



CO₂ Monitoring stations and WebApp short guide

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1. SYSTEM START-UP AND WIFI CONNECTION

Power the station using the provided micro-USB power supply or a power bank and micro-USB cable. The power consumption is about 0.5A.

Correct hardware connections are attested by the orange light flashing on the sensor and the green light flashing on the Raspberry Pi Zero.

Correct system operation and internet connection can be verified via the project WEB Site available at the address:

<https://www.co2lab.it/change-erasmus/login>

Entering the provided Username and Password, you can access to the “CO₂ Partner Monitoring Stations” main page:



Fig. 1. Main web page of the CHANGE Project monitoring stations. Each case refers to a specific numbered station and displays the local IP and wifi connection of each station, as well as the QR code linking to the specific station web page. Each case links to the specific station web page.

On the “CHANGE Proejct stations” page (see the screenshot reported in Fig. 1), there is a box for each CHANGE monitoring station identified by a unique ID number.

The ID number for each monitoring station is reported on the bottom of the station Raspberry Pi Zero board and on the box containing the station kit.

After a while (2/3minutes) the station is turned on, the Wi-Fi icon corresponding to your system ID will become green on the WEB page, as shown in the example of Fig. 2 for the CHANGE01 station.

Additional info regarding the Wi-Fi name (SSID), the local IP address, the date and time of last data sent to the server, and the actual values of CO₂, Temperature and Relative Humidity will be shown in the station box.

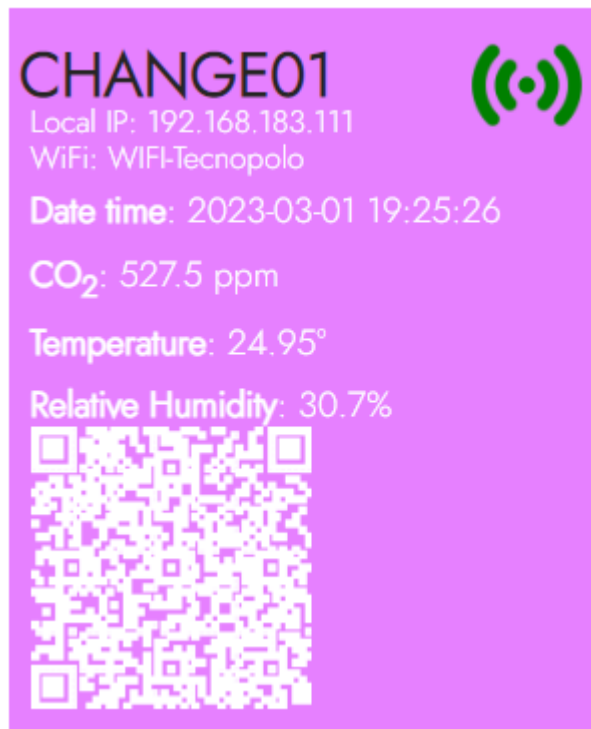


Fig.2. Information reported in the CO₂ monitoring system case when in operation.

The green WI-FI icon attests the correct connection of the system to the Wi-Fi network. Please refresh the web page in order to update the Wi-Fi icon status. If the icon doesn't become green, follow the procedure explained in Section 3. Is it also possible to add a new Wi-Fi network; the procedure is explained in Section 3.

2. DATA DISPLAY THROUGH THE WEBAPP

Calibration might be recommended if the station has undergone mechanical stresses or sudden temperature changes.

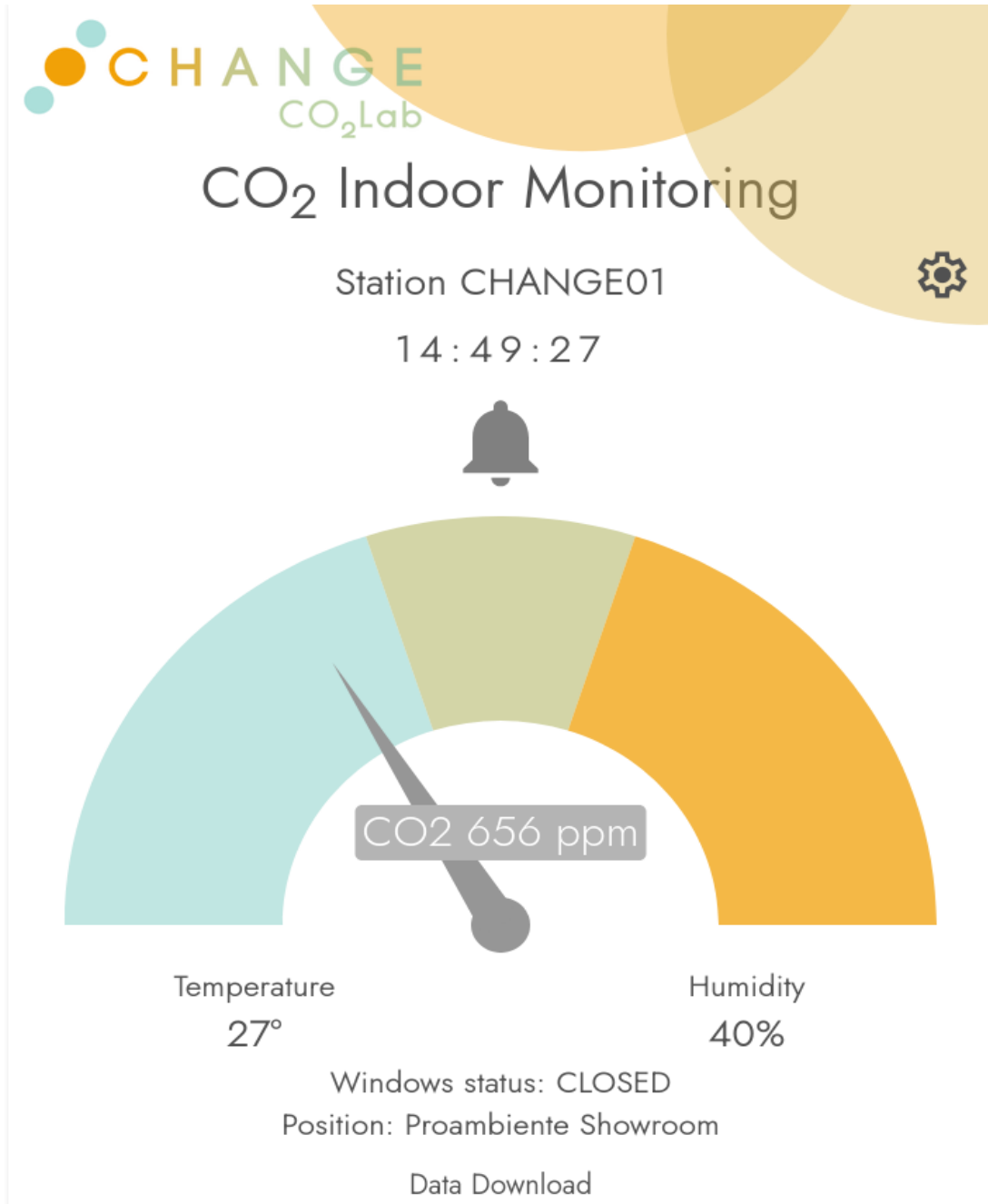


Fig. 3. Single station WebApp main page.

Once the system is properly working, it is possible to access the single system page by clicking on the corresponding box (see Fig.1). The single system page, shown in

Fig. 3, will display:

- The current value of CO₂ concentration, temperature, and humidity, along with a CO₂ gauge that has two thresholds at 800 and 1200 ppm. If these thresholds are exceeded, an audio alert will be triggered to indicate the need to ventilate the room;
- the status of the windows and the position of the station (to be set on the administration page, see Section); a button to download the data for the current day.

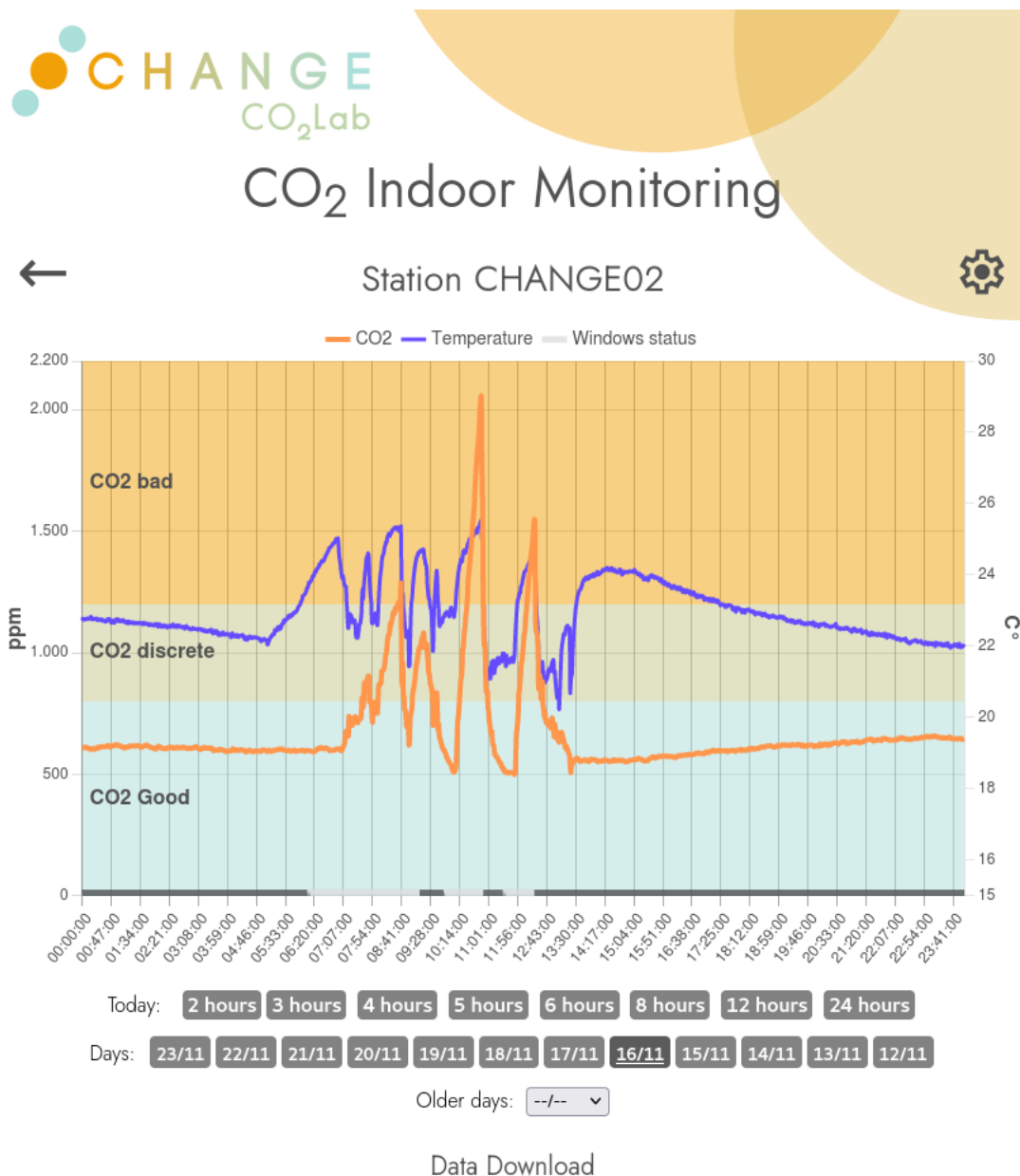


Fig. 4. Trend of CO₂ concentration (orange) and temperature (blue) vs time.

The chart displaying the CO₂ concentration and the temperature vs time are accessible by clicking on the CO₂ gauge. The trend of CO₂ is the orange line with the

scale on the left axis; the temperature is the blue line with the scale in the right axis; the window status (open/closed) is the white/black line in the lower part of the chart. The page shows the data for a selectable time interval between 2 and 24 hours for a selected day. By clicking on the date buttons (or on the list of older days), it is also possible to show historical data and download the corresponding CSV files, by clicking on “Download” after a specific day is selected.

IMPORTANT NOTE:

If the CO₂ concentration after turning on the system is lower than 400 ppm, it is necessary to recalibrate the system, following the procedure outlined in Section 3.

3. WEBAPP ADMINISTRATION PAGE

The administration page of the system can be accessed through the “Administration Page” icon placed to the right of the name of the station.

The sections on the Administration Page are (see Fig. 5):

Window status and position: it is possible to indicate whether the windows are closed or open in that moment, and the position of the CHANGE station, in order to provide useful information for subsequent data processing: in order to study the dynamics of indoor air quality in confined spaces it is very important to manually provide information about the status (open/closed) of the windows in the room under measurement.

The **Turn off** button allows for safe shutdown of the system, which occurs when the green LED on the Raspberry Pi board stops flashing.

The **CO₂ Calibration** button allows forcing the reading value of the Sensirion SCD-30 sensor to 417 ppm, which is the baseline value in an aerated location without people present. It is good practice to carry out periodic calibrations (every 7-15 days) according to the procedure described below:

1. Open available windows and allow the room to air out for at least 10 minutes with the door closed.
2. Close the windows and exit the room.
3. Wait 5 minutes and then perform calibration.
4. If the data does not stabilize around 417 ± 30 ppm in the next 5-10 minutes, repeat the procedure.



Fig. 5. Administration Page

The **ADD WIFI** button allows to add in the station new Wi-Fi connections: SSID (Wi-Fi name) and password are required. It's recommended to restart the station in order to properly apply the changes.

IMPORTANT NOTE:

The **Turn off**, **CO₂ Calibration**, and **ADD WIFI** buttons are enabled only if the user is connected to the same Wi-Fi as the CHANGE system (station). It means that the

user's pc/tablet/smartphone is connected to the Wi-Fi mentioned on the dashboard box.

4. WIFI CONNECTION ISSUES

This section deals with the resolution of Wi-Fi connection issues, which can occur when none of the Wi-Fi connections registered in the station are available in the location where the station is used. For example, first connection in a school, or connection in a new place such as in a science fair or in a different school.

To solve similar issues, the following Wi-Fi connection is configured in the memory of all the stations:

Wi-Fi name (SSID): CHANGE

Password: co2lab23

If no other Wi-Fi connection is available, then you can use your mobile phone to provide it, by configuring on the phone an hotspot named "CHANGE" and "co2lab23" as password. To do this you have to open the Settings app on your phone, go to the "Network" section and choose the "Hotspot & tethering" or "Personal Hotspot" (this can change from different devices or versions). After activating the Personal Hotspot on you mobile phone, the station can connect automatically and after a while on the CHANGE Web applicatione the Wi-Fi icon should become green (indicating the name of the Wi-Fi Connection as "CHANGE"). Now from the same mobile phone the shares the Hotspot connection, you can add a new Wi-Fi connection available in the location the station is, by using the **ADD WIFI** button in the Web application, as explained in Section 3.

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