



# We Know Bioprocessing

Fermentors and bioreactors for research through production

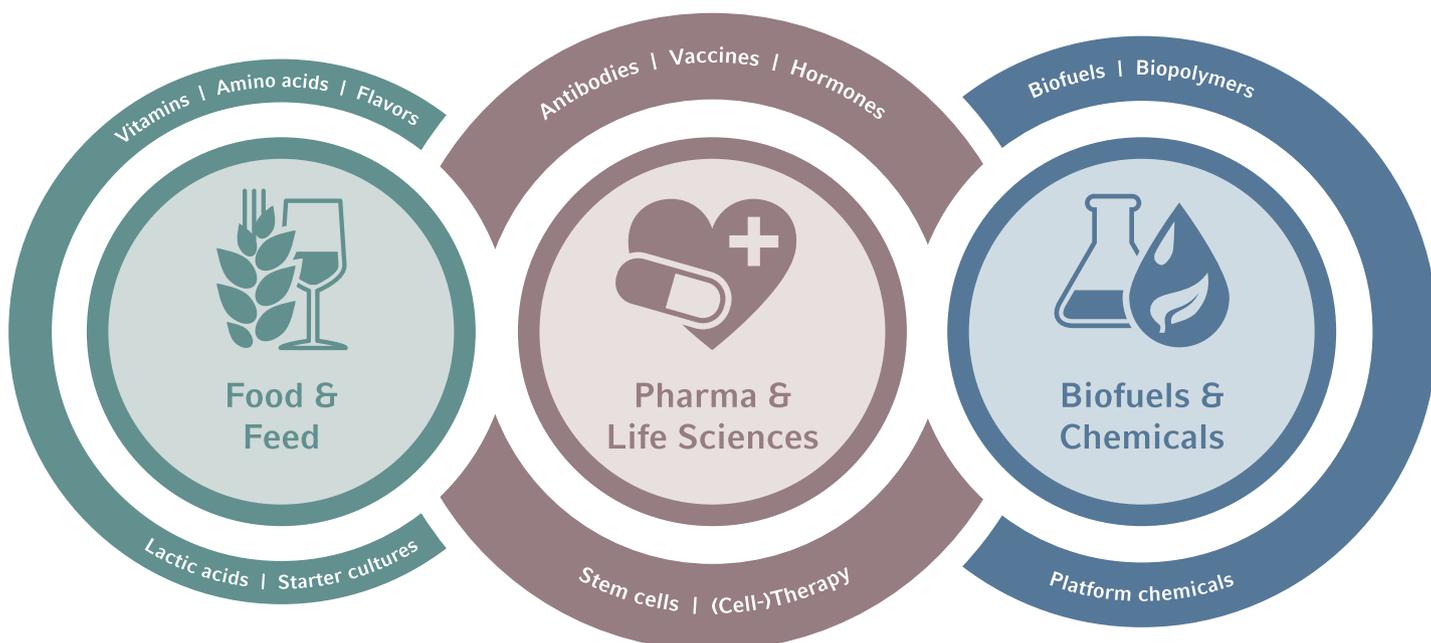


# »Heal, Fuel, and Feed the World.«

*Stephen Sherwin*

Bioprocess engineers develop and produce a multitude of products and ingredients available today. Their applications are diverse, and the products can be found in pharmaceutical, chemical, and nutrition industries. As Stephen Sherwin, former chairman of BIO association put it aptly: "Heal, fuel, and feed the world".

Our Eppendorf bioprocess solutions are successfully used in these industries and in applied research for decades. By exploiting the strong synergies in bioreactor technology and polymer manufacturing, Eppendorf has emerged as a global player and valuable resource to its customers. With an integrated portfolio comprising software, instruments, consumables, and services, we can satisfy the demands of bioprocess development through production. In that way and in line with our corporate mission, we contribute to the efforts of Eppendorf customers worldwide to improve human living conditions.



# Addressing Our Customers' Challenges

Single-use equipment, automation, perfusion culture, and other techniques have the potential to increase efficiency and change the way scientists and engineers work. Along with process intensification comes the need to utilize resources wisely. Users have to cope with rising amounts of data in order to achieve their goals faster. They are being assessed

by process performance characteristics such as costs per run and turn-around times.

Eppendorf is the right partner to meet these challenges. Satisfying professionals with full solutions to their tasks is what our bioprocess specialists are focusing on day-to-day. Expert teams take care of our customers worldwide.



## Process and Manufacturing

The biopharmaceutical landscape has long been dominated by the production of recombinant proteins and monoclonal antibodies (mABs). Nowadays, the industry is moving towards more diverse pipelines with a broader variety of biological active pharmaceutical ingredients (APIs), including biosimilars. Reacting to these rising demands, companies put flexible systems in place, optimized to balance costs and time-to-market.

Eppendorf offers flexible bioprocess solutions from a single source, supporting batch, fed-batch, continuous, and perfusion cultivation. From parallel small-scale bioreactor systems for early stage bioprocess development, benchtop bioreactors and fermentors for the laboratory scale to sterilize-in-place products for technology transfer and scale-up to production. They enable bioprocess professionals to establish robust and reproducible processes in all scales.



## Control and Analytics

Monitoring and control is key in bioprocess development and ensures the process environment for optimum cell growth and high-titer production. Applying Process Analytical Technology (PAT) concepts provides real-time insights improving product quality. Predictive models of cell and process performance enhance process understanding and optimize control through forecasting and estimating optimum parameter settings. Statistical tools like Multivariate Data Analysis (MVA) help scientists to get the most out of their data.

Software solutions from Eppendorf make use of these techniques by providing more than just bioprocess control. Comprehensive data- and information management supports scientists in enhancing their development efforts.

»Our bioprocess customers expect a special kind of support. Not only do our employees need to know their way around the technical devices; a knowledge of biological applications is also required. After all, we can only help if we understand exactly what our customers do and need. And in many cases, this close contact also results in new solutions.«

Dr. Karl Rix, Vice President, Head of Business Unit Bioprocess, Eppendorf



### Quality and Regulatory Aspects

The FDA's Quality by Design approach aims to design product quality and process efficiency into the process as early as possible. It includes the identification of critical process parameters (CPPs) and critical quality attributes (CQAs). These have to be monitored, controlled, and documented already early in biopharmaceutical development. Process automation opens up new possibilities in terms of quality control and validation, especially in GMP environments.

Eppendorf's parallel small-scale bioreactor systems support customers in implementing Quality by Design (QbD) principles in the development phase. Our advanced bioprocess control software is 21 CFR Part 11 compatible. Single-use bioreactor solutions from Eppendorf help make laboratories more efficient and safe.



### Integration and Services

Bioprocess equipment requires first-class service to achieve optimum results. Globalization, digital technologies, rising cost pressures, and the urge to be flexible in their operations make companies in the bioprocessing space face new challenges. They have to adapt their processes, facilities, and supply chains to these needs, establish global networks, and ensure high-quality training of all employees.

At Eppendorf, we offer broad expertise in automation and integration of third-party devices, making sure your systems run efficiently and are seamlessly integrated. Eppendorf customers can rely on high-quality technical and application support as well as comprehensive training and technical documentation.



## Vaccines

Driven by epidemic events and by governmental vaccination programs, there is a rising demand for development of new vaccines and the industry is growing at a double-digit rate. Eppendorf bioprocess equipment helps companies in setting up flexible processes that help balancing costs and shortening time-to-market.

Learn more on [www.eppendorf.com/vaccines](http://www.eppendorf.com/vaccines)

## Antibodies/Hormones

Improved cultivation techniques such as perfusion and new possibilities in data handling and automation enhance development of antibodies, therapeutic proteins, and active ingredients.

See how Eppendorf can support you with these initiatives on [www.eppendorf.com/antibodies](http://www.eppendorf.com/antibodies)

Besides standard impellers, Eppendorf offers specially impellers which can facilitate continuous and perfusion processes: Spin filters, Cell-Lift impellers, and packed-bed basket impellers.

**Fibra-Cel®** disks are a solid support material for growth of adherent mammalian, animal, and insect cells, when secreted proteins are desired.

Key advantages:

- > Cell densities averaging 10 times higher than traditional microcarriers, due to protection from shear forces
- > Higher mass transfer of nutrients and oxygen
- > Low pressure drop across the bed for efficient scale-up
- > Higher surface-to-volume ratios

Download application note  
on Vero cell perfusion  
culture using Fibra-Cel:  
[www.eppendorf.com/  
appnote359](http://www.eppendorf.com/appnote359)



Packed-bed impeller with Fibra-Cel

# Stem Cells

Stem cell-based technologies are promising approaches for therapy and drug discovery. For commercialization, researchers are evaluating standardization of their cultures and efficient scale-up.

Eppendorf customers rely on our bioprocess solutions for controlled cultivation of induced pluripotent stem cells (iPSCs), mesenchymal stem cells (MSCs), and others.



Do you want to know more about stem cell bioprocessing? Become part of the community and join our regular Stem Cell Community Day!

[www.stemcellday.de](http://www.stemcellday.de)

Stay Informed  
Stem Cell Expansion  
in Bioreactors

**eppendorf**

Stem cell culture in stirred-tank bioreactors makes scale-up easier and allows comprehensive monitoring and control of parameters like temperature, pH, and dissolved oxygen. Here are some tips to help you transfer your stem cell culture from dishes and flasks to bioreactors.

**1 Culture surfaces**  
To transfer cells from dishes/flasks to bioreactors, you need to adapt the culture conditions. The cells should be grown on microcarriers, which are small, spherical particles that provide a large surface area for cell attachment. The cells are grown on these microcarriers in a suspension culture.

**2 Inoculation**  
When adding cells to culture on microcarriers, use a gentle mixing protocol to avoid cell damage. The cells should be added to the bioreactor in a suspension culture. The cells are grown on these microcarriers in a suspension culture.

Parameter	Value
Cell seeding density	100,000 - 200,000 cells/mL
Microcarrier density	1 - 4 g dry weight
Cell to carrier ratio	100,000 - 200,000 cells / 1 g carrier

**3 Case-by-case optimization needed**  
Due to cell heterogeneity, stem cell lines often require optimization of culture conditions. Start slowly and use the large number of microcarriers to ensure that the cells are growing on the microcarriers. Optimize the culture conditions for each cell line and use the results to optimize the bioreactor process.

**4 Cell expansion**  
The expansion of stem cells in bioreactors is a complex process that involves many factors. The expansion of stem cells in bioreactors is a complex process that involves many factors. The expansion of stem cells in bioreactors is a complex process that involves many factors.

**5 Surface coating**  
The surface of the microcarriers should be coated with a layer of cells. The surface of the microcarriers should be coated with a layer of cells. The surface of the microcarriers should be coated with a layer of cells.

**6 Monitoring**  
The bioreactor should be monitored for cell growth and viability. The bioreactor should be monitored for cell growth and viability. The bioreactor should be monitored for cell growth and viability.

**7 Feeding**  
The bioreactor should be fed with fresh medium. The bioreactor should be fed with fresh medium. The bioreactor should be fed with fresh medium.

**8 Oxygen**  
The bioreactor should be supplied with oxygen. The bioreactor should be supplied with oxygen. The bioreactor should be supplied with oxygen.

**9 pH**  
The bioreactor should be controlled for pH. The bioreactor should be controlled for pH. The bioreactor should be controlled for pH.

**10 Agitation**  
The bioreactor should be agitated to ensure cell growth. The bioreactor should be agitated to ensure cell growth. The bioreactor should be agitated to ensure cell growth.

[www.eppendorf.com/bioprocessing](http://www.eppendorf.com/bioprocessing)

Download PDF on stem cell expansion in bioreactors:  
[www.eppendorf.com/stayinformed](http://www.eppendorf.com/stayinformed)



Researchers at Ncardia®, Netherlands rely on the DASbox® Mini Bioreactor System to develop a process for scaling up their production of iPSC-derived cardiovascular cells.

Find this and more research examples at [www.eppendorf.com/stem-cell-bioprocessing](http://www.eppendorf.com/stem-cell-bioprocessing)

DASbox Mini Bioreactor System, page 12





## Food & Feed

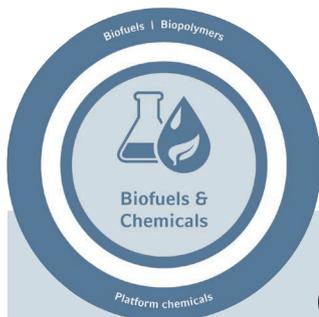
Microorganisms are routinely used in the food and animal feed industries for processes such as alcohol fermentation, the acidification of dairy products or ensilage. Besides, bacteria and fungi are gaining popularity in the production of food additives such as vitamins, antioxidants or bioactive peptides.

Eppendorf fermentors are available in sizes ranging from 65 mL – 1,200 L and serve process engineers from research and process development through production:

- > Strain and process characterization
- > Scale-down
- > High-cell-density fermentation
- > Scale-up

Read how our customers at BIOMIN®, Evonik®, and others benefit from Eppendorf fermentation solutions:

[www.eppendorf.com/food-feed](http://www.eppendorf.com/food-feed)



## Chemicals

Chemical synthesis, with its use of partially toxic reagents and solvents as well as high energy consumption, is in direct conflict with the sustainable handling of energy and raw material resources. Meanwhile, a large variety of chemicals can be efficiently produced by microbial fermentation. They are used for example as building blocks for polymers, food supplements, and ingredients for cosmetics. Complex biopolymers have the potential to replace fossil-derived plastics in the future.

## Academic Customers

No matter which area you are doing research in: We understand that universities and other publicly funded institutes are facing special challenges, such as frequently changing staff and often limited budgets. Also for these requirements, Eppendorf has the right solution.



The BioFlo® 120 Auto Culture modes allow 1-touch process control for microbial and cell culture applications and make the control station the perfect workhorse for beginners.

BioFlo 120, page 13

»The BioFlo range of fermentors enables unrivaled flexibility and performance for advanced process development and scale-up activities.«

Bruno Sommer Ferreira, PhD, CEO Biotrend.

Learn more:  
[www.eppendorf.com/chemicals](http://www.eppendorf.com/chemicals)



BioFlo 610, page 14

# A New Scale of Bioprocessing

	DASbox Mini Bioreactor System	DASGIP® Parallel Bioreactor Systems	BioFlo 120
			
Working volume range	60 - 250 mL	0.2 - 3.8 L <sup>1</sup>	0.25 - 40 L <sup>1</sup>
Single-use vessels available	•	•	•
Glass vessels, autoclavable	•	•	•
Stainless-steel vessels, SIP			
Interchangeable vessels	•	•	•
Bacteria/yeasts/fungi	•	•	•
Plant cells/algae	•	•	•
Mammalian/animal cells	•	•	•
Stem cells	•	•	•
Insect cells	•	•	•
Number of parallel units	Up to 24	Up to 16	
Controller <sup>2</sup>	DWC	DWC	BCS
Touchscreen controller			•
BioCommand®			•
DASware®	•	•	•
Gas mixing options	4 gas (air, N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> )	4 gas (air, N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> )	4 gas (air, N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> )
Gas flow control <sup>3</sup>	TMFC	R or TMFC	R or TMFC
Exhaust analysis	•	•	•
Optical density measurement	•	•	•
Validation			

<sup>1</sup> Realized using multiple vessels

<sup>2</sup> Controllers: DWC=DASware control, RPC=Reactor Process Controller, BCS=BioFlo Control Software, PLC=Programmable Logic Controller

<sup>3</sup> Gas Flow Controllers: R=Rotameter, TMFC=Thermal Mass Flow Controller

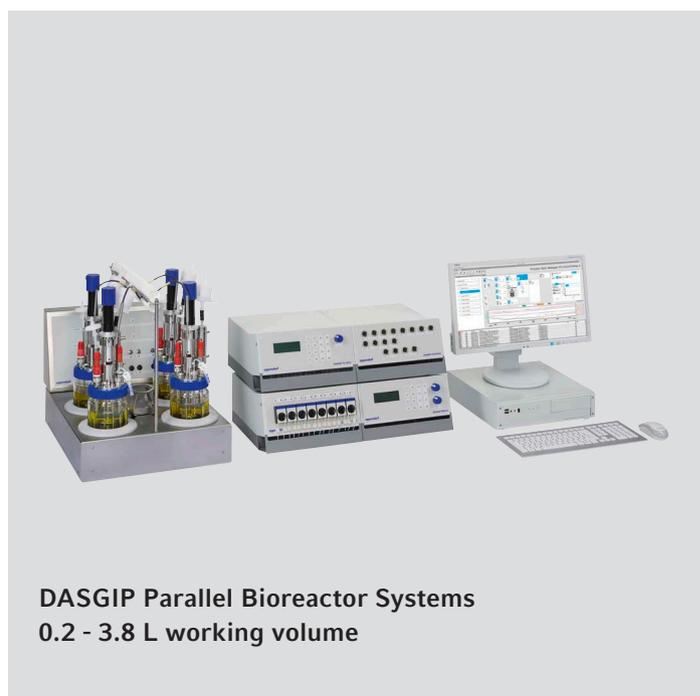
	BioFlo 320	BioFlo 510	CelliGen® 510	BioFlo 610	BioFlo Pro
					
	0.25 - 40 L <sup>1</sup>	10.75 - 32 L	10.75 - 32 L	13 - 100 L <sup>1</sup>	45 - 1,200 L <sup>1</sup>
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	Up to 8				
	BCS	RPC/PLC	RPC/PLC	RPC	PLC
	•	•	•	•	•
	•	•	•	•	•
	•				
	4 gas (air, N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> )	4 gas (air, N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> )	4 gas (air, N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> )	2 gas (air, O <sub>2</sub> )	2 gas (air, O <sub>2</sub> )
	TMFC	TMFC	TMFC	TMFC	TMFC
	•	•	•	•	•
	•				
	•	•	•	•	•

## Parallel Bioprocessing for Unparalleled Results: Small-Scale Systems



**DASbox Mini Bioreactor System**  
60 - 250 mL working volume

- > 4-fold parallel system extendable to up to 24 parallel operated glass or single-use bioreactors
- > Suitable for cell culture and microbial fermentation
- > Compact mini bioreactor system: requires only 7 cm (3 inches) bench space per bioreactor
- > Optimal tool for DoE and scale down approaches
- > Agitation control supporting overhead-driven Rushton, marine-type or pitched-blade impellers
- > Innovative liquid-free temperature control system needs no cooling agent supply and supports independent temperature control for each bioreactor
- > Accurate monitoring and control of pH, DO and level
- > Variable speed pumps for accurate liquid addition and operation in batch, fed-batch, continuous and cyclic perfusion mode
- > 4 mass flow controllers per bioreactor allow for individual mixing of air, N<sub>2</sub>, O<sub>2</sub> and CO<sub>2</sub> to headspace and/or submerged
- > Novel liquid-free Peltier exhaust condenser with easy to handle slide in - slide out activation and deactivation
- > DASware control Software for advanced process control
- > Compatible with DASware Software Suite for interconnectivity and bioprocess information management



**DASGIP Parallel Bioreactor Systems**  
0.2 - 3.8 L working volume

- > Parallel operation of up to 16 glass or single-use bioreactors
- > DASGIP Bioblock for advanced and user-friendly temperature control or temperature control via heat blankets and cooling fingers (benchtop bioreactors)
- > Suitable for cell culture, microbial fermentation and phototrophic cultivation
- > Modular design of control units allows for flexible system configurations that meet the demands of specific applications
- > Control of agitation, pH, level and DO (including customizable cascade modes) in each bioreactor
- > Variable speed pumps for accurate liquid addition and operation in batch, fed-batch, continuous and cyclic perfusion mode
- > Optical absorbance measurement for online calculation of e.g. OD<sub>600</sub> or cell dry weight
- > TMFC with individual gas mixing of air, N<sub>2</sub>, O<sub>2</sub> and CO<sub>2</sub>
- > Online calculation of OTR, CTR and RQ
- > DASware control Software for advanced process control
- > Compatible with DASware Software Suite for interconnectivity and bioprocess information management

## Exceedingly Versatile: Bench-Scale Fermentors and Bioreactors



**BioFlo 120**  
0.4 - 10.5 L working volume (autoclavable)  
0.25 - 40 L working volume (single-use)

- > Updated flexible software platform for universal control of both microbial and cell culture applications
- > New Auto Culture modes offer process control at the touch of a button.
- > Compatible with BioBLU® Single-Use Vessels for fermentation and cell culture applications
- > Precise temperature control provided through interchangeable heat-blanketed or water-jacketed vessels
- > High precision thermal mass flow controller (TMFC) for automatic gas flow control
- > Automatic gas mix for four independent sparge gas supplies
- > Available analog input/output connection for direct integration of accessories (i.e. scales, variable-speed pumps, etc.)
- > Integrated Mettler Toledo® Intelligent Sensor Management (ISM) platform
- > Integrated 7 in touchscreen for local process control
- > Compatible with DASware Software Suite or BioCommand for bioprocess information management



**BioFlo 320**  
0.6 - 10.5 L working volume (autoclavable)  
0.25 - 40 L working volume (single-use)

- > Interchangeable autoclavable and BioBLU Single-Use Vessels
- > Integrated Mettler Toledo Intelligent Sensor Management (ISM) platform
- > Control up to eight systems from a single-user interface
- > Universal control for both microbial and cell culture applications
- > Field-upgradable TMFC drawers for sparge and overlay gas
- > Enhanced software package with new cascade and time profile features
- > Built-in optical pH sensing technology for use with the BioBLU Single-Use Vessels
- > Ethernet communication for multi-unit control, Eppendorf SCADA software, and IP addressing
- > Up to six integrated pumps capable of operating in variable speed mode
- > Eight independently controlled process gas supplies
- > Suitable for batch, fed batch, and continuous processes as well as perfusion
- > Validation packages available for GMP regulated processes

## Industry Standards Meet Flexibility — Sterilizable-in-Place Fermentors and Bioreactors



**BioFlo 510 & CelliGen 510**  
Bench- and pilot-scale SIP fermentor and bioreactor  
10.75 - 32 L working volume

- > SIP bench and pilot scale reactors designed to meet the needs of R&D through production
- > Modular design allows for complete system flexibility
- > Add or remove components pre- or post-delivery
- > Multiple impeller and gas flow options
- > Integrated skid design with mobile table option to simplify transport
- > Features intuitive RPC control software and touchscreen interface
- > Optional Allen Bradley® PLC
- > Integrated load cell for online vessel volume monitoring
- > Fully automated SIP sequence for sterilization
- > Flush mounted vessel ports for enhanced vessel design and drainability
- > Validation packages available
- > 7 additional analog input/output connections for local integration of ancillary equipment
- > ASME-rated pressure vessel



**BioFlo 610**  
Pilot-scale SIP fermentor  
13 - 100 L working volume

- > Pilot production system without the traditional cost or footprint
- > Modular design allows for complete system flexibility
- > Add or remove components pre- or post-delivery
- > Multiple impeller and gas flow options
- > Integrated mobile skid simplifies transport
- > Features intuitive RPC control software and touchscreen interface
- > Integrated load cell for online vessel volume monitoring
- > Fully automated SIP sequence for sterilization
- > Flush mounted vessel ports for enhanced vessel design and drainability
- > Validation packages available
- > 7 additional analog input/output connections for local integration of ancillary equipment
- > ASME-rated pressure vessel



**BioFlo Pro**  
Large-scale SIP fermenter  
45 - 1,200 L working volume

- > Large scale industrial system supporting operation in accordance to cGMP and GAMP® guidelines
- > Modular design with over a hundred options allows for high level of customization pre and post delivery
- > Multiple impeller and gas flow options
- > NEMA-4 (IP65) rated control cabinet with industry-standard Allen Bradley PLC
- > Open piping skid allows for easy accessibility
- > Fully automated SIP sequence for sterilization
- > Clean-in-Place (CIP) options available for vessel and piping
- > Flush mounted vessel ports for enhanced vessel design and drainability
- > Validation packages available
- > ASME-rated pressure vessel



# BioBLU® Single-Use Vessels — Dependability through Proven Design

## Single-use simplicity

With renowned polymer expertise, Eppendorf is proud to offer the largest portfolio of rigid walled stirred-tank single-use vessels – in small and bench scale, to be operated with parallel DASbox Mini Bioreactor System, DASGIP Parallel Bioreactor Systems, or BioFlo/CelliGen bench-scale systems.



From 65 mL to 40 L, working volume, Eppendorf has a single-use solution to meet your needs

## Benefits

- > Proven performance and scalability of stirred-tank design
- > User-friendly set-up for rapid turnaround, shorter development times and lower operating costs
- > Specifically adapted designs available for microbial applications
- > Packed-bed configuration with Fibra-Cel disks is ideal for perfusion/continuous processes
- > USP Class VI and animal component-free materials, making vessels appropriate for GMP production
- > Non-invasive or industry standard sensor technology



### BioBLU c Single-Use Vessels for cell culture applications

Single-use solutions for small, bench and pilot-scale cell culture applications. A full portfolio of vessels covers a working volume range of 100 mL – 40 L, offering unmatched scalability. The single-layer polymer design mitigates issues related to leachables and extractables.



### BioBLU 5p Single-Use Vessel with packed bed

For the cultivation of adherent cells and for perfusion processes we offer the BioBLU 5p packed-bed vessel. It utilizes the proprietary Eppendorf packed-bed impeller design and is pre-loaded with Fibra-Cel disks. Providing a shear-free environment, it is a premium choice in a wide variety of applications, including the production of secreted products and stem cell culture.



### BioBLU f Single-Use Vessels for microbial applications

Single-use solutions for small and bench scale fermentation applications, covering a working volume range of 65 mL – 3.75 L. Fermentation processes have high mass transfer and heat removal requirements. Proven stirred-tank design, powerful overhead drives featuring Rushton-type impellers, and effective cooling make it possible for the BioBLU f vessels to achieve these demands.



### BioBLU Single-Use Vessel Adaptor Kits

BioBLU vessels are designed for use with the Eppendorf DASbox and DASGIP systems, BioFlo 120, and BioFlo 320. A range of adaptor kits is offered as well, enabling your existing bioreactor system for single-use operation without the expense of replacing the whole system.

BioBLU Single-Use Vessel bundles provide you with highest flexibility. They ease up to switch your bioreactor system from single-use to reusable vessel usage, back and forth.

### Are you worried about leachables and extractables?

The release of chemical compounds into the culture medium is a major concern related to the use of single-use equipment. Standardized tests help investigating the effects of leachables and extractables (L&Es) on cell growth.

Download application note on leachables studies:  
[www.eppendorf.com/appnote308](http://www.eppendorf.com/appnote308)



# Eppendorf Bioprocess Software — Much More Than Just Bioprocess Control

Eppendorf offers BioCommand® and DASware® control Supervisory Control and Data Acquisition (SCADA) software packages for advanced bioprocess control. The comprehensive DASware software suite provides next-generation bioprocess management.

## DASware software suite

### Next-generation bioprocess management

A suite of smart and flexible software solutions to accelerate bioprocess development, with DASware control for parallel bioprocess control. The DASware licences enable interconnectivity of bioreactors with external lab-devices, comprehensive data- and information management, Design of Experiments (DoE) and remote control of bioprocesses. DASware can be used with any Eppendorf benchtop bioreactor solution.



#### DASware control

> Advanced process monitoring, control, and data logging - for parallel cultivation with individual control of each bioreactor



#### DASware connect

> Integration into process control systems and legacy corporate historians facilitating company-wide access to all relevant bioprocess data



#### DASware access

> Remote monitoring and control of bioprocesses via PC, Notebook and Netbook or with the DASGIP iApp via iPhone®, iPod touch® and iPad®



#### DASware design

> Applies the Design of Experiments (DoE) concept via a full factorial DoE builder or by importing DoE designs from third-party DoE tools



#### DASware analyze

> Seamless integration of external lab devices to the bioreactor allows for process automation and feedback control loops



#### DASware discover

> A comprehensive and user-friendly information management solution for bioprocessing

## BioCommand software



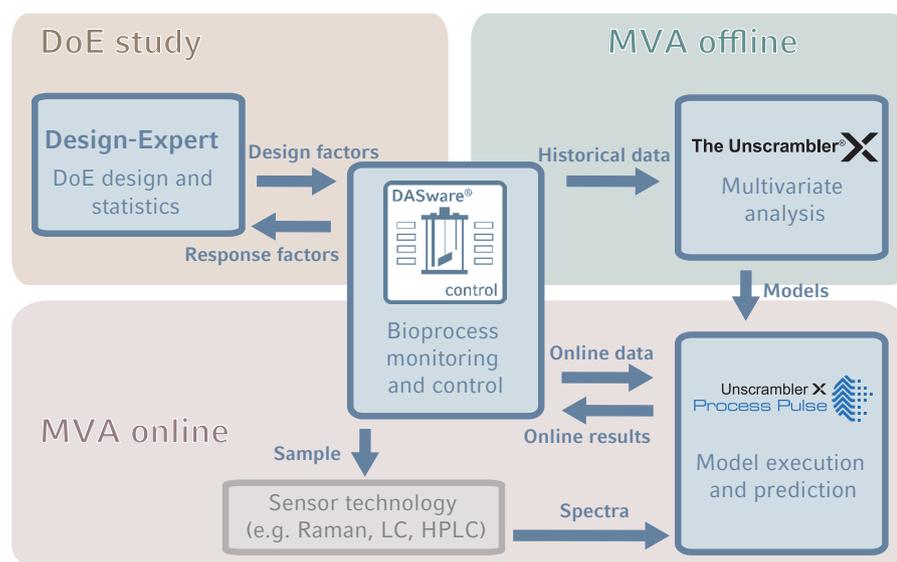
The BioCommand software enhances your ability to monitor, control and log data from your fermentation and cell culture processes. Three distinct packages provide the tools needed for research, optimization, and if needed, the security and audit trails to support your regulatory requirements.

- > **Track and Trend:** Provides the ability to trend and control parameter setpoints, establish alarm settings, and produce batch records; and is ideal for basic process management
- > **Batch Control:** Additional enhanced control features including a sophisticated programming module, custom synoptic display window, and equipment lock feature
- > **Batch Control Plus:** Includes three levels of security, event logs, and audit-trail capabilities to be compatible with the FDA 21 CFR Part 11

Features	Track & Trend	Batch Control	Batch Control Plus	DASware control
Batch info	•	•	•	•
User-defined event log	•	•	•	•
Summary	•	•	•	•
Loop info	•	•	•	•
Alarms	•	•	•	•
Trend graphs	•	•	•	•
Data log	•	•	•	•
Reports	•	•	•	•
Graphical programming		•	•	
Script programming		•	•	•
Synoptic display		•	•	•
Equipment lock		•	•	•
Audit trail/security			•	•
21 CFR Part 11			•	(•)*
OPC compliance	•	•	•	•
Parallel calibration				•
DASware compatibility				•

\* 21 CFR Part 11 compatibility is available for DASware control as an optional package. Please contact us for further information.

## Unlock the Box — Integrated Software Solutions for DoE and MVA



Bringing together the Eppendorf DASware control 5 software and the CAMO Software packages The Unscrambler® X with Design-Expert® and Unscrambler X Process Pulse II we present an integrated software solution for bioprocess control, DoE, and Multivariate Analysis (MVA).

### Use cases:

- > DoE studies: From experimental design to data analysis
- > Offline MVA: Analyze historical data and develop batch trajectory models
- > Online MVA: Implement models with real-time predictive control

Learn more at [www.eppendorf.com/MVA](http://www.eppendorf.com/MVA)

## Services and Training — Ensure the Performance of Your Bioprocess System



With our services we complement our bioprocess portfolio with Technical and Application Support, Training, and Maintenance Services.

We are committed to providing sincere, reliable services and tools to help you maintain premium performance, and maximum safety of your Eppendorf instruments and your workflows. This includes a comprehensive range of carefully designed service solutions performed by our dedicated bioprocess service teams worldwide.

### **Bioprocess Performance Plans**

Technologically demanding products require first-class service to ensure that the results they produce are optimized. Customers can rely on Eppendorf Service for superior support for their bioprocess products, beginning with startup of the system. The services range from technical support and troubleshooting to delivery of replacement parts on short notice and customer-specific maintenance programs.

### **Technical and Application Support**

You can expect the highest standards of support for your products and applications from Eppendorf. Our team of specialists is pleased to help you with advice and assistance for all kinds of questions regarding our bioprocess products and their applications.

### **Preventive Maintenance**

As with all complex technical systems, Eppendorf bioprocess equipment should be maintained regularly to keep all parts in good working order. This maintenance avoids cost-intensive down times and contributes to preservation of value. We recommend a complete preventive maintenance once a year. Additionally, we encourage users to execute certain maintenance actions prior to every run or in regular cycles (e.g. every month). We will be happy to advise.



### Eppendorf Training Center

In addition to support during installation, we highly recommend training for all new bioprocess customers. In addition to this initial training, Eppendorf also offers individual training adapted to the user's requirements like training of new employees or advanced/refresher training for employees already having experience with the bioprocess systems in place. The structure and methods of the training can be tailored to the customer's requirements from a general overview to a very detailed session on specific products or issues. Training in small groups makes it possible to provide individual guidance.

## The Eppendorf App



### Searching for the right spare part? Have a look at the Eppendorf App!

In the Eppendorf App, you find optimized product information tailored to mobile devices, as well as helpful tools for your daily laboratory work. We now extended the catalog functionality of the app, offering you a better overview of the components of your bioprocess product. Like this, you will find your spare parts and accessories more easily. Lots of products can be found in that way already - and we will be expanding the app with more!

[www.eppendorf.com/app](http://www.eppendorf.com/app)



# Eppendorf Handling Solutions

Liquid Handling  
Cell Handling  
Sample Handling

## Liquid Handling



In 1961, Eppendorf launched the first piston-stroke pipette. Today, our broad product offerings in Liquid Handling range from manual pipettes to electronic pipettes, dispensers and burettes to automated pipetting systems.

Eppendorf products are associated with state-of-the-art technology, outstanding ergonomics and award-winning design. This applies to both devices and the requisite consumables such as pipette tips and Combitips®.



### ■ Easypet® 3

Experience a new dimension of electronic pipetting with complete speed control and the utmost precision.

- > Intuitive and convenient speed adjustment simply done with the tips of your fingers
- > Lightweight, well-balanced and ergonomic design that allows for fatigue-free pipetting



### ■ Eppendorf Serological Pipets

Quality and convenience designed to work in perfect harmony with Easypet 3.

- > Clear and precise graduations for easy volume determination
- > Ultra-pure virgin polystyrene meeting the requirement of USP IV



### ■ Innova® S44i

A large-capacity incubated shaker in a surprisingly compact footprint.

- > 6 L maximum flask capacity on universal platform
- > Optional highly homogeneous LED photosynthetic light bank



### ■ epMotion® 5075m

The most flexible member of our family of automated liquid handling systems.

- > Mixing, temperature control and magnetic bead separation abilities
- > Optical sensor verifies labware, tips and volumes before the run



### ■ Multipette® E3/E3x

A motor driven dispensing system that utilizes the positive displacement principle and is capable of accurately pipetting any liquid.

- > Eliminates time consuming volume calculations with auto Combitip recognition
- > One-button tip ejector for one handed operation and contact-free advanced ejection

## Cell Handling

Discover our comprehensive range of instruments and consumables for the manipulation, cultivation and analysis of cells. For handling cells, in addition to manipulators and

## Concerned about Bacteria in Cell Culture?

Find useful tips on  
[www.eppendorf.com/cellexperts](http://www.eppendorf.com/cellexperts)

To make your job in the lab easier and more efficient – with this goal in mind we are developing products and solutions in the areas of Liquid Handling, Cell Handling, and Sample Handling. Visit the Eppendorf Handling Solutions online sphere and dive into the area of your choice, learn new things, and have fun as well: [www.eppendorf.com/handling-solutions](http://www.eppendorf.com/handling-solutions)



injectors, incubators and consumables for cultivation as well as complete bioreactor systems for cell culture applications are also available.

## Sample Handling

**Eppendorf products set standards in a wide variety of laboratory areas at an early stage** – standards that still serve as yardsticks for others today. Sample Handling encompasses many different work processes and steps: centrifugation, heating, freezing,

mixing, amplification, and analysis of samples. Eppendorf offers the devices and consumables needed for each of these steps and allows users to feel assured that the work they perform is of the highest quality.



### Eppendorf BioSpectrometer® Fluorescence

Fluorescence and micro-volume UV-Vis (OD) measurements in a single stand-alone instrument.

- > Preprogrammed methods for a wide range of kits, including Qubit
- > Multiple parameters to allow monitoring of protein production



### Eppendorf Conical Tubes 15 and 50 mL

No Compromise! The Eppendorf Conical Tubes meet the highest demands of diverse laboratory applications.

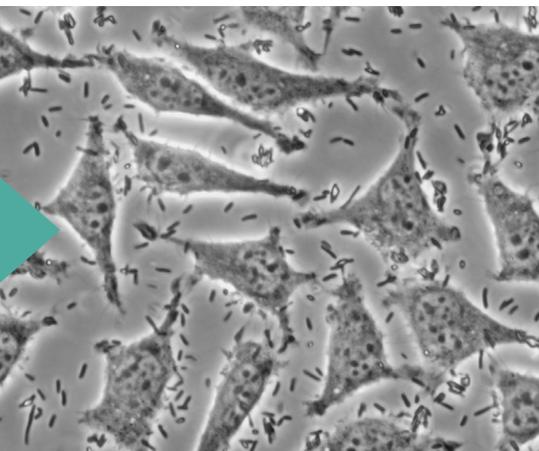
- > The newly designed screw cap provides optimal sealing properties
- > High g-Safe® centrifugation stability allows fast protocols for shorter run times



### Centrifuge 5920 R

Experience extraordinary high capacity in a very compact and ergonomic product design.

- > Swing-bucket rotors and adapters accommodate tubes and bottles from 0.2 mL to 1,000 mL
- > Fixed-angle rotors and plate rotor options



### CryoCube® F740 series

Eppendorf High-Efficiency ULT Freezers minimize operating costs while providing superior protection for your critical samples.

- > Premium insulation for optimal temperature uniformity
- > Monitor your freezer by VisioNize® for 24/7 safety



### Eppendorf Tubes® 5.0 mL

The missing link! This product represents the perfect option for working with medium-sized sample volumes.

- > Snap cap or screw cap
- > Compatible with accessories for conical 15 mL tubes – many existing adapters and racks can be used

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