

Breathmeter.com
CO₂ Rebreathing Analyzer
Operating Instructions

Power

Use the provided external 12 volt DC 10 amp power supply, or equivalent.

Probe, Weight and Stand

Clamp the stand to the edge of a table or bench and position the ring at the end of the horizontal rod to hold the probe in a vertical orientation. Position the height of the horizontal arm to accommodate the specimen under study. The probe produces a force of 10 Newtons +/- 0.2 (980 to 1020 grams on the scale).



Probe Connection



Connect the probe to the breathing machine using 40 cm of tubing with 6 mm inside diameter. The volume of this tube will influence the measurement.

Note: Longer tubing can be accommodated by adjusting the CO₂ flow. The small port on the probe can be used for etCO₂* monitoring, if desired. Otherwise, it should be capped off.

(*a patient monitor that displays end tidal CO₂ [etCO₂] is a useful tool for measuring CO₂ at the probe)

Breathing Machine


Connect the power supply and switch the power on. Adjust the breathing rate to the desired value, using the adjustment on the back of the analyzer. (Nominal for sleeping infant = 44/minute)

CO₂ Cylinder and Pressure Regulator

Connect the gas regulator to the cylinder using the little plastic gasket – make sure the gasket is in there – and tighten securely using a large wrench (spanner). The regulator can remain on the CO₂ cylinder until the cylinder needs to be exchanged.

If you are unfamiliar with the use of gas cylinders and pressure regulators, please read below:

Compressed gas cylinders contain a very high pressure gas and a pressure regulator is used to reduce the pressure to a working level. We use a nominal 0.5 bar (7 psi) which is important to keep constant. The regulator has a locking ring to prevent further adjustment.

- Keep the cylinder shutoff valve closed whenever you are not using gas
- Once set, leave the regulated pressure at about 0.5 bar and do not change it.
- When you open the outlet valve  open it a full two turns – (the first turn is restrictive)
- Keep the unit powered before and after flowing gas to prevent flooding the analyzer with CO₂
- A 5 pound (2.3 Kg) CO₂ cylinder should provide several hundred hours of operation.

Cylinder contents

Regulated Pressure Adjustment

Cylinder Shutoff Valve

(set to 0.5 bar)



Regulated Pressure Adjustment

Outlet Valve

Baseline Condition

The baseline measurement is established with the probe breathing freely. This can be achieved by elevating the probe at least 25 mm above any surface. A clamp on the probe stalk is provided for holding the probe in an elevated position.




CO2 Supply

Open the valve at the top of the CO2 cylinder  and confirm the outlet pressure is set to 0.5 Bar.

Connect the regulator output to the “CO₂ IN” port on the back of the analyzer. Diameter and length of the tubing will not influence the measurement – the tubing just needs to fit the connections without leaking.

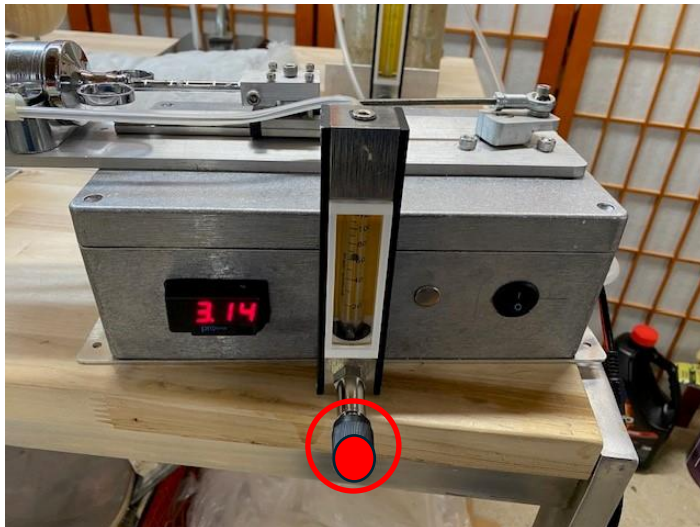
Gas flow


Switch on the analyzer.

Open the little valve at the outlet of the gas regulator. Open two full turns. 




Flowmeter





Using the control valve at the bottom of the flowmeter, set the flow to approximately 60 ml/min. If the valve has been adjusted previously, it will retain its adjustment. 

The meter displays the CO₂ volume % concentration, measured in the lung. The CO₂ indication takes several minutes to warm up and stabilize. Wait for the indication to remain stable for at least a minute before making any adjustments to the flow.

Baseline measurement

Breathing freely, the expected baseline measurement is between 3.75 and 4% CO₂. Small adjustments of the CO₂ flow will be required to bring the measurement into this range. Make very small incremental adjustments and wait a minute to see the result. 



When the CO₂ supply is shut off and later re-started, the flowmeter valve should retain its adjustment. Small corrections may still be required each time the CO₂ supply is shut off and restored.

Note: Before shutting off the power, close the little valve at the outlet of the pressure regulator  and close the big valve on top of the CO₂ cylinder.  Wait for the CO₂ flow to stop before switching off the power. This will prevent excess CO₂ from flooding the analyzer.

Material Measurement

Set the probe gently onto the test material in the vertical orientation, allowing gravity to apply the 10 Newton load. Adjust the stand to maintain the probe stalk in the vertical orientation.

Expect the measurement to slowly increase and become stable. Wait for the indication to remain stable for at least a minute before recording.

When measurements are completed, close the CO₂ cylinder  and outlet valve  and switch off the power.

Note: Once set, the gas pressure, breathing rate and CO₂ flowrate adjustments can be left in place. Next time the power is switched on and CO₂ cylinder valve and outlet valve opened, the analyzer will be “tuned in” and ready to use.

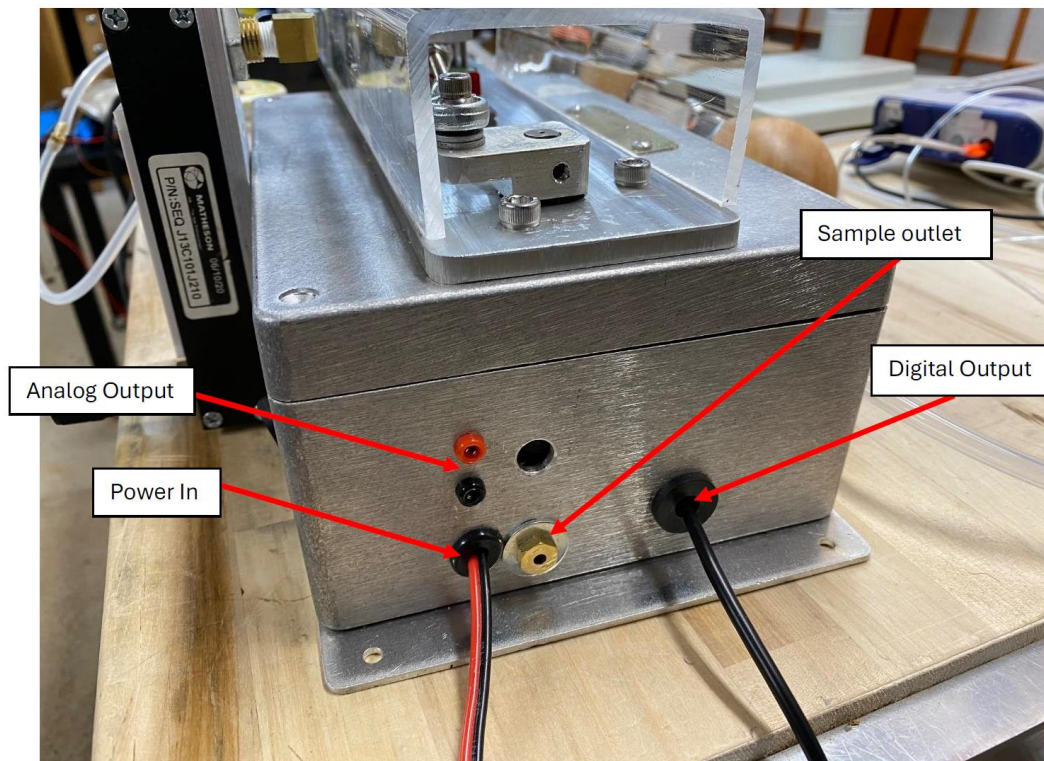
Calibration

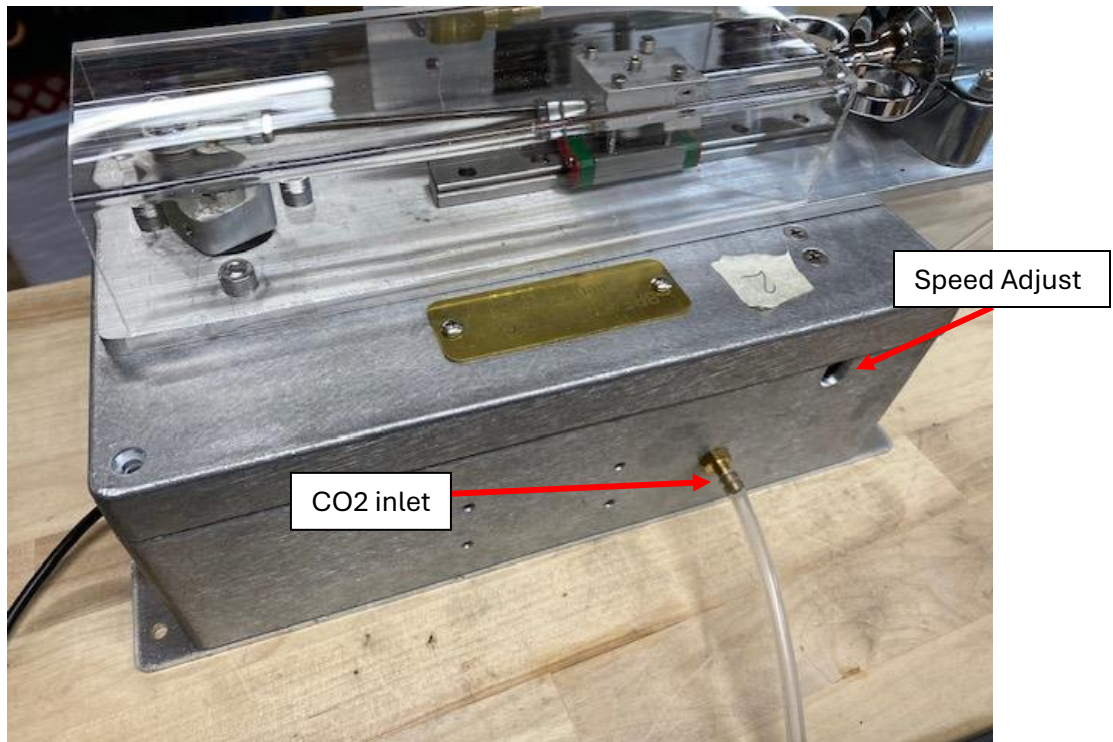
A Certificate of Calibration is provided with each unit. The indication on the panel meter has been calibrated against 10% reference gas and zero gas, and is very accurate, as reflected in the calibration certificate. The analog output on the side of the analyzer and digital output are uncorrected.

To check calibration: Using the port on the left side of the analyzer, inject a low flow rate (<1 LPM) of calibration gas and wait for the output to become steady. Note the input gas concentration and analyzer output. Nitrogen may be used to check the zero calibration.

If the output is inexact and requires adjustment, please see more detailed instructions for programming the panel meter.

Sample Inlet





Gaslab software

The digital output from Breathmeter can be connected to a PC using the USB port. Gaslab can be downloaded here:

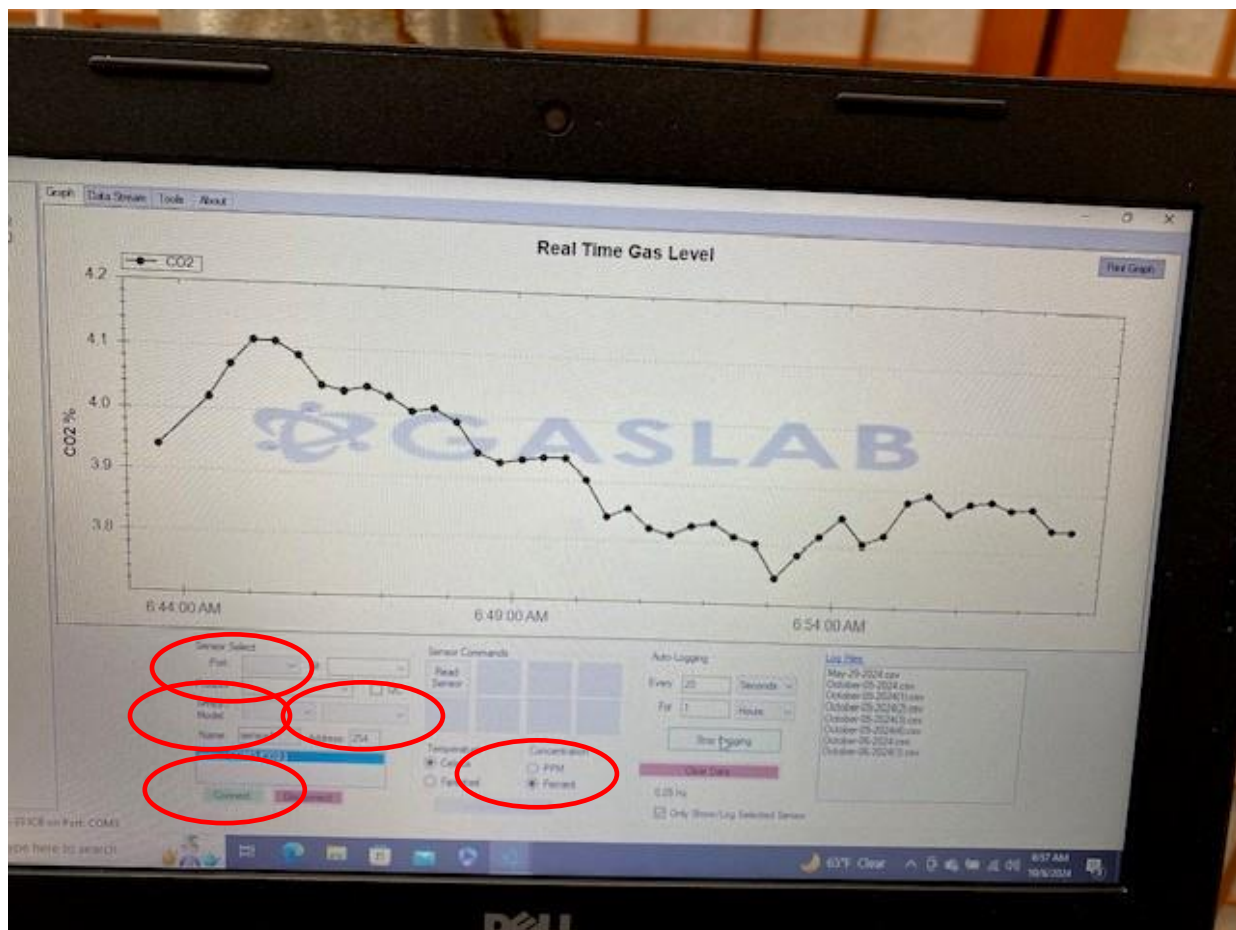
<https://gaslab.s3.us-east-2.amazonaws.com/GasLabSetup.msi>

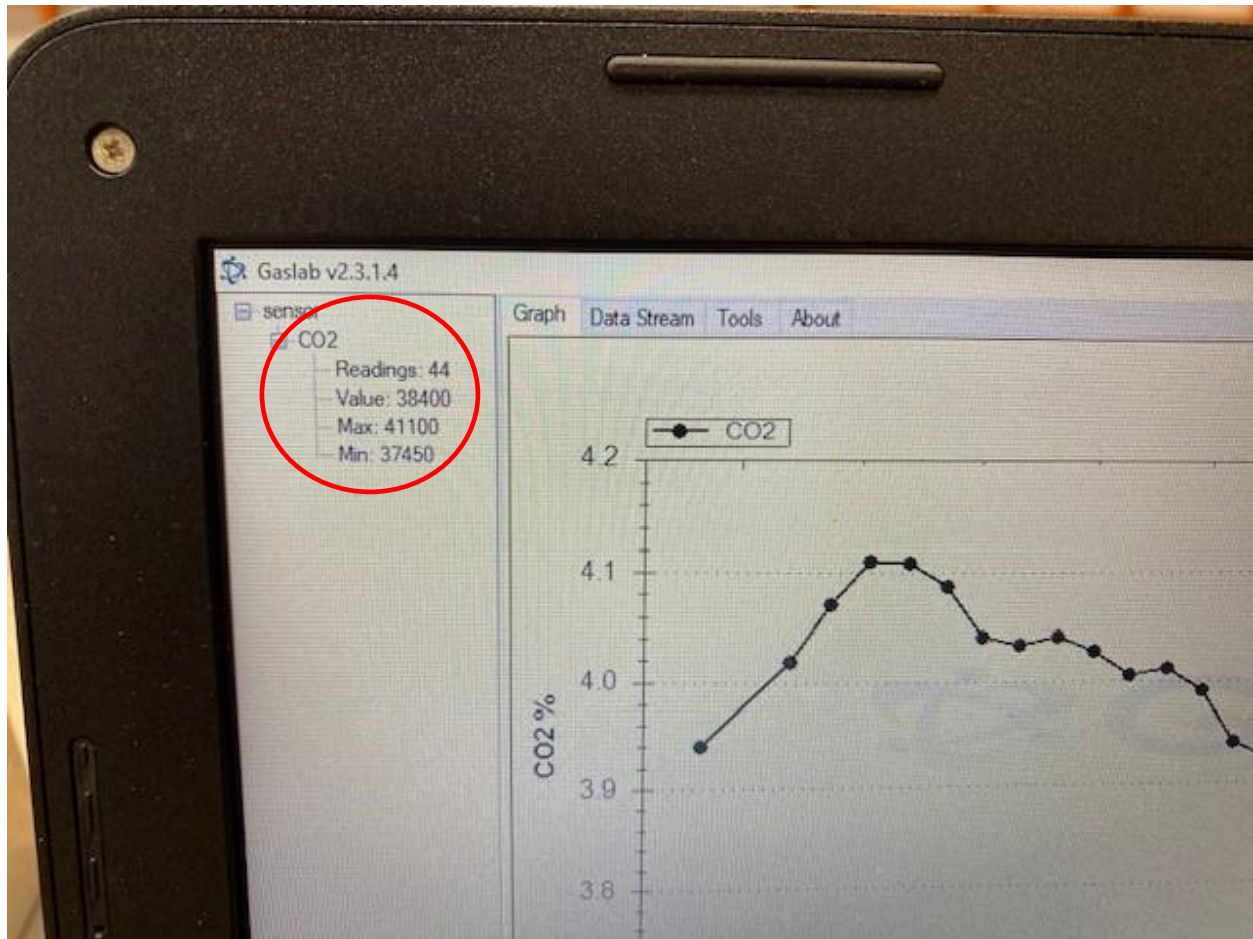
The software developer's notes may be found here: <https://www.co2meter.com/pages/downloads>

Once you open the application and connect Breathmeter, perform the setup:

1. Select the port
2. Select Series/Model to K Series
3. Select K33 ICB
4. Select Connect
5. Select Percent
6. Start Logging

Gaslab is useful to evaluate whether the measurement is steady.





Warranty - 1 year