# RoboLector®
## Automated Fermentation

# High-Throughput
# Real-Time Monitoring
# Scalability
# Individually triggered sampling and induction

# The Robotic Solution for your Fermentation
# RoboLector®

**The RoboLector® is a proprietary combination of a liquid handling robot with a BioLector®.**
This unique automated fermentation platform integrates the high-throughput fermentation and online
monitoring capability of the BioLector® with the precise liquid handling of a robotic system. Automated
fermentations with the RoboLector® allow highly elaborate experimental design. The platform
autonomously prepares media compositions, e. g. from pre-programmed design of experiment (DoE)
templates. Online fermentation monitoring for each individual well facilitates timely addition of
inducers, feed solutions and pH value adjustment to maintain favorable fermentation conditions.
Automated sampling into various targets, including a cooling station, ensures optimal process
monitoring and control. Sampling is processed without disturbing the shaking of the culture broth
by the BioLector®, which prevents temporary states of insufficient gas transfer.

## Applications

- Automated sampling
- Automated induction
- Induction profiling
- Synchronized process manipulation
- pH profiling
- Feeding profiling
- Media preparation
- Process characterization
- High-throughput protein expression
- Automated upstream processing
  with microbial cultures

## Measurements

### Triggered controlled sampling
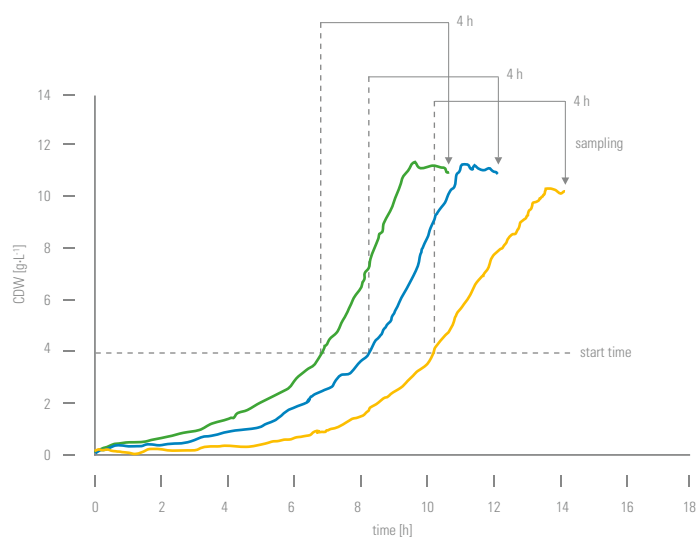


*C. glutamicum* ATCC 13032 pXMJ 19: SP-Cutinase T=30 °C, n=1200 rpm, $d_0$=3mm, $V_f$=1 mL
media: CG XII, 0.5 mM IPTG

Source: Rohe et al. Microbial Cell Factories 2012, 11:144

# Full Process Understanding





## Features

## Operating Principle

### Fermentation Modes

- DO or time controlled feeding
- Fed-batch with bolus feeding
- Repeated fed-batch

- Biomass dependent sampling or dosing
- Time dependent sampling or dosing
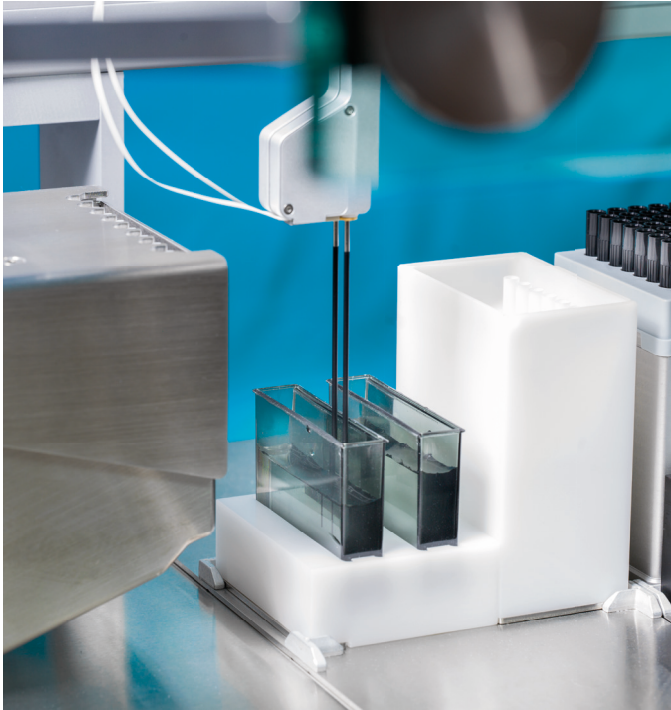- pH adjustments

### Online Trigger Signals

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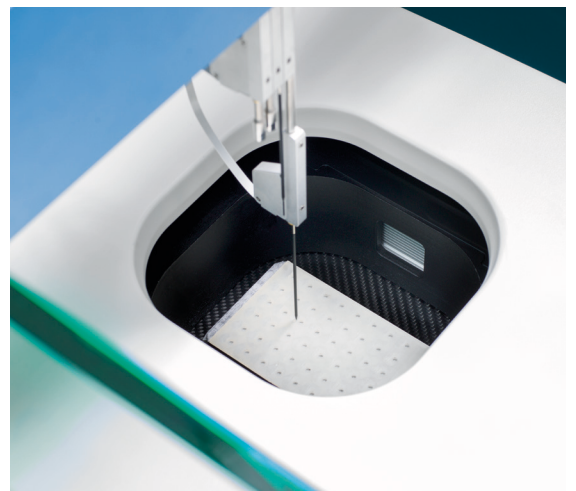


Access of pipetting tips to the shaking microtiter plate in the BioLector®

# Precision in Fermentations
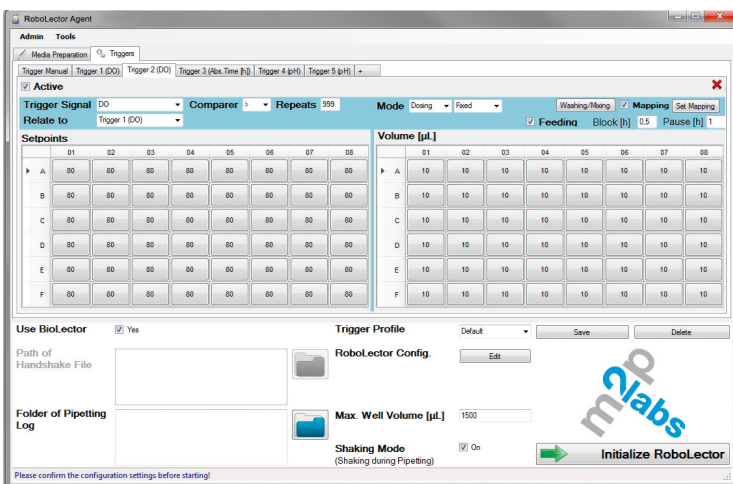




**RoboLector®** | m2p-labs

## Process Design Software



RoboLector® Agent Software for Fermentation Process Design

## Advantages

- Automated upstream processing of up to 48 parallel fermentations
- Continuous operation 24 hours/day and 7 days/week
- Plug & Play disposable technology
- Design of experiments (DoE)
- Detailed process understanding in short time
- Excellent pipetting accuracy (< 5 %, 50-950 µl) and reproducibility (CV < 5 %, 50-950 µl)
- Reliable scale up to lab-fermenters
- Fast and easy data analysis
- A valuable tool for PAT and QbD
- Processing units possible (for custom made solutions[1])

# Technical Specifications
## RoboLector®

| | RoboLector® L | RoboLector® XL |
|---|---|---|
| | Art.-No. G-RL-200/400 | Art.-No. G-RL-800 |
| | BioLector® integrated | BioLector® integrated |
| **Operation Conditions BioLector®** | | |
| Plate format | 48 | 48 |
| Working volume | 800 – 2400 µL | 800 – 2400 µL |
| Temperature, minimum | 5 °C below RT (room temperature) | 5 °C below RT (room temperature) |
| Temperature, maximum | 50 °C | 50 °C |
| Gas atmosphere | Various, see BioLector® | Various, see BioLector® |
| Humidity | > 75 % rH | > 75 % rH |
| Orbital shaker | 400 – 1500 rpm at 3 mm (diameter) | 400 – 1500 rpm at 3 mm (diameter) |
| **Liquid Handler** | | |
| Robotic arms | 1 | 1 |
| Arm type | Liquid handling | Liquid handling |
| Pipetting channels | 2 or 4 | 8 |
| Pipetting volume | | |
| with disposable tips | 20 – 950 µl | 20 – 950 µl |
| with washable tips | 10 – 1000 µl | 10 – 1000 µl |
| Liquid level detection | By capacity in conductive liquids | By capacity in conductive liquids |
| Type of tips | 1 disposable tip, 1 washable tip (L-2) | 2 disposable tips, 6 washable tips (XL-8) |
| | 1 disposable tip, 3 washable tips (L-4) | |
| Max. deck positions (SBS footprint) | 16 | 20 |
| **Modules** | | |
| Dimensions (WxHxD) w. BL I | 1625 × 935 × 780 mm | 1850 × 935 × 780 mm |
| Dimensions (WxHxD) w. BL II/Pro[2] | 1830 × 935 × 780 mm | 2055 × 935 × 780 mm |
| Weight (excl. BioLector®) | ca. 84 kg | ca. 102 kg |
| Power source | 100 – 240 V (50/60 Hz) | 100 – 240 V (50/60 Hz) |
| Optional modules | Different racks for reaction tubes, MTP (96, 48) cooling station, pre-culture module | Different racks for reaction tubes, MTP (96, 48) cooling station, pre-culture module |
| **Software Features** | | |
| Media preparation (disposable tips) | ✓ | ✓ |
| DoE import | ✓ | ✓ |
| Signal triggered actions | ✓ | ✓ |
| Dependent trigger | ✓ | ✓ |
| DO-controlled feeding | ✓ | ✓ |

The RoboLector® is a proprietary combination of a liquid handling robot and the BioLector®.

[1] Optionally, the BioLector® can be integrated into other standard liquid handling systems.

[2] Valve Control Unit (VCU) needs to be placed in close proximity to BioLector® Pro.

# The Company

**m2p-labs is an internationally leading supplier of microbioreactors.**

The company focuses on microbioreaction and automated solutions for screening and bioprocess development. The microfermentation technology enables customers to conduct experiments with great efficiency and excellent quality at low costs. More knowledge from small scale leads to more rational and reliable decisions in the development of bioprocesses.

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## PRODUCT PORTFOLIO

**Systems**

The BioLector® microbioreactor is a unique high-throughput fermentation system. In up to 48 parallel cultures the essential fermentation parameters such as biomass concentration, pH and DO as well as fluorescent proteins or substrates can be all monitored online. The advanced BioLector® Pro technology is using proprietary microtiter plates with an integrated microfluidic chip to continuously control the pH of each culture individually as well as the feeding for fed-batch cultivations. The BioLector® microbioreactors are established systems for bacterial, yeast, fungi, plant and insect cells. All systems are suitable for aerobic, microaerophilic and strict anaerobic cultivations.

**Consumables**

m2p-labs provides unique microtiter plates with improved oxygen transfer and excellent mixing properties. With its proprietary design, the FlowerPlate® supplies sufficient oxygen even to cultures with high oxygen demand. In addition, the microfluidic FlowerPlate® allows online feeding and pH control in 32 cultivation wells. The round well plate delivers moderate oxygen transfer for organisms with lower demand in oxygen or organisms sensitive to shear stress. All plates are available with different optical sensors for different applications.

**Automation**

The RoboLector® provides a unique automated cultivation platform combining the high-throughput fermentation and the online monitoring capability of the BioLector® with the accurate and reproducible pipetting of a liquid handling robot. The system is used for media preparations, automated sampling and dosing steps, inductions and fed-batch processing.

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