

SensorsX SX-GCO2NSA Series

Infrared Carbon Dioxide Gas Sensor

High Sensitivity | High Resolution | Low Power Consumption | Poisoning Resistant



0–100% Vol Measurement Range	UART / 0.4–2 V Output Signal	Ex ia I Ma Explosion Protection
3.6–5.5 V DC Supply Voltage	< 60 mA Average Current	T90 < 30 s Response Time

Carbon Dioxide Detection | NDIR Sensing | HVAC | Industrial Process | Agriculture

■ PRODUCT OVERVIEW

The SX-GCO2NSA Series is a compact NDIR carbon dioxide sensor for detecting CO₂ in air. It operates without oxygen dependency and integrates temperature compensation for stable long-term performance. The sensor combines infrared absorption measurement, micro-machined construction, and optimized circuit design to provide reliable CO₂ measurement in a compact package.



■ KEY FEATURES

◆ High Sensitivity & High Resolution Precise detection across the measurement range ◆ Multiple Output Options UART and analog voltage output available ◆ Excellent Stability Consistent long-term performance	◆ Low Power, Fast Response Quick response with low power consumption ◆ Temperature Compensation Built-in compensation with excellent linear output ◆ Poisoning & Humidity Resistant Resistant to water vapor interference and poisoning, long service life
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■ TYPICAL APPLICATIONS

Typical Applications

• HVAC & Indoor Air Quality Monitoring	• Industrial Process & Safety Monitoring	• Agriculture & Livestock Production Monitoring
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■ PERFORMANCE SPECIFICATIONS

General	
Model	SX-GCO2NSA
Detection Gas	Carbon dioxide (CO ₂)
Sensing Principle	Non-dispersive infrared (NDIR)
Measurement Range	0–100% Vol, selectable (see Range & Accuracy table below)
Timing	
Warm-up Time	1 min
Response Time	T90 < 30 s
Physical	
Dimensions	Ø20 mm × 21.4 mm (Ø0.787 in × 0.843 in)
Weight	35 g (1.23 oz)
Service Life	> 5 years

Range & Accuracy

Gas	Formula	Range	Resolution	Accuracy	Decimal Places
Carbon Dioxide	CO ₂	0–5000 ppm	10 ppm	±(50 ppm + 5% of reading)	None
Carbon Dioxide	CO ₂	0–5% Vol	0.01% Vol	±(0.05% Vol + 5% of reading)	2
Carbon Dioxide	CO ₂	0–10% Vol	0.01% Vol	±(0.05% Vol + 5% of reading)	2
Carbon Dioxide	CO ₂	0–20% Vol	0.1% Vol	±(0.05% Vol + 5% of reading)	2
Carbon Dioxide	CO ₂	0–50% Vol	0.1% Vol	±(0.05% Vol + 5% of reading)	2
Carbon Dioxide	CO ₂	0–100% Vol	0.1% Vol	±(0.05% Vol + 5% of reading)	2

All ranges include temperature compensation. Custom ranges available on request.

■ ELECTRICAL SPECIFICATIONS

Power	
Supply Voltage	3.6–5.5 V DC
Average Current	< 60 mA
Output Signal	
Interface Level	3.0 V
Output Type	UART and 0.4–2 V analog voltage
Intrinsic Safety Parameters	
Ui / Ii	5.5 V / 125 mA
Pi / Ci / Li	0.172 W / 10.92 µF / 0 µH

■ ENVIRONMENTAL SPECIFICATIONS

Temperature & Humidity	
Operating Temperature	-4 to +140 °F (-20 to +60 °C)
Operating Humidity	0–95% RH (non-condensing)
Ingress Protection	
Ingress Protection Rating	IP54 (IEC 60529)

■ COMMUNICATION PROTOCOLS

Modbus RTU (UART)

Parameter	Value
Communication Mode	Modbus RTU
Physical Interface	TTL232 (TTL-level UART)
Baud Rate	9600
Data Bits	8
Stop Bits	1
Parity	None
Default Address	0xFF

Supported function codes: 0x03 (Read Holding Registers) and 0x10 (Write Multiple Registers). CRC-16 checksum is appended to every frame.

Register Map

Register Address	Description	Count	Notes	Access
0x202B	Gas range	1	Gas measurement range	Read-only
0x2030	Gas unit	1	See unit code table below	Read/Write
0x2031	Decimal places	1	Range: 0–2	Read/Write
0x2011	Sensor address	1	Communication address range 0–254	Read/Write
0x6001	Concentration value	1	—	Read-only
0x4002–0x4006	Calibration points	1	Corresponds to calibration points 0–4	Read/Write
0x4008	Number of calibration points	1	Range: 0–5	Read/Write

Unit Codes

Code	Unit	Description
1	%LEL	Lower explosive limit
2	ppm	Parts per million (SI unit)
3	ppb	Parts per billion
4	%VOL	Percent by volume

■ CERTIFICATIONS & APPROVALS

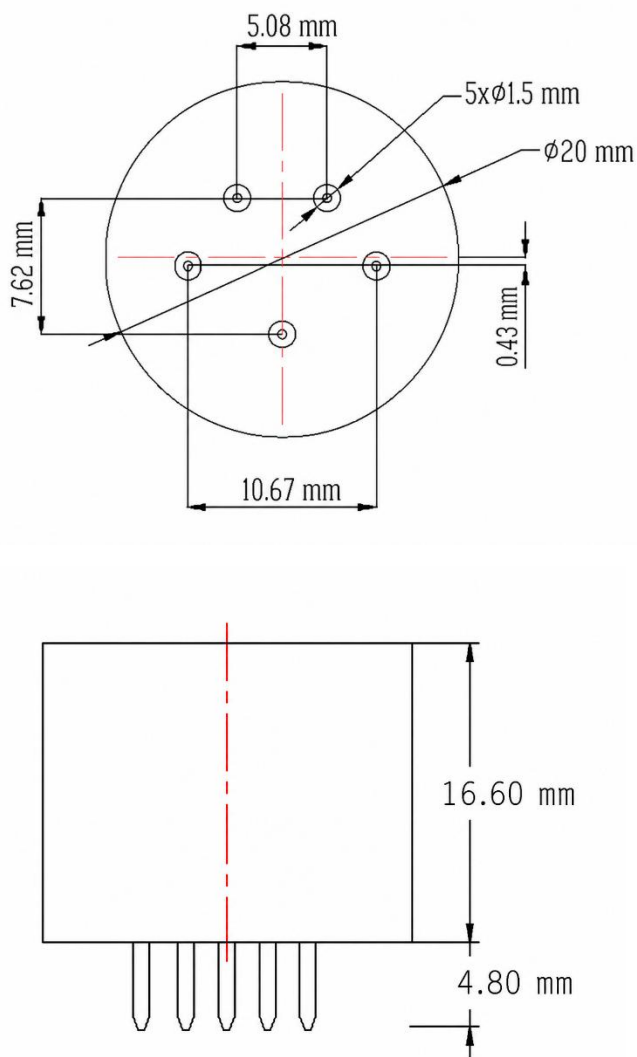
Explosion Protection	
Protection Type	Intrinsic Safety

Certification Mark

Ex ia I Ma

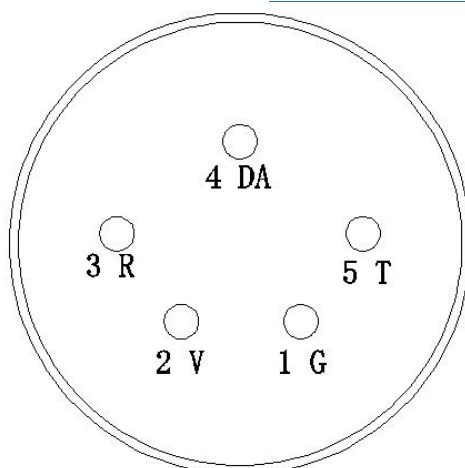
■ MECHANICAL DIMENSIONS

Sensor Outline Dimensions



Unless otherwise noted, housing dimension tolerances are ± 0.2 mm (± 0.008 in).

Pin Definitions

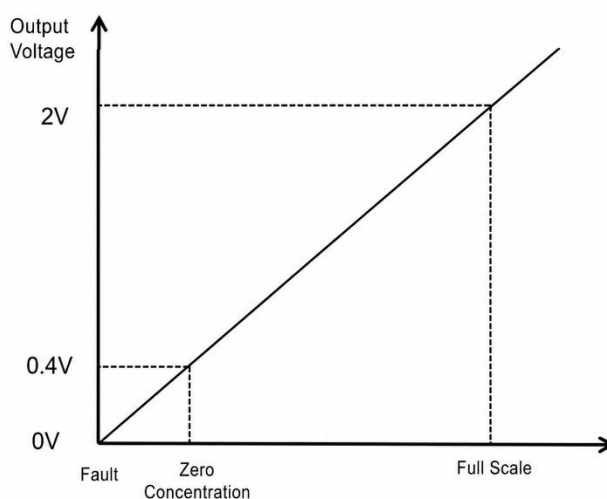


Pin	Name	Description
Pin 1	G	Voltage input, negative
Pin 2	V	Voltage input, positive
Pin 3	R (RXD)	Data input, 0–3.0 V
Pin 4	DA	Analog output, 0.4–2 V
Pin 5	T (TXD)	Data output, 0–3.0 V

■ WIRING DIAGRAM

Analog Voltage Output

The DA pin outputs a voltage in the range 0.4 V–2 V, corresponding to gas concentration from 0 to full scale. Connect the sensor Vin pin to 5 V and the GND pin to the power supply ground; connect the DA pin to the ADC input. After the warm-up period, the sensor outputs a voltage at the DA pin representing the gas concentration. During warm-up, the output voltage is 0.2 V; if a fault is detected, the output voltage is 0 V.



■ PRECAUTIONS

Intrinsic Safety / Explosion Protection

1. The sensor must be powered by an intrinsically safe power source; otherwise explosion-protection performance will be affected.

2. Do not replace the sensor in a hazardous location.
3. Do not disassemble or replace sensor components, as this may affect explosion-protection performance.
4. Do not modify components or structure, as this may affect explosion-protection performance.

Special Precautions

1. The sensor should be calibrated periodically; a calibration interval of 6 months is recommended.
2. Do not use the sensor for extended periods in environments with high dust density.
3. Use the sensor only within its rated supply voltage range.
4. Do not cut or solder the sensor pins.
5. Select a product with the appropriate measurement range for the specific application area and use case.

■ ORDERING INFORMATION — SX-GCO2NSA SERIES

Complete model number example: **SX-GCO2NSA-753**

Gas Range	
7	0–5000 ppm
8	0–5% Vol
9	0–10% Vol
A	0–20% Vol
B	0–50% Vol
C	0–100% Vol
Accuracy	
5	±50 ppm + 5% of reading <i>[Requires Gas Range = 7 (0–5000 ppm)]</i>
6	±0.05% Vol + 5% of reading <i>[Requires Gas Range = 8, 9, A, B, or C (any range except 0–5000 ppm)]</i>
Output	
3	UART and 0.4–2 V analog voltage
Customized	
D	Customized — specify requirements when ordering

Ordering Example:

SX-GCO2NSA-753 = 0–5000 ppm range, ±50 ppm + 5% of reading accuracy, UART and 0.4–2 V analog output.