SCANSPEED

SERVICE MANUAL

Multi-Purpose High-Speed Centrifuge

ScanSpeed Model 1580R

Date : 19.01.2017
Cat. No. : 7.647.518.201

CE

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1. Operating instructions

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
	Attention and warning for rotor coupling.		Attention and warning for door opening and closing
	Attention and warning for correct way of sample balancing in the rotor.		Attention and warning for correct way of buckets position.
	The door should be closed by gentle press-down touching motion		

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 door 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 operated automatically by a door lock unit including a motor, and it does not open while the rotor is running. If the door is opened accidentally, E2 error code appear and 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

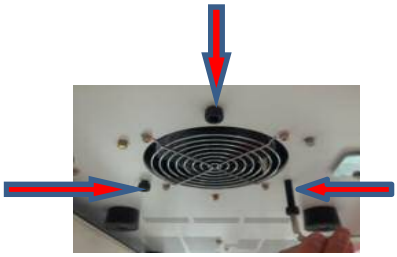
The 1580R is a rotor auto-recognized model. But an instrument is delivered without a rotor, so when you turn on the machine, the system tries to recognize a rotor automatically, and 'Error 9' is appeared because of absence of a rotor. Mount the rotor and turn off the machine, and turn on again. Then the instrument recognizes the rotor properly.

2.1 Unpacking

1) Lift the carton upward and remove the safety padding.
2) Lift the instrument on the four sides of the machine with appropriate number of helpers.
3) Place it to the flat space.
4) Remove motor fixing bolts 3ea of screw bolts are placed at the bottom of the unit for prevention of damage to the imbalance sensor caused by any moving of the motor during delivery. These bolts should be removed before the installation of the unit.

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


② Check two more bolts around the fan net.



③ Unscrew 3ea of bolts with a provided wrench.


2.2 Location

1) Install the device on 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 about 30cm departed from the wall for effective air circulation.
3) Install the device at the place with appropriate temperature and humidity. It also has to be maintained with the proper temperature & humidity.
4) Install the device at the place without any kinds of corrosive gases.

2.3 Supply the Power

1) The 1580R model uses 110V or 220V. Check proper voltage of your instrument and connect to adequate power outlet.
2) If the power input is more than +/- 10% of the recommended voltage or fluctuates frequently, it may affect some functions of the instrument. It is advised to use AVR (Automatic Voltage Regulator).
3) If you want to use the instrument at other voltage range, please contact us.

2.4 Power On/Off and Door Release

1) The power is provided via earth leakage breaker switch which is attached on the left side of the device. Connect the power cord properly and turn on the earth leakage breaker and the power is on, the latest setting value recalled with beeping sound.
2) Press the 'Door' button on the control screen to open the door.
3) Remove the protection materials inside the chamber.
4) Mount the rotor, close the door and turn off and on the instrument again for proper operating.

Auto-Door Lock
The door should be closed only by gentle press-down motion

2.5 Emergency Door Open

1) Turn off(on) the instrument by pressing a switch off(on) the left side of the machine.
2) Open the door using emergency door open function (with T-wrench).
3) Remove the (protection) materials inside the chamber.
4) Mount the rotor, close the door and turn on the instrument again for proper operating.
   * After mounting rotor, you can use 'DOOR' button to open the door.

3 Device Information

3.1 Special qualities

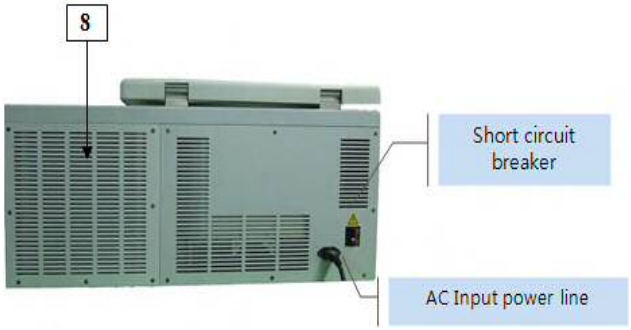
- High safety and low noise
- Tube capacity from 0.2㎖ to 15㎖
- High speed refrigerating model controlled by 16bit microprocessor
- Temperature controlled with preset target value
- Chamber cooled fast from room temperature to the target with Fast Cool function
- Fixed angle rotor(24 & 30) and Strip Rotor(32 & 64) available
- Rotor ID recognition whenever operated in such mode as START, PULSE and FAST COOL.
- Simultaneous display of rpm and rcf speed
- Memory function available to 100 programs
- Automatic Alarm function for Imbalance, Door open, Speed/Temperature trouble
- High tech AC Induction Motor adopted

3.2 Technical Specifications

Max. RPM	15,000 rpm
Max. RCF	25,910 x g
Max. capacity	6 x (250 & 15ml)
Control	Microprocessor controlled
Temp. set range	- 20 ~ 40 °C
Run time	≤ 9 hours 59 min or continuous
Noise level	≤ 60 dB
Acceleration levels	9
Deceleration levels	10
Program memory	100
Rotor Recognition	Automatic
Imbalance Recognition	Automatic
Motor	High torque AC induction motor
Safety	Lid-lock
Power & Frequency	220V, 50/60Hz (110V Optional)
Dimension (WxDxH) mm	770 x 650 x 390
Weight	93 Kg (for main body only)
CE Certification	Yes

3.3 Outer Description

Main Body	Rotor, GRS-G-r750-4	Rotor, GRF-G-15-24
		
	GRF-G-85-6	Rotor, GRF-G-m2.0-30
		
Special Tool	AC Cord	Rotor Coupling Tool & Emergency Door Open Tool
		

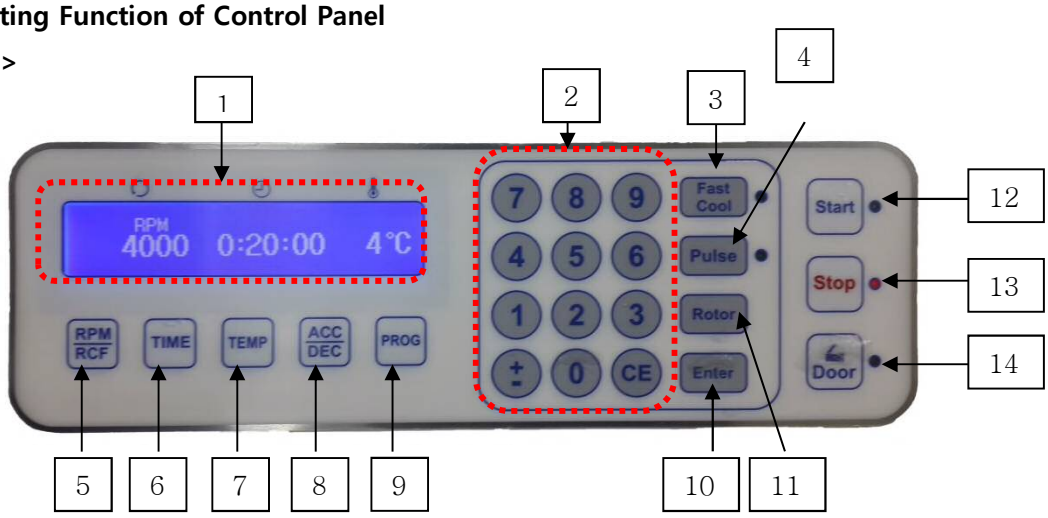


1) Door
2) Chamber
3) Key Pad
4) Door Striker
5) Ventilating Hole & Center Window
6) Spring Hinge
7) Power Switch
8) Radiator Ventilation Hole

9) Shock absorber

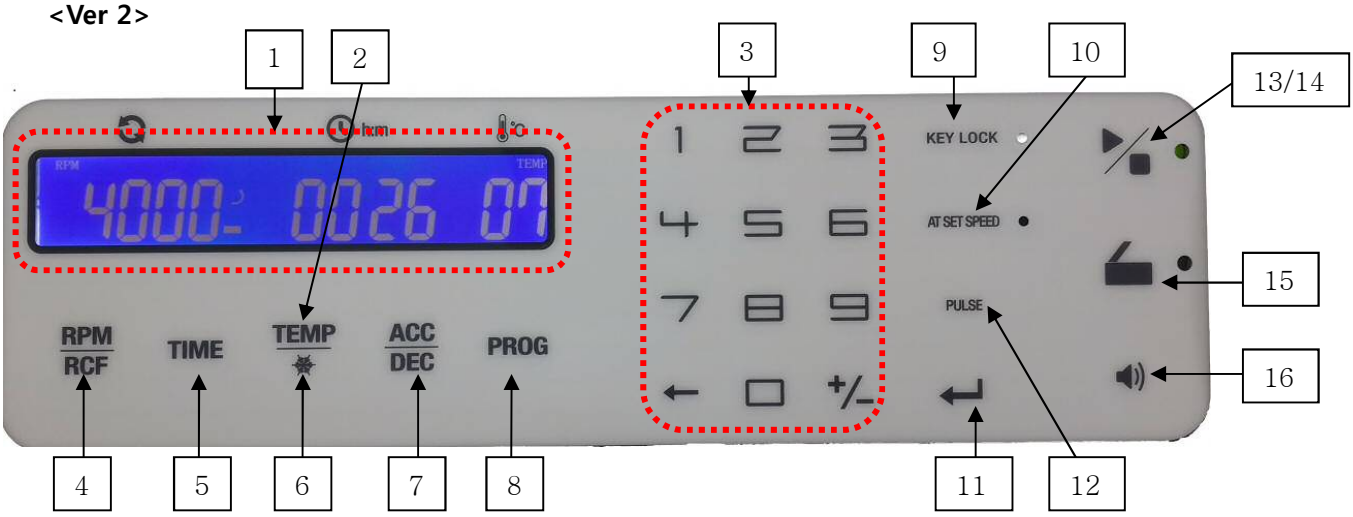
3.4 Operating Function of Control Panel

<Ver 1>



1. Display LCD : shows the data of each setting(RPM, RCF, Time, Temp, Acc/Dec, Program)
2. Numeric keypad : used to change(increase/decrease) the input data
3. Fast Cool : used to refrigerate at high rate down to the setting temperature.
4. Pulse : used to accelerate to set RPM once and decelerate rapidly.
5. RPM/RCF: used for switching RPM/RCF
6. TIME: used to set test time up to 9 hour 59 min 59 sec (0:00:00, continuous)
7. TEMP: used to set test temperature
8. ACC/DEC: used to set the acceleration (deceleration) level from 1(0) to 5 steps.
   '0' step means natural dec level. The bigger the number, the higher the acc/dec speed.
9. PROG : used to save or call the preserved setting values.
10. Enter: used to fix and save a setting value.
11. Rotor : to show the radius of coupled rotor
12. Start : used to start device operation
13. Stop : used to stop device operation
14. Door : used to open the door

<Ver 2>

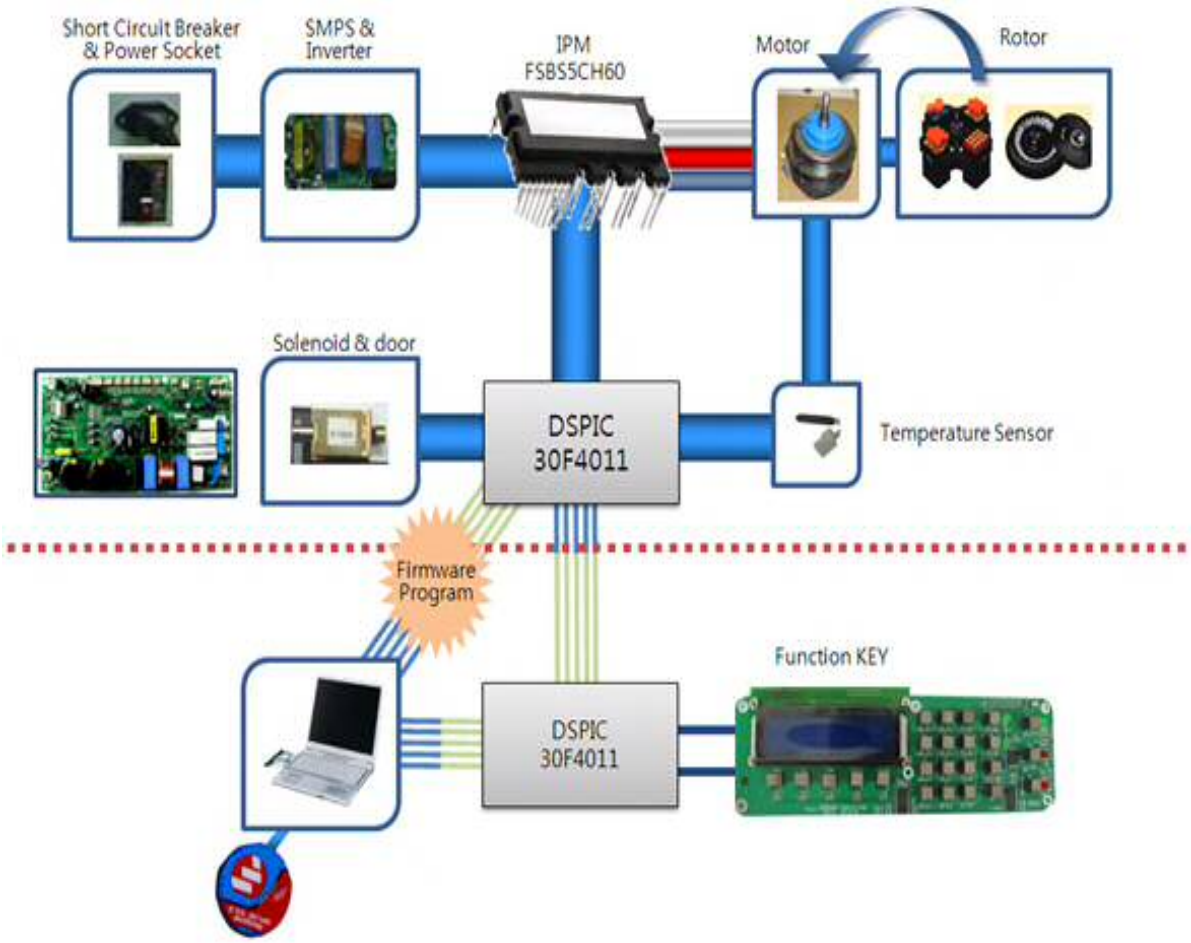


1. Display LCD : shows the data of each setting(RPM, RCF, Time, Temp, Acc/Dec, Program)
2. TEMP : used to set test temperature
3. Numeric keypad : used to change(increase/decrease) the input data
4. RPM/RCF : used for switching RPM/RCF
5. TIME : used to set test time up to 9 hour 59 min (0:00, continuous)
6. Fast Cool( ) : used to refrigerate at high rate down to the setting temperature.
   just pushing for two seconds.
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.

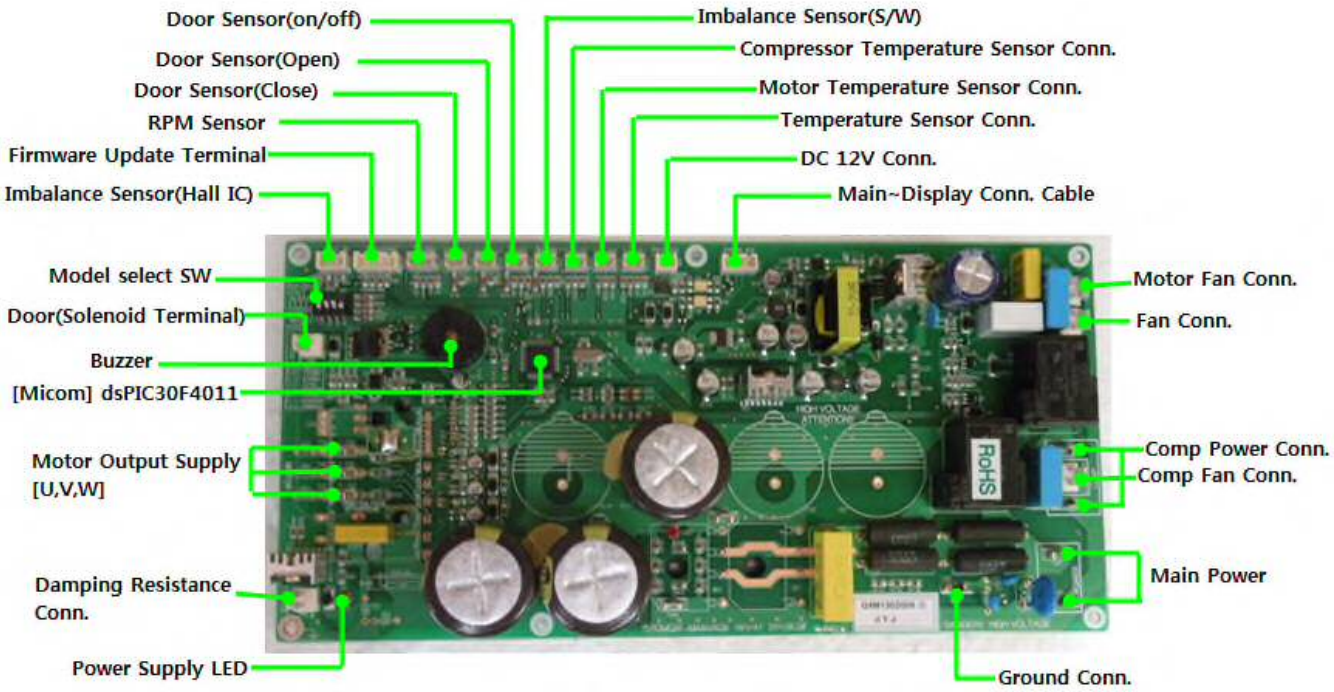
3.5 Operating System



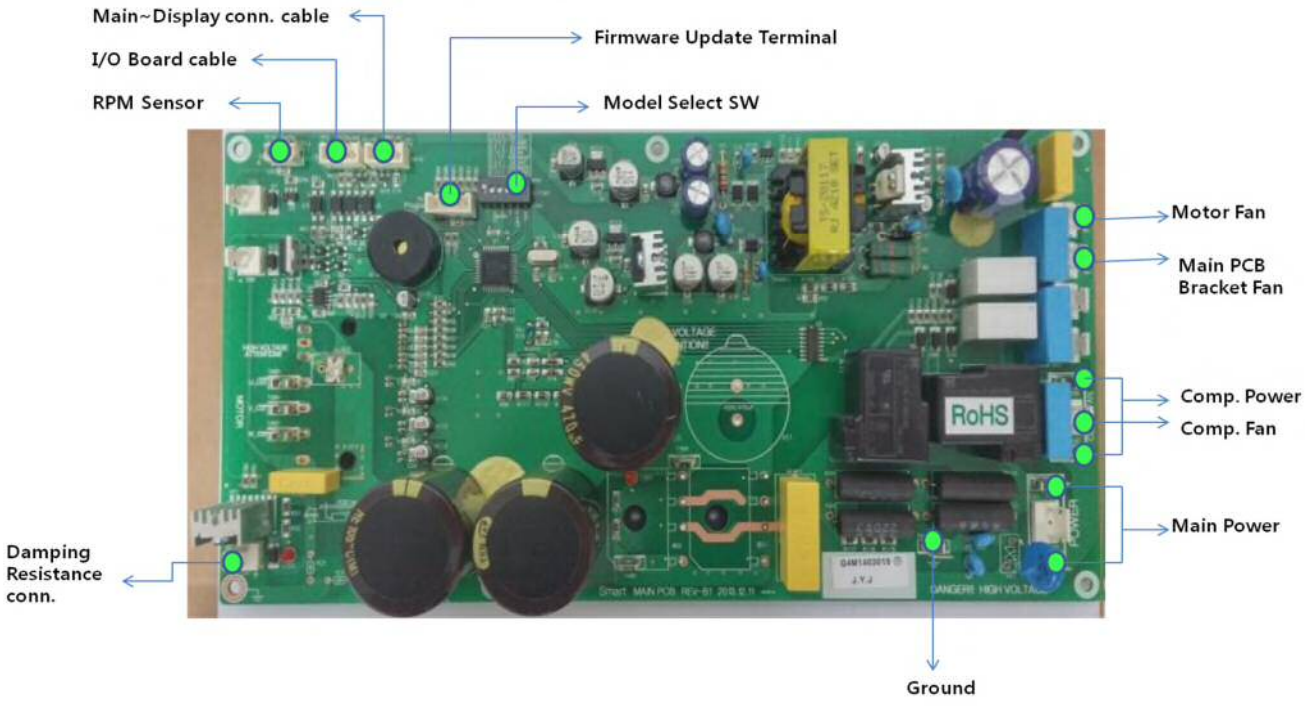
1) DSPIC 30F4011, MICOM; It controls all devices.
2) SMPS; distributes inlet power to each part as appropriate form.
3) Inverter; transforms the single phase power to the 3 phase for running the AC induction motor.
4) IPM FSBS5CH60; controls the AC induction motor.
5) Solenoid; open and close the door 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 Controller Board

<Ver 1>

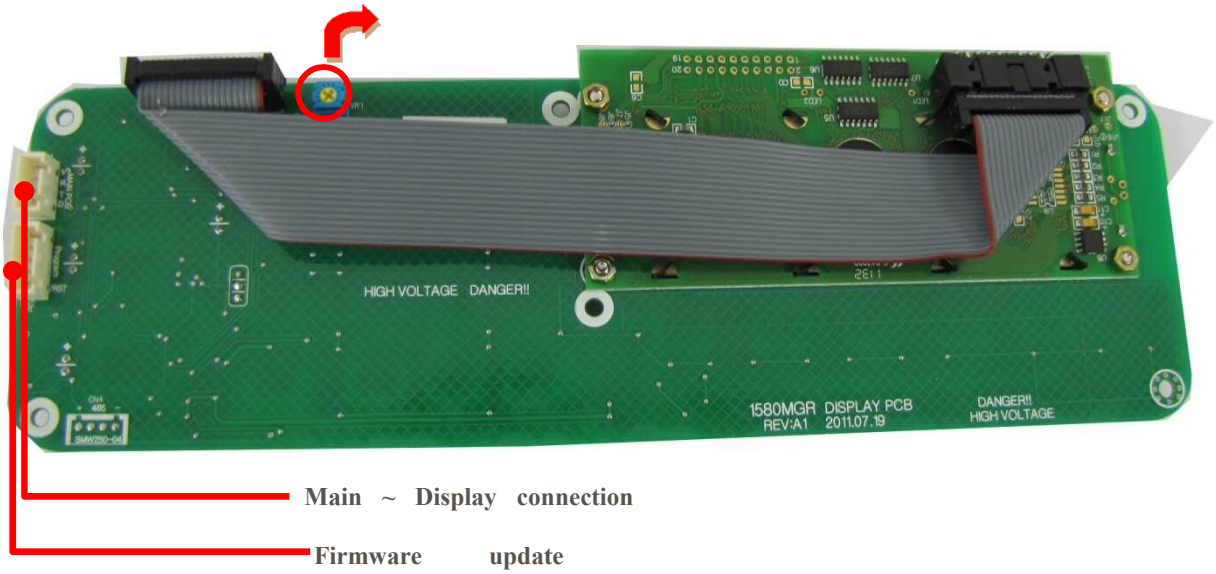


<Ver 2_Smart>



3.7 Display Controller Board

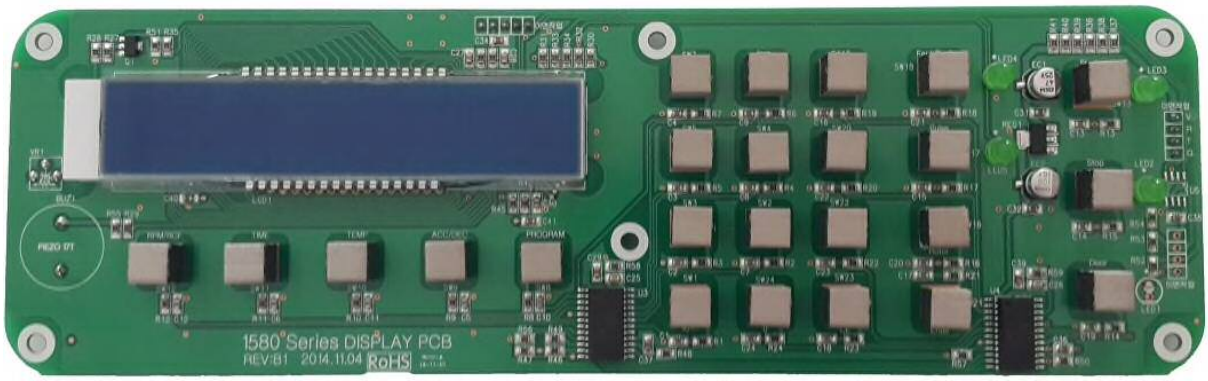
<Ver 1>

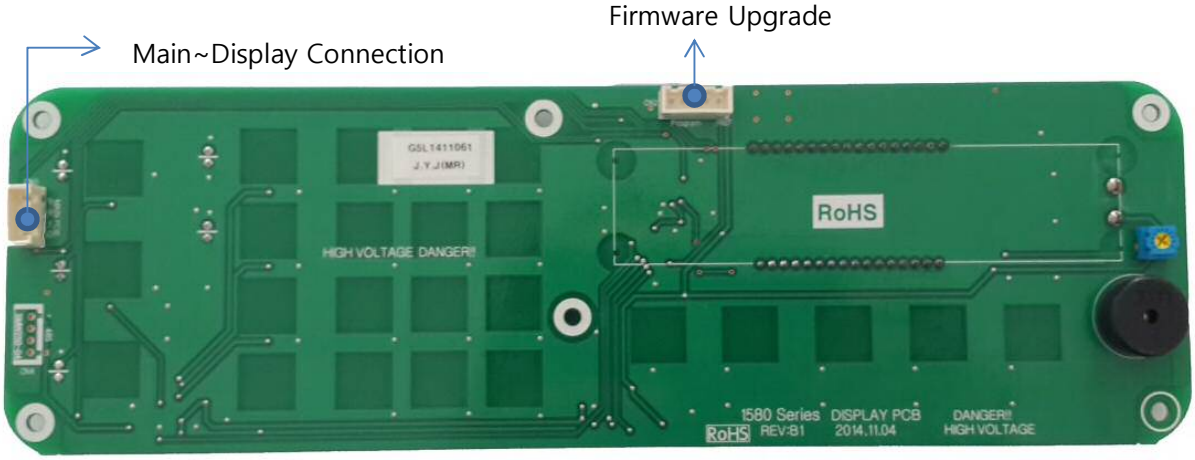


Adjustment of LCD Contrast

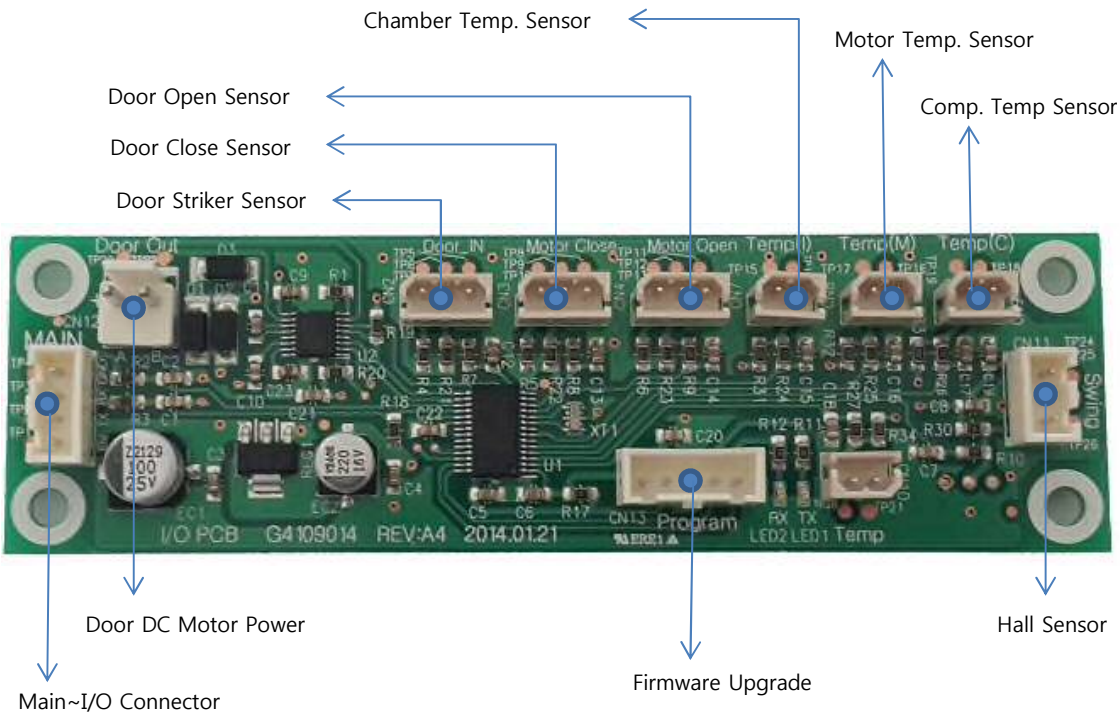
LCD brightness can be adjusted. Rotate the circled part at the below picture with clockwise direction using screw driver(+), LCD is getting brighter gradually. Counterclockwise is opposite.

<Ver 2>



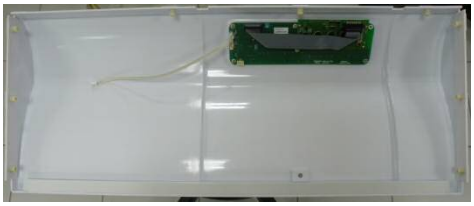


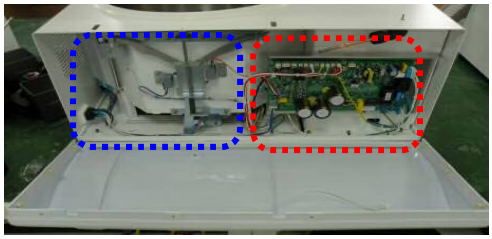
I/O Board



4 Disassembling

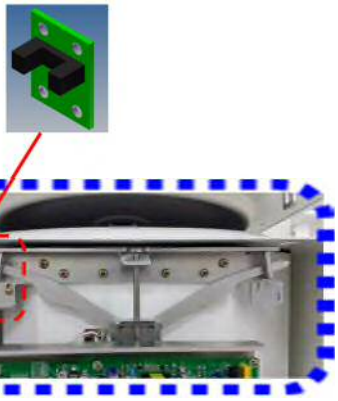
4.1 Front panel, Main controller board and I/O board





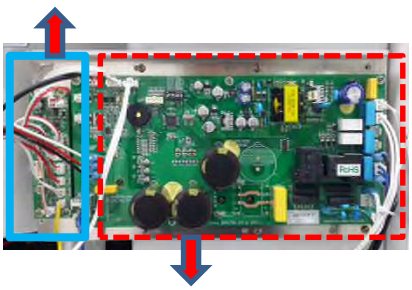
<Ver 1>

I/O Board



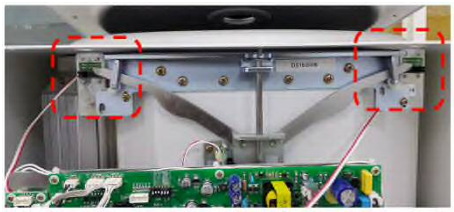
<Ver 1>

One Door Photo Sensor



Main Board

<Ver 2>



<Ver 2>

Two Door Photo Sensors

1) Open the door and remove 9ea of screws as arrowed part on the right picture.
2) Remove display cable at the front panel.
3) Remove cables connected at the Main controller board and the I/O board.
4) Remove 10 ea of screws at the Main controller board.
5) At the new model, remove the 4 ea screws at the I/O Board.

4.2 Door assembly

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

4.3 Motor cover and motor packing

[PIC 1]

[PIC 2]

[PIC 3]

[PIC 4]

Remove the 3 ea screws.

1) Detach the motor cover. [PIC 2]
2) Detach the motor packing [PIC 3& 4]

4.4 Motor assembly

Pic1

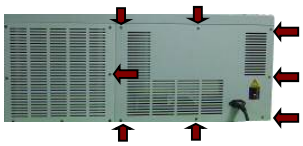
Pic2

1) Remove the motor cable, temp sensor cable, rpm sensor cable and ground cable.
2) Remove 3ea of nuts at motor ass'y and detach the ass'y with upward direction. [Pic1&2]

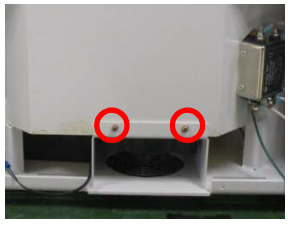
4.5 Anti-vibration rubber

1) Remove 3 ea of nuts from the motor .
2) Detach the motor .
3) If needed, detach the anti-vibration rubber assy to replace them.

4.6 Motor fan



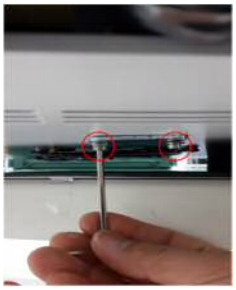
Pic1

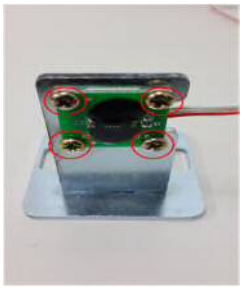


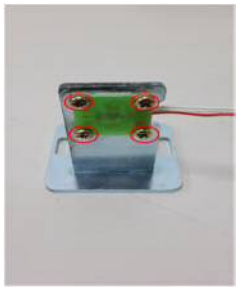
Pic2

1) Remove the back case.[Pic1]
2) Remove 2ea of screws at motor FAN BKT.[Pic2]
3) Remove motor fan conn. at controller board.
4) Detach the motor fan bracket assy.

4.7 Imbalance sensor assembly



[Pic1]


[Pic2] **<Ver 1_Pcb_A2>**


[Pic3] <Ver 2_Pcb_A3>

1) Remove the 2ea of screws at the buttom of the instrument [Pic1].
2) Detach the imbalance sensor assy.
3) Remove the 4 ea of screws [Pic2 & 3].
4) Detach the imbalance sensor (Hall sensor).
5) In the case of adjusting the imbalance sensor, refer to 5.3

4.8 RPM sensor assembly


[PIC 1]

→


[PIC 2]

→


[PIC 3]

1) Remove 3 of screws at the motor assy [PIC1].
2) Detach the shaft Hub [PIC2].
3) Remove the RPM sensor assy [PIC3].

5 Service Mode and adjustment

<Ver 1>

5.1 Transition into service mode

On the Control panel

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

5.2 Handling values

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

RPM(Set,Current),Frequency,Voltage ratio

Motor input/output voltage, Hall IC distance, Current

Temperature(Chamber, Motor,Cooling unit, Dip sw set value, Rotor ID No

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

Temperature adjust

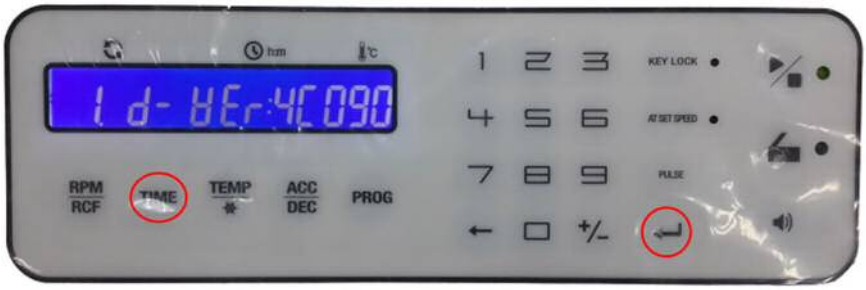
Error range of imbalance

Motor running time total

<Ver 2>

5.1 Transition into service mode

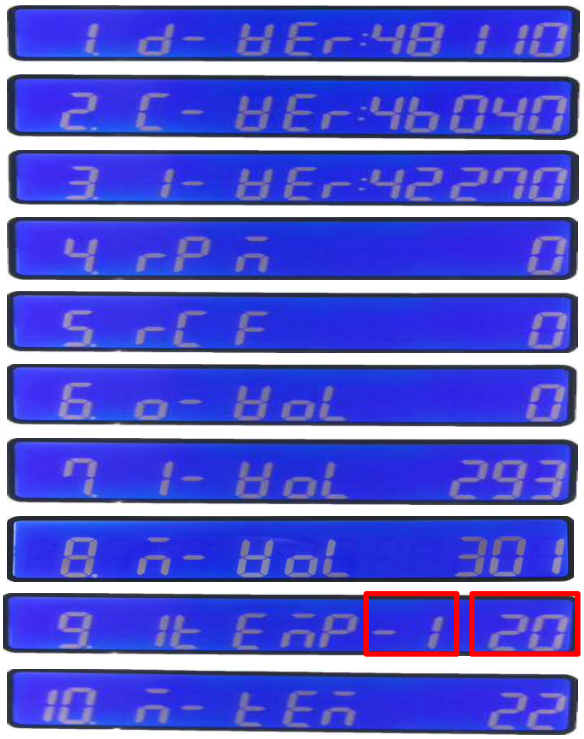
On the Control panel



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

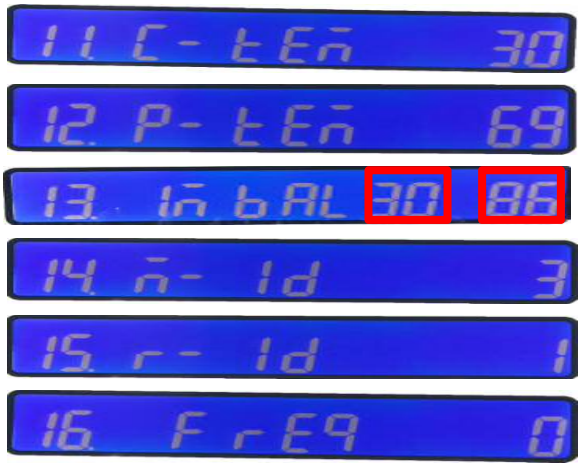
Voltage ratio

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( ) 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 ( )key **,as the picture below.**

- Displayed Value(ex.31) 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 numeric keypad button to increase & decrease the value.

3) Press Enter 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.

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 higher 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** • Refer to 5.3 for details. If E8 error is issued; • 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.
E11	Chamber Temp. error	• The instrument is not reached to setting temperature within an hour. **Corrective Action** • Replace the temp sensor assy with correct one.
E12	Temperature sensor error	• There is a faulty in the temperature sensing of chamber or disconnected cable. **Corrective Action** • connect the cable or replace a temp sensor assy.
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.

* Any wire disconnection or tuning of the instrument must be performed only by a service engineer who is authorized by GYROZEN Co., Ltd.

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.

5. Compare actual measurement rpm and setting

7.2.2 Validation of motor performance

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

Motor	*Model*	*U*	*V*	*W*
1500watt	1580R	White	Red	Black

Measuring method

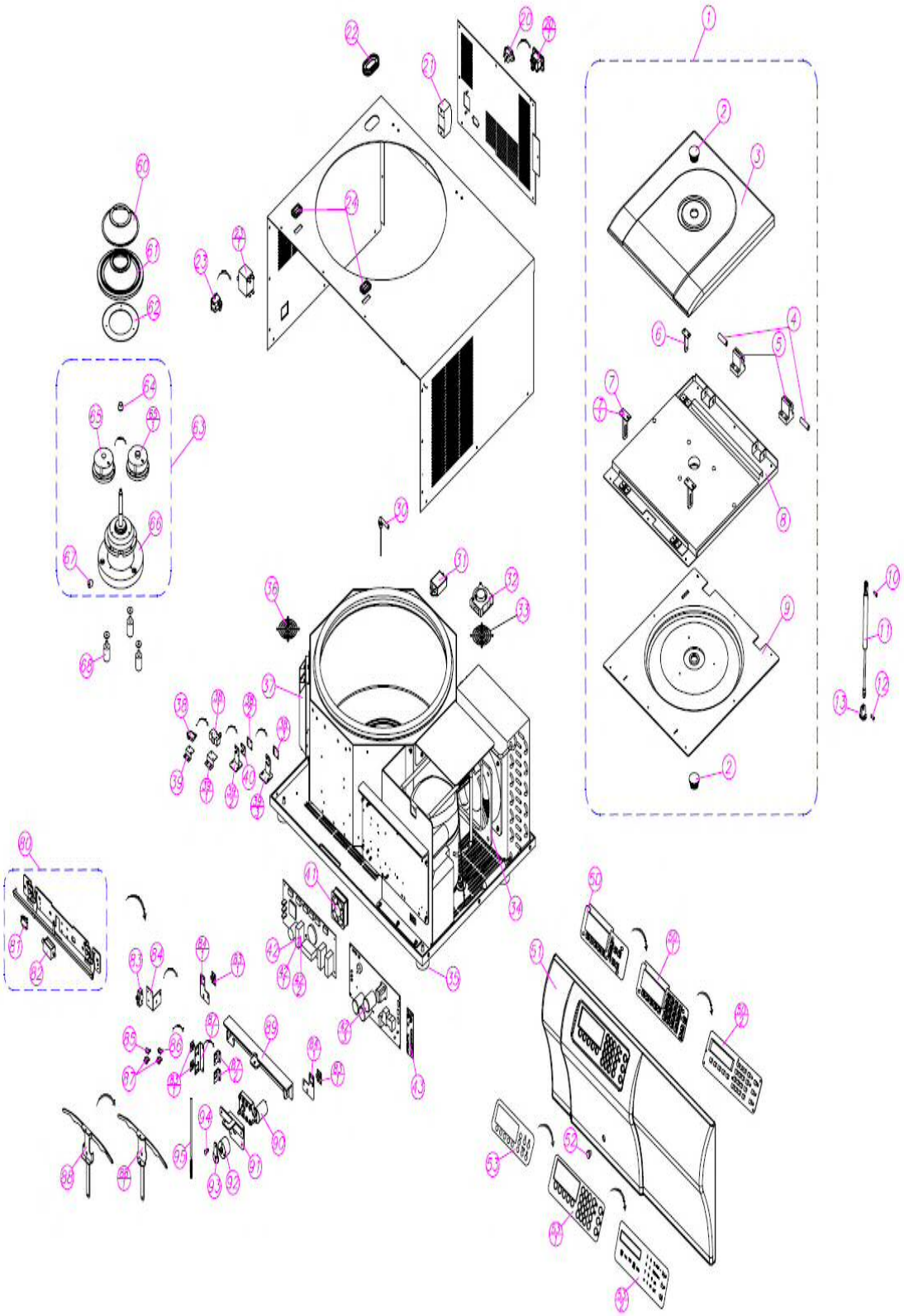
1) Use 'Multi meter tester' tool
2) Place the tool at the resistance location
3) Check the resistance value at u-v, u-w, v-w with tester lead
4) If the value is 0 or ∞ ohm, it means some trouble so it needs repairing.
5) The normal status is that 3 resistance values(u-v, v-w, w-u) are all same within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

- For the process of detaching the Motor, refer to 5. Disassembling.

8 Parts Information

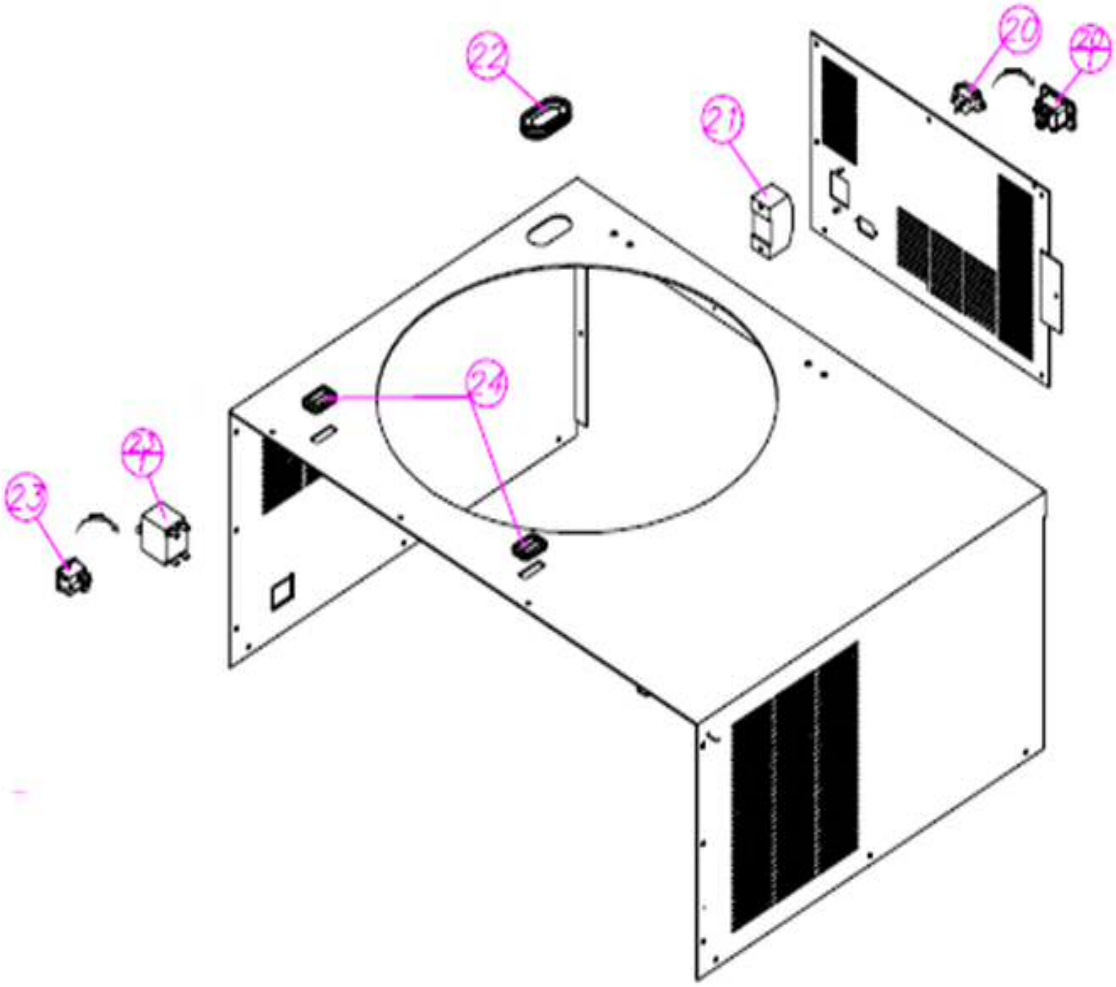
8.1 Assembly Drawing

1) All parts

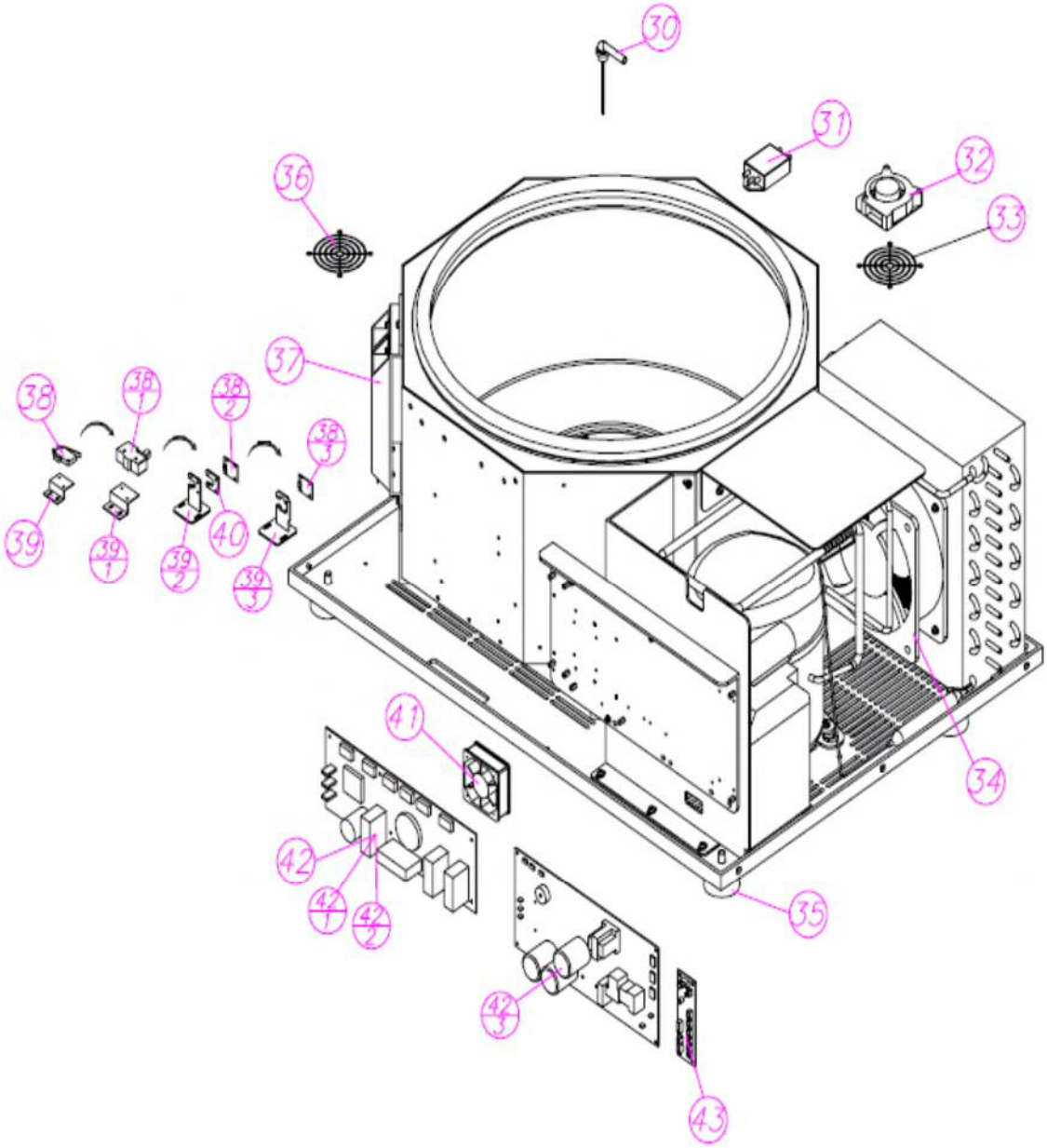


2) Top, Bottom Case & Chamber

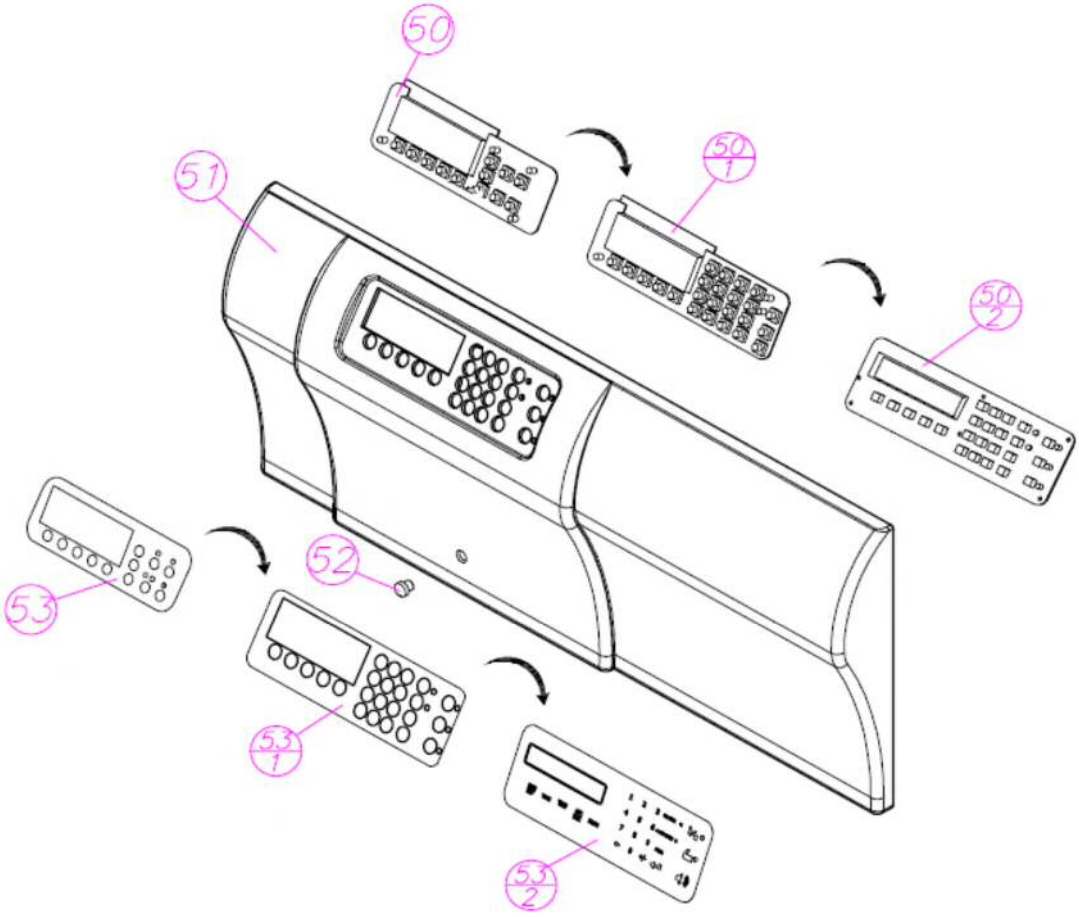
Case (top)



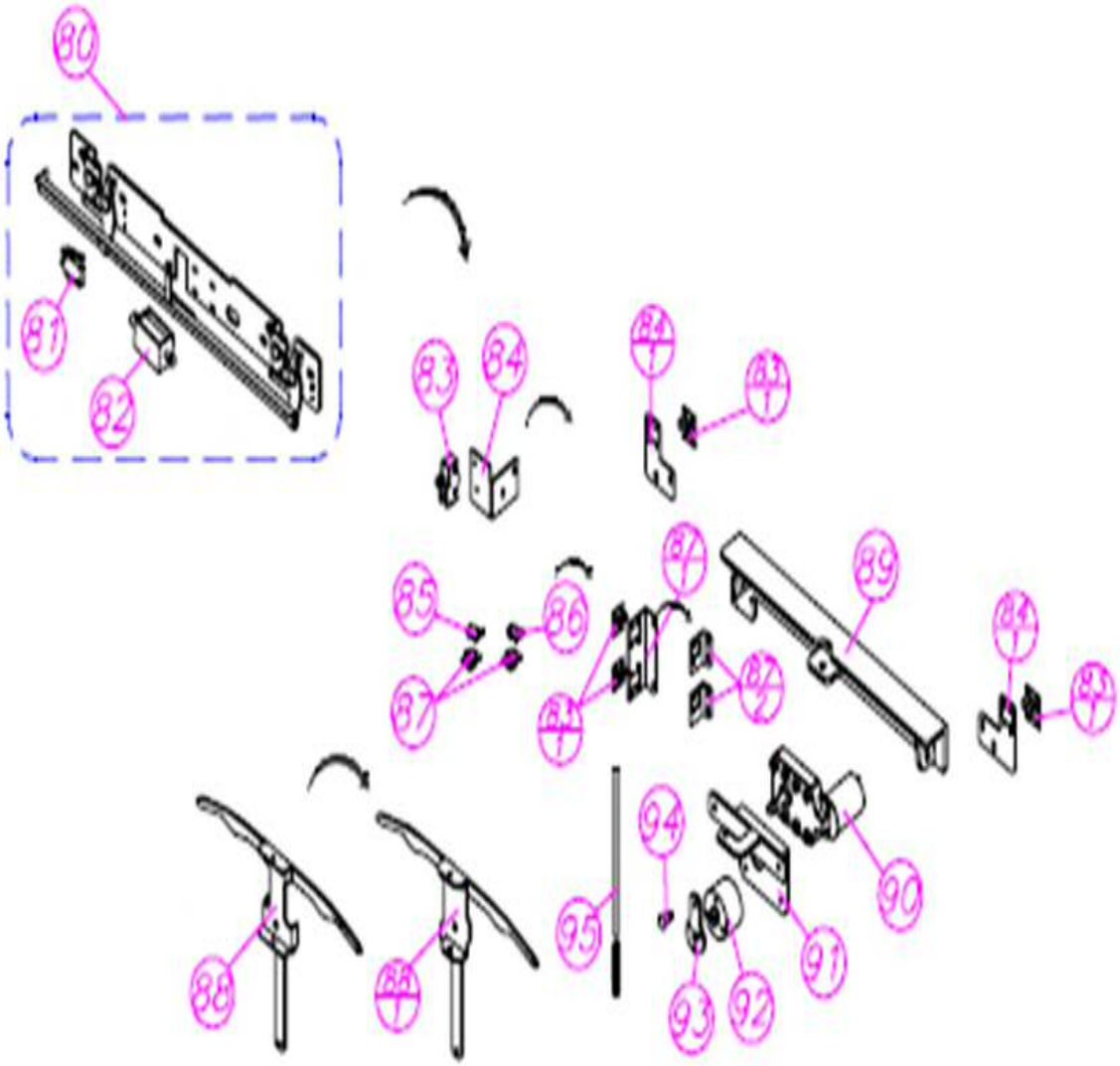
Case (bottom) & Chamber



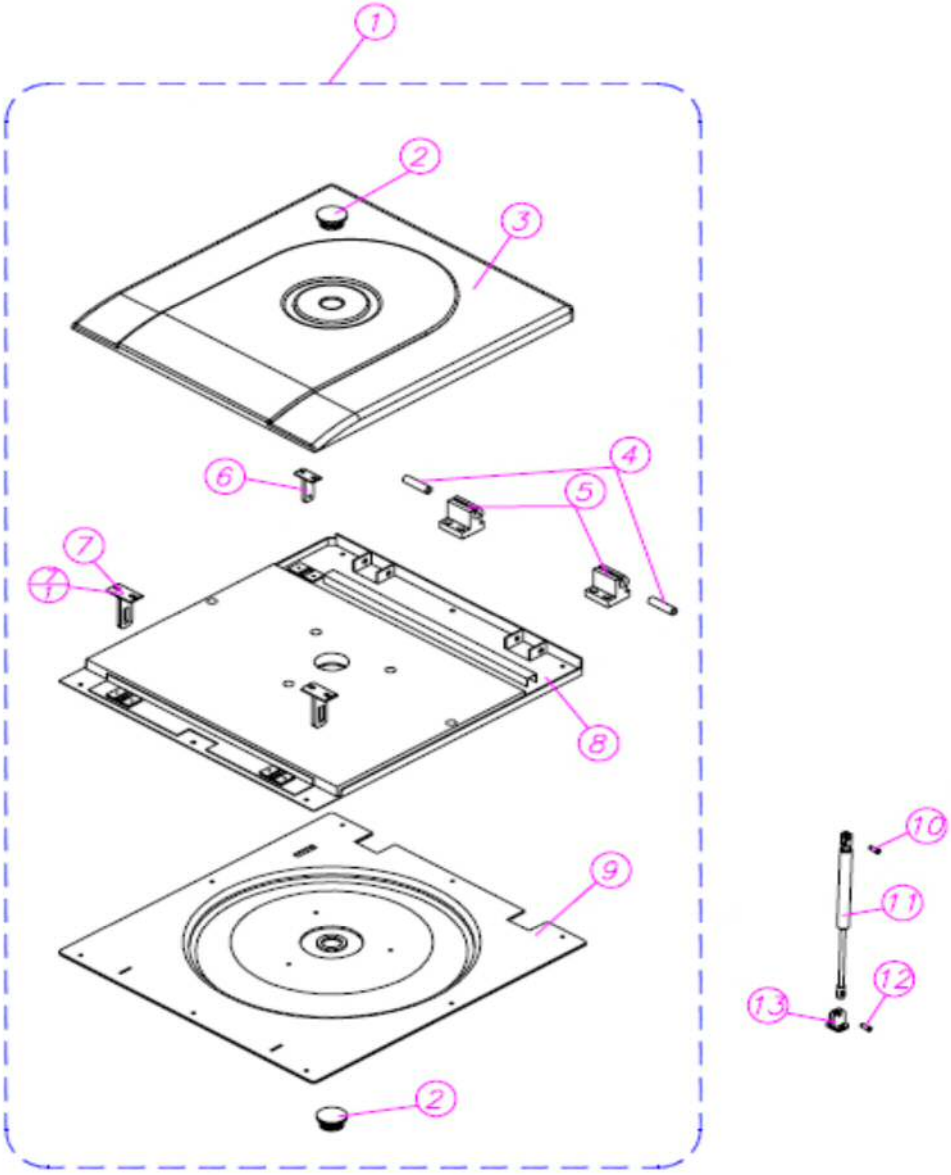
3) Front Panel



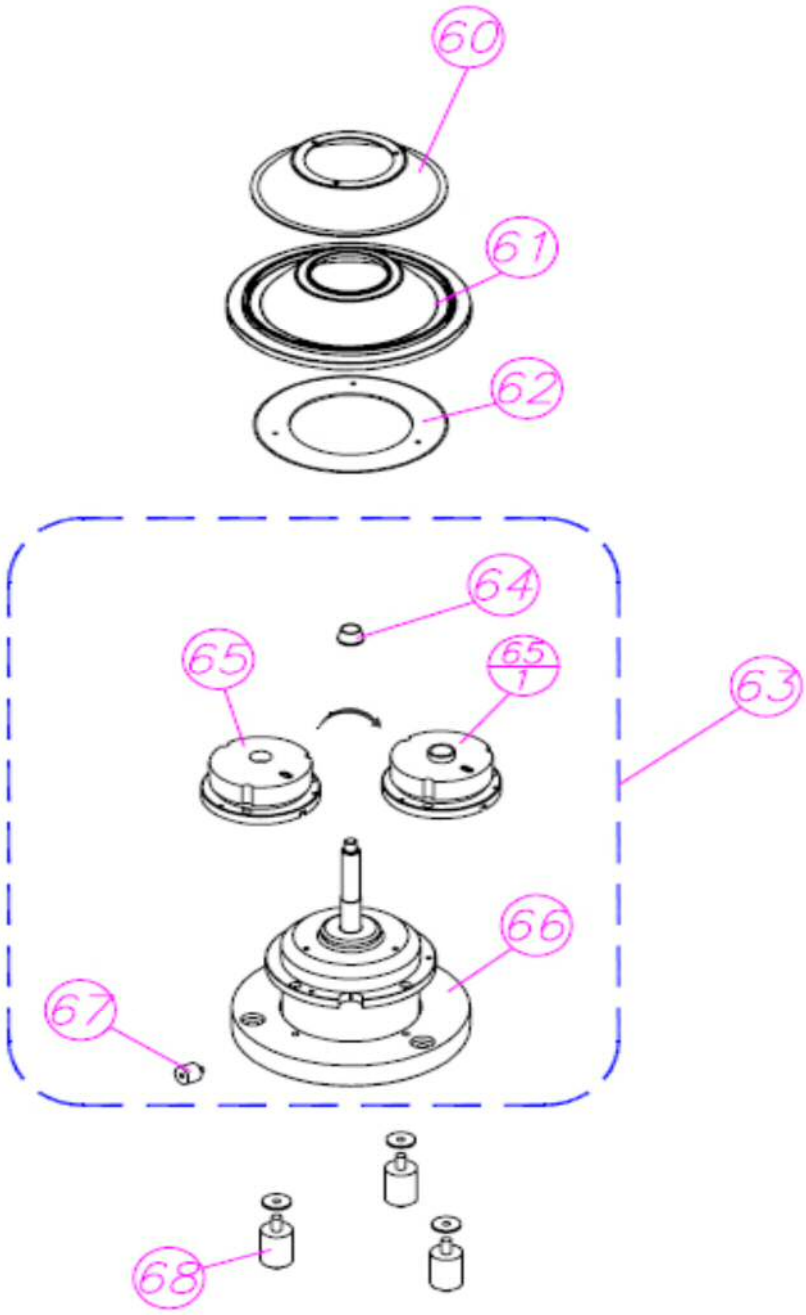
4) Door lock



5) Door



6) Motor



8.2 Parts list

* The grey colored letters are old version parts.

No.	Part No.	Name	Remark (Instrument S/N)
1	C04DR90100-00	Door Ass'y	
2	C99DR00420-03	Center window	Top and bottom layers of a door require one each.
3	C04DR00132-00	Door(TOP)-1580R	Without a center window
4	C03DR04420-02	Hinge pin	A door requires 2ea.
5	C03DR00623-00	Hinge	A door requires 2ea.
6	C99DR13020-01	Door stopper load	
7	C06DR00520-01	Striker(68mm)	A door requires 2ea.
7-1	C99DR00520-04	Striker(51mm)	A door requires 2ea.
8	C04DR00232-04	Door(Middle)-1580R	
9	C04DR00332-02	Door(BOTTOM)-1580R	
10	C99DR04020-00	Door stopper pin (top)	
11	C06DR81000-00	Door Stopper(28kgf)	
	C07DR81000-00	Door Stopper(27kgf)	
12	C99DR04120-00	Door stopper pin (bottom)	
13	C99DR01133-00	Door stopper Bracket (bottom)	
22	C99RB00420-01	Door stopper packing	
24	C15RB02120-02	Striker Packing	An instrument requires 2ea.
20	C04EL90900-00	Power connector	
20-1	C04EL90900-01	Power connector	
21	C04EL01010-02	Earth leakage circuit breaker	
23	C99EL00610-00	Power switch	
23-1	C04EL01510-00	Circuit protector and Power switch	
30			
	C04EL80900-00	TEMP SENSOR&Holder (CHAMBER) ASS'Y-1580R	
31	C02EL01110-02	Noise filter	
32	C04EL06310-00	Motor fan (220V)	
	C04EL06210-00	Motor fan (110V)	
33	V03CS04610-00	Wired guard 92mm(Motor Fan)	
34	C04EL06110-00	Condenser fan (220V)	
	C04EL06010-00	Condenser fan (110V)	
35	C03RB00820-01	Foot, rubber	An instrument requires 6ea.
36	V01CS04610-00	Wired guard 120mm(Motor)	
37	C04EL04110-00	Damping resistor	An instrument requires one pair.
38		Imbalance sensor	
39		Imbalance bracket	
38-1	C06EL02910-00	Imbalance sensor	
39-1	C04CS02633-00	Imbalance bracket	
38-2	C99BD00720-01	Imbalance sensor (PCB A2)	From G411611040041 From L422611060001
40	C99RB00520-00	Insulator rubber for Imbalance sensor (PCB A2)	

39-2	C04CS02633-01	Imbalance bracket	
38-3	C99BD00720-02	Imbalance sensor (PCB A3)	From LG422613070152
39-3	C04CS02633-02	Imbalance bracket	
	C04EL81100-00	Imbalance Sensor Ass`y	Imbalance sensor(PCB A3) and Cable(Imbalance)
	C04EL08220-01	Cable(Imbalance)	
41	V03EL06710-00	Board fan (220V)	
	V03EL06610-00	Board fan (110V)	
42	C04BD00120-00	Main PCB - 1580R(A8)	
42-1	C04BD00120-01	Main PCB - 1580R(A1)	
42-2	C04BD00120-02	Main PCB - 1580R(A2)	From VW422512010001 From LG422512050025 From GZ422512060002 From LS422512070057
42-3	C04BD00120-03	Main PCB - 1580R(B1,Smart)	From LG422614050058 From GZ422514040036 From LS422514080111
43	C15BD01420-01	I/O Board	
50	C02BD00220-02	Display Board and LCD Assembly	
50-1	C04BD00220-01	Display Board and LCD Assembly	
50-2	C04BD00223-01	Display Board and LCD Assembly	
51	C04CS00332-01	Front case	
52	C04RB00720-00	Emergency hole opener	
53	C02CS04020-02	Overlay	
53-1	C04CS04020-03	Overlay	
53-2	C04CS04020-04	Overlay	
60	C04CS02120-01	Top cover of Motor packing - 1580R	
61	C04RB00320-00	Rubber packing of Motor - 1580R	
62	C04CS04420-00	Insulating packing of Motor	
63	C04MT90200-01	Final motor Assembly (220V)	Include RPM sensor, shaft hub and imbalance sensing magnet
64	C04MT90100-01	Final motor Assembly (110V)	Include RPM sensor, shaft hub and imbalance sensing magnet
	C03MT02120-00	Shaft hub	
65	C04MT80700-00	RPM sensor holder Assembly - 1580R	
65-1	C04MT80700-01	RPM sensor holder Assembly - 1580R	From G422511120074
66	C04MT80200-01	Motor Assembly (220V) - 1580R	Without RPM sensor, shaft hub and imbalance sensing magnet
67	C04MT80100-01	Motor Assembly (110V) - 1580R	Without RPM sensor, shaft hub and imbalance sensing magnet
	C99RB00620-00	Imbalance sensing magnet	
68	C03RB00120-01	Anti-vibration Damper	One set is composed of three dampers.
80	C04DR90100-00	Door lock Assembly (110V) - 1580R	
	C04DR90200-00	Door lock Assembly (220V) - 1580R	

81	C03EL90100-00	Door sensor - I	
82	C99EL03020-00	Door solenoid (110V)	
	C99EL03120-00	Door solenoid (220V)	
83	C04EL90100-01	Door sensor - II	
83-1	C15BD01520-00	Photoelectric sensor for door status	An instrument requires 3 or 4ea.
84	C04DR03433-00	Bracket for Door sensor - II	
84-1	C04DR03433-01	Bracket for Photoelectric sensor	An instrument requires 1 or 2ea.
85	C04EL90700-00	Sensor for door close status	
86	C04EL90600-00	Sensor for door open status	
87	C04DR01933-00	Bracket for Sensor for door close/open status	An instrument requires 2ea. This bracket is for 85 and 86.
87-1	C04DR01933-01	Bracket for Sensor for door close/open status	This bracket is for Photoelectric sensor.
87-2	C04DR01933-02	Bracket for Sensor for door close/open status	An instrument requires 2ea. This bracket is for Photoelectric sensor.
88	C04DR95000-00	Door latch Assembly	
88-1	C04DR95000-01	Door latch Assembly (for Photoelectric sensor)	
89	C04DR00733-03	Bracket for fixing Door latch	
90	C04EL09010-00	DC Geared motor for door lock system	
91	C04DR01833-00	Bracket for DC Geared motor	
92	C04DR02120-00	Spindle for DC Geared motor	
93	C04DR01733-00	Spindle bracket	
94	C04DR04320-00	Pin for Spindle bracket	
95	C04DR03320-00	Rod for door lock system	
	C04RF12510-01	Compressor-MP12TG	
	C04CS85000-00	1580R Chamber assembly	
	C04RB00220-00	Chamber Packing-1580R	