

Using the Carbon Dioxide Sensor

The instructions in these notes are designed to show:

- How to calibrate the CO₂ Sensor
- How CO₂ levels change in an office with the windows closed.

General Points to note:

- The Logbook CO₂ Sensor uses a novel electrochemical technology. The key benefit is that it uses almost no power and so can be used to log for long periods of time without running the batteries down in the logger.
- The sensor responds slowly. It is not suitable for measuring the change in CO₂ from breath to breath. However you can measure the amount of CO₂ in human breath by breathing into a bag and putting the sensor in the bag to make the measurement.
- The sensor measures CO₂ levels from background atmospheric levels (nominally 400ppm¹) right up to high concentrations of 10% (100,000 ppm). In Datadisc the supplementary data function allows the calculation of CO₂ concentration in g m⁻³. The sensor accuracy after calibration is ±10% of reading.
- The maximum sampling rate for the sensor is 1 s.
- Metering Logbooks and HandyMeters will display values from the Carbon Dioxide Sensor.

Calibrating the Carbon Dioxide Sensor

In order to calibrate this sensor it is important to place it in a well ventilated location in which the CO₂ level is at the background level for 15 minutes prior to calibrating the sensor (this time should be increased to 60 minutes if the sensor has recently been exposed to high CO₂ concentrations).

Connect the sensor to a metering datalogger (or to Datadisc via a non metering interface with the meter running). Press the calibrate button on the sensor, **for at least 30 seconds**, until the reading changes to 400ppm (±10 ppm). The sensor is now calibrated.

To check to see if the sensor needs calibration place it in a well ventilated location for 15 minutes. If the sensor reads 400ppm ±40 ppm calibration is not necessary.

An investigation into the change of atmospheric CO₂ levels in an unventilated room

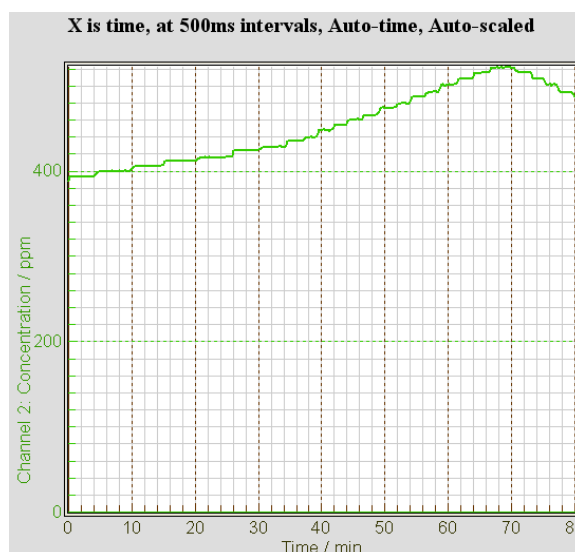
Using Datadisc and a CO₂ sensor, it is possible to investigate how the atmospheric CO₂ level varies as more people enter the room and the ventilation conditions change. To carry out this simple investigation proceed as follows:

1. Attach the Carbon Dioxide Sensor to the Logbook datalogger and place it in an empty classroom before the students arrive. Keep the windows closed at this point.
2. Start a recording. 10 minutes before the end of the lesson open the windows in the room.
3. Finish the recording at the end of the lesson. Attach the Logbook Datalogger to the computer start Datadisc and download the data to the computer using the file/transfer function.
4. Alternatively the data from the logger can be displayed throughout the lesson on a whiteboard using Datadisc and the changes monitored throughout the lesson if preferred.
5. A typical recording is shown in the graph.
6. In this example the windows of our office were closed as staff arrived. After 65 minutes the CO₂ levels had already risen to over 520 ppm. The windows were opened and the CO₂ levels can be seen to fall back down towards background levels.

Equipment List:

- A **Logbook** SE, XD,ML,UL,WL a USB lead to connect to the computer, a PC computer with **Datadisc** software installed.
- A **Logbook** CO₂ Sensor

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¹ Currently the level in remote regions is approximately 380 ppm but this varies somewhat in urban areas.