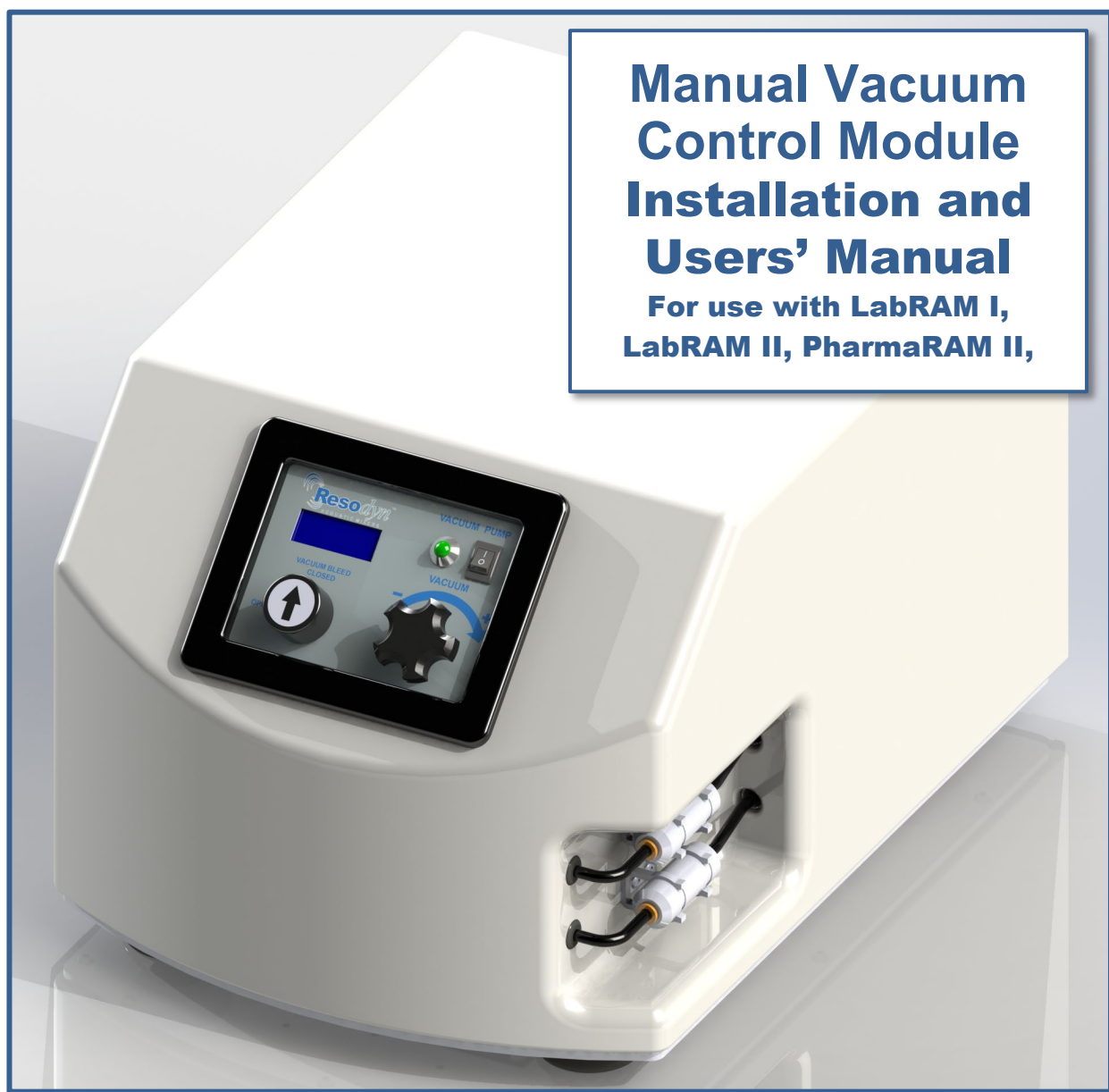




## **Manual Vacuum Control Module Installation and Users' Manual**

**For use with LabRAM I,  
LabRAM II, PharmaRAM II,**



## Notes & Information

Date of Purchase

Date of Installation

## Pilot Testing

Production Start

## Maintenance Record

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# 1 Introduction

The Resodyn Acoustic Mixer's Manual Vacuum Control Module (Manual Vacuum System) is a standalone vacuum and control system that can be connected to various RAM platforms to control and monitor the vacuum inside the mixing vessel. The vacuum system is supplied with 0.25" (6.35 mm) OD vacuum lines and two 10µm filters.

Key Features:

- Consistent and repeatable vacuum
- In-line vacuum filters keep pump clean, reducing maintenance
- Manual vacuum control to allow recipe development

The Manual Vacuum System provides the following processing advantages for RAM:

- Virtually eliminates mixing air entrainment
- Easy to install and operate
- Oil-less vacuum pump results in clean operation and very low maintenance

## 2 Definitions

Acceleration:	A change in velocity with respect to time that is expressed in “g” and used as a unit of input in RAM technology (e.g., 35 g of acceleration was used for 3 minutes to complete the mix). Different mixing media process at different accelerations, based on the material and the expected results.
Headspace:	The volume of compressible air, gas, or void space that is not occupied, above the mixing media in the vessel.
inHg:	Units of vacuum used on older Manual Vacuum Machines (inches of mercury) pulled below the ambient pressure. (29.92 inHg is 1 atm). This measure can become variable from one altitude to another.
Millibar (mbar)	One of the units of measure and input used when drawing pressure with the Resodyn Vacuum System. This method is based on an absolute scale and displays the same measure regardless of altitude. (This option is selected at purchase.).
Mixing Media:	Defined as the material inside a LabRAM I or LabRAM II mixing vessel on which vacuum can be drawn to improve mixing results.
Mixing Power:	The amount of power being delivered by the LabRAM system to perform mixing and can be affected by the use of vacuum.
Mixing Regime:	This term identifies certain modes of mixing. The mixing regime defines the bulk flow pattern of the mix during mixing. A regime changes when the bulk patterns change. Mixing regimes are affected when applying vacuum during processing.
RAM:	<u>ResonantAcoustic</u> <sup>®</sup> <u>Mixing</u> or ResonantAcoustic <sup>®</sup> Mixer.
Resonance:	The frequency (nominally 60 Hz) at which the LabRAM I and LabRAM II mechanical system operates in the most efficient and powerful manner.
torr:	One of the units of measure and input used when drawing pressure with the Resodyn Vacuum System. This method is based on an absolute scale and displays the same measure regardless of altitude. (This option is selected at purchase.)
Vacuum:	Internal vessel pressure that is less than atmospheric pressure.

### 3 Safety

Every effort has been made to assure that the Manual Vacuum System 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 Manual Vacuum System should be operated only within the limits outlined in the system specifications. The following classification defines acceptable use for the Manual Vacuum System.

- Indoor use only.
- Main supply voltage fluctuations are not to exceed  $\pm 10\%$  of the nominal supply voltage.
- This equipment is suitable for continuous operation.

#### 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.
	<p>The high voltage symbol indicates the possibility of electrical shock.</p> <p>This symbol means <u>turn off</u> the electrical supply before removing any cover with the symbol attached. Failure to do so may cause exposure to electrical shock hazard.</p> <p>Access to electrical components should only be carried out by a licensed electrician or qualified electrical engineer.</p> <p><b>NEVER</b> attempt to modify any electrical components or circuits as this may affect the safe operation of the machine.</p>
	Electrostatic Discharge (ESD) sensitive components.

### 3.4 Component Replacement

The system is designed with components that are specifically rated for use with the Manual Vacuum System machine. 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 meet the Manual Vacuum System machine requirements, which will compromise the safety of the operating personnel and may cause damage to the equipment.

### 3.5 Customer Responsibility

- Ensure that all operators have received the correct training to operate the vacuum module and mixer.
- Ensure that all operators have read and understood this manual.
- Ensure that a qualified electrician carries out any electrical maintenance.
- Allow only Resodyn Acoustic Mixers trained repair personal to repair a Manual Vacuum System or return to Resodyn after receiving a Return Authorization Number from a Resodyn sales representative.

### 3.6 Handling/Lifting

Upon receipt of the Manual Vacuum System, do not unpack or remove any of the packaging materials until positioned as close to the installation location as possible. When in position, carefully follow the instructions in the section below.

*To prevent additional charges, retain all packaging for one year should machine movement or unexpected warranty service be necessary. Original packaging will be required for service shipment during the warranty period and is highly recommended for any shipment performed during the entire life of the product.*

- DO NOT use lifting accessories around or attached to parts that may be damaged or fail during lifting.
- DO NOT use lifting accessories around sharp edges that may damage the item and cause the machine to fall.
- DO exercise caution when lifting and moving the equipment to avoid striking other objects.

The Manual Vacuum System mixer weighs 32 lbs. The Manual Vacuum System was packaged in a cardboard box with padding around the unit. The Manual Vacuum System is light enough to be carried by a single individual but can be carried by multiple people if required.

### 3.7 Mounting

The Manual Vacuum System should be installed on a stable, rigid surface capable of supporting the weight of the module. The Manual Vacuum System should be mounted on top of a table by the (4) four support feet shown below.



### 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 Manual Vacuum System 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 at the end of this document.

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

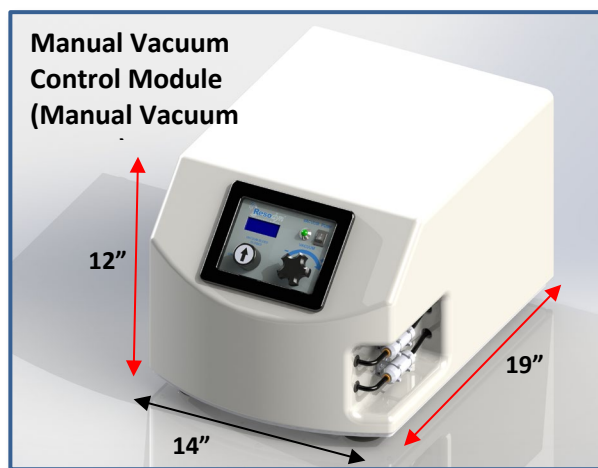
Technical Support for Mixer Operation:

Phone: (406) 497-5333 Fax: (406) 497-5206 e-mail: <a href="mailto:service@resodynmixers.com">service@resodynmixers.com</a>	Resodyn Acoustic Mixers 130 North Main, Suite 630 Butte, Montana 59701
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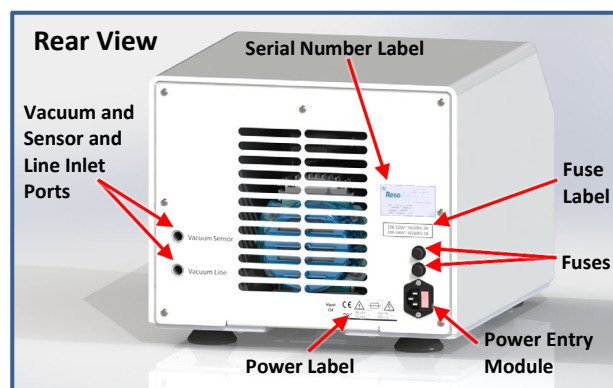
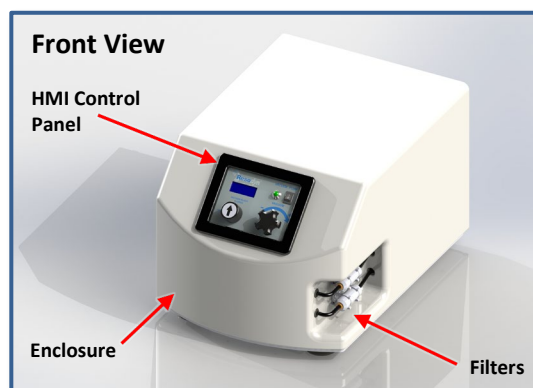


## 4 System Overview

The Manual Vacuum System is specifically designed and manufactured for pulling and controlling vacuum in the mixing container being processed with a compatible RAM platform. The Manual Vacuum System external features include the Enclosure, Human Machine Interface (HMI) Control Panel, Filters, Fuses, and Power Entry Module. This vacuum unit is designed for use with LabRAM I, LabRAM II and PharmaRAM II devices.



### 4.1 Enclosure



The enclosure surrounds the internal vacuum components and protects the user from any electrical shock, while also reducing the sound emitted by the Manual Vacuum System. The vacuum lines are fed from the back of the enclosure (inlet ports) to the filters. This allows the vacuum lines to be kept away from the working area.

### 4.2 Human Machine Interface (HMI) Control Panel

The HMI Control Panel is the primary user interface on the Manual Vacuum System. The HMI is located on the front of the Manual Vacuum System. From this panel, the user can turn the pump on/off, open/close the bleed vent, and adjust the partial vacuum pressure.

### 4.3 Vacuum Lines and Filters

The Manual Vacuum System is equipped with 0.25" (6.35 mm) vacuum line. The system has 10  $\mu$ m inline filters for the vacuum and vacuum sensor lines. The vacuum line pulls a vacuum in the mixing vessel, while the sensor line transmits a signal to a vacuum monitoring sensor in the mixing vessel. This provides a method to monitor the *true* vacuum in the mixing vessel.

## 5 System Specifications

The Manual Vacuum System is equipped with the following external connectors:

- Power connection
- Fuses
- Filters with 0.25" OD Vacuum Tube Connectors

See Section 4, Page 9 for detailed illustrations.

The Manual Vacuum System overall system specifications are provided in Table 5-1.

**Table 5-1 Manual Vacuum Control Module System Specifications**

Dimensions (Width x Depth x Height)	14" x 19" x 12" (36cm x 49cm x 31cm)
Weight	32lbs (15kg)
Vacuum	Down to 10 torr (13.3 mbar)
Electrical @50/60 Hz, CE Certified	100-120VAC / 200-240VAC
Fuses @ 50/60 Hz	3A @ 100-120VAC / 2A @ 200-240VAC
Standard Filtration Size	0.0004" (10µm)

### 5.1 Voltage Requirements

The Manual Vacuum System is designed to utilize single phase 100-120 VAC or 200-240 VAC 50Hz/60Hz supply voltages for use worldwide. The systems are configured with the specified fuses 3A for 100-120 VAC or 2A for 200-240 VAC 50Hz/60Hz supplied by the factory.

### 5.2 Power Consumption

The Manual Vacuum System consumes less than 150 Watts during normal operation.

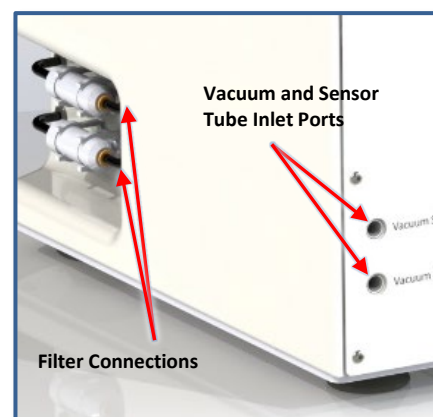
## 6 Installation and Support

### ***Unpacking, Lifting, and Placing the Automatic Vacuum System***

Please see Section 3.6 Handling and Lifting and 3.7 Mounting on Page 7 and 8 for important information.

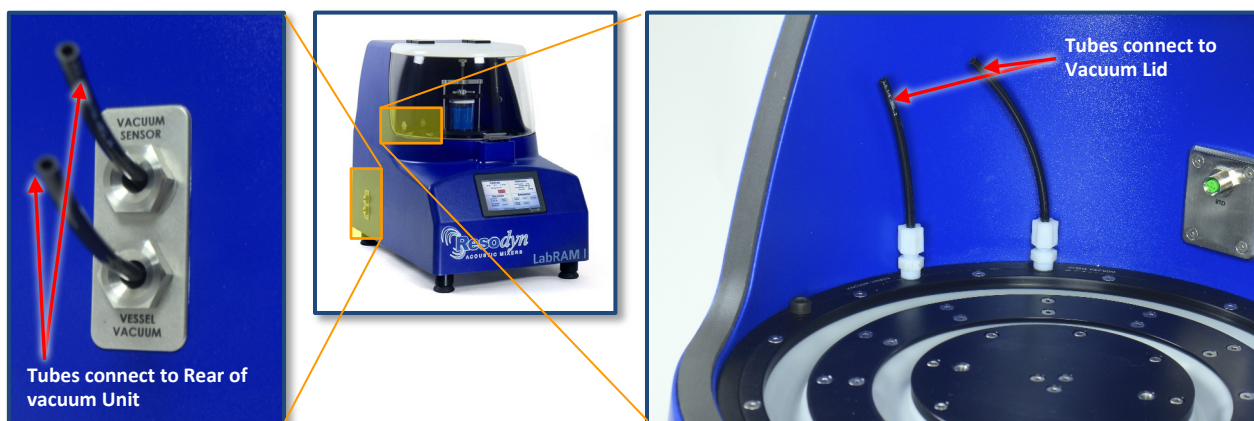
#### **6.1 Connecting Vacuum System to LabRAM I and LabRAM II**

The Manual Vacuum System is connected to LabRAM machines via *two* supplied 0.25" (6. mm) tube connectors. Insert the end of *one* of the tubes into the Vacuum or Sensor port on the back of the machine as shown to the right until the tube exits the System housing right before the filter cartridge connection. Push the tube end into the filter connectors until the tube is securely seated in the cartridge quick connector. Check to make sure that the connection is secure.



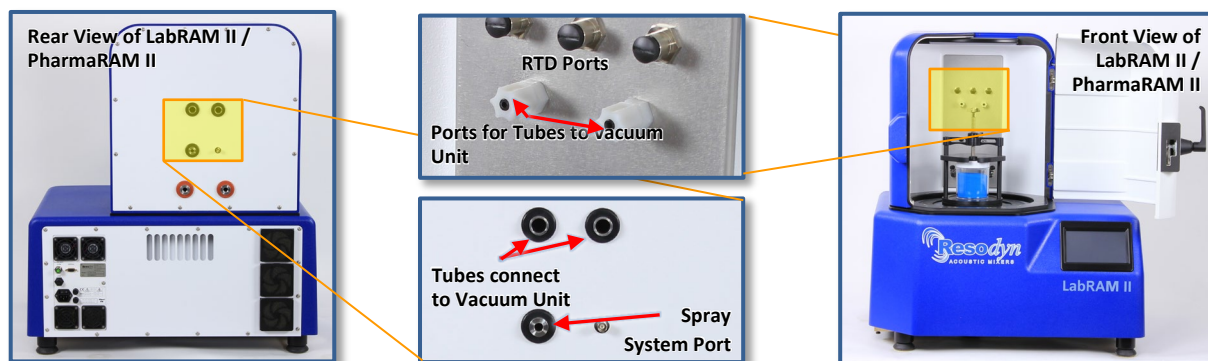
Before routing the other end of each tube through the vacuum ports on the left side (viewed from the front) of the LabRAM I as shown, or on the backpanel of the LabRAM II as shown, estimate the length of the tube needed to connect the two machines. Cut the tube as necessary.

If Space allows, the tube can be left the full length in case of later reconfiguration. Loosen the compression fitting nut (see the next page) to allow the vacuum tube to pass through the machine housing and fittings.



LabRAM I Vacuum and Sense Line Tube locations

Similarly, route the tubes through the back of the manual Vacuum unit housing. Then route the tubes through the backpanel of the LabRAM II recalling to loosen the compression fitting nut.



LabRAM II Vacuum and Sense Line Tube locations

### Compression Fitting Components

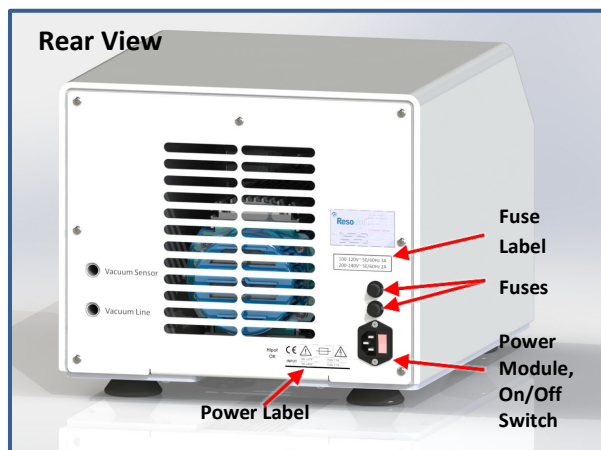


Each vacuum tube passes through the compression fitting in the LabRAM machines. The fitting is composed of 3 pieces: the compression nut, a conically shaped ferrule and a second ferrule with a flattened end. These components are configured as shown to the left. If incorrectly configured, the fitting on the tube will not function properly making the tubes insecure. All fitting related tubes or hoses should be configured to allow for movement of the mixing vessel. No sharp turns, twists, or kinks should be allowed to remain in any tubes or hoses.

## 6.2 Electrical Connections

Electrical power is provided to the Manual Vacuum System through a power cable connected to the power entry module. 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:

- 3 Amps for 100-120 VAC
- 2 Amps for 200-240 VA

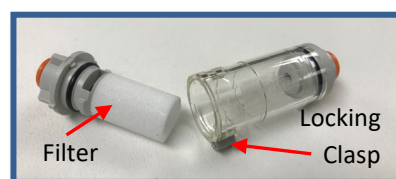
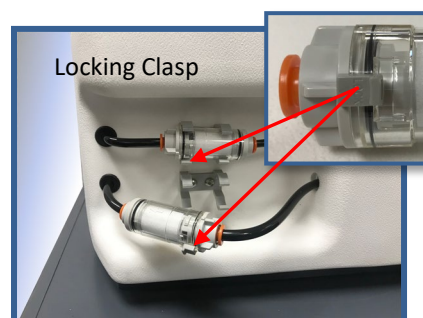
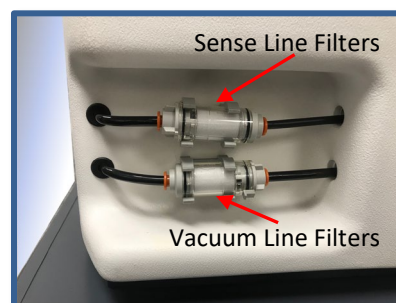


### 6.3 Filter Cartridge Replacement

Frequency of use will determine the life of the filters in the Vacuum System filter cartridges. Inspect frequently for material, debris, or other conditions that can affect the filters' effectiveness. Follow the steps below to change filters

Two filter cartridges are located on the lower right side of the machine when facing the HMI control panel. The upper cartridge is the "sense" line and the lower cartridge is the "vacuum" line.

1. Grasp the filter cartridge between the grey holding clips and pull out horizontally to access the cartridge filters.
2. Remove the vacuum tubes from either end by compressing the quick release fittings toward the cartridge body. Note the orientation of the arrow molded into the body of the cartridge in relation to the front and back of the machine. (Sense line – points to rear / Vacuum line – points to front.)
3. Compress the locking clasp toward the opposite end of the cartridge and rotate the cap counterclockwise to open and release the cap from the cartridge.
4. Remove and discard the old filter appropriately and replace with a new filter (Part No. 000000).
5. Reverse the steps above, making sure to re-orient the cartridge in the proper direction. The body of the cartridge is marked with an arrow as well. (Sense line – points to rear / Vacuum line – points to front.)
6. Repeat with the other cartridge. Inspect frequently for replacement.





## 7 Quick Start

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

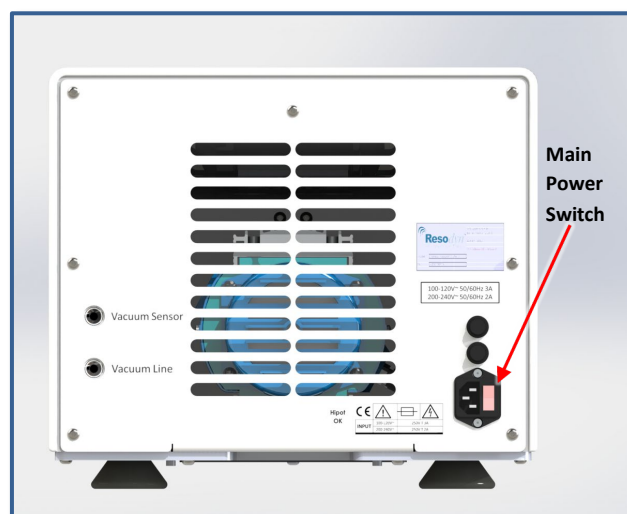
### 7.1 Setup

To first set up the Manual Vacuum System, the unit should be installed close to a compatible RAM mixer. The vacuum sensor and vacuum lines should be connected to the RAM Vacuum Lid of a mixing vessel. The mixing vessel and vacuum lid should be installed in the compatible RAM mixer.

### 7.2 Power-Up

Toggle the Main Power Switch (located on the Power Entry Module) to the On, or “I,” position to enable power to the Manual Vacuum System control box. Ensure the switch is in the “I” position.

“Resodyn VSDM” is displayed momentarily on the LCD screen as shown below. Next, the sensed vacuum pressure is displayed in units of Torr or mbar, as selected



## 8 HMI (Human Machine Interface) – Overview

The HMI is the primary user interface on the Manual Vacuum System.



- LCD Screen - The LCD Screen displays the vacuum pressure (*torr*) in the sensor line.
- Pump Switch - The Pump Switch turns the vacuum pump on/off.
- Indicator Light - The Indicator Light informs the user when the vacuum pump is on.
- Bleed Valve - The Bleed Valve is used to rapidly release the vacuum. Turning the valve to “OPEN” will leak air back into the vessel returning the pressure to ambient conditions. Turning the valve to “CLOSED” will seal off the air leak returning vacuum control to the Control Knob.
- Control Knob - The Control Knob regulates vacuum pressure within the mix container. To obtain more vacuum, turn the knob clockwise. To obtain less vacuum, turn the knob counterclockwise.

## 9 Care and Maintenance

Resodyn Acoustic Mixers and Manual Vacuum System are assembled at our corporate facilities in Butte, Montana, USA under a strict quality manual and overriding corporate philosophy of building world class equipment that is built to last. In order to help ensure long life, it is important to participate in and practice general cleaning and maintenance as indicated below:

### 9.1 Maintenance

The vacuum system is designed to be low maintenance. As such, there are only two items that require scheduled servicing:

- Tubing - The vacuum lines should be replaced when filled with material, cracked, or damaged
- Filters – Check filters periodically\ and replace when necessary.
- The vacuum filters should be inspected weekly and replaced as necessary

### 9.2 Cleaning Procedures

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.

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

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

### 9.3 Repairs and Replacement Parts

All components not listed in the Maintenance and Recommended Spare Parts sections should be replaced by Resodyn Acoustic Mixers trained repair personnel only.

#### 9.3.1 Major Repairs

All repairs inside the enclosure, unless otherwise stated in this manual, should be diagnosed and repaired 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.



### 9.3.2 Recommended Spare Parts


Recommended spare parts are listed in Table 9-1 as well as the recommended quantities to have on hand.

**Table 9-1 Manual Vacuum Control Module Spare Parts List**

Description	Part Number	Quantity
Fuses, 3A, Time Lag (For 100-120 VAC)	002442	2
Fuses, 2A, Time Lag (For 200-240 VAC)	002964	2
Vacuum Tubing, 0.25"	103146	2
Vacuum Spares Kit	902709	1
10 µm Vacuum Filter	002965	4
Filter Cartridge Spares kit (pack of 4)	902712	1

### 9.3.3 Fuse Replacement

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

	<p>Ensure the power to the Manual Vacuum System is turned off and disconnected before performing any maintenance on the unit.</p>
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### 9.3.4 Technical Support:

<p>Phone: (406) 497-5333  Fax: (406) 497-5206  e-mail: <a href="mailto:service@resodynmixers.com">service@resodynmixers.com</a></p>	<p>Resodyn Acoustic Mixers  130 North Main, Suite 630  Butte, Montana 59701</p>
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## 10 Troubleshooting and Service

The Manual Vacuum System 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.

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

Table 10-1 lists basic solutions to check before contacting your Resodyn Acoustic Mixers service representative. Use the following chart to resolve common operational events. If the problem persists, contact your customer service representative at the phone number above.

**Table 10-1 Troubleshooting Table**

<b>Description of Problem</b>	<b>Potential Problem</b>	<b>Solution</b>
<b>Vacuum is not being drawn in the mixing vessel</b>	Vacuum line plugged	Ensure vacuum lines are clean
	Vacuum lines not connected	Ensure the vacuum lines are fully seated in the vacuum line connections
	Vacuum leak	Check all vacuum seals on the mix vessel and lid
	Control Knob is open	Rotate the Pressure Control Knob clockwise
	Bleed Valve is open	Turn the valve to "CLOSED"
<b>Pump is not running</b>	Pump Switch is off	Toggle the Pump Switch to "on" or "I" so that the green indicator light is on
<b>LCD Screen is not on</b>	Main Power Switch is off	Toggle the Main Powder Switch to "on" or "I"
	Fuse is blown	Call 406-497-5333 for replacement instructions



