LP+ CO2 (LCD) RS485 Modbus

Room pendulum sensor

thermokon®
HOME OF SENSOR TECHNOLOGY

Datasheet

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»APPLICATION

Air quality sensor for measuring CO_2, temperature and humdity in outdoor areas. A device for integration in an automation system with RS485-Modbus interface and two analogue 0..10 V outputs. LCD models with RGB background light have a transparent cover.

»TYPES AVAILABLE

Room pendulum sensor optional with display CO2 + temp + optional rH – active BUS
- LP+ CO2 (LCD) Temp RS485 Modbus
- LP+ CO2 (LCD) Temp_rH RS485 Modbus

»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 UKCA

Declaration of conformity
The declaration of conformity of the products can be found on our website https://www.thermokon.de/

»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.

» 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.

» 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).

» APPLICATION NOTICE FOR HUMIDITY SENSORS

For standard environmental conditions re-calibration is recommended once a year to maintain the specified accuracy. A re-calibration may be required sooner than specified, or the sensor element may have to be exchanged when exposed to the following environmental conditions:

- Mechanical stress
- Contamination (dust / fingerprints e.g.)
- Abrasive chemicals
- Environmental influences (e.g. condensation on measuring element)

Re-calibration and deterioration of the humidity sensor due to environmental conditions are not subject of the general warranty.

Refrain from touching the sensitive humidity sensor/element. Touching the sensitive surface will void warranty.

» 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.

»TECHNICAL DATA

| Measuring values	CO2, temperature, humidity	
Output voltage	2x 0..10 V or 0..5 V, min. load 10 kΩ (live-zero configuration via Thermokon USEapp)	
Network technology	RS485 Modbus, RTU, half-duplex, baud rate 9.600, 19.200, 38.400 or 57600, parity: none (2 stopbits), even or odd (1 stopbit)	
Power supply	15..35 V = or 19..29 V ~ SELV *(with alternating voltage, the correct polarity must be ensured – see below)*	
Power consumption	max. 2,3 W (24 V =) | max. 4,3 VA (24 V ~)	
Measuring range temp.	0..+50 °C (default setting), optionally configurable via Thermokon USEapp	
Measuring range humidity	0..100% rH non-condensing, optionally configurable via Thermokon USEapp (enthalpy, absolute humidity, dew point)	
Measuring range CO2	0..2000 ppm (default), 0..5000 ppm, optionally configurable via Thermokon USEapp	
Accuracy temperature	±0,5 K (typ. at 21 °C)	
Accuracy humidity	±2% between 10..90% rH (typ. at 21 °C)	
Accuracy CO2	±(50 ppm +3% of reading) typ. at 21 °C, 50% rH, 1015 hPa	
Calibration	self-calibration, Dual Channel	
Sensor	NDIR (non-dispersiv, infrared), sensor wire white 5m or 10 m, other lengths on request	
Display *(optional)*	LCD 29x35 mm with RGB backlight	
Enclosure *(type-dependent)*	enclosure USE-M, PC, pure white, with removable cable entry	**with LCD (optional)** cover PC, transparent
Protection	IP30 according to EN 60529	
Cable entry	M25, with fourfold cable entry for wire with max. Ø=7 mm, removable	
Connection electrical	**Mainboard** removable plug-in terminal, max. 2,5 mm² Sensor cable length= 1,5m (default), max. 10 m, RJ45- plug	**Plug-in card** removable plug-in terminal, max. 1,5 mm²
Ambient condition	0..+50 °C, max. 85% rH short term condensation	
Mounting	installation is also possible using mounting base	

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

»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.
Looped through power supply - valid from 03.08.2020 (20216).

| 0..5 V |
| 0..10 V |

AOU2 — (Humidity \| 0..10 V)
AOU1 — (CO2 \| 0..10 V)
GND —
UB+ — (15..35 V = or 19..29 V ~)

A
A
B
B

B-
A+
A+

1	UB+	15..24 V = (±10%) oder 24 V ~ (±10%)
2	GND	15..24 V = (±10%) oder 24 V ~ (±10%)
3	AOU1	0..10 V | Differenzdruck
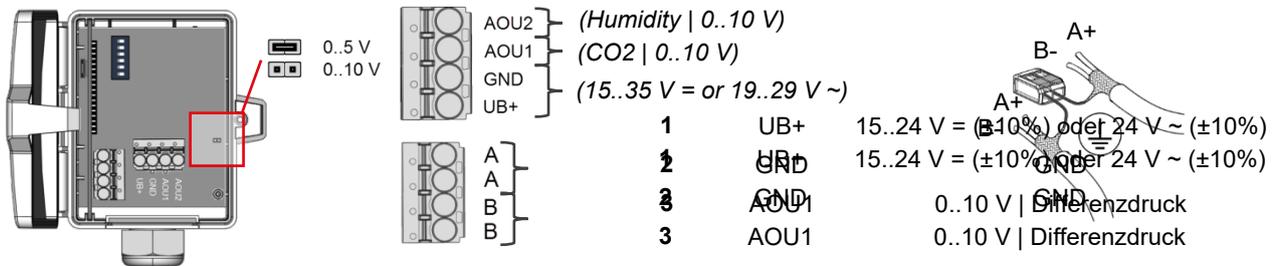
Modbus addresses:
USE-RS485 Modbus Interface
A detailed description of the Modbus addresses can be found under the following link: **Download**

»DIP SWITCH SETTINGS, MAINBOARD

CO2 range – DIP 1			DIP 2 | 3	temperatur range – DIP 4 | 5 [SI / IMP]			Measurand – DIP 6	
OFF	ON	reserviert	**OFF OFF**	ON OFF	OFF ON	ON ON	OFF	ON
ON / 1	ON / 1	ON / 2 3	ON / 4 5	ON / 4 5	ON / 4 5	ON / 4 5	ON / 6	ON / 6
0..2000 ppm	0..5000 ppm		**0..+50** / **+40..+140**	-20..+80 / 0..+200	-40..+60 / -40..+160	-15..+35 °C / 0..+100 °F	SI	IMP

»DIP SWITCHES, PLUG-IN CARD

Modbus Adress

| **ON=2^0 (1)*** | ON=2^1 (2) | ON=2^2 (4) | ON=2^3 (8) | ON=2^4 (16) |

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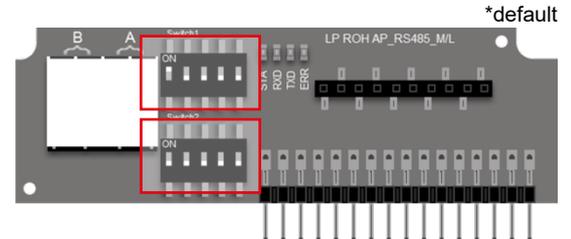
The modbus address of the device is set in the range of 1 ... 31 (binary encoded) using a 5-pole DIP switch. With address 0 via DIP, an extended address range (32..247) is available via USEapp.

Termination 120 Ω		**Baud**				**Parity**			
ON / 1	ON / 1	ON / 2 3	ON / 2 3	ON / 2 3	ON / 2 3	ON / 4 5	ON / 4 5	ON / 4 5	ON / 4 5
Not active*	active	**9600***	19200	38400	57600	**none*** (2-stopbits)	even	odd	none (1-stopbit)

Address	Access	Description	Resolution / Unit	
1	R	**relative humidity**	0.1	%rH
5	R	**CO2**	1.0	ppm

Address	Access	Description	Register 400 = 1 (Unit SI) Resolution / Unit			Register 400 = 2 (Unit Imperial) Resolution / Unit		
0	R	Temperature	SI	0.1	°C	Imperial	0.1	°F
2	R	Absolute humidity	SI	0.01	g/m³	Imperial	0.01	gr/ft³
3	R	Enthalpy	SI	0.1	kJ/kg	Imperial	0.1	BTU/lb
4	R	Dew point	SI	0.1	°C	Imperial	0.1	°F

»DIMENSIONS (MM)
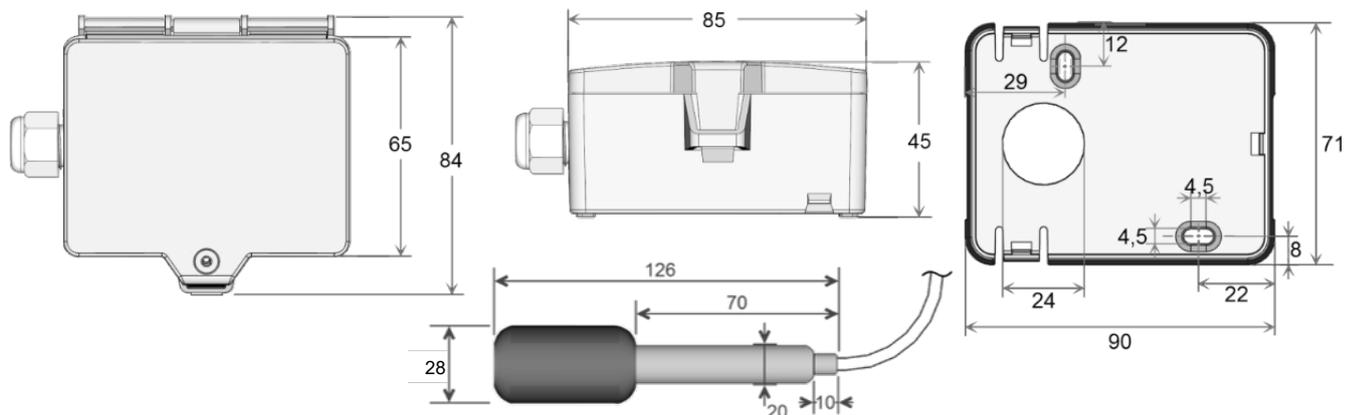
»ACCESSORIES (INCLUDED IN DELIVERY)

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)