



Features and Benefits

- Slim design for room applications
- Easy installation with LED indication
- Built-in circuitry diagnostics
- Optional set point, momentary button and LCD available

Technical Overview

Using a NDIR (non-dispersive infrared) sensor for measuring CO₂ concentrations and utilizing ABC (Automatic Baseline Correction) ensures accurate and maintenance free operation.

Options such as resistive temperature, set point adjust & momentary switch are available.

A feature of this sensor is when in 3-wire mode it automatically detects the controller input type, 4-20mA or 0-10Vdc. This can be overridden via a DIP switch if required. Sensors have on-board LED indication for power up status, output mode type and useful self-test feature.

Product Codes

GS-CO2-AQ-S Space CO₂ IAQ and Temperature Sensor
0-2000ppm

Suffixes (replace -T with type)

-T Direct resistive temperature output *

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)
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Nickel types:

F (NI1000a)	G (NI1000a/TCR (LAN1))
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Interface Options (add to part code)

-HR 0-5000ppm CO₂ range
-SP Resistive set point 0-10kΩ or 11-1kΩ
-MS Momentary switch
-TR Custom temperature range between -20 & +50°C
-LED 3-Colour LED indication for CO₂ levels

-5V Output 0-5Vdc (instead of 0-10Vdc)

Accessories

DECOR Decorators trim plate
GASKET Insulating gasket (pack of 10)

The LCD option is NOT available on this sensor.

Note*:

When using the -T option, the thermistor is not compensated for internal self heating.

Specification

Outputs:	3-wire (optional -T)	0-10Vdc (0-5V for -5V) or 4-20mA PTC/NTC resistive sensing element
Power Supply:		24Vac/dc ±10% (3-wire) 24Vdc ±10% (2-wire)
Supply current:	Average Peak	30mA 390mA
Electrical connections		Pluggable spring loaded terminal block min. 0.2mm ² , max. 1.5mm ²
Output ranges:	CO ₂ IAQ Temperature RH	0-2000ppm (optional 0-5000ppm) 0 to 1,000ppb TVOC 0 to 40°C 0 to 100%
Environmental:	Housing:	-10 to 60°C 0 to 95% non-condensing
Housing:	Material Dimensions	ABS (flame retardant) 115 x 85 x 30mm
Protection		IP30
Country of origin		UK
Conformity		EMC, CE & UKCA Marked

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.



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	0 to 40°C
Accuracy (20 to 40°C)	±0.5°C
Long term stability	<0.02°C p.a.
Response time	8 sec. (t 63%) @ 25°C 1 m/s air flow

Air Quality

Type	MEMS Siloxane, TVOC (Total Volatile Organic Compounds)
Accuracy	Typical ±15% of measured value

Measurement range	1,000ppb TVOC
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Optional Passive Output

Type	Resistive PTC & NTC types
Accuracy:	
Thermistor	±0.2°C 0 to 70°C
Platinum types	±0.2°C @ 25°C
Nickel types	±0.4°C @ 25°C

Set point	Resistive 0-10kΩ or 11-1kΩ ±30%
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Momentary switch	VFC 24Vac/dc 50mA max.
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Installation



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

1. Select a location on a wall of the controlled space which will give a representative sample of the prevailing room condition. Avoid sitting the sensor in direct sunlight, on an outside wall or near heat sources. An idea mounting height is 1.5m from the floor.
2. Undo the tamperproof screw at the bottom of the housing and remove the front panel from the base.
3. Using the base as a template mark the hole centres and fix to the wall with suitable screws. Alternatively the base plate can be mounted on to a conduit box or standard recessed back box. The base plate is suitable for EU & North America fixings.
4. Feed cable through the hole in the base plate of the housing, unplug the terminal block from the PCB and terminate the cores at the loose terminal block. Leave some slack inside the unit as required.
5. Set the switch on the PCB either to the 3-wire position (if fitted). Please refer to "Selecting output mode and LED indication" for more details.

IMPORTANT Do not alter the switch position while sensor is powered up. Do **not** select 2-wire when a 0v connection (3-wire) is made. Permanent damage to the sensor or BMS controller may result.

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

6. Connect all sensor outputs to the controller inputs or to the device, the sensor output(s) are connected to.
7. Before powering the sensor, ensure that the supply voltage is within the specified tolerances.

IMPORTANT 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.

8. 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 of continuous operation. Automatic Background Logic (ABC) is designed to be used in HVAC applications where CO₂ concentrations will drop to outside ambient condition (400ppm) in a 7-day period.

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.

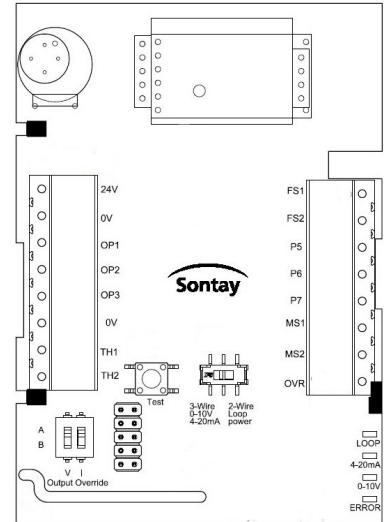
Electrical Connections:

24V	Supply 24Vac/dc
0V	Supply 0V (Common 0V)
OP1	CO ₂ output
OP2	IAQ output
OP3	Temp. output
0V	Not used
TH1	Direct Thermistor output (-T only)
TH2	Direct Thermistor output (-T only)

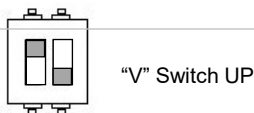
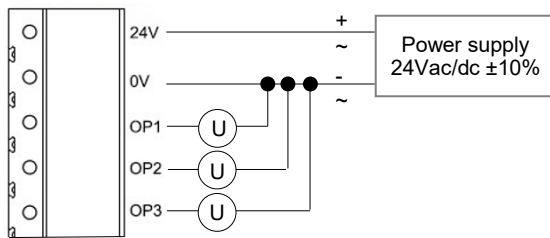
FS1	Not used
FS2	Not used
P5	Set point
P6	Set point, wiper
P7	Set point
MS1	Momentary switch
MS2	Momentary switch
OVR	Override on LCD

LED Indication:

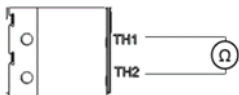
LOOP	Blue
4-20mA	Yellow
0-10V	Green
ERROR	Red



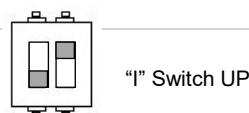
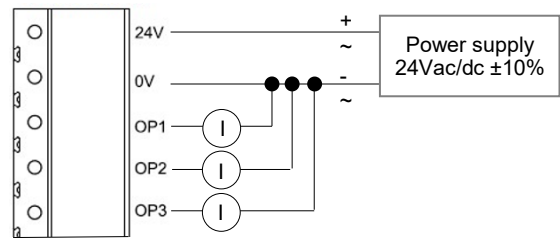
3-wire, 0-10Vdc / (0-5Vdc optional):



-T, direct resistive output:



3-wire, 4-20mA:



Momentary switch (-MS):
max. 500mA @24Vac/dc

Set point (-SP):

	-	+
P5/P6	0kΩ	10kΩ
P7/P6	11kΩ	1kΩ

See next page for further information on setting output modes.

For 1-11kΩ use the 0-10kΩ and add an inline 1kΩ resistor on the controller input side

Selecting output mode and LED indication:

IMPORTANT Do not alter the switch position while sensor is powered up. Do not select 2-wire if a 0v connection (3-wire) is made. Permanent damage to the sensor or BMS controller may result.

3-wire connection:

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 $>2k\Omega$, all the outputs will be set to 0-10Vdc and the green 0-10V LED will light.
- If ALL the loads are $>50\Omega$ and $<550\Omega$, all the outputs will be set to 4-20mA and the yellow 4-20mA LED will light.
- If ANY of the loads are $<50\Omega$ or >550 and $<2k\Omega$, all the outputs will be switched off and the red ERROR LED will light.

Auto detection can be overridden via 2-way DP switch situated on the left hand side of the PCB.

Set the auto detection 2-way DIP switch to the **3-wire** position

Set the override 2-way switch to:

- Voltage (0-10V/0-5V) switch DIP1 (V) to ON
- Current (4-20mA) switch DIP2 (I) to ON

The ON position for the switch is labelled on the switch itself.

Example, if you set the V switch (left) to OFF and the I switch (right) to ON, the device will force 3-wire current mode. The device is also set up to detect a change on these switches and reboot itself after 5 seconds - the error LED will flash during this period then the yellow 4-20mA LED will illuminate.

2-wire connection:

Ensure there is no power to the sensor before changing the switch and do not connect 0V. Set the switch in the right hand position. All outputs MUST be connected. The blue LOOP LED will light.

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 CO₂ Level Indication

The LED is configured to turn from green to amber when the CO₂ level rises above 1000ppm. The colour changes to red when the CO₂ 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

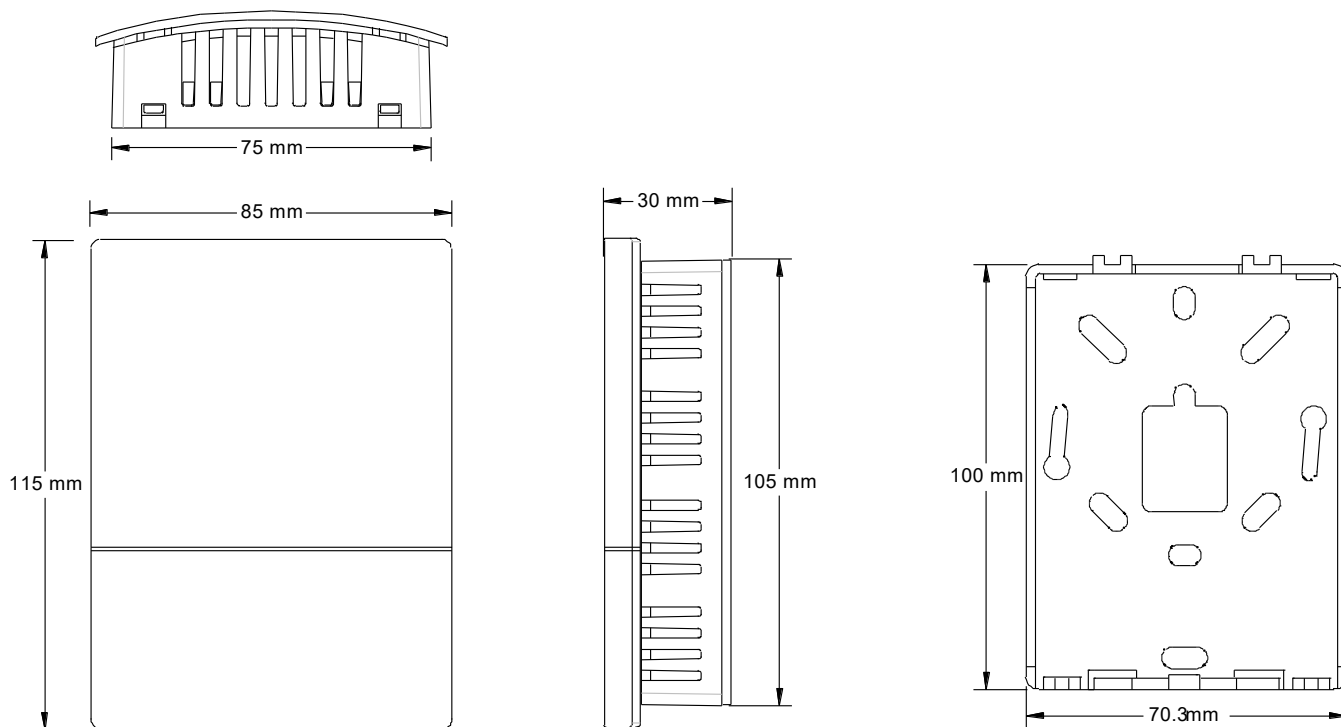
German Federal Environmental Agency translates TCOV concentration (parts per billion) on a logarithmic scale:

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 ie bad air, can affect the comfort, well being and health of building occupants. Poor indoor air 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

Dimensions:



Revision History:

Rev.	Description of change	Page No.	Date
7.1	Output type override & dimensions	3, 4 & 5	16/06/2023
7.0	New product	All	06/04/2022

Whilst every effort has been made to ensure the accuracy of this specification, Sontay cannot accept responsibility for damage, injury, loss or expense resulting from errors or omissions. In the interest of technical improvement, this specification may be altered without notice.