

## Centrifuge Services: An End-user's Guide

### Product Introduction

A laboratory centrifuge is used to separate fluids based on density. Generally, there are two types of centrifuge— micro centrifuge and tabletop centrifuge. These two differ on the sample capacity and types of rotor used, but both are used for sample separation by subjecting the samples in a containing vessel at a high-speed rotation. This is commonly used in hospitals and diagnostic labs for blood and urine testing, in research institution for DNA/RNA pelleting, and other procedures in the laboratory which require separation of heterogeneous mixtures.

### Application

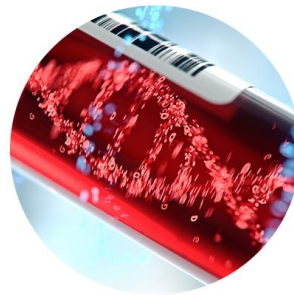
The centrifugal force (g-force) generated by a centrifuge motor isolates suspended particles from their surrounding medium on either a batch or a continuous-flow basis. There are various applications for centrifugation which may include sedimentation of cells and viruses, separation of subcellular organelles, and isolation of macromolecules such as DNA, RNA, proteins, or lipids.



Sample  
Sedimentation



Sample  
Preparation



DNA/RNA  
Pelleting



Blood and  
Urine Testing

### Maintenance

Poor maintenance of centrifuges will result in inefficient lab operations and can cause various physical and exposure hazards. Proper servicing and routine cleaning based on the manufacturer's recommendations are vital in maintaining a safe working environment for laboratory personnel.

Table 1. *Scheduled Maintenance*

No.	Description of Task to Perform	Maintenance to be carried out			
		Before using	After using	As needed	Yearly
1	Check if all components of the unit are grease-free and damage-free.	✓			
2	Maintenance procedure including cleaning of rotors and accessories.		✓		
3	Lubrication of the rotor insert bolts and lid thread.		✓		
4	Autoclaving and sterilization.			✓	
5	Removal of adherent dusts from the ventilation slots of the centrifuge.			✓	
6	General inspection.				✓
7	Testing of speed and temperature (if applicable).				✓

*General Maintenance*

Before using the unit, check if the following are not greased and damage-free: lid lock, motor shaft, and rotor. Do not operate the centrifuge with rotors or adapters that show any signs of corrosion or mechanical damage.



Apply a thin layer of rotor grease to the lid thread on the fixed-angle rotor (see *Figure A*).



In swing-bucket rotor (see *Figure B*), apply a thin layer of grease to the rotor bolts if it does not swing freely every after cleaning and autoclaving. Ensure that the rotor cross pivots and the bucket grooves are free from contamination. Also, ensure to grease the sealing of bucket caps regularly and the lid is tightly sealed.

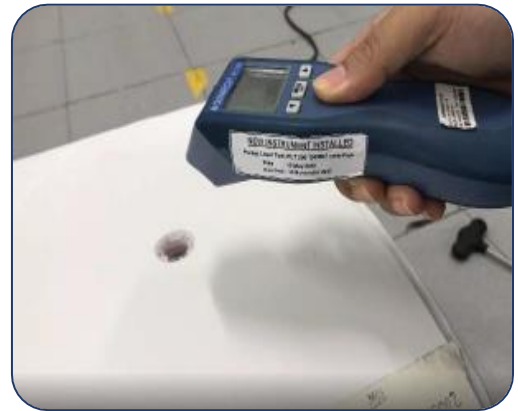


Annual general inspection is recommended for optimum operation. Check the following regularly:

- Tightness of screw hinges, sight glass, and rotor lid.
- Functional check of the operating panel and device control including emergency switch.
- Electrical safety check in accordance with the relevant regulations.



The speed and temperature can be calibrated or tested to reference instruments. It is recommended to calibrate at least once a year to ensure continuous and optimal performance of the centrifuge.



### Cleaning Procedure

- Cleaning of unit, rotors, and accessories  
Before cleaning and disinfection, make sure to turn off the device and disconnect the power supply. Do not pour liquids inside the interior. Clean the chamber, rotor, adapters, and external surfaces daily after use with a soft cloth soaked in pH-neutral detergents only. Ensure that all parts are dried thoroughly. Coat anodized aluminum parts with anti-corrosion oil regularly in order to increase their lifespans and reduce corrosion predisposition.
- Autoclaving and sterilization  
In case an infectious material spilled in the centrifuge, the rotor and rotor chamber must be disinfected right after the run. Before autoclaving, the materials must be carefully washed with distilled water. The recommended time for autoclaving is 12-20 min at 121°C (1 bar). Adapters, tubes, and rotors can be sterilized with ethylene oxide. Afterwards, apply enough airing on the items before reusing.

- Removal of adherent dusts from the ventilation slots of the centrifuge every six months using a soft brush.



### **Working Safely with Centrifuge**

The initial step in securing lab personnel is understanding the hazards, risk, and utilizing a combination of the appropriate safety equipment and procedures. Lab personnel should learn and strictly follow preventive measures to reduce damage and minimize occurrence of serious injuries. Here are a few important guidelines for operating a centrifuge:

- Before the run
  1. Ensure that centrifuge bowls and tubes are dry and the spindle is clean.
  2. Always use centrifuge safety cups with aerosol covers to contain spills and aerosols of potentially infectious materials.
  3. Secure that the rotor is properly and tightly seated on the driveshaft.
  4. Inspect seals regularly for deterioration and decontaminate the inside and outside of the cups or buckets.
  5. Pre-cool your centrifuge first before the operation starts when handling temperature-sensitive samples like proteins, blood, and urine.
  6. Weigh the samples and balance the tubes in the rotor/buckets.
  7. Do not use rotors and accessories that does not match the rotor of the centrifuge manufacturer.
  8. Do not overfill the tubes.
  9. Do not exceed the rotor's maximum run speed.
- During the run
  1. Close the centrifuge lid during operation and do not open the lid while the rotor is still running.
- After the run
  1. Make sure that the centrifuge is operating normally before leaving the laboratory.

2. Inspect seals regularly for deterioration and decontaminate the inside and outside of the cups or buckets. Replace as needed.

Moreover, it is recommended to use plastic centrifuge tubes than glass tubes. Plastic tubes are cheaper and more durable especially in high speed setting. It also come in different colors, making them much easier to label and organize.



You may also use adapters to fit tubes into the bores as unfit tubes may slip out into the holes. Slipping out of tubes may cause breakages and imbalance during the centrifugation process.



For containment, load and unload the rotor in a biological safety cabinet. Wait for 30 minutes before opening the centrifuge or aerosol-tight lid if a tube breaks or leaks to let the aerosols settle. Wait for 10 minutes after the rotor stops before opening the lid when a spill of infectious material occurs. Decontaminate the centrifuge with 70% ethanol or 10% bleach solution afterward. Remember that only properly trained personnel can check the O-rings on the rotor.