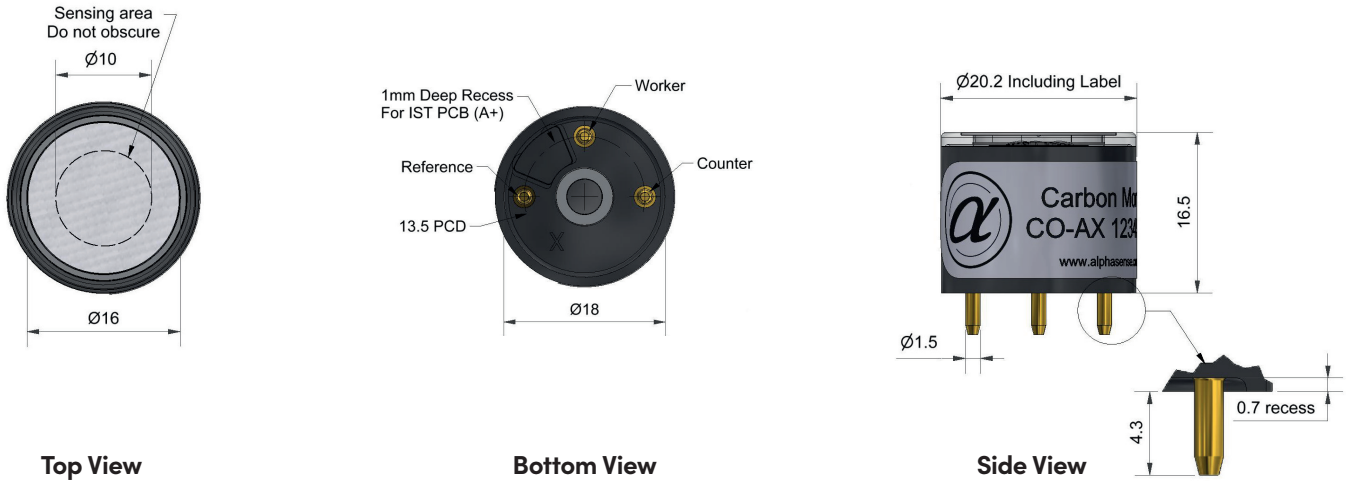


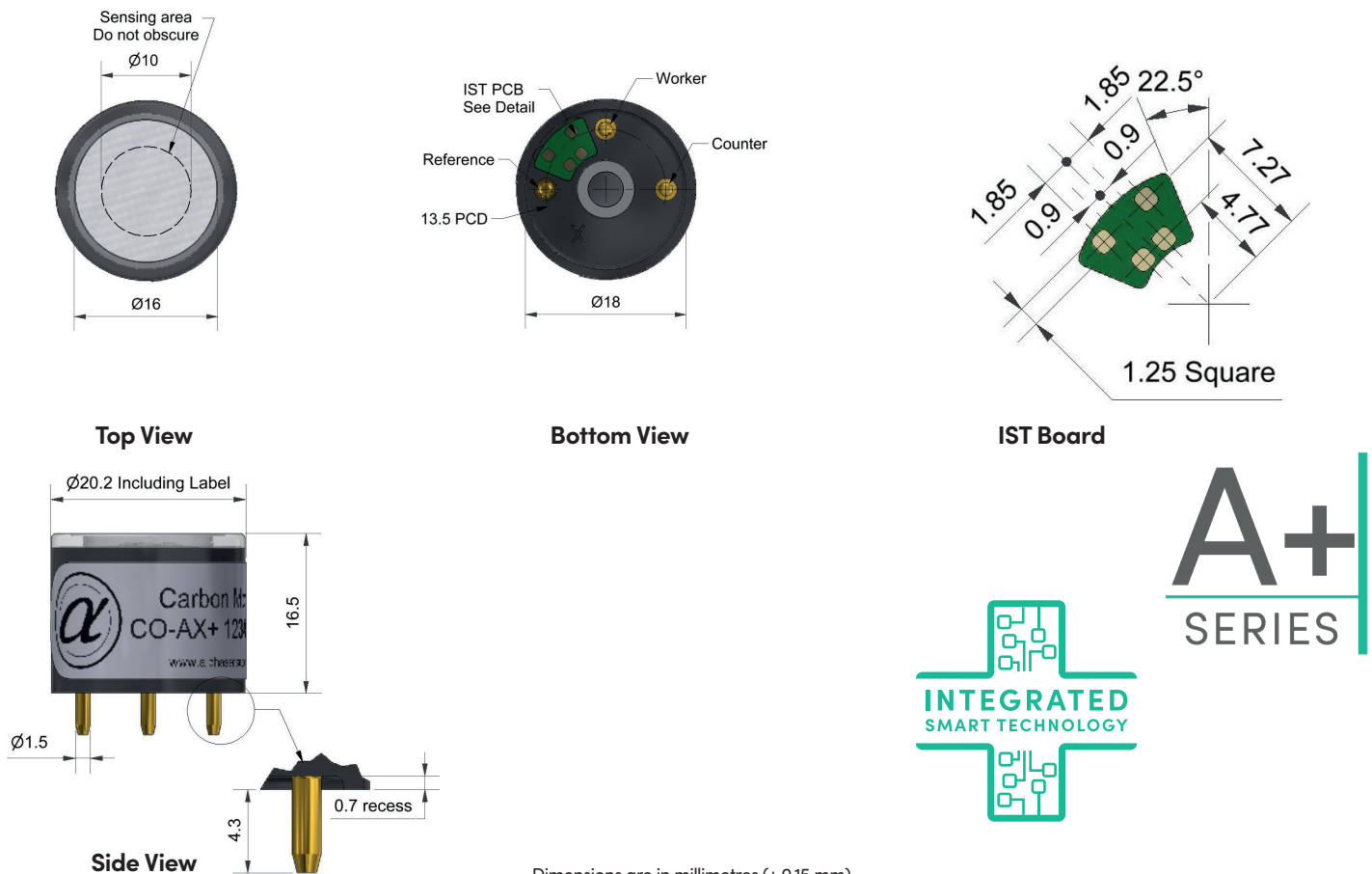
CO-AX/CO-AX+ Carbon Monoxide Sensor – Low Hydrogen Cross Sensitivity

The CO-AX 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 analysis and process control. The A series is the most widely used sensor format for portable gas detection applications. It is available in our standard format (CO-AX) and with our patented Integrated Smart Technology (CO-AX+) 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-AX Carbon Monoxide Sensor – Low Hydrogen Cross Sensitivity – 3-Electrode



CO-AX+ Carbon Monoxide Sensor – Low Hydrogen Cross Sensitivity – 3-Electrode (with Integrated Smart Technology)



Dimensions are in millimetres (± 0.15 mm).

Sensor Data

Performance	Sensitivity	nA/ppm in 400ppm CO	55 to 100	
	Response time	t90 (s) from zero to 400ppm CO	< 30	
	Zero current (typical)	ppm equivalent in zero air	< ± 3	
	Resolution	RMS noise (ppm equivalent)	< 0.5	
	Range	ppm CO limit of performance warranty	2,000	
	Linearity	ppm error at full scale, linear at zero and 800ppm CO	< ± 40	
	Overgas limit	maximum ppm for stable response to gas pulse	4,000	
Lifetime	Zero drift	ppm equivalent change/year in lab air	< 0.2	
	Sensitivity drift	% change/year in lab air, monthly test	< 6	
	Operating life	months until 80% original signal (24-month warranted)	> 24	
Environmental	Sensitivity @ -20°C	(% output @ -20°C/output @ 20°C) @ 400ppm CO	55 to 75	
	Sensitivity @ 0°C	(% output @ 0°C/output @ 20°C) @ 400ppm CO	75 to 90	
	Sensitivity @ 40°C	(% output @ 40°C/output @ 20°C) @ 400ppm CO	106 to 120	
	Zero @ -20°C	ppm equivalent change from 20°C	< 0 to 4	
	Zero @ 0°C	ppm equivalent change from 20°C	< 0 to 3	
	Zero @ 50°C	ppm equivalent change from 20°C	< 0 to -6	
Cross Sensitivity	Filter capacity	ppm-hrs	H ₂ S	250,000
	Filter capacity	ppm-hrs	NO ₂	500,000
	Filter capacity	ppm-hrs	NO	20,000
	Filter capacity	ppm-hrs	SO ₂	250,000
	H ₂ sensitivity	% measured gas @ 900ppm	H ₂ in 900ppm CO @ 10°C	< 2
	H ₂ sensitivity	% measured gas @ 900ppm	H ₂ in 900ppm CO @ 20°C	< 4
	H ₂ sensitivity	% measured gas @ 900ppm	H ₂ in 900ppm CO @ 30°C	< 6
	NO ₂ sensitivity	% measured gas @ 10ppm	NO ₂	< -1
	Cl ₂ sensitivity	% measured gas @ 10ppm	Cl ₂	< 0.1
	NO sensitivity	% measured gas @ 500ppm	NO	< -2
	SO ₂ sensitivity	% measured gas @ 20ppm	SO ₂	< 0.1
	C ₂ H ₄ sensitivity	% measured gas @ 400ppm	C ₂ H ₄	< 5
	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 @ 0 to 20°C (stored in sealed pot)	6	
	Load resistor	Ω (recommended)	10 to 47	
	Weight	g	< 6	

Figure 1 CO Sensitivity Temperature Dependence

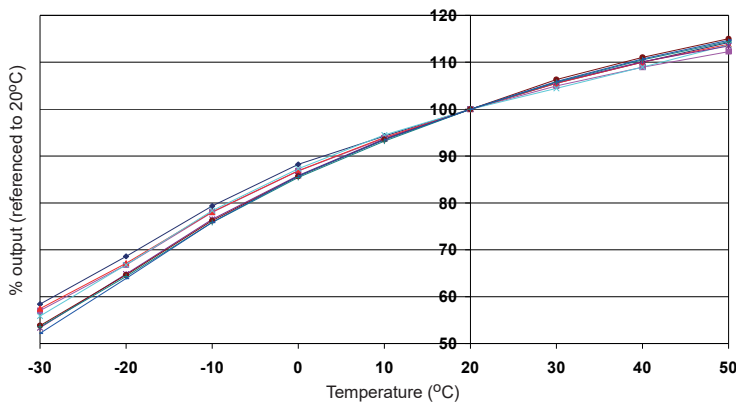


Figure 1 shows the variation in sensitivity caused by changes in temperature.

This data is taken from a typical batch of sensors.

Figure 2 Hydrogen Sensitivity Temperature Dependence

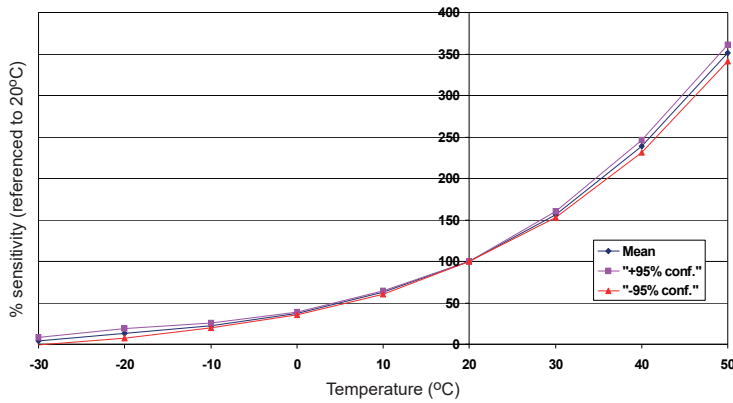


Figure 2 shows the strong temperature dependence of the CO-AX to hydrogen. Since hydrogen sensitivity is less than 4% at 20°C, hydrogen interference can practically be ignored at low temperatures.

However, at 50°C hydrogen interference is 14%.

This data is taken from a typical batch of sensors.

The mean and ±95% confidence intervals are shown.

Figure 3 Hydrogen Cross Sensitivity at 30°C

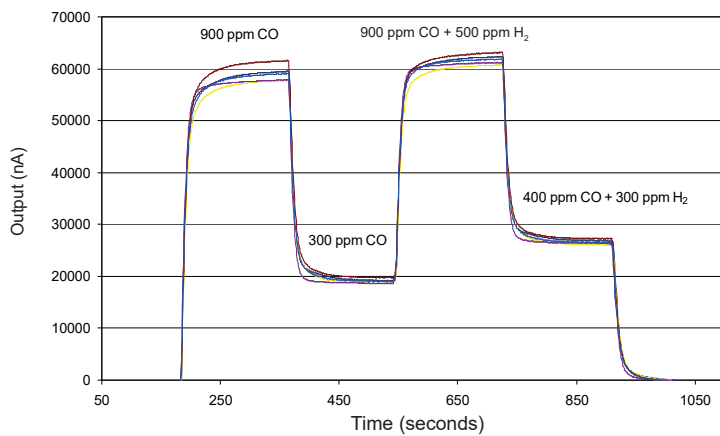


Figure 3 shows hydrogen sensitivity for a typical batch of eight CO-AX sensors at 30°C following EN50379. All sensors show less than 5% cross sensitivity when 500ppm hydrogen is added to 950ppm carbon monoxide. t_{90} is less than 45 seconds.

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

Important. The CO-AX must be operated with a 0 Volt bias between Reference & Working electrodes. Failure to comply with this requirement will result in a loss of its low Hydrogen cross sensitivity performance.

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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