OPERATING INSTRUCTIONS FOR 650mL SpinVessel® with VP 418SV2E-650-CC

US Patent #11,623,188
European Patent #3887049



SpinVessel® System with Computer Control feature for 650mL SpinVessel® Consumable: VP 418SV2E-650-CC includes Motor Unit, Spin Base, Controller, and Power Supply. Shown with SpinVessel® VP 830SV-650FB, sold separately.

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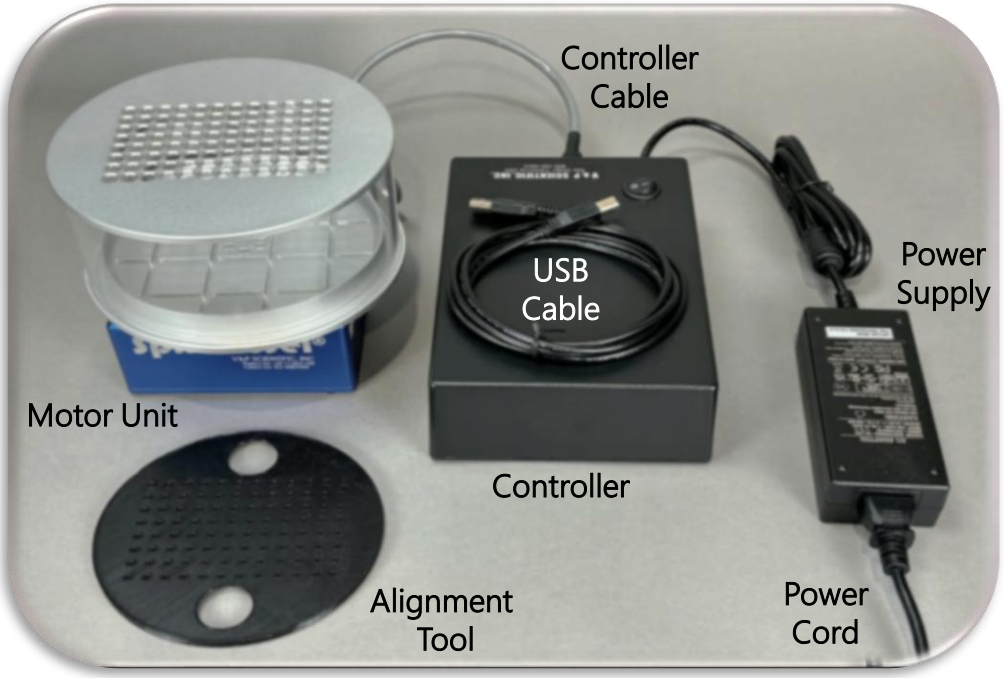
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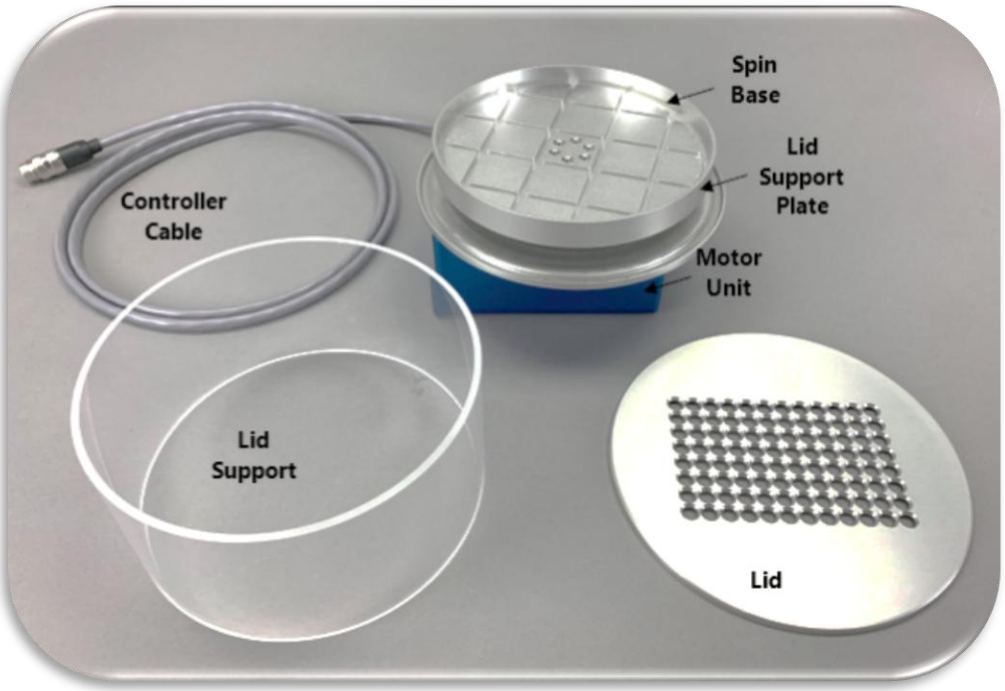
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Components



The lid system is composed of the Lid Support and Lid Support Plate

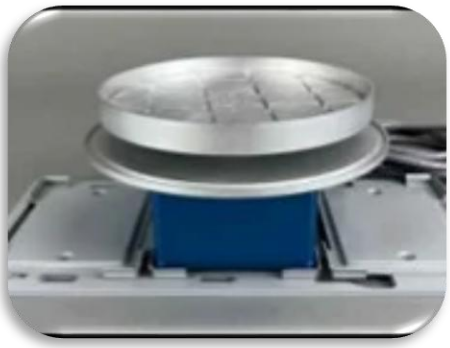


CONNECTING PARTS OF THE SpinVessel® SYSTEM



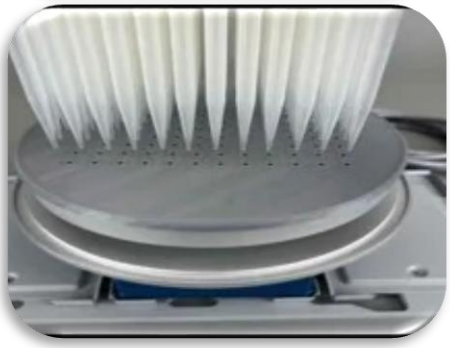
1. Place Motor Unit on a sturdy lab bench, table or robotic workstation.
   I. *Warning: Do not use the Spin Base as a handle to move the SpinVessel. Hold the Motor Unit with both hands to position the SpinVessel where desired.*
2. Controller and computer can be placed at a distance from the Motor Unit. Controller Cable is 6 feet long.
3. Connect Power Cord from Power Supply to an outlet.
4. Connect Power Cable from Power Supply to Controller.
   I. *Warning: Do not plug Controller in while power is on. Ensure that the Power Switch is in the off position ("0" is down). Always have Controller plugged in before powering up. Connect Controller Cable from the Motor Unit to the Controller.*
5. Connect the USB Cable from the Controller to the computer.

ALIGNING PIPET TIPS TO THE SpinVessel® Consumable

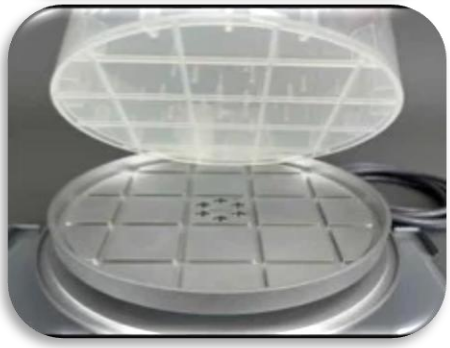


Place the SpinVessel® motor unit in the desired location on an automated liquid handler, in a microplate holder.

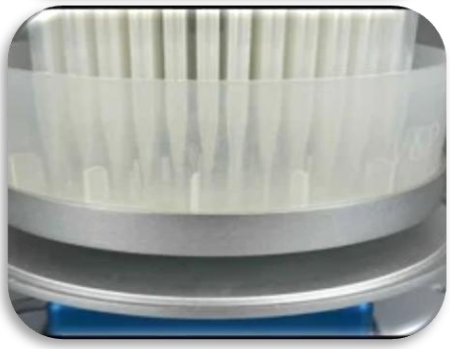
SLAS format (127.7 × 85.5 mm) fits any SLAS plate locator or carrier.



Place the alignment tool on the drive base, lower the tips until they just touch it, and align them with the holes. This registers the pipette head to the SpinVessel® and prevents tips from hitting the projections.



Remove the alignment tool. Insert consumable VP 830SV-650FB into the spin base, with tabs seated flat in the base slots. **The consumable should not rotate within the spin base.**



With the consumable seated, verify tip alignment relative to the projections. Without liquid in the tube, power on the SpinVessel® to confirm tips clear the projections.

POWERING UP THE SpinVessel® SYSTEM

The Power Switch (I/O) is located on the back of the Controller. To power up the Controller, depress the "I" of the switch.

OPERATING THE SpinVessel® With COMPUTER CONTROL

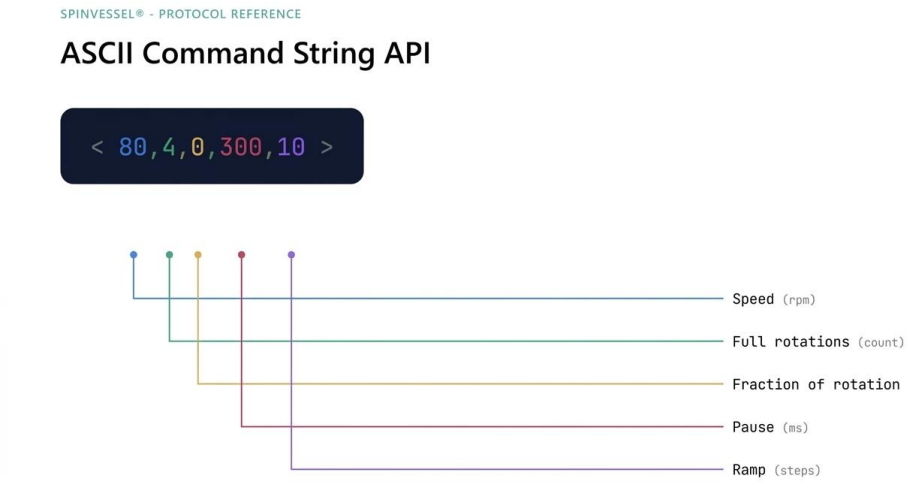
The SpinVessel® Models with "-CC" in the part number are controlled using a computer, however, V&P Scientific does offer a manual touch screen controller option (VP 418SV-MC) sold separately. The Controller for the computer-controllable SpinVessel® is connected by a USB communication cable to a computer. The Controller accepts simple ASCII commands to set the speed of the rotations, the number of rotations (including fractions of a rotation), the duration of pause before reversing direction, and the degree of ramping to the set speed.

Software Details

1. The SpinVessel® Controller uses an internal CH340G USB-to-serial converter (set to 9600, 8, N,1), which will require driver software. Windows may already have the needed USB driver software installed. If not, download the "CH340 USB DRIVER" from the provided USB flash drive and run "CH341SER.exe" to install it (Windows typically installs it automatically once downloaded). If your company policy does not allow the use of the provided USB stick, this driver is also available for download from the internet (contact your IT department for assistance if necessary).
2. The basic command language for this computer-to-stirrer communication is ASCII.
3. Commands can be sent from the computer using a standard terminal program like HyperTerminal or Realterm. Or, if needed, download the V&P Scientific Serial Terminal program from the provided USB flash drive. If your company policy does not allow the use of the provided USB stick, we suggest asking your IT department for a recommendation.
4. Alternatively, the ASCII commands can be sent by an automated liquid handler's software to control the SpinVessel®. Since there are many different automated liquid handlers available, please contact a technical representative from the company that makes the liquid handler.

Connecting and sending commands

1. Set up the system as described in the Set-Up section of the SpinVessel® Technote with the USB cable connected to the computer to be used.
2. Open the Serial Terminal program (V&P Scientific version or other).
3. Turn on the SpinVessel® instrument as described.
4. Select the appropriate COM port and click CONNECT to establish a line of communication between the instrument and the computer.
5. Create ASCII command strings as outlined in the diagram shown below to control the instrument with the following parameters:
    a. **Speed** of rotation in revolutions per minute (RPM).
    b. **Number of rotations** before reversing direction.
    c. **Fraction of a rotation** (input 0-9 for fractions of a rotation).
    d. **Pause** before reversing direction, in milliseconds.
    e. **Ramping**, 0-100, where 0 is no ramping (rapid acceleration) and 100 is full ramping (slow acceleration)
6. Hit ENTER to send command and start rotation of the SpinVessel® instrument.
7. To stop, type <0> and hit ENTER.



USING A 650mL SpinVessel® SYSTEM

The optimal stirring mode is dependent upon the application and needs to be empirically determined. Factors to consider in determining optimal 650mL SpinVessel® operation are the density of the particulates, their size and shape, as well as the volume and viscosity of the liquid. Start with 80 RPM and 4 rotations, then test to determine the appropriate RPMs and number of rotations for the particulate's density, fragility, and solution viscosity. It should be noted that the Ramping feature greatly increases the stability of the vortex and allows users to operate at much higher RPMs. When introducing Ramping, it's important to also increase the number of rotations to allow the motor to reach speed. Also, higher RPMs will naturally reduce the maximum volume level, as the centripetal force will push the liquid up the vessel's sidewalls. We have found that smaller-circumference SpinVessels® require higher RPMs than larger-circumference SpinVessels, because the critical factor is the linear speed generated at the circumference. See page 501 of our SLAS Technology paper for a full discussion of this phenomenon.
The following settings are ones to use when first testing the VP 418SV2E-650-CC SpinVessel®:

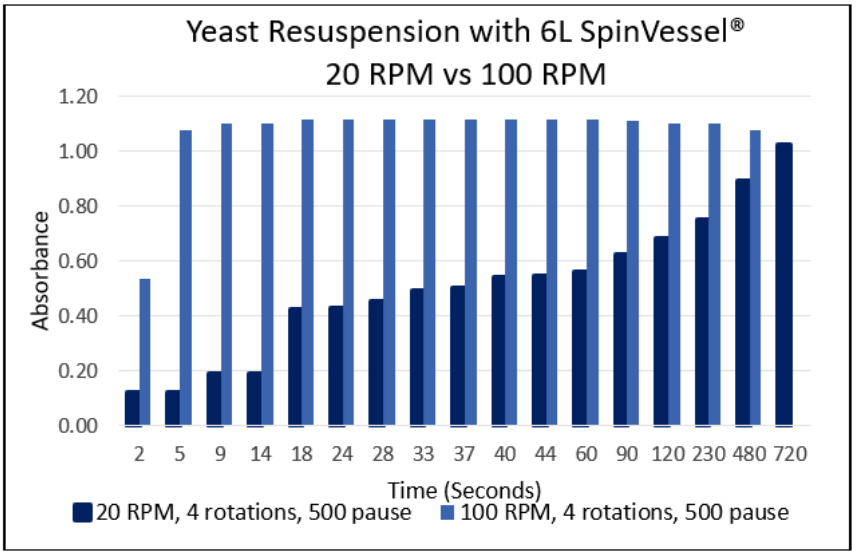
Speed: 80 RPM Rotate: 4 times Pause: 300 milliseconds Ramp: 10

It is always a good idea to practice with water in the SpinVessel® to determine safe RPM, rotation, pause, and ramp numbers before using expensive reagents.
Note that if Ramp is set to 0, liquid may splash out of the 650mL SpinVessel.

The VP 418SV2E-650-CC SpinVessel® is designed to be used only with a VP 830SV-650FB SpinVessels® consumable. Please contact V&P Scientific for pricing.

See below for an example of low versus high RPM for a solution of yeast cells in a large-circumference, 6-liter SpinVessel®. Please also note that the required speed (RPM) for optimal mixing is directly related to the diameter of the SpinVessel tube. The smaller the diameter , the faster the RPMs need to be to effect adequate mixing. Note: When given a longer mixing time, even the slower speed (20 RPM, i.e., more gentle mixing) was still able to suspend the yeast cells.

Operation



Product Maintenance

GENERAL PRODUCT CARE

When not in use, turn the power switch off.
Do not place the control unit in chambers with temperatures above 40°C.
To clean the stirrer, wipe it down with a cloth and mild detergent, then wipe it with water.
Do not immerse SpinVessel® Motor or Controller in liquid.

SAFETY PRECAUTIONS

The use of motor controls, like all use of concentrated power, is potentially hazardous. The degree of hazard can be greatly reduced by proper design, selection, installation, and use, but all hazards cannot be completely eliminated.

The following safety precautions must be observed during all phases of installation, operation, service, and repair of this motor control product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the products. V&P Scientific assumes no liability for the customer's failure to comply with safety requirements and practices.

Product Maintenance

Never reach into the consumable vessel by hand while the unit is running. Only precisely controlled robotic applications have the necessary accuracy to avoid spinning projections. Only do so after the movement has come to a complete stop.

Secure all loose clothing, hair, and jewelry before operating the equipment. Loose items can easily become caught in the rotating mechanism, leading to entanglement injuries.

Disconnect the power supply before performing any maintenance, cleaning, or adjustments. Unplug electric mixers or lock out the power source to prevent the machine from accidentally starting while you are working on it.

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.

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.

Please keep the special shipping carton in case the unit needs to be shipped back to V&P Scientific. Contact V&P Scientific for return authorization and shipping instructions or for any other assistance at 858-455-0643 or sales@vp-sci.com.