



### Turn Flasks Into Bioreactors

- Online-monitoring: pH, DO
- Programmable pumps: fed-batch, pH control, induction

Run everything from screening to process characterization to expression in one flexible system.



### Run More Experiments

- Setup in minutes
- Fill your incubator as with normal shake flasks

Setup parallel experiments easily and reliably with single-use pre-sterilized components.



### Learn From Every Experiment

- Know your process with online monitoring
- Access data online, anywhere

View and compare your experiments with the simple web-interface.



## Simple & Flexible

The **atSpiro ShakeReactor** turns shake flasks into bioreactors, making it possible to perform fed-batch fermentations with online monitoring and pH control.

Fast setup and flexible control make the ShakeReactor a versatile platform for fermentations and cell cultivations, ideal for:

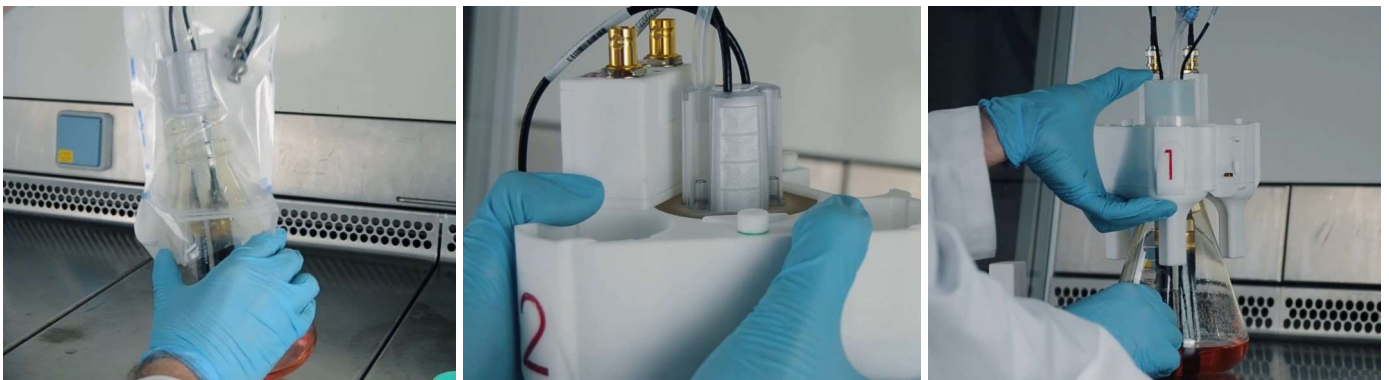
- strain selection
- process optimization
- cell expansion
- small scale production

## Parallel & Effective

The ShakeReactor is made to run in parallel. With a low investment, fast setup, and compact design you can **do 5 times more** experiments in parallel for the same time and cost as conventional bioreactors.

The ShakeReactor has a **simple workflow**, familiar to anyone who has worked with shake flasks. Wireless communication and battery power makes it easy to manage a large fleet of ShakeReactors, even for just one person.

**Single-use components** ensure a simple and reliable setup for each experiment and a low risk of contamination.



Ready in less than **15 minutes** to inoculate and place in an incubator.



## The ShakeReactor

The **atSpiro ShakeReactor** is a wireless and battery powered bioreactor that takes up the same amount of space as normal flasks. The ShakeReactor attaches onto 500 mL and 1000 mL Erlenmeyer flasks and works with standard incubators and shakers.

The reactor contains 3 high precision pumps that can be freely programmed for feeding, induction, and pH control.

Online-measurements of pH, dissolved oxygen (DO), and ambient temperature are collected wirelessly.

Monitoring	Containers	Shaking (max)
pH, DO, Temp.	3x 50 mL containers	25mm: 300 RPM 50mm: 200 RPM
pH Control	Battery Capacity	Flask
+/- 0.1 pH units	Standard: 7 days Double: 14 days	Erlenmeyer 500m, 1000mL

## High RPM Clamp

High RPM applications (>100 RPM) require the **atSpiro Power Clamp** to hold the ShakeReactor. The clamp comes in 500 mL and 1000mL versions and it is compatible with standard shakers and incubators.



Product Name	Product No.	Description
ShakeReactor	1.1.1	The ShakeReactor comes with a standard battery and 1 charging station.
Double Capacity Battery pack	1.2.2	Double capacity battery, compatible with standard charging station (can be purchased instead of the standard battery)
Power Clamp; 500 mL	1.3.500	Power Clamp for 500 mL Corning® Erlenmeyer flasks. Screws for attaching to shaker/incubator NOT included.
Power Clamp; 1000 mL	1.3.1000	Power Clamp for 1000 mL Corning® Erlenmeyer flasks. Screws for attaching to shaker/incubator NOT included.

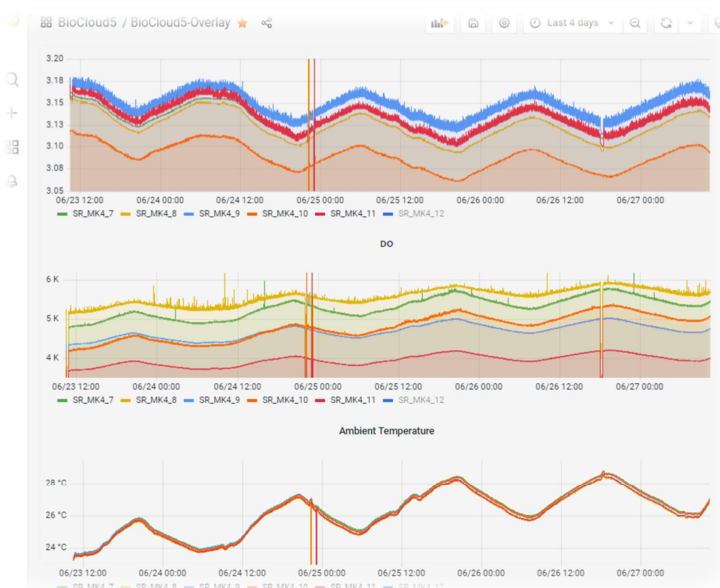
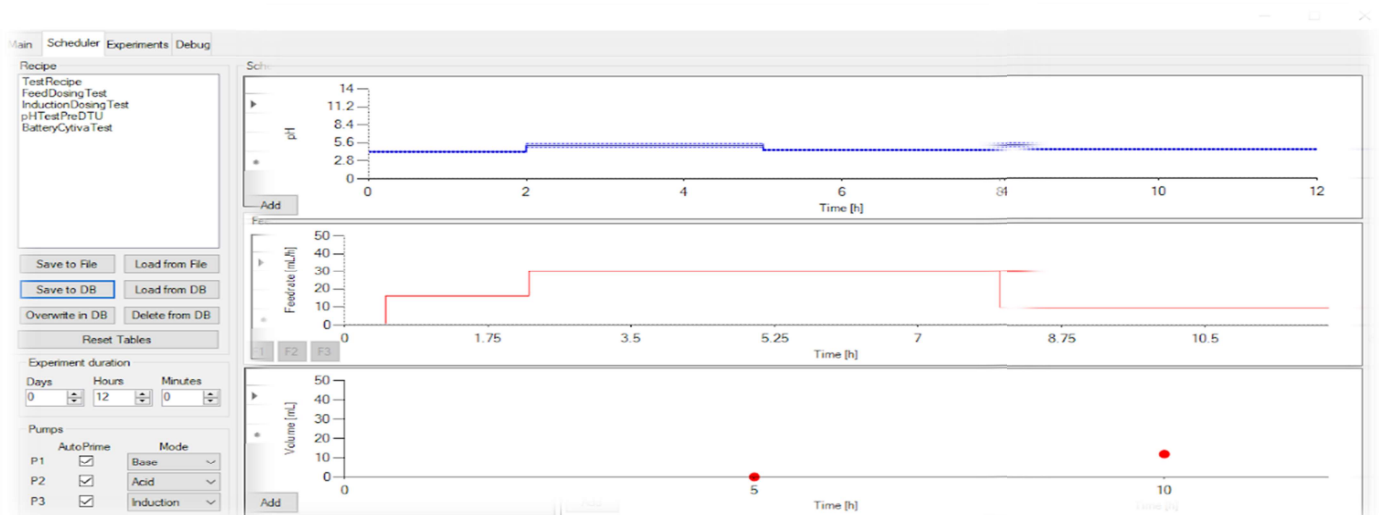


## Full Control

Our visual software interface lets you define your experiment through **Recipes**. A Recipe defines what the ShakeReactor does during an experiment, such as feed profiles, pH control bounds, induction times, and what feeds/reagents are in which liquid containers.

This allows you to:

- **Automatic feeding** with up to 3 custom feeding profiles
- **Control pH** with custom control bounds. One or two-sided.
- **Automate induction** at a pre-determined point in time
- **Manual remote dispensation** (e.g. based on offline measurements)



## Online Monitoring

A simple web-interface lets you monitor experiments in real time and compare different experiments.

Your data is available anywhere from any device through our secure platform.

## The BioHub

The **atSpiro BioHub** is the central hub that manages and communicates with your fleet of ShakeReactors. The BioHub is necessary for sending Recipes and receiving data from your ShakeReactors. You need one BioHub per lab, as the range is about 10 meters and doesn't go through walls well.

The BioHub comes with a 4G connection, so it connects directly and securely with our cloud platform. This makes it easy and secure to setup because it doesn't require access to your network or systems. The BioHub also creates a local backup of the experimental data, ensuring you don't lose anything.

### Local only configuration

It is possible to setup the BioHub to a local-only mode, such that all data stays locally on it, making it even more secure.



*BioHub*

Product Name	Product No.	Description
BioHub	1.0.1	The BioHub is a self-contained device, just plug it in an electrical outlet..

## Single-use Set

The components that have direct liquid contact are single-use — that is the liquid containers and the sensor module. They come as a set, sterilized and ready to use.

Single-use components make the setup much simpler, and have several advantages. They remove the need for maintenance and sterilization by the user, while increasing reliability and reducing the risk of contamination.



## Single-use Liquid Containers

Each experiment uses 3x 50 mL liquid containers that come sterilized. Dispensing is based on volume displacement (like a syringe), which allows for very accurate and reliable dispensation, without the need for calibration.

The liquid containers are filled before the experiment with a syringe and is compatible with most reagents and nutrient sources, such as:

- Viscous solutions (e.g. 70% glucose)
- Strong acids and bases
- Weak acids and bases

The dispensation system is flexible and enables you to use

- up to 3 different feedstocks, each with its own feeding profile
- up to 150 mL capacity of one feedstock by filling multiple containers with the same feed



## Single-use Sensor Modules

The sensor module makes a tight seal with the flask and liquid containers while allowing air to flow through a filter.

The standard sensor module comes with:

- pH sensor (Glass membrane)
- Dissolved oxygen (DO) sensor (Clark electrode)
- Filter for aeration (0.2 µm pore size)
- 2x sampling ports with luer-lock connectors

The sensor modules come in two sizes, one for each compatible flask:

- 500 mL Corning® Erlenmeyer flasks  
(CLS430422, CLS431145, CLS431408)
- 1000 mL Corning® Erlenmeyer flasks  
(CLS431146, CLS431147, CLS431402, CLS431403)



Product Name	Product No.	Description
Single-use set (pH+DO); 500 mL	5.2.500	1x 500 mL sensor module (with DO) 3x sterile liquid containers
Single-use set (pH+DO); 1000 mL	5.2.1000	1x 1000 mL sensor module (with DO) 3x sterile liquid containers