1961P01

QPA20…

1961P02

QPA20…D

Room air quality sensors QPA20…

- **With maintenance-free CO_2 sensing element based on optical infrared absorption measurement (NDIR[1)])**
- **and – depending on the type of sensor – VOC[2)] sensing element based on a heated tin dioxide semiconductor**
- **CO_2 temperature and CO_2 humidity-temperature multi-sensor**
- **No recalibrations required**
- **Operating voltage AC 24 V or DC 15…35 V**
- **Signal outputs DC 0...10 V**

1) NDIR = Non dispersive infrared

2) VOC = volatile organic compounds (also called mixed gas)

Use

In ventilation and air conditioning plants to enhance room comfort and optimize energy consumption by providing demand-controlled ventilation. The sensor acquires:

- CO_2 concentrations as an indication of occupancy in rooms where smoking is prohibited
- VOC concentrations as an indication of odors such as tobacco smoke, body odor, or material fumes in the room
- Relative humidity in the room
- Room temperature

The QPA20… can be used as a:

- Control sensor
- Transmitter for building automation and control systems and / or display units

Typical use:

- Acquisition of CO_2 and VOC concentrations:
  In party rooms, lounges, fair pavilions and exhibition halls, restaurants, canteens, shopping malls, athletic centers, sales rooms, and conference rooms
- Acquisition of CO_2 concentrations:
  In rooms with varying occupancy levels where smoking is prohibited, e.g. museums, theaters, movie theaters, auditoriums, office spaces, and school rooms

Important! QPA20… sensors may not be deployed as safety devices, e.g. as gas or smoke warning devices!

Type summary

Product number	*CO_2 measuring range*	VOC sensitivity	*Temperature measuring range*	*Humidity measuring range*	*Display of measured value*
QPA2000	0…2000 ppm	---	---	---	No
QPA2002	0…2000 ppm	Low (R1) Normal (R2) High (R3)	---	---	No
QPA2002D	0…2000 ppm	Low (R1) Normal (R2) High (R3)	---	---	Yes
QPA2060	0…2000 ppm	---	0...50 °C / –35...+35 °C	---	No
QPA2060D	0…2000 ppm	---	0...50 °C / –35...+35 °C	---	Yes
QPA2062	0…2000 ppm	---	0...50 °C / –35...+35 °C	0...100 %	No
QPA2062D	0…2000 ppm	---	0...50 °C / –35...+35 °C	0...100 %	Yes

Ordering

When ordering, please give name and product number, e.g.:
Room air quality sensor **QPA2002**

Equipment combinations

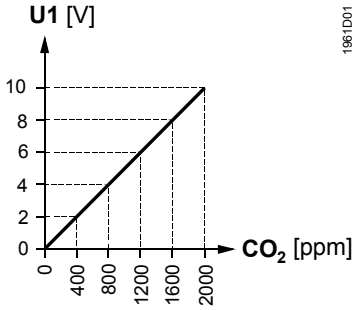
QPA20… sensors are designed for deployment with all types of systems and devices capable of acquiring and handling the DC 0...10 V output signal from the sensor.

Mode of operation

CO_2 concentrations

Symaro™ air quality sensors acquire the CO_2 concentration by infrared absorption measurement (NDIR). Due to an additional integrated reference light source, the measurement is always accurate and no service or recalibration needed, thus reducing service costs. The resulting output signal DC 0...10 V is proportional to the CO_2 content of ambient air.

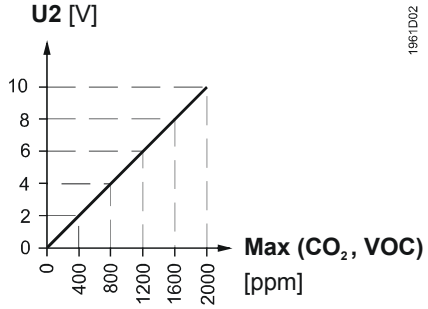
Function diagram CO_2 (output U1)



CO_2/VOC concentration – only with **QPA2002** and **QPA2002D**

The sensor acquires and evaluates the CO_2 / VOC concentration and transforms it to a ventilation demand signal.
It represents the result of maximum selection of the CO_2 measuring signal and the filtered VOC measuring signal. With maximum selection, the 2 demand signals are compared and – depending on the result and the selected VOC sensitivity – provided as common air quality demand.
The ventilation demand signal is provided via output U2 as a DC 0…10 V signal to be supplied to the ventilation controller.

Ventilation demand diagram (output U2)



VOC sensitivity

Using the shorting plug on the setting element for the measuring range allows for changing the impact of VOC ventilation demand on maximum selection against CO_2 ventilation demand.
The position in the center (R2) produces normal sensitivity of the VOC signal (factory setting). The 2 other positions are used to increase (R3) or decrease (R1) VOC sensitivity.

Response time "VOC signal"

Before the processor handles a change of the measured VOC value for maximum selection, a response time of 3 minutes for every Volt the signal value changes is observed.

Relative humidity
– only with **QPA2062** and **QPA2062D** –

The sensor acquires the relative humidity in the room with a capacitive humidity sensing element whose capacitance changes as a function of relative humidity.
An electronic measuring circuit converts the signal from the sensing element to a continuous DC 0...10 V signal, corresponding to a relative humidity range of 0...100 %.

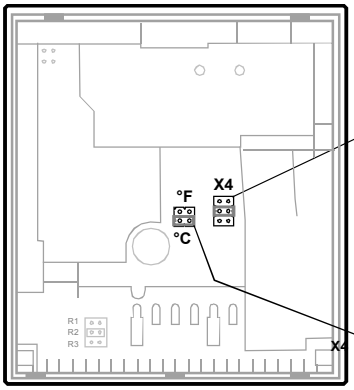
Temperature
– only with **QPA206…** –

The sensor acquires the room temperature with a sensing element whose electrical resistance changes as a function of the temperature.
The change is converted to an active DC 0...10 V output signal (≙ 0...50 °C or −35...+35 °C).

Mechanical design

The units are designed for wall mounting and can be deployed with most types of commercially available recessed conduit boxes. The cables can be introduced from the rear (concealed wiring), from below or above (surface-run wires) through knockout openings.
The units consist of 2 major sections: Casing and baseplate. Both snap together but can be again detached.
The measuring circuit, the sensing elements, and the setting elements are located on a printed circuit board in the unit.
The mounting base carries the connection terminals.

Setting elements…



QPA2000/2002/2060
QPA2002D/2060D

Measuring range	
R1	
R2	X4
R3	

Display Temperature unit
°F
°C

Test function active X4	U1	U2
	10 V	5 V
	0 V	5 V
	5 V	**10 V**
	5 V	**0 V**

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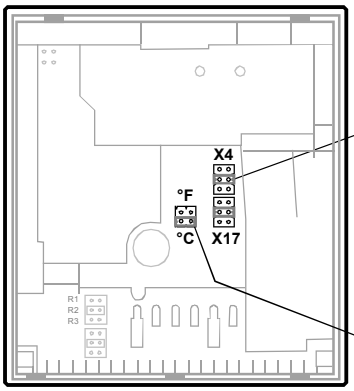


QPA2062
QPA2062D

Measuring range	
R1	
R2	X4
R3	

Display Temperature unit
°F
°C

* Test function active X4	U1	U2	U3
	10 V	5 V	5 V
	0 V	5 V	5 V
	5 V	**10 V**	5 V
	5 V	**0 V**	5 V

X17	U1	U2	U3
	5 V	5 V	**10 V**
	5 V	5 V	**0 V**
	5 V	5 V	5 V
	5 V	5 V	5 V

* Set either X4 or X17 into test function, but not both at the same time.

The setting elements can be accessed after removing the mounting base.

… for the measuring range — Meaning of the different shorting plug positions:

with **QPA2000**

- *For the CO_2 measuring range:*
  Shorting plug in the mid position (R2) = 0…2000 ppm (factory setting)

with **QPA2002** and **QPA2002D**

- *For CO_2 / VOC weighting:*
  - Shorting plug in the upper position (R1) = VOC sensitivity "low"
  - Shorting plug in the mid position (R2) = VOC sensitivity "normal" (factory setting)
  - Shorting plug in the lower position (R3) = VOC sensitivity "high"

with **QPA206…**

- *For the temperature measuring range:*

- Shorting plug in the upper position (R1) = –35...+35 °C
- Shorting plug in the mid position (R2) = 0...50 °C (factory setting)

… for the active test function

Shorting plug for the measuring range in the vertical position:
The signal output delivers the values according to table "Test function active".

… for changeover of the temperature display

Meaning of the different shorting plug positions:

- *For the unit of temperature:*
  - Shorting plug in the horizontal, lower position = °C (factory setting)
  - Shorting plug in the horizontal, upper position = °F

Behavior in the event of fault

All types
- In the event of CO_2 failure, 10 V is present at signal output U1 (after 60 seconds)

QPA2002
- In the event of CO_2 or VOC failure, 10 V is present at signal output U2 (after 60 seconds)

QPA2060 and **QPA2060D**
- If the temperature sensor becomes faulty, 0 V is present at signal output U2

QPA2062 and **QPA2062D**
- If the temperature sensor becomes faulty, 0 V is present at signal output U3, and the humidity signal at signal output U2 increases to 10 V (after 60 seconds)
- If the humidity sensor becomes faulty, 10 V is present at signal output U2 (after 60 seconds), and the temperature signal remains active

Display of measured values

With sensors type **QPA2002D**, **QPA2060D** and **QPA2062D**, the measured values can be read on an LCD. The following measured values are displayed:

- CO_2 : In ppm
- CO_2 + VOC: As a bar chart (4 bars ≙ U2 = 2 V, 20 bars ≙ U2 = 10 V)
- Temperature: In °C or °F
- Humidity: In %

Disposal

The major plastic components are labeled with material references in compliance with ISO / DIS 11 469 to allow for environmentally compatible disposal.

Engineering notes

The sensor must be powered by a transformer for safety extra low-voltage (SELV) with separate windings, suited for 100 % duty. Size and fuse it in compliance with local safety regulations.
When sizing the transformer, consider the power consumption of the sensor. For information about wiring, see the data sheets of the devices with which the sensor is used. Observe maximum permissible cable lengths.

Cable routing and cable selection

When laying the cables, remember that electrical interference is greater the longer the cables run parallel and the smaller the distance between them. On applications with EMC problems, use shielded cables. For secondary power lines and signal lines, use twisted-pair cables.

Mounting notes

Mounting location

Inner wall of the room to be ventilated, not in niches, not behind curtains, not above or near heat sources, and not exposed to direct light from spot lights.
Do not expose the sensor to direct solar radiation.
Seal the end of the conduit at the sensor to prevent false measurements due to drafts through the conduit.

Mounting instructions

Mounting instructions are enclosed in the package.

Commissioning notes

The sensor's functions can be checked 30 minutes after applying power:

- Checking the CO_2 function:
  In well ventilated rooms, the sensor shows the CO_2 concentration of the outside air. This is typically, 360 ppm (the sensor's measuring accuracy must be considered). Also, a basic functional check can be made by exhaling on the sensor. In this case, remember that the sensor's rate of response is purposely delayed (time constant t_{90} = 5 min)
- Checking the VOC function:
  Touch the sensor with a cotton ball dowsed in alcohol (e.g. gas from a cigarette lighter, without lighting a flame)

Ventilation should start when the preset switching level of the connected controller is reached.

After applying power to the types of sensor with display, **Init** appears for about 6 seconds.

Technical data

Power supply	Operating voltage (SELV)	AC 24 V ±20 % or DC 15…35 V
	Frequency	50/60 Hz at AC 24 V
	Power consumption	≤2 VA
Cable lengths for measuring signal	Perm. cable lengths	See data sheet of the device handling the signal
Functional data "CO_2"	Measuring range (MW = measured value)	0...2000 ppm
	Measuring accuracy at 23 °C and 1013 hPa	≤±(50 ppm + 2 % MW)
	Temperature dependency in the range of -5…45 °C	±2 ppm / °C typically
	Long-time drift	≤±20 ppm p.a.
	Time constant t_{90}	<5 min
	Output signal, linear (terminal U1)	DC 0...10 V ≙ 0...2000 ppm, max. ±1 mA
	Recalibration-free	8 years
Functional data "Maximum selection of CO_2 and VOC" with QPA2002 and QPA2002D	Measuring range	0...2000 ppm
	VOC sensitivity	See "Type summary"
	Output signal, linear (terminal U2)	DC 0...10 V ≙ 0...2000 ppm, max. ±1 mA
	Response time "VOC signal" t_{VOC}	3 min/V
Functional data "r.h." with QPA2062 and QPA2062D	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	approx. 20 s
	Output signal, linear (terminal U2)	DC 0...10 V ≙ 0...100 % r.h., max. ±1 mA
Functional data "Temperature" with QPA206…	Measuring range	0...50 °C (R2, R3) or −35...+35 °C (R1)
	Measuring element	NTC 10 kΩ
	Measuring accuracy at AC 24 V in the range of 15...35 °C −35...+50 °C	 ±0.8 K ±1 K
	Time constant t_{63}	8.5 min
	Output signal, linear (terminal U2 or U3)	DC 0...10 V ≙ 0...50 °C / −35...+35 °C Max. ±1 mA
Display of measured value	With QPA2002D, QPA2060D, QPA2062D	LCD
Protective data	Degree of protection of housing	IP 30 to IEC 60 529
	Safety class	III to EN 60 730
Electrical connections	Screw terminals for	1 × 2.5 mm² or 2 × 1.5 mm²
Environmental conditions	Operation to Climatic conditions Temperature (housing incl. electronics) Humidity Mechanical conditions	IEC 60 721-3-3 Class 3K3 0...50 °C 0…95 % r.h. (non-condensing) class 3M2

	Transport to	IEC 60 721-3-2
	Climatic conditions	Class 2K3
	Temperature	−25...+70 °C
	Humidity	< 95 % r.h.
	Mechanical conditions	Class 2M2
Materials and colors	Cover	ASA + PC, NCS S 0502-G (white)
	Housing	ASA + PC, NCS 2801-Y43R (gray)
	Mounting plate	PC, NCS 2801-Y43R (gray)
	Sensor (complete)	Silicone-free
	Packaging	Corrugated cardboard
Standards	Product safety	
	Automatic electrical controls for household and similar use	EN 60 730-1
	Electromagnetic compatibility	
	Immunity QPA2062, QPA2062D	EN 61 000-6-1
	Immunity QPA2000, QPA2002, QPA2002D, QPA2060D, QPA2060D	EN 61 000-6-2
	Emissions	EN 61 000-6-3
	CE conformity to	EMC directive 2004/108/EC
	conformity to Australian EMC Framework Radio Interference Emission Standard	Radio Communication Act 1992 AS / NZS 3548
Weight	UL conformity	UL 916
	Incl. packaging	
	Without display	approx. 0.10 kg
	With display	approx. 0.12 kg

ppm = parts per million (number of parts per one million parts)

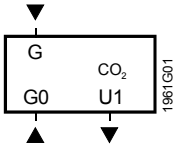
Room sensors with active outputs have power dissipation influencing temperature measurement. The degree of influence depends on the operating voltage and is compensated at AC 24 V operating voltage in Symaro™ room sensors. All other operating voltages may result in over- or undercompensation.

Furthermore, the measuring accuracy is influenced by the following:
- Prevailing air flow
- Wall surface (rough, smooth)
- Type of wall (wood, plaster, concrete, brick)
- Location of wall (inside, outdoors).

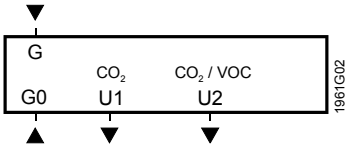
In an installed sensor, the application-specific measuring accuracy becomes constant after about a 1-hour operating time. It can be adjusted by a higher system (e.g. controller) as needed.

Connection terminals

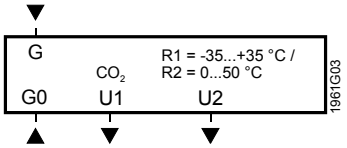
QPA2000



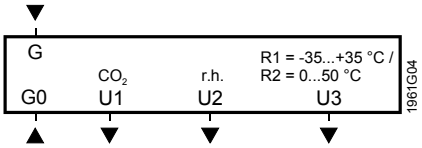
QPA2002, QPA2002D



QPA2060, QPA2060D

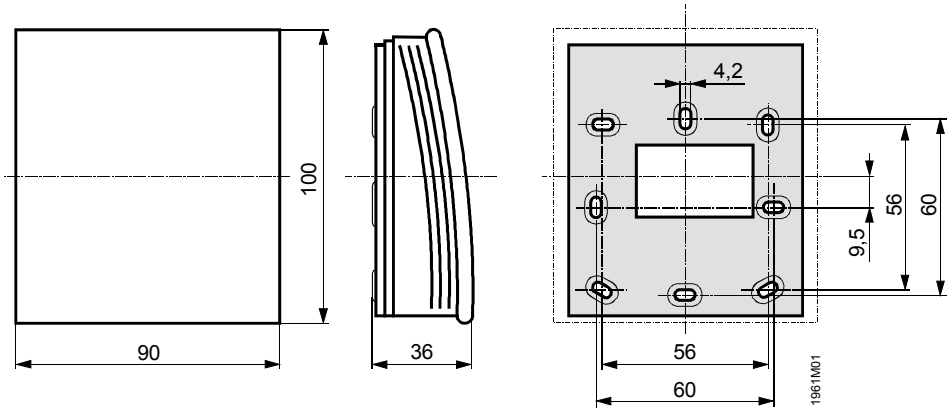


QPA2062, QPA2062D



G	System potential AC 24 V (SELV) or DC 15...35 V
G0	System neutral and measuring neutral
U1	Signal output DC 0...10 V
U2	Signal output DC 0...10 V
U3	Signal output DC 0...10 V

Dimensions (in mm)



Drilling plan

Subject to change