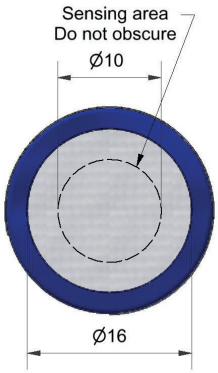
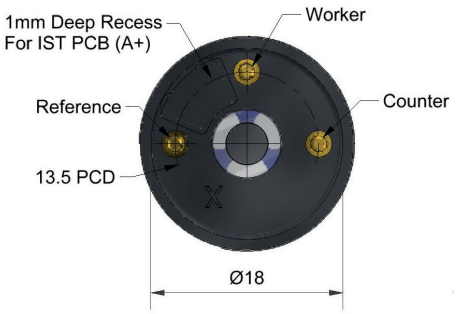
NO2-A1/NO2-A1+ Nitrogen Dioxide Sensor

The NO2-A1 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 (NO2-A1) and with our patented Integrated Smart Technology (NO2-A1+) 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.

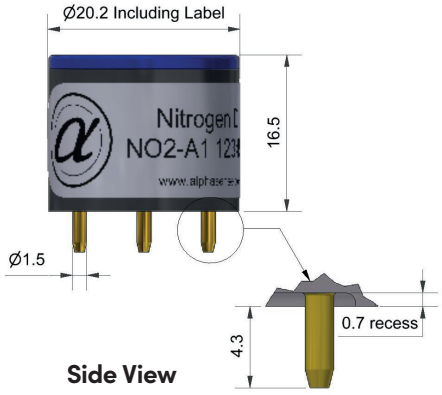
NO2-A1 Nitrogen Dioxide Sensor – 3-Electrode



Top View

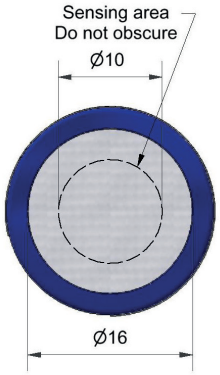


Bottom View

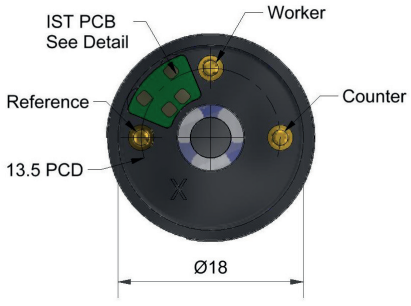


Side View

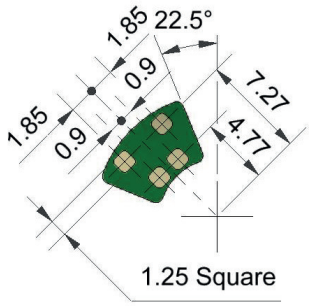
NO2-A1+ Nitrogen Dioxide Sensor – 3-Electrode (with Integrated Smart Technology)



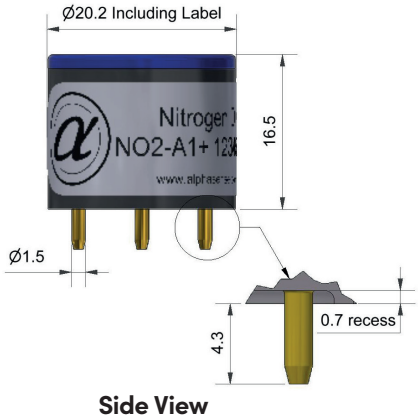
Top View



Bottom View



IST Board



Side View

A+ SERIES

INTEGRATED SMART TECHNOLOGY

Dimensions are in millimetres (± 0.15 mm).

T: +44 (0)1376 556700 **E:** sensors.alphasense@ametek.com **W:** www.alphasense.com

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 10ppm NO_2		-250 to -650
	Response time	t90 (s) from zero to 10ppm NO_2 (33Ω Load Resistor)		< 50
	Zero current	ppm equivalent in zero air		< ± 0.4
	Resolution	RMS noise (ppm equivalent) (33Ω Load Resistor)		< 0.02
	Range	ppm NO_2 limit of performance warranty		20
	Linearity	ppm error at full scale, linear at zero and 10ppm		< 1.5
	Overgas limit	NO_2 maximum ppm for stable response to gas pulse		100
Lifetime	Zero drift	ppm equivalent change/year in lab air		< 0.05
	Sensitivity drift	% change/year in lab air, monthly test		< -20 to -40
	Operating life	months until 80% original signal (24-month warranted)		> 24
Environmental	Sensitivity @ -20°C	% (output @ -20°C/output @ 20°C) @ 5ppm NO_2		73 to 94
	Sensitivity @ 50°C	% (output @ 50°C/output @ 20°C) @ 5ppm NO_2		105 to 125
	Zero @ -20°C	ppm equivalent change from 20°C		< ± 0.2
	Zero @ 50°C	ppm equivalent change from 20°C		< 0 to -0.5
Cross-sensitivity	H_2S sensitivity	% measured gas @ 20ppm	H_2S	< -35
	Cl_2 sensitivity	% measured gas @ 10ppm	Cl_2	< 80
	NO sensitivity	% measured gas @ 50ppm	NO	< 5
	SO_2 sensitivity	% measured gas @ 20ppm	SO_2	< -15
	CO sensitivity	% measured gas @ 400ppm	CO	< 0.1
	H_2 sensitivity	% measured gas @ 400ppm	H_2	< 0.1
	C_2H_4 sensitivity	% measured gas @ 50ppm	C_2H_4	< 0.1
	NH_3 sensitivity	% measured gas @ 20ppm	NH_3	< 0.1
	CO_2 sensitivity	% measured gas @ 5% volume	CO_2	< 0.1
	O_3 sensitivity	% measured gas @ 200ppb	O_3	< 120
Key Specifications	Temperature range	°C		-20 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 (for optimum performance)		33
	Weight	g		< 6

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Figure 1 Sensitivity Temperature Dependence

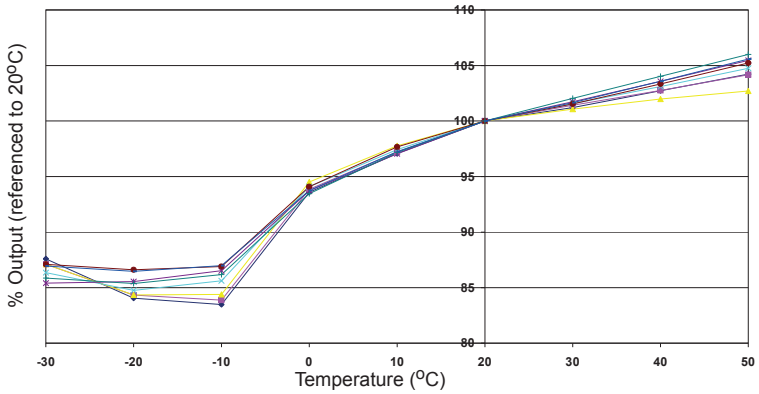

Figure 1 shows the variation in sensitivity caused by changes in temperature.

This data is taken from a typical batch of sensors.

Figure 2 Zero Temperature Dependence

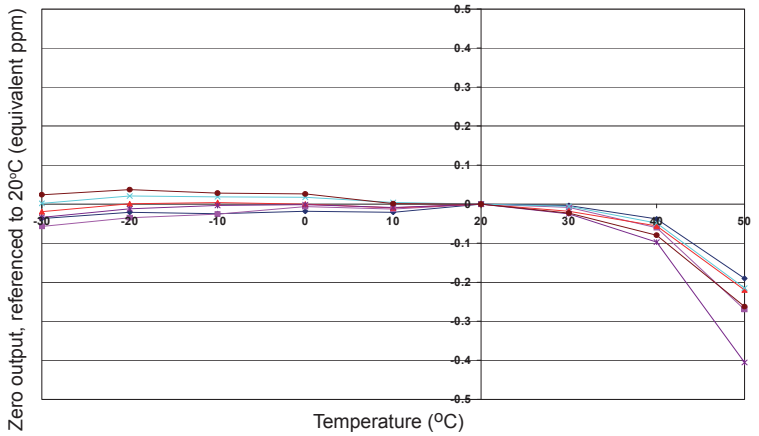

Figure 2 shows the variation in zero output caused by changes in temperature, expressed as ppm gas equivalent, referenced to zero at 20°C.

This data is taken from a typical batch of sensors.

Figure 3 Humidity plus Temperature Transient Response

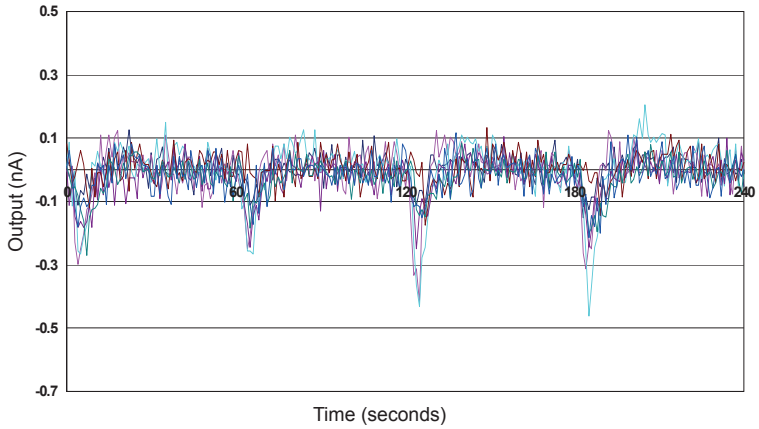

Figure 3 shows typical sensor outputs for a group of sensors exposed to exhaled breath for 4 cycles over 240 seconds.

This is an extreme test for such sensors and the shift in the base line of no more than 0.5 ppm shows a very strona resistance to this test.

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

Important. The CO-BX 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.

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. Doc. Ref. NO2-A1/JUN24

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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".