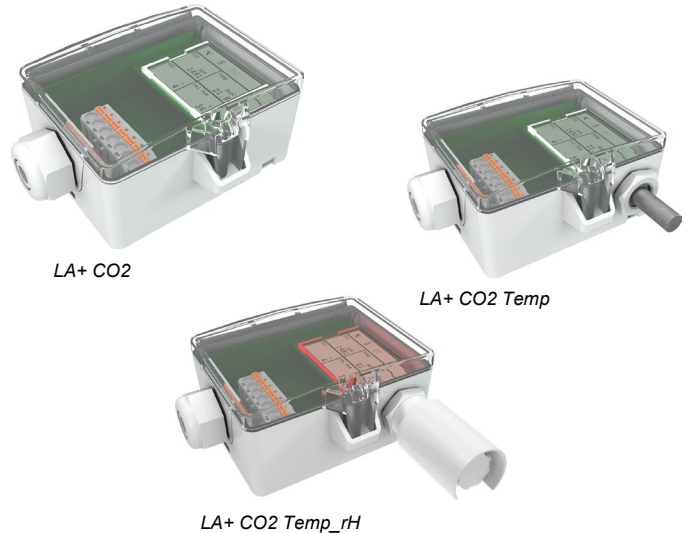# LA+ CO2 (LCD) (Temp_rH) RS485 BACnet

Outdoor sensor for air quality, optional temperature and humidity

thermokon®
HOME OF SENSOR TECHNOLOGY

Datasheet

Subject to technical alteration
Issue date: 27.03.2024 • A140

LA+ CO2

LA+ CO2 Temp

LA+ CO2 Temp_rH

The following illustrations show the LCD design

» APPLICATION

Air quality sensor for measuring CO2, temperature and humdity in outdoor areas with 2 0..10 V output. LCD models with RGB background light have a transparent cover.

» TYPES AVAILABLE

Outdoor sensor CO2, optional with display – active RS485 BACnet MS/TP
- LA+ CO2 (LCD) RS485 BACnet

Outdoor sensor CO2 temp, optional with display – active RS485 BACnet MS/TP
- LA+ CO2 (LCD) Temp RS485 BACnet

Outdoor sensor CO2 + temp + rH, optional with display – active RS485 BACnet MS/TP
- LA+ CO2 (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

» PRODUCT TESTING AND CERTIFICATION

CE

Declaration of conformity
The declaration of conformity of the products are 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

»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

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.

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).

Remark: Occurring draught 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

At regular environmental condition, 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 therm to loss of the specified accuracy:

- Mechanical stress
- Contamination (e.g. dust / fingerprints)
- Aggressive chemicals
- Ambient conditions (e.g. condensation on measuring element)

Do not touch the sensor elements!

Re-calibration or exchange of the sensor element are not subject of the general warranty.

»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

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 (dust / fingerprints e.g.)
- Abrasive chemicals
- Environmental influences (high humidity / condensation on measuring element)

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

»TECHNICAL DATA

Measuring values *(type-dependent)*	CO2, temperature and humidity	
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, **Fail-safe Biasing required**	
Power supply*	15..35 V = or 19..29 V ~ SELV *With alternating voltage, the correct polarity must be ensured*	
Power consumption	max. 2,3 W (24 V =) | max. 4,3 VA (24 V ~)	
Measuring range temp. *(type-dependent)*	**Temp | Temp_rH** 0..+50 °C (default setting) , optionally configured via Thermokon USEapp	
Measuring range humidity *(type-dependent)*	**Temp_rH** 0..100% rH non-condensing, optionally (enthalpy, absolute humidity, dew point)	
Measuring range CO2	0..2000 ppm (default), 0..5000 ppm (optionally configured via Thermokon USEapp)	
Accuracy temperature *(type-dependent)*	**Temp | Temp_rH** ±0,5 K (typ. at 21 °C)	
Accuracy humidity *(type-dependent)*	**Temp_rH** ±2% between 10..90% rH (typ. at 21 °C)	
Accuracy CO2	±50 ppm +3% of reading (typ. at 21 °C, 50% rH)	
Calibration	self-calibration, Dual Channel	
Sensor	NDIR (non-dispersiv, infrared)	
Display *(optional)*	**LCD** LCD 29x35 mm with RGB backlight	
Enclosure *(type-dependent)*	enclosure USE-M, PC, pure white, with removable cable entry	**LCD** cover PC, transparent
Protection	IP65 according to EN 60529	
Cable entry	M25, for wire max. Ø=7 mm, seal insert for fourfold cable entry	
Connection electrical	**Mainboard** removable plug-in terminal, max. 2,5 mm²	**Plug-in card** removable plug-in terminal, max. 1,5 mm²
Ambient condition	0..+50 °C, max. 85% rH short term condensation	

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 and all "negative" operating voltage input terminals (-) (=reference potential) are connected (in-phase connection of field devices).In the 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

In case of outdoor installation avoid direct rain and sun contact. Probably use sun respectively rain protection. Cable entry from bottom or side. For side cable routing set loop so that precipitation can drain defined. Observe permissible ambient condition.

Ausrichtung inkorrekt	Ausrichtung korrekt	Kabelzuführung
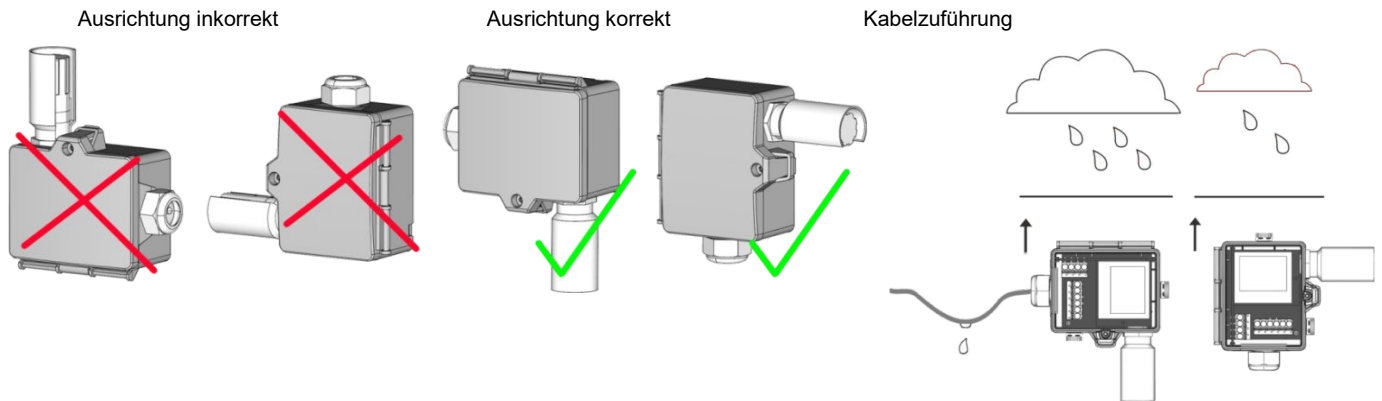
Regardless of the compass direction, the outdoor sensor should not be mounted in the following locations:
- on chimneys, under roofs, canopies or balconies
- in close proximity to an exhaust air opening
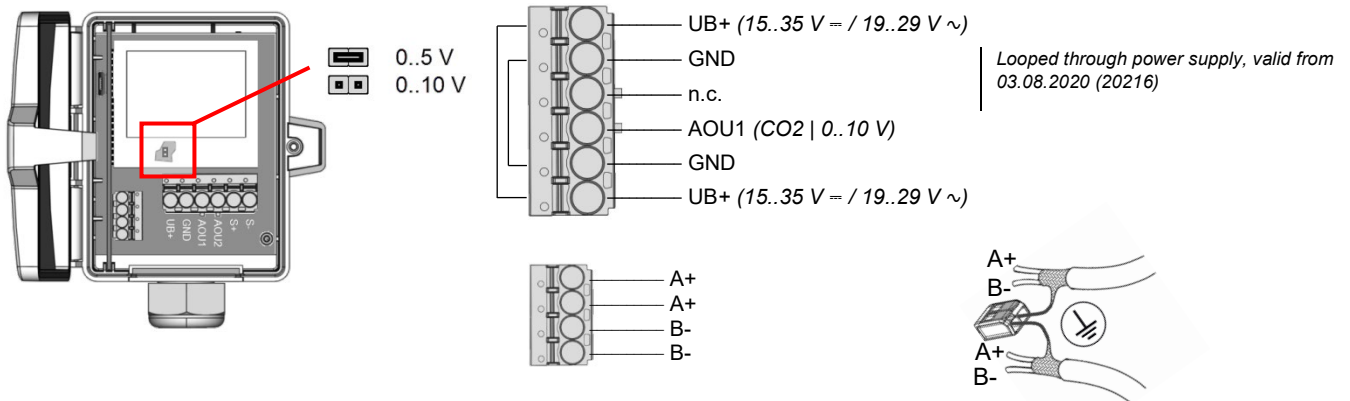- above, below or next to windows and doors

»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.
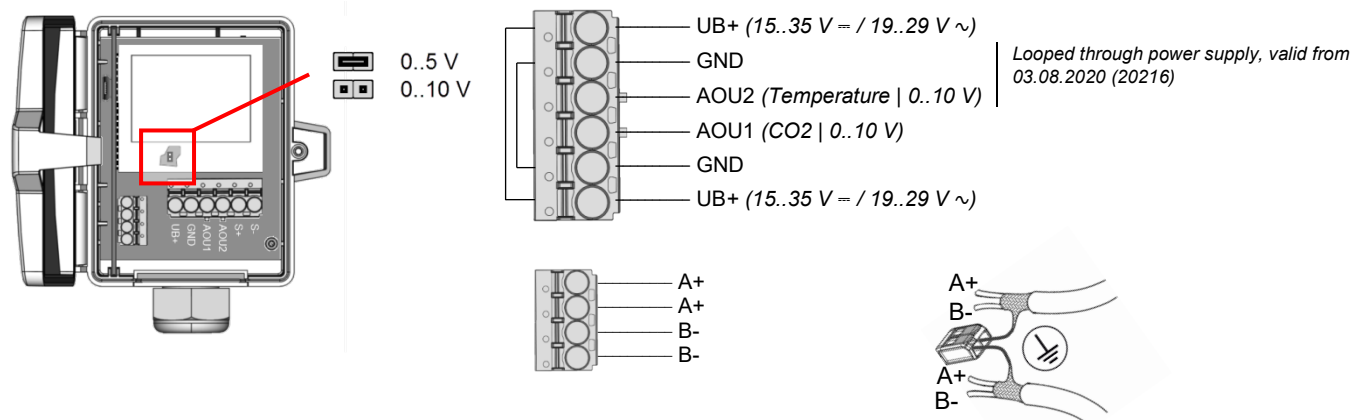
»CONNECTION PLAN

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.

LA+ CO2 (LCD) RS485

0..5 V
0..10 V

UB+ *(15..35 V ⎓ / 19..29 V ∼)*
GND
n.c.
AOU1 *(CO2 | 0..10 V)*
GND
UB+ *(15..35 V ⎓ / 19..29 V ∼)*

Looped through power supply, valid from 03.08.2020 (20216)

A+
A+
B-
B-

A+
B-
A+
B-

LA+ CO2 Temp (LCD) RS485 | LA+ CO2 Temp_rH (LCD) RS485

0..5 V
0..10 V

UB+ *(15..35 V ⎓ / 19..29 V ∼)*
GND
AOU2 *(Temperature | 0..10 V)*
AOU1 *(CO2 | 0..10 V)*
GND
UB+ *(15..35 V ⎓ / 19..29 V ∼)*

Looped through power supply, valid from 03.08.2020 (20216)

A+
A+
B-
B-

A+
B-
A+
B-

» DIP SWITCH CONFIGURATION (PLUG-IN CARD)

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).

*factory default settings

Object	Access	Description	COV Increment	Unit
AI-1	R	Relative Humidity	0..100 %	%rF
AI-5	R	CO2		ppm

Object	Access	Description	Object AV-38 = 1 (Unit SI)		Object AV-38 = 2 (Unit Imperial)	
			COV increment / Unit		COV increment / Unit	
AI-0	R	Temperature	0..+250	°C	0..+480	°F
AI-2	R	Absolute humidity	0..80	g/m³	0..35	gr/ft³
AI-3	R	Relative humidity	0..85	KJ/kg	0..40	BTU/lb
AI-4	R	Dew point	0..80	°C	0..200	°F

BACnet Objects, PICS and BIBBs:
USE-RS485 BACnet interface
A detailed description of the BACnet interface can be found at the following link: **Download**

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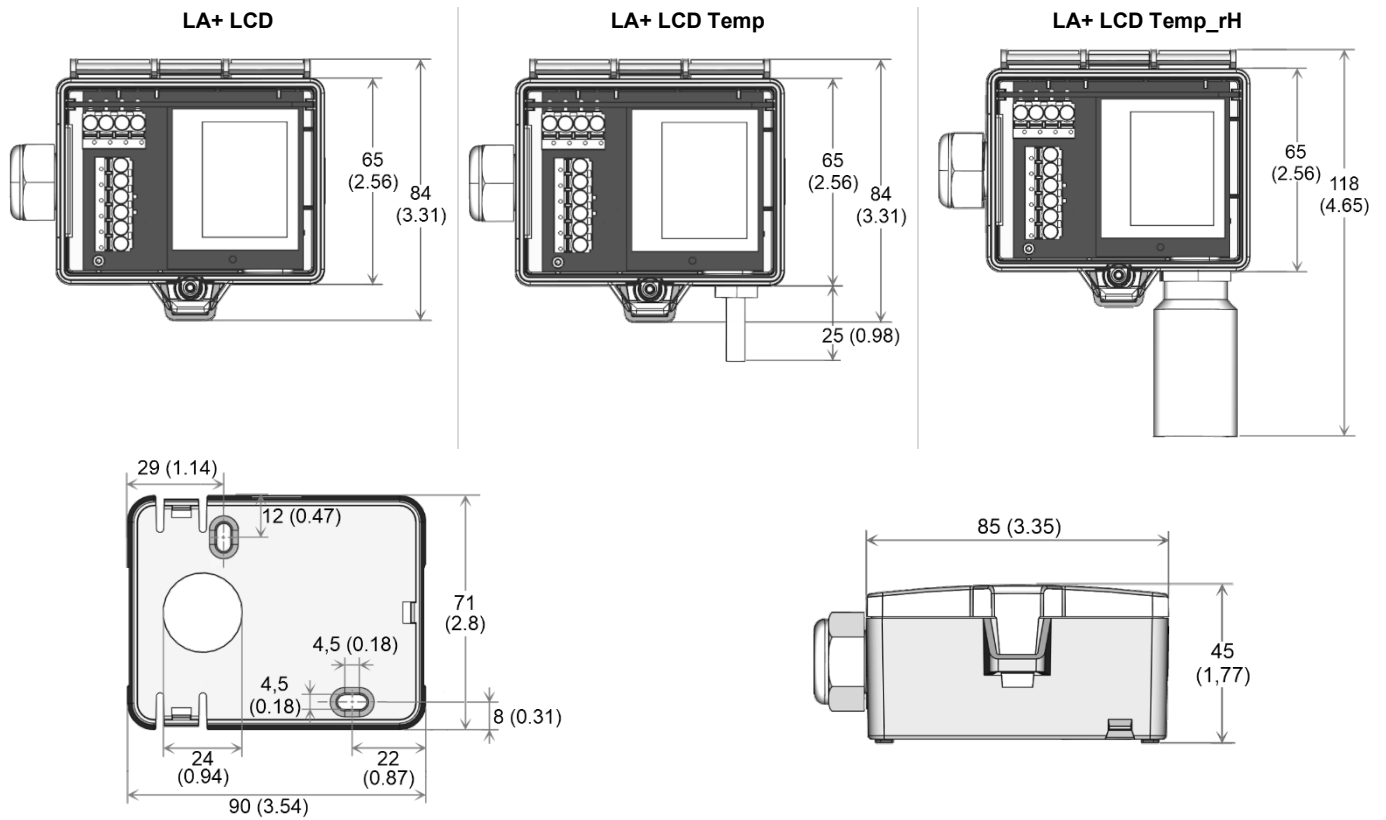
The configuration-app and the app description can be found in the Google Play Store or in the Apple App Store.

» 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.

»DIMENSIONS (MM)

LA+ LCD

LA+ LCD Temp

LA+ LCD Temp_rH

65 (2.56) 84 (3.31)

65 (2.56) 84 (3.31) 25 (0.98)

65 (2.56) 118 (4.65)

29 (1.14) 12 (0.47) 71 (2.8) 4,5 (0.18) 4,5 (0.18) 8 (0.31) 24 (0.94) 22 (0.87) 90 (3.54)

85 (3.35) 45 (1,77)

»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)

Bluetooth dongle	Item No. 668262
Filter stainless steel, wire mesh	Item No. 231169
RS485 Biasing Adapter	Item No. 811378
USB Interface RS485 (incl. driver CD)	Item No. 668293