

Floor Type Refrigerated Centrifuge

NFRC-100



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1. Safety Measures

- 1) Operate centrifuges according to the following safety notices.
 - Unplug the main power cord, when performing maintenance or when
 - Centrifuge is expected not to be used for a long period.
 - Load the rotor with samples arranged symmetrically. Opposing tubes must be of equal weight. Do not conclude that tubes are balanced by sight over volume.
 - Never exceed the maximum speed posted for the rotor.
 - Never use the rotor that appears damaged (e.g. O-rings missing, scratched, corroded, and cracked).
- 2) The Instruction Manual for NFRC-100 Intelligent large capacity refrigerated centrifuge contains all the information needed to install, operate, and maintain. To prevent any potential accident, please read this Instruction Manual carefully and operate centrifuges according to the following safety protocol.
- 3) Danger advises against certain actions or situations that could result in personal injury.
- 4) Warning advises against certain actions or situations that could result in personal injury, health risk, and environmental pollution.
- 5) Caution advises against actions or situations that could damage an instrument, produce inaccurate data, or invalidate a procedure.

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1. Introduction

Floor Type Refrigerated Centrifuge NFRC-100 is efficiently designed with a high-speed centrifugation system. It results in effective and precise separation of biological components, separation of blood /plasma components in a sample under low-temperature conditions for heat-labile samples. The microprocessor system keeps in check the over speed and imbalanced rotor by automatically reducing rotation speed levels. It is secured with an electronic lid lock that ensures the safety of the equipment as well as of the user.

2. Features

- ✓ AC frequency variable motor drive
- ✓ Safe and Reliable Performance
- ✓ Desired setting of acceleration and deceleration time
- ✓ Automatic Rotor identification
- ✓ LCD with touch screen display function
- ✓ Automatic Mechanical/Electronic lid lock for safety purpose
- ✓ Corrosion resistant rotors
- ✓ Non-CFC Refrigeration System
- ✓ Adjustable motor frequency with low noise operation

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3. Specifications

Model No.	NFRC-100
Maximum Speed	10000/min
Maximum RCF	18300×g
Maximum Capacity	6×1000ml
Speed Accuracy	±20r/min
Temperature Accuracy	±1 °C
Temperature Range	(-20 °C to 40 °C)
Acceleration/Deceleration Rate	0~9grade
The shortest Acceleration time	1min 30s (0~10000 r/min)
The shortest Deceleration time	1min 40s (10000 r/min~0)
Timer Range	0~23h 59min
Noise	≤65dB
Current	5A
Power Supply	AC220V&110V 50-60Hz
Overall Dimensions (L×W×H)	710×820×1200 mm
Net Weight	260kg
Gross Weight	350kg

4. Applications

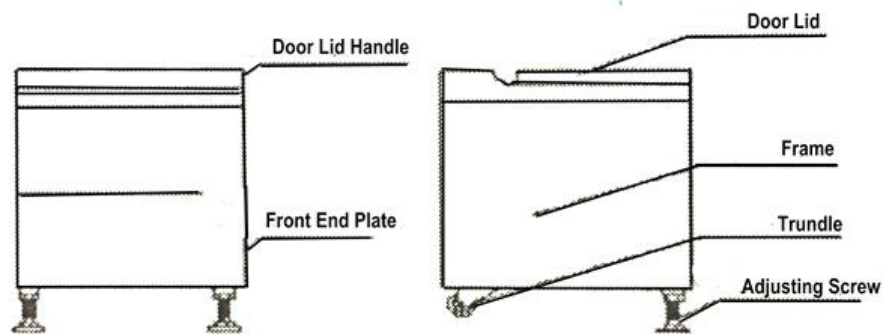
It is widely used in research laboratories, hospitals and healthcare sectors, universities, also in biology, chemistry laboratories and clinical research studies, pathology department, etc

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5. Instrument Introduction

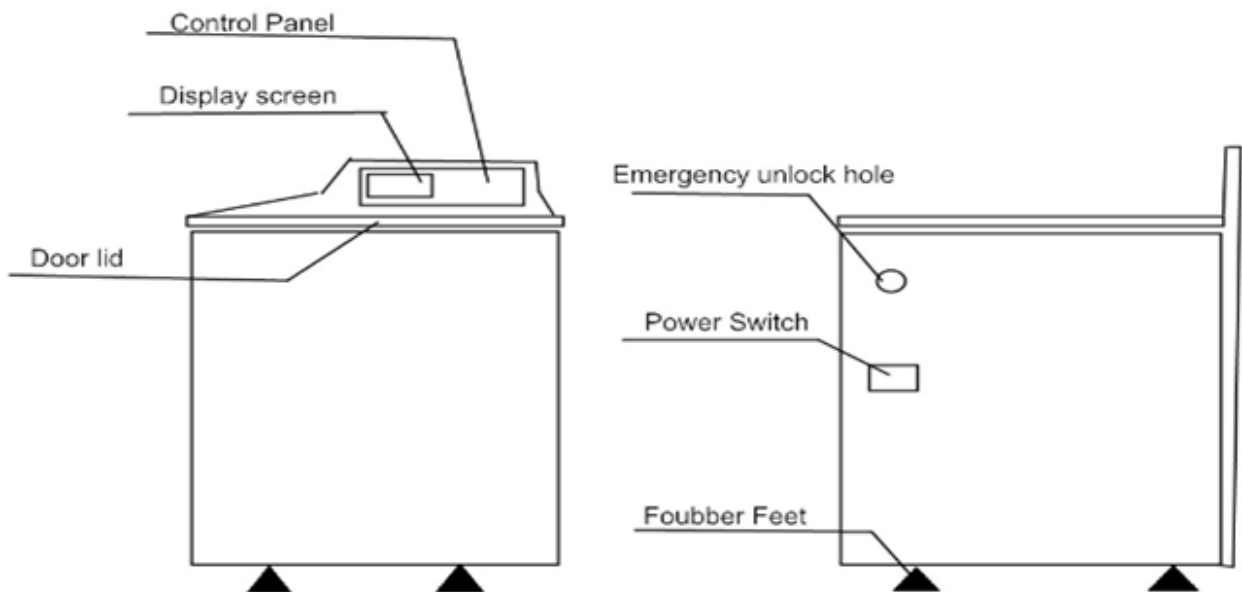
5.1 Structure

This centrifuge is composed of the main machine, rotor, and other accessories (by user's option). The main machine is composed of a machine frame, door lid, control panel, drive system, refrigerating system, and electric control system.



5.2 Main Frame Shape

When you need to check the motor, control board, or other parts' working status, please loosen the screws below the front-end plate first and then remove them.



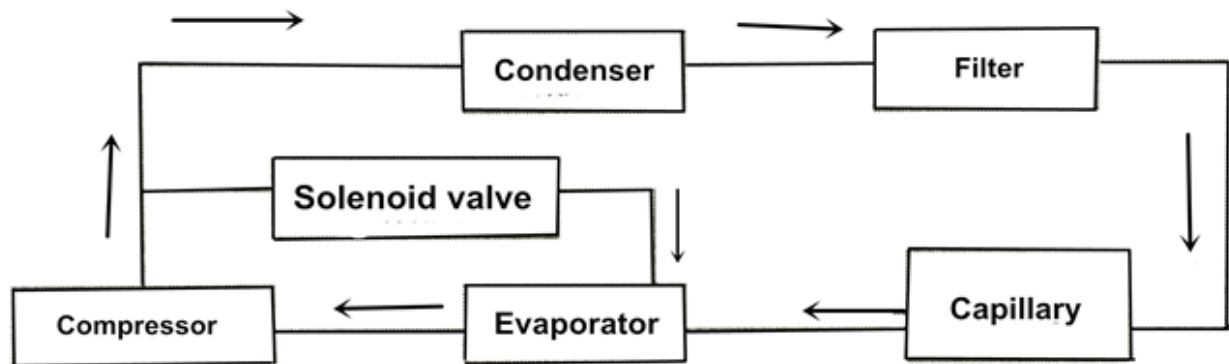
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5.3 Drive System

Direct drive system. A frequency conversion motor with high torque is equipped with a special shock absorber for reducing vibration and noise.

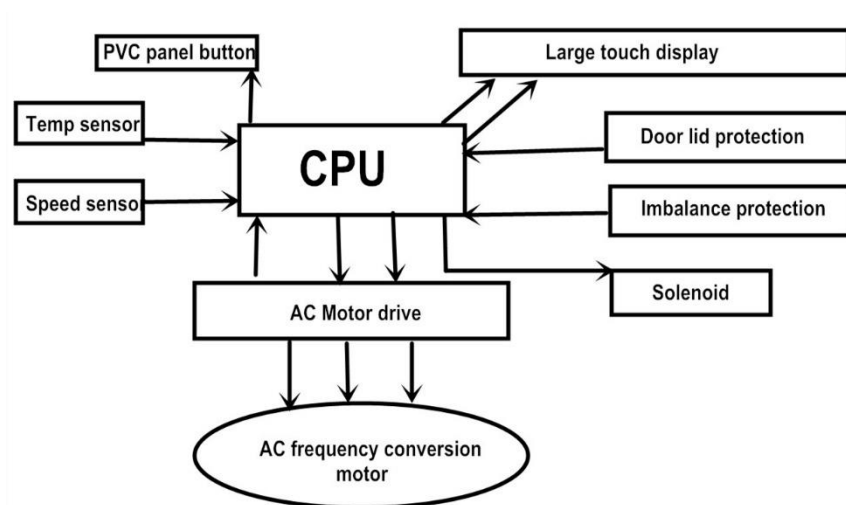
5.4 Refrigeration System

This centrifuge is equipped High-performance compressor, and CFC-free refrigeration system. And with two circuit controls and a start/stop solenoid valve for good efficiency of heating and refrigerating.



5.5 Electric Control Part

System control is adopted 8-digit CPU. Through sensors CPU detects the temperature in the centrifugal chamber, speed fault signal, etc., and compares them with the setup parameters such as temperature and speed, then deals with them correspondingly.



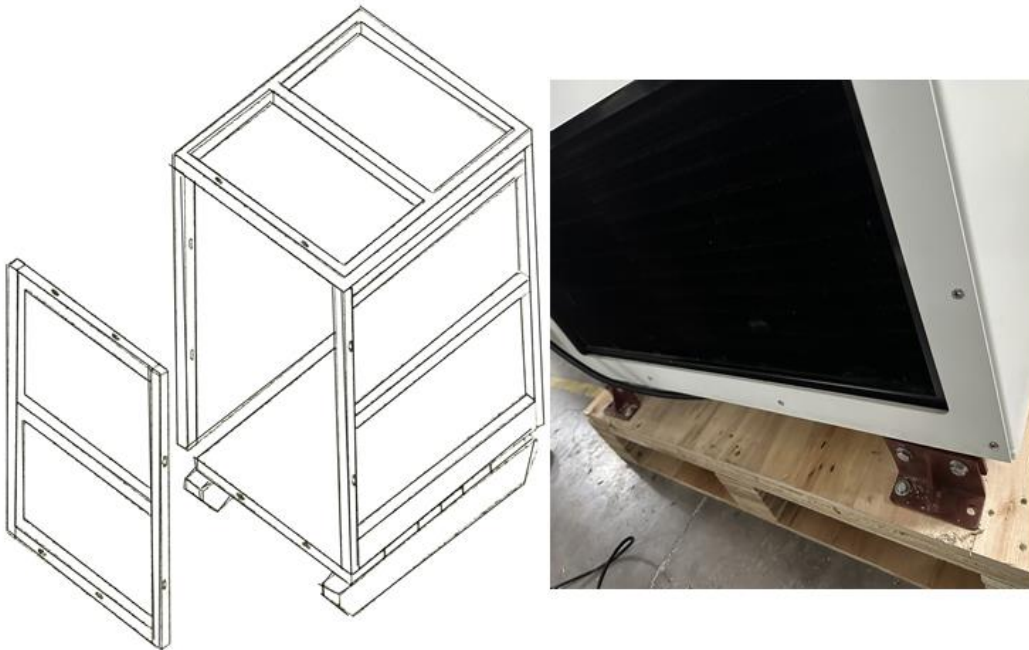
6. Installation

6.1 Unpacking of package

- ① Check the package before opening the packing box.
- ② Unpack the box as per the following guide.

Step 1: Unpack Box

Step 2: Disassemble the fixed plate at the centrifuge's back side.



Attention: The idler wheels of this centrifuge can be only moved a short distance on the smooth ground to avoid damage. Be sure to check the accessories and packing list after unpacking the case.

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6.2 Instrument Installation

6.2.1 Space requirement:

- ① The distance between the centrifuge and wall should be kept at 30cm at least for air circulation. And do not store any inflammable and any other dangerous goods in the safety space.
- ② This centrifuge can only be installed indoors with steady ground, no conducting dust, no corrosive gas, no strong shocking source, and no direct sunlight.
- ③ This centrifuge is better to operate under 25°C (constant temperature) conditions. Maximum humidity is 80% for 31°C, while 50% for 40 °C, and avoid placing the centrifuge under heat producer (e.g. sunshine, heating pipe, and radiator). And do not store any inflammable and any other dangerous goods in the safety space.

6.2.2 Power requirements:

- ① 220V Single phase or 380V Three phase (refer to nameplate), with independent earth line.



Warning: The ground wire should be connected properly in case of electric shock. Error Voltage or a voltage over 10% will damage the instrument, you need to check the voltage before connecting the power.

6.2.3 Installation requirements:

Adjusting screws are located on 2 corners of base board, four feet can be adjusted on floor and universal wheels can be raised 3-5mm by spinning them. Two truckles and two screwing feet should be adjusted until stressed equably.

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6.3 Adjusting Requirement

6.3.1 Checking the goods:

Check the packing list and make sure that damage occurred during delivery. Installation, adjustment, and maintenance should all be guided or operated by professional technicians.

6.3.2 Power on:

The power switch is located on the right side main case. Turn it to “ON” position, the compressor start to work and the centrifuge is power on.

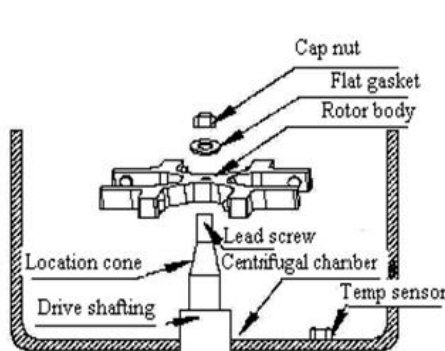
6.3.3 Door lid opening:

After installing the main machine, check the connection of all connectors and fuses first, and turn on the machine then. When the screen will be light on. Touch press the [OPEN], door lid will open automatically.

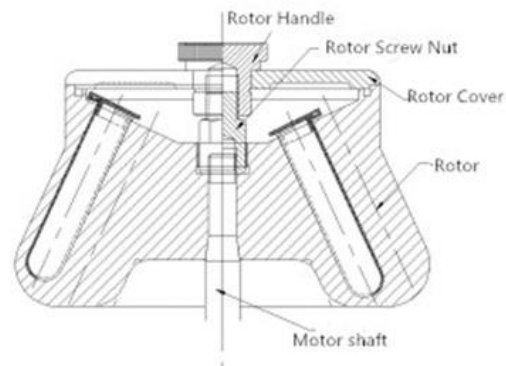
6.3.4 Rotor Installation:

- ① Rotor should be checked carefully before using. It is forbidden to use rotors and buckets with cracks and corrosion spots (especially the bucket's bottom of the swing rotor). All accessories should not be used if it is exceeding of its service life. The conical surface of the driving shaft should be smeared with some lubricating grease if the main spindle is left unused.

As shown in the following figure: Firstly clasp the symmetric spoke of the rotor, and put it on the rotor base vertically and placidly while the rotor bottom's location cone aims at the location cone of the drive shaft; then put the flat gasket on the lead screw and screw down the cap nut. At last, hold up the rotor steadily (not shacking) by one hand, and put the solid wrench on the cap nut by another hand. In the mean while turn the wrench for 3 to 6 rounds in clockwise direction until the rotor connects the drive shaft closely.



Swing Rotor



Angel rotor

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② Fill the tubes or bottles equally by eye (about 75% of the total volume), and balance the tubes by scale.



Warning: The difference in weight between the tubes should not exceed 2 grams. Load the tubes symmetrically

input centrifugal tubes should be even. The large difference may cause big shaking in running. In this case, the centrifuge should be stopped for checking. The tubes should be placed symmetrically by an even number. The tubes input improper, un-serious weigh the tubes and imbalance working will result in accidents.

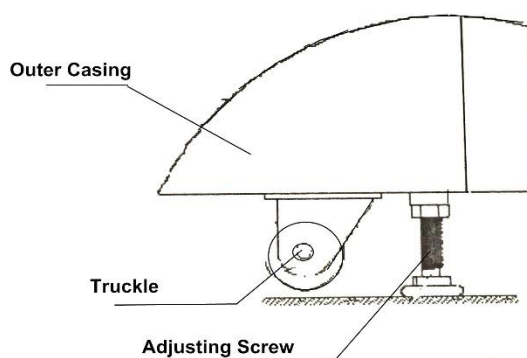


Note:

- i. Only the specified rotors can be used
- ii . Never use the rotor that appears damaged. Please confirm all the rotors , buckets and other accessories before use it.
- iii. Never exceed the maximum speed of the rotor and the cups!

6.3.5 Adjusting level

Take out the gradient after rotor installation, open lid of centrifugal chamber and then put it on the rotor bracket. Adjust 2 leveling screws (on the front of baseboard) until the bubbles of any directions are all located in center.



Warning: Adjust the screws for instrument levelling; reliable installation can reduce rotor damage.

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Attention: Make sure that 2 back wheels and 2 adjusting screws are all stressed, it is forbidden for hanging. Installation, adjustment and maintenance must be worked by professional technician.

6.3.6 Close the lid

After the rotor has been properly loaded, close the centrifuge lid

6.3.7 Rotor disassembly: (After finishing adjust or centrifugal)

First, clasp the spoke of the rotor with one hand, and put the solid wrench on the cap nut by another hand. In the mean while turn the wrench for 3 to 6 round in counter clock wise direction to loose the cap nut until the rotor can be separated from driving shaft. If the rotor is not taken out from the drive shaft for a lone time and blocked, you can beat the surrounding spoke of rotor several times lightly with wooden or rubber hammer. Then clasp the symmetric spoke of the rotor lift it slightly with both hands, and put the rotor on the flat table and ground covered with a soft pad.

Warning: All actions on the rotor must be soft for avoiding the damage of driving shafting.

6.3.8 Adjusting level

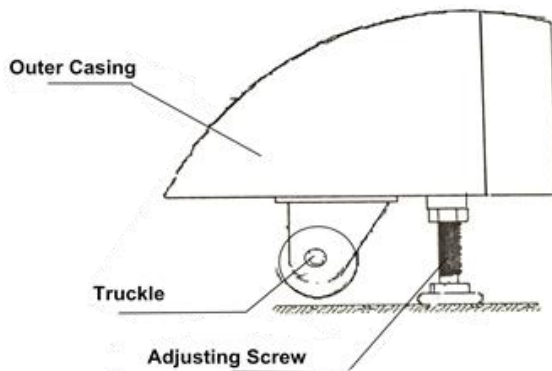
Take out the gradient after rotor installation, open the lid of the centrifugal chamber, and then put it on the rotor bracket. Adjust 2 leveling screws (on the front of the baseboard) until the bubbles of any direction are all located in the center.



Warning: Adjust the screws for instrument leveling; reliable installation can reduce rotor damage.

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Attention: Make sure that 2 back wheels and 2 adjusting screws are all stressed, it is forbidden for hanging. Installation, adjustment, and maintenance must be worked by a professional technician.



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7. Operations

7.1 Preparation and installation of the rotor

- 1) Choose the rotor and centrifuge tubes as the sample.
- 2) Use the double pan balance to balance the tubes with the sample. The difference can't be over 0.5g. Then put it into the centrifugal cup of the rotor in symmetry. The rotor lid should be locked closely.
- 3) The pipe rack of the swing rotor should be put on the rotor block according to the number and tubes should be put in symmetry. Do not allow the weight of the pipe rack in symmetry to be the same as the other pipe rack in symmetry. (if the sample is low, use another liquid instead).
- 4) Open the centrifuge chamber and clean it.
- 5) Put the rotor into the rotor block repose fully. Pay attention to making a transfer pin in the middle of the rotor and put it into the transfer pin' blank of the rotor block.
- 6) Make sure the rotor completely falls, or it is dangerous. Then close the lid of the centrifuge chamber.

7.2 Operations Procedures and Directions

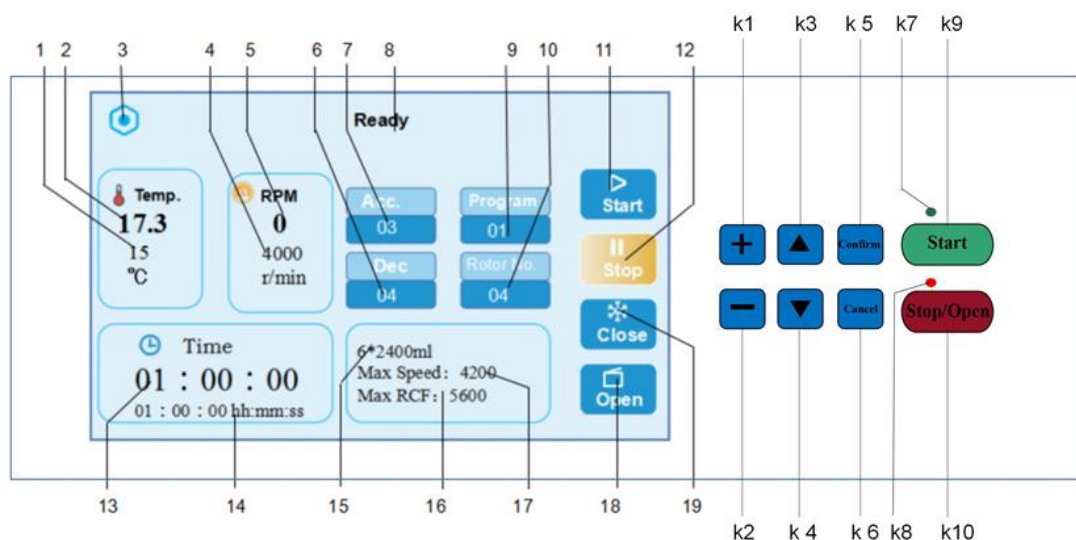
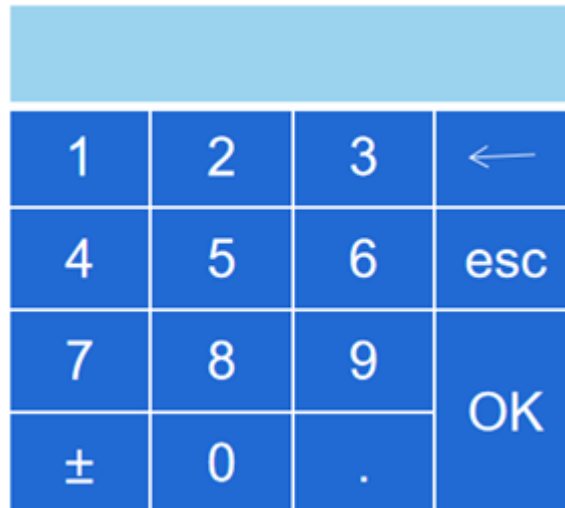


Fig-1

Floor Type Refrigerated Centrifuge NFRC-100



- | | |
|----------------------|-----------------------------|
| 1 Set temperature | 12 Stop Key |
| 2 Real temperature | 13 Real-time |
| 3 Set up | 14 Real-time left |
| 4 Set Speed | 15 Rotor Capacity |
| 5 Real speed | 16 Rotor max RCF |
| 6 Decoration grade | 17 Rotor max speed |
| 7 Acceleration grade | 18 Open door key |
| 8 Status | 19 Close door key |
| 9 Program memory | 20 K1~K10-operation buttons |
| 10 Rotor No. | |
| 11 Start key | |

7.2.1 Power on

The power switch is in the right bottom corner of the control panel. Turn it to the “On” position, and the power indicator will turn red.

7.2.2 Parameters setting

1) Temperature Setting

- ① Press▲or▼button, the temperature display window is a digital flashing and under the shadow, Press the "+" or "-" buttons on the control panel to the desired conditions, and press the "confirm" button to confirm and save the parameters.
- ② Click the [Temperature] on the screen, which will shows the Fig keyboard. Set the Temperature needed and click {OK} to confirm the setting or click {esc} to cancel the settings. The compressor will work since the machine is powered on.

2) RPM Setting

- ① Press▲or▼button, the RPM display window is a digital flashing and under the shadow, Press the "+" or "-" buttons on the control panel to the desired conditions, and press the "confirm" button to confirm and save the parameters.
- ② Click the [RPM] on the screen, which will shows the Fig keyboard. Set the RPM needed and click {OK} to confirm the setting or click {esc} to cancel the settings.

3) Time Setting

- ① Press▲or▼button, the Time display window is a digital flashing and under the shadow, Press the "+" or "-" buttons on the control panel to the desired conditions, and press the "confirm" button to confirm and save the parameters.
- ② Click the [Time] on the screen, which will show the Fig keyboard. Set the time needed and click {OK} to confirm the setting, or click {esc} to cancel the settings. Cut down timing mode while reaching to setting speed.

4) Acceleration/Deceleration Setting

- ① Press▲or▼button, the Acc/Dec display window is a digital flashing and under shadow, Press the "+" or "-" buttons on the control panel to the desired conditions, and press the "confirm" button to confirm and save the parameters.
- ② Click the [Acc/Dec] in Screen, which will show the Fig keyboard. Set the Acc/dec grade and click {OK} to confirm the setting.

5) Program Memory Setting

- ① Press▲or▼button, the Program Number in the display window is a digital flashing and under the shadow, Press "+" or "-" buttons on the control panel to the corresponding, press the "confirm" button to confirm and save the parameters.
- ② Click [Program] in Screen, which will shows the Fig keyboard. Choose the Prog. Number and then set other parameters that you need to memorize.

6) Rotor No. Setting

Click the [Rotor No.] in Screen, which will shows the Fig.2 keyboard. Set the Rotor and click {OK} to confirm the setting, if you set the wrong number, will correct it after running.

7) Open Door

Click the [open door] icon to open the door lid, for unexpected power off, there is an emergency door lid drawstring at the back side of the centrifuge.

8) Start

Click [Start key] on the screen or press the [Start] button at the panel, the machine will run and automatically identify the rotor number. Click the Start key no use while the door lid opening.

9) Stop

After finish running will stop automatically or click [Stop] at any time.

8. Maintenance

1) Maintenance of the centrifuge chamber

Clean the centrifugal chamber time, take out the rotor, and then scrubbed by a clean cloth. Put the silica gel bag into a chamber if the centrifuge will not be used for a long time to absorb humidity and avoid rust.

2) Maintenance of the rotor

The rotor block cannot bump. Do not damage the cone. Clean carefully rotor block and rotor cone with soft cloth before the rotor put in and coated with a little Vaseline or other grease medical.

3) Maintenance of the control box and work surface

Control box and work surfaces must be kept clean. The rotor centrifuge tube and other tools of centrifuge may not be placed on the panel to prevent scratches. Control box and work surface can be only used with a soft cloth and mild detergent.

4) Maintenance of drive shaft

The drive shaft must not be hit for conical surface/cone protection. Use a soft cloth to clean the drive shaft and taper hole before rotor installation, and then smear some Vaseline or other lubrication grease.

9. Troubleshooting

9.1 Common troubleshooting

A. The rotor does not work.

- If the power light is off, check if the fuse is burned out, and whether the power contact is good.
- Whether the value set is correct.
- Whether it is under thermal protection after a long time working.

B. Cooling effect is not good

- The temperature in the centrifuge chamber is too high.
- The centrifuge is too close to the wall.
- The condenser heat sink is blocked by dust or condenser fan is not running.
- Refrigeration system refrigerant leaks or is mixed with air. The cooling system is blocked or broken.
- The re-poured amount of refrigerant is too little or too much after repair or the refrigerant is not a match.
- The vibration and noise of the centrifuge increase or sound abnormal.
- Whether the ground is solid, and whether there are strong availability of source effects.
- Whether rotor balancing is destroyed.
- Whether the centrifuge tube is qualified for balance, or placing is symmetrical.
- Whether the level did not adjust well, it is with uniform stress.
- Whether shaft bending jumps are too large.
- In the centrifugal midway, the centrifuge tubes or O-type seal ring broke.

C. The rotor cannot be put into the rotor block repose fully.

- Check the rotor and rotor block if there are scars or dirty objects.
- Whether the transfer pin is out of shape.

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D. The rotor cannot be got out of the rotor block.

- By using the rotor handle screw into the center of the rotor screw, the rotor can be removed.
- The rotor block cone and the rotor cone coated with a little grease can easily remove the rotor.
- Do not run for a long time when there is no refrigeration.

9.2 Trouble reminder and solution

Trouble Reminder	Solution
The display window not working	Check whether the power switch is lightened, and if the connection line of the display panel is loose.
No Speed	Check whether the electric connector line of the motor is loose, and if the speed sensor is normal.
Over Speed	Turn it on again, and check whether the speed sensor is normal
Door Unclosed	Close the door tightly before start
Transducer Communication Trouble	Check whether the frequency converter is damaged, whether the communication line is connected good
Module Trouble	Please change the control board



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