Hands-Free Sampling

Delegate bioprocess sampling

Gain Better Bioprocess Data with Less Effort

The Bioprocess Autosampler takes manual work off your hands

Often you need to take a sample from your culture, not only when the bioprocess is finished, but also while it is still running. Using the samples you can observe how your culture is growing, how your desired product is produced, and to what extend nutrients are consumed. Like this, you can take action, if needed and to discover interdependencies between these and more parameters. Delegating the sampling task to an autosampler facilitates sampling 24/7 in short and regular intervals and like this gaining complete datasets.

Bioprocess data is a prerequisite for process optimization
Obtaining bioprocess data is the first step towards discovering interdependencies between process parameters and using this knowledge to optimize the outcome of your process.

Measure	**Understand**	**Optimize**
> Biomass	Relationship between	> Feeding strategy
> Viability	> Metabolite concentrations and viability	> Harvest time point
> Product concentrations	> Biomass and product concentration	> and more
> Product quality parameters	> Product concentration and quality	
> and more	> and more	

The advantages of automated sampling

Short and regular sampling intervals help obtaining strong datasets
Regular measurement of process parameters, the cells' status, and the concentration and quality of the product is the basis for a comprehensive view on the process. Such information is indispensable for process optimization.

Too long sampling intervalls can lead to an optimum being overlooked

Concentration

work hours | outside work hours | work hours

functional product
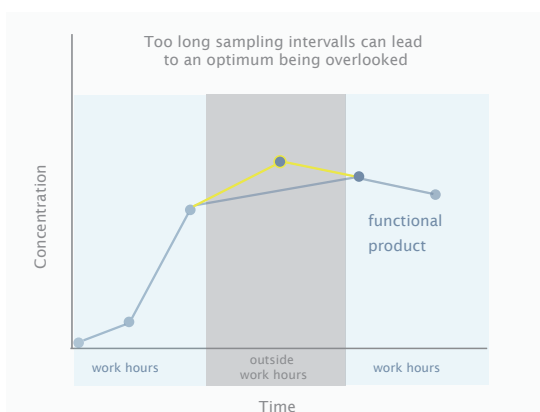
Time

Manual sampling

> Taking samples 24/7 requires working in shifts
> Sampling takes a significant amount of time
> Manual handling of many vials is error-prone

Automated sampling

> Facilitates sampling 24/7 in regular, short intervals
> Time is freed up for other tasks
> Automated sample storage reduces risk for human error

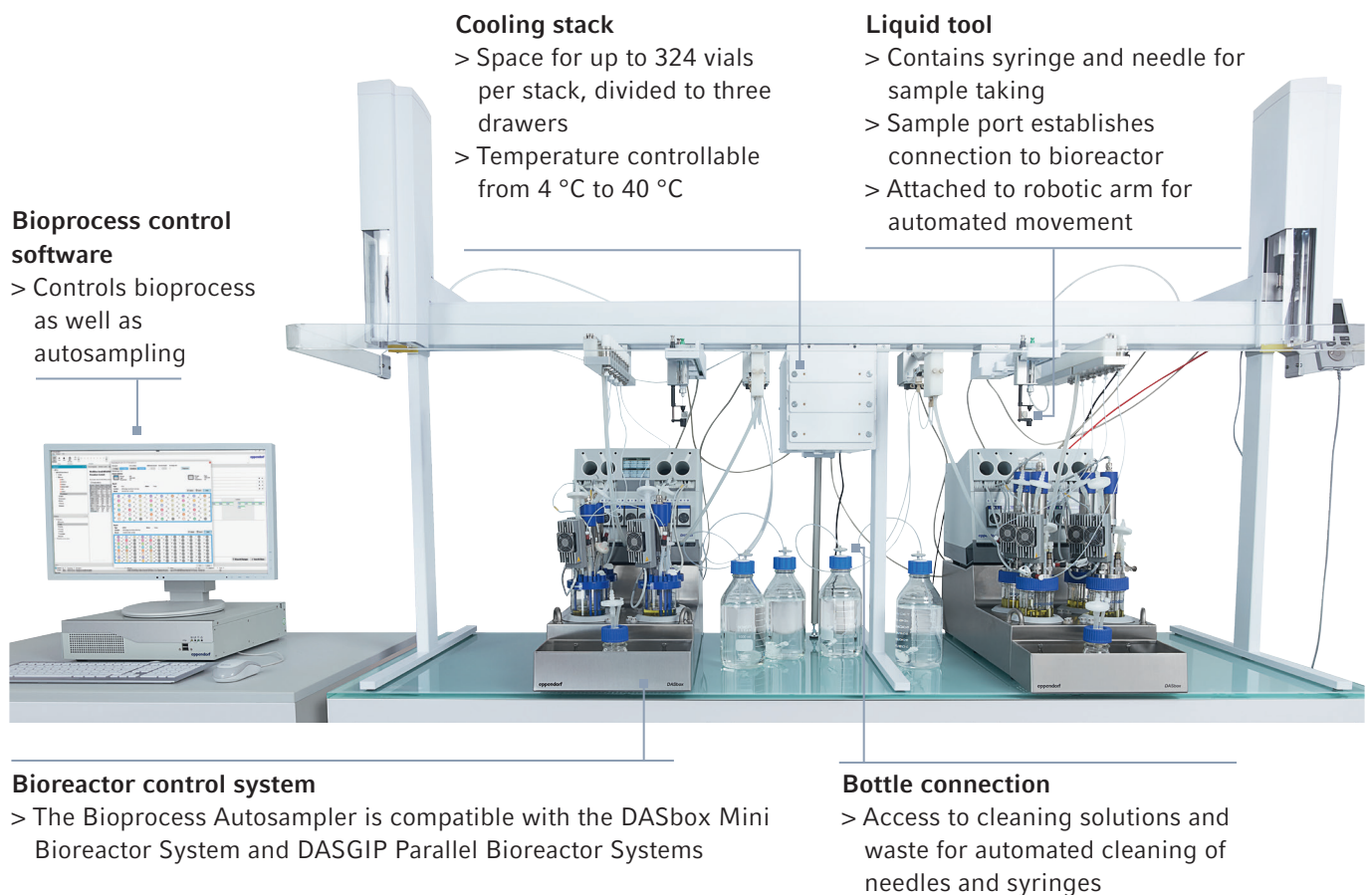# Efficiency

Automated bioprocess sampling made easy

The Bioprocess Autosampler from Eppendorf takes samples from multiple bioreactors and stores them tempered for later analysis. It is compatible with glass and single-use bioreactors operated with a DASbox® Mini Bioreactor System or a DASGIP® Parallel Bioreactor System.
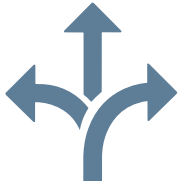
Autosampling at a glance

The Bioprocess Autosampler draws a sample from a bioreactor and transfers it to a predefined sample vial, which is stored in a tempered environment. The sampling device is automatically cleaned, so that the Bioprocess Autosampler is ready for the next sampling step.

Key features

> Enables regular, automated sampling 24/7
> Saves space, because no sterile hood is necessary for operation
> Keeps you flexible, because it is compatible with differently sized single-use and glass bioreactors

Cooling stack
> Space for up to 324 vials per stack, divided to three drawers
> Temperature controllable from 4 °C to 40 °C

Liquid tool
> Contains syringe and needle for sample taking
> Sample port establishes connection to bioreactor
> Attached to robotic arm for automated movement

Bioprocess control software
> Controls bioprocess as well as autosampling

Bioreactor control system
> The Bioprocess Autosampler is compatible with the DASbox Mini Bioreactor System and DASGIP Parallel Bioreactor Systems

Bottle connection
> Access to cleaning solutions and waste for automated cleaning of needles and syringes

Flexibility

Adapt your sampling strategy to your needs

Save space, save your culture, stay flexible: The Bioprocess Autosampler from Eppendorf was designed to minimize the contamination risk during sampling while eliminating the need for working in a laminar flow cabinet. Sample size and sampling speed are variable to suit your individual needs.

Sampling procedure
> The Bioprocess Autosampler holds one sampling port per bioreactor
> Tubing connects the sampling port with a dip tube in the bioreactor
> Sampling ports harbor a septum, which preserves the sterility of the bioreactor
> For sampling, a needle connected to a syringe is automatically inserted into the port, pinching through the septum
> The sample is transferred to a sampling vial by pinching through a septum in the vial lid

Flexible sampling

> 1.5 mL and 10 mL sample vials can be used
> Sample volumes of 1.5 mL and 5 mL can be selected
> Compatible with differently-sized glass and single-use bioreactors with working volumes of 60 mL to 1.8 L

Aseptic operation

> Aseptic operation without the use of a laminar flow cabinet
> Sanitation procedure using ethanol is similar to procedures which are usually applied when sampling manually

Space-saving and easy to install

> Modular design that facilitates expansion of the number of bioreactors to be sampled and retrofitting of existing bioprocess systems
> Space-saving design mounted on the lab bench

Efficient sampling

> Low dead volume minimizes the reduction of culture volume
> High sampling speed
> Dual arm option for even higher sampling speed

Ease-of-Use

Autosampling and bioprocess control combined in the same software package

The Bioprocess Autosampler from Eppendorf is seamlessly integrated into DASware® control bioprocess control software. Like this, there is no need to familiarize yourself with an additional software product. Sampling schemes can be adapted easily and the location of the sampling vials in the fraction cooler can be precisely defined.
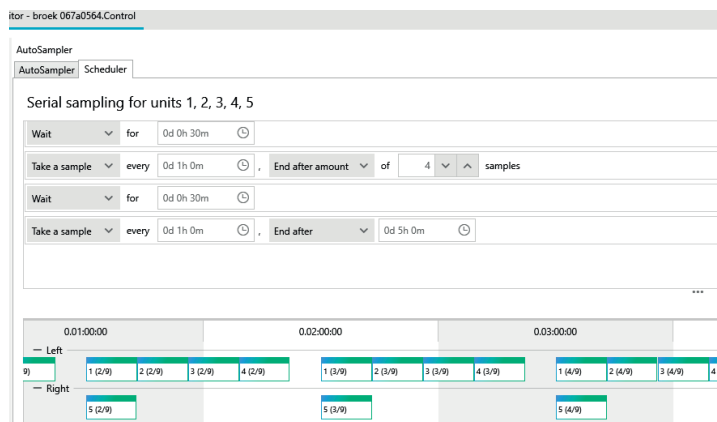
Define your sampling scheme in DASware control software
> Define sample intervals and sampling volume
> Predefine positions of vials in cooling stack
> Either serial sampling, where each sample is taken with the same syringe tool. After sampling a wash step is performed to prevent cross-contamination
> Or clustered sampling, where one syringe tool is used per bioreactor to ensure there is no cross-contamination
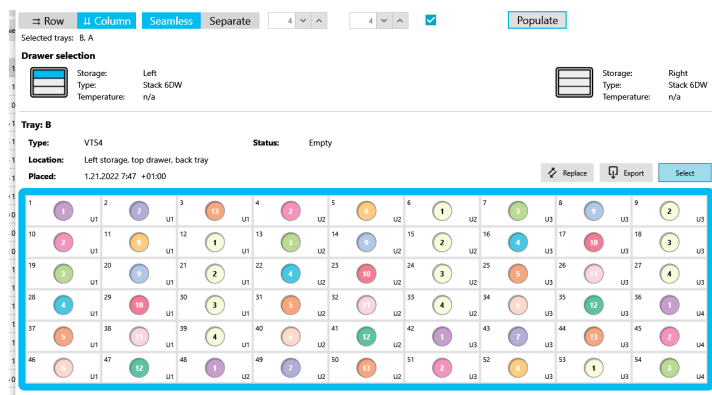
Flexibility
> Add samples to the sampling scheme during the run
> Include offline samples during the planning phase: Predefine storage location of offline samples and use process data obtained from them in addition to data from samples taken by the Bioprocess Autosampler

Example: Sampling from an *E. coli* fermentation process

> 8 bioreactors
> 8 sampling time points
> Each sample split up to 4 vials for further analysis

> 256 vials to be handled
   Pre-defining their storage location and automizing the placement of the vials reduced the risk of mixing up samples.

Learn more in our application note
www.eppendorf.group/autosampler-application

Future-Proof

Autosampling from various bioreactor types and sizes

The Bioprocess Autosampler from Eppendorf is compatible with various glass and single-use bioreactors at small and bench scale** and existing bioprocess systems can be retrofitted. Like this, the Bioprocess Autosampler adapts to changing requirements regarding working volume and bioreactor type.

Compatible bioprocess control systems
The Bioprocess Autosampler can be installed with new as well as retrofitted to existing bioreactor control systems.

DASbox® Mini Bioreactor System
> Parallel processing of up to 16 bioreactors*
> Compatible with glass and single-use bioreactors
> Working volume: 60 – 250 mL

DASGIP® Parallel Bioreactor System
> Parallel processing of up to 16 bioreactors*
> Compatible with glass and single-use bioreactors
> Working volume: 200 mL – 1.8 L

A selection of compatible bioreactors

Bioreactor	Bioprocess system	Bioreactor type	Working volume range
BioBLU® 0.3f Single-Use Bioreactor	DASbox® Mini Bioreactor System	single use	65 mL – 250 mL
DASbox® Mini Bioreactor	DASbox® Mini bioreactor System	glass	60 mL – 250 mL
BioBLU® 1f Single-Use Bioreactor	DASGIP® Parallel Bioreactor System	single use	250 mL – 1.25 L
DASGIP® Stirrer Vessel SR0700ODLS	DASGIP® Parallel Bioreactor System	glass	200 mL – 1.0 L
DASGIP® Stirrer Vessel SR1000ODLS	DASGIP® Parallel Bioreactor System	glass	400 mL – 1.5 mL
DASGIP® Stirrer Vessel SR1500ODLS	DASGIP® Parallel Bioreactor System	glass	400 mL – 1.8 mL

specifications subject to change

* Future configuration: With the first release only 8 vessels are supported
** Future configurations of the Bioprocess Autosampler system will include BioFlo® and SciVario® twin bench scale systems as well as cell culture applications

Technical Data

Bioprocess Autosampler specifications

Bioprocess Autosampler system	Single head	Dual head
Dimensions (W x D x H)	1768 x 795 x 1400 mm	2168 x 795 x 1400 mm
Net weight	45 kg (excluding bioprocess control system and PC)	65 kg (excluding bioprocess control system and PC)
Utility		
Power supply	2 power sockets	3 power sockets
Electrical	100–240 VAC, 50/60 Hz	
Bioprocess Autosampler configurations	single or dual head system	
Cooling stacks	1 or 2 cooling stacks (3 sample storage drawers per stack)	
Temperature range of cooling stacks	4–40 °C	
Available sample racks	For 1.5 mL vials (54 vials per rack, 2 racks per drawer)	
	For 10 mL vials (15 vials per rack, 2 racks per drawer)	
Sampling time (per sample)[1]	**1.5 mL samples**	**5.0 mL samples**
Serial sampling	12 min 35 s	15 min 28 s
Clustered sampling with washing step	18 min 38 s	21 min 48 s
Clustered sampling without washing step	5 min 08 s	8 min 18 s
Software	Minimal requirement: DASware® control 6.2; includes sampling planning module	

Bioreactor control systems	DASbox® Mini Bioreactor System[2]	DASGIP® Parallel Bioreactor System[3]
Parallel bioreactors (with Bioprocess autosampler)	16[4]	16[4]
Bioreactors	Glass and single-use	Glass and single-use
Working volumes	60–250 mL (glass)/65–250 mL (single-use)	200 mL–1.8 L (glass)/250 mL–1.25 L (single-use)
Agitation speed ranges	20–2,500 rpm (glass)/20–2,000 rpm (single-use)	100–600 rpm (standard)/30–1,250 rpm (optional)
Temperature control	Liquid-free heating and cooling (Peltier)	Integrated in the DASGIP Bioblock (optional: additional cooling fingers)
Standard temperature range	10–60 °C at 25 °C RT	5 K above cooling agent temperature–99 °C
Gas flow control	TMFC	TMFC/rotameter
Standard gas mixing	Air, N_2, O_2 and/or CO_2	
pH control	Acid and/or base and other set-ups	
DO control	Cascade (agitation speed, O_2 concentration, gas flow rate), and other set-ups	
Exhaust condensation	Liquid-free (Peltier)	Water-cooled or liquid-free (Peltier with DASGIP® EGC4)

Specifications subject to change.

[1] approximate values at a sample rate of 50 µL/second

[2] For more information on the DASbox® Mini Bioreactor System, visit www.eppendorf.com/dasbox

[3] For more information on the DASGIP® Parallel Bioreactor System, visit www.eppendorf.com/dasgip

[4] With the first release, eight vessels per Bioprocess Autosampler are supported

www.eppendorf.com

www.eppendorf.com/bp-autosampler