

## Differential pressure sensor

QBM3020-..., QBM3120-...



### For air and non-aggressive gases

- High degree of measuring accuracy
- Adjustable characteristic curve (pressure-linear or extracting-the-root)
- Operating voltage
  - QBM3020-...: AC 24 V / DC 13,5...33 V
  - QBM3120-...: DC 8...33 V
- Output signal
  - QBM3020-...: DC 0...10 V
  - QBM3120-...: 4...20 mA
- Zero-point adjustment
- Simple and fast mounting thanks to integrated fixing angle bar in the housing
- Maintenance free thanks to excellent long-term response
- Calibrated and temperature-compensated measuring signal
- Supplied with PVC tubing
- Very short reaction time
- Display\* Displays the present differential pressure.

\* Depending on type

## Application

The differential pressure sensor acquires differential, over and under pressure of air and non-aggressive gases, if a high degree of measuring accuracy and quality is required. It is also suited for measuring volume flow via differential pressure since the output signal can be set to extracting the root.

### Fields of application

- Measuring the slightest differential pressures in ventilation and air conditioning ducts
- Check air flows
- Monitor filters and control fans
- Pressure monitoring in labs, production, and clean rooms
- For acquiring variable air flow in VAV plants on the supply and extract air side

## Technical design

### Mode of operation

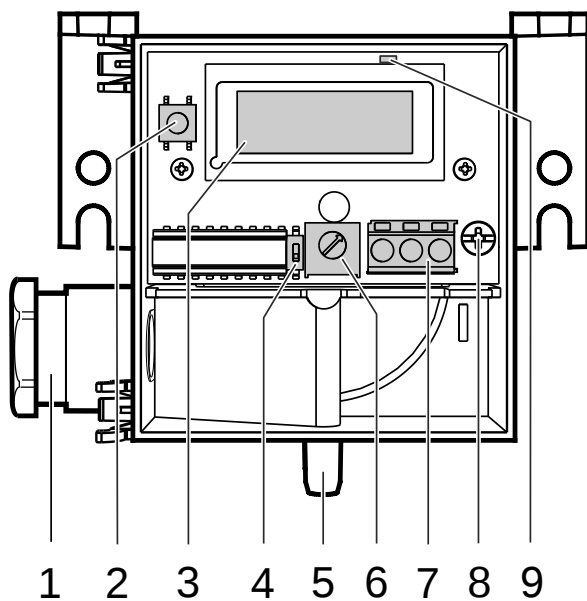
The sensor acquires the differential pressure using a silicon rubber membrane and ceramic bar. Depending on the type of sensor, the sensor generates a linear or extracting-the-root signal DC 0...10 V on the QBM3020-.. or 4...20 mA on the QBM3120.. that is calibrated and compensated for temperature. For extracting-the-root sensors can be adapted individually using the potentiometer.

### Mechanical design

The differential pressure sensor consists of:

- Sensor housing with mounting bracket, cable entry, and removable snap-on cover with safety screw
- Pressure chamber with membrane and ceramic lever
- PCB with terminal connections, DIP switch to switch the characteristic curve (see section "Commissioning [► 7]") and potentiometer for optional end value setting on extracting-the-root characteristic (0... 10 V or 4...20 mA output), LCD on QBM3020-..D and QBM3120-..D.
- Zero-point adjustment button to compensate for mounting position (see section "Commissioning [► 7]")

## Display, setting, and connection elements



### Key

|   |                                                                                                           |   |                                                                                 |
|---|-----------------------------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------------|
| 1 | Cable entry gland Pg 11 with cable strain relief                                                          | 6 | Potentiometer to set amplification at extracting-the-root output characteristic |
| 2 | Button for zero-point adjustment                                                                          | 7 | Terminal block                                                                  |
| 3 | LCD (QBM3020-..D and QBM3120-..D only), to digitally display the sensor signal in Pascal                  | 8 | Safety screw for hinged cover                                                   |
| 4 | DIP switch to change the characteristic (see 'Set characteristic curve' in section 'Commissioning [► 7]') | 9 | LED for zero-point adjustment                                                   |
| 5 | Probes (see section 'Mounting [► 6]')                                                                     |   |                                                                                 |

## Type summary

| Type (ASN) | Ordering number (SSN) | Pressure measuring ranges |                                   | Output signal |
|------------|-----------------------|---------------------------|-----------------------------------|---------------|
|            |                       | Default                   | End value can be set <sup>2</sup> |               |
| QBM3020-1U | S55720-S233           | -50...+50 Pa              | ± (30...50) Pa                    | DC 0...10 V   |
| QBM3020-1  | S55720-S234           | 0...100 Pa                | 50...100 Pa                       | DC 0...10 V   |
| QBM3020-3  | S55720-S235           | 0...300 Pa                | 100...300 Pa                      | DC 0...10 V   |
| QBM3020-5  | S55720-S236           | 0...500 Pa                | 300...500 Pa                      | DC 0...10 V   |
| QBM3020-10 | S55720-S237           | 0...1000 Pa               | 500...1000 Pa                     | DC 0...10 V   |
| QBM3020-25 | S55720-S238           | 0...2500 Pa               | 1600...2500 Pa                    | DC 0...10 V   |

| Type (ASN)               | Ordering number (SSN) | Pressure measuring ranges |                                   | Output signal |
|--------------------------|-----------------------|---------------------------|-----------------------------------|---------------|
|                          |                       | Default                   | End value can be set <sup>2</sup> |               |
| QBM3020-1D <sup>1</sup>  | S55720-S239           | 0...100 Pa                | 50...100 Pa                       | DC 0...10 V   |
| QBM3020-3D <sup>1</sup>  | S55720-S240           | 0...300 Pa                | 100...300 Pa                      | DC 0...10 V   |
| QBM3020-5D <sup>1</sup>  | S55720-S241           | 0...500 Pa                | 300...500 Pa                      | DC 0...10 V   |
| QBM3020-10D <sup>1</sup> | S55720-S242           | 0...1000 Pa               | 500...1000 Pa                     | DC 0...10 V   |
| QBM3020-25D <sup>1</sup> | S55720-S243           | 0...2500 Pa               | 1600...2500 Pa                    | DC 0...10 V   |
| QBM3120-1U               | S55720-S442           | -50...+50 Pa              | ± (30...50) Pa                    | 4...20 mA     |
| QBM3120-1UD <sup>1</sup> | S55720-S569           | -50...+50 Pa              | ± (30...50) Pa                    | 4...20 mA     |
| QBM3120-1                | S55720-S443           | 0...100 Pa                | 50...100 Pa                       | 4...20 mA     |
| QBM3120-3                | S55720-S444           | 0...300 Pa                | 100...300 Pa                      | 4...20 mA     |
| QBM3120-5                | S55720-S445           | 0...500 Pa                | 300...500 Pa                      | 4...20 mA     |
| QBM3120-10               | S55720-S446           | 0...1000 Pa               | 500...1000 Pa                     | 4...20 mA     |
| QBM3120-25               | S55720-S447           | 0...2500 Pa               | 1600...2500 Pa                    | 4...20 mA     |
| QBM3120-1D <sup>1</sup>  | S55720-S448           | 0...100 Pa                | 50...100 Pa                       | 4...20 mA     |
| QBM3120-3D <sup>1</sup>  | S55720-S449           | 0...300 Pa                | 100...300 Pa                      | 4...20 mA     |
| QBM3120-5D <sup>1</sup>  | S55720-S450           | 0...500 Pa                | 300...500 Pa                      | 4...20 mA     |
| QBM3120-10D <sup>1</sup> | S55720-S451           | 0...1000 Pa               | 500...1000 Pa                     | 4...20 mA     |
| QBM3120-25D <sup>1</sup> | S55720-S452           | 0...2500 Pa               | 1600...2500 Pa                    | 4...20 mA     |

<sup>1</sup> Type with digital display (in Pa)

<sup>2</sup> Relevant for applications using extracting the root characteristic

#### Conversion:

100 Pa = 1 hPa = 1 mbar

#### Ordering and delivery

When ordering a differential pressure sensor, please specify the quantity, type, order number, and product designation.

#### Example

| Type (ASN) | Order number (SSN) | Product designation          |
|------------|--------------------|------------------------------|
| QBM3020-3  | S55720-S235        | Differential pressure sensor |

The differential pressure sensor is supplied with 2-meter plastic tubing.  
Additional accessories may be ordered separately.

## Accessories

Additional sets of air duct probes are available depending on measuring requirements. Various mounting brackets are also available depending on installation location.

| Type (ASN) | Order number (SSN) | Description                                                                            |
|------------|--------------------|----------------------------------------------------------------------------------------|
| AQB2000    | BPZ:AQB2000        | Mounting bracket, for mounting sensors in isolated air ducts                           |
| AQB21.2    | BPZ:AQB21.2        | Top hat rail adapters for DIN top hat rails, HT 35-7.5                                 |
| FK-PZ1     | BPZ:FK-PZ1         | Air duct probe, short, stainless steel, with elastic lead-through                      |
| FK-PZ2     | BPZ:FK-PZ2         | Air duct probe, long, aluminum, with orifice plates for precise measuring requirements |

## Product documentation

| Topic              | Title                                                                                  | Document ID |
|--------------------|----------------------------------------------------------------------------------------|-------------|
| Data sheet AQB2000 | Mounting bracket, for mounting sensors in isolated air ducts                           | N1590       |
| Data sheet AQB21.2 | Top hat rail adapters for DIN top hat rails, HT 35-7.5                                 | N1590       |
| Data sheet FK-PZ1  | Air duct probe, short, stainless steel, with elastic lead-through                      | N1589       |
| Data sheet FK-PZ2  | Air duct probe, long, aluminum, with orifice plates for precise measuring requirements | N1589       |

Related documents such as the environmental declarations, declarations of conformity, etc., can be downloaded from the following Internet address:

[www.siemens.com/bt/download](http://www.siemens.com/bt/download)

## Safety

|  <b>CAUTION</b> |                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <b>National safety regulations</b><br>Failure to comply with national safety regulations may result in personal injury and property damage. <ul style="list-style-type: none"> <li>• Observe national provisions and comply with the appropriate safety regulations.</li> </ul> |

## Engineering

|  <b>WARNING</b> |                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | <b>Voltage</b><br>Injury from electrical shock <ul style="list-style-type: none"> <li>• Use a transformer for safety extra-low voltage SELV with separate windings, suited for 100% duty to power the sensor.</li> <li>• Observe permissible cable lengths.</li> <li>• Use shielded cables.</li> </ul> |

|  <b>CAUTION</b> |                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Power supply by SELV or class 2 power supply with limited output of 15 W or less. <ul style="list-style-type: none"> <li>• Use only copper wiring</li> </ul> |

## Mounting

The differential pressure sensor is suited for direct mounting on air ducts, walls, ceilings, or in control panels.

The supplied 2 meter plastic tubing can be modified to the duct connection on the plant.

| <b>NOTICE</b>                                                                       |                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>Condensation in sensor</b><br>Device damage <ul style="list-style-type: none"> <li>• Point the pressure connection nipples in the down position.</li> <li>• Ensure that the pressure connection nipples are higher in the ducts than the sensor probes.</li> </ul> |

### Connect pressure tubing

Connect the pressure tubing for the sensor probes to the differential pressure sensors as follows:

| On the air duct side                            | On the pressure sensor side            |
|-------------------------------------------------|----------------------------------------|
| Tubing with higher pressure side (lower vacuum) | Connect to pressure nipple 'P1' or '+' |
| Tubing with lower pressure side (higher vacuum) | Connect to pressure nipple 'P2' or '-' |

The sensor is supplied with mounting instructions.  
For more information, see section 'Product documentation'.

## Commissioning



The values indicated under 'Technical data' apply only to vertically mounted differential pressure sensors (connection nipples pointing down).

### Sensor calibration



Value deviations are possible when mounted horizontally (housing cover on top or bottom).  
Use zero-point adjustment to compensate for deviations.

### Set characteristic curve

The settings of the characteristic curve (pressure-linear/extracting-the-root) using a DIP switch.

| DIP switch | Characteristic curve                     |
|------------|------------------------------------------|
| *          | Pressure-linear characteristic curve     |
|            | Extracting-the-root characteristic curve |

\* Factory setting

### Zero-point adjustment

1. Wiring connection terminals Do not connect pressuring tubing at this time.
2. Press the zero-point adjustment button for more than 2 seconds until the LED briefly lights up  
The zero-point adjustment is additionally indicated on types with LCD displays of '0 Pa'.  
A menu opens if you press the zero-point button for less than 2 seconds on LCD types.  
It closes automatically by multiple presses or a waiting period of 8 seconds.
3. Connect pressure tubing

## Disposal

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This symbol or any other national label indicate that the product, its packaging, and, where applicable, any batteries may not be disposed of as domestic waste. Delete all personal data and dispose of the item(s) at separate collection and recycling facilities in accordance with local and national legislation.

For additional details, refer to [Siemens information on disposal](#).

| <b>Electrical interface</b> |                                                         |
|-----------------------------|---------------------------------------------------------|
| Power supply                | Safety extra low voltage (SELV/PELV)<br>Or class 2 (UL) |

| <b>QBM3020-..<br/>3-wire</b>   |                                                                                                                                                                 |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating voltage              | AC 24 V ±15 %, 50/60 Hz or DC 13.5...33 V                                                                                                                       |
| Power consumption              | <0.5 VA                                                                                                                                                         |
| Current draw                   | <10 mA                                                                                                                                                          |
| External fusing of supply line | Non-renewable fuse slow to a max. 10 A<br>or<br>Circuit breaker: Max. 13 A type B, C, D per EN 60898<br>or<br>Power source with current limitation of max. 10 A |
| Output signal                  | DC 0...10 V, ( $R_{Load}$ ) > 10 kΩ. (Not galvanically separated,<br>3-wire connection, short-circuit proof, protected against reverse polarity)                |

| <b>QBM3120-..<br/>2-wire</b>                |                                                                                                                                                                                      |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating voltage<br>For ohm loads to 500 Ω | DC 8...33 V<br>DC 18...33 V                                                                                                                                                          |
| Power consumption                           | <0.7 VA                                                                                                                                                                              |
| Current draw                                | 4...20 mA                                                                                                                                                                            |
| Output signal                               | 4...20 mA<br>$R_{Load} < \frac{\text{Supply Voltage} - 8 \text{ V}}{0.02 \text{ A}} \text{ } [\Omega]$<br>2-wire technology, short-circuit proof, protected against reverse polarity |

| <b>Functional data</b> |                                                  |
|------------------------|--------------------------------------------------|
| Measuring range        | See Section 'Type summary'.                      |
| Sensing element        | Piezo-resistive (silicone membrane, ceramic bar) |

| Functional data                                                           |                                                       |
|---------------------------------------------------------------------------|-------------------------------------------------------|
| Measuring accuracy at recommended mounting position and 25 °C temperature | (FS = Full Scale)                                     |
| <b>QBM3x20-10, -10D, -25, -25D</b>                                        |                                                       |
| Zero point, end value                                                     | <±0.7 % FS                                            |
| Sum from linearity, reproducible and hysteresis                           | <±0.6 % FS                                            |
| TC zero point                                                             | <±0,04 % FS/°C                                        |
| TC sensitivity                                                            | <±0,02 % FS/°C                                        |
| <b>QBM3x20-5, -5D</b>                                                     |                                                       |
| Zero point, end value                                                     | <±0,7 % FS                                            |
| Sum from linearity, reproducible and hysteresis                           | <±1 % FS                                              |
| TC zero point                                                             | <±0,04 % FS/°C                                        |
| TC sensitivity                                                            | <±0,05 % FS/°C                                        |
| <b>QBM3x20-3, -3D</b>                                                     |                                                       |
| Zero point, end value                                                     | <±0,7 % FS                                            |
| Sum from linearity, reproducible and hysteresis                           | <±1 % FS                                              |
| TC zero point                                                             | <±0,05 % FS/°C                                        |
| TC sensitivity                                                            | <±0,05 % FS/°C                                        |
| <b>QBM3x20-1U, -1, -1D</b>                                                |                                                       |
| Zero point, end value                                                     | <±1 % FS                                              |
| Sum from linearity, reproducible and hysteresis                           | <±1 % FS                                              |
| TC zero point                                                             | <±0,10 % FS/°C                                        |
| TC sensitivity                                                            | <±0,06 % FS/°C                                        |
| <b>QBM3020-..., QBM3120-...</b>                                           |                                                       |
| Long-term stability                                                       | ±1,0% FS as per DIN IEC 60 770                        |
| Reaction time                                                             | <20 ms                                                |
| Load change                                                               | <10 Hz                                                |
| Tolerable overload on one side                                            |                                                       |
| At P1                                                                     | 5,000 Pa<br>(10,000 Pa for types QBM3x20-5, -10, -25) |
| At P2                                                                     | 400 Pa                                                |

| Functional data                                      |                                                               |
|------------------------------------------------------|---------------------------------------------------------------|
| Bursting pressure<br>At room temperature<br>at 70 °C | 2 x overload<br>1.5 x overload                                |
| Display (QBM3x20-D only)                             | LCD, 2-line, 8 position, alphanumeric, no background lighting |
| Display of:                                          | Differential pressure in Pa                                   |
| Media<br>Permissible medium temperature              | Air and non-aggressive gases<br>0...70 °C                     |
| Maintenance                                          | Maintenance free                                              |

| Pins                                                                                                       |                                                                      |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Electrical connections<br><ul style="list-style-type: none"> <li>Screw terminals for cable lead</li> </ul> | Max 1.5 mm <sup>2</sup> (wire or stranded wire)<br>Cable gland Pg 11 |
| Pressure connection                                                                                        | PVC nipples Ø 6.2 mm                                                 |

| Degree of protection                                        |                       |
|-------------------------------------------------------------|-----------------------|
| Degree of protection of housing at recommended installation | IP54 as per EN 60529  |
| Protection class                                            | III as per EN 60730-1 |

| Ambient conditions                                                                                                        |                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Permissible ambient temperature<br><ul style="list-style-type: none"> <li>Operation</li> <li>Storage/transport</li> </ul> | <ul style="list-style-type: none"> <li>0...+70 °C</li> <li>-25...+70 °C</li> </ul> |

| Standards, directives and approvals               |                                                        |
|---------------------------------------------------|--------------------------------------------------------|
| Electromagnetic compatibility (application range) | For residential, commercial and industrial environment |
| EU conformity (CE)                                | See EU declaration of conformity *)                    |
| UK compliance (UKCA)                              | See UK declaration of conformity *)                    |
| RCM Conformity                                    | See RCM declaration of conformity *)                   |

### Environmental compatibility

The product environmental declaration \*) contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

### Dimensions (weight)

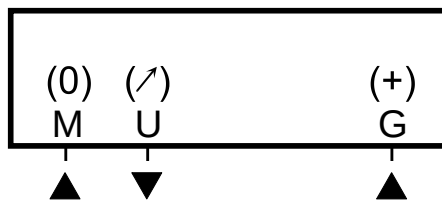
|                                       |          |
|---------------------------------------|----------|
| Weight (with packaging)               | 0.183 kg |
| Weight (with packaging), with display | 0.196 kg |

\*) The documents can be downloaded at [www.siemens.com/bt/download](http://www.siemens.com/bt/download).

## Connection diagrams

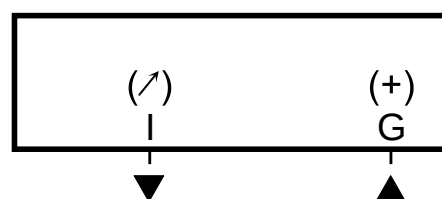
### Terminals

#### QBM3020-xx



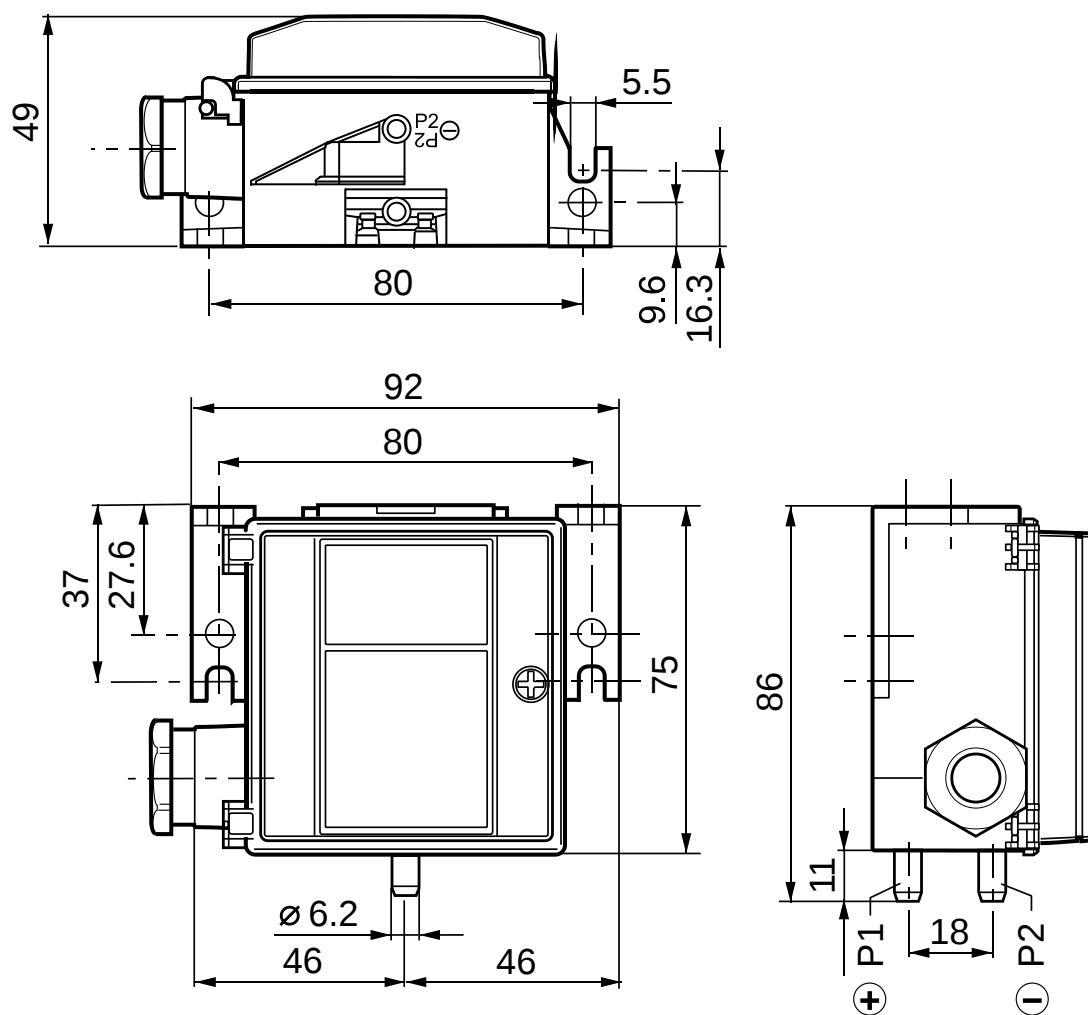
|       |                                             |
|-------|---------------------------------------------|
| G (+) | Operating voltage AC 24 V or DC 13.5...33 V |
| M (0) | GND, measuring neutral                      |
| U (↗) | Measuring signal DC 0...10 V                |

#### QBM3120-xx



|       |                               |
|-------|-------------------------------|
| G (+) | Supply voltage DC 8...33 V    |
| I (↗) | Measuring signal DC 4...20 mA |

## Dimensions



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