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better measurement



**SCHMIDT® Flow Switch
SS 20.200
Instructions for Use**

SCHMIDT® Flow Switch

SS 20.200

Table of Contents

1	Important information.....	3
2	Application range.....	3
3	Mounting instructions.....	4
4	Electrical connection.....	6
5	Commissioning.....	7
6	Switching threshold.....	8
7	Service information.....	9
8	Technical data.....	10
9	Certificates of conformity.....	11

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Subject to modifications

1 Important information

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 (refer to chapter 2). In particular, it is not designed for direct or indirect protection of personal or machinery.

SCHMIDT Technology cannot give any warranty as to its suitability for a 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

The symbols used in this manual are explained in the following section.



Danger warnings and safety instructions - read them carefully!

Non-observance of these instructions may lead to injury of the personnel or malfunction of the device.

2 Application range

The **SCHMIDT® Flow Switch SS 20.200** has been designed for stationary use in cleanrooms, air ducts or air shafts both under atmospheric pressure conditions and overpressure up to 10 bar¹. It measures the flow velocity of the measuring medium as standard velocity (unit: m/s), relative to standard pressure of 1013.25 hPa and standard temperature of 20 °C. Thus the measurements resp. switching threshold is independent of pressure and temperature of the medium.

An optional protective coating allows its use in dirty or aggressive media. The resistance of the coating to the media occurring during operation must be checked in each individual case.



When using the sensor outdoors, it must be protected against direct exposure to the weather.

¹ Only applicable with additional pressure protection measures

3 Mounting instructions

The **SS 20.200** is a high-precision and sensitive measuring device. Accordingly, the mechanical stress on the probe head must be minimised in all mounting steps.



Avoid mechanical stress of the sensor tip as much as possible, since otherwise irreversible damage can occur.

Mounting position

In order to achieve maximum measuring sensitivity, the sensor head should be mounted pointing upwards. A sensor head pointing downwards must be avoided, since this will increase the measuring range limit (nominal value 0.06 m/s).

In order to obtain good measurement results, the flow measuring sleeve must always be in the centre of the flow duct.



The sensor head must immerse completely (that is, including the temperature measuring sleeve) into the air flow. If this is not the case, the measured value can be completely wrong.

The sensor should not be mounted in the proximity of heat sources, since this may result in measurement errors. When used in ventilation pipes equipped with heat exchangers, the sensor should always be mounted upstream of the heat exchanger.

Wall mounting

First the protective cover must be pulled off the sensor head. Then the sensor together with the threaded piece (M 18 x 1 fine pitch thread) is screwed in the appropriate threaded bore of the duct wall. Set the desired position and secure it with a counter nut.

Alternatively **SCHMIDT Technology** offers auxiliary installation equipment. Please refer to following URLs for details:

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

This also includes compression fitting that are suitable for use in media with overpressure² in which the following has to be considered:



Mounting and dismounting of the sensor can be carried out only as long as the system is in **depressurized state**.

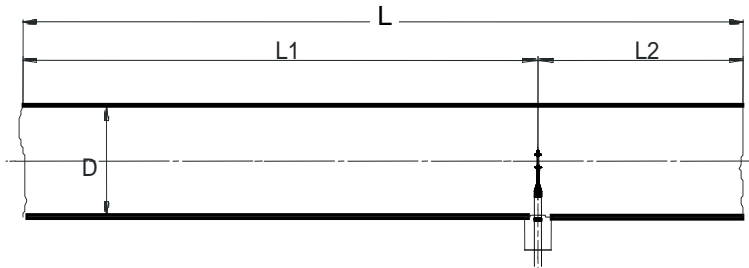
Only using proper pressure-tight seals (e. g. Teflon tape). Appropriate safety precautions are taken to avoid unintended discarding of the sensor due to overpressure.

² Pressure-tight, including pressure security kit (material no. 524891 and 524919)

Pipe-bound flow

To reach the accuracy specified in the data sheets, the sensor 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 L1) and behind the sensor (run-out distance L2) is held absolutely straight and without disturbances (such as edges, seams, bends, etc.).

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



- L Total length of measuring distance
- L1 Length of run-in distance
- L2 Length of run-out distance
- D Inner diameter of measuring distance

The following table shows the necessary straight conduit lengths as a function of the pipe inner diameter D for various scenarios.

Flow obstacle upstream of measuring conduit	Length of minimal distance	
	Run-in (L1)	Run-out (L2)
Light bend (< 90°)	10 x D	5 x D
Contraction / reduction / 90° bend	15 x D	5 x D
2 bends 90° in one plane (2-dimensional)	20 x D	5 x D
2 bends 90° (3-dimensional change in two directions)	35 x D	5 x D
Shut-off valve	45 x D	5 x D

This table lists the **minimum values** required in each case. If the listed straight conduit lengths cannot be achieved, the measurement accuracy may be impaired.

4 Electrical connection

For proper operation the sensor requires a DC power supply with a nominal value of 24 V with permitted tolerance of $\pm 20\%$. Typical current consumption is approx. 40 mA and at maximum 70 mA (without load of the switching output), depending on the flow velocity.



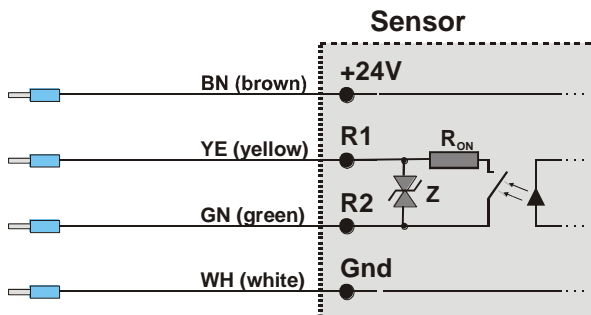
Only operate sensor in the defined range of operating voltage (24 V_{DC} \pm 20 %).

Undervoltage may result in malfunction; overvoltage may lead to irreversible damages.

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

Connecting cable assignment

The sensor is equipped with a cable firmly fixed to its housing with 2 m length and open cable ends (pin assignments see following graphic).



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

For signalling, a semiconductor relay is used. Its galvanically decoupled switching output has a maximum permanent switching power of 300 mW (R_{on} with typically 20 Ω , up to max. 25 Ω). The switching current should be at most 100 mA, the peak value of the switching voltage (AC or DC) must not exceed 30 V. Otherwise the bidirectional protecting diode (Z) between the load circuit terminals will break down and can be thermally destroyed (see connecting diagram).













The specified electrical operating values must not be exceeded. Exceeding them may lead to irreversible damage.

5 Commissioning

Status signalling

The **SS 20.200** has two light emitting diodes (LED) of different colours, indicating its current status (depending on the switching behaviour ordered).

The following table shows the signalling options and their cause.

Sensor status	LED green	LED red	Relay output
Supply voltage: - not connected / cable broken - poles reversed - too low (< 19.2 V)			Open
Initialisation (after switching on)			Open
Sensor defective			Open
Sensor ready Switching threshold ¹ underrun / exceeded			Closed / Open
Sensor ready Switching threshold ³ exceeded / underrun			Open / Closed

Legend:  = LED off  = LED flashes (2 Hz)  = LED on

Startup

Before switching on it must be checked if the **SS 20.200** is installed correctly, both mechanically and electrically.

The sensor is ready within 20 s, after applying the operating voltage. During this initialisation stage, the green LED is flashing.

As soon as the green LED is lit permanently, the sensor is ready.

If the sensor detects an internal defect, the green LED will go off and the red LED is flashing.

In case of defects the sensor must be sent in to **SCHMIDT®** for repair.

³ Depending on the sensor configuration ordered.

6 Switching threshold

The switching output will trip at an adjustable flow velocity. There are two basic types of setting the switching threshold:

Manual setting (order code N = P)

The switching threshold is set using the potentiometer mounted on the front side of the **SS 20.200**. To increase the switching threshold, rotate the potentiometer clockwise and visa-versa. The measuring range of the sensor is correlated linearly with the 270° of rotating, i.e., at the upper end (clockwise) the switching threshold is 95 % of the measuring range. At the lower end (zero point) the switching threshold is limited to 5 % of the measuring range.



The potentiometer has a slot size of 2.5 mm x 0.5 mm.

The maximum applicable torque at the potentiometer's dead stops is 3.5 Ncm.

With order code xx = 00, the potentiometer is set at about 50 % (default). At a distinct value xx > 00, the potentiometer is set ex works to the desired switching threshold („xx“ % of measuring range).

The individual setting of the switching point is done by adjusting the flow velocity to the desired threshold value. Then the potentiometer is rotated from the zero point clockwise until the relay is switching. The release point is then offset downward by the hysteresis (see also chapter: *Hysteresis of switching threshold*). For fine adjustment, the potentiometer can now be rotated back a little bit.

Preprogramed switching threshold (order code N = F)

If the flow velocity to be monitored is already known at the time of ordering, the sensor can be ordered with a fixed, preprogramed switching threshold. In this case, the potentiometer is put out of action and a sticker on the front side of the sensor informs about the programmed switching threshold.

Hysteresis of switching threshold

The hysteresis of the switching threshold is defined as the value that separates the switching point (SP) from the release point (RP). It is important which switching logic (S) was selected.

For S = 1 and S = 2, the sensor switches directly at the defined SP. RP is lower by 5 % of the measuring range.

For S = 3 and S = 4, SP is 5 % above the preset value. In this case, RP coincides exactly with the preset value.

7 Service information

Maintenance

Heavy contamination of the sensor head may lead to false measured values. Therefore, the sensor head must be checked for contamination at regular intervals. If contaminations are visible, the sensor can be cleaned as described below.

Cleaning the sensor tip

The sensor head can be cleaned to remove dust or dirt by moving it carefully in warm water containing a dishwashing liquid or other allowed cleaning liquid (e.g. isopropanol)⁴. Persistent incrustations or deposits can be previously softened by prolonged immersion and then removed by means of a soft brush or cloth. Avoid applying force to the sensitive sensor tip.



The sensor head is a sensitive measuring system. During manual cleaning proceed with great care.

Before putting it again into operation, wait until the sensor head is completely dry.

Sterilization

Both uncoated and coated sensors can be sterilized during operation. Alcohols (drying without leaving residues) and hydrogen peroxide (uncoated version only) are approved and certified disinfectants.

Spare parts or repair

No spare parts are available, since a repair is only possible at **SCHMIDT Technology**. 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.

⁴ Other cleaning agents upon request.

8 Technical data

Measuring quantity	Standard velocity w_N of air, based on standard conditions of 20 °C and 1013.25 hPa
Measuring medium	Air or nitrogen
Measuring range w_N	0 ... 1 / 2.5 / 10 / 20 m/s
Lower detection limit w_N	0.06 m/s
Switching threshold w_N	5 ... 95 % of measuring range; min. 0.1 m/s
Switching threshold setting	Standard: Potentiometer (single turn: 270°) Option: Pre-programmed
Switching hysteresis	5 % of switching threshold, min. 0.05 m/s
Reproducibility w_N	±(2 % of switching threshold + 0.1 m/s)
Response time (t_{90}) w_N	3 s (jump from 0 to 5 m/s)
Temperature gradient w_N	< 2 K/min (at 5 m/s)
Switch-on delay during start-up	20 s
Operating temperature	Sensor probe: -20 ... +85 °C Electronics: -20 ... +70 °C
Storage temperature	-20 ... +85 °C
Humidity range	0 ... 95 % of rel. humidity (RH); none-condensing
Operating pressure	0 ... 10 bar (overpressure)
Operating voltage U_B	24 V _{DC} ± 20 % (reverse voltage protected)
Current consumption	typ. < 40 mA (max. 70 mA) ⁵
Switching relay	30 V _{Peak} / 100 mA / 300 mW / R _{ON,max} = 25 Ω
Display LED	Green: Sensor status Red: Switching status / sensor defective
Electrical connection	Non-detachable cable, pigtail ⁶ , 4 x 0.14 mm ² , length 2 m, PVC (grey), Outer-Ø 3.8 mm
Maximum cable length	100 m
Protection type of housing	IP65 (with plug); IP52 (potentiometer open)
Protection type of probe tip	IP67
Protection class	III (SELV) or PELV (according EN 50178)
Minimum immersion depth	58 mm
Sensor tube diameter	9 mm
Mounting length	100 / 200 / 350 / 500 mm
Materials	Housing: PBT (Ultradur B4300 G4) Probe: Stainless steel 1.4571, PBT Coating: Polyurethanderivat (black)

⁵ Without signal current of switching output

⁶ With cable end sleeves

9 Certificates of conformity

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

SCHMIDT® Flow Switch SS 20.200

Part-Nos. **504 475** and **505 504**

is in compliance with the appropriate



European guidelines and standards

and



UK statutory requirements and designated standards.

The corresponding declarations of conformity are available for download at:

www.schmidt-sensors.com

www.schmidttechnology.de



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