Sontay®
Four Elms Road - Edenbridge
Kent - TN8 6AB - UK

GS-CO2-AQ-D
Duct Mounted CO_2 IAQ & Temp. Sensors
Issue Number 7.0
06/04/2022

Features and Benefits

- Robust sensor enclosure
- Easy installation with LED indication, test button and auto-output mode detection (3-wire)
- Pluggable terminal blocks and tool free installation
- Energy saving by ventilating at the optimum CO_2 levels

Technical Overview

Using a NDIR (non-dispersive infrared) sensor for measuring CO_2 concentrations and utilizing ABC (Automatic Baseline Correction) ensures accurate and maintenance free operation. They are also fitted with a IAQ temperature outputs.

A valuable feature of this sensor is, when in 3-wire mode, it automatically detects the controller input type, 4-20mA or 0-10Vdc. This removes the requirement for output jumpers. It also provides on-board LED indication for power up status and set output mode. The terminal blocks are pluggable and allow tool free installation (ferrules required).

Product Codes

GS-CO2-AQ-D   Duct CO_2 IAQ and T Sensor 0-2000ppm

Suffixes (add to part code)

-T   Direct resistive temp. output (change **T** to type below)
Thermistor types:

A (10K3A1)	**B** (10K4A1)	**C** (20K6A1)
H (SAT1)	**K** (STA1)	**L** (TAC1)
M (2.2K3A1)	**N** (3K3A1)	**P** (30K6A1)
Q (50K6A1)	**S** (SAT2)	**T** (SAT3)
W (SIE1)	**Y** (STA2)	**Z** (10K NTC)

Platinum types:
D (PT100a)   **E** (PT1000a)
Nickel types:
F (NI1000a)   **G** (NI1000a/TCR (LAN1))

Interface Options (add to part code)
-HR   0-5000ppm CO_2 range
-TR   Custom temperature range between -20 & +50°C
-LED   3-Colour LED indication for CO_2 levels
-5V   Output 0-5Vdc (instead of 0-10Vdc)

Specification

Outputs:	0-10Vdc (0-5V for -5V version) or 4-20mA self-detecting
(optional -T)	PTC/NTC resistive sensing element
Power Supply:	24Vac/dc ±10%
Supply current:	
Average	30mA
Peak	390mA
Electrical connections:	Pluggable spring loaded terminal block min. 0.2mm^2, max. 1.5mm^2
Output ranges:	
CO_2	0-2000ppm (optional 0-5000ppm)
IAQ	0 to 1,000ppb TVOC
Temperature	-20 to 50°C
Environmental:	
Housing:	-30 to 60°C 0 to 95% non-condensing
Media:	-10 to +50°C
Housing:	
Material	PC/GF (Halogen free, flame retard ant & UV stabilized)
Dimensions	125 x 105 x 85mm
Probe:	
Material	Probe PVC - End cap Delrin
Dimensions	210 x 20mm dia.
Protection	IP65
Country of origin	UK
Conformity	EMC, CE & UKCA Marked

Note:
The LCD is NOT available for this sensor type.

WEEE Directive:
At the end of the products useful life please dispose as per the local regulations.
Do not dispose of with normal household waste.
Do not burn.

CE UKCA

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Sensor Characteristics

Carbon Dioxide

Measurement interval	2 seconds
Accuracy	±70ppm ±3% of reading
Pressure dependency	+1.6% reading per kPa deviation from normal pressure
Response rate	2 minutes by 90%

Temperature

Measurement range	-20 to 50°C
Accuracy (20 to 40°C)	±0.5°C
Long term stability	<0.02°C p.a.
Response time	5 to 30 seconds (t 63%)

Air Quality

Type	MEMS Siloxane, TVOC (Total Volatile Organic Compounds)
Accuracy	Typical ±15% of measured value
Measurement range	0-1,000ppb TVOC

Installation

ATTENTION OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

Antistatic precautions must be observed when handling these sensors. The PCB contains circuitry that can be damaged by static discharge.

1. Select a location in the duct where dust & contaminants are at a minimum (i.e. after filters etc.) and which will give a representative sample of the prevailing air condition.

2. Fix the housing to the duct with appropriate screws

3. Release the snap-fit lid by gently squeezing the locking tab and feed the cable through the waterproof gland and terminate the cores at the terminal block. Leaving some slack inside the unit, tighten the cable gland onto the cable to ensure water tightness.

4. If the sensor is to be mounted outside, it is recommended that the unit be mounted with the cable entry at the bottom. If the cable is fed from above then into the cable gland at the bottom, it is recommended that a rain loop be placed in the cable before entry into the sensor.

5. Set the switch on the PCB to the 3-wire position ONLY.

6. Plug the terminal block on the pins header on the PCB. Check polarity and orientation.

IMPORTANT! Make sure the Terminal Block is fitted the correct position and direction. The cable entry faces the centre of the sensor.

7. Connect all sensor outputs to the controller inputs or to the device, the sensor output(s) are connected to.

8. Before powering the sensor, ensure that the supply voltage is within the specified tolerances

IMPORTANT! It is important to make all electrical output connections before applying the supply voltage. If the sensor is not connected in this sequence, damage may be caused to the input circuitry of the controller or device the sensor output(s) are connected to.

9. Allow 3 minutes before checking functionality, and at least 30 minutes before carrying out pre-commissioning checks. This will allow the electronics time to stabilise. In normal building management applications, accuracy is defined after a minimum of 3 ABC periods (72h) of continuous operation. Automatic Background Logic (ABC) is designed to be used in HVAC applications where CO_2 concentrations will drop to outside ambient condition (400ppm) in a 7-day period.

Electrical Connections:

24V	Supply 24Vac/dc
0V	Supply 0V (Common 0V)
OP1	CO_2 output
OP2	IAQ output
OP3	Temperature output
0V	Common 0V (if fitted)
TH1	Direct Thermistor output (-T only)
TH2	Direct Thermistor output (-T only)

Terminal Block:

For easier installation, the terminal block can be detached from the PCB.

When used with ferrules it doesn't require any tools to release the spring loaded terminal block.
When used with stranded cable, push in the orange latch to compress the spring load. Feed in the wire and release the spring to secure the wire connection.

IMPORTANT! Make sure the Terminal Block is fitted the correct position and direction. The cable entry faces the centre of the sensor.

Selecting output mode and LED indication:

Ensure there is no power to the sensor before changing the switch. Set the switch in the left hand position. The sensor automatically sets the outputs to 0-10V or 4-20mA based on the resistive load on the outputs. All outputs MUST be connected to the same type of load:
— If ALL the loads are >2k2Ω, all the outputs will be set to 0-10Vdc and the green 0-10V LED will light.
— If ALL the loads are >50Ω and <550Ω, all the outputs will be set to 4-20mA and the orange 4-20mA LED will light.
— If ANY of the loads are <50Ω or >550 and < 2k2Ω, all the outputs will be switched off and the red ERROR LED will light.

Output 1 is checked first, and if it has determined what this output is set to it will assume that all other enabled outputs are connected to similar loads. The LEDs will switch off after 15 minutes.

Self-Test Button:

The self-test button helps the installer to validate the wiring for each output and helps to commission the system.
When self-test button is pushed it cycles all outputs as follows: 0%, 50%, 100%, normal operation. After 30 seconds in any mode the system resets to normal operation.

When self-test button is held for more than 3 seconds, it sets all outputs to 50%, when released the outputs return to normal operation.

LED CO_2 Level Indication

The LED is configured to turn from green to amber when the CO_2 level rises above 1000ppm. The colour changes to red when the CO_2 level exceeds 1500ppm. These levels are customizable, but alternative values MUST be stated when ordering, as they cannot be changed on site.
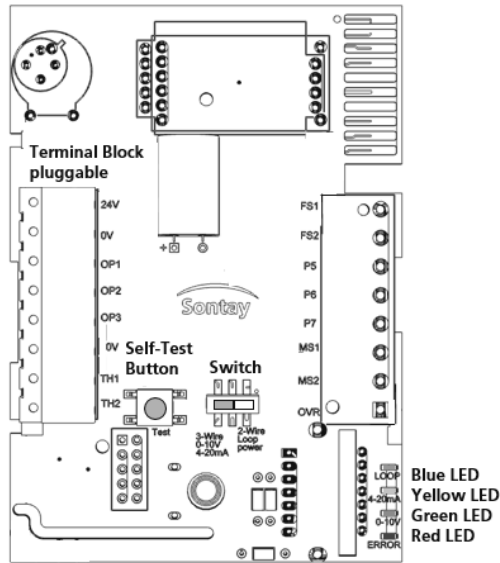
Recommended TVOC Monitoring Levels

German Federal Environmental Agency translates TCOV concentration (parts per billion) on a logarithmic scale:

Level	Recommendation	TVOC
Excellent	Target value	0 to 65ppb
Good	Ventilation / airing recommended	65 to 200ppb
Moderate	Intensified ventilation recommended	220 to 660ppb
Poor	Intensified / airing ventilation necessary	660 to 2200ppb
Unhealthy	Intense ventilation necessary	2200 to 5500ppb

Thereby the 5 stages or so called IAQ levels extend from excellent to unhealthy. Extended exposure to increased IAQ levels i.e bad air, can affect the comfort, well being and health of building occupants. Poor indoor qir quality is linked to sick building syndrome, reduced productivity and impaired learning in schools.
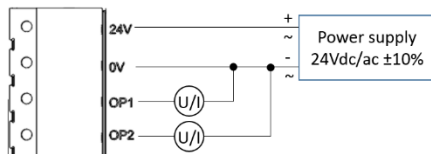
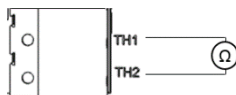Please note that the measuring range of this sensor type is 0 to 1000ppb

PCB Layout:

Sensor only supports 3-wire, do not select 2-wire

Connection Diagram:

3-wire, 0-10Vdc or 4-20mA

-T   Direct Thermistor only

TH1/TH2 Direct Thermistor only (optional)

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