

Order information SCHMIDT® Flow Sensor SS 20.415 LED and SS 20.515 LED

|                                     | Description  | Article number |   |   |   |   |   |   |   |   |   |
|-------------------------------------|--|----------------|---|---|---|---|---|---|---|---|---|
| Basic sensor                        | SCHMIDT® Flow Sensor SS 20.415 LED<br>Version as thermopile head   | 551 490 -      | A | 1 | C | D | E | F | G | H | I |
|                                     | SCHMIDT® Flow Sensor SS 20.515 LED<br>Version as dumb-bell head  | 551 550 -      | A | B | C | D | 1 | 1 | G | H | 1 |
|                                     | Options  |                |   |   |   |   |   |   |   |   |   |
| Mechanical type                     | Sensor length 150 mm x 300 mm  | 3              |   |   |   |   |   |   |   |   |   |
|                                     | Sensor length 270 mm x 300 mm  | 1              |   |   |   |   |   |   |   |   |   |
|                                     | Sensor length 300 mm (straight)  | 2              |   |   |   |   |   |   |   |   |   |
|                                     | Special length (only straight): _____ mm<br>(>300 ... 1,000 mm; 10 mm steps)   | 9              |   |   |   |   |   |   |   |   |   |
| Protection type                     | Without protective coating   | 1              |   |   |   |   |   |   |   |   |   |
|                                     | With protective coating (only SS 20.515 LED)   | 2              |   |   |   |   |   |   |   |   |   |
| Mechanical fixing                   | Threaded bush M25 with counternut  | 1              |   |   |   |   |   |   |   |   |   |
|                                     | Threaded bush M25 with thread adaptor M25 x 1.5 to PG21  | 2              |   |   |   |   |   |   |   |   |   |
|                                     | Threaded bush M25 with shank nut   | 3              |   |   |   |   |   |   |   |   |   |
|                                     | Welding bush   | 4              |   |   |   |   |   |   |   |   |   |
|                                     | Flange bush  | 5              |   |   |   |   |   |   |   |   |   |
|                                     | Without fixation material  | 6              |   |   |   |   |   |   |   |   |   |
| Measurement range                   | Measurement range 0 ... 1 m/s  |                |   |   |   | 1 |   |   |   |   |   |
|                                     | Measuring range 0 ... 1 m/s, unidirectional, with option LED indication of threshold monitoring (0.45 m/s ±20 %)         |                |   |   |   | 4 |   |   |   |   |   |
|                                     | Measurement range 0 ... 2.5 m/s  |                |   |   |   | 2 |   |   |   |   |   |
|                                     | Measurement range 0 ... 10 m/s   |                |   |   |   | 3 |   |   |   |   |   |
| Measurement direction               | Unidirectional   |                |   |   |   |   | 1 |   |   |   |   |
|                                     | Bidirectional (only SS 20.415 LED)   |                |   |   |   |   | 2 |   |   |   |   |
| Representation of the direction     | Unidirectional   |                |   |   |   |   |   | 1 |   |   |   |
|                                     | Switching output OC 1 = direction signal<br>(only SS 20.415 LED, bidirectional)  |                |   |   |   |   |   | 2 |   |   |   |
|                                     | Representation of the direction with halved analog signal:<br>0 m/s = 12 mA / 5 V (only SS 20.415 LED, bidirectional)    |                |   |   |   |   |   | 3 |   |   |   |
| Output signals                      | 0 ... 10 V   |                |   |   |   |   |   |   | 1 |   |   |
|                                     | 4 ... 20 mA  |                |   |   |   |   |   |   | 2 |   |   |
| Adjustment accuracy and calibration | Standard adjustment without certificate  |                |   |   |   |   |   |   |   | 1 |   |
|                                     | Standard adjustment unidirectional with certificate  |                |   |   |   |   |   |   |   | 4 |   |
|                                     | Standard adjustment bidirectional with certificate (SS 20.415 LED only)  |                |   |   |   |   |   |   |   | 5 |   |
|                                     | High precision calibration incl. ISO calibration certificate   |                |   |   |   |   |   |   |   | 2 |   |
|                                     | High precision calibration incl. ISO calibration certificate, bidirectional (only SS 20.415 LED)                         |                |   |   |   |   |   |   |   | 3 |   |
| Sensor programming                  | Factory setting  |                |   |   |   |   |   |   |   |   | 1 |
|                                     | Customer-specific programming (only SS 20.415 LED): switching polarity, threshold value, splitting signal, response time |                |   |   |   |   |   |   |   |   | 2 |

**SCHMIDT® Flow Sensor  
SS 20.415 LED and SS 20.515 LED**

laminar flow monitoring:  
very precise  
LED operating status indicator  
quick installation

Industrial processes

Cleanroom and pharmaceuticals

**Laminar flow  
safe operations  
at a glance!**

Form 1108/02/2017/2000/2 - Art. No. 552210.02 - Data subject to change





### Flow monitoring in clean rooms and clean zones

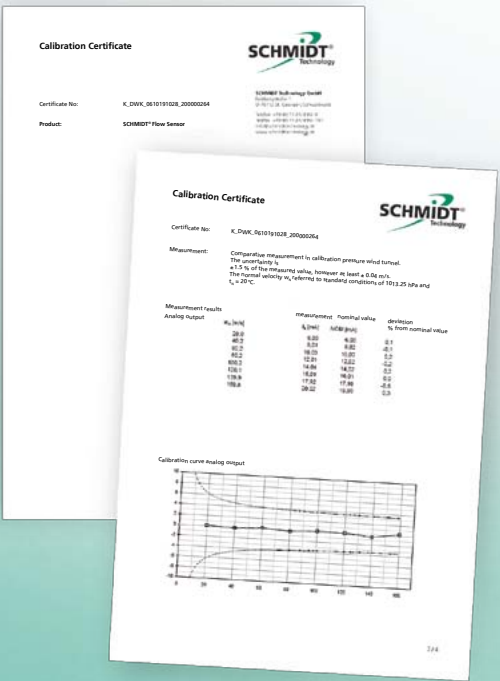
A direction-defined air-flow in clean rooms protects the products against contaminations and unwanted particles will safely be evacuated. To do so, a uniform air flow from the ceiling to the floor ("oriented, low-turbulence displacement flow") is maintained in clean rooms of strong purity levels. The monitoring range is from 0.36 to 0.54 m/s flow velocity (EU GMP guide, Annex 1 in class A). In the clean room the measurements are made behind terminal filters. Since the recirculation of air is reduced during standstill periods, an extremely precise measurement of the air velocity is mandatory from 0.1 m/s on.

### The solution: Air flow measurement by SCHMIDT® Flow Sensors SS 20.515 LED or SS 20.415 LED

According to the standard EN ISO 14644-3, the air velocity is measured at a distance of approx. 150 to 300 mm below the front surface of the filter. To facilitate an installation into ceiling or wall systems, the thermal SCHMIDT® Flow Sensors SS 20.415 LED and SS 20.515 LED are supplied with a cleanroom-compliant quick assembly kit. Both sensors are extremely compact since all electronic components are Oces in the low-turbulence displacement flow. For a use of supply air systems, the SS 20.415 LED offers an option for simultaneous detection of the flow direction – which is interesting in case of back flows.

### Measuring accuracy in black and white

One special feature of these sensors is the compensation and calibration in a novel "vertical flow channel". This offers the advantage that effects from the measurement steps on site are eliminated and highest precision will be achieved. The renowned laser doppler measurement process (LDA) is used as reference measurement process. 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 ISO calibration log. This calibration can be renewed in accordance with the specifications set by the user, which in – general is after one year.



SS 20.515 LED

SS 20.415 LED

Output signal  
4 ... 20 mA/0 ... 10 V

5 mechanical  
fixing options

with protecting cover

Evaluation  
electronics

Temperature  
sensor

Flow sensor

Measuring chamber

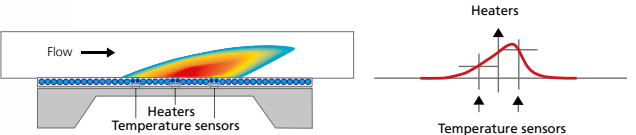
The extreme wide flow angle of 360 degrees radial and 90 degrees vertical eases the positioning in the gas flow.

### Precise measurement of small air velocities

Both SCHMIDT® Flow Sensors SS 20.415 LED and SS 20.515 LED are based on the thermal measurement principle. The mechanical architecture of the sensor element, however, varies.

### SCHMIDT® Flow sensor SS 20.415 LED The "Thermopile" measurement principle

The thermal Flow Sensor SS 20.415 LED is based on and functions with a thermopile sensor. Its heated semi-conductor element detects the cooling air flowing by.



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).

### SCHMIDT® Flow Sensor SS 20.515 LED the dumb-bell head measurement principle

The Flow Sensor that is located in the stainless steel sleeve between the two "disks of the dumb-bell", is heated to more than 40 K above the medium temperature. Which is measured by a separate temperature sensor. The output required to maintain this excessive temperature is used as measure to determine the flow velocity that is presented as "normal velocity". This means that it is not necessary to perform an additional pressure or temperature measurement of the medium. Both dumb-bell disks serve as flow rectifiers so that it is also possible to measure comparably irregular flows.

| Sensor operating status indicator |   |
|-----------------------------------|---|
| ● steady green light              | sensor is ready for operation   |
| ● flashing red light              | malfunction   |
| ● steady red light                | Analog output connected incorrectly   |
| ● flashing orange light           | Measured value outside monitoring window 0.45 m/s ± 20 % (as an order option) |



Always the right choice

Both sensors, the SS 20.415 LED and the SS 20.515 LED, can be used in cleanrooms and comply with the GMP and offer mounting options geared to cleanrooms as well as plug connections allowing for a quick change on site. Depending on the application, both sensors offer additional advantages:

- Can be disinfected using alcohols and H<sub>2</sub>O<sub>2</sub> (VHP-proof)
- Detection even of the smallest air flows from 0.05 and/or 0.06 m/s on
- Self-monitoring and transmission of error signals
- Special lengths of up to 1,000 mm (straight version)

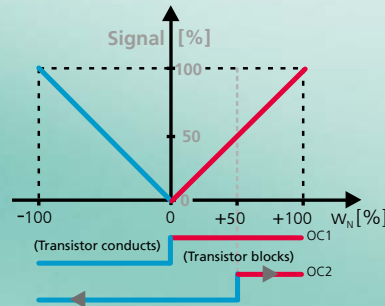
The differences at a glance

|                                    | SS 20.415 LED                      | SS 20.515 LED                     |
|------------------------------------|------------------------------------|-----------------------------------|
| Sensor version                     | Thermopile                         | Dumb-bell head                    |
| Temperature measurement            | -                                  | yes                               |
| Detection of the direction         | yes, bi-directional (as an option) | -                                 |
| Flow angle                         | ± 5°                               | 360°/±45°                         |
| Switching outputs                  | 2 x open collectors                | -                                 |
| For a use with:                    |                                    |                                   |
| Aggressive media                   | no                                 | +<br>++ (with protective coating) |
| Alcohols                           | +                                  | +<br>++ (with protective coating) |
| H <sub>2</sub> O <sub>2</sub>      | ++                                 | ++ (without protective coating)   |
| Response time (t <sub>90</sub> )   | from 0.01 s on                     | approx. 3 s                       |
| Resistance against mechanical load | ++                                 | +*                                |
| Cleaning when turned on            | no                                 | ++                                |
| Customer-specific programming      | yes (as an option)                 | -                                 |

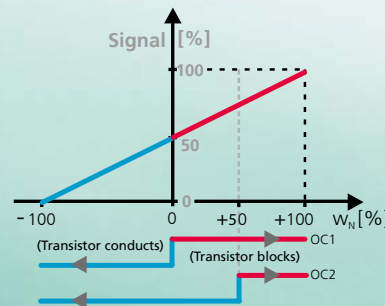
\* with safety bar; - not possible; + well-suited; ++ ideally suited

Representation of the analog and digital signals SS 20.415 LED

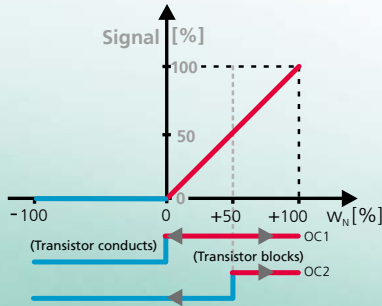
Bidirectional  
Representation of the direction: Switching output OC11



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



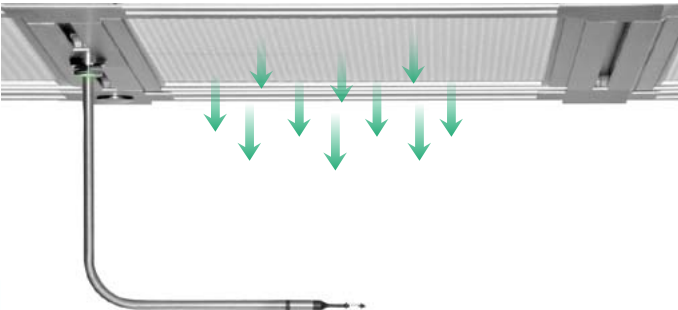
Unidirectional  
Representation of the direction: none



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 configured. The factory setting for the switching output OC2 is 50 % of the measurement range (option: customer-specific switch point).

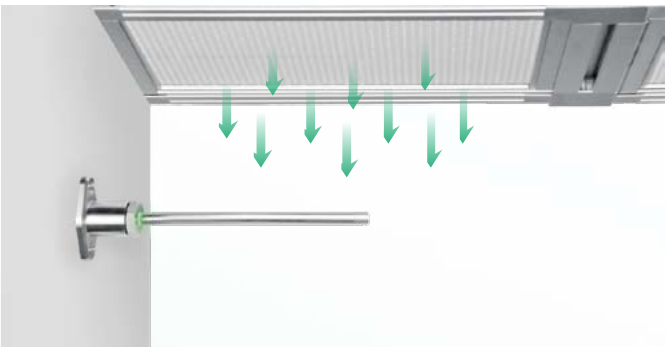
Both sensor types are available both, as 90° angular version for ceilings (150 x 300 mm or 270 x 300 mm) or straight for an integration into walls.

Example 1



SS 20.515 LED (angular; 270 mm x 300 mm), installation to the ceiling below a laminar flow unit (with a type 1 fixation)

Example 2



SS 20.415 LED (straight; ≥ 300 mm), installation to the wall (with a type 5 fixation)

| 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 the bidirectional version with representation of the direction via switching output 1 (OC1) |
| Switching output 2 (OC2) | 50 % of the measurement range           | (- 100 ...) 0 ... + 100 % |   |
| Switch polarity OC1/OC2  | See graphs „analog and digital signals“ | Polarity reversible       |   |

Accessories



Shielded connection cables are available in different lengths.



Coupler socket item no. 535 278

To be used with and to connect to already existing cables (shielded; Ø 0.14 mm)



LED display of the 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 m<sup>3</sup>/h
  - Programmable output signal
  - Two programmable relay outputs
  - Supply 85 - 250 V AC or 24 V DC
  - Power supply of the connected sensor
  - Option with 2nd measuring input



Safety bar item no. 531 026

To protect the bell head against strong mechanical impacts, it is possible to insert a safety bar made of stainless steel to the sensor tube. This is particularly useful for “clean workbenches”, for example, to avoid unwanted contacts during working. This safety bar excludes any form of aerodynamic impact. Dimensions (WxHxL): 53 x 11 x 99 mm

Order information accessories SCHMIDT® Flow Sensor SS 20.415 LED and SS 20.515 LED

| Description  | Article number |
|--|----------------|
| Coupler socket, 7-pin with soldering sleeves for cable Ø 0.14 mm <sup>2</sup>  | 535 278        |
| Connection cable with coupler socket, 5 m length, open cable ends, material PUR  | 535 279        |
| Connection cable with coupler socket, length _____ m, open cable ends (length 2 ... 100 m; 1-m steps)                                      | 505 911-4      |
| Connection cable, 7-pin with angle junction box, 10 m length, open cable ends, material PVC  | 535 281        |
| Power supply: output 24 V DC / 1A; input 115 / 230 V AC  | 535 282        |
| SCHMIDT® LED display MD 10.010 in wall housing to show volume flow and flow velocity, 85 ... 250 V AC and sensor power supply              | 527 320        |
| SCHMIDT® LED display MD 10.010, similar to 527 320 but with 24 V DC voltage supply   | 528 240        |
| SCHMIDT® LED display MD 10.015, similar to 527 320 but with an additional sum function and a second measuring input                        | 527 330        |
| SCHMIDT® LED display MD 10.015, similar to 527 330 but with 24 V DC voltage supply   | 528 250        |
| Assembly kit for tube connection for MD 10.010/10.015 with hose clamps and band to adapt it to the tube's diameter                         | 531 394        |
| Measuring Section Calibrator set (8 / 12 / 16 mA)  | 546 741-4      |
| Attachable protective clip for protection against mechanical influences, stainless steel   | 531 026        |
| Attachable protective 2-wires-clip for protection against mechanical influences, stainless steel, H <sub>2</sub> O <sub>2</sub> -resistant | 559 124        |



Selection of the mechanical fixing options

**Typ 1**

For mounting into ceilings, walls or frames of a thickness of 1 ... 22 mm. To insert a lock nut or a thread into the ceiling, an opening of Ø 26 mm will be required.

**Typ 2**

To be installed to an opening with PG21 thread (e.g. sprinkler openings in profiles) in the frame.

**Typ 3**

For mounting into a frame of a thickness of 21 ... 40 mm, especially for hollow chamber ceiling profiles. Openings of Ø 26 mm and Ø 28.5 mm will be required.

**Typ 4**

For welding into stainless steel ceilings or walls. For a pressure-tight mounting.

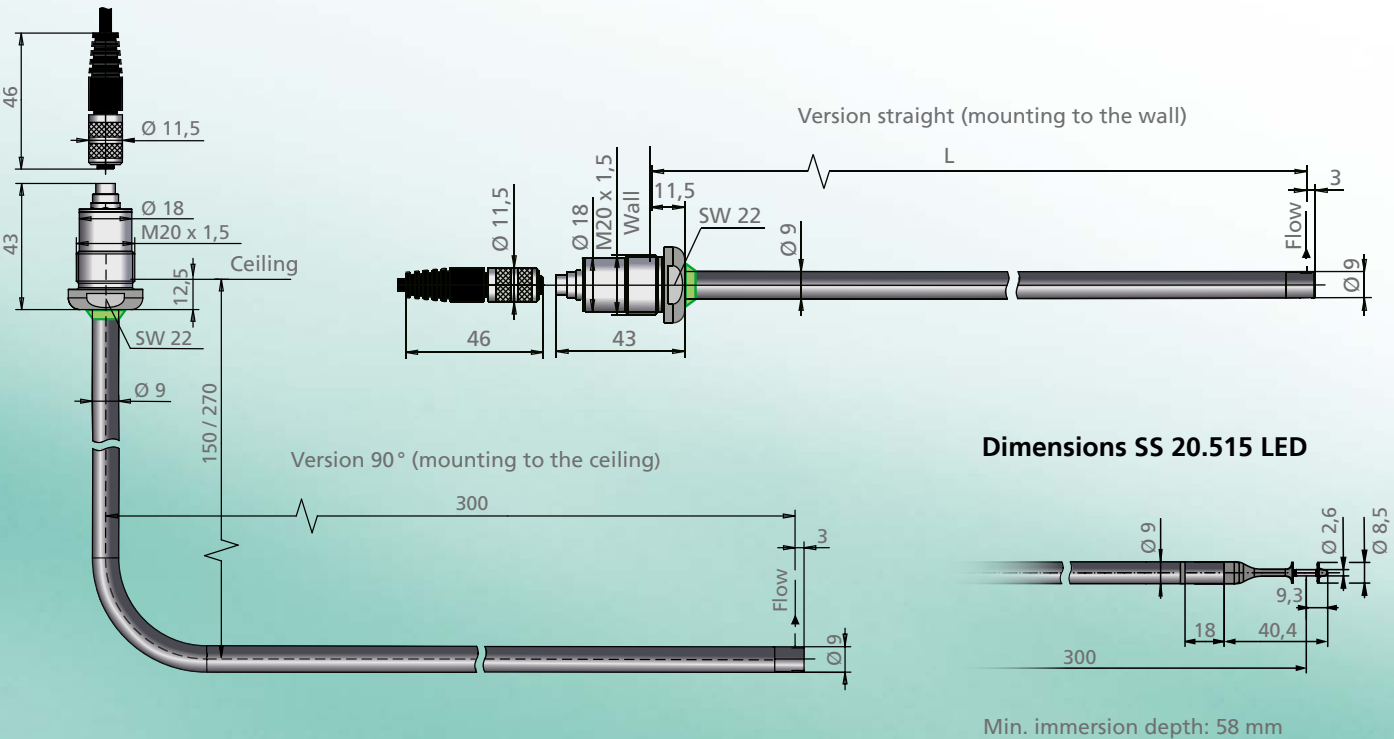
**Typ 5**

Will be installed by two M6 screws below the ceiling or to the wall. Opening in the ceiling/wall of Ø 15 mm required for cable plus 2 M6 threads.

- Scope of supply**

  - Threaded bush M25 (stainless steel 1.4571)
  - Counternut
- Threaded bushing M25 (stainless steel 1.4571)
  - Thread adapter M25 x 1.5 on PG21
- Threaded bush M25 (stainless steel 1.4571)
  - Shank nut
- Welding bush (stainless steel 1.4571)
- Flange bush (stainless steel 1.4404)

Dimensions SCHMIDT® Flow Sensor SS 20.415 LED and SS 20.515 LED (mm)



Technical Data

| Data  | SS 20.415 LED   | SS 20.515 LED  |
|---|---|--|
| Measurement size $w_N$                                  | Normal velocity $w_N$ referred to standard conditions of $T_N = 20^\circ\text{C}$ and $p_N = 1,013.25\text{ hPa}$   |  |
| Measurement medium                                      | Clean air / nitrogen / additional gases on request  |  |
| Measurement ranges flow $w_N$                           | 0 ... 1/2.5/10 m/s  |  |
| Max. display range $w_N$                                | + 10 % above measurement range  |  |
| Lower detection threshold $w_N$                         | 0.05 m/s  | 0.06 m/s   |
| Measurement range temperature $T_M$                     | -20 ... +70 °C  |  |
| Measurement precision                                   |   |  |
| Default $w_N$ <sup>1)</sup>                             | ±(3 % of the measured value + 0.05 m/s)   |  |
| High precision (option) $w_N$ <sup>1)</sup>             | ±(1 % of the measured value + 0.04 m/s)   |  |
| Repeatability $w_N$                                     | ±1 % of the measured value  |  |
| Response time $t_{90} w_N$                              | 0.01 ... 10 s (configurable), 1 s factory sett.   | 3 s (step from 0 to 5 m/s)   |
| Temperature gradient $w_N$                              | < 2 K/min at 5 m/s  |  |
| Measurement precision $T_M$<br>( $w_N > 1\text{ m/s}$ ) | ± 1 K (10 ... 30°C)<br>± 2 K remaining measurement range  |  |
| Operational temperature                                 |   |  |
| Operating temperature                                   | 0 ... +60 °C  | -20 ... +70 °C   |
| Storage temperature                                     | -20 ... +85 °C  |  |
| Material  |   |  |
| Sensor head   | Stainless steel 1.4404  | PBT reinforced by fiber glass, stainless steel 1.4404, protective coating (as an option) |
| Sensor tube   | Stainless steel 1.4404  |  |
| General data  |   |  |
| Medium, environment                                     | non condensating (up to 95 % RH)  |  |
| Operating pressure                                      | atmospheric (700 ... 1.300 hPa)   |  |
| Supply voltage  | 24 V DC ±10 %   |  |
| Power consumption                                       | typ. 30 mA/max. 150 mA  | typ. 80 mA/max. 120 mA   |
| Analog output   | 0 ... 10 V ( $R_L \geq 10\text{ k}\Omega$ ) or 4 ... 20 mA/max. 21,6 mA ( $R_L \leq 300\text{ }\Omega$ ); protected against short-circuit   |  |
| Switching outputs                                       | 2 open collectors, current-limited and protected against short circuits<br>( $\leq 26,4\text{ V DC}/55\text{ mA}$ ), configurable<br>Channel 1 (OC1): direction or threshold value<br>Channel 2 (OC2): threshold value<br>switching hysteresis 5 % of the threshold value, min. ±0.05 m/s |  |
| Error signal  | Only with 4 ... 20 mA output: 2 mA (according to NAMUR NE43)  |  |
| Connection  | Connector M9 screwed, 7-pin, male   |  |
| Maximum line length                                     | Voltage signal: 10 m, current signal: 100 m   |  |
| Mounting position                                       | downdraft direction   |  |
| Type / class of protection                              | IP 65/III (SELV or PELV EN 50178)   |  |
| Sensor length   | angled 150 x 300 mm / 270 x 300 mm, straight 300 mm or customer specific 310 ... 1,000 mm   |  |
| Weight  | approx. 200 g (angled version in 270 x 300 mm)  |  |

<sup>1)</sup> under reference conditions, related to the calibration reference