

# ABC Key to Maintenance-free Gas Sensors

All SenseAir sensors are maintenance-free in normal environments thanks to the built-in self-correcting ABC algorithm. ABC stands for automatic baseline correction, a SenseAir self-calibration function for achieving maintenance-free gas sensors. That means that SenseAir's sensors have a life expectancy of at least 15 years and do not require any further calibration when used in normal indoor air applications.

## How does the ABC algorithm work?

The ABC algorithm constantly keeps track of the sensor's lowest reading over a preconfigured time interval and slowly corrects for any long-term drift detected as compared to the expected fresh air value of 400 ppm (or 0.04%vol) CO<sub>2</sub>. In normal indoor applications the carbon dioxide level drops to nearly outside air some time during a week. By sampling the values for an 8 days period and then comparing the lowest value with the meters 400 point, the meter is able to understand if it needs to adjust the zero point.

If the sensor is detecting hydrocarbons, the level of these gases is probably near 0 ppm most of the time. In all cases the ABC set point is adjustable ABC. This algorithm takes advantage of the fact that the CO<sub>2</sub> level stabilizes in buildings when unoccupied.

## What causes sensor drift?

Rough handling, transportation and aging might result in a reduction of sensor accuracy. With time, the ABC function will tune the readings back to the correct numbers.

## What if a room is occupied 24 hours per day?

If a space is constantly occupied and there are no periods when outside levels drop to background levels then the ABC algorithm will not work. This is the case for greenhouses or in closed confined spaces where CO<sub>2</sub> levels may be elevated at all times. For these applications the ABC function can be turned off. Without ABC operating the sensor should be calibrated every two to three years.

## What If outside/background levels are higher or lower than 400 ppm?

Sometimes the lowest level may be higher or lower than the 400 ppm assumed by the self-calibration algorithm. CO<sub>2</sub> based ventilation control is based on measuring the difference between inside and outside concentrations. It really does not matter if the lowest level of the concentration is 450 ppm. Just knowing the difference between the baseline period and the occupied period is enough to provide adequate ventilation control. This algorithm has the same effect as placing a sensor outside to constantly measure the difference between inside and outside CO<sub>2</sub> concentrations.

## How long will the sensor maintain calibration?

The sensor will maintain calibration as long as it sees a background level of CO<sub>2</sub> on a periodic basis. The electronics and components in the sensor are rated for a minimum 15-year life. The sensor should maintain calibration over its working life.

## ABC period example

A typical carbon dioxide variation in a building is shown below. CO<sub>2</sub> variations, that originate from a varying presence of people in a building. The ABC periods, 8 days by default, are indicated. By the end of each period the sensor is renormalized automatically so that the lowest ppm values are approaching the specified background level.

