The Smarter Solution

BioFlo® 320 bioprocess control station
Highly Evolved

Whether your process includes cell culture or fermentation, autoclavable or single-use vessels, the BioFlo 320 seamlessly combines form and function in one state of the art package. A robust industrial design, intelligent sensors, Ethernet connectivity, and enhanced software capabilities are only a few of the features that set it apart from the competition. Combined with a sincere commitment to quality, the BioFlo 320 truly is the premium choice in bench-scale bioprocess control stations.

Flexible
> Autoclavable vessels and our comprehensive portfolio of BioBLU® Single-Use Vessels provide process customization
> Eppendorf exclusive packed-bed and cell lift impeller designs for continuous and perfusion processes
> Universal connections for analog or digital Mettler Toledo® ISM® sensors reduce sensor complexity
> Thermal mass flow controllers for sparge and overlay gas can be upgraded in the field
> Universal gas control strategy for both microbial and cell culture applications removes process limitations

Powerful
> Extensive working volume range of 250 mL – 40 L on a single control platform
> High-powered direct and magnetic drive motor assemblies
> Up to six integrated pumps capable of operating in variable speed mode
> Industry standard Ethernet communication for multi-unit control of up to eight systems, Eppendorf SCADA software, and remote monitoring

Industrial
> Industrial design featuring stainless steel front, back, and utility panels
> Left- and right-handed orientations to maximize lab space efficiency
> Hemispherical vessel nest design for minimum footprint
> Robust protection of sensitive electronic components (IP68-rated connections on utility panel and IP22-rated connection for power entry)
Small footprint... big impact
From R&D laboratories to pilot-scale production facilities, space is a major factor when selecting the right equipment. The BioFlo 320 offers flexibility, better control, and maximum functionality while occupying a fraction of the valuable lab space of similar systems. This means greater efficiency and productivity at a lower operating cost for your lab.
BioBLU® Single-Use Vessels

- Compatible with 250 mL – 40 L BioBLU Single-Use Vessels including the BioBLU 5p, the first single-use vessel to utilize the exclusive packed-bed impeller
- Built-in optical pH sensor technology
- Vessel and exhaust heat blanket connections provide precise temperature control and exhaust gas treatment
- Bench-scale single-use vessels specifically designed for microbial fermentation
- Rigid-walled, stirred-tank design provides many advantages over single-use bag design
  > Eliminates potential for tears, pits, and folds during installation
  > Single-layer polymer removes both uncertainty for leachable and extractable data and the need for unnecessary preventative actions, like pre-process media wash

Advanced Software Solutions

- Control eight units from a single user interface
- Automatic gas mixing algorithms for simplified control (4-gas, 3-gas, O₂ enrichment, N₂ enrichment)
- New ten-point cascade feature for sophisticated control strategies
- Built-in elapsed fermentation timer for batch management
- Trend display with up to twelve process values within a single view
- Remote access via PC or tablet

Intelligent Sensors

- Integrated Mettler Toledo Intelligent Sensor Management (ISM) platform
- Universal connections for up to four analog or digital (ISM) sensors
  > pH: analog or digital (ISM)
  > DO: analog or digital (ISM)
  > Optical DO: digital (ISM)
  > Redox: analog or digital (ISM)
  > CO₂: digital (ISM)
- Real-time sensor diagnostics anticipate sensor failure

Applications

- Universal control for mammalian, stem cell, insect, microbial, plant, and algae cultures
- Validation packages for use in GMP environment
- Suitable for use in all labs, from academic through pilot-scale production
- Batch, fed-batch, perfusion, and continuous processes
- Secreted product, vaccine, and monoclonal antibody production
- Growth of seed to pilot scale cultures
- Biofuels research and manufacturing
- Scale-up and scale-down modeling
- Suspension or adherent cultures
- Micro-aerobic, anaerobic, exothermic fermentation processes
- Specialized impellers for low-shear and zero-shear process needs
- Food and beverage
- Fine chemical processes
### BioFlo 320 Specifications

#### Control Station
- **Dimensions (W x D x H)**: 40.6 x 40.6 x 66.0 cm (16 in x 16 x 26 in)
- **Net weight**: 32 kg (70 lb)
- **Touchscreen**: 38.1 cm (15 in) projected capacitive touchscreen
- **Communication**: 2 x USB (software updates, serial communication) Ethernet (SCADA, IP Network) 3 x Analog Input/Output (defined as 4 – 20 mA or 0 – 5 V or 0 – 10 V)

#### Utility
- **Electrical Connection**: IEC (with regional plug types) **Requirement**: 100 – 120/208 – 240 VAC, 50/60 Hz, 2270 VA, Single Phase
- **Water Connection**: Stainless steel quick-connect **Connection**: Push-connect
- **Gas supply (Air, O₂, N₂, CO₂)**: 10 psig (0.69 barg) **Autoclavable**: 10 psig (0.69 barg) 6 psig (0.44 barg)

#### Exhaust
- **0.5 psig (0.035 barg)

#### Operating conditions
- **10 – 30 °C, up to 80 % RH, non-condensing

#### Altitude limit
- **2000 m

#### Agitation
- **Direct drive**: 25 – 1200 rpm (all vessel sizes)
- **Magnetic drive (autoclavable vessels)**: 1 L, 3 L, or 5 L: 25 – 500 rpm 10 L: 25 – 150 rpm
- **Magnetic drive (single-use vessels)**: BioBLU 1c: 25 – 500 rpm BioBLU 1f & 3f: 25 – 1200 rpm BioBLU 3c, 5c & 14c: 25 – 200 rpm BioBLU 50c: 25 – 150 rpm

#### Temperature
- **Water-jacketed**: 5 °C above coolant to 55 °C above ambient (80 °C max)
- **Stainless steel dish-bottom**: 5 °C above coolant to 65 °C above ambient (90 °C max for 10 L)
- **Single-use**: 5 °C above ambient to 40 °C (60 °C max for BioBLU 1) **Sensor type**: PT100

#### Gas supply
- **Sparge**: 1, 3, or 4 TMFC; ring or micro-sparger
- **Overlay**: 1 TMFC; headspace addition

#### Sensors
- **pH**: Analog or digital Mettler Toledo ISM 2 – 12
- **Optical pH**: Digital (Presens) 6 – 8
- **DO**: Analog or digital Mettler Toledo ISM 0 – 200 %
- **Optical DO**: Digital Mettler Toledo ISM 0 – 200 %
- **Redox**: Analog or digital Mettler Toledo ISM ±2000 mV (+)2000 mV
- **CO₂**: Digital Mettler Toledo ISM 0 – 100 %

#### Pumps
- **Pumps 1, 2, & 3**: Watson-Marlow 114DV 5 – 25 rpm 25 rpm (0 – 100 % Duty Cycle)
- **Pump 4 (optional)**: Watson-Marlow 314D 20 – 100 rpm 100 rpm (0 – 100 % Duty Cycle)
- **External pumps 1 & 2**: Watson-Marlow 120U/DV 0.1 – 200 rpm N/A

*Specifications subject to change.*
## Vessel Specifications

### Autoclavable vessels

<table>
<thead>
<tr>
<th>Vessel</th>
<th>1 L</th>
<th>3 L</th>
<th>5 L</th>
<th>10 L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total volume</td>
<td>2.5 L</td>
<td>5.0 L</td>
<td>7.5 L</td>
<td>14.0 L</td>
</tr>
<tr>
<td>Working volume</td>
<td>0.6 – 1.9 L</td>
<td>1.3 – 3.8 L</td>
<td>1.9 – 5.6 L</td>
<td>3.5 – 10.5 L</td>
</tr>
<tr>
<td>Vessel type</td>
<td>Stainless steel dished-bottom or water-jacketed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Borosilicate Glass, 316L Stainless Steel</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Impellers

- **Direct drive**: Rushton, pitched blade or marine
- **Magnetic drive**: Pitched blade, marine, spin filter, cell lift or packed-bed

### Dimensions (with exhaust condenser)

#### Stainless steel dished-bottom

<table>
<thead>
<tr>
<th>Outer diameter (OD)</th>
<th>19.9 cm</th>
<th>22.9 cm</th>
<th>25.6 cm</th>
<th>29.3 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (no exhaust filter)</td>
<td>51.8 cm</td>
<td>58 cm</td>
<td>61.2 cm</td>
<td>67.9 cm</td>
</tr>
<tr>
<td></td>
<td>20.4 in</td>
<td>22.8 in</td>
<td>24.1 in</td>
<td>26.7 in</td>
</tr>
</tbody>
</table>

#### Water-jacketed

<table>
<thead>
<tr>
<th>Outer diameter (OD)</th>
<th>21.6 cm</th>
<th>23.1 cm</th>
<th>27.7 cm</th>
<th>32.3 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (no exhaust filter)</td>
<td>55.4 cm</td>
<td>61.9 cm</td>
<td>65.5 cm</td>
<td>72.9 cm</td>
</tr>
<tr>
<td></td>
<td>21.8 in</td>
<td>24.4 in</td>
<td>25.7 in</td>
<td>28.7 in</td>
</tr>
</tbody>
</table>

### Number of head plate ports

| 6 mm | 1 | 3 | 3 | 3 |
| 13.5 | 9 | 10 | 12 | 12 |
| 19 mm | 0 | 1 | 1 | 1 |
| Total | 10 | 14 | 16 | 16 |

### Recommended sensor lengths (mm)

<table>
<thead>
<tr>
<th>Sensor</th>
<th>pH¹</th>
<th>pH (packed-bed)</th>
<th>DO¹</th>
<th>DO (packed-bed)</th>
<th>Redox¹</th>
<th>CO₂¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200</td>
<td>200</td>
<td>220</td>
<td>120</td>
<td>200</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>220</td>
<td>200</td>
<td>220</td>
<td>120</td>
<td>225</td>
<td>225</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>225</td>
<td>220</td>
<td>120</td>
<td>325</td>
<td>325</td>
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<td></td>
<td>200</td>
<td>220</td>
<td>220</td>
<td>120</td>
<td>220</td>
<td>320</td>
</tr>
</tbody>
</table>

1 Requires compression fitting (M1287-5030), 2 x included with Vessel Connection Kit

### Single-use vessels

#### BioBLU 1 c/f BioBLU 3c/f BioBLU 5c BioBLU 5p BioBLU 14c BioBLU 50

<table>
<thead>
<tr>
<th>Vessel type</th>
<th>Rigid-walled, stirred-tank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total volume</td>
<td>1.8 L</td>
</tr>
<tr>
<td>Working volume</td>
<td>0.25 – 1.25 L²</td>
</tr>
<tr>
<td>Impellers</td>
<td>Magnetic drive</td>
</tr>
</tbody>
</table>

### Recommended sensor lengths (mm)

<table>
<thead>
<tr>
<th>Sensor</th>
<th>pH (EC)²</th>
<th>DO²</th>
<th>Redox²</th>
<th>CO₂²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>220</td>
<td>220</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>220</td>
<td>225</td>
<td>225</td>
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</tr>
<tr>
<td></td>
<td>220</td>
<td>220</td>
<td>225</td>
<td>220</td>
</tr>
</tbody>
</table>

¹ Requires compression fitting (M1287-5030), 2 x included with Vessel Connection Kit
² BioBLU 5c: 425 mL minimal working volume when used with vessel stand and heat blanket
³ Installation may require compression fitting for optimal fit and depth (1386010200)

Specifications subject to change.
»Explore the versatility of the BioFlo® 320 Control Station.«