

Operation Manual

IEC[®] Centra CL3 Series Centrifuges

VENTILATED

Cat. No.3750: 120 VAC, 60Hz

Cat. No.3751: 220, 230, 240 VAC, 50/60 Hz

REFRIGERATED

Cat. No.3755: 120 VAC, 60Hz

Cat. No.3756: 220, 230, 240 VAC, 50 Hz

Cat. No.3757: 230 VAC, 60 Hz



OM3750 Rev. 5 11 January 2004

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1. Introduction

1.1 Product Description

The IEC Centra CL3 Series units are high-speed, multi-purpose centrifuges used in medical, industrial, and scientific applications. They are available in two models:

- Ventilated (CL3)
- Refrigerated (CL3R)

Both units accommodate a wide variety of rotors including fixed angle, swinging bucket, and fixed horizontal designs. They can process tubes, bottles, microplates, microcapillary tubes and microsample tubes. The units can centrifuge up to one liter of fluid in a single operation.

Operation Modes

There are two operation modes:

- **Manual Mode:** to enter temperature (refrigerated units only), speed/force, and time values for individual runs
- **Program Mode:** to define and save a maximum of 99 specific sets of run parameters, to recall and reuse

Timing Modes

Three timing modes are available on each unit:

- Automatic timed run
- Short spin (momentary)
- Hold (continuous mode).

Other Features

Acceleration and brake rates may be controlled to optimize runs; rapid for fast separations or slow for delicate samples. Repeat runs, with the same speed and time settings, may be achieved at the touch of a key.

A fail-safe cover interlock insures that the cover is closed before a run can begin, and keeps the cover closed until the rotor has reached a safe low speed (below 100 rpm), even in the event of a power failure.

The rugged steel cabinet and rigid construction provide quiet operation and long-term reliability.

1.2 About This Manual

Contents

This manual contains information to install, operate, and maintain IEC Centra CL3 Series Centrifuges. Differences between the refrigerated and ventilated models are noted in the text. This manual also contains speed and force, derating, chemical resistance, and decontamination tables.

Audience/Purpose

This manual is written for centrifuge operators. In addition to operation information, it contains a few basic troubleshooting techniques, and a chapter on maintenance. This manual is not a guide for servicing centrifuge units.

2. Installation

2.1 Receive the Unit

All units are shipped in protective packaging.

1. Follow the unpacking instructions on the carton.
2. Inspect the unit upon receipt and immediately file any damage claims with the shipper/carrier.
3. Complete and return the postage-paid warranty card.

2.2 Prepare the installation site

The unit normally resides on a bench top.

1. **OPTIONAL:**
Ventilated models can be placed in a cold room (no colder than 4 °C), for processing temperature-sensitive samples.

⚠ CAUTION

When you remove the centrifuge from a cold environment, do not operate for a minimum of two hours to allow condensation to evaporate prior to use.

NOTE: When used in a cold room environment, some bearing noise may become evident. The bearing lubricant thickens at low temperatures. As the centrifuge speeds up, it is thinned and distributed more evenly. Once this occurs, any noise should subside.

2. Place the centrifuge on a clean, dry surface, to make certain that the suction feet at the bottom grip the surface firmly. Keep the area beneath the unit free of debris and loose materials.

⚠ CAUTION

The resting surface must be level, to ensure quiet, vibration-free operation. A rigid and stable location is important. An improperly loaded centrifuge may vibrate or move

3. Locate the centrifuge to allow a clearance of 8 cm (3 inches) on all sides of the unit, to ensure proper ventilation.

Dimensions:

	IEC Centra CL3R	IEC Centra CL3
Sample Loading Height	12.5" (32 cm)	
Cover Closed Height	14.5" (37 cm)	
Cover Open Height	33" (84 cm)	
Width	26.5" (68 cm)	19.25" (49 cm)
Height	21" (53 cm)	

⚠ WARNING

International Electrotechnical Commission standard 1010 part 2-20 limits the permitted movement of a laboratory centrifuge to 12" (300 mm) in the unlikely event of a disruption. Laboratory management procedures should require that no person or any hazardous materials enter within this boundary while the centrifuge operates.

2.3 Verify Power Configuration

1. Verify that the correct power cord and connector is provided for your installation.

The unit requires a grounded power supply (3-outlet).

If your facility does not have grounded power outlets, arrange for proper grounding. The power cord plugs in on the left side of the unit.

WARNING



ELECTRICAL HAZARD!

Do not remove the grounding pin from the centrifuge power cord. Do not use the bare wired power cord to attach a power plug that does not have a grounding pin.

The power cord provided with the unit is correctly rated for the highest current demand. This power cord should not be interchanged with cords from equipment with lower current demand. Exchange of power cords between equipment may create a fire hazard.

2. For best results, the refrigerated centrifuge should be used on a dedicated line. Variations in line voltage or frequency affect the unit's speed and other characteristics.

NOTE:

Less than nominal line voltage may prevent the centrifuge from reaching maximum published specifications of speed and/or temperature. Power line voltage, at some locations, may sag when the refrigeration system turns on

2.4 Circuit Breaker

The system provides an automatic circuit breaker for emergency situations such as power surges that could damage the unit. If the circuit breaker trips:

1. Unplug the unit.
2. Press the white button, on the left side of the unit.
3. Plug the unit back in.

2.5 Moving the Unit

Suction cups at the bottom of the unit keep it anchored to the work surface. Keeping the unit stationary is a safety feature.

To move the unit to a new location:

WARNING



The unit can weigh up to 145 lb. (65.8 kg). Use caution when moving to avoid any injury.

1. Check that the new site meets the criteria in Section 2.2 before moving the unit.
2. Position a flat object, such as a tongue depressor, near a suction cup at the bottom of the unit.
3. Lift up an edge of the cup, and insert the flat object far enough to break the vacuum suction seal.
4. When all four suction cups are disengaged, lift the unit from the work surface.
5. When the unit is in its new location, ensure that the suction cups adhere correctly to the work surface

3. Operation

3.1 Rotor and Accessories

A balanced load is essential for all centrifuges. An unbalanced load produces vibration, and can damage the unit. ALWAYS balance containers on opposite sides of the rotor.

NOTE: A 2-gram load imbalance, at a speed of 4600 RPM, imparts force equivalent to 20 pounds (9.1 kg) at rest. Always ensure that the rotor is loaded symmetrically, with a full complement of accessories, and a full (or paired) set of tubes. Tube adapters should also be installed symmetrically.

Balance load within 1 gram

The rotors are dynamically balanced at the factory. The manufacturer matches removable parts (trunnion rings, shields, buckets, and carriers) to within 1 gram, and stamps the weight on each piece. Check these markings, whenever you interchange parts, to ensure that opposite parts are matched. Ensure that the total weight of samples and removable parts, loaded in opposing positions, are equal in weight, to within 1 gram. The position numbers, present on many rotors and adapters, identify opposing tube positions.

Opposing containers must be alike in shape, thickness, and distribution of glass or plastic. This is especially important for large containers.

NOTE:

Swinging Bucket Rotors:

Tubes loaded into swinging bucket rotors must be symmetric, around the axis of rotation. Verify this by rotating the entire rotor 180° by hand. The loads should be in the same apparent positions (not mirror images). In addition, the loads within each bucket must, also, be symmetric around the bucket's pivot axis. Verify this by ensuring that each bucket is loaded so that it does not tilt from the vertical, when the rotor is at rest. Maintaining balance within each bucket ensures that the bucket and the tubes swing out to horizontal, when the rotor reaches operating speed, applying centrifugal force toward the bottom of the tubes. Failure to achieve full swing-out causes vibration and premature wear of the rotor and the motor.

Samples of like (similar) specific gravities may be processed in the same run, provided that the samples of the same type are balanced around the rotor, as though they were the only pairs in the rotor.

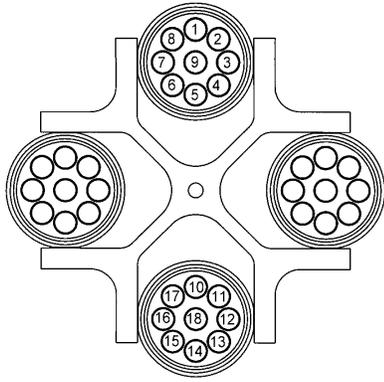
CAUTION

Do not exceed maximum rated speed for each rotor/ accessory combination. Maximum rated speeds can be found in Section 4.2 - Speed And Force Tables.

Rotor Balance

Load tubes in the following manner:

1. Load two tubes at positions: 9 and 18.
2. Load four tubes at positions: 1, 5 and 10, 14 or 7, 3 and 16, 12
3. Load six tubes at positions: 1, 9, 5 and 14, 18, 10 or 7, 9, 3 and 12, 18, 16
4. Loading an odd number of tubes is not recommended.



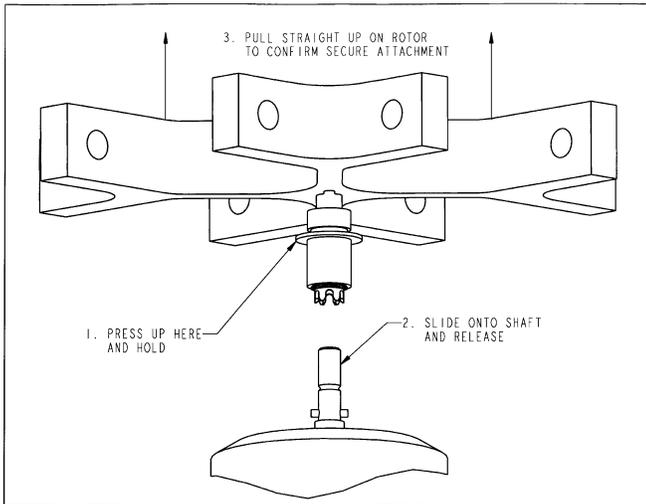
Avoiding Vibration

All centrifuges have critical speeds at which vibration occurs. As the speed increases beyond the critical speed, vibration will cease. This inherent condition also occurs during deceleration. An imbalanced load intensifies these critical vibrations. You should avoid running the centrifuge at or near its "critical speed" to avoid excessive vibration.

Rotor Installation

To install the rotor:

1. Press the disk (located on the underside of the rotor) to the rotor.
2. Slide the rotor over the shaft, until it snaps into place. Release the disk.
3. Pull the rotor straight up, to insure a positive lock.



Rotor Removal

To remove the 243 rotor:

1. Press the disk (located on the underside of the rotor) to the rotor.
2. Lift the rotor straight up.
3. Release the disk.

Rotor Adapter

To install the shaft adapter for an existing rotor:

1. Press the adapter disk and slide the adapter over the rotor shaft. Release the disk.
2. Pull the adapter straight up to insure a positive lock.
3. Align the rotor keyway with the key on the shaft adapter and place the rotor onto the adapter.
4. Tighten the rotor locking nut (with the provided wrench), until it tightly engages the rotor.

To remove existing rotors from the shaft adapter:

1. Remove any sample tubes, shields, buckets, and other accessories, from the rotor.
2. Unscrew and remove the locking screw.
3. Grasp the rotor and rock it front-to-back, and side-to-side.
4. Remove the rotor from the shaft.

3.2 Starting and Stopping a Run

The display above the Program key shows the unit's operating mode:

- blank The unit is in manual operation.
- 1-99 The unit is under control of the displayed stored program number.
- C The unit is set to **Rapid Condition**, a special program discussed in Section 3.4.

The rest of the display indicates the last parameters selected.

Manual Operation

For manual operation:

1. Press the MANUAL key so that the program display is blank.
2. Select the desired temperature (refrigerated system only).
3. Select the speed/g-force, run time, acceleration mode, and braking mode.
4. Press START to start the spin.

The time display counts down, and displays the time remaining in the current spin, during manual operation.

The specified run time begins when the START key is pressed. Braking begins when the set time elapses. Run time does not include braking time.

The spin will stop automatically at the end of the desired interval.

IMPORTANT:

A run can be stopped at any time by pressing the STOP key.

The settings can be changed during a manual run. These changes affect the run in progress. If the time setting is changed during a run the unit adjusts the count-down timer to display the revised setting as the total time of the run. If the new time selected is less than the elapsed time, the run will end.

The unit's mode (settings) cannot be changed during a program mode spin.

3.3 Timing Mode

Four timing modes are available on these units: To select a timing mode, press the down arrow under the time display until the time goes below zero, and the appropriate symbol is displayed.

Momentary Mode (---) - Momentary spin is useful for easily separated samples, for simultaneous mixing of samples, and to deposit condensate droplets at the bottom of the tube.

For momentary spin, set the mode so that three dashes (---) appear above the Clock icon. Select temperature (refrigerated models only), speed/g-force, acceleration mode, and braking mode, as for manual operation.

Press and hold the **START** key. The run starts when you press the key, and ends when you release the key. In this mode, you can perform very quick separations or protocols.

During a momentary spin, the unit displays actual values, not desired settings. The time display counts upward, and displays the elapsed time since the **START** key was pressed.

Hold Mode (HLd) - For hold mode (operation without preset time limit), set the mode so that **HLd** appears in the Time display.

Select temperature (IEC Centra CL3R only), speed/g-force, acceleration mode, and braking mode, as with manual operation. Press and release the **START** key. The run starts when you press the key, and stops only when you press the **STOP** key. Hold mode is like manual operation, except that the time setting is not used. During a run in hold mode, the time display counts upward, and displays the elapsed time of the spin.

At-Start Mode (ACC) - The set time will start counting down at the beginning of acceleration (when the start key is pressed). The unit is originally set to this mode.

At-Speed Mode (SPd) - The set time will start counting down, when the rotor has reached 95% of set speed. The display will alternately show the set time and SPd, during acceleration to 95% of the set speed.

To select a timing mode, press the Time down arrow key, and scroll below 0 minutes. **ACC**, **SPd**, **HLd**, or **---** will appear. Press and release the Time down arrow key, to choose the desired mode. After three seconds, or after pressing the **PROGRAM** or **START** keys, the display will return to the last selected run time, provided the up arrow key has not been pressed.

The timing mode is stored along with the other parameters, when a program is saved. If a saved program has been recalled, altered, and not re-saved, the timing mode will revert back to the previous mode, when recalled.

3.4 Stored Programs

The centrifuge has an internal memory capable of holding 99 sets of run parameters. Programs are retained in memory even if the power is turned off. When necessary, a program can be modified for a particular run or changed permanently.

NOTE: You cannot change the unit's program, rotor/radius, or timing modes during a spin.

Add/Change Program

1. Press **PROGRAM** to enter Program mode.
2. Select a program number with the numeric keypad. The current program parameters will appear on the display.
3. Modify the desired parameters including speed/RCF, time and temperature (if a refrigerated unit). Use the numeric keypad or modify the **ACCEL** or **BRAKE** modes. Additionally, a radius value may be stored explicitly in the program.
NOTE: The program number will flash indicating that the program was changed but not saved.
4. To make changes temporary, press **START**. To make changes permanent, press the **SAVE** key.

NOTE:

After pressing the **SAVE** key, the program number will stop flashing. The program will remain in memory until further changes are made.

Because the centrifuge has a fully automatic rotor recognition system, the very first rotor spun using a particular program will be identified and have its identity automatically stored in the program. If you did not set a radius value, the default radius (or maximum allowable radius) for that rotor will be stored with the program as well. If you attempt to run a rotor other than the one whose identity is stored in the program, a "ch hd" (check head) message will appear.

To clear the rotor and its radius from memory, press the **SAVE** button. The very first rotor spun after **SAVE** is pressed will have its identity stored in the program, together with its default radius (if not explicitly entered to the program).

Recall Program

1. Press the **PROGRAM** key to enter program mode.
2. Select the appropriate program number by entering the desired program number on the numeric key pad and press **ENTER**. The program's set parameters will display.
3. Press **START**, to begin this run.

Lock Program/Unlock Program

- To lock a program to prevent changes to the program's parameters:

1. Select the desired program on the numeric keypad.
2. Press the **SAVE** key three times.

When you scroll to a locked program, the letter **L** will flash in the program display after the program number is displayed.

- To unlock a program to change parameters:

1. Select the desired locked program on the numeric keypad.
2. Press the **SAVE** key three times.

3.5 Refrigeration (refrigerated systems only)

Refrigerated units refrigerate the rotor chamber to a specific temperature whenever the cover is closed and the unit is switched on.

NOTE: If you use the keypad and momentarily display a cold temperature (stepping through stored programs, for example), refrigeration will not be activated.

CAUTION

If the rotor chamber is not at the specified temperature, it will NOT abort a spin. Press the STOP key if you need to stop a run.

At the beginning of a spin, if the chamber temperature differs by more than 5° C from the specified temperature, the temperature display will switch between the actual and set/programmed temperatures until the two temperatures come to within 5° C.

Rapid Condition

When the chamber temperature (refrigerated models only) is above the set temperature, Rapid Condition will run the 243 rotor at 4000 rpm and all others at 2800 rpm to increase air circulation in the chamber, to quickly cool the chamber to the set point. When the chamber temperature is below the set temperature, Rapid Condition will run the rotor at 2800 rpm, to warm the chamber to the set temperature. When the temperature has been reached, three beeps will sound and the rotor will brake to rest. Some smaller rotors may not be able to warm the chamber to higher temperature settings.

To select this program, press the Program arrow keys, until a C appears in the Program display. Select the desired temperature, install a rotor, and press the START key.

3.6 Front Panel

Speed/Force display:
The rotor speed in RPM or force in RCF. Press this symbol to toggle between RPM and RCF. Use the arrow keys to change the set speed or force. The display shows speed within 50 RPM. It never requires calibration. Select speed in increments of 100 RPM, from 1,000 through 8,500 RPM. Select RCF in increments from 1 - 1,000 xg by 50 xg and above 1,000 xg by 100 xg. The numeric display can also display warning or error messages.

Time display: The number in the display (above this symbol) indicates time. Below ten minutes, time is displayed as minutes:seconds. Above 10 minutes, just minutes are displayed.

Time is set in:
1 second increments from 1 - 59 seconds.
15 second increments from 1 - 5 minutes.
1 minute increments from 5 - 99 minutes.

In normal timed mode, the system counts down from the set point. In time Hold or momentary spin modes, the system counts up.

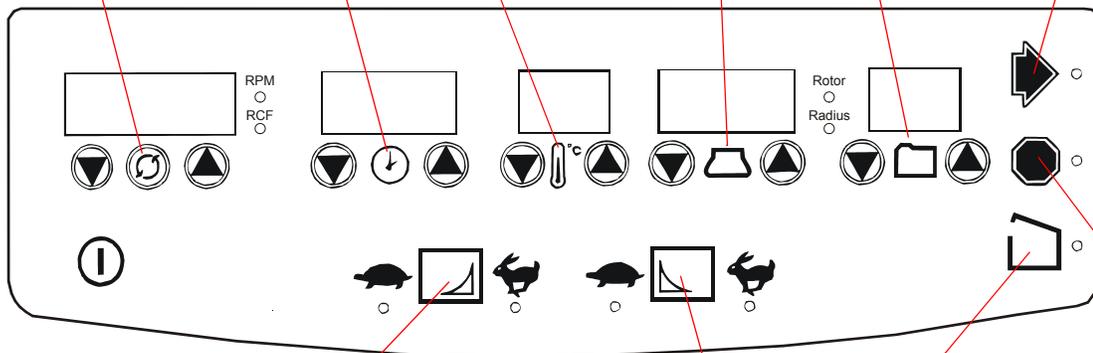
In At-Start mode, the timer begins counting at the start of a run. In At-Speed mode, the timer begins counting when the rotor reaches 95% of the set speed.

Rotor/Radius Key: The display (above this symbol) indicates the selected rotor number or the rotor radius, in centimeters. The rotor/radius key toggles between the two displays. The applicable Thermo Electron rotor numbers are supplied in the memory, along with their maximum radii, in centimeters. To select a rotor number, toggle to ROTOR, and press an arrow key under the rotor/radius display. To change the radius, toggle to RADIUS, and press an arrow key under the rotor/radius display. Note that the radius cannot be changed to a radius larger than the maximum radius, or less than the minimum radius, for the selected rotor.

Program key: This key saves the currently displayed desired settings as stored programs 1 through 99. The numeric display (above this symbol) shows the stored program number and mode of operation.

Temperature display:
The number in the display (above this symbol) represents temperature in degrees Celsius, from - 9 °C through + 40 °C (Refrigerated only).

This key starts a run. A run is governed by the Set parameters (manual or programmed). The associated green light blinks, until the rotor reaches 95% of the set run speed. The light stays on until the end of the run.



This key controls rotor acceleration up to 400 RPM. If the yellow light over the rabbit is lit, full acceleration is selected. If the yellow light over the turtle is lit, slow acceleration is selected. Slow acceleration takes from 15 to 35 seconds to achieve 400 RPM, depending on the rotor and its contents. After 400 RPM, full acceleration is applied until the set speed is reached.

This key controls rotor braking. If the yellow light over the rabbit is lit, full braking is selected. If the yellow light over the turtle is lit, slow braking is selected. (This means the rotor will coast down from 500 RPM.) If both lights are out, all braking is disabled and the rotor will coast from operating speed to a stop.

This key unlocks the cover. This key is inoperative if a run is in progress. Pressing it will not stop the run. The cover will not unlock until the rotor has slowed to below 100 rpm.

This key stops a run. (A run will also stop automatically when the set time has elapsed or the start key is released in momentary mode.) The red light will flash to indicate the rotor is still slowing down (braking or coasting). When the run ends the red light stays on indicating that the rotor has stopped.

Use the arrow keys to view or change the Set parameters for Speed/Force, Time, Temperature (Refrigerated only) Rotor/Radius, or Program. The first time the key is pressed the numeric display switches from Actual readings to Set parameters, without changing them. If you press the key a second time the selected parameter increases or decreases once for each depression. If you hold the key down, the setting will keep changing until you release the key.

The longer you hold the key the more rapidly the setting changes. Hold a key down to approach a desired setting. Then press the up or down key repeatedly to select the exact setting. When you release the arrow keys for 3 seconds the display returns to the Actual readings.

3.7 Diagnostic Messages and Error Codes

The beeper sounds in these situations:

- Two times on power up.
- Three times at the end of a spin.
- Five times when a warning occurs

Diagnostics

Diagnostic messages appear in place of the speed display in the following cases:

Message	Description
bAL	bAL indicates an unbalanced rotor. Open the cover to erase this message. Verify that a balanced load is installed. Inspect the rotor and rearrange the tubes, or add additional tubes with fluid to balance the rotor.
Lid	Lid appears if you press the START key when the cover is not closed. Close the cover to erase this message.
PFAIL	PFAIL indicates that power was interrupted during a run. This message appears when the unit is turned back on following the failure. The front panel will alternate between the PFAIL message and the remaining run time (or elapsed time if in Hold mode). Press STOP to erase this message. Press START to resume the previous run.
dFL	Drive Fault The drive fault error can occur due to one of the following conditions: - the motor experiences an abnormally high current or voltage condition - the drive PCB operating temperatures exceed 70°C - a brake circuit fault has been detected - a short to ground has occurred in the motor The rotor will coast to a stop. To clear the error, unplug the unit (or turn power switch off) and reconnect the unit (or turn power switch on). Check for obstruction of the cooling fans or vents. If repeated dFL errors occur, contact service personnel.

On/Off key: The **On/Off** key must be activated to enable use of the front panel. This key applies power to the control panel and refrigeration system (Refrigerated model only). The **On/Off** key is inoperative during actual runs. Stop a run with the **STOP** key. Refrigerated models display chamber temperature whenever they are plugged in, but will not cool down if the unit is off. The red **STOP** light indicates that the centrifuge is plugged in.



The control panel contains numeric displays for RPM/RCF (Speed/Force), Time, and Temperature (Refrigerated only). These displays have two states or modes: Actual (bright display) and Set (dim display).

In Actual mode (bright display), they indicate current run conditions, such as rotor speed or force elapsed time of, or time remaining in, the run actual temperature (Refrigerated only).

In Set mode (dim display), the display indicates the desired settings for the run.

The numeric displays can also, display warning or error messages

Gentle acceleration and braking can be selected when centrifuging delicate samples. The gentle settings avoid mixing of density gradients or breakup of pellets.

Acceleration and Braking

Error Codes

An error code typically means that the internal microprocessor has detected impermissible readings or a failure in the unit. Error messages appear in the speed display. When an error code is displayed, unplug and reconnect the unit to power. If the error code reappears, factory-authorized maintenance may be required. Contact your local Thermo representative and tell the service personnel which message appeared when you report the problem.

Error Code	Description
Err 1	No Tachometer Tachometer signals were not present during the run. The rotor coasts to a stop. Cover opening is inhibited after this error. Unplug and reconnect the unit to power to reset this error.
OSPd	Overspeed Speed is 200 RPM above the maximum speed for the installed rotor. The rotor will brake to a stop.
rEFR	Refrigeration Failure (Refrigerated only) The unit displays this code if the measured temperature exceeds 45°C, at any time during the run.
FSAFE	Fail-safe Time out Independent circuitry on the circuit board has sensed a lack of activity from the control microprocessor. All power circuits (including motor, latch, solenoid, etc.) are disabled.
COPF	Cop Watchdog/OpCode Trap Error The microprocessor has sensed a lack of activity from the program that controls the centrifuge. The rotor will coast to a stop.
COP	COP Watchdog Not Enabled The microprocessor COP is not enabled. The rotor will coast to a stop.
UndFI	Undefined Interrupt The microprocessor was interrupted by an undefined source. The rotor will coast to a stop.
ILLOP	Op-Code Trap Error The rotor will coast to a stop
dIR	Wrong Direction of Rotation The microprocessor discovered wrong direction of rotation, during acceleration
Warnings during a spin: Lid, PFAIL, and dIR error messages can occur during a spin. In this case, the rotor brakes or coasts to a stop and the run ends.	

4. Applications

4.1 Introduction

This section describes the use of specific rotors and accessories. More detailed information is shipped with the rotor or accessory itself. This section contains five reference sections:

- Speed and Force Tables
- Derating Table for Dense Samples
- Chemical Resistance Table
- Decontamination Table
- Nomograph

CAUTION

Do not exceed maximum rated speed for each rotor/ accessory combination. Maximum rated speeds can be found in Section 4.2 - Speed And Force Tables.

Relative Centrifugal Force (RCF or G-force) at a given speed varies with the rotor, and with the distance away (rotating radius) from the shaft of the centrifuge (center of rotation). The rotating radius is measured to the furthest inside tip of the tube, away from the centrifuge shaft. The Speed and Force Tables indicate the maximum speed and RCF that the IEC Centra CL3(R) can achieve, with various rotor/ accessory combinations. The Derating Table specifies reductions in maximum RPM, when spinning samples with specific gravity above 1.2.

Use of any tube above its rated RCF can cause tube cracking. To avoid this, compare the G forces, specified in the Speed and Force Tables, with the ratings for the tubes that you are using. If the tubes are not rated for the force that the centrifuge will apply, look up their reduced g force rating and enter it on the control panel.

Corrosive Solvents

Your centrifuge is made of materials designed to resist immediate attack from most laboratory chemicals. Prolonged exposure should be avoided, by immediately removing the chemical from rotor or assembly. Rotors and accessories placed in the chamber are made of a variety of materials, including aluminum and polypropylene. The Chemical Resistance Table shows the suitability of each material with different classes of reagents.

Section 5.2 describes how to clean and remove corrosion from the chamber, rotors, and accessories. Follow these instructions and clean spills promptly to minimize the effect of corrosive chemicals and to avoid expensive repairs.

4.2 Speed and Force Tables

Rotor 243 4-Place Swinging Bucket

Complete with 4 buckets, but without adapters.

No. x Vol. (ml)	Tube Description	Maximum		Adapter-Radius	Aerocarrier™ Adapter Quantity x Cat No*	Other
		RPM	RCF			
4 x 250 ml sealed	Thermo Electron 2502	4000	2970	16.6	2pr x6558E	-
4 x 250 ml unsealed	Corning 1260-250, 1280-250 †	4000	2970	16.6	2pr x6558E	-
4 x 175/225 mL sealed	Falcon 2076/2075 conical	4000	3150	17.6	2pr x6559E	-
4 x 100 ml sealed	Round bottom, 38x111 mm	4000	3110	17.4	2pr x6557E	-
4 x 80 ml	Amicon Centricon Plus 80	4000	2970	16.6	2pr x6558E	-
8 x 50 mL sealed	Corning 8240-50 †, Thermo Electron 2997	4000	3150	17.6	2pr x6556E	-
8x50ml sealed	Falcon/Corning conical	4000	3130	17.5	2pr x6560E	-
12x25ml sealed	Universal 25x107mm †	4000	2680	15.0	2pr x6568E	-
4 x20 ml	Amicon Centricon Plus 20	4000	3150	17.6	2pr x6556E	-
20x15ml sealed	Falcon/Corning conical	4000	3150	17.6	2pr x6561E	-
20x10ml sealed	Kova/Urisystem †	4000	3150	17.6	2pr x6561E	-
32x10ml sealed	16.5x103mm †	4000	2860	16.0	2pr x6567E	-
36x10-15ml sealed	Vacutainer 16x100, 16x125mm	4000	3150	17.6	2pr x6562E	-
20x14ml	Falcon 2059 round with cap ‡	4000	2700	15.1	2pr x6563E	-
36x7ml sealed	Vacutainer 16x75mm †	4000	2700	15.1	2pr x6563E	-
48x5-7ml sealed	Hemogard Vacutainer 13x75mm, 13x100mm	4000	3150	17.6	2pr x6566E	-
48x3-5ml sealed	10x75, 12x 75mm RIA tubes, Falcon # 2063	4000	3150	17.6	2pr x6566E	-
48x1.5/2ml sealed	Microtubes	4000	2110	11.8	2pr x6565E	-
48x0.7ml sealed	Microtainers	4000	2110	11.8	2pr x6565E	2pkx5763
48x0.5ml sealed	PCR microtubes	4000	2110	11.8	2pr x6565E	2pkx5763
48x0.4ml sealed	microtubes	4000	2110	11.8	2pr x6565E	2pkx5764
48x0.25ml sealed	microtubes	4000	2110	11.8	2pr x6565E	2pkx5764

* Adapters with Number Series 65XX are sold by the pair (pr). Adapters 5763, 5764 are sold by the pack/12.

Note: Aerocarrier Adapters comply with the aerosol containment requirements of:

OSHA 29 CFR Part 1910.1030 Occupational Exposure to Bloodborne Pathogens; Final Rule dated 12/06/91.

† Check with tube/bottle manufacturer for current maximum rating, as Thermo Electron Rotor/Accessory combination may exceed that rating.

‡ Caps have larger diameter than tube and interfere with each should all cavities try to be used. Thus, use only center hole and 12, 3, 6 and 9 o'clock positions in the adapter for a total of 5 tubes per adapter.

Aerocarrier is a trademark of Thermo Electron Corporation.

Corning is a registered trademark of Corning, Inc.

Amicon and Centricon are trademarks of Millipore Corporation.

Vacutainer and Microtainer are registered trademarks of Becton Dickinson Company.

PCR is a registered trademark of Perkin Elmer Corporation.

Rotor Packages 52151, 52152, 52153, 52154

Rotor 215 4 Place Horizontal Swinging Bucket

(Use requires 50968 tapered shaft adapter.)

No. of Places	Tube Volume (ml)	Trunnion/ Shield or Carrier	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. x Length (mm) Common Tube Size
4	50	325/320**	4100	2650	14.0	30 x 116
4	50	350/323**	3800	2050	15.2	Falcon/Corning Conical
4	10	310/356	4300	2750	13.2	17.2 x 113
8	50	326/320	3600	2050	14.2	30 x 116
12	10	355/356	3600	1900	13.2	17.2 x 112
12	10	366/1013	4100	2400	12.8	16.5 x 107 16 x 75; 16 x 100
16	5 - 7	366/1018	4150	2450	12.8	14.2 x 103 13 x 75; 13 x 100
20	3 - 5	366/369	4600	2625	11.1	12.6 x 83 10-12 x 75
4	3	1024	2050	500	10.6	1" x 3" Microscope Slide

* Order adapter 1106 and 571 cushion, to spin 15 ml Falcon/Corning Conical Tubes.

Rotor Package 52212

Rotor 221 6 Place Horizontal Swinging Bucket

(Use requires 50968 tapered shaft adapter)

No. of Places	Tube Volume (ml)	Shield	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. x Length (mm)
6	10	356	4400	2800	13.0	17.2 x 102
6	15	303	4000	2600	14.6	17.2 x 119 Falcon Corning Conical Kimble 45168-125

Rotor 244 2-Place (Tray) Horizontal Microplate

(Use requires 50968 tapered shaft adapter)

No. of Places	Tube Volume (ml)	Carrier	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Width x Length (mm)
4	-	included #	4000*	1800	10.0	86 x 128 (96 well) Microplates
2	-	49852	4000*	1800	10.0	86 x 128 x 55mm Deep Plates

* Replacement carrier is Thermo Electron No. 49852

** See derating table for 244 rotor

Rotor Package 58012

Rotor 801 6-Place Fixed Angle 45°

(Use requires 50968 tapered shaft adapter)

No. of Places	Tube Volume (ml)	Shield	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. x Length (mm)
6	50	305	4600	2950	12.1	30 x 133 Falcon Corning Conical*
6	50	320	5200	3300	10.8	30 x 116 Corning 8300-50

*With Thermo Electron 315 Conical Cushion

Rotor 804S 4-Place Fixed Angle 45° with 323 Sealed Dome Shields

(Use requires 50968 tapered shaft adapter)

No. of Places	Tube Volume (ml)	Shield	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. x Length (mm)
4	50	323*	7200	6675	11.5	Falcon/Corning Conical
4	60	341	2500	1000	14.3	Corning

* Order adapter 1106 and 571 cushion, to spin 15 ml Falcon/Corning tubes.

Rotor Package 58092

Rotor 809 12-Place Fixed Angle 45°

(Use requires 50968 tapered shaft adapter)

No. of Places	Tube Volume (ml)	Shield	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. x Length (mm)
12	10	356	5300	3200	10.2	17.2 x 88
12	15	303	4800	2880	11.2	17.2 x 102
12	15	302	4200	2480	12.6	17.2 x 122 Falcon/Corning Conical

Rotor Package 58153**Rotor 815 24 Place Fixed Angle 33°**

(Use requires 50968 tapered shaft adapter)

No. of Places	Tube Volume (ml)	Shield	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. x Length (mm)
24	10	356	4800	2860/2340	11.1/9.1	17.2 x 88
24	15	303	4200	2360/1970	12/10	17.2 x 102
24	15	302	3800	2100/1800	13/11	17.2 x 122 Falcon Corning Conical

Rotor Package 58162**Rotor 816 8-Place Fixed Angle 33°**

(Use requires 50968 tapered shaft adapter)

No. of Places	Tube Volume (ml)	Shield	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. x Length (mm)
8	50	320	4600	2800	11.7	30 x 115 Corning 8300-50
8	50	305	4300	2650	12.8	30 x 134 Falcon/Corning Conical*

* With Thermo Electron 315 cushion, order adapter 1106 and cushion 571 to spin Falcon/Corning tubes

Rotor 818 12-Place Fixed Angle 35°

(Use requires 50968 tapered shaft adapter)

No. of Places	Tube Volume (ml)	Adapter Number	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. x Length (mm)
12	5	-	8500	6060	7.5	12 x 80 Thermo Electron 2804, 2840
12	1.5 - 2	5762	8500	4680	5.5	11 x 66
12	B-D/.5	5761	8500	4770/3960	5.9/5.0	8 x 66
12	.4/.25	5760	8500	4680/3630	5.9/5.0	6 x 66

Rotor 819 10-Place Fixed Angle 35°

(Use requires 50968 tapered shaft adapter)

No. of Places	Tube Volume (ml)	Adapter Number	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. x Length (mm)
10	10	-	8500	6060	7.6	16.1 x 85 Thermo Electron 2046, 2067, 2801, 2850

Rotor 836 6-Place Fixed Angle 30°

(Use requires 50968 tapered shaft adapter)

No. of Places	Tube Volume (ml)	Adapter Number	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. x Length (mm)
6	30	-	8500	6060	7.5	25.8 x 100 Thermo Electron 2047, 2055, 2802
6	15	5965	8500	5820	7.2	16.1 x 109
6	5	5966	8500	5650	7.0	12.1 x 112
6	3	5967	8500	5490	6.8	10.9 x 95

Rotor 841 12-Place Fixed Angle 45°

(Use requires 50968 tapered shaft adapter)

No. of Places	Tube Volume (ml)	Adapter Number	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. x Length (mm)
12	1.5 - 2	-	8500	4680	5.8	11 x 39
12	B-D	5763	8500	4770	5.9	B-D Microtainer Tubes
12	.5	5763	8500	3960	4.9	8 x 66
12	.4	5764	8500	4680	5.8	6 x 46
12	.25	5764	8500	3630	4.5	6 x 46

Microtube Rotors

(Use requires 50036 hub adapter on 50968 tapered shaft adapter)

Rotor Cat. No.	No. of Tubes and Tube Size	Adapter Cat. No	Max Speed (RPM)	Max RCF (xg)	Radius (cm)
891 ¹ (Aerosol Contained)	24 x 1.5 ml	-	8500	6740	8.35
	24 x 0.6 ml B/D Microtainers™	5763**		6830	8.45
	24 x 0.5 ml PCR microtubes	5763**		6020	7.45
	24 x 0.4 ml microtubes	5764**		6740	8.35
	24 x 0.25 ml microtubes	5764**		5860	7.25
851 ²	24 x 1.5 ml	-	8500	6740	8.35
	24 x 0.6 ml B/D Microtainers™	5763**		6830	8.45
	24 x 0.5 ml PCR microtubes	5763**		6020	7.45
	24 x 0.4 ml microtubes	5764**		6740	8.35
	24 x 0.25 ml microtubes	5764**		5860	7.25
852 ²	48 x 0.5 ml PCR microtubes	-	8500	6460	8.00†
	24 x B/D Microtainers™	-		6060	7.50‡
853 ²	40 x 0.4 ml microtubes	-	8500	6950	8.60†
	40 x 0.25 ml microtubes	-		6790	8.40
	40 x 0.8 ml (6x50 mm) glass	-		6060	7.50
				6870	8.50

Microtainers® is a registered trademark of Becton Dickinson

** Order 2 pks of adapters separately. Thermo Electron 5763 and 5764 are packaged 12/pk.

† Outer row holds 24 tubes

‡ Inner row holds 24 tubes

Thermo Electron Corporation's 891 Rotor Provides Aerosol Containment and has been tested for microbiological containment by PHLS-CAMR, Porton Down. Meets requirements of US OSHA Bloodborne Pathogen Final Rule: (Regulation 29 CFR Part 1910.1030. Complete with Thermo Electron Corporation's 50417 Aerosol Containment Cover, 50525 Inner and 36597 Outer rubber O-ring seals.

2 Thermo Electron Corporation's 851, 852, 853 rotors

245 Horizontal Rotor 4x250 ml

(Use requires 50968 tapered shaft adapter)

No. of Tubes x Tube Size	Max Tube Size		Ultrac Adapter	Max RPM	Max RCF xg	Radius (cm)
	O.D. mm	L. mm				
40 x 1.5 ml microtubes	-	-	7228	2750	1375	16.2
40 x 3 ml	10.9	75	7228	2750	1450	17.2
48 x 5 ml	12.1	131	7226	2750	1450	17.2
5-7 ml (13 x 75-100mm vacutainers)	13.3	131	7238	2750	1450	17.2
28 x 10-15 ml vacutainers	16.2	110	7225	2750	1450	17.2
16 x 15 ml Falcon Conical	-	-	7230	2750	1475	17.6
12 x 30 ml	25.5	131	7223	2750	1450	17.2
4 x 50 ml	28.6	131	7231	2750	1450	17.2
4 x 50 ml Falcon/Corning Conical	-	-	7231	2750	1450	17.2
4 x 175 ml (Falcon 2076)	61.0	131	*	2750	1475	17.6
4 x 200 ml (Nunc 376813)	61.0	131	**	2750	1475	17.6
4 x 225 ml (Falcon 2075)	61.0	131	*	2750	1475	17.6
4 x 250 ml (Thermo Electron 2502, 2504)	61.0	131	-	2750	1500	17.8

* Also order Falcon 2090 cushions

**Also order Thermo Electron 5792 cushion

224/268 Horizontal Rotor 4x250 ml

(Use requires 50968 tapered shaft adapter)

No. of Tubes x Tube Size	Max Tube Size		Ultrac Adapter	Max RPM	Max RCF xg	Radius (cm)
	O.D. mm	L. mm				
40 x 1.5 ml microtubes	-	-	7228	4000	2450	13.7
40 x 3 ml	10.9	75	7228	4000	2630	14.7
48 x 5 ml	12.1	106	7226	4000	2630	14.7
40 x 7 ml	13.3	106	7236	4000	2630	14.7
28 x 7-10 ml	16.2	106	7225	4000	2630	14.7
12 x 15 ml Falcon Conical	-	-	7234	4000	2700	15.1
12 x 30 ml	25.5	106	7223	4000	2630	14.7
4 x 50 ml	28.6	110	7222	4000	2630	14.7
4 x 50 ml Falcon Conical	-	-	7231	4000	2630	14.7
4 x 75 ml (Thermo Electron 2059)	38.1	112	7221	4000	2630	14.7
4 x 175 ml (Falcon 2074)	61.0	125	*	4000	2700	15.1
4 x 250 ml (Thermo Electron 2261, 2051)	61.0	125	-	4000	2736	15.3

* Also order Falcon 2090 cushions

958 Horizontal Rotor 6x50 ml

(Use requires 50968 tapered shaft adapter)

No. of Tubes x Tube Size	Max Tube Size		TR. Ring	Carrier or Shield	Max RPM	Max RCF xg	Radius (cm)
	O.D. mm	L. mm					
48 x 5 ml	13.6	92	-	381	2600	1125	15.0
36 x Shell vial	17.7	77	-	379	2900	1300	13.7
36 x 7 ml	17.7	88	-	380	2600	1125	15.0
30 x 5 ml	12.6	98	366	369	3200	1600	14.0
24 x 7 ml	14.2	106	366	1018	2800	1375	15.7
18 x 10 ml	16.5	110	366	1013	2800	1400	15.9
24 x 10 ml	17.2	103	354	356	2400	1025	16.1
18 x 10 ml	17.2	112	355	356	2450	1075	16.1
6 x 15 ml	17.2	119	310	356	2950	1575	16.1
6 x 15 ml	17.2	134	310	303	2700	1475	17.6
12 x 50 ml	30.0	120	326	320	2400	1100	16.9
6 x 50 ml	30.0	124	325	320	2800	1475	16.8
6 x Microscope Slides	1"	3"	-	1025	1800	500	13.5

Hemato-Kit Rotor 930

(Use requires 1116 hublock adapter on 50968 tapered shaft adapter)

The 930 Hemato-Kit can convert the IEC CL3 Series into a micro-hematocrit centrifuge, providing a simple, economical way to perform occasional hematocrits. Blood cells are packed in about ten minutes, at 7800 RPM/6200 xg. Kit includes numbered 24-place rotor for 1.75 x 75 mm capillary tubes, 1505 gasket for tubes, cover, hublock adapter and wrench

for installing rotor. An accessory microcapillary tube reader available, to complete the system.

Order Cat. No. 930 Hemato-Kit and Cat. No. 2201 Microcapillary Tube Reader.

4.3 Derating Tables for Dense Samples

The Speed and Force Tables list the maximum speed for each rotor/adapter combination for the IEC CL3 Series.

These speeds are guaranteed, for samples whose specific gravity is not greater than:

- 1.2 for swinging bucket rotors
- 1.5 for fixed angle rotors

For denser samples, the maximum guaranteed speed is reduced (derated) by a factor from the table below:

Specific Gravity	Swinging Bucket	Fixed Angle
1.2	1.000	1.000
1.3	.960	1.000
1.4	.925	1.000
1.5	.894	1.000
1.6	.866	.967
1.7	.839	.939
1.8	.816	.912
1.9	.794	.888
2.0	.774	.866
2.1	.755	.844
2.2	.738	.825
2.3	.721	.807
2.4	.707	.790
2.5	.692	.774
2.6	.678	.758
2.7	.666	.744
2.8	.654	.731
2.9	.642	.719
3.0	.632	.707

Derating Example: An angle rotor, rated for 10,000 RPM, used with samples with a specific gravity of 1.6, cannot spin faster than 9,670 RPM. (10,000 x .967 = 9.670)

Specific gravities greater than 3.0. This table is based on the formula:

$$\sqrt{(S_o/S_a)}$$

You can use the same formula to compute derating factors for specific gravities greater than 3.0.

- S_o is the maximum specific gravity allowed before derating (1.2 or 1.5, depending on the type of rotor).
- S_a is the actual specific gravity of the sample.

⚠ CAUTION

Do not exceed the rated speed or specific gravity. Higher speeds or specific gravities will impose unnecessary wear on the centrifuge, and can cause rotor failure. Wear and damage caused in this manner are not covered under warranty.

244 Rotor

The 244 rotor is designed for centrifugation of multi-well microplates. The weight of the loaded microplates must be equally distributed between the rotor's two carriers. The maximum rated speed for the 244 rotor, when each of the carriers is loaded with 280 grams (total load of 560 grams), is 4000 rpm.

⚠ CAUTION

Loads greater than 280 grams (weight of the microplate and sample) must have maximum speed derated (according to the following table), to avoid rotor failure.

Derating Table for 244 Rotor

Load per Carrier (grams)	Max. Speed (rpm)
280	4000
300	3600
320	3300
340	3000
360	2800
380	2600
400	2400
450	1900
500	1400
600	800
Greater than 600	do not use

4.4 Chemical Resistance Table

The centrifuge, rotors and accessories are comprised of made of materials that are designed to resist attack from most laboratory chemicals. For your convenience, the chemical resistance table below shows the suitability of various materials with different classes of reagents.

NOTE: Refer to the cleaning section for information on cleaning and removing corrosion from various parts. Clean spills promptly to minimize the effect of corrosive chemicals and avoid expensive repairs.

	Plastic										Metal					Other			
	POLYALLUMER	POLYCARBONATE	POLYETHYLENE	POLYPROPYLENE	POLYURETHANE	PHENYLENE OXIDE (NORYL®)	MODIFIED (DELIRIN®)	ACETAL HOMOPOLYMER (CELCON®)	ACETAL COPOLYMER	NYLON	POLYSTYRENE	TITANIUM	STAINLESS STEEL	ALUMINIUM	MAGANESE BRONZE	MAGNESIUM	RUBBER	BUNA-N	VITON®
Acids, dilute or weak	E	E	E	E	G	E	F	N	F	E	G	G	F	F	N	F	E	E	E
Acids*, strong or conc.	E	N	E	E	F	N	N	N	N	F	N	N	N	N	N	N	F	G	N
Alcohols, aliphatic	E	G	E	E	F	E	E	E	N	E	E	E	E	E	F	E	E	G	E
Aldehydes	G	F	G	G	G	G	G	G	F	N	E	E	E	E	E	E	N	E	E
Bases	E	N	E	E	N	G	N	G	F	E	E	E	E	E	E	G	G	N	N
Esters	G	N	G	G	N	E	G	G	E	N	E	E	E	E	E	N	N	N	E
Hydrocarbons, aliphatic	G	F	G	G	E	N	E	E	E	N	E	E	E	E	E	N	E	E	E
Hydrocarbons, aromatic	F	N	G	F	N	N	E	E	E	N	E	E	E	E	E	N	N	E	E
Hydrocarbons, halogenated	F	N	F	F	N	N	G	E	G	N	E	E	E	E	N	N	N	F	E
Ketones	G	N	G	G	N	N	E	E	E	N	E	G	G	G	E	N	N	N	E
Oxidizing Agents, strong	F	N	F	F	N	N	N	N	N	N	E	F	N	N	N	N	F	E	E
Salts	E	E	E	E	E	E	E	E	E	E	E	F	F	F	N	E	E	E	E

*For Oxidizing Acids, see "Oxidizing Agents, strong".

Classification
of Resistance
E = EXCELLENT
G = GOOD
F = FAIR
N = NOT RECOMMENDED

4.5 Decontamination Table

Compatible Processes For Decontamination

Sterilization Methods	Plastic									Metal						Other				
	POLYALLOMER	POLYCARBONATE	POLYETHYLENE	POLYPROPYLENE	POLYURETHANE	MODIFIED PHENYLENE OXIDE (NORYL)	ACETAL COPOLYMER (DELFIN)	ACETAL COPOLYMER (CELCON)	NYLON	POLYSTYRENE	TITANIUM	STAINLESS STEEL	ALUMINIUM	MAGANESE BRONZE	MAGNESIUM	RUBBER	BUNA-N	VITON	PHENOLIC FIBER	PT - PAINTED SURFACE
Mechanical																				
Autoclave*	S	M	U	S	M	U	S	S	S	U	S	S	S	S	S	S	S	M	S	M
Ethylene Oxide Gas	S	S	S	S	S	S	S	S	S	S	S	S	S	S	U	U	S	S	S	S
Dry Heat (2Hrs. @ 160°C)	U	U	U	U	U	U	U	U	U	U	S	S	U	S	S	U	U	U	U	U
Chemical																				
Ethanol	S	S	S	S	U	S	S	S	U	M	S	S	S	S	S	S	S	S	S	S
40% Formalin	S	S	S	S	U	S	S	S	S	U	S	S	S	S	S	S	U	S	S	S
Methanol	S	M	S	S	M	S	S	S	U	M	S	S	S	S	S	S	U	S	S	S
2-Propanol	S	S	S	S	M	S	S	S	U	S	S	S	S	S	M	S	S	S	S	S
.5% Sodium Hypochlorite**	S	S	S	S	U	S	U	U	U	S	S	M	U	U	U	S	U	S	S	M
3% Hydrogen Peroxide	S	S	S	S	S	S	M	S	U	S	S	S	S	S	U	S	S	S	S	M
100% Hydrogen Peroxide	S	S	S	S	S	U	U	U	U	S	S	S	S	S	U	U	S	S	U	U
5% Phenol Solution	M	U	U	S	U	U	M	M	U	M	M	M	M	M	M	U	S	S	U	U

*For Oxidizing Acids, see "Oxidizing Agents, strong"

Autoclaving 121° C for 20 min. @ 2 ATM (15 PSIG)

** 1 to 10 Dilution of Household Bleach

S = SATISFACTORY

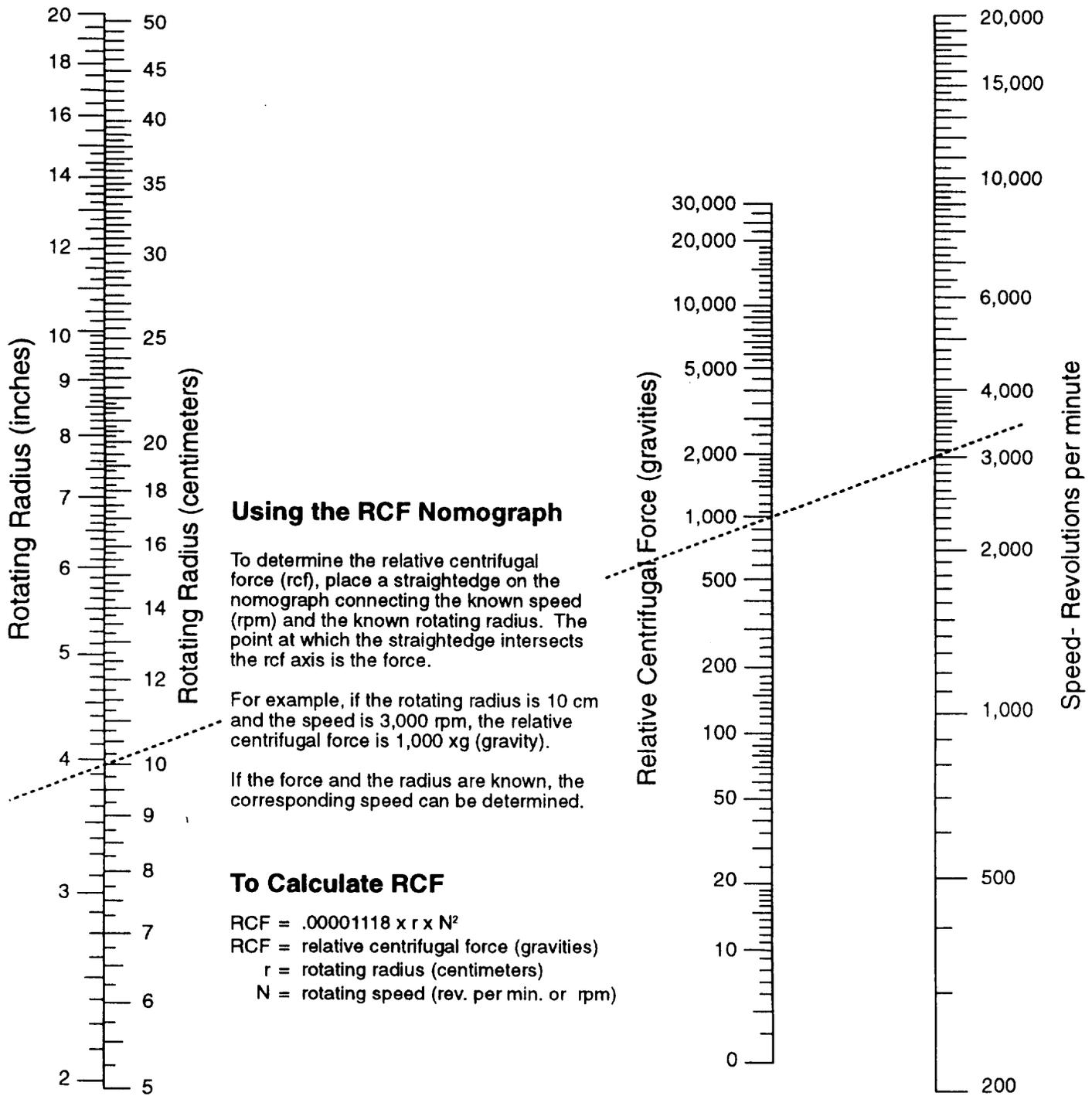
M - MARGINAL

U - UNSATISFACTORY

⚠ WARNING

This chart describes the material compatibility of various sterilization methods. It does not specify the adequacy of sterilization. Refer to the Chemical Resistance Table on the previous page for material compatibility during centrifugation.

4.6 RCF Nomograph



5. Maintenance

5.1 Care and Cleaning

- Keep the centrifuge clean to ensure good operation and to extend its life.
- Clean the sample chamber, rotor, and lid, at the end of each work day, and immediately after any spill. Use a damp sponge, warm water, and a mild liquid detergent, suitable for washing dishes by hand, such as Ivory® liquid. Do not use caustic detergents or detergents that contain chlorine ions. These attack metals.
- Remove stubborn stains with a plastic scrub pad. Do not use steel wool, wire brushes, abrasives, or sandpaper as they create corrosion sites. Never pour water directly into the rotor chamber.
- Scrub the rotor's tube cavities with a stiff test tube brush that has end bristles and a non-metallic tip. After cleaning, dry each part with a clean absorbent towel.

⚠ CAUTION

In the case of glass breakage, be careful to remove ALL particles of glass from the unit! In particular, be sure thoroughly scrub adapters and cushions with a wire brush or replace these items as glass shards embedded in the adapters can cause further breakage.

5.2 Corrosion Cleaning Procedure

The rotors and structural accessories are finished to give maximum resistance to corrosion. To maximize the life of the unit, continually inspect the rotor cavities for corrosion, especially if you use chloride ion solutions such as sodium chloride (saline), and sodium hypochlorite (household bleach), because these solutions attack most metals.

Clean the rotor, rotor chamber, and accessories (particularly the sample compartments and bucket cups) thoroughly after each exposure. Inspect all surfaces under bright light for corrosion. Be aware that small crevices grow deeper, eventually resulting in system failure.

If you see any corrosion, remove it immediately, using the following procedure:

1. Follow the cleaning procedure at the start of this section.
2. Soak the product in mild hand dish-washing detergent and scrub the product thoroughly with a stiff test tube brush. The brush should have end bristles and a non-metallic tip.
3. Soak the product in clear warm water for a minimum of an hour.
4. Rinse the product in warm water then in distilled water.
5. Dry the product thoroughly with a clean absorbent cloth.

⚠ CAUTION

If this procedure does not remove the corrosion, discontinue use of the product and inform technical service.

5.3 Storage: Keep the Unit Dry

Store parts on a soft surface to avoid damage.

Rotors and other parts should be clean and dry. Store them open to the air, not in a plastic bag, so any residual moisture evaporates. Face the parts upward to avoid moisture retention in the cavities.

5.4 Decontamination Procedures

⚠ WARNING

If tube breakage occurs releasing toxic, infectious, pathogenic, or radioactive material into the unit, decontaminate the chamber.

Rotors have sealed containers that provide aerosol containment and, if used as directed, keep spillage confined. If breakage occurs it may be sufficient to only decontaminate the sealed carriers.

The Decontamination Table in the previous section lists the sensitivity of various materials to common sterilization procedures. When using a 1-to-10 dilution of household bleach (sodium hypochlorite) to decontaminate metal rotors or accessories, follow decontamination by the corrosion cleaning procedure (5.2) since chloride ions attack most metals.

Always decontaminate for the minimum recommended time. If you observe corrosion, remove it as described earlier, discontinue use of the method and use an alternate decontamination procedure.

Polypropylene sealed carriers can be autoclaved. Remove any sample tubes before autoclaving unless they are completely full of sample. Remove caps, stoppers, and other tube closures before autoclaving to keep the tubes from collapsing under pressure. Autoclave the rotor and accessories at 121° C @ 15 psig for 20 minutes. Do not stack polypropylene rotors during this process. After cooling, perform a normal cleaning operation as described above.

Repeated autoclaving seriously degrades the performance of polycarbonate sealing covers.

5.5 Cover Interlock Bypass

The cover will remain locked if power fails. If you need to remove samples from the unit before power is restored, use the cover interlock bypass after the rotor has come to a stop. To bypass the cover interlock:

1. Unplug the centrifuge.
2. Locate the hidden plastic plug underneath the front ledge of the cabinet.
3. Use a screwdriver to pry out and remove the plug.
4. Pull the attached cord to release the cover interlock.
5. Replace the plug in the hole.

⚠ WARNING

Do not perform this operation routinely. The centrifuge's cover interlock provides operator safety. It allows the cover to be opened promptly, whenever rotation has stopped.

5.6 Condition of Returned Equipment

Obtain a return goods authorization (RGA) before returning equipment to the manufacturer. The RGA paperwork includes a Certificate of Decontamination for you to sign. It indicates that you have performed the proper steps for decontaminating the unit.

⚠ WARNING

All returned units must be decontaminated, free of radioactivity, and free of hazardous, infectious, pathogenic, or toxic materials.

All return equipment shipments will be refused until the signed certificate is received.

You must prepay transportation to the service depot.

6. Specifications

	IEC Centra CL3	IEC Centra CL3R
Maximum Speed:	8,500 RPM (841 fixed angle rotor) 4,000 RPM (243 swinging bucket rotor)	
Maximum Force:	6,200 xg (930 fixed angle rotor) 3,200 xg (243 swinging bucket rotor)	
Maximum Number of Tubes:	48 x 5 ml sealed (243 rotor) 12 x 25 ml Universal sealed (243 rotor) 20 x 15 ml Falcon/Corning sealed (243 rotor) 8 x 50 ml Falcon/Corning sealed (243 rotor) 4 x 250 ml (243 rotor) 4 x Microplates/2 x Deep plates (244 rotor)	
Maximum Sample Volume:	1 liter (243 rotor)	
Sound Level:	60 db(A) max.	
Operator Controls		
Chamber Temperature:	-9° to 40° C by 1°	
Speed:	0 - 8,500 RPM, by 100 RPM	
Spin Duration:	0:01 through 0:59, by 1 second 1:00 through 4:45, by 15 seconds 5 through 99 min., by 1 min. Momentary operation mode Hold mode (indefinite duration) At-Start timing mode At-Speed timing mode	
Repeatability		
Temperature Control:	± 1 C° in the range from +4° C to +22° C	
Rotation:	Accuracy within ± 10 RPM	
System Components		
Motor:	3/8 hp, Brushless DC	
Refrigerant	HP-80, CFC-free	
Power Requirements and Output		
Voltage	3750 - 120V/60 Hz 3751 - 220-240V/50/60 Hz 3755 - 120V/60 Hz 3756 - 220-240V/50 Hz 3757 - 220-240V/60 Hz	
Operating Current:	3750 - 5.5 AMPS 3751 - 3 AMPS 3755 - 10 AMPS 3756 - 5 AMPS 3757 - 5 AMPS Full specification compliance is guaranteed for up to ±5% line voltage specified. Function guaranteed up to ±10% of line voltage	
Heat Output:	1300 BTU/Hr	2400 BTU/Hr
Dimensions		
Sample Load Height:	32 cm (12.5 in)	
Cover Closed Height:	37 cm (14.5 in)	
Cover Open Height:	84 cm (33 in)	
Width	68 cm (26.5 in)	49 cm (19.25 in)
Depth	53 cm (21 in)	
Unit Weight:	68 kg (150 lbs)	46 kg (100 lbs)
Shipping Weight:	91 kg (200 lbs)	68 kg (150 lbs)

Specifications subject to change without notice.

Warranty

Thermo warrants that the Products will operate substantially in conformance with Thermo's Specifications applicable to such Products, when subjected to normal, proper and intended usage by properly trained personnel, for a period of twenty-four (24) months from the date of installation, not to exceed thirty (30) months from date of shipment from Thermo (the "Warranty Period"). Thermo agrees during the applicable Warranty Period, provided it is promptly notified in writing upon the discovery of any defect and further provided that all costs of returning the defective Products to Thermo are pre-paid by Purchaser, to repair or replace, at Thermo's option, non-conforming Products so as to cause the same to operate in substantial conformance with said Specifications. Such repair shall include parts only during the final twelve (12) months of the Warranty Period. Replacement parts may be new or refurbished, at the election of Thermo. All replaced parts shall become the property of Thermo. Lamps, fuses, bulbs and other expendable items are expressly excluded from the warranty. Thermo's sole liability with respect to equipment, materials, parts or software furnished to Thermo by third party suppliers shall be limited to the assignment by Thermo to Purchaser of any such third party supplier's warranty, to the extent the same is assignable. In no event shall Thermo have any obligation to make repairs, replacements or corrections required, in whole or in part, as the result of (i) normal wear and tear, (ii) accident, disaster or event of force majeure, (iii) misuse, fault or negligence of or by Purchaser, (iv) use of the Products in a manner for which they were not designed, (v) causes external to the Products such as, but not limited to, power failure or electrical power surges, (vi) improper storage of the Products or (vii) use of the Products in combination with equipment or software not supplied by Thermo. If Thermo determines that Products for which Purchaser has requested warranty services are not covered by the warranty hereunder, Purchaser shall pay or reimburse Thermo for all costs of investigating and responding to such request at Thermo's then prevailing time and materials rates. If Thermo provides repair services or replacement parts that are not covered by the warranty, Purchaser shall pay Thermo therefore at Thermo's then prevailing time and materials rates. ANY INSTALLATION, MAINTENANCE, REPAIR, SERVICE, RELOCATION OR ALTERATION TO OR OF, OR OTHER TAMPERING WITH, THE PRODUCTS PERFORMED BY ANY PERSON OR ENTITY OTHER THAN THERMO WITHOUT THERMO'S PRIOR WRITTEN APPROVAL, OR ANY USE OF REPLACEMENT PARTS NOT SUPPLIED BY THERMO, SHALL IMMEDIATELY VOID AND CANCEL ALL WARRANTIES WITH RESPECT TO THE AFFECTED PRODUCTS.

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