ПЕРЕДАТЧИКИ УГЛЕКИСЛОГО ГАЗА

GMP 231, 343

ТЕХНИЧЕСКИЕ ХАРАКТЕРИСТИКИ

Vaisala CARBOCAP Carbon Dioxide Probe GMP231

The Vaisala CARBOCAP® Carbon Dioxide Probe GMP231 withstands high temperature sterilization.

The Vaisala CARBOCAP® Carbon Dioxide Probe GMP231 is designed to provide incubator manufacturers with accurate and reliable carbon dioxide measurements and sterilization durability at high temperatures. The probe is based on Vaisala's patented CARBOCAP® technology and a new type of infrared (IR) light source. These technologies allow for sterilization temperatures of up to 180 °C, enabling easier and more complete sterilization without the risk of cross contamination.

The probe is installed through the incubator wall, ensuring that only the IR sensor and optical components are exposed to the incubation environment. This allows the incubator to be sterilized with the probe in place, removing the need to decontaminate the probe separately. This saves time and reduces the risk of contamination.

The probe's sensor performance is optimized at 5 % CO_2 but the sensor measures CO_2 up to 20 % with high accuracy. In addition, the GMP231 can measure pressure and temperature for CO_2 measurement compensation purposes, ensuring the product remains stable and accurate in all CO_2 incubation conditions. The sensor is made of highly durable materials to achieve outstanding stability over both time and temperature. Since water vapor, dust, and most chemicals do not affect measurements, the GMP231 module is ideal for CO_2 incubator environments.

Features/Benefits

- Probe durable during heat sterilization up to +180 °C (+356 °F)
- Incubator can be sterilized with probe in place – saving time and reducing risk of cross-contamination
- Heat durability and superior long-term stability with next generation CARBOCAP® sensor
- Designed for OEM use in CO_2 incubators – installation options available
- CO_2 sensor measurement optimized for 5 %CO_2, measurement range up to 20 %CO_2
- 4-point NIST traceable calibration (certificate included) for CO_2
- Internal pressure and temperature measurement improves accuracy and stability
- Full temperature and pressure compensations available
- Sensor head heating for condensation prevention

Technical Data

Performance

Measurement range	0 ... 20 %CO_2
Accuracy at 37 °C, 1013 hPa:	
Repeatability at	
0 ... 8 %CO_2	±0.1 %CO_2
8 ... 12 %CO_2	±0.2 %CO_2
12 ... 20 %CO_2	±0.4 %CO_2
Non-linearity at 0 ... 20 %CO_2	±0.1 %CO_2
Calibration uncertainty at 5 %CO_2	±0.1 %CO_2
Temperature dependence	
with compensation at	
3 ... 12 %CO_2, 20 ... 60 °C	±0.1 %CO_2
without compensation (typical)	-0.4 % of reading / °C
Pressure dependence	
with compensation at	
3 ... 12 %CO_2, 700 ... 1100 hPa	±0.015 % of reading / hPa
without compensation (typical)	+0.15 % of reading / hPa
Humidity dependence	
with compensation at	
0 ... 20 %CO_2, 0 ... 100 %RH	±0.9 % of reading (at 37 °C)
without compensation (typical)	+0.05 % of reading / %RH
O_2 dependence	
with compensation at	
0 ... 20 %CO_2, 0 ... 90 %O_2	±0.6 % of reading
without compensation (typical)	-0.08 % of reading / %O_2
Start-up time	10 s
Warm-up time for full spec.	1 min
Response time	
T63	< 30 s
T90	< 50 s
Long-term stability	
0 ... 8 %CO_2	<±0.2 %CO_2 / year
8 % ... 12 %CO_2	<±0.5 %CO_2 / year
12 % ... 20 %CO_2	<±1.0 %CO_2 / year

Operating Environment

Operating temperature for CO_2 measurement	0 ... 70 °C
Max. temperature durability in standby-mode (sensor head only)	up to +195 °C
Heat sterilization +180 °C durability	at least 120 cycles
Storage temperature	-40 ... +75 °C
Pressure (compensated)	500 ... 1100 hPa
operating	<1500 hPa
Humidity	0 ... 100 %, non-condensing
Condensation prevention	sensor head heating, when power on
Chemical tolerance	
DMSO	
IPA (70 % isopropyl alcohol, 30 % water)	
H_2O_2 (2000 ppm), non-condensing	
Ethanol	
Acetic acid	
Electromagnetic compatibility	EN61326-1, Generic Environment

Inputs and Outputs

Operating voltage	11 ... 30 VDC
when analog output in use	20 ... 30 VDC
Digital outputs	I^2C 5 V, RS-485 (2-wire with Vaisala industrial protocol)
Analog output	0 ... 20 mA (scalable) max. load 600 Ω
Power consumption	< 1 W (pulsed)

Mechanics

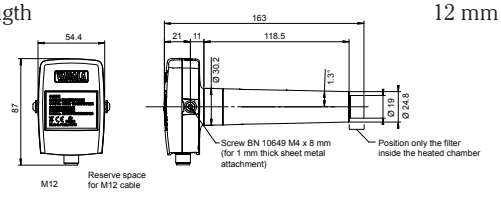
Probe housing material	
Housing	Metal coated plastic ABS+PC
Inner tube	Aluminum
Probe tube	PPSU
Filter	PTFE
Housing classifications	
sensor head	IP54
electronics housing	IP20
Connector	M12 / 8 pin
Weight	
probe (without cable)	150 g
probe (with cable	200 g

Accessories

M12 Connection Cable 0.9m w/ open ends	DRW240977SP
M12 Connection Cable 0.6m w/ Milli-Grid connector	ASM210903SP
Service cable for MI70	221801
Silicone plug	DRW240015SP
Attachment Bracket	DRW240247SP
PTFE filter	DRW240494SP
USB PC connection cable	221040
Calibration adapter for GMP231	239523

Dimensions

Probe tube max. diameter	30.2 mm
Probe tube min. diameter	24.8 mm
Probe tube length	118.5 mm
Sensor filter diameter	19 mm
Sensor filter length	12 mm



GMP343 Carbon Dioxide Probe for Demanding Measurements

The GMP343 is available as an open-path diffusion-aspirated model (left) and as a flow-through model (right).

Features/Benefits

- Excellent accuracy and stability
- Vaisala CARBOCAP® Sensor, a silicon-based non-dispersive infrared (NDIR) sensor
- A single-beam, dual-wavelength CO_2 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

The Vaisala CARBOCAP® Carbon Dioxide Probe GMP343 is an accurate and rugged probe-type instrument for ecological measurements. Typical applications include CO_2 soil respiration, ambient CO_2 monitoring, plant growth chambers, and OEM applications.

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

In combination with an MI70 indicator, the GMP343 provides a tool for accurate in-situ measurement. The MI70 can be used as a display, communication and data logging device.

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

Technical Data

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_2 not specified for 2 % range option

Noise (repeatability) at 370 ppm CO_2

with no output averaging	±3 ppm CO_2
with 30 s output averaging	±1 ppm CO_2

TEMPERATURE

Effect on accuracy **with** temperature compensation:

CO_2 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

* Always at least ±10 ppm CO_2.

Temperature compensation is performed by an integrated Pt1000 element

Technical Data

PRESSURE

Effect on accuracy **with** pressure compensation:

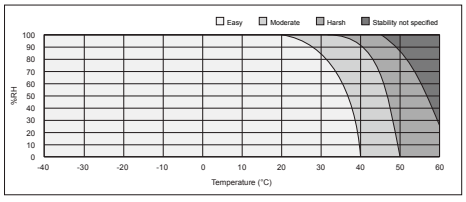
CO_2 range options	0 ... 1000 ppm	0 ... 2000 - 2 %
Pressure (hPa)	Accuracy (% of reading)	
900 ... 1050	±0.5	±1
700 ... 1300	±1	±2

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

* Always at least ±10 ppm CO_2.

GMP343 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

Warm-up time	
full accuracy ±0.5 %	10 min
full accuracy	30 min

Operating Environment

Temperature	
operating	-40 ... +60 °C (-40 ... +140 °F)
storage	-40 ... +70 °C (-40 ... 158 °F)
Humidity	see graph 'GMP343 Operating Conditions'
Pressure	
compensated range	700 ... 1300 hPa
operating	<5 bar
Gas flow for flow-through model	0 ... 10 liters/min
Electromagnetic compatibility	EN61326, Generic Environment

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

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
Standard diffusion filter (weather protection, IP65) +filter cover	GMP343FILTER
Diffusion filter (sintered PTFE filter, IP66) + filter cover	215521
Calibration adapter (for the diffusion model)	GMP343ADAPTER
Junction box	JUNCTIONBOX-8
Probe cables	
2m	GMP343Z200SP
6m	GMP343Z600SP
10m	GMP343Z1000SP
PC connection cable, 2m	213379
MI70 connection cable, 2m	DRW216050SP
USB adapter (USB-D9 Serial connection cable)	219686
Soil adapter kit for horizontal positioning	215519
Soil adapter kit for vertical positioning	215520

VAISALA

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