GMW90 Series Carbon Dioxide, Temperature and Humidity Transmitters for DCV

GMW90 Series Carbon Dioxide, Temperature and Humidity Transmitters for HVAC are available with either a display opening or a solid front. An optional traffic light indication can also be selected.

GMW90 Series CARBOCAP® Carbon Dioxide, Temperature, and Humidity Transmitters are based on new measurement technology for improved reliability and stability. With the new technology the transmitter’s inspection interval is extended to five years. Designed for demand controlled ventilation, these transmitters measure carbon dioxide and temperature, with the option for humidity measurements. The instruments come with a calibration certificate that meets traceability and compliance requirements.

**Reliability from Unique Measurement Technology**

GMW90 series transmitters use advanced Micro-Electro-Mechanical System (MEMS) technology for measuring carbon dioxide. The CARBOCAP® carbon dioxide sensor’s continuous reference measurement enables reliable and accurate readings and outstanding long-term stability also in buildings with round-the-clock occupancy. The new generation CARBOCAP® sensor no longer uses an incandescent light bulb, which limits sensor lifetime. This unique sensor consumes very little power compared to other sensors on the market. As a result, instrument self-heating is low and humidity and temperature can be measured correctly.

**Features**

- Measured parameters: carbon dioxide, temperature, and humidity (optional)
- Superior long-term stability with the next generation Vaisala CARBOCAP® sensor
- Accurate temperature and humidity measurements due to the low-power microglow infrared source
- Quick and easy installation and maintenance
- Calibrated, user-exchangeable measurement modules
- 3-point traceable CO₂ calibration (certification included)
- Both analog and digital communication (BACnet®/Modbus®)

**Easy Calibration**

Regular instrument maintenance guarantees a long product lifetime. Calibration is easiest done with the exchangeable measurement modules. Sensor traceability and measurement quality is easily maintained by snapping on a new module calibrated at Vaisala factory. The instrument can also be calibrated using a hand-held meter or reference gas CO₂ bottle. The service interfaces are easy to reach by simply sliding the cover down. The closed cover keeps the measurement environment stable during calibration and ensures a top-quality final result.
## Technical Data

### Dimensions in mm

<table>
<thead>
<tr>
<th>Models</th>
<th>Measurements</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMW93</td>
<td>CO₂+T</td>
<td>3-wire, voltage output</td>
</tr>
<tr>
<td>GMW93D</td>
<td>CO₂+T</td>
<td>3-wire, voltage output with display</td>
</tr>
<tr>
<td>GMW94</td>
<td>CO₂+T</td>
<td>3-wire, current output</td>
</tr>
<tr>
<td>GMW94D</td>
<td>CO₂+T</td>
<td>3-wire, current output with display</td>
</tr>
<tr>
<td>GMW93R</td>
<td>CO₂+T+RH</td>
<td>3-wire, voltage output</td>
</tr>
<tr>
<td>GMW93RD</td>
<td>CO₂+T+RH</td>
<td>3-wire, voltage output with display</td>
</tr>
<tr>
<td>GMW93RA</td>
<td>CO₂+T+RH</td>
<td>3-wire, voltage output with display and CO₂ indicator LEDs</td>
</tr>
<tr>
<td>GMW94R</td>
<td>CO₂+T+RH</td>
<td>3-wire, current output</td>
</tr>
<tr>
<td>GMW94RD</td>
<td>CO₂+T+RH</td>
<td>3-wire, current output with display</td>
</tr>
<tr>
<td>GMW95</td>
<td>CO₂+T</td>
<td>Digital (BACnet/Modbus) model</td>
</tr>
<tr>
<td>GMW95D</td>
<td>CO₂+T</td>
<td>Digital (BACnet/Modbus) model with display</td>
</tr>
<tr>
<td>GMW95R</td>
<td>CO₂+T+RH</td>
<td>Digital (BACnet/Modbus) model</td>
</tr>
<tr>
<td>GMW95RD</td>
<td>CO₂+T+RH</td>
<td>Digital (BACnet/Modbus) model with display</td>
</tr>
<tr>
<td>GMW90</td>
<td>CO₂+T</td>
<td>Configurable analog/digital models</td>
</tr>
<tr>
<td>GMW90R</td>
<td>CO₂+T+RH</td>
<td>Configurable analog/digital models</td>
</tr>
</tbody>
</table>
Technical Data

Measurement Performance

**Carbon Dioxide**
- **Measurement range**: 0 ... 5000 ppm
- **Stability in typical HVAC applications**: Total accuracy at room temperature ±75 ppm at 600 and 1000 ppm incl. 5 years drift
- **Carbon dioxide sensor**: Vaisala CARBOCAP® GM10
- **Accuracy**:
  - +20 ... +30 °C (+68 ... +86 °F): ±(30 ppm + 2 % of reading)
  - +10 ... +20 °C, +30 ... +40 °C (+50 ... +104 °F): ±(35 ppm + 2.7 % of reading)
  - -5 ... +10 °C, +40 ... +55 °C (+23 ... +50 °F, +104 ... +131 °F): ±(45 ppm + 3.8 % of reading)

**Temperature**
- **Measurement range**: -5 ... +55 °C (+23 ... +131 °F)
- **Temperature sensor**: Digital temperature sensor
- **Accuracy**: (for different temperature ranges):
  - +20 ... +30 °C (+68 ... +86 °F): ±0.5 °C (±0.9 °F)
  - +10 ... +20 °C, +30 ... +40 °C (+50 ... +104 °F): ±0.6 °C (±1.08 °F)
  - -5 ... +10 °C, +40 ... +55 °C (+23 ... +50 °F, +104 ... +131 °F): ±0.8 °C (±1.44 °F)

**Relative Humidity**
- **Measurement range**: 0 ... 95 %RH
- **Humidity sensor**: Vaisala HUMICAP® 180R
- **Accuracy at temperature range +10 ... +40 °C (+50 ... +104 °F):**
  - 0 ... 60 %RH: ±2.5 %RH
  - 60 ... 80 %RH: ±3.0 %RH
  - 80 ... 95 %RH: ±4.0 %RH
- **Accuracy at temperature range -5 ... +10 °C, +40 ... +55 °C (+23 ... +50 °F, +104 ... +131 °F):**
  - 0 ... 60 %RH: ±3.5 %RH
  - 60 ... 80 %RH: ±4.0 %RH
  - 80 ... 95 %RH: ±5.0 %RH

**Voltage Output Models**
- **Outputs**: 0 ... 5/10 V, 2 and 3 channel models
- **Load resistance**: 10 kΩ min.
- **Power consumption**: < 1 W

**Default Analog Scales**
- **CO₂**: 0 ... 2000 ppm
- **T**: -5 ... +55 °C
- **RH**: 0 ... 100 %RH

**Digital Models**
- **Power consumption**: < 1.5 W
- **Output type**: RS-485 (galvanic isolation, 1.5 kV)
- **RS-485 end of line termination**: Enable with jumper, 120 Ω
- **Supported protocols (selectable by DIP switch):**
  - **BACnet** MS/TP (selectable Master/Slave)
    - Address range, master mode: 0 ... 127
    - Address range, slave mode: 128 ... 255
  - **Modbus** RTU
    - Address range: 0 ... 247

**Inputs and Outputs**
- **Supply voltage**: 18 ... 35 VDC, 24 VAC ± 20% 50/60 Hz
- **Service port**: RS-485 line for temporary service use

**Mechanical Specifications**
- **Standard housing color**: White (RAL9003)
- **Housing material**: ABS/PC, UL-V0 approved
- **Output connector**: Screw terminals
- **Max. wire size**: 2 mm² (AWG14)
- **Service port connector**: 4-pin M8
- **Weight**: 163 g (5.75 oz)

**Compliance**
- **EMC compliance**: EN61326-1, Industrial Environment
- **IP rating**: IP50

Optional decorative cover blends the transmitter into your interior design.

**Spare Parts and Accessories**
- **CO₂ module**: GM10SP
- **Temperature Module (CO₂+T models)**: TM10SP
- **Humidity and Temperature Module (CO₂+T+RH models)**: HTM10SP
- **Decorative cover set (10 pcs)**: 236285
- **Connection cable for MI70**: 219980
- **USB cable for PC connection**: 219690

**Other Information**
- **Maximum operating temperature**: -5 ... +55 °C (+23 ... +131 °F)
- **Maximum storage temperature**: -30 ... +60 °C (-22 ... +140 °F)
- **Maximum operating humidity**: 0 ... 95 %RH

www.vaisala.com
GMW80 Series Carbon Dioxide, Humidity, and Temperature Transmitters for DCV

Vaisala CARBOCAP® Carbon Dioxide, Humidity and Temperature Transmitter Series

GMW80 is based on 2nd-generation technology for improved reliability and stability.

Features

- Superior stability due to 2nd-generation proprietary CARBOCAP® technology
- Improved accuracy due to low self-heating of microglow light source

GMW80 series transmitters are designed to fulfill the needs for CO₂ measurements in standard demand-controlled ventilation applications. Temperature measurement is always included in the GMW80 series transmitters. Combined with humidity measurement, relay, and LED CO₂ level indication, GMW80 series provides you the flexibility needed for a variety of projects.

The CARBOCAP sensors measure CO₂ accurately 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.

Easy Installation

With modern buildings often having hundreds of sensors, installation time per unit can be a significant cost factor. Returning to the building site to check sensor operation adds further costs. The GMW80 series transmitters include a number of subtle design features that have been introduced to make installation and commissioning quick and easy.

The pull-out tab makes opening the transmitter faster than before, while also doubling as a quality check slip and holder for the anti-tamper screw. The backplate can be twisted onto pre-mounted screws, and the wiring can be done easily on the clearly marked backplate. The electronics can be snapped on later when the building automation system is commissioned.

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.

Reliable Operation

The GMW80 series transmitters are optimized for low maintenance. The 2nd-generation, low-power CARBOCAP technology enables a longer lifetime and superior stability than ever before. As the power consumption is low, the heat generated by the electronics does not distort the temperature inside the sensor. The internal reference in the CO₂ sensor guarantees the best stability and operation even in constantly occupied buildings without frequent readjustments.

Benefits

- Cost-efficient, affordable
- Reliable and maintenance-free operation for up to 15 years
- Easy to install, easy to use
- Versatile – works well in buildings occupied 24/7
- Ideal for demand-controlled ventilation
Technical Data

Models

<table>
<thead>
<tr>
<th>Model</th>
<th>CO₂</th>
<th>CO₂ current and voltage output, Pt1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMW86P</td>
<td>CO₂</td>
<td>Voltage outputs, Pt1000</td>
</tr>
<tr>
<td>GMW83RP</td>
<td>CO₂</td>
<td>Voltage outputs, Pt1000, Display</td>
</tr>
<tr>
<td>GMW83DR</td>
<td>CO₂</td>
<td>Voltage outputs, Pt1000, Display</td>
</tr>
<tr>
<td>GMW83DR</td>
<td>CO₂</td>
<td>Voltage outputs, Pt1000, Display</td>
</tr>
<tr>
<td>GMW84</td>
<td>CO₂</td>
<td>Voltage outputs, Pt1000, Display</td>
</tr>
<tr>
<td>GMW84</td>
<td>CO₂</td>
<td>Voltage outputs, Pt1000, Display</td>
</tr>
<tr>
<td>GMW86</td>
<td>CO₂</td>
<td>Voltage outputs, Pt1000, Display</td>
</tr>
<tr>
<td>GMW88</td>
<td>CO₂</td>
<td>Voltage outputs, Pt1000, Display</td>
</tr>
</tbody>
</table>

1) Models with calibration certificate available (GMW83RP C/GMW83DRPC)

Measurement Performance

Carbon Dioxide

Measurement range 0 ... 2000 ppm

Accuracy across temperature range

\[+20 \ldots +30^\circ C (+68 \ldots +86^\circ F) \pm (30 \text{ ppm} \pm 3 \% \text{ of reading})\]
\[+10 \ldots +20^\circ C (+50 \ldots +68^\circ F), \pm (35 \text{ ppm} \pm 3.7 \% \text{ of reading})\]
\[+0 \ldots +10^\circ C (+32 \ldots +50^\circ F), \pm (40 \text{ ppm} \pm 4.8 \% \text{ of reading})\]

Stability in typical HVAC applications \(\pm (15 \text{ ppm} \pm 2 \% \text{ of reading})\) 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

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)

\[+10 \ldots +30^\circ C (+50 \ldots +86^\circ F) \pm 0.5 \text{ °C (0.9 °F)}\]
\[+0 \ldots +10^\circ C (+32 \ldots +50^\circ F), \pm 1^\circ C (1.8^\circ F)\]

Humidity

Measurement range 0 ... 95 %RH

Accuracy for temperature range 0 ... +30 °C (+50 ... +86 °F)

\[0 \ldots 80 \% \text{RH} \pm 3 \% \text{RH}\]
\[80 \ldots 95 \% \text{RH} \pm 5 \% \text{RH}\]

Accuracy for temperature ranges 0 ... +10 °C (+32 ... +50 °C), +30 ... +50 °C (+86 ... +122 °F)

\[0 \ldots 95 \% \text{RH} \pm 7 \% \text{RH}\]

Stability in typical HVAC applications \(\pm 2 \% \text{RH over 2 years}\)

Product lifetime > 15 years

Operating Environment

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

Inputs and Outputs

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

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

CO₂ 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

CO₂ indicator LED levels (A model) Flashing red: > 2000 ppm
Red: 1200 ... 2000 ppm
Yellow: 800 ... 1200 ppm
Green: < 800 ppm

Mechanical Specifications

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 mm² (AWG14)

Weight Plain and LED version: 114 g (4.02 oz)
Display version: 124 g (4.37 oz)
GMW88: 160 g (5.64 oz)

Spare Parts and Accessories

CO₂ module GM10SP80
INTERCAP® sensor 15778HM
GMW83, GMW83A, GMW83RP, GMW84, GMW84S and GMW86P Dimensions (in mm)

GMW88 Dimensions (in mm)

GMW83D and GMW83DRP Dimensions (in mm)