LK+ VOC (LCD) (Temp_rH)

Duct sensor for air quality
Optional: Temperature | Humidity

thermokon®
HOME OF SENSOR TECHNOLOGY

Data sheet

Subject to technical changes
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The following illustrations show the version with LCD

» APPLICATION

Duct air quality sensor for detection of VOC air quality, and optional humidity combined in one unit. Designed for duct mounted applications with up to three 0..10 V outputs. The sensor consists of a transmitter with VOC sensor, based on a heated tin oxide semiconductor. With the option board relay two-point controllers or a 2-stage 2-point controller for temperature or humidity can be realised.

» TYPES AVAILABLE

Duct sensor VOC, optional with LCD – active, 2 x 0..10 V | 2 x 4..20 mA | Relay

- LK+ VOC (LCD) VV
- LK+ VOC (LCD) AA
- LK+ VOC (LCD) VV Relay

Optionally with shortened sensor tube, Type 100

- LK+ VOC (LCD) 100 VV
- LK+ VOC (LCD) 100 AA
- LK+ VOC (LCD) 100 VV Relay

Duct sensor VOC + temp +rH (opt.), optional with LCD – active, 3 x/4 x 0..10 V

- LK+ VOC (LCD) Temp 3 x V
- LK+ VOC (LCD) Temp_rH 4 x V

Optionally with shortened sensor tube, Type 100

- LK+ VOC (LCD) 100 Temp 3 x V
- LK+ VOC (LCD) 100 Temp_rH 4 x V

Options: additional passive temperature sensor
eg: PT100/PT1000/NI1000/NI1000TK5000/NTC10K... and other sensors on request.

» SECURITY ADVICE – CAUTION

The installation and assembly of electrical equipment should only be performed by authorised personnel.

The product should only be used for the intended application. Unauthorised 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 is available on our website:
https://www.thermokon.de/direct/en-gb/categories/lkplus

»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

»GENERAL REMARKS CONCERNING SENSORS

Especially regarding passive sensors in two-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 and off, onsite power surges must be avoided.

»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.

»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	VOC, temperature, humidity (depending on the device)	
Output voltage	1..3 x 0..10 V or 0..5 V, min. load 10 kΩ (live-zero configuration via Thermokon USEapp)	
Output Amp *(type-dependent)*	**AA** 2 x 4..20 mA, max. load 500 Ω	
Output passive *(optional)*	**Passive** Options: additional passive temperature sensor eg: PT100/PT1000/NI1000/NI1000TK5000/NTC10K... and other sensors on request	
Output switch contact *(type-dependent)*	**Relay** 2 floating contacts for 24 V ~ or 24 V = / 3 A	
Power supply *(type-dependent)*	**V | VV | 3xV | Relay** 15..35 V = or 19..29 V ~ SELV	**AA** 15..35 V = SELV
Power consumption	Max. 2,3 W (24 V =) | max. 4,3 VA (24 V ~)	
Display *(optional)*	LCD 29 × 35 mm with RGB backlight	
Enclosure	Enclosure: USE-M, PC, pure white, with removable cable entry; Cover: PC, transparent,	
Degree of Protection	IP65, according to EN 60529	
Cable entry *(type-dependent)*	**V | VV | AA | 3 x V** Flextherm M20, for wire Ø = 4,5..9 mm, removable	**Relay** M25 with fourfold cable entry for wire with max. Ø = 7 mm, removable
Pipe *(type-dependent)*	**V** PA6, black, Ø = 19,5 mm; length: 150 mm **Type 100** Length: 70 mm	**VV | AA | VV Relay | 3 x V** PA6, black, Ø = 19,5 mm; length: 180 mm **Type 100** Length: 100 mm
Connection electrical	Removable plug-in terminal, max. 2,5 mm²	
Ambient condition	0..+50 °C, max. 85 % rH (short term condensation)	
Mounting	Installation with a mounting base is also possible	
Notes	VOC sensors detect gases and vapours which can be oxidised (burnt): Body odours, tobacco smoke, exhalations emitted by materials (furniture, carpets, paint, glue ...)	

» Temperature

Measuring range temp. *(type-dependent)*	**VV | 3 x V** 0..+50 °C (default setting), optionally configured via Thermokon USEapp	
Accuracy temperature *(type-dependent)*	**VV | AA | 3 x V | Relay** ±0,5 K (typ. at 21 °C)	**Passive** Depending on used sensor

» Humidity *(optional)*

Measuring range humidity *(type-dependent)*	**3 x V** 0..100 % (rH non-condensing), optionally configured via Thermokon USEapp (enthalpy, absolute humidity, dew point)
Accuracy humidity *(type-dependent)*	**3 x V** ±2 % between 10..90 % rH (typ. at 21 °C)

» VOC *(optional)*

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

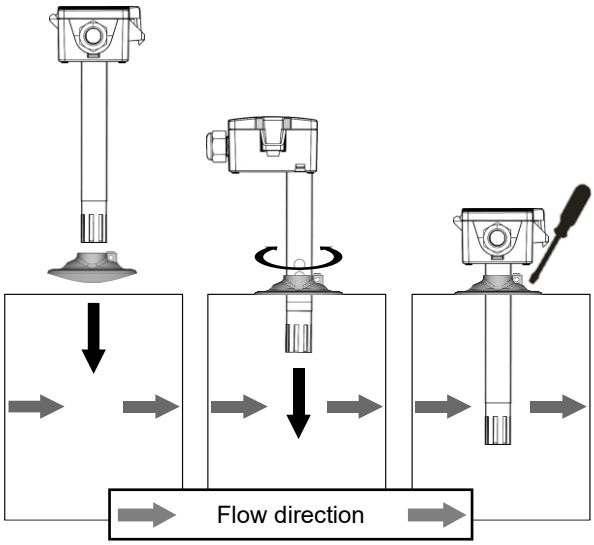
» Current

Air speed	Min. 0,3 m/s, max. 12 m/s

» MOUNTING ADVICE

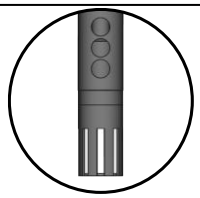
The sensor can be mounted on the ventilation duct by means of the mounting flange MF20 TPO (optional with mounting base). **Align the openings on the sensor tube according to the flow direction.** To prevent condensate permeation the pipe must be installed in an orientation that occurring condensate can run off.

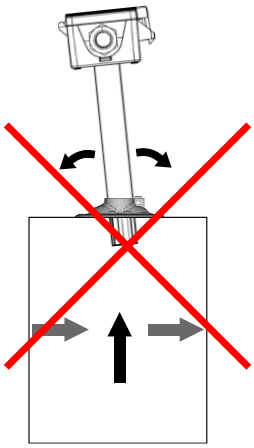
Carefully remove the lower section of the sensor and pull it out straight.



Don't tilt the sensor during mounting/dismounting!

Mount the holes in flow direction





» APPLICATION NOTICE

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.

» CONFIGURATION

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

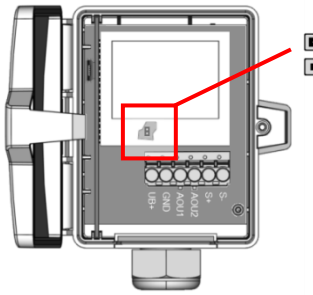
Application-specific reconfiguration of the devices can be carried out using the Thermokon USEapp. The configuration is carried out in the voltage-supplied state.

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

»WIRING DIAGRAM

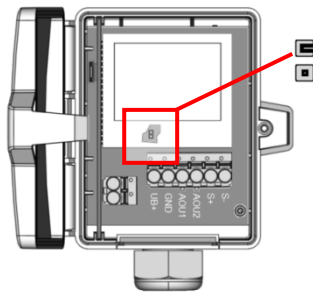
To change the output voltage range (default: 0..10 V to 0..5 V) via jumper, the display must be removed from the board first.

LK+ VOC (LCD) VV



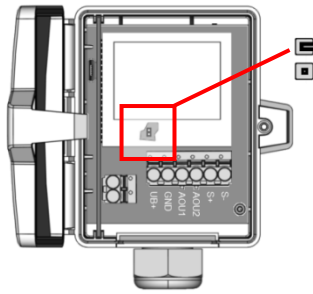
n.c.	*(ST-, optional passive sensor)*
n.c.	*(ST+, optional passive sensor)*
AOU2	*(temperature | 0..10 V)*
AOU1	*(VOC | 0..10 V)*
GND	*(15..35 V = or 19..29 V ~)*
UB+	

LK+ VOC (100) (LCD) AA



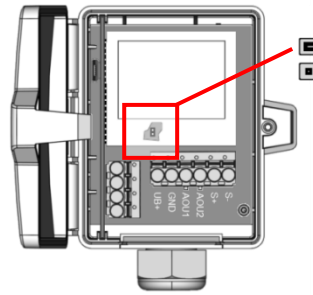
n.c.	*(ST-, optional passive sensor)*
n.c.	*(ST+, optional passive sensor)*
AOU2	*(temperature | 0..10 V)*
AOU1	*(VOC | 0..10 V)*
GND	*(15..35 V =)*
UB+	
AOI2	*(temperature | 4..20 mA)*
AOI1	*(VOC | 4..20 mA)*

LK+ VOC (100) (LCD) 3xV



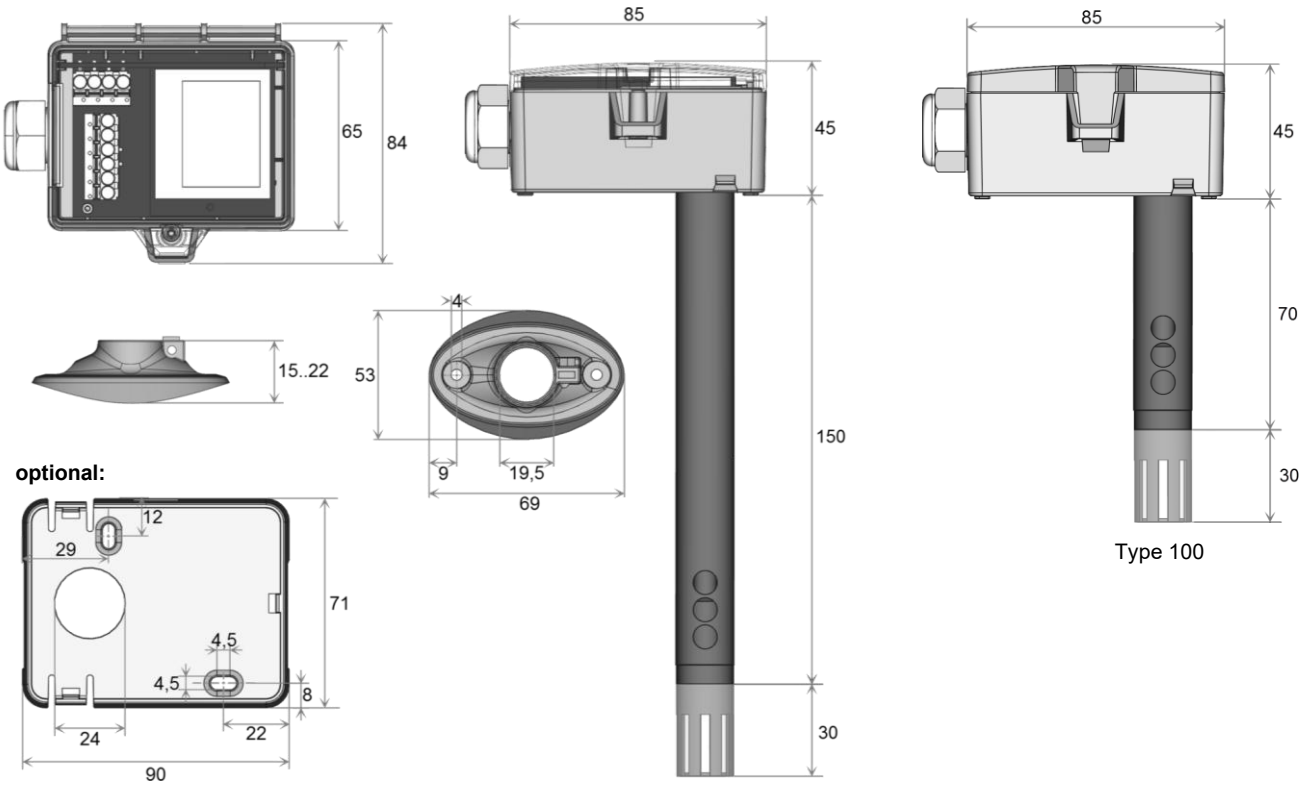
n.c.	*(ST-, optional passive sensor)*
n.c.	*(ST+, optional passive sensor)*
AOU2	*(temperature | 0..10 V)*
AOU1	*(VOC | 0..10 V)*
GND	*(15..35 V = or 19..29 V ~)*
UB+	
n.c.	
AOU3	*(humidity | 0..10 V)*

LK+ VOC (100) (LCD) VV Relay



n.c.	*(ST-, optional passive sensor)*
n.c.	*(ST+, optional passive sensor)*
AOU2	*(temperature | 0..10 V)*
AOU1	*(VOC | 0..10 V)*
GND	*(15..35 V = or 19..29 V ~)*
UB+	
	(Relay 2 | NO)
	(Relay 1 | NO)

»DIMENSIONS (MM)



Type 100

»ACCESSORIES (INCLUDED IN DELIVERY)

Mounting base	Item No. 631228
Mounting kit universal	Item No. 698511

• Cover screw + screw cover• 2 Wall plugs • 2 Screws (countersunk head) • 2 Screws (rounded head)

»ACCESSORIES (OPTIONAL)

Sealing insert M20 USE white, 2x Ø=7 mm (for 2 wire; PU 10 pieces)	Item No. 641333
Bluetooth dongle	Item No. 668262