tSENSE (Disp)

CO$_2$–, Temperature– and RH–Transmitter with colour touch display

tSENSE is an advanced and versatile 3-in-1 transmitter designed for installation in the air-conditioned zone. It measures CO$_2$ concentration, temperature and humidity in the ambient air accurately without need for additional compensation – true read. The data transmits to a BMS system or stand-alone controller using industry standard output signals and communication protocols.

tSENSE combines all the necessary elements for effective climate control in commercial office buildings, hospitals, hotels, schools and other facilities. Using CO$_2$-monitoring for demand control ventilation (DCV) allows healthy, comfortable and cost-effective environment for the occupants.
tSENSE is flexible in design with temperature control in combination with humidity control optional.
Though suitable for use in many different energy-efficient ventilation strategies, Senseair welcomes any discussions for specific needs.

Complies with ASHRAE standard 189.1
(±50ppm @ 1000ppm of measured CO$_2$ value)

Standard specification

Measured gas	Carbon dioxide (CO$_2$)
Operating principle	Non-dispersive infrared (NDIR)
Measurement range	0–2000ppm
OUT1 CO$_2$	0–10VDC, 0–2000ppm
OUT2 Temperature	0–10VDC, 0–50°C
OUT3 Relative Humidity	0–10VDC, 0–100%RH
Relay CO$_2$	On ≥1000 ppm$_{vol}$ Off ≤900ppm$_{vol}$
Accuracy (CO$_2$)	±30 ppm ±3% of reading
Dimensions [mm]	125 x 85 x 22
Dimensions display [mm]	49 x 37
Life expectancy	>15 years
Operation temperature range	0–50°C
Power supply	12VDC, 24VAC/DC
Communication	Modbus (MB) or BACnet (BAC) protocol over RS485

Key benefits

- Maintenance free
- Three sensors in one housing: CO$_2$, temp and RH
- Colour touch display with possibility of customisable GUI
- PIN codes for access to display- and meter settings
- Improved housing design for effective measurement

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tSENSE (Disp) Technical Specification

General Performance:

Storage Temperature Range	-30–70°C
Sensor Life Expectancy	>15 years
Maintenance Interval [1]	Maintenance free
Self-Diagnostics	Complete function-check of the sensor module
Display (Disp)	Configurable colour LCD with CO_2 [ppm], Temperature [°C] and Humidity [%RH]
Buttons	Touch display (Disp)
Warm-up Time	≤1min.(@ full specs 15min)
Operating Temperature Range	0–50°C
Operating Humidity Range	0–95%RH, non condensing humidity environment
Operating Environment	Residential, commercial

Electrical / Mechanical:

Power Input	12VDC, 24VDC or 24VAC (50–60Hz) ±20%
Power Consumption	<0.35W average non-display version, <0.6W display version
Peak Power Consumption	<2W
Wiring Connections	Screw terminal, max 1.5mm2, Containing: Power, GND, Out1, Out2, Out3, RS485. Option: passive temperature or relay

CO_2 Measurement:

Sensing Method	Non-dispersive infrared (NDIR) waveguide technology
Sampling Method	Diffusion
Response Time (T1/e)	<3min
Measurement Range	0–2000 ppm_{vol}.
Accuracy [2]	±50ppm (@1000 ppm_{vol}, 17–28°C and 30–60%RH)
	Typical full range: ±30ppm +3% of measured value [3,4]
Pressure Dependence	+1.58% reading per kPa deviation from normal pressure, 101.3kPa
Measurement Interval	15s

Temperature Measurement:

Measurement Range (T)	0–50°C
Accuracy [5]	±0.5°C (@ 17–28°C), ±1.0°C (outside 0–50°C)
Repeatability	±0.25°C (@ 17–28°C)
Response Time	<6min (Air velocity of 0.15m/s)
Measurement Interval	15s

Relative Humidity Measurement:

Measurement Range	0–100%RH
Accuracy [5]	±5%RH (@ 20–80%RH)
Hysteresis	±1%RH (@ 20–80%RH)
Annual Drift	<±0.5%RH
Repeatability	±0.25%RH (@ 17–28°C)
Response Time	<6min (Air velocity of 0.15m/s)
Measurement Interval	15s

Outputs:

Linear Analog Outputs:

Protection	PTC-fuses (auto reset), short-circuit safe
Output Conversion Accuracy	±2% of reading ±20mV
Output Signal	Voltage output 0–10V, Rout <100Ω, Load: >5kΩ
Output Resolution	10-bits, 10mV steps, 0.1% steps of full ppm/°C/%RH range
Out1: CO2 [6]	0–10V, corresponds to 0–2000 ppm_{vol}, at screw terminal
Out2: Temperature (T) [7]	0–10V, corresponds to 0–50°C, at screw terminal
Out3: Relative Humidity (RH) [7]	0–10V, corresponds to 0–100%RH, at screw terminal

Digital Output:

Relay (RL) [6]	On ≥1000 ppm_{vol} CO_2, Off ≤900ppmvol, CO_2, at screw terminal Form C / DPDT, I_{max}: 1A/50VAC/24VDC
Input Source	CO_2 / T / RH (configurable via touch display)

Note 1: No maintenance required in normal indoor air as ABC (Automatic Baseline Calibration) is used.

Note 2: In normal IAQ applications, accuracy is defined after minimum three (3) ABC-periods of continuous operation with ABC.

Note 3: Accuracy is specified over operating temperature range. Specification is referenced to certified calibration mixtures. Uncertainty of calibration gas mixtures (±1% currently) is to be added to the specified accuracy for absolute measurements.

Note 4: Repeatability is included. Uncertainty of calibration gases (±1%) is added to the specified accuracy.

Note 5: Depending on display brightness setting.

Note 6: Can be configured with PC software UIP (version 5 or later). See information at senseair.com

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