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March 2005

Operation Manual

Microcentrifuges
Force 1624
and
Force 1418, Force 1618

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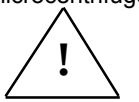
Congratulations on your Microcentrifuge selection. This microcentrifuge has been carefully designed and constructed for easy operation and proven durability. Digital displays, quiet operation, simple controls, autoclavable rotors and rotor covers are a few of this microcentrifuge's features.

Check the contents of the shipping carton. You should find the following items:

- Centrifuge
- Power cord
- Rotor - Force 1418 and Force 1618 - 18 x 1.5 ml rotor
  Force 1624 - 24 x 1.5 ml rotor
- Rotor cover
- Wrench
- Operation manual

Follow the instructions for selecting a location for the installation of your microcentrifuge.

To take advantage of the many features of this unit, carefully read this manual. It contains step-by-step procedures, examples and other vital information for proper care and operation of your microcentrifuge.



CAUTION

Safety Warnings

Use of this product in a manner not specified by the manufacturer may impair any safety protection provided by the equipment and may result in physical damage and/or personal injury. Please read all operating instructions in the Operation Manual prior to use of this device. See Good Laboratory Safety Precautions listed below.

Good Laboratory Safety Precautions

Good laboratory practice requires that the following safety precautions be observed.

- **Always tighten rotor nut with wrench before starting unit.**
- A boundary area of 300mm around the centrifuge should be marked and laboratory management procedures should require that no person or any hazardous materials or breakable items be located within this boundary while the centrifuge is operating.
- An emergency switch for disconnection of the AC (mains) power to the centrifuge, in case of malfunction, is required. This switch must be located away from the centrifuge, preferable outside the room in which the centrifuge is housed or adjacent to the exit from that room.
- Always wear OSHA approved, wraparound eye protection. Observe appropriate safety precautions for the materials being centrifuged as detailed by the Material Safety Data Sheets.
- The centrifuge must not be used with flammable or explosive materials, nor with materials which could chemically interact.

RCF Quick Reference (approx.) for 1.5ml tubes

RPM	1418	1618	1624
1000	82	82	91
2000	326	326	362
3000	735	735	815
4000	1306	1306	1449
5000	2040	2040	2264
6000	2938	2938	3260
7000	3999	3999	4437
8000	5223	5223	5796
9000	6611	6611	7335
10000	8161	8161	9056
11000	9875	9875	10958
12000	11752	11752	13040
13000	13793	13793	16019*
14000	NA	15996	NA

*Value given is for the maximum speed of the centrifuge, 13,300 rpm.

Accessories

The following accessories are available for the Force 1418, 1618 and 1624 centrifuges.

Adapters

Each adapter holds one tube.

Adapter for 500µl tubes, pack of 6	C1205
Adapter for 250/400µl tubes, pack of 6	C1206
Adapter for 200µl thermal cycling tubes, pack of 6	C1222

Operating Specifications

- Ambient operating temperature: 4º to 40ºC
- Operating humidity 0% to 95% humidity, noncondensing.
- The weight of the centrifuge, unloaded rotor and rotor cover is approximately 11 lb (5.0 kg) for the Force 1418 and Force 1618, and 11.75 lb (5.3 kg) for the Force 1624.

Electrical/Fuse Ratings

120 volt unit: 120V~, 50/60Hz, 1.5A 2.5AT Fuse
230 volt unit: 230V~, 50/60Hz, 0.8A 1.25AT Fuse
100 volt unit: 100V~, 50/60Hz, 1.5A 2.5AT Fuse

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Manual Lid Lock Release

Should a power failure occur while the centrifuge is in operation, the lid of the centrifuge will remain locked until power is restored. However, it is possible to gain access to valuable samples by releasing the lid lock manually.

1. Locate the plastic release button on the front of the centrifuge.
2. Pry the button out of the centrifuge housing.
3. A wire is attached to the button. Once the button is free of the housing, tug firmly on the button and wire to release the lid lock.
4. The lid of the centrifuge can now be opened and samples removed.
5. Before operating the centrifuge again, replace the release button.

NOTE: Do not attempt to operate the manual release while the rotor is spinning.

Cleaning and Maintenance

- There are no user serviceable parts within the unit. Opening the case will void the warranty.
- The unit should be wiped down after each use with a soft cloth. Periodic cleaning of the rotor and chamber should be performed to keep the unit in proper operating condition. Clean any spills immediately.
- Disconnect electrical power from the microcentrifuge before cleaning.
- Do not immerse the body of the centrifuge in any liquid
- Use mild soap or diluted bleach and a soft cloth. Do not use chemical solvents for cleaning.
- The removable rotor and rotor cover may be autoclaved at 121ºC.
- Before using any cleaning or decontamination method, except those recommended by the manufacturer, verity with the manufacturer that the proposed method will not damage the equipment

Note: An excessive buildup of dirt and grime in the centrifuge may affect operation of the unit. It is the responsibility of the user to maintain the centrifuge in the proper manner. Failure to do so may affect the warranty coverage.

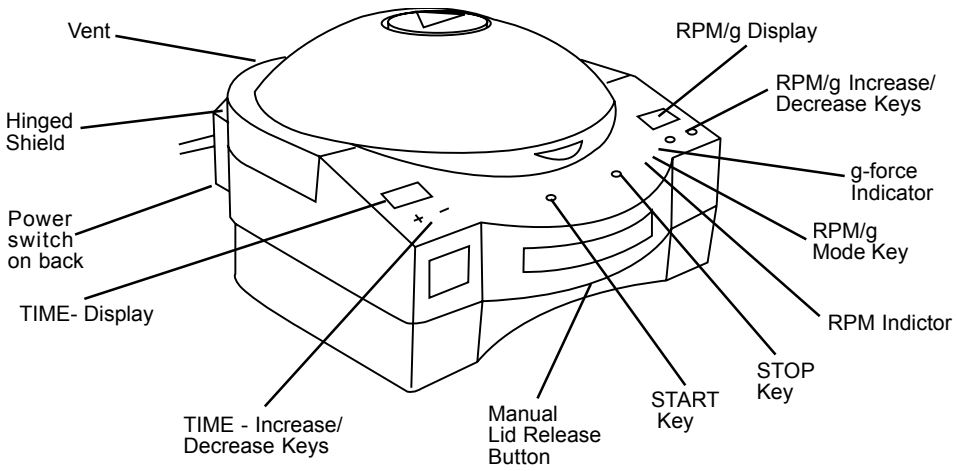
To Calculate Separation Acceleration & RPM:

$$RCF = 11.18 \times r \times (n/1000)^2$$

Where: r = radius in cm and
n = speed in rpm

The centrifugal radius of the 18 x 1.5ml rotor is 7.3cm and of the 24 x 1.5ml rotor, 8.1cm. The centrifugal radius of the rotors is reduced when using 0.5ml and 0.2ml adapters. For the 18 place rotor, the radius when using 0.5ml adapters is 6.6cm and when using 0.2ml adapters, it is 6.1cm. The centrifugal radius of the 24 place rotor with 0.5ml adapters is 7.4cm and 6.9cm when using 0.2ml adapters.

- Do not expose the centrifuge, rotor, rotor cover or accessories to materials or processes which could cause chemical or mechanical damage.
- Thoroughly inspect the centrifuge, rotor and accessories for mechanical and chemical damage *prior to each use*. Mechanical damage can often be visually observed, and includes cracks, scratches or gouges on the centrifuge lid or rotor. Chemical damage can often be visually observed and includes crazing, peeling or similar deterioration of the inner cavity, lid, rotor or surfaces.
- **DO NOT USE THE CENTRIFUGE OR ROTOR IF DAMAGE IS EVIDENT. REPLACE DEFECTIVE PARTS IMMEDIATELY.**
- Do not dispose of the centrifuge by incineration.
- Use only manufacturer-approved accessories with the unit.
- Sample tubes used must be compatible with the maximum Relative Centrifugal Force (RCF) rating of the centrifuge. Sample tubes have a limited life and should be used per the sample tube manufacturer's recommendations. Do not mix the sample tube types within a rotor. The weight of each sample should be within 5% of all other samples. To maintain balance, equally distribute loaded sample tubes in the rotor.
- The rotor cover provided is not intended to be a bioseal (as defined by IEC 1010-2-020) for containment of pathogenic microbiological specimens during use.
- **Do not move the centrifuge during operation, as the unit may become unbalanced and the rotor may become dislodged.**
- While a small amount of vibration during rotor acceleration or deceleration is normal, immediately stop the centrifuge if excessive vibration is evident at any time.
- Do not obstruct any air inlet or exhaust vent on the centrifuge.
- The centrifuge is not designed to spin more than 2.5 grams of fluid per sample tube.



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Specifications

Model	Max. speed	Max. RCF	Capacity
1418	13,000 rpm	14,000 x g	18 x 1.5 ml
1618	14,000 rpm	16,000 x g	18 x 1.5 ml
1624	13,300 rpm*	16,000 x g	24 x 1.5 ml

*Display shows 13,000 rpm

Operation

I. Setup

1. This product is intended for indoor use only
2. Locate the centrifuge on a smooth, clean work surface.
3. Plug cord into a properly grounded outlet. Set power switch to on.
4. A soft beep can be heard as the microcentrifuge powers up. Factory default settings will be displayed on the front panel. NOTE: If the lid latch does not release after power up, press the RED stop button.

II. Operation

1. Tighten rotor nut with wrench
2. Load the rotor with sample tubes. Be sure to balance the tubes in the rotor.
3. Place the rotor cover on the rotor. Do not use the rotor without the cover.
4. Close the lid and select the mode of operation

III. Modes of Operation - Normal

To program for normal operation, do the following:

1. On the right hand side of the microcentrifuge, press the MODE key once to select RPM or g-force as indicated by the Display Mode Indicator.
2. Press either the up or down arrow key to select the desired speed or g-force.
3. To set the TIME, press either the + or - key to select the desired run time.
4. Press lightly on the lid, while pressing the GREEN start key to begin the run.
5. You will hear a BEEP at the end of the run when the lid lock is released. To stop the unit before the time period expires, press the RED stop key.

IV. Modes of Operation - Pulse

To program for PULSE operation, do the following:

1. Select RPM or g as previously explained.
2. Set the time to ZERO
3. Press lightly on the lid
4. Press and hold the GREEN start key. Time will count up in seconds.
5. Release the GREEN start key to stop.
6. You will hear a BEEP at the end of the run when the lid lock is released.

Mounting and Securing the Rotor

Remove the rotor screw from the motor shaft by turning the screw counterclockwise. Clean the motor shaft and rotor mounting hole. Place the rotor on the motor shaft. The Force 1418 and Force 1618 have a cross-pin on the shaft that must be aligned with the slot on the underside of the rotor. The 1624 does not have a cross pin.

Reinstall the rotor screw on the motor shaft by turning it clockwise. Hold the rotor with one hand and hand-tighten the rotor screw. **Use the supplied wrench to tighten the screw an additional quarter turn.**

Troubleshooting

If a problem should arise with the centrifuge, please refer to this troubleshooting guide.

Problem	Solution
Lid will not open*	• Is the rotor spinning? Allow rotor to come to a complete stop before attempting to open the lid. • Check for and remove any obstructions in the lid latch holes. • Has the unit lost power? Lid will remain locked until power is restored. • Turn power swtich off then on again.
Unit will not start/does not achieve speed	• Lid is open. Press lightly on the lid while pressing the green start key. • Rotor is unbalanced. Reload properly. • Rotor cover is missing. Replace cover.
No power	• Check that the power cord is intact and not pinched. Check the outlet. Check that the power cord is connected to both the unit and the outlet. Check power switch. • Check fuse. Replace with properly rated fuse if necessary. • The unit may have received a large static discharge. Unplug the unit, wait one minute, turn unit back on and restart.
Excessive vibration	• Load is not balanced. Redistribute the sample tubes in the rotor. • Check installation of the rotor and cover. • Replace rotor.
No display	• Check the power connections. (See “No power”, above.)
Tone sounds when started.	• This indicates that the lid has not been closed or that the safety latch is not engaged. Confirm that the lid is completely closed and there are no obstructions in the latch holes. Press lightly on the lid while pressing the green start button to restart the unit.

*It is possible to release the lid lock manually to open the lid and remove samples in the event of a power failure. Follow the instructions under “Manual Lid Lock Release” to open the lid and retrieve samples.

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