

AAN 008 HOW HUMIDITY AFFECTS OXYGEN SENSOR OUTPUT

Introduction

As the relative humidity of air increases, the volume concentration of oxygen in air (nominally 20.9% in dry air) is reduced by the increasing water vapour pressure.

Alphasense Oxygen Sensors and Humidity

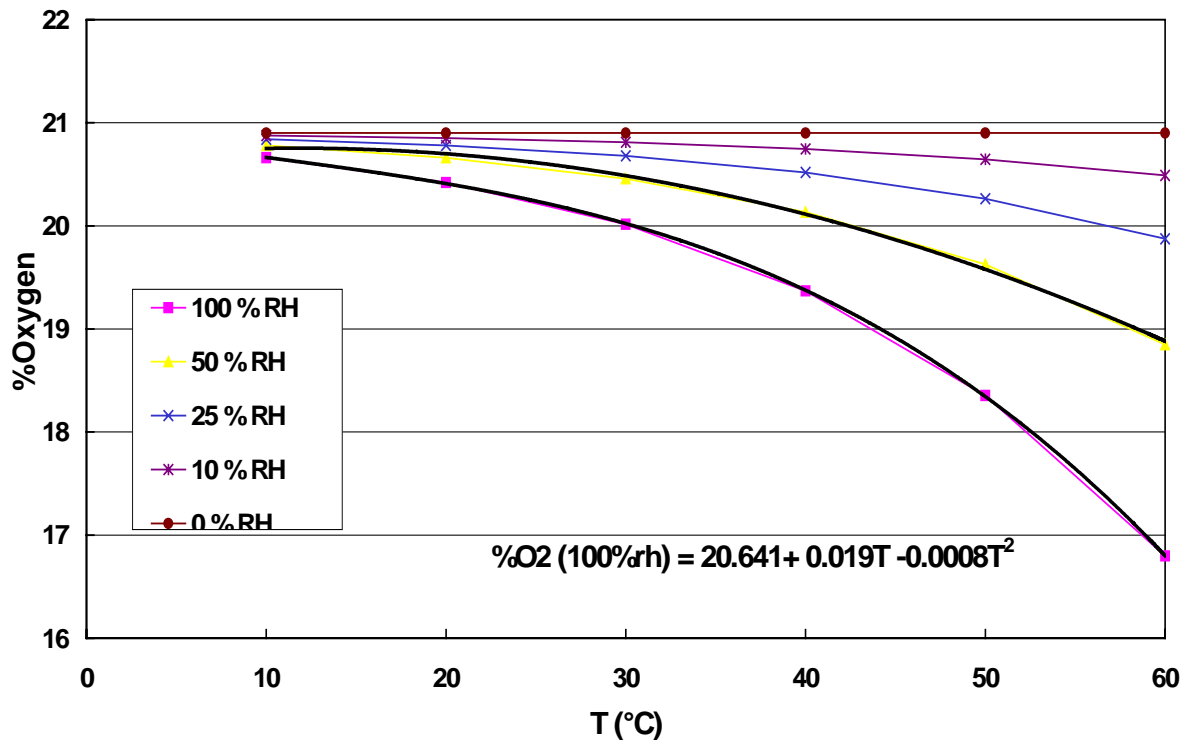


Figure 1 shows how oxygen concentration in air is diluted by humidity at different temperatures.

Due to the very small capillary dimension in Alphasense oxygen sensors, our oxygen sensors can be used in low and high humidity environments (see relevant data sheets). Extended operation in low humidity and high temperature outside the quoted ranges is not recommended due to evaporation or absorption of water from the electrolyte through the capillary.

Transient humidity performance

Changing output due to slow humidity changes can be understood as dilution, as shown in figure 1; however, rapid humidity changes cause transient performance as shown for an O2-A1 oxygen sensor in figure 2 below. Peaks are negative when humidity increases and positive when humidity decreases; the peak height increases as the humidity change increases. Alphasense oxygen sensors are designed to minimise humidity transient effects so even a large transient such as 10% to 90% rh will not set a gas detector into alarm.

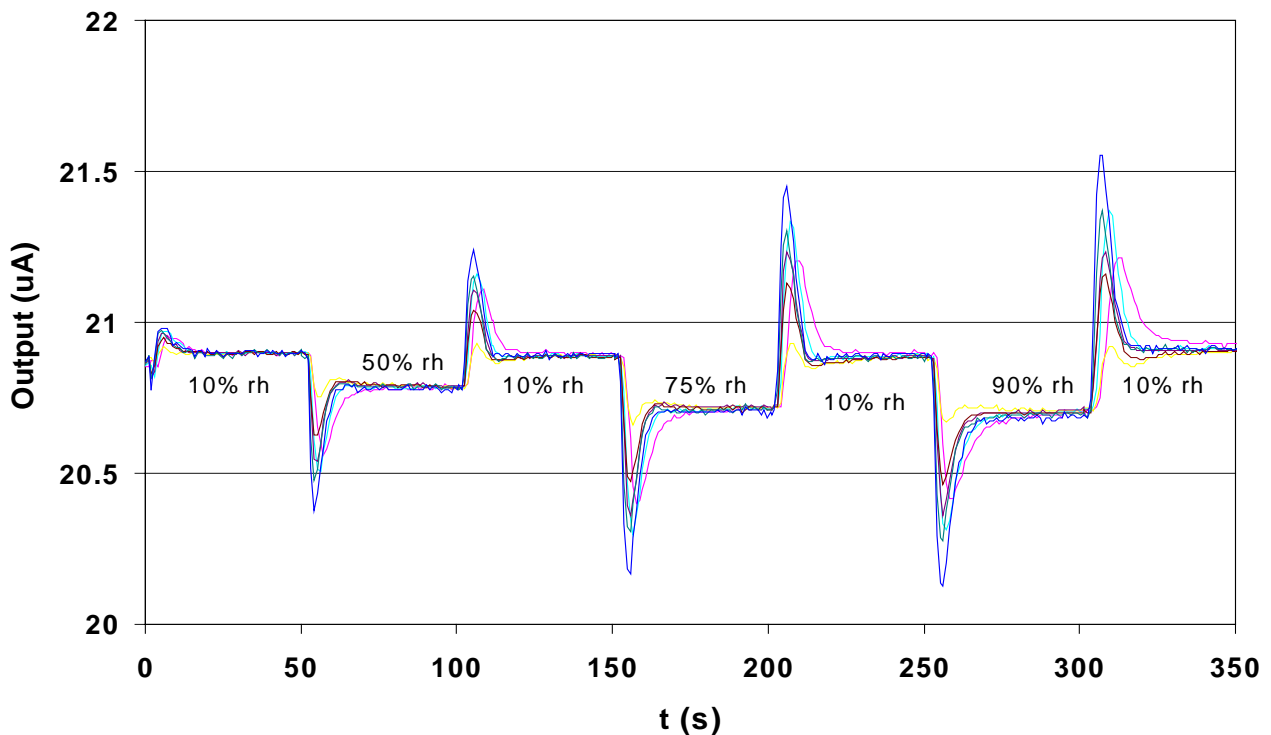


Figure 2. Transient humidity response of Alphasense O2-A1.

The effect shown in figure 2 is greatest for low output sensors: the O2-E1 shows the least effect, while the O2-A2 showed the strongest effect. Alphasense has modified the O2-A2 to specifically improve transient humidity spikes- it now has similar response as the O2-A1 shown above.

Contact Alphasense for advice on any specific application where humidity may be of concern.