



**SYRRIS**  
Orb Pilot

# Product information



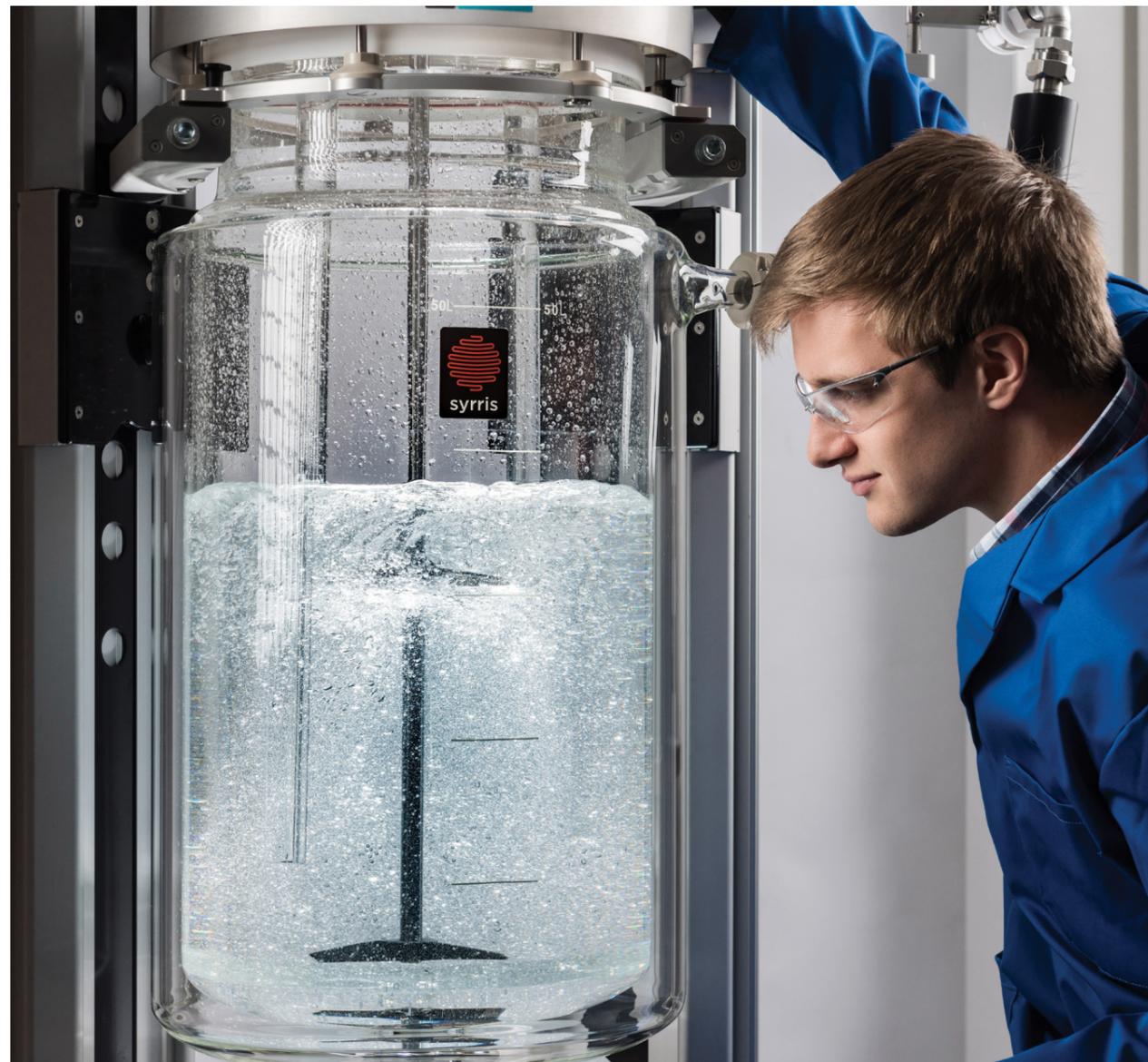
Pilot scale modular jacketed reactor offering  
multiple setups in one footprint

# Orb Pilot

Orb Pilot is a flexible and versatile floor-standing jacketed reactor system for scaling up of batch processes. Designed with the help of scale-up chemists and chemical engineers, Orb Pilot offers a wealth of user-friendly benefits, such as quick vessel changes, easy height adjustments, and a self-adjusting spring-loaded base frame, making it incredibly easy to use.

With 10 to 50 L vessels in a range of profiles, temperature range of -40 to 235 °C, powerful stirrer motors, and a selection of PTFE and stainless steel stirrers, Orb Pilot is easily configured to match your exact requirements. It's this versatility that truly provides multiple reactor setups in one footprint.

[syrris.com/orb-pilot](http://syrris.com/orb-pilot)



# Designed for you

**In designing Orb Pilot, we consulted with numerous chemical engineers to ensure we incorporated features that will make your life easier.**



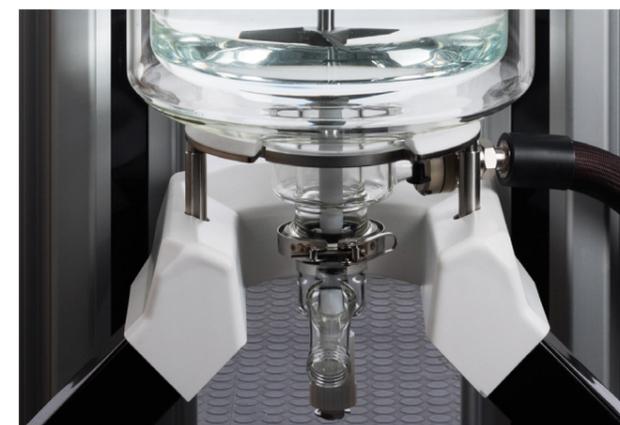
## Designed to mimic production vessels

Orb Pilot vessels mimic the L/D ratios of production scale vessels for easier scale-up to production. A range of stirrers—including industry-standard hydrofoil—provide various mixing options to suit all needs. Top loaded removable glass baffles provide superior mixing and easy cleaning.



## Easy vessel changes and cleaning in under an hour

In other reactor systems, changing and cleaning vessels can take days. Your time is too valuable, so Orb Pilot was designed to enable vessel changes in under an hour. The tool-free clamp holds the vessel in place even when completely undone, enabling in-place vessel cleaning.



## Detachable, spring-loaded BOV

Vessel bottom outlet valves are the most common things to break on a reactor. Orb Pilot's BOV uses a unique spring-loaded design to ensure it can't be overtightened, and is detachable for easy cleaning or replacement in case of accidental damage.

# Features

## Reflux Kit

The Reflux Kit enables applications at reflux as well as product concentration. Includes a 3500 cm<sup>2</sup> condenser, condenser support, coupling component, and fittings

## Lids

The Orb Pilot Lid is available in two sizes; DN235 and DN300. Both sizes include a DN60 Charging Port, DN60 Condenser Coupling, 2 x B19 & B34 Probe Ports, and 2 x Baffle Ports. Custom lids are also available

## Vessel Clamp

Orb Pilot's unique Vessel Clamp uses a force-limited design, preventing vessel breakages from over-tightening

## Base Frame

The Orb Pilot Base Frame is the foundation of the system and provides leveling feet, static dissipation, spring-loaded vessel support, and the ability to couple the frame to the Accessory Tower

## Removable baffles

Orb Pilot's glass baffles are top-loaded for fast and easy insertion, removal, and cleaning. These provide far superior mixing compared to systems with no baffles. Available in both high and low shear geometries

## Detachable outlet valve

Orb Pilot's BOV uses a unique spring-loaded design to ensure it can't be overtightened, and is detachable for easy cleaning or replacement in case of accidental damage

## Leveling feet

High-quality leveling feet with secure locking mechanism enable chemists to move Orb Pilot around the lab with ease, maximizing lab space



## Stirrer motors

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

An innovative stirrer motor lift system allows the stirrer motor to be easily moved into position or out of the way

## Easy height adjustment

Pre-set height adjustments on the frame make selecting the right clamp position for each vessel and the stirrer motor easy

## Stirrers

Optimize the stirring performance by matching the perfect stirrer to your application. We can supply industry standard stirrers (such as A310 hydrofoil impellers) to mimic production facilities. Custom stirrers are also available

## Oil drain and oil pipes

High-performance insulated hoses maximize heating efficiency, while the Oil Drain Unit enables mess-free oil drain of the reactor

## Optimized oil inlet

Orb Pilot's unique oil inlet design ensures incoming oil is evenly dispersed around the entire vessel jacket, avoiding the common issue of hot and cold spots

## Accessory Tower

The Accessory Tower couples directly to the Base Frame and accepts a wide range of accessories. The tower also doubles as a base for an automated dosing system, ideal for a mount feed vessel and pump shelf

# Simple and flexible

Designed with simplicity and flexibility in mind, Orb Pilot combines high performance and excellent value for all your pilot plant scale-up chemistry needs.



## Excellent heat control

Orb Pilot vessels have been designed to ensure completely uniform heat distribution, removing issues of hot and cold spots and enabling rapid temperature changes at all times



## Wide range of vessels

One Orb Pilot, multiple setups. Orb Pilot allows jacketed reactors (10 L, 20 L, 30 L, and 50 L) and vacuum jacketed reactors (10 L, 20 L, and 30 L) to be utilized on the same frame



## Quick vessel changes

Orb Pilot's unique Vessel Clamp, oil drain function, and quick connections allow vessels to be changed and/or cleaned in under an hour—a fraction of the time of most fixed scale-up reactor systems



## Optimized mixing

Orb Pilot's removable glass baffles provide optimized stirring performance for your process. The baffles are top-loaded through ports in the lid and sit alongside the stirrer, breaking up the vortex and ensuring the contents are thoroughly agitated



## Simple stirrer motor lift

Orb Pilot's innovative stirrer motor lift allows the stirrer motor to simply be uncoupled from the stirrer and lifted using the preset stirrer motor slide



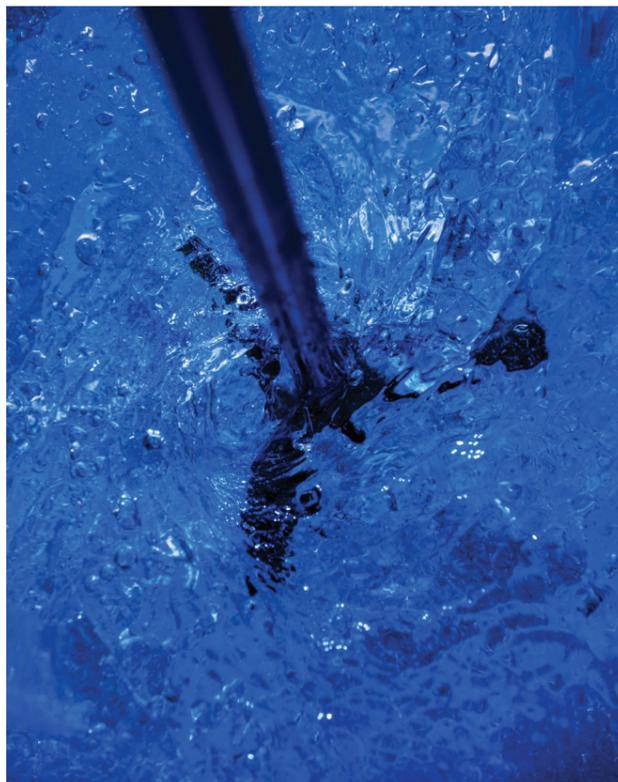
## Reagent dosing options

Accurate volumetric dosing up to 200 mL/min using the Atlas XL Syringe Pump, or a full range of dosing options to suit your process needs are available

## Efficient mixing

A jacketed reactor system is only as good as its ability to thoroughly and uniformly mix its contents. With increasing scale comes the increased risk of vortex formation during stirring which results in a dramatic loss of stirring efficiency.

To combat this, Orb Pilot offers top-loaded removable glass baffles that break up the vortex, ensuring the reactor contents are thoroughly agitated. Available in high and low shear options, the baffles are easily removed for cleaning or if your chemistry requires more gentle mixing.



## Temperature control

Orb Pilot vessels offer unrivaled thermal performance and are rated to -40 to 235 °C for a wide range of chemistries. The unique centralized oil input design ensures uniform heat distribution over the entire vessel, removing the issue of hot and cold spots throughout your reaction.

## Case Study

### Improving sustainability in commercial laundry with a custom Orb Pilot system



Robert Bird, R&D Project Manager  
Xeros, United Kingdom

**Xeros Technology Group—a company specializing in sustainable polymer solutions to advance the commercial laundry industry—can now produce more of their novel XOrb™ beads in one week than they previously could in two years thanks to a custom stirrer and gearbox for their Orb Pilot scale-up reactor.**

**Syrris' Custom Parts Team worked with Xeros to develop the custom double-helix stirrer and gearbox, specifically designed to fit a 50 L Orb Pilot vessel, to aid research and development of their XOrb beads. Robert Bird, R&D Project Manager, explained:**

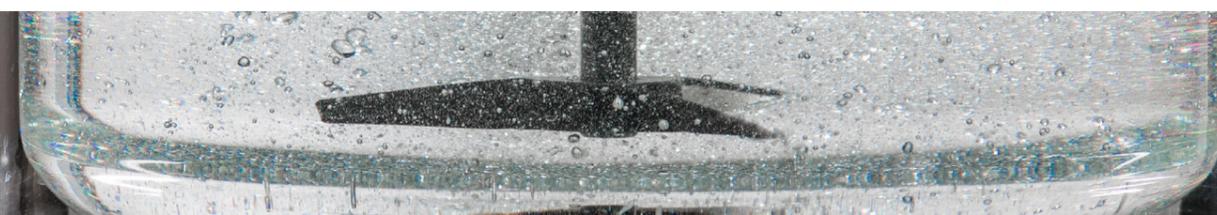
“One of our missions at Xeros is to improve the sustainability of industrial laundry washing by providing technologies that dramatically reduce water consumption. I work within the Polymer Development Team,

where we have produced novel XOrb™ beads. “These spheroidal balls can be added to a wash load to create a gentle mechanical action, helping to remove dirt and stains using less detergent and at lower temperatures, which saves water and reduces cost.

“In the space of a week, we can now produce more XOrb beads than we could have done in two years without the Orb Pilot system!

“Syrris also helped with the design of a customized stirrer, as well as adaptations to the gearbox and motor of the Orb Pilot, which gave us confidence that the setup would be suitable for our requirements.

“We are extremely happy with our current setup from Syrris and the improved scalability it offers for our XOrb bead production.”



# Accessories

Orb Pilot has been designed with the help and feedback from numerous process engineers who understand the issues faced in a scale-up lab. Orb Pilot is easy to customize to your exact requirements; simply choose from a range of vessels 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.

	Jacketed	10 L, 20 L, 30 L, and 50 L
	Vacuum Jacketed	10 L, 20 L, and 30 L
	<b>Custom reactors are also available</b>	

## Lids

Orb Pilot lids are available in borosilicate glass and PTFE in DN235 (EU and US) and DN300 (EU and US) sizes. Both sizes include a DN60 Charging Port, DN60 Condenser Coupling, 2 x B19 & B34 Probe Ports, and 2 x Baffle Ports. **Custom lids are also available.**

## Probes and Nodes

Wide range of probes and nodes available in various lengths, including temperature, turbidity, and pH.

## Stirrers

A wide range of PTFE, glass, stainless steel, and hydrofoil stirrers are available in a variety of geometries.

	Anchor
	Pitch blade turbine
	Hydrofoil Impeller
	<b>Custom stirrers are also available</b>

## Stirrer motors

High torque (400 N/cm), torque feedback, remote control, and digital display stirrer motors up to 800 rpm are available.

## Automation upgrade

Upgrade Orb Pilot 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

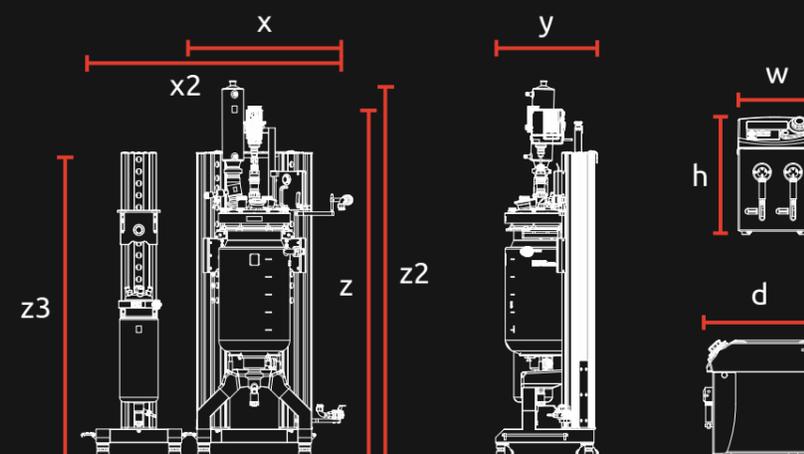
	Vessel range	10 to 50 L* / 10 to 30 L**
	Temp. range	-40 to 235 °C
	Pressure range	Vacuum: ≤50 mbara. Max. pressure: 250 mbar
	Stirrer motor rpm	500 continuous / 800 intermittent
	Stirrer motor torque	Up to 400 N/cm
	Dosing options	0.005 mL to 200 mL/min (Atlas XL Syringe Pump)

# Dimensions

	x (mm)	y (mm)	x2 (mm)	z^ (mm)	z2 (mm)	z3 (mm)
10 L	950	610	1540	1800	1975	1800
10 L VJ / 20 L	950	610	1540	1900	2050	1800
20 L VJ / 30 L	950	610	1540	1950	2115	1800
30 L VJ / 50 L	950	610	1540	2060	2220	1800

	w (mm)	h (mm)	d (mm)
Atlas XL Syringe Pump	355	163	258



\* Jacketed vessels  
 \*\* Vacuum jacketed vessels  
 ^ Z dimension requires 80 mm additional height for lifting the motor. The System will run without this height, but to remove the stirrer, lid, and vessel, this additional height is essential.

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

# Vessels

	10 L	10 L VJ	20 L	20 L VJ	30 L	30 L VJ	50 L
Vessel kit catalogue number	2201178	2201182	2201179	2201183	2201180	2201184	2201181
Working capacity (mL)	10,000	10,000	20,000	20,000	30,000	30,000	50,000
Flange inside diameter (mm)	235	235	235	235	235	235	300
Internal diameter (mm)	215	215	270	270	315	315	365
External diameter (mm)	250	315	315	365	365	415	415
Depth to nominal volume (mm)	318	318	395	395	443	443	542
Jacket volume (L)	3.85	3.85	7.3	7.3	11	11	15
Heat transfer surface area (m <sup>2</sup> )	0.27	0.27	0.40	0.40	0.50	0.50	0.71
Vessel mass (kg)	11	20	17	28	25	38	31
Oil jacket connection thread	M30 x 1.5 (20 mm internal diameter)						
Bottom outlet valve diameter (mm)	40						
Reactor material of construction	Borosilicate glass 3.3						
Other wetted parts materials	PTFE, FEP, PFA & FFKM						

# Lids

	DN235 (EU)	DN235 (US)	DN300 (EU)	DN300 (US)
Catalogue number	2201174	2201176	2201175	2201177
Vessel compatibility	10, 20, 30 L	10, 20, 30 L	50 L	50 L
Flange inside diameter (mm)	235	235	300	300
Center port	1 x Rodaviss 45			
Condenser & solid charging ports	2 x DN60 flange			
Baffle ports	2 x Rodaviss 45			
Probe ports	2 x B19	2 x A19	2 x B19	2 x A19
Liquid addition	1 x B34	1 x A34	1 x B34	1 x A34



# Why choose Syrris?

## Custom parts

We understand that all labs are different, so while we've designed our products to be as flexible as possible, sometimes you'll need something unique to your laboratory or application.

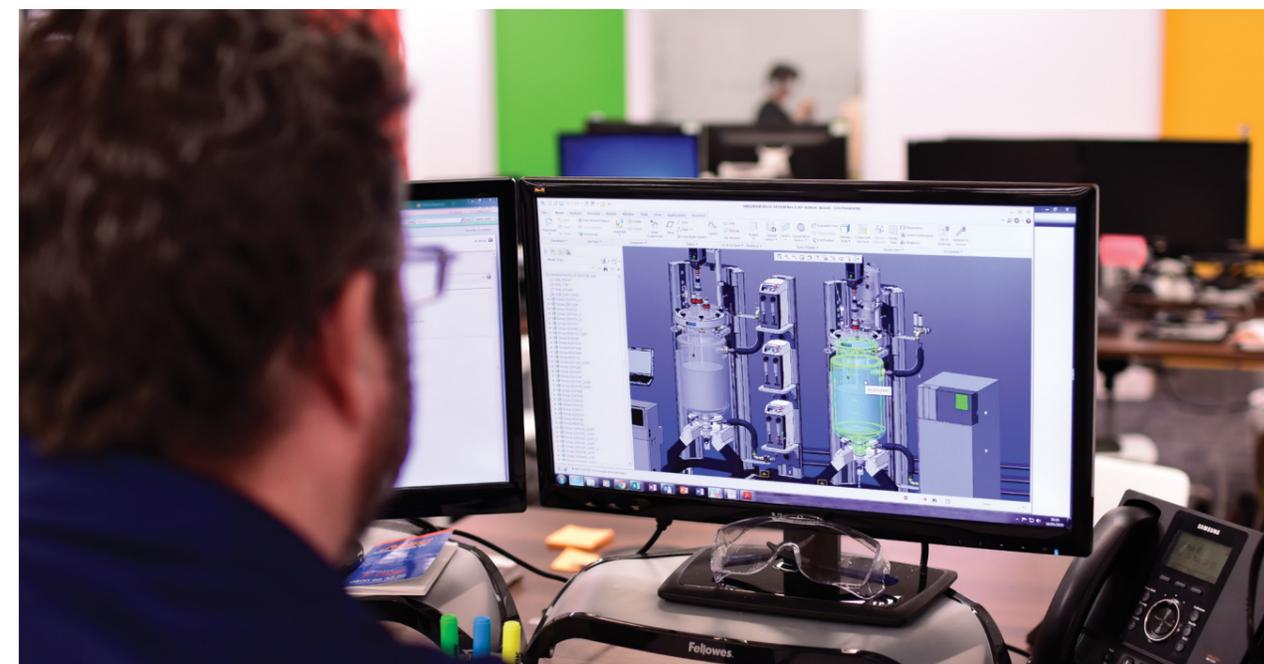
Many custom parts are simple variations on existing parts—shorter stirrer shafts or extra ports on a lid, for example. Some customers, however, require far more complex custom parts for their jacketed reactors or flow chemistry systems, such as automated bottom outlet valves (BOVs), unique stirrer designs, or custom vessels.

Syrris' ability to create unique custom parts is one of the main reasons chemists around the world choose Syrris for their needs.

## 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.





**“** In the space of a week, we can now produce more XOrb beads than we could have done in two years without the Orb Pilot system!

**Robert Bird, R&D Project Manager,  
Xeros Technology, UK**

**“** 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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# 400

**Publications**

Syrris products have been cited in over 400 peer-reviewed publications, demonstrating their viability for real-world chemistry

# 20

**Top Pharma**

Proud to have the top 20 pharmaceutical companies as Syrris customers, in addition to most leading academic institutions

# 1000s

**of Users**

Thousands of chemists and chemical engineers use Syrris products in their ground-breaking research and development

# 40

**Distributors**

Syrris works in partnership with over 40 distributors worldwide, offering expert knowledge and local support

# 2020

**Acquisition**

Acquired by AGI group who have over 70 years of experience in manufacturing and supplying high performance glass reactor systems

# 120

**Employees**

Over 100 employees work on behalf of the Syrris brand and its products across North America, EMEA and Asia

