



Differential pressure sensor QBM69..

for air and non-aggressive gases

- **Pressure-linear characteristic with selectable pressure measuring range**
- **Operating voltage AC 24 V or 13,5...35 V**
- **Output signal Modbus RTU:**
 - **Analog temperature sensors (2x) (accessory)**
LG-Ni1000, Ni1000, PT1000 or NTC10K
- **Very high accuracy over the whole measuring range**
 - **Temperature sensor (accessory)**
 - **Combined temperature/humidity sensor (accessory)**
Operating range -25...50°C / 0...100 % r.h.
- **Maintenance free**
- **Calibrated and temperature-compensated measuring signal**

Use

The differential pressure sensor QBM69.. acquires differential, over and under pressure of air and non-aggressive gases.

Fields of application:

- Measuring differential pressures in ventilation and air conditioning ducts
- Monitoring of air flows
- Monitoring of filters and control fans

MODBUS RTU

Address range	1-249 (40 default address)
Baudrate	1200 - 56000
Format	Modbus RTU
Line termination	DIP
Hardware	RS485
Default configuration	9600N1 (9600 baudrate, 1 stop bit no parity)

Type summary

Type (ASN)	Ordering number	Measuring ranges	Output signal
QBM69.1200	SE2:QBM69.1200	1x 0...1250 Pa	MODBUS RTU
QBM69.2500	SE2:QBM69.2500	1x 0...2500 Pa	MODBUS RTU
QBM69.7000	SE2:QBM69.7000	1x 0...7000 Pa	MODBUS RTU
QBM69.1212	SE2:QBM69.1212	2x 0...1250 Pa	MODBUS RTU
QBM69.2512	SE2:QBM69.2512	1x 0...2500 Pa + 1x 0...1250 Pa	MODBUS RTU
QBM69.2525	SE2:QBM69.2525	2x 0...2500 Pa	MODBUS RTU
QBM69.7012	SE2:QBM69.7012	1x 0...7000 Pa + 1x 0...1250 Pa	MODBUS RTU
QBM69.7025	SE2:QBM69.7025	1x 0...7000 Pa + 1x 0...2500 Pa	MODBUS RTU
QBM69.7070	SE2:QBM69.7070	2x 0...7000 Pa	MODBUS RTU

Accessory

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

Type reference /part no	Name
AQF.69T	Temperature sensor -40...125 °C
AQF.69TH	Temperature sensor -40...125 °C Humidity 0...100 % (none condensing)
AQF69.00	Filtercap for AQF69TH
AQB68.01	Silicone tubing (2 m), incl. 2 nipples

Ordering

When ordering, please give name and type reference/ part no.

Example 1	10 units Differential pressure sensors QBM69.1200
	10 units Silicone tubing AQB68.01
Exemple 2	10 units Differential pressure sensors QBM69.1212
	20 units Silicone tubing AQB68.01

Equipment combinations

Any systems or devices capable of acquiring and handling the sensor's signal over modbus.

Functioning

The sensor acquires the differential pressure using a MEMS* differential pressure sensor. The sensor generates as per the deflection, a linear and temperature-compensated output signal via Modbus. The differential pressure can at any time also be read over Modbus. An average of 500, 1000, 4000 and 1600 ms of the differential pressure is continuously calculated and can be access at separated Modbus register addresses.

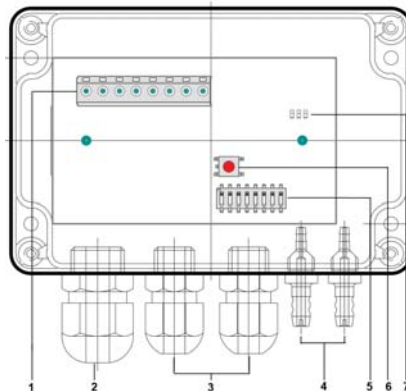
* MEMS = Micro Mechanical System

Mechanical design

The differential pressure sensor consists of:

- Sensor housing
- Cable entry with cable gland
- MEMS Pressure sensor (MEMS = Micro Mechanical System)
- Printed circuit board with connection terminals and DIP switch for configuration (see "Commissioning notes")
- Zero-point adjustment button (see "Commissioning notes")

Setting and connection elements



1. Connection terminals
2. Cable gland entry M16 (without cable strain relief)
3. Cable gland entry M12 (without cable strain relief)
4. Connection nipples (see "Mounting notes")
5. DIP switch for selecting the measuring range
6. Push-button for zero-point calibration and configuration
7. Status LEDs

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 100 meters and/or run parallel to the mains cables: Use shielded cables!

Mounting notes

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 under "Technical data", the differential pressure sensors must be mounted with the nipples 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.

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+ resp. P2+
Tubing with lower pressure side (higher vacuum)	Connect to pressure nipple P1– resp. P2–

The sensor is supplied with mounting instructions.

For detailed information on installation and mounting position, refer to the Sensor Installation Guide in www.siemens.se/hit

Configuration

Status LEDs

Green	Operation status
Set:	Normal operation
Flash:	Zero point calibration in progress
Yellow	Modbus status.
Flash:	Modbus communication active
Red	Error LED
Set:	Device error.
Flash:	Communication error modbus

Push-button

0 - 10s	Save configuration
10 - 30s	Calibrate Zero point
> 30 s	Factory reset.
Important notice:	After factory reset the DIP switches positions will be read. This means enabled temperature sensors and selected Modbus address will be used according to the DIP switches positions.

DIP-switches

See Commissioning notes

Commissioning notes

⚠ Caution

The differential pressure sensor zero point must always be calibrated first time the voltage is set, after installation.

1. Wiring connection terminals – Do not connect pressuring tubing (P1+ –, P2+ –) at this time.
2. Press the zero-point calibration button (6) for more than 10 seconds until the LED briefly lights up
3. Connect pressure tubing (P1+ –, P2+ –)

Settings

Configuration according to table below. All settings will be applied first after the button (6) in pressed, see page 3.

A	OFF	ON	Settings
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Temperature sensor type
2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Temperature sensor 1
4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Temperature sensor 2
5	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Modbus address 40..47
6	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
7	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Modbus termination
8	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

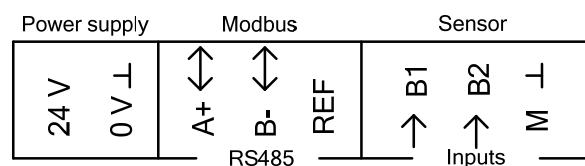
Note! The black mark indicates the DIP-switches position

Technical data

Electrical interface	Power supply	Safety extra low voltage (SELV/PELV)
	Operating voltage	AC 24 V ±15 %, 50/60 Hz DC 13,5...35 V
	Power consumption	< 1 VA
	Current draw	< 25 mA
	Output	MODBUS RTU (RS485) NOT galvanically separated, 3-wire, connection. Short-circuit proof, protected against reverse polarity.
Functional data	Measuring range	See "Type summary"
	Sensing element	MEMS (Micro Mechanical System)
	Measuring accuracy at recommended mounting position and 20 °C ambient temperature	
	Total error	<±1 % FS
	TC zero point	<±0,1 % FS / °C
TC sensitivity	<±0,06 % FS / °C	
Reaction time	1 s	

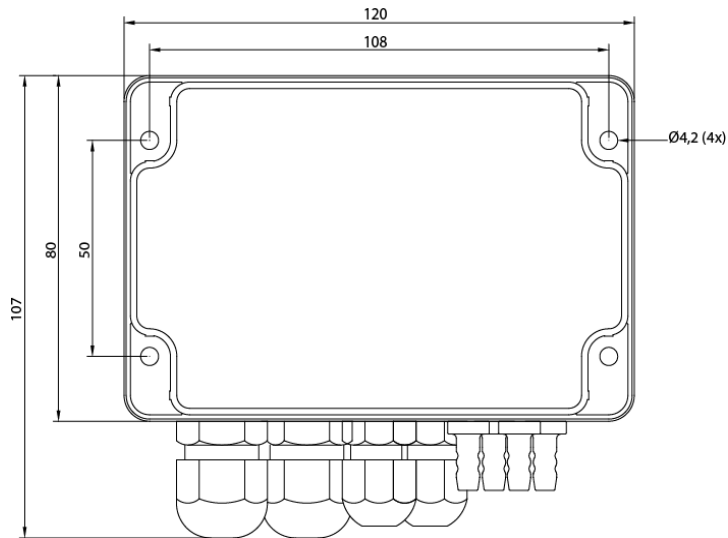
Degree of protection	Tolerable overload on one side	10 000 Pa
	on P1	4000 Pa (QBM69.12xx)
		4000 Pa (QBM69.25xx)
	on P2	10000 Pa (QBM69.70xx)
		4000 Pa (QBM69.xx12)
		4000 Pa (QBM69.xx25)
		10000 Pa (QBM69.xx70)
	Rupture pressure	200 kPa
	0...70 °C	
	Media	Air and non-aggressive gases
Admissible medium temperature	0...70 °C	
Maintenance	Maintenance free	
Degree of protection	Degree of protection of housing at recommended installation	IP65 as per IEC 60 529
Connections	Electrical connection	
	Screw terminals for	Max. 1,5 mm ² (wire or stranded wire)
	Cable lead (without cable strain relief)	2 x Cable gland entry M16 2 x Cable gland entry M12
Environmental conditions	Pressure connection	Brass nipples Ø 5 mm
	Permissible ambient temperature	IEC 60 721-3-3
	Operation	-25...50 °C
	Temperature compensated	0...50 °C
	Transport/ storage	-35...70 °C
	Permissible ambient humidity	<90 % r.h. (without condensation)
Directives, standards	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 50581
Environmental compatibility	The product environmental declaration	ISO 14001 (Environment)
	CE1E1910en 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)	0.200 kg

Connection terminals



24 V	Operating voltage AC 24 V or DC 13,5...35 V
0 V ⊥	GND (G0)
A (+)	Modbus Comm. +
B (-)	Modbus Comm. -
REF	Modbus reference
B1	Temperature sensor 1: LG-Ni1000, Ni1000, Pt1000, NTC10k
B2	Temperature sensor 2: LG-Ni1000, Ni1000, Pt1000, NTC10k
M	GND measurement neutral for B1 and B2

Dimensions (in mm)



Modbus specification

Holding registers

Addr	Description	Unit	Scaling	Read/Write
4x0001	Type		1	R
4x0002	Error		1	R
4x0003	Configuration		1	R/W
				0 = No error
				0 = No sensor
				1 = Temp.sensor 1 active
				2 = Temp.sensor 2 active
				3 = Temp.sensor 1+2 active
4x0004	Differentialpressure 1- Reliability		1	R
4x0005	Differentialpressure 1 - Value		1	R
4x0006	Differentialpressure 2 - Reliability		1	R
4x0007	Differentialpressure 2 - Value		1	R
4x0008	Temperature 1- Reliability		1	R
4x0009	Temperature 1 - Value	°C	0.1	R
4x0010	Temperature 2 - Reliability		1	R
4x0011	Temperature 2 - Value	°C	0.1	R
4x0012	Temperature 3 - Reliability		1	R
4x0013	Temperature 3 - Value	°C	0.1	R

Differentialpressure 1

4x0021	Reliability		1	R	See Reliability
4x0022	Value		1	R	
4x0023	Unit (Pa, PSI, mmHG, mmH2O)		1	R/W	
4x0024	Value [Pa]	Pa	1	R	
4x0025	Value [PSI]	PSI	0.0001	R	
4x0026	Value [mmHg]	mmHg	0.01	R	
4x0027	Value [mmH2O]	mmH2O	0.1	R	
4x0028	Value average 500 ms		1	R	
4x0029	Value average 1000 ms		1	R	
4x0030	Value average 4000 ms		1	R	
4x0031	Value average 16000 ms		1	R	
4x0032	Zero offset calibration		1	W	

Differential pressure 2

4x0051	Reliability (Reliability)		1	R	See Reliability
4x0052	Value		1	R	
4x0053	Unit (Pa, PSI, mmHG, mmH2O)		1	R/W	
4x0054	Value [Pa]	Pa	1	R	
4x0055	Value [PSI]	PSI	0.0001	R	
4x0056	Value [mmHg]	mmHg	0.01	R	
4x0057	Value [mmH2O]	mmH2O	0.1	R	
4x0058	Value average 500 ms		1	R	
4x0059	Value average 1000 ms		1	R	
4x0060	Value average 4000 ms		1	R	
4x0061	Value average 16000 ms		1	R	
4x0062	Zero offset calibration		1	W	

Temperature 1 (B1, External sensor)

4x0081	Reliability		1	R	See Reliability
4x0082	Value	°C	0.1	R	
4x0083	Temperature sensor type ¹⁾		1	R	

Temperature 2 (B2, Internal analog sensor)

4x0091	Reliability		1	R	See Reliability
4x0092	Value	°C	0.1	R	
4x0093	Temperature sensor type ¹⁾		1	R	

Temperature 3 (new feature Q3 2013)

4x0101	Reliability		1	R	See Reliability
4x0102	Temperature value	°C	0.1	R	
4x0103	Temperature sensor type ¹⁾		1	R	
4x0104	Reserved, Read as 0				
4x0105	Reserved, Read as 0				
4x0106	Reserved, Read as 0				
4x0107	Reserved, Read as 0				
4x1001	Modbus address		1	R	
4x1002	Base address		1	R/W	
4x1003	Modbus Baud rate		1	R/W	
4x1004	Modbus Data bits		1	R/W	
4x1005	Modbus Stop bits		1	R/W	
4x1006	Modbus parity		1	R/W	
4x1007	Save configuration		1	W	

¹⁾ 0 = LG-NI1000 1 = NI1000 2 = PT1000 3 = NTC10K

Reliability

Value		Pressure sensor	Temperature sensor
0	OK		
1	No sensor	Pressure sensor malfunction	Sensor not connected
2	Over range	Over pressure	Temperature over 150 °C
3	Under range	Under pressure	Temperature under – 40 °C
4	Open loop		
5	Short loop		
6	No output signal		
7	Other fault	Zero point calibration required	
8	Calculation error		
9	Extended error		
10	Configuration error	Configuration error	