



**LAB1ST**

- > Microbial Cultivation
- > One Controller & One Vessel
- > Economical and Efficient Choice

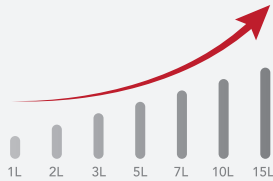
# BIOREACTOR

## BR100-M1

Cost-Effective and Standardized Solution for Microbial Cultivation

## Quick Overview of BR100-M1

- Cost-effective and streamlined: Standardized solution for microbial cultivation.
- Reliable performance and precise control: Core hardware from leading international brands ensures stability.
- Versatile total volumes: 7 options from 1L to 15L for diverse scales.

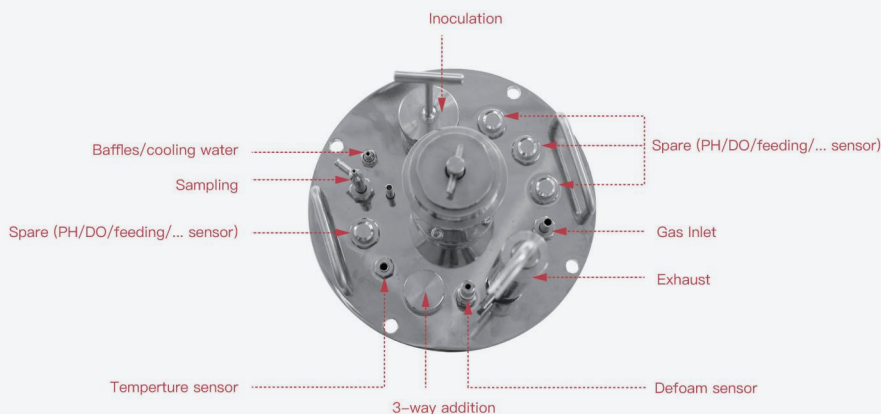
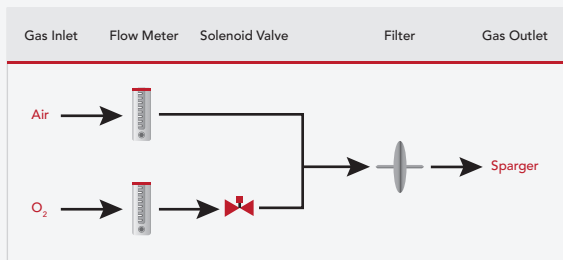


- Flexible customization: Extensive upgrades and bespoke solutions for special needs.
- Mature vessel manufacturing process: easy to disassemble, maintain and clean.

- Quick installation and easy to use: small footprint and easy installation.
- Powerful software functions: Full control via feedback, time, conditions, scripts, etc.
- Intuitive interface: 10.1-inch touchscreen with graphical design language.
- Remote communication: Wired and wireless LAN for remote monitoring and control.



## At-a-Glance BR100-M1 Configuration

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Controller   | Siemens PLC + 10.1-inch MCGS HMI;<br>Remote monitoring and control within LAN                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Glass Vessel | <p>Total volume 1-15 L with 25~75% working volume, autoclavable;<br/>Single-wall flat-bottom cylindrical vessel, borosilicate 3.3 glass, electrolytically polished SUS 316L;<br/>With pH, DO, temp., foam electrode interface, sparger, exhaust port, inoculation port, feeding port, sampling port, etc.</p>  <p style="text-align: center;">* smart layout by volume</p>                                       |
| Agitation    | <p>Top mechanical stirring, servo motor, 5-1000rpm;<br/>Comb type defoaming impeller, 4-blade impeller (based on volume), Rushton impeller</p> <div style="display: flex; justify-content: space-around; align-items: center;">    </div> |
| Gas Intake   | <p>2-way gas supply (Air + O<sub>2</sub>), 1 ring sparger,<br/>max. 2 vvm<br/>- Air: rotameter<br/>- O<sub>2</sub>: rotameter + solenoid valve</p>                                                                                                                                                                                                                                                              |
| Exhaust      | Exhaust condenser                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Sensor       | Hamilton® pH; Hamilton® DO; German JUMO Pt100 RTD; Foam                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Pump         | 4 fixed-speed peristaltic pumps for acid, alkali, defoamer and feed                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## Features

### Performance Meets Affordability with Uncompromised Quality

- The BR100-M1 bioreactor is developed based on years of industry experience and customer feedback, offering a simple yet efficient design that balances performance and cost.
- It features top-class components from trusted brands like **Siemens**, **Hamilton**, and **Jumo**, ensuring reliable, continuous monitoring and stable operation throughout the biological process.
- The combination of rotameters, solenoid valves and built-in integrated peristaltic pumps achieves reliable gas and feeding control.
- Its compact design minimizes space usage, making the most efficient use of laboratory space while boosting high performance and functionality.



### Simple Operation and Hassle-Free Maintenance

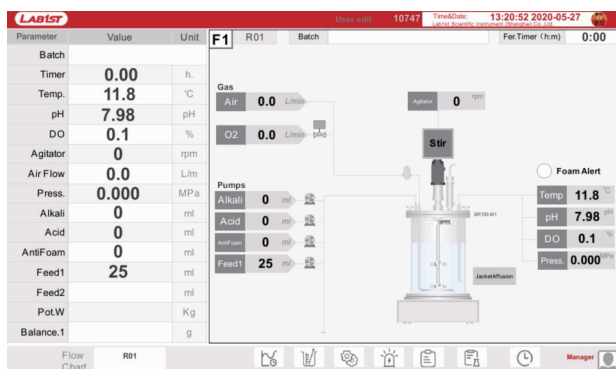
- The complete kit includes everything needed for the application, pre-configured, and ready to use, without the need to purchase additional accessories.
- No tools are required, and the user-friendly interface design makes installation simple and simplifies the preparation work before the process starts.
- The separation of the base, vessel body and stirring motor enables a lightweight design, making it easier for experimenters to transfer it to the sterilizer.
- The 10.1-inch touchscreen, combined with a simple and intuitive software design, offers full support for biological processes, making operation no longer complicated.
- All components are located on the vessel lid, allowing for easy disassembly and reassembly, simplifying cleaning and maintenance.



## Flexible, Reliable, and Fully Integrated System

### Software Functions: Precision Control and Full Process Flexibility

- Comprehensive control including manual, automatic, sequential, cascaded, conditional, etc. meet different experimental needs.
- Multiple cascades for DO control by means of agitation speed, oxygen bypass, and feed, increasing process control flexibility.
- Up to 24 recipes, with no theoretical upper limit on steps, to achieve automatic operation of the biological process.
- Easily perform online calibration for sensor and peristaltic pump ensures accurate and reliable process control.
- Extensible real-time display trend chart for easily viewing your entire biological process
- Complete batch data, alarm and operation records, easy to query, export and backup. With 8G ROM, data can be saved for many years.
- Three-level authority management and upper & lower limit alarm settings reduce risks.
- Wireless and wired LAN communication, easily realize remote monitoring and control.



### Glass Vessel: Optimal Design for Efficient Cultivation

- The single-wall flat-bottom cylindrical vessel is equipped with a heating base. The stainless steel bottom makes it more sturdy and reliable, and has good heat conduction.
- Electropolished 316L stainless steel, borosilicate 3.3 glass, EPDM and silicone sealing, clean and hygienic.
- Standard 2:1 height-to-diameter ratio, meeting most mass transfer and heat transfer requirements.
- Sufficient interfaces to meet the installation requirements of standard accessories and sensors.
- Knurled screw design for quick assembly, easy cleaning and maintenance.

## Hardware Configuration: Reliable Performance and High-Quality Components

### Gas Flow

- Standard configuration: 2 gas sources for air and oxygen, ring sparger, max. 2vvm, optimized for the microbial fermentation.
- The combination of rotameter and solenoid valve meets the economical and effective gassing strategy.
- Both the gassing and exhaust are equipped with premium Sartorius PTFE 0.2µm filters to prevent contamination.
- Exhaust through the optimized exhaust condenser helps to recover volatile components and maintain a good fermentation environment.

### Stirring & Impeller

- Top mechanical stirring, maintenance-free servo motor, quick response, no delay in starting, max. 1000 rpm.
- Standard Rushton impeller, optimized for fermentation processes with high mass transfer efficiency and insensitivity to shear force.
- Comb-type defoaming impeller, mechanically eliminates top foam and improves mass transfer.
- The impellers are height-adjustable and detachable, increasing flexibility and reducing maintenance costs.

### Feeding

- 4 fast-load fixed-speed peristaltic pumps for adding acid, alkali, defoamer and feed, with customizable functions, realize automatic control and metering.

### Sensor

- Hamilton® pre-pressurized gel-filled pH sensor with durable PHI glass membrane designed for sterilization.
- Hamilton® Polarographic DO Sensor with FDA-approved dissolved oxygen membrane for hygienic processes.
- German JUMO Pt100 RTD, fast response and durable.
- Conductivity foam sensor realizes automatically adding defoamer through the peristaltic pump, which is stable and reliable.

### Compliance

- CE certified, ensuring full compliance with the essential health, safety.



INNOVATIVE BIOREACTOR  
SOLUTIONS FOR YOUR RESEARCH

## Specification - Control Capacity

### Independent Control Tower

|                          |                                                                                                                                                                                                                                  |     |     |     |     |      |      |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|------|------|
| Housing Material         | Carbon steel, plastic powder coating                                                                                                                                                                                             |     |     |     |     |      |      |
| Dimensions [WxDxH, mm]   | 360×500×720                                                                                                                                                                                                                      |     |     |     |     |      |      |
| Weight [kg]              | Approx. 40 kg [depending on configuration]                                                                                                                                                                                       |     |     |     |     |      |      |
| Display I Operation      | 10.1" color touchscreen                                                                                                                                                                                                          |     |     |     |     |      |      |
| Controller               | Siemens S7-200 Smart PLC, MCGS HMI                                                                                                                                                                                               |     |     |     |     |      |      |
| Integrated Pump          | 4 fixed-speed fast-loading peristaltic pumps                                                                                                                                                                                     |     |     |     |     |      |      |
| Flow Meter               | 2 rotameters                                                                                                                                                                                                                     |     |     |     |     |      |      |
| Communication            | USB [software upgrade, data copy and export], Industrial Ethernet, WiFi                                                                                                                                                          |     |     |     |     |      |      |
| Interface                | · 1 x pH sensor cable    · 1 x DO sensor cable    · 2 x stirring motor control wires<br>· 1 x temperature sensor interface    · 1 x foam sensor cable    · 1 x heating base control wire interface<br>· 1 x main power interface |     |     |     |     |      |      |
| Water Interface          | 6 × hose barb fitting [inlet/outlet for exhaust condenser, base jacket and chilled water]                                                                                                                                        |     |     |     |     |      |      |
| Air Interface            | 3 × hose barb fitting [2 x gas supply interface, 1 x gas outlet]                                                                                                                                                                 |     |     |     |     |      |      |
| Power Supply             | 220V (±10%), 50Hz, single phase                                                                                                                                                                                                  |     |     |     |     |      |      |
| Adaptable Culture Vessel | 1 L                                                                                                                                                                                                                              | 2 L | 3 L | 5 L | 7 L | 10 L | 15 L |
| Rated Power [W]          | 400                                                                                                                                                                                                                              | 600 | 800 | 900 | 900 | 1500 | 1500 |

## Agitation Control

|                          |                                         |     |     |     |     |     |     |
|--------------------------|-----------------------------------------|-----|-----|-----|-----|-----|-----|
| Motor                    | Maintenance-free, low noise servo motor |     |     |     |     |     |     |
| Speed Range and Accuracy | 5 - 1000 rpm, $\pm 0.5\%$               |     |     |     |     |     |     |
| Rated Power [W]          | 200                                     | 400 | 400 | 400 | 400 | 750 | 750 |

## Gas Control

|                |                                                                                  |
|----------------|----------------------------------------------------------------------------------|
| Gas Source     | Air, O <sub>2</sub>                                                              |
| Control Method | · Air: rotameter    · O <sub>2</sub> : rotameter + solenoid valve                |
| Gas Inlet      | Ring sparger                                                                     |
| Flow Range     | Sparger - Air: Max. design 2 vvm    Sparger - O <sub>2</sub> : Max. design 1 vvm |
| Flow Accuracy  | ± 4%                                                                             |

## Temperature Control

|                                |                                                                             |    |     |     |     |     |     |
|--------------------------------|-----------------------------------------------------------------------------|----|-----|-----|-----|-----|-----|
| Control Method                 | Robust PID algorithm                                                        |    |     |     |     |     |     |
| Heating Method                 | Closed loop system with circulating jacket, bottom electric hot plate       |    |     |     |     |     |     |
| Heating Power [W]              | 80                                                                          | 80 | 200 | 330 | 330 | 550 | 550 |
| Cooling Method                 | Tap water or circulating cooling water                                      |    |     |     |     |     |     |
| Sensor                         | Pt100 RTD [JUMO, German]                                                    |    |     |     |     |     |     |
| Measurement Range and Accuracy | 0~150.0°C, ± 0.1°C                                                          |    |     |     |     |     |     |
| Control Range and Accuracy     | 8.0 °C above coolant to 40.0 °C above ambient (0-65.0 °C absolute), ± 0.2°C |    |     |     |     |     |     |

pH Control

|                                |                                                                                              |
|--------------------------------|----------------------------------------------------------------------------------------------|
| Control Method                 | · Robust PID algorithm    · Cascade control with peristaltic pumps by adding acid and alkali |
| Sensor                         | Hamilton Sterilizable Gel-filled pH electrode                                                |
| Measurement Range and Accuracy | 2.00~12.00, 0.01                                                                             |
| Control Accuracy               | ± 0.05                                                                                       |

## DO Control

|                                |                                                                                                      |
|--------------------------------|------------------------------------------------------------------------------------------------------|
| Control Method                 | · Robust PID algorithm    · Cascade control with different parameters [agitation, gas flow and pump] |
| Sensor                         | Hamilton Sterilizable polarographic DO electrode                                                     |
| Measurement Range and Accuracy | 0.0~150.0%, 0.1%                                                                                     |
| Control Accuracy               | ± 3%                                                                                                 |

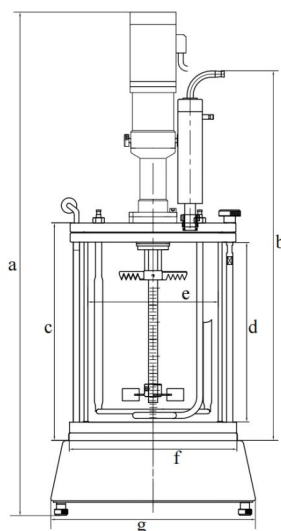
## Foam Control

|                |                                                                       |                              |
|----------------|-----------------------------------------------------------------------|------------------------------|
| Control Method | · Cascade control with peristaltic pump by adding antifoam (defoamer) | · Mechanical defoaming blade |
|----------------|-----------------------------------------------------------------------|------------------------------|

## Specification - Vessel

### Glass Vessel

|                                       |                                                                                                                                                                                                                                                                                                                                                                                 |      |      |      |      |      |       |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|-------|
| Type                                  | Single-wall flat-bottom cylindrical vessel, available for heating base                                                                                                                                                                                                                                                                                                          |      |      |      |      |      |       |
| Total Volume [L]                      | 1                                                                                                                                                                                                                                                                                                                                                                               | 2    | 3    | 5    | 7    | 10   | 15    |
| Max. Working Volume [L]               | 0.75                                                                                                                                                                                                                                                                                                                                                                            | 1.50 | 2.25 | 3.75 | 5.25 | 7.50 | 11.25 |
| Min. Working Volume [L]               | 0.25                                                                                                                                                                                                                                                                                                                                                                            | 0.50 | 0.75 | 1.25 | 1.75 | 2.50 | 3.75  |
| Material [Wetted Part]                | · Glass vessel material: Borosilicate 3.3 glass<br>· Vessel cover and inner parts: SUS 316L<br>· Seal: EPDM and Silicone                                                                                                                                                                                                                                                        |      |      |      |      |      |       |
| Surface Treatment                     | · Inner surface: electrolytic polishing, Ra <0.4 µm<br>· Outer surface: Ra <0.6 µm                                                                                                                                                                                                                                                                                              |      |      |      |      |      |       |
| Pressure Design                       | Working pressure: 0~1 bar @ 150°C Autoclavable                                                                                                                                                                                                                                                                                                                                  |      |      |      |      |      |       |
| Height to Diameter Ratio [H: D]       | Approx. 2:1                                                                                                                                                                                                                                                                                                                                                                     |      |      |      |      |      |       |
| Vessel Dimensions                     | Refer to "Table A"                                                                                                                                                                                                                                                                                                                                                              |      |      |      |      |      |       |
| Vessel Weight [Excluding Motor] [kg]  | 8                                                                                                                                                                                                                                                                                                                                                                               | 10   | 11   | 13   | 15   | 17   | 20    |
| Base Weight [With Bottle Holder] [kg] | 8                                                                                                                                                                                                                                                                                                                                                                               | 8    | 10   | 10   | 10   | 15   | 15    |
| Vessel Lid Interface                  | 1 × Agitator flange for top mechanical stirring    1 × Flame inoculation port<br>2 × Baffle port, including cooling coil    1 × Gas inlet port for ring sparger<br>1 × Exhaust port, including water-cooled exhaust condenser    1 × pH sensor port<br>1 × DO sensor port    1 × PT100 temperature sensor port    1 × Foam sensor port<br>1 × Sampling port    N × Feeding port |      |      |      |      |      |       |
| Impellers                             | · < 5L: 2 layers, top: foam breaker, bottom: 6-blade Rushton impeller<br>· 5L: 3 layers, top: foam breaker; middle: 4-blade pitched impeller; bottom: 6-blade Rushton impeller                                                                                                                                                                                                  |      |      |      |      |      |       |
| Baffles                               | · <3L: 2 removable baffles    · 3L: 4 removable baffles                                                                                                                                                                                                                                                                                                                         |      |      |      |      |      |       |



\* Table A

| Dimension                 |          |          |          |          |          |          |          |
|---------------------------|----------|----------|----------|----------|----------|----------|----------|
| Vessel volume [L]         | 1        | 2        | 3        | 5        | 7        | 10       | 15       |
| a [mm]                    | 448      | 540      | 637      | 656      | 736      | 840      | 888      |
| b [mm]                    | 360      | 430      | 470      | 486      | 522      | 616      | 700      |
| c [mm]                    | 205      | 254      | 270      | 286      | 368      | 430      | 470      |
| d [mm]                    | 170      | 230      | 230      | 240      | 315      | 380      | 420      |
| e [mm]                    | Ø90      | Ø110     | Ø140     | Ø170     | Ø170     | Ø185     | Ø216     |
| f [mm]                    | 156      | 156      | 187      | 220      | 220      | 240      | 275      |
| g [mm]                    | 210      | 210      | 248      | 267      | 267      | 300      | 340      |
| Sterilization Requirement |          |          |          |          |          |          |          |
| Minimum Size [mm]         | Ø195x365 | Ø195x450 | Ø230x475 | Ø270x500 | Ø270x590 | Ø275x645 | Ø320x710 |
| Recommended Size          | Ø260x400 | Ø260x500 | Ø300x550 | Ø330x550 | Ø330x650 | Ø330x650 | Ø370x750 |



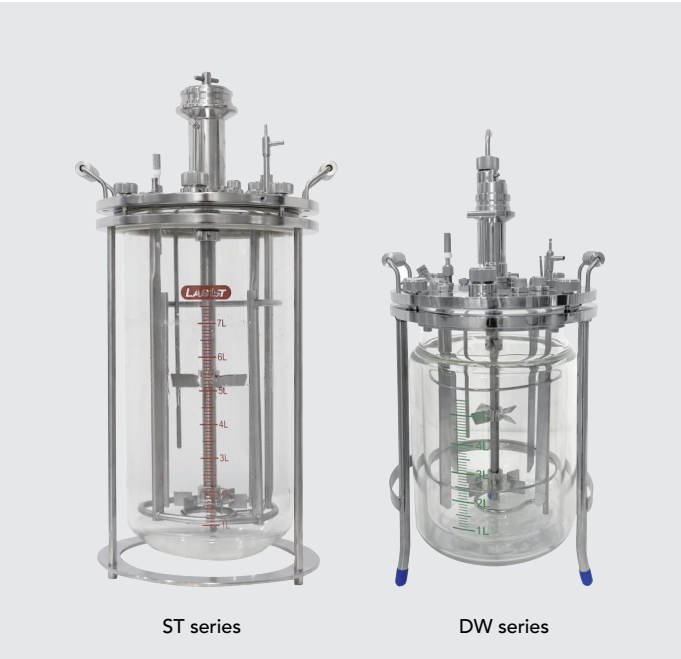
## Options & Upgrades

### Culture Vessel

| Item      | Description                                                                              | Function                                     |
|-----------|------------------------------------------------------------------------------------------|----------------------------------------------|
| ST Series | Single-wall round-bottom cylindrical vessel, available for electric blanket              | A variety of vessels to meet different needs |
| DW Series | Jacketed round-bottom cylindrical vessel, available for water jacket temperature control |                                              |

### Impeller

| Item | Description                                                                                                  | Function                                                          |
|------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Type | Lift impeller, oblique leaf impeller, rotary filter, Marine impeller, Spin filter, packed-bed impeller, etc. | Flexible customization to meet different application requirements |



### Sensors

| Item         | Description                                                                       | Function                                                           |
|--------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------|
| pH Sensors   | Hamilton® Arc smart pre-pressurized gel-filled sensor for real-time pH monitoring | Pre-calibrated, ready to use, automatic diagnostics                |
|              | Mettler Toledo Brand                                                              | More brand choices, adaptable to different systems                 |
| DO Sensors   | Mettler Toledo Brand                                                              | More brand choices, adaptable to different systems                 |
|              | Hamilton® optical dissolved oxygen sensor                                         | No polarization required, quick start                              |
| More Sensors | Mettler Toledo Brand                                                              | More brand choices, adaptable to different systems                 |
|              | Hamilton DCO2 sensor                                                              | Online real-time monitoring of carbon dioxide dissolved in liquids |
|              | Hamilton VCD sensor                                                               | Online real-time monitoring of viable cell density                 |
|              | Hamilton OD sensor                                                                | Online real-time monitoring of cell turbidity                      |

## More Options

| Item                 | Description                                                                        | Function                                                                                                                                 |
|----------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Control Cabinet      | Stainless steel 304 housing material                                               | More hygienic                                                                                                                            |
| HMI                  | Siemens                                                                            | International recognition                                                                                                                |
| Pump                 | Standard variable-speed pump                                                       | Supports more complex feeding procedures                                                                                                 |
|                      | Watson Marlow 114 variable speed pump                                              | International recognition                                                                                                                |
|                      | Additional external pumps [up to 2 for single-unit]                                | Support more in/out materials                                                                                                            |
| Flow Meter           | Burket MFC, up to 2pcs for BR100-M1                                                | Realize automatic control of gas flow with higher accuracy and calculate cumulative volume                                               |
| Power Supply         | 110V ( $\pm 10\%$ ), 60Hz, single phase                                            | Adapt to voltage standards of different countries and regions                                                                            |
| Wetted Part Material | 2205 duplex stainless steel/titanium                                               | Tolerant to high salinity environments                                                                                                   |
| Aspect Ratio         | 1.5:1   2.5:1   3:1   Customizable                                                 | Flexible customization to meet different application requirements                                                                        |
| Stirring Method      | Top magnetic stirring   Bottom magnetic stirring                                   | Magnetic coupling further enhances sealing                                                                                               |
| Sparger Type         | Microsparger                                                                       | Smaller bubble size, stronger gas-liquid mass transfer efficiency                                                                        |
| Adapter              | Adapter for sensor height adjustment                                               | Flexible positioning of sensor height to suit different vessel volumes                                                                   |
| Sampling             | Sterile sampling device                                                            | Consist of Luer head, one-way valve, T-joint, needle filter, and sterile syringe, suitable for sterile sampling.                         |
| Exhaust Gas Analysis | Exhaust gas analyzer for O <sub>2</sub> and CO <sub>2</sub>                        | Online real-time detection of CO <sub>2</sub> and O <sub>2</sub> in exhaust gas, analysis of respiratory metabolic parameters CER/OUR/RQ |
| Exhaust Gas Heating  | Exhaust heater                                                                     | Heating the exhaust gas filter to avoid filter clogging                                                                                  |
| Weighing             | Vessel weighing   Feed weighing                                                    | Weight measurement for level control                                                                                                     |
| Light                | Red, blue and white, or customizable; Fixed or adjustable light intensity (0-100%) | Optimize light conditions to significantly enhance cell density and biomass yield of photosynthetic organisms                            |
| Qualification        | IQ/OQ documentation                                                                | Meet compliance requirements                                                                                                             |
| Certification        | Comply with ASME BPE, UL and other certifications                                  | Meet the certification requirements of different countries and regions                                                                   |

● MFC



● Watson Marlow Peristaltic Pump



● OHAUS Scales



● Sensor Height Adapter



● Red, Blue and White Light

