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Introduction

Vaisala GMM220 transmitter modules are versatile instruments for measuring CO_2 in industrial applications. The CARBOCAP® sensor is silicon based and its operation is based on the NDIR Single-Beam Dual-Wavelength principle. The modules can be configured for different CO_2 measurement ranges and analog output ranges.

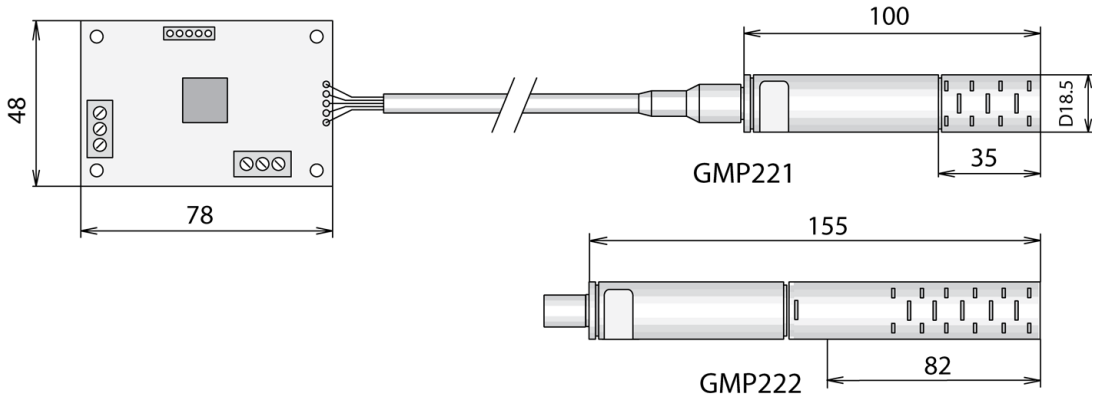


Figure 1 Dimensions of the Probes and Component Board of the GMM220 Series (in mm)

The GMM220 module consists of a component board, cable and a CO_2 probe. The shorter probe model (GMP221) is for higher and the longer model (GMP222) for lower CO_2 concentrations. A waterproof connector connects the probe to the cable. The probe also features a non-volatile memory for storing the calibration parameters. This enables interchangeability of the probes and allows easy field calibration by exchanging the probe with a freshly calibrated one.

Mounting

For power supply and analog outputs, the board is available either with pinheaders on bottom side or with screw terminals on top side; serial interface has always a pinheader.

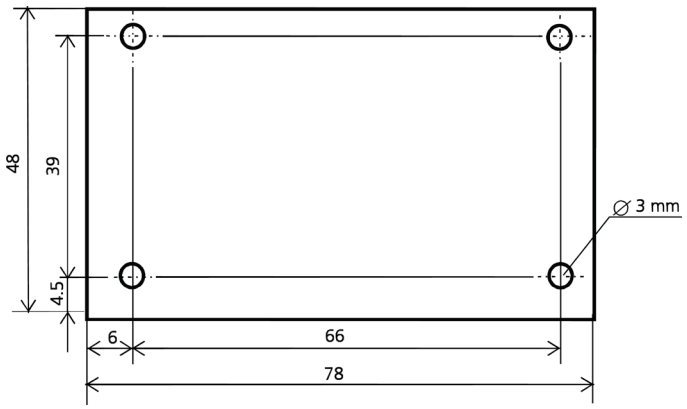


Figure 2 Dimensions of the Component Board (in mm)

If the board has pinheaders, mount it by soldering or plugging it into host board's female connectors.

Electrical Connections

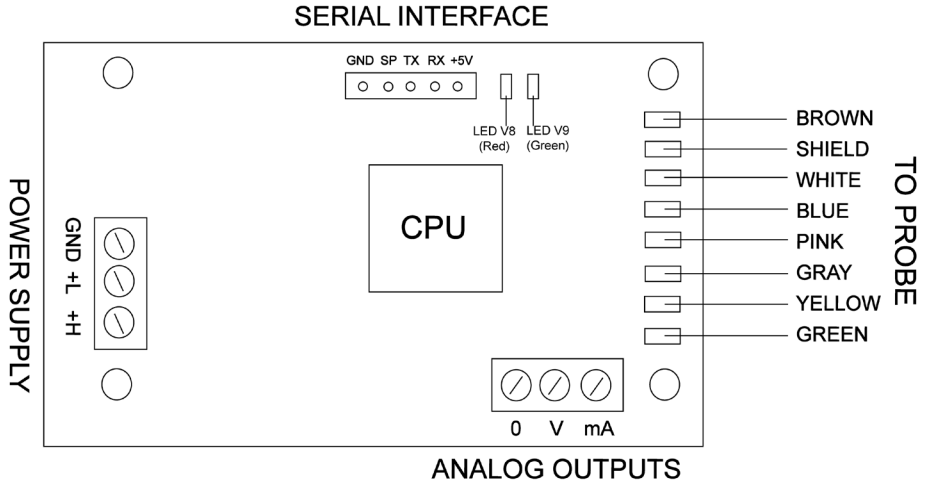


Figure 3 Electrical Connections

Power supply:

Two supply voltage alternatives:

- **+L** 12 volt supply input (11 VDC - 20 VDC)
- **+H** 24 volt supply input (18 VDC - 30 VDC)
- **GND** common ground for power supply

Average current consumption is 100 mA (+ current output, max. 20 mA)

Analog outputs:

- **0** common for both analog outputs
- **V** voltage output (default 0-1 V, on request 0-2 V, 0-2.5 V or 0-5V)
- **mA** current output (default 4-20 mA, on request 0-20 mA)

Serial interface:

The interface is a 5 V (TTL) level full duplex serial port.

- **GND** signal ground (same potential as the supply GND)
- **TX** data transmitted by the CO_2 module (low state corresponding mark)
- **RX** data received by the CO_2 module (low state corresponding mark)

Leave other serial interface pins unconnected.

Probe wires: If the CO_2 module is ordered with a separate probe cable, solder the wires to the component board according to colors shown in Figure 3.

LEDs:

- Normal operation: Led V8 (red) is not lit and Led V9 (green) is blinking.
- Measurement out of range: Led V8 (red) is blinking and Led V9 (green) is blinking, maximum value is shown. GMM220 returns to normal operation when CO_2 drops within range.
- Error state: Led V8 (red) is blinking and Led V9 (green) is blinking, no readings. In error state, check first that the probe is properly connected. In case of constant error, please contact Vaisala Service Centers.

Serial Interface Protocol

The transmitter is connected to a computer with the optional serial COM adapter (19040GM). A suitable terminal program such as WINDOWS® Hyper Terminal is needed for the communication.

Port settings: Baud rate 9600, data bits: 8, stop bits :1, parity: none, flow control: none

Commands

The last character in the GMM220 reply is a prompt >.

Single CO_2 measurement output

```
DISP option <cr>
```

Options: 2 = concentration in ppm, 4 = concentration in %

For example:

>DISP 2<cr>	the command (bold)
6543.2 <cr><lf>	response from the GMM220
>	prompt sent by the GMM220

Continuous CO_2 measurement output

```
MF_MODE option <cr>
```

Options: 0 = no output, 2 = output concentration in ppm, 4 = output concentration in %
For example:

>MF_MODE 4<cr>the command (bold)

5.625<cr><lf>	response from the GMM220
5.625<cr><lf>	
5.625<cr><lf>	

.

To stop continuous output, give command: MF_MODE 0<cr> or <ctrl+C>

Pressure Compensation

If altitude differs significantly from sea level (default), a pressure compensation should be made.

`MF_PRESSURE xxxx <cr>`	**Altitude m (ft)**	**Atmospheric pressure hPa (psi)**

where: xxxx = pressure in hPa.
Example of setting desired pressure:
`>MF_PRESSURE 900`
`MF_PRESSURE=900`
`>`
To save the setting, give command:
`MAIN_SAVE F`
	0 (sea level)	1013 hPa (14.69 psi)

	500 m (1640 ft)	954 hPa (13.84 psi)
	1000 m (3281 ft)	899 hPa (13.04 psi)
	1500 m (4921 ft)	845 hPa (12.26 psi)
	2000 m (6562 ft)	795 hPa (11.53 psi)
	2500 m (8202 ft)	747 hPa (10.83 psi)
	3000 m (9843 ft)	701 hPa (10.17 psi)

Temperature Setting

`MF_TEMP xxx <cr>`

where: `xxx` = ambient temperature (°C) x 10.

Example of setting desired temperature (25 °C):

```
>MF_TEMP 250
MF_TEMP=250
>
```

To save the setting, give command: `MAIN_SAVE F`

Technical Data

Carbon Dioxide

Measuring ranges

GMM221	0 … 2%, 0 … 3%, 0 … 5%, 0 … 10% , 0 … 20% CO_2
GMM222	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
Nonlinearity	± 0.5% FS
Typical output temperature dependence	-0.3% of reading / °C
Typical pressure dependence	+0.15 of reading/hPa
Long-term stability	<±5 %FS / 2 years
Response time (63%)	20 seconds (GMM221) 30 seconds (GMM222)
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
Analog output resolution	12 bits
Recommended external load:	
current output	max. 200 Ω
voltage output	min. 1000 Ω
Operating voltage	11 … 20 VDC or 18 … 30 VDC
Connections	Screw terminals, wire size 0.5 ... 1.5 mm2l
Power consumption	< 2.5 W

Operating conditions

Operating temperature	-20…+60 °C (-4 ... +140 °F)
Storage temperature	-30 ... +70 °C (-22 ... +158 °F)
Operating pressure	700 ... 1300 hPa
Humidity range	
probe	0 … 100 %RH (non-condensing)
mother board	0 … 85 % RH (non-condensing)

Mechanics

Probe:	
housing material	PC plastic
housing classification	IP65
Weight:	
GMM221(w/ 2m cable)	max. 180 g
GMM222 (w/ 2m cable)	max. 200 g

Compliance With EMC-Standards

- EN 61326-1:1997 + Am1:1998, Electrical equipment for measurement, control and laboratory use - EMC requirements - Generic environment
- Testing:
  - CISPR16/22 class B
  - EN/IEC 61000-4-2
  - EN/IEC 61000-4-3
  - EN/IEC 61000-4-4
  - EN/IEC 61000-4-5
  - EN/IEC 61000-4-6.

Warranty

Visit our Internet pages for standard warranty terms and conditions:
http://www.vaisala.com/warranty.

Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or Conditions of Sale for details of the warranty for each product.

Accessories

Order code	Description
GMP221, GMP222	Spare probe (use the order form to defi ne measurement range etc.)
25245GM	Clips (2 pcs) for attaching the probe
GMK220	CO_2 Calibration Unit
GM45156	Mounting flange for the probe
GMM220Z100SP	1 m high temperature probe cable (180 °C / 365 °F)
GMM220Z200SP	2 m probe cable
GMP343Z600SP	6 m probe cable
GMP343Z1000SP	10 m probe cable
19040GM	Serial COM adapter

Technical Support

For technical questions, contact the Vaisala technical support by e-mail at helpdesk@vaisala.com. Provide at least the following supporting information:

- Name and model of the product in question
- Serial number of the product
- Name and contact information of a person who can give information on the problem.

Product Returns

If the product must be returned for service, see www.vaisala.com/returns.

For contact information of Vaisala Service Centers, see www.vaisala.com/servicecenters.

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