SERVICE MANUAL

Model : FRN-U20DAI

DAEWOO ELECTRONICS

CONTENTS

1. WARNINGS AND PRECAUTIONS FOR SAFETY

Please observe the following safety precautions in order to use safely and correctly the refrigerator and to prevent accident and danger during repair.

1. Be care of an electric shock. Disconnect power cord from wall outlet and wait for more than three minutes before replacing PCB parts.
   Shut off the power whenever replacing and repairing electric components.

2. When connecting power cord, please wait for more than five minutes after power cord was disconnected from the wall outlet.

3. Please check if the power plug is pressed down by the refrigerator against the wall.
   If the power plug was damaged, it may cause fire or electric shock.

4. If the wall outlet is over loaded, it may cause fire.
   Please use its own individual electrical outlet for the refrigerator.

5. Please make sure the outlet is properly earthed, particularly in wet or damp area.

6. Use standard electrical components when replacing them.

7. Make sure the hook is correctly engaged.
   Remove dust and foreign materials from the housing and connecting parts.

8. Do not fray, damage, machine, heavily bend, pull out or twist the power cord.

9. Please check the evidence of moisture intrusion in the electrical components.
   Replace the parts or mask it with insulation tapes if moisture intrusion was confirmed.

10. Do not touch the icemaker with hands or tools to confirm the operation of geared motor.

11. Do not let the customers repair, disassemble and reconstruct the refrigerator for themselves.
    It may cause accident, electric shock, or fire.

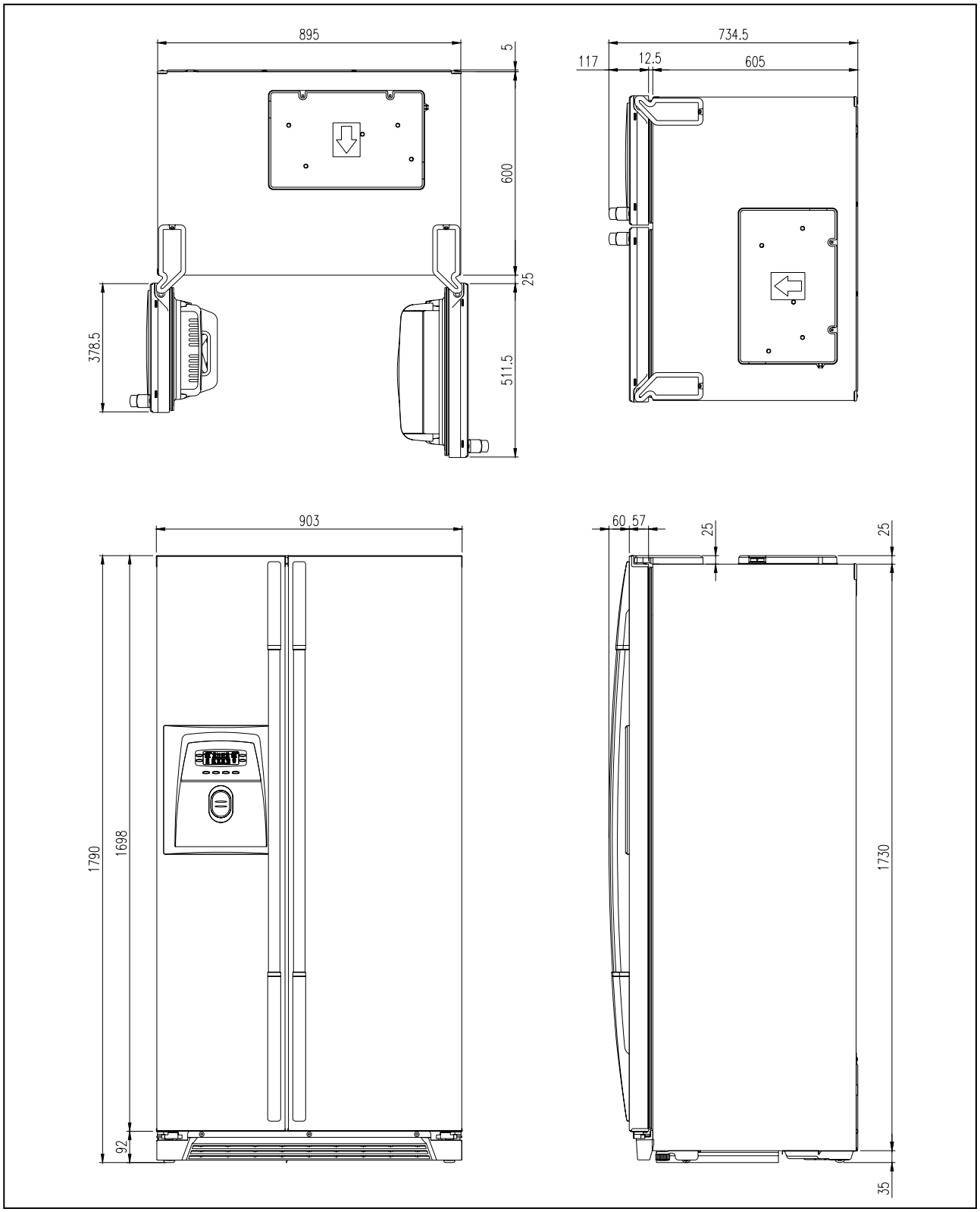
12. Do not store flammable materials such as ether, benzene, alcohol, chemicals, gas, or medicine in the refrigerator.

13. Do not put flower vase, cup, cosmetics, chemicals, etc., or container with full of water on the top of the refrigerator.

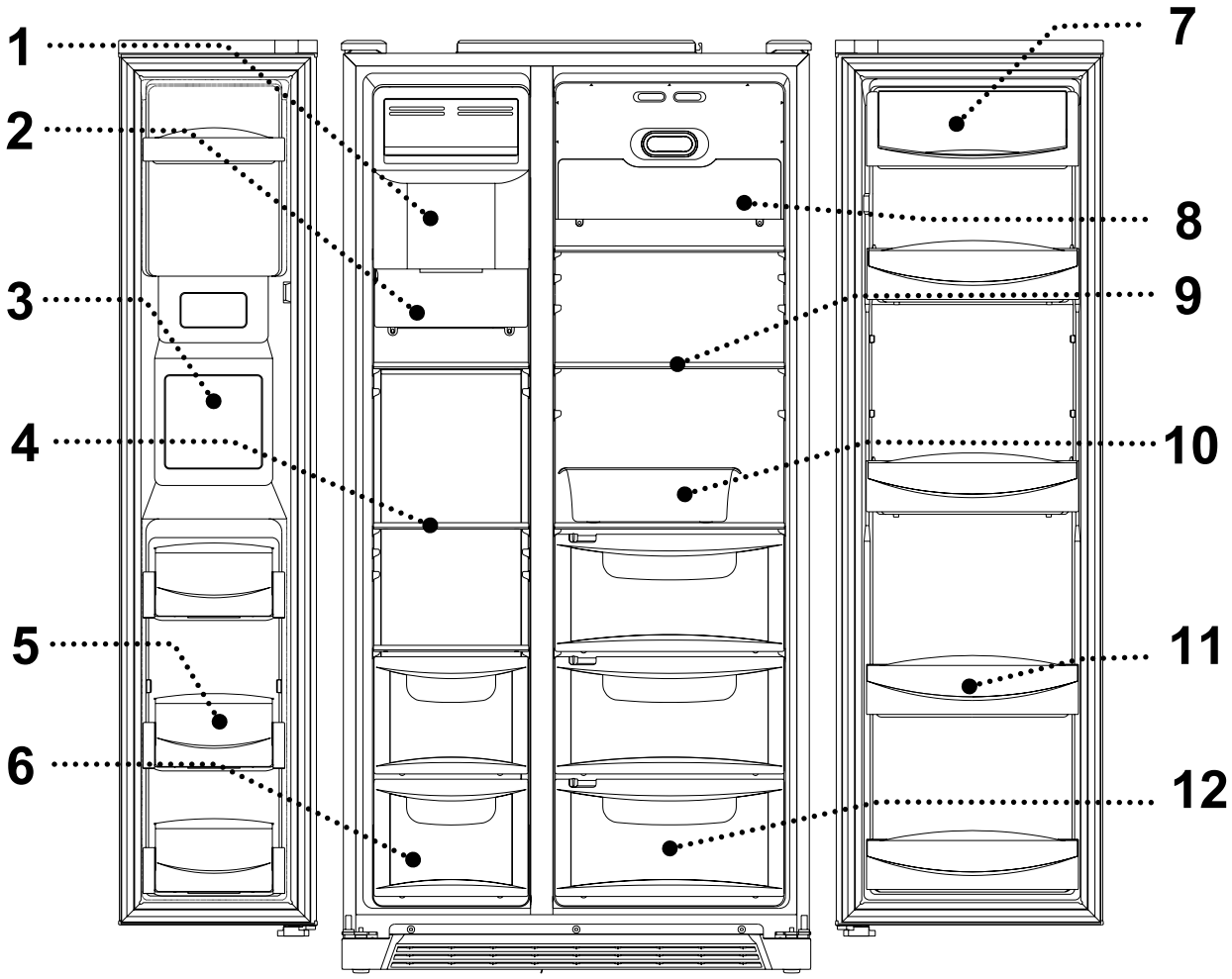
14. Do not put glass bottles with full of water into the freezer.
    The contents shall freeze and break the glass bottles.

15. When you scrap the refrigerator, please disconnect the door gasket first and scrap it where children are not accessible.

■ 2. EXTERNAL VIEWS. 2-1. External Size FRS(N)-U20DA



■ FRS(N)-U20DA

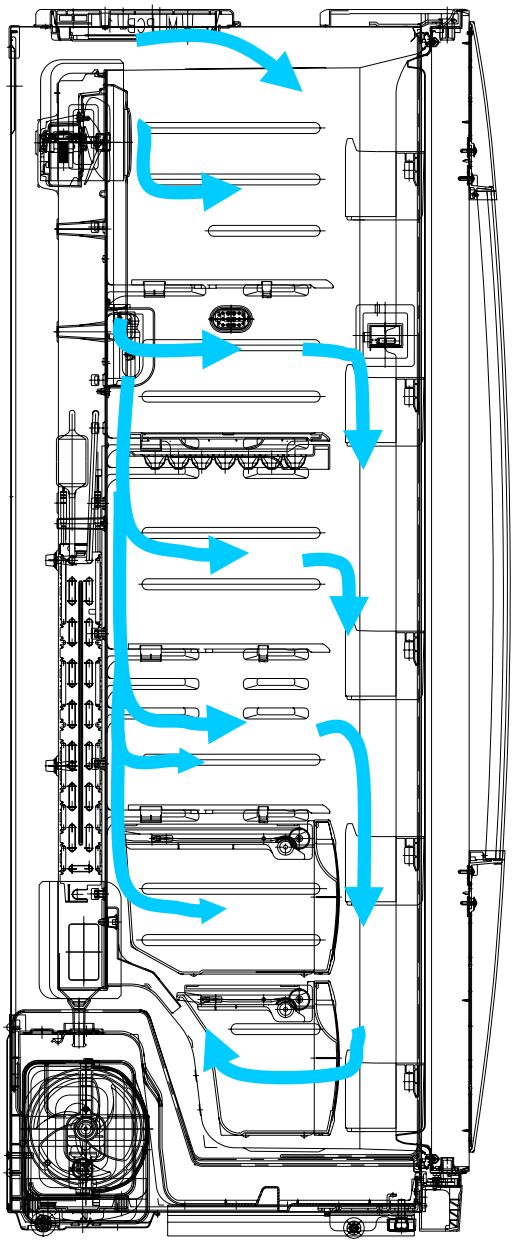


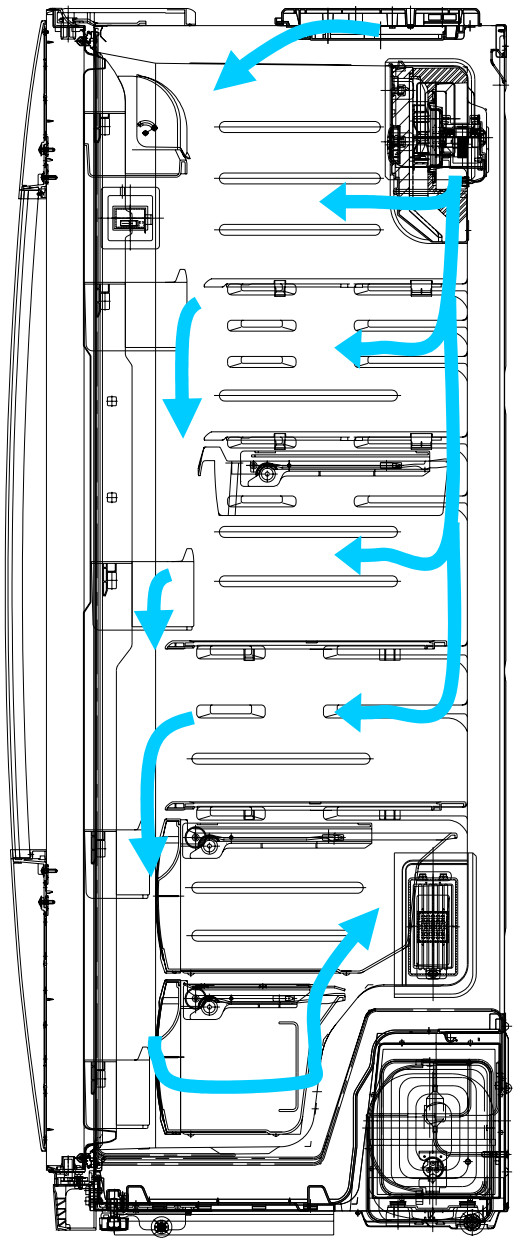
Freezer Compartment	Refrigerator Compartment
1. Ice cubes storage case	7. Dairy pocket
2. Freezer light	8. Refrigerator light
3. Water/Ice Dispenser	9. Refrigerator shelf
4. Freezer shelf	10. Movable Egg case
5. Freezer pocket	11. Refrigerator pocket
6. Freezer case	12. Refrigerator case

2-3. Cold Air Circulation

Freezer Compartment

Refrigerator Compartment





3. SPECIFICATION

3-1. Specification

Item				Specification	
Model Name				FRS(N)-U20DA	
ISO Gross Volume (Li)	Total			541 Li	
	Freezer			184 Li	
	Refrigerator			357 Li	
ISO Storage Volume (Li)	Total			504 Li	
	Freezer			170 Li	
	Refrigerator			334 Li	
External Dimension (Width × Depth × Height)				903mm × 734.5mm ×1790mm	
Rated Voltage				220~240V (50Hz)	
Weight				113kg	
COOLING	Comp	Model		MK183Q-L2U (MK5A5Q-R1U)	
		Motor Type		RSCR	
		Running Capacitor		350VAC/5㎌	
		PTC	Model Name	J531Q35E330M385-2	
			Spec	Resistance :33Ω Max Voltage :385V	
		O.L.P	Model Name	4TM265RHBYY-53	
			Close/Open Temp	69℃ / 130℃	
	Refrigerant			R-134a (R-600a)	
	Quantity			190g (76g)	
	Evaporator			Fin Type	
	Condenser			Fan Cooling System	
	Dryer			Molecular Sieve XH-9	
	Capillary Tube			IDΦ0.7 × T0.55 × L2200	

※ ( ) is the specification for the model which use R-600a(refrigerant)

Item		Specification	
Model Name		FRS(N)-U20DA	
DEFOREST	D-Sensor	PBN-43	
	F-Sensor	PBN-38	
	R-Sensor	PBN-43	
HEATER	Defrost Heater	AC220V / 192W	
	Main Duct Heater	AC220V / 7W	
	Louver Heater	AC220V / 8W	
	Dispenser Heater	AC220V / 5W	
	Water Pipe Heater	AC220V / 5W	
ELECTRICAL PARTS	Main Fuse (Power cord)	AC250V 15A	
	Fuse Temp (Defrost)	AC250V , 10A , 77℃	
	F-Fan Motor	DC13V / 2050±100 rpm	
	R-Fan Motor	DC13V / 1950±100 rpm	
	Condenser Fan Motor	DC13V / 1100±100 rpm	
	F-Lamp	AC230~240V / 25W (2EA)	
	R-Lamp	AC230~240V / 25W (2EA)	
	Door Switch , F / R	SP201R-7DL / SP201R-7DR (SPF101B-2D / SPF101B-1D)	

※ ( ) is the specification for the model which use R-600a(refrigerant)

4. OPERATION AND FUNCTIONS. 4-1. Display. 4-1-1. FRS(N)-U20DA

INPUT	CONTROL OBJECT
Front PCB button FREEZER SET, REFRIGERATOR SET SUPER FREEZER, SUPER REFRIGERATOR RESET FILTER, WATER / ICE, ICE MAKER LOCK ,LOCK	FCP C-LED

CONTENTS | **REMARKS**

1. Display control

FCP-LED	Control
88 DISPLAY (SET TEMP.)	Initial mode : Freezer & Refrigerator set→ Medium (-19℃/4℃)
SUPER FREEZER,SUPER REFRIGERATOR ICON	Dial
FUZZY, DEODORIZER ICON	Always ON
WATER / CUBED ICE/ CRUSHED ICE ICON	Dial
LOCK ICON	Dial
ICE MAKER LOCK ICON	Dial
FILTER CHANGE ICON	After six month, LED ON

2. “FREEZER SET” Button
 1) Temperature control of freezer compartment
 2) 7 step mode of successive temperature mode.
 3) Initial mode by power input : “Medium(-19℃)”
 ※Whenever pressing button, setting is repeated in the order of
 Medium (-19℃) → Medium Max 1 (-20℃) → Medium Max 2 (-21℃) → Max (-22℃)
 → Min (-16℃) → Medium Min 2 (-17℃) → Medium Min 2 (-18℃).

 Letters are indicated on 88 Display LED

Temperature Change	Min	Medium Min 1	Medium Min 2	Medium	Medium Max 1	Medium Max 2	Max
Temp indication	-16℃	-17℃	-18℃	-19℃	-20℃	-21℃	-22℃

3. “SUPER FREEZER” Button
 When this mode is chosen, the icon (FREEZER QUICK) is ON.

CONTENTS	REMARKS

4. “REFRIGERATOR SET” button.
   1) Temperature control of Refrigerator compartment
   2) 5 step mode of successive temperature mode.
   3) Initial mode by power input : “Medium (4℃)”
   ※Whenever pressing button, setting is repeated in the order of
   Medium (4℃) → Medium Max (3℃) → Max (2℃) → Min (6℃) → Medium Min (5℃).

   Letters are indicated on 88 Display LED

Temperature Change	Min	Medium Min	Mid	Medium Max	Max
Temp indication	6℃	5℃	4℃	3℃	2℃

5. “SUPER REFRIGERATOR” button.
   When this mode is chosen, the icon (REFRIGERATOR QUICK) is ON.

6. “WATER / ICE” button
   1) Select Water / Cubed Ice / Crushed Ice.
   2) Icon lights up to show your selection is on.
   Initial mode by power input : “Water” mode.
   3) The mode of Cubed Ice or Crushed Ice continues for 1 hour and then changes to Water. (Water icon turns ON)

REFERENCE : Please wait for 2-3 seconds in order to take final ice or drops of water when taking out cup from the pressing switches after taking ice or water.

7. “ICE MAKER LOCK” button
   1) Start by pushing “ICE MAKER LOCK” button
      ① “ICE MAKER LOCK” icon is on
      ② “WATER” icon is always on
   2) Stop by pushing “ICE MAKER LOCK” button again
      ① “ICE MAKER LOCK” icon is off
      ② “WATER” icon is on

8. “RESET WATER FILTER” button
   1) The normal (ICON OFF) is on for 6 month after are first power input.
   2) After sic months, icon is ON.
   3) How to reset Filter information
      ① Push the “RESET WATER FILTER” button for 3 seconds after change.

9. “LOCK” button
   1) This button stops operation of different button.
      ① “LOCK” icon is on
      ② Press this button to lock out this case and to keep temperature and function setting.
   2) Push “LOCK” button again for more than a second to stop it.

※ 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 minimum2~3 days.

4-2. Defrost Mode

INPUT	CONTROL OBJECT
1. Defrosting Cycle	1. Comp 2. F-Fan 3. R-Fan 4. D-Heater

CONTENTS	REMARKS

1. Defrost Mode

Pre-Cool

Pre-Cool
1) Time : 50 minutes
2) Comp , F-fan : ON
R-fan : Control
D-HTR : OFF
3) If F-sensor ≤ -27℃, then Pre-Cool becomes. OFF

Heater Defrosting

Heater Defrosting
1) Comp, F-fan, R-fan : OFF
D-HTR : ON
2) Time limit
30 seconds : Heater is ON regardless of D-sensor temperature right after defrosting start
30 minutes : in case of D1- Error
80 minutes : in normal control state
3) If D-sensor ≥13℃, Heater Defrosting is OFF

Pause

Pause
Time : 7 minutes
Comp, F-fan, R-fan, Heater etc. : OFF

Fan-Delay

Fan-Delay
1) Time : 5 minutes
Comp : ON and F-fan, R-fan, Heater : OFF

2.The defrost mode start with the following conditions

1) Total operation time of comp. becomes : 6,8,10,……. 24 hours.
① Comp. operating rate : more 85%
② Total door open time : 2 minutes
(Any door, F or R open time is over 2 minutes.)
③ Any error mode : R1, F1, D1, F3, RT/S, Door-switch etc.)

2) Defrosting mode starts unconditionally as long as total comp. work time is 24 hours, even if the above conditions 1) are not satisfied.

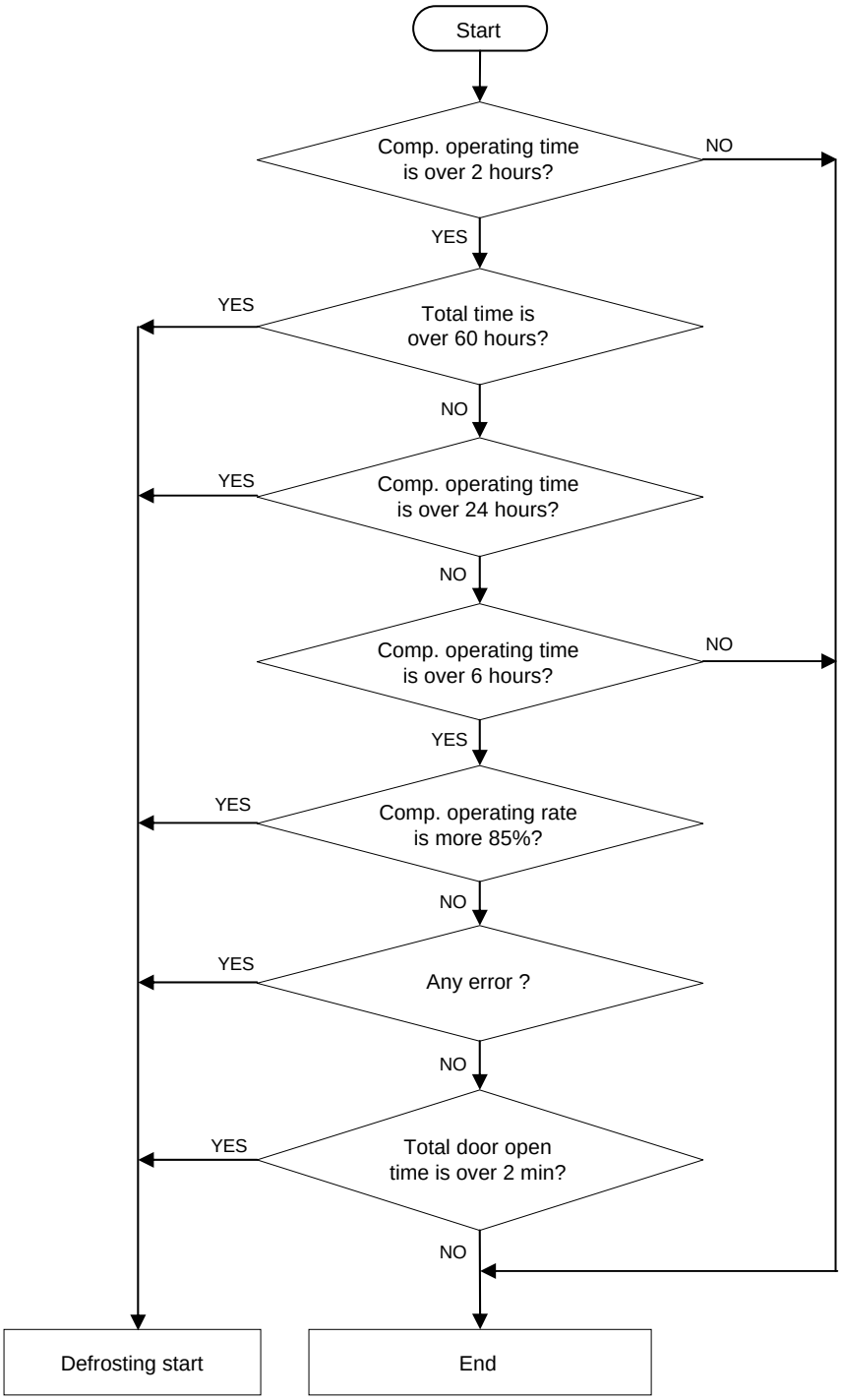
3) Defrosting mode starts immediately as long as total time of [comp. ON + comp. OFF] is over 60 hours, even if the above 1) and 2) conditions are not satisfied.

3. In providing initial power (or returning power failure)

If D-sensor temp. ≤ 3.5℃, defrosting mode starts .

CONTENTS	REMARKS

4. Flow Chart of Defrosting Start

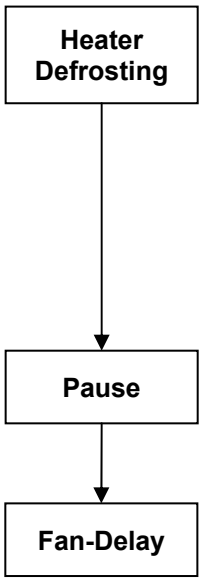


4-3. c (Forced Defrosting) Mode

INPUT	CONTROL OBJECT
1. Defrosting Cycle	1. Comp 2. F-Fan 3. R-Fan 4. D-Heater

CONTENTS	REMARKS

1. A/S Defrosting Mode (Heater defrost → Pause → Fan Delay)



Heater Defrosting
1) Comp, F-fan, R-fan : OFF
D-HTR : ON
2) Time limit
30 seconds : Heater is ON regardless of D-sensor temperature right after defrosting start
30 minutes : in case of D1-Error
80 minutes : in normal control state
3) If D-sensor ≥13℃, Heater Defrosting is OFF

Pause
Time : 7 minutes
Comp, F-fan, R-fan, Heater etc. : OFF

Fan-Delay
1) Time : 5 minutes
Comp : ON
F-fan, R-fan, Heater : OFF

2. How to start
1) Push “REF.TEMP” button 5 times while pushing “FRZ.TEMP” button simultaneously. --------- FRS-U20IA
2) In “LOCK” mode, push “REFRIGERATOR SET” button 5 times while pushing “FREEZER SET” button simultaneously. ------ FRS(N)-U20DA

3. How to proceed
1) Delete Pre-cool mode. (Others are same as normal defrosting)
2) Heater is ON regardless of D-sensor temp. at first 30 seconds. (Check of defrosting current)

4-4. Fan Voltage of Control Mode

INPUT	CONTROL OBJECT
1. F-Sensor 2. R-Sensor	1. F-FAN, R-FAN, C-FAN

CONTENTS	REMARKS

1. Fan voltage of control mode

FAN	F-FAN	R-FAN	C-FAN
Voltage	13 V	13 V	13 V

※ Refer to the 5-4. (Fan Function)

4-5. Louver Heater Control

INPUT	CONTROL OBJECT
1. Comp	Louver Heater

CONTENTS	REMARKS
It is linked with comp.	

4-6. Buzzer or Alarm Control

INPUT	CONTROL OBJECT
1. Control (Inner or F-PCB) buttons 2. Door Switch 3. Initial Power Input	Buzzer

CONTENTS	REMARKS
1. Buzzer sounds if any button of Inner Control is pushed. 2. Buzzer sounds 4 times 3 seconds after initial power input. 3. Buzzer sounds for 3 or 1 times in case of A/S forced defrosting and short (pull down) operation or explanation mode. 4. If door is open, buzzer sounds after every 1 minutes for 5 minutes (Door open alarm)	

4-7. Control of Interior Lights (FRS(N)-U20DA)

INPUT	CONTROL OBJECT
1. Refrigerator door switch 2. Freezer door switch 3. Home bar door switch 4. Dispenser switch	Lamp

CONTENTS	REMARKS
1. Control refrigerator compartment lights R-Lights turn ON/OFF by R-door switch ON/OFF (※ For 10 minutes after sensing door open, the lights turn off automatically through door close is not sensed.) 2. Control of freezer compartment lights. F-Light turn ON/OFF by F-door switch ON/OFF (※ For 10 minutes after sensing door open, the lights turn off automatically through door close is not sensed.) 3. R-lights ON/OFF by home bar door switch ON/OFF. (for only model with home bar) R-lights turn ON for 10 minutes after sensing home bar door switch open. 4. Dispenser lamp control (for only model with water/ice dispenser) Dispenser lamp turns ON/OFF by Dispenser switch. Dispenser lamp turns ON for 4 seconds after sensing switch close.	

4-8. Demonstration. 4-8-1. FRS(N)-U20DA

INPUT	CONTROL OBJECT
1. “FREEZER SET, WATER/ICE” Button , Door switch	Comp F/R-Fan Heater

CONTENTS	REMARKS
1. Start Push “ICE/WATER” button 5 times while pushing “FREEZER SET” button simultaneously. 2. Control 1) All other electrical components are OFF except for F-fan / R-fan 2) Fan Control Door OPEN → Fan ON / Door close → Fan OFF. 3. Stop or termination 1) During Demo mode, push “ICE/WATER” button 5 times while pushing “FREEZER SET” button simultaneously. 2) Power in again	

4-9. Compensation of R-sensor ON/OFF Point

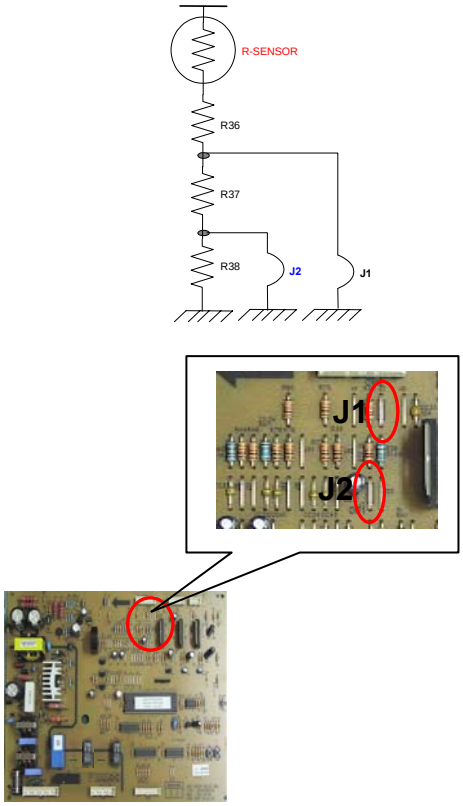
INPUT	CONTROL OBJECT
Main PCB	Resistance of R-sensor Mid ON/OFF Point

CONTENTS

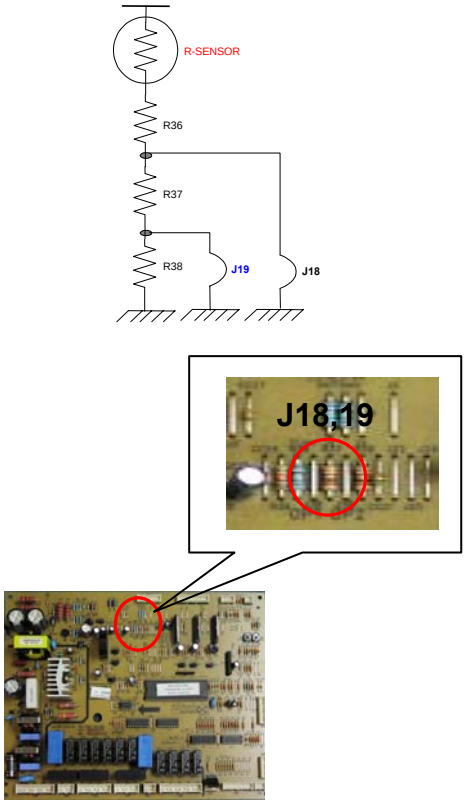
Compensation of R-sensor ON/OFF temp. (down)

In case temperature of refrigerator compartment is weak or insufficient,
take the following action.

FRS(N)-U20IA



FRS(N)-U20DA



R36 : R-SENSOR standard resistance in normal mode (31.4K)
R37 : In case of weak ref., cut J1 (or J18) to down the standard resistance by 1.5deg(2K)
R38 : In case of weak ref., cut J2 (or J19) to down the standard resistance by 1.5deg(2K)

FRS(N) -U20IA	J1	-	cut	cut
	J2	-	-	cut
	Temperature compensation	0℃	-1.5℃	3℃
FRS(N) -U20DA	J18	-	cut	cut
	J19	-	-	cut
	Temperature compensation	0℃	-1.5℃	3℃

REMARKS

※ Refer to the 5-2.
(Function of each sensor)

4-10-1. FRS(N)-U20DA (CLED Display of Front PCB)

INPUT	CONTROL OBJECT
Temperature Control Buttons	88 Display CLED

CONTENTS

1. How to start
   1) Under “LOCK” mode, press “SUPER FREEZER” button 5 times while pressing “FREEZER SET” button at the same time.
   2) The front CLED displays as the right diagram shows
      ([Ex.] Time Display of 0003 signifies 3 minutes of power on time.)
   3) Press “FREEZER SET” button and the following value is displayed successively.
      ① Time
      ② F-Sensor temperature
      ③ D-Sensor temperature
      ④ R-Sensor temperature
      ⑤ RT-Sensor temperature
      ⑥ P Factor display (Refer to water supply mode of automatic icemaker)
      ⑦ Filter remaining time until change (First check ; 4,320Hr)
      Refer to Filter Information Reset of CLED of front control panel.
   4) Error is displayed only if there is any ; it is skipped if no error.

2. How to stop
   1) Push “LOCK” button 1 time.
   2) It stops automatically in 4 minutes from the start.

3. All the error Codes are reset if they turn to be normal.

4. Error code

ERROR CODE	CONTENTS
F1	F-sensor : disconnection (“Lo”), short (“Hi”)
r1	R-sensor : disconnection (“Lo”), short (“Hi”)
rt	RT-sensor : disconnection (“Lo”), short (“Hi”)
d1	D-sensor : disconnection (“Lo”), short (“Hi”)
dr	R-Door Switch : defective
dF	F-Door Switch : defective
dH	Home bar Door Switch : defective
EI	I-sensor : disconnection (“Lo”), short (“Hi”)
EF	Flow sensor : defective
Et	Horizontal switch : error
Eg	Water supply : error
ES	Micro switch : error
EA	Drop the ice while Et
Eu	Full ice switch : error
C1	Cycle : abnormal or defective
F3	Return after defrosting : abnormal or defective
Co	Display Full Down mode
D2	Display forced defrost mode for A/S

REMARKS

CONTENTS	REMARKS

5. Control way of Error (if any)

1) “F1” error

Cause : F-sensor disconnection or short

Check point : Measure the resistance between both terminals after separating CN8 (or CN15) of the Main PCB. (Refer to the 5-2.)

If F-sensor is disconnected or shorted , change the F-sensor in the freezer compartment.

How to reset : If F-sensor is normal, the error is terminal temperature.

2) “R1” error

Cause : R-sensor disconnection or short

Check point : Measure the resistance between both terminals after separating CN7 (or CN14) of the Main PCB. (Refer to the 5-2.)

If R-sensor is disconnected or shorted , change the F-sensor in the refrigerator compartment.

How to reset : If R-sensor is normal, the error is terminal temperature.

3) “rt” error

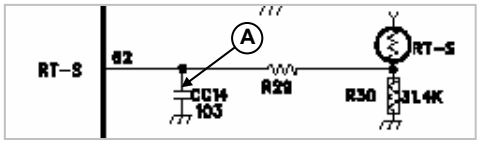
Cause : RT-sensor disconnection or short (full down)

Check point : Measure the voltage of “A” part on the Main PCB.

If the voltage is 0.5V~4.5V, it is normal.

If the voltage is 0V (short) or 5V (disconnected), change the RT-sensor on the Main PCB

How to reset : If RT-sensor is normal, the error is terminated automatically.



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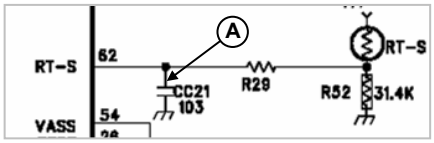

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4) “d1” error

Cause : D-sensor disconnection or short (full down)

Check point : Measure the resistance between both terminals after separating CN8 (or CN15) of the Main PCB. (Refer to the 5-2.)

If D-sensor is disconnected or shorted , change the D-sensor on the evaporator.

How to reset : If D-sensor is normal, the error is terminated automatically.

5) Door error (“dF” “dR” “dH” on display)

Cause : in case it senses that door is open for more than 1 hour.

Check point : F/R door is opened or not.

6) “C1” error

Cause : in case comp. works for over 3 hours when D-sensor temp. is over -5℃

Check point : Refrigerant leakage.

7) “F3” error

Cause : in case defrosting return is done by time limit of 80 min

Check point : Measure the resistance between both terminals of the defrost heater. (Assembled with evaporator)

If the resistance is ∞Ω (disconnected) or 0Ω (short) change the

8) “d2” mode (A/S forced defrosting mode)

Push “REFRIGERATOR SET” button 5 times while pushing “FREEZER SET” button simultaneously.

Control : A/S forced defrosting control (Pre-cool is deleted)

If D-sensor temp. is over 10℃, the mode is terminated automatically.

Refer to the 4-3. .

CONTENTS	REMARKS
9) “EI”ERROR Cause : I-SENSOR disconnection / short Check point : Measure the resistance between both terminals after separating CN11 of the Main PCB. (Refer to the 5-2.) If F-sensor is disconnected or shorted , change the I-sensor in the automatic ice maker. 10) “EF” ERROR Cause : When Flow-sensor ERROR (There is no Pulse during some time) The number of pulse signal is below 10 by 1 sec during water supply. Check point : Water supply line 11) “Eg” ERROR Cause : I-sensor temp (5min after water supply) doesn’t go up. Check the I-sensor or water supply line. 12) “ES” error (MICRO switch error) Cause : When it senses 1min continuously Check the MICRO switch of the dispenser. 13) “Ea” error Cause : Malfunction of ice drop motor. Check the motor by pushing test switch. 14) “Eu” error Cause : Switch (which senses if the ice is full or not) is in error. Control : When dropping the ice, the motor just rotates 90 degree. Termination : When the switch is in normal. 15)“EA“ ERROR Cause : When sensing Ice dropping by time 3 times in level sensor SW Error. Control : Stop of Ice Maker Termination : With normal level switch. Re-input of power or push if icemaker test switch. 16)“Et” ERROR Cause : Level switch error (No pulse is sensed for some time) Control : By time (Supply mode is skipped) Termination : Normal condition. * When all ERROR CODE is normal, the Refrigerator reset	

4-11. Summary of Function. 4-11-1. FRS(N)-U20DA (Front PCB)

INPUT	CONTROL OBJECT
Each button	Resistance of R-sensor Mid ON/OFF Point

CONTENTS	REMARKS

1. All the modes are started “LOCK” mode (except “FILTER RESET” mode)

2. Element A/S Function

Forced Defrosting	“FREEZER SET” + “REFRIGERATOR SET” 5 times
Reset water filter	Push “RESET WATER FILTER” for 3 seconds
Demo function	“REFRIGERATOR SET” + “WATER/ICE” 5 times
Pull Down	“REFRIGERATOR SET”+ “FREEZER SET”+ “WATER/ICE”5 times
Error display	“FREEZER SET”+ “SUPER FREEZER” 5 times
EEPROM clear	“WATER/ICE”+ “RESET WATER FILTER” 5times
Ice maker test	“WATER/ICE” + “ICE MAKER LOCK” 5 times

4-12. Back up Function (FRS(N)-U20DA)

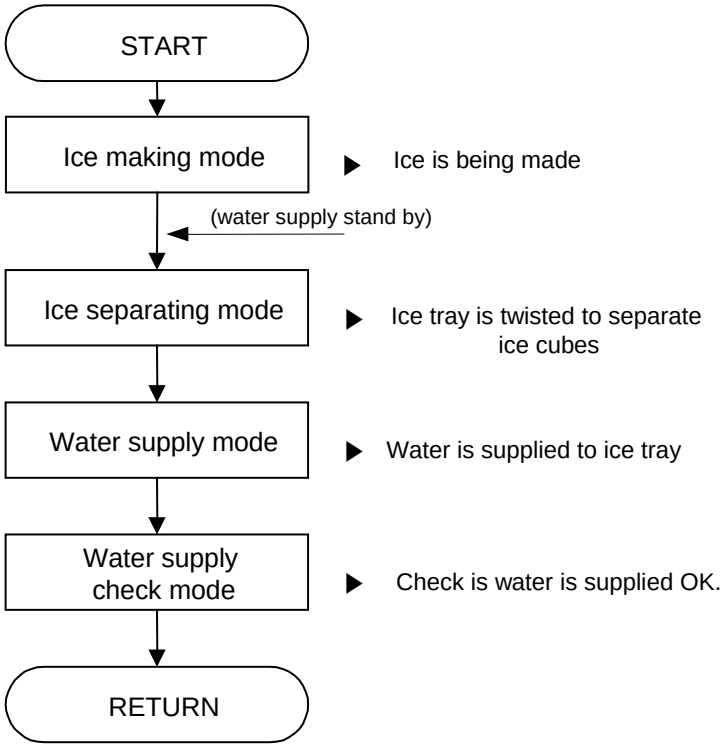
INPUT	CONTROL OBJECT
None	1. F-FAN, R-FAN, C-FAN

CONTENTS	REMARKS
1. Filter Exchange Information : Record as a real-time from the point of power input 2. P Factor (Information about Ice Maker)	

4-13. Automatic Icemaker (FRS(N)-U20DA)

INPUT	CONTROL OBJECT
Full ice sensing switch Ice Maker Lock Sensors	Ice separating motor

CONTENTS	REMARKS
1. Flow of ice making	



1) Press TEST switch under the Icemaker for more than 1 second and test starts.
   * Test mode starts from ice separating mode.
   * In case test switch has an error of short, test is done only once.

CONTENTS	REMARKS

2) With the initial power input, Ice tray turns to be horizontal and ice making mode starts.

3) Control of water hose heater

* Heater is always ON if RT-sensor has an error or RT is below 15 degree.
* Heater is always ON for 60 minutes (max. Limit time) if Flow-sensor has an error

4) Water supply stand-by

Condition : if ice is sensed full

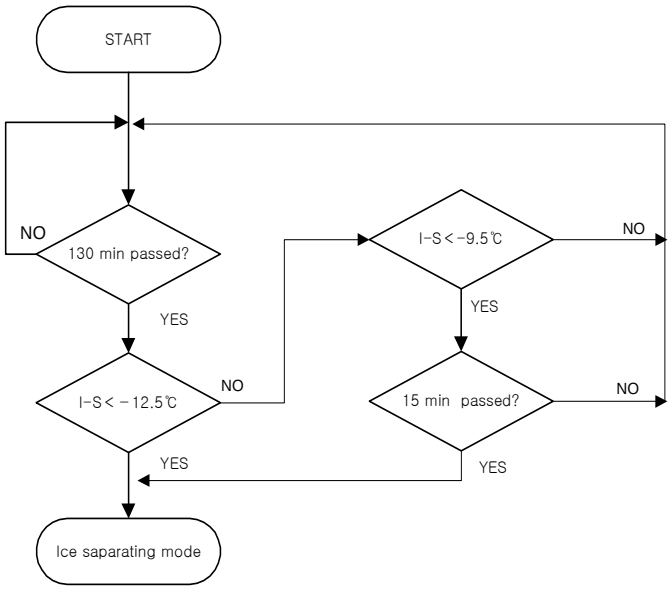
Operation : proceeds to Ice making mode (Ice separating and water supply Modes stop)

5) Crusher Function

It stops operation when freezer door is open

It operates if freezer door is closed.

2 Ice making mode



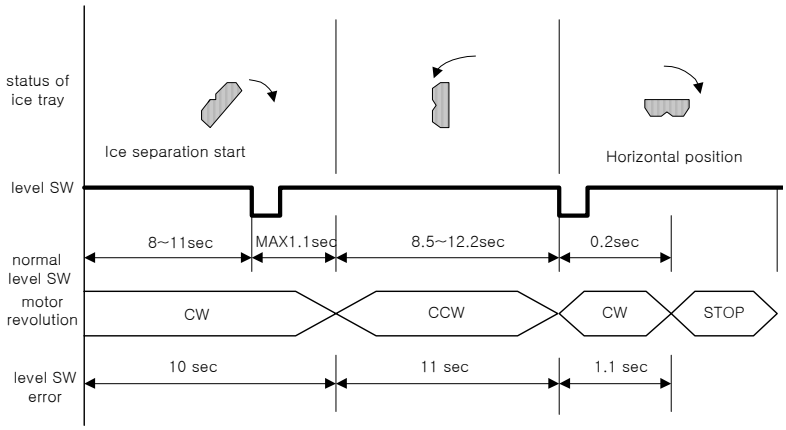
1) Ice making stops if ice-sensor is below -12.5℃ after 130 minutes.

2) Ice making also stops if ice-sensor is below -9.5℃ for 15 minutes, though ice-sensor is not below -12.5℃ after 130 minutes.

3) In case of ice sensor, ice making stops after 4.8 hours.

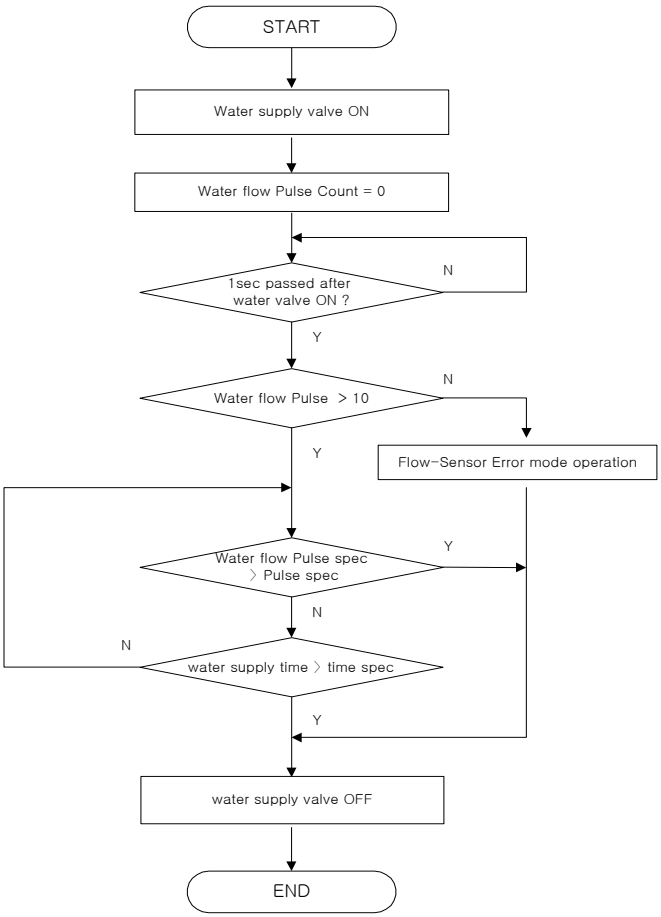
CONTENTS	REMARKS

3. Ice separating (drop) mode



1) Time of each zone used to verify level switch error
2) The rotation of motor is sensed at each zone
3) In case of level switch error, ice separation is done by time.
4) If ice separating motor has error, the mode stop.

4. Water supply mode



CONTENTS	REMARKS
1) Water supply valve is open when water supply mode starts after separation of ices. 2) Water is supplied by time in case sensor has error. 3) Factor valve is variable which can be useful in AS action ① Water flow pulse is set to 238 if flow sensor is in normal condition. (If water is supplied by time, maximum water supply time 165 seconds) ② In case water flow sensor has error, water time is 5.5 seconds. 5. Water supply check mode 5 minutes after water supply the status can be checked by RT-sensor and increase of temp. Ice sensor.	

RT-S	9℃ ↓	~15℃	~21℃	~31℃	~41℃	41℃ ↑
I-S	-10℃	-9℃	-8℃	-7℃	-6℃	-5℃

4-14. Dispenser Control Function

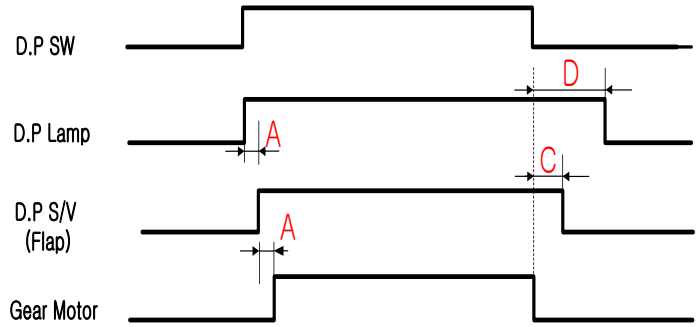
INPUT	CONTROL OBJECT
Dispenser switch WATER/ICE Button ICE MAKER LOCK Button Freezer Door Switch	Dispenser Lamp Crusher Motor Flap Solenoid Crusher Solenoid Dispenser Water Valve

CONTENTS	REMARKS
1) Initial mode : water (Mode change : Water → Cubed ice → Crushed ice) - Selected icon LED turns ON and others are OFF. 2) ICE MAKER LOCK Button Icemaker Lock function and its ICON Turn ON/OFF by pressing the button. 3) Display ① Water ICON turns ON as default mode ② The ICON of each mode turns ON by pressing its button. (If display switch makes error during operation of a mode, its ICON turns OFF) ③ When Icemaker Lock ICON turns ON. - ICE MAKER LOCK ICON turns ON - If it is in the mode of Cubed Ice or Crushed Ice, the mode is changed to Water and Water ICON turns ON - If there is no button input for 1 hour after selecting Cubed Ice or Crushed Ice the mode turns to Water (default)	

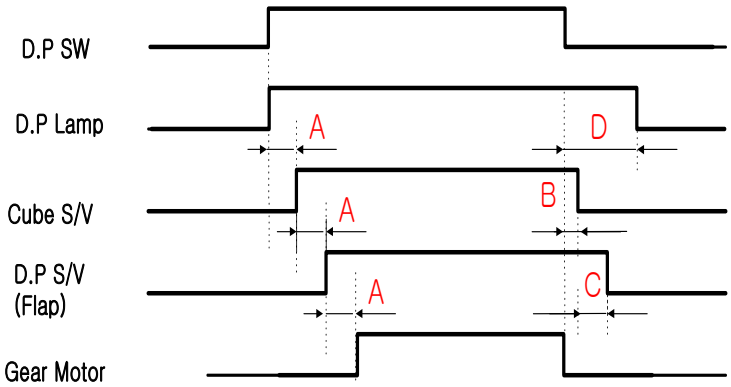
CONTENTS	REMARKS

4) Control Flow & Timing Chart

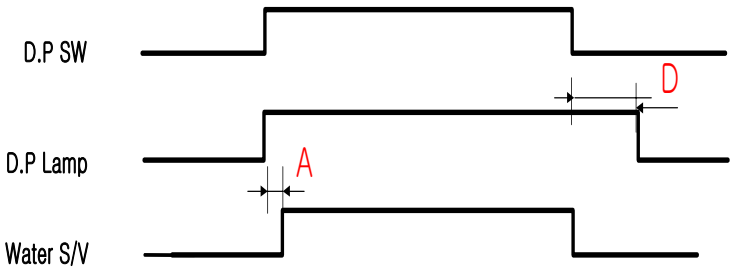
① Crushed Ice



② Cubed Ice

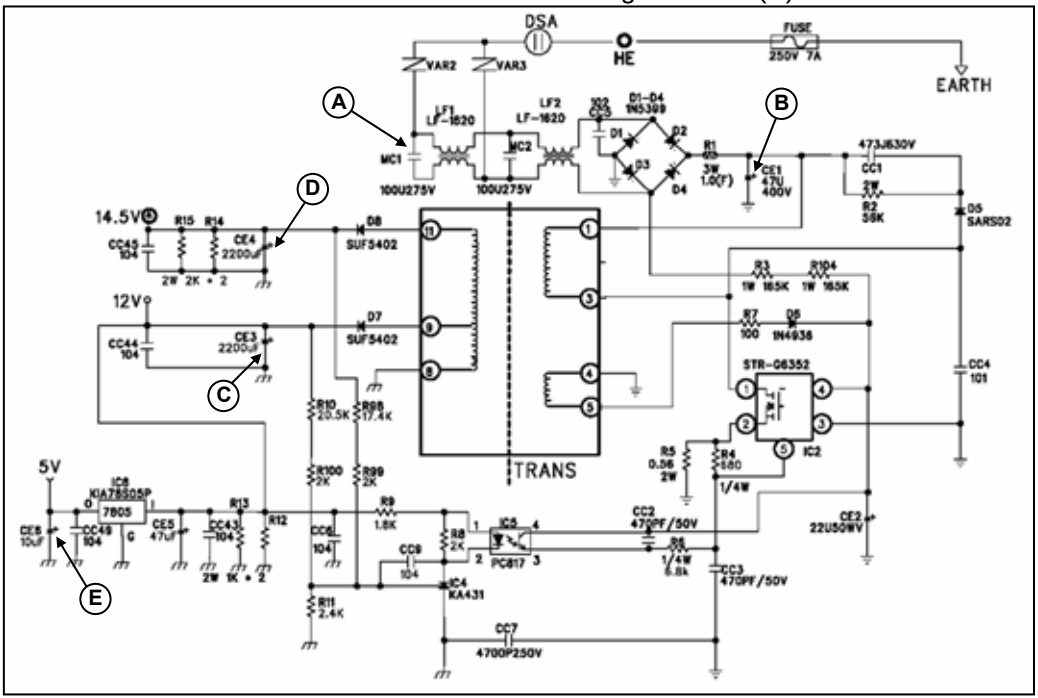


③ Water



Delay time : A = 500ms, B = 500ms, C = 2.0s, D = 5.0s

■ 5. CIRCUIT OPERATION. 5-1. Power Circuit Diagram. FRS(N)-U20DA



※ Voltage of every part

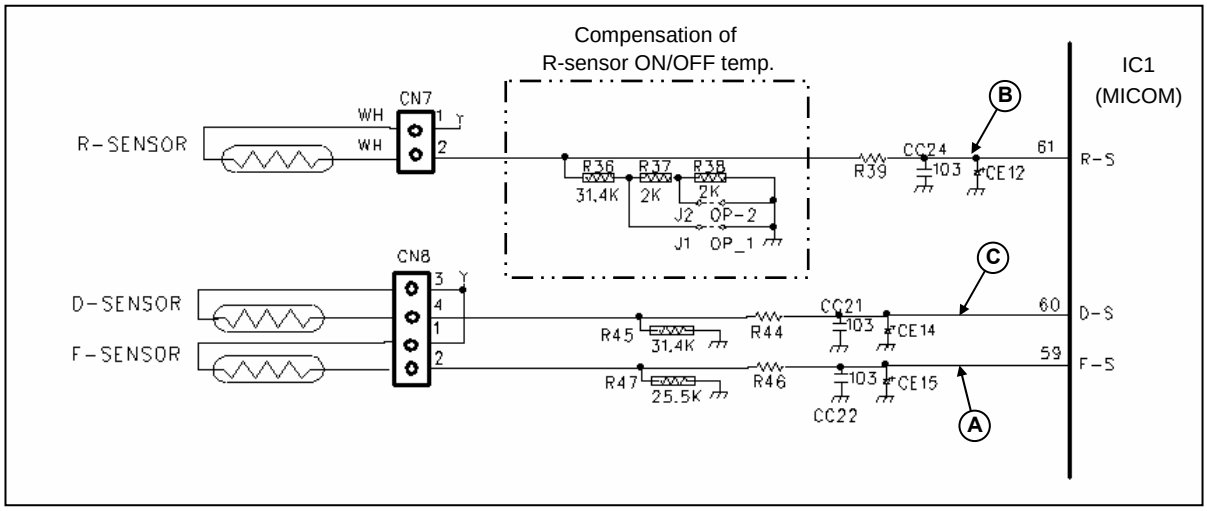
Parts	A	B	C	D	E
	MC1	CE1	CE3	CE4	CE6
Voltage	230Vdc	310Vac	12Vdc	14.5Vdc	5Vdc

※ **Caution :** Since high voltage (DC310V) is maintained at the power terminal, please take a measure after more than 3minutes have passed after removing power cords in the abnormal operation of a circuit.

5-2. Function of Each Sensor

■ FRS(N)-U20DA

CONTENTS	REMARKS



[F-sensor]

1) It senses the temperature of freezer compartment and control Comp., F-fan ON/OFF

2) How it works;

Working Point	Low ON	Mid OFF	High OFF
Working Temp.	-11℃	-16℃	-19℃
Resistance	≒9.32kΩ	≒15.19kΩ	≒15.58kΩ
Sensing Voltage	≒3.24V	≒2.93V	≒2.73V

[R-sensor]

1) It senses the temperature of refrigerator compartment and control R-fan ON/OFF

2) How it works;

Working Point	Low ON	Mid OFF	High OFF
Working Temp.	7.7℃	5.2℃	3.2℃
Resistance	≒23.33kΩ	≒24.05kΩ	≒24.76kΩ
Sensing Voltage	≒2.96V	≒2.83V	≒2.72V

[D-sensor]

1) It senses return point of defrosting heater.

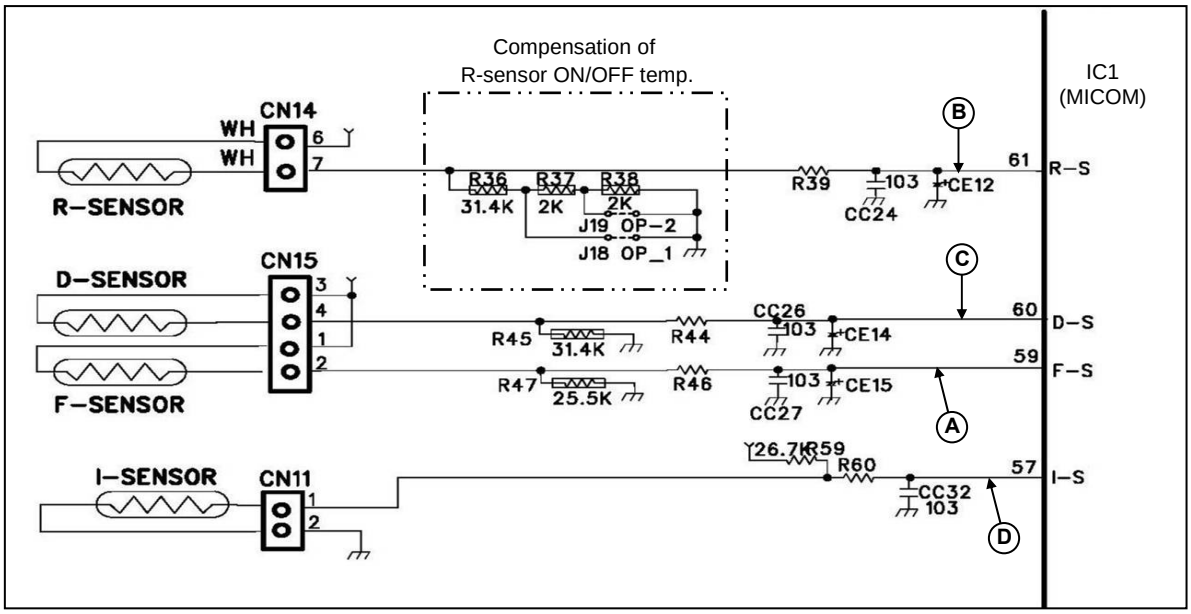
2) How it works;

Working Point	Return point of defrosting heater
Working Temp.	13℃
Resistance	≒22.56kΩ
Sensing Voltage	≒3.08V

* In case temperature of refrigerator compartment is weak or insufficient though comp. and R-fan operate in normal way;
  1) Cut J1 on the M-PCB, then temp. is lowered 1.5℃ than [Mid OFF point]
  2) Cut J1 and J2 on the M-PCB, then the temp, is lowered 3℃.

■ FRS(N)-U20DA

CONTENTS	REMARKS



[F-sensor (A)]

1) It senses the temperature of freezer compartment and control Comp., F-fan ON/OFF

2) How it works;

Working Point	Low ON	Mid OFF	High OFF
Working Temp.	-11℃	-16℃	-19℃
Resistance	≒9.32kΩ	≒15.19kΩ	≒15.58kΩ
Sensing Voltage	≒3.24V	≒2.93V	≒2.73V

[R-sensor (B)]

1) It senses the temperature of refrigerator compartment and control R-fan ON/OFF

2) How it works;

Working Point	Low ON	Mid OFF	High OFF
Working Temp.	7.7℃	5.2℃	3.2℃
Resistance	≒23.33kΩ	≒24.05kΩ	≒24.76kΩ
Sensing Voltage	≒2.96V	≒2.83V	≒2.72V

[D-sensor (C)]

1) It senses return point of defrosting heater.

2) How it works;

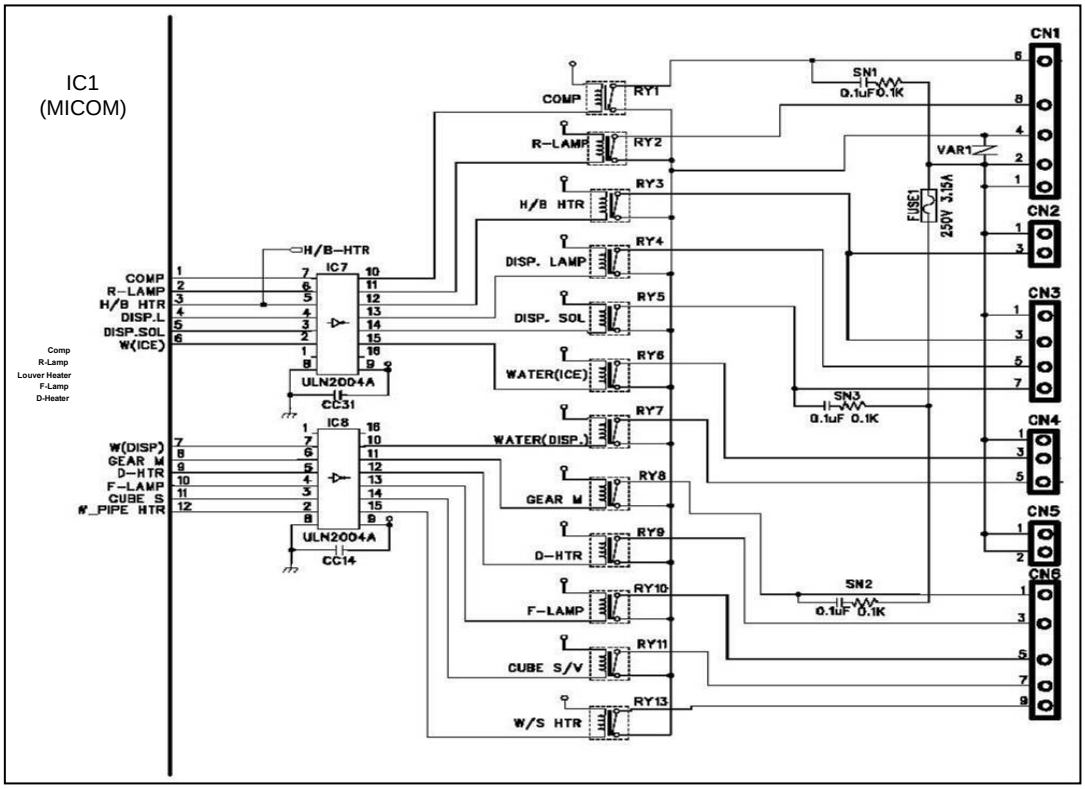
Working Point	Return point of defrosting heater
Working Temp.	13℃
Resistance	≒22.56kΩ
Sensing Voltage	≒3.08V

* In case temperature of refrigerator compartment is weak or insufficient, though comp. and R-fan operate in normal way;
  1) Cut J18 on the M-PCB, then temp. is lowered 1.5℃ than [Mid OFF point]
  2) Cut J18 and J19 on the M-PCB, then the temp, is lowered 3 ℃

■ FRS(N)-U20DA

CONTENTS	REMARKS

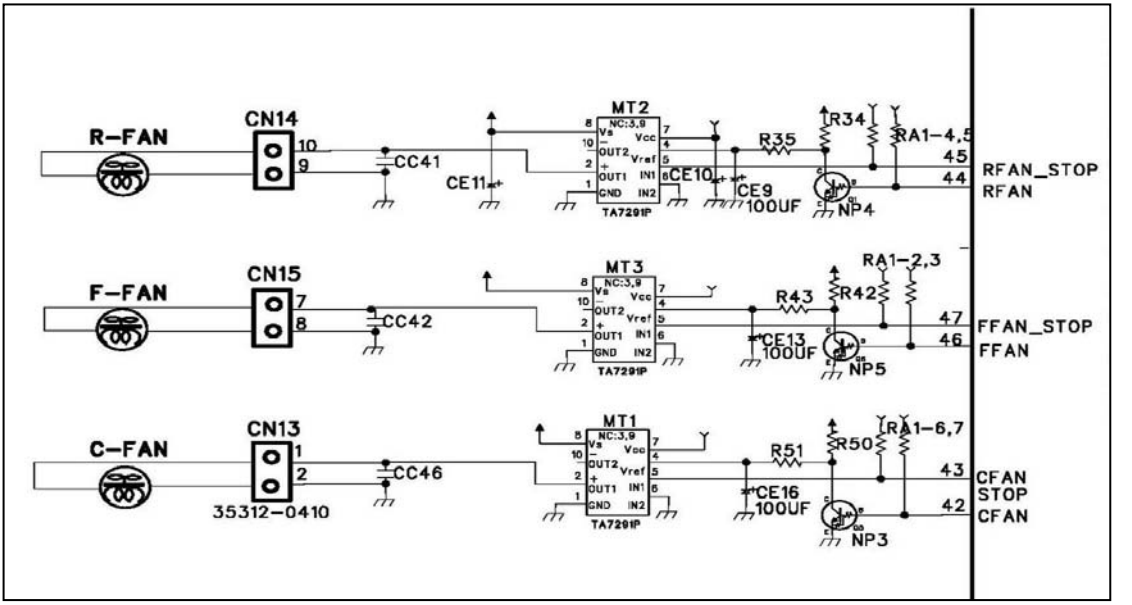
1. Circuit Diagram



2. How it works;

Control	Control Mode Method	ON Condition			OFF Condition		
		MICOM Port	IC ULN2004 Output pin		MICOM Port	IC ULN2004 Output pin	
Comp	Relay 1	#1≒5.0V	IC7	#10≒0.7V	#1≒0V	IC7	#10≒12V
R-Lamp	Relay 2	#2≒5.0V		#11≒0.7V	#2≒0V		#11≒12V
H/B Heater	Relay 3	#3≒5.0V		#12≒0.7V	#3≒0V		#12≒12V
Dispenser-Lamp	Relay 4	#4≒5.0V		#13≒0.7V	#4≒0V		#13≒12V
Dispenser-Solenoid	Relay 5	#5≒5.0V		#14≒0.7V	#5≒0V		#14≒12V
Water (Ice)	Relay 6	#6≒5.0V		#15≒0.7V	#6≒0V		#15≒12V
Water (Dispenser)	Relay 7	#7≒5.0V	IC8	#10≒0.7V	#7≒0V	IC8	#10≒12V
Geared-Motor	Relay 8	#8≒5.0V		#11≒0.7V	#8≒0V		#11≒12V
D-Heater	Relay 9	#9≒5.0V		#12≒0.7V	#9≒0V		#12≒12V
F-Lamp	Relay 10	#10≒5.0V		#13≒0.7V	#10≒0V		#13≒12V
Cube-Solenoid	Relay 11	#11≒5.0V		#14≒0.7V	#11≒0V		#14≒12V
Water Pipe Heater	Relay 12	#12≒5.0V		#15≒0.7V	#12≒0V		#15≒12V

■ 5-3. Fan Function. 1. Circuit Diagram. FRS(N)-U20DA



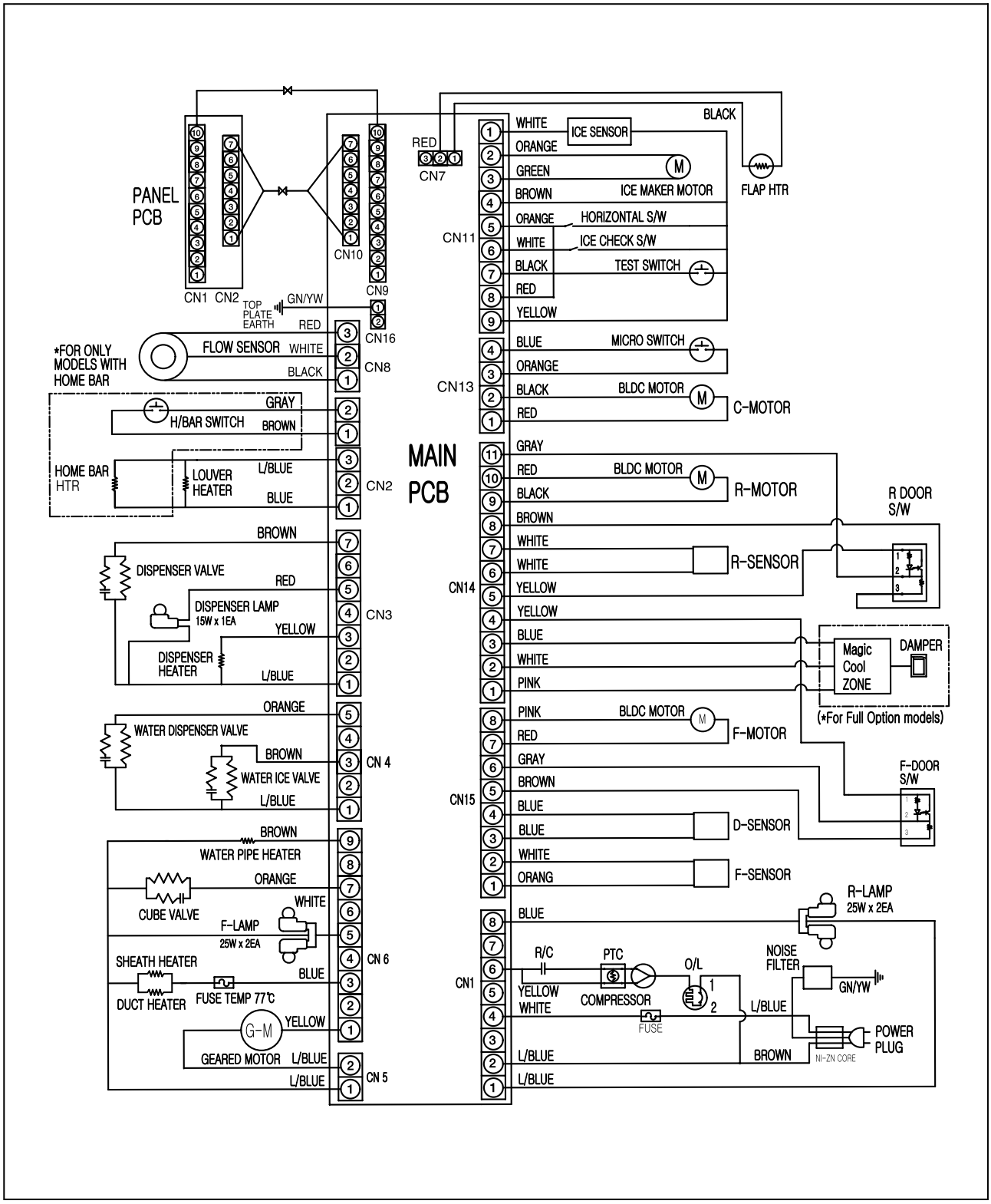
2. Explanation for the operation

* TA7291P is the drive IC for the only DC motor, and used for control of the fan motor
* One input and output is used for the control of the fan motor

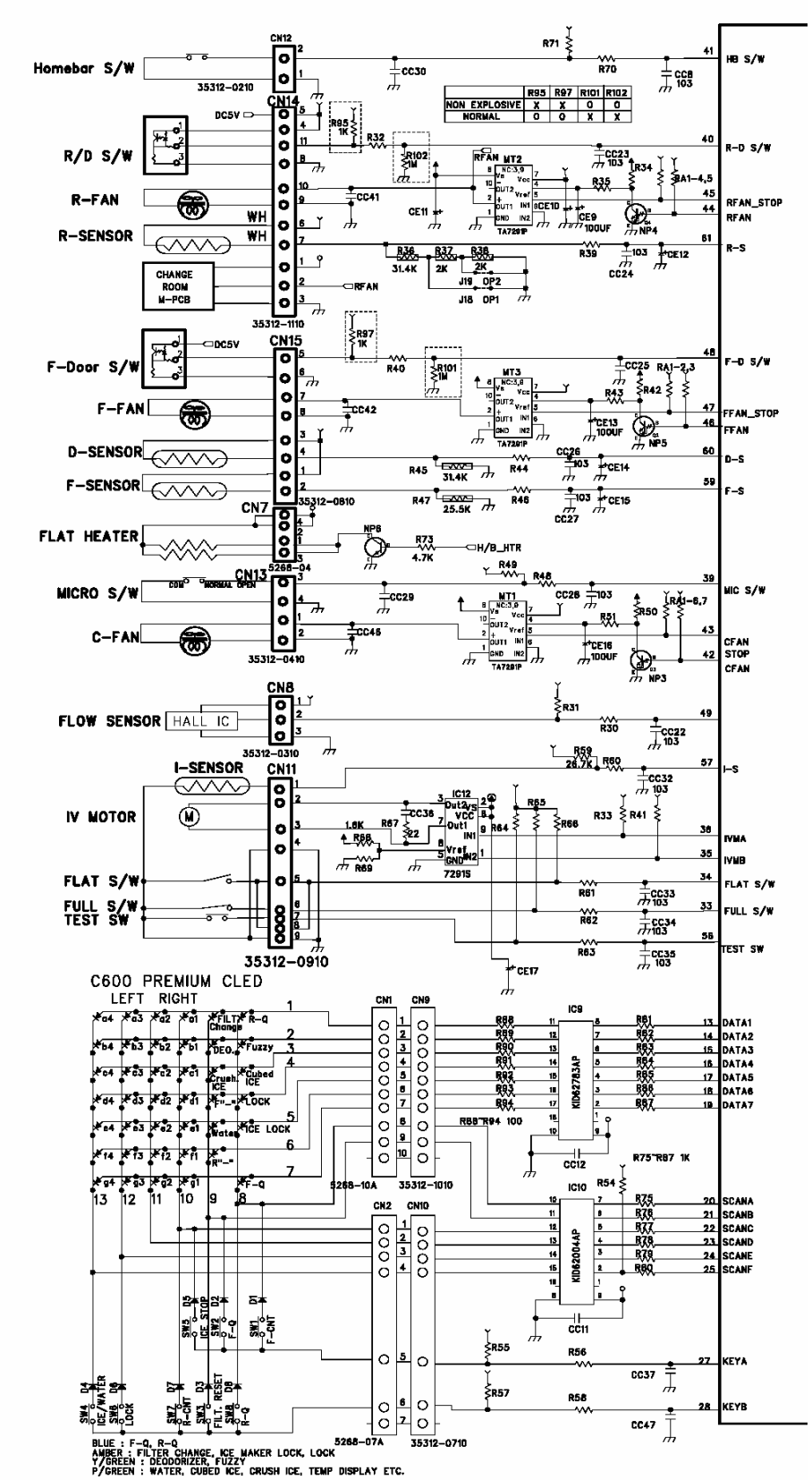
Input	Output	Remark
Motor IC No.5 Pin (R:MT2/F:MT3/C:MT1)	Motor IC No.2 Pin (R:MT2/F:MT3/C:MT1)	
High	High	13V
Low	Low	Stop

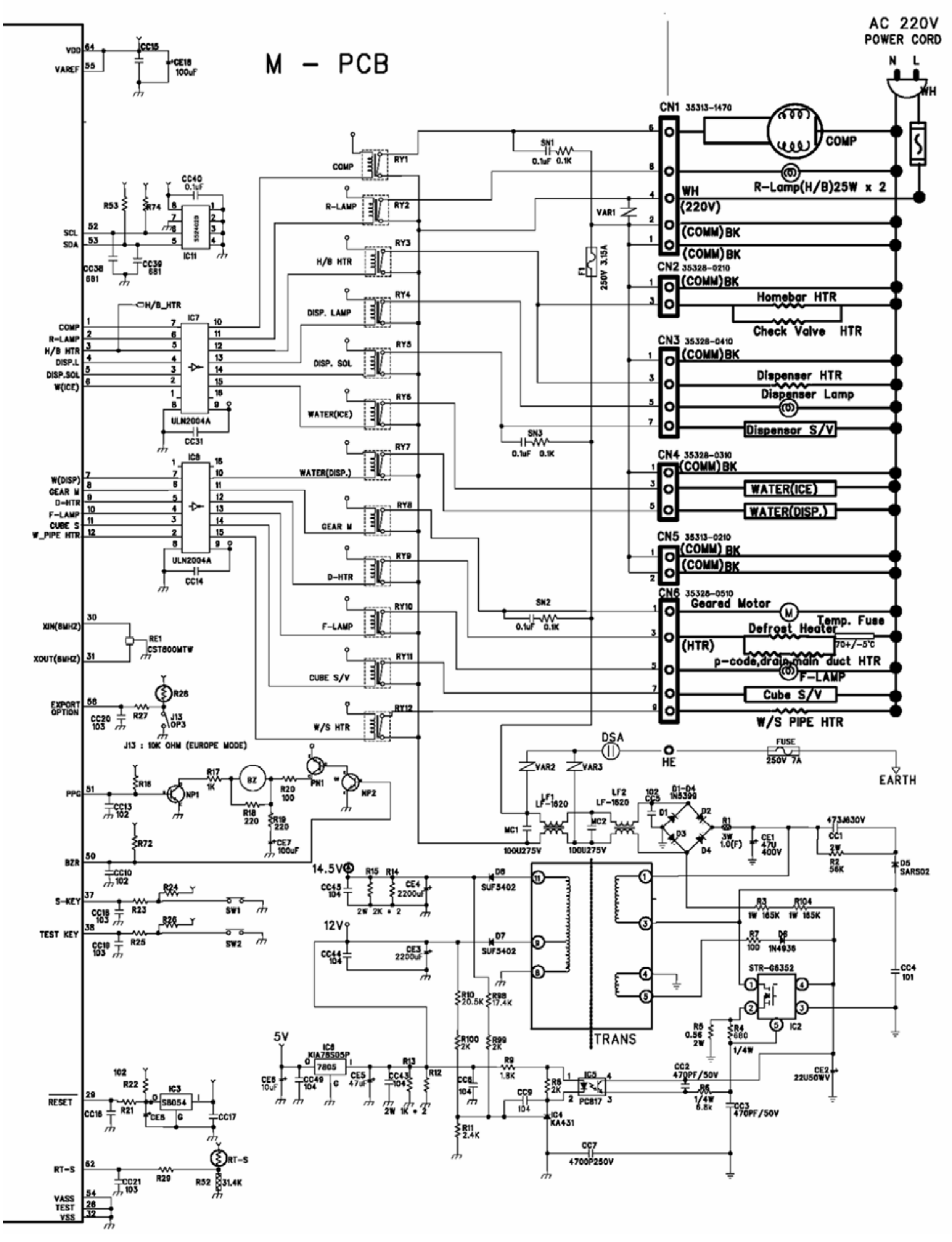
- Vref is the reference voltage for the adjustment of the output voltage by the voltage distribution of Vs (Maximum output voltage), and the output voltage applied to the fan is determined by the PWM control using the software.

6. 6-1. Wiring DIAGRAM. FRS(N)-U20DA



■ FRS(N)-U20DA


Homebar S/W
R/D S/W
R-FAN
R-SENSOR
CHANGE ROOM M-PCB
F-Door S/W
F-FAN
D-SENSOR
F-SENSOR
FLAT HEATER
MICRO S/W
C-FAN
FLOW SENSOR
HALL IC
I-SENSOR
IV MOTOR
FLAT S/W
FULL S/W
TEST SW
35312-0210
35312-1110
35312-0810
5268-04
35312-0410
35312-0310
35312-0910
HB S/W
R-D S/W
RFAN_STOP
RFAN
R-S
F-D S/W
FFAN_STOP
FFAN
D-S
F-S
MIC S/W
CFAN STOP
CFAN
I-S
IVMA
IVMB
FLAT S/W
FULL S/W
TEST SW
C600 PREMIUM CLED
LEFT RIGHT
5268-10A
35312-1010
5268-07A
35312-0710
BLUE : F-Q, R-Q
AMBER : FILTER CHANGE, ICE MAKER LOCK, LOCK
Y/GREEN : DEODORIZER, FUZZY
P/GREEN : WATER, CUBED ICE, CRUSH ICE, TEMP DISPLAY ETC.

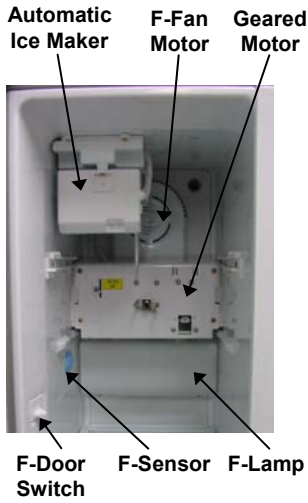


M - PCB
AC 220V
POWER CORD
N L
WH
CN1 35313-1470
COMP
R-Lamp(H/B)25W x 2
WH
(220V)
(COMM)BK
(COMM)BK
CN2 35328-0210
(COMM)BK
Homebar HTR
Check Valve HTR
CN3 35328-0410
(COMM)BK
Dispenser HTR
Dispenser Lamp
Dispensor S/V
CN4 35328-0310
(COMM)BK
WATER(ICE)
WATER(DISP.)
CN5 35313-0210
(COMM)BK
(COMM)BK
CN6 35328-0510
Geared Motor
Temp. Fuse
Defrost Heater
70+/-5°C
(HTR)
p-code,drain,main duct HTR
F-LAMP
Cube S/V
W/S PIPE HTR
RY1
RY2
RY3
RY4
RY5
RY6
RY7
RY8
RY9
RY10
RY11
RY12
COMP
R-LAMP
H/B HTR
DISP. LAMP
DISP. SOL
WATER(ICE)
WATER(DISP.)
GEAR M
D-HTR
F-LAMP
CUBE S/V
W/S HTR
ULN2004A
ULN2004A
DSA
HE
FUSE
250V 7A
EARTH
TRANS
STR-G6352
KIA7805P
S8054
PC817
KA431
SUF5402
14.5V
12V
5V
VDD
VAREF
SCL
SDA
W(DISP)
GEAR M
D-HTR
F-LAMP
CUBE S
W_PIPE HTR
XIN(8MHZ)
XOUT(8MHZ)
CST800MTW
EXPORT OPTION
J13 : 10K OHM (EUROPE MODE)
PPG
BZR
S-KEY
TEST KEY
RESET
RT-S
VASS
TEST
VSS

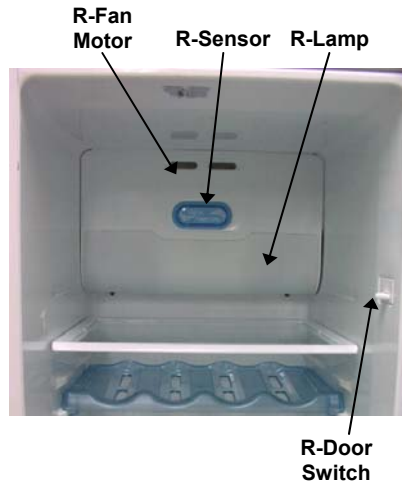
7. COMPONENT LOCATE WIEW

7-1. Front View

7-2. Inner View

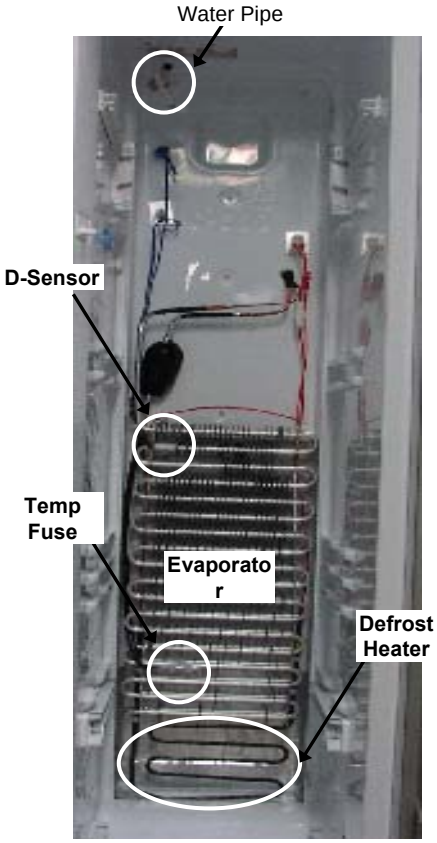


Freezer Compartment
(FRS(N)-U20DA)

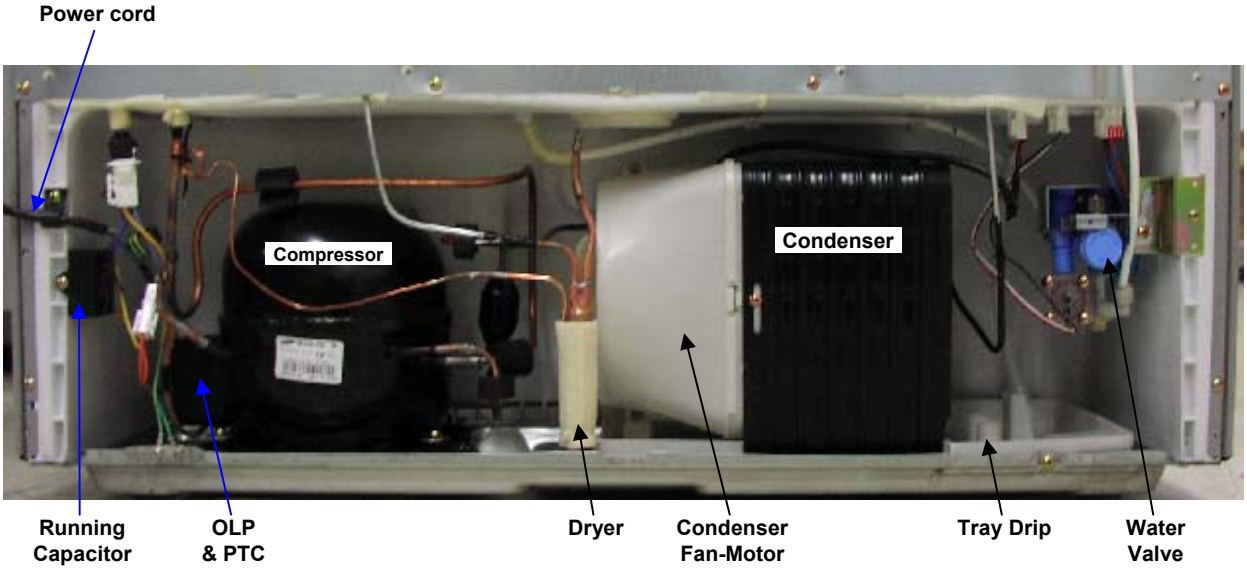


Refrigerator
Compartment
(FRS(N)-U20DA)

7-3. Evaporator



7-4. Machine Compartment



8. HOW TO CHECK EACH PARTS

8-1. Hose Ice Maker Tube Assembly

1) Disassembling Procedure

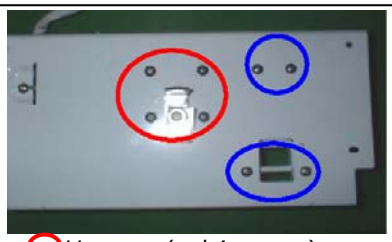
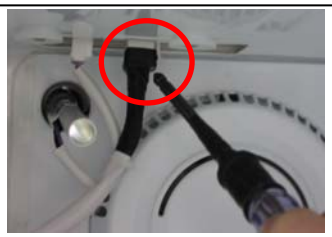
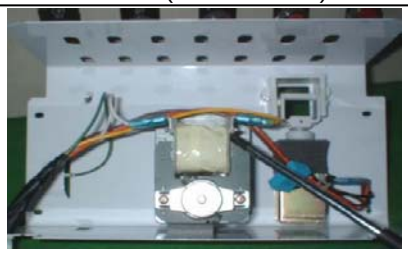
NO	DISASSEMBLING PROCEDURE	NO	DISASSEMBLING PROCEDURE
1	 ▷Pull forward Ice Storage Case	5	 ▷Remove 2 screws at the Cove Guide Cab W/Tube A.
2	 ▷Remove 2 screws.	6	 ▷Disassemble Cover Guide Cab W/Tube A
3	 ▷Pull forward Ice Maker.	7	 ▷Pull forward Hose Ice Maker Tube As.
4	 ▷Remove Water Hose Heater's 2P housing.	8	 ▷Check Hose Ice Maker Tube As.

2) How to check Hose Ice Maker Tube As.

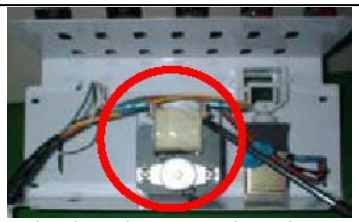
How to check	CRITERION
 ▷Measure the resistance of two wire	▷Good: 9680Ω(±8%) (8900 ~ 10456Ω) ▷If defective, change

8-2. Bracket Geared Motor Assembly

1) Disassembling Procedure

NO	DISASSEMBLING PROCEDURE	NO	DISASSEMBLING PROCEDURE
1	 ▷Remove 2 screws.	4	 ▷Pull forward Bracket Geared Motor.
2	 ▷Unscrew (4 points).	5	 Unscrew (red 4 screws). Unscrew (blue 4 screws).
3	 ▷Separate 6 pin housing of Bracket Geared Motor from the top connector.	6	 ▷Check Solenoid Valve and Geared Motor.

2) How to Check Hose Ice Maker Tube Assembly

PARTS	SPEC.	HOW TO CHECK	CRITERION
Geared Motor	▷SPEC. NAME :DAG-6502DEC ▷VOLTAGE :220/240V,50Hz	 ▷Check resistance value of 2 terminals with a Multi Tester.	▷GOOD : 11.3Ω(±10%) (10.8 ~ 12.7Ω) ▷DEFECTIVE ; Change the Geared Motor.
Cube Sol Valve	▷SPEC. NAME :Cube SN8 ▷VOLTAGE :220/240V,50Hz	 ▷Check resistance value of 2 terminals with a Multi Tester.	▷GOOD : 145Ω(±8%) (133 ~ 156Ω) ▷DEFECTIVE ; Change the Cube Sol Valve.

8-3. Dispenser Micro Switch

1) Disassembling Procedure

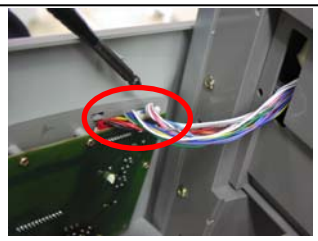
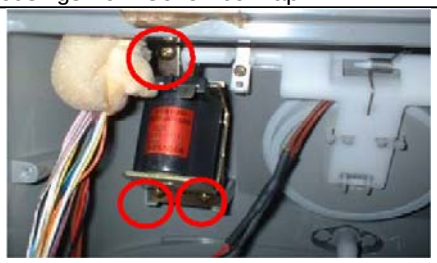
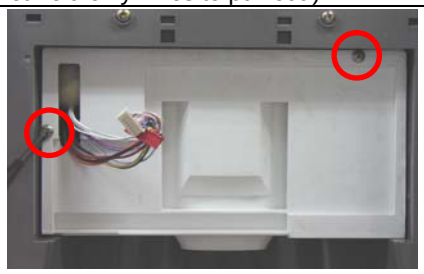
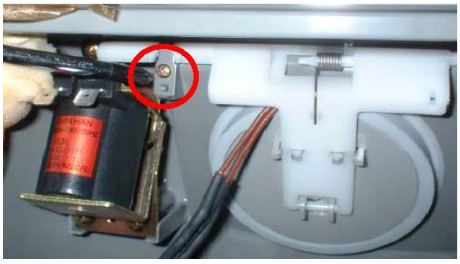
NO	DISASSEMBLING PROCEDURE	NO	DISASSEMBLING PROCEDURE
1	 ▷ Insert (-) screw driver into bottom hole of Dispenser Button Guide. Pull up forward to remove the guide. (Be careful not to damage guide surface.)	3	 ▷Separate wire connectors from Micro Switch.
2	 ▷ Remove Micro switch.	4	 ▷Check Micro Switch.

2) How to Check Micro Switch

PARTS	HOW TO CHECK	CRITERION
SPEC. NAME : VP333A-OD-8 VOLTAGE :125V,3A	 ▷Check both terminals (red circle) with a Multi Tester (Tester Mode : Resistance (Ω).	▷GOOD : Tact Switch (Blue Circle) / Terminals (Red circle) / Tester Result (Resistance Mode) ON (Close) / Connected / Some Value OFF (Open) / Disconnected / No value (0) ▷DEFECTIVE : Change Micro Switch.

8-4. Dispenser Solenoid Valve

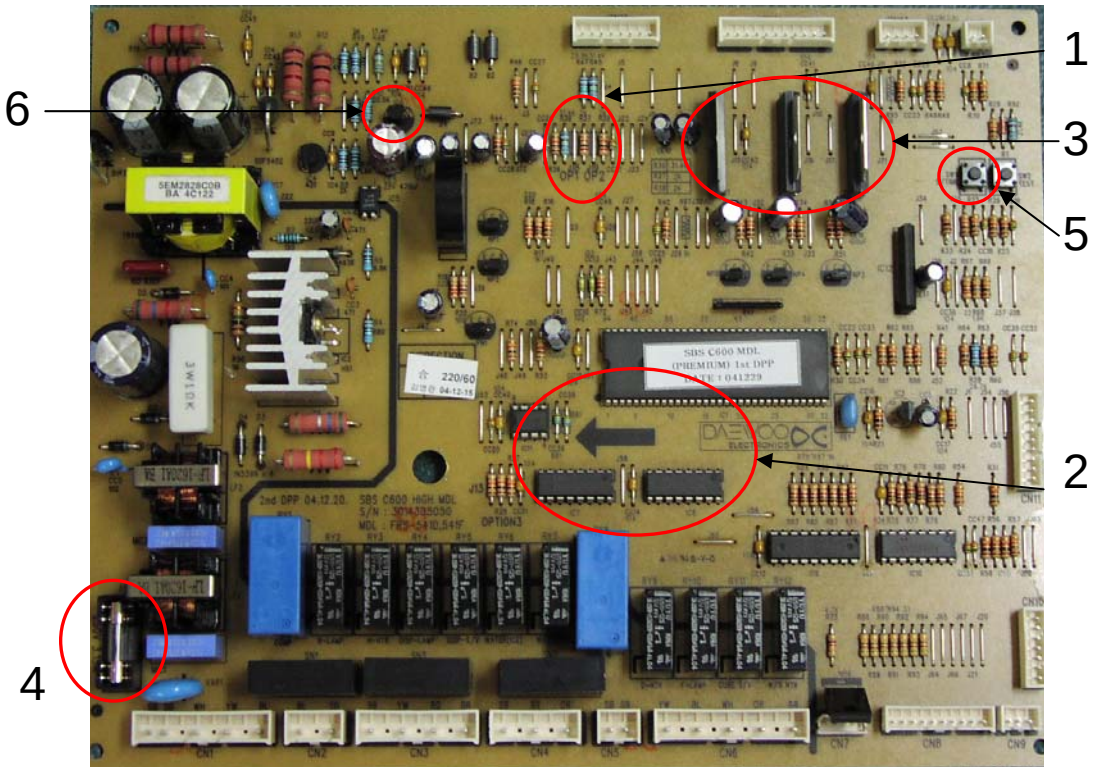
1) Disassembling Procedure

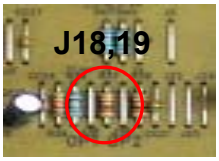
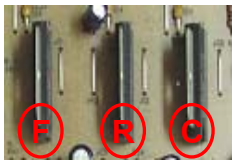
NO	DISASSEMBLING PROCEDURE	NO	DISASSEMBLING PROCEDURE
1	 ▷ Insert (-) screw driver into bottom left groove of Cover Dispenser Box. Pull forward with a snap.(Be careful not to damage cover and door surface.)	4	  ▷Separate 2 terminals from Sol Valve and 2P Housings from Cover Ice Flap.
2	 ▷ Separate 2 housings of 10P / 7P from Front PCB. (Do not hold only wires to pull out.)	5	 ▷Unscrew (3 points) to remove Sol Valve.
3	 ▷Unscrew (2 points) to remove Box Dispenser Shut.	6	 ▷Unscrew (1 point) to remove Cover Ice Flap.

2) How to Check Micro Switch

PARTS	SPEC.	HOW TO CHECK	CRITERION
Dispenser Sol Valve	▷SPEC. NAME :SOL2003-01B ▷VOLTAGE :220/240V,50Hz	 ▷Check resistance value of both terminals with a tester.	▷ Good : 215Ω(±10%) (193 ~ 236Ω) ▷DEFECTIVE : 0 Change Sol Valve.
Flap Heater Assembly	▷VOLTAGE :DC 12V,1.5W	 ▷Check resistance value of both terminals with a tester.	▷GOOD : 96Ω(±8%) (88 ~ 104Ω) ▷DEFECTIVE ; Change Flap Heater AS.

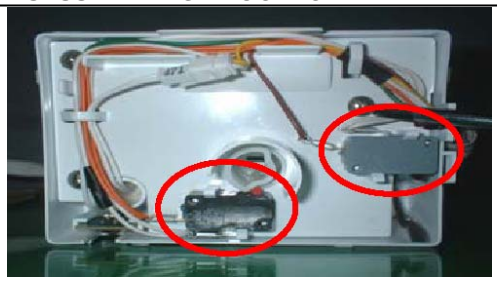
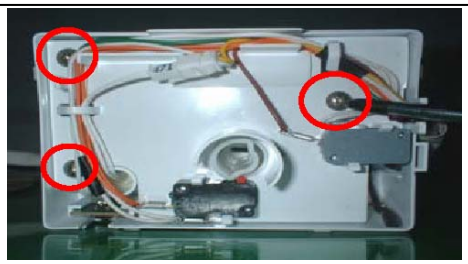
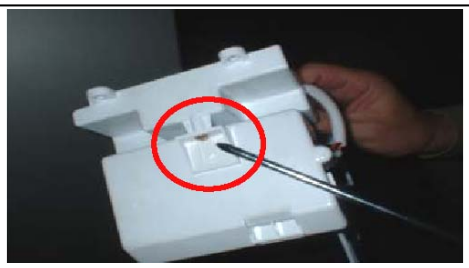
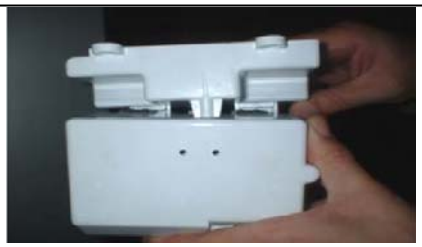
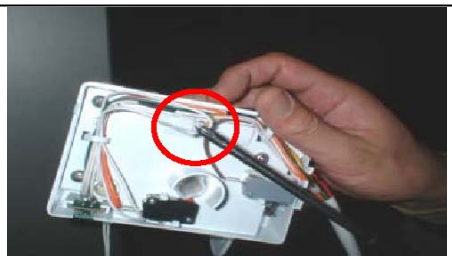
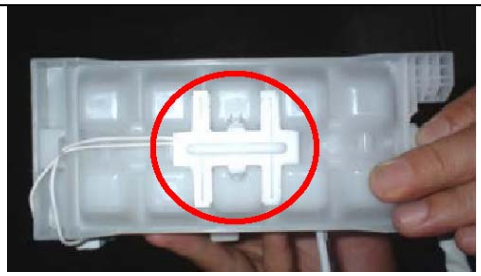
■ FRS(N)-U20DA



NO	ITEM	CHECK POINT	REMARK
1	Compensation of Weak Refrigeration →Making R-temp cooler	 * Used when making R-temp. down to compensate for weak refrigeration without changing FCP temp. setting. ▷Cutting of J18 ; down by 1.5 ℃ ▷Cutting of J18, J19 ; down by 3℃	
2	Relay Power Controller	* To check normal voltage of each electrical devices to & from Mi-com. ▷Check input & output voltage of MICOM and IC7, 8.	
3	Fan Power Controller	 * To check input & output voltage of Fan  ▷#2 : Input ▷#5 : Output	
4	Electric Current Fuse	* To check when each device does not work (250V,3.15A)	
5	Time Shortening Switch	* To shorten time in PCB checkup (Pressing 1 time is regarded as 1 minute has passed.)	
6	Regurator IC(5V)	* To check voltage of MICOM and IC Voltage check of IC#6 (Input :12V,Output : 5V)	

8-6. Ice Maker

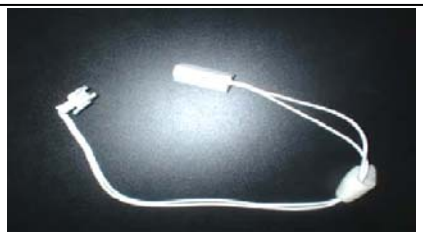
1) Disassembling Procedure

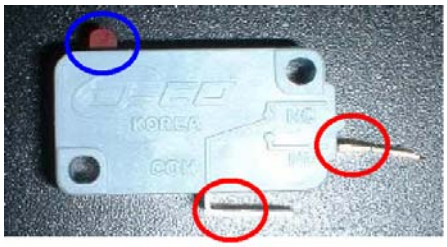
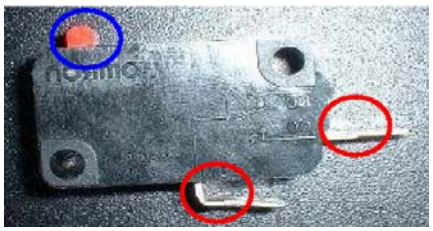
NO	DISASSEMBLING PROCEDURE	NO	DISASSEMBLING PROCEDURE
1	 ▷ Remove 2 screws on top front of ice maker.	6	 ▷Remove full ice sensing switch and level switch.
2	 ▷ Pull forward ice maker.	7	 ▷Unscrew (3 points) Plate Gear Fixture.
3	 ▷Unscrew Fixture of Frame Ice Maker.	8	 ▷ Check if ice dropping motor is normal (OK).
4	 ▷Separate Ice Maker Assembly from Frame Ice Maker.	9	 ▷Remove 2 pin housing from Plate Gear Fixture.
5	 ▷ Separate Cover I/M (A) from Cover I/M (B) with a (-) screw driver.	10	 ▷ Remove I-sensor (ice sensor) from Case Icing As.

* Follow the reverse order when assembling.

2) How to Check Ice Maker

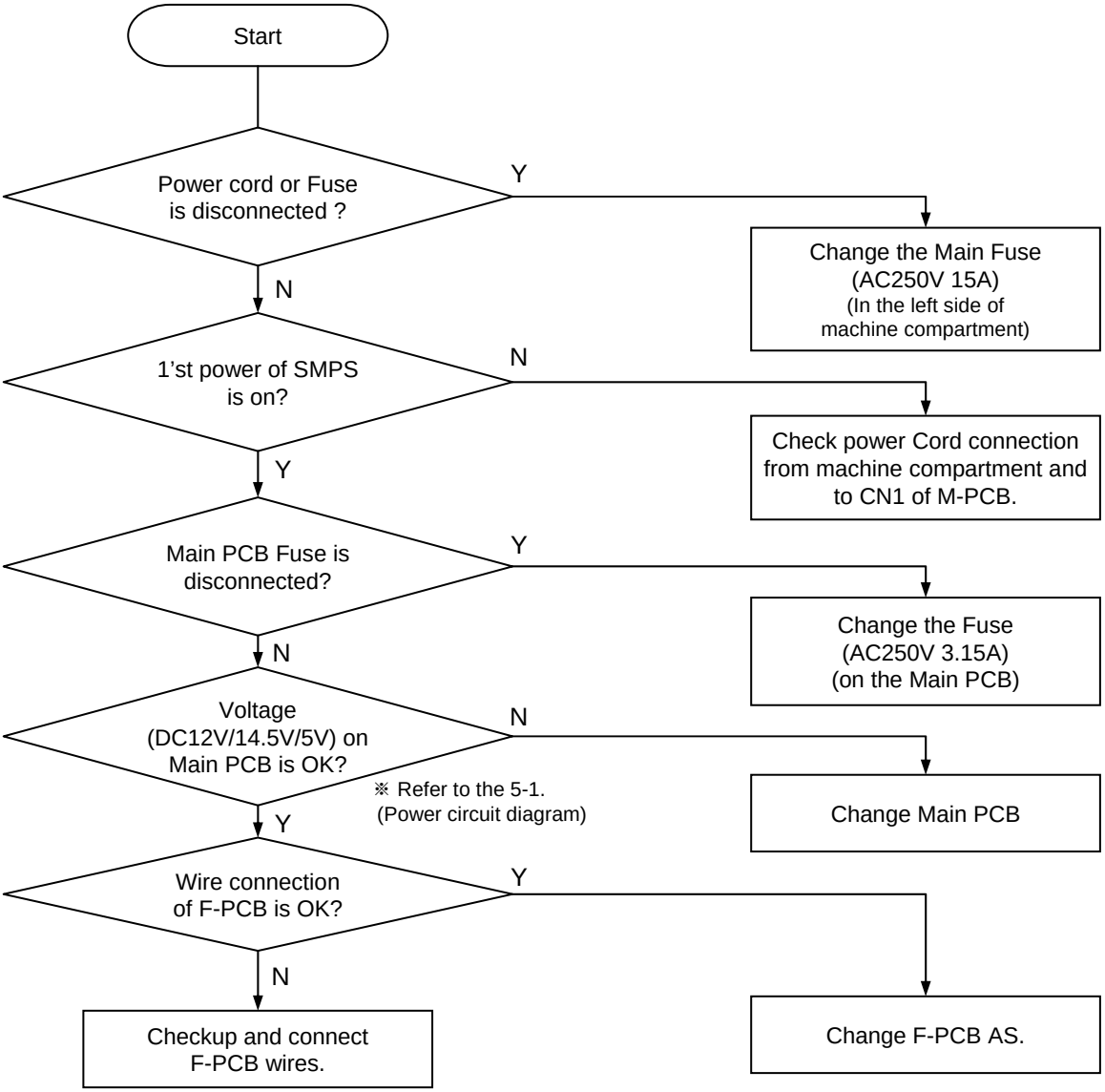
<table>
<tr><th>PARTS</th><th>HOW TO CHECK</th><th>CRITERION</th></tr>
<tr><td>Ice Dropping Motor</td><td> 
▷ Check resistance value of 2 wires with a Multi Tester.</td><td>▷ GOOD : RS-360RH-14250
: 6 ~ 14Ω

▷ DEFECTIVE :
Change the motor.</td></tr>
<tr><td>I-Sensor
(Ice Sensor)</td><td> 
▷ Check resistance value of 2 wires with a Multi Tester.</td><td>▷ GOOD : 4.4 ~ 50kΩ
(It depends on surround temp.)

▷ DEFECTIVE :
Change the sensor.</td></tr>
<tr><td>Full Ice
Sensing Switch</td><td> 
▷ Check resistance value of 2 terminals with a Multi Tester.</td><td>▷ GOOD :<table><tr><th>Tact Switch (Blue Circle)</th><th>Terminals (Red circle)</th><th>Tester Result (Resistance Mode)</th></tr><tr><td>ON (Close)</td><td>Connected</td><td>Some Value</td></tr><tr><td>OFF (Open)</td><td>Disconnected</td><td>No value (0)</td></tr></table>▷ DEFECTIVE :
Change the switch.</td></tr>
<tr><td>Level Switch</td><td> 
▷ Check resistance value of 2 terminals with a Multi Tester.</td><td>▷ GOOD :<table><tr><th>Tact Switch (Blue Circle)</th><th>Terminals (Red circle)</th><th>Tester Result (Resistance Mode)</th></tr><tr><td>ON (Close)</td><td>Connected</td><td>Some Value</td></tr><tr><td>OFF (Open)</td><td>Disconnected</td><td>No value (0)</td></tr></table>▷ DEFECTIVE :
Change the switch.</td></tr>
</table>

9. TROUBLE DIAGNOSIS

9-1. Faulty Start (F/R lights OFF , F-PCB Power OFF)

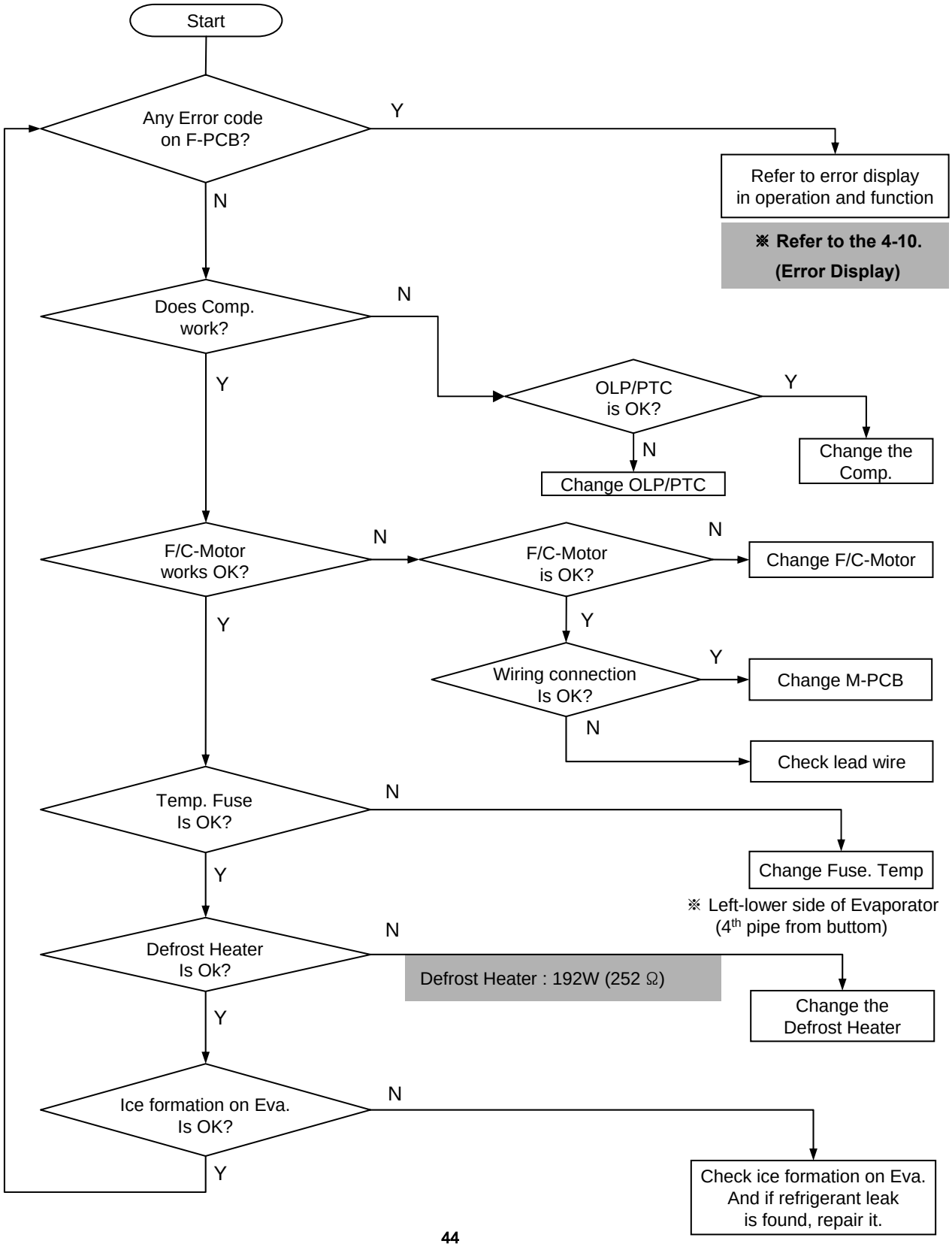


※ How to replace Front PCB

1) Insert a flat tip driver into the left down groove of panel frame and snap it out smoothly.
2) Separate 2 housings of 10P / 7P from Front PCB. (Do not hold only wires to pull out.)
3) Unscrew (7 points) to remove Front PCB.
   * Follow the reverse order when assembling.

9-2. Freezer Compartment

9-2-1. Freezing failure . (Foods are not frozen / cold.)

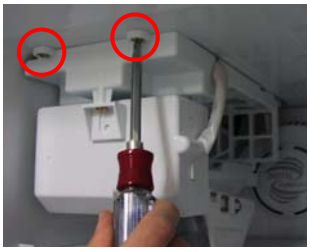


Removing and replacing Freezer parts

(1)

1) Remove foods.
2) Remove Ice Bucket, shelves and cases in Freezer compartment.

(2)



* Remove 2 screws of Ice Maker.

(3)

* Remove the Housing of Ice Maker AS. (Right side)

(4)

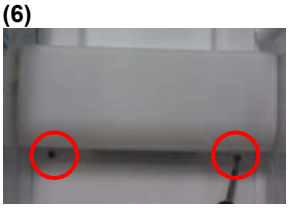
* Remove 4 screws of Geared Motor.

(5)

* Remove the Housing of Geared Motor AS. (Center)

Removing and replacing Freezer parts

(6)



* Remove light cover screws.

(7)

* Pull down smoothly the bottom of light cover to remove.

(8)

* Remove the screw of bracket F-Lamp.

(9)

* Remove the left housing.

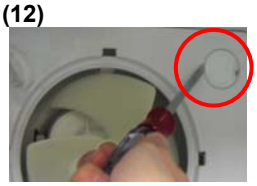
(10)

* Pull out smoothly the bracket F-Lamp AS. to remove.

(11)

* Hold the end of F-Fan cover and pull forward slowly.

(12)



* Remove the screw cap on the F-Louver A with a flat tip driver.

(13)

* Remove 3 screws of F-Louver A.

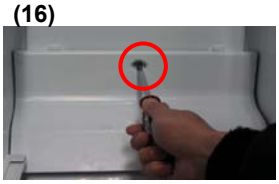
(14)

* Hold the end of F-Louver A and pull forward slowly.

(15)

* Remove the housing.

(16)

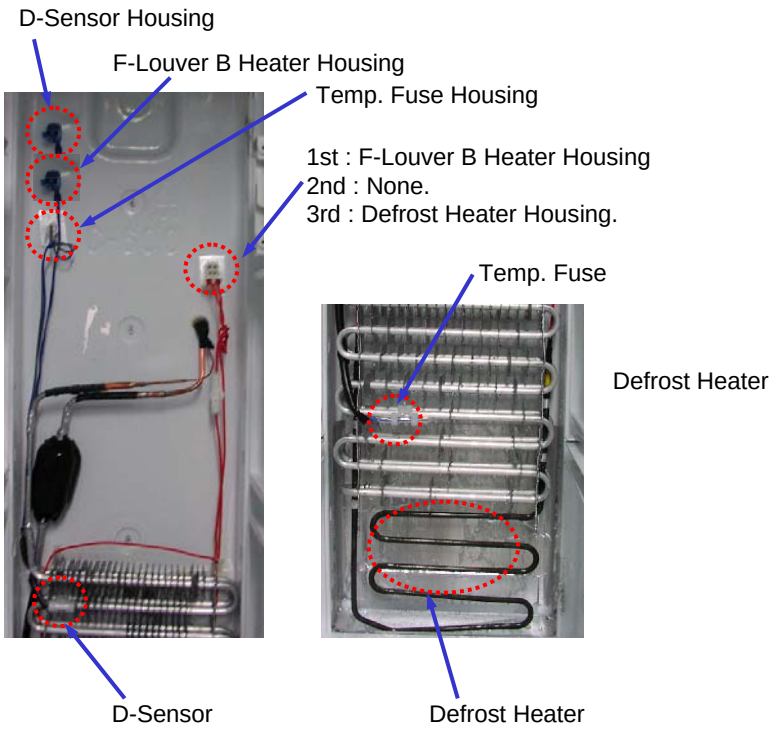


* Remove the screw of F-Return cover and pull out cover.

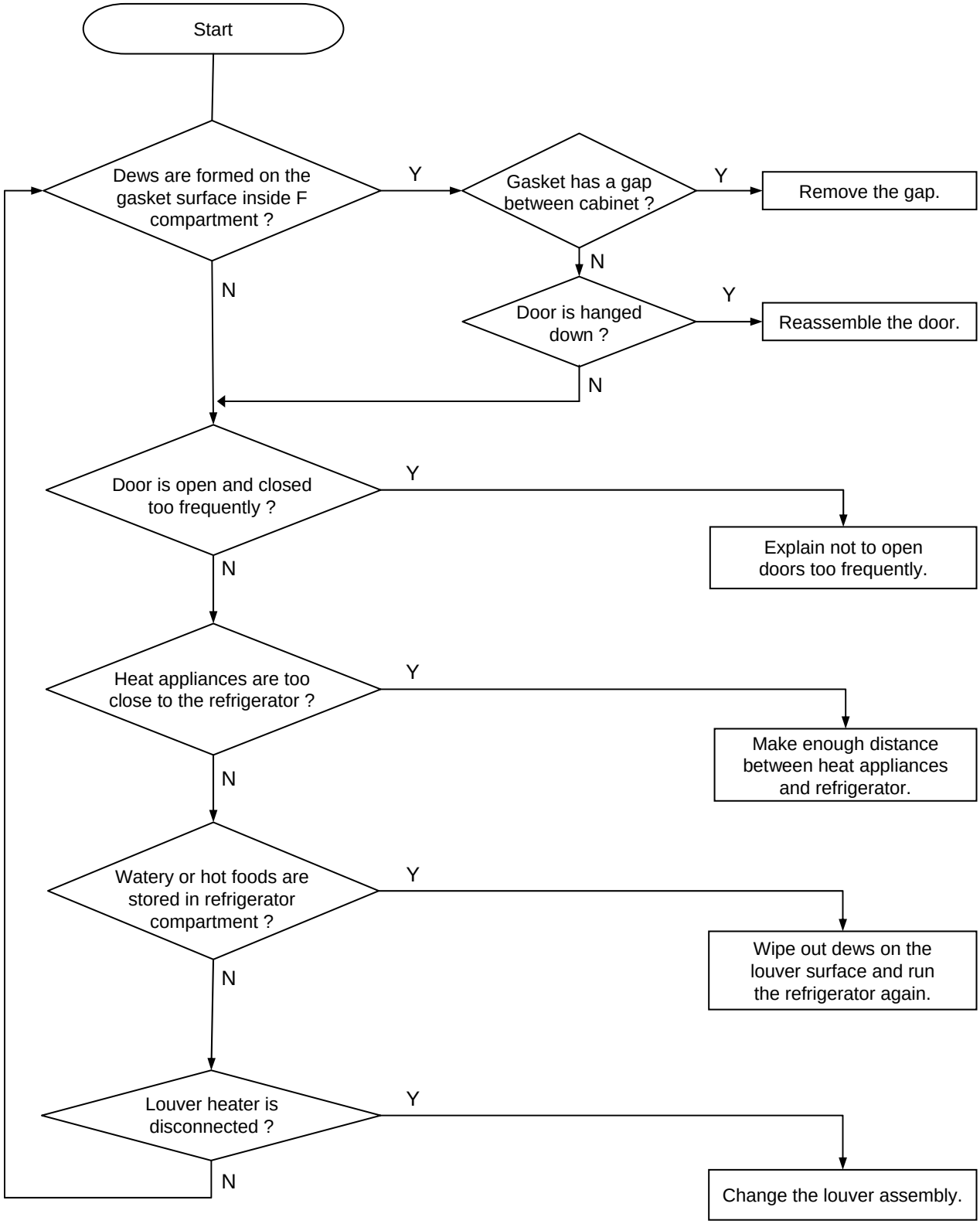
(17

* Hold the end of F-Louver B and pull forward slowly.

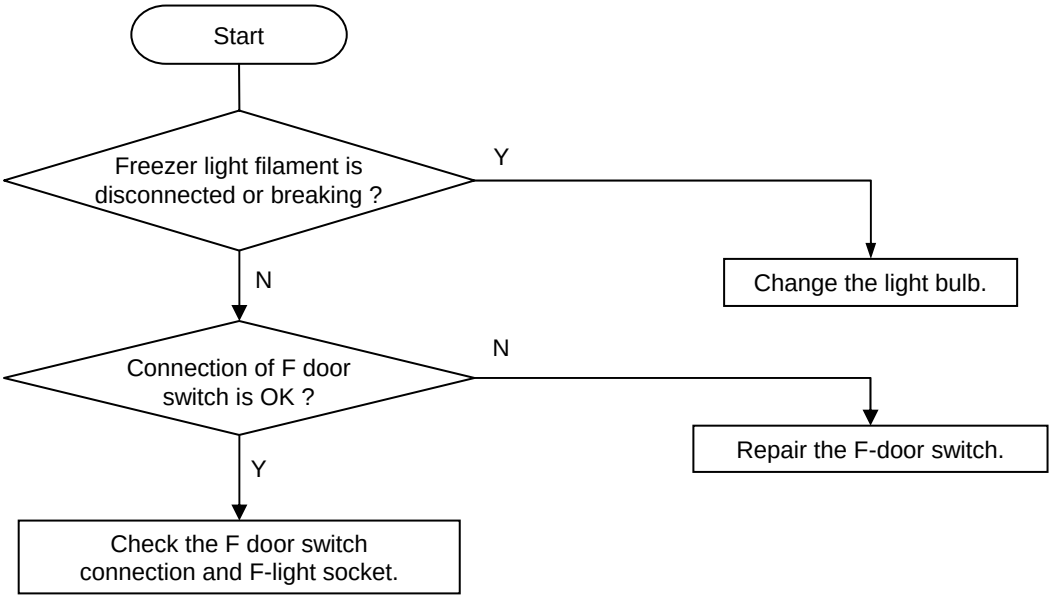
Removing and replacing Freezer parts



9-2-2. Ice Formation on F-Louver



9-2-3. Disconnection / breaking of Freezer Lights Wires



Change of F Lights

* Remove 2 screws of light cover.

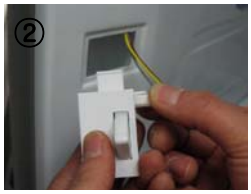
* Hold the bottom of light cover and pull forward to remove.

* Change the light bulb. (AC240V 25W)

※ Follow the reverse order of disassembling after changing the light.

Change of F Door Switch

* Insert a flat tip screw driver Into a gap of door switch to pull forward.



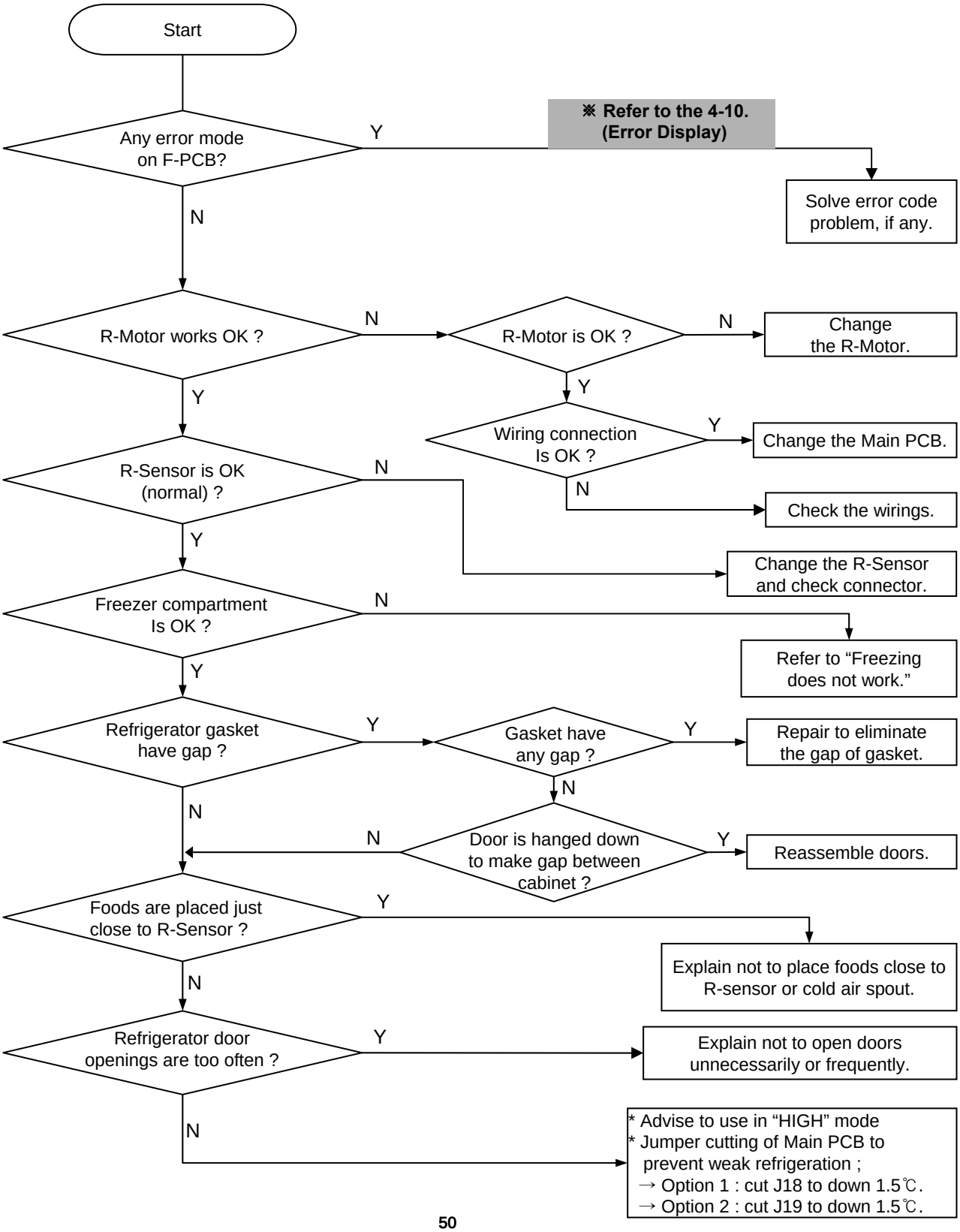
* Disconnect the housing and change the switch for a new one.

※ Be careful when changing the switch. F and R door switch are different in type and shape.

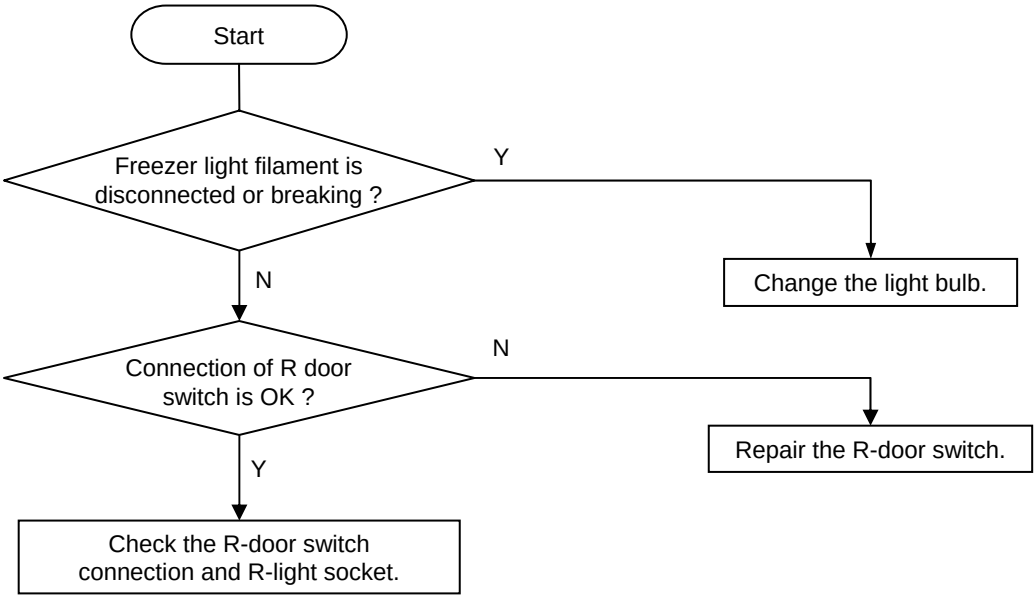
※ Follow the reverse order of disassembling after changing the switch.

9-3. Refrigerator Compartment

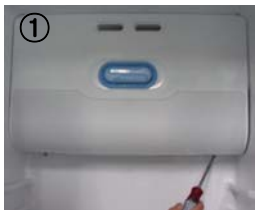
9-3-1. Refrigeration failure (Foods does not get cool or cold soon.)



9-3-2. Disconnection / Breaking of Refrigerator Lights Wires



Change of F Lights



* Remove screws of light cover.

▼

* Hold the bottom of cover and pull forward to remove.

▼

* Change the light bulbs. (AC240V 25W)

※ Follow the reverse order of disassembling after changing the light.

Change of F Door Switch

* Insert a flat tip screw driver into a gap of door switch to pull forward.

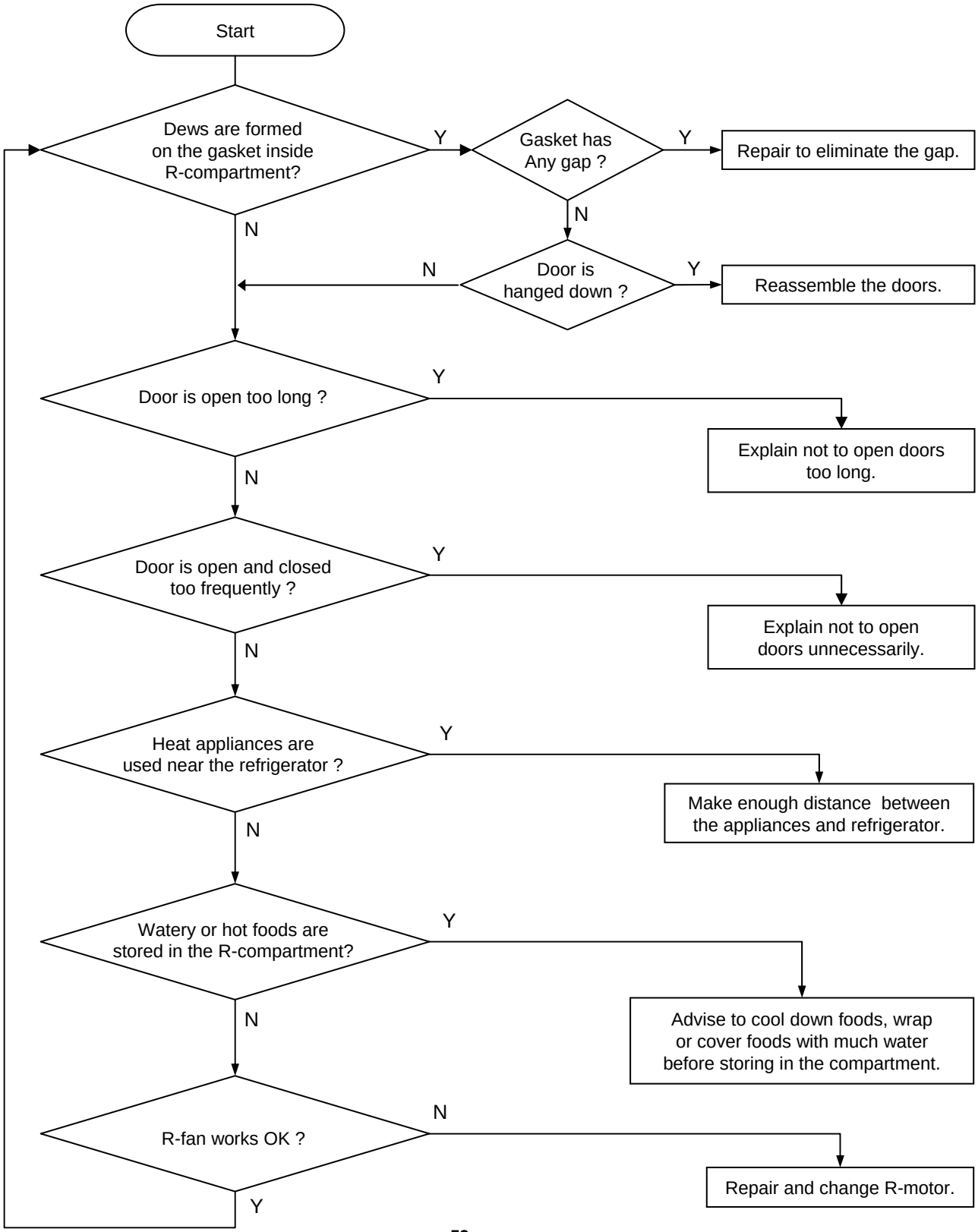
▼

* Disconnect the housing and change the switch for a new one.

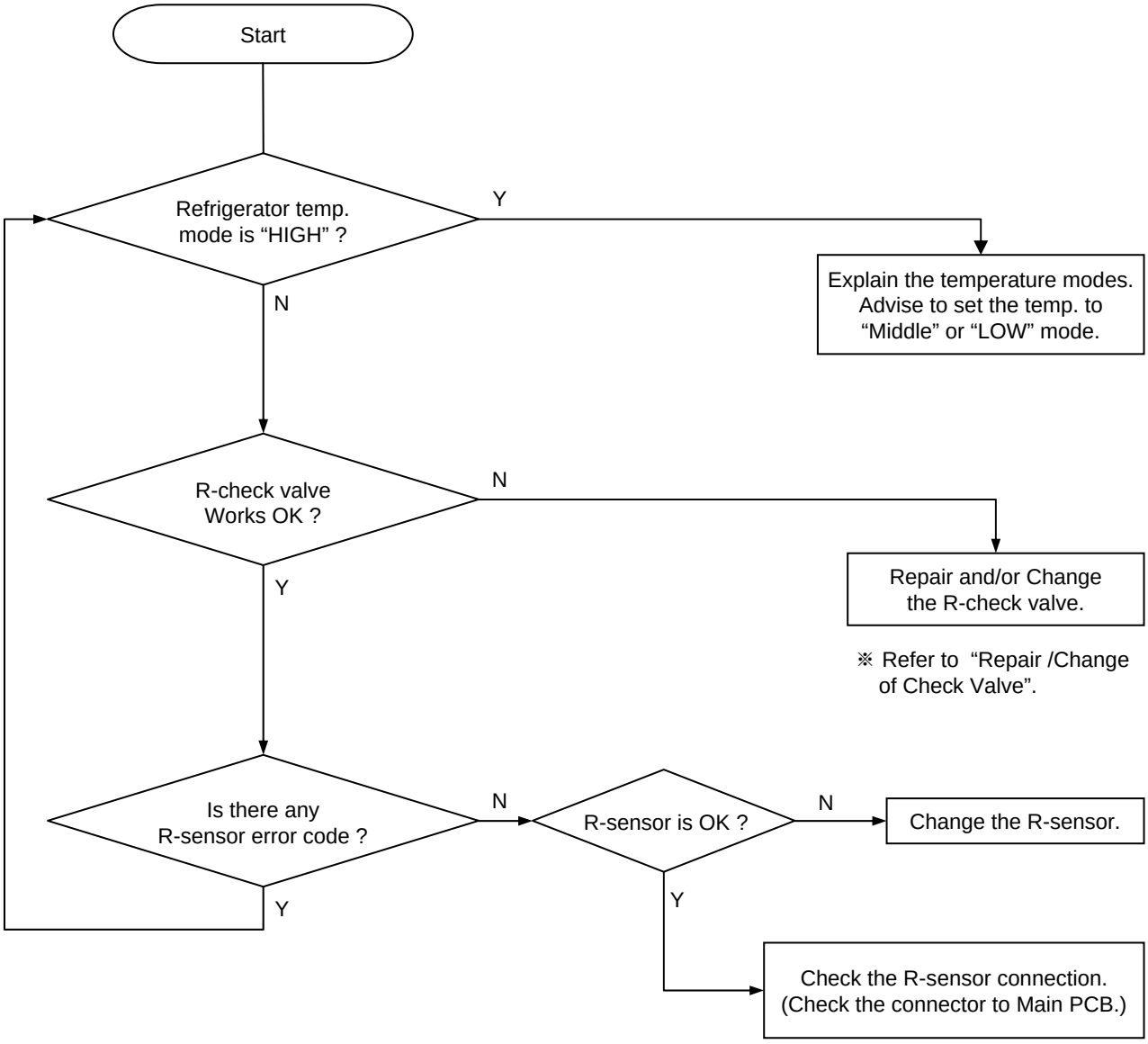
※ Be careful when changing the switch. F and R door switch are different in type and shape.

※ Follow the reverse order of disassembling after changing the switch.

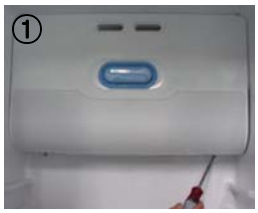
9-3-3. Dews on Refrigerator Compartment



9-3-4. Excessive Refrigeration of Vegetable Case



Removing of Check Valve



* Remove screws of light cover.

▼

* Hold the bottom of cover and pull forward to remove.

▼

* Disconnect light housing.

▼

* Remove screws with a (+)screw driver.

* Hold the bottom and right of damper to pull down to remove.

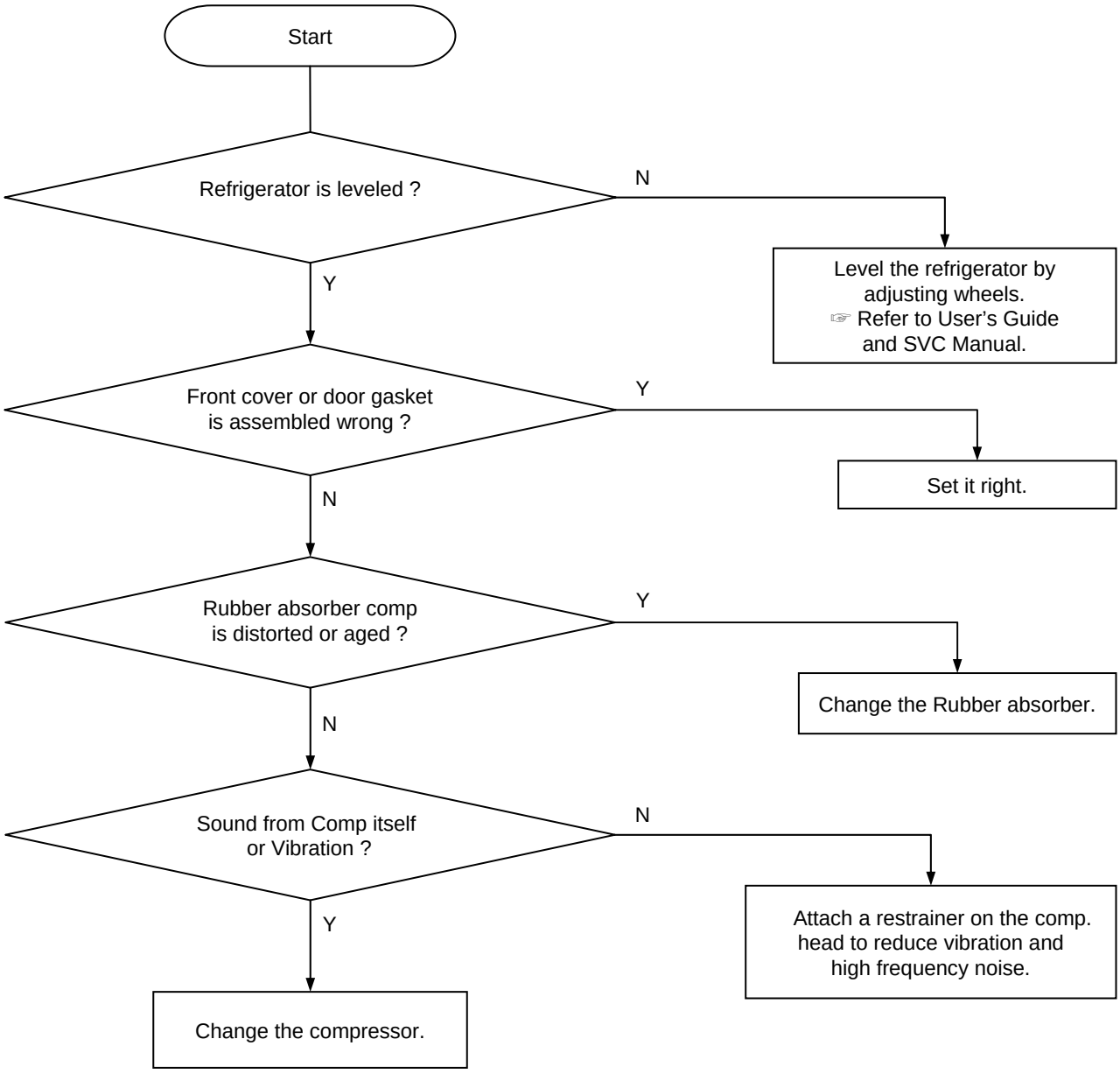
▼

* Lift up a piece of Check Valve Flap and insert a finger to the valve frame to hold out.

▼

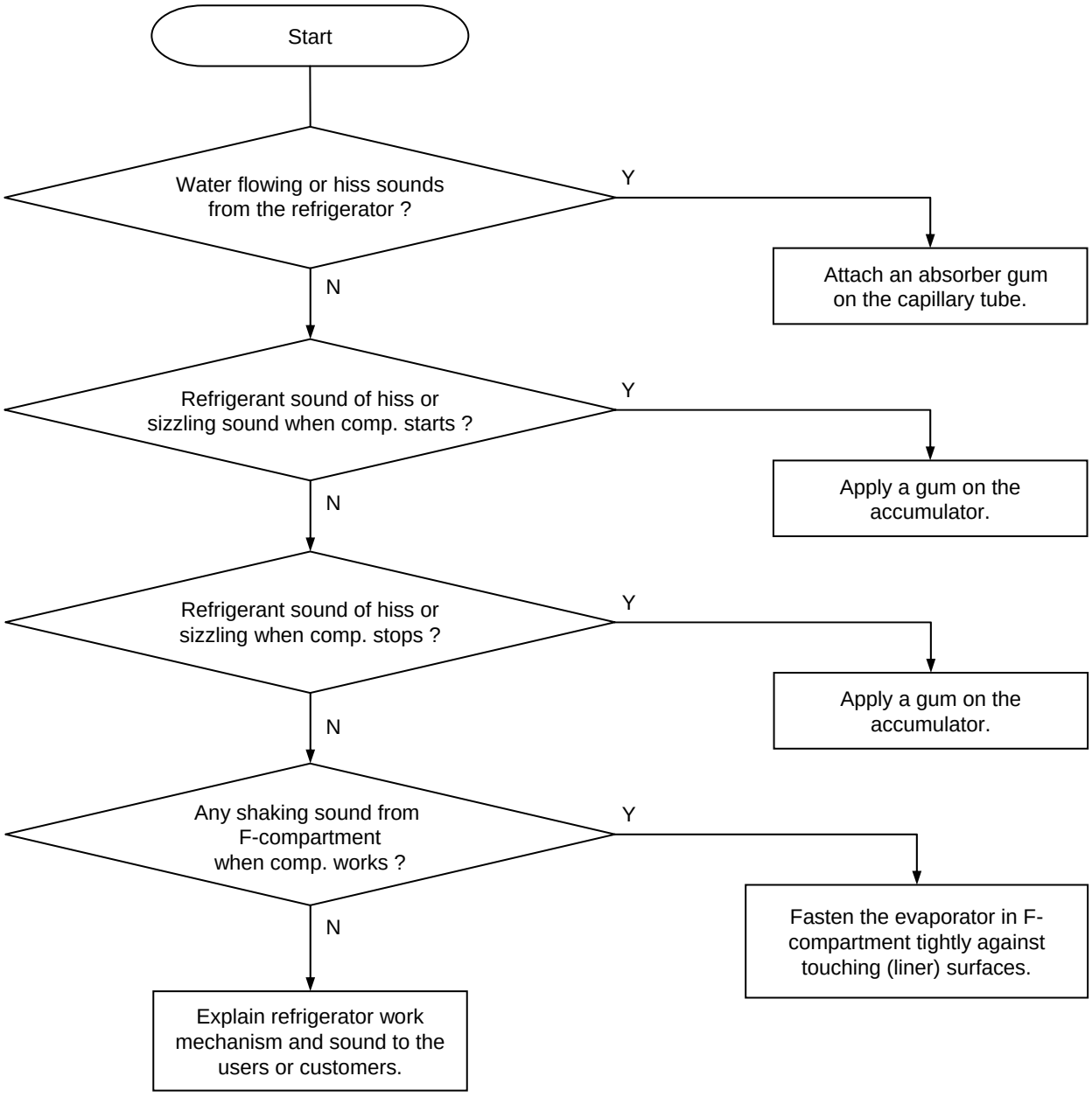
9-4. Operation Noise of Refrigerator

9-4-1. Comp. operation Noise



Remarks
● Compressor sound is somewhat normal because it works like a heart to circulate the refrigerant in the pipes during the refrigerator operation. ● Rattling or metallic touch sound of motor, piston of comp. can be heard when it starts or stops.

9-4-2. Refrigerant Flow Sound

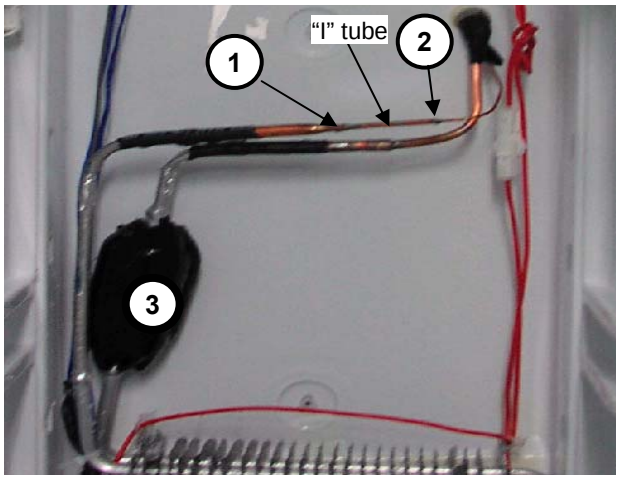


Remarks

● Water flowing sound, hiss or sizzling sound can make while refrigerant in the pipes is changing from liquid to gas state when comp. starts or stops.
It is normal to the refrigerator.

Troubleshooting of Evaporator Sound

1. Hiss Sound from Capillary Tube



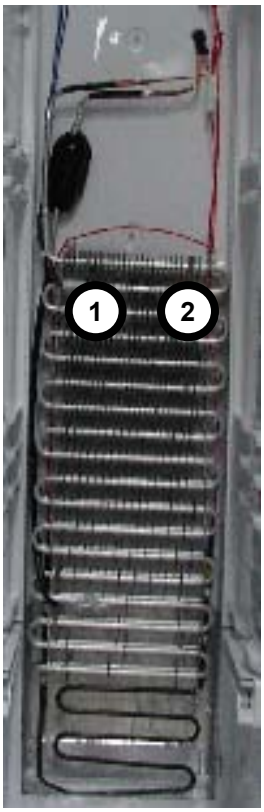
1) "I" tube is used to connect the capillary tube and evaporator. (2 welding points : ①, ②)

2) When such a sound is made, attach a absorber on the tube including 2 welding points.

2. Sizzling Sound from Accumulator

Attach a absorber on point ③ (accumulator).

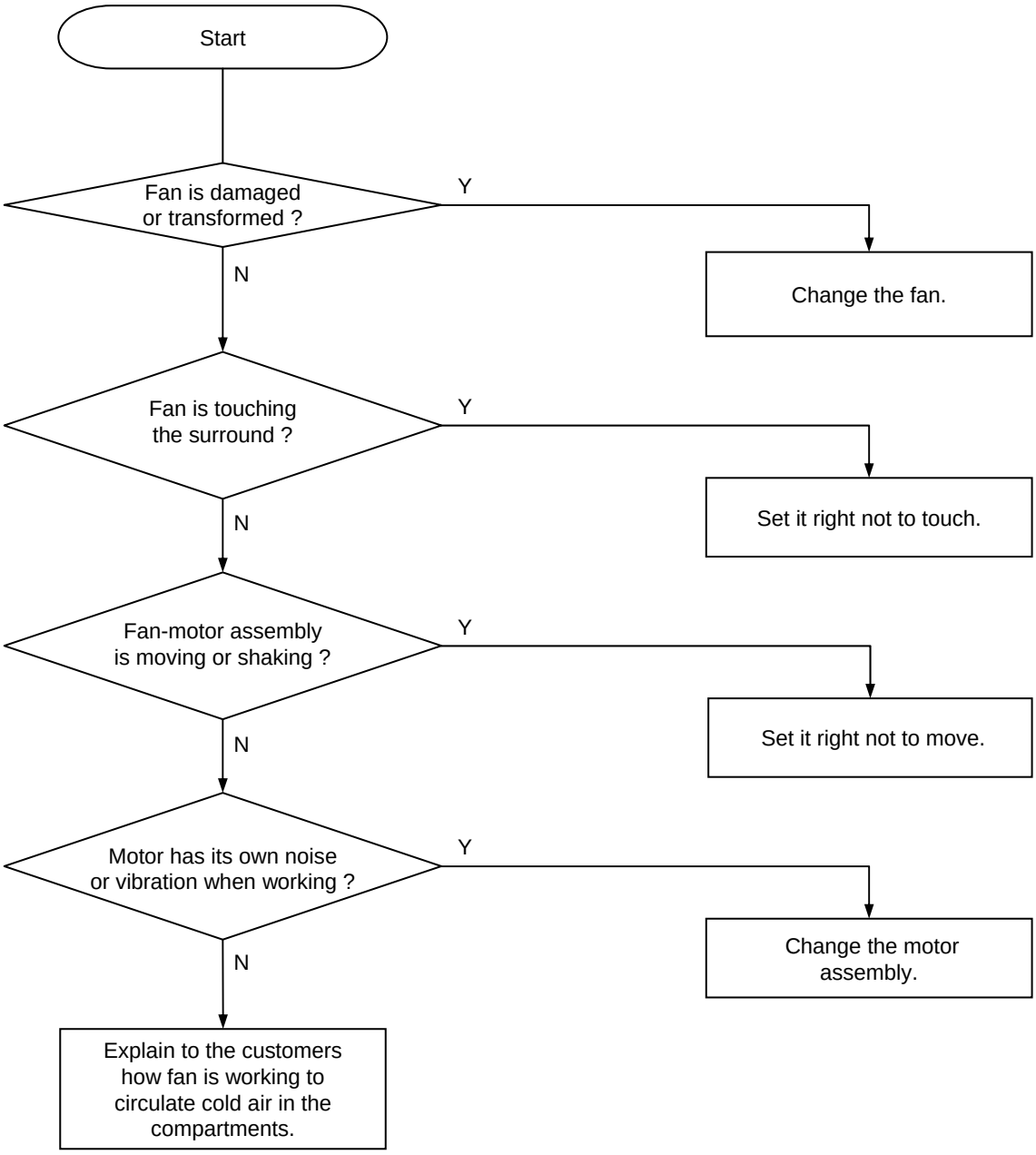
3. Shaking or trembling Sound of Evaporator



1) Check whether evaporator is fastened tight with the fasteners of ①, ②.

2) Insert a soft spacer (EPS) between left and right wall. Evaporator not to be shaken or trembled during refrigerator operation.

9-4-3. Fan Noise



Remarks
● The fan is sending out cold air to circulate it through the compartments. When the air is touching the surface of louver or liner wall, such sound can make.

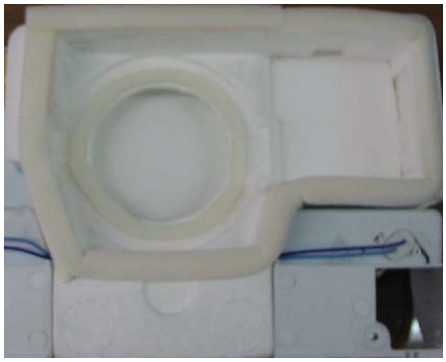
Troubleshooting of Fan Noise

1. Fixing or Fastening of Fan Motor

1) Check if fan motor frame of the assembly is fastened tightly with screws to the liner wall. Unless it is tight, vibration of shaking can make.

2) Check if fan motor and fan are hanged down. Fan working sound can be louder if they are not set right.

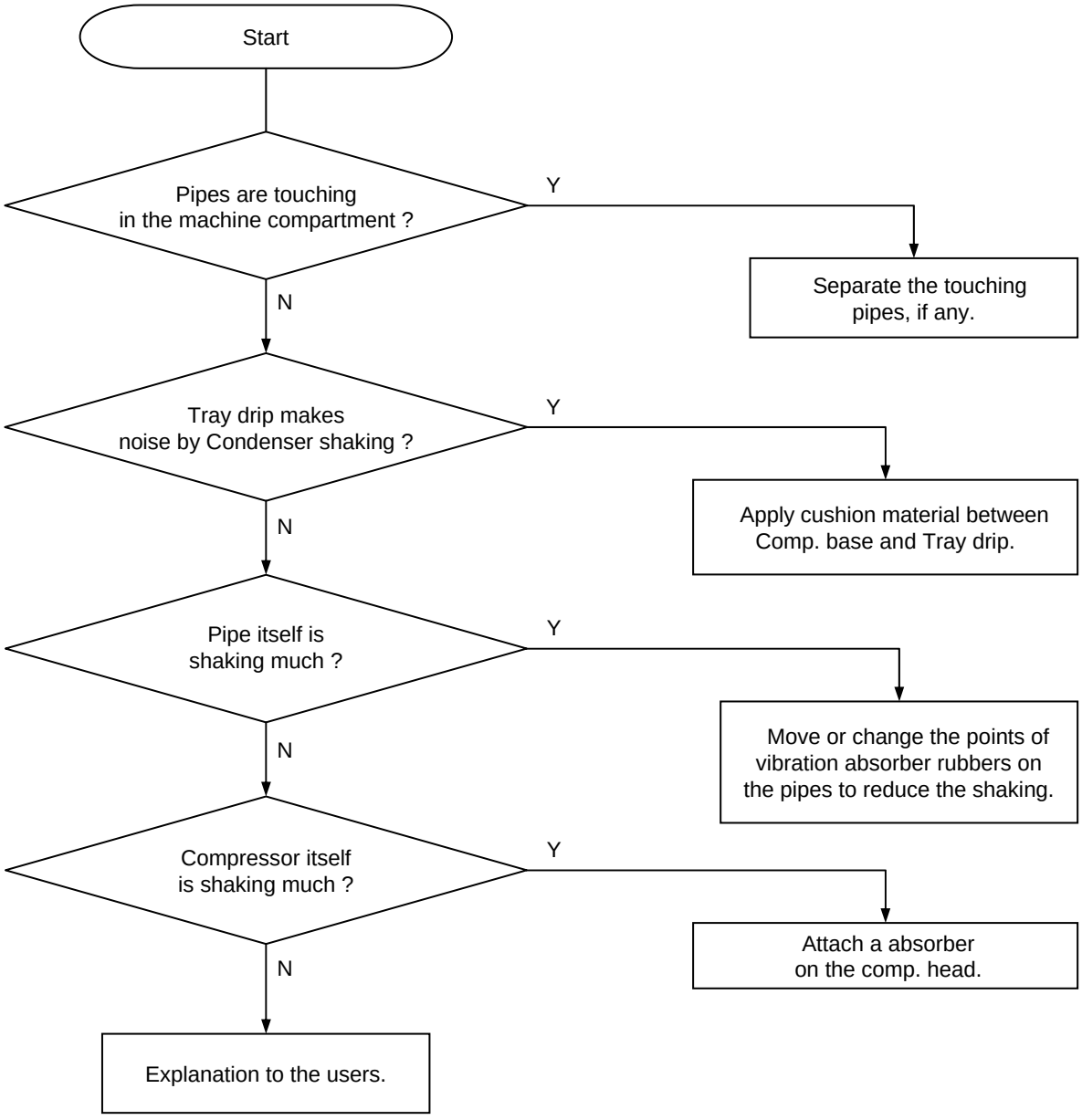
2. Any Touch Sound from Fan



1) Check if sealing sponge on the insulator touches the fan.
If so, set it again not to touch it.

2) If any damage on the insulator around the fan rotation is found, set the fan motor assembly right not to touch it.

9-4-4. Pipe Noise

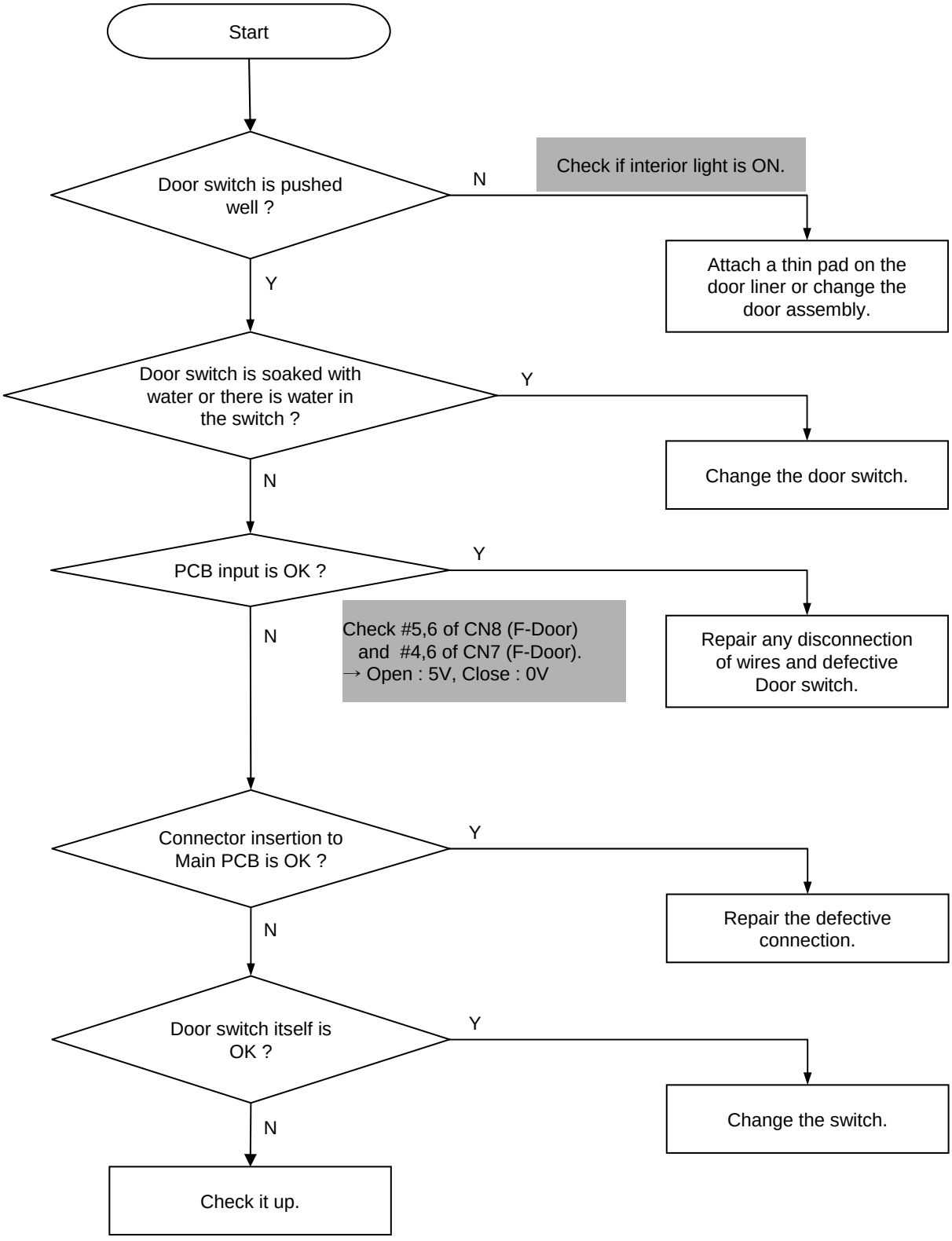


Remarks

- Refrigerant is erupting rapidly from the compressor to circulate pipes, so pipe shaking noise can make to some degree.
- In case compressor vibration is sent to a pipe directly, apply vibration absorber rubbers to welding points of the pipe and comp. or to a much bent point on the pipe.

9-5. Door

9-5-1. Door Opening Alarm Continues though the door is closed.

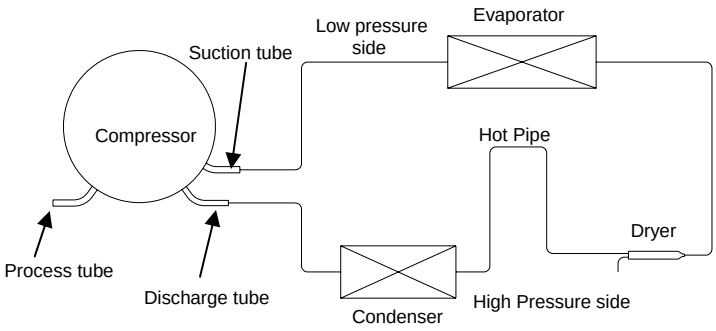


10. COOLING CYCLE HEAVY REPAIR

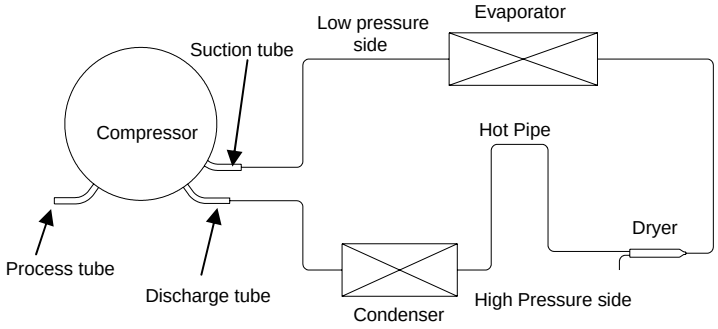
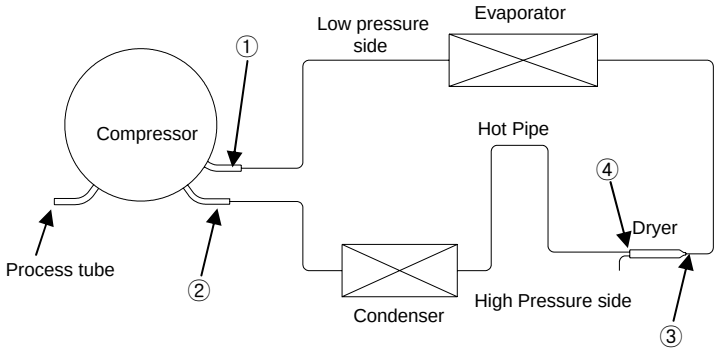
10-1. Summary of Heavy Repair

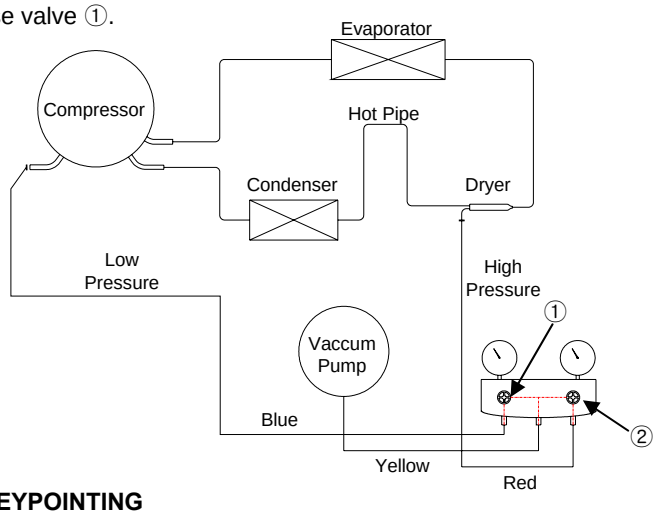
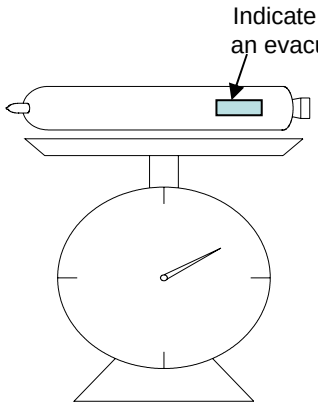
Process	Contents	Tools
Remove refrigerant Residuals	* Cut charging pipe ends (Comp. & Dryer) and discharge refrigerant from drier and compressor.	* Nipper, side cutters
Parts replacement and welding	* Confirm refrigerant (R-134a or R-600a) and oil for compressor and drier. * Confirm N2 sealing and packing conditions before use. Use good one for welding and assembly. * Weld under nitrogen gas atmosphere. * Repair in a clean and dry place.	* Pipe Cutter, Gas welder, N2 gas
Vacuum	* Evacuate for more than forty minutes after connecting manifold gauge hose and vacuum pump to high (drier) and low (compressor) pressure sides.	* Vacuum pump , Manifold gauge.
Refrigerant charging and charging inlet welding	* Weigh and control the bombe in a vacuum conditions with electronic scales and charge through compressor inlet (Process tube). * Charge while refrigerator operates). * Weld carefully after inlet pinching.	* Bombe (mass cylinder), refrigerant manifold gauge, electronic scales, punching off flier, gas welding machine
Check refrigerant leak and cooling capacity	* Check leak at weld joints. Note :Do not use soapy water for check. * Check cooling capacity → Check condenser manually to see if warm. → Check hot pipe manually to see if warm. → Check frost formation on the whole surface of the evaporator.	* Electronic Leak Detector, Driver.
Compressor compartment and tools arrangement	* Remove flux from the silver weld joints with soft brusher wet rag. (Flux may be the cause of corrosion and leaks.) *Clean tools and store them in a clean tool box or in their place.	* Copper brush, Rag, Tool box
Transportation and installation	* Installation should be conducted in accordance with the standard installation procedure. (Leave space of more than 5 cm from the wall for compressor compartment cooling fan mounted model.)	

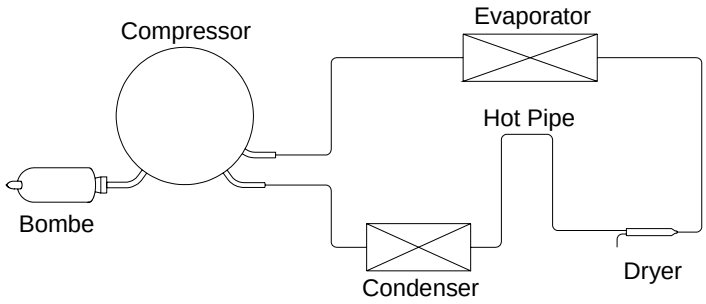
10-2. Precautions During Heavy Repair

Items	Precautions
Use of tools.	1) Use special parts and tools for R-134a or R-600a
Removal of retained refrigerant.	1) Remove retained refrigerant more than 5 minutes after turning off a refrigerator. (If not, oil will leak inside.) 2) Remove retained refrigerant by cutting first high pressure side (drier part) with a nipper and then cut low pressure side. (If the order is not observed, oil leak will happen.) 
Replacement of drier.	1) Be sure to replace drier when repairing pipes and injecting refrigerant.
Nitrogen blowing welding.	1) Weld under nitrogen atmosphere in order to prevent oxidation inside a pipe. (Nitrogen pressure : 0.1~0.2 kg/cm2.)
Others.	1) Nitrogen only should be used when cleaning inside of cycle pipes inside and sealing. 2) Check leakage with an electronic leakage tester. 3) Be sure to use a pipe cutter when cutting pipes. 4) Be careful not the water let intrude into the inside of the cycle.

10-3. Practical Work for Heavy Repair

Items	Precautions
1. Removal of residual refrigerant.	1) Remove residual refrigerant more than 5 minutes later after turning off the refrigerator. (If not, compressor oil may leak inside.) 2) Remove retained refrigerant slowly by cutting first high pressure side (drier part) with a nipper and then cut low pressure side. 
2. Nitrogen blowing welding.	 *** When replacing a drier:** Weld ①and② parts by blowing nitrogen (0.1~0.2kg/cm2) to high pressure side after assembling a drier. *** When replacing a compressor:** Weld ③and④ parts by blowing nitrogen to the low pressure side. Note) For other parts, nitrogen blowing is not necessary because it does not produce oxidized scales inside pipe because of its short welding time. **※ KEYPOINTING** Welding without nitrogen blowing produces oxidized scales inside a pipe, Which affect on performance and reliability of a product.

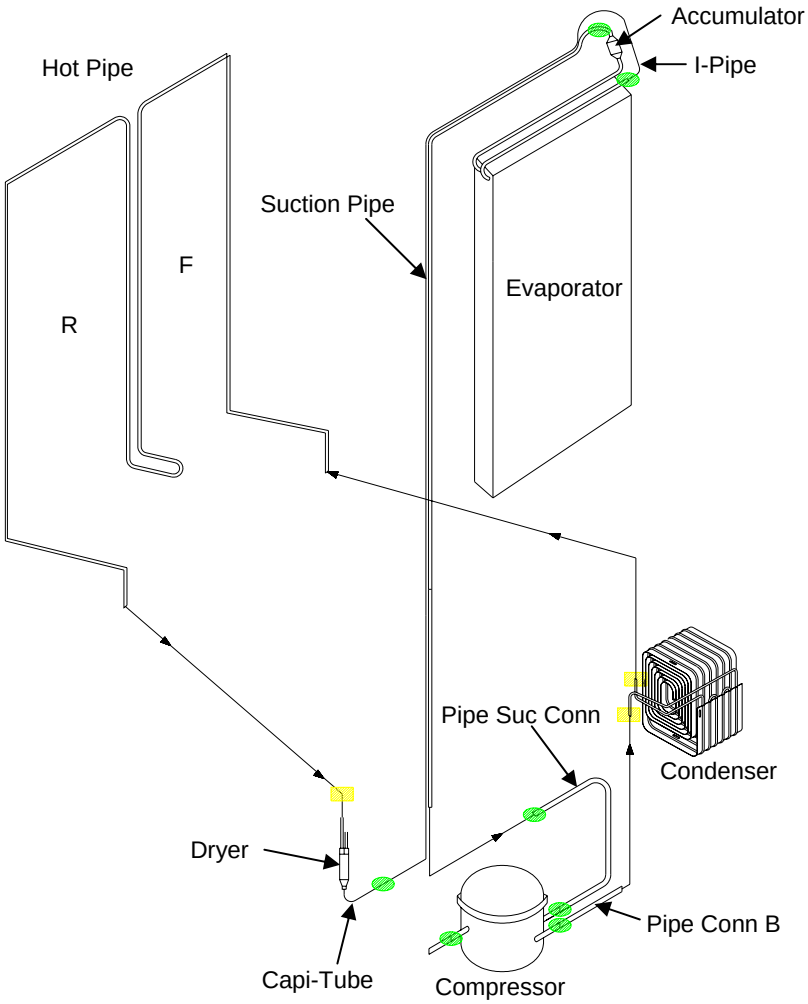
Items	Precautions
3.Vacuum degassing.	*** Pipe Connection** Connect a red hose to the high pressure side and a blue hose to the low pressure side. *** Vacuum Sequence** Open ①,② valves and evacuate for 40 minutes. Close valve ①.  **※ KEYPOINTING** 1) If power is applied during vacuum degassing, vacuum degassing shall be more effective. 2) Operate compressor while charging refrigerant. (It is easier and more certain to do like this.)
4.Refrigerant charging.	*** Charging sequence** 1) Check the amount of refrigerant supplied to each model after completing vacuum degassing. 2) Evacuate bombe with a vacuum pump. 3) Measure the amount of refrigerant charged. - Measure the weight of an evacuated bombe with an electronic scale. - Charge refrigerant into a bombe and measure the weight. Calculate the weight of refrigerant charged into the bombe by subtracting the weight of an evacuated bombe.  **※ KEYPOINTING** 1) Be sure to charge the refrigerant at around 25°C. 2) Be sure to keep -5g in the winter and +5g in summer. Calculation of amount of refrigerant charged the amount of refrigerant charged = a weight after charging - a weight before charging (a weight of an evacuated cylinder)

Items	Precautions
4.Refrigerant charging.	4) Refrigerant Charging Charge refrigerant while operating a compressor as shown above. 5) Pinch a charging pipe with a pinch-off plier after completion of charging. 6) Braze the end of a pinched charging pipe with copper brazer and take a gas leakage test on the welded parts. 
5. Gas-leakage test	* Take a leakage test on the welded or suspicious area with an electronic leakage tester.
6. Pipe arrangement in each cycle	* Check each pipe is placed in its original place before closing a cover back-M/C after completion of work.

10-4. Standard Regulations for Heavy Repair

1) Observe the safety precautions for gas handling.
2) Use JIG (or wet towel) in order to prevent electric wires from burning during welding.
(In order to prevent insulation break and accident.)
3) The inner case shall be melted and insulation material (polyurethane) shall be burnt if not cared during welding inner case parts.
4) The copper pipe shall be oxidized by overheating if not cared during welding.
5) Not allow the aluminum pipes to contact to copper pipes. (In order to prevent corrosion.)
6) Make sure that the inner diameter should not be distorted while cutting a capillary tube.
7) Be sure that a suction pipe and a filling tube should not be substituted each other during welding.
(High efficiency pump.)

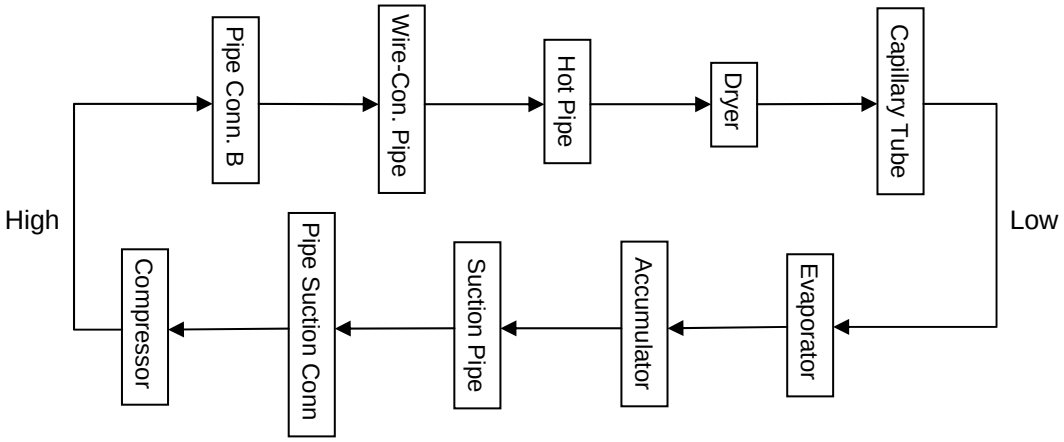
10-5. Brazing Reference Drawings.



▶ Welding Point

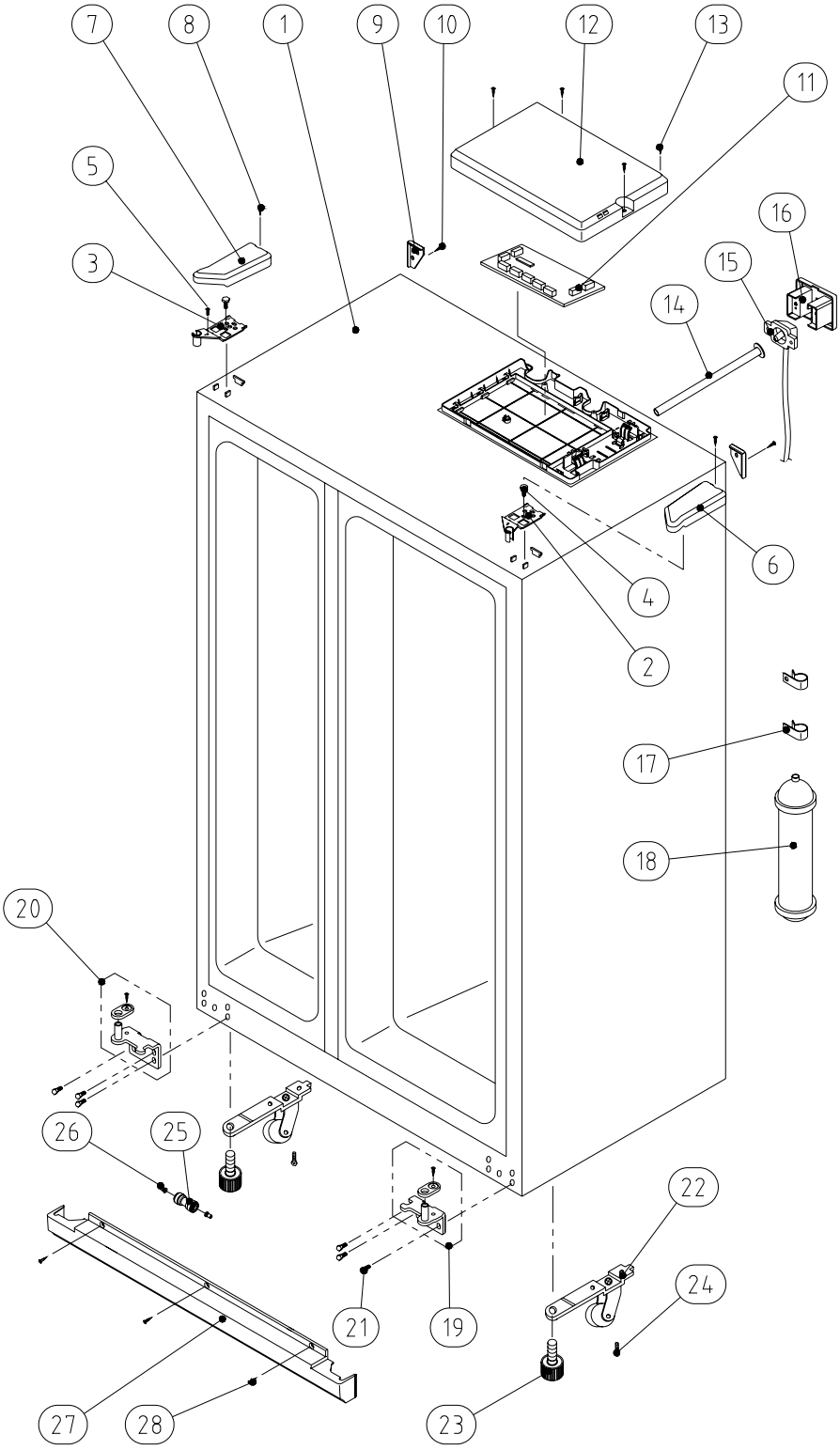
●	Copper Welding (Ag 5%)	7 Points
■	Silver Welding (Ag 35%)	3 Points

▶ Flow of Refrigeration Cycle

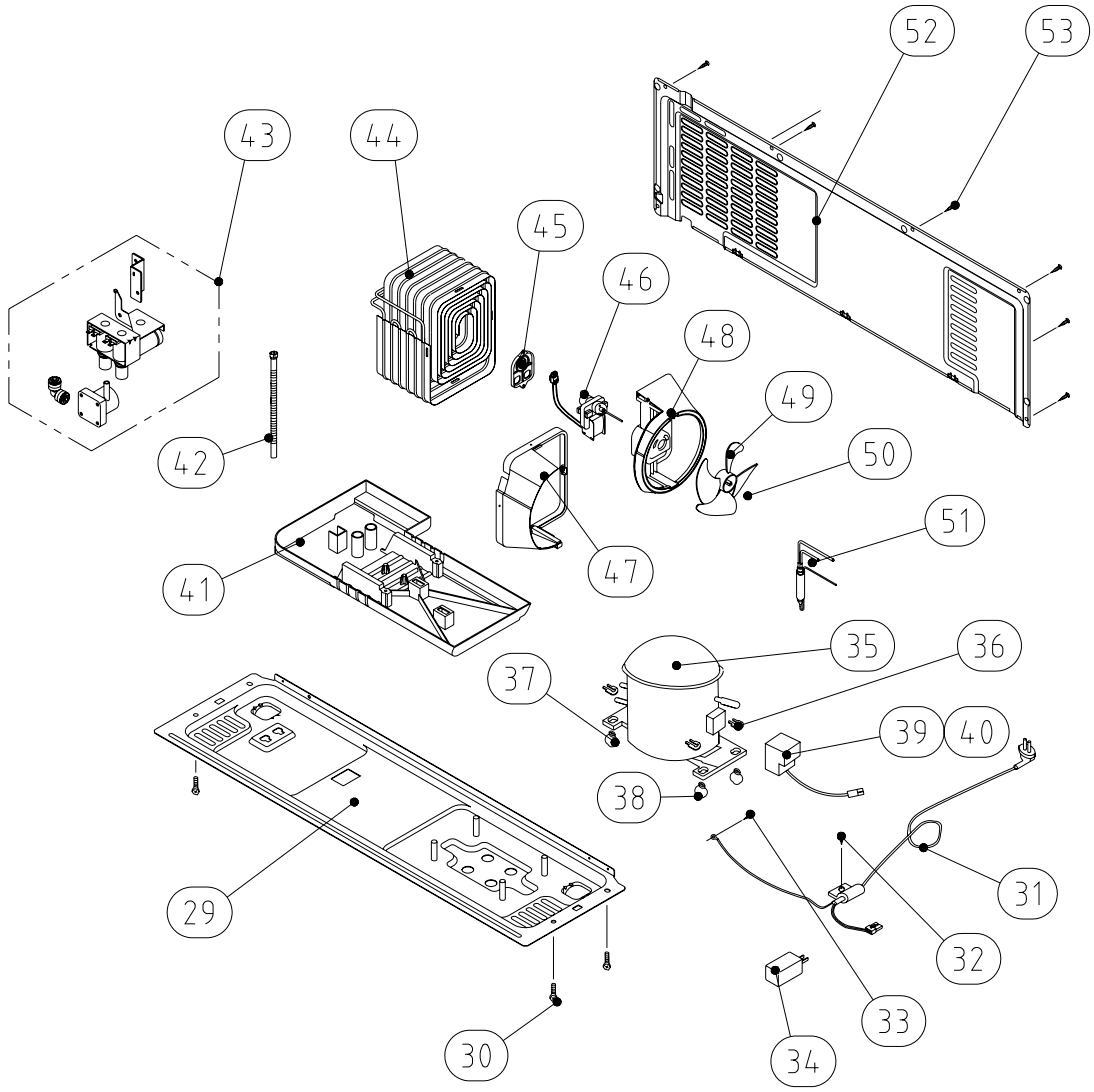


11-1. Exploded View (FRS(N)-U20DA)

CABINET



MECH ROOM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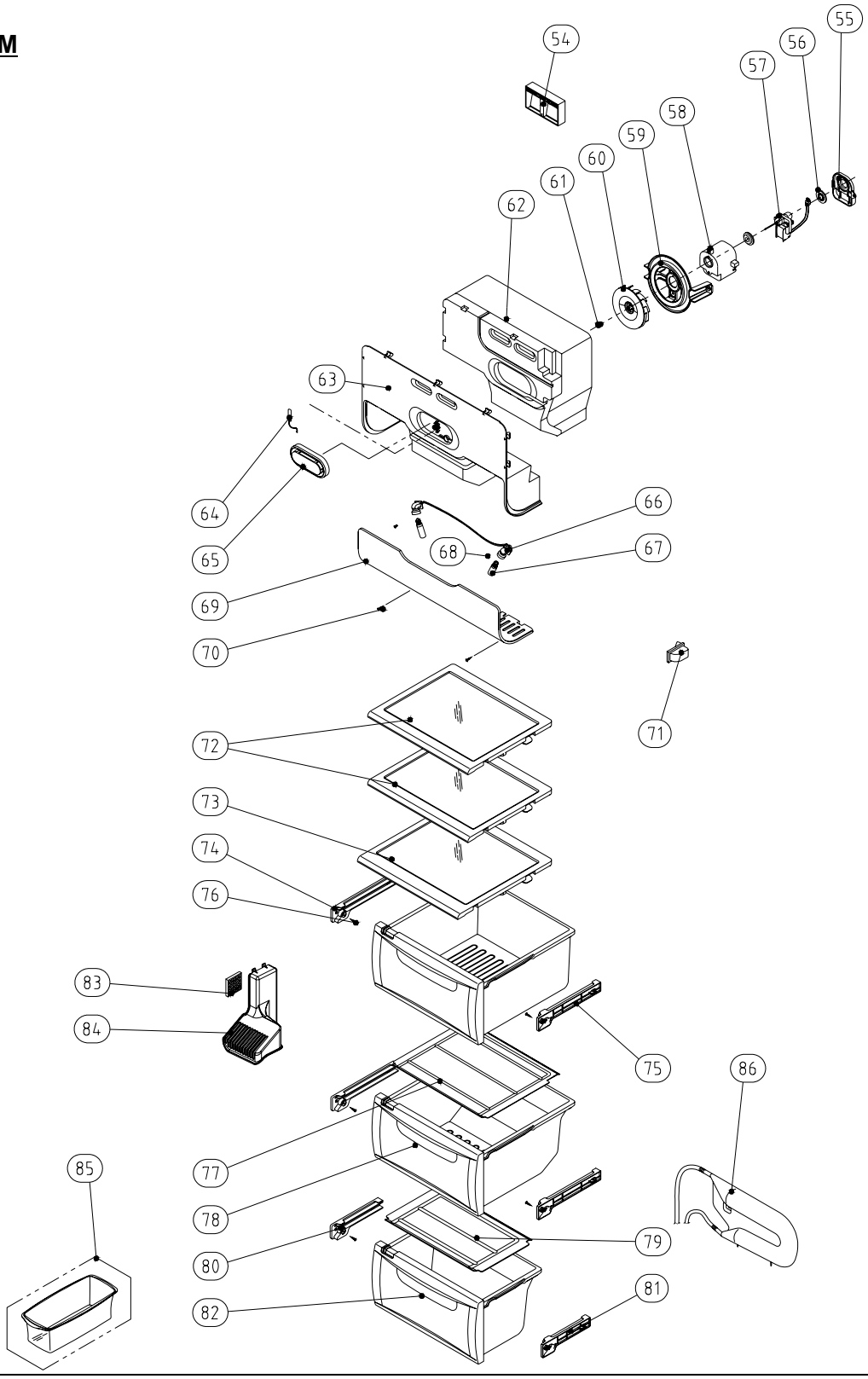
R ROOM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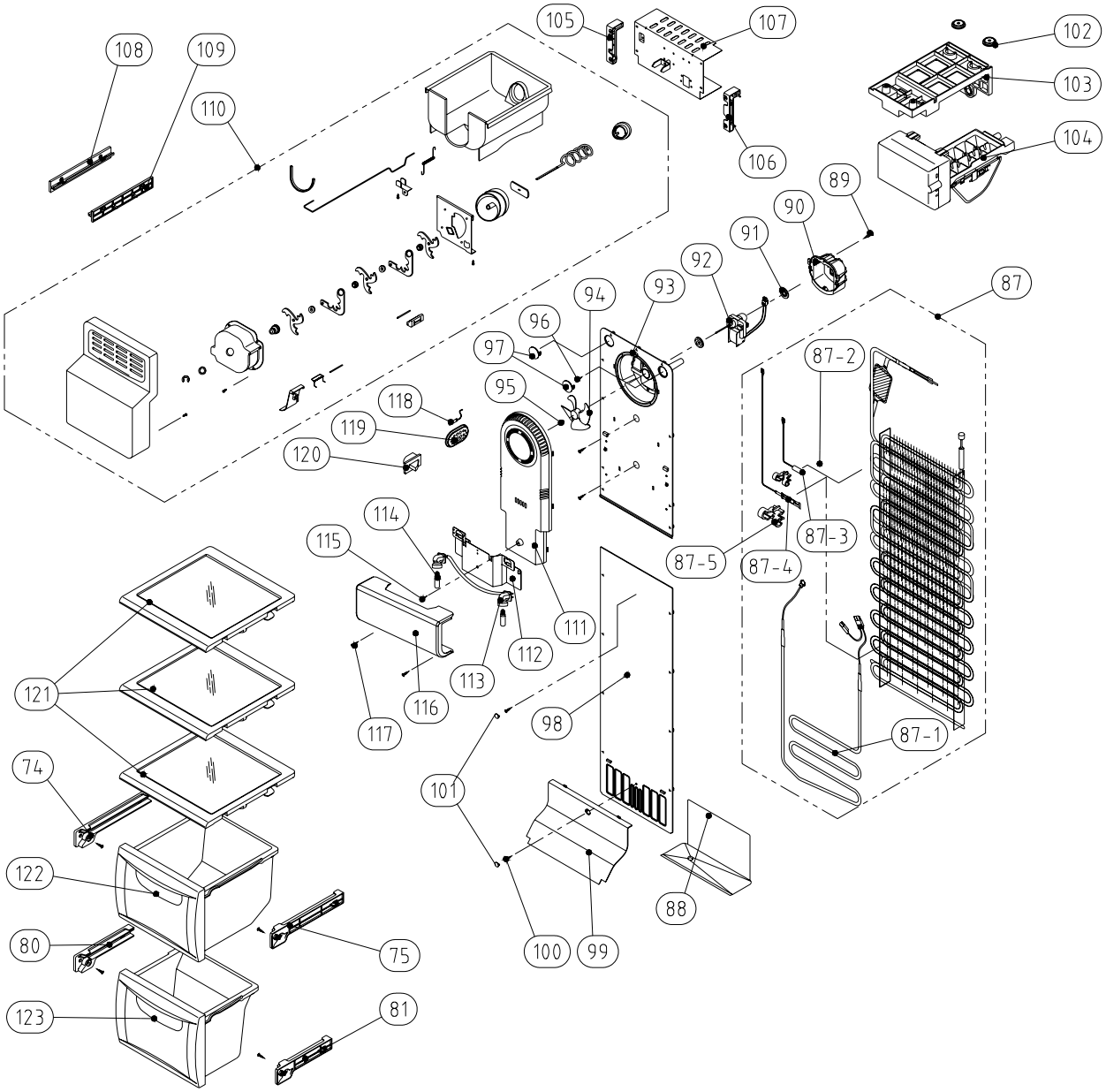
F ROOM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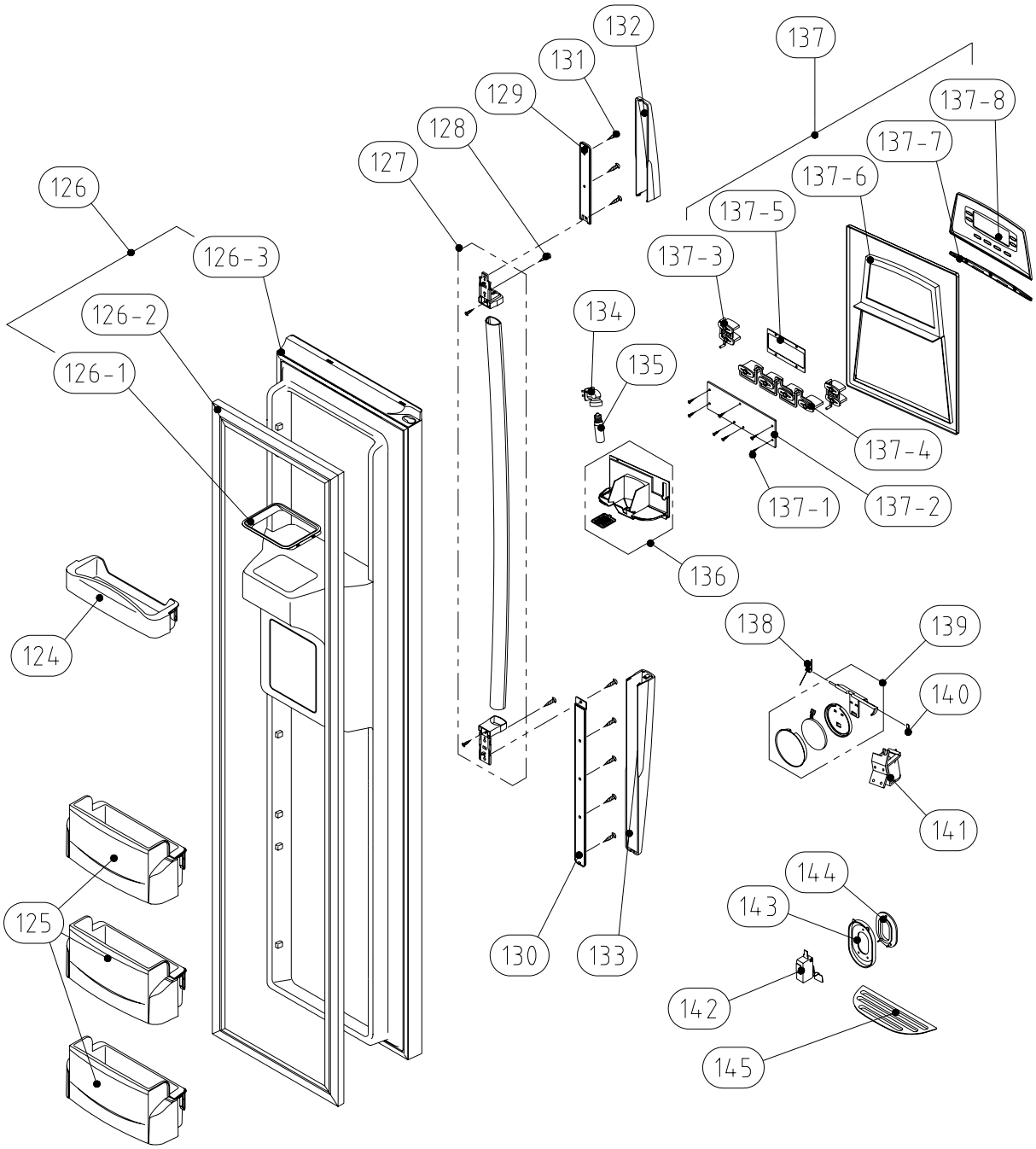
F DOOR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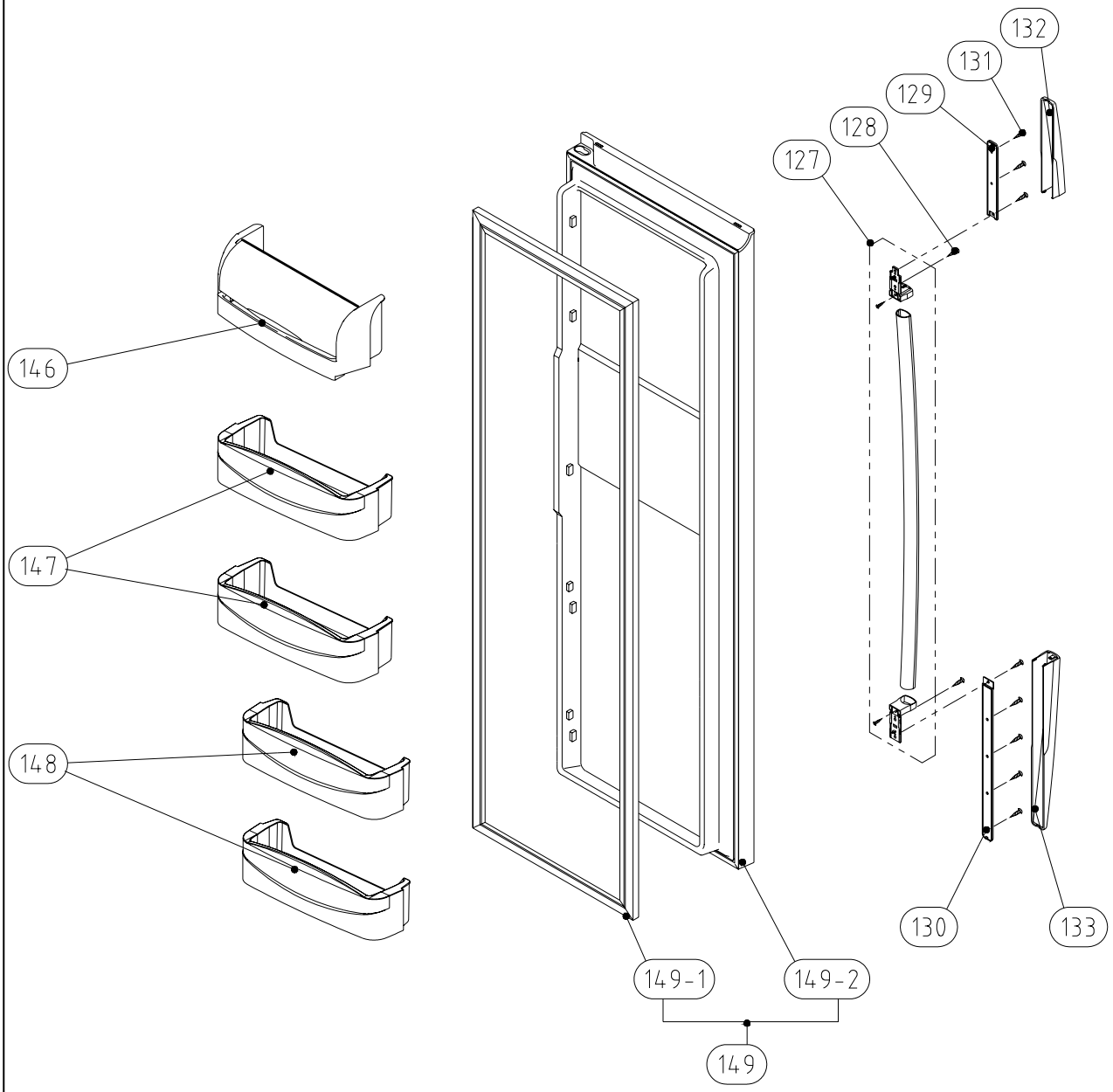
R DOOR



11-2. Parts list ((FRS(N)-U20DA))

No	Part code	Part Name	Q'ty	Description	Remark
1	3000057710	ASSY CAB URT	1	FRU-541D	
2	3012924400	HINGE *T *R AS	1	PO T3.0+PAINT	
3	3012924300	HINGE *T *L AS	1	PO T3.0+PAINT	
4	3016042300	SPECIAL *T HI BOLT	2	6X13 SWCH18A	
5	7051401065	SCREW MACHINE	1	PAN 4X10 SW BSNI	
6	3011446200	COVER *T HI *R	1	PP	
7	3011446100	COVER *T HI *L	1	PP	
8	7112401211	SCREW TAPPING	2	T1 TRS 4X12 MFZN	
9	3010968400	CAP CAB COVER	2	PP	
10	7112401211	SCREW TAPPING	2	T1 TRS 4X12 MFZN	
11	30143D5060	PCB MAIN AS	1	FRU-541D	
12	3011446000	COVER MAIN PCB BOX	1	PP(V-235)	
13	7112401211	SCREW TAPPING	4	T1 TRS 4X12 MFZN	
14	3013224800	HOSE ICE MAKER TUBE AS	1	FRU-541D	
15	3012530200	GUIDE CAB W/TUBE A AS	1	FRU-541D	
16	3011444100	COVER GUIDE CAB W/T A	1	HIPS	
17	3011202000	CLAMP WATER TUBE A	2	PA-66, 5N	
18	3019974800	S/PAER FILTER WATER AS	1	FR-S660CW	
19	3012924000	HINGE *U *R AS	1	P/O T5.0 + PAINT	
20	3012923900	HINGE *U *L AS	1	P/O T5.0 + PAINT	
21	3016001240	SPECIAL BOLT *T	6	6X22 SWCH22A(YL)	
22	3010657200	BRACKET ADJ FOOT	2	SPCC T3.0	
23	3012105100	FOOT ADJ AS	2	PP	
24	3016001240	SPECIAL BOLT *T	2	6X22 SWCH22A(YL)	
25	3013064200	HOLDER TUBE A	1	ACETAL	
26	3012019500	FIXTURE TUBE FIT B	2	PP	
27	3011447200	COVER CAB BRKT	1	PP	
28	7142401511	SCREW TAPPING	3	T2 TRS 4X16 MFZN	
29	3010340400	BASE COMP AS	1	FRU-571I	
30	3016003300	SPEICAL BOLT	4	T2 M6.5X20	
31	3011346700	CORD POWER AS	1	FRU-571I	
32	7112401211	SCREW TAPPING	1	T1 TRS 4X12 MFZN	
33	7051401065	SCREW MACHINE	1	PAN 4X10 SW BSNI	
34	3016401920	CAPACITOR RUN	1	400VAC 5UF	

No	Part code	Part Name	Q'ty	Description	Remark
35	3956145250	COMP	1	MK4A5Q-R1U	
36	3016002500	SPECIAL WASHER	4	SK-5, T0.8	
37	3010101600	RUBBER ABSORBER COMP	2	NBR	
38	3010101480	ABSORBER COMP AS	2	FRU-541D	
39	3018129600	SWITCH P RELAY AS	1	265RHB,330	
40	3811402200	COVER RELAY	1	MK4A5Q-R1U S/S (R600A)	
41	3011181300	CASE VAPORI AS	1	PP	
42	3013201700	HOSE DRN B	1	PE FRB-5350NT	
43	3015402300	VALVE WATER AS	1	FR-S660CW	
44	3014461510	PIPE WICON AS	1	TSW OD4.76XT0.7	
45	3012021700	FIXTURE MOTR	1	PP	
46	3015916100	MOTOR C FAN AS	1	DC-2213DWCA-3	
47	3018500300	M/BELL B	1	PP	
48	3018500200	M/BELL A	1	PP	
49	3011834700	FAN	1	ABS OD3.17XD150	
50	3011200500	CLAMP FAN	1	SUS 304	
51	3016808100	DRYER AS	1	C1220T-M OD19.05XL135	
52	3011497000	COVER MACH ROOM AS	1	SBHG T0.35	
53	7112401211	SCREW TAPPING	7	T1 TRS 4X12 MFZN	
54	3012214100	FRAME CHECK VALVE AS	1	FRU-571I	
55	3012023700	FIXTURE MOTOR S3	1	PP(NATURAL)	
56	3010107100	ABSORBER MOTOR	2	NBR	
57	3015916000	MOTOR R FAN AS	1	D4612AAA20	
58	3012023900	FIXTURE MOTOR S2	1	PP(NATURAL)	
59	3012023800	FIXTURE MOTOR S1	1	PP(NATURAL)	
60	3011835400	FAN R	1	ABS OD3.17XD110	
61	3011200510	CLAMP FAN	1	SUS 304	
62	3013357300	INSU DAMP AS	1	F-PS	
63	3011445200	COVER DAMP	1	HIPS	
64	3014807100	SENSOR R AS	1	PBN-43B	
65	3011445700	COVER R SENSOR	1	ABS+SPRAY	
66	3017906500	SOCKET R LAMP AS	1	250V/1A	
67	3013602500	LAMP	2	AC 240V 25W(S)	
68	7121300811	SCREW TAPPING	2	T2S PAN 3X8	

No	Part code	Part Name	Q'ty	Description	Remark
69	3015510800	WINDOW R LAMP	1	MIPS	
70	3016002720	SPECIAL CAP SCREW	2	SM18C	
71	3018128600	SWITCH LAMP *R	1	SPF101B-1D	
72	3017842800	SHELF R A AS	2	FRAME+PRINTED GLASS+FIX	
73	3017842900	SHELF R B AS	1	FRAME+PRINTED GLASS+FIX	
74	3012514500	GUIDE CASE A *L AS	3	ABS	
75	3012514600	GUDIE CASE A *R AS	3	ABS	
76	7122401611	SCREW TAPPING	10	T2S TRS 4X16 MFZN	
77	3011446600	COVER VEGETB A	1	GPPS	
78	3011114600	CASE VEGETB B AS	1	CASE+SILK+FRAME+KNOB	
79	3011446700	COVER VEGETB CASE B	1	GPPS	
80	3012529700	GUIDE CASE C *L AS	2	ABS	
81	3012529800	GUIDE CASE C *R AS	2	ABS	
82	3011114700	CASE VEGETB C AS	1	CASE+SILK+FRAME+KNOB	
83	3018701800	DEO ANTI AS	1	W40XT5XL40	
84	3011445900	COVER RETURN DUCT	1	PP	
85	3011171310	CASE EGG AS	1	CASE+VINYL	
86	3018201000	TANK WATER AS	1	FRU-541D	
87	3017053500	EVA AS	1	FRU-571I	
87-1	3012818300	HEATER SHEATH AS	1	AC220V/ 192W	
87-2	3014806900	SENSOR D AS	1	PBN-43	
87-3	3012023600	FIXTURE D SENS	1	PP	
87-4	3017202000	FUSE TEMP AS	1	AC250V 10A 77C	
87-5	4017Z90590	FIXTURE FUSE TEMP	1	PP	
88	3012529000	GUIDE DRN	1	GA	
89	7122401211	SCREW TAPPING	1	T2S TRS 4X12 MFZN	
90	3012007800	FIXTURE MOTOR A	1	HIPS	
91	3010107100	ABSORBER MOTOR	2	NBR	
92	3015915900	MOTOR F FAN	1	D4612AAA21	
93	3018921300	LOUVER F A	1	ABS	
94	3011834500	FAN	1	ABS OD3.17XD130	
95	3011200510	CLAMP FAN	1	SUS 304	
96	7122401611	SCREW TAPPING	3	T2S TRS 4X16 MFZN	
97	3010968600	CAP F LOUVER B	2	HIPS	

No	Part code	Part Name	Q'ty	Description	Remark
98	3018921500	LOUVER F B AS	1	HIPS	
99	3011443200	COVER F RETURN	1	HIPS	
100	7122401611	SCREW TAPPING	1	T2S TRS 4X16 MFZN	
101	3010924600	CAP F LOUVER	2	HIPS	
102	3012013200	FIXTURE C	2	PP	
103	3012205600	FRAME ICE MAKER	1	HIPS	
104	3000025920	ASSY ICE MAKER	1	FRU-541D(R600A)	
105	3012517800	GUIDE G/MOTR BRKT *L	1	ABS	
106	3012517900	GUIDE G/MOTR BRKT *R	1	ABS	
107	3010658100	BRACKET G/MOTR AS	1	FRS-541D	
108	3012520510	GUIDE ICE CRUSHER *L	1	ABS	
109	3012517710	GUIDE ICE CRUSHER *R	1	ABS	
110	3011115200	CASE ICE CRUSHER AS	1	FRU-541D	
111	3001401700	COVER F FAN AS	1	FRU-571I	
112	3014531900	PLATE F LAMP	1	SGCC T0.8	
113	3017906600	SOCKET F LAMP AS	1	250V 1A	
114	3013602500	LAMP	1	240V 25W	
115	7112401211	SCREW TAPPING	1	T1 TRS 4X12 MFZN	
116	3015510700	WINDOW F LAMP	1	MIPS	
117	3016002720	SPECIAL CAP SCREW	2	SM18C	
118	3014807000	SENSOR F AS	1	PT-38	
119	3011442600	COVER F SENS	1	ABS	
120	3018128500	SWITCH LAMP *L	1	SPF101B-2D	
121	3017842600	SHELF F AS	3	FRAME+PRINTED GLASS+FIX	
122	3011114800	CASE F A AS	1	CASE+SILK+FRAME	
123	3011114900	CASE F B AS	1	CASE+SILK+FRAME	
124	3019026700	POCKET F *T	1	HIPS+SILK	
125	3019027400	POCKET F AS	3	BASE+DECO+SILK	
126	3000060410	ASSY F DR	1	FRU-541D	
126-1	3010964600	CAP ICE PATH FRAME	1	HIPS	
126-2	3012318800	GASKET F DR AS	1	PVC	
126-3	3000003700	ASSY F DR URT	1	FRU-541D	
127	3012641500	HANDLE AS	1	FRU-571I	
128	3016002700	SPECIAL SCREW	2	WASR+TRS5X16 MFZN	

No	Part code	Part Name	Q'ty	Description	Remark
130	3010339600	BASE HANDLE *U	1	HIPS	
131	7112401211	SCREW TAPPING	8	T1 TRS 4*12 MFZN	
132	3011446400	COVER HNDL DECO *T	1	ABS+SPRAY	
133	3011446500	COVER HNDL DECO *U	1	ABS+SPRAY	
134	3017903702	SOCKET DISP LAMP AS	1	250V 1A 14BASE	
135	3013600020	LAMP	1	240V/15W(E14,CC5A)	
136	3010544000	BOX DISPNS ICE SHUT AS	1	FRU-541D	
137	3011494700	COVER DISPNS BOX AS	1	FRU-541D	
137-1	7173300811	SCREW TAPPITE	7	TT2 BIN 3X8 MFZN	
137-2	30143D5160	PCB FRONT AS	1	FRU-541D	
137-3	3016304800	BUTTON CONTROL B	2	ABS+AL	
137-4	3016304700	BUTTON CONTROL A	1	ABS+AL	
137-5	3015510900	WINDOW F PCB	1	PMMA	
137-6	3011446300	COVER DISPNS BOX	1	ABS+SPRAY	
137-7	3011636900	DECO DISPNS COVR	1	ABS+AL	
137-8	3014235100	PANEL F PCB	1	ABS+SPRAY	
138	3015102200	SPRING ICE D/LEVER	1	SUS	
139	3011495300	COVER ICE FLAP AS	1	FRU-541D	
140	3012019700	FIXTURE ICE SHUT LVR	1	SUS	
141	3015402000	VALVE SOL DISP	1	CUBE SN8	
142	3018125800	SWITCH MICRO	1	VP333A-2D	
143	3012213200	FRAME DISPNS BUTTON	1	ABS	
144	3016304600	BUTTON DISPNS	1	SILICON	
145	3012406900	GRILL DISPENSER	1	ABS	
146	3019027500	POCKET DAIRY AS	1	POCKET+COVER	
147	3019027200	POCKET R *M AS	2	BASE+DECO+SILK	
148	3019027300	POCKET R *S AS	2	BASE+DECO+SILK	
149	3000060500	ASSY R DR	1	FRU-571I	
149-1	3012318900	GASKET R DR AS	1	PVC	
149-2	3000058000	ASSY R DR URT	1	FRU-571I	