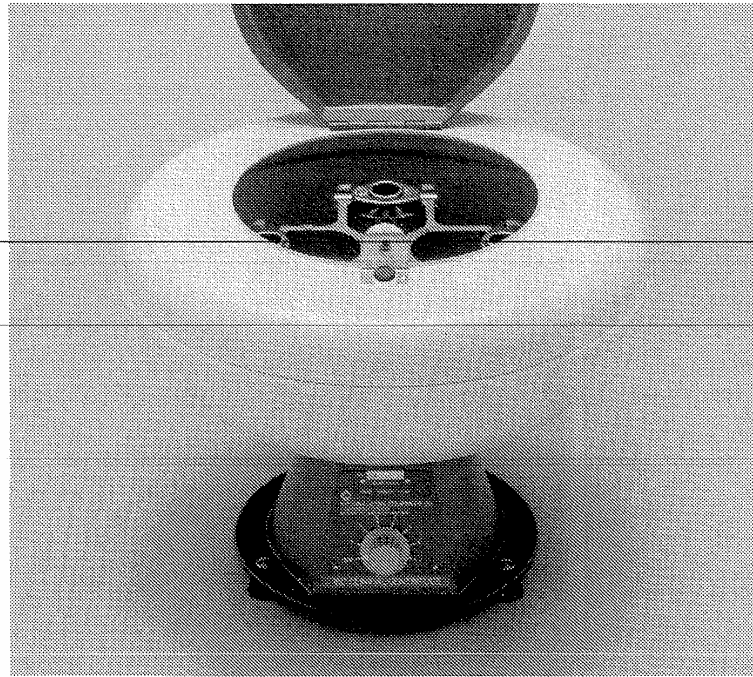


# IEC

## OPERATION MANUAL OM428



# CLINICAL™

Cat. No. 428 — 120V, 50/60 Hz

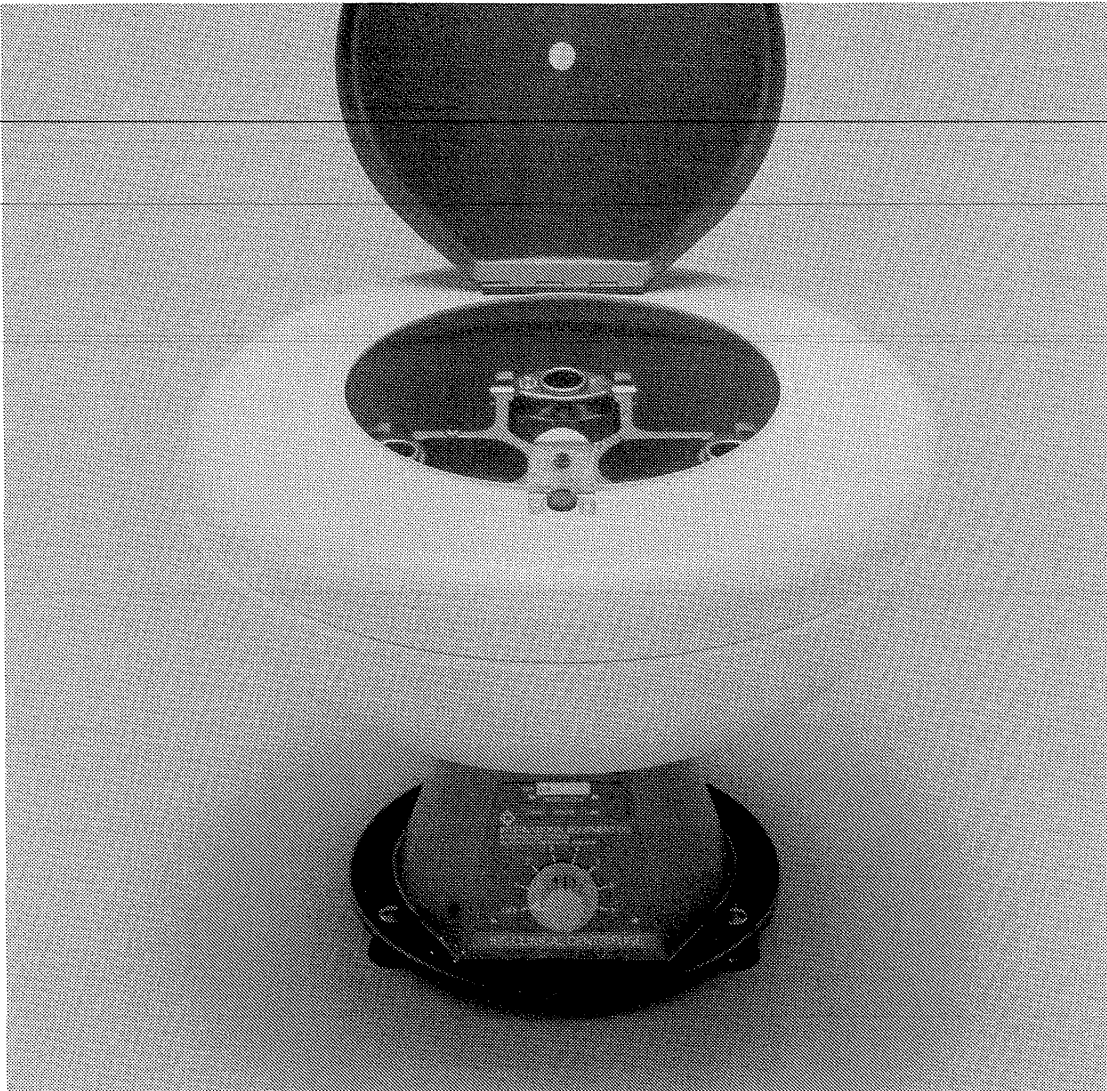
Cat. No. 429 — 240V, 50/60 Hz

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# 1 INTRODUCTION

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The CLINICAL™ centrifuge is a sturdy, compact bench-top centrifuge for multi-purpose use in medical, industrial, and scientific laboratories. This bench-top unit can achieve centrifugal forces of 4775 xg (5125 xg with hematocrit rotor).

The CLINICAL accommodates a wide variety of rotors, including angle and swinging-bucket. The centrifuge can process tubes, microcapillary tubes, and microsample tubes and up to 300 mL of total sample volume.

The CLINICAL centrifuge is controlled by a seven step switch on the front of the machine. This provides seven different rpm/g-force levels for each rotor combination.

Depending on the rotor installed, the CLINICAL can achieve up to 8500 rpm. There are two units: one for 120V, 50/60Hz (Cat. No. 428) and one for 240V, 50/60Hz (Cat. No. 429).

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## **2** INSTALLATION

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### **2.1 Receiving the Unit**

IEC ships the centrifuge in a carton that protects it from shipping hazards.

**Be sure to complete the postage-paid warranty card and return it to IEC.**

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### **2.2 Site Preparation**

The unit normally resides on a bench-top. The Specifications at the end of this manual give the dimensions of the unit. Place the unit on a clean and dry surface to ensure that the feet grip the surface firmly. Clear the area beneath the unit of debris and loose materials such as paper.

The surface must be level to ensure quiet, vibration-free operation. The rubber feet on the base of the unit minimize the transmission of vibration from the centrifuge to the bench top. A rigid, stable location is important since an improperly-loaded unit can vibrate or even move.

### **2.3 Power Configuration**

The CLINCAL uses AC power at 120 Volts, at 50 or 60 Hz for Catalog Number 428 and AC power at 240 Volts, at 50 or 60 Hz for Catalog Number 429. Variations in line voltage or frequency will affect the unit's speed and acceleration.

**Power cord.** The unit requires a grounded power supply (3-prong power outlet). If your facility does not have properly-grounded power outlets, arrange for proper grounding. Do not remove the grounding pin from the centrifuge power cord.

### **2.4 Moving the Unit**

Before moving, unplug the centrifuge and remove all accessories and the rotor.

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## 3 OPERATION

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### 3.1 Rotor and Accessories

A **balanced load** is essential with all centrifuges. An unbalanced load produces vibration and can damage the unit. A 2-gram load imbalance, at a speed of 4600 rpm, imparts force equivalent to 9.1 kg at rest (20 pounds). Therefore, always ensure that the rotor is loaded symmetrically 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, cups and carriers) to within 0.5 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 0.5 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.

**Swinging bucket rotors.** Tubes loaded into swinging bucket rotors must likewise 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 in the mirror image). 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.

You can process samples of different specific gravities 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.

**To install a rotor,** pull the plunger latch and open the cover, then lower the rotor straight onto the shaft. Screw the knurled metal locking nut (clockwise) onto the shaft to hold the rotor down (on some rotors, you must remove any sample tubes first). Tighten the nut with your fingers; do not use a tool.

**Exception:** Polypropylene microtube rotors with shaft adapter 50009 do not have the shaft protrude through the top of the rotor. If correctly aligned the locking nut adapter will screw onto the shaft. Use a coin to tighten the locking nut adapter.

Rotors with or without a keyway can be used on the CLINICAL since there is no key on the shaft.

**To remove a rotor,** first remove any sample tubes, shields, and other accessories from the rotor. Next unscrew (counterclockwise) approximately one full turn the knurled locking nut. Then place both thumbs on the knurled locking nut and grip the rotor with your fingers. Push your thumbs down and at the same time pull the rotor up with your fingers. This should dislodge the rotor from the shaft. If unsuccessful, **lightly tap** the knurled metal locking nut with a rubber/plastic mallet or other similar type object. The rotor can now be removed from the shaft.

### 3.2 Starting and Stopping a Run

The CLINICAL is operated by an eight position control knob on the front of the unit. There are seven speed/g-force settings plus an OFF position. Turning the control knob clockwise increases the speed to the maximum at setting 7. The settings are stepped positions from OFF to 7.

To stop the run simply turn the control knob counterclockwise to the OFF position.

An optional 60-minute portable timer (Cat. No. 2351) is available for 120V, 60 Hz power only. The unit is plugged into the timer and the timer knob is turned to the desired spin-time. Turn the CLINICAL speed control knob to desired setting. The unit will accelerate to speed and centrifuge. When time runs out the rotor will coast to a stop. To set times of less than 10 minutes, first turn timer knob past the ten minute mark, then back to the desired time setting.

For approximate speed and force information for each setting see section 4 (Rotor and Accessory Combination Table).

## 4 ACCESSORIES

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

### 4.1 Rotor and Accessory Combination Table

### 4.2 Derating Table for Dense Samples

### 4.3 Chemical Resistance Table

### 4.4 Decontamination Table

**Relative Centrifugal Force (RCF or G-force)** at a given speed varies with the rotor, and with the length of the sample tube, because the distance of the tube's tip from the center of rotation is different. The Speed and Force Table indicates the maximum speed and RCF the CLINICAL can achieve with various rotor/accessory combinations. The Derating Table specifies reductions in rpm when spinning samples with specific gravity above 1.2.

**The formula to calculate Relative Centrifugal Force:**

$$RCF = (RPM)^2 \times \text{Radius} \times \text{Constant}$$

- RCF is the g-force.
- RPM is the speed of the rotor in revolutions per minute.
- Radius is in centimeters usually given as maximum rotational distance.
- Constant is 0.0001118.

**Calculations for rpm and g-force for each of the seven settings:** This table will give the approximate speed and g-force percentages for each setting on the control knob. First find the rotor and accessory combination in the SPEED AND FORCE TABLES to get maximum speed and g-force for setting number 7 (maximum). IEC test the CLINICAL centrifuge at 120V, 60 Hz or 240V, 50 Hz.

		% OF MAX. RPM	% OF MAX. RPM
<b>CONTROL KNOB SETTING</b>	#7	100%	100%
	#6	80%	64%
	#5	70%	49%
	#4	50%	25%
	#3	35%	12%
	#2	20%	4%
	#1	10%	1%

After finding maximum rpm or g-force multiply the percentage of the run setting to get the approximate ( $\pm 5\%$ ) rpm or g-force for the centrifuge run.

**Example.** A #215 rotor with 369 multiple carrier can run at 4000 rpm/1975 xg at setting number 7.

At setting number 4 the speed will be  $4000 \times 50\% = 2000$  rpm and the g-force will be  $1975 \times 25\% = 495$  xg.

Misapplication of any tube can cause tube rupture. To avoid this, compare the G forces specified in the Speed and Force Table with the ratings for the tubes you are using. ~~If the tubes are not rated for the force the centrifuge will apply,~~ reduce the speed to the G-force listed for your tubes.

**Corrosive solvents.** Your IEC centrifuge is made of materials designed to resist attack from most laboratory chemicals. The interior of the rotor chamber is painted steel. 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 5.1 describes how to clean and remove corrosion from the chamber, rotors, and accessories. Follow these instructions, and clean spills promptly, to minimize the effects of corrosive chemicals, before any resulting chemical attack requires more expensive repair. Replace metal locking nut, rotors, or accessories if they become cracked, deformed, or gouged.

## 4 ACCESSORIES

### 4.1 Rotor and Accessory Combination Table

ROTOR 215 4-Place Horizontal Swinging-Bucket						
No. of Places	Tube Volume (ml)	Trunnion/ Shield or Carrier	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D.×Length (mm)
4	80	366/365	3250	1750	14.8	38×118
4	50	325/320*	3350	1750	13.9	30.0×116
4	50 (sealed)	350/323	3175	1750	15.4	FALCON/CORNING Conical
4	15 (sealed)	350/7323	3175	1750	15.2	FALCON/CORNING Conical
4	10	310/356	3550	1850	13.1	17.2×113
12	7	366/1013	3450	1725	12.9	16.5×107
16	7	366/1018	3450	1700	12.8	14.2×103
20	5	366/369	4000	1970	11.1	12.6×83

\* USE #312 CENTERING RING OR #1106 ADAPTER FOR 15 mL FALCON/CORNING CONICAL TUBES

ROTOR 221 6-Place Horizontal Swinging-Bucket						
No. of Places	Tube Volume (ml)	Shield	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D.×Length (mm)
6	10	356	3500	1775	13.0	17.2×102
6	15	303**	3100	1625	14.6	17.2×119

\*\* USE #668 CUSHIONS FOR 15 mL FALCON/CORNING CONICAL TUBE

ROTOR 801 6-Place Fixed Angle 45°						
No. of Places	Tube Volume (ml)	Shield	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D.×Length (mm)
6	50	305	3900	2050	12.1	30.0×134
6	50	320	4450	2400	10.8	30.0×115

ROTOR 804S 4-Place Fixed Angle 45°						
No. of Places	Tube Volume (ml)	Shield	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D.×Length (mm)
4	50	323	3900	1950	11.5	FALCON/CORNING Conical

ROTOR 803 6-Place Fixed Angle 45°						
No. of Places	Tube Volume (ml)	Shield	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D.×Length (mm)
6	7	356	4750	2575	10.2	17.2×88
6	10	303	4250	2275	11.3	17.2×102
6	15	302	3800	2050	12.7	17.2×122

## 4 ACCESSORIES

ROTOR 809 12-Place Fixed Angle 45°						
No. of Places	Tube Volume (ml)	Shield	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. × Length (mm)
12	7	356	4450	2250	10.2	17.2×88
12	10	303	4050	2075	11.3	17.2×102
12	15	302	3550	1800	12.7	17.2×122

ROTOR 818 12-Place Fixed Angle 35°						
No. of Places	Tube Volume (ml)	Adapter	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. × Length (mm)
12	5.0	—	7300	4475	7.5	12.0×80.0
12	1.5-2.0	5762	7300	3275	5.5	11.0×66.0
12	B-D/ 0.5	5761	7300	3525 2975	5.9 5.0	8.0×66.0
12	0.4/ 0.25	5760	7300	3500 3050	5.9 5.1	6.0×66.0

ROTOR 819 10-Place Fixed Angle 35°						
No. of Places	Tube Volume (ml)	Adapter	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. × Length (mm)
10	10	—	7400	4650	7.6	16.1×85.0
10	5.0	5986	7400	4525	7.4	12.1×85.0
10	4.0	5987	7400	4450	7.3	10.9×90
10	1.0	5989	7400	4400	7.2	6.1×52

ROTOR 820 4-Place Fixed Angle 30°						
No. of Places	Tube Volume (ml)	Adapter	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. × Length (mm)
4	30	—	7300	4475	7.5	25.8×100.0
4	15	5965	7300	4300	7.2	16.1×109.0
4	5.0	5966	7300	4175	7.0	12.1×112
4	3.0	5967	7300	4050	6.8	10.9×95

ROTOR 836 6-Place Fixed Angle 30°						
No. of Places	Tube Volume (ml)	Adapter	Max Speed (rpm)	Max RCF (xg)	Max Radius (cm)	O.D. × Length (mm)
6	30	—	7300	4475	7.5	25.8×100.0
6	15	5965	7300	4300	7.2	16.1×109.0
6	5.0	5966	7300	4175	7.0	12.1×112
6	3.0	5967	7300	4050	6.8	10.9×95

# 5 MAINTENANCE

## 5.3 Table of Spare Parts

Cat. No.	Description
1729	Rotor Locking Nut
1780	Brushes, one pair

## 5.4 Service

The Clinical centrifuge needs limited service outside of checking the brushes every 3 months. Replacement parts are available, see diagram below for part number and description.

