



BIOSTAT® Cplus

O₂-Enrichment



The BIOSTAT® Cplus O₂-Enrichment packages are dedicated to microbial applications. The integrated O₂-Enrichment gassing capability enables high oxygen transfer for high cell density cultures as well as for sheer-stress sensitive gassing for filamentous organisms. It may help to solve foaming problems due to reduced gassing and agitation rates. Furthermore, each BIOSTAT® Cplus package comes with safety containment valves (Sacova), which eliminates the risky needle operation for e.g. inoculation and other liquid additions to the sterile culture vessel.

Digital Controller

- Graphical user interface with color touch screen display
- Measurement and control for Temperature, pH, DO, agitation, Foam|Level
- Multi-stage DO cascade control
- 2x feed controller
- High-Foam alarm with safety shut down of aeration and agitation
- Optional level control via level probe or culture vessel weight
- Totalizers with digital calibration for gassing valves and pumps
- In-process pH-recalibration
- Trend display for up to 6 process values
- Up to 2 direct balance connections
- Optional internal Redox and Turbidity measurement
- Optional automatic or manual pressure control

"O₂-Enrichment" Gassing System

- Gas mixing of Air and O₂
- Precise manual adjustable flow meter for sparger flow adjustment
- O₂-Enrichment capability controlled via DO controller
- Optional mass flow controller for total flow

Pumps

- Up to 4 integrated pumps
- Configurable to feed controller
- Up to 2 external feed pumps
- Optional integrated speed controlled pump

Temperature System

- Closed loop pressurized thermostat system with recirculation pump and two heat exchanger for heating and cooling, alternately electrical heating
- Temperature range 8°C above cooling water up to 90°C
- Sterilization temperatures up to 130 °C

Agitation System

- Speed range 20 up to 1500 rpm
- Maintenance free
- High torque for power full mixing
- Gear-free for quiet operation
- Single or double mechanical seal (2L Single mechanical seal only)

Culture vessel

- Aspect ratio (H:D) 3:1 or 2:1 (2L & 5L 2:1 only)
- Jacketed culture vessel fully equipped with: Probes for Temperature, DO, pH, Foam|Level and High Foam

- Operation pressure gauge
- Stirrer shaft with single mechanical seal
- Rushton impellers
- Removable baffles
- Ring Sparger
- Stainless steel filter housing for aeration and exhaust with 0.2 µm grade sterile filters
- High efficiency exhaust cooler
- 1- Channel safety containment valve
- 3-channel safety containment valve
- Resterilizable sampling valve
- Bottom harvest valve
- Removable bottle support
- Addition bottles with stainless steel head piece and sterile venting filter
- Installation and start up kit

BioPAT® MFCS/DA software package

- Plug and Play configuration
- Online data acquisition
- Sample Data Management
- Enhanced Plotting
- Export functions
- Easy to use programming interface

The BIOSTAT® Cplus O₂-Enrichment packages are applicable for:

- Culture of microorganisms
- Industrial and academic research
- Process development
- Process optimization
- Up- and Down-scale studies
- Batch, fed batch and continuous culture
- High-cell density culture
- Small scale production
- Anaerobic| microaerophilic culture

Key Features

- Sanitary stainless steel design
- Small footprint
- Automatic SIP sequence
- Needle free operation via safety containment valves (Sacova)
- Culture vessels from 2 L to 30 L working volume
- Choice of steam or electrical heating
- High foam detection with safety shut-down
- Automatically controlled O₂ Enrichment
- Graphical user interface with color touch screen display
- Maintenance and gear free high-performance agitation motor
- Trend display with up to 6 process values
- Various process control possibilities
- Inclusive Supervisory Process control software (BioPAT® MFCS/DA)
- Validation support available

Technical Specifications

Space requirements Environmental Conditions	Dimensions
BIOSTAT Cplus 2L/ 5L Bench space requirement [W × H × D]	1000 × 1300 × 750 [mm] Benchtop version
BIOSTAT Cplus 10-30 L Floor space requirement [W × H × D]	1020 × 1900 × 750 [mm] Floor standing
Ambient temperature relative humidity (non condensating)	5–40°C 85%
Control unit	
Housing material	Stainless steel AISI 304
Display	Touch Screen 10.4"
Resolution	800 × 600 dpi
Host communication	Ethernet RS422 RS232
Measurement ranges	
Agitation motor speed 2L/5L/10L 15L/20L 30L	20-1500 20-1000 20-600 rpm
Temperature	0–150 °C
pH	2–12
pO ₂	0-100%
Pressure (option)	–0.5–2 [barg]
Turbidity (option)	0–6 AU
Redox (optional)	–1000–1000 mV
Gassing System	Air aeration with O ₂ supplementation
Outlet design	Hose tube OD 6 mm/ Reinforced silicon tubing connected to aeration line
Flowmeter	Air calibrated @ 3 barg 20 °C/ scale lenght 65 mm
Gas flow range "Sparger" 2L 5L 10 L 15L 20L 30L	0.42-4.2 1.3-13 2-20 3.6-36 3.6-36 5.5 - 55 [l/min]
Accuracy	+/- 4% FS
Thermal Mass Flow Controller (option)	Air calibrated
Flow range "Sparger" Total Flow 2L 5L 10L 15L 20L 30L	0.2-10 0.2-10 0.6-30 0.6-30 0.6-30 1-50 [slpm]
Accuracy	+/- 1% FS
Agitation motor	Maintenance and gear free servo drive
Performance 2L/5L 10L/15L 20L/30L	500 800 1200 [W]
Integrated pumps	Digital pulse width modulated controlled
Pump head	Watson Marlow 102R
Rotation speed	20 rpm
Flow rate integrated pumps	0.04 - 33 [ml/min] (tube dependent)
Integrated feed pump (option)	Speed controlled
Pump head	Watson Marlow 102R
Rotation speed	5-50 rpm
Flow rate integrated pumps	1 - 83 [ml/min] (tube dependent)
Temperature control system	Closed loop thermostate system with recirculation pump, heat exchanger for cooling and heating or electrical heater
Temperature control range (operation sterilization):	8°C above cooling water to 90°C up to 130 °C
Temperature measurement (jacket)	Pt100
Heat exchanger (cooling heating)	Stainless steel, copper soldered Stainless steel, copper soldered (optional: Stainless steel welded)
Electrical heater 2L/ 5L 10L-30L (optional)	3 kW 6 kW
External connections	
Balance connection	RS232
2 × Feed pumps	0–10 V
4 × External inputs	0–10 V
Culture vessel	2L5L10L15L20L30L
H:D ratio	2:12:12:1 3:12:1 3:12:1 3:12:1 3:12:1
Total volume	36,815223042 [L]
Working volume	0.9–21.6–54.5–10 3.5–105.5–15 5.0–157.5–20 5.5–209.0–30 7.0–30 [L]
Top plate ports 19 mm Total/ Used (Addition valves, Foam Level Probe) / Spare ASME vessel: Additional 19 mm port	4/3/14/3/15/3/2 4/3/15/3/25/3/25/3/2
Top plate ports with fixed installations	
Sparger inlet/ Exhaust cooler/ Agitation system/ sight glass for illumination (10–30L only)/ safety valve (PED vessel only)	555555
Upper side ports 25 mm	
ASME vessel: Additional port for bursting disc	- -33
Lower side port 25 mm Total/ Used (Pt100, pH, DO, sampling valve)/ Spare (12 mm port for Pt 100)	5/ 1/ 3/ 15/ 1/ 3/ 15/ 1/ 3/ 15/ 1/ 3/ 15/ 1/ 3/ 15/ 1/ 3/ 1
Bottom port (harvest valve)	111111
Vessel design	Jacketed stainless steel vessel with upper glass cylinderJacketed stainless steel vessel with vertical sight glass
Volume storage bottles	5005001000100010001000 [mL]
Material (product wetted parts)	Stainless steel AISI 316L/ Borosilicat glass / EPDM
Surface finish product wetted	Ra <= 0.8 µm, electropolished
Pressure design criterria 2L/ 5L Vessel Jacket	2.5barg/ -1 @ 150°C 4 barg/ -1 @ 150°C
Pressure design criterria 10-30L Vessel Jacket	3barg/ -1 @ 150°C 4 barg/ -1 @ 150°C
Fabrication 208 VAC 400 VAC packages	ASME PED (2L & 5L PED only)
Probes	
pO ₂ electrode	Polarographic
pH electrode	Gel filled
Foam / Level probe	Conductive probe, stainless steel ceramic isolated
Temperature probe	Pt100
Redox electrode (option)	Gel filled
Pressure sensor (option)	Piezoresistive sensor
Turbidity probe (option)	Single Channel NIR Absorption Probe, Gap 10 mm
Utilities Requirements Regulatory compliance	
Power supply	208 VAC (Plug: NEMA L 21–20P) or 400 VAC (Plug CEE)
Gases	4–6 barg; dry, particle and oil free
Process steam	2.5–3 barg, controlled, prefiltered
Clean steam	1.5–2 barg, controlled, prefiltered
Water return	Return to close loop cooling system
Condensate	Gravity drain with zero backpressure required
Regulatory compliance	CE

Ordering information

Description		BIOSTAT [®] Cplus-MO O ₂ -Enrichment					
		2L	5L	10 L	15L	20L	30L
Cat. No. 208 VAC	Culture vessel H:D ration	RCP-M02L OTRDS3 2:1	RCP-M05L OTRDS3 2:1	RCP-M10L OTRDS3 2:1	RCP-M15L OTRDS3 2:1	RCP-M20L OTRDS3 2:1	RCP-M30L OTRDS3 2:1
Cat. No. 400 VAC	Culture vessel H:D ration	RCP-M02L OTRDS4 2:1	RCP-M05L OTRDS4 2:1	RCP-M10L OTRDT4 3:1	RCP-M15L OTRDT4 3:1	RCP-M20L OTRDT4 3:1	RCP-M30L OTRDT4 3:1
Control Unit							
Digital controller, color display with touch screen		•	•	•	•	•	•
Control capabilities							
Temperature, pH, DO (2 stage cascade), Stirrer speed		•	•	•	•	•	•
Substrate A and Substrate B		•	•	•	•	•	•
Foam via conductive probe		•	•	•	•	•	•
High Foam alarm		•	•	•	•	•	•
Automatic sterilization sequence		•	•	•	•	•	•
Agitation motor (Servo drive)		•	•	•	•	•	•
Gasmixing		O ₂ -Enrichment					
Rotameter Sparger		•	•	•	•	•	•
Solenoid valve for O ₂ Enrichment		•	•	•	•	•	•
Peristaltic pumps (integrated)		3 for Acid/ Base/ Afoam unused pump can be configured as substrate pump					
Supervisory Process Control Software							
MFCS/DA for data storage		•	•	•	•	•	•
Supply frame							
Temperature control system		Open frame design Closed loop system with recirculation pump and heat exchanger for heating and cooling – Alternative: Electrical heating					
Agitation motor holder		•					
Solenoid valves and steam traps for automatic in-situ sterilization		•					
Installation kit, Tubing, O-Ring (spare set)		•					
Culture Vessel							
		Jacketed Stainless steel vessel with upper glass cylinder		Jacketed stainless steel vessel with vertical sight glass			
Stirrer shaft with Single Mechanical Seal		•	•	•	•	•	•
6-blade disk impeller		2	2	3	3	3	3
Stainless steel filter housing for Air Inlet and Exhaust filter incl. filter cartridges		•	•	•	•	•	•
Pressure gauge –1 / 3 barg		•	•	•	•	•	•
Aeration tube with Ring-sparger		•	•	•	•	•	•
Exhaust Cooler		•	•	•	•	•	•
4-Baffels (removable)		•	•	•	•	•	•
Resterilizable sampling valve; complete		•	•	•	•	•	•
1-Channel Sacova valve for needle free additions		•	•	•	•	•	•
3-Channel Sacova valve for needle free additions		•	•	•	•	•	•
Lamp for vessel illumination		–	–	•	•	•	•
Storage bottles		3	3	3	3	3	3
Removable tray for storage bottles		–	–	•	•	•	•
Harvest valve		•	•	•	•	•	•
pH Electrode, cable		•	•	•	•	•	•
DO Electrode, cable		•	•	•	•	•	•
Foam sensor, cable		•	•	•	•	•	•
Temperature sensor Pt 100		•	•	•	•	•	•
High-foam sensor with installation adaptor, cable		•	•	•	•	•	•
Options							
MFC (Sparger Total Flow)		◦ 8847789 0.2–10 l/min	◦ 8847789 0.2–10 l/min	◦ 8848521 0.6–30 l/min	◦ 8848521 0.6–30 l/min	◦ 8848521 0.6–30 l/min	◦ 8848556 1–50 l/min
Electrical heating instead of steam heat exchanger		◦ 8842509	◦ 8842509	◦ 8842507	◦ 8842507	◦ 8842507	◦ 8842507
Top plate lifting device		– –	– –	◦ 8842516	◦ 8842516	◦ 8842516	◦ 8842516
Pressure control Manual Automatic		◦ 8842512 8842513	◦ 8842512 8842513	◦ 8842512 8842514	◦ 8842512 8842513	◦ 8842512 8842513	◦ 8842512 8842513
Vessel weight measurement		– –	– –	◦ 8842514	◦ 8842514	◦ 8842514	◦ 8842514
Feed pump (integrated); speed controlled		◦ 8843468	◦ 8843468	◦ 8843468	◦ 8843468	◦ 8843468	◦ 8843468
Feed pump integrated; digital		◦ 8843466	◦ 8843466	◦ 8843466	◦ 8843466	◦ 8843466	◦ 8843466
Turbidity measurement (amplifier + probe)		◦ on request	◦ 8846618 + 8846604	◦ 8846618 + 8846604	◦ 8846618 + 8846604	◦ 8846618 + 8846604	◦ 8846618 + 8846604
Redox measurement (amplifier + probe)		◦ 8842744 + 8840237	◦ 8842744 + 8840237	◦ 8842744 + 8840237	◦ 8842744 + 8840237	◦ 8842744 + 8840237	◦ 8842744 + 8840237
Broad range of accessories available, Please contact us for further details Please note: Due to technical/ space limitations may not all options can be combined							

• = included, – = not included, – – = unavailable, ◦ = option

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