

LK-SX CO2 VV/3xV

Combined sensor CO₂, temperature, rel. Humidity (optional)

thermokon
Sensortechnik GmbH

Data Sheet

Subject to technical alteration
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Application

Duct air quality sensor with hinged lid enclosure for detection of CO₂ and temperature and optional with humidity. 0..10 V outputs. Designed for duct mounted applications.

Types available

LK-SX CO2 VV	CO ₂ - /temperature-Output 0..10 V, 15..24 V = or 24 V ~
LK-SX CO2 3xV	CO ₂ - /temperature-/rel. humidity-Output 0..10 V, 15..24 V = or 24 V ~

Security Advice – Caution



The installation and assembly of electrical equipment must be performed by a skilled electrician.

The device should only be used for the appropriate application. Unauthorised conversions or alteration are prohibited! The modules must not be used in relation with equipment that threatens, directly or indirectly, human health or life or with applications that can result in danger for people, animals or assets. Before connecting devices, the installation must be isolated from the power source!

For devices with controlling units (signal transducers, transmitters, etc.), it is important to make sure that the signal receiving device (actuators, generators, etc.) does not accept damaging or threatening conditions, that may arise from false signals during installation / configuration of the control unit. If necessary, disconnect the signal receiver from any source of power.

The following procedure must be carried out:

1. Disconnect the device from power.
2. Ensure the device is secured against reconnection.
3. Verify the device is not powered.
4. Prior to reconnection, ensure that the enclosure is securely closed.

Please verify and consult:

- Laws, standards and regulations.
- The current condition of the device at the time of installation, to ensure safe installation.
- The devices technical data and installation manual.



Notes on Disposal

As a component of 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. The Waste Electrical and Electronic Act (WEEE) is not applicable. However, the product may contain valuable materials that should not be recycled rather than disposed 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 ($\pm 0,2$ 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 or lowered 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.

Application Notice for Humidity Sensors

Refrain from touching the sensitive humidity sensor. Any touch of it will result in an expiration of warranty.

Under normal environmental conditions we recommend a recalibration interval of about 1 year to maintain the indicated accuracy. At high ambient temperatures and high humidity or when using the sensor in aggressive gases e.g. Chloric, Ozone, Ammoniac, an earlier recalibration or a change of the humidity sensor can become necessary. Such recalibrations or a probable sensor change are not part of the general warranty.

Information about Indoor Air Quality CO₂

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	High indoor air quality
IDA2	400.. 600 ppm	500 ppm	Mean indoor air quality
IDA3	600..1.000 ppm	800 ppm	Moderate indoor air quality
IDA4	>1.000 ppm	1.200 ppm	Low indoor air quality

Information about Self-Calibration Feature CO₂

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

Output voltage	1x 0..10 V (V), load min. 10 kOhm
Measured values	CO ₂ , temperature, humidity (optional)
Power supply	15..24 V = (±10%) or 24 V ~ (±10%)
Power consumption	max. 1,5 W (24 V =) 2,9 VA (24 V ~)
Measuring range CO ₂	0..2000 ppm
Measuring range temperature	0..+50 °C
Measuring range humidity	0..100% rH
Accuracy CO ₂	±75 ppm o. ±10% of measuring range (typ. at 21 °C)
Drift CO ₂	<5% FS or <10% of measuring range per year ¹⁾
Accuracy temperature	±1 °C of measuring range (typ. at 21 °C)
Accuracy humidity	±2% between 10..90% rH
Calibration	Self calibration dual channel
Pressure dependence	typ. 0,135% of measured value per mm Hg
Temperature dependence	typ. 2 ppm per °C (0..+50 °C)
Sensor	NDIR (non dispersive, infrared)
Min. air speed	3 m/sec
Ambient temperature	0..+50 °C
Ambient humidity	max. 85% rH non condensed
Protection	IP65 according to EN 60529
Terminal block	Terminal block, max. 1,5 mm ²
Cable entry size	M20
Enclosure colour	pure white
Enclosure material	PA6
Pipe material	PA6
Pipe colour	black
Pipe length	180 mm
Pipe diameter	19 mm
Filter material	Stainless steel, wire mesh
Notes	MF19 flange included
Warm-up time	<2 minutes (operational), 15 minutes (max. accuracy)
Weight	approx. 400 g

¹⁾ Depending on the ambient atmosphere, the value may be higher.

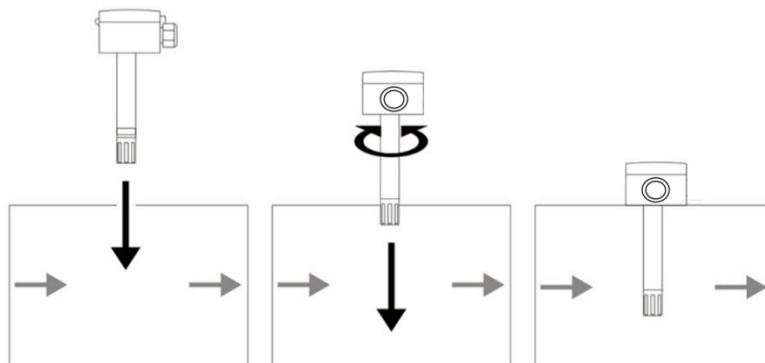
Mounting advices

The sensor can be attached to a mounting flange (recommended) or directly to the ventilation duct.

When installing the device make sure, that the air inlets of the sensor tube are positioned in direction of flow!!!

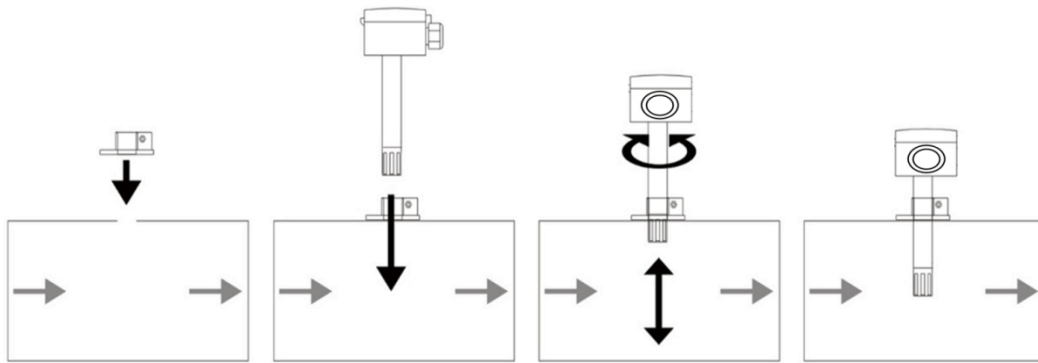
In case of condensation in the air duct please install the device in a way, that possible condensate is able to run-off.

Mounting without mounting flange:



Maximum air velocity 10 m/s. Fix the sensor at the air duct.

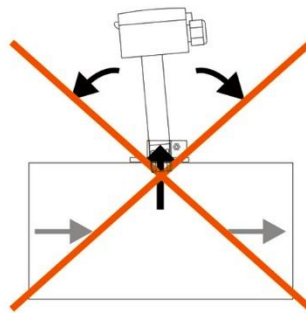
Mounting with mounting flange:



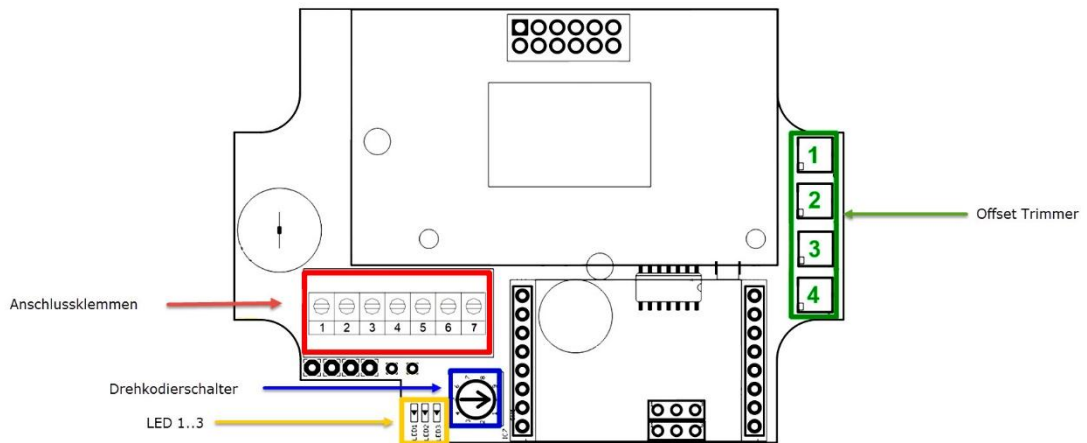
Maximum air speed 10 m/sec. Fix mounting flange at the air duct, fix the sensor at the mounting flange.

Dismounting advice

Unfix sensor and pull it out vertically. **Do not tilt the sensor during withdrawal!**



Terminal Connection Plan



Connection clamps:

Clamp #	Function	Function
	Type VV	Type 3xV
1	24 V	24 V
2	GND	GND
3	Not used	Not used
4	Output temperature 0..10 V (with offset)	Output temperature 0..10 V (with offset)
5	Output CO ₂ 0..10 V (with offset)	Output rel. humidity 0..10 V (with offset)
6	Output CO ₂ 0..10 V (without offset)	Output CO ₂ 0..10 V (without offset)
7	Not used	Not used

Rotary code switch:

Position	Output settings connection clamp #5	Output settings connection clamp #5
	Type VV:	Type 3xV:
0	Not used	Output rel. humidity 0..10 V
1	Not used	Not used
2	Not used	Not used
3	Not used	Not used
4	Output CO ₂ 0..10 V (with offset)	Not used
5	Not used	Not used

Offset trimmer:

Trimmer	Function	Function
	Type VV:	Type 3xV:
1	Not used	Not used
2	Offset settings CO ₂ (± 150 ppm)	Not used
3	Offset settings temperature (± 3 °C)	Offset settings temperature (± 3 °C)
4	Not used	Offset settings rel. humidity ($\pm 15\%$)

Commissioning

Following a power reset, all LEDs are ON for 90 seconds. During this warm-up time the output values are not valid.

The LEDs visualize the CO₂ concentration:

0..750 ppm	green LED ON
751..1250 ppm	yellow LED ON
1251..2000 ppm	red LED ON

Case of error

If an error occurs, the red LED flashes each second. The yellow and green LEDs encode the error type.

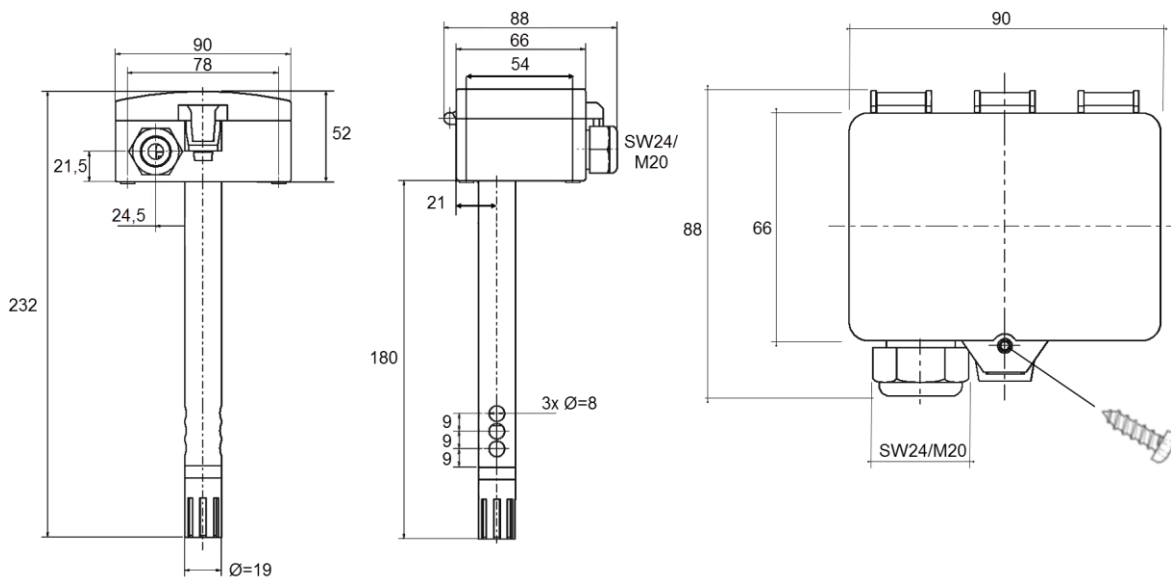
Green LED	Yellow LED	Error
flash	OFF	failure CO ₂ sensor
OFF	flash	failure VOC sensor
ON	ON	failure SHT
ON	OFF	failure humidity sensor
OFF	ON	failure temperature sensor

Application notice

During usage in air circulation dirt and dust may blind the sintered filter protecting the sensors. Then the sensor function may be handicapped.

When having dismantled the device, the functionality can be restored by air-cleaning with compressed air (filtered and free of oil), cleaned air or nitrogen. It is also possible to wash out the filter with distilled water. Severely polluted filters should be replaced.

Dimensions (mm)



Accessories (optional)

(MF19-PA) Mounting flange for mounting the sensor on the air duct.