



Ambr[®] 250 High Throughput Perfusion

Fast Track Intensified
Cell Culture Processes

Simplifying Progress

SARTORIUS

Ambr[®] 250 High Throughput Perfusion

A Fully-Automated Bioreactor System For Intensified Cell Culture Process Development

Ambr[®] 250 High Throughput Perfusion is a parallel bioreactor system for rapid development of scalable perfusion processes using 100 – 250 mL single-use bioreactors and a fully automated liquid handling platform. The system supports the typical range of hollow fibre cell retention applications, with up to 24 fully single-use perfusion bioreactors in parallel. This step change in perfusion process development capability dramatically accelerates optimization of intensified cell culture processes leading to lower production volumes and reduced cost of goods.

Productivity

Ambr[®] 250 dramatically improves laboratory productivity, enabling cell culture scientists to carry out many times more perfusion culture experiments and full DoE experiments at a fraction of the cost compared with traditional perfusion-enabled benchtop bioreactors.

Wide Range of Fed-Batch and Perfusion Culture Conditions

Perfusion cultures can be fully optimized over a wide range of important parameters, including target cell density, crossflow rate, perfusion rate, bleed volume, bleed frequency and filter type, as well as typical culture and bioreactor process conditions such as clone, media, pH, temperature, RPM and gas flows.

The Ambr[®] 250 High Throughput Perfusion system is also capable of operating in fed-batch mode using standard Ambr[®] 250 bioreactors.

Scalability

With the industry standard Ambr[®] 250 High Throughput mammalian cell culture bioreactor at its core, the Ambr[®] 250 High Throughput Perfusion system can provide highly predictive and scalable performance for fed-batch cultures, and has equivalent potential for perfusion processes.

Convenience

The fully automated liquid handler carries out bioreactor sampling and reagent additions, saving hours of process support time. Fully integrated single-use perfusion bioreactors dramatically reduce setup, cleaning and turnaround time, decreasing cost per experiment and allowing high system utilization with minimal development timelines.

 **For more information, please visit**
www.sartorius.com/en/products/fermentation-bioreactors/ambr-multi-parallel-bioreactors/ambr-250-high-throughput-perfusion



System Features

The Ambr[®] 250 High Throughput Perfusion System Combines 12 or 24 Bioreactor Stations, Integrated Perfusion Pumps, Bleed and Permeate Collection with a Fully Automated Platform

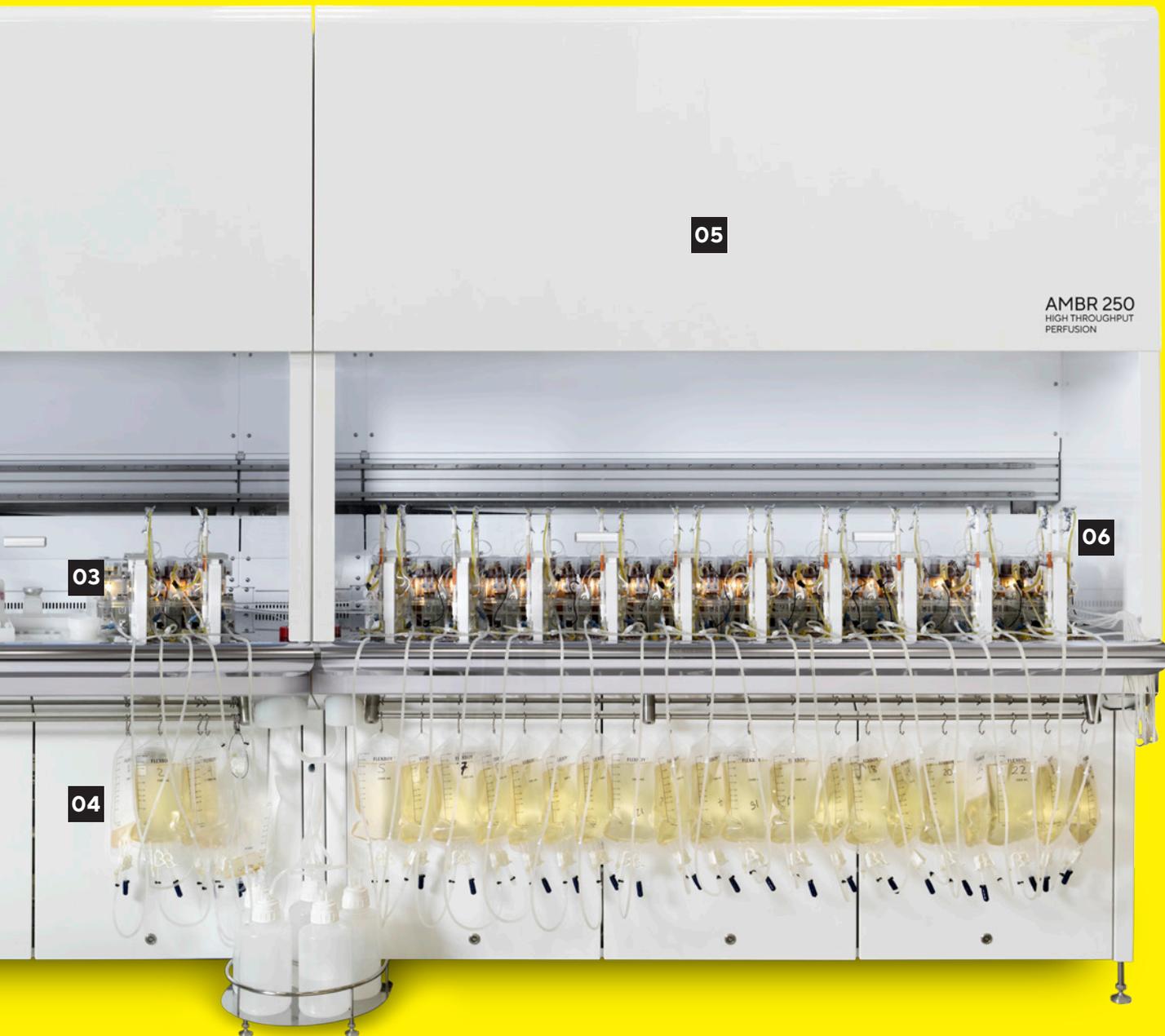


01 Automated liquid handler

The fully automated liquid handler carries out bioreactor sampling and liquid additions, significantly reducing manual operator interactions.

02 Integrated analytics

The liquid handler transfers samples to a range of optional integrated analyzers, enabling fully automated real-time feedback control loops based on these at-line assays. Optional analyzers: Ambr[®] analysis module; Nova Bioprofile[®] FLEX2[™]; Vi-CELL XR; Cedex HiRes.



AMBR 250
HIGH THROUGHPUT
PERFUSION

03
Bioreactor station array
12 or 24 bioreactor stations in parallel with full individual process control, offers convenient set-up and simplifies running of full DOE experiments.

04
Permeate and bleed flow control and collection system
The system includes perfusion crossflow and permeate pumps, automated bleed functions, and both permeate and bleed fluid collection sets with collection bag and tubing management features. Also includes a walk-away permeate sampling system for samples up to 10 mL.

05
Integrated biological safety cabinet
A class II biological safety cabinet designed to maintain an aseptic environment even during robot manipulation of bioreactors, significantly reducing any risk of process contamination.

06
Perfusion towers
Perfusion towers support and control key elements of the Ambr® 250 single-use perfusion bioreactors such as the perfusion pump chambers, pinch valve cassette and perfusion filter.

Bioreactor Vessels

Ambr[®] 250 High Throughput Single-Use Perfusion Bioreactors Include All Components Required for Perfusion Culture, Fully Assembled and Irradiated

Single-use perfusion bioreactors significantly reduce staff time needed for set-up and cleaning, and enable rapid system turnaround, increasing system utilization, efficiency and reducing development timelines. Fully assembled and irradiated components further reduce set-up time and minimize risk of lost experiments.

Bioreactor key features

Core features in Ambr[®] 250 High Throughput Perfusion bioreactors which are also present in standard mammalian cell culture bioreactors include:

- 100-250 mL working volume with baffles
- Dual 26 mm pitched blade impeller
- Spot-based DO sensor
- Disposable pH electrode
- Integrated gas inlet and outlet filters
- Robotic compatible cap for sampling
- Sparger and headspace gassing options
- Integrated exhaust gas condenser

01

Bioreactor perfusion features

The single-use perfusion bioreactor includes a high efficiency multi-hole sparger capable of supporting very high cell densities. Two dip tubes allow flow of culture to and from the perfusion pump and filter, plus automated bleeding and bleed-to-level functions.

03

Cell retention filter

The industry standard approach to cell retention, using a hollow fibre membrane. Options include a 0.2 µm or a 30 kDa filter as standard, and the filter can also be changed by the user before or during the experiment.

05

Pinch valve cassette

The single-use pinch valve cassette slots into place on the Ambr[®] 250 deck at the base of the perfusion tower. Four pinch valves guide the flow of fluids through the perfusion tubing set and enable automated bleeding functions.

02

Perfusion pump chambers

Single-use pump chambers are used to drive the exchange of culture fluid between the bioreactor and the hollow fibre filter. The pump chamber assembly includes retaining clips for the cell retention filter and snaps quickly and neatly into place on the main system perfusion tower.

04

Pressure sensors

Single-use pressure sensors connect quickly to the perfusion towers and continuously monitor pressure at the culture fluid inlet and permeate outlet, enabling online monitoring of transmembrane pressure.



🌐 For more information, please visit
www.sartorius.com/en/products/fermentation-bioreactors/ambr-multi-parallel-bioreactors/ambr-250-high-throughput-perfusion

Functions

The System Performs Many Fully Automated Functions

Bioreactor controller

- Three gasses per bioreactor with mass flow sensing of the mixed gas flow:
 - O₂
 - CO₂
 - N₂/air
- Four positive displacement liquid pumps per bioreactor for high precision at low flow rates
- When operating with perfusion bioreactors, three pumps are available for reagent addition to the bioreactor and the fourth liquid pump is used to direct permeate flow from the perfusion filter to a collection bag
- For fed-batch operation using standard Ambr® 250 High Throughput bioreactors, all four liquid pumps are available for reagent additions to the bioreactor
- Individual bioreactor temperature control with heating or cooling
- Individual impeller speed control per bioreactor
- Optional exhaust gas monitoring for O₂ and CO₂
- Integrated CIP/SIP protocols for fluid pumps and liquid lines (via optional autoCIP module)

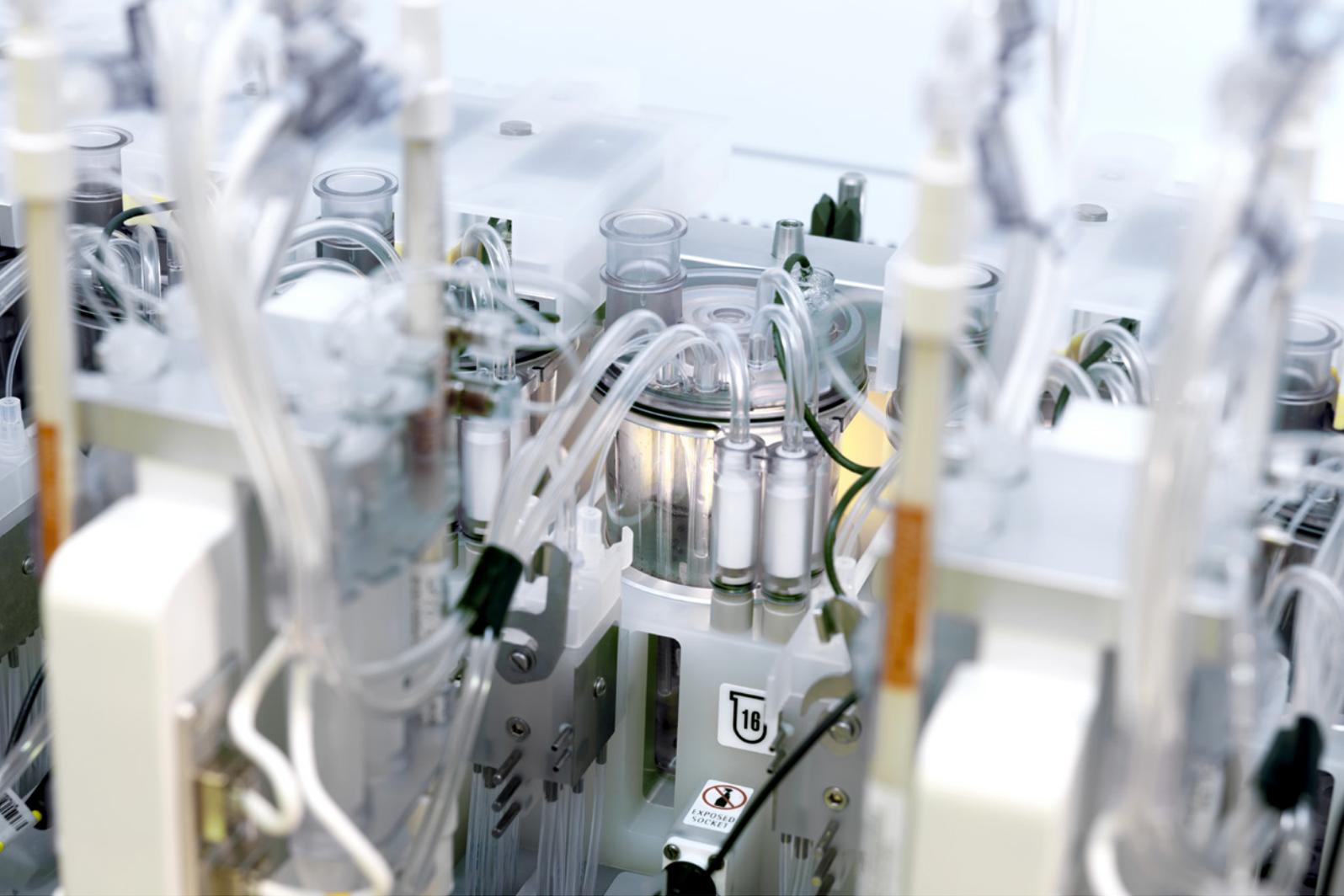
Perfusion tower

- Ergonomic 'easy connect' design for rapid installation of single-use perfusion bioreactors including all single-use perfusion components
- Perfusion culture crossflow pumps for each bioreactor provide individual control of perfusion flowrates
- Pinch valve system controls fluid flow between the bioreactor and perfusion filter, and automatically routes bleed fluid to a collection bag
- Online pressure monitoring at perfusion filter inlet and permeate outlet enable monitoring of transmembrane pressure
- Integrated perfusion tower heaters



For more information, please visit

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Applications

Ambr® 250 High Throughput Perfusion is capable of running in either perfusion culture or fed-batch mode, depending on the type of Ambr 250® High Throughput bioreactors installed. The system is able to cover a wide range of applications in biopharma development, including but not limited to perfusion process operations.

- Perfusion process clone selection
- Perfusion media development
- Perfusion process optimization
- Perfusion process characterization
- Perfusion process scale down model development

Scalability

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

- Geometrical similarity of vessel design
- Consistent mixing and gassing strategies
- High performance gas transfer and mixing
- Reliable single-use platforms



Ambr® 250
High Throughput Perfusion



Biostat® B
Univessel® SU 2L



Biostat STR® 50



Biostat STR® 200



Similar Geometry and Sensors



Process Development and Characterization

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Ambr® 250 High Throughput Perfusion



Biostat® B-DCU with Univessel® Glass 1 - 10 L



Biostat® D-DCU 10 - 200 L

← Also scalable to multi-use technologies →



Biostat STR® 500



Biostat STR® 1000



Biostat STR® 2000

- scaling up from 0.25 L to 1000 L →

Production →

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