» LK+ CO2+VOC (LCD) (Temp_rH)

Duct sensor for air quality, optional with temperature and humidity

thermokon®
HOME OF SENSOR TECHNOLOGY

Datasheet

USEapp ✓

Illustration similar, depending on the type

»APPLICATION

Sensor for outdoor CO_2 measurement optional temperature and humidity: cold rooms, greenhouses, production plants and warehouses. With a mix output, a mixture of CO_2 and VOC signals can be realized. The mixing ratio can be configured with the USE app. Designed for outdoor mounted applications with 0..10 V or 4..20 mA output. or 4..20 mA output. LCD models with RGB background light have a transparent cover. Display configuration and threshold values for color changes can be parameterized via Thermokon USEapp. With the option board relay two-point controllers or a 2-stage 2-point controller for temperature or humidity can be realized.

»TYPES AVAILABLE

Duct sensor CO2 + VOC or Mix, optional with LCD – active 2x 0..10 V | 2x 4..20 mA | Relay

LK+ CO2+VOC (LCD) VV
LK+ CO2+VOC (LCD) AA
LK+ CO2+VOC (LCD) VV Relay

optionally with shorter sensor tube, Type 100

LK+ CO2+VOC (LCD) 100 VV
LK+ CO2+VOC (LCD) 100 AA
LK+ CO2+VOC (LCD) 100 VV Relay

Duct sensor CO2 + VOC + temp +rH (opt.) or mix, optional with LCD – active 3x/4x 0..10 V

LK+ CO2+VOC (LCD) Temp 3xV
LK+ CO2+VOC (LCD) Temp_rH 4xV

optionally with shorter sensor tube, Type 100

LK+ CO2+VOC (LCD) 100 Temp 3xV
LK+ CO2+VOC (LCD) 100 Temp_rH 4xV

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 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.

»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.

»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

»INFORMATION ABOUT SELF-CALIBRATION FEATURE CO_2

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.

» 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".

» 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.

» PRODUCT TESTING AND CERTIFICATION

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.
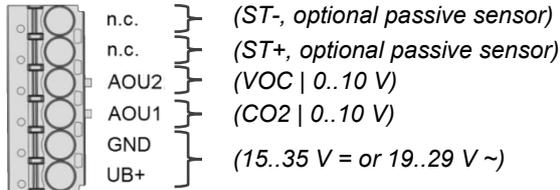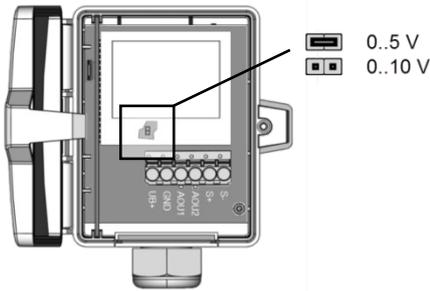
» TECHNICAL DATA

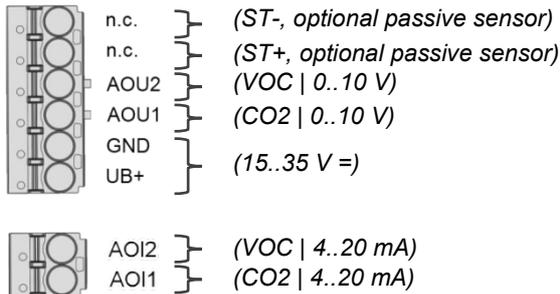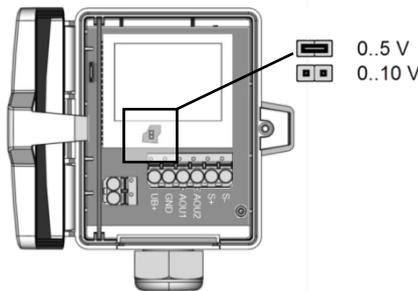|	
Measuring values	CO2, VOC, temperature + humidity (depending on the device)
Output voltage	2..4x 0..10 V or 0..5 V, min. load 10 kΩ (live-zero configuration via Thermokon USEapp)
Output Amp *(type-dependent)*	**AA** 2x 4..20 mA, max. load 500 Ω
Output passive	**passive** Options: additional passive 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)*	**VV | 3xV | 4xV| 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 ~)
Measuring range temp. *(type-dependent)*	**3xV | 4xV** +40..+140 °F (default setting), optionally configured via Thermokon USEapp
Measuring range humidity *(type-dependent)*	**4xV** 0..100% rH non-condensing, optionally configured via Thermokon USEapp (enthalpy, absolute humidity, dew point)
Measuring range CO2	0..2000 ppm (default), 0..5000 ppm (optionally configured via Thermokon USEapp)
Accuracy temperature *(type-dependent)*	**3xV | 4xV** ±0,5 K (typ. at 70 °F)	**passive** depending on used sensor
Accuracy humidity *(type-dependent)*	**4xV** ±2% between 10..90% rH (typ. at 70 °F)
Accuracy CO2	±50 ppm +3% of reading (typ. at 70 °F, 50% rH)
Air speed	min. 1 ft/s, max. 40 ft/s
Calibration	self-calibration, Dual Channel
Sensor	**CO2** NDIR (non-dispersiv, infrared)	**VOC** VOC sensor (heated metal oxide semiconductor)
Display *(optional)*	LCD 1.14x1.38 in. 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 *(type-dependent)*	**VV | AA | 3xV | 4xV** Flextherm M20, for wire max. Ø=0.18..0.35 in., removable	**Relay** M25 with fourfold cable entry for wire with max. Ø=0.28 in., removable
Pipe *(type-dependent)*	**VV | AA | VV Relay** PA6, black, Ø=0.77 in., length 6 in. **Type 100** Length 2.7 in.	**3xV | 4xV** PA6, black, Ø=0.77 in., length 7.1 in. **Type 100** Length 3.9 in.
Connection electrical	removable plug-in terminal, max. 14 AWG
Ambient condition	+32..+122 °F, 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 ...)

»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.
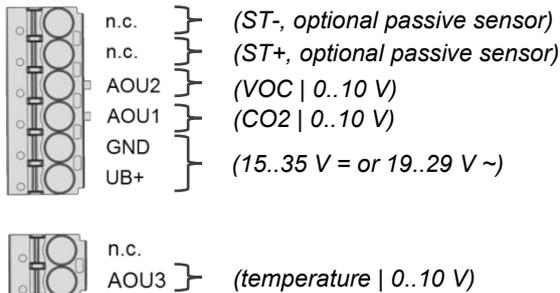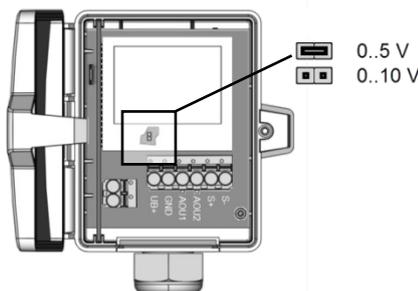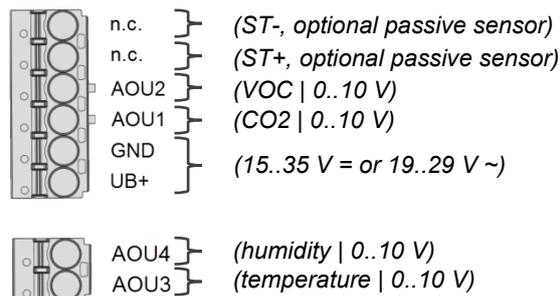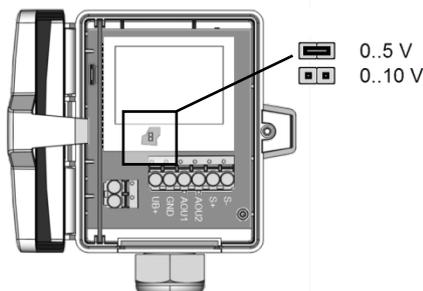
LK+ **CO2+VOC LCD VV**

0..5 V	
0..10 V	

n.c.	(ST-, optional passive sensor)
n.c.	(ST+, optional passive sensor)
AOU2	(VOC | 0..10 V)
AOU1	(CO2 | 0..10 V)
GND	
UB+	(15..35 V = or 19..29 V ~)

LK+ **CO2+VOC LCD AA**

0..5 V	
0..10 V	

n.c.	(ST-, optional passive sensor)
n.c.	(ST+, optional passive sensor)
AOU2	(VOC | 0..10 V)
AOU1	(CO2 | 0..10 V)
GND	
UB+	(15..35 V =)

AOI2	(VOC | 4..20 mA)
AOI1	(CO2 | 4..20 mA)

LK+ **CO2+VOC LCD 3xV**

0..5 V	
0..10 V	

n.c.	(ST-, optional passive sensor)
n.c.	(ST+, optional passive sensor)
AOU2	(VOC | 0..10 V)
AOU1	(CO2 | 0..10 V)
GND	
UB+	(15..35 V = or 19..29 V ~)

n.c.	
AOU3	(temperature | 0..10 V)

LK+ **CO2+VOC 4xV**

0..5 V	
0..10 V	

n.c.	(ST-, optional passive sensor)
n.c.	(ST+, optional passive sensor)
AOU2	(VOC | 0..10 V)
AOU1	(CO2 | 0..10 V)
GND	
UB+	(15..35 V = or 19..29 V ~)

AOU4	(humidity | 0..10 V)
AOU3	(temperature | 0..10 V)

LK+ **CO2+VOC LCD Relay**

0..5 V	
0..10 V	

n.c.	(ST-, optional passive sensor)
n.c.	(ST+, optional passive sensor)
AOU2	(VOC | 0..10 V)
AOU1	(CO2 | 0..10 V)
GND	
UB+	(15..35 V = or 19..29 V ~)

(Relay 2 | NO)
(Relay 1 | NO)

» DIMENSIONS (IN.)

optional:

Type 100

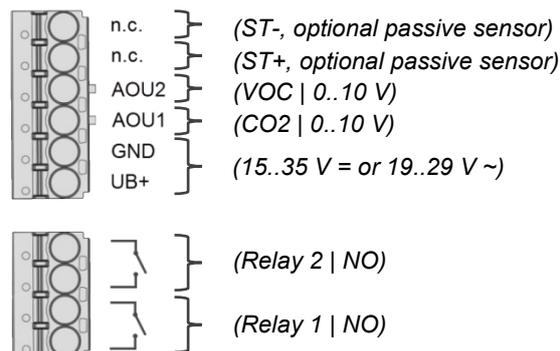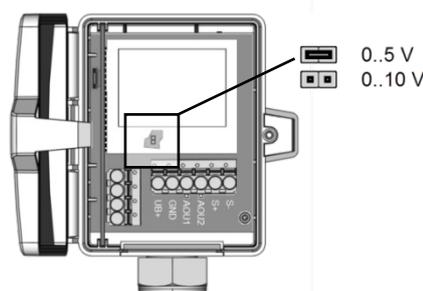## » ACCESSORIES (INCLUDED IN DELIVERY)

Mounting base   Item No. 631228
Mounting kit universal   Item No. 698511
• Cover screw + screw cover• 2 Rawlplugs • 2 Screws (countersunk head) • 2 Screws (rounded head)

» ACCESSORIES (OPTIONAL)

Sealing insert M20 USE white, 2x Ø=0.28 in. (for 2 wire; PU 10 pieces)   Item No. 641333