

h.e.l

Biotechnology Solutions

Elevate your bioprocessing capabilities with the adaptable and innovative BioXplorer range



Application Driven Solutions

Revolutionizing bioprocessing

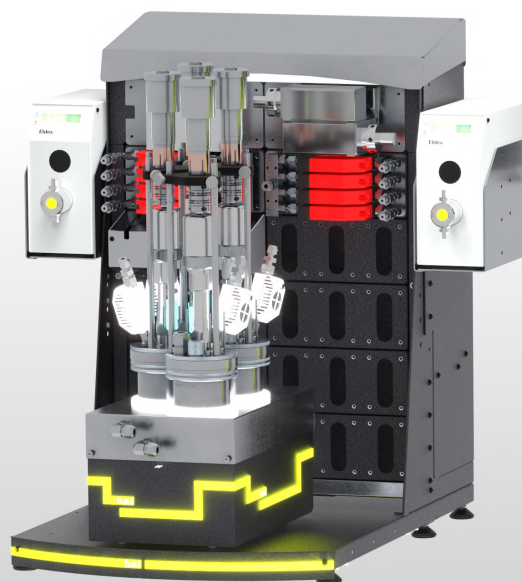
Advancements in bioprocess are driving change in all biotechnology, from healthcare to sustainability. Innovations in food sourcing, such as cultivated meat and alternative fuel development, replace traditional petrochemical approaches. Today's bioproducts encompass pharmaceuticals, foods, fuels, enzymes, fine chemicals, and more. H.E.L BioXplorer systems aid in screening, optimization, and acquiring essential process insights for an accelerated scale-up.

Decarbonization using syngas fermentation

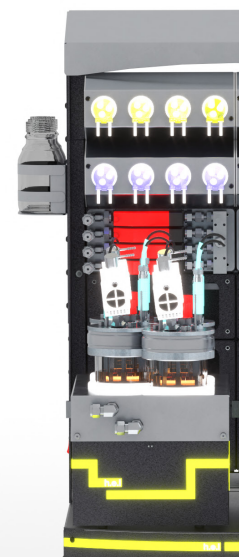
Governments and companies globally are under pressure to reduce carbon emissions. One strategy gaining increasing attention is synthesis gas (syngas) fermentation. This bioprocess exploits organisms capable of converting carbon-containing industrial waste gases into products, such as fuels and value-added chemicals. H.E.L's BioXplorer systems offer high-pressure options to drive up gas solubility, resulting in increased product yields.

Improving human health by studying the gut microbiome

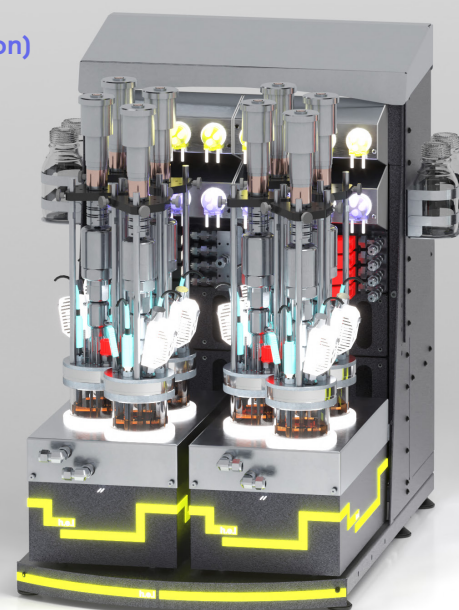
The gut microbiome has a significant impact on human health. With the digestive system being dynamic and multicompartmental, it is important to have adaptable tools for simulation. H.E.L BioXplorers can be configured to study effects of pro- and prebiotics, age, ill health, and shifts in microbiota.



BioXplorer 400P
(overhead agitation)



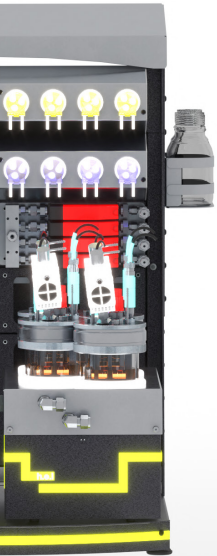
BioXplorer
400XL



BioXplorer 400XL
(overhead agitation)

Scalability and data integrity

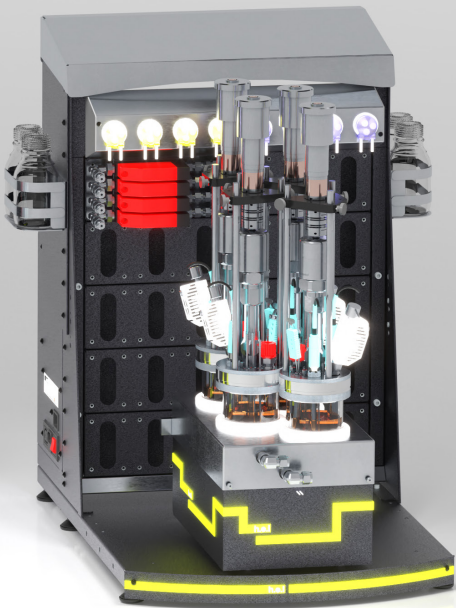
The BioXplorer was designed with scalability of data in mind. Ensuring that data obtained at low volumes is applicable to large-scale fermentations through careful design of vessel geometry, sparging, and options for agitation. Our software allows easy sharing of data enabling a smoother transition to production scale.



BioXplorer 400P

Increase product yield with pressurized bioreactors

H.E.L offers the only truly parallel bioreactor system operating at pressure, allowing fermentation at up to 10 bar. Increase gas bioavailability to achieve higher cell densities and/or product yields. Investigate impact of pressure gradients seen at production scale earlier for a faster, more efficient scale-up journey.



BioXplorer 400
(overhead agitation)

Configurable and customizable solutions

We are experts in tailored solutions for our customer needs and the BioXplorer range is no exception. Our in-house specialists can work with you to find a solution configured to your needs, whether that is to handle extreme conditions or acquire unique data insights.

H.E.L's BioXplorer

Highly configurable and highly modular

Automate your bioprocessing capabilities with the innovative parallel and adaptable BioXplorer range. The modular design increases flexibility and enables tailored solutions for diverse bioprocesses.

Liquid feeds

Automated peristaltic pumps are integrated into standard heads, allowing for strictly controlled feed and liquid removal.

Reactor material

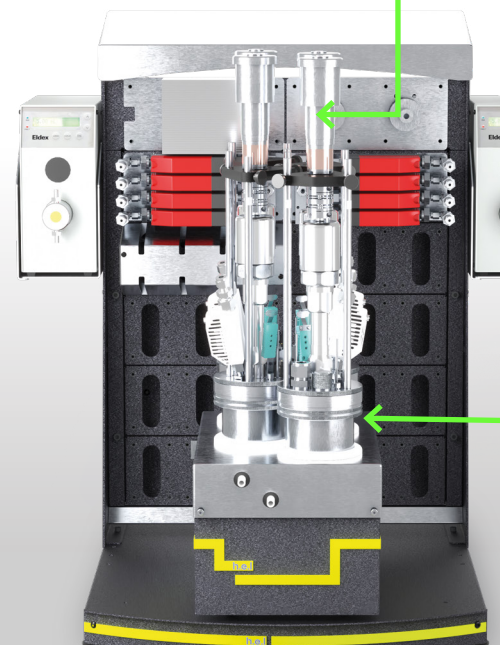
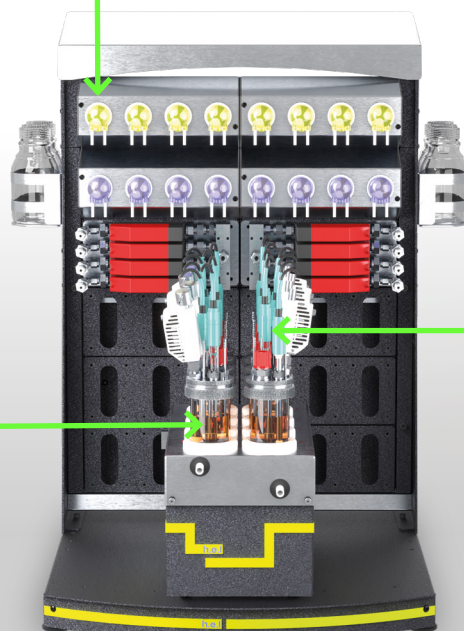
The material of our bioreactors are tailored for your conditions, with different materials available (e.g. glass and stainless steel)

Probes

Range of probes available for online monitoring and in-depth data insights, including pH, dissolved oxygen (DO), optical density (OD)

Agitation/stirring

A range of stirring options, with magnetic and overhead agitation, specifically designed to maintain sterility.



See the **BioXplorer 100** in your own laboratory - scan this QR code on your mobile device.



BioXplorer 100

Working volume
50-150mL
8 parallel reactors

BioXplorer 400P

Working volume
120-400mL
4-8 parallel reactors

Gas feeds

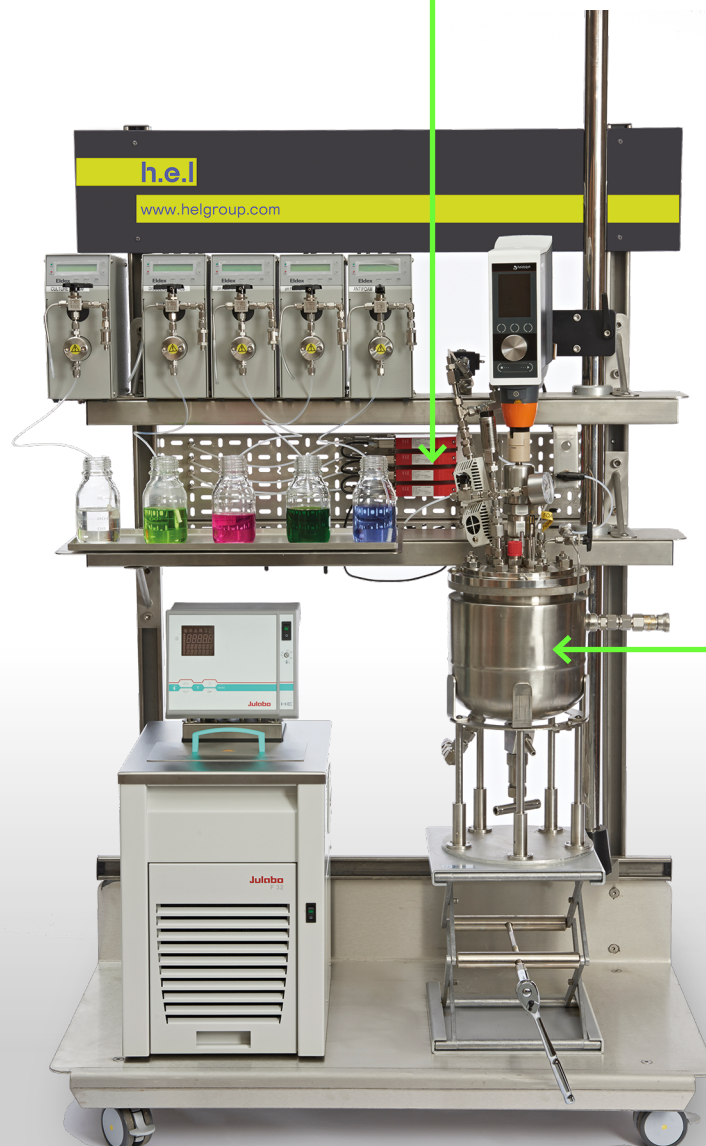
Highly precise mass flow-controlled gassing of air, N₂, O₂, CO, CO₂ and CH₄

Scalability

Range of working volumes and reactor materials available, ideal for scale-up or scale-down studies.

Pressure

Elevated pressure reactors up to 10 bar an effective addition to agitation/sparging for bioprocesses.



See the **BioXplorer 400** in your own laboratory – scan this QR code on your mobile device.



BioXplorer 5000P

Working volume
0.5–5L

NOT TO SCALE

Advanced sensor technologies

Data insights online



BioVIS

BioVIS is a probe for the online monitoring of total cell growth and biomass within a bioreactor, enabling culture growth kinetics to be tracked and logged.

- Remove or reduce the need for online sampling
- Simplify measurements
- Reduce contamination risks
- Conserve the culture media volume



Tandem gas analyser

H.E.L. offers a range of Tandem off-gas analysis units as an on-line tool to monitor and control a process continuously. By monitoring the off-gas, the software can automatically calculate:

- The oxygen uptake rate (OUR) of the cultivated cells
- The carbon dioxide production rate (CPR) can be measured for micro-organisms
- From this data, the respiration quotient (RQ) can be calculated automatically



pH and DO probes

All our BioXplorer systems come equipped with pH and Dissolved Oxygen (DO) probes providing online control and measurement. This enables strict control of the growth conditions in each bioreactor to optimise cell proliferation.



Liquid and gas feeds

The BioXplorer is equipped with integrated mass flow controllers (MFC's) for precise and accurate gassing of each bioreactor. Using H.E.L.'s own software, gas can be injected into the reactors using mass flow controllers (MFC). Similarly, liquid feeds (including medium, inoculum or acid/base) can be accurately supplied utilizing peristaltic pumps.

Control features

Aeration and DO control

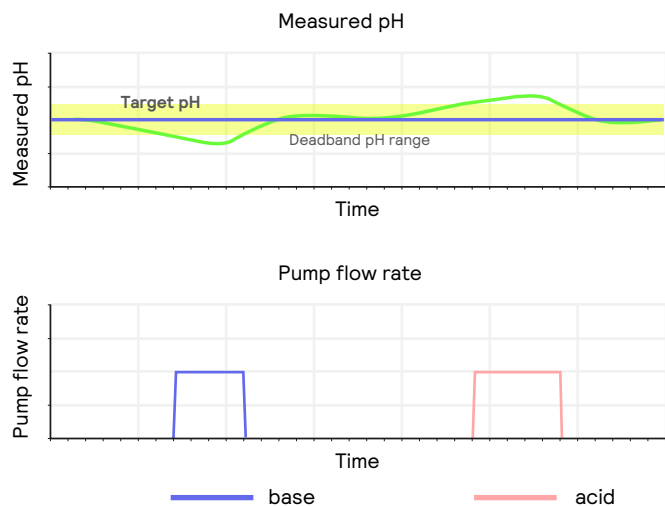
DO is one of the most critical parameters in microbial metabolisms. Aerobic organisms require oxygen for metabolism, whereas this gas is toxic for strict anaerobes. As a result, DO requires continuous monitoring and control. H.E.L.'s BioXplorers are equipped with DO probes to account for this gas in the medium. Using our powerful control software user defined control strategies for each individual bioreactor can be programmed to maintain ideal conditions for the microbial process. Optimum O_2 transfer rates can be automatically maintained by a cascaded control of air flow, agitation speed and oxygen enrichment.

pH control

This enables strict control of the growth conditions in each bioreactor to optimise cell proliferation. There are 2 options for pH control:

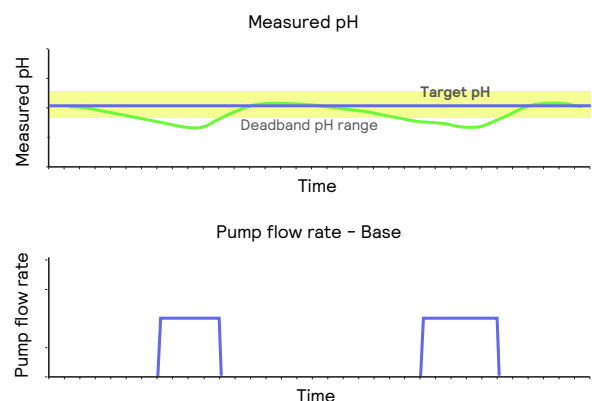
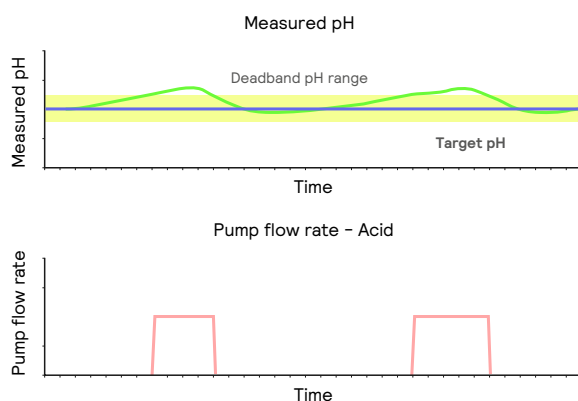
1. Two-way / Two-sided pH Control

Used when fermentation may result in pH moving away from optimal in both acidic and basic directions or when fermentation is very sensitive to deviation in pH. Define target pH value and a deadband pH range. The system continuously monitors the pH and responds accordingly to maintain the pH deadband range.



2. One-way / One-sided pH Control

Used when fermentation results in pH moving away from optimal in only one direction. Control can be set to adjust pH towards acidic values or towards basic values but not both.



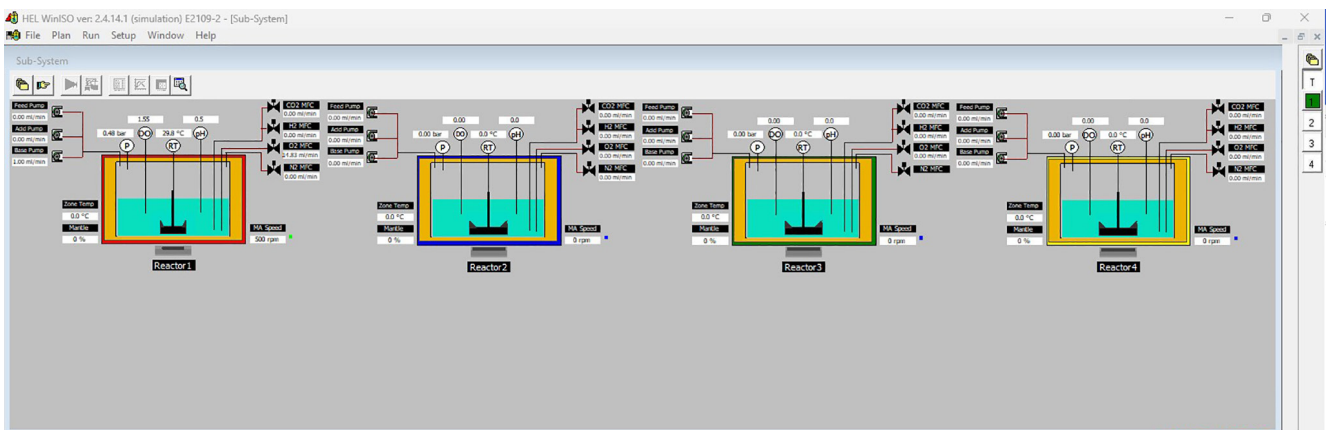
The Power of WinISO

Elevate your research with a software solution that adapts to your needs.

Flexibility and control

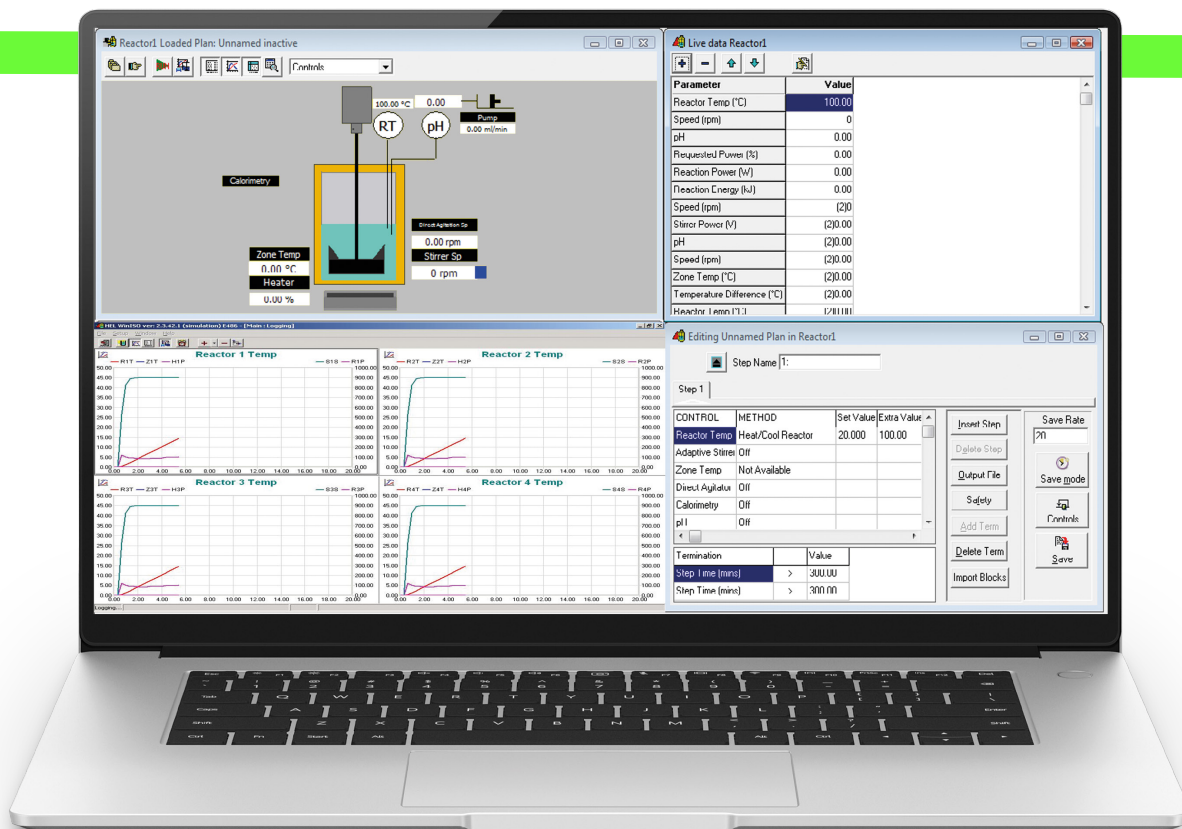
WinISO is unique with its control flexibility, employing feedback loops and advanced automation for pH and DO control. This dynamic approach not only enhances precision but also paves the way for seamless automation, providing you with the ultimate level of control over your experiments.

The H.E.L BioXplorer's parallel design is mirrored in the software with the ability to control multiple reactors with different recipes, all from one centralized platform. Enjoy the freedom of unlimited recipe and plan design, empowering your research with Design of Experiments (DOE) capabilities, and benefit from the flexibility of WinISO's highly configurable software architecture.



Empowering proactive experimentation

WinISO seamlessly integrates with a myriad of probes, including H.E.L's pH, DO, BioVIS, and Tandem Gas Analyzer. With additional integration of 3rd party PAT (Process Analytical Technology) systems, GC-MS, and more. With H.E.L you can transition into the era of artificial intelligence, using our WinISO software you have the capability to interface with AI systems. Our Software also provides the option of OPC and other communication protocols ensures a cohesive environment for your analytical tools, providing a comprehensive and responsive solution to your research needs.



Real-time interactivity

Change and adapt on the fly as you navigate through your experiments. The software's interactive design empowers you to make real-time adjustments through automation and manually. This ensures that your research evolves, aligning with your insights and discoveries.

Safety at the core

WinISO's robust safety features include pressure management and customizable safety measures, protecting both the operator and the experiment. Ensuring a secure environment for your experiments, allows you to focus on pushing boundaries without compromising on well-being.

Condition	Value	Action
P Hardware OK	=	FALSE Shut Down State 1
P Reactor Temp	>	35.000 Warning
P Reactor Temp	>	40.000 Shut Down State 1
P pH	>	8.0000 Shut Down State 1
P DO	>	5.0000 Shut Down State 1

Plan Add Step Add Delete Shut-down states Controls OK Cancel

All Reactors Shut Down Together



Speak to our specialists to configure your BioXplorer

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



Customer Service Enquiries & Technical Support Requests

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Product overview

Specification point	BioXplorer 100	BioXplorer 400	BioXplorer 400XL	BioXplorer 400P
Number of reactors	8	4	8	4
Total reactor volume	200	500	500	500
Working volume	50 - 150	120 - 400	120 - 400	120 - 400
Temperature	0 - 130°C (dependent on system setup)	0 - 130°C (dependent on system setup)	0 - 130°C (dependent on system setup)	0 - 135°C (dependent on system setup)
Stirrer speed	250 - 1500 rpm	Magnetic agitation 250 - 1500 rpm Overhead Agitation 20 - 2000 rpm	Magnetic agitation 250 - 1500 rpm Overhead Agitation 20 - 2000 rpm	Magnetic agitation 250 - 1500 rpm Overhead Agitation 20 - 2000 rpm
Reactor material	Glass with stainless steel lid	Glass with stainless steel lid	Glass with stainless steel lid	Stainless steel
Pressure rating	N.A. (atmospheric pressure only)	N.A. (atmospheric pressure only)	N.A. (atmospheric pressure only)	10 bar
Standard sensors/probes	Temperature, pH, dissolved oxygen	Temperature, pH, dissolved oxygen	Temperature, pH, dissolved oxygen	Temperature, pH
Standard feeds	2 liquid, 1 gas	2 liquid, 1 gas	2 liquid, 1 gas	2 liquid, 2 gas
Number of spargers	1	1	1	2
Circulator	Optional	Optional	Optional	Optional
Manual sampling	Optional	Optional	Optional	Optional
Dissolved oxygen probe	Included as standard	Included as standard	Included as standard	Optional
Oxygen reduction potential probe	Optional	Optional	Optional	Optional
Foam/level sensor	Optional	Optional	Optional	Optional
BioVIS	Optional	Optional	Optional	Optional
First additional liquid feed	Optional	Optional	Optional	Optional
Second additional liquid feed	Optional	Optional	Optional	Optional
First additional gas feed	Optional	Optional	Optional	Optional
Second additional gas feed	Optional	Optional	Optional	Optional



About H.E.L Group

H.E.L Group's mission is to work together with chemistry, safety and biotechnology experts to engineer and unleash the full potential of the scientific community. To this end, H.E.L develops and manufactures innovative scientific instruments and software designed to optimize the efficiency, safety and productivity of key processes in chemistry and biology applications.

The H.E.L team includes highly skilled process and software engineers, based at their extensive research and manufacturing facilities in the UK, as well as sales and support offices around the world.

H.E.L has a long history of solving complex challenges for customers. For more than 30 years the company has worked with businesses and laboratories globally, providing proprietary automated solutions for the pharma, biotechnology, chemical, battery and petrochemical sectors.

H.E.L is accredited with ISO 9001 : 2015 and ISO 14001 : 2015.

- With a strong focus on the customer, our **service and support** enables our customers to keep working efficiently
- Our **wide range of customizable products** put the customer at the heart of what we do, with solutions designed around their needs

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