» WRF04 CO2 RS485 BACnet

Combined room sensor CO2 optional temperature and humidity

thermokon®
HOME OF SENSOR TECHNOLOGY

Datasheet

Subject to technical alteration
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» APPLICATION

Surface mounted sensor for detection of CO2, temperature and optional relative humidity in room and office spaces. For direct connection to a DDC or a monitoring system, using BACnet protocol. Also available with traffic light LED.

» TYPES AVAILABLE

Room sensor CO2 + temperature – active RS485 BACnet MS/TP

WRF04 CO2 RS485 BACnet
WRF04 CO2 RS485 BACnet TLF

Room sensor CO2 + temperature + relative humidity – active RS485 BACnet MS/TP

WRF04 CO2 rH RS485 BACnet
WRF04 CO2 rH RS485 BACnet TLF

» SECURITY ADVICE – CAUTION

The installation and assembly of electrical equipment should only be performed by authorized personnel.

The product should only be used for the intended application. Unauthorised modifications are prohibited! The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or assets. Ensure all power is disconnected before installing. Do not connect to live/operating equipment.

Please comply with

- Local laws, health & safety regulations, technical standards and regulations
- Condition of the device at the time of installation, to ensure safe installation
- This data sheet and installation manual

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»NOTES ON DISPOSAL



As a component of a 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, hence the Waste Electrical and Electronic Act (WEEE) is not applicable. However, most of the products may contain valuable materials that should be recycled and not disposed of 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 an 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 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/element. Touching the sensitive surface will void warranty.

For standard environmental conditions re-calibration is recommended once a year to maintain the specified accuracy.
When exposed to high ambient temperature and/or high levels of humidity or presence of aggressive gases (i.e. chlorine, ozone, and ammonia) the sensor element may be affected and re-calibration may be required sooner than specified. Re-calibration and deterioration of the humidity sensor due to environmental conditions are not subject 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	Good indoor air quality
IDA2	400.. 600 ppm	500 ppm	Standard indoor air quality
IDA3	600..1.000 ppm	800 ppm	Moderate indoor air quality
IDA4	>1.000 ppm	1.200 ppm	Poor indoor air quality

»INFORMATION ABOUT SELF-CALIBRATION FEATURE CO_2

Virtually all gas sensors are subject to some sort of drift. The degree of drift is partially dependent on the use of quality components and good design. But even with good components and excellent design, a small amount of drift can still occur in the sensor that may ultimately result in the need for a sensor to be recalibrated.
The natural drift of the sensor is caused by:

• Dust/dirt • Aggressive chemicals absorbed inside chamber / optical elements • Corrosion inside chamber (high rh, condensation) • Temperature cycles causing mechanical stress • Electron/hole migration in the photo detector's semiconductor • Drift of photo amplifiers • External mechanical stress on chamber • Light source wear-off

Most of the effects listed above will be compensated by the automatic self-calibration of the sensor's dual channel technology. In contrast to commonly used ABC-Logic self-calibrating sensors with dual channel technology are suitable for all applications including those operating 24 hours, 7 days a week, for example hospitals.

However some effects cannot be compensated automatically and may result in a very gradual natural drift of a few ppm per month. This natural drift is not covered by Thermokon's 5-year warranty.

»TECHNICAL DATA

Measuring values	CO2, temperature, humidity
Network technology	BACnet MS/TP, Baudrate 9.600, 19.200, 38.400, 57.600 or 76800
Power supply	15..24 V = (±10%) or 24 V~ (±10%) SELV
Power consumption	max. 3 W (24 V = | 6 VA (24 V =)
Measuring range temp	0..+50 °C
Measuring range humidity (type-dependent)	0..100% rH non-condensing
Measuring range CO2	0..2000 ppm
Accuracy temperature	±0,5 K (typ. at 21 °C)
Accuracy humidity (type-dependent)	±2% between 10..90% rH (typ. at 21 °C)
Accuracy CO2	±75 ppm or 10% of measuring range (typ. at 21 °C), whatever is greater
Calibration	self-calibration, dual channel
Sensor	NDIR (non-dispersive, infrared)
Display (optional)	3 LEDs showing air quality (traffic light function 'TLF'
Enclosure	PC, pure white
Protection	IP30 according to EN 60529
Cable entry	breaking points top/bottom, entry on rear
Connection electrical	terminal block max. 1,5mm²
Ambient condition	0..+50 °C, max. 85% rH non-condensing
Weight	90 g
Mounting	to be mounted flat onto the surface using adhesive foil or screws

»PRODUCT TESTING AND CERTIFICATION

CE

Declaration of conformity

The declaration of conformity of the products can be found on our website https://www.thermokon.de/.

»MOUNTING ADVICES

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

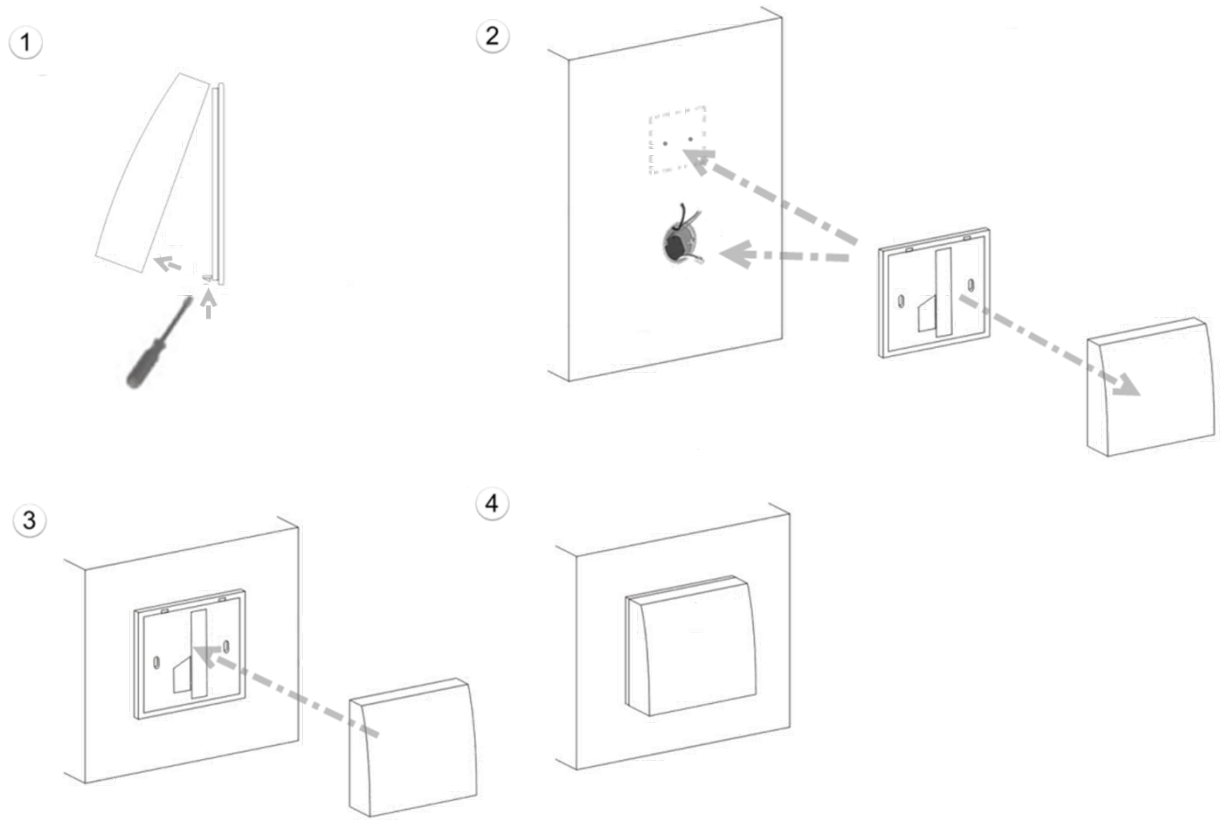
The device can be installed on a smooth wall surface or a flush box. A representative location for room temperature without direct insolation should be selected for the device.

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.



»TLF - TRAFFIC LIGHT FUNCTION (OPTIONAL)

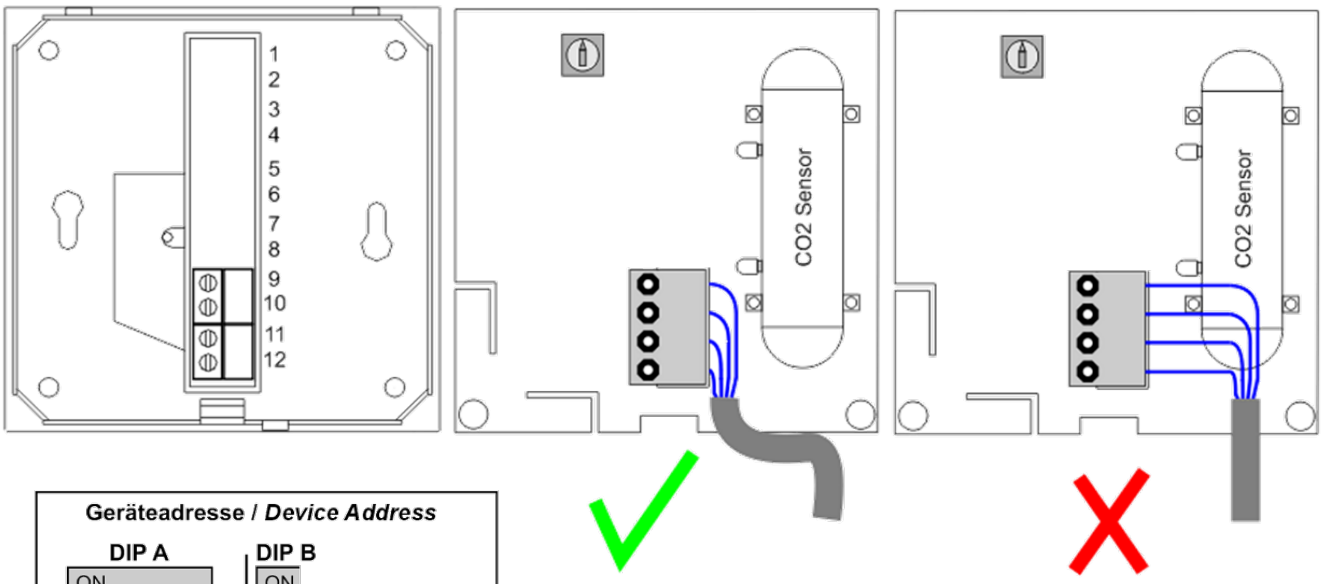
The 3 LEDs visualize the air quality

CO2	Behavior of the LEDs
0..750 ppm	green LED lights up
751..1250 ppm	yellow LED lights up
1251..2000 ppm	red LED lights up

» CONNECTION PLAN

Note:

Avoid laying the cable on the CO2 sensor, because this may damage the device and influence the measuring values.



Geräteadresse / *Device Address*

DIP A 1	2	3	4	5	6	DIP B 1	Adresse / *Address*
off	off	off	off	off	off	off	0
on	off	off	off	off	off	off	1
off	on	off	off	off	off	off	2
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
off	on	on	on	on	on	on	126
on	on	on	on	on	on	on	127

Baudrate

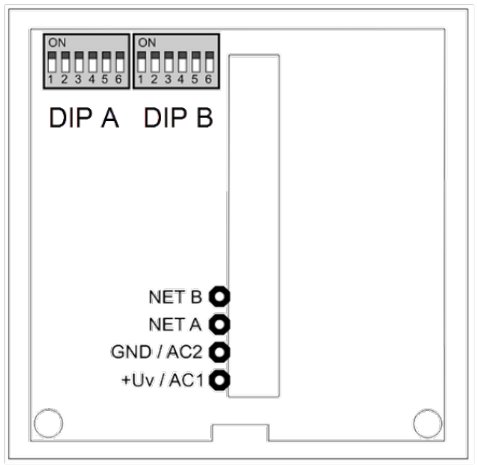
2	3	4	Baud
off	off	off	9600
on	off	off	19200
off	on	off	38400
on	on	off	57600
off	off	on	76800

DIP B

5	
off	reserviert
on	*reserved*

Abschluss / *Termination*

6	
off	**inaktiv** (Standard / *default*)
on	**120Ohm**



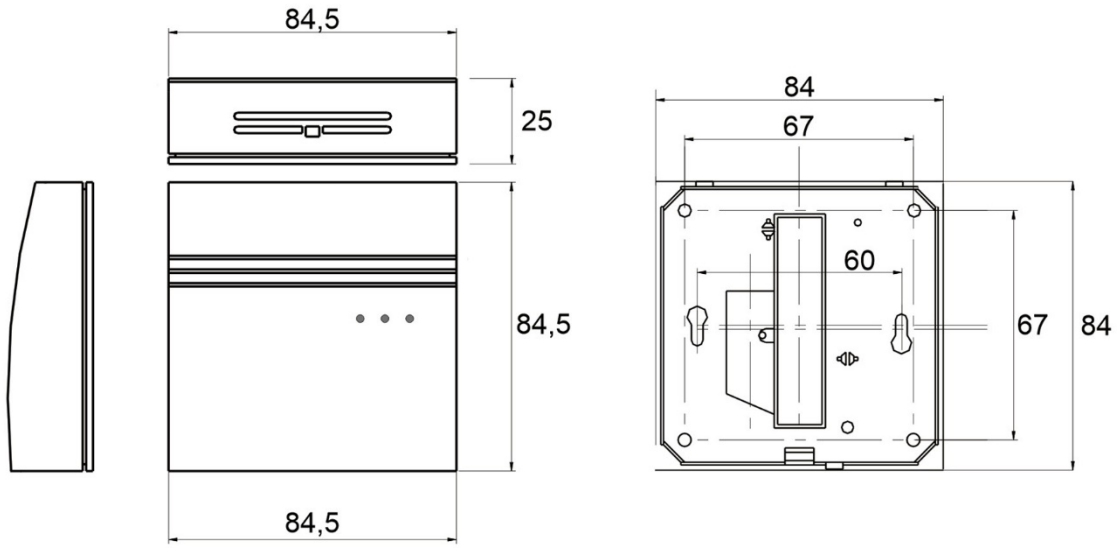
» CONFIGURATION SOFTWARE AND PROTOCOL DESCRIPTION

ZIP

BACnet Objects:
RS485 BACnet interface

A detailed description of the BACnet interface can be found at the following link:
→ **Download**

» DIMENSIONS (MM)



» ACCESSORIES (OPTIONAL)

Rawl plugs and screws (2 pcs. each)	Item No.: 102209
Frame for surface mounting WRF04	Item No.: 111584
Ball stroke protection BS100	Item No.: 103312