SIEMENS

1857

1857P01

QFA20…

QFA2060D

Room sensors

QFA20…

For relative humidity and temperature

- **Operating voltage AC 24 V or DC 13.5…35 V**
- **Signal output DC 0...10 V for relative humidity**
- **Signal output DC 0...10 V or LG-Ni 1000 or T1 for temperature**
- **Accuracy of ±3 % r.h. within comfort range**
- **Range of use –15…+50 °C / 0…95 % r. h. (non-condensing)**

Use

In ventilating and air conditioning plants to acquire
- relative humidity and
- temperature

in rooms.

The QFA20… is used as a
- control sensor and
- measuring sensor for building automation and control systems or indicating units.

Type summary

Type reference	*Temperature measuring range*	*Temperature signal output*	*Humidity measuring range*	*Humidity signal output*	*Operating voltage*
QFA2000	None	None	0...100 %	active, DC 0...10 V	AC 24 V or DC 13.5…35 V
QFA2020	0...50 °C	passive, LG-Ni 1000	0...100 %	active, DC 0...10 V	AC 24 V or DC 13.5…35 V
QFA2040	0...50 °C	passive, T1 (PTC)	0...100 %	active, DC 0...10 V	AC 24 V or DC 13.5…35 V
QFA2060 **QFA2060D**	0...50 °C / –35...+35 °C / –40…+70 °C	active, DC 0...10 V	0...100 %	active, DC 0...10 V	AC 24 V or DC 13.5…35 V

Ordering and delivery

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

Room sensor QFA2060D.

Equipment combinations

All systems or devices capable of acquiring and handling the sensor's DC 0...10 V, LG-Ni 1000 or T1 output signal.
When using the sensors for minimum or maximum selection, for averaging, or to calculate enthalpy, enthalpy difference, absolute humidity, and dew point, we recommend to use the SEZ220 signal converter (see Data Sheet N5146).

Mode of operation

Relative humidity

The sensor acquires the relative humidity in the room via its capacitive humidity sensing element whose electrical capacitance changes as a function of the relative humidity. The electronic measuring circuit converts the sensor's signal to a continuous DC 0...10 V signal, which corresponds to 0...100 % relative humidity.

Temperature

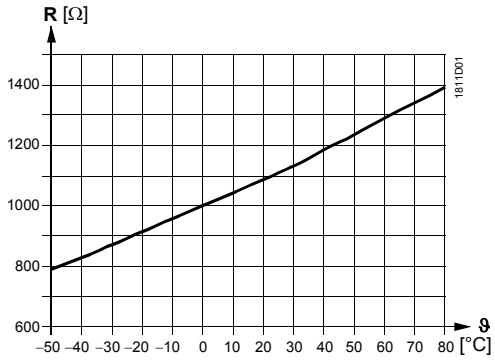
The sensor acquires the temperature in the room via its sensing element whose electrical resistance changes as a function of the temperature.
This change in resistance is converted to an active DC 0…10 V output signal, corresponding to a temperature range of 0… 50 °C, –35…+35 °C, or –40...+70 °C. The measuring range can be selected. The temperature is provided as a simulated passive LG-Ni 1000 or T1 output signal (≙ 0…50 °C) as an alternative to the active output signal.

Simulated passive output signal

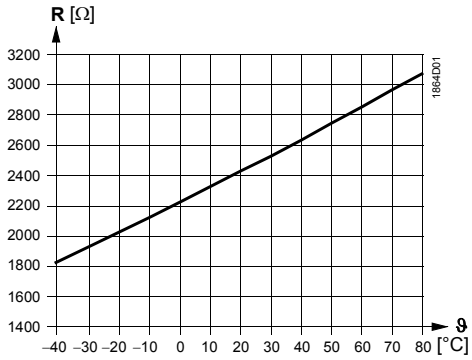
The measuring current from systems/devices to acquire the electrical resistance of the passive sensor differs greatly and impacts self-heating of the temperature sensing element at the end of the measuring tip. To compensate the impact, the passive output signal is simulated with an electronic circuit.

Sensing elements, simulated

Characteristic LG-Ni 1000



Characteristic T1 (PTC)



Legend

R Resistance value in Ohm
ϑ Temperature in degrees Celsius

Mechanical design

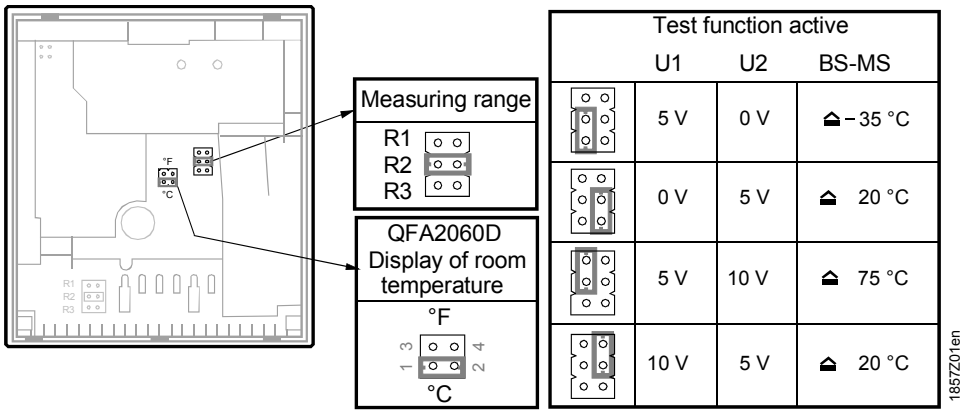
The room sensors have been designed for wall mounting. They are suitable for use with most commercially available recessed conduit boxes. The cables can be introduced from the rear (concealed wiring) or from below or above (surface-run wires) through knock-out openings.
The two-part housing comprises a casing and a baseplate. Both snap together but can be detached again.
The measuring circuit, the sensing elements and the setting element are located on the printed circuit board inside the casing.
The baseplate carries the connecting terminals.

Measured value display

The type QFA2060D provides the measured values on its LCD display. The following measured values are displayed alternately in intervals of 5 s:

- Temperature: in °C or °F
- Humidity: in % r. h.

Setting element



The setting elements are located in the casing. A setting element consists of 6 pins and a jumper. 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 jumper.

The different jumper positions have the following meaning:

- *For the passive temperature measuring range (QFM2120, QFM2140)::*
  Jumper in the middle position (R2) = LG-Ni 1000 or T1 (0...50 °C)
- *For the active temperature measuring range:*
  Jumper in the upper position (R1) = −35...+35 °C,
  Jumper in the middle position (R2) = 0...50 °C (factory setting),
  Jumper in the lower position (R3) = −40…+70 °C
- *For activating the test function:*
  Jumper in the vertical position: The values according to the table "Test function active" will be made available at the signal output.
- *For the measured value display (QFA2060D)*
  Jumper horizontal, in the upper position = °F
  Jumper horizontal, in the lower position = °C (factory setting)

Malfunction

- Should the temperature sensor become faulty a voltage of 0 V will be applied at signal output U2 or signal output BS-MS becomes high impedance (>1 MΩ) after 60 seconds, and the humidity signal at signal output U1 will reach 10 V.
- Should the humidity sensor become faulty a voltage of 10 V will be applied at signal output U1 after 60 seconds, and the temperature signal will remain active.

Engineering notes

Room sensors with active outputs have a high power loss, which ultimately influences temperature measurement. The degree of influence depends on the operating voltage and is compensated in the Symaro™ room sensors for an operating voltage of AC 24 V. Over- or undercompensation may occur for other operating voltages.

Furthermore, the measuring accuracy is impacted by the following factors:
- Prevailing air flow
- Wall surface (rough, smooth)
- Wall texture (wood, plaster, concrete, brick)
- Wall type (interior, exterior).

This application-specific measuring inaccuracy is constant for an installed sensor after approx. 1 operating hour, and it can be adjusted as needed in a higher system (e.g. controller).
A transformer for safety extra low-voltage (SELV) with separate windings for 100 % duty is required to power the sensor. When sizing and protecting the transformer, the local safety regulations must be complied with.
When sizing the transformer, the power consumption of the room sensor must be taken into consideration.
For correct wiring of the sensor, refer to the Data Sheets of the devices with which the sensor is used.
The permissible line lengths must be considered.

Cable routing and cable selection

It must be considered for routing of cables that the longer the cables run side by side and the smaller the distance between them, the greater the electrical interference.
Shielded cables must be used in environments with EMC problems.
Twisted pair cables are required for the secondary supply lines and the signal lines.

Mounting notes

Location

Inside wall (not on outside wall!) of the room to be air conditioned; not in recesses, behind curtains, above or close to heat sources or shelves not on walls behind which a chimney is located. The unit must not be exposed to spot lights or direct solar radiation.
The unit must not be exposed to spot lights or 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.
The end of the conduit at the sensor must be sealed to prevent false measurements due to draughts through the conduit.

Mounting instructions

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

Commissioning notes

Check wiring before switching on power. The temperature measuring range must be selected on the sensor, if required.
Wiring and the output signals can be checked by making use of the test function (refer to "Mechanical design").

⚠ We recommend not to use voltmeters or ohmmeters directly at the sensing element. In the case of the simulated passive output signals, measurements with commercially available meters cannot be made (measuring current too small).

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 measuring signal	Perm. cable lengths	See data sheet for the device handling the signal
Functional data of humidity sensor	Range of use	0…95 % r. h. (non-condensing)
	Measuring range	0…100 % r. h.
	Measuring accuracy at 23 °C and AC 24 V 0...95 % r.h. 30...70 % r.h.	 ±5 % r. h. ±3 %,r. h. typically
	Temperature dependency	≤0.1 % r. h./°C
	Time constant	< 20 s
	Output signal, linear (terminal U1)	DC 0...10 V ≙ 0...100 % r. h., max. ±1 mA

Functional data of temperature sensor with QFA2060(D)	Range of use	−15...+50 °C
	Measuring range	0...50 °C (R2 = factory setting), −35...+35 °C(R1) or −40…+70 °C(R3)
	Sensing element	NTC 10 kΩ
	Measuring accuracy at AC 24 V in the range 15...35 °C −35...+50 °C	 ±0.8 K ±1 K
	Time constant	8.5 min (depending on air movement and thermal coupling to the wall)
	Output signal, linear (terminal U2)	DC 0...10 V ≙ 0...50 °C / −35...+35 °C / −40…+70 °C max. ±1 mA
Functional data of temperature sensor with QFA2020, QFA2040	Measuring range	0...50 °C
	Sensing element simulated, corresponding to QFA2020 QFA2040	 LG-Ni 1000 T1 (PTC)
	Measuring accuracy at AC 24 V in the range 15...35 °C −35...+50 °C	 ±0.8 K ±1 K
	Time constant	8.5 min (depending on air movement and thermal coupling to the wall)
	Perm. measuring current with QFA2020 QFA2040	 1.18…4.21 mA 0.53…1.89 mA
Degree of protection	Housing	IP 30 as per IEC 60529
	Safety class	III as per EN 60 730
Electrical connections	Screw terminals for	1 × 2.5 mm^2 or 2 × 1.5 mm^2
Environmental conditions	Operation to Climatic conditions Temperature (housing with electronics) Humidity Mechanical conditions	IEC 60721-3-3 Class 3K5 −15...+50 °C 0…95 % r. h (non-condensing) Class 3M2
	Transport to Climatic condition Temperature Humidity Mechanical conditions	IEC 60721-3-2 Class 2K3 −25...+70 °C <95 % r. h. Class 2M2
Materials and colors	Housing front	ASA + PC, NCS S 0502-G (white)
	Bottom section of housing	ASA + PC, NCS 2801-Y43R (grey)
	Base	PC, NCS 2801-Y43R (grey)
	Sensor (complete assembly)	Silicone-free
	Packaging	Corrugated cardboard
Standards	Product safety Automatic electrical controls for household and similar use	 EN 60730-1
	Electromagnetic compatibility Immunity Emissions	 EN 61000-6-1 EN 61000-6-3
	CE conformity to	EMC directive 2004/108/EC
	conformity to Australian EMC framework Radio Interference Emission Standard	 Radio Communication Act 1992 AS/NZS 3548
	UL-conformity	UL 873
Weight	Incl. packaging **Without LCD display** **With LCD display**	 Approx. 0.130 kg Approx. 0,150 kg