

**INSTRUCTIONS FOR DISPOSAL OF WEEE BY USERS IN THE EUROPEAN UNION**

This product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service, or where you purchased the product.



(642VES Shown)

**WARRANTY:**

Drucker Diagnostics warrants that this centrifuge is free from defects in workmanship and parts for 2 years.



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Other Patents Pending

# Operator's Manual

Model 642VES, 642VFD & 642VFD-Plus • Laboratory Centrifuge

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**WARNING:** Use universal precautions when handling laboratory specimens. All human specimens of blood, blood compounds, or bodily fluids are potentially biohazardous and may contain Hepatitis B virus, Hepatitis C virus, Human immunodeficiency virus or other disease causing agents. For the safety of both the operator and service personnel, care should be taken when handling substances that are known to be toxic, radioactive, or contaminated with pathogenic microorganisms when using this centrifuge. When Risk Group II materials are used (as identified in the World Health Organization "Laboratory Bio-Safety Manual") the use of a Bio-Seal should be employed. More than one level of protection must be provided in the case of materials of a higher group. The use of flammable or explosive materials as well as those materials which chemically react vigorously is prohibited. Any use of the equipment in a manner not specified in these instructions may impair the level of protection provided by the equipment.

### Model Description:

The Horizon Models 642VES, 642VFD, and 642VFD-Plus are continuous-duty, electronically controlled, variable-speed, laboratory centrifuges equipped with a lid safety interlock system. They offer the user control over many parameters, including variable runtime, speed control, and deceleration. The exclusive horizontal rotor allows for quick and easy sample loading and complete horizontal separation. Samples can be viewed safely through the transparent lid. Entry into the centrifuge is restricted during operation by the safety interlock system.

The centrifuge is controlled in the following manner depending on the model:

- 642VES:** Controlled by five electronic push buttons and a backlit display, for easily controlling centrifugation parameters. Up to nine commonly used settings can be saved and recalled at the touch of a button.
- 642VFD-Plus:** Controlled by two electronic push-button timers that have been preset for ten (10) minutes at 3,800 RPM and five (5) minutes at 1,800 RPM, for precise spin times and ease of use.
- 642VFD:** Controlled by one electronic push-button timer that has been preset for ten (10) minutes at 3,800 RPM, for precise spin times and ease of use.

### Intended Use:

This is a general purpose laboratory centrifuge intended for safe and rapid density based separation of fluids, including physiologic fluids, in approved specimen receptacles, for qualitative or quantitative test procedures. This device is intended to be operated by properly trained personnel who have carefully read and understood the Operating Manual.

Users should also comply with the specimen receptable manufacturer's specific instructions for use, in addition to any other protocols established by the testing organization.

### Supplied Equipment\*:

The following items come standard with each Horizon 642VES, 642VFD, and 642VFD-Plus centrifuge:

- |   |     |                         |
|---|-----|-------------------------|
| 1. One (1) Six-Carrier Horizontal Rotor | p/n | 7786067*                |
| 2. Six (6) 75mm-100mm Carriers          | p/n | 7713079*                |
| 3. One (1) Operator's Manual            | p/n | 03-0-0002-0096          |
| 4. One (1) Line Cord                    | p/n | 7760006 (North America) |
|   | p/n | 7760005 (Europe)        |

The use of any line cord other than what is supplied by the manufacturer may not carry an adequate rating and is therefore prohibited.

\*The rotor and rotor accessories are rated for rotational frequency of 5,500 RPM.

### Replacement Parts:

Part No.	Description
7724037	Foot, rubber
7735049	Motor, 1/30 H.P., 115 V.A.C. Permanent Split Capacitor
03-1-0008-0016	Pawl, latch, lid
03-1-0008-0009	Knob, latch, lid
02-002-1-0024	Lid
7724071	Hinge, friction
7732018	Seal, lid gasket
7713079	Blue Tube Holder for 17mm x 100mm & 17mm x 75mm tubes
7760006	Power Line Cord (North America)
7760005	Power Line Cord (Europe)
7786067	Rotor, six place horizontal with reflector
7729009	Capacitor, 5uF, 250V A.C.
7751043	4A, Circuit Breaker
02-006-0-0003	Control Circuit Board for VFD
02-006-0-0004	Control Circuit Board for VFD Plus
02-006-0-0010	Control Circuit Board for VES
02-002-1-0016	Lid locking assembly

### Available Accessories:



**6-Place Fixed Angle Rotor**  
p/n 7786068



**SmartView™ Platform**  
p/n 00-079-009-001



**125mm Black Tube Holder**  
p/n 7713032  
(For use with fixed-angle rotor)

### **Calibration Testing:**

It is recommended that the top speed be tested every two years for continued safe operation. Contact Drucker Diagnostics for further information or testing availability.

### **Transportation**

During transportation accessories can become dislodged from the rotor and fall into the rotor chamber where they can remain unnoticed. In the event that the centrifuge needs to be transported to another site, make certain that there are no tube holders or accessories in the rotor or rotor chamber.

### **Repaired Units**

For verification of the safe state of the centrifuge following factory service or repair, refer to the date on the Factory Calibration located on the back of the centrifuge. This is the date that the repaired centrifuge was last factory tested and calibrated. For additional servicing information and technical support, contact Drucker Diagnostics or your authorized retailer.

### **Safety:**

#### **Lid Safety Switch:**

The lid is secured to the top of the cabinet by a latching knob and pawl system. When the knob is rotated clockwise, the pawl grips the underside of the cabinet opening and prevents the lid from opening. A mechanical stop positions the pawl and prevents it from rotating completely. When rotated to the stop position, the pawl makes contact with a micro-switch mounted underneath the cabinet top. The lid safety switch prevents the centrifuge from operating while the lid is open. An indicator light on the front of the machine will light up when the lid has been latched properly.

#### **Lid Safety Interlock System:**

In addition to the Lid Safety Switch, the 642VFD, 642VFD-Plus, and 642VES has a true "0 RPM" lid locking system. The lid safety interlock system keeps the lid locked at all times, (even during power failure), and requires that the rotor be at rest in order to unlock the lid. The centrifuge will not allow entry into the rotor chamber unless the centrifuge has power and the rotor is stopped. To open the lid, make sure that the centrifuge is plugged in and, with the rotor stopped, press the OPEN/STOP button.

**Note:** After the centrifuge has started spinning, it may be possible to rotate the lid knob enough to cause the pawl to lose contact with the lid safety switch. If this happens, the centrifuge motor may lose power, but the lid will still remain locked. If the knob is accidentally moved and this situation should occur, rotate the knob fully clockwise to its stop position and the centrifuge will resume operation.



#### **4A Resettable Circuit Breaker**

The 642VFD, 642VFD-Plus, and 642VES is protected with two in-line 4A resettable circuit breakers on the underside of the device. Any electrical overcurrent will trip the breakers, cutting power to the machine and protecting the internal electronics.

#### **Emergency Rotor Chamber Entry:**

In the event of power failure, it may be impossible to unlock the lid by conventional means. In this case, entry into the rotor chamber may be made by removing the latch label and using a pen to manually disengage the locking mechanism (see photo). Pull the mechanism towards the control panel and then unlatch and open the lid. If the unit is damaged, contact your authorized dealer or Drucker Diagnostics.

### **Features:**

- Swing-out horizontal rotor design, incorporating a unique test tube holder that produces horizontally separated samples while requiring no additional parts
- Cool-Flow air flow design that prevents overheating of samples
- Lid safety switch that prevents the centrifuge from operating unless the lid is closed and latched
- Removable rotor for easy cleaning
- Locking lid that allows entry into the centrifuge only after the rotor has completely stopped
- Clear lid for safe observation of samples and optical calibration of speed
- Electronically controlled timed operation
- Push-button operation
- Indicator Lights

'RUNNING'

Green – lights when power is applied to motor

'RUN 1' *VFD-Plus only*

Green – lights when power is applied to motor

'RUN 2' *VFD-Plus only*

Green – lights when power is applied to motor

'LATCHED'

Yellow – lights when lid is closed and latched

'UNLOCKED'

Red – lights when the locking system is deactivated

### **Specifications 642VFD, 642VFD-Plus, and 642VES:**

#### **Speed Range:**

(Horizontal)

1,000 - 3,800 (+/- 100) RPM

(Fixed Angle)

1,000 – 3,900(+/- 100) RPM

#### **RCF Range:**

(Horizontal)

114 – 2016 (+/- 90) xg

(Fixed Angle)

90 – 1860 (+/- 90) xg

#### **Maximum Capacity:**

60 mL (6 × 10 mL)\*

#### **Overall Dimensions (H x W x D):**

8.75 in. × 11.75 in. × 14 in.

(22 cm x 30 cm x 35 cm)

#### **Weight:**

12 lbs. (5.4 kg)

#### **Centrifuge Motor:**

1/30 HP, PSC motor

#### **Nominal Acceleration Time:**

20 seconds

#### **Protection:**

4 Amp, resettable circuit breaker (x2)

#### **Timer (642 VES):**

Electronic, 1 to 99 minutes, preset

to 10 minutes +5% / -2%

#### **Timer (642 VFD, 642VFD-Plus):**

Electronic, 1 to 30 minutes, preset

to 10 minutes +5% / -2%

#### **Power Rating:**

200 Watts

#### **Voltage Requirements:**

115/ 230 VAC (+/- 10%)

#### **Frequency:**

50/60 Hz

### **Permitted Environmental Conditions**

#### **Ambient Temperature During Operation:**

60°F - 90°F (16°C - 32°C)

#### **Maximum Relative Air Humidity:**

90%

\* Maximum sample density is 1.15 grams / mL, (water density = 1.0 grams / mL)

*Any use other than those specified by the Manufacturer is explicitly prohibited.*

## Setup Location:

1. Unpack the centrifuge and verify that all of the supplied equipment is present.
2. Choose a setup location which meets the following criteria:
  - a) A bench top clearance height of 20" is required in order to open the lid.
  - b) The clearance envelope is the space around the centrifuge which is required for safety. Choose a setup location which will allow for a clearance envelope of at least 24" x 24", (with the centrifuge at the center). Do not position the centrifuge in such a way that it would be difficult to disconnect the power in the case of emergency. No person or hazardous material shall be permitted in the clearance envelope during operation. The operator time within the envelope shall be limited to the time necessary for loading, unloading and centrifuge operation only.
  - c) Proper ventilation is necessary to prevent the overheating of samples as well as premature failure of the centrifuge. Choose an area which will allow unencumbered air flow.
  - d) The centrifuge is designed to secure to the operating surface by four suction feet. No adjustment is necessary for leveling the centrifuge, however, the surface should be flat and level.
  - e) **Be sure the outlet is always within reach as the line cord is the means of emergency disconnection!**

## Initial Setup Procedure:

If any problems are found during the initial setup procedure, refer to the troubleshooting section on page 9.

1. Plug the female end of the supplied line cord into the power input module located on the rear of the centrifuge. Plug the male end into an approved electrical outlet. For electrical safety, the unit must always be properly grounded.
2. Flip the switch on the power input module located on the rear of the centrifuge to the ON ( | ) position.
3. For safety purposes, the locking system is always activated. To deactivate the system, (in order to insert or retrieve samples), press the OPEN/STOP button on the control panel. The UNLOCKED indicator light should illuminate. If it does not, refer to page 9 on troubleshooting. The lid will be unlocked for 15 seconds after pushing the OPEN/STOP button.
4. Turn the latch counterclockwise and open the lid.
5. Spin the rotor by hand; check for free and level rotation. If the rotor does not spin freely, refer to page 9 on troubleshooting.
6. Place the six test tube holders inside the rotor (as shown to the right), and verify that they are seated properly.
7. Close the lid. Rotate the lid knob clockwise to its complete stop position. The 'LATCHED' indicator light should be illuminated. If it is not, make sure that the lid is latched properly. The centrifuge will not run unless the lid is latched and the 'LATCHED' light is illuminated.
8. Start a centrifugation cycle by pushing the START (BLOOD) button.
9. The 'RUNNING' indicator light will illuminate.
10. The test tube holders will slide up into the horizontal position and the unit will accelerate to full speed.
11. Listen to the sound of the centrifuge. A smooth whirring sound should be heard. If there are any loud or unusual sounds, stop the centrifuge by pushing the OPEN/STOP button immediately and refer to page 9 on troubleshooting.
12. Push the OPEN/STOP button. The 'RUNNING' indicator light should go out and the motor should slow to a stop.
12. The lid should remain locked until the rotor has nearly stopped. If the machine unlocks prematurely, contact Drucker Diagnostics for assistance. Once the rotor has stopped, the interlock system will become disengaged for sixty (60) seconds. The 'UNLOCKED' indicator light will illuminate during this time.
13. To gain entry into the centrifuge after this period has ended, simply press the OPEN/STOP button. The lid will unlock for fifteen (15) additional seconds.



Horizontal Rotor Shown

**After the centrifuge has passed this procedure it is ready for operation.**

## Troubleshooting:

Solutions:



**NOTE:**  
The lid latch must be turned completely clockwise to its stop position in order for the centrifuge to operate.

<b>Problem:</b>	The rotor does not spin freely.
<b>Solutions:</b>	<ul style="list-style-type: none"><li>- Make sure nothing has fallen into the rotor chamber.</li><li>- If there is nothing obstructing the rotor, contact Drucker Diagnostics or further assistance.</li></ul>
<b>Problem:</b>	Excessive noise when the machine is running.
<b>Solutions:</b>	<ul style="list-style-type: none"><li>- Check to see that the load is balanced.</li><li>- Make sure that nothing has fallen into the rotor chamber.</li><li>- Make sure that the nut in the center of the rotor is tight.</li><li>- Have a technician test the motor and replace it if necessary.</li></ul>
<b>Problem:</b>	The centrifuge does not run.
<b>Solutions:</b>	<ul style="list-style-type: none"><li>- Check the electrical outlet.</li><li>- Make sure the lid latch is turned completely clockwise to its stop position. When the lid is closed properly, the latched light on the control panel will illuminate.</li><li>- Check the circuit breaker switch at the bottom left of the machine. If the switch is white, the breaker has tripped. Contact Drucker Diagnostics for further assistance.</li><li>- The printed circuit board may be damaged. Have a technician test and replace the circuit board if necessary.</li></ul>
<b>Problem:</b>	The latch light does not come on when the lid is closed.
<b>Solutions:</b>	<ul style="list-style-type: none"><li>- Make sure that the unit has power.</li><li>- Make sure the lid latch is turned completely clockwise to its stop position. The latch makes contact with a switch underneath the front top of the cabinet. If this switch is not activated, the light will not turn on and the machine will not run.</li></ul>
<b>Problem:</b>	The machine does not unlock after a run has completed.
<b>Solutions:</b>	<ul style="list-style-type: none"><li>- The lid should remain locked until the rotor has nearly come to a complete stop and then unlock for 60 seconds. If additional unlock time is needed, press the 'OPEN / STOP' button with the machine plugged in and the rotor stopped. If the lid remains locked after this and will not unlock, the electronics may have been damaged. Contact Drucker Diagnostics for assistance. To access the rotor chamber, follow the procedure on page 10, "Emergency Rotor Chamber Entry".</li></ul>
<b>Problem:</b>	The run time is not set to the desired length.
<b>Solutions:</b>	<ul style="list-style-type: none"><li>- Check the run preset by following the instructions on page 5. If the preset is not the desired length follow the instruction on page 6 to change the run preset time.</li></ul>
<b>Problem:</b>	All LED indicators are blinking with 2 short audible beeps repeating continuously. (VES will display 'Imbalance Error')
<b>Solutions:</b>	<ul style="list-style-type: none"><li>- The imbalance detection threshold has been reached during the cycle indicating a full cycle was not completed.</li><li>- Check the balance of the load. Refer to BALANCED LOADS on page 7.</li><li>- If it is determined that the detection is too sensitive this can be adjusted by increasing the imbalance detection threshold. Refer to page 6 for programming settings.</li></ul>
<b>Problem:</b>	The yellow and red LED indicators are blinking with 3 short audible beeps repeating continuously. (VES will display 'Motor Power Err')
<b>Solutions:</b>	<ul style="list-style-type: none"><li>- The electrical current to the motor has exceeded the allowable limit, indicating that the full cycle was not completed.</li><li>- Make sure that nothing has fallen into the rotor chamber preventing the rotor from spinning freely.</li><li>- If there is nothing obstructing the rotor, the motor may be damaged. Contact Drucker Diagnostics for further assistance.</li></ul>
<b>Problem:</b>	The yellow and green LED indicators are blinking with 4 short audible beeps repeating continuously. (VES will display 'Motor Error')
<b>Solutions:</b>	<ul style="list-style-type: none"><li>- The internal tachometer has either not sensed a speed, the sensed speed is out of range, or the wrong rotor is installed. (NOTE: if the wrong rotor is installed the centrifuge will not run without reprogramming the rotor selection)</li><li>- Verify that the rotor being used is programmed correctly in the settings. Reprogram the correct rotor selection if necessary. Refer to page 7 for instructions.</li><li>- Remove the rotor following the instructions on page 7. Check to see that there is a small silver reflective sticker on the exterior vertical wall of the rotor.</li><li>- If the reflective sticker is present on the rotor and the correct rotor is programmed in the settings, contact Drucker Diagnostics for further assistance.</li></ul>
<b>Problem:</b>	The centrifuge cycle stops prematurely and the yellow LED indicator is blinking.
<b>Solutions:</b>	<ul style="list-style-type: none"><li>- This is an indication that the lid is not properly latched and the cycle has entered the "paused" state.</li><li>- Turn the knob clockwise to re-latch the lid and resume the cycle.</li><li>- If the cycle does not resume and the knob is fully turned, contact Drucker Diagnostics for further assistance.</li></ul>

**For servicing information or additional technical support, contact Drucker Diagnostics or your authorized distributor.**

## Care and Preventative Maintenance:

With proper care and maintenance your centrifuge will provide years of laboratory service. For proper care, the following steps should be taken:

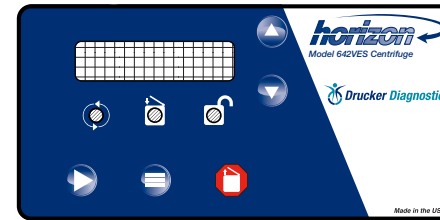
1. **Provide Adequate Ventilation:** For cooling purposes, the centrifuge draws in ambient air through the air intake cover on the top of the lid and exhausts this air in the rear of the base. The centrifuge should be placed on a hard smooth surface for good air circulation.
2. **Always Spin Balanced Loads:** Make certain that you are always spinning a balanced load. The centrifuge has a unique counter balanced motor mounting design which, along with its rubber suction feet, produces excellent vibration dampening. However, out-of-balance loads may break glass test tubes and may produce unsatisfactory separation results. Proper load balancing will improve sample separation and extend the life of the centrifuge. Refer to page 7 on balanced loads for additional information on balancing the load.
3. **Keep the Tube Holders Clean: NOTE:** Always follow the safety guidelines of your laboratory to properly clean up and/or dispose of materials in the event that a substance known to be potentially toxic, radioactive or contaminated with a pathogenic microorganism is spilt in or on the centrifuge. Small glass fragments left in the tube holder after a tube breakage may adhere to the next test tube inserted in that holder. When this tube is handled, these fragments may puncture protective gloves and lacerate the operator's fingers or hand. Remaining fragments may provide stress points on subsequent tubes and result in additional breakage. If a tube breakage occurs, carefully remove the tube holder. Properly dispose of the sample and tube fragments and thoroughly clean both the inside and outside of the tube holder. Insert a new tube cushion (if necessary) and replace the tube holder in the rotor.
4. **Motor and Electrical Maintenance:** The 642VFD, 642VFD-Plus, and 642VES uses a brushless permanent split capacitor AC motor. It should not need routine servicing for the life of the centrifuge. The electrical components are selected for high reliability and should not need routine service.
5. **Tube Holder Replacement:** It is recommended that the tube holders be replaced after 24 months of use.
6. **Remove Accessories Before Moving:** All tube holders, samples, and caps must be removed from the rotor chamber before transporting or storing the centrifuge to prevent damage and injury.

## Cleaning and Disinfection:

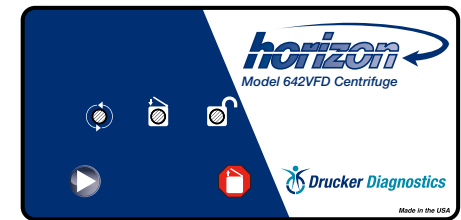
To prolong the life of the centrifuge cleaning and disinfection is recommended every six months, or whenever there is a spillage or tube breakage. Contaminants must be removed immediately, or corrosion and premature degradation of components can occur.

1. Unplug the centrifuge before cleaning.
2. Apply cleaning solutions with a towel or cloth. Do not submerge the centrifuge in water or other cleaning solutions as this will cause damage and void the warranty.
3. **ONLY isopropyl alcohol, soap and water, or a 10% (5500 PPM) bleach solution should be used for cleaning and disinfection of the centrifuge and accessories.**
4. All surfaces must be dried immediately after cleaning and disinfecting.
5. TBQ Germicidal products shall not be used, as they will cause damage to the centrifuge and void the warranty.
6. The use of fully/partially halogenated hydrocarbons, ketones, esters, ethers, benzyls, ethyl benzenes, and all other chemicals not prescribed by the manufacturer shall not be used as they may cause damage to the rotor chamber, rotor, tube holders, accessories and centrifuge exterior and void the warranty.
7. It may be necessary to remove the rotor and clean the rotor chamber. Follow the instructions on page 7 to remove and reinstall the rotor.

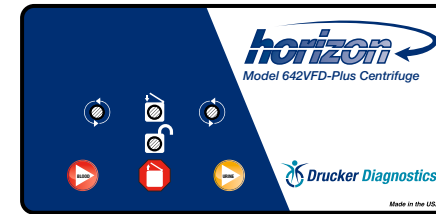
642VES



642VFD



642VFD Plus



## Programming memory locations for the model 642VES

1. To access memory locations, press the MENU button.
2. Select a memory location using the up and down SET buttons.
3. Once the desired memory location has been selected move the cursor to the desired parameter using the left scroll (START) and right scroll (OPEN/STOP) buttons.
4. Changing the parameter is accomplished by scrolling up and down with the SET buttons.
5. Memory locations can be renamed by scrolling to the name (Default names= Memory 1-9), moving the cursor to the desired location and selecting a scrolling through the characters with the SET buttons.
6. Exit the program menu by pressing the MENU button.
7. Any changes are automatically saved upon exiting the program menu.

## Verifying settings for the models 642VFD and 642VFD-Plus

1. With the centrifuge powered on, press the OPEN/STOP button to unlock the lid.
2. Open the lid.
3. Press and hold the START (BLOOD) button until the yellow 'LATCHED' light begins to flash, then release.
4. The centrifuge will indicate the settings for the START button you selected with audible beeps. Count the number of the beeps; they indicate the run time setting. Each beep equals one minute.
5. Press the START (BLOOD) button again, count the beeps. This time they indicate the RPM setting (one beep equals 100 RPM).
6. Press the START (BLOOD) button again counting the beeps; they indicate the brake setting magnitude (1 equals minimum brake level, 10 equals maximum brake level.)
7. Press the START (BLOOD) button again counting the beeps; they indicate the imbalance detection sensitivity (1 deactivates the detection, 2 equals the lowest sensitivity, 10 equals the maximum sensitivity).
8. Press the OPEN/STOP to return to the idle state.
9. **642VFD-Plus only:** The second preset run time, RPM, and brake level settings can be verified by following the same procedure but using the URINE button. Note: The imbalance detection sensitivity can only be verified using the BLOOD button.

### Programming (changing) settings for the models 642VFD and 642VFD-Plus

1. With the centrifuge powered on, press the OPEN/STOP button to unlock the lid.
2. Open the lid.
3. Press and hold the START (BLOOD) and OPEN/STOP buttons for approximately three (3) seconds. The yellow 'LATCHED' indicator will begin to flash; indicating program mode.
4. Release the buttons.
5. Press the START (BLOOD) button one time for each minute of run time desired, from a minimum of 1 minute to a maximum of 30 minutes.
6. Press OPEN/STOP to assign the run time setting. You will now begin to adjust the RPM setting.
7. Press START (BLOOD) to program the RPM, each press adds 100 RPM of speed desired. (e.g. Pressing the START button 20 times will enter a speed of 2000 RPM). Minimum RPM equals 1,000, Maximum RPM equals 3,800.
8. Press OPEN/STOP to assign the RPM setting. You will now begin to adjust level the brake setting.
9. Press START (BLOOD) button to program the brake setting (1 equals minimum brake level, 10 equals maximum brake level). The default brake setting is 6.
10. Press the OPEN/STOP button to assign the brake setting. You will now begin to adjust the imbalance sensitivity threshold setting.
11. Press the START (BLOOD) to program the imbalance detection sensitivity (1 deactivates the detection, 2 equals the lowest sensitivity, 10 equals the maximum sensitivity). The default imbalance detection sensitivity level is 6.
12. Press the OPEN/STOP button to assign the imbalance detection sensitivity setting and exit the programming mode.
13. **642VFD-Plus only:** The second run time, RPM, and brake level settings can be changed by following the same procedure but using the URINE button. Note: The imbalance detection sensitivity can only be programmed using the URINE button.
14. NOTE: The maximum setting for run time, RPM, brake level and imbalance detection sensitivity cannot be exceeded. If it is attempted, an error buzzer will sound to indicate that the limit has been reached. When this happens the settings will default to the maximum setting (Run time equals 30 min, RPM equals 3800, brake level equals 10, imbalance detection sensitivity equals 10).

### Operation:

#### **NOTE: Follow the initial setup procedure on page 4 before initial operation.**

1. Push the OPEN/STOP button and then open the lid.
  2. Insert cushions (if needed) into the tube holders for the tube size you are using. Refer to 'Tube Holder Configurations (page 8) for assistance.
  3. Place the test tube samples into the tube holders. Be sure to follow the rules for balanced loads.
  4. Close the lid and turn the lid knob clockwise to its complete stop position. The 'LATCHED' indicator light should turn on to indicate that the latch is closed properly. If the lid knob is not completely latched, the 'LATCHED' indicator light will not turn on and the centrifuge will not operate!
  5. **642VES ONLY:** Select a memory location using the up and down SET buttons. To change settings see page 5. 642VFD and 642VFD-Plus models only: The settings have been preset. To display or change the settings see page 6.
  6. Turn on the machine by pushing the START (BLOOD or URINE) button on the control panel.
  7. The centrifuge should begin to spin. The RUN (RUN 1 or RUN 2) indicator light should illuminate.
- IF A PROBLEM IS FOUND DURING A SPIN THAT REQUIRES THE CENTRIFUGE TO SHUT DOWN, PRESS THE 'OPEN / STOP' BUTTON !**
8. The running indicator light will begin to flash when one minute remains.
  9. After time has elapsed, the RUN (RUN 1 or RUN 2) indicator light will extinguish and the rotor will slow to a complete stop.
  10. The 'UNLOCKED' indicator light will illuminate and the locking mechanism will disengage allowing entry into the rotor chamber. If it does not, refer to page 9 on troubleshooting.
  11. Turn the lid knob counterclockwise and open the lid.
  12. Remove the samples.
  13. If the machine re-locks before the samples are removed, press the OPEN/STOP button to unlock the lid for an additional fifteen (15) seconds.

### **BALANCED LOADS**

**Your centrifuge must contain a balanced load in order to work properly.  
Use the following rules when loading the rotor.  
Spinning balanced loads will extend the life of the machine and  
produce better results.**

1. Opposing tube holders must be identical and must contain the same cushion, or none at all.
2. Opposing tube holders must be empty or loaded with equally weighted samples.
3. If an odd number of samples is to be spun, fill a tube with water to match the weight of the unpaired sample and place it across from this sample.

### **Rotor Removal, Installation, and Selection:**

#### **To remove the rotor:**

1. Unlock the centrifuge by pushing the OPEN/STOP button and unlatch and open the lid.  
**CAUTION:** Unplug the centrifuge from the electrical outlet at this time to eliminate the possibility of electrical shock or other injury.
2. Remove the test tube holders.
3. Remove the nut in the center of the rotor by turning it counterclockwise, (a 1/2" nut driver may be required).
4. The rotor is sitting on a cone-shaped adapter. Pull the rotor up and off of this adapter.

#### **To install the rotor:**

1. Place the rotor back onto the cone-shaped adapter. You may need to turn the rotor slightly to line it up properly.
2. The rotor should slide onto the rotor cone freely.
3. Once a proper fit has been achieved, replace the rotor knob or nut and turn it until it is hand-tight.
4. Replace the tube holders and verify that they are seated properly.
5. It is recommended that the initial setup procedures be performed to ensure that the rotor has been installed correctly and that no damage has been done to the centrifuge during either the rotor installation or possible rotor chamber cleaning. See page 4 for this procedure.

#### **To select a rotor:**

Follow these steps when installing a different rotor type than what was previously installed:

#### **Programming the Rotor Selection**

1. Power off the centrifuge.
2. Press and hold the START (START 1 for VFD-Plus) and OPEN/STOP buttons while powering the centrifuge on.
3. Once the centrifuge has powered on, release the two buttons.
4. All LEDs should light up signaling that the rotor selection mode has been entered.
5. To select the **fixed angle rotor** press the START (START 1 for VFD-Plus) **once**.
6. To select the **horizontal rotor** press the START (START 1 for VFD-Plus) **twice**.
7. Press the OPEN/STOP button once to save the setting.
8. The centrifuge will then beep once or twice indicating the rotor selection that was just entered.  
a. **VES only:** will display either 'Fixed' or 'Horiz' to indicate the selected rotor.

#### **Verifying the Rotor Selection**

1. Power off the centrifuge.
2. Press and hold OPEN/STOP.
3. While continuing to hold this button power the centrifuge on.
4. Release the OPEN/STOP button.
5. The centrifuge will then beep once or twice indicating the rotor selection.  
a. **VES only:** will display either 'Fixed' or 'Horiz' to indicate the selected rotor.