# How Often to Calibrate Gas Detectors

Regulatory Requirements

Many countries have safety agencies like OSHA and ATEX that give written standards on the frequency of calibration of portable gas detectors used for protection of workers. Sensor response invariably decreases gradually with time and exposure, and therefore a functional test of the instrument is important before the user enters any potentially hazardous environment. Although calibration standards are mostly written for confined space entry monitors with LEL/O_2/CO/H_2S sensors, we recommend the same procedures for all mPower instruments including those using other electrochemical sensors, PIDs and NDIR sensors.
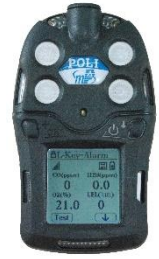
Causes for Sensitivity Loss

One of the most common causes for sensitivity loss is plugging or dirtiness of an inlet filter, or leaks in the sample train, so that the sample gas does not effectively reach the sensor. Pellistor-type LEL sensors can be poisoned, or their response suppressed, by silicone lubricants, acids, sulfur compounds and chlorinated compounds. Electrochemical sensors can be affected by loss of catalyst activity, drying of the electrolyte, or overexposure to corrosive gases, VOCs, or even the target gas. PIDs can lose sensitivity when the lamp ages or is coated by high-boiling compounds like heavy organic amines, or other deposits, particularly from phosphine or silazanes. A functional test applying detectable gas is the best way to check for any such issues.

- **Caution**: To test for sample train problems, it is important to set up the bump test or calibration check in a way that allows the instrument to sample the same way as in a live measurement. Thus, for diffusion instruments, the gas should be passed over the sensor and not forced through it. For a pumped instrument, the probe should be inserted into an open cup or open tube, into which gas is supplied, to allow the pump to draw in the sample without being forced into the unit.

Tiered Calibration Checks

mPower strongly recommends following the guidelines of ATEX and the ISEA (International Safety Equipment Association) on instrument calibration frequency:

- A daily test, either a *Bump Test* or *Calibration Check*, before entering a potentially hazardous environment. In both cases the applied gas concentration should exceed the alarm limit and ensure that the sensor and audio/visual alarms are working. A *Bump Test* need not use a define concentration gas and could be just a few seconds' exposure to cylinder gas or even a bottle of rubbing alcohol. A *Calibration Check* runs for full equilibration time and tests whether the instrument still responds within defined limits set by company policy, typically ±10-20% of the standard gas concentration.
- A *Full Calibration* if either the Bump Test or Calibration Check fail, and at regular intervals defined by company policy, the instrument manufacturer, or a regulatory guideline. Full Calibrations usually have tighter specifications than Calibration Checks. mPower recommends no more than a 1-month interval between calibrations for instruments that can be calibrated by the user. The best way to establish a calibration frequency is to start with daily calibrations and gradually increase the number of days until experience in the environment used establishes the longest allowable interval.

UNI 321 Monitors

The UNI 321 Series single-gas monitors can be bump tested but are not designed to allow full calibration by the user. The display normally shows only the number of months remaining but will show the gas concentration if the unit goes into alarm. Therefore, a calibration check with standard gas can be performed, but if the unit fails it will need to be disposed or sent to a service center for re-calibration or replacement.