Resodyn
ACOUSTIC MIXERS

PharmaRAM I
Installation and Users' Manual

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Notes

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1 Introduction

The *PharmaRAM I* Compounding Mixer is a groundbreaking, innovative, and versatile tool for the compounding pharmacists. The *PharmaRAM I* Compounding Mixer was developed for the advanced compounding of individualized medicine in various pharmacy settings.

The *PharmaRAM I* Compounding Mixer allows the compounding pharmacist:

- To mix a broad range of pharmaceutical materials for solid (tablets, capsules, dusting powders) and liquid dosage forms, with exceptionally uniformity.
- To accomplish the mixing of during compounding at significantly shorter times than traditional methods.
- To mix in a completely sealed and dust-free environment, resulting in enhanced operator safety.
- To mix with highly repeatability from mix-to-mix, ensuring reliable batch-to-batch product quality.
- To mix up to 300 grams of compounded medication.

Operated with the proper vessels and attachments the *PharmaRAM I* Compounding Mixers is transformed into a milling or sieving device.

PharmaRAM I is based on ResonantAcoustic® technology.

ResonantAcoustic® Mixing (RAM) and Acceleration

The primary driving mechanism that creates mixing by the ResonantAcoustic® Mixing (RAM) technology is Acceleration (rate of change of velocity).The unit of measure of acceleration in the International System of Units (SI) is meters per second squared, or m/s^2. A more familiar way to describe this phenomenon is the acceleration of gravity here on earth, or ***g***. One ***g*** is the acceleration of gravity at the Earth's surface and uses the standard gravity symbol: g_n, defined as ~9.81 meters per second squared.

Acceleration is the driving mechanism for acoustic mixing, stated in units of the acceleration of standard gravity - or ***g*** - as outlined above. For example, a heavily loaded mixture of solids with a viscous liquid may be best mixed at an **Acceleration** of 80 ***g***, or 80 times the force of gravity.

The correct level of **Acceleration,** or ***g*** creates micro-mixing zones that liquids and viscous materials require, and creates the chaotic collision phenomenon that effectively mixes solids and powders. The process of determining an optimal **Acceleration,** or ***g*** to obtain the best mixing is an iterative one, arrived at through observation, optimization, and product quality testing. Resodyn

Acoustic Mixers process engineers and technical sales staff are always available to provide assistance in this process.

Furthermore, **Acceleration** or ***g*** is measured the same way across all RAM technology platforms. So, 50 *g* on the *PharmaRAM I* mixer is equivalent to 50 *g* on the *PharmaRAM I I* mixer.

It is also important to note that, while mechanical devices typically rely on *increasing* the power to improve mixing, better mixing with RAM technology is not necessarily the result of more power. Instead, the quality of mixing is the result of the *right combination* of energy applied to the materials - in the form of **Acceleration** or ***g*** - for an adequate amount of time. Therefore, some materials may be best mixed at a lower level of **Acceleration.**

2 Definitions

Acceleration:	A change in velocity with respect to time that is expressed in "*g*." Different mix media mixes at different accelerations, based on the material and the expected results. (See "*g*" below.)
g:	A measure of acceleration expressed as a multiple of the gravitational acceleration applied to the vessel and mix media during mixing. For example, 10 g is 10 times the force of gravity. It may also be shown as g. Another term that may be used to describe the acceleration is "gravities." (See "Acceleration" above.)
RAM:	ResonantAcoustic® Mixing or ResonantAcoustic® Mixer.
Resonance:	The frequency (nominally 60 Hz) at which the mechanical system operates in the most efficient manner.

3 Safety

Every effort has been made to assure that the *PharmaRAM I* is easy to use, reliable, and safe. This section outlines the general safety considerations and defines caution and warning symbols used throughout this manual.

3.1 General Safety Considerations

For safe operation, the *PharmaRAM I* should be operated only within the limits outlined in the system specifications. The following classification defines acceptable use for the *PharmaRAM I* .

- Indoor use only.
- Main supply voltage fluctuations are not to exceed ±10% of the nominal supply voltage.
- This equipment is suitable for continuous operation.
- For use in non-hazardous environments as classified by the United States National Electrical Code (NEC).

3.2 Warnings and Cautions

Throughout the manual, the following symbols are used to identify warnings and cautions:

	The caution symbol indicates a potential hazardous situation which could result in minor injury or damage to the product.
	The high voltage symbol indicates the possibility of electrical shock. This symbol means turn off the electrical supply before removing any cover with the symbol attached. Failure to do so may cause exposure to electrical shock hazard. Access to electrical components should only be carried out by a licensed electrician or qualified electrical engineer. **NEVER** attempt to modify any electrical components or circuits as this may affect the safe operation of the machine.
	Electrostatic Discharge (ESD) sensitive components.

3.3 Important Safety Notes

This equipment should only be operated by trained and qualified personnel.

Mixing operations can generate heat and internal pressure depending on material and mixer accelerations. Do not mix materials longer than what has been characterized as safe.

Do not attempt to run the machine without a mix container holder. Equipment damage may result.

Do not disable or tamper with any safety items, such as safety interlock switches located on the *PharmaRAM I* compounding mixer.

Note: Changes in noise level or frequency are common during mixing operations. If rattling, metal-on-metal, or obnoxious noises occur, turn off the *PharmaRAM I* and call or email the Resodyn Acoustic Mixers Technical Support.

3.4 Hazardous Location Notes

The *PharmaRAM I* system is designed to be operated in non-hazardous environments.

The *PharmaRAM I* system is protected by an IP20 enclosure which is not rated for operation in dusty environments.

The *PharmaRAM I* system is rated for operating in ambient environments between 0°C – 40°C (32°F – 104°F).

3.5 Component Replacement

The system is designed with components that are specifically rated for use with the *PharmaRAM I* compounding mixer. Only replace worn or damaged components with direct factory replacement parts or parts approved by Resodyn Acoustic Mixers. Incorrect component replacement can impair the safety of the equipment and risk injury to personnel.

Do not replace components with non-factory components. Non-factory replacement parts may not be rated to be used to the *PharmaRAM I* compounding mixer requirements, which will compromise the safety of the operating personnel and may cause damage to the equipment.

3.6 Customer Responsibility

- Ensure that all operators have received the correct training to operate the mixer.
- Ensure that all operators have read and understood this instruction manual.
- Ensure that a qualified electrician carries out any electrical maintenance.

- Allow only Resodyn Acoustic Mixers Service Engineers to repair a *PharmaRAM I* or return to Resodyn after receiving a Return Authorization.

3.7 Handling/Lifting

⚠	The *PharmaRAM I* mixer weighs 180 lb. (82 kg) with no payload or additional options. For safe lifting and transporting of the mixer, it should be lifted by at least four (4) people via the handles and lift points on each side, as shown below.

The *PharmaRAM I* mixer weighs 180 lb. (82 kg) with no vessel holder, payload, or additional options. The mixer should be lifted by at least four (4) people, one on each side. The two primary lifting positions are on the left and right-hand sides of the *PharmaRAM I* machine where retractable, integral lifting handles are located (Figures 1 and 2 below). Two remaining personnel can assist in lifting the *PharmaRAM I* mixer at the front and back base plate next to the machine feet. Exercise caution when lifting and moving the *PharmaRAM I* to avoid striking other objects.

There is ~1 ½" (~38 mm) clearance under the *PharmaRAM I*. This space allows clearance for fingers, and for the retractable handles to be securely positioned under the machine when not in use. The images below show the recommended locations for lifting the mixer using a combination of base plate handholds and retractable handles.

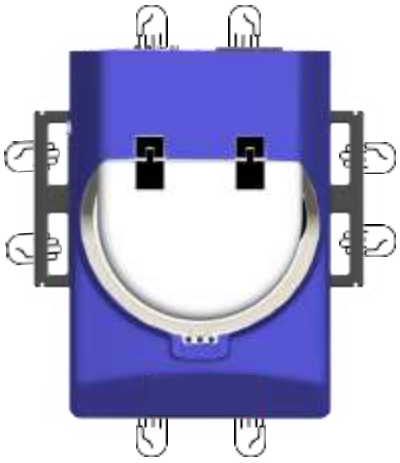


Figure 1 – Overhead View, lifting positions and handles

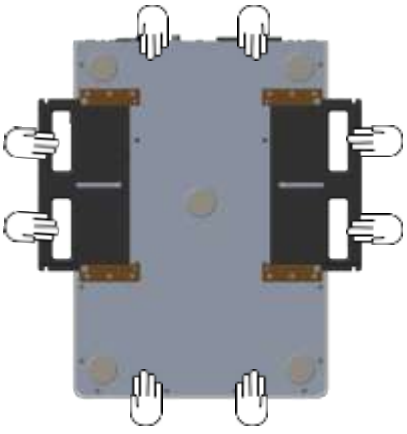


Figure 2 - Underside View, lifting positions and handles

Do not lift using any location other than the retractable handles and the mixer's baseplate handholds as indicated above. Lifting it any other way may cause damage to the *PharmaRAM I* mixer and may result in personal injury.

3.8 Guards and Safety Devices

Ensure all safety devices (limit switches, etc.) are functioning correctly, and regularly check their operation.

3.9 Technical Support for Mixer Operation

The *PharmaRAM I* mixer should only be operated when it is in good working condition. If the system shows any signs of visible damage or fails to operate as outlined in this manual, the system should not be operated.

For operational errors and troubleshooting, refer to the Troubleshooting section.

If necessary, contact your Resodyn Acoustic Mixers customer service representative for questions or the contacts provided below for additional technical support.

Technical Support for Mixer Operation:

Phone:	+1-406-497-5333	Resodyn Acoustic Mixers, Inc.
Fax:	+1-406-497-5206	130 North Main, Suite 630
Email:	service@resodynmixers.com	Butte, Montana 59701
Web:	https://resodynmixers.com/support	USA

4 System Overview

The *PharmaRAM I* mixer is a ResonantAcoustic® Mixer (RAM) specifically designed and manufactured for use in mixing up to 0.7 lbs. (300 g) of materials. The *PharmaRAM I* mixer is a highly versatile mixing system that is designed for laboratory and production environments. The *PharmaRAM I* mixer is equipped with proprietary mixing control circuitry, a vessel holder, machine safety interlocks, and a molded plastic acoustic enclosure. The *PharmaRAM I* mixer external features include the Acoustic Enclosure, Lid, control dashboard, Power Switch, Electrical Connectors, Fuse Ports, Cooling Fans, and Air Vents.

Figure 4-1. *PharmaRAM I* External Dimensions.

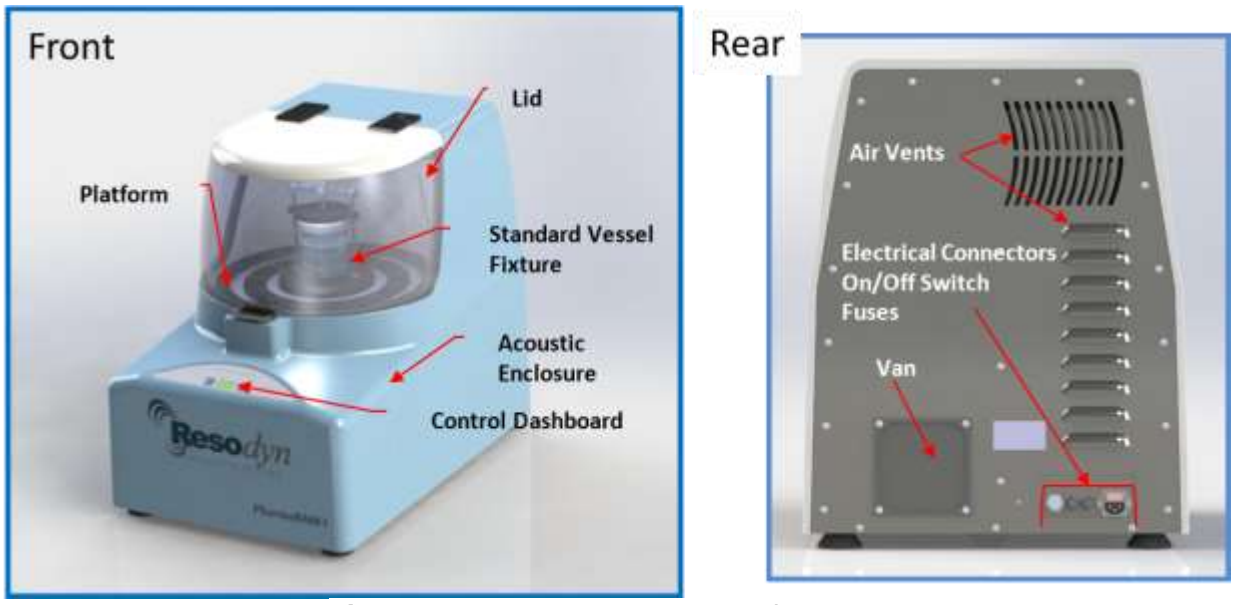


Figure 4-2. *PharmaRAM I* External Features.

4.1 ResonantAcoustic® Mixing Platform

The *PharmaRAM I* delivers energy to the material being mixed by moving the mixing vessel up and down, 60 times a second, at up to 80 *g* of acceleration.

4.2 Acoustic Enclosure

The acoustic enclosure surrounds the patented resonator system. See Figure 4.2 – 1.The enclosure reduces the sound emitted by the *PharmaRAM I* mixer and covers all the moving parts that could pose a risk to operators. A lift assisted lid (gas cylinder enabled) provides access to the mixer to load and unload mixing containers. The lid is unlocked via a stainless steel latch on the front of the Acoustic Enclosure.

Figure 4.2-1. *PharmaRAM I* Major Components.

⚠	During operation the Payload Plate, Driver Plate, Fixture, and Vessel, are accelerating up to 80 *g* of acceleration at nominally sixty times per second. Serious bodily injury is possible if one comes into contact with these moving surfaces.

4.3 Control Dashboard

The Control Dashboard is the user's primary source for interaction with the mix materials. See Figure 4.3-1.

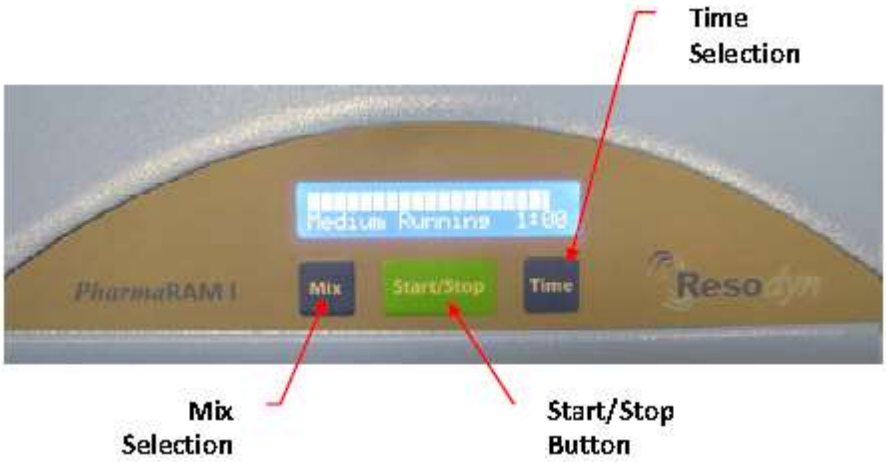


Figure 4.3-1. *PharmaRAM I* Control Dashboard.

The mix button enables selection of the three mixing levels (low, medium, or high), while the time button enables selection of the desired discrete length of mixing (10 seconds, 30 seconds, 1, 2, 3, 4, or 5 minutes). Similarly, the Start/Stop button enables commencement of mixing or cessation in the event something is observed prior to the expiration of the pre-designated mix time. An On/Off switch is located on the back of the machine near the electrical power socket. (See Figure 4-2.

4.4 Standard Vessel Fixture and Vessels

A variety of vessel sizes and types, along with the appropriate hold-down fixtures are available for the *PharmaRAM I* mixer. The standard and supplied vessel hold-down fixture is a 4" diameter vessel holder that accommodates vessel between the heights of 3.25" and 4.6". For vessel shorter than 3.25", spacers can be purchased from Resodyn Acoustic Mixers. Many applications call for specialized, custom hold down fixtures. Resodyn is fully equipped to handle virtually any shape of vessel a particular mixing application requires.

Please contact your Resodyn Acoustic Mixer sales representative to learn more.

The *PharmaRAM I* mixer hold-down fixture is made of several key components. These are the hold-down knob, jam nut, cross bar, bolts, standoffs, upper base, and lower base shown above in sequence and described in more detail below (Figure 4.4–1).

Hold-Down Knob. Turning the Hold-down Knob clockwise clamps the vessel in place. The knob is coupled to specialized thread designed for strength and accuracy.

The thread is connected to the **Upper Base**. Turning the knob raises and lowers the **Upper Base**.

Jam Nut. The Jam Nut is used to lock the vessel in place. When tightened against the top of the **Cross Bar**, the **Jam Nut** locks the **Hold-Down Knob** from loosening during operation. The **Jam Nut** is set after the mixing vessel is tightened down using the **Hold-Down Knob**.

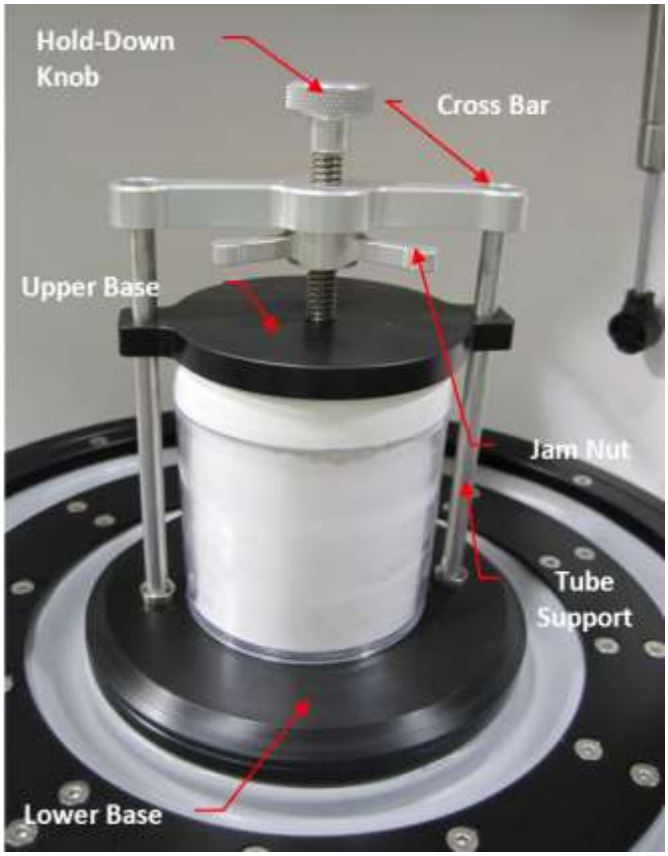


Figure 4.4-1. Components of Standard Vessel Fixture**.**

5 System Specifications

The *PharmaRAM I* mixer is equipped with the following electrcal connectors: 1) Power Cord Socket, 2) USB, 3), and 3) Fuse Ports. All external connections are found in the back panel of the *PharmaRAM I* mixer machine. See Page 18 for a detailed illustration.

The *PharmaRAM I* mixer overall system specifications are provided in Table 5-1

Table 5-1. *PharmaRAM I* mixer Specifications.

Description	Range		
Maximum Payload Capacity	0.7 lbm (300 grams)†		
Sealed Payload Enclosure	Yes		
Mixing Acceleration	40, 60 or 80 g‡		
Mixing Frequency	58 – 66 Hz Varying Load		
Acceleration Control	"Mix" selector button for three acceleration settings of "Low" "Medium" "High"		
g equivalent acceleration for mix setting	40	60	80
Mix Time Selection	"Time" selector button to facilitate choice of seven time durations from 10 seconds, 30 seconds, 1, 2, 3, 4, or 5 minutes.		
Program – Timed	Fixed acceleration and time, with a countdown timer visually representing the relative time remaining in the mix cycle.		
Input Power @ 50 – 60 Hz, CE Certified	100 – 120 / 200 – 240 VAC		
System Weight	180 lb		
Size (H X W X D)	25"H x 18" x 24"		
Operating Temperature & Humidity	15°C - 40°C Maximum 95% relative humidity (non-condensing)		

† 1 *g* = acceleration of gravity on the surface of the earth.
‡ At "High" mix setting, fully loaded, back panel 2" from wall. The amount of noise may vary nominally with the placement of the *PharmaRAM I* mixer within the room, total payload being mixed, and mixing intensity.

	**NOTE:** The *PharmaRAM I* mixer weighs approximately 180 lbs. without a fixture and should be handled by a two people lifting the machine at front and rear sides. Make sure to use safe and adequate lifting procedures. The lifting procedures are described in Section 3.7 Handling/Lifting. The system should be located on a sturdy table or bench that will hold the mixer and any auxiliary equipment, supplies or loads.

5.1 Voltage Level

The *PharmaRAM I* mixer is designed to utilize single phase 100-120 or 200-240VAC 50Hz/60Hz supply voltages for use worldwide.

5.2 Power Consumption

The mixer is designed to be very efficient by operating at a resonant condition. Nominal power consumption while operating at 90g of acceleration with an empty vessel is ~120W (0.69 Power Factor). During normal operation, the *PharmaRAM I* mixer will draw between 80 and 800 Watts.

6 Installation and Support

6.1 Unpacking, Lifting, and Placing PharmaRAM I

	The *PharmaRAM I* mixer weighs 180 lb. (82 kg) with no vessel holder or additional options. For safe lifting and transporting of the mixer, it should be lifted by at least four (4) people via the handles and lift points on each side as shown in Section 3.7 Handling/Lifting

Upon receipt of the *PharmaRAM I* mixer, do not unpack or remove any packaging materials until positioned as close to the installation location as possible. When in position, remove all wrapping and strapping, and shipping paperwork for your records. Retain all packaging material until the *PharmaRAM I* mixer is installed and working properly.

- Open the top of the box and remove any packing materials, bubble wrap or other items.

  When all packaging material is removed, slide the packaging box/sleeve up and over the *PharmaRAM I* mixer. The *PharmaRAM I* mixer should be the only remaining item, resting on cushioning bags in a corrugated tray on the shipping pallet.
- Check to ensure that the following components are included in the shipment:
  - *PharmaRAM I* mixer.
  - Power cable.
  - Standard vessel holder.
  - Polystyrene mixing vessels (two 8 oz and two 16 oz).
- Make sure to remove any loose packaging material from the area before attempting to move or install the *PharmaRAM I* mixer.
- With a minimum of four people lifting at all four lifting locations, and using appropriate safe lifting practices, lift the *PharmaRAM I* mixer straight up and carry to its installation location. See Section 3.7 Handling/Lifting for lifting locations.
- After installing the vessel holder (Section 6.5 Vessel Holder Assembly) and making all necessary connections, re-locate the *PharmaRAM I* mixer to its final position.
- When placing the *PharmaRAM I* mixer at its location, allow enough room around the machine to complete the installation, route wires, and allow for working space, etc.

6.2 Mounting

The *PharmaRAM I* mixer should be installed on a level, stable, and rigid surface capable of supporting the machine weight of 180lbs (82kg) plus the weight of the vessel holder, vessel, and mix payload. If other equipment or materials are to be placed or used on the same surface, a higher weight rating should be used as appropriate.

ResonantAcoustic® Mixing (RAM) technology imparts near zero forces to the surface on which it is mounted. Careful placement and leveling by a qualified technician is recommended, as is periodic inspection of the positioning and condition of the surface. Surrounding instruments and accessories should be considered in an overall placement plan.

6.3 Remove the Shipping Lock Bar

The *PharmaRAM I* mixer is shipped with a Lock Bar to secure the resonator during transportation. The Lock Bar **MUST** be removed before proceeding with installation or attempting to operate the *PharmaRAM I* mixer.

1. Open the lid and remove the 3/16" Hex Key from its shipping bag attached to the Warning Label. Use the Hex Key to remove the two ¼-20 Socket Head Cap Screws securing the Lock Bar.
2. Lift the Lock Bar off the platform and retain it along with screws for future re-positioning or transport of mixer. A black-padded Resodyn case is provided for your documentation, manuals, and other materials, like the Lock Bar and hardware.

Do not plug in the power cord before the lock bar has been removed!

Once the lock bar has been removed, the vessel holder assembly can now be installed using the instructions that follow.

6.4 Vessel Holder Assembly

Remove the Vessel Holder Assembly from the accessory box accompanying the shipment.

Mounting holes for attaching the *Pharma*RAM I Hold-Down Fixture are provided in the Platform. Tighten the ¼-20 Socket Head Cap Screws as far as possible using the provided 3/16" Allen wrench (it is not possible to over tighten) as seen in Figure 6.4-1.

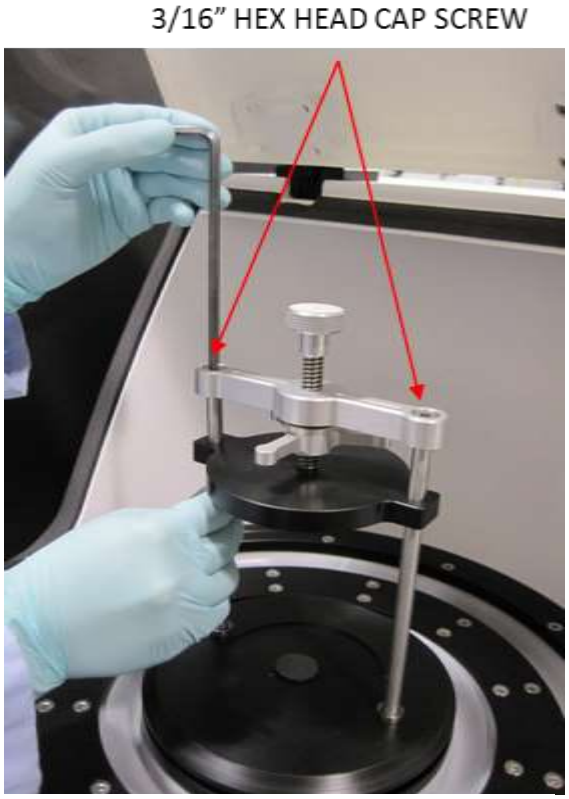


Figure 6.4-1. Attaching the Hold-Down Fixture.

⚠	On its highest setting, *the* PharmaRAM I *mixer operates at 80* g*'s, where 1 g equals the* acceleration of gravity on the surface of the earth. The vessel holder screws must be torqued to 8 ft-lb (10.8 Nm) to prevent the Vessel Holder and Vessel from loosening during operation.

6.5 Electrical Connections

Power Cord Socket, On/Off Switch, Fuse Ports, and a USB Port are located on the rear side of the *PharmaRAM I* mixer (Figure 6.5–1.).

Electrical power is provided to the *PharmaRAM I* mixer through the cord labeled “Power” which connects to the Power Cord Socket on the back panel of the *PharmaRAM I* mixer.

PharmaRAM I mixer is powered off with the On/Off toggle switch on the backside of the machine.

The electrical source and fuses should be rated for the supply power for your area. The following cord and fuse ratings for the voltages are as follows: 6.3 Amps for 100-120 VAC and 3 Amps for 200-240 VAC. Plug one end of the power cord into the power cord socket in the rear of the machine and plug the other end into the wall power receptacle.

The USB Port allows connection to a computer in order to perform updates of the *PharmaRAM I* mixer’s Firmware.

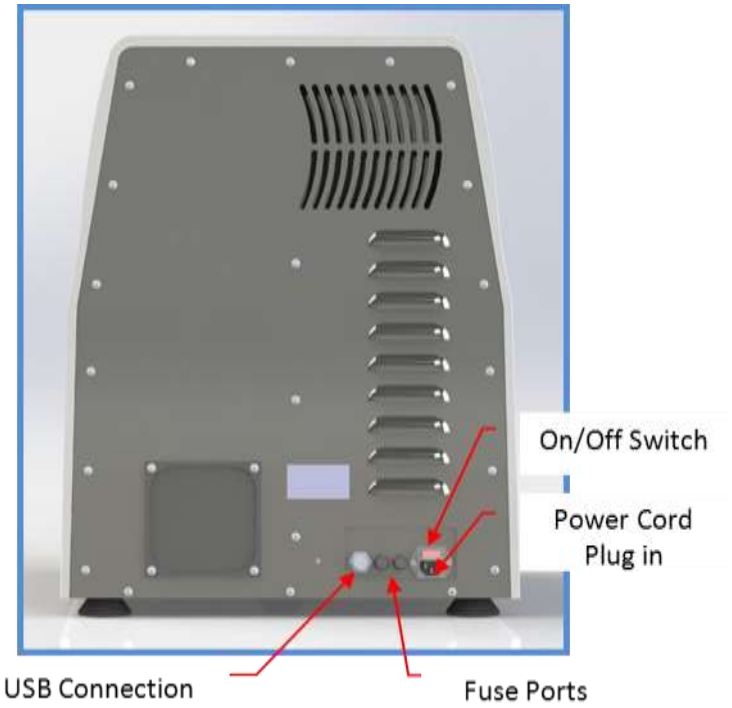


Figure 6.5-1. Electrical Connections.

7 Quick Start

This section defines the minimum steps required to operate the *PharmaRAM I* mixer. All instructions and guidelines in Section 6 must be completed before attempting a Quick Start or operation of the *PharmaRAM I* mixer.

7.1 Setup

To first set up the *PharmaRAM I* mixer, the mixing vessel must be installed. The fixture must have a vessel installed before operating the mixing vessel.

7.1.1 Open the Lid

To Access the mix platform press down firmly on the stainless steel latch located on the front of the mixer, just above the control dash board. The lid will release, and gently open automatically via the lift-assist cylinder. Operators are cautioned to not stand directly over the latch when opening as the lid is automatically sent the lid outward and upward.

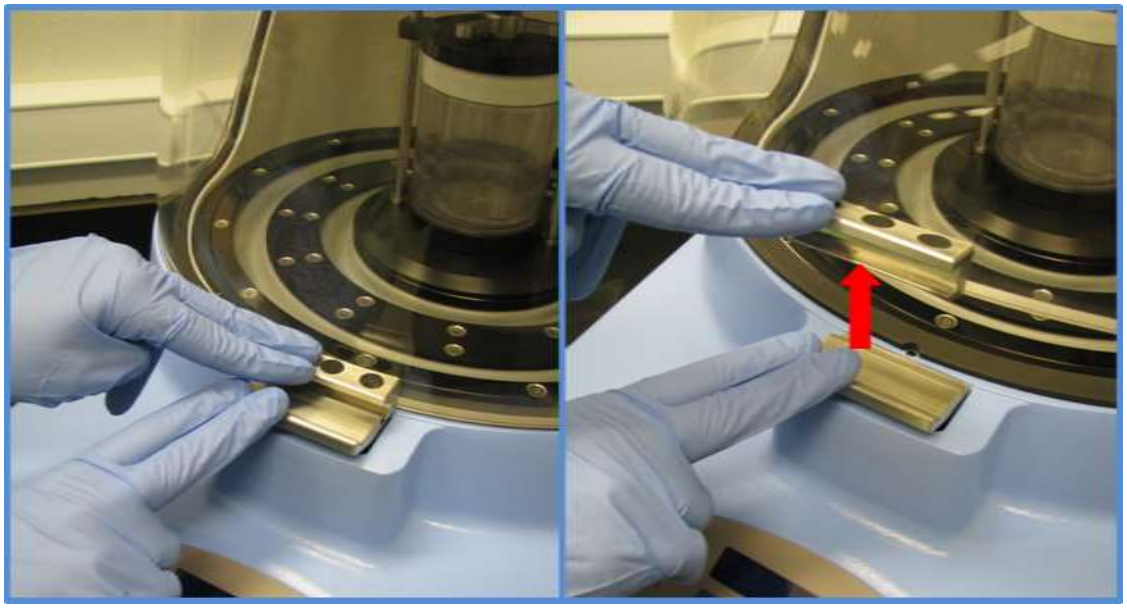


Figure 7.1.1 – 1. Opening the Lid.

7.1.2 Securing Container in the Vessel Holder

Place the mixing vessel centered on of the Lower Base, ensuring to align over the bottom dot, in the Vessel Holder Assembly. If the dot is missing, please call Resodyn Customer Service at 406-497-5333. Turn the Hold-Down Knob clock-wise at the top of the fixture until snug, to fasten the Mixing Vessel in place. Tighten the Jam Nut to lock the Vessel Holder assembly together. The mixing vessel should not feel loose if grabbed and moved while fastened in the holder. If the vessel feels loose, tighten further. Vessel spacers may also be used under the mixing vessel when mixing in short vessels.

To install vessels into the fixture refer to Figure 7.1.2-1.

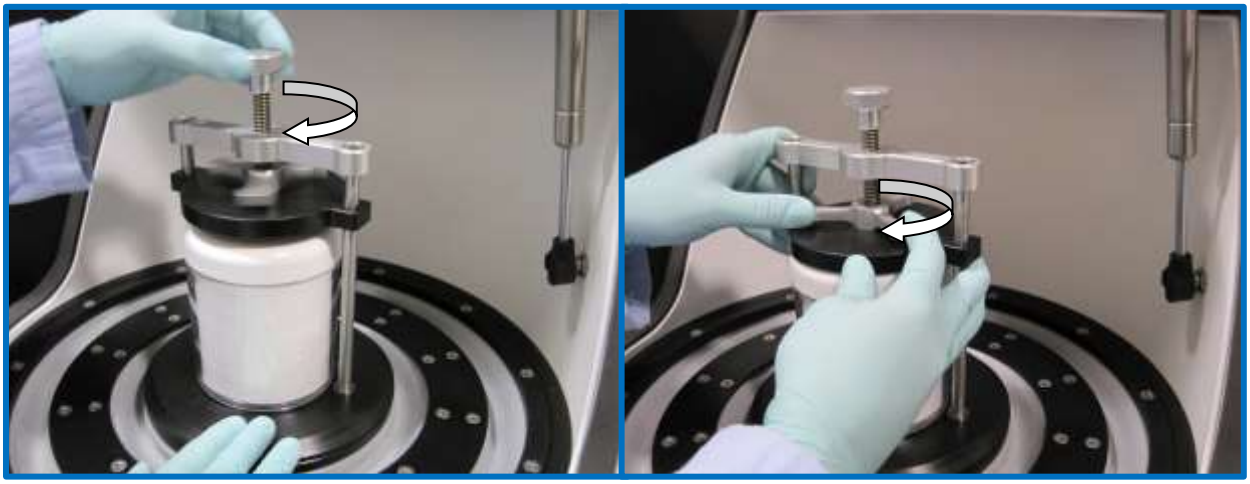


Figure 7.1.2-1 Securing Vessel in Hold-Down Fixture.

⚠	Do not overload mix vessel. Adherence to the maximum weight is required for proper operation and machine life.

⚠	The Hold-Down Knob and Jam Nut must be firmly seated in place. Failure to do so may result in the vessel vibrating loose during operation.

7.1.3 Close the Lid

Secure the lid with one hand, while holding the latch open with the other as seen below in Figure 7.1.3-1.

Push downward on the lid until the lower edge of the lid bracket has cleared the upper edge of the latch, and release the latch (ensuring the lid remains in place)

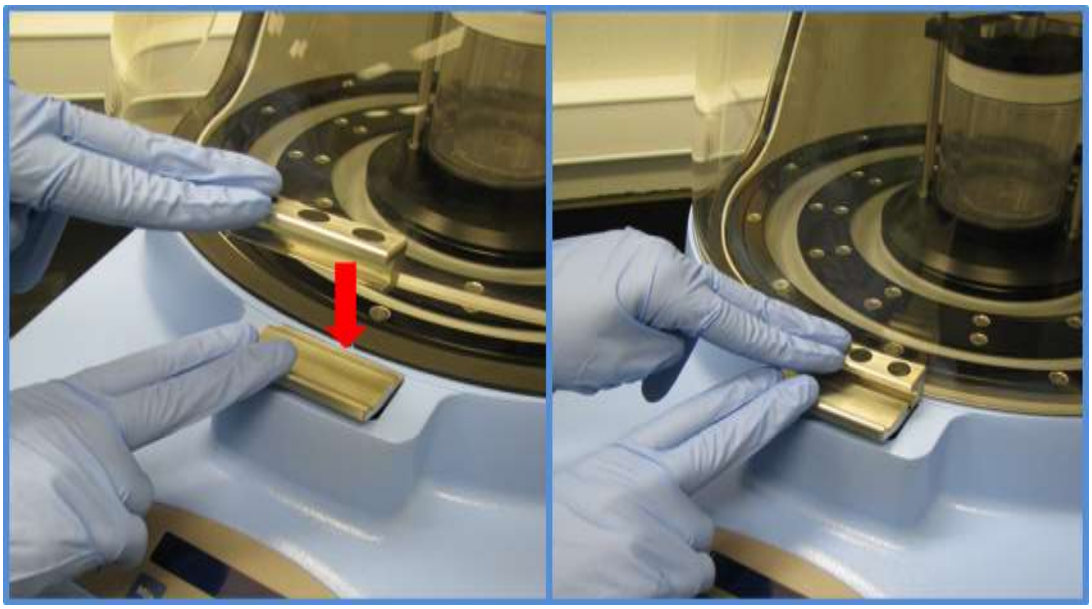


Figure 7.1.3 – 1. Closing the Lid.

Note: The lid is equipped with a SAFETY INTERLOCK SWITCH. If the lid is not fully secured, the *PharmaRAM I* will not commence mixing.

Do not attempt to override the SAFETY INTERLOCK SWITCH! During operation the Platform, Fixture, and Vessel vibrate up to 80 *g*'s. Serious bodily injury may occur if one comes into contact with these moving surfaces.

⚠	Do not attempt to override the Safety Interlock Switch as serious injury may result. During operation the Payload Plate, Driver Plate, Fixture, and Vessel move up and down rapidly, accelerating up to 80 *g* at nominally 60 times per second. Serious bodily injury is possible if one comes into contact with these moving surfaces.

7.2 Power-Up

Plug the provided power cord into the Power Cord Socket (Figure 6.5-1; page 19) on the rear side of the *PharmaRAM I* , and a wall outlet.

To turn on the power, simply toggle the rocker switch on the rear of the *PharmaRAM I* , to the "ON" position (Figure 6.5-1; page 19).

When power is applied to the system, the Resodyn Acoustic Mixers screen is displayed on the Dashboard.

Pushing the start button will commence mixing of the vessel for the mixer's default time setting of ten (10) seconds.

7.3 Completion

Opening the lid and removing the mix container completes the mixing cycle.

- When the status bar contains the word "Stopped", the mixer lid can be opened by depressing the stainless steel latch on the front of the lid.
- When the lid stops moving open, release the Jam Nut by turning counter clockwise and Hold-Down Knob by turning counter clockwise until the vessel can be removed from the fixture.
- Remove the vessel.

8 Startup and Mixing Operation Procedure

The user should find the simplified control dashboard, intuitive and very straightforward to use. To begin mixing follow the steps as outlined below:

When Power is turn on via the On/Off toggle switch in the rear of the machine, the following screen will be displayed:

Note that it displays:

- Mix Setting
- Status of the mixer (Stopped)
- Selected mix duration
- A bar indicating the proportional amount of time remaining in the current mix cycle. Here, no mixing has taken place so the bar fills the screen.

If the user were to push the “Start/Stop” button now, the mixer would operate for ten seconds at the “Low” g level (40 *g*’s) before again coming to rest and displaying the same screen indicated above. Instructions for altering the mix parameters are found in the following section.

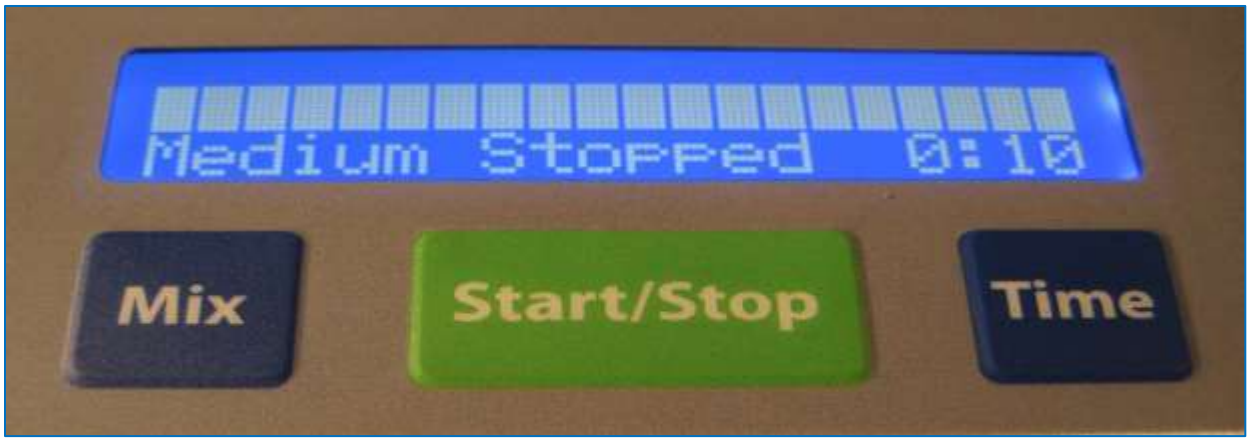
8.1 Adjusting Mix Acceleration

The *PharmaRAM I* is equipped with a single, one directional “Mix” button for selecting between the three available acceleration choices of Low, Medium, or High.

To increase the mix acceleration press the “Mix” button once to go from Low to Medium;

or from Medium to High.

Pressing the “Mix” button once more returns the selection back to Low acceleration.



At any time during an active mix cycle, it is possible to adjust acceleration by pressing the Mix button until the new desired acceleration setting is displayed.

8.2 Time Duration

Much like the choice of mix acceleration, the *PharmaRAM I* is equipped with a single, one directional “Time” button for selecting the user’s choice of ten seconds to five minutes for a batch.

Pressing the time button once at the default screen will change the allotted time from ten seconds to thirty seconds, one, two, three, four, or five minutes as applicable.

Much like the Mix feature, pressing the time button again at five minutes returns the user to the low end of the scale (or ten seconds).

Unlike the mix feature, once a mix has commenced it is not possible to adjust the time duration (absent stopping the mix or opening the lid as discussed below).

8.3 Starting & Stopping a Mix

With the appropriate mix acceleration and time duration chosen, press the “Start/Stop” button to commence the mix.

Note that the status bar has changed to reflect “Running” and the countdown timer is visually indicating the proportional amount of time remaining in the current mix cycle.

Stopping the mix at any time prior to the expiration of the selected time duration will pause mixing. This is true whether the user presses the green “Start/Stop” button, or if the lid is opened in the course of mixing triggering the safety interlock switch.

Depending on the reason for pausing the mixing, a User may want to start again from the beginning or simply resume the current mix cycle. By pressing the “Start/Stop” button the user is prompted to either restart the mix from the beginning by pressing “Mix,” or to finish the remainder of the current mix cycle by pressing “Time.”


Timer Restart (Mix),
or Resume (Time)?
Mix
Start/Stop
Time

9 Care and Maintenance

Resodyn Acoustic Mixers are assembled at our corporate facilities in Montana, under a strict quality manual and an overriding corporate culture of building world-class equipment that is built to last.

In order to help ensure long life and effective maintenance, it is important to participate in general cleaning and maintenance as indicated below.

9.1 Preventive Maintenance

The bellows can prematurely wear and become damaged if materials are allowed to be free in the resonator area. Cleaning of the upper resonator and bellows ensures a long life of the bellows. If necessary, use a small hand vacuum to clear debris from the bellows area, making sure not to create a vacuum between the device and the bellows material. Use a soft, non-abrasive cloth and water to complete cleaning the bellows.

9.2 Cleaning Procedures

Molded Plastic Acoustic Enclosure.

The Plastic Acoustic Enclosure is coated with a Gloss Blue Polyurethane, Textured powder coating. Clean with a soft, non-abrasive cloth and water with slight additives of neutral washing agents (pH 5 – 8). Greasy or oily substances may be removed by rubbing with a cloth wetted with isopropyl alcohol (IPA) or white spirit free of aromatic compounds.

	If IPA is used for cleaning, do not allow overspray to contact cast acrylic lid. Significant damage to finish will occur.

Rinse with damp, cold water after every cleaning process to remove any remnants of the cleaning process.

Do not use solvents or similar containing esters, ketones, aromatics, or halogenated hydrocarbons. Do not use strong acids alkaline detergents or abrasives. Rinse with cold water after every cleaning process.

Cast Acrylic Lid. Clean with soft, non-abrasive, 100% cotton cloth and water with slight additives of neutral washing agents (pH 5 – 8). Commercially available ammonia-free acrylic and plastic cleaners with anti-fog, anti-static, and dust repellent additives may also be used.

	Do not use detergent, abrasive cleaners or isopropyl alcohol and do not use paper towels.

9.3 Accelerometer Calibration

The acceleration of the *PharmaRAM I* mixer should be calibrated once a year or per the end users specified preventative maintenance schedule or when the accelerometer is replaced.

The calibration kit can be purchased or rented from Resodyn Acoustic Mixers.

9.4 Maintenance

The *PharmaRAM I* mixer is designed with few serviceable replaceable parts.

9.4.1 Major Repairs

All repairs inside the enclosure should be diagnosed and repaired by Resodyn Acoustic Mixers trained repair personnel only. All components not listed on the replaceable wear parts or spare parts list should also be replaced by Resodyn Acoustic Mixers trained repair personnel only.

	Do NOT attempt to take off the acoustic enclosure because of electrical shock hazards. The high voltage symbol indicates the possibility of electrical shock.

9.4.2 Recommended Maintenance Schedule

The recommended preventative maintenance intervals for the *PharmaRAM I* mixer only involve the bellows (see Bellows replacement illustration below). The bellows are to be visually inspected weekly and replaced as necessary.

Recommended spare parts to have on hand are listed in Table 9.4.2-1 as well as their quantities.

Table 9.4.2-1. Spare Parts List.

Description	Part Number	Quantity
Inner Bellows Gasket	101841	1
Outer Bellows Gasket	101842	1
Fuses 250V T 6.3 Amp (for 100 – 120 VAC)	002187	2
Fuses 250V T 3 Amp (for 200 – 240 VAC)	002442	2

9.4.2 Replacement of Serviceable Parts

Common client serviceable replacement parts are identified below. These parts are the fuses, bellows, and accelerometer, and are listed in Table 9.5-1. The bellows estimated life is greater than 500 hours and the accelerometer is greater than 2,000 hours.

Table 9.4.2–1. Customer Replaceable Parts List.

Description	Part Number	Quantity
Accelerometer & Integrated Cable Assembly	102103	1
Inner Bellows Gasket	102841	1
Outer Bellows Gasket	101842	1
Fuses 250V T 6.3 Amp (for 100 – 120 VAC)	002187	2
Fuses 250V T 3 Amp (for 200 – 240 VAC)	002442	2

9.4.3 Fuse Replacement

The fuse should only be replaced when the machine does not power up, but power is being delivered to the machine. If this occurs, please call your Resodyn Acoustic Mixers representative for further instructions.

Fuse access is located on the lower left area of the back of the *PharmaRAM I* mixer, shown in Section 6.5 Electrical Connections. Turn the fuse cap counterclockwise to remove fuse.

	Do NOT remove the fuse without first unplugging the AC power cord from its power source.

Insert new fuse into cap and turn cap clockwise until secure. If the *PharmaRAM I* mixer does not power up, please call Resodyn Mixers service at 406-497-5333.

9.4.4 Bellows Replacement

The *PharmaRAM I* mixer is equipped with a sealed inner enclosure that houses the Resonator. The interior of the machine is sealed with inner and outer bellows between the moving plates and the enclosure. These bellows are designed for operational life greater than 500 hours. Should replacement be required, instructions for the bellows are provided with the replacement parts.

9.4.5 Accelerometer Replacement

The *PharmaRAM I* mixer is equipped with an accelerometer that is mounted to the underside of the Payload Plate, shown above. The accelerometer is designed for an operational life greater than 2,000 hours. Should replacement be required, instructions for the accelerometer are provided with the replacement part. When an accelerometer is replaced, the *PharmaRAM I* mixer must be calibrated or damage to the machine may occur. Calibration Kits are available through Resodyn Acoustic Mixers.

9.4.6 Technical Support for Mixer Operation:

Phone:	+1-406-497-5333	Resodyn Acoustic Mixers, Inc.
Fax:	+1-406-497-5206	130 North Main, Suite 630
Email:	service@resodynmixers.com	Butte, Montana 59701
Web:	https://resodynmixers.com/support	USA

10 Troubleshooting and Service

The *PharmaRAM I* mixer should only be operated when it is in good working condition. If the system shows any signs of visible damage or fails to operate as outlined in this manual, the system should not be operated.

For operational errors and troubleshooting, refer to the Troubleshooting section.

If necessary, contact your Resodyn Acoustic Mixers customer service representative with questions or additional technical support related to the mixer at 406-497-5333.

Some straightforward solutions to resolve common operational events are in shown in Table 10-1 below. Review the chart before contacting your Resodyn Acoustic Mixers service representative. If the problem persists, contact your customer service representative at the phone number above.

Table 10-1. Troubleshooting Table.

Description of Problem	Potential Problem	Solution
Mixer will not power up	Power cord unplugged Power switch off	Ensure that the power cord is plugged into the mixer and a wall outlet. Ensure that the power switch (located on the back of the machine above power cord) is in the on position, "**I**".
Error: Lid Open	Lid opened before mixer stopped	Lid was opened when the mixer was running, which stopped the machine. Do not open the lid unless the mixer screen shows "Stopped" on the bottom line.
Error: Broken Accel.	Accelerometer cable or accelerometer has failed	Accelerometer and cable assembly must be replaced
Error: Amp Overheat	Mixer amplifier is too hot	Ensure adequate ventilation on the backside of the mixer. Ensure room temperature is within specified range.
Error: Over Temp.	Mixer enclosure is too hot	Ensure adequate ventilation on the backside of the mixer. Ensure room temperature is within specified range.
Error: Amp Fault	Vessel overloaded	Remove mix material until it is within the maximum specified load limits.
Error: Overloaded	Vessel overloaded	Remove mix material until it is within the maximum specified load limits.
Error: Over Current	Vessel overloaded	Remove mix material until it is within the maximum specified load limits.

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