WRF04 CO2

Combined room sensor CO_2 / temperature / rel. humidity (optional)

Thermokon
Sensortechnik GmbH

Data Sheet

Subject to technical alteration
Issue date: 28.04.2015

Application

Surface mounted sensor for detection of CO_2, temperature and optional relative humidity in room and office spaces.

For direct connection to a DDC or a monitoring system, using 0..10 V outputs. Also available with traffic light LED and LCD display.

Types available

WRF04 CO2 VV ... CO_2 0..10 V / temperature 0..10 V

WRF04 CO2 3xV ... CO_2 0..10 V / temperature 0..10 V / humidity 0..10 V

Options

-Z   3 LEDs for displaying level of CO_2 concentration

LCD   LCD for displaying values

-R   Potential free relay output with adjustable CO2 threshold value (only with analogue output, relay 2 A / 24 V ~ or 24 V =)

Security Advice – Caution

⚠️

The installation and assembly of electrical equipment must be performed by a skilled electrician.

The device should only be used for the appropriate application. Unauthorised conversions or alteration are prohibited! The modules must not be used in relation with equipment that threatens, directly or indirectly, human health or life or with applications that can result in danger for people, animals or assets. Before connecting devices, the installation must be isolated from the power source!

For devices with controlling units (signal transducers, transmitters, etc.), it is important to make sure that the signal receiving device (actuators, generators, etc.) does not accept damaging or threatening conditions, that may arise from false signals during installation / configuration of the control unit. If necessary, disconnect the signal receiver from any source of power.

The following procedure must be carried out:

1. Disconnect the device from power.
2. Ensure the device is secured against reconnection.
3. Verify the device is not powered.
4. Prior to reconnection, ensure that the enclosure is securely closed.

Please verify and consult:

- Laws, standards and regulations.
- The current condition of the device at the time of installation, to ensure safe installation.
- The devices technical data and installation manual.

Notes on Disposal

As a component of large-scale fixed installation, Thermokon products are intended to be used permanently as part of a building or a structure at a pre-defined and dedicated location. The Waste Electrical and Electronic Act (WEEE) is not applicable. However, the product may contain valuable materials that should not be recycled rather than disposed as domestic waste. Please note the relevant regulations for local disposal.

Remarks to Room Sensors

Location and Accuracy of Room Sensors

The room sensor should be mounted in a suitable location for measuring accurate room temperature. The accuracy of the temperature measurement also depends directly on the temperature dynamics of the wall. It is important, that the back plate is completely flush to the wall so that the circulation of air occurs through the vents in the cover. Otherwise, deviations in temperature measurement will occur due to uncontrolled air circulation. Also the temperature sensor should not be covered by furniture or similar devices. Mounting next to doors (due to draught) or windows (due to colder outside wall) should be avoided.

The temperature dynamics of the wall will influence the temperature measurement. Various wall types (brick, concrete, dividing and hollow brickwork) all have different behaviours with regards to thermal variations.

Surface and Flush Mounting

The temperature dynamics of the wall influence the measurement result of the sensor. Various wall types (brick, concrete, dividing and hollow brickwork) have different behaviours with regard to thermal variations. A solid concrete wall responds to thermal fluctuations within a room in a much slower way than a light-weight structure wall. Room temperature sensors installed in flush boxes have a longer response time to thermal variations. In extreme cases they detect the radiant heat of the wall even if the air temperature in the room is lower for example. The quicker the dynamics of the wall (temperature acceptance of the wall) or the longer the selected inquiry interval of the temperature sensor is the smaller the deviations limited in time are.

Build-up of Self-Heating by Electrical Dissipative Power

Temperature sensors with electronic components always have a dissipative power, which affects the temperature measurement of the ambient air. The dissipation in active temperature sensors shows a linear increase with rising operating voltage. This dissipative power has to be considered when measuring temperature. In case of a fixed operating voltage (±0,2 V) this is normally done by adding or reducing a constant offset value. As Thermokon transducers work with a variable operating voltage, only one operating voltage can be taken into consideration, for reasons of production engineering. Transducers 0..10 V / 4..20 mA have a standard setting at a operating voltage of 24 V =. That means, that at this voltage, the expected measuring error of the output signal will be the least. For other operating voltages, the offset error will be increased or lowered by a changing power loss of the sensor electronics. If a re-calibration should become necessary later directly on the sensor, this can be done by means of a trimming potentiometer on the sensor board.

Remark: Occurring draft leads to a better carrying-off of dissipative power at the sensor. Thus temporally limited fluctuations might occur upon temperature measurement.

Application Notice for Humidity Sensors

Refrain from touching the sensitive humidity sensor. Any touch of it will result in an expiration of warranty.

Under normal environmental conditions we recommend a recalibration interval of about 1 year to maintain the indicated accuracy. At high ambient temperatures and high humidity or when using the sensor in aggressive gases, an earlier recalibration or a change of the humidity sensor can become necessary. Such recalibrations or a probable sensor change are not part of the general warranty.

Information about Indoor Air Quality CO_2

EN 13779 defines several classes for indoor air quality:

Category	CO_2 content above the content in outdoor air in ppm		Description
	Typical range	Standard value	
IDA1	<400 ppm	350 ppm	High indoor air quality
IDA2	400.. 600 ppm	500 ppm	Mean indoor air quality
IDA3	600..1.000 ppm	800 ppm	Moderate indoor air quality
IDA4	>1.000 ppm	1.200 ppm	Low indoor air quality

Information about Self-Calibration Feature CO_2

All gas sensors are subject to drift caused by components. This fact results generally in the need to recalibrate the sensors regularly.

With dual channel technology Thermokon integrates automatic self-calibration for different fields of operation. In contrast to common used ABC-Logic sensors with self-calibration dual channel are suitable for applications operating 24 hours, 7 days a week as for example hospitals.

**Manual calibration is not necessary!**

## Technical Data

Output voltage   2x 0..10 V (VV), 3x 0..10 V (3xV), load max. 10 mA
Measuring values   VV: CO_2 + temperature, 3xV: CO_2 + temperature + humidity
Power supply   15..24 V = (±10%) or 24 V~ (±10%)
Power consumption   max. 3 W (24 V =) | 6 VA (24 V ~)
Measuring range CO_2 0..2000 ppm
Measuring range temperature 0..+50 °C
Measuring range humidity   0..100% rH non-condensing
Accuracy CO_2 ±75 ppm or 10% of measuring range (typ. at 21 °C)
Temperature dependence CO_2 typ. 2 ppm per °C (0..+50 °C)
Accuracy temperature   ±1% of measuring range (typ. at 21 °C)
Accuracy humidity   ±2% at range 10..90% rH (typ. at 21 °C)
Calibration   Self calibration dual channel
Sensor   NDIR (non dispersive, infrared)
LCD   29x12 mm, monochrome (optional)
Traffic light functionality (-Z) 3 LEDs showing air quality (optional)
                            green LED is on while   0.. 750 ppm
                            yellow LED is on while   751..1250 ppm
                            red LED is on while   1251..2000 ppm
Ambient temperature   0..+50 °C
Ambient humidity   max. 85% rH non condensed
Cable entry type   Rear entry or top/bottom of enclosure
Protection   IP20 according to EN 60529
Terminal block   Terminal block, max 1,5 mm²
Enclosure colour   pure white
Enclosure material   ASA
Warm-up time   <2 minutes (operational), 15 minutes (max. accuracy)
Weight   90 g

Terminal Connection Plan

1 GND-wire for short connection wires
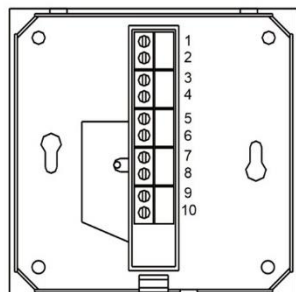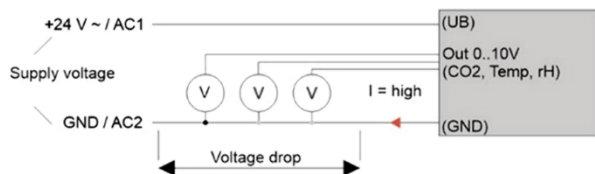

2 GND-wires for long connection wires
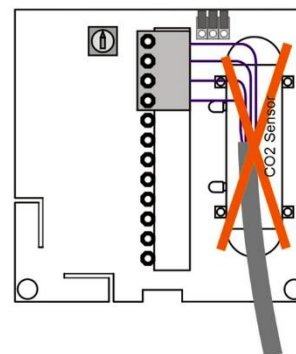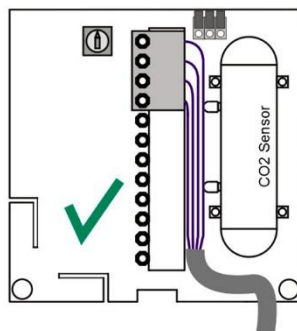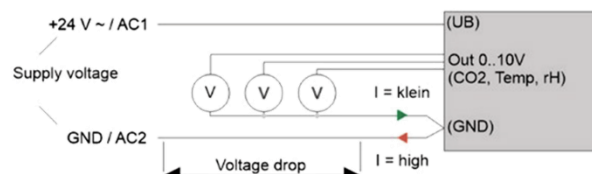
Clamp	Type WRF04 CO2 VV		Type WRF04 CO2 3xV	
1	GND/AC2		GND/AC2	
2	UB +24 V ~/AC1		UB +24 V ~/AC1	
3	Temp.	0..10 V	Temp.	0..10 V
4	CO_2	0..10 V	CO_2	0..10 V
5	not used		rel. humidity	0..10 V
6	not used		not used	
7	not used		not used	
8	Relay C	(only option -R)	Relay C	(only option -R)
9	Relay NO	(only option -R)	Relay NO	(only option -R)
10	Relay NC	(only option -R)	Relay NC	(only option -R)

Configuration

P1   Offset temperature   ±3 K

P2   Offset CO_2 ±150 ppm

P3   Offset rel. humidity   ±15% rH   mode switch position 0
       CO_2 set point   for relay option   mode switch position 2
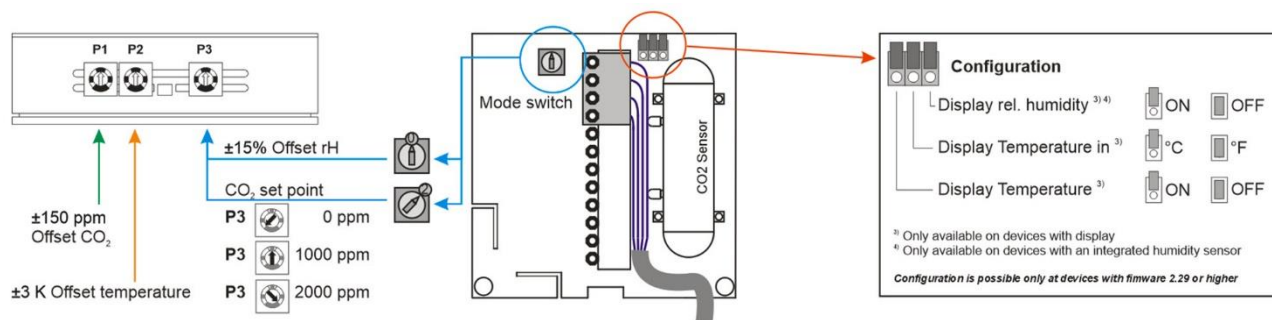
For configuration set mode switch to the appropriate position and then choose offset or set point using P1 to P3. With changing P1 to P3 the value is stored in the device.

Changing set point will not change offset for rel. humidity, if the mode switch has been set to the correct position.

Mounting Advices

Make sure that the device is power-off, if you install it!

The device can be installed on a smooth wall surface or a flush box. A representative location for room temperature without direct insolation should be selected for the device.

The use of deep installation boxes is recommended due to increased storage capacity for the wires. Empty tubes have to be sealed to avoid air draught from the installation tube.

(1) For wiring, the upper part of the base plate has to be removed. Base plate and upper part are connected via snap tab located in the middle of the enclosure bottom.

(2) The installation of the base plate to the smooth wall surface can be done either by sticking using the enclosed adhesive film (A) as well as using plugs and screws.

(3) Finally the device is clicked into the base plate.
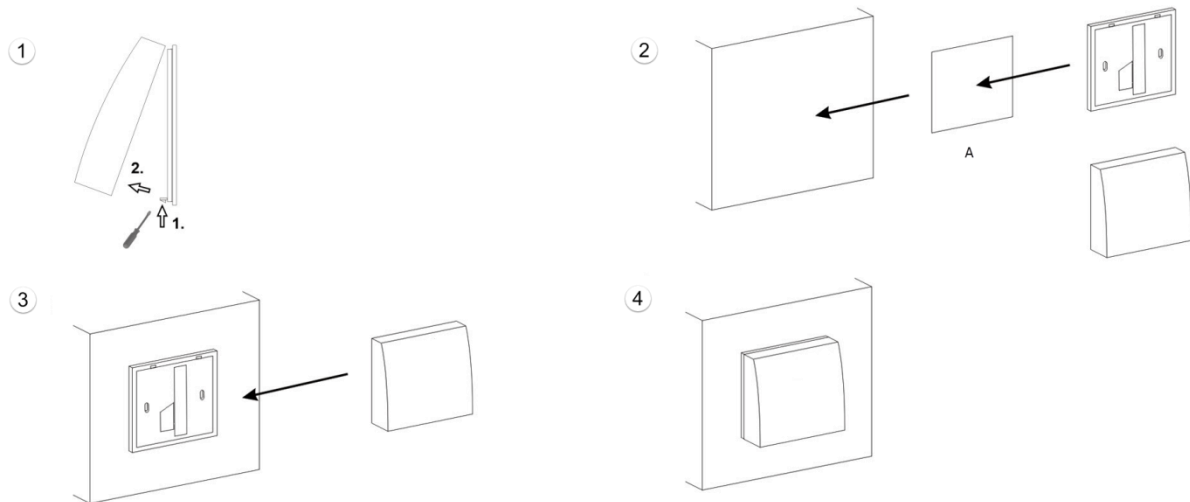
Dimensions (mm)
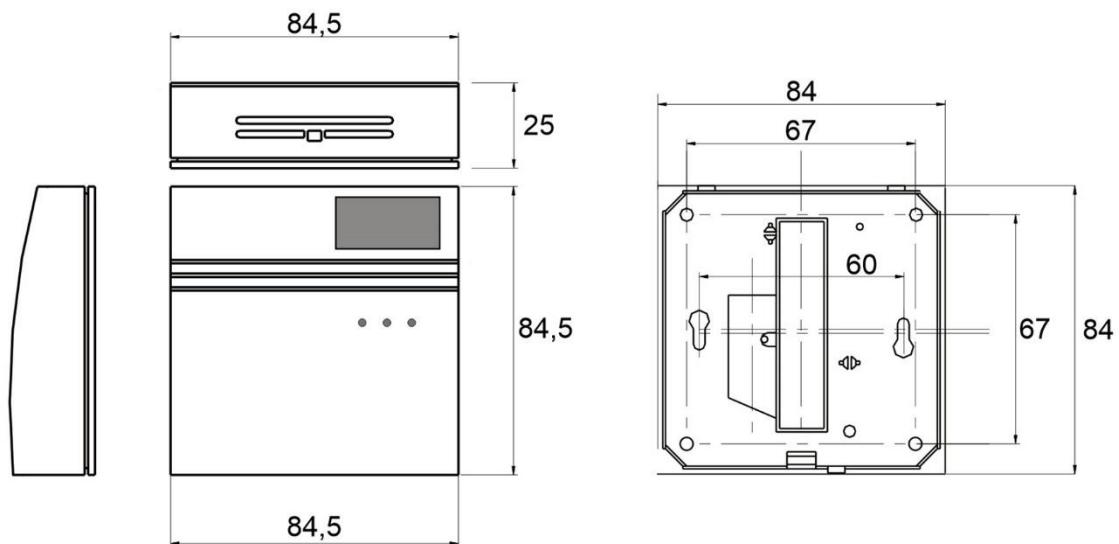
Accessories

Rawlplugs and screws (2 pcs. each)   Art.No. 102209
Frame for surface mounting WRF04   Art.No. 111584
Ball stroke protection BS100 (only for WRF04)   Art.No. 103312