. Then tighten the spigot nut slightly using the fork wrench AF17 to fix the sensor.
- Align sensor to nominal flow direction (direction of arrow) considering that immersion depth must be maintained.



The angular deviation should not be greater than $\pm 5^\circ$ referenced to the ideal direction of the gaseous flow. Otherwise measurement accuracy may be affected (deviation > 1 %).

- Tighten spigot nut by turning the fork wrench (AF17) by a quarter while maintaining the sensor in position.

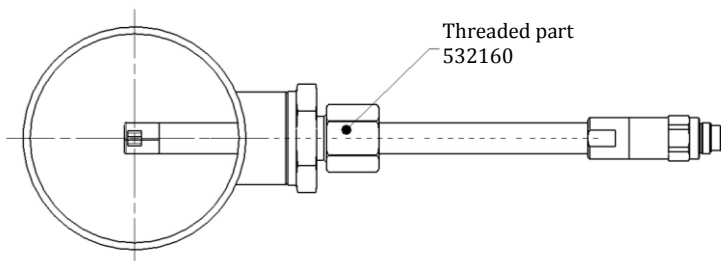


Figure 3-1

⁵ The screw-in thread of the compression fitting must be sealed, e.g. with a teflon tape.

To reach the accuracy specified in its data sheets, the **SS 20.400** has to be positioned in a straight conduit and at a place with undisturbed flow profile. An undisturbed flow profile can be achieved if a sufficiently long distance in front of the sensor (run-in distance) and behind the sensor (run-out distance) is held absolutely straight and without disturbances (such as edges, seams, bends, etc.).



Correct measurements require laminar⁶ flow with as low turbulence as possible.

The design of the run-out distance is also important, since disturbances do not only act **in** direction of the air flow but also lead to turbulences **opposite** to flow direction.

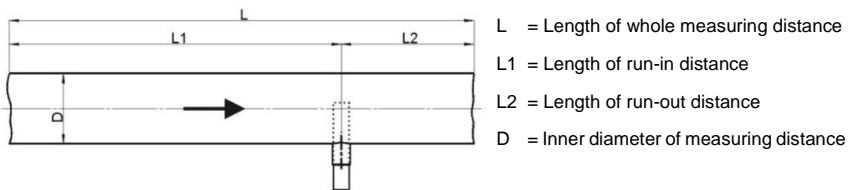


Figure 3-2

The following Table 2 shows the required straight conduit lengths depending on tube diameter and different disturbances.

This table lists the minimum values required in each case. If the listed straight conduit lengths cannot be achieved, measurement accuracy may be impaired or additional actions are required like the use of flow rectifiers⁷.

⁶ Here the term “laminar” means an air flow low in turbulence (not according to its physical definition saying that the Reynolds number is < 2300).

⁷ E. g. honeycombs made of plastics or ceramics; profile factor may change therefore.

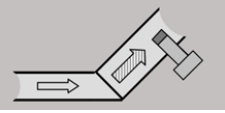
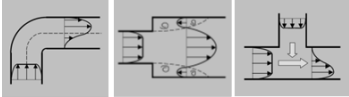
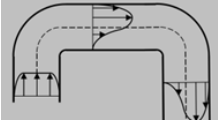
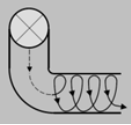
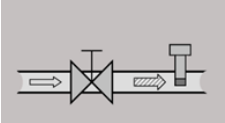
| Flow obstacle upstream of measuring distance | | Minimum distance length of | |
|--|---|----------------------------|--------------|
| | | Run-in (L1) | Run-out (L2) |
| Light bend (< 90°) |  | 10 x D | 5 x D |
| Reduction Expansion 90° bend T-junction |  | 15 x D | 5 x D |
| Two 90° bends in one plane (2-dimensional) |  | 20 x D | 5 x D |
| Two 90° bends with 3-dimensional change in direction |  | 35 x D | 5 x D |
| Shut-off valve |  | 45 x D | 5 x D |

Table 2

When mounting the sensor in a tube with a known cross section area, the output signal of the flow velocity can be used to calculate the standard volumetric flow of the medium:

| | | |
|---------------------------------|-------------|--|
| $A = \frac{\pi}{4} \cdot D^2$ | D | Inner diameter of pipe [m] |
| $\bar{w}_N = PF \cdot w_N$ | A | Cross section area of tube [m ²] |
| $\dot{V}_N = \bar{w}_N \cdot A$ | w_N | Flow velocity in the middle of tube [m/s] |
| | \bar{w}_N | Average flow velocity in tube [m/s] |
| | PF | Profile factor (for tubes with a circular cross section A) |
| | \dot{V}_N | Standard volumetric flow [m ³ /s] |

SCHMIDT Technology provides on its homepage a convenient calculation tool to compute flow velocity or volume flow in pipes (circular or rectangle) for all its sensor types and measuring ranges:

www.schmidt-sensors.com

OR

www.schmidttechnology.de

Wall mounting

The wall mounting flange (520181) is designed for installation of the sensor **SS 20.400** as an immersion sensor through a wall (e.g. wall of a flow box). The threaded bush included in the delivery has a base provided with a plane contact surface and two holes which allow a fast and easy installation by means of two screws.

All advantages, requirements and installation instructions regarding the stepless sensor installation are applicable for the compression fitting (see subchapter: *Tube-related flow*).

Mounting for measuring room-to-room overflow

A room-to-room overflow sensor is fixed by means of a wall mounting bracket (503895 made of anodized aluminium or 551740 made of stainless steel). The sensor should be placed in flow direction behind the wall opening, whereas the sensor tip must be located in the middle of the opening (see Figure 3-3 for exemplary use of 503895).

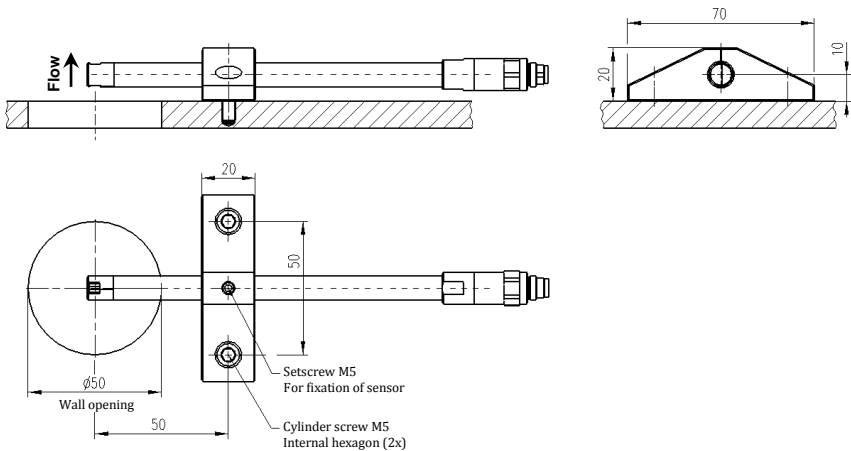


Figure 3-3



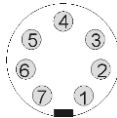
The application of a **SS 20.400** with bidirectional measurement capability allows the detection of backflow and is therefore able to signalize critical operating conditions.

4 Electrical Connection

Plug-in connector

The **Flow Sensor SS 20.400** is equipped with a plug-in connector which is firmly integrated in the housing. The connector has the following data:

Number of connection pins: 7 (plus shield connection on the metallic housing)
Type: Male
Fixation of connecting cable: Screw M9 (on cable)
Protection type: IP67 (with properly attached cable)
Model: Binder, series 712
Pin numbering:



View on connector of sensor

Figure 4-1

The pin assignment of the plug-in connector can be found in Table 3.

| Pin | Designation | Function | Wire colour |
|-----|-------------|--|-----------------|
| 1 | Power | Operating voltage : +U _B | White |
| 2 | TXD | Do not connect ⁸ | Brown |
| 3 | RXD | Do not connect ⁸ | Green |
| 4 | OC1 | Switching output 1: Direction or threshold | Yellow |
| 5 | OC2 | Switching output 2: Threshold | Grey |
| 6 | Analogue | Velocity signal w _N | Pink |
| 7 | GND | Operating voltage : Mass | Blue |
| | Shield | Electromechanical shielding | Shield meshwork |

Table 3

All signals use GND as electric reference potential.

The wire colours mentioned in Table 3 are applicable for the use of a **SCHMIDT®** cable (article no.: 505911-4, 535279 and 535281).

⁸ Usable with the obsolete Programming Interface (505960).

Electrical assembly



During electrical installation ensure that no voltage is applied and inadvertent activation is not possible.

The cable shield is electrically connected to the metallic housings of the plug-in connector and the sensor which are coupled to GND (VDR⁹, in parallel with 100 nF). The shield and / or the housing should be connected to an anti-interference potential, e.g. earth (depending on the shielding concept).



The appropriate protection class III (SELV) respective PELV (EN 50178) has to be considered.

Operating voltage

The **SS 20.400** is protected against a polarity reversal of the operating voltage.

It has a nominal operating voltage range of $U_B = 12 \dots 26.4 \text{ V}_{DC}$.



Only operate sensor in the defined operating voltage range (12 ... 26.4 V_{DC}).

Undervoltage may result in malfunction. Overvoltage may lead to irreversible damage to the sensor.

The specifications for operating voltage are valid for the connection at the sensor. Voltage drops generated due to line resistances must be considered by the customer.

Current consumption of the sensor is typ. 35 mA, at maximum 150 mA (including all maximal signal output currents).

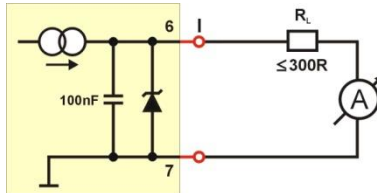
⁹ Voltage dependent resistor; breakdown voltage 27 V @ 1 mA

Analog signal output

The analog output is protected against a short circuit towards both rails. It is available in two basic versions which differ in the representation range (signal interval, bipolarity) additionally (see Table 4):

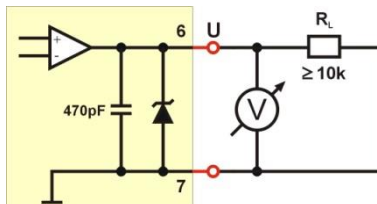
Current interface:

| | |
|---------------------------------|---|
| Signal range: | 4 ... 20 mA |
| Type: | High side driver, load resistance against GND |
| Maximum load resistance R_L : | 300 Ω |
| Maximum load capacity C_L : | 100 nF |
| Maximum cable length: | 100 m |
| Wiring: | |



Voltage interface:

| | |
|---------------------------------|---|
| Signal range: | 0 ... 10 V |
| Type: | High side driver, load resistance against GND |
| Minimum load resistance R_L : | 10 k Ω |
| Maximum load capacity C_L : | 10 nF |
| Maximum short-circuit current: | 25 mA |
| Maximum cable length: | 10 m (recommended) |
| Wiring: | |



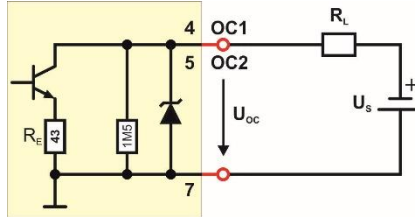
The voltage drop in the GND wire of the connecting cable (mass offset¹⁰) can significantly affect the analog signal of the voltage output.

¹⁰ The specific resistance of the lead of the nominal cable (0.14 mm²) is 0.138 Ω /m (20 °C); at $L = 10$ m a current of $I_{B,max} = 150$ mA can cause a voltage drop up to 240 mV.

Switching outputs

The sensor is equipped with two current limited and short-circuit protected switching outputs with following technical data:

| | |
|--|--|
| Type: | Low side driver, open collector |
| Maximum switching voltage $U_{S,max}$: | 26.4 V _{DC} |
| Maximum switching current $I_{S,max}$: | 55 mA (typ. 50 mA) |
| Maximum off-state resistance R_{Off} : | 1.5 M Ω ¹¹ |
| Minimum load resistance $R_{L,min}$: | Depending on switching voltage U_S (see below) |
| Maximum load capacity C_L : | Depending on switching current I_S (see below) |
| Maximum cable length: | 100 m |
| Wiring: | |



Each switching output can be used as follows:

- Direct driving of ohmic or inductive loads (e.g. LED or relay) with a maximum current consumption of 50 mA.
- Direct activation of digital inputs with (integrated) pull-up resistor R_L (e.g. PLC input).

Due to the internal measuring resistor, which is connected in parallel to the transistor, the switching stage has a comparatively low off-state resistance of 1.5 M Ω . This should be taken into account in case of a (high resistance) pull-up resistor R_L . For a digital evaluation, it is recommended to choose a value of $R_L < 167$ k Ω so as to achieve an active high level (locked transistor) which is 10 % below switching voltage U_S or higher.

Because of its open collector design, the switching voltage U_S is independent of the operating voltage U_B of the sensor. Thereby it does not behave like an ideal switch (in particular in combination with the protective mechanism) but exhibits in conductive condition a drop voltage U_{OC} with following behaviour:

- Well below the maximum current $I_{S,max}$, the open circuit voltage U_{OC} results from voltage drop via the emitter resistance R_E plus saturation voltage over the collector emitter path of the switching transistor:

$$U_{OC} \approx 47 \Omega \cdot I_S + 0.2 V$$

¹¹ Measuring resistor and switching transistor; additional leakage current of the TVS diode connected in parallel ($U_{OC} \approx U_{S,max}$): $< 100 \mu A$

- If maximum current is almost reached, the emitter resistance locks the switching transistor by an inverse feedback so that the voltage drop over the transistor (from $U_{OC} \approx 2.6 \text{ V}$) rises significantly while the current remains constant (analog current limiting). From this borderline case, the minimum allowed (static) load resistance $R_{L,\min}$ at an defined voltage U_S can be calculated¹²:

$$R_{L,\min} = \frac{U_S [\text{V}] - 2.6 \text{ V}}{0,05 \text{ A}} \Omega$$

Example:

$R_{L,\min} = 476 \Omega$ at maximum switching voltage $U_{S,\max} = 26.4 \text{ V}$.

- If the load resistance is too low (e.g. short-circuit), a digital short-circuit protection will become active which clocks the switching output (switch impulse¹³ of approx. 1 ms duration, pause of approx. 300 ms with locked transistor) until the cause of the faulty switching is eliminated.



In case of a high capacitive load C_L , the inrush current impulse may trigger the quick-reacting short-circuit protection (permanently) although the static current requirement is below the maximum current $I_{S,\max}$. An additional resistor connected in series to C_L can eliminate the problem.

- Each switching output is protected against voltage peaks by an unipolar TVS diode¹⁴ (see wiring diagram). Positive voltage impulses (e.g. due to an inductive load) are limited to approx. 30 V, negative impulses are short-circuited against GND (conducting-state voltage of a diode).

¹² Basic current of the switching transistor can be neglected.

¹³ Transistor conducting

¹⁴ Transient Voltage Suppressor diode

5 Signaling

Analog output

The following is valid for all output versions of the **SS 20.400**:

- Representation of measuring range:

The measuring range of flow velocity (0 ... $w_{N,max}$ Or $|\pm w_{N,max}|$) is mapped in a linear way to the signaling range of the used analog output type (see Table 4).

| Voltage interface (U) | Current interface (I) |
|--|--|
| | |
| $w_N = \frac{w_{N,max}}{10 V} \cdot U_{Out}$ | $w_N = \frac{w_{N,max}}{16 mA} \cdot (I_{Out} - 4 mA)$ |

Table 4

- Overflow:

Flow speeds which exceed the measuring range are furthermore output in a linear way up to 110 % of the measuring range (end value + 10 %), to signalize clearly that there is an overflow.

For higher values of flow the output signal remains constant.

- Indication of flow direction¹⁵:

Depending on its type, the sensor measures flow only in one (unidirectional) or in both directions (bidirectional).

In an unidirectional version (see Figure 5-1), the switching output OC1 (factory setting)¹⁶ is used to signalize explicit a zero flow. The output transistor locks if the flow is higher than 0 m/s and conducts if it is lower or equal to 0 m/s.

¹⁵ Related to nominal measuring direction (defined as positive) of the sensor head.

¹⁶ OC1 can be configured optionally to any threshold value within measuring range.

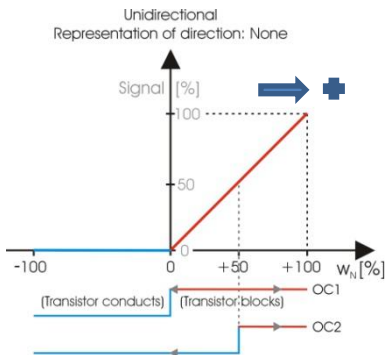


Figure 5-1

To distinguish between positive and negative flow direction, bidirectional versions use either switching output OC1 (see Figure 5-2) or the representation area of the analog signal output is halved, that means zero flow is defined at 50 % of the signalling range (see Figure 5-3).

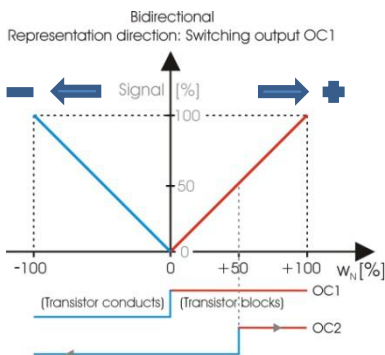


Figure 5-2

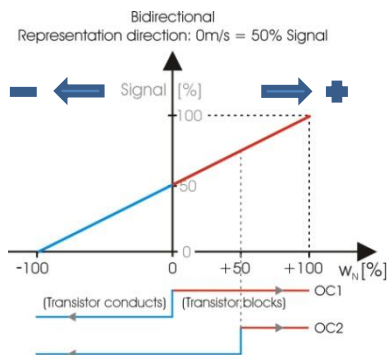


Figure 5-3

- **Error signaling:**
The voltage interface (0 ... 10 V) is set to zero.
The current interface (4 ... 20 mA) signalizes 2 mA.
- **Response time (damping of measured values):**
By default the response time of flow measurement is 1 s.
Optionally it could be configured in the range of 0.01 ... 10 s by order.

Switching outputs

Both switching outputs are used as threshold value switches which means they change their switching condition during normal measuring operation as soon as the measured flow velocity exceeds or falls below the adjusted value.

- **Switching hysteresis:**
The threshold value is symmetrically superimposed by a fixed hysteresis. The hysteresis width is 5 % of the threshold value (but at least 0.05 m/s) and is not configurable.
- **Switching polarity:**
The switching polarity is defined as the change in direction of the switching state during a certain procedure (from "transistor locked" to "transistor conductive" or vice versa).
Both switching outputs are configured by factory with positive polarity, which means that a previously conducting transistor locks if the switching threshold is exceeded (and, in connection with the switching load, switches to a positive voltage level of U_S).
Switching polarity is configurable by ordering.
- **Configuration OC1:**
If the analogue indication area of the bidirectional version corresponds to the absolute value of the measuring range, OC 1 is used to signalize the direction (see Figure 5-2).
Otherwise it is used as an optionally programmable threshold switch that is set to a threshold value of 0 m/s by factory.
- **Configuration OC2:**
OC2 can generally be used as a freely programmable threshold switch (ordering). By default the middle of the positive measuring range is considered as the threshold value.
- **Error signaling:**
Both switching outputs are conducting independent of their configured switching polarity.

6 Startup

Prior to turn on the **SCHMIDT® Flow sensor SS 20.400**, the following checks have to be carried out:

- Correct connection of connecting cable in the field.
- Tightness between sensor connector and connecting cable (flat seal must be correctly inserted in the female cable connector).
- Tight fit of the spigot nut on connecting cable connector.

The sensor is ready for operation about five seconds after switch-on.

If the sensor has another temperature than it's ambient, this time is prolonged until the sensor has reached ambient temperature.

In case of faults or other problems during installation, the fault table (Table 5) can help to resolve the problem.

If the problems persist, please contact **SCHMIDT Technology**.

7 Information on Continuous Operation

Sterilization

The **SS 20.400** can be sterilized during operation.

Approved disinfectants are alcohol (drying without leaving residues) and hydrogen peroxide. If too much cleaning agent is applied to the sensor, the "soiling detection" can be activated and the analog signal is set to error state (0 V or 2 mA). As soon as the sensor element is dried, the sensor is automatically reset to its normal function.



Due to its capillarity, the chamber head gap in the sensor tip can be filled completely with cleaning agent. In this case, it is possible that it will take **more than one hour** until the liquid is evaporated and the sensor works again without problems. To accelerate the drying process, the measuring gap can be cleaned carefully by means of a short compressed air blast or similar methods.

Cleaning of the system

If other cleaning agents are used than mentioned above, the sensor tip must be protected by means of the protective cap included in the delivery. This is especially important for cleaning agents with dried residues or cleaning processes during which dirt may come into the sensor tip.



Prior to carry out problematic cleaning measures (e.g. using inadmissible cleaning agents), the protective cap (yellow, included in delivery) must be placed on the sensor head to protect its sensor element.

See also chapter 8 Service Information, subchapter *Cleaning of the system*.

8 Service Information

Maintenance

A soiled sensor tip may distort the measured value. Therefore the sensor tip must be checked for soiling at regular intervals.

If it is soiled or wetted by a liquid, the sensor signals an error via the analog output (0 V or 2 mA). In this case, clean sensor as described below.

If the error signal does not disappear after cleaning and drying, the sensor must be sent in to the manufacturer for repair.

Cleaning sensor tip

If the sensor tip is soiled or dusty, it must be carefully cleaned by means of compressed air (avoid strong pressure impulses!).

If this procedure is not successful, the sensor tip can be cleaned by immersing and washing it in alcohol, which dries without leaving residues (e.g. isopropyl alcohol).

As soon as the alcohol has been evaporated, the sensor is again ready for operation.

- Do not shake or tap the wet sensor!
- Do not try to clean the sensor tip by any type of mechanical methods. Do not touch the sensor element located in the chamber head. This may irreversibly damage the sensor.
- Do not use strong cleaners, brushes or other objects like fluffy cloths etc. to clean the sensor tip!
- Inappropriate cleaning agents may leave residues on the sensor element and therefore lead to faulty measurements or result in permanent damage to the sensor element.
- If the chamber head gap of the sensor tip is completely filled with cleaning agent, accelerate the drying process by blowing it out, if necessary.



Removing malfunctions

The following Table 5 lists possible errors with a description how to detect them. Furthermore, possible causes and measures to be taken to remove them are listed.

| Error image | Possible cause | Remedy |
|--|---|---|
| No output signals OC1/2 locked $A_{Out} = 0 \text{ V} / 0 \text{ mA}$ | Operating voltage (too low; not / incorrectly connected) | Check operating voltage and wiring |
| | Sensor defective | Send in for repair |
| Error message of sensor OC1/2 conducting $A_{Out} = 0 \text{ V} / 2 \text{ mA}$ although there is flow | Sensor element wetted | Wait until sensor element is dry Blow out sensor tip (if possible) |
| | Sensor element soiled | Clean sensor tip |
| | Sensor element defective | Send in for repair |
| Unexpected values of analog output Measured A_{Out} : Too high / low Strong noise / drift | Sensor configuration (Measuring range / direction; output type) | Check order configuration and measurement settings |
| | Medium to be measured does not correspond to calibration medium | Check medium parameters (standard medium: Air at 1013.25 hPa and 20 °C) |
| | Mounting conditions (tilting / immersion depth) | Check mounting conditions |
| | Irregular flow conditions (turbulences / other disturbances) | Check run-in and -out distance Increase damping of measured flow velocity |
| | Sensor element soiled | Clean sensor tip |
| | Operating voltage (stability / value) | Check operating voltage |
| | Large / fast variations of pressure and temperature | Check medium parameters |
| Unexpected values of switching outputs | Configuration | Check configuration |
| | Faulty wiring | Check wiring |
| | Digital short-circuit protection active | Load resistance too small (increase $R_L > R_{L,min}$) Reduce load capacity C_L Insert resistor in series to C_L |

Table 5

Transport / dispatch of the sensor



Before transport or dispatch of the **SS 20.400**, the delivered protective cap must be put over the sensor head.

Avoid soiling or mechanical stress.

Calibration

If the customer has made no other provisions, we recommend repeating the calibration at a 12-month interval.

To do so, the sensor must be sent in to the manufacturer.

Spare parts or repair

No spare parts are available, since a repair is only possible at the manufacturers. In case of defects, the sensors must be sent in to the supplier for repair.

When the sensor is used in systems important for operation, we recommend keeping a replacement sensor in stock.

Test certificates and material certificates

Every newly produced sensor is accompanied by a certificate of compliance according to EN 10204-2.1. Material certificates are not available.

Upon request, we shall prepare, at a charge, a factory calibration certificate, traceable to national standards.

9 Technical Data

| | |
|---|--|
| Measuring quantity | Normal velocity w_N of air based on normal conditions of 20 °C and 1013.25 hPa |
| Medium to be measured | Clean air or nitrogen; more gases on request |
| Measuring range | (±) 0 ... 1 / 2.5 / 5 / 10 / 20 m/s Unidirectional or bidirectional |
| Lower detection limit | (±) 0.05 m/s |
| Measuring accuracy ¹⁷ - Standard - High precision | ±(3 % of meas. value +2 % of end value); min. ±0.05 m/s ±(1 % of meas. value +2 % of end value); min. ±0.04 m/s |
| Repeatability | ±1.5 % of measured value |
| Response time (t_{90}) | 1 s (configurable: 0.01 ... 10 s) |
| Storage temperature | -20 ... +85 °C |
| Operating temperature | 0 ... +60 °C |
| Humidity range | Not condensing (< 95 % rel. humidity) |
| Operating pressure | Atmospheric (700 ... 1,300 hPa) |
| Mounting tolerance | ±5° relative to nominal flow direction |
| Operating voltage | 12 ... 26.4 V DC (reverse polarity protected) |
| Current consumption | Typ. < 35 mA (max. 150 mA) ¹⁸ |
| Analog output - Current - Voltage | Short circuit protected 4 ... 20 mA ($R_L \leq 300 \Omega$; $C_L \leq 100$ nF) 0 ... 10 V ($R_L \geq 10$ k Ω ; $C_L \leq 10$ nF) |
| Switching outputs | 2 pc., open-collector, current-limited, short-circuit-protected Switch 1 (OC1): Direction or threshold value Switch 2 (OC2): Threshold value Max. load: 26.4 V DC / 55 mA Threshold: 0 ... 100 % of end value; min. ±0.05 m/s Hysteresis: 5 % of switching threshold; min. 0.05 m/s Configuration: Polarity, threshold value (by ordering) |
| Electrical connection | Plug (male), M9, screwed, 7-pin (shielded) |
| Line length (max.) | Voltage output: 10 m / current output: 100 m |
| Protection type | Housing: IP 66 / plug-in connector ¹⁹ : IP 67 |
| Protection class | III (SELV) or PELV (EN 50178) |
| Mounting position | arbitrary |
| Dimensions / material - Sensor probe - Sensor tube - Plug-in connector | \varnothing 9 mm x 10 mm Stainless steel 1.4404 \varnothing 9 mm x 130 / 200 / 300 mm Stainless steel 1.4404 \varnothing 14 mm x 40 mm Stainless steel 1.4404 |
| Weight | About 60 g (at 300 mm probe length) |

¹⁷ Under reference condition

¹⁸ Including all signal output currents

¹⁹ Only with correctly attached connecting cable

10 Declarations of Conformity

SCHMIDT Technology GmbH herewith declares in its sole responsibility, that the product

SCHMIDT® Flow Sensor SS 20.400

Part-No. **518 210**

is in compliance with the appropriate



European guidelines and standards

and



UK statutory requirements and designated standards.

The corresponding declarations of conformity can be download from **SCHMIDT®** homepage:

www.schmidt-sensors.com

www.schmidttechnology.de



SCHMIDT Technology GmbH

Feldbergstraße 1
78112 St. Georgen
Germany

Phone +49 (0)7724 / 899-0

Fax +49 (0)7724 / 899-101

Email sensors@schmidttechnology.de

URL www.schmidt-sensors.com
www.schmidttechnology.de