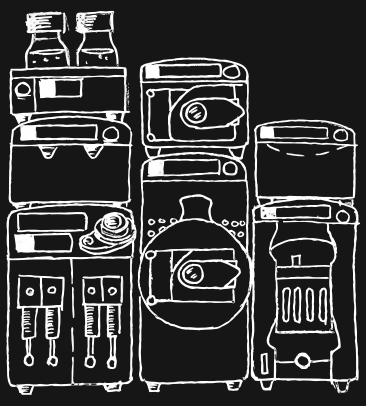
Asia

SYRRIS
Asia

Product information



Award-winning flow chemistry solutions

Asia Flow Chemistry System

Asia is the award-winning flow chemistry range from Syrris. Designed by chemists for chemists, it enables the widest variety of chemical reactions with ultimate ease of use.

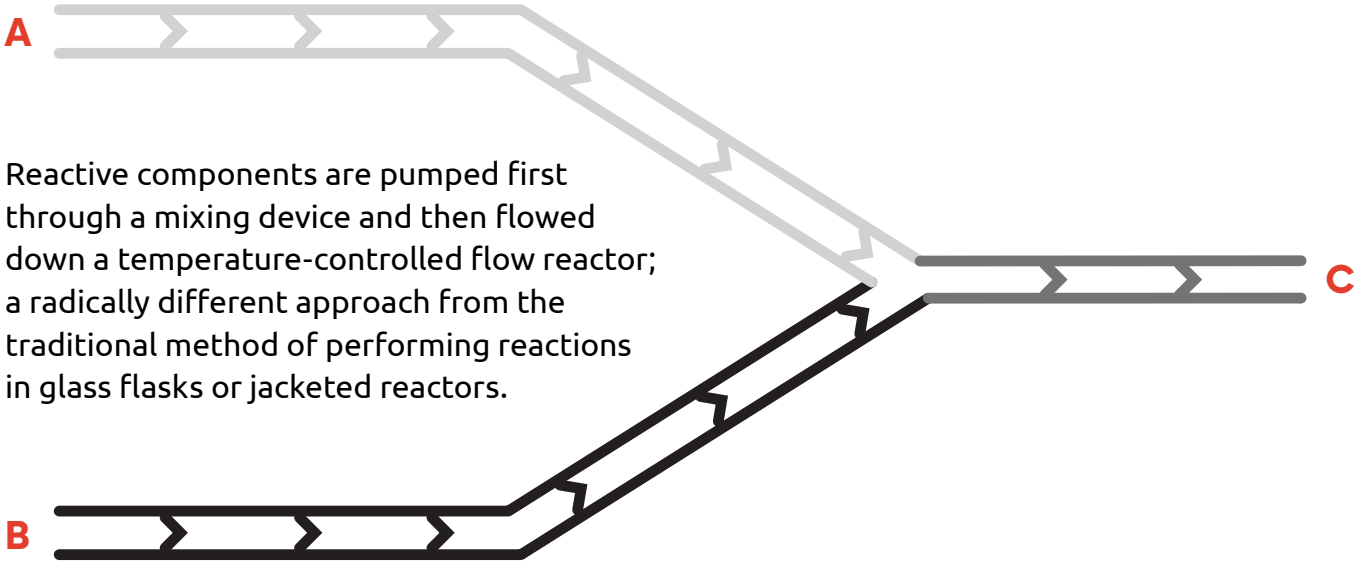
Chemists have complete control with Asia. Run manual or automated experiments, with production scales of mg to kg, with a range of temperatures, pressures, and reaction times to suit your needs.

With all wetted materials offering maximum chemical resistance, you'll receive years of continuous service.

syrris.com/asia

What is flow chemistry?

Flow chemistry is the process of performing chemical reactions in a tube, capillary, or micro structured device (a flow reactor).



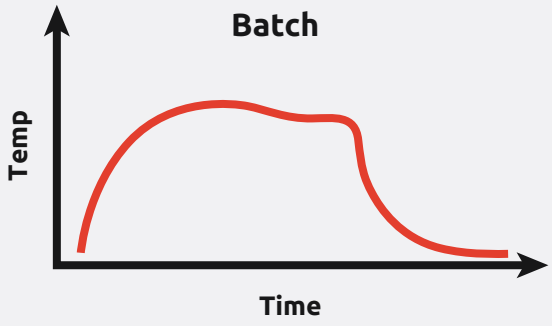
Reactive components are pumped first through a mixing device and then flowed down a temperature-controlled flow reactor; a radically different approach from the traditional method of performing reactions in glass flasks or jacketed reactors.

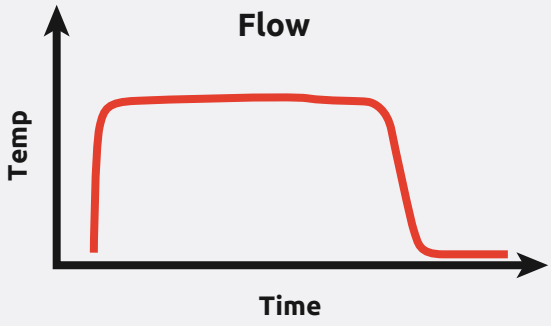
Flow rate, residence time, reactor volume, and production rate

In a flow reactor, the residence time (i.e. the amount of time that the reaction is heated or cooled) is calculated from the volume of the reactor and the flow rate through it. Asia offers reaction times from a few seconds to a few hours. **Residence time can be varied by changing the reactor volume and/or the flow rates.**

Temperature control

The surface area to volume ratio of the reaction mixture in a Syrris flow reactor is much greater than a round-bottom flask. Thus, heat can be transferred to or from the reaction mixture much more rapidly than in a batch reactor. Greater temperature control can, therefore, be maintained for exo- or endothermic reactions improving consistency and yield.





Benefits of flow chemistry

The minituarized nature of lab-scale flow chemistry systems enable far greater control over reaction parameters, including temperature, residence times, molar ratios, and pressure. The combination of this advanced control leads to 9 main benefits of continuous flow chemistry.

TOP 9 BENEFITS OF CONTINUOUS FLOW CHEMISTRY

Read more at **syrris.com/why-flow**

Faster reactions

It is much easier to pressurize flow chemistry systems than batch chemistry systems. Higher pressures enable higher temperatures, resulting in faster reaction rates (according to the Arrhenius equation).

Safer reactions

Flow reactions are safer because the quantity of reaction occurring at any one time is minimized. Reactions occur as small amounts of liquids are mixed through small reactors, whereas in a batch reactor, the entire reactor contents are mixed at once.

Faster reaction optimization

In a continuous flow chemistry reactor it is extremely easy to vary the reaction time, reaction temperature, ratio of reagents and concentration, resulting in much faster reaction optimization.

Fast serial library synthesis

Flow chemistry systems enable fast, serial library synthesis and purification of 10s to 100s of compounds a day with total automation of liquid handling through the use of automated reagent addition and product collection modules.

Access unique reaction conditions

With flow chemistry, chemists can access novel chemistries not previously possible with traditional batch methods. Chemists can create reactive intermediates and hazardous reagents on demand and react them with no isolation.

Reactions are more selective

Poor selectivity in chemistry stems from variations in temperature, reaction time, and addition/stirring rates. Flow chemistry systems enable much better control and selectivity through excellent temperature control and minimal concentration gradient.

Scale-up is easier in flow than batch

Scaling up from lab scale batch chemistry can be a difficult process. Scaling up in flow is easy. Using the same conditions used to optimize the reaction, chemists can simply flow the reaction for longer to create more material. Scaling up of flow reactors with increased flow rates can afford even more.

Reaction analysis integration

With batch reactions chemists are required to sample multiple times to analyze their reaction. In flow, the chemist can analyze their reaction continuously (IR, Raman, UV, NMR) with a single probe, while sampling and diluting modules allow a reaction aliquot to be diverted to external analytical devices (HPLC, LCMS, etc.).

Reactions are easier to work-up

Traditional batch chemistry relies on a separate operation to perform a work-up, but in continuous flow chemistry, the reaction is already mobile. This enables in-line work-up of liquid-liquid extraction and solid phase reagents/scavengers/filtration.

Case Study

A new dimension in drug discovery for Gedeon Richter

Research Scientist, Dr. György Túrós, explains how the pharmaceutical giant is using Asia to access new chemistries

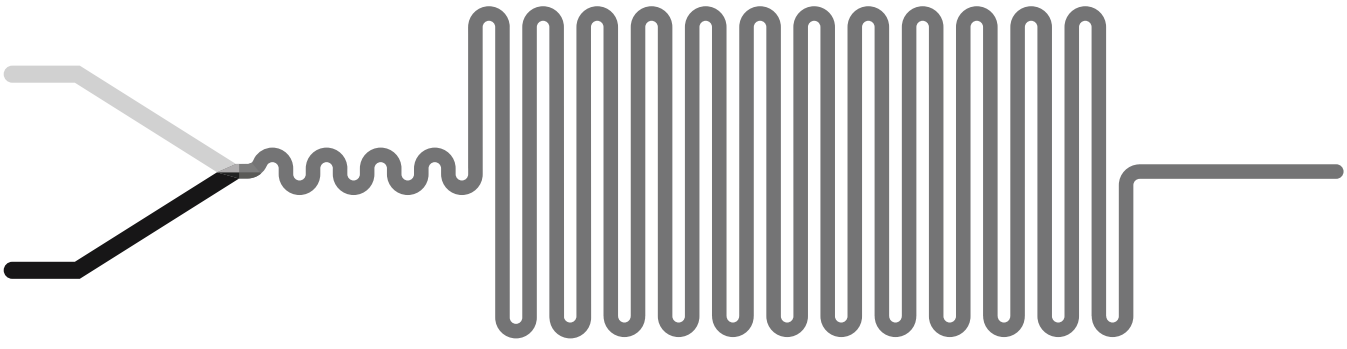
The Discovery Chemistry Department at Gedeon Richter in Budapest, Hungary, invested in an Asia flow chemistry system to aid researchers involved in the design and synthesis of original CNS drugs. Research scientist Dr. György Túrós explained:

"In discovery chemistry research, we need to perform a lot of very interesting and complex chemical syntheses and, until now, have relied on classical batch chemistry methods.

"We purchased an Asia flow chemistry reactor in June 2012, and are reaping the benefits of using flow chemistry techniques. The system has extended the range of chemistries available to us, allowing us to work at much higher pressures and temperatures—sometimes above a solvent's boiling point—to create completely new heterocyclic scaffolds.

"We can combine the Asia modules in a variety of different ways to meet changing needs, and will also be able to add additional modules at a later date if required. This was an important consideration, and one of the main reasons for choosing Asia.

"Syrris has been very supportive, giving us some valuable ideas and flow chemistry tips during our training, and we can now do chemistry which was absolutely impossible before. In my opinion, Syrris is as innovative in the synthetic chemistry arena as Google or Apple in the informatics field."



Systems

Starter System

The Asia Starter System is ideal for both industrial and academic chemists eager to begin introducing flow chemistry into their research.

The easy-to-use and affordable Starter System contains all essential flow system modules: an Asia Syringe Pump, an Asia Chip Climate Controller, a glass microreactor, and an Asia Pressure Controller. The Starter Systems is future-proof and can be seamlessly upgraded with additional features and modules as the user's experience with flow chemistry grows.

Electrochemistry System

Electrochemical activation of chemical reagents enables selectivity and transformations impossible by other techniques. Asia gives easy access to electrochemical synthesis methods.

The Asia Flux module and cell offers a wide range of electrodes assembled without the need for tools. The unique design allows the precise control of electron transfer into the process. Users can operate in either constant current (Galvanostatic) mode or constant voltage (Potentiostatic) mode to achieve reductions and oxidations.

Cold System

The Asia Cold System has been defined to enable safe chemical reactions under cryogenic conditions (e.g. exothermic organometallic reactions).

The Asia Cold System incorporates all the required modules for running reactions in continuous flow at temperatures down to -100 °C. The advanced system centers on the Cryo Controller module, delivering temperatures down to -100 °C using only electrical power without the need for external cooling.

Nanoparticle System

Flow chemistry offers exceptional advantages for nanoparticle synthesis resulting in narrow particle size distribution and control over shape and architecture.

The Nanoparticle System offers fast and reproducible mixing, excellent heat transfer, and accurate temperature control. The ability to isolate the nucleation and particle growth is key to harnessing the advantages of flow for these applications giving unique size, shape, and architecture. The Nanoparticle System is ideal for the rapid optimization and production of nanoparticles.

Discovery Chemistry System

The Asia Discovery Chemistry System gives the modern discovery laboratory a new toolbox to enable faster and more efficient research.

This system offers easily configured flow experiments capable of running a wide range of chemistries. Users can design a list of experiments, each requiring just hundreds of microliters of reagents, and run them in sequence. This system is ideal for the creation of targeted compound arrays and for efficient reaction optimization for scale-up.

Process Optimization System

Ideal for exploring the conversion of a batch process to a flow process and varying reaction parameters to optimize the reaction conditions.

Easy setup of tens of automated reactions using the intuitive Asia Manager Software. The set-up enables rapid and efficient reaction optimization exploring both continuous reaction parameters (time, temperature, molar ratios) and also the screening of discontinuous parameters such as reagents, catalysts, and enzymes.

Scale-Up System

Flow chemistry offers an easy and efficient way for scaling up reactions.

Flow reaction parameters can be optimized using a small microreactor on a few milligrams before moving onto a large tube reactor system for synthesizing multi-gram quantities of products. The Scale-Up System enables exploratory reactions to be performed and optimized, taking these optimized conditions the chemist can easily move to a manufacturing amount, even producing kgs per day on the same system, with minimal setup changes.

Premium System

Ideal for chemists who are interested in the utmost functionality and the widest range of flow chemistry applications.

The Asia Premium System provides the full range of Asia modules and enables standard flow chemistry operations (reaction optimization, scale-up, etc.) as well as advanced use (electrochemistry, multi-step reactions, cryogenic reactions, etc.). This exhaustive system includes the benefits of all the other systems, including full automation of experiments for walk-away use.

Modules

Pressurized Input Store

Pressurizes four bottles with an inert gas enabling the use of air sensitive reagents and eliminates cavitation when pumping. **Input pressure 1 to 10 bar, output pressure 1 bar**

Heater and Chip

This module has adaptors that can be changed in seconds to heat the full Asia range of reactors. **Temperature range: room temperature to 250 °C**

FLLEX

Flow Liquid-Liquid EXtraction (FLLEX) offers continuous flow aqueous work up. FLLEX can be used anywhere within the flow setup. **Internal volume: 100 µL**

Automated Reagent Injector

Allows automated aspiration and loading of multiple reagents into injection loops under inert conditions and subsequent pressurization prior to injection. A range of removable racks give a range of usable vial sizes. Ideal for rapid reaction optimization

Chip Climate Controller

Enables glass microreactors to be cooled or heated from **-15 °C to +150 °C**. No need for circulator or cold water supply

Reagent Injector

Chemically resistant manually filled injection valves allow partial or full loops volume to be injected into the reaction. Provides the possibility to switch the valves independently or simultaneously with manual or full automation control. Sample loop sizes of 0.1 mL, 1 mL, 5 mL and 10 mL available

Pressure Controller

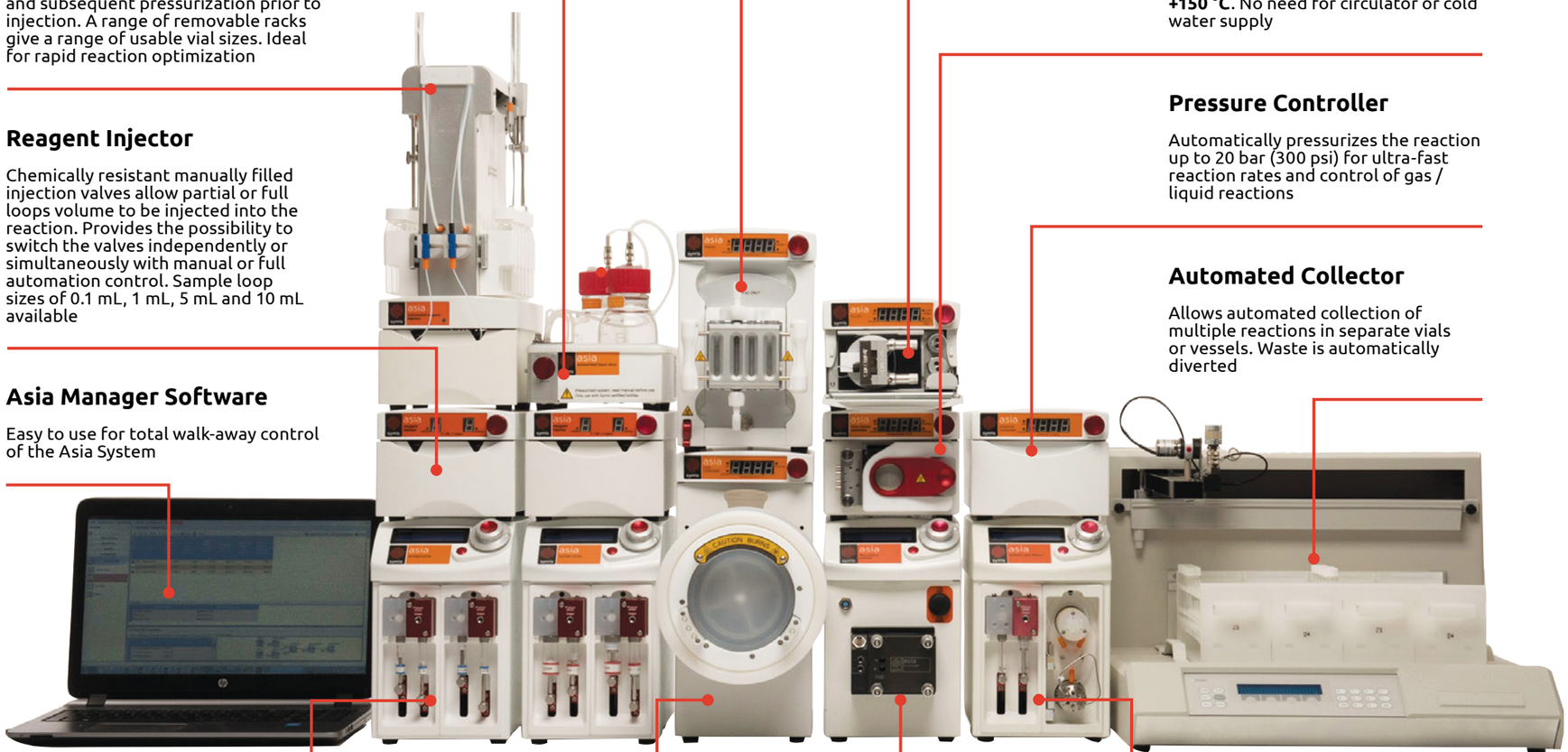
Automatically pressurizes the reaction up to 20 bar (300 psi) for ultra-fast reaction rates and control of gas / liquid reactions

Automated Collector

Allows automated collection of multiple reactions in separate vials or vessels. Waste is automatically diverted

Asia Manager Software

Easy to use for total walk-away control of the Asia System



Syringe Pump

Extremely chemically resistant continuous flow pumps for ultra smooth flow. **Flow rate from 1 µL/min to 10 mL/min each channel. Maximum pressure: 20 bar**

Cryo Controller

Rapidly cool a selection of fluoropolymer or stainless steel tube reactors to -70 °C, or a range of glass or quartz microreactors to -100 °C. Requires only mains power; no need for cryogenic media

FLUX—Flow Electrochemistry

Enables a wide range of electrode materials to be changed in seconds, tool-free. Includes a power supply and electrochemical flow cell with minimal electrode gap. **Internal reaction volume: 225 µL**

Sampler and Dilutor

Enables on-line reaction analysis by automated sample extraction, dilution and transfer to an analytical system e.g. LCMS or UPLC. **Dilution factor: 5 to 250**

The basics of a flow system

Flow chemistry systems can be as simple—or as advanced—as your chemistry requires. All flow chemistry systems require 3 modules; a pump, a reactor (e.g. glass microreactor or tube reactor), and a pressure controller.

Beyond these three essential components, you can build your flow system to your exact requirements. Easily add additional modules including heating/cooling, pressure controllers, automated or manual reagent injectors, electrochemistry, and many more.

Syringe Pump

Pumps are potentially the most important part of a flow chemistry system. Without confidence in pumping accuracy and performance many of the advantages of flow chemistry are lost

Microreactor

Flow chemistry reactors need to be as versatile as possible to cover the greatest range of reaction conditions. Reactors should be flexible in volume to allow a large range of residence times, provide excellent mixing/heat transfer, offer good visibility where possible, and offer the greatest chemical compatibility for the widest range of chemistry

Pressure

The ability to apply high pressures to a flow chemistry reaction is a major benefit. Pressure allows superheating of the reaction mixture above reflux limitations, and allows control of gas reactions, whether introducing gas or where gas is evolved

Flow chemistry reactors

Asia offers a range of reactors, depending on your chemistry. These include glass microreactors, tube reactors, and solid phase column reactors in a range of configurations and sizes.

Highly chemically compatible, Asia reactors are optimized for heat and mass transfer, allowing for the greatest flexibility when designing a flow chemistry experiment.

Asia Microreactors

Microreactors are transparent flow reactors for solution phase chemistry. The design results in extremely fast and reproducible mixing, rapid heat transfer, and minimized back pressure due to flow. Available 1 mL and 250 µL glass Microreactors, and 1 mL glass Reactor Mixer.

Asia Tube Reactors

The Asia Tube Reactors are large volume microfluidic reactors designed for preparative scale solution phase chemistry. The tube reactor contains a long length tube giving larger volumes than glass microreactors and therefore allows higher flow rates for a given residence/reaction time. Available in 4 mL or 16 mL volumes.

Asia Column Reactors

Asia Column Reactors allow the use of solid phase chemistry such as heterogeneous catalysts, solid-supported reagents, or scavengers. The columns can be heated by mounting on the Asia Heater using the Solid Phase Adaptor. There are 4 different diameter columns offering a wide range of volumes. Optional adjustable ends allow columns to be filled with the exact amount required. Available in 0.7, 2.4, 5.6, and 12 mL volumes.

Asia Syringe Pump

The pump is the heart of any flow chemistry set-up, so smooth and accurate flow is essential to reap the various benefits continuous flow offers.

Designed specifically for flow chemistry applications the Asia Syringe Pump provides ultra-smooth flow rates of 1.0 µL to 10 mL/min, pressures up to 20 bar (300 psi), and is constructed from extremely chemically resistant materials. Providing ultimate ease of use, the valves, pressure sensors, and syringes can all be unclipped / unscrewed in seconds without the need for tools.

The Asia Syringe Pump offers two independent flow channels each with an integrated pressure sensor and is controlled by the intuitive front panel's twist and click control knob with screen (enabling it to be used with your existing lab equipment) or by the Asia Manager PC software.

Compared with peristaltic and HPLC-like pumps, the Asia Syringe Pump is practically pulseless which is essential for pumping at all flow rates. The pumping operation produces very low vacuums when aspirating, allowing the use of low vapor pressure and low boiling point solvents which are problematic with HPLC-like pumps.

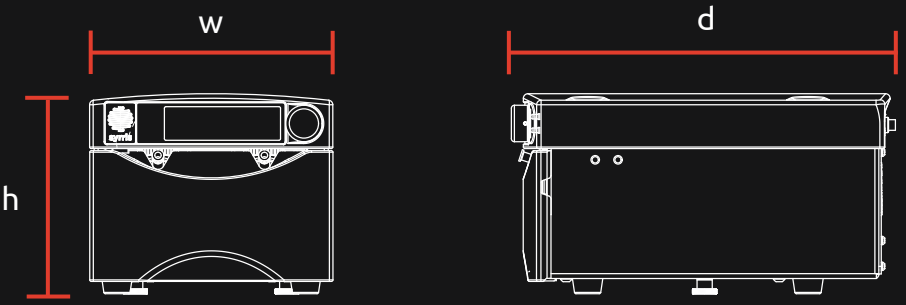
A selection of syringe sizes allows the widest dynamic flow rate range of 1 µL to 10 mL/min per channel and provides the widest range of residence times on the market.

Specifications

Flow rate	1 µL/min to 10 mL/min per pump channel	
Temp. range	-100 to 250 °C	
Pressure range	Up to 20 bar	
Reactor volumes	Microreactors:	1 mL and 250 µL glass 1 mL glass Reactor Mixer
	Tube Reactors:	4 mL or 16 mL
	Column Reactors:	0.7, 2.4, 5.6, and 12 mL

Dimensions

	h (mm)	w (mm)	d (mm)
Asia Manager PC Software	N/A	N/A	N/A
Automated Reagent Injector	505	160	300
Automated Collector	270	470	300
Chip Climate Controller	130	160	310
Cryo Controller	335	160	455*
FLLEX	130	160	280
FLUX	257	160	495
Heater	255	160	260
Pressurized Input Store	220	160	255
Pressure Controller	130	160	275
Reagent Injector	130	160	260
Sampler and Dilutor	260	160	270
Syringe Pump	260	160	260



* Not including measurement of reactor. Dimension will depend on choice of reactor.

Systems

* Depending on the syringe size.
** 10 bar when using fluoropolymer tube reactors.
^ Depending on cooling solution.

	Starter		Electrochemistry		Discovery		Process Optimization	
	Regular	Advanced	Regular	Advanced	Regular	Advanced	Regular	Advanced
Flow rate	1.0 µL/min to 10 mL/min*		1.0 µL/min to 10 mL/min*		1.0 µL/min to 10 mL/min*		1.0 µL/min to 10 mL/min*	
Pressure (bar)	0 to 20 bar	0 to 20 bar**	0 to 5 bar**		0 to 20 bar	0 to 20 bar**	0 to 20 bar	0 to 20 bar**
System temp. (°C)	-15 to +150	-15 to +250	0 to +60		-70 to amb	-100 to +250	-15 to +150	-15 to +250
Pump channels	2		2	4	2	4	2	4
Chip reactors	✓	✓	✓	✓	✓	✓	✓	✓
Tube reactors	✗	✓	✗	✓	✗	✓	✓	✓
Column reactors	✗	✓	✗	✓	✗	✓	✓	✓
Electrochemistry	✗	✗	✓	✓	TUBE	CRYO	✗	✗
FLUX volume	N/A		225 µL		N/A		N/A	
Product collection	✗	MANUAL	MANUAL	AUTO	AUTO	AUTO	AUTO	AUTO
Aqueous work-up	✗	✗	✗	✗	✗	✓	✗	✓
Pressurized inputs	✗	✓	✓	✓	✓	✓	✓	✓
Injection valves	✗	2	2	4	2	4	2	4
Auto injection valves	✗	✗	✗	✗	✗	2	✗	2
Analysis interface	✗	✗	✗	✗	✗	✗	✗	✓
Automation	✗	✗	✗	✓	✓	✓	✗	✓

	Cold		Nanoparticle		Scale-Up		Premium	
	Regular	Advanced	Regular	Advanced	Regular	Advanced	Regular	Advanced
Flow rate	1.0 µL/min to 10 mL/min*		1.0 µL/min to 10 mL/min*		1.0 µL/min to 10 mL/min*		1.0 µL/min to 10 mL/min*	
Pressure (bar)	0 to 20 bar	0 to 20 bar**	0 to 20 bar	0 to 20 bar**	0 to 20 bar	0 to 20 bar**	0 to 20 bar	0 to 20 bar**
System temp. (°C)	-70^ to amb	-100 to +250	amb to +150	-15 to +250	-70 to amb	-100 to +250	-70 to amb	-100 to +250
Pump channels	2	4	2	4	2	4	4	6
Chip reactors	✓	✓	✓	✓	✗	✗	✓	✓
Tube reactors	✗	✓	✓	✓	✓	✓	✓	✓
Column reactors	✗	✓	✗	✗	✗	✓	✓	✓
Cooled reactors	TUBE	CRYO	✗	✗	TUBE	CRYO	TUBE	CRYO
FLUX volume	N/A		N/A		N/A		225 µL	
Product collection	MANUAL	AUTO	MANUAL	AUTO	✗	MANUAL	AUTO	AUTO
Aqueous work-up	✗	✗	✗	✗	✗	✓	✓	✓
Pressurized inputs	✓	✓	✓	✓	✓	✓	✓	✓
Injection valves	2	4	✗	4	✗	2	4	4
Auto injection valves	✗	2	✗	✗	✗	✗	✗	2
Analysis interface	✗	✗	✗	✗	✗	✓	✓	✓
Automation	✗	✓	✗	✓	✗	✓	✓	✓

Solvent cheat sheet

	Boiling point (°C)		
	1 bar	10 bar	20 bar
Acetoc Acid, Glacial	118	214	263
Acetone	56	146	179
Acetonirile	82	163	214
1-Butanol	118	205	263
2-Butanol	100	160	238
Chloroform	61	156	186
Cyclohexane	81	187	213
Dichlorobenzene	180	220	345
N,N-Dimethyl Formamide	153	250	309
Dimethyl Sulfoxide	189	268	358
1,4-Dioxane	101	200	240
Ether, Anhydrous	35	125	151
Ethyl Alcohol	78	152	209
Ethyl Acetate	77	174	208
n-Heptane	98	187	236
n-Hexane	69	171	197
Isobutyl Alcohol	108	182	249
Methanol	65	142	191
Methyl Ethyl Ketone	80	181	212
Methylene Chloride (DCM)	40	123	158
Pentane	36	126	152
2-Propanol	82	156	214
Tetrahydrofuran	66	164	193
Toulene	110	217	252
Water	100	184	239
Xylene	143	250	296

Support

Syrris is on hand to help when you need it. From feasibility studies and proof of concept, through to on-site support by a Syrris engineer, our team are experienced chemists and are supported by a network of trained distributors in over 40 countries.

Built by our UK production team to the highest standard, with chemically resistant materials, Syrris products ensure years of continued service. A 1-year warranty as standard and the option to extend this further for complete peace of mind.

Ask the experts

One of the biggest barriers to performing your chemistry in continuous flow is the conversion of your existing techniques into flow techniques. That's where we come in!

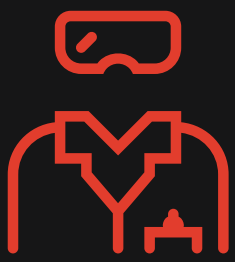
Feasibility studies

Syrris staff have many years of experience working with chemists in all industries on a range of applications. We have successfully "proven" to countless businesses how a switch to continuous flow would improve the yield, safety, and speed of their chemistry compared to their existing methods.

Talk to Syrris about how we will work with you to provide feasibility studies before you commit to buy.

Batch and flow combined

While many chemists successfully switch their entire process to continuous flow, a "batch and flow" combined approach may be best, depending on your chemistry. With a wealth of experience in traditional batch chemistry techniques and industry leading batch chemistry products, Syrris is well placed to help.

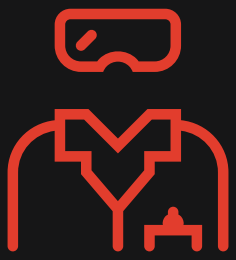


"We chose the Asia Flow Chemistry System because of its ability to provide options for multiple setups in a single platform: this level of flexibility is unique to Asia products"

Florin Oancea, Director at ICECHIM

"The system is running seven days a week and is so popular that people are queuing up to use it"

Dr. Rodrigo Souza, Associate Professor in Organic Chemistry, UFRJ, Brazil



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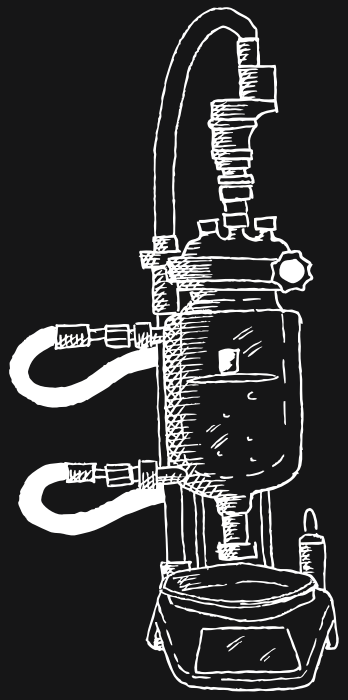
SYRRIS
Atlas HD

Product information



Fast, scalable, reproducible chemistry
with full automation

Atlas HD

Atlas HD is an automated and modular jacketed reactor system for R&D chemists and chemical engineers. Atlas HD enables supreme flexibility and easy cleaning with tool-free vessel changes from 50 mL to 5 L.

Atlas HD can be tailored to your chemistry needs with a temperature range of -90 to +250 °C, various stirring options, and a wide range of pressures.

A range of sensors including turbidity, temperature, pressure, and pH can be configured. Automated dosing is possible using the intelligent Atlas Syringe Pump.

Enjoy fast, scalable, and reproducible chemistry with Atlas HD.

syrris.com/atlas-hd

What are jacketed reactors?

Jacketed reactors are typically glass or stainless steel reaction vessels that are designed for accurately controlling the temperature of their contents through the use of a "jacket" of heating/cooling fluid.

Round-bottom flasks have long been the mainstay of almost all chemistry labs, but they come with inherent problems that make them unsuitable for more challenging chemistry. Whereas round-bottom flasks are generally limited to 4 temperatures —reflux, room temperature, 0 °C, and -78 °C—the jacketed reactor is controlled by a circulator and provides pinpoint accuracy in temperature control at whatever temperature your chemistry requires.

Automated jacketed reactors

When combined with software automation, jacketed reactors offer far more benefits than just accurate temperature control.

Chemists can program simple or complex reaction recipes to automatically run their reactions without the need for supervision, including the ability to perform temperature and/or pH dependent dosing when combined with intelligent syringe pumps and relevant sensors.

TOP 5 BENEFITS OF CHEMISTRY AUTOMATION

Read more at **syrris.com/benefits-of-automation**

Increased productivity

Automate your manual tasks, create recipes and run your experiments while you carry out other tasks.

Reliability of results

Remove human error, increase reproducibility and reliability with easy to understand graphical data to ensure you get the best possible chemistry.

Improved safety

Set software limits that allow the system to shut down automatically if conditions are exceeded, and set alarms to warn you when there is a risk of an accident.

Resource savings

Chemistry automation increases productivity and reaction accuracy, helping your lab perform more chemistry, minimize reagent wastage, and improve experiment efficiencies.

Walk-away time

Intelligent software automatically performs your chemistry for you while you get away from the lab bench to catch up on those publications you've been meaning to read!

Features

Powerful stirring

Quick-release high speed stirrer motor and coupling. The Scorpion Overhead Stirrer provides auto-aligning overhead stirring up to 800 rpm

Oil Pipe Tidy

To allow leak-free storage of your oil pipes when changing vessels. The Oil Pipe Tidy is easily attached to the Scorpion Pole on the Atlas HD Base Frame

Oil Drain Unit

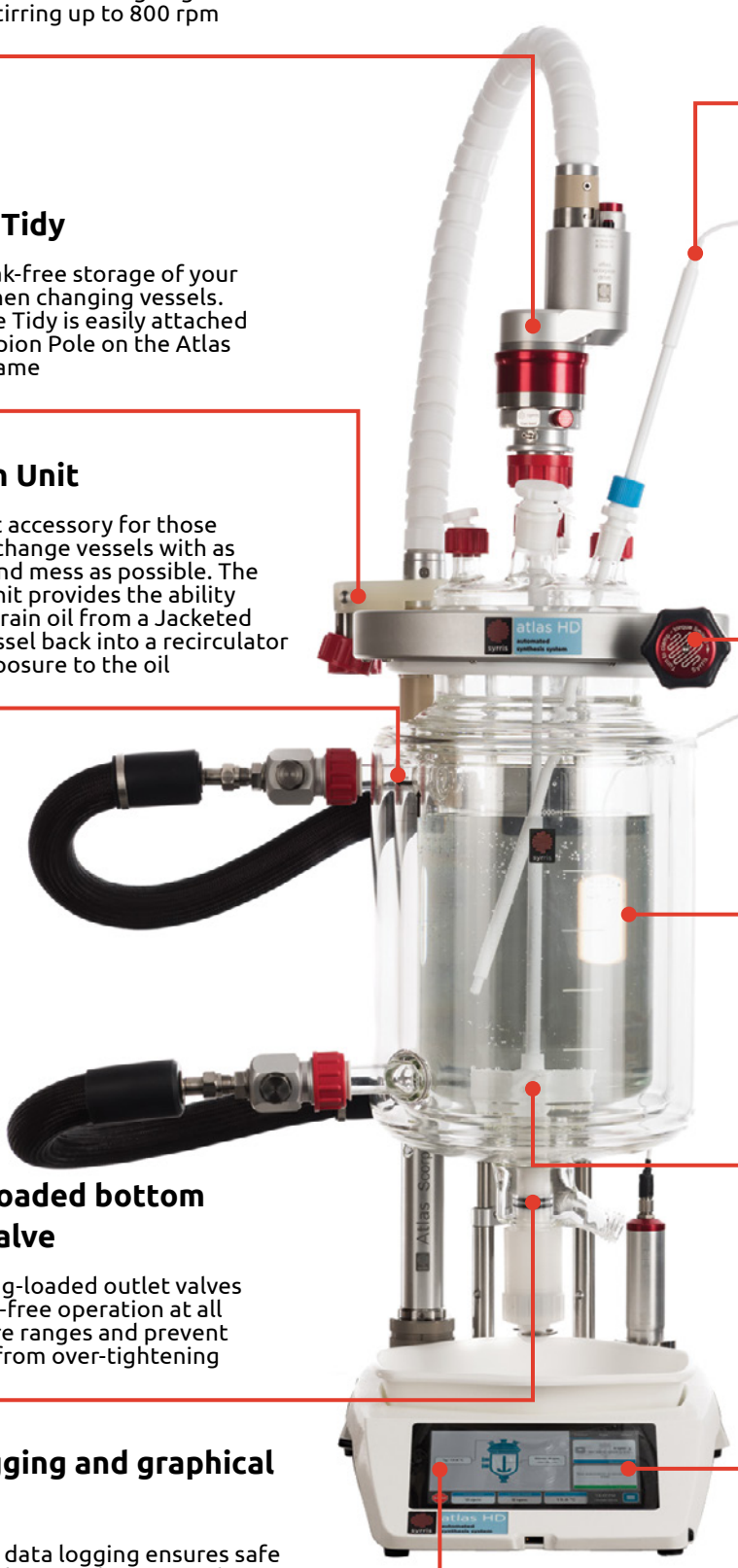
The perfect accessory for those wishing to change vessels with as little fuss and mess as possible. The Oil Drain Unit provides the ability to quickly drain oil from a Jacketed Reactor Vessel back into a recirculator without exposure to the oil

Spring-loaded bottom outlet valve

Syrris' spring-loaded outlet valves ensure leak-free operation at all temperature ranges and prevent breakages from over-tightening

Data logging and graphical display

Automated data logging ensures safe keeping of data. Real-time graphing of all data streams allows quick monitoring of reaction parameters



Probes and Nodes

Temperature, turbidity, and pressure. Atlas HD probes and nodes can be used in conjunction with the Atlas Syringe Pump for temperature-controlled and pH-controlled dosing

Quick clamp release

The Jacketed Vessel Clamp is a quick-release clamping mechanism. Designed to make changing reactors both quick and easy, the clamp supports the vessel even when fully open

Vessels and lids

Choose from a range of handmade borosilicate glass jacketed reaction vessels and lids. Available in round bottom and torispherical profiles with vacuum jacketed options for torispherical vessels

Range of stirrers

Stirrers are available in anchor, Pitched Blade Turbine, and retreat curve impellor as standard. Custom options are also available, as well as adjustable impellors

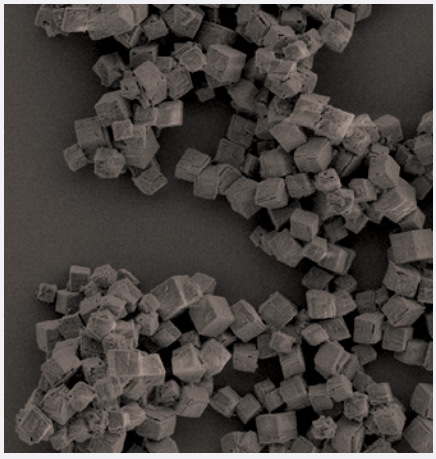
Touchscreen control base

The touchscreen base provides full reaction automation directly on Atlas HD

Applications

Thanks to its modular design, Atlas HD is easily customized for a wide range of chemistries.

Advanced Synthesis	Atlas HD is designed to operate complicated synthesis with multiple dosing profiles and PAT feedback. High temperature to cryogenic temperatures can be achieved.
Reaction Calorimetery	The Atlas HD Reaction Calorimeter has been designed to be the easiest reaction calorimeter on the market to use and understand. Offering both Heat Flow Calorimetry (HFC) and Power Compensation Calorimetry (PCC), the system is perfect for the understanding of your thermal hazards.
Crystallization	Atlas HD Crystallization Reactor controls and monitors the crystallization process by automatically modifying temperature and dosing to the vessel in real-time. Crystal growth is monitored using a turbidity probe. Ultrasound technology allows reproducible control of crystallizations, enabling selectivity of parameters such as particle size, shape, crystallinity, and polymorphism.
Pressure Reactors	Atlas HD 3 Bar Pressure System is designed for applications where elevated pressures are required, such as hydrogenations, carbonylations, etc., or high-vacuum applications.



Accurate reaction control

Atlas HD's touchscreen and PC software provides you with unmatched capability to accurately and automatically define and control various reaction parameters over a range of working volumes.

With the ability to control other lab equipment—such as the Atlas Syringe Pump—Atlas HD provides you with full walk-away chemistry, relieving you of mundane reaction monitoring and freeing up your time to focus on more interesting tasks.

With built-in safety features including alarms and shutdown policies, you can confidently let your reactions run overnight or even over weekends!

Atlas HD automatically logs all reaction parameters which are displayed graphically both in real time and for post-reaction analysis. You can easily recall and replicate experiments, ensuring complete repeatability of your processes.

Take complete control of your reactions with Atlas HD's intuitive, powerful, and easy-to-use touchscreen and PC software.

Control reaction parameters including

- Temperature
- Stirring
- Dosing/addition
- Turbidity
- Pressure
- pH

Atlas Syringe Pump

Atlas Syringe Pumps are versatile chemistry pumps featuring advanced dosing protocols including pH control, temperature-dependent dosing, and autosampling, with flow rates from 0.5 µL to 200 mL/min. Atlas Syringe Pumps are perfect for chemists looking for a single syringe pump that can fulfill all their chemistry needs.

Multiple dosing options, including;

- Temperature-dependent dosing
- pH-controlled dosing
- Autosampling of up to 6 samples with each syringe/valve

Multiple control modes, including;

- Dual Dosing Mode provides two independent dosing channels
- Continuous-Dosing Mode combines both dosing channels to provide a single continuous flow
- Autosampling Mode allows one reagent to be dosed while collecting samples from the process at predefined times

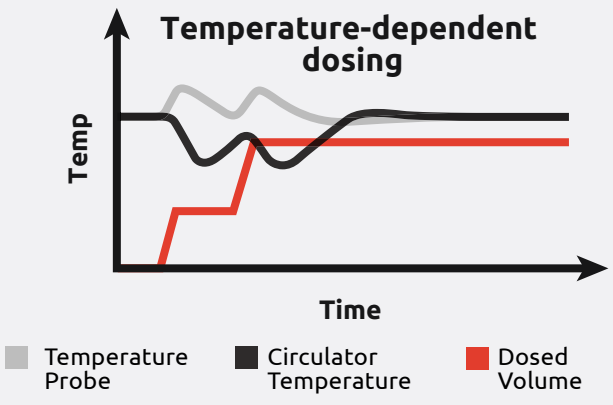
Temperature-dependent dosing

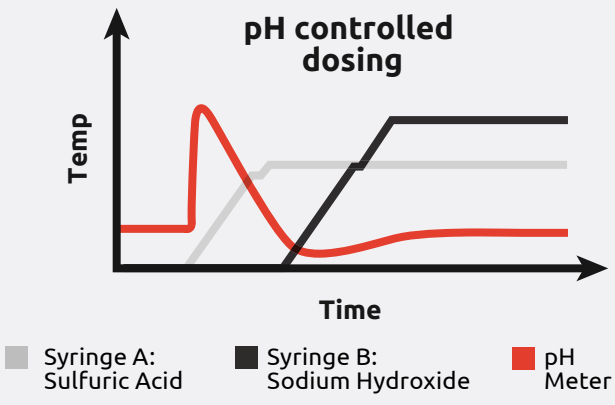
Accurate temperature control and monitoring is vital for accurately predicting the scale-up of chemical processes, and in biochemistry, temperature control is critical to avoiding denaturing or damaging the product.

Atlas Syringe Pumps offer temperature-dependent dosing whereby the reagent addition is automatically paused until your safe reactor temperature is reached. This enables you to automatically mitigate against exotherms and endotherms, increasing laboratory safety and saving valuable time.

pH-controlled dosing

Combined with an Atlas pH probe and node, the Atlas Syringe Pump can automatically dose an acid and/or base to keep the pH of your reaction within a defined range. Automated pH control can save chemists valuable time by removing the need to manually add small amounts of acid/base over the course of a reaction.





Case Study

Walk-away process development for API production with Atlas HD

Scott Clunas, Process Chemist
TauRx Therapeutics

Researchers at TauRx Therapeutics are using the automation capabilities of the Syrris Atlas HD reactor systems to simplify and accelerate process development for its product pipeline. Based at the company's primary research facilities at the University of Aberdeen, Scotland, the Syrris equipment is an integral part of the quality by design (QBD) process optimization workflow. Process Chemist Scott Clunas explained:

"We have been using Syrris' Atlas Syringe Pumps and software for a number of years. This combination of pumps and automation software is very flexible, allowing us to add multiple reagents to a reactor vessel at set intervals, without needing to have somebody at the bench to manually add liquids or swap lines. We have been very happy with the robustness and performance of the pumps, so when we were looking to invest in additional batch reactor systems, Syrris was the logical choice.

"We now have four Atlas HD jacketed reactor systems—set up as two parallel pairs each controlled by a single PC—allowing us to more quickly and easily perform QBD studies for the production of our active pharmaceutical ingredients. Each of these experiments can run for 24 to 48 hours, so it's essential that we can automate the entire reaction.

"The Atlas reactor systems ensure that each experiment is performed in exactly the same way every time—eliminating the variability associated with manual processes—giving us a very high degree of process control for consistent results and, ultimately, more robust processes."

Accessories

Atlas HD has been designed to overcome the issues chemists face in a Process Development lab. Atlas HD provides ultimate ease-of-use, intelligent automation and monitoring, and complete system flexibility. Choose from a range of vessels, probes, sensors, stirrers, and more to have complete control of your processes.

Jacketed reactors

Choose from a range of glass jacketed and vacuum jacketed reaction vessels. All Syrris reactor vessels are manufactured at our state-of-the-art glass manufacturing site.

	Round Bottomed	100 mL to 3 L
	Torispherical	50 mL to 5 L
	Vacuum Jacketed	100 mL to 5 L
	Conical Bottom	250 mL to 1 L
	Stainless Steel (Torispherical)	100 mL to 2 L
	**Custom reactors are also available**	

Lids

Atlas HD lids are available in borosilicate glass, PTFE, and stainless steel in various sizes: DN80 (EU and US) and DN150 (EU and US). **Custom lids are also available.**

Probes and Nodes

Wide range of probes and nodes available in various lengths, including temperature, turbidity, and pH. Atlas HD probes and nodes can be used in conjunction with the Atlas Syringe Pump for temperature-controlled and pH-controlled dosing.

Stirrers

PTFE, glass, and stainless steel stirrers in a variety of geometries are available.

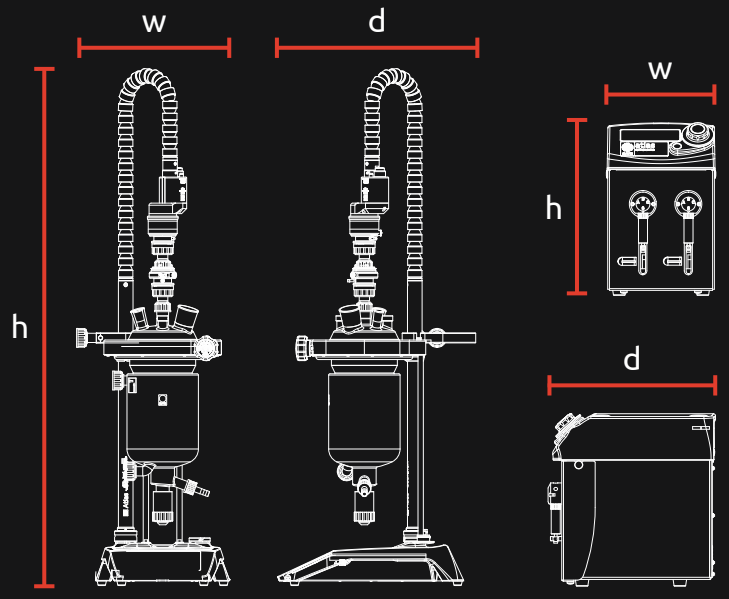
	Anchor
	Pitch blade turbine
	Retreat curve impellor
	**Custom stirrers are also available**

Specifications

	Vessel range	50 mL to 5 L
	Temp. range	-90 to 250 °C*
	Pressure range	Vacuum: ≤50 mbara. Max. pressure: 200 bar**
	Stirrer motor rpm	Up to 800 rpm (Atlas Scorpion Overhead Stirrer) Up to 2000 rpm (with optional Heidolph Stirrer)
	Stirrer motor torque	Up to 11 Ncm (Atlas Scorpion Overhead Stirrer) Up to 100 Ncm (with optional Heidolph Stirrer)
	Dosing options	0.5 µL to 20 mL/min (Atlas Syringe Pump) 5 µL to 200 mL/min (Atlas XL Syringe Pump)

Dimensions

	h (mm)	w (mm)	d (mm)
DN80 System (50 mL to 2 L)	1230	540	470
DN150 System (1 L to 5 L)	1330	580	470
Atlas Syringe Pump	255	163	240
Atlas XL Syringe Pump	355	163	258



* Normal temperature range is -40 to 200 °C. Temperatures outside of this range require an upgrade kit.

** Atlas HD: Vacuum (50mbara) to 0.25 barg

Atlas HD 3 Bar Pressure System: 1.78 mbar to 3 bar

All dimensions in mm. Please allow a tolerance of +/- 20 mm.

Vessels

Torispherical (available with vacuum jacket)

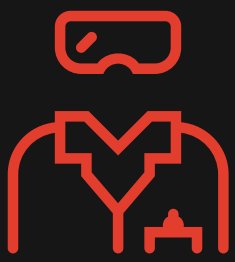
	100 mL	250 mL	500 mL	1 L	1 L	2 L	2 L	3 L	5 L
Catalogue no.	2200185	2200186	2200187	2200188	2201157	2200189	2201158	2201159	2201160
Working capacity (mL)	100	250	500	1,000	1,000	2,000	2,000	3,000	5,000
Flange ID (mm)	80				150	80	150		
Internal diameter (mm)	50	65	85	105	105	130	130	140	170
External diameter (mm)	85	105	125	145	145	170	170	180	215
Depth to nominal vol. (mm)	54	80	95	122	122	159	159	204	234
Jacket volume (mL)	155	348	492	730	824	1055	1192	1510	2549
Jacket connection thread	M16 x 1 (10 mm internal diameter)								
Outlet valve dia. (mm)	9				20	9	20		
Reactor material	Borosilicate glass 3.3								
Other wetted parts	PTFE, FEP, PFA & FFKM								

Round-bottom

	100 mL	250 mL	500 mL	1 L	2 L	3 L
Catalogue no.	2101525	2101528	2101530	2101532	2101534	2200261
Working capacity (mL)	100	250	500	1,000	2,000	3,000
Flange ID (mm)	80					
Internal diameter (mm)	50	60	80	105	120	150
External diameter (mm)	90	100	120	145	160	185
Depth to nominal vol. (mm)	58	98	113	133	197	195
Jacket volume (mL)	155	348	492	730	1055	1510
Jacket connection thread	M16 x 1 (10 mm internal diameter)					
Outlet valve dia. (mm)	9				20	
Reactor material	Borosilicate glass 3.3					
Other wetted parts	PTFE, FEP, PFA & FFKM					

Lids

	DN80 (EU)	DN80 (US)	DN150 (EU)	DN150 (US)
Catalogue no.	2101030	2101594	2201155	2201156
Vessel compatability	All DN80	All DN80	All DN150	All DN150
Flange ID (mm)	80	80	150	150
Center port	RV24	RV24	RV24	RV24
Condenser port	1 x B19	1 x A19	1 x B29	1 x A29
Solid addition port	1x B29	1x A29	1 x B45	1 x A45
Baffle ports	1 x GL18	1 x GL18	2 x GL25	2 x GL25
Probe ports	2 x B19	2 x A19	2 x B19	2 x A19

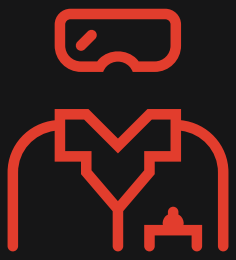


"With Atlas, we can leave experiments running all night and get a good result the next day, freeing up time to do other tasks. The system is easy to use and reliable"

Onofre Casanova, IFF, Benicarlo, Spain

"We have been delighted at the high demand our chemists have placed on Atlas. We are also very impressed with the speed and quality of the service and support"

Dr. Phil Peach, Process CRD, Pfizer, UK



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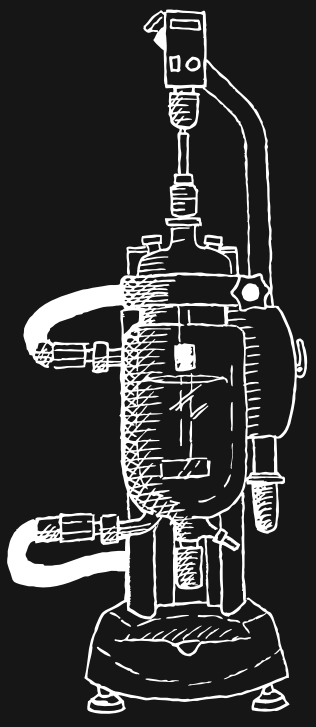
SYRRIS
Orb

Product information



Compact benchtop jacketed reactor
offering ultimate ease of use

Orb

Orb is a benchtop jacketed reactor system combining excellent value and high quality construction with unique, user-friendly features and reliable performance.

Designed for daily use, Orb's intuitive and thoughtful design makes it incredibly easy to use. Orb offers rapid height adjustment and two clamp sizes to accommodate a wide range of vessels from 100 mL to 10 L which can be interchanged rapidly and seamlessly. The system can be used over a wide temperature range for all your lab's chemistry needs. A wide selection of accessories and upgrades for automation are available.

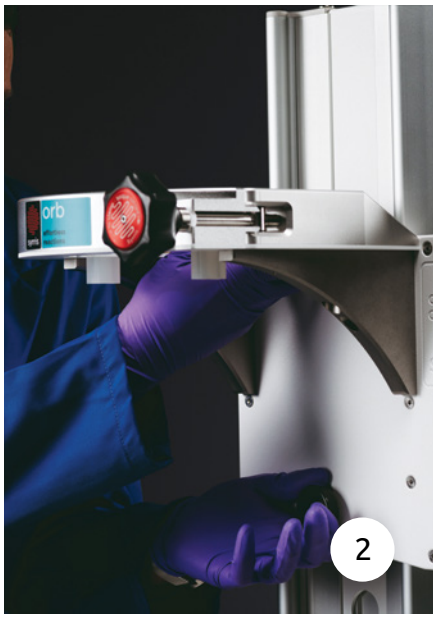
syrris.com/orb

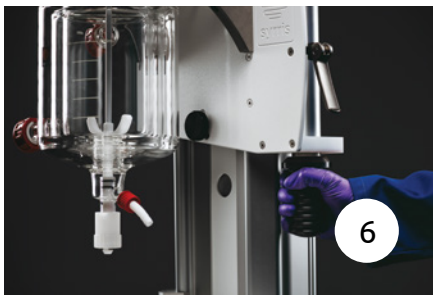
Why Orb?

Due to its modular design, wide vessel range, and wide temperature limits, Orb can be used in many applications including process development and optimization, advanced synthesis, crystallization, automated synthesis, and more.

Ease of use is Syrris' main design philosophy.

1. **Easy scale-up with a wide vessel range**
2. **Work at your height with easy, tool-free adjustment**
3. **Avoid spills with rapid oil pipe connection and oil drain**
4. **Quick clamp system for fast and safe vessel loading**
5. **Save lab space with one Orb frame for all vessels**
6. **Easy, simple, tool-free motor adjustment**





"Our passion is to design products to make chemists' lives easier. The aim was to create a product with excellent performance at an attractive price.... and we believe Orb does this."

Dr. Omar Jina, Chief Commercial Officer

Features

Condensers

A wide variety of condensers are available

Lids

The Orb Lid is available in two sizes (DN100 & DN150). Ports are included for baffles, solid addition, probes, and condensers, with custom options available

Oil Pipe Tidy

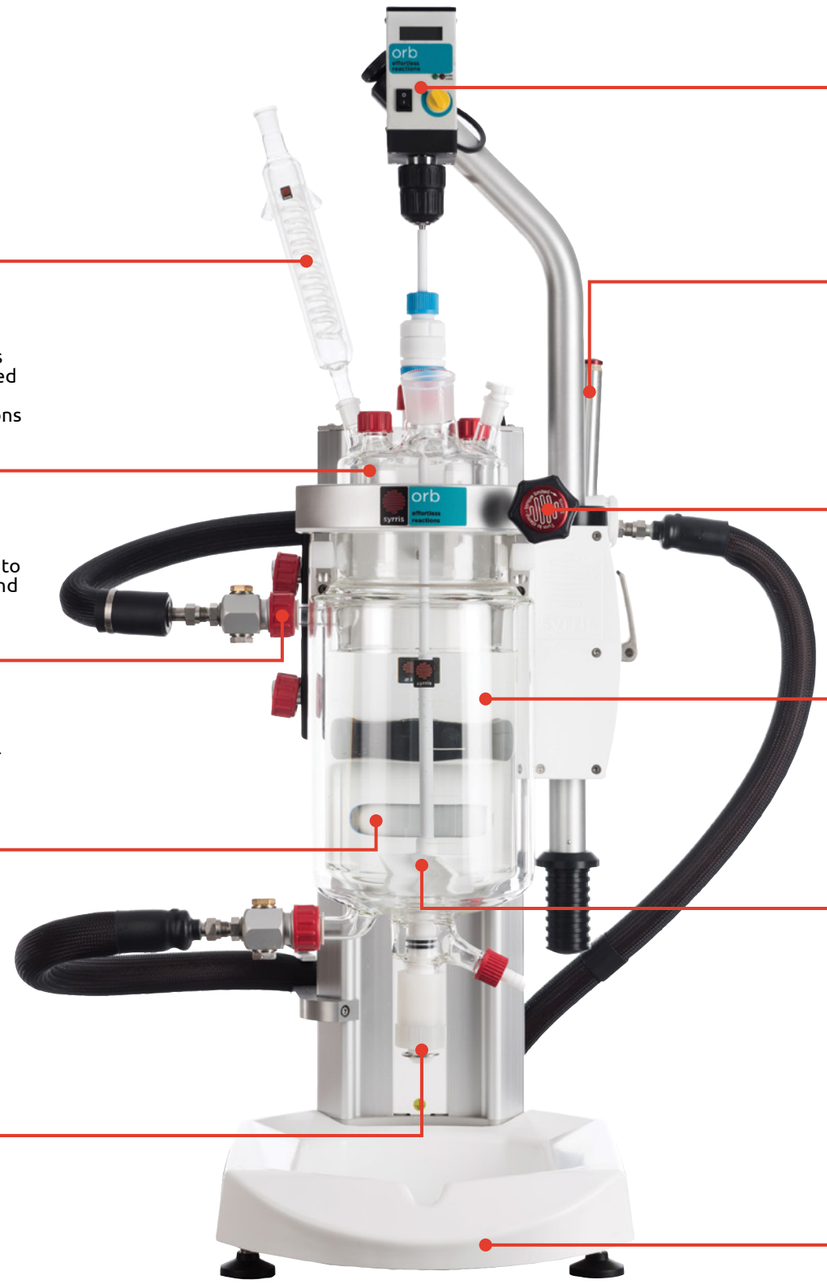
The Oil Pipe Tidy is easily attached to the main plate on the Orb Clamp and allows leak-free storage of your oil pipes when changing vessels

Baffles

Orb baffles are available to further improve mixing. Top-loading and removable for easy insertion and cleaning

Outlet valve

Syrris' spring-loaded outlet valves ensure leak-free operation at all temperature ranges and prevent accidental damage through over-tightening



Stirrer motors

High-specification motors from leading manufacturers offer performance and durability for the most demanding applications

Oil Drain Unit

To limit mess when changing vessels, Orb has an optional Oil Drain Unit for easy and mess-free draining of vessel jackets

Clamp

The patent-pending Orb Clamp is available in two sizes (DN100 & DN150) and allows rapid vessel changes with safe sealing and support. The unique design holds the vessel in place even when completely undone

Vessels

Jacketed vessels are available from 100 mL to 10 L (with vacuum jacket option up to 5 L). Custom options are also available

Stirrers

Orb stirrers are available in anchor, Pitched Blade Turbine, and retreat curve impellor as standard. Custom stirrer options and adjustable impellors are also available

Base Frame

The Orb Base Frame is a rugged and adaptable frame which accommodates all vessel sizes in the Orb family

Designed for you

Designed with simplicity and flexibility in mind, Orb is the jacketed reactor system combining high performance and excellent value.

Wide range of vessels

One Orb, multiple vessels. Orb allows vessels from 100 mL to 10 L to be utilized on one system. Single jacketed (up to 10 L) or vacuum jacketed (up to 5 L) reactors in torispherical or round bottom profiles (up to 5 L) can be used on the system. Torispherical reactors are the ideal choice for your scale up studies

Quick vessel changes

Orb's unique vessel clamp, oil drain function, and quick connections allow vessels to be interchanged in minutes, providing the utmost in flexibility

Simple stirrer lift

Orb's innovative stirrer motor lift allows the stirrer motor to be easily lifted and rotated out of the way to give full access to the lid and ports. The stirrer motor can then be relocated without the need for further alignment

Tool-free height adjustment

The unique frame allows you to adjust the Orb vessel height without any tools so you can work at a level that is suitable for you

The importance of accurate temperature control

Round-bottom flasks have long been the mainstay of almost all chemistry labs, but they come with inherent problems that make them unsuitable for more challenging chemistry.

Limited temperature ranges, lack of repeatability, and the need for constant experiment supervision all fly in the face of the ever-growing pressure on synthetic organic chemists to develop innovative chemical reactions and compounds quickly and efficiently. Jacketed reactor systems help combat these issues and enable chemists to perform better chemistry, more efficiently than ever.

The challenge: Accurately maintaining reaction temperatures

Round-bottom flasks are generally limited to 4 temperatures;

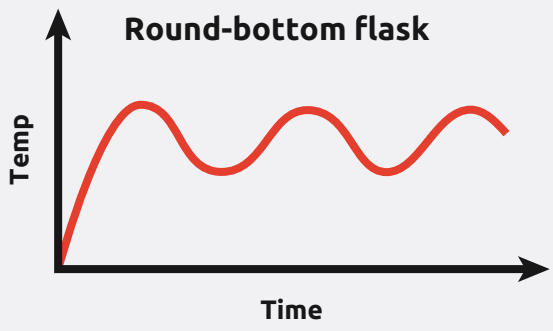
- Reflux
- Room temperature (can vary significantly with changes in environment)
- 0 °C (can be achieved with an ice bath)
- -78 °C (a mixture of acetone and dry ice)

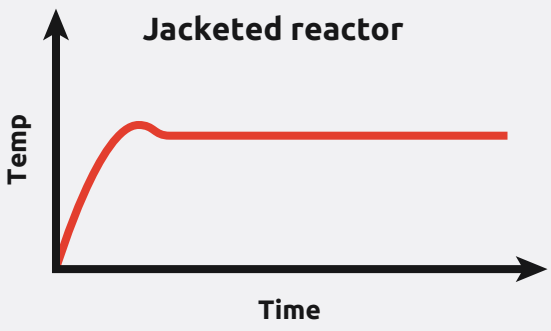
Flasks make life difficult if your chemistry requires a different temperature, as most optimized processes do. The variations in temperature when manually controlled, although small, can dramatically impact the reaction yield and reproducibility of results.

The solution: Pinpoint accuracy in temperature control with jacketed reactor vessels and circulators

Jacketed reactors accurately control the temperature of their contents through the use of a "jacket" of heating/cooling fluid which is controlled to fractions of degrees by oil circulators. Not only does this enable much more consistent reaction temperatures, but it also provides easy temperature "ramping"—something that's virtually impossible with round-bottom flasks.

This advanced temperature control allows chemists to work at a huge range of temperatures and therefore access more complex chemistries. The accuracy also enables far greater repeatability and reproducibility of results.





Intelligent dosing

Many processes require accurate dosing of reagents. Syrris provides a multitude of dosing options to suit your process requirements, including volumetric, sensor-based, and gravimetric-centered dosing.

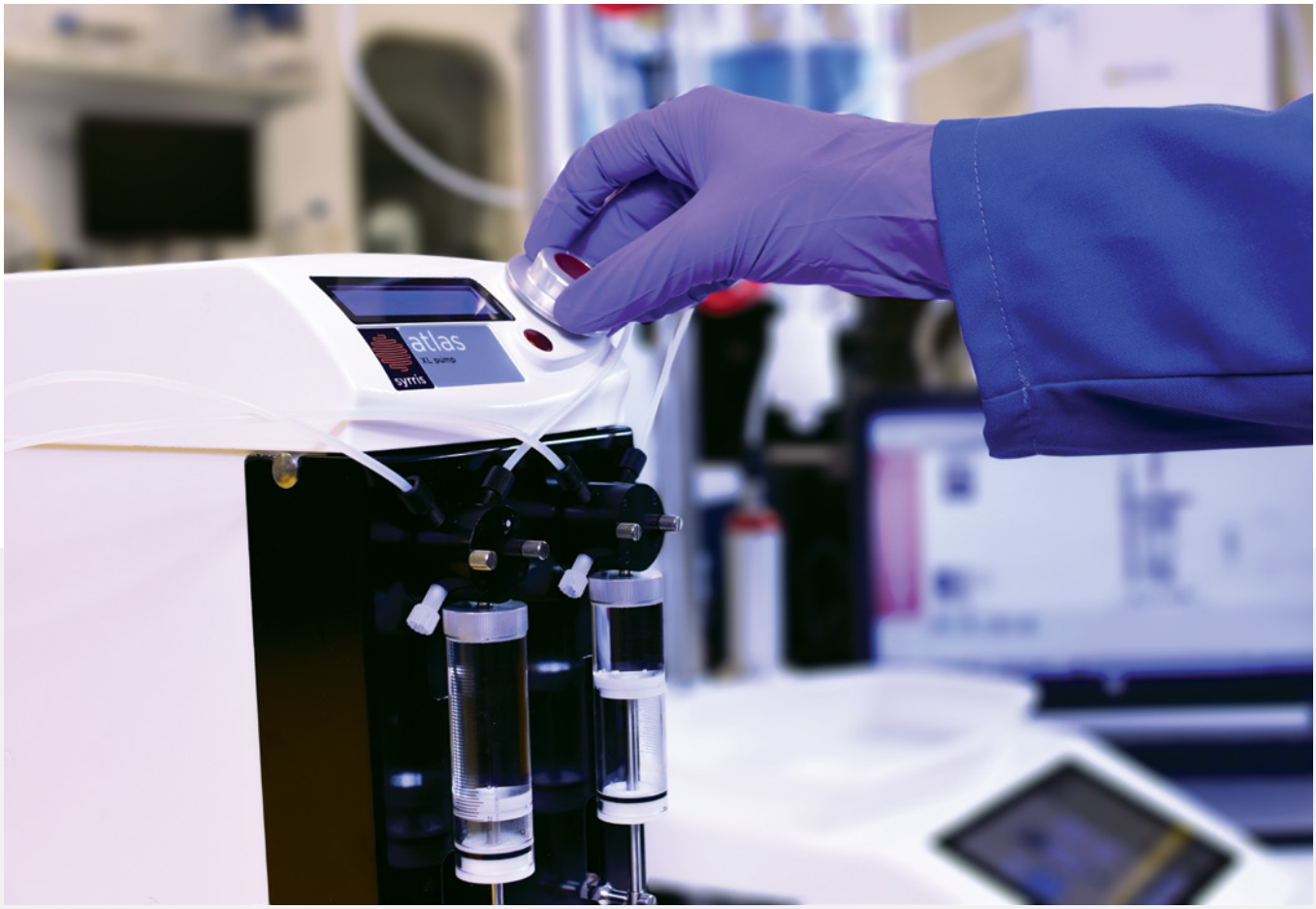
Atlas Syringe Pumps are versatile chemistry pumps featuring advanced dosing protocols including pH control, temperature-dependent dosing, and autosampling with flow rates from 0.5 µL to 200 mL/min. The pumps can be operated in standalone/manual mode, or controlled automatically using automation software. Atlas Syringe Pumps can be used as standalone pumps with Orb (or your existing batch reactors), or controlled by Atlas PC Software 1 for fully automated synthesis.

Multiple dosing options, including;

- Temperature-dependent dosing
- pH-controlled dosing
- Autosampling of up to 6 samples with each syringe/valve

Multiple control modes, including;

- Dual Dosing Mode enables two reagents to be dosed independently
- Continuous-Dosing Mode enables refilling of one syringe while the other doses
- Autosampling Mode allows one reagent to be dosed while collecting samples from the process at predefined times



Case Study

Reproducible scaling of gold nanoparticles in Brazil with Orb

Prof. Ricardo Aucélio
Pontificia Universidade Católica

Researchers at a University in Brazil have been using the Orb Jacketed Reactor system to scale up their gold nanoparticle synthesis. Prof. Ricardo Aucélio from Pontificia Universidade Católica research looks at specialist nanoparticles for use in analytical tools. They purchased the Orb system in an attempt to overcome the scaling issues of moving from a round bottom flask. Prof. Ricardo Aucélio said:

"The reactor was purchased with CNPq resources in order to produce gold nanoparticles in aqueous medium at room temperature. Prior to the acquisition of the reactor, these reactions used to be done in round bottom flasks on magnetic stirring plates. However, we had a recurrent problem regarding the repeatability of the nanomaterial quality, due to the difficulty of adjusting the frequency of agitation, especially when we promoted the modification of the volume (in mL) of the synthesis.

"Using small volumes such as 30 mL the results were adequate, however, when we needed to scale the synthesis to 180 mL (retaining the same proportions of reactants) the repeatability of the measured optical signal of the AuNPs became inadequate. On the other hand, when we started making these reactions in Orb this problem no longer exists. The jacketed vessels present an appropriate geometry that assists in the adequate homogenization of the reaction medium, promoted by the mechanical agitator. In this way, we are constantly using the reactor and the research group is fully satisfied with its performance.

"The Orb system is very simple to operate, compact and robust. We are using it for the synthesis of gold nanoparticles (AuNPs) capped with different chemical binders. As the system is very easy to operate, my masters´ and doctoral students already have full autonomy to use the system."

Accessories

Orb has been designed by chemists who understand the issues chemists face with jacketed reactor systems. Orb is easy to customize to your exact requirements; simply choose from a range of vessel sizes and types, baffles, probes, sensors, stirrers, stirrer motors, and other glassware accessories.

Jacketed reactors

Choose from a range of glass jacketed and vacuum jacketed reaction vessels. All Syrris reactor vessels are manufactured at our state-of-the-art glass manufacturing site.

	Round Bottomed	100 mL to 5 L
	Torispherical	100 mL to 10 L
	Vacuum Jacketed	100 mL to 5 L
	**Custom reactors are also available**	

Lids

Orb lids are available in borosilicate glass, PTFE, and stainless steel in various sizes: DN100 (EU and US) and DN150 (EU and US). **Custom lids are also available.**

Probes and Nodes

Wide range of probes and nodes available in various lengths, including temperature, turbidity, and pH. Orb probes and nodes can be used in conjunction with the Atlas Syringe Pump for temperature-controlled and pH-controlled dosing.

Stirrers

PTFE, glass, and stainless steel stirrers in a variety of geometries are available.

	Anchor
	Pitch blade turbine
	Retreat curve impellor
	**Custom stirrers are also available**

Stirrer motors

High torque (200 N/cm), torque feedback, remote control, and digital display stirrer motors up to 800 rpm are available.

Automation upgrade

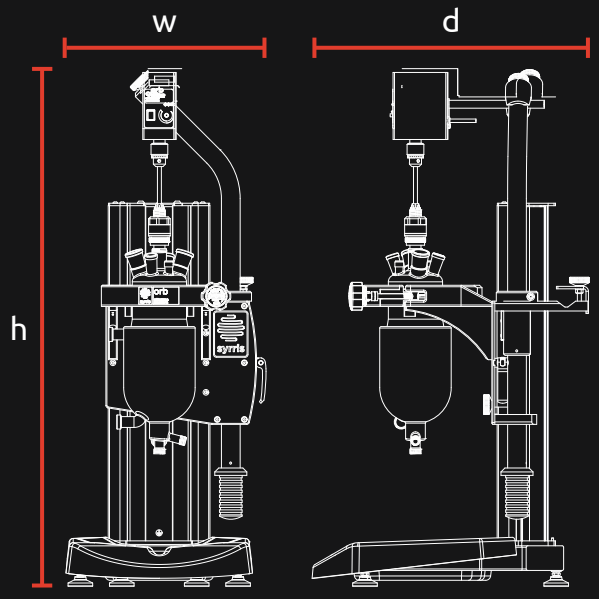
Orb (and all other manual jacketed reactors) can be upgraded to full automation through Atlas PC Software 1, Syrris' powerful and easy-to-use automation platform. Reaction automation enables true walk-away chemistry and offers a number of safety, repeatability, and accuracy benefits to chemists.

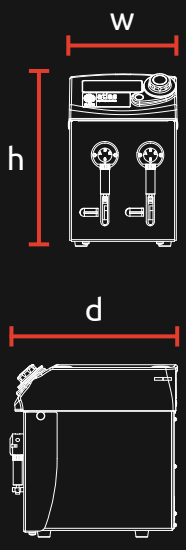
Specifications

	Vessel range	100 mL to 10 L * / 100 mL to 5 L**
	Temp. range	-90 to 250 °C***
	Pressure range	Vacuum (≤50 mbara****) to 250 mbar
	Stirrer motor rpm	500 continuous / 800 intermittent
	Stirrer motor torque	Up to 200 Ncm
	Dosing options	0.5 µL to 20 mL/min (Atlas Syringe Pump) 5 µL to 200 mL/min (Atlas XL Syringe Pump)

Dimensions

	h (mm)	w (mm)	d (mm)
100 mL to 2 L vessels	975^	406^^	570
5 L vessels	1065^	406^^	570
10 L vessels	1245^	406^^	570
Atlas Syringe Pump	255	163	240
Atlas XL Syringe Pump	355	163	258





* Jacketed vessels
** Vacuum jacketed vessels
*** Normal temperature range is -40 to 200 °C. Temperatures outside of this range require an upgrade kit.
**** Lower vacuum is achievable with upgraded parts
^ Allow additional 80 mm for motor lifting.
^^ Please allow for oil pipes. Dimension is for system only.

All dimensions in mm. Please allow a tolerance of +/- 20 mm.

Vessels

Torispherical (available with vacuum jacket)

	100 mL	250 mL	500 mL	1 L	1 L	2 L	2 L	3 L	5 L	10 L
Catalogue no.	2200997	2200996	2200995	2200994	2200993	2200992	2200991	2201138	2200990	2200989
Working capacity (mL)	100	250	500	1,000	1,000	2,000	2,000	3,000	5,000	10,000
Flange ID (mm)	100				150	100	150			
Internal diameter (mm)	51	69	83	105	105	130	130	140	170	205
External diameter (mm)	85	105	120	145	145	170	170	180	215	250
Depth to nominal vol. (mm)	54	80	97	122	122	159	159	205	235	315
Jacket volume (mL)	254	381	542	805	805	1169	1169	1484	2511	3805
Jacket connection thread	M16 x 1 (10 mm internal diameter)									
Outlet valve dia. (mm)	9				20	9	20			
Reactor material	Borosilicate glass 3.3									
Other wetted parts	PTFE, FEP, PFA & FFKM									

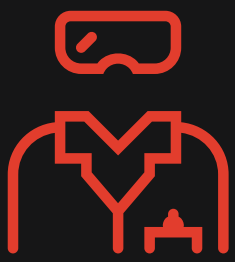
Round-bottom

	100 mL	250 mL	500 mL	1 L	1 L	2 L	2 L	3 L	5 L
Catalogue no.	2201006	2201005	2201004	2201003	2201002	2201001	2201000	2201137	2200999
Working capacity (mL)	100	250	500	1,000	1,000	2,000	2,000	3,000	5,000
Flange ID (mm)	100				150	100	150		
Internal diameter (mm)	51	69	83	105	105	140	140	145	175
External diameter (mm)	85	105	120	145	145	185	185	185	215
Depth to nominal vol. (mm)	58	80	107	133	133	153	153	207	238
Jacket volume (mL)	254	381	542	805	805	1169	1169	1484	2511
Jacket connection thread	M16 x 1 (10 mm internal diameter)								
Outlet valve dia. (mm)	9				20	9	20		
Reactor material	Borosilicate glass 3.3								
Other wetted parts	PTFE, FEP, PFA & FFKM								

Lids

	DN100 (EU)	DN100 (US)	DN150 (EU)	DN150 (US)
Catalogue no.	2200982	2200981	2200980	2200979
Vessel compatability	All DN100	All DN100	All DN150	All DN150
Flange ID (mm)	100	100	150	150
Center port	RV24	RV24	RV34	RV34
Condenser port	B29	A29	B29	A29
Solid addition port	B29	A29	B45	A45
Baffle ports	GL18	GL18	GL25/RV34*	GL25/RV34*
Probe ports	2 x B19	2 x A19	2 x B19	2 x A19

* Dependent on baffles

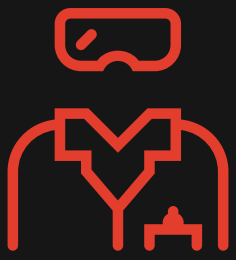


"The Orb system is simple to operate, compact, & robust. My Masters and Doctoral students already have full autonomy to use the system"

Prof. Ricardo Aucélio, Pontificia Universidade Católica, Brazil

"One key to our success with the system, apart from the strength of the product itself, is the highly responsive nature of Syrris as a company"

Dr. Sunil S. Nadkarni, VP, Product Development Torrent, India



Get in touch

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