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New Brunswick Scientific

Where Quality and Innovation Have Become Tradition

BIOFLO® 110
MODULAR FERMENTOR & BIOREACTOR

1.3L – 14.0L Systems Ideal for Research Labs



BioFlo 110: Versatile & Easy-to-Use!

If you'd like to produce higher yields of biomass or secreted products than your current shaker, T-flask or roller bottle can provide, NBS has the solution! We've developed a fermentor—bioreactor specifically designed for simple, intuitive operation, with the power and versatility to meet the ever-changing needs of busy research labs.

Readily Adapts as Your Needs Change

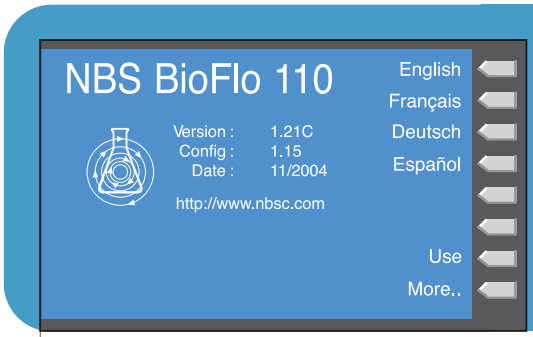
- **Grow virtually any cell type** from aerobic and anaerobic microbial cultures to yeast, insect, plant and mammalian cells.
- **Interchangeable control modules, impellers, motor drives and vessels** provide all the versatility you'll ever need. Simply add or substitute components as process requirements change.
- **Autoclavable glass vessels in four sizes** simplify scale-up and let you select the right volume for your application. Available in 1.3, 3.0, 7.5 and 14.0L (total volume).
- **Pre-programmed control ranges** for fermentation and cell culture simplify operation and can be easily user-modified for you specific needs.

Advanced Controls. Simple Operation

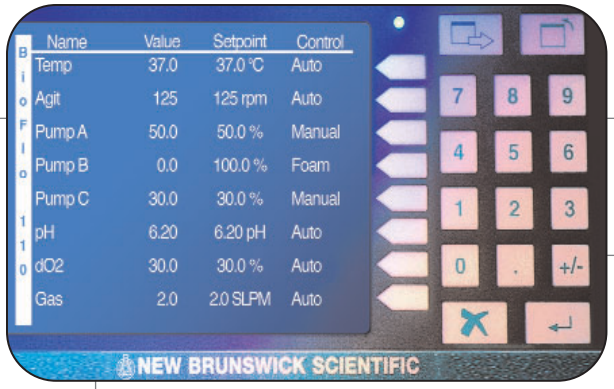
- **Control and view up to four separate vessels** from a single screen.
- **Simple display and easy-to-use controls** make the BioFlo 110 the most user-friendly system on the market today.
- **Navigate between control screens** to easily set system parameters.
- **Advanced language features:** choose English, Spanish, German or French, or switch between them.

Simplified System Selection

- **Pre-packaged kits** have everything you need to get started.
- **Select either our Basic or Advanced Fermentation Kits, or Advanced Cell Culture Kit.** A single catalog number is all that's needed.
- **Add-a-Vessel Kits** simplify adding a 2nd, 3rd or 4th vessel. (Additional controllers are required.)
- **Optional controllers and components** can be added at any time.



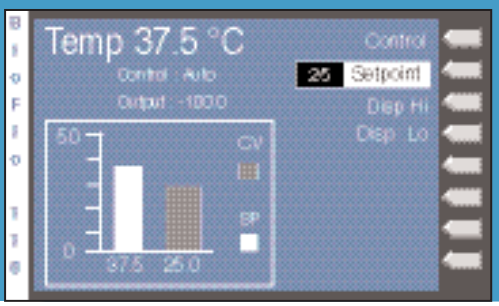
Select one of four display languages to get started.



The Primary Control Unit or "PCU" is exceptionally user-friendly—control screens are easy to understand and navigate.



Pre-packaged kits provide turn-key solutions for your lab. Adding extra vessels or control modules is plug-and-play simple. No configuration needed. Advanced Cell Culture Kit shown.



Select "Setpoint" to easily change the process parameters and graph range.



With the Gas Mix Controller, blend 2 or 4 gasses to regulate pH and/or DO, or choose 100% of one gas.



Advanced users may modify "P" (Proportional), "I" (Integral) and "dead-band" values. Return to factory settings simply by selecting "Default".

Simply Extraordinary

Intelligent Controls

- **Built-in "cascade" feature** automatically maintains pH and DO setpoints. Control pH using gas and/or acid/base addition; and DO with agitation, gas and/or additions.
- **Optional Gas Mix Controller** automatically mixes 2 or 4 gasses to optimize growth in microbial, insect, plant and animal cell cultures.
- **Choose gas flow control** via manual rotameter or digital thermal mass flow control.
- **Adjustable P-I-D values for pH and DO** provide additional control flexibility.
- **Upgrade your firmware** quickly and easily using free downloads from our website. No service technician or down-time!
- **Compatible with NBS BioCommand® software and Modbus** for advanced control and data logging.

Smart Design

- **Magnetic drive and direct drive** options provided for cell culture. Direct drive is standard for fermentation.
- **Choice of eight vessels—**single-wall vessel with heat blanket, double-walled vessel with water-jacket heater, available in 1.3, 3.0, 7.5 and 14L options.
- **Removable plug** at the end of the sparge ring simplifies cleaning.
- **Probe immersion length can be adjusted** using NBS-designed probe adapters.

Application Support

- **Our team of application specialists** and scientists are available for your support. Hands-on training is available at our U.S. headquartered research & pilot plant labs. Ask your sales representative regarding availability of on-site training at your facility.

Impeller Choices



Multiple impellers are offered to suit virtually any application.

1. Rushton impeller
2. Pitched blade impeller
3. Marine blade
4. Spin filter with marine blade

Parts & Accessories

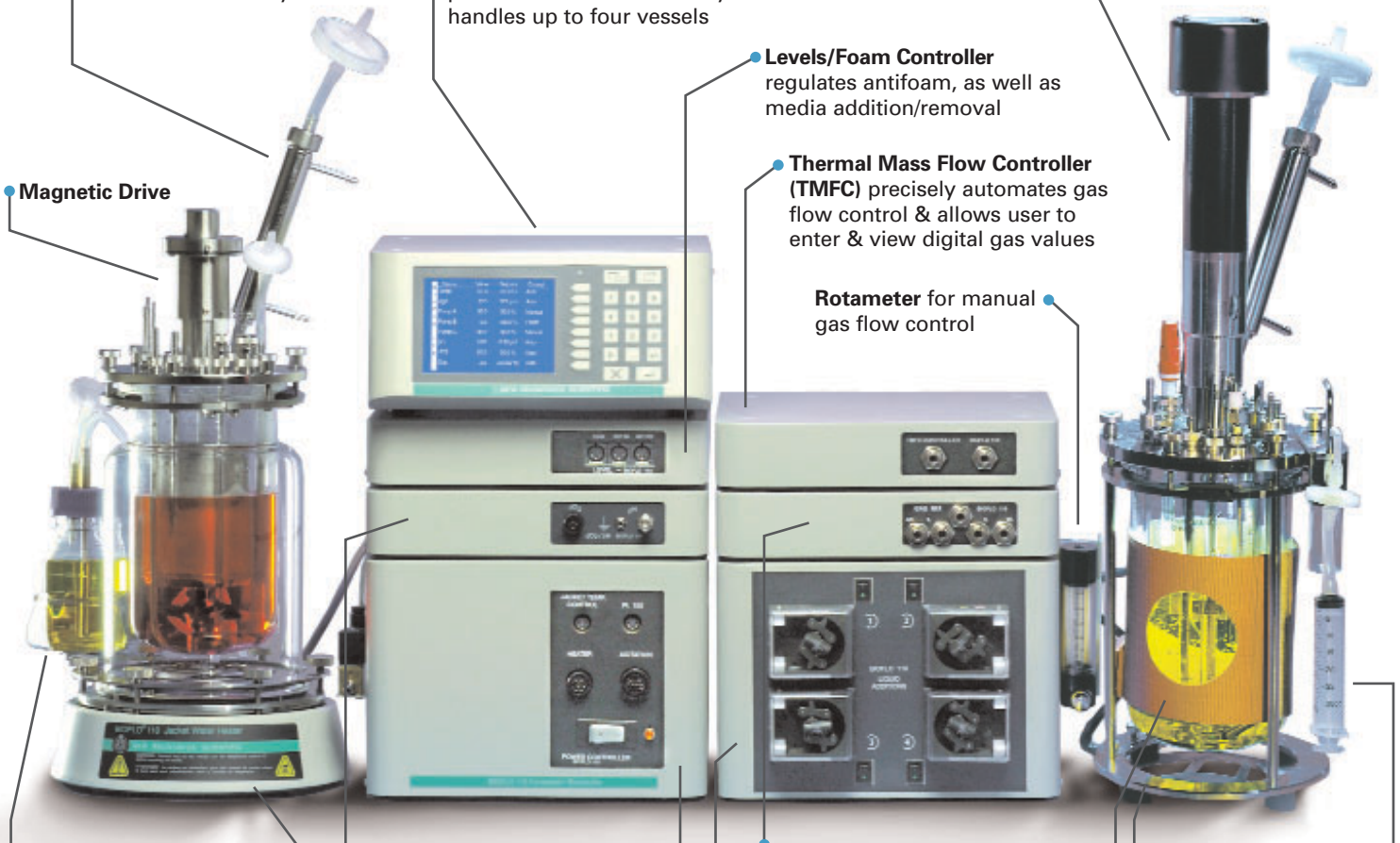


Wide range of accessories are available for your BioFlo 110.

Optional Spare Parts Kit



Optional Spare Parts Kits provide replacement filters, o-rings and more, neatly organized and ready to use.



Stainless Steel Exhaust Condenser keeps vessel contents from evaporating and exhaust filter dry

Multi-Language Primary Control Unit (PCU) controls and displays up to 32-process parameters. Simultaneously handles up to four vessels

Direct Drive

Levels/Foam Controller regulates antifoam, as well as media addition/removal

Thermal Mass Flow Controller (TMFC) precisely automates gas flow control & allows user to enter & view digital gas values

Magnetic Drive

Rotameter for manual gas flow control

Addition Bottle Holder is conveniently mounted on the vessel stand, saving valuable bench space

Space-saving **Water Jacket Heater** sits below the double-walled vessels

pH/dO$_2$ Controller regulates a pH probe and a DO probe

Power Controller regulates temperature, agitation and up to five pumps

Gas Mix Controller provides regulation of pH and DO in cell culture and oxygen enhancement in fermentation. Four valves allow automatic rationing of two or four gasses: air, O_2, CO_2 & N_2

Pump Module has four independent pumps for acid/base, antifoam, liquid addition/removal. One module may be shared by multiple vessels

Sterile Sampler

Autoclavable Vessel Stand is provided with heat-blanketed vessels.

Heat Blanket with two viewing windows provides precise temperature control for single-walled vessels

Multiple Headplate Ports provide ample space for probes				
Vessel Size	**6 mm**	**12 mm**	**19 mm**	**Total Ports**
1.3 L	1	9	0	**10**
3.0 L	6	7	0	**13**
7.5 & 14.0 L	7	8	1	**16**

Small Footprint. Controllers stack to save valuable bench space.									
Controller	**Height**		**Width**		**Depth**		**Weight**	
PCU	5¼″	(13.3)	12″	(30.5)	14″	(35.6)	5	2.3
Power	8 ¼″	(21.0)	12″	(30.5)	12″	(30.5)	16	7.2
Level/Foam	4″	(10.2)	12″	(30.5)	12″	(30.5)	4	1.8
pH/DO	4″	(10.2)	12″	(30.5)	12″	(30.5)	5	2.3
TMFC	4″	(10.2)	12″	(30.5)	12″	(30.5)	5	2.3
4-Pumps	8.5″	(21.6)	12″	(30.5)	14.5″	(36.8)	14	6.4
Gas Mix	4″	(10.2)	12″	(30.5)	12″	(30.5)	4	1.8

All dimensions shown in inches & cm. Weight shown in lbs. and kg.

Out of the box and ready to grow.

The BioFlo 110 is simple to set up and easy to expand as your needs grow:

- **The most basic kit includes a Primary Control Unit and Power Controller to regulate temperature and agitation.**
- **Additional control modules** are plug and play ready—no configuration required.
- **Use one of our BioCommand® software packages** to automate data collection and supervise your cultures.

You won't easily outgrow the BioFlo 110's capabilities.

Contents of BioFlo® 110 Fermentor & Cell Culture Kits

Kit Contents	Advanced Fermentation Kit	Advanced Cell Culture Kit	Basic Fermentation Kit
Vessel Kit – Basic*			●
Vessel Kit – Advanced *	●	●	
Primary Control Unit (supports 4 vessels)	●	●	●
Power Controller (for temperature and agitation)	●	●	●
Foam/Levels Controller	●	●	
Foam Probe, adapter and cable	●	●	
pH/DO Controller	●	●	
pH Probe, adapter and cable	●	●	
DO Probe, adapter and cable	●	●	
4-Pumps Module	●	●	
Gas Mix Controller		●	
Thermal Mass Flow Controller (optional)			

(*) For details of vessel kit components, see the Add-A-Vessel table below

Add-A-Vessel Kits for Fermentation and Cell Culture

Vessel Kits are very complete, containing most ancillary components required for independent operation as a 2nd, 3rd or 4th vessel. Additional control components may be required.

Component	Vessel Kit – Advanced Fermentation		Vessel Kit – Advanced Cell Culture		Vessel Kit – Basic Fermentation	
	Heat Blanket (HB)	Water Jacket (WJ)	Heat Blanket (HB)	Water Jacket (WJ)	Heat Blanket (HB)	Water Jacket (WJ)
Dish-Bottom Vessel w/stainless steel headplate	●	●	●	●	●	●
Vessel Stand	●		●		●	
Agitation Motor, 50–1200 rpm	●	●			●	●
Agitation Motor, 30–300 rpm			●	●		
Direct Drive Assembly	●	●	●	●	●	●
Magnetic Drive Assembly Option			●	●		
Heater Blanket	●		●		●	
Jacket Water Heater		●		●		●
Immersion Cooling Coil	●		●		●	
Cooling Water Valve	●	●	●	●	●	●
Thermowell	●	●	●	●	●	●
RTD Probe	●	●	●	●	●	●
Rotameter	●	●	●	●	●	●
Baffle Assembly	●	●			●	●
Two Rushton Impellers	●	●			●	●
One Pitched Blade Impeller			●	●		
Exhaust Condenser	●	●	●	●		
Sterile Sampler	●	●	●	●		
Tri-Port Adapter	●	●	●	●		
Septum Kit	●	●	●	●		
Liquid Addition Tube and Headplate Adapter	●	●	●	●		
Three Addition Bottles and Tubing	●	●	●	●		

Advanced Fermentation Kits — Ordering Information

Advanced Fermentation Kits are available with choice of heat-blanketed vessel (HB) or water-jacketed vessel (WJ).				
Total Volume (L)	**Working Volume (L)**	**Electrical Service**	**HB Kit Catalog No.**	**WJ Kit Catalog No.**
1.3	0.4 – 1.0	100 – 120 V 200 – 240 V	M1273-1121 M1273-1151	M1273-1111 M1273-1161
3.0	0.8 – 2.2	100 – 120 V 200 – 240 V	M1273-1122 M1273-1152	M1273-1112 M1273-1162
7.5	2.0 – 5.6	100 – 120 V 200 – 240 V	M1273-1125 M1273-1155	M1273-1115 M1273-1165
14.0	4.0 – 10.5	100 – 120 V 200 – 240 V	M1273-1130 M1273-1150	M1273-1120 M1273-1160

Basic Fermentation Kits — Ordering Information

Basic Fermentation Kits are available with choice of heat-blanketed vessel (HB) or water-jacketed vessel (WJ).				
Total Volume (L)	**Working Volume (L)**	**Electrical Service**	**HB Kit Catalog No.**	**WJ Kit Catalog No.**
1.3	0.4 – 1.0	100 – 120 V 200 – 240 V	M1273-1101 M1273-1141	M1273-1621 M1273-1631
3.0	0.8 – 2.2	100 – 120 V 200 – 240 V	M1273-1102 M1273-1142	M1273-1622 M1273-1632
7.5	2.0 – 5.6	100 – 120 V 200 – 240 V	M1273-1105 M1273-1145	M1273-1625 M1273-1635
14.0	4.0 – 10.5	100 – 120 V 200 – 240 V	M1273-1110 M1273-1140	M1273-1630 M1273-1640

Advanced Cell Culture Kits — Ordering Information

Advanced Cell Culture Kits are available with choice of heat-blanketed vessel (HB) or water-jacketed vessel (WJ) and choice of magnetic (M) or direct-drive (D) agitation systems.					
Total Volume (L)	**Working Volume (L)**	**Electrical Service**	**Agitation System**	**HB Catalog No.**	**WJ Catalog No.**
1.3	0.4 – 1.0	100–120 V	M D	M1273-1201 M1273-1301	M1273-1211 M1273-1311
		200–240 V	M D	M1273-1401 M1273-1501	M1273-1171 M1273-1371
3.0	0.8 – 2.2	100–120 V	M D	M1273-1202 M1273-1302	M1273-1212 M1273-1312
		200–240 V	M D	M1273-1402 M1273-1502	M1273-1172 M1273-1372
7.5	2.0 – 5.6	100–120 V	M D	M1273-1205 M1273-1305	M1273-1215 M1273-1315
		200–240 V	M D	M1273-1405 M1273-1505	M1273-1175 M1273-1375
14.0	4.0 – 10.5	100–120 V	M D	M1273-1210 M1273-1310	M1273-1220 M1273-1320
		200–240 V	M D	M1273-1410 M1273-1510	M1273-1170 M1273-1370

Optional BioCommand Software for Automated Data Logging & Control

BioCommand Plus: M1291-0000	BioCommand Lite: M1286-0000

BioFlo 110 Fermentor/Bioreactor Specifications*

Vessel	**Total Volume**	**1.3 Liters**	**3.0 Liters**	**7.5 Liters**	**14.0 Liters**
	Working Volume	0.4 – 1.0 Liters	0.8 – 2.2 Liters	2.0 – 5.6 Liters	4.0 – 10.5 Liters
	Design	Water-jacketed and heat-blanketed vessels available All are autoclavable, dished-bottom, borosilicate glass			
	Stand	Heat-blanketed vessels include integral bench and autoclave stand Water-jacketed vessels are self-standing			
Agitation	**Fermentation**	Direct drive, 50 – 1,200 rpm, dual Rushton-style impellers			
	Cell Culture	30 – 300 rpm, direct or magnetic drive, pitched blade impeller			
Temperature	**Control**	All vessels use P-I-D control for heating and cooling Heat-Blanketed Vessels: External heat mantle & high-capacity immersed cooling coil Water-Jacketed Vessels: Temperature-controlled water in glass jacket			
	Maximum Temp.	70° C			
Controller Design		Primary Control Unit (PCU) plus optional, stackable loop-control modules. PCU supports 4 vessels — up to 32 loops, total			
Communications		Serial Port with BioCommand & Modbus protocols. 4-channel 0 - 2.5 V DC output for recorder			
Primary Control Unit (PCU)	**Functions**	Human Interface Control Center for up to 4 vessels			
	Display	Bright text & graphics on 3.4 x 4.5" (8.6 x 11.4 cm) ¼ VGA screen			
	Multi-Vessel Support	Automatically senses attached loop controllers			
	Upgrades	Built-in floppy drive for easy firmware upgrades			
	Display Languages	English, German, French & Spanish			
	Control Modes	Manual and Automatic			
	Operating Modes	Fermentation and Cell Culture			
Power Controller		Provides power for temperature control (heating and cooling), agitation and 5 optional pumps for liquid addition and removal			
4-Pump Module ◊		Module provides four peristaltic pumps for liquid addition and removal			
Antifoam/Levels Controller ◊		Module supports three conduction probes for automating liquid additions and removals, and foam control			
DO_2 - pH Controller ◊	**General Info**	Optional controller with one pH and one dissolved oxygen probe connection			
	Dissolved Oxygen Control	Setpoint range: 0 – 100 %. Agitation or oxygen enrichment cascades. Sparge on demand. Four-gas algorithm for cell culture application			
	pH Control	Setpoint range: 2 – 12. Control - P-I-D with adjustable deadband. Acid/base liquid additions (requires pumps). Four-gas mixing (requires Gas Mix Controller)			
Gas Mix Controller ◊		Four solenoid valves sequence additions of up to four gasses for pH and DO control in cell culture, or oxygen enrichment of sparge gasses			
Utility Requirements	**Water (50µ filter)**	5–10 PSIG (0.34–0.68 kg/cm²)			
	Air/O_2/CO_2/N_2	3–10 PSIG (0.20–0.68 kg/cm²) medical grade			
	Electricity	(2) 100/120V, 50/60 Hz, 10 Amp or (2) 200/240V, 50/60 Hz, 6 Amp			
Certifications		CE, cETL			
Simplified Ordering		A variety of complete kits are offered — see pages 6 - 7. Individual components, spare parts kits and maintenance plans are also available. Contact your NBS rep for details.			

(*) Specifications subject to change without notice. (◊) Not all controllers are included with all kits. Refer to pages 6 – 7 for details.

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Vessel Dimensions, As Prepared for Autoclave

Vessel Total Volume	Heat-Blanketed Vessels									
	With Exhaust Condenser						Without Exhaust Condenser			
	Width		Depth		Height		Diameter		Height	
	Inches	cm	Inches	cm	Inches	cm	Inches	cm	Inches	cm
1.3 & 3.0L	9.5	24	8.5	22	22	56	8.5	22	16.5	42
7.5L	14.5	37	11.5	29	25.5	65	11.5	29	19.5	49.5
14.0L	11.5	29	11.5	29	29	74	11.5	29	24	61
	On Optional Slant Rack									
7.5L	28	71	11.5	29	18	46	—	—	—	—
14.0L	31.5	80	11.5	29	20	51	—	—	—	—
Vessel Total Volume	Water-Jacketed Vessels									
	With Exhaust Condenser						Without Exhaust Condenser			
	Width		Depth		Height		Diameter		Height	
	Inches	cm	Inches	cm	Inches	cm	Inches	cm	Inches	cm
1.3L	11.5	29	11.5	29	20.5	52	9.25	24	16	41
3.0L	11.5	29	11.5	29	22.5	56	9.25	24	18	45
7.5L	11.5	29	11.5	29	26.8	68	11.5	29	20.5	52
14.0L	11.5	29	11.5	29	31.5	80	11.5	29	26.5	67
	On Optional Slant Rack									
7.5L	26	66	11.5	29	18.5	47	—	—	—	—
14.0L	28.5	72	11.5	29	20.5	52	—	—	—	—

Gross Weight, Complete Kits

Vessel Type	Size	Fermentation				Cell Culture	
		Basic Kit		Advanced Kit		Advanced Kit	
	T.V.	lbs	kg	lbs	kg	lbs	kg
Non-Jacketed	1.3	37	17	62	28	67	30
	3.0	43	19	68	31	73	33
	7.5	63	28	88	40	93	42
	14.0	67	31	92	42	97	44
Water-Jacketed	1.3	39	18	64	29	69	31
	3.0	43	20	68	31	73	33
	7.5	64	29	89	41	94	43
	14.0	75	34	100	46	105	48

Vessel size in the charts above and at left indicate total volume.

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