Simply a question of
better measurement

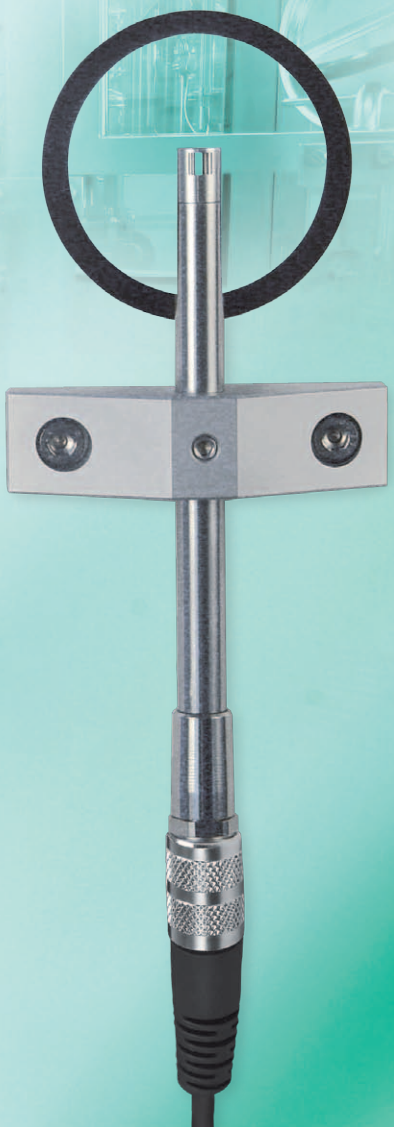
SCHMIDT® Technology

SCHMIDT® Flow Sensor SS 20.400 and SS 23.400 ATEX 3

The quick-acting specialists for increased operating safety in the cleanroom – with integrated direction detection

Cleanroom and pharmaceuticals

Industrial processes



Increasing safety through flow measurement

Defined overpressures ensure process safety in cleanrooms through overflow from one room to the other. This overflow is usually monitored indirectly via pressure sensors. When doors or airlocks are opened, the pressure often falls below the desired operating limit of the pressure sensor, thus indicating no overpressure. In this phase, the cleanroom operator has no information (measured values) on the actual overflow. However, a backflow can be present and, consequently, contamination may be introduced. This will not be noticed despite a correctly performed pressure measurement. This can be improved in order to considerably increase the safety of the cleanroom.

Increasing operating safety with the bidirectional SCHMIDT® Flow Sensor SS 20.400 and SS 23.400 ATEX 3

These flow sensors not only measure the actual overflow from one room to the other but also detect the direction as an actual signal. This allows simple and consistent monitoring of all clean areas, including local cleanrooms (cleanmachines). The additional measured flow values also make it possible to release batches more easily. The flow sensor is able to measure even very small air flows down to 0.05 m/s. This corresponds to a pressure difference of approx. 0.01 Pascal! The direction of flow can be easily integrated into the existing monitoring, e.g. as a switch signal or analog signal. The sensor has no moving parts and, due to its all-metal construction, a GMP-compliant design, which guarantees complete cleanability. When used in cleanmachines, the sensor is also suitable for laminar-flow monitoring, due to its characteristics and easy mounting. The ATEX-version SS 23.400 ATEX 3 (category 3G, Zone 2) is ideal for potentially explosive areas. And one more thing: Reducing overpressures, especially during production downtimes, allows savings in energy costs while maintaining and extending safety aspects.

Measuring accuracy in black and white

Upon request they will be supplied with an additional high-precision calibration system. This system enhances the precision even more by the use of more calibration points, and the documentation of the target and actual values as factory calibration certificate. Upon request, the sensor is adjusted and calibrated for application as "laminar-flow sensor" on ceiling diffusers optimized for such an application. On request, the sensor is also available with a DAkkS accredited calibration.

Also suitable for other applications?

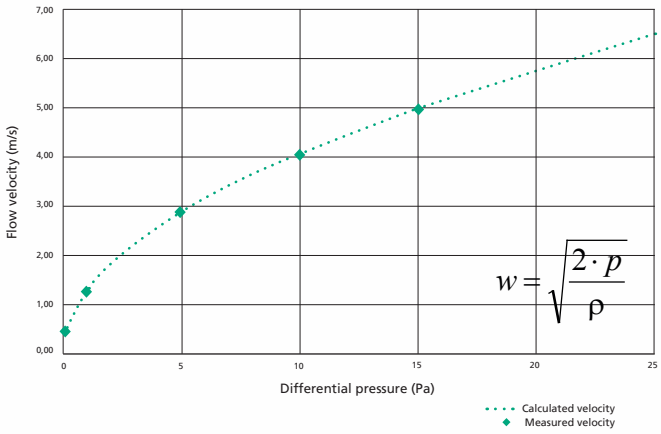
Determining the flow velocity and the direction of flow is important in many sectors of industry.

Typical examples of applications are:

- Detecting the laminar flow in potentially explosive areas, e.g. in modern paint booths, RABS and isolators
- Measurement of supply air flows to avoid an explosive atmosphere
- Monitoring the escaping contaminated air from closed rooms
- and much more

Simple and safe – the overflow principle in practice

The flow sensor is installed in front of a wall opening, which has a diameter of at least 25 mm. The pressure in the cleanroom and the flow velocity are directly dependent on each other (see adjacent diagram). The diameter does not affect the flow velocity (Torricelli's law) but too small a diameter gives a wrong flow value due to friction in the wall opening.



SS 20.400

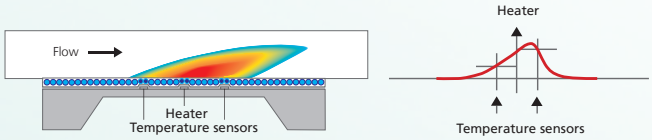
Direct mounting of the SS 20.400 in front of the wall opening for measuring overflow velocity.

SS 23.400 ATEX 3

Reliable detection of low air flows!

SCHMIDT® Flow Sensor SS 20.400/SS 23.400 ATEX 3 – bidirectional measurement with one sensor

The thermal Flow Sensors SS 20.400 and SS 23.400 ATEX 3 are based on a thermopile sensor. It uses its heated semiconductor element to detect the flowing cooling air.



A heat bell forms on top of the "heater" and will be moved by the flow. At the left and right hand sides of the heater, two temperature probes measure the medium´s temperature. The resulting measurement differences are used to determine the normal velocity. There, where the warmest area is detected, the sensor identifies the flow direction (as an option).

Sensitive to flow and mechanically robust

In order to protect the sensor element from mechanical influences, it is installed in a measuring chamber, while the signal electronics is completely integrated into the sensor tube. This simplifies the installation on site, which does not require an external measuring transducer. The SS 20.400/SS 23.400 ATEX 3 permanently monitors its function. Condensing moisture, liquids or a defect of the sensor element are detected by it and reported on the current output with 2 mA.

Well protected

Before disinfecting the switched on sensor with aqueous cleaning agents, the protective cap included in the delivery must be placed on the sensor head (not required if sterilized by means of evaporator). Small dust deposits in the measuring chamber can be removed by blowing air through it or cleaning in alcohol.

Output signal
4 … 20 mA / 0 … 10 V
and 2 switching signals

Enhanced safety: ATEX version

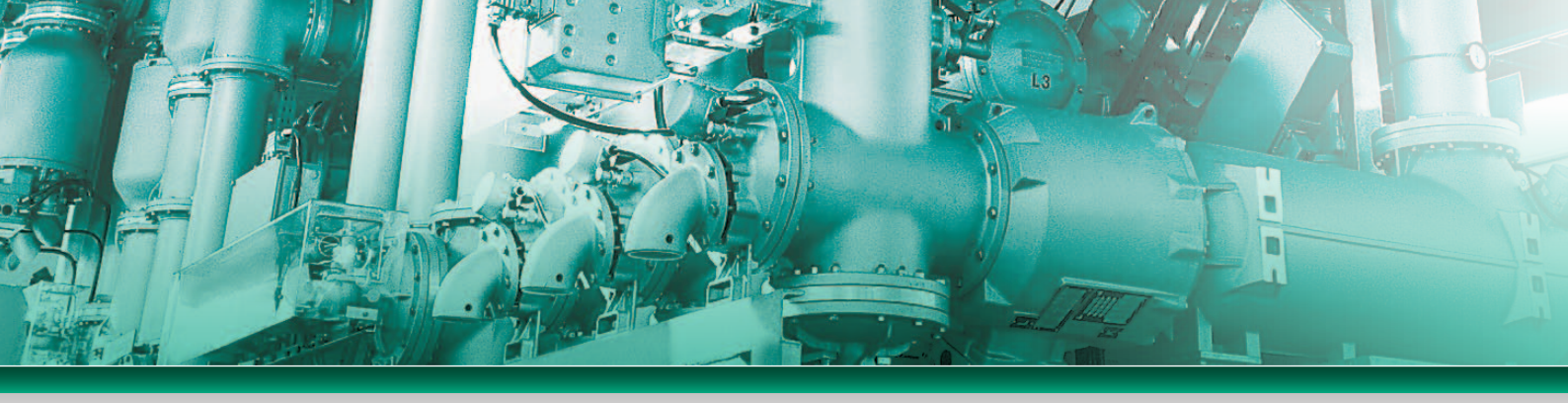
For use of the sensor in potentially explosive areas, the SS 20.400 is also available in an ATEX[1] version. It can be used in accordance with ATEX directive 2014/34/EU in Zone 2 (device category 3G) without additional measures (such as a Zener barrier). For operation in accordance with its designated use, SCHMIDT® connecting cables (see order data) must be used.

[1] SS 23.400 ATEX 3

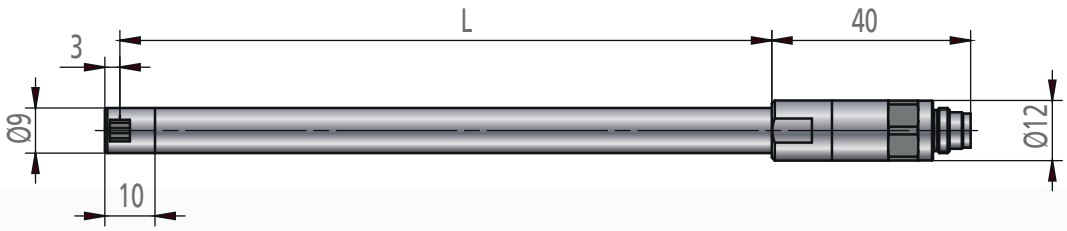
Technical Data

Data	
Measurement value	Normal velocity w_N referred to standard conditions of T_N = 20 °C and p_N = 1,013.25 hPa
Measurement medium	Clean air / nitrogen (additional gases on request)
Measurement ranges w_N	0 … 1 / 2.5 / 5 / 10 / 20 m/s
Lower detection threshold w_N	0.05 m/s
Measurement precision	
Standard [2]	±(3 % of measured value + [2 % of fmr; min. 0.05 m/s])
High precision (option) [2]	±(1 % of measured value + [2 % of fmr; min. 0.04 m/s])
Response time (t_{90}) w_N	0.01 … 10 s (configurable), 1 s factory sett.
Operating temperature	
Operating temperature	0 … +60 °C
Storage temperature	-20 … +85 °C
Material	
Sensor head	Stainless steel 1.4404
Sensor tube	Stainless steel 1.4404
Plug connector	Stainless steel 1.4571
General Data	
Humidity	Measuring mode: non-condensing (< 95 % RH)
Operating pressure	Atmospheric (700 … 1,300 hPa)
Supply voltage	12 … 26.4 V DC
Power consumption	Typ. < 35 mA (max. 150 mA including switching outputs)
Analog output	0 … 10 V or 4 … 20 mA; protected against short-circuit
Switching outputs	2 open collectors, current-limited and protected against short circuit, configurable Channel 1 (OC1): direction or threshold value; Channel 2 (OC2): threshold value max. 26.4 V DC / 55 mA Switching hysteresis 5 % of threshold value, min. ± 0.05 m/s
Connection	Connector M9, screwed, 7-pin
Maximum line length	0 ... 10 V: 10 m; 4 ... 20 mA: 100 m
Mounting position	Any
Minimum protrusion length	50 mm
Protection type / protection class	IP 66 / III (SELV or PELV)
ATEX Category (option)	II 3G Ex ec IIC T4 Gc (3G, zone 2)
Sensor length	130 / 200 / 300 mm
Weight	Approx. 60 g max. (300 mm sensor length)

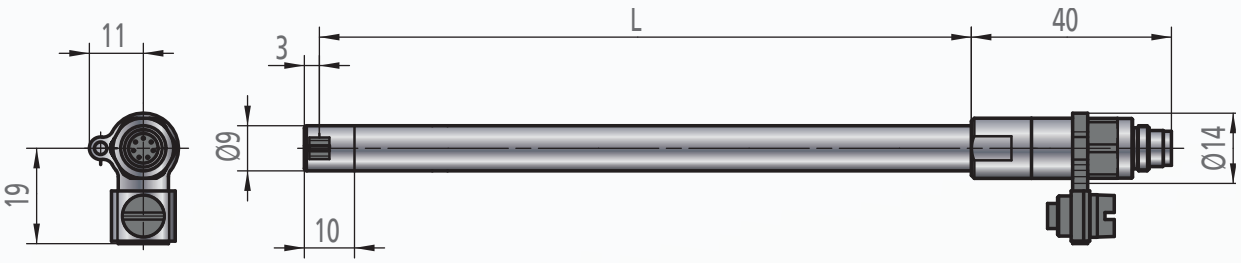
[2] under reference conditions, related to the calibration reference
fmr = final measuring range



Dimensions SCHMIDT® Flow Sensor SS 20.400

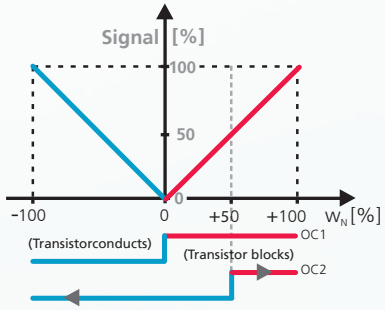


Dimensions SCHMIDT® Flow Sensor SS 23.400 ATEX 3

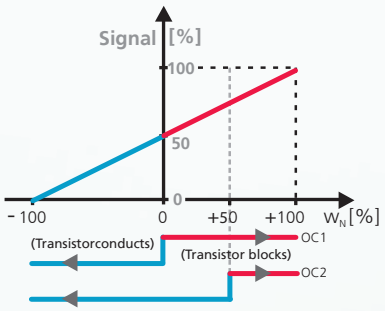


Representation of analog and digital signals SS 20.400 and SS 23.400 ATEX 3

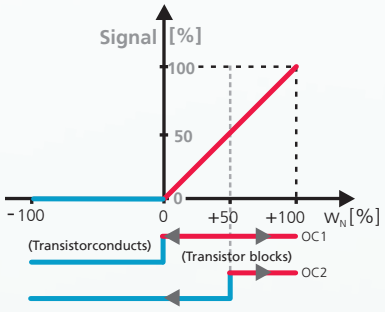
Bidirectional
Representation of direction: Switching output OC1



Bidirectional
Representation of direction: 0 m/s = 50 % signal



Unidirectional
Representation of direction: none



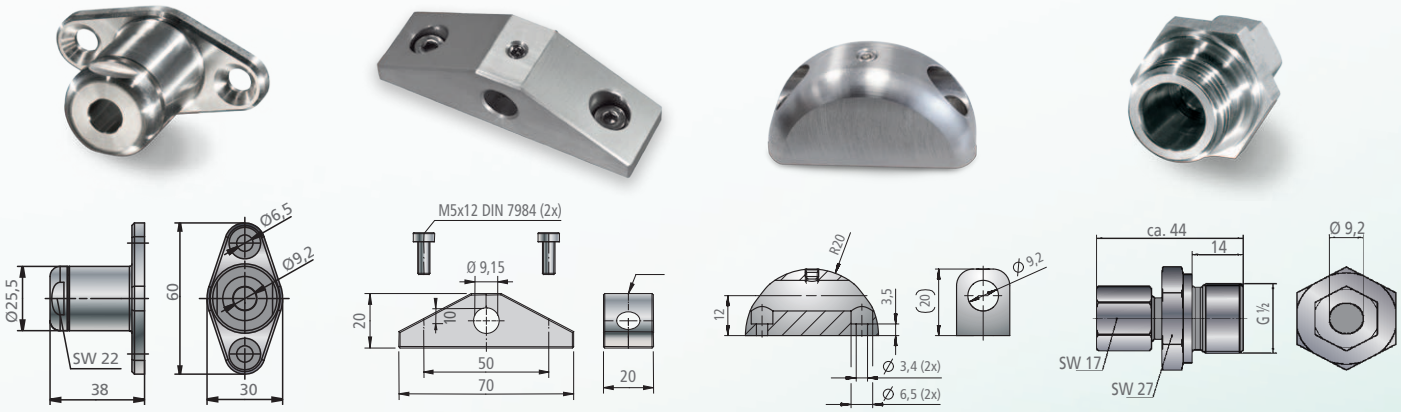
Remark: in an unidirectional design, the switching output OC1 is used as flow indicator by default (configurable). It will clearly show a flow higher than 0 m/s by blocking and will switch if this is less or equal to 0 m/s. Arrows in the representation of the switching outputs mean that the threshold value can be configurated. The factory setting for the switching output OC2 is 50 % of the measurement range (option: customer-specific switch point).

Parameter	Factory setting	Setting range	Note
Response time	1 s	0.01 … 10 s	
Switching output 1 (OC1)	0 m/s	(- 100 …) 0 … + 100 %	Fixed to 0 m/s in bidirectional version with representation of direction via switching output 1 (OC1)
Switching output 2 (OC2)	50 % of measurement range	(- 100 …) 0 … + 100 %	
Switch polarity OC1 / OC2	See graphs „analog and digital signals“	Polarity reversible	

Accessory

LED display of measurement values
(see separate brochure)
To visualize the values directly on site, a LED measurement value display can be supplied.
Advantages:
- Display in m/s or m³/h
- Programmable analog output signal
- Two programmable relay outputs
- Power supply 85 … 250 V AC or 24 V DC
- Power supply of connected sensor
- Option with 2. measuring input

Mounting accessories



Wall mounting flange
Art. no. 520 181
For mounting on walls through wall openings
Material: stainless steel 1.4571, PTFE

Wall mounting bracket
Art. no. 503 895
For mounting in front of wall openings
Material: anodized aluminum

Wall mounting bracket stainless steel
Art. no. 551 740
For mounting in front of wall openings, cleanroom optimized design
Material: stainless steel 1.4571

Through-bolt joint
Art. no. 532 160
For gas-tight mounting in tubes and channels; atmospheric pressure
Material: stainless steel 1.4571, clamping ring PTFE

Order information SCHMIDT® Flow Sensor SS 20.400 and SS 23.400 ATEX 3

	Description	Article number							
Basic sensor	SCHMIDT® Flow Sensor SS 20.400, thermopile sensor head	518 210 -	X	Y	D	Z	R	-	P
	SCHMIDT® Flow Sensor SS 23.400 ATEX 3, thermopile sensor head, ATEX version * (Kat. 3G, Zone 2)	513 970 -						4	
	Options								
Mechanical type	Sensor length 130 mm (for order option ATEX: only with 0 ... 10 V output signal available)		1						
	Sensor length 200 mm		2						
	Sensor length 300 mm		3						
Measurement range	Measurement range 0 ... 1 m/s			1					
	Measurement range 0 ... 2.5 m/s			2					
	Measurement range 0 … 5 m/s			3					
	Measurement range 0 … 10 m/s			4					
	Measurement range 0 … 20 m/s			5					
Measurement direction, adjustment accuracy and calibration	Unidirectional standard adjustment				1				
	Unidirectional standard adjustment with factory calibration certificate				6				
	Bidirectional standard adjustment				2				
	Bidirectional standard adjustment with factory calibration certificate				7				
	Unidirectional high precision calibration incl. factory calibration certificate				3				
	Bidirectional high precision calibration incl. factory calibration certificate				4				
	Unidirectional LF – optimized for Laminar Flow application, high precision, with factory calibration certificate (only for measuring range 1 m/s)				5				
Analog output	0 … 10 V					1			
	4 … 20 mA (for option ATEX not for sensor length 130 mm)					5			
Representation of the direction	Bidirectional: switching output OC 1						1		
	Bidirectional: halved analog signal 0 m/s = 12 mA / 5 V						2		
	Unidirectional						3		
Sensor programming	Factory setting								S
	Customer-specific programming of switching polarity, direction signal and response time								K

	Description	Article number
Accessories	Coupler socket, 7-pin, with soldering sleeves, for cable 0.14 mm² (not for SS 23.400 ATEX 3)	535 278
	Connecting cable Cleanroom 7-pin with coupler socket, 5 m length, open cable ends, PVC	561 972
	Connecting cable Cleanroom like 561 972, but with 20 m length	561 973
	Connection cable with coupler socket, 7-pin, length 5 m, open cable ends	535 279
	Connection cable with coupler socket, 7-pin, variable length (2 … 100 m; step: 1 m)	505 911-4
	Connection cable with angle junction socket, 7-pin, length 10 m, open cable ends	535 281
	Wall mounting flange, stainless steel, clamping ring PTFE	520 181
	Through-bolt joint, stainless steel G½, atmospheric pressure	532 160
	Wall mounting bracket, aluminium anodized	503 895
	Power supply: output 24 V DC / 1 A; input 115 / 230 V AC	535 282
	Wall mounting bracket, stainless steel	551 740
	SCHMIDT® LED display MD 10.010; in wall housing to visualize volumetric flow and flow velocity, 85 … 250 V AC and sensor supply	527 320
	SCHMIDT® LED display MD 10.010; as with 527 320 but with 24 V DC voltage supply	528 240
	SCHMIDT® LED display MD 10.015; in wall housing, similar to 527 320 but with additional sum function and second measuring input	527 330
	SCHMIDT® LED display MD 10.015; as with 527 330 but with 24 V DC voltage supply	528 250
	Assembly kit for pipe assembly, suitable for MD 10.010 / 10.015, including pipe clamps and collar for adjustment to pipe diameter	531 394
	Measuring Section Calibrator set (8 / 12 / 16 mA)	546 741-4

* Use of ATEX sensor is only permitted with original connection cables from SCHMIDT Technology.

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