LK+ VOC LCD RS485 BACnet

Duct sensor for air quality, temperature and humidity (optional)

thermokon®
HOME OF SENSOR TECHNOLOGY

Datasheet

Subject to technical alteration
Issue date: 21.09.2018 • A003

Illustration similar

Application

Duct air quality sensor for detection of VOC air quality, and optional humidity combined in one unit. Designed for duct mounted applications with 2 0..10 V outputs. The sensor consists of a transmitter with VOC sensor, based on a heated tin oxide semiconductor.

Types Available

Duct sensor VOC + temp <u>optional with display</u> – active RS485 BACnet MS/TP

LK+ VOC (LCD) Temp RS485 BACnet

Duct sensor VOC + temp +rH <u>optional with display</u> – active RS485 BACnet MS/TP

LK+ VOC (LCD) Temp_rH RS485 BACnet

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.

General remarks concerning sensors

Especially with regard to passive sensors in 2-wire conductor versions, the wire resistance of the supply wire has to be considered. If necessary the wire resistance has to be compensated by the follow-up electronics. Due to self-heating, the wire current affects the measurement accuracy, so it should not exceed 1 mA.

When using lengthy connection wires (depending on the cross section used) the measuring result might be falsified due to a voltage drop at the common GND-wire (caused by the voltage current and the line resistance). In this case, 2 GND-wires must be wired to the sensor - one for supply voltage and one for the measuring current.

Sensing devices with a transducer should always be operated in the middle of the measuring range to avoid deviations at the measuring end points. The ambient temperature of the transducer electronics should be kept constant. The transducers must be operated at a constant supply voltage (±0,2 V). When switching the supply voltage on/off, onsite power surges must be avoided.

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 USEapp software and an optional Bluetooth interface.

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 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:

Similar to a catalyst converter the organic molecules are burnt (oxidized) when in contact with the sensor's heated -dioxide surface, adding a small amount of heat combustion. The increased temperature is measured providing a signal proportional to the number of molecules being burnt. CO_2 cannot be detected as it cannot be further oxidized.

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 converter the VOC sensor will deteriorate over time, which will affect the sensitivity. This VOC sensor automatically compensates the decrease in sensitivity by dynamic auto-calibration.

The reference level of air quality is derived from the ambient conditions over a 72h period. The lowest reading within this 72h time period will be used as reference level, representing the "clean and fresh air level".

Technical Data

Measuring values	VOC, temperature + humidity (depending on the device)	
Output voltage	2x 0..10 V or 0..5 V, min. load 10 kΩ (live-zero configuration via Thermokon USEapp)	
Network technology	RS485 BACnet MS/TP	
Power supply	15..35 V = or 19..29 V ~	
Power consumption	max. 2,3 W (24 V =) | max. 4,3 VA (24 V ~)	
Measuring range temp.	0..+50 °C (default setting), optionally configurable via Thermokon USEapp	
Measuring range humidity	**Temp_rH** 0..100% rH non-condensing, optionally configurable via Thermokon USEapp (enthalpy, absolute humidity, dew point)	
Accuracy temperature	**Temp | Temp_rH** ±0,5 K (typ. at 21 °C)	
Accuracy humidity	**Temp_rH** ±2% between 10..90% rH (typ. at 21 °C)	
Air speed	min. 0,3 m/s, max. 12 m/s	
Calibration	self-calibration	
Sensor	VOC sensor (heated metal oxide semiconductor)	
Display	LCD 29x35 mm with RGB backlight	
Enclosure	enclosure USE-M, PC, pure white, cover PC, transparent, with removable cable entry	
Protection	IP65 according to EN 60529	
Cable entry	M25, for wire max. Ø=7 mm, seal insert for fourfold cable entry	
Connection electrical	**Mainboard** removeable plug-in terminal, max. 2,5 mm²	**Plug-in card** removeable plug-in terminal, max. 1,5 mm²
Pipe	PA6, black, Ø=19,5 mm, length 180 mm	
Ambient condition	0..+50 °C, max. 85% rH short term condensation	
Mounting	installation is also possible using mounting base	
Notes	mixed gas sensors detect gases and vapours which can be oxidised (burnt): Body odours, tobacco smoke, exhalations emitted by materials (furniture, carpets, paint, glue ...)	

Declaration of conformity

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

Configuration

The Thermokon bluetooth dongle with micro-USB is required for communication between USEapp and USE-M / USE L (Item No..: 668262). Commercial bluetooth dongles are not compatible.

Application-specific reconfiguration of the devices can be carried out using the Thermokon USEapp. The configuration is carried out in the voltage-supplied state.

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

Application notice

The housing cover must be completely closed in order to ensure the accuracy and reproducibility of the measured values during a test or service log via USEapp.

The Bluetooth dongle snaps into the socket easily. When removing, please fix the plug-in card (option PCB) so that it is not unintentionally pulled out.

Mounting Advices

The sensor can be mounted on the ventilation duct by means of the mounting flange MF20 TPO (optional with mounting base). Align the openings on the sensor tube according to the flow direction.
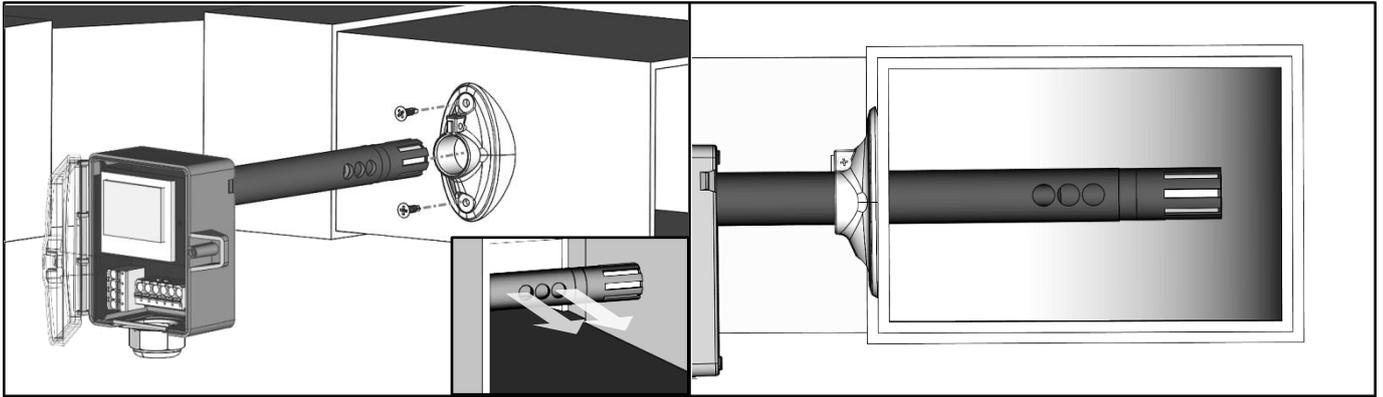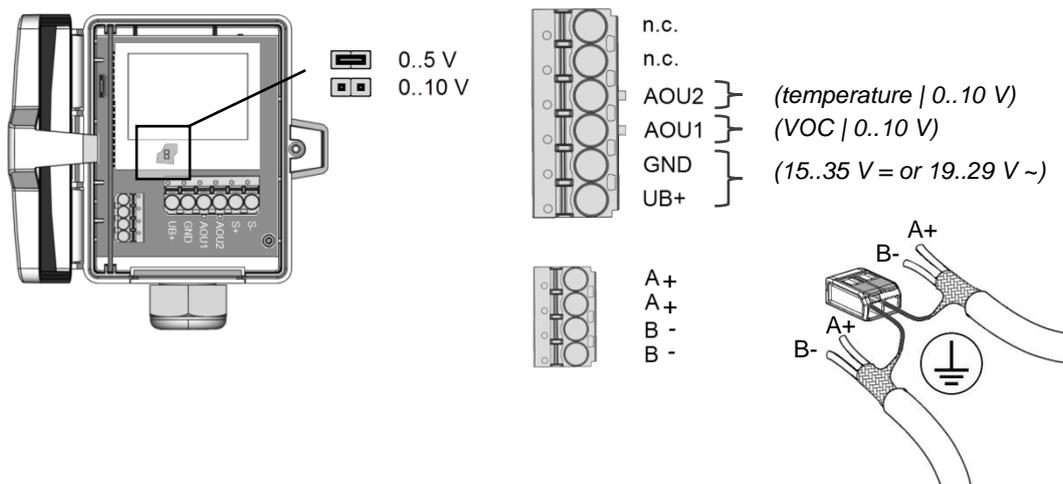

optional:
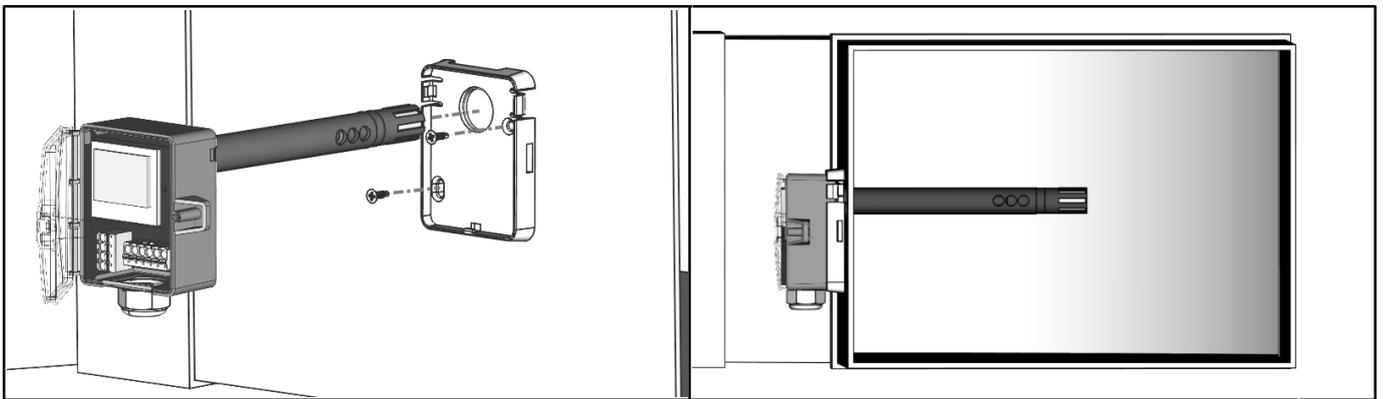
Connection Plan

To change the output voltage range (default 0..10 V to 0..5 V) via jumper, the display must be removed from the board first. If the RS485 cable is looped through, connect both cable shields using the enclosed 2-pol. Connect terminal as shown.

LK+ VOC **(LCD) RS485 BACnet**

n.c.
n.c.
AOU2 — *(temperature | 0..10 V)*
AOU1 — *(VOC | 0..10 V)*
GND
UB+ — *(15..35 V = or 19..29 V ~)*

0..5 V
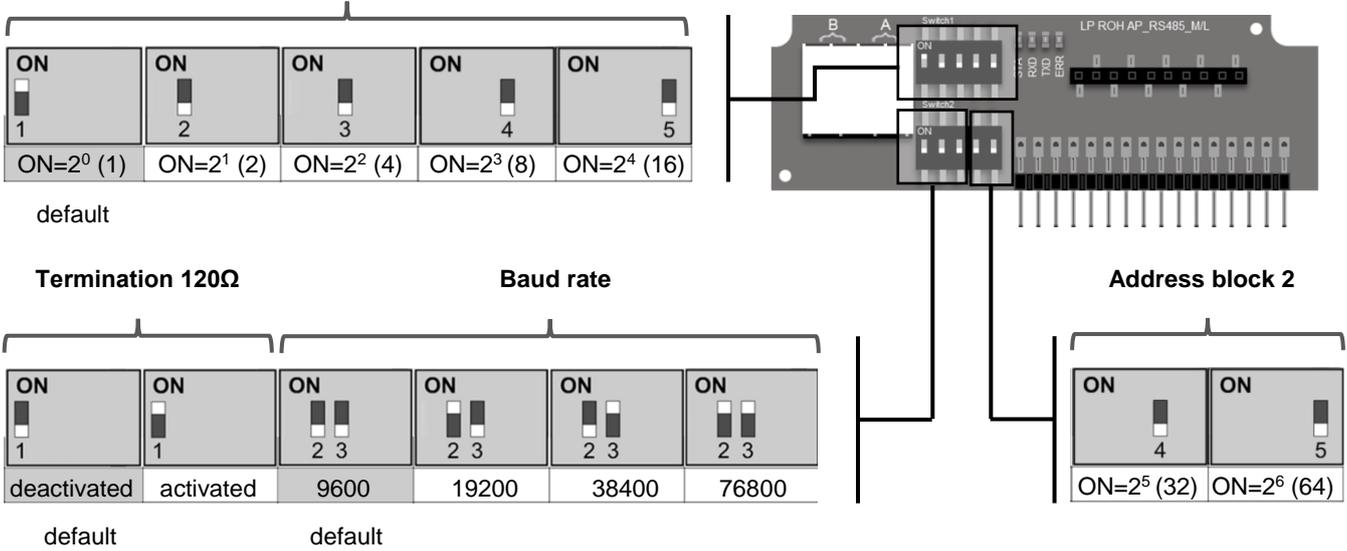0..10 V

A +
A +
B -
B -

A+
B-
A+
B-

The BACnet address of the device is set binary coded in the range of 1 ... 127 via 7 dip-switches. (the address 0 is reserved and cannot be selected).

BACnet Objects:
USE-RS485 BACnet interface

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

Address block 1

ON 1	ON 2	ON 3	ON 4	ON 5
ON=2^0 (1)	ON=2^1 (2)	ON=2^2 (4)	ON=2^3 (8)	ON=2^4 (16)

default

Termination 120Ω   **Baud rate**   **Address block 2**

ON 1	ON 1	ON 2 3	ON 2 3	ON 2 3	ON 2 3		ON 4	ON 5
deactivated	activated	9600	19200	38400	76800		ON=2^5 (32)	ON=2^6 (64)

default   default

Measuring values

Object	Access	Description		Unit
AI-1	R	**relative humidity**		%rF
AI-6	R	**VOC**		ppm

Object AV-38 = 1 (Unit SI)

Objects	Access	Description		Unit
AI-0	R	**temperature**	SI	°C
AI-2	R	**absolute humidity**	SI	g/m³
AI-3	R	**enthalpy**	SI	KJ/kg
Ai-4	R	**dew point**	SI	°C

Object AV-38 = 2 (Unit Imperial)

Objects	Access	Description		Unit
AI-0	R	**temperature**	Imperial	°F
AI-2	R	**absolute humidity**	Imperial	gr/ft³
AI-3	R	**enthalpy**	Imperial	BTU/lb
Ai-4	R	**dew point**	Imperial	°F

Dismounting Advices

Remove the lower section of the sensor carefully and pulling straight out. **Pay close attention to the correct dismantling of the component!**
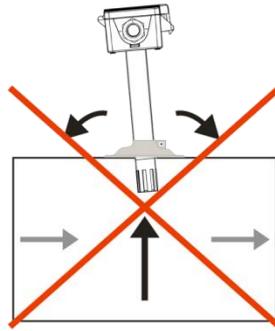
Dimensions (mm)
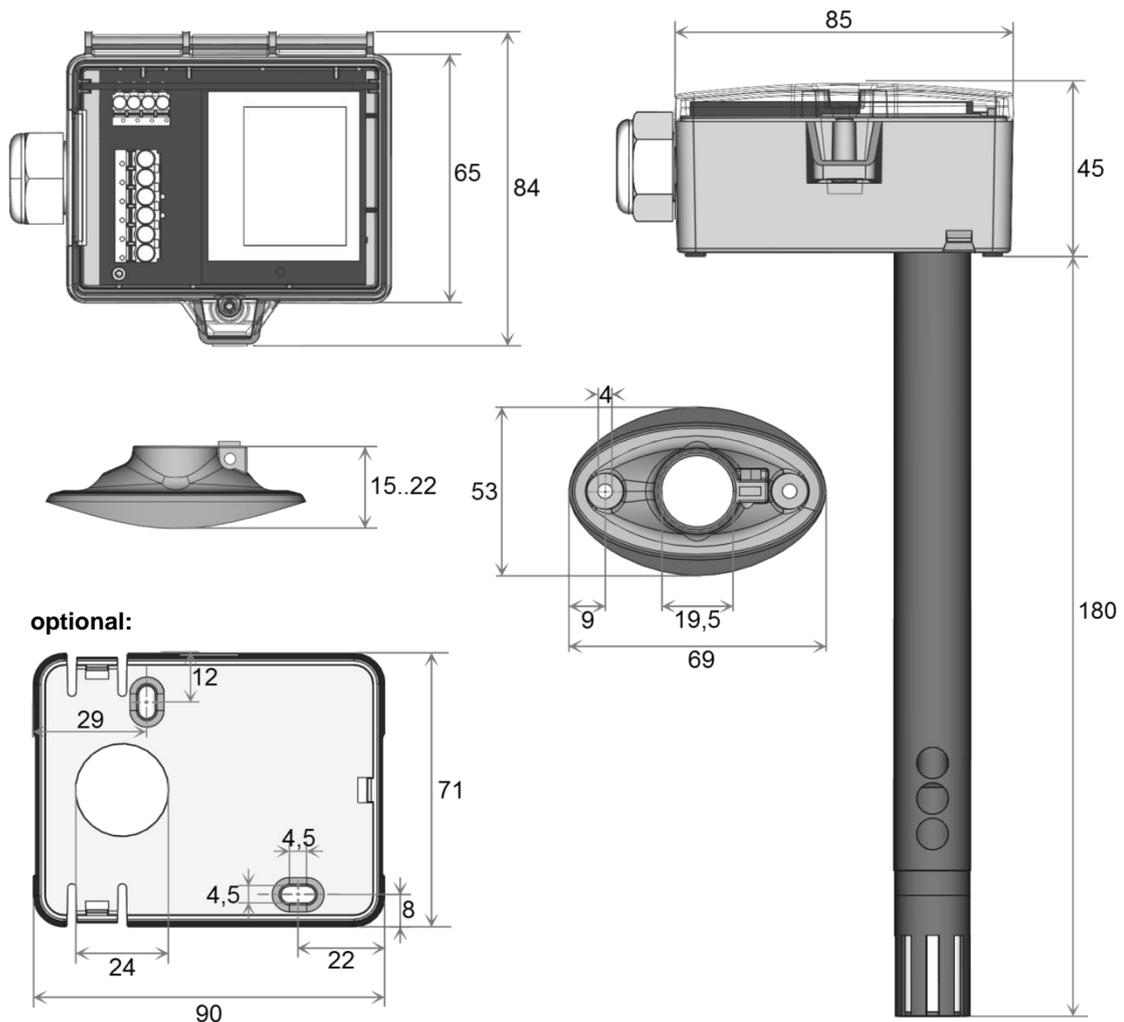
optional:

Accessories (included in delivery)

Mounting flange MF20 TPO   Item No. 612562
Mounting kit universal   Item No. 698511
• Cover screw + screw cover• 2 Rawlplugs • 2 Screws (countersunk head) • 2 Screws (rounded head)

Accessories (optional)

Mounting base   Item No. 631228
Filter stainless steel, wire mesh   Item No. 231169