

# CARBOCAP® Carbon Dioxide Probe

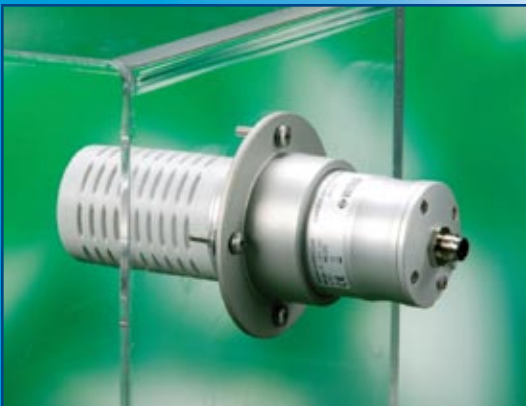


The Vaisala CARBOCAP® Carbon Dioxide Probe GMP343 is an accurate and rugged probe-type instrument for ecological measurements. Typical applications include:

- CO<sub>2</sub> soil respiration
- Ambient CO<sub>2</sub> monitoring
- Plant growth chambers
- OEM applications

## Features

- Excellent accuracy and stability
- CARBOCAP® Sensor, a silicon-based non-dispersive infrared (NDIR) sensor
- A single-beam, dual-wavelength CO<sub>2</sub> measurement with no moving parts
- Compensation options for temperature, pressure, humidity and oxygen
- Low power consumption and heat emission
- Designed for outdoor use
- Compact and lightweight



With the optional mounting flange, the GMP343 can for example be installed directly into a soil respiration box.

The diffusion-aspirated probe eliminates sampling systems and errors related to pressure differences caused by pumps.

## Open Path, Diffusion Aspirated Probe

The product concept eliminates the need for bulky and power-consuming gas sampling systems. The power consumption of the GMP343 itself is low, even below 1 W.

## Novel Solution for Soil Respiration Measurements

The use of diffusion aspiration eliminates the measurement error caused by pressure differences often present in pump-aspirated measurement systems.

## Rugged Metal Structure

The body of the GMP343 is IP67- classified and suitable for harsh environments. The sensor's diffusion filter protects it from dust and dirt. Heated optics prevent the formation of condensation.

## User-configurable Measurement

The GMP343 can output both numerically filtered and raw measurement data. The instrument can also compensate the measurement with an internal temperature measurement and user-set relative humidity, pressure and oxygen values.

## MI70

In combination with an MI70 indicator, the GMP343 provides an ideal tool for accurate in-situ measurement. The MI70 is used as a display, communication, and data-login device. To achieve most accurate measurements, a Vaisala HMP75 humidity probe can be connected to the MI70 indicator for automatic humidity compensation. In that case a manual compensation is not needed.

The optional MI70 Link Windows® software allows transferring logged and real-time data of the GMP343 from the MI70 to a PC.

## Calibration

Each GMP343 is calibrated using  $\pm 0.5\%$  accurate gases at 0 ppm, 200 ppm, 370 ppm, 600 ppm, 1000 ppm, 4000 ppm and 2 %. Calibration is also done at four temperature points, -30° C, 0° C, 25° C and 50° C. If needed, the customer can re-calibrate the instrument using the multipoint calibration (MPC) feature allowing up to 8 user-defined calibration points.



# Sensor Technical Specifications

## Performance

Measurement range options 0 ... 1000 ppm, 0 ... 2000 ppm,  
0 ... 3000 ppm, 0 ... 4000 ppm,  
0 ... 5000 ppm, 0 ... 2 %

Accuracy (excluding noise) at 25° C (77° F) and 1013 hPa after factory calibration with 0.5 % accurate gases with different range options

0 ... 1000 ppm ±(3 ppm + 1 % of reading)  
0 ... 2000 ppm - 0 ... 2 %\* ±(5 ppm + 2 % of reading)

\*Accuracy below 200 ppm CO<sub>2</sub> not specified for 2 % range option

Noise (repeatability) at 370 ppm CO<sub>2</sub>  
with no output averaging ±3 ppm CO<sub>2</sub>  
with 30 s output averaging ±1 ppm CO<sub>2</sub>

## Temperature

Effect on accuracy **with** temperature compensation:

CO <sub>2</sub> range options	0 ... 1000 ppm	0 ... 2 000 - 5000 ppm	0 ... 2 %
Temperature °C (°F)	Accuracy (% of reading)		
+10 ... +40 (+50 ... +104)	±1	±1	±2
+40 ... +60 (-104 ... +140)	±2	±3	±4
-40 ... +10 (-40 ... +50)	±3	±3	±5

For readings below 200 ppm CO<sub>2</sub> ±5 ppm CO<sub>2</sub> Temperature compensation is performed by an integrated Pt1000 element

## Pressure

Effect on accuracy **with** pressure compensation:

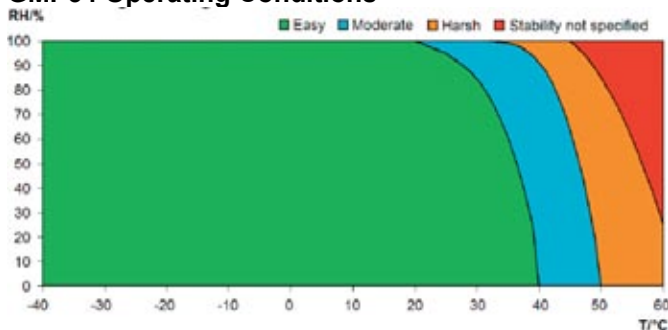
CO <sub>2</sub> range options	0 ... 1000 ppm	0 ... 2000 - 2 %
Pressure (hPa)	Accuracy (% of reading)	
900 ... 1050	±0.5	±1
700 ... 1300	±1	±2

Integrated pressure sensor is **not** included in GMP343

Long term stability see graph below

easy <±2 % of reading / year  
moderate <±2 % of reading / 6 months  
harsh <±2 % of reading / 3 months

## GMP34 Operating Conditions



Response time (90 %)

Diffusion model		
Filter attached	Averaging (s)	Response (s)
Yes	0	75
Yes	30	82
No	0	<2
No	30	30

Flow-through model		
Gas flow (l/min)	Averaging (s)	Response (s)
0.3	0	26
0.3	30	44
1.2	0	8
1.2	30	23



## Inputs and Outputs

Operating voltage **11 ... 36 VDC**

Power consumption

without optics heating <1 W

with optics heating <3.5 W

Analog outputs

Current output

range **4 ... 20 mA**

resolution **14 bits**

max. load **800 Ohm @ 24 VDC,**

**150 Ohm @ 10 VDC**

Voltage output

range **0 ... 2.5 V, 0 ... 5 V**

resolution **14 bits (13 bits with 0 ... 2.5 V)**

min. load **5 kOhm**

Digital outputs **RS485, RS232**

## Operating Environment

Temperature

operating **-40 ... +60° C (-40 ... +140° F)**

storage **-40 ... +70° C (-40 ... 158° F)**

Pressure

compensated range **700 ... 1300 hPa**

operating **<5 bar**

Gas flow for flow-through model **0 ... 10 liters/min**

Electromagnetic compatibility **EN61326, Generic Environment**

## Dimensions

Length **180 mm (7.1")**

Diameter **55 mm (2.2")**

## Warm-up Time

full accuracy ±0.5 % **10 min**

full accuracy **30 min**

## Materials

Housing **anodized aluminium**

Filter cover **PC**

IP classification

Housing (cable attached) **IP67**

Diffusion filter (weather protection) **IP65**

Diffusion filter (sintered PTFE) **IP66**

Cable connector type **8-pin M12**

Weight (probe only) **360 g**

## Options and Accessories

Wall mount bracket **GMP343BRACKET**

Mounting flange **GMP343FLANGE**

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