



# Bridge to Production

BioFlo® 320 – Universal controller for cell culture and microbiology applications, building the bridge from research to manufacturing



# Bridge to Production

The BioFlo 320 is a universal bench-scale bioreactor system for both process development and clinical and commercial manufacturing. Powerful technology for precise process monitoring and control, a large working volume range, and software features that save time and reduce risks make it a reliable partner for developing robust processes and scaling them up from R&D to manufacturing. It is suitable for cell culture as well as microbial applications.

## Application Driven

- > Universal gas control strategy for both microbial and cell culture applications removes process limitations
- > Industrial design featuring stainless steel front, back, and utility panels
- > Eppendorf exclusive packed-bed and cell-lift impeller designs for continuous and perfusion processes
- > Left- and right-handed orientations with vessel nest design to maximize lab space efficiency
- > Highly configurable gas flow control - Up to 5 configurable Mass Flow Controllers (TMFC) for Overlay and Sparge that can be field upgraded
- > Validation Guide available to support controller qualification for manufacturing applications<sup>1)</sup>

## Scalability

- > Autoclavable vessels and our comprehensive portfolio of BioBLU® Single-Use Bioreactors provide process customization
- > Extensive working volume range of 400 mL – 40 L on a single control platform
- > The combination of the BioFlo 320 with the BioFlo 720 provides a perfect connection between R&D and pilot/production suites
- > High-powered direct and magnetic drive motors and up to six integrated variable speed pumps for precise stirring and addition control

## Simple and Safe Operation

- > Monitor and control the process directly at the large touch-screen or with Eppendorf SCADA software
- > Alarm functions automatically stop all running loops if needed
- > Automatic recognition of the connected digital sensors and installed TMFCs
- > Robust protection of sensitive electronic components (IP68-rated connections on utility panel and IP22-rated connection for power entry)
- > Universal connections for analog or digital Mettler Toledo® ISM® sensors reduce sensor complexity

## Open Communication

- > Industry standard Ethernet communication for multi-unit control of up to eight systems
- > Monitor and control the process directly at the large touch-screen or with Eppendorf SCADA software
- > DASware® control for enhanced efficiency, providing recipe management, scripting, and more
- > DASware control plus with 21 CFR part 11 and EudraLex Volume 4 Annex 11 compatibility
- > BioNsight® cloud provides comparison of data from different runs and different locations
- > DeltaV® is available for seamless software communication with DeltaV distributed control system

<sup>1)</sup> BioFlo 320 is not a medical device as defined by the Food and Drug Administration or other regulatory authorities.

## Small footprint... big impact

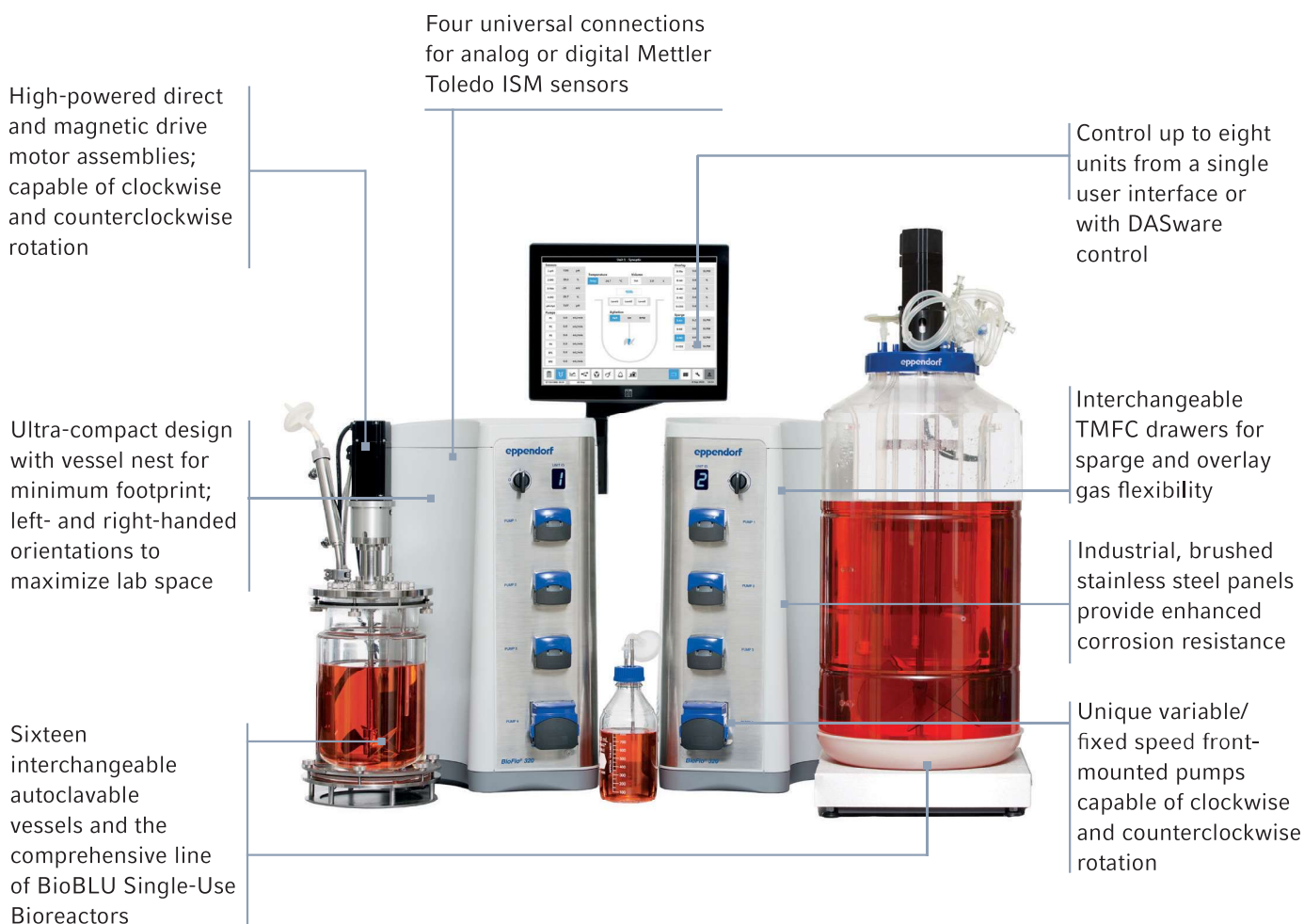
From R&D laboratories to manufacturing facilities, space is an important factor when selecting the right equipment. The BioFlo 320 offers flexibility, better control, and maximum functionality while occupying a fraction of the valuable lab space of similar systems. This means greater efficiency and productivity at a lower operating cost for your lab.



# Application Driven

Highly configurable to suit your requirements

The BioFlo 320 offers the highest level of application flexibility, made possible by features like universal connections for analog and digital sensors, up to six integrated pumps, a highly configurable gas flow control, and compatibility with a wide range of glass and single-use bioreactors. It is suitable for the cultivation of human and animal cells, including stem cells, as well as microbial fermentation. It supports batch, fed-batch, continuous, and perfusion mode.



**Single-use bioreactors:**  
0.40 L – 40 L

**Autoclavable glass bioreactors:**  
0.6 L – 10.5 L

**Intelligent sensors:**  
Connections for up to four analog or digital Mettler Toledo ISM sensors

**Process control:**  
Cell culture or microbiology



# Application Driven

Seamlessly connect R&D to manufacturing

The BioFlo 320 bioprocess control system is designed to bridge the gap between research and development and manufacturing. It is suitable for many applications, including the production of cells, secreted proteins, viral vectors, plasmids, and small molecules. By enabling seamless transfer of optimized protocols from R&D to manufacturing, the BioFlo 320 ensures consistency and scalability, helping you accelerate your path from innovation to market.

## Application flexibility

- > Suitable for the use in all labs, from academia through pilot-scale production
- > Universal control for mammalian, stem cell, insect, and microbial cultures
- > Suspension or adherent cultures
- > Micro-aerobic, anaerobic, exothermic fermentation processes
- > Batch, fed-batch, perfusion, and continuous processes
- > Scale-up and scale-down modeling
- > Specialized impellers for low-shear and zero-shear process needs
- > Used in a variety of applications, including the production of monoclonal antibodies, vaccines, viral vectors, plasmids, and stem cells

**Discover application examples of the BioFlo 320 –**  
Download our application notes:

*Glucose control using Raman spectroscopy in CHO cell culture*

[www.eppendorf.group/AN415](http://www.eppendorf.group/AN415)

*CHO cell culture scale-up for mAB production*

[www.eppendorf.group/AN436](http://www.eppendorf.group/AN436)

*HEK 293 suspension cell culture*

[www.eppendorf.group/AN447](http://www.eppendorf.group/AN447)

*Large-scale manufacturing of hiPSC-derived cardiomyocytes*

[www.eppendorf.group/AN409](http://www.eppendorf.group/AN409)

*High-density Vero cell perfusion culture*

[www.eppendorf.group/AN359](http://www.eppendorf.group/AN359)

*Pichia pastoris fermentation culture*

[www.eppendorf.group/AN438](http://www.eppendorf.group/AN438)

## Transition seamlessly from R&D to clinical and commercial manufacturing

Translate your R&D upstream bioprocess achievements into clinical and commercial manufacturing success with our integrated solutions.

In combination with BioBLU HNQ Single-Use Bioreactors, DASware control plus SCADA software, and service offerings for qualification and calibration, the BioFlo 320 provides a unified solution to support compliance with GMP requirements.

Learn more on

[www.eppendorf.group/commercial-bioprocessing](http://www.eppendorf.group/commercial-bioprocessing)





# Scalability

Scale-up from small scale to bench scale

BioFlo 320 glass bioreactors provide optimal conditions and flexibility for microbial fermentation and cell culture applications. With a scalable design, ranging from 600 mL to 10 L, they help with the transition from small-scale experiments to bench-scale operations. With specialized impellers for cell culture applications and documentation helping you with the qualification for use in manufacturing environments, they are the perfect tool advancing your R&D projects to the next level.

## BioFlo® 320 glass bioreactors



- > Working volume range of 0.6 – 10.5 L
- > Direct-drive and magnetic drive agitation options
- > Clock-wise and counter clock-wise rotation
- > Stainless steel dished bottom vessels for rapid heat transfer
- > Water-jacketed vessels for gentle temperature control
- > Industry standard headplate ports for sensors and sampling and addition tubes
- > Specialized spin filter, cell lift and packed-bed impellers for cell culture applications requiring low-shear or no-shear agitation
- > Validation Guide available to help qualify the glass bioreactors for use in manufacturing environments.

### BioFlo 320 glass bioreactors

	1 L	3 L	5 L	10 L
Total volume	2.5 L	5.0 L	7.5 L	14.0 L
Working volume	0.6 – 1.9 L	1.3 – 3.8 L	1.9 – 5.6 L	3.5 – 10.5 L
Heating/cooling	Stainless steel dish bottom or water-jacketed			
Agitation	Direct drive or magnetic drive			



### Scale Up Assist – integrated into the BioFlo software

- > Scale Up modeling software for the calculation of important process parameters
- > Calculates all parameters based on either constant P/V or constant tip speed
- > Up to 3 different vessel sizes can be selected
- > The software contains vessel specific data from the Eppendorf vessel portfolio and the Thermo Scientific HyPerforma 5:1 Single-Use Bioreactors (SUBs).



# Scalability

The perfect connection from R&D to manufacturing using BioBLU Single-Use Bioreactors

The BioFlo 320 can seamlessly operate with our BioBLU Single-Use Bioreactors in R&D as well as in manufacturing. Our BioBLU HNQ Single-Use Bioreactors come with a Validation Guide, just like the BioFlo 320 controller to help with the qualification of the systems for manufacturing applications. Combined with the BioFlo 720, this provides scale-up possibilities from 420 mL to 500 L with single-use vessels.

## BioBLU® Single-Use Bioreactors



### 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 the different process needs of microbes and human and animal cells, including stem cells
- > Reduce capital investment: by using your existing bioprocess controller

Find out more about at

[www.eppendorf.group/single-use-bioreactors](http://www.eppendorf.group/single-use-bioreactors)

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

### Find out more, how we streamlined cell culture scale-up:

- > Read about the characterization of the BioBLU c Single-Use Bioreactor portfolio
- > Discover the Scale Up Assist software feature
- > Find a case study for scale-up of mAB production in CHO cells from 3 L to 150 L

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





# Simple and Safe Operation

Monitoring and control of critical parameters

The BioFlo software ensures a consistent user experience across all BioFlo control systems and helps you simplify your process, mitigate risk, and save time. The control software gives valuable insights into your process, such as current process parameters, and the lifetime of connected digital sensors. Eight units of the BioFlo 320 bioprocess control system can be connected to each other and controlled via a single user interface. This enables parallel processing, which is highly valuable for optimizing processes efficiently and producing reproducible results.

## Simplify process control

The control software gives valuable insights into critical process parameters. Software features such as the *Auto Calibrate* and *Scale Up Assist* function simplify your process and help to save time.

### Powerful process control

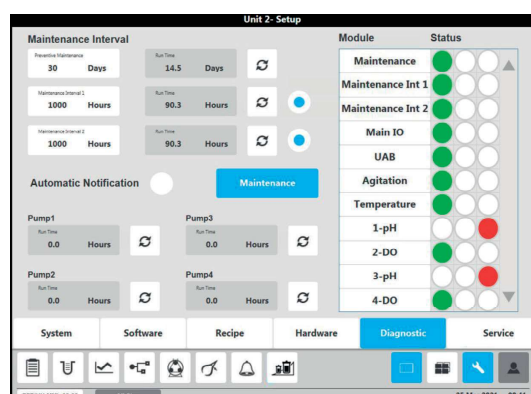
- > Control eight units from a single user interface
- > Automatic gas mixing algorithms for simplified control (4-gas, 3-gas, O<sub>2</sub> enrichment, N<sub>2</sub> enrichment)
- > Ten-point cascade feature for sophisticated control strategies
- > Built-in elapsed process timer for batch management
- > Trend display with up to twelve process values within a single view

### Auto Calibrate

- > Automated calibration for all attached DO sensors at once
- > DO sensors can be run through an automatic calibration sequence reducing touch time and ensuring consistency
- > User specifies calibration scheme, process conditions, and zero-point method (electronic or N<sub>2</sub>)
- > System completes calibration when slope stabilizes

## Mitigate risks to protect your process

Monitoring the controller and the process is key to successful process development. The BioFlo 320 software is designed to provide you with the status of both.



- > Alarm functions automatically inform about the status of the process, with automatic loop shutdown if needed
- > Receive alarm notifications via email or text message directly to your mobile device
- > The diagnostic screen provides information on the hardware status and upcoming maintenance
- > Real-time diagnostics of digital sensors anticipate sensor failure



# Open Communication

**Bioreactor systems and software solutions – Orchestrated for bioprocess control, automation, and analysis**

The BioFlo 320 fits seamlessly into our upstream bioprocess portfolio of bioreactor systems, control software, data analysis tools, and automation solutions. The products work in harmony to provide a complete upstream bioprocessing solution, enabling controlled cell cultivation, process automation for increased efficiency, and reduced manual labor. Additionally, our solutions help generating and best using valuable bioprocess data, empowering you to develop better processes faster.



## Reduce complexity

DASware® control serves as the central software solution, thereby eliminating the need to learn multiple tools.



## Integrate your devices

DASware control and the Eppendorf bioprocess control systems facilitate the full integration of lab devices such as the Bioprocess Autosampler and third-party sensors.



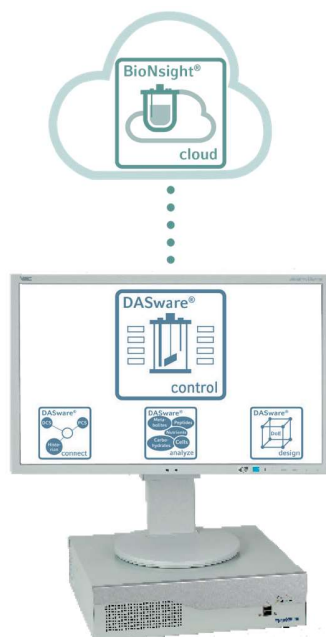
## Simplify data sharing

Easily share your bioprocess data with your team and collaboration partners enabled by DASware control and BioNightsight cloud software.



## Improve data analysis

Contextualize data across devices, runs, and sites with BioNightsight cloud software.



**Expand the BioFlo 320 functionality with the Eppendorf bioprocess software solutions**

Visit our eshop to find more information about our bioprocess software solutions:

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

**Automate 24/7 sampling with the Bioprocess Autosampler**

Find more information about connecting the BioFlo 320 with the Bioprocess Autosampler:

[www.eppendorf.group/bpautosampler](http://www.eppendorf.group/bpautosampler)



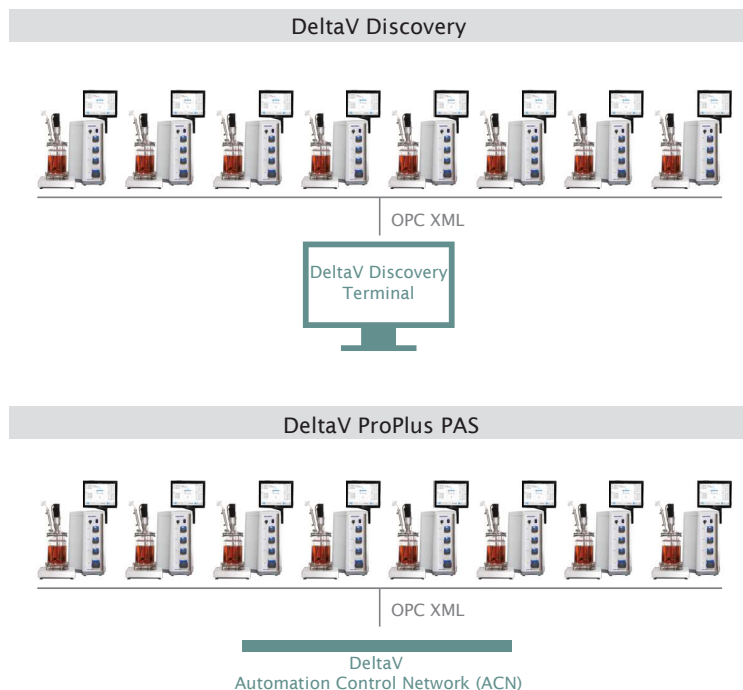
# Open Communication

BioFlo 320 and DeltaV®

Emerson® and Eppendorf have partnered to develop seamless software communication between the DeltaV distributed control system and the BioFlo 320 bioprocess control station. Our open communication protocol exposes controller information allowing it to be integrated into broader features and functions of the DeltaV platform, simplifying tech transfer, scale-up, and recipe sharing in bioprocess research and process development.

## Intelligent Control

The software allows for integration of up to eight BioFlo 320 bioprocess control stations using a OPC XML communication protocol. For ease of use, customers already familiar with the BioFlo 320 will recognize many of the design elements brought into the software application.



BioFlo 320 with DeltaV Discovery offers a stand-alone solution for R&D laboratories. BioFlo 320 with DeltaV ProPlus PAS allows integration into an existing DeltaV infrastructure.

# Technical Data

## BioFlo 320 Specifications

Control Station			
Dimensions (W x D x H)	40.6 x 40.6 x 66.0 cm (16 in x 16 x 26 in)		
Net weight	32 kg (70 lb)		
Touchscreen	38.1 cm (15 in) projected capacitive touchscreen		
Communication	2 x USB (software updates, serial communication) Ethernet (SCADA, IP Network) 3 x Analog Input/Output (defined as 4 – 20 mA or 0 – 5 V or 0 – 10 V)		
Utility	Connection	Requirement	
Electrical	IEC (with regional plug types)	100 – 120/208 – 240 VAC, 50/60 Hz, 2270 VA, Single Phase	
Water	Stainless steel quick-connect	10 psig (0.69 barg)	
Gas supply (Air, O <sub>2</sub> , N <sub>2</sub> , CO <sub>2</sub> )	Push-connect	Autoclavable	Single-use
		10 psig (0.69 barg)	6 psig (0.44 barg)
Exhaust	0.5 psig (0.035 barg)		
Operating conditions	10 – 30 °C, up to 80 % RH, non-condensing		
Agitation			
Direct drive	1 L, 3 L: 25 – 1500 rpm		
	5 L, 10 L: 25 – 1200 rpm		
Magnetic drive (autoclavable vessels)	1 L, 3 L, or 5 L: 10 – 500 rpm 10 L: 10 – 150 rpm		
Magnetic drive (single-use vessels)	BioBLU 1f: 10 – 1200 rpm; BioBLU 3f: 25 – 1200 BioBLU 1c: 10 – 500 rpm BioBLU 3c, 5c, 5p, 10c & 14c: 10 – 200 rpm BioBLU 50c: 10 – 150 rpm		
Temperature			
Water-jacketed	5 °C above coolant to 55 °C above ambient (80 °C max)		
Stainless steel dish-bottom	5 °C above coolant to 65 °C above ambient (90 °C max; 85 °C max for 10 L)		
Single-use	5 °C above ambient to 40 °C (60 °C max for BioBLU 1)		
Sensor type	PT100		
Gas supply			
Sparge	1, 3, or 4 TMFC; ring or micro-sparger		
Overlay	1 TMFC; headspace addition		
Sensors	Communication	Control range	
pH	Analog or digital Mettler Toledo ISM	2 – 12	
Optical pH	Digital (Presens)	6 – 8	
DO	Analog or digital Mettler Toledo ISM	0 – 200 %	
Optical DO	Digital Mettler Toledo ISM	0 – 200 %	
Redox	Analog or digital Mettler Toledo ISM	(-)2000 mV – (+)2000 mV	
CO <sub>2</sub>	Digital Mettler Toledo ISM	0 – 100 %	
Pumps	Pump Head	Variable Speed	Fixed Speed
Pumps 1, 2, & 3	Watson-Marlow 114DV	5 – 25 rpm	25 rpm (0 – 100 % Duty Cycle)
Pump 4	Watson-Marlow 314D	20 – 100 rpm	100 rpm (0 – 100 % Duty Cycle)
External pumps 1 & 2	Watson-Marlow 120U/DV	0.1 – 200 rpm	N/A

Specifications subject to change.

# Get in Touch

Would you like to get more information about our the BioFlo 320 or discuss your individual requirements? Get in touch, we are all ears!



Visit our eshop to find more detailed product information or inquire a product:

[www.eppendorf.group/bioflo320-system](http://www.eppendorf.group/bioflo320-system)

Or simply mail to [bioprocess-info@eppendorf.com](mailto:bioprocess-info@eppendorf.com) with any question.

## Eppendorf Bioprocess Products – application in GMP regulated environment

[Download document](#) to find out which features you can expect at minimum from Eppendorf products that are deemed suitable or compatible for GMP.

**Your local distributor:** [www.eppendorf.com/contact](http://www.eppendorf.com/contact)

Eppendorf SE · Barkhausenweg 1 · 22339 Hamburg · Germany  
[eppendorf@eppendorf.com](mailto:eppendorf@eppendorf.com) · [www.eppendorf.com](http://www.eppendorf.com)

[www.eppendorf.group/bioflo320-system](http://www.eppendorf.group/bioflo320-system)

Mettler Toledo® and ISM® are registered trademarks of Mettler Toledo AG, Switzerland. Watson-Marlow® is a registered trademark of Watson-Marlow Limited, UK. Emerson® is a registered trademark of Emerson Electric Co., USA. DeltaV® is a trademark of Emerson Electric Co., USA. Eppendorf®, the Eppendorf Brand Design, BioN Sight®, and BioBLU® are registered trademarks of Eppendorf SE, Germany. DASware® is a registered trademark of DASGIP Information and Process Technology GmbH, Germany. BioFlo® and BioCommand® are registered trademarks of Eppendorf, Inc., USA. All rights reserved, including graphics and images. Copyright © 2025 by Eppendorf SE.  
Order No.: AN00111020/GB7/PDF/0925/EBC