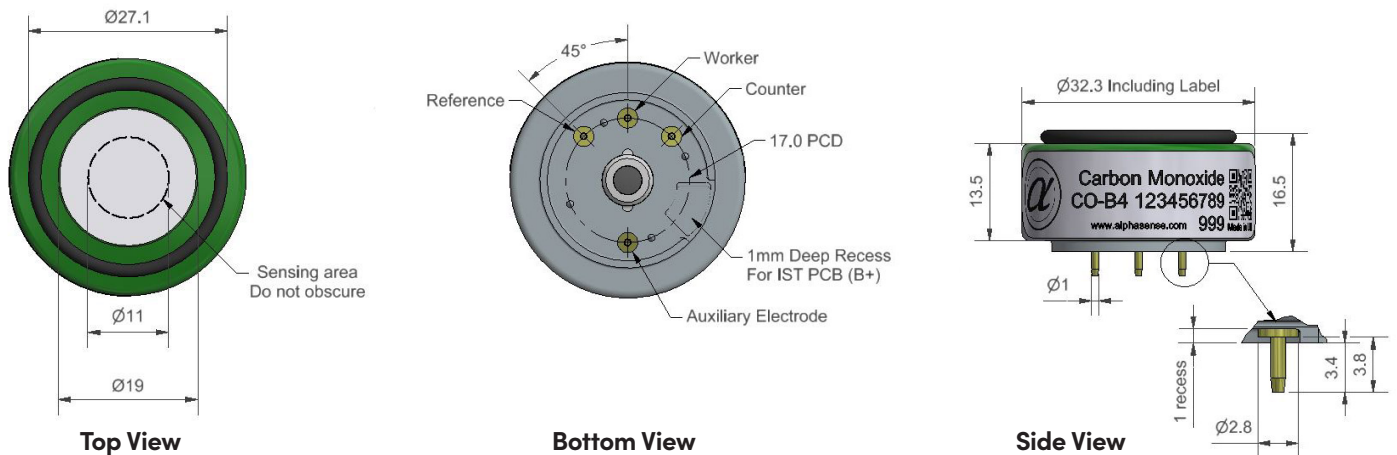


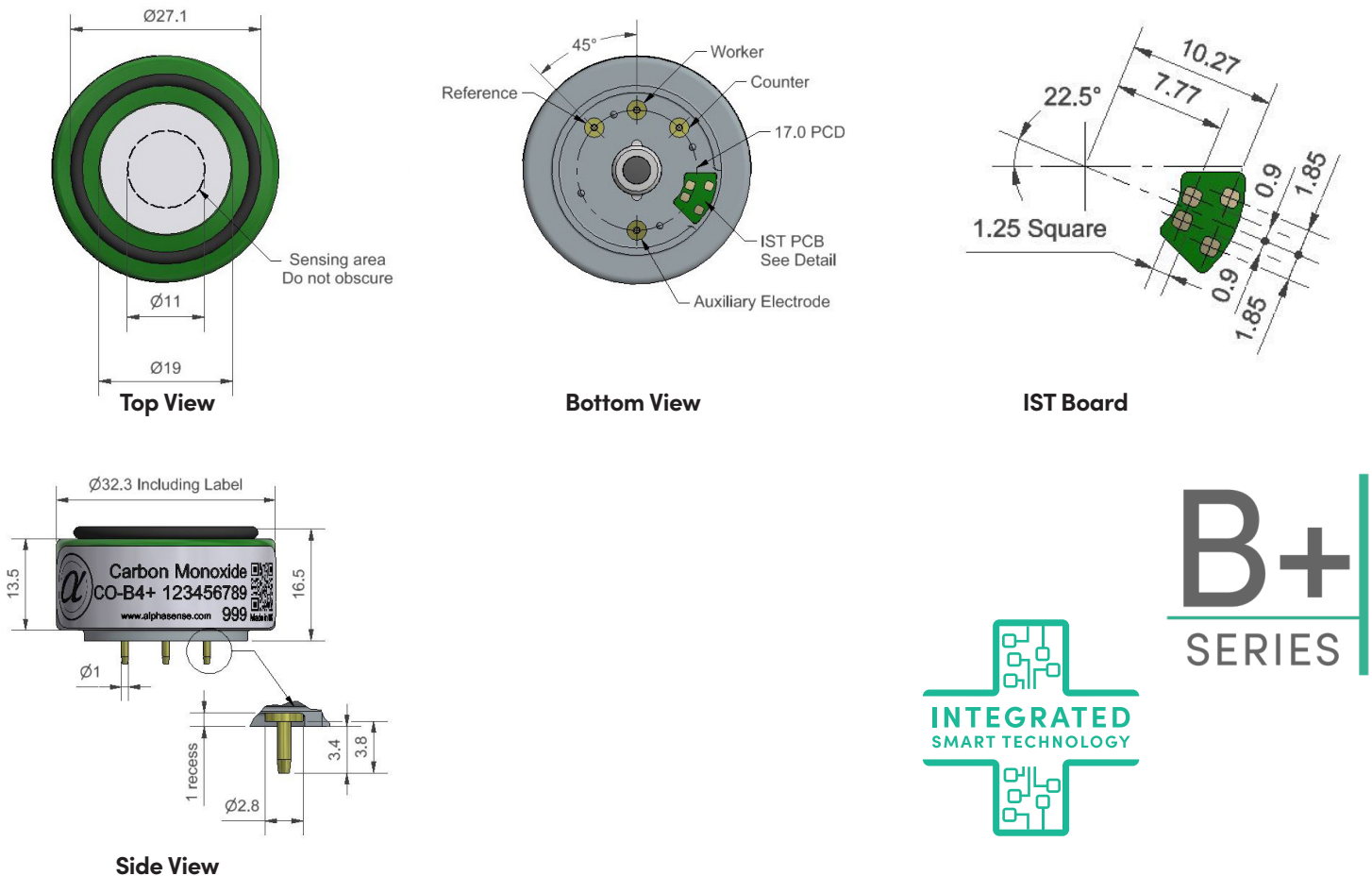
CO-B4/CO-B4+ Carbon Monoxide Sensor

The CO-B4 sensor is a PPB sensor that is designed for environmental air quality applications with best-in-class baseline stability. This product is available in our standard format (CO-B4) and with our patented Integrated Smart Technology (CO-B4+) 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.

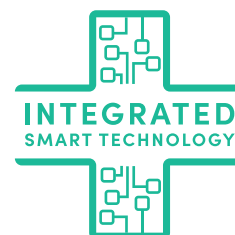
CO-B4 Carbon Monoxide Sensor – 4-Electrode



CO-B4+ Carbon Monoxide Sensor – 4-Electrode (with Integrated Smart Technology)



Dimensions are in millimetres (± 0.15 mm).



B+
SERIES

Sensor Data

Performance	Sensitivity	nA/ppm in 2ppm CO	420 to 650
	Response time	t90 (s) from zero to 10ppm CO	< 30
	Zero current	nA in zero air at 20°C	+30 to -250
	Noise*	± 2 standard deviations (ppb equivalent)	4
	Range	ppm limit of performance warranty	1000
	Linearity	ppb CO error at full scale, linear at zero, 500ppm CO	20 to 35
	Overgas limit	maximum ppm for stable response to gas pulse	2000
*Tested with Alphasense ISB low noise circuit			

Lifetime	Zero drift	ppb equivalent change/year in lab air	< ± 100
	Sensitivity drift	% change/year in lab air, monthly test	< 10
	Operating life	months until 50% original signal (24-month warranted)	> 36

Environmental	Sensitivity @ -20°C	(% output @ -20°C/output @ 20°C) @ 5ppm CO	40 to 70
	Sensitivity @ 50°C	(% output @ 50°C/output @ 20°C) @ 5ppm CO	110 to 125
	Zero @ -20°C	nA	-30 to +30
	Zero @ 50°C	nA	-50 to -200

Cross-sensitivity	Filter capacity	ppm-hrs	H ₂ S	250,000
	H ₂ S sensitivity	% measured gas @ 5ppm	H ₂ S	< 1
	NO ₂ sensitivity	% measured gas @ 5ppm	NO ₂	< 1
	Cl ₂ sensitivity	% measured gas @ 5ppm	Cl ₂	< 1
	NO sensitivity	% measured gas @ 5ppm	NO	< -3
	SO ₂ sensitivity	% measured gas @ 5ppm	SO ₂	< 0.1
	H ₂ sensitivity	% measured gas @ 100ppm	H ₂ @ 20°C	< 50
	C ₂ H ₄ sensitivity	% measured gas @ 100ppm	C ₂ H ₄	< 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 (ISB circuit is recommended)	33 to 100
	Weight	g	< 13

Figure 1 Sensitivity Temperature Dependence

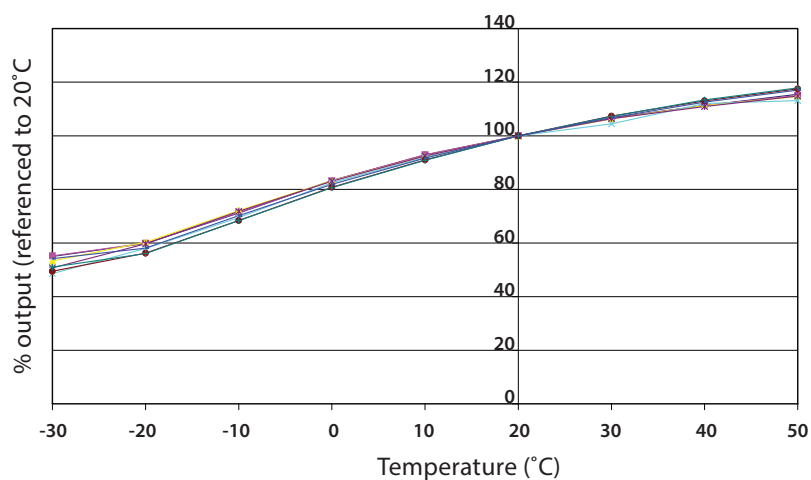


Figure 1 shows the temperature dependence of sensitivity at 2ppm CO.
This data is taken from a typical batch of sensors.

Figure 2 Zero Current Temperature Dependence (corrected)

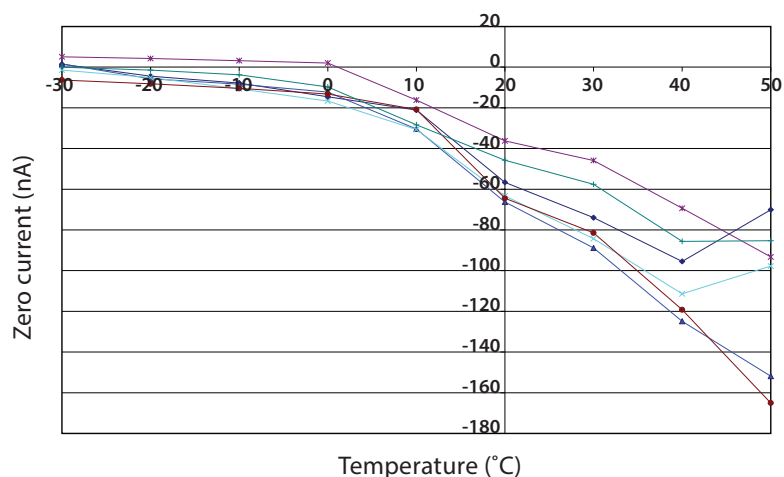


Figure 2 shows the variation in zero output of the working electrode caused by changes in temperature, expressed as nA.
This data is taken from a typical batch of sensors.
Contact Alphasense for further information on zero current correction.

Figure 3 Response from 0 to 1ppm CO

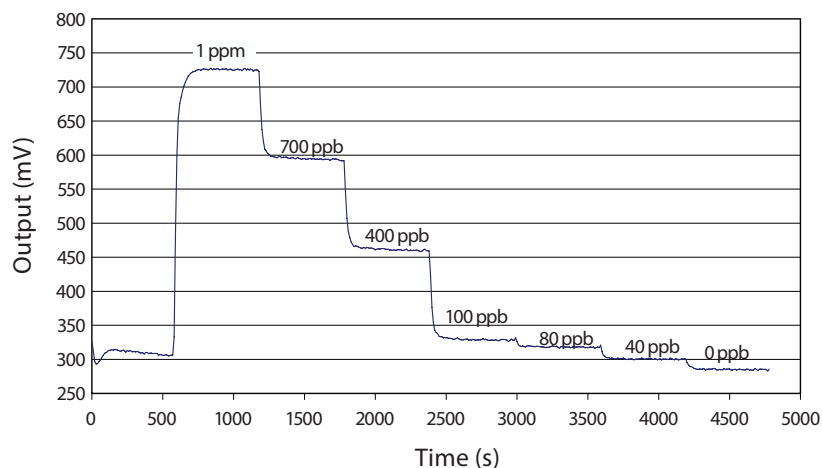


Figure 3 shows response from 0 to 1ppm CO.
Use of Alphasense ISB circuit reduces noise to 4ppb, with the opportunity of digital smoothing to reduce noise even further.

IST Board Data

Interface

Communication Bus	Compatible with the 400 kHz I ² C 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

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.

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. CO-B4/FEB24