

Differential pressure sensors

QBM32xx



for air and non-aggressive gases

- High degree of measuring accuracy
- Selectable measuring range
- Selectable output:
 - DC 0...10 V
 - DC 0...5 V (units with display only)
 - 4...20 mA, 3-wire
 - 4...20 mA, 2-wire
- Zero-point adjustment
- Integrated mounting bracket for simple installation
- Excellent long-term stability for maintenance free operation
- Calibrated and temperature-compensated measuring signal
- Very short response time
- Optional LCD
- Adjustable characteristic curve (pressure-linear or extracting-the-root)

Use

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

The differential pressure sensor is used for:

- Measuring the differential pressures in ventilation and air conditioning ducts
- Verifying air volume flow
- Monitoring filters and control fans
- Pressure supervision in labs, production, and clean rooms
- Acquiring variable air flow in VAV systems

Functions

Mode of operation

The sensor acquires the differential pressure using a silicon rubber membrane and a ceramic bar. The sensor generates a linear or extracting-the-root which is calibrated and compensated for temperature.

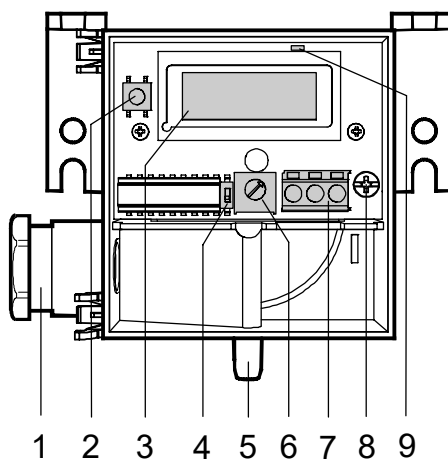
The individual adjustment of the pressure measurement range for extracting-the-root sensors is done by means of a potentiometer.

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 switches for configuration and potentiometer for optional end value setting on extracting-the-root characteristic
- LCD (D models only)
- Zero-point adjustment button to compensate for mounting position (see Commissioning [► 5])

Display, settings and connection elements



- | | | | |
|---|---|---|---|
| 1 | ½" conduit connection | 6 | Potentiometer to set amplification at extracting-the-root output characteristic |
| 2 | Push-button for zero-point adjustment | 7 | Terminal block |
| 3 | LCD (D models only), to digitally display the measured value | 8 | Safety screw for hinged cover |
| 4 | DIP switches to change the characteristic, select measuring range and output signal | 9 | LED for zero-point adjustment |
| 5 | Process connections for ¼" tubing | | |

Type summary

| Type | Order number | Pressure measuring ranges | | |
|----------------|--------------|-----------------------------------|---------------------------------|---------------------------------|
| | | Range 1 | Range 2 | Range 3 |
| QBM3230U03UD * | S55720-S522 | -0.3" to +0.3" -100 to +100 Pa | -0.2" to +0.2" -50 to +50 Pa | -0.1" to +0.1" -30 to +30 Pa |
| QBM3230U1D * | S55720-S523 | 0" to 1" 0 to 300 Pa | 0" to 0.5" 0 to 100 Pa | 0" to 0.3" 0 to 50 Pa |
| QBM3230U2D * | S55720-S524 | 0" to 2" 0 to 500 Pa | 0" to 1" 0 to 300 Pa | 0" to 0.5" 0 to 100 Pa |
| QBM3230U3D * | S55720-S525 | 0" to 3" 0 to 1000 Pa | 0" to 2" 0 to 500 Pa | 0" to 1" 0 to 300 Pa |
| QBM3230U5D * | S55720-S526 | 0" to 5" 0 to 1600 Pa | 0" to 3" 0 to 1000 Pa | 0" to 2" 0 to 500 Pa |
| QBM3230U10D * | S55720-S527 | 0" to 10" 0 to 2500 Pa | 0" to 5" 0 to 1600 Pa | 0" to 3" 0 to 1000 Pa |
| QBM3230U20D * | S55720-S528 | 0" to 20" 0 to 5000 Pa | 0" to 10" 0 to 2500 Pa | 0" to 5" 0 to 1600 Pa |

* With digital display

Accessories

Additional sets of air duct probes are available depending on measuring requirements.

| Type | Order number | Designation |
|-------------|--------------|----------------------------------|
| BPZ:536-376 | 536-376 | Pitot tube assembly for 6" duct |
| BPZ:536-378 | 536-378 | Pitot tube assembly for 8" duct |
| BPZ:536-380 | 536-380 | Pitot tube assembly for 10" duct |
| BPZ:536-382 | 536-382 | Pitot tube assembly for 12" duct |
| BPZ:536-384 | 536-384 | Pitot tube assembly for 14" duct |
| BPZ:269-062 | 269-062 | Static pressure probe |

Product documentation

| Topic | Title | Document ID: |
|-------------------------|---------------------------------------|--------------|
| Mounting / installation | Differential Pressure Sensors QBM32xx | A6V12093752 |

Related documents such as environmental declarations, CE declarations, etc., can also be downloaded at the following Internet address:

www.siemens.com/bt/download


Notes

Engineering

The transformer used must be suited for safety extra low voltage (SELV) when using an AC power supply. 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 150 feet and run parallel to the mains cables, use shielded cables!

| ⚠ WARNING | |
|---|---|
|  | <p>No internal line protection for supply lines to external consumers</p> <p>Risk of fire and injury due to short-circuits</p> <ul style="list-style-type: none"> Adapt the line diameters as per local regulations to the rated value of the installed fuse. |

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


To achieve the housing protective class indicated in chapter 'Technical data [▶ 9]', the differential pressure sensors must be mounted with the pressure nipple facing down. In addition, they should be higher than the air duct probes.

| ⚠ WARNING | |
|---|---|
|  | <p>If the pressure connection nipples point upwards or are at a lower level than the air duct probes, condensation can collect inside the sensor, causing damage to the device.</p> |

| NOTICE | |
|---|--|
|  | <p>The pressure tubing for the sensor nipples are connected as follows to the differential pressure sensors.</p> |

| 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.

| ⚠ WARNING | |
|---|--|
|  | <p>Power supply by SELV or class 2 power supply with limited output of 15 W or less (UL requirement)</p> <p>Use only copper wiring.</p> |

⚠ CAUTION



The values indicated in chapter 'Technical data [▶ 9]' 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 section 'Zero-point adjustment' below.

Set DIP switches

DIP switches 1-3 are used to select the measuring range. Switches 4-8 are used to select the output signal. Switch 9 is used to turn filter on or off. Switch 10 is used to select standard linear output or root extraction.

| Factory Settings | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-----------------------------|---------------------------------|-------------------|---|---|---|---|---|---|---|---|----|
| | | 1 (ON) 0 (OFF) | | | | | | | | | |
| Pressure Range ¹ | Measuring Range 1 | 0 | 0 | | | | | | | | |
| | Measuring Range 2 | 0 | 1 | | | | | | | | |
| | Measuring Range 3 | 1 | 0 | | | | | | | | |
| Output | 0...10 V, 3-wire ² | | | 1 | 1 | 0 | 0 | 0 | 0 | - | - |
| | 0...20 mA, 3-wire | | | 0 | 1 | 1 | 1 | 0 | 1 | - | - |
| | 4...20 mA, 3-wire | | | 0 | 1 | 1 | 0 | 0 | 1 | - | - |
| | 4...20 mA, 2-wire | | | 0 | 0 | 1 | 1 | 1 | 0 | - | - |
| Filter | 0 = OFF, 1 = ON | | | | | | | | | x | - |
| Signal | 0 = Linear, 1 = Root Extraction | | | | | | | | | | x |

¹ Refer to 'Type summary [▶ 3]'.

² Units with display may be configured for 0...5 V or 0...10 V output

Zero-point adjustment

See also Display, setting and connection elements.

- a) Do not connect pressure tubing at this time.
- b) 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 LCDs with '0 in'.
- a) Connect pressure tubing.


Setup parameters (D units only)

- a) Press the zero-point button for less than 2 seconds to access the setup parameters.
 ⇒ Menu closes after 8 seconds or multiple presses of the button.

| Display | Definition | Available options | Notes |
|---------------------------------|---|---|---|
| x.xx in H ₂ O | Current DP reading in selected units | Not selectable | Press and hold push button to reset zero point |
| FS: x.xx In H ₂ O | Upper limit of current measuring scale | Not selectable | Adjust Turbo-Pot to fine tune upper limit of measuring range down to 50 % of standard value |
| Display: Pressure | Identifies selected display type | Pressure in selected units % of full scale | - |
| Unit: in H ₂ O | Identifies selected display units | Inches water column mbar Pa kPa hPa | - |
| Output: Xxxxx | Displays selected output signal (selectable only if DIP switches are configured for voltage output) | 0...10 V 0...5 V | Use DIP switches to select voltage or current outputs |
| Range %: 0 / 100 | - | 0 / 100 10 / 90 100 / 100 100 / 0 | - |
| Filter: 0.02 s | - | 0.02 seconds 1 second 5 seconds 20 seconds | - |

| Display | Definition | Available options | Notes |
|-----------------|------------|------------------------|---|
| Light: 5 min | - | Off On 5 minutes | - |
| Serial | - | Not selectable | Press and hold pushbutton to view serial number. Press again to view FW number Press again to view run time in minutes Press again times to view run time in hours |
| Factory Reset? | - | Not selectable | Press and hold pushbutton to activate reset sequence. Press and hold pushbutton to confirm. Note: Does not reset DIP switch values |

Disposal

| | |
|---|---|
|  | <p>The device is considered an electronic device for disposal in accordance with European Directive and may not be disposed of as domestic waste.</p> <ul style="list-style-type: none"> • Use only designated channels for disposing the devices. • Comply with all local and currently applicable laws and regulations. |
|---|---|

Warranty

Technical data on specific applications are valid only together with Siemens products. Siemens rejects any and all warranties in the event that third-party products are used.

| Electrical interface | |
|-----------------------------|---|
| Power supply | Safety / protective extra low voltage (SELV / PELV) or class 2 (UL) |

| 0...10 V output | |
|---------------------------------|---|
| 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 supply line protection | Fuse slow max. 10 A or Circuit breaker max. 13 A Characteristic B, C, D according to EN 60898 or Power source with current limitation of max. 10 A |
| Output voltage | DC 0 ...10 V |
| Burden (R _{Load}) | >10 kW |
| Output | Not galvanically separated, 3-wire connection, short-circuit proof, protected against reverse polarity |

| 4-20mA Output | |
|---|---|
| Operating voltage for ohm loads of up to 500 Ω | DC 8...33 V DC 18...33 V |
| Power consumption | <0.7 VA |
| Current draw | 4...20 mA |
| Output | 4...20 mA $R_{LOAD} < \frac{\text{SupplyVoltage} - 8 \text{ V}}{0.02 \text{ A}} [\Omega]$ 2-wire technology (inherently short-circuit proof and reversed polarity protected) |

| Functional data | |
|------------------------|--|
| Measuring range | Refer to Type summary [▶ 3] |
| Sensing element | Piezo-resistive (silicone membrane, ceramic bar) |

| | |
|---|---|
| Measuring accuracy at recommended mounting position and 20 °C ambient temperature | ±1% full scale ±0.03" below 1" |
| Long-term stability | ±1.0% FS as per DIN IEC 60770 |
| Response time Load change | <20 ms <10 Hz |
| Tolerable overload on one side At P1 At P2 | 20 inches H ₂ O (40 inches H ₂ O for QBM3xxxU15) 1.6 inches H ₂ O |
| Rupture pressure 32...158°F (0...70 °C) at room temperature | 1.5 x overload 2 x overload |
| Display (D models only) Display of | LCD, 2-line, 8 position each, alphanumeric, not background lit Differential pressure in inches H ₂ O |
| Media | Air and non-aggressive gases |
| Admissible medium temperature | 32...158 °F (0...70 °C) |
| Maintenance | Maintenance free |

Degree of protection


| | |
|------------------------------|---------------------------------------|
| Protection degree of housing | IP54 according to EN 60529 (≈NEMA 3S) |
| Protection class | III according to IEC/EN60730-1 |

Connections

| | |
|--|-------------------------------------|
| Electrical connection Screw terminals for cable lead | Max. 16 AWG (wire or stranded wire) |
| Pressure connection | Barbed fittings for ¼" tubing |

Environmental conditions

| | |
|---|---|
| Permissible ambient temperature Operation Transport and storage | 32...158 °F (0...70 °C) -13...+158 °F (-25...+70 °C) |
| Permissible ambient humidity | <90 % r. F. (without condensation) |

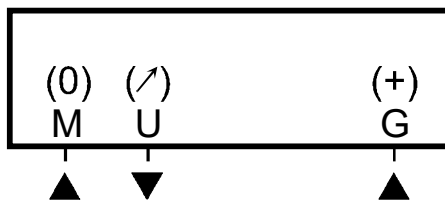
| Standards, directives and approvals | |
|---|---|
| Product standard | EN 61326-2-3:2013 Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements |
| Electromagnetic compatibility (Applications) | For use in residential, commercial, light-industrial and industrial environments |
| EAC conformity | Eurasia conformity |
|  | UL 60730-1 / UL 60730-2-6 http://ul.com/database |

| Dimensions (weight) | |
|--|-------------------|
| Weight (with packaging), without display | 6.5 oz (0.183 kg) |
| Weight (with packaging), with display | 7.0 oz (0.196 kg) |

*) The documents can be downloaded from <http://siemens.com/bt/download>.

Connection terminals

3-wire output

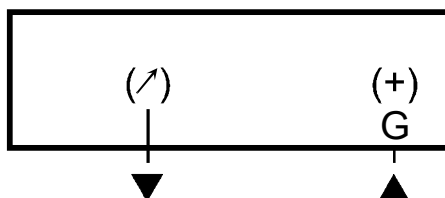


G (+) Operating voltage AC 24 V or DC 13.5...33 V

M (0) GND, measuring neutral

U (↗) Measuring signal DC 0...10 V

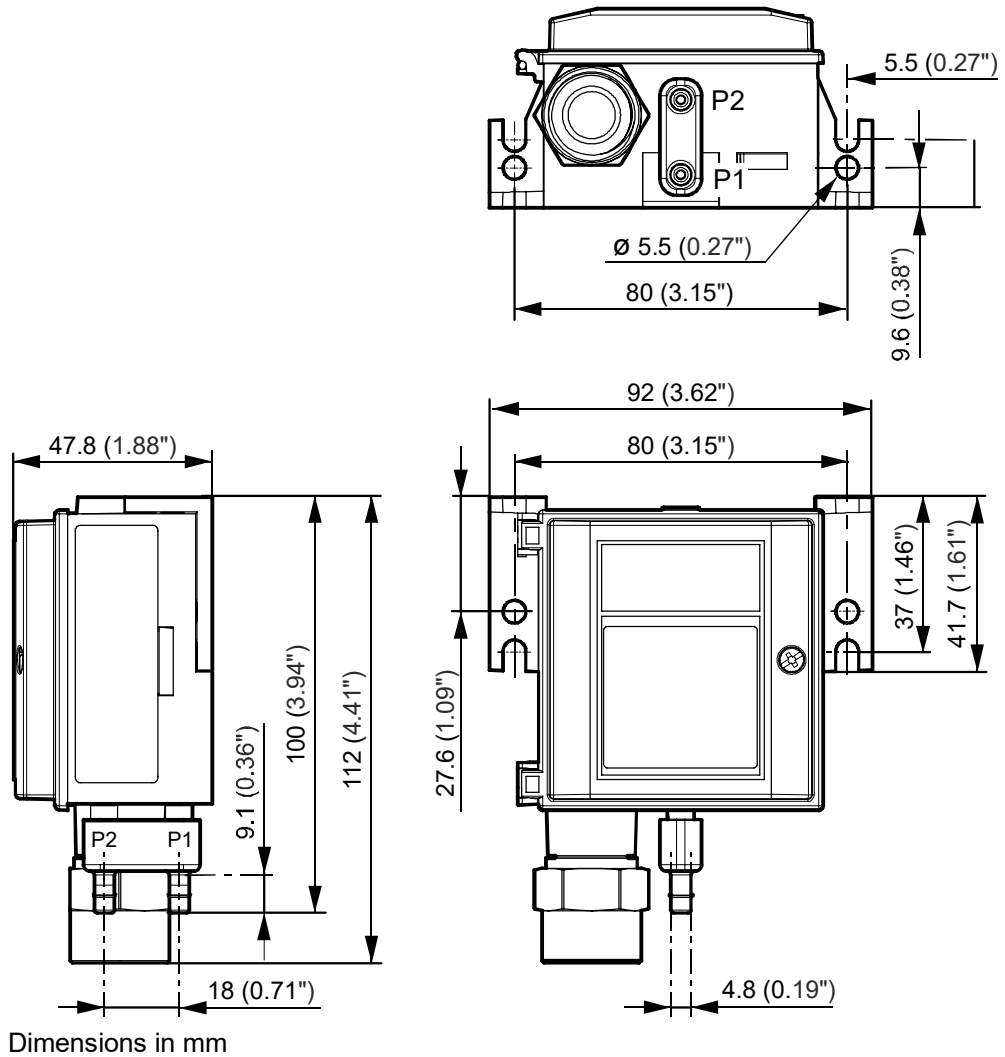
2-wire output



G (+) Supply voltage DC 8...33 V

I (↗) Measuring signal DC 4...20 mA

Dimensions



NOTICE



Conduit connection is for standard 1/2" conduit
System connections 3/16" O.D. barbed for 1/4" push on tubing