

Refrigerator Service Manual

BALLISTA2



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1. SPECIFICATIONS

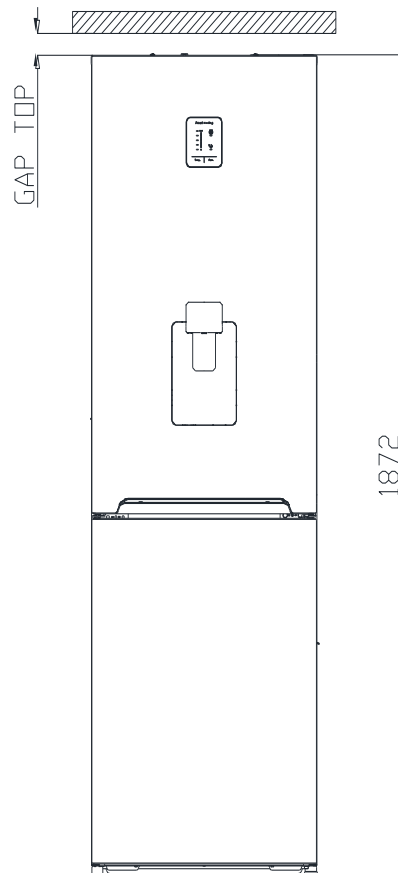
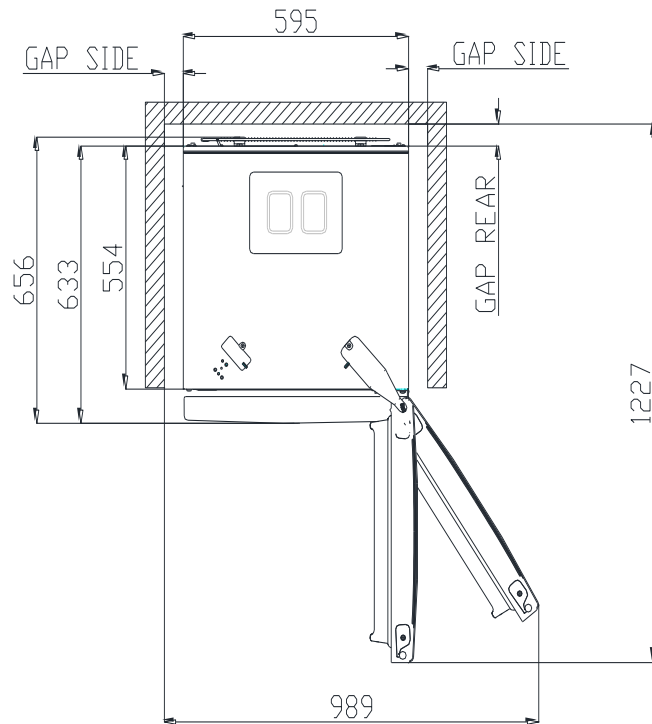
1-1. Model Information

* is the Door Type

Buyer No.			
Factory No.			
Gross Vol. ISO 15502 (unit: L)	Total	335 (Dispenser 有)	336 (Dispenser 無)
	Freezer	110 (Dispenser 有)	110 (Dispenser 無)
	Refrigerator	225 (Dispenser 有)	226 (Dispenser 無)
Storage Vol. ISO 15502 (unit: L)	Total	304 (Dispenser 有)	305 (Dispenser 無)
	Freezer	86 (Dispenser 有)	86 (Dispenser 無)
	Refrigerator	218 (Dispenser 有)	219 (Dispenser 無)
Diemension (unit: mm)	Net Width (Packing)	597(630)	
	Net Depth (Packing)	656(705)	
	Net Height (Packing)	1872(1970)	
Net Weight (Packing)		67(73)kg	
Control Type		KNOB & Digital Smart Control	
Cooling Cycle	Refrigerant Type	R-600a	
	Refrigerant Charge	0.044kg	
	Evaporator Type	Fin Type	
	Condenser Type	Natural Convection Cooling System	
	Dryer	Desiccant: Molecular Sieve xH-9	
	Capillary Tube (unit: mm)	ID0.7 x T0.55 x L2290	
Heater	Defrost Type	Automatic Start & Stop	
	Defrost Heater	AC230V, 130W	
	Defrost Shape	Sheath Type	
Freezer Fan Motor		DC12V, 2300RPM	
Refrigerator Lighting		Bulb 15W x 1EA	
Blowing Agent		C-Pentane	

1-2. Outside Dimensions & Interior Parts

1-2-1. Outside Dimensions

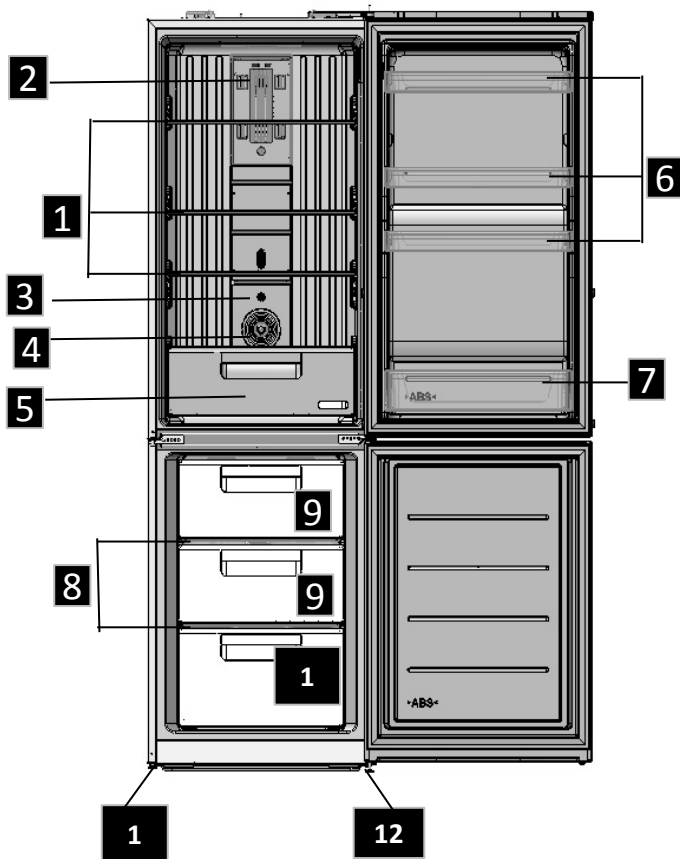


※ Allow sufficient space to the side, rear and top for air circulation (side and rear: at least 50mm, top: at least 100mm)

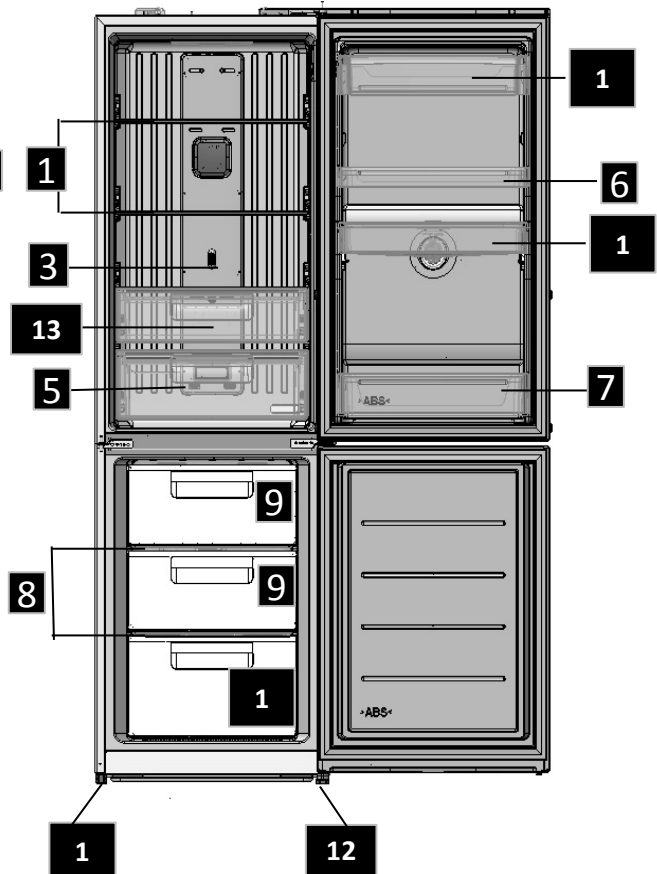
1-2. Outside Dimensions & Interior Parts

1-2-2. Interior Parts

Dial Type



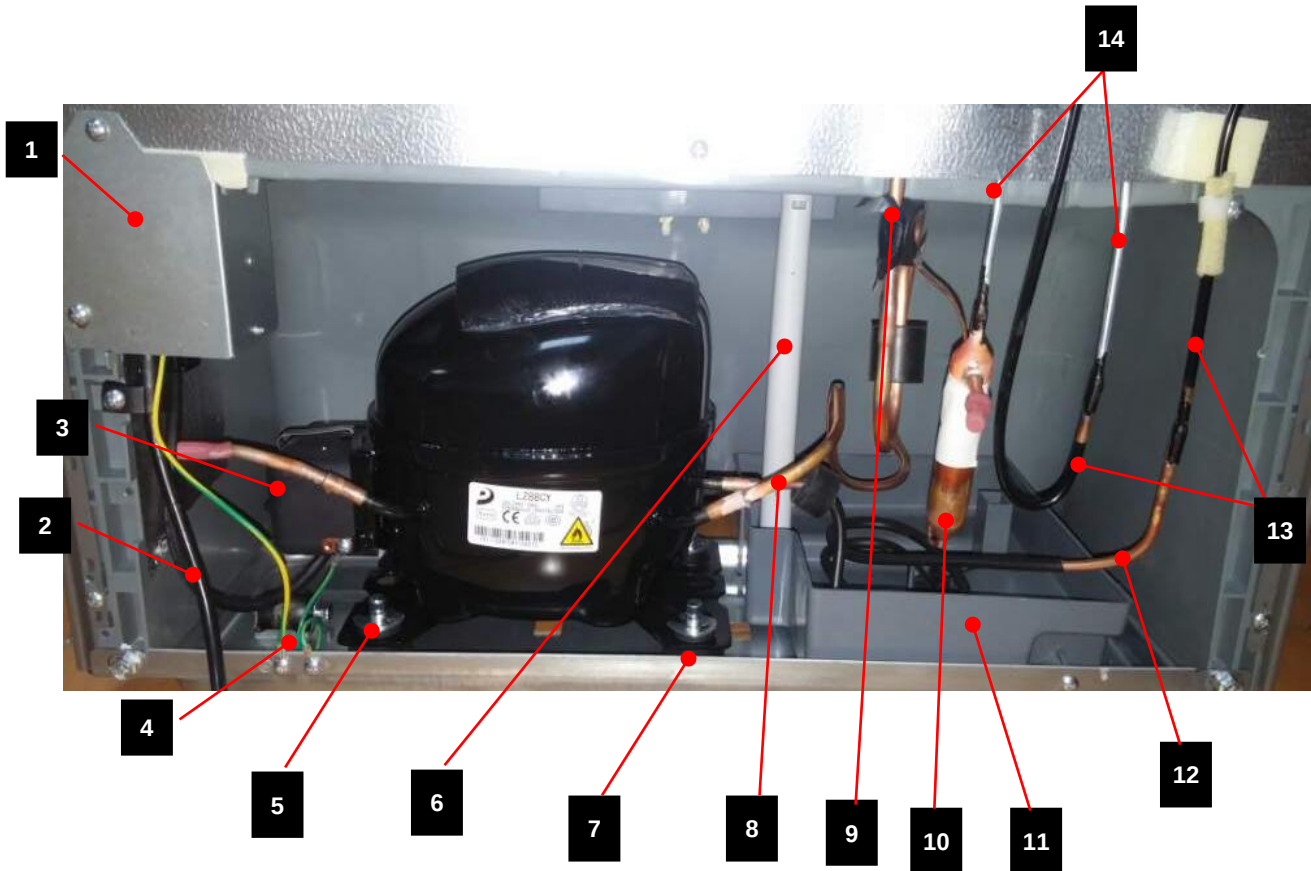
Fcp Type



1. Refrigerator Shelves
2. Lamp Window
3. Multi Duct
4. Knob R Control
5. Vegetable Case
6. Refrigerator Pocket "R"
7. Refrigerator Pocket "J"
8. Freezer Shelves
9. Freezer Case "A"

10. Freezer Case "B"
11. Adjusting Leg (Left)
12. Adjusting Leg (Right)
13. Fresh Case
14. Pocket Dairy
15. Water Tank

1-3. Machine (Compressor) Compartment View



1.Box Power As (Capacitor Run)

2. Power Cord

3. Switch P Relay As

4. Earth Comp Wire

5. Fixture Compressor (Washer)

6. Drain Hose

7. Compressor Absorber

8. Pipe Suction Connector

9. Pipe Suction As

10. Dryer As

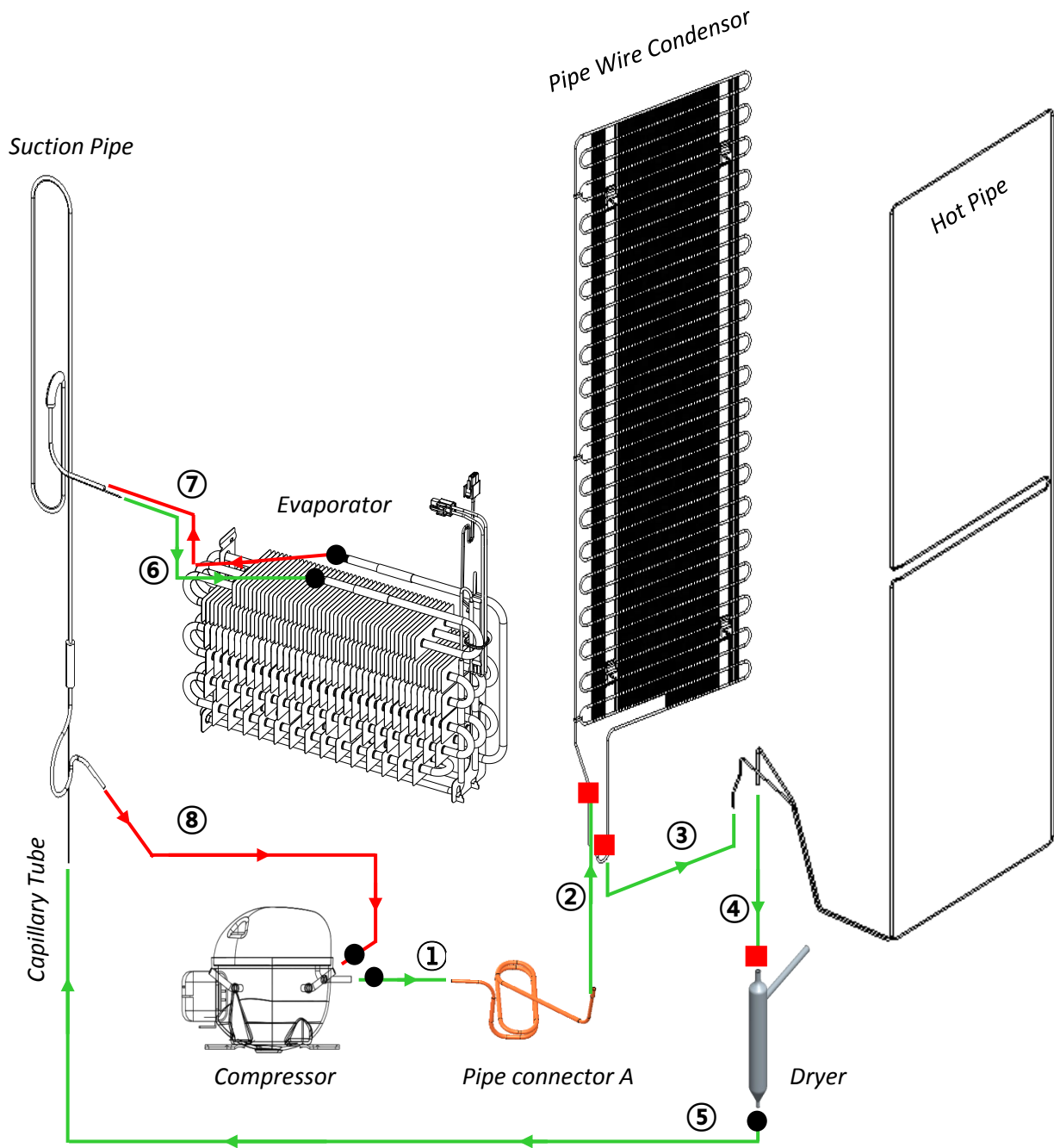
11. Case Vapor As

12. Pipe Connector A

13. Pipe Wire Condensor As

14. Pipe Hot

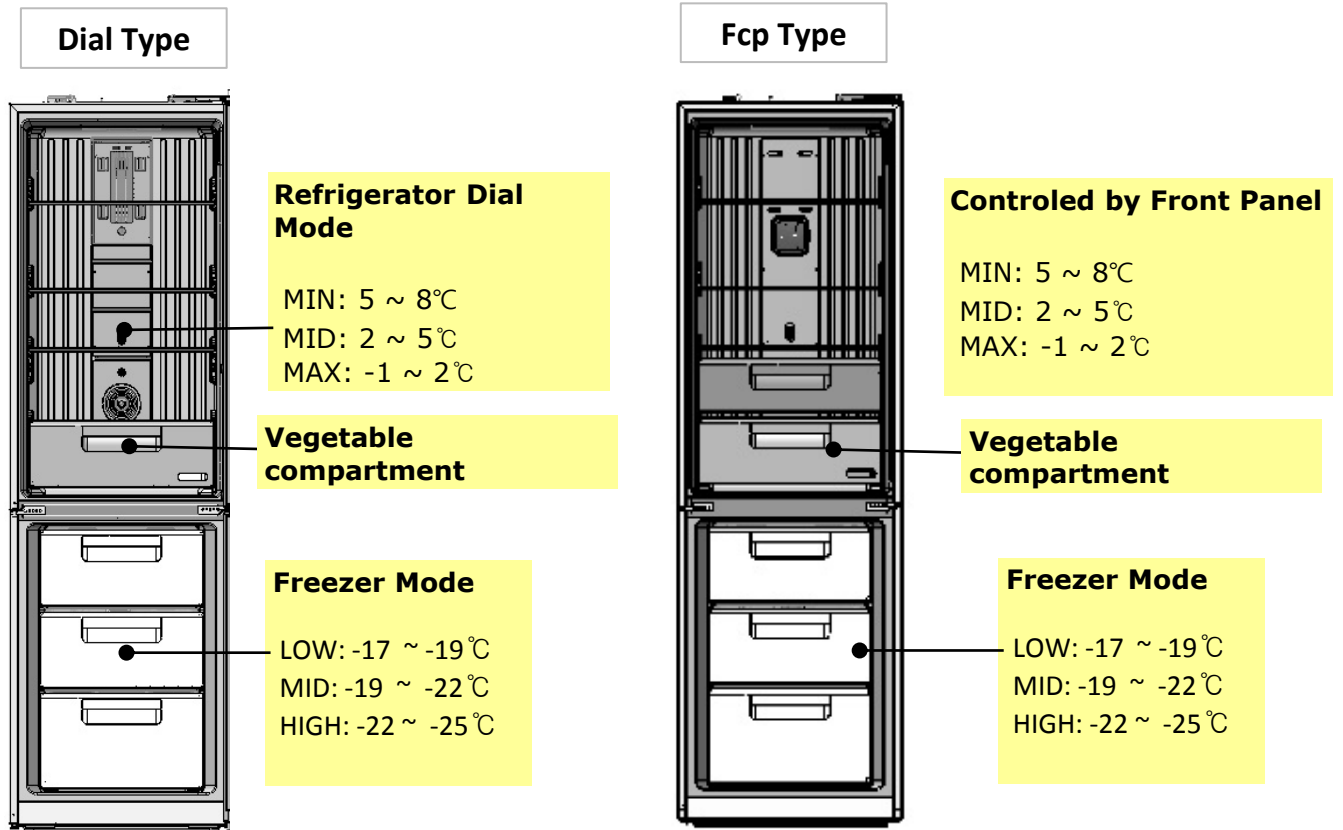
1-4. Refrigerant Cycle



- Welding Point

●	Copper Welding (Ag 5%)	5 Point
■	Silver Welding (Ag 30%)	3 Point

1-5. Temperature Diagram

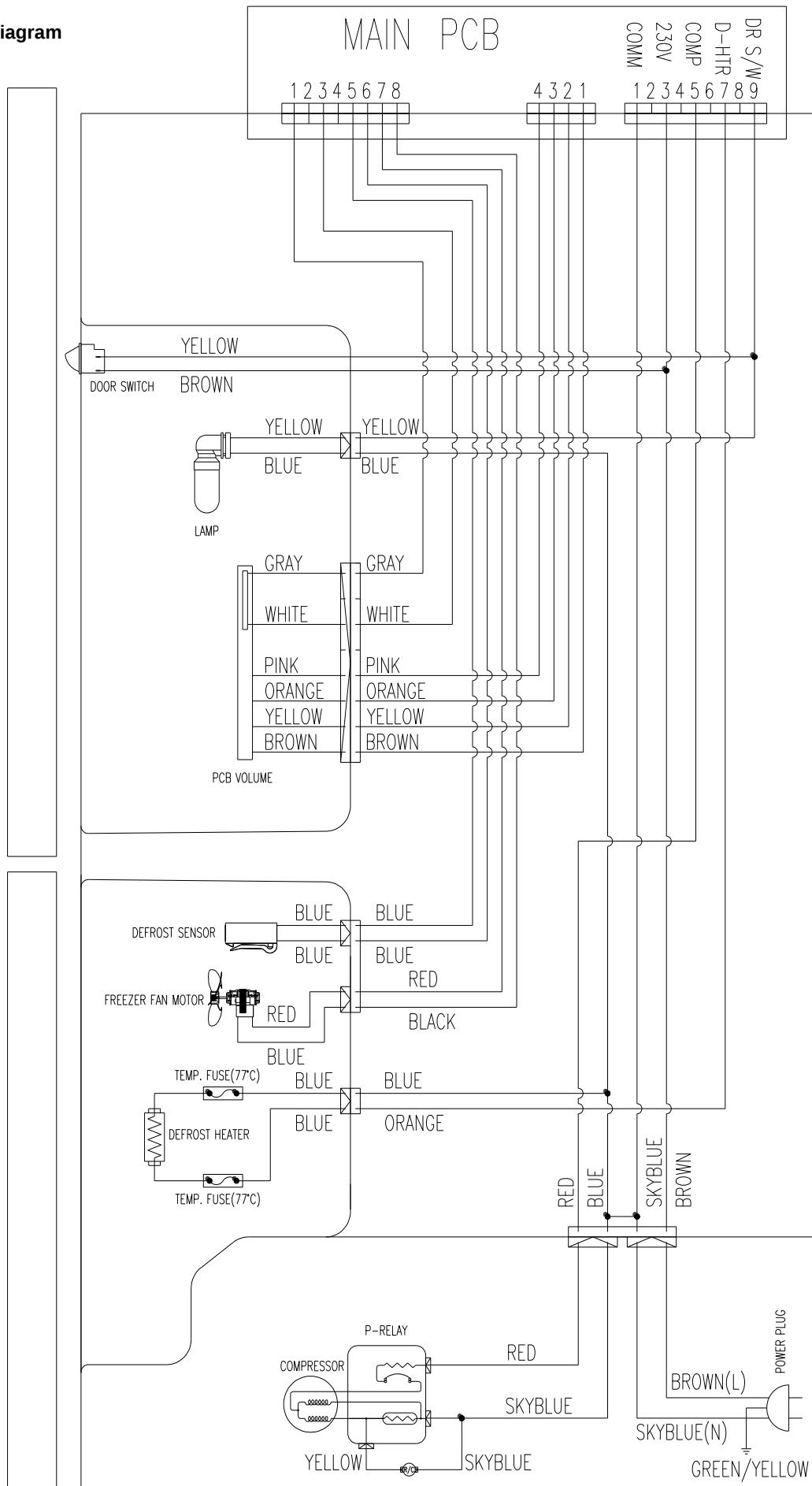


; The actual inner temperature varies depending on the food status, as the indicated setting temperature is a target temperature, not actual temperature within refrigerator.

; Refrigeration function is weak in the initial time.

Please adjust temperature as above after using refrigerator for minimum 1 ~ 2 days.

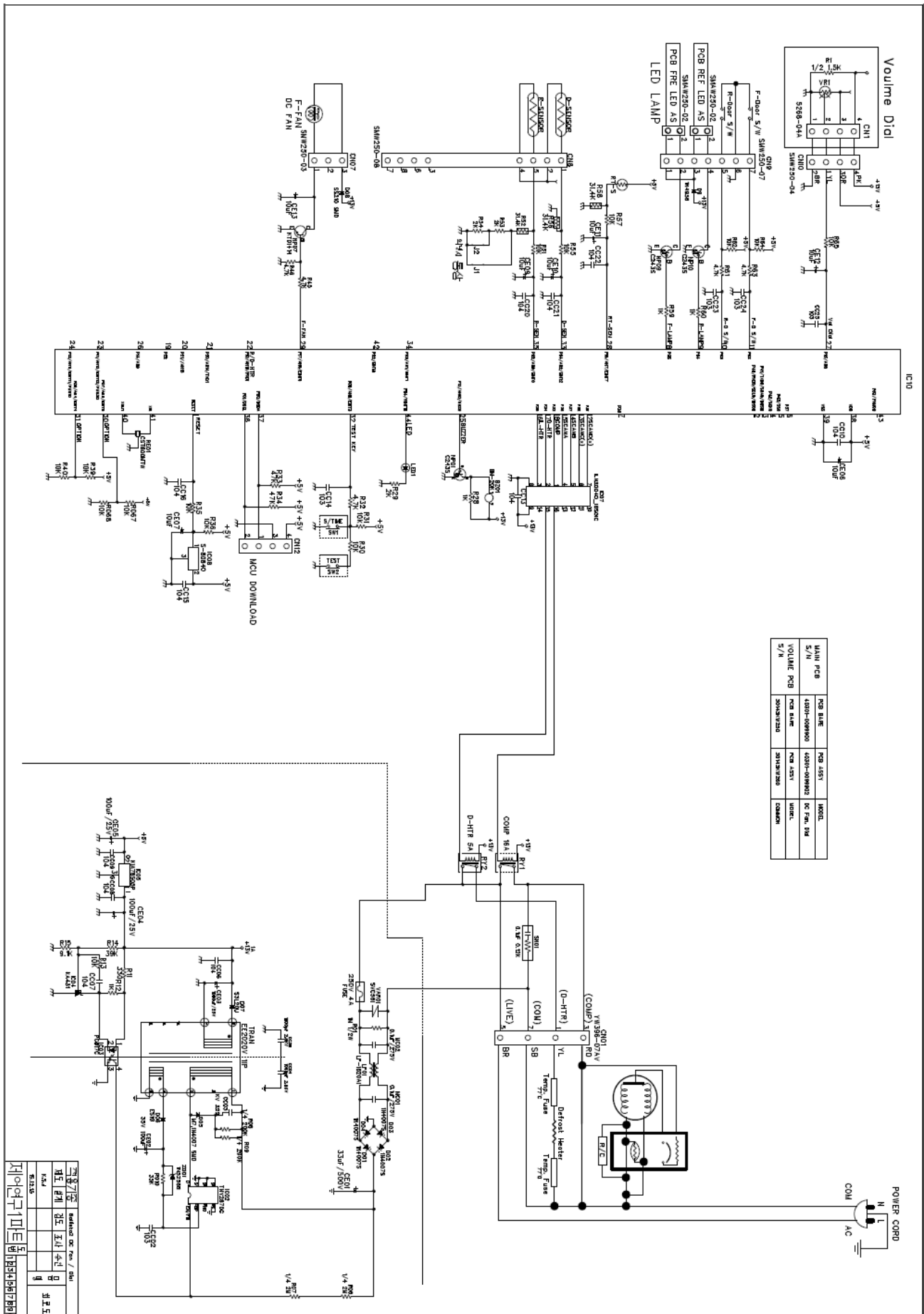
1-6. Wiring Diagram



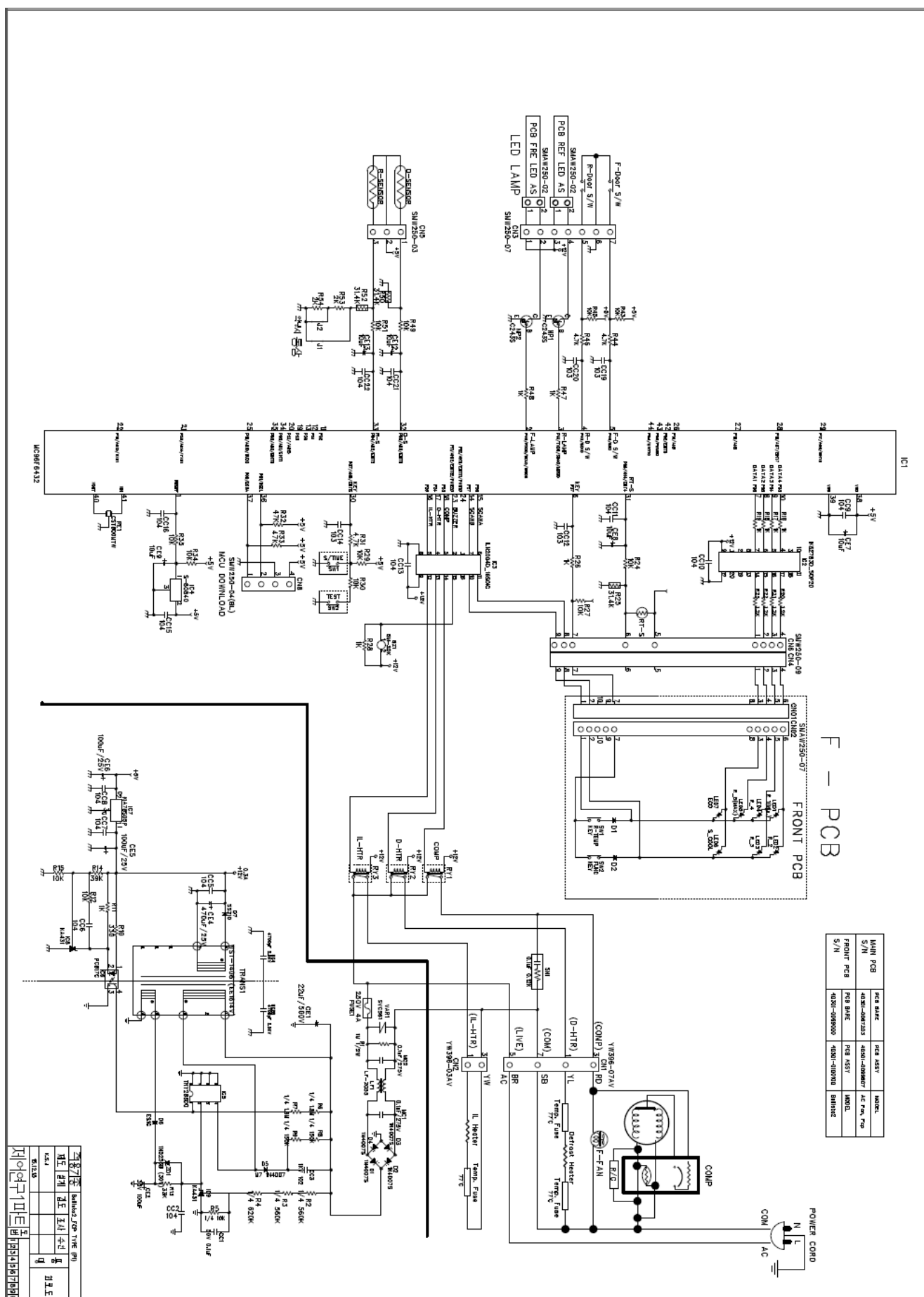
1.7. Main PCB Circuit Diagram

[illegible]

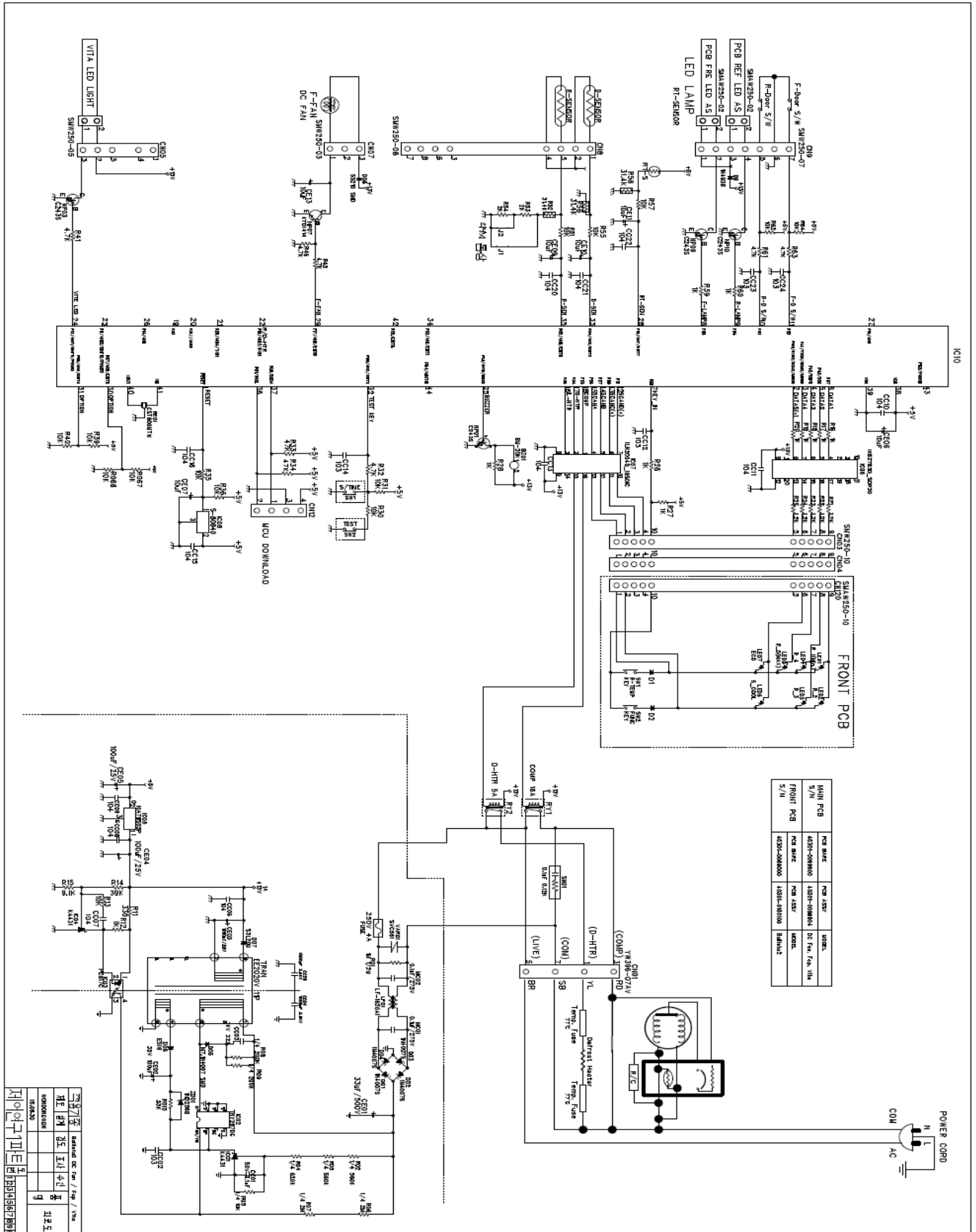
1.7. Main PCB Circuit Diagram



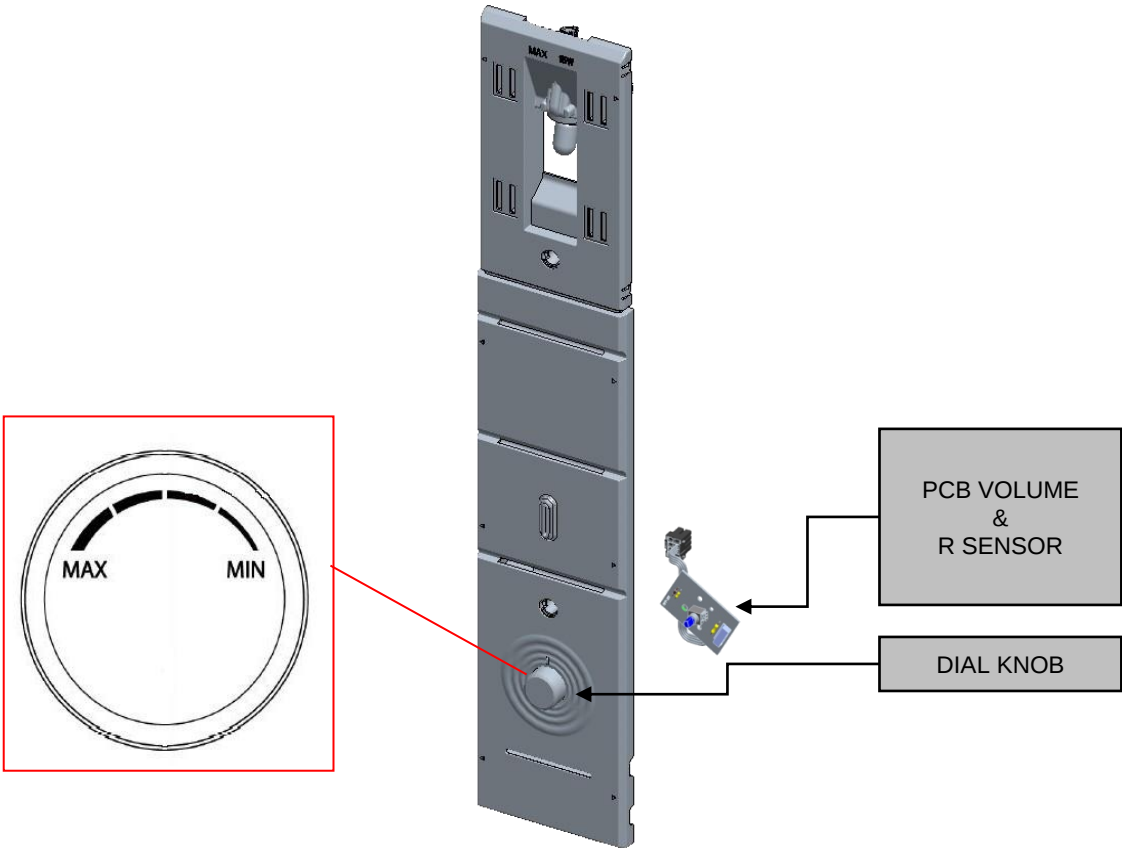
1.7. Main PCB Circuit Diagram



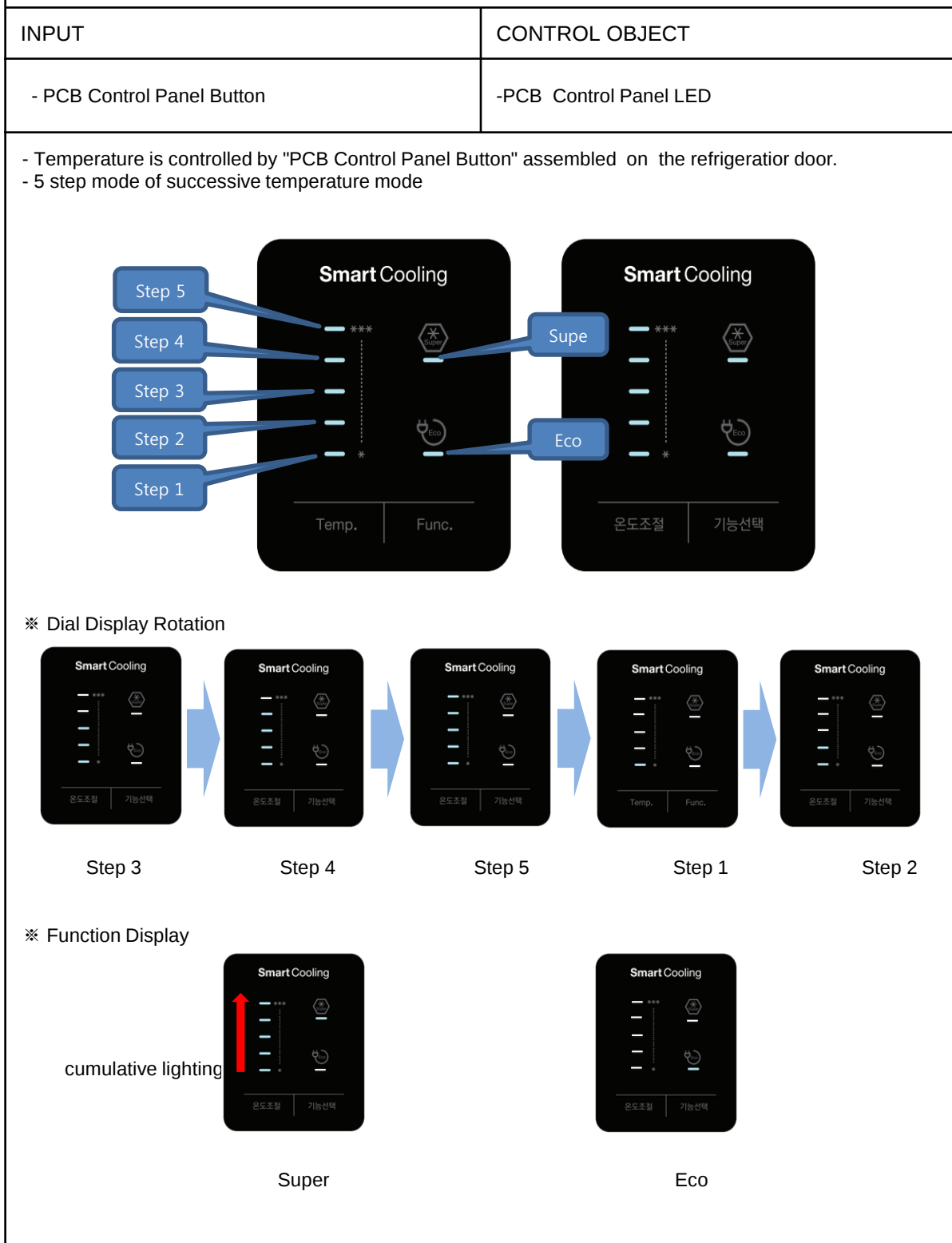
1.7. Main PCB Circuit Diagram



2-1. "PCB VOLUME" Control

INPUT	CONTROL OBJECT
- Turn 'DIAL KNOB' on the 'COVER M/FLOW DUCT'.	-PCB Volume
- Temperature is controlled by "PCB Volume" assembled with "Dial Knob". - 7step mode of successive temperature mode <'COVER M/FLOW DUCT AS': Air Duct Device in the Refrigerating Compartment> 	

2-1. "PCB VOLUME" Control



2-2. Temperature Control of Refrigerator Compartment

INPUT	CONTROL OBJECT
- Turn 'DIAL KNOB' - R sensor	- COMPRESSOR - FAN

A. COMP and FAN will be controlled by the on/off condition of each mode.

B. Temperature Difference of Refrigerator each step :

STEP	1	2	3	4	5	6	7
ON(°C)	5.5	4.4	3.4	2.3	1.6	0.5	-0.6
OFF(°C)	-0.7	-1.7	-2.7	-3.7	-4.4	-5.5	-6.6

MIN			MID			MAX
-----	--	--	-----	--	--	-----

C. Temperature of Refrigerator at Mid-'Dial Knob' OFF point : -3.7°C

D. Refrigerator ON/OFF Temp. Difference: 6°C

E. Temperature of Freezer Control

-It will be only controlled by using "KNOB F LOUVER" in the Freezer Comaprtment.

2-2. Temperature Control of Refrigerator Compartment

INPUT	CONTROL OBJECT
- PCB Control Panel Button - R sensor	- COMPRESSOR - FAN

A. COMP and FAN will be controlled by the on/off condition of each mode.

B. Temperature Difference of Refrigerator each step :

STEP	1	2	3	4	5	Super
ON(°C)	9.0	6.9	5.1	4.0	1.4	1.4
OFF(°C)	2.4	0.4	-1.3	-2.4	-3.0	-3.0

MIN		MID		MAX	Super
-----	--	-----	--	-----	-------

C. Temperature of Refrigerator at 'NOR' OFF point : -1.3°C

D. Refrigerator ON/OFF Temp. Difference: 6.5°C

E. Temperature of Freezer Control

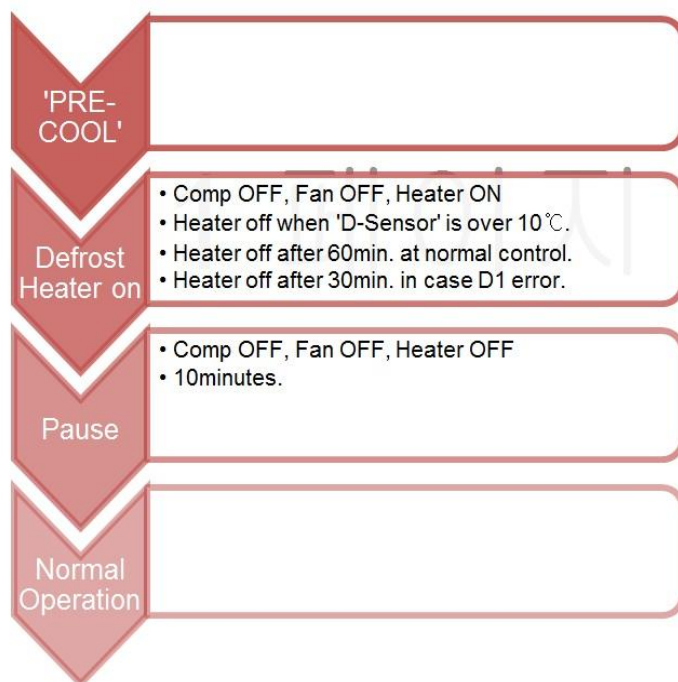
-It will be only controlled by using "PCB Control Panel Button" in the Freezer Comaprtment.

2-3. Defrost Mode

INPUT	CONTROL OBJECT
- Accumulated Compressor Run Time - Running Time Ratio of Compressor - Accumulated Door Open Time	- Compressor - F Fan - Defrost Heater

A. Defrost Mode Operation condition

- (1) In case accumulated compressor run times: 6, 8, 10, 12 hours,
- when there occur any errors:
R1, D1, C1, RT, Door SW error etc. (Check "2-9. ERROR DISPLAY")
 - or, running rate of COMP (per 2hrs of accumulated operation time) is more than 90%
 - or, accumulated door open time is over 2 minutes
- (2) Even if the above condition is not satisfied,
- defrost mode starts immediately when accumulated compressor run time is 14hrs.
 - total compressor running time (on time + off time) is 72hours.

B. Normal Defrost Mode**C. Forced Defrost Mode**

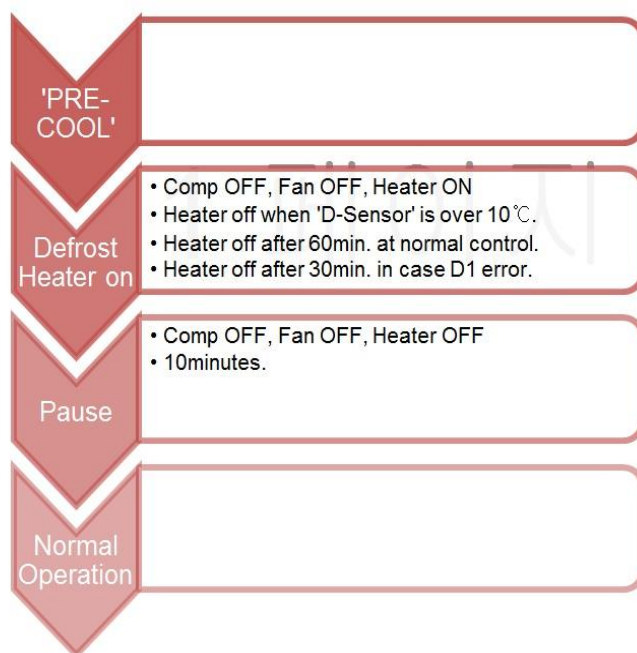
- How to start:
 - (1) by press Door S/W for continuously and Control 'Dial Knob'(MIN -> MAX) 1 times.
 - (2) or, by press 'Test Key' 3 times on Main PCB
- If appliance has any error, Forces Defrost Mode don't start.
- Process: same as Normal Defrost Mode except 'PRE-COOL'
 - ※ Heater is supposed to be on Initial 30sec. even though the temp. at "D SENSOR" is over 10°C. (for TEST)
- How to confirm: If Force Defrost Mode start, you can buzzer sound

2-3. Defrost Mode

INPUT	CONTROL OBJECT
- Accumulated Compressor Run Time - Running Time Ratio of Compressor - Accumulated Door Open Time	- Compressor - F Fan - Defrost Heater

A. Defrost Mode Operation condition

- (1) In case accumulated compressor run times: 6, 8, 10, 12 hours,
 - when there occur any errors: R1, D1, C1, RT, Door SW error etc. (Check "2-9. ERROR DISPLAY")
 - or, running rate of COMP (per 2hrs of accumulated operation time) is more than 90%
 - or, accumulated door open time is over 2 minutes
- (2) Even if the above condition is not satisfied,
 - defrost mode starts immediately when accumulated compressor run time is 14hrs.
 - total compressor running time (on time + off time) is 72hours.

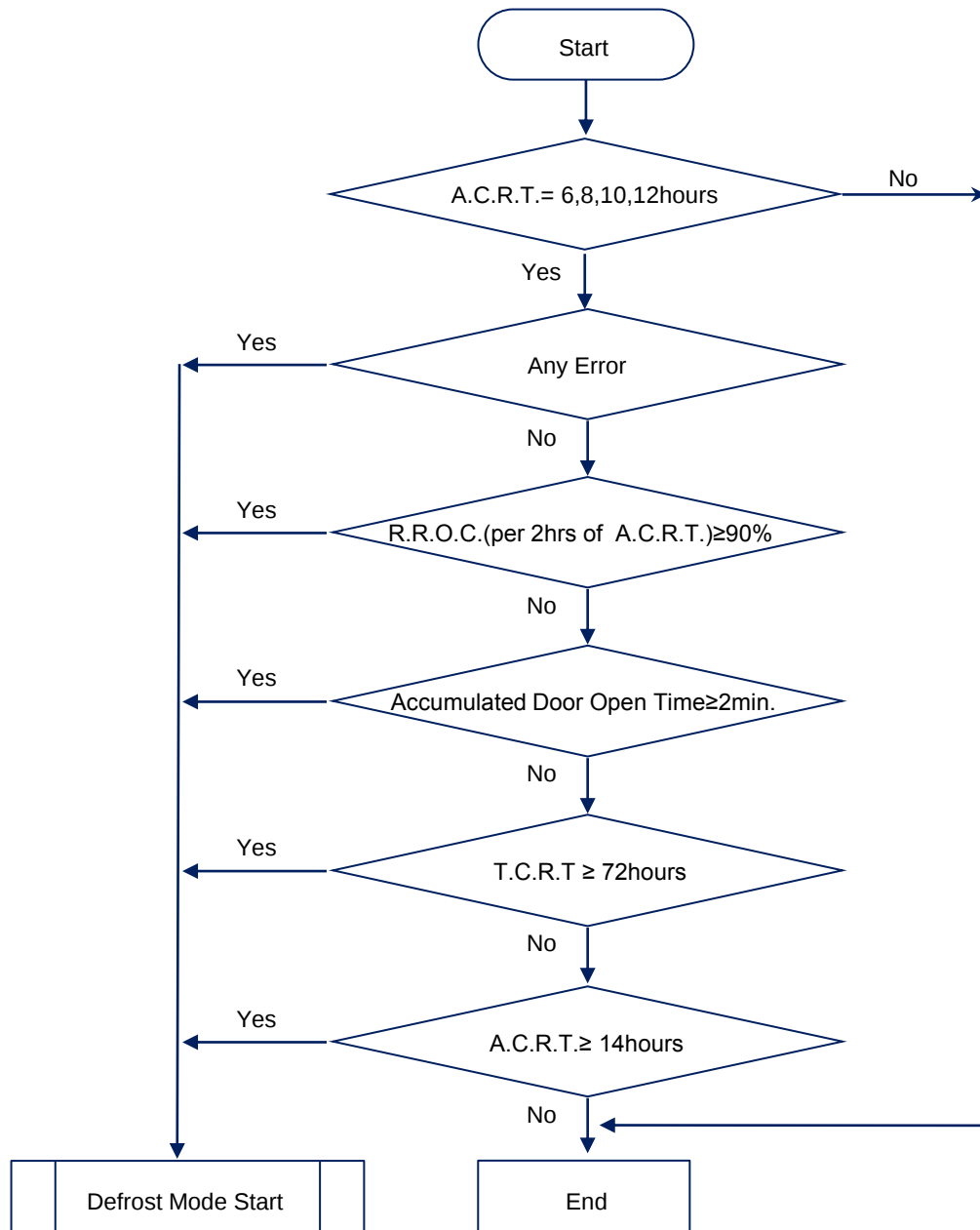
B. Normal Defrost Mode**C. Forced Defrost Mode**

- How to start:
 - (1) by press "TEMP" button for continuously and "FUNC" button 5 times.
 - (2) or, by press 'Test Key' 3 times on Main PCB
- If appliance has any error, Forces Defrost Mode don't start.
- Process: same as Normal Defrost Mode except 'PRE-COOL'
 - ※ Heater is supposed to be on Initial 30sec. even though the temp. at "D SENSOR" is over 10°C. (for TEST)
- How to confirm: If Force Defrost Mode start, you can buzzer sound

2-3. Defrost Mode

D. Flow chart of How to Start Defrost Mode

- ※ A.C.R.T. : Accumulated Compressor Run Times
- ※ R.R.O.C. : Running Rate of Compressor
- ※ T.C.R.T. : Total Compressor Running Time (on time + off time)



2-4. Function of Low Ambient Temperature (RT)	
INPUT	CONTROL OBJECT
RT	- COMP
A. Condition of LOW RT - RT sensor below 21°C - When the RT sensor is over 21°C, the system comes to be "General Operation Mode". - When the RT sensor is between 20.5°C to 21°C, the system keeps the previous mode. B. Control - When the temp of RT sensor is between 13°C to 21°C, COMP on temp is 1.5°C DOWN and off Temp is 2.0°C UP - When the temp of RT sensor is below 13°C, COMP on temp is 2.5°C DOWN and off Temp is 1.5°C UP	

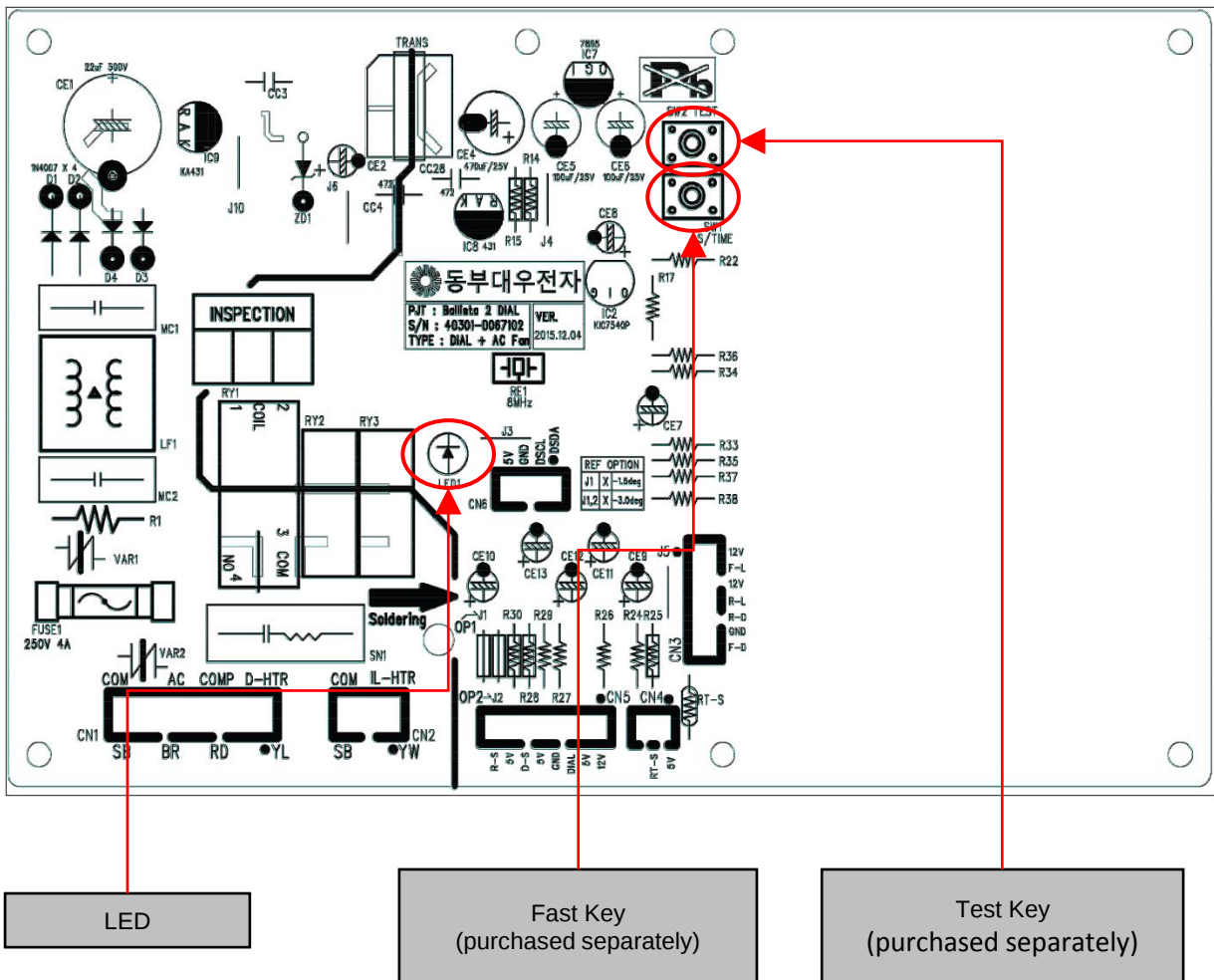
2-5. Prevention of Compressor Restart	
INPUT	CONTROL OBJECT
N/A	COMP
It takes several minutes to protect Compressor: - 6 minutes after Comp off	

2-6. Buzzer Sound	
INPUT	CONTROL OBJECT
- Forced Defrost Mode start - Door Switch - Initial Power Input	Buzzer
A. When Forced Defrost Mode start, the buzzer rings 3 times. B. After 2 seconds power's on, the buzzer rings 3 times. C. At Short Circuit Test, the buzzer rings 1 times. D. When door opens, the buzzer rings every 1 minute for 5 minutes.	

2-7. Time Saving Function

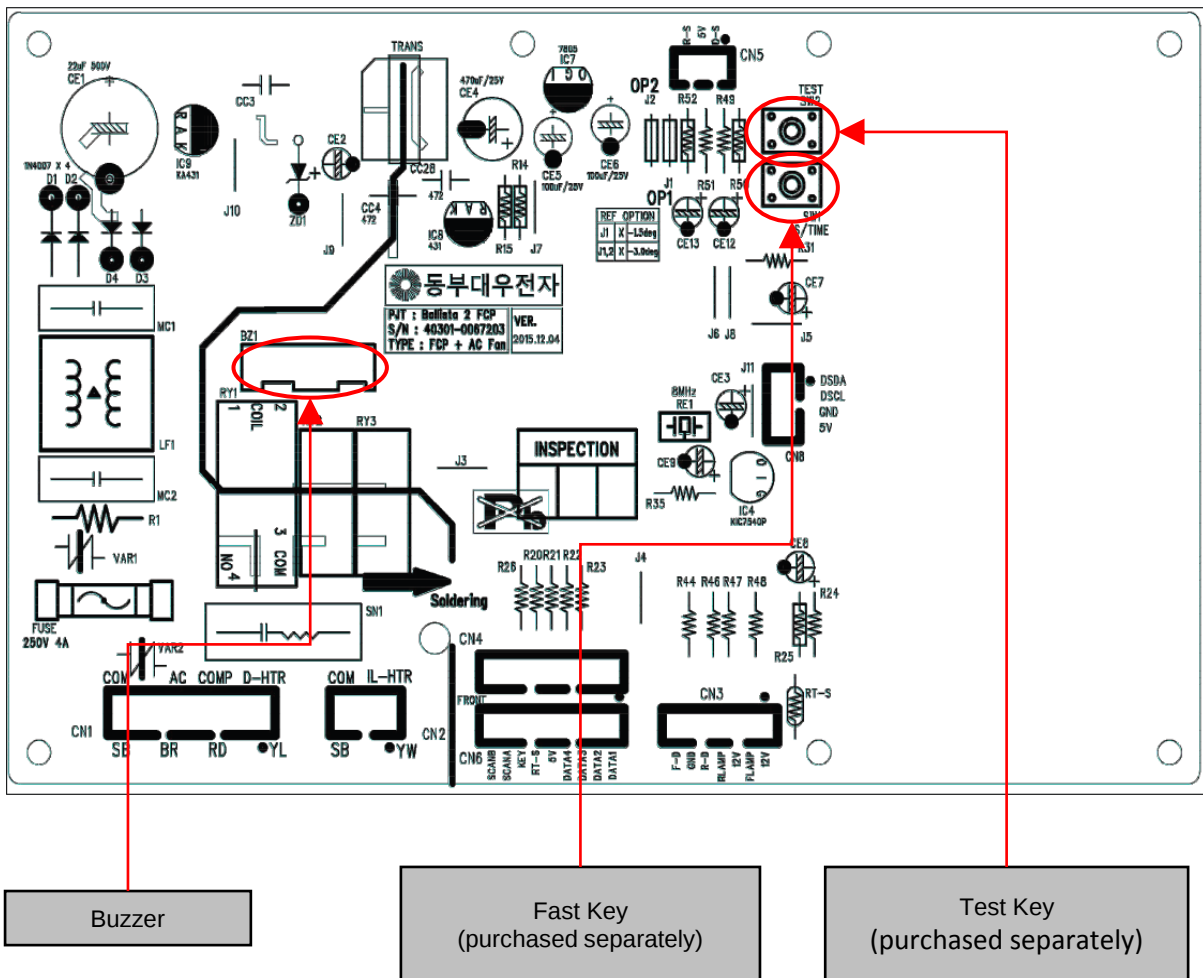
INPUT	CONTROL OBJECT
"FAST KEY"	
A. How to Save - 1 min : Click FAST KEY one time on MAIN PCB. - 30 min : If you press FAST KEY continuously, you can reduce 30 minutes on each 2.5 seconds. B. Example for usage: when reduce test time	

MAIN PCB



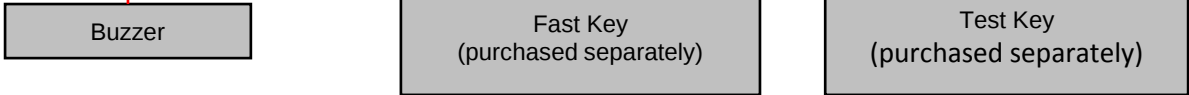
2-7. Time Saving Function	
INPUT	CONTROL OBJECT
"FAST KEY"	Buzzer
A. How to Save - 1 min : Click FAST KEY one time on MAIN PCB. - 30 min : If you press FAST KEY continuously, you can reduce 30 minutes on each 2.5 seconds with buzzer. B. Example for usage: when reduce test time	

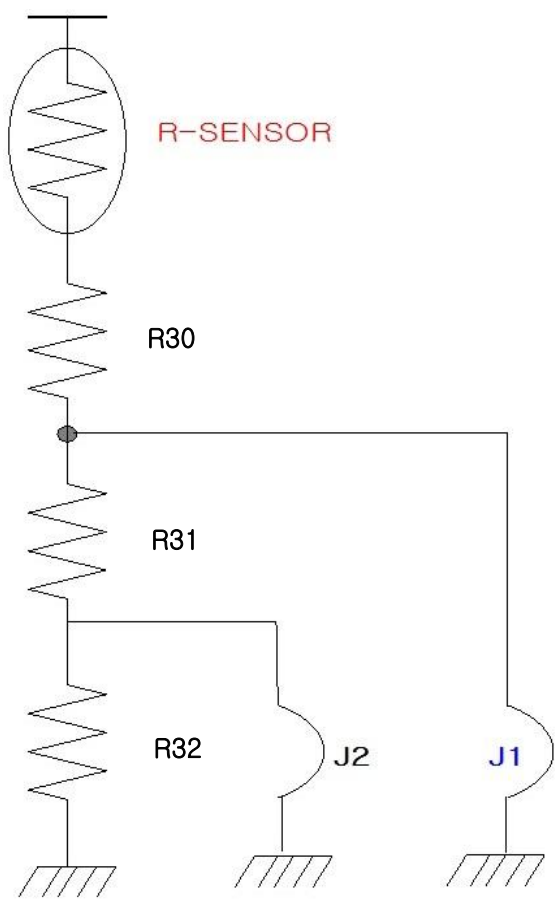
MAIN PCB

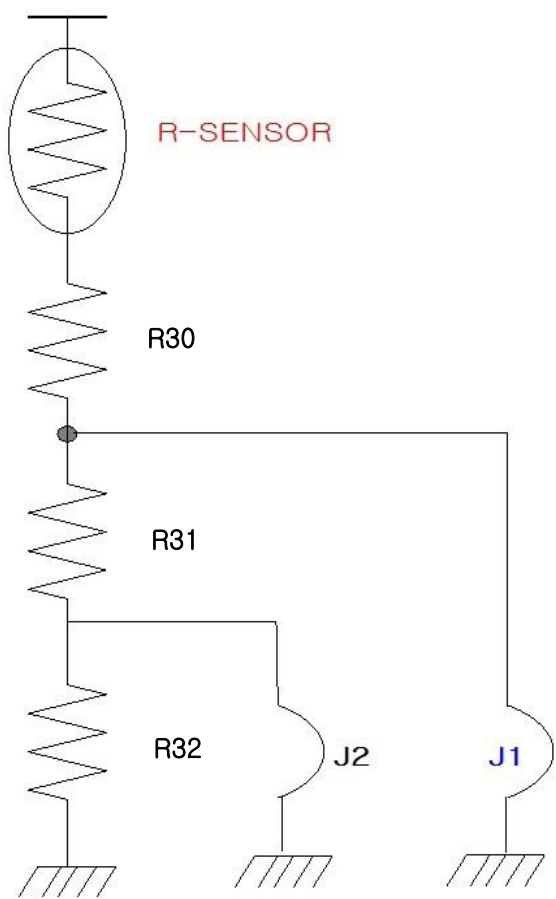


2-7. Time Saving Function	
INPUT	CONTROL OBJECT
"FAST KEY"	Buzzer
A. How to Save - 1 min : Click FAST KEY one time on MAIN PCB. - 30 min : If you press FAST KEY continuously, you can reduce 30 minutes on each 2.5 seconds with buzzer. B. Example for usage: when reduce test time	

MAIN PCB



2-8. Control of R-sensor OFF Point	
INPUT	CONTROL OBJECT
"J1", "J2" On Main PCB	Control Resistance of R sensor OFF Point
- When the refrigeration of refrigerator is poor or weak though Fan and COMP are working continuously, the following actions are recommended for service. (1) Resistance (R30) : Default resistance (31.4Kohms) (2) Resistance (R30+R31) : Cut the "J1" off to reduce Default R sensor OFF Point by 1.5°C. (2Kohms up) (3) Resistance (R30+R31+R32) : Cut the "J2" off additionally to reduce Default R sensor OFF Point by 3.0°C. (total 4Kohms up) ※ R30 = R-SENSOR OFF point R30 + R31 = R-SENSOR OFF point - 1.5°C R30 + R31 + R32 = R-SENSOR OFF point - 3°C 	

2-8. Control of R-sensor OFF Point	
INPUT	CONTROL OBJECT
"J1", "J2" On Main PCB	Control Resistance of R sensor OFF Point
- When the refrigeration of refrigerator is poor or weak though Fan and COMP are working continuously, the following actions are recommended for service. (1) Resistance (R52) : Default resistance (31.4Kohms) (2) Resistance (R53+R54) : Cut the "J1" off to reduce Default R sensor OFF Point by 1.5°C. (2Kohms up) (3) Resistance (R52+R53+R54) : Cut the "J2" off additionally to reduce Default R sensor OFF Point by 3.0°C. (total 4Kohms up) ※ R52 = R-SENSOR OFF point R52 + R53 = R-SENSOR OFF point - 1.5°C R52 + R53 + R54 = R-SENSOR OFF point - 3°C 	

2-9. Error Display

INPUT	CONTROL OBJECT
Sensor Error	LED Lamp

- ERROR DISPLAY

- If appliance has any errors, LED on the Main PCB is flickering.

- If the appliance is normal (no error), LED IS off.

A. 'R1' ERROR

: It happens when R-Sensor is OPEN or SHORT.

(1) LED DISPLAY: Shortly flickering(0.3sec.) 1 times.

(2) CONTROL:

Controlled by the following condition of RT

RT sensor TEMP (unit: °C)	~13	~21	~30	~40	~43	43~	RT-S Error
COMP. Operating ON/OFF TIME (unit: min.)	7/50	10/35	25/35	30/26	50/15	50/15	30/26

※ If 'RT ERROR' happens at the same time, "COMP. ON/OFF Operating Time" is 30min/26min.

(3) RELEASE: When R-Sensor is working normally.

B. 'RT' ERROR

: It happens when RT-Sensor is OPEN or SHORT.

(1) LED DISPLAY: Shortly flickering(0.3sec.) 2 times.

(2) CONTROL: Delete the conditions of 'RT-sensor Control' and operate normally.

(3) RELEASE: When RT-Sensor is working normally.

C. 'd1' ERROR

: It happens when D-Sensor is OPEN or SHORT.

(1) LED DISPLAY: Shortly flickering(0.3sec.) 3 times.

(2) CONTROL: Return to next limit defrost time (30 min)

(3) RELEASE: When D-Sensor is working normally.

D. 'DR' / 'DF' ERROR

: It happens when the system senses R/F door opens more than 1 hour.

(1) LED DISPLAY: Shortly flickering(0.3sec.) 4 times / 5 times.

(2) CONTROL: Delete function relating to R/F door switch sensing

(3) RELEASE: When sensing close from R/F door S/W.

E. 'F3' ERROR

: It happens when Defrost Heater off after 60min.

(1) LED DISPLAY: Shortly flickering(0.3sec.) 6 times.

(2) CONTROL: Skip the step 'PRE-COOL' of Defrost Mode.

(3) RELEASE: Defrost Heater off by D-Sensor.

※ When pushing 'TEST KEY' on the main PCB,

LED is long(1.0sec.) flickering several times.

ex. 'Forced Defrost Mode:' long flickering 2 times

flicker

CODE	LED	ERROR
R1	1time	R sensor
RT	2times	RT sensor
d1	3times	D sensor
DR	4times	DR Switch
DF	5times	DF Switch
F3	6times	Defrost

- To Confirm Errors:

Check LED on the main PCB

- The Priorities of Error :

R1→RT→D1→DR→DF→F3



CODE	LED	ERROR
R1	1time	R sensor
RT	2times	RT sensor
d1	3times	D sensor
DR	4times	DR Switch
DF	5times	DF Switch
F3	6times	Defrost
- To Confirm Errors: Check LED on the main PCB		
- The Priorities of Error : R1→RT→D1→DR→DF→F3		

2-9. Error Display

INPUT	CONTROL OBJECT
PCB Control Panel Buttons on Door	LED DISPLAY

- Error Check Mode

(1) How to start: Push "FUNC" button for continuously and "TEMP" button 5 times .

(2) What happen: LED "ECO" flickering, and if any errors occur, the related LEDs on.

(3) CANCEL: Push "TEMP" button 1 time, or wait 4 minutes.

※ After operations back to normal, the displays come to be reset.

A. "R1" ERROR

: It happens when R-Sensor is OPEN or SHORT.

(1) LED DISPLAY: LED "1" flickering (OPEN) / LED "1" on (SHORT)

(2) REACTION: Controlled by the following condition of RT

RT sensor TEMP (unit: ℃)	~13	~21	~30	~40	~43	43~	RT-S Error
COMP. Operating ON/OFF TIME (unit: min.)	7/50	10/35	25/35	30/26	50/15	50/15	30/26

※ If 'RT ERROR' happens at the same time, "COMP. ON/OFF Operating Time" is 30min/26min.

(3) RELEASE: When R-Sensor is working normally.

B. "RT" ERROR

: It happens when RT-Sensor is OPEN or SHORT.

(1) LED DISPLAY: LED "2" flickering (OPEN) / LED "2" on (SHORT).

(2) REACTION: Delete the conditions of RT-sensor Control and operate normally.

(3) RELEASE: When RT-Sensor is working normally.

C. "d1" ERROR

: It happens when D-Sensor is OPEN or SHORT.

(1) LED DISPLAY: LED "3" flickering (OPEN) / LED "3" on (SHORT).

(2) REACTION: Return to next limit Defrost Time (30 min).

(3) RELEASE: When D-Sensor is working normally.

D. "DR" / "DF" ERROR

: It happens when the system senses R/F door opens more than 1 hour.

(1) LED DISPLAY: LED "4 / 5" on.

(2) REACTION: Delete function relating to R/F door switch sensing.

(3) RELEASE: When sensing close from R/F door S/W.

E. 'F3' ERROR

: It happens when Defrost Heater off after 60min.

(1) LED DISPLAY: : LED "Super" on.

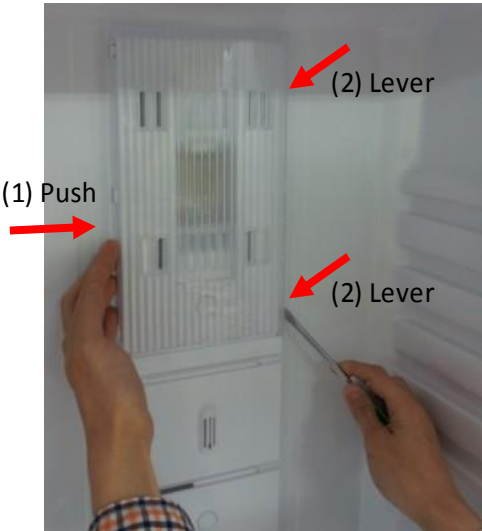
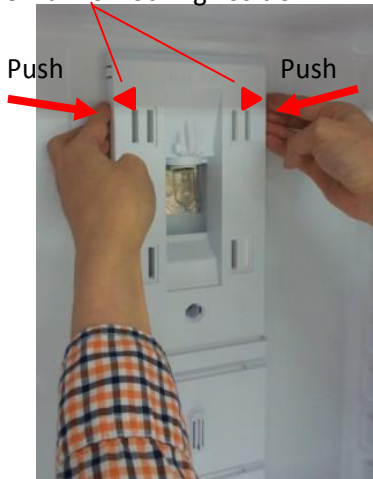
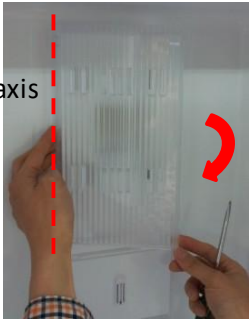
(2) CONTROL: Skip the step 'PRE-COOL' of Defrost Mode.

(3) RELEASE: Defrost Heater off by D-Sensor.

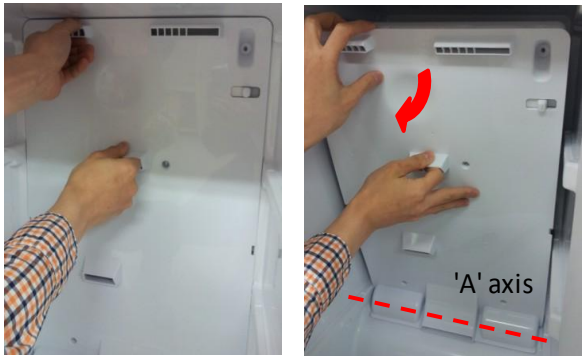
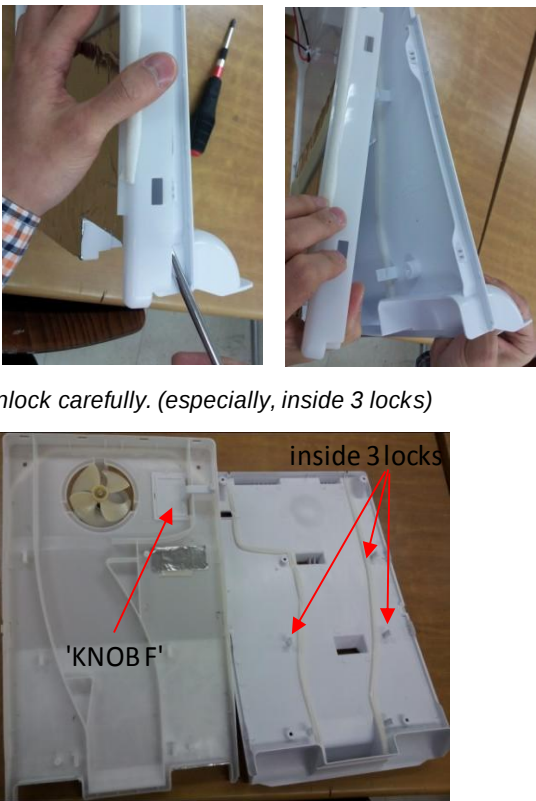
3-1. Door Switch

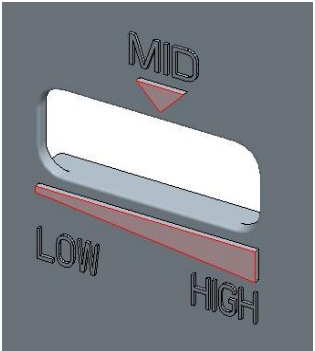
No	Procedure	No	Procedure
1	 <i>Inuput a thin driver in the upper part as above picture. And lift up 'Door Switch' carefully.</i>	3	
2	 <i>Inuput a thin driver in the lower part as above picture. And lift up 'Door Switch' carefully.</i>		 <i>Disconnect the wire housing.</i>

3-2. Cover Multi-Flow Duct As (in Fresh food Compartment)

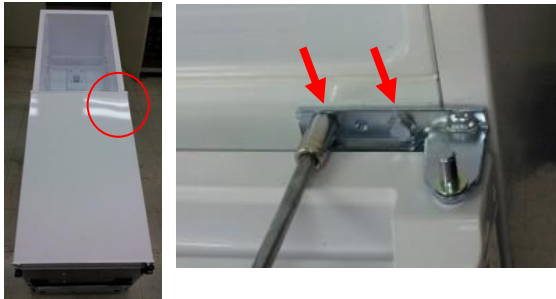
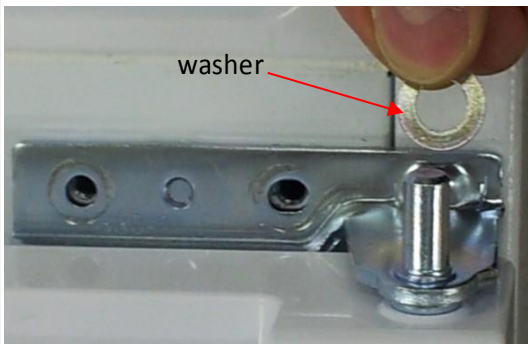
No	Procedure	No	Procedure
1	 Unlock the lamp window (1) Push the window right side (2) Lever two window lock with flat driver	4	the Mark of Locking Position  Unlock the 'COVER MFLOW DUCT' (1) Check the marks of locking position on 'Cover'. (Number of the marks are model dependent) (2) Push the 'cover' inside and Unlock.
2	 Open window turning on the axis 'A'	5	  Disconnect the Lamp & Sensor wire housing.
3	  Remove two screw cap with flat driver. Unscrew 2 points		

3-3. Louver F As (in Frozen Food Compartment)

No	Procedure	No	Procedure
1	 Unscrew to disassemble the 'Louver F As' from Freezer.	4	 Unscrew to disassemble as each component part.
2	 Remove the 'Louver F As' pulling the top side.	5	 Unlock carefully. (especially, inside 3 locks) inside 3 locks 'KNOBF' ※Default position of 'KNOB F' is 'MID'
3	 Disconnect Fan motor wire housing.		



3-4. DOOR F/R

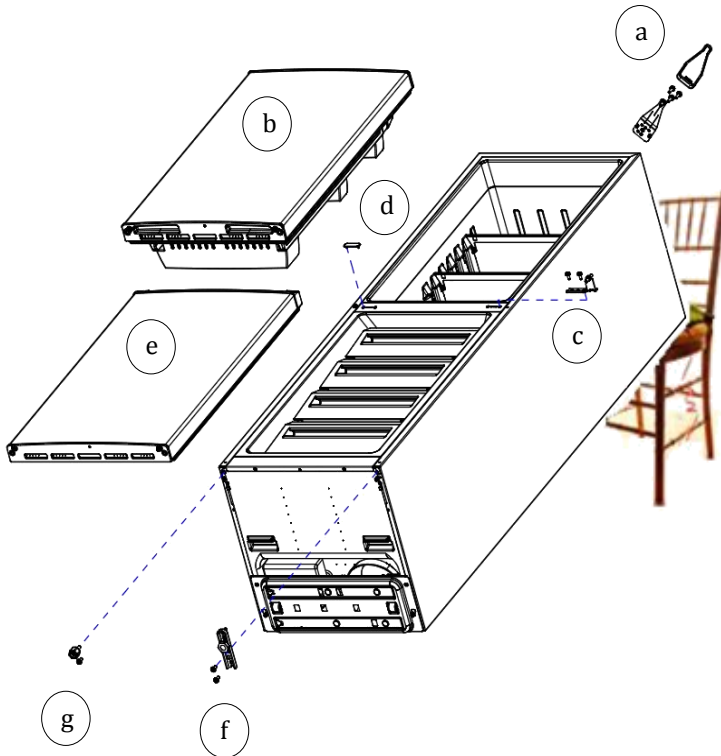
No	Procedure	No	Procedure
1	 Tilt down the appliance to the rear.	 Remove door in fresh food compartment. And unscrew middle hinge.	
2	 Lift up top cover hinge to remove.	 ※ Don't forget the washer for middle hinge.	
3	 Unscrew and remove top hinge.	 Lift up middle cover hinge to remove.	

3-4. DOOR F/R

No	Procedure	No	Procedure
6	  <i>Unscrew and remove under hinge.</i>  ※ Don't forget the washer for under hinge. ※ The washer for under hinge's bigger than middle one.	7	   <i>Turn the 'Adjusting Leg (Left)' CCW and Remove.</i>
		8	 <i>Remove door in frozen food compartment.</i>

4. How To Change Door Position

Features are model dependent (Below is RN-271 model)



1-1> Tilt down the appliance to the rear.
(Watch out for "Pipe Wire Condensor" damage.)

1-2> Disassemble following parts in order.

- 'Top Cover Hinge' and 'Top Hinge'(a)
- 'Refrigerator Door'(b)
- 'Middle Hinge'(c)
- 'Middle Cover Hinge'(d)
- 'Freezer Door'(e)
- 'Under Hinge'(f)
- 'Adjusting Leg '(g)

1-3> Move following 'Door Accessories' in the opposite position:

- 'Cover Bushings'(i)
- 'Door Stoppers'(j)

1-4> Change the position of following parts each other and assemble them:

'Adjusting Leg '(g) & 'Under Hinge'(f)

1-5> Level and assemble the 'Freezer Door'(e)

1-6> Change the position of following parts each other and assemble them:

'Middle Cover Hinge'(d) & 'Middle Hinge'(c)

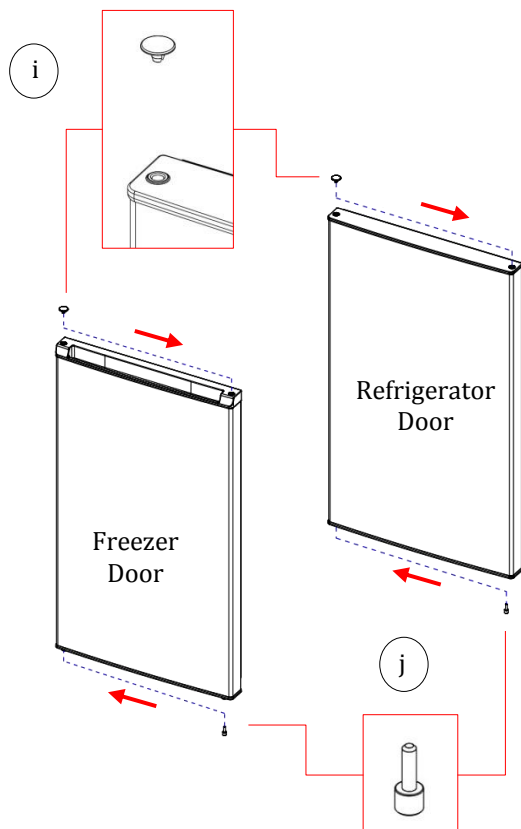
1-7>

Level and assemble the 'Refrigerator Door'(b).

1-8>

Assemble following parts on the opposite side:

'Top Cover Hinge' and 'Top Hinge'(a)



5-1. Safety Warning (R-600a Refrigerant Models Only)



This appliance contains a certain amount of isobutane refrigerant (R600a) a natural gas with high environmental compatibility that is, however, also combustible.

When transporting and installing the appliance, care should be taken to ensure that no parts of the refrigerating circuit are damaged.

Refrigerant squirting out of the pipes could ignite or cause an eye injury. If a leak is detected, avoid any naked flames or potential sources of ignition and air the room in which appliance is standing for several minutes.

- In order to avoid the creation of a flammable gas-air mixture if a leak in the refrigerating circuit occurs, the size of the room in which the appliance may be sited depends on the amount of refrigerant used. The room must be 1m³ in size for every 8g of R600a refrigerant inside the appliance. The amount of refrigerant is shown on the identification plate inside the appliance.
- Never start up an appliance showing any signs of damage. If in doubt, consult your dealer.

5-2. Tools

1. R-600a ref. Can	2. Can adapter	3. Pinch Plier
4. Ref. discharging hose	5. Vacuum pump	6. Welder
7. Coupling Pipe	8. Leakage Tester	9. Electronic-scale

5-3. Process Summary

1st Step. R-600a ref. discharging

- Connect the discharging hose to the outdoors.
- Time : 7 min.

2nd Step. Removing the remaning refrigerant

- For removing of remaning refrigerant., connect the discharging hose to the vacuum pump
- Time : 10min

3th Step. Exchanging comp. & dryer / pipe welding

- Exchange Comp. and Dryer
- Welding the Pipe
- Copper-Copper : 5% rod
- Copper-Steel : 30% rod

4th Step. Welding coupling pipe

Coupling cap and gas charging cap should be seperated before welding.

5th Step. Vacuum

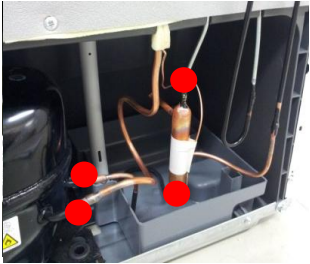
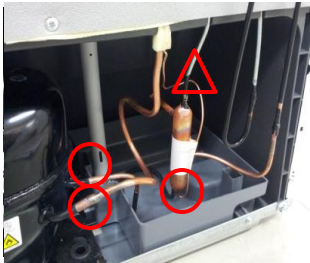
- Check the vacuum with (mani-polder) gauge
- Time : 60~80min

6th Step. Charge R-600a

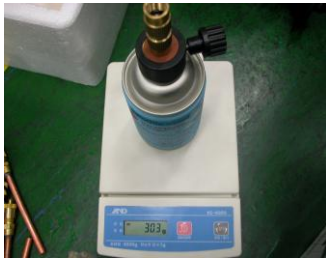
- Charging the ref. on POWER ON
- Time : 10min

5-4. In Detail Precess

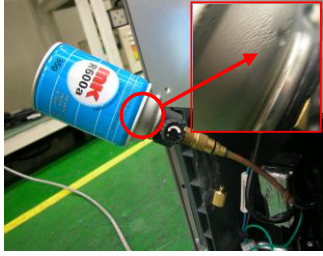
NO.	SVC process	Image	Details
1	Connecting the pinch-plier & discharging hose		1. Connect the discharging hose to the pinch-plier 2. The outlet of discharging hose should be placed to the outdoor(window)
2	Fixing the pinch-plier & charging pipe		1. Fix the pinch-plier to the compressor charging pipe. 2. Pinch-plier should not be moving freely. ※ If that is moving freely, it would cause fire/explosion as leakage gas in the room.
3	Discharging the R-600a ref.		1. Discharge the R-600a ref. to outdoor. [Befor connecting the vacuum pump] ※ It should have enough time more than 7 minutes to discharge.

NO.	SVC process	Image	Details
4	Removing the remaining ref.		1. And then, connect the vacuum pump to the outlet of discharging hose ※ Vacuum pump should be placed at the outdoor where is able to clear air easily. ※ It should have enough time more than 10 minutes to discharge.
5	Removing the pinch-plier & pipe		1. Disassemble the each pipe (Del-pipe, Suc-pipe, Capi-pipe, Dryer & Hot-pipe) ※ Caution ; A part is easily damaged by flame so that disassembly should be done carefully.
6	Exchanging comp & dryer		1. Change the comp. & dryer. ※ You should check the comp. spec. and assemble correctly.
7	Welding	 	1. Weld the each pipe. ※ ○ Copper-Copper welding - 5% rod △ Copper-Steel welding - 35% rod
8	Disassembly of charging valve (Coupling pipe)		1. Decap the couplig pipe cap and disassemble the vlave ass'y. ※ If you don't disassemble, the coupling rubber would be melted.

5. How To Charge R-600a Refrigerant

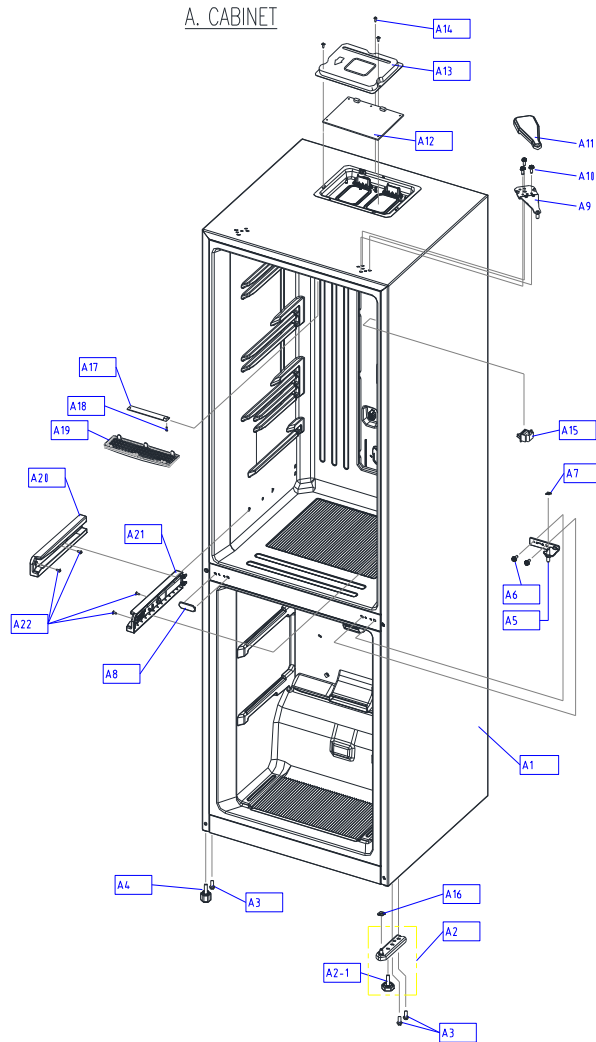
NO.	SVC process	Image	Details
9	Coupling pipe welding		1. Weld after inserting the coupling pipe to the compressor. ※ Use the wet cloth for preventing the other part of machinery-room from damage.
10	Valve reass'y & guage connecting		1. Reassemble the valve ass'y with coupling pipe to clockwise. 2. Connect the blue hose of the guage to the coupling pipe and the yellow hose to the vacuum pump. 3. Open the blue guage lever and start the vacuum pump
11	Vacuum		1. Be vacuumed the cycle with pump. ※ Time : 60~80min => If the vacuum time is less than 60min, ref. COP & air coolong would be weak.
12	Check		1. Check the guage : -76_{cm}Hg ※ If the cycle is not vacuumed, it would be leak.
13	Adjusting the amounts of refrigerants (R-600a can)		1. Check the amounts of R-600a can with scale and discharge the surplus ref. ※ Discharging is surely done at the outdoor where is able to clear air. ※ Tip of adjusting. - Can total weight :160g(Can 75g+Ref. 85g) - Adapter : 145g => Total : 305g - The amounts of charging : 79g => Discharging : 6g => Total : 299g

5. How To Charge R-600a Refrigerant

NO.	SVC process	Image	Details
14	Connecting of coupling pipe & adapta		1. Conect can adapter to the coupling pipe. 2. Charge the ref. with open lever slowly. ※ Refrigerant should never leak in the room.
15	Charging		1. On the power of refrigerator and then start to charge the ref. (10min) ※ Charge the ref. until going out the water vapour condensing on the can outlet.
16	Leakage Test		1. Check the leakage. ※ You must rework from Step.1 when the leakage is detected.
17	Finish		1. Clean and clear around the machinery room when the service is finished. 2. Assemble the machinery room cover.

6. PART LIST

6-1. Cabinet Compartment (Dial Type)

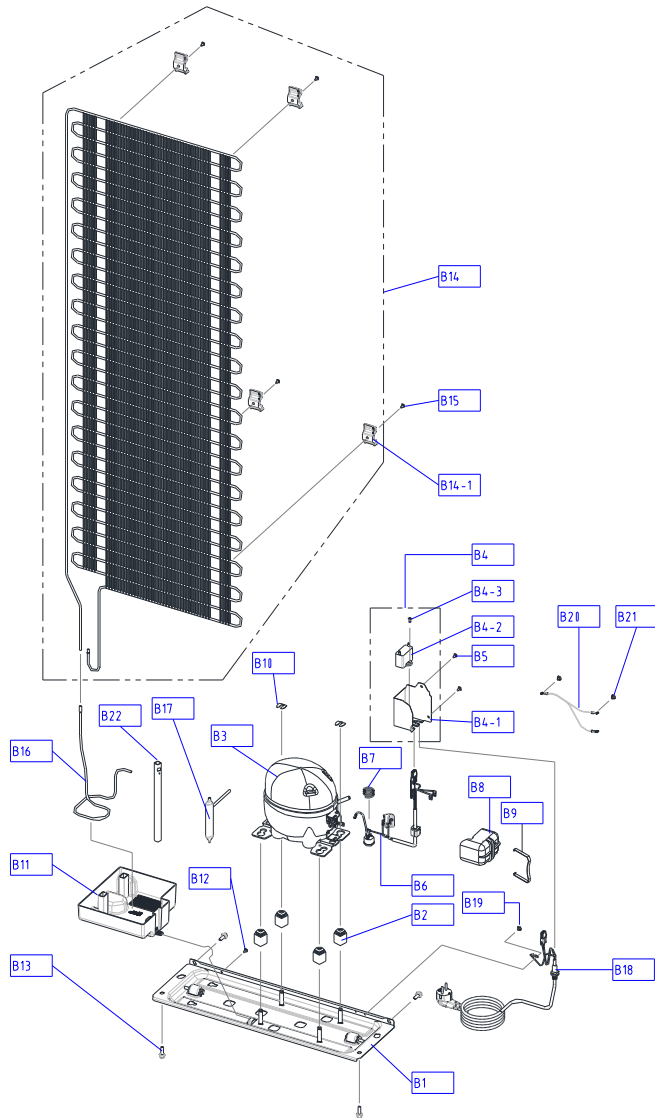


NO	PART-CODE	PART NAME	SPEC.	Q'ty RN-53*
A1	30100-0192800 30100-0193500	ASSY CAB URT	RCE-307/308	1
A2	3012938100	HINGE *U AS	PO T3.2	1
A2-1	3012105300	FOOT ADJ AS	PP+INSERT	1
A3	30160A1700	SPECIAL BOLT	SWCH10A M8*L18	3
A4	3012106500	FOOT ADJ *L AS	PP+INSERT	1
A5	30129-0020200	HINGE *M AS	PO T3.2	1
A6	3016001250	SPECIAL BOLT *M	6X15 SWCH22A(WH)	2
A7	3016044400	SPECIAL WASHER *M HI	SGCC, T1.0X1.D8.5XO.D15	2
A8	3010937710	CAP DV HI HOLE *M	HIPS	1
A9	3012937900	HINGE *T AS	RFPO, T2.6	1
A10	3016001250	SPECIAL BOLT *M	6X15 SWCH22A(WH)	3
A11	3001448500 3001448510 3001448520	COVER HI *T	PP(WHITE) PP(GRAY) PP(BLACK)	1
A12	30143KW060	PCB MAIN AS	BAL2 AC DIAL	1
A13	301149CB00	COVER M/PCB BOX AS	SECC(WHITE)	1
A14	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	3
A15	301179DP00	DOOR S/W AS	HC-050	1
A16	3816000200	SPECIAL WASHER	SPCC T1.0 O.D21*I.D8 MFZN	1
A17	330143LR310	PCB FRE LED AS	5-LED, CEM-1, 152X20X1.6T(2PIN)	1
A18	7121301011	SCREW TAPPING	T2S PAN 3X10 MFZN	1
A19	30155-0021100	WINDOW LED	GPPS	1
A20	30125-0036200	GUIDE V CASE *L	PP	1
A21	30125-0036300	GUIDE V CASE *R	PP	1
A22	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	4

6. PART LIST

6-2. MACH ROOM Compartment (Dial Type)

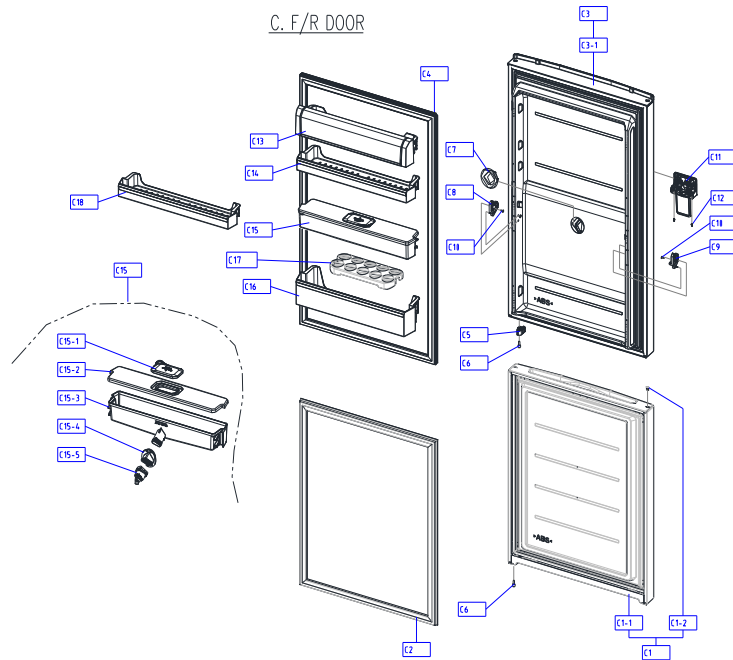
B. MACH ROOM



NO	PART-CODE	PART NAME	SPEC.	Q'ty RN-53*
B1	3010365500	BASE COMP AS	RFP-301	1
B2	3010103400	ABSORBER COMP	RUBBER	4
B3	3956188C50	COMPRESSOR	LZ88CY(QLZ12Y) 220-240V 50HZ	1
B4	3010583700	BOX POWER AS	RFP-301(350V/5UF)	1
B4-1	3010552101	BOX POWER	GI/T0.5	1
B4-2	3016405900	CAPACITOR RUN	350V 5UF	1
B4-3	7122401211	SCREW TAPPING	T2S TRS 4*12 MFZN	1
B5	7112401211	SCREW TAPPING	T1 TRS 4X12 MFZN	2
B6	3018134600	WITCH P RELAY AS	B60-120, QP2-15C(RSCR DONPER)	1
B7	3015103900	SPRING OVERLOAD	LZ88CY OLP FIXING	1
B8	3811402600	COVER RELAY	LZ88CY	1
B9	3015103800	SPRING COVER RELAY	LZ88CY COVER RELAY FIXING	1
B10	3016002500	COMP WASHER	SK-5 T0.8XW22XL24.5	2
B11	301119V300	CASE VAPORI	PP	1
B12	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	1
B13	3016003300	SPECIAL BOLT	T2 M6.5*20	1
B14	3014480010	PIPE WI-CON AS	RFP-301	1
B14-1	3012041500	FIXTURE WI-CON	PP	4
B15	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	1
B16	3014479430	PIPE CONN A	DUCT1-0 OD4.76*T0.5	1
B17	3016808200	DRYER AS	10G, SINGLE TUBE	1
B18	3011348111	CORD POWER AS	FR-290(유럽형.N) 이중스토퍼, 250V 10/16A	1
B19	7S422X4081	SPECIAL SCREW	TT3 TRS 4X8 SE MFZN	1
B20	3012763210	HARNESS EARTH COMP	FRM-241, L140	1
B21	7S422X4081	SPECIAL SCREW	TT3 TRS 4X8 SE MFZN	2
B22	3012513950	HOSE DRN B	PVC	1

6. PART LIST

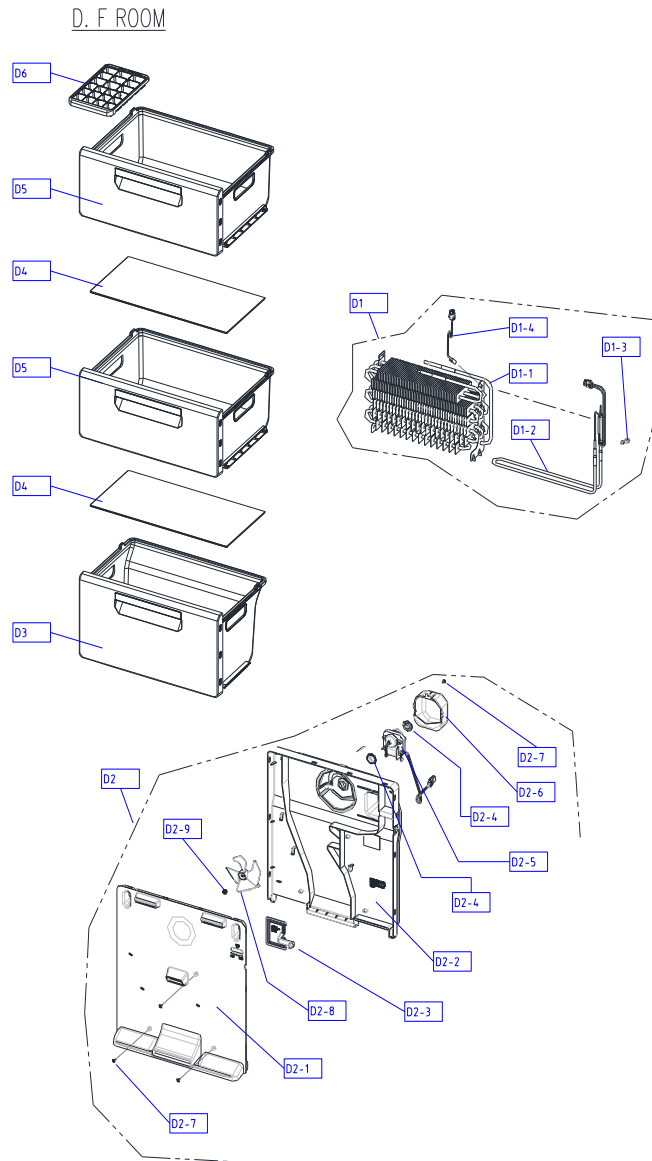
6-3. F/R DOOR Compartment (Dial Type)



NO	PART-CODE	PART NAME	SPEC.	Q'ty
				RN-53*
C1	30100-0191700	ASSY F DR	PCM, FRONT HIDDEN	1
C1-1	30100-0186100	ASSY F DR URT	BAL2	1
C1-2	30114-0084400	COVER CAP HL	ABS	1
C2	30123-0012900	GASKET F DR AS	BAL2	1
C3	30100-0191800	ASSY R DR	PCM, FRONT HIDDEN	1
	30100-0191802		PCM, HIDDEN, DSPNS	
C3-1	30100-0186200	ASSY R DR URT	BASIC	1
	30100-0209100		DISPENSER TYPE	
C4	30123-0013000	GASKET R DR AS	BAL2	1
C5	30152-0004500	STOPPER R DR	POM(NTR)	1
C6	3016047410	PECIAL STOPPER DR BOLT	TAP-TITE 5*16	2
C7	30123-0013000	HOLDER W/TANK	RFP-301	1
C8	30152-0047000	STOPPER W/TANK *L	ABS	1
C9	3015206400	STOPPER W/TANK *R	ABS	1
C10	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	2
C11	60142-0022100	PANEL DISPNS AS	ABS	1
C12	3015206400	FIXTURE K	ABS	2
C13	30190-0026000	POCKET DAIRY AS	GPPS(CRYSTAL)	1
C14	3019068720	POCKET R	GPPS(CRYSTAL)	2
C15	30182-0004200	TANK WATER AS	ABS	1
C15-1	30109-0043100	CAP W/TANK COVR	SILICON	1
C15-2	301149FW00	COVER W/TANK	LDPE	1
C15-3	30114-0061200	TANK WATER	GPPS(CRYSTAL)	1
C15-4	3014013100	PACKING DISPNS	SILICON	1
C15-5	3015407000	VALVE WATER AS	FRP-513	1
C16	30190-0016402	POCKET J	GPPS(CRYSTAL)	1
C17	3011190800	CASE EGG TRAY	GPPS(CRYSTAL)	1
C18	30190-0024500	POCKET R A1	GPPS(CRYSTAL)	1

6. PART LIST

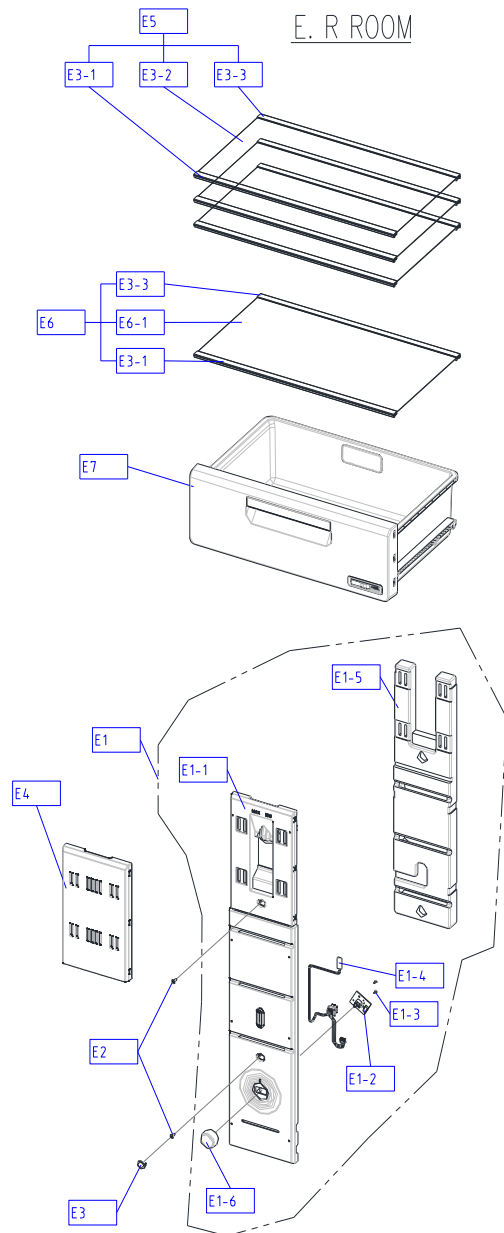
6-4. F ROOM (Dial Type)



NO	PART-CODE	PART NAME	SPEC.	Q'ty RN-53*
D1	3017070000	EVA AS	RFP-301, 230V, 130W	1
D1-1	3017070100	EVA SAS	RFP-301	1
D1-2	3012831200	HEATER SHEATH AS	RFP-301, 230V, 130W	1
D1-3	4856813100	CABLE TIE	DA-140	1
D1-4	3014811400	SENSOR D AS	RFP-301, LOCK TYPE	1
D2	3018932500	LOUVER F AS	RFP-301	1
D2-1	3018932300	LOUVER F A	PP	1
D2-2	3018932400	LOUVER F B	PP	1
D2-3	3013415800	KNOB F CONTL	PP	1
D2-4	3010107100	ABSORBER F MOTR	NBR	2
D2-5	3015922200	MOTOR F AS	AC220V/50HZ, 2500RPM	1
D2-6	3010664700	BRACKET FAN MOTR	PP, T2.0	1
D2-7	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	4
D2-8	3011835900	FAN	OD100, SHAFT OD3.17	1
D2-9	3011200510	CLAMP FAN	SUS 304 (SPRING)	1
D3	30111-0048000	CASE F A2 AS	GPPS(CRYSTAL)+VINYL	1
D4	3017861500	SHELF GLAS F	T3.2 RFP-301	2
D5	30111-0047900	CASE F A1 AS	GPPS(CRYSTAL)+VINYL	2
D6	3010564910	CASE ICEING AS	CASE ICEING+VINYL	1

6. PART LIST

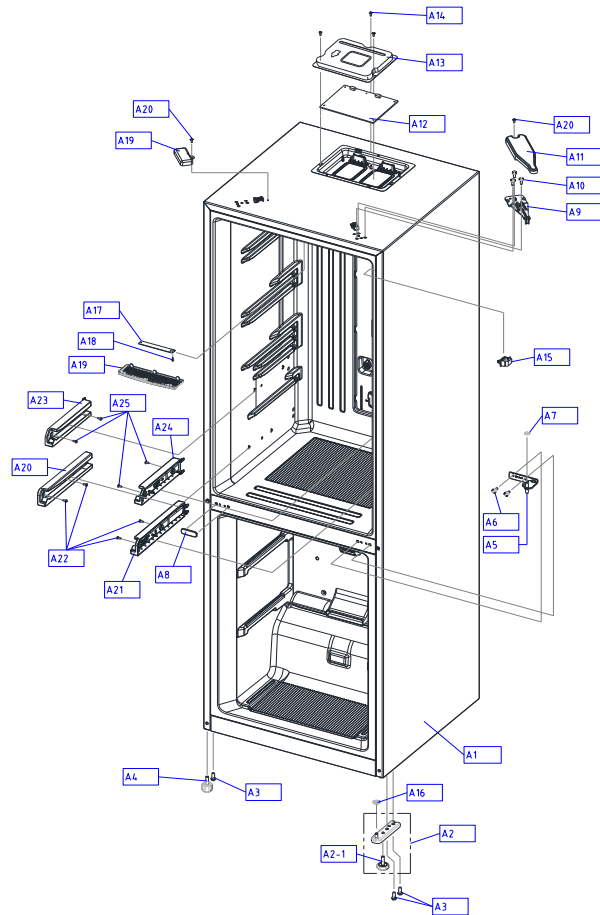
6-5.R ROOM (Dial Type)



NO	PART-CODE	PART NAME	SPEC.	Q'ty
				RN-53*
E1	30114-0086200	COVER M/FLOW DUCT AS	RFP-301	1
E1-1	301149C300	COVER M/FLOW DUCT	HIPS	1
E1-2	30143KW260	PCB VOLUME AS	BALLISTA VOLUME	1
E1-3	7121300811	SCREW TAPPING	T2S PAN 3X8 MFZN	2
E1-4	60127-0043700	HARNESS PCB VOLUME	RFP-301	1
E1-5	3013387900	INSU M/FLOW DUCT	F-PS	1
E1-6	3013415700	KNOB R CONTL	HIPS	1
E2	7112401411	SCREW TAPPING	T1 TRS 4*14 MFZN	2
E3	3010924600	CAP F LOUVER	HIPS T2.3	1
E4	3015523801	WINDOW M/FLOW DUCT	HIPS	1
E5	30178-0029300	SHELF R AS	RFP-301	3
E5-1	30116-0033100	DECO R SHELF *F	ABS, L490	1
E5-2	30178-0029400	SHELF R GLAS	T3.2*489*313.5	1
E5-3	30116-0033200	DECO R SHELF *B	ABS, L490	1
E6	30114-0086700	COVER VICASE AS	T3.2	1
E6-1	30114-0086300	COVER GLAS VICASE	T3.2 * 489 * 295	1
E7	30111-0046300	CASE VEGETB AS	BAL2	1

6. PART LIST

A. CABINET



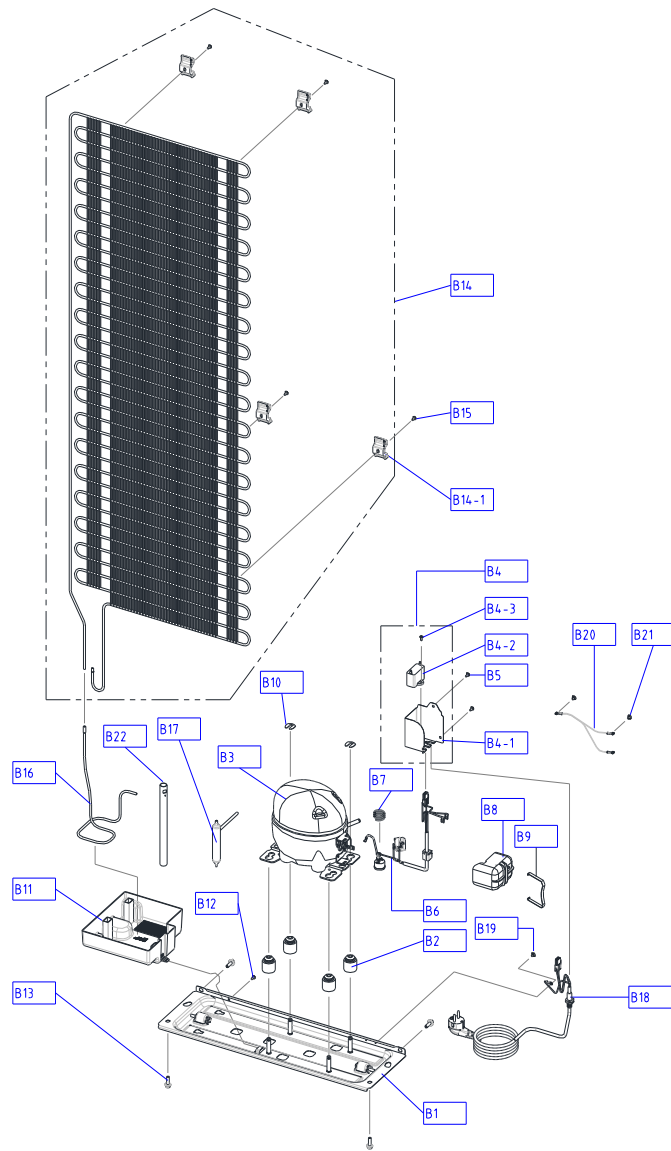
6-1. Cabinet Compartment(Fcp Type)

NO	PART-CODE	PART NAME	SPEC.	Q'ty RN-53*
A1	30100-0192900	ASSY CAB URT	AC,FCP	1
	30100-0211300		AC,VITA	
	30100-0193600		DC,FCP	
	30100-0206200		DC,VITA	
	30100-0206400		AC,FCP,FRESH	
	30100-0211400		AC,VITA,FRESH	
	30100-0206600		DC,FCP,FRESH	
	30100-0206700		DC,VITA,FRSH	
A2	3012938100	HINGE *U AS	PO T3.2	1
A2-1	3012105300	FOOT ADJ AS	PP+INSERT	1
A3	30160A1700	SPECIAL BOLT	SWCH10A M8*L18	3
A4	3012106500	FOOT ADJ *L AS	PP+INSERT	1
A5	30129-0020200	HINGE *M AS	PO T3.2	1
A6	3016001250	SPECIAL BOLT *M	6X15 SWCH22A(WH)	2
A7	3016044400	SPECIAL WASHER *M HI	SGCC, T1.0X1.D8.5XO.D15	2
A8	3010937710	CAP DV HI HILE *M	HIPS	1
A9	3012937900	HINGE *T AS	PO, T2.6	1
A10	3016001250	SPECIAL BOLT *M	6X15 SWCH22A(WH)	3
A11	3001448500	COVER HI *T	PP(WHITE)	
	3001448510		PP(GRAY)	
	3001448520		PP(BLACK)	
A12	30143KW060	PCB MAIN AS	BAL2 DC DIAL	1
			BAL2 AC DIAL	
A13	301149CB00	COVER M/PCB BOX AS	SECC(WHITE)	1
A14	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	3
A15	301179DP00	DOOR S/W AS	HC-050K4 250V2.5A	1
A16	3816000200	SPECIAL WASHER	SPCC T1.0 O.D21*I.D8 MFZN	1
A17	330143LR310	PCB FRE LED AS	5-LED, CEM-1, 152X20X1.6T(2PIN)	1
A18	7121301011	SCREW TAPPING	T2S PAN 3X10 MFZN	1
A19	30155-0021100	WINDOW LED	GPPS	1
A20	30125-0036200	GUIDE V CASE *L	PP	1
A21	30125-0036300	GUIDE V CASE *R	PP	1
A22	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	4

6. PART LIST

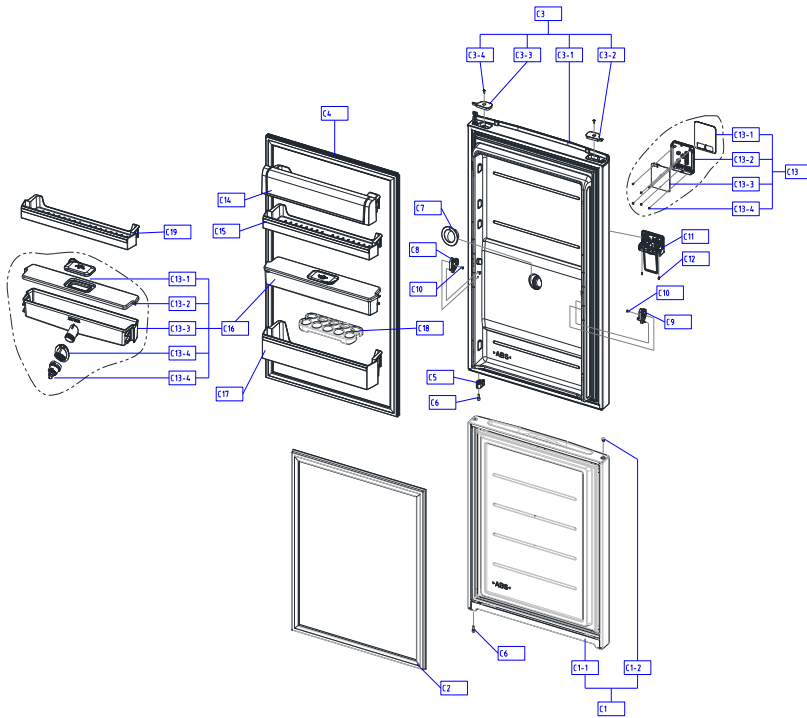
6-2. MACH ROOM Compartment(Fcp Type)

B. MACH ROOM



NO	PART-CODE	PART NAME	SPEC.	Q'ty
				RN-53*
B1	3010365500	BASE COMP AS	RFP-301	1
B2	3010103400	ABSORBER COMP	RUBBER	4
B3	3956188C50	COMPRESSOR	LZ88CY(QLZ12Y) 220-240V 50HZ	1
B4	3010583700	BOX POWER AS	RFP-301(350V/5UF)	1
B4-1	3010552101	BOX POWER	GI/T0.5	1
B4-2	3016405900	CAPACITOR RUN	350V 5UF	1
B4-3	7122401211	SCREW TAPPING	T2S TRS 4*12 MFZN	1
B5	7112401211	SCREW TAPPING	T1 TRS 4X12 MFZN	2
B6	3018134600	SWITCH P RELAY AS	B60-120, QP2-15C(RSCR DONPER)	1
B7	3015103900	SPRING OVERLOAD	LZ88CY OLP FIXING	1
B8	3811402600	COVER RELAY	LZ88CY	1
B9	3015103800	SPRING COVER RELAY	LZ88CY COVER RELAY FIXING	1
B10	3016002500	COMP WASHER	SK-5 T0.8XW22XL24.5	1
B11	301119V300	CASE VAPORI	PP	1
B12	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	1
B13	3016003300	SPECIAL BOLT	T2 M6.5*20	4
B14	3014480010	PIPE WI-CON AS	RFP-301	1
B14-1	3012041500	FIXTURE WI-CON	PP	4
B15	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	4
B16	3014479430	PIPE CONN A	DUCT1-0 OD4.76*T0.5	1
B17	3016808200	DRYER AS	10G, SINGLE TUBE	1
B18	3011348111	CORD POWER AS	FR-290(유립형.N) 이중스토퍼, 250V 10/16A	1
B19	7S422X4081	SPECIAL SCREW	TT3 TRS 4X8 SE MFZN	1
B20	3012763210	HARNESS EARTH COMP	FRM-241, L140	1
B21	7S422X4081	SPECIAL SCREW	TT3 TRS 4X8 SE MFZN	2
B22	3012513950	HOSE DRN B	PVC	1

6. PART LIST



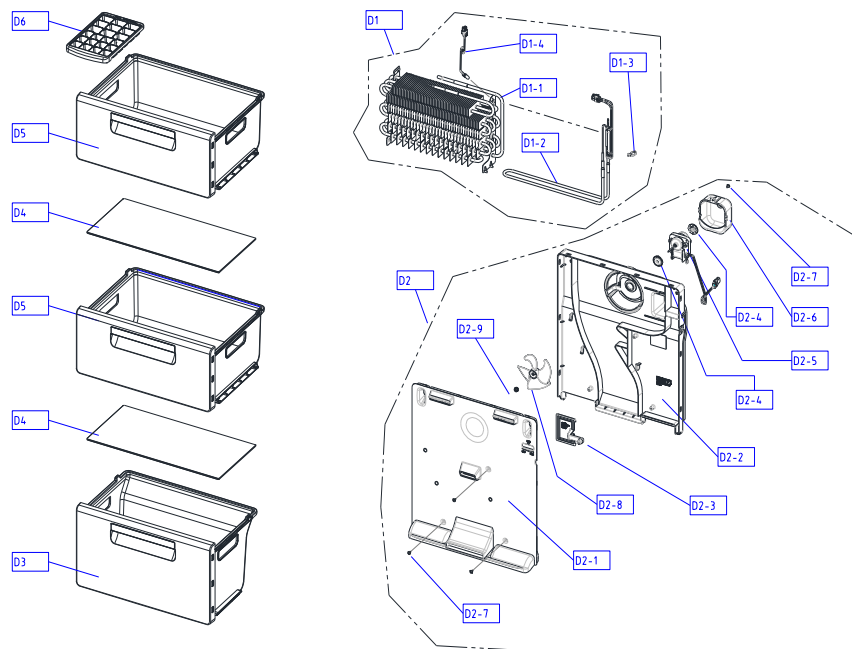
6-3. F/R DOOR Compartment(Fcp Type)

NO	PART-CODE	PART NAME	SPEC.	Q'ty RN-53*
C1	30100-0191700	ASSY F DR	PCM, FRONT HIDDEN	1
C1-1	30100-0186100	ASSY F DR URT	BAL2	1
C1-2	30114-0084400	COVER CAP HL	ABS	1
C2	30123-0012900	GASKET F DR AS	BAL2	1
C3	30100-0191800	ASSY R DR	PCM, HIDDEN, DSPNS	1
	30100-0191802		PCM, FRONT HIDDEN	
C3-1	30100-0186200	ASSY R DR URT	DISPENSER TYPE	1
	30100-0209100		BASIC	
C3-2	3011450300	COVER CAP HOLE A	PP	1
C3-3	3011450300	COVER CAP HOLE A	PP	1
C3-4	7112401011	SCREW TAPPING	T1 TRS 4*10 MFZN	2
C4	30123-0013000	GASKET R DR AS	BAL2	1
C5	30152-0004500	STOPPER R DR	POM(NTR)	1
C6	3016047410	SPECIAL STOPPER DR BOLT	TAP-TITE 5*16	2
C7	30123-0013000	HOLDER W/TANK	RFP-301	1
C8	30152-0047000	STOPPER W/TANK *L	ABS	1
C9	3015206400	STOPPER W/TANK *R	ABS	1
C10	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	1
C11	60142-0022100	PANEL DISPNS AS	ABS	1
C12	3015206400	FIXTURE K	ABS	2
C13	60142-0022200	PANEL CONTL *F AS	영문 (ENGLISH)	1
	60142-0022201			
	60142-0022202			
C13-1	3014263601	PANEL CONTL *F	ABS	1
C13-2	30155-0019102	WINDOW FCP AS	영문 (ENGLISH)	1
	30155-0019101		국문 (KOREAN)	
	30155-0019100		중문 (CHINA)	
C13-3	40301-0100100	REF PCB FRONT ASSY	BAL2	1
C13-4	7121300811	SCREW TAPPING	T2S PAN 3X8 MFZN	6
C14	30190-0026000	POCKET DAIRY AS	GPPS(CRYSTAL)	1
C15	3019068700	POCKET R	GPPS(CRYSTAL)	2
C16	30182-0004200	TANK WATER AS	ABS	1
C16-1	30109-0043100	CAP W/TANK COVR	SILICON	1
C16-2	301149FW00	COVER W/TANK	LDPE	1
C16-3	30114-0061200	TANK WATER	GPPS(CRYSTAL)	1
C16-4	3014013100	PACKING DISPNS	SILICON	1
C16-5	3015407000	VALVE WATER AS	FRP-513	1
C17	3019068800	POCKET J	GPPS(CRYSTAL)	1
C18	3011190800	CASE EGG TRAY	GPPS(CRYSTAL)	1
C19	30190-0024500	POCKET R A1	GPPS(CRYSTAL)	1

6. PART LIST

6-4. F ROOM(Fcp Type)

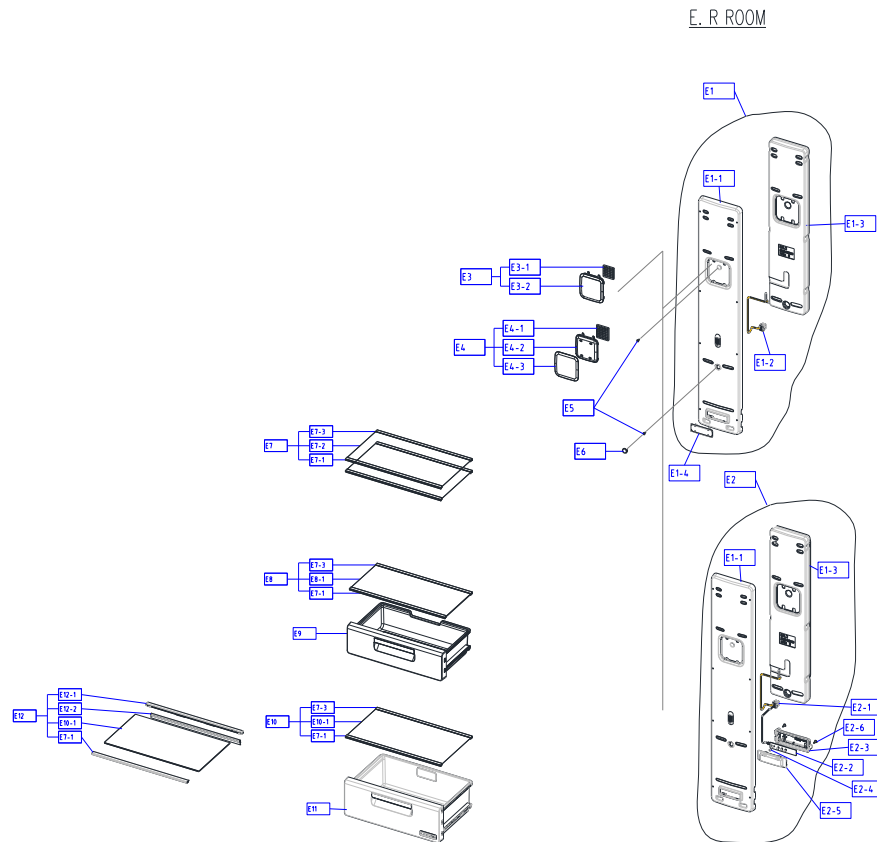
D. F ROOM



NO	PART-CODE	PART NAME	SPEC.	Q'ty RN-53*
D1	3017070000	EVA AS	RFP-301, 230V, 130W	1
D1-1	3017070100	EVA SAS	RFP-301	1
D1-2	3012831200	HEATER SHEATH AS	RFP-301, 230V, 130W	1
D1-3	4856813100	CABLE TIE	DA-140	1
D1-4	3014811400	SENSOR D AS	RFP-301, LOCK TYPE	1
D2	3018932500	LOUVER F AS	RFP-301	1
D2-1	3018932300	LOUVER F A	PP	1
D2-2	3018932400	LOUVER F B	PP	1
D2-3	3013415800	KNOB F CONTL	PP	1
D2-4	3010107100	ABSORBER F MOTR	NBR	2
D2-5	3015922200	MOTOR F AS	AC220V/50HZ, 2500RPM	1
D2-6	3010664700	BRACKET FAN MOTR	PP, T2.0	1
D2-7	7112401211	SCREW TAPPING	T1 TRS 4*12 MFZN	4
D2-8	3011835900	FAN	OD100, SHAFT OD3.17	1
D2-9	3011200510	CLAMP FAN	SUS 304 (SPRING)	1
D3	30111-0048000	CASE F A2 AS	GPPS(CRYSTAL)+VINYL	1
D4	3017861500	SHELF GLAS F	T3.2 RFP-301	2
D5	30111-0047900	CASE F A1 AS	GPPS(CRYSTAL)+VINYL	2
D6	3010564910	CASE ICEING AS	CASE ICEING+VINYL	1

6. PART LIST

6-5.R ROOM(Fcp Type)



NO	PART-CODE	PART NAME	SPEC.	Q'ty
				RN-53*
E1	30114-0086600	COVER M/FLOW DUCT AS	BAL2, FCP	1
E1-1	30114-0085200	COVER M/FLOW DUCT	PP	1
E1-2	60127-0044900	HARNESS R SENS AS	BAL2, FCP	1
E1-3	30133-0021000	INSU M/FLOW DUCT	F-PS	1
E1-4	30109-0049800	CAP VITA	ABS	1
E2	30114-0085100	COVER M/FLOW DUCT AS	BAL2, FCP, VITA	1
E2-1	60127-0045400	HARNESS VITA AS	F-PS	1
E2-2	60136-0001500	LAMP PCB LED AS	DGD-D10020RB	1
E2-3	30111-0046800	CASE VITA	PP	1
E2-4	7121300811	SCREW TAPPING	T2S PAN 3*8 MFZN	1
E2-5	30155-0022000	WINDOW VITA	GPPS	1
E2-6	7112401011	SCREW TAPPING	T1 TRS 4*10 MFZN	2
E3	30109-0050900	CAP COVR DEO AS	BAL2, MHP	1
E3-1	30109-0049300	CAP COVR DEO	ABS	1
E3-2	3011901700	FILTER CATECHIN AS	5T*40*40	1
E4	30114-0088300	COVER DEO AS	BAL2, MHP	2
E4-1	30122-0034800	FRAME DEO	BAL2, GPPS	1
E4-2	60187-0001100	DEO	T5*40*40	1
E4-3	30114-0085300	COVER DEO	PC	1
E5	7112401411	SCREW TAPPING	T1 TRS 4*14 MFZN	2
E6	3010924600	CAP F LOUVER	HIPS T2.3	1
E7	30178-0029300	SHELF R AS	RFP-301	3
E7-1	30116-0033100	DECO R SHELF *F	ABS, L490	1
E7-2	30178-0029400	SHELF R GLAS	T3.2*489*313.5	1
E7-3	30116-0033200	DECO R SHELF *B	ABS, L490	1
E8	30114-0088000	COVER FRESH CASE AS	BAL2, MHP	1
E8-1	30114-0087900	COVER GLAS FRESH	T3.2*489*243	1
E9	30111-0046500	CASE FRESH AS	BAL2	1
E10	30114-0086400	COVER V/CASE AS	BAL2, BASIC	1
E10-1	30114-0086300	COVER GLAS V/CASE	T3.2 * 489 * 295	1
E11	30111-0046300	CASE VEGETB AS	BAL2	1
E12	30114-0086400	COVER V/CASE AS	BAL2, MHP	1
E12-1	30116-0032700	DECO COVR VEGETB *B	HIPS	1
E12-2	30123-0013600	GASKET V/CASE	BAL2, MHP	1