UT090 Room temperature and CO2 sensor

Summary

The room temperature and CO2 sensor contains NDIR CO2 sensor for measuring of carbon dioxide concentration in rooms with variable load. The output signals are analogue signals of 2× 0...10 V DC.

Application

- **Air handling units in rooms with variable load: schools, theatres, auditing halls etc…**
- **Monitoring and record of temperature and CO_2 concentration in interiors**

Function

The temperature is measured by an internal sensor, signal of which is processed in a microprocessor, and converted to normalized analogue output signal. The CO_2 value is measured by a communicative NDIR module, and its digital signal is converted to analogue output as well.

Measuring range

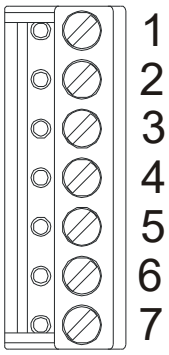
The measuring range of the temperature sensor is 0 to +50 °C. The value is proportional to the signal of 0...10 V at the AO1 terminal.
The CO2 measuring range is 0...2000 or 0...5000 ppm, selectable by SW1, the measured value is a 0...10 V signal at AO2.

Technical data

Power supply	24 V AC ± 10 % or 16...35 V DC
Consumption	3 VA
Temperature measuring range *	0 ... +50 °C, ± 0.5 °C
CO2 measuring range	0 ... 2000 ppm SW1 OFF (default), 0 ... 5000 ppm SW1 ON
CO_2 measuring accuracy	± 30 ppm ± 5 % of measured value
CO_2 sensor response time (90 %)	16 s
CO_2 sensor autocalibration	SW2 … ON active (Default) SW2 … OFF inactive
Protection degree	IP20

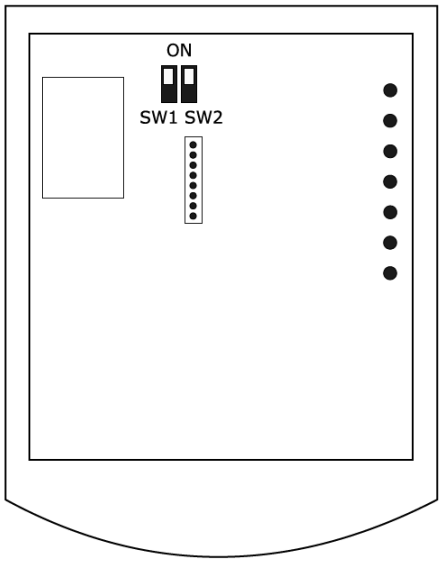
Output	2x 0...10 V DC
Max. output current	10 mA (with 1 kOhm load),
Short-circuit current	20 mA, permanently short-circuit proof (PTC)
Resolution	12bit D/A converter
Terminals	screw terminals for wires 0,35 – 1,5 mm^2
Cover	ABS, RAL9010
Weight	0,15 kg
Dimensions	90x115x30 mm
Ambient temperature	External conditions: +5…40 °C; +5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K3 Storage: +5…40 °C; 5…85 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K2)
Standards conformity	EMC EN 61000-6-2 ed.3:2005 + Cor.:2005-09, EN 61000-6-4 ed.2:2007 + A1:2011 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2013 + Corr.1:2011-10 Hazardous substances reduction EN 50581:2012

Terminals



1: AO1 0…10 V temperature
2: G0 power – common point
3: AO2 0…10 V CO2
4:
5: GND technical earth (TE)
6: G0 power – common point
7: G power

DIP switches



Back of the PCB

SW1
ON CO2 measuring range 0...5000 ppm
OFF CO2 measuring range 0...2000 ppm (default)

SW2
ON autocalibration active (default)
OFF autocalibration inactive

CO_2 calibration

Place the sensor to an environment with a CO2 concentration of 400 ppm. Disconnect power, after it switch SW1 and SW2 to the ON position. Plug in the power, switch OFF switches SW1 and SW2 to between 1 and 3 seconds after powering. The red LED flashes 5 times (1s light 1s pause), which calibrates the CO2 value to 400 ppm.

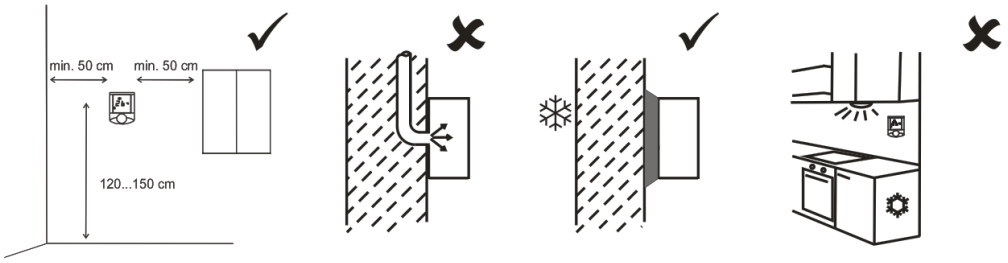
CO_2 autocalibration

Transportation and aging may cause sensor drift. The sensor records the lowest reading and expects that at least once per 8 days the CO2 concentration reaches the outside air level (400 ppm). The lowest measured value is then assigned the 400 ppm level. Autocalibration does not work if the room is occupied 24 hours a day, or there are no periods when the gas level drops to background (e.g. greenhouses). Then, the autocalibration function can be disabled by SW2. The autocalibration is set to ON by default.
During the first days of operation, until the first autocalibration, the sensor may read values which differ from the real values by several hundreds ppm, e.g. 200 ppm at night etc. This error is automatically corrected with the first autocalibration.

Installation

Units are intended for operating in a normal and chemically non-aggressive environment. They do not need any servicing or maintenance. Install them in a vertical position at places where they can be operated easily and measure correct values of temperature, i.e. in the height of about 150 cm, with no direct sunlight or other heat / cool source (AHU outlets, refrigerator, electrical appliances). The device consists of two parts: bottom with screw terminal block and cover containing PCB, display, and the knob. The bottom part is fixed by 2 or 4 screws to any flat surface or a flush-mounting box Ø 60 mm. At the back of the bottom there is an aperture for cabling. The bottom should be installed and cabling connected first, and the upper part inserted after the construction works have been finished to prevent damage to the unit.

Seal the conduits to avoid influencing the sensor by draught. Use insulating pad when installing the sensor on cold walls. Avoid sensor exposition to sunlight or other heat sources.

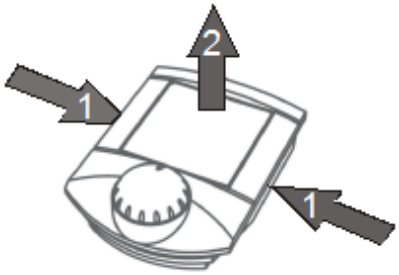


Cover opening

When removing the display part, proceed as follows:

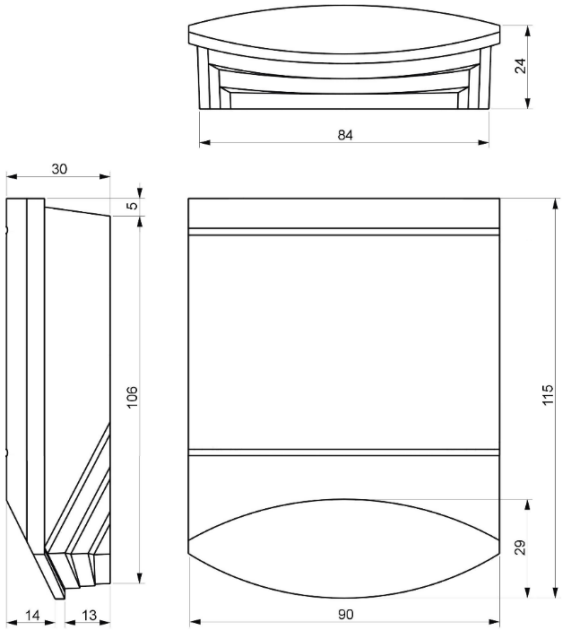
- press gently the side parts of the unit and pull the left of the display part by several milimeters
- pull the display part and remove it from the bottom.

Do not bend the display part too much, the connector pins could be damaged. The locks are only at the sides of the display part, not at the top nor bottom.



Dimensions

UT090



All dimensions are in *mm.*

Safety note

The device is designed for monitoring and control of heating, ventilation, and air conditioning systems. It must not be used for protection of persons against health risks or death, as a safety element, or in applications where its failure could lead to physical or property damage or environmental damage. All risks related to device operation must be considered together with design, installation, and operation of the entire control system which the device is part of.

***** Sensors with following S/N have temperature measuring range -25 … +60 °C:

193372	188707	187081
193371	188706	187080
193370	188705	187079
193368	188704	187078
193363	188703	187077
193361	188700	187076
193360	188699	187074
193269	188697	187073
192504	188696	187072
192503	188694	187061
192502	188693	187060
192501	188692	187059
192500	188681	187058
192489	188677	187057
192488	188668	187056
188755	188662	187055
188752	188661	187054
188748	188659	187053
188742	187253	187052

Changes in versions

This datasheet applies only to devices with S/N: 182396 or higher.
05/2020 – First datasheet version.
08/2020 – Information of humidity measurement removed.
11/2020 – Change of temperature range, info about sensors with different temperature measuring range added.