

Tandem Gas Analyzers

Real-Time Off-Gas Analysis for Bioprocess Monitoring and Control



CO₂ and O₂ Off-Gas Analysis for Enhanced Bioprocess Insight

The [Tandem Gas Analyzers](#) provide real-time, online data to understand, control, and predict bioprocesses.

Designed for off-gas analysis in microbial fermentations, the system measures O₂, CO₂ gas concentrations and integrates seamlessly with our [BioXplorer](#) bioreactor platform and a wide range of third-party systems.

Enhanced insight into cells and bioprocesses:

- ✓ Real-time assessment of cellular physiological state
- ✓ Batch-to-batch variation analysis
- ✓ Automatic calculation of:
 - OUR: Oxygen Uptake Rate
 - CER: Carbon Dioxide Evolution Rate
 - RQ: Respiratory Quotient



Increase the Reliability and Reproducibility of Bioprocesses

- ✓ Metabolic flux analysis and mass-balance calculations
- ✓ Metabolically active-based feeding
- ✓ Repeatable event decisions: i.e., induction, inoculation, harvesting
- ✓ Integration to any reactor size (200 mL – 100 m³)
- ✓ Improved scale-up and scale-down predictability

Tandem Gas Analyzer Features

The Tandem family of off-gas analyzers provides continuous, multi-line monitoring and supporting control of bioprocesses from lab to production scale. Portable and standalone configurations deliver flexible, reliable performance in laboratory environments.

Tandem PRO

A compact unit for single-reactor monitoring. It integrates directly with the fermenter control system, providing calibrated gas concentration and flow measurements. The system supports O₂, and CO₂ measurement, with built-in alarms and error reporting. Outputs are designed for seamless integration with reactor software.

Tandem Multiplex

Designed for facilities running multiple reactors without needing continuous monitoring on each. It mirrors the functionality of the Tandem PRO while allowing connection to 6–18 fermenters. Users can set the sampling cycle time between reactors.

Tandem PRO



Tandem Multiplex



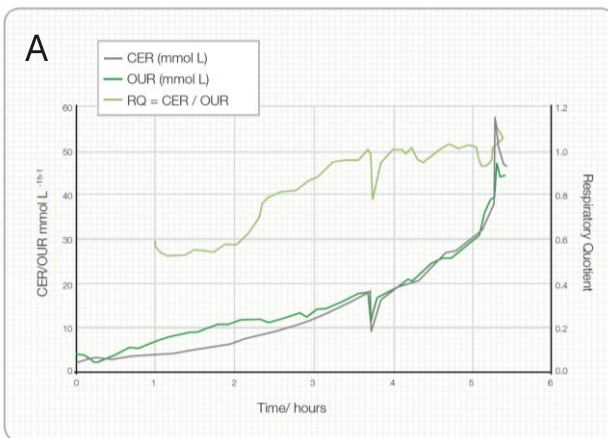
Model	Lines	Sampling	Calibration with gases	Gas Flowrate	Output	Dimensions (mm)
PRO	1	Continuous	Manual & Automatic, on local display	25–1000 ml/min	Dual 0–10V & 4–20mA plus RS232	250w x 260d x 170h
Multiplex	4, 6, 8, or 12	User definable from 30 secs	Manual & Automatic, on local display	25–1000 ml/min	RS232	320w x 260d x 410h

[Contact our specialist](#)

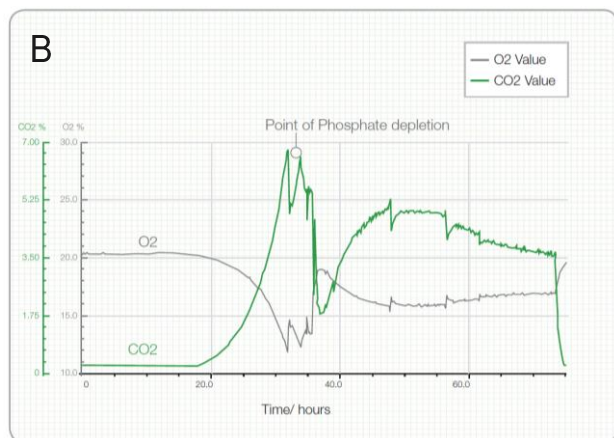


Specification point	CO ₂	O ₂
Measurement principle	Infra Red Absorption	Electrochemical
Range	Multiple ranges from 0-100%	Multiple ranges from 0-100%
Resolution	0.01%	0.01%
Accuracy	±2% of full scale	±2% of full scale
Drift	<0.05%/month full scale	<0.05%/month full scale
Operating Temp.	0 - 45°C	0 - 45°C
Temp. Compensation	Included	0.02%/°C
T90 Response Rate	<50 seconds	<10 seconds

Case Studies: Bioprocess Development of *E. coli* by understanding its metabolism



Transition between substrates – Andrew Collis, GSK Operations, UK



Prediction of metabolic events – Dominic Reeks, UCB Group, UK

The [Tandem Off-Gas Analyzers](#) delivered high-resolution, real-time insight into the respiratory dynamics of *E. coli*. (A) The feed switch is evident before the 4-hour mark, and corresponding shifts in RQ capture the metabolic transition between carbon- and nitrogen-based substrates. Using this information to automate feed strategies supports process optimization. (B) The tandem gas analyzer also enabled identification of the phosphate depletion point, marked by a rapid drop in carbon dioxide and a concurrent rise in oxygen in the exhaust gas, signaling a clear metabolic shift.

Upgrades, Support, and Training

We understand that your needs can change over time and you may require:

- A system upgrade
- Training for new team members
- Support on your processes
- To book some time with our service team

Our service team and highly knowledgeable technical staff will work with you to find the right solution.



About H.E.L Group

H.E.L Group partners with scientists, engineers, and biotechnology professionals to accelerate innovation and unlock the full potential of modern research and manufacturing. We design and build advanced scientific instruments and intelligent software that enhance the efficiency, accuracy, and safety of chemistry and bioprocess workflows.

With a portfolio spanning automated reactor systems, parallel screening platforms, bioreactors, and safety testing technologies, H.E.L solutions support high-value applications across chemistry, catalysis, flow chemistry, materials development, fermentation, and scale-up. Our team combines deep technical expertise with decades of engineering experience. All products are developed and manufactured in the UK, supported by global sales and applications teams who work closely with customers to implement the right tools for their scientific and production challenges.

For more than 37 years, H.E.L has helped organizations—from leading pharma and biotech companies to chemical, energy, and academic research centers—solve complex process problems and achieve safer, more productive R&D.

Why customers choose H.E.L Group:

- ✓ **Customer-centric engineering:** Our systems are designed for real scientific needs, with modularity and scalability to fit diverse workflows.
- ✓ **Application-driven support:** Dedicated technical and service teams ensure fast implementation, tailored training, and long-term reliability.
- ✓ **Configurable solutions:** A wide range of custom options allows each platform to be optimized for specific chemistry, bioprocess, or scale-up requirements.

H.E.L Group is committed to enabling the next generation of scientific breakthroughs by empowering researchers with tools that deliver reproducibility, safety, and deeper insight every day, in every experiment.

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