Sontay®
Four Elms Road - Edenbridge
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Features and Benefits

- Real time indoor air quality monitoring
- Multiple sensors, PM2.5, PM10, TVOC, HCHO, CO$_2$, humidity & temperature
- Three colour light ring indicating indoor air quality levels (can be switch off)
- Ceiling or wall mounted
- Modbus RTU output

Technical Overview

The GS-IAQ-S measures multiple different sensors types for all-round indoor air quality. Sensor types include is for PM2.5, PM10, TVOC, HCHO, CO$_2$, humidity & temperature measurement. All can be monitored via the Modbus RTU output, there is also a 3-colour LED ring indicating different indoor air quality levels.

A built-in large flow bearing blower and the control technology of automatic constant flow, the GS-IAQ-S has the much higher and long-term operation stability and life, of course more accuracy.

Product Codes

GS-IAQ-S   Indoor ceiling or wall mounted monitor with PM2.5, PM10, TVOC, HCHO, CO$_2$, humidity & temperature measurement

Sensor Definitions

PM2.5	Pollutants less than 2.5 microns
PM10	Pollutants less that 10 microns
TVOC	Total Volatile Organic Compounds
HCHO	Formaldehyde (CH$_2$0)
CO$_2$	Carbon dioxide
Humidity	Relative humidity
Temperature	Dry bulb temperature

Specification

Outputs	Modbus RTU
Power Supply	12-28Vdc or 18-27Vac
Current consumption	1.9W (80mA)
Electrical connections	Rising cage to suit 0.2 to 1.5mm²
Output ranges:	
PM2.5	0 to 500µg/m³
PM10	0 to 800µg/m³
TVOC	0 to 3.5mg/m³
HCHO	0 to 0.6mg/m³
CO$_2$	0 to 5000ppm
Humidity	0 to 99%RH
Temperature	-20 to +60°C
Accuracy*:	
PM2.5	10% of reading, 0-300µg/m³
TVOC	±0.05 µg/m³ +10% of reading
HCHO	±0.005 µg/m³ +5% of reading
CO$_2$	±50ppm +3% of reading
Humidity	<±4%RH (20-80% RH)
Temperature	<±0.6°C @ 25°C
Indicator ring	See page 3, point 5
Environmental:	
Temperature	0 to 50°C
Humidity	5 to 90% non-condensing
Housing:	
Material	PC/ABS
Dimensions	130 x 130 x 45mm
Protection	IP20
Certification:	
	RESET, Grade B
	WELL
Conformity	EMC, CE & UKCA Marked
Country of origin	China

* Accuracy @ 25°C, 10 to 60%RH
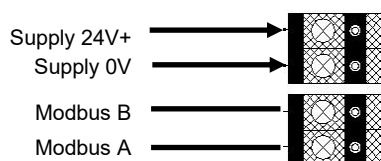
Installation & Precaution Notes

- The monitor is used for indoor air quality monitoring and is suitable for ceiling installation and wall installation. This product should not be used outdoors.

- The installation location should avoid kitchens, heating, air conditioning indoor units, direct sunlight, etc., which are affected by heat sources and other polluting gases. Keep away from high power or electrostatic precipitator equipment to avoid affecting product accuracy. The installation location should be convenient for regular maintenance.

- Measurement parameters include micro-particles and total volatile gases, and it should be ensured that there is no construction or decoration in the environment. When used in new construction, it should be installed after the renovation project is completed and cleaned.

- If the room where the sensor has been installed needs to be renovated, the sensor should be removed before the conditions permit, and then installed after the renovation is completed. For situations where disassembly is difficult, be sure to completely wrap the sensor to prevent paint and dust from entering the sensor.

- This product should avoid the deviation of CO$_2$ measurement caused by the product's drop and impact caused by the beam shift in the sensor chamber; it should avoid the long-term exposure of the product to the high concentration of total organic volatile gas, which may cause the sensor poisoning to be unrecoverable. For example, the concentration is greater than several times the TVOC range in the sensor.

- When the temperature of the sensor environment changes greatly, for example, if the product has just been received during the cold weather, it should be placed indoors for 8 hours before being powered on. Or move from the air-conditioned room to the non-air-conditioned area, etc., and also need to be placed for at least 2 hours before powering up. Avoid excessive temperature difference and cause condensation or equipment damage.

- Never paint the sensor casing to avoid clogging the inlet and outlet, and the paint entering the MSD chamber.

- Do not use cigarettes to test PM2.5 measurements. Because the particles of cigarettes are mostly between 0.1 & 0.3 microns, and the concentration cannot be controlled. As a result, the PM2.5 measurement deviation is too large.

- When multiple sensors use RS485 Modbus output, when sharing a power supply, make sure that the power supply wiring uses the same name of the power polarity, and the wrong connection will cause damage to the equipment.

- Re-use after first use or long time, it should be continuously energized for more than 48 hours to ensure stable output of all measured values.

- The built-in CO$_2$ sensor has a self-calibration function. The readings may be deviations after power on or after a period of power off. And will be getting normal work after 2-7 days with continuously power on. And will be automatically calibrated during long term use.

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Installation

ATTENTION
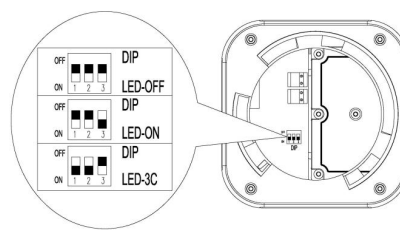OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

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

1. Select a location on a ceiling or wall of the controlled space which will give a representative sample of the prevailing room condition. Avoid sitting the sensor in direct sunlight, beside windows, on an outside wall or near heat sources. If wall mounting an idea mounting height is 1.5m from the floor.

2. Separate the back plate from the main housing, rotate the back plate clockwise as shown by the direction arrow.

3. There are two electrical knockouts on the base plate, remove as required, pass your electrical cables though these. Then using the back plate as a template mark the holes and fix to the wall with suitable screws.

4. Terminate the cores of the cable at the terminal block. These can be removed to make connection easier, Observe polarity of the Modbus and if using 24Vdc. Leave some slack inside the unit as required.

Supply 24V+ →
Supply 0V →
Modbus B →
Modbus A →

5. Indicator LED

    There is a circle ring of indicator light in the centre of the housing. This indicator light is used to show concentration range of measured value. This indicator light can be controlled by any of measured values of among PM2.5 or CO₂ or TVOC through RS485 communication command, and change the colour of indicator light depending on the Concentration.

    The measured value of the change of indicator light can be selected with one minute average value or one hour average value of 24 hours average value in the communication command.
    The indicating light is controlled by one minute average value of PM2.5 as factory default.
    DIP switches can control the ring of indicator light Open, which characterizing AQI concentration changes and Green light keeps ON constantly, and Turn Off the indicating light.

Indicating Light	DIP4	DIP3	DIP2	DIP1	
Light OFF	OFF	OFF	OFF	OFF	
3-Colour Lights	OFF	ON	ON	ON	(Default)
Green Normally ON	ON	OFF	OFF	OFF	

Colour changes corresponding to the measured arrange:

PM2.5	<35ug/m3 Green	35~75ug/m³ Yellow	>75ug/m³ Red
CO₂	<800ppm Green	800~1200ppm Yellow	>1200ppm Red

5. Replace the housing to the base plate, align the dot on the base plate in the middle of the indicator arrows on the side of the main housing. Turn anti-clockwise until it clicks.

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

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Maintenance & Fault Finding

- To ensure accurate sensor data, regular maintenance is required in normal use environments. Depending on the environment in which it is used, maintenance is usually required once every 3 to 6 months. The special environment should shorten the maintenance period, such as public places with large dust, dry seasons and pollen seasons, and poor environmental cleanliness.

- General maintenance includes: cleaning the filter and using a vacuum cleaner to remove dust inside the filter. If there is a large deviation in the measured value, or if dust and debris cannot be cleaned after entering, you need to return to the factory for re-cleaning and calibration.

Fault Condition	Troubleshooting
PM2.5 data abnormal deviation is too large, the value is too high or too low	Check whether there's external matter or a lot of dust into the sensor housing or on the air inlet and air outlet. After a long time use, it may be necessary to return back to the factory for re-calibration.
The CO$_2$ data is abnormal, The value is too high or too low	The CO$_2$ sensor has a self-calibration function. Self-calibration will make CO$_2$ values normal. Self-calibration conditions: The CO$_2$ concentration is around 400ppm for at least 4 hours in every 24 hours. The self-calibration environment should last for one week. In special cases, such as CO$_2$ sensor affected by violent vibration or dropped, self-calibration will not take effect, then the CO$_2$ sensor has to be returned back for re-calibrated or replacement.
TVOC's deviation is too large (high or low)	TVOC module needs to be stabilized for at least 48 hours after being powered. TVOC data deviation may be a little large within a short time after power on. TVOC base line deviation may result in large data deviation. The equipment can be placed outside the window or outdoors for at least 24 hours when the outdoor air is good and clear, allowing TVOC to retrace its baseline.
Temp and humidity deviation is too large, the value is too high	Check whether the environmental factors surrounding the sensor has any influence, such as direct sunlight, close to the heating, air conditioning air outlets, etc. If everything is normal, you need to re-calibrate the temperature and humidity.
Temp and humidity deviation is too large; value is too low or value does not change for a long time	The temperature and humidity values are too low and the temperature and humidity values need to be re-calibrated. The value does not change for a long time, and it can be powered up after power off to see if it returns to normal. If you cannot recover, you need to return to the factory to replace the temperature and humidity sensor.
Communication interruption RS485 (Modbus RTU)	Check if the power supply is normal, if the RS485 terminal is loose. Whether the RS485 communication line is accidentally cut by other constructions. Whether an inductive load with electromagnetic interference is added or started near the equipment or RS485 communication line, such as a water pump.

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Modbus Registers

Mode: Modbus RTU (MSB First)
Baud Rate: 1-4800 2-9600 3-14400 4-19200 5-38400 6-56000 7-57600 8-115200   (default : 2-9600bps)
Start Bits: 1
Data Bits: 8
Stop Bits: 1 / 2   (default: 1)
Parity: None / Odd / Even   (default: None)

Support Function code:
3 -   Read Holding Registers
4 -   Read Input Registers
6 -   Write Single Register
16 -   Write Multiple registers

Starting Register Decimal	Data Description	Function	Read/Write	Quantity of Registers (2Bytes/16bit)	Format	Data Range, Data Description	Default
0/1050	PM2.5 hourly average measurement	4	R	2	32 Bit Float, Big Endian	0~1000.0µg/m³	
2/1052	PM10 hourly average measurement	4	R	2	32 Bit Float, Big Endian	0~1000.0µg/m³	
8/1058	CO$_2$ hourly average measurement	4	R	2	32 Bit Float, Big Endian	0~5000ppm	
10/1060	TVOC hourly average measurement	4	R	2	32 Bit Float, Big Endian	0~4.000mg/m³	
1064	CH$_2$0 hourly average measurement	4	R	2	32 Bit Float, Big Endian	0~2.890mg/m³	
1074	Pressure hourly moving average measurement	4	R	2	32 Bit Float, Big Endian	-1000~200000Pa	
12/1000	PM2.5 one minute average measurement	4	R	2	32 Bit Float, Big Endian	0~1000.0µg/m³	
14/1002	PM10 one minute average measurement	4	R	2	32 Bit Float, Big Endian	0~1000.0µg/m³	
16/1004	Temperature real-time measurement	4	R	2	32 Bit Float, Big Endian	-20.00 °C~ 60.00°C	
18/1006	Humidity real-time measurement	4	R	2	32 Bit Float, Big Endian	0-100.00% RH	
20/1008	CO$_2$ real-time measurement	4	R	2	32 Bit Float, Big Endian	0~5000ppm	
22/1010	TVOC real-time measurement	4	R	2	32 Bit Float, Big Endian	0~4.000mg/m³	
1014	CH$_2$0 real-time measurement	4	R	2	32 Bit Float, Big Endian	0~2.890mg/m³	
1024	Pressure real-time measurement	4	R	2	32 Bit Float, Big Endian	-1000~200000Pa	
24/1100	PM2.5 24-hour moving average measurement	4	R	2	32 Bit Float, Big Endian	0- 1000.0µg/m³	
26/1102	PM10 24-hour moving average measurement	4	R	2	32 Bit Float, Big Endian	0- 1000.0µg/m³	
32/1108	CO$_2$ 24-hour moving average measurement	4	R	2	32 Bit Float, Big Endian	0~5000ppm	
34/1110	TVOC 8-hour moving average measurement	4	R	2	32 Bit Float, Big Endian	0~4.000mg/m³	
1114	CH$_2$0 24-hour moving average measurement	4	R	2	32 Bit Float, Big Endian	0~2.890mg/m³	
1124	Pressure 24-hour moving average measurement	4	R	2	32 Bit Float, Big Endian	-1000~200000Pa	

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Starting Register Decimal	Data Description	Function	Read/Write	Quantity of Registers (2Bytes/16bit)	Format	Data Range, Data Description	Default
1300	Primary pollutant 24-hour average measuring value (One of PM 2.5/ PM10/ CO$_2$/ TVOC) (Calculated based on 24-hour or 1-hour moving average measurement) Primary pollutant type (One of PM 2.5/ PM10/ C0$_2$/ TVOC) (Calculated based on 24- hour or 1-hour moving average measurement)	4	R	2	32 Bit Float, Big Endian	1300	
1302	Primary pollutant type (One of PM 2.5/ PM10/ CO$_2$/ TVOC) (Calculated based on 24- hour or 1-hour moving average measurement)	4	R	1	INT16	1-PM25, 2-PM10, 3-CO$_2$, 4-TVOC	
1303	Index level of the primary pollutant (One of PM2.5/PM10/CO$_2$/TVOC) (Calculated based on 24-hour or 1-hour moving average measurement)	4	R	1	INT16	Level 1-Excellent Level 2-Good Level 3-Light pollution Level 4-Medium pollution Level 5-Heavy pollution Level 6-Severe pollution	
1304	AQI value of the primary pollutant (One of PM2.5/ PM10/CO$_2$/TVOC). (Calculated based on 24-hour or 1-hour moving average measurement)	4	R	1	INT16	0~500	
1320	PM2.5 AQI value (Calculated based on 24-hour moving average measurement)	4	R	1	INT16	0-500	
1321	PM10 AQI value (Calculated based on 24-hour moving average measurement)	4	R	1	INT16	0-500	
1322	CO$_2$ AQI value (Calculated based on 24-hour moving average measurement)	4	R	1	INT16	0-500	
1323	TVOC AQI value (Calculated based on 24-hour moving average measurement)	4	R	1	INT16	0~500	
1350	PM2.5 Pollution index level (Calculated based on 24-hour moving average measurement)	4	R	1	INT16	1-6	
1351	PM10 Pollution index level (Calculated based on 24-hour moving average measurement)	4	R	1	INT16	1-6	
1352	CO$_2$ Pollution index level (Calculated based on 24-hour moving average measurement)	4	R	1	INT16	1-6	
1353	TVOC Pollution index level (Calculated based on 24-hour moving average measurement)	4	R	1	INT16	1-6	
78	3 colour LED status	4	R	1	INT16	0-OFF, 1-Green, 2-Yellow, 3-Red	

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Starting Register Decimal	Data Description	Function	Read/Write	Quantity of Registers (2Bytes/16bit)	Format	Data Range, Data Description	Default
0	Modbus Address	3/6	R/W	1	UINT16	1-247	1
1	Modbus rate (bps)	3/6	R/W	1	UINT16	1-4800 2-9600 3-14400 4-19200 5-38400 6-56000 7-57600 8-115200	2
2	Modbus Parity check bit	3/6	R/W	1	UINT16	1-NONE 1 STOP_BIT 2-NONE 2 STOP_BIT 3-Odd 1 STOP_BIT 4-Even 1 STOP_BIT	1
4	Temperature correction value	3/16	R/W	2	32 Bit Float, Big Endian	-3.0~3.0°C/ -6.0~6.0°F	-2.0
6	Humidity correction value	3/16	R/W	2	32 Bit Float, Big Endian	-5.0~5.0%RH	0
14	CO₂ compensation value	3/16	R/W	2	32 Bit Float, Big Endian	-300.0~300.0ppm	0

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