Anton Paar

Carbo 520 Optical

The inline CO_2 sensor for beverages

Imagine a new kind of certainty in your production line

With Carbo 520 Optical you always know the actual CO_2 concentration of all beverages in your process. This optical measurement system provides drift-free results of unconditional accuracy. The basis of this breakthrough: A cutting-edge optical measuring principle called ATR.

Out-of-the-box
As Carbo 520 Optical requires no sample teaching and is easily installed inline, it works immediately, out-of-the-box.

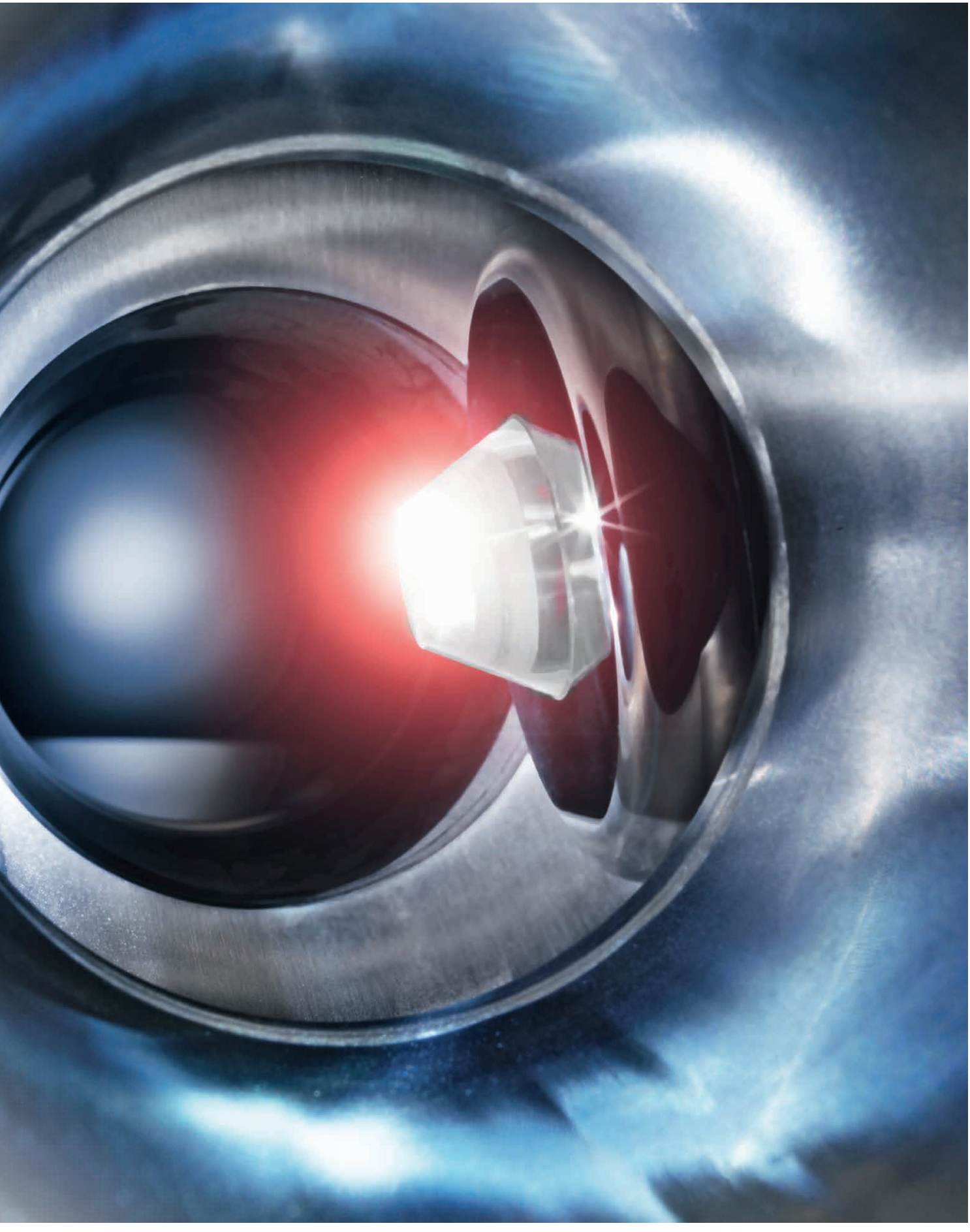
Maintenance-free
You can count on an entirely maintenance-free, hygienic and robust inline sensor – a truly “fit and forget” system that works and simply keeps on working, minimizing your TCO (total cost of ownership).

Product independent
Whatever your beverages’ solubility, sugar composition, foreign gases, color or turbidity: nothing influences your CO_2 readings.

Back to work quickly after CIP
Carbo 520 Optical is EHEDG-certified and is quickly back to measuring right after CIP cleaning.

Easy integration and automation
Anton Paar’s Smart Sensor concept enables you to connect to a wide range of process control and quality management systems.

Using Carbo 520 Optical you are free to direct your attention elsewhere.



Crystal Clear Benefits

Carbo 520 Optical is a process CO_2 sensor for beverages, easily installed inline. In direct contact with your sample, the system provides linear, drift-free CO_2 readings over the entire measurement range from 0 g/L to 12 g/L.

Fit and forget

Carbo 520 Optical is entirely maintenance-free. It measures CO_2 concentration based on the spectroscopic method of Attenuated Total Reflection (ATR), so the only “motion” in the system is the passing of infrared light through a crystal. As the sensor has no moving or mechanical parts, there is no wear and tear and no disposables are required. Since no external purging gas or external compressed air is required to operate the sensor, there are no supply valves to control.

Minimize 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 and within specifications.

Measure all beverages with a single setup

Carbo 520 Optical results are not influenced by the measured beverages’ solubility or sugar composition. Whether you measure the CO_2 content of colas, beers, wines or other beverages – you can always employ the same measurement method, without consideration of any beverage type differences.

Count on uninfluenced CO_2 results

Carbo 520 Optical offers unconditional accuracy, as it is designed to avoid certain “pitfalls” known to falsify results in other comparable optical systems. As the sensor measures specific wavelengths of light absorbed by CO_2 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 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.

Short cleaning procedures

The sensor is constructed without any moving parts or dead space, is suitable for aseptic applications and EHEDG-certified.

Get immediate results

Carbo 520 Optical is easily installed directly inline and therefore truly in touch with your sample. Even the slightest changes in concentration are swiftly reported in real time; measurement values are updated every 4 seconds.

The sensor easily communicates with your existing system via a wide range of standard fieldbus formats such as PROFIBUS, Modbus TCP, PROFINET, DeviceNet and EtherNet/IP. The faster your measurement, the faster you can react – for optimized control and efficiency.

Three different installation options
Intelligent operation in any location

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 and display. Anton Paar's Davis 5 evaluation software enables real-time availability of data and comparison to laboratory references for quality control and quality assurance purposes.

With Operating Terminal (OT)

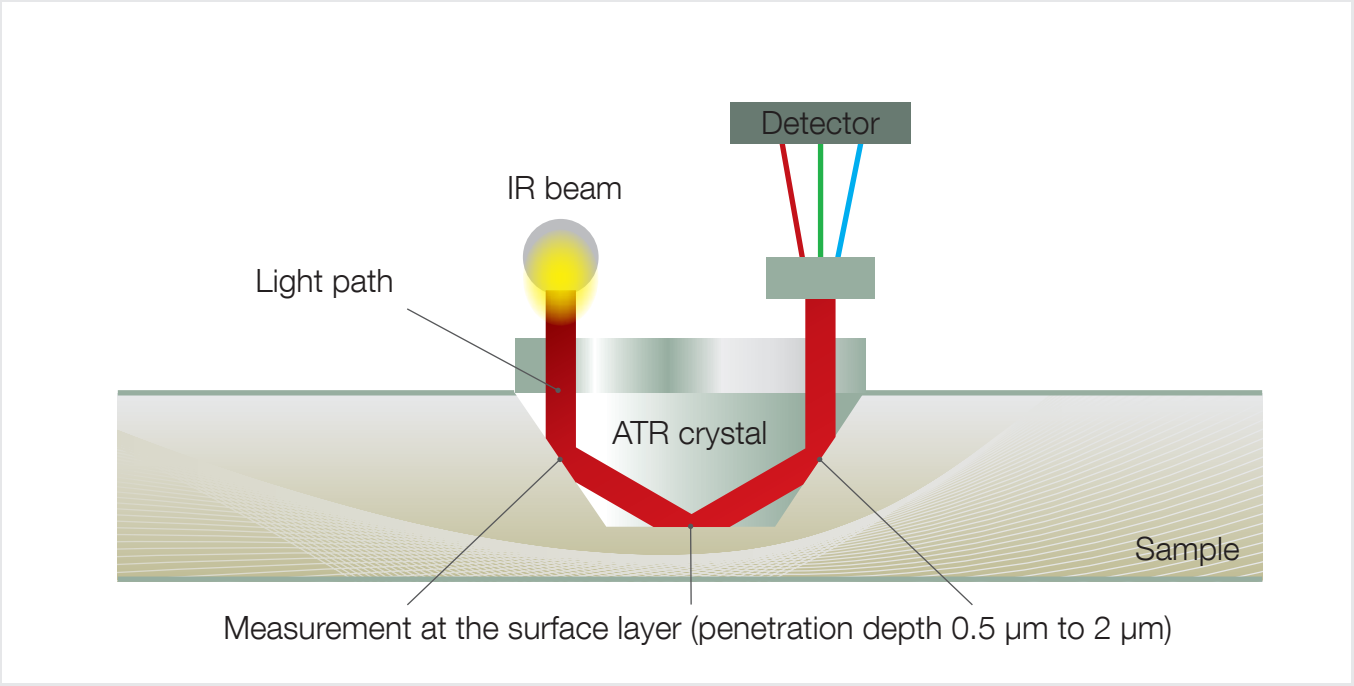
The Carbo 520 Optical OT version displays the measured values on the sensor's operating terminal (OT). No evaluation unit is required. Simply read the measurement values and status information at the sensor, directly in the production line.

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

The measurement principle is based on Attenuated Total Reflection (ATR). A sapphire in constant contact with the sample is suffused by a beam of infrared light which interacts specifically with the CO_2 at the sapphire/sample interface. The attenuated intensity of the reflected infrared beam is measured and used to precisely calculate the sample's CO_2 concentration. You benefit from a design without moving parts or cavities.



Specifications	
Measuring range	0 to 12 g/L (0 to 6 vol)
Accuracy	±0.05 g/L (0.025 vol)
Repeatability	±0.01 g/L (0.005 vol)
Reproducibility	0.01 g/L (0.005 vol)
Resolution	< 0.01 g/L (0.005 vol)
Measuring temperature range	-3°C to +30°C
Ambient temperature range	-10°C to +55°C (at T_{sample} = -3°C) -10°C to +45°C (at T_{sample} = 30°C)
Maximum temperature	95°C (max. 4h)
Pressure	max. 10 bar rel. (145 psi rel.)
Measuring interval	4 seconds
Self-diagnosis	Compliant with NAMUR recommendation NE107
Degree of protection	IP 65 (NEMA 4), 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. 25 W
Fieldbuses (optional)	PROFIBUS | PROFINET | DeviceNet | EtherNet/IP Modbus TCP
Dimensions (W x H x D)	174 mm x 174 mm x 232 mm
Weight	approx. 4 kg

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