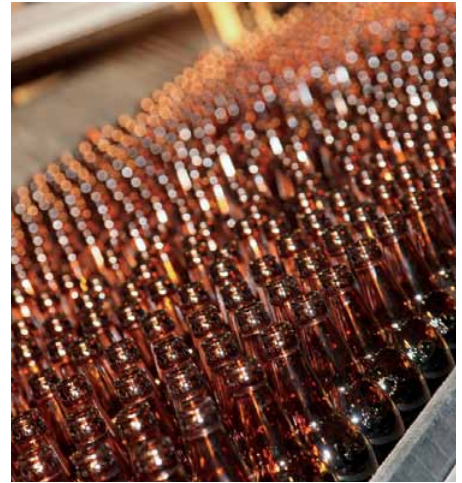


Know the Risks - Work Safely with CO₂



In addition to its vital role in photosynthesis, respiration and carbon cycle, carbon dioxide (CO₂) has many industrial applications. Both solid and liquid CO₂ are used in refrigeration and cooling. In the beverage industry, CO₂ gives the fizz to the drinks and prevents bacterial and fungal growth in soft drinks, beer and wine. CO₂ is an environmentally friendly propellant in aerosols and due to its unreactive nature it is used as an inert gas in various processes, packaging and fire extinguishers, to mention some applications. CO₂ is produced in combustion processes of carbon containing material.

In addition to its excellent refrigerant properties, the safety and the non-flammable nature of CO₂ have already been realized in the early days of refrigeration. CO₂ is one of the natural refrigerants that does not harm the ozone layer and has no or negligible climate impact. CO₂ has replaced the restricted CFC, HCFC and HFC refrigerants, which cause ozone depletion and are powerful greenhouse gases.

CO₂ Exposure Limits in the Working Environment

CO₂ is a non-toxic and non-flammable gas. However, it does not support life and exposure to elevated CO₂ concentrations can induce a risk to life. The leakage of odorless and colorless CO₂ refrigerant cannot be detected without proper sensors. Although CO₂ is considered to be a non-toxic gas, CO₂ concentration

can reach dangerously high levels in poorly ventilated spaces.

There are guidelines and regulations related to the acceptable levels of CO₂ in working environments. For example, the U.S. Occupational Safety & Health Administration, OSHA, has set limitation to CO₂ exposure. The permissible exposure limit (PEL) describes the maximum daily human exposure to a substance allowed in a workroom's air over an 8-hour shift.

PEL for CO₂ is 5 000 ppm measured as time weighted average (TWA) level of exposure. In addition, the American Conference of Governmental Industrial Hygienists, ACGIH, has set the short-term exposure limit to 30,000 ppm of CO₂.

Risks of CO₂

CO₂ is always present in the atmosphere at a low level of approximately 400 ppm. However, high concentrations of CO₂ are extremely dangerous. Drowsiness is experienced under continuous CO₂ exposure at a level of 10,000 ppm (1%). At 2-3% of CO₂ heaviness in the chest is experienced and breathing becomes more frequent and deeper. Headache and sweating will also develop during the exposure. Levels above 5% of CO₂ are considered toxic. At 4-5% of CO₂, breathing becomes uncomfortable and lack of oxygen starts causing dizziness. At 6% of CO₂ the sensory processing abilities start deteriorating after some minutes. Less than one minute of exposure to 10-15% of CO₂ results quickly in unconsciousness. When the CO₂ level is between 17 and 30%, fatal exposure occurs in less than one minute.

At all places where CO₂ gas or CO₂ ice is used, produced, shipped or stored, the levels of CO₂ can rise dangerously high and the environment must be monitored with an appropriate sensor.

Selecting the Location for the CO₂ Measurement

When measuring CO₂ for the safety of the personnel, the CO₂ transmitter should be installed as close as possible to potential leakage points for early detection. Transmitters

should also be placed in all human occupied spaces. When designing the CO₂ safety monitoring solution, the geometry of the monitored area should be considered, taking into account ventilation and air flow in the space. The number and location of the CO₂ transmitters should always be based on risk assessment of the monitored area.

Get familiar with Vaisala's reliable and accurate CO₂ transmitters at www.vaisala.com/GMT220

Typical Concentrations and Effects

Effect	CO ₂ Concentration
Typical atmosphere	350 - 450 ppm
Acceptable indoor air quality	600 - 800 ppm
Tolerable indoor air quality	1000 ppm
Average exposure limit over 8 hours	5000 ppm
Concern, short exposure only	6000 - 30000 ppm
Increased respiration and headache	3 - 8 %
Nausea, vomiting, unconsciousness	10 % +
Sudden unconsciousness, death	20 % +



For more information, visit www.vaisala.com or contact us at sales@vaisala.com

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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 CO₂. The GMT221 is for higher concentrations of CO₂ and the

GMT222 for lower concentrations of CO₂. 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 CO₂. 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 mm ²
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

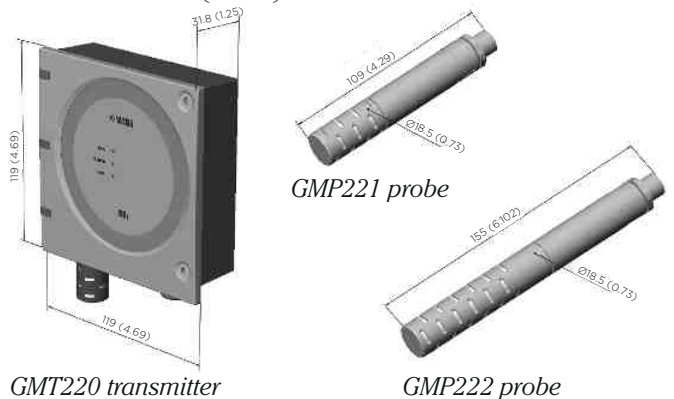
Housing material	
transmitter body	ABS plastic
probe	PC plastic
Housing classification	IP65
Weight:	
GMT221	max. 280 g
GMT222	max. 300 g
Probe cable length	2 m and 10 m (optional)

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)



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Please contact us at
www.vaisala.com/requestinfo



Scan the code for
 more information

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