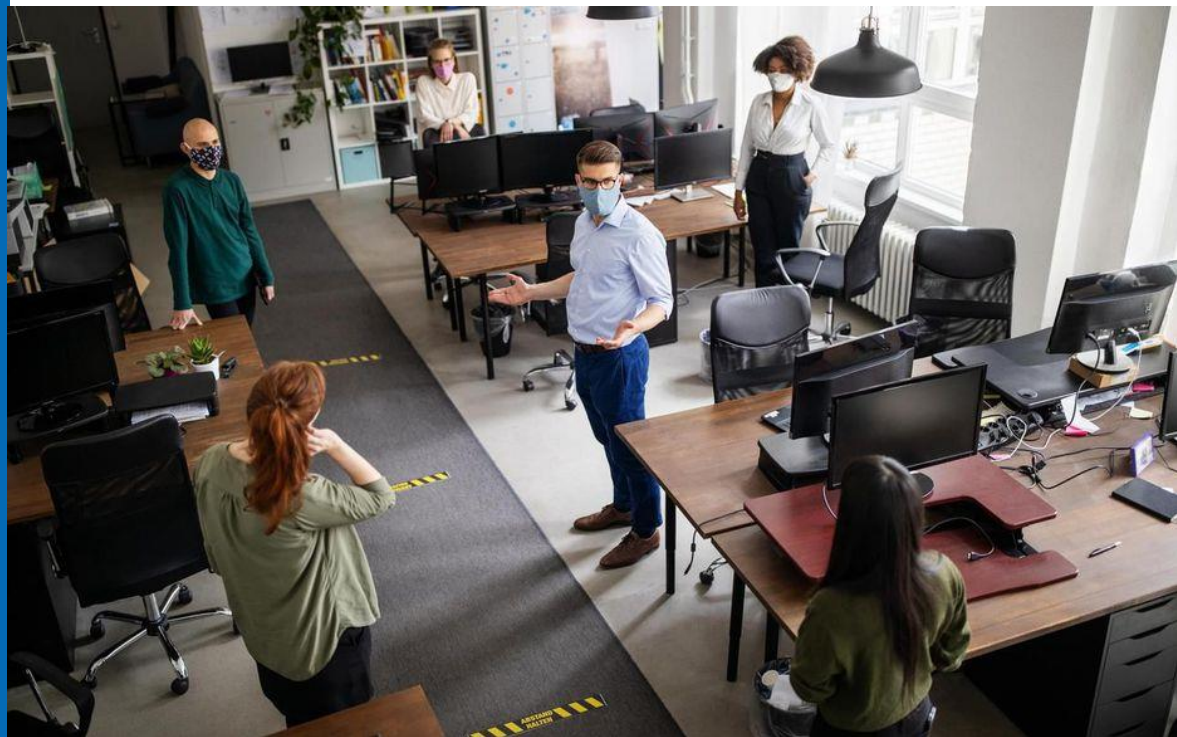# Practical Guide to Installing CO2 Sensors

Indoor air quality measurement. Fight against COVID19 and the well-being of users of your premises

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IOT FACTORY

Practical Guide to Installing CO2 Sensors
Indoor air quality measurement. Fight against COVID19 and the well-being of users of your premises

Motivations

CO2 concentration

Measuring the CO_2 concentration in closed places (offices, restaurants, hairdressing salons, schools, etc.) has become a subject of particular attention today, following the COVID19 crisis and the greatly increased risk of contamination in spaces closed.

However, indoor air quality standards are not recent. Most national laws provide for measures to limit the CO_2 concentration. The principle is based on scientific consensus which shows a clear correlation between CO_2 concentration and indoor air pollution. Indoor air pollution, beyond promoting the transmission of airborne viral diseases, can cause:

- Loss of concentration
- Nausea
- Headaches
- Nasal irritation
- Difficulty breathing
- Dryness in the throat
- Airborne virus contamination

In Belgium, for example, the CO_2 limitation is set, in the "well-being law", at 900 ppm (parts per million) for 95% of the occupancy time, or 500 ppm above the concentration of the outside air. .

CO2

400 ppm GOOD	< 800 ppm AVERAGE	> 1200 ppm BAD

Temperature and Humidity

Temperature and humidity are also parameters to monitor, which have an impact on comfort and health in closed places. While it is more difficult to set simple thresholds, as the circumstances and the type of location can vary, it is accepted that these must be within the limits presented in the following graph.
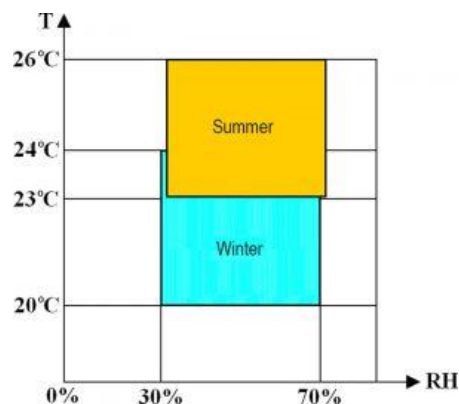
Installation of CO2 sensors

There is no hard and fast rule as to how many CO2 sensors to install and where to place them. You have to use common sense, and take into account the characteristics of this measure.

- CO2 is mainly produced by human respiration (except in the specific case of CO2 production by a device in the room, etc.). The amount of CO2 produced per person depends on their type of activity (light, intense ...)
- In principle, the CO2 concentration is homogeneous, but in large spaces (> 50m2), there may be local variations. These variations are due in particular to the presence of open doors / windows, the close presence of a person, the existence of partitions, and the ventilation present ...

It is therefore recommended to place the CO2 sensor at human height (+/- 150 cm), ideally not next to a door or a window, and not too close (min 1.5m) to a workstation. of somebody.

One-off or continuous measurements?

If you have efficient mechanical ventilation, and the occupancy of the premises is constant (therefore not a meeting room or a restaurant for example), occasional measures may be sufficient, in order to check that the ventilation is correctly programmed (in number m3 of fresh air - new! - per hour and m2).

If, on the other hand, the room has a variable occupancy rate, continuous measurement is probably recommended. All the more recommended since the ventilation of the room is manual (opening of doors / windows).

Number of CO2 sensors to install

You must place sensors in all the rooms you want to control. One sensor per room up to 50m2. For larger premises, the principle can be to check, by punctual measurements, the homogeneity of the C2O concentration at different places in the room, according to different occupancy situations. On the basis of these results (homogeneous measurements or strong disparities), you can then define the optimal number of sensors to be placed, to obtain a reliable result, without unnecessarily increasing the relative cost of the CO2 sensor equipment.

One-off CO2 measurement

Most sensors require calibration. This is usually done by placing the sensor outside (where the CO2 concentration is stable - around 400ppm in general) for a period of time. Refer to the calibration procedure supplied with the sensor.

To take a measurement, place the sensor in the measurement area, ideally at breast height, and outside the area that could affect the measurement (window, door, ventilation duct, etc.). Avoid staying too close (> 1.5 m) so as not to influence the measurement. And wait at least 5-10 minutes.

Measures to be taken

What if you measure too high a CO_2 concentration? You have to ventilate. Preferably with fresh air of course.

If you have mechanical ventilation, call your installer or increase the ventilation rate. Avoid air recirculation.
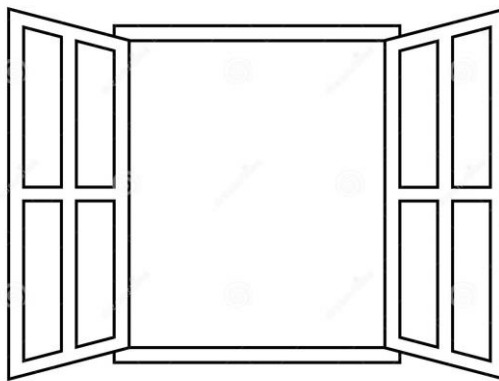
- **Open doors / windows.**
  With fully open windows, you can achieve an air change equivalent to 10x the volume of the room per hour.
- **Create air circulation** (for example by opening 2 windows on opposite sides of your building. The temperature difference (linked to the sun) will create a draft.
- **Limit the number of people in the room.**
- **For meeting rooms, ventilate** (minimum 10 minutes) after each meeting. Leave a window open during the meeting. If possible, limit the number of participants physically present. Or choose a meeting room designed for a larger number of participants.
- If the higher measurements are not sufficient, **install air purifiers.**

Temperature and manual ventilation
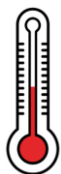
Some might be reluctant to open windows, especially in winter, to ventilate a room. You should know that walls, ceilings, floors and furniture accumulate up to 150 times more heat than the ambient air. This means that if the temperature, in winter, will drop when you open the windows (for example 10 minutes of ventilation, several times a day), it will rise very quickly thereafter, thanks to the heat stored in the place in question. **You will lose little heat and your air will be renewed!**

Mechanical ventilation

The size of mechanical ventilation systems is characterized by the number of cubic meters per hour of injected fresh air. Depending on the assignment of the room, this parameter will be specified per m2 (private places) or per person (common places - offices, schools, etc.). Be sure to start ventilation well before people arrive, and stop well after they have left. Ideally 2 hours before / after.

> In the context of the COVID19 crisis, it is recommended (Superior Health Council in Belgium) a flow rate of 50 m3 per hour and per person - ideally 80 m3 per hour and per person, in order to have the highest CO_2 concentration. low possible, and in any case below 800 ppm.

Call a professional to size or control your mechanical ventilation.

A ventilator is not an air renewal system. To avoid !

IOT Factory's AirQuality.ONE Solution

Indoor air quality control is essential to ensure occupant comfort. Whether in offices, shops, schools and nurseries, public places or even bars and restaurants, monitoring indoor air pollution, temperature and humidity conditions can increase the user comfort, reduce pollution-related illnesses, and limit contamination caused by respiratory viruses.

Air Quality.ONE is:

- Management of all your buildings, floors and spaces in which you place sensors
- The possibility of defining managers by building and limiting their access rights
- Interactive dashboards
- Alerts when a threshold is exceeded, directly on your smartphone
- WEB, CSV and PDF reports
- A web and mobile application (iOS, Android)
- Compatibility with different CO2 sensors, but also other sensors for the Smart Building

About IOT Factory

IOT Factory is a European technology company, based in Brussels, specializing in Smart Metering and Asset Tracking. With more than 20 years of experience in IOT and M2M solutions, we offer software solutions and sensors for air quality monitoring, energy monitoring, smart building, and equipment monitoring.

www.iotfactory.eu