



# Single-Use Scalability

BioBLU® and BioBLU HNQ Single-Use Bioreactors  
for cell culture, fermentation, and commercial manufacturing



Broad compatibility from R&D to commercial manufacturing

**BioBLU® Single-Use Bioreactors are compatible with the following bioreactor control systems:**

- > DASbox® Mini Bioreactor System
- > DASGIP® Parallel Bioreactor Systems
- > SciVario® twin
- > BioFlo® 120
- > BioFlo 320
- > BioFlo 720

# »Proven stirred-tank design meets single-use technology.«

Over 15 years ago, Eppendorf pioneered the development of the first rigid-wall single-use bioreactors, setting a new standard in bioprocessing technology by combining the benefits of single-use technology with the reliable performance of conventional glass or stainless steel bioreactors. Since then, Eppendorf has continuously improved these systems, establishing the BioBLU® series as a benchmark for reliability and performance. Today, BioBLU reactors are integral to academic and industrial applications providing innovative solutions to complex production challenges.

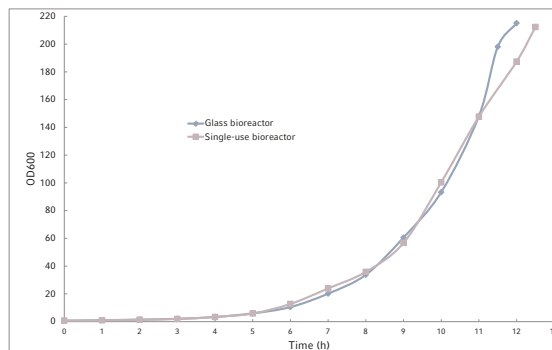
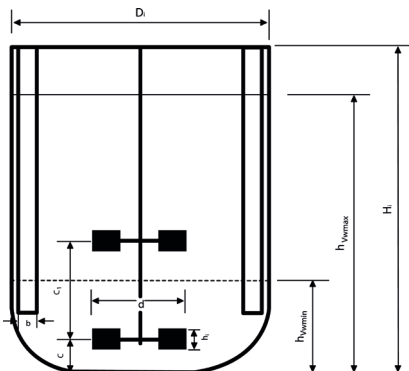
Unlike single-use bag-type bioreactors, BioBLU vessels are constructed from rigid materials, eliminating risks associated with folding stress and potential leaks. Agitation within BioBLU reactors is achieved using low shear impellers driven by magnetic coupling, ensuring a homogeneous environment and uniform cell suspension essential for consistent product yield.

## How BioBLU® Single-Use Bioreactors benefit you:

- > Scalability: Working volume range 65 mL to 40 L
- > Risk mitigation: Reduced contamination and cross-contamination risk
- > Productivity: Reduced turn-around times; less cleaning effort
- > Flexibility: Several bioreactor versions meet different process needs
- > Reduce capital investment by using your existing equipment

## As Good as Glass

From bioreactor geometries to process capabilities, BioBLU bioreactors make the switch to single-use easy.



A high-cell density fed-batch cultivation of *E. coli* K12 in 3 L glass bioreactor and BioBLU 3f Single-Use Bioreactor, respectively, resulted in outstanding 200 OD<sub>600</sub> and highly similar growth curves—proving the excellent comparability of the bioreactor designs.





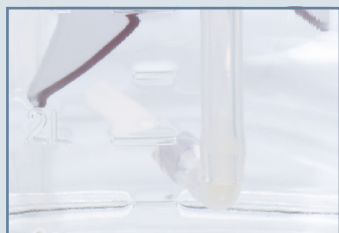
# Application Driven

Designed for the cultivation efficiency



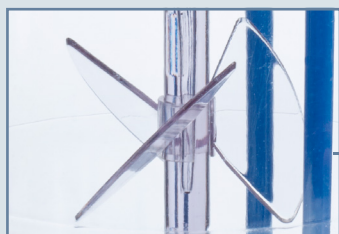
## Weldable and easy-to-connect tubing

In-field flexibility and ease-of-use



## Flexible gassing

Overlay and submerged gassing; options for open pipe-, micro- or macro-sparger to best suit your application



## Industry standard design

Standard impeller size and bioreactor dimensions for efficient mixing and mass transfer, and scalable results



## Effective exhaust treatment

Liquid-free exhaust condensation (Peltier) or electric heater band.\*



## Industrial head plate

Integration of standard sensors, liquid addition and sampling ports. Enclosed magnetic drive reduces contamination risk.

## Head plate adaptors

Single-use septa, tri-ports, and compression fitting adaptors facilitate the flexible use of Pg 13.5 ports



## Non-invasive sensors

Non-invasive standard DO and optical pH sensor ports remove sensor failure concerns



# Scalability

Scale-up your bioprocess >400-fold

BioBLU Single-Use Bioreactors are available in different sizes and facilitate bioprocessing in working volumes from 65 mL to 40 L. The differently sized bioreactors have similar geometries. Scale-up relevant parameters, like tip-speed range, power numbers and  $k_L a$  range have been characterized to support scale-up strategy development. Bioprocess scale-up is further simplified by the *Scale Up Assist* software feature for selected bioreactor control systems from Eppendorf.

## The differently sized bioreactors have similar geometries

	BioBLU® 0.3c	BioBLU® 1c	BioBLU® 3c	BioBLU® 10c	BioBLU® 50c
<b>Working volume</b>	100 – 250 mL	320 mL – 1.25 L	1.25 – 3.75 L	3.3 – 10 L	18 – 40 L
<b>Ratio <math>H_i/D_i</math> = Bioreactor height : Bioreactor ID</b>	1.8	2.0	2.0	2.0	2.0
<b>Ratio <math>h_{V_{wmax}}/D_i</math> = Max. liquid height : Bioreactor ID</b>	1.2	1.5	1.5	1.5	1.3
<b>Number of impellers</b>	1	1 or 2	1 or 2	1	1
<b>Ratio <math>d/D_i</math> = Impeller OD : Bioreactor ID</b>	0.5	0.5	0.5	0.5	0.5

ID = inner diameter, OD = outer diameter



## Cell Culture Scale-Up Using Stirred-Tank Single-Use Bioreactors

In this article we discuss, how we characterized the BioBLU c Single-Use Bioreactor portfolio to streamline cell culture scale-up and demonstrate, how we scaled-up the working volume of a cell culture process for mAB production. Find out more!

[www.eppendorf.group/cell-culture-scale-up](http://www.eppendorf.group/cell-culture-scale-up)



	BioBLU® 0.3f	BioBLU® 1f	BioBLU® 3f
<b>Ratio <math>H_i/D_i</math> = Bioreactor height : Bioreactor ID</b>	1.8	2.0	2.0
<b>Ratio <math>h_{V_{wmax}}/D_i</math> = Max. liquid height : Bioreactor ID</b>	1.2	1.5	1.5
<b>Number of impellers</b>	2	2 or 3	3
<b>Ratio <math>d/D_i</math> = Impeller OD : Bioreactor ID</b>	0.4	0.4	0.4

ID = inner diameter, OD = outer diameter



# Flexibility

Meet the needs of different cell types and applications

Different cell types have different needs. Several BioBLU Single-Use Bioreactor versions were designed to meet the special needs of suspension cells, anchorage-dependent cells, and stem cells.



## BioBLU® c Single-Use Bioreactors

For the scalable cultivation of cells in suspension, on microcarriers or as cell aggregates.

- > Working volume range:
  - BioBLU 0.3c: 100 mL – 250 mL
  - BioBLU 1c: 320 mL – 1.25 L
  - BioBLU 3c: 1.25 L – 3.75 L
  - BioBLU 10c: 3.3 L – 10 L
  - BioBLU 50c: 18 L – 40 L
- > Successfully used for the cultivation of different cell types, including CHO, HEK293, Sf9, CD4<sup>+</sup> T cells, mesenchymal stem cell, and induced pluripotent stem cells



## BioBLU® 5p Single-Use Bioreactor

For the cultivation of adherent cells and for perfusion processes.

- > Pre-loaded with Fibra-Cel® Disks, a solid growth support matrix
- > It utilizes the proprietary Eppendorf packed-bed impeller design, providing a low-shear environment
- > Eliminates the need for cell filtration to separate cells from secreted end products
- > Working volume: 3.75 L



## BioBLU® 0.3sc Single-Use Bioreactor

Optimized to suit the special needs of stem cells.

- > An 8-blade impeller ensures reduced cell settling and very good mixing already at low agitation speeds to reduce the stress for your stem cells
- > Optimized to support cell aggregate formation
- > Working volume: 100 mL – 250 mL

Learn more about cell culture in bioreactors!



[www.eppendorf.group/bioprocess-cells](http://www.eppendorf.group/bioprocess-cells)

Get to know more about Fibra-Cel Disks!



[www.eppendorf.group/fibra-cel-disks](http://www.eppendorf.group/fibra-cel-disks)

Learn more about our bioprocessing solutions for cell and gene therapy development!



[www.eppendorf.group/bioprocess-cgt](http://www.eppendorf.group/bioprocess-cgt)



# Flexibility

Meet the needs of different cell types and applications

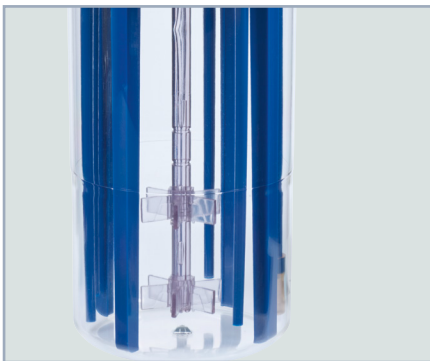
Compared to cell culture applications, fermentation processes have much higher mass transfer and heat removal requirements. The Eppendorf BioBLU f Single-Use Bioreactors fully address the specific needs of fermentation.



## BioBLU® f Single-Use Bioreactors

Powerful overhead drives featuring Rushton-type impellers, and smart solutions for cooling for high cell density cultivations.

- > High-performance mass and heat transfer suitable for high-cell density fermentation
- > Water-cooled or liquid-free (Peltier) exhaust condensation available
- > Sealed magnetic overhead drives with Rushton-type impellers for excellent mixing
- > Working volume range:
  - BioBLU 0.3f: 65 mL – 250 mL
  - BioBLU 1f: 250 mL – 1.25 L
  - BioBLU 3f: 1.25 L – 3.75 L



## Premium solutions for microbiology

- > Interior baffles aid mixing and mass transfer. The baffles of the BioBLU 1f additionally provide efficient heat removal through active cooling.
- > Sealed magnetic overhead drives with Rushton-type impellers for excellent mixing

	BioBLU® 0.3f	BioBLU® 1f	BioBLU® 3f
Stirring	up to 2,000 rpm	up to 1,500 rpm	up to 1,200 rpm
Heat transfer	> 50 W/L	> 50 W/L	> 50 W/L
Gassing	up to 2 vvm	up to 2 vvm	up to 1.5 vvm

## Find application examples for microbial fermentation in BioBLU f Single-Use Bioreactors



### E. coli fermentation



### Pichia pastoris fermentation



### Anaerobic Clostridium fermentation





# Risk Mitigation

Reduce the the risk of process failure

BioBLU Single-Use Bioreactors reduce the risk of failure during setup and during the runtime of the process. Like this they help you protecting your precious cells and products and reduce the risk for time-consuming and costly batch failures.

## Reduced risk for process failure

- > Non-invasive sensor options for temperature, dissolved oxygen, and pH reduce the contamination risk and offer the possibility for sensor replacement during the run
- > Sealed magnetic bearings further reduce the contamination risk
- > Single-use nature eliminates the cross-contamination risk
- > Bioreactors are individually pressure-tested to ensure bioreactor integrity.
- > Simplify installation with rigid-wall design, no risk for damages due to folding of bioreactor bags

## Polymer expertise by Eppendorf

Decades of experience in the field of sophisticated polymer products was key to the development of BioBLU Single-Use Bioreactors.

- > Bioreactor body and head plate comprised of single layer injection molded plastic not containing softeners
- > The use of virgin raw materials eliminates risks from the use of recycled materials
- > Eppendorf sources all raw material directly



Are you working in regulated environments and looking for qualification and validation supporting documentation?

Contact your local sales representative and ask for our BioBLU HNQ variants.

Read our biocompatibility study on CHO cell culture in X-ray irradiated BioBLU Single-Use Bioreactors according to the DECHEMA Recommendation for Leachables Studies.





# Accessories

Reduce capital investment by using your existing equipment

## Available 2025: New Cell Retention Diptube



The cell retention diptube uses a 30  $\mu\text{m}$  or 100  $\mu\text{m}$  precision woven monofilament fabric, build by a supplier with more than 150 years of experience in technical fabrics. The current design is suitable for BioBLU 1c, BioBLU 3c, BioBLU 10c and BioBLU 50c as well as all glass / stainless steel bioreactors with a Pg 13.5 port.

- > Pre-sterilized (beta-irradiated) and ready to use (30 $\mu\text{m}$  or 100 $\mu\text{m}$  mesh)
- > Double bag packaging similar to BioBLU Single-Use Bioreactors
- > Connection through tube welding

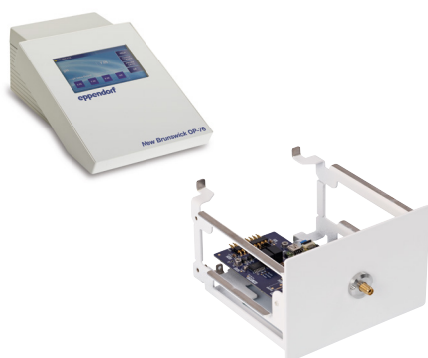
## Simple conversion to single-use



### Reduce capital investment by using your existing equipment

- > BioBLU Single-Use Bioreactor Adaptor Kits and Single-Use Bioreactor Bundles enable your existing Eppendorf small or bench-scale bioreactor system for single-use operation without the expense of replacing the whole system.
- > The kits facilitate the conversion of your bioreactor system from reusable to single-use bioreactors.

## Non-invasive, sterile pH measurements: Optical pH sensor modules



Use the optical pH sensors of the BioBLU Single-Use Bioreactors Monitor and control the pH signal of your BioBLU Single-Use Bioreactor using your existing bioreactor controller. For all our systems, we provide an optical pH solution designed to work with our BioBLU Single-Use Bioreactors, eliminating autoclaving autoclaving and under-the-hood insertion of pH sensors to further reduce setup time and costs.

## BioBLU c Single-Use Bioreactors

Technical data <sup>1</sup>						
	BioBLU® 0.3c BioBLU® 0.3sc	BioBLU® 1c	BioBLU® 3c	BioBLU® 10c	BioBLU® 50c	BioBLU® 5p
Working volume (total)	100 – 250 mL (380 mL)	320 mL – 1.25 L (1.8 L)	1.25 – 3.75 L (5 L)	3.3 – 10 L (13.3 L)	18 – 40 L (50 L)	3.75 L (5 L)
Material	Bioreactor: PS, PC, tubing: silicone, C-Flex;					
Sterilization	Irradiated by > 25 kGy (X-ray). SAL-level 10 <sup>-6</sup>					
Head plate ports						
Pg 13.5	2x	3x	4x	4x	1x	1x
Liquid addition	1x submerged, 1x overlay	2x submerged, 2x overlay	1x submerged, 3x overlay	1x submerged, 3x overlay	3x overlay	3x overlay
DO sensor port	1x (permeable gas membrane)	1x (permeable gas membrane)	1x (permeable gas membrane) <sup>2</sup>	1x (permeable gas membrane) <sup>2</sup>	1x (permeable gas membrane)	1x (permeable gas membrane)
Optical pH sensor port	■ <sup>2</sup>	■ <sup>2</sup>	■ <sup>2</sup>	■ <sup>2</sup>	■	■
Gas sparge	■	■	■	■	■	■
Gas overlay	■	■	■	■	■	■
Exhaust	■	■	■	■	■	■
Harvest tube	■	■	■	■	■	■
Thermowell	■	■	■	■	■	■
Drive	Magnetic overhead drive					
Fibra-Cel® disks	–	–	–	–	–	150 g
Recommended agitation speed	20 – 500 rpm (BioBLU 0.3c) 20 – 200 rpm (BioBLU 0.3sc)	30 – 600 rpm	25 – 200 rpm	25 – 200 rpm	25 – 150 rpm	25 – 200 rpm
Exhaust treatment <sup>3</sup>	Liquid-free (Peltier)	Liquid-free (Peltier) or water-cooled	Electric heater band or Peltier	Electric heater band	Electric heater band	Electric heater band or Peltier

Ordering information						
Description	Working volume	Sparger	Impeller	pH	Quantity	Order no. (X-ray irradiated)
BioBLU® 0.3c	100 – 250 mL	Open pipe	1x pitched blade	Standard	4-pack	1386101000
BioBLU® 0.3c	100 – 250 mL	Open pipe	1x pitched blade	Optical	4-pack	1386101500
BioBLU® 0.3sc	100 – 250 mL	Open pipe	1x 8-blade	Optical	4-pack	1386102000
BioBLU® 1c	320 mL – 1.25 L	Open pipe	1x pitched blade	Standard	4-pack	1386111000
BioBLU® 1c	320 mL – 1.25 L	Open pipe	1x pitched blade	Optical	4-pack	1386112000
BioBLU® 1c	320 mL – 1.25 L	Open pipe	2x pitched blade	Standard	4-pack	1386111100
BioBLU® 1c	320 mL – 1.25 L	Open pipe	2x pitched blade	Optical	4-pack	1386112100
BioBLU® 3c	1.25 L – 3.75 L	Microsparger	1x pitched blade	Optical	1-pack	1386124000
BioBLU® 3c	1.25 L – 3.75 L	Macrosparger	1x pitched blade	Optical	1-pack	1386125000
BioBLU® 3c	1.25 L – 3.75 L	Microsparger	2x pitched blade	Optical	1-pack	1386126000
BioBLU® 3c	1.25 L – 3.75 L	Macrosparger	2x pitched blade	Optical	1-pack	1386127000
BioBLU® 5p	3.75 L	Microsparger	Packed bed	Optical	1-pack	1386130500
BioBLU® 5p	3.75 L	Macrosparger	Packed bed	Optical	1-pack	1386131500
BioBLU® 10c	3.3 L – 10 L	Microsparger	1x pitched blade	Optical	1-pack	1386140300
BioBLU® 10c	3.3 L – 10 L	Macrosparger	1x pitched blade	Optical	1-pack	1386141300
BioBLU® 50c	18 L – 40 L	Microsparger	1x pitched blade	Optical	1-pack	1386162000
BioBLU® 50c	18 L – 40 L	Macrosparger	1x pitched blade	Optical	1-pack	1386163000

<sup>1</sup> Technical specifications are subject to change without notice. <sup>2</sup> Utilizes 1x Pg 13.5 port. <sup>3</sup> These accessory parts are separate order items.

## BioBLU f Single-Use Bioreactors

### Technical data\*

	BioBLU® 0.3f	BioBLU® 1f	BioBLU® 3f
<b>Working volume (total)</b>	65 – 250 mL (380 mL)	250 mL – 1.25 L (1.8 L)	1.25 L – 3.75 L (5 L)
<b>Material</b>	Bioreactor: polystyrene (PS), polycarbonate (PC) Tubing: silicone	Bioreactor: polystyrene (PS), polycarbonate (PC) Tubing: silicone	Bioreactor: polycarbonate (PC) Tubing: silicone
<b>Sterilization</b>	Irradiated by > 25 kGy (X-ray). SAL-level 10 <sup>-6</sup>		Autoclavable, no pre-sterilization
<b>Autoclavable</b>	No	No	Yes
<b>Max. operating temperature</b>	45 °C	45 °C	45 °C
<b>Head plate ports</b>			
Pg 13.5	2x	3x	4x
Liquid addition	1x submerged, 2x overlay	2x submerged, 3x overlay	1x submerged, 3x overlay
DO sensor port	1x (permeable gas membrane)	1x (permeable gas membrane)	1x (Pg 13.5)
Gas sparge	■	■	■
Exhaust	■	■	■
Harvest tube	■	■	■
Thermowell	■	■	■
Baffles	–	4x	4x
<b>Drive</b>	Magnetic overhead drive		
<b>Impellers</b>	2 Rushton-type impellers (6 blades)	2 or 3 Rushton-type impellers (6 blades)	3 Rushton-type impellers (6 blades)
<b>Recommended agitation speed**</b>	20 – 2,000 rpm	100 – 1,500 rpm	25 – 1,200 rpm
<b>Exhaust condensation***</b>	Liquid-free (Peltier)	Liquid-free (Peltier)/water-cooled	Water-cooled
<b>Cooling</b>	Peltier-based	Baffles with integrated cooling	Cooling finger
<b>Sensors***</b>	Dissolved Oxygen: polarographic (DASGIP DO Sensor, 162/4.7 mm) Temperature: Pt100 - RTD pH: standard 120/12 mm glass sensor	Dissolved Oxygen: polarographic (DASGIP DO Sensor, 278/4.7 mm) Temperature: Pt100 - RTD pH: standard 220/12 mm glass sensor	Dissolved Oxygen: polarographic or optical (225/12 mm) Temperature: Pt100 - RTD pH: standard 225/12 mm glass sensor

### Ordering information

Bioreactor	Impellers	Quantity	Order number (X-ray irradiated)
BioBLU® 0.3f	2 x Rushton-type	4-pack	1386101100
BioBLU® 1f	2 x Rushton-type	4-pack	1386113000
	3 x Rushton-type	4-pack	1386113100
BioBLU® 3f	3 x Rushton-type	1-pack	1386000900 (no pre-sterilization)

\* Technical specifications are subject to change without notice. \*\* Agitation speed range may be limited by capabilities of controller.

\*\*\* Specifications apply to the operation with DASbox Mini Bioreactor System, DASGIP Parallel Bioreactor Systems, SciVario twin, and BioFlo controllers, respectively. These accessory parts are separate items.

## BioBLU HNQ Solutions Suitable for Commercial Manufacturing

Ordering information						
Description	Working volume	Sparger	Impeller	pH	Quantity	Order no. (X-ray irradiated)
BioBLU® 1c HNQ	320 mL – 1.25 L	Open pipe	1x pitched blade	Optical	4-pack	1386114000
BioBLU® 3c HNQ	1.25 L – 3.75 L	Microsparger	1x pitched blade	Optical	1-pack	1386124500
BioBLU® 3c HNQ	1.25 L – 3.75 L	Macrosparger	1x pitched blade	Optical	1-pack	1386125500
BioBLU® 3c HNQ	1.25 L – 3.75 L	Microsparger	2x pitched blade	Optical	1-pack	1386126500
BioBLU® 3c HNQ	1.25 L – 3.75 L	Macrosparger	2x pitched blade	Optical	1-pack	1386127500
BioBLU® 5p HNQ	3.75 L	Microsparger	Packed bed	Optical	1-pack	1386132500
BioBLU® 5p HNQ	3.75 L	Macrosparger	Packed bed	Optical	1-pack	1386133500
BioBLU® 10c HNQ	3.3 L – 10 L	Microsparger	1x pitched blade	Optical	1-pack	1386140500
BioBLU® 10c HNQ	3.3 L – 10 L	Macrosparger	1x pitched blade	Optical	1-pack	1386141500
BioBLU® 10c HNQ	3.3 L – 10 L	Microsparger	2x pitched blade	Optical	1-pack	1386145500
BioBLU® 10c HNQ	3.3 L – 10 L	Macrosparger	2x pitched blade	Optical	1-pack	1386144500
BioBLU® 50c HNQ	18 L – 40 L	Microsparger	1x pitched blade	Optical	1-pack	1386164000
BioBLU® 50c HNQ	18 L – 40 L	Macrosparger	1x pitched blade	Optical	1-pack	1386165000

<sup>1</sup> Technical specifications are subject to change without notice. <sup>2</sup> Utilizes 1x Pg 13.5 port. <sup>3</sup> These accessory parts are separate order items.

Ordering information			
Bioreactor	Impellers	Quantity	Order number (X-ray irradiated)
BioBLU® 1f HNQ	3 x Rushton-type	4-pack	1386115000
BioBLU® 3f HNQ <sup>1</sup>	3 x Rushton-type	1-pack	1386128000

<sup>1</sup> Macrosparge

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**Your local distributor: [www.eppendorf.com/contact](http://www.eppendorf.com/contact)**  
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Warning! Not approved for applications in medical diagnostics or therapy! The single-use vessel has not been developed for applications in medical diagnostics or therapy. It is not a medical equipment within the meaning of Regulation (EU) 2017/745. Do not use the single-use vessel for medical or therapeutic applications.

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