



BIOSTAT® B-DCU II



The BIOSTAT® B-DCU II is a new generation of a well proven Fermentor|Bioreactor system, designed for meeting demanding requirements in both research and process development. Unrivalled for scale-down and scale-up modelling of various culture processes, the BIOSTAT® B-DCU II provides a new level of power and flexibility.

Features

- Independent process control for up to 6 culture vessels
- Superior gas mixing with up to 6 Rotameter and Mass Flow Controller
- Up to six integrated peristaltic pumps with choices for fixed and analogue speed pumps
- Validation support available, inclusive Logbook and 3-Level password protection

The BIOSTAT® B-DCU II is available for both microbial as well as cell culture applications.

Control Tower

The BioPAT® DCU control system belongs to the most proven and advanced bioprocess controllers ever developed. Utilizing proven technology and expert engineering, our existing in-house systems to bring powerful control capabilities to the sophisticated biotechnology market.

Supply Tower

Gassing strategies

"O₂-Enrichment" Gassing Strategy

The "O₂-Enrichment" Gassing Strategy provides oxygen enrichment capability via solenoid valve controlled by DO controller

"Gas Flow Ratio Control" Gassing Strategy

The "Gas Flow Ratio Control" Gassing Strategy provides on-line gas flow measurement and control of Air and O₂ via Mass Flow Controller. The gas flows are user adjustable or can be controlled via DO controller.

"Exclusive Flow" Gassing Strategy

The "Exclusive Flow" Gassing Strategy is a automatically controlled 4-gas mixing system providing Overlay and Sparger gassing.

Air is routed to Overlay. Air, O₂ and N₂ is routed to Sparger. CO₂ can be routed to Sparger or Overlay.

"Advanced Additive Flow" Gassing Strategy

The "Advanced Additive Flow" Gassing Strategy is an automatically controlled 4-gas mixing system providing Overlay and Sparger or Individual gas outlets. Each of the up to 6 gas flow path has its own rotameter and can be upgraded with Mass flow Controller.

Dosing Pumps

Up to 6 industrial proven easy-to-use peristaltic pumps for each culture vessel are infinitely controlled for addition of corrective agents, feeding, as well as culturing volume control. Up to four of the six can be analogue speed controlled pumps. Several pump speed ranges are available for both fixed and speed controlled pumps. Additionally, external pumps for feeding can be easily connected.

Temperature Control

Each culture vessel can be operated and automatically controlled at different temperatures. There are two choices offered. For single wall vessels, there is an electric heating blanket and cooling finger with solenoid valve. Alternatively, an integrated, high-efficiency thermostat system – with recirculation pump combined with jacketed culture vessels – features precise temperature control, even at minimum working volumes.

Agitation System

The high performance Servodrive motor assembly combines low shear, gentle agitation for cell cultures and high speed mixing for microbial high cell density cultivation.

Culture vessel

Standard UniVessel® culture vessels, developed with over 40 years experience in up-scale and sterile design, are available as single wall or jacketed stirred tank vessels in 0.5, 1, 2, 5 and 10 L working volumes. Each UniVessel® can be supplied with a range of accessories and devices, including flexible couplings to allow the vessels to fit into tight autoclaves.

Technical Specification

Space requirements | Environmental conditions:

Space requirement 1-fold 2-fold 3-fold 4-fold 5-fold 6-fold [W×H×D] (without options)	800 1200 1700 2050 2550 3000 × 780 (10L: 820) × 800 [mm]
Space requirement autoclave Ø H (with BB-8844593 flexible adaptor for exhaust cooler) 0.5 L 1 L 2 L 5 L 10 L without tray for storage bottles	170 × 340 (N/A) 240 × 500 (340) 270 × 550 (400) 300 × 700 (510) 350 × 820 (620) [mm]
Ambient temperature relative humidity (non-condensating)	5 - 40°C 85%

Control Tower

Housing material	Stainless steel AISI 304
Display	Touch Screen 15"
Resolution	1024 × 768 dpi
Communication Control Tower/Supply Tower Control Tower/Host	Ethernet Ethernet

Measurement ranges | resolution

Stirrer speed 0.5 L 1 L 2 L 5 L 10 L	tbd 20-2000 20-2000 20-1500 20-800 [rpm] 1 rpm
Temperature	0 - 150°C 0.1°C
pH	2-12 0.01 pH
pO ₂	0-250% 1%
Foam and Level	on/off 4 user selectable sensitivities
Turbidity	0 - 6 AU 0.01 AU
Redox	-2000-2000 mV 1 mV
Pressure	0-1000 mbar 1 mbar

Gassing System

Outlet design	O ₂ -Enrichment, Gas Flow Ratio Control, Exclusive Flow, Advanced Additive Flow
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Flowmeter

Available gas flow ranges	Air calibrated @ 1.21 bara 20°C
Accuracy	1.5 - 15 mL/min to 2.3-23 L/min
	+/- 2% FS

Thermal Mass Flow Controller

Available gas flow ranges for Air/N ₂ , O ₂ and CO ₂	Calibrated to specific gas
Accuracy	1.5 - 15 mL/min to 0.4-20 L/min
	+/- 1% FS

Agitation

Motor performance torque 0.5L 1L, 2L, 5L, 10L 10L	Maintenance and gear-free servo drive
	75/0.28 200/1.03 400/1.32 [W]/[Nm]

Integrated pumps

Pump head	on/off controlled, pulse-width modulated controlled
Rotation speed	Watson Marlow 102R, for tubing with 1.6 mm wall thickness
Flow rate tube dependent (bore x wall tubing) 1.6 x 1.6 / 3.2 x 1.6 [mm]	2 20 [rpm]

Integrated feed pump

Pump head	Speed-controlled
Rotation speed	Watson Marlow 102R, for tubing with 1.6 mm wall thickness
Flow rate tube dependent (bore x wall tubing) 1.6 x 1.6 / 3.2 x 1.6 [mm]	1 - 10 5 - 50 [rpm]

Temperature control system for jacketed culture vessel

Temperature control range	0.2 - 2 / 0.8 - 8 1.1 - 11 / 4 - 40 [ml/min]
Electrical heater	Connector for heating blanket and solenoid valve for cooling water
Connections to culture vessel exhaust cooler	8°C above cooling water to 80°C

Temperature control for single wall culture vessel water

Temperature control range	1000 W
Heating power of heating blankets 0.5L 1L 2L 5L 10L	Quick couplings Quick couplings
Connector heating blankets	Thermostat system with recirculation pump and solenoid valve for cooling

External connections

Balance standard option / interface / connector	8°C above cooling water to 60°C
CO ₂ exhaust analyzer interface / connector	- 100 170 400 780 [W]
Feed pump connection qty. / interface / connector	Amphenol eco mate 6-pol +PE
External inputs qty. / interface / connector	2 4 / RS232 / M12
	1 / RS232 / M12
	2 / 0-10 V / M12
	2 / 0-10 V / M12

Culture vessel

Design	0.5 L 1 L 2 L 5 L 10 L
Total volume	Single wall or jacketed glass vessel with stainless steel head pleate (0.5 L vessel jacketed only)
Working volume	0.75 1.6 3 6.6 13 [L]
Headpleate ports 19 mm 12 mm 6 mm	0.15-0.5 L 0.4 -1 0.6-2 0.6-5 1.5-10 [L]
Volume storage bottles	- 6 4 3 2 6 3 2 9 3 3 8 7 2 9
	250 250 250 500 500 [mL]

Sensors

pO ₂ sensor connector	Polarographic or optical VP
pH sensor connector	Gel-filled VP
Temperature sensor connector	Pt100 with pocket M12
pH/ Redox sensor onnector	Gel-filled VP
Turbidity sensor connector	Single Channel NIR Absorption Probe Fischer 104
Pressure transmitter connector	Piezoresistive M12
Foam sensor connector	Conductive Clip
Level sensor connector	Conductive Clip
Material (product wetted parts)	Borosilicate glass / Stainless steel AISI 316L/ EPDM

Utility consumption

Power consumption max. DCU Tower Supply Tower	200 2000 [W]
Water consumption max. per Supply Tower	5 L/min
Gas consumption per Supply Tower	depending an installed Flow meter or Mass Flow controller

Utility requirements | Housing connection

Power supply DCU Tower Supply Tower	110-230V/6A GFIC:32 mA 120V/15A or 230V/10A GFIC: 32 mA
Gasses	Controlled @ 1.5 barg (22 psig); dry, particle and oil-free hose connector OD 6 mm
Water	Controlled @ 2-4 barg (29-58 psig) hose connector OD 10 mm
Drain	Gravity drain with zero backpressure required hose connector OD 10 mm
Regulatory compliance	CE (build according to UL & CSA requirements)

Ordering information

Description	BIOSTAT® B-DCU II Individual
Control unit	
Control Tower	Industrial PC with 15 " touch screen operation
Firmware capability	Overview vessel and single vessel display Trend display Guided calibration routines for sensors and media and gas totalizer Alarm message display Process values : up to 200 Control loops : up to 128 Calibration routines up to 64 Configuration tool available
Measurement and Control capabilities	Agitation Temperature pH, Dual measurement possible DO (5 stage cascade), Dual measurement possible Foam Level Substrate pump controller Gravimetric Feed Control Culture vessel measurend and control Turbidity measurement Redox measurement Gravimetric Harvest Control Total Gas Flow Control "Sparger" Total Gas Flow Control "Overlay" Other on request
Validation support models	3-level Password Module Logbook Module
Supply Tower	
I/O Tower components	Up to twelve (12) amplifier Up to 6 Mass flow Controller Up to 6 dosing/shut off valves Up to 4 on/off controlled pumps (integrated) Up to 4 speed controlled pumps Up to three (3) auxiliary inputs Up to 4 serial balance/scales connections Agitation motor control unit Up to one (1) pressure vessel controller
Gasmixing (integrated)	O ₂ -Enrichment Gas Flow Ratio Control Exclusive Flow Advanced Additive Flow 2 or 6 gas outlets
Rotameter	Various flow ranges available from 1.5 -15 mL/min to 2.3 – 23 L/min
Mass Flow Controller	various flow ranges available from 0.15 – 15 mL/min to 0.4 – 20 L/min
Drive unit	75 W for 0.5 L UniVessel® 200 W for 1L – 10L UniVessel® 400 W for 10 L UniVessel®
Peristaltic pumps (integrated)	Watson Marlow 102 pump head 2 rpm or 20 rpm on/off controlled 1-10 rpm or 5-50 rpm speed controlled
Temperature control system (integrated)	Thermostat system or connector for heating blanket
Culture Vessel	UniVessel® single wall or jacketed vessel
Design	Single wall or jacketed vessel Stainless steel top plate with lifting handles Stainless steel stand (not for 0.5 L UniVessel)
Vessel working volume	0.5 L 1 L 2 L 5 L 10 L others on request
Stirrer shaft coupling	Direct coupling or Magnetic coupling
Stirrer shaft sealing	Single mechanical seal or magnetic drive
Impeller	6-blade impeller (ruston) 3-blage segment impeller Paddle impeller
Storage bottles	250 mL 500 mL
Aeration device	ring-sparger micro-sparger Overlay aeration fitting bubble free aeration
Deaeration	Exhaust fitting Exhaust cooler
Additions	1-way fitting 3-way fitting 4-way fitting septum ports
Dip tubes	Fixed length height adjustable Hight adjustable bended
Sampling systems	Bypass sampler Manual sampler
Perfusion device	Internal Spinfilter External Spinfilter
Sensors for	Pt 100 pH or pH/ redox combined DO (Clark or Optical) Vessel pressure Turbidity sensor Foam sensor, 80 mm Level sensor, 150 mm or 300 mm
Supervisory Process Control Software	BioPAT® MFCS/DA or BioPAT® MFCS/win

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