# NOVOS 3 (EPD) RS485 BACnet

Room sensor
Optional: $CO_2$ | VOC | Temperature | Humidity

thermokon®
HOME OF SENSOR TECHNOLOGY

## Data sheet

Subject to technical changes
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## »APPLICATION

The maintenance-free sensor creates conditions for a pleasant indoor climate and well-being. Typical applications are schools, office buildings, hotels, cinemas or similar objects. The device is available with additional LED display (traffic light function) with color change function for displaying the measured values. The threshold values can be individually configured via the Thermokon NOVOSapp.

## »TYPES AVAILABLE

**Room sensor – active, RS485 BACnet**

- NOVOS 3 Temp RS485 BACnet*2
- NOVOS 3 Temp_rH RS485 BACnet*2
- NOVOS 3 CO2 Temp RS485 BACnet*1,2
- NOVOS 3 CO2 Temp_rH RS485 BACnet*1,2
- NOVOS 3 VOC Temp RS485 BACnet*2
- NOVOS 3 VOC Temp_rH RS485 BACnet*2
- NOVOS 3 CO2 + VOC RS485 BACnet*1,2
- NOVOS 3 CO2 + VOC Temp RS485 BACnet*1,2
- NOVOS 3 CO2 + VOC Temp_rH RS485 BACnet*1,2

*1 optional available with TLF (RGB-LED to display the air quality)

*2 optional available with ePaper Display

## »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. Unauthorized modifications are prohibited! The product must not be used in relation to any equipment that in case of 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 installation. Do not connect to live/operating equipment.

Please comply with

- Local laws, health & safety regulations, technical standards and regulations
- The state of the technology at the time of installation
- This data sheet and installation manual

## »BUILD-UP OF SELF-HEATING BY ELECTRICAL DISSIPATIVE POWER

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 must 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.

Thermokon transducers can be operated with variable operating voltages. The transducers are set at the factory with a reference operating voltage of 24 V =.

At this voltage, the expected measuring error of the output signal will be the least. Other operating voltages can cause a measurement deviation changing power loss of the sensor electronics.

A recalibration can be carried out directly on the unit or via a software variable (app or bus).

## »APPLICATION NOTICE FOR HUMIDITY SENSORS

At regular environmental conditions, it is recommended to calibrate the sensor annually to check the compliance with the accuracy required in the application. The following conditions can damage the sensor element or lead in long term to loss of the specified accuracy:

- Mechanical stress
- Contamination (e.g. dust or fingerprints)
- Aggressive chemicals
- Ambient conditions (e.g. condensation on measuring elements)

**Do not touch the sensor elements!**

**Re-calibration or exchange of the sensor elements are not subject of the general warranty.**

## »INFORMATION ABOUT SELF-CALIBRATION FEATURE $CO_2$

All gas sensors are subject to drift. The degree of drift is dependent on the use of components and product design. In addition, the following environmental conditions, among others, can accelerate/favor the aging and wear of the sensors:

- Mechanical stress (also due to temperature fluctuation)
- Contamination (e.g. dust or fingerprints)
- Aggressive chemicals
- Ambient conditions (high humidity or condensation on measuring elements)

An internal self-calibration function with dual channel technology compensates for the caused drift. Thermokon sensors are for permanent use (e.g. hospitals).

## »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 |

## »USER INFORMATION FOR VOC AIR QUALITY SENSORS

Volatile organic compounds (VOC) are gaseous and vaporous substances of organic origin present in the air. VOC sensors detect the major portion of air quality that is perceived olfactorily (through the sense of smell) by humans (e.g. body odors, tobacco smoke, emissions from materials such as furniture, carpets, paints, adhesives, etc.).

**The VOC value is an application-specific indicator of indoor air quality and does not provide any information about the composition of the substances present.**

A VOC sensor oxidises the organic molecules that come into contact with it, causing the resistance of the semiconductor to change. The VOC index (0...500) describes the air quality relative to the learned indoor air conditions. A value of 100 corresponds to “normal” indoor air quality (reference value determined dynamically over approximately 8 days); values below 100 indicate an improvement, while values above 100 indicate a deterioration in air quality. If the room is not ventilated despite high index values, the value will gradually approach 100 again, as the sensor learns the poor air as the new “normal”.

**The sensor must not be exposed to direct drafts, as these can significantly influence and distort the measurement result. Any contact with the sensitive sensors must be avoided and will void the warranty.**

| VOC index | Classification | Meaning | Recommendation |
|---|---|---|---|
| **0 – 100** | Better air quality | Lower VOC load than the learned reference level of the previously measured indoor air quality (see Section 4.2), e.g. after ventilation, when using an air purifier, or with low room occupancy. | No action needed |
| **100** | Reference value (baseline) | Corresponds to the “normal” indoor air quality learned by the algorithm. On Thermokon devices, this reference is determined dynamically over approx. 8 days (see Section 4.2). | Normal condition |
| **100 – 500** | Worse air quality | Higher VOC load than the learned reference level, e.g. due to cooking, cleaning agents, high occupancy, or emissions from new furniture or fresh paint. | Ventilation or air purification are recommended; at high values (> 350) intense ventilation is recommended |

## » TECHNICAL DATA

| | |
|---|---|
| **Measuring values** *(optional)* | Temperature, humidity, $CO_2$, VOC |
| **Network technology** | RS485 BACnet, **Fail-safe Biasing required** |
| **Power supply*** | 15..35 V = (or 19..29 V ~)* SELV |
| **Power consumption** | Typ. 0,4 W (24 V =) \| 0,8 VA (24 V ~) |
| **Display** *(optional)* | ePaper, as measured value display, display can be parameterized via Thermokon NOVOSapp |
| **Inputs** | 1 input for floating contact |
| **Enclosure** | PC V0, pure white, design cover (optional) |
| **Degree of protection** | IP20, according to DIN EN 60529 |
| **Cable entry** | Open rear side, predetermined breaking points at the bottom, drill marks on the top |
| **Electrical connection** | Tool-free mountable spring terminal, max. AWG16 |
| **Ambient condition** | -31..+158 °F, max. 85 % (non-condensing),<br>with $CO_2$ or VOC sensor operating temperature range: +32..+122 °F |
| **Mounting** | Surface mounted on flush-mounting box (Ø = 2.36 in. \| 60 mm) or to be mounted flat onto the surface using screws, base part can be mounted and wired separately |
| **Notes** | For configuration, an optional programming dongle (Bluetooth) is available (refer to accessories) |

***Power supply***
*When several BUS devices are supplied by one 24 V AC voltage supply, it is to be ensured that all “positive” operating voltage input terminals (+) of the field devices are connected with each other and all “negative” operating voltage input terminals (-) (= reference potential) are connected together (in-phase connection of field devices). In case of reversed polarity at one field device, a supply voltage short-circuit would be caused by that device.* ***The consequential short-circuit current flowing through this field may cause damage to it. Therefore, pay attention to correct wiring.***

*AC voltage requires higher power consumption. This results in greater self-heating and requires an on-site offset adjustment. Therefore, we recommend using a DC power supply.*

### » Temperature

| | |
|---|---|
| **Measuring range temp** | -31..+158 °F |
| **Accuracy temperature** | ±0,5 K (typ. 70 °F) |

### » Humidity

| | | | | |
|---|---|---|---|---|
| **Measuring range humidity** *(optional configurable)* | **Relative humidity** (default) 0..100 % rH | **Enthalpy** 0..85 KJ/kg \| 0..37 BTU/lb | **Absolute humidity** 0..50 \| 0..80 g/m³ 0..1,5 \| 0..2,3 g/ft³ | **Dew point** +32..+122 \| -4..+176 °F |
| | Configurable via Thermokon NOVOSapp or BUS | | | |
| **Accuracy humidity** | ±2 % between 10..90 % rH (typ. at 70 °F) | | | |

### » $CO_2$

| | |
|---|---|
| **Measuring range $CO_2$** | 0..2000 ppm \| 0..5000 ppm (configurable via Thermokon NOVOSapp or BUS) |
| **Accuracy $CO_2$** | ±50 ppm +3 % of reading (typ. at 21 °C, 50 % rH, 1015 hPa) |
| **Calibration** | Self-calibration, Dual channel |
| **Sensor** | NDIR (non-dispersive, infrared) |
| **Display** *(optional)* | RGB LED (traffic light function 'TLF') |

### » VOC

| | |
|---|---|
| **Measuring range VOC** | VOC index: 0..500 |
| **Sensor** | Heated metal oxide semiconductor |

## » MOUNTING ADVICE

The Accuracy of the room sensors is influenced by the technical specifications as well as the positioning and the installation type.

**During assembly:**

- Seal mounting box (if present).
- Installation type, air draught, heat source, radiation heat or direct sunlight can affect the measurement.
- Building material specific properties of the installation place *(brick-, concrete-, partition wall, cavity wall)* can affect the measurement.

**Assembly not recommended:**

- in air draughts (e.g.: close to windows/doors/fans)
- near heating sources,
- in direct sunlight
- niches/between furniture

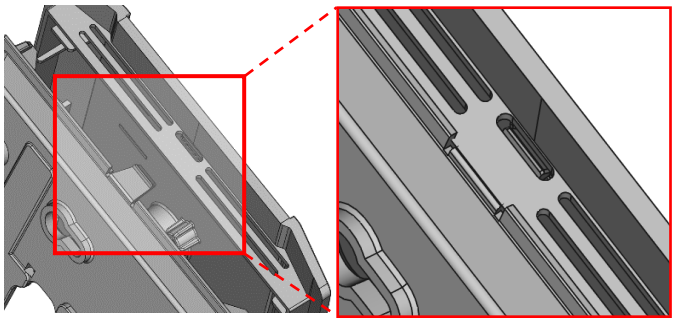
Please make sure that the device is de-energised if you want to install it!

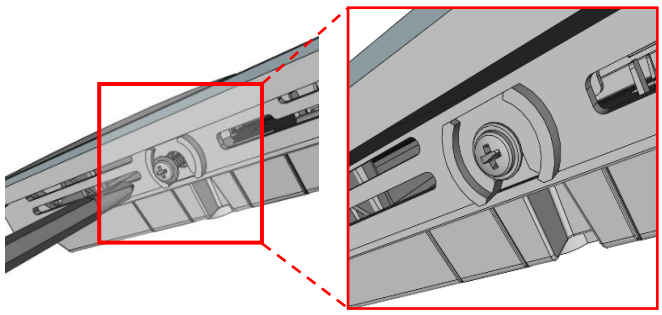
The installation can be performed on the flat wall surface or on a flush-mounted box. A representative place should be selected. Sunshine and draft, e.g. in the installation tube should be avoided, so that the measurement result is not falsified. Seal the end of the installation tube.

- for wiring, the upper part of the device must be removed from the base plate. Base plate and upper part are detachable connected to each other by means of locking lugs.
- the base plate is mounted on the flat wall surface with wall plugs and screws.
- finally, the device is attached to the base plate and fixed with the screw.
- internal connecting wires must be routed in such a way that they do not press against the PCB or the sensors. Excess cable must be stored in the flush-mounted wall box.

**Housing open/close**

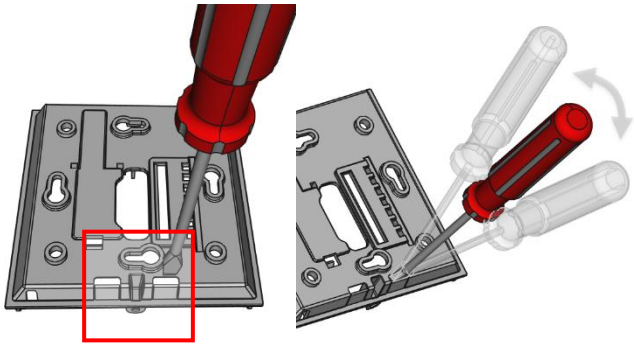
| Snap the upper part of the housing into the locking lug on the upper side | Fix the upper part of the housing on the underside with the screw |
|---|---|

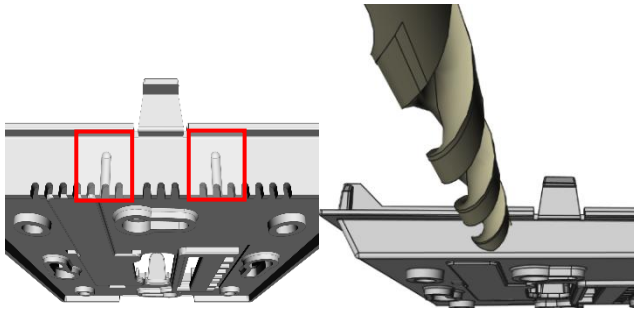




**Cable entry**

| There are predetermined breaking points for 2 optional cable entries on the underside of the base plate | On the upper side of the base plate there are 2 grits as position for a drill hole max. Ø 6 mm |
|---|---|



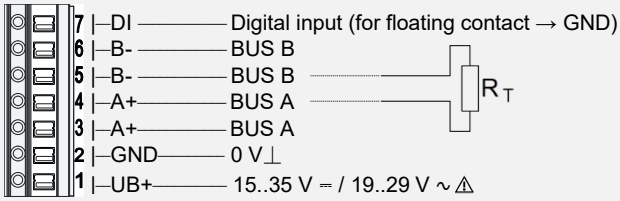


When using a drill, you should absolutely ensure that the base plate is firmly clamped. Before drilling, the pressure must be reduced and carefully drilled. A sudden break-through of the drill bit can be the result.

## »WIRING DIAGRAM

**Room sensor – active, RS485 BACnet**

**NOVOS 3 RS485 BACnet**




**With alternating voltage, the correct polarity must be ensured!**
**Please note the technical data.**

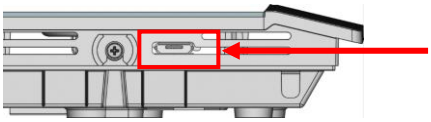
**Don´t forget the BUS termination (120 Ω) at the last device of the line!**
*(Not included in the scope of delivery)*

## » CONFIGURATION

The configuration is performed in powered state. The following options are available for configuring the device:

| Device connection | Micro USB | Micro USB |
|---|---|---|
| Configuration adapter | Thermokon USB interface  | USB Bluetooth dongle   |
| Configuration software | PC/notebook with uConfig software<br>*Parameterisation via desktop PC/notebook with uConfig software, via Thermokon USB interface* – Item No. 597838* | Smartphone/tablet with NOVOSapp<br>*Parameterisation with mobile devices via Bluetooth and NOVOSapp. A separately available Bluetooth dongle* is required – Item no. 668262* |

**Commercially available Bluetooth dongles or USB to Micro-USB adapter cables are not compatible. You need a mobile device that supports at least Bluetooth version 4.1. The configuration app with the corresponding instructions can be downloaded from the Google Play Store or the Apple App Store.*



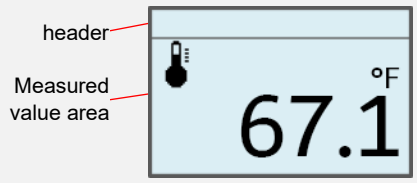
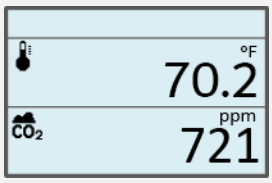
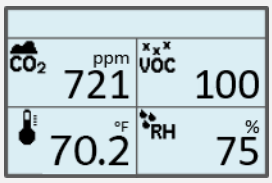
Position of the Micro USB port, see bottom of the device, for configuration with Bluetooth dongle or Micro USB programming interface

Configuration during operation is additionally possible via BMS through RS485 connection.

## » DISPLAY

The display scales automatically depending on the device and the number of measured variables. Parameters such as the display/hiding of measured variables are changed via the app. The software and hardware versions are displayed during the boot process.

**Display**

| 1 measured value | 2 measured values | 3 or 4 measured values |
|---|---|---|
|   |   |   |

**Symbols**

| Measured values* | | | | Header symbols *(can be displayed in the header via bus)** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature | Humidity | Eco-Mode | Notice | Heating | Cooling |
| VOC | $CO_2$ | Window contact | Occupied | Unoccupied | Maintenance |

**Additional symbols** *(displayed when triggered)*

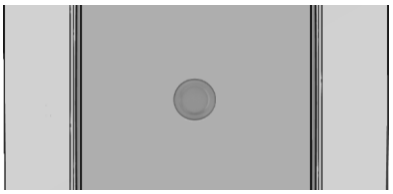
| | | |
|---|---|---|
| Traffic light function* | Threshold value colored LED illumination | LED illumination |
| Notice | Internal sensor error (display next to measured variable) | Measured value area |

*depending on variant

## »TLF – TRAFFIC LIGHT FUNCTION (OPTIONAL)

The traffic light function can be implemented with any available measured variable. Different colors can be assigned for up to 5 different measuring ranges.

**Example: CO2 TLF**
The LED visualizes the air quality value (Thresholds and colors optionally configurable via Thermokon NOVOSapp or BUS).

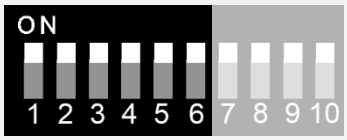


| $CO_2$ (Default setting) | LED behavior |
|---|---|
| 0..750 ppm | LCD glows green |
| 751..1250 ppm | LCD glows yellow |
| 1251..2000 ppm | LCD glows red |

## »DIP SWITCH SETTINGS

The BACnet address of the device is set in the range of 1..127 (binary encoded) using a 6-pole DIP switch. With address 0 via DIP, an extended address range (128..247) is available via NOVOSapp.

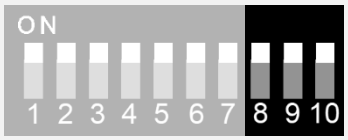
**BACnet address – DIP 1..7 (binary coded)**




| DIP switch | 1 = ON | 2 = ON | 3 = ON | 4 = ON | 5 = ON | 6 = ON | 7 = ON |
|---|---|---|---|---|---|---|---|
| Value | $2^0$ (1) | $2^1$ (2) | $2^2$ (4) | $2^3$ (8) | $2^4$ (16) | $2^5$ (32) | $2^6$ (64) |

**Default setting, adress 127**

**Baud rate – DIP 8..10**




| 8 | 9 | 10 | Baud rate |
|---|---|---|---|
| OFF (ON) | OFF (ON) | OFF (ON) | 9.600 (Default setting) |
| ON | OFF | OFF | 19.200 |
| OFF | ON | OFF | 38.400 |
| ON | ON | OFF | 57.600 |
| OFF | OFF | ON | 76.800 |
| ON | OFF | ON | 115.200 |

| Obj. type | Inst.-No | Object name | Unit *configurable via <File Transfer>* | |
|---|---|---|---|---|
| | | | SI | IMP |
| AI | 500 | Temperature | °C | °F |
| AI | 501 | Relative humidity | % rH | |
| AI | 502 | Absolute humidity | g/m³ | gr/ft³ |
| AI | 503 | Enthalpy | kJ/kg | BTU/lb |
| AI | 504 | Dew point | °C | °F |
| AI | 505 | $CO_2$ | ppm | |
| AI | 506 | VOC | Index | |
| AI | 507 | $CO_2$-/VOC-Mix | % | |
| BI | 514 | Status digital input | 1 ON/0 OFF | |

**BACnet objects, PICS and BIBBs**
NOVOS RS485 BACnet interface
A detailed description of the BACnet interface can be found under the following link:
https://www.thermokon.de/direct/files/novos-rs485-bacnet-manual.zip

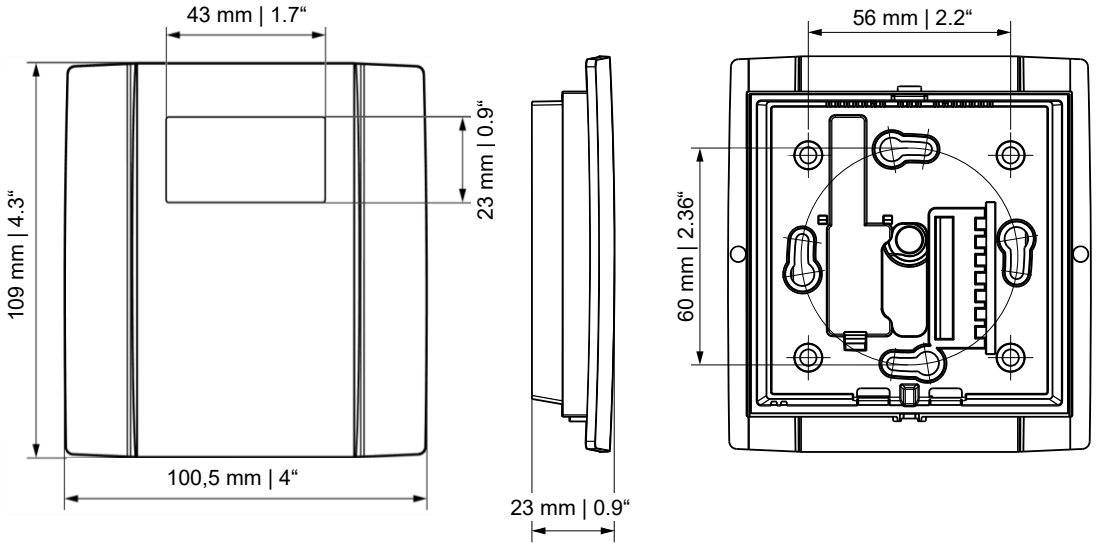
## »PRODUCT TESTING AND CERTIFICATION

**Declaration of conformity**
The declaration of conformity of the products can be found on our website:
https://www.thermokon.de/direct/en-gb/categories/novos-3

## »NOTES ON DISPOSAL

The crossed-out wheelie bin symbol indicates that the product or removable batteries must not be disposed of with household or commercial waste. Within the EU, you are legally obliged to dispose of the product separately and appropriately in accordance with the national laws of your country. Alternatively, please contact your supplier or Thermokon Sensortechnik GmbH. Further information can be found at: www.thermokon.com

## »DIMENSIONS (MM / IN.)




## »ACCESSORIES (OPTIONAL)

| | |
|---|---|
| Wall plugs and screws (2 pcs. each) | Item No. 102209 |
| PSU-UP24 – flush mount power supply, 24 V (AC input: 100..240 V ~ \| DC output 24 V = 0,5 A) | Item No. 645737 |
| Mounting bracket (surface mounted) white | Item No. 795050 |
| Mounting bracket (surface mounted) black | Item No. 795074 |
| | |
| Bluetooth dongle | Item No. 668262 |
| Thermokon USB interfaceItem No. 597838 | |
| USB interface RS485 (incl. driver CD) | Item No. 668293 |
| RS485 biasing adapter | Item No. 811378 |