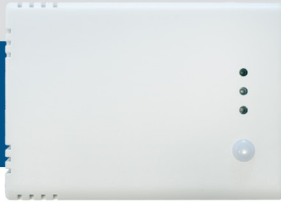# RCMFX-3
## Intelligent multifunctional CO$_2$ room sensor

The RCMFX-3 are intelligent multifunctional room sensors featuring adjustable CO$_2$, temperature and relative humidity ranges. The used algorithm controls a single analogue / modulating output based on the measured CO$_2$, T and rH values, which can be used to directly control an EC fan, an AC fan speed controller or an actuator powered damper. All parameters are accessible via Modbus RTU.

## Key features

- Spring contact terminal block
- Selectable CO$_2$, temperature and relative humidity ranges
- Fan speed control based on temperature, humidity and CO$_2$ measurements
- Bootloader for updating the firmware via Modbus RTU communication
- Modbus RTU communication
- Day / night detection via ambient light sensor
- 3 LEDs for status indication with adjustable light intensity
- Long-term stability and accuracy

## Area of use

- Demand controlled ventilation based on temperature, relative humidity and CO$_2$
- Suitable for residential and commercial buildings
- For indoor use only

## Article codes

| Article code | Supply | Imax |
|---|---|---|
| RCMFG-3 | 24 VDC | 50 mA |
| | 24 VAC ±10% | 120 mA |
| RCMFF-3 | 24 VDC | 50 mA |

## Technical specifications

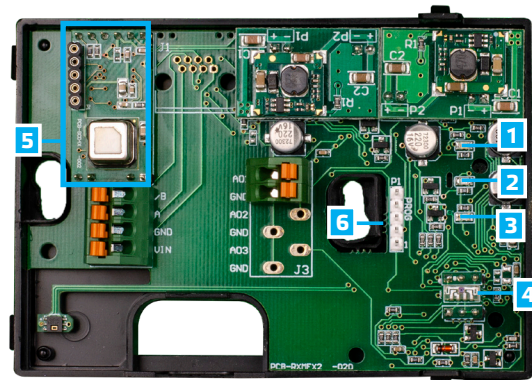| | | |
|---|---|---|
| Analogue / modulating output | 0—10 VDC mode | min. load resistance 50 kΩ ($R_L$ ≥ 50 kΩ) |
| | 0—20 mA mode | max. load resistance 500 Ω ($R_L$ ≤ 500 Ω) |
| | PWM (open-collector type) mode | 1 kHz, min. load resistance 50 kΩ ($R_L$ ≥ 50 kΩ), PWM voltage level: 3,3 VDC or 12 VDC |
| Typical range of use | Temperature | 0—50 °C |
| | Relative humidity | 0—95 % rH (non-condensing) |
| | CO$_2$ range | 400—2.000 ppm |
| Accuracy | | ±0,5 °C (5—50 °C) |
| | | ±6 % rH (20—80 % rH) |
| | 400—2.000 ppm CO$_2$ | ±(50 ppm + 3 % of the reading) |
| | 2.001—5.000 ppm CO$_2$ | ±(40 ppm + 5 % of the reading) |
| Protection standard | | IP30 (according to EN 60529) |

## How to configure

### SenteraWeb

Via a Sentera Internet Gateway you can connect your installation to the SenteraWeb HVAC cloud and:

- Easily change the parameter settings of the connected devices remotely
- Define users and give them access to monitor the installation via a standard web browser
- Log data - create diagrams and export logged data
- Receive alerts or warnings when measured values exceed alert ranges or when errors occur
- Create different regimes for your ventilation system - e.g. day-night regime

Please refer to the Modbus Register Map of the product for more details regarding the Modbus registers.
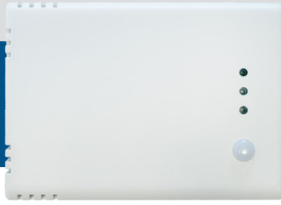
## Indications



| | | |
|---|---|---|
| 1 - Red LED | On | Measured temperature or relative humidity values are out of range or CO$_2$ is higher than or equal to Alert 2 level |
| | Blinking | Communication with one of the sensors fails |
| 2 - Yellow LED | On | Measured temperature or relative humidity values are in the alert range or CO$_2$ is higher than or equal to Alert 1 level |
| | Blinking | Modbus communication has stopped and Holding register 8 is activated (Modbus timeout > 0 seconds) |
| 3 - Green LED | On | Measured temperature or relative humidity values are within range or CO$_2$ level is lower than Alert 1 level |
| 4 - Ambient light sensor | | Low light intensity / Active / Standby |
| 5 - CO$_2$ sensor element | | To measure CO$_2$ concentration, self-calibrating |
| 6 - PROG header, P1 | 1 2 3 4 5 | Put a jumper on pins 1 and 2 and wait for at least 5 seconds to reset the Modbus communication parameters |
| | 1 2 3 4 5 | Put a jumper on pins 3 and 4 and restart the supply to enter bootloader mode |

**Note:** *By default, the LED indicators visualise the measured CO$_2$ level. When the sensor is in bootloader mode, the green and yellow LEDs flash alternately. During the firmware download, the red LED is flashing additionally.*

## Wiring and connections

| Article type | RCMFF-3 | RCMFG-3 | |
|---|---|---|---|
| VIN | 24 VDC | 24 VDC | 24 VAC ±10% |
| GND | Ground | Common ground | AC ~ |
| A | Modbus RTU (RS485) communication, signal A | | |
| /B | Modbus RTU (RS485) communication, signal /B | | |
| AO1 | Analogue / modulating output 1 - temperature, rH or CO₂ (0—10 VDC / 0—20 mA / PWM) | | |
| GND | Ground AO1 | Common ground | |
| Connections | Spring contact terminal blocks, cable cross section: 1,5 mm² | | |

*Attention! The -F version of the product is not suited for 3-wire connection. It has separate grounds for power supply and analogue output. Connecting both grounds together might result in incorrect measurements. Minimum 4 wires are required to connect -F type sensors.*

*The -G version is intended for 3-wire connection and features a 'common ground'. This means that the ground of the analogue output is internally connected with the ground of the power supply. For this reason, -G and -F types cannot be used together on the same network. Never connect the common ground of -G type articles to other devices powered by a DC voltage. Doing so might cause permanent damage to the connected devices.*

## Fixing and dimensions
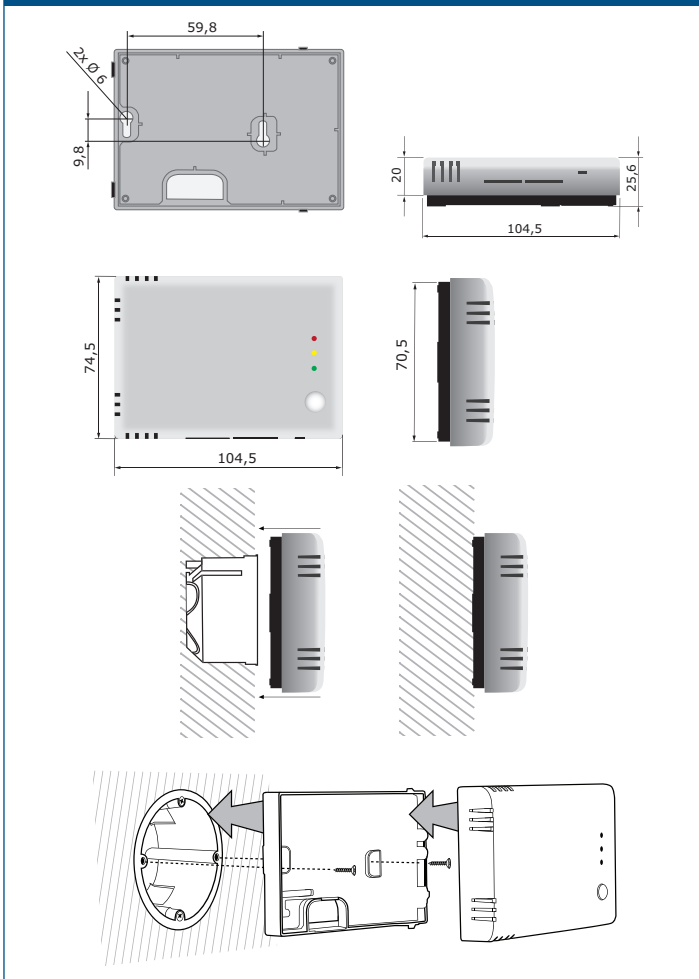


## Operational diagrams
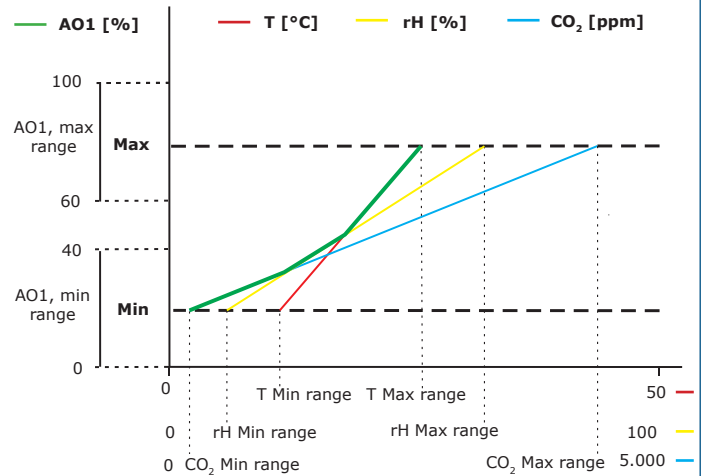


*Note: The output changes automatically depending on the highest of the T, rH or CO₂ values, i.e. the highest of the three output values controls the output. See the green line in the operational diagram above. One or multiple sensors can be deactivated. E.g. it is also possible to control the output based on the measured CO₂ value only.*

### LED indication of CO₂ sensor (default setting)
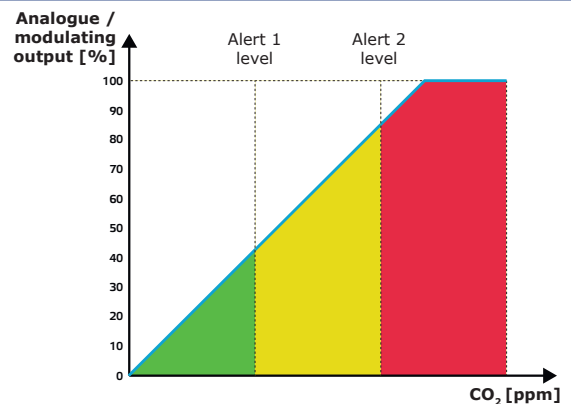


### LED indication of temperature and humidity sensors

## Standards

CE
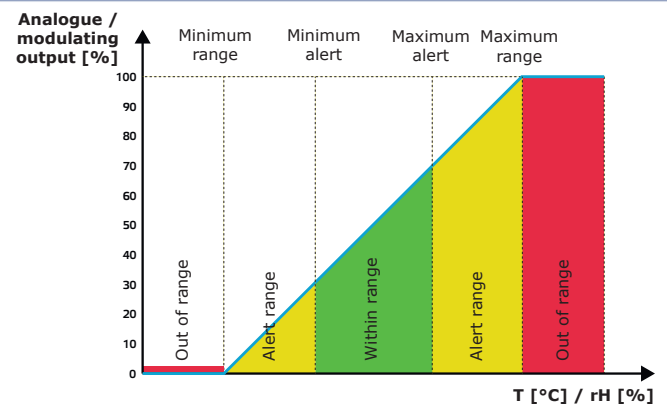
- Low Voltage Directive 2014/35/EU:
  - EN 60529:1991 Degrees of protection provided by enclosures (IP Code) Amendment AC:1993 to EN 60529
  - EN 60730-1:2011 Automatic electrical controls for household and similar use - Part 1: General requirements

- EMC Directive 2014/30/EU:
  - EN 60730-1:2011 Automatic electrical controls for household and similar use - Part 1: General requirements
  - EN 61000-6-1:2007 Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light industrial environments
  - EN 61000-6-3:2007 Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments Amendments A1:2011 and AC:2012 to EN 61000-6-3
  - EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
  - EN 61326-2-3:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements Test configuration, operational conditions and performance criteria for transmitters with integrated or remote signal conditioning.

- WEEE 2012/19/EU

- RoHs Directive 2011/65/EU:
  - EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

## Packaging

28
110
76
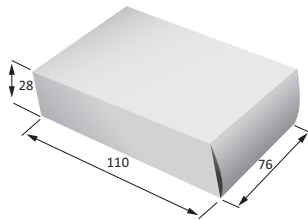
| Article | Packaging | Length [mm] | Width [mm] | Height [mm] | Net weight | Gross weight |
|---|---|---|---|---|---|---|
| **RCMFF-3 RCMFG-3** | Unit (1 pc.) | 110 | 76 | 28 | 0,092 kg | 0,105 kg |
| | Carton (24 pcs.) | 492 | 182 | 84 | 2,208 kg | 2,67 kg |
| | Box (144 pcs.) | 514 | 414 | 274 | 13,248 kg | 17,01 kg |

## Global trade item numbers (GTIN)

| Packaging | RCMFF-3 | RCMFG-3 |
|---|---|---|
| **Unit** | 05401003018880 | 05401003018897 |
| **Carton** | 05401003302972 | 05401003302989 |
| **Box** | 05401003504406 | 05401003504413 |