

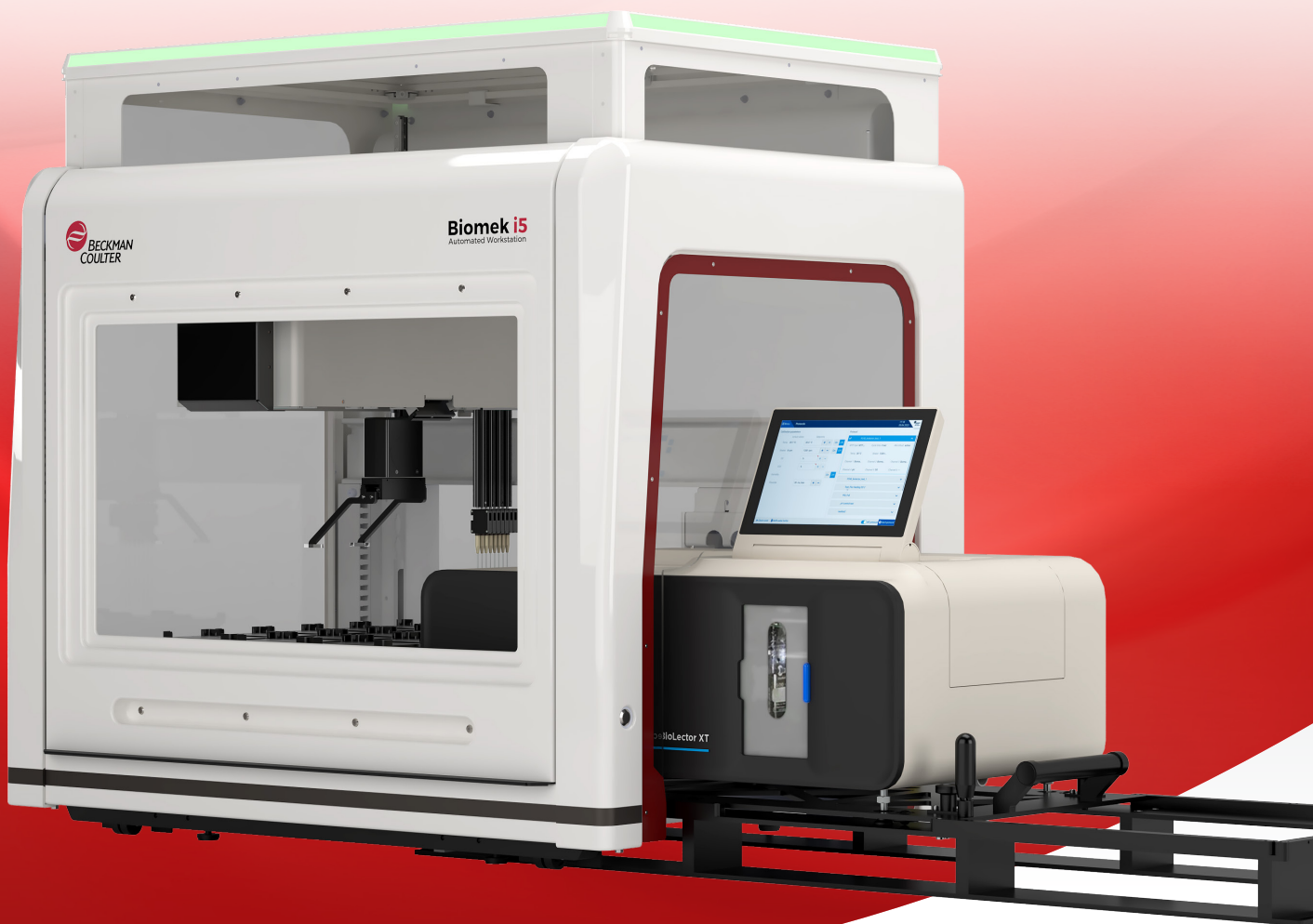


BioLector XT & Biomek i5 INTEGRATION

GET MO₂RE DATA. NOW.

With or without O₂

Automated high-throughput bioprocessing for
increased process understanding and walk-away time



ACCELERATING
answers

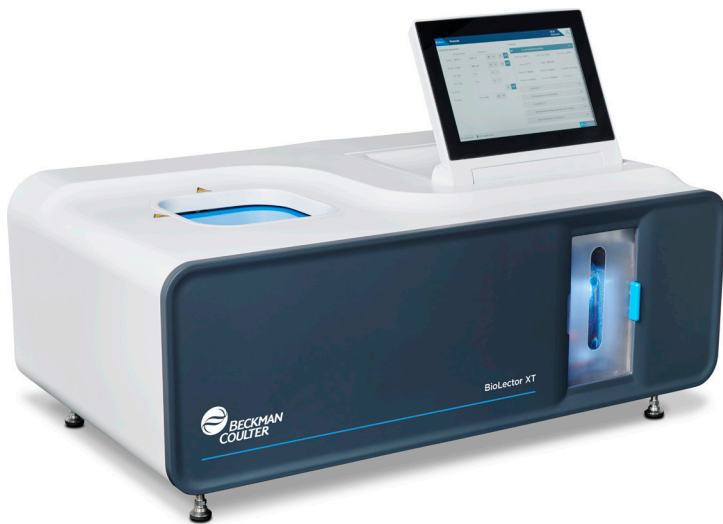


48 / 32 PARALLEL MICROBIOREACTORS
ONLINE MONITORING
CONTINUOUS & FULLY FLEXIBLE FEEDING
ACTIVE pH CONTROL
INDIVIDUALLY TRIGGERED SAMPLING,
INDUCTION & INOCULATION
SCALABILITY, REPRODUCIBILITY
& AUTOMATION

Unlock further potential of the system and integrate the BioLector XT high-throughput microbioreactor in a Biomek i5 liquid handler.

Not only measure biomass, pH value, dissolved oxygen and fluorescence real-time during the cultivation of various microorganisms - but also use these signals as well-specific triggers for liquid handling actions. Increase the walk-away time and let the system automatically draw samples, add media and inducer solutions or seed cultivation wells with inocula from the QInstruments BioShake plate position, which can be used as an on-deck pre-culture module.

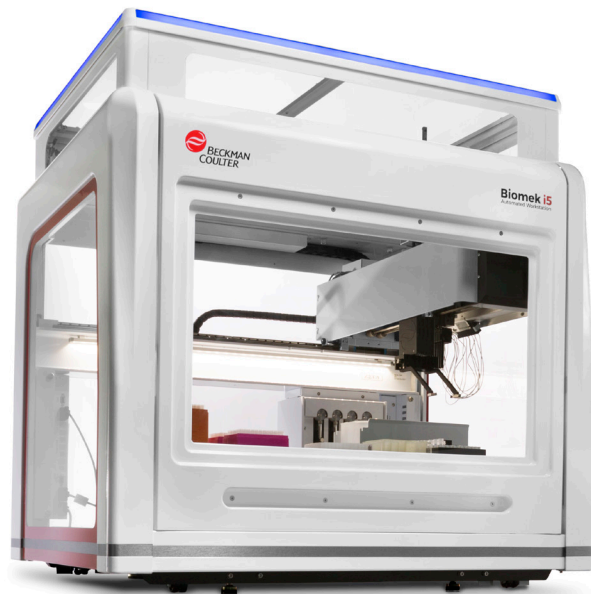
The Automated Solution for Your Microbial Cultivation



This unique automated screening platform integrates the high-throughput cultivation and online monitoring capability of the BioLector XT microbioreactor with the precise liquid handling of a robotic system. Automated cultivations with the integrated BioLector XT microbioreactor and Biomek i5 liquid handler allow highly elaborate experimental design.

The platform autonomously prepares media compositions and performs online cultivation monitoring for each individual well. This facilitates timely addition of inducers, feed solutions or pH adjusting agents to maintain favorable cultivation conditions. Automated sampling into various targets, including temperature controlled plate positions, ensures optimal process monitoring and control.

Sampling is executed without the need to stop the shaking of the microtiter plate and thus the culture broth, which facilitates continuous and sufficient gas transfer and mixing.



DISCOVER THE ADDITIONAL CAPABILITIES OF AN AUTOMATED BIOLECTOR XT MICROBIOREACTOR

- Automated sampling / harvesting
- Automated inoculation of cultivation wells
- Automated induction
- Bolus feeding / repeated fed-batch
- Induction profiling
- Microbial growth synchronization
- Feed profiling
- Media preparation
- Automated upstream processing with microbial cultures

Innovative new gassing lid

- Cone lid guides pipetting tips
- Self-sealing, pre-cut slits in the single-use microtiter plate silicone cover foil ensure maintenance of sterility
- Gassing with O₂ within a range of 1% to 100%
- Gassing with CO₂ within a range of 0% to 12%
- Reduces gas consumption to a few mL/minute
- Optional humidification of gases reduces evaporation



BioLector XT microbioreactor gassing lid for integration in a liquid handler

MO₂RE flexibility for more applications

- Feeding strategy development
- Feeding rate optimization
- Media screening and optimization
- Cultivation parameter optimization
- pH profiling
- High-oxygen (up to 100%) and high-carbon dioxide (up to 12%) cultivations
- Cell line and strain screening
- Synthetic and systems biology
- Statistical design of experiments (DOE)
- Growth characterization
- High-throughput protein expression
- Enzyme and cell activity tests
- Functional genomics
- Proteomic studies
- Inhibition and toxicity tests
- Quality control

FULL CONTROL OVER YOUR CULTIVATIONS FOR COMPLETE PROCESS UNDERSTANDING



Process Design Software

Cultivation modes

- Dissolved oxygen or time controlled feeding
- Fed-batch with bolus feeding
- Repeated fed-batch
- Biomass dependent sampling or dosing
- Time dependent sampling or dosing
- pH adjustments

Online trigger signals

- Biomass concentration
- pH value
- Dissolved oxygen
- Fluorescent molecules (GFP, YFP, DsRed ...)
- NAD(P)H and riboflavins
- Process or induction time
- Working volume

Advantages

- Automated upstream processing of up to 48 parallel cultivations
- Continuous operation 24/7
- Detailed process understanding in short time
- Excellent pipetting accuracy ($\pm 5\%$)
- Reliable scale-up to lab fermenters
- Fast and easy data analysis
- A valuable tool for PAT and QbD

BIOMEK i5 LIQUID HANDLER



Simplicity so you can focus more on science

- 1 Bright, multiple color- and pattern-coded status light bar alerts you to the instrument's current mode, even from across the room.
- 2 Light Curtain provides key safety feature during operation and method development.
- 3 Internal LED light illuminates the instrument deck for easy access and monitoring of your workspace status.

Efficiency to help deliver higher productivity

- 4 Rotating gripper with unique offset finger design optimizes access to high-density decks, enabling more efficient workflows.
- 5 Linear motion control increases positional accuracy for pipetting access to high-density labware.



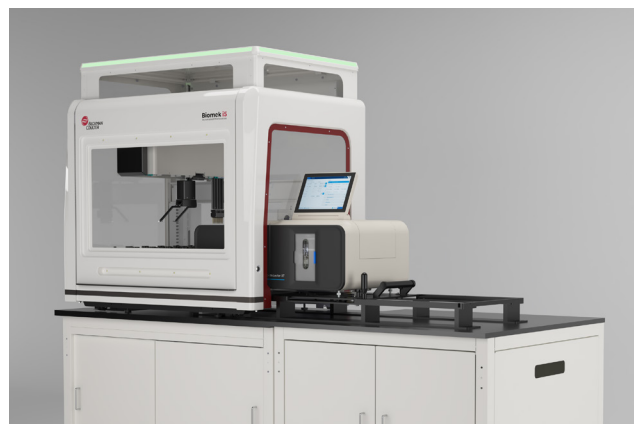
Exemplary deck layout

Adaptability to extend scale and reach

- 6 Grid-based deck with simple accessory installation enables quick workflow changes.
- 7 Spacious, open-platform design enables access from all sides to enable integration of adjacent-to-deck and off-deck processing elements (e.g., analytical devices, external storage/incubation units, and labware feeders).

Trusted reliability and support to reduce downtime

- 8 Safeguard sample and reagent integrity from air particulates with enclosed versions of the Biomek i-Series Automated Workstations.
- 9 Vertical sliding door on enclosure provides front access without aisle obstruction.
- 10 Onboard cameras enable live broadcast and on-error video capture to expedite response time and system diagnosis.
- 11 Microbioreactor-integrated liquid handler comes with Span-8 pipetting (fixed tips) with independent probe calibration for (single) volume transfers from 5 to 500 μL , with multiple liquid transfers possible.



Automated BioLector XT microbioreactor

TECHNICAL SPECIFICATIONS

Integrated System Part no.: D00493

System components		Operating conditions BioLector XT microbioreactor		Optical measurements	
BioLector XT microbioreactor	1	Plate format	48 or 32 reactor/16 reservoir wells	Filter configuration	up to 6 different filters
Biomek i5 Span-8 with enclosure	1	Volume (cultivation well)	800 - 2400 µL (depending on microtiter plate type)	Preinstalled filters	Biomass, Riboflavin, pH and DO
Hardware integration package for BioLector XT & Biomek	1	Cultivation temperature, min	8 °C below ambient temperature	Wavelengths	365 nm - 800 nm
Software integration package for BioLector XT & Biomek	1	Cultivation temperature, max	50 °C	MTP read time	-1.8 min/parameter/32 wells -2.7 min/parameter/48 wells depending on parameter measured and shaking frequency
Gassing lid for automated batch cultivation	1	pH control	Measurement range (see below)	Scattered light measurement ¹	Resolution > 50 NTU, at densities higher than 500 NTU: 10% of measured value
Robotic cone lid	1	Shaking conditions	3 mm shaker	Examples: <i>E. coli</i> in FlowerPlate MTP	(M2P-MTP-48-xxxx), 1-250 OD ₆₀₀ ⁻² , (37 °C, 1000 µL, 800 rpm)
Fixed tip piercing probe, teflon coated	8	Shaking frequencies	100 rpm - 1500 rpm	<i>E. coli</i> in Microfluidic MTP	(M2P-MTP-MF32C-xxxx), 2-250 OD ₆₀₀ ⁻² , (37 °C, 1000 µL, 800 rpm)
360° gripper	1	Specifications Biomek i5 liquid handler			
Biomek i5 large volume tubing kit	1	Robotic arms	1	Ranges, measurement and pH control	
Active wash station for Span-8 pipette tips	2	Pipetting channels	8 + 360° gripper	Calibration	Precalibrated plates
ALP, 1x1 static	13	Type of tips	Fixed tips (Fixed100)	Measurement range pH	-5.0 - 7.5 or -4 - 6 (low pH module) with < 0.1 deviation Ranges are broader with less accuracy
Device controller input output box	1	Pipetting volume	5 - 500 µL (for single transfers), multiple liquid transfers possible	Measurement range DO	0 - 100% oxygen saturation ³
ColdPlate Heater Cooler, temperature controlled plate position	1	Pipetting accuracy	± 5%	pH control	By acid or/and alkali
Integration kit for ColdPlate on i-Series deck	1	Pipetting precision	≤ 10%	Application mode	Disposable technology
Installation kit for Biomek i-Series	1	Liquid level detection	Through capacity in conductive liquids		
		Max. deck positions (ALPs)	12		
		Technical data			
		Dimensions (W×H×D)	206 cm x 112 cm x 81 cm ⁴ 206 cm x 147 cm x 81 cm (with door open)		
		Weight	240 kg (BioLector XT & Biomek i5, enclosed & rail system) Approx. 44 kg add. valve control unit (VCU)		
		Max. power consumption	BioLector XT microbioreactor: < 360 W Valve control unit: < 80 W Biomek i5: < 500 W		
		Interface	Ethernet		
		Ambient conditions	15 - 25 °C, max. < 80% rH (non-condensing)		
		Automation	BioLector XT microbioreactor can also be integrated in a Biomek i7 liquid handler; integration of the Light Array Module (LAM) with Biomek i-Series liquid handlers is not possible		

- ¹ Scattered light detection depends on shaking frequency, filling volume of cavity, microtiter plate type, particle size and particle shape of microorganism and media components.
- ² Determined in triplicates; resolution is given when the span between the arithmetic averages of the values is larger than three times the larger standard deviation.
- ³ 100% corresponding to the DO level reached while gassing with 100% O₂ without O₂ consumption.
- ⁴ Minimum requirements for custom table (W x D): 210 cm x 85 cm, 300 kg load

Optional Microbioreactor Modules

Part no.	Description	Application	Additional feature	Note
M2P-E-MFXT	Microfluidic module	Feeding and pH control	Active pH control according to online signals & continuous feeding of up to 2 solutions	Proprietary MTP with microvalves & microfluidic channels required
M2P-E-O2XT-100	O ₂ up-regulation module	Cultivation with O ₂ enriched air	Control of gas atmosphere: 21 - 100% O ₂	
M2P-E-O2XT-25	O ₂ down-regulation module	Cultivation with O ₂ reduced air, microaerophilic conditions	Control of gas atmosphere: 1 - 21% O ₂	Use only with N ₂ or N ₂ mixed with up to 12% CO ₂
M2P-E-CO2XT-12	CO ₂ up-regulation module	Cultivation with CO ₂ controlled gas atmosphere	Control of gas atmosphere: 0 - 12% CO ₂	
M2P-E-OP-501-599	LED/Filter module	Measurement of additional fluorescences in BioLector XT microbioreactor	Measurement at additional wavelengths	Custom made filter modules available
M2P-E-OP-524	Low pH filter module	Cultivation of yeast, <i>Lactobacillus</i> spp., fungi & more	Low pH measurement, range 4 - 6 pH	Upgradable on-site
M2P-E-OP-9xx	Laptop for BioLector device	Laptop for data analysis	Data analysis and visualization on separate computer	

Optional Liquid Handler Modules

Part no.	Description	Application
C07609	HEPA kit for Biomek i5	Filtered air circulation
C66351	ColdPlate Heater Cooler	Module for heating/cooling samples on the deck (-20 °C - 100 °C)
C67966	Integration kit for ColdPlate on i-Series deck	Required for above
C82687	QInstruments BioShake D30 plate position	Pre-culture module for storing pre-culture on deck
C02612	Mobile Workstation for the Biomek i5 liquid handler (1.22m x 0.82m)	
C02617	Table for Biomek i-Series (1m x 1m)	

FOR RESEARCH USE ONLY. Not for use in diagnostic procedures.

Note: Biomek pipetting performance capabilities represent pipetting performance that can be achieved from an optimally configured Biomek i-Series® Automated Workstation. Stated performance values were established using aqueous media, measured spectrophotometrically, and using Biomek Software. Actual results can be optimized through the flexibility of Biomek Software, which allows default settings controlling pipetting performance to be modified for labware, tips, liquid types, and pipetting techniques and templates specific to the physical properties of the sample and reagent types being pipetted.

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2023-GBL-EN-101205-v1