



CO₂ incubators maintain specific levels of CO₂, temperature, and humidity for optimum cell growth. These parameters are monitored via sensors. For CO₂ incubators, there are two types of sensors commonly used: the infrared (IR) CO₂ sensor and the thermal conductivity (TC) sensor.

Infrared (IR) CO₂ Sensor

IR CO₂ sensor operates on the theory that light is absorbed by gases at specific frequencies. For instance, light is absorbed by CO₂ at 4.3 μm, within the IR band of the electromagnetic spectrum. The sensor measures the IR light directed at the CO₂ gas, while other wavelengths are prevented from hitting the sensor via a filter. Higher CO₂ levels would cause fewer IR rays to pass through the filter and be detected by the sensor. Low CO₂ levels would cause more IR rays to be detected by the sensor. This sensor provides accurate and stable measurements in varying conditions (see figure 1).

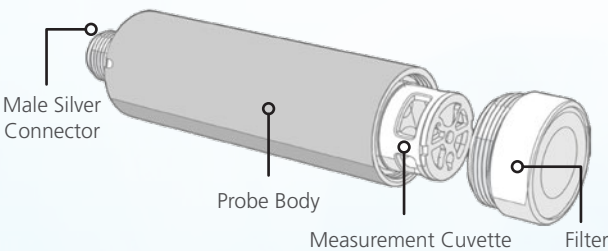


Figure 1. CO₂ Probe for measuring carbon dioxide.

Thermal Conductivity (TC) Sensor

TC sensor operates by measuring the resistance of CO₂ versus the ambient air (reference gas) and detecting changes in the resistance of the gas based on the CO₂ input flow. TC sensor is readily affected by humidity and temperature since these two factors affect air resistance. Therefore, opening the door of the CO₂ incubator easily affects the sensor, leading to inaccurate measurements (see figure 2).

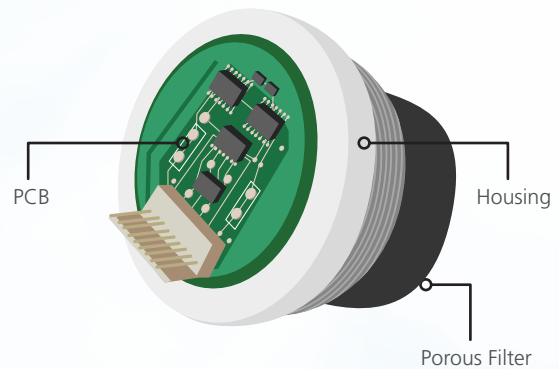


Figure 2. TC CO₂ sensor's operating principle relies on a resistor as a heater and two thermocouples as sensing element for the CO₂ gas.

The Right Choice of Sensor

Both sensors can detect CO₂ levels inside the CO₂ incubator chamber. However, the difference in performance and efficiency is notable. TC sensor is sensitive to fluctuations of temperature and humidity, while IR CO₂ sensor is not. This gives the latter a major advantage in terms of accuracy, making it the right choice for cell culture applications.

Esco offers state-of-the-art CO₂ incubator models equipped with IR CO₂ Sensor



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CelMate® CO₂ Incubators



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