



# GMP251 Carbon Dioxide Probe

for %-Level Measurements



## Features

- Measurement range 0 ... 20 %CO<sub>2</sub>
- Intelligent, stand-alone probe with analog and digital outputs
- Compatible with Indigo 200 transmitters and Vaisala Insight
- Wide operating temperature range -40 ... +60 °C
- IP65-classified housing
- Full temperature and pressure compensations
- 2nd-gen proprietary CARBOCAP® technology
- Integrated temperature measurement for CO<sub>2</sub> compensation purposes
- Compensations for background gases, O<sub>2</sub>, and humidity
- Sensor head heated to prevent condensation

Vaisala CARBOCAP® Carbon Dioxide Probe GMP251 is a new intelligent probe for measuring carbon dioxide. This robust, stand-alone measurement device is designed for use in demanding applications, such as life science incubators, where stable, reliable, and accurate performance is required.

## Benefits

- Superior long-term stability
- Reliable and accurate
- Calibration certificate included

GMP251 is based on Vaisala's unique, second-generation CARBOCAP technology that enables exceptional stability. A new type of infrared (IR) light source is used instead of the traditional incandescent light bulb, which extends the lifetime of GMP251.

GMP251 incorporates an internal temperature sensor for compensation of the CO<sub>2</sub> measurement according to ambient temperature. The effects of pressure and background gas can also be compensated for. The measurement range is 0 ... 20 %CO<sub>2</sub> and the sensor performance is optimized at 5 %CO<sub>2</sub> measurement.

The operating temperature range of the probe is wide (-40 ... +60 °C (-40 ... +140 °F)), and the probe housing is classified as IP65. Condensation is prevented as the internal sensor head is heated.

GMP251 is resistant to dust and most chemicals, such as, H<sub>2</sub>O<sub>2</sub> and alcohol-based cleaning agents.

## Ease of Use

GMP251 is a compact probe with easy and fast plug-in, plug-out installation. The surface of the probe is smooth, which makes it easy to clean. The probe provides several output options, including analog current and voltage outputs and digital RS-485 output with Modbus protocol.

GMP251 can be connected to Indigo 200 series transmitters for an extended range of output and configuration options. See [www.vaisala.com/indigo](http://www.vaisala.com/indigo).

For easy-to-use access to field calibration, device analytics, and configuration functionality, the probe can be connected to Vaisala Insight PC Software (for Windows® 7, 8.1 and 10: see [www.vaisala.com/insight](http://www.vaisala.com/insight)).

## Applications

GMP251 is ideal for life science incubators, cold storages, fruit and vegetable transportation, and for all demanding applications where stable and accurate %-level CO<sub>2</sub> measurements are needed.

# Technical Data

## Measurement Performance

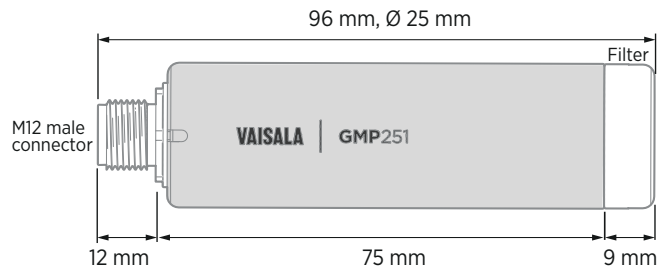
|                                                                                       |                                      |
|---------------------------------------------------------------------------------------|--------------------------------------|
| Measurement range                                                                     | 0 ... 20 %CO <sub>2</sub>            |
| <b>Accuracy at 25 °C (77 °F) and 1013 hPa (incl. Repeatability and Non-linearity)</b> |                                      |
| At 5 %CO <sub>2</sub>                                                                 | ±0.1 %CO <sub>2</sub>                |
| 0 ... 8 %CO <sub>2</sub>                                                              | ±0.2 %CO <sub>2</sub>                |
| 8 ... 20 %CO <sub>2</sub>                                                             | ±0.4 %CO <sub>2</sub>                |
| <b>Calibration Uncertainty</b>                                                        |                                      |
| At 5 %CO <sub>2</sub>                                                                 | ±0.12 %CO <sub>2</sub>               |
| At 20 %CO <sub>2</sub>                                                                | ±0.32 %CO <sub>2</sub>               |
| <b>Long-Term Stability</b>                                                            |                                      |
| 0 ... 8 %CO <sub>2</sub>                                                              | ±0.3 %CO <sub>2</sub> /year          |
| 8 ... 12 %CO <sub>2</sub>                                                             | ±0.5 %CO <sub>2</sub> /year          |
| 12 ... 20 %CO <sub>2</sub>                                                            | ±1.0 %CO <sub>2</sub> /year          |
| <b>Temperature Dependence</b>                                                         |                                      |
| With compensation at 5 %CO <sub>2</sub> ,<br>0 ... 50 °C (32 ... 122 °F)              | < ±0.05 %CO <sub>2</sub>             |
| With compensation,<br>0 ... 20 %CO <sub>2</sub> , -40 ... 60 °C<br>(-40 ... 140 °F)   | ±0.045 % of reading/°C               |
| Without temperature compensation at<br>5 %CO <sub>2</sub> (typical)                   | -0.25 % of reading/°C                |
| <b>Pressure Dependence</b>                                                            |                                      |
| With compensation at 5 %CO <sub>2</sub><br>700 ... 1100 hPa                           | ±0.05 %CO <sub>2</sub>               |
| With compensation, 0 ... 20 %CO <sub>2</sub><br>500 ... 1200 hPa                      | ±0.015 % of reading/hPa              |
| Without compensation (typical)                                                        | +0.15 % of reading/hPa               |
| <b>Humidity Dependence</b>                                                            |                                      |
| With compensation, 0 ... 20 %CO <sub>2</sub> ,<br>0 ... 100 %RH                       | ±0.7 % of reading (at 25 °C (77 °F)) |
| Without compensation (typical)                                                        | +0.05 % of reading / %RH             |
| <b>O<sub>2</sub> Dependence</b>                                                       |                                      |
| With compensation, 0 ... 20 %CO <sub>2</sub> ,<br>0 ... 90 %O <sub>2</sub>            | ±0.6 % of reading (at 25 °C (77 °F)) |
| Without compensation (typical)                                                        | -0.08 % of reading / %O <sub>2</sub> |
| <b>Flow Rate Dependence (for Flow-Through Model Option)</b>                           |                                      |
| < 1 l/min flow                                                                        | No effect                            |
| 1 ... 10 l/min flow                                                                   | < 0.6 % of reading/ l/min            |
| Start-up time at 25 °C (77 °F)                                                        | < 10 s                               |
| Warm-up time for full spec.                                                           | < 4 min                              |
| <b>Response Time (T90)</b>                                                            |                                      |
| With standard filter                                                                  | < 1 min                              |
| Flow-through model with > 0.1 l/min                                                   | < 1 min                              |
| With spray shield                                                                     | < 2 min                              |

## Operating Environment

|                                                            |                                                                                                                                                                                                                    |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating temperature of CO <sub>2</sub><br>measurement    | -40 ... +60 °C (-40 ... +140 °F)                                                                                                                                                                                   |
| Storage temperature                                        | -40 ... +70 °C (-40 ... +158 °F)                                                                                                                                                                                   |
| <b>Pressure</b>                                            |                                                                                                                                                                                                                    |
| Compensated                                                | 500 ... 1100 hPa                                                                                                                                                                                                   |
| Operating                                                  | < 1.5 bar                                                                                                                                                                                                          |
| Humidity                                                   | 0 ... 100 %RH, non-condensing                                                                                                                                                                                      |
| <b>Gas Flow (for Flow-Through Option)</b>                  |                                                                                                                                                                                                                    |
| Operating range                                            | < 10 l/min                                                                                                                                                                                                         |
| Recommended range                                          | 0.1 ... 0.8 l/min                                                                                                                                                                                                  |
| Condensation prevention                                    | Sensor head heating, when power on                                                                                                                                                                                 |
| EMC compliance                                             | EN61326-1, Generic Environment                                                                                                                                                                                     |
| Chemical tolerance (temporary<br>exposure during cleaning) | <ul style="list-style-type: none"> <li>H<sub>2</sub>O<sub>2</sub> (2000 ppm, non-condensing)</li> <li>Alcohol-based cleaning agents (for example ethanol and IPA)</li> <li>Acetone</li> <li>Acetic acid</li> </ul> |

## Mechanical Specifications

|                       |                                  |
|-----------------------|----------------------------------|
| Weight, probe         | 45 g (1.59 oz)                   |
| <b>Materials</b>      |                                  |
| Probe housing         | PET plastic                      |
| Filter                | PTFE membrane, PET plastic grid  |
| Connector             | Nickel plated brass, M12 / 5 pin |
| IP rating, probe body | IP65                             |
| Connector             | M12 5-pin male                   |
| <b>Dimensions</b>     |                                  |
| Probe diameter        | 25 mm (0.98 in)                  |
| Probe length          | 96 mm (3.78 in)                  |



## Inputs and Outputs

|                |                                                                                                                                                                              |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analog outputs | <ul style="list-style-type: none"><li>0 ... 5/10 V (scalable), min load 10 k<math>\Omega</math></li><li>0/4 ... 20 mA (scalable), max load 500 <math>\Omega</math></li></ul> |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Operating Voltage

|                            |               |
|----------------------------|---------------|
| With digital output in use | 12 ... 30 VDC |
| With voltage output in use | 12 ... 30 VDC |
| With current output in use | 20 ... 30 VDC |

|                |                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------|
| Digital output | Over RS-485: <ul style="list-style-type: none"><li>Modbus</li><li>Vaisala Industrial Protocol</li></ul> |
|----------------|---------------------------------------------------------------------------------------------------------|

### Power Consumption

|                                |       |
|--------------------------------|-------|
| Typical (continuous operation) | 0.4 W |
| Maximum                        | 0.5 W |

## Spare Parts and Accessories

|                                                  |             |
|--------------------------------------------------|-------------|
| Standard membrane filter                         | ASM211650SP |
| Porous sintered PTFE filter (extra protection)   | DRW243649SP |
| Probe cable with open wires (1.5 m)              | 223263SP    |
| Probe cable with open wires and 90° plug (0.6 m) | 244669SP    |
| Probe cable with open wires (10 m)               | 216546SP    |
| Flow-through adapter with gas ports              | ASM211697SP |
| USB cable for PC connection <sup>1)</sup>        | 242659      |
| M170 connection cable for probe                  | CBL210472   |
| Flat cable for GMP250 probes, M12 5-pin          | CBL210493SP |
| Probe mounting clips (2 pcs)                     | 243257SP    |
| Probe mounting flange                            | 243261SP    |
| Calibration adapter                              | DRW244827SP |
| Spray shield                                     | ASM212017SP |

### Transmitters

|                   |                                                                        |
|-------------------|------------------------------------------------------------------------|
| Indigo 200 series | See <a href="http://www.vaisala.com/indigo">www.vaisala.com/indigo</a> |
|-------------------|------------------------------------------------------------------------|

<sup>1)</sup> Vaisala Insight software for Windows available at [www.vaisala.com/insight](http://www.vaisala.com/insight)



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[www.vaisala.com](http://www.vaisala.com)

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