

LK-SX CO₂+VOC 3xV/4xV

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

thermokon
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Data Sheet

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Application

For detection of CO₂, VOC, temperature and Humidity. Designed for duct mounted applications with up to 4 0..10 V outputs.

Types available

LK-SX CO ₂ +VOC 3xV (CO ₂ + VOC + Temp)	3 outputs 0..10 V
LK-SX CO ₂ +VOC 3xV (CO ₂ + VOC + Mix CO ₂ /VOC)	3 outputs 0..10 V
LK-SX CO ₂ +VOC 4xV (CO ₂ + VOC + Temp + Mix CO ₂ /VOC)	4 outputs 0..10 V
LK-SX CO ₂ +VOC 4xV (CO ₂ + VOC + Temp + rH)	4 outputs 0..10 V

Security Advice – Caution



The installation and assembly of electrical equipment should only be performed by authorised 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 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 the product 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 ($\pm 0,2$ 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.

Application Note 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.

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	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 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!

Application Notice for Air Quality Sensors VOC

Unlike CO₂ sensors, which specifically measure CO₂, mixed gas sensors detect a wide range of gases. The sensor signal does not indicate the type of gas or its 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 CO₂, 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. CO₂ 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".

Technical Data

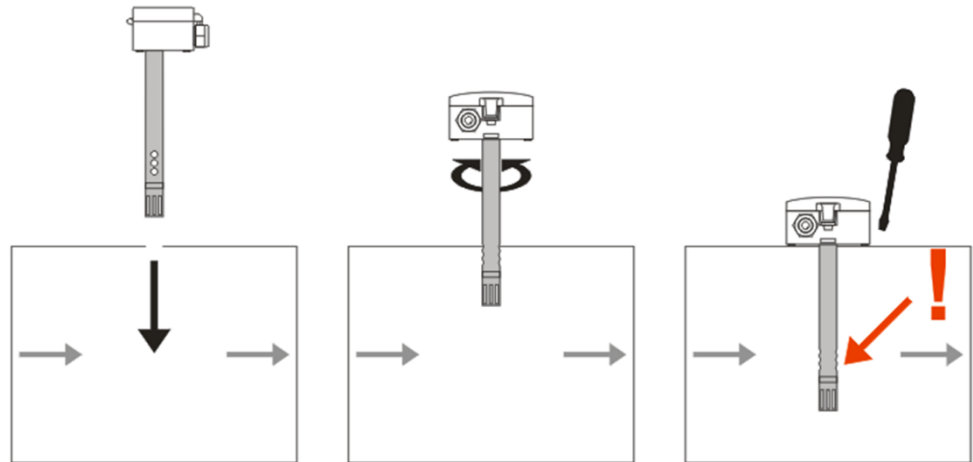
Measuring values		temperature, humidity, CO ₂ , VOC
Output voltage	3xV 4xV	3x 0..10 V 4x 0..10 V, load min. 10 kΩ
Power supply		15..24 V = (±10%) or 24 V ~ (±10%)
Power consumption		max. 1,5 W (24 V =) 2,9 VA (24 V ~)
Measuring range temperature		0..+50 °C
Measuring range humidity		0..100% rH
Measuring range CO ₂		0..2000 ppm
Accuracy temperature		±1% of measuring range (typ. at 21 °C)
Accuracy humidity		±2% at range 10..90% rH (typ. at 21 °C)
Accuracy CO ₂		±75 ppm or ±10% of measured value
Air speed		min. 0,3 m/s, max. 10 m/s
Calibration		Self calibration dual channel (CO ₂)
Sensor		VOC-Sensor, NDIR (non dispersive infrared)
Enclosure		PA6, pure white
Protection		IP54 according to EN 60529, IP65 with bolted cover
Cable entry		M20 for wire max 8 mm
Connection electrical		plug-in terminal max 1,5mm ²
Pipe		PA6, black, Ø=19,5 mm, L=180 mm
Filter		stainless steel, wire mesh
Ambient condition		0..+50 °C, max 85%rH short term condensation
Weight		400g
Delivery content		MF20 flange
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 ...)

Mounting advices

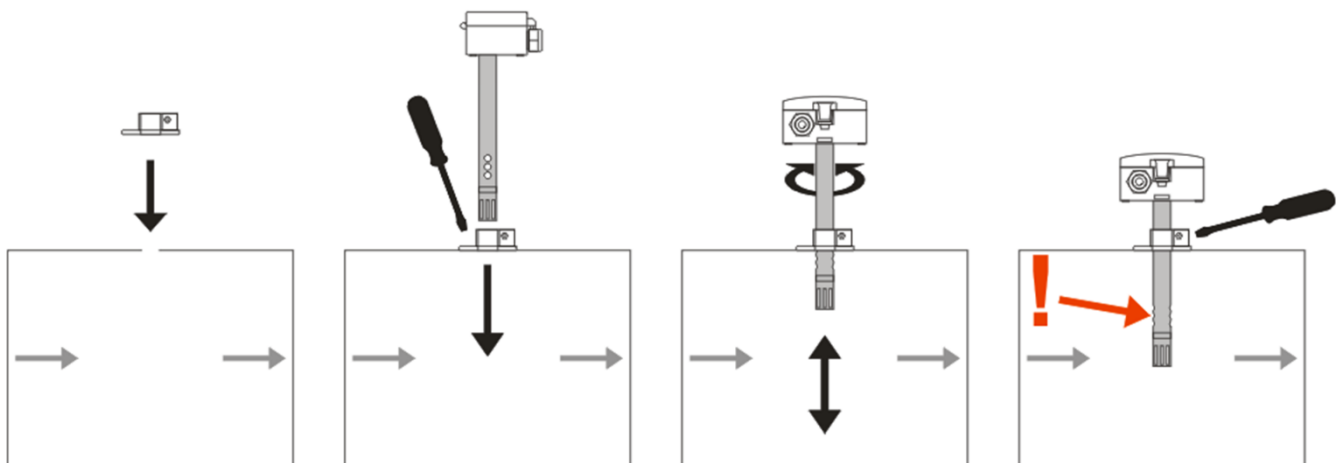
The sensor can be mounted on a flange (recommended) or directly into the ventilation duct.

Please note that during installation the openings of the pipe are mounted in the direction of air flow!

Mounting without mounting flange



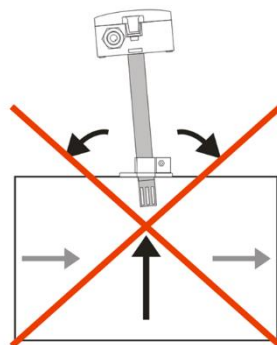
Mounting with mounting flange



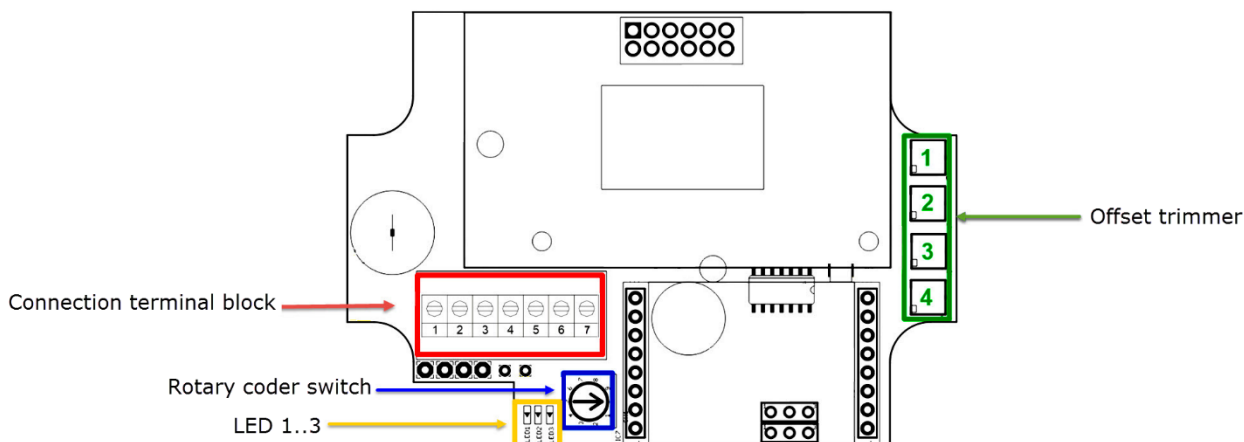
Dismounting Advices

Remove the lower section of the sensor carefully and pulling straight out.

Pay close attention to the correct dismantling of the component!



Terminal Connection Plan



Terminal assignment:

Clamp	Function	Function
	<i>Type 3xV (CO₂+VOC+Temp)</i>	<i>Type 3xV (CO₂+VOC+Mix CO₂/VOC)</i>
1	24 V	24 V
2	GND	GND
3	-	-
4	Output temperature 0..10 V (with Offset)	-
5	Output CO ₂ or VOC 0..10 V (with Offset)	CO ₂ /VOC:50/50%, 30/70%, 70/30% (with Offset)
6	Output CO ₂ 0..10 V (without offset)	Output CO ₂ 0..10 V (without Offset)
7	Output VOC 0..10 V (without Offset)	Output VOC 0..10 V (without Offset)
	<i>Type 4xV (CO₂+VOC+Temp+Mix CO₂/VOC)</i>	<i>Type 4xV (CO₂+VOC+Temp+rH)</i>
1	24 V	24 V
2	GND	GND
3	-	-
4	Output temperature 0..10 V (with Offset)	Output temperature 0..10 V (with Offset)
5	CO ₂ /VOC:50/50%, 30/70%, 70/30% (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	Output VOC 0..10 V (without Offset)	Output VOC 0..10 V (without Offset)

Rotary code switch:

Position	Output settings connection clamp #5	Output settings connection clamp #5
	<i>Type 3xV (CO₂+VOC+Temp)</i>	<i>Type 3xV (CO₂+VOC+Mix CO₂/VOC)</i>
0	-	-
1	-	50% CO ₂ + 50% VOC (with Offset)
2	-	30% CO ₂ + 70% VOC (with Offset)
3	-	70% CO ₂ + 30% VOC (with Offset)
4	Output CO ₂ 0..10 V (mit Offset)	-
5	Output VOC 0..10 V (mit Offset)	-
	<i>Type 4xV (CO₂+VOC+Temp+Mix CO₂/VOC)</i>	<i>Type 4xV (CO₂+VOC+Temp+rH)</i>
0	-	Output rel. humidity 0..10 V
1	50% CO ₂ + 50% VOC (with Offset)	-
2	30% CO ₂ + 70% VOC (with Offset)	-
3	70% CO ₂ + 30% VOC (with Offset)	-
4	-	-
5	-	-

Offset Trimmer:

Trimmer	Function	Function
	<i>Type 3xV (CO₂+VOC+Temp)</i>	<i>Type 3xV (CO₂+VOC+Mix CO₂/VOC)</i>
1	Offset settings VOC (± 15%)	Offset settings VOC (± 15%)
2	Offset settings CO ₂ (± 150 ppm)	Offset settings CO ₂ (± 150 ppm)
3	Offset settings temperature (± 3 °C)	-
4	-	-
	<i>Type 4xV (CO₂+VOC+Temp+Mix CO₂/VOC)</i>	<i>Type 4xV (CO₂+VOC+Temp+rH)</i>
1	Offset settings VOC (± 15%)	-
2	Offset settings CO ₂ (± 150 ppm)	-
3	Offset settings temperature (± 3 °C)	Offset settings temperature (± 3 °C)
4	-	Offset settings rel. humidity (± 15%)

Commissioning

After a power-reset, all LED's light up for 90 seconds. After conclusion of the warm-up phase, the signals come available at the outputs.

The LEDs visualize the combined air quality value, depending on the setting of the rotary coding ratio CO₂ / VOC 50-50%, 30-70% or 70-30%.

0..33%	0..750 ppm	Green LED illuminate
34..66%	751..1250 ppm	Yellow LED illuminate
67..100%	1251..2000 ppm	Red LED illuminate

However, in case of error, the red LED flashes every second. The yellow and green LEDs encode the respective error type.

Green LED	Yellow LED	Error
flash	OFF	failure CO ₂ -Sensor
OFF	flash	failure VOC-Sensor
ON	ON	failure humidity and temperature Sensor
ON	OFF	failure humidity Sensor
OFF	ON	failure temperature Sensor

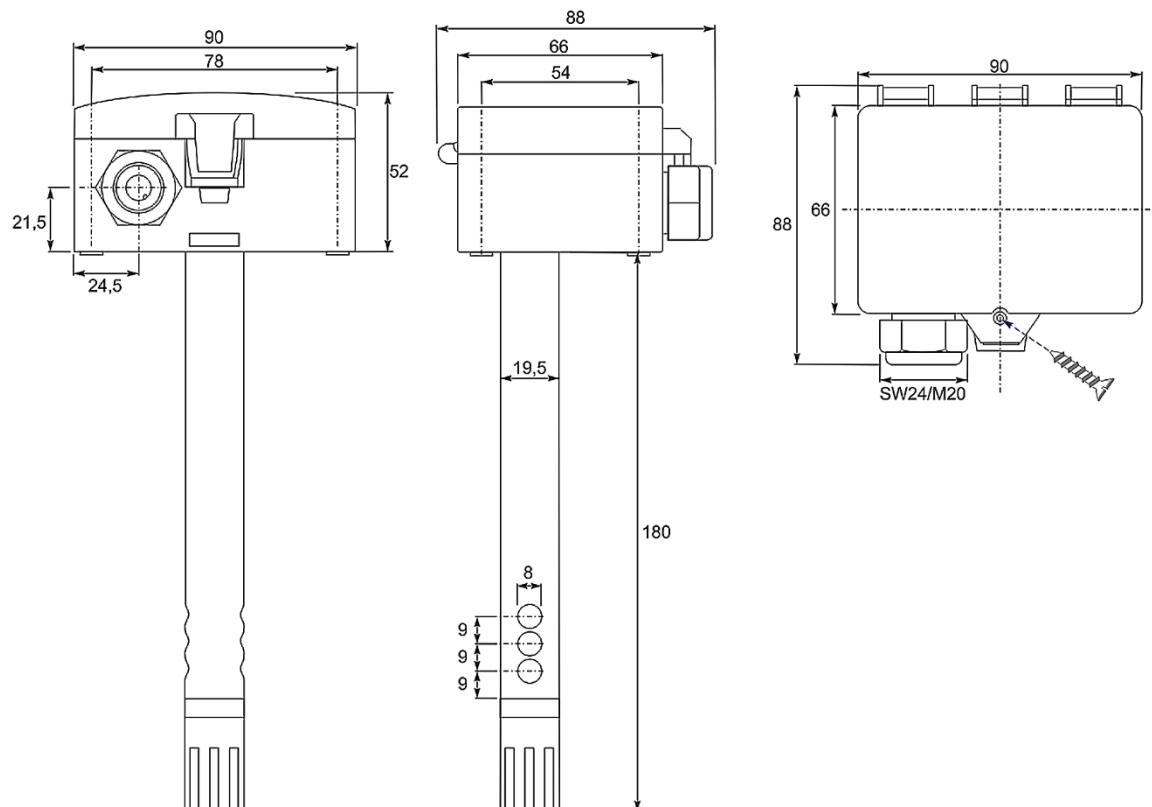
Application notice

Dirt in the air can collect on the filter and then adversely affect the operation of the sensor after a certain time.

Under normal ambient condition an annual maintenance is recommended. Rinse the filter after cleaning with distilled water and dry it using clean oil-free air or nitrogen. Extremely contaminated filters should be replaced.

At extreme ambient conditions, e.g. corrosive gases, the humidity sensor may have to be changed.

Dimensions (mm)



Accessories (optional)

Rawl plugs and screws (2 pcs each)

Filter stainless steel, wire mesh

Mounting flange MF20 TPO

Item No. 102209

Item No. 231169

Item No. 612562