



### Features

- Measurement range 0 ... 20 %CO<sub>2</sub>
- Intelligent, standalone probe with analog and digital outputs
- Compatible with Indigo transmitters and Insight PC software
- Wide operating temperature range (-40 ... +60 °C)
- IP65-classified housing
- Integrated temperature measurement for CO<sub>2</sub> compensation purposes
- Compensations also for pressure, oxygen, and humidity
- Sensor head heated to prevent condensation
- Compatible with Indigo transmitters, RFL100 data logger, and Insight PC software

Vaisala CARBOCAP® Carbon Dioxide Probe GMP251 is a new intelligent probe for measuring carbon dioxide. This robust, standalone 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 patented, latest-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 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. 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.

A flow-through adapter with gas ports is available as an accessory, enabling tubing for easy and flexible remote measurement with a separate pump. A multiplexer can also be added for sampling gas from several locations. <sup>1)</sup>

1) Third-party pump and multiplexer not provided by Vaisala.

# Technical data

## Measurement performance

Measurement range	0 ... 20 %CO <sub>2</sub>
<b>Accuracy <sup>1)</sup></b>	
At 5 %CO <sub>2</sub>	±0.1 %CO <sub>2</sub>
At 0 ... 8 %CO <sub>2</sub>	±0.2 %CO <sub>2</sub>
At 8 ... 20 %CO <sub>2</sub>	±0.4 %CO <sub>2</sub>
<b>Calibration uncertainty</b>	
At 5 %CO <sub>2</sub>	±0.07 %CO <sub>2</sub>
At 20 %CO <sub>2</sub>	±0.27 %CO <sub>2</sub>
<b>Long-term stability</b>	
At 0 ... 8 %CO <sub>2</sub>	±0.3 %CO <sub>2</sub> /year
At 8 ... 12 %CO <sub>2</sub>	±0.5 %CO <sub>2</sub> /year
at 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> , 0 ... +50 °C (+32 ... +122 °F)	< ±0.05 %CO <sub>2</sub>
With compensation, 0 ... 20 %CO <sub>2</sub> , -40 ... +60 °C (-40 ... +140 °F)	±0.045 % of reading/°C
without temperature compensation at 5 %CO <sub>2</sub> (typical)	-0.25 % of reading/°C
<b>Pressure dependence</b>	
With compensation at 5 %CO <sub>2</sub> 700 ... 1100 hPa	±0.05 %CO <sub>2</sub>
With compensation, 0 ... 20 %CO <sub>2</sub> 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> , 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> , 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>Start-up, warm-up, and response time</b>	
Start-up time at +25 °C (+77 °F)	< 10 s
Warm-up time for full spec.	< 4 min
Response time (T90):	
With standard filter	< 1 min
Flow-through option with > 0.1 l/min	< 1 min
With spray shield	< 2 min
<b>Flow rate dependence (for flow-through option)</b>	
Flow rate dependence:	
< 1 l/min flow	No effect
1 ... 10 l/min flow	< 0.6 % of reading/ l/min

<sup>1)</sup> At 25 °C (77 °F) and 1013 hPa (incl. repeatability and non-linearity).

## Compliance

EU directives	EMC, RoHS
EMC compatibility	EN 61326-1, basic electromagnetic environment
Compliance marks	CE, RCM

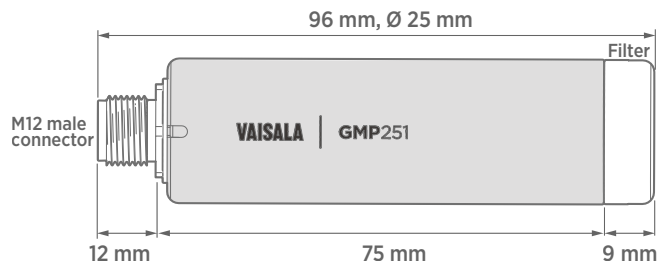
## Operating environment

Operating temperature of CO <sub>2</sub> measurement	-40 ... +60 °C (-40 ... +140 °F) <sup>1)</sup>
Storage temperature	-40 ... +70 °C (-40 ... +158 °F)
Humidity	0 ... 100 %RH, non-condensing
Condensation prevention	Sensor head heating, when power on
IP rating, probe body	IP65
Chemical tolerance (temporary 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>
<b>Pressure</b>	
Compensated	500 ... 1100 hPa
Operating	< 1.5 bar
<b>Gas flow (for flow-through option)</b>	
Operating range	< 10 l/min
Recommended range	0.1 ... 0.8 l/min

<sup>1)</sup> Occasional short-term exposure to up to +90 °C (+194 °F) allowed, provided that the probe is fully installed inside the measured condition and power is switched on. Accuracy specification not applicable if used in temperatures above +60 °C (+140 °F).

## Mechanical specifications

Weight, probe	45 g (1.59 oz)
Connector type	M12 5-pin male
<b>Materials</b>	
Probe housing	PBT polymer
Filter	PTFE membrane, PBT polymer grid
Connector	Nickel plated brass
<b>Dimensions</b>	
Probe diameter	25 mm (0.98 in)
Probe length	96 mm (3.78 in)



GMP251 dimensions

## 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>
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Digital output	Over RS-485: <ul style="list-style-type: none"> <li>Modbus</li> <li>Vaisala Industrial Protocol</li> </ul>
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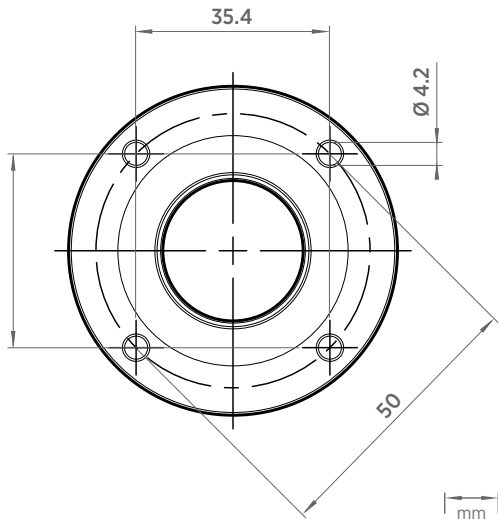
<b>Operating voltage</b>	
With digital output in use	12 ... 30 VDC
With voltage output in use	12 ... 30 VDC
With current output in use	20 ... 30 VDC

<b>Power consumption</b>	
Typical (continuous operation)	0.4 W
Maximum	0.5 W

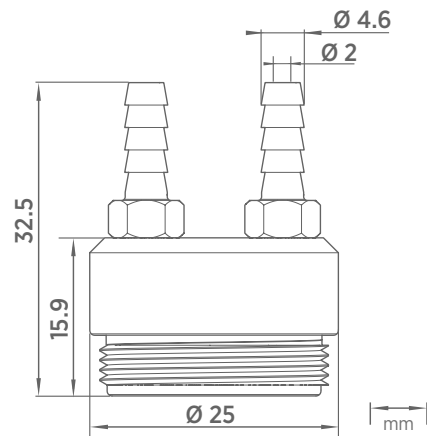
## Spare parts and accessories

Standard membrane filter	ASM211650SP
Porous sintered PTFE filter	DRW243649SP
Probe cable with open wires (1.5 m)	223263SP
Probe cable with open wires (1.5 m), shielded	254294SP
Probe cable with open wires (3 m)	26719SP
Probe cable with open wires (10 m)	216546SP
Probe cable with open wires and 90° plug (0.6 m)	244669SP
Probe cable with open wires and 90° plug (1.5 m)	255102
Flow-through adapter with gas ports	ASM211697SP
Indigo USB adapter <sup>1)</sup>	USB2
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

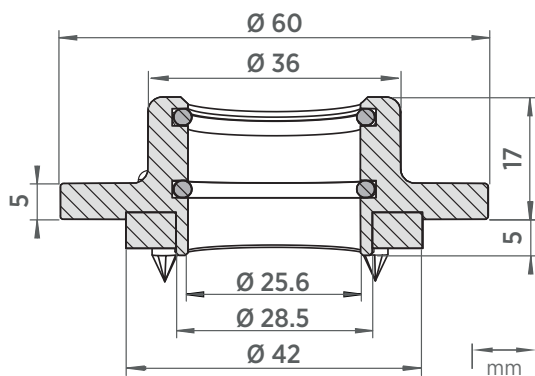
<sup>1)</sup> Vaisala Insight software for Windows available at [www.vaisala.com/insight](http://www.vaisala.com/insight)



Probe mounting flange dimensions



Flow-through adapter with gas ports. Suitable for tubes with 4 mm inner diameter.



Probe mounting flange dimensions, cross section