



OEM Sensors for Process Analytics

Optical Dissolved Oxygen
Measurements

**WHERE
PRECISION
MEETS
RELIABILITY**

 **Metroglas**

Optical DO Sensor to exceed the Expectations

WHY ONLINE DO MEASUREMENTS

Dissolved oxygen is a key parameter that directly influences the growth, metabolism, and productivity of microorganisms. Accurate online DO measurements ensure that bioreactors operate under optimal conditions, leading to enhanced product yield and quality.

Real-Time Monitoring:

Continuous online DO measurements provide real-time data, allowing for immediate adjustments to maintain ideal oxygen levels. This responsiveness is vital for preventing oxygen depletion or excess, which can negatively impact microbial activity and fermentation outcomes.

Process Optimization:

By closely monitoring DO levels, system integrators can fine-tune aeration and agitation strategies, ensuring that microorganisms receive the right amount of oxygen at all times. This optimization leads to more efficient fermentation processes, reducing costs and increasing productivity.

Quality Control:

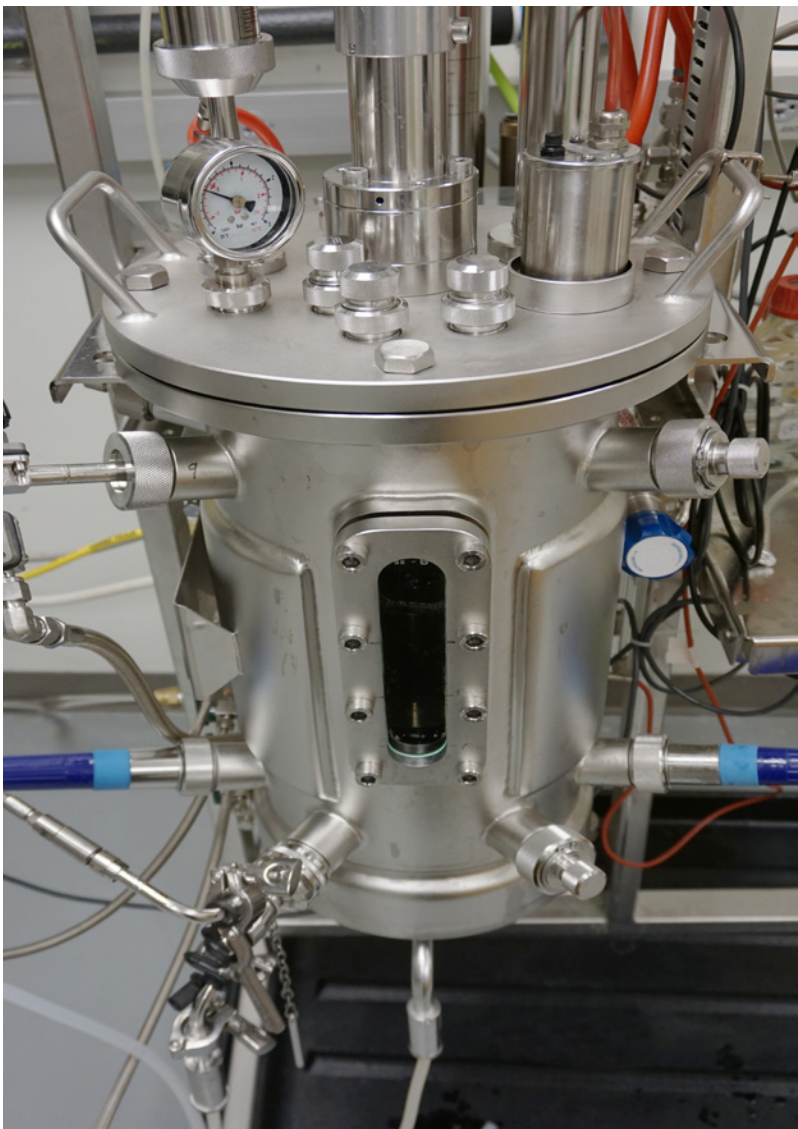
Consistent DO monitoring helps to maintain the stability and reproducibility of fermentation batches. This is essential for producing high-quality products, especially in industries such as pharmaceuticals, food and beverage, and biofuels.

Enhanced Safety:

Proper DO management minimizes the risk of anaerobic conditions, which can lead to the production of unwanted by-products or hazardous substances. Online DO sensors help ensure a safe and controlled fermentation environment.

Compliance and Traceability:

Online DO measurements provide continuous records, supporting compliance with regulatory requirements and simplifying audits by ensuring complete data traceability.



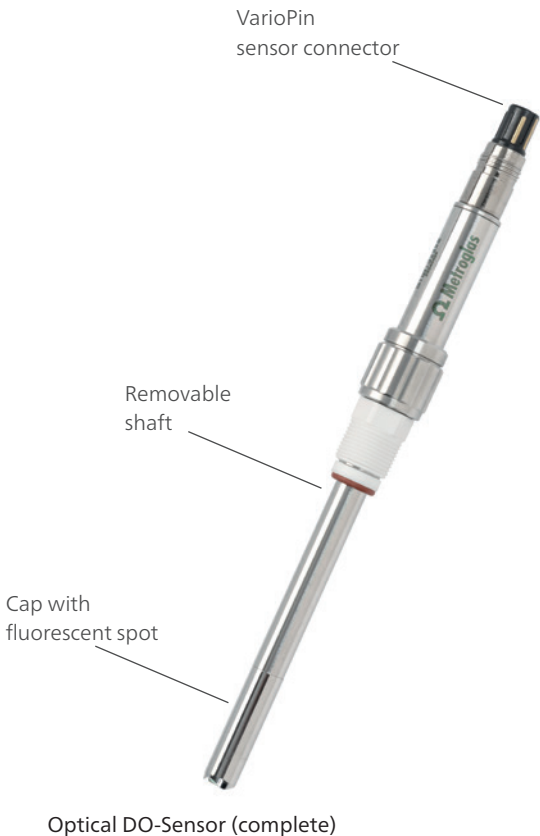
DO SENSOR WITH UNIQUE DESIGN

At the heart of modern process analytics lies optical DO sensing based on fluorescence quenching. Unlike electrochemical dissolved oxygen sensors, optical sensors are robust, low-maintenance, and deliver stable results with minimal drift. No time consuming polarization procedures.

The Metroglas DO sensor takes this technology a step further with a unique modular design that enhances lifespan, reduces downtime, and delivers consistently fast and accurate measurements.

The sensor consists of a measuring part with electronics and an optical fiber tube, a removable metal shaft, and a replaceable cap with a fluorescent spot on it.

The unique modular design ensures that only the removable shaft and sensor cap require autoclaving, maximizing the lifetime of the sensor's electronic and optical components.



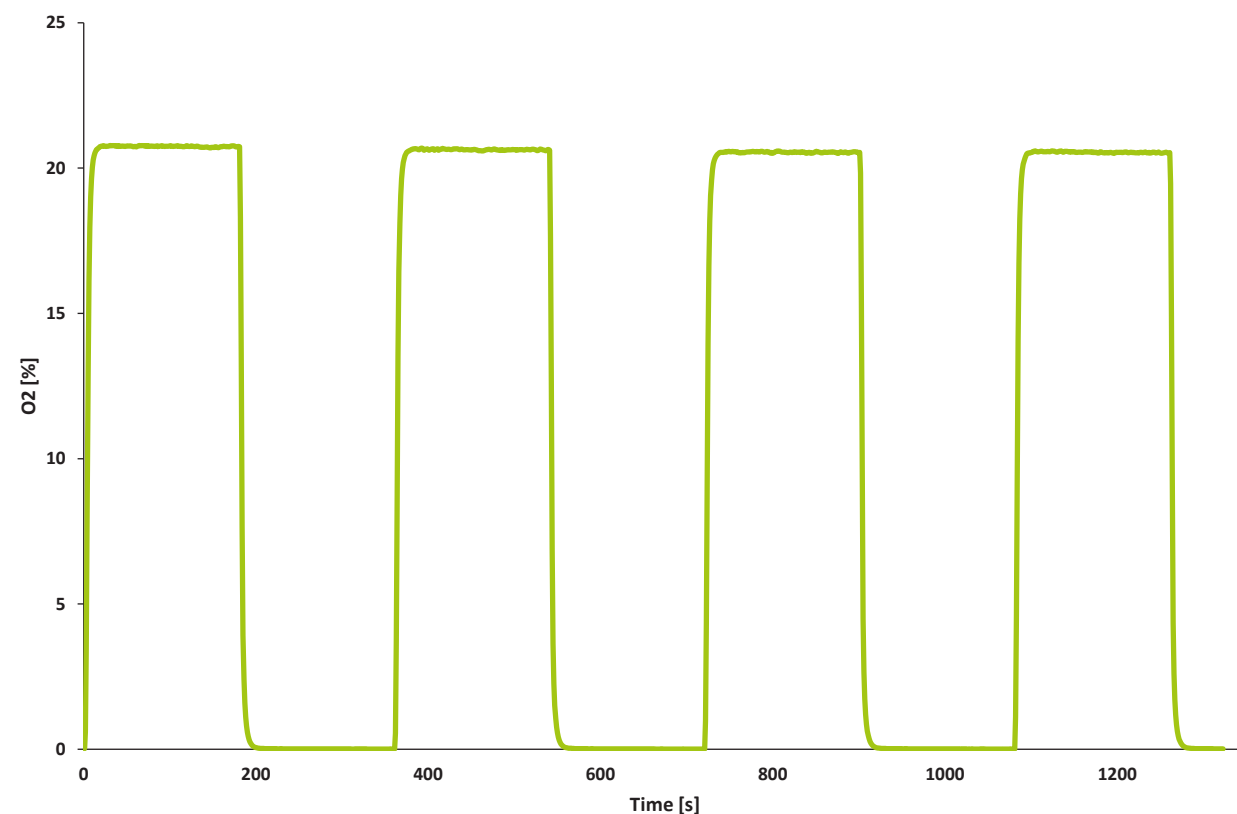


Figure 1: Response time in gas phase 0% - 20% and 20% - 0% O₂ over 4 gas replacement cycles.

Fast Response times:

The innovative cap with integrated fluorescence dye ensures rapid oxygen detection. Faster response means quicker calibration and immediate detection of process changes.

Figure 1 shows DO sensor's response time in gas phase with T₉₈ < 15 seconds (20% -> 0% O₂) and T₉₈ < 10 seconds (0% -> 20% O₂).

Long-Term Accuracy:

Low drift over weeks of operation ensures reliable data throughout the entire fermentation cycle. This stability reduces the need for frequent recalibration, saving time and labor costs.

Figure 2 shows the drift of the sensor in gas phase over a period of 10 days. The diagram shows stable results with a drift < 1%.

HIGHLIGHTS OF METROGLAS DO SENSORS

- **Fast Response Time:** quick and reliable measurements support dynamic bioprocess monitoring and significantly reduces calibration time.
- **Unbeatable Lifespan:** unique design to limit the autoclaving to the removable sensor shaft with the cap.
- **Low Maintenance:** no need for electrolyte replacement and cumbersome calibration procedures, reducing downtime.
- **High Accuracy:** our optical sensors provide precise and stable readings, crucial for sensitive biotech processes.

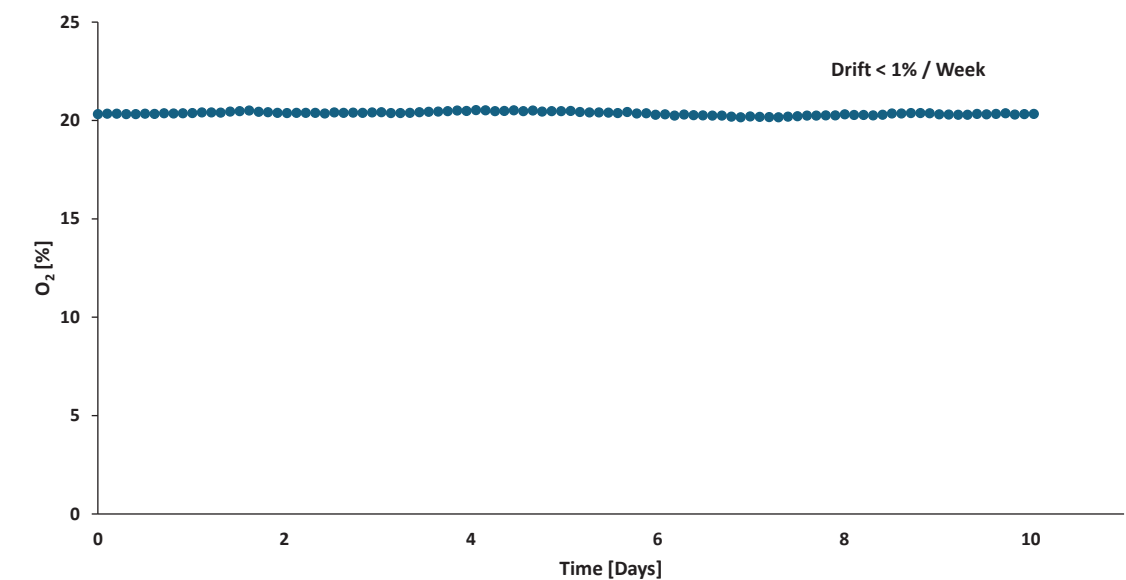


Figure 2: Drift values over 10 days in water @37°C.

Extended Sensor Lifespan:

Thanks to its modular design, only the removable shaft and replaceable cap need to be sterilized or autoclaved. By protecting the sensor electronics and optics from repeated exposure to these procedures, the sensor delivers a longer service life and reliable long-term performance.

Figure 3 shows no significant changes in the sensors response time T₉₅ and T₉₈, even after 10 autoclaving cycles.

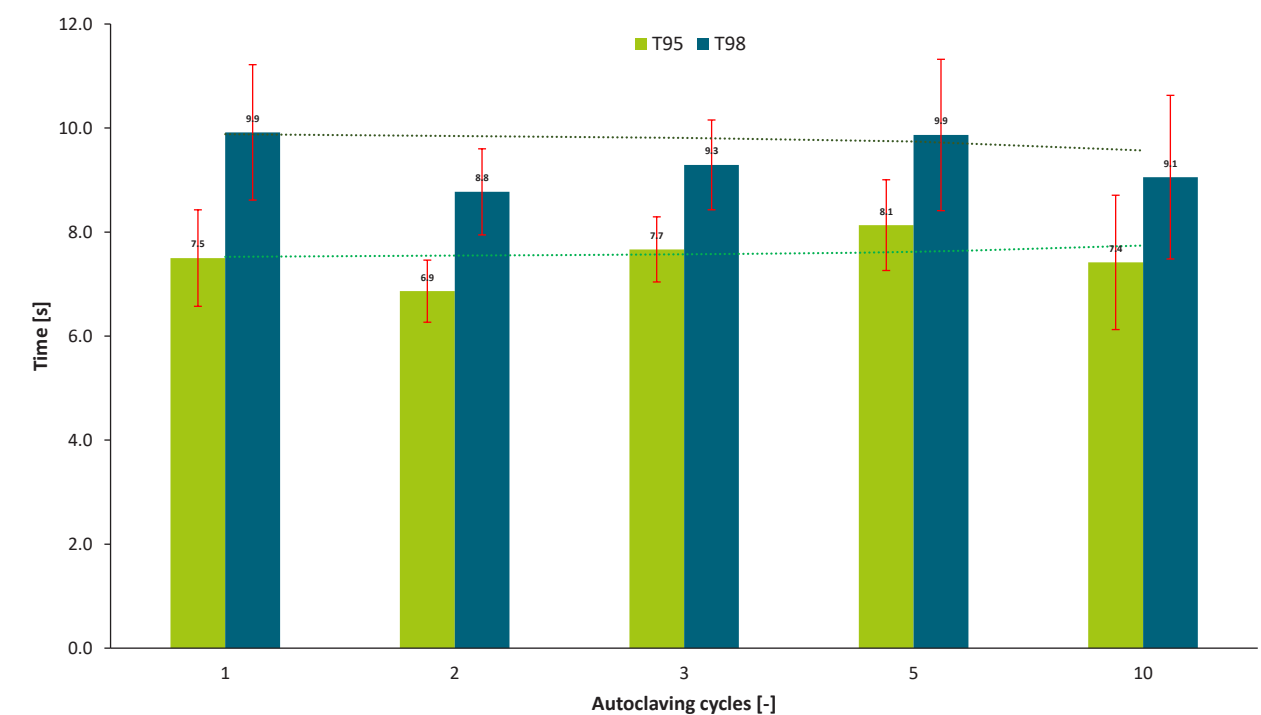


Figure 3: Response time of Metroglas DO-sensor, T₉₅ and T₉₈ after 0-10 autoclaving cycles.



Low Maintenance:

No electrolyte replacement, no cumbersome polarization procedures—just simple calibration and straightforward operation that minimizes downtime and operating costs.

Hygienic design:

Designed with the highest hygienic standards in mind, the Metroglas DO sensor is the perfect fit for pharmaceutical, biotech, and other hygiene-sensitive industries.

The Metroglas DO sensor combines scientific precision with engineering ingenuity. By offering fast response, stable long-term accuracy, and an extended lifespan, it ensures optimal oxygen control while minimizing downtime and operational costs.

TECHNICAL SPECIFICATIONS

Applications	Pharmaceuticals, Biotechnology
Measuring technology	Optical fluorescence quenching
Measuring range	0 - 250 % air saturation 0 - 50 % O ₂
Response time	T98 ≤ 30 s at 25°C
Drift	< 1% / week at 25°C
Wetted membrane	Silicone
Wetted metallic materials	Stainless steel (316L), Ra ≤ 0.4
O-ring materials	VMQ (Silicone)
Temperature sensor	Yes
Operating temperature	0 – 50 °C
Autoclaving	<20 min @131°C (without removable electronics and optics)
CIP / SIP	yes
Certificates & approvals	Upon request
Operating pressure	0.2 – 4 bar
Shaft diameter	12 mm
Sensor connector	VarioPin, PG13.5
Output signal	3.3V TTL, UART
Min. immersion depth	10 mm
Length	120 mm, 220 mm, other lengths upon request



Customized sensor solutions are possible upon request.



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