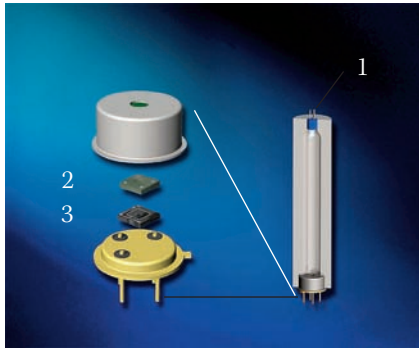


## Vaisala CARBOCAP® Sensor Technology for Stable Carbon Dioxide Measurement



The Vaisala CARBOCAP® Sensor components:

1. Infrared source
2. Tunable FPI filter
3. Infrared detector

The Vaisala CARBOCAP® Sensor is a silicon based, non-dispersive infrared (NDIR) sensor for the measurement of gaseous carbon dioxide. Its working principle is Single-Beam Dual-Wavelength NDIR, the same method that is commonly used in expensive high performance NDIR analyzers. However, in the Vaisala CARBOCAP® Sensor, the traditional rotating filter wheel is replaced with a tiny, electrically controlled Fabry-Perot Interferometer (FPI) made of silicon. A true Dual-Wavelength measurement can be provided in a very simple and practically solid-state structure.

### The operating principle

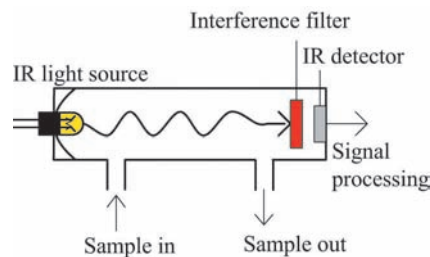
An infrared source at the end of the measurement chamber emits light into the gas chamber, where any carbon dioxide gas present absorbs a part of the light at its characteristic wavelength. The FPI interference filter is electrically tuned so that its pass band coincides with the absorption wavelength of carbon dioxide. The IR detector measures the strength of the signal that passes through.

After this the pass band of the FPI is shifted to a wavelength where no absorption occurs. This provides the reference signal. The ratio of these two signals, one at the absorption

### Features/Benefits

- Vaisala CARBOCAP® Sensor, a silicon-based non-dispersive infrared (NDIR) sensor
- Built-in reference measurement – superior stability
- No moving parts - excellent durability

wavelength and the other at the reference wavelength, indicates the degree of light absorption in the gas and thus the gas concentration. The reference signal compensates for the possible effects of sensor aging and contamination, making the sensor very stable over time.



The Vaisala CARBOCAP® Sensor is simple in structure, yet it offers high performance.

The Vaisala CARBOCAP® sensors have excellent stability, both in terms of time and temperature. The sensor is accurate and durable, and its small size enables the measurement system to be truly miniaturized. Due to the simplicity of the structure, Vaisala is able to offer customers a high quality sensor at an affordable price. In particular, Vaisala CARBOCAP® solutions will prove themselves economical over time: their stability will decrease maintenance costs significantly over the years.

### Applications

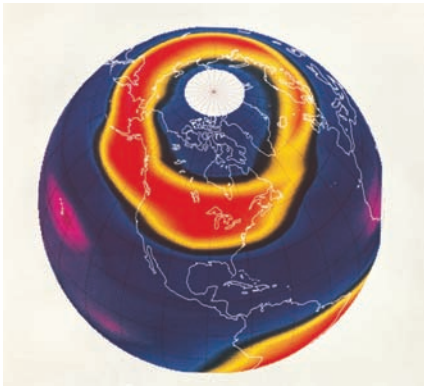
Vaisala's line of CO<sub>2</sub> instruments meets the needs of ecological measurements as well as industrial measurements and HVAC. Fixed transmitters and portable meters, as well as OEM modules, are available.

For ecological measurements Vaisala offers instruments, such as Vaisala CARBOCAP® Carbon Dioxide Probe GMP343, for diffusion based CO<sub>2</sub> measurement. The instruments can be used both in below-ground CO<sub>2</sub> measurements and soil respiration boxes.

The Vaisala CARBOCAP® Carbon Dioxide Transmitter Series GMT220 are designed to measure CO<sub>2</sub> in harsh and humid environments, such as greenhouses and industrial process sites.

For HVAC applications, Vaisala product range consist of both duct and wall mount transmitters. They are a cost-effective solution for demand controlled ventilation and related applications. The Vaisala CARBOCAP® technology is so stable that these instruments only require a calibration check every five years.

The Vaisala CARBOCAP® Hand-Held Carbon Dioxide Meter GM70 is ideal for various spot-checking applications, like laboratories, greenhouses, mushroom farms, breweries and bottling plants and as a tool for checking fixed CO<sub>2</sub> instruments.



*A small change in the soil respiration can have a major impact on the whole atmospheric CO<sub>2</sub> budget and on the global ecosystem.*



*Forests have an important role in world's ecosystem.*



*Biological research.*



*The productivity in a greenhouse can be increased up to 30% with proper CO<sub>2</sub> fertilization. The optimum CO<sub>2</sub> concentration depend on the plant and the light conditions in the greenhouse.*



*Carbon dioxide is used for carbonation of beverages - CO<sub>2</sub> is the gas that gives the fizz to soft drinks. In breweries and wineries, CO<sub>2</sub> is recovered as a by-product of fermentation. CO<sub>2</sub> is also injected into bottles when the bottles are capped to remove oxygen.*



*By monitoring CO<sub>2</sub> and humidity levels, certain broiler houses have observed improved growth rate, feed conversion, and product quality.*



*The top reasons for maintaining good indoor air quality are human comfort and health aspects, energy savings and well-being of the building and it's structures.*



*Too low ventilation means bad air quality and an unpleasant environment.*