QFA31…

QFA31..D

QFA31… with AQF3100

AQF3150

AQF3153

Symaro™

Room sensors QFA31…

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 r. h. and temperature**
- **Very high measuring accuracy across the entire measuring range**
- **Capacitive humidity measurement**
- **Function test**
- **Range of use –40…+70 °C / 0…100 % r. h.**
  with LCD display -25…+70 °C / 0…100 % r. h.

Use

The QFA31… 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
- Indoor swimming-pools
- Computer and EDP centers
- Greenhouses
- With the AQF3100 accessory for outdoor use

Type summary

Type reference	*Temperature measuring range*	*Temperature signal output*	*Humidity measuring range*	*Humidity signal output*	*Operating voltage*	*Measured value display*
QFA3100	None	None	0...100 %	aktiv, DC 0...10 V	AC 24 V or DC 13,5…35 V	No
QFA3101	None	None	0...100 %	aktive, 4…20 mA	DC 13,5…35 V	No
QFA3160	0...50 °C / –40…+70 °C / –35...+35 °C	aktive, DC 0...10 V	0...100 %	aktive, DC 0...10 V	AC 24 V or DC 13,5…35 V	No
QFA3160D	0...50 °C / –40…+70 °C / –35...+35 °C	aktive, DC 0...10 V	0...100 %	aktive, DC 0...10 V	AC 24 V or DC 13,5…35 V	Yes
QFA3171	0...50 °C / –40…+70 °C / –35...+35 °C	aktive, 4…20 mA	0...100 %	aktive, 4…20 mA	DC 13,5…35 V	No
QFA3171D	0...50 °C / –40…+70 °C / –35...+35 °C	aktive, 4…20 mA	0...100 %	aktive, 4…20 mA	DC 13,5…35 V	Yes

Ordering

When ordering, please give name and type reference, e.g.:
Room sensor **QFA3160**
The **AQF3100** outdoor mounting and the service set **AQF3153** are listed under “Accessories“ and must be ordered as a separate item.

Equipment combinations

The QFA31… 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

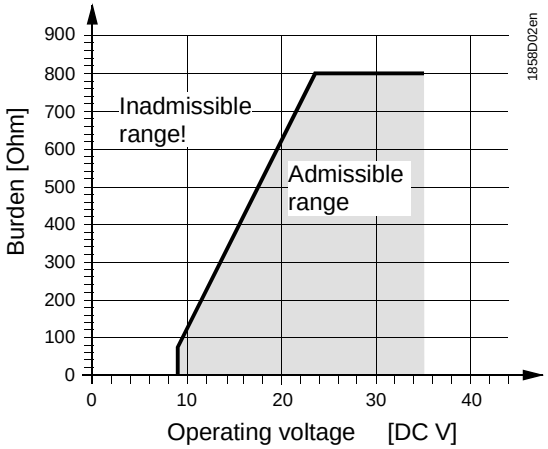
The sensor acquires relative humidity via its capacitive sensing element whose capacitance varies as a function of the relative humidity of the ambient air.
An electronic circuit converts the sensor’s signal to a continuous DC 0...10 V or 4…20 mA signal, corresponding to a relative humidity of 0...100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

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



Room sensor QFA31…

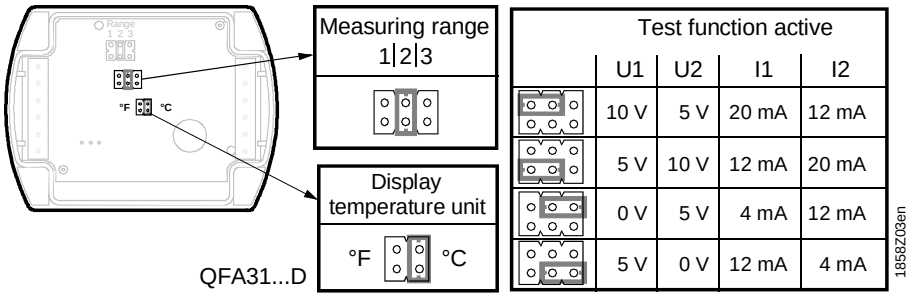
The room sensor consists of housing, printed circuit board, connection terminals and measuring tip. The housing consists of 2 parts: Base and removable cover (screwed). A rubber seal is installed between housing and cover in order to satisfy the requirements of IP 65 degree of protection.
The measuring circuit and the setting element are accommodated on the printed circuit board inside the cover, the connection terminals in the base. Housing and measuring tip are screwed together. The measuring tip features a degree of protection of IP40. The sensing elements are located at the end of the measuring tip, protected by a screw-on filter cap.
The M16 cable entry gland supplied with the sensor can be screwed into the bottom of the base. If the sensor is used outdoors, that opening must be closed off and the prepared hole on the opposite side of the base knocked out.

Measured value display

The types QFA3160D and QFA3171D with LCD display shows the following values:

Temperature:	in °C or °F
Humidity:	in %

Setting elements



The setting elements are located inside the cover. A setting element is consisting of 6 pins and a shorting plug. It is used for selecting the required temperature measuring range and for activating the test function. Types with LCD display have a second setting element with 4 pins and a shorting plug.

The different shorting plug positions have the following meaning:

- *For the active temperature measuring range:*
  Shorting plug in the left position (R1) = −35...+35 °C,
  Shorting plug in the mid position (R2) = 0...50 °C (factory setting)
  Shorting plug in the right position (R3) = −40...+70 °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“

For the measured value display (QFA31…D)

- Shorting plug vertical in the right position = °C (factory setting)
- Shorting plug vertical in the left position = °F

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

Outdoor mounting kit AQF3100

The outdoor mounting kit consists of:

- 1 wall mounting bracket complete with radiation shield
- 4 Phillips-head screws K35 x 12

- 1 grommet M 16 x 1.5 with O-ring and nut M 16 x 1.5 for closing off the sensor's cable entry hole if not required

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 °C
- 50%, 23 °C
- 20%, 5 °C

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

Accessories

Name	*Type reference*
Outdoor mounting kit (incl. radiation shield)	**AQF3100**
Filter cap (for replacement)	**AQF3101**
Measuring tip (exchangeable for replacement)	**AQF3150**
Service set (for function test)	**AQF3153**

Engineering notes

Use a safety extra low-voltage (SELV) transformer with separate windings designed for 100 % duty. All safety regulations valid at the location of the plant must be observed when sizing and protecting the transformer.
When sizing the transformer, the sensor's power consumption must be taken into consideration.
For the electrical connection of the sensor, refer to the Data Sheets of the devices with which the sensor is used.
The maximum permissible cable lengths must be observed.

Cable routing and cable selection

For cable routing, it should always be considered that electrical interference is the greater, the longer the cables run parallel and the smaller the distance between them. Use shielded cables if necessary.
Twisted pairs of cables are required for the secondary supply lines and the signal lines.

Note to **QFA3171(D)**

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!

Mounting notes

Interior mounting

QFA31… <u>without</u> AQF3100

Mounting location

Inside wall (not on outside wall!) of the room to be air conditioned; not in recesses, shelves, behind curtains, above or close to heat sources; not on walls behind which a chimney is located.
The sensor must not be exposed to direct solar radiation.
Install the sensor in the occupied space about 1.5 m above the floor and at least 50 cm from the next wall.

Caution!

- The seal between housing and cover must not be removed, or else degree of protection IP 65 will be no longer ensured.
- The sensing elements inside the measuring tip are sensitive to shock and impact. Avoid any such impact on mounting.

Mounting position

Without using the AQF3100 outdoor mounting kit, the sensor must not be mounted with the measuring tip pointing upward.

Mounting Instructions

Mounting Instructions are printed on the sensor's packaging.

Outdoor mounting	**QFA31… with AQF3100**
Mounting location	Exterior wall, preferably on the North or Northwestern side of the building; if possible in the middle of the wall, at least 2.5 above the ground. Not above or below windows, above doors and ventilation shafts, below balconies or eaves.
Mounting position	The sensor with AQF3100 must be mounted in a vertical position (radiation shield at the top).
Mounting Instructions	Mounting Instructions are enclosed with the AQF3100.
Note	When using the AQF3100 outdoor mounting kit, the sensor's cable entry hole must be closed off with the grommet and the prepared M16 cable entry on the opposite side knocked out.

Commissioning notes

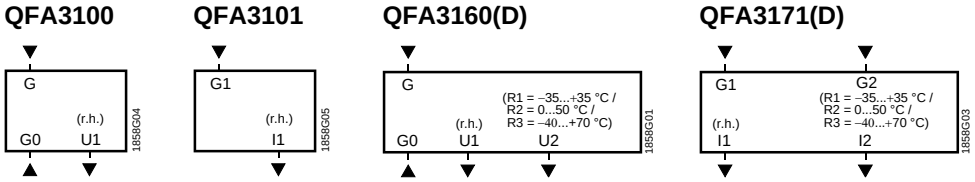
Prior to switching on power, check wiring.
On the sensor, select the required temperature measuring range.

Technical data

Power supply	Operating voltage	AC 24 V ±20 % or DC 13.5...35 V
	Frequency	50/60 Hz at AC 24 V
	Power consumption	≤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 and AC 24 V 0...100 % r.h.	 ±2 %
	Temperature dependency	≤0.05 % r.h./°C
	Time constant	< 20 s
	Output signal, linear (terminal U1)	DC 0...10 V ≙ 0...100 % r.h. max. ±1 mA
	Output signal, linear (terminal I1) Burden	4…20 mA ≙ 0...100 % r.h. refer to "Function"
Functional data "Temperature sensor"	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
	Measuring accuracy at AC 24 V in the range of 15...35 °C −35...+70 °C	 ±0.6 K ±0.8 K
	Time constant	8.5 min. (according to airflow and wall coupling)
	Output signal, linear (terminal U2)	DC 0...10 V ≙ 0...50/−35...+35/−40...+70 °C max. ±1 mA
	Output signal, linear (terminal I2) Burden	4..20 mA ≙ 0...50/−35...+35/−40...+70 °C refer to "Function"
Degree of protection	Housing degree of protection to	IEC 60 529
	Base unit	IP65
	measuring tip	IP40
	Unit with outdoor mounting kit	IP65
	Safety class	III to EN 60 730
Electrical connections	Screw terminals	1 × 2.5 mm^2 or 2 × 1.5 mm^2
	Cable entry gland (enclosed)	M 16 x 1.5
Environmental conditions	Operation to	
	Climatic conditions	class 4K2 to IEC 60 721-3-4
	Temperature (housing with electronics)	−40...+70 °C
	LCD-display readable	−25...+70 °C
	Humidity	0...100 % r.h. (with condensation)
	Mechanical conditions	class 3M2 to IEC 60 721-3-3

	Transport to	IEC 60 721-3-2
	Climatic condition	class 2K3
	Temperature	−40...+70 °C
	Humidity	<95 % r.h.
	Mechanical conditions	class 2M2
Materials and color	Base	polycarbonate, RAL 7001 (silver-grey)
	Housing cover	polycarbonate, RAL 7035 (light-grey)
	measuring tip	polycarbonate, RAL 7001 (silver-grey)
	Filter cap	polycarbonate, RAL 7001 (silver-grey)
	Mounting bracket	PA, RAL 7035 (light-grey)
	Sensor (entirely)	silicon-free
	Packaging	corrugated cardboard
Standards	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
	CE conformity to	EMC directive 2004/108/EC
	conformity to	
	Australian EMC framework	Radio Communication Act 1992
	Radio Interference Emission Standard	AS/NZS 3548
	UL-Konformität	UL 873
Weight	Incl. packaging	
	Without LCD-display	0.152 kg
	With LCD-display	0.175 kg
	AQF3150	0.050 kg
	AQF3153	0.066 kg

Connection terminals



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

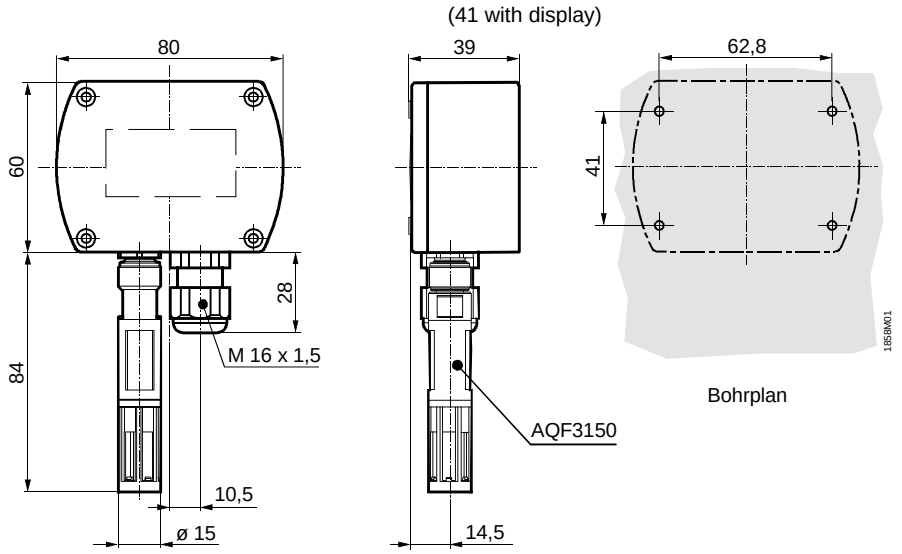
*Note on connection terminals of the **QFA3171(D)**:*

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!

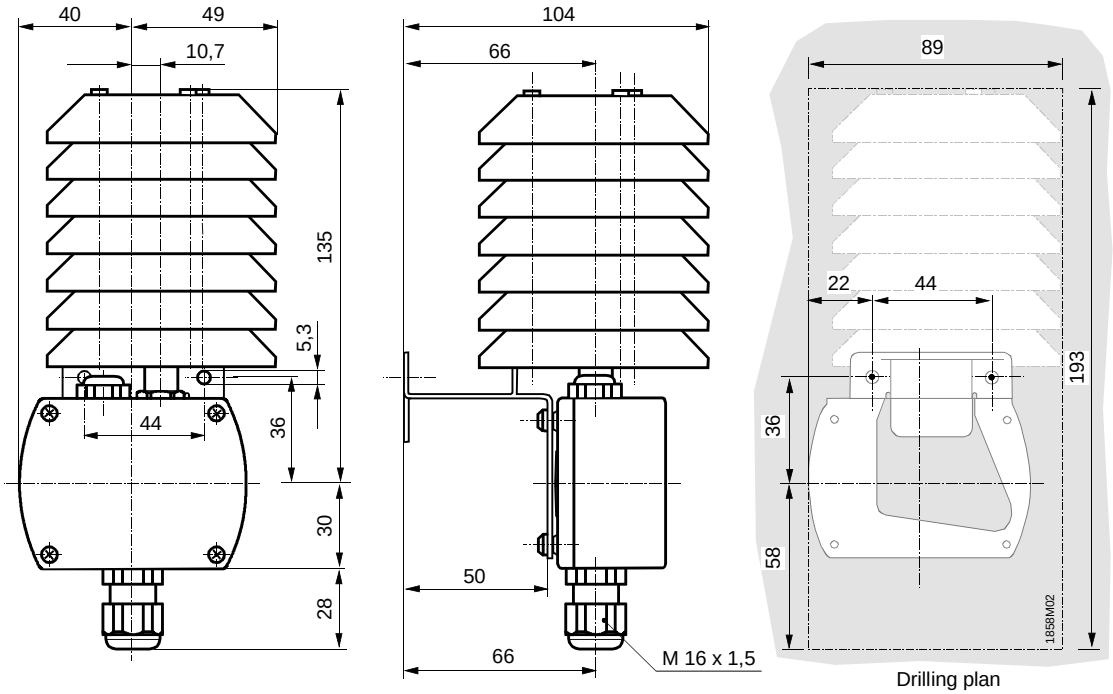
Dimensions (all dimensions in mm)

QFA31…(D)

Dimensioning without (with) LCD-display



QFA31… with AQF3100



Subject to change