

GMT220 Series CO₂ transmitter *USER'S GUIDE*

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CHAPTER 1

GENERAL INFORMATION

Safety

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

WARNING

Warning denotes a serious hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury to or death of personnel.

CAUTION

Caution denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

NOTE

Note highlights important information. It calls attention to an essential procedure, practice, condition or the like.

Warranty

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.

CHAPTER 2

PRODUCT DESCRIPTION

Vaisala's GMT220 transmitters are versatile instruments for measuring CO₂ in industrial applications. The CARBOCAP® sensor is silicon based and its operation is based on the NDIR Single-Beam Dual-Wavelength principle.

Parts

Different parts of the GMT220 transmitter are shown in Figure 1 and Figure 2.

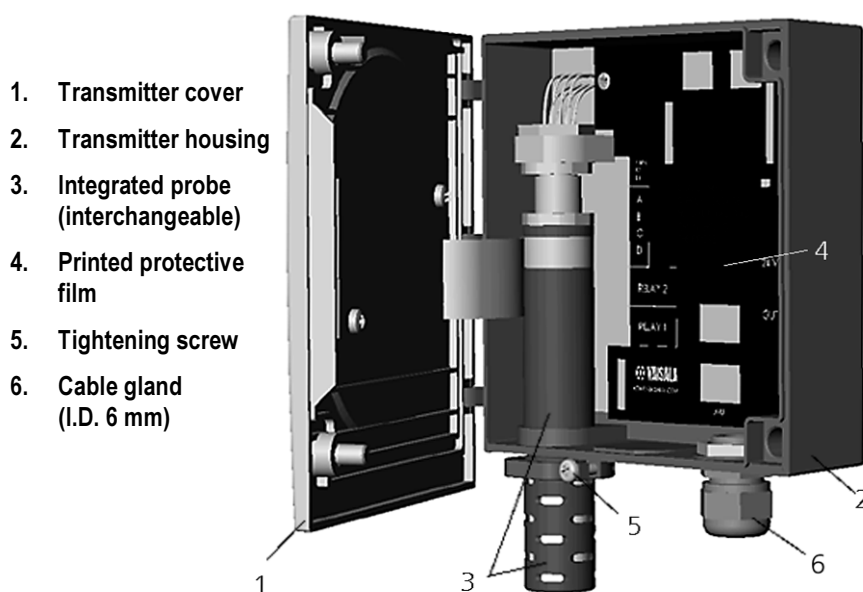


Figure 1 Different parts of GMT220. Probe integrated into the transmitter housing e.g. wall model transmitter.

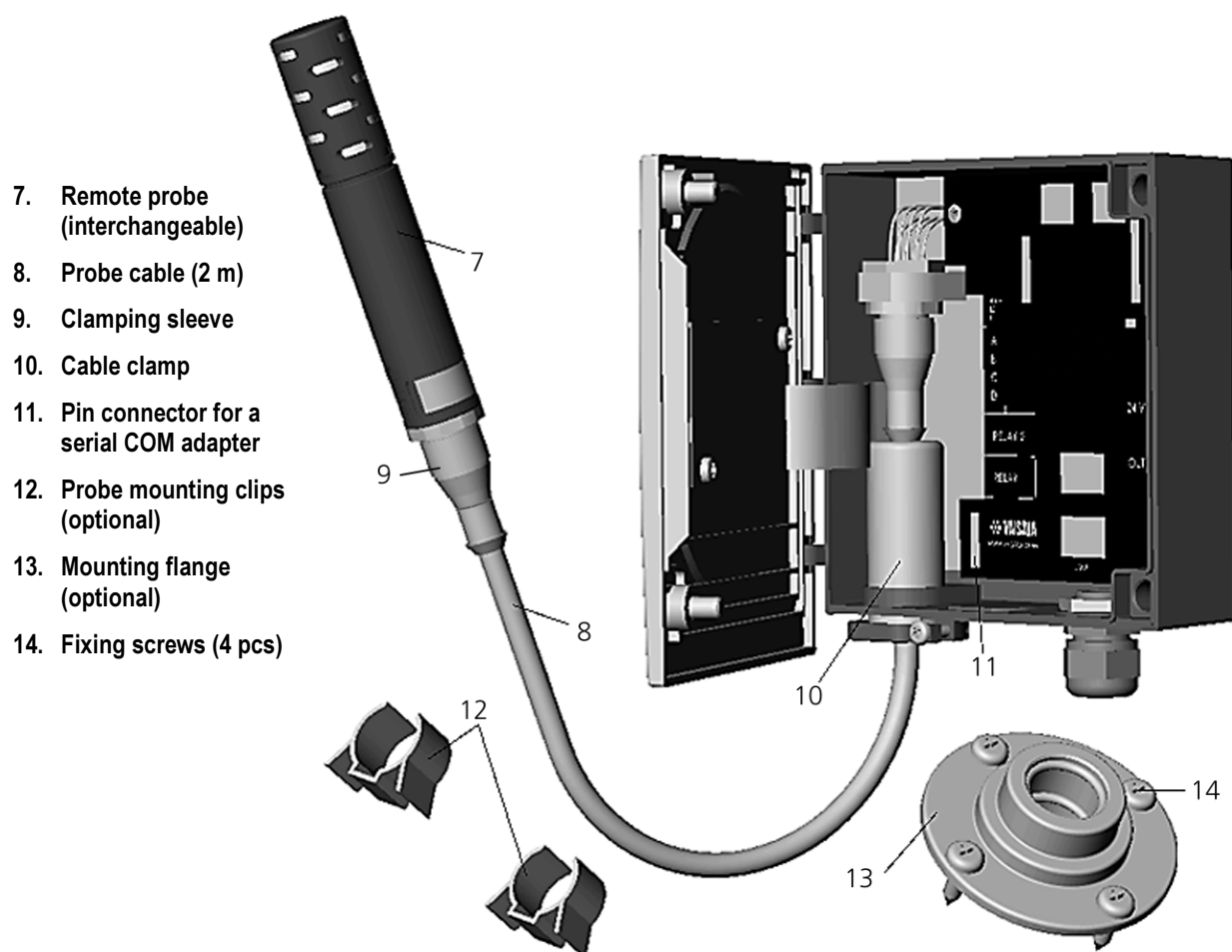


Figure 2 Different parts of GMT220. Probe installed remotely.

Led light indicators and optional display

The GMT220 series transmitter has as standard three LED light indicators on the cover plate: operation, level 1 and level 2 (see Figure 3). The green operation LED is lit as the power is connected. If the relays are used, the lit red LED indicates excess of corresponding relay trigger point e.g. CO₂ concentration is over predefined limit. In normal conditions, the LEDs indicating CO₂ concentration are dark.

The transmitter is also available with an optional back lit LCD display, which outputs the CO₂ concentration as either percentage or ppm depending on the measurement range of the probe.

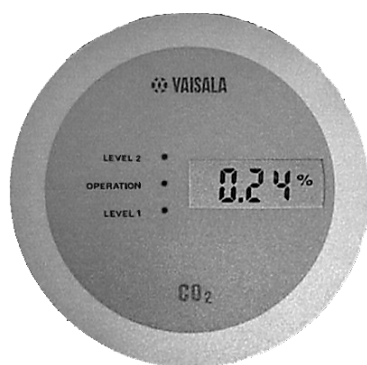


Figure 3 LED light indicators and optional display

CHAPTER 3

INSTALLATION AND MAINTENANCE

Mounting

Mount the wall model transmitter or the remote probe into a place, which gives a true picture of the environment to be measured and is as clean as possible. Air should circulate freely around the probe. Please take into a consideration that because CO₂ is slightly heavier than air it tends to accumulate in low areas without proper ventilation e.g. the CO₂ concentration is higher there.

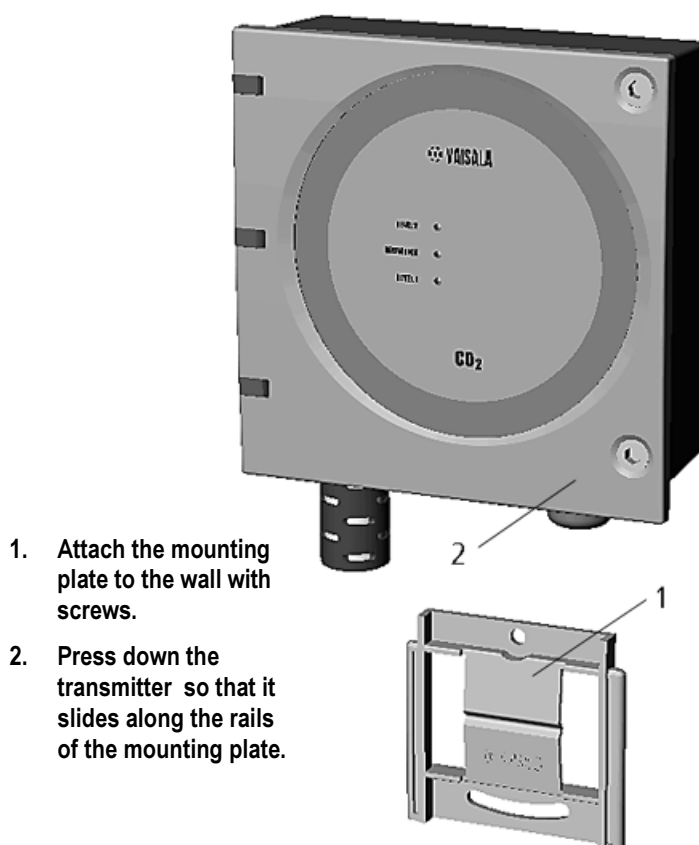


Figure 4 **Mounting the transmitter**

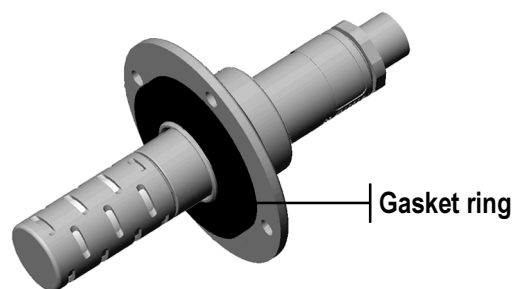


Figure 5 Mounting the probe in a duct or channel.

When the probe is installed in a duct or channel, it is recommended to use the optional mounting flange GM45156. All you need to do is to drill a hole with minimum diameter of 22 mm in the wall. The flange is then attached onto the duct with four screws so that the gasket ring seals the attachment. The probe is placed through the flange so deep that the perforated head is completely in the duct (see Figure 5).

NOTE

If there is clearly lower air pressure in the duct, an additional sealing may be necessary. This is to avoid possible CO₂ concentration variation due to leaking through the attachment.

Electrical connections

The nominal 24 V supply is connected between terminals + and - on the motherboard (right-hand side). The analogue outputs are available at remaining terminals (see Figure 6). The common wire is connected to terminal 0 and the other wire either to terminal V (voltage output) or to terminal mA (current output). The current output is chosen with the jumper 4mA (see Figure 6): 4...20mA is chosen by connecting the jumper (default) and the 0...20 mA is chosen by disconnecting the jumper.

CAUTION

Connecting power leads to the output terminals can seriously damage the product.

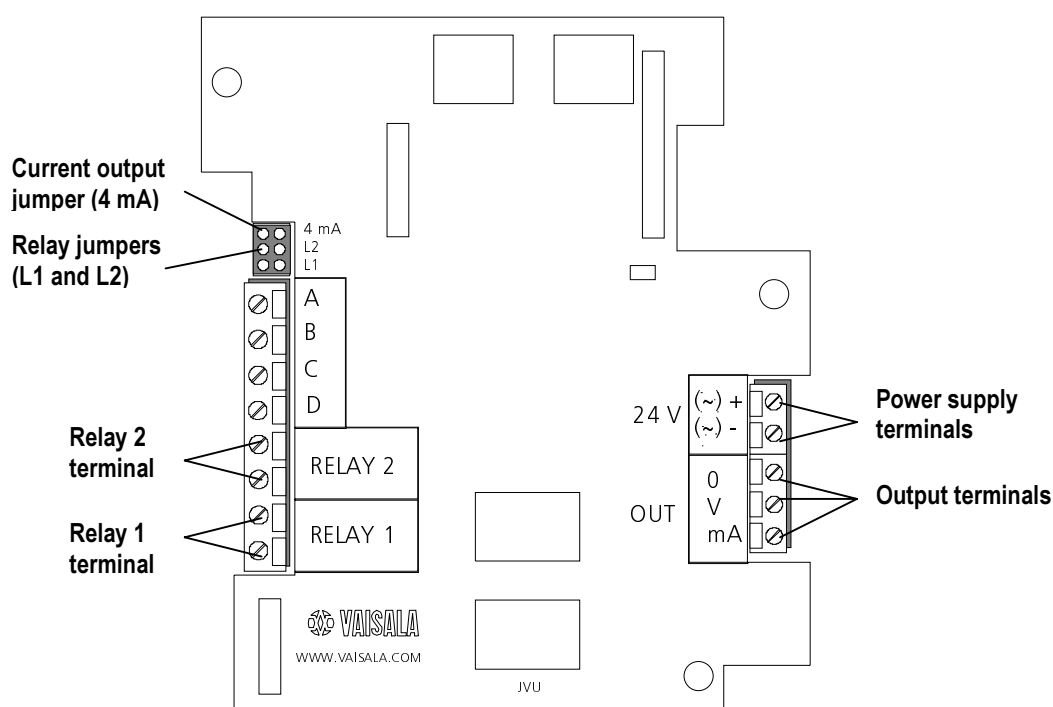


Figure 6 Electrical connections and jumpers

Power supply requirements

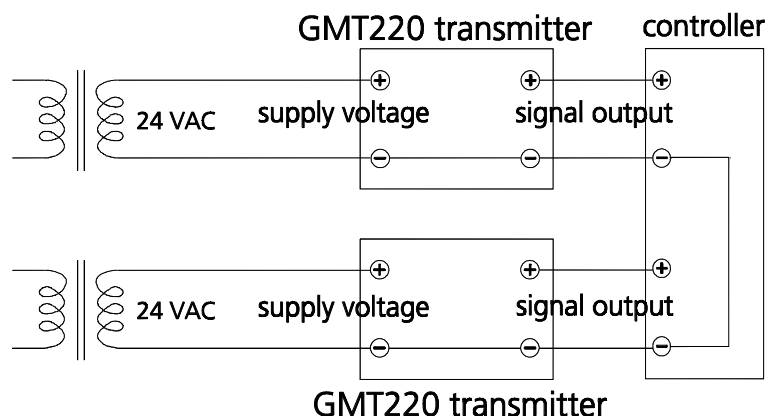
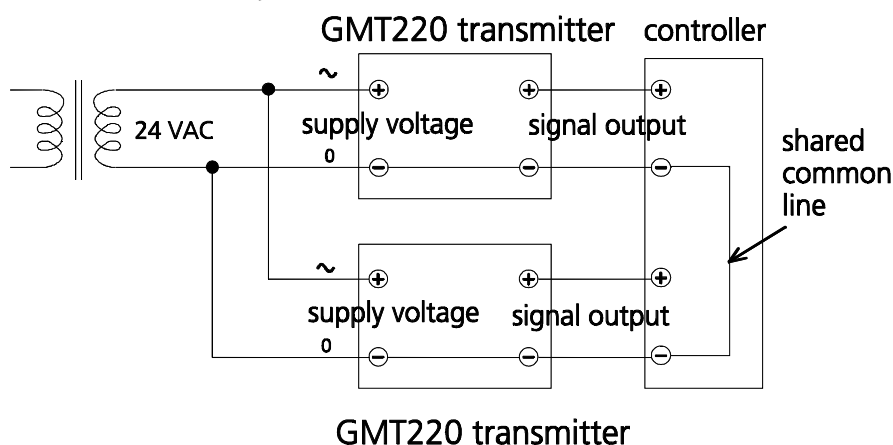
The GMT220 series transmitters are designed to operate with a nominal 24 VAC/DC supply. The power supply should maintain the voltage for all load conditions and all mains voltages. The power input includes a halfwave rectifier. To avoid current peaks, it is recommended to use a DC supply.

Connection to a 24 VAC supply

The GMT220 series transmitters can also 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 there is an increased risk of a short-circuit. To avoid this, always use separate floating supply for each transmitter (see Figure 7 A).

CAUTION

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

A) No common loop - RECOMMENDED!**B) Common loop formed - NOT recommended!****Figure 7 AC connections**

Relays

If the relay outputs are used, the wiring is done at the left-hand side terminals on the motherboard (see Figure 6). When the relay trigger point is exceeded, the relay switches on (default). This function can be inverted by disconnecting the corresponding relay jumper (L1 or L2).

The relay trigger points have been set at factory as defined in the order form. The points can also be changed with an optional serial COM adapter 19040GM. For more detailed information see page 12.

Maintenance

Replacing the probe

The probe can be changed easily. All the calibration electronics are in the probe, which can be disconnected without disconnecting wires. If the probe is integrated into the transmitter housing, open the cover, loosen the tightening screw on the transmitter body (see page 3) and pull out the probe. The remotely installed probe is disconnected from the cable by loosening the clamping sleeve of the connector. The new spare probe is automatically identified by the control electronics of the transmitter.

NOTE

Disconnection of the probe causes an error and relay activation (ON).

Calibration checking

It is recommended to perform a calibration checking 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 CO₂ concentration.

1. Check the current transmitter reading.
2. Replace the probe with the reference.
3. Let the transmitter stabilize for a few minutes. The measured CO₂ concentration near by the transmitter may have increased due to breathing. This is assumable especially in case of the integrated probe.
4. Compare the readings measured with the original and the reference probe.

If there is need for re-calibration / adjustment of the probe, please contact Vaisala or Vaisala's representative.

Self diagnostics

The GMT220 series transmitter goes through a continuous self-diagnostic procedure. If any problems occur, it displays the corresponding error message.

The transmitter without a display indicates problems by blinking the LED lights. Non-critical instantaneous errors are shown with the green operation LED and fatal errors with red LEDs, in addition the relays switch ON.

If any error occurs, please check first that the probe is connected properly. In case of a constant error, please contact either Vaisala or your local Vaisala representative.

NOTE

Disconnection of the probe causes an error and relay activation.

CHAPTER 4

SERIAL COMMUNICATION SETTINGS

Table 1 **Serial interface settings**

Baud rate	9600
Parity	none
Data bits	8
Stop bits	1

Setting relay trigger points

The relays of the transmitter turn ON/OFF when the CO₂ content reaches the predefined trigger point. These points can be changed by using the COM adapter (19040GM), a computer and a suitable terminal software. There are two trigger points for both of the relays. The higher limit activates the performance of 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.

MF_Rx_HIGH yyy<cr>

where:

x = 1 or 2 (number of the relay)

yyy = trigger point (CO₂ content in ppm)

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

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

NOTE

Remember to save the settings.

MF_Rx_LOW yyy<cr>

where:

x = 1 or 2 (number of the relay)

yyy = trigger point (CO₂ content in ppm)

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

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

NOTE

Remember to save the settings.

Pressure compensation

GMT220 series transmitters have pressure compensation in the software calculations. The factory set value for current pressure is 1013 hPa. For example in case of high altitude, the pressure value can be changed by using the COM adapter (19040GM), a computer and a suitable terminal software. The pressure is given in hPa.

MF_PRESSURE xxxx<cr>

where:

xxxx = pressure in hPa

Example of setting desired pressure:

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

NOTE

Remember to save the settings.

Saving the settings

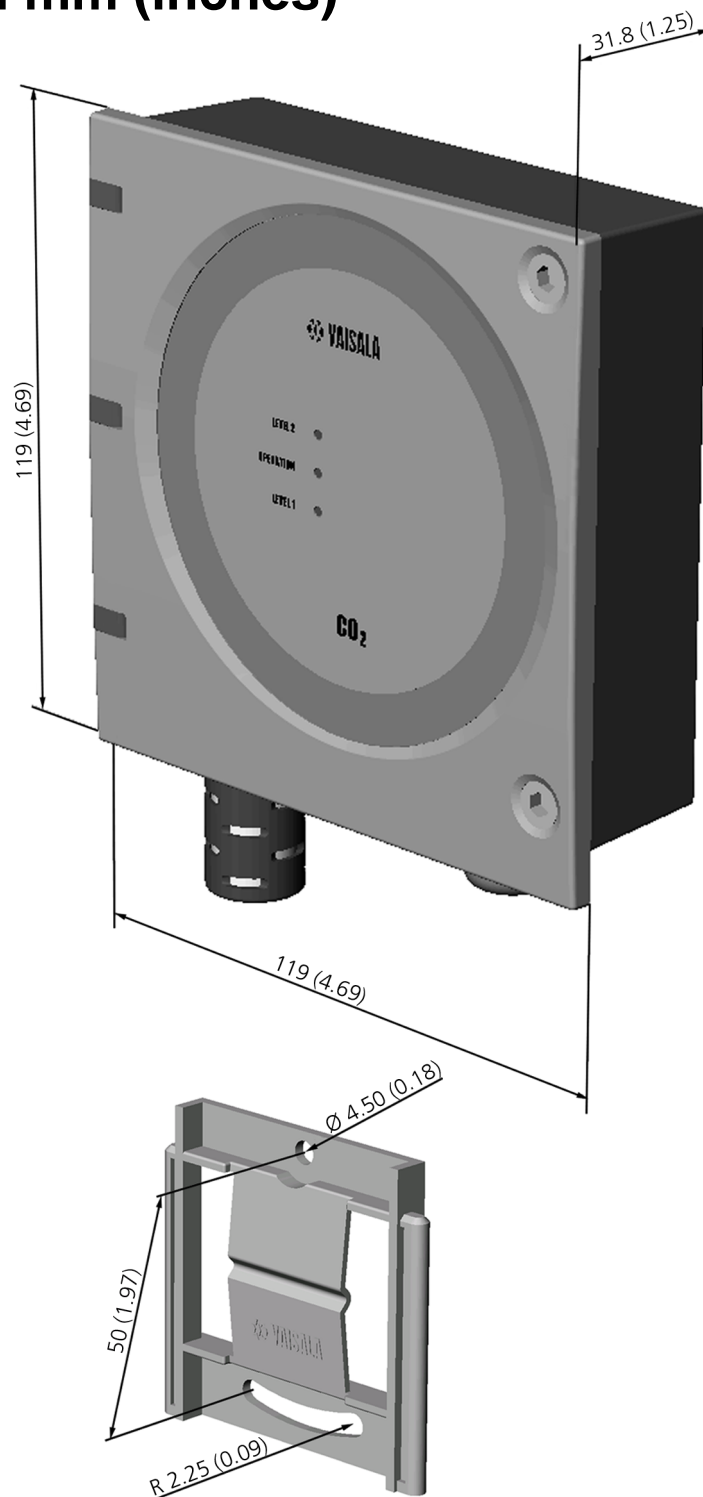
MAIN_SAVE F<cr>

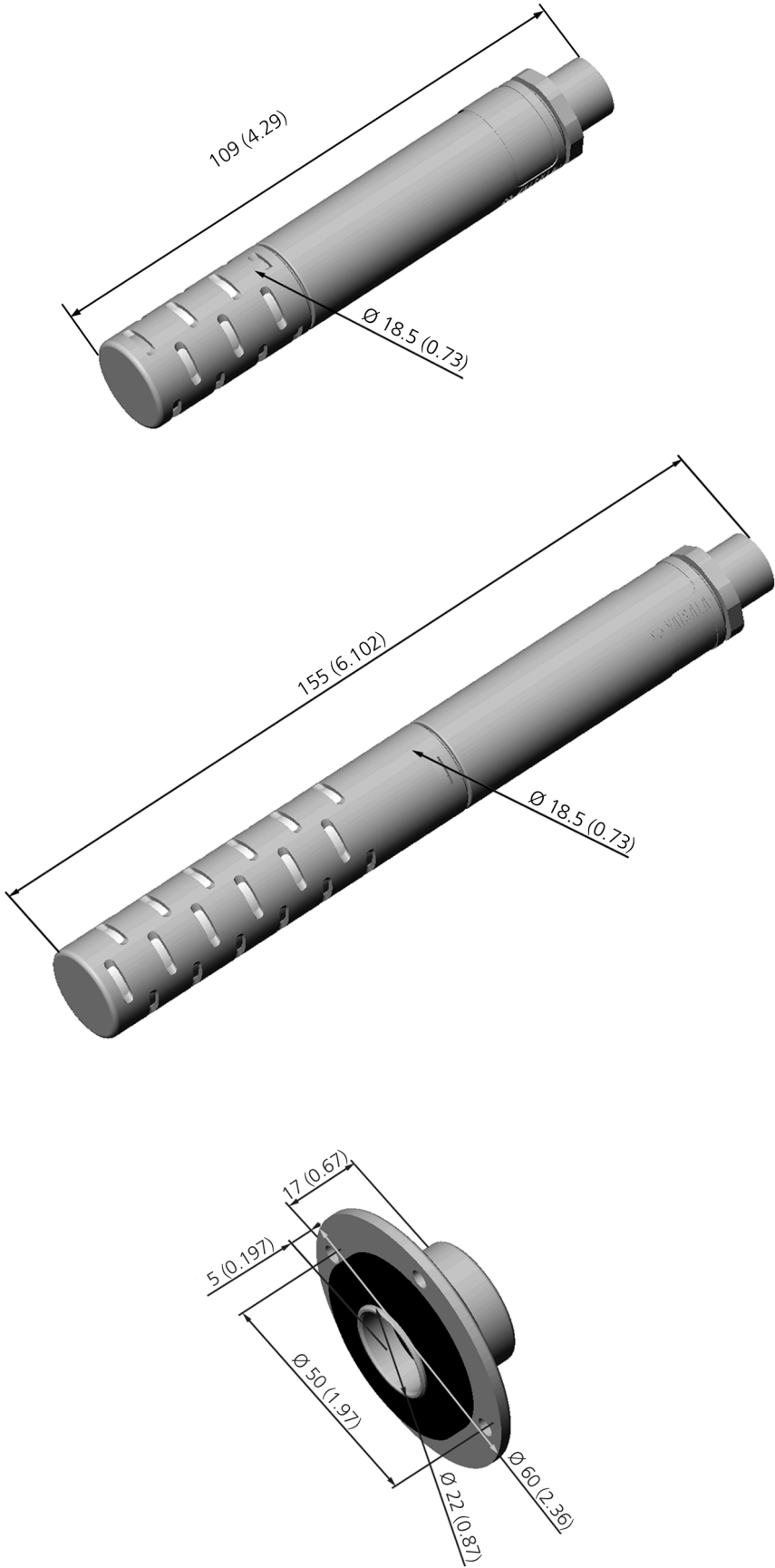
All the above mentioned settings have to be saved by using the command MAIN_SAVE F<cr>.

CHAPTER 5

TECHNICAL DATA

Dimensions in mm (inches)





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 at 25°C against certified factory references	
GMT221	<±[0.02% CO ₂ + 2% of reading]
GMT222	<±[20 ppm CO ₂ + 2% of reading]
(including repeatability and calibration uncertainty)	
Non-linearity	<±0.5 %FS
Temperature dependence (typically)	0.1 %FS / °C
Pressure dependence (typically)	0.15 % of reading/hPa
Long-term stability	<±5 %FS / 2 years
Response time (63%)	20 seconds (GMT221) 30 seconds (GMT222)

Operating conditions

Operating temperature range	-20...+60 °C
Humidity range	
probe with cable	0 - 100 %RH (non-condensing)
transmitter body	0 - 85 % RH (non-condensing)

General

Analog outputs	0 - 20 mA or 4 - 20 mA and 0 - 10 V
Resolution of analog outputs	0.03 %FS
Recommended external load:	
current output	max. 400 Ω
voltage output	min. 1 kΩ
Relay contact ratings	max. 30 VAC / 60 VDC, 0.5 A
Power supply	nominal 24 VAC/DC
Power consumption	< 4 W
Warm-up time	< 15 minutes
Storage temperature range	-30...+70°C

Mechanics

Housing material	
transmitter body	ABS plastic
probe	PC plastic
Housing classification	IP65/NEMA4
Weight	
GMT221:	max. 280 g
GMT222	max. 300 g

Electromagnetic compatibility

The GMT221 and GMT222 transmitters 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, 8 kV air)

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

(IEC 1000-4-4, 500 V)

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

(IEC 1000-4-5, 500 V)



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
25665GM	2 meters cable for the probe
19040GM	Serial COM adapter
GML220	LonWorks® module