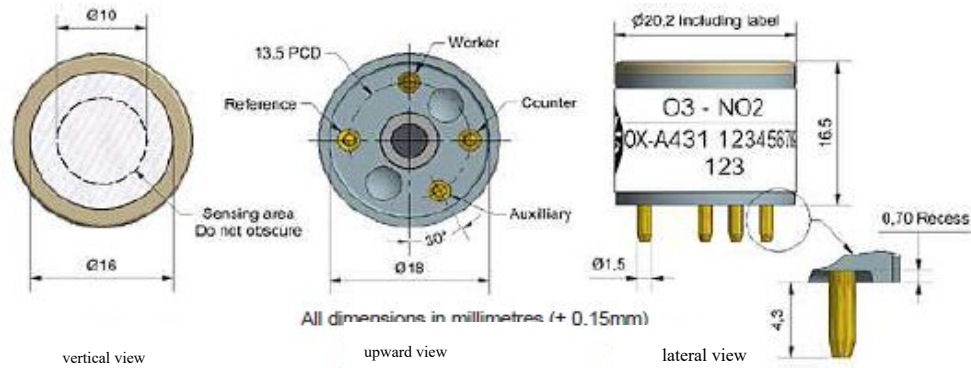


OX-A431 Oxidizing gas sensor ozone + nitrogen dioxide four-electrode



Patented

Figure 1 Schematic Diagram of OX-A431



3 Sensing parameters			
function	sensitivity	Sensitivity ₃ (nA /ppm) in 1ppmO ₃	-200~ -650
	response time	Time ₃ to 90% of the concentration at 0 to 1ppmO ₃ (s)	< 80
	zero current	Output at 20°C in zero grade air (nA)	-70~70
	noise *	Standard deviation ±2 (equivalent ppb)	15
	range	Measuring limits (ppm) that guarantee product performance	20
	degree of linearity	The ppm value of the full scale error is linear ₃ from 0 to 20ppm	< ±0.5
	overload	Maximum ppm value of gas pulse stabilized reaction	50
* The test uses Alphasense AFE low noise circuit board			
life span	zero drift	Equivalent ppb values that change in the laboratory air from year to year	0~20
	sensitivity drift	Percentage change in laboratory air over the year, measured monthly	< -20~-40
	working life	Number of months to which the output is reduced to 50% of the original signal (24 months guaranteed)	> 24
environment	-20°C sensitivity	2ppmO ₃ at (-20°C output/20°C output)%	60~80
	Sensitivity at 40°C	2ppmO ₃ at(40°C output/20°C output)%	80~105
	-20°C when zero point	nA	0~25
	40°C at the zero point	nA	20~90
cross connection sensitivity	H ₂ S	Gas sensitivity percentage measured at 5ppmH ₂ S	< -80
	NO	Gas sensitivity percentage measured at 5ppmNO	< 5
	Cl ₂	Gas sensitivity percentage measured ₂ at 5ppmCl ₂	< 100
	SO ₂	Gas sensitivity percentage ₂ at 5ppmSO ₂	< -3
	CO	Gas sensitivity percentage measured at 5ppmCO	< -3
	C ₂ H ₄	Sensitivity percentage of gas measured at 100ppmC ₂ H ₄	< 0.1
	NH ₃	Percentage sensitivity of gas ₃ at 20ppmNH ₃	< 0.1
	H ₂	Gas sensitivity percentage measured at 100ppmH ₂	< 0.1
	CO ₂	5%Vol CO ₂ when measured percentage sensitivity of gas	0.1
	halothane	Gas sensitivity percentage measured at 100ppm fluorine	< 0.1
hinge	temperature range	°C	-30~40
parameter	pressure limit	kPa	80~120
	Humidity range	Percentage of continuous relative humidity	15~85
	Storage period	Number of months for preservation from 3 to 20°C (to be kept in a sealed tank)	6
	load resistance	Ω (Recommended use of AFE circuit board)	33~100
	weight	g	< 6

Figure 2. Temperature Characteristics of Sensitivity at 1 ppm O₃

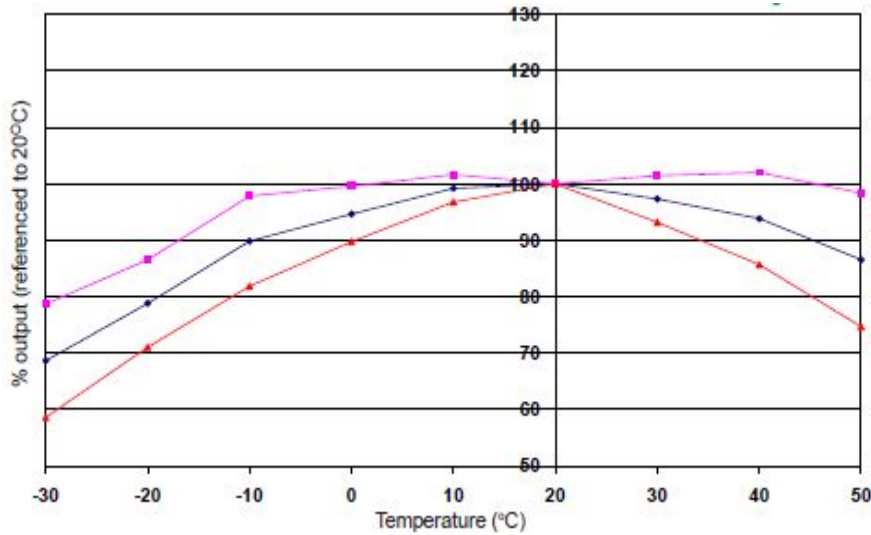


Figure 2 shows the average and 95% confidence level of sensitivity temperature characteristics at 1ppm O₃.

A good sleeve design is required to detect ozone at high temperatures to ensure that ozone can be detected by the sensor before the reaction.

Data was collected from typical batch sensors.

Figure 3 Zero Temperature Characteristics

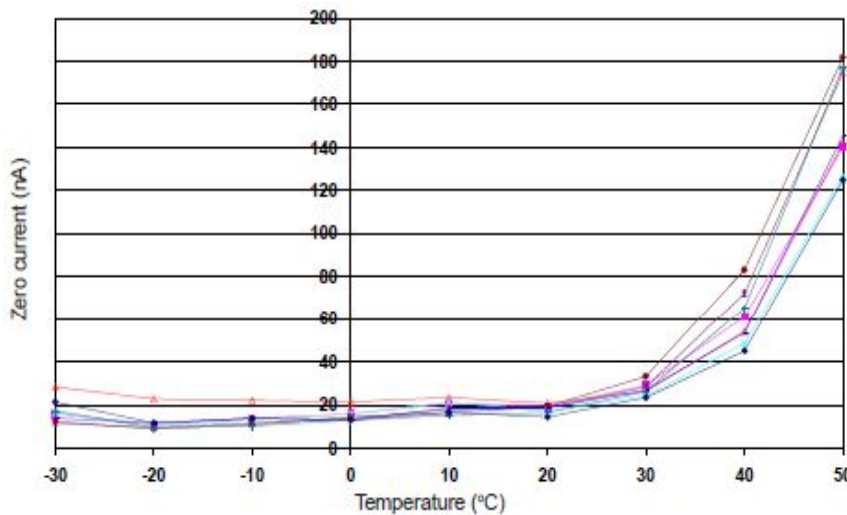


Figure 3 shows the change of zero point output of the working electrode caused by temperature change, in units of nA.

Data was taken from a typical batch of sensors.

For more information about zero current correction, contact Alphasense.

Figure 4 Reaction of 200-0 Ppb O₃

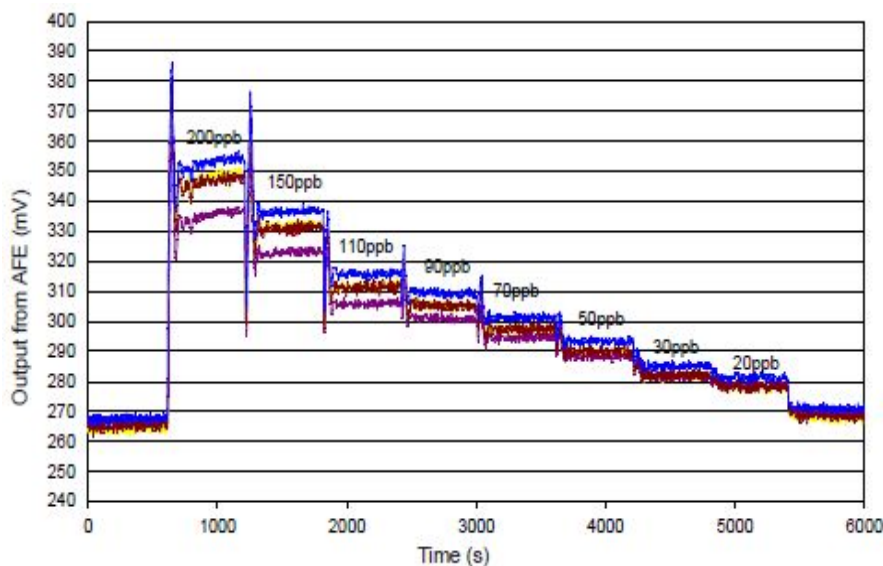


Figure 4 shows the reaction process of the transducer to 200-0ppb O₃.

Using the Alphasense AFE circuit board can reduce the noise to 15 ppb, and using digital filtering can further reduce the noise.

The magnitude of the offset voltage depends on the intentional offset value of the AFE circuit board.

OX-A431 Oxidizing gas sensor ozone + nitrogen dioxide four-electrode



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The OX-A431 sensor can simultaneously detect O_3 and NO_2 ($O_3 + NO_2$), while the NO2-A43F sensor can only measure NO_2 while filtering out O_3 . By using both sensors, the measured concentration of OX-A431(calibrated) minus that of NO2-A43F(calibrated) gives the calculated concentration of O_3 .

Before making a subtraction to determine the O_3 concentration, ensure that the electronic zero point offset, sensor zero point offset, temperature characteristics, sensitivity (nA/ppm), and sensitivity temperature characteristics of both sensor signals have been corrected.

NO ₂ sensing parameters			
function	sensitivity	Sensitivity in 2ppmNO(nA/ppm)	-200~-550
	response time	Time ₂ to 90% from zero to 1ppmNO (s)	< 80
	zero current	Output at 20°Cm in zero-level air (nA)	-70~70
	noise *	Standard deviation ± 2 (equivalent ppb)	15
	range	Measurable limit (ppm) that guarantees product performance	20
	degree of linearity	The ppm value of the full scale error is linear at 0~20ppm	< ±0.5
	overload	Maximum ppm value of gas pulse stabilized reaction	50
	* The test uses Alphasense AFE low noise circuit board		
life span	zero drift	Equivalent ppb values that change in the laboratory air from year to year	0~20
	sensitivity drift	Percentage change in laboratory air over the year, measured monthly	< -20~-40
	working life	Number of months to output down to 50% of original signal (warranty 24 months)	> 24
environment	-20°C sensitivity	2ppmNO ₂ at (-20°C output/20°C output)%	50~80
	Sensitivity at 40°C	2ppmNO ₂ at(40°C output/20°C output)%	115~130
	-20°C when zero point	nA	0~25
	40°C at the zero point	nA	20~50
cross connection sensitivity	H ₂ S	Gas sensitivity percentage measured at 5ppmH ₂ S	< 100
	NO	Gas sensitivity percentage measured at 5ppmNO	< 5
	Cl ₂	Gas sensitivity percentage ₂ measured at 5ppmCl	< 100
	SO ₂	Gas sensitivity percentage ₂ at 5ppmSO	< -3
	CO	Gas sensitivity percentage measured at 5ppmCO	< -3
	C ₂ H ₄	Sensitivity percentage of gas measured at 100ppmC ₂ H ₄	< 0.1
	NH ₃	Percentage sensitivity of gas ₃ at 20ppmNH	< 0.1
	H ₂	Gas sensitivity percentage ₂ at 100ppmH	< 0.1
	CO ₂	Sensitivity percentage of gas measured ₂ at 5%Vol CO	0.1
	halothane	Gas sensitivity percentage measured at 100ppm fluorine	< 0.1
hinge	temperature range	°C	-30~40
parameter	pressure limit	Kpa	80~120
	Humidity range	Percentage of continuous relative humidity	15~85

Figure 5. Temperature Characteristics of Sensitivity at 2ppm NO₂

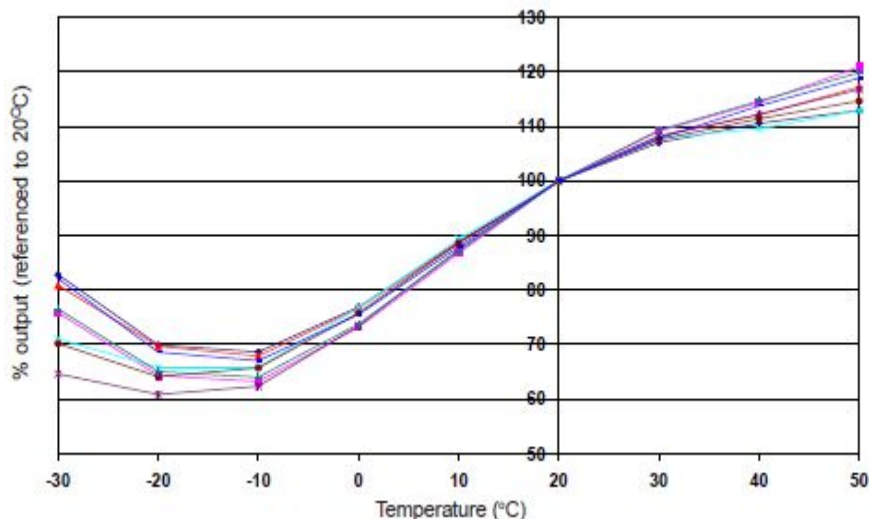


FIG. 5 shows the temperature characteristics of sensitivity at 2ppm NO₂.

Data was collected from typical batch sensors.

Figure 6 Reaction at 50ppb NO₂

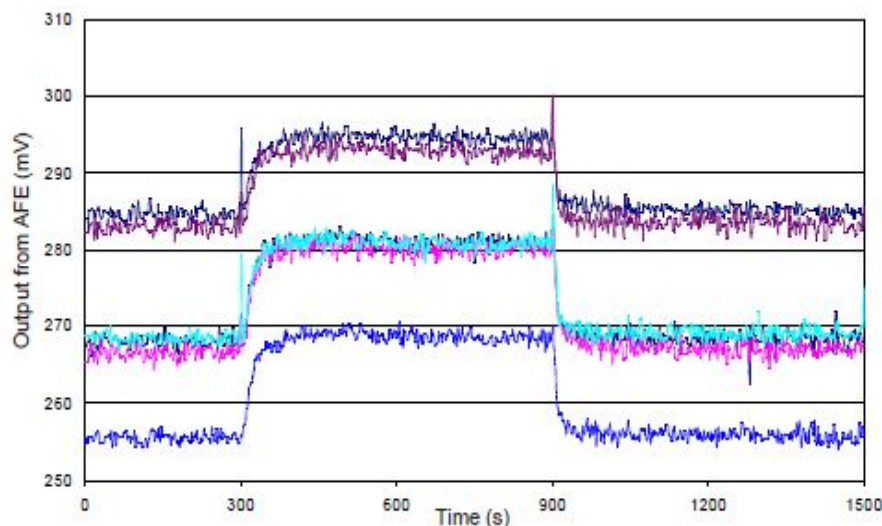


Figure 6 shows that even in a low NO₂ concentration environment, the OX-A431 sensor is able to respond quickly and return to the baseline.

Figure 7 Reaction of NO₂ from 200 to 0 Ppb

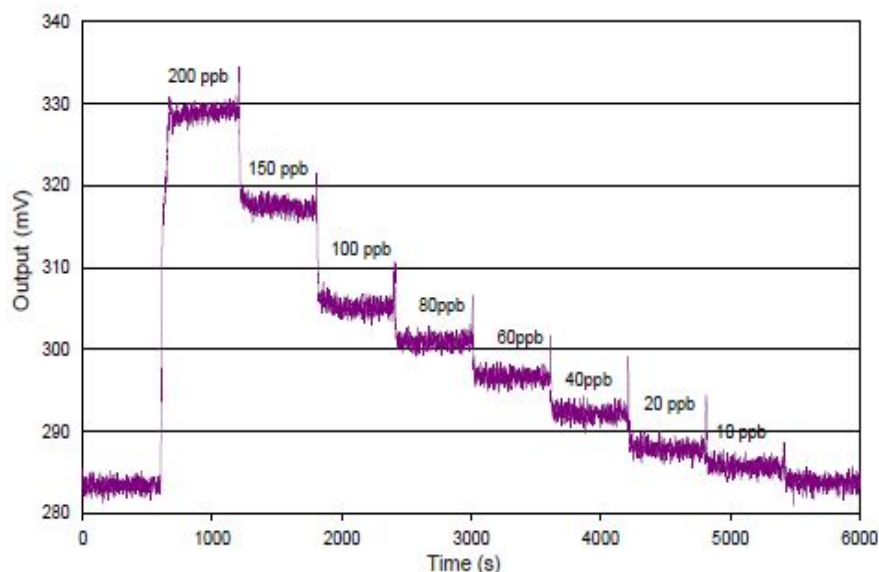


FIG. 7 shows the reaction process of the transmitter to 200-0ppb NO₂.

Using the Alphasense AFE circuit board can reduce noise to 15ppb, and digital filtering can further reduce noise.

The magnitude of the offset voltage depends on the intentional offset value of the AFE circuit board.

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