SCHMIDT® Technology

SCHMIDT® Flow Sensor
SS 20.60

Instructions for Use

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Imprint:

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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 (s. chapter 2 Range of Applications) In particular, it is not designed for direct or indirect personal protection.

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.

2 Range of Applications

The SCHMIDT® flow sensor SS 20.60 is designed for stationary use in compressed air pipes, air ducts or air shafts under atmospheric pressure conditions. The sensor measures the flow velocity of the measuring medium as standard velocity (unit m/s), relative to the standard pressure of 1013.25 hPa and the standard temperature of 20°C. The output signal is linear and independent of the pressure and temperature of the medium. When mounting the sensor in a tube, the output signal of the flow velocity can be used to calculate the standard volumetric flow or the mass flow of the medium. Please refer to the separate table “SS 20.60 Profile Factors”.

3 Safety information

When installing and removing the sensor, it is essential to observe the instructions detailed below:

1. The sensor may **only** be installed and removed when no pressure is applied.
2. The nut (AF24) of the screw pipe connection must be **firmly tightened** before applying compressed air.

   Permitted tightening torque: 20 Nm minimum
   30 Nm maximum
3. In case of mechanical strain (vibration), the nut (AF24) must be secured additionally
   (e.g. using a commercially available screw lock).
4. Make sure to close the safety chain before pressure is applied. The chain lock must be hung up in a way to avoid sagging of the chain.

ATTENTION
The maximum allowed positive operating pressure of 16 bar must not be exceeded! If the above safety instructions are not observed, the sensor in the screw pipe connection may be loosened and thrown out due to the overpressure.

4 Determination of the position of installation

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) and behind the sensor (run-out distance) 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 do not only act **in** the direction of the air flow but also lead to turbulence **opposite** to the flow direction.

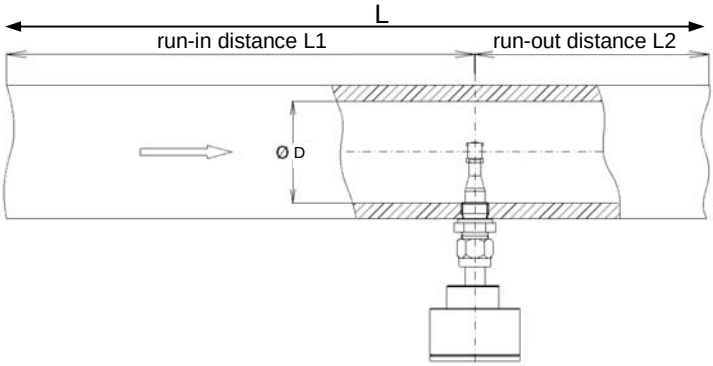


Figure 1: Sensor position in the pipe

L= total length of the measuring distance, L1 = length of the run-in distance, L2 = length of the run-out distance, D = diameter of the measuring distance

The sensor tip must be positioned in the center of the pipe opening as shown in Figure 1.

The following table shows the necessary straight conduit lengths as a function of each disturbance.

Table of run-in and run-out distances

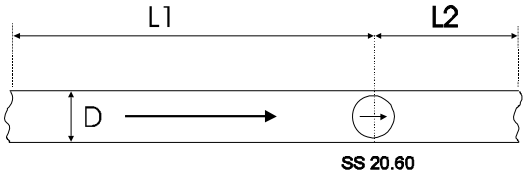
Flow obstacle **upstream** of the measuring conduit	Minimum length of the run-in distance (L1)	Minimum length of the run-out distance (L2)
Light bend (< 90°)	**10 x D**	**5 x D**
Contraction (conduit contracts toward the measuring area)	**15 x D**	**5 x D**
Expansion (conduit expands toward the measuring area)	**15 x D**	**5 x D**
90° bend or T-junction	**15 x D**	**5 x D**
Two 90° bends in one plane	**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**

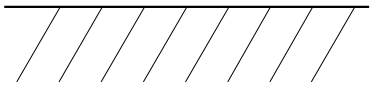
Table 1: Run-in and run-out distances

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.

Installation position

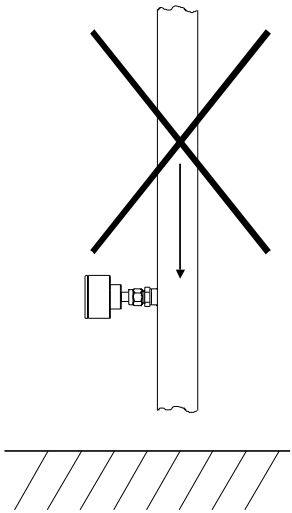
The sensor should preferably be installed in horizontally positioned pipes.





ATTENTION
Avoid installing the sensor in a pipe with downward flow.

This would considerably increase the lower measuring range limit.



5 Mounting instructions

The safety instructions must be observed.

1. To install the sensor, first insert the through bolt joint into the pipe union. Then introduce the sensor up to the desired immersion depth and turn it, while it is still loose, counter-clockwise by about 80°. Use a fork wrench (AF 27) to fix the hexagon bolt at the screw pipe connection by a locknut.

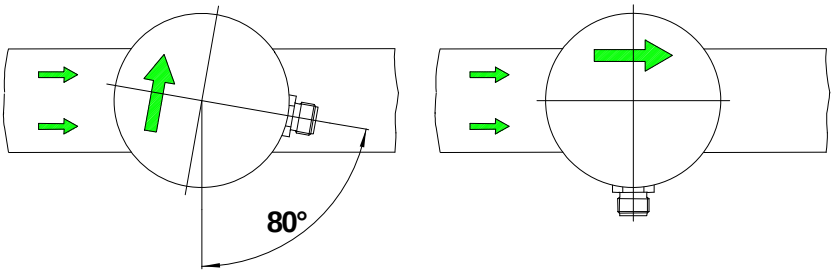


Figure 2: Fixing the sensor in the pipe

2. Tighten the union nut (AF24) until the arrow on the sensor housing corresponds to the direction of the pipe flow. The angular deviation should not be greater than ±3° referenced to the ideal position. Otherwise the measurement accuracy may be affected. You can check the set angular position by placing a bubble level on the stop face. In case of wrong adjustment, the through bolt joint has to be loosened. Repeat the mounting procedure as described under item 1.

3. Make sure to close the safety chain before pressure is applied. The chain lock must be hung up in a way to avoid sagging of the chain.

ATTENTION
The stop face of the housing must **not** be used for securing.

The housing **must not** be turned any more, once the through bolt joint has been tightened. Otherwise, the housing may be detached from the sensor tube.

6 Electrical connections

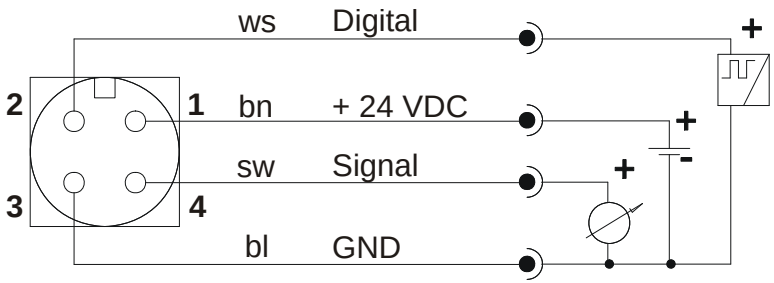


Figure 3: SS 20.60 connection assignment (view of the plug pins at the sensor)

The cable supplied has the following color assignment:
ws = white, bn = brown, sw = black, bl = blue

The negative of the dc voltage (GND) is at the same time the reference potential for the analog signal.

ATTENTION
Only operate the sensor in the defined range of operating voltage (24 VDC +/- 20 %). Undervoltage may result in malfunction. Overvoltage may lead to irreversible damage to the sensor.

7 Startup

The valid measuring range and the configuration of the signal outputs are specified on the rating plate (see housing cover).

Note: After applying the supply voltage, the output signal will at first adopt a higher value and then level off at the correct measurement value after about 10 seconds.

7.1 LED display

The sensor has 4 LEDs indicating its current state.

The following table indicates the different signaling options:

No.	State	LED 1	LED 2	LED 3	LED 4
1	Ready for operation & flow < 5%				
2	Flow > 5%				
3	Flow > 20%				
4	Flow > 50%				
5	Flow > 80%				
6	Flow > 100% = overflow				
7	Sensor element defective				
8	Operating voltage too low				
9	Operating voltage too high				
10	Electronic temperature too high				
11	Electronic temperature too low				

Table 2: Sensor state signaling

 LED off

 LED on: green

 LED on: orange

 LED flashes (approx. 2Hz): red

7.2 Error signaling

In case of malfunction of the sensor element, all the four LEDs flash in red (also see Table 2: Sensor state signaling) and the output variant 4 ... 20 mA generates a current of 2 mA.

In this case, the device must be sent to the manufacturer for repair.

The other error states signaled by the LEDs are not indicated at the analog output. LED signaling remains active until the cause of the error has been eliminated.

ATTENTION
Causes of any error signaling have to be eliminated immediately. A significant exceeding or falling below the permitted operating parameters can result in permanent damage to the sensor.

ATTENTION
During error state signaling, the measured values at the analog output may show considerable deviations.

8 Service information

Maintenance
The sensor tip must be checked regularly for contamination and must be cleaned when required. Contamination of the sensor element may lead to a false measurement. It is recommended to check it once a year and more frequently if it is heavily contaminated.

Cleaning the sensor tip
The sensor tip can be cleaned to remove dust/dirt by moving it carefully in warm water containing (a) washing-up liquid; if necessary a very soft brush can be used. Before putting it back into operation, wait until the sensor tip is completely dry.

ATTENTION
Do not use strong cleaners, solvents, brush or other hard objects.

Recalibration
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 manufacturer. In case of defects, the parts 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

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

9 Declaration of conformity

EG-Konformitätserklärung
Certificate of Conformity
Déclaration de conformité CE

SCHMIDT Technology GmbH erklärt, dass das Produkt
SCHMIDT Technology GmbH herewith declares that the product
SCHMIDT Technology GmbH déclare que le produit

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den wesentlichen Schutzanforderungen entspricht, die in der Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedsstaaten über elektromagnetische Verträglichkeit (**2004/108/EG**) festgelegt sind.

is in compliance with the relevant protection requirements in respect of the electromagnetical compatibility (EMC) which are laid down in the guidelines of the council for the harmonization of the regulations of the members within the European community (**2004/108/EG**).

correspond aux prescriptions de protection établies dans la norme du conseil pour l'harmonisation de règles de droit des Etats membre sur la compatibilité électromagnétique (**2004/108/EG**).

Zur Beurteilung hinsichtlich elektromagnetischer Verträglichkeit wurden folgende Normen herangezogen:

The assessment of EMC for industrial applications refers to the following European standards:

Pour le jugement de la compatibilité électromagnétique normes suivantes sont appliquées:

a) Störaussendung (Emission) / Electromagnetic Emission / Interférence
EN 61000-6-3:2007

b) Störfestigkeit / Electromagnetic Immunity / Immunité aux parasites
EN 61000-6-2:2005

Helmar Scholz
Leiter Entwicklung Sensoren / R&D Manager Division Sensors / Directeur développement capteur

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SCHMIDT Technology GmbH
Feldbergstrasse 1
D-78112 St. Georgen
Phone +49 (0)7724/899-0
Fax +49 (0)7724/899-101
info@schmidttechnology.de
www.schmidttechnology.de

Art.No. 300 754.02