

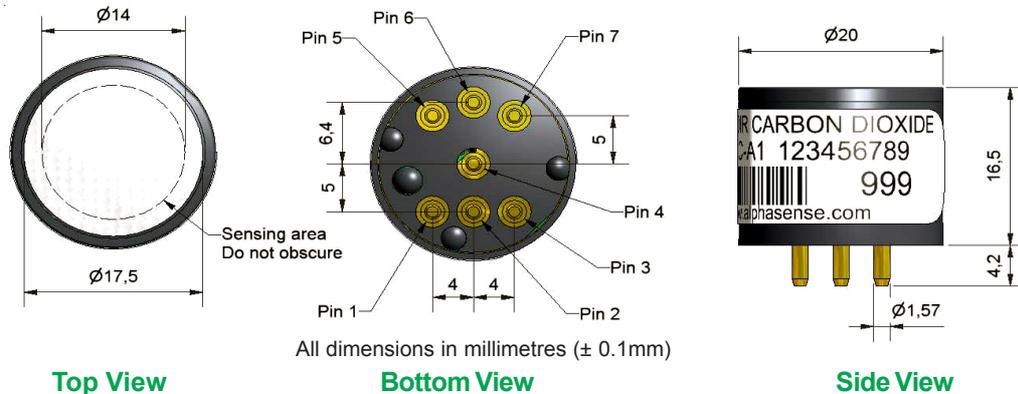


# IRC-A1 CARBON DIOXIDE INFRARED SENSOR

PYROELECTRIC DETECTOR



**Figure 1 NDIR-A Schematic Diagram**



**Pin out details:**

1. Lamp return
2. Lamp +5V
3. +5V Pyro supply
4. Detector output
5. Reference output
6. Thermistor output
7. OV Pyro supply and case connection

**Notes:**

1. Dimensions without tolerances are nominal
2. Recommended PCB socket: Wearnes Cambion Ltd. code: 450-3326-01-06-00
3. Weight: 15g
4. Use antistatic precautions when handling
5. Do not cut pins
6. Do not solder directly to pins

**PERFORMANCE**

Maximum Power Requirements	5.0 VDC, 60mA max. (50% duty cycle source drive)
Minimum Operating Voltage	2.0 VDC, 20mA max. (50% duty cycle source drive)
Source Drive Frequency	1.5 to 3 Hz (recommended 2 to 2.25 Hz)
Active Output in $N_2$ (peak-to-peak)	60 - 100mV @ 2.1 Hz, 50% duty cycle
Reference Output in $N_2$ (peak-to-peak)	40 - 80mV @ 2.1 Hz, 50% duty cycle
Response Time ( $t_{90}$ )	< 40s @ 20°C ambient
Warm-up Time	To final zero $\pm 100\text{ppm}$ : < 30 s @ 20°C To specification: < 30 minutes @ 20°C

**LIFETIME**

MTBF > 5 years

**KEY SPECIFICATIONS**

Temperature Signal	Integral thermistor (NTC, $R_{25} = 3000 \Omega$ B= 3450 K)
Operating Temperature Range	-20°C to +50°C (linear compensation from -10 to 40°C)
Storage Temperature Range	-40°C to +75°C
Humidity Range	0 to 95% rh non-condensing

TYPE*	Range (Application)	Accuracy (%FS, using universal linearisation coefficients)	Zero Resolution	Full Scale Resolution	Zero Repeatability	Full Scale Repeatability
IAQ	0 to 5000ppm (IAQ)	1	1ppm	15ppm	$\pm 10\text{ppm}$	$\pm 50\text{ppm}$
	0 to 5 % vol (Safety)	1.5	1ppm	100ppm	$\pm 10\text{ppm}$	$\pm 500\text{ppm}$
Other	0 to 20 % vol (Combustion)	2.5	1ppm	500ppm	$\pm 10\text{ppm}$	$\pm 2500\text{ppm}$
	0 to 100 % vol (Process Control)	4	1ppm	0.5 % vol	$\pm 10\text{ppm}$	$\pm 5000\text{ppm}$

\* When ordering, select 'IAQ' or 'Other', depending on your application.

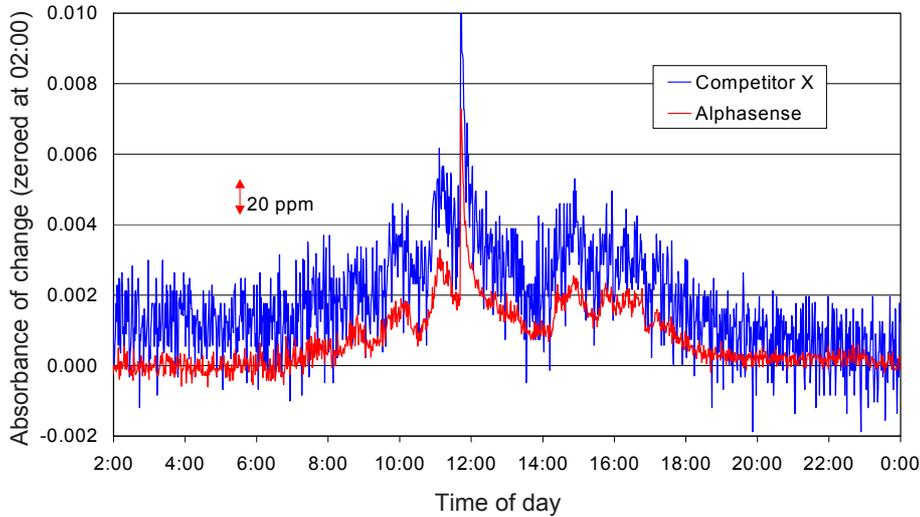
**NOTE:** all sensors are tested at ambient environmental conditions, unless otherwise stated. As applications of use are outside our control, the information provided is given without legal responsibility. Customers should test under their own conditions, to ensure that the sensors are suitable for their own requirements.



# IRC-A1 Performance Data

Technical Specification

**Figure 2 Comparison of Resolution**

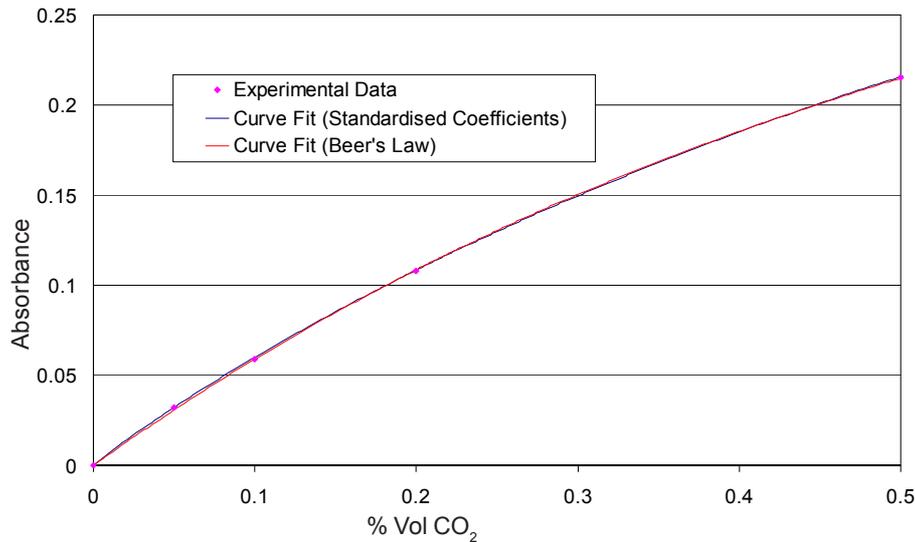


Comparison of resolution of IRC-A1 (red) and competitor's 20mm diameter NDIR cell (blue).

Both cells were operated at 2.25 Hz with the same electronic circuit. Both cells use the same light source and dual pyroelectric detector.

The improved resolution of the IRC-A1 is due to the patent pending optical design.

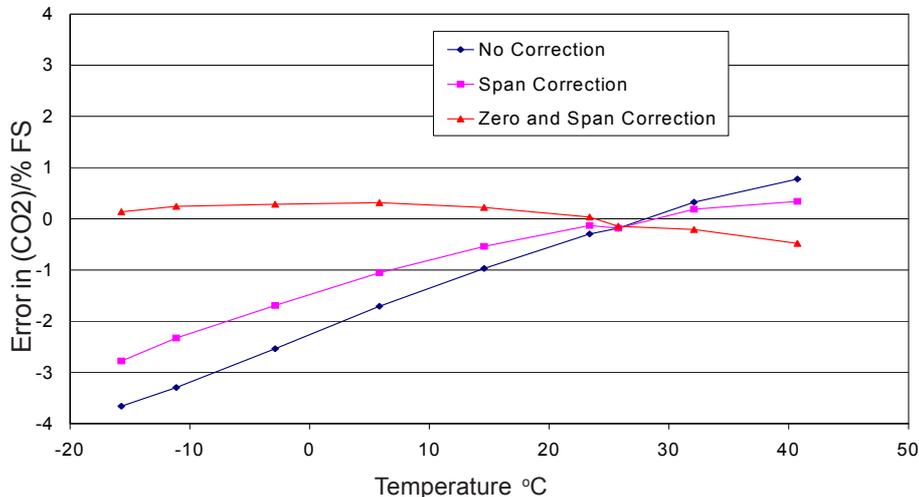
**Figure 3 Beer-Lambert Performance**



Typical response from 0 to 5000ppm CO<sub>2</sub>.

The fit is very close to the theoretical curve, predicted by the Beer-Lambert Law.

**Figure 4 Temperature Compensation**



Temperature compensation corrects for temperature error in the detector.

Best compensation includes both span and zero correction; span correction can be a universal correction, but zero temperature correction will vary with each cell.

The graph shows error at 5,000 ppm CO<sub>2</sub>.

For further information on the performance of this sensor, on other sensors in the range or any other subject, please contact Alphasense Ltd. For Application Notes visit "[www.alphasense.com](http://www.alphasense.com)".

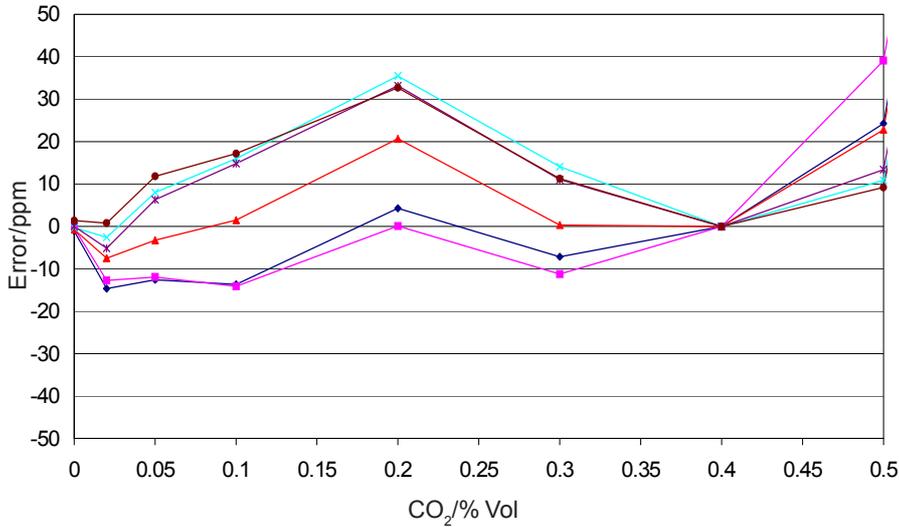
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Technical Specification

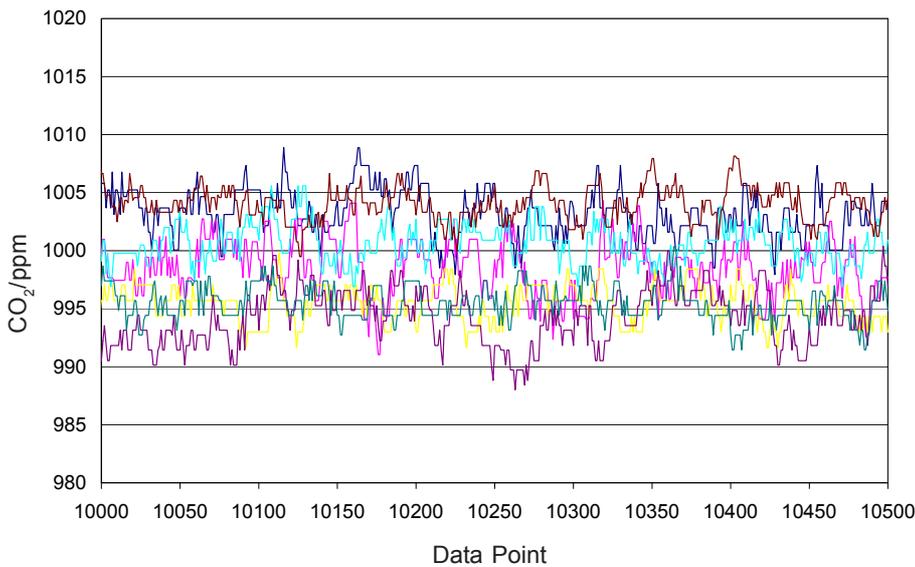
**Figure 5 Linearisation**



Custom linearisation is not necessary with the IRC-A1. Using universal linearisation constants, repeatability between cells is very good, allowing easy implementation.

For an IAQ application, a zero and then single calibration at 4,000ppm CO<sub>2</sub> gives the error shown above: less than 2% of reading and typically less than 0.5% of reading for six different IRC-A1 cells.

**Figure 6 Resolution**



Excellent stability and resolution at 1000ppm CO<sub>2</sub> for the IRC-A1 is achieved by better design, not by using more expensive components.

**NOTE:**

For applications where fluctuating ambient light will fall on the white dust filter (top of sensor), order with the optional ambient light filter (IRC-AF).



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.

For further information on the performance of this sensor, on other sensors in the range or any other subject, please contact Alphasense Ltd. For Application Notes visit "[www.alphasense.com](http://www.alphasense.com)".

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