Sontay®
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GS-WS-S

WELLSense Smart Sensor Space Mounted

Issue Number 10.0
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Key Benefits

- BACnet & Modbus outputs
- Universal 0-10Vdc IO
- Total indoor air quality monitoring unit
- Configurable traffic light colour LED bars
- Wall or ceiling mounted
- With or without Epaper touch screen display
- Fan speed and setpoint output options

General Specification

Supply voltage	24Vac/dc ±10%
Electrical connections	Pluggable spring loaded terminal block min. 0.2mm2, max. 1.5mm2
Communication	RS-485 (EIA-485) Protocol selectable via DIP switch
BACnet MS/TP	9k6, 19k2, 38k4, 76k8 or auto baud rate detection
Modbus RTU	9k6, 19k2, 38k4 or 57k6 baud rate 8 data bits, no parity 2 stop bits / odd parity 1 stop bit / even parity 1 stop bit
Measurement ranges:	
T	-20 min to +110 max units (°C or °F)
RH	0 to 100% RH
CO_2	0 to 2,000 or 5,000ppm
TVOC	0 to 50,000ppm or 0 to 500 index
NOx	0 to 500 index
CO	0 to 500ppm
PM	0 to 1,000 µg/m³
IO (selectable AO or AI):	
AO	2x Analogue output 0-10V *or*
AI	2x Analogue input 0-10V
EMC Compliance:	
Emissions	EN 61000-6-3:2007+A1:2011
Immunity	EN 61000-6-2:2005
Ambient:	
Temperature	-20 to +50°C
RH	15 to 90% non-condensing
Housing:	
Material	PVC
Colour	White finish
Dimensions	110 x 96 x 28mm
Protection	IP20
Country of origin	UK
Conformity	EMC, CE & UKCA Marked WELL (certification in progress)

Sensor Definitions

PM1	Pollutants less than 1 microns
PM2.5	Pollutants less than 2.5 microns
PM10	Pollutants less than 10 microns
TVOC	Total Volatile Organic Compounds
NOx	Nitrous Oxide
CO	Carbon Monoxide
CO_2	Carbon Dioxide
RH	Relative Humidity
T	Dry Bulb Temperature

Sensing Characteristics

Temperature T

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

Humidity RH

Type	ASIC	
Accuracy (30 to 70% RH)	Typical ±1.8% RH	Maximum ±3.5% RH
Long term stability	<0.5% RH p.a.	
Response time	8 sec. (t 63%) @ 25°C 1 m/s airflow	

Carbon Dioxide CO_2

Type	NDIR with ABC logic, user configurable
Measurement interval	2 seconds
Accuracy	±70ppm ±3% of reading
Response rate	2 minutes by 90%

Indoor Air Quality IAQ

Type	MEMS Siloxane, TVOC (Total Volatile Organic Compounds)
Accuracy	< ±15% of measured value
Conditioning period	7 days

Indoor Air Quality NOx

Type	MEMS Siloxane
Accuracy	< ±15% of measured value
Conditioning period	7 days

Carbon Monoxide CO

Type	Electrochemical sensor
Accuracy	Typical ±7% fsd.
Baseline offset	<±10ppm equivalent
Response time	max. 60 seconds (t90)

Particulate Matter PM

Type	Optical, laser-based particulate-matter measurement
Accuracy	± 10 µg/m³ from 0 to 100 µg/m³ ± 10% from 101-1000 µg/m³
Conditioning period	≥ 120 seconds

IMPORTANT The sensor is not designed, manufactured or intended for use or re-sale as control or monitoring equipment in environments requiring life safety performance, in which the failure of the sensor could lead directly to death, personal injury, or severe physical or environmental damage. Sontay and its suppliers specifically disclaim any express or implied warranty of fitness for life safety, not to be used in domestic applications.

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

CE UKCA

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Technical Overview

The GS-WS-S is an all-in-one indoor air quality sensor measuring PM 1, PM2.5, PM10, TVOC, NOx, CO, CO_2, temperature, and humidity.

Data is available via BACnet MS/TP or Modbus RTU. With two three-colour LED bars shows air quality levels at a glance.

Can be utilised to help a building gain WELL accreditation.

Part Codes

GS-WS-S	x	x	x	x	x	x	**Space Humidity & Temperature**
							Configuration sensing options CO_2:
	0						None
	1						CO_2
							Configuration sensing options CO:
		0					None
		1					CO
							Configuration sensing option TVOC/NOx:
			0				None
			1				TVOC
			2				TVOC & NOx
							Configuration sensing options PM:
				0			None
				1			PM
							Configuration options LED:
					0		None
					1		LED
							Configuration User Interface Screen options:
						0	None
						1	Screen
						2	Screen & Own branding
						3	None & No Branding

Standard units are supplied with the Sontay logo. To customise the unit with your own logo, select “1” under the Configuration UI option. Please provide your logo as a .PNG file to support@sontay.com

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Installation

Handling & Precautions:

- Use **antistatic precautions** – static discharge can damage the PCB.
- **Do not use** in swimming pools or spas (chemicals shorten sensor life and void warranty).
- Mount on an **interior wall**, ~1.5 m high. Avoid sunlight, outside walls, and heat sources.
- Install **after construction/renovation** to avoid dust (warranty may be void if contaminated).

Installation Steps:

1) Remove tamperproof screw and front panel from the base.

2) Mount base (to conduit box, back box, or wall using base as template).

3) Feed cable through base and terminate wires (see “Electrical Connections”) at the terminal block located in the base.

4) Set PCB dipswitches as required for network settings and address (see “DIP Switches”).

5) Replace the front panel and secure the tamperproof screw.

6) Connect outputs to controller and check supply voltage before powering.

7) Wait 4 minutes for initial check, 30 minutes before pre-commissioning

Calibration & Testing:
For accurate comparison with a reference, probes must be adjacent in a stable RH environment for at least 30 min. Avoid using mechanical hygrometers or “slings.”

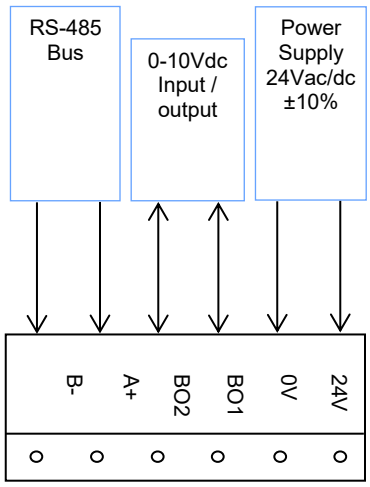
Terminal Block

Detachable for easy installation. For ferrules, no tools needed. For stranded wires, press the orange latch, insert the wire, and release.
Ensure the cable entry faces the sensor centre.

Electrical Connections

24V	Supply 24Vac/dc
0V	Supply 0V (Common 0V)
IO1	Analogue Input/output 1
IO2	Analogue Input/output 2
A+	RS-485 A+
B-	RS-485 B-

The electrical terminals are located in the back plate making it easier to wire



Network Cable

Sontay recommend that Belden 9841 or 3106 cable be used for the RS-485 network bus. Similar specification cable may also be used. If other types of cable, such as CAT5, is employed, it may be necessary to switch DS2-8 (the 120Ω terminating resistor) ON for each device to obtain reliable communications.

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LED Light Bar

The light bar can display the status of a selected sensor or be controlled directly via the BMS network. It can display **green, amber or red**, or be switched off.

Select the sensor source using **BACnet Object MSV-0** or **Modbus Register 40046**.

The light bar colour is determined by the **Good** and **Fair** thresholds set using **BACnet Objects AV-9 and AV-10** or **Modbus Registers 40043 and 40044**. Threshold values must use the same units and format as the selected sensor.

For example, with **Temperature** selected:

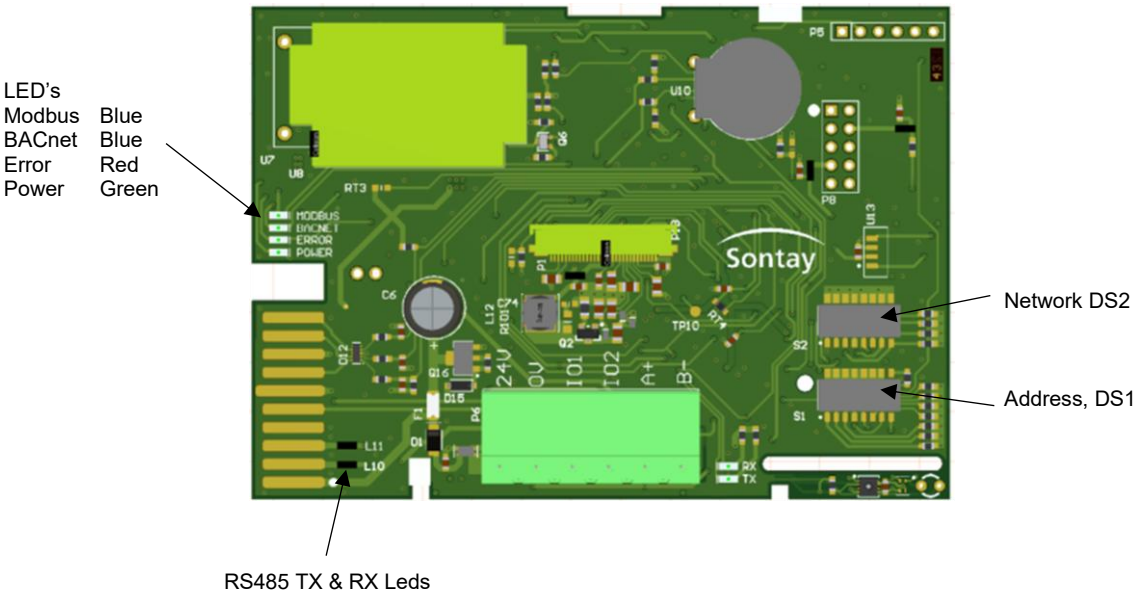
- Good = 25
- Fair = 28
- 23 → Green
- 26 → Amber
- 30 → Red

The colour direction can be reversed by swapping the Good and Fair values. For example, setting **Good = 28** and **Fair = 25** reverses the green and red ranges.

Network control is a special case. When the source is set to **Network**, the **Good** and **Fair** levels directly control the light bar colour, as shown in **Table.**

Colour	Good	Fair
Off	0	0
Red	0	1
Green	1	0
Amber	1	1

PCB Layout



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DIP Switches

Set network settings using the network DIP switch, **DS2**

IMPORTANT

- DS2-5 and DS2-6 have no effect if DS2-4 is set to BACnet.
- Auto-baud only works in BACnet mode.
- Only set DS2-8 to ON if the sensor is the last device on the RS-485 bus

Setting	DS2 - 1	DS2 - 2	DS2 - 3	DS2 - 4	DS2 - 5	DS2 - 6	DS2 - 7	DS2 - 8
Auto-baud (BACnet only)	-	-	**On**	-	-	-	-	-
9600 Baud Rate	Off	Off	Off	-	-	-	-	-
19200 Baud Rate	**On**	Off	Off	-	-	-	-	-
38400 Baud Rate	Off	**On**	Off	-	-	-	-	-
57600 (Modbus) / 76800 (BACnet) Baud Rate	**On**	**On**	Off	-	-	-	-	-
Modbus Network	-	-	-	**On**	-	-	-	-
BACnet Network	-	-	-	Off	-	-	-	-
No Parity - 2 Stop Bits	-	-	-	-	Off	Off	-	-
Odd Parity - 1 Stop Bit	-	-	-	-	**On**	Off	-	-
Even Parity - 1 Stop Bit	-	-	-	-	Off	**On**	-	-
No Parity - 1 Stop Bits	-	-	-	-	**On**	**On**	-	-
No RS485 termination	-	-	-	-	-	-	-	Off
RS485 termination	-	-	-	-	-	-	-	**On**

Set MAC address using DIP switch, **DS1**

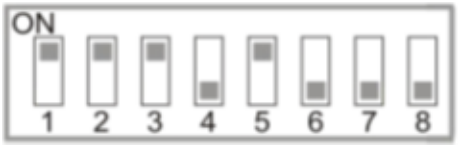
IMPORTANT

- Changing any DIP switch setting while the sensor is powered will cause the sensor to reboot.

Address	DS1 - 1	DS1 - 2	DS1 - 3	DS1 - 4	DS1 - 5	DS1 - 6	DS1 - 7	DS1 - 8
0	Off	Off	Off	Off	Off	Off	Off	Off
1	**On**	Off	Off	Off	Off	Off	Off	Off
2	Off	**On**	Off	Off	Off	Off	Off	Off
4	Off	Off	**On**	Off	Off	Off	Off	Off
8	Off	Off	Off	**On**	Off	Off	Off	Off
16	Off	Off	Off	Off	**On**	Off	Off	Off
32	Off	Off	Off	Off	Off	**On**	Off	Off
64	Off	Off	Off	Off	Off	Off	**On**	Off
128	Off	Off	Off	Off	Off	Off	Off	**On**

Example, DS1 set for an address of 23

DS1-1 =1
DS1-2 =2
DS1-3 =4
DS1-5 =16
Total =23



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LED's

Set MAC address using DIP switch, **DS1**

IMPORTANT

- All the LEDs apart from Power (green) will go off after being powered for 15 minutes.

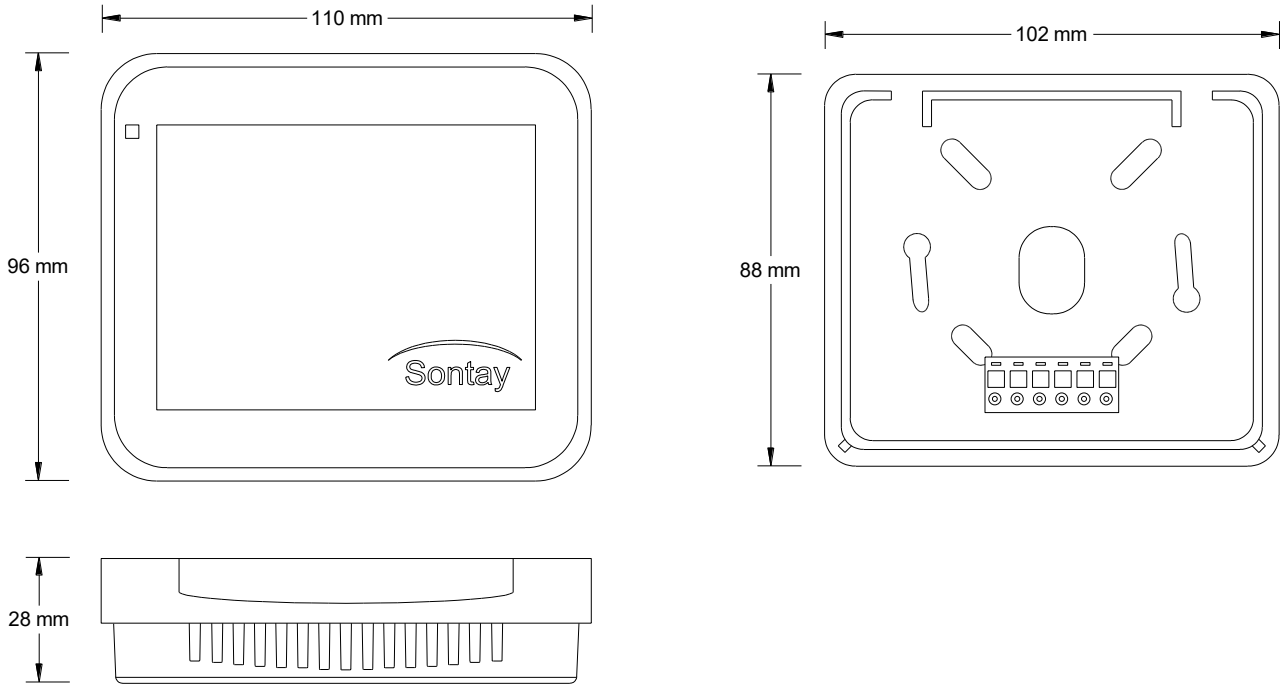
Function	Colour	Description
Power	Green	Directly run from device power, lit when device is powered
Error	Red	Lit when self-test errors are detected
RS-485-TX	Green	Flash (~25ms per transfer) to indicate RS-485 data transactions in the given direction
RS-485-RX	Yellow	
BACnet	Blue	Indicates which network protocol is in use, errors have occurred if neither are lit. BACnet LED will flash whilst the auto-baud process is in progress
Modbus	Blue	

Fault Finding

Symptom	Cause	Actions
No BACnet MS/TP Communications	PCB not powered	Check green power LED. Apply power to PCB observing correct polarity.
	BACnet not selected using DS2-4	Observe that the BACnet LED is ON. Check that DS2-4 is set to OFF.
	Incorrect address setting	Set a unique, valid address.
	Duplicate device instance	The device instance is "662" + the MAC address. Check that the device instance is correct and unique on the network.
	120Ω terminator (DS2-8) set ON	Only set the 120Ω terminator ON if the sensor is the last on the RS-485 bus.
	Incorrect baud rate	Check the baud rate switches (DS2-1 to DS2-3)
	Incorrect RS-485 wiring	Ensure A+ on the sensor is connected to A+ one each sensor and/or MS/TP master
No Modbus RTU Communications	PCB not powered	Check green power LED. Apply power to PCB observing correct polarity.
	Incorrect address setting	Set a unique, valid address.
	Modbus not selected using DS2-4	Observe that the Modbus LED is ON. Check that DS2-4 is set to ON.
	120Ω terminator (DS2-8) set ON	Only set the 120Ω terminator ON if the sensor is the last on the RS-485 bus.
	Incorrect baud rate	Check the baud rate switches (DS2-1 to DS2-3)
	Incorrect parity and stop bit settings	Check the parity and stop bit switches (DS2-5 to DS2-6)
	Incorrect RS-485 wiring	Ensure A+ on the sensor is connected to A+ one each sensor and/or RTU master

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Dimensions



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.

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