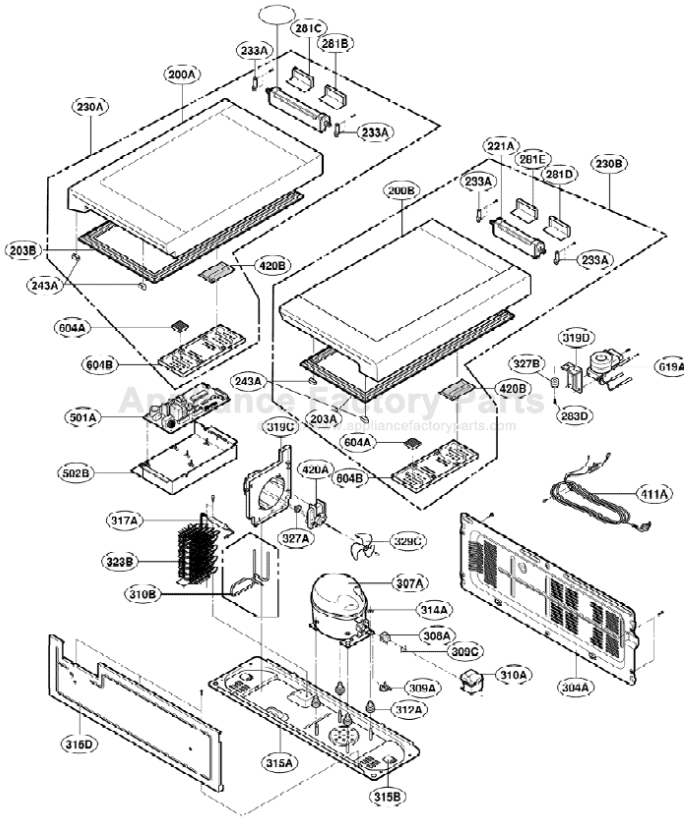
LG GR-K18PBA Owner's Manual



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LG

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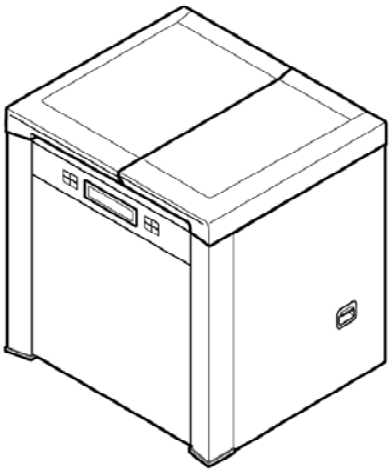
KIMCHI REFRIGERATOR

SERVICE MANUAL

CAUTION

PLEASE READ CAREFULLY THE SAFETY PRECAUTIONS OF THIS MANUAL BEFORE CHECKING OR OPERATING THE REFRIGERATOR.



MODEL : GR-K18PB/GR-K18PBC

Safety regulations

1. First check if there is any electric leakage in the refrigerator unit.
2. Always unplug the refrigerator before handling any electricity conducting parts.
3. When testing the refrigerator with the power on, use insulated gloves for safety.
4. When using measuring instruments, check the rated current, voltage and capacity.
5. Do not allow water or moisture to get into the mechanical or electrical parts of the refrigerator.
6. Remove all things on top of the refrigerator before tilting it during repairs to avoid spills.
   Be especially careful for thin objects (glass sheet, book).
7. When the refrigerating cycle is damaged, always request service to the major repair service agency.
   (This is to prevent the house from getting dirty from the gas within the cycle.)
8. Always double check for repairs related to safety to ensure customer safety.

Contents

Safety warnings and cautions

Chapter 1. Safety warnings and cautions

▶ Always observe the 'Safety Warnings' and 'Cautions', which hare intended to ensure safety while repairing or operating the product.

▶ Precautions are classified into 'Warning' and 'Caution', as explained below.

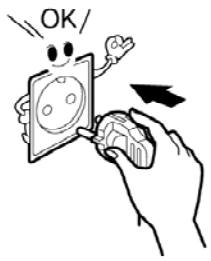
⚠ Warning Warning means a dangerous condition which could result in significant damage, injury or death if the instructions are not followed.

⚠ Caution Caution means a condition which could result in damage or injury if instructions are not followed.

⚠ Warning

Use caution to prevent electric shock

The control panel (main PCB) uses 310V. When replacing PCB parts, wait at least 3 minutes after unplugging. Always unplug the refrigerator before repairing.

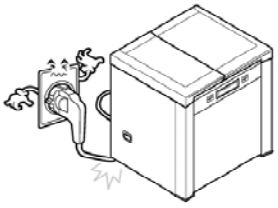


Do not allow the consumer to repair, disassemble or modify the refrigerator.

Damaged power plug can cause fire or electric shock.

Make sure that the power plug is not pressed by the back of the refrigerator

Power plug may be damaged and cause a fire or electric shock.



Use a dedicated circuit.

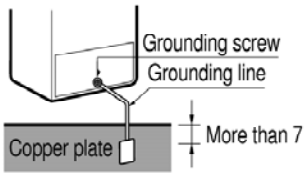
Overloading circuits or outlets could cause a fire.

Safety warnings and cautions

⚠ Warning

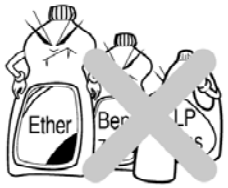
This product should always be grounded, when needed.

If you think that there is a possibility of electricity leakage by water or moisture, always ground the unit.



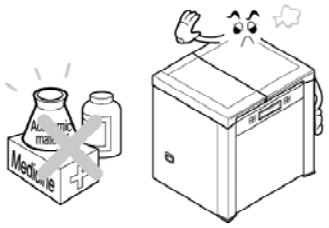
Do not store flammable liquid or gas in the refrigerator such as ether, benzene, alcohol, medicine, LP gas etc.

It can cause an explosion or a fire.



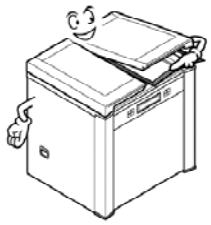
Do not store medicine or academic material etc. in the refrigerator.

Store an object that requires precise temperature control can cause deterioration in quality or unexpected reaction to cause a dangerous situation.



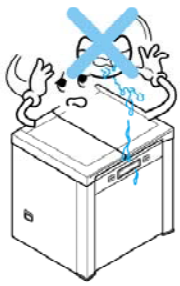
When disposing the refrigerator, remove the rubber packing on the door and do not leave it where children play.

A child can be dangerously entrapped in the refrigerator.



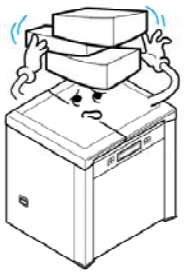
Do not set items, particularly flower vase, cup, cosmetic or medicine on top of the refrigerator.

It can cause fire and electric shock or cause an injury from dropping.



Do not stack items or carelessly store food on the refrigerator.

Items stored on the refrigerator could fall and cause injury.



Safety warnings and cautions

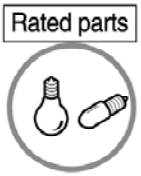
⚠ Caution

When using the refrigerator for low temperature in freezer or refrigerator, do not store bottles.

Bottles can freeze and cause the bottles to crack, which can cause an injury.

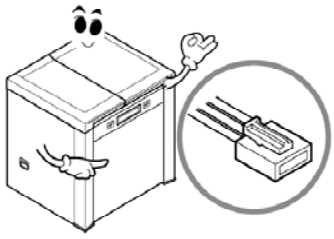
Always use exact replacement parts.

Make sure that the model name, voltage, current and temperature ratings are correct for the electric part.



During repairs, be sure all connectors are tight and wires are properly routed.

Make sure the connectors of the housing part are properly connected.



Do not bend, modify, bend, pull or twist the power cord.

It can cause fire or electric shock.

During repairs, remove all dust and foreign material from the housing part, connector part and check part.

It can prevent problems such as tracking or short circuit.

Allow at least 5 minutes for resetting if you unplug the refrigerator.

If can cause an overload to the condenser operation and cause problems.

After 5 minutes

Product specification

Chapter 2. Product specification

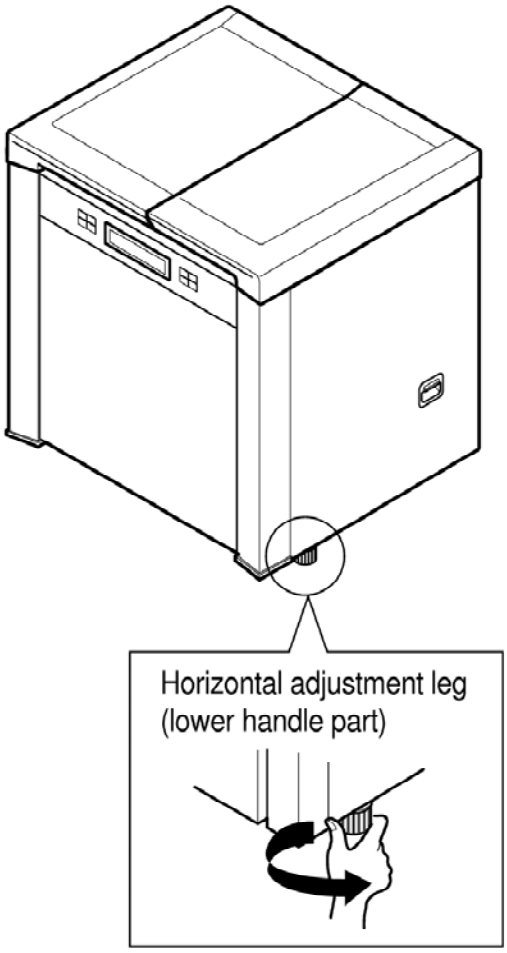
2-1. GR-K18PB/GR-K18PBC

Item		GR-K18PB	GR-K18PBC
		SPEC	
Volume	Usable volume	184Li	
	Left compartment	92Li	
	Right compartment	92Li	
External dimensions	Width	923mm	
	Depth	694mm	
	Height	877mm	
Total weight		67kg	
Motor power consumption		133W	130W
Cooling method		Direct cooling	
Store/Season		Electronic	
Insulation material		CYCLO PENTANE	
Fresh vegetable basket		1 pc.	
Kimchi refrigerator container		6 pcs. (6 large)	
Low temperature catalytic deodorizing system		2 pcs.	
Freeze cycle	Compressor	NR58LBQH	KX56LACH
	Evaporator	PIPE ON SHEET	
	Refrigerant (amount)	R134a(140g)	
	Oil	FREOL@15G(210cc)	FREOL@15G(280cc)
Electrical part rating	PTC	P6R8MB	
	Fan motor for compressor cooling	4TM412TFBYY	4TM314TFB
	Left compartment seasoning heater	ø110,3 blades attached	
	Right compartment seasoning heater	115V / 80W(Resistance:605Ω)	
	Capacitor (running)	250VAC 14μF	250VAC 10μF
	Capacitor (starting)	200VAC 50μF	160VAC 100μF

Chapter 3. Product installation method

3-1. Method to adjust height of refrigerator

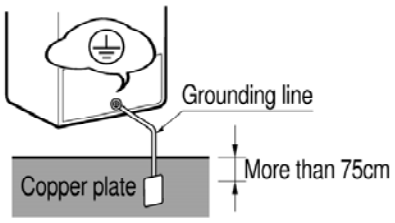
■ **First adjust the level of the refrigerator.**
(If the floor is uneven, the refrigerator may vibrate or cause noise.)



▶ Adjust the front to be leveled by turning the height adjustment screws under the front corners in the arrow direction.

3-2. Grounding method

Plug the cord into a 115V grounded outlet. If you are unsure of the voltage or grounding integrity, consult a qualified electrician.

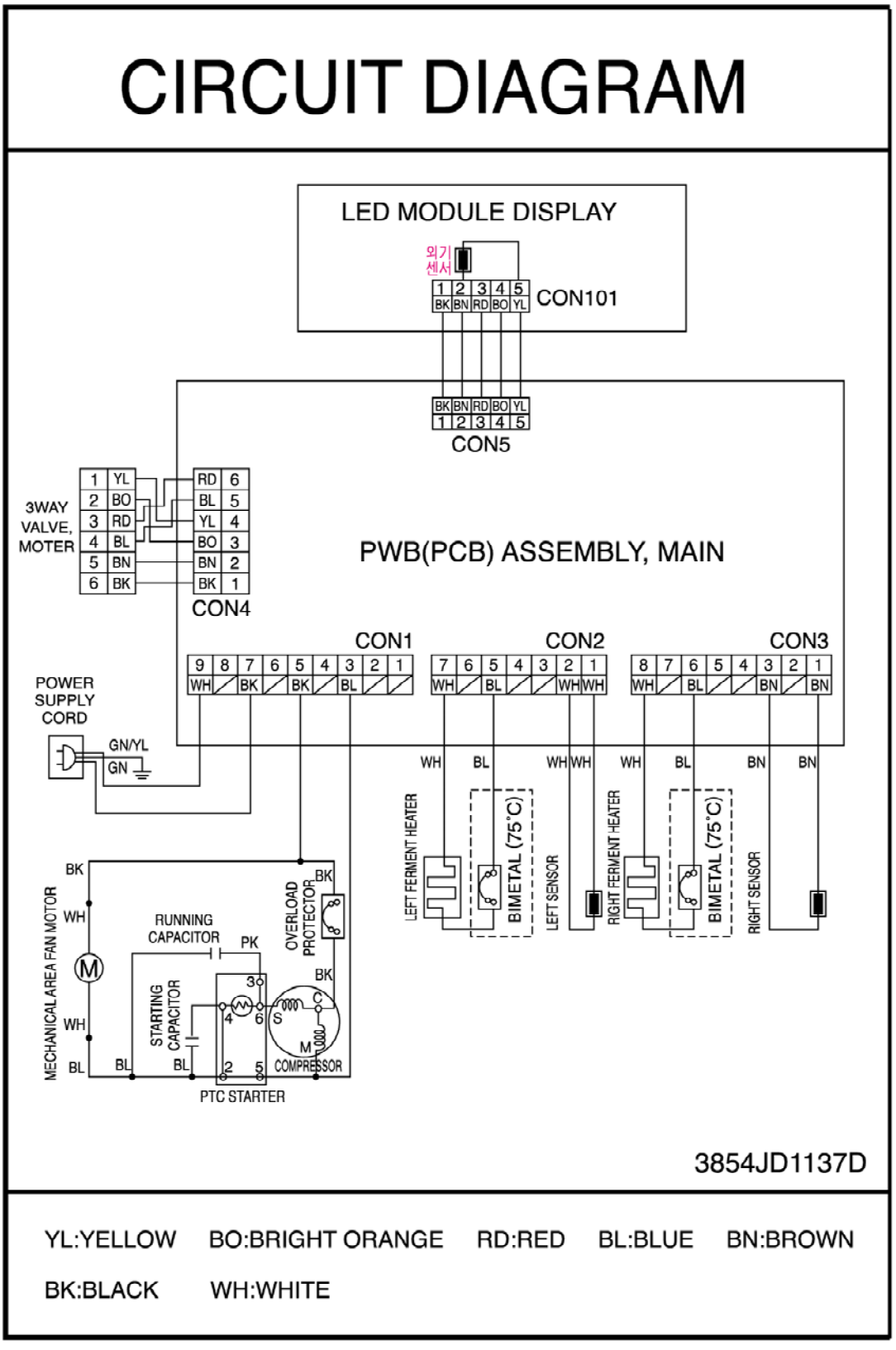


Caution **Take care not to ground the circuit at one of the following places:**

1. **Water pipe:** If there is a plastic piping within the system, the ground may not be valid.
2. **Gas pipe:** There is a danger of fire or explosion.
3. **Phone line or lightning rod:** If lightning strikes, dangerous voltage may be induced in the circuit.

Circuit diagram

Chapter 4. Circuit diagram



MICOM function and circuit description

Chapter 5. MICOM function and circuit description

5-1. Function description

5-1-1. Display part

Notch	Cabbage/Radish/Mul Kimchi			Vegetable/Fruit			Light freezing			Freezing food		
	Min	Mid	Max	Min	Mid	Max	Min	Mid	Max	Min	Mid	Max
Temperature	0℃	-1.0℃	-2.0℃	3.5℃	2.5℃	1.5℃	-4.0℃	-5.0℃	-6.0℃	-15℃	-18℃	-21℃

1. When the power is connected for the first time, it is set to “Lock”, “Left compartment-Cabbage Kimchi-Mid” and “Right compartment-Cabbage Kimchi-Mid”.
2. During a power shut-down or when the power is reconnected, the refrigerator maintains the prior display. But in case of a power-shut down or power reconnection during rhythm fermenting, the temperature returns to “Mid” for the applicable food type.
3. In “Lock” status, you will not hear a buzzer even when you press the buttons and the functions will not work. (But for Fighting1 mode, the Lock LED blinks 3 times.)

MICOM function and circuit description

5-1-2. Food storage/seasoning function

(1) When selecting food type and storing temperature

1. Press the “Lock/Unlock” button for more than 2 seconds to switch to “Unlock” status.
2. Press the “Store” button to change the storing temperature to “Mid” → “Max” → “Min” → “Mid”. The food type changes from “Cabbage Kimchi” → “Radish Kimchi” → “Mul Kimchi” → “Vegetable/Fruit” → “Light Freezing” → “Freezing” as the storing temperature changes from “Min” → “Mid”.
3. Press the “Lock/Unlock” button to complete the selection of food type and storing temperature. At this time, if a minute passes without pressing the “Lock/Unlock” button, it will automatically switch to Lock status and end the food type and storing temperature selection mode.

(2) When selecting rhythm fermenting (seasoning)

1. Press the “Lock/Unlock” button for more than 2 seconds to switch to “Unlock” status.
2. Press the “Ferment” button to change the seasoning stage to “Seasoning1” → “Seasoning2” → “Mature seasoning” → “Fresh seasoning1” → “Fresh seasoning2” → “Seasoning1”. The food type changes from “Cabbage Kimchi” → “Radish Kimchi” → “Mul Kimchi” as the seasoning degree changes from “Fresh seasoning2” → “Seasoning1”.
3. Press the “Lock/Unlock” button to complete the rhythm fermenting (seasoning). At this time, if a minute passes without pressing the “Lock/Unlock” button, it will automatically switch to Lock status and end the rhythm ferment (seasoning) selection mode.
4. When the rhythm fermenting selection is completed, “Seasoning in process” LED will be on and when seasoning is done, the “Seasoning complete” LED will be on. And the storing temperature will automatically be set to “Mid”.

(3) When selecting flavor keeping

1. Press the “Lock/Unlock” button for more than 2 seconds to switch to “Unlock” status.
2. Press the “Store” button to select Cabbage Kimchi, Radish Kimchi or Mul Kimchi. (Flavor keeping function is only limited to Cabbage Kimchi, Radish Kimchi and Mul Kimchi.)
3. At this time, press the “Flavor keeping” button to select or cancel the flavor keeping function.
4. Press the “Lock/Unlock” button to end the flavor keeping selection mode. At this time, if a minute passes without pressing the “Lock/Unlock” button, it will automatically switch to Lock status and end the flavor keeping selection mode.
5. If you select flavor keeping during seasoning process, it will immediately end the seasoning and switch to flavor keeping. At this time the storing temperature will automatically be set to “Mid”.
6. If you select the flavor keeping function, the refrigerator will lower the temperature to maintain the current Kimchi flavor. (-1 degrees for “Min”, -0.5 degrees for “Mid” and -0 degrees for “Max”.)
7. During flavor keeping operation, a cold shock operation is done every 12 hours.
8. If you select rhythm fermenting during flavor keeping, the flavor keeping function will be canceled.

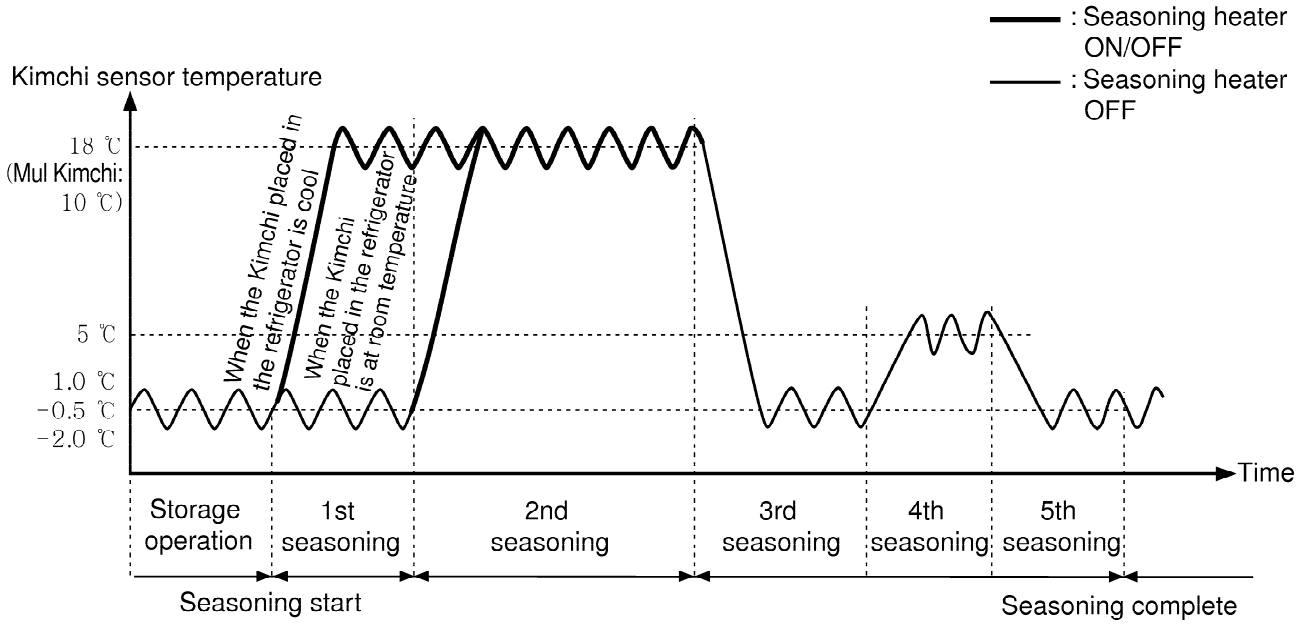
MICOM function and circuit description

5-1-3. When selecting power on/off function

1. Press the "Lock/Unlock" button for more than 2 seconds to switch to "Unlock" status.
2. Press the "Compartment selection" button to select the compartment.
3. At this time, press the "Power" button for more than 2 seconds to turn the power off.
4. At this time, all the LEDs in the display will be turned off with the power off LED turning on.
5. If you press the "Power" button when the power is off, it will turn on the power and recover to "Cabbage Kimchi" and "Mid".
6. When the power is turned off, the heater of the applicable compartment is turned off and the valve will be closed.

5-1-4. Rhythm fermenting control pattern diagram

1. The fermenting control pattern varies, depending on the temperature of the Kimchi when it is placed into the storage, the type of Kimchi being made and the degree of the seasoning selected.
2. In the 1st seasoning cycle, if the Kimchi is at room temperature, the cold control operates.
3. During the seasoning cycle, if the Kimchi is cold, the seasoning heater is turned on and if the Kimchi is warm, the seasoning heater is turned off.
4. If a failure occurs, such as a sensor error during seasoning, the storage will default to Cabbage Kimchi storage status.



MICOM function and circuit description

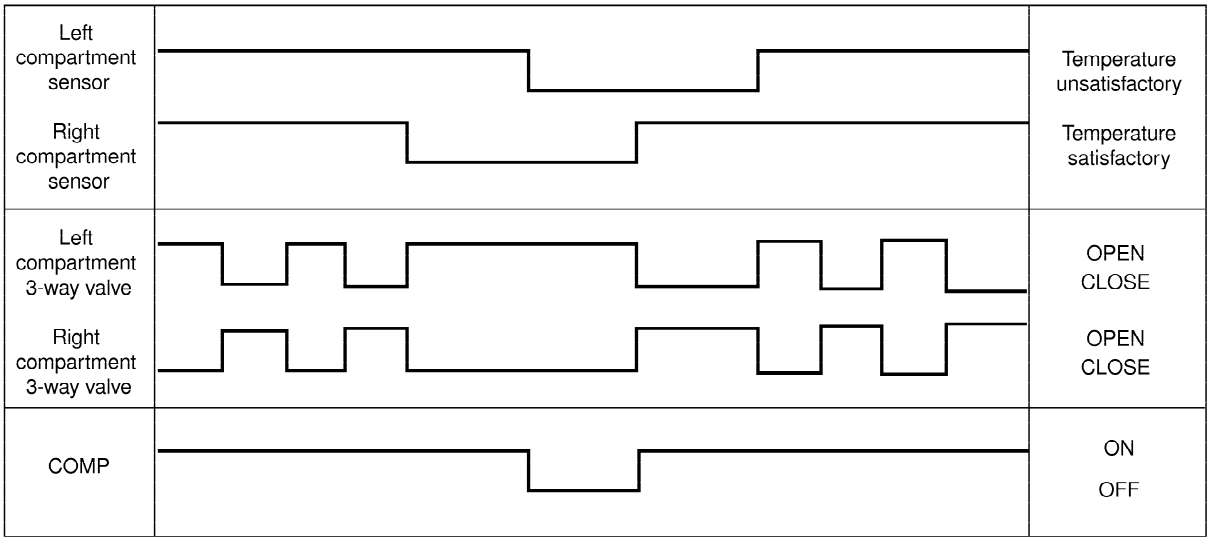
5-1-5. Temperature control method

1. The compressor runs or stops and the 3-way valve opens or closes depending on the temperature sensed in the left and right compartment.
2. If the temperature in either compartment is unsatisfactory, the compressor is turned on and the 3-way value is opened to the affected compartment.
3. If the temperature in both compartments is unsatisfactory, the compressor is turned on and runs until both compartments become satisfactory. The 3-way valve is opened and closed to each compartment alternatively until the temperature is satisfactory.
4. During the seasoning cycle, if the temperature is low, the heater is turned on and if the temperature is high, the compressor is turned on and the 3-way value is opened.

Left compartment temperature	Right compartment temperature	3-Way valve position	COMP
Satisfactory	Satisfactory	Note 1) ※	OFF
Satisfactory	Unsatisfactory	Right compartment	ON
Unsatisfactory	Satisfactory	Left compartment	ON
Unsatisfactory	Unsatisfactory	Left 20 min/Right 20 min	ON

Note1) When the temperature is satisfactory in both compartments, the 3-way valve is open to whichever compartment that has had a satisfactory temperature most recently.

■ Summary chart of COMP and 3-Way valve operation



5-1-6. Buzzer sound

When you press a button on the front display, you will hear a varying buzzer sound depending on the type and function. (Refer to Buzzer operating circuit in p21).

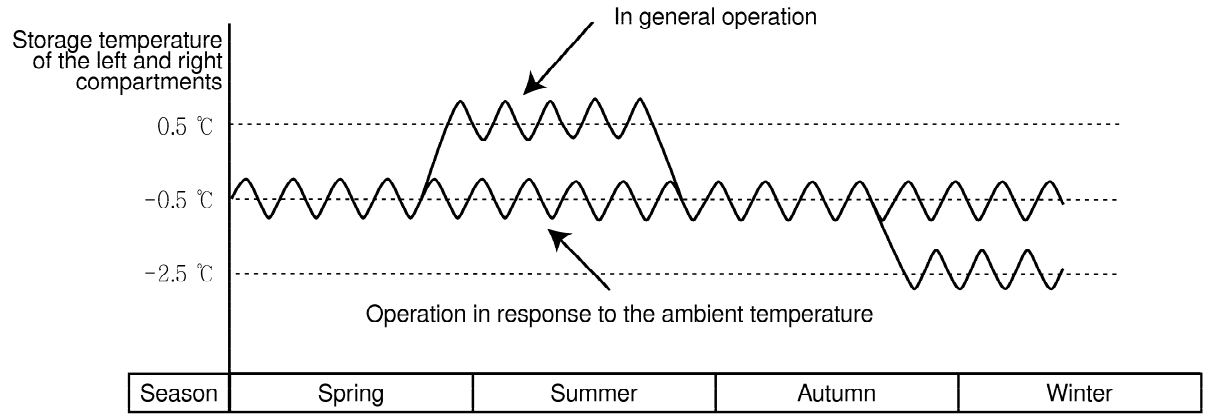
5-1-7 Power failure compensation function

1. When the power is restored after an outage, the refrigerator performs the setting originally programmed except for Error status and Test mode.
2. If the power fails during the seasoning process, there is not power outage compensation function and the storage defaults to previously set Kimchi type and temperature of "Mid". (to protect excessive seasoning)

MICOM function and circuit description

5-1-8. Operation in response to ambient temperature

The storage senses the ambient temperature and adjusts the temperature in the compartments accordingly. This keeps the storage from being too cold or too warm because of seasonal variations and maintains exact temperatures in the compartments.



5-1-9. Sequential operation of components

Components (compressor, 3-way valve and left/right seasoning heater) are operated in a specific order to prevent damage and noise caused by simultaneous operation of all parts when the unit is started and after completing the self-test routine.

Operation status		Operating order	Remarks
Initial power-up	Temperature of the left of right sensor is >45℃	Immediately: Power on → 3-way valve open; 3 min: 3-way valve left open; 10 sec: Compressor on	
	Temperature of the left of right sensor is <45℃	Immediately: Power on → Left seasoning heater on; 0.5 sec: Right seasoning heater on; 5 sec: Left seasoning heater off; 0.5 sec: Right seasoning heater off → Compressor on 3 sec: 3-way valve open; 3 min: 3-way valve left open; 10 sec: Compressor on	
When returning to normal status in test mode		All loads off → 7 min: Compressor on 3 sec: 3-way valve open; 3 min: 3-way valve left open	The 3-way valve is opened to both compartments for 3 minutes; then it is opened to either the left or the right compartment, depending on the temperature in the compartments.

※ Operation order may slightly vary depending on temperature setting.

MICOM function and circuit description

5-1-10. Error diagnosis function

1. The error diagnosis function is the function to support SVC in case of an error that can affect the performance of the product.
2. If an error occurs, the control panel button will not work.
3. If an error occurs and is resolved, the refrigerator will default to the normal status. (The unit is reset.)
4. The error codes are shown in segment for the remaining seasoning time display of the right compartment, and all LEDs, except for failure code, are turned off.

◯ : Normal operation

NO	Item	Error code display	Product operation status in failure					Error contents	Remarks
			Compressor	Left 3-way valve	Right 3 way valve	Left heater	Right heater		
1	Failure of left compartment sensor (R1).	Displays "E1" on the seasoning remaining time part	◯	2 minute open 30 minute close	◯	Heater off	◯	Left compartment lid sensor disconnected or short circuited	* Check the connection of each sensor
2	Failure of right compartment sensor (R2).	Displays "E2" on the seasoning remaining time part	◯	◯	2 minute open 30 minute close	◯	Heater off	Left compartment lid sensor disconnected or short circuited	
3	Failure of ambient temperature sensor (RTS)	Note 1)	◯	◯	◯	◯	◯	Ambient temperature sensor disconnected or short circuited	
4	Communications error	Only LED for "E1" and "E2" was on	◯	◯	◯	Heater off	Heater off	When communication is not working continuously for 30 sec	The connector could be pulled out. Poor TR in communications part

Note 1) In case of an ambient temperature sensor error, the error code is not displayed and press the left and right compartment "Store" buttons for more than 1 second when checking the LED.
If the ambient temperature sensor is normal, the LED will light up with all other LEDs except for "E1" and "E2" LEDs.

MICOM function and circuit description

5-1-11. Test function

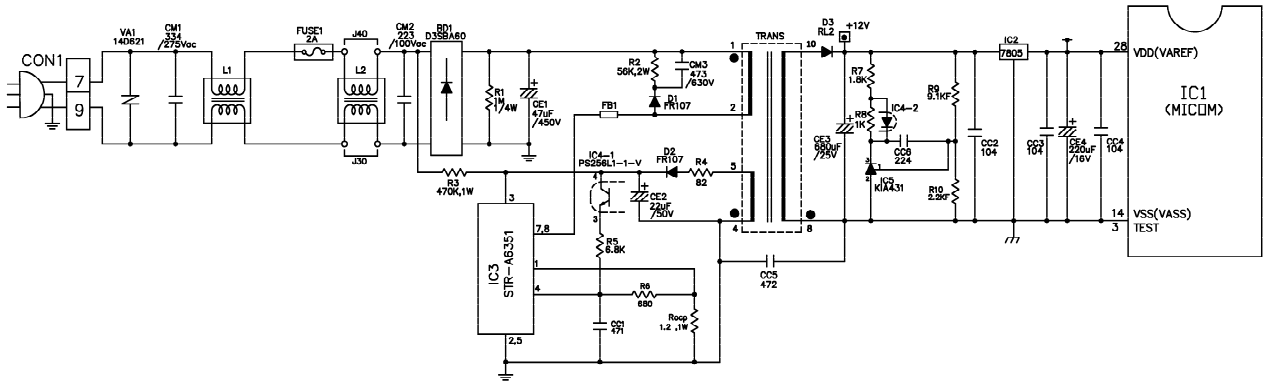
1. The test function checks the functions of the PCB and the refrigerator, searching for errors in parts.
2. The test switch on the PCB operates the test mode. The refrigerator reverts to the normal mode after 2 hours if you forget to end it manually.
3. When the test mode is active, the buttons on the control panel are disabled but the buzzer still sounds a ding if one is pressed.
4. When the test mode is completed, unplug the refrigerator briefly and plug it in again to reset it and allow normal operation.
5. If a sensor failure or other failure is detected during the test mode, release the test mode to display the failure code.
6. During the display of the error code, test mode does not work even if you press the Test switch.

Mode	Operation	Contents	Remarks
TEST1	Press the test switch once	1) Compressor ON. 2) 3-way valve opens to the left and right compartments alternatively at 20 minute intervals. 3) Left and right seasoning heaters off. 4) Left compartment store/ferment food type LED on	※ This test checks the refrigeration system for the left and right compartments. ※ The system recovers to the initial status after a maximum of 2 hours.
TEST2	Press the test switch once when Test 1 indicates it is completed.	1) Compressor ON and right compartment 3-way valve open. 2) Left and right compartment seasoning heater off 3) Left compartment store/ferment stage, flavor keeping, power off, seasoning in process, seasoning complete LED on.	※ This test checks the refrigeration system for the right compartment only. ※ The system recovers to the initial status after a maximum of 2 hours.
TEST3	Press the test switch once when Test 2 indicates it is completed.	1) Compressor ON and left compartment 3-way valve open. 2) Left and right compartment seasoning heater off 3) Right compartment store/ferment, food type LED on.	※ This test checks the refrigeration system for the left compartment only. ※ The system recovers to the initial status after a maximum of 2 hours.
TEST4	Press the test switch once when Test 3 indicates it is completed.	1) Compressor off 2) Left and right compartment seasoning heater on 3) Right compartment store/ferment stage, flavor keeping, power off, seasoning in process, seasoning complete LED on.	※ This test checks the seasoning heaters. ※ The system recovers to the initial status after a maximum of 30 minutes. When the temperature of the compartments is higher than 40℃, the storage will default to its initial status.
Normal recovery	Press the test switch once when Test 4 indicates it is completed.	Returns to initial status	※ The compressor operates after a delay of 7 minutes.

MICOM function and circuit description

5-2. Circuit description

5-2-1. Power circuit

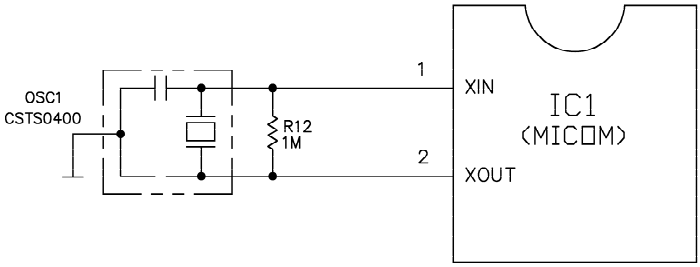


The power circuit consists of the noise attenuation part and the SMPS (Switch Mode Power Supply) part. The SMPS consists of the rectifier (BD1 & CE1) to convert AC voltage to DC voltage, switching part (IC3) to switch the converted DC voltage, transformer to transmit energy of the first side of the switching end to the second side, the secondary power to supply power to MICOM and IC, and the feedback part (IC4) to feedback the secondary voltage to the first side of the transformer in order to maintain the secondary voltage constant.

Caution : High voltage (DC 310V) is maintained in this circuit. Wait at least 3 minutes after unplugging to allow the current to dissipate. There is a danger of electric shock.

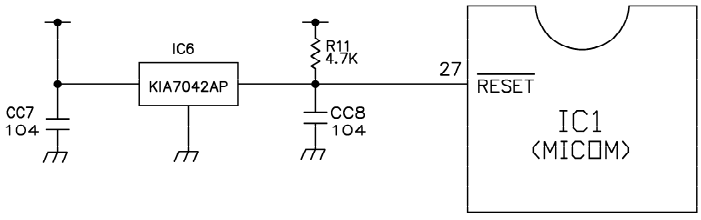
5-2-2. Oscillation circuit

The oscillation circuit provides the clock signal for synchronization and calculation of time in relation to the logic elements of microprocessor IC1 (MICOM). OSC1 must always use the original rated parts, because if the specification changes, the timing generated will not be correct, causing erratic functioning of the microprocessor.



5-2-3. Reset circuit

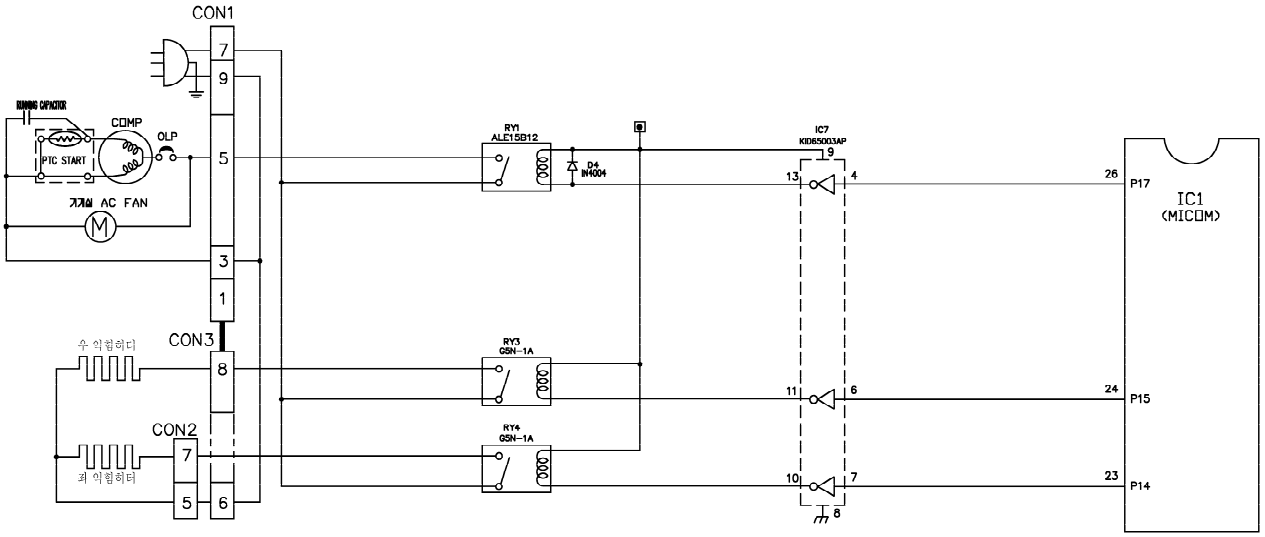
The reset circuit allows the entire process to be started from the initial status by resetting the various elements within the MICOM (IC1), such as RAM, whenever power is applied to the unit. Low voltage is applied to the reset terminal for 10ms at the beginning of the power input. The reset terminal has a voltage of 5 V during general operation. (If the reset operation fails, the microprocessor will not operate.)



MICOM function and circuit description

5-2-4. Load/Buzzer driving circuit

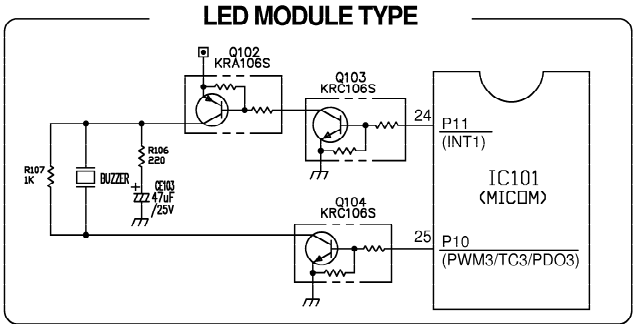
(1) Load driving circuit



Type of load		COMP. fan motor	Left seasoning heater	Right seasoning heater
Measuring point (IC7)		13	10	11
Status	ON	Within 1V		
	OFF	12V		

(2) Buzzer driving circuit (located on display PCB)

※ Only the buzzer sound for the Lock/Unlock operation is shown in this SVC technical manual.

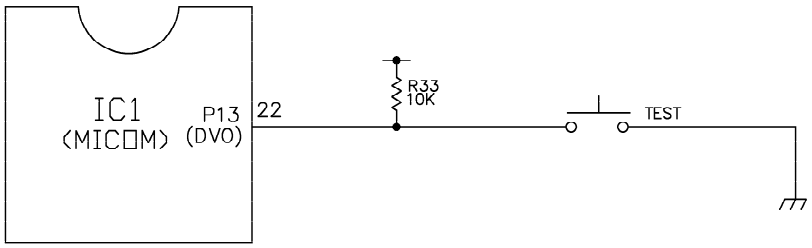


Status / Measuring point	Ex) Lock: "Ding-D-Dong" sound	Ex) Lock: "Ding-D-Dong" sound	Off
IC101 (Pin 3/61)	45ms 45ms 45ms 45ms 70ms 750ms 5V 0V	45ms 45ms 45ms 45ms 70ms 750ms 5V 0V	5V
IC101 (Pin 2/62)	5V 0V 1046.5Hz 1174.7Hz 1318.5Hz	5V 0V 1568.0Hz 1318.5Hz 1046.5Hz	0V

MICOM function and circuit description

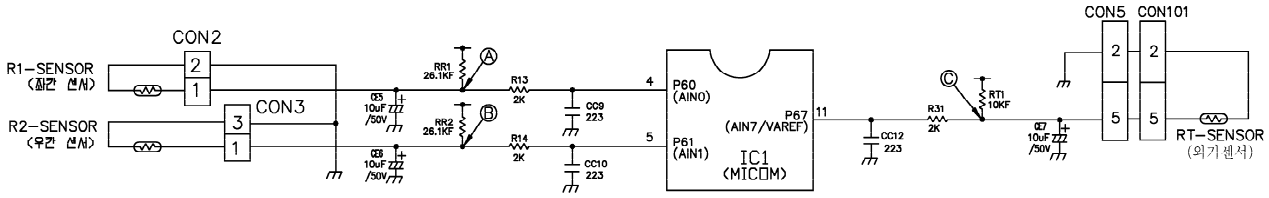
5-2-5. Switch input circuit

The following circuit is the input circuit to detect the test switch signal to check the refrigerator.



5-2-6. Temperature sensor circuit

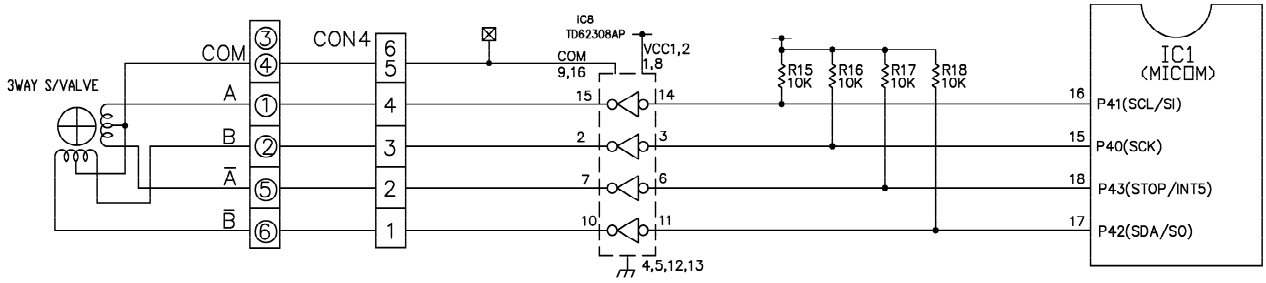
The following temperature sensor circuit consists of a sensor to detect the outside (ambient) temperature and sensors in the left and right compartments for storing and seasoning Kimchi. The status of each sensor, whether open or shorted, is shown below.



Sensor	Check point	Normal(-30℃~50℃)	Shorted	Open
Left compartment sensor	POINT Ⓐ Voltage	0.5V~4.5V	0V	5V
Right compartment sensor	POINT Ⓑ Voltage			
Outside sensor	POINT Ⓒ Voltage			

MICOM function and circuit description

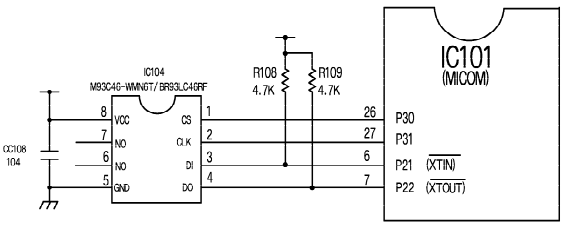
5-2-7. Stepping motor operation circuit (3-way valve)



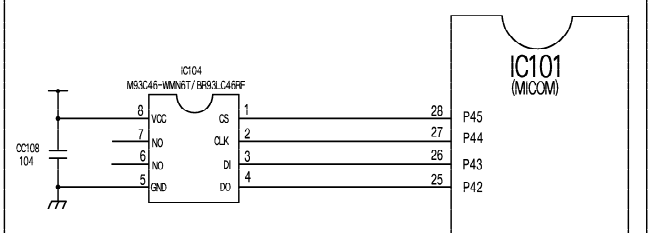
▶ The motor is operated by sending out "High" and "Low" signals as many as the designated number of steps through MICOM Pin 15, 16, 17, 18 to rotate the motor through the magnetic field formed by the motor and the coil wrapped around each stator.

5-2-8. Power failure compensation circuit (located on display PCB)

(Model for Toshiba MICOM)



(Model for Magna Chip MICOM)

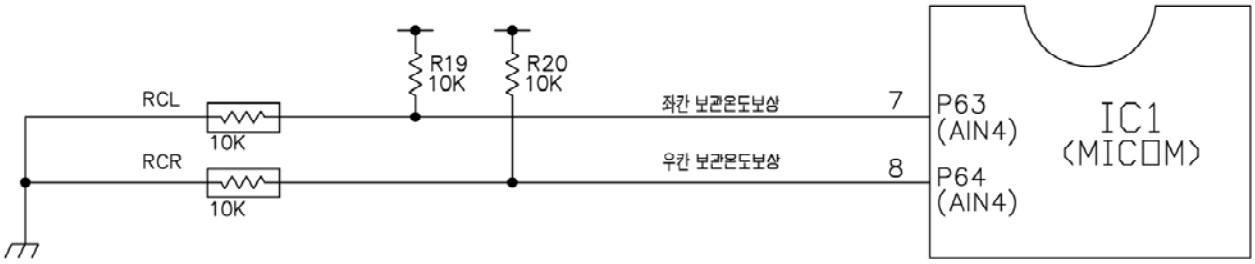


▶ The power failure compensation circuit recalls the temperature range of the right and left compartments and maintains these levels if power if interrupted briefly.
The IC for power failure compensation (EEPROM) delivers to and maintains the information in MICOM through the serial interface.

MICOM function and circuit description

5-2-9. Storing temperature compensation and over-cool/under-cool cut compensation circuit

(1) Storing temperature compensation



▶ This is the circuit to input the temperature compensation level required for adjusting storage temperature at the left or right compartment.

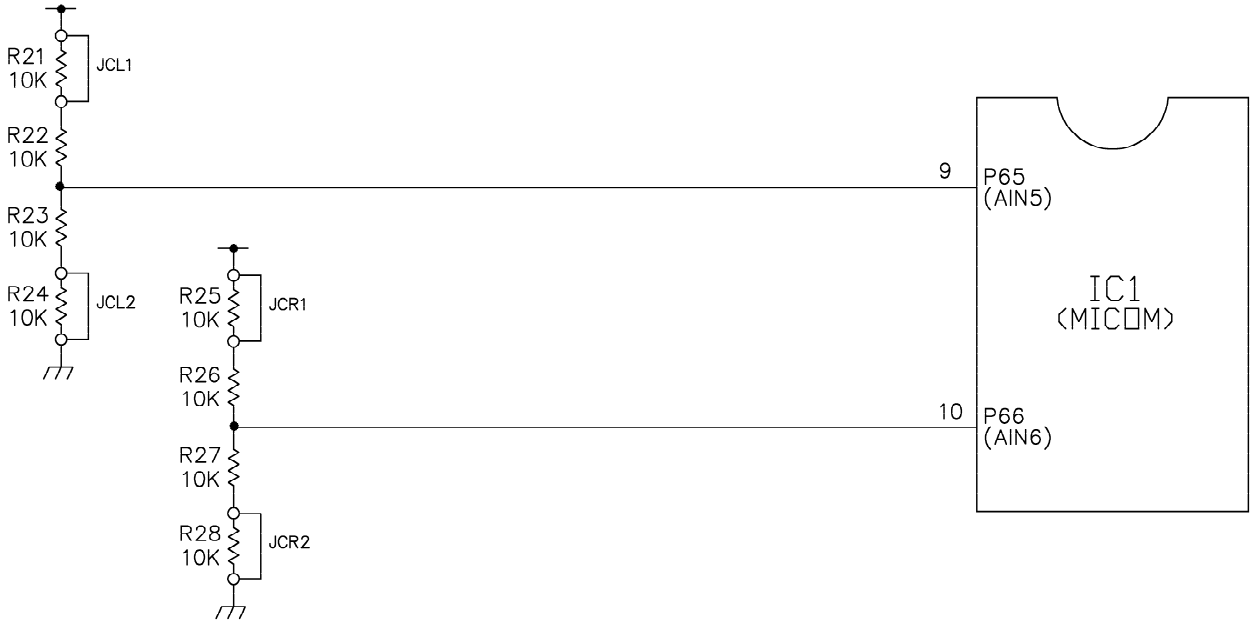
Left compartment (RCL)	Right compartment (RCR)	Temperature compensation value	Remarks
180 KΩ		+2.5 ˚C	Warmer
56 KΩ		+2.0 ˚C	
33 KΩ		+1.5 ˚C	
18 KΩ		+1.0 ˚C	
12 KΩ		+0.5 ˚C	
10 KΩ		0 ˚C	Standard temperature
8.2 KΩ		-0.5 ˚C	
5.6 KΩ		-1.0 ˚C	
3.3 KΩ		-1.5 ˚C	
2 KΩ		-2.0 ˚C	Cooler
470 Ω		-2.5 ˚C	

▶ Temperature compensation table by adjustment of resistance value (difference against current temperature)
Ex) If you change the resistance of compensation at the left compartment (RCL) from 10KΩ (current resistance) to 18KΩ (adjusted resistance), the storage temperature in the left compartment will be increased by 1℃.

Classification	Modified resistance / Current resistance	470 Ω	2 KΩ	3.3 KΩ	5.6 KΩ	8.2 KΩ	10 KΩ	12 KΩ	18 KΩ	33 KΩ	56 KΩ	180 KΩ
Left compartment (RCL)	470KΩ	No change	0.5℃ UP	1℃ UP	1.5℃ UP	2℃ UP	2.5℃ UP	3℃ UP	3.5℃ UP	4℃ UP	4.5℃ UP	5℃ UP
	2 KΩ	0.5℃ DOWN	No change	0.5℃ UP	1℃ UP	1.5℃ UP	2℃ UP	2.5℃ UP	3℃ UP	3.5℃ UP	4℃ UP	4.5℃ UP
	3.3 KΩ	1℃ DOWN	0.5℃ DOWN	No change	0.5℃ UP	1℃ UP	1.5℃ UP	2℃ UP	2.5℃ UP	3℃ UP	3.5℃ UP	4℃ UP
	5.6 KΩ	1.5℃ DOWN	1℃ DOWN	0.5℃ DOWN	No change	0.5℃ UP	1℃ UP	1.5℃ UP	2℃ UP	2.5℃ UP	3℃ UP	3.5℃ UP
	8.2 KΩ	2℃ DOWN	1.5℃ DOWN	1℃ DOWN	0.5℃ DOWN	No change	0.5℃ UP	1℃ UP	1.5℃ UP	2℃ UP	2.5℃ UP	3℃ UP
	10 KΩ	2.5℃ DOWN	2℃ DOWN	1.5℃ DOWN	1℃ DOWN	0.5℃ DOWN	No change	0.5℃ UP	1℃ UP	1.5℃ UP	2℃ UP	2.5℃ UP
Right compartment (RCR)	12 KΩ	3℃ DOWN	2.5℃ DOWN	2℃ DOWN	1.5℃ DOWN	1℃ DOWN	0.5℃ DOWN	No change	0.5℃ UP	1℃ UP	1.5℃ UP	2℃ UP
	18 KΩ	3.5℃ DOWN	3℃ DOWN	2.5℃ DOWN	2℃ DOWN	1.5℃ DOWN	1℃ DOWN	0.5℃ DOWN	No change	0.5℃ UP	1℃ UP	1.5℃ UP
	33 KΩ	4℃ DOWN	3.5℃ DOWN	3℃ DOWN	2.5℃ DOWN	2℃ DOWN	1.5℃ DOWN	1℃ DOWN	0.5℃ DOWN	No change	0.5℃ UP	1℃ UP
	56 KΩ	4.5℃ DOWN	4℃ DOWN	3.5℃ DOWN	3℃ DOWN	2.5℃ DOWN	2℃ DOWN	1.5℃ DOWN	1℃ DOWN	0.5℃ DOWN	No change	0.5℃ UP
	180 KΩ	5℃ DOWN	4.5℃ DOWN	4℃ DOWN	3.5℃ DOWN	3℃ DOWN	2.5℃ DOWN	2℃ DOWN	1.5℃ DOWN	1℃ DOWN	0.5℃ DOWN	No change

MICOM function and circuit description

(2) Over-cool/Under-cool cut compensation



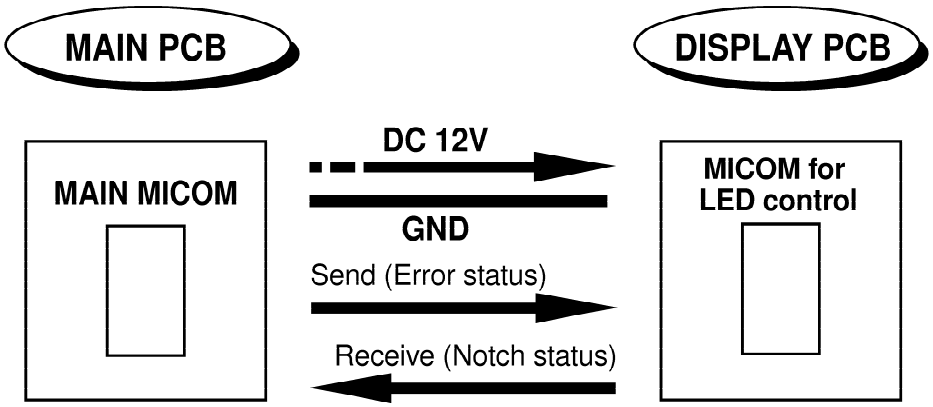
Left compartment cut compensation		Left compartment storing temperature compensation	Right compartment cut compensation		Right compartment storing temperature compensation
Over-cool compensation	Under-cool compensation		Over-cool compensation	Under-cool compensation	
JCL1	JCL2		JCR1	JCR2	
CUT		+1℃	CUT		+1℃
	CUT	-1℃		CUT	-1℃
CUT	CUT	0℃	CUT	CUT	0℃
		0℃ (Factory default)			0℃ (Factory default)

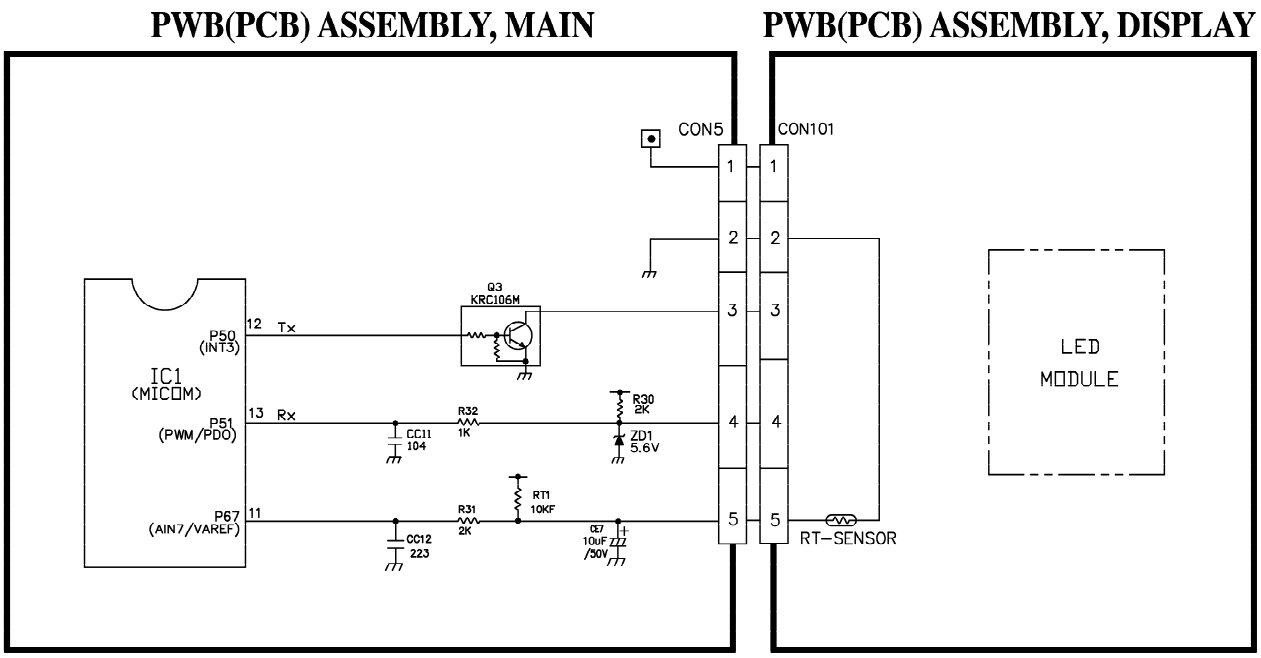
▶ The cut compensation circuit compensates the storing temperature of the left or right compartment by simply cutting it out of service for a brief period.

MICOM function and circuit description

5-2-10. Communication circuit between main PCB and display PCB

This circuit provides communications between the MICOM on the main PCB and the MICOM of the display PCB.
If there is no communication between these boards for 30 seconds, a communication error occurs.

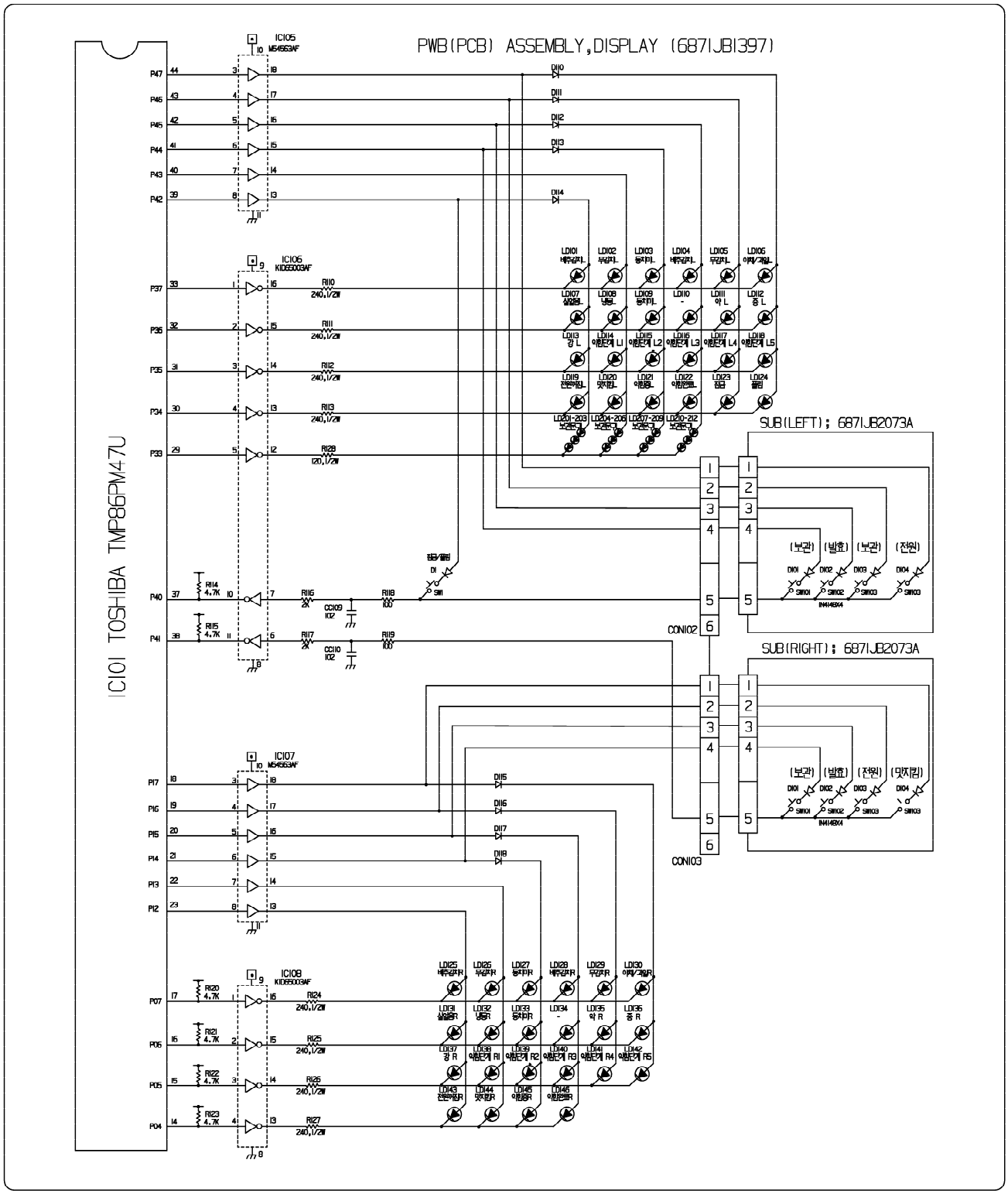




MICOM function and circuit description

5-2-11. Button input and display part illumination circuit

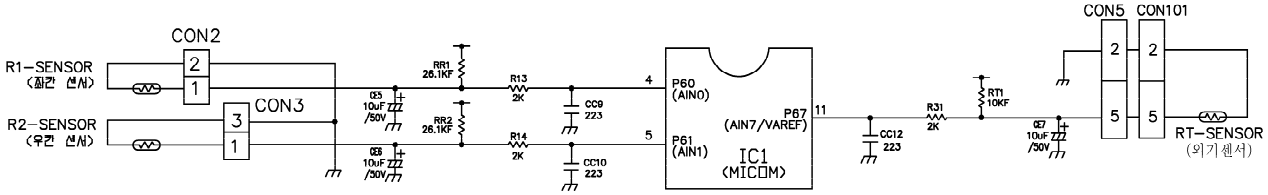
This circuit determines which buttons are pressed and drives the LED display, whose driving method is a scan method.



MICOM function and circuit description

5-3. Sensor resistance characteristics table

Measuring temperature (℃)	Left sensor, right sensor, outside sensor
-20℃	77 KΩ
-15℃	60 KΩ
-10℃	47.3 KΩ
-5℃	38.4 KΩ
0℃	30 KΩ
+5℃	24.1 KΩ
+10℃	19.5 KΩ
+15℃	15.9 KΩ
+20℃	13 KΩ
+25℃	11 KΩ
+30℃	8.9 KΩ
+40℃	6.2 KΩ
+50℃	4.3 KΩ



▶ The tolerance of the sensor resistance is ±3%.

▶ Measure the resistance value of the sensor after leaving it for more than 3 minutes (delay is required due to sensing speed.)

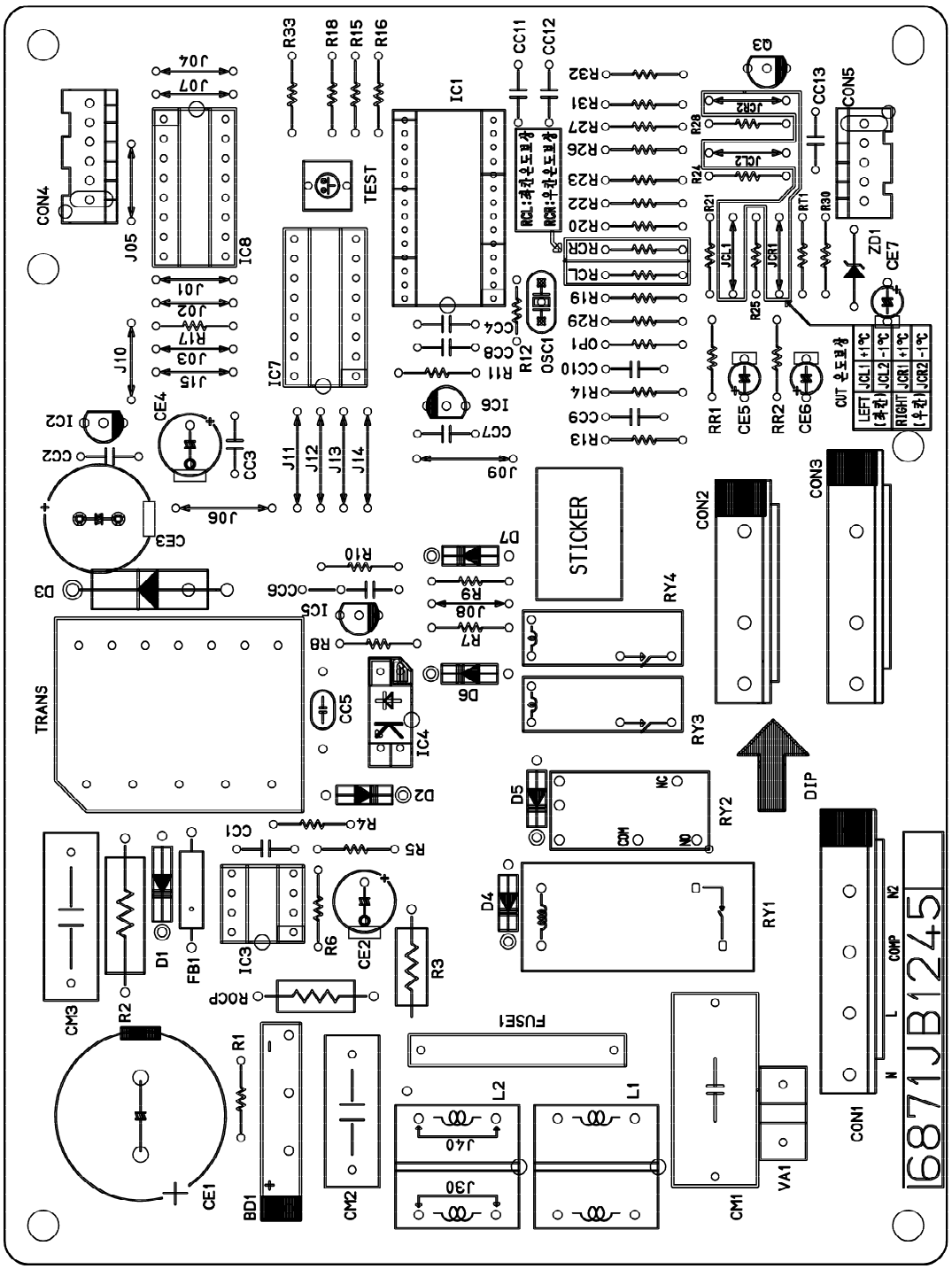
▶ Always use a digital tester. Analog testers have a higher margin of error.

▶ For left and right sensor, measure both sensor ends of the connector after separating the connectors of CON2 and 3 of PWB (PCB) assembly and main part. For the outside sensor, measure end of 2 and 5 of CON5.

MICOM function and circuit description

5-4. PCB parts diagram and parts list

5-4-1. PWB (PCB) assembly and main parts diagram (The parts diagram can slightly change according to the situation.)



MICOM function and circuit description

5-4-2. PWB (PCB) assembly and main parts list

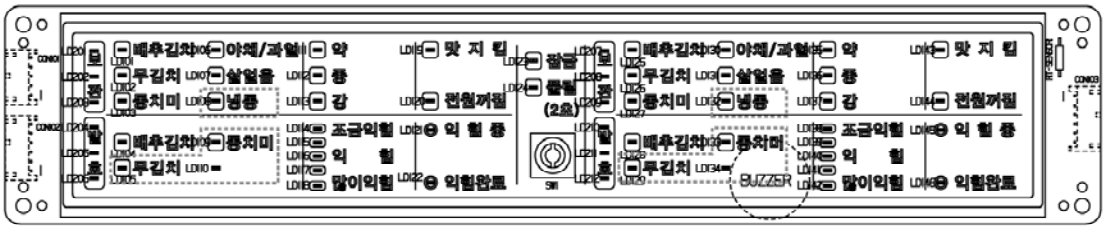
※ The parts list can slightly change according to the situation.

N	M	L	J	H	G	WORK
VIVA3 CK-160 (중국)	VIVA3 CK-200 (중국)	VIVA3 CK-180 (베트남)	VIVA3 ILK(180)	VIVA3 ILK(200)	VIVA3 ILK(160)	APPLICATION
Qty	Qty	Qty	Qty	Qty	Qty	No	P/NO	DESCRIPTION	SPEC	MAKER	REMARK
1	1	1	1	1	1	1	6870JB8105B,C	PWB(PCB)	IU-PJT MAIN PCB	DOOSAN	FR1,1.6T
1	1	1	1	1	1	2	6170JB2010C	TRANSFORMER,SMPS(COIL	A3-PJT 12.5V 1A	한영전자	TRANS
1	1	1	1	1	1	3	6630AQ9106D	CONNECTOR (CIRC),WAFE	YW396-09AV	YEON HO	CON1
1	1	1	1	1	1	4	6630VM04107	CONNECTOR (CIRC),WAFE	YW396-07AV(7P-1,2,5,7)	YEON HO	CON2
1	1	1	1	1	1	5	6630VM04208	CONNECTOR (CIRC),WAFE	YW396-08AV(8P-1,3,6,8),RED	YEON HO	CON3(RED)
1	1	1	1	1	1	6	6630JB8004E	CONNECTOR (CIRC),WAFE	SMW250 YEONHO 6P 2.5MM STRAIGHT	YEON HO	CON4
1	1	1	1	1	1	7	6630JB8004D	CONNECTOR (CIRC),WAFE	SMW250 YEONHO 5P 2.5MM STRAIGHT	YEON HO	CON5
-	-	-	-	-	1	8	0IZZJB2057	IC,DRAWING	TMP87C809N 28P,SDIP BK IU-PJT A6	TOSHIBA	IC1
-	-	-	-	1	-	9	0IZZJB2057	IC,DRAWING	TMP87C809N 28P,SDIP BK IU-PJT A3	TOSHIBA	IC1
-	-	-	1	-	-	10	0IZZJB2057	IC,DRAWING	TMP87C809N 28P,SDIP BK IU-PJT A4	TOSHIBA	IC1
1	1	1	1	1	1	11	0ISTLKE016A	IC,KEC	KIA78L05BP	KEC	IC2
1	1	1	1	1	1	12	0IKE704200A	IC,KEC	KIA7042P 3P BK RESET	KEC	IC6
1	1	1	1	1	1	13	0IKE650030B	IC,KEC	KID65003AP '18P,SDIP' BK DRIVE	KEC	IC7
1	1	1	1	1	1	14	0ITO623080C	IC,DRAWING	62308 16PIN SDIP BK DRIVE IC ST	TOSHIBA	IC8
1	-	-	1	-	-	15	0IPMGKD001A	IC,POWER MANAGEMENT	SL431M KODENSHI 3PIN,TO-92M 2.495V	광전자	IC5
-	1	1	-	1	1	16	0IKE431000A	IC,KEC	KIA431 3 PIN TP - -	KEC	IC5
1	1	1	1	1	1	17	0IPMGNE001A	IC,POWER MANAGEMENT	PS2561-1 NEC 4P,DIP BK = TLP762	NEC	IC4
1	1	1	1	1	1	18	6212W5M002A	RESONATOR,CERAMIC	CSTS0400 MURATA 4MHZ +/-0.5% TP	MURATA	OSC1
1	1	1	1	1	1	19	6102JB8001B	VARISTOR	INR14D621 ILJIN 620V 10% WORLD	IL JIN	VA1
1	1	1	1	1	1	20	6920000001A	RELAY	ALE15B12 MATSUSHITA 250VAC 16A	MATSUSHITA	RY1
2	2	2	2	2	2	21	6920JB2003A	RELAY	G5N-1A OMRON (JAPAN)DC12V 16.7	OMRON	RY3,4
1	1	1	1	1	1	22	0IPMGSK003A	IC,POWER MANAGEMENT	STR-A6351 SANKEN 8 DIP ST SMPS	SANKEN	IC3
1	1	1	1	1	1	23	0TR106009AF	TRANSISTOR,BIPOLARS	KRC 106M KEC	KEC	Q3
1	1	1	1	1	1	24	0DB360000AA	DIODE,RECTIFIERS	D3SBA60 BK SHINDENGEN 600V 4A	SHINDENKEN	BD1
1	1	1	1	1	1	25	0DRSA00070A	DIODE,RECTIFIERS	RL2 SANKEN BK NON 400V 2A 40A 5	SHINDENKEN	D3
2	2	2	2	2	2	26	0DR107009AA	DIODE,RECTIFIERS	FR107 TP DELTA DO41 1000V 1A 3	DELTA/평창	D1,2
1	1	1	1	1	1	27	0DD400409AC	DIODE,RECTIFIER	RECT1N4004 TP	DELTA/평창	D4
1	1	1	1	1	1	28	0CE476ZV6E0	CAPACITOR,FIXED ELECT	47UF HE 450V 20% BULK SNAP IN	RUBICON,SAMHWA/SAMYOUNG	CE1
1	1	1	1	1	1	29	0CE687YH6E0	CAPACITOR,FIXED ELECT	680UF RX 25V 20% BULK SNAP IN	RUBICON,SAMHWA/SAMYOUNG	CE3
1	1	1	1	1	1	30	0CE227BF638	CAPACITOR,FIXED ELECT	220UF KME TYPE 16V 20% FM5 TP 5	RUBICON,SAMHWA/SAMYOUNG	CE4
1	1	1	1	1	1	31	0CE226EK638	CAPACITOR,FIXED ELECT	22UF KME TYPE 50V 20% FM5 TP 5	RUBICON,SAMHWA/SAMYOUNG	CE2
3	3	3	3	3	3	32	0CE106AK638	CAPACITOR,FIXED ELECT	10UF KM TYPE 50V 20% FM5 TP 5	RUBICON,SAMHWA/SAMYOUNG	CE5,6,7
1	1	1	1	1	1	33	0CQ33418670	CAPACITOR,FIXED FILM	0.33UF D 275V M M/PP NI R	PILKO	CM1
1	1	1	1	1	1	34	0CQ4732Y430	CAPACITOR,POLYESTER	47000PF S 630V J M/PE NI R	SAM HWA	CM3
1	1	1	1	1	1	35	0CQ2241N630	CAPACITOR,POLYESTER	0.22UF D 100V M M/PE NI R	SAM HWA	CC6
1	1	1	1	1	1	36	0CK47202510	CAPACITOR,CERAMIC (HI	4700P 2KV K B S	DOOSAN/SAM HWA	CC5
3	3	3	3	3	3	37	0CK2230K949	CAPACITOR,FIXED CERAM	22NF 50V Z F TA52	TAE YANG	CC9,10,12
6	6	6	6	6	6	38	0CK1040K949	CAPACITOR,FIXED CERAM	0.1UF D 50V 80%,-20% F(Y5V) TA5	TAE YANG	CC2,3,4,7,8,11
1	1	1	1	1	1	39	0CK4710K519	CAPACITOR,CERAMIC (HI	470PF 50V K B TA52	TAE YANG	CC1
1	1	1	1	1	1	40	0DZMR00029A	DIODE,ZENERS	1N5232B MOTORORA TP DO34 0.5W 5	DELTA/평창	ZD1
1	1	1	1	1	1	41	0RS5602K641	RESISTOR,FIXED METAL	56K OHM 2 W 5.00% F20	SMART	R2
1	1	1	1	1	1	42	0RS4703J609	RESISTOR,FIXED METAL	470K OHM 1 W 5% TA52	SMART	R3
1	1	1	1	1	1	43	0RS0121J609	RESISTOR,FIXED METAL	1.2 OHM 1 W 5% TA52	SMART	RCP
1	1	1	1	1	1	44	0RD0822G609	RESISTOR,FIXED CARBON	82 OHM 1/4 W 5.00% TA52	SMART	R4
1	1	1	1	1	1	45	0RD6800G609	RESISTOR,FIXED CARBON	680 OHM 1/4 W 5.00% TA52	SMART	R6
4	4	4	4	4	4	46	0RD2001G609	RESISTOR,FIXED CARBON	2K OHM 1/4 W 5.00% TA52	SMART	R13,14,30,31
1	1	1	1	1	1	47	0RD4701G609	RESISTOR,FIXED CARBON	4.7K OHM 1/4 W 5.00% TA52	SMART	R11
1	1	1	1	1	1	48	0RD6801G609	RESISTOR,FIXED CARBON	6.8K OHM 1/4 W 5.00% TA52	SMART	R5
1	1	1	1	1	1	49	0RD1004G609	RESISTOR,FIXED CARBON	1M OHM 1/4 W 5.00% TA52	SMART	R1
1	1	1	1	1	1	50	0RD1004F609	RESISTOR,FIXED CARBON	1M OHM 1/6 W 5.00% TA52	SMART	R12
1	1	1	1	1	1	51	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	RCL
1	1	1	1	1	1	52	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	RCR
1	1	1	1	1	1	53	0RN1002G409	RESISTOR,FIXED METAL	10K OHM 1/4 W 1.00% TA52	SMART	RT1
2	2	2	2	2	2	54	0RN2612G409	RESISTOR,FIXED METAL	26.1K OHM 1/4 W 1.00% TA52	SMART	RR1,RR2
16	16	16	16	16	16	55	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TA52	SMART	R15~29,33
2	2	2	2	2	2	56	0RD1001G609	RESISTOR,FIXED CARBON	1K OHM 1/4 W 5.00% TA52	SMART	R8,32
1	1	1	1	1	1	57	0RD1801G609	RESISTOR,FIXED CARBON	1.8K OHM 1/4 W 5.00% TA52	SMART	R7
1	1	1	1	1	1	58	0RN2201G409	RESISTOR,FIXED METAL	2.2K OHM 1/4 W 1.00% TA52	SMART	R10
1	1	1	1	1	1	59	0RN9101G409	RESISTOR,FIXED METAL	9.1K OHM 1/4 W 1.00% TA52	SMART	R9
1	1	1	1	1	1	60	6210JB8001A	CORE (CIRC),BEAD	BFS3510A0 SAMWHA 35X10MM AXIAL	SAM HWA	FB1
1	1	1	1	1	1	61	6600RRT001W	SWITCH,TACT	THVV502GAA POSTECH 12V DC 50MA	POSTEC	TEST
1	1	1	1	1	1	62	6200JB8003A	FILTER(CIRC),NOISE	3A 3MH 250V CV430030 A345-PJT C	TNC	L1
1	1	1	1	1	1	63	0FZZJB3001A	FUSE	250V 2A SLOW-BLOW LITTELFUSE,T	SAMJU	FUSE1
9	9	9	9	9	9	64	43607015	WIRE,JUMP	GC10 WHITE T0.6 L10 FOR A INSR	10MM	J01~05,07,08,10,15
6	6	6	6	6	6	65	43607015	WIRE,JUMP	GC10 WHITE T0.6 L10 FOR A INSR	12.5MM	J06,09,11~14
4	4	4	4	4	4	66	43607015	JUMP WIRE	0.6MM 10MM - - -	10MM	JCL1,2,JCR1,2
2	2	2	2	2	2	67	43607015	JUMP WIRE	0.6MM 10MM - - -	10MM	J30,40
-	-	1	-	-	-	68	0IZZJB2057A	IC,DRAWING	TMP87C809N 28P,SDIP BK VIVA3 CK180	TOSHIBA	IC1
-	1	-	-	-	-	69	0IZZJB2057B	IC,DRAWING	TMP87C809N 28P,SDIP BK VIVA3 CK200	TOSHIBA	IC1
1	-	-	-	-	-	70	0IZZJB2057C	IC,DRAWING	TMP87C809N 28P,SDIP BK VIVA3 CK160	TOSHIBA	IC1

MICOM function and circuit description

5-4-3. PWB (PCB) assembly and display parts diagram and parts list

※ The parts list can slightly change according to the situation.



Qty	No	P/NO	DESCRIPTION	SPEC	MAKER	REMARK
1	1	6870JB821GB	PWB(PCB)	ATHENA3-PJT FIGHTING! DISPLAY PCB	DAEDUCK/SG COM	STH
1	2	----------	REFLECTOR	ABS SUPER WHITE	TECHNO	-
*	3	-	-	-	-	-
1	4	4140JB1054E	NAME PLATE,P(H)	ATHENA3-PJT FIGHTING! 냉동 유	TECHNO	투명70%
-	5	4140JB1054F	NAME PLATE,P(H)	ATHENA3-PJT FIGHTING! 냉동 黑	TECHNO	투명70%
-	6	-	-	-	-	-
*	7	-	-	-	-	-
1	8	6630A0915GD	CONNECTOR (CIRC),WAFER	SMAW250-05G (ANGLE TYPE)	YEON HO	CON101
2	9	6630A0915GE	CONNECTOR (CIRC),WAFER	SMAW250-06G (ANGLE TYPE)	YEON HO	CON102,103
-	10	-	-	-	-	-
-	11	-	-	-	-	-
1	12	0IZZJB2057L	IC,DRAWING	TMP86PM47U 44P QFP TRAY OTP AHHENA3 FGTI 160L	TOSHIBA	IC101
*	13	0IZZJB2057M	IC,DRAWING	TMP86PM47U 44P QFP TRAY OTP AHHENA3 FGTI 180L	TOSHIBA	IC101
-	14	0IZZJB2057N	IC,DRAWING	TMP86PM47U 44P QFP TRAY OTP AHHENA3 FGTI 200L	TOSHIBA	IC101
-	15	-	-	-	-	-
-	16	-	-	-	-	-
*	17	-	-	-	-	-
1	18	0ISTLKE002A	IC,STANDARD LOGIC	KIA78L05F KEC SOT-89 TP REGULATOR	KEC	IC102
1	19	0ISTLKE003A	IC,STANDARD LOGIC	KIA7042AF KEC SOT-89 TP RESET IC	KEC	IC103
-	20	0ISS9346GDD	IC,SGS-THOMSON	M93C46-WMN6T 8PIN TP AUTO RESTART SMD	ST	IC104
1	21	0IRH9346GDD	IC,ROHM	BR93LC46RF-W 8PIN SOP 8K EEPROM -	ROHM	IC104
*	22	0ISTLMI001A	IC,STANDARD LOGIC	M54563AF MITSUBISHI 20 R/TP CONVERT	MITSUBISHI	IC105,107
2		0ISTLMI001A	IC,STANDARD LOGIC	TD62783AF TOSHIBA 18 R/TP CONVERT	TOSHIBA	
		0IKE657830B	IC,STANDARD LOGIC	KID65783AF 20PIN SOP TRAY TR ARRAY BUFFER	KEC	
2	23	0IKE650030C	IC,KEC	KID65003AF 16SOP 8K 70H DRIVER	KEC	IC106,108
		0ISTLC00066A	IC,STANDARD LOGIC	ULN2003A TOSHIBA 16PINSOP TAPPING NPN TRARRAY	TOSHIBA	
1	24	0ISTLKE004A	IC,STANDARD LOGIC	KRA106S KEC SOT-23 TP TRANSISTOR DTA143ZCA SOT-23	KEC ,CHANGJIANG	Q102
3	25	0ISTLKE005A	IC,STANDARD LOGIC	KRC106S KEC SOT-23 TP TRANSISTOR DTC143ZCA SOT-23	KEC ,CHANGJIANG	Q101,103,104
-	26	-	-	-	-	-
-	27	-	-	-	-	-
1	28	6212RR3245A	RESONATOR,CERAMIC	CSTCR4M00G53-R0 MURATA 4.0MHZ +/- 0.5% T/R SMD	MURATA	OSC101
*	29	-	-	-	-	-
-	30	-	-	-	-	-
1	31	0CE107VF6DC	CAPACITOR,FIXED ELECTR	100UF MV 16V 20% R/TP(SMD) SMD	SAMWHA,RUBYCO,G-LUXON	CE102
1	32	0CE476VF6DC	CAPACITOR,FIXED ELECTR	47UF MV 25V 20% R/TP(SMD) SMD	SAMWHA,RUBYCO,G-LUXON	CE103
*	33	-	-	-	-	-
-	34	-	-	-	-	-
9	35	0CK104DK94A	CAPACITOR,FIXED CERAMI	100NF 2012 50V 80%,-20% R/TP F(Y5V)	MURATA	CC101-109
2	36	0CK102DK96A	CAPACITOR,FIXED CERAMI	INF 2012 50V 80%,-20% R/TP X7R	MURATA	CC109,110
-	37	-	-	-	-	-
*	38	-	-	-	-	-
-	39	-	-	-	-	-
2	40	0RH1000L622	RESISTOR,METAL GLAZED(	100 OHM 1 / 8 W 2012 5.00% D	SMART,ROHM	R118,119
1	41	0RD2200E672	RESISTOR,FIXED CARBON	220 OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R106
2	42	0RD1001E672	RESISTOR,FIXED CARBON	1K OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R102,107
3	43	0RD2001E672	RESISTOR,FIXED CARBON	2K OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R101,116,117
10	44	0RD4701E672	RESISTOR,FIXED CARBON	4.7K OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R103,104,114,115,120-123,108,109
1	45	0RD1004E672	RESISTOR,FIXED CARBON	1M OHM 1/8 W 5% 2012 R/TP	SMART,ROHM	R105
-	46	-	-	-	-	-
	47					
8	48	----------	RESISTOR,METAL GLAZED(	240 OHM 1 / 2 W 5025 5.00% D	SMART,ROHM	R110-113,124-127
	49					
	50					
9	51	0DRM0002BA	DIODE,RECTIFIERS	RLR4004 ROHM R/TP SOT23 400V 1A 20A ,SEC 10MA	DELTA,GENERAL	DI10-18
1	52	0DSRM0006BA	DIODE,SWITCHING	RLS4148 ROHM R/TP LLDS(LL-34) 75V 4S	ROHM	DI
1	53	6600R000009	SWITCH,TACT	JPT1212B JEIL 12VDC 50MA	NAMAE	SW1
1	54	0DZRM0018BA	DIODE,ZENERS	RLZ ROHM R/TP LLDS(LL-34) 500MW 5.6V 20MA .PF	DELTA,ROHM	ZDI01
-	55	-	-	-	-	-
-	56	-	-	-	-	-
11	57	0DLLE0098AA	LED	LEDTECH HT-S91UYG(O)R/TP ULTRA BRIGHTYELLOWGREEN	LEDTECH	LD101-103,106-108,111-113,119,120
11	58	0DLLE0098AA	LED	LEDTECH HT-S91UYG(O)R/TP ULTRA BRIGHTYELLOWGREEN	LEDTECH	LD125-127,130-132,135-137,143,144
2	59	0DLLE0039AA	LED	LEDTECH ELECTRONICS ------RED	LEDTECH	LD123,124
10	60	0DLLE0039AA	LED	LEDTECH ELECTRONICS LTBB32-UR-19IT R/TP AMBER	LEDTECH/EVERLIGHT	LD104,105,109,114-118,121,122
10	61	0DLLE0039AA	LED	LEDTECH ELECTRONICS LTBB32-UR-19IT R/TP AMBER	LEDTECH/EVERLIGHT	LD128,129,133,138-142,145,146
*	62	-	-	-	-	-
-	63	-	-	-	-	-
1	64	6709JB8003A	BUZZER,PIEZO CERAMIC	BM-20B BLUEON PIEZO 4KHZ 8SDB	BLUEON	BUZZER
		6709JB3002G	BUZZER,PIEZO CERAMIC	CBE2240BP DAE YOUNG PIEZO 4KHZ 90DB(CHINA)	DAE YOUNG	
1	65	6500JB3001A	SENSOR,TEMPERATURE	RT SENSOR JAMES-TEC COMBI PCB	JAMES TECH	RT-SENSOR
*	66	-	-	-	-	-
2g	67	5500000008AA	SOLDER,SOLDERING	SR-34 PB FREE, LFM-48	HUISUNG	-
-	68	5SWZU-L05AA	SOLDER,SOLDERING	LFM-38, SN 3.0AG-0.5CU% 3.0MM	HUISUNG	-
5g		5500000019AA	SOLDER,SOLDERING	LFM-48W TM-TS PB FREE HEESUNG METAL CREAM SN#3CU SN=3.0AG=0.5CU%	HUISUNG	-
*	69	7245ZR0004A	FLUX	SV-RMF-06 KSK 12.5WT% 0.815+-0.003	-	-

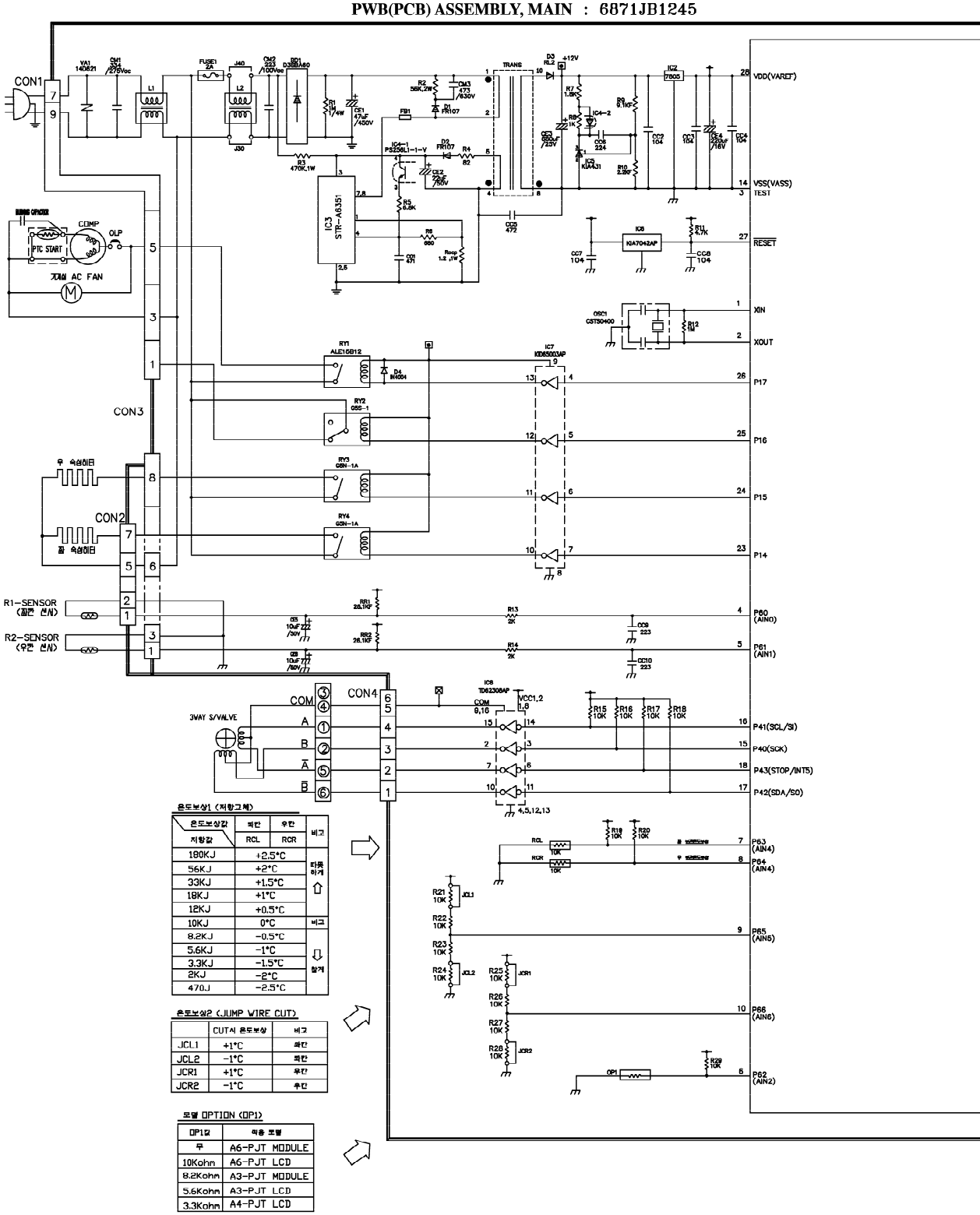
MICOM function and circuit description

5-5. PCB circuit diagram

5-5-1. PWB (PCB) assembly and main circuit diagram

※ PCB circuit diagram can slightly change according to the situation.

PWB(PCB) ASSEMBLY, MAIN : 6871JB1245



온도보상1 (저항고체)

온도보상값 / 저항값	외관 RCL	우관 RCR	비고
180KJ	+2.5°C		따뜻하게 ⇧
56KJ	+2°C		
33KJ	+1.5°C		
18KJ	+1°C		
12KJ	+0.5°C		
10KJ	0°C		비고
8.2KJ	-0.5°C		시원하게 ⇩
5.6KJ	-1°C		
3.3KJ	-1.5°C		
2KJ	-2°C		
470J	-2.5°C		

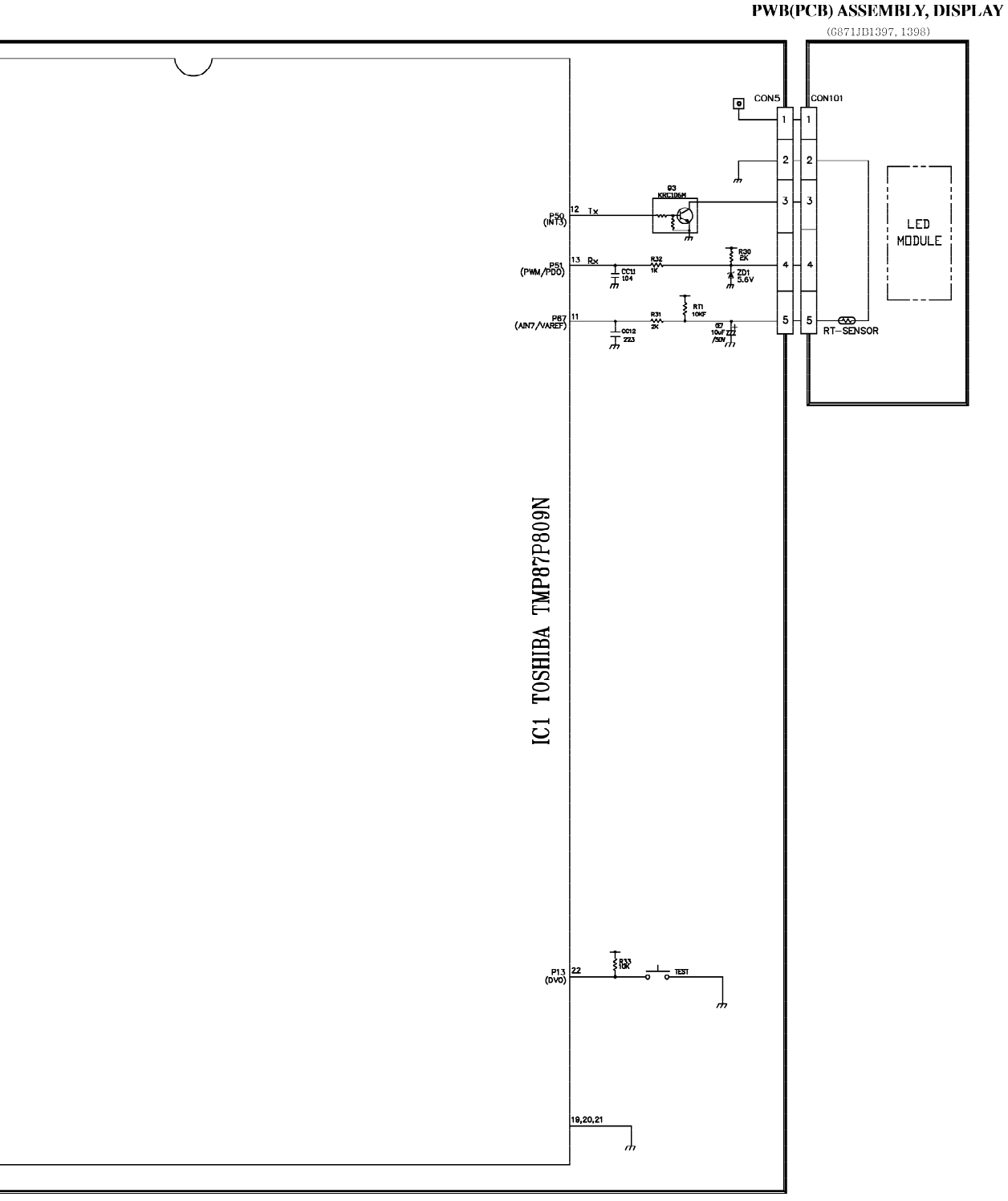
온도보상2 (JUMP WIRE CUT)

	CUT시 온도보상	비고
JCL1	+1°C	외관
JCL2	-1°C	외관
JCR1	+1°C	우관
JCR2	-1°C	우관

모델 OPTION (OP1)

OP1값	적용 모델
무	A6-PJT MODULE
10Kohm	A6-PJT LCD
8.2Kohm	A3-PJT MODULE
5.6Kohm	A3-PJT LCD
3.3Kohm	A4-PJT LCD

MICOM function and circuit description

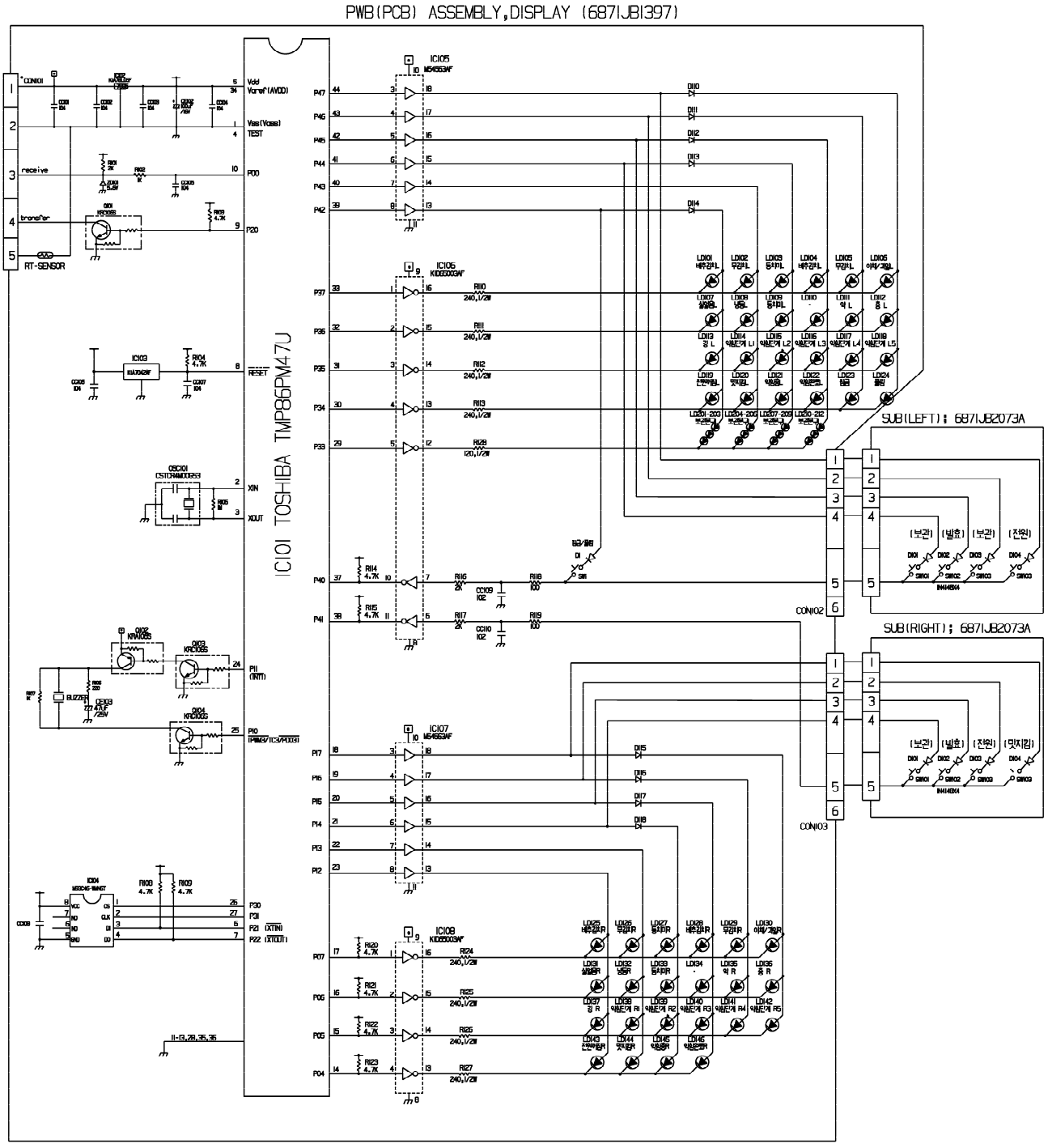


MICOM function and circuit description

5-5-2. PWB (PCB) assembly and display circuit diagram (6871JB1397)

※ The circuit diagram can slightly change according to the situation.

※ This includes the PWB (PCB) assembly and sub circuit diagram.



Chapter 6. Freezing cycle and refrigerant

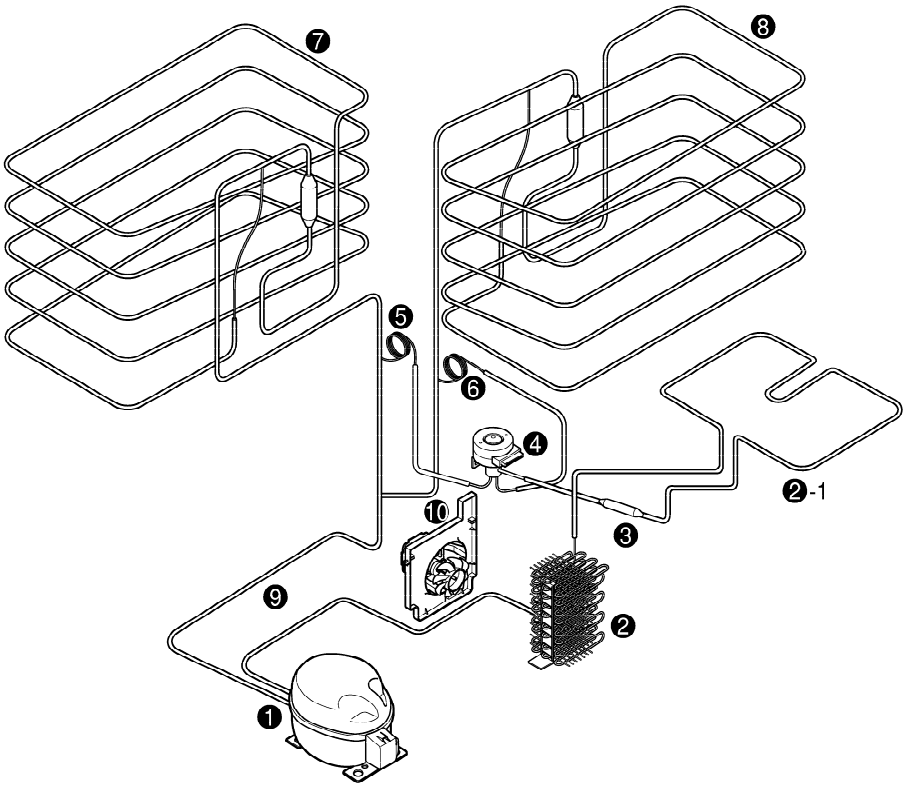
6-1. Freezing cycle (Freezing principle/Refrigerant gas circulation diagram)

6-1-1. Freezing principle

Freezing is an operation of maintaining a lower temperature (generally 0℃) than the natural temperature (usually ambient temperature surrounding us). This requires an insulated space, refrigerant (R134a) to absorb the heat and the circulation circuit (compressor, condenser, evaporator etc.) to operate the phase change of the refrigerant.

6-1-2. Refrigerant gas circulation diagram

1. Compressor
2. Wire condenser
2-1. Hot line pipe
3. Drier
4. 3-way valve
5. Capillary tube (left)
6. Capillary tube (right)
7. Evaporator (left)
8. Evaporator (right)
9. Suction pipe
10. Cooling fan



Freezing cycle and refrigerant

6-1-3. Operation description of each circulation circuit

No.	Parts name	Operation details	Refrigerant gas condition (input and output)
1	Compressor	Compress the refrigerant from low pressure (0kg/cm²) to high pressure (8-12kg/cm²).	Low pressure gas-->High pressure gas (0kg/cm²) (8~12kg/cm²) Temperature (30℃) → (80~120℃)
2	Condenser & hot line pipe	High pressure gas refrigerant exhausts heat and becomes liquid refrigerant.	High pressure gas-->High pressure liquid (8~12kg/cm²) (8~12kg/cm²) Temperature (80~120℃) → (40~60℃)
3	Drier	There is an absorbent that absorbs the moisture within the circulation circuit. (Moisture absorption device)	
4	Capillary tube	This is the long narrow pipe where high pressure refrigerant passes to reduce the pressure.	High pressure liquid-->Low pressure liquid (8~12kg/cm²) (0kg/cm²) Temperature (40~60℃) → (-27℃)
5	Evaporator	Low pressure liquid refrigerant absorbs heat to change to low pressure gas refrigerant.	Low pressure liquid-->Low pressure gas (0kg/cm²) (0kg/cm²) Temperature (-27℃)
6	Suction pipe	This connects the evaporator and the compressor.	Low pressure gas-->Low pressure gas (0kg/cm²) (8~12kg/cm²) Temperature (-27℃) → (30℃)

Caution

- ▶ Because the outlet of the capillary tube is where the high pressure refrigerant changes from high to low pressure, the low pressure refrigerant quickly diffuses to the evaporator, making flash sounds. (shik shik sound)
- ▶ When the low pressure liquid refrigerant evaporates from the evaporator, it is done throughout the whole pipe from inlet to outlet, making a sound of liquid refrigerant flowing. This can happen depending on the load condition of the refrigerator and on the evaporation, but it is not a problem.

6-2. Refrigerant

Refrigerant name	Characteristics	ODP	GWP	Remarks
R134a (HFC-134a)	Because it does not include chloride, which cause ozone destruction, it will not destruct the ozone and has a low GWP compared to the existing R12 (GWP: 15300).	0	1200	Refrigerant

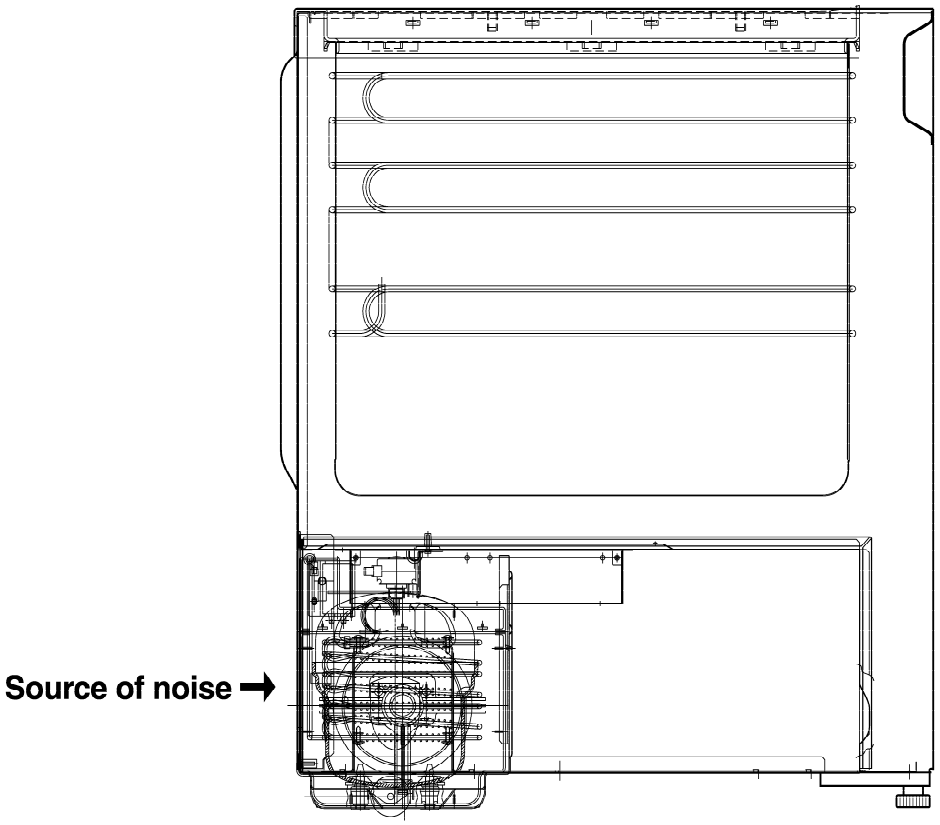
※ ODP: Ozone Depleting Potential (Relative index with CFC11 as 1.0)
GWP: Global Warming Potential (Relative index with CO2 as 1.0)

Chapter 7. General details about the product

7-1. Refrigerator noise

The structure of the freezing room and mechanical room, which are the sources of Kimchi refrigerator noise, is as follows.

Here you can see that the main source of noise during refrigerator operation is the compressor, the condenser and the fan motor that cools the compressor in the mechanical room.



(Fig. Diagram of Kimchi refrigerator noise source)

7-1-1. SVC method for noise claim

(1) Basic method of noise reduction

- **Block**: This method blocks the noise from the source so that it does not reach the ears by blocking the transmission path of the sound with high density sound blocker. (This is effective in high frequency area)
- **Using sound absorber**: This method is similar to the blocking method but uses Styrofoam and glass wool in the transmission path to absorb the sound. (This is effective in low frequency area)
- **Vibration reduction**: This method blocks the mechanical vibration from the operating part so that it does not reach other parts. (using vibration reduction rubber etc.)
- **Dynamic balance maintenance**: This method minimizes the dynamic imbalance of the rotating object.
- **Fixing the vibrating part**: This method firmly fixes the vibrating part depending on the situation.
- **Removing contact**: Separate the two parts or firmly fix the object that periodically make sound by hitting each other.

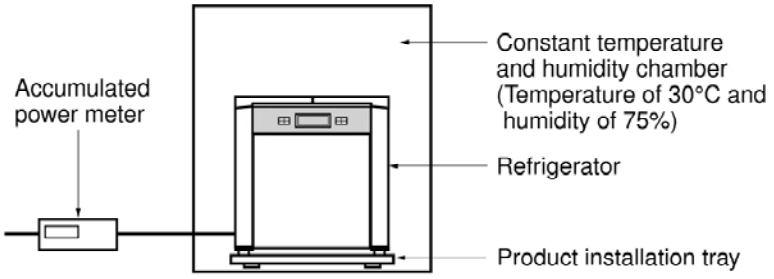
General details about the product

(2) Service method for major noise claim item for Kimchi refrigerator

Noise claim	Noise generation	Service method	Remarks
Noise from poor installation	▶ The installation floor surface is not hard enough ▶ The refrigerator is not leveled	• Reinforce the floor hardness • Move the installation location • Use the adjustment screw in front of the refrigerator to level the refrigerator	
Parts vibration	▶ "Wing" sound	• Insert firmly all the parts of the refrigerator in the right location	▶ Mainly within the refrigerating compartment
Compressor resonance sound	▶ "Woong Woong" sound	• Reduce the noise by adjusting the pipe and seat rubber	
Compressor noise	▶ Poor balance of the compressor ▶ Contacting sound of the surrounding pipe of the compressor part	• Adjust the surrounding pipe and seat rubber to maintain the level of the compressor • Remove contact	
Operating device noise	▶ Contact sound from the OLP contact point during compressor operation	• Exchange OLP	▶ "Tak Tak"
Wire condenser noise (vibration noise)	▶ "Woong Woong" sound ▶ "Ching" sound	• Recheck the screws • Remove the welding part of the heat plate (wire) and remove the heat plate	

7-2. Details on power consumption

The power consumption of the refrigerator is measured within the chamber where constant temperature and humidity is maintained. In the right figure, maintain the chamber to 30℃ and 75% humidity with no load to the refrigerator and set the temperature of the left and right compartment to 3℃ to measure the power consumption. The power consumption is calculated as follows.



Monthly power consumption (kWh/month) = Measured value (kWh/day) x 365 days / 12 months

Caution The actual power consumption and the one indicated on the refrigerator can differ due to the using condition.

Chapter 8. Major repair method for freezing cycle

8-1. Major repair work standard for refrigerator using R134a refrigerant

No.	Work item		Unit	Work standard	Objective	Remarks
1	Opening time for pipe and piping parts		Min	Pipe part: Within 1 hour Compressor: Within 10 minutes Drier: Within 20 minutes	Prevent moisture penetration	Specially manage to half or lower of the prior standard during rain or rainy season. (Especially the water penetration within the piping can be crucial)
2	Welding work		Nitrogen supply pressure	Do the welding while supplying the nitrogen. (Nitrogen pressure: .1-0.2kg/cm^2)	Prevent oxidization scale generation within the pipe from high temperature heat during welding	- Refer to the Caution section of the major repair part for work methods of each part. - Because the R134a refrigerant has a smaller molecular size than that of R12 refrigerant, special care is needed when welding the pipe because leakage can occur more easily. - Do not apply pressure to the parts of the piping before and after the welding. It can cause the pipe to crack and cause leakage.
3	Refrigerator cycle	Vacuum time	Min	40 minutes or more	Remove moisture	Manufacturer of 113l/min model WVP-Z: US Asco Note) The model should have a counter-current blocker.
		Vacuum degree	Torr	0.03 Torr or below (reference)		The vacuum effect can be increased during a vacuum with both high and low pressure while operating the compressor.
		Vacuum part		Simultaneous vacuum for high and low pressure		
		Vacuum piping	EA	Use manifold for R134a Model name: 40134A Manufacturer: US Robin Air	Prevent mixed penetration of mineral oil and ether oil	For the refrigerant piping (rubber type), using the existing piping for R12 for the new R134a refrigerant can cause the rubber to be melted (can cause leakage).
		Pipe coupler	EA	For R134a Model name: PCV630-2SV 1EA Model name: PCV400-2PV 1EA Manufacturer: Japanese Nito	Prevent mixed penetration of R12 refrigerant	
		Socket	EA	For R134a Model name: 2SV	Prevent mixed penetration of R12 refrigerant	
		Plug	EA	For R134a Model name: 2PV	Prohibit mixed use of R12 refrigerant	
4	Refrigerator cycle Refrigerant measurement (BOMBE)		EA	Use the one for R134a and the measurement tolerance is ±5g. Note) If it is -5g for winter and +5g for summer, it is well managed. (manufactured by LG)	Prohibit mixed use of R12 refrigerant	- When measuring the refrigerant, do not measure it in a very hot or cold location (ambient temperature of 25℃ is best) When manufacturing an additional bombe, use copper for the material. - End socket: 2SV plug: Use the proper one for 2PV R134a Note) When welding the connection part of both ends, make sure the internal O ring (rubber) does not burn.
5	Exchange drier			- For R134a - When repairing the refrigerator cycle piping, always exchange the drier.	Remove moisture existing within the piping	
6	Leakage test			- Never do a soap water test. The soap water can leak into the piping from the vibration. - Leakage detector model: 16170, 16500. Manufacturer: US Robin Air	Detect refrigerant leakage part (for reference)	- For the refrigerant leaking part, check if oil is leaked and if not found, use the electric leakage detector.

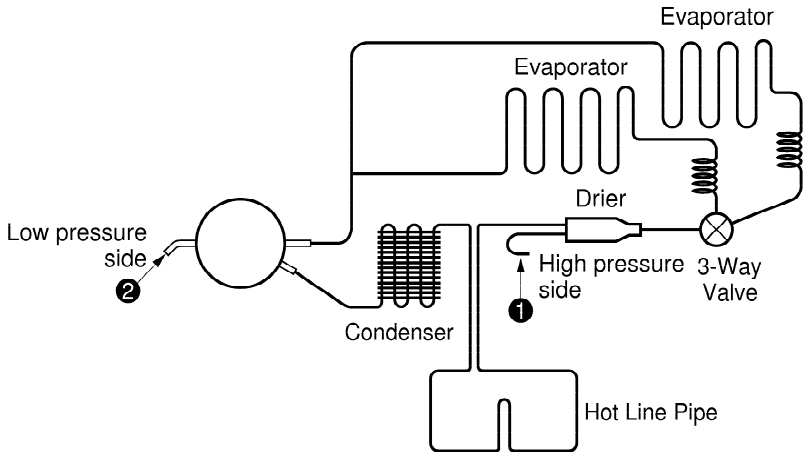
Major repair method for freezing cycle

8-2. Introduction to major repair work

Work sequence	Major repair details	Work tools
Diagnose problem		
Remove residual refrigerant	- Cut the end of the drier part (high pressure side) and compressor charging part to remove the refrigerant.	Pliers, nipper
Exchange and weld parts	- Use the compressor, drier, oil and refrigerant for R134a. - For the parts with nitrogen sealing and vacuum wrapping, check the "pik" sound before assembling. Use only the ones with proper wrapping and immediately assemble and weld the parts. - When welding the parts always substitute the nitrogen. (nitrogen pressure: 0.1-0.2kg/cm^2) - Major repair work should be done in a clean work space with no humidity.	Pipe cutter, gas welder, nitrogen gas Welding rod (silver: IS430B, copper: BCup-2) Flux (Hydrux Korea)
Vacuum	- Connect the hose and vacuum pump of the manifold gauge to the high pressure (drier part) and low pressure side (compressor refrigerant charging part), and make it vacuum for more than 60 minutes. - Vacuuming speed: 113/l/min	Vacuum pump (for R134a), manifold gauge
Charge refrigerant and weld the sealing	- Measure the bombe exclusively provided by LG for R134a within the regulated value ±5g using an electric weight and insert it to the refrigerant charging part of the compressor. (insert refrigerant while operating the refrigerator) - Weld carefully after pinching the charging part.	Bombe for R134a (mass cylinder), refrigerant (R134a), manifold gauge, electric weight, punch off pliers, gas welder
Check the refrigerant leakage and cooling performance	- Check for leakage in the re-welded parts • Minor leakage: Use the electric leakage detector • Major leakage: Use the naked eye or finger to check the oil from the compressor ※ Caution: Do not use soap water for the leakage parts - Cooling performance check 1. Check whether the heat emitter is warm by hand. 2. Check if the moisture is formed evenly around the evaporator surface within the refrigerator.	Electric leakage detector, driver (+)
Arrange the mechanical room and tools	- The flux of the silver welding part should be removed with soft brush or wet cloth etc. (Flux can accelerate rusting and cause leakage). - The tools for R134a should be wiped off well so that dust and moisture cannot be penetrated and kept in a clean tool box or specified location.	Brass brush, cloth, tool box.
Move and install	- The installation after moving, should be done in accordance with the installation method of the major repair for the refrigerator. (Maintain a 5cm or more distance from the wall for the model with the cooling fan in the mechanical room.)	

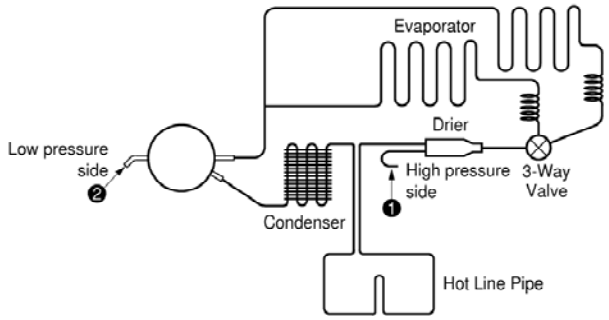
Major repair method for freezing cycle

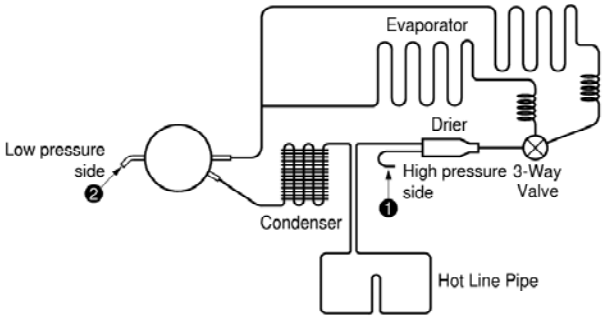
8-3. Caution during major repair

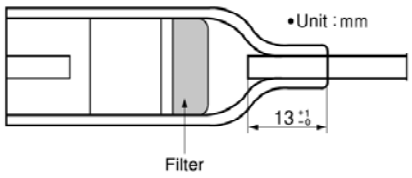
Item	Caution
1. Using tools	1) Use the parts and tools for R134a.
2. Removing residual refrigerant	1) When removing the residual refrigerant always turn the refrigerator off and then wait for more than 5 minutes. (If you work before waiting 5 minutes, the internal oil can leak out.) 2) When removing the refrigerant, first cut the 1. high pressure side (drier part) with a nipper and secondly cut the 2. low pressure side to remove the residual refrigerant. (You must do it in this order. If this order is reversed a great amount of oil can leak out.) 
3. Exchanging drier	1) During piping repair and inserting the refrigerant, always use the drier for R134a.
4. Welding nitrogen substitute	1) To prevent the oxidization scale from forming within the pipe, weld it while substituting the nitrogen with a constant pressure within the piping. (nitrogen pressure: 0.1-0.2kg/cm^2)
5. Others	1) Internal cleaning and sealing within the cycle pipe should be done with nitrogen gas or R134a refrigerant. 2) When checking for leakage, use the electric leakage detector. 3) When cutting the pipe, always use the pipe cutter. 4) Be careful not to let moisture penetrate within the cycle.

Major repair method for freezing cycle

8-4. Actual major repair work

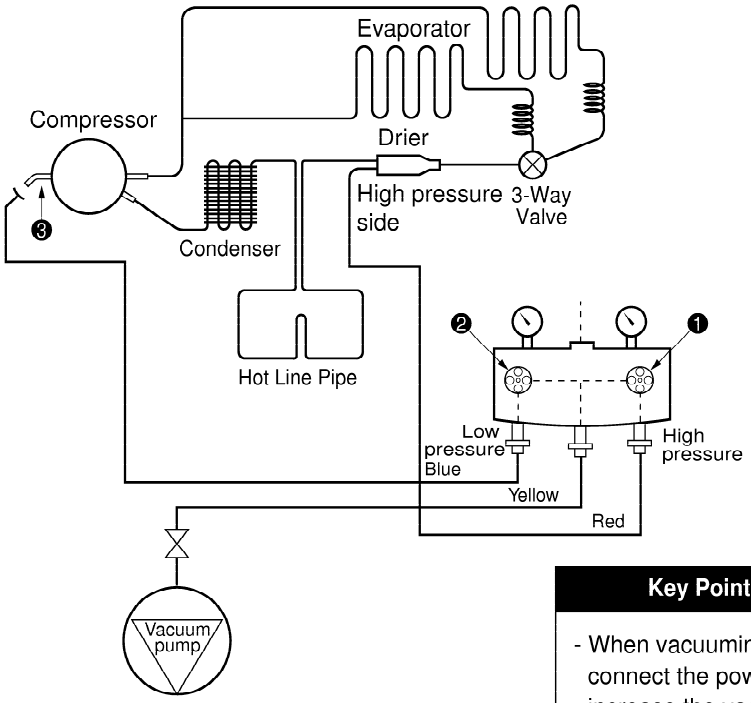
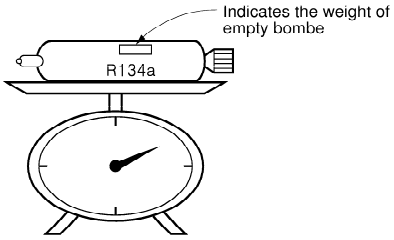
<table>
<tr><th>Item</th><th>Caution</th></tr>
<tr><td>1. Removing residual refrigerant</td><td>


Key Point
Maintain refrigerant removing order (Oil can leak from compressor)
1. When removing the residual refrigerant always turn the refrigerator off and then wait for more than 5 minutes. (If you work before waiting 5 minutes, the internal oil can leak out.)
2. When removing the refrigerant, first cut the 1. high pressure side (drier part) with a nipper and secondly cut the 2. low pressure side to slowly remove the residual refrigerant.
</td></tr>
<tr><td>2. Nitrogen blowing welding (Welding nitrogen substitute)</td><td>


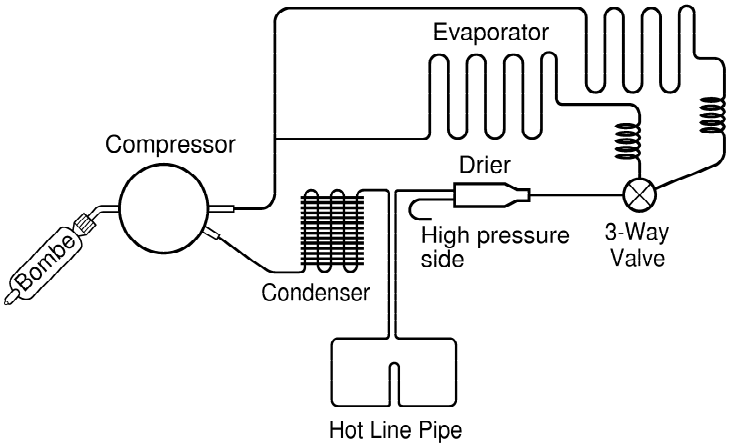
Key Point
If you do not blow the nitrogen while welding, it can form oxidization scale and have a negative effect on product performance and reliability.
Exchanging drier
After assembling the drier, blow the nitrogen gas to the high pressure side (0.1-0.2kg/cm²) and do the welding on part 1 and 2.
Exchanging compressor
Blow the nitrogen gas to the low pressure side and then do the welding on part 1 and 2.
Note) The heating time during welding for other parts is very short and the possibility of forming an internal oxidization scale is very low. Exclude the nitrogen blowing for other parts.
</td></tr>
<tr><td>3. Exchanging drier</td><td>


Key Point
When inserting the capillary tube always check the inserting length. (When it is over-inserted, the tube can interfere with the filter and clog the filter.)
Inserting capillary tube
Before inserting the capillary tube, measure and indicate (13 $^{+1}_{-0}$) on the capillary tube and insert as much as the indicated to do the welding.
</td></tr>
</table>

Major repair method for freezing cycle

Item	Caution
4. Vacuuming	 **Connecting the pipe** Connect the red hose to the high pressure side and the blue hose to the low pressure side. **Vacuuming order** Open valve 1 and 2 to vacuum for 40 minutes and then close valve 1. **Key Point** - When vacuuming, connect the power to increase the vacuum effect. - When sucking the refrigerant operate the compressor. (Inserting refrigerant is easier and surer.)
5. Refrigerant charging	**Working order** 1) After completing the vacuuming, check the refrigerant amount for each model. 2) Using the vacuum pump, make the bombe vacuum. 3) Measure the refrigerant charging amount - Using an electric weight, measure the weight of the vacuum bombe. - After charging the refrigerant in the bombe, calculate and measure the weight.  **Key Point** - Room temperature must be around 25℃ during the operation. - Control the refrigerant charging amount as follow; -5g in winter and +5g in summer. **Calculation of refrigerant charging amount** Refrigerant amount=Weight after charging - Weight before charging (Bombe weight)

Major repair method for freezing cycle

Item	Caution
5. Charging the refrigerant	 4) Charging the refrigerant: As shown above, operate the compressor and charge the refrigerant with the charging pipe. 5) When the charging is complete, pinch the charging pipe using the pinch-off plier. 6) After welding the end of the pinched charging pipe with copper, test for gas leakage on the welding part.
6. Testing for gas leakage	Using an electric weight, test for leakage on welded parts and other parts that you think can leak gas out.
7. Arranging cycle piping of each part	When the work is done, check whether all pipes are in its original position before closing the cover back-M/C. Especially maintain a distance (10mm) between the pipes so that it does not touch each other.

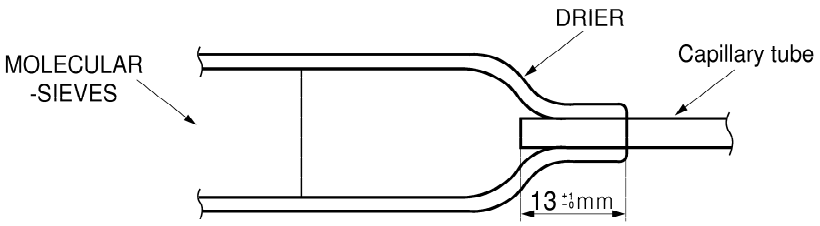
8-5. Basic principle for major repair

1) Follow the safety principles of handling gas.

2) Use a plate jig (or wet towel), if needed, to prevent any skin burn from wires during welding. (to ensure insulation is not damaged, to prevent safety accidents and to ensure product safety.)

3) Prevent pipe copper pipe oxidization from overheating during welding.

4) Follow the insertion length of the capillary tube to the driver of 13^{+1}_{-0} .

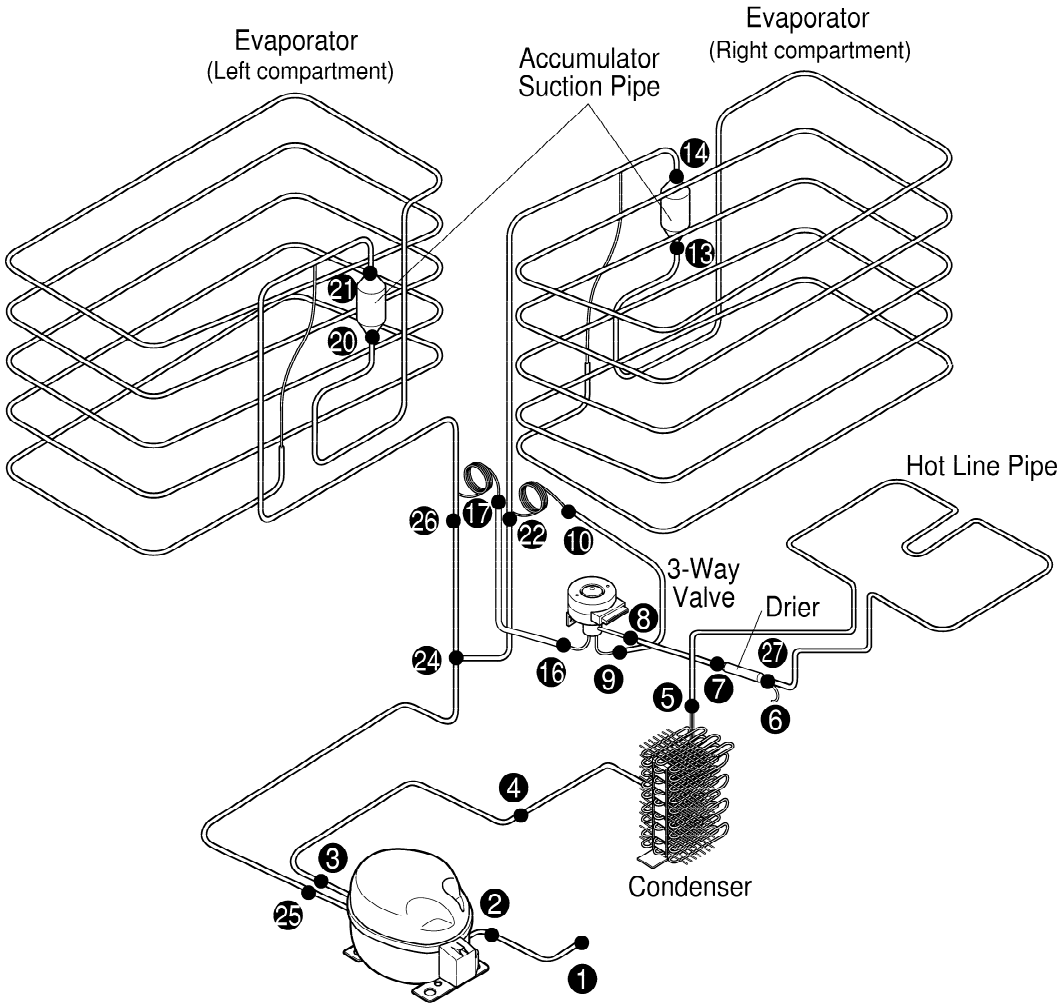


5) When cutting the capillary tube, make sure it does not get crushed.

6) When doing the welding, make sure the suction tube does not be mixed with the charging tube. (High efficiency pump)

Major repair method for freezing cycle

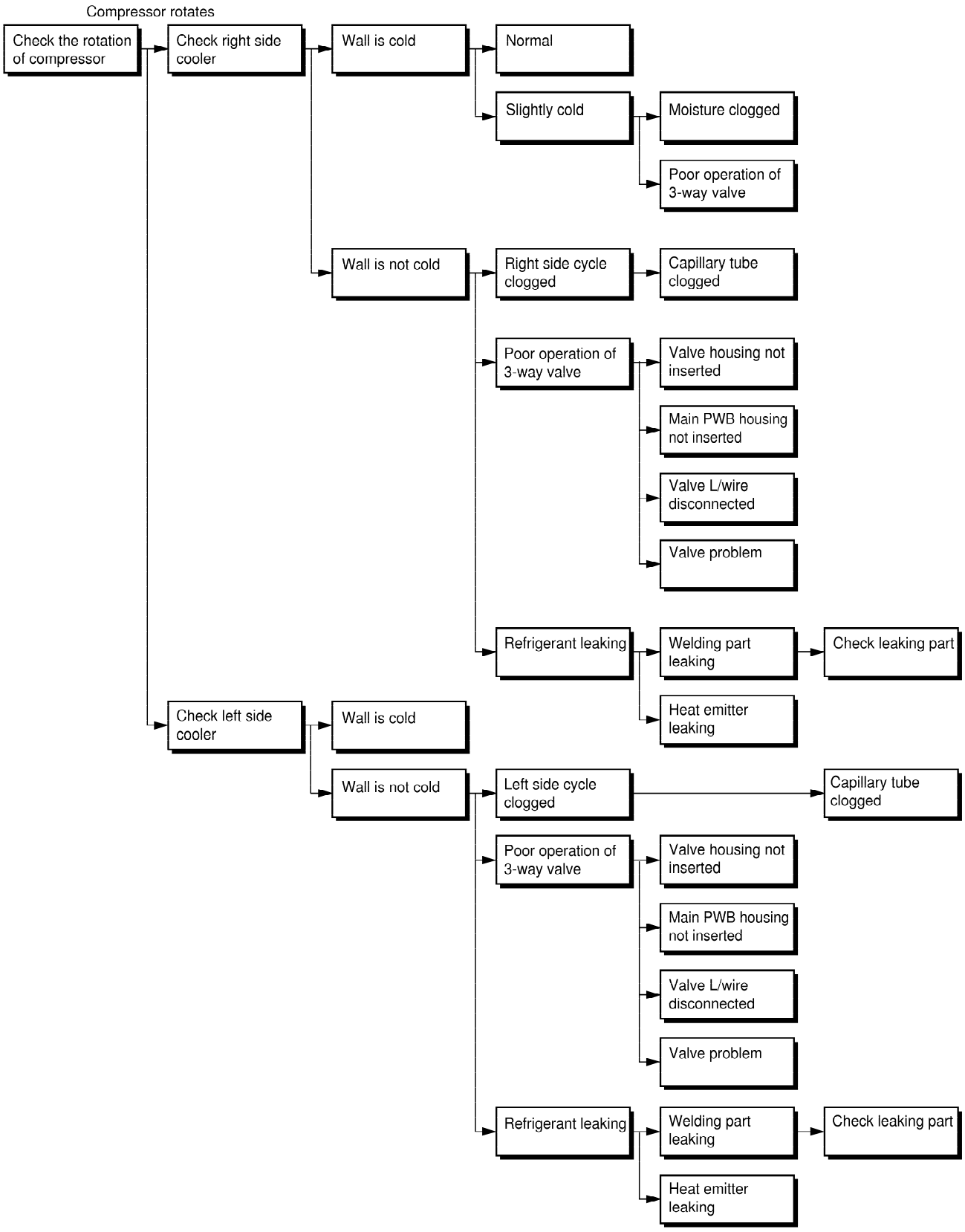
8-6. Welding reference diagram



Welding classification	Applied parts	Remarks
Copper	1,2,3,7,10,13,14,17,20,21,22,24,25,26,27	
Silver	4,5,6,8,9,16	
LOKRING	11,12,18,19	

Major repair method for freezing cycle

8-7. Problem checking procedure



Major repair method for freezing cycle

8-8. Caution for major repair service

8-8-1. Cycle clogged and leaking

■ When exchanging parts, welding or resealing the refrigerant from the cycle being clogged or leaking, always exchange the drier to remove the moisture within the cycle.

8-8-2. 3-Way valve service

■ Because the 3-way value controls the refrigerant with an internal plastic damper, when repairing or exchanging the welding part of the valve, the welding heat can be transmitted to the pipe to deform the plastic damper, causing poor operation. Therefore always service the product in the specified order.

1) Valve welding part service

- For type with a joint pipe in the 3-way valve: When the refrigerant leaked on the joint pipe (a, b, c part) connected to the value, you must exchange the 3-way valve assembly.
  (If you have to weld it for a specific reason, cover the body with a wet towel and minimize the heat transmission (below 100℃).)

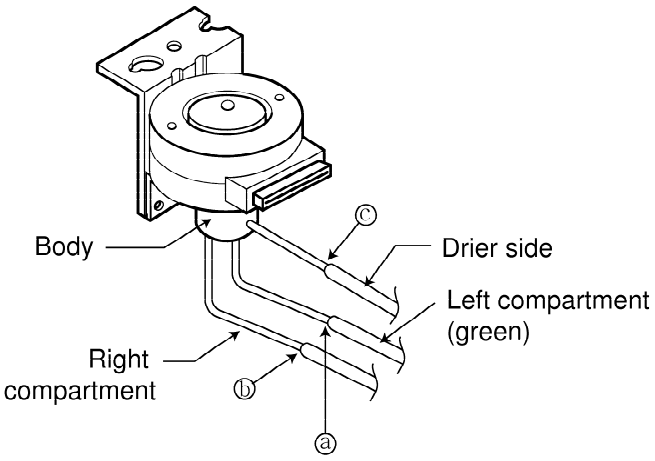
2) Valve exchange service (valve problem)

You must do the service operation in the same method as above.

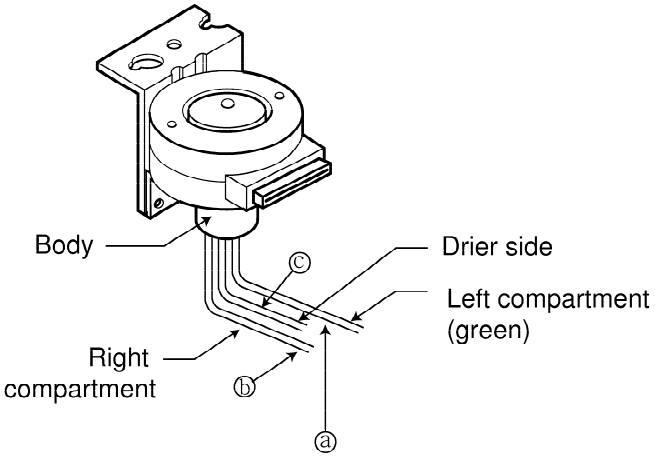
3) Other cautions

1. You must insert the capillary tube by 13^{+1}_{-0} for welding. (This is to prevent the clogging of the tube during welding.)
2. Be careful not to drop or apply high impact to the valve because it can cause damage the internal injection mold part.
   (Damage to the internal part can increase the change of poor operation and leakage.)

(Type with a joint pipe)



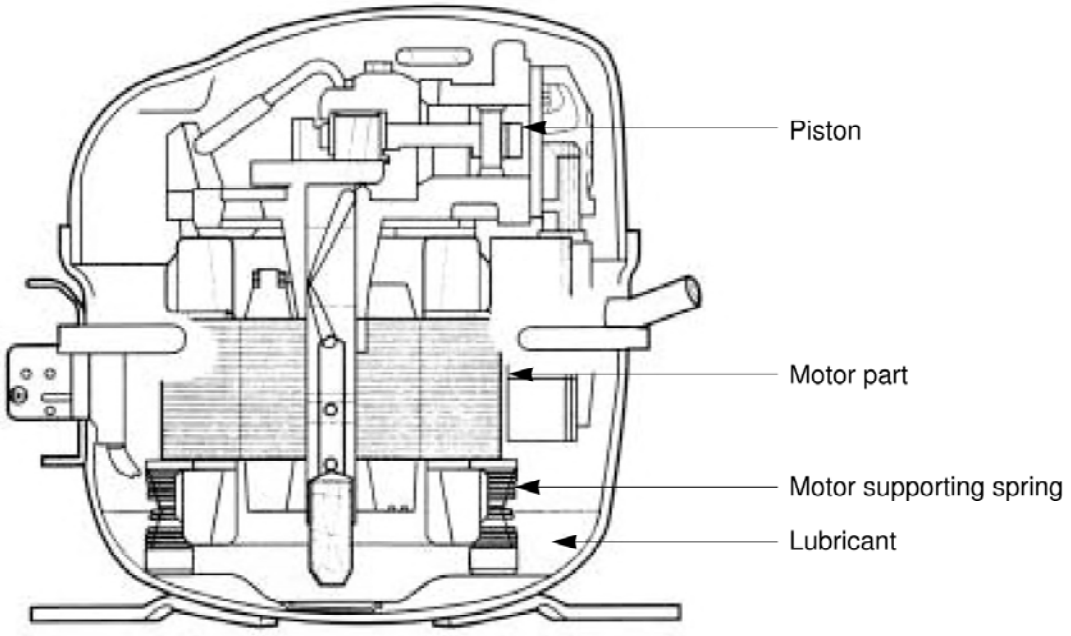
(Type without a join pipe)



Chapter 9. Characteristics of each part

9-1. Cycle part function and operating principle

9-1-1. Compressor function and operating principle (Back and forth movement type)



Compressor is composed of the piston part compressing the refrigerant gas from low to high pressure, the motor part for the operation, and lubricant to accelerate the cooling process and to lubricate the movement.

The low pressure refrigerant is distributed overall within the internal space of the compressor and after being compressed, the high pressure refrigerant is exhausted through the pipe connected to the external heat emitter.

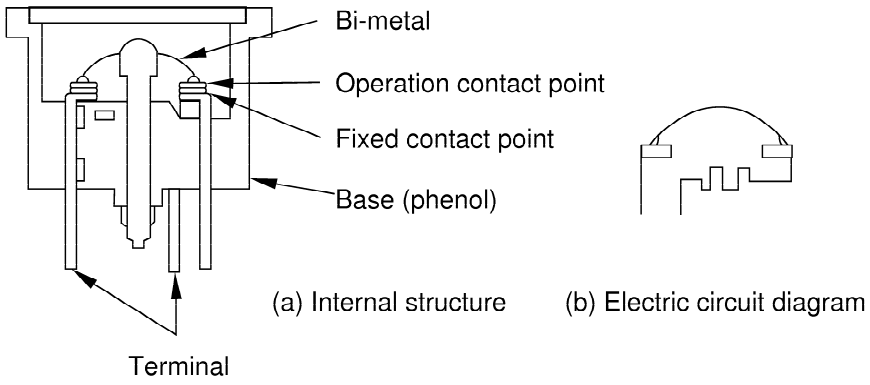
Caution

- ▶ The compressor for service is supplied with nitrogen gas charged and the rubber cap sealed.
  This is to prevent internal oxidization and the prevent moisture in the atmosphere from penetrating.
  When removing the cap for exchanging the compressor, you can hear a "pik" sound with nitrogen gas emitting, which means it is a normal product.
  If the nitrogen gas is emitted already it means that it is a poor product with moisture penetrated already and this must not be used.
- ▶ The center axis of the compressor is easily shifted from external impact. Therefore you must be especially careful from impact when carrying or storing the product.

Characteristics of each part

9-1-2. Overload protection relay (O.L.P) structure and function

- The overload protection relay cuts the power to protest the motor when the temperature of the compressor rises abnormally or when the overly high current is sent to the compressor motor.
- Overload protection relay structure is composed of the bi-metal element that cuts the power based on the temperature and the heater that heats during an over-current. They are attached to the external surface of the compressor and detects the temperature of the compressor. The composing circuit is connected to the compressor motor in direct connection.
- When the overload protection relay operates, you can here a "tak" sound and the operation contact point of the bi-metal separates from the fixed contact point. When the heat of the heater is reduced or when the temperature of the compressor is lowered after 3-5 minutes, the bi-metal connects the circuit with another "tak" sound to operate the compressor.



(Overload relay structure)

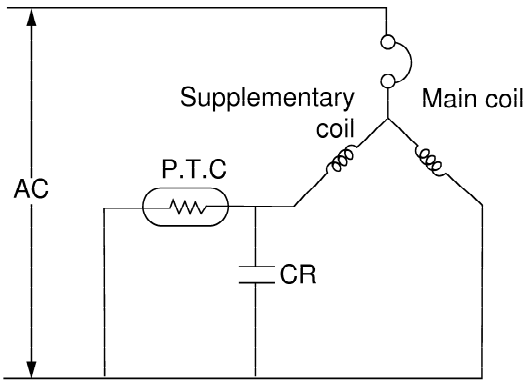
Caution

▶ The overload protection relay detects and operates by both the temperature and the current. Therefore even when the power is not connected, it can still operate when the temperature of the surface is high and it can operate when there is an over-current even with low temperature on the surface. But even though this will not happen in reality, just make sure that the relay operates by a combination of abnormal temperature and current. (But the effect from the current is bigger than that from the temperature.)

▶ After the overload protection relay operates and it recovers after 3-5 minutes when the heat is lowered, it can still operate again if the surface temperature or current is high. In other words, repeated operation for several hours can cause a customer claim. At this time, adequately cool the compressor and connect the power. Also there is a case when the relay operates but immediately recovers to operate again. At this time, exchange the relay.

9-1-3. Starter (P.T.C) function and operating principle

- The starter is directly connected to the supplementary coil of the compressor to accelerate the compressor operation. It is internally installed within the external case of the compressor like the overload protection relay.
- The starter is generally composed of P.T.C material but in the past there were ones in relay contact point type.
  P.T.C stands for Positive Temperature Coefficient, referring to a resistance that has a constant value initially (ex 33Ω) but when the power is connected the resistance becomes infinite. To understand the role of the starter you must understand the operating principle of the single phase inductive motor and simple AC circuit.



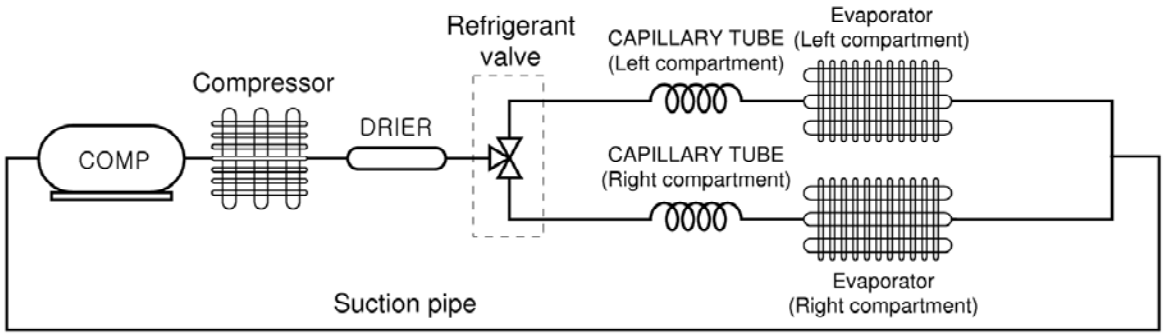
(Motor circuit)

Characteristics of each part

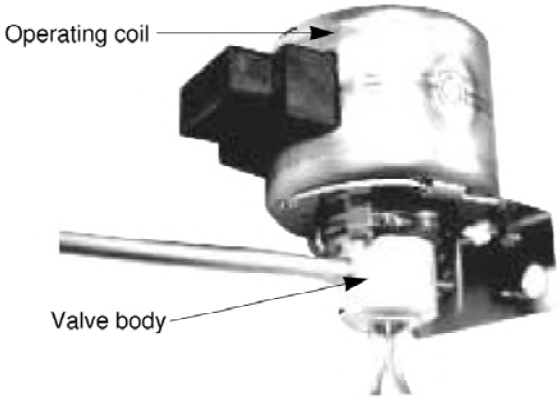
9-1-4. Refrigerant valve

(1) Function

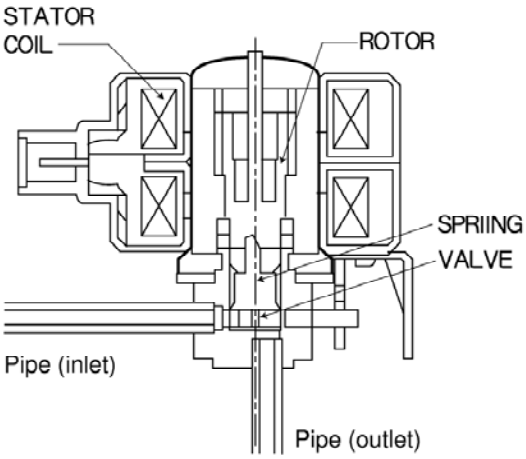
This switches the refrigerant that went through the compressor to the left or right compartment evaporator.



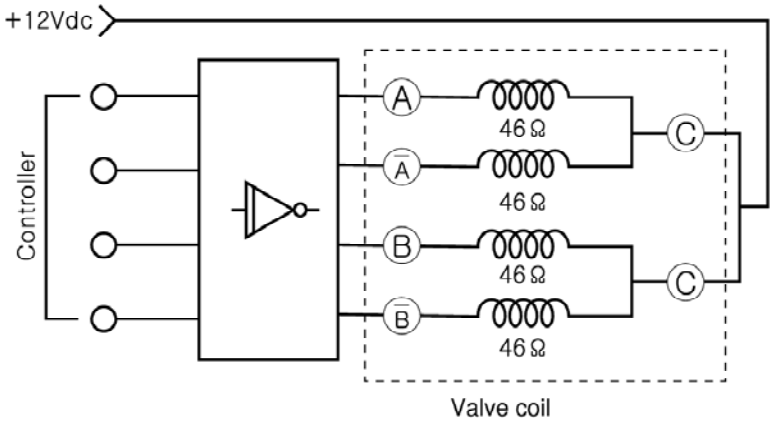
(2) Operating structure

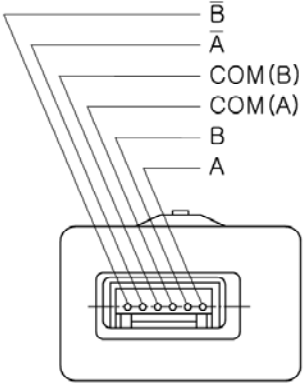


(External structure)



(Internal structure)



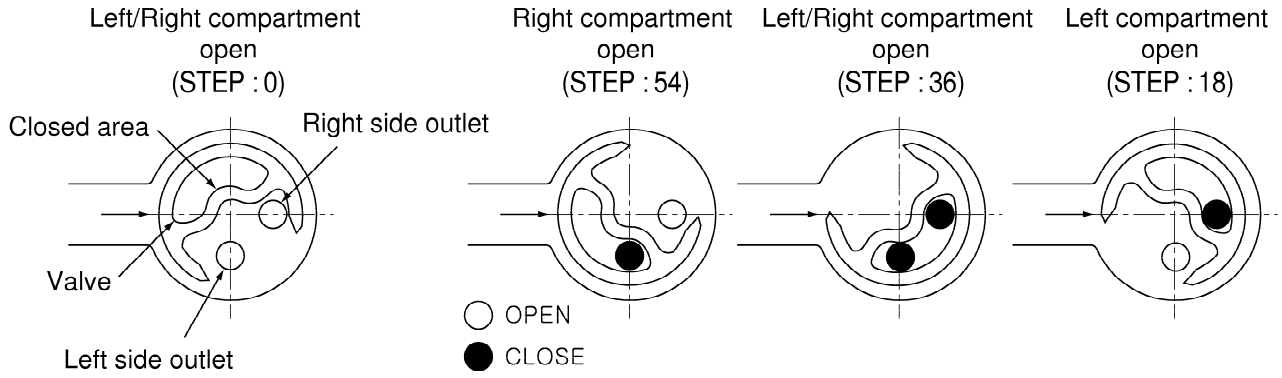


(Operating circuit)

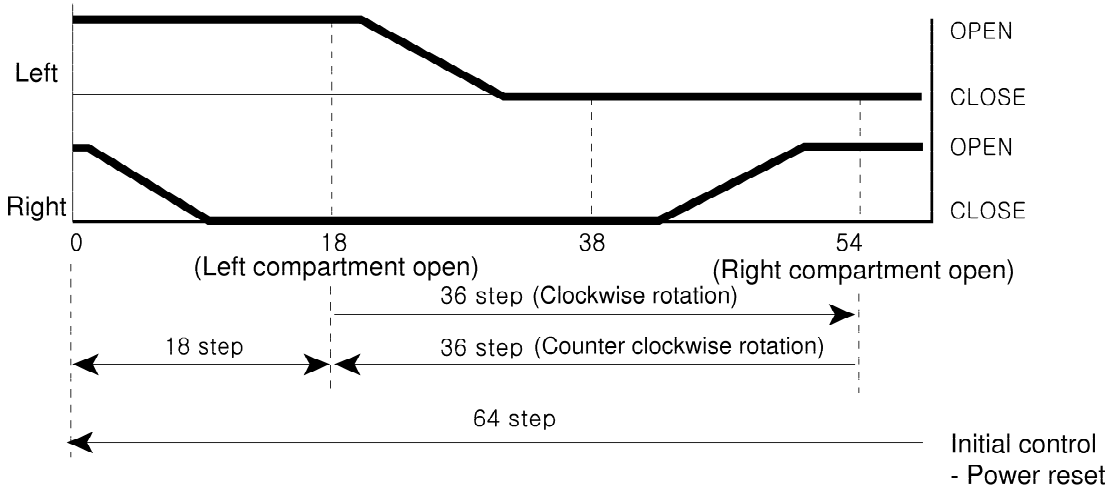
Characteristics of each part

(3) Operating principle

Controlling the rotating angle of the stepping motor will open/close the outlet pipe entrance by changing the shape of the valve connected to the bottom of the rotor.



(4) Operating characteristics



Characteristics of each part

9-1-5. Motor (mechanical room)

(1) Function

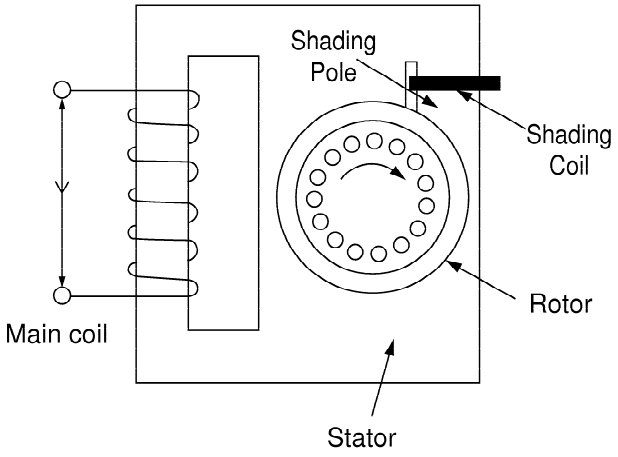
• **Motor cooling (mechanical room)**

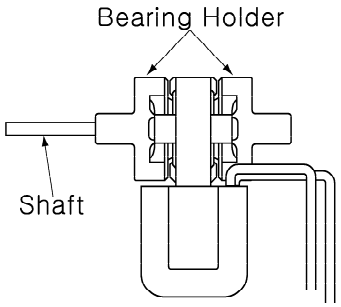
This is the part used for circulating the air within the mechanical room and applies to the wire condenser type. This operates when the compressor operates and the heated refrigerant from the compressor lowers the temperature when passing through the wire condenser and also reduces the temperature of the compressor to improve the performance.

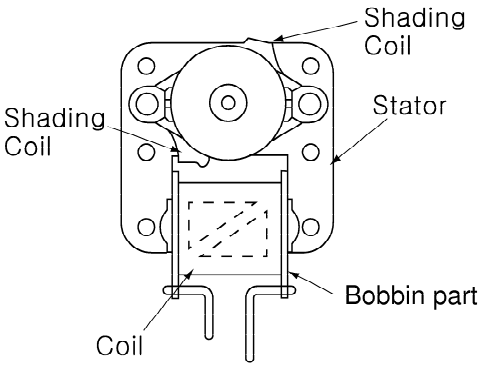
(2) Operating principle and characteristic

• **Characteristic**

The motor applied to the refrigerator is the shading pole motor of the inductive motors. As shown below, it is a 2 pole device with one pole composed of 2 parts. On the small pole called the shading pole, wire is connected (shorted) called the shading coil. In accordance with the characteristics of the AC motor, the motor switches between + and - to operate but because in the 2 pole device, the N and S pole changes within both poles without left and right rotation, the device cannot rotate without help from an external device. Therefore the shading pole and coil creates the rotating direction for operation. The shading pole motor cannot rotate in reverse direction. Therefore the rotating direction must be set during assembly to rotate in the desired direction.







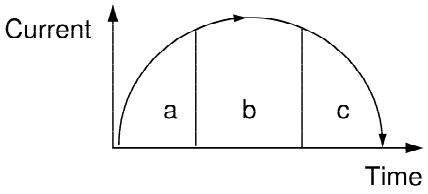
Characteristics of each part

• **Operating principle**

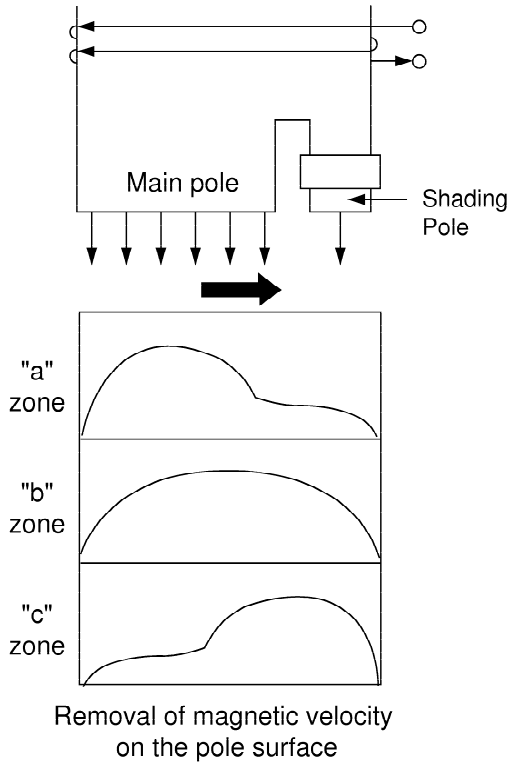
When the AD power is connected to the coil of the shading pole motor, the central axis of the magnetic field shifts in the bold arrow direction of <Fig. 2>. As the central axis moves, the rotor moves in the same direction to turn the motor.

Why does the central axis of the magnetic field shift?

<Fig. 1> shows a diagram of AC current changing as time changes. If you look at changes of magnetic velocity in "a' zone where the current abruptly increases, the velocity increases as the current increases in the main pole. But in the shading pole, the negative effect of the velocity increase is generated from the shading coil to reduce the velocity shifting the center of the magnetic field to the main pole. In "b" zone, the change in current is minimal and the negative effect of shading coil is minimal to have the center of the magnetic field in the middle as shown in <Fig. 2>. In "c" zone, the velocity of the main pole decreases but with the negative effect increasing the velocity from the shading pole side, the center shifts to the shading pole side. As shown, the center of the magnetic field shifts from the main pole to the shading pole to rotate the rotor.



<Fig. 1> Change of AC current



<Fig. 2> Change in magnetic velocity by changes in current

Characteristics of each part

9-1-6. Heater

(1) Introduction

When using the refrigerator to realize the fermenting algorithm program, a Kimchi seasoning heater is attached on the external surface of the inner case.

(2) Heater type and role

Classification	Applied part	Function	Resistance value	Remarks
Heater	External surface of inner case	For Kimchi seasoning	605Ω/EA	(Applicable to R-K18**)

(3) Poor product: Poor heater

■ Heater assembly (ferment/rice storage)

Problem (parts)	Symptom	Check method	Resolution
1. Heat wire disconnected/connecting wire disconnected	Kimchi not seasoned	1. Measure the resistance of both ends of the heater with a tester to see if it is ∞ Ω.	1. Exchange the product
2. Poor terminal contact		2. Measure the resistance of both ends of the heater with a tester to see if it fluctuates.	2. Properly insert the connector

Characteristics of each part

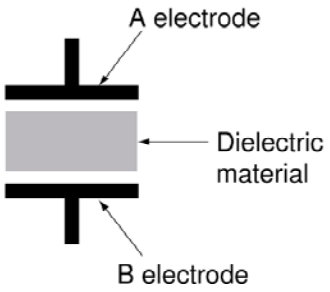
9-1-7. Capacitor operating principle and temperature characteristics

(1) Function

1. Capacitor (C/S): Sometimes called the starting capacitor, it is used to improve the motor operation characteristics in low pressure because the operating torque is weak based on the characteristics of the motor within the compressor of the refrigerator in low voltage areas (85% or less than rated).
2. Capacitor (C/R): Sometimes called the running capacitor, it is used to improve the operating torque of the motor within the compressor of the refrigerator. (Capacitor for operation)

(2) Concept

When you put dielectric material between two facing electrodes and connect the voltage, the electric charge will be accumulated. This functional device is called a capacitor and the basic structure is as shown in the right figure.



(3) Poor symptom (product)

Problem (parts)	Symptom	Check method	Resolution
Disconnected (open) Shorted Normal	1) Compressor does not work. 2) Compressor is heated. 3) OLP is operating. 4) Power fuse is disconnected. (Immediately after exchanging or frequently)	- Measure the both ends of the capacitor with a tester to see if there is no change: ∞ Ω.	- Exchange the capacitor
	1) Compressor does not work. 2) Compressor is heated. 3) Compressor repeatedly works and stops. 4) OLP is operating. 5) Power fuse is disconnected. (Immediately after exchanging or frequently)	- Measure the both ends of the capacitor with a tester to see if it is 0 Ω.	- Exchange the capacitor
	1) Compressor does not work. 2) Compressor is heated. 3) Compressor repeatedly works and stops. 4) OLP is operating. 5) Power fuse is disconnected. (Immediately after exchanging or frequently)	- Measure the both ends of the capacitor with a tester to see if it decreases and then slowly increases (Move toward 0 Ω and then to ∞ Ω).	- Check other parts

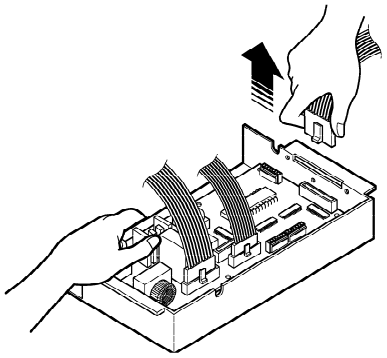
Caution

- ▶ Before the measurement, short the capacitor with a driver to discharge all the electricity.
- ▶ After setting the multiplier rate to maximum within the resistance measuring range, measure while switching the terminals.

Chapter 10. Cautions for disassembling the product

10-1. PWB (PCB) assembly, main

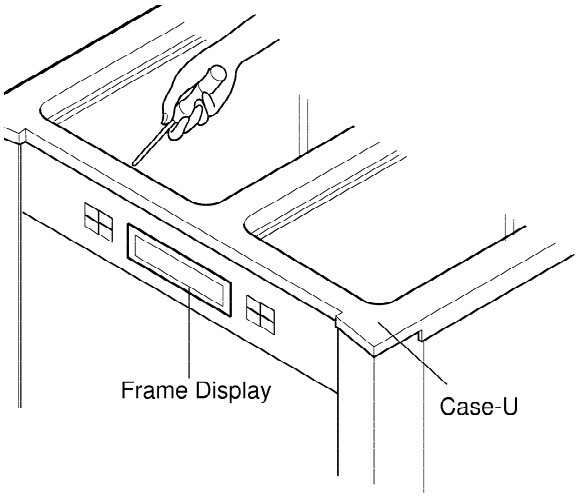
- When disassembling the PWB (PCB) assembly, main located in the mechanical room, be careful so that the lead wires do not touch the edge part.
- If the lead wire coating is disconnected or the coating is damaged, it can cause a short circuit.



10-2. Frame assembly, display

- Using the - driver, open the slot between the frame display and the case-U to disassemble the unit. At this time, be careful not to apply too much pressure to damage the PWB (PCB) assembly, display or make scratches on frame display and case-U.

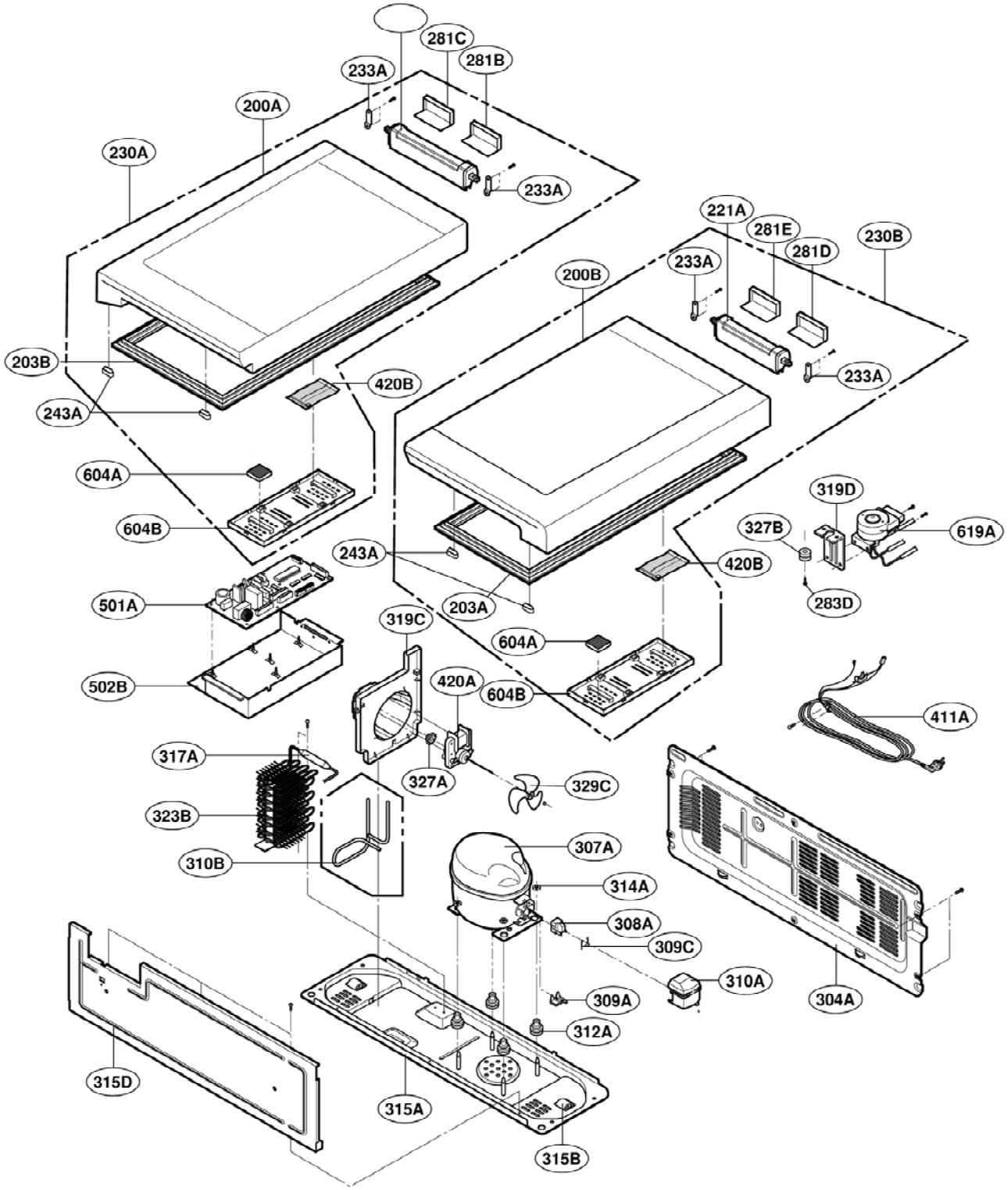
※ Depending on the mode, the service slot is on the top left or right side.



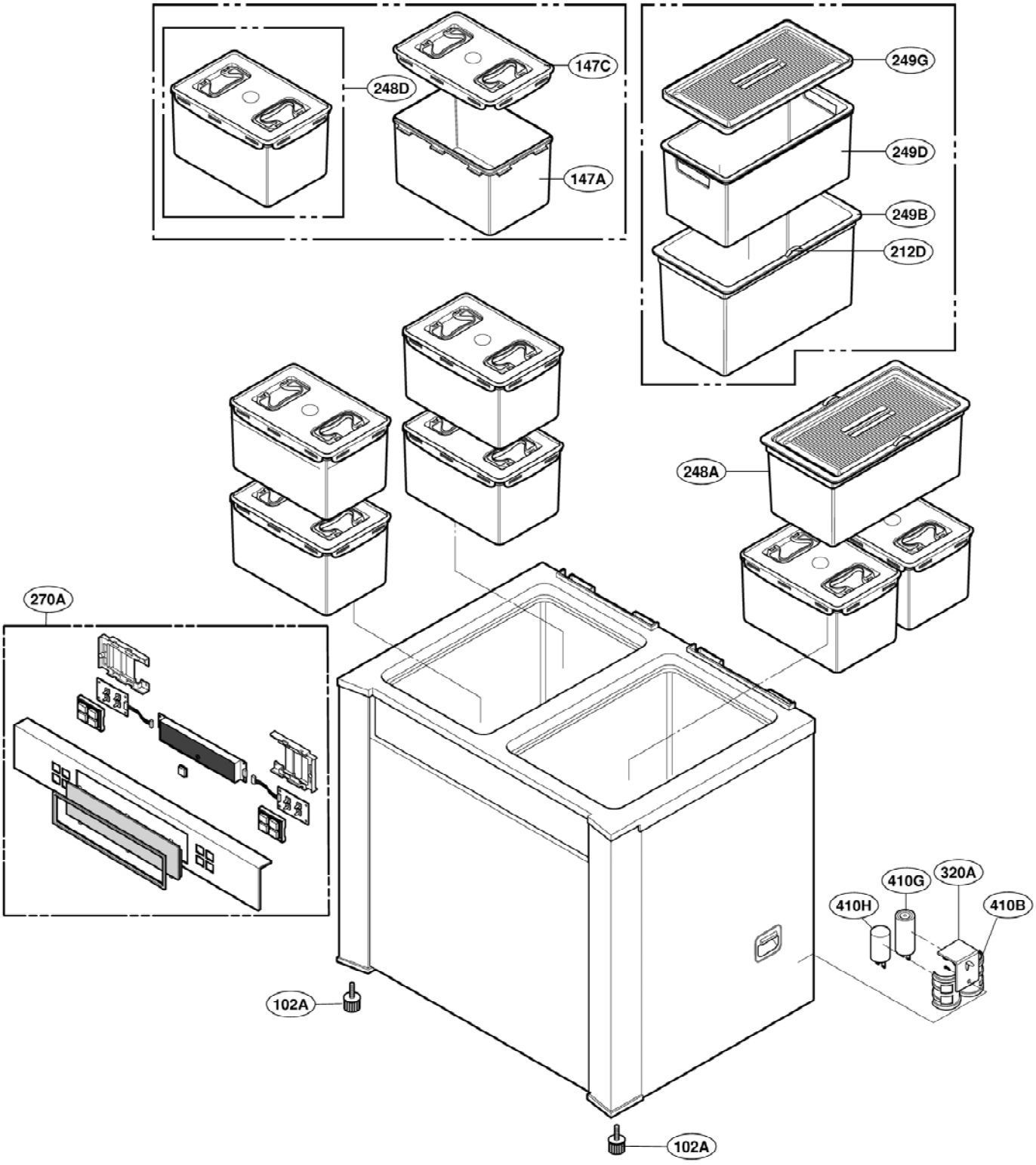
Assembly diagram and service parts list

Chapter 11. Assembly diagram and service parts list

11-1. Assembly diagram (GR-K18PB/GR-K18PBC)



Assembly diagram and service parts list



Assembly diagram and service parts list

11-2. Service parts list (GR-K18PB/GR-K18PBC)

LOC No.	DESCRIPTION	GR-K182PB	GR-K182PBC	QTY
102A	LEG,ADJUST	4778JA2015A	‹	2
147A	BANK,SIDE DISH	5074JA1044B	←	6
147C	COVER ASSEMBLY,BANK	3551JA1053F	←	6
200A	DOOR FOAM ASSEMBLY,R(L)	5433JA1138B	←	1
200B	DOOR FOAM ASSEMBLY,R(R)	5433JA1139B	←	1
203A	GASKET,DOOR(R)	4987JA2010B	←	1
203B	GASKET,DOOR(L)	4987JA2010B	←	1
212D	HANDLE,CH	3650JA2097B	←	2
221A	HINGE ASSEMBLY(R)	4775JA1008B	←	1
222A	HINGE ASSEMBLY(L)	4775JA1008B	←	1
230A	DOOR ASSEMBLY, R(L)	3581JA1145B	←	1
230B	DOOR ASSEMBLY, R(R)	3581JA1146B	←	1
233A	BRACKET,COVER	4810JA3136A	←	4
243A	STOPPER,DOOR	4620JA3023A	←	4
248A	BASKET ASSEMBLY,DOOR	5005JA1013E	←	1
248D	BANK ASSEMBLY,SIDE DISH	5075JA1025J	←	6
249B	BASKET,DOOR	5004JA1148B	‹	1
249D	BASKET,DOOR	5004JA1150C	←	1
249G	COVER,MAGIC ROOM	3550JA2199B	←	1
270A	FRAME ASSEMBLY,DISPLAY	3211JA1071B	←	1
281B	CAP,HINGE L(R)	5006JA2048G	←	1
281C	CAP,HINGE L(L)	5006JA2048H	←	1
281D	CAP,HINGE R(R)	5006JA2048G	←	1
281E	CAP,HINGE R(L)	5006JA2048H	←	1
283D	SCREW, DRAWING	ISZZJA3018B	←	1
304A	COVER ASSEMBLY,BACK-M/C	3551JA1034D	←	1
307A	COMPRESSOR,SET ASSEMBLY	2521C-A5864	2521C-A5614	1
308A	P.T.C	6748C-0002C	←	1
309A	O.L.P	6750C-0005Q	6750C-0004S	1
309C	CLIP	4860JA3005A	←	1
310A	COVER,P.T.C	3550JA2041B	←	1
310B	PIPE ASSEMBLY,JOINT	5200JA1084C	←	1
312A	RUBBER,SEAT	5040JA3035A	‹	4
314A	STOPPER,COMP	4J03277A	←	4
315A	COMP BASE ASSEMBLY,STD	3103JA1031A	←	1
315B	ROLLER	3J02312A	←	2
315D	BOTTOM PLATE ASSEMBLY	3305JA2024A	←	1
317A	DRIER ASSEMBLY	5851JA2005E	←	1
319C	BRACKET,MOTOR	4810JA1030A	←	1
319D	BRACKET,MOTOR	4810JA3054A	←	1

Assembly diagram and service parts list

LOC No.	DESCRIPTION	GR-K182PB	GR-K182PBC	QTY
320A	HOLDER, BRACKET	4930JA2102A	←	1
323B	CONDENSER ASSEMBLY,WIRE	5403JA1059D	←	1
327A	RUBBER,MOTOR-N	J756-00008B	←	1
327B	RUBBER, DAMPING	5040JA3063A	←	1
329C	FAN ASSEMBLY	5901JA1013A	‹	1
410B	HOLDER,CAPACITOR	J580-00014A	←	1
410G	CAPACITOR,R	0CZZJB2005H	0CZZJB2010J	1
410H	CAPACITOR, M/S	J513-00012Y	J513-00012Y	1
411A	POWER CORD ASSEMBLY	6411JB2025L	←	1
420A	MOTOR(MECH),COOLING	4680JB1035S	←	1
501A	PWB(PCB) ASSEMBLY,MAIN	6871JB1245W	←	1
502B	CASE ASSEMBLY,PWB	3111JA2021C	←	1
604A	DEODORIZER	5986JA3006D	←	2
604B	COVER,DEODORIZER	3550JD1088B	←	2
619A	VALVE ASSEMBLY,GAS	5221JB1001A	←	1

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