HORIZON

Model 24 Flex-AV

Operator's Manual

Drucker Diagnostics

TABLE OF CONTENTS

Symbols

Symbol	Definition	Use
	Caution	Caution to safety hazard. Potential risk of personal injury or damage to the instrument if improperly handled. Consult the manual before proceeding.
	Electrical Hazard	Hazardous Voltage. Potential risk of personal injury or damage to the instrument.
	Manufacturer	Manufacturer of record.
	Electrical and electronic products recycling symbol	Recycle only as electronic waste. Do not dispose in normal waste.
	RoHS Compliant	Compliance with RoHS environmental standards.
	CE Mark	Denotes conformity to specific European directives and regulations.
	UKCA Mark	Denotes conformity to specific UK directives and regulations
	MET Listing	Denotes conformity to specific safety standards and regulations.
FDA LISTED	FDA Listed	Denotes that the product has been properly listed with the FDA.
	ISO Certification	Denotes conformity to quality standards and quality management systems.

CAUTION AND WARNING STATEMENTS

This device is intended to be operated by properly trained personnel who have carefully read the operating manual and are familiar with the function of the device. [Refer to the clinical laboratory method specified by the specimen receptacle manufacturer or established by the medical technology for the products applications.]

WARNING: For the safety of both the operator and service personnel, care should be taken when using this centrifuge if handling substances that are known to be toxic, radioactive, or contaminated with pathogenic microorganisms. Use appropriate personal protection equipment (PPE). When Risk Group II materials are used, (as identified in the World Health Organization "Laboratory Bio-Safety Manual"), a Bio-Seal should be employed. If materials of a higher risk group are being used, more than one level of protection must be provided. The use of flammable or explosive materials as well as those materials which have a vigorous chemical reaction is prohibited.

WARNING: "Universal precautions"[1] should be followed in handling all items contaminated with blood or other bodily fluids.

Users of centrifuge should validate the processing of their disposable for their specific application prior to use.

Operation of this equipment in a manner not specified by the manufacturer may impair the protection provided by the equipment.

Unplug the centrifuge before cleaning or performing maintenance.

Do not autoclave carbon fiber buckets.

WARNING: Do not make modifications to or remove any hardware from rotor without prior authorization from Drucker Diagnostics.

WARNING: Only use Drucker Diagnostics components in this centrifuge

WARNING: Inspect centrifuge for cracks or physical damage to cabinet, lid, rotor, or tube holders. Damage may result in unsafe operation. Discontinue use until repairs have been performed.

For your safety and the durability of the machine, never transport or store centrifuge with tube holders inside machine.

Electrical safety protection is provided by properly connecting the centrifuge to earth ground. Use only the manufacturer provided line cord and ensure that it is connected to a properly grounded power receptacle. Failure to do so will result in an electrical hazard.

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with this operator manual, may cause interference to radio communications.

Operation of this equipment in a residential area may cause interference, in which case the user will be required to correct the interference at his own expense.

Due to the lack of the possibility of human exposure, all Drucker centrifuges and accessories sold by Drucker Diagnostics, Inc. are compliant without any special labeling required by the California Safe Drinking Water and Toxic Enforcement Act (Proposition 65).

The maximum combined weight allowed to be loaded into each carrier (including Drucker provided components) shall not exceed maximum specification. Refer to **General Specifications** section for maximum carrier load specification.

1 Recommendations for Prevention of HIV Transmission in Health Care Settings. MMWR 1987; 36 (Supplement #2S)

MODEL DESCRIPTION

Satisfy your lab's most diverse processing requirements with the HORIZON 24 FLEX-AV. Customize settings and check every detail on the digital display.

This general-purpose laboratory centrifuge may also be used to spin approved containers with biologics, chemicals (non-flammable, non-explosive, non-volatile, and non-highly reactive), and environmental samples.

FEATURES

- The first five (5) cycles are conveniently pre-set and labeled for your lab's most common applications. Use the default cycles or add and customize additional cycles as needed.
- A time and speed/g-force can be quickly entered for a single use cycle. The cycle will not be retained in memory.
- If desired, the control panel can be temporarily locked on one cycle for error-free reproducibility.
- A Preset Lock can be turned on to prevent changes from being made accidentally to programmed cycles.
- Up to five (5) additional preset cycles can be programmed for time, speed, and braking and labeled with a custom name. Cycles can be programmed by g-force (RCF) or speed (RPM) to facilitate matching validated cycles and tube manufacturers' IFUs.
- A digital cycle counter tracks the number of cycles the centrifuge has run.
- Lid lighting indicates the centrifuge's status (ready, running, done), informing the operator when tubes are ready for the analyzer and preventing tubes from being left in the centrifuge longer than necessary (patent pending).
- A traditional audible alert indicates the completion of the cycle. The audible alert can be muted.
- Cool–Flow design prevents overheating of samples by using ambient air to keep specimens at room temperature.
- The carriers are fiber reinforced for high strength, durability, and years of trouble-free use.
- A clear lid permits safe observation of samples and optical calibration of speed.
- The lid safety system prevents the centrifuge from operating unless the lid is closed and latched.
- The lid safety system only allows entry into the centrifuge after the rotor has completely stopped.
- The high-power brushless motor provides years of operation with no routine maintenance.

INTENDED USE

General purpose laboratory centrifuge, intended for the density-based separation of fluids through centripetal acceleration.

WARRANTY

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

INITIAL SETUP

For your safety, only setup the centrifuge within the appropriately designated operating environment. Refer to **General Specifications** section for pertinent environmental condition requirements when using the centrifuge.

- Unpack and verify that all the following are included:
    - Centrifuge
    - Power cord
    - Carriers
    - Carrier Inserts
    - Quick Start Guide
- Place the centrifuge on a flat and level surface. A bench top clearance height of 22" (56 cm) is required to open the lid.
- The centrifuge should have 6" (15 cm) of clear space around the centrifuge. Proper ventilation is necessary to prevent the overheating of samples as well as premature failure of the centrifuge. Choose an area which allows unencumbered air flow, and where the temperature remains between 16°C and 32° C (60°F and 90°F).
- No 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.
- Plug the line cord into the centrifuge.
- Plug the line cord into an approved electrical outlet.

Be sure that the electrical outlet is always accessible, as the line cord is the means of emergency disconnection.

OPERATION

- Load all four (4) carriers into the rotor.

Always process centrifuge spin cycles with four (4) buckets loaded into the rotor – even when buckets are empty.

- Place disposable(s) into the carriers, utilizing inserts as appropriate.

The maximum combined weight allowed to be loaded into each carrier (including Drucker provided components) shall not exceed maximum specification. Refer to **General Specifications** section for maximum carrier load specification.

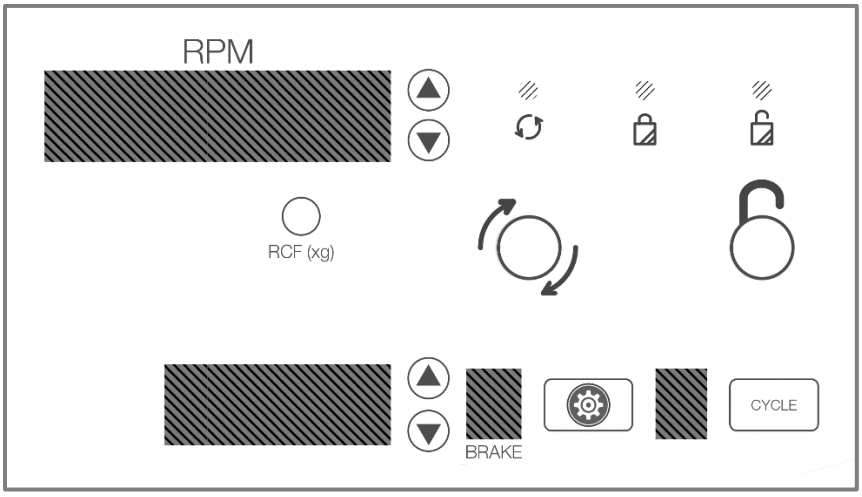
Be sure to follow the rules for balanced loads. Refer to **Balancing Loads** section.

- Close the lid and turn the lid knob clockwise to its complete stop position.

- The digital screen shows the currently selected cycle. To select another cycle, press the CYCLE button in succession until the desired cycle is selected.
- Pushing the START button on the control panel will start the spin cycle.
- When the cycle is completed, the rotor will slow to a complete stop and the lid light will flash.
- The unlocking mechanism will engage for 60 seconds allowing entry into the rotor chamber. To unlock after more than 60 seconds have elapsed, press the UNLOCK button. The lid will unlock for another 15 seconds.
- Turn the lid knob counterclockwise and open the lid. The lid light will turn off.
- You may now safely remove the disposable(s).

QUICK START

The top screen display alternates between the name of the currently selected cycle and speed. The bottom screen displays the time setting.



	**Start**	Begins running the cycle displayed on the screen. The lid must be closed.
	**Unlock**	Allows access into the rotor chamber by engaging the unlocking mechanism. Entry is only possible when the rotor is stopped.
	**Stop**	Pressing the UNLOCK button during operation will terminate the run and unlock the lid after the rotor has come to a stop.
	**Cycle Selection**	Press the CYCLE button to select the desired saved cycle.

Settings and Interface

Default Preset Settings (Not Editable)

Preset	Name	RPM	Time	Brake Setting
1	ACP	1,500	5 minutes	0
2	CN 30M	2,500	4 minutes	0
3	CN 60M	3,400	3 minutes	0
4	CN 90M	3,400	6 minutes	0
5	EQ 90M	3,000	9 minutes	0

Quick Adjust - Time and Speed

Change time, speed (RPM) or g-force (RCF) for a single cycle.

	**Setting Speed**	To change the speed (RPM) shown on the top display, use the up and down buttons next to that screen. The CYCLE number is replaced with a "--"in the display, and the top screen displays the speed.
	**Setting by G-Force**	Press and hold the RCF (xg) button while changing the displayed setting on the top screen, using the up and down buttons next to it. The RPM will automatically adjust.
	**Setting Time**	Press the up and down buttons next to the TIME display.

Quick Adjust - Brake Setting

	**Enter the Advanced Menu**	Press the GEAR button to enter the advanced menu.
	**Change Brake Values**	While in the advanced menu, navigate to "Brake". Use the UP and DOWN buttons next to the TIME screen to adjust brake to desired value between 0 (no brake applied) and 9 (maximum braking force applied).
	**Exit the Menu**	Press the GEAR button to save changes.

Changing the Beeper (Audible Alert)

	**Enter the Advanced Menu**	Press the GEAR button to enter the advanced menu.
	**Turn Beeper On or Off**	While in the advanced menu, navigate to “BEEPER” using the UP and DOWN buttons of the RPM display. Switch ON or OFF with the UP and DOWN buttons next to the TIME display. Note: This setting will apply to all cycles.
	**Exit the Menu**	Press the GEAR button to save changes.

Display Cycle Count

	**Display Cycle Count**	With the lid open and the unit powered, press and hold the START button for approximately five (5) seconds. The cycle count will be displayed until the START button is released.

Single Cycle Lock and Preset Lock

To ensure repeatability, the centrifuge can be locked either on one cycle (Single Cycle Lock) or restricted to the saved cycles (Preset Lock). The Single Cycle Lock also prevents making changes to the selected cycle parameters. The Preset Lock allows selection of any saved cycle and prevents changing the parameters of saved cycles.

	**Activate Preset Lock**	With the lid open, press and hold the UNLOCK button for approximately five (5) seconds to enter Preset Lock. One beep will confirm that Preset Lock is activated.
	**Cancel Preset Lock**	Press and hold the UNLOCK button for approximately five (5) seconds. Three (3) beeps will confirm that the Preset Lock is now deactivated.
	**Activate Single Cycle Lock**	With the lid open, press and hold the UNLOCK button for approximately six (6) seconds to enter Single Cycle Lock. One beep, then two subsequent beeps will confirm that Single Cycle Lock is activated.
	**Cancel Single Cycle Lock**	Press and hold the UNLOCK button for approximately five (5) seconds. Three (3) beeps will confirm that the Single Cycle Lock is now deactivated.

Programmable Preset Cycles

Save up to 10 custom cycles. The top screen alternates between cycle name and speed.

Creating a New Programmable Preset Cycle

	**Change Settings**	Refer to previous table (Quick Adjust Time and Speed) to change speed and time to desired values via Quick Adjust mode.
	**Create Cycle**	Hold the CYCLE button for approximately two (2) seconds until you hear a double beep. The new programmable preset cycle is now saved.

Modifying a Programmable Preset Cycle

	**Select Preset Setting**	Press the CYCLE button to select the Programmable Preset Setting you would like to modify.
	**Access the Menu**	Hold the CYCLE button for approximately two (2) seconds until you hear a double beep. The cycle number should begin flashing.
	**Setting by G-Force (Recommended)**	Press and hold the RCF (xg) button, while changing the setting using the UP and DOWN buttons next to the RPM display. The RPM will automatically adjust.
	**Setting Speed (Alternate)**	To change the speed (RPM), use the UP and DOWN buttons next to the RPM display. The g-force will adjust automatically and can be verified by pressing the RCF button.
	**Setting Time**	Press the UP and DOWN buttons next to the TIME display.
	**Enter the Advanced Menu**	Press the GEAR button to enter the advanced menu.
	**Change Brake Values**	“BRAKE” should be selected by default. Use the UP and DOWN buttons next to the TIME display to turn brake on and off.
	**Turn Beeper On or Off**	While in the advanced menu, navigate to “BEEPER” using the UP and DOWN buttons of the RPM display. Switch ON or OFF with the UP and DOWN buttons next to the TIME display. Note: This setting will apply to all cycles.

	**Naming the Cycle**	While in the advanced menu, navigate to the cycle name using the UP and DOWN buttons of the RPM display Press the START button. The asterisk symbol "*" indicates the space selected. Use the UP and DOWN buttons of the Time display to change characters, then move to the next space with the right arrow >. Repeat process until all edits are completed. Press the GEAR button to return to the main programming menu.
	**Save and Exit Settings Mode**	To save changes, press the GEAR button to exit the Advanced Menu, followed by the CYCLE button to exit Cycle Edit Mode.

DELETING A PROGRAMMABLE PRESET CYCLE

	**Select Preset Setting**	Press the CYCLE button to select the programmable preset cycle you would like to delete.
	**Access the Menu**	Hold the CYCLE button for approximately two (2) seconds until you hear a double beep. The cycle number should begin flashing.
	**Navigate to Delete**	Using the UP and DOWN buttons of the RPM display, navigate to "DELETE".
	**Confirm Deletion**	Press the CYCLE button to delete the programmable preset cycle

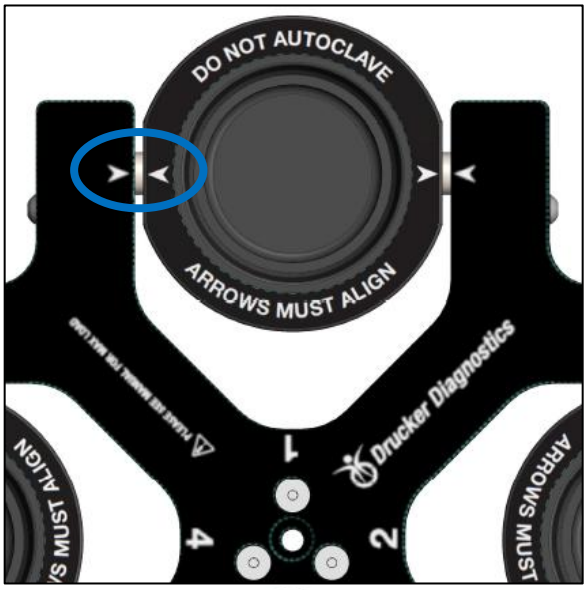
Loading the Centrifuge

Carrier Alignment

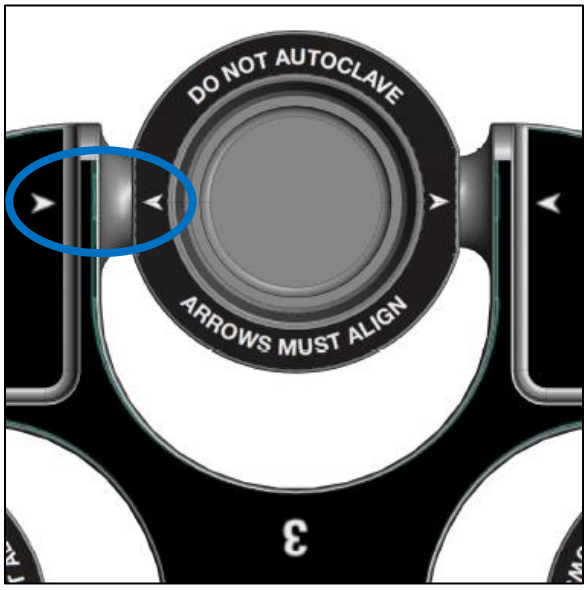
To ensure proper operation, align carriers and rotor utilizing the arrows indicated below.

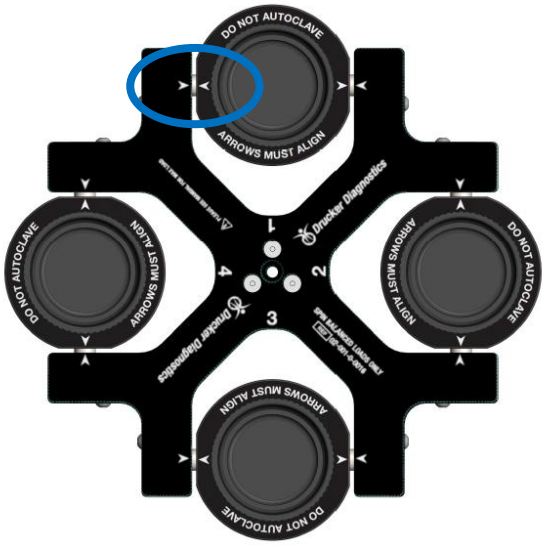
Verify that carriers are hanging from the rotor pins and swing freely into the horizontal position.

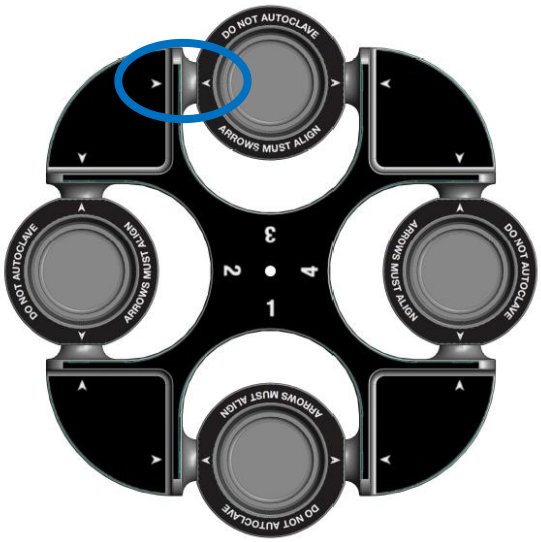
Rotor P/N 02-001-0-0016



Rotor P/N 03-1-0001-0138







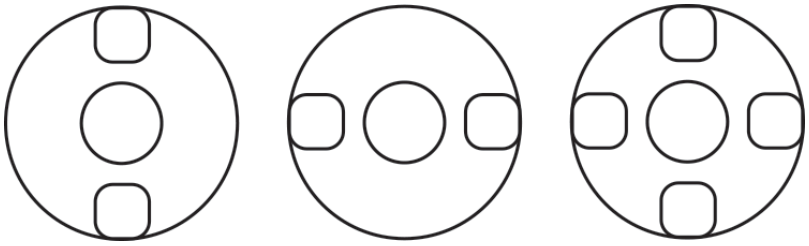
Balancing Loads

Your centrifuge must contain a balanced load to work properly. Spinning balanced loads will extend the life of the centrifuge and produce better results.

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.

Opposing carriers must be equally loaded, empty, or loaded with equally weighted samples.

All buckets in rotor must be from the same manufacturing lot.



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:

- **Always Spin Balanced Loads:** Make certain that you are always spinning a balanced load, as shown in the previous section. These centrifuges have a unique counter balanced motor mounting design which 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.
- **Motor and Electrical Maintenance:** The highest quality electrical components have been selected for the centrifuges and should not need maintenance or servicing for the life of the centrifuge.
- **Carrier Replacement:** It is recommended that the carriers be replaced after 24 months of use. Inspect carriers regularly for cracks. If cracks are discovered, replace immediately.
- **Remove Accessories Before Moving:** All carriers, inserts, and disposables 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 spillage or tube breakage. Contaminants must be removed immediately, or corrosion and premature degradation of components can occur. Before using any cleaning or decontamination methods other than those recommended by the manufacturer, users should verify with the manufacturer that the proposed method will not damage the equipment.

Cleaning and Decontamination may be necessary as a safeguard before laboratory centrifuges, rotors, and any accessories are maintained, repaired, or transferred.

- Unplug the centrifuge before cleaning.
- Use appropriate personal protective equipment (PPE).
- Apply cleaning solutions with a dampened towel or cloth ONLY. Do not spray or pour cleaning solution directly onto or into the centrifuge. Do not saturate the centrifuge or submerge the centrifuge in water or other cleaning solutions as this will cause damage, create a safety risk, and void the warranty.
- ONLY isopropyl alcohol or a 10% (5500 PPM) bleach solution should be used to disinfect the centrifuge and its accessories.

Do not autoclave carbon fiber buckets.

- All surfaces must be dried immediately after cleaning and disinfecting.
- 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, carriers, accessories, and centrifuge exterior and void the warranty.

TBQ Germicidal products are not recommended as they may cause damage to the centrifuge. refrain from using to prevent voiding the warranty.

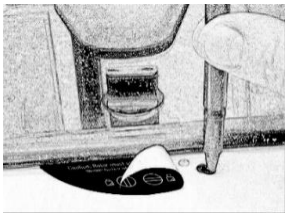
Calibration Testing

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.

TROUBLESHOOTING

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

The centrifuge does not run	○ Verify that the centrifuge is powered. One of the LED lights should be on. ○ If "LID" message is displayed, make sure the lid latch is turned completely clockwise to its stop position. ○ If the centrifuge still does not run, contact Customer Service.
The rotor does not spin freely	○ Make sure nothing has fallen into the rotor chamber, following the procedure above. ○ If nothing obstructs the rotor, the rotor may be damaged. Contact Customer Service for further assistance.
The centrifuge makes a rattling noise when running	○ Stop the centrifuge. Open the lid. ○ Wearing PPE, remove tubes and carriers/inserts and look for fallen objects or debris. Carefully reach inside the rotor chamber with a tool to remove them. ○ Inspect the rotor, carriers or inserts for damage. ○ If the carriers or inserts have any damage, even slight, safely dispose of them and replace them. ○ If the rotor appears damaged, contact Customer Service for further assistance.
Excessive noise or vibration when the centrifuge is running	○ Verify that all four centrifuge feet are properly seated on a flat surface. ○ Ensure that the load is balanced according to instructions in the Balancing Loads section. ○ Make sure that nothing has fallen into the rotor chamber.
"ABORT" is displayed on the top screen	○ The centrifugation cycle has been interrupted.
The centrifuge stops and beeps continuously	○ The load is not balanced. Press the UNLOCK button, open the lid, and balance the load as recommended in the Balancing Loads section.
The centrifuge is stuck on one of the settings	○ Single Cycle Lock is active. To deactivate it, press and hold the UNLOCK button for approximately five (5) seconds.
Preset settings are selectable, but Quick Adjust mode cannot be accessed	○ Preset Lock is active. To deactivate it, press and hold the UNLOCK button for approximately five (5) seconds.

Cycle parameters cannot be changed	○ Default Preset Settings are locked and cannot be edited. ○ If attempting to edit cycle parameters of a Programmable Preset Cycle, Single Cycle Lock or Preset Lock may be active. • If cycle selection is locked on one cycle, press and hold the UNLOCK button for approximately five (5) seconds. Three (3) beeps will confirm that the lock is now deactivated. • If different saved cycles can be selected but not modified, the centrifuge is in Preset Lock mode. Press and hold the UNLOCK button for approximately five (5) seconds. Three (3) beeps will confirm that the lock is now deactivated.
The centrifuge does not unlock after a run is completed	○ Wait until the rotor has come to a complete stop. If the lid knob still cannot be rotated, press the UNLOCK button and try again.  ○ If no LED light is on, the unit is not powered and the lid will not unlock by conventional means. Remove the latch label and use a pen to manually disengage the locking mechanism. Pull the mechanism towards the control panel and then unlatch and open the lid. ○ If the unit is damaged, contact Customer Service for assistance.
The lid does not open	○ Ensure that the lid knob is turned fully counterclockwise. ○ If the knob cannot be turned counterclockwise, turn it fully clockwise, press UNLOCK, and turn counterclockwise. ○ If the lid remains locked after this and will not unlock, the electronics may have been damaged. Contact customer service for assistance.
Lid is difficult to open, or does not stay open by itself	○ Adjust the opening torque on one or both of the lid hinges, via the center screw of either hinge. • Tightening the screw increases opening torque. • Loosening the screw decreases opening torque.

CALCULATING THE G-FORCE

The I.F.U.s of tube manufacturers recommend cycles at a minimum G-Force, which can be calculated if you know the RPM and the radius. Use the formula below.

In Centimeters:
RCF or G-force = 0.00001118 x
Rotor Radius (cm) x $(RPM)^2$

In Inches:
RCF or G-force = 0.0000284 x
Rotor Radius (in) x $(RPM)^2$

Radius 6.46 in (16.4 cm)
(Displayed RCF is calculated at 16.4 cm radius, and is rounded to the nearest 10 xg.)

GENERAL SPECIFICATIONS

The rotor and accessories are rated for the maximum rotation frequency shown in the tables below.

	HORIZON 24 Flex-AV	
	For Centrifuge Serial Number containing: YYMM**31**AA001	For Centrifuge Serial Number containing: YYMM**57**AA001
Disposable Capacity	4 disposables (Up to diameter of 4.6 cm / 1.81 in) (Up to length of 13.0 cm / 5.12 in)	
Dimensions (H x W x D)	15 in x 17 in x 9 in (38 cm x 43 cm x 23 cm)	15 in x 17 in x 10 in (38 cm x 43 cm x 25 cm)
Weight	39 lbs (17 kg)	37 lbs (17 kg)
Sound Level	75 dB A	64 dB A
Supply Voltage	100 – 240 V (+/- 10%)	
Supply Frequency	50 - 60 Hz	
Current Consumption	3.6 amps at 115 VAC 1.8 amps at 230 VAC	4.2 amps at 115 VAC 2.1 amps at 230 VAC
Centrifuge Motor	½ H.P. Brushless	
Max Speed	4,000 RPM (+/- 100)	
Max Carrier Load	140.0 grams	
Cycle Time	0.5 to 99 minutes (+/- 2%)	
Environmental Conditions		
Set-up Site	Indoor Use Only	
Altitude	Up to 2,000m from Sea Level	
Ambient Temperature	2 °C to 40 °C	
Humidity	Maximum relative humidity 80% for temperatures up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C	
Overvoltage Category	II	
Pollution Degree	2	

This operator's manual is part number 03-0-0002-0160, Rev. F
For access to previous manual revisions, please contact Drucker Diagnostics Customer Service.

Product Family: BOOST Series (HORIZON 24 Flex-AH, 24 Flex-AV)

Complies with UL61010-1/CSA C22.2 No. 61010-1 and IEC61010-2-020

FDA LISTED

E112532

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, waste disposal service, or where you purchased the product.

Designed, built, and supported in the USA

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ISO 13485 Medical Devices Quality Management