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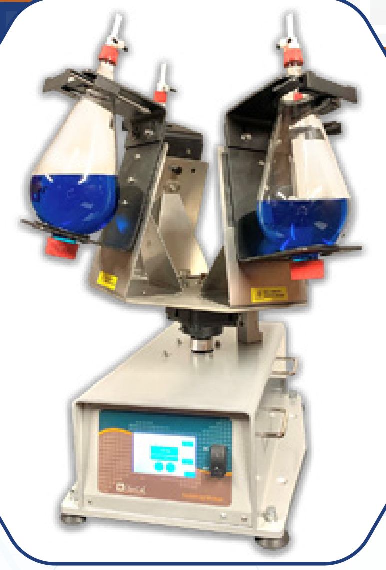
Tools for Scientists®



User Instructions

Instruction Notes for Nutating Shaker

Introduction

The shaker is designed to thoroughly mix liquid in a shaking action. The action created by the shaker will move liquid up, down, side-to-side and around. The shaker will give the most effective results with minimal effort by the operator. Total load to be used on this shaker shouldn't exceed 40 pounds.

Unpacking/Setup

Due to the weight of the shaker, it is recommended that a minimum of 2 people lift the shaker from the shipping package. Verify the installation location of the shaker is capable of securely holding the shaker system with addition of a full load.

If the shaker has been located in an environment that the temperature is below ambient temperature, let the temperature of the shaker equalize for approximately 1 hour prior to applying power.

Holders

The shaker has the capability of accommodating four holders. There is no need to have a balanced load for the shaker to operate. Each holder is attached to the octagon shape plate with the included hardware. The holder is designed to securely hold separatory funnels from the size of 250ml through 2 liter. The holders also have the capability of holding Erlenmeyer flasks from the size of 250ml to 1 liter.

Installation of Shaker Base

The weight of the shaker, without holders is approximately 165 pounds. To prevent the shaker from "walking" while in operation, clean any contaminates from the surface that the shaker will reside. Verify that the bottom side of the feet on the on the shaker are clean of any contaminates.

The shaker has the capability of being installed within a fume hood. Holders that hold 2 liter separatory funnels will require a minimum operating area of 30" depth, 36" length, and 36" height. Holders that hold separatory funnels, 1 liter or less in size, can operate in a standard long fume hood with the dimensions of 24" deep x 72" long.

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Nutating Shaker User Instructions

Holder Installation

The shaker has the capability of (4) 2 liter separatory funnel holders, (4) 1 liter Erlenmeyer flask holders, or any combination of (1) to (4) holders installed onto the octagon shaped platform. Each of the holders is secured to the platform with (2) 1/4-20 x 3/4" bolts, (2) 1/4" lock washers, and (2) 1/4-20 hex nuts. All mounting hardware is stainless steel and provided for the installation of (4) holders onto the platform. See Figure 1 and 2 for further installation details.

Figure 1 - Top

Figure 2 - Bottom

Glassware Installation

WARNING: Total load capacity for the shaker is 40 pounds. Balancing the load is not necessary for operation of the shaker.

The installation of separatory funnel or Erlenmeyer flask can be completed after the holders are installed onto the platform. The loading/removal is made easy by the incorporation of a spring loaded assembly in each holder.

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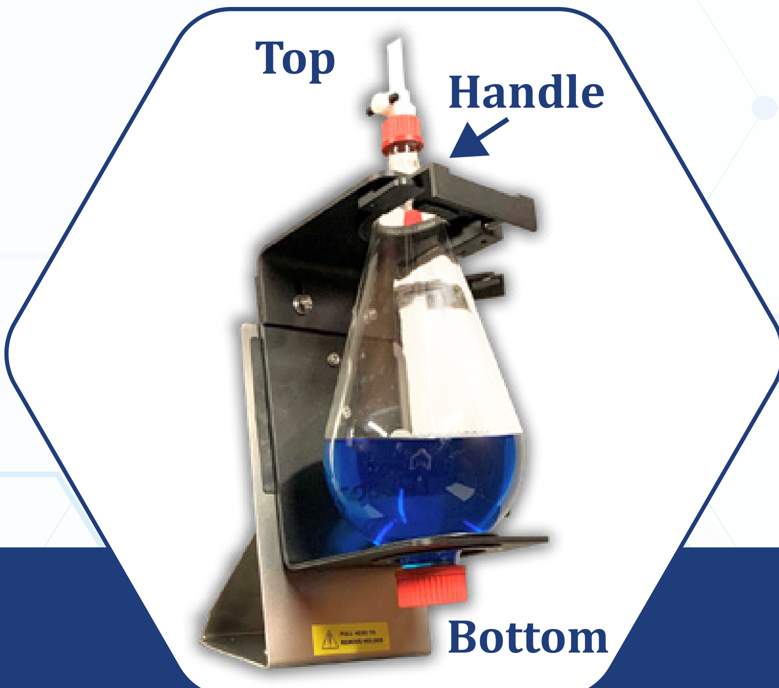
Nutating Shaker User Instructions

Separatory Funnels

Install the separatory funnels into the holders. Set the holder(s) with the screw cap hole in the bottom position. If the holder isn't orientated with the screw cap hole at the bottom position, unscrew the black knob that is located on the back side of the holder until it springs outward. The rotate the holder 180 degrees so that the cap hole is located at the bottom position. Secure the holder from rotating by re-installing the black knob. Pull the spring loaded handle outward, top section of the holder, and rotate 180 degrees out of the way of the U shaped opening. Place the screw cap of the separatory funnel into the bottom hole of the holder. Then carefully place the top section of the separatory funnel into the U shaped portion of the holder. Continue to hold the top section of the separatory funnel up against the back side of the U shaped section of the holder until the spring loaded handle is secured into position. Pull the spring loaded handle outward and move it into position to allow the handle to slide between the guides. Carefully allow the spring loaded handle to press up against the top section of the separatory funnel. Verify that the separatory funnel is held securely into the holder before operation. Filling the separatory funnel while installed within the holder can be done easily. Loosen the black knob, located on the back side of the holder, and rotate the holder until the screw cap is in the top position. Fill the separatory funnel then rotate the funnel and the rotate the funnel back to the original position, funnel cap in the bottom position. Install the black knob into the tightened position.



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Nutating Shaker User Instructions

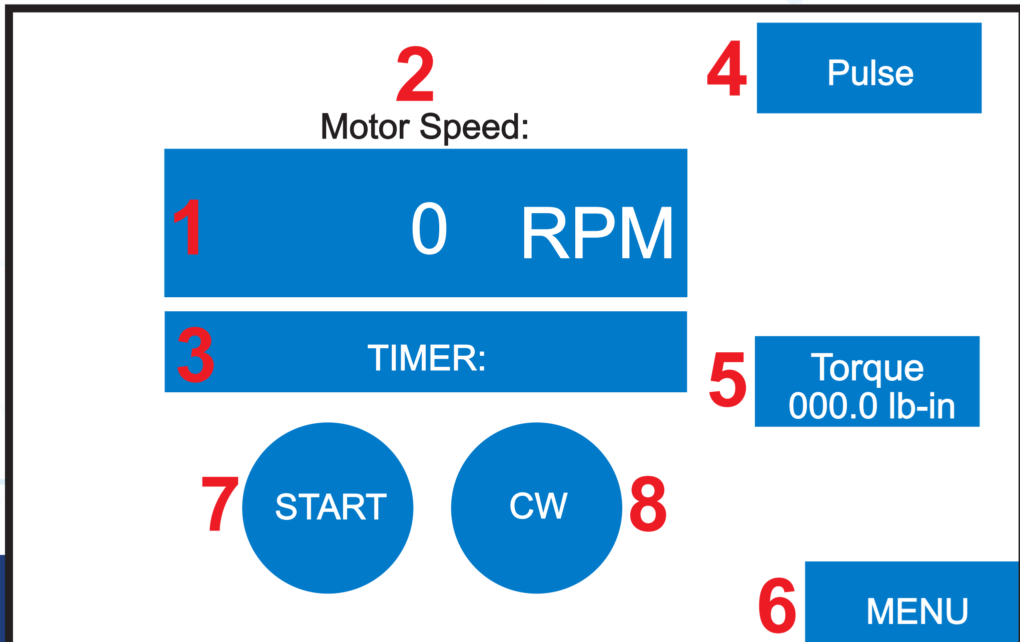
Erlenmeyer Flasks

Orientate the holder with the handle in the top position. Pull the spring loaded handle to the open position and move it out of the way of the U shaped part of the holder. Insert the Erlenmeyer flask into the holder and set it as far back into the holder as possible. Secure the flask by re-installing the handle into the loaded position. The Erlenmeyer flask is only intended to be used in the upright position. Only use the stopper or capped flask.

Features

- Microcontroller based technology
- Brushless DC motor
- Closed loop motor control for safe operation
- 5 inch resistive touch screen user interface
- Manual/recipe programmed operation
- PC software available for operation and setup of shaker
- USB communication port

User Interface



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Nutating Shaker User Instructions

User Interface

1.) Displays the current RPM of the motor while in operation.
2.) Displays the RPM speed set by the user.
3.) Operation timer defined by user.
- Hours, minutes and seconds entered by user.

4.) Pulse Feature
- Motor operates at the user defined ON time and OFF time. Time is in seconds.

5.) Displayed Torque
- User selectable scale
  - g-cm
  - oz-in
  - lb-in
  - N-m

6.) Menu Selections
- Setup
- Recipe

7.) Start/Stop Button
- This button will start or stop the shaking operation.

8.) CW/CCW Button
- This allows the user to change the direction the platform rotates during the shaking operation.
  - CW (Clockwise)
  - CCW (Counter Clockwise)

Device Setup

Access the setup screen by selecting the menu from the main operation screen. Select the setup button to access the setup screen.

NOTE: Not all displayed options will have functionality on this model of shaker.

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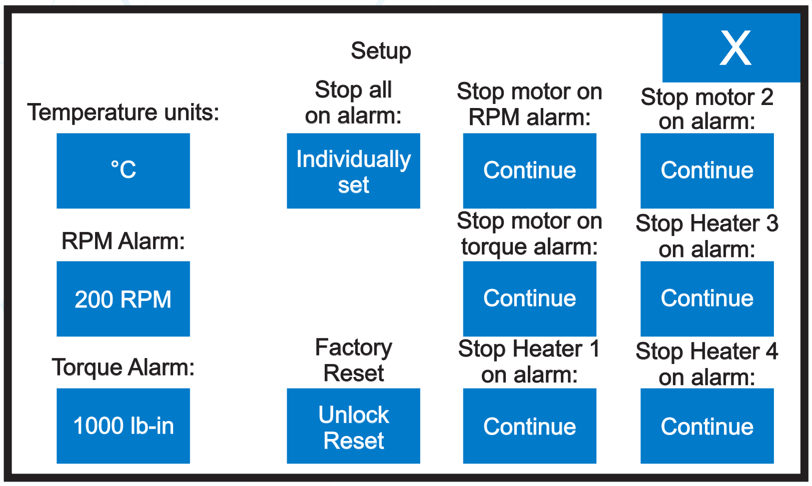
Nutating Shaker
User Instructions



Touch within the blue box to make changes

- **Temperature Units**
  - ***Not a valid setup option for this shaker.***
- **RPM Alarm**
  - **Set RPM value at which an alarm will occur when value is exceeded.**
- **Torque Alarm**
  - **Set a torque value that an alarm will occur when value is exceeded.**
- **Stop All on Alarm (touch box to toggle between options)**
  - **Individual Set: User can individually set the alarm action for that particular alarm. These are the (2) columns that appear on the right half of the screen when stop all on alarm is set to individually set.**
  - **Stop All: When any alarm occurs all operations will stop.**

Remaining options only visible if "Stop All on Alarms" = Individually Set

- **Stop motor on RPM alarm:**
  - **Continue - RPM alarm occurs the motor will remain operating but an alarm will show on the operation screen.**
  - **Stop - RPM alarm is active the motor will stop.**
- **Stop motor on torque alarm:**
  - **Continue - Torque alarm occurs the motor will remain operating. Visual/audible will occur while on the main operation screen.**
  - **Stop - Torque alarm will cause the motor to stop.**

******Stop Heater 1-4 on alarm are not valid functions for this device******

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Nutating Shaker User Instructions

Recipe Setup/Edit

Complete the following steps to setup and new recipe or edit an existing recipe.

1.) From the main operation screen touch the 'Menu' button.

2.) Touch the 'Recipe' button that is located on the menu screen.

3.) Touch 'Unlock Editing' button.

- Passcode: 1983

4.) Select the recipe that is desired to be setup.

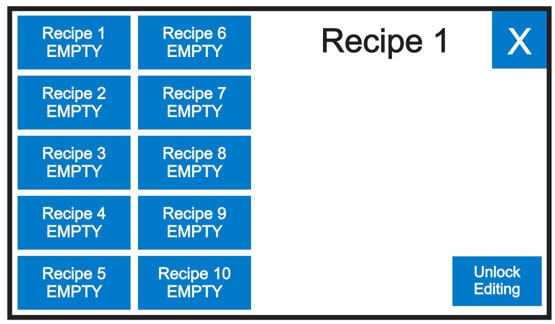
- The selected recipe will be displayed left of the 'X' button, Recipe #.

5.) If selected recipe location is 'EMPTY' then touch the new recipe button.

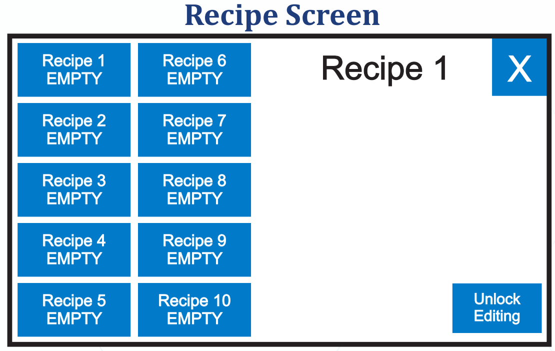
6.) If recipe data is stored in recipe location the user has two options, edit recipe or delete recipe.

7.) New or Edit Recipe: (Reference Recipe Setup)

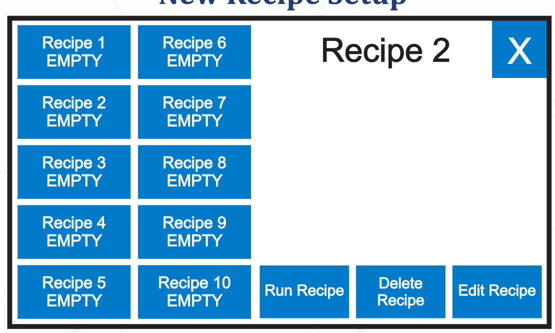
- Step - Each recipe can have a max of 20 steps programmed.
- Delete Step - Removes step from recipe.
- Previous Step - Moves one step back.
- Add Step - Add additional step if current step is less than 20.
- Motor - Motor speed (RPM's) and rotation (CW/CCW).
- Pulse - Enable pulse and set ON and OFF time. • Timer - Enter the hour(s), minute(s) and second(s) for current step.
- Back - Exit the current recipe. All changes will be automatically saved.



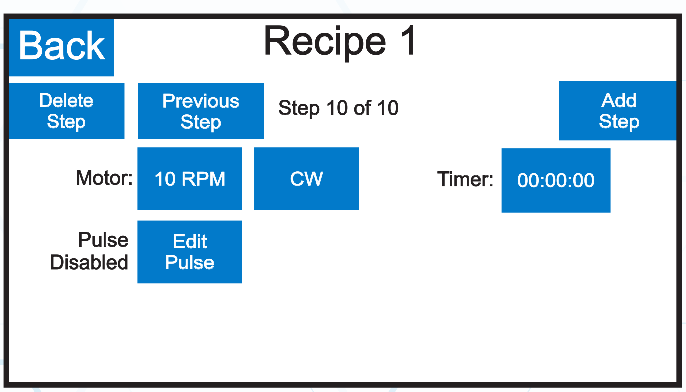
Recipe Screen



New Recipe Setup



Edit/Delete Recipe



Recipe Setup

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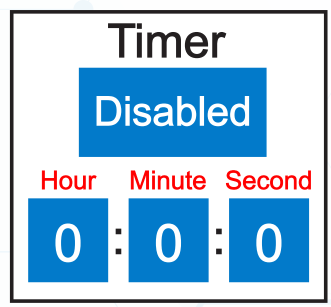
Nutating Shaker User Instructions

Standard Operation

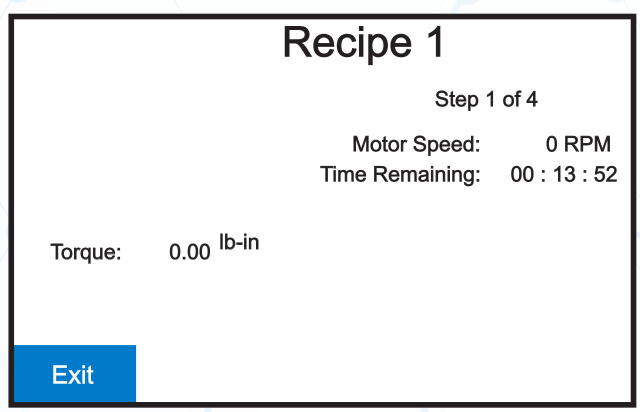
1.) Install holders with serpentine funnels or Erlenmeyer flask.
2.) Power on by turning the power switch to the ON position.
3.) If not completed, follow device setup instructions on page 5. If device setup has been completed in prior operation then advance to the next step, unless changes are required.
4.) Set the direction of rotation by pressing the CW/CCW button. This can only be done when the shaker is in the stopped mode. If the shaker has been running, allow the platform to come to a complete stop before changing the direction.
5.) Set the operation speed by touching the box that shows the current speed. Enter the desired speed value, 10 RPM's to 160 RPM's, via the keypad displayed on the screen. Touch save when complete. NOTE: If value entered is not an acceptable speed a minimum or max speed value will be displayed on the screen for the user. Only 10-160 RPM's are acceptable values.
6.) Change the torque scale by touching the Torque box on the main operation screen. Touch the desired scale.
7.) Touch the timer box to setup run timer operation.
  - If run timer operation is not desired then set the timer to 'Disabled'.
  - To operate with the run timer touch the Disabled/Enabled box. 'Enabled' will appear when run timer operation is active.
  - Set the desired run time by touching each box, Hours/Minutes/Seconds.
  - Touch the 'X' to return to the main operation screen.
8.) Touch the 'Start' button to start the shaker.
9.) Touch the 'Stop' button to stop the shaker.



Timer Screen

Recipe Operation

1.) Touch the 'Menu' button from the main operation screen.
2.) Touch the 'Recipe' button on the menu screen.
3.) Touch recipe button 1-10. *Only recipes that have been configured can be selected to run.*
4.) The active selected recipe will be displayed left of the 'X' button on the display.
5.) Touch the 'Run Recipe' button to run the selected recipe.
6.) Touch the 'Exit' button at any time to stop the recipe.



Example: Recipe Run Screen

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Nutating Shaker
User Instructions

This mixer is intended for indoor use in a laboratory setting.

Do not remove or tamper with the grounding means of this instrument. A qualified service technician should do the maintenance on this instrument.

Follow the procedures for decontamination. Prior to any type of service performed on the instrument, decontaminate and document according to site procedures. Prior to servicing or shipping, the instrument must be free of any biohazardous material. When shipping, a copy of the decontamination form must be attached to the shipping documents.

Adherence to Department of Transportation (DOT) regulations must be followed when shipping any decontaminated instrument.

Decontamination of equipment parts and any other surfaces potentially contaminated with biohazardous material must be cleaned with 0.5% sodium hypo chlorite in water (diluted bleach) or a bleach alternative, allowed to stand for 15 minutes and rinsed with water, as described in the Maintenance section.

KEEP HANDS CLEAR WHEN IN MOTION

Indicates potential danger due to a surface motion.

Operating Specifications:	**099A NSM12**	**120VAC +/- 10%, 10A, 60Hz.**
	099A NSM24	**240VAC +/- 10%, 10A, 50Hz.**
	099A NSM12-2H	**120VAC +/- 10%, 10A, 60Hz.**
	099A NSM24-2H	**240VAC +/- 10%, 10A, 50Hz.**

Operating Environment: 0 to 90% relative humidity / 32 to 100°F / 0 to 37°C

Pollution Degree: 2 (Normally only non-conductive pollution occurs)

Installation Category II: Local level (Connect to branch circuit and not directly to main circuit, such as a fuse panel)

Storage: 0°C to 60°C / Relative Humidity 5-80%, non-condensing @ 30°C

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Nutating Shaker User Instructions

Issue	Cause	Action
No Power/Display not Illuminated	• Power switch in the off position. • Circuit breaker tripped • Input power not present • Damaged display	• Check power switch position. • Press in the white indicator *NOTE: If breaker continues to trip after resetting there is high probability of an issue. Contact Glas-Col for technical support.* • Verify correct AC voltage is being supplied to shaker. • Contact Gls-Col for support.
Touch Screen Unresponsive	• Microcontroller issue • Electrical noise • Damaged display	• Power unit off and wait about 10 seconds. Then turn switch to ON position. • Verify no new equipment has been installed around shaker that could be emitting electrical noise. • Contact Glas-Col for support.
Communication	• Damaged USB cable • Incorrect COM port • Microcontroller issue	• Replace cable • Verify correct COM port is set within PC software. • Power cycle the shaker. Disconnect USB cable form device and reconnect after completing power cycle.
Rack Movement	• Holder not secured to platform • Holder damaged/worn	• Verify bolts are tight and holder doesn't move on the platform. • Contact Glas-Col for support
Excessive Vibration	• Shaker not level • Damaged feet • Contaminated surface • Mechanical issue	• Verify that shaker is sitting on level surface. • Replace feet • Clean surface and feet so they can grip surface. • Contact Glas-Col for support.

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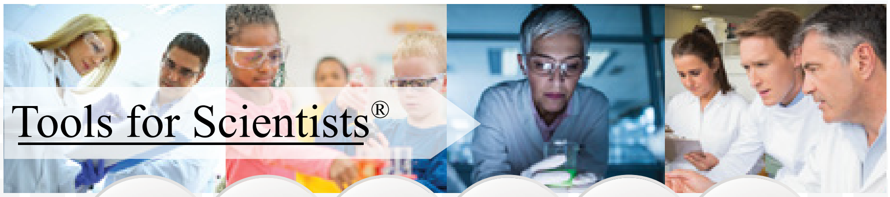

Nutating Shaker User Instructions

Safety and Caution Message

- Always follow your companies safety procedures when using laboratory equipment. Here are a few safety references: The National Fire Protection Council, American Chemical Society, National Fire Protection Association, etc. Such references often apply to your specific disipline and procedure.

- Verify the power source to the device has proper voltage, properly grounded, and adequate capacity for the load. Never operate any device beyond its rated specifications.

- Never alter product construction, such as disconnecting or removing electrical grounding devices. Such altercations can cause electrical shock hazard, device operational failures, and void of the warranty of the product.

- Protect power cords and other electrical devices from corrosive and damaging materials. Insure all safety equipment is in proper use, such as hoods, apparel, shields, etc.

- Verify all locking pins, knobs, screws, etc. are properly installed prior to operation.

- Verify that proper space is given around the shaker so the platform/holders can move during operation without any obstructions.

- Glas-Col laboratory equipment should be inspected on a regular basis. Never use equipment if any damage has occurred, such as power cord or worn mechanical parts.

- Unattended equipment should be operated through an automatic controlling device.

Maintenance

The motor shaft bearing should be lubricated with Valvoline® Synpower grease, or comparable product, after 400 hours of operation. The grease fitting for the bearing that is on the motor shaft can be accessed just above the top of the shaker base where the shaft protrudes. The shaker should be protected from mechanical damage, chemical spillage and corrosive atmospheres as much as possible.

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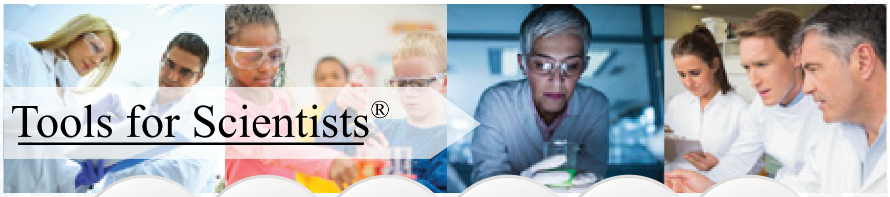

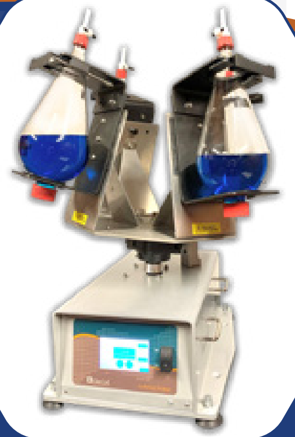

Nutating Shaker User Instructions

Holders for Nutating Shaker

Item Number	Description
099A VH0250T	Triple Holder for (3)/250ml Separatory Funnels with screw cap
099A VH0500DST	Double Holder for (2)/500ml TEF Separatory Funnels with screw cap
099A VH0500E	Single Holder for (1)/500ml Erlenmeyer Flask
099A VH0500S	Single Holder for (1)/500ml Separatory Flask
099A VH1000DS	Double Holder for (2)/1L Separatory Funnels
099A VH1000DST	Double Holder for (2)/1L PTFE Separatory Funnels
099A VH1000E	Single Holder for (1)/1L Erlenmeyer Flask
099A VH1000S	Single Holder for (1)/1L Separatory Funnels
099A VH1000T	Single Holder for (1)/1L PTFE Separatory Funnel
099A VH2000S	Single Holder for (1)/2L Separatory Funnel
099A VH2000T	Single Holder for (1)/2L PTFE Separatory Funnel

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