



## Technical Overview

Using a NDIR (non-dispersive infrared) sensor for measuring CO<sub>2</sub> concentrations and utilizing ABC (Automatic Baseline Correction) ensures accurate and maintenance free operation. They are also fitted with a temperature output or RH & temperature outputs.

Options such as set point adjust, momentary switch and fan speed selection, together with a multi-line backlit LCD display are available. A 0-10Vdc override status input option is also available, allowing occupancy indication on the display.

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. 2-wire loop powered is selectable via a DIP switch. 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).

## Features & Benefits

- Slim design for room applications
- Easy installation with LED indication, test button and auto-output mode detection (3-wire)
- Pluggable terminal blocks and tool free installation
- Optional set point wheel, fan speed slider, momentary button and LCD available
- Energy saving by ventilating at the optimum CO<sub>2</sub> levels

## Product Codes

**GS-CO<sub>2</sub>-S** Space CO<sub>2</sub> and T Sensor 0-2000ppm  
**GS-CO<sub>2</sub>-RHT-S** Space CO<sub>2</sub> RH & T Sensor 0-2000ppm

Suffixes (add to part code)

**-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 CO<sub>2</sub> range
- SP** Resistive set point 0-10kΩ or 11-1kΩ
- FS3** Resistive 3-speed fan switch
- FS4** Resistive 4-speed fan switch
- FS5** Resistive 5-speed fan switch
- MS** Momentary switch
- TR** Custom temperature range between -20 & +50°C
- LCD** Integral LCD
- LED** 3-Colour LED indication for CO<sub>2</sub> levels
- 5V** Output 0-5Vdc (instead of 0-10Vdc)

Accessories

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

\*\* Interface Restrictions

SP only	SP-MS only
MS only	SP-FS only

**Note\*:**

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

## General 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 <sup>2</sup> , max. 1.5mm <sup>2</sup>
Output ranges:	
CO <sub>2</sub>	0-2000ppm (optional 0-5000ppm)
Temperature	0 to 40°C
RH	0 to 100%
Environmental:	
Temperature	-10 to 60°C
Humidity	0 to 95% non-condensing
Housing:	
Material	ABS (flame retardant)
Colour	RAL 9003 polished white finish
Dimensions	115 x 85 x 30mm
Protection	IP30
Country of origin	UK

### 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.



The products referred to in this data sheet meet the requirements of EU Directive 2014/30/EU

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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	0 to 40°C
Accuracy (20 to 40°C)	±0.5°C
Long term stability	<0.02°C p.a.
Response time	5 to 30 seconds (τ 63%)

### Humidity

Measurement range	0 to 100% RH	
Type	ASIC	
Accuracy (at 25°C)	20 to 60% RH ±3% RH	10 to 90% RH ±4% RH

Long term stability	<0.5% RH p.a.
Response time	8 sec. (τ 63%) @ 25°C 1 m/s airflow

### Optional Passive Outputs

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

### Set point

Resistive 0-10kΩ or 11-1kΩ ±30%  
For 1-11kΩ use the 0-10kΩ and add an inline 1kΩ resistor on the controller input side

### Fan speed

Resistive, see page 3

### Momentary switch

VFC 24Vac/dc 50mA max.

### LCD Display Option

#### -RHT

To show CO<sub>2</sub> and T values  
To show CO<sub>2</sub>, T & RH values

## Installation



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

**Note: Sontays range of CO<sub>2</sub> sensors are not suitable for use in swimming pool & spa applications. Sensors used in these types of applications are not covered under Sontays warranty terms. Chemicals used in swimming pool & spas can contaminate the humidity element, which results in a reduced service life.**

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. For -RHT versions set the switch on the PCB to the 3-wire position ONLY, other versions the dip-switch is not fitted.

**IMPORTANT!** Do not alter the switch position while sensor is powered up, do not select 2-wire. Permanent damage to the sensor or BMS controller may result.

6. Plug the terminal block on the pins header on the PCB. Check polarity and orientation. Replace the housing to the base plate and tighten the tamperproof screw (if required) through the lug at the bottom of the base plate.

**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<sub>2</sub> concentrations will drop to outside ambient condition (400ppm) in a 7-day period.

## Electrical Connections:

<b>24V</b>	Supply 24Vac/dc	<b>FS1</b>	Fan speed resistive
<b>0V</b>	Supply 0V (Common 0V)	<b>FS2</b>	Fan speed resistive
<b>OP1</b>	CO <sub>2</sub> output	<b>P5</b>	Set point
<b>OP2</b>	RH output (-RHT versions only)	<b>P6</b>	Set point, wiper
<b>OP3</b>	Temperature output ( <b>not used for -T option</b> )	<b>P7</b>	Set point
<b>0V</b>	Common 0V (if fitted)	<b>MS1</b>	Momentary switch
<b>TH1</b>	Direct Thermistor (-T only)	<b>MS2</b>	Momentary switch
<b>TH2</b>	Direct Thermistor (-T only)	<b>OVR</b>	Not used

## 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:

**IMPORTANT!** Do not alter the switch position while sensor is powered up, do not select 2-wire. 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 orange 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.

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.

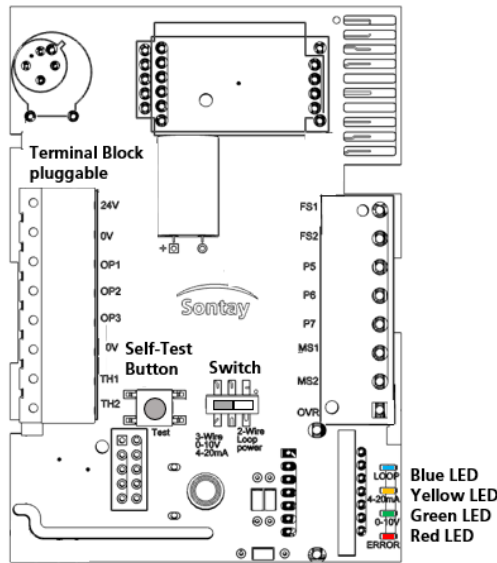
When self-test button is pushed it cycles all outputs as follows: 0%, 50%, 100%, normal operation. After 30 seconds in any mode the system resets to normal operation.

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.

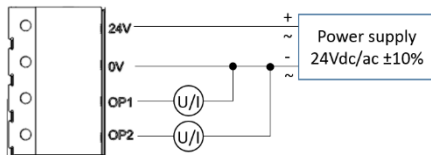
## LED CO<sub>2</sub> Level Indication

The LED is configured to turn from green to amber when the CO<sub>2</sub> level rises above 1000ppm. The colour changes to red when the CO<sub>2</sub> level exceeds 1500ppm. These levels are customizable, but alternative values **MUST** be stated when ordering, as they cannot be changed on site.

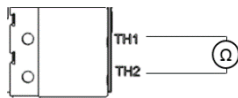
## PCB Layout:



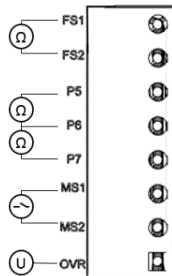
## Connection Diagram:



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



-T Direct Thermistor only



### Fan speed (-FSx):

The position of the selector switch will cause the resistance between the terminals to alter as shown below.

0	Open circuit
1	22.7kΩ
2	26kΩ
3	29.3kΩ
Auto	32.6kΩ

### Momentary switch (-MS):

max. 500mA @24Vac/dc

### Set point (-SP):

	-	+
P5/P6	0kΩ	10kΩ
P7/P6	11kΩ	1kΩ

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

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

For pricing or any further information, please contact Omni Instruments Ltd.

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