



## QUICK REFERENCE GUIDE



# Vaisala CARBOCAP<sup>®</sup> Carbon Dioxide Module GMM111



- Compact flow aspirated CO<sub>2</sub> measurement module
- CO<sub>2</sub> measurement range options of 0 ... 5 %CO<sub>2</sub>, 0 ... 10 %CO<sub>2</sub> or 0 ... 20 %CO<sub>2</sub>
- For OEM applications

## GENERAL

Vaisala CARBOCAP<sup>®</sup> Carbon Dioxide Module GMM111 measures CO<sub>2</sub> concentrations up to 5, 10 or 20 % depending on the choice of measurement range. The module features flow-through aspiration and is intended for applications such as incubators and bioreactors. GMM111 powers up from 24 VDC/VAC and provides both voltage and current analog outputs. The module also supports digital RS485 communication.

## ELECTRICAL CONNECTIONS

Make the connections according to the table below. See Figure 3 for wire terminals.

mA	Signal 4 ... 20 mA
V	Signal (+) 0 ... 10 V
0	Signal (-)
B	RS485 Signal B
A	RS485 Signal A
0	Power supply (-)
24V	Power supply (+) 24 VDC/VAC

### Powering

The module requires a nominal 24 VDC/VAC power supply maintaining a voltage of 18 ... 30 VDC or 20 ... 26 VAC for all load conditions and all mains voltages. Although the power input includes a half-wave rectifier, it is recommended to use a DC supply to avoid current peaks.

### Connections to 24 VAC Power Supply

Connecting more than one module to a single 24VAC transformer forms a common loop and increases the risk of a short-circuit. Therefore, a separate floating supply for each module is recommended (see Figure 1).

If several modules share a common transformer, the phase (~) must always be connected to the 24 V connector in each module (see Figure 2).

## GAS SAMPLE CONSIDERATIONS

The unit has been designed for strictly non-condensing conditions. If the gas sample is drawn from humid conditions, special care must be taken to prevent condensation from occurring in the sensor. In practice this means lowering the dewpoint of the gas sample below the sensor temperature, for example by drying the sample gas.

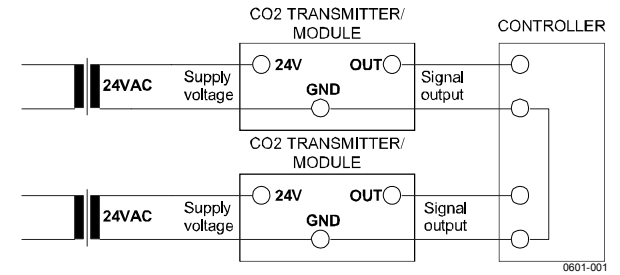


Figure 1 Connection of Separate AC Supplies (Recommended)

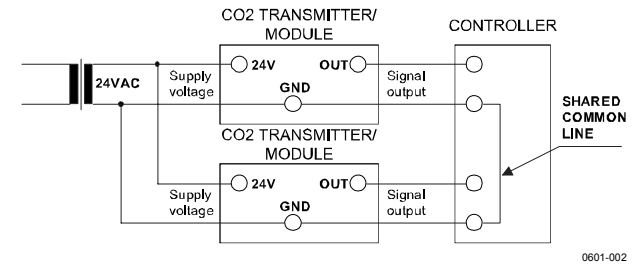


Figure 2 Connection of Single AC supply to Several Modules

## DIMENSIONS

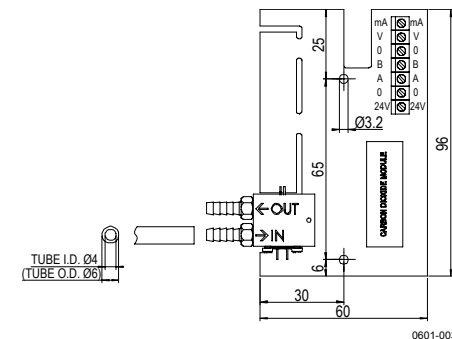


Figure 3 Module Connections and Dimensions

## SERIAL COMMUNICATION INTERFACES

The modules support RS232 or RS485 communication. RS232 is set as factory default. The RS485 interface is selected by serial command. The communication settings for both interfaces are: 9600, N, 8, 1.

### RS485 Interface

The interface is non-isolated two-wire interface with no internal bus termination. If termination is needed, use RC termination (100  $\Omega$  resistor in series with 1 nF capacitor) at both ends of the bus. See serial commands list below to activate the RS485 interface.

### RS232 Interface

Use the RS232 interface for setting the operating parameters. The connection cable between PC and module (a serial COM adapter for maintenance purposes) is available from Vaisala (order code: 19040GM).

## SERIAL COMMANDS

Serial commands are the same for RS232 and RS485 interface. <cr> stands for pressing ENTER.

### Polling command for CO<sub>2</sub> measurement (ppm):

SEND <cr>

### Setting the interval for the RUN (continuous output) mode:

INTV X Y<cr>  
X = 0 (default) ... 255  
Y = S/MIN/H

### Starting the continuous mode printing:

R<cr>

### Stopping the continuous mode printing:

S<cr>

### Saving the parameters into the memory:

SAVE<cr>

### Enabling/disabling the RS485 interface:

RS485 X<cr>  
X = ON/OFF

### Changing the operation mode:

SMODE X<cr>  
X = STOP (default) / RUN / POLL

### Giving the device address:

ADDR X<cr>  
X = 0 (default) ... 99

### Opening the polling line:

OPEN addr<cr>  
addr = 0 (default) ... 99

### Closing the polling line:

CLOSE<cr>

[www.vaisala.com](http://www.vaisala.com)

## SERVICE, CALIBRATION AND ADJUSTMENT

This product is designed to operate its lifetime without maintenance. The modules are calibrated before shipping from the factory. For technical questions, contact the Vaisala technical support; by e-mail [helpdesk@vaisala.com](mailto:helpdesk@vaisala.com), or by fax +358 9 8949 2790.

Repair and calibration services are provided by Vaisala Service Centers:

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## TECHNICAL DATA

Property	Description / Value
<b>Performance</b>	
Measurement ranges	0 ... 5 %CO <sub>2</sub> , 0 ... 10 %CO <sub>2</sub> or 0 ... 20 %CO <sub>2</sub>
Measurement accuracy (incl. repeatability, non-linearity and calibration uncertainty)	±(1.5 % of range + 3 % of reading)
Long-term stability	< ±1 %CO <sub>2</sub> / 2 years
Response time	1 min @ 0.5 l/min flow
Flow rate dependence of reading	
< 1 l/min	no effect
1 ... 10 l/min	4 % of reading / l/min
Temperature dependence of reading	-0.35 % of reading / °C (typical)
Pressure dependence of reading	+0.15 % of reading / hPa (typical)
Warm-up time	1 min, 10 min full specification
Product lifetime	> 10 years

Property	Description / Value
<b>Operating environment</b>	
Operating temperature range	+5 ... +55 °C
Operating humidity range	0 ... 99 %RH non-condensing
Operating pressure range	700 hPa ... 1200 hPa
Operating gas flow range	< 10 l/min
Recommended gas flow range	0.2 ... 0.8 l/min
<b>Inputs and outputs</b>	
Operating voltage	24 V (±20 %) AC/DC
Power consumption	< 2 W
Outputs	
analog	0 ... 10 V, 4 ... 20 mA
serial	RS485, 2-wire, non-isolated
Recommended external load	
current output	< 500 $\Omega$
voltage output	> 1 k $\Omega$
Electromagnetic compatibility	EN61326-1: Generic Environment.
<b>Materials</b>	
Weight	47 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.

