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Find the *Eppendorf / New Brunswick Scientific Innova 2000* at our website: ***Click HERE***

innova

BIOLOGICAL SHAKERS

Benchtop, Floor Standing and Stackable Models for All of Your Culture Needs









New Brunswick Scientific

Where Quality and Innovation Have Become Tradition

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Innova® Shakers
Quality. Reliability.



Incubated/Refrigerated & Stackable



Page 6

Incubated/Refrigerated Floor Model



Page 8

Incubated /Refrigerated & Stackable



Page 10

Incubated



Page 12

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Convenience.



New Brunswick shakers are used in more laboratories, the world over, than any other biological shaker. Their immense popularity stems from the quality materials and an often imitated but never duplicated design principle that translates into worry-free operation, often for decades of continuous use.

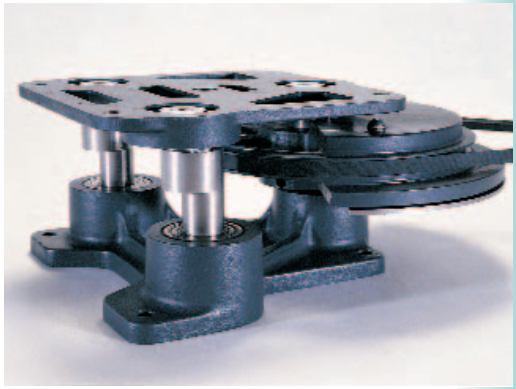
Little wonder that our top-of-the-line Innova® models are the best-selling shakers in the industry. These microprocessor-controlled shakers offer a wide range of advanced features for reproducible results, automated operation and long life. Design advantages include pushbutton setpoints, digital alarms and self-correcting feedback controls that lock onto speed and temperature with exceptional precision. Built-in safety sensors limit speed when the shaker is overloaded or unbalanced. Some models even include temperature programming to limit metabolic activity in studies that end overnight or on the weekend, saving a return trip to the lab. With 22 models to choose from, including several space-saving stackable units, there's a shaker to meet your every need.

See page 4 for standard features included in every Innova shaker, then turn to the model or models that best suit your application on the pages that follow.

Why Are Innova Shakers So Reliable?

Dependable, day in and day out operation is due in large part to the unique **NBS Triple Eccentric Gyrotory® Drive**. The broad-based cast-iron support mechanism is the heaviest in the industry, with a proven 50-year record of dependability. Precisely fitted with nine ball-bearings, it's counterbalanced to impart smooth, uniform motion to the culture medium, even when operated at speeds up to 500 rpm.

Of course there are many other design advantages inherent in all Innova shakers that ensure your shaker will last for many years to come. Cool-running heavy-duty motors; welded, not-screwed or riveted cabinetry; and circuitry that's individually fused, to name just a few. For more, see the next page.



Incubated/Refrigerated Multi-Shaker



Page 14

Incubated/Refrigerated Water Bath



Page 16

Platform/Ambient Shakers



Page 18

Multi-Tier Shaker

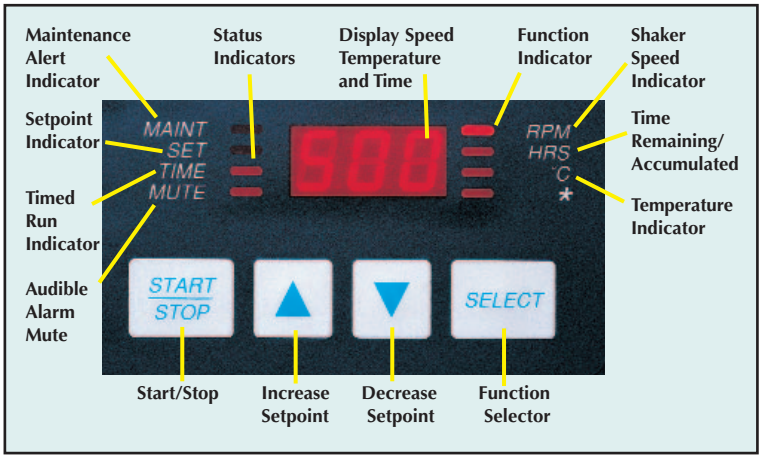


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More Design Advantages





Membrane keypad sets and displays operating parameters, current status, running time and alarm conditions. Wipes down for easy cleanup in case of spills.

- **Microprocessor Controls With Self-Correcting PI Feedback** precisely regulate speed, running time and, when applicable, incubation, refrigeration and humidity
- **Wide Speed Range Provides Versatility for Culturing Shear-Sensitive Mammalian Cells as well as Robust Bacterial Cultures**. Speed controlled within ± 1 rpm
- **Incubated Models Precisely Regulated Within ±0.1°C** in the 30° - 40°C range. See spec charts for added details
- **Timed Studies (0.1 to 99.9 Hours) Can Be Programmed for Automatic Agitation Shut-Off.** End-of-study alarm and status light can be deactivated for continuous operation
- **Audible and Visible Alarms** additionally alert the user to setpoint deviations. Audible alarm can be muted
- **User-Friendly Controls** for entering setpoints and viewing current status. Display is clearly visible from all angles, across the room, and in the dark
- **Interchangeable Accessory Platforms** accommodate any size glassware. **"Dedicated Platforms"** with a single-size clamp provide maximum capacity. **"Universal Platforms"** let you mix different-sized flask clamps and test tube racks, for added versatility. (See page 22-23.)
- **NBS Shakers Are the Quietest-Running Shakers In the Industry** providing a more favorable work environment
- **Electronics & Mechanical Components Are Enclosed, Protected From Accidental Spills**
- **Output Signal to Record Temperature and Speed**
- **Cool-Running Brushless Motor** never requires lubrication; and provides years of long life
- **Comprehensive Warranty** — Two-years or 10,000 hours, whichever comes later, covering labor and parts for the *entire machine***

(**) Glassware and their contents are not covered. See actual warranty for details. Innova 44 & 44R have a two year comprehensive warranty with three years on parts.

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Inherent In Innova Shakers

Model	Platform size (Inches)	Max Capacity 250 ml flasks on universal platform	Capacity & Largest Flask Size on Universal Platform	Orbit Diameter (inches)	Temperature Range C° (†)	RPM Range ◊	Type/Application	Refrigeration	Multi-Step Programming	Photosynthetic Lights	Gassing Manifold	UV Germicidal Lamp	Humidity Control	Humidity Monitor	Page
Innova 2000	11 x 13	6	4 x 500mL	0.75	N/A	25 to 500	Benchtop								18-19
Innova 2050	12 x 16	10	8 x 500mL	0.75	N/A	25 to 500	Benchtop								18-19
Innova 2100	18 x 18	18	2 x 6L	0.75	N/A	25 to 500	Benchtop								18-19
Innova 2150	18 x 24	24	3 x 6L	0.75	N/A	25 to 500	Benchtop								18-19
Innova 2300	18 x 30	30	4 x 6L	1.0 ; 2.0	N/A	25 to 500	Benchtop								18-19
Innova 2350	24 x 36	50	8 x 6L	1.0 ; 2.0	N/A	25 to 500	Benchtop								18-19
Innova 2130	18 x 18	N/A	N/A	0.75	N/A	25 to 500	Robotic interface								18
Innova 2135	18 x 18	N/A	N/A	0.187	N/A	25 to 800	Robotic interface								18
Innova 2180	18 x 18	N/A	N/A	0.187	N/A	25 to 800	Combi-chem								18
Innova 3100	12 x 16.5	8	2 x 2L	0.5	A +5 to 100	25 to 400	Waterbath								16-17
Innova 4000	18 x 18	18	5 x 2L	0.75	A +5 to 60	25 to 500	Benchtop				✓*				12-13
Innova 4080	18 x 18	18	5 x 2L	0.75	A +5 to 80	25 to 500	Benchtop				✓*				12-13
Innova 4200	18 x 18	18	2 x 6L	0.75 ; 1.0	A +5 to 80	25 to 400	Single Benchtop or floor Stackable (2 units)				✓*				10-11
Innova 4230	18 x 18	18	2 x 6L	0.75 ; 1.0	A -20 to 80	25 to 400		✓	✓*	✓*	✓*				10-11
Innova 4300	18 x 30	30	4 x 6L	1.0	A +5 to 60	25 to 500	Floor				✓*				8-9
Innova 4330	18 x 30	30	4 x 6L	1.0	A -15 to 60	25 to 500	Floor	✓			✓*				8-9
Innova 4335	18 x 30	30	4 x 6L	1.0	A -15 to 60	25 to 500	Dual Temp timer	✓	✓		✓*				8-9
Innova 4340	18 x 30	30	4 x 6L	1.0	A -15 to 60	25 to 500	Dual Temp Photosynthetic	✓	✓	✓	✓*				8-9
Innova 44	18 x 30	30	6 x 5L	1.0 ; 2.0	A +5 to 60	25 to 400	Floor Stackable (up to 3)		✓		✓*	✓*		✓*	6-7
Innova 44R	18 x 30	30	6 x 5L	1.0 ; 2.0	A -20 to 80	25 to 400	Floor Stackable (up to 3)	✓	✓	✓*	✓*	✓*		✓*	6-7
Innova 4900	Up to 4 18 x 24	96	Refer to Catalog	1.0 ; 2.0	A†-20 to 60	25 to 400	Env. Chamber with up to 4 shakers	✓	✓*	✓*			✓		14-15
Innova 5000	6 Platforms 32.5 x 26.8	252	Refer to Catalog	2.0	N/A	25 to 350	Three tier, large scale								20-21

(*) Optional feature. (†) Ambient = Temperature 1 meter from shaker. (◊) Baffled flasks can significantly reduce maximum speed.

Safety Features

- **Unique acceleration - deceleration circuit** prevents sudden starts and stops. Minimizes mechanical damage for longer shaker life; and eliminates wetting of flask closures which would otherwise interfere with oxygen transfer
- **Speed-limiting sensor** slows agitation to a safe speed when overloaded or unbalanced
- **Unique vibration sensor** stops agitation when excess vibration is detected (Models 4900, 5000 and 44/44R)
- **Open door or open lid cutout switch** stops agitation when chamber is open †
- **Thermostat fail-safe** shuts off heaters if high limit is exceeded †
- **Automatic restart after power interrupt with non-volatile memory** keeps studies running smoothly
- **All Innova shakers are CE listed**

(†) Temperature-controlled models only

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innOva®

LARGE CAPACITY STACKABLE INCUBATOR SHAKERS

Models 44 & Refrigerated 44R for Space-Restricted Labs

Innova 44 Series Shakers can be stacked up to three units high, tripling the capacity of space usually occupied by a single incubator shaker. Based on the extremely popular Innova 4400 series, the Innova 44 includes many new standard features and the latest technology available. Innova Model 44 offers incubation, while Innova Model 44R adds refrigeration.



Unique Advantages

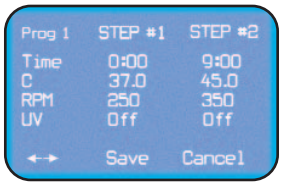
- **Precisely-Regulated Temperature,** ranging from +5ºC above ambient to 80ºC (-20ºC below ambient to 80ºC for Innova 44R); accurate within ±0.1ºC
- **Agitation 25 to 400 rpm,** ±1 rpm
- **Space-Saving Door** glides up and out of your way
- **Slide-Out Platform** provides easy access to all samples
- **Intuitive Programming** allows multiple parameter changes–temperature, speed, photosynthetic lights* and UV light decontamination*. All are easily changed on a timed basis. Ideal for heat inductions or temperature reductions to slow growth, eliminating unnecessary trips back to the lab. (*Optional accessories)
- **Double-Pane, Thermal Glass** provides excellent insulation and clear observation of cultures
- **Interior Chamber Light** enhances observation
- **Multi-Function Reservoir** humidifies chamber to reduce sample evaporation and protect unit from spills. Built-in drain facilitates clean up
- **Pull-Out Service Module** allows convenient access to all electronic and heating/cooling components
- **Superior Air Circulation System** with low-watt-density resistance heaters for rapid temperature equilibration & excellent uniformity
- **RS-232 Computer Interface** allows remote data logging and program control using standard lab management software
- **Heavy-Duty Door Gasket** maintains a leak-free seal and ensures excellent temperature uniformity
- **Extra-Large Chamber** holds flasks up to 5 liters

Options

- **Refrigeration**–select Model Innova 44R
- **Orbit**–available in a 1″(2.5 cm) or 2″(5.1 cm) diameter
- **Humidity Probe**–monitors humidity levels throughout your process
- **12-Port Gassing Manifold**–permits direct gassing into flasks or other vessels
- **Ultraviolet Light**–a germicidal lamp in the airflow path outside the chamber reduces the bio-burden of circulated air on Model Innova 44R only
- **Programmable Photosynthetic Light Bank**–on Innova 44R only
- **Validation Packages Available**



Large, easy-to-read display screen clearly shows operating parameter and actual value. Displayed parameters can be selected by user. A single knob selects all operating conditions easily and quickly



Programmable controller allows multiple-step parameter changes, eliminating unnecessary trips back to the lab

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INNOVA MODELS 44 & 44R STACKABLE, INCUBATOR SHAKER SPECIFICATIONS*

Temperature	Range †	Innova 44: ambient +5°C to 80°C Innova 44R: ambient -20°C to 80°C. Minimum setpoint 4°C		
	Control	±0.1°C		
	Refrigeration	Innova 44R only. Hermetically sealed compressor uses CFC free refrigerant		
	Heaters	Low-watt-density resistance heaters with high-temperature safety thermostat cut-out		
Shaking	Range §	25 to 400 rpm – 1" (25 mm) orbit 25 to 300 rpm – 2" (51 mm) orbit or with any 2 stacked units 25 to 250 rpm – With 3 stacked units		
	Control	±1 rpm		
Timer and Parameter Control	4 Modes	➢ Speed and temperature continuous ➢ Shaker can be set to run from 0.1 to 99.9 hours ➢ Onboard firmware can program multiple parameter changes (temperature, speed, photosynthetic light††, UV decontamination††) ➢ Shaker control and data logging via RS-232 and remote computer running conventional laboratory management software		
Alarms	Audible and visual	Indicate when speed deviates more than 5 rpm, temperature more than 1°C, and when program or time has finished. (Alarm may be muted.)		
Safety	Mechanical and electronic	Sensors limit speed of shaker when unbalanced, stops shaker when excess vibration is detected and shuts off temperature when high-temperature limit is exceeded		
Computer Interface	RS-232	For data logging and incubator/shaker control using laboratory management software		
Power	Model 44: 800 VA; 44R: 1,400 VA	120V 60Hz; 100V 60Hz; 230V 50Hz; 100V 50Hz		
Dimensions	Platform**	18" x 30" (46 x 76 cm)		
	Chamber	26"D x 36"W x 18"H (66 x 91 x 46 cm) from top of platform		
	Overall	**Single unit**	**Two stacked**	**Three stacked**
	Wide	53" (135 cm)	53" (135 cm)	53" (135 cm)
	Deep	33" (84 cm)	33" (84 cm)	33" (84 cm)
	High ◊	26" (66 cm)	52" (132 cm)	78" (198 cm)
Weight	Innova 44: 525 lbs (238 kg). Innova 44R: 570 lbs (259 kg)			
Drive Mechanism	Triple-eccentric counter-balanced drive in cast iron housing with 9 permanently lubricated ball bearings. Driven by solid-state brushless DC motor			
Ambient Conditions	10°C to 35°C. 20 - 80% RH (non-condensing)			
Service	All mechanical and electronic components are easily accessed from the front of the machine			
Warranty	Comprehensive warranty – two years on labor, three years on parts			

* Specifications subject to change without notice. Innova 44 & 44R are cETLu certified.
§ Baffled flasks can significantly reduce maximum speed.
† Maximum temperature 60°C with optional Humidity Monitor. In Model 44R, attaining a 20°C below ambient temperature depends on RH and other ambient conditions. For 230 V Innova 44R models, temperature range is 17°C below ambient to 80°C, with a minimum setpoint 4°C.
†† Optional
** Platform(s) sold separately - see platform capacity chart below, and Accessories, page 22. Note: Innova 44 and 44R platforms are not interchangeable with other NBS Shakers, nor are other NBS platforms interchangeable with the Innova 44 Series.
◊ Does not include optional base. Door open adds 21" (53 cm) to height of top of unit.

Shaker Capacity

Flask Size	Dedicated Platform	Universal Platform**
50 mL	N/A	91
125 mL	60	39
250 mL	40	30
500 mL	24	24
1 L	15	14
2 L	12	8
2.8 L	6	6
4 L	6	6
5 L	N/A	6†

** Flask clamps and test tube racks for the Universal Platform must be ordered separately. Dedicated Platforms include clamps. See pages 22 - 23.
† Using Sticky Tape; less with clamps

Optional Accessories

Short Base	raises shaker by 4" or 10.2 cm
Medium Base	raises shaker by 12" or 30.5 cm
Tall Base	raises shaker by 16" or 40.6 cm
Stacking Kit	Order 1 kit for 2 units/ 2 kits for 3 units

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LARGE-CAPACITY, ENVIRONMENTAL SHAKERS

Model 4300 Series: Incubate, Refrigerate, Illuminate

The incubated Innova 4300 Series is designed for handling greater quantities of flasks. It easily holds (12) 2 L flasks and accepts flasks up to 6 L*. Four models available: Innova 4300 provides incubation. Model 4330 adds refrigeration. Model 4335 is enhanced with dual-temperature setpoints; 4340 includes all the above, plus photosynthetic lighting.



Model 4300 provides large-capacity shaking for flasks up to 6 liters.

Unique Advantages

- **Temperature Range:** Model 4300 only, from 5°C above ambient to 60°C. All others, 15°C below ambient to 60°C, minimum setpoint is 4°C
- **Rapid Temperature Equilibration and Uniform Temperature Regardless of Sample Location** provided by a unique high-speed air circulation system
- **Programmable Timer on Model 4335 Automates Switching Between Two Temperatures, and Cycling Agitation On or Off.** Limits metabolic activity in studies that end overnight, saving a return trip to the lab; and facilitates heat inductions



Refrigerated Model 4340 is equipped with a programmable photosynthetic light bank and 7-day timer for automated on-off control of shaking and lighting. Mirror-finished stainless steel interior enhances light reflectivity.

- **High-Intensity Photosynthetic Light Bank with Programmable Temperature and Light Controller on Model 4340**. Enables programming the unit to turn the lights on in the morning and incubate at a higher temperature, then turn the lights off and switch to a lower temperature in the evening, mimicking diurnal conditions
- **Foot Pedal-Actuated Lid Lift** releases and raises the lid; leaves hands free for transferring a platform to or from the shaker
- **Large-Capacity Interchangeable Accessory Platforms,** 30" x 18" (76 x 46 cm) accommodate flasks up to 6 L*. Platforms snap-in place without tools using optional Quick Change Platform
- **Large Viewing Window in Lid** on all but Model 4340
- **12-Port Gassing Manifold** on all 4300 Series models

(*) Photosynthetic-lighted Model 4340 accepts flasks to 4 L only

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U.S. Patent Nos. 3,430,926, 3,002,895 and 5,052,812.
French Patent No. 1,596,064. U.K. Patent No. 1,199,840
Swiss Patent No. 476,530. German Patent No. 1,816,710

INNOVA 4300 SERIES INCUBATOR SHAKER SPECIFICATIONS*

		MODEL 4300	MODEL 4330	MODEL 4335	MODEL4340
Shaking	Range & Control §	25 to 500 rpm ±1 rpm over entire speed range by means of PI microprocessor control. Acceleration circuit prevents sudden starts/stops			
	Motion	1" (2.54 cm) diameter circular orbit			
	Indication	Digital LED electronic display in 1 rpm increments. Character height 3/8" (0.95 cm)			
	Timer	Programmable shaking periods from 0.1 hr. to 99.9 hrs. Triggers audible alarm and energizes status light at end of period. Can be deactivated for continuous operation			
	Program-mable start & stop	See timer above		7-day 24-hour clock programs agitation on-off cycling	See timer above
Temperature	Range	5°C above ambient to 60°C	15°C below ambient to 60°C (minimum setpoint is 4°C)		
	Control	PI microprocessor feedback regulation, controlled ± 0.1°C in 30°C to 40°C range, and ± 0.25°C for the remaining range			
	Program-mable Operation	—		Switches between 2 temperatures using a built-in 7-day 24 hr clock timer, capable of programming up to 24 events. Model 4335 timer controls temp. & agitation; Model 4340 timer controls temp. & lights	
	Gradient	Nominally 0.25°C			
	Indication	Digital LED display in 0.1°C increments. Character height 3/8" (0.95 cm)			
	Heaters	Low-watt density, resistance-type heaters with high-temperature safety thermostat cut off			
	Refrigeration	—	CFC-free refrigerant 1/2 hp hermetically-sealed compressor. Condensing unit automatically operated by digital temperature controller		
Photo-synthetic Illumination	Lamps	—			Six 30-Watt Gro-Lux lamps
	Program-mable Operation	—			7-day 24 hr electronic clock timer programs up to 24 events. Lights can be programmed on or off to simulate daytime and nighttime
Alarms		Audible and visible signals indicate when speed deviates more than 5 rpm, and temperature more than 1°C from setpoints, and when timer operation has expired. (Alarm may be muted.)			
LED Display		Indicates speed, temperature, running time and alarm conditions. Displays readout of internal clock (actual accumulated operating time). Character height: 3/8" (0.95 cm)			
Recorder Output		0 - 5 volt output for tracking temperature and speed with external recorder or computer			
Drive		Triple-eccentric counterbalanced drive in cast-iron housing with 9 permanently lubricated ball bearings			
Drive Motor		Solid-state brushless D.C. motor. Maximum torque 63-oz-in (0.44 N-m)			
Safety		Unique sensors limit speed of shaker when overloaded or unbalanced; stops shaker when lid is opened ; and shuts off temperature when high-temperature limit is exceeded			
Setpoint Retention		Setpoints and operating status retained by non-volatile memory. Automatic restart after power is restored (indicated by flashing display)			
Viewing Window		11" Wide x 17" Long (28 x 43cm) hermetically-sealed double pane insulated window in lid, for complete viewing capability			Chamber lid contains no viewing window
Power		100V, 120V, 220V and 240V 50/60 Hz models available			
		720 VA	1,300 VA		1,500 VA
Dimensions	Platform	30" Wide x 18" Deep (76 x 46 cm). (Platforms sold separately - see page 22.)			
	Overall	43" Wide x 28" Deep x 37" High (109 x 71 x 94 cm)	45" Wide x 28" Deep x 37" High (114 x 71 x 94 cm)		
	Overall with Lid Open	Add 22" (56 cm) to height and 1.5" (4 cm) to Depth			
	Chamber	34.75" Wide x 22.25" Deep x 19.25" clearance above shaker platform (88.3 x 56.5 x 49 cm)			Same but clearance above platform is 15" (88.3 x 56.5 x 38 cm)
Weight	Net Gross	400 lbs. (181 kg) 490 lbs. (222 kg)	430 lbs. (195 kg) 515 lbs. (234 kg)		440 lbs. (200 kg) 530 lbs. (240 kg)
Ambient Conditions	Temperature	0°C - 40°C	15°C - 35°C		
	Humidity	90% non-condensing			

* Specifications subject to change without notice. The Innova 4300 is cETL listed.
§ Speed range based on shaking a typical workload. Baffled flasks can significantly reduce maximum speed.

Shaker Capacity & Accessory Platforms

Same as for Model 2300. See chart on page 19.

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BENCHTOP GYROTORY® INCUBATOR SHAKERS

Models 4200 & Refrigerated 4230

Our most versatile benchtop shaker, Model 4230 can agitate, incubate, refrigerate and illuminate. When refrigeration is not needed, Model 4200 does the job. These multi-purpose instruments have the same size shaker platform as Models 4000/4080, but accept flasks to 6 Liters, and have two stationary shelves for added incubating or storing capability. With a front-opening door, they can be used on the bench, or floor-stacked two high for space savings.



Front-loading Innova 4200/4230, shown equipped with an accessory platform for 250 mL flasks, and with two stationary shelves which are standard for incubating or refrigerating added samples.

Unique Advantages

- **Wide Temperature Range:** 5°C above ambient to 80°C in Model 4200; and from 20°C below ambient in refrigerated Model 4230 (minimum setpoint is 4°C)
- **Two Adjustable-Height, Stationary Shelves** provide added storage for incubating plates and other samples
- **Units Can Be Used On the Bench or Stacked* Two High** on the floor for space savings
- **Optional Dual-Temperature Programming Timer† Automates Switching Between Two Temperatures, and Cycling Agitation On or Off**. Limits metabolic activity in studies that end overnight, saving a return trip to the lab; and facilitates heat inductions
- **Large Viewing Window & Internal Light Provide Clear Chamber Visibility**, minimizing the need to open the door. Rapid air circulation produces quick temperature equilibration and recovery, when needed
- **In-Chamber, Moisture-Proof Receptacle Provides Power for an Accessory Instrument** such as rocker, roller, or second shaker
- **Key Lock Door** adds security
- **Large-Capacity Accessory Platforms Accept Glassware Up to 6 L**; Snap in place without tools, using optional Quick Change Platform Kit
- **Optional 5-Port Gassing Manifold** permits direct gassing into flasks for anaerobic cultures
- **Optional Photosynthetic Light Bank** with external on-off switch is available for culturing plant cells. (Model 4230 only)



Stack them up for space savings.

(*) Requires stacking kit
(†) Programming option available on Model 4230 only

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INNOVA MODELS 4200 & 4230 INCUBATOR SHAKER SPECIFICATIONS*

Shaking	Range & Control §	25 to 400 rpm (25 - 300 when stacking two units), ±1 rpm over entire speed range by means of PI microprocessor control. Acceleration circuit prevents sudden starts/stops
	Motion	3/4" (1.9 cm) diameter circular orbit or 1" (2.54 cm)
	Indication	Digital LED electronic display in 1 rpm increments. Character height 3/8" (0.95 cm)
	Timer	Programmable shaking periods from 0.1 hr. to 99.9 hrs. Triggers audible alarm and energizes status light at end of period. Can be deactivated for continuous operation
Temperature	Range	Model 4200: 5°C above ambient to 80°C Model 4230: Same, but from 20°C below ambient (minimum setpoint is 4°C)
	Control	PI microprocessor feedback regulation, controlled ± 0.1°C in 30°C to 40°C range, and ± 0.25°C for the remaining range
	Optional Program-ming	Model 4230 only, optional programmable timer can switch between two temperatures and turn agitation on or off. Enables incubating and agitating samples at one temperature for a period of time and then switching to a lower temperature and shutting agitation off to limit metabolic activity. 7-day 24 hr clock timer, programs up to 24 events
	Gradient	Nominally 0.25°C
	Indication	Digital LED display in 0.1°C increments. Character height 3/8" (0.95 cm)
	Heaters	Low-watt density, resistance-type heaters with high-temperature safety thermostat cut off
	Circulation	Forced air: 120 CFM (57 L/sec.) Fan rated for operation in temperatures up to 130°C
	Recovery	3°C - 9°C per minute depending on heat load
	Refriger-ation	Model 4230 only: Hermetically-sealed compressor uses CFC-free refrigerant
Alarms ◊		Audible and visible signals indicate when speed deviates more than 5 rpm, and temperature more than 1°C from setpoints, and when timer operation has expired
LED Display		Indicates speed, temperature, running time and alarm conditions. Displays readout of internal clock (actual accumulated operating time). Character height: 3/8" (0.95 cm)
Recorder Output		0 - 5 volt output for tracking temperature and speed with external recorder or computer
Drive		Triple-eccentric counterbalanced drive in cast-iron housing with 9 permanently lubricated ball bearings
Drive Motor		Solid-state brushless D.C. motor. Maximum torque 40-oz-in (0.28 N-m)
Safety		Unique sensors limit speed of shaker when overloaded or unbalanced; stops shaker when excess vibration is detected or when door is opened ; and shuts off temperature when high-temperature limit is exceeded
Setpoint Retention		Setpoints and operating status retained by non-volatile memory. Automatic restart after power is restored (indicated by flashing display)
Viewing Window		11.4" Wide x 19.25" High (29 x 49 cm) double pane insulated window
Electric Receptacle		200 Watt moisture-proof internal electric outlet installed in chamber for optional magnetic stirrers, rocker, roller, portable shaker, etc.
Power		100V, 120V, 220V and 240V 50/60 Hz. Model 4200: 600VA (120V). Model 4230: 1,000VA (120V)
Illumination	Chamber	13 Watt fluorescent light illuminates chamber with external on-off switch
	Photo-synthetic	Optional for Model 4230 only. Photosynthetic Light Bank with (6) 15-Watt Gro-Lux lights and an external on-off switch
Dimensions	Platform	20" Wide x 18" Deep (46 x 46 cm). (Platforms sold separately - see page 22.)
	Overall	24.4" Wide x 28.7" Deep x 36.4" High (62 x 73 x 92.5 cm) With door open: 51.2" [130 cm] Deep. Height stacked: 71" High (180 cm) †
	Chamber	20.5" Wide x 20.5" Deep x 24.8" High from shaker platform (52 x 52 x 63 cm)
Weight		Model 4200: 270 lbs. (123 kg) Net; 330 lbs. (150 kg) Gross. Model 4230: Add 30 lbs (14 kg)
Ambient Conditions		Temperature: 0°C - 40°C for Model 4200 and 15°C - 35°C for Model 4230 Humidity: 90% non-condensing.

* Specifications subject to change without notice.
§ Speed range based on shaking a typical workload. Baffled flasks can significantly reduce maximum speed.
◊ Audible alarm may be muted.
† Requires stacking kit

Accessory Platforms and Racks

Same as for Models 4000/4080, except additionally accepts 4 and 6 L flasks. See chart on page 13.

Optional Accessories

Programmable Photosynthetic Light Option, Model 4230 only
Dual Temperature/Agitation Programming Unit, Model 4230 only **

Gas Manifold, 5-Port **

Stacking Kit

** Options available factory-installed, only.

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BENCHTOP GYROTORY® INCUBATOR SHAKERS

Models 4000 & High-Temperature 4080

For precise control of temperature and agitation in a benchtop incubator shaker, there is no equal to the Innova 4000/4080 Series of shakers. These large-capacity models are capable of culturing a wide array of organisms in test tubes and flasks up to 2.8 L. High-temperature Model 4080 additionally can perform various molecular biology techniques, including hybridization studies, plasmid preps, DNA finger-printing and more.



Model 4000 provides uniform temperature control in a range up to 60°C; Model 4080 increases the range to 80°C for added hybridization capability.

Unique Advantages

- **Temperature Range:** 5°C above ambient (or coolant) to 60°C, and to 80°C in high-temperature Model 4080. Optional factory-installed cooling coil available for operating at sub-ambient conditions
- **Agitation 25 - 500 rpm,** ± 1 rpm
- **Uniform Temperature Control** provided by large-capacity blower, tightly-constructed chamber, and self-correcting microprocessor feedback control that instantly compensates for changes in temperature
- **See-Through Lid Provides Complete Visibility** minimizing the need to open the chamber. Rapid air circulation produces quick temperature equilibration and recovery, when needed
- **Interchangeable, Large-Capacity Accessory Platforms,** 18" x 18" (46 x 46 cm), accept gel trays, culture tubes and flasks to 2.8 L; snap in place without tools, using optional Quick Change Platform
- **Optional 5-Port Gassing Manifold** enables direct gassing into flasks for anaerobic cultures



A hydraulic arm eases lid opening and closing.

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INNOVA MODELS 4000 & 4080 INCUBATOR SHAKER SPECIFICATIONS*

Shaking	Range & Control §	25 to 500 rpm ± 1 rpm over entire speed range by means of PI microprocessor control. Acceleration circuit prevents sudden starts/stops
	Motion	3/4" (1.9 cm) diameter circular orbit
	Indication	Digital LED electronic display in 1 rpm increments. Character height: 3/8" (0.95 cm)
	Timer	Programmable shaking periods from 0.1 hr. to 99.9 hrs. Triggers audible alarm and energizes status light at end of period. Can be deactivated for continuous operation
Temperature	Range	Model 4000: 5°C above ambient (or coolant temperatures using optional cooling coil), to 60°C Model 4080: Same, but to 80°C
	Control	PI microprocessor feedback control: Model 4000: ± 0.1°C in 30°C to 40°C range, and ± 0.25°C for the remaining range Model 4080: ± 0.1°C in 30°C to 40°C range, and ± 0.5°C from 40°C to 80°C
	Gradient	Nominally 0.25°C
	Indication	Digital LED display in 0.1°C increments. Character height 3/8" (0.95 cm)
	Heaters	Low-watt density, resistance-type heaters with high-temperature safety thermostat cut off
Alarms ◊		Audible and visible signals indicate when speed deviates more than 5 rpm, and temperature more than 1°C from setpoint, and when timer operation has expired
LED Display		Indicates speed, temperature, running time and alarm conditions. Displays readout of internal clock (actual accumulated operating time). Character height: 3/8" (0.95 cm)
Recorder Output		0 - 5 volt output for tracking temperature and speed with external recorder or computer
Drive		Triple-eccentric counterbalanced drive in cast-iron housing with 9 permanently lubricated ball bearings
Drive Motor		Solid-state brushless D.C. motor. Maximum torque 40-oz-in (0.28 N-m)
Safety		Unique sensors limit speed of shaker when overloaded or unbalanced; stops shaker when lid is opened ; and shuts off temperature when high-temperature limit is exceeded
Setpoint Retention		All setpoints and operating status are retained by non-volatile memory. Automatic restart after power is restored (indicated by flashing display)
Drive Interrupt		Automatic drive interrupt when cover is opened
Power		100V, 120V, 220V and 240V 50/60 Hz models available Model 4000: 600VA; Model 4080: 1,000VA
Dimensions	Platform	18" Wide x 18" Deep (46 x 46 cm). (Platforms sold separately - see Accessories, page 22.)
	Chamber	20.5" Wide x 20.5" Deep x 12.5" High (52.1 x 52.1 x 31.8 cm)
	Overall	21" Wide x 27.5" Deep x 19.75" High (53 x 70 x 50 cm) With Lid Open: 21" Wide x 29.5" Deep x 33" High (53 x 75 x 84 cm)
Weight		115 lbs. (52 kg) Net; 145 lbs. (66 kg) Gross
Ambient Conditions		Temperature: 0 - 60°C. Humidity: 90% non-condensing

* Specifications subject to change without notice. The Innova 4000 is cETL listed.
§ Based on shaking a typical workload. Baffled flasks may significantly reduce maximum speed.
◊ Audible alarm may be muted.

Shaker Capacity Models 4000/4080 & 4200/4230

Flask Size	Dedicated Platform	Universal Platform**
10 mL	N/A	109
25 mL	N/A	64
50 mL	64	45
125 mL	34	21
250 mL	25	18
500 mL	16	14
1 L	9	8
2 L	5	5
2.8 L	4	4
4 L ◊	4	4
5 L ◊	N/A	4
6 L ◊	2	2

** Flask clamps and test tube racks for the Universal Platform must be ordered separately. Dedicated Platforms include clamps. See pages 22 - 23.
◊ Available on Models 4200/4230 only.

Optional Accessories, Models 4000/4080

Cooling Coil	Factory installed. For temperatures as low as 5°C above coolant temperature
Gas Manifold	5-Port, factory installed

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SPACE-SAVING ENVIRONMENTAL CHAMBER
Model 4900

This environmentally-controlled chamber is designed to culture dozens, and even hundreds, of samples on up to four independently-controlled shakers. Heavy-duty shakers are ordered separately, to accommodate your specific needs. The system includes programmable regulation of heat, refrigeration and humidification as standard; photosynthetic operation is optional.



Innova 4900 accessorized with four shakers with slide out platforms. The large glass door and illuminated chamber (with on-off switch) make it easy to view all cultures in this space-saving multi-tiered system.

Unique Advantages

- **Operates One to Four Shakers, Simultaneously. Agitation is Individually Controlled on Each Shaker;** and each can be individually programmed to start up or shut off at a pre-set time. Accessory shakers with choice of 1" or 2" (2.5 or 5.1 cm) orbit sold separately
- **Versatile System Converts from an Antibiotic Screening Facility to a Photosynthetic Chamber;** from a warm-room environment to a cold room
- **Temperature Range** 20°C below ambient to 60°C. Minimum setpoint is 4°C
- **Humidity Controller Minimizes Evaporation** of cultures by injecting vapor into the chamber atmosphere
- **Powerful Heater and Fan Provide Rapid Heat-Up Capability and Temperature Uniformity** throughout the chamber
- **Computer-Compatible For Automated Setpoint Changes** using optional software package*. Program agitation on-off cycling, humidity control, multiple-temperature changes and photosynthetic lighting sequences on the basis of time
- **Accommodates Up to Two Optional High-Intensity Photosynthetic Light Manifolds with Programmable Temperature and Light Controller**. Dual-channel, 24-event per channel timer, switches lamps on/off automatically and switches between two temperatures (without the aid of an external computer.) Multiple light programs may be established for each day of the week, each with a different cycle length (1 min. to 24 hrs.) and each operating at a choice of two temperatures
- **Thermally-Insulated, Electrically-Heated Glass Door†** with double-pane tempered glass minimizes heat loss and condensation; permits clear observation, minimizing the need to open the chamber
- **Choice of Lift-Out or Slide-Out Accessory Platforms** for easy access to all size flasks from 10 mL to 6 L. Sliding platforms (shown above) glide in place and lock down without tools. Lift-out platform recommended for high humidity applications

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* Requires computer and BioCommand® Plus or BioCommand® Lite software. For photosynthetic work, additionally requires light manifolds

† Standard door is hinged on left side; but is reversible to fit any room layout

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INNOVA MODEL 4900 MULTI-TIERED ENVIRONMENTAL SHAKER SPECIFICATIONS*

Accessory Shakers	Range, Control § & Motion	Chamber accepts up to four shakers - see capacity chart below. (Chamber, shakers & platforms ordered separately.) Speed: 25 to 400 rpm with 1" (2.5 cm) stroke or 25 to 300 rpm with 2" (5.1 cm) stroke, ±1 rpm over entire speed range by PI microprocessor control. Acceleration circuit prevents sudden starts/stops
	Indication	Digital LED module, one per shaker, displays shaking in 1 rpm increments. Character height: 3/8" (0.95 cm)
	Drive	Triple-eccentric counterbalanced shaker drive in cast-iron housing with 9 permanently lubricated ball bearings
	Drive Motor	Solid-state brushless D.C. motor. Maximum torque 63-oz-in (0.44 N-m)
	Timer	Programmable shaking periods from 0.1 hr. to 99.9 hrs. Triggers audible alarm and energizes status light at end of period. Can be deactivated for continuous operation
Temperature	Range	20°C below ambient to 60°C (minimum setpoint is 4°C)
	Control	PI microprocessor feedback regulation, controlled ± 0.1°C in 30°C to 40°C range, and ± 0.25°C for the remaining range. Capable of dual-temperature programming with photosynthetic lighting option. Capable of multi-temperature programming with optional BioCommand® computer-driven software and external computer
	Gradient	Nominally ±0.5°C
	Indication	Digital LED display in 0.1°C increments. Character height 3/8" (0.95 cm)
	Heaters	Low-watt resistance-type heaters with high-temperature safety thermostat cut off
	Circulation	Twin air blower with air displacement of 300 CFM (8.5m^3/min.)
	Refrigeration	1/2 hp compressor with hot-gas bypass system. Fully accessible from front of console. CFC-free
Humidity†	Range	To 90% relative humidity (RH) with temperatures between 37°C and 45°C. To 85% relative humidity (RH) with temperatures between 25°C and 36°C.
	Control	±5%
	Indication	Digital LED display in 0.1% increments. Character height 3/8" (0.95 cm)
	Humidifier	Electric heat flash vaporizer (130°C)
Illumination	Interior	Two 40-watt fluorescent lamps with on-off control switch located outside the chamber
	Photo-synthetic Light Option	Chamber accommodates up to two photosynthetic light banks, (see chart, below.) Each bank contains six 20-watt Gro-Lux® fluorescent lamps. Includes Programmable Temperature & Light Timer to automate turning lights on in the morning while incubating at a higher temperature, then turning lights off and lowering temperature in the evening, mimicking diurnal conditions. 7-day 24 hr clock timer programs up to 24 events. Only one timer needed for up to two light banks
Alarms ◊		Audible and visible signals indicate when speed deviates more than 5 rpm, temperature more than 1°C, or RH more than 5% from setpoint, and when timer operation has expired
Chamber		Maximum chamber capacity with one optional light bank is 3 shakers; with two light banks is 2 shakers. Chamber constructed of heavy-gauge stainless steel, mirror finished
Door		32" x 70" (81.3 x 177.8 cm) full view double-pane tempered glass, heated to inhibit condensation and enhance chamber visibility
Safety		Unique sensors limit speed of shaker when overloaded or unbalanced; stops shaker when excess vibration is detected or when door is opened ; and shuts off temperature when high-temperature limit is exceeded
Setpoint Retention		Setpoints and operating status retained by non-volatile memory. Automatic restart after power is restored (indicated by flashing display)
Power		208, 220, 240V 50/60 Hz models available. 2,350 VA maximum, typical 1,925 VA. Main circuit breaker plus each individual circuit fused or protected by circuit breaker
Chart Recorder		Optional factory-installed, front-mounted, 6 channel analog and digital recorder for tracking speed of 4 shakers, chamber temperature and RH
Computer Control		Optional BioCommand® software for PC control of up to 6 parameters via an RS-422 serial communications port using a 25-pin "D" subminiature connector
Dimensions	**Accessory Platforms**	**Slide-Out:** 18" x 24" (46 x 61 cm) has integral rollers and locking mechanism to extend platform beyond the front of the chamber, facilitating handling glassware.
		Lift-Out: 18" x 24" (46 x 61 cm) has handles for easy removal; Recommended for high-humidity applications.
	Chamber	30" Wide x 22" Deep x 66" High (76 x 56 x 168 cm)
	Overall	55" Wide x 30.5" Deep x 78.5" High (140 x 77.5 x 199 cm)
Weight		Platforms : 90 lbs. (41 kg) each Chamber: Gross: 1,400 lbs. (635 Kg) including 4 shakers. Net: 1,200 lbs. (544 Kg) including 4 shakers
Ambient Conditions		Temperature: 15°C - 35°C. Humidity: 90% non-condensing

* Specifications subject to change without notice. § Based on shaking a typical workload. Baffled flasks may significantly reduce maximum speed.
† Requires connection to a deionized water supply regulated to 20 psi to provide a flow rate of approximately 50 mL/hr.
◊ Audible alarm may be muted.

Shaker & Chamber Capacity

Flask Size	Flasks per Dedicated Slide-Out Platform	Flasks per Dedicated Lift-Out Platform	Flasks per Universal Platform**	Chamber Capacity		
				Shakers per Chamber	Shakers using 1 Light Bank	Shakers using 2 Light Banks
50 mL	80	80	63	4	3	2
125 mL	48	52	35	4	3	2
250 mL	35	35	24	4	3	2
500 mL	20	16	20	4	3	2
1 L +	12	12	12	4	3	2
2 L +	8	8	8	3	3	2
2.8 L+	5	5	5	3	3	2
4 L +	4	4	5	2	2	2
5 L	N/A	N/A	4	2	2	2
6 L +	4	4	3	2	2	2

Optional Accessories

Photosynthetic Lighting Six Gro-Lux® lights with 7-day programmable module automates on-off light cycles and/or two different temperature cycles. Usage reduces chamber capacity - See capacity chart at left.

Six-Channel Strip-Chart Recorder

BioCommand® Software automates data logging and control

Microplate Platform accommodates 90 standard or 18 deep well plates

** Flask clamps and test tube racks for the Universal Platform must be ordered separately. Dedicated Platforms include clamps. See pages 22 - 23. Microplate platforms also available - see options chart.

U.S. Patent No. 5,052,812

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BENCHTOP GYROTORY® WATER BATH SHAKER

Model 3100

Temperature control is exceptionally precise using the Innova Model 3100. This automated water bath shaker is ideal for culturing a wide range of cell types, as well as for staining, destaining and hybridization protocols.



Innova 3100 high-temperature, water bath shaker.

Unique Advantages

- **Adjustable Level Control Automatically Replenishes Evaporated Water,** maintaining desired level without monitoring or refilling. Water-in and drain lines are each fitted with control valves to simplify cleaning, filling and complete draining
- **Temperature Range of 5°C Above Ambient to 100°C*** provides for a wide range of molecular and cell biology work
- **Optional Cooling Coil** extends the range of applications to near and below ambient conditions

* *Elevated temperatures attained with aid of an optional gable cover and with a bath liquid with a high boiling point to minimize evaporation.*



Larger-capacity than many water bath shakers, the Innova 3100 easily accommodates gel trays, tubes and flasks.

- **Temperature Precisely Controlled** within 0.1°C in the 30 - 40°C range and within 0.5° in the remaining range. Fluctuations as minute as 0.025°C are corrected in seconds via microprocessor feedback control
- **Speed Range, 25 - 400 rpm**, ± 1 rpm
- **Acceleration Circuit Builds Up Speed Gradually,** avoiding sudden starts and unwanted splashing
- **Deep Bath with Rounded Corners and Baffles Allows Elevated Speeds** with minimal turbulence or splashing
- **One-Piece Seamless Bath** is crevice-free, easy to keep clean; rust-resistant stainless steel
- **Heat Loss and Evaporation Minimized** with use of optional Plexiglas or stainless-steel gable covers
- **Optional Space-Saving Dolly (fits under benches and desks) and Optional Mobile Cart** are available for use where bench space is limited

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INNOVA MODEL 3100 WATER BATH SHAKER SPECIFICATIONS*

Shaking	Range & Control §	25 to 400 rpm ± 1 rpm over entire speed range by means of PI microprocessor control. Acceleration circuit prevents sudden starts/stops, minimizing both splashing & mechanical damage
	Motion	1/2" (1.3 cm) diameter circular orbit
	Indication	Digital LED electronic display in 1 rpm increments. Character height: 3/8" (0.95 cm)
Temperature	Range	5°C above ambient (or coolant temperatures using optional cooling coil), to 100°C†
	Gradient	Nominally 0.1°C
	Control	± 0.1°C in 30°C to 40°C range, and ± 0.5°C for the remaining range
	Regulation	PI microprocessor feedback control with pulse-width modulation of heater
	Indication	Digital LED display in 0.1°C increments. Character height 3/8" (0.95 cm)
	Heaters	Low-watt density, silicone rubber mat heater with high-temperature safety thermostat cut off
Timer		Programmable shaking periods from 0.1 hr. to 99.9 hrs. Triggers audible alarm and energizes status light at end of period. Can be deactivated for continuous operation
Alarms		Audible and visible signals indicate when speed deviates more than 5 rpm, and temperature more than 1°C from setpoint, and when timer operation has expired. Also signals low-water level condition. (Audible alarm may be muted.)
LED Display		Indicates speed, temperature, running time and alarm conditions. Displays readout of internal clock (actual accumulated operating time). Character height: 3/8" (0.95 cm)
Recorder Output		0 - 5 volt output for tracking temperature and speed with external recorder or computer
Drive		Triple-eccentric counterbalanced drive in cast-iron housing with 9 permanently lubricated ball bearings
Drive Motor		Solid-state brushless D.C. motor. Maximum torque 40-oz-in (0.28 N-m)
Safety		Unique sensor limits speed of shaker when overloaded or unbalanced and shuts off temperature when high-temperature limit is exceeded
Bath		Deep-drawn, stainless-steel, seamless bath with radius corners. Adjustable level control from 0.5" to 3" above shaker platform. Water-in and drain lines with shut-off valves and overflow line provided. (17.5" L x 13.25" W x 8" H [43 x 35 x 20 cm])
Automatic FIlling		Bath automatically refillable to a volume of 15 L; requires connection to water inlet line
Setpoint Retention		All setpoints and operating status are retained by non-volatile memory. Automatic restart after power is restored (indicated by flashing display)
Power		100V, 120V, 220V and 240V 50/60 Hz models available. 1,100VA
Dimensions	Platform	12" Wide x 16.5" Deep (30.5 x 42 cm) (See Accessories, page 22.)
	Overall	17" Wide x 27.5" Deep x 14.5" High (43 x 70 x 37 cm)
Weight		105 lbs. (47.6 kg) Net; 140 lbs (63 kg) Gross
Ambient Conditions		Temperature: 0 - 60°C. Humidity: 90% non-condensing

* Specifications subject to change without notice. The Innova 3100 is cETL listed.
§ Based on shaking a typical workload. Baffled flasks may significantly reduce maximum speed.
† Gable Cover, (stainless steel or Plexiglas), recommended. See optional accessories chart below. Temperatures as low as -20°C attained with portable refrigeration system, cooling coil and Gable Cover.

Shaker Capacity

Flask Size	Ded. Platform	Univ. Platform**
50 mL	31	18
125 mL	22	18
250 mL	13	8
500 mL	8	6
1L	6	4
2L	2	2

** Flask clamps and test tube racks for the Universal Platform must be ordered separately. Dedicated Platforms include clamps. See pages 22 - 23.

Accessory Racks for Test Tubes
(Must be used with a sub-platform - see Accessories)

Description	Racks Per Bath	Tubes Per Rack
Rack for 13 mm Tubes	4	60
Rack for 16 mm Tubes	4	36
Rack for 20 mm Tubes	4	29
Rack for 25 mm Tubes	4	18

Half-Size Accessory Platforms
(Must be used with a sub-platform - see Accessories)

Size of Glassware	Platforms Per Bath	Clamps per Platform
50 mL Erlenmeyer	2	13
125 mL Erlenmeyer	2	8
250 mL Erlenmeyer	2	5

Optional Accessories

Gable Cover, Plexiglas for temperatures up to 60°C

Gable Cover, stainless steel for temperatures up to 100°C

Factory-Installed Cooling Coil for near-ambient temperature and below

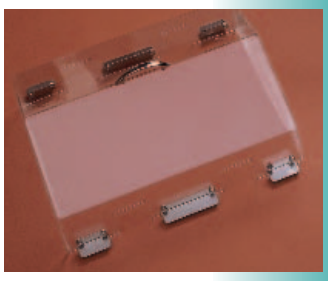
Spare Set of Suspension Arms for rapid replacement of alternate platforms

Space-Saving Dolly for under lab bench operation
18" W x 28.25" L (46 x 72 cm). Height, shaker on cart: 20" (51 cm)

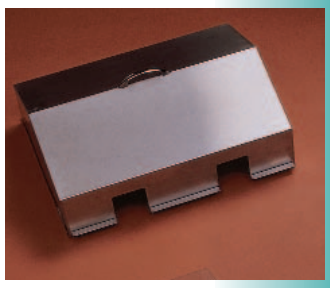
Portable Cart, 22.5" W x 32.25" L (57 x 87 cm)
Height, shaker on cart: 42.5" (108 cm)

Sub-Platform is required when using half-size platforms and test-tube racks. One sub-platform accommodates two half-size platforms or 4 racks

OPTIONAL ACCESSORIES



Optional Plexiglas Gable Cover minimizes evaporation & speeds heat-up, in applications up to 60ºC.



For high-temperature applications up to 100ºC, choose the stainless-steel Gable Cover.



Half-size platforms with clamps already mounted, provide maximum capacity for shaking different sized flasks on a single water bath shaker. Requires a sub-platform. (See charts below and page 22 for other platform options.)

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GYROTORY® PLATFORM SHAKERS

Models 2000, 2100 & 2300 Series & 5050 Racking System

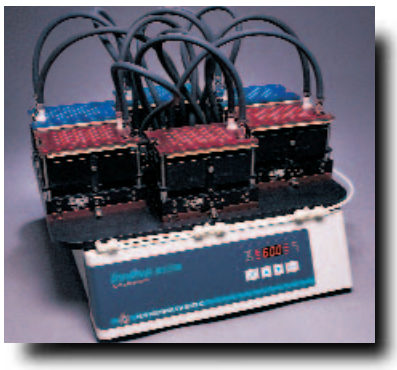
For shaking in ambient conditions, on the bench, in an incubator or a warm room, Innova Platform Shakers are the instrument of choice. Six ruggedly-built models provide reliable, continuous-duty shaking of test tubes and flasks to 6 Liters. Additionally, NBS also manufactures a series of high-speed, small orbit and robotic-interfaced models for drug discovery labs.



Left to right, Innova 2100, 2300 and 2000 Benchtop Platform Shakers.

Unique Advantages

- **Low Profile - Less than 6" (15 cm) Tall** enables use of multiple shakers in an incubator or environmental chamber
- **Optional, Oversize Platforms and Stabilizer Kits Increase Capacity by 45%.** Models 2050, 2150 and 2350 are factory-ready. Field conversion kits are also available to stabilize the shaker when increasing capacity of a Model 2000 to a 2050, 2100 to 2150, or 2300 to 2350
- **Optional Temperature/Speed Monitoring Kit** with RTD sensor displays and records process values
- **Space-Efficient, Four-Tier Racking System** is available to house up to eight Model 2300 shakers



NBS has designed a variety of specialized heavy-duty benchtop shakers for high-throughput screening. Select an ultra-high-speed model (up to 800 rpm), or one with robotics interface for automated sampling. Contact your NBS representative for details.



The Innova Model 5050 racking system saves valuable floor space by stacking up to four Model 2300 shakers on sturdy stainless-steel shelves. Shown with extension rack, Model 5051, for housing a total of eight shakers. Built-in electric outlet provides convenient power source for shakers, which are sold separately.

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INNOVA MODELS 2000, 2100 & 2300 SERIES SHAKERS SPECIFICATIONS*

		Model 2000/2050	Model 2100/2150	Model 2300/2350
Shaking	Range § & Control	25 to 500 rpm ± 1 rpm over entire speed range by means of PI microprocessor control. Acceleration circuit prevents sudden starts/stops, minimizing both splashing & mechanical damage		
	Motion	3/4" (1.9 cm) diameter circular orbit		1" (2.54 cm) or 2" (5.0 cm) diameter circular orbit. Max. speed with 2" stroke is 300 rpm
	Indication	Digital LED electronic display in 1 rpm increments. Character height: 3/8" (0.95 cm)		
Timer		Programmable shaking periods from 0.1 hr. to 99.9 hrs. Triggers audible alarm and energizes status light at end of period. Can be deactivated for continuous operation		
Alarms		Audible and visual signals indicate when speed deviates more than 5 rpm from setpoint, and when timer operation has expired. (Audible alarm may be muted)		
LED Display		Indicates speed, running time and alarm conditions. Displays readout of internal clock (actual accumulated operating time). Character height: 3/8" (0.95 cm)		
Drive		Triple-eccentric counterbalanced drive in cast-iron housing with 9 permanently lubricated ball bearings		
Motor		Solid-state brushless D.C. motor. Maximum torque for Innova 2000/2100 Series: 40-oz-in (0.28 N-m). For 2300 Series: 63-oz-in (0.44 N-m)		
Safety		Unique sensor limits speed of shaker when overloaded or unbalanced		
Setpoint Retention		All setpoints and operating status are retained by non-volatile memory. Automatic restart after power is restored (indicated by flashing display)		
Power		35 VA	80 VA	150 VA
Dimensions	**Platform,** Wide x Deep (See p. 22)	**2000:** 11" x 13" 28 x 33 cm	**2100:** 18" x 18" 45.7 x 45.7 cm	**2300:** 30" x 18" 76.2 x 45.7 cm
		2050: 12" x 16" 30.5 x 40.6 cm	**2150:** 24" x 18" 61 x 45.7 cm	**2350:** 36" x 24" 91.4 x 60.9 cm
	Overall, Wide x Deep x High	**2000:** 14" x 14.5" x 5.75" 35.5 x 37 x 14.6 cm	**2100:** 19" x 21.9" x 6.4" 48 x 55.5 x 16 cm	**2300:** 30" x 22.3" x 6.4" 76.2 x 45.7 x 16 cm
		2050: 17" x 14.5" x 5.75" 43 x 37 x 14.6 cm	**2150:** 24" x 23.3" x 6.4" 60.1 x 59.1 x 16.2 cm	**2350:** 36" x 24" x 6.4" 91.4 x 61 x 16 cm
Weight		**2000:** 33 lbs. (15 kg) Net 41 lbs. (18.6 kg) Gross	**2100:** 76 lbs. (34.5 kg) Net 120 lbs. (54.4 kg) Gross	**2300:** 108 lbs. (49 kg) Net 145 lbs. (66 kg) Gross
		2050: 35 lbs. (16 kg) Net 43 lbs. (19.1kg) Gross	**2150:** 80 lbs. (36.3 kg) Net 125 lbs. (57 kg) Gross	**2350:** 112 lbs. (51 kg) Net 150 lbs. (68 kg) Gross
Ambient Conditions		Temperature: 0 - 60°C. Humidity: 90% non-condensing		

* Specifications subject to change without notice. All non-incubated Innova benchtop shakers are cETL listed.
§ Based on shaking a typical workload. Baffled flasks may significantly reduce maximum speed.



Gain extra flask capacity by selecting Models 2050 (shown), 2150 or 2350, each offering oversize platforms and stabilizing kit. Available factory-ready or with a field conversion kit to upgrade from a Model 2000, 2100 or 2300, respectively.

Shaker Capacity, Models 2000, 2100, 2300 Series & 4300 Series

Flask Size	Model 2000		Model 2050		Model 2100		Model 2150		Model 2300 & 4300 Series		Model 2350	
	Platform: Ded.	Univ.**	Platform: Ded.	Univ.**	Platform: Ded.	Univ.**	Platform: Ded.	Univ.**	Platform: Ded.	Univ.**	Platform: Ded.	Univ.**
10 mL	60	60	86	86	—	109	—	—	—	183	—	—
25 mL	32	20	48	32	—	64	—	—	—	92	—	—
50 mL	20	15	35	32	64	45	80	63	108	92	—	—
125 mL	12	11	20	16	34	21	48	35	60	39	96	75
250 mL	8	6	12	10	25	18	35	24	40	30	70	50
500 mL	6	4	8	8	16	14	20	20	24	18	40	30
1 L	—	—	6	—	9	8	12	12	15	12	24	24
2 L	—	—	3	—	5	5	8	8	12	8	15	15
2.8 L	—	—	—	—	—	4	—	5	6	6	12	12
4 L	—	—	—	—	—	4	—	5	6	6	12	10
5 L	—	—	—	—	—	4	—	4	—	6 §§	—	10
6 L	—	—	—	—	—	2	—	3	4	4§§	6	8

Other Optional Accessories, 2000, 2100 & 2300 Series

Temperature/Speed Monitoring Kit Senses, measures & displays temperature and speed for recording on an external recorder. (2100 & 2300 Series only)

Capacity Upgrade Kit	Converts a Model 2000 to a 2050
	Converts a Model 2100 to a 2150
	Converts a Model 2300 to a 2350

** Flask clamps and test tube racks for the Universal Platform must be ordered separately. Dedicated Platforms include clamps. Utility Carrier and Utility Tray Platforms also available. A white, reflective universal platform for photosynthetic work is also available for Model 4340 only. See page 22-23.
§§ Model 4340 maximum flask size is 4L.

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innova®

SPACE-SAVING, MULTI-TIER, GYROTORY® SHAKER

Model 5000

This industrial workhorse is designed to uniformly shake hundreds of samples, day-in and day-out, under the extreme conditions of an environmental room. New engineering concepts in load balancing minimize stress and vibrations, even when fully loaded and running at the maximum speed of 350 rpm.



Innova 5000 accepts hundreds of samples on up to six accessory platforms. As pictured above, platforms are cantilevered from a central column to provide easy access to all glassware, and lock in place without tools. The control module may be mounted centrally on the base (as shown) or may be wall mounted.

Unique Advantages

- **Three-Tiered Shaker Simultaneously Agitates Hundreds of Samples on Up to Six Large Capacity Platforms***
- **2" (5.1 cm) circular orbit** is that most commonly used in screening studies
- **Cantilevered Platforms Provide Unobstructed Access to All Flasks.** Accepts 10 mL to 4L flasks on lower two tiers; and flasks up to 6 L on the top tier
- **Removable Control Module Can Be Panel Mounted or Positioned Remotely Outside the Chamber.** Fiber-optic link provides remote monitoring and control capability up to 32.8 ft. (10 m) away; eliminates both electrical "noise" interference as well as the need for bulky electrical wires
- **Precisely Balanced, Extremely Stable Shaker Mechanism with Massive Cast-Iron Base Need Not be Bolted to the Floor**
- **Four Cushioned Idlers Mounted to the Corners of the Base Stabilize the Shaker, Ensure Uniform Motion** without undue strain or structure fatigue
- **Designed with the Aid of Computer Stress Analysis Tests,** the structure has been built to withstand a lifetime of continuous shaking regardless of the workload
- **Agitation is precisely maintained between 25 and 350 rpm† even with line voltage fluctuations as high as ±10%**
- **Cool-Running Motor** has no appreciable affect on chamber temperature, making it well-suited to environmental rooms
- **Elimination of commutators and motor brushes minimize wear and maintenance**
- **Optional Output Signal Can Be Provided for Recording Speed** on an external chart recorder

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* *Platforms are sold separately to allow different sized glassware to be shaken simultaneously.*

† *Based on shaking a typical workload.*

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INNOVA MODEL 5000 MULTI-TIERED SHAKER SPECIFICATIONS*

Shaking	Range & Control §	25 to 350 rpm ± 1 rpm over entire speed range by means of PI microprocessor control. Acceleration circuit prevents sudden starts/stops, minimizing both splashing & mechanical damage
	Motion	2" (5.1 cm) diameter circular orbit
	Indication	Digital LED electronic display in 1 rpm increments. Character height: 3/8" (0.95 cm)
Timer		Programmable shaking periods from 0.1 hr. to 99.9 hrs. Triggers audible alarm and energizes status light at end of period. Can be deactivated for continuous operation
Alarms		Audible and visual signals indicate when speed deviates more than 5 rpm from setpoint, and when timer operation has expired. (Audible alarm may be muted)
LED Display		Indicates speed, running time and alarm conditions. Displays readout of internal clock (actual accumulated operating time). Character height: 3/8" (0.95 cm)
Drive		Dynamically-balanced, ball bering drive with 4 idler shafts mounted on each corner in a cast-iron housing with 16 permanently lubricated ball bearings
Motor		Solid-state brushless D.C. motor. One third hp. Maximum torque 155 oz-in (1.09 N-m)
Safety		Vibration sensor limits speed of shaker when overloaded or unbalanced and shuts off shaker when excess vibration is detected
Setpoint Retention		All setpoints and operating status are retained by non-volatile memory. Automatic restart after power is restored (indicated by flashing display)
Power		100V, 120V, 220V and 240V 50/60 Hz, 3,010VA
Fuse Protection		Main line circuit breaker
Dimensions	**Platform**	32.5" x 26.75" (82.5 x 68 cm), each. Maximum capacity: 6 platforms per shaker. (See Accessories, p. 22.)
	Overall	62" Wide x 38" Deep x 53" High ◊ (157.5 x 96.5 x 135 cm)
Weight		2,000 lbs. (907 kg) Net 2,200 lbs (998 kg) Gross
Ambient Conditions		Temperature: 0 - 60°C. Humidity: 90% non-condensing

* Specifications subject to change without notice.
§ Based on shaking a typical workload. Baffled flasks may significantly reduce maximum speed.
◊ Allowances should be made for additional height occupied by flasks on top tier and for motion of shaker in determining actual overall dimensions.

Shaker Capacity
(Accepts up to 6 platforms per shaker)

Flask Size	Flasks/ Dedicated Platform	Maximum Flasks Per Shaker	Flasks/ Universal Platform**	Maximum Flasks Per Shaker
10 mL	300	1,800	264	1,584
25 mL	248	1,488	143	858
50 mL	161	966	143	858
125 mL	99	594	72	432
250 mL	64	384	42	252
500 mL	42	252	33	198
1 L	23	138	17	102
2 L ◊	14	70	12	72
2.8 L ◊	9	54	8	48
4 L †	9	16	8	48
5 L †	N/A	N/A	6	36
6 L †	8	16	6	36

** Flask clamps and test tube racks for the Universal Platform must be ordered separately. Dedicated Platforms include clamps. See pages 22 - 23.
◊ When used on bottom tier, can only use front half of platform.
† For use on top tier only. Maximum 16 flasks on top two tiers.

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innOva®

ACCESSORY PLATFORMS, RACKS & CLAMPS

NBS offers a variety of options for safely securing tubes, flasks and plates to the shaker. The platforms shown are available in a range of sizes and represent the various styles and finishes available.

1. The Universal Platform provides the flexibility for using a mix of different size tubes or glassware on a single platform. It comes with numerous mounting holes to allow you to add and interchange clamps and racks at your discretion. Flask clamps, 10 mL to 6 L, and racks are sold separately. See below for details.

2. If using a single flask size only, our **Dedicated Platforms** provide maximum capacity, and come with clamps installed.

3. The Utility Carrier has two adjustable clamping bars to quickly secure a variety of glassware or tubes on the non-skid rubber mat.

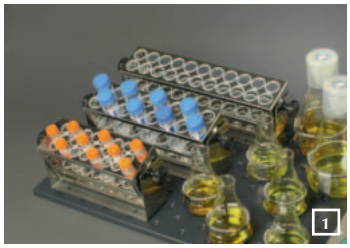
4. The Utility Tray, designed for low-speed applications, allows for quick addition or removal of flasks, plates or tubes. A non-skid rubber mat is provided.

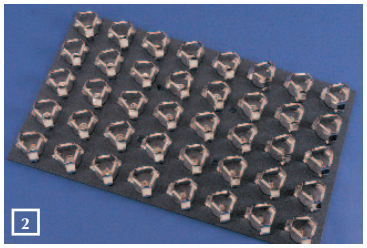
5. Sticky Tape and Sticky Pad are an alternative to flask clamps for securing vessels to a shaker platform. Both are ideal for containers such as bottles and dishes that cannot be held with conventional flask clamps. With flasks, these products can be used at speeds of up to 200 to 300 RPM depending on orbit diameter, flask size and load. Sticky Tape is supplied as a roll 23 m (75 feet) x 3.8 cm (1.5 inches) and can be used several times before losing its adhesive properties. Sticky Pad is 20 cm x 20 cm (7.9 inches square) and can be re-generated to like-new condition by washing with mild detergent and water. Neither can be used in water baths.

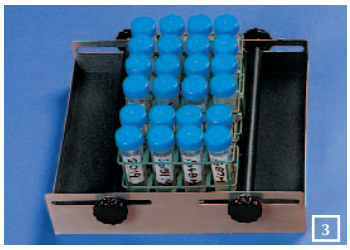
6. New Test Tube Racks have an adjustable angle and tube height support. Made from stainless-steel inserts to help retain tubes and prevent them from spinning in rack. Finger-tight knobs let you quickly adjust angle or release rack from base plate for easy transport to the bench. See page 23 for rack capacity.

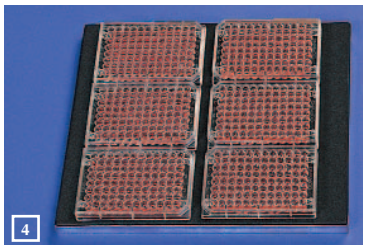
7. Microplate Holders available in two styles. The single layer style will hold five standard or deep well plates. The stacked plate style will hold up to nine standard or 3 deep well plates. Both holders are used with Universal Platforms.

8. Microplate Platforms hold dozens of microplates. (No additional platform required.)

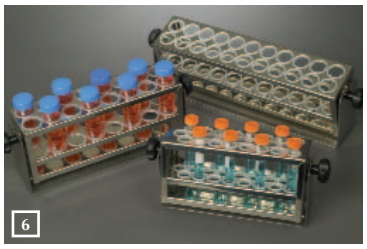


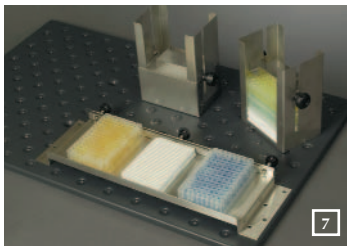


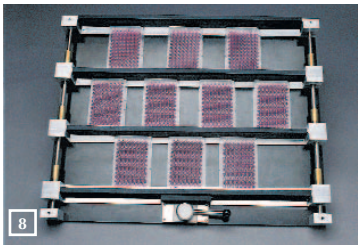


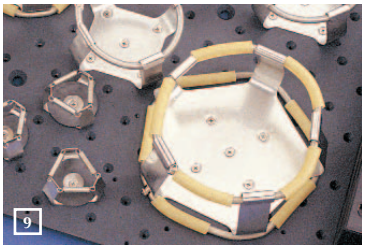










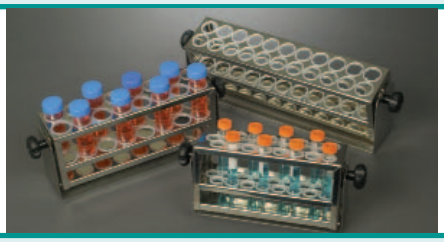


9. Flask Clamps are of a single piece stainless-steel construction (not spot welded or riveted) for added strength and safety holding flasks firmly in place. Larger clamps come with a double set of rubber tubing for added security when agitating flasks at high speeds.

A variety of other accessories, including mobile carts, dollies, spare parts kits and more are also available.

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Test Tube Rack & Microplate Carrier Capacity



	Part number	Test Tube Size	Tubes/Rack	Models 2100 4000 /4080 4200/4230	Models 2150 4900	Models 2300 4300 Series 44/44R	Model 2350	Model 5000	Model 2000	Models 2050 3100
				Racks per platform						
Large Racks	M1289-0100	8-11 mm	80	4	6	7	12	10	—	—
	M1289-0200	12-15 mm	60							
	M1289-0300	15-18 mm	42							
	M1289-0400	18-21 mm	30							
	M1289-0500	22-26 mm	22							
	M1289-0600	26-30 mm	20							
Medium Racks	M1289-0010	8-11 mm	60	5	7	9	13	10	—	3
	M1289-0020	12-15 mm	44							
	M1289-0030	15-18 mm	31							
	M1289-0040	18-21 mm	23							
	M1289-0050	22-26 mm	16							
	M1289-0060	26-30 mm	16							
Small Racks	M1289-0001	8-11 mm	48	5	8	7	18	16	3	4
	M1289-0002	12-15 mm	34							
	M1289-0003	15-18 mm	24							
	M1289-0004	18-21 mm	18							
	M1289-0005	22-26 mm	13							
	M1289-0006	26-30 mm	12							
Rack Holder	TTR-210	**Angled Tube Rack Holder** uses thumbscrew to secure user-supplied test-tube racks, 10° angle, 4" - 5" W (12.7 cm) and up to 15" L (38 cm)		2	3	4	8	6	—	—
	TTR-215	**Spacer bar to TTR-210** for narrower test tube racks		—	—	—	—	—	—	—
Microplate	M1289-0700	**Microplate Holder, stack** (3 deep well or 9 standard)		8	12	16	27	24	3	6
	TTR-221	**Microplate Holder, single Layer** (5 deep well or standard)		2	3	4	8	6	—	—

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