HR21M
High Speed Refrigerated Centrifuge

The Operation Instruction

Please read through this operation instruction in details before the operation.

Catalog

Ⅰ.product usage

HR series centrifuge is widely applied in biochemistry, health and medicine, food safety, life science, agriculture science, grassland farming science, blood bank, blood station, biological product and pharmacy product, to make sample separation, precipitation and concentration.

Ⅱ.Technical parameters

Maximum rotate speed	21000r/min
Maximum centrifugal force	48900×g
Maximum capacity	6×500ml
Time range	0~9h 59min
Control temperature range	-20℃~40℃
Temperature control precision	±1℃
Rotate speed precision	±50r/min
deceleration gear	1～12
Common operations procedures	16
Noise	≤65dB
Use environmental temperature	5℃~40℃
Relative humidity	≤80%

Power AC220V 30A 50Hz

Ⅲ.Rotor parameters

Model	Maximum rotate speed(r/min)	Maximum centrifugal force(×g)	Maximum capacity (ml)
1	21000r/min	48330×g	16×10 ml
2	18000r/min	34885×g	30×1.5 ml
3	16000r/min	27760×g	8×50 ml
4	20000r/min	43000×g	6×50 ml
8	8000r/min	11800×g	6×500 ml
9	12000r/min	20300×g	8×100 ml
10	12000r/min	20400×g	4×300 ml

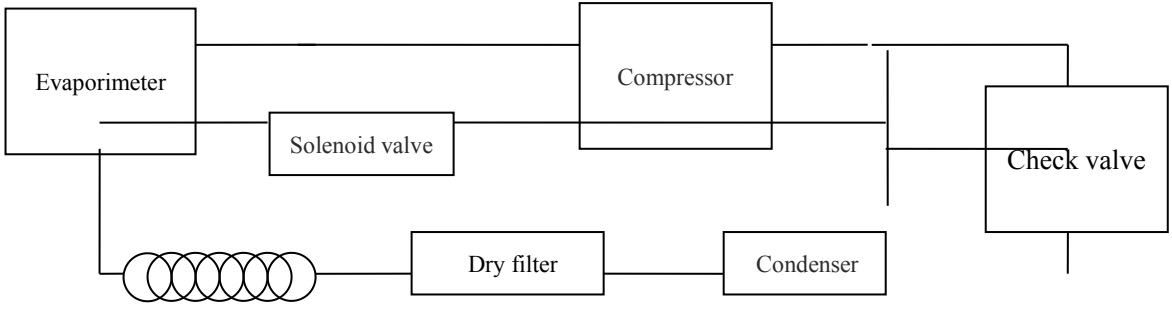
Ⅳ. Control and Operation

1.Driving System

The driver greatly reduced its vibration and noises by adopting seal and pre-lubricated driving shaft as well as direct driving mode by frequency motors.

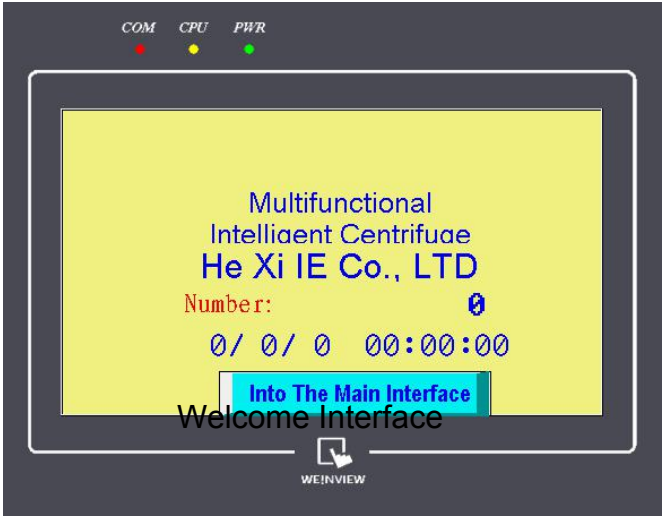
Attention: rotor rotate speed may have some vibration to some extent when it is at critical speed. This kind of vibration is normal. If abnormal vibration occurs, imbalance detector may make motor stop.

2.Refrigerating System



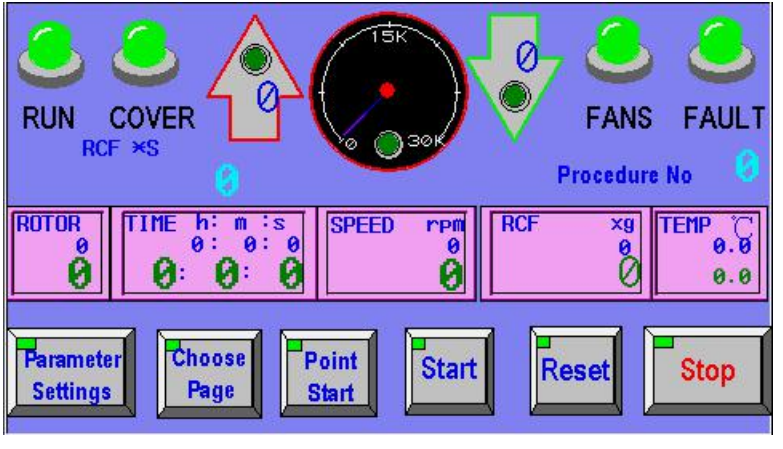
The refrigerating system adopts totally enclosed wind cooling and imported Taikang （tecumseh europe） environmental fluorine-free compressor as well as two-pass compressor refrigerating and heating to control temperature in centrifugal chamber.

3. Display adopts touching type colored tablet



Welcome Interface

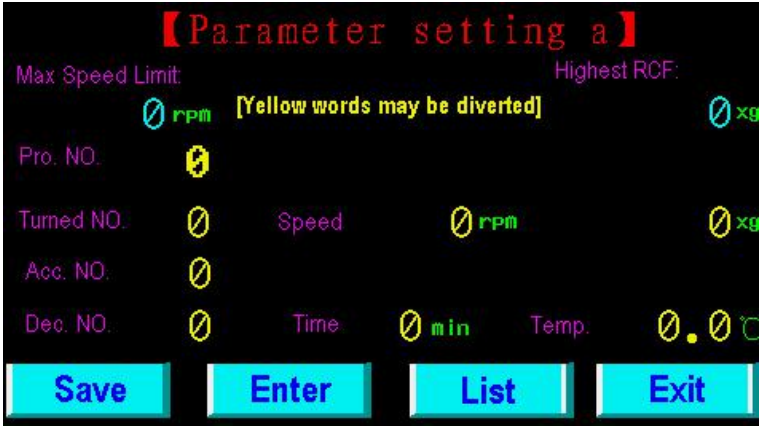
4. Operation Procedures



The above picture is the main interface, and it has four indicator lights as running, face plate, air blower and fault, and speed-up & speed-down gears, centrifugal points and display of application number; five parameters (including rotor number, time, rotate speed, centrifugal force and temperature); six operation buttons, “Parameter” button to examine parameter and setting; “Choose page” button to examine various displays and system setting, mode setting; “Inching” button is manual operation, press the button directly to speed up to the set rotate speed, and release the button to speed down to 0; “Start” button is to run the machine; when the system displays in disorder due to such reasons as obstruction, press “Reset” button to restore to the initial state; press the button during normal running, it will speed down without break, and it needs a long time to stop, therefore, don’t press this button during normal running; “Stop” button is to stop the machine, and when the machine completely stops, press “stop”

button to open face plate.

Press “Parameter” button on main interface to enter the interface as below:



The yellow words in the setting interface can be modified, and users can set procedure number, rotor number, rotate speed, centrifugal force, speed-up and speed-down gears, time

and temperature. Rotate speed and centrifugal force should be corresponding parameter, and when setting rotate speed, automatically calculate the centrifugal force according to rotor radius; set centrifugal force to automatically calculate rotate speed in the same way; rotor radius is set by the factory; the corresponding values of 12-gear speed-up and speed-down rates are set by the factory; the longest time is 999 minutes, when the machine runs to the set rotate speed, and the time begins to display in countdown manner.

Notice: The highest rotate speed is 21000r/min and the maximum relative centrifugal force is 48900×g.

There are 16 stored procedure numbers (0-15), and every procedure number has corresponding parameter (including rotor number, rotate speed (centrifugal force), speed-up and speed-down gears, time and temperature), users can store commonly-used operation procedures into procedures numbers at one time, and only turn the procedure numbers while

running the machine.

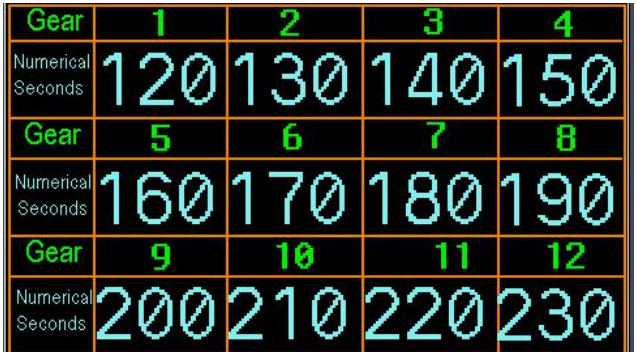
When setting parameters, lightly touch the yellow words to pop up keypad (as below), input values and press “ENT” button to confirm, “CR” button to cancel and “ES” button to escape.

Press “Save options” after setting according to requirements, and pop up dialogue box to confirm; input procedure numbers, press “Confirm” button to pop up dialogue box and confirm to use the input procedure number. Press “Procedure list” button to examine parameters in various procedure numbers, display it in two pages (as below), and press “Exit” button to quit after setting.

Press “Choose page” button on the main interface to pop up the following page:

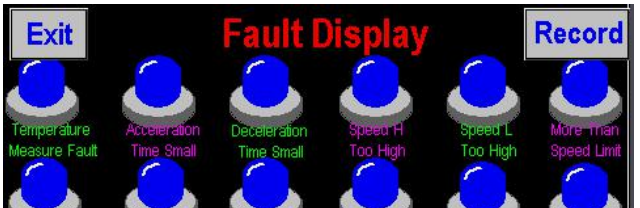
① Rotor display (as below) is to examine the set rotor parameter (including minimum speed-up and speed-down time, rotor radius and maximum rotate speed), to continuously examine, and press “Exit” button to quit.

② Gear display (as below) is to examine the values of 1-12 speed-up and speed-down gears (unit: second), and press upper left of the display screen to quit.



③ System setting It is set by the factory. Users are not allowed to amend.

④ Fault display (as below) It can examine the present faults (indication light displays in red), press “Record” button to examine previous fault record, and press “Exit” button to quit.



⑤ Running curve (as below) Display the running curve of rotor and press the upper left of the display screen to escape.

⑥ Run display (as below) to display the present running state; in the main interface, automatically turn to this page after 10 seconds; press “Stop” button in the page to stop the machine, and press this button to open face plate after it completely stops; press the upper left of the display screen to the previous page.

⑦ Mode setting: the machine can run setting of operation modes (separation step) by the factory according to users' requirements.

Press "Exit the page" button to exit to the previous main interface.

5. Safety Protection Devices

① Main current protection setting. When supply current exceeds the rating, the switch will trip and the machine power off and can not be started.

② Over-speed protection device. When rotate speed is out of control or exceeds the preset rotate speed 200r/min, the motor will automatically power off to prevent the machine

from running over speed to endanger the machine and personal safety.

③ Imbalance protection device. When the machine is vibrating due to imbalanced operation, and the swing exceeds a certain number, the fault light will turn on and the motor will power off to stop the machine.

④ Over heat protection. When the temperature in the centrifugal chamber exceeds 40℃, the machine cannot be started or will be automatically turn off.

⑤ Door-open protection. When the door is not closed, the machine will start.

⑥ Setting error protection. When setting parameters are wrong, the system will automatically indicate the reasons.

⑦frequency inverter failure protection. When such failure occurs in operation, the system will automatically stop the machine and restore, and it needs a long time to stop.

Ⅴ.Disassemble the packing case

Before disassembling, check the appearance of the packing case. During transportation, severe bump and lying upside down should occur, and the appearance of the packing case should be good.

When disassembling the case, first disassemble the top plate, then the wooden bolts that connect the baseboard, and disassemble the main body. Take down the plastic over clothes, first check whether packing list complies with the attachment after disassembling the case. If there is discrepancy, please contact installation and debugging personnel directly.

Ⅵ. Installation

(conducted by installation and debugging personnel of the company)

1.Requirement on installation environment: the place of installation of the machine is indoor, the ground should be flat and hard, the air has no conductivity dust, no corrosive or

destructive insulation gas and there is no strong vibration source in the neighboring areas.

2.Requirement on installation space: the back of the machine should not be less than 10cm from the installation distance to guarantee the requirement of cooling air on emission.

3.Requirement on installation power supply: the power supply of the machine should be single phase alternating current, 220 V, 15 A. The power supply should be equipped with independent earth line and it is forbidden to use zero line to replace earth line. The earth line of the power supply and cable of the machine is longer than the other two wires and it cannot be connected in a wrong way.

4. Requirement on machine installation: after installation, check the five rubber feet to be equally weighted. Otherwise, it should be readjusted up to the requirement.

Ⅶ.Installation and use of rotors

1. Installation of rotors

(1)Before using every time, please check carefully to see whether there are cracks and

corrosive spots on the rotors (especially various centrifugal holes of angle rotors, jump ring holes of rejection level rotors). It is forbidden to use jump rings or angle rotors with cracks and corrosive spots. It is forbidden to use rotors that have expired the guarantee period.

⑵When separating blood bags, put them into jump rings after being weighed with plate rack balance scale to ensure the difference of weight ≤3g; if separated with centrifuge bottle, put centrifuge bottle into jump rings after being weighed with balance scale, and the difference of weight should be ≤3g.

When in centrifuge, all the blood bags should be put into (when test solution is little, add substituent into spare centrifuge bottles) to prevent rotors from damage due to unequal homogeneous stress. It is forbidden to run rotor in imbalanced motion.

⑶Place rotor block on the spindle of the centrifugal machine, and screw up central nut with spanner. Place O shape seal ring on angle rotor first, put rotor cover, and screw knurl screw in threaded shaft and lock rotor.

2. Correct use of rotor

(1)Rotor should operate within specified rotate speed;

(2)Clean centrifuge cups before use, and hang them in rotor gears; if centrifugal samples are few, they should be equally divided into two shares or four shares, symmetrically put into centrifugal cups after being weighed; other empty cups should be filled with water or other solutions and symmetrically put them into cups after being weighed. When running, four centrifugal cups should work at the same time, centrifugal cups or test solutions are not allowed to be operated if they are not symmetrically placed. Wrongly using centrifugal cups will produce huge vibration, and sometimes even damage machine and endanger human safety.

Ⅷ.Particulars about quality warranty and safety

1.Products have “three warranties”, and the warranty period for the host is 12 months. “Three warranties” period starts from the time when installation and debugging personnel of the

company deliver the accepted products and users sign on the installation and debugging cards.

2.Warranty period for rejection level rotor and jump rings is one year.

3.Before installing rotors, operators must carefully check rotors and jump rings to see whether there are cracks and corrosive spots; if there are cracks and corrosive spots, the rotors and jump rings are forbidden to use; otherwise, all consequences will be borne by users.

4.It is forbidden to run rotors with over speed, and the responsibility for accidents caused by over speed will be borne by users.

5.While the machine is normally running, it is forbidden to open face plate to observe running, and touch “Reset” button to forcibly stop machine.

6.Earth wires must connect with ground, otherwise there is the danger of getting an electric shock. Brown line is the firing line, green line is zero line, and black line is earth wire, and they must not be wrongly connected. After machine stop, please disconnect power supply.

Note: When there is power failure or electromagnetic lock failure, the face plate cannot be

opened, pull wire rope, and open the face plate with hand (wire rope is under the display screen).

Ⅸ.Maintenance

1. After taking rotors from centrifugal chamber, timely clean them with neutral detergent to avoid chemical corrosion, store in dry and airy place; it is now allowed to use non-neutral detergent to clean rotors, coat a little grease in the central holes on rotors and on the conical surface.

2. If the centrifugal chamber is not used for a long time, it must be cleaned. Clean its water, and coat a little grease on the conical surface of the spindle.

3.In order to ensure refrigerating effect, air conditioner should be installed indoors when temperature is higher than 30℃.

4.Keep the place of the centrifuge clean, check condenser (cooling fins) to see whether it

(they) is (are) blocked by dirt; if there is dirt, please clean it in time, and clean it every three months to ensure condensing effect.

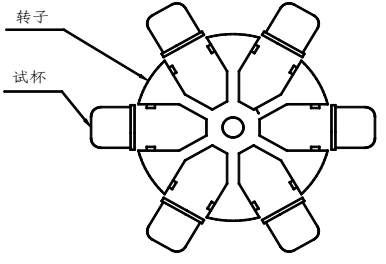
Ⅹ.Service Life of Rotors and Centrifugal Cups

Rotors of the company adopt aeronautic super-duralumin alloys. The service life of angle rotor is five years and rejection level rotor and centrifugal cups are five if strictly comply with the methods of rotors and centrifugal cups and maintenance. Damaged rotors and centrifugal cups due to corrosion must not be used, please contact manufacturers in time to examine corrosion or replace new rotors. As for rotors and centrifugal cups damaged due to corrosion or improper maintenance by users, the users themselves should bear the responsibility.

Safety particulars about the use of swing rotors

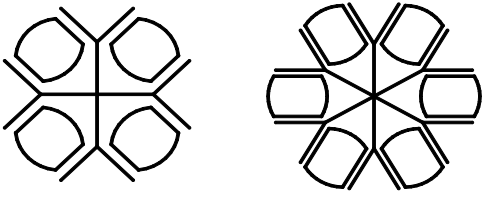
1. Before using, check whether there is dirt, corrosion or bumping in the rotors and on the surface of test glasses. When using, clean rotor block and test glasses; if there is corrosion or large bumping, stop using.

2. Put cleaned test glasses into rotor block. As shown below.

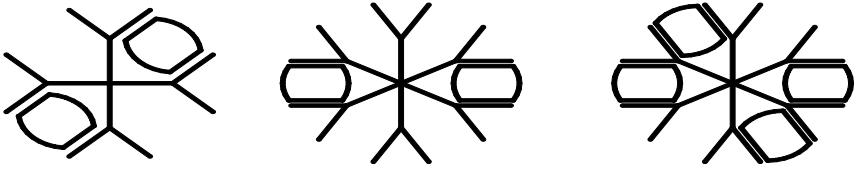


Picture 1

3. When running, all test glasses should hang on the rotor block, as shown below.



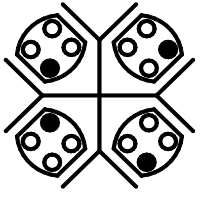
Correct installation Picture 2



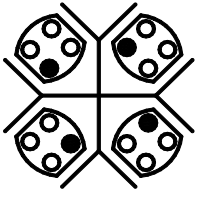
Incorrect installation Picture 3

4. Test glasses with samples should be equally weighed before putting into the rotor block,

the difference in weight is 3g. The balanced test glasses should be symmetrically put into the rotor block so as to balance it and the test glasses.



Incorrect installation

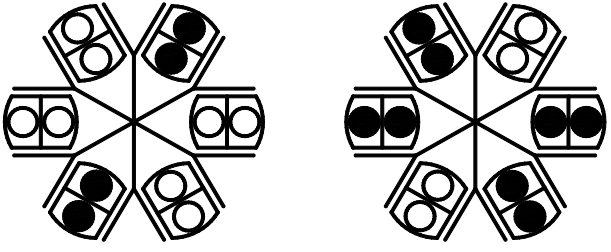


Picture 4 Correct installation

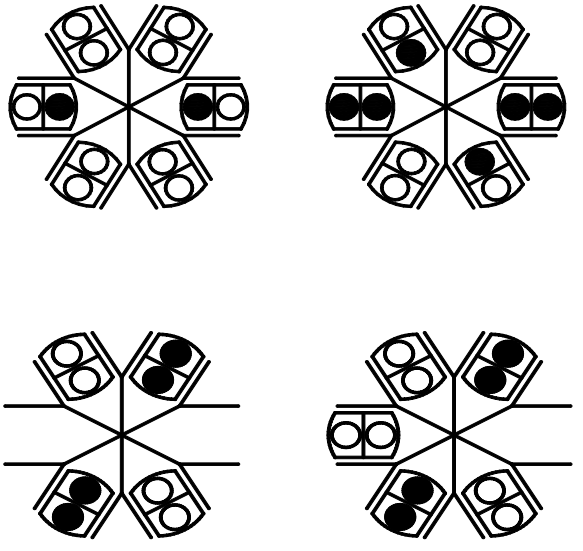
Safety particulars about double-glasses swing rotor

When running, all test glasses must hang on the rotor block and such circumstance as

asymmetry or less than the required number of glasses should never occur. As shown below.



Correct installation



Incorrect installation

● With test glasses ○ Without test glasses

Maintenance record

Date	Maintenance content	Maintenance