

BIOSTAT[®] B plus
Laboratory
fermentor | bioreactor
benchtop system

Engineering by
Sartorius BBI Systems

BIOSTAT® B plus integrated system solution...

BIOSTAT® B plus are designed to become the new benchtop systems standard in research fermentors and bioreactors, worldwide. Application driven preconfigured packages for microbial culture and cell culture can be delivered ready to use right "out of the box".

A comprehensive range of pre configured packages are available to satisfy the demands of both microbial & cell culture applications.

Basic unit comprising...

- Stainless steel housing
- Digital controller
- Operating interface
- Gassing system with rotameter, solenoid valves or mass flow controller
- Motor with controller
- Thermostat system with circulation pump or dry heating with controlled cooling water valve
- Up to 4 peristaltic pumps
- Integrated amplifier

Culture vessel equipped with...

- Sensors for temperature, pH, DO, foam and level
- Stirrer shaft with industrial sealing
- Impeller
- Aeration tube with sparger, sterile filters and exhaust cooler
- Storage bottles, sample/harvest pipe, blind plugs
- Tube, O-ring and tool kit

...and optionally a full range of accessories to meet your future needs.

... ready to use packages for your drug discovery and small-scale-production



Features

(Single or Twin configuration)

- Graphical user interface with touch screen
- Trend display with up to 6 process values
- Direct balance connection
- 1 L–10 L UniVessel® culture vessel with storage bottle tray, lifting handles and sampling system
- High performance stirrer motor for all applications and UniVessel® sizes
- Up to 4 integrated peristaltic pumps, 2 external pump connections
- Application driven integrated gassing system, choice of:
 - microbial culture
 - O₂ Enrichment
 - Gas Flow Ratio Control
 - cell culture | dual use
 - Exclusive Flow
 - cell culture
 - Additive Low Flow
- Integrated thermostat or dry heating system
- Space for Redox and turbidity measurement (Single only)
- Pre-configured software for system extensions

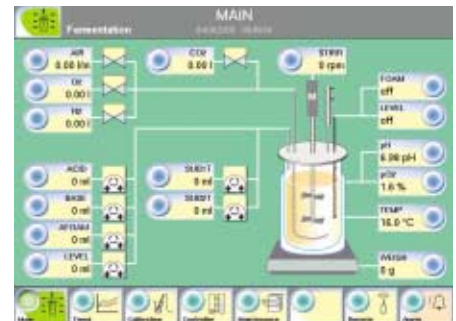
MFCS/DA Software

To accelerate your research activities, a powerful supervisory software MFCS/DA for extended visualization, data acquisition and trend display is included.

Space requirement

Required bench size approx. W × H × D (mm)	Single	Twin
BIOSTAT® B plus / 1 L	560 × 730 × 565	800 × 730 × 565
BIOSTAT® B plus / 2 L	590 × 730 × 565	860 × 730 × 565
BIOSTAT® B plus / 5 L	620 × 730 × 565	920 × 730 × 565
BIOSTAT® B plus / 10 L	670 × 820 × 565	1040 × 820 × 565
Required inner autoclave dimension Ø × H [mm]		
UniVessel® 1 L	240 × 500 *	
UniVessel® 2 L	270 × 550 *	
UniVessel® 5 L	300 × 700 *	
UniVessel® 10 L	350 × 820 *	
Utility lines	Customer supply	
Power supply	230 VAC or 120 AC	
Gasses	Controlled @ 1.5 barg; dry, particle and oil free	
Water	Controlled @ 2 barg	
Drain	@ 0 barg	

* Height reducible via flexible adaptor





Digital Controller

BIOSTAT® B plus controller created for the needs of today's bioprocess applications.

- Single and Twin control capability
- Graphical user interface with color display and touch screen
- Integrated amplifiers for temperature, pH, DO, foam & level
- Twin combined Level | Foam controller
- Space for Redox and turbidity amplifier, Single only
- Integrated digital control loops for temperature, pH, DO, agitation, gasmixing, air flow and 2x substrate
- Level control via probe or balance
- Multi-stage DO cascade control
- Totalizer with digital calibration for probes and pumps
- In-process pH-recalibration
- Trend display for up to 6 process values
- Balance connection
- Developed according to GAMP guidelines

Temperature Control System

Choice of dry heating or thermostat system for precise temperature control with rapid heating and cooling rates.

Thermostat System

- Integrated in basic unit
- Powerful heater (1 kW)
- Automatic controlled cooling water valve
- Circulation pump
- Temperature range 8 °C above cooling water up to 80 °C.

Dry Heating System

- Integrated in basic unit
- Plug connector for heating blanket
- Automatic controlled cooling water valve for optional cooling finger
- For temperatures up to 60°C



Gassing

Integrated culture vessel protection via safety valve

O₂-Enrichment

- For microbial cultures
- Automatic gasmixing of Air and O₂
- Solenoid valve for O₂-Enrichment capability
- Controlled via DO controller
- Exchangeable Rotameter
- Optional massflow controller

Gas Flow Ratio Control

- For microbial cultures
- Gasmixing of Air and O₂ via Gas Flow Ratio Controller
- Two integrated massflow controller for Air and O₂
- Controlled via DO controller
- Exchangeable Rotameter

Exclusive Flow

- For cell culture or multipurpose use
- Sparger and Overlay gas outlet
- Automatic gasmixing of Air, O₂, N₂, CO₂ for Sparger aeration
- Air for Overlay aeration
- 2 exchangeable rotameters
- Controlled via pH/DO controller
- Optional massflow controller

Additive Low Flow

- For cell cultures
- Sparger and Overlay gas outlet
- Automatic gasmixing of O₂, N₂, CO₂ for Sparger gassing
- Air for Overlay gassing
- 4 exchangeable rotameters
- Controlled via pH/DO controller
- Optional mass flow controller for total Sparger and Overlay flow

Pumps

Controlled via BIOSTAT® B plus controller for precise media conditioning, feeding and harvest.

- Up to 4 integrated pumps
- Configurable substrate controller
- Up to 2 external or internal feed pumps
- Watson Marlow pump heads



Culture vessel

UniVessel® autoclavable culture vessels. Developed with over 40 years experience in sterile design.

- 1 L – 10 L jacketed or single wall culture vessels
- Pre-configured for microbial or cell culture application
- Stirrer shaft with single mechanical seal
- Polished head plate for highest sanitary conditions
- Vertical lifting handles for easy handling
- Head plate with maximized numbers of ports
- Removable addition bottle support
- Minimized autoclave space requirement
- 316 L stainless steel for medium contact parts
- Real O-ring sealing, no compressed O-rings
- Full range of accessories for microbial and cell culture applications

Stirrer Drive

High performance servo drive combines low shear agitation for cell cultures with high speed mixing for microbial high cell density fermentations.

- Speed range 20–2.000 rpm
- Maintenance free
- High torque
- Easy handling

MFCS SCADA Software Family ... the Software Solution for your Bioprocess



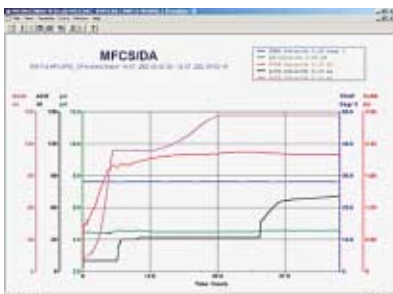
Our key platform to automation is based on the use of flexible Digital Control Systems (Micro-DCU and DCU), which are specifically tailored for fermentation and cell culture applications. When combined with our Supervisory Control and Data Acquisition (SCADA) systems, this solution provides the most cost-effective platform for a broad range of applications.

The current SCADA Software Family consists of two products: MFCS/DA and MFCS/win...

MFCS/DA

MFCS/DA has been designed as a self-explanatory system with plug and play configurations for micro-DCU based fermentors like the BIOSTAT® B plus. It provides simultaneous data acquisition and control from up to 4 process units. The Operator Service program acts as the main point of interaction with the software, providing access to all functions: set-up, control, plotting, etc.

MFCS/DA even includes the ability to incorporate other laboratory data, such as off-line process analysers. An Export function gives added flexibility for analysing data using other off-line programs. More advanced control strategies can be developed by the already included Programmer's Interface.



Operator Service

Batch Display provides an overview of all process units. Additional on-line, configurable views display for individual process units as well as an overall complete system display.

Sample Data Management

During a batch, off-line sample analysis generates critical process data, which should be included in the batch record. These values can be entered into a standard spreadsheet/table.

Plotting

Any combination of 1 to 10 variables can be displayed together. On-line data, as well as manually entered, off-line data can be selected. Line types, colors and other plot characteristics are user-definable. Preferences can be stored in re-usable plotting templates.

Data Export

Data from finished or still active bioprocesses can be further processed by 3rd party software using the Export Module.

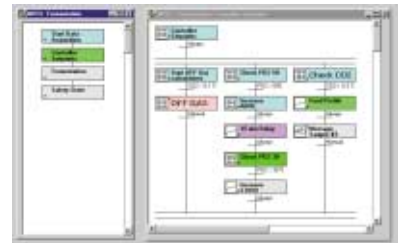
Programming Interface

Typical applications of this module could include calculation of Oxygen Uptake Rates (OUR), Carbon Dioxide Evolution Rate (CER) and Respiration Coefficient (RQ) for use in establishing new controller setpoints for more advanced process control.

MFCS/win 2.1

MFCS/win 2.1 the 4th generation of BBI's enhanced Supervisory Control and Data Acquisition software package satisfies a broad range of requirements in research, pilot and production area. Supplied preconfigured and "ready to use", the configuration can easily be adapted by the user to any change in process requirement. Main features include on-line data acquisition and storage, sample data management for off-line measured values, process evaluation and visualisation, as well as event dependent process control, process documentation via data export and batch reporting following the cGMP rules. The open system architecture provides connectivity to a wide range of 3rd party devices and software packages - via MFCS/win drivers, OPC-Client, OPC-Server or programmable interface (API).

Fully validatable according to GMP category 4 (Configurable System) and 21 CFR Part 11 compliance for electronic records and signatures, MFCS/win has all the necessary functionality for operation in a regulated cGMP production environment.



... Additional Accessories for Today's and Future Bioprocessing Needs



Perfusion system: Internal Spinfilter

The Internal Spinfilter is a scalable perfusion system which is applicable for continuous medium exchange for long-term cultivation. It can be used for suspension or micro carrier cultivations and is available in stainless steel or disposable design.

It is directly mounted on the stirrer shaft, resulting in easy sterile handling and operation.



Perfusion system: External Spinfilter

The External Spin Filter (ESF) is a scalable perfusion system applicable for continuous medium exchange for long-term cultivation. It is operated in an external loop with adjustable rotation speed.



Bubble free aeration

Bubble free aeration is recommended for extremely shear stress sensitive cells, such as primary mammalian cells. Shear forces caused by bursting bubbles can be avoided and, in addition foam production is prevented.



Sterile couplings: STT couplings

STT-Sterile quick connectors provide sterile connection of tubings. Due to the use of a replaceable slot membranes STT couplings provide a re-usable sterile environment.



SuperSpinner

The SuperSpinner is a incubator-based cell cultivation system. It combines a traditional spinner bottle with a patented bubble free aeration | stirrer system. SuperSpinners are used for seed cultivations and micro scale production and are applicable for suspension and micro carrier cultures. Due to the disposable design of the aeration | stirrer system constant cultivation results are assured.



Turbidity measurement system: FUNDALUX® II

FUNDALUX® II is an absorption-based photometric probe, designed for use with fermentors | bioreactors.

By continuously measuring cell growth | biomass as a function of light absorption, the process operator can gain real-time knowledge to optimize the process control.

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