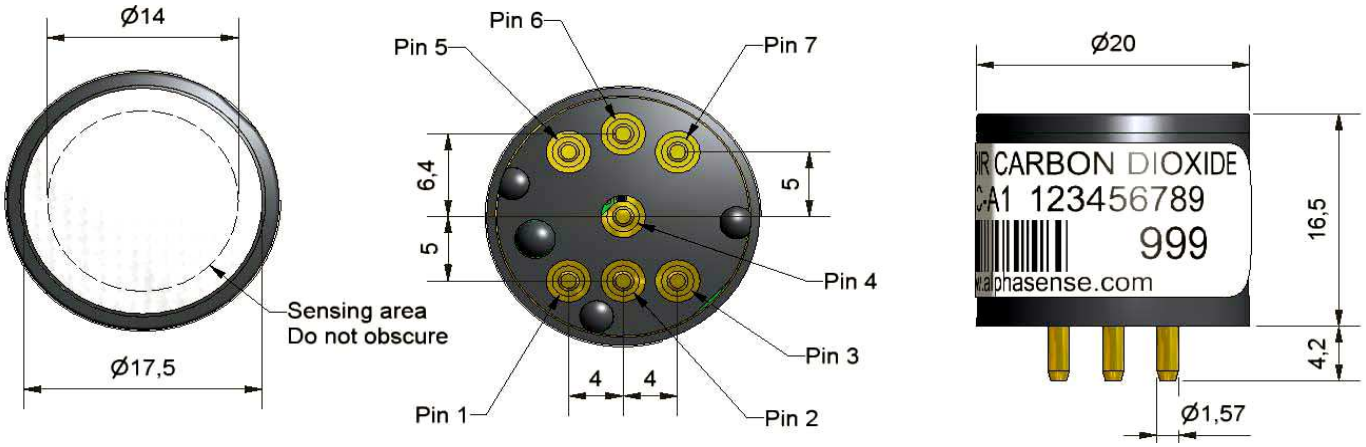
IRC-A1 Carbon Dioxide infrared sensor – pyroelectric detector



Top View **Bottom View** **Side View**

Dimensions are in millimetres (+/- 0.1 mm).

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:

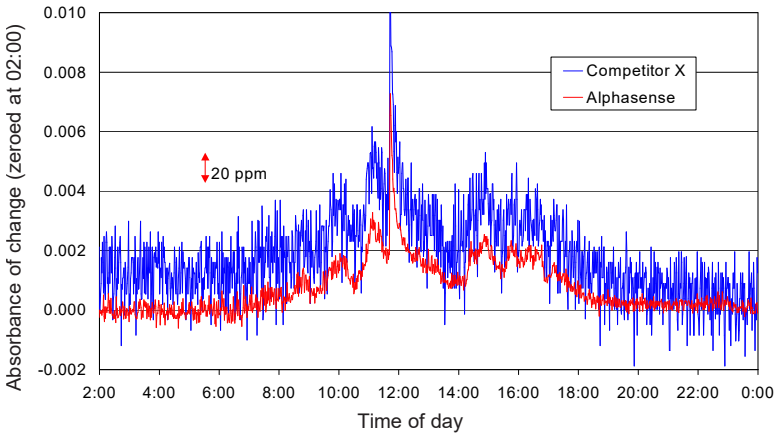
1. Dimensions without tolerances are nominal
2. Recommended PCB socket: Wearnes Cambion Ltd. code: 450-3326-01-06-00
3. Weight: 15g
4. Use antistatic precautions when handling
5. Do not cut pins
6. Do not solder directly to pins
7. We suggest this sensor is best used in a fixed site instrument where calibration and measurement can be carried out in-situ, and the sensor is not subject to acute mechanical stress or changes of temperature.

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 (t90)	< 40s @ 20°C ambient
	Warm-up time	To final zero ± 100ppm: < 30 s @ 20°C To specification: < 30 minutes @ 20°C
Lifetime	MTBF	> 5 years
Key Specifications	Temperature signal	Integral thermistor (NTC, R_{25} = 3000 Ω B= 3450 K)
	Operating temperature range	-20°C to +55°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	±10ppm	±50ppm
Other	0 to 5 % vol (Safety)	1.5	1ppm	100ppm	±10ppm	±500ppm
	0 to 20 % vol (Combustion)	2.5	1ppm	500ppm	±10ppm	±2500ppm
	0 to 100 % vol (Process Control)	4	1ppm	0.5 % vol	±10ppm	±5000ppm

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

Figure 1 Comparison of Resolution

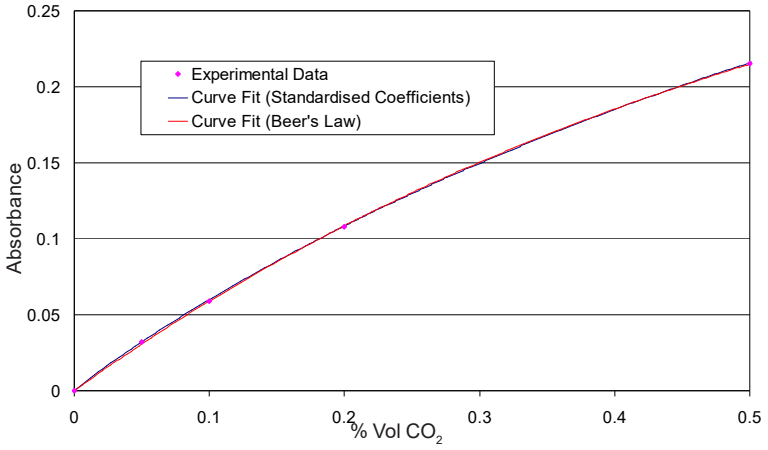


Comparison of resolution of IRC-A1 (red) and competitor's 20mm diameter NDIR cell (blue).

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.

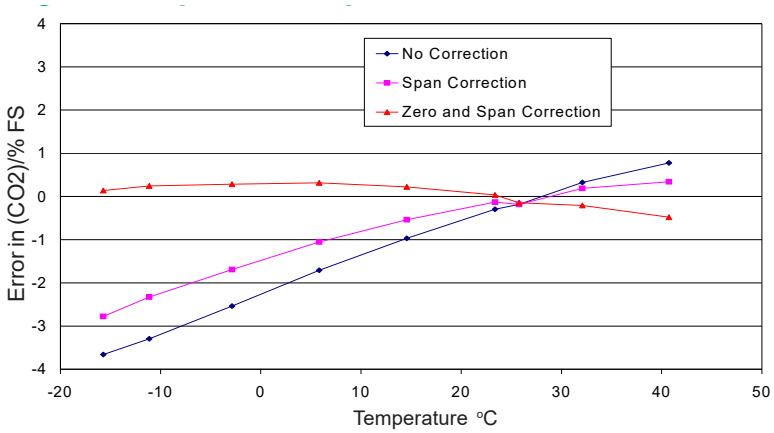
Figure 2 Beer-Lambert Performance



Typical response from 0 to 5000ppm CO_2.

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

Figure 3 Temperature Compensation

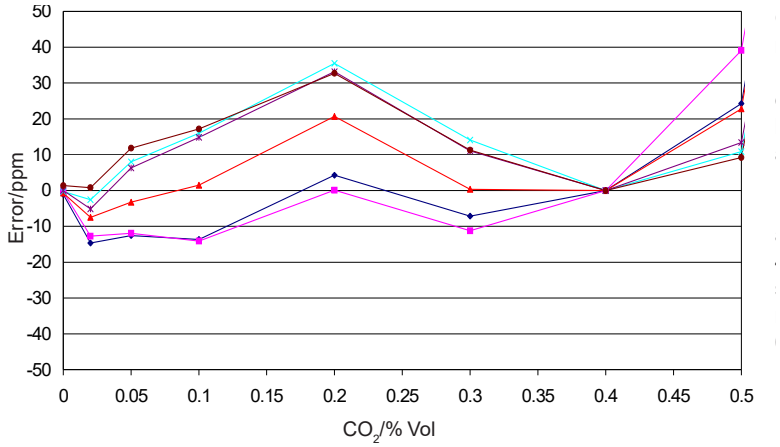


Temperature compensation corrects for temperature error in the detector.

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_2.

Figure 4 Linearisation

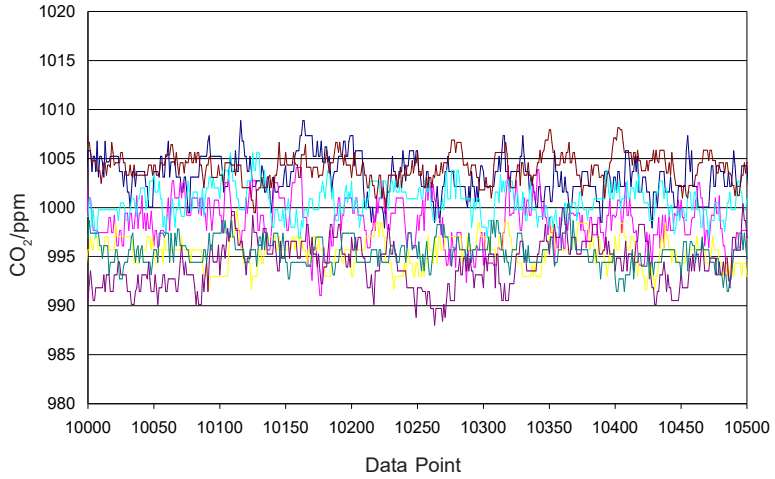


Custom linearisation is not necessary with the IRC-A1.

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_2 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 5 Resolution



Excellent stability and resolution at 1000ppm CO_2 for the IRC-A1 is achieved by better design, not by using more expensive components.