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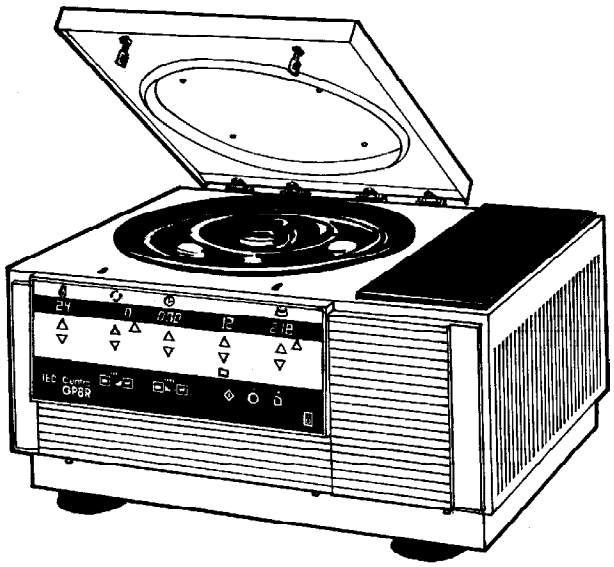
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Find the *Thermo IEC Centra-GP8R* at our website: ***Click HERE***

OPERATION MANUAL
OM3121

Revision 7



Centra-GP8
Ventilated Centrifuge
Cat. No. 3121 -- For 100/120/220/240 VAC, 50/60 Hz

Centra-GP8R
Refrigerated Centrifuge
Cat. No. 3122 -- For 120 VAC, 60 Hz
Cat. No. 3125 -- For 220/240 VAC, 50/60 Hz

Centra-GP8(F)
Ventilated Floor Model Centrifuge
Cat. No. 3127 -- For 100/120/220/240 VAC, 50/60 Hz

Centra-GP8R(F)
Refrigerated Floor Model Centrifuge
Cat. No. 3128 -- For 120 VAC, 60 Hz
Cat. No. 3129 -- For 220/240 VAC, 50/60 Hz

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TABLE OF CONTENTS

1 INTRODUCTION 2

2 INSTALLATION 3
- 2.1 Receiving the Unit 3
- 2.2 Site Preparation 3
  - Clearance Envelope 3
- 2.3 Power Configuration 3
  - Table For Electric Configuration 4
  - Voltage 5
  - Fuses 5
  - Power Cord 6
- 2.4 Moving the Unit 6

3 OPERATION 7
- 3.1 The Front Panel 7
- 3.2 Rotor and Accessories 10
  - Balance 10
  - Vibration 11
  - Rotor Installation/Removal 11
  - Adding Rotors 11
  - Deleting Rotors 12
- 3.3 Starting And Stopping A Run 12
- 3.4 Operating Modes 13
  - Manual Operation 13
  - Rapid Condition (GP8R Only) 13
  - Hold Mode 14
- 3.5 Stored Programs 14
  - Locking/Recall/Add/Change 14
- 3.6 Refrigeration (GP8R Only) 15
- 3.7 Fail-Safe Systems 16

4 ACCESSORIES 17
- 4.1 Speed and Force Tables 17
- 4.2 Derating Table for Dense Samples 23
- 4.3 Chemical Resistance Table 24
- 4.4 Decontamination Table 25
- 4.5 Nomograph 26

5 MAINTENANCE 27
- 5.1 Cleaning 27
- 5.2 Cover Interlock Bypass 29
- 5.3 Calibration 29
- 5.4 Brush Replacement 29
- 5.5 Warranty 30
- 5.6 Condition of Returned Equipment 31
- 5.7 Table of Spare Parts 31
- 5.8 Fuses Not Replaceable By The Operator 32

6 SPECIFICATIONS 33

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1 INTRODUCTION

The Centra-GP8 series are general purpose centrifuges designed for use in medical, industrial and scientific laboratories. The Centra-GP8 series is available in the following models.

Benchtop models:	3121 - GP8	100/120/220/240 Vac, 50/60 Hz
	3122 - GP8R	120 Vac, 60 Hz
	3125 - GP8R	200/220/240 Vac, 50/60 Hz
Kneewell models:	3123 - GP8(K)	100/120/220/240 Vac, 50/60 Hz
	3124 - GP8R(K)	120 Vac, 60 Hz
	3126 - GP8R(K)	200/220/240 Vac, 50/60 Hz
Floor Models:	3127 - GP8(F)	100/120/220/240 Vac, 50/60 Hz
	3128 - GP8R(F)	120 Vac, 60 Hz
	3129 - GP8R(F)	220/240 Vac, 50/60 Hz

The Centra-GP8 series can develop a maximum relative centrifugal force (RCF) of 4630 xg using the 822A rotor. The centrifuges will accommodate a range of centrifuge tubes and devices including 750 mL bottles, microplates, cytological slide carriers, and microsample tubes. Maximum sample load is 3 Liters.

Designed for ease of use, the Centra-GP8 has an ergonomic touch pad control panel and bright, easily read LED displays. The unit can be operated in manual mode, hold, or one of 35 programmable operations. Programs can also be modified at run time, offering unlimited run variations. In addition, rotor number entry permits automatic calculation of RCF. Other features include a coast mode and separate acceleration and deceleration controls for maintaining delicate samples such as those with density gradients.

All refrigerated models allow you to select chamber temperatures from -5°C to 40°C and will maintain 2°C at full speed with the 218 rotor. All refrigerated models also offer a Rapid Condition function for pre-cooling or pre-heating the rotor and sample chamber. Repeat runs with precisely the same temperature, speed and time setting can be achieved with the touch of a button.

The internal microprocessor that allows this simplified operation also ensures repeatable results, preventing inadvertent loss of sample, and even alerts operators when periodic maintenance is due.

The Centra-GP8 series rugged steel cabinet and rigid construction provide quiet operation and long-term reliability coupled with impressive safety features. A fail-safe cover interlock prevents the rotor from running unless the cover is closed. It also prevents the cover from being opened until the rotor has slowed to less than 90 RPM, even if the power fails. If a load-imbalance occurs, a sensor shuts the unit down and triggers a warning message.

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2 INSTALLATION

2.1 Receiving the Unit

IEC ships the centrifuge in a carton that protects it from shipping hazards. Follow the unpacking instructions on the carton. Be sure to complete the postage-paid warranty card and return it to IEC (U.S. and Canada) or to the local distributor (Export).

2.2 Site Preparation

For benchtop units, place the unit on a smooth, clean, dry surface to ensure that the suction feet grip firmly. The surface must be rigid, stable and level to ensure quiet, vibration-free operation.

Clear the area beneath the unit of debris and loose material such as paper. Allow 8 cm (3 inches) of clearance near the ventilation grill of refrigerated units.

For Kneewell and Floor Model units, make sure that the floor is clean, stable and level, and that the unit has at least 8 cm (3 inches) of clearance for the GP8 and 16 cm (6 inches) of clearance for the GP8R at the rear for ventilation.

Warning: Lock the front wheels before starting a run to avoid dangerous movement. To gain access to the caster locks, pull the centrifuge forward about 15 cm (6 inches) and then swing backwards to swivel the casters to the front.

Section 6 of this manual provides specific dimensions and specifications for each of the Centra-GP8 units.

Clearance Envelope

International Electrotechnical Commission standard 1010 part 2-20 limits the permitted movement of a laboratory centrifuge to 300mm in the event of a disruption. The user should therefore mark the clearance envelope boundary around the centrifuge, or laboratory management procedures should require that no person or any hazardous materials are within such a boundary while the centrifuge is operating.

2.3 Power Configuration

Do not plug in the centrifuge until you have configured the power correctly. For best results, the centrifuges should be used on a dedicated line. Variations in line voltage or frequency will affect the unit's speed and other characteristics. Less than nominal line voltage may prevent the centrifuge from reaching published specifications of speed and/or temperature. Also, power line voltage at some locations may sag when the refrigeration system turns on.
Caution: Configuring the centrifuge incorrectly may damage the equipment and will void your warranty.

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Table for Electric Configuration

	Centra-GP8 & GP8(K/F)	Centra-GP8R & GP8R(K/F)	Centra-GP8R & GP8R(K/F)
Voltage (AC)	100/120/220/240	120	200/220/240
Frequency (Hz)	50/60	60	50/60
Model No.	3121, 3123, 3127	3122, 3124, 3128	3125, 3126, 3129
Fuse Requirement (all fuses are 250 V, Slo-Blo Type T glass 5 x 20 mm)	two 16A at { 100 120 V two 6.3A at { 220 240 V	one 20A at 120 V	two 16A at { 200 220 240 V
Power Line Ampacity	10 A	15 A	10 A
Voltage Range	90-110 V; set 100 V 108-132 V; set 120 V 198-242 V; set 220 V 216-264 V; set 240 V	108-132 V	180-220 V; set 200 V 198-242 V; set 220 V 216-264 V; set 240 V

Note: Power line ampacity requirement provides for sufficient current to permit effective performance.

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Voltage

Use a volt meter to measure the voltage at your site. For models 3121, 3123, 3125, 3126, 3127 and 3129: Locate the power entry module on the lower left side of the unit. On the right side of the module is the fuse drawer. A small latch on the left holds this drawer in place. Press the latch and slide the drawer out. If the number visible in the window differs from the voltage at your site, remove the square insert, rotate it, and reinstall it so that the correct voltage is displayed through the window.

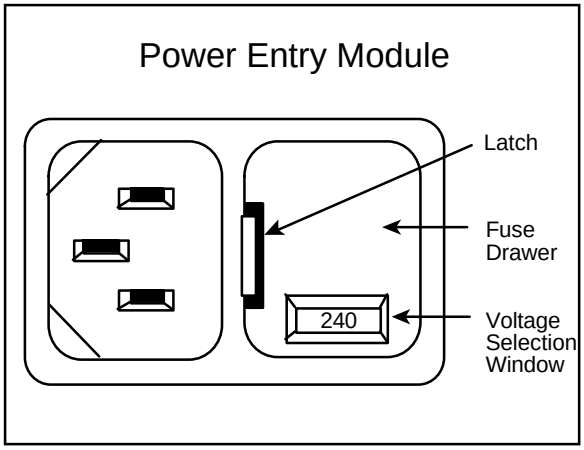
Fuses

Install appropriate fuses for the voltage at your site.
Centra-GP8 & Centra-GP8(K) (model #3121, #3123, #3127):
two 16A fuses for 100/120 V; or two 6.3A fuses for 220/240 V.

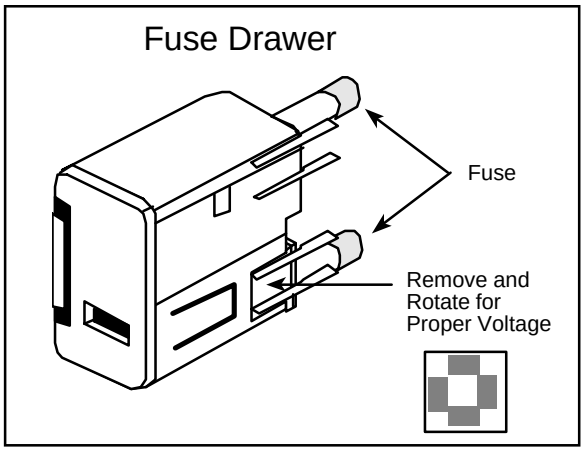
Centra-GP8R & Centra-GP8R(K) (model #3122, #3124, #3128):
These models have no insert or window and are **already configured** for use with 120V, 60 Hz only.

Centra-GP8R & Centra-GP8R(K) (model #3125, #3126, #3129):
two 16A fuses.

Ensuring that the fuses are securely in place, reinstall the entire drawer in the side of the centrifuge.



POWER ENTRY MODULE



FUSE DRAWER

Circuit Breaker

Centrifuges are fitted with either a single pushbutton circuit breaker or a dual pushbutton switch/circuit breaker. The dual pushbutton switch/circuit breaker may be used as an On/Off switch for the centfuge as follows:

The circuit breakers are located in the base of the centrifuge. The dual pushbutton swicth/circuit breaker is identified by the red and green buttons. Pressing the green button connects power and resets the breaker. Power may be disconnected by pressing the red button or by unplugging the power cord from the centrifuge.

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Power cord The Centra-GP8R requires a grounded power supply (3-prong power outlet). If your facility does not have properly grounded outlets, arrange for proper grounding.

IEC provides two power cords with each Centra-GP8 and Centra-GP8R. One is suitable for North America, Japan and Korea. The other has bare wires at one end so other plug types can be attached.

Caution: Do not remove the grounding pin from the centrifuge power cord. Do not use the bare wire power cord to attach a power plug that does not have a grounding pin. Use only the appropriate power cord supplied by IEC.

If the bare wire power cord is used, install the selected plug and attach the cord to the receptacle on the lower left side of the centrifuge. Plug into the power outlet.

Warning: The power cord(s) 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.

2.4 Moving the Unit

If you relocate a GP8 series centrifuge to a different power source, please refer to section 2.3 to check the power requirements and, if necessary, reconfigure the power.

Benchtop First, remove the rotor and accessories. Next, release the seal on the suction cups that adhere the Centra-GP8/R to the work surface. Lift the edge of each suction cup to release the seal and insert an object such as a tongue depressor underneath to prevent the cup from resealing. Position the device in its new location and check the cups to ensure they are gripping the benchtop properly.

Kneewell To move the kneewell centrifuge, remove the rotor and accessories. Unlock the front casters and grasp the centrifuge by its side handles and wheel into position. Maneuver it backward to expose the locking casters again. Lock down the casters.

Warning: Lock the front wheels before starting a run to avoid dangerous movement.

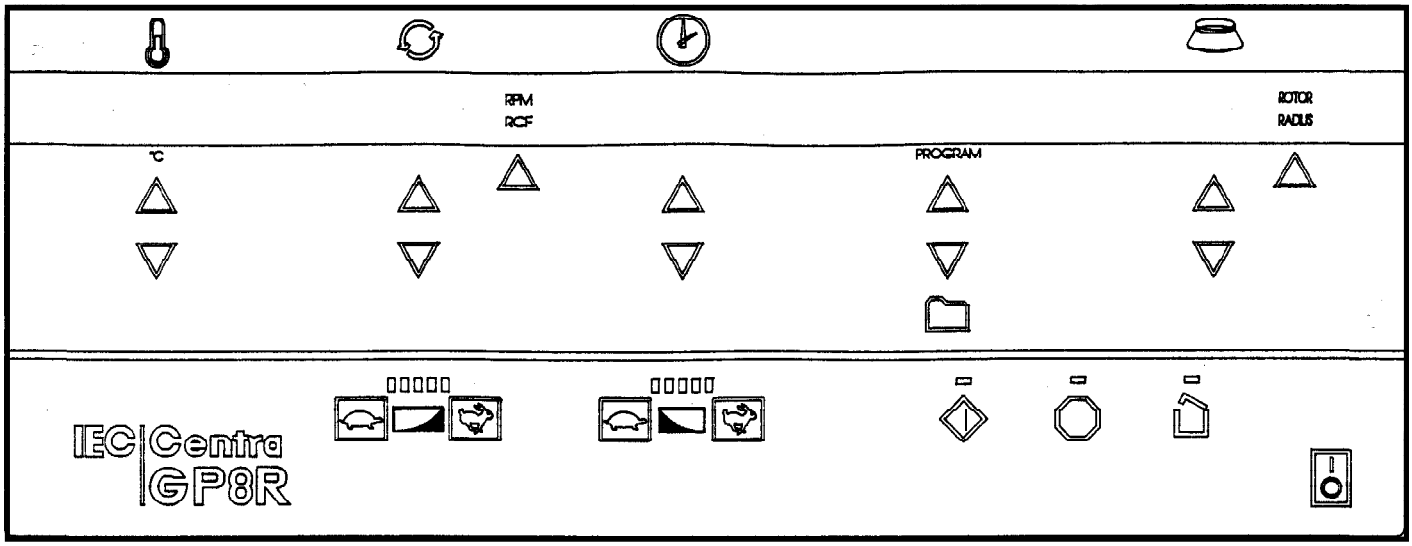
Floor Model To move the floor model centrifuge, remove the rotor and accessories. Unlock the front casters and grasp the centrifuge by the corners of the cabinet and wheel into position. Maneuver it backward to expose the locking casters again. Lock down the casters.

Warning: Lock the front wheels before starting a run to avoid dangerous movement.

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3 OPERATION

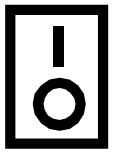
3.1 The Front Panel



FRONT PANEL OF THE CENTRA-GP8R

Run parameters are selected using the touch switches on the control panel. An audible beep signals when a switch has been pressed. The arrow keys are used to select the different parameters.

The Digital Display indicates both the actual and set parameters for rotor speed or g-force, run time, chamber temperature, program number and rotor number or rotor radius. The display normally operates at full brightness when indicating actual run conditions. However, the display dims when indicating set conditions, or while the arrow keys are being used to change parameters.



The On/Off button turns on the power to the display and to the refrigeration system (GP8R). The unit must be on to open the lid, or operate the controls.

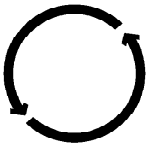


Arrow keys are used to view or change the desired settings for temperature, RPM/RCF, time or rotor/radius. Pressing an arrow once changes the display momentarily from actual readings to the program settings. Pressing the arrow twice allows you to re-program the run parameters. To raise or lower a setting by one increment, press and release the appropriate arrow key. To adjust in greater increments, hold the arrow key down and the settings will change slowly at first and then accelerate. As you approach the proper setting, release the button and then press it repeatedly to select the exact setting. When a button is released for three seconds, the display returns to actual readings.

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The number under this symbol represents temperature in whole degrees Celsius. This can be set between -5 and 40°C in 1° increments. The display range is -9 to 45° C, and the accuracy is ±1°C from 2°C to ambient. If the actual temperature is not within 5° of the set temperature when the run button is pressed, the run will start, a beep will sound for 1.5 seconds to alert the user, and the temperature display will alternate between the set point and the actual temperature until the chamber temperature is within 5° of the setting.



The display under this symbol indicates either the rotor speed (RPM), or the Relative Centrifugal Force (RCF). Speeds are shown in increments of 10 rpm. RCF is shown in 1xg increments below 100xg and 10xg increments above 100xg. Speed can be set between 500 and 6000 rpm in 10 rpm increments. RCF can be set in 1xg increments up to 100xg, and 10xg increments from 100xg to 4630xg. When entering speed, the last digit is fixed at zero and cannot be changed. The accuracy of the speed control is ±10 rpm.

RPM
RCF



This button toggles between RPM and RCF. When RPM is selected, the speed indicator displays revolutions per minute. When RCF is selected, the speed indicator displays relative centrifugal force, and the rotor/radius indicator displays either the rotor number or the rotor radius. RCF is only indicated when a rotor number has been selected in the rotor/radius display.



Time can be set in 1 second intervals up to 59 seconds, 15 second intervals from 1 to 5 minutes, and 1 minute intervals from 5 to 360 minutes. During a run, the display indicates time remaining in minutes. Below 10 minutes, the time is displayed in minutes and seconds. The run timing accuracy is better than 10 milliseconds.

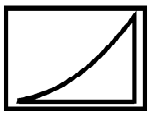
Two timing modes are available: Acc, for countdown to start at the beginning of acceleration; and SPd, for countdown to start when the rotor has reached 95% of set speed. Press the time down arrow key to scroll below zero. Acc or SPd will appear, indicating the current timing mode. Press and release the time down arrow key to toggle between Acc or SPd. With the correct timing mode in the time display, press the time up arrow key to select the run time. If the time up key is not pressed at this time, the originally programmed time will be retained. Acc and SPd only toggle when the down key is pressed. If a program has been recalled from memory, altered, and not saved, the manual timing mode is the same as the original program.



The rotor/radius display indicates either the selected rotor number or the rotor radius in centimeters. This display illuminates when the rotor is selected. The applicable IEC rotor numbers are supplied in the memory, along with their maximum or most common radius in centimeters. The key under rotor/radius toggles between the two. To select a rotor number, toggle to ROTOR and press an arrow key under the rotor display. To change the radius, toggle to RADIUS, and press an arrow key under the rotor display. Note that the radius cannot be changed to a radius larger than the maximum radius for that rotor. The display changes back to rotor number after three seconds.

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Gentle acceleration and braking can be selected when centrifuging delicate samples. The gentle settings prevent the mixing of density gradients and the breakup of pellets. The yellow acceleration and deceleration mode LED's indicate which rates have been chosen (one LED equals setting of 1-slow; five LEDs equals setting of 5-fast).

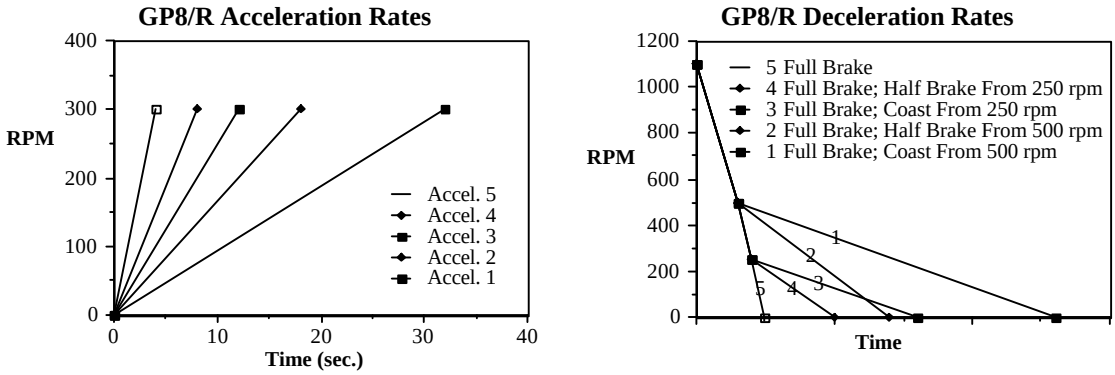


The tortoise and hare beside this symbol control rotor acceleration to 300 RPM. After 300 RPM, acceleration is always at maximum rate. Press the tortoise to decrease acceleration, the hare to increase. Five accel. profiles are available, ranging from fast acceleration, when all indicators are lit, to the slowest acceleration, when only one indicator is lit.



The tortoise and hare beside this symbol control rotor braking. Six brake profiles are available. Press the tortoise to decrease braking, the hare to increase. As each level is selected another indicator lights up until all indicators are lit. The sixth profile, coast from set speed, is indicated when all lights are out.

The profiles for acceleration and deceleration are shown in the graphs below. Press the tortoise and hare buttons to select the rates which are most appropriate for your application. For example, for delicate separations, use Accel 1 (slow) and a coast mode.



ACCELERATION AND DECELERATION RATES

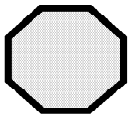
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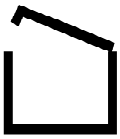
This button saves the currently displayed setting as stored program 1 through 35. (see section 3.5)



This button starts a run, using the desired settings shown on the display panel. The associated green light blinks while the rotor approaches the set speed. Then the light stays on until the end of the run.



This button stops the run. (A run will also stop when the set time has elapsed.) The associated red light blinks as the rotor decelerates. (It also blinks if an error occurs; see section 3.7) The light stays on when the rotor stops. Three beeps signal that the rotor has stopped.



This button unlocks the cover. The button is inoperative during a run, and the cover will not unlock until the rotor speed is below 90 rpm. The cover must be closed to start a run. The associated yellow light is on whenever the cover is open.

3.2 Rotor and Accessories

Balance

A balanced load is essential for the safe operation of all centrifuges. An unbalanced load produces vibration and can damage the unit. A 2 gram load imbalance, at a speed of 4600 rpm, imparts a force equivalent to 9.1 kg at rest (20 pounds). Therefore, always make sure that the rotor is loaded symmetrically with a full complement of accessories, and with a full (or paired) set of tubes. Tube adapters should also be installed symmetrically.

IEC rotors are dynamically balanced at the factory. IEC matches removable parts (trunnion rings, shields, buckets and carriers) to within 1.0 gram, and stamps the weight on each piece. Check these markings whenever you interchange parts to ensure that opposite parts are matched in weight. The total weight of samples and removable parts loaded in opposing positions must be equal in weight to within 1.0 gram. The position numbers, present on many rotors and adapters, identify opposing tube positions.

To obtain good dynamic balance, the opposite loads must not only be equal in mass, but must also have the same center of gravity. Opposing containers must be alike in shape, thickness and distribution of glass or plastic. This is especially important for large containers. Tubes loaded into swinging bucket rotors must likewise be symmetrical 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 in the mirror image). In addition, the loads within each bucket must also be symmetrical around the bucket's pivot axis. Verify this by ensuring that each bucket is loaded and doesn't tilt vertically when the rotor is at rest. Maintaining balance within each bucket ensures that the bucket and the tubes swing out horizontally when the rotor reaches operating speed, applying centrifugal force to the bottom of the tubes. Failure to achieve full swing-out causes vibration, premature wear and may resuspend samples.

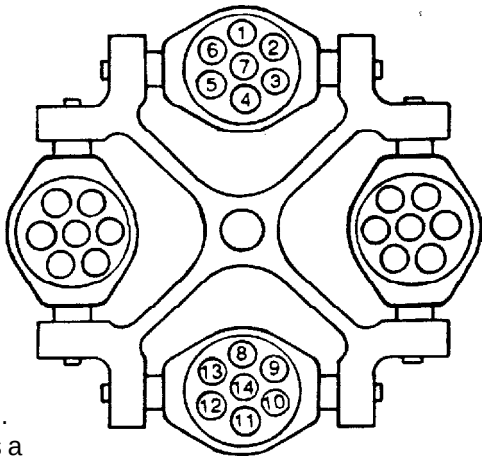
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For example, load tubes in the following manner:

1. Load four tubes.
   Positions 3, 6, 10, 13
   or 2,5,9,12
   or 1,4,8,11

2. Load six tubes.
   Positions 6,7,3,13,14,10
   or 5,7,2,12,14,9
   or 1,7,4,8,14,11

3. Load an odd number of tubes.
   Not recommended (unless a dummy tube is used for balance.)



Samples of different specific gravities may be processed in the same run, provided that the samples of a given type are balanced around the rotor as though they were the only ones in the rotor.

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. **Do not operate this centrifuge continuously at observed critical speeds.**

Rotor Installation

The rotors specified for this centrifuge are secured to the drive motor shaft by a hex nut which is tightened or loosened with the IEC Part No. 1787 wrench, which is supplied with the machine. Before placing the rotor onto the shaft, remove the hex nut, then be sure that the tapered hole in the rotor and the taper of the shaft are clean. Taking care not to damage the threads, carefully lower the rotor onto the shaft, then tighten the hex nut to secure the rotor to the motor shaft. **NOTE: Do not use any other tool to tighten the hex nut as overtightening could occur and the threads could be damaged.**

Rotor Removal

Use the IEC Part No. 1787 wrench to loosen the hex nut which holds the rotor to the shaft. Remove the nut by turning it counterclockwise. Use both hands to keep the rotor horizontal and pull the rotor up and off the shaft. Periodic lubrication of the taper with BLC (see Section 5.1) will assure easy rotor removal.

Adding Rotors

As new rotors are released by IEC, the rotor number and radius can be added to the rotor menu. To do so, press the hidden key located behind the “C” in IEC. Prog x.x will appear. Press RPM arrows until "rotor Add" appears. Press the file key and "Rotor" will appear next to the Rotor/ Radius display. Press an arrow key under the rotor display to select the new rotor number. Press the file key. "Radius" appears. Use arrow keys

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to select maximum radius. Press file key again. "RPM" will be illuminated. Use the RPM arrow key to select the maximum RPM for the rotor. Push file again. Unit beeps three times to acknowledge addition of rotor. Press "C" in IEC to return to normal operation. Note: Up to five rotors may be added to memory. When the rotor memory is full, the unit displays "FUL" under the rotor symbol.

Deleting Rotors

Push "C" in IEC. Use RPM arrows to scroll to "rotor Add." Use the time arrows to select "dEL" instead of "Add." Press file key. "Rotor" appears. Use rotor arrows to select rotor to be deleted. Press file key to delete. Unit beeps three times to acknowledge deletion of rotor.

3.3 Starting and Stopping a Run

Install as described in Section 2 of this manual. Plug in the power cord. For models with a circuit breaker, ess the green button (see Section 2.3). Read section 3.1 for a general description of the front panel. The desired settings (press arrow key to display momentarily) shown on the front panel always govern the operation of the unit. The number or symbol displayed above the PROGRAM keys describes the operating mode of the unit. It's important that the unit be in the correct mode for the desired operation (see Section 3.4).

Starting A Run

Press the On/Off switch in the lower right corner of the front panel. The Front Panel displays the set parameters for Speed, Time, Temperature (GP8R), Program Number, and Acceleration and Deceleration (brake) settings and rotor number current when the machine was turned off. The stop indicator is illuminated showing that the machine is not running. After 3 seconds the display changes to the actual parameters.

Press the cover button to open the Centra-GP8, and install a rotor per rotor installation instructions. To close the cover, lower the centrifuge cover to approximately 6 inches open. With a slight flick of the wrist, firmly push down the cover so that the resulting momentum engages the latches. Since the GP8 series has a two-point interlock system, both mechanisms must be fully engaged for operation to proceed. If the run button is pressed when only one interlock is engaged, a "Lid" message will appear in the speed display. Should this occur, close the cover again. The yellow lid light turns off when the cover is fully latched.

Press the arrow keys twice to start changing each parameter. The key may be pressed repeatedly or held to increment the parameter. Press the accel or decel key to select the appropriate acceleration and braking rates. Press START. A three beep signal sounds, the start indicator blinks and the display changes to the set parameters. After 1.5 seconds the run starts and the display changes back to the actual run parameters. To view the set parameters for three seconds, press and release any arrow key at any time during a run.

Stopping A Run

A run will end when the set time expires, or press the stop button to end a run and begin deceleration as selected.

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3.4 Operating Modes

The PROGRAM symbol can be one of the following *operating modes*:

blank: The unit is set to *manual operation*.

1-35: The unit is under control of the *stored program* with the number shown. (see Section 3.5)

C: The unit is set to *Rapid Condition*.

H: The unit is set to *hold mode*, in which it runs until you stop it.

These digits and symbols appear above the PROGRAM arrows when the arrows are pressed.

Whenever you change the unit's mode of operation, the rest of the front panel assumes the state it was in the last time that mode was selected.

Parameters may be changed during a run in manual mode or HOLD mode. Temperature and acceleration/deceleration settings can be changed during Rapid Condition. The centrifuge will adjust to the new run parameters when the display changes back to run mode 3 seconds after the last key is released.

Manual Operation

Press the PROGRAM keys until the PROGRAM display is blank. Next, select a desired temperature, rpm (or RCF, if rotor number is selected), run time, acceleration, rotor/radius, timing and deceleration modes. Then press START. The spin stops automatically at the end of the desired interval. To manually stop the spin, press the STOP button.

During manual operation, the MINUTES display counts down the remaining time in the current spin.

When the timing mode is ACC, the run time that you specify includes acceleration time and begins when you press the START button. When the timing mode is SPd, count down starts when 95% of set speed is reached. Deceleration begins when the specified time elapses.
You can change the settings during a manual run to affect the run in progress. If you change the time settings, the unit adjusts the display countdown accordingly. If the revised run time is less than the current time remaining, reducing the time setting may end the run. You cannot change the unit's program, rotor/radius, or timing modes during a spin.

Rapid Condition (GP8R Only)

When the chamber temperature is above the set temperature, RAPID CONDITION will run a rotor at 500 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 3400 rpm to warm the chamber to the set temperature. When the temperature has been reached a three beep signal will sound and the rotor will brake to rest. (Some smaller rotors may not be able to warm the chamber to the higher temperature settings.)

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Hold Mode In HOLD mode the centrifuge will run at the current settings for speed and temperature until the STOP button is pressed. The time display will count up until STOP is selected. The run time display is retained until the lid is opened and closed again. HOLD uses the current settings for acceleration and braking. Set parameters can be changed during a run in the HOLD mode.

3.5 Stored Programs

The Centra-GP8 series has an internal memory capable of holding 35 sets of run parameters. Each set, or program, is stored and can be recalled by selecting a program number (1-35). 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. You cannot change the unit's program, rotor/radius, or timing modes during a spin.

Locking Programs Programs can be locked from the program lock in the special function menu. Press the "C" in IEC. Use RPM arrows to scroll until "Loc P" is displayed. Use the program arrow keys to select the program to be locked. Pressing the following keys in the following order will lock or unlock a program: Start, Stop, Cover Open, Stop, Start and File (Save). The display will alternate between the program number and an "L" indicating that the values of the program are locked and cannot be changed.

Recall Program Press a program arrow key to select the appropriate program number. The programmed run parameters will be displayed and will become the set parameters. To begin this run, simply press START.

Add/Change Program Select a program number with the program arrow keys. The current program parameters will appear on the display. Modify the desired parameters using the parameter arrow keys, or the ACCEL or BRAKE switches. To make the changes permanent, press the PROGRAM SAVE (file folder) key. The program number will stop flashing, and the new program will be displayed and will remain in memory until further changes are made. To make changes temporary, press START without pressing the PROGRAM SAVE (file folder) key. The program display goes blank to indicate that the values are now stored in the manual program and the instrument is not operating from the program mode at this time. As long as the PROGRAM SAVE (file folder) key is not pressed, the original program remains unchanged.

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3.6 Refrigeration (GP8R Only)

Whenever the cover is closed and the unit is switched ON, the rotor chamber is cooled as necessary to maintain the desired temperature setting. However, using the keyboard so that a cold temperature is momentarily displayed (for example, stepping through the stored programs) does not activate refrigeration.

If a temperature higher than ambient is specified, the unit does not heat the rotor chamber except through the normal heating effect of the equipment (i.e. rotor air friction).

If the rotor chamber is not at the temperature specified, it does not abort the spin. However, if the rotor chamber differs by 5°C or more from the specified temperature at the start of a run, the unit sounds an audible alarm. The °C display switches between the actual and programmed temperature until the two temperatures come within 5°C. This shows the reason for the alarm. Press the STOP button if the run should not continue at the actual temperature.

The unit is not designed for use as a refrigerator. The natural fanning action of the rotating horizontal and fixed angle rotors serves to maintain a uniform temperature distribution inside the chamber. Therefore, at zero RPM, set and actual chamber temperatures may be different.

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3.7 Fail-Safe Systems

Interlock: Lid cannot be opened when motor is energized or when rotor speed exceeds 90 rpm. The lid latch is a mechanical latch opened by momentary engagement of a solenoid. In the event of a power failure, the door latch can be actuated with a tool for sample recovery.

User Diagnostics: Warning messages will appear in the display and seven beeps will sound to alert the user of conditions that require attention:

bAL This message appears in the time display when an imbalanced rotor is run. The rotor decelerates with full brake to rest. The cover must be opened to reset this warning.

LId This message appears in the time display If the lid is not fully closed when START is pressed.

HEAd This message warns that a run has been started with no rotor in the chamber. The cover must be opened to reset this warning.

PFAIL A power failure was detected during a run. Rotor will be stopped at programmed deceleration when power is restored. This warning is cleared by opening the cover.

bruSh This message appears (every 800 hours of use) at the end of every run if it is time to check or change the brushes.

Error Codes: Software will monitor and provide appropriate control, including front panel error messages in the time display, when any of the following conditions occur:

Error 001: No tachometer
Error 002: Overspeed
Error 003: Runaway
Error 004: Chamber temperature in excess of 45°C.
Error 005: Fail-safe time-out
Error 006: COP Watchdog/Op-Code Trap error
Error 007: Stack error
Error 008: No COP - COP watchdog system not active
Error 009: Undefined interrupt

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4 ACCESSORIES

4.1 Speed And Force Tables

ROTOR 216 4-place Swinging Bucket Rotor (includes four Cat. No. 316S buckets)						
No. of Places	Tube Volume (ml)	Adapter Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
148	0.25/0.4	5737	3400	2400	18.6	0.25/0.4 microtubes
148	0.5/0.7	5737	3400	1890	14.6	0.5 microtubes/B-D Microtainers
148	5	5737	3400	2440	18.9	12.4x91
108	1.5	5827	3400	1940	15.0	1.5 microtubes
108	7-10	5827	3400	2440	18.9	14.5x130
76	10-20	5719	3400	2440	18.9	18.0x130
36	15	5719	3400	2440	18.9	Falcon/Corning plastic conical
28	40-50	5707	3400	2440	18.9	29.6x130
28	50	5807	3400	2070-2460	16-19	29.5x115
20	50	5805	3400	2390	18.5	29.6x126
12	15	5703w/7323	3400	2430	18.8	17.4x126
12	50	5703w/323	3400	2460	19.0	29.4x118
8	50	5704	3400	2380	18.4	29.5x125
8	100	5704	3400	2530	19.6	44.8x136
4	140	5780	3400	2460	19.0	63.4x143
4	250	5780	3400	2550	19.7	63.4x138
4	500	5781	3400	2530	19.6	77.1x145
4	750	-	3400	2550	19.7	98.3x138
4	Blood Bags	2039	3400	2520	19.5	Single, double pack bags
4	Micro-plates	5782	3400	2210	17.1	86Wx128L
4	Cyto-slides	5799w/1024	1500	480	19.0	25Wx75L

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Rotor 218A 4-place Swinging Bucket Rotor

(includes windshield, cover and four cat. no. 3218 buckets)

No. of Places	Tube Volume (ml)	Adapter Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
148	0.25	5737	4600	3850	16.3	0.25 microtube
148	0.4	5737	4600	4300	18.2	0.4 microtube
148	0.5	5737	4600	4260	18.0	B-D Microtainer
108	1.5	5827	4600	4140	17.5	1.5/2.0 microtube
76	4	5719	4600	4330	18.3	18.0x65
148	3-5	5737	4600	4330	18.3	12.4x118
108	7-10	5827	4600	4330	18.3	14.5x118
76	10-15	5719	4600	4330	18.3	18.0x118
24	15	5719	4600	4330	18.3	18.0x127
48	15	5712	4600	4330	18.3	Falcon/Corning Conical
24	15	5712	4600	4330	18.3	Falcon/Corning Conical
12	12	5703	4600	4330	18.3	Falcon/Corning Conical
12	15	5703	4600	4400	18.6	17.5x126
28	40-50	5707	4600	4330	18.3	29.6x118
20	50	5805	4600	4470	18.9	Falcon/Corning Conical
12	50	5703	4600	4400	18.6	Falcon/Corning Conical
12	40-50	5703	4600	4400	18.6	29.4x118
4	140	5780	4600	4450	18.8	63.4x139
4	200	5780	4600	4470	18.9	63.4x137
4	175/225	5780	4600	4470	18.9	63.4x139
4	250	5780	4600	4550	19.2	63.4x139
4	500	5781	4600	4550	19.2	77.3x145
4	Blood Bags	2077	4600	4470	18.9	Single, double pack
4	750	-	4600	4550	19.2	98.4x140
4	Plates	5784	4000	2650	14.8	86x128
4	Slides	5799	1500	460	18.4	Microscope slides

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ROTOR 228 4-place Swinging Bucket Rotor (includes four Cat. No. 377S sealed buckets)						
No. of Places	Tube Volume (ml)	Adapter Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
148	0.25/0.4	5737	3400	2350	18.2	0.25/0.4 microtubes
148	0.5/0.7	5737	3400	1830	14.2	0.5 microtubes/B-D Microtainers
148	5	5737	3400	2390	18.5	12.4x91
108	1.5	5827	3400	1940	15.0	1.5 microtubes
108	7-10	5827	3400	2390	18.5	14.5x130
76	10-20	5719	3400	2390	18.5	18.0x130
36	15	5719	3400	2390	18.5	Falcon/Corning plastic conical
28	40-50	5707	3400	2390	18.5	29.6x130
28	50	5807	3400	2000-2400	16-19	29.5x115
20	50	5805	3400	2340	18.1	29.6x126
12	15	5703w/7323	3400	2380	18.4	17.4x126
12	50	5703w/323	3400	2400	18.6	29.4x118
4	140	5780	3400	2400	18.6	63.4x143
4	250	5780	3400	2500	19.3	63.4x138
4	500	5781	3400	2480	19.2	77.1x145
4	750	-	3400	2500	19.3	98.3x138
4	Blood Bags	2039	3400	2480	19.3	Single, double pack bags
4	Micro-plates	5782	3400	2210	17.1	86Wx128L
4	Cyto-slides	5799w/1024	1500	480	19.0	25Wx75L

ROTOR 269 Swinging Bucket Rotor						
No. of Places	Tube Volume (ml)	Trunnion/ Shield Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
64	5-7	- / 381	3400	2310	17.9	13.6x108
48	10	- / 380	3400	2310	17.9	17.7x108
24	15	366/1013	3600	2470	17.0	16.4x133
8	50	325/320	3800	3200	19.8	30.0x145
8	50	350/323	3700	3030	19.8	29.4x120
8	Slides	- / 1024	1600	425	14.8	Microscope Slides

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ROTOR 284 4-place Swinging Bucket Rotor
(Requires four Catalog No. 384S cups, adapters, tubes or

No. of Places	Tube Volume (ml)	Adapter Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
28	1.5	7228	3800	3080	19.1	1.5 microtube
60	3	7228	3800	3080	19.1	10.9x75
48	5	7226	3800	3080	19.1	12.1x137
40	7-10	7236	3800	3080	19.1	13.3x137
28	7-12	7225	3800	3080	19.1	16.2x137
28	10-15	7224	3800	3080	19.1	16.2x137
16	15	7230	3800	3150	19.5	17.0x130
12	30	7223	3800	3080	19.1	25.5x137
40	50	7231	3800	3080	19.1	29.5x135
4	75	7221	3800	3080	19.1	38.1x137
4	150	7220	3800	3160	19.6	52.2x143
4	140	-	3800	3080	19.1	63.4x138
4	250	-	3800	3200	19.8	63.4x144

ROTOR 811A Angle Rotor (45°)

No. of Places	Tube Volume (ml)	Shield Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
20	20	306	4600	3950/ 3500	16.7/14.8	17.2x172
20	15	302	5300	4370/ 3425	13.9/10.9	17.2x129
20	10	303	5500	4260/ 3620	12.6/10.7	17.2x114
20	7	356	5600	4000/ 3330	11.4/9.5	17.2x99

ROTOR 822A Fixed Angle Rotor (45°)

No. of Places	Tube Volume (ml)	Shield Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
12	50	305	4800	4025	15.6	30.0x138
12	50	320	5400	4630	14.2	30.0x118

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ROTOR 825A Angle Rotor (45°)

No. of Places	Tube Volume (ml)	Shield Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
8	100	340	4100	3500	18.6	33.2x195
8	60	341	4700	4420	17.9	33.2x175
8	50	1124	4900	4080	15.2	29.5x133
8	50	323	5100	4190	14.4	29.5x120

ROTOR 831A Angle Rotor (45°)

No. of Places	Tube Volume (ml)	Shield Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
36	15	302	4600	4090/ 2175	17.3/9.2	17.2x140
36	10	303	5100	4650/ 4100	16.0/14.1	17.2x122
36	7	356	4800	3840/ 2675	14.9/10.4	17.2x102

ROTOR 832A Angle Rotor (45°)

No. of Places	Tube Volume (ml)	Shield Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
14	100	340	3700	3030	19.8	33.2x165
14	60	341	4400	3980	18.4	33.2x146

ROTOR 838 Angle Rotor (45°)

No. of Places	Tube Volume (ml)	Shield Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
60	15	303	3700	3000/ 1850	19.6/ 7.2	17.2x126
60	10	356	4800	4740/ 3025	18.4/ 11.7	17.2x114

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ROTOR 921 Swinging Bucket Rotor						
No. of Places	Tube Volume (ml)	Trunnion/ Shield Number	Maximum Speed (rpm)	Max RCF (xg)	Max Radius (cm)	Max Tube Size O.D. x Length (mm)
48	5-7	- / 381	4400	3250	15.0	13.6x102
36	10	- / 398	3500	2290	16.7	17.7x112
18	15	355/303	3700	2690	17.6	17.2x135
12	50	326/320	4100	3190	17.0	30.0x127
12	50	326/305	3500	2620	19.1	30.0x147
6	50	325/320	4600	4000	17.0	30.0x130
6	50	350/323	4400	3680	17.0	29.4x120
6	50	350/1124	4300	3680	17.8	29.4x133
6	Slides	- / 1024	1800	500	13.8	Microscope Slides

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4.2 Derating Table for Dense Samples

The Speed and Force Table lists the maximum speed for each rotor/adapter combination in the Centra-GP8. Faster speeds impose unnecessary wear on the motor and may cause damage to the rotor.

These speeds are guaranteed only with 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 allowed speed is reduced (derated) by a factor from the table below:

Derating Factor for:

Specific Gravity	Swinging Bucket	Fixed Angle
1.2	1	1
1.3	.960	1
1.4	.925	1
1.5	.894	1
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

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

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

$$\check{s}(s_0/s_a)$$

...where s_0 is the maximum specific gravity allowed before derating (1.2 or 1.5, depending on the type of rotor), and s_a is the actual specific gravity of the sample in question. You can use the same formula to compute derating factors for specific gravities greater than 3.0.

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4.3 Chemical Resistance Table

	Plastic										Metal					Other			
	PA	PC	PE	PP	PU	NL	DN	CN	NN	PS	TI	SS	AL	MB	MG	RR	BN	VN	PF
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".

PA - POLYALLOMER
PC - POLYCARBONATE
PE - POLYETHYLENE
PP - POLYPROPYLENE
PU - POLYURETHANE
NL - MODIFIED PHENYLENE OXIDE (NORYL)
DN - ACETAL HOMOPOLYMER (DELRIN)
CN - ACETAL COPOLYMER (CELCON)
NN - NYLON
PS - POLYSTYRENE

TI - TITANIUM
SS - STAINLESS STEEL
AL - ALUMINUM
MB - MANGANESE BRONZE
MG - MAGNESIUM
RR - RUBBER
BN - BUNA-N
VN - VITON
PF - PHENOLIC FIBER

Classification of Resistance
E= Excellent
G= Good
F= Fair
N= Not Recommended

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4.4 Decontamination Table

Compatible Processes For Decontamination																				
Sterilization Methods	Plastic										Metal					Other				
	PA	**PC**	**PE**	**PP**	**PU**	**NL**	**DN**	**CN**	**NN**	**PS**	**TI**	**SS**	**AL**	**MB**	**MG**	**RR**	**BN**	**VN**	**PF**	**PT**
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	S	U	U	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	S	U	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	S	U	U	S	S	U
5% Phenol Solution	M	U	U	S	U	U	M	M	U	M	M	M	M	M	M	M	U	S	S	U

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

PA - POLYALLOMER
PC - POLYCARBONATE
PE - POLYETHYLENE
PP - POLYPROPYLENE
PU - POLYURETHANE
NL - MODIFIED PHENYLENE OXIDE (NORYL)
DN - ACETAL HOMOPOLYMER (DELRIN)
CN - ACETAL COPOLYMER (CELCON)
NN - NYLON
PS - POLYSTYRENE

TI - TITANIUM
SS - STAINLESS STEEL
AL - ALUMINUM
MB - MANGANESE BRONZE
MG - MAGNESIUM
RR - RUBBER
BN - BUNA-N
VN - VITON
PF - PHENOLIC FIBER
PT - PAINTED SURFACES

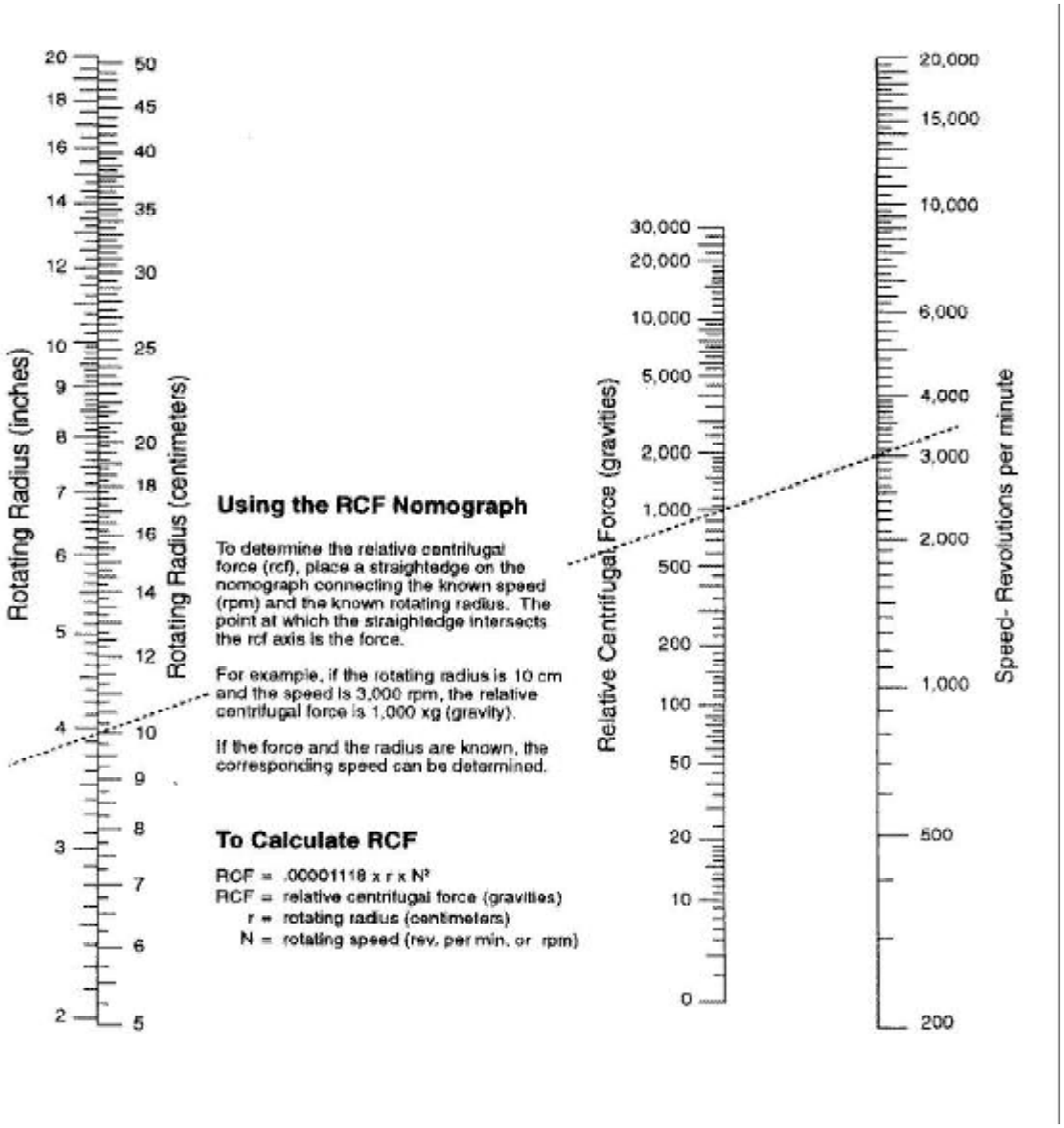
*Autoclaving
121°C for 20 min.
@ 2 ATM (15 PSIG)
**1 to 10 Dilution of
Household Bleach

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 section 4.4 - **Chemical Resistance Table**, for material compatibility during centrifugation.

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4.5 Nomograph



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5 MAINTENANCE

5.1 Cleaning

Keep your centrifuge clean to ensure good operation and to extend its life. Clean the entire sample chamber, rotor, and lid at the end of each workday, and also right after any spill.

To clean the sample chamber, 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, since these attack metals. Remove stubborn stains with a plastic scrub pad. Do not use steel wool, wire brushes, abrasives, or sandpaper, since they create corrosion sites. **Never pour water directly into the centrifuge bowl.** Scrub the rotor's tube cavities with a stiff test-tube brush that has end bristles and a non-metallic tip. After cleaning any part, dry it properly, preferably using a clean, absorbent towel.

If glass breakage occurs, remove all broken pieces immediately. Glass particles, if present in the chamber, will be ground into a fine grey dust during centrifugation. If glass breakage recurs it is recommended that all adapters and cushions be replaced. Particles of broken glass become imbedded in the plastic or rubber accessories. These particles can come in contact with new glass tubes, creating a pressure point which may result in recurring glass breakage.

Cleaning swinging bucket rotors is necessary to ensure that the buckets can pivot freely. Periodically manipulate each bucket; if you feel resistance or hear squeaking, lubricate all buckets with Bonded Lubricant Coating (BLC), IEC Part No. 7133. Use the following cleaning and lubrication procedure:

1. Wipe the old lubricant from all rotor pins and buckets with a soft, clean, lint-free cloth saturated with solvent such as trichloroethylene.

2. Clean the rotor and buckets as described above. The cleaning step is important because BLC only adheres to a clean surface. If you are unable to remove foreign matter in this way, contact an authorized IEC Service Representative.

3. Shake the bottle of BLC vigorously until all the gray sediment at the bottom of the bottle is dispersed.

4. Use the brush applicator cap to apply a light coating of BLC to the bucket slots only. Do not lubricate the pins. Lubricant will move around the pins during a spin.

5. Give the BLC 1 to 2 minutes to dry. Buff the bucket slots vigorously with a soft, clean, lint-free cloth. Continue until no more BLC rubs off onto the cloth. The surface will be a shiny, light gray.

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Corrosion

IEC manufactures and finishes rotors and structural accessories to give maximum resistance to corrosion. However, maximum equipment life requires that you continually inspect the rotor cavities for corrosion, especially after using chloride ion solutions, such as sodium chloride (saline), and sodium hypochlorite (household bleach). These solutions attack most metals. Clean the rotor, rotor chamber, and accessories (particularly the sample compartments and bucket cups) thoroughly after each such use. Inspect all surfaces under bright light for corrosion; small crevices will grow deeper and cause failure.

If you see any corrosion, remove it immediately as follows:

1. Follow the cleaning procedure at the start of this section. Soak the part in the mild hand-dishwashing detergent. Scrub the part thoroughly with a stiff test-tube brush having end bristles and a non-metallic tip.

2. Soak the part again in clear warm water for at least an hour.

3. Rinse the part thoroughly in warm water first, then in distilled water.

4. Dry the part thoroughly with a clean, absorbent cloth.

5. **If this procedure does not remove the corrosion, discontinue use of the part.**

Storage

Store parts on a soft surface to avoid damaging finished surfaces. Rotors and other parts should be clean and dry for storage. Store them open to the atmosphere, not in a plastic bag, so that any residual moisture will evaporate. The parts should face downward to avoid retaining moisture in the cavities.

Decontamination

Decontamination is called for if tube breakage occurs and infectious, pathogenic, or radioactive material is released into the unit. Some rotors totally contain the sample tubes. In this case, spillage is usually confined to the rotor. If so, it may be sufficient to decontaminate the rotor. The Decontamination Table lists the sensitivity of various materials to common sterilization procedures. When using a 1-to-10 dilution of household bleach (sodium hypochlorite) to decontaminate the chamber, metal rotors or accessories, follow decontamination by the corrosion cleaning procedure given earlier, 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.

Repeated autoclaving will seriously degrade the performance of polycarbonate materials.

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5.2 Cover Interlock Bypass

If power fails, the cover remains locked. 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.

Ensuring that the rotor has stopped, unplug the centrifuge. Locate a hidden plug just below the front panel. Use a screwdriver to remove this plug. Pull the attached cord to release the cover interlock. Listen for both interlocks to release before opening the cover. Reassemble the plug in the hole.

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

5.3 Calibration

The built-in, independent digital tachometer in your centrifuge is calibrated by IEC according to standards that are traceable to the U.S. National Institute of Standards and Technology (NIST). The built-in tachometer uses crystal standards that do not drift. Therefore, IEC recommends verifying the RPM indicator once every 24 months. This can be done easily using an optical tachometer through the clear plastic viewport in the lid. If this measurement indicates instrument tachometer failure, please notify IEC Technical Service.

5.4 Brush Replacement

1. Unplug the centrifuge line cord. Remove rotor and accessories. Unscrew the 6 screws retaining the motor boot and remove the boot.

2. Identify both brush caps which are located on the upper sides of the drive motor.

3. Use a screwdriver to remove the brush caps. Be careful not to drop any parts down into the motor chamber.

4. Carefully remove the brushes and inspect them. Each brush is complete with a carbon contactor, a spring, a copper connector wire and an end cap. Brush contactors should be replaced when less than 6mm (1/4 in) long.

Caution: The commutator revolves in a counterclockwise direction as viewed from above. If original brushes are reused, they must be inserted in the same position from which they were removed to assure satisfactory motor operation. The trailing edge of the brush may be identified by the presence of a dark deposit of carbon along the side of the brush adjacent to that edge.

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6. Inspect the brush to be installed. Use IEC brushes only (part number 49801). Brushes must not be damaged or have broken copper connector wires. The spring should not be broken. Insert each brush into the holder and align end caps to rectangular slot. Screw in brush caps carefully. Ensure that end caps freely engage the brush holder.

7. Replace the motor boot. Plug in centrifuge line cord.

8. Reset the brush counter. Press the hidden key located behind the "C" in IEC on the front control panel. Use the RPM arrows to scroll through the special functions menu until the word "brush" appears. Also displayed will be a number indicating the hours that have passed since the counter was last reset. Press the file key to reset this to zero. Press the hidden key again to escape the special functions menu and return to normal operation.

Important: When replacing brushes, order a spare set (part number 49801).

5.5 Warranty

IEC wants you to be satisfied with the quality of your Centra-GP8 or Centra-GP8R centrifuge. We guarantee your IEC centrifuge for one year and IEC rotors for seven years. We will repair or replace any of these products that fail, within this period from the date of its delivery, due to defects in material and workmanship, and we will ship you the repaired product or its replacement at our expense. You must use IEC-approved accessories and genuine IEC spare parts. This warranty does not apply to any instrument that has been abused or repaired without authorization.

THE FOREGOING OBLIGATIONS ARE IN LIEU OF ALL OTHER OBLIGATIONS AND LIABILITIES INCLUDING NEGLIGENCE, AND ALL WARRANTIES, OF MERCHANTABILITY OR OTHERWISE, EXPRESSED OR IMPLIED IN FACT OR BY LAW. THE FOREGOING STATES OUR ENTIRE AND EXCLUSIVE LIABILITY, AND BUYER'S EXCLUSIVE REMEDY, FOR ANY CLAIM OR DAMAGES IN CONNECTION WITH THE SALE OR FURNISHING OF GOODS OR PARTS, THEIR DESIGN, SUITABILITY FOR USE, INSTALLATION, OR OPERATION. IEC WILL IN NO EVENT BE LIABLE FOR ANY SPECIAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, AND OUR LIABILITY UNDER NO CIRCUMSTANCES WILL EXCEED THE PURCHASE PRICE FOR THE GOODS FOR WHICH LIABILITY IS CLAIMED. IN SOME INSTANCES, UNITS MAY CONTAIN RECONDITIONED (AS NEW) PARTS.

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5.6 Condition of Returned Equipment

Before returning equipment to IEC, you must contact IEC's or your dealer's service department to obtain a return goods authorization (RGA). **All returned units must be decontaminated, free of radioactivity, and free of hazardous and infectious materials.** The RGA paperwork includes a certificate for you to sign indicating that you have performed these steps. IEC will not accept the shipment unless this signed certificate accompanies it.

You must prepay transportation to the service depot.

5.7 Table of Spare Parts

GP8 and GP8(K) -- 3121, 3123 and 3127

50058	Fuse 16A (100, 120 V)
9946	Fuse 6.3A (220, 240 V)
47114	Rotor Locking Nut
1787	Rotor Locking Wrench
7133	Bonded Lubricant Coating (BLC)
49801	Brushes (pair)
43177	Line Cord (Domestic)
43312	Line Cord (International)
65436A	5/16 Magnetic Socket

GP8R and GP8R(K) -- 3122, 3124 and 3128

47114	Rotor Locking Nut
1787	Rotor Locking Wrench
7133	Bonded Lubricant Coating (BLC)
49801	Brushes (pair)
43177	Line Cord
65436A	5/16 Magnetic Socket

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GP8R and GP8R(K) -- 3125, 3126 and 3129

50058	Fuse 16A
47114	Rotor Locking Nut
1787	Rotor Locking Wrench
7133	Bonded Lubricant Coating (BLC)
49801	Brushes (pair)
43177	Line Cord (Domestic)
43312	Line Cord (International)
65436A	5/16 Magnetic Socket

5.8 Fuses Not Replaceable By The Operator

Three internal fuses are not replaceable by the operator.
These fuses should only be replaced by qualified service personnel.

F1	12.5A	T	250V
F2	6.3A	T	250V
F3	1A	FAST	125V

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6 SPECIFICATIONS

Maximum Speed:	5600 rpm (811A angle rotor) 4600 rpm (218 windshield rotor) 3400 rpm (216 horizontal rotor)
Maximum Force:	4630 xg (822A)
Maximum Capacity:	3000 ml (216/218/228 rotors)
Refrigeration System:	Sealed 1/2 hp compressor to maintain guard bowl at 2°C at full speed with 218 rotor. Refrigerant is R-22.
Heat Output:	GP8 630 Watt (2150 BTU/hr.) (typical) GP8R 880 Watt (3000 BTU/hr.) (typical)
Power Requirements:	100,120, 220, 240VAC +/- 10%, 50/60 Hz

Dimensions:	GP8	GP8R	GP8R(K)	GP8R(F)
a. Cover open:	36 in.	36 in.	45 in.	54 in.
b. Cover closed:	17 in.	17 in.	26 in.	35 in.
c. Width:	23 in.	30 in.	23 in.	23 in.
d. Depth:	24 in.	24 in.	27 in.	27 in.

Shipping Weight:	
GP8	200 lbs.
GP8R	270 lbs.
GP8(K)	240 lbs.
GP8R(K)	280 lbs.
GP8(F)	375 lbs.
GP8R(F)	375 lbs.

Ordering Information:

3121 - GP8 -100/120/220/240 Vac, 50/60 Hz, 10 A
3122 - GP8R -120 Vac, 60 Hz, 15 A
3123 - GP8(K) - 100/120/220/240 Vac, 50/60 Hz, 10 A
3124 - GP8R(K) -120 Vac, 60 Hz, 15 A
3125 - GP8R -200/220/240 Vac, 50/60 Hz, 10 A
3126 - GP8R(K) -200/220/240 Vac, 50/60 Hz, 10 A

Viewport in cover for speed verification

Specifications subject to change without notice.

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