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Product overview

The sensor (CO2 / T / H) is designed to measure air quality, temperature and humidity in room and areas. The air quality is measured based on CO2 levels. The air quality sensor output can be active or passive. Optional display is available.


Room Sensor


with 3 LED

Technical details

- Room sensor for measuring the CO2 concentration and temperature in rooms
- Measuring range 0...2000ppm and 0...50°C
- Output 0...10V
- Power supply DC 15-24V / AC 24V
- Optional with LCD display to show CO2 concentration, temperature and relative humidity
- Optional with 3 LED to show the CO2 concentration
- Optional with analog output for relative humidity

with LCD

Types available

Type code	Description
EXT-TN-1072587*	Room CO2 0-10V 0-2000ppm with relay
EXT-TN-1071436	Room CO2/Temperature, 0-10V 0-2000ppm, NTC10k (10k-2)
EXT-TN-1071443	Room CO2/Temperature, 2 X 0-10V 0-2000ppm, 0-50°C
EXT-TN-1066685	Room CO2/Temperature, 2 X 0-10V 0-2000ppm,0-50°C 3 X LED
EXT-TN-1066708*	Room CO2/Temperature, 2 X 0-10V 0-2000ppm 0-50°C LCD
EXT-TN-1071450	Room CO2/Temperature/Humidity, 3 X 0-10V, 0-2000ppm, 0-50°C, ±3RH
EXT-TN-1072594	Room CO2/Temperature/Humidity, 3 X 0-10V, 0-2000ppm, 0-50°C, ±3RH with relay
EXT-TN-1071467*	Room CO2/Temperature/Humidity, 3 X 0-10V, 0-2000ppm, 0-50°C, ±3RH with 3 X LED
EXT-TN-1071474*	Room CO2/Temperature/Humidity, 3 X 0-10V, 0-2000ppm, 0-50°C, ±3RH with LCD

* Available only upon request

Technical data

Standards

CE conformity	- 2004/108/EG Electromagnetic compatibility - 2001/95/EG Product safety
EN conformity	- EN60730-1:2002 EMC - EN60730-1:2002 Product safety

Technical data (cont.)

General data

Power supply	DC 15-24V(±10%) or AC 24V(±10%)
Power consumption	Max. 3W / max. 6VA
Clamps	Terminal screw, max. 1,5mm², wire or braid
Analog outputs	- CO2 : 0...10V, load max. 10mA - Temperature : 0...10V, load max. 10mA (Device with active temperature output only) - Relative humidity : 0...10V, max. load 10mA (Device with active humidity output only)
CO2 Sensor	0...2000ppm, NDIR (non-dispersive infrared)
Temperature dependence	CO2 < 0.2% of full scale per °C
Accuracy @21°C	- CO2 : typical ±40ppm + 4% of reading - Temperature : typical ±1K of full scale - Humidity : typical ±3% (between 20...80% rH)
Warm Up Time	< 2 minutes
Response Time	< 10 minutes
Stability CO2	< 2% full scale over life of sensor (typical lifetime 15 years)
Repeatability CO2	<1% of full scale
Calibration interval	Not required - see ABCLogic
Material	White ASA, RAL 9010 (Pure white)
Housing protection	IP20 according to EN60529
Ambient temperature	0...+50°C, max. 85% RH non-condensing
Weight	90g
Relay output	Changeover contact, floating max. 2A, max. DC 24V / AC 24V Relay switch on if the CO2 value reaches the adjusted setpoint (hysteresis : 100ppm)
3 LEDs	3 LEDs to show the CO2 concentration: 0...750ppm: Green LED on 751...1250ppm: Yellow LED on 1251...2000ppm: Red LED on
LCD display	Shows the measurement values and parameters

Security advice ⚠

The installation and assembly of electrical equipment may only be performed by a skilled electrician.
The modules must not be used in any relation with equipment that supports, directly or indirectly, human health or life or with applications that can result in danger for people, animals or real value.

Electrical connection

The devices are constructed for the operation of protective low voltage (SELV). For the electrical connection, the technical data of the corresponding devices is valid. Sensing devices with transducer should in principle 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(±0.2V). When switching the supply voltage on/off, power surges must be avoided on site.
When using long connection wires (depending on the used cross section) 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 laid to the CO2 sensor - one for the supply voltage and one for the measuring current.

Electrical connection (cont.)

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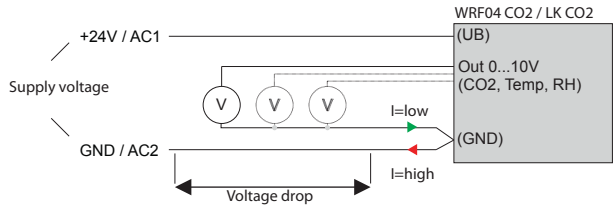
2 GND wires for long connection wires



Mounting advice for Room CO2/ Temperature / Humidity

The devices are supplied in an operational status. Installation is made by means of rawl plugs and screws (accessory) to the smooth wall surface.
For wiring, the snap-on lid must be separated from the base plate. Installation must be made on representative places for the room temperature, to avoid a falsification of the measuring result. Solar radiation and draught should be avoided. If the device is mounted on standard flush box, the end of the installation tube in the flush box must be sealed, so to avoid any draught in the tube falsifying the measuring result.

Application note

The DIN EN 13779 defines several classes for the indoor air quality, which are shown in the table below:

Category	CO2 content over 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	>1000 ppm	1200 ppm	Low indoor air quality

ABCLogic™ - Self calibration feature

Introduction

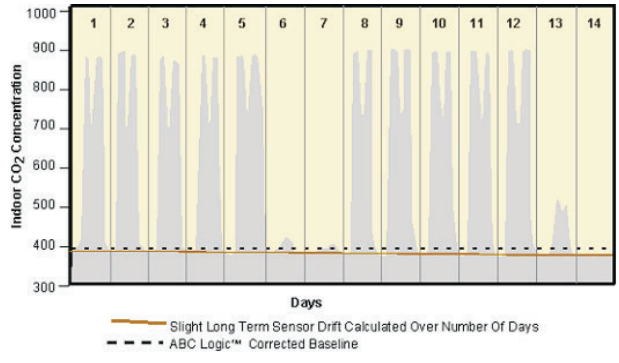
Virtually all gas sensors are subject to some sort of drift. The degree of drift is partially dependent on the use of quality components and good design. But even with good components and excellent design a small amount of drift can still occur in the sensor that may ultim ately result in the need for a sensor to be recalibrated. Generally, recalibration involves a maintenance person visiting each sensor in a building and performing a 5 minute to 20 minute recalibration routine using gas bottles and plastic tubing. The calibration process is simple but i t can turn into a significant expense if recalibration is required frequently. If the wrong choice of sensors is made, the expense of sensor maintenance may wipe out any potential energy savings that could come from CO2 based demand controlled ventilation.

What causes sensor drift?

As discussed before, sensor design and components have a lot to do with drift. In the sensor the natural drift of the sensor isvery gradual at a few ppm per month with the greatest drift occurring in the first few months of operation.This drift can be up or down.The self-calibration feature called ABCLogic™is designed to correct all sensor drift including aging of the light source.

How it works

Outside levels of CO2 are generally very low at around 400 to 500 ppm. Inside buildings people are the major source of CO2. When a building is unoccupied for 4 to 8 hours CO2 levels will tend to drop to outside background levels. This is especially the case if the building operational schedule includes a pre-occupancy purge of fresh air into the building prior to the start of the day.
ABCLogic™ which stands for "Automatic Background Calibration" utilizes the computing power in the sensor's on-board microproces sor to remember the lowest CO2 concentration that takes place every 24 hours. The sensor assumes this low point is at outside levels. The sensor is also smart enough to discount periodic elevated readings that might occur if for example a space was used 24 hours per day over a few days. Once the sensor has collected 14 days worth of low concentration points it performs a statistical analysis to see if there has been any small changes in the sensor reading over background levels that could be attributable to sensor drift. If the analysis concludes there is drift, a small correction factor is made to the sensor calibration to adjust for this change.
The figure below shows CO2 concentrations as they might occur over 14 days in an of fice space with peak concentrations occurrin g in the morning and afternoon of each day. The dotted line is drawn through all the low points for each day as compared to an assumed b ackground of 400 ppm. If a statistically relevant change in the data shows a shift above or below background, a slight adjustment is made to sensor calibra-tion as shown by the solid level line. Every day the sensor looks at the past 14 days worth of data and determines if a calibration adjustment is necessary.



When using CO2 to measure and control for ventilation it is most important to consider not the absolute ppm levels but the differential concentration between inside and outside concentrations. One of the additional benefits of ABCLogic™is that the sensor is calibrated to outside levels without having the expense and trouble of placing a sensor in the outside air. The sensor assumes that the lowest level is 400 ppm. Any readings above this level are related to the differential.

Application for ABCLogic™

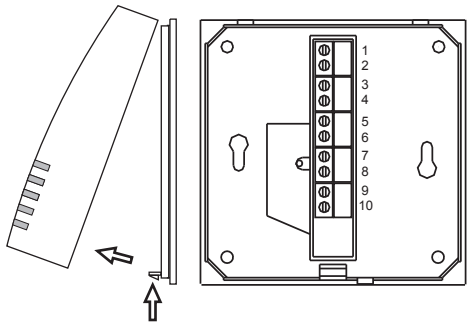
It is important to note thatABCLogic™ is designed for use in applications where spaces are periodically unoccupied for 4 hours per day or more so that indoor concentrations can drop down to typical outside levels.
NOTE! The CO2 sensor is not suitable for environments where the CO2 concentrations are consistently elevated, because the unit automati-cally adjusts its calibration to daily low ambient CO2 levels.

Commissioning Sensors withABCLogic™

When first installed CO2 sensors with ABCLogic™, the sensors will use the first 14 days of operation to calibrate themselves to local background levels. Each sensor will calibrate itself to its environment over the first 14 days of operation.

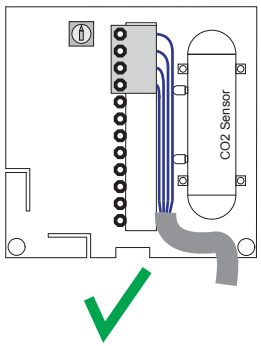
Terminal connection plan

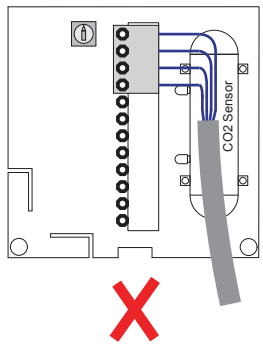
Room CO2



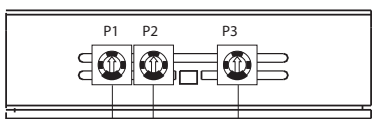
Clamp	Room type
1	GND / AC2
2	UB +24V / AC1
3	Temp. 0..10V
4	CO2 0..10V
5	Rel. Humidity 0..10V [3]
6	Sensor A [3]
7	Sensor B [3]
8	Relay C [3]
9	Relay NO [3]
10	Relay NO [3]

3) Optional

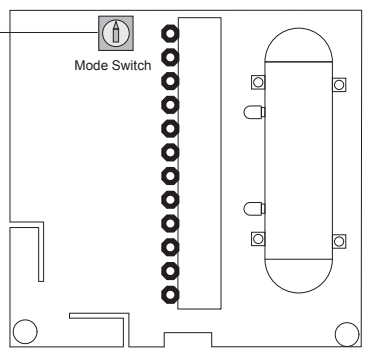




Avoid laying the cable on the CO2 sensor, because this may damage the device and influence the measuring values.



Offset-/Setpoint Adjustment
P1: Offset temperature
P2: Offset CO2
P3: Offset rel. humidity (mode switch position 0) or
Adjustment CO2 setpoint (mode switch position 2)



±15% Offset rel. humidty

CO2 set point for relay

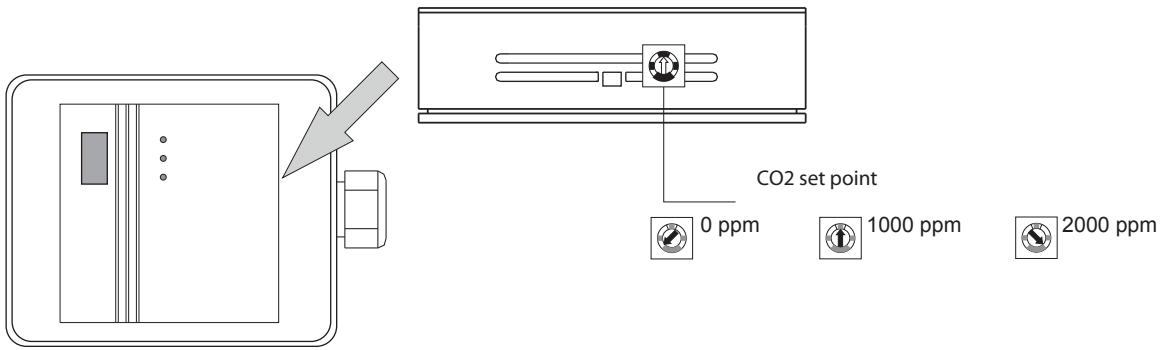
P3 0 ppm P3 1000 ppm P3 2000 ppm

±150ppm offset CO2

±3K Offset Temperature

Terminal connection Plan

Devices with optional relay (Option -Relay)



Dimensions (mm)