

# NOVOS 3 (EPD) RS485 Modbus

Room sensor, optional with CO2 | VOC | Temperature | Humidity

**thermokon**<sup>®</sup>  
HOME OF SENSOR TECHNOLOGY

## Datasheet

Subject to technical alteration  
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## » APPLICATION

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. 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 Modbus

- NOVOS 3 Temp RS485 Modbus\*2
- NOVOS 3 Temp\_rH RS485 Modbus\*2
- NOVOS 3 CO2 Temp RS485 Modbus\*1,2
- NOVOS 3 CO2 Temp\_rH RS485 Modbus\*1,2
- NOVOS 3 VOC Temp RS485 Modbus\*2
- NOVOS 3 VOC Temp\_rH RS485 Modbus\*2
- NOVOS 3 CO2 + VOC RS485 Modbus\*1,2
- NOVOS 3 CO2 + VOC Temp RS485 Modbus\*1,2
- NOVOS 3 CO2 + VOC Temp\_rH RS485 Modbus\*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. 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

## » 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 has to be considered when measuring temperature. In case of a fixed operating voltage ( $\pm 0,2$  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).

**Remark: Occurring draught 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

At regular environmental condition, 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 / fingerprints)
- Aggressive chemicals
- Ambient conditions (e.g. condensation on measuring element)



**Do not touch the sensor elements!**

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

## » INFORMATION ABOUT SELF-CALIBRATION FEATURE CO2

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 (dust / fingerprints e.g.)
- Abrasive chemicals
- Environmental influences (high humidity / condensation on measuring element)

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

## » INFORMATION ABOUT INDOOR AIR QUALITY CO2

EN 13779 defines several classes for indoor air quality:

Category	CO <sub>2</sub> 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

## » APPLICATION NOTICE FOR AIR QUALITY SENSORS VOC

Volatile organic compounds (VOC) are gaseous and vaporous substances of organic origin in the air. VOC-sensors monitor the significant part of humanly olfactory sensed air quality. (e.g. body odor | tobacco smoke | odor of materials, furniture, carpets, paint, adhesives, ...)

**The VOC-Value is an application-specific indication for air quality and doesn't provide any information about individual components of VOC**

A VOC sensor oxidises the organic molecules that collide with it, which results in changing the resistance of the semiconductor.

**Any contact with the sensitive sensors must be avoided and will invalidate the warranty.**

The VOC Sensor is factory calibrated and can be calibrated via NOVOSapp subsequently, if needed.

» **TECHNICAL DATA**

Measuring values	temperature   humidity   CO2   VOC
Network technology	RS485 Modbus, RTU, half-duplex, baud rate 9.600, 19.200, 38.400 or 57600, parity: none (1 stopbit, alternative 2 stopbits), even or odd (1 stopbit), <b>Fail-safe Biasing required</b>
Power supply	15..35 V = (or 19..29 V ~)* SELV
Power consumption	typ. 0,4 W (24 V =)   0,8 VA (24 V ~)
Inputs	1x input for floating contact
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	rear entry, breaking points bottom, drill mark top
Connection electrical	tool-free mountable spring terminal, max. 1,5 mm <sup>2</sup>
Ambient condition	-20..+70 °C, max. 85% non-condensing, with CO2 or VOC sensor operating temperature range 0..+50 °C
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	for configuration an optional programming dongle (Bluetooth) is available (refer to accessories)

» **Temperature**

Measuring range temp	-20..+70 °C
Accuracy temperature	±0,5K (typ. at 21 °C)

» **Humidity (optional)**

Measuring range humidity (optional configurable)	<b>relative humidity</b> (default) 0..100% rH	<b>Enthalpy</b> 0..85 KJ/kg	<b>absolute humidity</b> 0..50   0..80 g/m <sup>3</sup>	<b>dew point</b> 0..+50   -20..+80 °C
	configurable via Thermokon NOVOSapp or BUS			
Accuracy humidity	±2% between 10..90% rH (typ. at 21 °C)			

» **CO2 (optional)**

Measuring range CO2	0..2000 ppm   0..5000 ppm (configurable via Thermokon NOVOSapp or BUS)
Accuracy CO2	±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 indicating air quality (traffic light function 'TLF')

» **VOC (optional)**

Measuring range VOC	0..100 %
Sensor	VOC sensor (heated metal oxide semiconductor)

\***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.**

## » MOUNTING ADVICES

The Accuracy of the room sensors are 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 recommendet in...

- Air draught (e.g.: close to windows / doors / fans ...)
- Near heating sources,
- Direct sunlight
- Niches / between furniture / ...

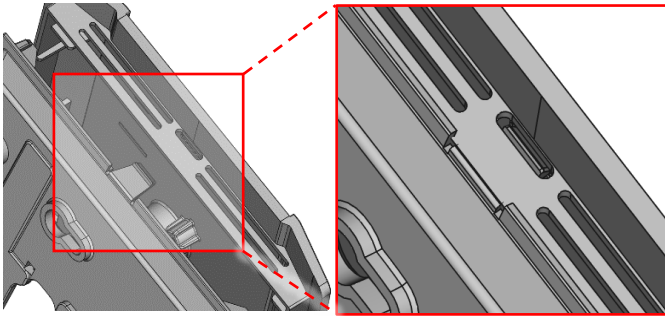
Please make sure that the device is de-energized if you want to install it!

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.

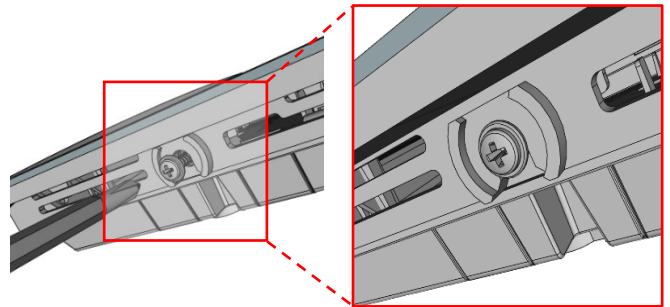
- For wiring, the upper part of the device must be removed from the base plate. Base plate and upper part are detachably connected to each other by means of locking lugs.
- The mounting of the base plate on the flat wall surface is done with rawplugs and screws.
- Finally, the device is attached to the base plate and fixed with the screw.

### Housing open / close

Snap the upper part of the housing into the locking lug on the upper side

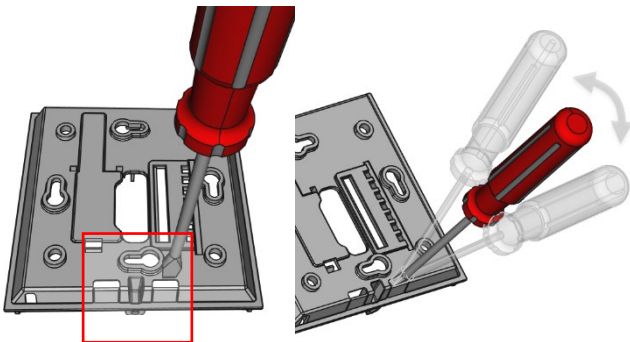


Fix the upper part of the housing on the underside with the screw included in the delivery.

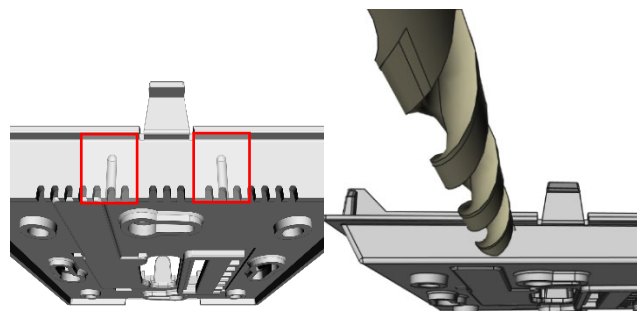


### Cable entry

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.

» CONNECTION PLAN

Room sensor – active RS485 Modbus

**NOVOS 3 RS485 Modbus**

7	DI	digital input (for floating contact → GND)
6	B-	BUS B
5	B-	BUS B
4	A+	BUS A
3	A+	BUS A
2	GND	0 V
1	UB+	15..35 V = / 19..29 V ~ Δ

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 delivery)

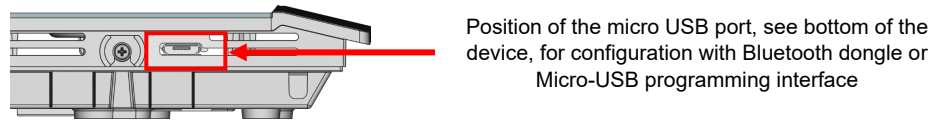
» CONFIGURATION

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

Device connection	RS485	Micro-USB	Micro-USB
Configuration-adapter	USB-RS485 Converter 	Thermokon USB-Interface 	USB-Bluetooth Dongle 
Configuration-software	PC/Notebook with uConfig software <i>Parameterization via desktop PC/Notebook with uConfig software and a USB/RS485 converter (Item No. 668293)</i>	PC/Notebook with uConfig software <i>Parameterization via desktop PC/Notebook with uConfig software, via Thermokon USB-Interface* (Item No. 597838)</i>	Smartphone/Tablet with NOVOS App <i>Parameterization with mobile devices via Bluetooth and NOVOSapp. A separately available Bluetooth dongle* is required (item no. 668262)</i>






















\*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.

A configuration during operation is additionally via BMS through RS485 connection possible.



» 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 / 4 Measured values
<div><div>header</div><div>Measured value- area</div><div><div></div><div>19,5 °C</div></div></div>	<div><div></div><div>21,2 °C</div><div></div><div>72,1 ppm</div></div>	<div><div></div><div>721 ppm</div><div></div><div>50 %</div><div></div><div>21,2 °C</div><div></div><div>75 %</div></div>
Symbols		
Measured values*		Header symbols (can be displayed in the header via bus)*
 Temperature	 Humidity	 Eco-Mode
 VOC	 CO2	 Notice
		 Heating
		 Cooling
		 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 range

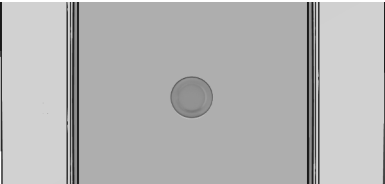
\*depending on variant

» 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.

Example: CO2 TLF

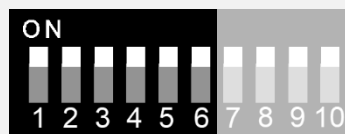
The LED visualizes the air quality value (Thresholds optionally configurable via Thermocon NOVOSapp).

	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

## » DIP-SWITCH-SETTINGS

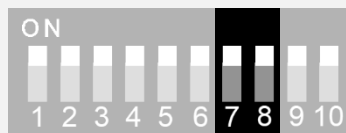
The modbus address of the device is set in the range of 1 ... 63 (binary encoded) using a 6-pole DIP switch. With address 0 via DIP, an extended address range (64..247) is available via NOVOSapp.

### Modbus-Adress - DIP 1..6 (binary coded)



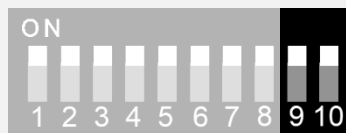
Dip switch	1 = on	2 = on	3 = on	4 = on	5 = on	6 = on
Value	$2^0$ (1)	$2^1$ (2)	$2^2$ (4)	$2^3$ (8)	$2^4$ (16)	$2^5$ (32)
Factory default, address 63						

### Baud rate - DIP 7 & 8



7	8	Baud rate	
off	off	9600	
on	off	19200	
off	on	38400	
on	on	57600	(factory default)

### Parity / Stop bits - DIP 9 & 10



9	10	Parity
off	off	None – 2-Stopbits
on	off	Even – 1 Stopbit
off	on	Odd – 1 Stopbit
on	on	None – 1-Stopbit (factory default)

Adress	Access	Description	Scaling / Unit
501	R	relative humidity 850 = 85,0 %rF	0.1 %rF
505	R	CO2	1.0 ppm
506	R	VOC	1.0 %
507	R	CO2 / VOC MIX	
514	R	Status digital input open = 0 closed = 1	

### Register 1100 = 1 (Unit SI)

Adress	Access	Description	Scaling / Unit
500	R	Temperature 210 = 21,0 °C	SI 0.1 °C
502	R	Absolute humidity 1500 = 15,0 g/m³	SI 0.1 g/m³
503	R	Enthalpy 550 = 55,0 kJ/m³	SI 0.1 kJ/kg
504	R	Dew point 180 = 18,0 °C	SI 0.1 °C

### Register 1100 = 2 (Unit Imperial)

Adress	Access	Description	Scaling / Unit
500	R	Temperature 700 = 70,0 °F	Imperial 0.1 °F
502	R	Absolute humidity 4200 = 4,2 gr/ft³	Imperial 0.1 gr/ft³
503	R	Enthalpy 240 = 24,0 BTU/lb	Imperial 0.1 BTU/lb
504	R	Dew point 600 = 60,0 °F	Imperial 0.1 °F



#### Modbus addresses:

NOVOS-RS485 Modbus Interface

A detailed description of the Modbus addresses can be found under the following link:

<https://www.thermokon.de/direct/files/novos-rs485-modbus-manual.zip>

## » PRODUCT TESTING AND CERTIFICATION



### Declaration of conformity

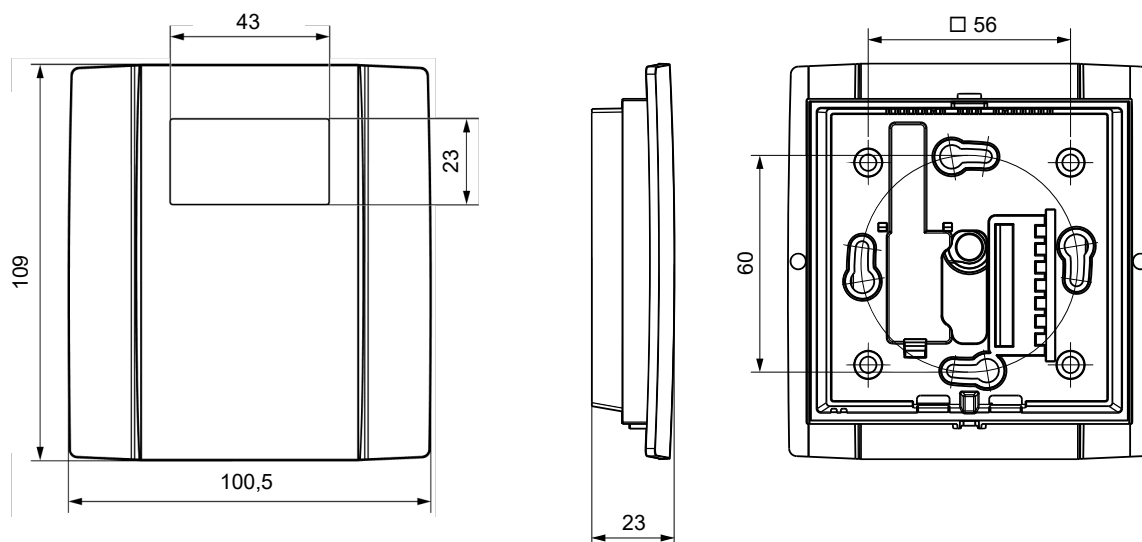
The declaration of conformity of the products can be found on our website  
<https://www.thermokon.de/direct/en-gb/categories/novos-3>

## » NOTES ON DISPOSAL



The crossed-out wheeled 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](http://www.thermokon.com)

## » DIMENSIONS (MM)



## » ACCESSORIES (OPTIONAL)

Rawlplugs and screws (2 pcs. each)  
 PSU-UP24 – flush mount power supply 24 V (AC Input: 100..240 V ~ | DC Output 24 V = 0,5 A)  
 Mounting bracket (surface mounted) white  
 Mounting bracket (surface mounted) black

Item No. 102209  
 Item No. 645737  
 Item No. 795050  
 Item No. 795074

Bluetooth dongle  
 Thermokon USB-Interface  
 USB RS485 Modbus RTU Logger  
 USB Interface RS485 (incl. driver CD)  
 RS485 Biasing Adapter

Item No. 668262  
 Item No. 597838  
 Item No. 809917  
 Item No. 668293  
 Item No. 811378