

Autoclavable MiniBio Bundle 500ml



for Cell Culture Application

1 Mini Bioreactors Real Small Real bioreactors

The MiniBio range of bioreactors (250 ml, 500 ml and 1000 ml total volume) is a true scale down of the laboratory scale bioreactors in the 1 to 20 liter range. The MiniBio systems have the same flexibility as the laboratory scale bioreactors. This means that the MiniBio systems can be customized to fit the demands of any process. The small volume reduces medium costs and reduces the use of expensive bench space.

Unique features of small scale bioreactors:

- Generate more data in less time
- Easy setup and operation
- Cultivate using less bench space
- Generate scalable results
- Easy data handling

2 Key features

- **Intelligent control:** The controller adaptively controls all key process parameters using an autotuning feature that automatically sets optimal PID control settings. This feature ensures that optimal control performance is achieved quickly and without the need for advanced engineering expertise.
- **Access security:** Password controlled access is provided for three levels of operator: operator, engineer and service engineer. Each level has access to defined areas of functionality.
- **Software update:** Updating software to the latest version is extremely simple and is achieved by connecting a USB memory stick to the controller. The system automatically loads the update.
- **Advanced interface:** Ethernet communication is used to connect the controller to a computer or network. Communication to SCADA software (supervisory control and data acquisition) such as Lucullus is via Ethernet. The my-Control is OPC compliant which makes communication possible with any SCADA that meets this standard.
- **Remote communication:** The biocontroller can be accessed remotely via the internet using standard Internet browsers to view and control the system.
- **Expandability:** The my-Control can be configured to control virtually any bioprocess. Additional I/O (4x Analog In, 4x Analog Out, 8x Digital Out) or USB drivers (for scales or buglab) can be provided to communicate with external devices such as biomass monitors, optical density sensors, scales, gas analyzers, variable or fixed speed pump.
- **Documentation and validation:** The my-Control has been developed and documented in compliance with regulations GAMP 5. This supports the full validation of the system for your process

3 Configuration

The cell MiniBio bundle is configured as follows:

- **pH control** is achieved with a fixed speed peristaltic pumps, which is configured as base and a CO₂ solenoid valve for acid addition. CO₂ Flow is set by a needle valve.
- **Dissolved oxygen (DO)** is controlled with air regulated by a solenoid valve and flow is set with a needle valve.
- **Temperature control** is achieved using a heating blanket wrapped around the bioreactor.
- **Mixing** is provided by a stirrer with marine impeller
- Lucullus Lite is provided for **data** logging.

4 Detailed part list

4.1 Bioreactor 500 ml, Glass Autoclavable

<u>Bioreactor</u>		
1	Z611050010	Bioreactor 500 ml Basic Unit, incl. Dished bottom vessel, head plate, clamping ring, support Head plate incl.: Sample pipe, fixed height 4x addition pipe 3mm OD Sparger pipe Temperature pocket
<u>Agitation</u>		
1	Z510002110	Stirrer motor
1	Z813150501	Stirrer assembly, lipseal
1	Z813140501	Vortex marine impeller
<u>Additions</u>		
1	Z812070251	Liquid addition tube cap
1	Z813020251	Septum holder
<u>Aeration</u>		
1	Z813080252	Offgas outlet
1	Z813180251	Porous sparger tip
1	Z811300251	Autoclavable disposable airfilter, 0,2 µm 0-5L/min
1	Z811302030	Autoclavable disposable airfilter, 0,2 µm 0-40L/min
<u>Adapters</u>		
2	Z813000253	Sensor holder for pH and DO ₂
4	Z813220251	Blindstopper M8x1 port
1	Z813220252	Blindstopper M12x1 port

4.2 Control and actuator system, my-Control

<u>Basic Controller</u>		
1	Z310210011	Basic <i>my-Control</i>
1	Z310210110	Front panel silver
<u>Agitation</u>		
1	Z310213010	Control module stirrer

4.3 Sensors

<u>Dissolved Oxygen</u>		
1	Z010017080	Sensor Dissolved Oxygen
1	Z100065012	Cable DO sensor
<u>pH</u>		
1	Z001017080	Sensor pH ⁺ , gel-filled
1	Z100065010	Cable pH sensor
<u>Temperature</u>		
1	Z034014010	Sensor Temperature

4.4 Actuators

Additions

1	Z310216010	Variable speed pump drive and pump head assembly
1	Z310216020	Control module 2x variable speed pump
1	Z364010210	Pharmed tubing, ID 1.02mm, 3m

Aeration

2	Z310212011	Solenoid valve for Air and CO ₂
2	Z310212020	Gas flow needle valve for Air and CO ₂
1	Z310212081	Overlay blind plug connection
1	Z364111600	Silicone tubing 7.5m, size 16

Temperature

1	Z311021051	Heating blanket 500ml
1	Z310211020	Control module heating blanket

4.5 Software

1	Lucullus Lite, Data acquisition software for Windows 7, Windows 10, Vista
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4.6 Spare Parts & Services

Quantity	Article	Description
1	Z811000251	Start-up kit, autoclavable bioreactor 500ml
1	Z850101510	Sample and addition bottle 15ml 100pcs

4.7 Optional add-on packs

Various add-on packs are available including

- Mass flow controllers for aeration
- Additional pump(s) or microvalve for very small and accurate additions
- Foam/Level control
- Temperature control with cooling
- Electrical condenser
- A perfusion system: the MiniBioSep
- Special front panel colours

5 Controller


5.1 my-Control

The my-Control is one of the most advanced bioreactor control units for small scale bioreactors starting at 50ml (working volume). It can control bioreactors up to a total volume of 3L. This versatile controller can be dedicated for either cell culture or microbial cultures. The flexibility of the software makes it possible to switch from a microbial culture into a cell culture simply by installing a new configuration from a USB stick. With its footprint of only 19 by 35 cm (W x D) it uses the minimal amount of bench space, allowing to set up as many as 5 on 1 m width of bench space.

The basic my-Control includes the controller, software with PID loops. The human interface is created on a pc using a web browser. Any pc with a web browser like Windows Internet explorer, Mozilla Firefox or Google Chrome can be used to start the human interface. Even wireless devices like an iPad or Android tablet can be used to open the human interface of the my-Control in their web browsers, given that the controller is connected to a Wi-Fi router.

Within the web interface all settings, like setpoints, start/stop control loops, calibration data etc, can be controlled and it can be configured to show your most important process parameters. The pc is not included with the bundle.

View of the my-Control screen in a web browser



The screenshot displays the my-Control web interface. At the top, there is a navigation bar with icons for Home, Access level, System, Control, and Calibrate. A central status bar shows 'my-Control' and 'Process time 00h 00m 01s'. Below this, a central illustration of a bioreactor is shown. To the left of the bioreactor, a list of control parameters is displayed with their current values and setpoints:

- Heating Element: 100.00 %
- Cooling valve: 0.00 %
- CO2 valve: 0.00 ml/min (0.42 ml)
- N2 valve: 0.00 ml/min (0.77 ml)
- O2 valve: 0.00 ml/min (0.71 ml)
- Air valve: 0.00 ml/min (0.88 ml)

To the right of the bioreactor, a 'Process parameters' panel is visible, showing real-time data for various sensors and actuators:

- Start / Stop all controllers: Start (play icon) / Stop (stop icon)
- pH: 7.00 / 7.00
- Temperature: 26.3 / 37.0 °C
- DO: 15.4 / 20.0 %
- Level: no contact
- Stirrer: 10 / 10 rpm

At the bottom left, a 'Welcome!' message is displayed. The Applikon Biotechnology logo is located in the bottom right corner.



The my-Control can be supplied in a variety of colours for quick identification.

SENSOR INPUT SPECIFICATIONS:

The installed input amplifiers have the following specifications:

pH amplifier:

Range: 0 - 14 pH
Accuracy: ± 0.01 pH
 R_{in} : $> 10^{15} \Omega$

Temperature amplifier:

Type: Pt-100
Range: 0 - 150°C
Accuracy: ± 0.1 °C

dO₂ amplifier:

Type: Polarographic
Range: 0 - 500 % (air)
Accuracy: ± 0.1 %

2x Level and/or Foam amplifier:

Type: On/Off signal
Sensitivity: Firmware selectable
High: $> 26 \mu S - 100$ %
Low: $> 200 \mu S - 100$ %



5.2 Actuators

- A variable speed pump 5-200rpm that is configured for base addition. It has a flow range of 0.17 to 6.8 ml/min for the supplied tubing of 1.0 mm ID.
- A solenoid and needle valve for Air, controlling the DO concentration
- A solenoid and needle valve for CO₂, controlling pH
- Stirrer motor with a range from 10-2000 rpm. Typically set between 200-500 rpm for cell culture applications.
- A heating blanket with viewing window for temperature control from ambient up to 70°C

6 bioreactor range Small Scale Bioreactors

6.1 500 ml MiniBio bioreactor

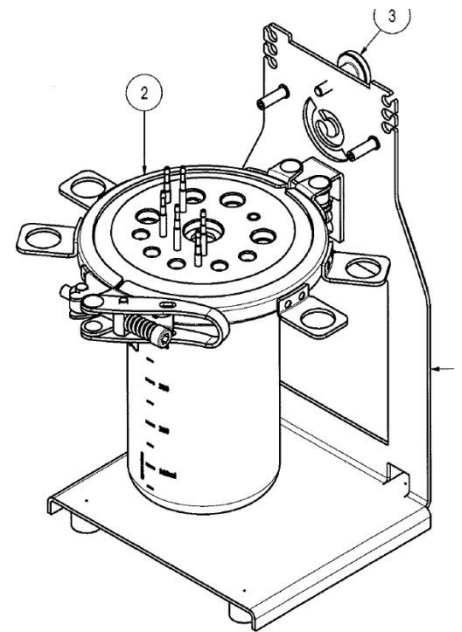
The 500 ml dished-bottom bioreactor is an ideal tool for applications where small volumes are required. The vessel and motor come with a convenient assembly frame what holds the bioreactor and motor in place. This frame can be used to carry the bioreactors around the laboratory and during autoclaving. The bioreactor can also be easily taken out of the frame to be placed in an optional support for autoclaving multiple bioreactors.

The 316L bioreactor head plate has several fixed ports:

- Porous sparger with filter
- Sample pipe
- Thermowell for temperature sensor
- 4 addition pipes, overlay

Furthermore it is provided with

- Stirrer with marine impeller (D=2/5 RD)
- Air outlet with filter
- Septum
- Blindstoppers



6.2 Sensors

- Mini pH sensor (L=170 mm, D=8 mm) with cable and sensor nipple.
- Mini Dissolved Oxygen sensor (L=170 mm, D=8 mm) with cable and sensor nipple.
- PT100 temperature sensor with cable.

6.3 Data acquisition

Lucillus Lite is included with all BioBundles. This is a Windows-based data acquisition software package. Data are digitally logged in real-time and online. Data can be exported to Excel. The software can be upgraded to a standard, advanced or expert version.

6.4 Accessories

- Silicon tubing and hose clamps.
- 1 liquid addition bottle 15ml
- Blind plugs for unused ports
- Gas filters
- Spare parts kit.