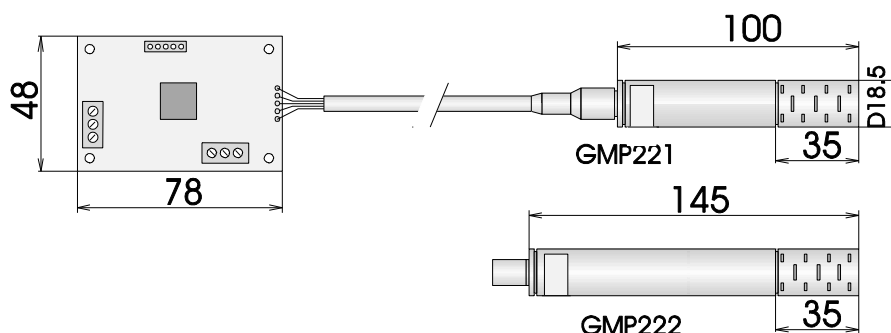## INTRODUCTION

Vaisala's 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 true interchangeability of the probes and forms a good basis for easy field calibration.
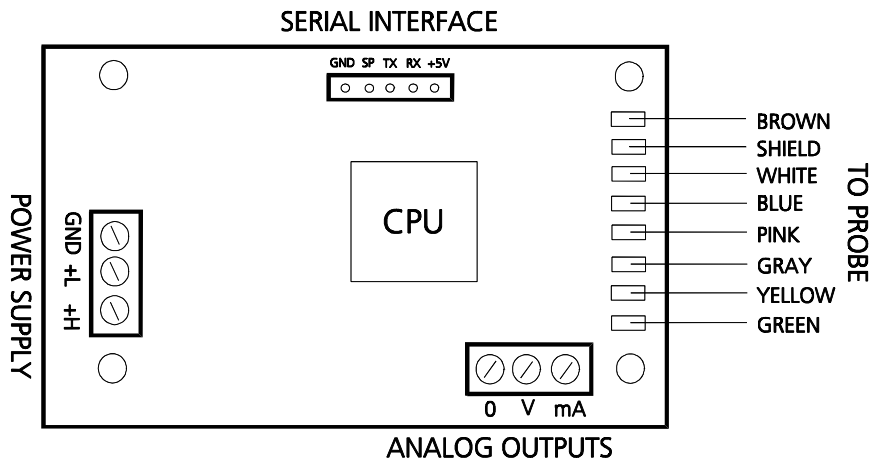
MOUNTING

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.
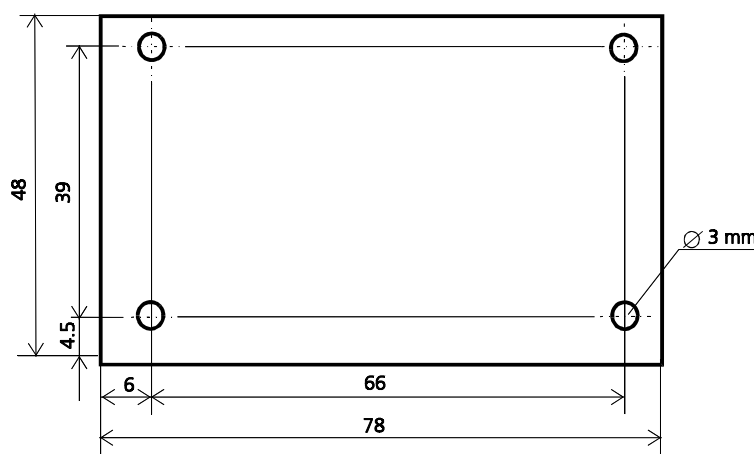
Figure 2 Dimensions of the component board (in mm)

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:

There are 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:

Outputs can be scaled at factory on request.

> **0**   common for both analog outputs
> **V**   voltage output (default 0-1V, others 2 V, 2.5 V, 5 V)
> **mA**   current output (default 4-20 mA, other 0-20 mA)

Serial interface:

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

> **GND**   signal ground (same potential as the supply GND)
> **TX**   data transmitted by the CO2 module (low state corresponding mark)
> **RX**   data received by the CO2 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.

SERIAL INTERFACE PROTOCOL

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

Port settings

baud rate	9600
data bits	8
stop bits	1
parity	none
flow control	none

Prompt from the GMM220

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

Polling command for CO$_2$ concentration

DISP option <cr>

Options:
2 = concentration in ppm CO$_2$ 3 = concentration in % CO$_2$

For example:

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

Continuous mode printing

MF_MODE option <cr>

Options:

0 = no printing   2 = print concentration in ppm CO$_2$ 4 = print concentration in % CO$_2$

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 printing, give command:

       MF_MODE 0<cr> or **<ctrl+C>**

TECHNICAL DATA

Measuring ranges
        GMM221   0 - 2% CO$_2$, 0 - 3% CO$_2$, 0 - 5% CO$_2$, 0 - 10% CO$_2$, 0 - 20% CO$_2$
        GMM222   0 - 3000 ppm, 0 - 5000 ppm, 0 - 7000 ppm, 0 - 10 000 ppm

Accuracy at 25°C against
certified factory references $<\pm[1~\%FS + 1.5\%$ of reading]
(including non-linearity and calibration uncertainty)
Repeatability $<\pm1~\%FS$
Temperature dependence
of output (typically)   0.1 %FS / °C
Pressure dependence (typic.) 0.1 FS/hPa
Long-term stability $<\pm5~\%FS$ / 2 years
Response time (63%)   15 seconds (GMM221)
                                 30 seconds (GMM222)

The GMM221 and GMM222 modules comply with the following EMC standards and have passed the following tests:

EN 50081-1 (EN 55022 Class B = CISPR 22)

EN 50082-1 (IEC 1000-4-2, 4 KV contact, 8KV air)
   (IEC 1000-4-3, 80-1000 MHz, 80%AM, 3V/m)

   (IEC 1000-4-4, 500 V)

   (IEC 1000-4-6, 0.15 - 80 MHz, 80% AM,3V/m)

Operating conditions
Operating temperature range -20…+60 °C
Humidity range
        probe   0 - 100 %RH (non-condensing)
        mother board   0 - 85 % RH (non-condensing)

General
Analog outputs   0 - 20 mA or 4 - 20 mA and
                         0 - 1 V or 0 - 2 V, 0 - 2.5 V, 0 - 5 V
Resolution of analog outputs 0.03 %FS
Recommended external load:
    current output   max. 200 Ω
    voltage output   min. 1kΩ
Power supply   11 - 20 VDC or 18 - 30 VDC
Serial output   @ 5V level
Power consumption   < 2.5 W
Warm-up time   < 5 minutes

Mechanics
Probe:
    housing material   ABS plastic
    housing classification IP65
Weight:
GMM221   175 g
GMM222   200 g

GUARANTEE

Vaisala issues a guarantee for the material and workmanship of this product under normal operating conditions for one (1) year from the date of delivery. Exceptional operating conditions, damage due to careless handling and misapplication will void the guarantee.

Accessories

Order code	Description
GMP221, GMP222	Spare probe (use the order form to define measurement range etc.)
25245	Clips (2 pcs) for attaching the probe
GM45156	Mounting flange for the probe
19040GM	Serial COM adapter