

HuMax 14K

| User Manual



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Human

Diagnostics Worldwide

REVISION LIST OF THE MANUAL

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SYSTEM VERSION

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SERVICE AND SUPPORT



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1 SAFETY INSTRUCTIONS

1.1 Introduction

This manual is considered as a part of the instrument; it has to be at the operator's hand as well as at the maintenance operator's availability. For accurate installation, use and maintenance, please read the following instructions carefully. In order to avoid instrument damage or personal injury, carefully read the "GENERAL SAFETY WARNINGS", describing the suitable operating procedures. In case of breakdowns or any troubles with the instrument, apply to the local Technical Service.

1.2 User warranty

HUMAN warrants that instruments sold by one of its authorised representatives shall be free of any defect in material or workmanship, provided that this warranty shall apply only to defects which become apparent within one year from the date of delivery of the new instrument to the purchaser.

The HUMAN representative shall replace or repair any defective item at no charge, except for transportation expenses to the point of repair.

This warranty excludes the HUMAN representative from liability to replace any item considered as expendable in the course of normal usage, e.g.: lamps, valves, syringes, glassware, fuses, diskettes, tubing etc.

The HUMAN representative shall be relieved of any liability under this warranty if the product is not used in accordance with the manufacturer's instructions, altered in any way not specified by HUMAN, not regularly maintained, used with equipment not approved by HUMAN or used for purposes for which it was not designed.

HUMAN shall be relieved of any obligation under this warranty, unless a completed installation / warranty registration form is received by HUMAN within 15 days of installation of this product.

This warranty does not apply to damages incurred in shipment of goods. Any damage so incurred shall be reported to the freight carrier for settlement or claim.

1.3 Intended use of the instrument

The instrument is intended for laboratory application by professional users. It has to be used for the expected purposes and in perfect technical conditions, by qualified personnel, in working conditions and maintenance operations as described in this manual, according to the GENERAL SAFETY WARNINGS. This manual contains instructions for professional qualified operators.

1.4 General safety warnings

Use only chemical reagents and accessories specified and supplied by HUMAN and/or mentioned in this manual. Place the product so that it has proper ventilation.

The instrument should be installed on a stationary flat working surface, free from vibrations.

Do not operate in area with excessive dust.

Work at room temperature and humidity, according to the specifications listed in this manual.

Do not operate this instrument with covers and panels removed.

Only use the power cord specified for this product, with the grounding conductor of the power cord connected to earth ground.

Use only the fuse type and rating specified by the manufacturer for this instrument, use of fuses with improper ratings may pose electrical and fire hazards.

To avoid fire or shock hazard, observe all ratings and markings on the instrument.

Do not power the instrument in potentially explosive environment or at risk of fire.

Prior to cleaning and/or maintaining the instrument, switch off the instrument and remove the power cord.

For cleaning use only materials specified in this manual, otherwise parts may become damaged. It is recommended always to wear protective apparel and eye protection while using this instrument. Respective warning symbols, if appearing in this manual, should be carefully considered.

1.5 Disposal management concept

The currently valid local regulations governing disposal must be observed. It is in the responsibility of the user to arrange proper disposal of the individual components.

All parts which may comprise potentially infectious materials have to be disinfected by suitable validated procedures (autoclaving, chemical treatment) prior to disposal. Applicable local regulations for disposal have to be carefully observed.

The instruments and electronic accessories (without batteries, power packs etc.) must be disposed off according to the regulations for the disposal of electronic components.

Batteries, power packs and similar power source have to be dismantled from electric/electronic parts and disposed off in accordance with applicable local regulations.

1.6 Instrument disinfection

Analytical instruments for in vitro diagnostic involve the handling of human samples and controls which should be considered at least potentially infectious. Therefore every part and accessory of the respective instrument which may have come into contact with such samples must equally be considered as potentially infectious.

Before doing any servicing on the instrument it is very important to thoroughly disinfect all possibly contaminated parts. Before the instrument is removed from the laboratory for disposal or servicing, it must be decontaminated. Decontamination should be performed by authorised well-trained personnel only, observing all necessary safety precautions. Instruments to be returned have to be accompanied by a decontamination certificate completed by the responsible laboratory manager. If a decontamination certificate is not supplied, the returning laboratory will be responsible for charges resulting from non-acceptance of the instrument by the servicing centre, or from authority's interventions.

1.7 Biohazard warning

Analytical instruments for in vitro diagnostic application involve the handling of human samples and controls which should be considered at least potentially infectious. Therefore every part and accessory of the respective instrument which may have come into contact with such samples must equally be considered as potentially infectious.

For safety reasons, we have labeled instruments with the „BIOHAZARD“ warning label below.

FIGURE 1
Biological Hazard Symbol



2 MAIN PURPOSE OF THE UNIT AND DESCRIPTION

The HuMax 14K centrifuges are designed to separate liquids of different densities by applying centrifugal force.

Different types of rotors, swing-out and angle rotors, can be fitted to the centrifuges.

The microprocessor control system also displays the RCF value during the run.

The ventilation system of the HuMax 14K limits temperature in the bowl at max. +12°C.

The centrifuges are manufactured according to the following standards:
EN 61010-1, EN 50081-1, EN 980

3 TECHNICAL SPECIFICATIONS

3.1 Technical Specifications Table

	HuMax 14K
Max Speed	17161 rotor: 4100 rpm, 17163 rotor: 14000 rpm
Max. RCF*	17161 rotor: 3045 x g, 17163 rotor: 18407 x g
Max. Capacity	17161 rotor: 4x 200 ml, 17163 rotor: 24 x 1.5/2 ml
Control System	Microprocessor controlled
Display	Digital, High Visibility
No. of Memories	10
Speed Range	500-14000 rpm
Speed Step	10 rpm
Speed Accuracy	± 20 rpm
Timer Range	01-99 min + Hold Position
Timer Step	1 min
Acceleration Rate	10 acceleration rates, 0: slowest, 9: fastest
Braking Rate	10 braking rates, 0: slowest, 9: fastest
Power Supply	230 V ± 10%, 50/60 Hz
Max. Power	500 W
Average Power	300 W
Dimension WxDxH	Instrument without any components : 465 x 550 x 400 mm Space required for routine use: 565 x 650 x 870 mm Packaging: 520 x 600 x 490 mm
Net Weight	43.4 kg
Gross Weight	47.6 kg

TABLE 1

* RCF: Relative Centrifugal Force

3.2 Operating Principles

3.2.1 Drive System

The rotor is driven by a three phase asynchronous motor. The microprocessor control system assures the correct drive speed.

The force applied to the rotor is directly related to the shape of the rotor, the swing-out rotor receives more force than the angle rotor does.

! If power failure occurs, access to the samples is possible by opening the lid with a special tool. Please see the manual lid opening section (4.6) for further information.

Longer radius and more accessories increase the load of the rotor and decrease the spinning speed.

The centrifuge does not allow the rotor to spin at a speed that it cannot resist mechanically.

Please make that sure the correct type of rotor is selected during programming.

SAFETY INTERLOCK SYSTEM

The safety interlock system prevents opening of the lid while the rotor is spinning.

The centrifuge does not operate until the lid is closed and the lid remains locked until the rotor stops spinning. The “Lid Open” indicator turns on to warn the user if the lid is not closed properly.

3.2.2 Imbalance Detection System

The imbalance detection system of the HuMax 14K centrifuges operates electronically when an unacceptable imbalance occurs. In this case the brake is applied immediately.

The “Err 1” imbalance error is displayed and the imbalance indicator turns on. The lid cannot be opened until the rotor stops spinning. The centrifuge can only be started after the lid has been opened and the rotor has been re-loaded correctly.

To avoid facing imbalance problems, please make sure to balance the load.

3.3 Rotor Selection Table

Rotor	Description	Capacity	Max. Tube Dim. mm	Rad mm	Max. Speed Rpm	Max RCF xg	TABLE 2
17161	Swing-Out Rotor	4x 200 ml	Ø 57	162	4100	3045	
17161/1	Set of 4 buckets	200 ml	Ø 57	162	4100	3045	
17161/3	4 PP bottles with cap	200 ml	Ø 56.5	162	4100	3045	
17161/4	Set of 4 inserts	1x100 ml	Ø 45	162	4100	3045	
17161/5	Set of 4 inserts	1x50 ml Conical	Ø 30	162	4100	3045	
17161/6	Set of 4 inserts	7x15 ml	Ø 17	162	4100	3045	
17161/7	Set of 4 inserts	3x15 ml Conical	Ø 17	162	4100	3045	
17161/8	Set of 4 inserts	7x5/7ml	Ø 13.5	162	4100	3007	
17162	Angle rotor	30x15 ml	Ø 17	160	4100	3007	
17157	Adapter	1 x 5 ml	Ø 13	160	4100	3007	
17156	Adapter	1 x 7 ml	Ø 13	160	4100	3007	
17155	Adapter	1 x 1.5/2 ml	Ø 11	160	4100	3007	
17163	Angle Rotor	24x 1.5/2 ml	Ø 11	84	14000	18405	
17161/1*	Adapter	1x500/800 µl	Ø 8	84	14000	18405	
17161/2*	Adapter	1x 200 µl PCR	Ø 6.5	84	14000	18405	
17161/3*	Adapter	1x250/400/700µl	Ø 6.5	84	14000	18405	

* For 17163 is required to use 24 adapters.

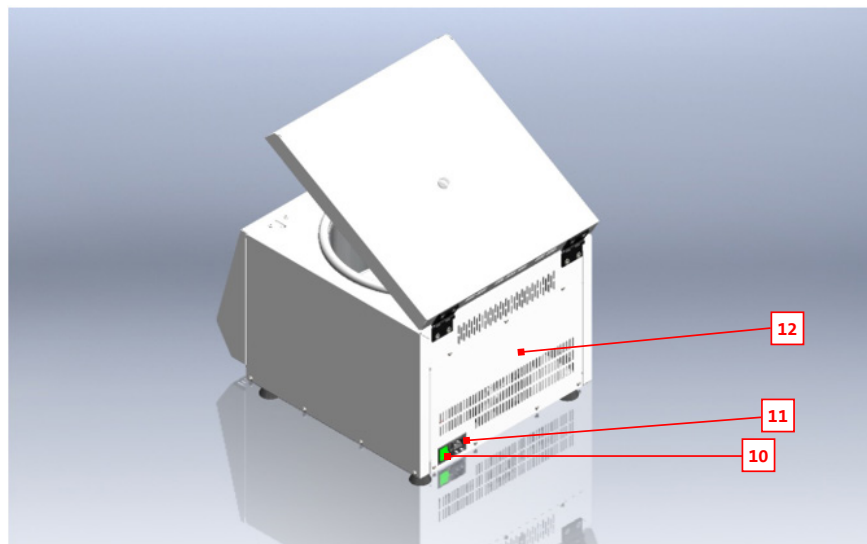
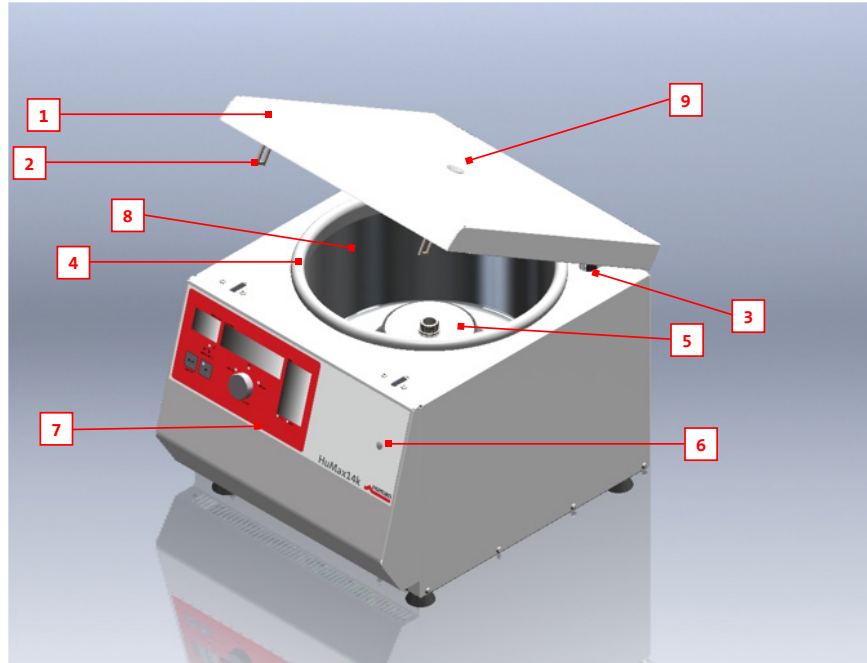


FIGURE 2

! Insert set is not needed for 200 ml tubes.

FIGURE 3

- 1 Lid
- 2 Lock Pin
- 3 Gas Spring
- 4 Lid Gasket
- 5 Rotor
- 6 Manual LID Opening Hole
- 7 Control Panel
- 8 Bowl
- 9 Observation Window
- 10 On/Off Switch
- 11 Electrical Socket And Fuses
- 12 Air Ventilation



4 INSTALLATION PROCEDURE

4.1 Lifting and Transport

Because of the heavy weight of the centrifuge, all lifting and transport must be carried out by using proper handling equipment. The centrifuge should be lifted from underneath and never be turned over.

4.2 Contents Of Package

The package includes:

- 1 ea. HuMax 14K Centrifuge
- 1 ea. User manual
- 1 ea. Manual lid opening tool
- 1 ea. Electrical cable
- 1 ea. 24-Socket wrench (nut & lever)
- 1 ea. Bucket lubrication grease
- 1 ea. Puller tool

4.3 Mains Supply

Max. power requirement: 500 VA (average: 300 VA)

Max. power requirement: 800 VA (average: 500 VA)

The centrifuges should be connected to grounded plugs.

4.4 Environmental Conditions

The centrifuge is designed to operate safely under the following conditions:

- Indoor use only
- Ambient temperature: 5°C to 40°C
- Maximum relative humidity of 80% for temperature up to 22°C
- Maximum altitude: 2000 m

Maximum performance is obtained between 15°C and 25°C.

! This operation must be carried out by someone who is informed of the danger and of the precautions that must be taken. Before opening the lid manually, make sure that the rotor has stopped spinning. Upon opening the lid, lift it by hand and observe the rotor. If the rotor is still spinning, close the lid and wait approximately 10 minutes before repeating the operation.

4.5 Positioning

- Make sure that no damage has occurred during transport.
- Make sure that the positioning is suitable for users.
- Lift the centrifuge underneath and carry it to its place.
- The bench-top must be rigid enough to support the weight and vibrations.
- Leave 30 cm free space on all sides of the centrifuge.
- Open the lid using the unlocking tool and make sure that no objects are left in the bowl. (See the manual lid opening section 4.6).
- Make sure that the centrifuge does not occupy the utilisation space of nearby equipment or do damage to it.
- The user should check the centrifugation process during the operation.
- Make sure that the mains supply is suitable for the instruments' power consumption (230 V, 50 Hz, grounded plug).

4.6 Manual Lid Opening

In case of power cut or any breakdown, the centrifuge can be opened manually to access the samples.

To open the lid manually:

- Switch off the instrument.
- Insert the manual lid opening tool into the hole on the left side of the instrument (see the general view drawing).
- Push the tool downward, keeping it vertical until the lid opens.

4.7 Preparation of the Rotor to run

Before installation, check the rotor for corrosion and cleanliness.

Chemical or mechanical corrosion may cause severe damage to the rotor and the centrifuge. Particles which are stuck inside the inserts cause the breakage of tubes and lead to major imbalance please check to make sure that no particles are left on the rotor.

The central hole of the rotor and the motor shaft should always be kept clean and dry, especially before any centrifugal operations.

4.7.1 Rotor Installation

- Put some light oil on the drive head to prevent sticking.
- Be careful that the rotor fits on the drive shaft.
- Screw the shaft nut with socket wrench to the clockwise direction. Make sure that the shaft nut is screwed down tightly, but do not apply excessive torque.
- For swing-out rotors, lubricate the pins where the buckets are hanged.
- Place the buckets to the rotor.
- Connect the centrifuge to the power supply.

4.7.2 Loading

The most important condition of an efficient centrifugation is to balance the tubes properly. Loading must be done by meeting the requisites of static and dynamic balance.

Static Balance: This balance states that diametrically oppositely placed weights are almost the same. In application, the liquid level in the tubes should be at the same height to balance the load.

Dynamic Balance: This balance states that diametrically oppositely placed center of the gravity of tubes are symmetrical with respect to spinning axis of the rotor.

- Although in hospitals the samples having almost the same densities are centrifuged, in industry, samples having different densities may be centrifuged. In this case, the dynamic balance becomes more important factor than the static balance is.
- If the number of tubes to be centrifuged is less than the capacity of the rotor, the tubes must be placed oppositely. If an odd number of tubes is centrifuged, a water filled tube at the same weight should be used for balancing.

Examples of the proper and improper loading are shown below.

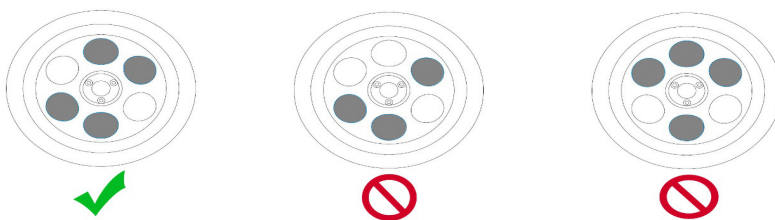


FIGURE 4



Imbalance of the rotor may cause major damage to the rotor and centrifuge.



Never attempt to introduce liquids into the tube inserts.



Balance the rotor with glass tubes if you use glass tubes for centrifugation.

Balance the rotor with plastic tubes if you use plastic tubes for centrifugation.



Always use tubes which can withstand to the set speeds.

5 CONTROL PANEL AND INDICATORS

5.1 Control Panel, Display

Please see below the front panel of the HuMax 14K R.

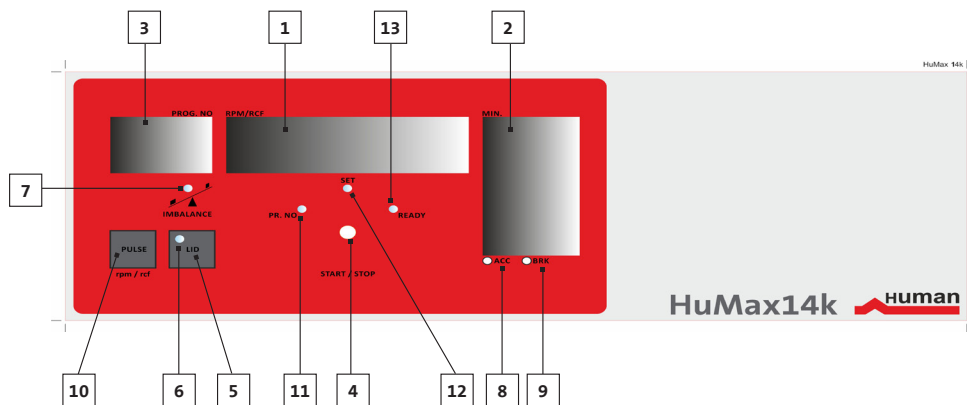


FIGURE 5

Control Display Panel

KEY / INDICATOR	FUNCTION
(1) Status display	Display of speed (500-14.000 rpm) or display of RCF (0-18.405 x g) during the run, rotor type during programming and error code.
(2) Time display / Acceleration/Brake/ Temperature Display	Display of the run time from 1 min. to 99 min. and hold position (H). Display of the acceleration and brake rates from 0 to 10, for HuMax 14K it also displays the bowl temperature during programming and the run.
(3) Program No display/ RUNNING indicator Leds	Display of the program number from 0 to 9. The 4 leds light up consecutively during the run to indicate the spinning of the rotor.
(4) ENCODER Button	This has two functional move. Turn clockwise and opposite clockwise, reach program menu, set value and "READY" situation. By turning the Encoder button increase or decrease values during programming stage. When Led is "READY" situation, by pushing Encoder button start device. Stops the run by starting the braking phase manually.
(5) LID key	Opens the lid if the lid indicator lights up.
(6) LID Indicator Led	It turns on if the lid remains open or is not properly closed.
(7) Imbalance Indicator Led	It is activated if imbalance occurs. Brake is applied immediately.

TABLE 3

(8) Acceleration Indicator Led	It turns on while the acceleration rate is being programmed and while the rotor is accelerating.
(9) Braking Indicator Led	This indicator turns on if the lid remains open or is not properly closed.
(10) PULSE Button	PULSE mode on if pushing button by during READY situation. It is pushed to see the RPM or RCF value on the speed display during the run, to pass among the displays and to store the programmed values.
(11) Program Number Led	It indicates that the user is on the program menu.
(12) Set Menu Led	It indicates that the user is on the set value menu.
(13) READY Led	It indicates that the device ready to run.

5.2 Preparing to Run

- Switch on the centrifuge
- Open the lid
- Fit the rotor and balance the sample load
- Close the lid

5.3 Making a New Program

Determine the rotor type, the speed and time, the acceleration and braking rates.







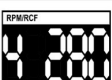









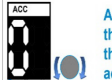


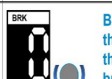





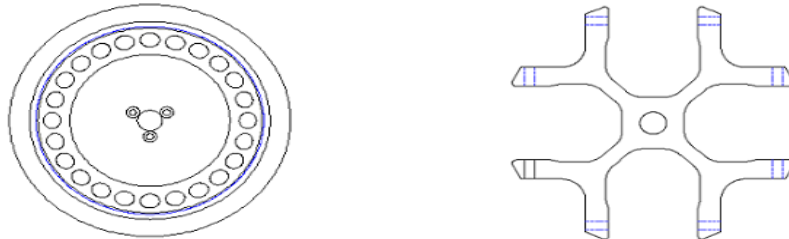
PROGRAM SETTING	 By turning the Encoder button select SET menu.	→	 Push the Encoder button.	→	 The display flashes. By turning the Encoder button increase or decrease the value.	→	 Push the Encoder button and save the value.
ROTOR TYPE SETTING	 The display flashes. By turning the Encoder button increase or decrease rotor type.	→	 Push the Encoder button and save the value.	→	 Push the Encoder button and save the value.		
RPM / RCF	 The display flashes. By turning the Encoder button select RCF or RPM.	→	 Push the Encoder button and save the value.	→	 Push the Encoder button and save the value.		
SPEED SETTING	 The display flashes. By turning the Encoder button increase or decrease run speed.	→	 Push the Encoder button and save the value.	→	 Push the Encoder button and save the value.		
TIME SETTING	 The display flashes. By turning the Encoder button set operating time value.	→	 Push the Encoder button and save the value.	→	 Push the Encoder button and save the value.		
ACCELERATION SETTING	 Acceleration led turns on and the display flashes. By turning the Encoder button set acceleration level.	→	 Push the Encoder button and save the value.	→	 Push the Encoder button and save the value.		
BRAKE SETTING	 Brake led turns on and the display flashes. By turning the Encoder button set brake level.	→	 Push the Encoder button and save the value.	→	 Push the Encoder button and save the value.		
TEMPERATURE SETTING <small>(THIS STEP IS VALID FOR COOLING MODEL.)</small>	 Cooling indicator led turns on, the display flashes. By turning the Encoder button increase or decrease temperature value.	→	 Push the Encoder button and save the value.	→	 Push the Encoder button and save the value.		

TABLE 4

ROTOR TYPE	DISLPAY	MAX. (RPM)	MAX. (RCF)
RA 280 Swing – Out	4.280	4,100	3,082
MP 200 Swing – Out	PLAtE	4,100	2,349
RS 600 Angle	6.100	9,000	8,965
RS 100 Angle	10.10	12,000	14,167
RS 24 Angle	24. 1.5	14,000	18,406
RS 30 Angle	30. 1.5	13500	19968

TABLE 5

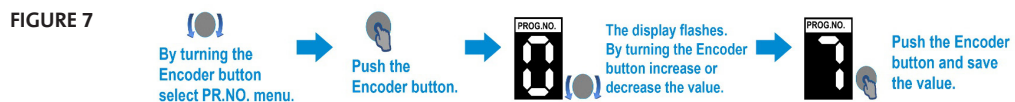
FIGURE 6
Angle Rotor (left),
Swing-out Rotor (right)



! The correct rotor type should be selected in order to see the correct RCF values during the run.

5.3.1 Selecting the memorized program

Select the requested program number at stand-by position by turning Encoder button (6) value increase and decrease. All values related to the selected program will be shown on the relevant displays. Check that all values are correct.



- Load the rotor with samples by paying attention to the dynamic and static balances.
- Close the lid, see that the lid open warning led (8) turns off.
- See that the READY led (16) turns on and push Encoder button (6).
- The rotor starts accelerating according to the set value and the acceleration led turns on. The set speed or RCF value is displayed during the set time duration. (RPM or RCF screen will appear in every 3 seconds). For the operations whose speeds are higher than 2.000 rpm, the rotor accelerates according to the set acceleration value up to 2.000 rpm and then continues accelerating with the highest acceleration value, 9 to reach the set speed. As the speed reaches the set value, “-“ sign appears on the acc/brk/temp display (3).
- The elapsed time is counted down as the centrifugation starts.
- When the time display shows “00”, the program ends, the breaking led turns on and the set break rate is shown at acc/brk/temp display (3). The rotor brakes with the highest break rate, 9 until it slows down to 2.000 rpm and continues braking according to the set braking value.

- The elapsed time until the rotor stops is counted and is shown at the time display. This is the time that passes until the rotor stops.
- When the speed display shows “0”, the “end” expression appears. The user is warned by an intermittently sounding alarm.
- Push the LID button (7) to open the lid.
- You may leave the centrifuge at stand-by position.

5.3.2 Pulse mode

- Load the rotor with samples by paying attention to the dynamic and static balances.
- Set the all parameters for program (see 5.3).
- Close the lid, see that the lid open warning led (8) turns off.
- See that the READY led (16) turns on and push Encoder button (6).

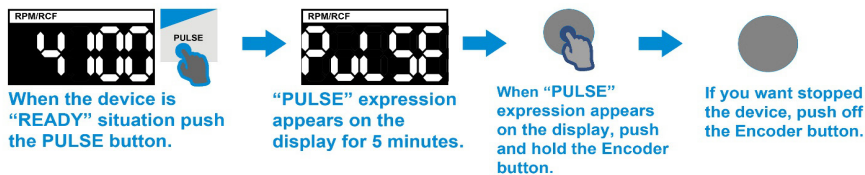


FIGURE 8

- ! You may display the RPM or RCF value on the speed display during the run by pushing the function button.

The centrifuge waits at the stand-by position with the program values of the last program.

Please open the lid after every operation, otherwise the centrifuge cannot be run again.

5.4 END OF OPERATION

At the end of the cooling operation with the HuMax 14K centrifuges, dry with a non-wool soft cloth or paper towel at the centrifuge cell. (When the end of cooling operation with HuMax 14K, has a puddle at the centrifuge cell. So dry to water with paper towel and soft cloth.)

5.5 SAFETY INTERLOCK SYSTEM

The safety interlock system prevents opening of the lid when the rotor is spinning.

The centrifuge does not operate until the lid is closed and the lid remains locked until the rotor stops spinning. The “Lid Open” indicator turns on to warn the user if the lid is not closed properly.

- ! If power failure occurs, access to the samples is possible by opening the lid with a special tool. Please see the manual lid opening section (4.6) for further information.

6 CLEANING & PERIODICAL MAINTENANCE

6.1 Periodical Maintenance

- Disconnect the power cable and after the maintenance check the presence of the mains grounding line.
- Rotors should be washed after every use, especially if a spillage has occurred, in warm water containing a few drops of liquid soap. (A mild washing liquid is ideal as a cleaner).
- Rotors and other accessories must be clean if any spillage or chemicals occur.
- You may use a nylon brush to clean the buckets and tube inserts of the rotor.
- **Do not use metal brushes.**
- Dry the rotor with a piece of soft absorber cloth. Please make sure that the buckets and inserts are well dried, you may use hair dryer.
- The buckets of the swing-out rotors should be greased frequently with the oil provided with the centrifuge. Please remove the light oil from the pins and put a small amount of fresh oil every time you grease. This will ensure free swinging of the buckets. Most of the imbalance problems are mostly raised by the users who do not clean and oil the pins.
- Please do not leave the rotor on a metal surface, particularly stainless steel as electrochemical reactions set off easily with the aluminum or magnesium in the rotor.
- Make sure that no deposit remains at the bottom of the bucket because the pressure of a flask or tube from above during centrifugation will certainly increase the chance of corrosion.

6.2 Disinfection / Sterilisation

- Apply alcohol, for example %70 ethanol or isopropanol, for 10 minutes against bacteria and viruses.
- The rotors and buckets may be autoclaved at 121°C and under 215 kPa pressure for 20 minutes but please do not forget to remove all accessories.
- Do not use formaldehyde for the sterilization process.
- Phenol is a corrosive substance and should never be used.
- Glutaraldehyde is a toxic substance and increases the rate of fatty acid in the body.

! If the centrifuged samples are corrosive, only rinsing with water is not sufficient. The residuals dissolve in the water and humidity on the rotor and in the buckets.

6.3 Corrosion Information

The HuMax rotors which are made of aluminum are designed to spin at proper RCF's for many years. When used properly, their resistance to corrosion and their life span increases and the imbalance problems decrease.

All accessories should be thoroughly checked regularly as almost all laboratory environments can easily lead to corrosion.

6.3.1 Chemical Corrosion

Clean any electrolyte liquids or other corrosive materials from the surface of the instrument as they may cause discoloration or pitting.

The other causes of corrosion are as follows:

- Chemical vapours in the laboratory environment which dissolve in the water on the rotor (in refrigerated centrifuges)
- Corrosive liquids which overflow from overfilled and unsealed tubes, (the liquids which spread out during centrifugation)
- Contaminated and non-cleaned buckets, tubes and bottles

Some particles may stick to the tubes, buckets and adapters. These particles scrape the anodised surface during centrifugation and ease the occurrence of corrosion.

6.3.2 Stress Corrosion

This type of corrosion is caused by the force of the centrifugation of the corrosive chemical which is already in contact with the alloy. As the aluminium alloy contacts with the corrosive chemical, the stress corrosion starts. This type of corrosion is even more dangerous than the chemical corrosion as the effects of this corrosion are microscopic and very difficult to observe in the course of time.

The corrosive material is pushed against the aluminium alloy by the centrifugation "g" force during the centrifugation. This situation causes the stress corrosion to occur more quickly than the chemical corrosion does. Microscopic cracks occur under the force of the centrifugation.

Every centrifugation causes the aluminium rotor to be attacked by the chemical more and more and eventually micro-cracks decrease the resistance of the rotor against the centrifugation force. Fortunately, no crash occurs just after the first micro-cracks have occurred as the rotors are manufactured according to the high safety limits.

The corrosion of the small amount of corrosive materials does not result in severe cracks but weakens the mechanical resistance of the rotor in the course of time.

The rotors' places, buckets, buckets' edges and the base of the rotor should be checked regularly. In case of doubt please contact a specialist.

6.4 Cleaning

- Disconnect the centrifuge before cleaning.
- There is no need of daily cleaning unless a tube breakage occurs or any liquid spills.

6.5 Electricity

Centrifuged at high voltages are present behind the panels. These panels are electrically disconnecting Do not open the centrifuge.

7 TROUBLESHOOTING

If the centrifuge fails to operate, check that,

- The on/off switch is on,
- The fuses are sound,
- The plug is not defective,
- The centrifuge is well connected to the supply,
- The electricity installation is not defective,
- Power is supplied.

In case of below written failures, related error codes are shown

- | | |
|-------|---|
| Err 1 | - Imbalance error. Wrong loading.
- To avoid facing imbalance problem, please make sure to insert the tubes correctly, see 3.2.2. |
| Err 2 | - Motor overheat. Please switch off the centrifuge for at least 20 minutes |
| Err 3 | - Speed failure. The optical sensor could have failed. Please observe whether the “running” indicator leds are on or not. If it is not on, the optical sensor is defective. If it is on, the motor could have failed. Contact to your service if either occurs.
- This error code occurs when the mains voltage drops below the lower limit. |
| Err 4 | - Lid failure. This failure occurs when lid is opened during the centrifugation. |
| Err 5 | - The temperature sensor endings are broken. This error code appears only on HuMax 14 R. |
| Err 6 | - Motor failure. The motor driver unit (inverter) is defective. Switch off the centrifuge and switch on again after the motor has stopped. If you still see the error code, contact to the service. |
| Err 7 | - “Lid Open” switch are broken on the Lid Board. |
| Err 8 | - “Lid Close” switch are broken on the Lid Board. |

8 ELECTRICAL CIRCUIT DIAGRAMS

8.1 Electrical Circuit Diagram of HuMax 14K

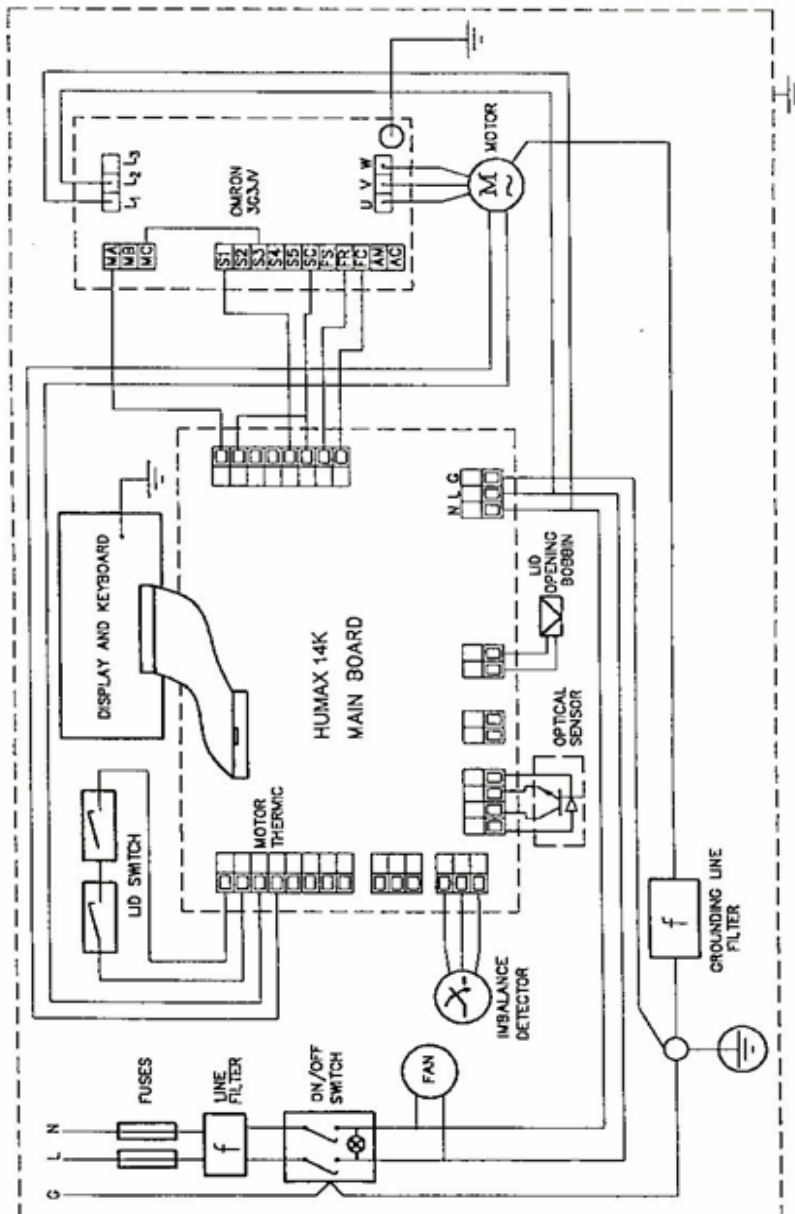
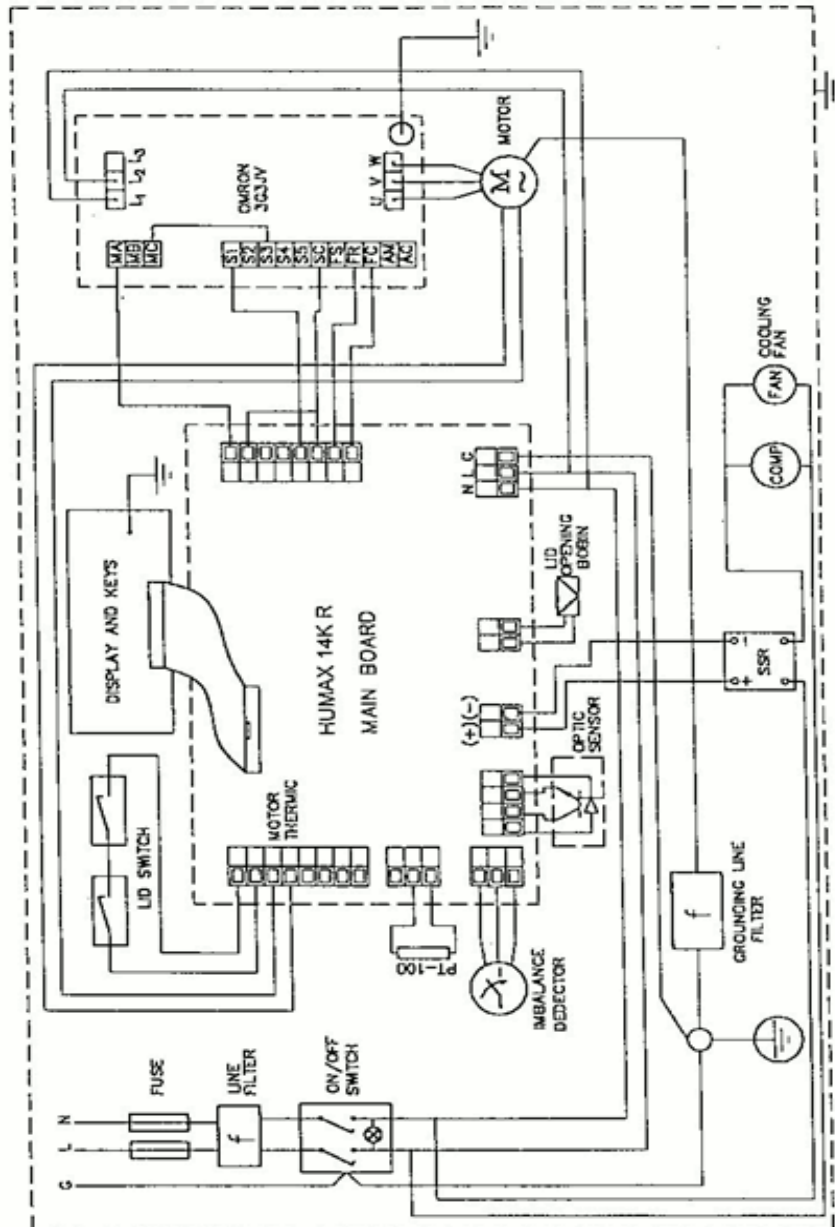


FIGURE 9

8.2 Electrical Circuit Diagram of HuMax 14K R

FIGURE 10



HUMAN

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