

# LK+ CO2 LCD RS485 Modbus

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

**thermokon**<sup>®</sup>  
HOME OF SENSOR TECHNOLOGY

## Datasheet

Subject to technical alteration  
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## Application

Duct air quality sensor for detection of CO<sub>2</sub>, with temperature and humidity (optional). Designed for duct mounted applications with 2 0..10 V outputs.

## Types Available

### Duct sensor with display CO<sub>2</sub> + temp – active BUS

LK+ CO<sub>2</sub> LCD Temp RS485 Modbus

### Duct sensor with display CO<sub>2</sub> + temp +rH – active BUS

LK+ CO<sub>2</sub> LCD Temp\_rH RS485 Modbus

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.

## 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 ( $\pm 0,2$  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 ( $\pm 0,2$  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 a trimming potentiometer on the sensor board.

**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<sub>2</sub>

EN 13779 defines several classes for indoor air quality:

Category	CO <sub>2</sub> 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<sub>2</sub>

All gas sensors are subject to drift caused by components. This fact results generally in the need to recalibrate the sensors regularly.

With dual channel technology Thermokon integrates automatic self-calibration for different fields of operation. In contrast to common used ABC-Logic sensors with self-calibration dual channel are suitable for applications operating 24 hours, 7 days a week as for example hospitals.

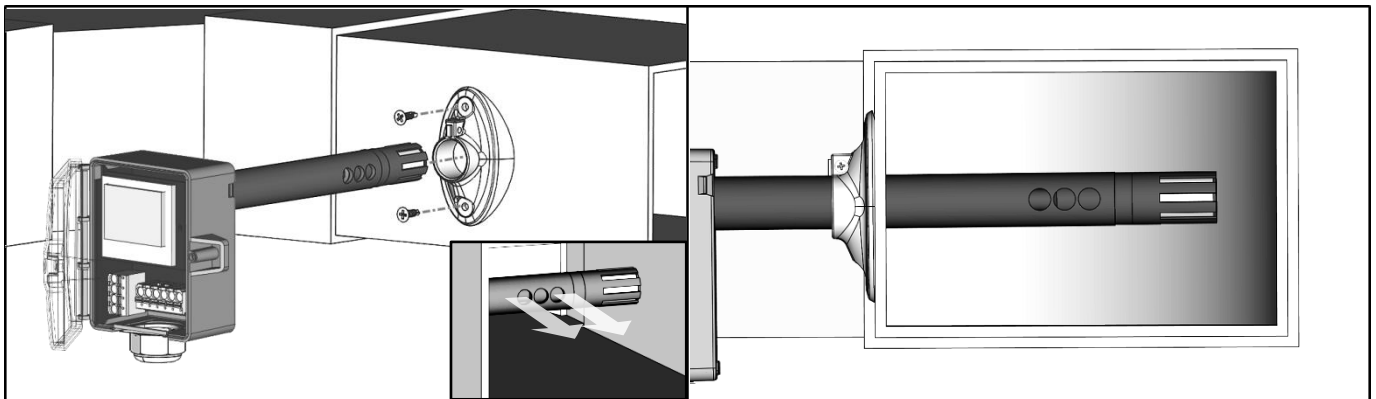
**Manual calibration is not necessary!**

## Technical Data

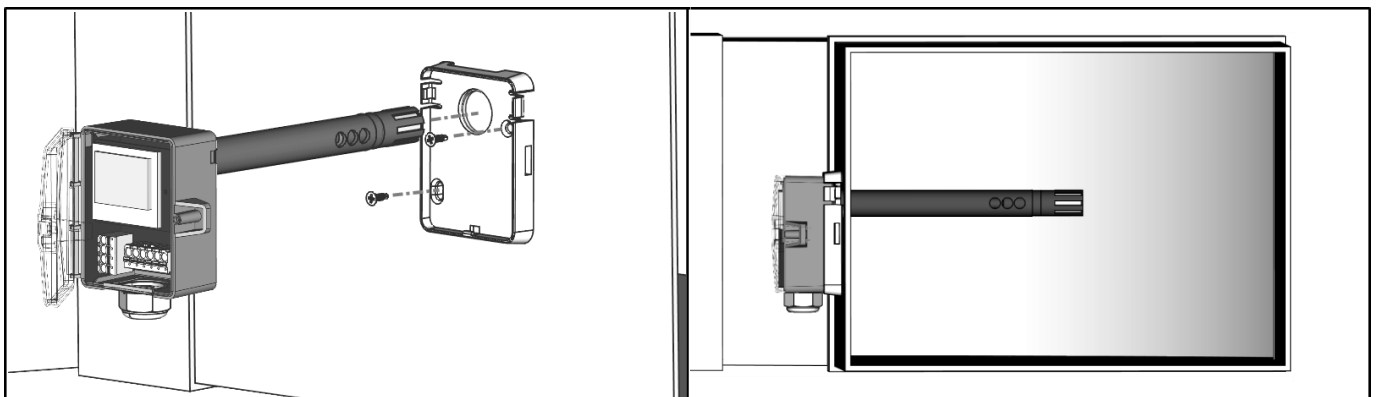
Measuring values		CO2, temperature + humidity (depending on the device)
Output voltage	Temp_rH	2x 0..10 V or 0..5 V, min. load 10 k $\Omega$ (live-zero configuration via Thermokon USEapp)
Network technology		RS485 Modbus
Power supply		15..35 V = or 19..29 V ~
Power consumption		max. 2,5 W (24 V =)   max. 4,3 VA (24 V ~)
Measuring range temp.		0..+50 °C (default setting), optionally configured via Thermokon USEapp
Measuring range humidity	Temp_rH	0..100% rH non-condensing, optionally configured via Thermokon USEapp (enthalpy, absolute humidity, dew point)
Measuring range CO2		0..2000 ppm, 0..5000 ppm (optionally configured via Thermokon USEapp)
Accuracy temperature	passive	$\pm 0,5$ K (typ. at 21 °C)
Accuracy humidity	Temp_rH	typ. $\pm 0,3$ K (typ. at 21 °C), depending on used sensor
Accuracy CO2		$\pm 2\%$ between 10..90% rH (typ. at 21 °C)
Air speed		$\pm 50$ ppm +3% of reading, (typ. at 21 °C, 50% rH)
Calibration		min. 0,3 m/s, max. 12 m/s
Sensor		self-calibration, Dual Channel
Display		NDIR (non-dispersiv, infrared)
Enclosure		LCD 29x35 mm with RGB backlight
Protection		enclosure USE-M, PC, pure white, cover PC, transparent, with removable cable entry
Cable entry		IP65 according to EN 60529
Connection electrical		M25, for wire max. $\varnothing=7$ mm, seal insert for fourfold cable entry
	Modbus clamp	removeable plug-in terminal, max. 2,5 mm <sup>2</sup>
Pipe		removeable plug-in terminal, max. 1,5 mm <sup>2</sup>
Ambient condition		PA6, black, $\varnothing=19,5$ mm, length 180 mm
Mounting		0..+50 °C, max. 85% rH short term condensation
		installation is also possible using mounting base

## 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.



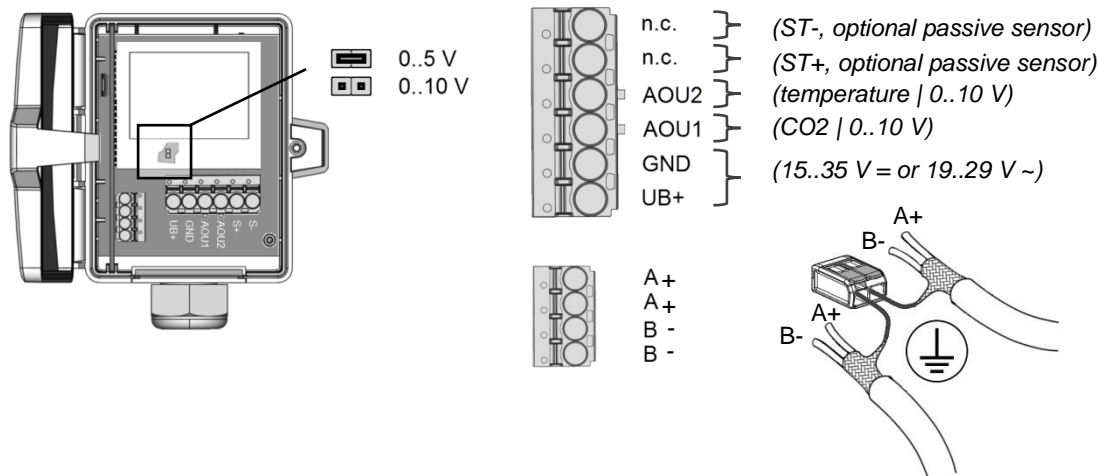
optional:



## 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.

### LK+ CO2 RS485 Modbus



The modbus address of the device is set in the range of 1 ... 31 (binary encoded) using a 5-pole DIP switch. With address 0 via DIP, an extended address range (32..247) is available via USEapp.



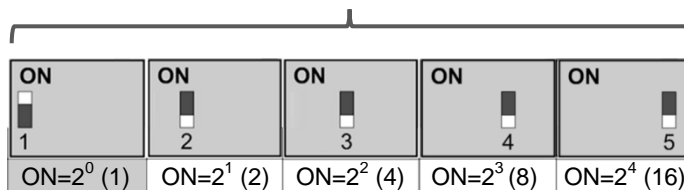
#### Modbus addresses:

USE-RS485 Modbus Interface

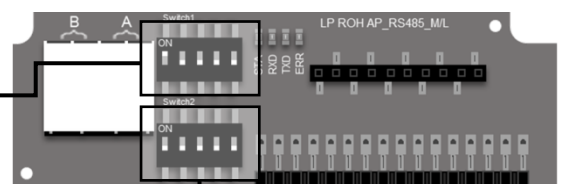
A detailed description of the Modbus addresses can be found under the following link:

→ [Download](#)

#### Address



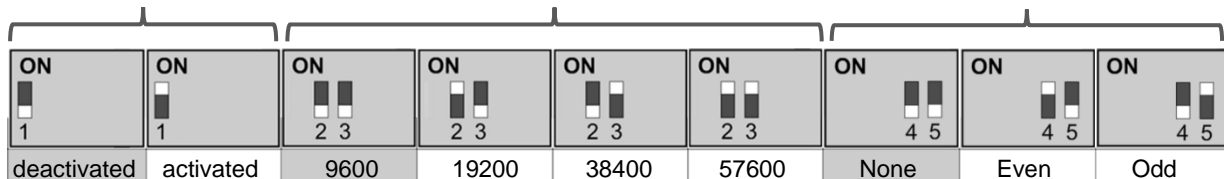
default



#### Termination 120Ω

#### Baud rate

#### Parity



default

default

default

## 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.

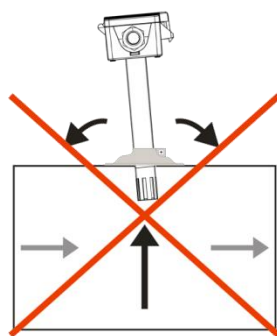


The configuration-app and the app description can be found in the download area of our webpage.

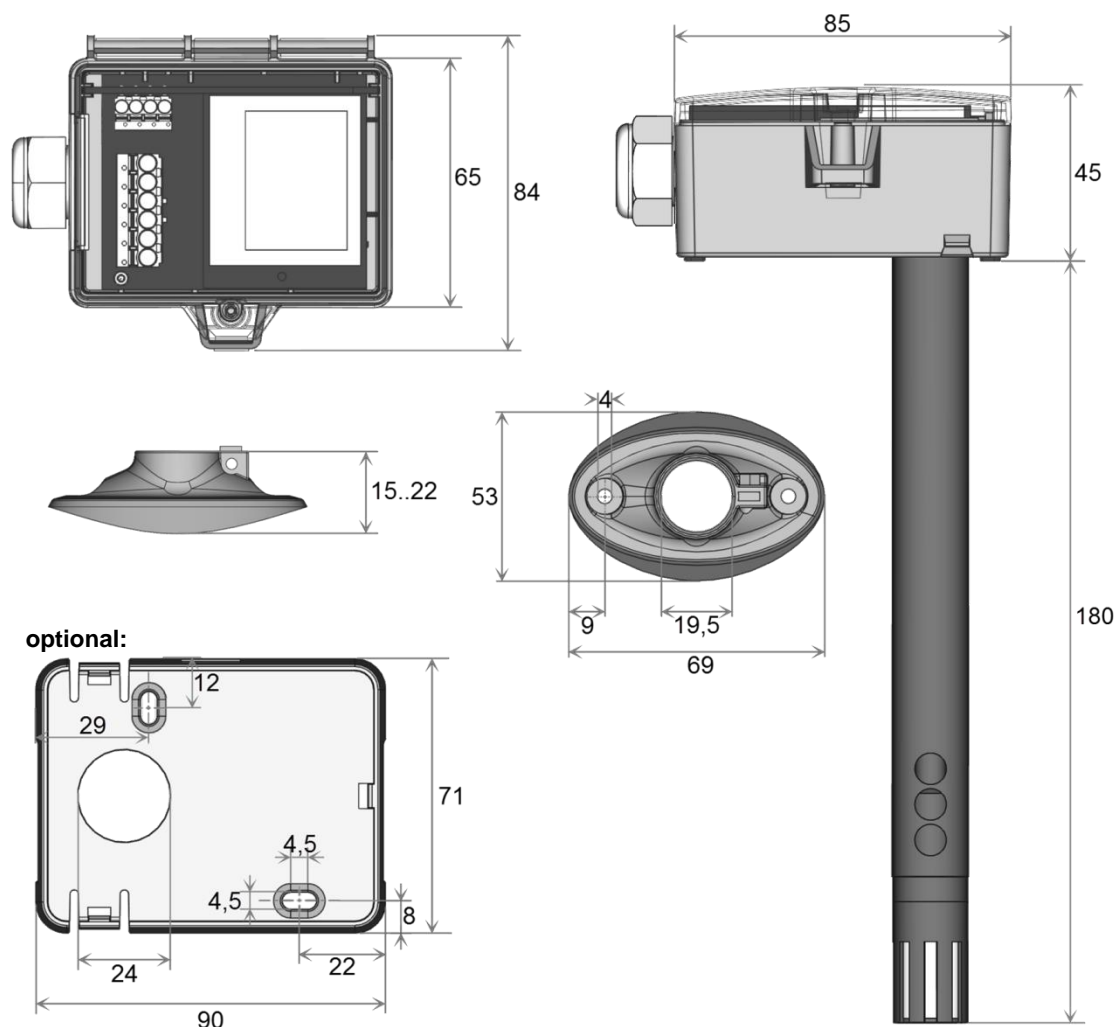
→ [Download \(APK-file for Android\)](#)

## 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)



## Accessories (included in delivery)

Mounting flange MF20 TPO  
 Mounting kit 4  
 • Cable entry M25 • Wago twofold terminal • Cover screw • 2 Screws (countersunk head)

Item No. 612562  
 Item No. 674140

## Accessories (optional)

Mounting base  
 Filter stainless steel, wire mesh

Item No. 631228  
 Item No. 231169