



QBM3020-..

QBM3020-..D

Differential pressure sensor

QBM3020-...

for air and non-aggressive gases

- High degree of measuring accuracy
- Adjustable characteristic curve (pressure-linear or extracting-the-root)
- Operating voltage AC 24 V or DC 13.5...33 V
- Output signal DC 0...10 V
- Zero-point adjustment
- Simple and fast mounting thanks to integrated fixing angle bar in the housing
- Maintenance free thanks to excellent long-term stability
- Calibrated and temperature-compensated measuring signal
- Supplied with plastic tubing
- Very short response time
- Actual value display*

* Depending on type

Application

The differential pressure sensor acquires differential, over and under pressure of air and nonaggressive 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 supervision in labs, production, and clean rooms
- For acquiring variable air flow in VAV plants on the supply and extract air side

Type summary

| Type (ASN) | Product number (SSN) | Pressure measuring ranges | | Output signal |
|---------------------------------|----------------------|---------------------------|-----------------------------------|---------------|
| | | Standard | End value can be set ² | |
| QBM3020-1U | S55720-S233 | –50... +50 Pa | ± (30... 50) Pa | 0...10 V DC |
| QBM3020-1 | S55720-S234 | 0...100 Pa | 50... 100 Pa | 0...10 V DC |
| QBM3020-3 | S55720-S235 | 0...300 Pa | 100... 300 Pa | 0...10 V DC |
| QBM3020-5 | S55720-S236 | 0...500 Pa | 300... 500 Pa | 0...10 V DC |
| QBM3020-10 | S55720-S237 | 0...1000 Pa | 500... 1000 Pa | 0...10 V DC |
| QBM3020-25 | S55720-S238 | 0...2500 Pa | 1600... 2500 Pa | 0...10 V DC |
| QBM3020-1D ¹ | S55720-S239 | 0...100 Pa | 50... 100 Pa | 0...10 V DC |
| QBM3020-3D ¹ | S55720-S240 | 0...300 Pa | 100... 300 Pa | 0...10 V DC |
| QBM3020-5D ¹ | S55720-S241 | 0...500 Pa | 300... 500 Pa | 0...10 V DC |
| QBM3020-10D ¹ | S55720-S242 | 0...1000 Pa | 500... 1000 Pa | 0...10 V DC |
| QBM3020-25D ¹ | S55720-S243 | 0...2500 Pa | 1600... 2500 Pa | 0...10 V DC |

¹ Type with digital display (in Pa)

² Relevant for application 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, and product name.

Example

| Type (ASN) | Product 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 | Name | Data sheet |
|----------------|----------------------------------------------------------------------------------------|------------|
| AQB2000 | Mounting bracket, for mounting sensors in isolated air ducts | N1590 |
| AQB21.2 | Top hat rail adapters (5 pieces) for DIN top hat rails, HT 35-7.5 | N1590 |
| FK-PZ1 | Air duct probe, short, stainless steel, with elastic lead-through | N1589 |
| FK-PZ2 | Air duct probe, long, aluminum, with orifice plates for precise measuring requirements | N1589 |

Mode of operation

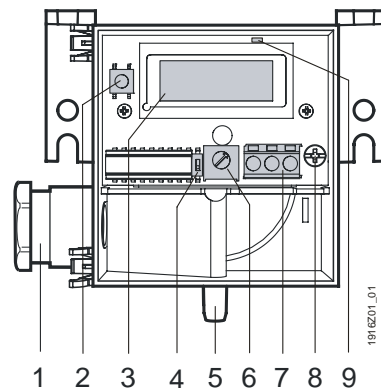
The sensor acquires the differential pressure using a silicon rubber membrane and ceramic bar. Depending on the type of sensor, the sensor generates a linear or extracting-the-root signal DC 0...10 V, that is calibrated and compensated for temperature. The individual adjustment of the pressure measurement range for extracting-the-root sensors is done by means of a 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 Commissioning notes) and potentiometer for optional end value setting on extracting-the-root characteristic (0...10 V output)
- LCD on QBM3020...D
- Zero-point adjustment button to compensate for mounting position (see "Commissioning notes")

Display, setting and connection elements



Key

- 1 Cable entry gland Pg 11 with cable strain relief
- 2 Push-button for zero-point adjustment
- 3 LCD display (**QBM3020-..D** only), to digitally display the sensor signal in Pascal
- 4 DIP switch to change the characteristic (see "Set characteristic curve under "Commissioning notes")
- 5 Connection nipples (see "Mounting notes")
- 6 Potentiometer to set amplification at extracting-the-root output characteristic
- 7 Terminal block
- 8 Safety screw for hinged cover
- 9 LED for zero-point adjustment

Engineering notes

The transformer used must be suited for safety extra low voltage (SELV). It must have separate windings and be designed for 100 % duty. Transformer size and fuse must comply with local safety regulations.

Observe maximum permissible cable lengths.

If cable lengths exceed 50 meters and run parallel to the mains cables: Use shielded cables!

Mounting and Installation notes

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. To achieve the housing protective class indicated under "Technical data", the differential pressure sensors must be mounted with the pressure nipple facing down. In addition, they should be higher than the air duct probes.

Caution

If the pressure connection nipples point upward or are at a lower level than the air duct probes, condensation can collect inside the sensor, causing damage to the device.

Note

The pressure tubing for the sensor nipples are connected as follows to the differential pressure sensors:

| 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 detailed information on installation and mounting position, refer to the [Sensor Installation Guide](#) in BT download center.

Caution

- Power supply by SELV or class 2 power supply with limited output of 15 W or less (UL requirement)
- Use only copper wiring

Commissioning notes

Caution



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

Sensor calibration

Value deviations are possible for horizontal mounting (housing cover on top or bottom). These deviations can be compensated for by using the zero-point adjustment. See "Zero-point adjustment" below.

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

See also Display, setting and connection elements

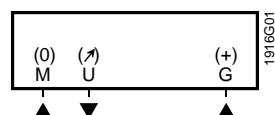
1. Wiring connection terminals – Do not connect pressure tubing at this time.
2. Press the zero-point adjustment button for more than 2 seconds until the LED briefly lights up. The zero-point adjustment is additionally indicated on types with LCD displays with "0 Pa".
A menu opens if you press the zero-point 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

Technical data

| | | |
|-----------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| Electrical interface | Power supply | Safety extra low voltage (SELV/PELV) |
| | Operating voltage | AC 24 V \pm 15 %, 50/60 Hz or DC 13.5...33 V |
| | Power consumption | <0.5 VA |
| | Current draw | < 10 mA |
| | Output voltage | DC 0 ...10 V |
| | Burden (R_{Load}) | >10 k Ω |
| | Output | Not galvanically separated, 3-wire connection, short-circuit proof, protected against reverse polarity |
| Functional data | Measuring range | refer to "Type summary" |
| | Sensing element | Piezo-resistive (silicone membrane, ceramic bar) |
| | Measuring accuracy at recommended mounting position and 20 °C ambient temperature | (FS = Full Scale) |
| | for QBM3020-10, -10D, -25, -25D | |
| | – Zero point, end value | < \pm 0.7 % FS |
| | – Sum from linearity, reproducible and hysteresis | < \pm 0.6 % FS |
| | – TC zero point | < \pm 0.04 % FS/°C |
| | – TC sensitivity | < \pm 0.02 % FS/°C |
| | for QBM3020-5, -5D | |
| | – Zero point, end value | < \pm 0.7 % FS |
| | – Sum from linearity, reproducible and hysteresis | < \pm 1 % FS |
| | – TC zero point | < \pm 0.04 % FS/°C |
| | – TC sensitivity | < \pm 0.05 % FS/°C |
| | for QBM3020-3, -3D | |
| | – Zero point, end value | < \pm 0.7 % FS |
| | – Sum from linearity, reproducible and hysteresis | < \pm 1 % FS |
| | – TC zero point | < \pm 0.05 % FS/°C |
| | – TC sensitivity | < \pm 0.05 % FS/°C |
| | for QBM3020-1U, -1, -1D | |
| | – Zero point, end value | < \pm 1 % FS |
| | – Sum from linearity, reproducible and hysteresis | < \pm 1 % FS |
| | – TC zero point | < \pm 0.1 % FS/°C |
| | – TC sensitivity | < \pm 0.06 % FS/°C |
| | Long-term stability | \pm 1,0% FS as per DIN IEC 60770 |
| | Response time | <20 ms |
| | Load change | < 10 Hz |

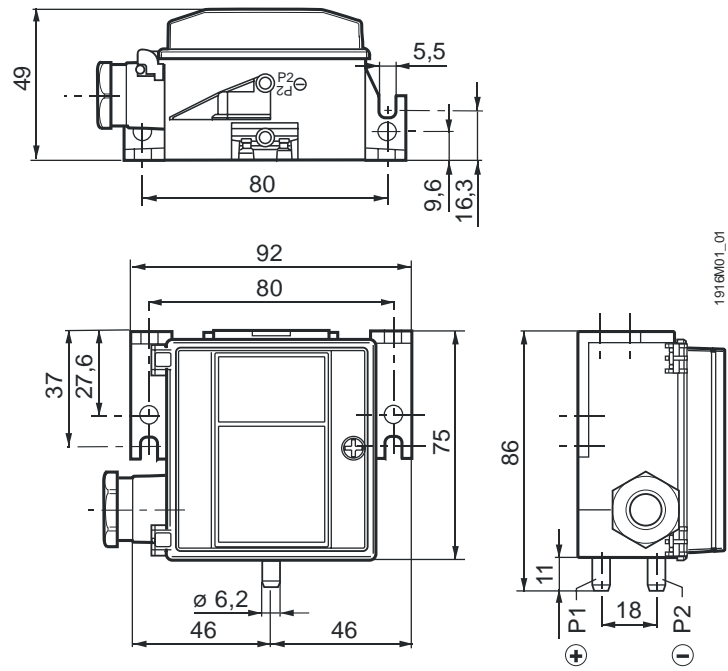
| | | |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| | Tolerable overload on one side | |
| | At P1 | 5,000 Pa (10,000 Pa for types QBM3020-5, -10, -25) |
| | At P2 | 400 Pa |
| Degree of protection | Rupture pressure | |
| | 0...70 °C | 1.5 x overload |
| | at room temperature | 2 x overload |
| | Display (on QBM3020-...D only) | LCD, 2-line, 8 position each, alphanumeric, not background lit |
| | Display of | Differential pressure in Pa |
| | Media | Air and non-aggressive gases |
| | Admissible medium temperature | 0...70 °C |
| | Maintenance | Maintenance free |
| | Housing | IP 54 as per IEC 60 529 |
| | Protection class | III as per EN 60 730 |
| Connections | Electrical connection | |
| | Screw terminals for cable lead | max. 1.5 mm ² (wire or stranded wire) cable gland entry Pg 11 |
| Environmental conditions | Pressure connection | PVC nipples Ø 6.2 mm |
| | Permissible ambient temperature | |
| | Operation | 0...70 °C |
| | Transport and storage | -25...+70 °C |
| Directives, standards | Permissible ambient humidity | <90 % r. F. (without condensation) |
| | CE conformity as per | |
| | EMC guidelines | 2004/108/EC |
| | Immunity, emissions | EN 61 326-1, EN 61 326-2-3 |
| | RoHS Directive | 2011/65/EU |
| | Technical RoHS documentation | EN 50 581 |
| | C conformity emissions | AS /NZS 61000-6-3 |
| | UL approval as per | UL 60730-1 / UL 60730-2-6 |
| Environmental compatibility | The product environmental declaration | ISO 14001 (Environment) |
| | CE1E1916en contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal) | ISO 9001 (Quality) |
| Dimensions (weight) | Weight (with packaging), without display | 0.183 kg |
| | Weight (with packaging), with display | 0.196 kg |

Connection terminals



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

Dimensions



Dimensions in mm

