

BOOST

2+ Max











Operator's Manual



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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	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.



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.



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.

MODEL DESCRIPTION

Satisfy your lab's most diverse processing requirements with the Boost 2+ Max. Customize settings and check every detail on the digital display. Program up to 10 custom cycles.

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

- 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 10 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

- Unpack and verify that all the following are included:
 - Centrifuge
 - Power cord
 - Carriers
 - Carrier Inserts (if applicable)
 - Quick Start Insert or Operator's Manual
- Setup the centrifuge on flat and level surface. A bench top clearance height of 25" (64 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.
- 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.
- Turn on the power switch on the back of the centrifuge.



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

OPERATION

- 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.

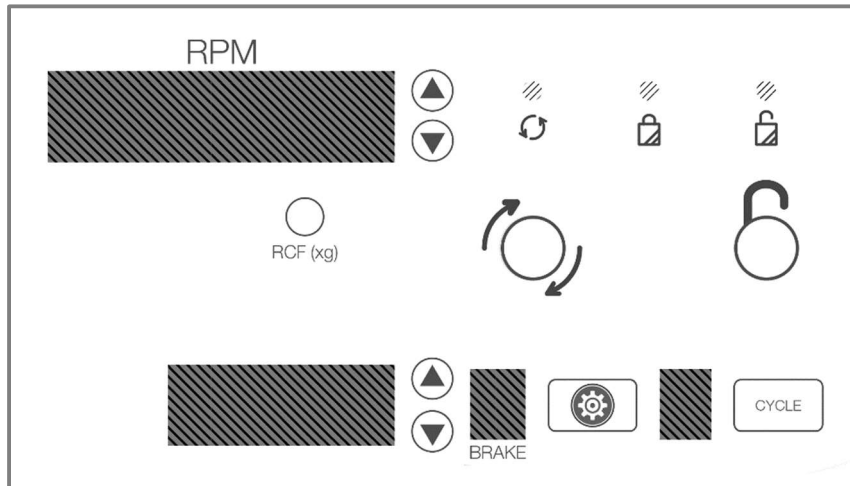


Be sure to follow the rules for balanced loads. Refer to **Balancing Loads** section.

- Close the lid by pressing down on the front edge of the lid. An audible "click" and the illuminated "LOCKED" symbol will indicate that the lid is fully closed.
- The digital screen shows the currently selected cycle. To select another cycle, press the UP or DOWN 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 countdown timer reaches zero, the rotor will begin to slow to a complete stop and the lid lights will begin to flash.
- Once the cycle is complete, the lock will disengage and the lid will automatically pop open.
- You may now safely remove the disposable(s).

QUICK START

The top screen display alternates between the name of the currently selected 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. Once the rotor has come to a stop, pressing the UNLOCK button again will open the centrifuge lid.
	Cycle Selection	Press the CYCLE button to select the desired saved cycle.




SETTINGS

QUICK ADJUST TIME AND SPEED




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

	<p>Setting Speed</p>	<p>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.</p>
	<p>Setting by G-Force</p>	<p>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.</p>
	<p>Setting Time</p>	<p>Press the up and down buttons next to the TIME display.</p>



ADJUSTING THE BRAKE SETTING

	<p>Enter the Advanced Menu</p>	<p>Press the GEAR button to enter the advanced menu.</p>
	<p>Change Brake Values</p>	<p>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).</p>
	<p>Exit the Menu</p>	<p>Press the GEAR button.</p>


CHANGING THE BEEPER (AUDIBLE ALERT)

	<p>Enter the Advanced Menu</p>	<p>Press the GEAR button to enter the advanced menu.</p>
	<p>Turn Beeper On or Off</p>	<p>While in the advanced menu, navigate to “Beeper”. Switch ON or OFF with the UP and DOWN buttons next to the TIME display. This setting will apply to all cycles.</p>
	<p>Exit the Menu</p>	<p>Press the GEAR button.</p>

CREATE NEW CYCLE









	<p>Change Settings</p>	<p>Refer to previous table (Quick Adjust Time and Speed) to change speed and time to desired values.</p>
	<p>Save Cycle</p>	<p>Hold the CYCLE button until you hear a double beep.</p>

DISPLAY CYCLE COUNT




	<p>Display Cycle Count</p>	<p>With the lid open and the unit powered, press and hold the START button. The cycle count will be displayed until the START button is released.</p>
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MODIFYING A PRESET

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




	Access the Menu	With desired cycle selected, access the menu.
	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 display. The RPM will automatically adjust.
	Setting Speed (Alternate)	To change the speed (RPM), use the UP and DOWN buttons next to the 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.
	Change Brake Values	While in the advanced menu, navigate to "Brake". Use the UP and DOWN buttons next to the TIME screen to turn brake on and off.
	Turn Beeper On or Off	While in the advanced menu, navigate to "Beeper". Switch ON or OFF with the UP and DOWN buttons next to the TIME display. This setting will apply to all cycles.
	Naming the Cycle	While in the advanced menu, navigate to the cycle name with the UP and DOWN arrows. Press the START button. The * indicates the space selected. Use the UP and DOWN buttons to change characters, then move to the next space with the right arrow >. Press the GEAR button to return to the main programming menu.
	Save and Exit Settings Mode	Press the GEAR button, followed by the CYCLE button to exit the menu.

DELETING A CYCLE

	<p>Enter the Advanced Menu</p>	<p>With the desired cycle selected, access the menu and enter the advanced menu.</p>
	<p>Navigate to Delete</p>	<p>Using the UP and DOWN buttons, navigate to DELETE. Exit the menu. WARNING: CYCLE WILL BE DELETED IF MENU IS EXITED WITH DELETE SELECTED.</p>
	<p>Confirm Deletion</p>	<p>Press the CYCLE button to Delete the cycle.</p>

CYCLE 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.

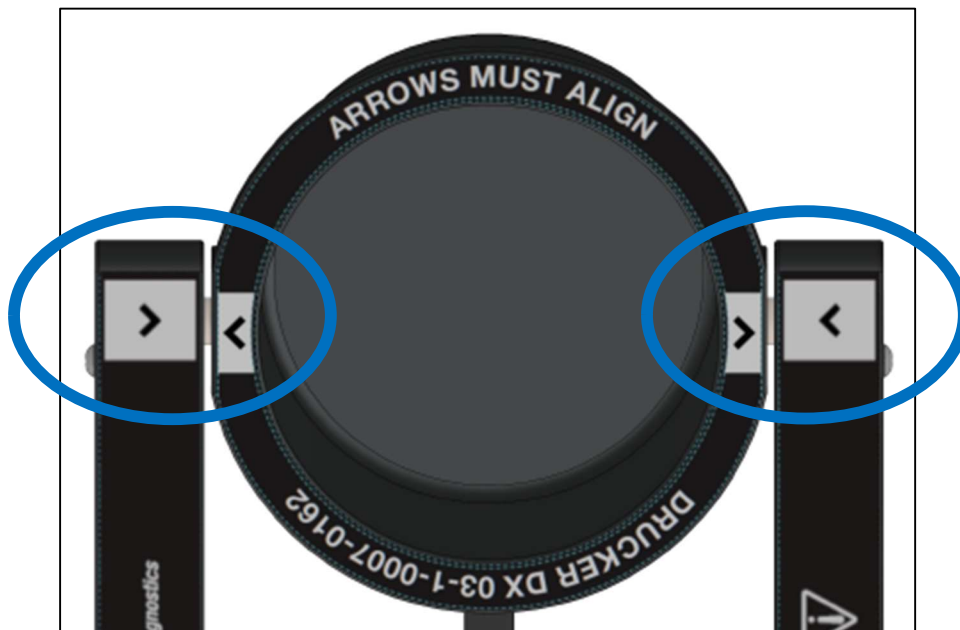
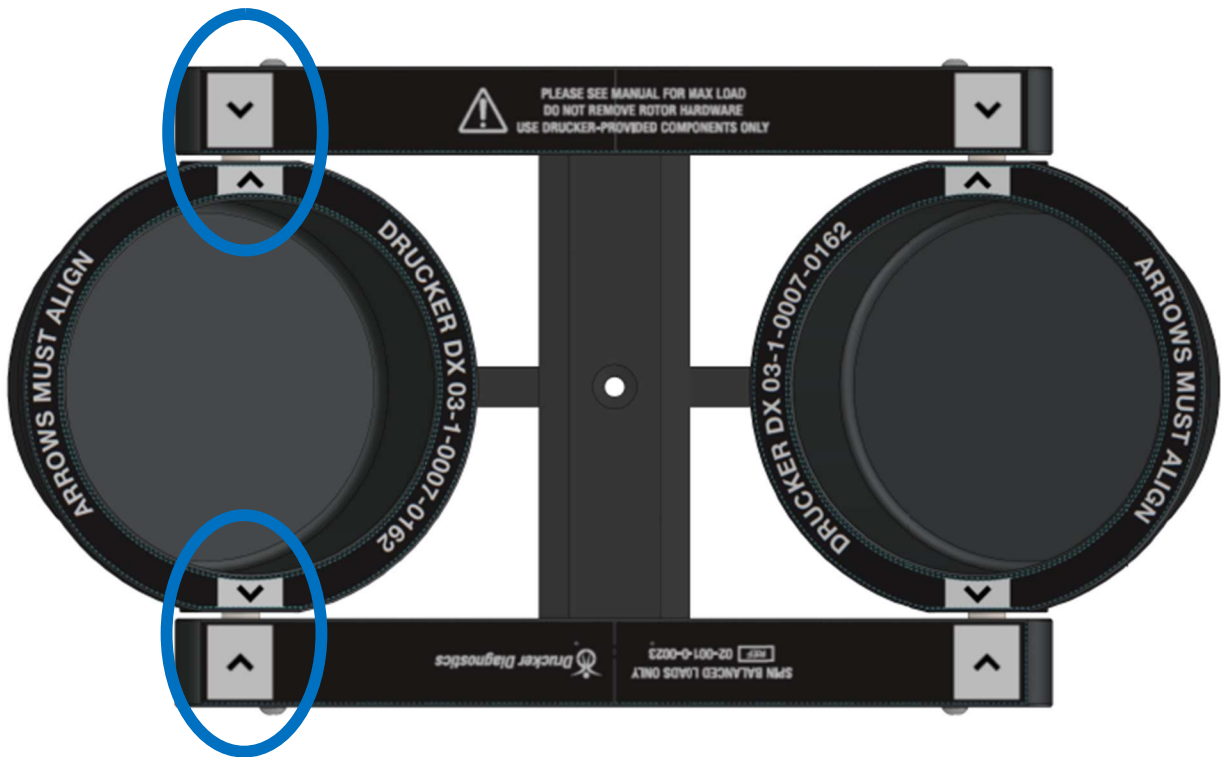
	<p>Enter Preset Lock</p>	<p>With the lid open, press and hold the UNLOCK button to enter Preset Lock. One beep will confirm that cycle selection is now locked. NOTE: If Single Cycle Lock is set, it must be canceled before Presets Only Mode can be set.</p>
	<p>Enter Single Cycle</p>	<p>With the lid open, select desired cycle, press and hold the UNLOCK button. Two beeps will confirm that cycle selection is locked.</p>
	<p>Cancel Lock</p>	<p>Hold the UNLOCK button. Three beeps will confirm that the cycle selection is now unlocked.</p>

LOADING

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.



BALANCING LOADS

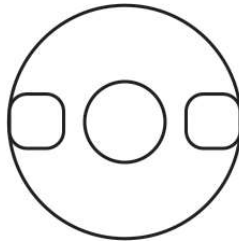
Your centrifuge must contain a balanced load to work properly. Spinning balanced loads will extend the life of the centrifuge and produce better results.



The amount of imbalance allowed to be loaded into each opposing carrier shall not exceed maximum specification. Refer to **General Specifications** section for maximum imbalance specification.

Use the following rules when loading the rotor. 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.



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 a 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.

- 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.
- 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.

TROUBLESHOOTING

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

<p>The centrifuge does not run</p>	<ul style="list-style-type: none"> ○ Verify that the centrifuge is powered. One of the LED lights should be on. ○ If “LID” message is displayed, ensure that the lid is closed and latched. Press lightly on the front edge of the lid. An audible “click” and the illuminated “LOCKED” symbol will indicate the lid is fully closed. ○ If the centrifuge still does not run, contact Customer Service.
<p>The rotor does not spin freely</p>	<ul style="list-style-type: none"> ○ 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.
<p>The centrifuge makes a rattling noise when running</p>	<ul style="list-style-type: none"> ○ 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.
<p>Excessive noise or vibration when the centrifuge is running</p>	<ul style="list-style-type: none"> ○ 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 of this manual. ○ Make sure that nothing has fallen into the rotor chamber.
<p>“Abort” is displayed on the top screen</p>	<p>The centrifugation cycle has been interrupted.</p>
<p>The centrifuge stops and beeps continuously</p>	<p>The load is not balanced. Press the UNLOCK button, open the lid, and balance the load as recommended elsewhere in this manual.</p>
<p>The centrifuge is stuck on one of the settings</p>	<p>Cycle selection is locked. Press the UNLOCK button for 5 seconds.</p>
<p>Only a few cycles can be accessed</p>	<p>The Preset Lock is active. To deactivate it, press the UNLOCK button for 5 seconds, until you hear 2 beeps, then again until the next 2 beeps. All cycles can now be accessed and/or amended.</p>
<p>The cycle time and speed are not set to the desired value</p>	<p>Check the setting by following the instructions in the section on Setting or Modifying a Saved Cycle. If the preset is not the desired length, follow the procedure on the same page to change the preset time.</p>

<p>Cycle parameters cannot be changed</p>	<ul style="list-style-type: none"> ○ If cycle selection is locked on one cycle, press the UNLOCK button for 5 seconds. Then, press the GEAR button and follow the instructions elsewhere in this manual. ○ If different saved cycles can be selected but not modified, the centrifuge is in Preset Lock mode. Press the UNLOCK button for 5 seconds until two beeps are heard, then again until the next two beeps. You should now be able to change cycle parameters.
<p>The centrifuge does not unlock after a run is completed</p>	<ul style="list-style-type: none"> ○ Wait until the rotor has come to a complete stop. If the lid does not automatically open, 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. Insert the provided tool into the holes in the lid and cabinet, located near the latch mechanism, to manually disengage the latch mechanism. If successful, the lid should pop open. ○ If the unit is damaged, contact Customer Service for assistance.
<p>The lid does not open</p>	<ul style="list-style-type: none"> ○ Press the UNLOCK button to open the lid. ○ If the lid remains locked after this and will not unlock, the electronics may have been damaged. Contact customer service for assistance.

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 or go to www.druckerdiagnostics.com/g-force-calculator/.

In Centimeters:

$$\text{RCF or G-force} = 0.00001118 \times \text{Rotor Radius (cm)} \times (\text{RPM})^2$$

In Inches:

$$\text{RCF or G-force} = 0.0000284 \times \text{Rotor Radius (in)} \times (\text{RPM})^2$$

Radius 6.14 in (15.6 cm)
 (Displayed RCF is calculated at 15.6cm radius, and is rounded to the nearest 25 xg.)

GENERAL SPECIFICATIONS

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

Disposable Capacity	2 disposables (Up to diameter of 91.4 mm / 3.60 in) (Up to length of 137.2mm / 5.40 in)
Dimensions (H x W x D)	15 in x 18 in x 10 in (38 cm x 46 cm x 25 cm)
Weight	37 lbs. (18 kg)
Sound Level	67 dB A
Supply Voltage	100 – 240 (+/- 10%)
Supply Frequency	50 - 60 Hz
Current Consumption	3.6A at 115 VAC 1.8A at 230 VAC
Centrifuge Motor	½ H.P. Brushless
Max Speed	3,200 RPM (+/- 100)
Max G-Force	1,800 xg
Max Carrier Load	330.0 grams
Max Imbalance	5.0 grams
Cycle Time	.5 to 99 minutes (+/- 2%)
Environmental Conditions	
Set-up Site	Indoor Use Only
Altitude	Up to 2,000m from Sea Level
Ambient Temperature	5 °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 03-0-0002-0298, Rev. B

To access previous manuals please click relevant link below:

[Revision A](#)

Product Family: BOOST Series (BOOST 2+ Max)

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

Protected by U.S. Patents #6,811,531, # 7,422,554, #D718,463, & #D734,489. Other Patents Pending

FDA LISTED



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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