

The Vaisala GMM220 series CO₂ measurement modules based on CARBOCAP® technology.

relation to the actual CO₂ concentration.

The ST probe described here is equipped with Vaisala's modular CO₂ sensor. The CARBOCAP® sensor is silicone based and operates on the NDIR Single-Beam Dual-Wavelength principle. Based on this new measuring principle, its main advantages are long-term stability and a long life – the main reasons why we chose Vaisala's product for our carbon dioxide application.

The output of the sensor (Signal Converter Module) is 0 (4) – 20mA and a serial interface RS-232 is available.

Additional signal processing is realized by connecting the CO₂ probe to a measuring computer FMC-MINI LCD. This is a modification of an existing measuring computer which is successfully used in biotechnology to detect volatile organic compounds. The system for measuring carbon dioxide is a new development by Biotechnologie Kempe.

The carbon dioxide concentration in the carrier gas is shown as % Vol. after processing by the computer.

Based on the detected concentration in the carrier gas, the computer calculates the partial pressure of CO₂ in the fermentation broth. The next step is the calculation of the dissolved CO₂ by means of the additionally measured temperature. The influence of other compounds on the solubility of CO₂ can be compensated for with the computer program. The measuring computer realizes the collection of values, processing, calibrations and graphs.

Measuring range

Several CO₂ probes are offered for measuring the dissolved carbon dioxide concentration by the described principle, in accordance with the measuring range.

The measuring range is fixed by the carrier gas flow rate, which, in turn, depends on the nozzle being used. Depending on the chosen nozzle, a measuring range of 0–50 % or 0–100 % of saturation can be realized. These probes are offered for using during no-pressure fer-

mentation; a probe which covers a range of 0–500 % saturation, for use during pressurized fermentations, is also available.

Carbon dioxide applications

Carbon dioxide is a product of the cellular metabolism of micro-organisms used in biotechnology. During fermentation the carbon dioxide content is the result of carbon dioxide formation by the micro-organisms and its transport by aeration. By means of the CO₂ probe it is possible:

- to detect the carbon dioxide concentrations which inhibit the metabolism and growth of micro-organisms, so the user is able to start compensating measures – for example, aeration.
- to obtain information about the growth and activity of micro-organisms during fermentation.
- to realize the control of anaerobic fermentations.

Carbon dioxide also plays an important role as a quality parameter in the beverage and brewery industry and can be detected by the measuring system in order to ensure the quality of the final product. ■

GMM220 Series Carbon Dioxide Measurement Module

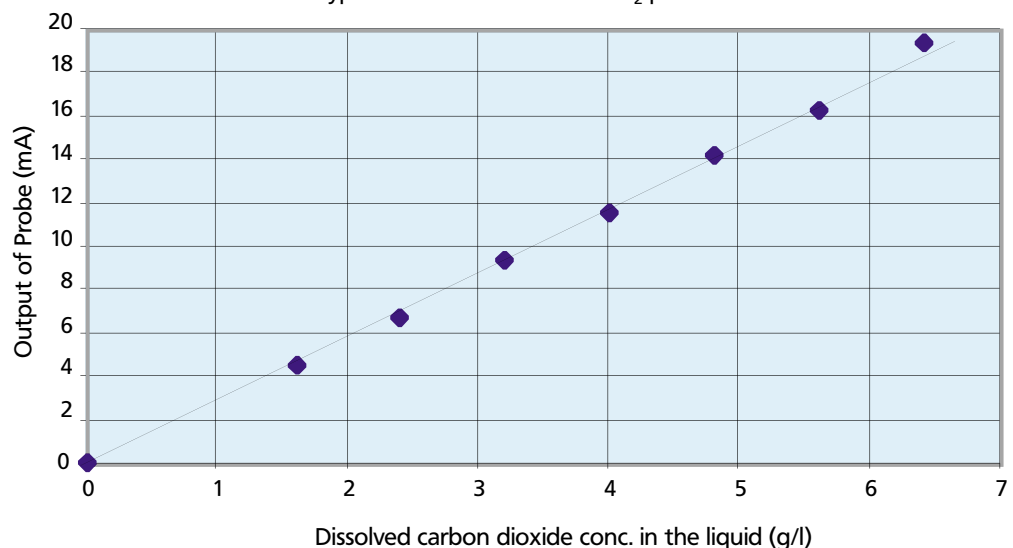
The Vaisala GMM220 series CO₂ measurement modules incorporate the enhanced CARBOCAP® technology. The transmitters have been optimized for integration into equipment for greenhouse control, incubators, fermentors, safety alarms and integrated systems.

Many advanced features enable trouble-free control of CO₂ levels, even in demanding applications and harsh environments.

The GMM220 series transmitters provide both time and temperature stability thanks to the CARBOCAP® sensor's constant reference measurement.

Fully interchangeable probes make the GMM220 series transmitters very versatile. The probes do not only simplify calibration and field service, but they also make it easy to alter the measurement range. Different power supply voltages and output options as well as different probe attachments are also available. ■

Typical calibration curve for CO₂ probe



Calibration curve (related to a beverage industry application).