Application Note AN-103

May 2016

SPEC Sensors™ Power-On Stabilization Considerations

Scope

For accurate and repeatable measurements, Baseline/Zero current should be stable with no drift. This application note describes the phenomena.

Baseline/Zero Current Stabilization

The electrochemical sensor can be thought of as a capacitor. The bias placed across the working and reference electrodes is similar to voltage across the plates of a capacitor. In the case of the electrochemical sensor, the effective surface area of the "plates" is extremely high. Thus, when the sensor is initially placed on bias, a "charging current" is observed (see **Figure 1**). This current may be as high as several hundred µA initially, but will quickly drop to the low microampere range. Ideally, this baseline current should be in the sub-microamp range. As the sensor continues to be powered on, the baseline/zero current asymptotically becomes lower and more stable, i.e. it improves in performance.

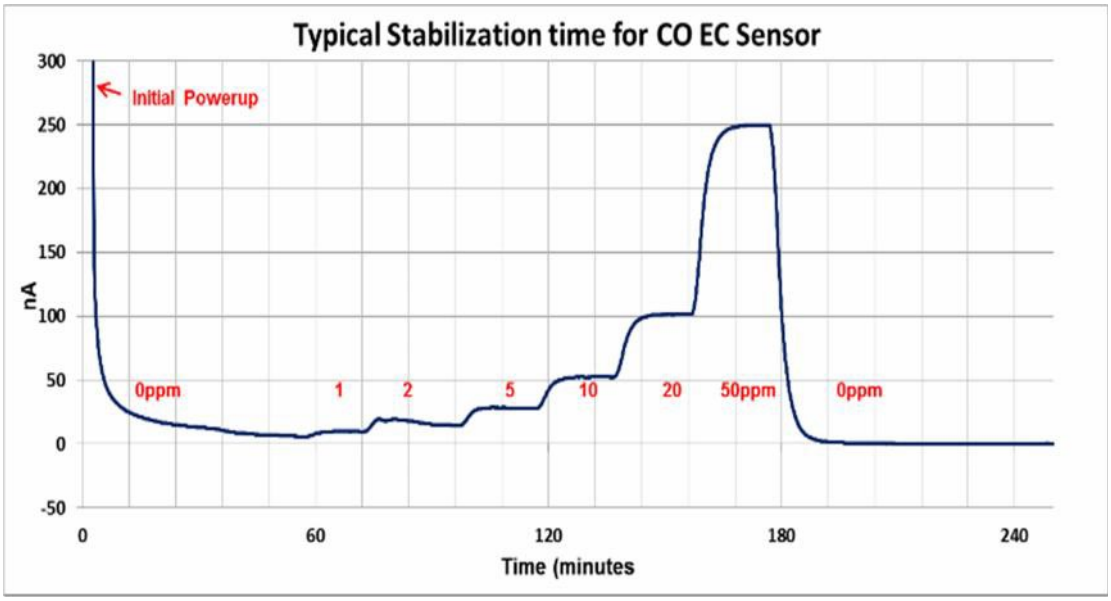

Figure 1: Power on Stabilization of CO Sensor

Thus ***Power-On Stabilization time is dependent on the accuracy goal of the application***. In general, you will observe less baseline drift, and thus improved accuracy, with increasing time after initial power-on increases. The minimum time on power before operation must be determined by the application, based upon the operating bias, minimum detection limit and concentration range of interest. *[See **Figure 2**] This is an example of incomplete warm-up, with potential 100-200 ppb errors in measured levels of NO2 after 20 minute. Note the 160 minute zero/baseline level.*