



QBM65-...



QBM65.1-...



QBM65.2-...

## Differential Pressure Sensors

## QBM65...

for air and nonaggressive gases

- With choice of pressure-linear or extracting-the-root characteristic with adjustable pressure measuring range
- Operating voltage AC 24 V or DC 13.5...33 V
- Output signal DC 0...10 V

### Use

For very demanding requirements with regard to accuracy and quality in the field of ventilation, air conditioning and heating. To acquire the differential pressure of air or nonaggressive gases.

*Typical fields of application:*

- Chemical industry (laboratories and production)
- In industrial environments (risk of contamination)
- In hospitals (e.g. in the operating theatre)

The differential pressure detectors are used:

- To measure over- or underpressure in air ducts in relation to the ambient pressure
- To measure pressure differentials between different rooms
- To acquire variable air volumes in VAV plants on the supply and extract air side
- To monitor filters and to control fans
- Especially on applications that demand:
  - great accuracy
  - very short response times (monitoring of fans)
  - no susceptibility to contamination

## Type summary

Pressure-linear characteristic	Type reference	Measuring range		Type reference
	Without indication	Standard	Limit value adjustable	With indication
	<b>QBM65-1U</b>	-50... +50 Pa	No	---
	<b>QBM65-1</b>	0... 100 Pa	No	<b>QBM65.1-1</b>
	<b>QBM65-3</b>	0... 300 Pa	No	<b>QBM65.1-3</b>
	<b>QBM65-5</b>	0... 500 Pa	No	<b>QBM65.1-5</b>
	<b>QBM65-10</b>	0...1,000 Pa	No	<b>QBM65.1-10</b> <sup>1)</sup>
	<b>QBM65-25</b>	0...2,500 Pa	No	<b>QBM65.1-25</b> <sup>1)</sup>

1) Value displayed x 10 = measured value

Extracting-the-root characteristic

Type reference	Measuring range	
	Without indication	Limit value adjustable
<b>QBM65.2-1</b>	0... 100 Pa	40... 100 Pa
<b>QBM65.2-3</b>	0... 300 Pa	120... 300 Pa
<b>QBM65.2-5</b>	0... 500 Pa	200... 500 Pa
<b>QBM65.2-10</b>	0...1000 Pa	400...1,000 Pa
<b>QBM65.2-25</b>	0...2500 Pa	1,000...2,500 Pa

(Conversion: 100 Pa = 1 hPa = 1 mbar)

## Ordering and delivery

When ordering, please give name and type reference, e.g. differential pressure sensor **QBM65.1-3**.

The differential pressure sensor is supplied complete with 2 m plastic tubing. Additional accessories are to be ordered separately.

## Accessories

Two sets of air duct probes are available for precise measurements, see datasheet CA1N1589E for details. Mounting brackets are available additionally.

Type reference	Name
<b>AQB2000</b>	Mounting bracket for mounting the sensor on lagged ducts
<b>AQB21.2</b>	Bracket (5 pieces) for top hat rails to DIN, HT 35-7.5
<b>FK-PZ1</b>	Air duct probe, short, stainless steel, with elastic lead-through for simple, quick and airtight mounting
<b>FK-PZ2</b>	Air duct probe, long, aluminium, with orifice plate for precise measurements

## Equipment combinations

Any systems or devices that are capable of acquiring and handling the sensor's DC 0...10 V output signal.

The sensor acquires the differential pressure with the help of a silicon diaphragm. The deflection of the diaphragm is sensed and converted to an electric signal. With the extracting-the-root sensors, the potentiometer is used to match the pressure measuring range on an individual basis.

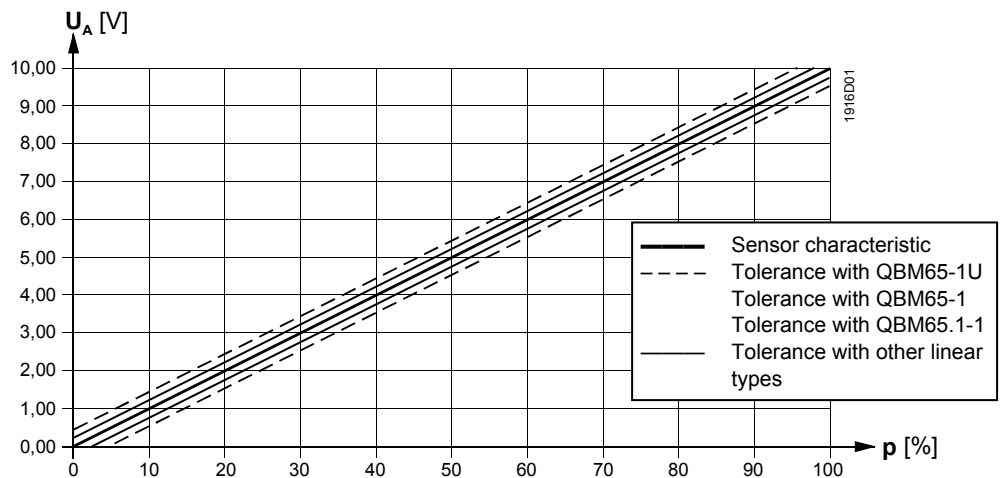
Depending on the type of sensor, the sensor's electronic circuit generates either a pressure-linear or extracting-the-root signal which is calibrated and temperature-compensated.

The measured value is delivered by the sensor as an analog DC 0...10 V output signal.

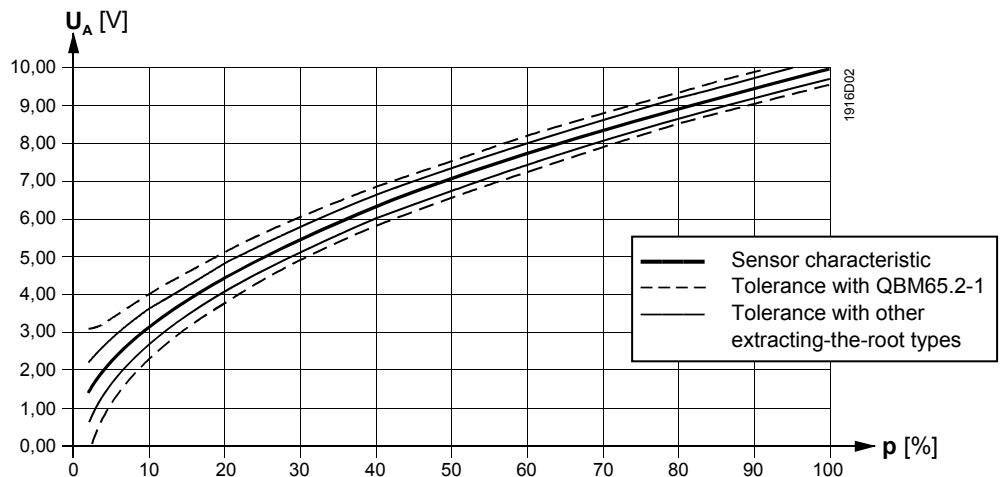
**Overview of the characteristics and measuring accuracy at an ambient temperature of 20 °C:**

Sensor characteristics and accuracy

Linearer output and total tolerances with a change of  $\pm 10$  °C



Extracting-the-root output and total tolerances with a change of  $\pm 10$  °C



Legend

$U_A$  Output voltage in V  
 $p$  Pressure measuring range in percent

For detailed information on accuracy, refer to "Technical data".

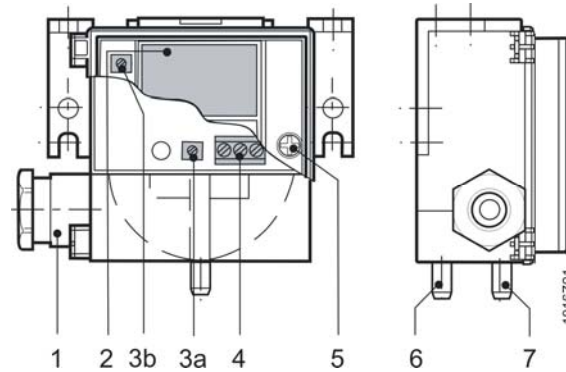
## Mechanical design

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The differential pressure sensor is designed for wall and ceiling mounting. It consists of:

- Sensor housing with mounting bracket, cable entry and removable snap-on cover with safety screw
- Pressure casing with diaphragm and lever
- Printed circuit board with connection terminals and – with the extracting-the-root sensor – with a potentiometer for adjusting the limit value
- LCD with the QBM65.1...

## Display, setting and connection elements



## Legend

- 1 Cable entry gland Pg 11 with cable strain relief
- 2 Digital display for sensor signal in Pa (only with the **QBM65.1-...**)
- 3 Potentiometer (only with the **QBM65.2-...**), to set a) the measuring range in the range 40...100% FS and b) the zero point in the range -10...+10% FS;  
supplied a) in the fully counterclockwise position (-) = Measuring range 100 %  
b) in the center position = zero point 0 % FS
- 4 Terminal block
- 5 Safety screw for hinged cover
- 6 Nipple for tubing connection "+"
- 7 Nipple for tubing connection "-"

## Engineering notes

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The transformer used must be suited for safety extra-low voltage. It must have separate windings and be designed for 100 % duty.

It must be sized and fused in compliance with local safety regulations.

If the line length exceeds 50 m and runs parallel to mains cables, screened cable must be used!

## Mounting and installation notes

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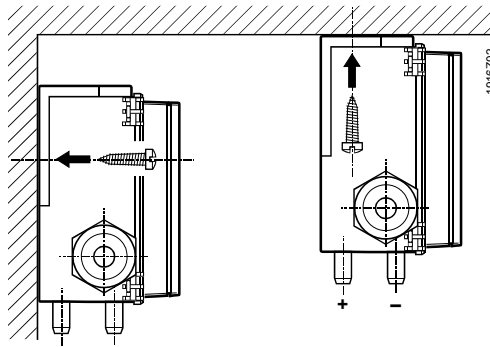
The QBM65... is suitable for direct mounting on ducts, walls or ceilings and in control panels.

The sensor should be mounted vertically.

Where possible, the pressure connection nipples should be at the bottom, or if necessary, to the side, and they should always be higher than the duct probes.

Horizontal mounting (with the hinged cover to the top or bottom) is NOT RECOMMENDED. If horizontal mounting cannot be avoided, account must be taken of deviations in the measured value (refer to "Factory calibration", below).

**⚠ Caution**



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

When mounting on 35 x 7.5 top hat rails to DIN, mounting bracket **AQB21.2** is required which is available as an accessory item. The sensor snaps on the bracket.

For direct mounting on lagged ducts, the sensor can be fitted with an **AQB2000** mounting bracket (see "Accessories").

A 2 m length of plastic tubing is supplied with the sensor and can be adapted to the air duct probes on site. The tubing with the higher pressure (lower vacuum) must be connected to nipple "P1" or "+", and the tubing with the lower pressure (higher vacuum) must be connected to nipple "P2" or "-".

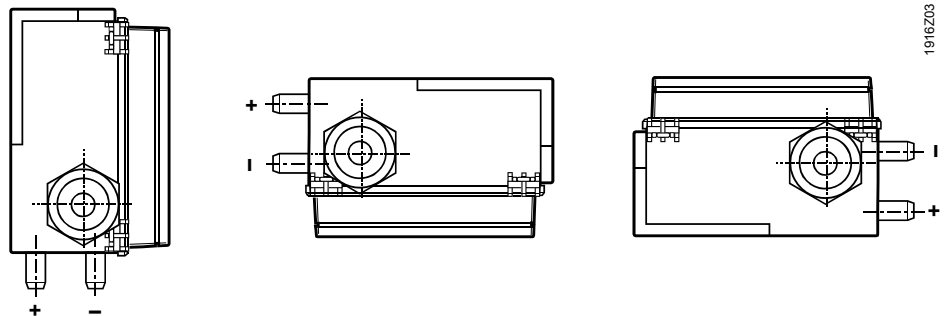
The sensor is supplied with mounting instructions.

**Factory calibration**

The values given under "Technical data" are valid only when the differential pressure sensor is mounted vertically.

Should it be necessary to mount the sensor horizontally, i.e. with the hinged cover at the top or bottom (NOT RECOMMENDED), account must be taken of the deviations in the measured value.

<p>Recommended orientation: hinged cover in vertical position. Signal: as per factory calibration (mandatory with the <b>QBM65-1U</b>)</p>	<p>NOT RECOMMENDED: Hinged cover facing downward. Signal: approximately 13 Pa above actual pressure</p>	<p>NOT RECOMMENDED: Hinged cover facing upward. Signal: approximately 13 Pa below actual pressure</p>
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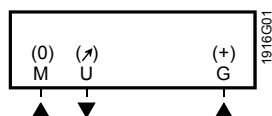


## Technical data

Electrical interface	Power supply	Safety extra low voltage (SELV, PELV)
	Supply voltage	AC 24 V ± 15 %, 50/60 Hz or DC 13.5...33 V
	Power consumption	< 0.5 VA
	Current consumption	< 10 mA
	Output voltage	DC 0 ... 10 V
	Load (R <sub>Load</sub> )	> 10 kΩ
	Output	not galvanically separated, 3-wire connection, short-circuit proof and protected against reversed polarity)
Functional data	Measuring range	refer to "Type summary"
	Measuring element	Piezoresistive (silicone diaphragm and ceramic lever)
	Measuring accuracy when mounted in recommended orientation and at an ambient temperature of 25 °C	(FS = Full Scale)
	• With <b>linear</b> characteristic	
	– Zero point	< ± 0.7 % FS
	– Total linearity, reproducibility and hysteresis	< ± 1 % FS
	– TC zero point	< ± 0.05 % FS/°C
	– TC sensitivity	< ± 0.05 % FS/°C
	For <b>QBM65-1</b> and <b>QBM65.1-1</b>	
	– Zero point	< ± 1 % FS
	– Total linearity, reproducibility and hysteresis	< ± 2 % FS
	– TC zero point	< ± 0.10 % FS/°C
	– TC sensitivity	< ± 0.06 % FS/°C
	For <b>QBM65-1U</b>	
	– Total zero point, linearity, reproducibility and hysteresis	< ± 3 % FS (3 Pa)
	– TC zero point	< ± 0.10 % FS/°C
	– TC sensitivity	< ± 0.06 % FS/°C
	• With <b>extracting-the-root</b> characteristic	(2...100 % of pressure range)
	– Absolute error	≤ ± 0.3 $\sqrt{\frac{pFS}{p}}$ + 1.5 [% of final value]
	– TC zero point	< ± 0.06 $\sqrt{\frac{pFS}{p}}$ in % FS/°C
	– TC sensitivity	< ± 0.05 % FS/°C
	For <b>QBM65.2-1</b>	
	– Absolute error	≤ ± 0.6 $\sqrt{\frac{pFS}{p}}$ + 1.5 [% of final value]
– TC zero point	< ± 0.15 $\sqrt{\frac{pFS}{p}}$ in % FS/°C	
– TC sensitivity	< ± 0.06 % FS/°C	
Long term stability	± 1% FS to DIN IEC 60 770	
Response time	< 10 ms	
Tolerable overload on one side for ± type	10 000 Pa 10 000 Pa on P1, 400 Pa on P2 or -400 Pa on P1, -10 000 Pa on P2	
Rupture pressure	2 × overload at room temperature 1.5 × overload at 70°C	
Indication (only with QBM65.1...)	LC-display	
Range	standard measuring range in Pa, 3.5 Digit	
Media	air and nonaggressive gases	
Perm. temperature of medium	0...70 °C	
Maintenance	no maintenance required	

Protective data	Degree of protection	IP 54 to IEC 60 529
	Safety class	III to EN 60 730
	Fire class to	UL94
	Hinged cover	HB
	Pressure casing, complete	V-2
Connection	Tubing	V-2
	Connection terminals	
	screw terminals for	3 × 1.5 mm <sup>2</sup>
Environmental conditions	Cable entry	Pg 11 cable gland
	Pressure connection	plastic nozzle 6.2 mm dia.
	Perm. ambient temperature	
Directive and standards	Operation	0...70 °C
	Storage/transport	-10...+70 °C
	Perm. ambient humidity	<90 % r.h., non-condensing
Environmental compatibility	Electromagnetic compatibility	
	Immunity to	EN 61 000-6-2, EN 61 326-1
	Emissions to	EN 61 000-6-3, EN 61 326-1
	CE conformity to EMC directive	2004/108/EC
	C-tick conformity (EMC)	EN 61 000-6-3
	Approvals	
	ETL	listed
Materials	UL conformity to	UL Std 61010-1
	CSA certified to	CSA C22.2 No 61010-1.2
	Environmental product declaration CA1E1916en	ISO 14001 (environment)
	provides information on environmentally compatible	ISO 9001 (quality)
	product design and assessment (RoHS compliance,	SN 36350 (environ. compat. products)
composition of substances, packaging, environmental	RL 2002/95/EG (RoHS)	
benefit, and disposal).		
Weight	Housing	PC (Polycarbonate)
	Hinged cover	ABS
	Pressure casing	PC with 10 % fiber-glass
	Diaphragm	2-component silicone LSR and PC with 10 % fiberglass, free from gas emissions
Weight	Tubing	PVC (Polyvinylchloride, soft)
	Weight (including packaging), without indication	0.09 kg
	Weight (including packaging), with indication	0.10 kg

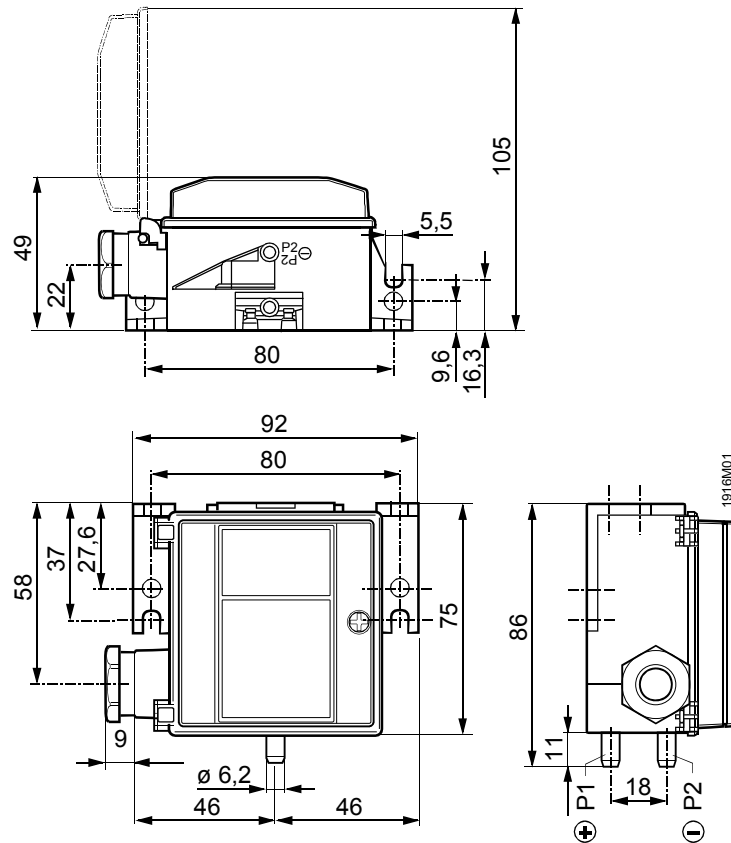
## Connection terminals



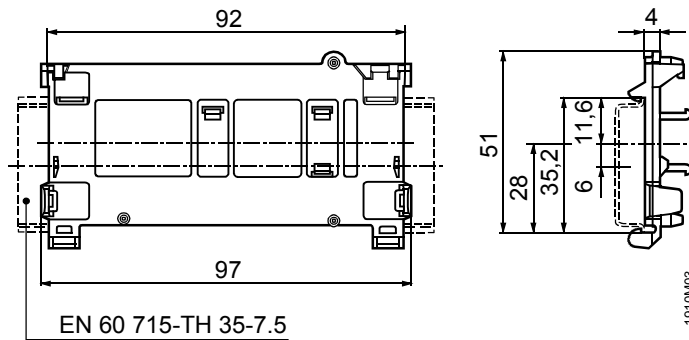
G (+) Operating voltage AC 24 V or DC 13.5...33 V  
M (0) GND, measuring neutral  
U (⚡) Measuring signal DC 0...10 V

## Dimensions

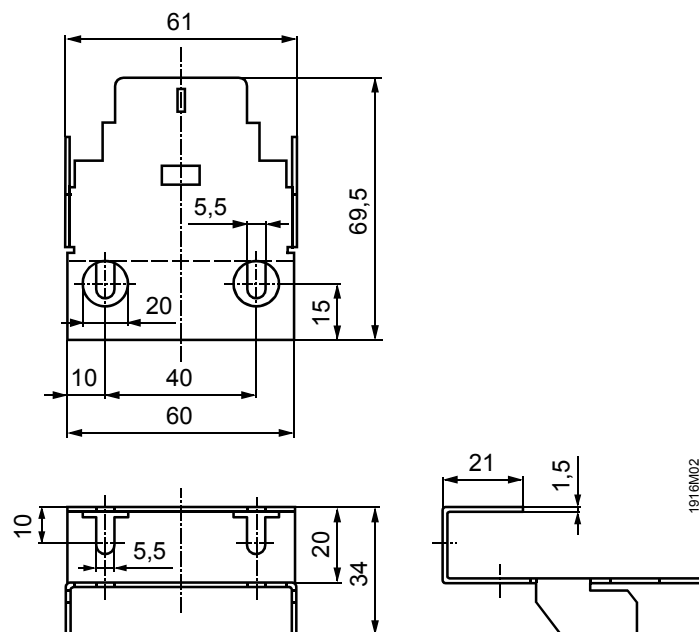
### QBM65...



### AQB21.2



### AQB2000



Dimensions in mm