



sartorius stedim
biotech

ambr[®] 250 modular Single-Use Benchtop Bioreactor with Simplified Operation for Increased Productivity



turning science into solutions

New Advanced Benchtop Bioreactor System for Parallel Microbial and Cell Culture

ambr[®] 250 modular is an innovative new high performance benchtop bioreactor system for parallel microbial or cell culture in 100 - 250 mL single-use vessels. The system utilizes the same advanced stirred tank bioreactor technology pioneered in the original ambr[®] 250 high throughput system. The system comprises a series of elegantly designed benchtop modules enabling 1 to 8 bioreactors to be operated in parallel and a control module with intuitive system software accessed via a user-interface screen.

- Productivity

Each single-use bioreactor vessel is fully integrated with sensors, liquid reservoirs and syringe pumps which make it possible for experiments to be set up and turned around rapidly. A single user can operate up to 8 bioreactors at a time.

- Scalability

Because the bioreactor vessels are geometrically similar to larger bioreactors, all processes on the system can be scaled up to those of large bioreactors making for optimum scalability.

- Ease-of Use

Due to the unique integrated single-use design of the vessel, with probes, pumps and reservoirs the user can focus on the process and not the set-up. There is no need to connect multiple tubes or filters or to autoclave the vessels and accessories.

- Expandable

The modularity of the system means that it can be extended to meet the needs of an expanding company.



New ambr[®] 250 modular



ambr[®] 250 modular System Combines 1 to 8 Bioreactor Stations and a Control Module with System Software



The modular design is expandable up to 8 bioreactors.



Bioreactor module

Holds 2 bioreactor stations. Up to 4 modules can be connected to the controller.

Fast-loading peristaltic pump

Accessible for each bioreactor, provides an alternative route for feeding and harvesting. This is in addition to the 5 integrated syringe pumps in each bioreactor.

Chilled liquid reservoir
Chills liquids to temperatures between 6-8°C ensuring temperature sensitive media can be maintained.



3 step 'Easy Connect' installation for all gas, liquid and sensor connections

- Step 1 - slot in
- Step 2 - secure with clamp
- Step 3 - secure pH connector

Enabling quick set-up and rapid turnaround.



Touch screen user-interface
Enabling easy control and supervision of multiple bioreactors.

Bioreactor controller
Manages all processes including pH, temperature and DO for up to 8 bioreactors. Fully integrated foam control.

Optional off-gas analyzer
Monitors and controls processes using data from individual bioreactors' exhaust gases.

ambr[®] 250 modular Bioreactor Vessels

Each bioreactor is fully integrated with 5 liquid reservoirs and proprietary single-use syringe pumps. The integration simplifies experimental set-up, eliminates any need for vessel sterilization, and significantly reduces any error due to manual handling.

Vessel scalability

Vessels are geometrically similar to standard bench and pilot scale bioreactors, enabling straightforward scale-up.

Single-use mammalian or microbial bioreactors

- 100 - 250 mL working volume.
- Dual pitch blade or Rushton impellers.
- Spot based DO sensor.
- Disposable pH electrode.
- Integrated gas inlet filters.
- Sparge and headspace gassing options.
- Integrated exhaust gas condenser.

Integrated liquid reservoirs

- 2 Integrated 125 mL reservoirs per bioreactor
- 3 Integrated 50 mL Reservoirs per bioreactor.

Single-use syringe pumps

Each reservoir is integrated to its own high precision syringe pump allowing for highly consistent and accurate liquid delivery.

Fully integrated liquid lines and reservoirs
Allowing for rapid experimental set-up and turnaround.

Visible liquid addition lines
Allow view of liquid during auto-priming.



Gas tube

Gases can either be delivered into the headspace or sparged into the media. These delivery systems are independent and can function in parallel.

Septum cap

Allows for rapid liquid additions with a syringe.



Single-use pH and DO sensors
Both pre-calibrated, the DO spot measures 0 - 200% and the standard pH probe has a measurement range of 2 - 8.5.

Double impeller - Rushton or pitch-blade
For microbial or mammalian vessels respectively.

New Unbaffled Single-Impeller Vessel

This vessel type has been developed for microcarrier and regenerative medicine applications. The design is optimized to provide gentle mixing, good culture circulation and efficient resuspension of microcarriers or aggregates, especially when running very gentle agitation conditions i.e. low stirring speeds.



Single impeller
The large pitched blade impeller near the bottom of the vessel provides effective and gentle mixing at low stirring speeds.

Unbaffled vessel
Removing baffles from the side wall maximizes fluid circulation at the base of the vessel at low stirring speeds. This ensures microcarriers or aggregates remain suspended and well mixed during very gentle low speed mixing.

Software

ambr[®] 250 modular is supplied with the same advanced software as the established ambr 250 high throughput system. Users can design new and complex experiments and analyze results easily and quickly.

ambr 250 modular software encompasses 4 applications all of which enable export and import of data to | from different sources.



Process Definition
Simple 'drag and drop' process steps for quick and easy definition of experiments.



Runtime
Monitoring and adjustment of all process parameters in real time, for each individual bioreactor.

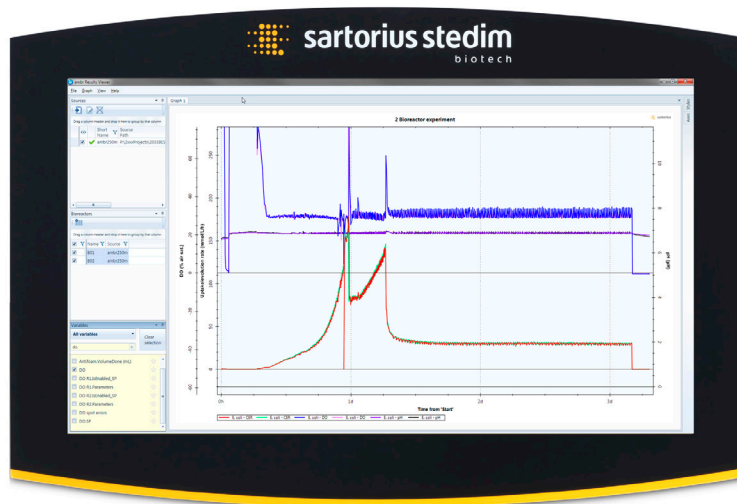


Experiment Viewer
Historian application which enables users to fully analyze experiments looking at audit trails, all variables and completed recipes.

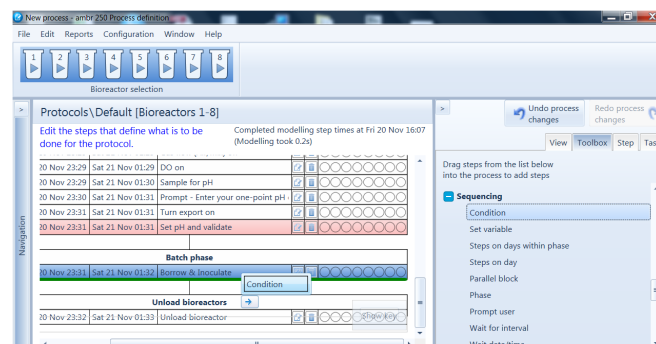


Results Viewer
Comparison of plots from experiments run at different times - allows parameters from multiple experiments to be plotted together on the same graph.

Touchscreen interface
The ambr 250 modular system controller is operated via an intuitive touchscreen interface, ensuring user interactions are ergonomic and efficient.



Multi-parallel design
The ambr 250 software has been developed especially for multi-parallel bioreactor operation, and provides efficient workflows for process set up, monitoring and other user interactions.



Functions

ambr[®] 250 modular automatically controls and adds liquids to 1 to 8 bioreactor | fermenter vessels in parallel

Bioreactor controller

- Three gasses per bioreactor with mass flow sensor:
- Mammalian
 - O₂
 - CO₂
 - N₂ | air
- Microbial
 - O₂
 - Air
 - N₂
- Five positive displacement liquid pumps per bioreactor for high precision at low flow rates.
- Individual bioreactor temperature control with heating and cooling.
- Individual impeller speed control per bioreactor.
- Optional off-gas analysis by BioPAT ambr Xgas for CO₂ and O₂, also uses OUR and CER measurements.

Applications

ambr[®] 250 modular is configurable for microbial or mammalian cell culture and is used in R&D across biopharm and industrial biotech for the following applications:

- Process optimization.
- Process characterization.
- Process robustness experimentation in support of QbD studies.
- Process scale-down model.

Regenerative Medicine

ambr 250 has been applied very widely in biopharma as a predictive and scalable process development tool, reducing timelines, applying DoE and QbD, and improving productivity and product quality.

ambr 250 is also an effective process development model for Regenerative Medicine applications, and can be used to rapidly and efficiently develop processes for a wide range of therapies and cell types. Optimized processes can be scaled up or scaled out into the chosen production system for manufacture of clinical material, such as Sartorius Biostat[®] RM TX or Biostat[®] STR bioreactors.

To date ambr 250 systems have been used to successfully culture a wide range of cell types, including CHO, HEK293, Vero, BHK, T-cells, CAR-T, hMSC, PBMNC, ES, iPS, and more.



Scalability

Single-Use from Cell Line and Process Development to Production Scale

- Geometrical similarity of vessel design
- Consistent mixing and gassing strategies
- Reliable single-use platform



ambr[®] 250 modular

BIostat[®] B
UniVessel[®] SU 2L

BIostat STR[®] 50

BIostat STR[®] 200

Similar geometry and sensors -

← Process development



ambr[®] 250 modular



BIOSTAT[®] B-DCU with UniVessel[®] Glass
1 - 10 L



BIOSTAT[®] D-DCU
10 - 200 L

← Also scalable to glass and stainless steel bioreactors →



BIOSTAT STR[®] 500



BIOSTAT STR[®] 1000



BIOSTAT STR[®] 2000

scaling up from 0.25 L to 1000 L

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