h.e.l

Specification Book

Chemical Synthesis:
System and Reactor Options

Parallel and bench scale reactor systems
for chemical synthesis, chemical process
development & scale-up



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Systems

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- AutoMATE

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- AutoLAB

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- PolyBLOCK HP
- AutoMATE HP

High Pressure Bench Scale Systems
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Reaction Calorimeters
- Simular

Customized Reactor Systems
- AutoMATE Custom
- AutoLAB Custom

Ambient Pressure Parallel Systems

Specification Point	PolyBLOCK 4	PolyBLOCK 8	AutoMATE
Platform type	Compact parallel Ideal when bench space is limited, or for specific applications	Compact parallel Ideal when bench space is limited, or for specific applications	Linear parallel Ideal for more complex applications. Expandable functionality
Typical applications	- General chemical synthesis - Process screening - Process optimization - DoE campaigns - Bespoke applications	- General chemical synthesis - Process screening - DoE campaigns - Bespoke applications	As with PolyBLOCK, but configurable for more demanding situations, e.g. - larger volumes - very viscous materials - extended temperature range - greater accessibility for multiple feeds - sampling and sensor options
Application specific options	Solubility/crystallization monitoring - Meta stable zone width determination Online calorimetry* - Reaction enthalpy, reaction kinetics	Solubility/crystallization monitoring - Meta stable zone width determination Online calorimetry* - Reaction enthalpy, reaction kinetics	Solubility/crystallization monitoring - Meta stable zone width determination Online calorimetry* - Reaction enthalpy, reaction kinetics
Number of independently controlled reactors	4	8	4
Maximum reactor volume	500 ml	200 ml	500 ml **Optional:** 1 L custom reactors available
Reactor options	Please see separate Reactor Options		
Temperature range**	Ambient to 200 °C (without external circulator; software limited) **Optional:** - Low temperature circulator dependent. (Typical config, down to -40 °C)	Ambient to 200 °C (without external circulator; software limited) **Optional:** - Low temperature circulator dependent. (Typical config, down to -40 °C)	Ambient to 250 °C (without external circulator, software and glassware limited) **Optional:** - Low temperature circulator dependent. (Typical config, down to -40 °C) - High temperature up to 350 °C
Temperature accuracy	Within ± 0.1 °C		
Pressure range	Glass: vacuum 0.05 bara to 1.1 bara For high pressure options please see High Pressure Parallel Systems		
Sensors	- Reactor temperature - Zone temperature - Stirrer speed **Optional:** - pH - Turbidity - Redox - Conductivity - Dissolved oxygen - Additional integration of third-party probes possible	- Reactor temperature - Zone temperature - Stirrer speed **Optional:** - pH - Turbidity - Redox - Conductivity - Dissolved oxygen - Additional integration of third-party probes possible	- Reactor temperature - Zone temperature - Stirrer speed **Optional:** - pH - Turbidity - Redox - Conductivity - Dissolved oxygen - Additional integration of third-party probes possible

*requires WinISO software platform
**Temperature range measured in reactor

Ambient Pressure Parallel Systems

Specification Point	PolyBLOCK 4	PolyBLOCK 8	AutoMATE
System control options	A variety of inputs can be logged, enabling automated monitoring and feedback control of the reactor system, such as: - Temperature (either reactor, jacket and/or difference) - Stirrer speed - Liquid level - Liquid feed rate and total amount added. - Liquid sampling and dilution - pH - Dissolved oxygen - Gas flow rate and pressure (if required)		
Additional options	- Off-gas measurement - 21 CFR Part 11 compliance* - Integration with third party analytical instruments		
Condensing and inerting options	- Liquid-cooled glass condensers, with inert gas connections - Manifold for connection of multiple condensers - Metal block for condensing and inert connection on tubes and small reactors		
Software	Common control software enables regular data logging, multi-step recipes, parameter control, and feedback loops. Adds responsive intelligence and delivers intuitive interface that needs only minimal training to run quickly		
Safety features	- Automatic, user-configurable, shutdown procedures if a safety condition is exceeded to ensure user safety - Automatic hardware and software fail-safes are installed on every system		
Dimensions (L x W x H)	350 x 200 x 200 mm**	350 x 200 x 200 mm**	1050 x 500 x 900 mm**

*requires winISO
**Excluding circulators, pumps, and other optional accessories

Please see our Customized Reactor Systems page if the functionality you require is not listed in our standard configuration

Ambient Pressure Bench Scale Systems

Specification Point	AutoLAB
Platform type	Fully automated modular laboratory reaction system, for ambient pressure use Can be designed, configured, and tailored to individual requirements
Typical applications	- General chemical synthesis - Process optimization - Process scale-up - Kilo-lab/Pre-pilot production
Application specific options	Solubility/crystallization monitoring - Meta stable zone width determination Online calorimetry* - Reaction enthalpy, reaction kinetics
Temperature range**	-50 °C to 250 °C (circulator dependent) Limited to a maximum of 200 °C for glass reactor options
Reactor types	Single, bench scale reactor available in glass, stainless steel SS316 and hastelloy C276 Full reactor details can be found under Ambient Pressure Bench Scale Reactor Options
Reactor volume	From 0.5 to 20 L Full reactor details can be found under Ambient Pressure Bench Scale Reactor Options
Pressure range	Glass: vacuum 0.05 bara to 1.1 bara For high pressure options please see High Pressure Parallel Systems
Sensors	- Reactor temperature - Jacket or mantle temperature - Stirrer speed **Optional:** - pH - Turbidity - Redox - Conductivity - Dissolved oxygen - Additional integration of third-party probes possible
System control options	A variety of inputs can be logged, enabling automated monitoring and feedback control of the reactor system, such as: - Temperature (either reactor, jacket and/or difference) - Stirrer speed - Liquid level - Liquid feed rate and total amount added. - Liquid sampling and dilution - pH - Dissolved oxygen - Gas flow rate and pressure (if required)

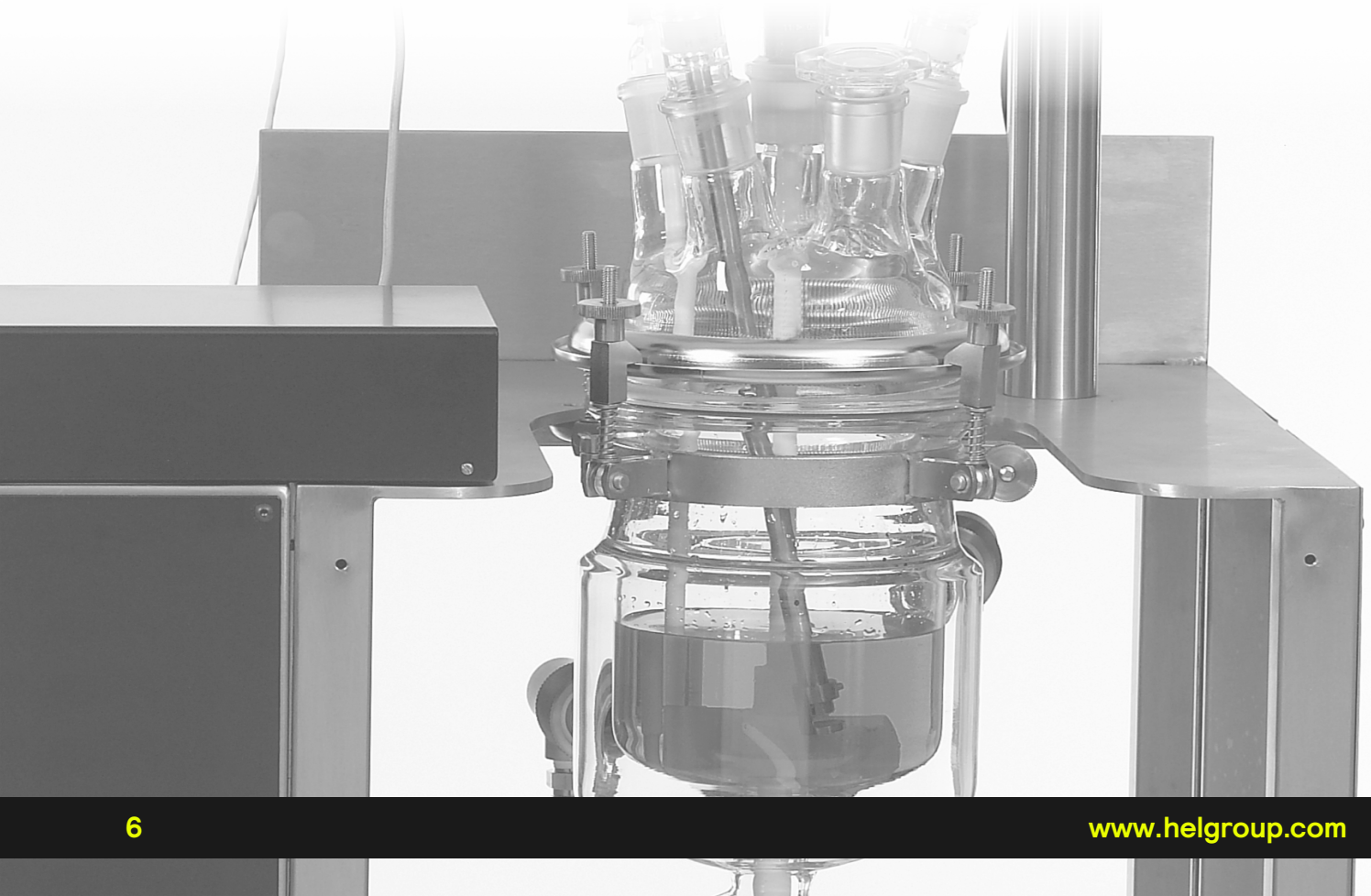
*requires WinISO software platform
**Temperature range measured in reactor

Ambient Pressure Bench Scale Systems

Specification Point	AutoLAB
Condensing and inerting options	- Liquid-cooled glass condensers, with inert gas connections - distillation tool - automated reflux control
Reagent addition	Up to 2 liquid feeds More possible with AutoLAB Custom
Additional options	- Off-gas measurement - 21 CFR Part 11 compliance* - Integration with third party analytical instruments
Software	Common control software enables regular data logging, multi-step recipes, parameter control, and feedback loops. Adds responsive intelligence and delivers intuitive interface that needs only minimal training to run quickly
Safety features	- Automatic, user-configurable, shutdown procedures if a safety condition is exceeded to ensure user safety - Automatic hardware and software fail-safes are installed on every system

*requires WinISO software platform

Please see our Customized Reactor Systems page if the functionality you require is not listed in our standard configuration



High Pressure Parallel Systems

Specification Point	PolyBLOCK HP	AutoMATE HP
Platform type	Compact parallel Ideal when bench space is limited, or for specific applications	Linear parallel Ideal for more complex applications. Expandable functionality
Typical applications	- General high pressure synthesis. e.g. Hydrogenation - High Pressure process screening - High Pressure process optimization - DoE campaigns - Bespoke applications	As with PolyBLOCK HP, but configurable for more demanding situations, e.g. - larger volumes - very viscous materials - extended temperature range - greater accessibility for multiple feeds - sampling and sensor options
Application specific options	Catalyst screening - Gas consumption rate calculation High pressure online calorimetry* - Reaction enthalpy, reaction kinetics	Catalyst screening - Gas consumption rate calculation High pressure online calorimetry* - Reaction enthalpy, reaction kinetics
Number of independently controlled reactors	4 or 8	4
Maximum reactor volume	500 ml (4 reactor) 50 ml (8 reactor)	500 ml
Reactor options	Please see separate Reactor Options	
Temperature range**	Ambient to 200 °C (without external circulator; software limited) **Optional:** - Low temperature circulator dependent. (Typical config, down to -40 °C)	Ambient to 250 °C (without external circulator; software limited) **Optional:** - Low temperature circulator dependent. (Typical config, down to -40 °C) - High temperature up to 350 °C
Temperature accuracy	Within ± 0.1 °C	
Pressure range	0 to 200 bar	0 to 200 bar
Sensors	- Reactor pressure - Reactor temperature - Zone temperature - Stirrer speed **Optional:** - Direct gas flow (volumetric and mass) measurement - Additional Integration of third-party probes possible	- Reactor pressure - Reactor temperature - Zone temperature - Stirrer speed **Optional:** - Direct gas flow (volumetric and mass) measurement - Additional Integration of third-party probes possible

*requires WinISO software platform
**Temperature range measured in reactor

High Pressure Parallel Systems

Specification Point	PolyBLOCK HP	AutoMATE HP
System control options	A variety of inputs can be logged, enabling automated monitoring and feedback control of the reactor system, such as: - Temperature (either reactor, jacket and/or difference) - Stirrer speed - Liquid level - Liquid feed rate and total amount added - Pressure - Gas flow rate - Inert/purging cycles and venting	
Sampling options	Manual sampling	Manual sampling
Additional options	- Off-gas measurement - 21 CFR Part 11 compliance* - Integration with third party analytical instruments	- Off-gas measurement - 21 CFR Part 11 compliance* - Integration with third party analytical instruments
Software	Common control software enables regular data logging, multi-step recipes, parameter control, and feedback loops. Adds responsive intelligence and delivers intuitive interface that needs only minimal training to run quickly	
Safety features	- Automatic, user-configurable, shutdown procedures if a safety condition is exceeded to ensure user safety - Automatic hardware and software fail-safes are installed on every system e.g. Certified pressure safety valves and/or rupture discs	
Dimensions (L x W x H)	350 x 200 x 200 mm**	1050 x 500 x 900 mm**

*requires WinISO software platform
**Excluding circulators, pumps, and other optional accessories

Please see our Customized Reactor Systems page if the functionality you require is not listed in our standard configuration



High Pressure Bench Scale Systems

Specification Point	AutoLAB HP
Platform type	Fully automated modular laboratory reaction system, for high pressure use Can be designed, configured, and tailored to individual requirements
Typical applications	- General high pressure chemical synthesis - High pressure process optimization - High pressure process scale-up - High pressure Kilo-lab/Pre-pilot production
Application specific options	Catalyst screening - Gas consumption rate calculation High pressure online calorimetry* - Reaction enthalpy, reaction kinetics
Temperature range**	-50 °C to 250 °C as standard (circulator dependent) Additional options to increase to -80 °C to 350 °C (circulator dependent)
Reactor types	Single, bench scale reactor available in stainless steel SS316 and hastelloy C276 Full reactor details can be found under High Pressure Bench Scale System Reactor Options
Reactor volume	From 1 to 20 L Full reactor details can be found under Ambient Pressure Bench Scale System Reactor Options
Pressure range	From 0 to 100 bar (reactor volume dependent)
Sensor options	- Reactor Pressure - Reactor Temperature - Jacket or Mantle Temperature - Stirrer Speed **Optional:** - Direct gas flow (volumetric and mass) measurement - Additional Integration of third-party probes possible
System control options	A variety of inputs can be logged, enabling automated monitoring and feedback control of the reactor system, such as: - Temperature (either reactor, jacket and/or difference) - Stirrer speed - Liquid level - Liquid feed rate and total amount added - Pressure - Gas flow rate - Inert/purging cycles and venting

*requires WinISO software platform
**Temperature range measured in reactor

High Pressure Bench Scale Systems

Specification Point	AutoLAB HP
Sampling options	Manual sampling
Reagent addition	- Up to 2 liquid feeds - Up to 2 gas feeds More possible with AutoLAB Custom
Additional options	- Off-gas measurement - 21 CFR Part 11 compliance* - Integration with third party analytical instruments
Software	Common control software enables regular data logging, multi-step recipes, parameter control, and feedback loops. Adds responsive intelligence and delivers intuitive interface that needs only minimal training to run quickly
Safety features	- Automatic, user-configurable, shutdown procedures if a safety condition is exceeded to ensure user safety - Automatic hardware and software fail-safes are installed on every system e.g. Certified pressure safety valves and/or rupture discs

*requires WinISO software platform

Please see our Customized Reactor Systems page if the functionality you require is not listed in our standard configuration



Reaction Calorimeters

Specification Point	Simular
Platform type	Reaction Calorimeter
Typical applications	- Process safety - Process scale-up - Process development and optimization
Vessel material	Glass, 316 Stainless steel, and Hastelloy C276
Reactor volume	250 ml to 5L*
Dual vessel	A dual vessel option is available (typically with a glass, ambient pressure vessel and a metal, high-pressure vessel) including a larger dual frame and switching between reactors
Temperature range	-80°C to 250°C (dependent on reactor material and circulator)*
Pressure range	Vacuum to 100 bar (optional pressure – up to 200 bar, depending on reactor volume and material)*
Stirring	Standard unit includes an automatically controlled 100 Ncm torque motor (Reactor material dependent)*
Sensor options	Temperature, pressure, pH, turbidity, and other sensors are available. Integration of third-party probes is possible, such as in-situ FTIR, particle sizing probes and Raman probes with software integration.
Reagent addition	Prominent Pump and balance combination for glass reactors and HPLC pump for metal reactors. Optional feeds: – Pressurized vessels for highly volatile reagents – Mass flow controller for gas feeds (0 to 2000 mln/min)
Gas evolution measurement	Off-gas flow rate measurement (reactor material dependent)

* Contact your local H.E.L group representative to discuss additional options

Reaction Calorimeters

Specification Point	Simular
Control & analysis software	- Easy to use, powerful software designed both advanced users and beginners - Intelligent automation: Customizable interface with real-time sensor readings, allowing for feedback loops, and reactor parameters based on user preferences. User-defined experiment plans covering simple to advanced reactions. - Common software across H.E.L group process safety product range for ease of use and to save time on training
Calorimetry Modes	Isothermal calorimetry: – Power compensation calorimetry – Heat flow calorimetry Optional: Reflux calorimetry Other methodologies: – Isoperibolic calorimetry
Safety features	Automatic user-configurable shutdown procedures if a safety condition is exceeded to ensure user safety
Dimensions (L x W x H)	– Single Simular: 850 x 650 x 1200 mm – Dual Simular: 1100 x 650 x 1300 mm Caution: Excludes circulators, pumps, balances, and other optional accessories. Extra width should be allowed. Larger reactors could be taller. The distillation kit option increases the overall height to 2000mm.

* Contact your local H.E.L group representative to discuss additional options

Custom Reactor Systems

H.E.L Group has a well-established history of developing bespoke, automated reactor solutions for the chemical and pharmaceutical R&D community. We continue this proud tradition with our two fully customizable chemical synthesis platforms, the **AutoMATE Custom** and the **AutoLAB Custom**. We are also able to offer a degree of customization across our wider portfolio.

The **AutoMATE Custom** is based on a linear parallel reactor platform, designed for chemical synthesis applications during the early stages of chemical and pharmaceutical process development. The **AutoLAB Custom** is a fully configurable, automated laboratory bench-scale reaction system for the later stages of process development and scale-up. Both systems offer expandable functionality and can be designed to specific, individual application and process requirements.

Mix and match

Interchangeable vessels for quick exchange between applications
- combine high- and low- pressure reactor options
- alternative reactor materials (e.g., Hastelloy C22, Titanium and Zirconium)
- adaptor inserts for different vessel types (e.g., tubes, flasks, and reactors)

Customizable chemistry

Configure the system for your needs
- reactor system control built around your requirements
  (e.g., automated sampling, liquid and gas dosing, process monitoring tools, reflux/distillation)
- integrate with third-party probes & instrumentation
- add application modules to suit your evolving research
  (e.g., gas consumption or evolution measurement, online calorimetry, MSZW determination)

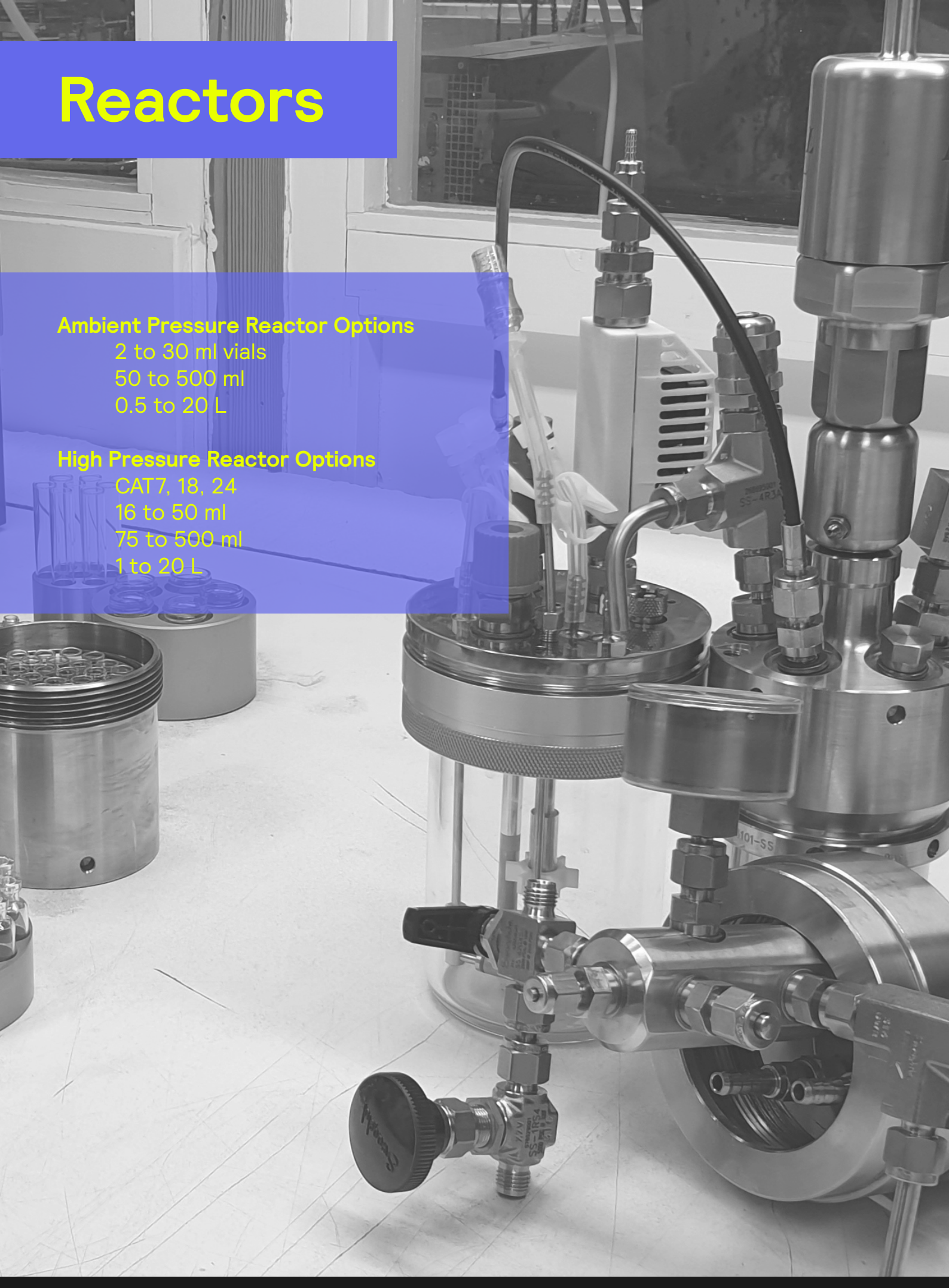
Beyond the bench

Define the system you want
- go larger with bespoke floor standing options
- combine with other bench-scale reactors on a multi-reactor stand

If you are interested in a customized solution, please contact us to discuss your specific requirements.



Reactors



Ambient Pressure Reactor Options

2 to 30 ml vials
50 to 500 ml
0.5 to 20 L

High Pressure Reactor Options

CAT7, 18, 24
16 to 50 ml
75 to 500 ml
1 to 20 L

Ambient Pressure Reactor Options

Specification Point	2 ml vials	4 ml vials	5 ml vials	10 ml vials	30 ml vials
Vial Type	HPLC Crimp top	HPLC Crimp top	Open top reactor tubes	Tall reaction tube (screening reactor)	Tall reaction tube (screening reactor)
Vial material	Glass with cap	Glass with cap	Glass	Glass with PTFE lid	Glass with PTFE lid
Stirring options	Magnetic Agitation	Magnetic Agitation	Magnetic Agitation	Magnetic Agitation	Magnetic Agitation
Stirring speed*	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)
Impeller options Magnetic Agitation	PTFE Flea	PTFE Flea	PTFE Flea	- PTFE Flea - PTFE Anchor - Metal Narrow Magnetic Anchor	- PTFE Flea - PTFE Anchor - Metal Narrow Magnetic Anchor
Maximum working vial temperature	200 °C	200 °C	200 °C	200 °C	200 °C
Condenser option	N	N	N	Y	Y
Inerting block/ manifold	N	N	N	Block	Block
Sensors available	N	N	N	N	Y

* Maximum stirrer speed achievable dependent on reactor conditions

System Compatibility

PolyBLOCK 4	Y† Vial adaptor available (upto 30 vials)	Y† Vial adaptor available (upto 20 vials)	Y† Vial adaptor available (single or 7 vials)	Y† Vial adaptor available (single or triple vial)	Y† Vial adaptor available (single or triple vial)
PolyBLOCK 8	Y† Vial adaptor available (upto 8 vials)	Y† Vial adaptor available (upto 7 vials)	Y† Vial adaptor available (single or 7 vials)	Y† Vial adaptor available (single or triple vial)	Y† Vial adaptor available (single vial)
AutoMATE	Y† Vial adaptor available (upto 30 vials)	Y† Vial adaptor available (upto 20 vials)	Y† Vial adaptor available (single or 7 vials)	Y† Vial adaptor available (single or triple vial)	Y† Vial adaptor available (single or triple vial)
CrystalScan	N	N	N	N	Y† Vial adaptor available (single vial)

† Insert adaptor available

Ambient Pressure Reactor Options

Specification Point	50 ml flat-bottomed reactor	100 ml flat-bottomed reactor	200 ml flat-bottomed reactor	350 ml flat-bottomed reactor	500ml flat-bottomed reactor
Reactor material	Glass with PTFE lid	Glass with PTFE lid	Glass with PTFE lid	Glass with PTFE lid Glass with glass lid	Glass with PTFE lid Glass with glass lid
Stirring options	Magnetic Agitation	- Magnetic Agitation - Direct Agitation	- Magnetic Agitation - Direct Agitation	- Magnetic Agitation - Direct Agitation	- Magnetic Agitation - Direct Agitation
Stirring speed	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)
Impeller options **Magnetic Agitation**	- PTFE Flea - PTFE Anchor - Metal Narrow Magnetic Anchor	- PTFE Downflow - PTFE Upflow - PTFE Rushton - PTFE Marine - PTFE Anchor - Metal Narrow Magnetic Anchor	- PTFE Downflow - PTFE Upflow - PTFE Rushton - PTFE Marine	- PTFE Downflow - PTFE Upflow - PTFE Rushton - PTFE Marine	- PTFE Downflow - PTFE Upflow - PTFE Rushton - PTFE Marine
Impeller options **Direct Agitation**	N/A	- Metal Downflow - Metal Upflow - Metal Wide Anchor	- Metal Downflow - Metal Upflow - Metal Wide Anchor	- Metal Downflow - Metal Upflow - Metal Wide Anchor	- Metal Downflow - Metal Upflow - Metal Wide Anchor
Maximum working reactor temperature	200 °C	200 °C	200 °C	200 °C	200 °C
Liquid dosing per reactor	Multiple independent feeds possible*				
Automated sampling (ASu)	Optional	Optional	Optional	Optional	Optional
Condenser option	Y	Y	Y	Y	Y
Inerting block/ manifold	Block	Manifold	Manifold	Manifold	Manifold
Sensors available	Y	Y	Y	Y	Y

*up to a combined total of 5 lid ports

System Compatibility

PolyBLOCK 4	Y†	Y†	Y†	Y Direct agitation not possible with glass lid	Y Direct agitation not possible with glass lid
PolyBLOCK 8	Y†	Y	Y	N	N
AutoMATE	Y†	Y†	Y†	Y	Y
CrystalScan	Y†	Y	Y	N	N

† Insert adaptor available

Ambient Pressure Reactor Options

Specification Point	0.5 L	1 L	2 L	5L	10 L	20 L
Reactor type	Glass, single jacket (as standard) **Optional:** Vacuum (double) jacket. Recommended for low temperatures to reduce ice build-up on reactor, and for calorimetry applications					
Frame type	Bench-top	Bench-top	Bench-top	Tall bench-top	Floor-standing	Floor-standing
Stirrer speed range* **(speed limited, stirrer-dependent)**	0 to 600 rpm	0 to 600 rpm	0 to 600 rpm	0 to 400 rpm	0 to 400 rpm	0 to 300 rpm
Maximum stirrer torque* **	100 Ncm	100 Ncm	100 Ncm	200 Ncm	200 Ncm	200 Ncm

* **Optional:** Automated stirring with higher torque rate motors are available
** Maximum stirrer speed achievable dependent on reactor conditions

Liquid feed options

Diaphragm pump	Versatile pump, with inert wetted parts **Recommended option:** feed off balance for greater feed accuracy
Peristaltic pump	Pump tubing easily replaced for chemical compatibility or re-ranging desired flow rate. **Recommended option:** feed off balance for greater feed accuracy
Syringe pump	- Ideal for feeding small quantities of liquid - Single or dual syringes

Please see our Customized Reactor Systems page if the reactor type you require is not listed in our standard configuration

System Compatibility

AutoLAB	Y	Y	Y	Y	Y	Y
Simular	Y	Y	Y	N	N	N



High Pressure Reactor Options

Specification Point	CAT 7	CAT 24	CAT 18
Description	Single reactor supporting 7 vials for catalytic screening	Single reactor supporting 24 vials for catalytic screening	Single reactor supporting 18 vials for catalytic screening
Reactor material	- Stainless steel - Hastelloy	- Stainless steel - Hastelloy	- Stainless steel - Hastelloy
Stirring options	Magnetic Agitation	Magnetic Agitation	Magnetic Agitation
Impeller options	PTFE Flea	PTFE Flea	PTFE Flea
Stirring speed	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)
Maximum working reactor temperature	250 °C	250 °C	250 °C
Pressure rating	Up to 100 bar	Up to 100 bar	Up to 100 bar
Typical working volumes	10 ml vials	4 ml vials	2 ml vials
Sensors available	Temperature	Temperature	Temperature

System Compatibility			
PolyBLOCK 4 HP	N	Y	Y
PolyCAT 4	N	Y	Y
DigiCAT	Y	Y	Y

For higher throughput, automated catalyst screening solutions, see DigiCAT 96 in our high pressure catalysis portfolio. Supports a standard 96-well Zinsser block for up to 96 simultaneous reactions in 1 ml vials.



High Pressure Reactor Options

Specification Point	16 ml	25 ml	50 ml
Description	Single reactor Designed for catalysis applications	Single reactor Designed for catalysis applications	Single reactor Designed for catalysis applications
Reactor material	- Stainless steel - Hastelloy	- Stainless steel - Hastelloy	- Stainless steel - Hastelloy
Stirring options	Magnetic Agitation	Magnetic Agitation	Magnetic Agitation
Impeller options	- PTFE Anchor - Metal Narrow Magnetic Anchor	- PTFE Anchor - Metal Narrow Magnetic Anchor	- PTFE Anchor - Metal Narrow Magnetic Anchor
Stirring speed* **	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)
Maximum working reactor temperature	Up to 350°C*	Up to 350°C*	Up to 350°C*
Pressure rating	Up to 200 bar*	Up to 200 bar*	Up to 200 bar*
Typical working volumes	5 ml to 12.8 ml**	7 ml to 20 ml**	9 ml to 40 ml**
Liquid dosing per reactor	Upto 1 feed	Upto 1 feed	Upto 1 feed
Gas feed	1 feed (can switch between inert and reactive gas)	1 feed (can switch between inert and reactive gas)	1 feed (can switch between inert and reactive gas)
High pressure gas manifold	Y	Y	Y
Sensors available	Y	Y	Y

* (Reactor material/design dependent)
**typical working volumes, thermocouple present for direct measurement of reactor temperature. When temperature measurement is not required the minimum volume is 2ml lower than the stated value and the maximum volume is increased by 20%.
*** Maximum stirrer speed achievable dependent on reactor conditions

System Compatibility

PolyBLOCK 4 HP	Y†	Y†	Y†
PolyBLOCK 8 HP	Y†	Y†	Y†
AutoMATE HP	Y†	Y†	Y†
ChemSCAN	Y	Y	Y
PolyCAT 4	Y†	Y†	Y†
PolyCAT 8	Y	Y	Y
DigiCAT	Y	Y	Y

† Insert adaptor available

High Pressure Reactor Options

Specification Point	75 ml	150ml	300 ml	500 ml
Description	Single Reactor	Single Reactor	Single Reactor	Single Reactor
Reactor material	- Stainless steel - Hastelloy	- Stainless steel - Hastelloy	- Stainless steel - Hastelloy	- Stainless steel - Hastelloy
Stirring options	Magnetic Agitation	Magnetic Agitation	Magnetic Agitation	Magnetic Agitation
Impeller options **Magnetic Agitation**	- PTFE Anchor - Metal Narrow Anchor	- PTFE Downflow - PTFE Upflow - PTFE Rushton - PTFE Marine	- PTFE Downflow - PTFE Upflow - PTFE Rushton - PTFE Marine	- PTFE Downflow - PTFE Upflow - PTFE Rushton - PTFE Marine
Impeller options **Direct Agitation**	- Metal Wide Anchor	- Metal Downflow - Metal Upflow - Metal Wide Anchor	- Metal Downflow - Metal Upflow - Metal Wide Anchor	- Metal Downflow - Metal Upflow - Metal Wide Anchor
Stirring speed* **	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)	Up to 1500 rpm (viscosity dependent)	Up to 1000 rpm (viscosity dependent)
Maximum working reactor temperature	Up to 350°C*	Up to 350°C*	Up to 350°C*	Up to 350°C*
Pressure rating	Up to 200 bar*	Up to 200 bar*	Up to 200 bar*	Up to 200 bar*
Typical working volumes	11 ml to 40 ml	11 ml to 85 ml	38 ml to 220 ml	50 ml to 400 ml
Liquid dosing per reactor	Multiple independent feeds possible**			
Gas feed	1-2 independent feeds standard, more possible** **Optional:** pre-mixing			
Inerting block/ manifold	Y	Y	Y	Y
Sensor options	Y	Y	Y	Y

* (Reactor material/design dependent)
**up to a combined total of 5 lid ports
*** Maximum stirrer speed achievable dependent on reactor conditions

System Compatibility

PolyBLOCK 4 HP	Y†	Y†	Y†	Y†
AutoMATE HP	Y†	Y†	Y†	Y†
PolyCAT 4	Y†	Y†	Y†	Y†
DigiCAT	Y	Y	Y	Y

† Insert adaptor available

High Pressure Reactor Options

Specification Point	1 L	2 L	5L	10 L	20 L
Reactor type	- Stainless steel - Hastelloy	- Stainless steel - Hastelloy	- Stainless steel - Hastelloy	- Stainless steel - Hastelloy	- Stainless steel - Hastelloy
Frame type	Bench-top	Bench-top	Tall bench-top	Floor-standing	Floor-standing
Stirrer speed range (speed limited, stirrer-dependent)	Up to 1000 rpm	Up to 1000 rpm	Up to 1000 rpm	Up to 1000 rpm	Up to 1000 rpm
Maximum stirrer torque	100 Ncm	100 Ncm	200 Ncm	200 Ncm	200 Ncm
Pressure rating	Up to 100 bar*	Up to 100 bar*	Up to 100 bar*	Up to 100 bar*	Up to 50 bar*

* Please see our Customized Reactor Systems page if you require a specific pressure rating

Liquid feed options	
Diaphragm pump	Versatile pump, with inert wetted parts. Pressure limitations depending on model, please enquire. With flow rates up to 38 ml/min **Recommended option:** feed off balance for greater feed accuracy
High pressure syringe pump	Dedicated high pressure liquid feed pump. With max flow rates up to, 20, 40 or 80 ml /min.
Coriolis flow meter	Ideal for liquified gases from a pressurised vessel, and when flow chemical composition is not known in advance
Solenoid valve	On-off control of liquid feed. Less sensitive than other options

Gas feed options	
MFC	Up to 20 – 30 L/min as standard. Calibrated for specific gas, supply pressure and downstream pressure.
Solenoid valve	Solenoid valve pressure feed control (can also be used for gas uptake measurements)

System Compatibility					
AutoLAB	Y	Y	Y	Y	Y
Simular	Y	Y	N	N	N

WinISO

Bringing effortless efficiency to your laboratory automation

With the power of WinISO, you can elevate your research with a software solution that adapts to your needs.



Flexibility and control

- Fully configurable workspace – improved efficiency by displaying the info you need
- No swapping between windows required; configure the workspace to suit you
- Powerful and flexible code base combined with an intuitive and user-friendly design
- Increase reproducability and reduce human error

Empowering proactive experimentation

Designed around the user experience, WinISO combines:

- Advanced real-time data display
- Automated monitoring of experiment completion and failure states
- Rapid data capture modes
- Easy DOE with the creatation of custom plans in our offline simulator mode across single or multiple parallel reaction systems

Real-time interactivity

- Change and adapt on the fly as you navigate through your experiments.
- Interactive design empowering real-time adjustments
- Ensure that your research evolves, aligning with your insights and discoveries

Safety at the core

- Robust safety features protect both the operator and the experiment
- Ensuring a secure environment for your experiments, allows you to focus on pushing boundaries

For more information, and how to request an upgrade, visit
https://helgroup.com/products/laboratory-automation-software/
or speak to your local H.E.L representative



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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