SCANSPEED

SERVICE MANUAL

Multi-Purpose, High-Speed Centrifuge

ScanSpeed Model 1236R

Date : 19.01.2017
Cat. No. : 7.638.515.801

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 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.
  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 a motor, 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 Positioning

Rigid and flat place

On the declined place the weight of rotor can make the shaft warp in the long time running.

Air circulation

Smooth air circulation is needed to increase the cooling effect. So the space between the device and wall should be larger than 12 inch(30cm). And dust should be kept away for it can prevent air from flowing smoothly.

Temperature and humidity

In the condition that temperature is too high, the cooling function cannot work effectively. And in that too low, the electric parts can work unusually. And it that humidity is too high, rotor can rust and electric part can get dew which invokes disorder.

Corrosive gas

Rotor and shaft can be corroded by some kind of gas such as Chlorine gas or sulfurous acid gas. So this kind of gas should be kept out.

2.2 Leveling

The target place should be confirmed to be leveled by leveling bar.

2.3 Installation procedure

1) Unpacking

- Untie the plastic banding over the paper box and get lid of box from the device main body
- Unwrap the vinyl coat surrounding the main body and remove stuffing cushion from chamber
- Place the device on a proper place by moving device's wheel

2) Delivery Check

- Rotor(Optional)
- Rotor lid open/close tool(with an order of large capacity & Fixed Angle rotors)

- Main Product

Main body

Rotor locking Tool

Balancing level

Wheel spanner

AC Power Cable

Emergency door open Tool

User's manual

Lubricant(grease)

3) Electricity Check

- 1236R model needs 110V or 220V voltage. Connect the device to adequate power outlet.
- If the voltage 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 recommend to use AVR(Automatic Voltage Regulator)
- If you want to use the device under the other voltage range, please contact us for safe usage

4) Removal of Safety Padding

1236R is delivered with its chamber filled with safety padding. As the 1236R has the rotor auto-recognition function, the system unnecessarily tries to identify a rotor if you turn on the power before fixing a rotor. In this case an error signal is issued because of absence of the rotor. When this error appears, press 'Enter' button at the control panel and then press 'DOOR' button to open the door. Mount/re-mount the rotor and press 'START' button to recognize the rotor again.

5) Power on and opening door

- Turn on the device by the switch on the right side of the machine.
- Press the 'Door' button to open the door.

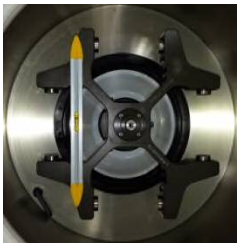
If it does not work (door not open), use the emergency door open tool (as the figure)

<Ver 1>

<Ver 2>

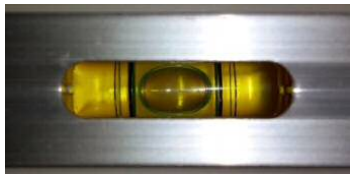
6) Balance Adjustment

The imbalance of the machine causes not only momentary troubles of vibration, noise and error during operation but also ultimate damage on the device.
The following steps are recommended to check the balance status of a rotor with a balancing level tool included.



Mount the rotor and place the balancing level crisscross pattern on Rotor.

Confirm that air bubble of windows of the balancing level are within the black lines.



To adjust the balance status, rotate the red colored ring at the 4 wheel caster clockwise or counterclockwise until the device is well balanced.

7) Rotor assembling and disassembling

- To assemble a rotor, mount the proper rotor onto the motor shaft.
- Grasp the rotor with one hand, and put the rotor locking tool into the central groove of the rotor. Finally rotate the tool clockwise until tightly assembled.
- To disassemble the rotor, rotate the rotor locking tool counterclockwise.
- To open or close the rotor lid, grasp the rotor with one hand and rotate the rotor lid nut counterclockwise for opening, and clockwise for closing with the other hand.

3. Device Information

3.1 Special qualities

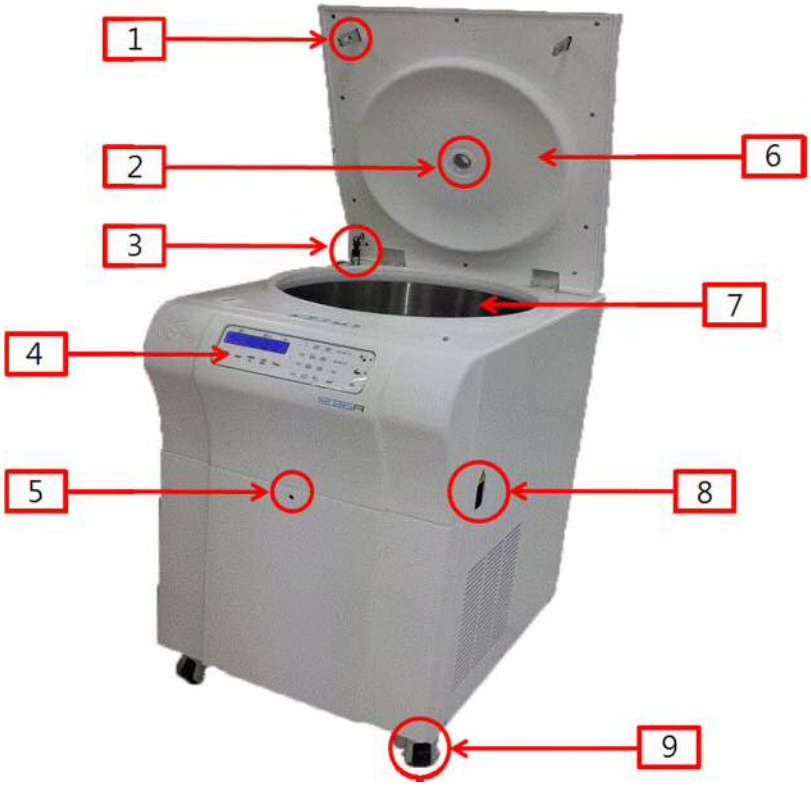
- High safety and low noise
- Wide range of Tube capacity from 0.2㎖ to 6x85㎖
- Simultaneous display of rpm and rcf speed
- Rotor ID recognition whenever operated in such mode as START, PULSE and FAST COOL.
- 9 acceleration and 9 deceleration levels with additional gravity(natural) deceleration
- Memory function available to 100 programs
- Automatic alarm for imbalances, door open & temperature error
- Environment friendly AC induction motor and R404a refrigerant
- Mounted on lockable and level-adjustable casters

3.2 Technical Specifications

	Fixed-Angle Rotor / Swing-out Rotor
Max. RPM	12,000 rpm / 5,000 rpm
Max. RCF	16,582 x g / 5,394 x g
Max. capacity	6 x 85㎖ / 4 x 250㎖
Control	Microprocessor controlled
Range of temperature setting	-20℃ to 40℃
Run time	timed < 10 hr, or continuous
Noise level	≤60 dB
Acceleration levels	9 ramps from 1 to 9
Deceleration levels	10 ramps from 0 to 9 additional zero setting for natural deceleration
Display	LCD
Rotor Identification	Automatic
Imbalance cutout	Yes
Safety lid lock	Yes
Lid drop protection	Yes
Power & Frequency	AC220V (110V optional), 50~60Hz
Power Requirement	2,500 VA
Dimension (WxDxH) mm	473 x 600 x 840
Weight without rotor	110 Kg (main body only)
CE Certification	Yes

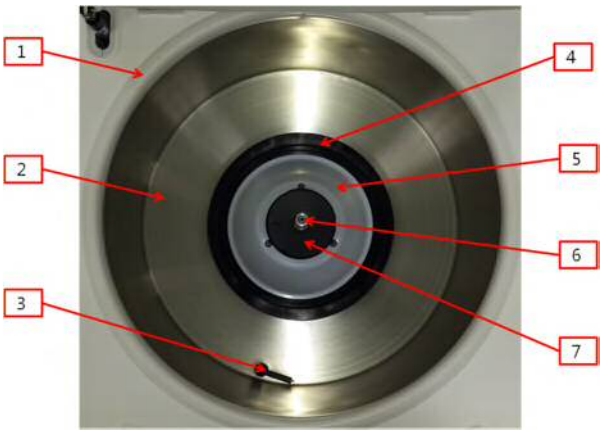
3.3 Outer Description

1) External parts



1	Striker	6	Door assembly
2	Center window	7	Chamber
3	Door stopper	8	Power switch
4	Control Panel	9	Wheel caster
5	Emergency door open hole		

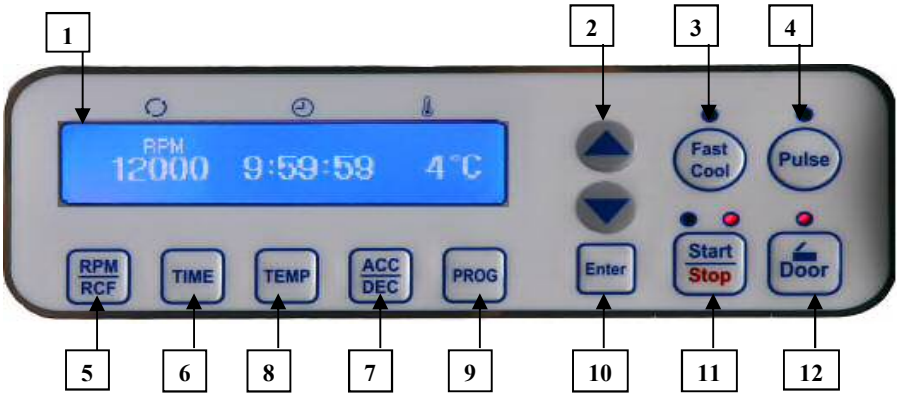
2) Chamber parts



1	Chamber packing
2	Chamber
3	Temperature Sensor assy
4	Motor packing
5	Cover(motor packing)
6	Motor shaft
7	RPM Sensor holder assy

3.4 Operating Function of Control Panel

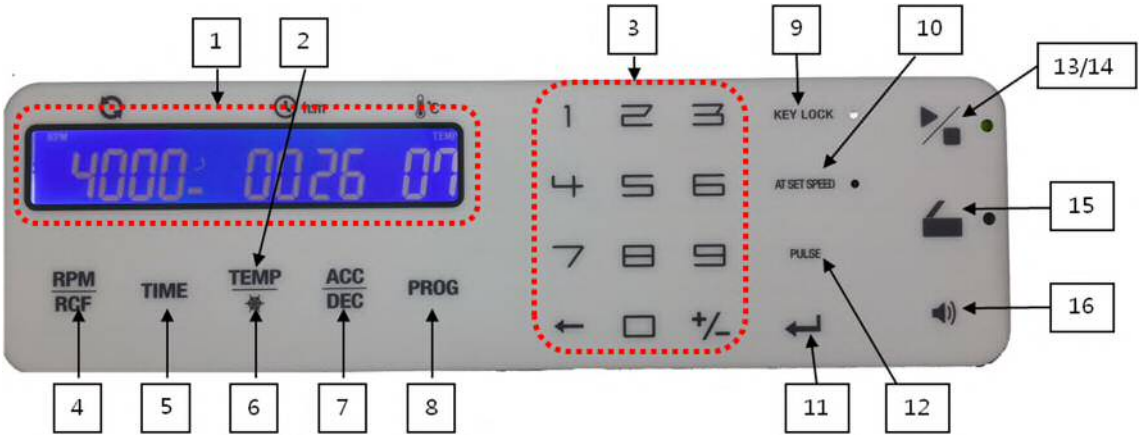
<Ver 1>



1) Display LCD: to show the RPM/RCF,TIME,TEMPERATURE display
2) Up & down arrow: Uses to change input data.
3) Fast Cool: for high-speed refrigeration up to the set temperature
4) Pulse: for quick and short running
5) RPM/RCF: to switch the RPM/RCF display
6) TIME: to set test time up to 9 hr 59 min 59 sec (0:00:00 continuous)
7) ACC/DEC: for setting the acceleration & deceleration level from 1 to 9 steps. '0' step means natural gravity acc/dec, and increasing numbers mean faster speed
8) TEMP: for setting temperature
9) PROG: to save a set of setting values or call the saved setting values
10) Enter: for the completion of data setting
11) START/STOP: Uses to start & stop operation.
12) Door: to open the door.

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

<Ver 2>



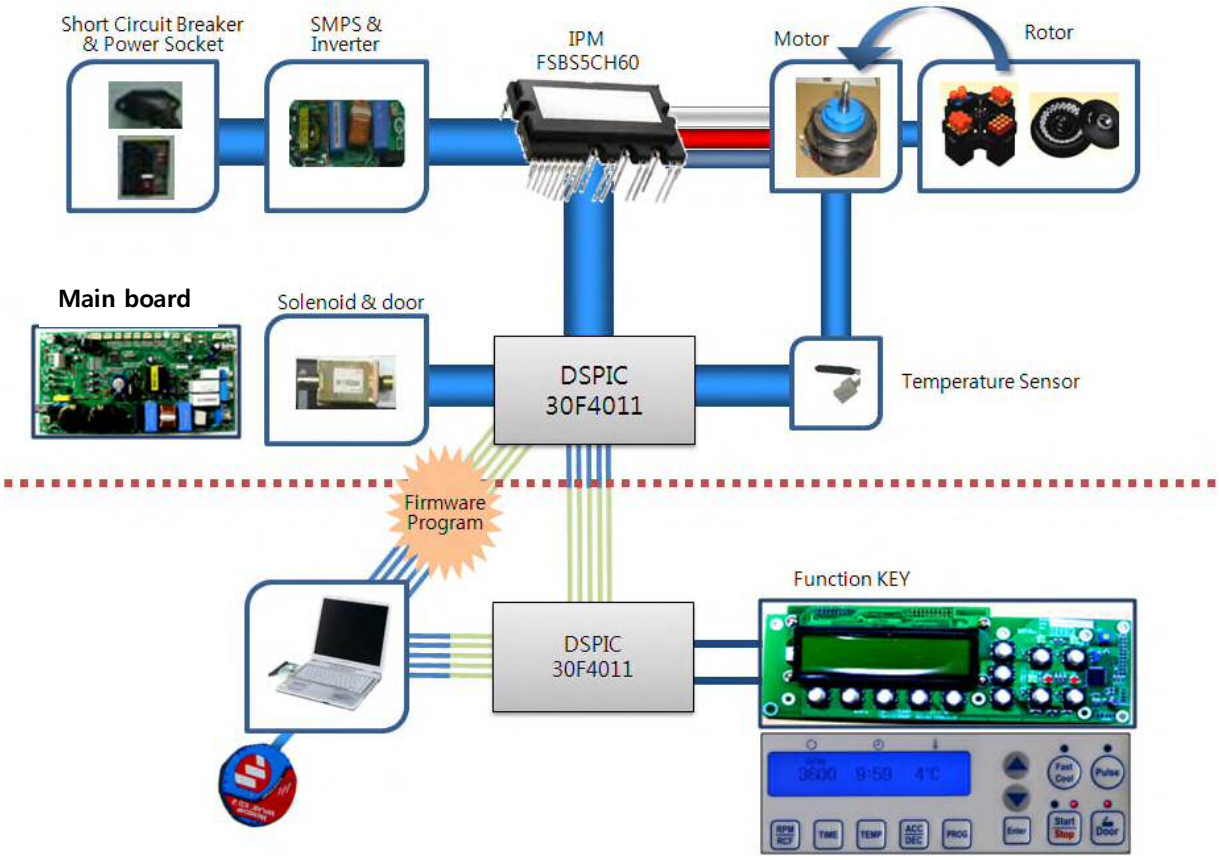
1. Display LCD : shows the data of each setting(RPM, RCF, Time, Temp, Acc/Dec, Program)
2. TEMP : used to set test temperature
3. Numeric keypad : used to change(increase/decrease) the input data
4. RPM/RCF : used for switching RPM/RCF
5. TIME : used to set test time up to 9 hour 59 min (0:00, continuous)
6. Fast Cool( ) : used to refrigerate at high rate down to the setting temperature.
7. ACC/DEC : used to set the acceleration (deceleration) level from 1(0) to 9 steps. '0' step means natural dec level. The bigger the number, the higher the acc/dec speed.
8. PROG : used to save or call the preserved setting values.
9. KEY LOCK : used to lock the button
10. AT SET SPEED : used to counts the run time once the actual run speed reaches to the set speed value.
11. Enter( ): used to fix and save a setting value.
12. PULSE : used to accelerate to set RPM once and decelerate rapidly.

13/14. Start/Stop( ) : used to start/stop device operation.

15. Door( ) : used to open the door.
16. Beep( ) : used to set the beep sound.

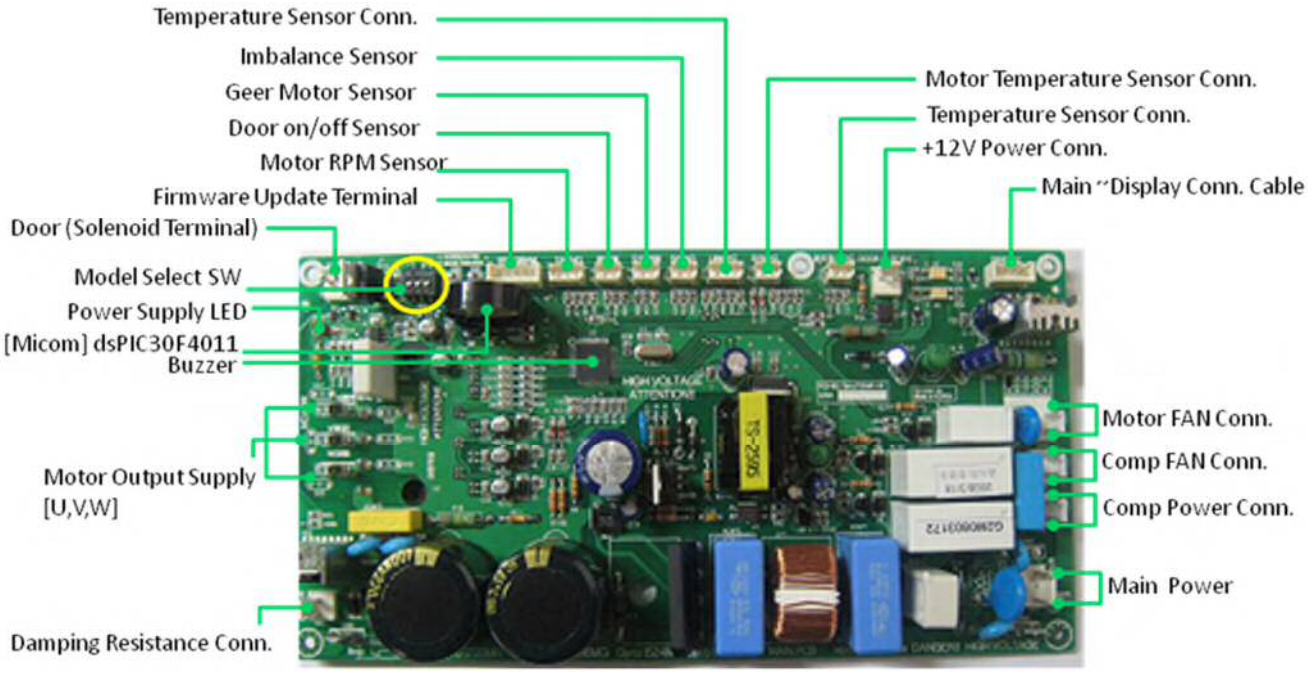
3.5 Operating System

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 Control Board

<Ver 1>



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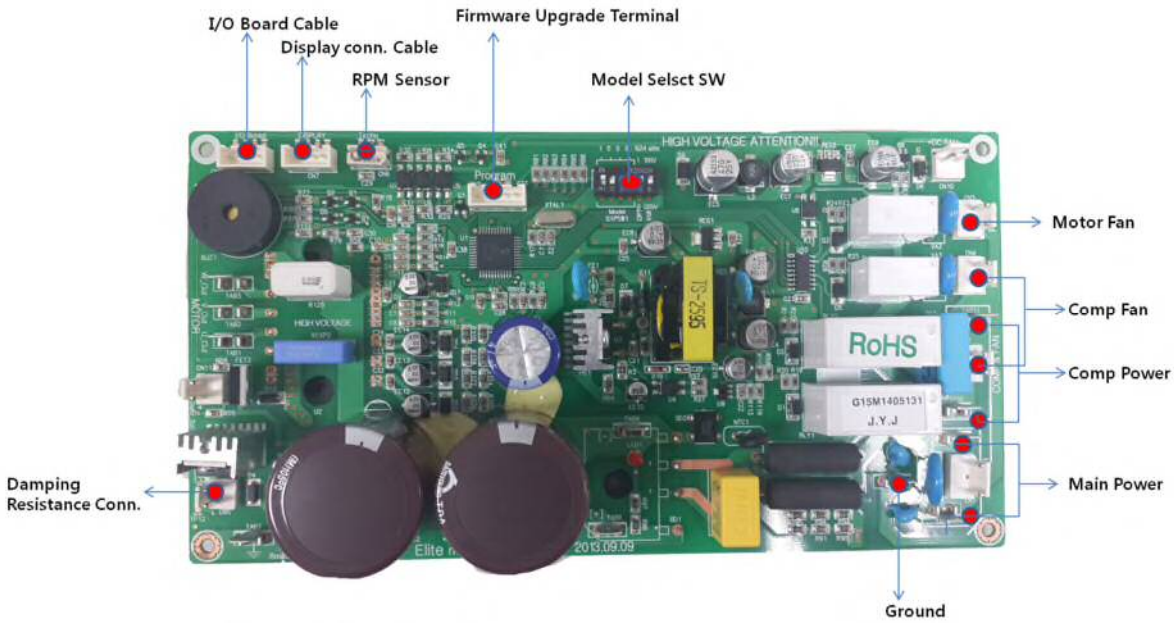
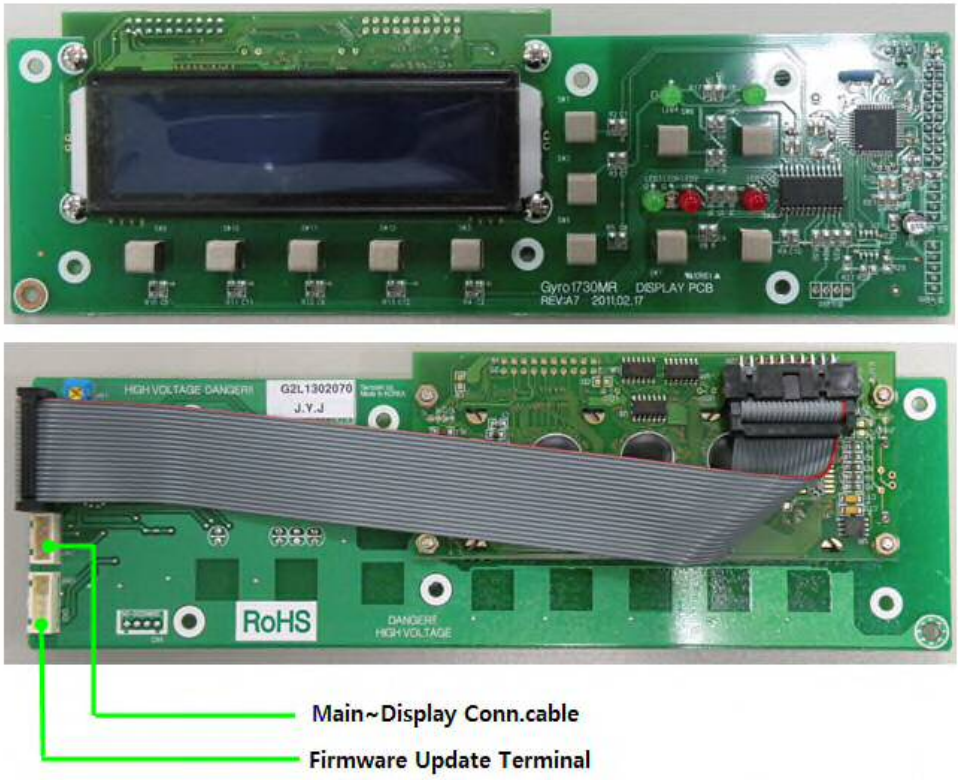


3.7 Display Control Board

<Ver 1>



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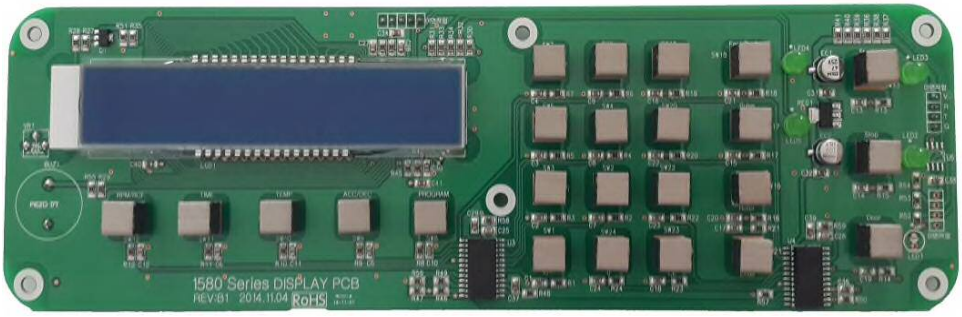
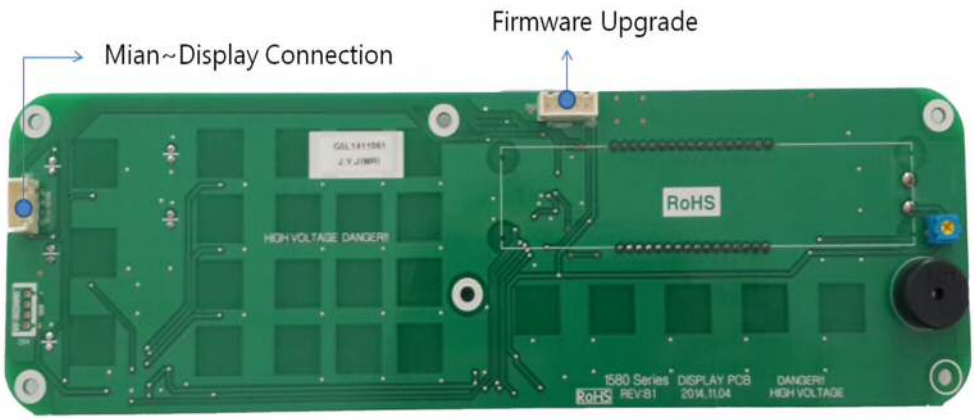
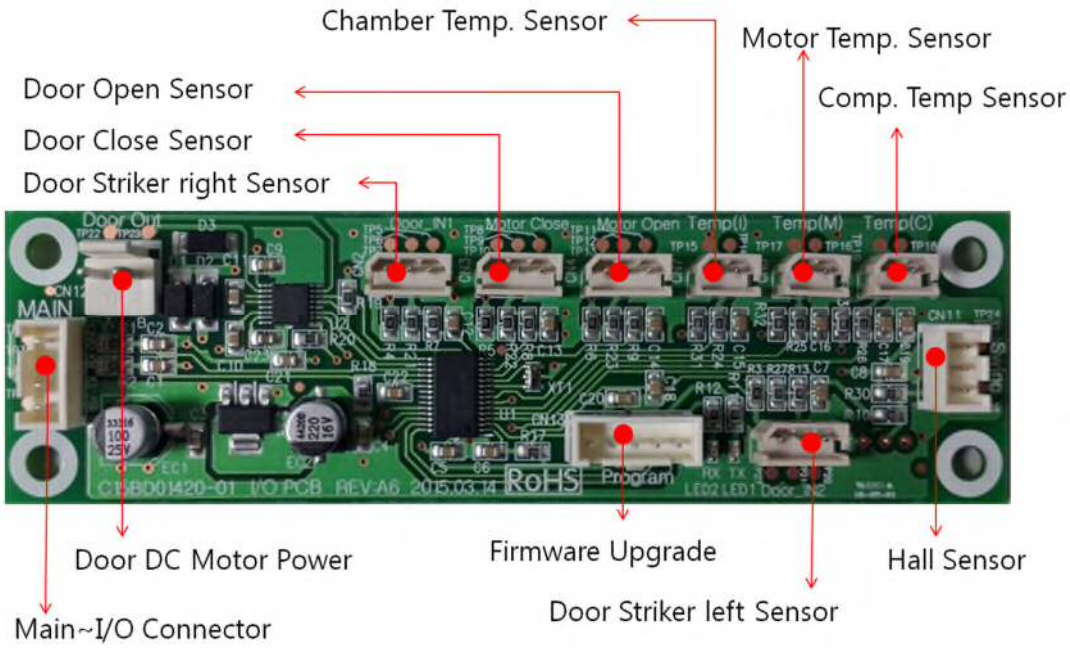


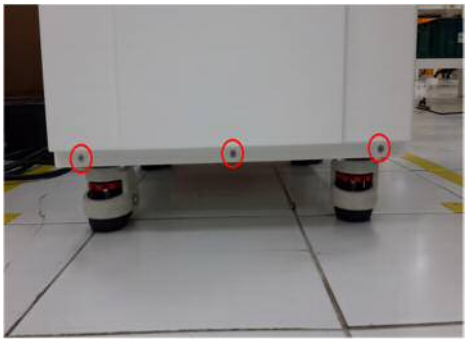


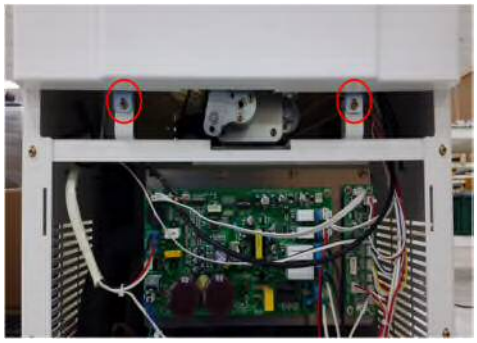
3.8 I/O Board

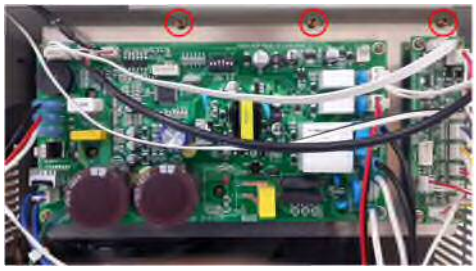

Chamber Temp. Sensor
Motor Temp. Sensor
Door Open Sensor
Comp. Temp Sensor
Door Close Sensor
Door Striker right Sensor
Door DC Motor Power
Firmware Upgrade
Hall Sensor
Main~I/O Connector
Door Striker left Sensor

4. Disassembly

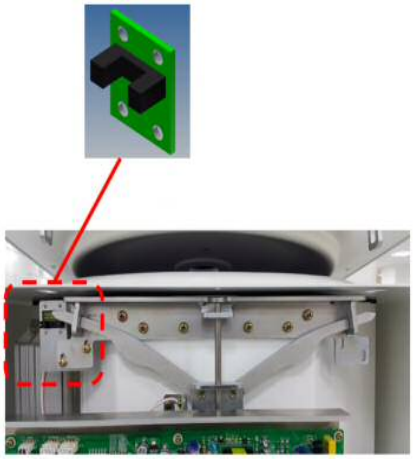
4.1 Front panel and controller board



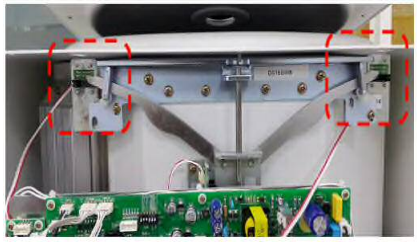




1) Remove 3 screws at the front bottom Case.
2) Detach the front bottom case pushing Down.
3) Detach all of the connector from Board(be sure to make a mark of position).
4) Remove 2 screws and detach the front case pushing Up.
5) Detach the main controller board and I/O board from the device.
6) If needed, the board bracket can be removed.



<Ver 1> (One Door Photo sensor)



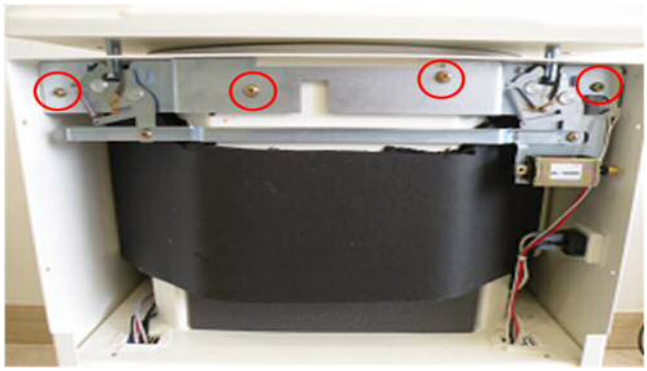
<Ver 2> (Two Door Photo Sensors)

4.2 Door Assembly

1) Remove the E-ring and the door stopper pin at the Door stopper.
2) Remove 4 ea of M6x10 screws at the 2 hinges of the door assy.
3) Detach the door assy from the device.
4) If needed, the 2 hinges can be detached.

4.3 Door Lock Assembly

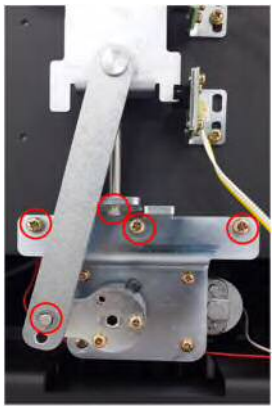
<Ver 1>

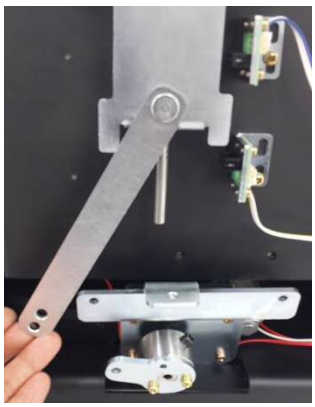


1) Detach the connectors of solenoid and door sensor from the main board.
2) Remove 4 screws at the door lock assembly
3) If needed, door sensor or solenoid can be replaced.

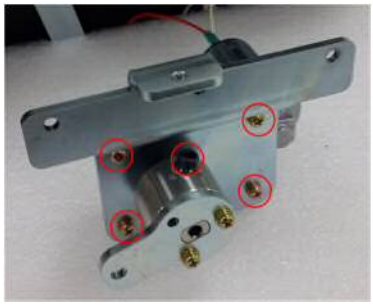
4.4 DC gear Motor Assembly

<Ver 2>





1) Remove 5 screws at the door lock assy.



2) Remove 5 screws at the geared Motor bracket.

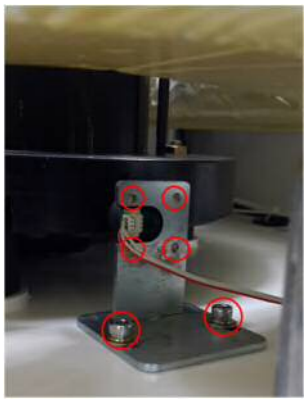
4.5 Motor assembly and Anti-vibration rubber





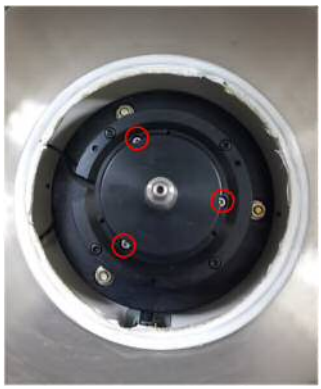

1) Remove 3 screws at the motor cover.
2) Remove the motor cover, motor packng and motor insulator.
3) Remove 3 nuts at the motor assy.
4) Detach the motor cable, motor GND cable and motor Temp/rpm sensor cable at the PCB.
5) Detach the motor assembly.
6) If needed, the Anti-vibration rubber can be replaced.

4.6 Imbalance sensor assembly



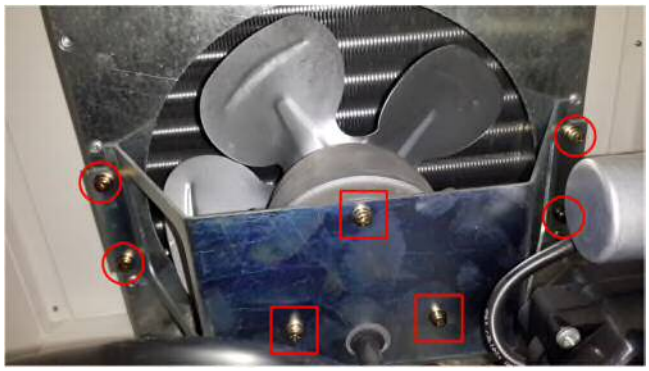
1) Remove 2 ea of wrench bolts.
2) Detach the imbalance sensor bracket assy.
3) Remove 4 ea of screws on the bracket.
4) Detach the imbalance sensor(Hall sensor) PCB.
5) In the case of adjusting the imbalance sensor, refer to 5.3

4.7 RPM sensor assembly



1) Detach the shaft Hub from the motor assy.
2) Remove 3 ea of wrench bolts on the RPM sensor holder assy.
3) Remove the RPM sensor connector on the PCB.
4) Detach the RPM sensor holder assy from motor assy.

4.8 Compressor Fan



1) Remove the front panel.
2) Remove 4 screws at the fan bracket(red circle).
3) Remove 3 screws at the fan(red rectangle)
4) Detach the Compressor fan.

4.9 Motor Fan

1) Remove 11 screws at the back panel.
2) Remove 2 screws at the motor fan bracket.
3) Detach the Motor fan.

5. Service Mode and Adjustment

<Ver 1>

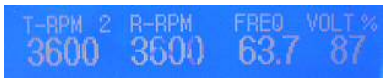
5.1 Transition into service mode

On the Control panel

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

5.2 Handling values

1) Confirm the set values with Up/Down key.
2) Imbalance sensitivity can be adjusted by Up/Down key and push the Enter key to save
3) Power off to return from service mode.



RPM(Set Current),Frequncy,Voltage ratio

Motor input/output Voltage,Curent,Hall IC distance

Temperature(Chamber,Motor,Cooling unit,Dip/Sw set value, Rotor ID No.

Status of switches(ON/OFF),Main/Display program version

Temperature adjust

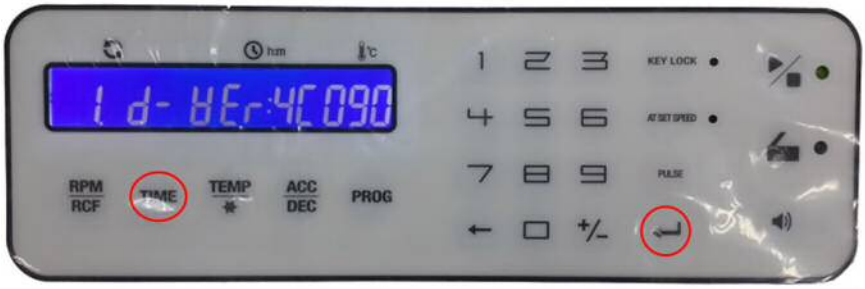
Imbalance error range

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

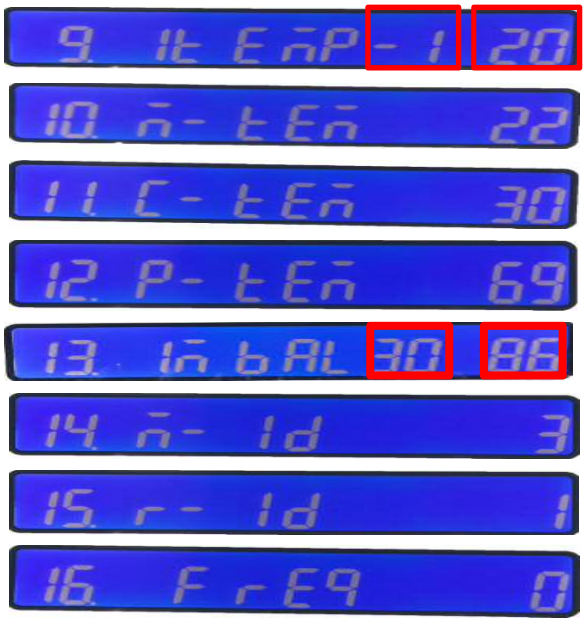
RPM

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.187) 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.10) means **Imbalance i.e. The tolerance of imbalance sensitivity window**
- Set the imbalance range to become (ex.187 +/- 31). If the distance of imbalance sensor goes over (ex.187 +/- 31), 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.

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.

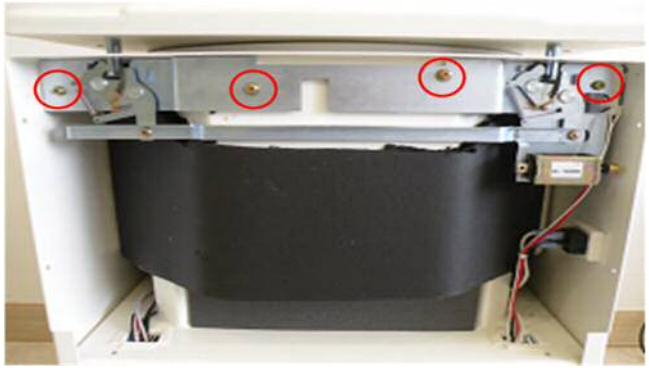
2) Press (ACC DEC or PROG) key **,as the picture below.**

- 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 ass'y 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) Loosen the 4 screws fixing the Door lock assy(red circle).
3) Reposition the Door lock assy
4) Fasten the 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 *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
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.
E16	Comp. Temp. sensor error	• 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 tests for centrifuges

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	*Model*	*U*	*V*	*W*
750watt	1236R	White	Red	Black

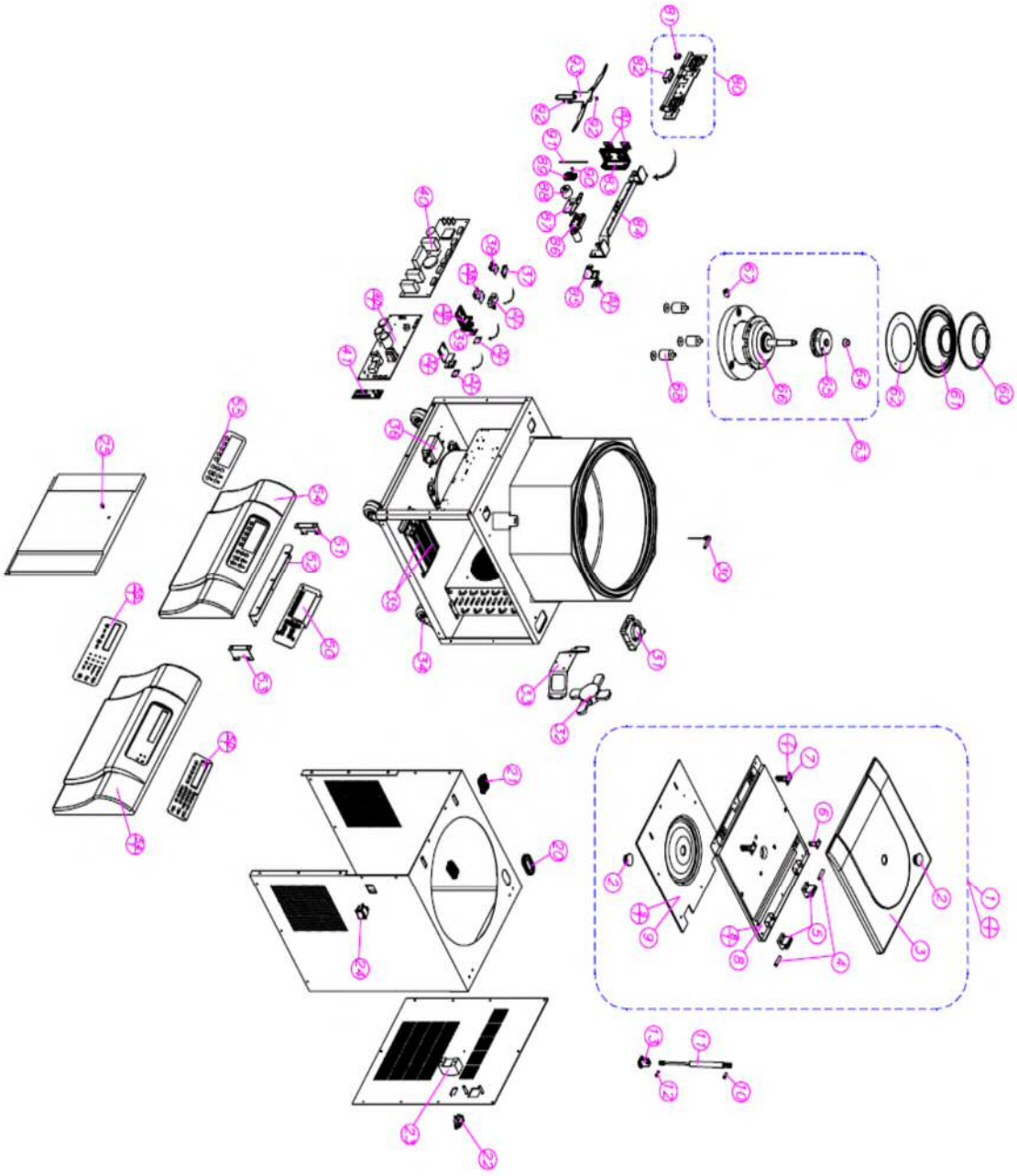
Measuring method

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 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%.

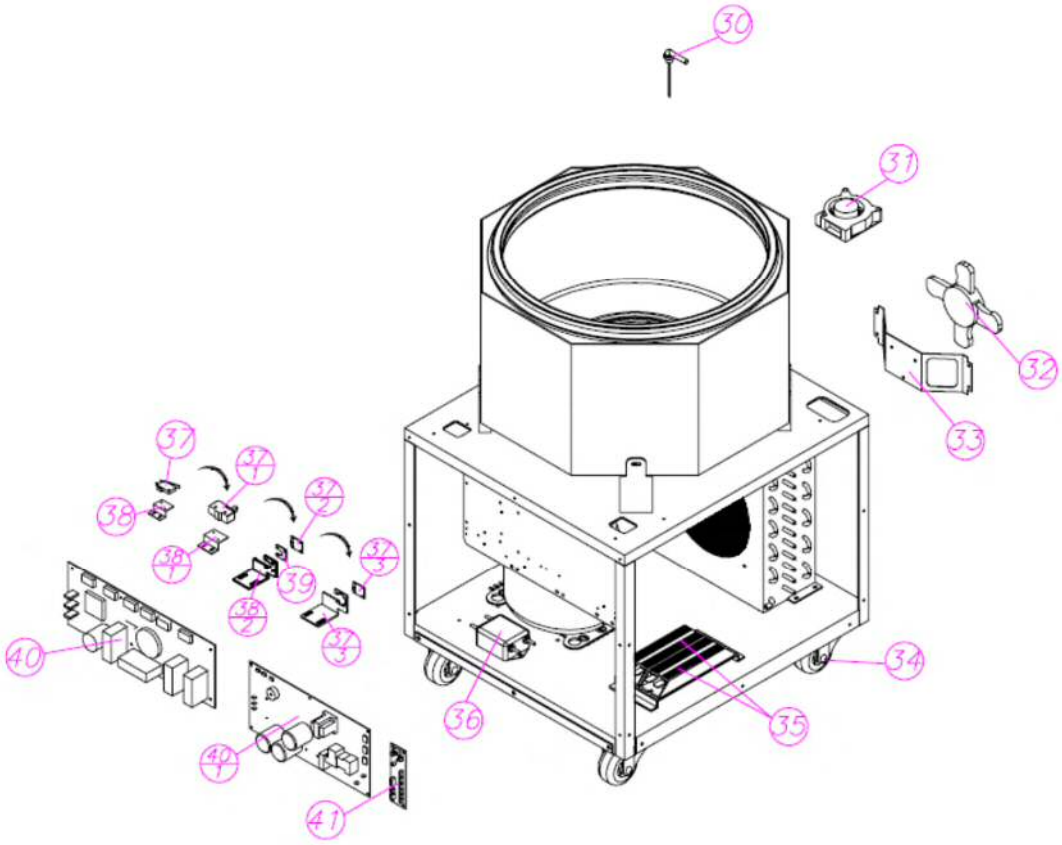
8. Parts Information

8.1 Assembly Drawing

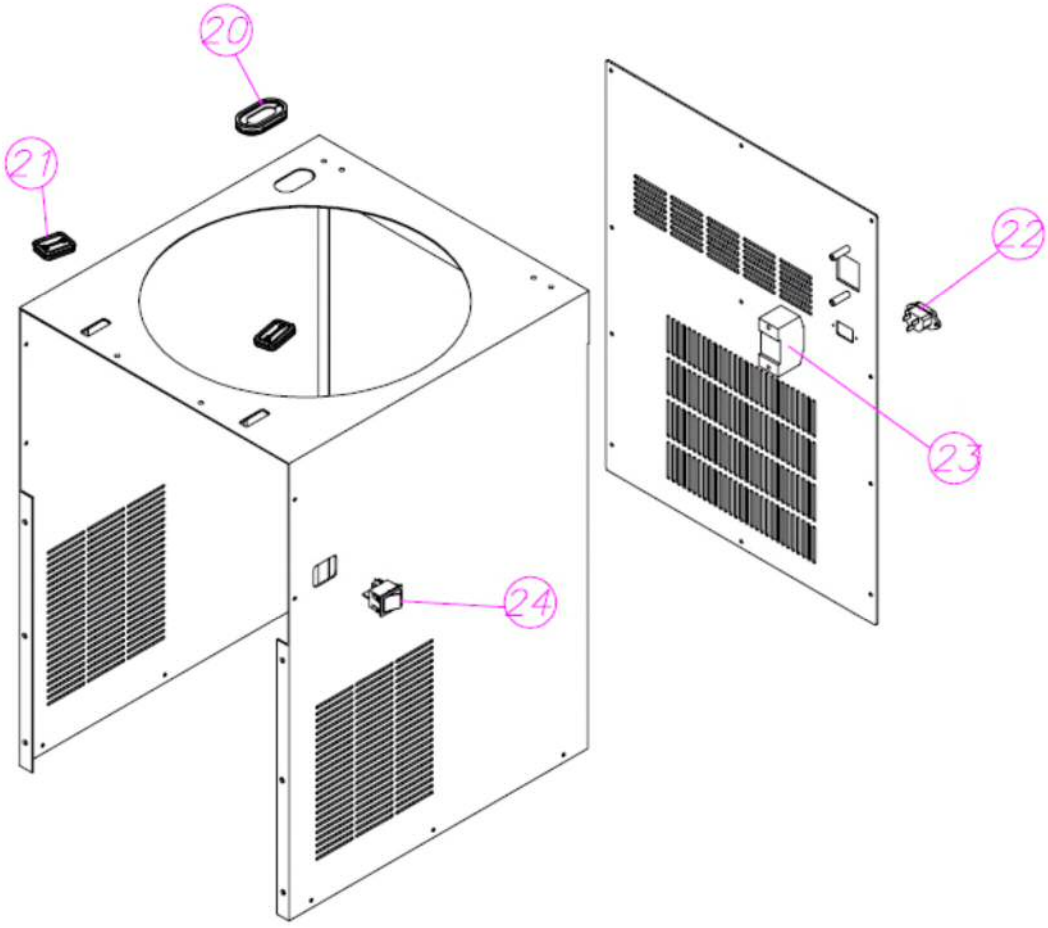
1) All parts



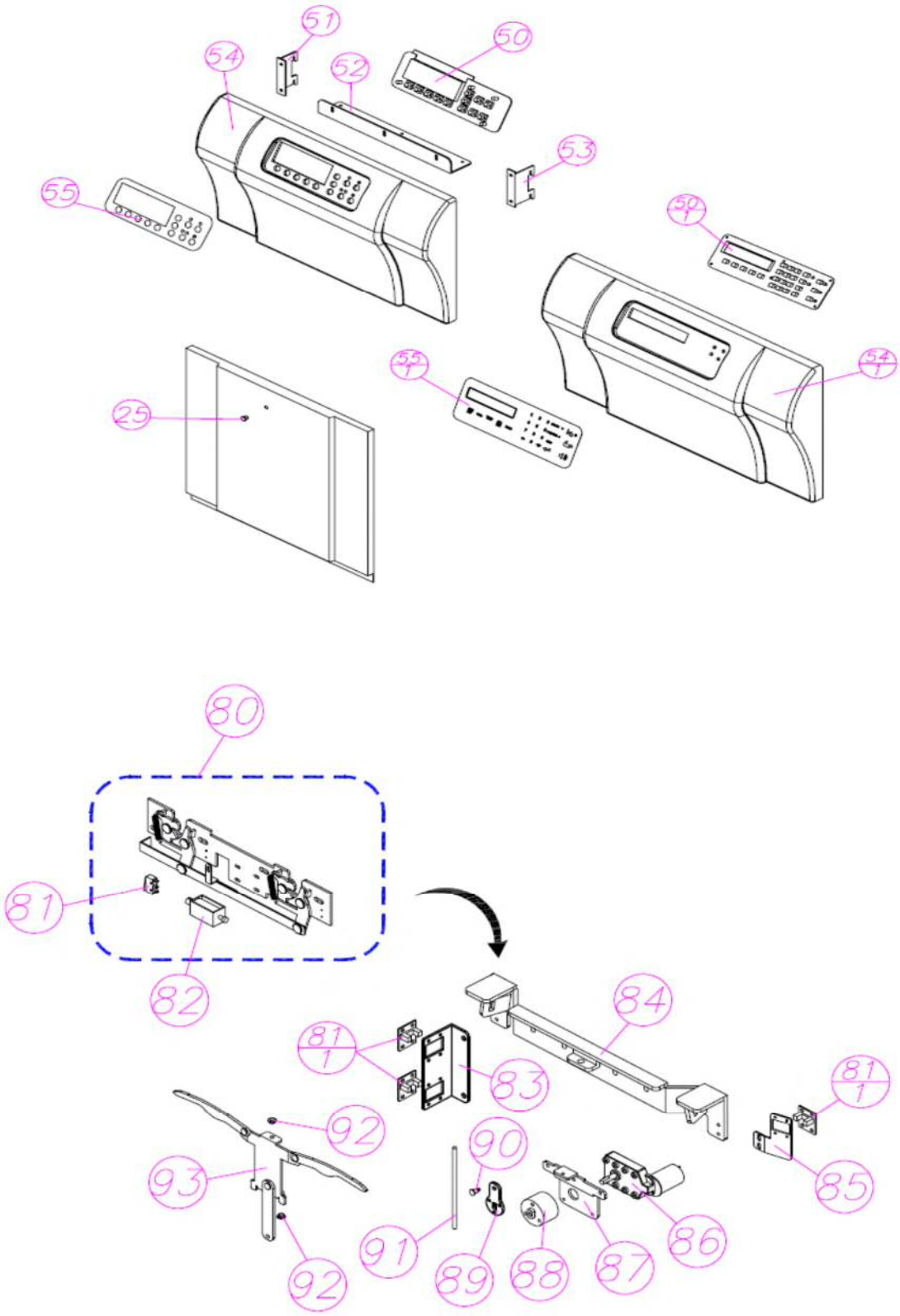
2) Bottom



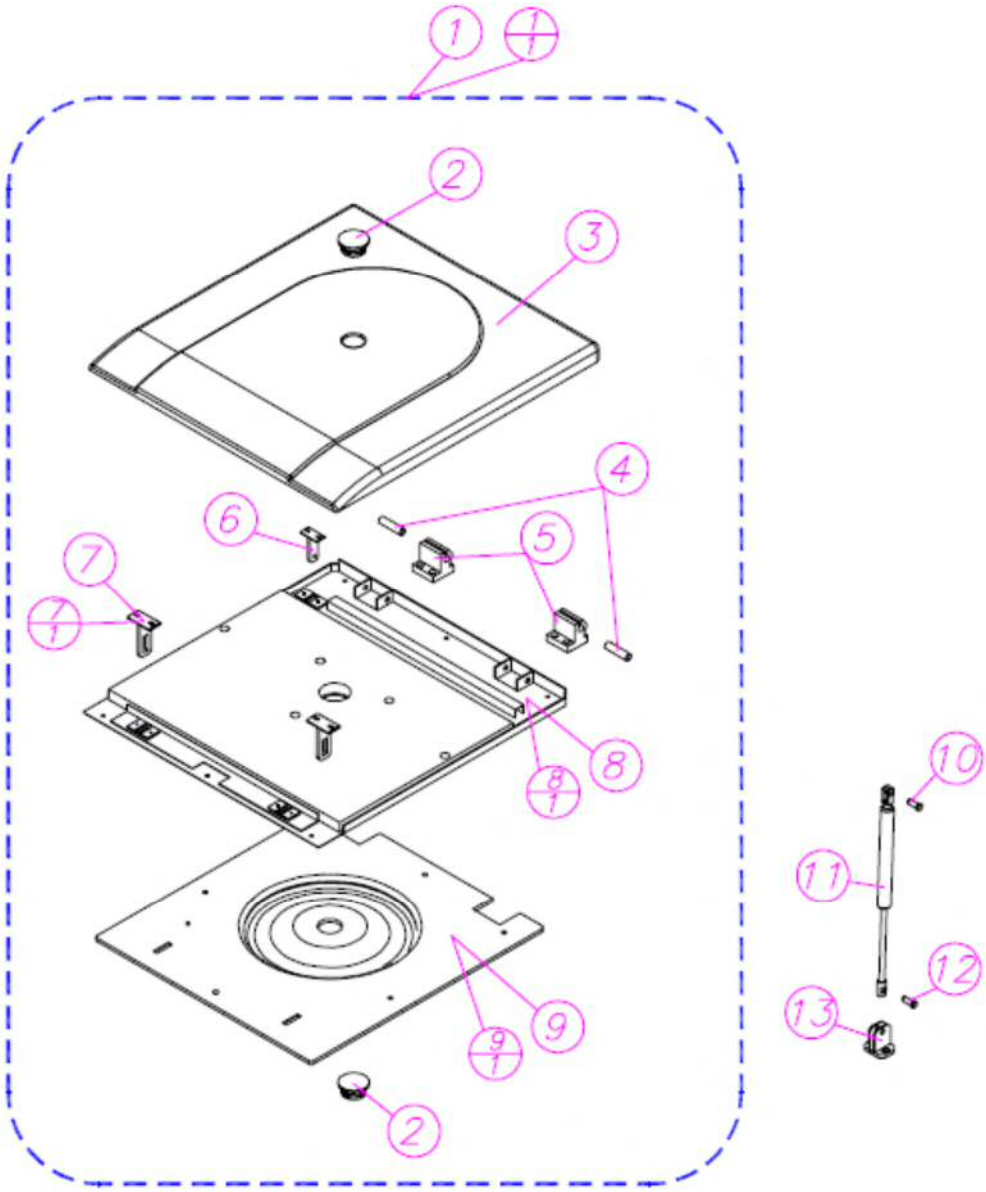
3) Case



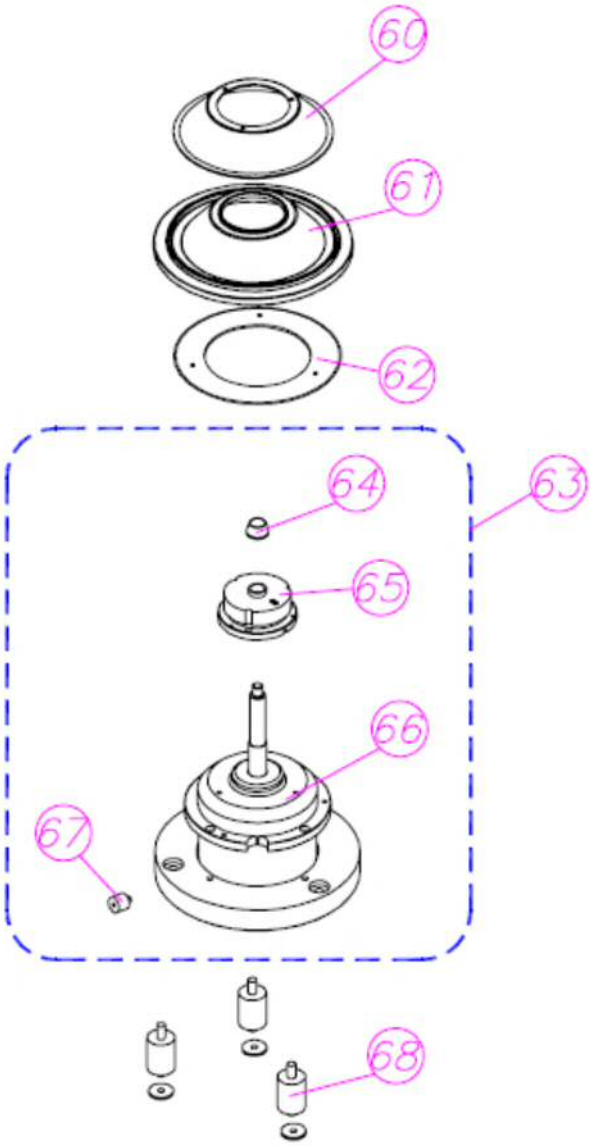
4) Front panel & Door Lock



5) Door



6) Motor



8.2 Part List

No	Part No.	Part Name
1	C08DR90100-00	Door Ass'y
	C08DR90100-01	Door Ass'y(for Auto Door Lock)
2	C99DR00420-03	Center window
3	C03DR00120-01	Door(TOP)-1248
4	C03DR04420-02	Hinge pin
5	C03DR00623-00	Hinge
6	C99DR13020-01	Door stopper load
7	C99DR00520-04	Striker(51mm)
7-1	C06DR00520-01	Striker(68mm)
8	C09DR00232-01	Door(MIDDLE) -1236R
8-1	C09DR00232-04	Door(MIDDLE) -1236R
9	C09DR00320-00	Door(BOTTOM)-1236R
9-1	C09DR00320-01	Door(BOTTOM)-1236R
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	C99RB00420-01	Door stopper packing
21	C15RB02120-02	Packing(Striker)
22	C04EL90900-00	Power socket
23	C04EL01010-02	Earth Leakage Circuit Breaker (ELCB)
24	C99EL00610-00	Power switch
30	C04EL80900-00	TEMP Sensor & Holder(CHAMBER) ASS'Y
31	C04EL06310-00	Fan(Motor) - 220V
	C04EL06210-00	Fan(Motor) - 110V
32	C08EL06110-04	Fan(Condenser)
33	C09RF01533-02	Bracket(Fan)-1236R
34	C09CS04210-00	Castor
35	C04EL04110-00	Damping resistor
36	C02EL01110-02	Noise filter
37	G1103230	Imbalance Sensor ass'y
37-1	C99BD00720-01	Imbalance Sensor(PCB A2)
37-2	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	C02BD00120-01	Main Board Ass`y(A10)
40-1	C15BD00120-00	Main Board Ass'y(elite)
41	C15BD01420-00	I/O Board
50	C02BD00220-02	Display Board Ass`y
50-1	C04BD00223-01	Display Board Ass`y
51	C03CS01633-02	Bracket(Front)-L
52	C09CS01833-00	Bracket(Front)-BOTTOM-1236R
53	C03CS01733-02	Bracket(Front)-R
54	C03CS00320-01	Case(Front)
54-1	C03CS00320-02	Case(Front)
55	C02CS04020-02	Overlay
55-1	C08CS04020-01	Overlay
56	C04RB00720-00	Emergency cap-1580R
60	C04CS02120-01	Cover(Motor Packing)-1580R
61	C04RB00320-00	Packing(Motor)-1580R
62	C04CS04420-00	Insulator (Motor)
63	C09MT90200-00	Final Motor Ass`y(220V)
63	C09MT90100-00	Final Motor Ass`y(110V)
64	C03MT02120-00	Shaft Hub
65	C04MT80700-01	RPM sensor holder ASS'Y-1580R - 1'st
66	C09MT80200-00	Motor Ass`y(220V)
66	C09MT80100-00	Motor Ass`y(110V)
67	C99RB00620-00	Magnet for Imbalance sensor
68	C03RB00120-01	Anti-vibration Damper
80	C09DR90100-00	DOOR LOCK ASS'Y(110V)- 1236R/1248R
80	C08DR90200-00	DOOR LOCK ASS'Y(220V)- 1236R/1248R
81	C08EL90100-01	Door sensor Ass`y
81-1	C15BD01520-00	Photo sensor(PCB) for Lid
82	C99EL03020-00	Solenoid-110

82	C99EL03120-00	Solenoid-220
83	C08DR01933-00	Close/Open(PCB) bracket for Lid
84	C08DR00733-00	Bracket(Latch Fixed)
85	C08DR03433-00	Bracket(Door sensor(PCB))
86	C04EL09010-00	Motor(DC Gear)
87	C08DR01833-00	Geared Motor bracket
88	C04DR02120-00	Spindle for Geared Motor
89	C08DR01733-00	Spindle bracket
90	C04DR04320-00	Pin for Spindle bracket
91	C04DR03320-00	Road
92	C99DR06920-00	Flange Bearing
93	C08DR95000-00	Latch Ass'y for Photo sensor(PCB)