SCANSPEED

SERVICE MANUAL

Multi-Purpose High-Speed Centrifuge

ScanSpeed Model 1580

Date : 19.01.2017
Cat. No. : 7.648.519.201

CE

Table of Contents

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 safety precautions

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.
  http://www.who.int/csr/resources/publications/biosafety/Labbiosafety.pdf)
- 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 motor and 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.

Device vibration

If the rotor loses balance while running by any reason, it invokes vibration on the device itself. In this case the Imbalance sensor senses it and makes the rotor begin to decrease with preset level issuing Imbalance Error warning. This safety function protects the device from damage during operation.

2. Installation

2.1 Unpacking

1) Check if the box contains such parts as;
   ① Power cable, 1ea
   ② Rotor locking tool
   ③ Emergency door open tool, 1ea
   ④ User's manual, 1ea
   ⑤ Rotor (Optional)
2) Open the box and lift out the device carefully together with the safety padding.
3) Remove the safety padding and vinyl wrap.
4) Remove the motor fixing bolts

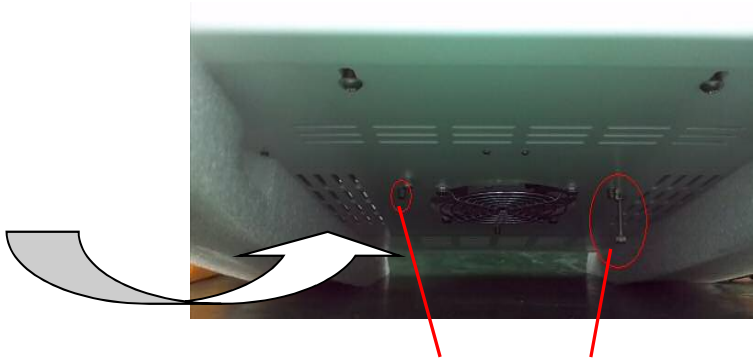
   There are 2 screws placed at the bottom of the device. They protect the imbalance sensor from any damage caused by some accidental moving of the motor during delivery.

   And they should be removed before the installation of the device as follows;

   ① Check if a long bolt(A came out from bottom of the device. As it is longer than the leg pieces, the device cannot stand horizontally.

   ② Check also another screw around the long one.

Bottom side



③ Unscrew and remove the 2 screws with a provided wrench.

5) 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) 1580 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/Off and Emergency Door Open

1) Turn on the device by the switch on the right side of the machine.
2) Press the 'Door' button to open the door.
   If it does not work (door not open), use the emergency door open tool (as the figure).

<Ver 1>

<Ver 2>

3. Device Information

3.1 Special qualities

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

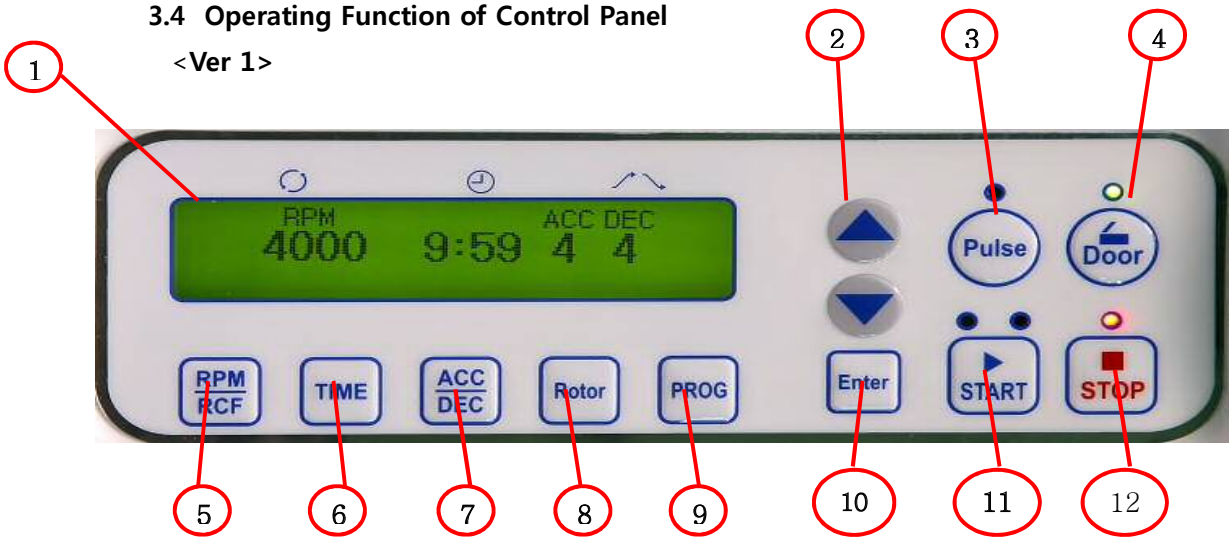
3.2 Technical Specifications

Max. RPM(Fixed Angle/Swing out)	15,000/5000 rpm
Max. RCF(Fixed Angle/Swing out)	24,249/5,394 xg
Max. capacity(Fixed Angle/Swing out)	6 x 85 ㎖/4 x 750 ㎖
Run time	≤ 99 min 59 sec or continuous
Program memory	100
Power supply	220V, 50/60Hz
Power requirement	1500 VA
Dimension (WxDxH) mm4	540 x 650 x 380
Weight	57 Kg
CE Certification	Yes

3.3 Outer Description

3.4 Operating Function of Control Panel

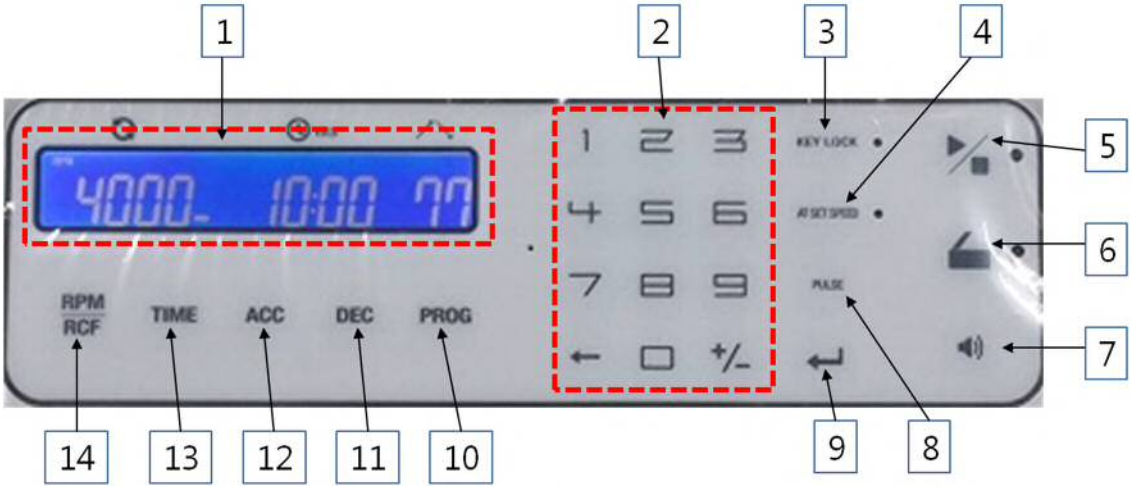
<Ver 1>



1) RPM/RCF display: to show the RPM/RCF
2) UP & DOWN button; to confirm and set the data.
3) Pulse: to accelerate and decelerate within short period.
4) Door: to open the Door while not operating
5) RPM/RCF: to show and set the RPM & RCF data
6) TIME: to show pre-set time up to 99 min 59 sec (00: continuous)
7) ACC/DEC: to set the step of ACC/DEC.
8) Rotor: to set the radius value .
9) PROG: to save a set of setting values or call the saved setting values.
10) Enter: to complete the settings
11) START: to start operating
12) STOP: to stop the operating.

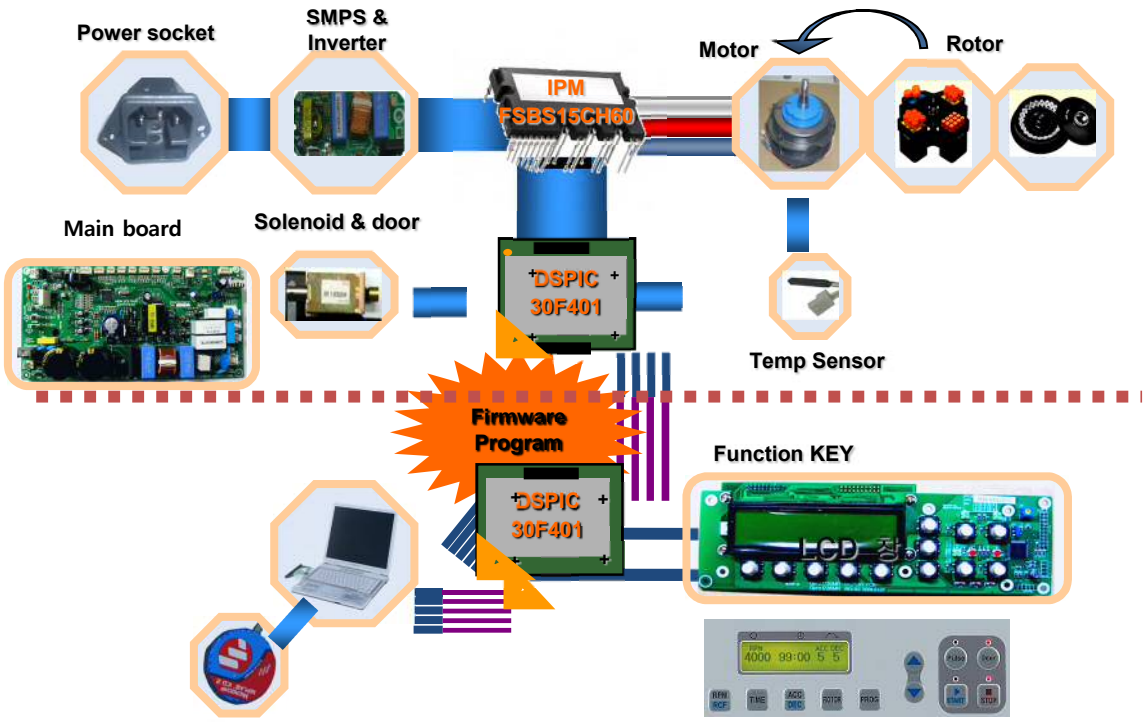
* If you press the arrow button longer than 3 seconds, the numbers change rapidly and the set-up is achieved faster.

<Ver 2>



1. Display LCD : shows the data of each setting(RPM, RCF, Time, Acc, Dec, Program)
2. Numeric keypad : used to change(increase/decrease) the input data
3. KEY LOCK : used to lock the button.
4. AT SET SPEED : used to counts the run time once the actual run speed reaches to the set speed value.
5. Start/Stop( ) : used to start/stop device operation.
6. Door( ) : used to open the door.
7. Beep( ) : used to set the beep sound.
8. PULSE : used to accelerate to set RPM once and decelerate rapidly.
9. Enter( ): used to fix and save a setting value.
10. PROG : used to save or call the preserved setting values.
11. DEC : used to set the deceleration level from 0 to 9 steps.
    '0' step means natural dec level. The bigger the number, the higher the dec speed.
12. ACC : used to set the acceleration level from 1 to 9 steps.
    The bigger the number, the higher the acc speed.
13. TIME : used to set test time up to 99 min 59 sec (0:00, continuous)
14. RPM/RCF : used for switching RPM/RCF

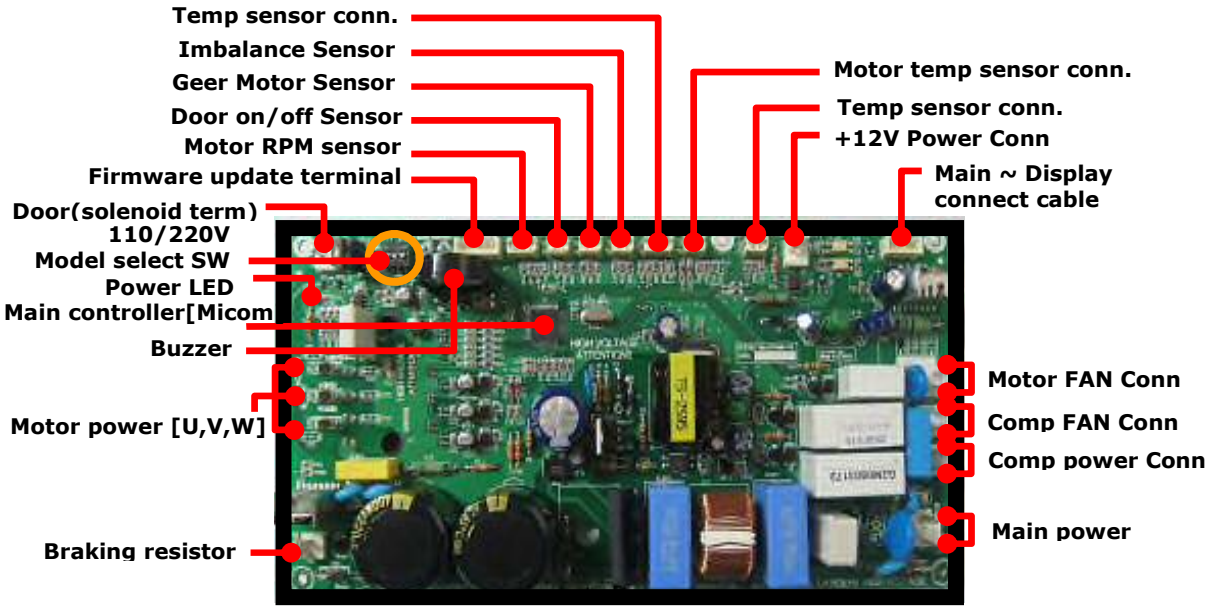
3.5 Operating System



1) DSPIC 30F4011, MICOM; It 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; open and close the door lid automatically.
6) Temp sensor; measure the temperature of motor at its surface and issue E3 error if too high(above 110℃).
7) Firmware program; is used to update the firmware with notebook and interfacing connector.

3.6 Main Controller Board

<Ver 1>



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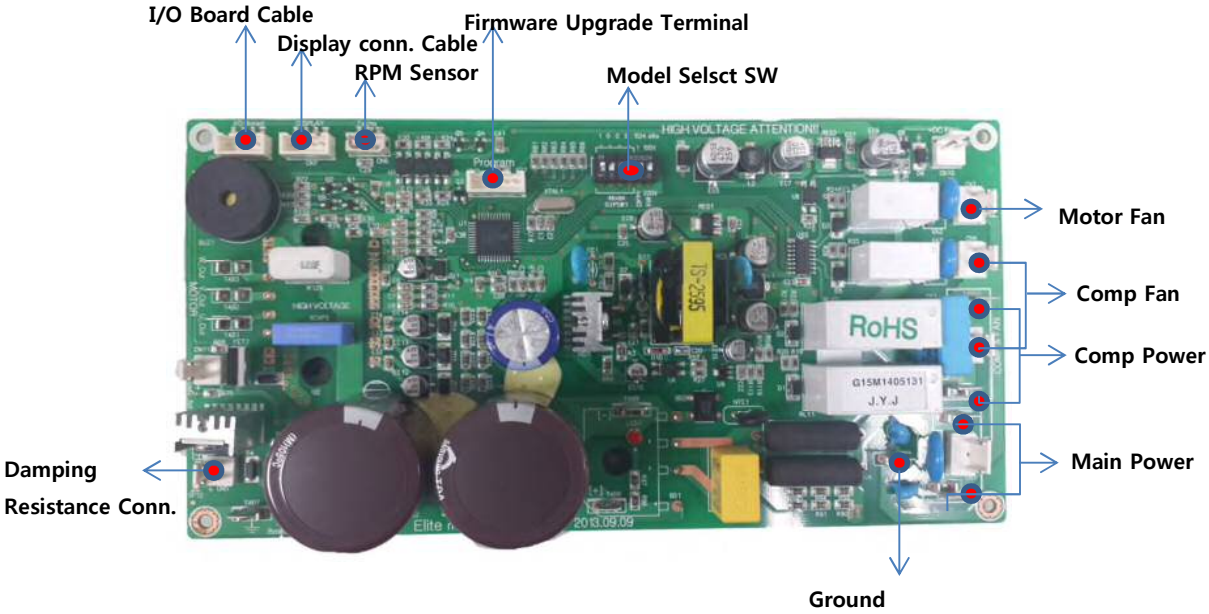
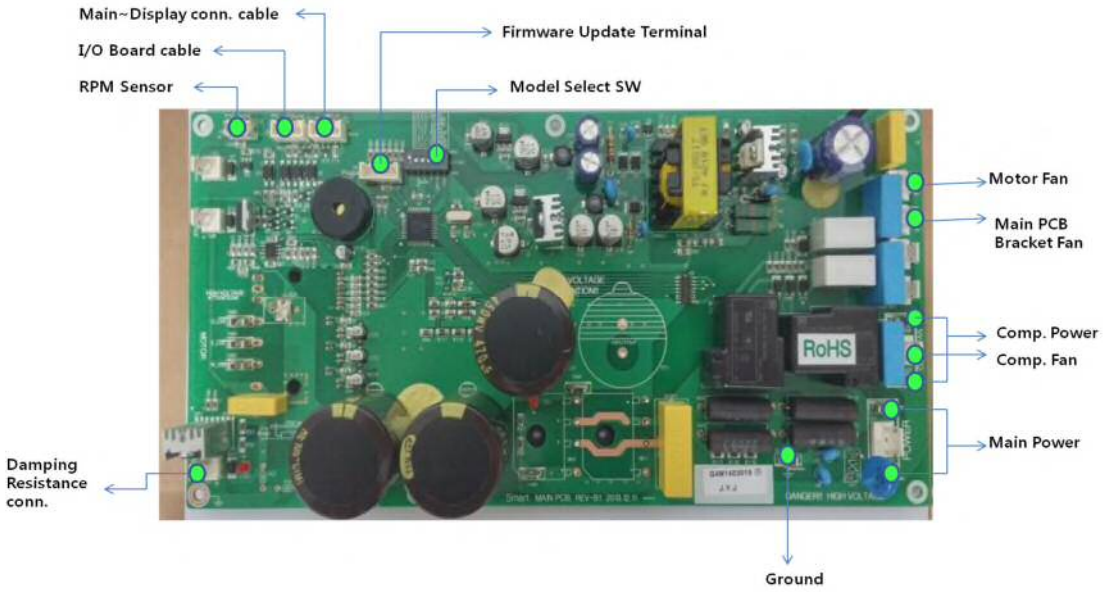
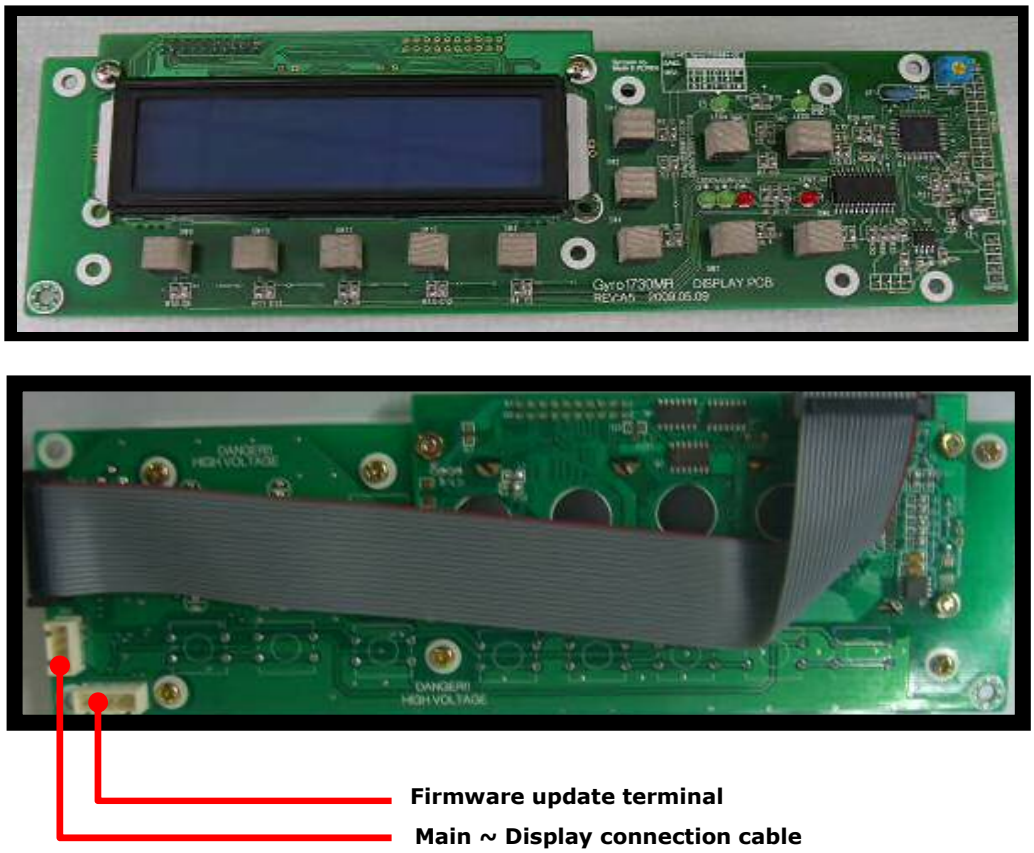


<Ver 2_110V_Smart PCB>



3.7 Display Controller Board

<Ver 1>



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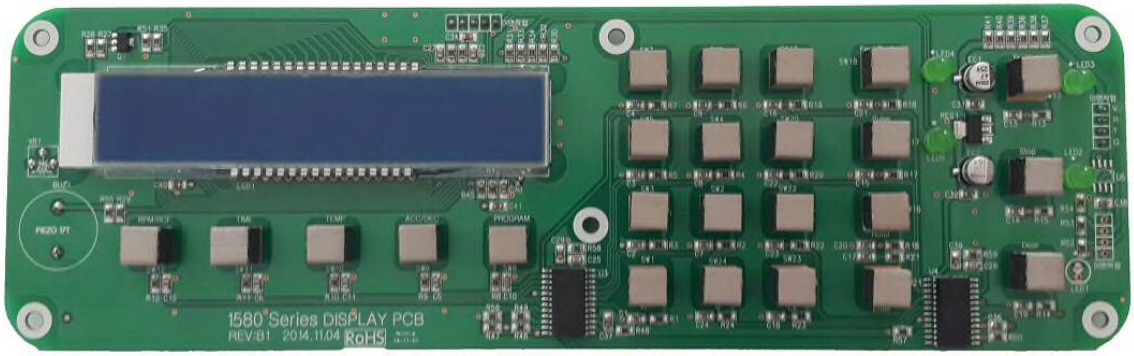
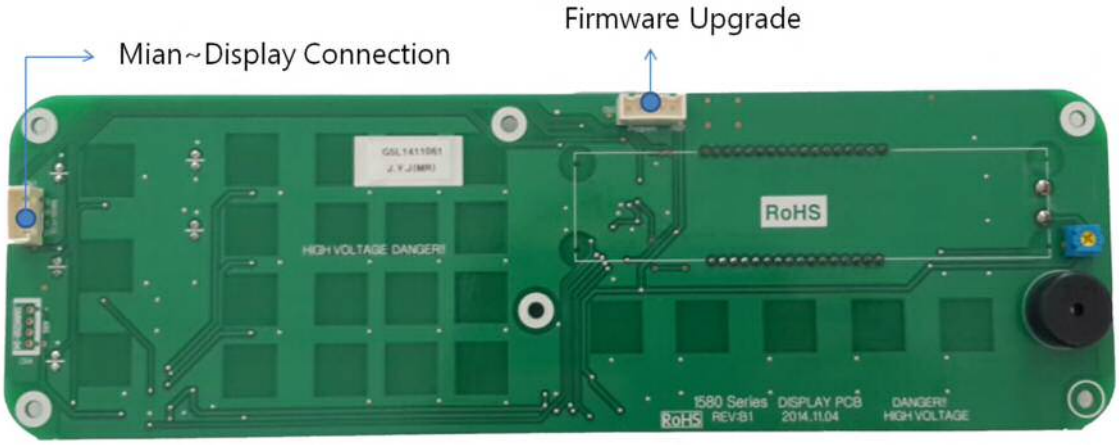
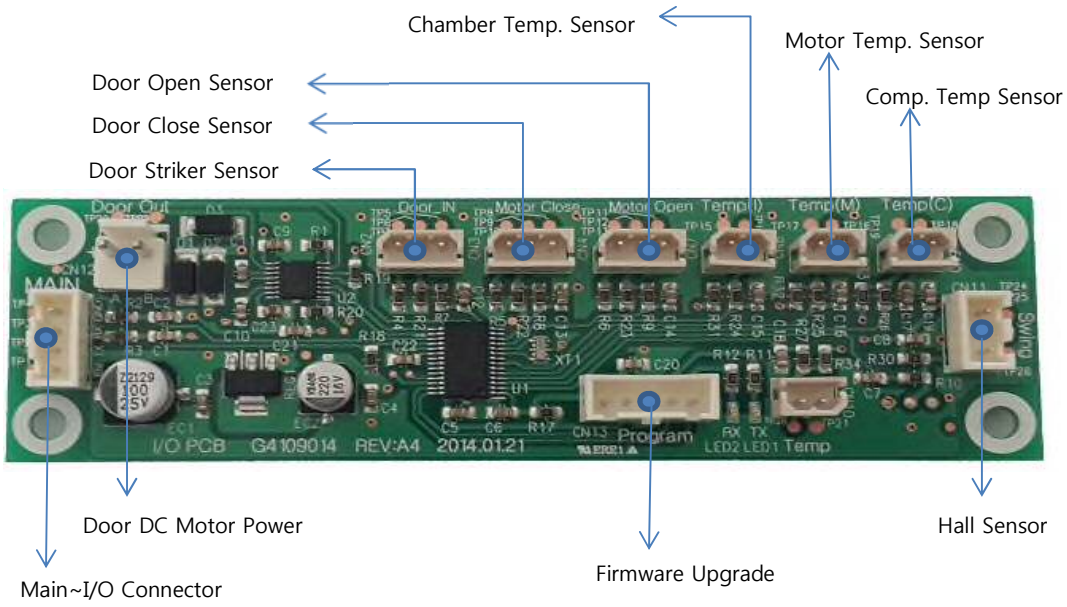


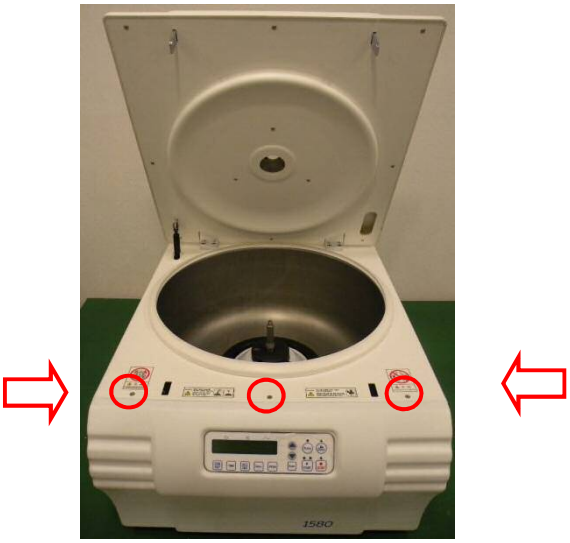


3.8 I/O Board



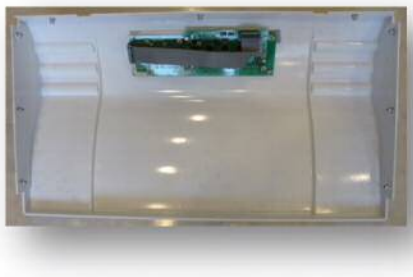
4. Disassembling

4.1 Front panel and controller board



1) Remove the 9 screws at the side part and front of the device.(pointed by red arrows and red circles)

<Ver 1>



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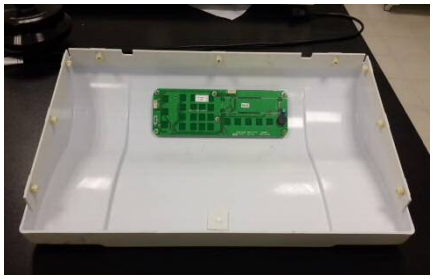
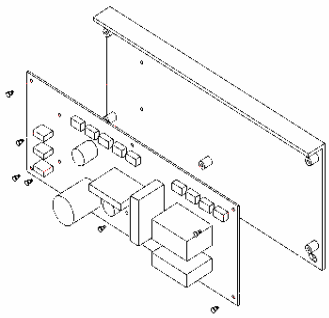


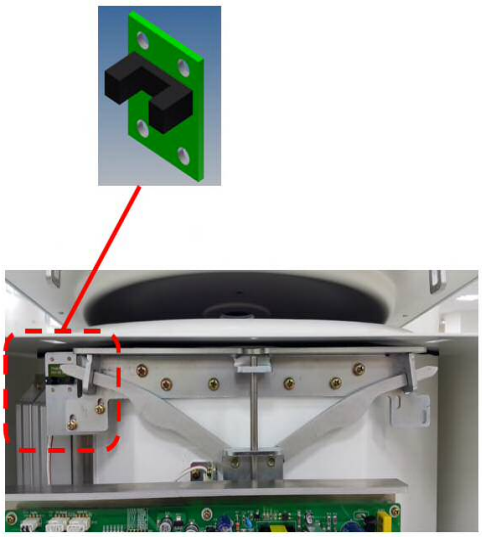
2) Detach the Main controller board.

<Ver 1>

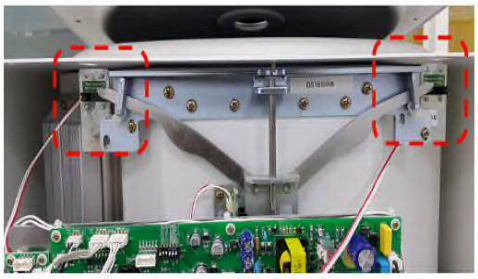


<Ver 2_220V_Elite PCB>

<Ver 2_110V_Smart PCB>



<Ver 1> (One Door Photo sensor)

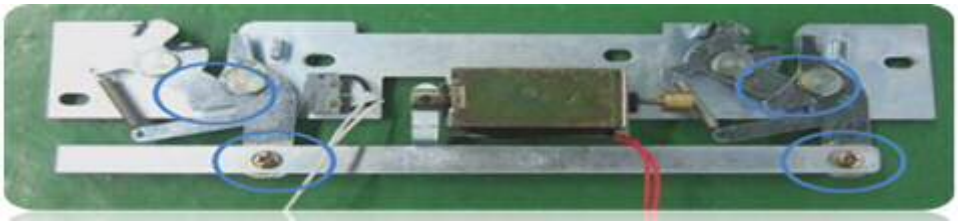


<Ver 2> (Two Door Photo Sensors)

4.2 Door Assembly and door lock assembly

1) Disassemble the connection pin of absorber.
2) Disassemble the 2 hinges that couple the door assy to the case top.
3) Disassemble the door assy from the device.

4) Disassemble the Door lock assy.



5) If needed, door sensor or solenoid can be replaced.
6) Apply grease to the blue circled area for its durability.

4.3 Motor assembly

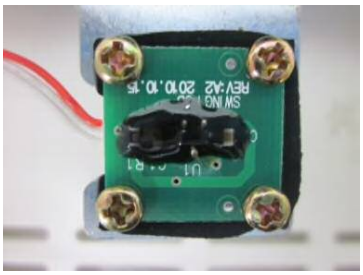
1) Remove 3 screws from the motor packing cover.
2) Remove cover and motor packing.
3) Remove 3 nuts from the motor assy.
4) Disconnect the Motor cable, motor Temp cable and RPM sensor cable.
5) Disassemble the motor assy




4.4 RPM Sensor assembly

1) Remove Motor cover and packing
2) Remove 3 screws on the RPM sensor holder assy.
3) Disconnect RPM sensor cable on the Main PCB.
4) Disassemble the RPM Sensor assembly.

4.5 Imbalance sensor assembly



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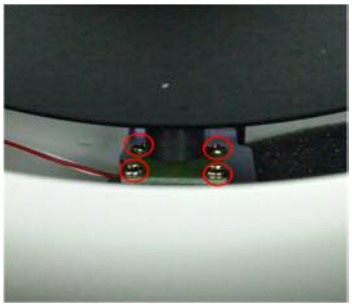


<Ver 2>

1) Remove the 2 screws from the below of the buttom plate.
2) Disassemble the imbalance sensor assy.
3) Remove the 4 screws on the sensor PCB.
4) Disassemble the imbalance sensor (Hall sensor).
5) In the case of adjusting the imbalance sensor, refer to 5.3

4.6 Motor Fan assembly

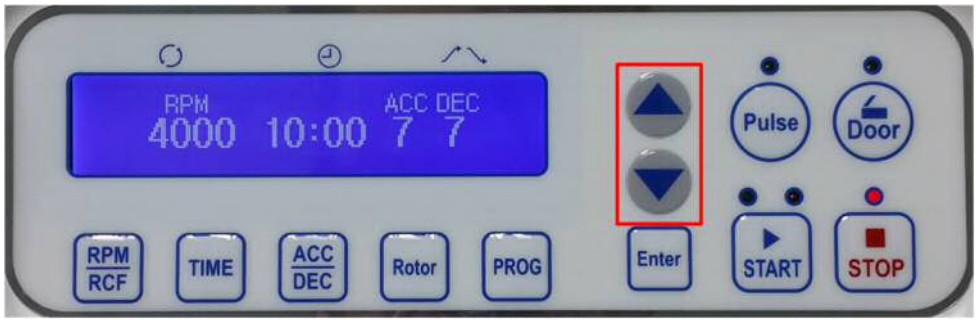
1) Remove the back panel.
2) Disassemble the Motor Fan assembly.

5. Service Mode and Adjustment

<Ver 1>

5.1 Transition into service mode

On the Control panel



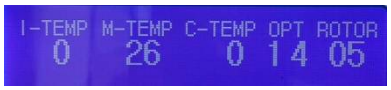
1) Power ON
2) Push the Down( ) key during 5 seconds.
3) When beep sounds push the Up( ) key

5.2 Handling values

1) Confirm the set values with Up/Down key.
   The numeric value on the FND varies by one. (refer to figure below)
2) Imbalance sensitivity can be adjusted by Up/Down key after press the Enter key.
   And it can be saved by press the Enter key.
3) Power off to return from service mode.

RPM(Set, Current), Frequency, Voltage ratio

Motor input, output, Hall IC distance, Ampere



Temp(Chamber, Motor), DIP switch, Rotor ID

Switch status, Main & Display SW version

Temperature offset

Imbalance sensitivity

Sum of motor running time

<Ver 2>

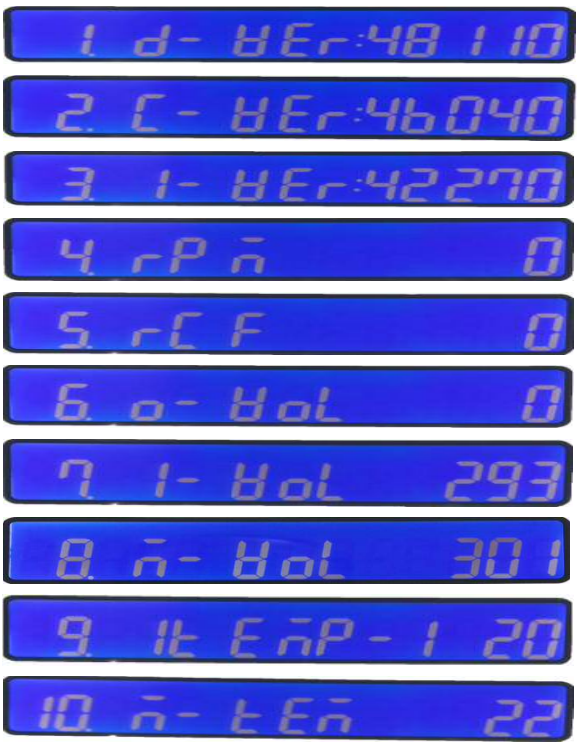
5.1 Transition into service mode

On the Control panel

1) Power ON
2) Push the (↵) key for 5 seconds until beep sound
3) When beep sounds push the (TIME) key (beginning of Service mode).

5.2 Handling values

1) Confirm the set values with (ACC / DEC or PROG) key.
2) Imbalance sensitivity can be adjusted by Numeric keypad and push the (↵) key to save
3) Push the (↵) key to return from service mode.



Display firmware version

Main board firmware version

I/O board firmware version

RPM

RCF

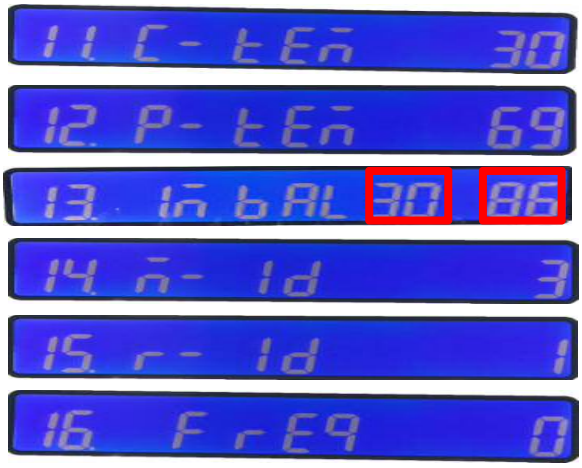
Voltage ratio

Input voltage

Motor voltage

Chamber Temp.(ad. Factor / present Temp)

Motor Temperature



Compressor Temperature

Main board Temperature

Imbalance(Tolerance value / Physical value)

Model ID

Rotor ID

Frequency value

5.3 Procedure for Imbalance adjustment

<Ver 1>

1) Press ( )or ( ) key **,as the picture below.**

- Displayed Value(ex.183) means **HALL i.e.** the physical distance status of the hall sensor.
- The normal value of imbalance sensor lies between 170 and 200. If it lies between 170 and 200, the sensor position is fine. The adjustment to align the sensor position is not needed.

2) Press ( )or ( ) key **,as the picture below.**

- Displayed Value(ex.25) means **Imbalance i.e. The tolerance of imbalance sensitivity window**
- Set the imbalance range to become (ex.183 +/- 25). If the distance of imbalance sensor goes over (ex.183 +/- 25), the sensor will make alarm for warning.
- **Increase Number:** to Lower sensitivity
- **Decrease Number:** to Higher sensitivity
- The values can be changed by pressing ( ) button to increase the value or ( ) button to decrease the value after press the Enter key.

3) Press 

key to save the value.

<Ver 2>

1) Press (ACC DEC or PROG) key **,as the picture below.**

- Displayed Value(ex.86) means **HALL i.e.** the physical distance status of the hall sensor.
- The normal value of imbalance sensor lies between 70 and 100.
  If it lies between 70 and 100, the sensor position is fine. The adjustment to align the sensor position is not needed.

2) Press (ACC DEC or PROG) key **,as the picture below.**

- Displayed Value(ex.30) means **Imbalance i.e. The tolerance of imbalance sensitivity window**
- Set the imbalance range to become (ex.86 +/- 30).
  If the distance of imbalance sensor goes over (ex.86 +/- 30),
  the sensor will make alarm for warning.
- **Increase Number:** to Lower sensitivity
- **Decrease Number:** to Higher sensitivity
- The values can be changed by pressing numeric keypad button to increase & decrease the value.

3) Press  key to save the value.

5.4 Door lock assembly adjustment

By some reason when the door does not fit, so it does not open or close normally, the Door lock ass'y can be adjusted.(position moved).

1) Detach the front panel.
2) loose the 5 screws that fix the Door lock assy.
3) Reposition the Door lock assy
4) Fasten the 5 screws.

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	• Failure of control firmware

	Device does not work at all	**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
E8	Rotor Imbalance *Rotor is not balanced around its center of rotation* *(E8 is issued always during the operation)*	• Device is not positioned on a flat, level, and vibration free surface **Corrective Action** • Relocate instrument to a flat, level, and vibration free surface. • Rotor is loaded with samples not evenly weighted symmetrically **Corrective Action** • Make sure that samples are evenly weighted and distributed symmetrically around the center of rotation. • Rotor is not securely attached to the shaft **Corrective Action** • Make sure the rotor and/or rotor lid is securely attached to the shaft. • Imbalance sensor is setup too sensitively **Corrective Action** • Test 1st time with imbalance distance between 170 and 200 and with imbalance range of 10. • Test 2nd time with imbalance range more than 10. • Refer to 6.3 for details. If E8 error is issued on 1st and not on 2nd test; • Imbalance sensor works normally. • Set the distance and range with the original value at the time of production.
E9	RPM sensor error *Rotor is not recognized and RPM data is lost.*	• Rotor is installed properly **Corrective Action** • Install the rotor as instructed in the manual • Make sure that rotor is aligned correctly. • Incorrect rotor is installed **Corrective Action** • Replace the rotor with correct one. • RPM sensor is defective or damaged. **Corrective Action** • Check if RPM value on the display If RPM value does not vary; • Replace RPM sensor with normal one.
E15	Motor Temperature error *Temperature of Motor goes too high*	• Temperature sensor is defective or damaged. **Corrective Action** • Measure the resistance value of temperature sensor. • Check if the value falls on 10,000Ω(10kΩ) at 25℃. If Temperature sensor is not normal; • Replace the sensor with normal one. • The temperature of compressor is over heated up. **Corrective Action** • Measure the resistance value of temperature sensor. • Replace the sensor with normal one.
E17	Communications Error	• Insecure communication arises among Main-Display-I/O. **Corrective Action** • Check the cable and the PCB.
E20	Door PhotoSensor error (Door-in 1)	• PhotoSensor of Door-in-1 is defective or damaged **Corrective Action** • Replace the Photo Sensor with normal one
E21	Door PhotoSensor error (Motor Close)	• Motor Close Photo Sensor is defective or damaged **Corrective Action** • Replace the Photo Sensor with normal one

E22	Door PhotoSensor error (Motor Open)	• Motor Open Photo Sensor is defective or damaged **Corrective Action** • Replace Motor Open Photo Sensor with normal one
E23	Door PhotoSensor error (Door-in 2)	• PhotoSensor of Door-in-2 is defective or damaged **Corrective Action** • Replace Motor Open Photo Sensor with normal one
E24	Door PhotoSensor error (Motor close & open)(1)	• Motor Close & Open Photo Sensor are sensed at the same time **Corrective Action** • Replace defective or damaged Photo Sensor with normal one
E25	Door PhotoSensor error (Motor close & open)(2)	• Motor Close & Open Photo Sensor are not sensed at the same time **Corrective Action** • Replace defective or damaged Photo Sensor with normal one
E26	Door PhotoSensor error (Motor open & Door In)(1)	• Door-in Photo Sensor is sensed while Motor Open Photo Sensor is being sensed **Corrective Action** • Replace defective or damaged Photo Sensor with normal one
E27	Door PhotoSensor error (Motor open & Door In)(2)	• Door-in Photo Sensor is not sensed while Motor Close Photo Sensor is being sensed **Corrective Action** • Replace defective or damaged Photo Sensor with normal one

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** Perform the recommended corrective action as listed in E8.

7. Maintenance

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.

7.2.2 Validation of Motor Performance

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

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

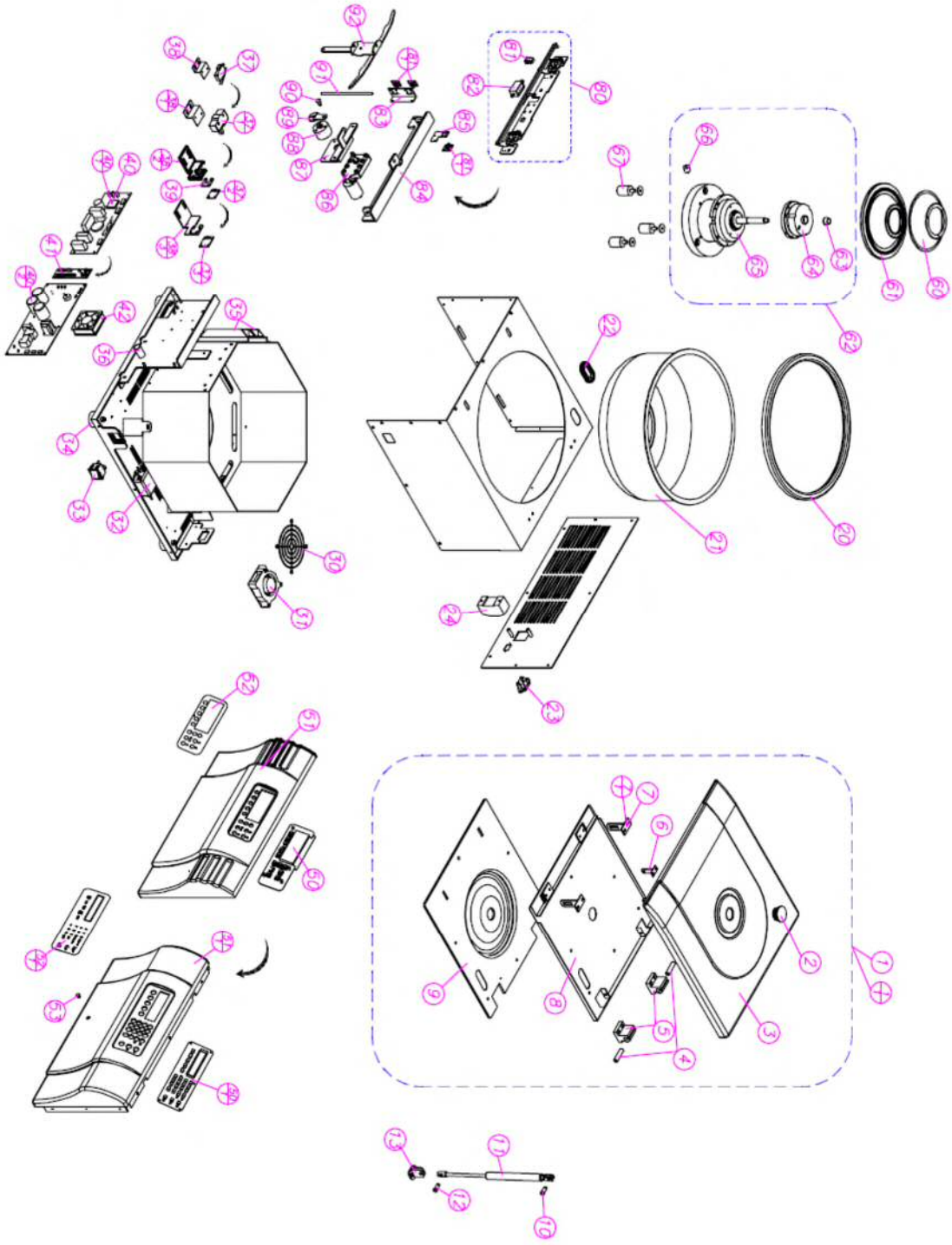
Measuring method

1) Use 'Multimeter tester' tool
2) Place the tool at the resistance location
3) Check the resistance value at u-v, u-w, v-w with tester lead
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%.

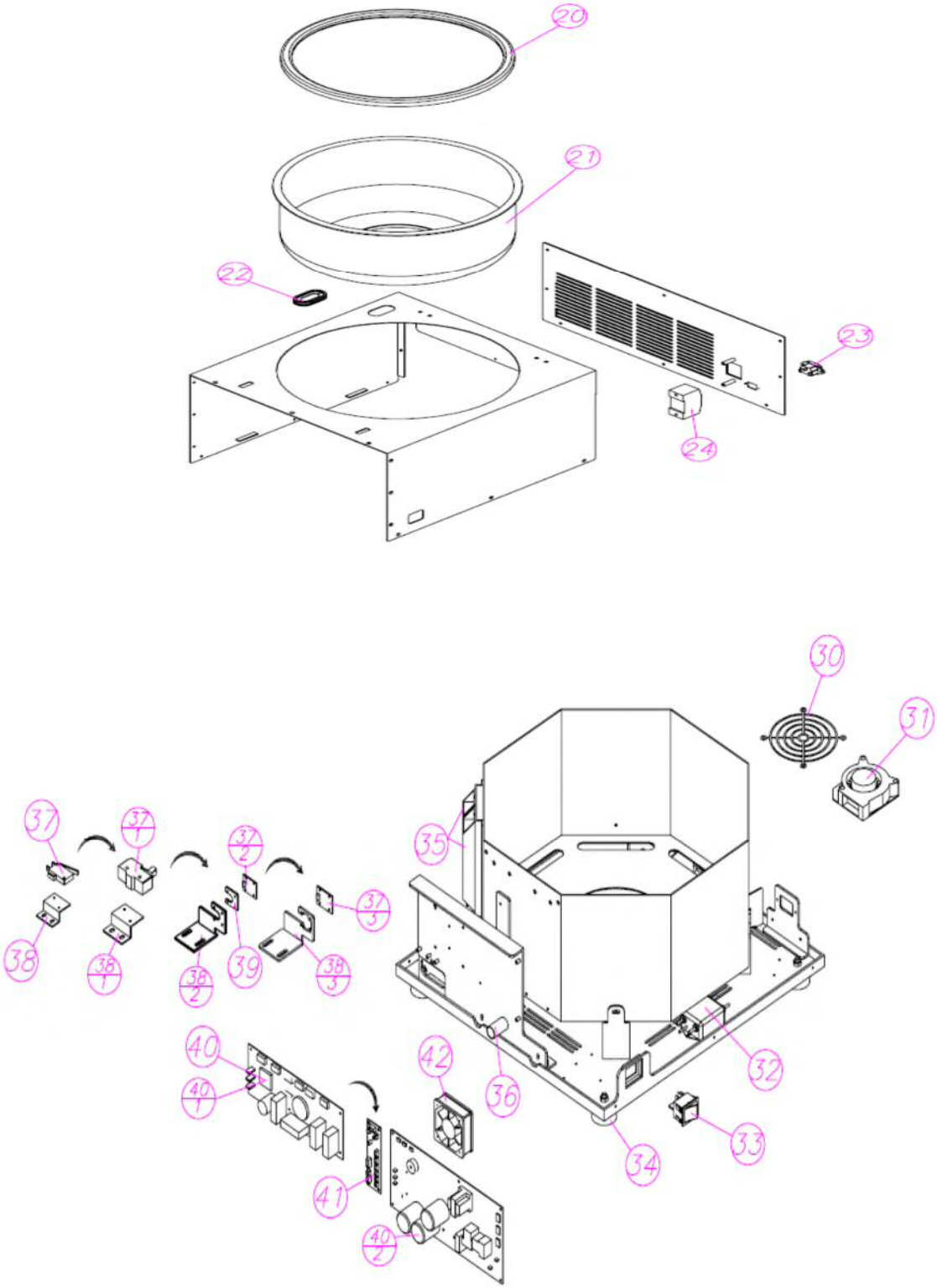
8. Parts Information

8.1 Assembly Drawing

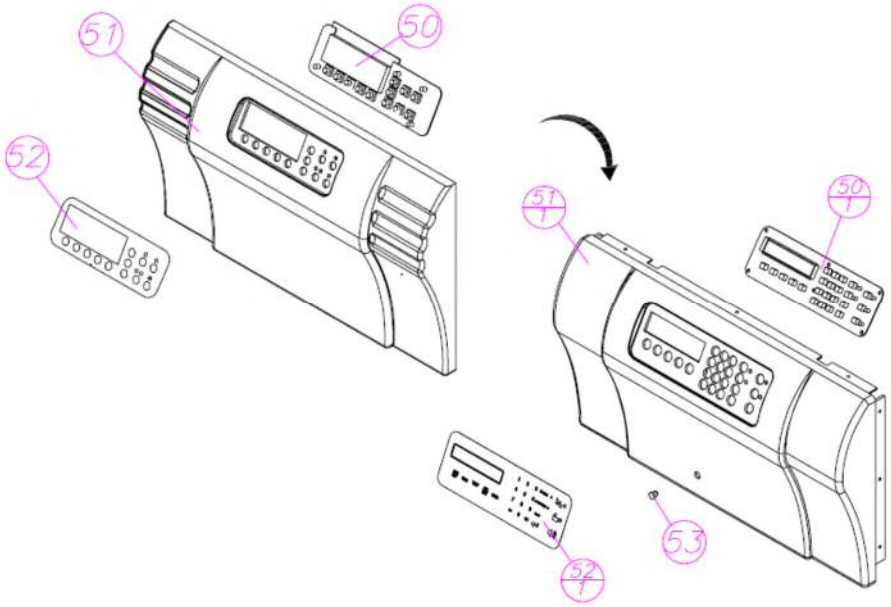
1) All parts

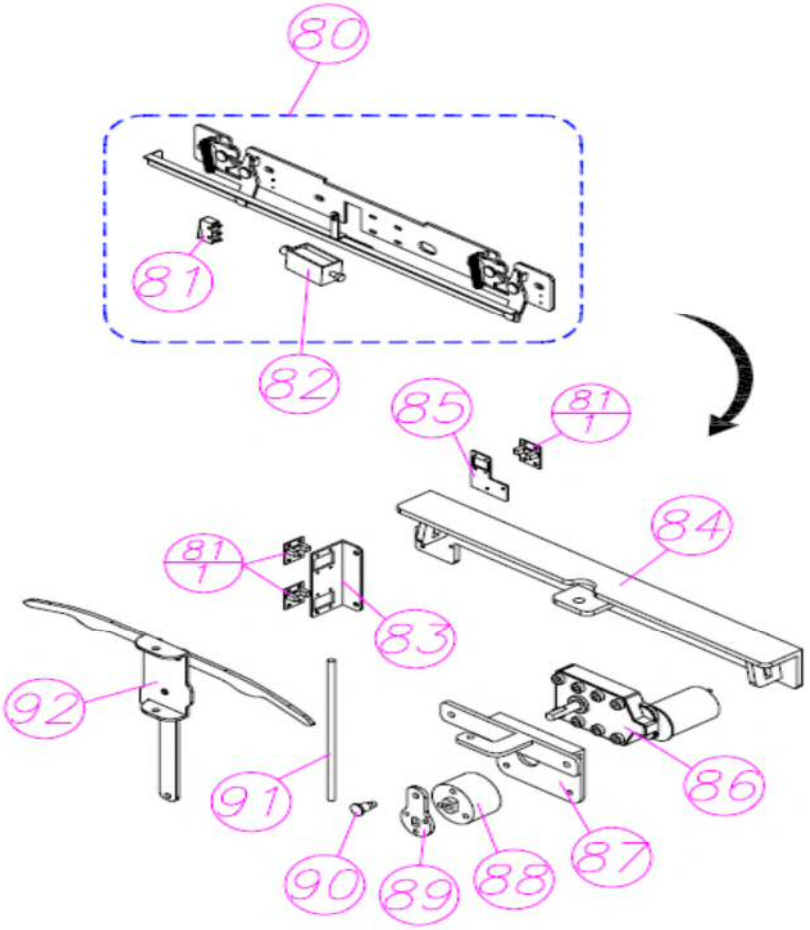


2) Top & Bottom Case

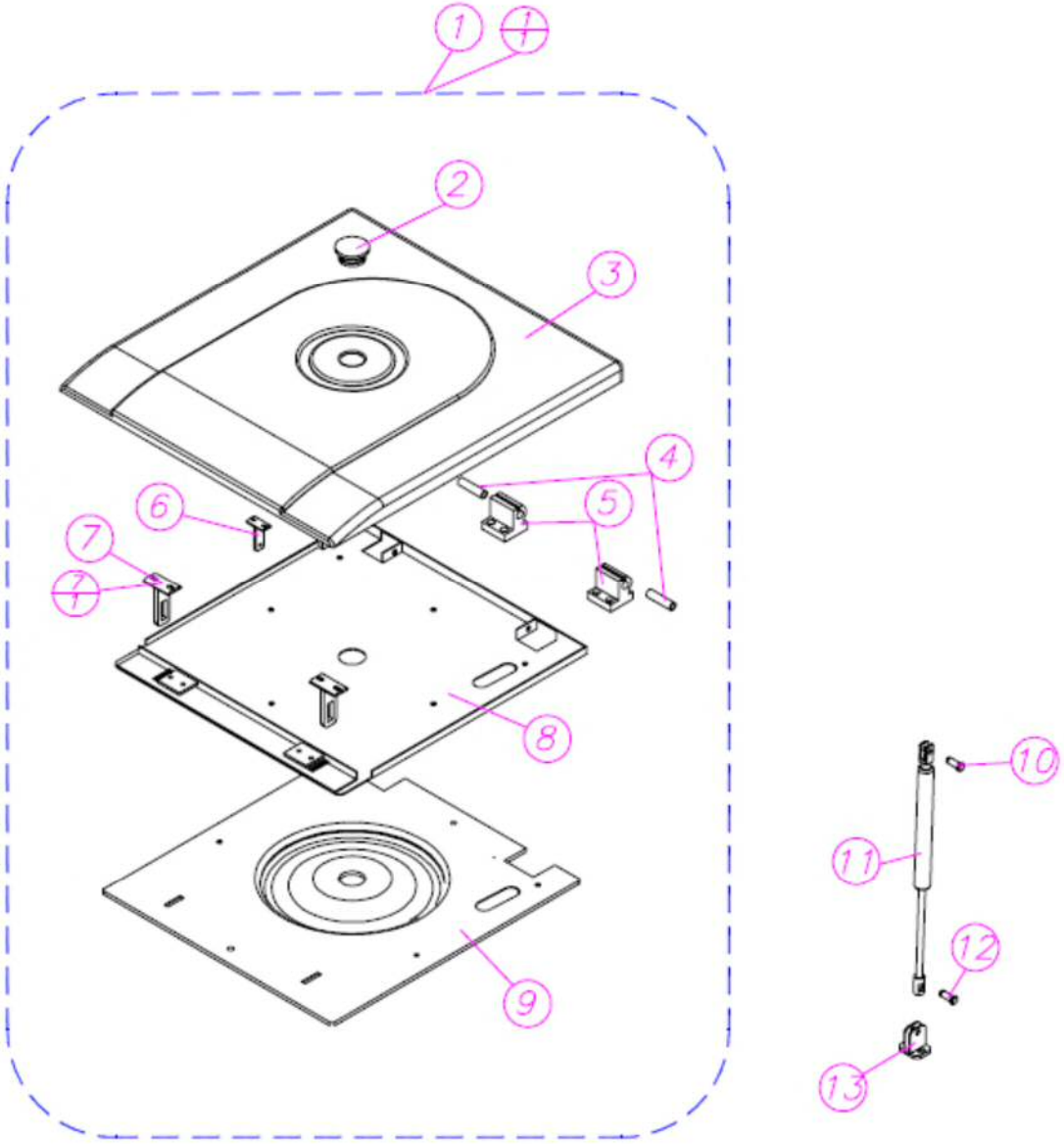


3) Front Panel & Door lock

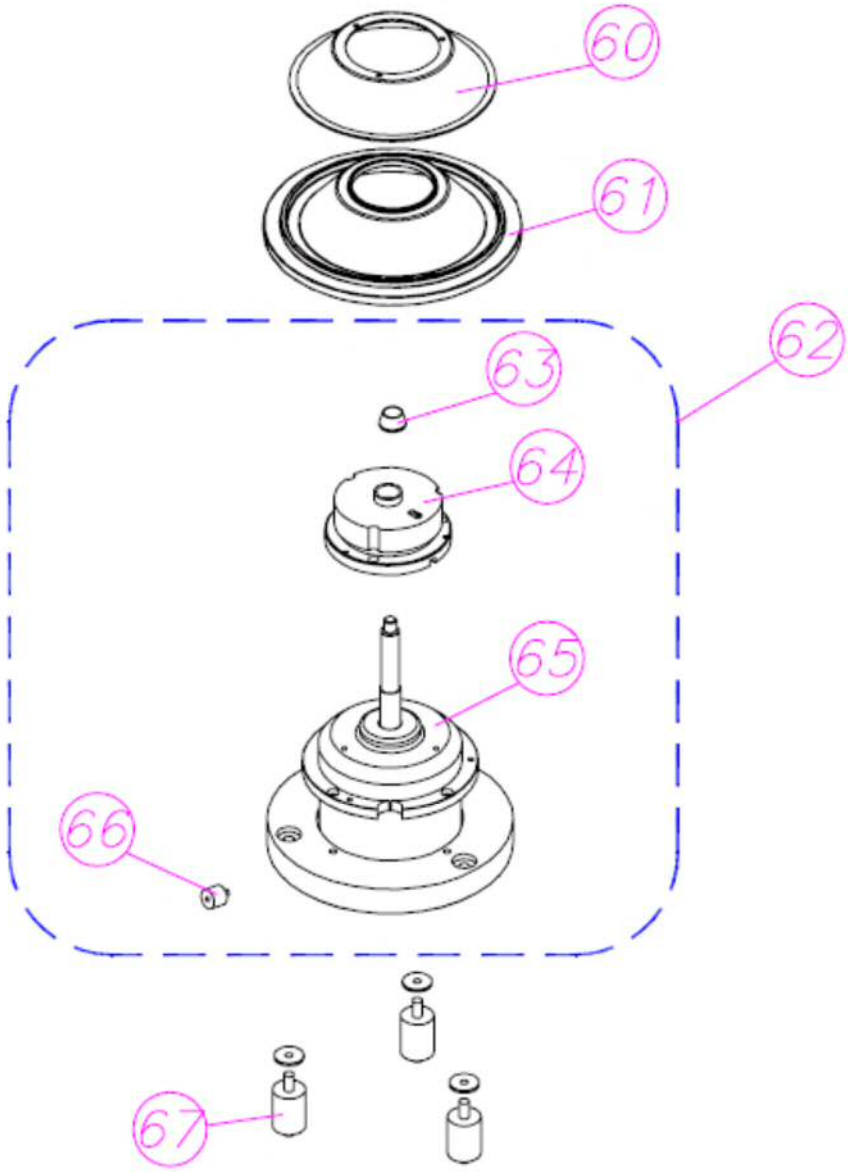




4) Door



5) Motor



8.2 Part List

No	Part No.	Part Name
1	C07DR90100-00	Door Ass'y
1-1	C07DR90100-01	Door Ass'y(for Auto Door Lock)
2	C99DR00420-03	Center window
3	C04DR00132-00	Door(TOP)-1580R
4	C03DR04420-02	Hinge pin
5	C03DR00623-00	Hinge
6	C99DR13020-01	Door stopper load
7	C07DR00520-01	Striker(58mm)
7-1	C06DR00520-01	Striker(68mm)
8	C07DR00232-02	Door(MIDDLE)-1580
9	C07DR00332-02	Door(BOTTOM)-1580
10	C99DR04020-00	Door stopper pin (Top)
11	C06DR81000-00	Door Stopper(28kgf)
12	C99DR04120-00	Door stopper pin (Bottom)
13	C99DR01133-00	Door stopper BK (Bottom)
20	C07RB00220-00	Packing(Chamber)-1580
21	C07CH00134-01	Chamber -1580
22	C99RB00420-01	Packing (Door stopper)
23	C04EL90900-00	Power socket
24	C04EL01010-02	Earth Leakage Circuit Breaker (ELCB)
30	V01CS04610-00	Guard 120mm(Motor)
31	C04EL06310-00	Fan(Motor)-220V
	C04EL06210-00	Fan(Motor) - 110V
32	C02EL01110-02	Noise Filter
33	C99EL00610-00	Power switch
34	C03RB00820-01	Rubber Foot
35	C04EL04110-00	Damping resistor
36	C07DR10324-00	Tool Guide
37	G1103230	Imbalance sensor ass'y
37-1	C06EL02910-00	Imbalance Sensor Ass'y
37-2	C99BD00720-01	Imbalance Sensor(PCB A2)
37-3	C99BD00720-02	Imbalance Sensor(PCB A3)
38	G3103220	Imbalance Bracket
38-1	C04CS02633-00	Imbalance Bracket

38-2	C03CS02633-02	Imbalance Bracket(for PCB A2)
38-3	C03CS02633-03	Imbalance Bracket(for PCB A3)
39	C99RB00520-00	Insulator rubber for Imbalance
40	C04BD00120-00	Main Board Ass`y-1580R(A8)
40-1	C04BD00120-02	Main Board Ass`y-1580R(A2)
40-2	C15BD00120-00	Main Board-elite-220V
	C04BD00120-03	Main Board Ass`y-1580RG(Smart)-110V
41	C15BD01420-00	I/O Board
42	V03EL06710-00	Fan(Board)-220
	V03EL06610-00	Fan(Board)-110
50	C02BD00220-02	Display Board Ass`y
50-1	C04BD00220-01	Display Board Ass`y
51	C07CS00332-02	Case(Front)(1580)
51-1	C07CS00332-03	Case(Front)(1580)
52	C03CS04020-00	Overlay-1248
52-1	C03CS00320-01	Overlay
53	C04RB00720-00	Emergency cap-1580R
60	C04CS02120-01	Cover(Motor Packing)-1580R
61	C04RB00320-00	Packing(Motor)-1580R
62	C04MT90200-01	Final Motor Ass'y-(220V)
	C04MT90100-01	Final Motor Ass'y-(110V)
63	C03MT02120-00	Shaft Hub
64	C04MT80700-01	RPM sensor holder ASS'Y-1580R
65	C04MT80200-00	Motor Ass`y(220V)-1580R
	C04MT80100-00	Motor Ass`y(110V)-1580R
66	C99RB00620-00	Magnet for Imbalance sensor
67	C03RB00120-01	Anti-vibration Damper
80	C04DR90100-00	DOOR LOCK ASS'Y(110V)-1580/R
	C04DR90200-00	DOOR LOCK ASS'Y(220V)-1580/R
81	C03EL90100-00	Door sensor
81-1	C15BD01520-00	Photo sensor(PCB) for Lid
82	C99EL03020-00	Solenoid-110
	C99EL03120-00	Solenoid-220
83	C04DR01933-01	Close/Open(PCB) bracket for Lid
84	C04DR00733-04	Latch Fixed bracket

85	C04DR03433-01	Bracket(Door sensor(PCB))
86	C04EL09010-00	DC Gear Motor
87	C04DR01833-00	Geared Motor bracket
88	C04DR02120-00	Spindle for Geared Motor
89	C04DR01733-00	Spindle bracket
90	C04DR04320-00	Pin for Spindle bracket
91	C04DR03320-00	Road
92	C04DR95000-01	Latch Ass'y for Photo sensor(PCB)