SCANSPEED

SERVICE MANUAL

PERSONAL MICRO CENTRIFUGE

ScanSpeed Model Mini

Date : 19.01.2017
Cat. No. : 7.601.314.101, 7.601.314.102, 7.601.314.103

CE

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1. Operating Instruction

1.1 About this manual

- This service manual should be used by specialized engineers authorized by Gyrozen Co., Ltd.
- Any repairing work operated by non-authorized personnel cannot be protected and guaranteed.
- This service manual aims to find possible errors quickly and fix them properly.
- Refer to the user's manual for detailed operation of Centrifuge.
- Do not copy or reprint without approval

1.2 Safety label and precaution

1.2.1 Safety Label

The labels attached to the device give information for safety.

Label	Information	Label	Information
	Attention label to show risk and warning		Attention label to warn electric shock

1.2.2 Safety Precautions

Make sure to

- Supply proper voltage power according to device's power requirement.
- Let all repairing works done by authorized or qualified personnel.
- Use rotors or accessories which are approved by Gyrozen.
- Not try to open the lid and or move the device while the rotor is running.
- Operate the centrifuge with a rotor properly attached and secured to the shaft.
- Not use flammable, hazardous, explosive, or corrosive materials.
  NOTE: When it is required to use toxic, radioactive materials or pathogenic micro-organisms, which belong to the Risk Group II of WHO: "Laboratory Bio-safety Manual," should follow the regulation guidelines from WHO.
- Keep away hazardous materials farther than 30 cm (12 in) from the device during centrifugation, as recommended in IEC standards 61010-2-020.
- Keep the rpm or rcf under its maximum speed in the case that the density of sample materials is greater than 1.2 g/ml to avoid rotor failure.
- Load samples symmetrically in the rotor diagonally to make balance between the tubes.
- Balance the load on the rotor totally to prevent the damage to the device even by using several water-filled tubes.
- Place device on a flat, level, rigid and stable surface.
- Disconnect power supply prior to maintenance and service work to avoid electrical shock.
- Use proper disinfection procedures when centrifuging bio hazardous compounds.

In Blackout

When a blackout takes place while the device is running, the door does not open. And the rotor speed begins to decrease at natural level. Even if the power turns on before the rotor stops completely, the rotor does not return to the original speed, but decreases more rapidly with buzzer sound.

Door opening

The door is closed/opened automatically by a door lock unit operated by a solenoid, and it will not be opened while the rotor is running at all. Even if the door is opened accidentally, a door limit switch senses it instantly to make the rotor speed decrease.

2. Installation

2.1 Unpacking

1) Check if the box contains such parts as;
   ① Power cable, 1ea
   ② User's manual, 1ea
   ③ Rotor, 1ea
   ④ Lid, 1ea
   ⑤ Rotor coupling nut, 1ea
   ⑥ Adaptor 0.2ml, 12ea
   ⑦ Adaptor 0.5ml, 12ea
2) Open the box and lift out the device carefully together with the safety padding.
3) Remove the safety padding and vinyl wrap.
4) Place the device on the flat surface.

2.2 Location

1) Install the device at the solid and flat floor or table. If you place the centrifuge at the slope, the axis of rotation is possibly changed because of the rotor weight.
2) Install the device keeping a distance of 30cm at least from the wall.
   The distance is needed for the air circulation around the device.
3) Install the device at the place with appropriate temperature and humidity.
   These conditions have to be maintained constantly as soon as possible.
4) Install the device at the place without any kinds of corrosive gases.

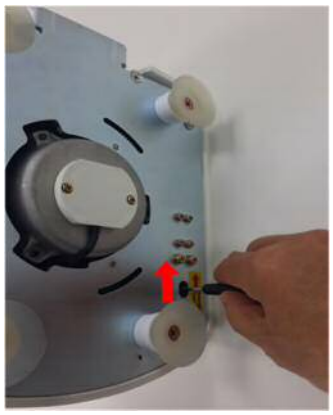
2.3 Supply the power

1) mini model uses 110V or 220V.
   Check proper voltage of the device and connect to adequate power outlet.
2) If the power input is more than +/- 10% of the recommended voltage or fluctuating frequently, it may affect some functions of the device.
   In that case it is recommended to use AVR (Automatic Voltage Regulator).
3) If you want to use the device under the other voltage range, please contact us for safe usage.

2.4 Power On and opening front door

1) Turn on the device by the switch on the back side of the device.
2) The door opens automatically at the time of power on.
3) The door opens automatically also when the test ends.
4) To open the door in other cases, press the 'Door' button.

5) If it does not work (door not open), use the emergency door open tool at the bottom of the device(as the figure)



Insert a tool like a driver into the hole and push the latch to the red arrow direction

3. Device Information

3.1 Special qualities

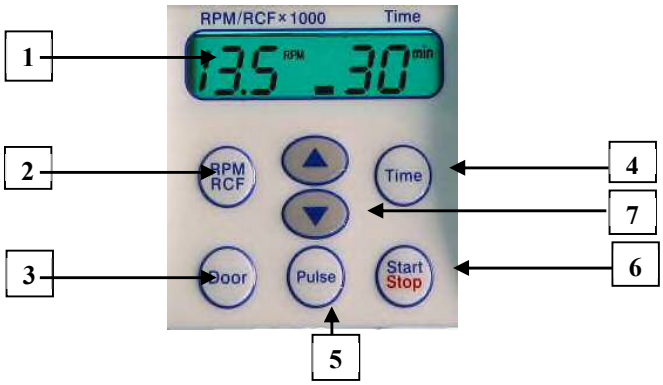
- High safety and low noise
- Fixed angle rotor
- Simultaneous display of rpm and rcf speed
- Automatic alarm function for Door open, Speed trouble
- High tech AC Induction Motor adopted

3.2 Technical Specifications

Max. RPM	13,500 rpm
Max. RCF(Fixed Angle)	12,300xg
Max. capacity(Fixed Angle)	12 x 1.5/2.0 ㎖, 4 x 8-tube PCR strips
Run time	≤ 30 min
Acceleration time	≤ 12ec
Deceleration time	≤ 16ec
Power supply	220V, 50/60Hz(110V optional)
Power requirement	300 VA
Dimension (WxDxH) mm	208 x 245 x 145
Weight	4.4 Kg(main body only)
CE Certification	Yes

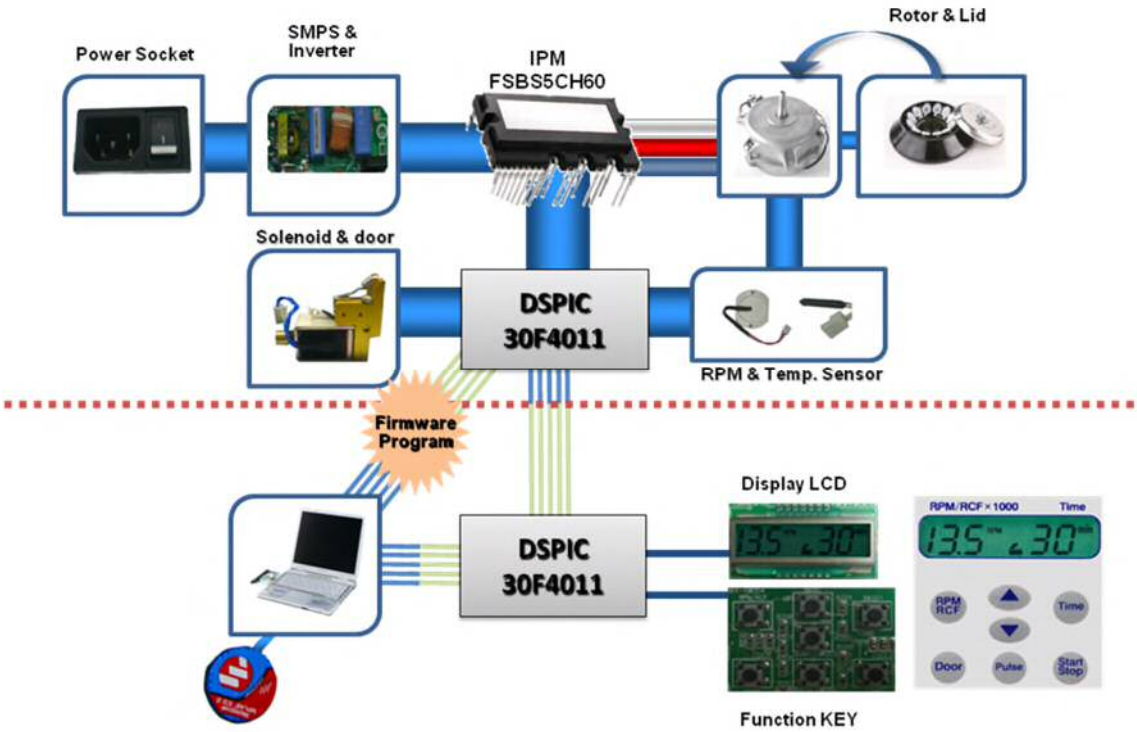
3.3 Outer Description

3.4 Operating Function of Control Panel



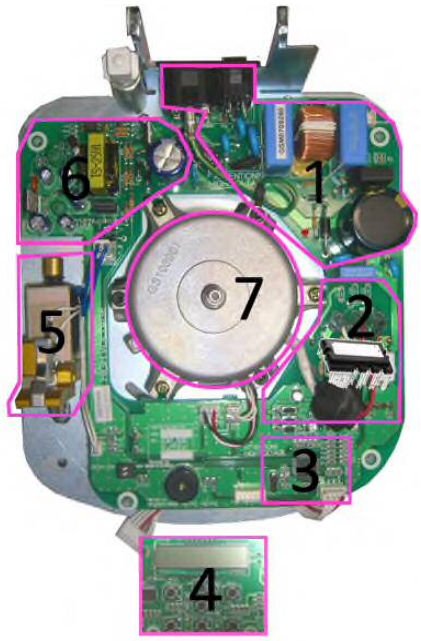
1) Display LCD: to show the data of each function.
2) RPM/RCF button: to set speed value and to switch the RPM/RCF display.
3) Door button: to open the door.
4) Time button: to set test time from 1 min to 30 min.
5) Pulse button: to accelerate to set RPM and decelerate rapidly.
6) Start/Stop button: to start and to stop operation.
7) Up & Down arrow button: to change input data.

3.5 Operating System



1) DSPIC 30F4011, MICOM; controls all devices.
2) SMPS; distributes inlet power to each part as appropriate form.
3) Inverter; transforms the single phase power to the 3 phase for running the AC induction motor.
4) IPM FSBS5CH60; controls the AC induction motor.
5) Solenoid; opens and closes the door lid automatically.
6) Temperature sensor; measures the temperature of motor at its surface and issues E3 error if it goes too high(above 110℃).
7) Firmware program; used to update the firmware with notebook and interfacing connector.

3.6 Controller Board



1) Power AC input & DC rectification/smoothing [AC power – Fuse – NTC – LPF – Bridge Diode]

- Forming of inverter operation power by radio wave recification of AC power
- B/Diode: 4A, 600V
- Smoothing condenser for motor output: 220uF/400V
- Prevention of inrush current – NTC_10D-15

2) IPM [Intelligent Power Module]

- Forming of motor control signal from MICOM - Failchild FNB41560

3) Control Part [MICOM]

- MICOM for system control
- Flash memory & RAM insided 16bit MICOM for high-speed processing by simplifying of circuit - working clock frequency 10Mhz (inside x 4)
- Microchip – dsPIC30F4011
- Control of external in-output and communication with display

4) Display Part

- Control function key and display by communication with main control chip
- Microchip – PIC16F917

5) Door Control [Solenoid]

- Operate by supply of DC100V voltage and current in 0..5 sec when the 'Door' button pressed.
- Door switch

6) Producing of inverter power

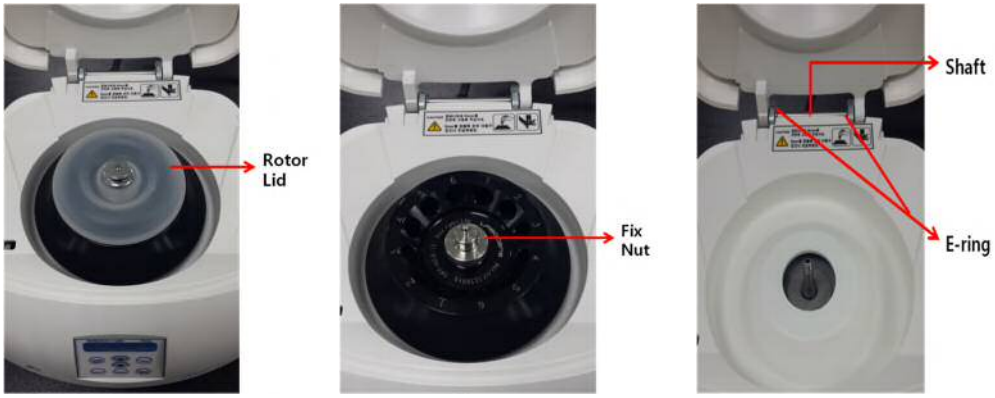
- Supply power of IPM and MICOM from SMPS
- Input: 220V / Output: 12v, 15v, hi-dc[311V_DC], 5v
- Trans & PWM control
- Smoothing condenser for power supply of control part: 47uF 400V

7) Motor [AC220V 65W]

- Motor on 3Phase operating with setting data by input of motor output voltage from IPM
- RPM sensor
- Motor temperature sensor

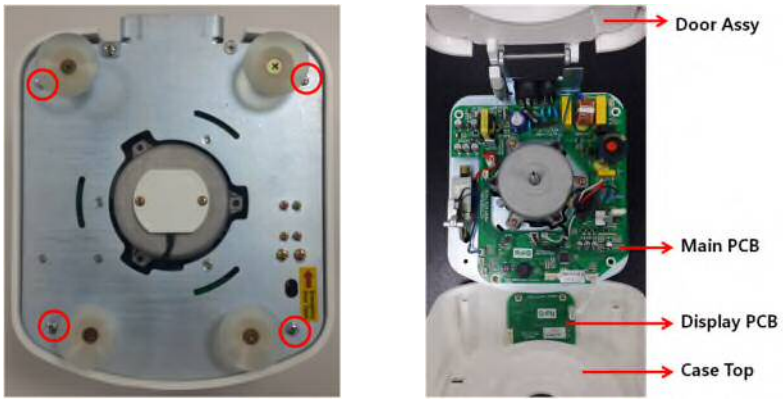
4. Disassembling

4.1 Rotor and Door assembly



1) Remove the rotor lid
2) Remove the fix nut and rotor.
3) Remove the 2ea E-ring and the shaft.
4) Remove the door assembly.

4.2 Case Top



1) Remove the 4 screws from the bottom of device.
2) Disassemble the case top from the case bottom.

4.3 Main Controller Board

1) Disconnect all cables from the Main PCB.
2) Remove the 4 screws(red circle).
3) Disassemble the main controller board from the case bottom.

4.4 Display Controller Board

1) Disconnect the display cable.
2) Remove the 2 screws.
3) Disassemble the Display board from the case top.

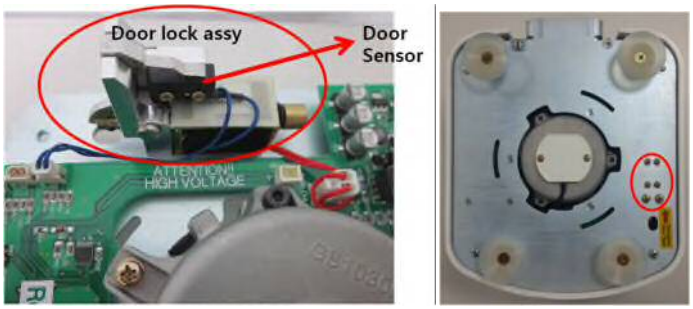
4.5 Motor assembly and Anti-vibration rubber.

1) Disconnect the motor, RPM and motor temp cable.
2) Remove the 4 screws.
3) Disassemble the Motor assembly.
4) If you need, replace the Anti-vibration rubber.

4.6 RPM Sensor assembly

1) Disconnect the RPM Sensor cable from the Main PCB.
2) Remove the 2 screws(red circle).
3) Disassemble the RPM Sensor holder assembly.

4.7 Door lock assembly and Door Sensor



1) Disconnect the door sensor and solenoid cable from the Main board.
2) Remove the 6 screws from the case bottom.
3) Remove the Door lock assembly from the case bottom.
4) If you need, replace the Door Sensor assembly.

5. Service Mode

5.1 Transition into service mode

On the Control panel

1) Power ON while pushing the RPM/RCF key and Start/Stop key at the same time
2) After 2 seconds push the UP( ) key and then push the DOWN( ).
3) Service mode begins.

5.2 Handling values

1) Confirm the set values with left side Up/Down key.
2) Power off to return from service mode.

 current RPM

 Motor output frequency

 Motor output voltage

 Motor input voltage

 Motor Temperature

 Display program version

 Main program version

 sum of operation time

6. Error code and Troubleshooting

6.1 Error code

In the event of a malfunction, an error message with code number appears indicating the possible causes and the device is forced to stop. Turn off the power immediately, identify the causes and follow the corrective actions as recommended below.

Error Code	Problem	Possible Cause/Co
E1	RPM Sensor Error: *Failure to reach to 200 rpm within 2 sec.*	• Motor is out of order • RPM Sensor is defective or damaged. • RPM sensor cable or wire is not connected. **Corrective Action** • Turn the power switch off. • Check RPM sensor and cable. • Test again to see if the problem is repaired. If the problem is not be fixed; • Replace the RPM sensor assy
E2	Door Open Error: *Door opens during operation*	• Door lock is loosened • Door open sensor is defective or damaged. **Corrective Action** • Turn the power switch off. • Detach the front panel. • Test by Door button to see if the solenoid works. • Adjust the Door lock position. If the problem is not fixed; • Replace the Door Lock assy or, • Replace the solenoid assy and sensor
E3	Motor Overheated: *Detected internal temperature is higher than 110℃*	• Ventilation inlet opening is blocked. • Temperature sensor is defective or damaged. **Corrective Action** • Clean the ventilation inlet opening or remove any objects blocking inside. • Turn the power switch off and wait about 1 hour with the door opened for cooling down the motor. • Test again to see if the problem remains. If the problem is not fixed; • Replace the motor
E4	Under voltage *Supply voltage to Motor is lower than required.*	• SMPS and Inverter on the main board does not work normally. **Corrective Action** • Confirm the voltage under the Test mode. • Replace the motor.
E5	Over voltage *Supply voltage to Motor is lower than allowed.*	• SMPS and Inverter on the main board does not work normally. **Corrective Action** • Confirm the voltage under test mode. • Replace the motor.
E6	Over speed *Actual rpm speed value is higher 1,000 rpm than set speed value*	• Inverter on the main board does not work normally. **Corrective Action** • Confirm the speed under test mode or by tachometer. • Upgrade the firmware If the problem is not fixed; • Replace the motor
E7	Control system failure *Device does not work at all*	• Failure of control firmware **Corrective Action** • After power on, check if the beep sound issued. • Check if the Power LED on the main board is on.

		If some trouble of firmware is confirmed; • Update the firmware

6.2 Troubleshooting

If other malfunctions without error code indication occur, turn off the power immediately. Then identify the causes and carry out the corrective action as indicated below. If the device stops due to the error indication, it cannot be restarted until error is cleared. After the problem is fixed, restart the device to check if the error occurs again.

Error Indication	Possible Reason
No display or power: *Power failure during operation; display screen is blank*	• Device is powered up incorrectly **Corrective Action** • Plug the power cord into the appropriate power outlet. • Device is not connected to the power outlet **Corrective Action** • Make sure to securely connect the power cord to the power outlet. • Temporary system error **Corrective Action** • Turn the power switch off and reset device.
Operation cannot start *Rotor does not rotate*	• Rotor recognition or sensor error **Corrective Action** • Perform the corrective action as listed in E1 and/or E9. • Door is not closed completely **Corrective Action** • Make sure to press down the door firmly until the latch handle is fully retracted. • Door lock sensor error **Corrective Action** • Replace the sensor with normal one. • Temporary system error **Corrective Action** • Turn the power switch off and reset device.
Door does not open/close *Door does not fit the door lock*	• Door lock is not assembled at proper position. • Door latch does not work properly. **Corrective Action** • Open the door by emergency door open tool. • Detach the front panel check the trouble cause. • Adjust the position of Door lock or replace it.
Door open LED always on *Device does not start*	• Door lock sensor is defective or damaged. **Corrective Action** • Detach the front panel. • Check if the sensor is defective • Replace the defective sensor with normal one
Vibration is excessive. *Unusual noise issues*	• Rotor is not balanced **Corrective Action** • Rearrange the balance of rotor.

7. Maintenace

7.1 Cleaning and disinfection

1) Outer part of device

① Clean the outside of the device with a dry soft cloth. If necessary, dip the cloth with neutral detergents and clean contaminated parts. Keep dry completely after cleaning.

② Do not use any volatile chemicals such as alcohol, benzene, etc.

③ If any rust appears, clean with neutral detergents and dry it.

2) Inner part of device

① Keep dry inside the chamber after every use of the device.

② Clean the shaft always for avoiding an imbalance error during the rotation.

③ If any part is contaminated, clean with neutral detergents.

3) Rotor

① Clean the rotor if rotor is contaminated by any samples.

② Keep dry it after usage.

4) Moving or shipping of device

① If you need to move the device, make sure to protect the shaft from any physical impact.

② Remove the rotor and fill inside the chamber with proper materials to keep the shaft on place.

7.2 Device test for centrifuge

7.2.1 Validation of actual RPM

1) Prepare a RPM speed tachometer (hand tachometer) and fluorescent light tape.

2) Attach some fluorescent light tape on a grip of a rotor lid.

3) Set the specific rpm and start the operation.
4) Measure an actual rpm using the tachometer through center window of main body lid.

5) Compare actual measurement rpm and setting rpm.

7.2.2 Validation of Motor performance

Check the resistance value at motor output terminals (Unit: Ω)

Motor	***U***	***V***	***W***
AC Induction 200watt	Black	Red	White

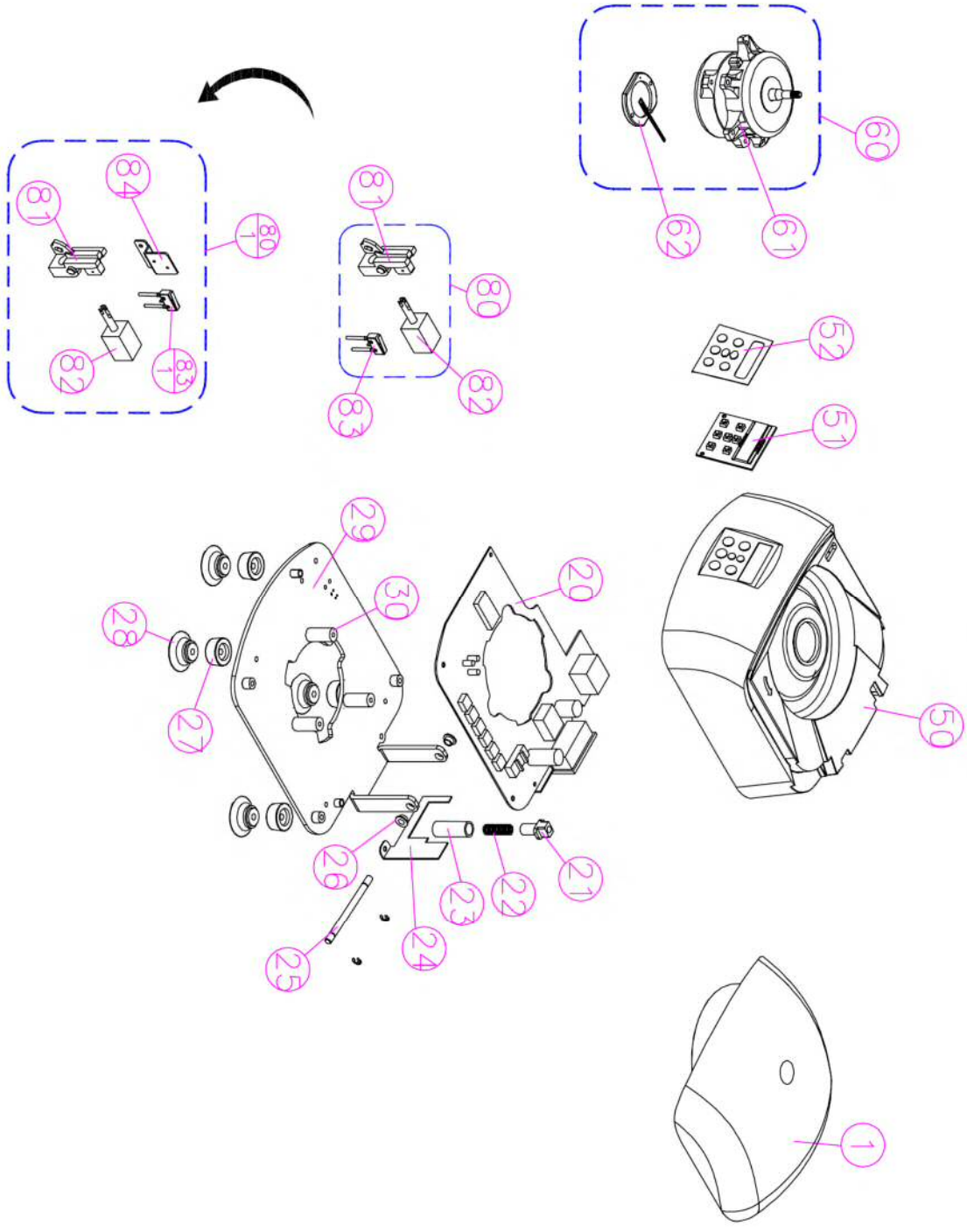
Measuring method

1) Use 'Multi meter tester' tool
2) Place the tool at the resistance location
3) Check the resistance value at u-v, u-w, v-w with tester.
4) If the value is 0 or ∞ ohm, it means some trouble so it needs repairing.
5) The normal status is that 3 resistance values(u-v, v-w, w-u) are all same within a range of ±5%.

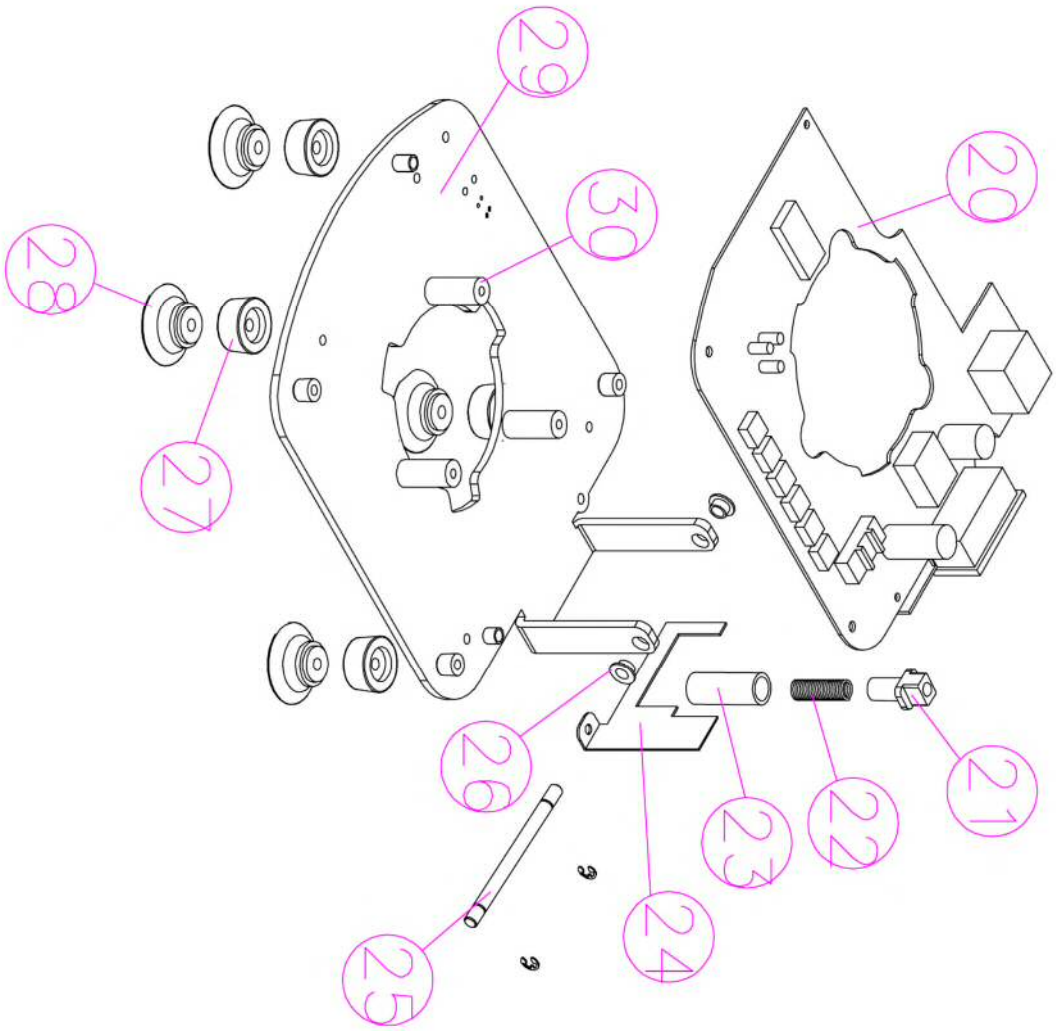
8. Parts Information

8.1 Assembly Drawing

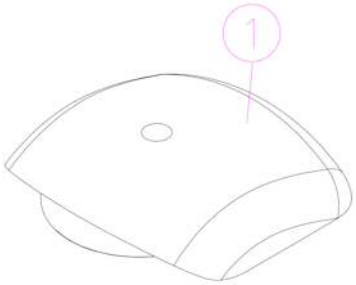
1) All parts



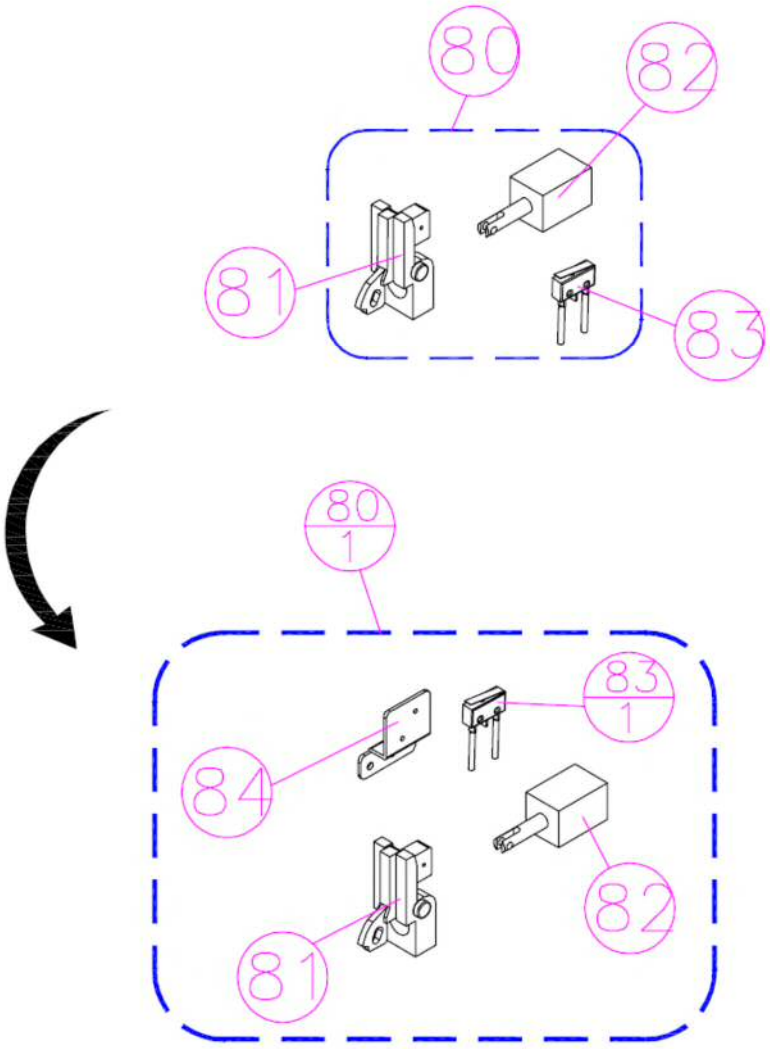
2) Case (Bottom)



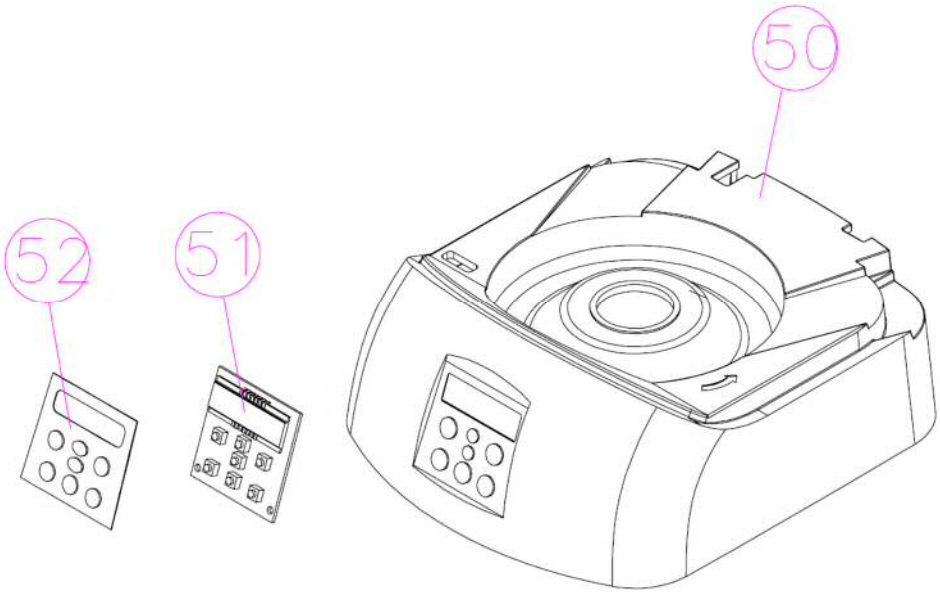
3) Door Assembly



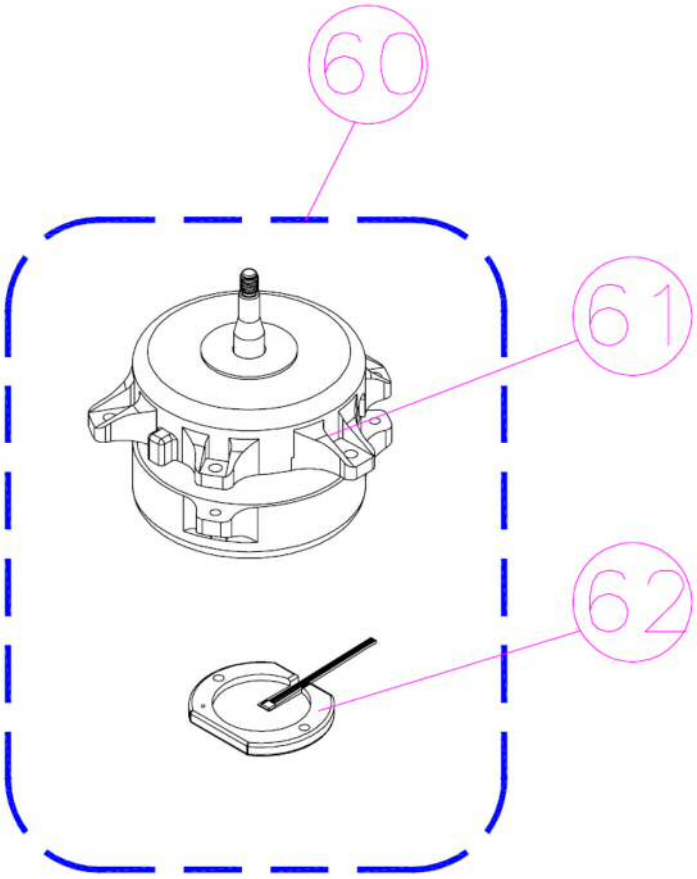
4) Door lock assembly



5) Front panel



6) Motor assembly



8.2 Part List

* The grey colored letters are old version parts.

No.	Part No.	Part Name	Remark
1	C12DR90000-00	Door Ass'y (White+White)	
	C12DR900B0-00	Door Ass'y (Blue+Blue)	
	C12DR900BW-00	Door Ass'y (Blue+White)	
	C12DR900PW-00	Door Ass'y (Pink+White)	
20	C12BD00120-02	Main Board Ass`y - mini	
21	C12DR02420-01	Tension Bar(Old)	
21	C12DR02420-02	Tension Bar(New)	
22	C12DR05420-00	Tension Bar Spring	
23	C12DR02520-02	Tension Bar Holder	
24	C12CS00533-02	Panel(Back)-mini	
25	C12DR04420-01	Hinge Pin	
26	C99DR06920-00	Flange Bearing	An instrument requires 2ea.
27	C12CS04120-01	Spacer for Foot	An instrument requires 4ea.
28	C12RB00920-00	Foot, rubber	An instrument requires 4ea.
29	C12CS00233-07	Case(BOTTOM)-mini	
30	C12RB00120-02	Anti-vibration Damper	An instrument requires 3ea.
50			
	C12CS00120-03	Case(TOP) White-mini	
	C12CS00120-B0	Case(TOP) Blue-mini	
	C12CS0012P-00	Case(TOP) Pink-mini	
51	C12BD00223-00	Display Board-mini(A7)	
	C12EL08020-00	Cable(Display)	
52	C12CS04020-02	Overlay-mini	
60	C12MT90100-01	Final Motor Assembly (110V)-mini	
	C12MT90200-01	Final Motor Ass'y(220V)-mini	
61	C12MT80100-01	Motor Ass'y (110V)-mini	
	C12MT80200-01	Motor Ass'y (220V)-mini	
62	C12MT80700-00	RPM Sensor ASS'Y-mini	
80	C12DR90200-00	Door Lock ASS`Y-mini(220V)	
	C12DR90100-00	Door Lock ASS`Y-mini(110V)	
80-1	C12DR90200-01	Door Lock ASS`Y-mini(220V)	
81	C12DR90100-01	Door Lock ASS`Y-mini(110V)	
	C12DR82000-00	Latch Body Ass'y	
82	C12EL03110-02	Solenoid-220V	
	C12EL03010-02	Solenoid-110V	
83	C12EL90120-01	Door Sensor Ass`y-mini	
83-1	C12EL90120-02	Door Sensor Ass`y-mini	
84	C12DR03433-00	Bracket(Door Sensor)	
	GRF-m2.0-12-LA-01	Plastic rotor lid of GRF-m2.0-12 for mini	

	C12RT22020-04	Rotor Locking Nut-mini	