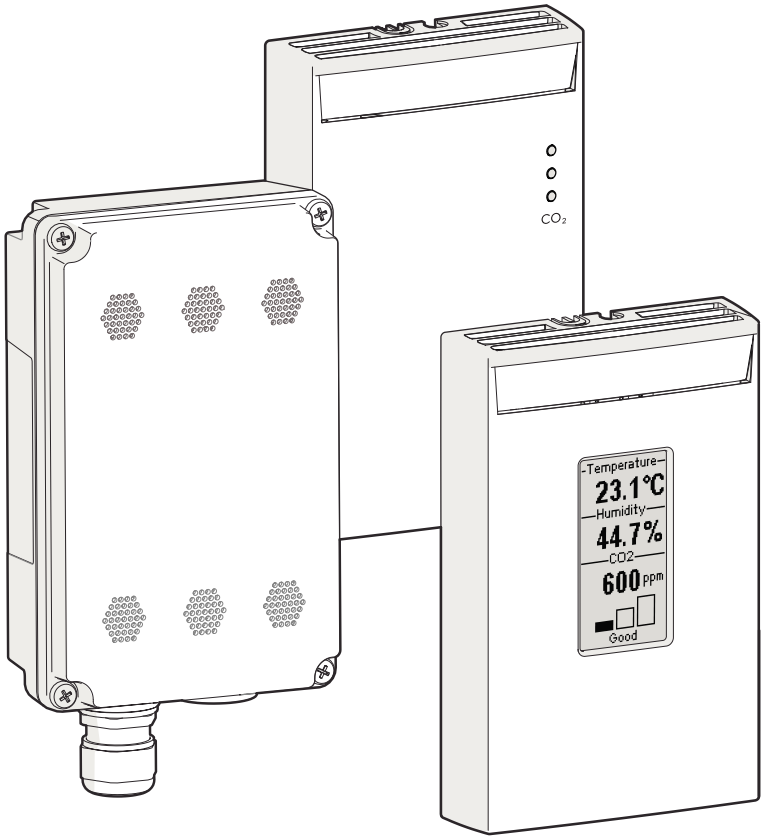
M211748EN-F

User Guide

Vaisala CARBOCAP® Carbon Dioxide, Humidity and Temperature Transmitters

GMW80 Series



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1. About This Document

1.1 Version Information

This document provides detailed instructions for using and maintaining Vaisala GMW80 series transmitters.

Table 1 Document Versions

Document Code	Date	Description
M211748EN-F	January 2018	This manual. Added new product model GMW88. Wiring and mounting instructions updated. Document template updated. Removed product models GMW83T and GMW86PT.
M211748EN-D	November 2015	Added new product models: GMW84 and GMW84S.

1.2 Related Manuals

Document Code	Name
M211660EN	GM10 Quick Guide

1.3 Documentation Conventions

WARNING! Warning alerts you to a serious hazard. If you do not read and follow instructions 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 highlights important information on using the product.

1.4 Trademarks

Vaisala®, CARBOCAP®, and INTERCAP® are registered trademarks of Vaisala Oyj.

All other product or company names that may be mentioned in this publication are trade names, trademarks, or registered trademarks of their respective owners.

1.5 Patent Notice

This product is protected by the following patents and patent applications and their corresponding national rights:

Table 2 Applicable Patents or Applications

Issuing Office	Publication Number
United States Patent and Trademark Office	US 5,827,438
	US 6,177,673
European Patent Office	EP0776023
	EP0922972
German Patent and Trade Mark Office	69615635
Japan Patent Office	4263285
Finnish Patent Office	112005
	105598

2. Product Overview

2.1 Introduction to GMW80 Series

Vaisala GMW80 series CARBOCAP® carbon dioxide, humidity, and temperature transmitters are wall-mount transmitters designed to fulfill the needs for CO_2 measurements in standard demand controlled ventilation applications.

The following table lists the GMW80 series transmitters and their features.

Table 3 GMW80 Series Transmitters

Model Name	CO_2 Output	T Output	RH Output	Display	CO_2 LEDs	Relay	T Setpoint
GMW83	0 ... 10 V	0 ... 10 V	No	No	No	No	No
GMW83A	0 ... 10 V	0 ... 10 V	No	No	Yes	No	No
GMW83D	0 ... 10 V	0 ... 10 V	No	Yes	No	No	No
GMW83RP	0 ... 10 V	0 ... 10 V Pt1000 (passive)	0 ... 10 V	No	No	No	No
GMW83DRP	0 ... 10 V	0 ... 10 V Pt1000 (passive)	0 ... 10 V	Yes	No	No	No
GMW84	4 ... 20 mA	4 ... 20 mA	No	No	No	No	No
GMW84S	4 ... 20 mA	4 ... 20 mA	No	No	No	Yes	No
GMW86P	4 ... 20 mA 0 ... 10 V	Pt1000 (passive)	No	No	No	No	No
GMW88	4 ... 20 mA 0 ... 10 V	No	No	No	No	No	No

Letters at the end of the model name stand for the following features:

P Passive temperature measurement
D Display
A CO_2 indicator LEDs
R Humidity measurement
S Relay

The CO_2 measurement is based on a new generation CARBOCAP® sensor, which uses a novel, silicon-based microchip emitter instead of an incandescent light bulb. The internal reference in the CO_2 sensor guarantees the best stability and operation also in constantly occupied buildings without frequent readjustments.

CARBOCAP® sensors give correct CO_2 measurements immediately when powered on. As they have a built-in reference measurement, they do not need a lengthy learning phase before the measured values are correct. Proper operation can be verified immediately after snapping on the device cover.

All GMW80 series transmitters measure carbon dioxide (CO_2) and temperature (T) with the exception of GMW88, which measures only CO_2. Certain models also include relative humidity (RH) measurement. Humidity measurement utilizes the Vaisala INTERCAP® sensor.

For measurements in more demanding conditions (for example, dusty or humid installation locations), the GMW88 model provides an IP64-rated enclosure with a cable gland.

2.1.1 Transmitter Parts

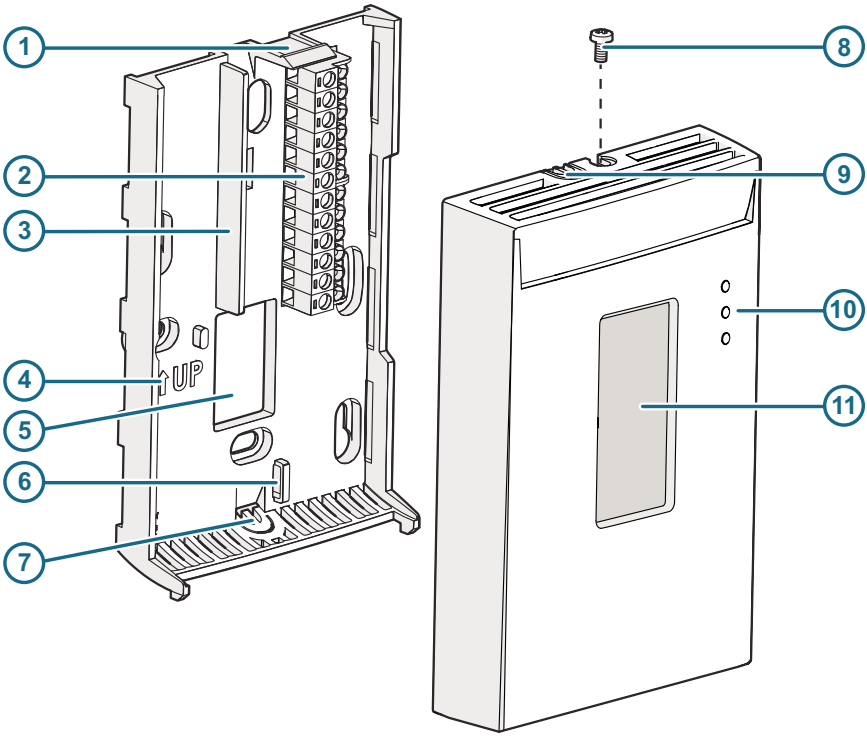


Figure 1 GMW80 Series Transmitter Parts

1 Opening tab.
2 Screw terminals. The wiring information is marked on the mounting base next to the terminals.
3 Barrier to prevent the cable from being routed below the GM10 measurement module. The area to avoid is marked **NO CABLES** on the mounting base.
4 Orientation arrow. Should point up after mounting base has been installed.
5 Opening for cable when wiring from behind (recommended).
6 Place for zip tie (optional, for cable strain relief).
7 Breakaway tab for routing the cable from below.
8 Locking screw. Supplied with the transmitter.
9 Breakaway tab for routing the cable from above.
10 CO_2 level indicator LEDs (on models with letter A) or relay indicator LED (on models with letter S).
11 Display (on models with letter D).

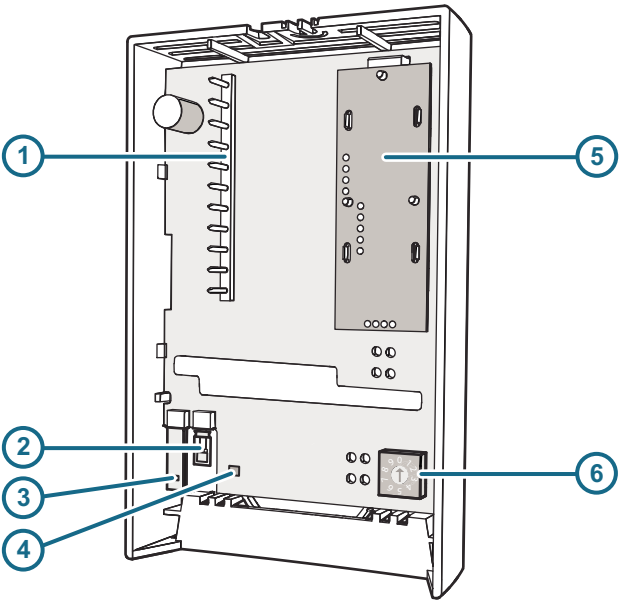


Figure 2 GMW80 Series Component Board Parts

1 Pins that connect the transmitter cover to the screw terminals when the transmitter cover is in place.
2 Vaisala INTERCAP® humidity sensor (on models with letter R).
3 Pt1000 temperature sensor for passive temperature measurement (on models with letter P).
4 Active temperature sensor.
5 GM10 carbon dioxide measurement module.
6 Rotary switch for relay setpoint (on models with letter S).

2.1.2 GMW88 Transmitter Parts

The enclosure of the IP64-rated GMW88 transmitter model differs from the other GMW80 transmitter models. In GMW88, the component board is located on the cover of the enclosure instead of the mounting base, and wires are led into the enclosure either through a cable gland on the bottom of the mounting base or a sealed lead-through at the back. The enclosure is opened and closed with 4 screws instead of the opening tab used in other models.

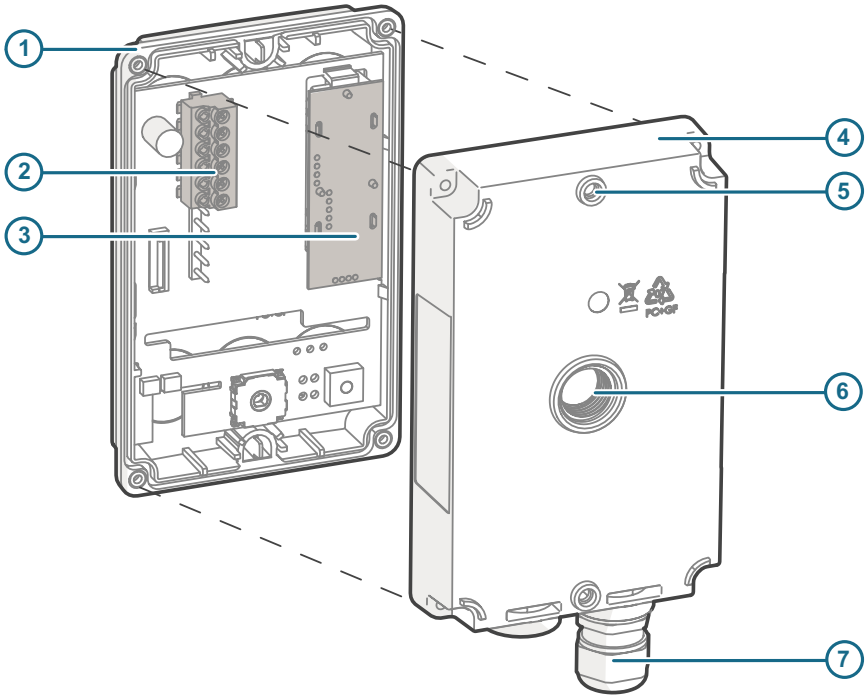


Figure 3 GMW88 Transmitter Parts

1 Transmitter cover with captive screws (4 pcs).
2 Screw terminals. The wiring information is printed on a label on the mounting base.
3 GM10 carbon dioxide measurement module.
4 Mounting base.
5 Screw holes for mounting on top and bottom of mounting base (2 screws, Ø 3.5 mm).
6 Alternative lead-through for wiring through the back (break seal, transfer cable gland here and seal cable gland hole on bottom of transmitter).
7 Cable gland for leading wires inside the enclosure.

More Information

- Dimensions (page 41)
- Installing GMW88 (page 25)

2.2 Display

GMW80 series transmitters with the letter **D** in the model name (for example, GMW83D) are equipped with a display.

2.2.1 Startup Screens

When a GMW80 series transmitter with a display is powered on, it shows a sequence of information screens. The screens are shown for a few seconds each.

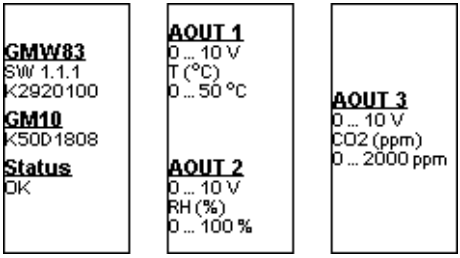


Figure 4 Example Startup Screens

The first screen shows the following information:

- Transmitter model, software version, and serial number.
- Serial number of the connected GM10 CO_2 measurement module. If the module is disconnected, no serial number is shown.
- Transmitter status: OK or ERROR. If the status is ERROR, the cause of the error will be shown on the measurement screen after the startup is completed.

The following screen(s) show the configuration of the active analog outputs:

- Output type (for example, 0 ... 10 V).
- Output parameter and unit (for example, CO_2 (ppm)).
- Output scaling (for example, 0 ... 2000 ppm).

2.2.2 Measurement Screen

After the startup screens the transmitter shows the measurement screen. It shows the measured parameters and an air quality indicator based on the current CO_2 level.

- **Good** air quality: 0 ... 800 ppm CO_2
- **Fair** air quality: 800 ... 1200 ppm CO_2

- **Poor** air quality: >1200 ppm CO_2

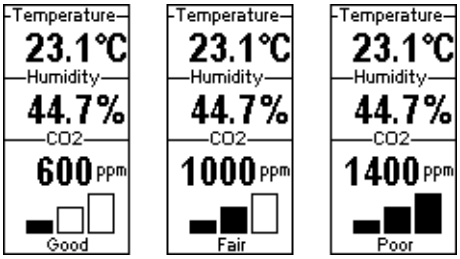


Figure 5 Example Measurement Screens

2.2.3 Error Messages

If there is a problem with measurement, affected readings are replaced with stars. The alarm indicator and an error message will also appear on the screen. If more than one error is active, the display will cycle through the errors, showing each error for a few seconds.

For a list of possible errors and their causes, see Problem Situations (page 35).

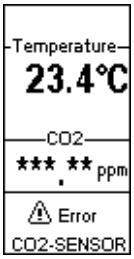


Figure 6 Example Error Message on Display

2.3 Relay

Transmitter model GMW84S has one SPST-NO relay (max. 50 VDC / 50 VAC, 500 mA) that is activated when the measured CO_2 level rises above the setpoint. When the relay is active (contact is closed), a green LED is lit on the transmitter cover.

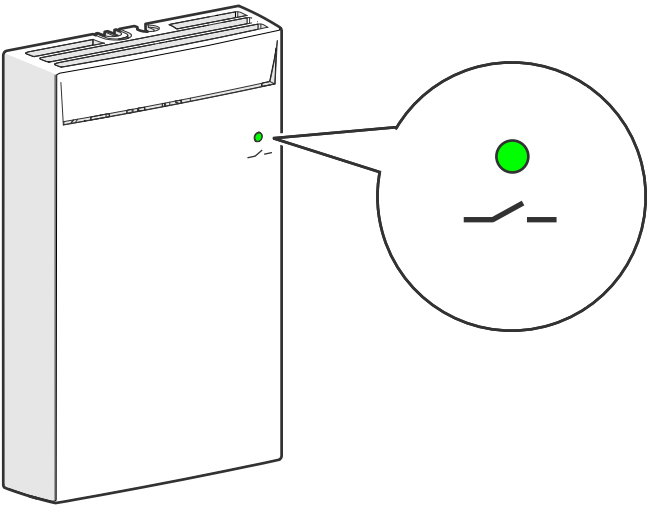


Figure 7 Relay Indicator LED on GMW84S

Relay setpoint is set using a rotary switch on the component board. Use a small flat head screwdriver to turn the switch. The switch has ten positions with predefined setpoints.

Figure 8 Rotary Switch

Table 4 Relay Setpoints

Switch Position	Setpoint in ppmCO_2
0	600 ppm (default)
1	700 ppm
2	800 ppm

Switch Position	Setpoint in ppmCO_2
3	900 ppm
4	1000 ppm
5	1200 ppm
6	1400 ppm
7	1600 ppm
8	1800 ppm
9	2000 ppm

A hysteresis of 50 ppm is applied to prevent the relay from switching back and forth when the measured value is near the setpoint value. The relay is activated/deactivated when the measured CO_2 value passes the setpoint, plus/minus 50 ppm.

For example, consider a transmitter that has the relay setpoint set to 1000 ppm CO_2. As the measured CO_2 value rises, the relay is activated at 1051 ppm. The relay remains activated until the measured value falls to 949 ppm.

2.4 CO_2 Level Indicator LEDs

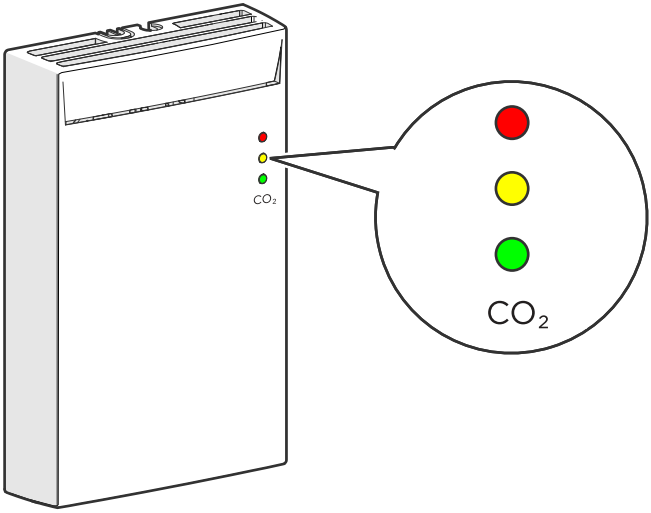


Figure 9 CO_2 Level Indicator LEDs on Model GMW83A

Transmitter model GMW83A has indicator LEDs for the measured CO_2 level on the front cover. The LEDs provide a visual indication of the measured CO_2 level to the occupant of the monitored space.

The LEDs are lit as follows:

- Red LED (top): lit between 1200 ... 2000 ppm CO_2, blinking > 2000 ppm CO_2.
- Yellow LED (center): lit between 800 ... 1200 ppm CO_2.
- Green LED (bottom): lit between 0 ... 800 ppm CO_2.

2.5 Analog Output Overrange Behavior

Analog outputs of the GMW80 series transmitters have a defined behavior when the values measured by the transmitter are outside the scaled analog output range.

- At the top end of the output range, the output is clipped to the maximum value of the output. This means that even if the measured parameter rises, the value does not change anymore.
- At the low end of the output range, the output stays at the minimum value when the measured parameter falls below the scaled range.
- The output is eventually set to the error state if the measured parameter is far enough from the scaled output range. The exact limits for this behavior are parameter dependent; see the figures below.

For more information on the error state, see Error State (page 37).

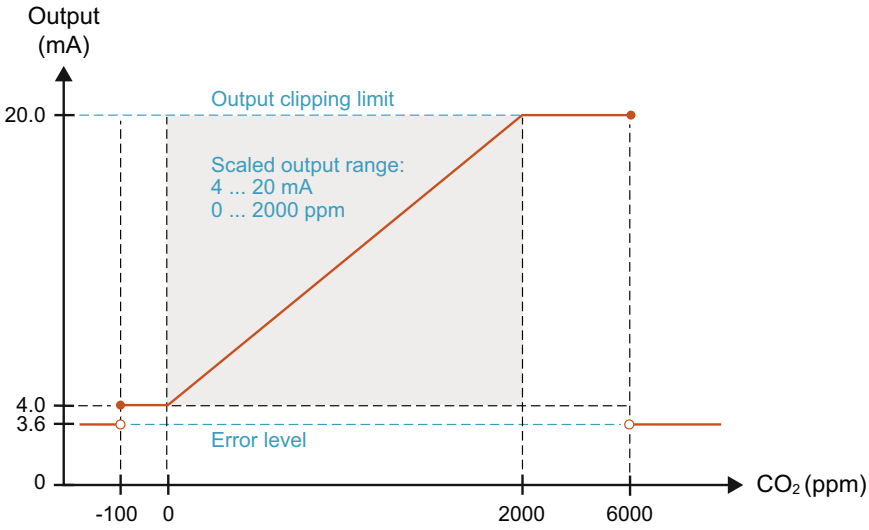


Figure 10 Overrange Behavior of CO_2 Measurement with 4 ... 20 mA Output

Negative ppm values cannot physically exist but the behavior of the output is defined to account for cases where a low CO_2 reading, combined with sensor drift, could cause a negative result.

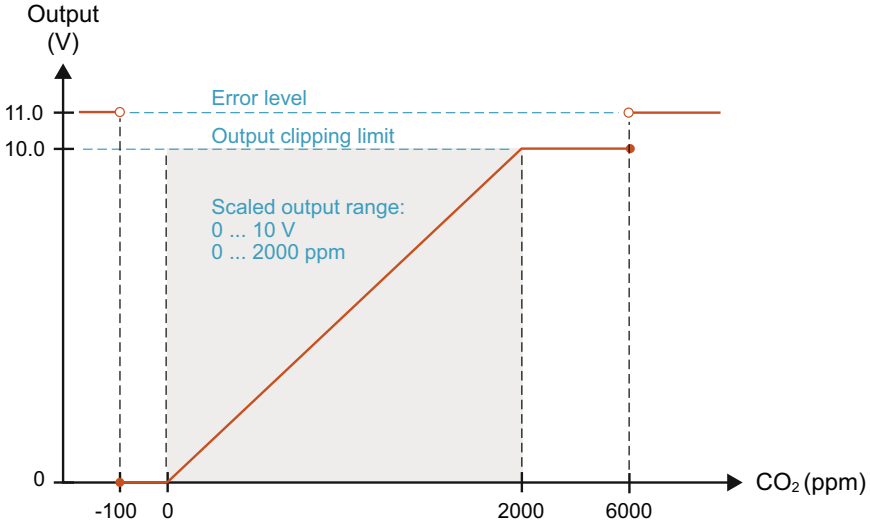


Figure 11 Overrange Behavior of CO_2 Measurement with 0 ... 10 V Output.

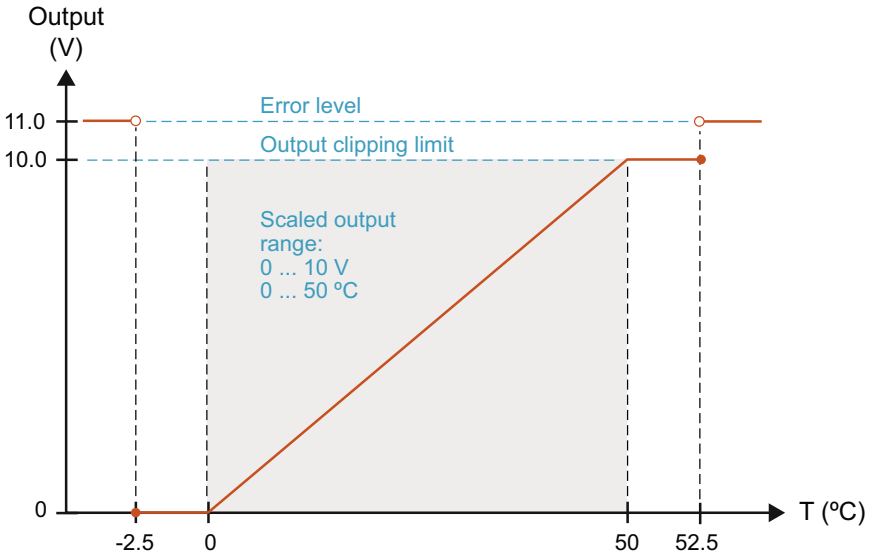


Figure 12 Overrange Behavior of Active Temperature Measurement

Passive temperature measurement (reading the Pt1000 resistor) is not affected by the overrange behavior or the error state.

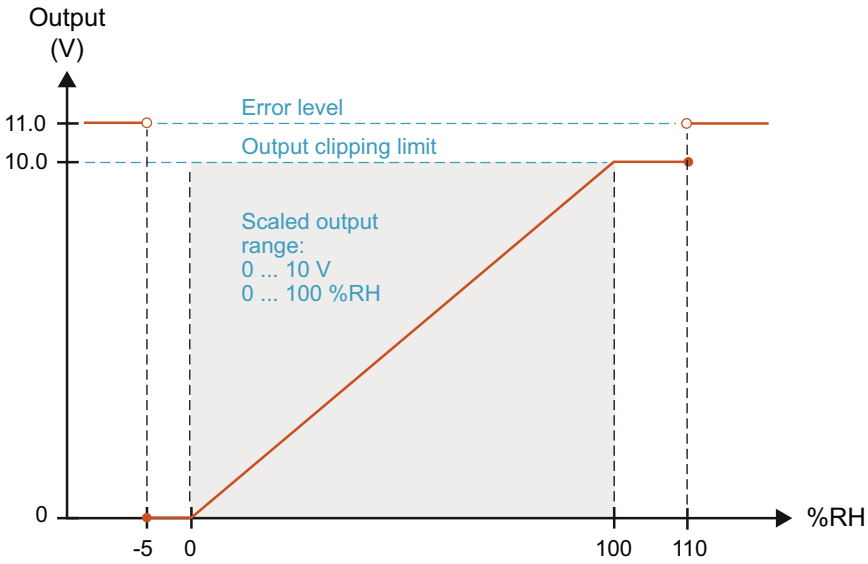


Figure 13 Overrange Behavior of Relative Humidity Measurement

The transmitter can measure humidities in excess of 100 %RH if the sensor element becomes wet due to condensation.

2.6 Safety

The GMW80 series transmitter delivered to you has been tested for safety and approved as shipped from the factory. Note the following precautions:

WARNING! Make sure that you prepare or connect only de-energized wires.

CAUTION! Do not modify the unit or use it in ways not described in the documentation. Improper modification may lead to safety hazards, equipment damage, failure to perform according to specification, or decreased equipment lifetime.

CAUTION! Electrostatic Discharge (ESD) can cause immediate or latent damage to electronic circuits. Avoid touching exposed component contacts during installation and maintenance.

2.7 Regulatory Compliances

GMW80 series complies with the following directives:

- RoHS Directive
- EMC Directive

The conformity is declared with using the following standards:

- EN 50581: Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.
- EN 61326-1: Electrical equipment for measurement, control, and laboratory use – EMC requirements – Immunity test requirements for equipment intended to be used in an industrial electromagnetic environment.
- EN 550022: Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement.

3. Installation

3.1 Selecting Location

Select a location that represents well the area of interest. Interior walls and columns are typically suitable locations. The installation height should be 1.2 ... 1.8 m (4 ... 6 ft).

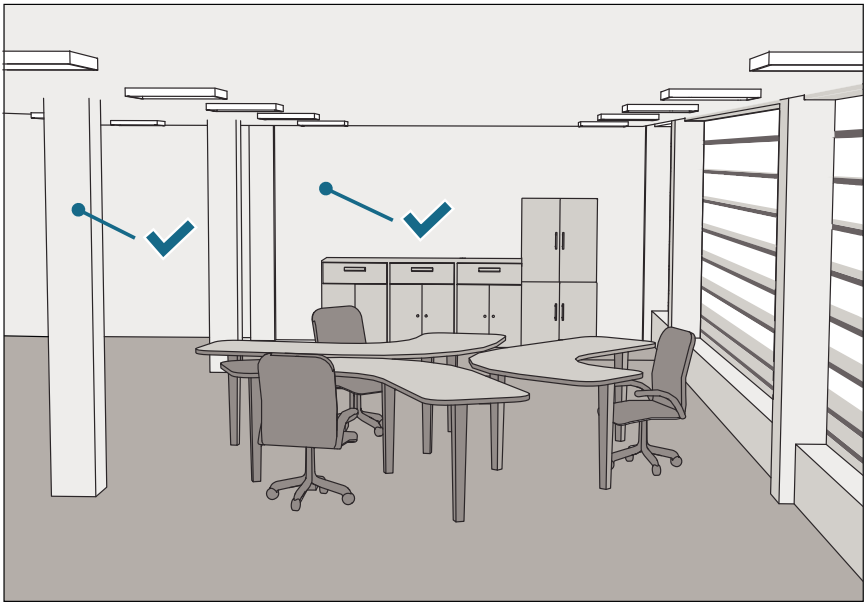


Figure 14 Examples of Good Installation Locations

Seal the cable opening when bringing a cable through the wall. The hole will supply air from outside the room into the transmitter and affect the measurement readings. For example, fresh concrete binds CO_2 and may cause low readings, especially in new buildings.

Avoid installing in the following locations:

- Near doors or windows.
- Near heat and moisture sources.
- In direct sunlight.
- In locations that are blocked by furniture.
- Close to the discharge of supply air ducts.
- On the floor or the ceiling.

- On points that experience excessive vibration.

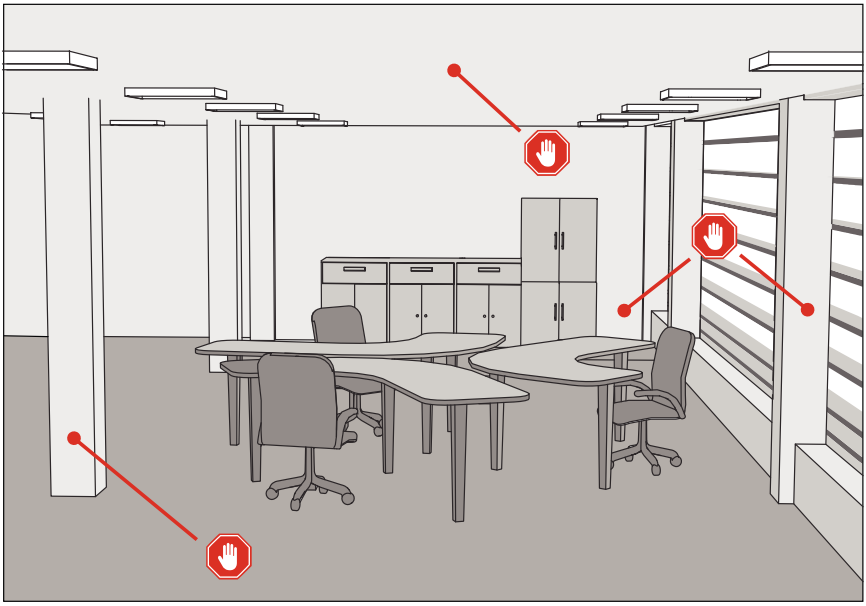
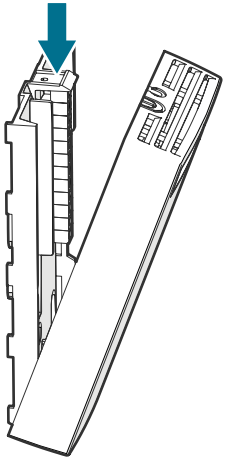


Figure 15 Examples of Unsuitable Installation Locations

3.2 Opening and Closing the Transmitter

GMW80 series transmitters are delivered from the factory with a pull tab that makes it easy to open the transmitter for installation. Note that the GMW88 model is opened and closed with 4 screws instead of an opening tab. See Figure 3 (page 11).

1. To open the transmitter after it has been installed:
   a. Loosen the locking screw if it has been installed.
   b. Use a flat screwdriver to push down the tab that holds the transmitter cover and mounting base together, and pull the top of the transmitter cover away from the mounting base.



CAUTION! Be careful when opening the transmitter:
- Pushing down too hard can break off the opening tab.
- Inserting the screwdriver too far into the transmitter enclosure may damage transmitter components.

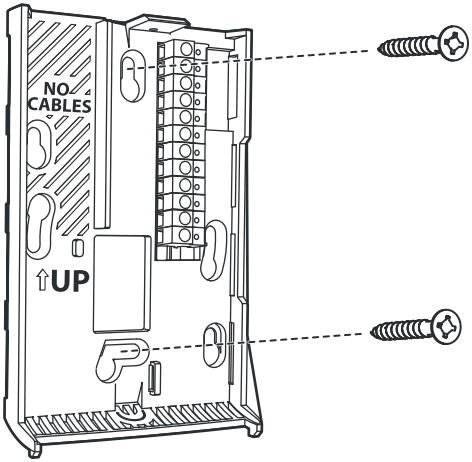
2. To close the transmitter:
   a. Align the bottom of the transmitter cover with the bottom of the mounting base.
   b. Tilt the top of the transmitter cover forward until the tab catches with an audible snap. Note that closing the transmitter starts it up if power is supplied to the screw terminals.
   c. Pull on the cover gently to make sure it is properly closed and not loose.
   d. Attach the locking screw if desired.

3.3 Installing the Mounting Base

GMW80 series transmitters are designed to be installed on a mounting box or directly to a wall surface.

1. Make sure the orientation arrow on the mounting base points up. Proper orientation is important: air must flow through the vents on the bottom and top.
2. Use the mounting holes to attach the mounting base securely. Use at least two screws (not included). The mounting holes are suitable for the most common European, American, and Asian mounting boxes. The mounting base can be twisted on to pre-mounted screws.

CAUTION! To avoid damaging the component board when you close the enclosure, make sure the screw heads do not project out of the mounting holes.



CAUTION! Mounting bases are tailored to the individual transmitter at the factory. If you attach several mounting bases before connecting the transmitters, store the transmitters in their original shipping boxes, so that you can match the serial number on the mounting base to the serial number on the shipping box.

The mounting base of the GMW88 model differs from other GMW80 series models. See Installing GMW88 (page 25).

3.4 Installing GMW88

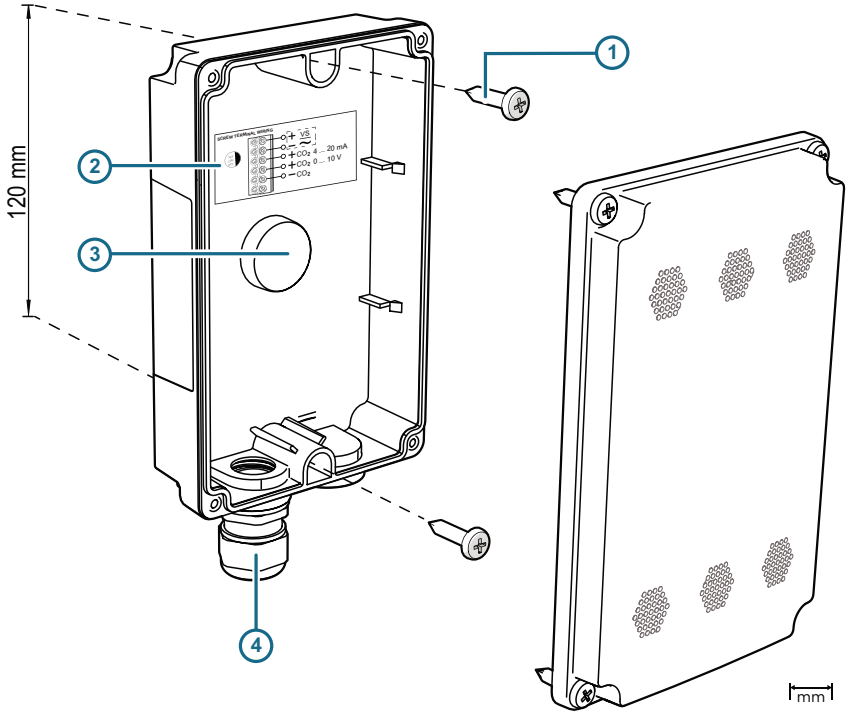


Figure 16 Mounting GMW88

1 Mounting screws (2 pcs, Ø 3.5 mm, head Ø ≤ 8 mm).
2 Wiring instructions label.
3 Alternative lead-through for wiring through the back (break seal and transfer cable gland to the threads on this lead-through).
4 Cable gland for leading the input/output cable (Ø 4 ... 8 mm) inside the enclosure.

1. Open the transmitter cover (4 screws) and use 2 mounting screws (Ø 3.5 mm) to attach the mounting base to the installation surface. Point the cable gland straight down.
2. Route the input/output cable through the cable gland. Attach wiring to the screw terminals as shown on the mounting base label. See Wiring GMW88 (page 31).

> If you use the alternative lead-through on the back of the transmitter, seal the hole on the bottom of the transmitter after removing the cable gland.

3. Tighten the cable gland and close the transmitter cover (4 screws).

3.5 Wiring

Connect the wiring to the screw terminals on the mounting base. The terminal assignments are marked next to the screw terminals. Do not connect wiring to unmarked terminals.

Note that the analog signal ground terminal is internally connected to the power supply ground terminal.

Maximum wire size is 2 mm^2 (AWG14). Route the cable through the hole in the mounting base if possible.

The GMW88 transmitter is wired either through a cable gland on the bottom of the transmitter or an alternative lead-through on the back of the transmitter. See Figure 3 (page 11).

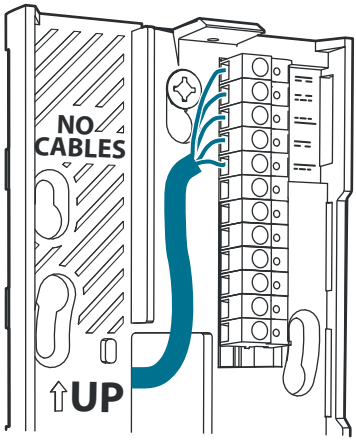


Figure 17 Routing the Cable from Behind (GMW83, GMW84, and GMW86 Models)

WARNING! Connect only de-energized wires.

CAUTION! Do not route the cable through the area marked **NO CABLES** on the mounting base. That space is taken up by the CO_2 measurement module when the transmitter cover is attached.

You can also bring the cable to the housing from above or below, but you have to break off the small plastic tab that covers the hole on top or bottom of the housing.

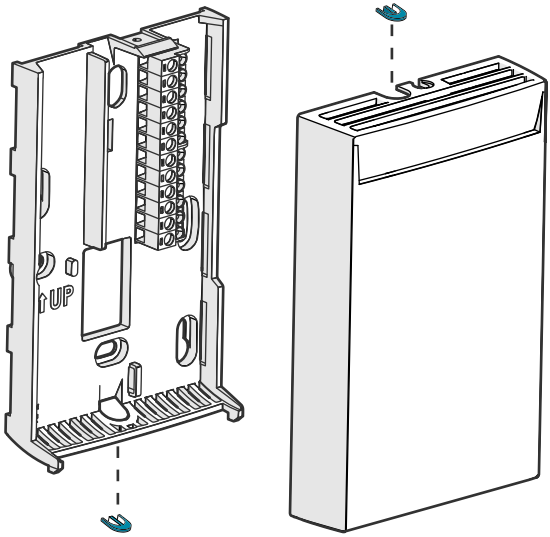


Figure 18 Locations of the Breakaway Tabs

When wiring from below, you can secure the cable with a zip tie to provide strain relief.

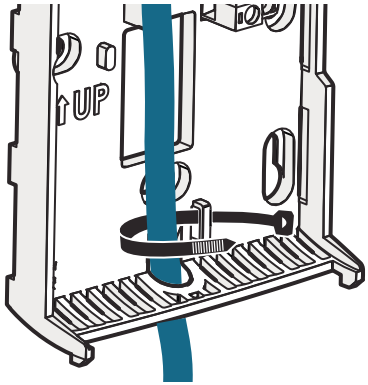


Figure 19 Wiring from Below with Zip Tie Strain Relief

After completing the wiring, connect the transmitter body over the mounting base. Note that mounting bases are model-specific.

3.5.1 Wiring GMW83, GMW83D and GMW83A

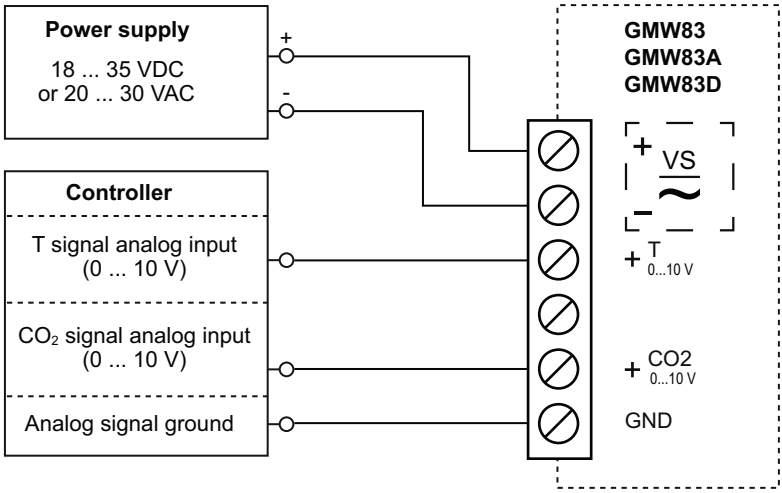


Figure 20 Wiring for GMW83, GMW83D, and GMW83A

3.5.2 Wiring GMW83RP and GMW83DRP

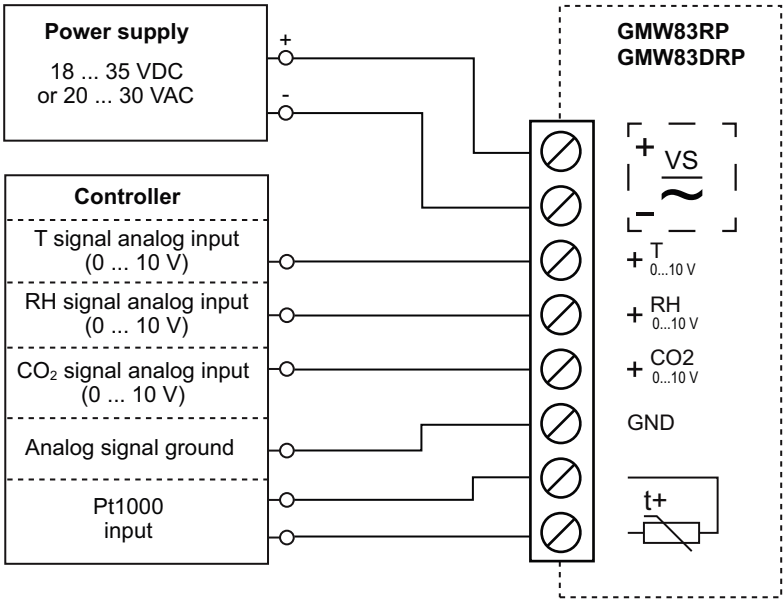


Figure 21 Wiring for GMW83RP and GMW83DRP

3.5.3 Wiring GMW84

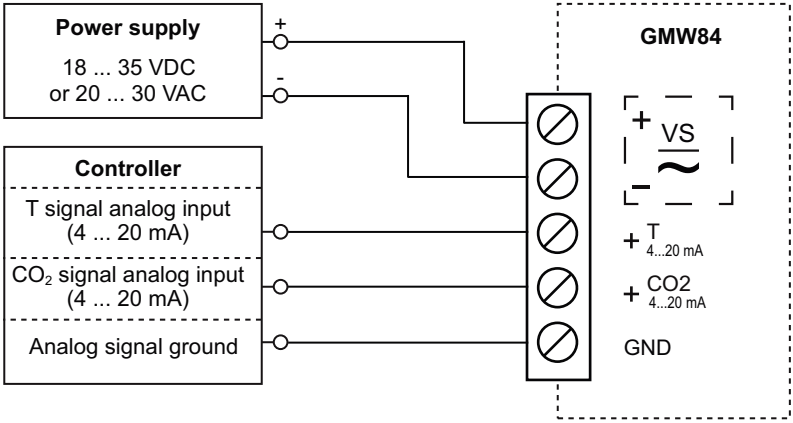


Figure 22 Wiring for GMW84

3.5.4 Wiring GMW84S

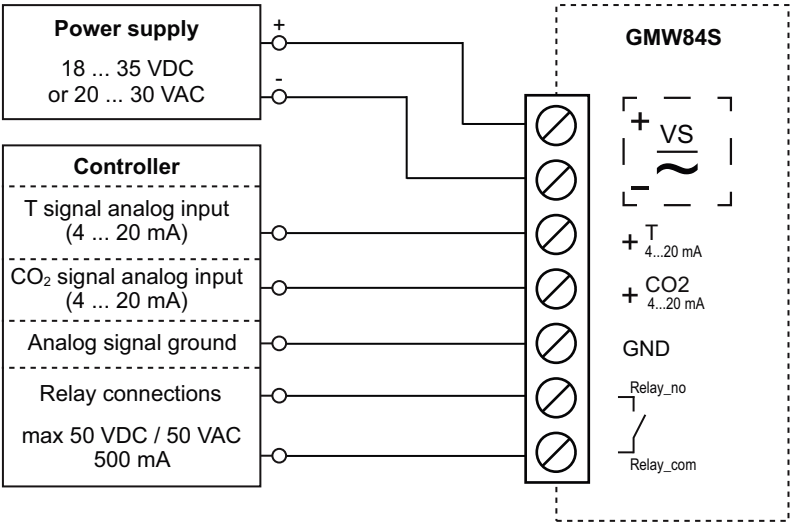


Figure 23 Wiring for GMW84S

To change the setpoint of the relay, turn the rotary switch on the component board. See Relay (page 14).

3.5.5 Wiring GMW86P

GMW86P has two outputs for the CO_2 signal: 4 ... 20 mA and 0 ... 10 V. You can use both outputs simultaneously but typically only one of them is needed. Note that they share a common minus terminal.

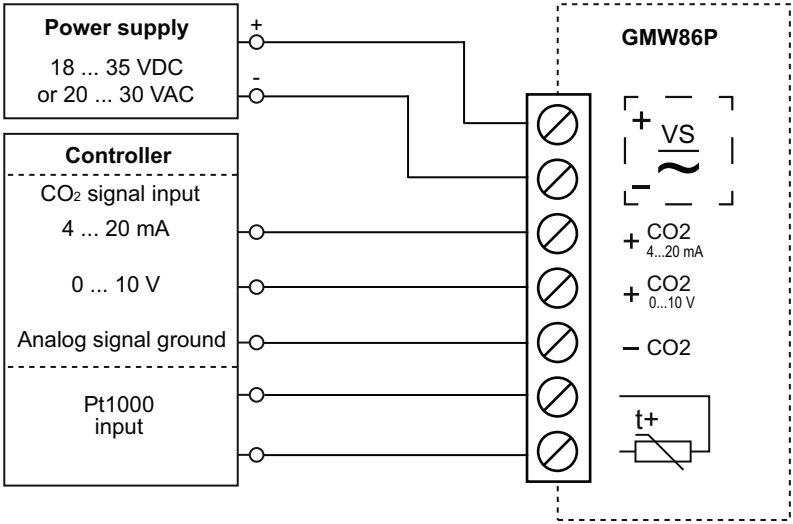


Figure 24 Wiring for GMW86P

3.5.6 Wiring GMW88

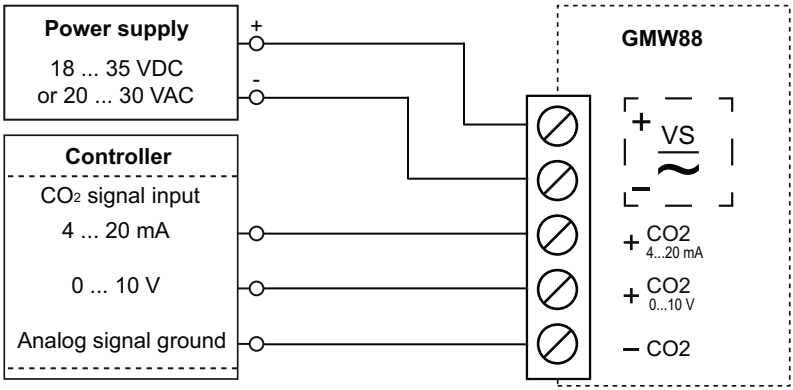


Figure 25 Wiring for GMW88

4. Maintenance

4.1 Cleaning

The body of the transmitter can be cleaned by wiping with a moistened lint-free cloth. Do not use cleaning agents or solvents, or blow pressurized air into the transmitter housing.

If you suspect the CO_2 measurement module is dirty, do not attempt to open it. Instead, replace it with a new part. For order codes of spare parts, see Spare Parts and Accessories (page 41).

4.2 Replacing the CO_2 Measurement Module (GM10)

- GM10 spare part module (Vaisala order code GM10SP80)
- Flat head screwdriver (for opening the transmitter)

To replace the module:

1. Disconnect the transmitter body from the mounting base.
2. Locate the GM10 module on the transmitter. The module is a separate component board with a golden cuvette that contains the CARBOCAP® sensor. The module is connected to the main transmitter board with a connector, and held in place by a plastic clip on the other side. See Figure 2 (page 10).
3. Disconnect the module by carefully lifting the module from the connector side.

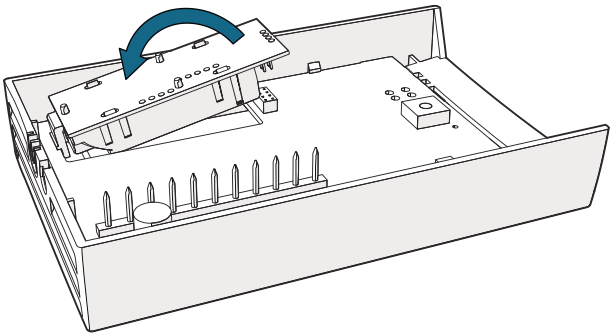


Figure 26 Disconnecting the GM10 Module

4. Take the new GM10 module and place it in the hole for the module so that the plastic clip meets the component board. Then lower the connector end of the module.
5. Push down on the module to secure the connector.
6. Reconnect the transmitter to the mounting base.
7. Check the output of the transmitter (or the display if included on the model) to verify that the CO_2 measurement is working normally and is not in the error state. For more information on the error state, see Error State (page 37).

4.3 Replacing the INTERCAP Humidity Sensor

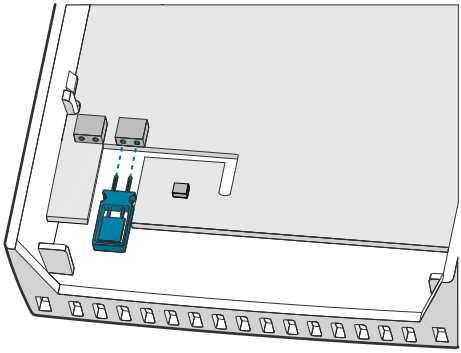
- INTERCAP® sensor (Vaisala order code 15778HM)
- Flat head screwdriver (for opening the transmitter)

CAUTION! To avoid contaminating or damaging the sensor:

- Handle the sensor by its plastic frame.
- Do not touch the sensor surface in the middle.
- Wear lint-free ESD gloves.

To replace the sensor:

1. Disconnect the transmitter body from the mounting base.
2. Locate the INTERCAP® sensor on the component board. See Figure 2 (page 10).
3. Disconnect the old INTERCAP® sensor by pulling it straight out of its socket.



4. Insert the new INTERCAP® sensor in the socket.
5. Reconnect the transmitter to the mounting base.

6. Check the output of the transmitter (or the display if included on the model) to verify that the humidity measurement is working normally and the transmitter is not in the error state. For more information on the error state, see Error State (page 37).

5. Troubleshooting

5.1 Problem Situations

Table 5 Possible Problem Situations and their Remedies

Problem	Possible Cause	Remedy
Analog output reading is unchanging and appears incorrect.	Transmitter has set the analog output to the error level (3.6 mA or 11 V) because the transmitter is in the error state.	Determine what has caused the error state and remove the cause. For a description of the error state and its possible causes, see Error State (page 37).
Temperature reading is too high.	Transmitter is installed in an unsuitable location, for example, near a heat source or in sunlight.	Relocate transmitter. See Selecting Location (page 21).
	Transmitter is installed in improper orientation.	Reinstall transmitter with the arrow on the mounting base pointing up.
	Unsuitable operating environment.	Verify that the operating environment is within specified operating limits.
CO_2 reading is too high.	Source of CO_2 near the transmitter.	• Use a portable instrument to verify the CO_2 reading at the installation location. Avoid breathing on the instruments while checking. • Check for sources of CO_2 in the measured area, such as people working right next to the transmitter.
	CO_2 measurement module must be replaced.	See Replacing the CO 2 Measurement Module (GM10) (page 32).

Problem	Possible Cause	Remedy
CO_2 reading is too low.	The measured area contains materials that bind CO_2 (such as fresh concrete), producing a low-CO_2 environment.	• Use a portable instrument to verify the CO_2 reading at the installation location. Avoid breathing on the instruments while checking. • Check if the transmitter is installed on a mounting box that supplies air from inside the wall into the transmitter. If yes, seal the opening that supplies the air.
	CO_2 measurement module must be replaced.	See Replacing the CO 2 Measurement Module (GM10) (page 32).
Relay is always activated.	Relay setpoint set too low.	Adjust the relay setpoint. See Relay (page 14).
Error text on display: **CO2-SENSOR**	GM10 module disconnected.	Open the transmitter and check if the GM10 module is installed securely. See Figure 2 (page 10). • If the module is loose or entirely disconnected, reinstall it as instructed in Replacing the CO 2 Measurement Module (GM10) (page 32). • If the GM10 module appears to be installed but the problem persists, disconnect and reconnect the module carefully.
	CO_2 measurement module must be replaced.	Replace the GM10 module with a verified working module.
	CO_2 reading over 6000 ppm.	• Use a portable instrument to verify the CO_2 reading at the installation location. Avoid breathing on the instruments while checking. • Check for sources of CO_2 in the measured area, such as people working right next to the transmitter.

Problem	Possible Cause	Remedy
Error text on display: **RH-SENSOR**	Humidity sensor disconnected.	Open the transmitter and check the condition of the humidity sensor. See Figure 2 (page 10). • If the sensor is missing or damaged, replace it. See Replacing the INTERCAP Humidity Sensor (page 33). • If the sensor is wet, wait for it to dry or dry it very gently with clean instrument air.
	Humidity sensor damaged.	
	Humidity sensor wet.	
Error text on display: **T-SENSOR**	Temperature reading is outside the scaled output range.	• Verify the ambient temperature with a portable instrument. • See Analog Output Overrange Behavior (page 16).
	Temperature sensor damaged.	Open the transmitter and check if the active temperature sensor on the component board has been damaged. See Figure 2 (page 10).
Error text on display: **INTERNAL**	Problem with transmitter software.	• Restart the transmitter. • If the error persists, contact Vaisala support.

5.2 Error State

If the transmitter detects a serious hardware or software error, or the measured reading is well outside the scaled range, the analog outputs are set into a defined error level instead of the measured result. The error level depends on the output type:

- For 4 ... 20 mA output, the error level is **3.6 mA**.
- For 0 ... 10 V output, the error level is **11 V**.

If the cause of the error is removed, the transmitter resumes normal operation of analog outputs. Some errors may require a reset of the transmitter to recover.

If the error state is caused by a measurement result being well outside the scaled output range, only affected channels are set to the error state. For more information, see Analog Output Overrange Behavior (page 16).

Examples of situations that can cause the error state:

- The transmitter measures over 6000 ppm CO_2.
- The CO_2 measurement module (GM10) is disconnected.

6. Technical Data

6.1 Specifications

Table 6 Models

GMW86P	CO_2	CO_2 current and voltage output, Pt1000
GMW83RP[1)]	CO_2+RH+T	Voltage outputs, Pt1000
GMW83DRP[1)]	CO_2+RH+T	Voltage outputs, Pt1000, Display
GMW83	CO_2	Voltage outputs
GMW83A	CO_2	Voltage outputs, CO_2 indicator LEDs
GMW83D	CO_2	Voltage outputs, Display
GMW84	CO_2	CO_2 current output
GMW84S	CO_2	CO_2 current output, Relay
GMW88	CO_2	CO_2 current output

1) Models with calibration certificate available (GMW83RPC/GMW83DRPC)

Table 7 Measurement Performance

Property	Specification
Carbon Dioxide	
Measurement range	0 ... 2000 ppm
Accuracy across temperature range	
+20 ... +30 °C (+68 ... +86 °F)	±(30 ppm +3 % of reading)
+10 ... +20 °C (+50 ... +68 °F), +30 ... +40 °C (+86 ... +104 °F)	±(35 ppm +3.7 % of reading)
+0 ... +10 °C (+32 ... +50 °F), +40 ... +50 °C (+104 ... +122 °F)	±(40 ppm +4.8 % of reading)
Stability in typical HVAC applications	±(15 ppm + 2 % of reading) over five years
Warm-up time	1 min 10 min for full specification
Response time (63 %)	60 s GMW88 model: 7 min
Carbon dioxide sensor	Vaisala CARBOCAP® GM10

Property	Specification
Temperature	
Measurement range	0 ... +50 °C (+32 ... +122 °F)
Temperature sensor	On P models: Pt1000 RTD Class F0.15 IEC 60751 For analog outputs: Digital temperature sensor
Accuracy (GMW83, GMW84)	
+10 ... +30 °C (+50 ... +86 °F)	±0.5 °C (0.9 °F)
+0 ... +10 °C (+32 ... +50 °F), +30 ... 50 °C (+86 ... +122 °F)	±1 °C (1.8 °F)
Humidity	
Measurement range	0 ... 95 %RH
Accuracy for temperature range +10 ... +30 °C (+50 ... +86 °F)	
0 ... 80 %RH	±3 %RH
80 ... 95 %RH	±5 %RH
Accuracy for temperature ranges 0 ... +10 °C (+32 ... +50 °F), +30 ... +50 °C (+86 ... +122 °F)	
0 ... 95 %RH	±7 %RH
Stability in typical HVAC applications	±2 %RH over 2 years
Product lifetime	> 15 years

Table 8 Operating Environment

Property	Specification
Operating temperature	0 ... +50 °C (+32 ... +122 °F)
Operating humidity	0 ... 95 %RH Dewpoint < 30 °C (+86 °F)
Storage temperature	Models without display: -40 ... +70 °C (-40 ... +158 °F) Models with display: -30 ... +70 °C (-22 ... +158 °F)
EMC compliance	EN61326-1, Industrial environment

Table 9 Inputs and Outputs

Property	Specification
Supply voltage	18 ... 35 VDC 24 VAC ±20 % 50/60 Hz

Property	Specification
Max. current consumption at 18 VDC	GMW84 models: 70 mA Other models: 45 mA
Max. power consumption at 30 VAC	GMW83 models: 0.7 W GMW86 models and GMW88: 1 W GMW84 models: 1.2 W
Outputs	4 ... 20 mA and/or 0 ... 10 V
Current loop resistance (4 ... 20 mA)	0 ... 600 Ω
Voltage output load resistance	Min. 10 kΩ
CO_2 output scale	0 ... 2000 ppm
Temperature output scale	0 ... +50 °C (+32 ... +122 °F)
Humidity output scale	0 ... 100 %RH
Passive temperature sensor (P models)	Pt1000 RTD
Temperature setpoint (T models)	10 kΩ potentiometer
Relay (S models)	1 pc, SPST-NO Max. 50 VDC / 50 VAC, 500 mA
CO_2 indicator LED levels (A model)	Flashing red: > 2000 ppm Red: 1200 ... 2000 ppm Yellow: 800 ... 1200 ppm Green: < 800 ppm

Table 10 Mechanical Specifications

Property	Specification
IP rating	IP30 GMW88 model: IP64
Housing material	ABS/PC UL-V0 approved GMW88 model: PC
Housing color	White (RAL9003)
Output connector	Screw terminal
Max. wire size	2 mm^2 (AWG14)
Weight	Plain and LED version: 114 g (4.02 oz) Display version: 124 g (4.37 oz) GMW88: 160 g (5.64 oz)

6.2 Spare Parts and Accessories

Information on spare parts, accessories, and calibration products is available online at www.vaisala.com and store.vaisala.com.

Name	Order Code
CO_2 module	GM10SP80
INTERCAP® sensor	15778HM

6.3 Dimensions

All dimensions are in millimeters (mm).

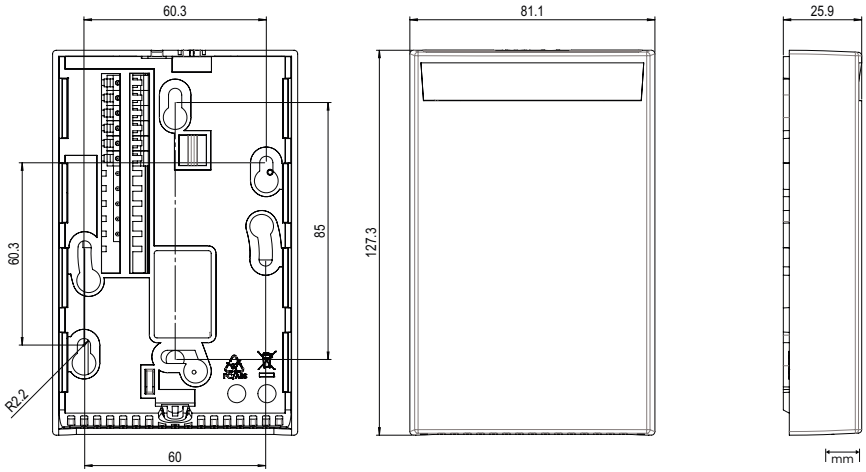


Figure 27 Dimensions for GMW83, GMW83A, GMW83RP, GMW84, GMW84S, and GMW86P

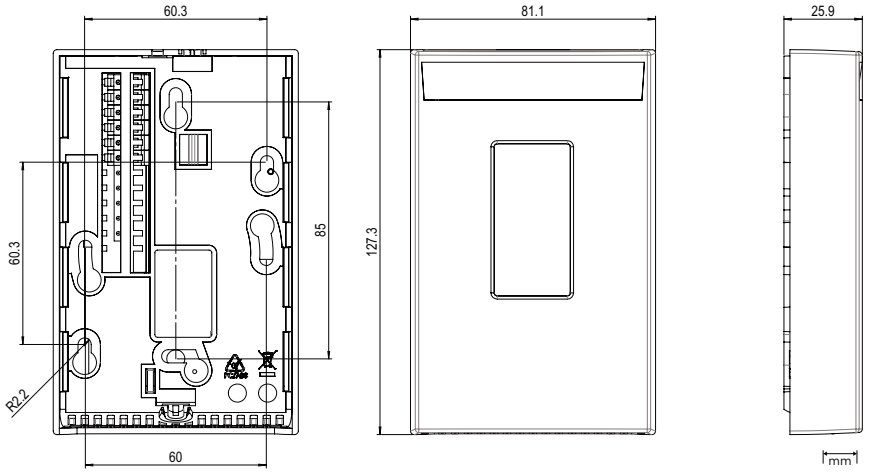


Figure 28 Dimensions for GMW83D and GMW83DRP

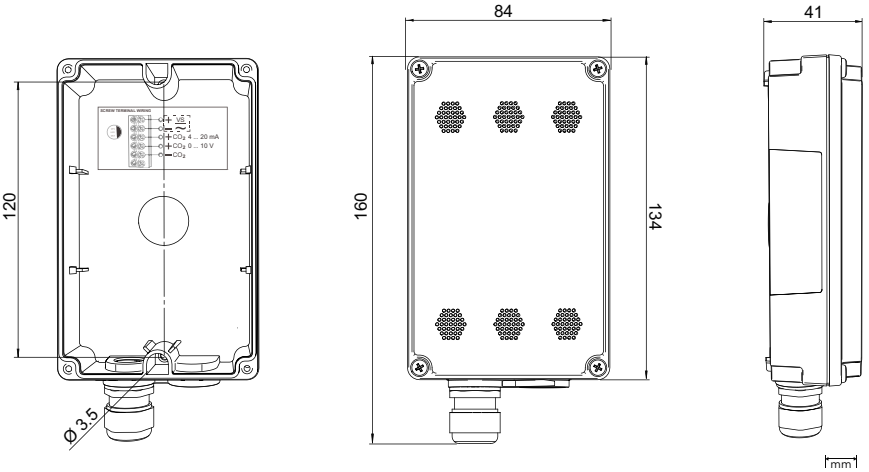


Figure 29 Dimensions for GMW88

Warranty

For standard warranty terms and conditions, see 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.

Technical Support

Contact Vaisala technical support at helpdesk@vaisala.com. Provide at least the following supporting information:

- Product name, model, and serial number
- Name and location of the installation site
- Name and contact information of a technical person who can provide further information on the problem

For more information, see www.vaisala.com/support.

Recycling

Recycle all applicable material.

Follow the statutory regulations for disposing of the product and packaging.

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