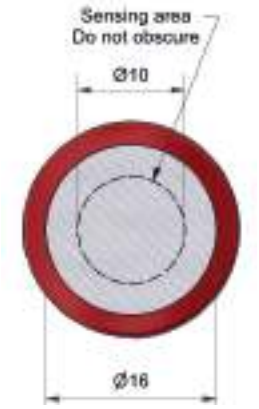
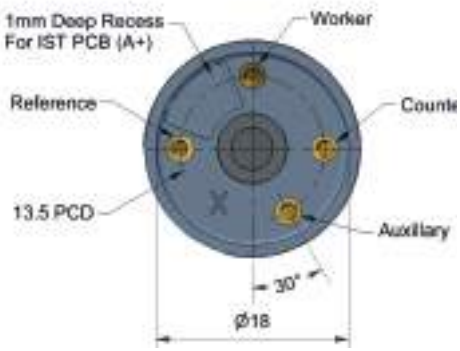
SO2-A4/SO2-A4+ Sulfur Dioxide Sensor

The SO2-A4 sensor is a PPB sensor that is designed for industrial safety and environmental air quality applications with best-in-class baseline stability. The A series is the most widely used sensor format for portable gas detection applications. This product is available in our standard format (SO2-A4) and with our patented Integrated Smart Technology (SO2-A4+) that has an IST board with a memory chip and temperature sensor integrated in the sensor. The + sensors store specific calibration, specification, and identification data on every sensor allowing plug and play operation. The on-board temperature sensor improves the accuracy and simplicity of temperature compensation algorithms.

SO2-A4 Sulfur Dioxide Sensor – 4-Electrode



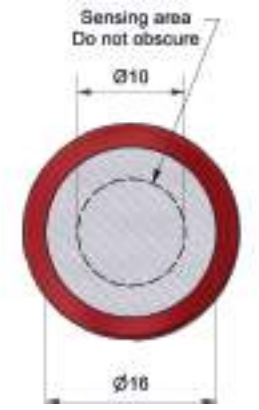
Top View



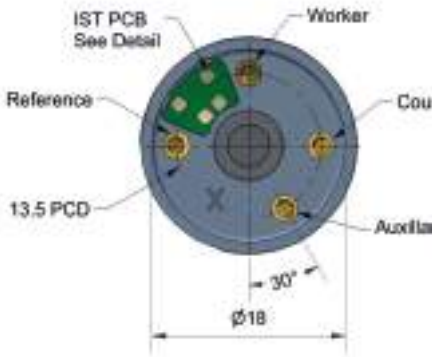
Bottom View

Side View

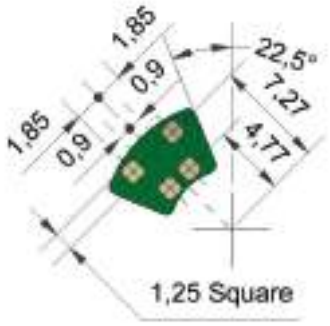
SO2-A4+ Sulfur Dioxide Sensor – 4-Electrode (with Integrated Smart Technology)



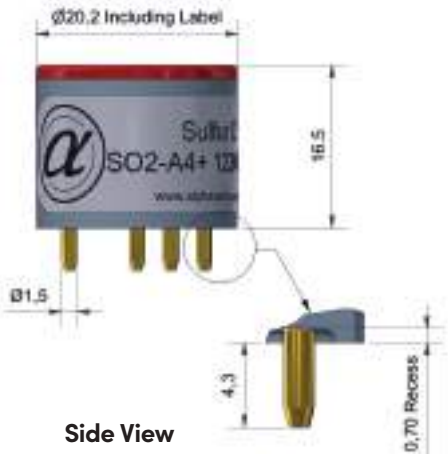
Top View



Bottom View



IST Board



Side View

Dimensions are in millimetres (± 0.15 mm).

Sensor Data

Performance	Sensitivity	nA/ppm at 2ppm SO_2		320 to 500
	Response time	t90 (s) from zero to 2ppm SO_2		< 20
	Zero current	nA in zero air at 20°C		-80 to +80
	Noise*	±2 standard deviations (ppb equivalent)		15
	Range	ppm limit of performance warranty		50
	Linearity	ppb error at 20ppm SO_2, linear at zero and 2ppm SO_2		0 to -5
	Overgas limit	maximum ppm for stable response to gas pulse		100
	***Tested with Alphasense AFE low noise circuit**			
Lifetime	Zero drift	ppb equivalent change/year in lab air		< ± 20
	Sensitivity drift	% change/year in lab air, monthly test		< ± 15
	Operating life	months until 50% original signal (24-month warranted)		> 36
Environmental	Sensitivity @ -20°C	% (output @ -20°C/output @ 20°C) @ 2ppm SO_2		80 to 95
	Sensitivity @ 50°C	% (output @ 50°C/output @ 20°C) @ 2ppm SO_2		90 to 110
	Zero @ -20°C	nA change from 20°C		< ± 25
	Zero @ 50°C	nA change from 20°C		150 to 300
Cross Sensitivity	Filter capacity	ppm hrs		450
	H_2S sensitivity	% measured gas @ 5ppm	H_2S	< 2
	NO_2 sensitivity	% measured gas @ 5ppm	NO_2	< -120
	Cl_2 sensitivity	% measured gas @ 5ppm	Cl_2	< -80
	NO sensitivity	% measured gas @ 5ppm	NO	< 4
	CO sensitivity	% measured gas @ 5ppm	CO	< 3
	H_2 sensitivity	% measured gas @ 100ppm	H_2	< 1
	C_2H_4 sensitivity	% measured gas @ 100ppm	C_2H_4	< 1
	NH_3 sensitivity	% measured gas @ 20ppm	NH_3	< 0.1
	CO_2 sensitivity	% measured gas @ 5%	CO_2	< 0.1
	O_3 sensitivity	% measured gas @ 0.5ppm	O_3	< -120
Key Specifications	Temperature range	°C		-30 to 50
	Pressure range	kPa		80 to 120
	Humidity range	% rh continuous		15 to 90
	Storage period	months @ 3 to 20°C (stored in sealed pot)		6
	Load resistor	Ω (recommended)		10 to 47
	Weight	g		< 13

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For further information on the performance of this sensor, on other sensors in the range or any other subject, please contact Alphasense Ltd. or visit our website at "www.alphasense.com".

Figure 1 Sensitivity Temperature Dependence

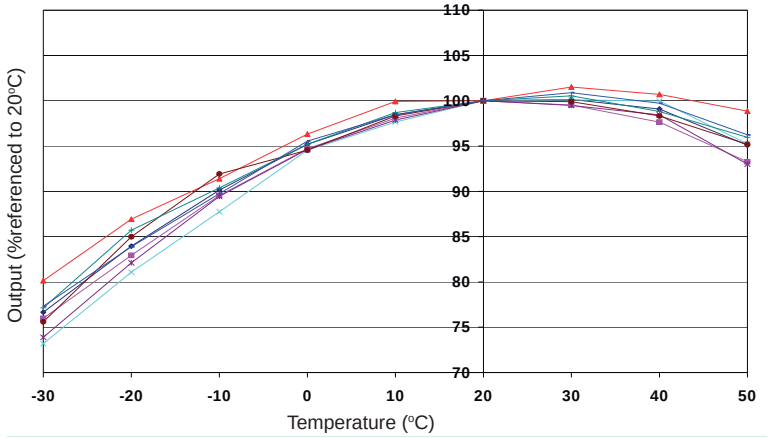

Figure 1 shows the temperature dependence of sensitivity at 2ppm SO_2.

This data is taken from a typical batch of sensors.

Figure 2 Zero Temperature Dependence

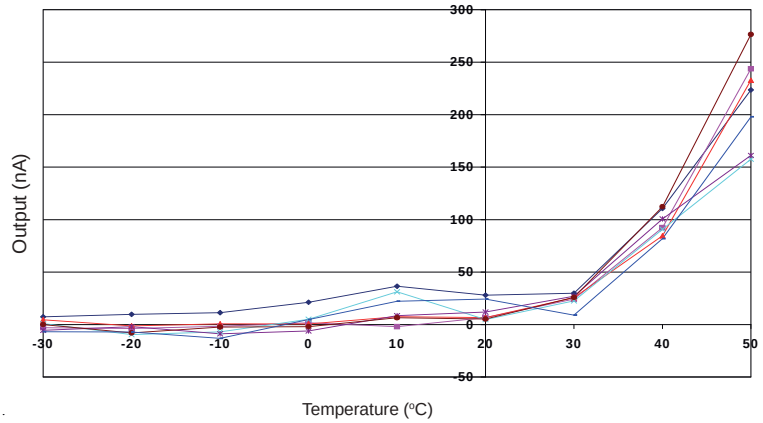

Figure 2 shows the variation in zero output of the working electrode caused by changes in temperature, expressed as nA.

This data is taken from a typical batch of sensors.

Contact Alphasense for futher information on zero current correction.

Figure 3 Response to 200ppb SO_2

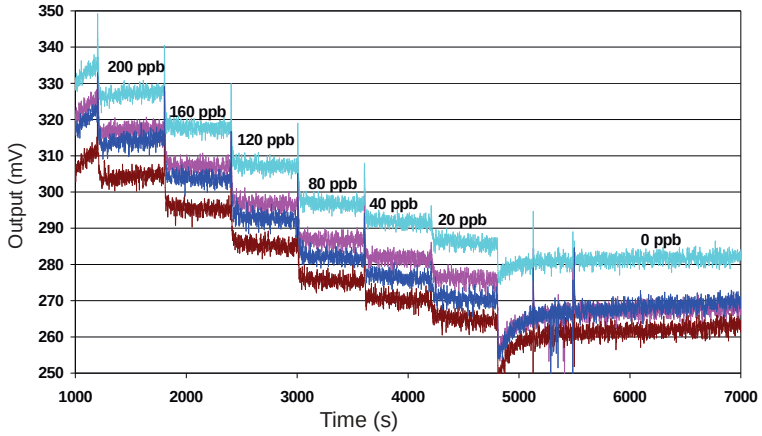

Figure 3 shows response from 20 to 200ppb SO_2.

Use of Alphasense AFE circuit reduces noise to 15ppb, with the opportunity of digital smoothing to reduce noise even further.

IST Board Data

Interface	Communication Bus	Compatible with the 400 kHz I²C protocol
	Max. Bus Speed	Up to 1 MHz
	Input Logic Levels	High (Recessive) < 2.3 V | Low (Dominant) < 0.2 V
	Absolute Max. Input Signal	3.6 V
Electrical	Supply Voltage Range	1.7 V to 3.6 V
	Supply current – Stand-By	< 5 µA
	Supply current – Operating	< 0.15 mA (temperature reading only) < 2.15 mA (temperature reading + memory reading/writing)
	Power Supply Conditioning	Built-In 100 nF decoupling capacitor
	ESD Protection	4 kV (human body model) - Enhanced ESD / Latch-Up protection
	Bus Pins Input Capacitance	15 pF max.
Performance	Operational Temperature	–40 °C to +85 °C
	Temperature Sensor Accuracy	±1°C (-0°C to +70°C)
	Memory Data Retention	> 200 years
	Memory Write Cycles	> 4,000,000
Data & Communication	Memory IC & I2C Address	M24128X-FCU | Device Address: R - 0xA0 / W – 0xA1
	Temperature IC & I2C Address	MAX31875R0TZS+T | Device Address: R - 0x90 / W – 0x91
	Product Data Start Address	0x0900
	Calibration Data Start Address	0x0B00
	User Data Area	0x0D00 – 0x18FF (3,072 Bytes)
	CRC Polynomial	0x 01 04C1 1DB7
	Digital Signature Algorithm	SHA-256

Factory-populated data

Product Data
Data Format Version
Customer (OEM) ID
Product ID
Type of Sensor / Target Gas
Sensor Serial Number
End of Storage Period Date
Sensor Replacement Date
Product Data Checksum
Alphasense Digital Signature
Customer Digital Signature

Calibration
Calibration Data Units
Zero (clean dry air) Output
Calibration Span
Calibration Output
Sensitivity
Calibration Date
Calibration Data Checksum
Calibration Data Signature

Sensor Specification
Over-gas limit
Concentration Range
Temperature Range Low
Temperature Range High
Humidity Range Low
Humidity Range High
Pressure Range Low
Pressure Range High
Specification Checksum

15,000+ locations

Customer Specific
Custom Parameters
Re-Calibration Due Date
Operational Limits:
Low | High | STEL | TWA
Next Bump Test Due Date
User Data Area

Note: Above 85% rh and 40°C a maximum continuous exposure period of 10 days is warranted. Where such exposure occurs the sensor will recover normal electrolyte volumes when allowed to rest at lower % rh and temperature levels for several days.

At the end of the product's life, do not dispose of any electronic sensor, component or instrument in the domestic waste, but contact the instrument manufacturer, Alphasense or its distributor for disposal instructions. NOTE: all sensors are tested at ambient environmental conditions unless otherwise stated. As applications of use are outside our control, the information provided is given without legal responsibility. Customers should test under their own conditions, to ensure that the sensors are suitable for their own requirements.

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For further information on the performance of this sensor, on other sensors in the range or any other subject, please contact Alphasense Ltd. or visit our website at "www.alphasense.com".