Crowcon Technical Note

Document Reference: **GEN082b**

Document applies to: **Oxygen sensor testing in fresh air**

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Testing Oxygen Sensors

Before handling electronic components, ESD (Electro Static Discharge) precautions must be observed. An example of an ESD kit can be seen below.

Be aware that electrochemical sensors can leak electrolyte therefore handle with care, see supplier's material safety data sheet for guidance

This document tells you how to test an Oxygen 2-pin lead acid electrochemical sensor independently of its PCB or instrument giving a fresh air reading.

You will need

1. Calibrated voltmeter (measuring mV)
2. A 100 ohm wire wound resistor with Crocodile clips at each end (locally manufactured) as shown adjacent.
3. Sensor to test
4. ESD kit for handling PCBs

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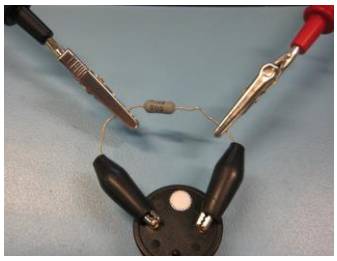
Testing process

Check the manufacture date code on the sensor, it is the last 3 digits after the serial number as shown. Ensure the sensor is still within its design life-span (ie 2 years or 3 years depending on sensor).

Date Code

Carefully remove the sensor from the PCB, ensuring not to damage the pins or PCB sockets.

Clip the resistor assembly across the 2 pins on the sensor, and attach the voltmeter probes on either side of the resistor (note if the polarity is wrong, the voltmeter will give negative result; this does not matter just turn the probes around).



Example 7OX-V with 100 ohm resistor

Select mV on the voltmeter and allow reading to stabilise for at least 60 seconds (may take up to 2 minutes). Ensure the sensor is in fresh air.

When the reading has stabilised compare the output signal to the chart below:

Oxygen Sensor Type	Min. response	Max. response
O2-A2	8.0 mV	12.0 mV
O2-A3	6.0 mV	8.5 mV
5FO	36.0 mV	46.0 mV
7OX-V	17 mV	22.0 mV

If the mV reading is below the minimum response make a note of the reading and the serial number of the sensor and if a warranty claim is appropriate, request a CRN using the normal warranty process.

If the mV reading is within the specification, ensure the sensor pins and PCB sockets are clean, re-fit the sensor to the instrument and try zeroing through the unit's keypad or using the appropriate PC software.

If the sensor still fails to calibrate, check the PCB for faults and read the notes on reasons for sensor failure on the following page.

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Reasons for sensor failure

Oxygen sensors can sometimes leak; the electrolyte leaks down the pins from inside the sensor. This can be seen easily when it is still wet or when it has dried. You will note an acidic odour, when it's dried it forms a powdery coating on the pins see example below.

If leakage has occurred the contamination of the sensor pins and PCB sockets increases resistance resulting in reduced sensor signal (and subsequent calibration failure). It may be possible to restore performance by cleaning the sensor pins and sockets using iso-propyl alcohol and a soft brush

In some applications oxygen sensors are exposed to high humidity which can in extreme cases saturate the PTFE filter fixed to the front of the sensor. A water-saturated filter may prevent oxygen entering the sensor resulting in a reduced output signal. In such cases performance may be restored by removing the sensor and placing in a warm and dry environment (20-30ºC, 50%RH ideally) for a period of time; 4-6 hours should be sufficient. Once the filter has dried-out oxygen can enter and the sensor signal will revert to normal levels.

Additional Notes

- If the sensor is not connected to the PCB or resistor it will become unstable and it will take several minutes to settle
- Also note the sensor should not be covered, breathed upon or placed face down when the test is being performed as this will reduce the sensor output and may give false readings

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