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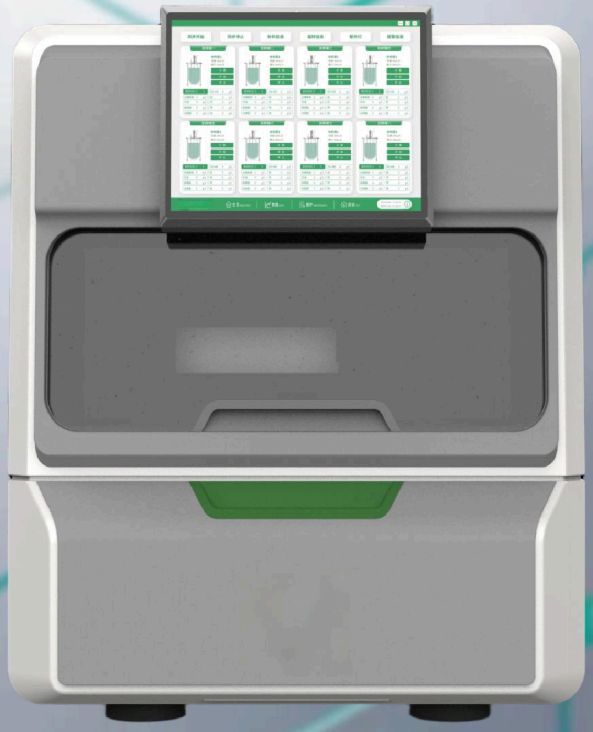
Bioreaction Detection System

Sampling/processing/analysis/sample retention system



About us

Company Profile

Founded in 2011, Vector Science&Technology is a high-tech manufacturer providing complete solutions for the power monitoring and biotechnology industries. Committed to our value “Make power monitoring&life science easier”. Focusing on supplying equipment and consumables for biological instruments and consumables for recombinant protein drugs, vaccine preparations, antibody drugs, cell therapy, and genetic engineering. Our products cover multiple □elds including general laboratory instruments, biopharma equipment, and nanomaterial R&D equipment.

Faciility

Vector Science & Technology possesses a production area of 3,000 square metres, alongside multiple research and development centres nationwide. It maintains a highly trained and experienced R&D and production team, complemented by a professional pre-sales and after-sales service team.

Mission and Vision

Relying on its well-trained and experienced team of sales & marketing, project management, and service engineering professionals, Vector aims to continuously deliver innovative solutions for the global biopharmaceutical industry.

Talent Team

Currently employs 200+ staff members, comprising 1 PhD holder, 5 postgraduate students, 30 undergraduates, and over 100 additional production personnel.

R&D Center

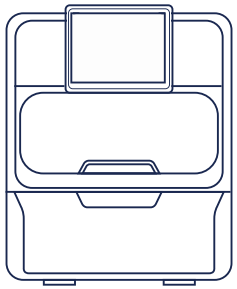
Established in collaboration with Xi'an Jiaotong University, our R&D Centre. Located in Qingdao, Vector has R&D centers in Suzhou and Shanghai. Possesses an independent technical and software development team alongside a comprehensive quality management system.

Qualifications

Our company has obtained a total of 31 software copyright registrations and 25 patent certificates, comprising 16 utility model patents and 9 invention patents. Fully equipped with validation qualifications and documentation including CE, cGMP, FDA, and 3Q.

VECTOR

Bioreaction Online Detection System

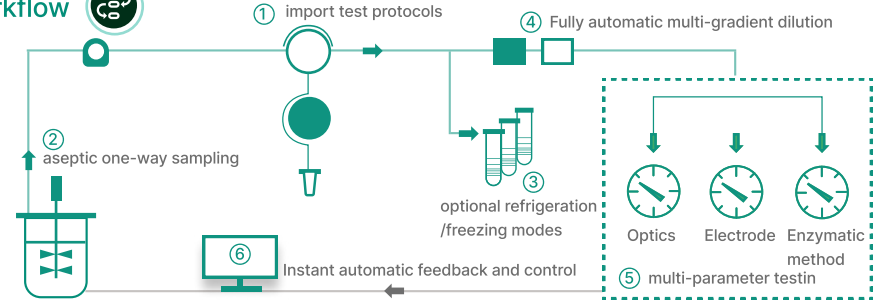


The Bioreaction Online Detection System (BODS) is an instrument designed for fully automated online sampling, processing, analysis, and sample retention in bioreactors. Integrating multiple detection modules, it provides real-time displays of biomass, substrate consumption, and product formation within the reactor. It also enables timely adjustments to the feedback control system, facilitating precise controlled feeding of substrates, improving the efficiency of fermentation process control, and providing robust data support for fermentation process optimization and scale-up.

Product Features

- Sterile recirculating sampling
- Scheduled sample retention
- Fully automated sample processing
- Multi-parameter testing
- Automatic feedback control

Workflow



Applications

- Online monitoring and control of microbial fermentation processes
- PAT technology and process development in synthetic biology
- online monitoring and control of animal cell culture processes
- high-throughput, high-efficiency screening of microbial strains and processes

Product advantages

1. Independent control of each fermenter
2. One-to-many mode, significantly reducing operating costs
3. Automated sample processing for high efficiency
4. Automated cleaning and calibration for more accurate testing
5. Integrated monitoring of multiple parameters
6. Multi-mode automatic feedback control

Technical specifications

	BODS Enterprise Edition BOSE - E	BODS Research Edition BOSE - II - R
Suitable Fermentation Systems	Pilot or production tanks	1–50 L fermentation tanks
Sampling Mode	Unidirectional sampling, sampling rate ≥ 100 mL/min	Aseptic unidirectional sampling, sampling rate ≥ 50 mL/min
Sampling Channels	Single channel	Single channel (expandable to 2–8 channels)
Specific technical specifications are shown in the table below	Optional: Glucose, lactose, galactose, lactic acid, glutamic acid, glutamine, lysine, xylose, ethanol, methanol, glycerol：	

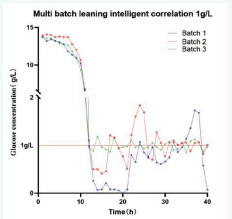
Item Name	Enzyme Membrane Detection Range	Precision
Enzyme Membrane Detection Parameters Glucose, Lactose, Galactose, Glutamic Acid	0.02-1g/L	<3% F.S.
Glutamine, Lysine, Xylose, Glycerol Lactic Acid, Ethanol	0.02-0.5g/L	<5% F.S.
Methanol	0.02-0.25g/L	<5% F.S.

Enzyme-membrane detection channels	Standard: 1 channel; Optional: 4 channels	Standard: 2 channels; Optional: 4 channels
Automatic dilution system	Dual sample dilution cells, precise dilution 20–1500 times	
Feed module	None	Single-channel feedback-controlled feeding
Feedback of feeding information	Standard, can feed back the instrument's detection results to the DCS system via analog output signals	
Printer	None	Integrated into the main unit as standard, dot matrix impact printing
OD detection	Up to 8 selectable wavelengths in the 420–700 nm range (-0.8),compatible with the instrument's automatic dilution system(Precise dilution range can be expanded up to 1200(Precise dilution range20–1500×), OD detection range can be expanded to a maximum Sample retention module	Up to 8 selectable wavelengths in the 420–700 nm range (-0.8), compatible with the instrument's automatic dilution system (Precise dilution range can be expanded up to 1200(Precise dilution range20–1500×), OD detection range can be expanded to a maximum Sample retention module
Sample Retention Module	Optional, 50 × 10 mL sample retention vials, adjustable retention volume 1–8 mL, selectable between refrigerated and frozen modes Optional	
Ion Detection Parameters	Optional，NH 3：0.2–20 g/L; Nat: 0.2–20 g/L; K: 0.2–20 g/L. The above parameters are optional	
Ion Detection Channels	1-channel or 3-channel detection available	
Main Unit Dimensions (WxDxH)	550 × 502 × 760 mm	670 × 680 × 950 mm

Case Applications

Case 1:

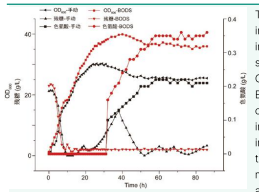
Multi-batch AI Learning for Intelligent Correlated Feeding



After three rounds of AI self-learning, the BODS control accuracy improved from ±1.0 g/L to ±0.15 g/L

Case 1:

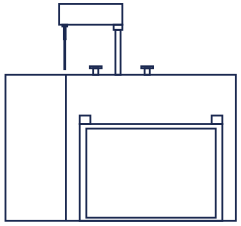
Multi-batch AI Learning for Intelligent Correlated Feeding



Comparison of fermentation results between manual feeding and intelligent correlation feeding

This case study uses a tryptophan-producing engineering strain as the starting strain to investigate the impact of different feeding strategies on the strain's tryptophan yield. Compared to the manual feeding mode, the BODS intelligent correlation system, operating without human intervention, stabilized the residual sugar level in the medium at the set value (2 ± 0.2 g/L) through automatic sampling,detection, monitoring, feedback adjustment, and autonomous learning of feeding strategies. At the same time, the strain's tryptophan yield increased by approximately 71.4%

Muli-Biochemical Parameters analyzer



The Multi-Biochemical Parameters Analyzer (MBP) is an instrument designed for the automated pretreatment and analysis of biochemical samples. Featuring multi-parameter detection, full automation, and high efficiency, this instrument can simultaneously analyze the concentrations of biomass, substrates, and metabolites, thereby effectively reducing the labor and material costs associated with sample processing and testing.

Product Features

- Multi-parameter testing
- Fully automatic sample loading
- Immediate results

Workflow

Sample Storage Box (16 per batch)

Pipetting (High-Precision Pipetting Module)

Sample Testing
(Enzyme-Linked Immunosorbent Assay)

Applications

- Offline Monitoring of Microbial Fermentation Processes
- Offline Monitoring of Animal Cell Culture Processes
- High-Throughput, High-Efficiency Strain and Process Screening

Product advantages

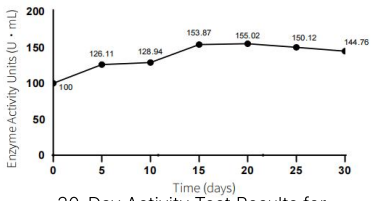
1. Fully automatic, high-throughput
2. Multi-parameter testing
3. Modular design

Technical specifications

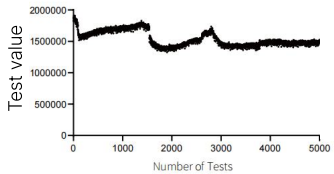
Classification	Technical Specification
Industrial PC	7.7-inch resistive touchscreen
Automatic feeding system	16
Enzyme membrane detection module	1–4 channels selectable for detection (selectable parameters: glucose, lactate, glutamate, xylose, ethanol, methanol, glycerol), data accurate to 0.01 g/L
Data storage Automatically stores data	can store at least 5,000 data points and allows filtering and querying by time. Data export and printing supported; export format is CSV, which can be opened in Excel
Printer	Print head lifespan of 1.5 million lines; printed information includes test time, sample number, test parameters, and test results
User Permissions	Supports permission management; supports configuration of at least 10 users
Power Supply	AC220V,50Hz
Power	1000W(MAX)
Dimensions (W x D x H)	420*350*300mm
Weight	15KG
Operating Environment	Temperature 5–35°C, humidity ≤85% RH

Consumable performance

Ⅰ: Glucose Enzyme Membrane



30-Day Activity Test Results for the Glucose Enzyme Membrane

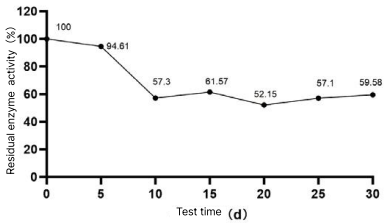


Test Results for 5,000 Injections of the Glucose Enzyme Mem brane

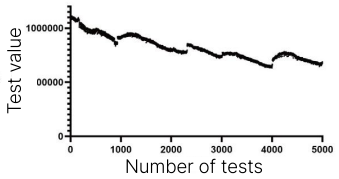
Number of tests	Residual enzyme activity	Linear（0.02-1.00g/L）
0	100.0%	y=99.519x+0.0347 R²=0.9999
1000	94.1%	/
3000	81.6%	y=101.21x-0.4128 R²=0.9994
5000	83.7%	y=98.975x+0.5305 R²=0.9998

Test Results for the Detection Range of the Glucose Enzyme Membrane

Ⅱ: Ethanolase membrane



Results of the 30-day activity test for the ethanolase membrane



Results of the 5,000-puncture test for the ethanolase membrane

Number of tests	Residual enzyme activity	0.02-1.00g/L Linear
0	100.0%	y=96.079x+7.631 R²=0.9902
1000	85.0%	/
3000	69.2%	y=99.25x+5.7165 R²=0.9924
5000	68.7%	y= 99.25x+5.7165 R²=0.9924

Test Results for the Detection Range of the ethanolase membrane