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Document Purpose

The purpose of this document is to provide additional technical performance data for the 4OXV CiTiceL® to assist and accelerate the integration of the sensor into gas detection instrumentation. The sensor has been subjected to a rigorous characterisation regime as part of the development process. Within this document we present detailed information on the results of this regime.

This document and the information contained within does not constitute a specification and the data is provided for informational purposes only. It should be used in conjunction with the Product Datasheet and the appropriate Operating Principles. All data provided was current at the time of release of this document.

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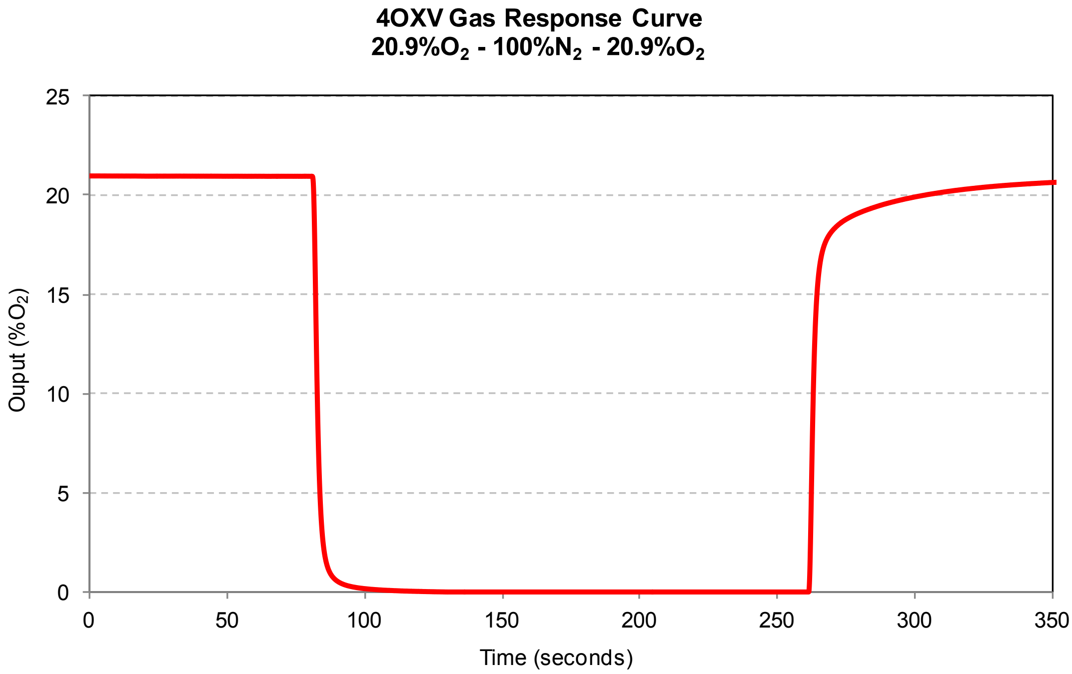
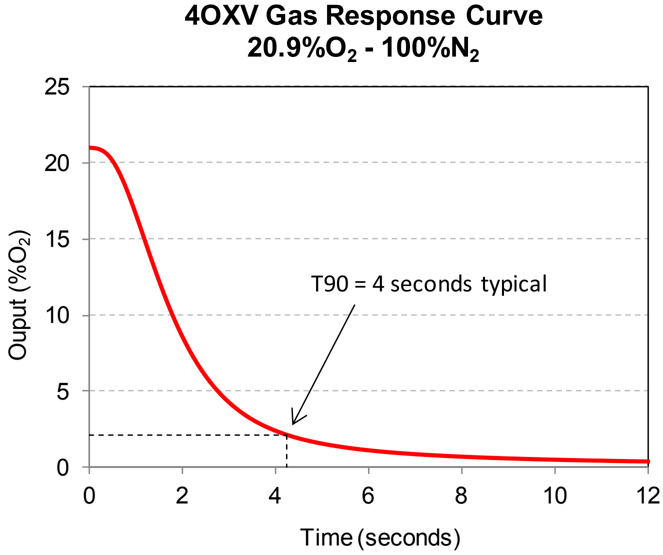
The Gas Response Curve

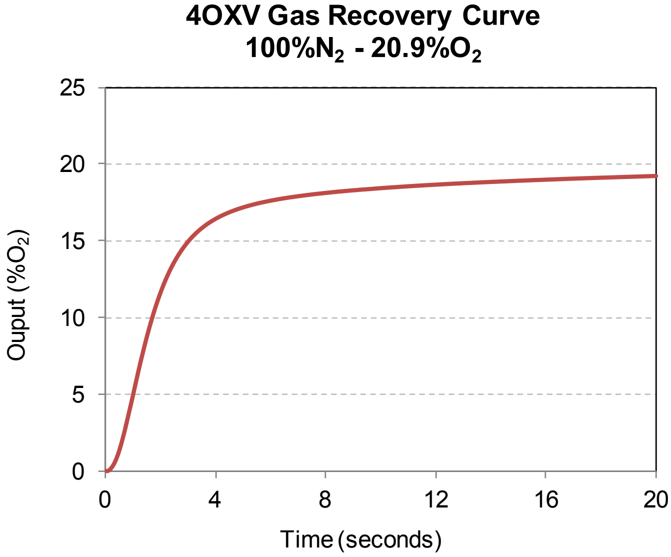
The data below shows a typical response curve for the 4OXV.

Test data was taken from current production at the time of release of this document, and reflects the typical performance of a production batch at this time. A flow rate of 200 ml/minute was used for both clean air and nitrogen.



The data below shows typical response and recovery profiles based on the data above.





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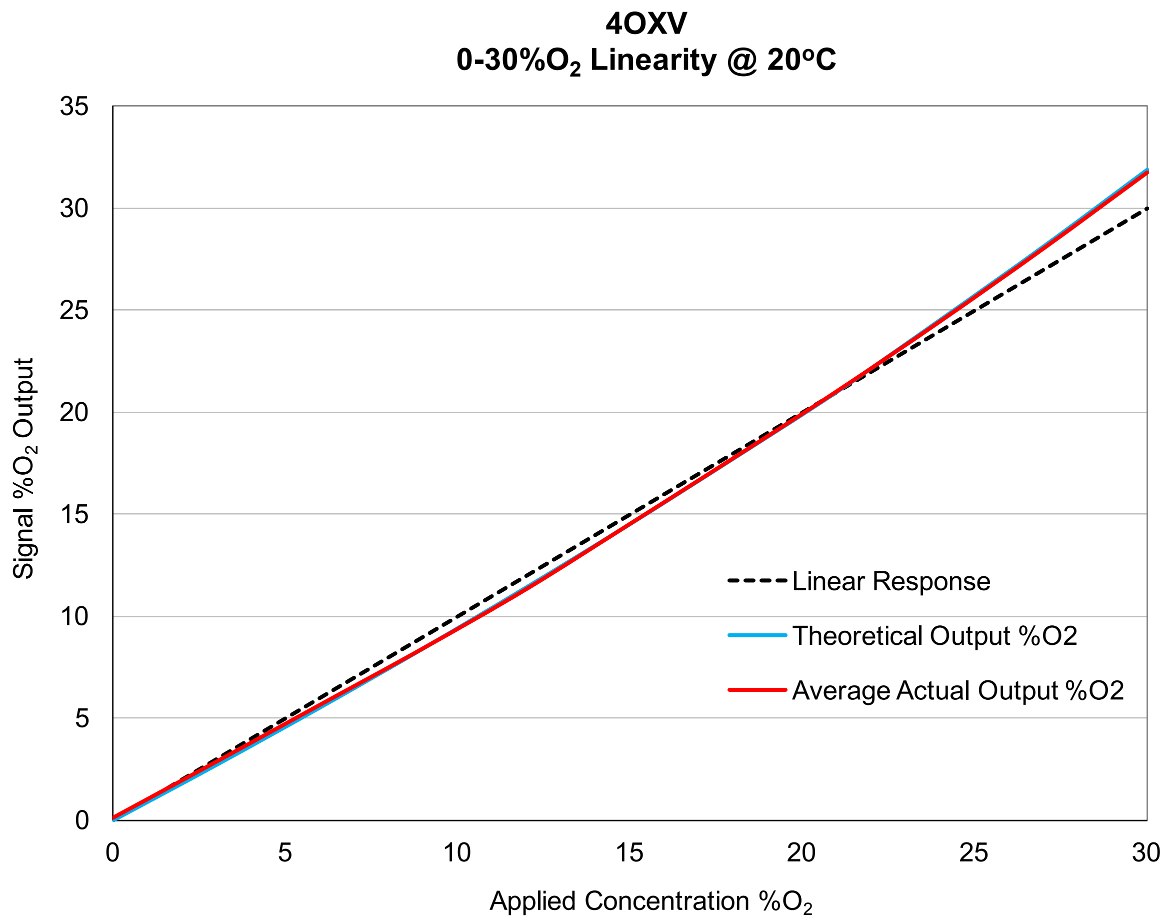
Linearity

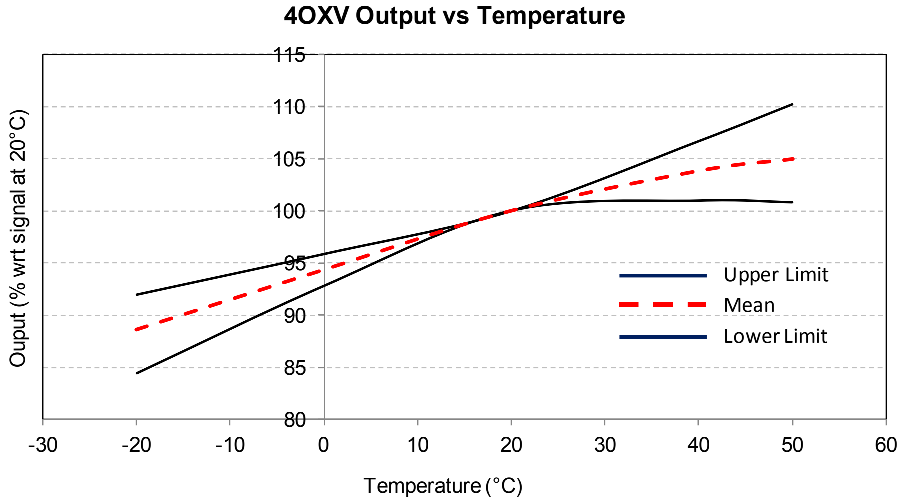
The data below shows the typical linearity performance of the 4OXV when subjected to differing oxygen concentrations across the detection range. The presented results reflect the performance of a typical production batch. Across typical measurement ranges for industrial safety, the sensor can often be considered linear and no additional compensation should be required.



The data above shows that when calibrated at 20.9% O_2, the maximum error occurs at around 10% O_2 where the sensor output is approximately 0.5% lower than a linear response would indicate.

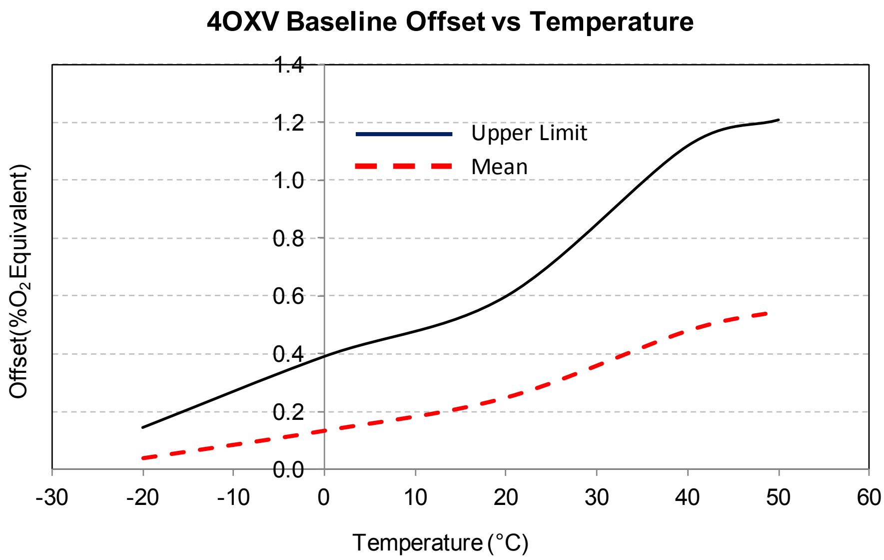
Variation of Output with Temperature

The output of the 4OXV CiTiceL® will vary as a function of ambient temperature. The data below shows the typical output performance across the operating temperature range and is presented normalized to the 20°C value. Deviation from the normalized value is greatest at lower temperatures. For instruments that are expected to function across a wide range of ambient temperatures, City Technology recommends that an electronic compensation algorithm is used to ensure maximum accuracy. The presented results reflect the performance of a typical production batch.



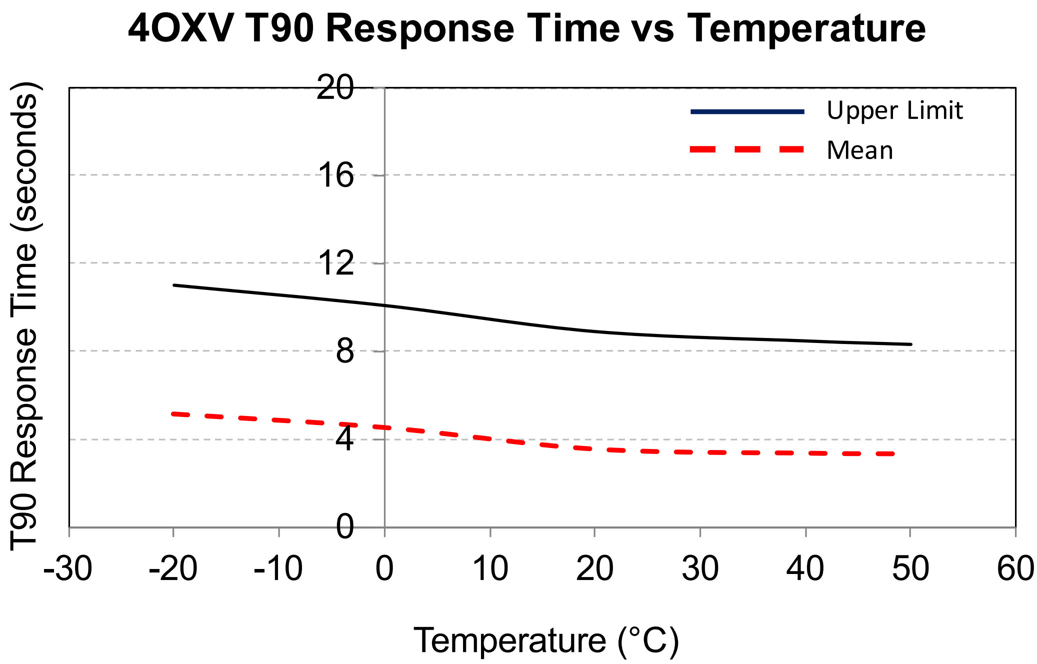
Variation of Baseline Offset with Temperature

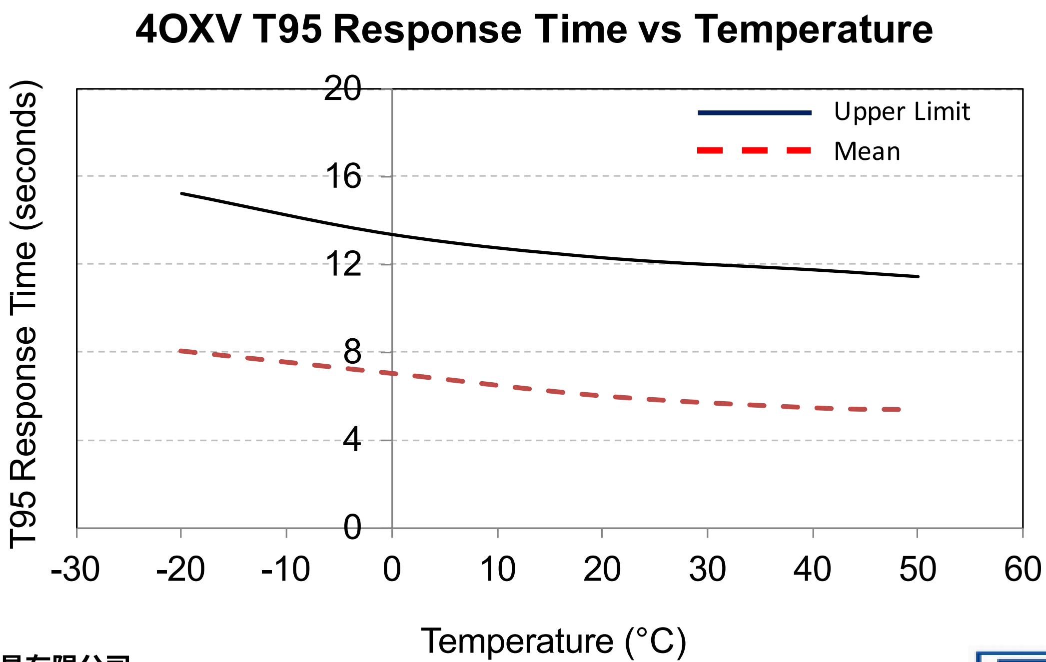
The electrical output in the absence of oxygen (baseline offset) of the 4OXV will vary as a function of the ambient temperature. The data below shows the typical 4OXV performance across the operating temperature range. Although the variation is relatively small, City Technology recommends the use of offset correction factors, particularly at higher temperatures so as to minimize inaccuracies in the span measurement. The pre-sented results reflect the typical performance of a production batch.



Variation of Response Time with Temperature

The response time of the 4OXV will vary as a function of ambient temperature, typically getting faster at higher temperatures and responding more slowly at lower temperatures. The data below shows typical T90 and T95 response times of the 4OXV across the operating temperature range. The presented results reflect the performance of a typical production batch.





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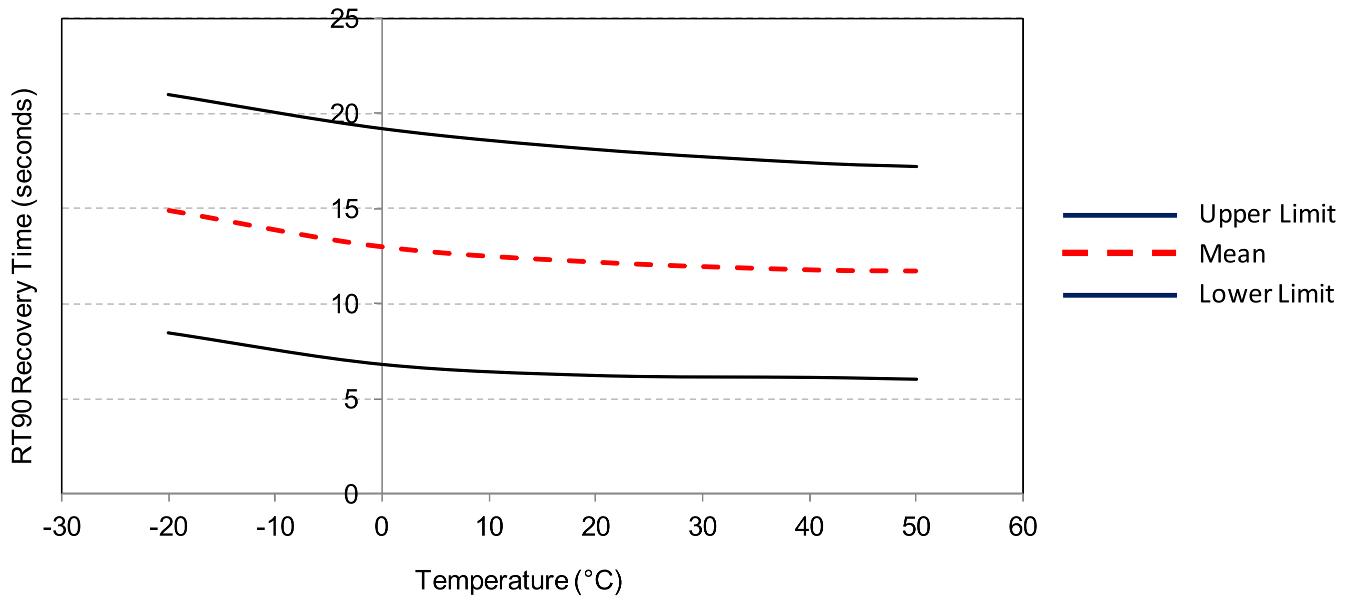
Variation of RT90 Recovery Time with Temperature

The rescovery time of the 4OXV will vary as a function of ambient temperature. The data below show typical RT90 recovery times across the operating temperature range, after a 2 minute exposure to 100% nitrogen. The presented results reflect the performance of a typical production batch.

4OXV RT90 Recovery Time vs Temperature



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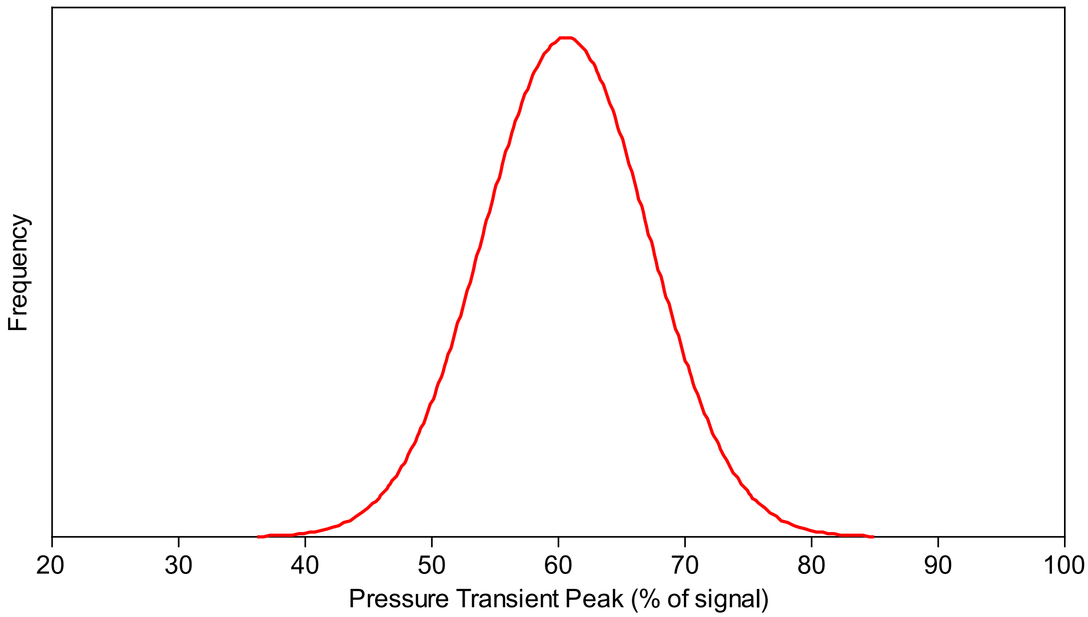
Humidity, Pressure & Temperature Performance

Pressure Transient Behaviour

The 4OXV CiTiceL will give a transient response to a step change in pressure - an increase in signal for an ipositive pressure change and a decrease in signal for a negative pressure change. This transient usually fades away after a few seconds but may result in false alarms.

During manufacture, all 4OXV CiTiceLs are exposed to a +60 mBar step change in pressure, and the peak amplitudes of the resulting transient responses are recorded. The data below reflect the typical transient peak amplitudes from production batches.

Pressure Transient Peak Measurement
(+60 mBar step change)



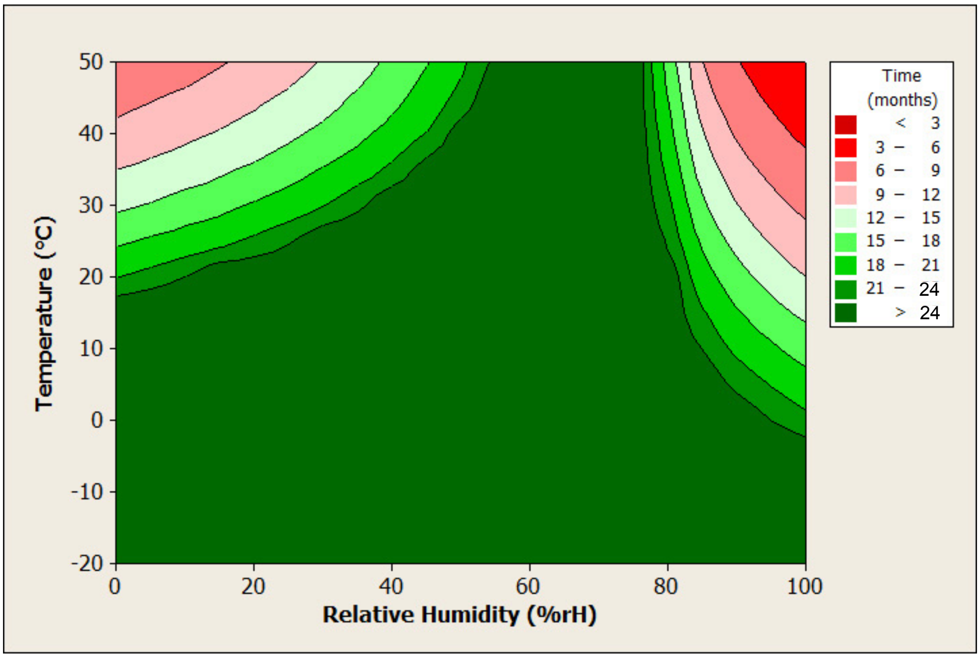
Effect of Temperature & Relative Humidity on Operational Life

The 4OXV has been developed to demonstrate stable performance across a range of operating temperatures and relative humidities. The design of the sensor includes an aqueous electrolyte which remains in equilibrium with the ambient environment. At a fixed relative humidity of 64%, the sensor will neither lose nor gain water irrespective of the ambient temperature. However, if the sensor is subjected to an environment with an RH of less than 64%, it will gradually lose water. Equally, in an environment with an RH of greater than 64%, it will gradually absorb water from the atmosphere. The rate at which the sensor loses or gains water is determined by the ambient temperature -water transfer is faster at higher temperatures.

If the sensor is subjected to prolonged extremes of relative humidity at high temperatures for extended periods of time, there remains a risk that the performance of the sensor may be compromised, showing a loss in sensitivity, enhanced baseline or slower response time. It is therefore recommended that if the customer's intended use of the 4OXV may subject it to prolonged exposures to extreme environments, they consult a member of the City Technology Technical Sales team for further advice as to the likely implications and how to overcome any issues seen

The chart below is a theoretical model which provides an indication of the effect of continuous expusure of temperature and relative humidity on sensor lifetime.

Effect of Temperature and Relative Humidity on 4OXV Lifetime



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