# LA+ CO2+VOC (LCD) (Temp_rH)

Outdoor sensor for air quality

thermokon®
HOME OF SENSOR TECHNOLOGY

## Data sheet

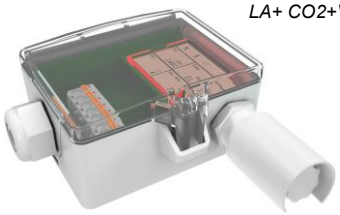
Subject to technical changes
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*LA+ CO2+VOC*



*LA+ CO2+VOC Temp*



*LA+ CO2+VOC Temp_rH*

## » 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. LCD models with RGB background light have a transparent cover. Display configuration and threshold values for colour changes can be parameterised via Thermokon USEapp. With the option board relay two-point controllers or a 2-stage 2-point controller for temperature or humidity can be realised.

## » TYPES AVAILABLE

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

- LA+ CO2+VOC (LCD) VV
- LA+ CO2+VOC (LCD) AA
- LA+ CO2+VOC (LCD) VV Relay

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

- LA+ CO2+VOC Temp 3 x V
- LA+ CO2+VOC 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 authorized personnel.

The product should only be used for the intended application. Unauthorized 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/laplus

## » 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

## » USE ENCLOSURE WITH UV AND WEATHER RESISTANCE

After some time, outdoor mounted plastics can lose their color and quality. Therefore, all USE housings are made of special white polycarbonate (PC). The light-stable colorants and additives are used to achieve optimum protection of the polymer while maintaining color stability. The titanium dioxide used is specially developed for polycarbonate and offers excellent UV protection through the reflection of the entire light spectrum including the UV component by 340 nm. This effectively counteracts the otherwise occurring photochemical polymer degradation. The colors stay full for a long time without fading. The material is also resistant to cold and frost.

## » GENERAL REMARKS CONCERNING SENSORS

Especially regarding passive sensors in two-wire conductor versions, the wire resistance of the supply wire must be considered. If necessary, the wire resistance must 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.**

## » INFORMATION ABOUT SELF-CALIBRATION FEATURE $CO_2$

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 (e.g. dust or fingerprints)
- Aggressive chemicals
- Ambient conditions (high humidity or condensation on measuring elements)

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

## »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 |

## »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 oxidizes 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** | $CO_2$, VOC, temperature, humidity (depending on the device) | |
| **Output voltage** | 2..4 x 0..10 V or 0..5 V, min. load 10 kΩ (live-zero configuration via Thermokon USEapp) | |
| **Output Amp** *(type-dependent)* | **AA**<br>2 x 4..20 mA, max. load 500 Ω | |
| **Output passive** *(type-dependent)* | **Passive**<br>Options: additional passive temperature sensor<br>eg: PT100/PT1000/NI1000/NI1000TK5000/NTC10K... and other sensors on request | |
| **Output switch contact** (type-dependent) | **Relay**<br>2 floating contacts for 24 V ~ or 24 V = / 3 A | |
| **Power supply** *(type-dependent)* | **VV \| 3 x V \| 4 x V \| Relay**<br>15..35 V = or 19..29 V ~ SELV | AA<br>15..35 V = SELV |
| **Power consumption** | Max. 2,3 W (24 V =) \| max. 4,3 VA (24 V ~) | |
| **Display** *(optional)* | LCD 1.14” × 1.37” mm with RGB backlight | |
| **Enclosure** | Enclosure: USE-M, PC, pure white, with removable cable entry<br>Cover: PC, transparent | |
| **Degree of Protection** | IP65, according to EN 60529 | |
| **Cable entry** *(type-dependent)* | **VV \| AA \| 3xV \| 4xV**<br>Flextherm M20, for wire Ø = 0.17”..0.35” mm, removable | **Relay**<br>M25 with fourfold cable entry for wire with max. Ø = 0.27”, removable |
| **Electrical connection** | Removable plug-in terminal, max. 14 AWG | |
| **Ambient condition** | 32..+122 °F, 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 oxidized (burnt): Body odours, tobacco smoke, exhalations emitted by materials (furniture, carpets, paint, glue ...) | |

### » Temperature

| | | |
|---|---|---|
| **Measuring range temp.** *(type-dependent)* | **3 x V \| 4 x V**<br>32..+122 °F (default setting), optionally configured via Thermokon USEapp | |
| **Accuracy temperature** *(type-dependent)* | **VV \| AA \| 3 x V \| 4 x V \| Relay**<br>±0,5 K (typ. at 70 °F) | **Passive**<br>Depending on used sensor |

### » Humidity *(optional)*

| | |
|---|---|
| **Measuring range humidity** *(type-dependent)* | **4 x V**<br>0..100 % rH (non-condensing),<br>Optionally configured via Thermokon USEapp (enthalpy, absolute humidity, dew point) |
| **Accuracy humidity** *(type-dependent)* | **4 x V**<br>±2 % between 10..90 % rH (typ. at 70 °F) |

### » $CO_2$

| | |
|---|---|
| **Measuring range $CO_2$** | 0..2000 ppm (default), 0..5000 ppm (optionally configured via Thermokon USEapp) |
| **Accuracy $CO_2$** | ±50 ppm +3 % of reading (typ. at 70 °F, 50 % rH) |
| **Calibration** | Self-calibration dual channel |
| **Sensor** | NDIR (non-dispersive, infrared) |

### » VOC

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

## » 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.**

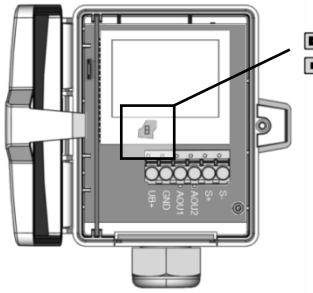
Application-specific reconfiguration of the devices can be carried out using the Thermokon USEapp. The configuration is carried out in the voltage-supplied state.

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

## »WIRING DIAGRAM

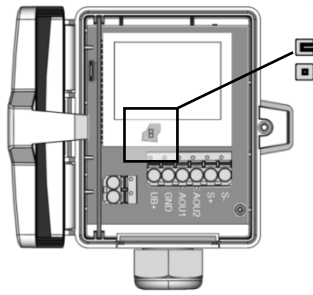
To change the output voltage range (default: 0..10 V to 0..5 V) via jumper, the display must be removed from the board.

**LA+ CO2+VOC LCD VV**



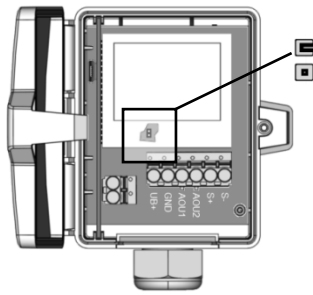

| | |
|---|---|
| n.c. | *(ST-, optional passive sensor)* |
| n.c. | *(ST+, optional passive sensor)* |
| AOU2 | *(VOC \| 0..10 V)* |
| AOU1 | *(CO2 \| 0..10 V)* |
| GND | *(15..35 V = or 19..29 V ~)* |
| UB+ | |

**LA+ CO2+VOC LCD AA**



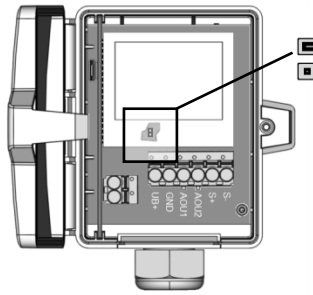

| | |
|---|---|
| n.c. | *(ST-, optional passive sensor)* |
| n.c. | *(ST+, optional passive sensor)* |
| AOU2 | *(VOC \| 0..10 V)* |
| AOU1 | *(CO2 \| 0..10 V)* |
| GND | *(15..35 V =)* |
| UB+ | |
| AOI2 | *(VOC \| 4..20 mA)* |
| AOI1 | *(CO2 \| 4..20 mA)* |

**LA+ CO2+VOC LCD 3 x V**



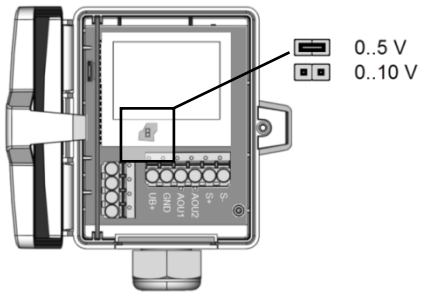

| | |
|---|---|
| n.c. | *(ST-, optional passive sensor)* |
| n.c. | *(ST+, optional passive sensor)* |
| AOU2 | *(VOC \| 0..10 V)* |
| AOU1 | *(CO2 \| 0..10 V)* |
| GND | *(15..35 V = or 19..29 V ~)* |
| UB+ | |
| n.c. | |
| AOU3 | *(temperature \| 0..10 V)* |

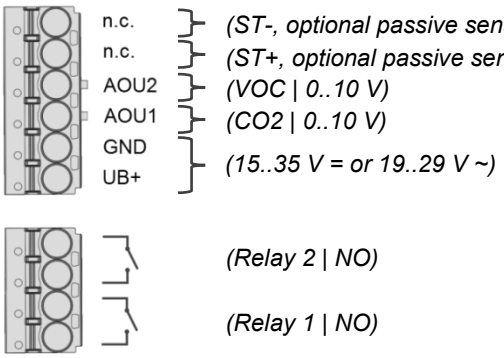
**LA+ CO2+VOC 4 x V**




| | |
|---|---|
| n.c. | *(ST-, optional passive sensor)* |
| n.c. | *(ST+, optional passive sensor)* |
| AOU2 | *(VOC \| 0..10 V)* |
| AOU1 | *(CO2 \| 0..10 V)* |
| GND | *(15..35 V = or 19..29 V ~)* |
| UB+ | |
| AOU4 | *(humidity \| 0..10 V)* |
| AOU3 | *(temperature \| 0..10 V)* |

**LA+ CO2+VOC LCD Relay**



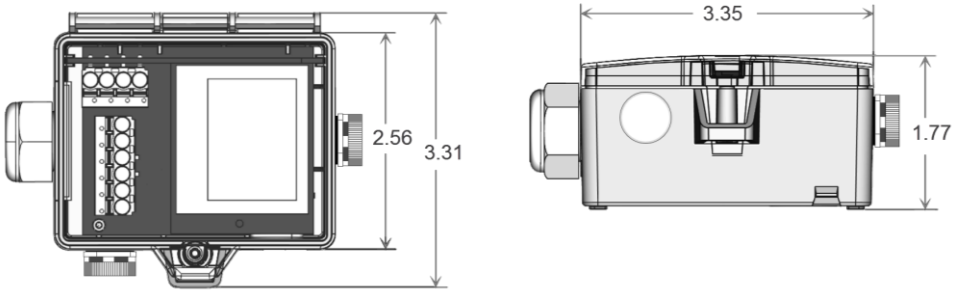





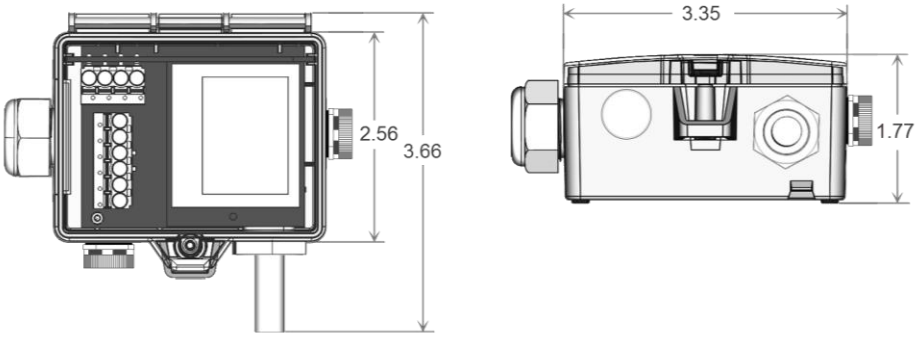


## » DIMENSIONS (IN.)

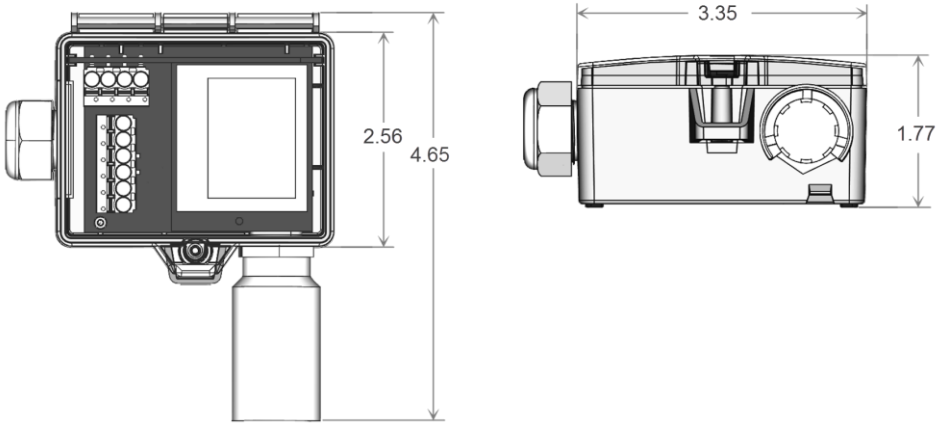
**LA+ CO2+VOC LCD Relais**



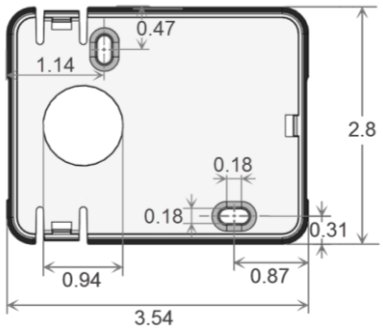

**LA+ CO2+VOC LCD Temp**




**LA+ CO2+VOC LCD Temp_rH**



**Mounting base**




## »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, 2 x Ø = 0.27” (for 2 wires; PU: 10 pieces) | Item No. 641333 |