VAISALA / TECHNOLOGY DESCRIPTION

Vaisala CARBOCAP® Sensor for Measuring Carbon Dioxide




First launched in 1997, the Vaisala CARBOCAP® carbon dioxide (CO_2) sensor features a groundbreaking innovation – the micromachined, electrically tunable Fabry-Perot Interferometer (FPI) filter for built-in reference measurement. This reliable and stable sensor has been delivering accurate CO_2 measurements for over 15 years across a wide range of industries and applications, from building automation and safety to life sciences and ecological research.

How It Works

Carbon dioxide has a characteristic absorbance band in the infrared (IR) region at a wavelength of 4.26 µm. This means that when IR radiation is passed through a gas containing CO_2, part of the radiation is absorbed. Therefore, the amount of radiation passing through the gas depends on the amount of CO_2 present, and this can be detected with an IR detector.

The Vaisala CARBOCAP sensor features an electrically tunable FPI filter located in front of the IR detector. In addition to measuring CO_2 absorption, the micromechanical FPI filter enables a reference measurement at a wavelength where no absorption occurs. When taking the reference measurement, the FPI filter is electrically adjusted to switch the bypass band from the absorption wavelength to a non-absorption wavelength. The reference measurement compensates for any potential changes in the light source intensity, as well as for contamination and dirt accumulation in the optical path. This feature means that CARBOCAP sensor operation is highly stable over time.

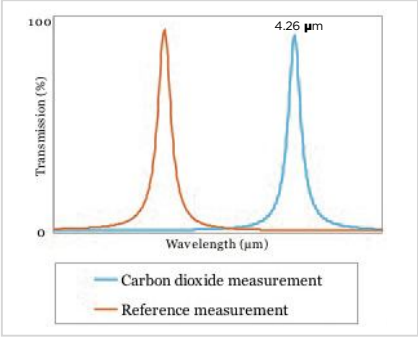
Instruments measuring at both the absorption and the reference wavelength with a single light source are known as single-beam dual-wavelength instruments. The technology is widely applied in costly analyzers. The unique feature of the CARBOCAP sensor is its micromachined FPI filter, which performs a dual-wavelength measurement using a single detector. The compact size of the sensor means that this advanced technology can be incorporated into small probes, modules, and transmitters.

CARBOCAP in Brief

- A silicon-based infrared (IR) absorption sensor
- Continuous internal reference measurement
- Both ppm and percentage-level CO_2 measurement
- Providing accurate measurements for over 15 years

CARBOCAP's Unique Benefits

- Superior stability enabled by built-in reference measurement
- Minimal maintenance and calibration requirements
- Insensitive to dust, water vapor, and most chemicals
- Insensitive to changing air flow



Both absorption and reference are measured with the CARBOCAP sensor.

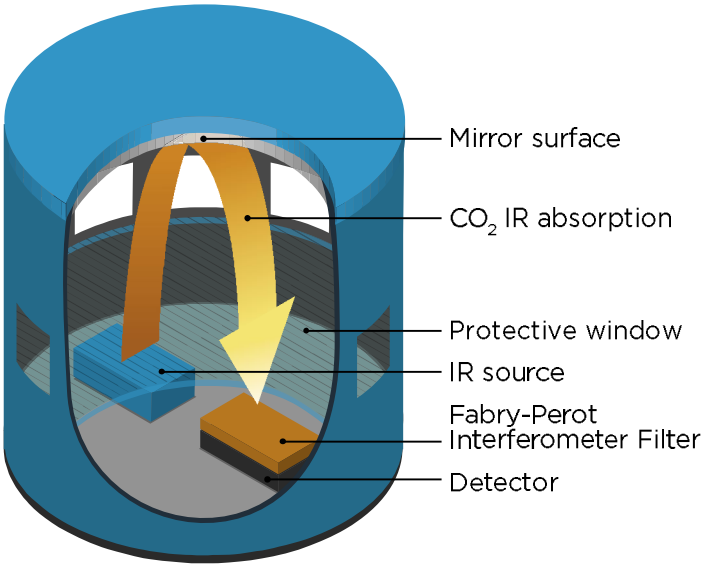
Typical Applications for Carbon Dioxide Measurement

Vaisala CARBOCAP instruments are well suited to a wide range of applications, from ppm (parts per million) to percentage-level CO_2-measurements. Since CO_2 is harmful in high concentrations, it is present at percentage levels only within closed processes such as fermentation and controlled-atmosphere storage environments. Percentage-level measurements are also typical in life-science applications such as CO_2 incubation.

Normal atmospheric air includes CO_2 at ppm levels. Typical CARBOCAP applications include ventilation control in buildings occupied by people, animal shelters, and greenhouses. In areas where large volumes of CO_2 are handled, reliable CO_2 measurement with alarm control is an important safety precaution. The CARBOCAP sensor is also a popular choice in ecological measurement applications, where excellent long-term stability and tolerance to harsh conditions are important requirements.

CARBOCAP CO_2 Products

Vaisala offers instruments for measuring CO_2 at ppm and percentage levels in both indoor and outdoor environments. Vaisala's wide variety of CO_2 instruments ranges from hand-held meters, measurement modules, and industrial transmitters to high-volume, affordable transmitters for volume applications. View the complete range of CO_2 products at www.vaisala.com/carbondioxide.



Structure of the CARBOCAP sensor.

The CARBOCAP® Story

The CARBOCAP story began in 1992, when micromechanical sensors were being intensively researched at Vaisala. The groundbreaking idea of miniaturizing the Fabry-Perot Interferometer (FPI) was born, leading to collaborative development work with VTT Technical Research Center of Finland. Later, a patent application was submitted for a single-channel gas concentration measurement method using the FPI.

The driving force behind the innovation of the CARBOCAP sensor was Vaisala's commitment to developing superior technologies for environmental measurements. And indeed, Vaisala's pioneering work in the field of silicon-based NDIR technology and electrically tunable filters resulted in the compact, simple and high-performance CARBOCAP sensor. To this day, the long-term stability and reliability of the measurement provided by the FPI is unrivaled.

The first commercial CARBOCAP products for measuring ppm-level CO_2 in ventilation applications were launched in 1997, with instruments for percentage-level CO_2 measurements following soon after. CARBOCAP technology is proven in a wide range of applications, including ecological measurements, where it performs reliably in harsh environments such as soil and snow, satisfying the thirst for knowledge that scientists have for understanding nature's processes.

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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:

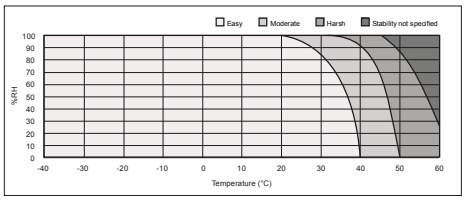
CO_2 range options	0 ... 1000 ppm	0 ... 2000 - 2 %
Pressure (hPa)	Accuracy (% of reading)	
900 ... 1050	±0.5	±1
700 ... 1300	±1	±2

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

For full specifications, see the GMP343 User's Guide.

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Vaisala takes pride in professional and comprehensive specifications that are based on scientific test methods and known standards. The accuracy specification takes into account repeatability, non-linearity, and hysteresis, and is given for the full measurement range, unless otherwise stated. This means our customers get truly reliable information with no gaps, helping them make the right decisions.

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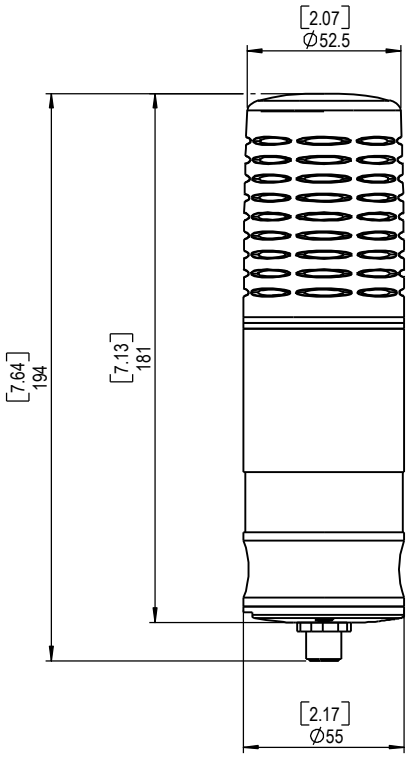
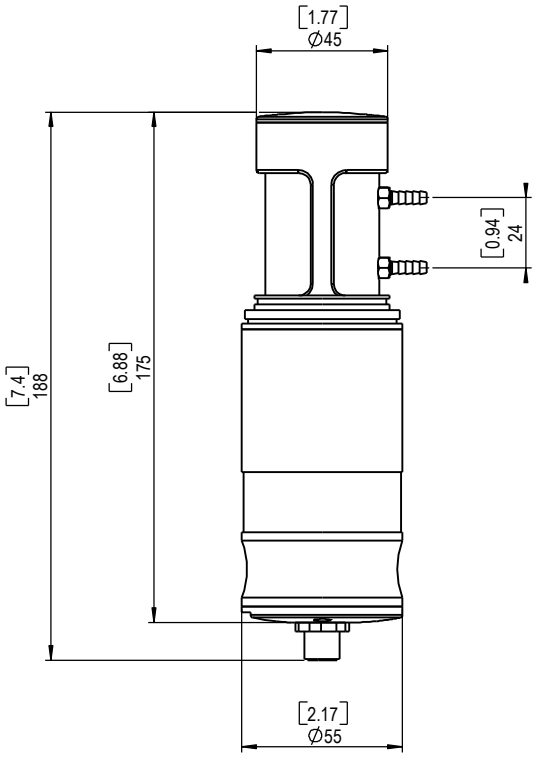
Scan the code for more information

Dimensional Drawings of the GMP343 Carbon Dioxide Probe

Dimensions in mm (inches)



Diffusion model



Flow-through model

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GMP251 Carbon Dioxide Probe for %-Level Measurements

The GMP251 is shown in the actual size in the above image.

Features/Benefits

- Measurement range 0 ... 20 %CO_2
- Intelligent, stand-alone probe with analog (V, mA) and digital (RS485) outputs
- Superior long-term stability with the 2nd-gen proprietary CARBOCAP® technology
- Wide operating temperature range -40 ... +60 °C
- IP65 classified housing
- Full temperature and pressure compensations
- Integrated temperature measurement for CO_2 compensation purposes
- Compensations for background gases, O_2, and humidity
- Sensor head heated to prevent condensation
- Applications: life science incubators, cold storages, fruit and vegetable transportation

The 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, like life science incubators, where stable, reliable, and accurate performance is required. The 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 the GMP251.

The GMP251 incorporates an internal temperature sensor for compensation of the CO_2 measurement according to ambient temperature. The effects of pressure and background gas can also be compensated for. The measurement range is 0 ... 20 %CO_2 and the sensor performance is optimized at 5 %CO_2 measurement. The operating temperature range of the probe is wide and the probe housing is classified as IP65. Condensation is prevented as the internal sensor head is heated.

The GMP251 is resistant to dust and most chemicals, such as, H_2O_2 and alcohol-based cleaning agents.

Ease of Use

The GMP251 is a compact probe that is easy and fast to install in a number of ways. It's easy to plug in and plug out. The surface of the probe is smooth, which makes it easy to clean. The probe provides several outputs for the CO_2 measurement, analog current and voltage outputs as well as digital RS485 with Modbus protocol.

Applications

The GMP251 is ideal for life science incubators, cold storages, fruit and vegetable transportation, and for all demanding applications where stable and accurate %-level CO_2 measurements are needed.

Technical Data

Performance

Measurement range	0 … 20 $\%CO_2$
Accuracy (including repeatability and non-linearity)	
at 25 °C and 1013 hPa	
at 5 $\%CO_2$	±0.1 $\%CO_2$
0 ... 8 $\%CO_2$	±0.2 $\%CO_2$
8 ... 20 $\%CO_2$	±0.4 $\%CO_2$
Calibration uncertainty	
at 5 $\%CO_2$	±0.05 $\%CO_2$
at 20 $\%CO_2$	±0.19 $\%CO_2$
Long-term stability	
0 ... 8 $\%CO_2$	±0.3 $\%CO_2$ / year
8 % ... 12 $\%CO_2$	±0.5 $\%CO_2$ / year
12 % ... 20 $\%CO_2$	±1.0 $\%CO_2$ / year
Temperature dependence with compensation	
at 5 $\%CO_2$, 0 ... 50 °C	<±0.05 $\%CO_2$
Pressure dependence with compensation	
at 5 $\%CO_2$, 700 ... 1100 hPa	±0.05 $\%CO_2$
Start-up time at 25 °C	< 10 s
Warm-up time (for full specifications)	< 4 min
Response time (T90) with standard filter	< 1 min
FLOW-THROUGH MODEL/OPTION	
Response time (T90) with >0.1 l/min	< 1 min
Flow rate dependence	
<1 l/min flow	no effect
1 ... 10 l/min	< 0.6 % of reading/ l/min
Gas flow	
Operating range	< 10 l/min
Recommended range	0.1 … 0.8 l/min

Operating Environment

Operating temperature	-40 … +60 °C
Storage temperature	-40 … +70 °C
Pressure (compensated)	500 … 1200 hPa
operating	< 1.5 bar
Humidity	0 … 100 %, non-condensing
Condensation prevention	sensor head heating when power is on
Chemical tolerance (temporary exposure during cleaning)	H_2O_2 (2000 ppm) non-condensing; alcohol-based cleaning agents (e.g. ethanol and IPA); acetone; acetic acid
Electromagnetic compatibility	EN61326-1, Generic Environment

Inputs and Outputs

Operating voltage	
when digital output in use	12 … 30 VDC
when voltage output in use	13 … 30 VDC
when current output in use	20 … 30 VDC
Digital output	RS485 (Modbus RTU, Vaisala Protocol)
Analog outputs	0 … 5/10 V (scalable), min. load 10 kΩ
	0/4 … 20 mA (scalable), max. load 500 Ω
Power consumption	0.4 W in continuous operation

Mechanics

Probe housing material	PET plastic
Filter material	PTFE membrane, PET plastic grid
Connector	Nickel plated brass, M12 / 5 pin
Housing classification	IP65
Weight	
probe	45 g

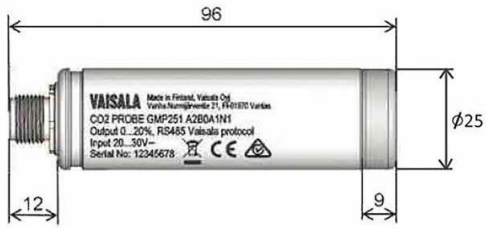
Spare Parts and Accessories

Standard membrane filter	ASM211650SP
Porous sintered PTFE filter, extra protection	DRW243649SP
Flow-through adapter with gas ports	ASM211697SP
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
Probe mounting clips (2 pcs)	243257SP
Probe mounting flange	243261SP
USB cable for PC connection	242659
MI70 connection cable for probe	CBL210472
Calibration adapter	DRW244827SP

Dimensions

Probe diameter	25 mm

Dimensions in mm



GMT220 Series Carbon Dioxide Transmitters for Industrial Applications

The GMT220 transmitters withstand harsh and humid environments.

Features/Benefits

- Incorporates Vaisala CARBOCAP® - the silicon-based NDIR sensor
- IP65 protected against dust and spray water
- Several measurement ranges
- Easy installation
- Standard analog outputs and two configurable relays available

Applications include:

- Horticulture and fruit storage
- Greenhouses and mushroom farming
- Safety alarming and leakage monitoring
- Demand controlled ventilation in harsh environments

The Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GMT220 is designed to measure carbon dioxide in harsh and humid environments. The housing is dust- and waterproof to IP65 standards.

The GMT220 series transmitters incorporate the advanced Vaisala CARBOCAP® Sensor. The patented sensor has unique reference measurement capabilities. Its critical parts are made of silicon; this gives the sensor outstanding stability over both time and temperature. By lengthening the calibration intervals, the user saves both time and money.

Interchangeable Probes

The user has a choice of measurement ranges up to 20% of CO_2. The GMT221 is for higher concentrations of CO_2 and the GMT222 for lower concentrations of CO_2. The GMT220 probes are interchangeable. They can be removed and reattached or replaced at any time – without the need for calibration and adjustment. The probes can be attached directly to the transmitter body or, when used with a cable, installed remotely into hard-to-reach places or areas with dangerously high levels of CO_2.

The interchangeability of the GMT220 transmitter's probes truly facilitates field maintenance.

The end user can carry out field maintenance without any additional equipment or heavy and expensive calibration gas bottles by simply replacing a probe.

Probes that have been replaced can be sent to Vaisala for recalibration.

Technical Data

Performance

Measurement Ranges	
GMT221	0 ... 2 %
for high concentrations	0 ... 3 %
	0 ... 5 %
	0 ... 10 %
	0 ... 20 %
GMT222	0 ... 2000 ppm
for low concentrations	0 ... 3000 ppm
	0 ... 5000 ppm
	0 ... 7000 ppm
	0 ... 10 000 ppm
Accuracy (including repeatability, non-linearity and calibration uncertainty) at 25 °C and 1013 hPa	
GMT221	±(1.5 % of range + 2 % of reading)
(applies for concentrations above 2 % of full scale)	
GMT222	±(1.5 % of range + 2 % of reading)
Temperature dependence, typical	-0.3 % of reading / °C
Pressure dependence, typical	+0.15 % of reading/hPa
Long-term stability	<±5 %FS/2 years
Response time (63 %)	
GMT221	20 seconds
GMT222	30 seconds
Warm-up time	30 seconds, 15 minutes full specifications

Inputs and Outputs

Outputs	0 ... 20 or 4 ... 20 mA and 0 ... 10 V
Resolution of analog outputs	12 bits
Recommended external load:	
current output	max. 400 Ohm
voltage output	min. 1 kOhm
Two pre-or user-defined relay outputs	
Relay contacts	max. 30VAC/60VDC, 0.5A
Connections	screw terminals, 0.5 ... 1.5 mm²
Operating voltage	16 ... 35 VDC or 24 VAC (±20%)
Power consumption	<4 W

Operating Environment

Operating temperature	-20 ... +60 °C (-4 ... +140 °F)
with display	0 ... +50 °C (+32 ... +122 °F)
Storage temperature	-30 ... +70 °C (-22 ... +158 °F)
Operating pressure (compensated range)	700 ... 1300 hPa
Humidity	0 ... 100 %RH, non-condensing
Electromagnetic compatibility	EN61326-1, Generic Environment

Mechanics

Housing material	
transmitter body	ABS plastic
probe	PC plastic
Housing classification	IP65
Weight:	
GMT221	max. 280 g
GMT222	max. 300 g
Probe cable length	2 m and 10 m (optional)

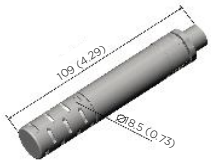
Accessories

Spare probe	GMP221, GMP222
(use the order form to define measurement range etc.)	
Clips (2 pcs) for attaching the probe	25245GM
Mounting flange for the probe	GM45156SP
Probe cables	
2 m	25665GMSP
10 m	210848GMSP
Calibrator for interchangeable probes	GMK220
Wall Assembly Plate	GM45160
In-soil adapter for probe	211921GM
Serial COM adapter	19040GM
Calibration adapter for probe	26150GM

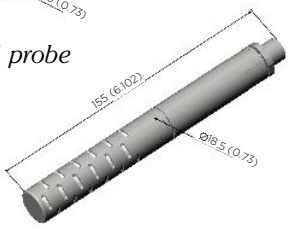
Dimensions

Dimensions in mm (inches)

GMT220 transmitter



GMP221 probe



GMP222 probe

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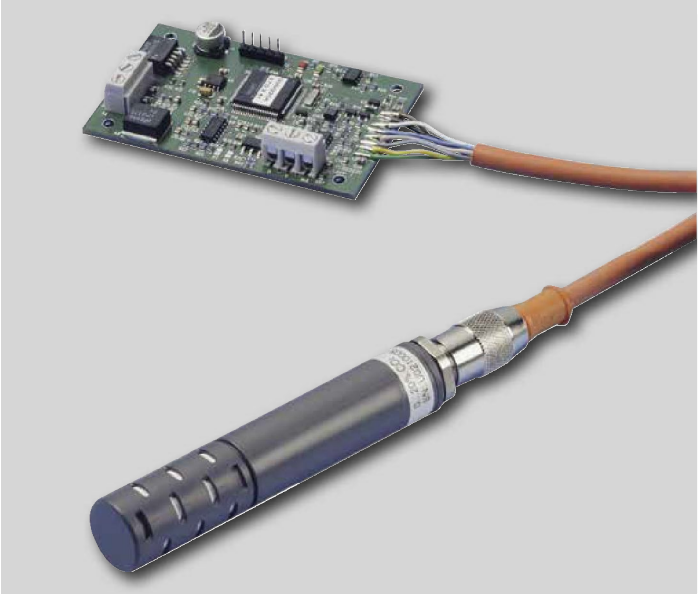
GMM220 Carbon Dioxide Modules for Demanding OEM Applications



The Vaisala CARBOCAP® Carbon Dioxide Module Series GMM220 withstand harsh conditions. They provide high carbon dioxide measurement accuracy over wide temperature and relative humidity ranges.

Features/Benefits

- Incorporates Vaisala CARBOCAP® - the silicon based CO_2 sensor
- Choice of several measurement ranges
- IP65 protected probe against dust and spray water
- Interchangeable probes provide easy maintenance
- Modules optimized for integration into equipment for greenhouse control, incubators, fermentors, safety alarming and integrated systems.

For Harsh Environments

The Vaisala CARBOCAP® Carbon Dioxide Module Series GMM220 are designed for Original Equipment Manufacturers (OEM's) requiring carbon dioxide measurements in harsh and demanding applications.

Vaisala CARBOCAP®

The GMM220 series modules incorporate the industrial Vaisala CARBOCAP® Sensor. The patented sensor has unique reference measurement capabilities. Its critical parts are made of silicon; this gives the sensor outstanding stability over both time and temperature.

Since water vapor, dust, and most chemicals do not affect the measurement, the GMM220 series modules can be used in harsh and humid environments.

Interchangeable Probes

The GMP220 probes are interchangeable. They can be removed, reattached or replaced at any time – without the need for calibration and adjustment. The interchangeable probes make calibration and field service easy. In addition, the measurement range can be changed simply by replacing one probe with another.

Different Configurations

The user has a choice of measurement ranges up to 20 % CO_2: the Vaisala CARBOCAP® Carbon Dioxide Module GMM221 for higher and the Vaisala CARBOCAP® Carbon Dioxide Module GMM222 for lower concentrations of CO_2.

Different power supply voltages, output options, as well as cable lengths, connectors, and mounting gear are also available.

Technical Data

Carbon Dioxide

Measurement ranges	
GMM221 for high concentrations	0 ... 2 %, 0 ... 3 %, 0 ... 5 %, 0 ... 10 %, 0 ... 20 %
GMM222 for low concentrations	0 ... 2000 ppm, 0 ... 3000 ppm, 0 ... 5000 ppm, 0 ... 7000 ppm, 0 ... 10 000 ppm
Accuracy (including repeatability, non-linearity and calibration uncertainty) at 25 °C and 1013 hPa	
GMM221	±(1.5% of range + 2% of reading) (applies for concentrations above 2% of full scale)
GMM222	±(1.5 % of range + 2 % of reading)
Temperature dependence, typical	-0.3 % of reading / °C
Pressure dependence, typical	+0.15% of reading hPa
Long-term stability	<±5 %FS/2 years
Response time (63 %)	
GMM221	20 seconds
GMM222	30 seconds
Warm-up time	30 seconds, 15 minutes full specifications

Inputs and Outputs

Outputs	0 ... 20 or 4 ... 20 mA, 0 ... 1 V, 0 ... 2V, 0 ... 2.5 V, or 0 ... 5 V
Resolution of analog outputs	12 bits
Recommended external load:	
current output	max. 200 Ohm
voltage output	min. 1 kOhm
Operating voltage	11 ... 20 VDC or 18 ... 30 VDC
Connections	screw terminals, wire size 0.5 ... 1.5 mm^2
Power consumption	<2.5 W

Operating Environment

Operating temperature	-20 ... +60 °C (-4 ... +140 °F)
Storage temperature	-30 ... +70 °C (-22 ... +158 °F)
Operating pressure	700 ... 1300 hPa
Humidity	
probe	0 ... 100 %RH, non-condensing
mother board	0 ... 85 %RH, non-condensing
Electromagnetic compatibility	Applicable parts of EN61326-1, Generic Environment

Mechanics

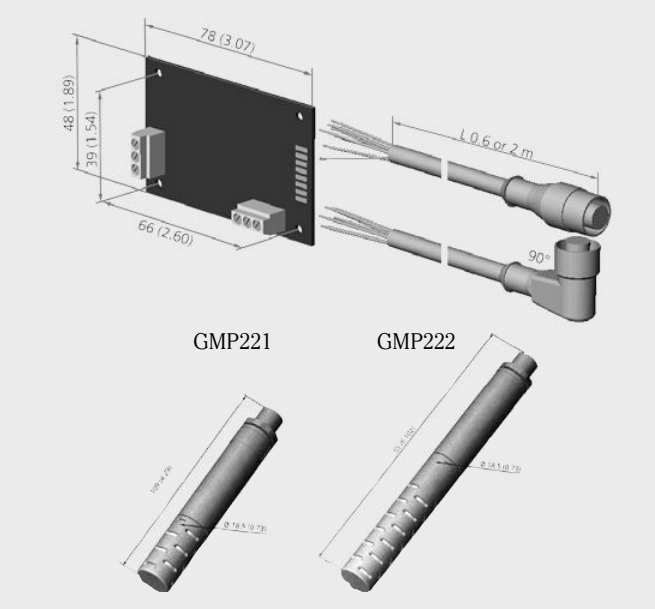
Probe housing material	PC plastic
Housing classification (probe only)	IP65
Weight: GMM221 (w/2m cable)	max. 180 g
Weight: GMM222 (w/2m cable)	max. 200 g
Probe cable length	0.6 m, 1 m (high temperature cable), 2 m, 6 m or 10 m (optional)

Accessories

Spare probe (use the order form to define measurement range etc.)	GMP221, GMP222
Clips (2 pcs) for attaching the probe	25245GM
Mounting flange for the probe	GM45156SP
Calibrator for interchangeable probes	GMK220
Probe cables	
1 m high temperature probe cable (180 °C / 365 °F)	GMM220Z100SP
2 m probe cable	GMM220Z200SP
6 m probe cable	GMP343Z600SP
10.0 m probe cable	GMP343Z1000SP
Serial COM adapter	19040GM
Calibration adapter for probe	26150GM

Dimensions

Dimensions in mm (inches)



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GMM111 Carbon Dioxide Module

The Vaisala CARBOCAP® Carbon Dioxide Module GMM111 is a CO_2 measurement module with flow-through aspiration.

Features/Benefits

- Compact CO_2 module with flow-through aspiration
- Ideal for control of CO_2 concentrations in incubators
- Incorporates Vaisala CARBOCAP®, the silicon based NDIR sensor with unique internal referencing
- Advanced single-beam, dual wavelength measurement with no moving parts
- Measurement range options 0 ... 5 %, 0 ... 10 % and 0 ... 20 % CO_2
- Excellent long-term stability

The Vaisala CARBOCAP® Carbon Dioxide Module GMM111 is designed especially for control of biological processes where high CO_2 concentrations are used. It has 3 optional measurement ranges 0 ... 5/10/20 % CO_2. The GMM111 is a flow-through model and has barbed connectors for attaching the in and out flow tubes. As the module is not mounted in the chamber, the chamber can be heatsterilized without removing the module.

The Vaisala CARBOCAP® CO_2 sensors have been proven to be accurate and durable. They have an excellent long-term stability, which decreases maintenance. The superior performance of Vaisala CARBOCAP® sensors results largely from the stable reference provided by the electrically tunable Fabry-Perot Interferometer(FPI).

The tunable FPI filter measures CO_2 absorption, and simultaneously a reference wavelength. This internal reference measurement compensates effectively for any changes in the optical path, such as light source intensity changes and contamination. In the HVAC market, this type of reference measurement is a unique feature to Vaisala CARBOCAP® products.

The true internal reference measurement of Vaisala CARBOCAP® CO_2 transmitters provides years of stable CO_2 measurements.

Technical Data

Performance

CO_2 measurement range	0 ... 5 %, 0 ... 10 % or 0 ... 20 %
Accuracy (including repeatability, non-linearity and calibration uncertainty)	±(1.5% of range + 3 % of reading)
Long-term stability	
0 ... 8 $\%CO_2$	±0.5 $\%CO_2$/year
8 ... 12 $\%CO_2$	±1 $\%CO_2$/year
12 ... 20 $\%CO_2$	±2 $\%CO_2$/year
Response time T_{90}	< 1 min, when flow > 0.2 l/min
Flow rate dependence	
< 1 l/min flow	no effect
1 ... 10 l/min flow	4 % of reading/ l/min
Temperature dependence, typical	-0.3 % of reading/°C
Pressure dependence, typical	+0.15 % of reading/hPa
Warm-up time	1 min, 10 min for full specifications

Operating Environment

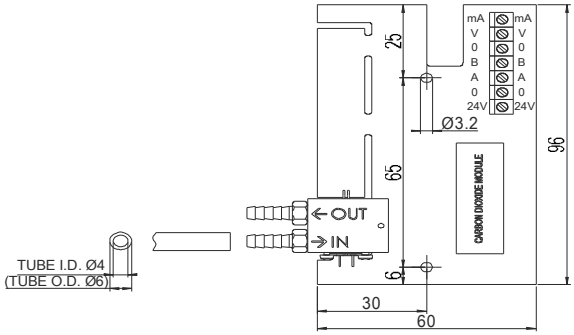
Temperature	+5 ... +55 °C (+41 ... +131 °F)
Humidity	0 ... 99 %RH non-condensing
Pressure	700 ... 1200 hPa
Gas flow	
operating range	< 10 l/min
recommended range	0.2 ... 0.8 l/min
Electromagnetic compatibility	Applicable parts of EN61326-1, Generic Environment

Inputs and Outputs

Outputs	4 ... 20 mA, 0 ... 10 V RS485, 2-wire, non-isolated
Operating voltage	24 V (±20 %) AC/DC
Power consumption	<2 W

Dimensions

Dimensions in mm



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GM70 Hand-Held Carbon Dioxide Meter for Spot-Checking Applications

The Vaisala CARBOCAP® Hand-Held Carbon Dioxide Meter GM70 is the demanding professional's choice for hand-held carbon dioxide measurement. The meter consists of the indicator (center) and probe, used either with the handle (left) or pump (right).

Features/Benefits

- Proven Vaisala CARBOCAP® reliability
- Two optional sampling methods: diffusion or pump aspiration
- User-friendly meter with multilingual user interface
- Numerical and graphical display of measurements
- Data can be logged and transferred to PC via MI70 Link software
- Wide selection of measurement ranges
- Easy recalibration using the interchangeable probes
- Suitable for field checking of fixed CO_2 instruments
- Short warm-up time
- Compact and versatile

The Vaisala CARBOCAP® Hand-Held Carbon Dioxide Meter GM70 is a user-friendly meter for demanding spot measurements in laboratories, greenhouses and mushroom farms. The meter can also be used in HVAC and industrial applications, and as a tool for checking fixed CO_2 instruments.

The GM70 has a short warm-up time and is ready for use almost immediately. It has a menu-based interface, a graphical LCD display and data logging capability. The optional MI70 Link Windows® software in combination with a USB connection cable provides an easy way to handle data in a PC environment.

Vaisala CARBOCAP® Technology

The GM70 incorporates the advanced Vaisala CARBOCAP® sensor that has unique reference measurement capabilities. The measurement accuracy is not affected by dust, water vapor or most chemicals. The GM70 has a two-year recommended calibration interval.

Two Sampling Methods

The handle is for hand-held diffusion sampling. The GM70 pump enables pump-aspirated sampling from locations difficult to access otherwise. It is also ideal for comparisons with fixed CO_2 transmitters.

Interchangeable Probes

The GM70 uses the same probes as Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GMT220 and Modules Series GMM220. By plugging different probes into the handle or pump, the user can easily change the measurement range of the GM70.

The meter can also be used as a calibration check instrument for Vaisala's GM20 and series, GMT/M220 fixed CO_2 instruments. GMP220 probes can even be adjusted by using the GM70 meter.

The GM70 has two probe inputs. Vaisala's relative humidity and dewpoint probes can also be used simultaneously with CO_2 measurement.

Technical Data

CO_2 Volume Concentration Measurement

Measurement ranges	
High concentrations	0 ... 2 %
short probe (GMP221)	0 ... 3 %
	0 ... 5 %, 0 ... 10 %, 0 ... 20 %
Low concentrations	0 ... 2000 ppm
long probe (GMP222)	0 ... 3000 ppm, 0 ... 5000 ppm,
	0 ... 7000 ppm, 0 ... 10,000 ppm
Accuracy (including repeatability, non-linearity and calibration uncertainty) at 25 °C and 1013 hPa	
GMP221	±(1.5% of range + 2% of reading)
(applies for concentrations above 2% of full scale)	
GMP222	±(1.5% of range + 2% of reading)
Temperature dependence, typical	-0.3 % of reading / °C
Pressure dependence, typical	+0.15% of reading/hPa
Long-term stability	<±5 %FS/2 years
Response time (63 %)	
GMP221	20 seconds
GMP222	30 seconds
Warm-up time	30 seconds, 15 minute full specifications

Measurement Environment

Temperature	-20 ... +60 °C (-4 ... +140 °F)
Relative humidity	0 ... 100 %RH non-condensing
Operation pressure	700 ... 1300 hPa
Flow range (diffusion sampling)	0 ... 10 m/s

Probe, Handle & Pump General

Sensor	Vaisala CARBOCAP®
Housing material	
GMP221/222 probe	PC plastic
GMH70 handle	ABS/PC blend
GM70 Pump	aluminium casing
Storage temperature	-30 ... +70 °C (-22 ... +158 °F)
Storage humidity	0 ... 100 %RH non-condensing
Weight	
GMH70 with GMP221/222 probe	230 g
GM70 Pump with GMP221/222 probe	700 g

MI70 Indicator General

Menu languages	English, Chinese, French, Spanish, German, Japanese, Russian, Swedish, Finnish
Display	LCD with backlight, graphic trend display of any parameter, character height up to 16 mm
Max. no. of probes	2
Power supply	Rechargeable NiMH battery pack with AC-adapter
Analog output	0 ... 1 VDC
Output resolution	0.6 mV
PC interface	MI70 Link software with USB or serial port cable
Data logging capacity	2700 points
Alarm	Audible alarm function
Operating temperature range	-10 ... +40 °C (+14 ... +104 °F)
Operating humidity range	non-condensing
Housing material	ABS/PC blend
Housing classification	IP54
Weight	400 g

Battery Operation Time

Continuous use	
with handle	better than 8h at +20 °C (+68 °F)
with pump	better than 5h at +20 °C (+68 °F) without load
Data logging use	up to a month, depending on logging interval

Electromagnetic Compatibility

EN 61326-1, Portable Equipment.

Accessories

Connection cable for fixed CO_2 instruments	
GMT220, GMM220, GMD20 and GMW20	GMA70
MI70 Link software with USB cable	219687
MI70 Link software with serial port cable	MI70LINK
Analog output cable for 0 ... 1 VDC	27168ZZ
Calibration adapter	26150GM
Carrying case	MI70CASE
Battery, NiMH 4.8V	26755
Spare probe	GMP221, GMP222
(use the order form to define measurement range etc.)	
Nafion Membrane Tubing	212807GM

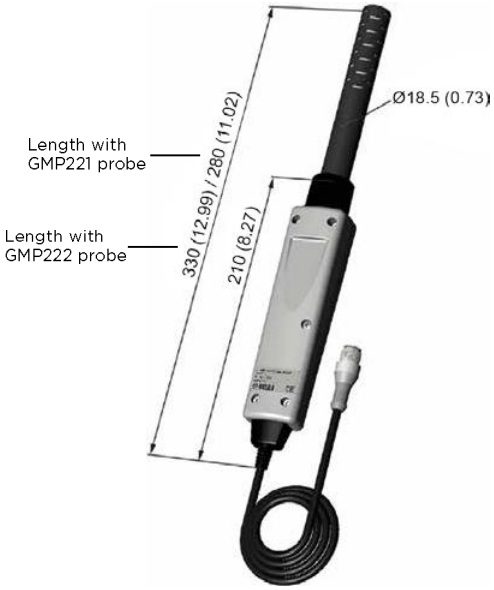
Technical Data

Dimensions

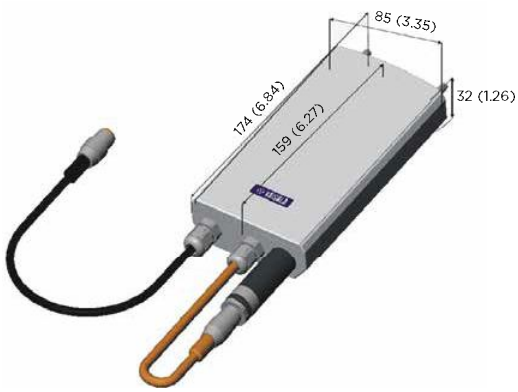
Dimensions in mm (inches)

MI70 indicator

Probe handle with probe



GM70 pump with probe



GMW90 Series Carbon Dioxide, Temperature, and Humidity Transmitters for Demand Controlled Ventilation Applications

GMW90 Series Carbon Dioxide, Temperature and Humidity Transmitters for HVAC are available with either a display opening or a solid front. An optional traffic light indication can also be selected.

Features/Benefits

- Measured parameters: carbon dioxide, temperature, and humidity (optional)
- Superior long-term stability with the next generation Vaisala CARBOCAP® sensor
- Accurate temperature and humidity measurements in a three-parameter instrument due to the low-power microglow infrared source
- Quick and easy installation and maintenance
- Calibrated, user-exchangeable modules for carbon dioxide, temperature and humidity
- 3-point traceable CO_2 calibration (certification included)
- Both analog and digital communication (BACnet/Modbus)

The Vaisala GMW90 Series CARBOCAP® Carbon Dioxide, Temperature, and Humidity Transmitters are based on new measurement technology for improved reliability and stability. With the new technology the transmitter's inspection interval is extended to five years.

Designed for demand controlled ventilation, these transmitters measure carbon dioxide and temperature, with the option for humidity measurements. The instruments come with a calibration certificate that meets traceability and compliance requirements.

Reliability from Unique Measurement Technology

The GMW90 Series Transmitters use advanced Micro-Electro-Mechanical System (MEMS) technology for measuring carbon dioxide. The CARBOCAP® carbon dioxide sensor's continuous reference measurement enables reliable and accurate readings and outstanding long-term stability also in buildings with round-the-clock occupancy.

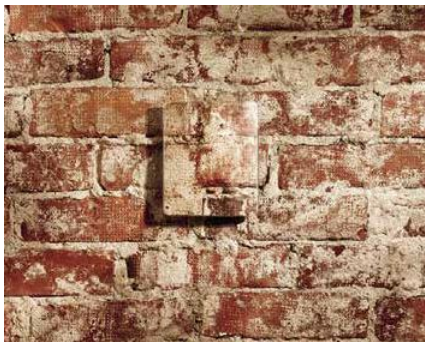
The new generation CARBOCAP® sensor no longer uses an incandescent light bulb, which limits sensor lifetime. This unique sensor consumes very little power compared to other sensors on the market. As a result, instrument self-heating is low and humidity and temperature can be measured correctly.

Convenient Installation

GMW90 Series Transmitters have been designed for quick and easy installation and maintenance. Every model includes a display for easy startup and convenient maintenance. To protect the sensor from dust and dirt during construction and installation, the units can be cabled with back-plate only. Electronics can be snapped on later at an appropriate phase in the construction project. Dip switches make it quick and easy to configure the transmitters.

Easy Calibration

Regular instrument maintenance guarantees a long product lifetime. Calibration is easiest done with the exchangeable measurement modules. Sensor traceability and measurement quality is easily maintained by snapping on a new module calibrated at Vaisala factory. The instrument can also be calibrated using a hand-held meter or reference gas CO_2 bottle. The service interfaces are easy to reach by simply sliding the cover down. The closed cover keeps the measurement environment stable during calibration and ensures a top-quality final result.



Make the transmitter blend into your interior design with the optional decorative cover.

Technical Data

Models

GMW93	CO_2+T	3-wire, voltage output
GMW93D	CO_2+T	3-wire, voltage output with display
GMW94	CO_2+T	3-wire, current output
GMW94D	CO_2+T	3-wire, current output with display
GMW93R	CO_2+T+RH	3-wire, voltage output
GMW93RD	CO_2+T+RH	3-wire, voltage output with display
GMW93RA	CO_2+T+RH	3-wire, voltage output with display and CO_2 indicator LEDs
GMW94R	CO_2+T+RH	3-wire, current output
GMW94RD	CO_2+T+RH	3-wire, current output with display
GMW95	CO_2+T	Digital (BACnet/Modbus) model
GMW95D	CO_2+T	Digital (BACnet/Modbus) model with display
GMW95R	CO_2+T+RH	Digital (BACnet/Modbus) model
GMW95RD	CO_2+T+RH	Digital (BACnet/Modbus) model with display
GMW90	CO_2+T	Configurable analog/digital models
GMW90R	CO_2+T+RH	Configurable analog/digital models

Performance

CARBON DIOXIDE	
Measurement range	0 … 5000 ppm
Accuracy	
+20 ... +30 °C (+ 68 ... + 86 °F)	± (30 ppm + 2 % of reading)
+10 ... +20 °C, +30 ... +40 °C (+50 ... +68 °F, +86 ... +104 °F)	± (35 ppm + 2.7 % of reading)
-5 ... +10 °C, +40 ... +55 °C (+23 ... +50 °F, +104 ... +131 °F)	± (45 ppm + 3.8 % of reading)
Stability in typical HVAC applications	Total accuracy at room temperature ±75 ppm at 600 and 1000 ppm incl. 5 years drift*
Carbon dioxide sensor	Vaisala CARBOCAP® GM10
TEMPERATURE	
Measurement range	-5 ... +55 °C (+23 ... +131 °F)
Accuracy	
+20 ... +30 °C (+68 ... +86 °F)	±0.5 °C (± 0.9 °F)
+10 ... +20 °C, +30 ... +40 °C (+50 ... +68 °F, +86 ... +104 °F)	±0.6 °C (± 1.08 °F)
-5 ... +10 °C, +40...+55 °C (+23 ... +50 °F, +104 ... +131 °F)	±0.8 °C (± 1.44 °F)
Temperature sensor	Digital temperature sensor
RELATIVE HUMIDITY	
Measurement range	0 ... 95 %RH
Accuracy	
Temperature range	+10 ... +40 °C (+50 ... +104 °F)
0 ... 60 %RH	±2.5 %RH
60 … 80 %RH	±3.0 %RH
80 ... 95 %RH	±4.0 %RH
Temperature range	-5 ... +10 °C, +40 ... + 55 °C (+23 ... +50 °F, +104 ... +131 °F)
0 ... 60 %RH	±3.5 %RH
60 … 80 %RH	±4.0 %RH
80 ... 95 %RH	±5.0 %RH
Stability in typical HVAC applications	±0.5 %RH/year
Humidity sensor	Vaisala HUMICAP® 180R

*Complies with CEC-400-2008-001-CMF

Operating Environment

Operating temperature range	-5 ... +55 °C (+23 ... +131 °F)
Operating humidity range	0 … 95 %RH
	Dewpoint <30 °C (+86 °F)
Storage temperature range	-30 ... +60 °C (-22 ... +140 °F)
Electromagnetic compliance	EN61326-1, Industrial Environment

Spare Parts and Accessories

CO_2 module	GM10SP
Temperature Module (CO_2+T models)	TM10SP
Humidity and Temperature Module (CO_2+T+RH models)	HTM10SP
Decorative cover set (10 pcs.)	236285
Connection cable for HM70 hand-held meter	219980
USB cable for PC connection	219690

Mechanics

IP class	IP30
Standard housing color	White (RAL9003*)
Housing material	ABS/PC, UL-V0 approved
Output connector	Screw terminals
	max. wire size 2 mm^2 (AWG14)
Service port connector	4-pin M8
Weight	163 g

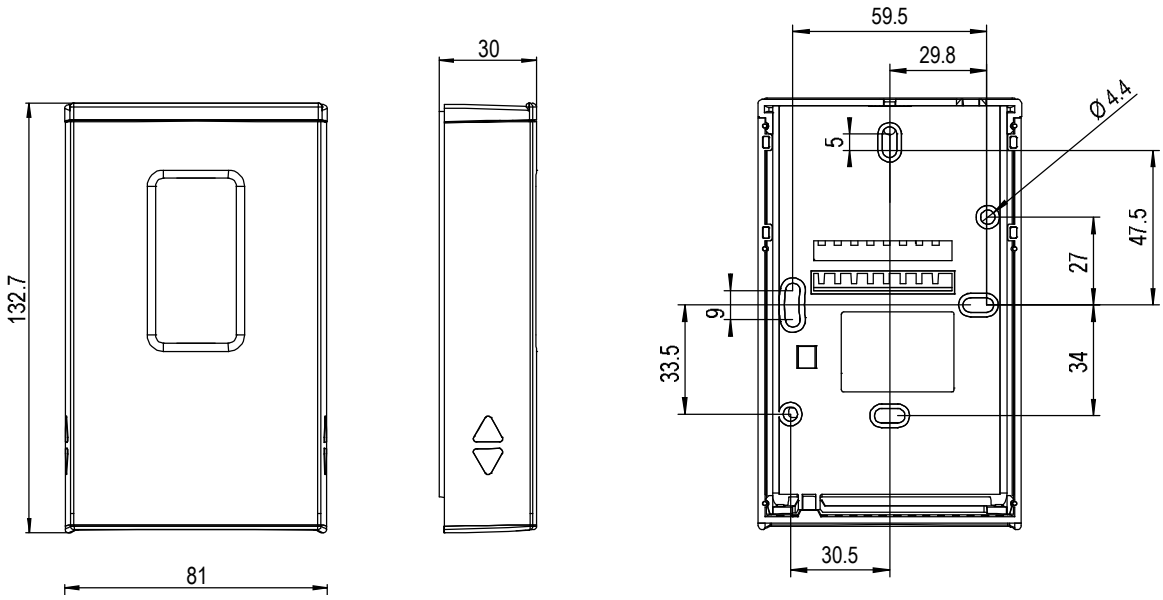
*RAL code is only indicative with potential small variations in color shade

Inputs and Outputs

Supply voltage	18 … 35 VDC, 24 VAC ± 20% 50/60 Hz
Current output models	
Outputs	0/4…20 mA, 2 and 3 channel models available
Loop resistance	0…600 Ω
Power consumption	<2W
Voltage output models	
Outputs	0…5/10 V, 2 and 3 channel models available
Load resistance	10 kΩ min.
Power consumption	<1W
Default analog scales	
CO_2	0…2000 ppm
T	-5…+55°C
RH	0…100 %RH
Digital models	
Power consumption	<1.5W
Output type	RS-485 (galvanic isolation, 1.5 kV)
RS-485 end of line termination	Enable with jumper, 120 Ω
Supported protocols	Selectable by DIP switch
BACnet MS/TP	
Operating mode	Selectable Master/Slave
Address range, master mode	0 … 127
Address range, slave mode	128…255
Modbus RTU	
Address range	0 … 247
Service port	RS-485 line for temporary service use

Dimensions

Dimensions in mm



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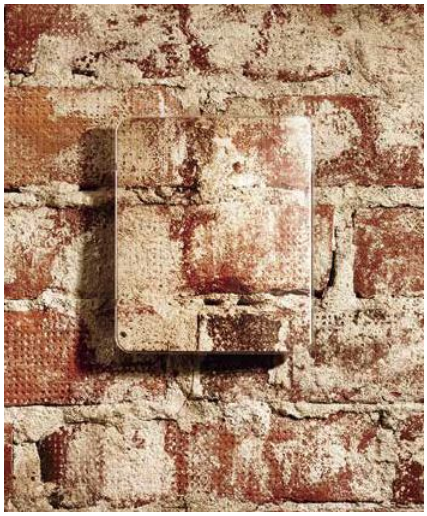
Decorative Cover for Vaisala GMW90 and HMW90 Series Transmitters

The decorative cover helps to camouflage the transmitter to the surroundings. Transmitter location can be chosen with optimal measurement in mind without compromising aesthetics.



www.vaisala.com/GMW90
www.vaisala.com/HMW90

VAISALA

GMW80 Series Carbon Dioxide, Humidity and Temperature Transmitters for DCV

GMW80 series transmitters.

Features/Benefits

- Cost-efficient, affordable
- Reliable and maintenance-free operation up to 15 years
- Superior stability due to 2nd-gen proprietary CARBOCAP® technology
- Improved accuracy due to low self-heating of microglow light source
- Easy to install, easy to use
- Versatile – works well in buildings occupied 24/7
- Ideal for demand-controlled ventilation

The Vaisala CARBOCAP® Carbon Dioxide, Humidity and Temperature Transmitter Series GMW80 is based on a second-generation technology for improved reliability and stability. The transmitters are designed to fulfill the needs for CO_2 measurements in standard demand-controlled ventilation applications. Temperature measurement is always included in the GMW80 series transmitters. The optional temperature set-point potentiometer, humidity measurement, relay and LED CO_2 level indication give you the flexibility needed for a variety of projects.

The CARBOCAP® sensors measure CO_2 accurately immediately when powered on. As they have a built-in reference measurement they do not need a lengthy learning phase before the measured values are correct. Proper operation can be verified immediately after snapping on the device cover.

Easy Installation

With modern buildings often having hundreds of sensors, the installation time per unit can be a significant cost factor. Returning to the building site to check sensor operation adds further costs.

The GMW80 series transmitters include a number of subtle design features that have been introduced to make installation and commissioning quick and easy. The pull-out tab makes opening the transmitter faster than before, while also doubling as a quality check slip and holder for the anti-tamper screw. The backplate can be twisted onto pre-mounted screws, and the wiring can be done easily on the clearly marked backplate. The electronics can be snapped on later when the building automation system is commissioned.

Reliable Operation

The GMW80 series transmitters are optimized for low maintenance. The second-generation, low-power CARBOCAP® technology enables a longer lifetime and superior stability than ever before. As the power consumption is low, the heat generated by the electronics does not distort the temperature inside the sensor. The internal reference in the CO_2 sensor guarantees the best stability and operation even in constantly occupied buildings without frequent readjustments.

The reliable operation and accurate measurement values of the GMW80 series transmitters contribute to the significant cost savings brought by demand-controlled ventilation.

Technical Data

Models

GMW86P	CO_2	CO_2 current and voltage output, Pt1000
GMW86PT	CO_2	CO_2 current and voltage output, Pt1000, Temp setpoint
GMW83RP*	CO_2+RH+T	Voltage outputs, Pt1000
GMW83DRP*	CO_2+RH+T	Voltage outputs, Pt1000, Display
GMW83	CO_2+T	Voltage outputs
GMW83T	CO_2+T	Voltage outputs, Temp setpoint
GMW83A	CO_2+T	Voltage outputs, CO_2 indicator LED:s
GMW83D	CO_2+T	Voltage outputs, Display
GMW84	CO_2+T	CO_2 current output
GMW84S	CO_2+T	CO_2 current output, Relay

*models with calibration certificate available

Performance

CARBON DIOXIDE	
Measurement range	0 ...2000 ppm
Accuracy	
+20 ...+30 °C	±(30 ppm +3 % of reading)
+10 ...+20 °C, +30 ...+40 °C	±(35 ppm +3.7 % of reading)
+0 ...+10 °C, +40 ...50 °C	±(40 ppm +4.8 % of reading)
Stability in typical HVAC conditions	±(15 ppm + 2 % of reading) over 5 years
Warm-up time	1 min; 10 min for full specification
Response time (63 %)	60s
Carbon dioxide sensor	Vaisala CARBOCAP®GM10
TEMPERATURE	
Measurement range	0 ...50 °C
Sensor (on P models)	Pt1000 RTD Class F0.15 IEC 60751
Sensor (for analog outputs)	Digital temperature sensor
Accuracy (GMW83, GMW84)	
+10 ...+30 °C	±0.5 °C
+0 ...+10 °C, +30 ...50 °C	±1 °C
HUMIDITY	
Measurement range	0 ...95 %RH
Temperature range	+10 ...+30 °C
0 ...80 %RH	±3 %RH
80 ...95 %RH	±5 %RH
Temperature range	0 ...+10 °C, +30 ...+50 °C
0 ...95 %RH	±7 %RH
Stability in typical HVAC applications	±2 %RH over 2 years
Product lifetime	>15 years

Operating Environment

Operating temperature range	0 ...+50 °C (+32 ...122 °F)
Operating humidity range	0 ...95 %RH Dew point <30 °C (+86 °F)
Storage temperature range	-40 ...+70 °C (-40 ...158 °F)
Display models	-30 ...+70° C (-22 ...158 °F)
Electromagnetic compliance	EN61326-1, Industrial Environment

Mechanics

IP class	IP30
Housing material	ABS/PC UL-V0 approved
Housing color	White (RAL9003)
Output connector	Screw terminal max. wire size 2mm² (AWG14)
Weight	114 g (Plain and LED version) 120 g (Setpoint version) 124 g (Display version)

Inputs and Outputs

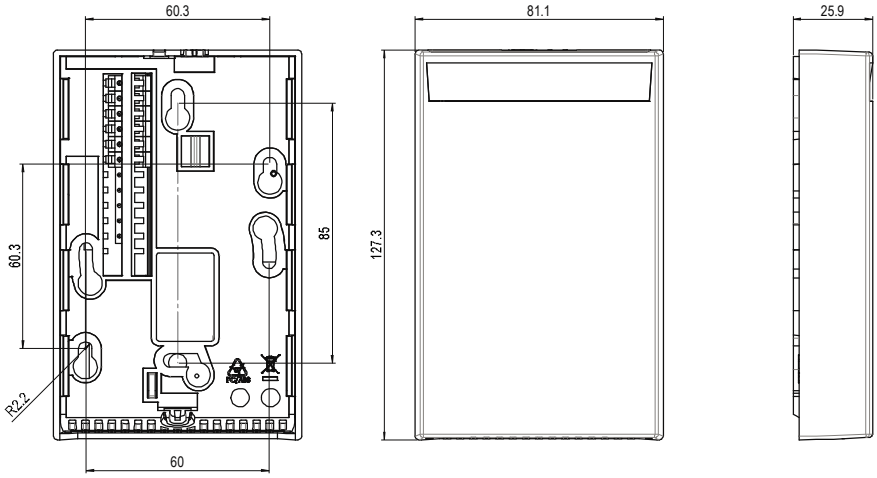
Supply voltage	18 ...35 VDC, 24 VAC ±20 % 50/60 Hz
Max. current consumption at 18 VDC	
GMW83/86	45 mA
GMW84	70 mA
Max power consumption at 30 VAC	
GMW83	0.7 W
GMW84	1.2 W
GMW86	1 W
Relay (GMW84S)	1 pc (max 50 VDC, 500 mA)
Outputs (see model table)	4 ...20 mA and/or 0 ... 10V
CO_2 output scale	0 ...2000 ppm
Temperature output scale	0 ...50 °C
Humidity output scale	0 ...100 %RH
Passive temperature sensor (P models)	Pt1000 RTD
Temperature setpoint (T models)	10 KΩ potentiometer
LED CO_2 indicator levels (A model)	
flashing red	>2000 ppm
red	1200 ...2000 ppm
yellow	800 ... 1200 ppm
green	<800 ppm

Spare Parts and Accessories

CO_2 module	GM10SP80
INTERCAP® sensor	15778HM

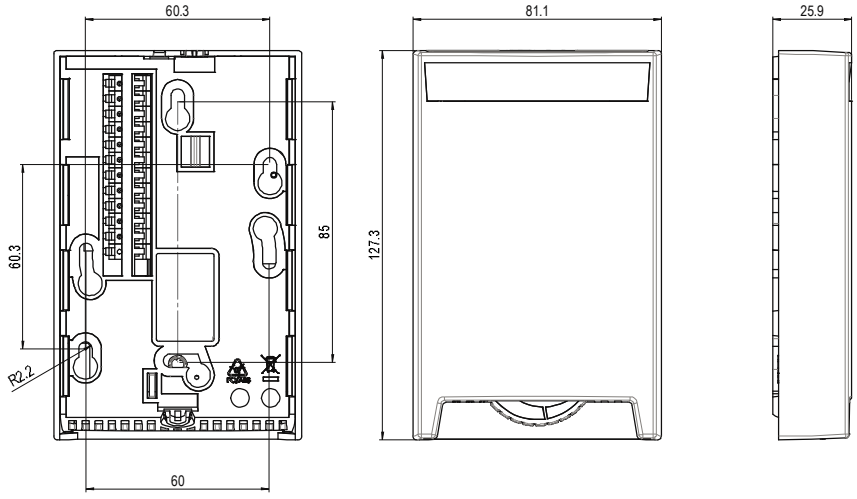
GMW83, GMW83A, GMW83RP, GMW84, GMW84S and GMW86P dimensions

CO_2 4 … 20mA/0 … 10V output
T Pt1000 RTD

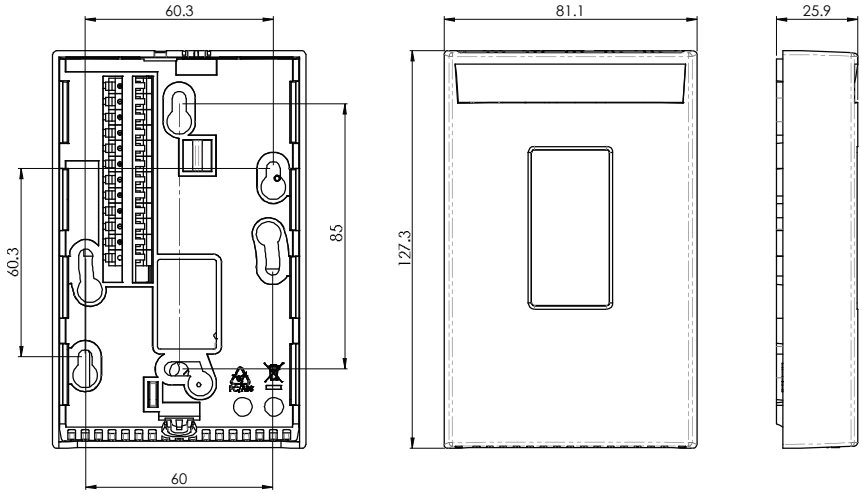


GMW83T and GMW86PT dimensions

CO_2 4 … 20mA/0 … 10V output
T Pt1000 RTD



GMW83D and GMW83DRP dimensions



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Scan the code for more information

GMD20 Series Carbon Dioxide Transmitters for Demand Controlled Ventilation Applications

The GMD20 series transmitters are designed for use in ventilation-related applications.

Features/Benefits

- Versatile transmitters
- Reliable measurement with sensor inside the duct
- Incorporates Vaisala CARBOCAP® Sensor - the silicon-based NDIR sensor
- Excellent long-term stability
- Negligible temperature dependence
- Ease of installation

The duct mounted Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GMD20 is specially designed for Demand Controlled Ventilation (DCV). They are easy to install and require no maintenance. The recommended calibration interval is five years.

Vaisala CARBOCAP® Technology

The GMD20 Series Transmitters use the silicon-based Vaisala CARBOCAP® Sensor. The simple structure and reference measurement capabilities make this Single-Beam, Dual-Wavelength NDIR sensor extremely stable and reliable.

The temperature and flow dependences of the sensor are negligible. In addition, the measurement accuracy is not affected by dust, water vapor and most chemicals.

Versatile Transmitters

The GMD20 series transmitters can be used independently, or incorporated into building energy management systems. The series consists of duct mount units GMD20 and GMD20D. Version D has a display.

The duct units' compact sensor head design fits inside the ventilation duct, eliminating the risk of leaking gaskets and measurement errors.

In addition to the standard 0 ... 20 mA, 4 ... 20 mA and 0 ... 10 V outputs, there are two other options: one LonWorks® interface and a relay output. The relay output is standard with the display units.

Improve Indoor Air at Minimal Energy Costs

The use of the GMD20 series transmitters ensures the best possible control of air quality and results in considerable savings in energy consumption, maintenance and recalibration costs.

Technical Data

Performance

CARBON DIOXIDE MEASUREMENT	
Measurement range	0 ... 2000 ppm (nominal; can be calibrated for other ranges: 0 ... 5000 ppm, 0 ... 10,000 ppm, 0 ... 20,000 ppm)
Accuracy (including repeatability, non-linearity and calibration uncertainty)	± (2 % of range + 2% of reading)
Long-term stability	<±5 % of range / 5 years
Response time (63%)	1 minute
Warm-up time	1 minute, 15 minutes full specifications

Inputs and Outputs

Outputs	0 ... 20 or 4 ... 20 mA and 0 ... 10 V
Optional outputs	relay LonWorks® interface
Resolution of analog outputs	8 bits
Recommended external load:	
current output	max. 500 ohm
voltage output	min. 1 kohm
Operating voltage	nominal 24 VAC/DC (18 ... 30 VDC)
Connections	screw terminals, wire size 0.5 ... 1.5 mm^2
Power consumption	<2.5 W

Operating Environment

Temperature	-5 ... +45 °C (+23 ... +113 °F)
Humidity	0 ... 85 %RH, non-condensing
Flow velocity (GMD20)	0 ... 10 m/s
Electromagnetic compatibility	EN61326-1, Generic Environment

Mechanics

Housing material	ABS plastic
Housing classification (GMD20 electronics housing)	IP65
Weight: GMD20 (D)	140 g (170 g)

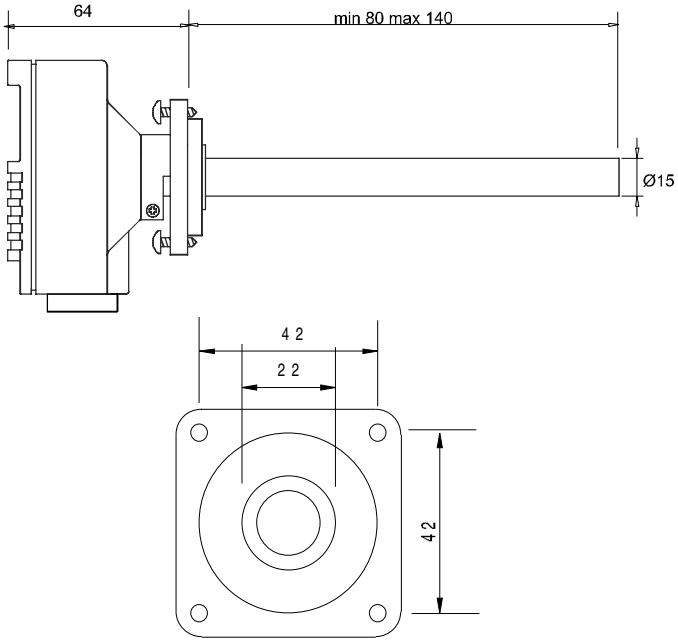
Accessories and Options

Display and relay option for GMD20	GMI21
Relay output option	GMR20
LonWorks® module with CO_2 signal	GML20
(Not available when display option is added)	
Serial COM adapter	19040GM
Hand-held meter for field verification	GM70

Dimensions

Dimensions in mm

GMD20 and GMD20D



CARBOCAP® is a registered trademark of Vaisala.

VAISALA

Vaisala takes pride in professional and comprehensive specifications that are based on scientific test methods and known standards. The accuracy specification takes into account repeatability, non-linearity, and hysteresis, and is given for the full measurement range, unless otherwise stated. This means our customers get truly reliable information with no gaps, helping them make the right decisions.

www.vaisala.com/requestinfo

Scan the code for more information

GMM112 Carbon Dioxide Module for HVAC Applications

The Vaisala CARBOCAP® Carbon Dioxide Module GMM112 is a basic CO_2 measurement module.

Features/Benefits

- Compact OEM module for demand controlled ventilation and other CO_2 measurement applications
- Incorporates Vaisala CARBOCAP®, the silicon based NDIR sensor with unique internal referencing
- Advanced, single-beam, dual wavelength measurement with no moving parts
- Excellent long-term stability
- Ideal for ventilation control in all types of occupied spaces

The Vaisala CARBOCAP® Carbon Dioxide Module GMM112 is a compact module for measuring ppm (parts per million) levels of carbon dioxide. The GMM112 module is designed for indoor use in demand controlled ventilation and other applications requiring carbon dioxide control.

The GMM112 has three optional ranges to select from: 0…2 000 ppm, 0…5 000 ppm and 0…10 000 ppm. The selectable analog (current and voltage) and digital outputs make it easy to integrate to various control systems. The GMM112 modules are easy to install and need practically no maintenance.

Proven Performance with the Vaisala CARBOCAP® Sensor

The GMM112 module includes Vaisala CARBOCAP® carbon dioxide sensor, a silicon-based infrared (IR) absorption sensor. The excellent long-term stability of the CARBOCAP® sensor results from its unique measurement technology. The sensor features an electrically tunable Fabry-Perot Interferometer for built-in reference measurement. The sensor not only measures CO2 absorption but also a reference, which makes it possible to compensate for potential light intensity variations and contamination and dirt accumulation in the optical path, making the sensor extremely stable over time.

CARBOCAP sensor has no need for any compensation algorithms that are used in more simple sensors to compensate for their drift. In applications with constant elevated levels of carbon dioxide and in buildings with around-the-clock occupancy (e.g. hospitals, manufacturing facilities, residential buildings, and retirement homes) the compensations based on assumed background carbon dioxide level simply do not work.

Technical Data

Performance

CO_2-measurement range	0 ... 2000 ppm 0 ... 5000 ppm 0 ... 10000 ppm
Accuracy (including repeatability, non-linearity and calibration uncertainty)	± (2 % of range + 2 % of reading
Long-term stability	± 5 % of range/5 years
Response time T90	1 min
Temperature dependence, typical	-0,35 % of reading / °C
Pressure dependence, typical	+0,15 % of reading/hPa
Warm-up time	1 min, 10 min for full. specification
Product lifetime	> 10 years

Operating Environment

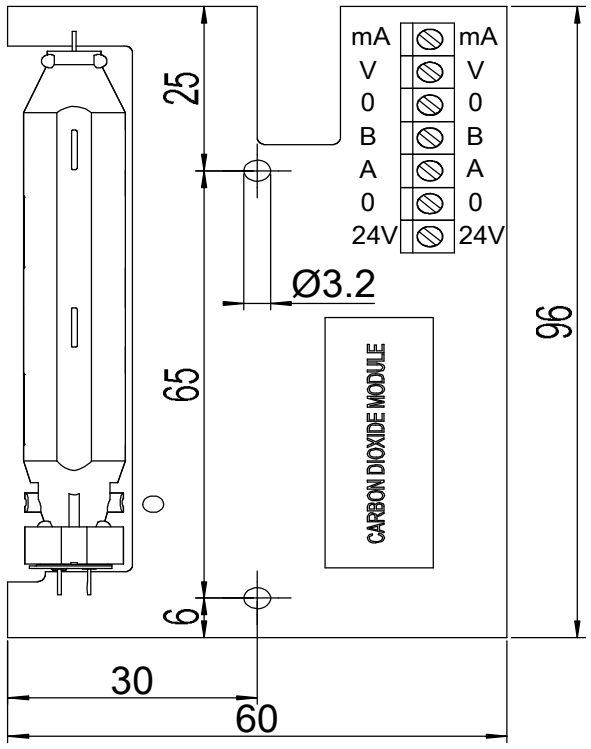
Temperature	-5 ... +45 °C (23 ... 113 °F)
Humidity	0 ... 85 %RH
Pressure	700 ... 1200 hPa
Electromagnectic compatibility	
Complies with EMS standard EN61326-1:1997 + Am1:1998, Generic Environment	

Inputs and Outputs

Operating voltage	24 V (±20 %) AC/DC
Power consumption	<2 W
Outputs	4 … 20 mA, 0 … 10 V, RS-485, 2-wire, non-isolated

Dimensions

Dimensions in mm



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