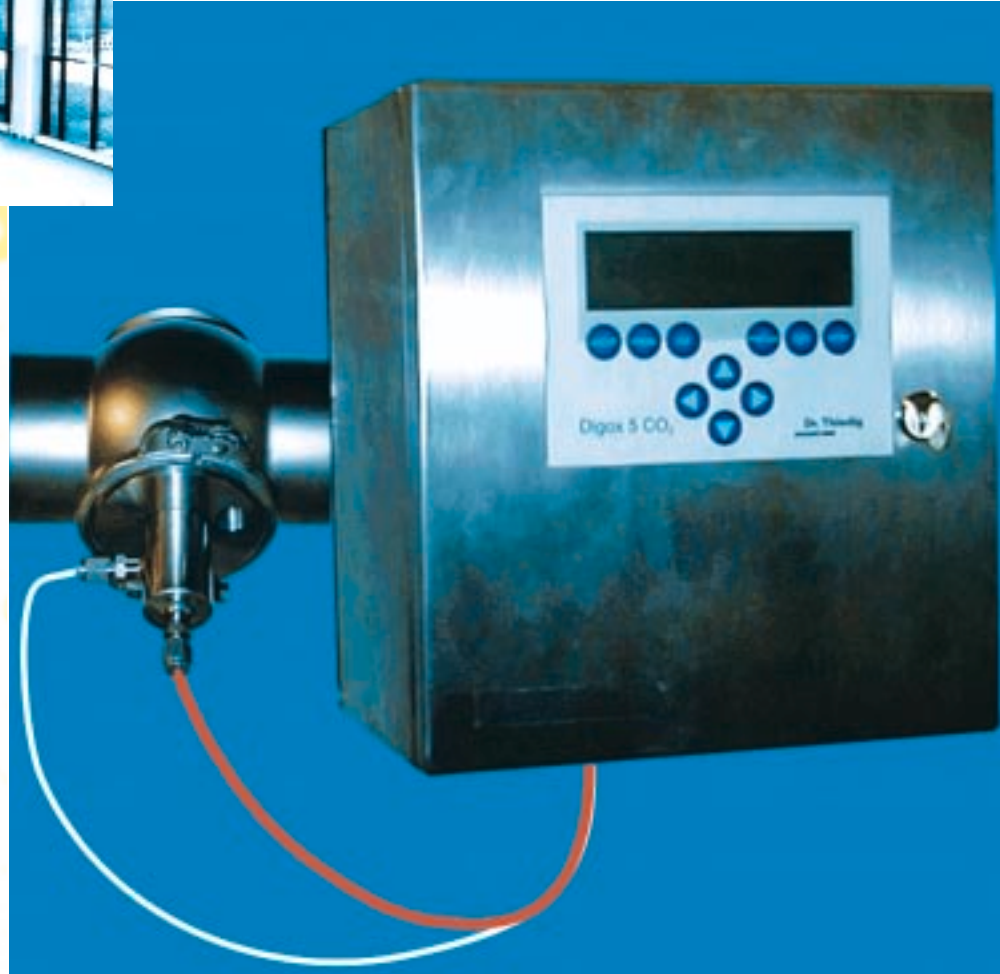


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Anlagen- und Analysentechnik

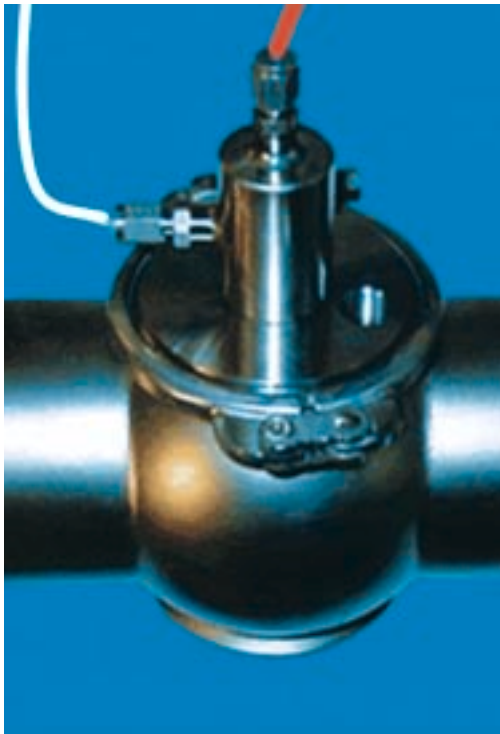


DIGOX 5 CO₂

In-line measurement of CO₂ for constant product quality

DIGOX 5 CO₂ – the robust system for CO₂ measurement in the beverage industry

The content of dissolved CO₂ is a decisive factor for the taste of a beverage. It also influences the accuracy of other measurements, such as original gravity. In addition, carbonisation causes considerable costs in beverage production. These are some of the many reasons why in-line measurement of the CO₂ content is indispensable.



Thiedig in-line probe

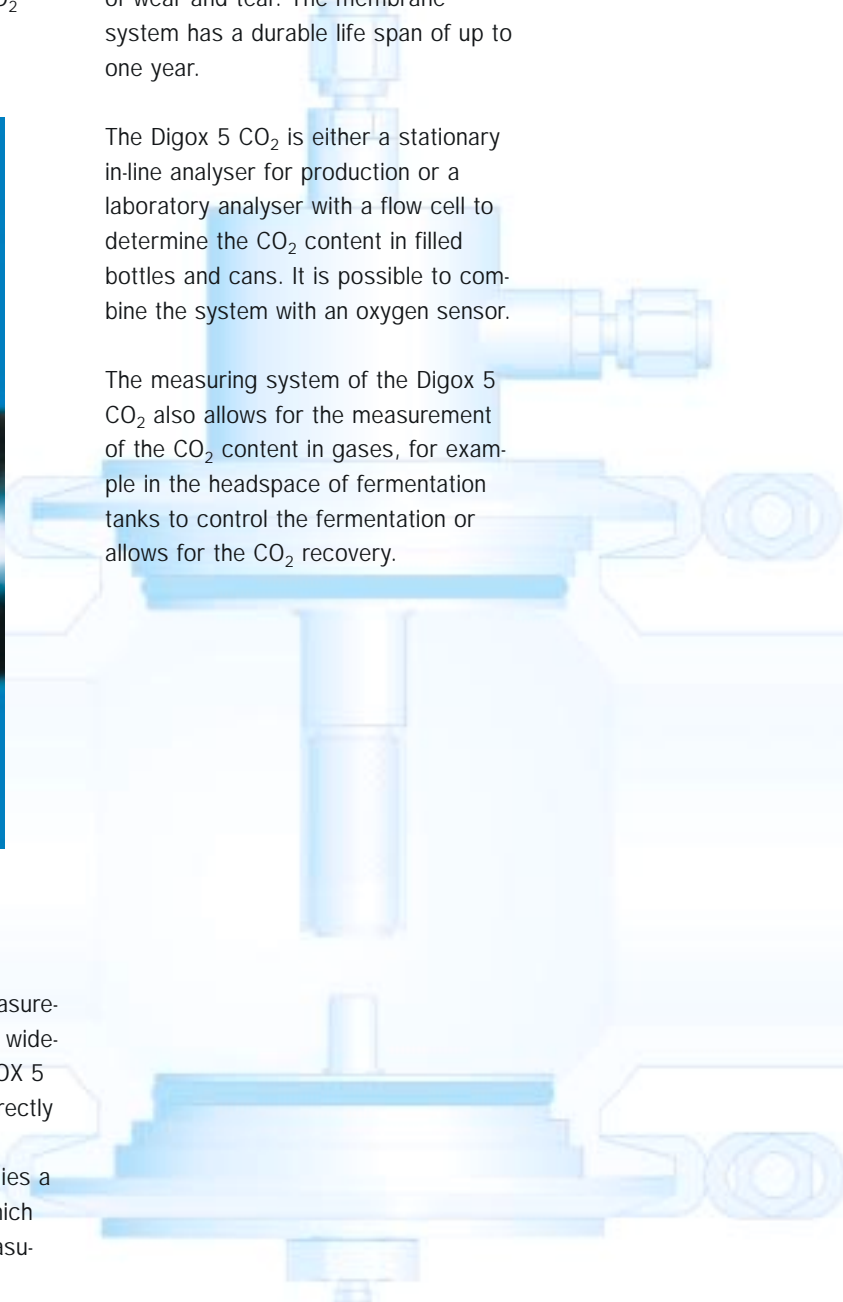
The Digox 5 CO₂ is a robust and precise system for in-line CO₂ measurement of beverages. In contrast to widely available (p,T) systems, the DIGOX 5 CO₂ measures the CO₂ content directly via a physical measuring method. Therefore, the DIGOX 5 CO₂ supplies a continuous signal. Dead times, which are caused by pumping out a measuring cell, do not exist.

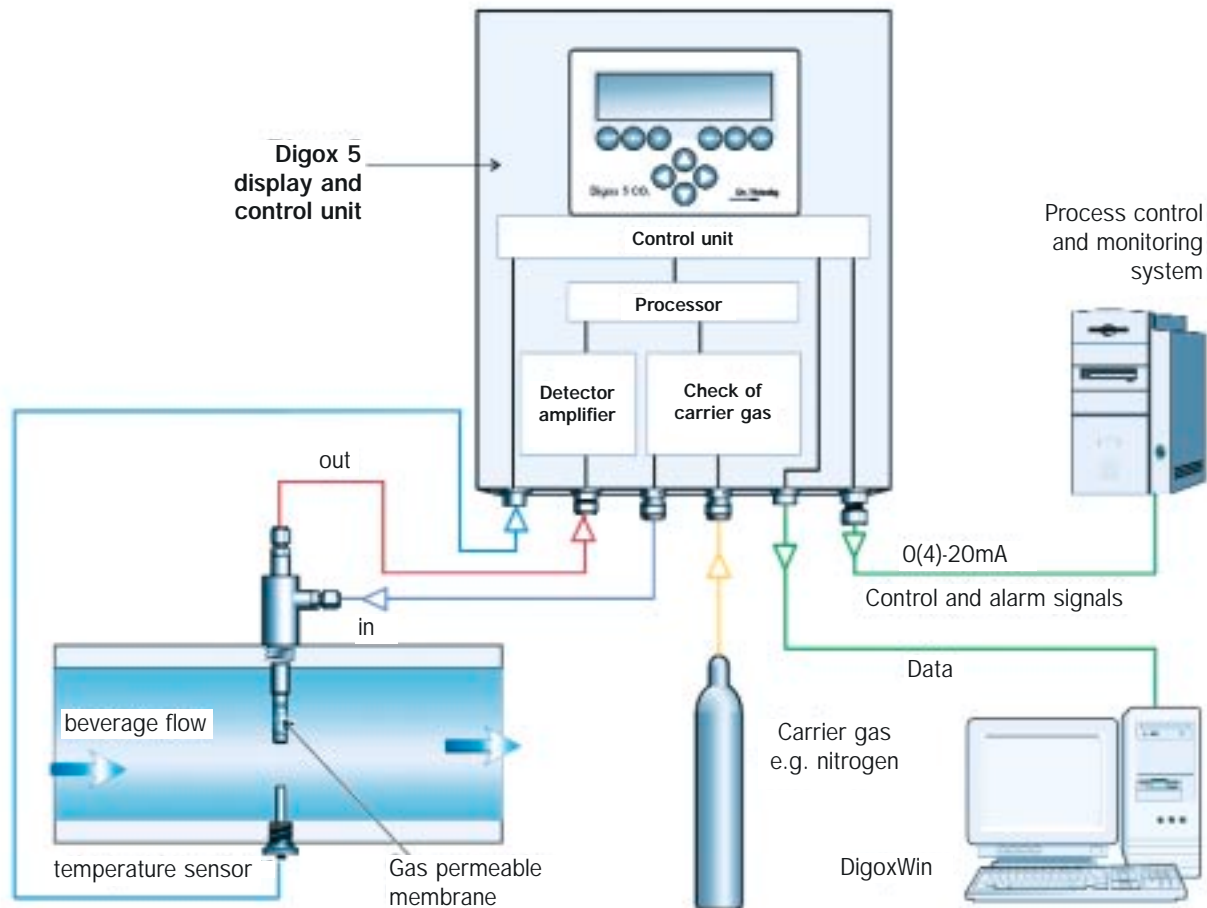
Other gases, such as nitrogen or oxygen, which can be found in beverages, do not cause any cross sensitivities when measuring.

The probe of the Digox 5 CO₂ has no moving parts, such as magnet valves or bulbs and is therefore almost free of wear and tear. The membrane system has a durable life span of up to one year.

The Digox 5 CO₂ is either a stationary in-line analyser for production or a laboratory analyser with a flow cell to determine the CO₂ content in filled bottles and cans. It is possible to combine the system with an oxygen sensor.

The measuring system of the Digox 5 CO₂ also allows for the measurement of the CO₂ content in gases, for example in the headspace of fermentation tanks to control the fermentation or allows for the CO₂ recovery.





Configuration of the system

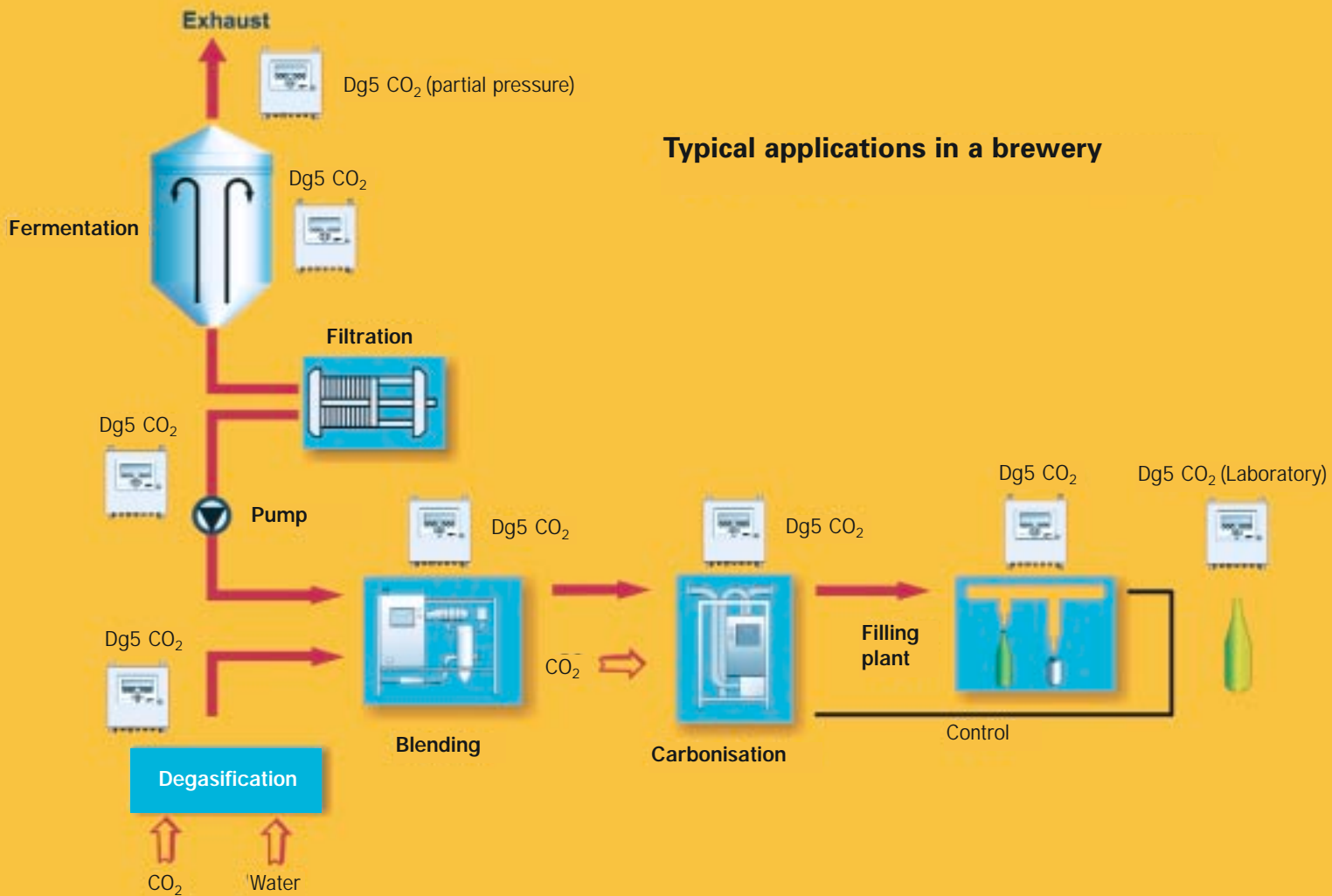
Operating principle of Digox 5 CO₂

The Digox 5 CO₂ probe is calibrated at our workshop to determine directly the partial pressure of the dissolved CO₂ in the beverage. The value will be passed on to the Digox 5 display and control unit which then calculates the concentration of dissolved CO₂ in g/l. The predetermined correct solubility of the beverage can be selected by choice. This value will be corrected to the current temperature of the beverage, which is measured by a sensor belonging to the Digox system in the beverage piping. Any changes in the composition of the beverage (brix, alcohol, etc.) can be taken into account when calculating the solubility. If the exact value of the solubility is unknown, the system calibration can be carried out by means of a reference value. Such a value can be determined by the shaking method for example.

The Digox 5 CO₂ operates almost free of wear and tear, because it does not contain any moving parts. In contrast to other in-line systems, the membrane only serves for sampling purposes. Therefore, the system has a high operational reliability.

The robust construction of the probe - all parts which get in contact with the sample are made of stainless steel V4A, the silicon membrane is concurrent to FDA - facilitates a long service life.

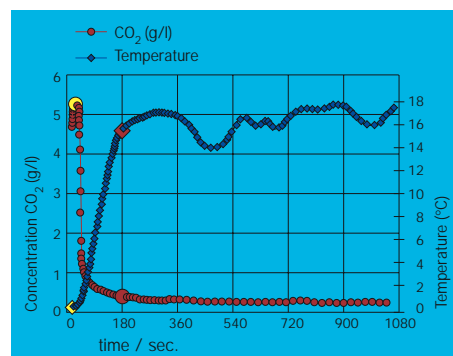
For the connection to common piping and flange systems (e.g. in-line housing VARIVENT®), we offer suitable adapters. The probe is fully suitable for steam sterilization and CIP-compatible.



Typical applications in a brewery

Advantages of continuous in-line CO₂ measurement

- The continuous and direct monitoring of the measuring values with a computer results in an increased accuracy.
- The product quality will be more constant.
- Laboratory staff will be relieved of routine work.
- Information about the product quality can be recorded in detail (product re-tracking).
- on-line information regarding the condition of fermenters, tanks and filling machines.
- Minimization of CO₂ losses.
- Deformation and bursting of cans and bottles will be avoided due to continuous and correct measurements.

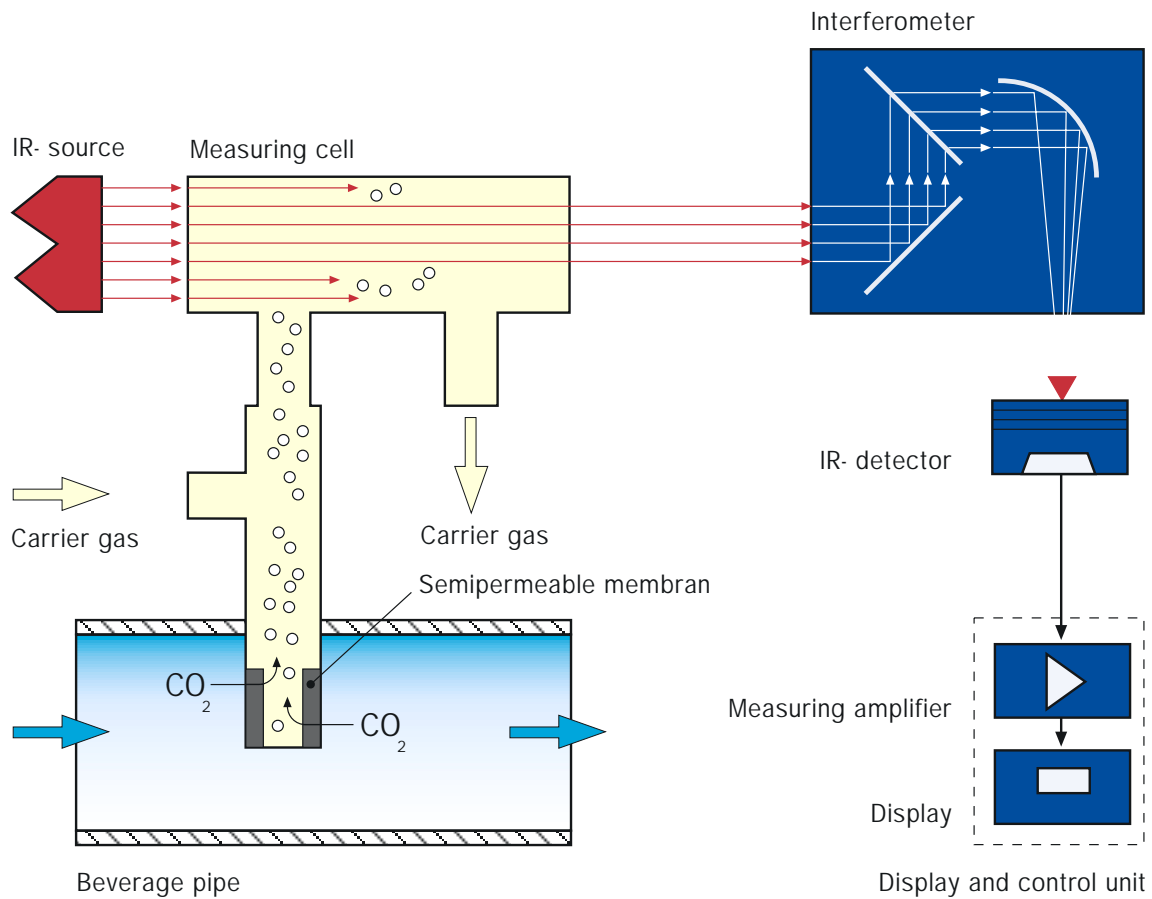


The Digox 5 CO₂ data logger allows the continuous recording of all relevant data, for example of the CO₂ concentration together with the temperature, when filling a beer pipe after CIP.

After filling the pipe with beer, the CO₂ concentration through the carbonization system can be seen.



Each system is carefully tested in our certified laboratories. Special customer requests can be adapted at any time.



Principle of function of the measurement system Digox 5 CO₂

The system Digox 5 CO₂

The probe

The probe immerses directly into the beverage piping. The CO₂ diffuses through the membrane system and is transported to a detector from a carrier gas (nitrogen, synthetic air or compressed air with a defined, constant CO₂ content) and is measured there. The system Digox 5 CO₂ offers, according to the requirement, different detectors and membrane systems. The measuring system can therewith be optimally adjusted to different process requirements. The probe fulfils the requirements to microbiology according to EHEDG standard.)*

The evaluation and control unit (ASE) of the DIGOX 5 CO₂

First of all, the ASE serves the evaluation of the measuring signal and the in situ display of the measuring value. The relevant working data such as measuring value, partial pressure of

the CO₂, temperature, date and time are displayed in a clear graphic. The operation of the measuring system is carried out by a clearly structured menu guidance with diverse adjustment options of relevant working data, for example a selection menu with a total of 16 available options. The failure of the sensor and carrier gas are displayed by a clear message.

The calibration of the measuring system is very easy and is carried out by pressing a button. A reference value, which has been determined in the laboratory, serves in practice as calibration standard. A retrievable calibration memory function shows the time of the last six calibrations with the calibration result as well as information about a possible drift of the measuring system.

The evaluation unit has a signal outlet (0/4-20 mA), which has been adjusted to the measuring range (please see

technical data), two freely programmable limits, one failure message for system error as well as an interface. The combination with a regulator for the CO₂ dosage is easily possible.

A built-in data logger has over 4000 memory spaces. The memory interval is freely selectable, the smallest step 1 s. In addition to the CO₂ content, the temperature in the piping, partial pressure of the CO₂, date and time are recorded. The stored data are read via the interface. The supplied software CarboWin enables the transmission of measuring data to Microsoft Excel® with the respective possibilities of displaying the measuring value as a table or graphic.

*in preparation valid September 2001

Specifications

Probe	
<i>Measuring ranges</i>	range 1: 0 ... 2 g/l (pressureless) range 2: 0 ... 10 g/l
<i>Accuracy</i>	range 1: $\pm 0,05$ g/l range 2: $\pm 0,1$ g/l
<i>Repeatability</i>	$< \pm 0,1$ g/l
<i>Response time t_{90}</i>	25 s
<i>Maximal sample pressure</i>	< 40 bar
<i>Sample temperature</i>	0 ... 50°C (CIP-compatible up to 130°C)
<i>Sample flow</i>	1 mm/s $< v < 10$ m/s
<i>Mounting length CO₂ - probe</i>	< 70 mm Mounting adapter for all standard Varivent® in-line cases or other in-line piping connections
<i>Assembling position</i>	any
<i>Housing</i>	Stainless steel (1.4571), ABS/ IP 65
<i>Diameter of probe (immersion)</i>	16 mm
<i>Weight</i>	900 g
Display and control unit	
<i>Functions</i>	Calculation of concentration from the measured partial pressure, Calculation depending on the type and choice of solubility Temperature correction of solubility Sample-Hold at standstill in the piping (controllable via external signal) Protection against unauthorized operation
<i>Monitoring functions</i>	Automatic carrier gas regulation, Monitoring of carrier gas pressure
<i>Calibration</i>	At our workshop: Partial pressure calibration At customer's site: Reference calibration
<i>Data logger</i>	4000 measuring values, subdivided in 5 segments
<i>Limit values</i>	2 freely programmable limit values
<i>Analogue output</i>	3 outputs, each 0(4) ... 20 mA
<i>Interfaces</i>	RS 232, RS 485 (optional)
<i>Power supply</i>	230 V, 2 A
<i>Weight</i>	12 kg
<i>Mounting</i>	Wall mounting or attachment at beverage piping

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