



New Brunswick Benchtop and Stackable Incubator Shakers Innova<sup>®</sup> 42/42R

> Operating Manual M1335-0050 Revision E



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# CAUTION!

This equipment *must* be operated as described in this manual. If operational guidelines are not followed, equipment damage and personal injury *can* occur.

Please read the entire operating manual before attempting to use this unit.

Do not use this equipment in a hazardous atmosphere or with hazardous materials for which the equipment was not designed.

Eppendorf is not responsible for any damage to this equipment that may result from the use of an accessory not manufactured by Eppendorf.

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# OVERVIEW

The Innova 42/42R Benchtop Incubator Shakers are benchtop or floor stackable orbital shakers that utilize a triple eccentric counter-balanced drive mechanism. They provide horizontal plane rotary motion in either a <sup>3</sup>/<sub>4</sub>-inch (1.9 cm) or a 1-inch (2.54 cm) diameter circular orbit, depending on the model. A Proportional/Integral (PI) microprocessor controller with instantaneous digital feedback controls the speed over the entire speed range.

1

The Innova 42R provides temperature control from 20°C below ambient (with a minimum setpoint of 4°C) to 80°C, and the Innova 42 from 5°C above ambient to 80°C. Naturally, both these ranges depend on relative humidity and other ambient factors, as well as the options installed in the unit. Ambient temperature is measured at one meter from the exterior of the unit.

Erlenmeyer flasks (up to 6 liters in size), and a wide variety of tubes and plates can be accommodated using the New Brunswick shaker accessories described in Section 8.7.

The Innova 42/42R may be operated in the following ways:

- **Continuously:** at a set speed and temperature, until user intervention.
- In a timed mode: run at a set speed, time and temperature for a period of up to 99.9 hours, after which the shaker automatically shuts off.
- Via the shaker's programmable controller: run through multiple temperature and speed changes for an extended period of time.
- Via computer through an RS-232 interface.

For safe operation, the Innova 42/42R shakers are designed with a safety switch that automatically stops the shaker mechanism when the door is opened.

The Innova 42/42R is equipped with visual and audible alarms that alert the user to the following conditions:

- The end of a timed run
- Deviations from speed setpoint
- Deviations from temperature setpoint
- Power failure
- Door open

To accommodate customer needs, a wide variety of platforms can be used with the Innova 42/42R:

- Universal platforms are the most flexible, providing hole patterns for flask clamps, test tube racks and other accessories.
- Dedicated platforms are supplied with flask clamps attached; they are designed solely and expressly for this purpose.
- Test tube racks, microplate holders, and test tube rack holders are also available (a universal platform is needed for all test tube racks and holders).

For further information on these accessories, see Section 8.7.

# 2 INSPECTION & UNPACKING OF EQUIPMENT

#### 2.1 Inspection of Boxes

After you receive your order from Eppendorf, inspect the boxes carefully for any damage that may have occurred during shipping. Report any damage immediately to the carrier and to your local Eppendorf Customer Service Department.

#### 2.2 Packing List Verification

Verify against your Eppendorf packing list that you have received all of the correct materials.

#### 2.3 Unpacking of Equipment



Do not attempt to lift the Innova 42/42R by yourself. Always ask for assistance or use a lifter or other suitable equipment when raising or handling the unit.

Upon unpacking the unit, inspect it carefully for any damage that may have occurred during transit. Report any apparent damage to the carrier and to your Eppendorf sales representative. Save the crate and packing materials.

# NOTE:

Use of the Innova 42/42R Shakers requires a platform, which is a separate item. See the Available Platforms list in Section 8.7.1.

#### 2.4 Out of Box Concerns

If any part of your order was damaged during shipping, is missing pieces, or fails to operate properly, please fill out the *Customer Satisfaction Form 6300*, included with your equipment, and return it by fax.

#### 2.5 Warranty Registration

Please complete and return your warranty card or register electronically at our Website: <u>www.nbsc.com</u>

# 3 PREPARING THE LOCATION

#### 3.1 Physical Location

# WARNING!

Do not attempt to lift the Innova 42/42R by yourself. Always ask for assistance or use a lifter or other suitable equipment when raising or handling the unit.

The surface where you place the Innova 42/42R should be smooth, level and sturdy, and must be able to accommodate 300 pounds.

#### 3.2 Environment

The shaker is designed to operate optimally in the following ambient conditions:

- 10° to 35°C
- 20 to 80% Relative Humidity (non-condensing)

#### 3.3 Electrical Requirements

The Innova 42/42R can be equipped to run on:

- 100 Volts, 50/60 Hz, 1500 VA maximum
- 120 Volts, 60 Hz, 1500 VA maximum
- 230 Volts, 50 Hz, 1500 VA maximum

In all cases, voltage variations must not exceed  $\pm 10\%$ .

#### 3.4 Space Requirements

It is essential that the shaker be situated in an area where there is sufficient space for the unit and its service lines (*see Figure 1*).

The dimensions of the Innova 42/42R are:

Width	25.00 inches	63.50 cm
Depth	29.33 inches	74.49 cm
Height	32.22 inches	81.84 cm

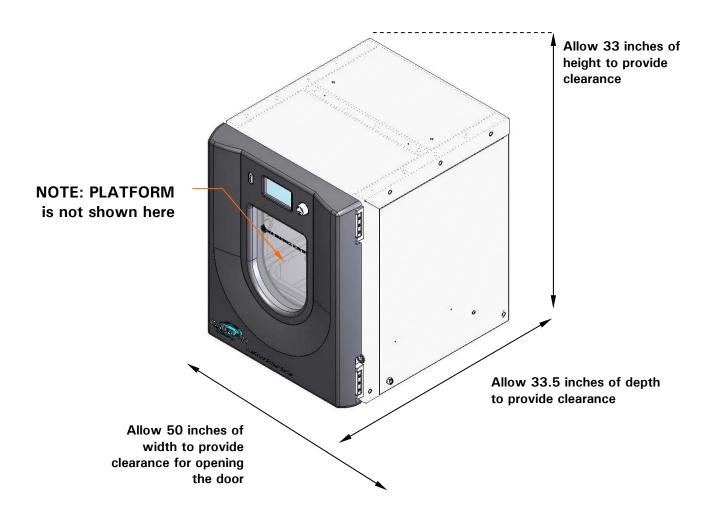
The effective surface area required for operation is:

Width	29 inches	74 cm
Depth	33.5 inches	85 cm

### NOTE:

Be sure to allow at least four inches (10 cm) around shaker for ventilation, access to power cord (rear panel), and access to power switch and RS-232 port (right side).

Figure 1: Space Requirements



# 4 INSTALLATION

#### 4.1 Platform Installation

A platform must be installed on the unit prior to use. See Section 6.2 for detailed instructions.

## 🖎 NOTE:

The platform is recommended for speeds up to 400 RPM. For reference, see the Load/Speed graphs provided in Appendix D, Section 14.

#### 4.2 Flask Clamp Installation

Flask clamps purchased for use with universal platforms (*see Section 8.7.1*) require installation. Clamps are installed by securing the base of the clamp to the platform with the correct type and number of screws. All clamps are shipped complete with hardware.

## 🖎 NOTE:

# The Innova 42 and 42R platforms require 10-24 x 5/16-inch Phillips-head screws (which are supplied) to fasten flask clamps.

Clamps for 2 liter flasks or larger are shipped with an additional girdle to keep the flasks in place. The girdle is an assembly of springs and sections of rubber tubing. One girdle is already in place on the clamp, the other is packed separately. To install these double girdle clamps:

- 1. Place the clamp on the platform, aligning its mounting holes with holes on the platform. Secure the clamp in place using the flat Phillips head screws provided (#S2116-3051, 10-24 x 5/16-inch). Use Figure 2b to help you identify the proper screws, as three different types of screws are shipped with the clamps.
- 2. With the first girdle in place, as delivered, on the upper part of the clamp body (*see Figure 2a*), insert an empty flask into the clamp.
- 3. After making sure the sections of tubing are located between the clamp legs, roll the first girdle down the legs of the clamp as far as it can go. The tubing sections will rest against the platform, and the springs will be under the clamp base.
- 4. Place the second girdle around the upper portion of clamp body (just as the first girdle was initially). Make sure that its spring sections rest against the clamp legs, while its rubber tubing sections sit against the flask, in between the clamp legs.

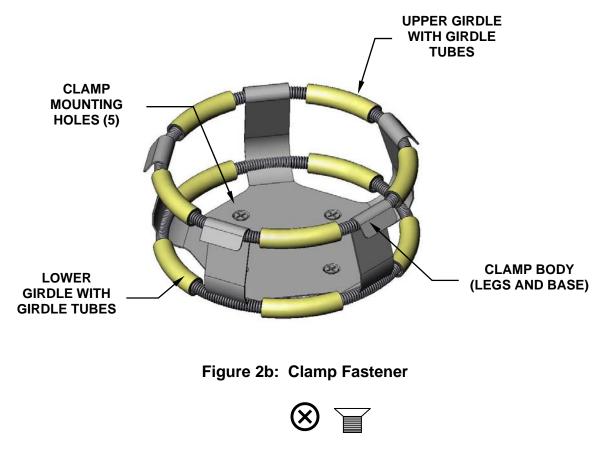


Figure 2a: Double Girdle Clamp Installation

The upper girdle secures the flask within the clamp, and the bottom girdle keeps the flask from spinning.

New Brunswick flask clamps are used on a variety of shaker platforms. Flat head screws of different lengths and thread pitch are used to secure the clamp. The following table identifies the proper screw for your shaker application by reference to the head style. Select the appropriate screws and set the others aside.

#### Table 1: Clamp Hardware Application Chart

Description	Part Number	Qty.	Application		
10-24 x 5/16 (7.9 mm) flat Phillips (+) head screw	S2116-3051	1	5/16" (7.9 mm) thick aluminum, phenolic and stainless steel platforms.		

#### No matter what size the clamp, use these screws to fasten them to your platform:

# NOTE:

One-liter and larger flask clamps are fastened with 5 screws.

### 4.3 Electrical Connections

# CAUTION!

Before making electrical connections, be sure to check the following:

- 1. If you have not already done so, check that the voltage and frequency of your unit are compatible with your electric supply.
- 2. Remove the caution label from the rear of the unit.
- 3. Set the circuit breaker on the right side of the unit to the OFF position.

#### **ONLY THEN:**

4. Plug the power cord into a grounded electrical outlet.

# 

A grounded electrical outlet is necessary for the safe operation of this instrument.

### 4.4 Optional Culture Drawer

If you plan to use the optional culture drawer, it would be a good idea to install it before stacking units. Please refer to Section 5.18 for installation instructions.

#### 4.5 Stacking Instructions

## WARNING!

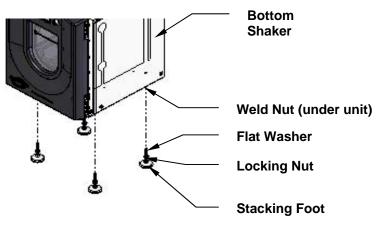
Do not attempt to lift the Innova 42/42R by yourself. Always ask for assistance or use a lifter or other suitable equipment when raising or handling the unit.

To stack two Innova 42/42R shakers, see Section 4.5.1. To stack an Innova 4200/4230 on an Innova 42/42R, skip to Section 4.5.2.

#### 4.5.1 For Two 42/42R Shakers

To stack two Innova 42/42R shakers:

- 1. Determine which unit will be the bottom one. If you are stacking a 42 with a 42R, we recommend placing the non-refrigerated 42 on top.
- 2. Install four P0160-5941 stacking feet, each with its flat washer, on top of the locking nut in each of the four weld nuts on the underside of the bottom unit. *You will need to tilt the cabinet back in order to install them.* See Figure 3a below:



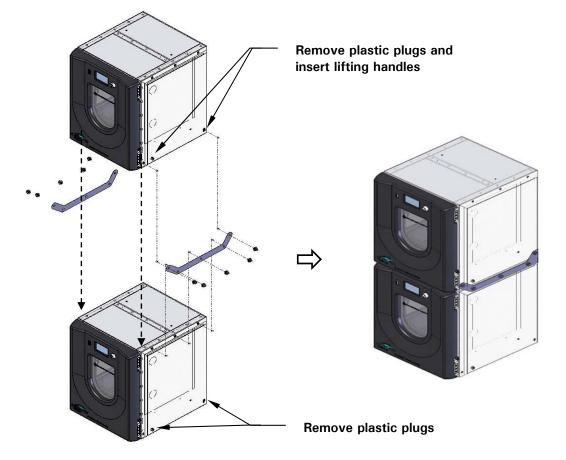
#### Figure 3a: Installing the Stacking Feet

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Do not tip a refrigerated unit (42R) on its side as this may damage the compressor.

3. Level the bottom unit and lock the feet in place with the locking nuts.

4. Remove the plastic plugs from the mounting holes on the shakers' side panels. There are two per side at the bottom of the top shaker and at the top of the bottom shaker. (Save them for future use.)



#### Figure 3b: Stacking Two Innova 42/42R Shakers

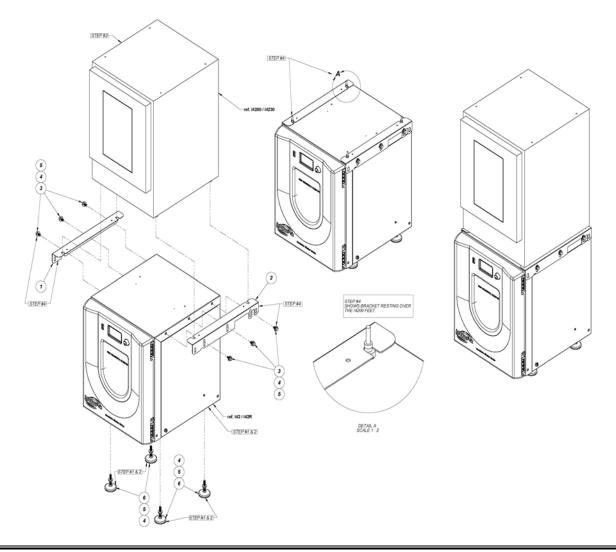
- 5. Insert the screw-in lifting handles provided (#P0220-1112) with the stacking kit into the previously plugged holes at the bottom of the shaker to be lifted.
- 6. With the help of a lifter or other suitable equipment, place one shaker on top of the other, both facing in the same direction as shown. Remove the handles.
- 7. Align the each side of the stacking frame with the mounting holes on both shakers and, using the bolts provided, install both sides of the frame.
- 8. Check the units with a level again, adjusting the feet if needed.

#### 4.5.2 For an Innova 4200/4230 on an Innova 42/42R

To stack an Innova 4200 or 4230 on an Innova 42 or 42R shaker:

1. With reference to Figure 3c below, install four P0160-5941 stacking feet (item <sup>(6)</sup>), each with its flat washer (item <sup>(5)</sup>), on top of the locking nut (item <sup>(4)</sup>) in each of the four weld nuts on the underside of the bottom unit. *You will need to tilt the cabinet back in order to install them.* 

#### Figure 3c: Stacking an Innova 4200/4230 on an Innova 42/42R



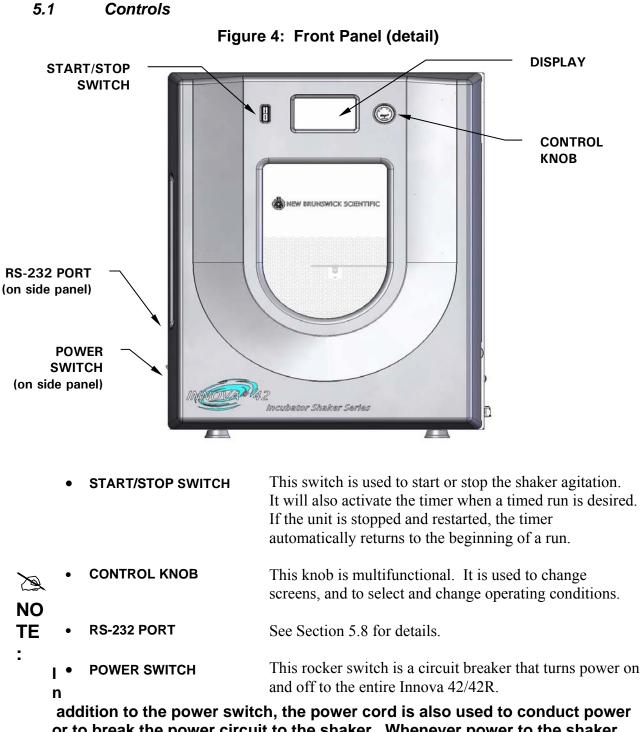
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Do not tip a refrigerated unit (42R) on its side as this may damage the compressor.

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- 2. Level the bottom unit and lock the feet in place with the locking nuts (item 4).
- 3. With the help of a lifter or other suitable equipment, place center the Innova 4200/4230 over the Innova 42/42R, both facing in the same direction as shown.
- 4. Align each side of the stacking frame (items ① & ② in Figure 3c) with the mounting holes on both shakers, also taking care to align the grooves with the Innova 4200/4230's feet, as shown.
- Fasten the stacking frames in place using the bolts, washers and locking nuts provided (items ③, ④ & ⑤). The frame should rest over the top of the Innova 4200/4230's feet as shown in Figure 3c, Detail A.
- 6. Check the units with a level again, adjusting the feet if needed.

# 5 FEATURES

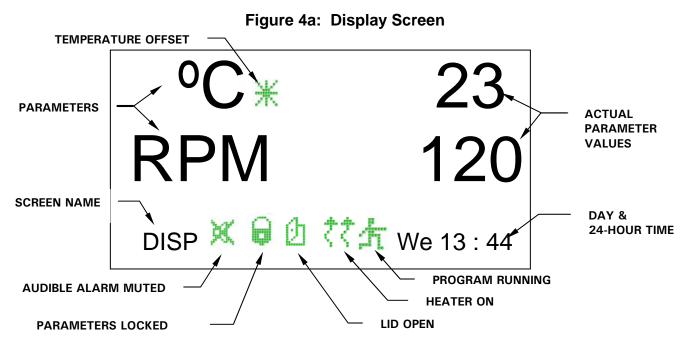


or to break the power circuit to the shaker. Whenever power to the shaker may be a hazard (during cleaning, maintenance or service work), be sure to disconnect the power cord from the electrical outlet.

#### 5.2 LCD Display

When the unit is powered up, using the Power Switch located on the front panel (*see Figure 4*), the initial display screen will remain for a short time while the system boots up.

Then the main screen, called **DISP** for Display, appears (*see Figure 4a*). This screen will indicate the same parameters that were in effect when the power was turned off.



- For an explanation of the icons on the display screen, see Section 5.4.
- Turning the Control Knob will highlight functions and/or values that can be changed.

For more information on working in the Display Screen, see Section 6.7.1.

#### 5.3 Changing Screens

You can change screens displayed by highlighting the screen name field in the lower left corner, pressing the Control Knob in until it clicks, rotating the Knob left or right (which also makes clicking sounds) to the desired screen and clicking the Control Knob in again. Table 1a describes the various screens:

Screen Name	Meaning	Features/Modes
DISP	Display	Shows two user-selectable parameters* and actual values.
SUMM	Summary	Shows all parameters*, setpoints and actual values.
SET	Set-Up	Set day of week, set time, enable or mute alarm, lock or unlock operating parameters
LAMP	Lamps	Internal chamber light: ON (always on); OFF (always off); AUTO (default mode), light goes on and stays on when lid is open, shuts off 15 seconds after lid is closed, and goes on for 15 seconds when Control Knob is moved. ¤ Photosynthetic lights (GRO): ON, OFF, <sup>1</sup> NONE ¤ UV Light (UV): ON, OFF, <sup>1</sup> NONE
СОММ	Communication (RS-232)	SET: set baud rate OFF disables RS-232 MONITOR: PC commands shaker to read setpoints and actual values on a schedule determined by PC software. Parameters are unlocked and can be changed by program or manually. SLAVE: PC controls shaker and logs data. TALK: Shaker sends setpoint and actual data to PC at one-minute intervals.
CAL	Calibration	Allows user to enter a temperature offset. Self-calibrates the speed sensor.
PROG	Program	Allows user to set up 1- 4 programs, each with 1-15 steps.
* see Table 2	Display Screen Pa	

#### Table 1a: Screens

#### Table 2: Display Screen Parameters

Parameter Name	Meaning
RPM	Shaking speed, in revolutions/minute
°C	Chamber temperature, in degrees Celsius
HRS	Programmed time remaining, in hours
¤ %RH	Relative Humidity, in percent.
д UV	Status of Ultraviolet germicidal lamp
¤ GRO	Status of Photosynthetic growth lamps

¤ Optional

#### 5.4 Display lcons

There are six icons that help identify operating conditions. Five of these icons are located at the bottom of the display, and they are visible, when applicable, in any screen you are viewing, except the Program subscreens. The sixth appears, when applicable, next to °C whenever the temperature is onscreen.

lcon	Explanation
X	This icon appears when audible alarms are muted.
θ	This icon appears when the possibility to make manual or programmed parameter changes is disabled (locked). This is controlled by settings on the SET screen. See Section 6.7.3
Ø	This icon appears when the shaker lid is open.
<i>††</i>	This icon appears when the Heater is on. See Section 5.10.
<b>赤</b>	This icon appears when a user-defined Program is running. See Section 6.8.5.
Ж	This icon appears to the right of <sup>o</sup> C if the Temperature Offset feature is being used. See Section 6.10.

#### 5.5 Alarms

If an alarm condition exists, the field in the lower right corner will alternate the Day and Time with characters indicating the nature of the alarm condition, accompanied by an audible alarm (unless muted):

Indication	Description
TEMP	The temperature deviates more than 61°C from setpoint after achieving control temperature range. After door is opened, alarm will be disabled for 5 minutes while chamber recovers to setpoint.
SPEED	The speed deviates more than 65 RPM from setpoint after achieving operating speed setpoint. After door is opened, alarm will be disabled for 5 minutes while chamber recovers to setpoint.
POWER	Indicates unit is powering up (both at normal power-up and after power interruption); will flash until the Control Knob is moved.
HRS	Indicates when timed run is completed.

#### 5.6 Door Operation

When the door is opened, the following will happen:

- Heater turns off
- Shaker stops
- Interior light goes on and, when it is in **AUTO** mode, will remain on for 15 seconds after the lid is closed
- UV germicidal lamp (if so equipped) turns off

#### 5.7 Spill Containment

The Innova 42/42R is equipped with a spill diverter (sub platform) and one-piece plastic liner to protect the drive mechanism from accidental spills and/or broken glassware. This pan can also be used as a water reservoir to humidify the chamber and to reduce evaporation. An optional factory-installed humidity monitor is also available.

The reservoir can be drained through the quick-connect valve on the right side of the unit.

#### 5.8 Software Interfaces

The RS-232 port is located below the Power Switch on the right side of the base (*see Figure 1*). It can be used to interface a computer to the shaker for control of operating conditions or data logging applications (*see Section 11*).

The customer is responsible for securing the proper driver to interface with the RS-232.

#### 5.9 Interior Light(s)

When the **LAMP** screen is in its default **AUTO** mode, the interior ("chamber") light is activated for 15 seconds whenever you turn the Control Knob. It will automatically shut off after 15 seconds of Control Knob inactivity.

The chamber light will also go on when the lid is open.

In addition, you can set the chamber light to be continuously **ON** or **OFF** by selecting either mode in the **LAMP** screen.

There are two additional light options for refrigerated units only: interior photosynthetic growth lamps (*see Section 5.16*) and a germicidal UV lamp located outside the chamber but in the airflow path (*see Section 5.15*).

#### 5.10 Heater

The chamber temperature is sensed by a 1000 ohm platinum RTD. A xxx W heater is controlled using pulse width modulation on a 2.5-second duty cycle. This cycle time is fast enough to prevent noticeable changes in air temperature due to the cycling.

Whenever the heater is on, the Heater On icon 5 will appear in the display. The heater automatically stops running when the door is opened.

### 5.11 Refrigeration (42R Only)

The refrigeration system in the Innova 42R is a variable-capacity system carefully designed with self-checks to maintain the setpoint, to balance pressure within the system, and to keep the evaporator from freezing.

When the shaker is powered up, there is a four-minute time delay prior to compressor start-up.

#### 5.12 Service Accessibility

In the unlikely event that your Innova 42/42R should need service, all electronic boards, refrigeration and heating components are easily accessible **to an authorized service technician**.

#### 5.13 Optional Remote Alarm

The Innova 42/42R can be equipped with a factory-installed remote alarm component (Part number M1320-8029). When it is hooked up to your relay and receiving equipment, this device will send notification of an alarm condition to the remote location you choose.

#### 5.14 Optional Gassing Manifold Kit

**This option is factory-installed.** The manifold delivers gas into the chamber via as many as 12 ports. The manifold can be adapted to the desired tubing configuration by adding or subtracting ports or by temporarily clamping off unused tubes. You may elect to use splitters (barbed Y-connectors) after the manifold to increase the number of flasks you can serve.

You determine the appropriate gas flow rate using a pressure regulator (which you supply) on the gas supply.



- Never use the gas manifold with flammable gases.
- Regulate the gas supply & never exceed 15 PSIG inlet pressure to the manifold.

50 feet of 1/16-inch (ID) sterilizable silicone tubing is supplied with the kit. Filters may be needed:  $0.22\mu$  syringe filters (which you supply) can be fitted to the individual manifold ports to maintain a sterile barrier.

#### 5.15 Optional Germicidal UV Lamp



WARNING!

Never try to operate the UV Germicidal Lamp while the shaker lid is open.

This option, a germicidal ultraviolet lamp, is placed inside the Service Compartment, outside the chamber to help reduce the risk of contamination. The lamp is identified on the display screen as **UV**.

The UV germicidal lamp is factory-installed and available on refrigerated units only. Operation instructions are provided with this option.

#### 5.16 **Optional Photosynthetic Lamps**

This factory-installed option, available on refrigerated units only, provides six photosynthetic growth lamps inside the chamber. They can be turned on and off manually, by the easily set programmable timer, or by computer. These lamps are identified on the display screen as GRO. The replacement bulb part number is P0300-0221.

The recommended operating temperature when using this option is 15 - 37°C; the maximum operating temperature is 70°C.

## NOTE:

When the GRO lights are on, the unit cannot achieve a chamber temperature lower than 13.5°C below ambient.

#### **Specifications:**

Bulb type & model:	T8 fluorescent
Lumens @ 25°C:	325
Color Rendering Index (RI):	66

To complement this option, water can be added to the spill pan in order to elevate the humidity level in the chamber. See Section 6.4 for instructions.

#### 5.17 **Optional Humidity Monitor**

This optional factory-installed accessory allows you to monitor relative humidity levels in the chamber throughout your run. When the humidity sensor is present in the chamber, maximum shaker temperature is automatically limited to 60°C.

#### **Specifications:**

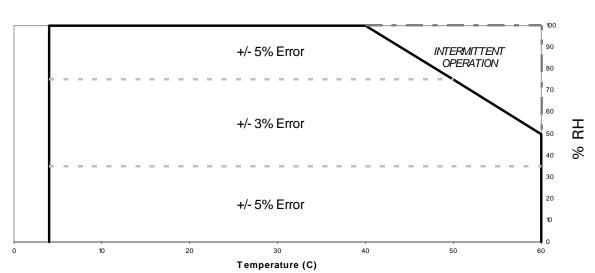
Humidity Operating Range:	0 to 100% RH
Temperature Operating Range:	4 to 60°C
Accuracy:	See Figure 5: Operating Range & Error Graph, on the following page
Hysteresis:	± 1.5% RH
Recovery Time after Saturation:	10 seconds
Long Term Stability:	0.5% RH per year



#### 

Operating the Innova 42/42R with humidity sensor at temperatures above 60°C can result in *permanent damage* to the sensor.

#### Figure 5: Humidity Sensor Operating Range & Error Graph



**Operating Range and Humidity Error** 

#### 5.18 Optional Culture Drawer

The Innova 42/42R can be equipped with a culture drawer that the user installs inside at the top of the cabinet. The culture drawer is designed to reduce sample dessication. This convenient feature allows you to easily access plates, T-flasks and other samples that need incubation but do not need shaking.

## 🖎 NOTES:

When the culture drawer is in place, the largest flask you can place on the platform beneath it is 2L.

The culture drawer must be installed at the top of the cabinet for best results. Installing it in a lower position will block air flow and significantly disrupt temperature uniformity.

To install the culture drawer:

- 1. Install the four shelf clips (packaged with the standard shelf) into the rails inside the chamber as you would for the standard shelf. These clips must be at the same height on the rails and near the top of the chamber
- 2. Ensure that there is enough clearance to install the Culture Drawer into the chamber.
- 3. Unwrap the Culture Drawer and gently insert it into the chamber, ensuring that the handle faces outside the chamber.

- 4. Ease the Culture Drawer into position so that it rests on each of the four shelf clips and is well supported.
- 5. Pull it out and push it in to test its stability.

Your new Culture Drawer is ready for use.

# 6 **OPERATION**

#### 6.1 Platform Assemblies

The Innova 42/42R can be used with a variety of New Brunswick platforms that will accept a wide range of clamps for flasks, test tubes, etc. A platform, which is required for operation, is a separate item, not included with the shaker assembly. Refer to Section 8.7.1 for details on available platforms and platform accessories.

#### 6.2 Installation of Platform

**Prior to use, a spill cover and platform must be installed on the unit.** The shaker is shipped with 4 Allen head platform screws installed in the bearing housing (*see Figure 6 below, which also shows the spill cover that you must install*). Set the power to OFF and unplug the unit. Remove the platform screws, then use them to install the spill cover (sometimes also referred to as a drip tray) and platform over the bearing housing:

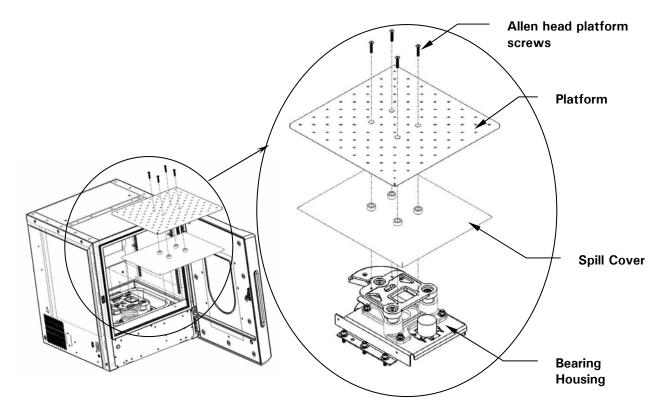


Figure 6: Installing Platform & Spill Cover

#### 6.3 Safety Precautions

Before operating the shaker, verify that anyone involved with its operation has been instructed in both general safety practices for laboratories and specific safety practices for this apparatus.



The user is also responsible for following local guidelines for handling hazardous waste and biohazardous materials that may be generated from the use of this equipment.



If service should be required on a unit that is going to be returned to an Eppendorf facility, it must be completely decontaminated and cleaned prior to its return, and a Returned Material Safety Sheet must be filled out to certify that you have complied. See Section 12, *Product Returns*.



It is the responsibility of the user to carry out appropriate decontamination procedures if hazardous material is spilled on or inside the equipment. Before using any cleaning or decontamination method other than those suggested by the manufacturer, users should check with Eppendorf that the proposed method would not damage the equipment.

This equipment is **not** "explosion-proof" and should never be used with flammable substances or used to grow organisms that produce flammable by-products.

# 

To prevent damage to the shaker and its contents, never run the shaker without a platform.

#### 6.4 Filling the Water Reservoir

If you choose to use the spill pan as a water reservoir to reduce evaporation and to raise the humidity level in the chamber:

- 1. Open the lid and temporarily remove the platform.
- 2. Make sure that the drain check valve is closed.

## NOTE:

As you add water, do not allow the water to splash or flow into the recessed middle of the pan, where the bearing housing assembly is mounted. Pour water *very slowly* into the shallow area beyond the edge of the spill cover to protect the bearing housing.

3. Accessing the pan/reservoir from the left, the right or in front of the spill cover, **slowly** fill the reservoir with no more than 2 liters of distilled water. A long, narrow watering can or a flexible hose will make it easier to access the pan while protecting the bearing housing from accidental overflow.

At a 37°C setpoint, the chamber loses approximately 50 mL/hr from the pan. At a 25°C setpoint, and placed in a 25°C room, the chamber achieves a relative humidity equilibrium that is approximately 15% above the ambient humidity.

#### 6.5 Draining the Water Reservoir

To drain water from the water reservoir/spill pan:

- 1. Attach the quick-connect drain fitting, direct it to a container or drain, and allow the water to gravity drain.
- 2. When the reservoir is empty, detach the fitting.

The spill pan/water reservoir drain is located in the front, on the left, under the humidity tray.

#### 6.6 Starting the Shaker

To initially start the shaker, close the door and turn the power switch (located on the righthand side of the unit) to the **ON** (I) position. The display will come on (first showing only **Eppendorf**, then briefly displaying the model number, 42 or 42R, and the stroke, <sup>3</sup>/<sub>4</sub> inch or 1 inch, and then quickly moving into the Display screen), and the audible alarm will sound. If you turn the Control Knob, the audible alarm will stop. For details on muting and activating the alarm, see Section 6.9.

When the shaker begins to operate, the LCD display will track the speed as it accelerates to the last entered setpoint. The shaking action may be started or stopped by pressing the Start/Stop button on the front panel.

### NOTE:

The shaker will not operate if the door is open. This is indicated by the "door open" icon appearing in the bottom line of the display (see Figure 4a or Table 3).

#### 6.7.1 Display Screen

When you turn the power on, this is the first screen to appear after the company title screen. The default display parameters are temperature (°C) and shaking speed (**RPM**).

You can change the displayed parameters. To replace a parameter:

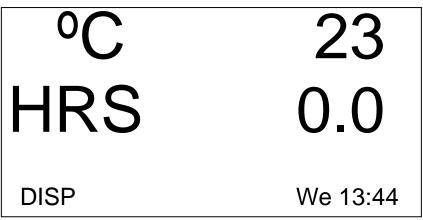
1. Using the Control Knob, highlight the parameter that you wish to replace. For this example, we will replace **RPM** (*see Figure 7*).

°C	23
RPM	120
DISP	We 13:44

Figure 7: Changing Display Parameter

- 2. Click the Control Knob in. **RPM** will flash.
- 3. Turn the Knob until the desired parameter appears in the highlighted field. For this example, we will select **HRS**.
- 4. Click the Knob in, to set and save the parameter (see Figure 8).





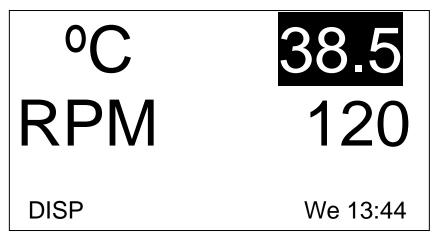
# If you highlight an item, change it, but do not save your selection, after a few seconds the screen will revert to its previous setting.

You can also use this screen to verify a setpoint, even though the values displayed here are actual (current) values. **To view a setpoint**:

- 1. Use the Control Knob to highlight the value (in this example, we will view the temperature setpoint, so we will highlight the current °C, which is 23).
- 2. Click the Knob in to display the current setpoint, which will flash.

At this point you can modify the setpoint or click the Knob in again to return to the normal display, which will be the actual temperature. **To modify a setpoint** in this screen:

- 1. Use the Control Knob to highlight the current value (we will continue to use the temperature as our example, so we will select **23**).
- 2. Click the Knob in to display the current setpoint (in this example, **38.5**—*see Figure 9*), which will flash.



#### Figure 9: Changing Setpoint

3. Turn or spin the Knob to reset the setpoint (in this example, turn the Knob left to decrease the setpoint to **37.0**).

# NOTE:

If you turn the Control Knob slowly, one click left or right will change the setpoint by an increment of one tenth of a degree Celsius (0.1°C). If you spin the Knob, the value will change by larger increments.

4. Click the Knob in to set and save this new setpoint.

# If you highlight an item, change it, but do not save your selection, after a few seconds the screen will revert to its previous setting.

5. The display will automatically return to the actual value.

To move out of this screen and into the next:

- 1. Use the Control Knob to highlight **DISP**, then click the Knob in. **DISP** begins to flash.
- 2. Turn the Knob to the right until the next screen, Summary (**SUMM**), appears. If you turn too far and enter another screen, just turn the Knob back to the left to recapture the **SUMM** screen.
- 3. Click the Knob in to select the screen and to work in it.

#### 6.7.2 Summary Screen

In this screen (*see Figure 10*), you can see both the current **ACTUAL** readings and the **SET**points for shaking speed (**RPM**), chamber temperature (**°C**), and elapsed time in a programmed run (**HRS**).

PARAM	ACTUAL	SET
RPM ⁰C HRS	100 45.1 0.0	100 45.0 0.0
SUMM		Th 16:18

Figure 10:	Summary Screen
------------	----------------

# NOTE:

The current day (Su, Mo, Tu, We, Th, Fr or Sa) and time always remains visible in the lower righthand corner.

The only elements you can modify in this screen are setpoints. To change setpoints in this screen:

- 1. Turn the Knob until the desired setpoint is highlighted, then click the Knob in. The setpoint will begin to flash.
- 2. Turn the Knob to the right to increase the number, or to the left to decrease it. One click left or right will increase the setpoint by an increment of one (one whole unit or one tenth unit, depending on the parameter). Move the Knob more rapidly (you can spin it) to change the value by larger increments.
- 3. Click the Knob in to set and save the new value.

# If you highlight an item, change it, but do not save your selection, after a few seconds the screen will revert to its previous setting.

4. Repeat the above steps to change any or all of the other setpoints.

#### To move out of this screen and into the next:

- 1. Use the Control Knob to highlight **SUMM**, then click the Knob in. **SUMM** begins to flash.
- 2. Turn the Knob to the right until the next screen, Setup (SET), appears. If you turn too far and enter another screen, just turn the Knob back to the left to recapture the SET screen.
- 3. Click the Knob in to select the screen and to work in it.

#### 6.7.3 Setup Screen

Here you can set the day of the week and the time (on a 24-hour clock). This screen also allows you to lock all of your settings from further changes, and to mute or enable the audible alarm.

SETUP	
Day :	Thu
Hour/Min :	16:19
Lock :	Off
Mute :	Off
SET	Th 16:19

Figure 11: Setup Screen

- 1. Turn the knob to highlight the day (**Thu** in the sample screen above), then click inward once. The day will flash.
- 2. Turn the knob left or right to select the day of choice: Sun, Mon, Tue, Wed, Thu, Fri or Sat.
- 3. Click the knob in to set and save your choice.

#### NOTE:

If you highlight an item, change it, but do not save your selection, after a few seconds the screen will revert to its previous setting.

#### To change the time (Hour/Min):

- 1. Turn the knob to highlight the time (**16:19** in the sample screen above), then click inward once. The time will flash.
- 2. Turn the knob left or right to change the time. Left moves backward, right moves forward in time. One click right or left changes by one minute; spin the knob to move more rapidly.
- 3. Click the knob once inward to set and save your choice.

#### To lock the settings:

- 1. Turn the knob to highlight Lock, then click inward once. The current status (Off in the sample screen above) will flash.
- 2. Turn the knob in either direction; the only other choice is **On**. Click once inward to select and save **On**, or continue turning to return to **Off**.
- 3. When you set **Lock** to **On**, the <sup>IIII</sup> icon will appear at the bottom of the screen. This icon will remain on display through all main display screens until you turn the locking function off.

#### To mute the audible alarm:

- 1. Turn the knob to highlight **Mute**, then click inward once. The current status (**Off** in the sample screen above) will flash.
- 2. Turn the knob in either direction; the only other choice is **On**. Click once inward to select and save **On**, or continue turning to return to **Off**.
- 3. When you set **Mute** to **On**, the icon will appear at the bottom of the screen. This icon will remain on display through all screens until you turn the muting function off.

To move out of this screen and into the next:

- 1. Use the Control Knob to highlight **SET**, then click the Knob in. **SET** begins to flash.
- 2. Turn the Knob to the right until the next screen, RS-232 (**RS232**), appears. If you turn too far and enter another screen, just turn the Knob back to the left to recapture the **RS232** screen.
- 3. Click the Knob in to select the screen and to work in it.

#### 6.7.4 Lamps Screen

In this screen (*see Figure 12*), you can turn the chamber light (**Chamber**), the optional UV germicidal ("decontamination") lamp (**UV Decont**) and the optional photosynthetic growth lamps (**Growth**) on and off.

**On** means the light is always on, and **Off** means the light is always off, unless you add additional programming.

There is an additional mode for the chamber light: **Auto**. In **Auto** mode, the light will go on every time you activate the control knob or open the lid. This is the default mode.

#### 🖎 NOTE:

The Lamps screen, shown below, will always indicate Chamber light mode. If the shaker is not equipped with the optional UV germicidal lamp and/or photosynthetic growth lamps, UV Decont and/or Growth will say None.

LAMPS	
Chamber : UV Decont : Growth :	Auto Off Off
LAMP	Th 16:20

Figure 12: L	amps Screen
--------------	-------------

To change the mode setting for any of the lamps:

- 1. Turn the Control Knob to highlight the setting for the lamp of choice, then click the knob in. The current setting will flash (in the sample screen, we will use the **Chamber** light as an example.
- 2. Turn the Knob left or right until the desired mode setting appears (Auto in this example).
- 3. Click the Knob in to save the new setting.

#### NOTE:

## If you highlight an item, change it, but do not save your selection, after a few seconds the screen will revert to its previous setting.

#### To move out of this screen and into the next:

- 1. Use the Control Knob to highlight LAMP, then click the Knob in. LAMP begins to flash.
- 2. Turn the Knob to the right until the next screen, RS232 (**COMM**), appears. If you turn too far and enter another screen, just turn the Knob back to the left to recapture the **COMM** screen.
- 3. Click the Knob in to select the screen and to work in it.

#### 6.7.5 RS232 Screen

This screen (*see Figure 13*) is used only if you have connected a personal computer to the RS-232 port (*see Section 5.8*). Here you can select the RS-232 port's **Mode** and the **Baud Rate** appropriate to your PC.

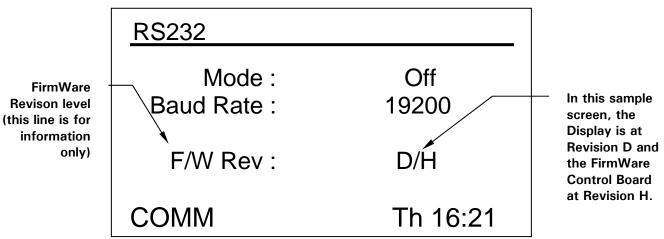


Figure 13: RS232 Screen

#### To change the Communication Mode:

- 1. Turn the Control Knob to highlight the current setting (**Off** in the sample screen above), then click the Knob in. The current setting will flash.
- 2. Turn the Control Knob left or right until the desired mode setting appears (*see Table 5: Communication Mode*):

Mode	Application
Off	The RS-232 port is not open to communication in
	either direction.
Slave	The shaker can be fully controlled from the
	computer.
Talk	The shaker sends current value reports to the
	computer once per minute.
Monit [Monitor]	The shaker responds only to "Report Requests".

#### Table 5: Communication Mode

3. Click the Control Knob inward once to save the new setting.

#### NOTE:

## If you highlight an item, change it, but do not save your selection, after a few seconds the screen will revert to its previous setting.

#### To change the Baud Rate:

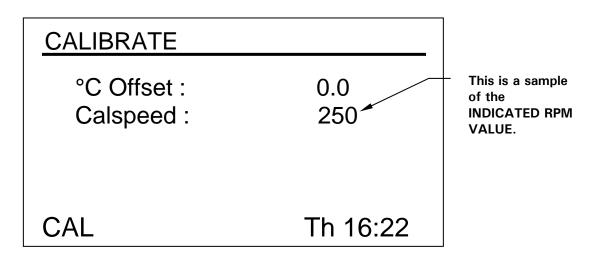
- 1. Turn the Control Knob to highlight the current setting (**19200** in the sample screen above), then click the knob inward once. The current setting will flash.
- Turn the Control Knob left or right until the desired setting appears: 9600, 19200 or 38400. The setting you choose should match the baud rate of your computer.
- 3. Click the Control Knob inward once to save the new setting.

To move out of this screen and into the next:

- 1. Use the Control Knob to highlight **COMM**, then click the Knob in. **COMM** begins to flash.
- 2. Turn the Knob to the right until the next screen, Calibrate (CAL), appears. If you turn too far and enter another screen, just turn the Knob back to the left to recapture the CAL screen.
- 3. Click the Knob in to select the screen and to work in it.

#### 6.7.6 Calibrate Screen

Use this screen (*see Figure 14*) to create a temperature offset and to calibrate the shaking speed (*for details, see Sections 6.10, Temperature Offset Calibration, and 6.11, Using Calspeed*).





#### 6.7.7 Programs Screen

Use this screen (*see Figure 15*) to set as many as four operating programs for the shaker. Each program can have as many as 15 steps. *See Section 6.8 below for complete details*.

Figure	15:	Programs	Screen
--------	-----	----------	--------

PROGRAMS	
Program 1 :	Off
Program 2 :	Off
Program 3 :	Off
Program 4 :	Off
-	
PROG	Th 16:23

#### 6.8 Programming the Shaker

#### 6.8.1 Timer Only

By setting an **HRS** setpoint in the **DISP** or **SUMM** screen, the shaker may be set to automatically stop after a preset time period of 0.1 to 99.9 hours.

If the time is set to 0.0, the shaker will operate continuously until either the door is opened or the Start/Stop button is pushed.

#### 6.8.2 Programmed Steps

The resident software for the Innova 42/42R can store up to four programs, each having as many as 15 steps. *Each step* can be programmed in one-minute increments, for total periods of one minute up to 99 hours 59 minutes each.

To enter the programming mode, use the Control Knob to select the **PROG** screen (*see Figure 15, repeated below*). At this point, you can **Run** a program, **Edit** a program, generate a **New** program or turn a program **Off**. **Off** is the default mode.

PROGRAMS	
Program 1 :	Off
Program 2 :	Off
Program 3 :	Off
Program 4 :	Off
PROG	Th 16:23

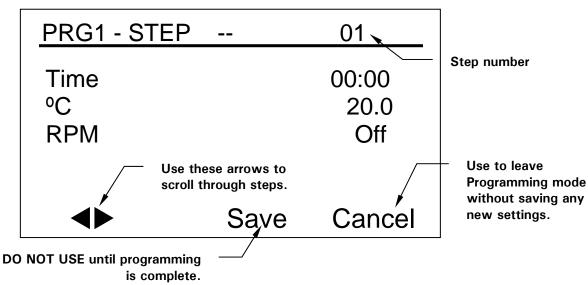
#### Figure 15: Programs Screen

#### 6.8.3 Creating a Program

To write a **New** program:

1. Use the Control Knob to highlight the mode of Program 1 (in our sample screen, Figure 15, it is **Off**), then click the Knob in. The selected field begins to flash.

2. Turn the Knob until the field says **New**. Click the Knob in to select this mode. The screen for Program 1 - Step 1 will open (*see Figure 16*):



#### Figure 16: Program 1 – Step 1

#### NOTE:

## If your shaker is not equipped with these optional features, "UV" and "GRO" will appear with the word "Off" in this screen but will not be programmable.

- 3. Turn the Knob to highlight the Time setting (00:00 in the sample screen above), then click the Knob in. The field will flash.
- 4. Turn the Knob until the desired running **duration** for this step (from 00:01, which means one minute, to 99:59) appears, then click the Knob in to save the setting. We will set Step 1 time to eight hours for this example (*see Figure 17*).
- 5. Turn the Knob to highlight the °C temperature setting (**20.0** in the sample screen above), then click the Knob in. The field will flash.
- 6. To set the temperature desired (°C from 4.0 to 80.0) for the time period you have set, turn the Knob (left to decrease, right to increase). When the desired value appears, click the Knob in to save the setting. We will set Step 1 temperature to 37.0°C (*see Figure 17*).
- 7. Turn the Knob to highlight the **RPM** setting (**Off** in the sample screen above), then click the Knob in. The field will flash.

8. Turn the Knob to select the desired shaking speed (25 to 400 RPM) for this time period, then click the Knob in to save the setting. We will set Step 1 speed to 150 RPM (*see Figure 17*).

#### NOTE: DO NOT select "Save" yet!

9. To program Step 2 (*see sample screen in Figure 17*): use the Control Knob to highlight the arrows at the bottom left of the screen. Click the Knob to make the arrows flash, then turn the Knob to the right until Step 2 appears. Click the Knob in to work in this screen, and repeat Steps 3-10.

			_
PRG1 - STEI	P 01	02 🔪	
Time	08:00	03:00	Step number
°C	37.0	40.0	
RPM	150	225	
	Save	Cancel	

Figure 17: Program 1 – Step 2

Whatever step is shown on the right-hand side of the display is settable (*in Figure 17, it is Step 2*). To scroll between steps, select the arrows (*bottom left*), then turn the Control Knob clockwise or counterclockwise, then select the desired step.

#### NOTE:

## The time entered for each step is <u>for that step only</u>; it is not cumulative (i.e., the elapsed time from the start of the program).

10. Continue to program as many as 15 steps in the same manner. For our sample program, we have only three steps (*see Figure 18 on the following page*).

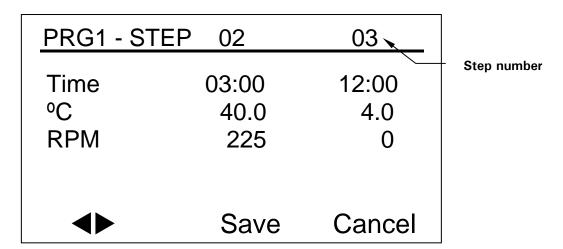


Figure 18: Program 1 – Step 3

The three-step program we have illustrated is designed to start incubating cultures at 37°C and hold that temperature for eight hours, shaking at 150 RPM. After eight hours, Step 2 engages, increasing the temperature setpoint to 40°C for a temperature induction, holding that temperature for three hours and increasing the shaking speed to 225 RPM. After this interval, the temperature will be cooled to 4°C and held at that temperature for twelve hours; no shaking will occur during this period, as the speed is set to 0 RPM.

Please note that temperature reductions, even at temperatures above ambient (going from 40° to 30°C, for example), require refrigeration to be effective.

#### To save the entire program:

- 1. Once all your steps are set, use the Control Knob to highlight **Save** at the bottom of the screen, then click the Knob in. The field will flash.
- Click the Knob in again to save the program. The display will read Process Running – Saving Profile for a few seconds, then return to the main Programs (PROG) screen.

If you wish, you can set Programs 2, 3 and 4 and save them in the same manner.

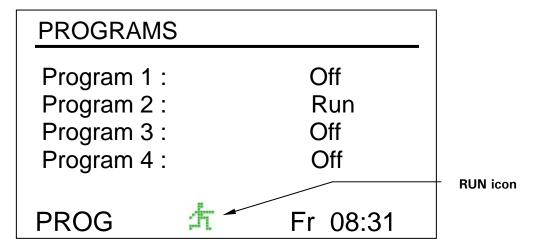
#### 6.8.4 Editing a Program

**Use the Edit function** to open a program you have already created and saved, in order to modify your settings following the same procedures.

#### 6.8.5 Running a Program

Use the Run fuction to turn a specific program on. Naturally, only one program can run at a time. When you change the mode to Run, the screen will show the Run icon:





**To stop a program:** You can abort a run any time by changing the program's function to **Off**.

#### 6.9 Muting the Audible Alarm

The Innova 42/42R shakers have an audible alarm that is activated under predetermined conditions (*see Table 4*). It may be muted in the following way:

- 1. Turn the Control Knob until the **SET** screen is highlighted on the display. Click the Knob in to work in this screen.
- 2. Turn the Knob to highlight the **Mute** mode (**On**), then click the Knob in. The field will flash.
- 3. Turn the Knob to change the setting to **Off**, then click the Knob to save this selection.

To reactivate the audible alarm at any time, repeat steps 1-3, reversing "off" and "on".

#### 6.10 Temperature Offset Calibration

The temperature probe and the temperature controller are calibrated together at the factory. The temperature probe measures the temperature of the air at the probe's location, near the return vent. The controller uses the probe input to adjust air temperature, up or down, to match the temperature setpoint.

Depending on various conditions within the chamber, such as flask placement and size, the heat produced by growing organisms, heat losses due to liquid evaporation from flasks, etc., the display temperature may differ from temperatures within the flasks themselves. You can calculate the correction value for this offset and program the shaker to display a corrected temperature.

#### 6.10.1 Calculating the Offset Value

If you wish to have the temperature display ("Indicated Temperature") match the temperature at a given point, or match the average of a series of points within the chamber ("Actual Temperature"), proceed as follows:

- 1. Let the unit equilibrate at or near the desired temperature, then record the Indicated Temperature.
- 2. Now record the Actual Temperature.
- 3. Calculate the temperature correction value using this formula: Actual Temperature – Indicated Temperature = Temperature Offset Value.
- 4. To set the Temperature Calibration Offset, follow the procedure outlined in Section 6.10.2 below.

#### 6.10.2 Setting the Offset

To set the temperature calibration **Offset**:

- 1. Use the Control Knob to enter the **CAL** screen (*see Figure 14, repeated below*).
- 2. Turn the Control Knob to highlight the current setting (**0.0** in the sample screen above), then click the Knob in. The current setting will flash.
- 3. Turn the Knob (left for negative settings or right for positive settings) to display the desired setting. As you turn the Knob, each click represents one tenth of a degree Celsius (0.1°C).
- 4. When you reach the desired setting, click the Control Knob in to save the new value.
- 5. When the Temperature Offset is set to any value other than 0, the *icon* will appear next to °C in the **DISP** and **SUMM** screens.

#### NOTE:

If you highlight an item, change it, but do not save your selection, after a few seconds the screen will revert to its previous setting.

CALIBRATE		
°C Offset : Calspeed :	0.0 250	<ul> <li>This is a sample of the INDICATED RPM VALUE.</li> </ul>
CAL	Th 16:22	

Figure 14: Calibrate Screen

#### 6.11 Using Calspeed

The **Calspeed** function, which is set in the **CAL** screen (*see Figure 14 above*), is used to calibrate the speed of the shaking mechanism. Calibrated at the factory, speed does not need to be recalibrated until a major operating component (e.g., drive belt) is changed.

#### NOTE:

## Prior to calibrating the speed, make sure that the platform is properly secured to the subplatform, and any flasks present are secured.

When the shaker is running, the **CAL** screen shows the indicated RPM value. If you wish to calibrate the speed, set the speed to a value that can be measured— a setpoint of 250 RPM works well. The use of a strobe is recommended for accuracy. If, after measuring the actual speed, you wish to adjust the indicated value:

- 1. Click the Control Knob in.
- 2. Set the new value.
- 3. Click the Knob in again to save the setting.
- 4. Turn the shaker OFF, wait a few seconds, then turn the shaker back ON.
- 5. Recheck the speed using a strobe.

#### 6.12 Power Interruption

In the event of a power failure, the Innova 42/42R Shakers are equipped with an **automatic restart** function. The shaker's non-volatile memory retains all stored information. If the shaker was in operation prior to the power interruption, the shaker will begin to operate at its last entered setpoints. The alarm/POWER display will flash, indicating that a power interruption has occurred. Turn the Control Knob in any direction to acknowledge the visual alarm. The flashing will stop.

## 7 MAINTENANCE

#### WARNING!

When cleaning the unit, always turn off the shaker and disconnect the power cord from the power supply.

#### 7.1 Routine Maintenance

No routine maintenance schedule is required for the Innova 42 and 42R.

To ensure that your shaker retains its attractive appearance, an occasional cleaning, using a cloth with conventional household (non-abrasive) cleaner is recommended (*see Section 7.2 below for more details*).

We also suggest that the area around the shaker be vacuumed or swept to remove dust and other debris, ensuring proper air flow in and around the shaker.

#### 7.2 Cleaning External & Internal Surfaces

The unit may be cleaned using a damp cloth or any standard household or laboratory cleaner to wipe down its outer surfaces. Do not use abrasive or corrosive compounds to clean this instrument, as they may damage the unit and void the warranty.

If Biohazard decontamination is required, see Section 7.3 below.

#### 7.3 Biohazard Decontamination



It is the responsibility of the user to carry out appropriate decontamination procedures if hazardous material is spilled on or inside the equipment. Before using any cleaning or decontamination method other than those suggested by the manufacturer, users should check with Eppendorf that the proposed method would not damage the equipment.

Commercially available household bleach solutions, when diluted at a 1:10 ratio, are effective in routine decontamination of the instrument. The method for decontaminating a spill depends upon the nature of the spill.

Spills involving fresh cultures or samples known to have low concentrations of biomass should be flooded with decontamination solution and soaked for 5 min before cleanup. Spills involving samples with high concentrations of biomass, or involving organic matter, or occurring in areas warmer than room ambient temperature, should be exposed to decontamination solution for *at least one hour* before cleanup.



Personnel involved in the cleanup of any spill should wear gloves, safety glasses, and a laboratory coat or gown during the cleanup process. Respiratory protection should be considered for spills where aerosolization is suspected.

# 8 SERVICE & ACCESSORIES

#### 8.1 Troubleshooting

If any problems occur with your shaker, do not attempt to perform any service on the unit other than specified in this manual. Unauthorized servicing may void the warranty. Please contact your local Eppendorf Customer Service Department

In any correspondence with Eppendorf, please refer to the model number and serial number of your unit. This information is on the electrical specification plate, located on the rear panel of the unit, above the power connector.

There are some problems, however, that you can investigate and correct yourself. Refer to the following Troubleshooting Guide:

Symptom(s)	Probable Cause(s) & Solution(s)		
	Power cord is not plugged in and/or power switch is off: plug in power cord (to working electric outlet), and turn on power switch.		
	Door is open—look for Open Door icon on display: close door firmly.		
	On/Off switch is not working: call for service.		
	If you recently replaced a fuse, it may not have been seated		
Shaker does not run.	properly: remove and reinstall the fuse carefully.		
	Shaking speed has been set to Zero by program running (look		
	for Run icon in display) or by computer interface: reset shaking		
	speed.		
	Defective main board: call for service		
	Defective display controller board: call for service.		
	Jammed shaking mechanism: call for service		
	Defective motor: call for service		
	Drive belt out of alignment or worn: call for service.		
Shaker runs slowly	If you recently replaced a fuse, it may not have been seated		
and/or no speed	properly: remove and reinstall the fuse carefully.		
indication.	Incorrect speed calibration: recalibrate shaking speed.		
	Defective main board: call for service.		
	Defective motor: call for service.		
	Drive belt out of alignment or worn: call for service.		

...continued...

Symptom(s)	Probable Cause(s) & Solution(s)		
Shaker does not run at	Shaker is running in Program mode (look for Run icon in		
set speed.	display).		
	Shaker speed has been changed by RS-232 command/		
	computer interface.		
	Shaker is overloaded and/or you are using baffled flasks:		
	remove some contents & balance load.		
	Defective motor: call for service.		
	Drive belt out of alignment or worn: call for service.		
	Check speed calibration.		
Operating noise	Load out of balance: unload all contents, then reload.		
	Loose component(s) in platform, subplatform and/or drive		
	assembly: call for service.		
Incubator does not	Shaker running in Program mode: Run icon in display.		
reach set temperature.	Temperature setpoint changed by RS-232/computer interface		
	command.		
	Heater fuse blown: replace.		
	Compressor fuse blown: replace.		
	Compressor over-pressure switch activated: call for service.		
	Ambient temperature too high or too low: cool or heat the		
	room as needed.		
	Defective heater: call for service.		
	Defective refrigeration system: call for service.		
	Incorrect temperature indication (see below).		
Incorrect temperature	Temperature Offset has been programmed: Offset icon in		
indication.	display.		
	Defective RTD assembly: call for service.		
	Defective main board: call for service.		

#### 8.2 Product Returns

Should you need to return your Innova 42/42R to Eppendorf for any reason, first contact Customer Service to obtain a Returned Material Authorization (RMA) number. This number must appear on the outside of the shipping container, otherwise Eppendorf Receiving will refuse to accept the shipment.

In addition, you must also certify that the instrument being returned has been thoroughly cleaned and decontaminated. A form for this purpose is provided in Section 12 of this manual; it can also be downloaded from our website (<u>www.nbsc.com</u>). A copy of this completed Return Authorization and Decontamination Certificate must be attached to the outside of the container, with a second copy packed inside with the instrument.

#### 8.3 Opening the Service Compartment

#### WARNING!

Before opening the Service Compartment, always turn off the shaker and disconnect the power cord from the power supply.

The Service Compartment contains the shaker's electronic and temperature control components. Normally, this compartment should be accessed **by authorized service technicians only.** You may, from time to time, need to remove the access panel in order to replace fuses (*see Section 8.4 below*).

#### 8.4 Fuse Replacement

#### WARNING!

When replacing fuses, always turn off the shaker and disconnect the power cord from the power supply.

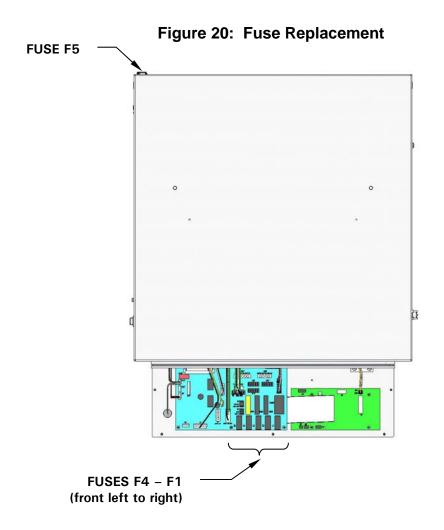
There are four fuses located behind the front bezel panel. To access these fuses:

- 1. Turn the power off and unplug the shaker. Open the cover of the shaker.
- 2. Remove the four fasteners that hold the front panel in place (*see Figure 4*), setting them aside for reuse.
- 3. Open the front panel, allowing it to lay flat.
- 4. The fuses are located on the PC board (*see Figure 20*), which you will find on the right side of the base weldment.
- 5. Fuses are numbered 1 through 4 (*see Table 6*); access the fuse you wish to replace by using a coin or a blade screwdriver to turn and release the spring-loaded cap.
- 6. Replace the fuse with a new one of the same type and rating (see Table 6).

There is a fifth, internal outlet, fuse on the back of the unit (*see Figure 20 & Table 6*). Follow Steps 5 & 6 above to replace it.

Fuse Holder Number	Function	Type & Rating
F1	Heater	Slo Blo <sup>®</sup> 6.3A
F2	Grow Lamp	Slo Blo <sup>®</sup> 3.15A
F3	UV Lamp	Slo Blo <sup>®</sup> 3.15A
F4	Compressor	Slo Blo <sup>®</sup> 10A
F5	Internal Outlet	Slo Blo <sup>®</sup> 0.5A (230V)
		Slo Blo <sup>®</sup> 0.75A (120V)
		Slo Blo <sup>®</sup> 1A (100V)

Table 6: Fuses



#### WARNING!

The following procedures are provided <u>for your information only</u>. Do not attempt to perform these service interventions yourself unless you are an authorized service technician.

#### 8.5 Belt Replacement or Adjustment

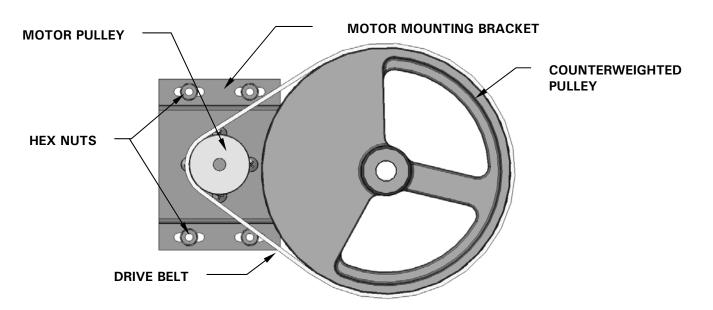
**To gain access to the drive belt**, your service technician will follow these steps with reference to Figure 21 on the following page:

#### WARNING!

Always keep fingers clear of the drive belt and pulley.

Set the ON/OFF power switch to OFF.

- 1. Disconnect the power cord from the electrical outlet.
- 2. Open the cover of the shaker to gain access to the front panel.
- 3. Use a Phillips head (+) screwdriver to remove the two screws that attach the hinged front panel to the housing. Gently lay down the front panel and set aside the screws for reuse. Also remove the lefthand side access cover. Looking into the shaker, the motor assembly is on the left side.
- 4. Use the hex wrench to loosen the four hex nuts on the motor mounting bracket.



#### Figure 21: Drive Belt Replacement

- 5. Gently slide the motor mounting bracket toward the righthand side of the shaker. This loosens the drive belt from the motor pulley and the large counterweighted pulley. Moving the motor mounting bracket forward will cause the belt to fall from both belt tracks.
- 6. Remove the old belt.
- 7. With one hand, place the new belt around the motor pulley, and with the other hand guide the belt around the large counterweighted pulley.
- 8. Move the motor mounting bracket back, until there is a slight resistance.
- 9. Verify that the drive belt has a slight pressure near the center. The recommended deflection is 3/8 inch (9.5 mm).
- 10. Use the hex wrench to tighten the four hex nuts on the motor mounting bracket.
- 11. Reinstall the hinged front panel with the two screws previously set aside. Use a Phillips (+) head screwdriver to tighten the screws.
- 12. Close the cover of the shaker.
- 13. Reconnect the power cord to the electrical outlet.

#### 8.6 Replacement Parts

Eppendorf offers a spare parts kit, part number M1335-6000, that contains commonly needed replacement parts for your Innova 42/42R shaker: one motor drive poly-V belt, two light bulbs and various fuses.

#### 8.7 Accessories

When ordering accessories, you may be asked to provide the model number and serial number of your shaker. This information is on the electrical specification plate, located on the rear panel of the unit.

#### 8.7.1 Platforms

Description	Capacity	Part No.
Universal Platform	see Table 8	M1250-9902
125 mL Erlenmeyer flask Dedicated Platform*	34	M1194-9904
250 mL Erlenmeyer flask Dedicated Platform*	25	M1194-9905
500 mL Erlenmeyer flask Dedicated Platform*	16	M1194-9906
1L Erlenmeyer flask Dedicated Platform*	9	M1194-9907
2L Erlenmeyer flask Dedicated Platform*	5	M1194-9908
2.8L Fernbach flask Dedicated Platform*	4	M1194-9932
Utility carrier with cushioned crossbars		M1194-9909
Utility tray with non-skid rubber surface		M1194-9910
Sticky pad platform		M1250-9903

#### Table 7: Available Platforms

\*dedicated platforms include flask clamps

Should you decide in favor of the Universal Platform, following is a list of that particular platform's flask capacity, according to flask size:

#### **Table 8: Universal Platform Flask Capacities**

Flask Type	Capacity*
50 ml Erlenmeyer Flasks	45
125 ml Erlenmeyer Flasks	21
250 ml Erlenmeyer Flasks	18
500 ml Erlenmeyer Flasks	14
1 L Erlenmeyer Flasks	8
2 L Erlenmeyer Flasks	5
2.8 L Fernbach Flasks	4
3 L Erlenmeyer Flasks	4
4 L Erlenmeyer Flasks	4
5 L Erlenmeyer Flasks	4
6 L Erlenmeyer Flasks	2

\*Clamps for Universal Platform are sold separately.

#### 8.7.2 Flask Clamps for Universal Platforms

The following clamps, according to flask size, are available for use with the Universal Platform:

Clamp Size	Part Number
10 ml Erlenmeyer Flask	ACE-10S
25 ml Erlenmeyer Flask	M1190-9004
50 ml Erlenmeyer Flask	M1190-9000
125 ml Erlenmeyer Flask	M1190-9001
250 ml Erlenmeyer Flask	M1190-9002
500 ml Erlenmeyer Flask	M1190-9003
1 L Erlenmeyer Flask	ACE-1000S
2 L Erlenmeyer Flask	ACE-2000S
2.8 L Fernbach Flask	ACSB-2800S
3 L Erlenmeyer Flask	ACE-3000S
4 L Erlenmeyer Flask	ACE-4000S
5 L Erlenmeyer Flask	ACE-5000S
6 L Erlenmeyer Flask	ACE-6000S

#### 8.7.3 Replacement Clamp Hardware

New Brunswick flask clamps come complete with mounting screws. Additional screws are available separately in packs of 25 (Part number S2116-3051P).

#### 8.7.4 Test Tube Racks & Other Accessories

Table 10:	Racks	&	Trays
-----------	-------	---	-------

Accessory Description		Part Number	Platform Capacity
Adjustable angle Test Tube	80 tube capacity	M1289-0100	7
Rack for tubes 8 – 11 mm	60 tube capacity	M1289-0010	9
diameter	48 tube capacity	M1289-0001	9
Adjustable angle Test Tube	60 tube capacity	M1289-0200	7
Rack for tubes 12 - 15 mm	44 tube capacity	M1289-0020	9
diameter	34 tube capacity	M1289-0002	9
Adjustable angle Test Tube	42 tube capacity	M1289-0300	7
Rack for tubes 15 –18 mm	31 tube capacity	M1289-0030	9
diameter	24 tube capacity	M1289-0003	9
Adjustable angle Test Tube	30 tube capacity	M1289-0400	7
Rack for tubes 18 – 21 mm	23 tube capacity	M1289-0040	9
diameter	18 tube capacity	M1289-0004	9

...continued...

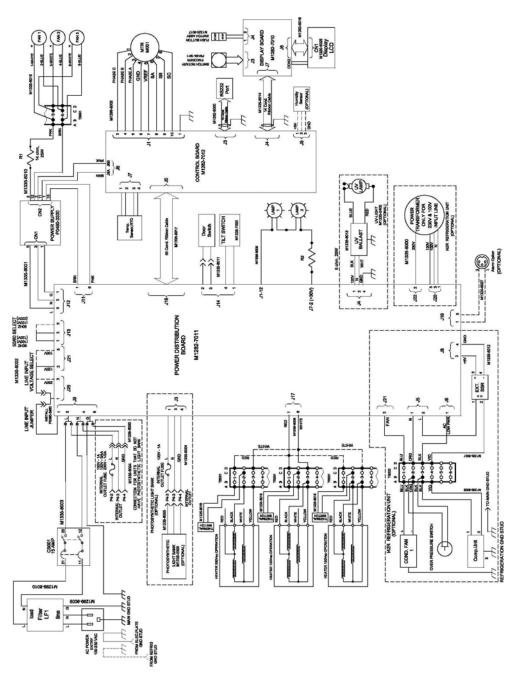
Accessory I	Description	Part Number	Platform Capacity
Adjustable angle Test Tube	22 tube capacity	M1289-0500	7
Rack for tubes 22 – 26 mm	16 tube capacity	M1289-0050	9
diameter	13 tube capacity	M1289-0005	9
Adjustable angle Test Tube	20 tube capacity	M1289-0600	7
Rack for tubes 26 - 30 mm	16 tube capacity	M1289-0060	9
diameter	12 tube capacity	M1289-0006	9
Microplate holder rack (stacked)	3 deep well or 9 standard	M1289-0700	16
Microplate holder rack (single layer)	5 deep well or standard	TTR-221	4
Angled Test Tube Rack Holder* for user-supplied test tube racks that are 4-5 in. (10-13 mm) wide and up to 15 in. (38 mm) long.		TTR-210	4
Angled Test Tube Rack Spacer Bar* for use with TTR-210 to accommodate test tubes racks that are less than 5 in. (13 mm) wide.		TTR-215	NA

\* Universal Platform Required

## 9 DRAWINGS & TABLES

#### 9.1 Schematics





#### NOTE:

See your Eppendorf representative for a larger view of this drawing.

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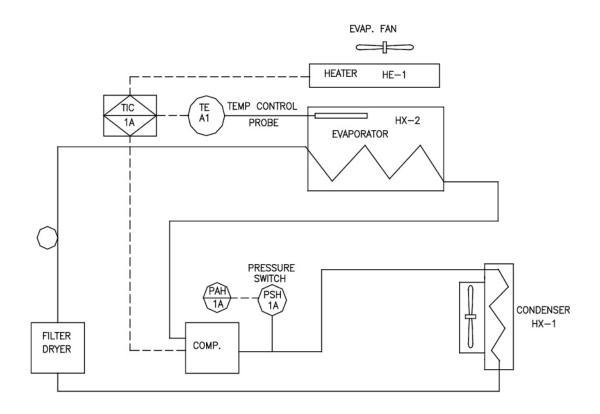


Figure 23: Refrigeration Schematic

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## **10** SPECIFICATIONS

These specifications assume a **maximum load of 34 pounds** (**15.5 kg**), including platforms, clamps, glassware and contents.

Innova 42 & 42R Incubator Shaker			
SHAKING			
Speed	25-400 rpm with either ¾-inch (1.9 cm) or 1-inch (2.54 cm) stroke		
	and using double-girdle clamps fo	r flasks over 2L (see Section 4.2).	
Control Accuracy	± 1 rpm		
Indication	Displayed in 1 rpm increments		
Stroke/Orbit	<sup>3</sup> / <sub>4</sub> -inch (1.9 cm) or 1-inch (2.54 cm	ו)	
TEMPERATURE			
Range (42) <sup>1</sup>	5°C above ambient temperature to		
Range (42R) <sup>1</sup>	20°C below ambient temperature	(minimum 4°C) to 80°C	
Control Accuracy	± 0.1°C at 37°C		
Indication	Displayed in 0.1°C increments		
Heater	Long-life, low-watt density resistar thermostat	nce-type heater with high temperature	
ALARMS		tion when speed deviates more than 5	
ALANIIS		C from setpoints, and when timer has	
	expired. Audible alarm can be mut		
LCD DISPLAY	240 x 128 backlit		
RS-232	Remote control, remote monitoring	g, remote data logging	
SETPOINT RETENTION	All setpoints and operating status	are retained in non-volatile memory	
AUTOMATIC RESTART	Automatic restart after power is restored, indicated by flashing display		
DRIVE	Triple-eccentric counterbalanced drive with nine permanently lubricated ball		
	bearings		
DRIVE MOTOR	Solid-state brushless DC motor.		
SAFETY	Drive Interrupt shuts off power to Shaker when door opens.		
	Acceleration/deceleration circuit p		
	minimizing both splashing and mechanical damage. Independent		
	~	nuts the motor off in unbalanced condition.	
ELECTRICAL	100 Volts, 50/60 Hz	1500 VA per shaker	
REQUIREMENTS	120 Volts, 60 Hz		
	230 Volts, 50 Hz		
FUSES	Behind Electrical Panel:	Next to Outlet:	
	3.15A glass tube, slow-blowing	0.5A glass tube, slow-blowing	
	6.3A glass tube, slow-blowing	0.75A glass tube, slow-blowing	
	10.0A glass tube, slow-blowing	1.0A glass tube, slow-blowing	
ETL REGULATORY	UL 61010A-1	CAN/CSA-C22.2 No. 1010.1	
STANDARDS	UL 61010A-2-010 CAN/CSA-C22.2 No. 1010.2.010		
CE REGULATORY	See Declaration of Conformity, Section 10.1.		
STANDARDS			

<sup>1</sup> depending on ambient factors, such as relative humidity, and options installed

...continued...

Innova 42 & 42R Incubator Shaker		
DIMENSIONS		
Width	25 inches (63.5 cm)	
Width with door open	50 inches (127 cm)	
Depth (Front to Back)	29.7 inches (75.4 cm)	
Height	32.22 inches (81.84 cm)	
CHAMBER	20.3 inches deep x 20.375 inches wide x 18.77 inches high	
DIMENSIONS	(51.5 cm deep x 51.7 cm wide x 47.7 cm high) from top of platform	
PLATFORM	Aluminum, 18" X 18" (46 X 46 cm). Select universal or dedicated styles.	
NET WEIGHT		
42	216 lbs (98 kg)	
42R	266 lbs (121 kg)	

#### 10.1 Certifications

The Innova 42 and 42R have been tested to ETL standards, to comply with UL and CAN/CSA electrical safety standards (see "ETL Regulatory Standards" in the specifications table).

As attested in the *CE Declaration of Conformity* reproduced on the following page, the Innova 42 and 42R also conform to the appropriate CE standards (see also "CE Regulatory Standards" in the specifications table).

	1
	New Brunswick
CE	CE
DECLARATIO	ON OF CONFORMITY
New Brunswick Scientific hereby declar European Union directive and standards	res that the product(s) listed below conform to the s identified in this declaration.
Product(s)	
Innova 42/42R	
EU Directive(s)	
Low Voltage (2006/95/EC) Electromagnetic Compatibility (2004/108/ CE Marking Directive (93/68/EEC)	/EC)
Standard(s)	
EN61010-1 EN61010-2-010 EN55011 (CLASS B) EN61000-3-2 EN61000-3-3 EN61000-4-2	EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 EN61000-4-11
The conformity assessment procedures we	ere performed at the following:
<ul> <li>Intertek Testing Services, 41 Ply Brunswick Scientific, 44 Talmad</li> </ul>	ymouth Street, Fairfield, NJ 07004 and New Ige RD, Edison, NJ, 08818
The technical documentation relevant to th New Brunswick Scientific 175 Freshwater Blvd Enfield, CT 06082 U.S.A Tel. (860) 253-3400 Fax. (860) 741-0859	ne above equipment will be held at:
Henry Coulture Director of QA RA	21 · JUN · 12 Date

## 11 APPENDIX A: REMOTE PROGRAMMING

#### 11.1 Setting Up with HyperTerminal

You can use the Microsoft<sup>®</sup> HyperTerminal program on your personal computer to communicate with your shaker:

- 1. Before you set up HyperTerminal, be sure to check the **Mode** and **Baud Rate** parameter settings (*see Section 6.7.4*).
- 2. While you are in the RS232 screen (*see Figure 13*), set the **Mode** parameter to **Slave**, and select the appropriate **Baud Rate**. The default setting, as you see in your screen, is 19200; your other choices are 9600 or 38400.
- 3. Connect the RS-232 cable between your computer and the shaker's RS-232 port.
- 4. Start HyperTerminal, and follow the steps for Setting a New Connection. When prompted, select the COM port you will be using, then set the COM parameters (see Table 11 below):

Baud Rate	Enter the setting on your shaker (see Step 2 above)
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

#### Table 11: COM Parameters for HyperTerminal

- 5. To be sure that you have established a connection with your shaker, turn the shaker **OFF**, open the HyperTerminal connection, then turn the shaker back **ON**. Once a connection has been made, the shaker will send an **OK** to HyperTerminal.
- 6. You may wish to send a trial command to the shaker (*see Sample Test below*). We suggest that you enable *Caps Lock* on your computer, because all commands must be sent as capital letters.

#### Sample Test:

- 1. To request the current setpoint, type **RS** at the terminal. When you type **R**, you should see the **R** on the computer display. This is an echo character, sent back by the Innova 42/42R. When you type the S, you should see the echo **S** displayed at the computer.
- 2. Use the ←Enter key to send the carriage return control character. This will move the cursor back over the first character.

3. **RS** is a Request command, so your shaker will send back the data corresponding to the command.

#### 11.2 Overview of Command Sets

Using an optional RS-232 interface, the user has the capability to control various functions of the Innova 42/42R shakers by computer. A detailed command set follows this introduction.

The serial interface uses an echo character protocol that is implemented to indicate that a valid character has been received by the shaker. For every character sent by the user computer, the Innova 42/42R will return a matching character. This echo character should be read by the computer and compared to the character that was sent.

#### NOTE:

When you are sending a command, do not allow the pause between any two characters of your message to last longer than 10 seconds. If it takes any longer, the shaker's serial port will reset itself.

In the following example, the Master (your computer) will command (the C in CS) the shaker (Slave) to set its speed to 150 RPM:

Master sends:	Innova 42/42R responds:
<b>CS</b> <space><b>150</b><cr></cr></space>	CS <space>150<cr></cr></space>

In the next example, the **Master** (your computer) will request that the shaker (**Slave**) report (the **R** in **RV**) the actual parameters:

Master sends:	Innova 42/42R responds:
RV <cr></cr>	First the echo: <b>RV</b> < <i>CR</i> >
	Then the report:
	<arg1><tab><arg2><tab><arg3><arg7><cr><lf></lf></cr></arg7></arg3></tab></arg2></tab></arg1>

#### NOTE:

On power-up, even if the shaker is not set in Slave mode at the time, the shaker will always send these four characters: OK < CR > < LF >. Before starting any communications, be sure to clear the computer's receive buffer.

This is the command set format: **Command**>**Space**>**Arg1**>**Space**>**Argn**...>**Terminator**> Most Commands are defined as two capital characters using standard ASCII format (see the command sets provided below).

If a command has additional arguments, the ASCII space control character separates each argument. The command is terminated using the ASCII carriage return control character; an optional line feed control character may also be included but must follow the carriage return character.

When a command is sent that returns data, the characters returned are in ASCII format. Each additional argument returned will be separated by the ASCII space or tab control character; refer to the selected command for the actual format. Data returned is terminated with a carriage return line feed control character sequence.

Section 11.3 provides an Index to the 2-character command codes.

Sections 11.4-0 provide command sets for your use for Set Commands, Profile Control Commands, Report Request Commands and Set/Get Date & Time.

#### 11.3 Index to Command Codes

Command Code	Meaning
CS	Command Speed
СТ	Command Temperature
<b>DO</b>	
PC	Clear Profile
PM	Profile Mode
PR	Read Profile Step in Memory
PS	Profile Stop/Start
PW	Write Profile Step to Memory
RI	Report Software Version
RP	Report Parameter List
RS	Report Setpoint Values
RV	Report Measured Values
=D	Set Date and Time
?D	Get Date and Time

Code	Meaning	Format
CS	Command Speed	CS <space><arg1><cr></cr></arg1></space>
		where <b>Arg1</b> = Agitation setpoint (####)
СТ	Command	CT <space><arg1><cr></cr></arg1></space>
	Temperature	where Arg1= Temperature setpoint (###.#)

#### 11.5 Profile Control Commands

Code	Meaning	Format
PC	Clear Profile	PC <space><arg1><space><arg2><cr></cr></arg2></space></arg1></space>
	(clears profile	where <b>Arg1</b> = Profile number (range 1 to 4) and
	step)	Arg2=Step number (range 1 to 15)
		<b>NOTE:</b> If <b>Arg2</b> is not included, all 15 steps of the selected profile will be cleared.
PM	Profile Mode	PM <cr></cr>
	(returns status of current profile	There are no parameters to this command.
	run/hold mode)	Return data format:
		<arg1><space><arg2><space><arg3><cr></cr></arg3></space></arg2></space></arg1>
		where <b>Arg1</b> =Run/hold status (0 = end, 1 = run),
		Arg2=Profile number and
		Arg3=Step number
		<b>NOTE:</b> If a profile has not been selected to run, a 0 will be returned for Profile number and Step number.
PR	Read Profile step	PR <space><arg1><space><arg2><cr></cr></arg2></space></arg1></space>
	in memory	where Arg1 = Profile number (range 1 to 4) and
		Arg2=Step number (range 1 to 15)
		Return data format:
		< <b>Arg1</b> > <space>&lt;<b>Arg2</b>&gt;<space>&lt;<b>Arg3</b>&gt;<space>&lt; CR&gt;<lf></lf></space></space></space>
		where <b>Arg1</b> =Profile number (range 1 to 4),
		Arg2=Step number,
		Arg3=Temperature setpoint,
		Arg4=Agitation setpoint,
		Arg5=CO2 setpoint (future option, reads 0.0),
		Arg6=Step hours, and
		Arg7=Step minutes
continued		

New Brunswick

Code	Meaning	Format
PS	Profile Stop/ Start (stops or	<b>PS</b> < <i>CR</i> > With no other parameters, any profile currently running
	starts a program profile)	will be stopped.
		PS <arg1><space><arg2><cr></cr></arg2></space></arg1>
		where <b>Arg1</b> =Profile number (range 1 to 4), and
		Arg2=Step number (range 1 to 15).
		<b>NOTE:</b> If <b>Arg2</b> is not included, the profile will start in Step 1.
PW	Write Profile step	PW <space><arg1><space><arg2><space><arg3></arg3></space></arg2></space></arg1></space>
	to memory	<space></space>
		<cr></cr>
		where <b>Arg1</b> =Profile number (range 1 to 4),
		Arg2=Step number (range 1 to 15),
		Arg3=Temperature setpoint,
		Arg4=Agitation setpoint,
		<b>Arg5</b> =CO2 setpoint (future option); Enter 0.0,
		Arg6=Step hours (range 0 to 99), and
		Arg7=Step minutes (range 0 to 59)

#### 11.6 Report Request Commands

\_\_\_\_\_

Code	Meaning	Format	
RI	Report	RI <cr></cr>	
	Software		
	Version	Return data format:	
		<arg1><tab><arg2><cr><lf></lf></cr></arg2></tab></arg1>	
		where Arg1=Display module software version, and	
		<pre>Arg2=Control module software version</pre>	
RP	Report	RP <cr></cr>	
	Parameter		
	List (ASCII	Return data format:	
	text header)	<arg1><tab><arg2><tab><arg3><arg6><cr><lf></lf></cr></arg6></arg3></tab></arg2></tab></arg1>	
		where <b>Arg1</b> ="Shaker Speed",	
		Arg2="Temperature", and	
		Arg3="% CO2 Concentration"	
	continued		

...continued...

Code	Meaning	Format
	Report	RV <cr></cr>
RV	Measured	RS <cr></cr>
	Values	
		Return data format:
	Report	<arg1><tab><arg2><tab><arg3><arg6><cr><lf></lf></cr></arg6></arg3></tab></arg2></tab></arg1>
RS	Setpoint	where <b>Arg1</b> = Shaker Speed,
	Values	Arg2=Temperature, and
		Arg3=% CO2 Concentration (future option, reads 0.0)

#### 11.7 Set/Get Date & Time

Code	Meaning	Format
=D	Set Date & Time	=D <space><arg2><space><arg3><space><arg7><cr></cr></arg7></space></arg3></space></arg2></space>
?D	Get Date & Time	<pre>?D<cr> Return data format: <arg1><tab><arg2><tab><arg3><tab><arg7><cr><lf> where Arg1=Hours (range 0-23), Arg2=Minutes (range 0-59), Arg3=Seconds (range 0-59), Arg4=Year (range 00-99), Arg5=Month (range 01-12), Arg6=Date (range 1-31), Arg7=Day (range 1-7; 1=Monday, 2=Tuesday7=Sunday)</lf></cr></arg7></tab></arg3></tab></arg2></tab></arg1></cr></pre>

For example, this command:

will set the real date and time on your shaker to:

1:30:00 am, 2004, July 4, Sunday.

## 12 APPENDIX B: PRODUCT RETURNS

#### 12.1 Return Procedure

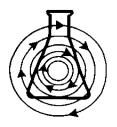
As explained in Section 8.2, should you need to return your Innova 42/42R to Eppendorf for any reason, first contact Customer Service to obtain a Returned Material Authorization (RMA) number. This number must appear on the outside of the shipping container, otherwise Eppendorf Receiving will refuse to accept the shipment.

In addition, you must also certify that the instrument being returned has been thoroughly cleaned and decontaminated. A form for this purpose is provided on the following page; you can photocopy it and fill it out by hand. It can also be downloaded from our website (www.nbsc.com), if you prefer to fill it out electronically.

A copy of the completed Return Authorization and Decontamination Certificate must be attached to the outside of the container, with a second copy packed inside with the instrument.

#### 12.2 Return Authorization and Decontamination Certificate

A sample form for you to copy and fill out is provided on the following page.



## Eppendorf Return Authorization and Decontamination Certificate

Contact Eppendorf for an RMA number prior to returning any equipment, then complete this form and attach it to the outside container of the equipment being returned to our facility. In addition, please enclose a completed, duplicate copy of this form with the returned item.

Returned Material Authorization (RMA) No	umber	
Equipment being returned: Model Number _	Serial Number	
Reason for its return:		
This equipment (check all that apply):		-
New Product	Biohazards Not used Used, but decontaminated with	
Hazardous Chemicals <ul> <li>Not used</li> <li>Used, but decontaminated with</li> </ul>	Radioactive Materials         Image: Disconstruction         Image: Disconstructio	

I certify that the equipment described above has been thoroughly cleaned and decontaminated of all chemical, biological and radioactive contaminants and also certify that the returned unit is safe for unprotected human contact.

By:	Signature			Print name	
Title:	Signature		Date: _		
Company:					
Address:					
Phone:		_ Fax: _		email:	
					Form 2847

# 13 APPENDIX C: INTERNAL AC SOCKET

#### 13.1 Using Ancillary Equipment with the Innova 42/42R

The Innova 42/42R has a special internal AC socket, rated at 100W, that is used to power ancillary equipment such as magnetic stirrers, rockers, rollers or small shakers.

In most cases, the equipment used will be light duty rockers or rollers. However, if heavier equipment is desired, the operator should verify that the stainless steel shelves supplied can support the load.

In addition, be sure to verify that the equipment operating inside the Innova 42/42R does not affect the stability of the unit. This is accomplished by operating the particular piece of equipment under the expected load and speed conditions. If the Innova 42/42R vibrates, limit the load and/or speed conditions for the operation of the ancillary equipment.

If the Innova 42/42R is intended to be used as a shaker at the same time, both shaker and ancillary equipment should be run under expected load and speed conditions. If the unit vibrates, the shaker speed and/or the load should be reduced, or the Innova 42/42R should not be used as a shaker at the same time the ancillary device is in operation.

The outlet is located inside the shaker chamber on the upper left side. It is important to note that this AC supply is the same as the main supply of your 42/42R. If your unit operates off a 120 volt supply, then any ancillary equipment you plug into the internal socket must also operate at 120 volts.

#### 13.1.1 Electrical Moisure-Proof Plug

The AC socket (*see Figure 24 on the following page*), with cover and mating plug (supplied) is designed to be used in humid environments. To use the socket, you have to connect the special male plug (supplied with the unit) to the equipment that you use in the Innova 42/42R. If your equipment has a detachable power cord, you may want to obtain a different power cord to be used solely with the Innova 42/42R shaker.

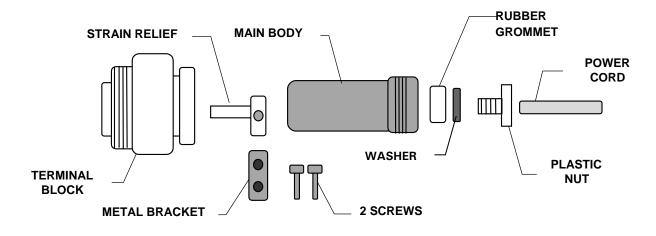


Figure 24: Internal AC Moistureproof Plug

## WARNING!

The following procedure is to be performed ONLY by an authorized service technician.



## WARNING!

The internal AC circuit supplied is fused at 100 Watts. *DO NOT* connect other equipment that requires more power.



The protective cover attached to the internal AC socket MUST always cover the socket when the socket is not being used. Verify the power is off before you attach or detach the cover.

To assemble the moisture-proof plug:

- 1. Connect the power cord to the electrical plug. Slide the power cord through the plastic nut, washer, rubber grommet and the main body (*see Figure 24 above*).
- 2. Connect the hot wire to *terminal 2*.
- 3. Connect the neutral wire to *terminal 3*.
- 4. Connect the ground wire to the ground terminal on the terminal block.

- 5. Attach the strain relief to the terminal block. Slide the two legs into the slots in the terminal block.
- 6. Use the metal bracket, capture the wires and secure with the two screws.
- 7. Screw the main body onto the terminal block.
- 8. Push the rubber grommet into the end of the main body.
- 9. Push the washer on.
- 10. Screw the plastic nut onto the main body and tighten. Ensure a tight seal by hand tightening the rubber grommet to compress the power cord. Securely tightening the plastic nut to the main body also provides a water seal for the plug.
- 11. Connect the power cord to the ancillary equipment if applicable.
- 12. Turn off all the power switches.
- 13. Remove the cover to the internal socket. The socket is on the upper right side, inside the shaker chamber.
- 14. Plug the electrical plug into the internal socket, and secure the plug in place by hand tightening the knurled knob.

## NOTE:

#### The socket is keyed so that it will only go in when oriented properly.

15. Use the knurled knob and tighten the plug finger tight to obtain a good seal.

Your ancillary equipment operates whenever the main power switch is powered on.

## NOTE:

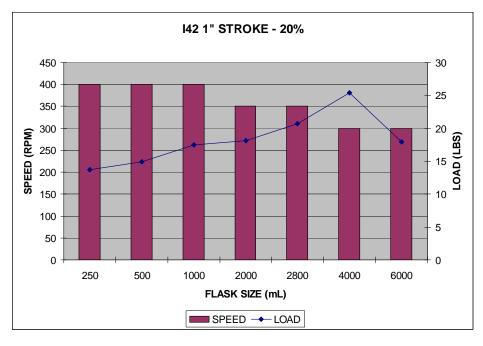
Use of ancillary equipment in the Innova 42/42R may affect the operating temperature range of the Innova 42/42R. This is due to the additional heat generated by the ancillary equipment used.

## 🖄 NOTE:

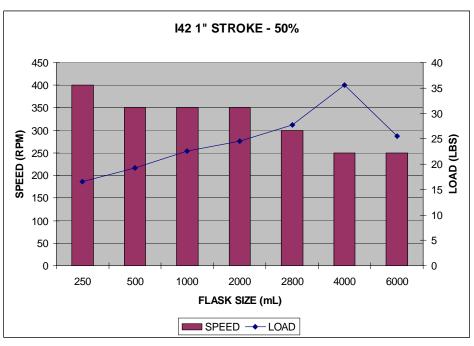
The internal AC socket is also used for the factory-installed optional photosynthetic lamps. If this option is installed on your shaker(s), the internal socket cannot be used for other equipment.

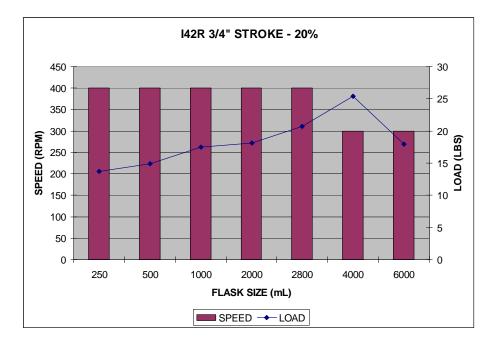
# 14 APPENDIX D: LOAD/SPEED GRAPHS

In the following graphs, **20%** and **50%** indicate level to which flasks were filled. These are *sample* load/speed runs provided for your information.



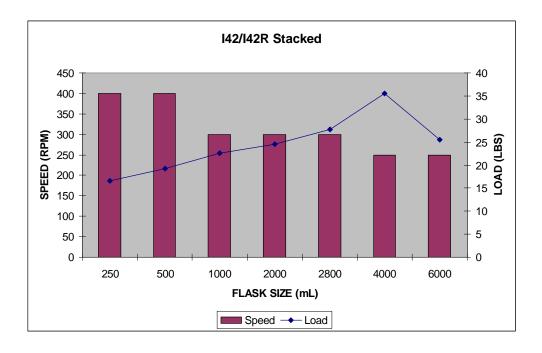
#### 14.1 Innova 42 with 1-inch Stroke





#### 142R 3/4" STROKE - 50% 250 200 150 **(S81) QVO1** 20 15 FLASK SIZE (mL) SPEED --- LOAD

## 14.2 Innova 42R with 3/4-inch Stroke



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