ENGLISH

Operating instructions
mounting & installation

CAREL

DPWQ 402000

Room CO_2 sensor,
with self-calibrating,
with multi-range switching,
active and switching output

DPDQ 402000 including mounting flange

Duct CO_2 sensor,
with self-calibrating,
with multi-range switching,
active and switching output

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DPWQ 402000

APPLICATION:

The maintenance-free, microprocessor-controlled room CO_2 sensor is used to monitor the entire room climate. In order to do this, the CO_2 concentration is measured within in the range of 0...2000 ppm or 0...5000 ppm and converted into standard signals (0-10 V or 4...20 mA). Elegant enclosure made of plastic, with snap-on lid, base with 4-hole attachment, for installation on vertically or horizontally installed in-wall flush boxes, with predetermined breaking point for on-wall cable entry. The CO_2 content of the air is measured using an optical NDIR sensor (non-dispersive infra-red technology).

TECHNICAL DATA:

Power supply:	24 V AC / DC (± 10 %)
Power consumption:	< 1.5 W / 24 V DC typical; < 2.9 VA / 24 V AC typical; peak current 200 mA
Sensor CO_2:	optical NDIR sensor (non-dispersive infra-red technology) **with automatic and manual calibration**
Measuring range, CO_2:	**multi-range switching** (selectable via DIP switches) 0...2000 ppm; 0...5000 ppm
Output CO_2:	**0-10 V** or **4...20 mA** (selectable via DIP switches)
Measuring accuracy CO_2:	± 30 ppm ± 3 % of measured value
Temperature dependence CO_2:	± 5 ppm / °C or ± 0.5 % of measured value / °C (whichever is higher)
Pressure dependence:	± 0.13 % / mm Hg
Long-term stability:	< 2 % in 15 years
Gas exchange:	by diffusion
Relay output:	with potential-free changeover contact 24 V (assignment selectable via DIP switches)
Ambient temperature:	0...+ 50 °C
Warm up time:	approx. 1 hour
Response time:	< 2 minutes
Electrical connection:	0.14 - 1.5 mm^2, via screw terminals
Enclosure:	plastic, material ABS, colour pure white (similar to RAL 9010)
Dimensions:	85 x 85 x 27 mm
Installation:	wall mounting or on in-wall flush box, Ø 55 mm, base with 4 holes, for attachment to vertically or horizontally installed in-wall flush boxes for rear cable entry, with predetermined breaking point for cable entry from top /bottom in case of plain on-wall installation
Protection class:	III (according to EN 60730)
Protection type:	IP 30 (according to EN 60529)
Standards:	CE conformity, electromagnetic compatibility according to EN 61 326, EMC Directive 2014 / 30 / EU, Low Voltage Directive 2014 / 35 / EU

DPWQ 402000

DIP switches	**DPWQ 402000**
CO_2 content	**DIP 1**
0...2000 ppm (default)	OFF
0...5000 ppm	**ON**
CO_2 automatic zero point	**DIP 3**
deactivated	OFF
activated (default)	**ON**
Output	**DIP 4**
Voltage 0-10 V (default)	OFF
Current 4...20 mA	**ON**
Note: **DIP 2 and 5** are not assigned!	

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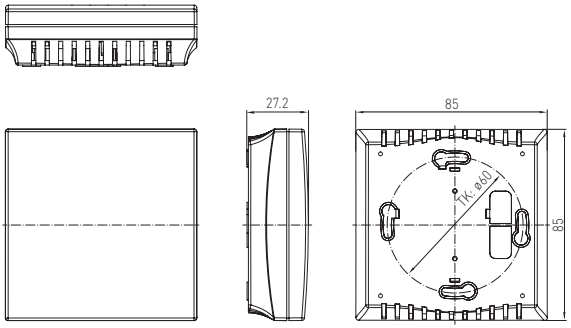
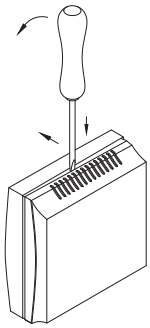
Dimensional drawing **DPWQ402000**

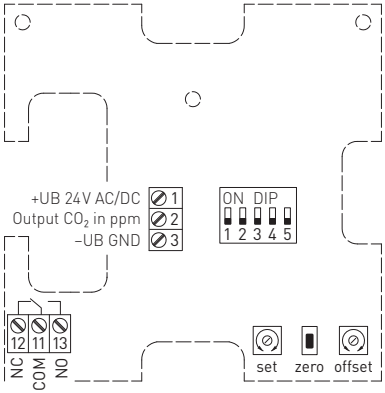


Enclosure **DPWQ402000**



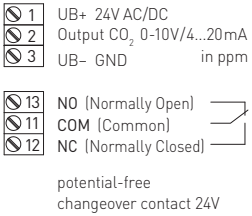
To open the enclosure, set a screwdriver (2.0) in the groove at centre, press down, and lift up the bottom frame slightly. Pull top cover forward and hold it.

Connecting diagram **DPWQ402000**



NC = Normally Closed
COM = Common
NO = Normally Open

Schematic diagram **DPWQ402000**



potential-free
changeover contact 24V

Type / WG02	Measuring Range CO_2	Output CO_2	Features
DPWQ402000	0...2000 / 0... 5000 ppm	0 - 10 V / 4...20 mA	Changeover contact
Note:	This unit **must not** be used as safety-relevant device!		

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DPDQ 402000 including mounting flange

APPLICATION:

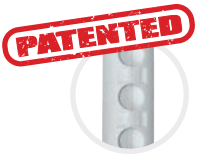
Patented quality product (patent no. DE 10 2014 010 719.1)

The maintenance-free, microprocessor-controlled duct CO_2 sensor is designed for duct installation and is used to detect the CO_2 content of the air. The measurement signals are converted to standard signals of 0-10 V or 4...20 mA.

The CO_2 content of the air is measured using an optical NDIR sensor (non-dispersive infra-red technology). The detection range of the CO_2 sensor is calibrated for standard applications such as monitoring residential rooms and conference rooms. Room ventilation on an as-needed basis, improved well-being and customer benefit, increased comfort as well as reduced operating costs through energy conservation are just some of the benefits of employing CO_2 sensors.

A measuring system based on NDIR (non-dispersive infra-red technology) for CO_2 measurement consists of a light source and a receptor. A certain range of wavelengths of light radiated by the source is damped and absorbed by CO_2 molecules in the measured section. This damping is detected by the receptor.

DPDQ402000



TECHNICAL DATA:

Power supply:	24 V AC / DC (± 10 %)
Power consumption:	< 1.5 W / 24 V DC typical; < 2.9 VA / 24 V AC typical; Peak current 200 mA
Sensor, CO_2:	optical NDIR sensor (non-dispersive infra-red technology) **with automatic and manual calibration**
Measuring range, CO_2:	**Multi-range switching** (selectable via DIP switches) 0...2000 ppm; 0...5000 ppm
Output, CO_2:	**0-10 V** or **4...20 mA** (selectable via DIP switches) 1 changeover contact (24 V / 1 A) switchpoint adjustable
Measuring accuracy, CO_2:	± 30 ppm ± 3 % of measured value
Temperature dependence, CO_2:	± 5 ppm / °C or ± 0.5 % of measured value / °C (whichever is higher)
Pressure dependence:	± 0.13 % / mm Hg
Long-term stability:	< 2 % in 15 years
Gas exchange:	by diffusion
Warm up time:	approx. 1 hour
Ambient temperature:	–10...+60 °C
Response time:	approx. 1 minute
Electrical connection:	0.14 - 1.5 mm^2, via screw terminals
Enclosure:	plastic, UV-stabilised, material polyamide, 30 % glass-globe reinforced, with quick-locking screws (slotted / Phillips head combination), colour traffic white (similar to RAL 9016)
Enclosure dimensions:	72 x 64 x 37.8 mm
Cable gland:	M 16 x 1.5; including strain relief, exchangeable, max. inner diameter 10.4 mm
Protective tube:	**PLEUROFORM™**, material polyamide (PA6), with torsion protection, Ø 20 mm, NL = 202.5 mm, v_{max} = 30 m/s (air)
Process connection:	via flange made of plastic (included in scope of delivery)
Protection class:	III (according to EN 60730)
Protection type:	IP 65 (according to EN 60529) enclosure only!
Standards:	CE conformity, electromagnetic compatibility according to EN 61 326, EMC Directive 2014 / 30 / EU

DIP switches	DPDQ 402000
CO_2 content	**DIP 1**
0...2000 ppm (default)	OFF
0...5000 ppm	**ON**
CO_2 automatic zero point	**DIP 3**
deactivated	OFF
activated (default)	**ON**
Output	**DIP 4**
Voltage 0-10 V (default)	OFF
Current 4...20 mA	**ON**
Note: **DIP 2** is not assigned!	

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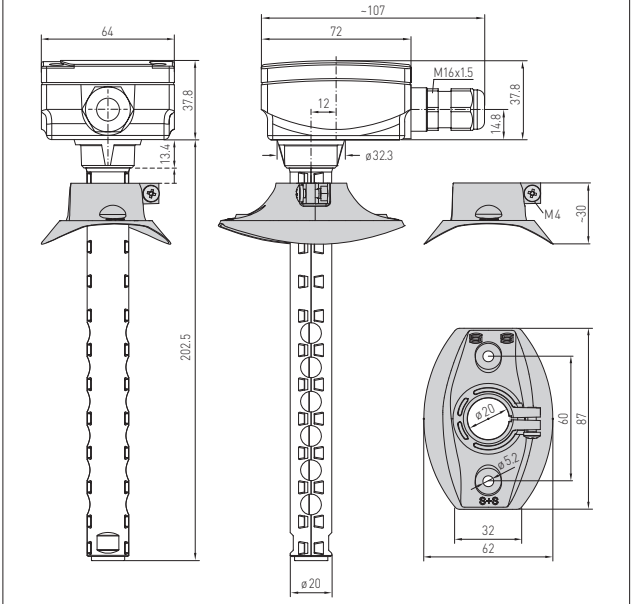
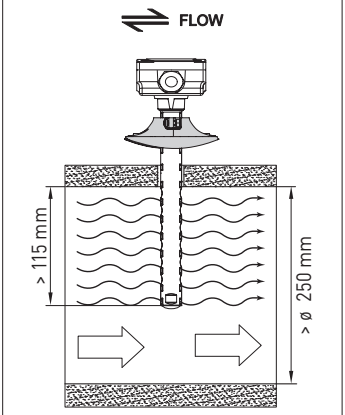
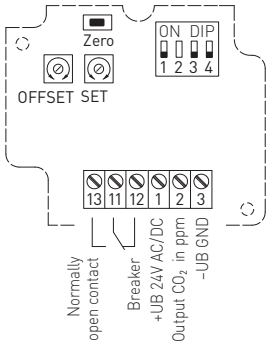
Dimensional drawing **DPDQ402000**



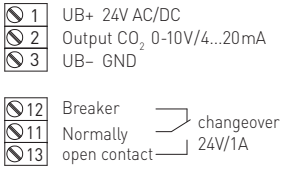
Mounting diagram **DPDQ402000**



Connecting diagram **DPDQ402000**



Schematic diagram **DPDQ402000**



Type / WG02	Measuring Range CO_2	Output CO_2	Features
DPDQ402000	0...2000 / 0... 5000 ppm	0 - 10 V / 4...20 mA	Changeover contact
Note:	This unit **must not** be used as safety-relevant device!		

ENGLISH

Notes regarding DPWQ 402000 and DPDQ 402000

- This device may only be used in non-precipitating air without above-atmospheric or below-atmospheric pressure at the sensor element.
- The voltage output is short-circuit proof.
- Applying overvoltage will destroy the device.
- In case of pollution, we recommend cleaning and recalibration in the factory.
- The device operating range covers 10...95 % relative humidity respectively 0...+50 °C. Outside of that range, mismeasurements or increased deviations will occur.
- The CO_2 sensor is shock-sensitive. Due to the mechanism's design, the measuring result may vary if shaken.
- The device calibrates itself at an interval of 7 days. To ensure this function, the device needs to be supplied with fresh air (CO_2 content 400 ppm) at least for 10 minutes during each 7-day period.
- If this device is operated beyond the specified range, all warranty claims are forfeited.

Air quality is measured through a chemical sensor. Due to its functional principle, the lifetime of the sensor depends on nature and concentration of the pollutant gas burden. The sensitive layer of the sensor element reacts with all volatile organic compounds and is thereby modified in its electrical properties or "exhausted". This process results in a displacement of the characteristic curve. Such characteristic curve displacement however amounts to less than 15 % / year under normal burden. In measuring air quality, the general condition of air quality is detected. Whether air quality is "good" or "bad" is differently interpreted by each person.
Different pollution burdens and concentrations influence the air quality signal (0...10 Volt) in different ways. Examples for this are cigarette smoke, deodorant sprays, cleaning agents, or also various adhesive materials for floor and wall coverings as well as dyestuffs. Increased burdens e.g. by solvents, nicotine, hydrocarbons, aerosol propellants etc. intensify consumption/aging of the sensor element. Particularly under high pollutant gas burdens – also during non-operational idle state periods of the devices (transport and storage) – zero-point drift will occur. Consequently, this must be corrected at site according to the respective circumstances or basic burdens.

Air quality measuring instruments of different manufacturers cannot directly be compared because of different functional principles, preset basic burdens (zero-point), and permitted burdens (amplification/sensitivity). Devices are preset respectively calibrated according to the sensor manufacturer's specifications. Here, a zero-point and a final value is determined and thus a maximum burden. In particular cases, exceeding measuring ranges or excessive basic burdens on the devices will occur (outgassing floor carpeting, wall paint, etc.). In order to enable distinguishing different air qualities, devices need to be adjusted by the customer according to the conditions existing on site that do not correlate to the factory-preset definition range and calibration. Please note that factory calibration is thereby lost and compliance with technical data can no longer be guaranteed.

ATTENTION!

The minimum CO_2 concentration of outdoor air amounts to approx. 350 ppm (output voltage = 1.75 V at MR = 2000 ppm or 0.7 V at MR = 5000 ppm) in leafy, hardly industrialised areas. Gas inter-exchange in the sensor element happens by diffusion. Depending on changes in the concentration and flow velocity of the air surrounding the sensor, the reaction of the device to changes in CO_2 concentration may appear with a delay. It is absolutely necessary to choose the device mounting position to ensure that the air stream "presses" into the duct tube. Otherwise, below-atmospheric pressure will develop in the duct tube that may cause a substantial deceleration of gas exchange of even prevent it.

Automatic calibration of the carbon dioxide measurement – ABC logic (default)

The automatic background logic is a self-calibrating mechanism that is suitable for use in applications in which the CO_2 concentration regularly drops to fresh air level (350 - 400 ppm). This should typically happen attimes during which the rooms are unoccupied. The sensor reaches its normal accuracy after 24 hours of continuous operation in an environment which has been exposed to a fresh air supply of 400 ppm CO_2. The deviation error remains minimal with at least 4 cases of sensor exposure to fresh air within 21 days. The ABC logic requires continuous operating cycles of longer than 24 hours in order to function properly.

Manual calibration of the carbon dioxide measurement

Manual calibration can be carried out regardless of the position of the DIP switch (ABC logic).
Before and during the calibration process, sufficient fresh air (CO_2 content = 500 ppm) must be provided.
The calibration process is started by pressing the "ZERO" button (approx. 5 seconds). This is signalled by the flashing LED.
The calibration follows. During this phase, the LED is constantly active. The LED is deactivated after successful calibration.

Mounting information

During wiring phase it is mandatory to open the enclosure very carefully to prevent damage to components and sensor.
Please pay utmost attention to the correct connection of wires and connecting terminals by verifying the polarity.

Putting in operation

After switching on the device, a self-test and tempering period follows. This procedure takes 30 - 50 minutes depending on ambient conditions.
Afterwards, it is mandatory to run the manual calibration procedure. Thereafter the ABC logic may be activated.

Switching point setting

The SET potentiometer can be used to select a switchpoint between 10 % and 95 % of the measuring range.
The 10 % is added to the fresh air limit of 400 ppm.
A potential-free changeover contact is available as a switching output.

Offset

Subsequent adjustment of the CO_2 measured value can be carried out using the offset potentiometer.
The adjustment range is ± 10 % of the measuring range.

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Our "General Terms and Conditions for Business" together with the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry" including supplementary clause "Extended Retention of Title" apply as the exclusive terms and conditions.

In additionIn addition, the following points are to be observed:

- These instructions must be read before installation and putting in operation and all notes provided therein are to be regarded!
- Devices must only be connected to safety extra-low voltage and under dead-voltage condition. To avoid damages and errors the device (e.g. by voltage induction) shielded cables are to be used, laying parallel with current-carrying lines is to be avoided, and EMC directives are to be observed.
- This device shall only be used for its intended purpose. Respective safety regulations issued by the VDE, the states, their control authorities, the TÜV and the local energy supply company must be observed. The purchaser has to adhere to the building and safety regulations and has to prevent perils of any kind.
- No warranties or liabilities will be assumed for defects and damages arising from improper use of this device.
- Consequential damages caused by a fault in this device are excluded from warranty or liability.
- These devices must be installed by authorised specialists only.
- The technical data and connecting conditions of the mounting and operating instructions delivered together with the device are exclusively valid. Deviations from the catalogue representation are not explicitly mentioned and are possible in terms of technical progress and continuous improvement of our products.
- In case of any modifications made by the user, all warranty claims are forfeited.
- This device must not be installed close to heat sources (e.g. radiators) or be exposed to their heat flow. Direct sun irradiation or heat irradiation by similar sources (powerful lamps, halogen spotlights) must absolutely be avoided.
- Operating this device close to other devices that do not comply with EMC directives may influence functionality.
- This device must not be used for monitoring applications, which serve the purpose of protecting persons against hazards or injury, or as an EMERGENCY STOP switch for systems or machinery, or for any other similar safety-relevant purposes.
- Dimensions of enclosures or enclosure accessories may show slight tolerances on the specifications provided in these instructions.
- Modifications of these records are not permitted.
- In case of a complaint, only complete devices returned in original packing will be accepted.

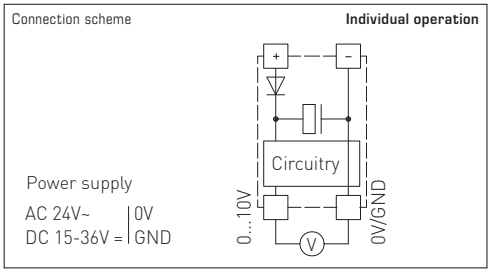
SUPPLY VOLTAGE:

For operating voltage reverse polarity protection, a one-way rectifier or reverse polarity protection diode is integrated in this device variant. This internal one-way rectifier on AC supply voltage.

The output signal is to be tapped by a measuring instrument. The output signal is measured her against zero potential (0V) of the input voltage!

When this device is operated on **DC supply voltage**, the operating voltage input UB+ is to be used for 15...36V DC supply and UB– or GND for ground wire!

Connection scheme **Individual operation**

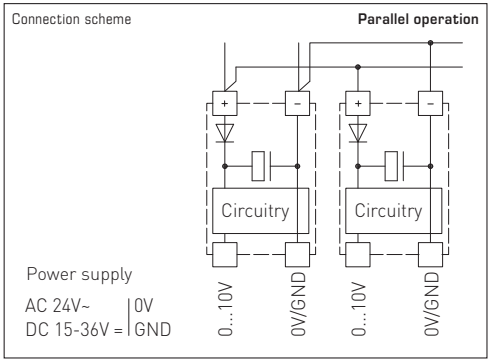


When several devices are supplied by one 24V **AC voltage supply**, it is to be ensured that all "positive" operating voltage input terminals (+) of the field devices are connected with each other and all "negative" operating voltage input terminals (–) (= reference potential) are connected together (in-phase connection of field devices). All outputs of field devices must be referenced to the same potential!

In case of reversed polarity at one field device, a supply voltage short-circuit would be caused by that device. The consequential short-circuit current flowing through this field device may cause damage to it.

Therefore, pay attention to correct wiring!

Connection scheme **Parallel operation**



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Disposal of the product

The appliance (or the product) must be disposed of separately in accordance with the local waste disposal legislation in force.

WARNING

The CAREL product is a state-of-the-art device, whose operation is specified in the technical documentation supplied with the product or can be downloaded, even prior to purchase, from the website www.carel.com. The customer (manufacturer, developer or installer of the final equipment) accepts all liability and risk relating to the configuration of the product in order to reach the expected results in relation to the specific installation and/or equipment. The failure to complete such phase, which is required/indicated in the user manual, may cause the final product to malfunction; CAREL accepts no liability in such cases. The customer must use the product only in the manner described in the documentation relating to the product.
The liability of CAREL in relation to its products is specified in the CAREL general contract conditions, available on the website www.carel.com and/or by specific agreements with customers.

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