NOVOS 3 CO2 + VOC

Room sensor for air quality
Optional: Temperature | Humidity

thermokon®
HOME OF SENSOR TECHNOLOGY

Data sheet

Subject to technical changes
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»APPLICATION

Room sensor for CO_2 measurement and additionally temperature and humidity (relative, absolute, enthalpy and dew point). The maintenance-free sensor creates the 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 air quality sensor CO2 + VOC – active, 2 x 0..10 V | 2 x 4..20 mA
- NOVOS 3 CO2 + VOC VV*
- NOVOS 3 CO2 + VOC AA*

Room air quality sensor CO2 + VOC + temperature – active, 3 x 0..10 V
- NOVOS 3 CO2 + VOC Temp 3 x V*

Room air quality sensor CO2 + VOC + temperature + humidity – active, 4 x V 0..10 V
- NOVOS 3 CO2 + VOC Temp_rH 4 x V *

*optional with TLF – traffic light function, RGB-LED indicating air quality | 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

»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

»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 oxidizes 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	CO_2 + VOC + temperature (optional) + humidity (optional)	
Voltage output *(type-dependent)*	**VV | 3 x V | 4 x V** 2 x/3 x/4 x V 0..10 V or 0..5 V, min load 10 kΩ (live-zero configuration 1..10/2..10 V) configurable via Thermokon NOVOSapp	
Output Amp *(type-dependent)*	**AA** 2 x 4..20 mA, max. load 500 Ω	
Power supply *(type-dependent)*	**VV | 3 x V | 4 x V** 15..35 V = or 19..29 V ~ SELV	**AA** 15..35 V = SELV
Power consumption *(type-dependent)*	**VV | 3 x V | 4 x V** Typ. 0,4 W (24 V =) | 0,8 VA (24 V ~)	**AA** Max. 0,5 W / 24 V =
Display *(optional)*	ePaper as measured value display, display can be parameterized via Thermokon NOVOSapp	
Enclosure	PC V0, pure white, design cover (optional)	
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	+32..+122 °F, max. 85 % (non-condensing)	
Mounting	Surface mounted on flush-mounting box (Ø = 60 mm) or to be mounted flat onto the surface using screws, base part can be mounted and wired separately	
Notes	Mixed gas sensors detect gases and vapours which can be oxidized (burnt): Body odors, tobacco smoke, exhalations emitted by materials (furniture, carpets, paint, glue ...)	

» Temperature *(optional)*

Output signal range temp. **scaling analogue output*	+40..+140 °F (default setting), selectable from 4 temperature ranges -30..+130 | +40..+140 | 0..+100 | +40..+90 °F, configurable via NOVOSapp
Accuracy temperature *(type-dependent)*	±0,5 K (typ. at 70 °F)

» Humidity *(optional)*

Measuring range humidity	**Relative humidty** (default) 0..100 % rH	**Enthalpy** 0..85 KJ/kg	**Absolute humidity** 0..50 | 0..80 g/m³	**Dew point** +32..+122 | -4..+176 °F
	Configurable via Thermokon NOVOSapp			
Accuracy humidity	±2 % between 10..90 % rH (typ. at 70 °F)			

» CO_2

Measuring range CO_2	0..2000 ppm | 0..5000 ppm (optional configurable via Thermokon NOVOSapp)
Accuracy CO_2	±50 ppm+ 3 % of reading (typ. at 70 °F, 50 % rH, 1015 hPa)
Calibration	Self-calibration, Dual Channel
Sensor	NDIR (non-dispersive, infrared)
Display *(optional)*	RGB-LED indicating air quality (CO_2, traffic light function 'TLF'), optional

» 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

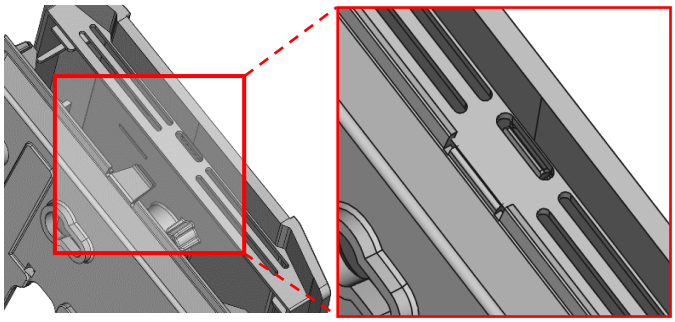
Please make sure that the device is de-energized if you want to install it!

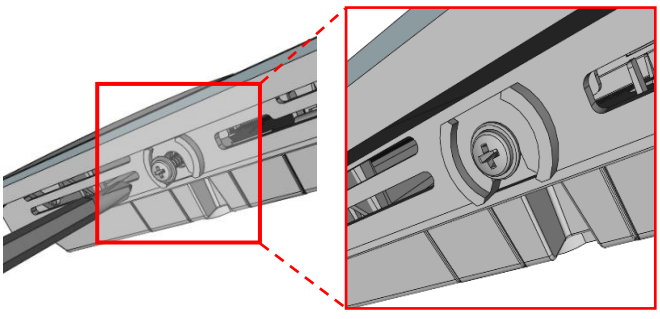
The installation can be performed on the flat wall surface or on a flush-mounted box. A representative place should be selected. Sunshine and draft, e.g. in the installation tube should be avoided, so that the measurement result is not falsified. Seal the end of the installation tube.

- 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

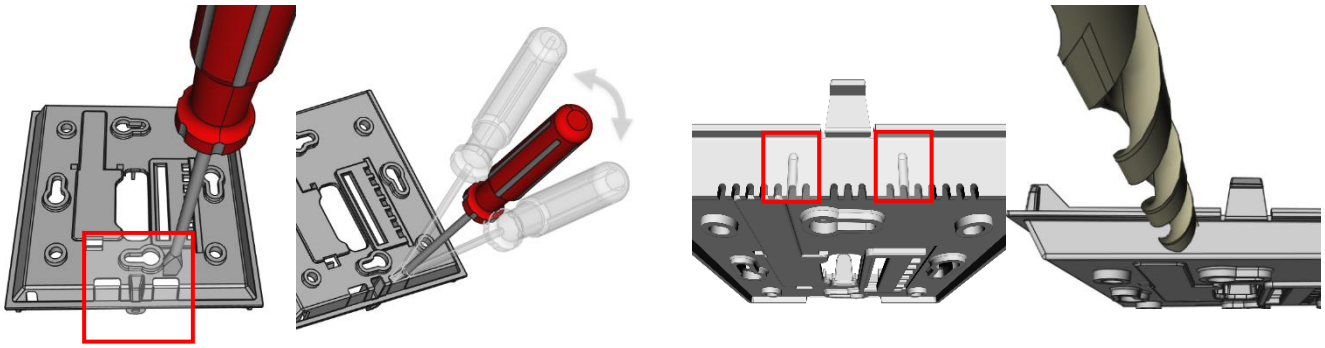
Snap the upper part of the housing into the locking lug on the upper side	Fix the upper part of the housing on the underside with the screw





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

The following connection diagrams show the assignment of measuring values to analog outputs in factory default. Output variables reconfigurable via Thermokon NOVOSapp.

Room sensor CO2 + VOC – active, 2 x 0..10 V | 2 x 4..20 mA

NOVOS 3 CO2 + VOC VV	NOVOS 3 CO2 + VOC AA
4 |–AOU2—— VOC | 0..10 V 3 |–AOU1—— CO2 | 0..10 V 2 |–GND—— 0 V⊥ 1 |–UB+—— 15..35 V ⎓ / 19..29 V ∿	4 |–AOI2—— VOC | 4..20 mA 3 |–AOI1—— CO2 | 4..20 mA 2 |–GND—— 0 V⊥ 1 |–UB+—— 15..35 V ⎓

Room sensor CO2 + VOC + temperature – active, 3 x 0..10 V

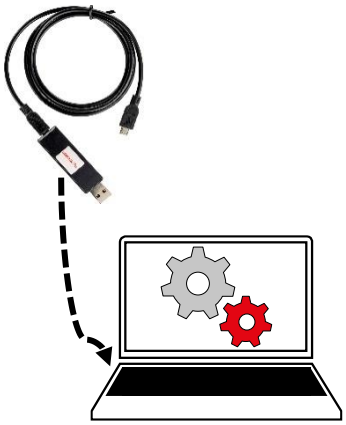
NOVOS 3 CO2 + VOC + Temp 3 x V
5 |–AOU3—— Temperature | 0..10 V 4 |–AOU2—— VOC | 0..10 V 3 |–AOU1—— CO2 | 0..10 V 2 |–GND—— 0 V⊥ 1 |–UB+—— 15..35 V ⎓ / 19..29 V ∿

Room sensor CO2 + VOC + temperature + humidity – active, 4 x 0..10 V

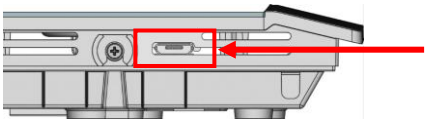
NOVOS 3 CO2 + VOC + Temp_rH 4 x V
6 |–AOU4—— Temperature | 0..10 V 5 |–AOU3—— Humidity | 0..10 V 4 |–AOU2—— VOC | 0..10 V 3 |–AOU1—— CO2| 0..10 V 2 |–GND—— 0 V⊥ 1 |–UB+—— 15..35 V ⎓ / 19..29 V ∿

»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 
Confguration interface	PC/Notebook with uConfig software Partial parameterization via desktop PC/Notebook with uConfig software, via Thermokon USB-Interface*.Item No. 597838	Smartphone/Tablet with NOVOS App Parameterization with mobile devices via Bluetooth and NOVOSapp. A separately available Bluetooth dongle* is required. Item no. 668262

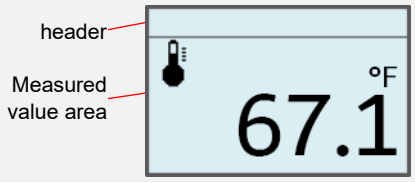
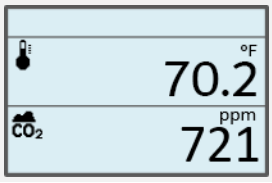
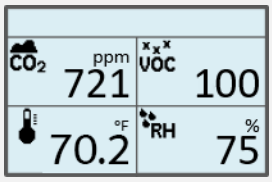
**Commercially available Bluetooth dongles or USB to Micro-USB adapter cables are not compatible. You need a mobile device that supports at least Bluetooth version 4.1. The configuration app with the corresponding instructions can be downloaded from the Google Play Store or the Apple App Store.*



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

»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*			
	Temperature	Humidity	
	VOC	CO_2	

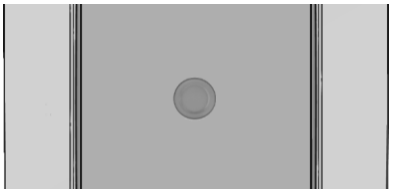
Additional symbols *(displayed when triggered)*			
Traffic light function*	Threshold value colored LED illumination	LED illumination	
Note	Internal sensor error (display next to measured variable)	Measured value range	

*depending on variant

»TLF – TRAFFIC LIGHT FUNCTION (OPTIONAL)

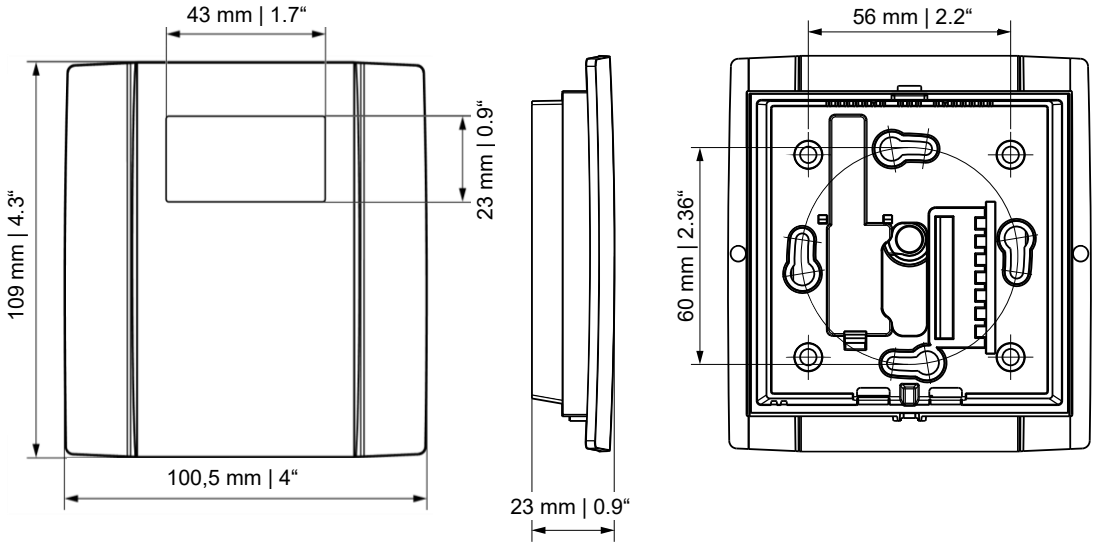
The traffic light function can be implemented with any available measured variable. Different colors can be assigned for up to 5 different measuring ranges.

The LED visualizes the air quality value (Thresholds optionally configurable via Thermocon NOVOSapp).



CO2 (factory default)	Behavior of the LED
0..750 ppm	LED lights up in green
751..1250 ppm	LED lights up in yellow
1251..2000 ppm	LED lights up in red

»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
Bluetooth dongle	Item No. 668262
Thermokon USB-Interface	Item No. 597838
Mounting bracket (surface mounted) white	Item No. 795050
Mounting bracket (surface mounted) black	Item No. 795074