

Symaro™

Duct sensors

QFM31...

for relative humidity (high accuracy) and temperature

- Operating voltage AC 24 V / DC 13.5...35 V
- Signal output DC 0...10 V / 4...20 mA for relative humidity and temperature
- Very high measuring accuracy across the entire measuring range
- Function test
- Capacitive humidity measurement
- Range of use $-40...+70\text{ °C}$ / 0...100 % r. h.

Use

The QFM31... is for use in ventilation and air conditioning plants where high accuracy and short response times for measuring relative humidity are required. The measuring range covers the entire humidity range of 0...100 %.

Examples

- Storage and production facilities in the paper, textile, pharmaceutical, food, chemical and electronics industry, etc.
- Laboratories
- Hospitals
- Computer and EDP centers
- Indoor swimming pools
- Greenhouses

The QFM31... is used as a

- control sensors in the supply or extract air
- limit sensor for maximum limitation of supply air humidity after a steam humidifier
- limit sensor, e.g. for measured value indication or for connection to a building automation and control system
- sensor for enthalpy and absolute humidity, together with the AQF61.1 (refer to Data Sheet N1899) or SEZ220 (refer to Data Sheet N5146)

Type summary

Type reference	Temperature measuring range	Temperature signal output	Humidity measuring range	Humidity signal output	Operating voltage
QFM3100	None	None	0...100 %	Active, DC 0...10 V	AC 24 V or DC 13.5...35 V
QFM3101	None	None	0...100 %	Active, 4...20 mA	DC 13.5...35 V
QFM3160	0...50 °C / -40...+70 °C /-35...+35 °C	Active, DC 0...10 V	0...100 %	Active, DC 0...10 V	AC 24 V or DC 13.5...35 V
QFM3171	0...50 °C / -40...+70 °C /-35...+35 °C	Active, 4...20 mA	0...100 %	Active, 4...20 mA	DC 13.5...35 V

Ordering

When ordering, please give name and type reference, e.g.:

Duct sensor **QFM3160**

Place a separate order for the service set AQF3153 listed under accessories.

Equipment combinations

The QFM31... is for use with all types of systems and devices that can acquire and handle the sensor's DC 0...10 V or 4...20 mA output signal.

Technical design

Relative humidity

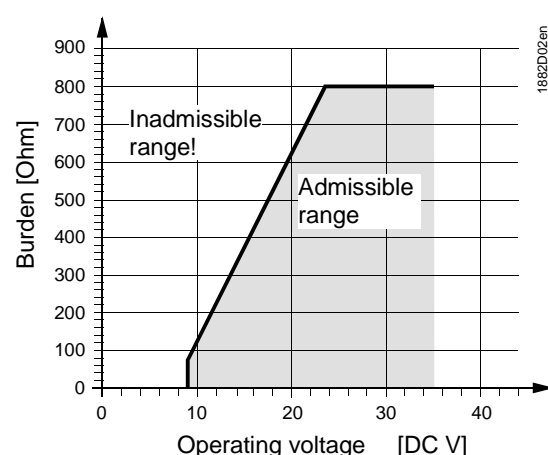
The sensor acquires relative humidity via its capacitive sensing element whose capacitance varies as a function of the relative humidity of the ambient air. An electronic circuit converts the sensor's signal to a continuous DC 0...10 V or 4...20 mA signal, corresponding to a relative humidity of 0...100 %.

Temperature

The sensor acquires the temperature via its sensing element whose electrical resistance varies according to the temperature of the ambient air. This variation is converted to an active DC 0...10 V or 4...20 mA output signal, corresponding to a temperature range of 0...50 °C, -35...+35 °C, or -40...+70 °C. The measuring range can be selected.

Burden diagram

Output signal, terminal I1 / I2



Mechanical design

The duct sensor consists of housing, printed circuit board, connection terminals, mounting flange and immersion rod with measuring probe.

The 2-sectional housing is comprised of base and removable cover (screwed). The measuring circuit and the setting element are located on the printed circuit board inside the cover, the connection terminals on the base.

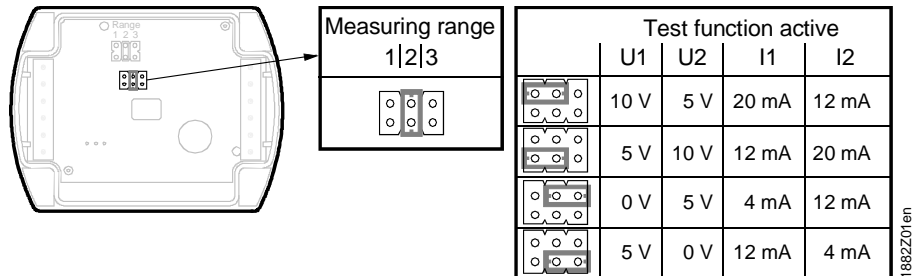
The sensing elements are located at the end of the measuring probe and protected by the filter cap.

Cable entry is made via the cable entry gland M16 (IP 54) supplied with the sensor, which can be screwed into the housing.

Immersion rod and housing are made of plastic and rigidly connected.

The sensor is fitted with the mounting flange supplied with the sensor. The flange is to be placed over the immersion rod and then secured in accordance with the required immersion length.

Setting element



The setting element is located inside the cover. It consists of 6 pins and a shorting plug. It is used for selecting the required temperature measuring range and for activating the test function.

The different shorting plug positions have the following meaning:

- *For the active temperature measuring range:*
 Shorting plug in the left position (R1) = $-35...+35\text{ }^{\circ}\text{C}$,
 Shorting plug in the mid position (R2) = $0...50\text{ }^{\circ}\text{C}$ (factory setting)
 Shorting plug in the right position (R3) = $-40...+70\text{ }^{\circ}\text{C}$
 - *For the active test function:*
 Shorting plug in the horizontal position: The values available at the signal output are those given in the table "Test function active"
- Behavior in the event of fault
- If the temperature sensor is faulty, the voltage at signal output U2 (I2) is 0 V (4 mA) after 60 seconds, the humidity signal at signal output U1 (I1) increases to 10 V (20 mA)
 - If the humidity sensor is faulty, the voltage at signal output U1 (I1) is 10 V (20 mA) after 60 seconds; the temperature signal remains active

Service set AQF3153

The service set comprises three measuring tips without sensor element. Each tip signals a predefined temperature and humidity value to the basic unit:

- 85%, $40\text{ }^{\circ}\text{C}$
- 50%, $23\text{ }^{\circ}\text{C}$
- 20%, $5\text{ }^{\circ}\text{C}$

The fixed values are available at the signal outputs. The accuracy of the values is the same as for the test function. The measuring tips can be exchanged in operation.

Accessories

Name	Type reference
Filter cap (for replacement)	AQF3101
Measuring tip (exchangeable for replacement)	AQF3150
Service set (for function test)	AQF3153

Engineering notes

	<p>To power the sensor, a transformer for safety extra low-voltage (SELV) with separate windings for 100 % duty is required. When sizing and protecting the transformer, the local safety regulations must be observed.</p> <p>When sizing the transformer, the power consumption of the duct sensor must be taken into consideration.</p> <p>For correct wiring of the sensor, refer to the Data Sheets of the devices with which the sensor is used.</p> <p>The permissible line lengths must be observed.</p>
Cable routing and cable selection	<p>When laying the cables, it must be observed that the longer the cables run side by side and the smaller the distance between them, the greater the electrical interference.</p> <p>Shielded cables must be used in environments with EMC problems.</p> <p>Twisted pair cables are required for the secondary supply lines and the signal lines.</p>
Note to QFM2171	<p>Terminals G1(+) and I1 (–) for the humidity output must always be connected to power, even if only the temperature output G2(+) and I2 (–) is used!</p>




Mounting notes

Location	<p>The sensor should be mounted in the middle of the duct wall. If used in connection with steam humidifiers, the minimum distance after the humidifier should be 3 m, the maximum distance 10 m.</p> <p>If the application involves dew point shifting, the sensor must be fitted in the extract air duct.</p> <p>Only the flange must be fitted to the duct wall. The sensor is then inserted through the flange and engaged.</p>
<i>Caution!</i>	<ul style="list-style-type: none">• The seal between housing and cover must not be removed, or else degree of protection IP 65 will be no longer ensured.• The measuring rod's sensing elements are sensitive to impact. Avoid any such impact on mounting.
Fitting instructions	<p>Fitting instructions are printed on the sensor's packing.</p>

Commissioning notes

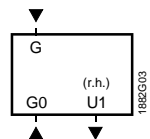
Check wiring before switching on power. The temperature measuring range must be selected on the sensor, if required.

Technical data

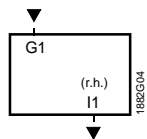
Power supply	Operating voltage	AC 24 V \pm 20 % or DC 13.5...35 V
	Frequency	50/60 Hz at AC 24 V
	Power consumption	\leq 1 VA
Cable lengths for the measuring signal	Max. perm. cable lengths	refer to Data Sheet of the device handling the signal
Functional data "Humidity sensor"	Measuring range	0...100 % r.h.
	Measuring accuracy at 23 °C 0...100 % r.h.	\pm 2 %
	Temperature dependency	\leq 0.05 % r.h./°C
	Time constant	approx. 20 s in moving air
	Output signal, linear (terminal U1)	DC 0...10 V $\hat{=}$ 0...100 % r.h. max. \pm 1 mA
	Output signal, linear (terminal I1) Burden	4...20 mA $\hat{=}$ 0...100 % r.h. refer to "Function"
	Measuring range	0...50 °C (R2 = factory setting), –35...+35 °C (R1), –40...+70 °C (R3)
	Sensing element	Pt 1000 class B to DIN EN 60 751
Functional data "Temperature sensor"	Measuring accuracy at 15...35 °C –35...+70 °C	\pm 0.6 K \pm 0.8 K
	Time constant	approx. 20 s in moving air
	Output signal, linear (terminal U2)	DC 0...10 V $\hat{=}$ 0...50 °C / –35...+35 °C / –40...+70 °C max. \pm 1 mA
	Output signal, linear (terminal I2) Burden	4...20 mA $\hat{=}$ 0...50 / –35...+35 / –40...+70 °C refer to "Function"
	Housing	IP 65 to IEC 529
	Safety class	III to EN 60 730
	Screw terminals	1 \times 2.5 mm ² or 2 \times 1.5 mm ²
	Cable entry gland (enclosed)	M 16 x 1.5
Environmental conditions	Operation to	IEC 721-3-3
	Climatic conditions	class 4K2
	Temperature (housing with electronics)	–40...+70 °C
	Humidity	0...100 % r. h. (with condensation)
	Mechanical conditions	class 3M2
	Transport to	IEC 721-3-2
Materials and color	Climatic condition	class 2K3
	Temperature	–25...+70 °C
	Humidity	<95 % r. h.
	Mechanical conditions	class 2M2
	Base	polycarbonate, RAL 7001 (silver-grey)
	Cover	polycarbonate, RAL 7035 (light-grey)
	Immersion rod	polycarbonate, RAL 7001 (silver-grey)
	Filter cap	polycarbonate, RAL 7001 (silver-grey)
	Mounting flange	PA66 – GF35 (black)
	Cable entry gland	PA, RAL 7035 (light-grey)
Standards	Sensor (complete assembly)	silicon-free
	Packaging	corrugated cardboard
	Product safety	
	Automatic electrical controls for household and similar use	EN 60 730-1
	Electromagnetic compatibility	
	Immunity	EN 61 000-6-1
	Emissions	EN 61 000-6-3
	 conformity to	EMC directive 89/336/EEC
	 conformity to	
	Australian EMC framework Radio Interference Emission Standard	Radio Communication Act 1992 AS/NZS 3548
Weight	 conformity	UL 873
	Incl. packaging	0.208 kg

Connection terminals

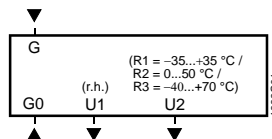
QFM3100



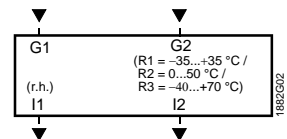
QFM3101



QFM3160



QFM3171

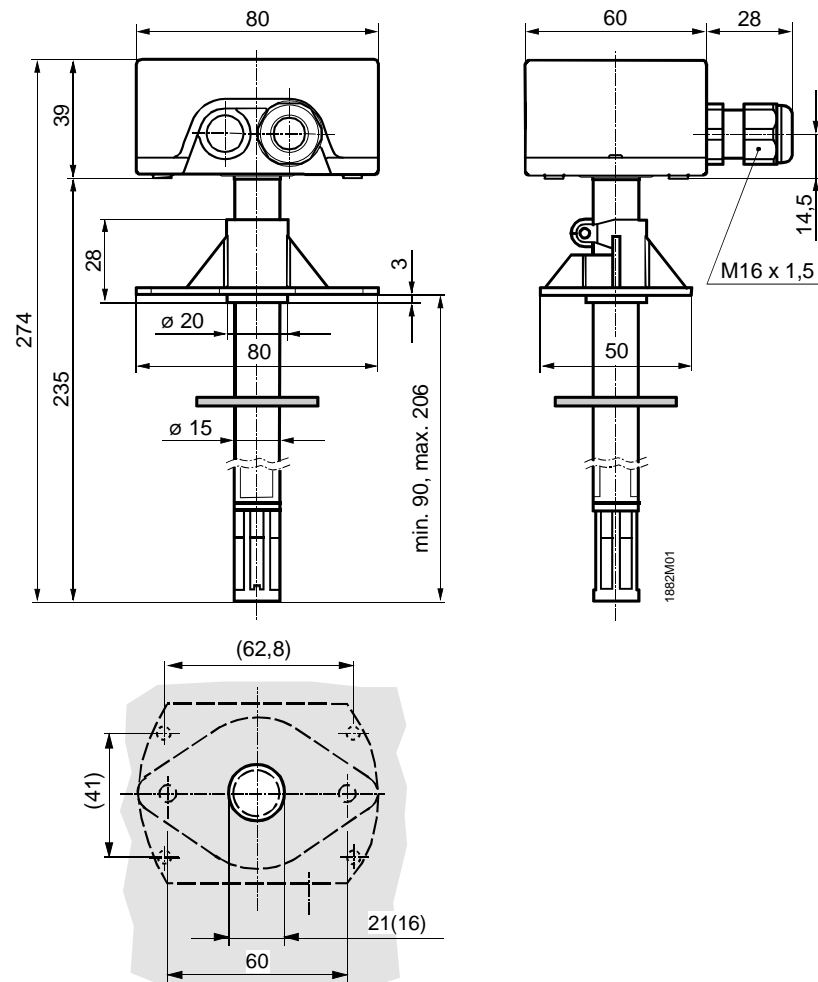


G, G0	Operating voltage AC 24 V (SELV) or DC 13.5...35 V
G1, G2	Operating voltage DC 13.5...35 V
U1	Signal output DC 0...10 V for relative humidity 0...100 %
U2	Signal output DC 0...10 V for temperature range 0...50 °C / -40...+70 °C / -35...+35 °C
I1	Signal output 4...20 mA for relative humidity 0...100 %
I2	Signal output 4...20 mA for temperature range 0...50 °C / -40...+70 °C / -35...+35 °C

Note on connection terminals of the QFM3171:

Terminals G1(+) and I1(-) for the humidity output must always be connected to power, even if only the temperature output G2(+) and I2(-) is used!

Dimensions



Drilling template with (without) mounting flange

Dimensions in mm