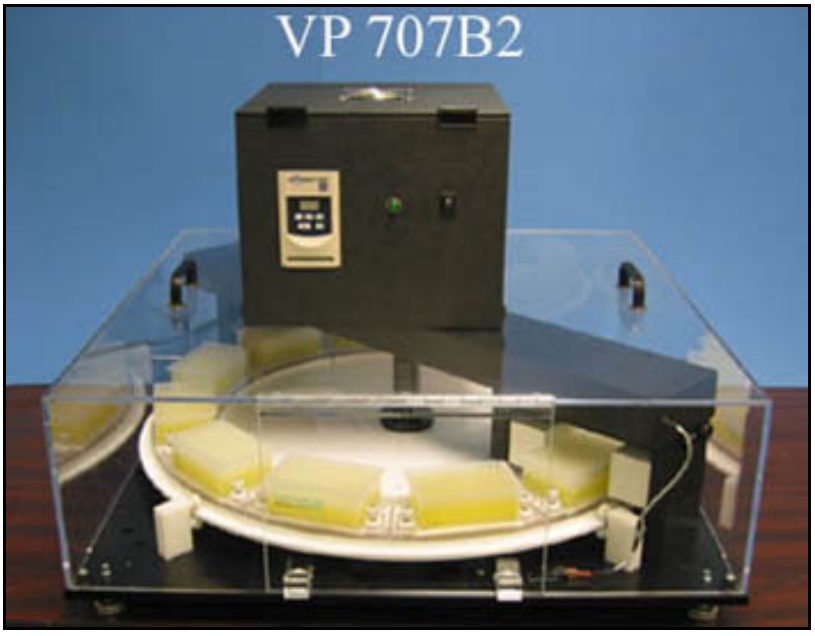
OPERATION and CARE MANUAL for V&P SCIENTIFIC'S CAROUSEL MAGNETIC LEVITATION STIRRER with INCUBATOR: VP 707B1,VP 707B2 or VP 707B4



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SET-UP

WARNING!!!!!

- **The Carousel Magnetic Levitation Stirrer has very strong magnetic fields coming from both the levitation and pull down magnets.**
- **People with pacemakers should not get closer than 18 inches.**
- **Remove all magnetically influenced tools and objects from the immediate area to prevent them from being pulled onto the magnets or from striking someone if pulled towards the magnets.**
- **Keep credit cards, watches and other magnetically sensitive items at least 24 inches from the Carousel Magnetic Levitation Stirrer's magnetic fields.**

1. Remove crate screws holding the top and sides of the crate to the crate bottom. Lift top and sides of the crate from the bottom. **Save crate**.

2. Remove the 4 corner hold-down bolts. These secure the Carousel base to the crate bottom during shipping. They are accessible from the underside of the crate bottom.

3. Carefully remove internal packing and plastic wrapping material. Leave the clear acrylic cover in place.

4. **Do not lift or apply force to the clear acrylic cover.**

5. With 4 people together grasp under the aluminum base of the Carousel and lift it from the crate bottom to the location on a table top or bench where it will be used.

6. **Caution: the Carousel Stirrer weighs ~ 200 lbs**.

7. Open the front panel of the control box (black box on top of clear acrylic cover) by grasping front panel at the bottom on either side and pulling forward. Remove the 'spare parts box' and extra packing. Spare parts include set screws, bolts and 6 non-magnetic Allen wrenches (made from Beryllium Copper alloy) for any adjustments needed near the magnets.

8. With 2 people, grasp the acrylic cover handles and remove cover. As cover is lifted, be aware of the disconnected control cables. Lift cover straight up and off the Carousel. Set the cover off to the side on a level surface.

9. Remove all foam shipping blocks from Carousel. **Save the shipping material.** Install the four ½" set screws (found in the spare parts box) into the hold down holes in the base. These help seal the Carousel chamber for incubator use.

10. Remove all masking paper from inside and outside of the acrylic cover (if any). Re-install the acrylic cover by having 2 people hold the cover by the handles while a third guides the motor cables into the control box opening. Place cover on carousel base around the 4 locating corner detents.

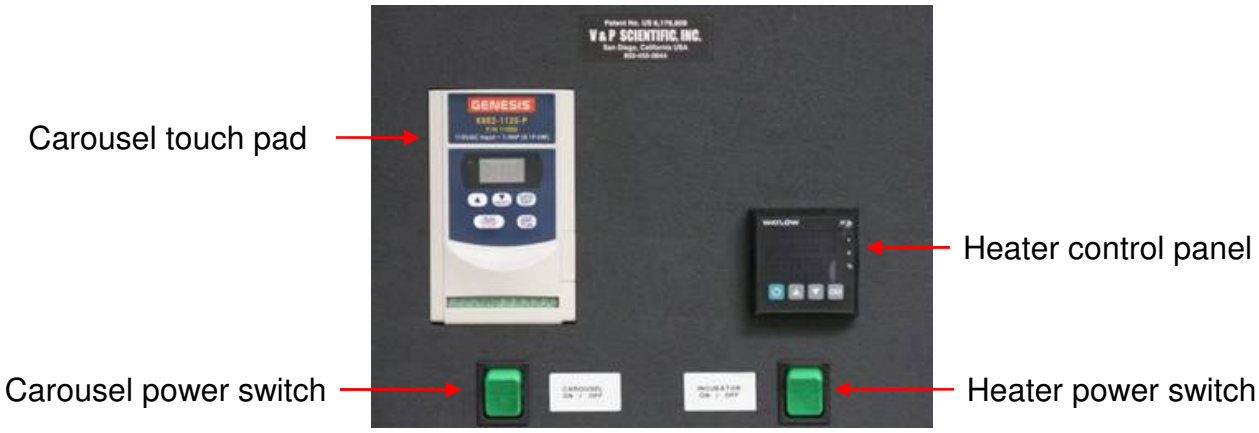
11. Connect the cables and place them toward the back of the control box away from the Watlow heater control. Be sure all the cables are clear as the panel door is closed. Adjust cables if necessary. Plug in the power cord.

12. Level the Carousel by adjusting the 4 threaded corner feet. Tighten the lock nuts on the feet to maintain their position.

OPERATION

CAROUSEL

To power up the Carousel Stirrer, flip the carousel power switch to the "on" position (switch will light up).



Control Panel of Carousel Stirrer with Incubator

Adjust the speed with the up and down arrows on the carousel touch pad (Genesis series Motor Control). For a two lift magnet Carousel Stirrer, the Hertz frequency displayed (cycles/second) is also the LPM (Lifts per Minute). Each cycle/second equals ½ RPM. For a one, three or four magnet lift Carousel Stirrer, the number of Lifts per Minute (LPM) will be displayed on the Rate Meter on the right side (a feature not found on the two lift Carousel Stirrer). The speed, displayed in the touch pad window, can be set from 1 to 56 Hz (or LPM) or 1 to 28 RPM.

Customers who grow cultures in 96 well microplates typically find the optimal LPM to be around 14. However, each customer will need to determine the optimal LPM for their own culture system.

Close the door to start the Carousel.

Caution! The speed of the Carousel Stirrer contributes a centrifugal force that can, in combination with the magnetic field, eject levitation stir balls from the microplate. Increasing the height of the plate by adding shims under the hold down plates may be necessary. See **ADJUSTING LEVITATION HEIGHT (page 5)** for details**.**

Once the Carousel Stirrer is running, it may be stopped in several ways. The preferred way to stop is to open the front access door which breaks the safety switch circuit. To start again, close the front access door.

Caution! When adding or removing microplates, it is possible to bypass the safety switch by hand to advance the carousel to the next position. Use this method with caution.

The Carousel Stirrer can also be stopped by pressing the run/stop button on the carousel touch pad. To re-start, the front access door must be opened and closed to re-set the safety switch. The Carousel Stirrer can be stopped by turning the carousel power switch to the off position. However it is necessary to wait several seconds for the display to go dark before the switch will turn the system back on. Next, open and close the front access door to start the carousel.

When turning the system off for a long period of time, use the carousel power switch.

INCUBATOR TEMPERATURE CONTROL

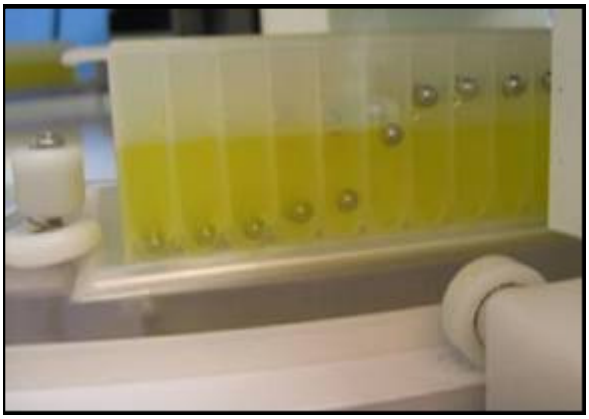
The temperature controlled incubator can be used with or without the carousel running. Turn the heater power switch to the "on" position. Adjust the up and down arrows on the heater control panel (see Watlow Controller Instructions for more details) to obtain temperatures from 23 to 43°C.

LOADING AND UNLOADING MICROPLATES

To load and unload microplates, adjust the carousel to a low speed using the down arrow on the carousel touch pad. To stop the carousel, open the front access door to activate the safety switch to brake the motor. Engage the safety switch by hand to position the carousel so there is one microplate in the middle of the access opening. Release the safety switch to stop carousel.

Caution: Do not attempt to load or unload plates while the carousel is moving.

There are 2 possible plate holding systems or “hold-down shoes” to accommodate different plate types: spring-loaded cap & washer and snap-in. The spring-loaded cap & washer system is used with a “skirt-less” type of plate that has a protruding lip at the bottom edge of the plate (such as the 2.2ml ABgene #AB-0661 seen in photo below left). The snap-in system is for a “skirted” plate that has smaller lipped edge (such as the 2.2ml Genetix #S1205 seen in photo below right).



Spring-loaded cap & washer

Snap-in

Spring-Loaded Cap & Washer System

To load a microplate in a spring-loaded cap & washer “hold down shoe”, hold the plate at a 10-degree angle and slide the leading edge under the spring-loaded washer and into the “toe” of the hold down shoe. The trailing edge of the microplate is then snapped down inside the “heel” of the shoe and held in place by the spring-loaded washer. **Check each plate to make sure it is properly seated**. To unload a microplate, lift up on the trailing edge of the microplate until it clears the heel and pull it away from the carousel center until it disengages.

Snap-in System

To load a microplate into a snap-in “hold down shoe”, slide the microplate edges into the side slots. The trailing edge of the microplate is snapped down inside the “heel” of the shoe and held in place by the heel. **Check each plate to make sure it is properly seated**. To unload a microplate, lift up on the trailing edge of the microplate until it clears the heel and pull it away from the carousel center until it disengages.

ADJUSTING LEVITATION HEIGHT

Adjusting levitation height of balls in the microplates is easily accomplished by changing the shims under the hold down shoe. Shims (2, 4 and 6 mm thick) are included with the Carousel Stirrer. As shipped, the shims under the hold down shoes are 2 and 6 mm. Depending upon the viscosity and surface tension of the liquid being stirred, adjustment to the microplate height may be needed.

Note: The use of only a 2 mm shim or no shim is not recommended. Microplates at that height could allow the stir balls to be pulled out of the wells when stirring an aqueous solution. However, a viscous solution or higher liquid volume may be stirred in microplates at a lower height.

In addition to the height of the plate in the magnetic field, the speed of the carousel can also contribute a centrifugal force that can, in combination with the magnetic field, eject levitation stir balls from the microplate. With the 6 mm and smaller shims speed, greater than 9 RPM are not recommended.

To change the shims, use the non-magnetic Beryllium Copper Allen wrench to remove the bolts from the hold down shoe and shim. When attaching shims on the carousel deck, make sure the numbered side is facing up. To increase the levitation height, use a shorter shim to lower the plate.

Decrease the levitation height by increasing the shim thickness. The following combinations are possible: no shim, 2 mm shim, 4 mm shim, 6 mm shim, 4 mm + 2 mm shims and 6 mm + 2 mm shims.

Important! Because the bolts that fasten the hold down shoe and shims to the carousel deck project through the deck, they may hit the pull down magnets underneath. It is very important to use the correct length bolt. Different length bolts are supplied with the shims. The following table will help to select the correct bolt when changing the levitation height.

Shim thickness	Bolt length	Thread
0"	1/2"	10-32
2 mm	1/2"	10-32
4 mm	1/2" or 5/8"	10-32
6 mm	5/8"	10-32
6 mm + 2 mm	3/4"	10-32

CARE

The cover is made of an acrylic plastic. Avoid contact with alcohol and organic solvents and cleaning products such as Windex. The cover should be cleaned only with solutions designed for use on acrylic plastic such as Brillianize (http://www.brillianize.com).

The hold-down shoes are polycarbonate and can be cleaned with mild detergents. Avoid exposure to UV light.

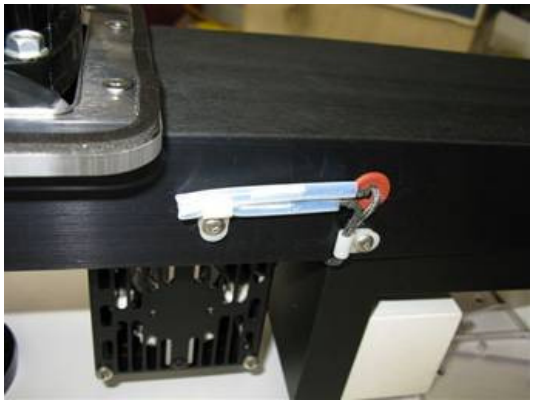
When not in use, turn the power switch off.

Do not operate stirrer at temperatures above 55°C.

Periodically remove the carousel cover and check the levitation and pull down magnets for a build up of magnetic debris on the surface. To carry out this check:

1. Disconnect the power cord. Open the control panel door and disconnect the control cable. Open the front access door to disengage the safety switch.
2. With 2 people, grasp the acrylic cover handles and remove cover. As cover is lifted, be aware of the disconnected control cables. Lift cover straight up and off the Carousel. Set the cover off to the side on a level surface.
3. Remove any magnetic debris from the magnets with a dry cloth. Periodically tighten the three set screws that connect the drive shaft to the carousel deck.
4. Re-install the acrylic cover by having 2 people hold the cover by the handles while a third guides the motor cables into the control box opening. Place cover on carousel base around the 4 locating corner detents.
5. Connect the cables and place them toward the back of the control box away from the Watlow heater control. Be sure all the cables are clear as the panel door is closed. Adjust cables if necessary. Plug in the power cord.
6. A 'spare parts box' was supplied with the Carousel Stirrer. Spare parts include set screws, bolts and 6 non-magnetic Allen wrenches (made from Beryllium Copper alloy) for any adjustments needed near the magnets.

Spare electric fuses are provided for the Watlow heater controller, incubator heater, carousel and a spare 72°C thermal fuse for the heater. The electric fuse receptacles are located near the power cord plug-in and are clearly labeled. The thermal fuse is located on the back side of the motor support.



The carousel motor is an AC Inverter Motor and requires no maintenance.

SPECIFICATIONS

The VP 707 series Levitation Stirrers are driven by a heavy duty three phase, inverter duty, non-synchronous, parallel shaft, 1/6 horsepower, induction gearmotor manufactured by Bodine Electric Company. This motor was selected primarily because of its ruggedness and reliability. The control for this motor is a KB adjustable frequency AC inverter (Genesis series). It is a PWM type inverter that accepts single-phase AC input voltage and converts it to an adjustable frequency three phase AC output voltage. Since the speed of AC induction motors is proportional to the line frequency, adjusting the output frequency of the inverter enables adjustable speed operation of the motor. At output frequencies below the motor's rating, the Genesis series inverter simultaneously adjusts applied voltage to the motor so that it is proportional to the applied frequency. This prevents stator saturation and resultant overheating. At output frequencies above the motor rating, the applied voltage is held constant, so torque output from the motor is proportionately lower at higher frequencies. See Appendix A for Genesis AC Inverter Motor Control specifics. If the equipment is used in a manner not specified by V&P Scientific, Inc., the protection provided by the equipment may be impaired.

WARRANTY

V&P Scientific, Inc. warrants this product to be free from defects in material and workmanship when used under normal laboratory conditions for one year. This warranty begins from the date of delivery by V&P Scientific.

In the event this product fails under normal laboratory conditions within the specified period of time because of a defect in material or workmanship, V&P Scientific will, at its option, repair or replace the product. Damage to the product caused by user negligence is not covered.

Please keep the special shipping crate in case the unit needs to be shipped back to V&P Scientific. Please contact V&P Scientific at the address below for return authorization and shipping instructions.

This warranty is made in lieu of other warranties expressed or implied including the warranties of merchantability and fitness for a particular purpose. V&P Scientific shall not be liable for loss or damages arising from the use of these products nor for consequential damages of any kind.

APPENDIX

A) Instructions for Installation and Operation of a Genesis series AC Inverter Motor Control.
B) Instructions for Operation of the Watlow Heater Controller series 93.