SIEMENS

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QFA4160 QFA41…D AQF4150 AQF3153

Symaro™

Room sensors QFA41…

for relative humidity and temperature
with calibration certificates

- **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**
- **Capacitive humidity measurement**
- **Recalibration service**
- **Test function for loop test**
- **Range of use –40…+70 °C / 0…100 % r. h.**
  with LCD display -25…+70 °C / 0…100 % r. h.

Use

The QFA41… sensor is used in ventilation and air conditioning plants requiring:

- Very high accuracy and reliability for measuring relative humidity and temperature
- Regular recalibration and readjustment of the sensors

Examples:

- Storage and production facilities in the paper, textiles, pharmaceutical, chemical, electronics industries, etc.
- Laboratories
- Hospitals
- Computer centers
- Greenhouses

Type summary

Type reference	*Temperature measuring range*	*Temperature signal output*	*Humidity measuring range*	*Humidity signal output*	*Operating voltage*	*Measured value display*
QFA4160	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
QFA4160D	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
QFA4171	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
QFA4171D	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 and delivery

When ordering, please give name and type reference, e.g.:
Room sensor **QFA4160**
Place a separate order for the service set AQF3153 listed under accessories.
The circular connector with its screwed plug is delivered uninstalled.

Equipment combinations

The QFA41… 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

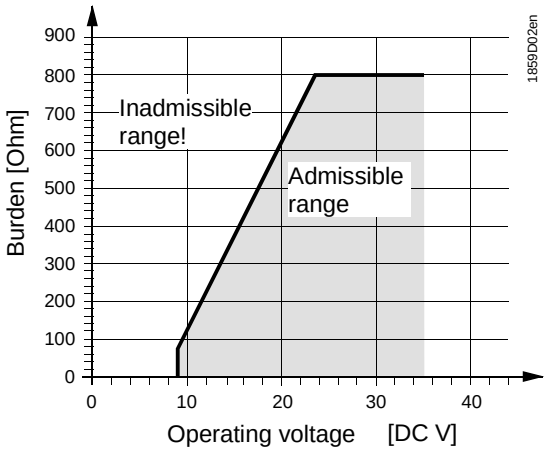
The sensor acquires relative humidity via its capacitive sensing element whose capacitance varies as a function of the relative humidity of the ambient air.
An electronic circuit converts the sensor's signal to a continuous DC 0...10 V or 4…20 mA signal, corresponding to a relative humidity of 0...100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

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 room sensor consists of housing, printed circuit board, connection terminals, measuring tip and circular connector. The housing consists of 2 parts: Base and removable cover (screwed).

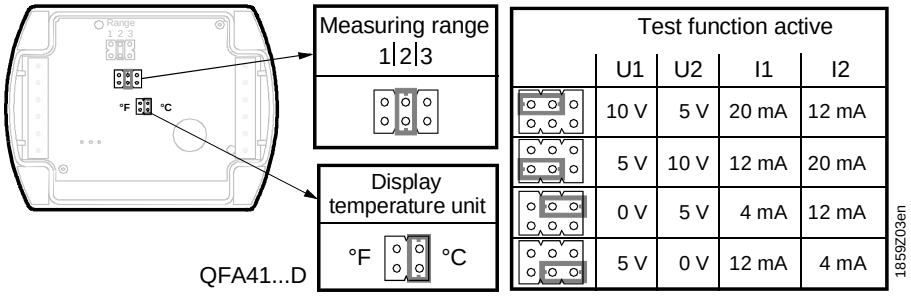
A rubber seal is installed between housing and cover in order to satisfy the requirements of IP 65 degree of protection.
The measuring circuit and the setting element are accommodated on the printed circuit board inside the cover, the connection terminals on the base.
Housing and measuring tip are screwed 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.
Cable entry is made via the circular connector, which consists of coupling piece with M16 thread and connector with screwed plug. The coupling piece is secured to the housing and internally wired.
The sensor is designed for wall mounting.

Measured value display

The types QFA4160D and QFA4171D 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 (QFA41…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

Calibration certificates

The sensor and its exchangeable AQF4150 measuring tip are numbered, registered and calibrated prior to delivery. The associated calibration certificates are supplied with the sensor.

Service set AQF3153

The service set comprises ~~there~~ 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 measuring tips can be exchanged in operation.
The service set allows for easy and quick loop test performance as recommended by Vertical Market Pharma and offered by their calibration service in various countries.

Accessories

Name	*Type reference*
Measuring tip certified (exchangeable)	**AQF4150**
Service set (for loop test)	**AQF3153**
Filter cap (for replacement)	**AQF3101**

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 **QFA4171(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

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

The QFA4160 must not be mounted with the measuring tip pointing upward.

Mounting Instructions

Mounting Instructions are printed on the inner side of the package.

Commissioning notes

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

Recalibration service

SBT HVAC Products provides a recalibration service for used sensors.
Recalibration should be performed at 12-month intervals under "normal" conditions, i.e. within the comfort range for humidity and temperature, and at air contamination levels that are not above average.

Services provided

The recalibration service includes the following:

- Delivery and invoicing of the new AQF4150 measuring tip complete with calibration certificate
- Delivery of a calibration certificate for the (old) measuring tip returned to SBT HVAC Products, enabling the customer to assess the time of usage of the measuring tip

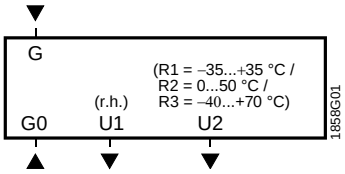
Technical data

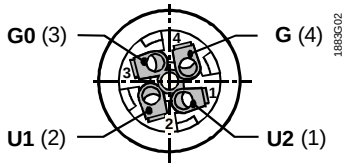
Power supply	Operating voltage	AC 24 V ±20 % or DC 13.5...35 V
	Frequency	50/60 Hz at AC 24 V
	Power consumption	≤1 VA
Cable lengths for the measuring signal	Max. perm. cable lengths	refer to Data Sheet of the device handling the signal
Functional data “Humidity sensor"	Measuring range	0...100 % r.h.
	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 ±1 mA max.
	Output signal, linear (terminal I2) Burden	4..20 mA ≙ 0...50/−35...+35/−40...+70 °C refer to "Function"
Degree of protection	Housing	IP65 to IEC 60529, measuring tip IP40
	Safety class	III to EN 60 730
Electrical connections	Connector with screwed plug Screw terminals for Cable entry	Lumberg RSC 4/9 0.75 mm^2 max. 4…8 mm dia.
Environmental conditions	Operation Climatic conditions Temperature (housing with electronics) LCD-display readable Humidity Mechanical conditions	 class 4K2 to IEC 60721-3-4 −40...+70 °C −25...+70 °C 0...100 % r.h. (with condensation) class 3M2 to IEC 60721-3-3
	Transport to Climatic condition Temperature Humidity Mechanical conditions	IEC 60721-3-2 class 2K3 −40...+70 °C <95 % r.h. class 2M2
Materials and colors	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)

	Circular connector	
	Connector with screwed plug	Lumberg RSC 4/9
	Contact carrier and body	PA, black
	Knurled nut and contact	CuZn, nickel-plated
	Coupling piece	Lumberg RKFM 4/0.5 M
	Contact carrier	TPU
	Casing and contact	CuZn, nickel-plated
	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 conformity	UL 873
Weight	Incl. packaging	
	Without LCD-display	0.196 kg
	With LCD-display	0.221 kg
	AQF3153	0.066 kg
	AQF4150	0.050 kg

Connection terminals

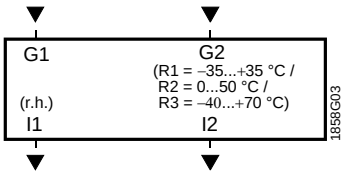
QFA4160(D)

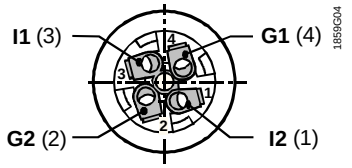




Front view:
Connector fitted, body removed

QFA4171(D)





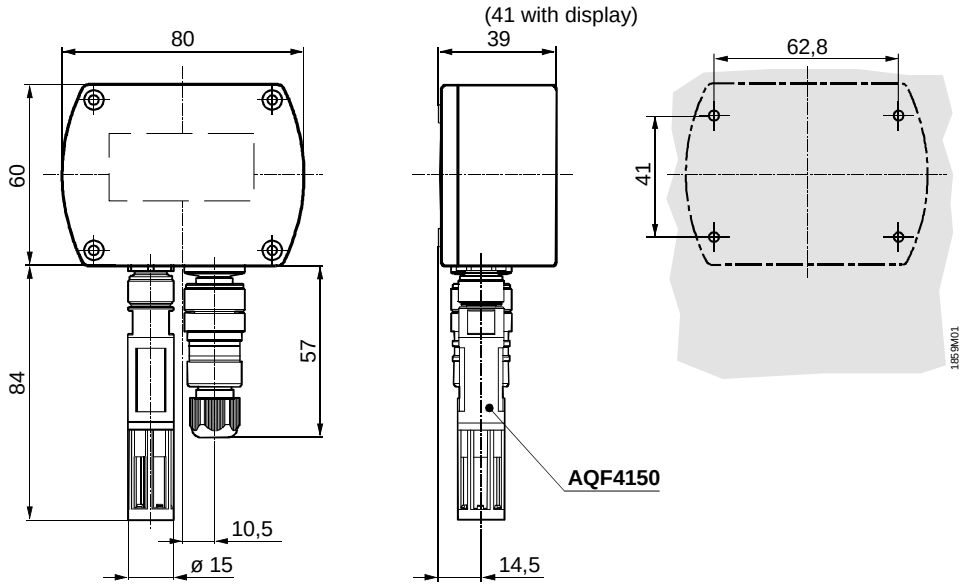
Front view:
Connector fitted, body removed

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 **QFA4171(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



Dimensioning without (with) LCD-display

Dimensions in mm