



New Brunswick™ Innova® 2300/ 2350 Shakers

Operating manual

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1 Operating instructions

1.1 Using this manual

- ▶ Carefully read this operating manual before using the device for the first time.
- ▶ Also observe the operating manual enclosed with the accessories.
- ▶ The operating manual should be considered as part of the product and stored in a location that is easily accessible.
- ▶ When passing the device on to third parties, be sure to include this operating manual.
- ▶ If this manual is lost, please request another one. The latest version can be found on our website www.eppendorf.com (international) or www.eppendorfnna.com (North America).

1.2 Danger symbols and danger levels

1.2.1 Hazard icons

	Electric shock		Crushing
	Material damage		Hazard point
	Heavy loads		Explosive

1.2.2 Degrees of danger

The following danger levels are used in safety messages throughout this manual.

DANGER	<i>Will</i> lead to severe injuries or death.
WARNING	<i>May</i> lead to severe injuries or death.
CAUTION	May lead to light to moderate injuries.
NOTICE	May lead to material damage.

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1.3 Symbols used

Example		Meaning
	▶	You are requested to perform an action.
	1. 2.	Perform these actions in the sequence described.
	•	List.
		References useful information.

2 Safety

2.1 User profile

The device may only be operated by trained lab personnel who have carefully read the operating manual and are familiar with the device functions.



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.

2.2 Warnings for intended use



WARNING! Heavy!

- ▶ Do not attempt to lift the Innova 2300/2350 Shaker by yourself.
- ▶ Ask for assistance or use suitable equipment when raising or handling the device.



WARNING! Risk of electric shock and/or damage to the device!

- ▶ Use a grounded power supply.



WARNING! Risk of electric shock and/or damage to the device!

- ▶ Before cleaning device, turn off and unplug from mains/power supply.



WARNING! Risk of electric shock when replacing fuses!

- ▶ Turn off shaker and disconnect from mains/power supply.



WARNING! Risk of explosion and injury or death!

- ▶ Do not use equipment with flammable substances or organisms with flammable by-products.



NOTICE! Risk of damage to device!

- ▶ Never run shaker without a platform.

Safety

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**CAUTION!**

- ▶ A minimum load is required to safely operate the Innova 2300/2350
 - ▶ The minimum load that the unit can safely operate at under maximum speed (500 rpm) is 10.9 kg (25 lb). This includes the weight of the platform, flasks and media.
 - ▶ Without a minimum load there is risk of instability that may cause serious injuries.
-

3 Product description

3.1 Main Illustration

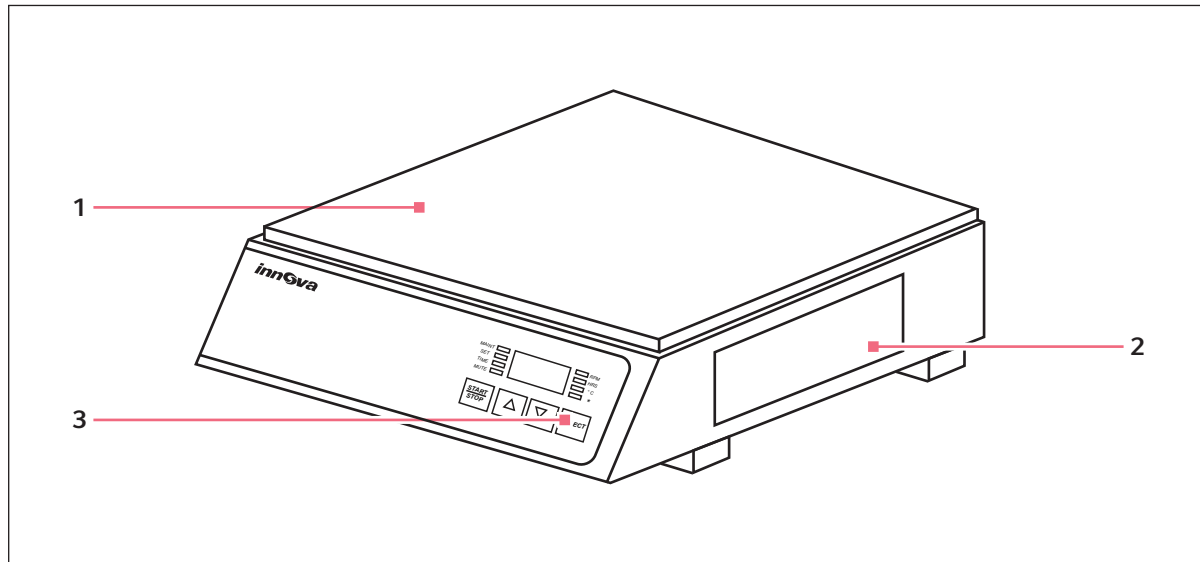


Fig. 3-1: Innova 2300/2350 front view

1 Platform

3 Control panel

2 Temperature/monitor RTD probe and bracket
Optional

Unless otherwise indicated, all drawings represent both Innova 2300 and Innova 2350 models.

Product description

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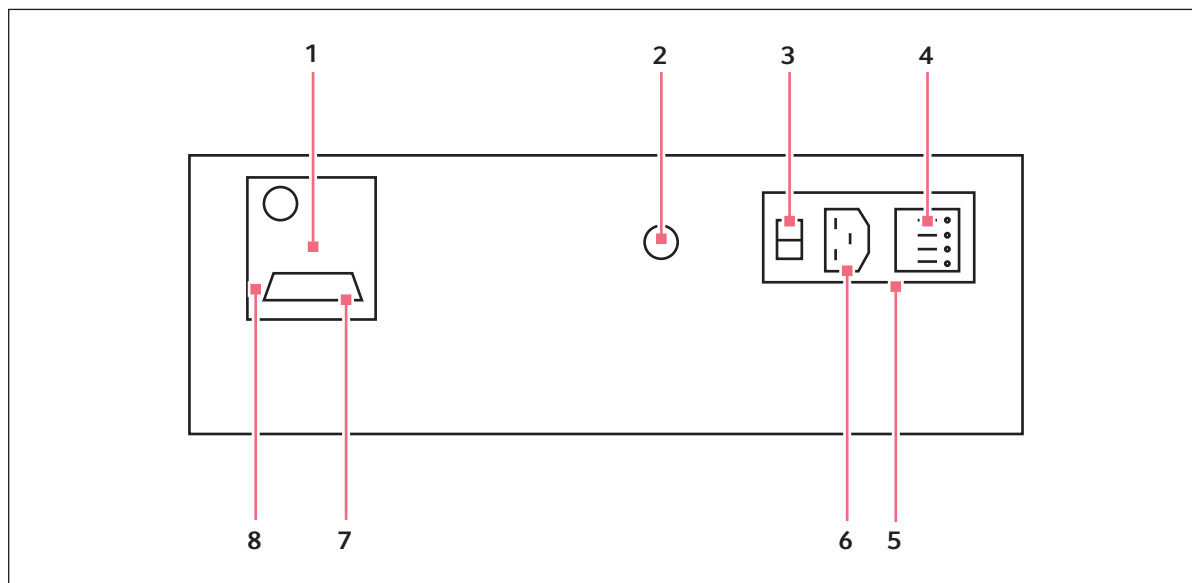


Fig. 3-2: Innova 2300/2350 rear view

1 RTD connectos

Optional

2 Fuse

Control circuit

3 On/Off switch

4 Voltage selector

5 Universal power module

6 Power cord connection

7 Chart recorder connection

Optional

8 Cover plate

3.2 Features

The Innova 2300/2350 is a benchtop or floor shaker utilizing a triple eccentric counter-balanced drive to provide horizontal plane rotary motion in a 25 (1in) or 51 mm (2 in) circular orbit. A Proportional/Integral (PI) Microprocessor controller with instantaneous digital feedback controls the speed over a range of 25 - 5 00 rpm.

This manual is intended to provide the user with a complete understanding of:

- Installation
- Operation
- Basic components of the device
- Basic preventive maintenance and service of the device

Be sure to familiarize yourself with this manual prior to operating your Innova 2300/2350.

3.2.1 Operation

The shaker may be operated either continuously or in a timed mode via a programmable timer for shaking periods of 0 hr 1 min – 99.9 hr.

A Temperature Monitoring option is available for the measurement, display and documentation of sample temperature.

3.2.2 Orbit

- Triple eccentric counterbalanced drive
- 25.4 mm (1 in) diameter circular orbit or 50.8 mm (2 in) diameter circular orbit

3.2.3 Alarms

The Innova 2300/2350 is equipped with audible and visible alarms that alert the user to the following conditions:

- The end of a timed run
- Deviation of shaking speed outside the tolerance limits

3.2.4 Platforms and accessories

To accommodate customer needs, a wide variety of platforms can be used with the Innova 2300/2350. Dedicated platforms are available for a variety of flask sizes. Universal platforms are also available.

3.2.5 Main control board

The main control board for the Innova 2300/2350 Shaker has the following functions:

- Non-volatile memory for storage of key parameters during power interruption
- Speed sensing, electronic commutation and power control for the brushless DC drive motor
- Maintains an elapsed running time clock
- Contains firmware for shaker control, as well as recognition of an expansion connector for option modules
- Provides an operator interface via displays, audible alarm and connection to the keypad module (keys and display graphics)

The optional temperature module is designed to piggyback onto the main board via an expansion connector. It has the following functions:

- Control of analog power supplies.
- Signal conditioning of RTD sensor readings
- Provision of remote monitoring capabilities by supplying analog outputs for speed and temperature which are compatible with chart recorders and analog data acquisition systems

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3.3 Universal power module

The power module contains a voltage card and fuse holder which are used to select the appropriate voltage and fusing. This universal power entry system adapts to worldwide power requirements. Voltage and fusing has been set prior to shipment. Innova shakers are available in 100 V, 120 V, 220 V and 240 V configurations that accommodate both 50 and 60 Hz frequencies.

**WARNING! Risk of electric shock and/or damage to device!**

- ▶ Do not plug the shaker into a power source until you check the voltage and frequency settings.
 - ▶ Check the voltage selection on the power entry module against the main identification label or serial tag, located on the side or rear of the unit.
-

3.4 Control panel

The control panel is located on the front of the instrument. It serves as the operator interface, and consists of:

- A START/STOP key
- An up arrow (▲)
- A down arrow (▼)
- A SELECT key
- A 3-digit LED display that provides numeric values, and some letter codes
- 4 function indicator lights
- 4 status indicator lights

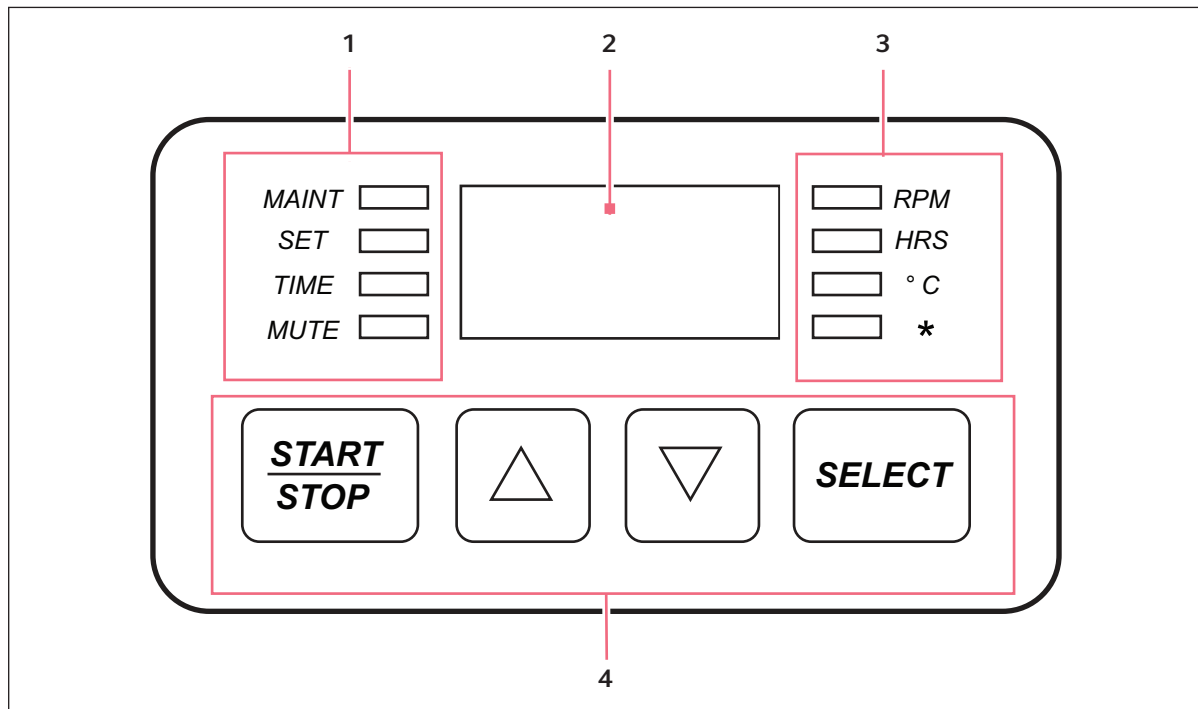


Fig. 3-3: Control panel

1 Status indicators

3 Function indicators

2 LED display

4 Keypad

3.4.1 LED display

The Innova control panel has a 3-digit LED display. During normal shaker operation, the display will indicate:

- Shaker status (ON/OFF)
- Shaking speed
- Setpoints
- Hours remaining (timed run)
- Measured temperature (when temperature/monitor option is installed)

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3.4.2 Keypad

START/STOP	- Starts and stops the drive - Activates or stops timer when timed run is desired
▲ ▼ Keys	- Adjusts the setpoint of a displayed parameter up or down - Used to enter the SET mode for setpoint changes
SELECT	Changes the displayed parameter

3.4.3 Status indicators

MAINT	- Illuminates after 10,000 hours of use - Accumulated running time is internally monitored and may be displayed as a guideline - Indicates need for routine maintenance (see <i>Routine maintenance on p. 25</i>)
SET	Illuminates to indicate that: - Shaker is in SET mode - Setpoints are being displayed - Setpoints can be altered
TIME	Illuminates to indicate that the timer is in operation
MUTE	Illuminates to indicate that the audible alarm is disabled

3.4.4 Function indicators

RPM	Revolutions per minute
HRS	Time remaining
°C	Temperature function (only activated if the temperature/monitor option is installed)
*	Not applicable

3.5 Platform assemblies

The Innova 2300 can be used with a wide variety of 46 cm x 76 cm (18 in x 30 in) platforms which will accept a variety of clamps for flasks, test tubes, etc.

The Innova 2350 can accommodate a wide variety of 61 cm x 91.4 cm (24 in x 36 in) platforms which will accept a variety of clamps for flasks, test tubes, etc.

3.6 Optional features

3.6.1 Temperature/monitor option

A Temperature/Monitor Option is available for installation on the Innova 2300/2350. The temperature of liquid in any vessel or the ambient temperature can be measured using the RTD electronics-based measuring device supplied with this option. When the option is installed, the LED will display the measured temperatures in 0.1 °C increments.

This option also allows the connection of a chart recorder so that temperature and shaking speed can be documented. The analog output for shaking speed is 0 – 5 V, 1 V per 100 rpm. For temperature, the output is 0 – 5 V with .05 V per °C. The output can also be connected to a data logging computer with an analog data acquisition card.

3.6.2 Capacity upgrade option for 2300

It is possible to significantly increase the capacity of your Innova 2300 Shaker with an available capacity upgrade package (part number M1191-9905). This option will convert an Innova 2300 to an Innova 2350 simply and easily.

This package consists of an appropriate counterweight, outrigger feet and hardware. Large capacity Innova 2350 platforms must be used with the Innova 2350 configuration. For a listing of available platforms, (see *Innova 2300 interchangeable platforms on p. 33*) and (see *Innova 2350 interchangeable platforms on p. 34*).

3.6.3 Quick change platform option

This accessory enables the user to snap in platforms without tools or hardware. This is especially handy for those users who change platforms frequently. The kit includes a subplatform with spring clips, an extra counterweight, and hardware for installation. This option is available on the Innova 2300 only. A speed range of 25 – 400 rpm is recommended when this option is installed.

3.7 Heavy duty construction

3.7.1 Triple Eccentric drive

The triple eccentric drive used in the Innova shakers employs the same proven technology that has reliably driven New Brunswick shakers for over 50 years. This drive mechanism utilizes a counterweight system to stabilize the rotary motion produced during operation.

When the workload moves in one direction, opposing forces are generated to stabilize the shaker. This action will help eliminate the problem of “walking” that may occur with less precisely balanced instruments. Vibrations are minimized and the life of the unit is extended.

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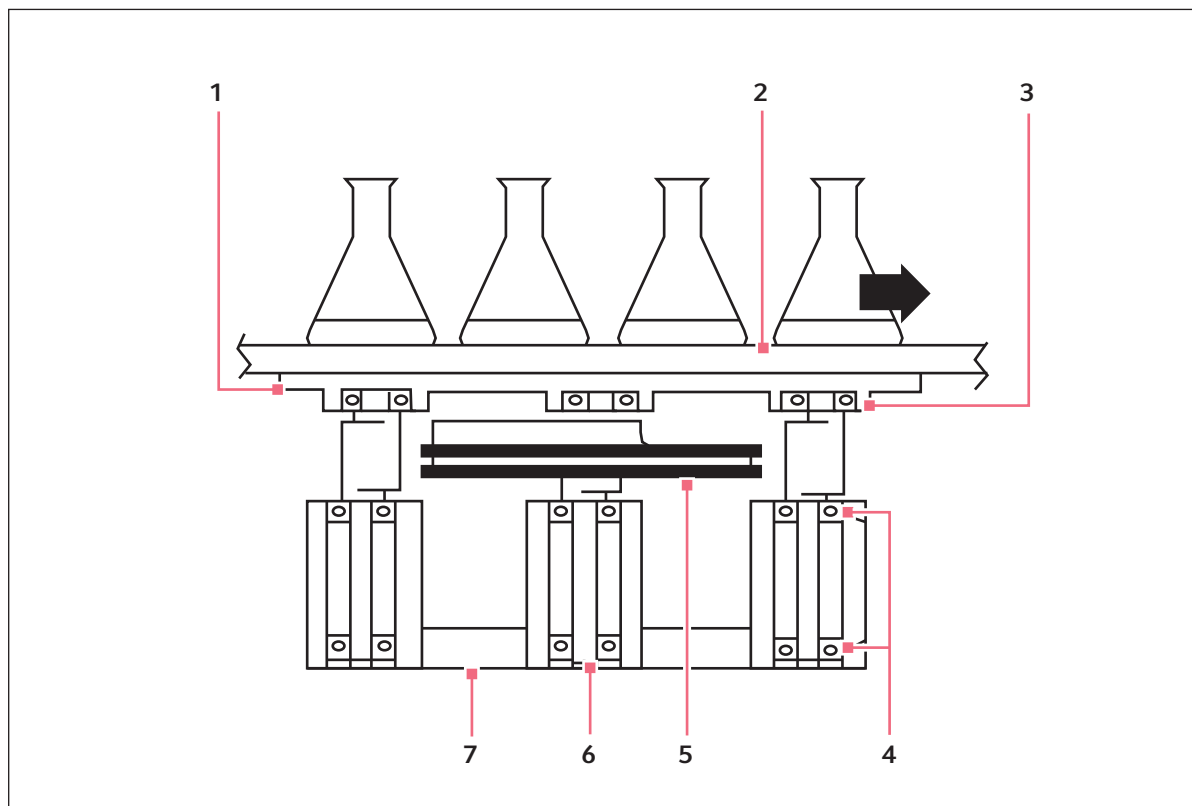


Fig. 3-4: Counterbalanced drive mechanism (2300/2350)

- | | |
|--------------------------------|------------------------------------|
| 1 Upper bearing housing | 5 Pulley with counterweight |
| 2 Shaker platform | 6 Eccentric drive shaft |
| 3 Upper ball bearing | 7 Lower bearing housing |
| 4 Ball bearing | |

3.7.2 Bearings

Innova shakers employ sealed lubricated ball bearings of the highest quality. Sealed bearings minimize the generation of airborne particles that could be disadvantageous in clean rooms or controlled environment areas.

3.7.3 Motor

The Innova 2300/2350 Shaker uses a brushless ball bearing DC motor. This low profile motor provides high torque along with quiet, efficient operation and low maintenance. The rugged motor has a rating of 1/8 horsepower.

4 Installation

4.1 Unpacking

Upon unpacking the unit, inspect it carefully for any apparent damage that may have occurred during transit. Immediately report any damage to the carrier and to the Eppendorf Service Department. Do not discard the crate or packing material.



VERY IMPORTANT: There are 2 small plastic straps that hold the bearing housing in place for shipping. Be sure to remove these 2 straps before operation.

4.2 Checking voltage configuration



WARNING! Risk of electric shock and/or damage to device!

- ▶ Do not plug the shaker into a power source until you check the voltage and frequency settings.

Do not plug your shaker into the power source until you determine that voltage of your unit matches your electrical service. This can be determined by checking the voltage indicator and label on the rear of the unit.

4.3 Space requirements

It is essential that the unit be situated in an area where there is sufficient space for the shaker and platform to clear walls and other potential obstructions during operation.

The dimensions, including a platform but excluding glassware, are:

Model	Width	Depth	Height
Innova 2300 without capacity upgrade	74 cm (29 in)	56.5 cm (22 1/4 in)	17 cm (6 3/8 in)
Innova 2350, Innova 2300 with capacity upgrade	91 cm (36 in)	61 cm (24 in)	17 cm (6 3/8 in)

The effective surface area required for operation is:

Model	Width	Depth
Innova 2300 without capacity upgrade	81 cm (32 in)	64 inch (25 in)
Innova 2350, Innova 2300 with capacity upgrade	99 cm (39 in)	68.5 inch (27 in)

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**WARNING!**

- ▶ Do not position the equipment so that it is difficult to operate the disconnecting device (main plug).
 - ▶ For service reasons and for cases of emergencies, sufficient space must be provided for easy access to the main power cord/power switch (located at the back of the unit).
-

4.4 Electrical connections

**WARNING! Risk of electric shock and/or damage to device!**

- ▶ Use a grounded power supply.
-

**CAUTION!**

- ▶ A detachable main power cord has been provided with your unit.
 - ▶ Only use the cord provided with the unit.
-

Before making electrical connections, be sure to follow these instructions:

1. Check that the power module at the rear of the unit is set to the correct voltage, corresponding to your power source.
2. Remove the caution label from the universal power module.
3. Make sure the plastic straps have been removed from the upper bearing housing.
4. Make sure the power switch on the back of the unit is set in the OFF position.

ONLY THEN:

5. Connect the line cord to the power module and to a grounded electrical outlet.

4.5 Install the platform

The Innova 2300/2350 can be used with a variety of Eppendorf 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 (see *Platform capacity* on p. 29).

**CAUTION! Risk of damage to the device!**

- ▶ Never run the shaker without a properly installed platform.
-

A platform must be installed on the device prior to use. To install a platform:

1. Set the power switch in the Off position.
2. Using the 7/32 in hex key provided, remove the 4 Allen head platform screws installed in the subplatform of the bearing housing (under the shaker).
One of the 4 screws has a tag so you can identify the platform screws. Set them aside for reuse.
3. Place the platform on top of the shaker's subplatform.
Be sure to use the proper size platform for your particular model shaker
4. Reinstall and tighten the 4 platform screws (previously set aside) with the hex key to secure the platform.

4.6 Quick change platform option

If the quick change platform option is installed:

1. Slip the appropriately sized platform between the side guides and push the platform to the rear retainer.
2. Press down on the front edge of the platform.
The platform should snap down into place and be retained by the springs.
3. Check that the rear edge of the platform is engaged under the bend of the rear clip.

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4.7 Install flask clamps

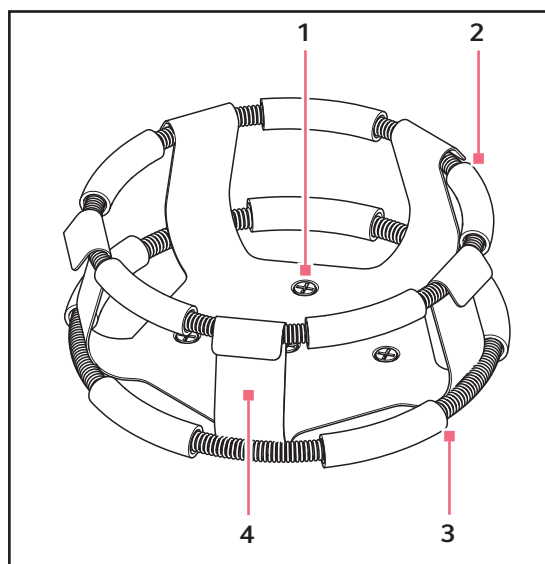
**WARNING!**

- ▶ Do not overfill flasks (i.e., more than 50% of the flask volume).



Eppendorf flask clamps are used on a variety of shaker platforms. Flat Phillips head screws of different lengths and thread pitch are used to secure the clamp (see *Clamp hardware on p. 35*). All clamps are shipped complete with hardware.

Clamps for 2 – 6 L flasks are shipped with an additional girdle to keep the flasks in place. To install 2 – 6 L clamps:



1. Place the clamp on the platform and secure it in place with the correct type of screws.
2. Place the loose girdle around the upper portion of the clamp body so that it is held in place by the clamp legs.
3. Insert the flask into the clamp.

Fig. 4-1: Double girdle clamp



The instructions and illustration above also apply to 2800 ml Fernbach flask clamps.

1 Clamp mounting holes

With screws

2 Upper girdle with girdle tubes

Secures flask within the clamp

3 Lower girdle with girdle tubes

Prevents flask from spinning

4 Clamp body (legs and base)

5 Operation

5.1 Getting started

To start the instrument, turn the power switch to the ON position.

When the shaker is running, the LED display will track the speed as it accelerates to the last entered setpoint. The shaking action may be stopped or started by pressing the START/STOP key.

5.2 Continuous/unlimited run

1. If the LED displays OFF, press the START/STOP key.
2. Press the SELECT key to illuminate RPM.
3. Press either ▲ or ▼ to enter SET mode (SET indicator will illuminate).
4. Set the speed by using the ▲ or ▼ key until the desired setpoint is displayed.
Holding the ▲ or ▼ key will cause the setting to change more rapidly.

The setpoint may be changed at any time during a run without stopping the shaker by following steps 2 – 4. During speed changes, the alarm may sound until the speed returns to within 5 rpm of the setpoint.

5.3 Checking setpoints

To check any setpoint:

1. Press the SELECT key to illuminate the desired indicator.
2. Press either ▲ or ▼ to enter the SET mode and display the current setpoint.



Holding the ▲ or ▼ key for more than 0.5 s causes the setpoint to change. Should this occur, resetting will be necessary.

5.4 Timed functions

The shaker may be programmed to stop automatically after a preset time period of 0.1 to 99.9 hr. There must be power to the shaker in order to set the timer. However, a timed run can be initiated while the unit is either shaking or stopped.

5.4.1 Setting the timer

1. Press the SELECT key to light HRS.
2. Press either ▲ or ▼ to enter the SET mode, then set a time period of 0.1 – 99.9 hr.
3. While SET light is illuminated, press the START/STOP key to program the time (and start the run).

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The TIME indicator will illuminate and remain on for the duration of the run. At the end of the timed run:

- The display will read OFF
- The time indicator will flash
- The audible alarm will sound

The setpoint may be changed during a run without stopping the shaker by following steps 1 and 2 above.

5.4.2 Canceling the timer

To cancel the timer **without** stopping the shaker:

1. Press the SELECT key to illuminate HRS.
2. Press either ▲ or ▼ to enter the SET mode, then immediately press the START/STOP key.
The Time indicator will go out and the display will read "OFF".

5.5 Alarm functions

Innova shakers have an audible alarm which is activated at predetermined times. It is possible to deactivate and reactivate the alarm, according to your needs.

5.5.1 Stopping the alarm

When the alarm sounds, you can stop it by pressing the SELECT key and changing to any other function.

5.5.2 Deactivating the alarm

The alarm may be deactivated in the following way:

1. Press SELECT to illuminate HRS.
2. **Simultaneously** press the ▲ and ▼ keys.
The SET and MAINT indicators will flash.
3. While the SET and MAINT indicators are flashing, press the START/STOP key.
The MUTE indicator will illuminate to advise that the audible alarm is deactivated.

5.5.3 Reactivating the alarm

The alarm may be reactivated in the following way:

1. Press SELECT to illuminate HRS.
2. **Simultaneously** press the ▲ and ▼ keys.
The SET and MAINT indicators will flash.
3. While the SET and MAINT indicators are flashing, press the START/STOP key.

The MUTE indicator will extinguish to advise that the audible alarm is active.



The shaker may be stopped or started by pressing the START/STOP key. When starting, the unit will automatically return to the last function and speed setting.
The audible alarm will sound until the speed is within 5 rpm of the setpoint.

The alarm will **not** sound while the shaker is accelerating immediately following turning on the power.

5.6 Total running time

The control modules of the Innova shakers keep track of the time the shaker has been on, tracking the hours of usage.

To display the accumulated running time:

1. Select HRS using the SELECT key.
2. Simultaneously press the ▲ and ▼ keys.

The SET and MAINT indicators will flash and the accumulated running time will be displayed in hundreds of hours (i.e., "02" equals 200 hours; "102" equals 10,200 hours). This display will continue for 10 seconds and then default to the previous mode readout.



After 10,000 hours of operation, the MAINT indicator will light. Preventive maintenance is recommended at this point. The Eppendorf Service Technician will deactivate the light when the technician performs the required maintenance.

5.7 Temperature/monitor option

This option consists of an internal electrical interface, an RTD temperature probe and an analog output for chart recorder or data acquisition system. When this option is installed, either the ambient temperature or the temperature of any vessel on the shaker platform can be measured with the probe:

1. Remove the probe from its holder and insert it into the vessel to be monitored.
2. Use the SELECT key to indicate °C.



The °C indicator will only function when the temperature/monitor option is installed.

Since the temperature/monitor option does not provide temperature control, any attempt to enter a temperature setpoint results in the display of *Err* on the control panel.

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5.8 Recorder adaptation

To record speed or temperature, an auxiliary recorder (not supplied, but available from Eppendorf) can be used. The recorder should have the following capabilities:

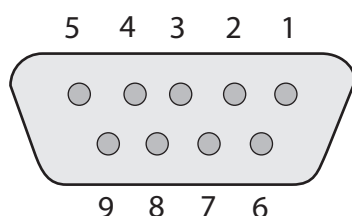


Fig. 5-1: Recorder connector as seen from the rear of the unit

- For speed, each channel should have signal conditioning that accepts 0 – 5 V input.
- For temperature, each channel should have a signal conditioning that accepts 0 – 5 V input
- A mating connector is required on the recorder cable (not supplied, but available from Eppendorf). This is a 9-pin male D subminiature connector, AMP Amplitite HDP-20 series or equivalent.

Pin number	Signal name	Scale
6	Speed	1 V = 100 rpm
2	Ground	
7	Temperature	1 V = 20 °C
3	Ground	

6 Maintenance



WARNING!

- ▶ Before performing any service, turn off the power, using the ON/OFF switch on the rear panel, and disconnect the power cord.
-

6.1 Routine maintenance

No routine maintenance is required for the Innova 2300/2350 Shaker.

The MAINT indicator light illuminates at the end of 10000 hours of use. At that time, contact your local Eppendorf Service Engineer, or call the Eppendorf Service Department. This periodic maintenance will keep your unit in premium condition.

6.2 Cleaning external and internal surfaces



WARNING! Personnel injury and equipment damage!

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

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.

6.3 Fuse replacement



WARNING! Risk of electric shock when replacing fuses!

- ▶ Turn off shaker and disconnect from mains/power supply.
-



CAUTION!

- ▶ A detachable main power cord has been provided with your unit.
 - ▶ Only use the cord provided with the unit.
-

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To replace fuses (without changing the fusing arrangement):

1. Disconnect the unit from the power source.
2. Using a small screwdriver, remove the cover/fuse block located on the rear of the unit.
3. Remove the old fuse.
4. Insert a new one of the same type.
5. Replace the cover/fuse block into the power module.



Spare fuses are supplied with the unit.

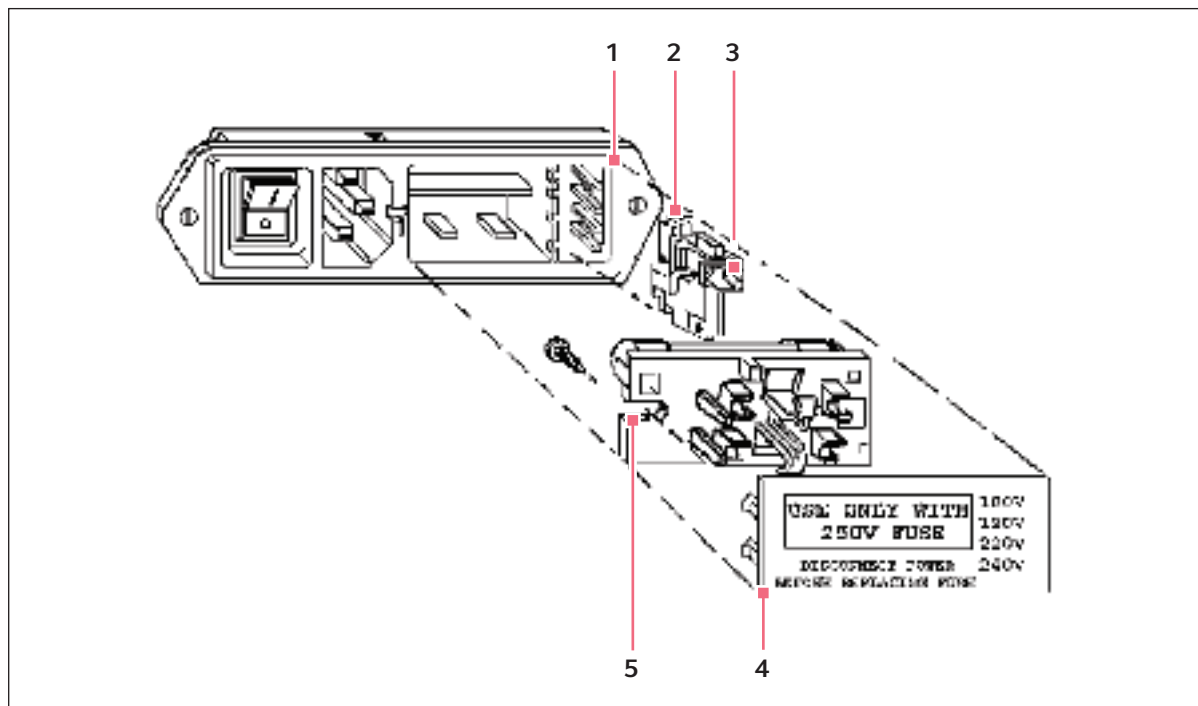


Fig. 6-1: Power entry module (2300/2350)

- | | |
|-------------------------|--------------|
| 1 Housing | 4 Cover |
| 2 Voltage selector card | 5 Fuse block |
| 3 Indicator pin | |

7 Technical data

7.1 Specifications

7.1.1 Innova 2300

Tab. 7-1: Shaking

Speed	• 25 rpm – 500 rpm	• 25 rpm – 300 rpm
Motion	• 25.4 mm (1 in) diameter circular orbit	• 50.8 mm (2 in) diameter circular orbit
Indication	• LED digital electric display • 1 rpm increments	
Setpoint and control	• Digital adjustment with PI microprocessor control and instantaneous visual feedback	
Accuracy	• ± 1 rpm	



At 25 – 400 rpm, the unit will perform to specifications with up to ± 10 % line voltage fluctuation. To attain speed accuracy at 401 – 500, the line voltage cannot be lower than 5 % of the rated voltage.

Drive	• Eccentric counterbalanced ball bearing drive
Keypad timer	• Programmable shaking periods from 0 hr 1 min – 99.9 hr by a digital timer • Timer shuts off at the end of shaking period and energizes status light • Timer counts down and digital display indicates remaining time • Can be deactivated for continuous operation • Unit will display total accumulated running time for service information
Operating ambient environment	• 0 °C – 60 °C • Up to 90 %, non-condensing • Up to 2000 m
Self-diagnostic status	• Warning signal (audible and visible) indicates when shaking speed deviates more than 5 rpm • Warning signal (audible and visible) indicates when timer operation has expired • Audible alarm can be deactivated/reactivated by the operator
Remote speed monitoring (optional)	• Chart recorder output for speed 0.5 V, 1 V per 100 rpm • Accuracy ± 25 mV
Automatic restart	• Unit will automatically restart after undesired power interruption • Setpoints are maintained by non-volatile memory • Interruption is indicated by a flashing LED
Motor	• 1/8 HP • 3 phase • Brushless ball bearing DC motor
Electrical service	• 100 V, 120 V, 220 V, 240 V • All voltages 50/60 Hz 150 VA • Universal power entry system adapts to U.S. or international requirements
Electrical protection	• Main fuse(s) in power entry module • Control circuits provided with separate fuse

Technical data

New Brunswick™ Innova® 2300/2350 Shakers
English (EN)

Construction	• Heavy gauge steel • Phosphate coated • Textured painted frame	
Weight	Net	• 49 kg (108 lb)
	Gross	• 66 kg (145 lb)

Dimensions

Width	74 cm (29 in)
Depth	56.5 cm (22 1/4 in)
Height	17 cm (6 3/8 in)

Platform dimensions

Width	46 cm (18 in)
Depth	76 cm (30 in)

7.1.2 Innova 2350

Tab. 7-2: Shaking

Speed	• 25 rpm – 400 rpm	• 25 rpm – 300 rpm
Motion	• 25.4 mm (1 in) diameter circular orbit	• 50.8 mm (2 in) diameter circular orbit
Indication	• LED digital electric display • 1 rpm increments	
Setpoint and control	• Digital adjustment with PI microprocessor control and instantaneous visual feedback	
Accuracy	• ± 1 rpm	



At 25 – 400 rpm, the unit will perform to specifications with up to ± 10 % line voltage fluctuation. To attain speed accuracy at 401 – 500, the line voltage cannot be lower than 5 % of the rated voltage.

Drive	• Eccentric counterbalanced ball bearing drive
Keypad timer	• Programmable shaking periods from 0 hr 1 min – 99.9 hr by a digital timer • Timer shuts off at the end of shaking period and energizes status light • Timer counts down and digital display indicates remaining time • Can be deactivated for continuous operation • Unit will display total accumulated running time for service information
Operating ambient environment	• 0 °C – 60 °C • 90 % • Non-condensing • Up to 2000 m

Self-diagnostic status	• Warning signal (audible and visible) indicates when shaking speed deviates more than 5 rpm • Warning signal (audible and visible) indicates when timer operation has expired • Audible alarm can be deactivated/reactivated by the operator	
Remote speed monitoring (optional)	• Chart recorder output for speed 0.5 V, 1 V per 100 rpm • Accuracy ± 25 mV	
Automatic restart	• Unit will automatically restart after undesired power interruption • Setpoints are maintained by non-volatile memory • Interruption is indicated by a flashing LED	
Motor	• 1/8 HP • 3 phase • Brushless ball bearing DC motor	
Electrical service	• 100 V, 120 V, 220 V, 240 V • All voltages 50/60 Hz 150 VA • Universal power entry system adapts to U.S. or international requirements	
Electrical protection	• Main fuse(s) in power entry module • Control circuits provided with separate fuse	
Construction	• Heavy gauge steel • Phosphate coated • Textured painted frame	
Weight	Net	• 51 kg (112 lb)
	Gross	• 68 kg (150 lb)

Dimensions

Width	91 cm (36 in)
Depth	61 cm (24 in)
Height	17 cm (6 3/8 in)

Platform dimensions

Width	61 cm (24 in)
Depth	91 cm (36 in)

7.2 Platform capacity

Universal platforms have multiple holes enabling you to mount an assortment of flask clamps or other accessories on a single platform. The capacities shown in this section represent the maximum number of flasks in a given size that will fit on the platform in a balanced pattern. Universal platform, clamps and accessories are sold separately.

When just one size flask will be used on the shaker (i.e. 250 mL flasks), dedicated platforms come with flask clamps already mounted. Dedicated platforms generally will hold a greater number of flasks than the universal platform, but do not offer the versatility.

Technical data

New Brunswick™ Innova® 2300/2350 Shakers
English (EN)

7.2.1 Innova 2300 platform capacities

For **universal** platforms that measure 46 cm (18 in) × 76 cm (30 in):

Description	Amount
10 mL flask	183
25 mL flask	92
50 mL flask	92
125 mL flask	39
250 mL flask	30
500 mL flask	18
1 L flask	12
2 L flask	8
2.8 L flask	6
4 L flask	6
5 L flask	6
6 L flask	4
Large TT rack	7
Medium TT rack	9
Small TT rack	9
Microplate rack (stack)	16
Microplate rack (1 layer)	4

For **dedicated** platforms that measure 46 cm (18 in) × 76 cm (30 in):

Description	Amount
50 mL flask	108
125 mL flask	60
250 mL flask	40
500 mL flask	24
1 L flask	15
2 L flask	12
2.8 L flask	6
4 L flask	6
6 L flask	4

7.2.2 Innova 2350 platform capacities

For **universal** platforms that measure 61 cm (24 in) × 91 cm (36 in):

Description	Amount
125 mL flask	75
250 mL flask	50
500 mL flask	30
1 L flask	24
2 L flask	15
2.8 L flask	12
4 L flask	10
5 L flask	10
6 L flask	8
Large TT rack	12
Medium TT rack	13
Small TT rack	18
Microplate rack (stack)	27
Microplate rack (1 layer)	8

For **dedicated** platforms that measure 61 cm (24 in) × 91 cm (36 in):

Description	Amount
125 mL flask	96
250 mL flask	70
500 mL flask	40
1 L flask	24
2 L flask	15
2.8 L flask	12
4 L flask	12
6 L flask	6

Technical data

New Brunswick™ Innova® 2300/2350 Shakers
English (EN)

8 Ordering information

8.1 Service parts (2300/2350)

Part number	Description	Quantity
P0380-3710	0.16A / 250V / Time Delay - Fuse	1
P0380-3530	1.6A / 250V / Time Delay - Fuse	1
P0420-1610	10VA Transformer	1
M1191-5300	130VA Transformer Assembly	1
P0320-0350	2100µF Capacitor	1
P0460-4791	Diode Bridge	1
P0360-4040	130V Varistor	2
M1191-4000	Large Motor Assembly	1
M1190-9941	Main Control P.C.B.	1
M1190-5000	Membrane Switch Panel	1
P0460-2200	Power Entry Module	1
P0720-2053	Power Cord 120V 10A	1
P0720-2021	Power Cord 220V	1
P0180-0281	Bearing Shield Upper	3
P0180-0282	Bearing Shield Lower	6
R-336	Belt	1
M1191-6331	Bearing Housing Assembly, 1-inch Circular Orbit	1
M1194-8000	Stainless Steel RTD Assembly (Optional)	1
M1191-0050	Innova 2300/2350 Operations Manual	1
M1191-6332	Bearing Housing Assembly., 2-inch Circular Orbit	1

8.2 Innova 2300 interchangeable platforms

Catalog number	46 cm x 76 cm (18 in x 30 in) platform size	
	Clamp quantity	Size of glassware
M1250-9920	Universal Platform	
M1191-9908	108	50mL Erlenmeyer Flask
M1191-9909	60	125mL Erlenmeyer Flask
M1191-9910	40	250/300mL Erlenmeyer Flask
M1191-9911	24	500mL Erlenmeyer Flask
AG-1	15	1L Erlenmeyer Flask
AG-2	12	2L Erlenmeyer Flask

Ordering information

New Brunswick™ Innova® 2300/2350 Shakers
English (EN)

Catalog number	46 cm × 76 cm (18 in × 30 in) platform size	
	Clamp quantity	Size of glassware
AG-4	6	4L Erlenmeyer Flask
AG-6	4	6L Erlenmeyer Flask
AG-28	6	2800mL Fernbach Flask

8.3 Innova 2350 interchangeable platforms

The Innova 2350 is counterweighted and balanced for a 61 x 91 cm (24 in x 36 in) platform. It has a speed range of 25 rpm – 500 rpm. Maximum recommended speed may be limited to 400 rpm under certain conditions.

Catalog number	60 cm × 91 cm (24 in × 36 in) platform size	
	Clamp quantity	Size of glassware
PTL-386	Universal Platform	
M1191-9912	96	125mL Erlenmeyer Flask
M1191-9913	70	250/300mL Erlenmeyer Flask
M1191-9914	40	500mL Erlenmeyer Flask
AG-21-1	24	1L Erlenmeyer Flask
AG-21-2	15	2L Erlenmeyer Flask
AG-21-4	12	4L Erlenmeyer Flask
AG-21-6	6	6L Erlenmeyer Flask
AG-21-8	12	2800mL Fernbach Flask

8.4 Accessory flask clamps

All clamps listed are made of stainless steel.

Catalog number	Clamp type
ACE-105	10 mL Erlenmeyer
ACE-255	25 mL Erlenmeyer
ACE-505	50 mL Erlenmeyer
ACE-125S	125 mL Erlenmeyer
ACE-250S	250 mL Erlenmeyer
ACE-500S	500 mL Erlenmeyer
ACE-1000S	1.0 L Erlenmeyer
ACE-2000S	2.0 L Erlenmeyer
ACE-4000S	4.0 L Erlenmeyer

Catalog number	Clamp type
ACE-6000S	6.0 L Erlenmeyer
ACFE-2800S	2.8 L or 2800 mL Fernbach
ACSB-500S	500 mL Media Bottles
ACSB-1000S	for 1 L Media Bottles

8.5 Clamp hardware

Eppendorf flask clamps are used on a variety of shaker platforms. Flat Phillips and flat head screws of different lengths and thread pitch are used to secure the clamp. The following tables identify the proper screw for your shaker application by reference to the head style.

Tab. 8-1: 10 – 500 mL clamp hardware application chart

Description	Part number	Qty.	Application
10-24 x 5/8 (15.87 mm) flat Phillips (+) head screw	S2116-3101	1	19.05 mm (3/4 in) thick wood platform
10-24 x 5/16 (7.9 mm) flat Phillips (+) head screw	S2116-3051	1	7.9 mm (5/16 in) thick aluminum, phenolic and stainless steel platforms
10-32 x 5/16 (7.9 mm) flat slotted (-) head screw	S2117-3050	1	All stainless steel platforms

Tab. 8-2: 1 – 6 Liter clamp hardware application chart

Description	Part number	Qty.	Application
10-24 x 5/8 (15.87 mm) flat Phillips (+) head screw	S2116-3101	5	19.05 mm (3/4 in) thick wood platform
10-24 x 5/16 (7.9 mm) flat Phillips (+) head screw	S2116-3051	5	7.9 mm (5/16 in) thick aluminum, phenolic and stainless steel platforms
10-32 x 5/16 (7.9 mm) flat slotted (-) head screw	S2117-3050	5	All stainless steel platforms



The 1 – 6 liter chart also applies to 2800 mL Fernbach flask clamps.

Ordering information

New Brunswick™ Innova® 2300/2350 Shakers
English (EN)

8.6 Optional kits

8.6.1 Temperature/monitor option

The temperature and speed monitoring kit (part number M1191-9924) allows an Innova 2300 or 2350 to measure and display sample or ambient temperature and to record it on a remote chart recorder or computer. This kit consists of:

- An internal electrical interface
- An RTD temperature probe
- An analog output for chart recorder or computer



The package does not include a chart recorder.

This option must be installed by an authorized service technician.

8.6.2 Quick change platform kit

The easy-loading Quick Change Platform kit (part number M1191-9904) enables users of the Innova 2300 (without capacity upgrade) to change or mount any 46 cm x 76 cm (18 in x 30 in) platform without the use of tools or hardware.

This kit must be installed by an authorized service technician.

8.6.3 Capacity upgrade option

With this kit (part number M1191-9905), an Innova 2300, which has an 46 cm x 76 cm (18 in x 30 in) platform, can be converted to an Innova 2350, with a 61 cm x 91 cm (24 in x 36 in) platform.

The kit consists of:

- Counterweighting
- Hardware
- Outrigger feet

Platforms must be purchased separately.

This option must be installed by a qualified service engineer.

9 Transport, storage and disposal

9.1 Disposal

In case the product is to be disposed of, the relevant legal regulations are to be observed.

Information on the disposal of electrical and electronic devices in the European Community:

Within the European Community, the disposal of electrical devices is regulated by national regulations based on EU Directive 2012/19/EU pertaining to waste electrical and electronic equipment (WEEE).

According to these regulations, any devices supplied after August 13, 2005, in the business-to-business sphere, to which this product is assigned, may no longer be disposed of in municipal or domestic waste. To document this, they have been marked with the following identification:



Because disposal regulations may differ from one country to another within the EU, please contact your supplier if necessary.

In Germany, this is mandatory from March 23, 2006. From this date, the manufacturer has to offer a suitable method of return for all devices supplied after August 13, 2005. For all devices supplied before August 13, 2005, the last user is responsible for the correct disposal.

Transport, storage and disposal

New Brunswick™ Innova® 2300/2350 Shakers
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10 Certifications

eppendorf

Declaration of Conformity

The product named below fulfills the requirements of directives and standards listed. In the case of unauthorized modifications to the product or an unintended use this declaration becomes invalid.

Product name:

Innova® 2300 and 2350
including accessories

Product type:

Benchtop open air shaker

Relevant directives / standards:

2006/95/EC: EN 61010-1
2004/108/EC: EN 61000-6-1, EN 61000-6-4
2011/65/EU
2012/19/EU



Management Board



Portfolio Management

Date: October 28, 2013

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Certified

ISO 13485
Certified

ISO 14001
Certified

M1191-2115-00

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Certifications

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