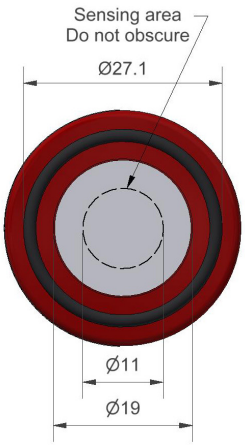
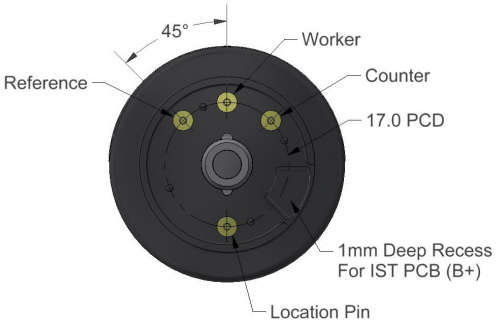
SO2-BE/SO2-BE+ Sulfur Dioxide Sensor, High Concentration

The SO2-BE sensor is a PPM sensor that is designed for a broad variety of applications and instrumentation including portable gas detectors and fixed gas detection systems for industrial safety, environmental air quality and process control. This product is available in our standard format (SO2-BE) and with our patented Integrated Smart Technology (SO2-BE+) 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.

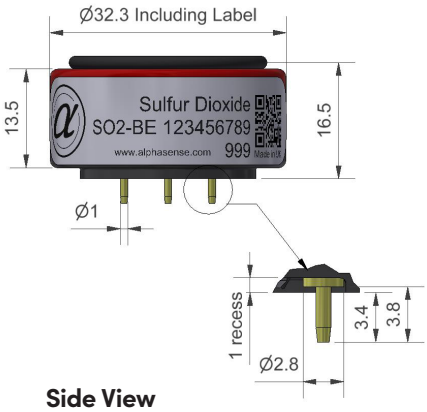
SO2-BE Sulfur Dioxide Sensor, High Concentration – 3-Electrode



Top View

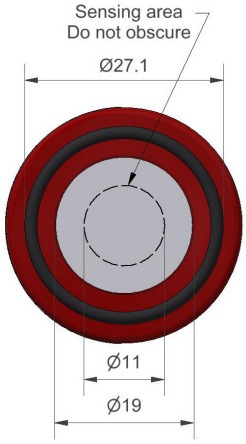


Bottom View

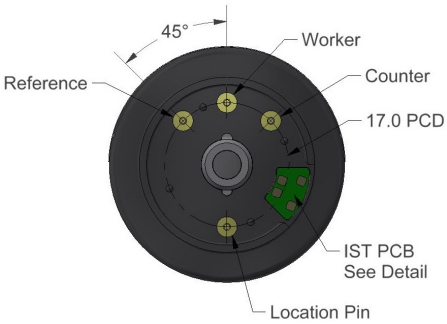


Side View

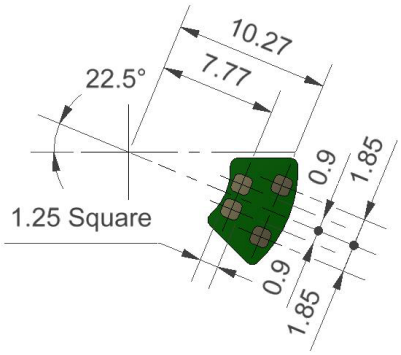
SO2-BE+ Sulfur Dioxide Sensor, High Concentration – 3-Electrode (with Integrated Smart Technology)



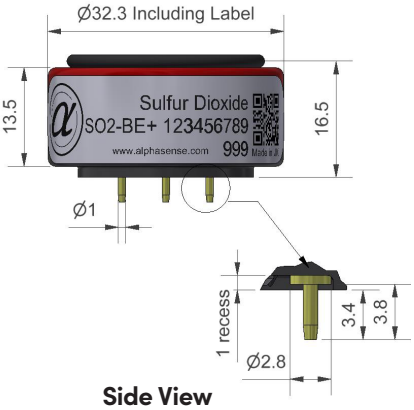
Top View



Bottom View



IST Board



Side View

B+ SERIES

INTEGRATED SMART TECHNOLOGY

Dimensions are in millimetres (± 0.15 mm).

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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".

Sensor Data

Performance	Sensitivity	nA/ppm in 20ppm SO_2	70 to 110
	Response time	t_{90} (s) from zero to 20ppm SO_2	< 30
	Zero current (typical)	ppm equivalent in zero air	< ±2
	Resolution	RMS noise (ppm equivalent)	< 2
	Range	ppm limit of performance warranty	2000
	Linearity	ppm error at full scale, linear at zero and 20ppm SO_2	nd
	Overgas limit	maximum ppm for stable response to gas pulse	10,000
Lifetime	Zero drift	ppm equivalent change/year in lab air	nd
	Sensitivity drift	% change/year in lab air, monthly test	nd
	Operating life	months until 80% original signal (24 month warranted)	> 24
Environmental	Sensitivity @ -20°C	% (output @ -20°C/output @ 20°C) @ 20ppm	80 to 90
	Sensitivity @ 50°C	% (output @ 50°C/output @ 20°C) @ 20ppm	95 to 105
	Zero @ -20°C	ppm equivalent change from 20°C	< ±1
	Zero @ 50°C	ppm equivalent change from 20°C	< -1 to 10
Cross sensitivity	Filter capacity	ppm·hrs H_2S	4000
	H_2S sensitivity	% measured gas @ 20ppm H_2S	< 2
	NO_2 sensitivity	% measured gas @ 10ppm NO_2	< -180
	Cl_2 sensitivity	% measured gas @ 10ppm Cl_2	< 35
	NO sensitivity	% measured gas @ 50ppm NO	< -30
	CO sensitivity	% measured gas @ 400ppm CO	< 8
	H_2 sensitivity	% measured gas @ 400ppm H_2	< 1.5
	C_2H_4 sensitivity	% measured gas @ 400ppm C_2H_4	< 0.1
	NH_3 sensitivity	% measured gas @ 20ppm NH_3	< 0.1
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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Figure 1 Sensitivity Temperature Dependence

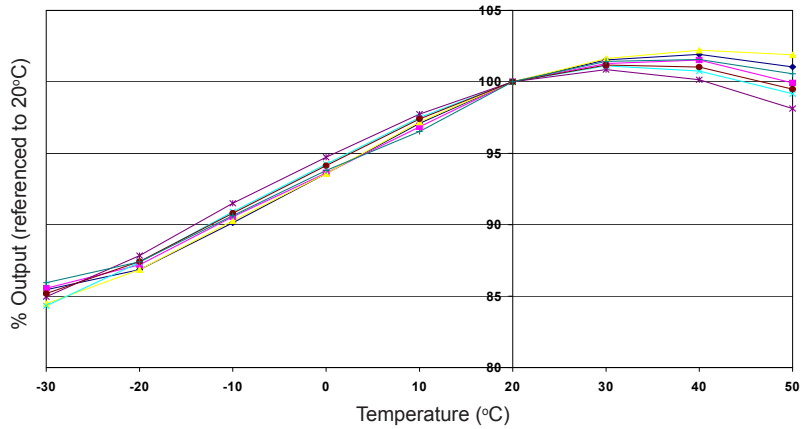


Figure 1 shows the variation in sensitivity caused by changes in temperature.

This data is taken from a typical batch of sensors.

Figure 2 Zero Temperature Dependence

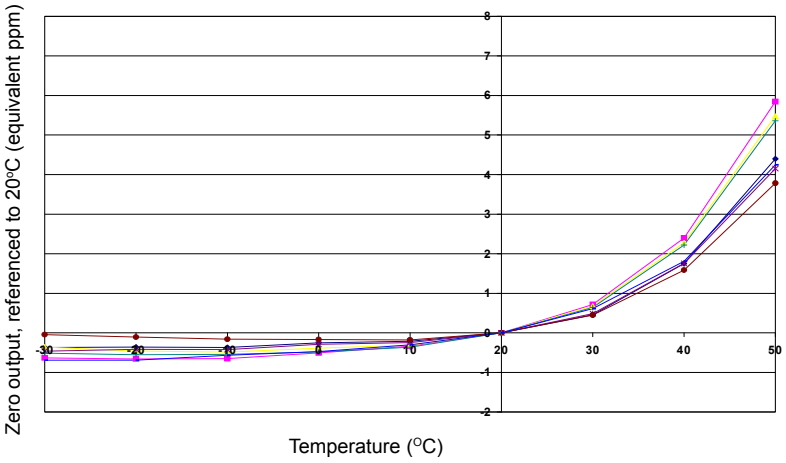
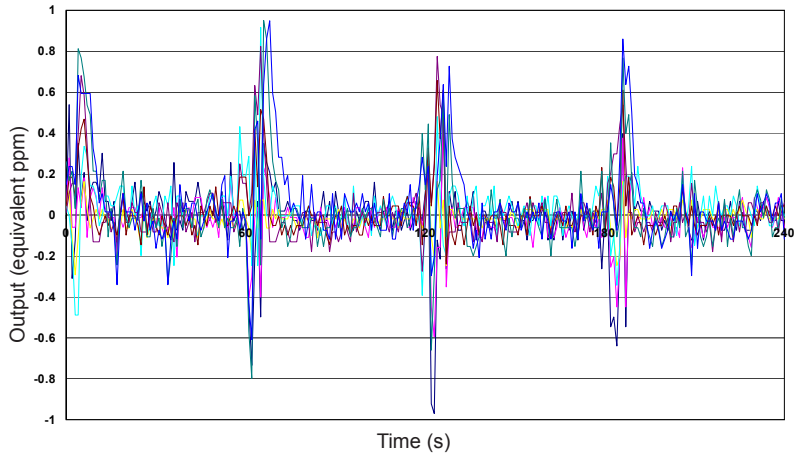


Figure 2 shows the variation in zero output caused by changes in temperature, expressed as ppm gas equivalent, referenced to zero at 20°C.

This data is taken from a typical batch of sensors.

Figure 3 Response breath test



Simply breathing on a sensor causes both temperature and humidity transients.

The SO2-BE recovers rapidly, returning to zero after four consecutive breaths.

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, with 10 ohm load resistor, 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.

In the interest of continued product improvement, we reserve the right to change design features and specifications without prior notification. The data contained in this document is for guidance only. Alphasense Ltd accepts no liability for any consequential losses, injury or damage resulting from the use of this document or the information contained within.(©ALPHASENSE LTD) Doc. Ref. SO2-BE/FEB24

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