



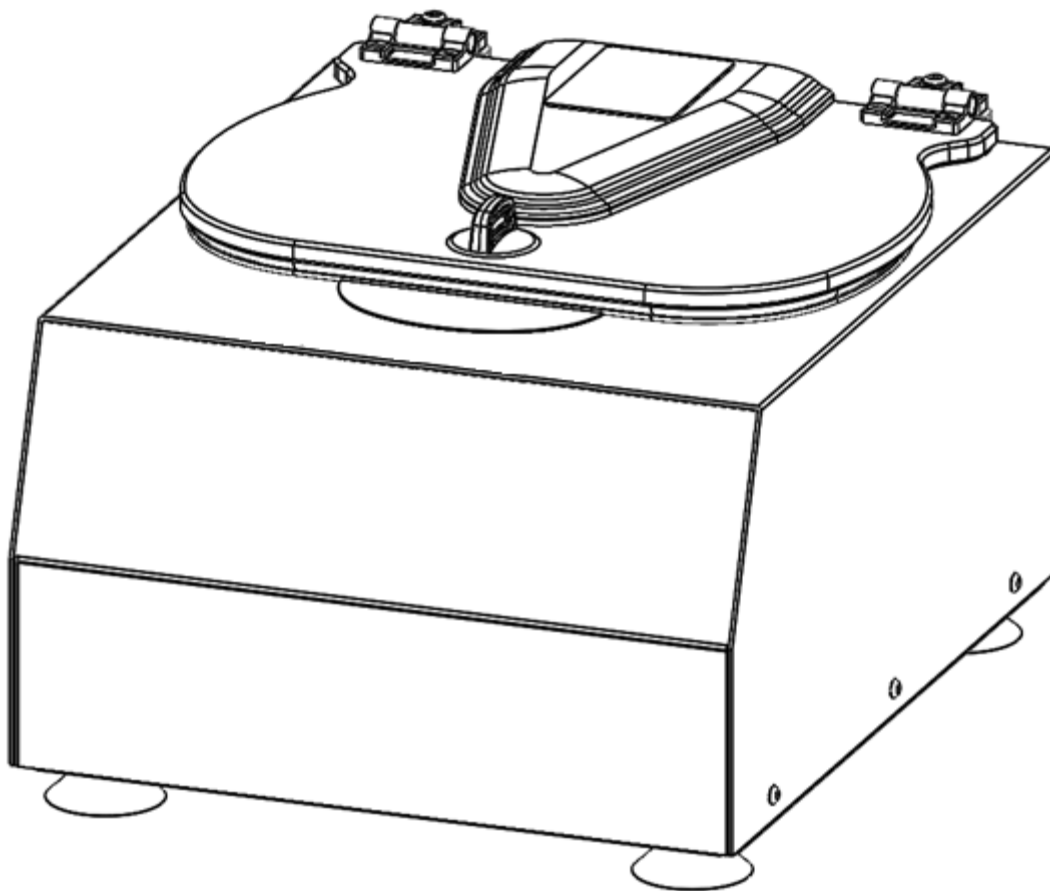
# ***Drucker Diagnostics***

*Innovative Solutions for a Healthier World*

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## **Service Manual**

### **DASH Apex 12 Centrifuge**



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## 1. PREFACE

- 1.1. The purpose of this manual is to provide the service technician with information for troubleshooting, testing, and repair of laboratory centrifuge model DASH Apex 12. Only qualified technically trained personnel should attempt any of the servicing described in this document. Failure to follow the procedures in this document may result in personal injury or instrument damage. Drucker Diagnostics will not be held liable for any injury or damage because of improper servicing.
- 1.2. Information contained within this manual is subject to change without notice.

## 2. GENERAL DESCRIPTION OF MAJOR COMPONENTS

- 2.1. Motor: Brushless DC Motor
- 2.2. Printed Circuit Board: The PCB is the microcontroller-based control center of the centrifuge. All control signals are generated in the PCB.
- 2.3. Lid Locking Tray Assembly: The lid tray assembly contains a solenoid and limit switch that are used to determine the state of the lid (Open or Closed) and to keep the lid locked during centrifugation cycles.
- 2.4. Rotor: The centrifuge rotor is the main component that spins in the centrifuge. The rotor is loaded with tube holders, and the samples are placed into the tube holders for processing.

## 3. WARRANTY INFORMATION

- 3.1. Drucker Diagnostics warrants its centrifuges to be free from defects in workmanship and parts for two years.

## 4. SPECIFICATIONS

Maximum Speed	5200 RPM
Maximum RCF	4000
Dimensions (in)	9.0 (H) x 13 (W) x 15 (L)
Environmental Operating Range	16-32 deg C
Typical Noise Level (At Maximum Speed)	< 61 dB A

Electrical Rating	95-253 VAC
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## 5. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
The lid does not open.	No Power	Check removable line cord or wall outlet.
	Lid knob is ajar	Rotate the lid knob fully clockwise before pressing the 'UNLOCK' button
	Lid lock is active (Unlock timed out)	Press the 'UNLOCK' button to de-activate the lid
	Lid tray is unplugged from PCB or defective	Requires service
	PCB is damaged	Requires service
		To gain access to the rotor - Remove the label directly in front of the lid knob and slide the lid latch lever toward the front of the centrifuge. This will unlock the lid.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Excessive vibration	Rotor improperly loaded	Load equally filled tubes symmetrically in the rotor. All carriers and/or tube holders must be present in the rotor, whether loaded, or empty.
	Debris lodged within the rotor or tube carriers	Carefully inspect all rotor pockets, tube holders and crevasses for debris.
	Centrifuge housing is loose	Requires service
	Missing/damaged feet	Requires service
	Motor failure	Requires service
	Rotor damaged	Replacement required

PROBLEM	POSSIBLE CAUSE	SOLUTION
Rotor does not spin	No Power	Check removable line cord
	No Power	Check circuit breaker on underside of centrifuge.
	No Power	Check wall outlet
	Lid not properly latched	Press down firmly on lid and rotate lid knob fully clockwise.
	Internal connection failure	Requires service
	PCB failure	Requires service
	Motor Failure	Requires service

PROBLEM	POSSIBLE CAUSE	SOLUTION
Clicking noise during braking	Rotor is loose	Tighten rotor screw per section 7-2

PROBLEM	POSSIBLE CAUSE	SOLUTION
Whistling noise while running	Debris in air intake / exhaust ports	Remove power before clearing debris.
	Gasket failure	Requires service

PROBLEM	POSSIBLE CAUSE	SOLUTION
Cycle ends prematurely. The centrifuge reports the error in a repeating BUZZ / BEEP sequence		
BALANCE ERROR 1 ERROR BUZZ + 2 REPEATING BEEPS	Rotor improperly loaded	Load equally filled tubes symmetrically in the rotor.
	Debris lodged within the rotor or tube carriers	Carefully inspect all rotor pockets, tube holders and crevasses for debris.
	Rotor damaged	Replacement required
LOW SPEED ERROR 2 ERROR BUZZES + 2 REPEATING BEEPS	Rotor Speed is under set speed for too long.	Check the lid and guard bowl gaskets. Voids in the rotor chamber gaskets change the airflow, resulting in increased stress on the motor drive
OVERCURRENT ERROR 3 ERROR BUZZES + 3 REPEATING BEEPS	Motor or PCB failure	Service Required
NO RPM ERROR 6 ERROR BUZZES + 4 REPEATING BEEPS	Sensor not connected to PCB	Check connections
	Sensor failure	Replace motor
	Locked rotor	Service Required
EEPROM ERROR 2 ERROR BUZZES + 6 REPEATING BEEPS	PCB failure	Replace PCB
ACCELEROMETER ERROR 2 ERROR BUZZES + 7 REPEATING BEEPS	PCB failure	Replace PCB
MOTOR DRIVE ERROR 2 ERROR BUZZES + 9 REPEATING BEEPS	PCB failure	Replace PCB

## 6. SERVICE INSTRUCTIONS

### 6.1. Cleaning

- The cabinet, rotor and accessories can be cleaned using soap and water, isopropyl alcohol, or a 10% (5500 PPM) bleach solution
- 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.
- Under no circumstances should any of the following be used: TBQ Germicidal Products, Fully/Partially Halogenated Hydrocarbons, Ketones or Esters.
- The use of any chemicals not prescribed by the manufacturer may cause damage to the rotor and tube carriers and shall not be used.

### 6.2. Removing the Rotor

- Use a 1/8" hex key to loosen the center rotor screw (turn counter-clockwise).
- Lift the rotor straight up and out of the rotor chamber.
- To install the rotor, reverse steps A and B above. Take care to align the shaft cross-pin with the rotor hub. Tighten the rotor screw to 3.5 Nm.

### 6.3. Maintaining the Rotor

- Keep the rotor clean, any corrosive materials must not be allowed contact with the rotor and should be cleaned immediately.
- The rotor should be checked periodically for signs of wear.
- Remove the rotor from service if any of the following are found: cracks, deep scratches, corrosion or discoloring.

### 6.4. Rotor Screw

- If the rotor screw needs to be tightened, use a 1/8" hex key and tighten to 3.5 Nm.

### 6.5. Speed Calibration

- Check the centrifuge speed periodically, every two years is recommended.
- Important: When verifying rotor speed, make certain that all carriers are installed in the rotor.
- No calibration adjustment of speed can be made, only a verification of rotor speed.

### **6.6. Removing the Cabinet (Upper Housing)**

- There are eight screws that fasten the centrifuge cabinet to the base.
- Begin by unplugging the centrifuge.
- Use a 3/32 hex key to remove the cabinet screws (three on left and right sides, two in the rear)
- The cabinet control panel is attached to the base internally with cable harnesses. Be careful not to stress the cables when removing the cabinet.
- Stand directly in front of the centrifuge and lift the cabinet straight up and off the base, setting it down on its right side.
- Gently remove the power supply and motor harnesses from the PCB.

### **6.7. Replacing the Lid Lock Assembly**

- The lid tray assembly is accessible once the cabinet has been removed.
- Gently remove the lid tray wire harness from the PCB.
- The lid tray assembly is held in place with two #6 Nylok nuts. Use a 5/16" nut driver to remove the nuts. The tray will slide off the threaded studs.
- To install the lid tray, slide it onto the studs, and secure it with two #6 Nylok nuts, hand tight.
- Complete the installation by gently plugging the wire harness into the PCB header 'J2'. The header and connector are keyed for proper orientation.

### **6.8. Replacing the PCB**

- The PCB is accessible once the cabinet has been removed. Make certain that all wire harnesses have been disconnected. Use standard precautions for handling static sensitive components.
- The PCB is held in place with six #6 Nylok nuts and plastic insulator washers. Use a 5/16" nut driver to remove the nuts. The PCB and washers are now free to slide off the threaded studs.
- Beneath the PCB are six plastic standoffs. If they are crushed, replace them before reassembly.
- To install the PCB, make certain that six plastic standoffs are present on the control panel studs.
- Slide the board onto the studs
- Install six plastic washers onto the studs securing the circuit card.
- The six nuts should be tightened only until the buttons on the control panel click when pressed – do not over tighten. Each nut sets the height of a separate control panel button. Too low, and they cannot be actuated, too high and they jam against the front panel label and are always in the 'ON' state. Tighten each nut a ¼ turn in succession, trying each corresponding button as you go.
- Once each control panel button clicks when pressed, installation is complete.

### 6.9. Removing the motor

- Remove the cabinet assembly by following 7.8
- Cut and remove all wire harness zip ties.
- Flip the base assembly up-side down and remove the three exhaust air channel screws with a #2 Phillips driver.
- Set the exhaust cover aside
- The guard bowl is held in place with six #8 screws. Remove them with a #2 Phillips driver.
- Lift the base assembly off the guard bowl and set it aside.
- The motor assembly is held in place with 3 #8 Nylok nuts and fender washers. Remove the nuts with an 11/32" nut driver.
- Remove the three fender washers.
- Lift the motor assembly up and off the studs.
- The motor is secured to the mounting plate with 4 #8 screws. Use a # 2 Philips driver to remove the screws.

### 6.10. Replacing the motor



Fig 1



Fig 2

- Place the motor onto the motor mount plate and thread the motor wires into the cutout as shown (fig 1).
- Attach the motor to the motor mount plate with four #8 screws and torque to 18 in-lbs (Fig 2).
- Secure the motor wire harness with a zip tie as shown. Snip the tag end of the zip tie flush when complete.

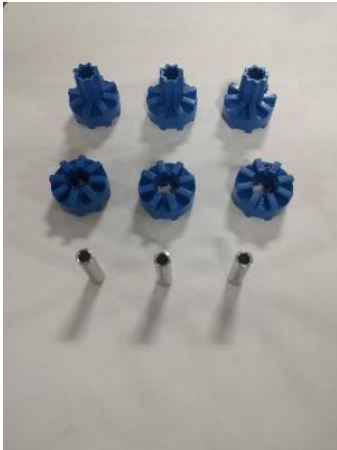


Fig 3



Fig 4



Fig 5

- Insert the Elastomer bushings into the motor mount plate as shown (fig 4).
- Push the grommets onto the bushings as shown (fig 5).



Fig 6

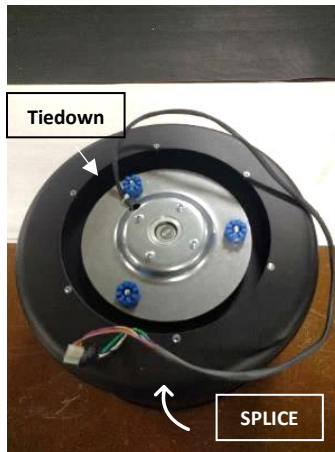


Fig 7



Fig 8

- Place one Aluminum spacer 30-000112 onto each stud as shown (fig 6).
- Install the motor mount assembly onto the guard bowl studs so that the motor wire tiedown is positioned opposite of the guard bowl splice (fig 7).
- Install one fender washer onto each stud (fig 8).
- Finish the assembly with one Nylok nut on each stud, and tighten to 13 in-lbs





Fig 9



Fig 10

- Place the base assembly onto the guard bowl assembly with the guard bowl splice positioned as shown (fig 9).
- Feed the motor wire harness into the base passthrough so that the wire harness is not pinched between the base and the guard bowl (fig 10).

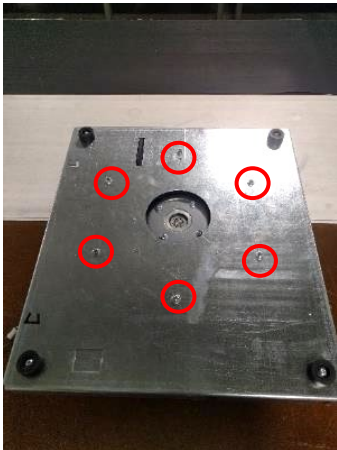


Fig 11

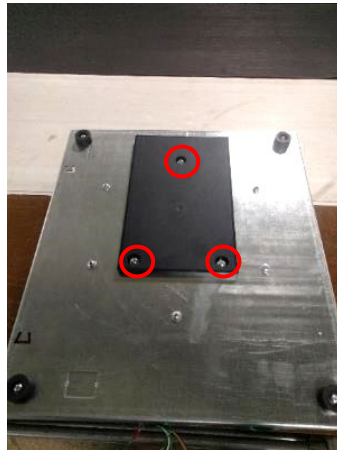


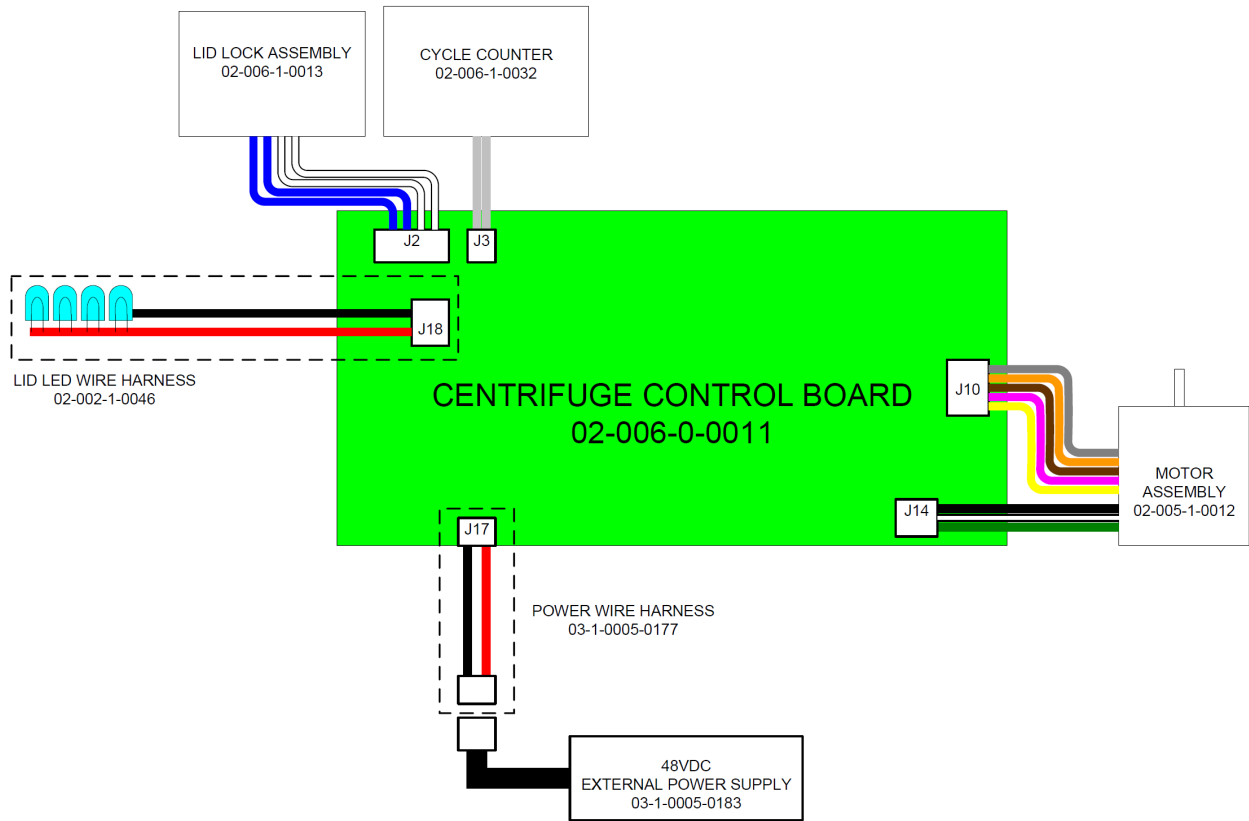
Fig 12

- Secure the base with six #8 screws torqued to 10 in-lbs. (fig 11).
- Install the exhaust cover and secure with three #8 screws torqued to 10 in-lbs. (fig 12).

### 6.11. Power Connections and Final Assembly

- Plug the power harness into J17
- Plug the motor harness into J10 (Hall Sensors) and J14 (Motor power)
- Plug the lid lock harness into J2
- Plug the cycle counter harness into J3
- Carefully place the cabinet onto the base taking care not to pinch any wires between the two.
- Complete the assembly by replacing the eight #8 screws, with a 3/32 hex key.

## 7. WIRING DIAGRAM



## 8. SPARE PARTS LIST

