



# High Speed Refrigerated Centrifuge FM-HRC-A100

## Index

<b>Sr.no</b>	<b>Title</b>	<b>Page no</b>
1.	Safety Measures	2
2.	Introduction	3
3.	Features	3
4.	Specifications	4
5.	Applications	5
6.	Installation	6
7.	Operations	8
8.	Maintenance	11
9.	Troubleshooting	13
10.	Accessories	14
11.	Circuit diagram	15

## 1. Safety Measures

- Unplug the main power cord, when performing maintenance or when the 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. Use "water blank" tubes to balance sample tubes of unequal weight if necessary. Do not conclude that tubes are balanced by sight over volume. Use the pan balance provided in the centrifuge room for balancing tubes in rotors for the centrifuge.
- Never exceed the maximum speed posted for the rotor!
- Never use the damaged rotor (e.g. O-rings missing, scratched, corroded, and cracked).

All centrifuges have potential risk factors during operation; you must understand the operating procedures and safety precautions for the safe use of centrifuges.

Failing to operate the provisions of this manual may result in personal injury or property damage, be sure to abide by the rules. The Company is not liable for obligations if the consequences are not made in conformity with the rules and operations of this manual.

When starting to use the centrifuge machine, kindly:

1. Press the Power Switch first after plugging in.
2. Check the nut tight and rotors balance.
3. Operate it according to the Operation Instructions.

### **Safety Notice**

- The centrifuge will not be allowed to operate under any condition if the speed exceeds the rated speed for the rotor and brackets.
- The rotor or tube is prohibited from further use if any corrosion or crack occurs.
- The door will not be allowed to open when the centrifuge is in operation.
- If the rotor is not in use for three months, it should be subjected to operating for 10 min before it can be allowed to operate at its max speed.

## 2. Introduction

**High Speed Refrigerated Centrifuge FM-HRC-A100** is a microcomputer controlled system with 18000 rpm maximum speed and  $23846 \times g$  maximum centrifugal force. Features angle rotors with  $24 \times 0.5$  ml maximum capacity. Equipped with brushless frequency motor offers smooth working of the unit. The digital LCD display offers convenient reading of test data, stores various parameter data information. Acceleration and deceleration of 9 kinds and 10 options for self-defined work mode selection.

## 3. Features

- ✓ Microcomputer control with LCD display
- ✓ High efficiency refrigeration compressor
- ✓ AC frequency conversion motor drive
- ✓ Maximum spin speed 23000 rpm with  $33097 \times g$  RCF
- ✓ Automatic balancing without need of trimming
- ✓ Acceleration and deceleration of 9 kinds
- ✓ Work mode selection with 10 options
- ✓ Mutual setting of rotating speed / centrifugal force and double synchronous display screen
- ✓ Automatic identification of rotor
- ✓ Stainless steel centrifugation chamber
- ✓ Parameter changes adjustable any time without disturbing centrifugation process
- ✓ Equipped with air exhaust temperature system
- ✓ Electric safety door locks for protection

## 4. Specifications

<b>Model No.</b>	<b>FM-HRC-A100</b>
<b>Maximum speed</b>	18000 rpm
<b>Maximum RCF</b>	23846 × g
<b>Maximum capacity</b>	24 × 0.5 ml
<b>Speed accuracy</b>	± 100 rpm
<b>Temperature range</b>	-20°C to 40°C
<b>Temperature accuracy</b>	± 2°C
<b>Time range</b>	1 min to 99 h 99 m 99 s
<b>Construction</b>	Stainless steel centrifuge chamber
<b>Noise</b>	≤ 55 dB
<b>Power</b>	1040 W
<b>Power supply</b>	AC 220 V 50 Hz
<b>Dimension (L × W × H)</b>	670 × 670 × 460 mm
<b>Net weight</b>	65 kg
<b>Gross Weight</b>	85 kg

## Optional Rotor Selection

<b>Rotor Name</b>	<b>Max speed (rpm)</b>	<b>Max capacity (ml)</b>	<b>Max RCF (g)</b>
Angle rotor 1	18000 rpm	24 × 0.2 ml	18824 × g
Angle rotor 2	18000 rpm	24 × 0.5 ml	23846 × g
Angle rotor 3	18000 rpm	12 × 0.5 ml	16300 × g
Angle rotor 4	18000 rpm	12 × 1.5 / 2.2 ml	23198 × g
Angle rotor 5	14000 rpm	24 × 1.5 / 2.2 ml	17465 × g
Angle rotor 6	16000 rpm	12 × 5 ml	17459 × g
Angle rotor 7	14000 rpm	12 × 10 ml	18188 × g
Angle rotor 8	14000 rpm	12 × 7 ml	16327 × g
Angle rotor 9	12000 rpm	8 × 15 ml	14107 × g
Angle rotor 10	16099 rpm	6 × 50 ml	16099 × g
Angle rotor 11	14000 rpm	32 × 0.2 ml	13367 × g

## 5. Applications

Used for cell separation at blood banks, precipitation purposes, sample processing in clinical protocols, cell culture applications, microplate processing and separation procedures in biochemistry, food safety and medical diagnosis.

## 6. Installation

- The centrifuge should be placed on a firm table with four feet in contact with the table.
- Certain spaces should be allowed around the centrifuge for ideal ventilation.
- Power: AC 220V 50Hz 10A with socket capacity  $>10A$ , ground connection should be secured.

### Working Conditions

- Environment Temperature:  $5^{\circ}\text{C}\sim 35^{\circ}\text{C}$ .
- Relative Humidity:  $\leq 85\%$ .
- The centrifuge operating room should be free from conductive dust, explosive or corrosive gas.
- Power: AC  $220\text{V}\pm 22\text{V}$   $50\text{Hz}\pm 1\text{Hz}$ , and a separate ground connection should be provided in the centrifuge operating room.

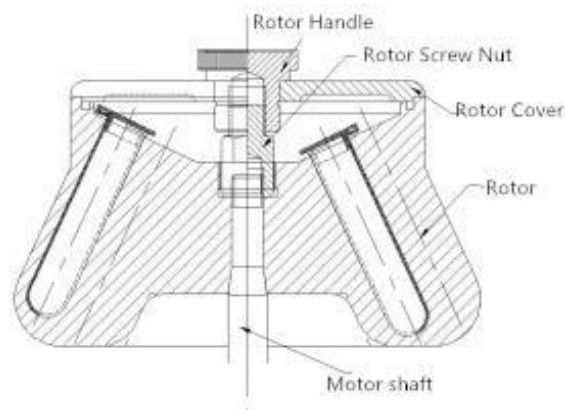
### Installation Requirements

Place the centrifuge on a steady platform or table. Make four rubber cushions stand in balance to prevent vibration. Otherwise, add some pads to readjust the height up to the requirements (by the user).

### Rotor Installation

The drive spindle in the chamber and the inside cones of the rotor should be first wiped with a piece of soft and clean cloth, then place the rotor with two hands on the cone side of the drive spindle in the centrifuge chamber, Washer should be placed before tightening the screw nuts.

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 shaking) with one hand, and put the solid wrench on the cap nut with another hand. In the meantime, turn the wrench for 3 to 6 rounds in a clockwise direction until the rotor connects the drive shaft closely.



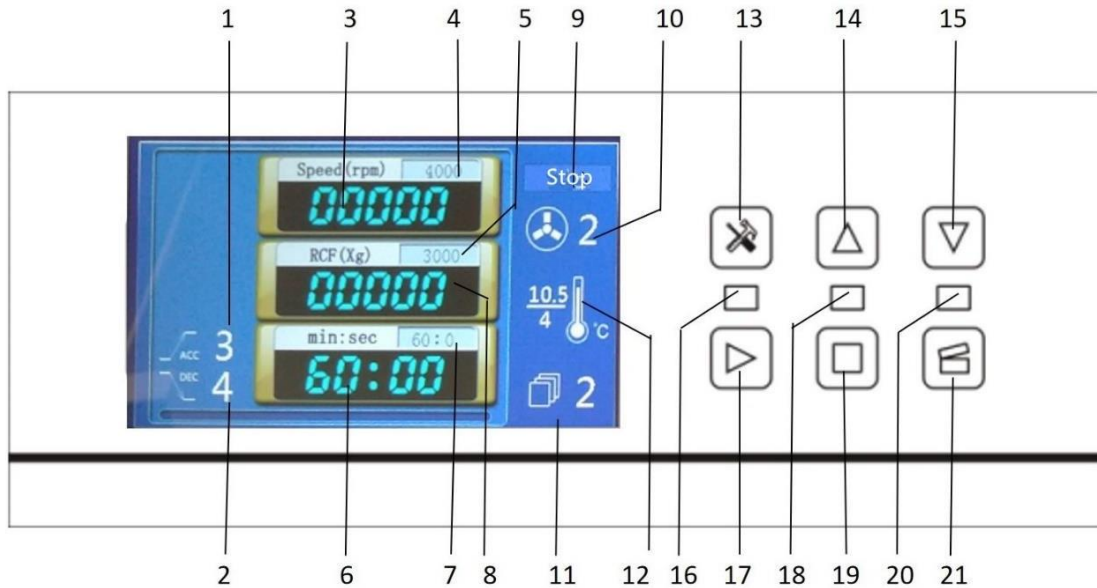
### **Tubes Installation**

Place the bracket into the slot of the rotor; make sure that the bracket is turning smoothly, tube sets (adapters) are placed into holes of brackets, and the solution is separated into the tubes. Visually check if the solution in the tubes is roughly equal before putting them into the tube sets.



## 7. Operations

### Preset



- Dec
- Acc
- Real Speed
- setting speed
- Setting RCF
- Real Time
- Setting Time
- Real RCF
- Running/Stop Condition
- Rotor Number
- Program
- Temperature
- Set key
- Increase key
- Decrease Button
- Running Indicate Light
- Start key
- Stop Indicate Light
- Stop Key
- Door Cover State Indicate Light
- Door Open Key

### a) Rotor typesetting

Press [SET] once or continuously times to modify the rotor type when the “rotor” display window flashes or there is a bright spot at the right and bottom edge in stop status, and then press [▲]/[▼]to increase or decrease the number. After waiting for 3 seconds, the system will confirm your setting.

**Warning :** The rotor type should be set according to the installed one.

### b) Rotation speed setting:

**Warning:** The same rotor can hold buckets and accessories with different speeds or RCF values.

Press [SET] once or continuous times to modify the speed value when the ‘SPEED/RCF’ display window flashes or there is a bright spot at the right and bottom edge in stop/running status, and then press [▲]/[▼]to increase or decrease the current value. After waiting for 3 seconds, the system will confirm your setting.

### c) RCF setting :

Press [SET] once or continuous times to modify the RCF value when the ‘ROTOR’ display the window shows “F.” and ‘SPEED/RCF’ display window shows the setup RCF value in stop/running status, and then press [▲]/[▼]to increase or decrease the current value. After waiting for 3 seconds, the system will confirm your setting.

### d) Temperature setting:

Press [SET] once or continuously times to modify centrifugation temperature when’ displays window flashes or there is a bright spot at the right and bottom edge in stop/running status, and then press [▲]/[▼]to increase or decrease the current value. After waiting for 3 seconds, the system will confirm your setting.

### e) Time setting:

Press [SET] once or continuously times to modify centrifugation time when the ‘TIME’ display window flashes or there is a bright spot at the right and bottom edge in stop/running status, and then press [▲]/[▼]to increase or decrease the current value. After waiting for 3 seconds, the system will confirm your setting.

### f) Program memory:

Press [SET] once or continuously times to select the Number of programs, then set the parameters according to the above instruction, wait for 3 seconds, and the system will confirm your program setting. (kindly memory parameters one by one, most for 35 programs memory).

### g) Acceleration setting:

Press [SET] once or continuous times to modify the Acc curve when the ‘SPEED/RCF’ display window shows “ACC X” in stop/running status, and then press [▲]/[▼]to increase or decrease the current value(The higher the value, the shorter the Acc time; vice versa). After waiting for 3 seconds, the system will confirm your setting.

### h) Deceleration setting

Press [SET] once or continuous times to modify the Dec curve when the 'SPEED/RCF' display window shows "DEC X" in stop/running status, and then press [▲]/[▼] to increase or decrease the current value (The higher the value, the shorter the Dec time; vice versa). After waiting for 3 seconds, the system will confirm your setting.

### i) Start or brake

- Press [▶] after you confirm the setup parameters, and press [■] to brake at any time during a run. If you want to know the RCF during a run, press the [RCF] (RCF light should be on) to check the RCF value under the current speed. The centrifuge will be back to the running status in 4 seconds automatically.
- If you want to know the setup parameters during a run, press the [SET] to check the setup parameters. The centrifuge will be back to the running status in 4 seconds automatically (in the case of no setup revising).
- If the time is counted down to "0" or it is stopped automatically for trouble, the centrifuge will break and stop automatically. When the speed is 0 r/min for the model, you can press [STOP] to open the door lid (if the electricity cuts off, insert the special unlock tool into the door opening hole and push it horizontally to open the door lid). Then the buzzer tweets 15 times, and presses [RCF] to eliminate the buzz; if you press [STOP] to stop the operation during a run, the buzzer won't tweet.

### j) Rotor disassembly: (after finishing adjust or centrifuge)

First, clasp the spoke of the rotor with one hand, and put the solid wrench on the cap nut by another hand. In the meantime, turn the wrench for 3 to 6 rounds in a counterclockwise direction to lose the cap nut until the rotor can be separated from the driving shaft. If the rotor is not taken out from the drive shaft for a long time and blocked, you can beat the surrounding spoke of the rotor several times slightly with a wooden or rubber hammer. Then clasp the symmetric spoke of the rotor lift slightly by 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 to avoid the damage of driving shafting.

## 8. Maintenance

- Dry the centrifuge chamber, rotor, and tube with a piece of clean and soft cloth after operation.
- Check regularly to find if there is any corrosion or crack on the rotor, bracket, tube sets, and tubes.
- Heat the temperature of the centrifuge to 25°C to 30°C for 10 minutes after using and make sure it is no more water left in the container to avoid rusting.

If the centrifuge will not be in use for a month, take out the rotor from the chamber, grease the cone side of the drive spindle and the center hole of the rotor, and keep the rotor in a dry place.

### Error analysis:

#### 1. Imbalance protection : E-1

During a run, the system will be stopped automatically since the high vibration caused by imbalance exceeds the extent value and displays "E1".

#### 2. Over-speed protection : E-2

The system cannot work when the setting speed is over max speed. Or the system will be stopped automatically if the actual speed is **more than** the rotor max speed or the setup speed by 500r/min. "E6" will be then displayed.

#### 3. Door lid protection: E-3

Since the centrifuge runs at high speed, it will not run for the door lid opening. If forcing the door lid open during a run, the system will be stopped automatically, and "E3" will be then displayed.

Door open Error during running : E-4

The door opens **while** the machine is running.

#### 4. Over-current Ea

(The motor power supply is too large, causing large loads due to excessive increases in the speed, or drive damage.)

Over-voltage (shutdown) Eb

(DC voltage is too high, causing the rise due to large load speed too fast, or drive damage.)

#### 5. Under-voltage Ec

(DC voltage is too low, causing the rise due to un-enough speed, or drive damage.)

No Speed trouble : E-7

The centrifuge will not stop when the velocity-measuring system is broken, "E7" will display.

### **6. Error manipulation : E-8**

Before a run error occurs, the system cannot work; during a run set wrongly, the setup would be invalid. In standby mode press the [START] key, "E8" will be then displayed while it cannot start.

### **7. IPM trouble : E-9**

While IPM has trouble, the system cannot work and "E9" will be then displayed.

## 9. Troubleshooting

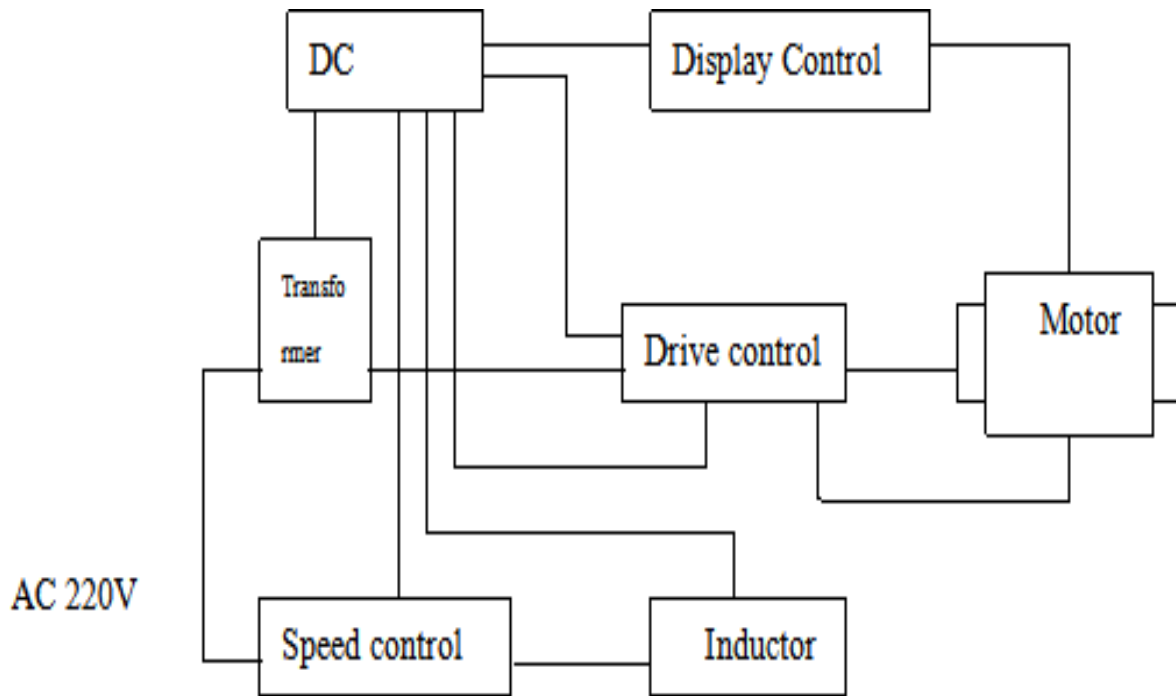
- **No power indication after the machine is powered on :**
  - a) Check if the power supply is OK.
  - b) Check if the plug and sockets are well connected.
  - c) Check if the fuse is burned. The correct size of the fuse is F10A250V( $\Phi$ 5×20)
  - d) Check if the power indicator is burned.
  
- **After power on, the power indication is OK, but the operation of the machine is abnormal:**
  - a) Check if the time or speed is set.
  - b) Check if the control circuit is normal.
  
- **Abnormal vibration occurred after starting the machine :**
  - a) Check if there are any foreign materials in the tube set and check if the solution in the tubes is properly arranged.
  - b) Check if the tube set of the swing rotor is properly in contact with the bracket.

10. Accessories

**Packing List**

S.no	Description	Quantity	Remark
1	Centrifuge	1set	√
2	Rotor	pcs	
3	Certificate	1pcs	√
4	Operation Instruction	1pcs	√
5	Packing List	1pcs	√
6	Solid wrench	1pcs	√
7	Adapter	1 set	√

## 11. Circuit Diagram



Fison Instruments Ltd  
272 Bath Street Glasgow G2 4JR UK  
Email: [info@fison.com](mailto:info@fison.com) | Website: [www.fison.com](http://www.fison.com)