SIEMENS

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

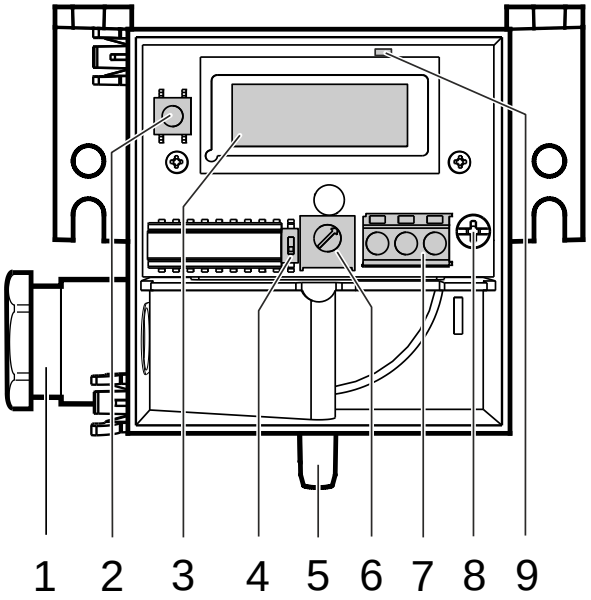
The sensor acquires the differential pressure using a silicon rubber membrane and ceramic bar. Depending on the type of sensor, the sensor generates a linear or extracting-the-root signal DC 0...10 V on the QBM3020-.. or 4…20 mA on the QBM3120.. that is calibrated and compensated for temperature. For 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 ²	
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 [2]	
QBM3020-1D [1]	S55720-S239	0...100 Pa	50...100 Pa	DC 0…10 V
QBM3020-3D [1]	S55720-S240	0...300 Pa	100...300 Pa	DC 0…10 V
QBM3020-5D [1]	S55720-S241	0...500 Pa	300...500 Pa	DC 0…10 V
QBM3020-10D [1]	S55720-S242	0...1000 Pa	500...1000 Pa	DC 0…10 V
QBM3020-25D [1]	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 [1]	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 [1]	S55720-S448	0...100 Pa	50...100 Pa	4...20 mA
QBM3120-3D [1]	S55720-S449	0...300 Pa	100...300 Pa	4...20 mA
QBM3120-5D [1]	S55720-S450	0...500 Pa	300...500 Pa	4...20 mA
QBM3120-10D [1]	S55720-S451	0...1000 Pa	500...1000 Pa	4...20 mA
QBM3120-25D [1]	S55720-S452	0...2500 Pa	1600...2500 Pa	4...20 mA

[1] Type with digital display (in Pa)

[2] 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:

Notes

Safety

⚠ CAUTION	
	**National safety regulations** Failure to comply with national safety regulations may result in personal injury and property damage. ● Observe national provisions and comply with the appropriate safety regulations.

Engineering

⚠ WARNING	
	**Voltage** Injury from electrical shock ● Use a transformer for safety extra-low voltage SELV with separate windings, suited for 100% duty to power the sensor. ● Observe permissible cable lengths. ● Use shielded cables.

⚠ CAUTION	
	Power supply by SELV or class 2 power supply with limited output of 15 W or less. ● Use only copper wiring

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.

NOTICE	
!	**Condensation in sensor** Device damage ● Point the pressure connection nipples in the down position. ● Ensure that the pressure connection nipples are higher in the ducts than the sensor probes.

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 is 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

	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.

Technical data

Electrical interface	
Power supply	Safety extra low voltage (SELV/PELV) Or class 2 (UL)

QBM3020-.. 3-wire	
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 or Circuit breaker: Max. 13 A type B, C, D per EN 60898 or Power source with current limitation of max. 10 A
Output signal	DC 0...10 V, (R_{Load}) > 10 kΩ. (Not galvanically separated, 3-wire connection, short-circuit proof, protected against reverse polarity)

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

Functional data	
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)
QBM3x20-10, -10D, -25, -25D	
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
QBM3x20-5, -5D	
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
QBM3x20-3. -3D	
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
QBM3x20-1U, -1, -1D	
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
QBM3020-.., QBM3120-..	
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 (10,000 Pa for types QBM3x20-5, -10, -25)
At P2	400 Pa

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

Pins	
Electrical connections ● Screw terminals for cable lead	 Max 1.5 mm^2 (wire or stranded wire) 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 ● Operation ● Storage/transport	 ● 0...+70 °C ● -25...+70 °C

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).

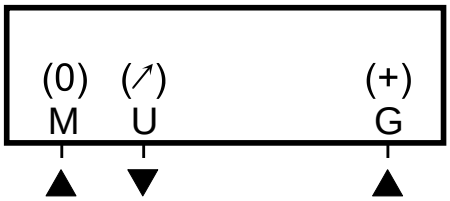
Dimensions (weight)	
Weight (with packaging)	0.183 kg
Weight (with packaging), with display	0.196 kg

*) The documents can be downloaded at www.siemens.com/bt/download.

Connection diagrams

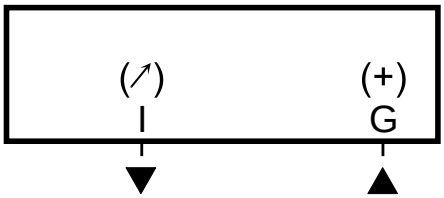
Terminals

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

