



Anton Paar

Carbo 520 Optical

The inline CO₂ sensor for beverages

::: Unique Density & Concentration Meters



Always Calm in the Eye of the Storm

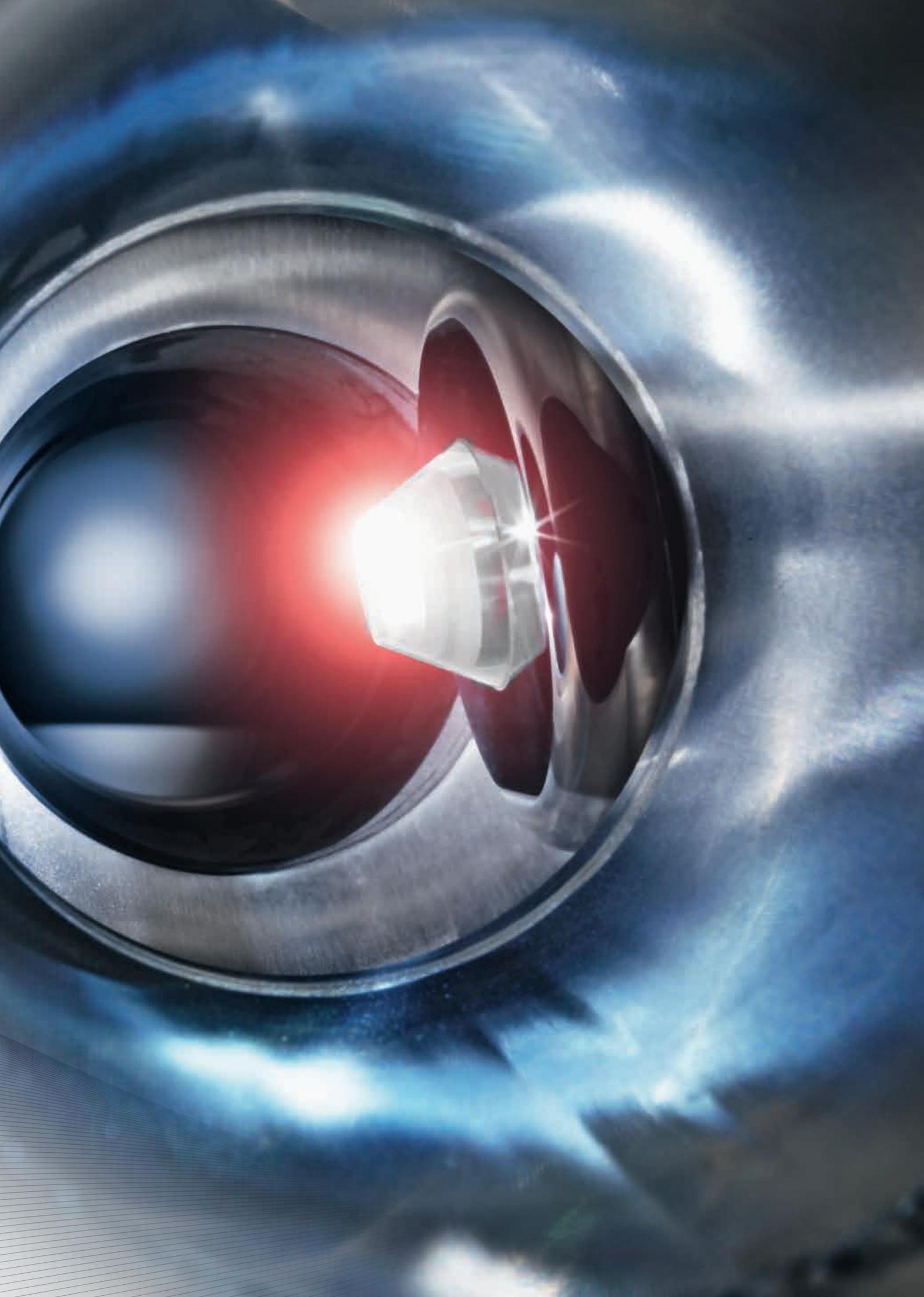
Imagine a new kind of certainty in your production line.

Now you always know the actual CO₂ concentration of all beverages in your process.

Now you can count on an entirely maintenance-free, hygienic and robust inline sensor – a truly **“fit and forget”** system that works and simply keeps on working. The basis of this breakthrough: **A cutting-edge optical measuring principle called ATR.**

Now you are using an optical measuring system, which means you are always provided with drift-free results of unconditional accuracy. Whatever your beverages' solubility, sugar composition, foreign gases, color or turbidity: **None of these factors influence your CO₂ readings.** CO₂? **You are covered. You are free to direct your attention elsewhere.**

You are using Carbo 520 Optical.



Crystal Clear Benefits

Carbo 520 Optical is a process CO₂ sensor for beverages easily installed inline. In direct contact with your sample, the system provides linear, drift-free CO₂ readings over the entire measurement range from 0 g/L to 12 g/L.

► Fit and forget about maintenance

Carbo 520 Optical is entirely maintenance-free. It measures CO₂ concentration based on the spectroscopic approach of Attenuated Total Reflection (ATR), so the only “motion” in the system is the passing of infrared light through a crystal. Since the sensor has no moving or mechanical parts, there is no wear and tear and no disposables are required. You need no external purging gas and no external compressed air to operate the sensor, so there are no supply valves to control.

► Minimize your operating costs

Carbo 520 Optical requires a power supply of 24 V and 10 W, the same amount you would need to run an energy-saving light bulb. On top of this energy efficiency and the sensor's long life, your greatest cost savings result from Carbo 520 Optical's accuracy and high measurement speed, which allow you to minimize your raw material investments and run your production tightly within specifications.

► Measure all beverages with a single setup

Carbo 520 Optical results are not influenced by the measured beverages' solubility and sugar composition. Whether you measure the CO₂ content of colas, beers, wines or other beverages – you can always employ the same measurement method, without having to consider any beverage type differences.





► Count on uninfluenced CO₂ results

Carbo 520 Optical offers unconditional accuracy, as it is designed to avoid certain “pitfalls” known to falsify results in other comparable optical systems. Since the sensor measures specific wavelengths of light absorbed by CO₂ molecules only, the measurement is highly selective and not affected by other gases common in beverages, like oxygen or nitrogen. Also, since the measurement is performed at the surface layer of a sample, its individual color or turbidity is equally irrelevant to the measured results.

► Easily measure typically difficult samples

The measurement of beverages with large particles presents a particular challenge regarding accuracy and hygiene. With Carbo 520 Optical, typically difficult samples like fruit juice with pulp are simply and reliably measured, as the sensor is constructed without any moving parts or dead space and is suitable for aseptic applications. Cleaning of the EHEDG-certified sensor is easy and efficient.

► Get immediate results at all times

Carbo 520 Optical is easily installed directly inline and therefore truly in touch with your sample. Even slightest changes in concentration are swiftly reported in real time; measurement values are updated every 4 seconds. The system is fully open to communication, with easy connection to fieldbuses such as PROFIBUS, Modbus TCP, PROFINET and EtherNet/IP. The faster your measurement, the faster you can react – for optimized control and efficiency.

About the Sensor

Intelligent operation in any position: Different versions of Carbo 520 Optical

Where would you like to read your measurement results? The choice is yours – three versions of Carbo 520 Optical are available:



► With mPDS 5

Carbo 520 Optical can be used in combination with Anton Paar's mPDS 5 evaluation unit, a powerful system for connecting various sensors for process control. Carbo 520 Optical transfers the measured values to the mPDS 5 for evaluation.



► With Operating Terminal (OT)

The Carbo 520 Optical OT version displays the measured values on the sensor's operating terminal (OT). No evaluation unit is required. Simply read the measurement values and status information at the sensor directly in the production line.

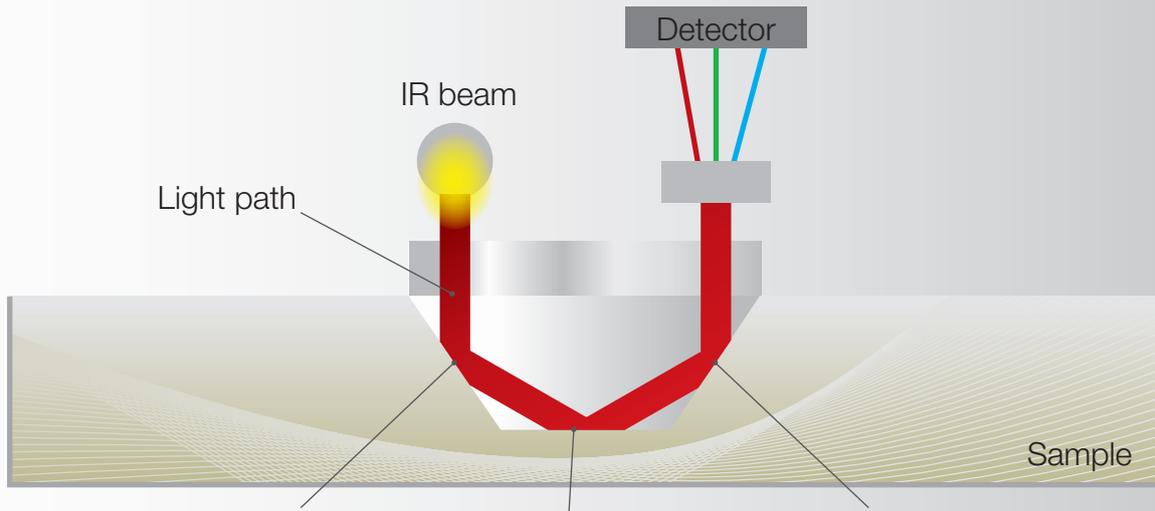


► With Remote Operating Terminal (ROT)

The Carbo 520 Optical ROT version displays the measurement values on a remote operating terminal (ROT). No evaluation unit is required. The ROT can be placed at a distance of up to 250 meters from the sensor's location. The results are shown wherever you wish, e.g. with other displays or positioned for better visibility.

► The measurement principle

It's in the name: Carbo 520 Optical employs an optical method to selectively measure CO₂, uninfluenced by other gases or the samples' color and turbidity. This principle is based on infrared spectroscopy and is called ATR, for Attenuated Total Reflection. An ATR crystal in constant contact with the sample is suffused by a beam of infrared light, which passes through the crystal in such a way that it reflects off the crystal's inner surface. The reflected beam contains specific absorption bands related to the CO₂ molecules in the sample. These bands' intensity is measured by a detector and used to precisely calculate the sample's CO₂ concentration.



Measurement at the surface layer (penetration depth 0.5 μm - 2 μm)

Specifications	
Measuring range	0 to 12 g/l (0 – 6 vol)
Accuracy	0.1 g/l (0.05 vol)
Repeatability	0.02 g/l (0.01 vol)
Resolution	0.01 g/l (0.005 vol)
Measuring temperature range	- 5 °C to 30 °C
Maximum temperature	< 90 °C (max. 30 minutes) < 80 °C (permanent)
Pressure	max. 10 bar rel. (145 psi rel.)
Measuring interval	4 seconds
Self-diagnosis	Compliant with NAMUR recommendation NE107
Degree of protection	IP 67 (Nema 6)
Process connection	Tuchenhagen Varivent N
Certifications	EHEDG Type EL Class I
Power	SELV DC 24 V (DC 20 V to 30 V), max. 40 W
Fieldbuses (optional)	PROFIBUS PROFINET EtherNet/IP Modbus TCP
Dimensions (W x H x D)	174 mm x 174 mm x 231 mm
Weight	approx. 4 kg



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Instruments for:

Density and concentration
measurement

Rheometry

Viscometry

Sample preparation

Microwave synthesis

Colloid science

X-ray structure analysis

Refractometry

Polarimetry

Volatility

Oxidation Stability

Cold Flow Properties

Consistency & Ductility

Various Petroleum Properties

High-precision temperature
measurement



Specifications
subject to change
without notice.