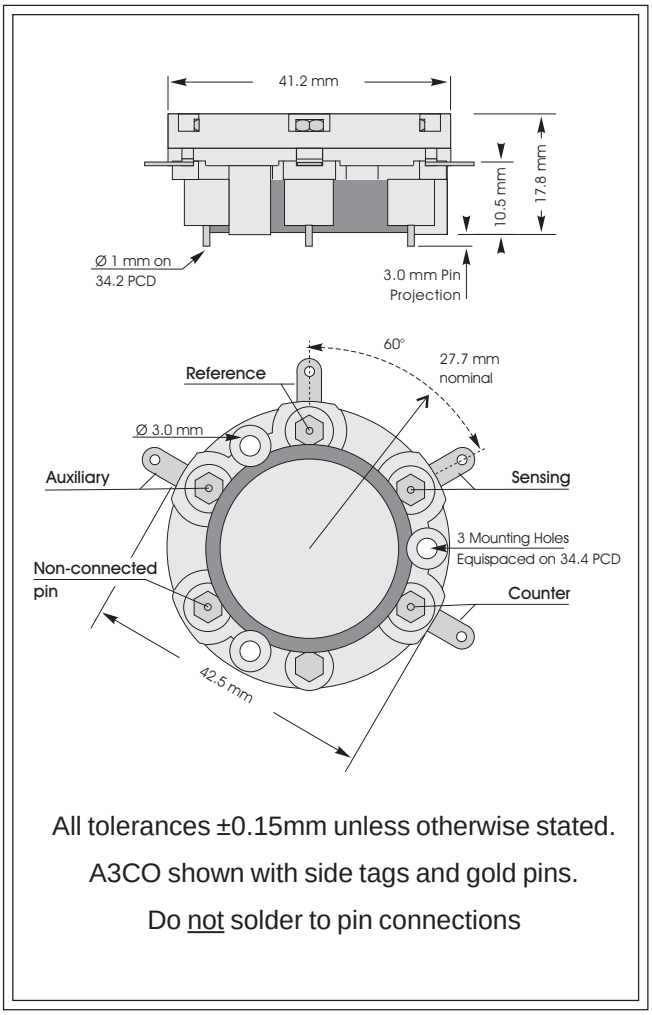
# A3CO EnviroceL®

This sensor is for monitoring gases at levels found in the environment. It is designed to give accurate readings of CO in ambient air.

## Performance Characteristics

| | |
|---|---|
| **Nominal Range** | 0-500ppm |
| **Maximum Overload** | 1000ppm |
| **Expected Operating Life** | Two years |
| **Output Signal** | 0.2 ± 0.04 µA/ppm |
| **Resolution** | 100ppb |
| **Temperature Range** | -20°C to +50°C |
| **Pressure Range** | Atmospheric ± 10% |
| **Pressure Coefficient** | No data |
| **$T_{90}$ Response Time** | <40 seconds |
| **Relative Humidity Range** | 15 to 90% non-condensing |
| **Typical Baseline Range (pure air)** | 0 to 1ppm equivalent |
| **Maximum Zero Shift (+20°C to +40°C)** | 2ppm equivalent |
| **Long Term Output Drift** | <10% signal loss/year in air |
| **Recommended Load Resistor** | 10Ω (see over) |
| **Bias Voltage** | Not required |
| **Repeatability** | 1% of signal |
| **Output Linearity** | Linear |




All tolerances ±0.15mm unless otherwise stated.

A3CO shown with side tags and gold pins.

Do not solder to pin connections

N.B. All performance data is based on conditions at 20°C, 50%RH, and 1013mBar

## Physical Characteristics

| | |
|---|---|
| **Material** | Polycarbonate |
| **Weight** | 22g |
| **Position Sensitivity** | None |
| **Storage Life** | Six months in CTL container |
| **Recommended Storage Temperature** | 0-20°C |
| | 12 months from date of despatch |

## Cross-Sensitivity Data

| | |
|---|---|
| **Sulphur Dioxide** | None |
| **Hydrogen Sulphide** | None |
| **Nitrogen Dioxide** | None |
| **Nitric Oxide** | None |



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## Circuitry required

The A3CO EnviroceL differs from standard three electrode sensors by the introduction of a second working electrode, known as the **Auxiliary**. A suitable operating circuit is shown below.

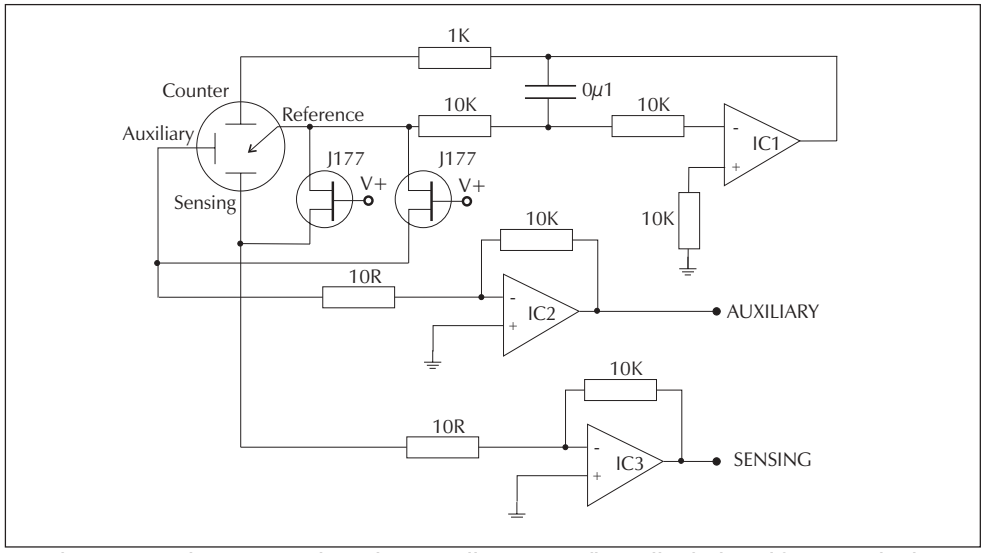


**Figure 1.**
A3CO Operating Circuit

**IC1** - This amplifier should have either a low offset or have its offset nulled out. The PMI OP-77, OP-90, Intersil or Teledyne 7650, and Linear Technology LT1078 are all suitable.

**IC2, IC3** - This amplifier acts as a current to voltage converter and its offset performance is less critical. The OP-77 or similar is a suitable choice

Recommended value of $\mathbf{R_{load}}$ is given in the specification overleaf.

When no gas is present, there is a small zero gas (baseline) signal from each electrode. Upon exposure to carbon monoxide, the *sensing* electrode produces a signal proportional to the concentration of gas. Virtually all the gas is reacted on contact with this electrode, so the *auxiliary* electrode remains largely unaffected and hence the signal remains at its baseline level. It can therefore be assumed the *auxiliary* signal is wholly attributed to the baseline.

The baseline signal of both electrodes is slightly affected by changes in atmospheric conditions (e.g. temperature). However as both are subject to the same conditions, any shift in baseline on the *sensing* electrode will be followed by a similar shift in the *auxiliary*. Hence by comparing the two signals any baseline changes may be compensated.

Evaluating the carbon monoxide concentration of a sample from the two signals is a straightforward subtraction:-.

Let:

$I_S$ = *Sensing* electrode signal;
$I_A$ = *Auxiliary* electrode signal;
$I_{CO}$ = Baseline compensated carbon monoxide signal.

Then

$$I_{CO} = I_S - I_A$$





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