» NOVOS 5 LCD RS485 Modbus

Room sensor, optional with CO2 | VOC | temperature | humidity

thermokon®
HOME OF SENSOR TECHNOLOGY

Datasheet

Subject to technical alteration
Issue date: 05.08.2019 • A101

»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 has an LC display with color change function for displaying the measured values. The threshold values and display settings can be individually configured via the Thermokon NOVOSapp.

»TYPES AVAILABLE

Room sensor – active RS485 Modbus

NOVOS 5 Temp LCD RS485 Modbus

NOVOS 5 Temp_rH LCD RS485 Modbus

NOVOS 5 CO2 Temp LCD RS485 Modbus

NOVOS 5 CO2 Temp_rH LCD RS485 Modbus

NOVOS 5 VOC Temp LCD RS485 Modbus

NOVOS 5 VOC Temp_rH LCD RS485 Modbus

NOVOS 5 CO2 + VOC LCD RS485 Modbus

NOVOS 5 CO2 + VOC Temp LCD RS485 Modbus

NOVOS 5 CO2 + VOC Temp_rH LCD RS485 Modbus

»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

»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 the NOVOSapp software and an optional Bluetooth interface. (additionally with sensors with BUS interface via an appropriate software variable).

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, 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 SELF-CALIBRATION FEATURE CO2

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.

»INFORMATION ABOUT INDOOR AIR QUALITY CO2

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

»APPLICATION NOTICE FOR AIR QUALITY SENSORS VOC

Unlike CO_2 sensors, which specifically measure CO_2, mixed gas sensors detect a wide range of gases. The sensor signal does not indicate the type of gas or it's concentration in ppm. Mixed gas sensors detect gases and vapours consisting of carbohydrates, or more generally gases that can be oxidised (burnt): Odours, perfume, cleaning fluid scent, tobacco smoke, new materials fumigations (furniture, carpets, paint, glue ...).

Unlike CO_2, which humans cannot sense, the amount of odours (VOC) indicates the level of air quality. VOC sensors have proven their value in a multitude of applications for many years.

Measuring principle:

A heated tin dioxide semiconductor sensor burns (oxidizes) organic molecules that come into contact with it, thereby changing the resistance of the semiconductor. The change in resistance is characteristic for the type and concentration of the molecules. Gas mixtures such as air produce a mixed signal that can not be deduced from individual components. CO2 can not be detected because it can not be burned.

Refrain from touching the sensor's element sensitive surface. Touching the sensitive surface element will void warranty.

»INFORMATION ABOUT CALIBRATION VOC

Similar to a catalyst, the sensitivity of the sensor decreases over time. The VOC sensor compensates for this decrease in sensitivity through regular auto-calibration.

The measured values are recorded over a period of 24 hours. The lowest value within this period is used as the reference value ("new zero level") for clean, fresh air. Measured thereafter, lower readings result in an immediate adjustment of the reference value.

»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/.

» 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 (2 stopbits), even or odd (1 stopbit)
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	LCD 29x35 mm with RGB backlight
Enclosure	PC, pure white
Protection	IP30 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 mm²
Ambient condition	-20..+70 °C, max. 85% non-condensing, with CO2 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

Measuring range humidity (optional configurable)	**relative humidty** (default) 0..100% rH	**Enthalpy** 0..85 KJ/kg	**absolute humidity** 0..50 | 0..80 g/m³,	**dew point** 0..+50 | -20..+80 °C,
	configurable via Thermokon NOVOSapp or BUS			
Accuracy humidity	±2% between 10..90% rH (typ. at 21 °C)			

» CO2

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

Measuring range VOC	0..100 %
Calibration	self-calibration
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 my cause damage to it.

Therefore, pay attention to correct wiring.

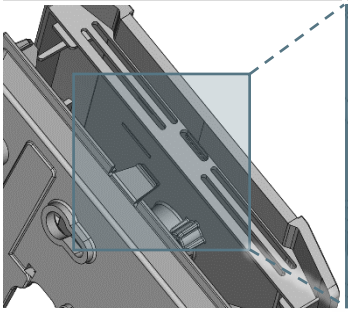
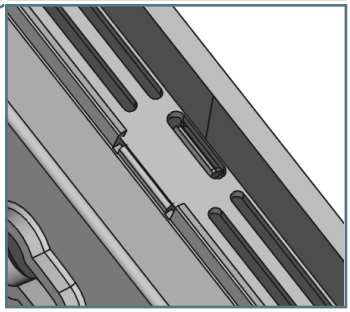
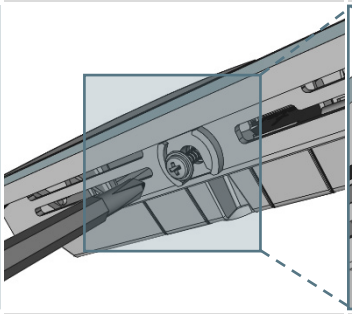
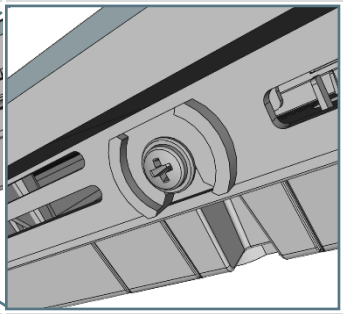
»MOUNTING ADVICES

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

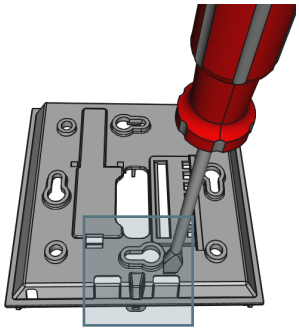
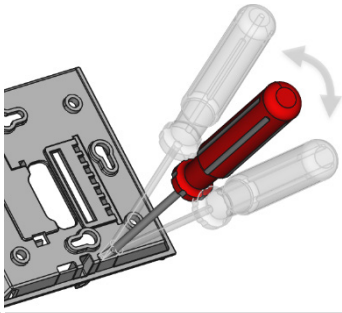
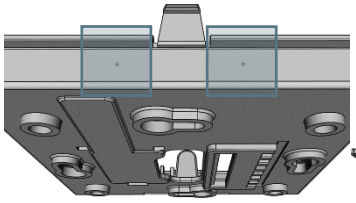
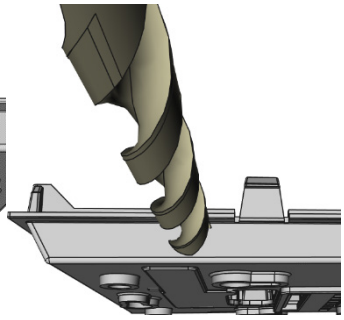
The installation can be performed on the flat wall surface or on a flush-mounted box. A representative place should be selected. Sunshine and draft, e.g. in the installation tube should be avoided, so that the measurement result is not falsified. Seal the end of the installation tube.

- 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	
			

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.

»CONFIGURATION

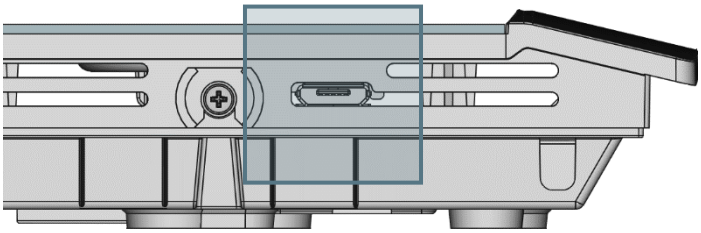
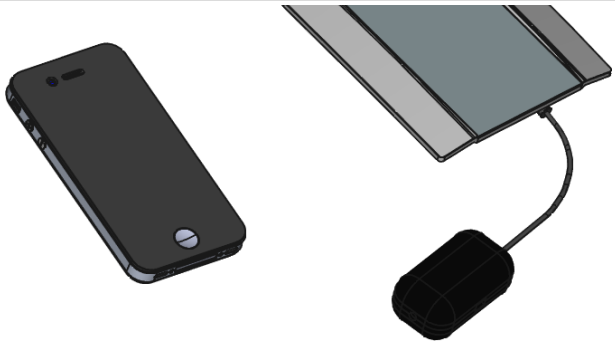
The Thermokon bluetooth dongle with micro-USB is required for communication between NOVOSapp and NOVOS products (Item No.: 668262). Commercial bluetooth dongles are not compatible.

Application-specific reconfiguration of the devices can be performed using the Thermokon NOVOSapp. The configuration performed in voltage-supplied state.

The configuration-app and the app description can be found in the Google Play Store or in the Apple App Store.

The following parameter can be changed via the app

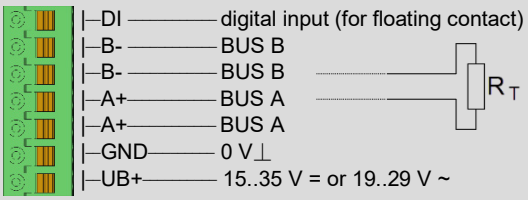
Output signal	0..10 V | 1..10 V | 2..10 V | 0..5 V | 1..5 V
Unit system	SI | Imperial
Measuring value	Selection of output variables | Assignment of the output channels
Output signal range temp	-50..+50 | 0..+50 | -15..+35 | -20..+80 °C
Display	Brightness | RGB behavior – measuring value - thresholds
Miscellaneous	Offset / Wall correction factors | Maintenance / Service Intervals

On the bottom there is the micro USB port for the Bluetooth dongle	If the Bluetooth dongle is connected to the device, the device can be configured via Bluetooth with the NOVOSapp
	

»CONNECTION PLAN

Room sensor – active RS485 Modbus

NOVOS 5 RS485 Modbus



Don´t forget the BUS termination (120 Ω) at the last device of the line!

» TLF – TRAFFIC LIGHT FUNCTION (DISPLAY-RGB-BACKLIGHT)

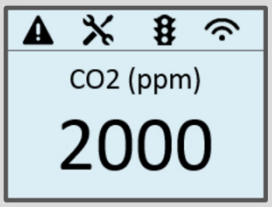
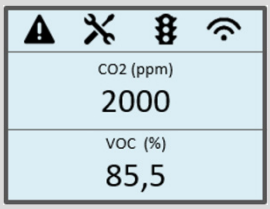
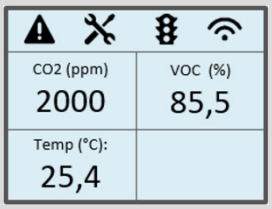
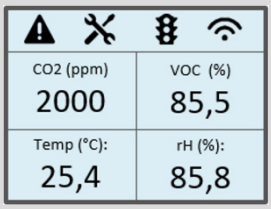
The display RGB backlight visualizes the air quality value (configurable via Thermocon NOVOSapp or BUS).

CO2 (Factory default)	Behavior of the RGB backlight
0..750 ppm	LCD lights up in green
751..1250 ppm	LCD lights up in yellow
1251..2000 ppm	LCD lights up in red

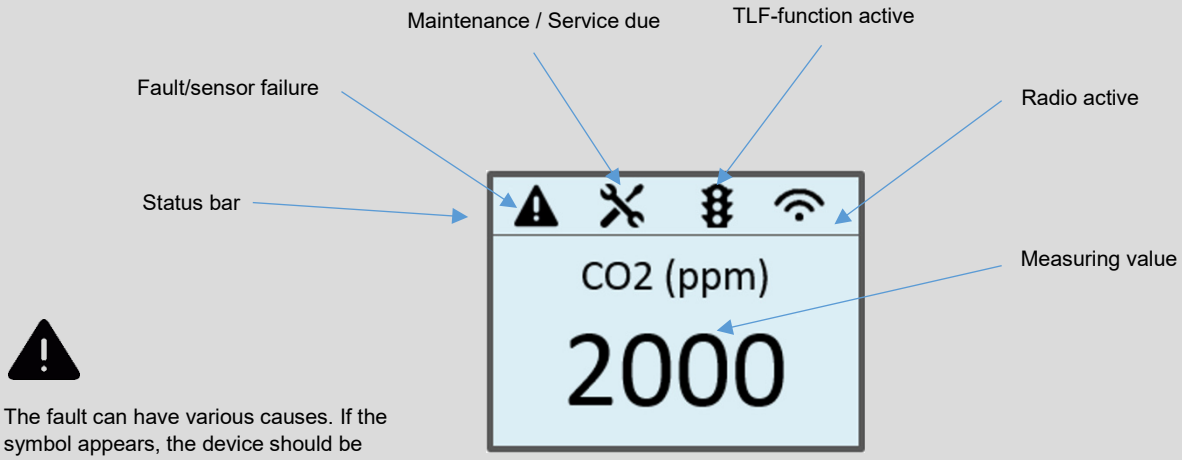
» DISPLAY

Depending on the device and the number of measured values, the display automatically scales. Parameters, such as the fading in / out of measured values, brightness and TLF function, are changed via the app.During the boot process, the software and hardware versions are displayed. Novos devices can visually display measured values via the RGB display. Thresholds for color changes can be configured through the app.

Example

1 Measuring value	2 Measuring values	3 Measuring values	4 Measuring values
			

Display

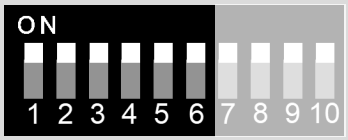


The fault can have various causes. If the symbol appears, the device should be returned for inspection.

» 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.

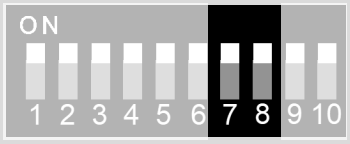
Modbus-Address - DIP 1..6 (binary coded)



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-Stop bits
on	off	Even – 1 Stopbit
off	on	Odd – 1 Stop bit
on	on	None – 1-Stop bit (factory default)

Address	Access	Description	Scaling / Unit	
501	R	relative humidity	0.1	%rF
505	R	CO2	1.0	ppm
506	R	VOC	0.1	%

Register 1100 = 1 (Unit SI)

Address	Access	Description	Scaling / Unit		
500	R	temperature	SI	0.1	°C
502	R	absolute humidity	SI	0.01	g/m³
503	R	enthalpy	SI	0.1	kJ/kg
504	R	dew point	SI	0.1	°C

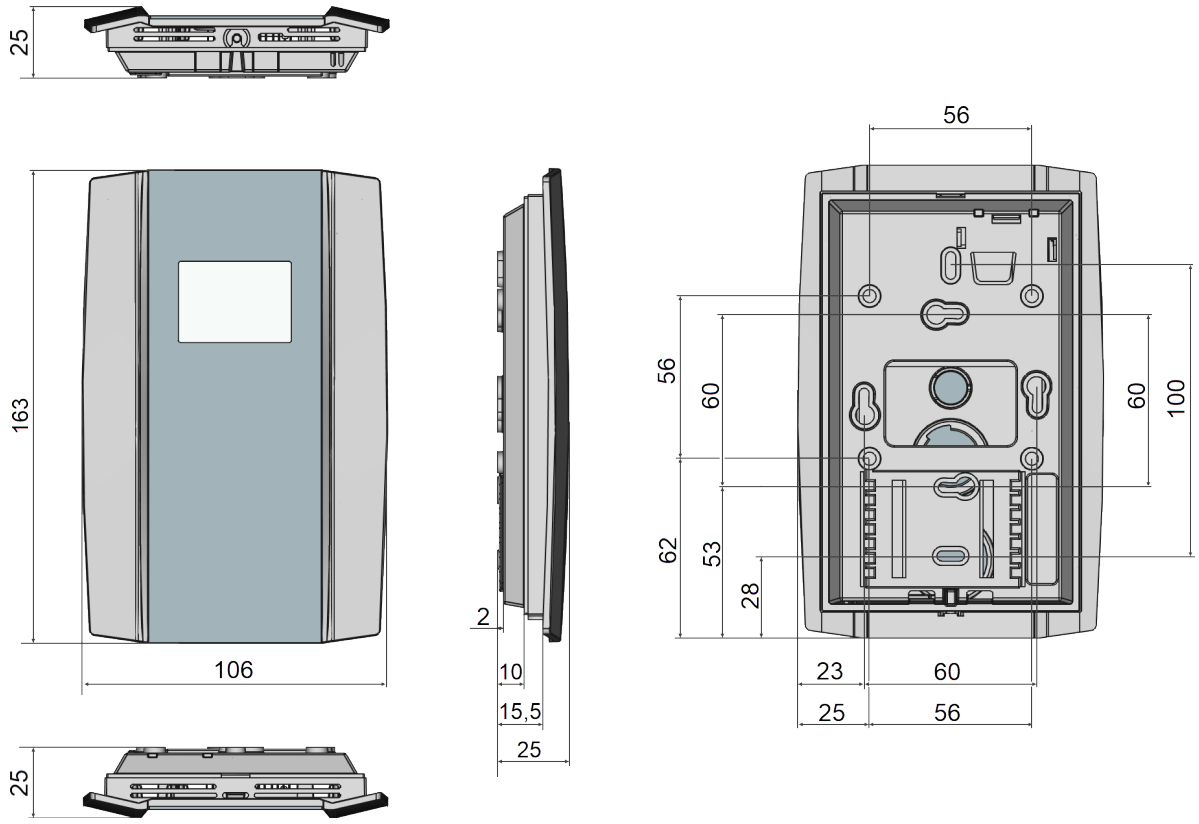
Register 1100 = 2 (Unit Imperial)

Address	Access	Description	Scaling / Unit		
500	R	temperature	Imperial	0.1	°F
502	R	absolute humidity	Imperial	0.01	gr/ft³
503	R	enthalpy	Imperial	0.1	BTU/lb
504	R	dew point	Imperial	0.1	°F

Modbus addresses:
NOVOS-RS485 Modbus Interface

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

»DIMENSIONS (MM)



»ACCESSORIES (OPTIONAL)

Rawlplugs and screws (2 pcs. each)	Item No. 102209
Bluetooth dongle	Item No. 668262
Converter RS485 Modbus-USB incl. Driver CD	Item No. 668293
PSU-UP24 – flush mount power supply 24 V (AC Input: 100..240 V ~ | DC Output 24 V = 0,5 A)	Item No. 645737