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QUESTO MANUALE PRIMA DI
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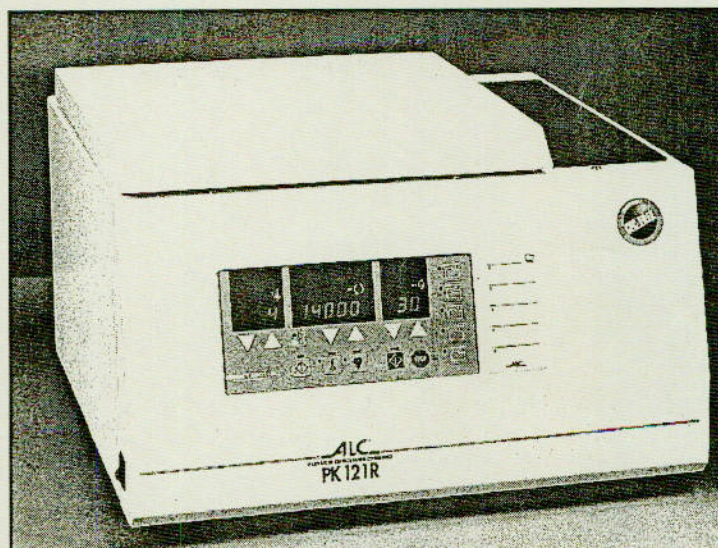
CAREFULLY READ THIS MANUAL
BEFORE OPERATING YOUR
INSTRUMENT

L'UTILIZZO DELLA CENTRIFUGA,
SECONDO LE ISTRUZIONI
CONTENUTE NEL PRESENTE
MANUALE, NON E' PERICOLOSO

THE USE OF THIS CENTRIFUGE,
ACCORDING TO INSTRUCTIONS
ENCLOSED IN THIS MANUAL, IS
NOT DANGEROUS

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precautions described in this
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PK121R centrifuge



Manuale di istruzione
User Manual

GUARANTEE

The Centrifuge with its Rotating equipment and Accessories is guaranteed for a period of 12 months from the date of purchase. The guarantee covers complete and free of charge replacement of parts that are considered faulty by our engineers and includes workmanship limited to repair or replacement. Transport and extra packing costs or other charges for services requested by customers on their premises (such as testing, checking, assistance visits, etc.) will be charged to the customers.

The guarantee is not valid in the following cases:

- If the centrifuge and its accessories have not been correctly used, according to the instructions contained in this manual.
- If the user or a third party, not authorized by us, has mishandled or altered any component of the unit.

Any possible damage resulting from centrifuge function failures is not covered by this guarantee.

For any information, claim, or spare parts/accessories request, please contact your distributor, always specifying the centrifuge serial number and the date of purchase.

Distributor

Service

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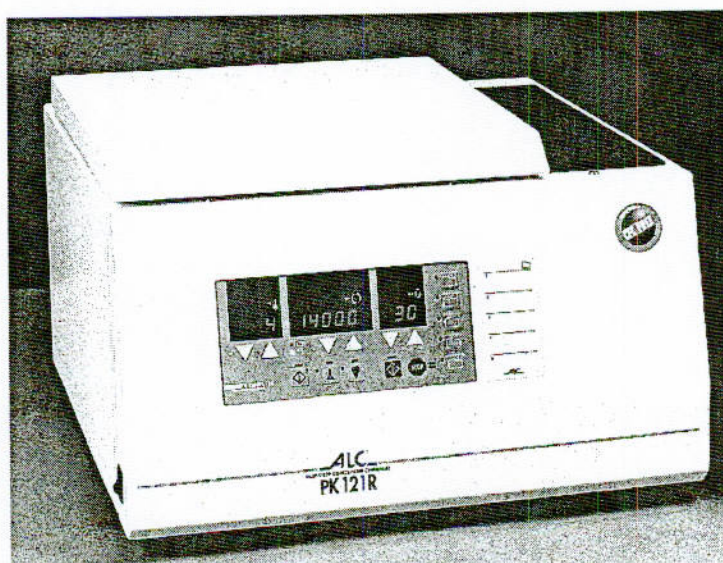
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1.

MANUFACTURER**1.1 Advice to the user in safety terms**

- This centrifuge was properly manufactured and is safe and reliable. It could however become dangerous for the operator or for other people if used by incompetent personnel, not according to the attached instructions, for different purposes from the ones it was built for, if not correctly earthed.
- The normal use of the centrifuge could require the manipulation of biological and hazardous materials. The users and personnel of maintenance must have specific requirements of professionalism for each substance they used; they must be trained to operate with safety.
- The centrifuge cannot be electrically and/or mechanically connected with other instruments.
- As this centrifuge does not conform to anti-deflagration standards, it should be used exclusively in explosion proof areas.
- The user must be careful about the safety precautions for the relative materials to be used with a laboratory centrifuge: toxic, radioactive or contaminated with pathogenic microorganisms; with respect to both operator and service personnel safety. For this purpose it could be used containers (*Harper Test*) or than one level of protection shall be provided in the case of higher Risk Group II materials (as identified in the World Health Organization "*Laboratory Biosafety Manual*").
- The maximum density of the centrifugation, samples should not exceed 1200 kg/m³.
- The centrifuge should be used exclusively with the rotating equipment specified by the instructions, in their integrity and only with original spares.
- Do not use the centrifuge when it is damaged or not a safety operating or irregularity. Advice authorized personnel by manufacturer as soon as for every anomaly.
- Only original ALC spares can be used.
- It is strictly forbidden to take any changes to the centrifuge by customers or other personnel not authorized.



1.2 Safety devices and notices

In order to ensure both mechanical and electrical operational safety, the centrifuge is provided with the following safety control systems, as detailed in the attached Declaration of Agreement:

- The centrifuge will not start unless the lid is locked.
- The lid cannot be opened during centrifugation, even in the event of power failure.
- Safety electronic circuits for self-diagnosis (with micro - processor control); any possible breakdown of the circuits and of the sensors is shown on the display and neutralised, at the same time, preventing unsafe operating conditions of the machine.
- Load imbalance safety device.
- Double metal protection casing; reinforced centrifugation chamber in AISI 304 stainless steel incorporating the refrigeration coil.
- Lid antifall device.
- Main bipolar switch.
- Individual certified test, with measurements and testing of the leakage currents, the earth connection resistance and the applied voltage.
- Identification plates; operating instructions.

1.3 Warning markings

The following symbols are necessary for the operator to preserve the protection afforded by the equipment and to preserve dangers.

I on the main switch allows centrifuge operating.

0 on the main switch disconnects the centrifuge from the main supply.



This symbol means that you will find important information for safety and if they are unobserved it could be taken some damages to appliance and/or operator.



Only authorized personnel can operate with the parts where there is the symbol and after switch off the mains supply. To operate with high voltage could cause death.

1.4 Introduction

This manual is part of the centrifuge and it should be conserved for future notes and consultations. Keep always the manual close to the appliance. ALC invites all the users to read this manual.

2.

INSTALLATION

2.1 Transport, Packaging, Lifting



During transport the centrifuge is seated in a special packaging. Due to the weight of the machine, all lifting and transporting must be carried out by using proper handling equipment (e.g.: fork lift trolley) that complies with current regulations, and by people having undergone the necessary training.

1. The general conditions accepted for the centrifuge transport and storage are:
 - a) *Ambiental temperature -20°C + 50°C.*
 - b) *Relative humidity up to 90% excluding moisture formation.*

2. Unpack the centrifuge, carefully removing first the rotating equipment, any possible accessories and the material supplied for ordinary maintenance. Check the contents of packaging against the packing list.

(Keep the packaging until the centrifuge has been tested).

2.2 Installation

The machine should be installed in a dust and corrosion free room. Place the centrifuge on a bench top, which must be rigid and sufficiently strong.

IMPORTANT: at least 2 people are required to lift the centrifuge from the palette and place it on the bench.



WARNING: Leave a 300-mm space free on each side of the machine and behind for right ventilation.

2.3 Mains Wiring

Check mains and frequency: they must correspond to values shown on instrument identification label.

230 V + 5% - 10% 50/60 Hz (1 phase + earthing)
120 V + 5% - 10% 60 Hz (1 phase + earthing)

mod.
PK121R
PK121R-V1



Warning: Check that mains wiring are effectively earthed.

The centrifuge is provided with R.F.I. filters. Manufacturer declines all responsibility for any damages due to nonearthing of the machine.

2.4 Environmental conditions

- Indoor use.
- Temperature: 5°C to + 40°C.
- Maximum relative humidity of 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C.

2.5 Lid Unlock



1. Switch the centrifuge on through the main on the left side of the unit.
2. When the centrifuge is switched on but stationary: LID led on at the opening.
3. The mechanic unlocks and consequent opening of the lid is obtained pulling the lever on the top right side of the machine towards the centrifuge front.

Warning: before proceeding to the installation operations, it is advisable to disconnect the centrifuge from the mains, by moving the POWER switch on "off" position.

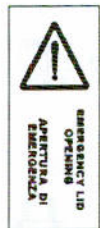
4. After opening the lid, remove any possible packaging around the driving spindle. Unscrew the equipment-blocking nut from the engine shaft. Carefully clean the inside of the centrifugation chamber removing any packing residues. Due to the air - whirling, solid particles accidentally left in the centrifugation chamber would create an excessive wear of the chamber itself and of the outer Equipment rotating bottoms.

2.6 Emergency lid unlock



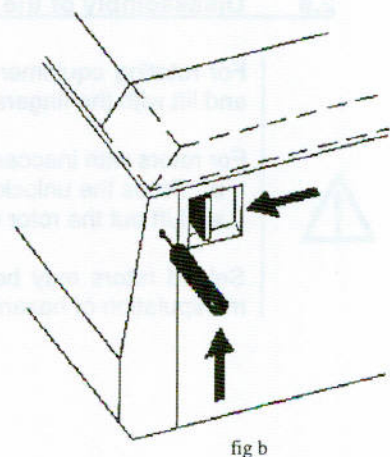
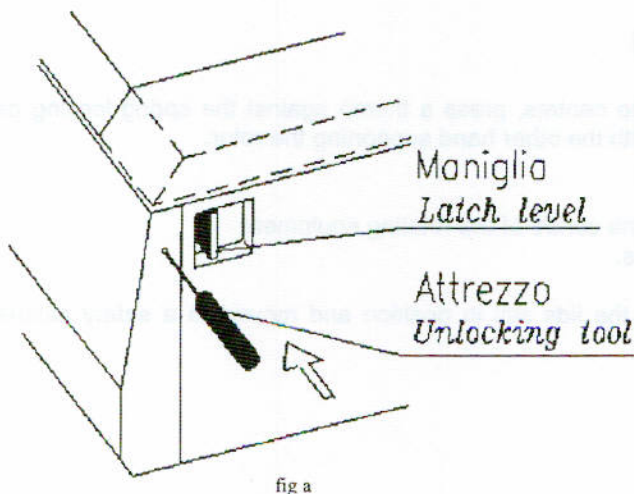
In the event of mains non-availability or power failure, the lid can be opened using the special tools supplied with the centrifuge.

This operation should always be effected with the centrifuge mains plug disconnected.



1. Unscrew the nylon screw in the hole on the right side of the centrifuge and here below identified.
2. Insert horizontally the unlocking tool supplied with the centrifuge in the hole (fig. a).
3. Lift the unlocking tool and at the same time pull the lever (fig. b).
4. At the end screw again the nylon screw.

Warning - Should the emergency occur due to electricity failure, during centrifugation, wait at least 40 minutes for the end of the Rotating Equipment rotation. Upon opening, lift the lid by hand and observe the rotor (be careful in this operation): if it is still rotating, close the lid and wait 10 minutes more before repeating the operation.



2.7 Inspection

Before installation, the rotating equipment should be thoroughly inspected for corrosion and cleanliness (see 6.3). The clip in the centre of the rotor and the drive spindle should also be clean and undamaged: these parts should be wiped over before each use.

Any failure to follow the above advice may have serious consequences for the safety of the appliance.

If visible signals of corrosion or anomalies on the rotor or buckets are present, contact the authorized personnel. Also the centrifuge should be observed: screw, lid hinges, latch and corrosion. In case of problems contact the technicians.

2.8 Assembly of the Rotating head

Operations for assembly:



1. Control the right side of the rotor. Caution: keep always the silk-screen printed on the rotor up (fig. 1).
2. Handling the rotor with 2 hands, push it on the drive shaft until you hear "click". Only after having heard "click" you will be sure to have correctly assembled the rotor (see fig. 2).
3. Lift the rotating head strongly: when it is correctly placed, it won't move. If it is not locked, repeat the operation n° 2.

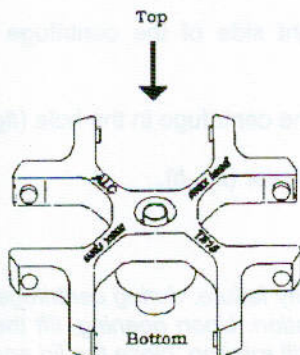


fig. 1

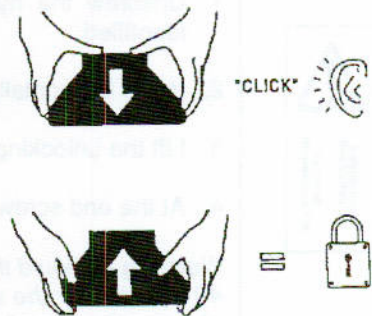


fig. 2

Warning: be sure the rotor is locked, before starting the centrifuge.

2.9 Disassembly of the Rotating head

For rotating equipment with accessible centres, press a thumb against the spring locking device and lift with the fingers while pulling with the other hand supporting the rotor.

For rotors with inaccessible centres:

- Press the unlocking device into the centre of the rotating equipment
- Lift out the rotor using both hands.



Sealed rotors may be removed with the lids still in position and moved to a safety cabinet for manipulation of hazardous material.

3.

CHARACTERISTICS

3.1 Dimensions Weights

Height x Width x Depth:..... 38 x 57,5 x 59,5 cm
 Net Weight:..... 72 Kg

3.2 Centrifugation characteristics

Max. allowable capacity:.....with swing-out rotor (4 x 190 ml) $760 \times 10^{-6} \text{ m}^3$
 with fixed-angle rotor (6 x 50 ml) $300 \times 10^{-6} \text{ m}^3$
 Max. Allowable density: 1200 Kg/ m^3
 Max. allowable weight: 0.912 Kg
 Max. speed:with swing-out rotor : 4100 rpm
 with fixed-angle rotor : 14000 rpm
 Max. RCF at tip:.....with swing-out rotor 3025 xg
 with fixed-angle rotor 18403 xg
 Work temperature:..... -10°C +40°C
 Max. noise: < 59 dBA

3.3 Electrical characteristics

Nominal operating voltage:.....	230V + 5% - 10%	50/60 Hz	mod: PK121R
	120V + 5% - 10%	60 Hz	PK121R-V1
Power consumption	4,9A (a 230V)		
	9.7A (a 120V)		
Max power (steady state):	520 W		

3.4. Specifications

- Microprocessor controlled.
- Quick selection programs.
- Working temperature -10°C + 40°C. (accuracy: +/- 1,5° C.).
- Set/reading speed 300 - 14000 rpm (by step of 10 rpm or 100 rpm if you push continually more than 2 sec. the speed key); accuracy: +/- 20 rpm.
- High or (low: 5 shape) acceleration.
- High or (low: 4 coast-down + inertial) deceleration.
- Set timer 1 min. up 99 min. + ∞.
- Pulse key "Momentary".
- Electronic-accelerometric imbalance encoder.
- Direct driving system.
- Brushless induction drives motor.

4.

DESCRIPTION - PERFORMANCE

4.1 Functional principles

The PK121R centrifuge was designed for laboratory use. Through the application of a Relative Centrifugal Force (RCF) it allows the separation of substances made of different density elements. Swing out rotating equipment can carry a higher load than a fixed angle or aerodynamical equipment. The larger the diameter of a rotor, with accessories, the greater the load, and the lower the maximum r.p.m. Relative Centrifugal Force (RCF) generated by rotating equipment is directly proportional to the sedimentation useful radius and to the speed value square.

4.1.1 Drive system

A three phase asynchronous motor drives the rotating equipment. It is situated in the centre of a virtually hermetically sealed and armours plated centrifugation chamber.

4.1.2 Safety interlock system

The centrifuge is equipped with an interlock system that prevents opening of the centrifuge lid when the rotor is spinning. The centrifuge will not operate until the lid is closed and latched in place. The lid remains latched until rotor stops spinning.

NOTE: If a power failure occurs, access to the samples in the centrifuge is possible. For this it is necessary to use a special tool. Follow the lid opening procedure emergency.

Perform bypass under emergency conditions as the rotor could still be rotating (see 2.6).

4.1.3 Imbalance Sensor

The centrifuge is equipped with a load imbalance detector.

In case of excessive imbalance the machine stops whilst: this condition is displayed with the message "IMbAL" which will disappear once the lid has been opened to remove the imbalance cause (see 5.10).

The tolerated imbalance depends upon the rotor in use. Carefully balance the sample load to avoid actuating the imbalance detection system.



4.1.4 Refrigeration System

The PK121R is equipped with a refrigeration system, which allows the samples to be spun at a temperature lower than room temperature. The display shows the refrigeration chamber's temperature.

Avoid leaving the lid open in order to preserve a constant temperature and avoid the build-up of ice: in fact when the centrifuge is stopped, the lid is closed and $T < 4^{\circ}\text{C}$, the refrigeration system will be switched off (whatever the SET is). When real $T > 4^{\circ}\text{C}$ and higher than the SET value the cooling unit resumes.

It is possible that in certain conditions (high speed and time of centrifugation), the samples' temperature could be higher than the display value.

Empirical tests by the user will enable him to know what air temperature to select compared to the normal temperature of the protocol.

Of course this compensation is not possible if the cooling unit is working at maximum power or if the run time is too short.

The refrigerate circuit is equipped with gas **R134a** without CFC (Chloro-Fluor-Carbons), in accordance with the Montreal protocol directions for preservation of the ozone layer in the atmosphere.



Condense draining

The refrigerated centrifuge has a rubber pipe in order to empty the centrifugation chamber from condensation produced after low temperature centrifugation.

On machine's back side close to drain hose, you can find the label here below represented:



- Switch off the centrifuge and disconnect the mains.
- Put a small basin under the pipe.
- Take off the cap for the condense exit.
- Insert the cap when finished.
- Insert the plug.

ATTENTION: don't remove the cork from the drain hose during the centrifugation.

4.2 Rotating equipment - Performance

4.2.1 Rotating equipment - Table

Type of Equip.	Load composition		Eq. Composition			Accessories		Useful max radius max m
	Capacity	α	Rotating head cat. n°	Bucket cat.n°	Sealing cap cat. n°	Sealing cap cat. n°	KIT cat. n°	
O-M24	4 X 190 ml	0-90°	T515	P509	-	C506	CYTOKIT L500	0.161
O-M17	2 X 3 micropl.	0-90°	T517	P511	-	SMP.KIT L502		0.115
F-M6	30 X 15 ml	40°	T521	3195	-			0.135
A-M10	6 X 50 ml con.	40°	T523		-			0.112
A-M13	10 X 10 ml	40°	T525		C509			0.085
A-M21	24 X 2.0/1.5 ml	45°	T527		C511			0.084
A-M12	20 X 2.0/1.5 ml	45°	T529		6758*			0.078
A-M6	60 X 2.0/1.5 ml	90°	T531		includ.*			0.072

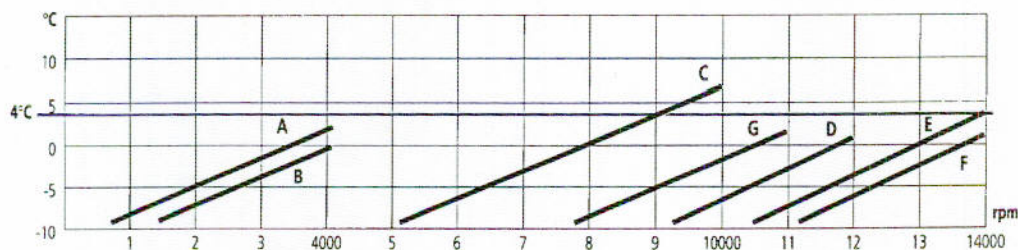
* not sealing cap

4.2.2 Performance

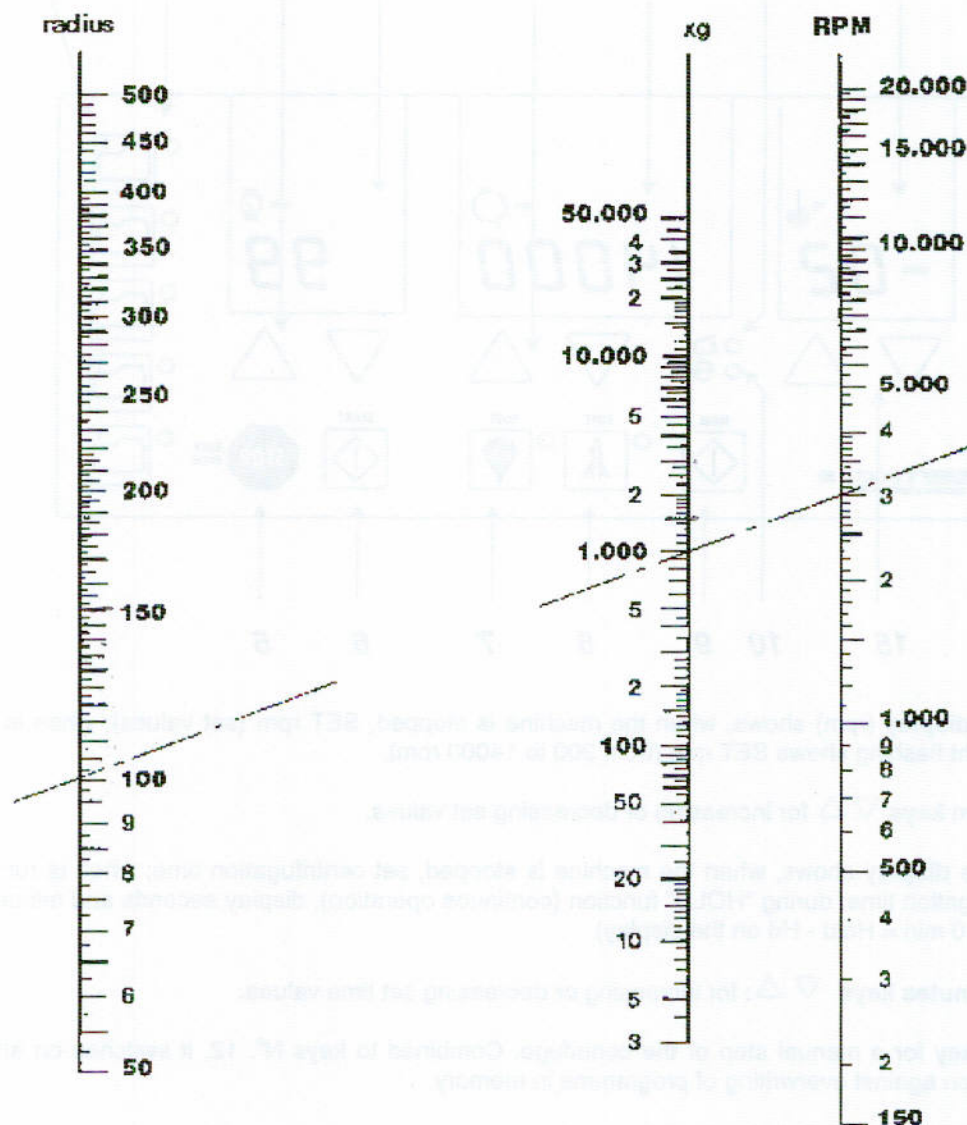
Type of equipment	max speed rpm	max RCF xg	temperature vs. speed curve
O-M24	4100	3025	A
O-M17	3000	1157	B
F-M6	4100	2537	B
A-M10	10000	12519	C
A-M13	12000	13682	D
A-M21	14000	18403	E
A-M12	14000	17089	F
A-M6	11000	9738	G

4.2.3 Temperature table

Lowest reachable temperatures for rotating equipment with ambient $T + 20^\circ\text{C}$



4.3 RCF Calculation



The main factors of the centrifuge action in terms of correct analysis methodology are: the centrifugation time and the gravity number "xg" (relative centrifuge acceleration) to which the product is submitted. The graph allows the determination, as a function of the radius "r", of the relative centrifuge acceleration value, expressed in multiples of the gravity acceleration value g (9.8 m/sec.) for each RPM value between 150 and 20,000.

EXAMPLE

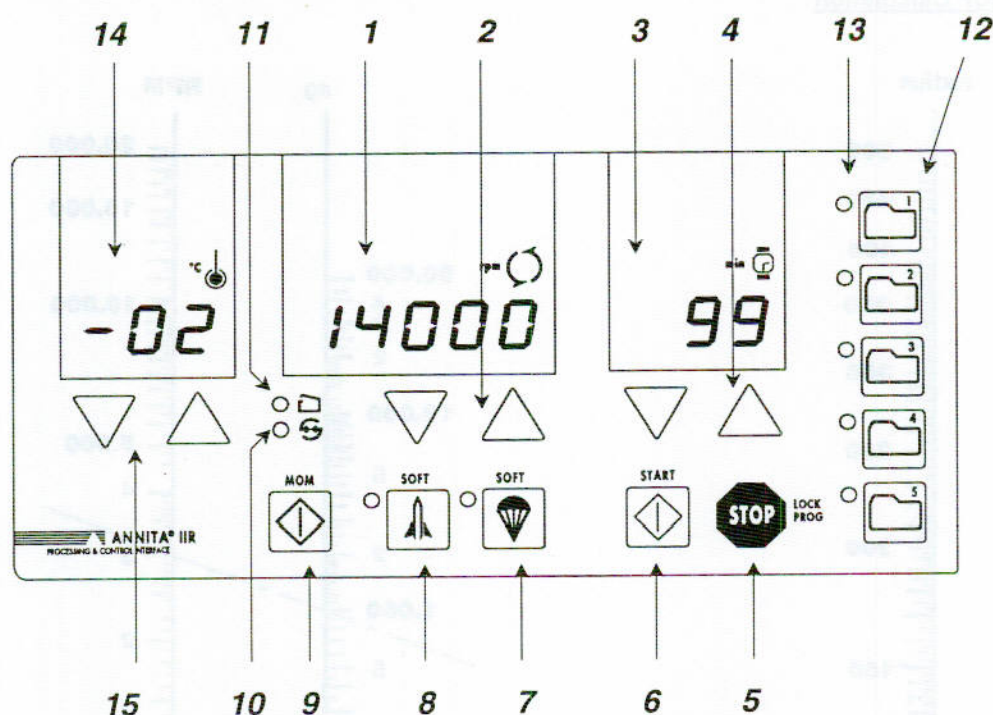
To find the relative centrifuge acceleration value xg of a point at a 100 mm (0.1m) distance from the rotation axis and rotating at 3000 RPM, place a ruler on the radius scale on the left, joining the point marked 100 on the left scale with the one marked 3000 on the right hand scale of the RPM: the intersection of the central scale xg gives directly the required relative centrifuge acceleration value (in our case 1000 xg).

The following relations connect the relative centrifuge acceleration and the RPM number:

$$xg = 1,1178 \cdot 10^{-3} \cdot n^2 \cdot r \quad \text{where } n = \text{RPM}$$

$$n = \sqrt{\frac{xg}{1,1178 \cdot 10^{-3} \cdot r}} \quad r = \text{radius in metres}$$

4.4 "ANNITA IIR - processing & control interface"



1. **Speed display** (rpm) shows, when the machine is stopped, SET rpm (set values); when is spinning, real rpm. With light flashing shows SET rpm (from 300 to 14000 rpm).
2. **SET rpm keys** ▽ △ for increasing or decreasing set values.
3. **Minutes display** shows, when the machine is stopped, set centrifugation time; when is running, the remaining centrifugation time; during "HOLD" function (continuous operation), display seconds and minutes flying. (from 1 to 99 min; 0 min = Hold - Hd on the display).
4. **SET minutes keys** ▽ △: for increasing or decreasing set time values.
5. **STOP key** for a manual stop of the centrifuge. Combined to keys N°. 12, it switches on and off the password protection against overwriting of programme in memory.
6. **STAR key** for starting of centrifugation cycle.
7. **SOFT key** to set low deceleration (LED lit). Low deceleration can be programmed by 4 coast-down + inertial.
8. **SOFT key** to set low acceleration (LED lit). 5 shapes can program low acceleration.
9. **MOM (Momentary)** key for short runs at high speed: when the MOM key is pressed, the centrifuge spins at the set speed as long as the key is held down; the display shows the elapsed running time
10. **GREEN LED**: flashes during start-up and slowing down phase, fixed when real speed = SET rpm.
11. **YELLOW LED**: if it is lit, the lid can be opened. It comes on when the centrifuge is stationary.
12. **5 PROGRAMME KEYS**: for quick programming and recalling of 5 work cycles.
13. **5 led combined with programme keys**: LED LIT = programme selected.
14. **TEMPERATURE DISPLAY**: it visualises, the real air temperature of the centrifugation chamber whether the rotor is stationary or centrifuging. If the led flashes visualises the set value (-10°C to +40°C).
15. **SET Temperature Keys** ▽ △: pressing the "up" or "down" key increases/decreases the set temperature value.

5. OPERATION PROCEDURE

5.0 Instructions for the operator

1. The presence of the operator is necessary from the start until centrifuge reaches the selected speed.
2. It is necessary the presence also to the stop.

5.1 Power Switch - Cover unlock



1. By positioning the mains switch, located on the left side of the machine to "on" both the centrifuge and the refrigeration circuit are connected with the mains. The "ANNITA IIR" interface will be in the same "Operative Mode" as in the last work cycle.
2. When the machine doesn't work and with led on, it's possible to unlock the lid. The mechanical unlock, with subsequent lid opening, is obtained by pulling towards the front of the unit the handle on the centrifuge top right.

5.2 Loading balance

fig. 1

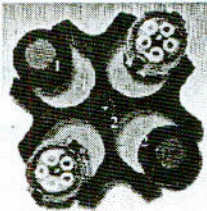
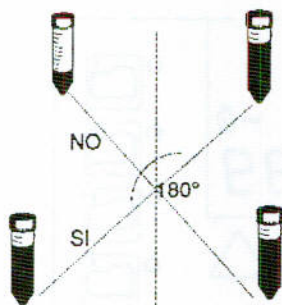


fig. 2



fig. 3



correct incorrect

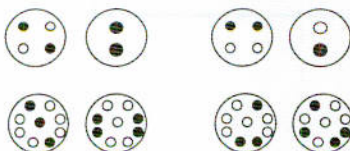


fig. 4

5.2.1 All rotating equipment are dynamically balanced at source; reference numbers and marks indicate the exact respective positions of the various parts forming the equipment; when rotating, this should always be whole and complete (eg. bucket n°2 positionated on the rotor in correspondence of the number 2, see fig. 1).

5.2.2 All buckets must be always inserted into the rotating fixed-angle equipment, even for partial loads (see fig. 2).

5.2.3 In the load balance operation, the buckets should never be weighed, but only their contents (adapters, tubes, etc.).

5.2.4 Distribute the load correctly. Loads should be inserted two by two, of equal weight, at 180 degrees from the rotation axis and at equal distance (radius) from the centre of rotation (see fig. 3).

5.2.5 For partial loads of swing-out rotating equipment (type O-) it is advisable to distribute the tubes symmetrically also with regard to the centre of rotation (see fig. 4).

5.2.6 Avoid overloading the rotating equipment, having to centrifuge liquids with higher density than 1200 kg/m^3 , the max. rpm should be reduced according with the following formula:

$$\text{Allowed rpm} = \text{max. rpm} * (1200/\text{New density})$$

5.2.7 Lower the lid, then close it pressing on the front edges until the hook in the lid clicks into the lid lock mechanism. Only this operation will activate the centrifuge-starting device.

NOTE: When using the aerodynamic rotating heads, all tubes must be balanced within ± 2 grams, in order to obtain the best separation.

5.3 "Operative Mode" Selection: **MANUAL - PROGRAM**

INTRODUCTION: The ANNITA IIR is an interface between man and machine, no previous operational knowledge is necessary: the programming is really intuitive; every parameter can be set by pressing the cursor key with a continuous action from the minimum to the maximum and viceversa.

Accessible parameters for setting:

- a) *rpm centrifugation* (300 rpm up to max. for the Equip., see 4.2.2).
- b) *Centrifugation time* (1 min up to 99 min + ∞)
- c) *Working temperature* (-10°C to +40°C)
- d) *Low acceleration* (1-5 profile, 1 is the slower)
- e) *Low deceleration* (0-4 coast-down; 0 inertial)

The microprocessor allows the basics option between the **MANUAL** operative mode (with the widest setting, control, variation and parameter modification choice), the **PROGRAM** operative mode for an absolute repeatability of the memorised cycles and (if needed) with a protection from unwanted variations due to overwriting or errors.

5.3.1 **MANUAL** Operative Mode

It is automatically activated when all programs are not selected (all led-programme switched off). It will be possible to have access to all parameters and to change them either with running or stationary machine.

The **MANUAL** Operative Mode (led programme switched off) is also the basic condition for program setting changing and storing.

5.3.2 **PROGRAM** Operative Mode

The pre-set values can be stored into 5 programs by means of 5 keys programme.

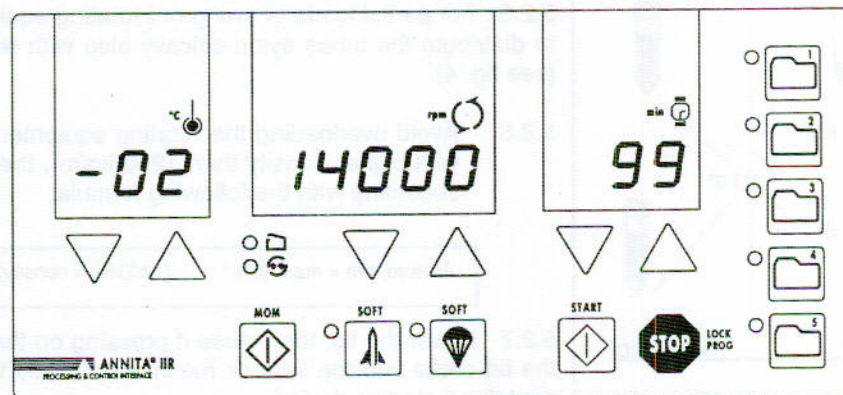
To select programs press the key-programme respectively.

If the LED at side of key-programme is lit, it means: programme selected; to turn off the memory press the same key to switch off the led.

To select another programme just press another key.

5.3.3 **MOMENTARY (MOM)** Operative Mode

Run function, which enables the selection of max speed, and max acceleration by continuously depressing MOM key. When the  is released the centrifuge slowing down until stopping.



5.4 How to set

BASIC CONDITION: Centrifuge stationary and MANUAL Operative Mode.

5.4.1 Centrifuge alimentation

The centrifuge is in the same operative condition of the least work MANUAL or PROGRAM (with set).

Pressing "key-programme" to cancel programme selected by mistake

When the centrifuge is stopped the display visualises:

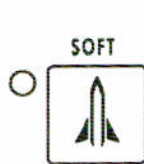
°C	-Real temperature in the centrifugation chamber
rpm	-set rpm
min	-set min

5.4.2 Acceleration setting by SOFT 'ACL' key

High acceleration (led off)

Low acceleration (led on)

It is possible to select various acceleration profile setting.



1. Pressing the  with led on for 3 sec.
(The rpm-display shows "ACL" flashing and a number between 1 and 5)
2. When SOFT ACL key is pressed, with **SET rpm keys** ∇ $\triangle$ select acceleration curve between 1 and 5.

5.4.3. Deceleration setting by SOFT 'dCL' key

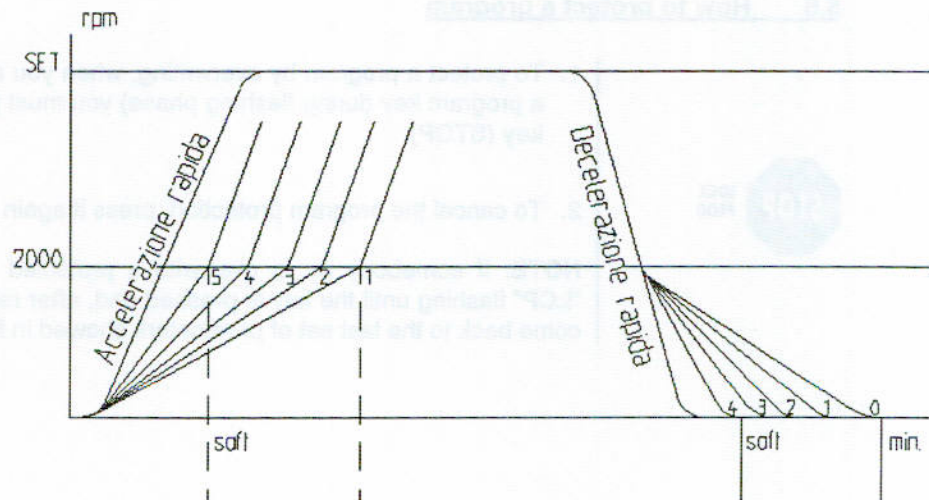
High deceleration (led off)

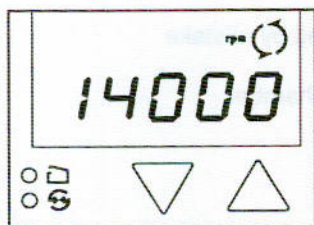
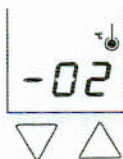
Low deceleration (led on)

It is possible to select various low coast-down deceleration-setting curves, corresponding to several profiles of decreasing time speed.



1. Pressing the  with led on for 3 sec.
(The rpm-display shows "dCL" flashing and a number between 0 and 4).
2. When SOFT ACL key is pressed, with **SET rpm keys** ∇ $\triangle$ select deceleration curve between 0 and 4 (0 = inertial).





5.4.4. Setting °C, rpm, min profiles

- Touching one of 6 SET keys ▽ △, all display and "SET" led (on) will start to flash.
- When the display flashes, it is possible to change selected parameter using SET keys.

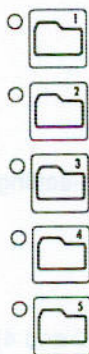
SET °C-10 °C to +40 °C (according to a loading condition; see 4.2).

SET rpm300 to 14000 rpm (see 4.2 for rpm max for Rot. Equipment).

SET min1 to 99 min (0 = continuous - "HD" on the display).

3 second after all the required parameter changes, the display stops flashing confirming automatically the new SET.

5.5 How to set and memorise a program



BASIC CONDITION: Centrifuge stationary and "MANUAL" Operative Mode.

1. To store the parameters which appears on the display (°C., rpm, min, SOFT ACL, SOFT dCL) **press a programme keys between 1 and 5 during parameter flashing phase**. When the **Led** by side to the **programme key** will lit then the program has been memorised.

Note: It is not possible to set a programme with "Hd" time: the timer display will continue flashing; you must insert a determined time profile.

2. To restore "MANUAL MODE", press again the selected **program key**; the led goes off and it is possible to make a new program.

5.6 How to protect a program

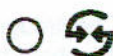


1. To protect a program by overwriting, when you memorise a new program (pressing a program key during flashing phase) you must press simultaneously **LOCK PROG key (STOP)**.

2. To cancel the program protection, press it again together with  key.

NOTE: If somebody try to overwrite a protected program, the display rpm shows "LCP" flashing until the key is pressed and, after released, still 3 seconds. The display come back to the last set of parameters showed in MANUAL MODE.

5.7 Starting the centrifuge



BASIC CONDITION: Lid closed

1. Press **"START"** key.

In **MANUAL OPERATIVE MODE** and in **PROGRAM MODE**, the centrifuge will accelerate to the set speed, when the run time is completely elapsed, deceleration take place.

- During run time °C. and **rpm** displays show real parameters, **min** display elapsed run time in minutes "counts-up" or remaining run time "counts-down" if SET min = Hd = mode continuous and only in "MANUAL").
- Yellow led goes off.
- Green led will start flashing until set speed is reached and kept (fixed led lit).

NOTE: if set **rpm** is higher than Max speed of rotating Equipment, green led will continue flashing (see 5.10 SET). Correct right SET rpm or select suitable program.

2. During run time and **OPERATIVE "MANUAL" MODE**, to read and change set values, press $\nabla \triangle$ SET cursors:

- display starts to flash and shows the set values for 3 seconds.
- during flashing it is possible to change set values.
- during run in **MANUAL** it is possible to change the deceleration (high or "SOFT" and SOFT profile).

3. During run time and **OPERATIVE "PROGRAM" MODE**, it is possible to show set values pressing the corresponding arrow key, and it's not possible to change the parameters setting.

5.8 Stopping the centrifuge



Once the pre-set time manually has elapsed, the centrifuge automatically stops with the pre-set brake mode.

In any situation, press  to anticipate stopping.

NOTE: The centrifuge stop can also occurs automatically for load imbalance, power failure, error or breakdown. In all cases the relative information will appear on the message display.

5.9 "MOMENTARY" function



BASIC CONDITION: Centrifuge stationary and **MANUAL** Operative Mode.

For short runs you can use : The rotating equipment will accelerate with max. acceleration at the set speed, by continuously depressing MOM key.

- The **yellow led**, (opening and closing the centrifuge lid), goes out.
- The **green led**, (start-up phase), will start to flash
- The **min display** will show the elapsed centrifuging time ("counts-up") in second until 99; then again from 0 to 99 sec., etc.

When the  is released the centrifuge slowing down until stopping.

5.10 Messages - Alarms

The microprocessor visualises on the display the messages to inform or indicate errors, malfunctions or breakdowns, expressed in letters, numbers and codes.

At the end of every centrifugation cycle, stationary centrifuge. The message disappears and will appear the set rpm at the next operation (e.g. pressing any key or opening the lid).

END

When the  is pressed with open or apparently closed lid (lid down but not locked) it appears LID + acoustic alarm. The lid must be close: the message disappears enabling to start the centrifuge.

LID

When the load is imbalanced it appears message + acoustic alarm. The centrifuge stops and will be necessary to rebalance the load (5.2). The message disappears when the lid is opened.

IMBAL

When power failure occurs; the centrifuge decelerates and when power returns the message appears; disappearing at the next operation.

MAINS

When, due to a breakdown of the refrigeration system or other reasons, the temperature inside the refrigeration chamber rises more than 45°C, the message appears and the centrifuge stops. The message disappears when the temperature drops below 40°C.

OVERT

During centrifugation flashing in case of utilisation of a program with set speed higher than the rotating equipment maximum speed. The message disappears when centrifuge is stopped or the parameter is corrected on Manual Operative Mode.

SET

Messages 'E0..' (e.g. E01) together with an acoustic alarm mean failure condition. The 'E04' message will appear on the display after a power failure, in this case wait for the rotor head to stop before opening the lid. In the other cases (E...) contact the Assistance Service.

E....

6.

HAZARDS, PRECAUTIONS AND LIMITATION OF USE

6.1 Dangerous operations - work conditions to avoid

- Using the centrifuge if it has not been properly installed.
- Incorrect assembly of the rotating head on the driving stud and buckets on the rotor.
- Lean on the machine.
- Stay in the controlled area more than required time.
- Depositing any object that could be dangerous in the free area.
- Moving or shifting the machine during centrifugation.
- Using the centrifuge with rotating equipment showing evident corrosion, wear marks and cracking on the rotating head or on the buckets.
- Using the centrifuge with rotating equipment and accessories not approved by the manufacturer.
- Using the centrifuge in explosion risk rooms or with explosion risk products or chemical materials subject to violent reaction.
- Imbalanced load causing an excessive vibration of the centrifuge.
- IF ANY DANGEROUS EVENT OCCURS, KEEP YOURSELF FAR AWAY FROM THE INSTRUMENT AND SWITCH OFF THE MAIN POWER SOURCE WITH A REMOTE EMERGENCY CIRCUIT BREAKER.
- Don't insert all buckets into the rotating equipment, even for partial loads (Just Cytokit can be inserted with only two buckets).
- Do not leave the appliance exposed to the elements (rain, sun, etc.).
- Exceeding the maximum speed indicated in the "max. rpm" column of the performance table (see 4.2.2).
- Using old accessories on a new machine.
- Using tubes, bottles not suited for centrifugation.
- Centrifugating samples with higher density than allowed to the maximum speed, without reducing the speed limit (see 5.2.5).
- Manipulating and/or tampering with the electronic and mechanical parts by unskilled personnel.

6.2 EN 61010-2-020 STANDARD

- The En 61010-2-020 standard relative to laboratory centrifuges recommends the user:
- To mark out a clearance envelope 300 mm around the centrifuge or establish special procedures for the non entry of all persons or all dangerous materials into this space during the operation of the centrifuge.
 - To provide an emergency stop switch enabling the mains power to be cut in the case of malfunction. The switch should be placed at a safe distance from the centrifuge, preferably in a different room from that in which the centrifuge is situated.

6.3 Rotor and accessory precautions

6.3.1 Corrosion information

ALC International rotors made of aluminium alloy are designed to operate at their rated RCF for many years. With careful use they will resist corrosion, lowering the possibility of excessive imbalance, disruption and subsequent damage to the instrument. The primary conditions for the initiation of corrosion exist in every laboratory during daily use of the centrifuge. For this reason it is essential that due care and attention be paid to inspection and cleaning.

CHEMICAL CORROSION

This corrosion is characterised by chemical reactions due to the existence of any electrolyte liquid on the surface of the rotating equipment.

If these substances are allowed to remain on the surface the corrosion will almost certainly occur. This produces first a discoloration of the anodization the pitting of the metal.

Acidic and alkaline solutions sustaining their pH level will create problems of corrosion in aluminium equipment. Chlorides, present in salts or even in skin contact with the rotating equipment are among the most aggressive and harmful substances commonly found in the laboratory.

The chemical products, which are the origin of this corrosion do not necessarily originate from broken tubes, for example they could come from:

- chemical vapours present in the laboratory which are dissolved in the residual humidity, in condensed water (refrigerated centrifuges) present at the base of the rotor pockets.
- corrosive liquids originating from overfilled uncapped tubes (the liquid overflowing during centrifugation)
- Inserts, adapters, racks, bottles whose exterior has been soiled by a chemical product or poorly rinsed after decontamination (with bleach, for example).

NOTE: If the products are very corrosive, simply rinsing is insufficient. Residual traces dissolve little by little with the humidity present in the bottom of the rotor pocket.

BEWARE of the presence of solid particles beneath tubes, inserts, racks or adapters. These particles are crushed by the centrifugal force and penetrate the protective, anodised layer of buckets and rotors, thus creating easy pathways for corrosion.

STRESS CORROSION

This term relates to the phenomenon of accelerated corrosion due to the effect of centrifugation when a corrosive chemical is in contact with the alloy. From the time when the aluminium alloy has been attacked by chemicals, stress corrosion begins to appear. As it is on a microscopic scale it is even more dangerous than a macroscopic since it is invisible.

During centrifugation, chemicals responsible for corrosion are also submitted to the very high "g" force, which pushes them against the alloy. This close contact facilitates the chemical reaction which occurs much faster than in a static situation. Moreover, centrifugal force is very directional thus corrosion under stress creates, with a very small amount of corrosive product, straight microscopic fissures. Each centrifugation run makes the chemical migrate further and further.

Fissures or cracks, although it is microscopic, are a cut in the metal, breaking the cohesion of the material. As one weak link in a chain allows the chain to break, so the microfissures break the chain of resistance of the accessory to centrifugal force. As accessories are designed with high levels of safety, rupture does not occur as soon as the first microfissures are produced.

Depending upon the location of the fissure, disruption may occur before it reaches the external surface of the accessory. The fissure creates a weakness, which makes the accessory less and less resistant to mechanical fatigue. The corrosion by a small amount of corrosive product does not disrupt the accessory but makes it mechanically weaker and weaker until disruption due to both centrifugal effort and number of cycles.

WARNING: Because stress corrosion is largely invisible, it is essential that rotating equipment are scrutinised regularly paying particular attention to susceptible parts such as the bottom of pockets, the outer edges and the base of the rotating equipment.

6.3.2 Contamination hazards

ALC centrifuges are likely to be used in medical research and laboratory where hazardous substances are frequently present.



WARNING:

The user has the responsibility for carrying out appropriate decontamination and elimination of the handled materials.

Users should be aware on the internationally recognized "*Laboratory Biosafety Manual*", which gives information on decontaminants; their use; dilutions; properties; and potential applications.

If hazardous material is split on/or inside the appliance clean with appropriate methods also the drain hose in the case it flows inside.

If decontamination procedures require the use of warming (eg. autoclave) the rotating equipment should always be completely disassembled before being subjected to heat and after external chemical cleaning. Seals, Tubes and plastic components should be decontaminated with the method most suitable for them, which might not be the same as for rotating equipment.

Note that the black color on the surface of the rotating equipment will be gradually washed out if the rotor is regularly autoclaved or bleached. This does not necessarily denote degradation on the anodization.

Warning: ANY PART, WHICH HAS BEEN SUBJECTED TO TEMPERATURES ABOVE 130°C, MUST BE DISCARDED.

Warning: For any other unscheduled cleaning, the customer must contact the builder to verify that the proposed method does not damage the appliance.

ALC International makes no claims as to the effectiveness of proprietary brands of decontaminating solutions.

7.

ROUTINE MAINTENANCE

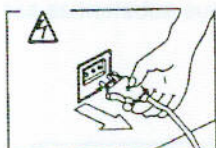


fig. 7.1

Caution: During maintenance operations, always disconnect the centrifuge from the mains (fig. 7.1).

7.1 Rotating Equipment and Centrifugation Chamber cleaning

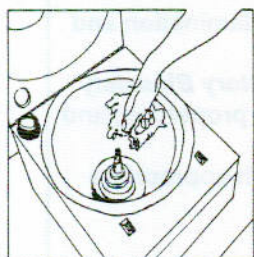


fig. 7.2

Regular cleaning of rotating heads and centrifugation chamber is vital for correct work condition of the centrifuge.

The operator must wear opportunity accessories during the cleaning (mask, gloves, special wears ...).

Verify the integrity of biosafety components when they are used. The substances used determinate also the correct methods for inspection of these components. However the user must verify always their good conditions also by inspection. Do not clean with materials could damage silicone and polycarbonato.

The regular maintenance for biosafety is important for daily life efficiency.

Ideally, rotating equipment should be washed after every run but at least weekly in warm water containing a few drops of mild not alkaline detergent (domestic washing up liquid is ideal) and **EVERY TIME AFTER A SPILLAGE HAS OCCURRED**. Do not forget to wash the core of the rotating head, which comes into contact with the drive spindle. Each pocket of the rotating heads aerodynamics and bucket of swing-out equipment must be washed thoroughly using a small nylon brush. Once the rotating head has been removed, it is easy to clean the centrifugation chamber and gaskets, warm water with not alkaline detergent is recommended. Do not use corrosive solvents.

Once the Rotating Equipment is clean, rinse it running water, preferably disillid. Dry the Rotating Equipment with a soft absorbent non-woven cloth or tissue. Drying may be finished off with warm air jet (e.g. a hair dryer).

DO NOT USE METAL WIRE BRUSHES and MAKE CERTAIN THAT ROTATING HEADS SLOTS AND BUCKETS ARE WELL-DRIED (fig. 7.2).

NEVER LEAVE damp Rotating Equipment on a metal surface, particularly stainless steel because an electrochemical reaction could take place with the aluminium or magnesium in the rotor. For swing-out rotating equipment, be sure to clean the dirty grease from the studs and replace it with a small amount of fresh grease. This will ensure that the buckets swing freely. The vast majority of apparent imbalance problems arise from the failure of the user to clean and grease the studs and not from instrument error.

Never apply grease if studs and balancing slots have not been carefully cleaned (fig. 7.3 a/b). Use only the same kind of greases furnished in the Rotating Equipment packaging.

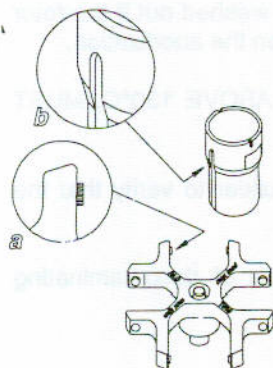


fig. 7.3



The refrigerated centrifuge PK121R is equipped with a chamber drain hose which provides the facility for evacuating excessive condensation:

- Switch off the centrifuge and disconnect the plug.
- Put a small basin under the pipe.
- Take off the cap for the condense exit.
- Insert the cap when finished.
- Insert the plug

ATTENTION: Never take off the cap from the drain hose during the centrifugation.

7.2 Exterior cleaning

For a correct cleaning a light domestic use detergent is recommended. A mixture of 50% isopropilic alcohol and water is warmly suggested because it will not damage the labels.

7.3 Circuit breaker

It replaces the double protection fuse disconnecting the centrifuge to the main during short circuits or overcurrent.

If the main circuit breaker cuts off the power to the instrument, do not attempt to switch on before a service engineer has checked over the unit.

OPERATOR'S NOTE

9.

CERTIFICATE of DECONTAMINATION and CLEANING



(For Your convenience, use a copy of this page)

Read carefully the instructions below before sending an instrument, or parts of it, to Technical Assistance.

MR / MRS (NAME) _____
 ESTABLISHMENT _____
 DEPARTMENT _____
 ADDRESS _____ POST / ZIP CODE _____
 CITY _____ STATE / COUNTRY _____

DECLARES the cleaning and decontamination of the following:

CENTRIFUGE _____	SERIAL N° _____
ROTOR _____	SERIAL N° _____
ROTOR _____	SERIAL N° _____
ACCESSORY - Description _____	SERIAL N° _____
ACCESSORY - Description _____	SERIAL N° _____

NATURE of contamination

Decontamination PROCEDURE USED

Decontamination CERTIFIED by:

Mr / Mrs. _____	Institution: _____
Date _____	Signature: _____

When an instrument, or parts of it, comes back after demonstration or requires servicing by Technical Assistance personnel, the following procedure must be accomplished to ensure personnel safety:

- Clean the instrument and proceed to its decontamination from any kind of dangerous stuff.
- Compile this *Decontamination Certificate* with all the information required.
- Attach this *Certificate* to the instrument (or part) before sending it to the Assistance.

Technical Assistance personnel **will not accept** instruments deprived of this *Decontamination Certificate*.

