USER'S GUIDE

Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GMT220

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CHAPTER 1
GENERAL INFORMATION

This chapter provides general notes for the manual and the Carbon Dioxide Transmitter Series GMT220.

About This Manual

This manual provides information for installing, operating, and maintaining Carbon Dioxide Transmitter Series GMT220.

Contents of This Manual

This manual consists of the following chapters:

- Chapter 1, General Information, provides general notes for the manual and the Carbon Dioxide Transmitter Series GMT220.
- Chapter 2, Product Overview, introduces the Carbon Dioxide Transmitter Series GMT220.
- Chapter 3, Installation, provides you with information that is intended to help you install this product.
- Chapter 4, Serial Communication, contains information that is needed to change the Carbon Dioxide Transmitter Series GMT220 settings and to read the device status.
- Chapter 5, Maintenance, provides information that is needed in basic maintenance of the Carbon Dioxide Transmitter Series GMT220.
- Chapter 6, Technical Data, provides the technical data of the Product.

Version Information

Table 1   Manual Revisions

Manual Code	Description
M010022EN-D	August 2008
M010022EN-E	October 2008 - Updated technical specification
M010022EN-F	March 2012 - Updated error messages

Related Manuals

Table 2   Related Manuals

Manual Code	Manual Name
M010139EN	Vaisala CARBOCAP® Hand-Held Carbon Dioxide Meter GM70 User's Guide

Documentation Conventions

Throughout the manual, important safety considerations are highlighted as follows:

WARNING	Warning alerts you to a serious hazard. If you do not read and follow instructions very carefully at this point, there is a risk of injury or even death.

CAUTION	Caution warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.

NOTE	Note highlights important information on using the product.

Safety

The Carbon Dioxide Transmitter Series GMT220 delivered to you has been tested for safety and approved as shipped from the factory. Note the following precautions:

WARNING	Ground the product and verify outdoor installation grounding periodically to minimize shock hazard.

CAUTION	Do not modify the unit. Improper modification can damage the product or lead to malfunction.

ESD Protection

Electrostatic Discharge (ESD) can cause immediate or latent damage to electronic circuits. Vaisala products are adequately protected against ESD for their intended use. It is possible to damage the product, however, by delivering electrostatic discharges when touching, removing, or inserting any objects inside the equipment housing.

To make sure you are not delivering high static voltages yourself:

- Handle ESD sensitive components on a properly grounded and protected ESD workbench.
- When an ESD workbench is not available, ground yourself to the equipment chassis with a wrist strap and a resistive connection cord.
- If you are unable to take either of the above precautions, touch a conductive part of the equipment chassis with your other hand before touching ESD sensitive components.
- Always hold component boards by the edges and avoid touching the component contacts.

Recycling

	Recycle all applicable material.

	Dispose of batteries and the unit according to statutory regulations. Do not dispose of with regular household refuse.

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.

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CHAPTER 2
PRODUCT OVERVIEW

This chapter introduces the Carbon Dioxide Transmitter Series GMT220.

GMT220 Transmitter Parts

Vaisala's GMT220 transmitters 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.
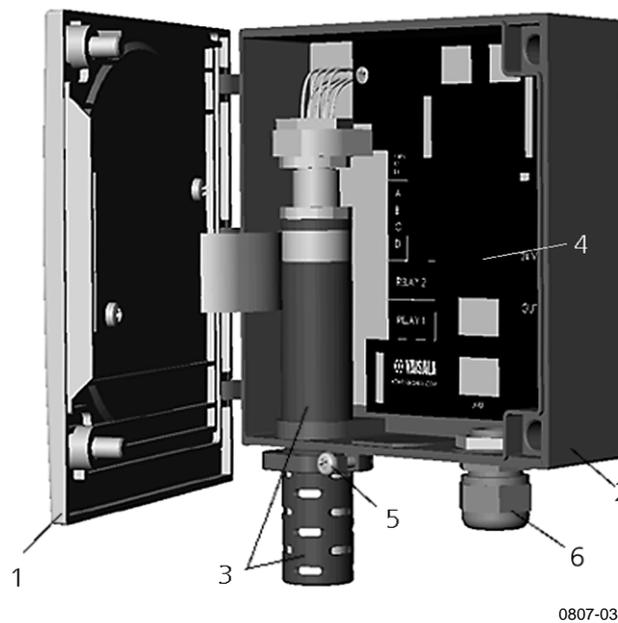
0807-032

Figure 1   GMT220 with Integrated Probe

The following numbers refer to Figure 1 above:

1 = Transmitter cover
2 = Transmitter housing
3 = Integrated probe (interchangeable)
4 = Printed protective film
5 = Tightening screw
6 = Cable gland (I.D. 6 mm)
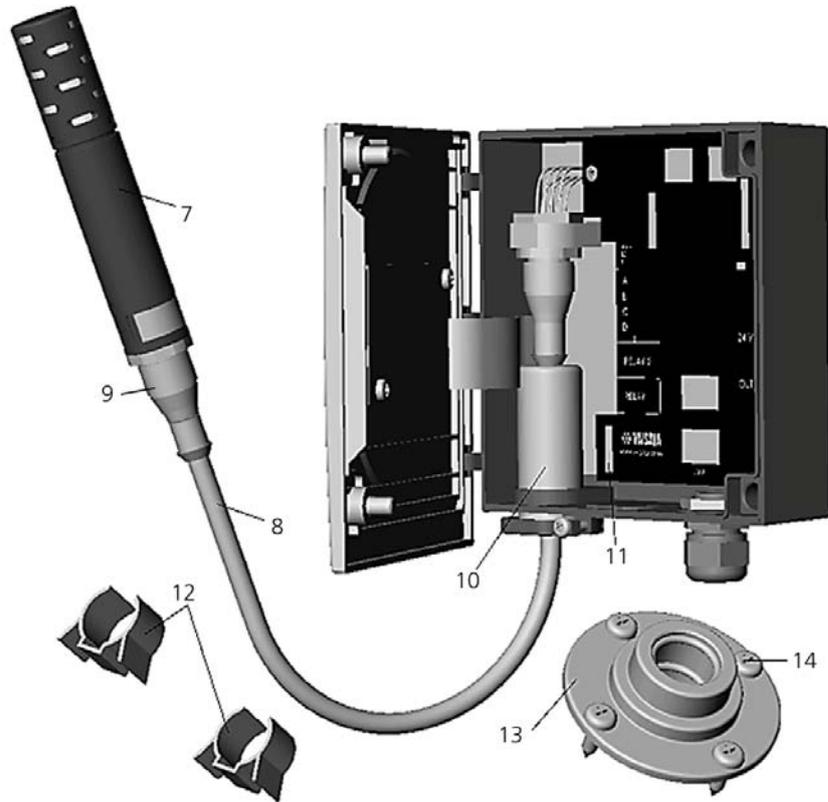
0807-033

Figure 2   GMT220 with Probe Installed Remotely

The following numbers refer to Figure 2 above:

7   =   Remote probe (interchangeable)
8   =   Probe cable (2m or 10m)
9   =   Clamping sleeve
10 =   Cable clamp
11 =   Pin connector for an optional serial COM adapter
12 =   Probe mounting clips (optional)
13 =   Mounting flange (optional)
14 =   Fixing screws (4 pcs)

LED Indicators and Optional Display

The GMT220 series transmitter has, as a standard, three LED light indicators on the cover plate: OPERATION, LEVEL 1 and LEVEL 2 (see Figure 3).

- The green OPERATION LED is lit when the power is connected.
- The red LEVEL LEDs are lit if the relay setting is reached, for example when CO_2 concentration is over the predefined limit. If the relays are not in use, the LEVEL LEDs indicating CO_2 concentration are dark.

The transmitter is also available with an optional back lit LCD display, which outputs the CO_2 volume concentration in unit of percentage or ppm depending on the measurement range of the probe.

Blinking led lights and Er-codes in the display indicate operation errors, see Error Messages on page 25.

0807-034

Figure 3   LED Indicators and Optional Display

For GMP221 probe, the display shows percentage values with two decimal accuracy, for example 0.31 %. For GMP222 probe, the display shows ppm values rounded up to the nearest 10 ppm.

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CHAPTER 3
INSTALLATION

This chapter provides you with information that is intended to help you install this product.

Wall Mounting

Mount the wall model transmitter or the remote probe into a place representing the environment to be measured.

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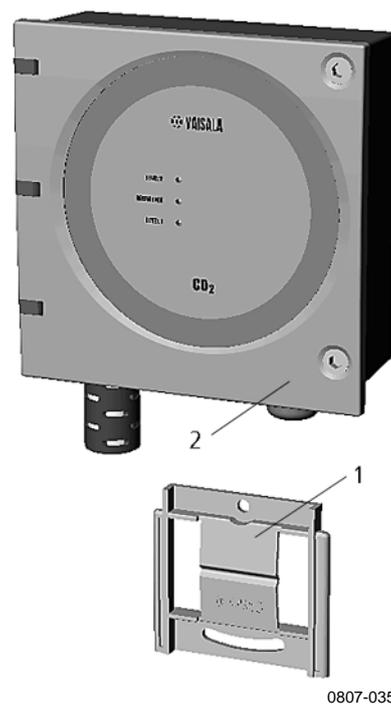
Figure 4   Mounting the Transmitter

The following numbers refer to Figure 4 above:

1   =   Attach the mounting plate to the wall with screws.
2   =   Press down the transmitter so that it slides along the rails of the mounting plate.

Duct or Channel Mounting

When the probe is installed in a duct or channel, it is recommended to use the optional mounting flange (GM45156SP).

1. Drill a hole with minimum diameter of 22 mm in the wall.

2. Attach the flange onto the duct with four screws so that the gasket ring seals the attachment.

3. Place the probe through the flange so deep that the perforated head is completely in the duct (see Figure 5 below).
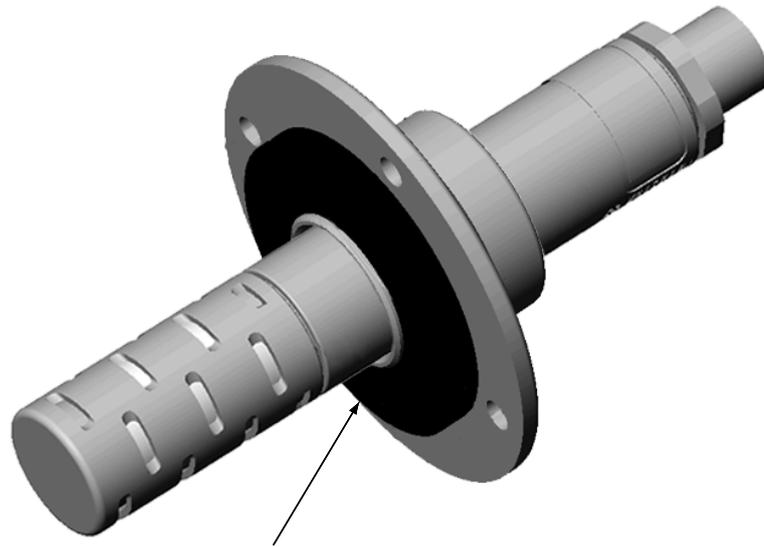
0807-036

Figure 5   Gasket Ring

NOTE	If the air pressure in the duct is clearly lower than the surrounding air pressure, an additional sealing may be necessary. This is to avoid possible measurement errors due to leakages through the joint.

Connections

To connect the GMT220:

1. Connect the nominal 24 V supply terminals (+) and (-) on the motherboard (right-hand side, see Figure 6 below).

2. Connect the analog output (see Figure 6 below) as follows:
    Terminal 0:   the common wire (-)
    Terminal V: voltage output signal (+)
    Terminal mA: current output signal (+)

If the current output is chosen, select the output range by using the current output jumper 4mA (see Figure 6 below). If the range of 4...20mA is chosen, connect the jumper (default). If the range of 0...20 mA is chosen, disconnect the jumper.

CAUTION	Connecting the power leads to the output terminals can seriously damage the product.
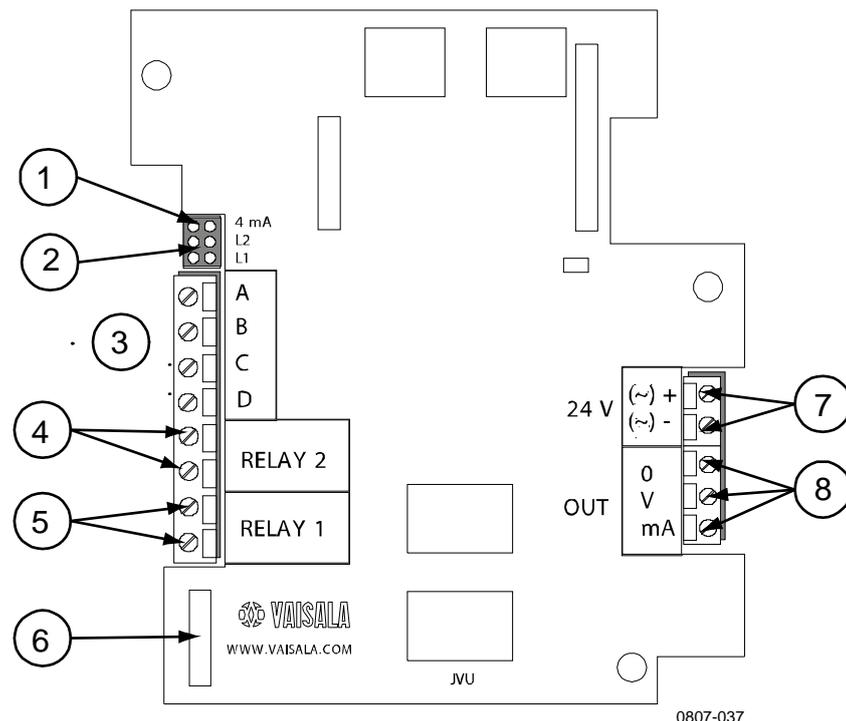
Figure 6   Electrical Connections and Jumpers

The following numbers refer to Figure 6 on page 15:

1 = Current output jumper (4 mA)
2 = Relay jumpers L1 and L2
3 = A, B, C and D: Not intended for customer use
4 = Relay 2 terminals
5 = Relay 1 terminals
6 = Serial port
7 = Power supply terminals
8 = Output terminals

Power Supply Requirements

The GMT220 series transmitters are designed to operate with a nominal 24 VAC/DC supply. The power supply should maintain the voltage for all load conditions and all mains voltages. The power input includes a halfwave rectifier. To avoid current peaks, it is recommended to use a DC supply.

Connection to a 24 VAC Supply

The GMT220 series transmitters can be connected to a 24 VAC supply without an external rectifier. However, when more than one transmitter is connected to one 24 VAC transformer, a common loop is formed and risk of a short-circuit increases. To avoid this, always use separate floating supply for each transmitter, see Figure 7 A on page 17.

CAUTION	If several transmitters have to share one transformer, the phase (~) must always be connected to (+) connector (24 V) in each transmitter, see Figure 7 B on page 17.

A) Connection of separate AC supplies to the transmitters (recommended connection).
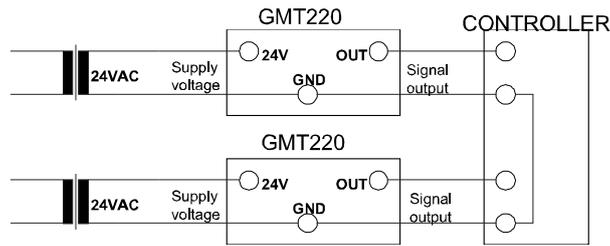
B) Connection of one AC supply to the transmitters.
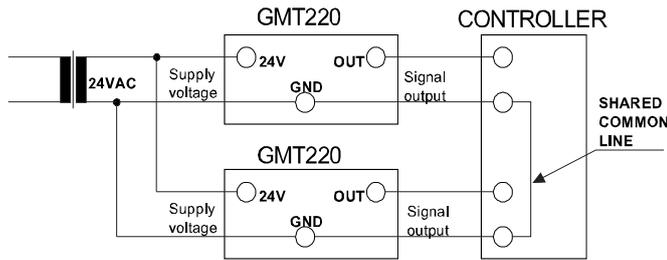
0807-038

Figure 7   AC Connections

Relays

The relay output wiring is done at the left-hand side terminals on the motherboard, see Figure 6 on page 15. When the relay trigger point is exceeded, the relay switches ON. This function can be inversed by disconnecting the corresponding relay jumper (L1 or L2).

The relay trigger points have been set at the factory as defined in the order form. The points can also be changed with a PC and the optional serial COM adapter 19040GM, see section Setting Relay Trigger Points on page 21. The COM adapter 19040GM, see Figure 8 below, can be ordered from Vaisala. For order information, see section Accessories on page 37.
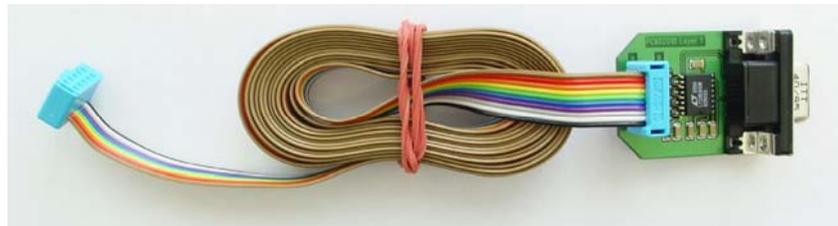
0808-001

Figure 8   19040GM Serial COM Adapter

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CHAPTER 4
SERIAL COMMUNICATION

This chapter contains information that is needed to change the Carbon Dioxide Transmitter Series GMT220 settings and to read the device status.

Serial Cable Settings

The GMT220 is linked to PC via a serial cable equipped with a COM adapter (optional part 19040GM, can be ordered from Vaisala).

Connect the serial cable to your PC's serial port and transmitter's serial port located in the motherboard, see Figure 9 below.
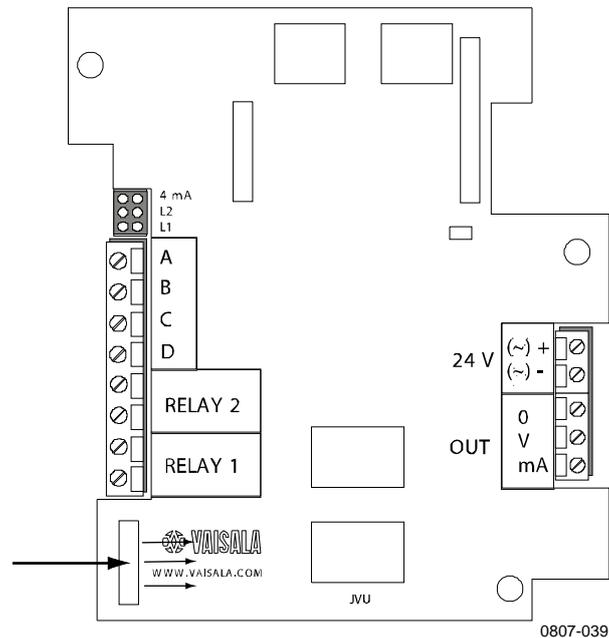
Figure 9   Serial Port and Cable Direction

Set the serial settings according to Table 3 below.

Table 3   Serial Settings

Baud rate	9600
Parity	None
Data bits	8
Stop bits	1
Flow control	X_{on}/X_{off} (none)

NOTE	Remember to save the settings after each command.

Serial Commands

Table 4   Serial Commands

Command	Description
MF_Rx_HIGH	Sets high relay trigger limit
MF_Rx_LOW	Sets low relay trigger limit
MAIN_SAVE F	Saves changes
MF_PRESSURE	Sets ambient pressure value
MF_TEMP	Sets ambient temperature value
MF_DMODE	Sets display operation mode
MF_OUT_I_MODE	Sets current output range

NOTE	To view all set values for the transmitter, use **MF** command alone, without any parameters.

Setting Relay Trigger Points

The relays of the transmitter turn ON/OFF when the CO_2 content reaches the predefined trigger point. For the ON/OFF selection, see section Relays on page 17. There are two trigger points for both relays. The higher limit activates the relay and the lower deactivates it. The two limits are used to prevent the relay switching back and forth when the measured value is very close to set point.

Both commands can also be entered without entering a trigger point value. The command without parameters gives the current set value.

MF_Rx_HIGH yyy<cr>

where:
x = 1 or 2 (number of the relay)
yyy = trigger point (CO_2 content in ppm)

Example of setting the higher trigger limit of the relay 1:

```
>MF_R1_HIGH 1200
MF_R1_HIGH=1200.0000
>
```

Save the settings:

MAIN_SAVE F<cr>

Give the lower trigger limit:

MF_Rx_LOW yyy<cr>

where:
x= 1 or 2 (number of the relay)
yyy = trigger point (CO_2 content in ppm)

Example of setting the lower trigger limit of the relay 1:

```
>MF_R1_Low 900
MF_R1_LOW=900.000000
>
```

Save the settings:

MAIN_SAVE F<cr>

Pressure Compensation

For achieving the most accurate measurements in high altitudes where the barometric pressure is lower than in the sea level, the actual pressure value can be set to the GMT220's software. The factory setting is 1013 hPa. Pressure values in different altitudes are shown in Table 5 below. The ambient pressure value can be set by using the following command:

MF_PRESSURE xxxx<cr>

where: xxxx = pressure in hPa

Example of setting desired pressure:

```
>MF_PRESSURE 900
MF_PRESSURE=900
>
```

Save the settings:

MAIN_SAVE F<cr>

Table 5   Altitude and Atmospheric Pressure

Altitude m (ft)	Atmospheric Pressure (hPa)	Atmospheric Pressure (psi)
0 (sea level)	1013	14.69
500 (1640)	954	13.84
1000 (3281)	899	13.04
1500 (4921)	845	12.26
2000 (6562)	795	11.53
2500 (8202)	757	10.83
3000 (9843)	701	10.17

Temperature Setting

The ambient temperature value can be set by using the following command:

MF_TEMP xxx<cr>

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

Example of setting desired temperature (25 °C):

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

Save the settings:

MAIN_SAVE F<cr>

Display Setting

The display operation mode, display accuracy and probe temperature can be set by using the following command:

MF_DMODE x<cr>

where: x = 0 (zero)/1/2/3/7/8/9

0= no display
1= ppm-reading with one decimal
2= %-reading with two decimals
3=reading with no decimals
7=ppm-reading with no decimal
8= ppm-reading with 10 ppm accuracy

```
>mf_dmode 7
MF_DMODE=07 00 00 00 00
```

Save the settings:

MAIN_SAVE F<cr>

Error States

The GMT220 series transmitter goes through a continuous self-diagnostic procedure. If any problems occur, it displays a corresponding error message. A transmitter without a display indicates errors by blinking the three LED lights on the cover. Transmitter with a display indicates error by showing an error code in the display.

In all error cases, check first that the probe is connected properly, then reset the transmitter by disconnecting it. In case of a constant error, please contact Vaisala Service Center or a local Vaisala representative (see sections Technical Support on page 33 and Product Returns on page 33).

Non-critical and Fatal Errors

There are two types of errors. In case of a non-critical instantaneous error, the measurement continues and the error code is displayed. If there is a fatal error, the measurement is interrupted and the corresponding error code is displayed.

NOTE	In a fatal error state, the analog output goes to 100 % (20 mA or 10 V).

Non-critical errors are indicated by the blinking of the green operation LED light and fatal errors by the red relay LED lights.

If the actual CO_2 concentration is out of the measurement range, the display and all outputs stop at the highest measured value until the carbon dioxide concentration in the environment falls back to a measurable level.

Error Indication in Transmitters without Display

Error codes are cabled by blinking a message with short flashes of the LED lights.

LEDs are situated on the cover of the transmitter. The green OPERATION LED is blinking when a non-critical error occurs (no effect on relays). The red LEVEL 1 and LEVEL 2 LEDs are blinking when a fatal error occurs (switches the relays OFF).

NOTE	The red level LED is continuously lit when the predefined CO_2 concentration is exceeded.

Error Messages

Table 6   Error Messages

Error Message	Probable Cause	Action	Severity
Er 01	Main board memory problem	Contact Vaisala Service Center	Fatal
Er 02	Main board memory problem	Contact Vaisala Service Center	Fatal
Er 03	Main board memory problem	Contact Vaisala Service Center	Fatal
Er 04	Probe contact failure	Contact Vaisala Service Center	Fatal
Er 05	Probe contact failure	Contact Vaisala Service Center	Fatal
Er 06	Probe contact failure	Contact Vaisala Service Center	Fatal
Er 08	Incompatible probe	Contact Vaisala Service Center	Fatal
Er 10	IR-source failure	Contact Vaisala Service Center	Fatal
Er 11	IR-source failure	Contact Vaisala Service Center	Fatal
Er 12	Sensor failure	Contact Vaisala Service Center	Fatal
Er 13	Signal error	None	Non-critical
Er 14	Measurement out of range	Check environment and recalibrate if necessary	Non-critical

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CHAPTER 5
MAINTENANCE

This chapter provides information that is needed in basic maintenance of the Carbon Dioxide Transmitter Series GMT220.

Replacing the Probe

The probe on the transmitter can be changed and replaced if necessary.

Transmitter with Integrated Probe (Wall Model)

To replace the integrated probe, do the following:

1.   Open the cover
2.   Loosen the tightening screw on the transmitter body (see Figure 1 on page 9).
3.   Pull out the probe and install a new probe. Tighten the screw and close the cover.

Transmitter with Remote Probe

To replace the remote probe, do the following:

1.   Loosen the clamping sleeve and pull the probe out, see Figure 2 on page 10.
2.   Install a spare probe and tighten the clamping sleeve.

All the calibration electronics are in the probe. The new probe is automatically identified by the control electronics of the transmitter.

NOTE	Disconnection of the probe causes an error and switches the relays OFF.

Check and Calibration

There are three ways to check the transmitter and calibrate it. These are presented in this section.

Comparison with Calibrated Probe

It is recommended to check the calibration of the GMT220 every second year. A simple field calibration checking can be performed by using a calibrated reference probe. During the checking procedure, please avoid exhaling towards the probe as this alters the CO_2 concentration.

1.   Check the current transmitter reading.
2.   Replace the probe with a reference probe.
3.   Let the transmitter stabilize for a few minutes. The measured CO_2 concentration near by the transmitter may have increased due to breathing.
4.   Compare the readings measured with the original and the reference probe.

The difference between the readings should be less than 5 % of the full scale reading of the GMT220. If there is need for an adjustment of the probe, please contact Vaisala Service Center or Vaisala's representative (see sections Technical Support on page 33 and Product Returns on page 33).

Calibrator GMK220

The Vaisala GMK220 calibrator is intended for spot checking and two-point calibration of the GMT220 series probes. The calibration parameters are stored to the nonvolatile memory of the probes. Contact Vaisala's representative to get more information about the GMK220.

On-site Checking and Adjusting with Reference Gas and GM70 Hand-Held Meter

A probe to be checked can be flushed in a reference gas by using a field check adapter (optional part, 26150GM). The procedure requires pressurized gas bottle giving a flow rate of 0.4...1.0 l/min through the adapter chamber. If an adjustment is needed, it can be carried out by a user with a Vaisala's hand-held carbon dioxide meter GM70. Probes can also be sent to Vaisala Service Centers (see sections Technical Support on page 33 and Product Returns on page 33) to be calibrated.

Follow the instructions below to check the operation of a GMP220 series probe.

1.   Check the display reading of the GM70.
2.   Turn off the GM70.
3.   Detach the GM70's probe as follows:
    - Loosen the plastic probe fastener by unscrewing it about 5 turns.
    - Take a firm hold from the base of the probe and pull strongly until the probe comes loose.
4.   Detach the GMP220 probe from the transmitter base (open the cover, loosen the tightening screw and pull the probe out).
5.   Insert the GMP220 probe to the GM70 handle as deep as possible. Turn the probe inside the handle until you feel that a step in the probe connector snaps into the groove of the probe handle connector and locks the probe.
6.   Tighten the probe fastener.
7.   Turn on the GM70.
8.   Compare the readings of the GM70 and the transmitter probe to be checked.
9.   If there is need for an adjustment, please contact Vaisala Service Center or adjust the probe according to the instructions in sections Two-Point Adjustment Procedure on page 30 and One-Point Adjustment Procedure on page 32.

To perform the adjustment, you need the following:

- GM70 diffusion handle
- One or two accurate reference gases according to which adjustment you do
- Pressure regulator

- Flow meter

- Field check adapter (Vaisala order code: 26150GM)

- Flexible tubing with 3 mm (1/8 inch) inner diameter

Two-Point Adjustment Procedure

CAUTION	Please take special care regarding the following when carrying out the adjustment:
	- Check that you give the correct reference concentrations in the correct units.
	- Check that the reading has really stabilized before accepting the reading.
	You cannot revert back to the factory settings after the adjustment!

1. Insert the probe into the field check adapter until the perforated filter is covered.

0505-237

Figure 10   Field Check Adapter

2. Connect the tubing to the bottom port of the adapter.

3. Connect the adapter with the tubing to the flow meter, the pressure regulator and further to the low-end reference gas bottle. The side port of the adapter is left open for gas outflow.

4. Let the low end reference gas flow and stabilize with a flow rate of about 0.6 l/min. Follow the reading of GM70, and after it has stabilized, wait for 6 more minutes.

5. Take out the screw from the GM70 probe handle to expose the adjustment button (see Figure 11 below). Press the button with a small screwdriver. When pressing the button, the indicator turns to adjusting mode.

0505-236

Figure 11   Location of the GM70 Adjustment Button

6.   Press ⊖ OK to confirm the adjusting.

7.   Select CO2, press ⊖ SELECT.

8.   Press ⊖ YES to give the ambient pressure and temperature values.
     To continue adjusting press ⊖ EXIT.

9.   Now the adjustment mode is on. Press ⊖ GRAPH to confirm that the
     readings have stabilized. Go back and press ⊖ ADJUST to select the
     adjustment method.

10. Select 2-point adjustment, press ⊖ SELECT. Press ⊖ READY with the
     stabilized reading in the lower reference concentration.

11. Give the lower reference concentration value by using the arrow
     buttons (for example, if you are using pure nitrogen, enter value 0
     ppm). Take care that you give the correct value in correct units, as
     you cannot revert the earlier values after accepting the new values.
     Press ⊖ OK.

     Next move on to the adjustment at the second (high-end)
     reference point.

12. Take out the tubing from the low-end gas bottle and connect it to
     the high-end gas bottle.

13. Let the high end reference gas flow and stabilize with a flow rate of
     0.6 l/min. Follow the reading of GM70, and after it has stabilized,
     wait for 6 more minutes.

14. Press ⊖ READY with the stabilized reading in the higher reference
     concentration.

15. Give the high-end reference concentration value by using the arrow
     buttons. The analyzed CO_2 concentration of the reference gas is
     typically printed on the bottle.
     Take care that you give the correct value in correct units, as you
     cannot revert to the earlier values after accepting the new values.
     Press ⊖ OK.

16. Confirm the adjustment, press ⊖ YES. By pressing ⊖ NO you return to adjustment mode display. (If the difference between the two references is less than 20% of the measuring range of the probe, adjustment cannot be done).

17. Adjustment is complete. Press ⊖ BACK-EXIT to return to the basic display.

18. Shut off the gas flow.

19. Replace the screw onto the adjusting button.

One-Point Adjustment Procedure

CAUTION	Please take special care regarding the following when carrying out the adjustment: - Check that you give the correct reference concentrations in the correct units. - Check that the reading has really stabilized before accepting the reading. You cannot revert to the factory settings after the adjustment!

1. Insert the probe into the field check adapter (as deep as possible, the perforated filter cover should be completely inside the adapter).

2. Connect the tubing to the bottom port of the adapter.

3. Connect the adapter with the tubing to the flow meter, the pressure regulator and further to the reference gas bottle. The side port of the adapter is left open for gas outflow.

4. Let the reference gas flow and stabilize with a flow rate of 0.6 l/min. Follow the reading of GM70, and after it has stabilized, wait for 6 more minutes.

5. Take out the screw from the GM70 probe handle to expose the adjustment button (see Figure 11 on page 31). Press the button with a small screwdriver. When pressing the button, the indicator turns to adjusting mode.

6. Press ⊖ OK to confirm the adjusting.

7. Select CO2, press ⊖ SELECT.

8. Press ⊖ YES to give the ambient pressure and temperature values. To continue adjusting press ⊖ EXIT.

9. Now the adjustment mode is on. Press ⊖ GRAPH to see when the readings have stabilized. Go back and press ⊖ ADJUST to select the adjustment method.

10. Select 1-point adjustment, press ⊖ SELECT. Press ⊖ READY if the value has stabilized.

11. Give the reference concentration value by using the arrow buttons.

    Examples: For a zero-point adjustment using pure nitrogen (N_2) enter value 0 ppm.

    For other reference gases, the analyzed CO_2 concentration is typically printed on the bottle. Use that value.

    Take care that you give the correct value in correct unit, you cannot revert the earlier values after accepting the new values. Press ⊖ OK.

12. Confirm the adjustment, press ⊖ YES. By pressing ⊖ NO you return to adjustment mode display.

13. Adjustment is complete. Press ⊖ BACK-EXIT to return to the basic display.

14. Shut off the gas flow.

15. Replace the screw onto the adjusting button.

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 location of the installation site
- Name and contact information of a technically competent person who can provide further 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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CHAPTER 6
TECHNICAL DATA

This chapter provides the technical data of the Product.

Technical specifications

Measuring range
GMT221	0 ... 2% CO_2
	0 ... 3% CO_2
	0 ... 5% CO_2
	0 ... 10% CO_2
	0 ... 20% CO_2
GMT222	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

GMT221	$\pm$ (1.5% of range + 2% of reading)

(applies for concentrations above 2% of full scale)

GMT222	$\pm$ (1.5% of range + 2% of reading)

Temperature dependence, typical	- 0.3 % of reading / °C (output decreases when temperature rises, default 25 °C (77 °F))
Pressure dependence, typical	+ 0.15 % of reading / hPa (output increases when pressure rises, default 1013 hPa (1 atm))
Long-term stability	< $\pm$ 5 %FS / 2 years

Response time (63%)
GMT221	20 seconds
GMT222	30 seconds
Warm-up time	30 seconds
	15 minutes full specification

Inputs and outputs

Outputs	0 ... 20 mA or 4 ... 20 mA and 0 ... 10 V
Resolution of analog outputs	12 bits
Recommended external load	
current output	max. 400 Ω
voltage output	min. 1 kΩ
Two pre-or user-defined relay outputs	
Relay contacts	max. 30 VAC / 60 VDC, 0.5 A
Operating voltage	nominal 24 VAC/DC
Power consumption	< 4 W
Connections	screw terminals, wire size 0.5 ... 1.5 mm^2

Operating conditions

Operating temperature range	
without display	-20 … +60 °C (-4 ... +140 °F)
with display	0 … +50 °C (+32 ... +122 °F)
Storage temperature range	-30 ... +70°C (-22 ... +158 °F)
Operating pressure (compensated range)	700 ... 1300 hPa
Humidity range	0 ... 100 %RH, non-condensing

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)

Electromagnetic compatibility

The GMT221 and GMT222 transmitters comply with the following standards:

EN 61326-1, Electrical equipment for measurement, control and laboratory use - EMC requirements - Generic environment.

[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]

CE

Accessories

Description	Order Code
Spare probe (use the order form to define measurement range etc.)	GMP221, GMP222
Spare filter for GMP221	25378GMSP
Spare filter for GMP222	25879GMSP
Clips (2 pcs) for attaching the probe	25245GMSP
Field check adapter	26150GM
Protective sleeve for the GMP221	GM45168SP
Protective sleeve for the GMP222	GM45237SP
Mounting flange for the probe	GM45156SP
2 meters probe cable (includes a cable clamp)	25665GMSP
10 meters probe cable (includes a cable clamp)	210848GMSP
Serial COM adapter	19040GM
Hand-held carbon dioxide meter	GM70
Calibrator for the probes	GMK220
In-soil adapter	211921GM
Wall mounting plate	GM45160
Probe cap for GMP221	GM45129
Probe cap for GMP222	GM45172
Connection cable for MI70	GMA70

Dimensions in mm (inches)
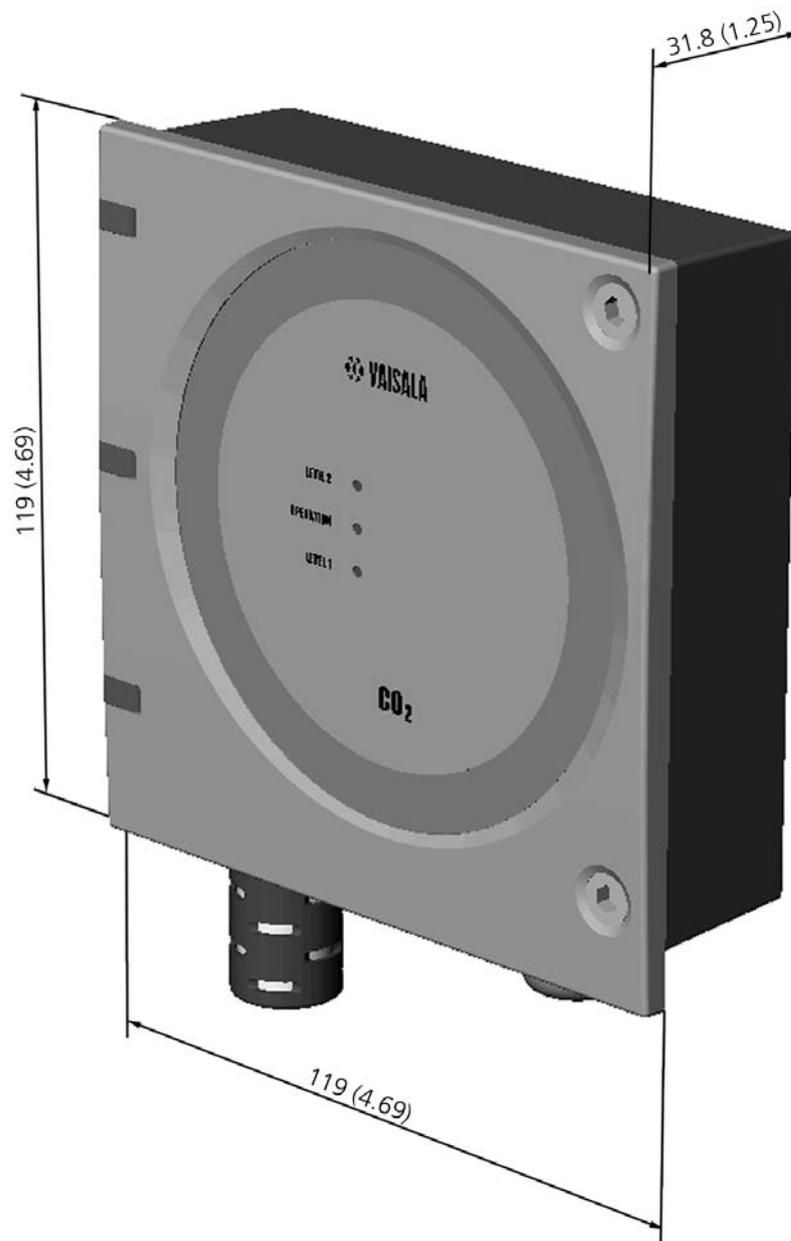
0807-040

Figure 12   Transmitter

Ø 4.50 (0.18)

50 (1.97)

R 2.25 (0.09)
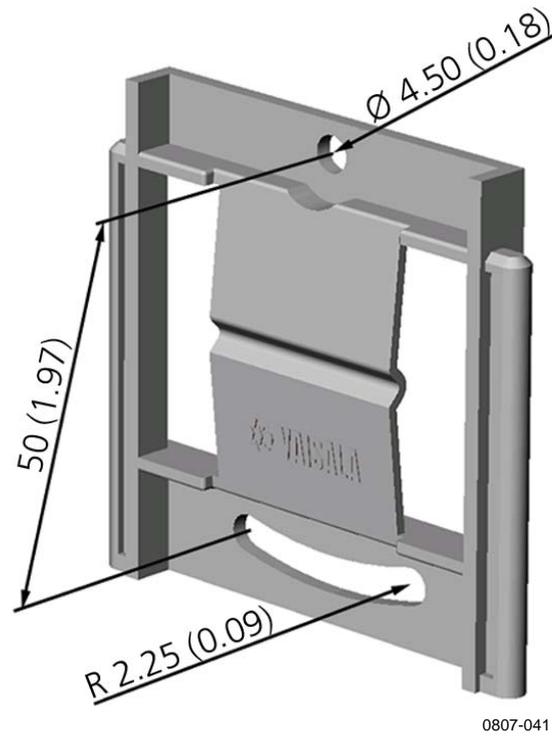
0807-041

Figure 13   Mounting Plate

109 (4.29)

Ø 18.5 (0.73)
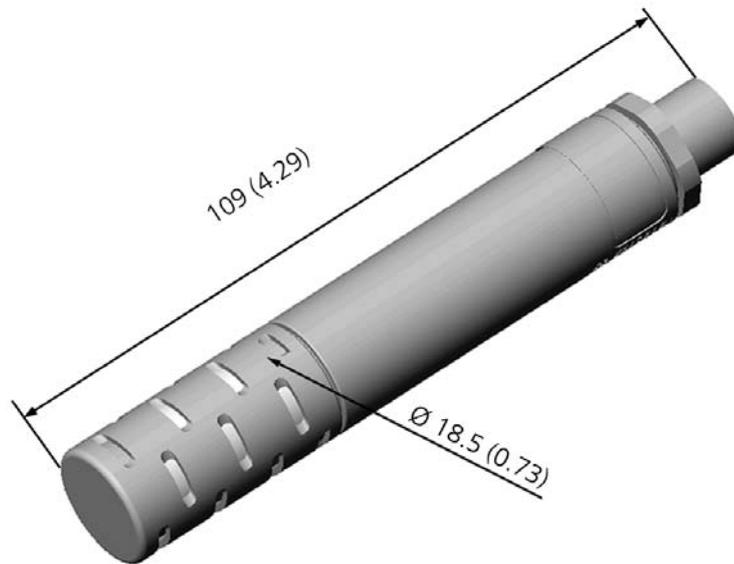
0807-042

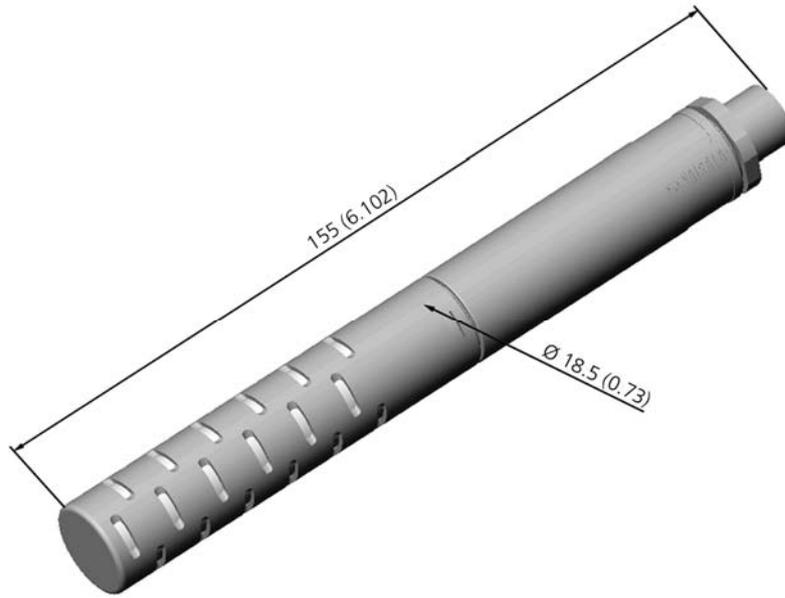**Figure 14   Probe GMP221**

0807-043

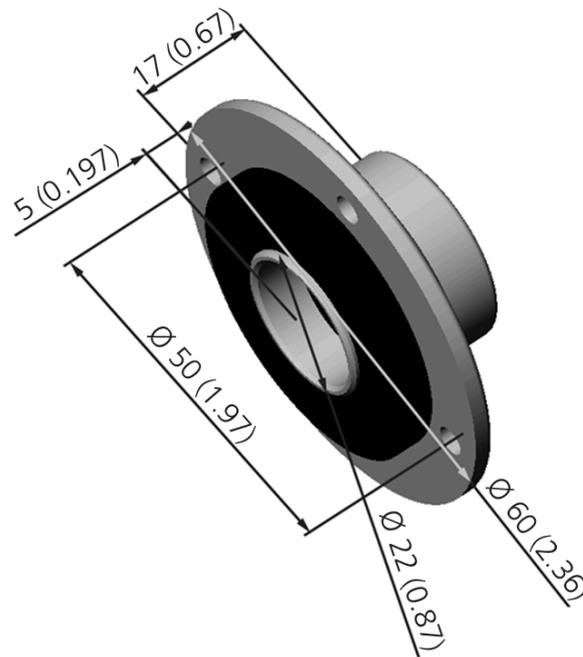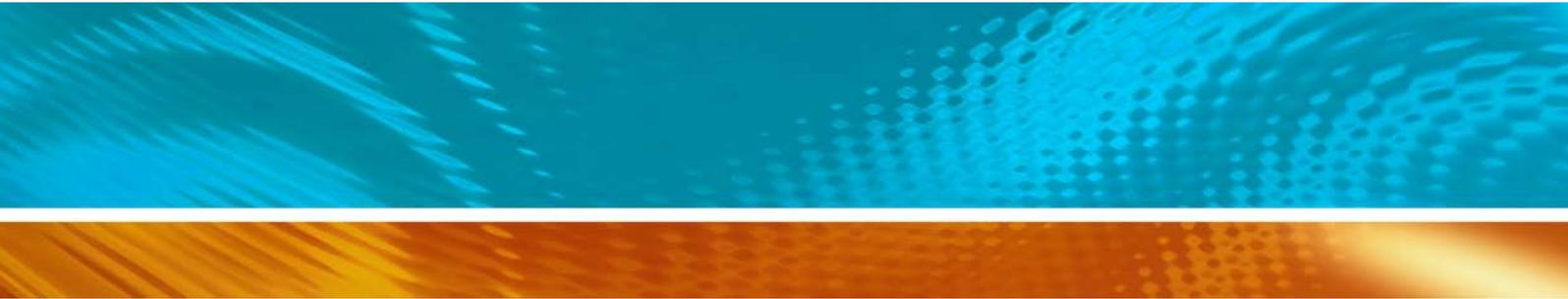**Figure 15   Probe GMP222**

0807-044

Figure 16   Mounting Flange GM45156SP

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