Service manual

Continuous type Ice machines

Contents

1. General Information

1.1. Safety Precautions

⚠WARNING
- This product must be installed in compliance with laws and regulations of the country, state and area of installation. - Read the manual thoroughly before starting installation, maintenance and repair of the product. - Failing to follow the instructions provided in the manual may cause property damage or injury. - The installation, maintenance and repair of the product must be conducted by a certified technician. - The product must be connected to an independent power line and must be earth-wired. - The product must be installed on an even surface, and items with independent head and bin must have aligning openings. - Water supply must provide drinkable water. - The product is filled with high-pressure gas. Make sure to prevent any damage to the refrigerant circuit during installation, maintenance and repair. - Before starting installation, maintenance or repair of the product, make sure to remove all potential risk factors, such as water on the floor. - Make sure to cut off power before starting installation, maintenance or repair of the product. - If cleaning agent or chemical is used during maintenance, make sure to wear protective equipment before conducting work. - Do not remove ice using a sharp object or tool.

1.1.1. Flammable Refrigerant Precautions

- **Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized.**

⚠WARNING
- Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapour being present while the work is being performed. - All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided. - The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e., nonsparking, adequately sealed, or intrinsically safe. - If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available on hand. A dry chemical or CO2 fire extinguisher should be adjacent to the charging area.

- No person carrying out work in relation to a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment shall be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be displayed.
- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.
- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times, the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.

  The following checks shall be applied to installations using refrigerating system.

  a) the actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed.

  b) the ventilation machinery and outlets are operating adequately and are not obstructed;

  c) if an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.

  d) marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.

  e) refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.
- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment, so all parties are advised. Intial safety checks shall include

  a) that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;

  b) that no live electrical components and wiring are exposed while charging, recovering or purging the system;

  c) that there is continuity of earth bonding.

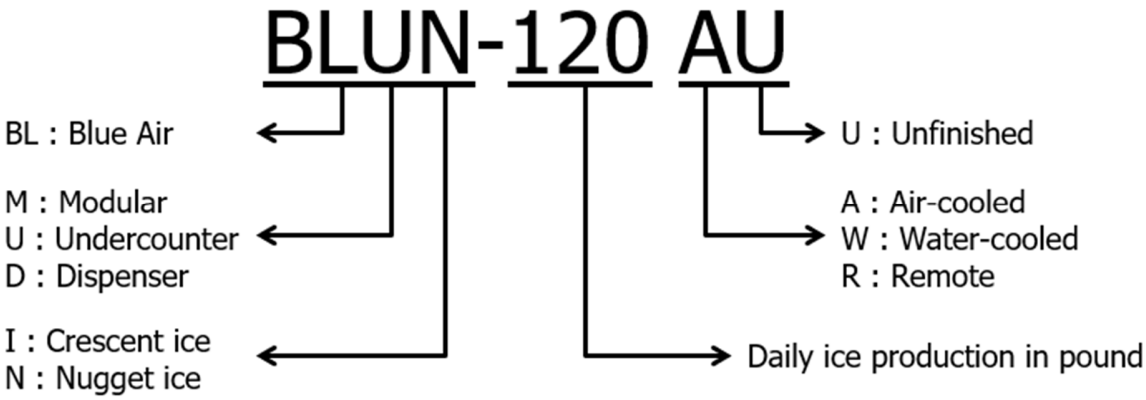
1.2. Warranty information

⚠WARNING
- Product or parts damage occurring due to inappropriate use and storage or use of incompatible parts is not subject to warranty coverage.

Classification		Warranty period
Product		3 years
Parts	Compressor	5 years
	Evaporator	5 years
	Other parts	3 years

1.3. Model Name and Serial Number

1.3.1. Model Name



1.3.2. Serial Number

LUIA A 94 H 2 00001

a b c d e f

a (4 digits) : CIS code for specific model b (1 digit) : Product group

c (2 digits) : Manufacturing site (supplier code)

d (1 digit) : Manufacturing year

e (1 digit) : Manufacturing month

f (5 digit) : Serial number (00001 ~ 99999)

Year	2020	2021	2022	2023	2024	2025
Mark	N	R	T	W	X	Y
Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.
Mark	1	2	3	4	5	6
Month	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Mark	7	8	9	A	B	C

1.4. Installation and Usage Environment

1.4.1. Installation Location

- Well-ventilated indoor and outdoor space.
- Space with no heat source in the vicinity and no direct sunlight.
- Space with sufficient amenities for water supply and drainage, and easy wiring.
- Space with no obstacles disturbing the air circulation (heat exchange) around the ice machine.
- Clean space with no contamination near the ice machine.
- Space with flooring capable of withstanding the weight of the ice machine when it is filled with ice.

1.4.2. Installation Conditions

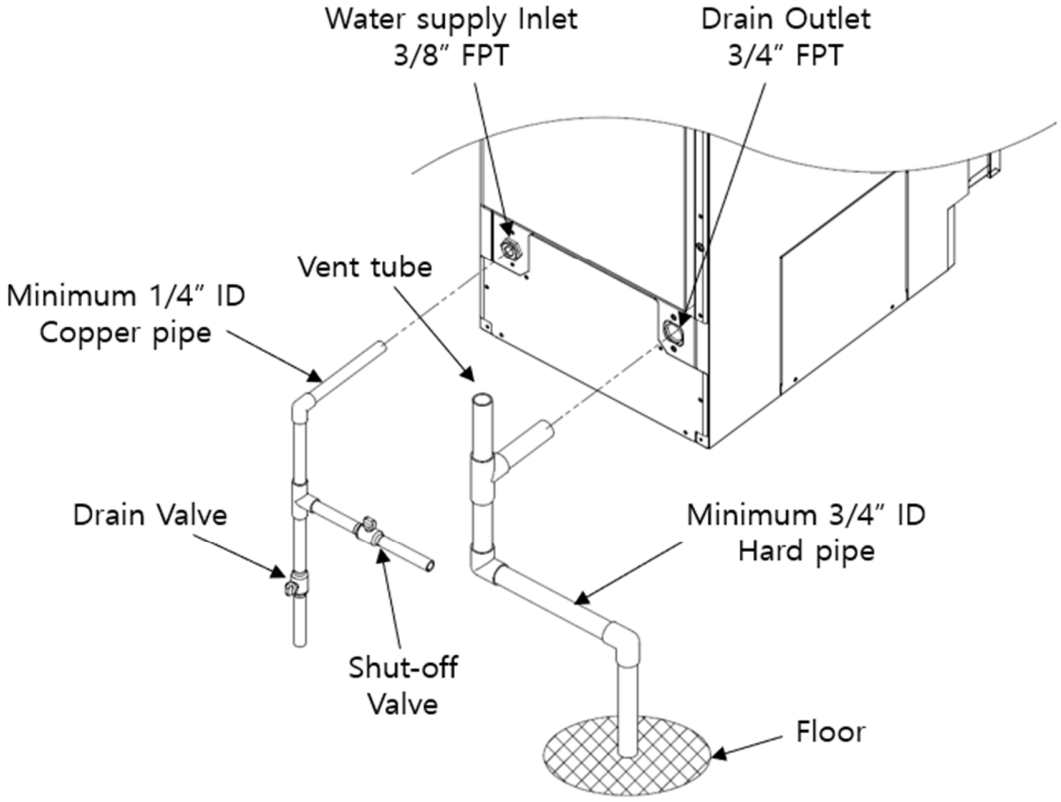
- The ice machine must be on an even level during installation.
- The drain end of the ice machine must have an air gap (5cm).
- The ice machine must be cleaned after installation.
- It should be possible to easily remove the drain line from the ice machine.
- To ensure sufficient air circulation and ease of maintenance, spaces of 0" (0cm) on the top, 0" (0cm) on the side, and 6" (15cm) on the rear must be secured.

1.4.3. Usage Environment

Item	Model	범위	단위
Ambient temperature	All	7~38	℃
		45~100	℉
Water temperature	All	7~32	℃
		45~90	℉
Water pressure	All	10~100	psig
		0.7~7.0	Kg/㎠
Voltage	115V product	104~127	V
	208-230V product	198~242	
	220-240V product	207~253	

1.5. Water Connections

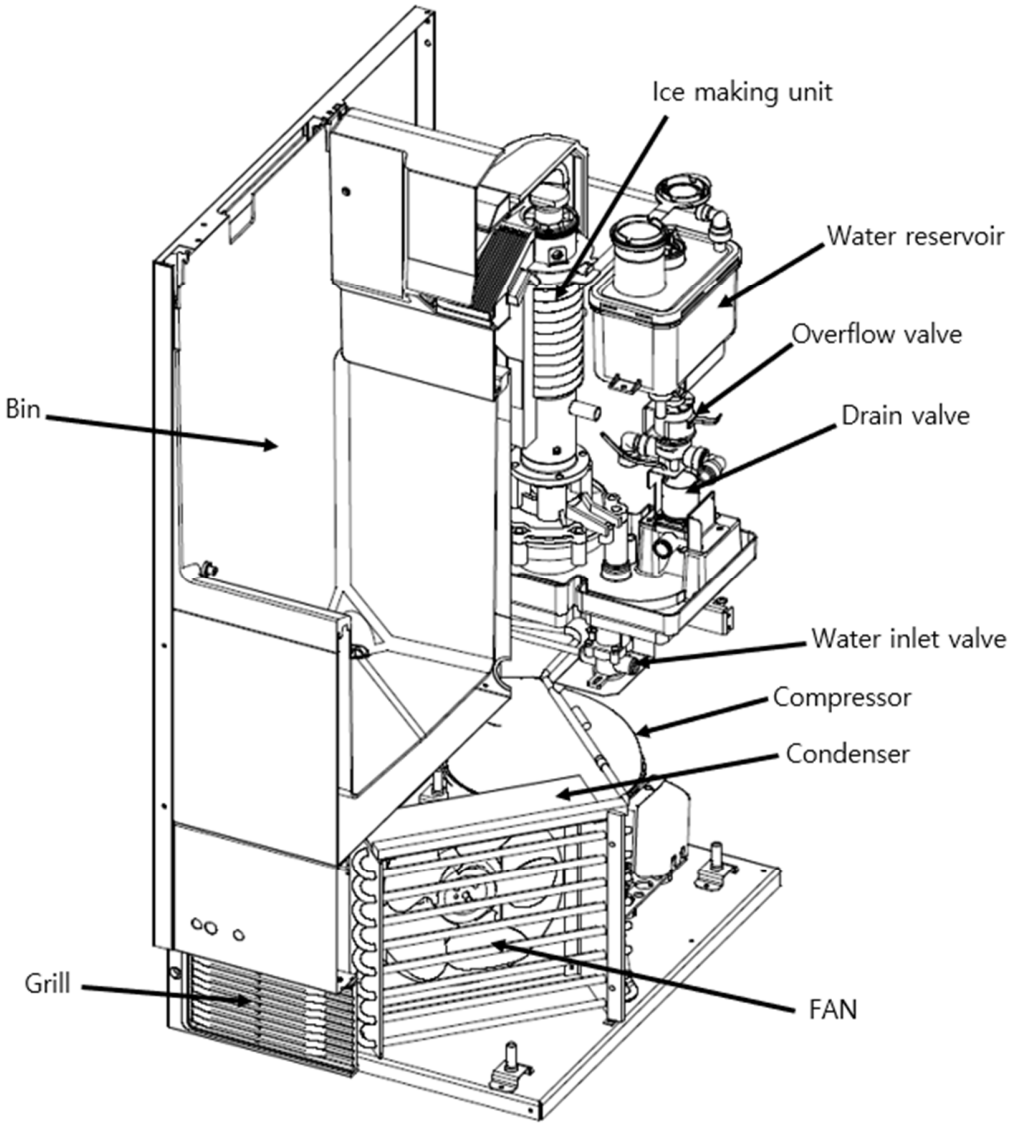
1.5.1. BLUN-120A,120AU



*** At least 5cm (2″) of vertical space must be provided between the drain pipe end and the floor drain.**

1.6. Names of Parts

1.6.1. BLUN-120A,120AU



1.7. Product specification 제품 사양서

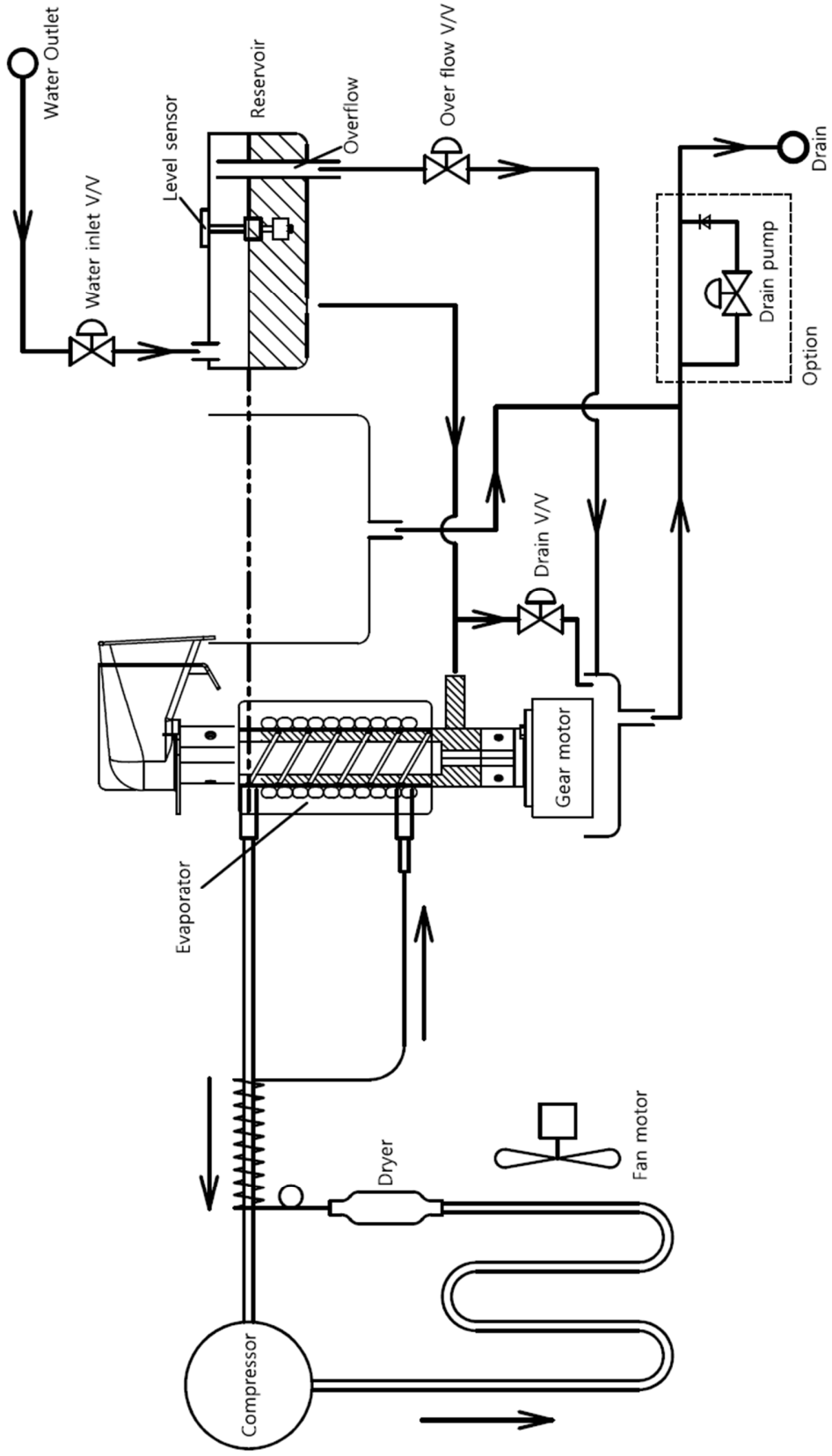
Content	BLUN-120A	REMARKS
AC Supply Voltage	115V / 60Hz / 1Ph	
Amperage / Power Consumption	4A	
Maximum Fuse Circuit Breaker	15A	
Product Size (W*D*H)	378 x 641 x 863 [mm] 15" x 25" x 34" [inch]	
Weight		
Maximum Daily Ice Production	106.3 lbs (48.2 kg)	AT90°F/WT70°F AT32°C/WT21°C
Ice Hardness Factor	90%	AT90°F/WT70°F AT32°C/WT21°C
Refrigerant	R-290 40g	

⚠WARNING
- Performance may vary depending on the amount of refrigerant, so the correct amount of refrigerant must be charged.

2. Technical Information

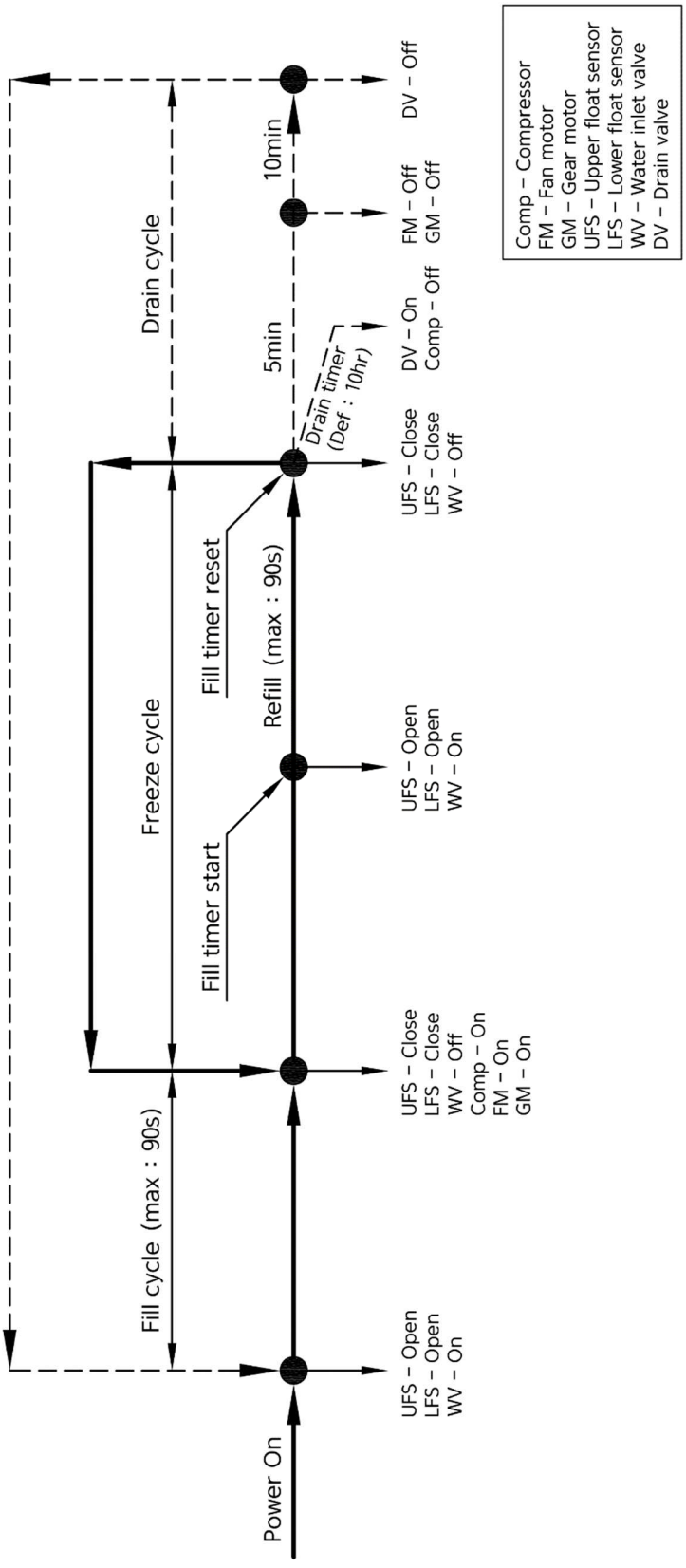
2.1. Refrigerant and Water Circuit Diagram

2.1.1. Under counter

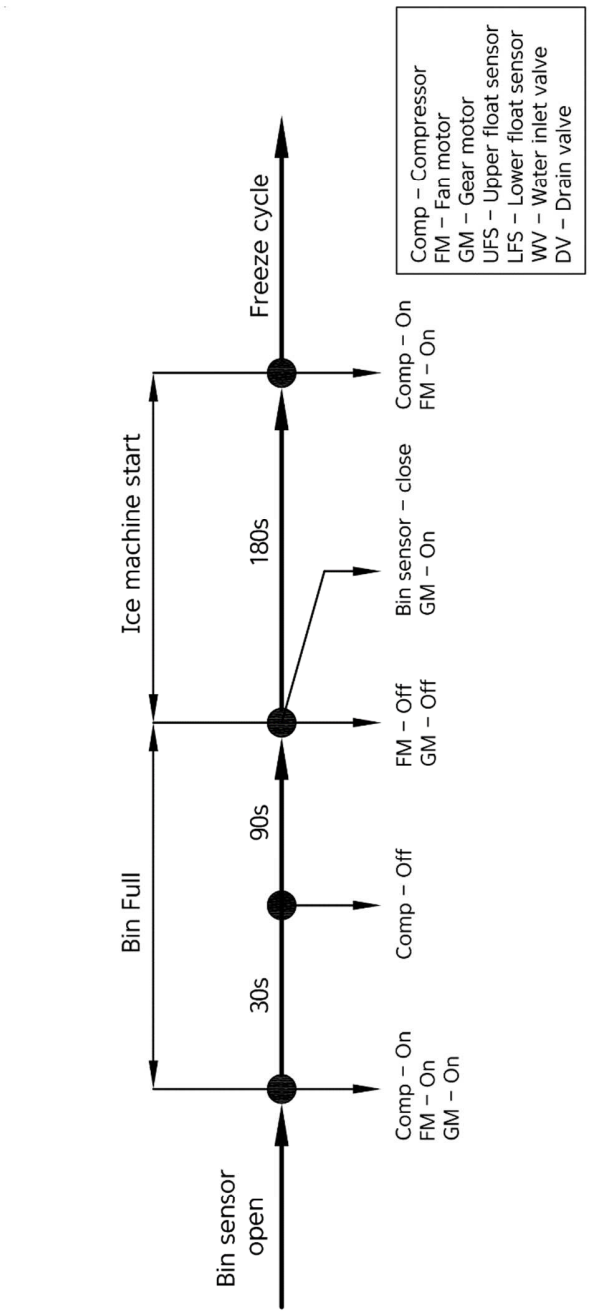


2.2.Ice Machine Control

2.2.1. Ice Making Flowchart



2.2.2. Flowchart for Ice Full Status



2.2.3. Description of Ice Machine Stages

- **Power Standby**
  - Once the main power is connected, the On/Off LED turns red, indicating 'Standby' state.

- **Water Supply**
  - 'Water Supply' stage is the stage where the water required to make ice is supplied after pressing the power button to operate the ice machine.
  - During the 'Water Supply' stage, the water inlet valve starts operating.
  - Once water fills up to the full level of the water tank, the 'Water Supply' stage ends.
  - "Ice" is indicated on the display.

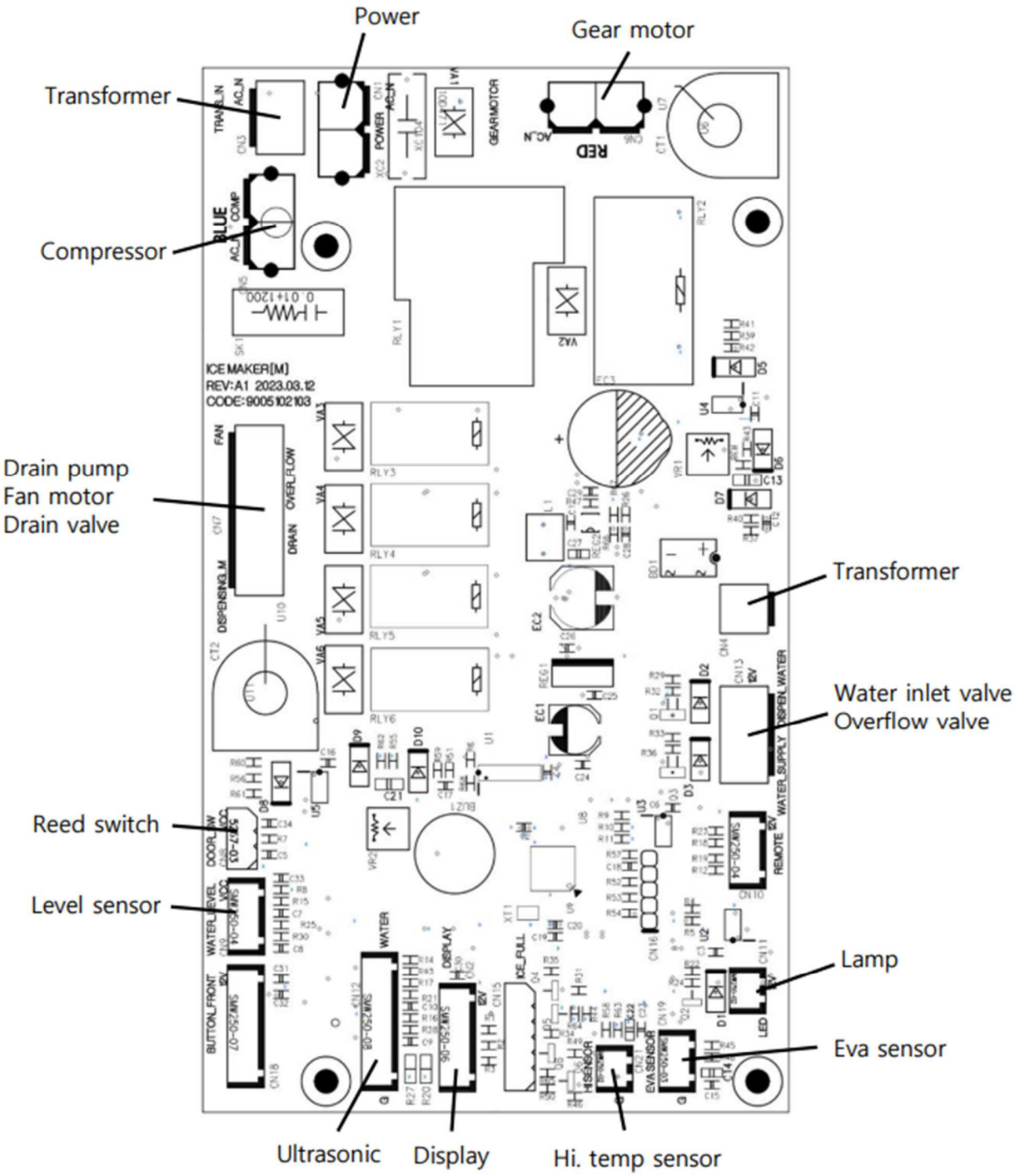
- **Ice Making**
  - 'Ice Making' stage is the stage where ice is made.
  - During the 'Ice Making' stage, the compressor, fan motor and gear motor operate.
  - "Ice" is indicated on the display.

- **Drain**
  - 'Drain' stage is the stage where the water in the water tank and EVA are drained.
  - During the 'Drain' stage, the drain valve starts operating.
  - The drain operates periodically according to the user setting.
    (Default: 5-minute draining every 5q hours)

- **Ice Full**
  - 'Ice Full' is the stage set when the ice bin cannot hold more ice.
  - Once the 'Ice Full' sensor operates, all parts stop operation in stages.
  - Once the 'Ice Full' sensor stops, the 'Ice Making' stage resumes.

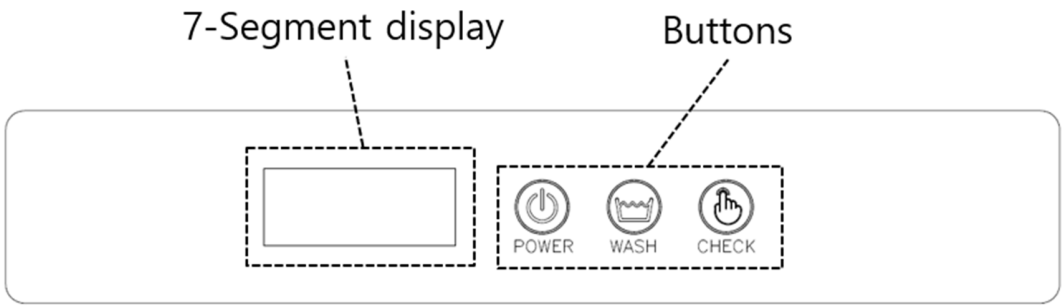
2.3.Ice Machine Control Board and Operation

2.3.1. Main Control Board



2.3.2. Display Control Board

1) Name of Each Part



2) Major functions

- **7 segment display**

Display	Status
	'Ice Making' stage
	Drain in operation
	Cleaning in operation
	'Ice Full'
	Indication when it is necessary to add cleaning agent and disinfectant during 'Cleaning Mode'
	'Cleaning Mode' complete

- **Error Codes**
  - When the ice machine is not operating properly, the following error codes are displayed along with a signal (beep).

7-segment	내용	비고
E01	Ice making error: No water was consumed for 30 minutes	
E02	Compressor overheat: High temperature sensor for temperatures > 115℃	
E03	Gear motor error: Overcurrent or undercurrent of gear motor	
E04	EVA icing error: Excessive freezing of EVA	
E05	Water supply error: Full level not detected	
E06	High temperature sensor not connected	
E07	Main Control Board 기능 프로그램 에러	
E08	Low temperature sensor not connected	
E09	Drain pump sensor not connected	
E10	Ultra sonic sensor not connected	
E11	'Ice full' sensor error	

- E01 : Error is displayed when low water level is not detected for 30 minutes after detecting full water level during the 'Ice Making' stage.

- E02 : Error is displayed when the compressor high temperature sensor detects temperatures higher than 115℃.

- E03 : Error is displayed when the gear motor current is too high or too low (2.5A or higher/0.2A or lower).

- E04 : Error is displayed only if the EVA outlet temperature is 7℃ lower than the temperature 50 seconds before, and then the gear motor and fan operate for 90 seconds, product stops and restarts operation 10 minutes later.
  If the product stops operation for three consecutive times, the button flashes to indicate

the error, and the product shuts down completely.

- E05 :
  1) Water supply stage: If the water level does not reach full after 90 seconds of water supply, water supply is executed again for 90 seconds. Error code E05 is displayed if the water level does not reach full after another water supply.
  2) 'Ice Making' stage: Water supply is executed if low water level is detected. Error is displayed if low water level is detected 10 seconds later.
  3) 'Ice Making' stage: 90-second water supply is executed if full water level is not reached 90 seconds after the low water level is lifted. Error is displayed if full water level is not reached after supplying water.

- E06 : Error is displayed if the high temperature sensor is not connected or is short circuited.

- E07 : Error is displayed if an error occurs in the main control board program.

- E08 : Error is displayed if the low temperature sensor is not connected or is short circuited.

- E09 : Error is displayed if the drain pump sensor is not connected or is short circuited.

- E10 : Error is displayed if the ultrasonic sensor is not connected or is short circuited.

- E11 : Error is displayed if the 'Ice Full' sensor is not connected or is short circuited.

- **Buttons**

- Power : Press and hold for 2 seconds to turn on/off the ice machine.

- Wash :
  1) Press once to enter 'Cleaning/Disinfection' mode.
  2) Press and hold for 5 seconds to enter 'Parts Test' mode.

- Check :
  1) Press once to check the internal operation data for the ice machine.
  2) Press and hold for 5 seconds to enter the 'Program Change' mode.

- **Real-time Data**

- Each time the 'Check' button is pressed during operation, data is displayed on the display If no additional action is made for 20 seconds, the product returns to its operation state.

순서	항목	단위	비고
1 - T	Gear motor operation time	Hour	
2 - H	High temperature sensor temperature	℃ (℉)	
3 - L	Low temperature sensor temperature	℃ (℉)	
4 - A	Gear motor current	A	
5 - B	Ultrasonic sensor distance	mm	
6 - D	Drain pump sensitivity	mm	

2.3.3. Changing Ice Machine Control Board Parameters

1) How to Change

순서	Display Control Board	Operation
1		Press and hold the 'Check' button for 5 seconds to enter the parameter change mode.
2		The display shows P-1.
3		Press the "Power" button, the value of P-1 is displayed. Press the 'Wash' button to increase the value. Press the 'Check' button to decrease the value.
4		Press the 'Power' button to move to the next parameter.
5	-	For information about the definition and order of parameters, refer to the Parameter Table.
6		Press and hold the 'Check' button for 5 seconds to close the parameter change mode.

2) Parameter Order

Order	Display	Details	Min.	Max.	Default (US)	Unit	Remarks
1	P-1	Drain interval	1	10	5	-	Hour(1,2,5,10)
2	P-2	Drain time	5	10	5	5	sec
3	P-3	Comp delay at off	5	180	30	5	Sec
4	P-4	Gear motor delay at off	60	180	90	10	Sec
5	P-5	Water supply valve on time	60	150	90	5	Sec
6	P-6	Cleaning time	30	60	30	10	Min
7	P-7	Cleaning count	1	5	3	1	회
8	P-8	Temperature unit setting	℃	℉	℉	-	℃ / ℉
9	P-9	Model name setting	PUM	UND	UND	-	PUM / UND
10	P-10	Ultrasonic sensor (Ice Full) short distance	1	999	150	1	mm(Ice Full)
11	P-11	Ultrasonic sensor (Ice Full) long distance	1	999	180	1	mm(Ice Full)
12	P-12	Ultrasonic sensor (Drain pump) short distance	1	999	30	1	mm(Drain)
13	P-13	Ultrasonic sensor (Drain pump) long distance	1	999	80	1	mm(Drain)

- P-1 : Drain interval: Stops the ice machine and drains water at the operation interval set by the user.
  Can be set as 1, 2, 5, 10 hours (Default: 10 hours)

- P-2 : Drain time: Draining is executed during operation of the ice machine for the set amount of time (default: 5 seconds)

- P-3 : Sets the delay time until the compressor shuts down after the ice machine stops. (Default 30 seconds)

- P-4 : Sets the time the gear motor operates to empty the ice inside the evaporator when

the ice machine stops (Default: 90 seconds)

- P-5 : Sets the time for which the water supply valve operates after detecting low water level in the Ice Making stage (Default: 90 seconds)

- P-6 : Sets the cleaning operation time in cleaning mode (Default: 30 minutes)

- P-7 : Sets the number of rinsing motions in cleaning mode (Default: 3)

- P-8 : Sets the temperature unit the temperature sensor reads (Default: °F)

- P-9 : Sets the ice machine model (Default: UND)

- P-10 : Set ultrasonic sensor (Full ice) short distance value. (Default: 150mm)

- P-11 : Set ultrasonic sensor (Full ice) long distance value. (Default: 180mm)

- P-12 : Set ultrasonic sensor (Drain pump) short distance value. (Default: 30mm)

- P-13 : Set ultrasonic sensor (Drain pump) long distance value. (Default: 80mm)

3. Service Information

3.1. Parts Operation Check

3.1.1. Test Mode

1) Test to Enter Test Mode

- **Operation of major ice machine parts can be checked using Test Mode.**

Order	Display Control Board	Operation
1		If the product is operating, press and hold the 'Power' button for 5 seconds to stop the ice machine.
2		Press and hold the 'Wash' button for 5 seconds to enter test mode.
3		'oFF' is displayed on the display.
4		Press the 'Wash' button again to display C on the display, and the compressor beings operation.
5	-	Pressing the 'Wash' button again will display other parts, and the corresponding part will begin operation. For information about the order of parts operation, refer to the Test Mode Order Table.
6		With 'oFF' displayed on the display, press and hold the 'Wash' button for 5 seconds to close test mode. The mode also closes if no action is made for 3 minutes.

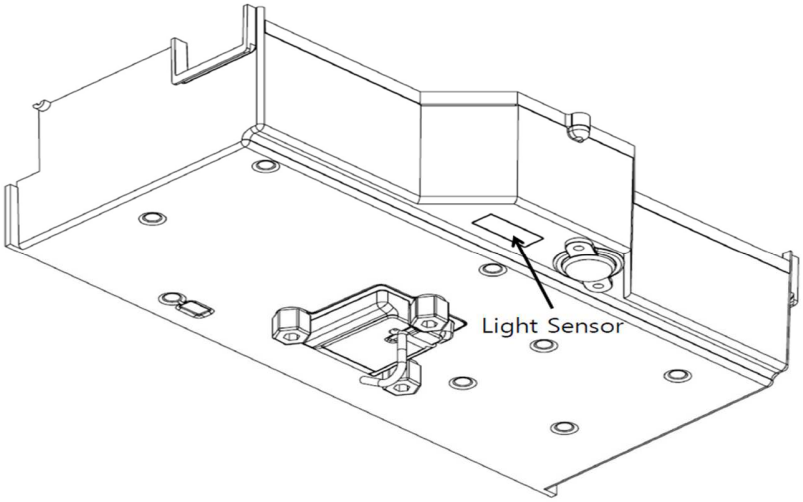
2) Test Mode Order

Order	Operation	Display	Details	Remarks
1	Each press of the 'Wash' button moves the menu to the next item	oFF	Test standby	
2		C	Compressor On	
			Fan motor On	
			Gear motor On	
3		≡	Water inlet valve On	
4		F	Fan motor On	
5		D	Drain valve On	
6		Gea	Gear motor On	
7		O	Over flow valve On	
8		P	Drain pump On	

* Parts that are not included in the machine will not be displayed.

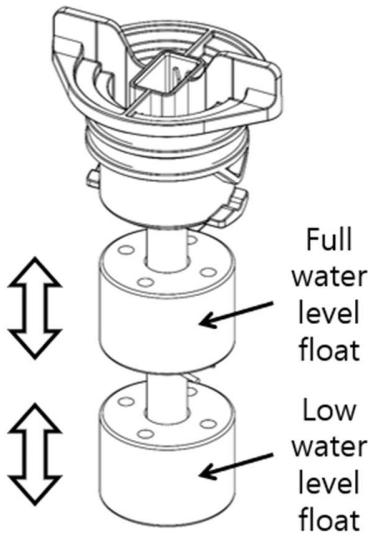
3.1.2. Sensor Operation Check

1) 'Ice Full' Sensor



- Operation check is possible when the ice machine is operating (Water supply stage, ice making stage)
- Block one of the two 'Ice Full' sensors Ultrasonic using a finger.
- If the sensor is operating properly, the display shows 'Ful' in 5 seconds (Ice full state).
- Remove the finger and the 'Ice Full' state is removed in 5 seconds.

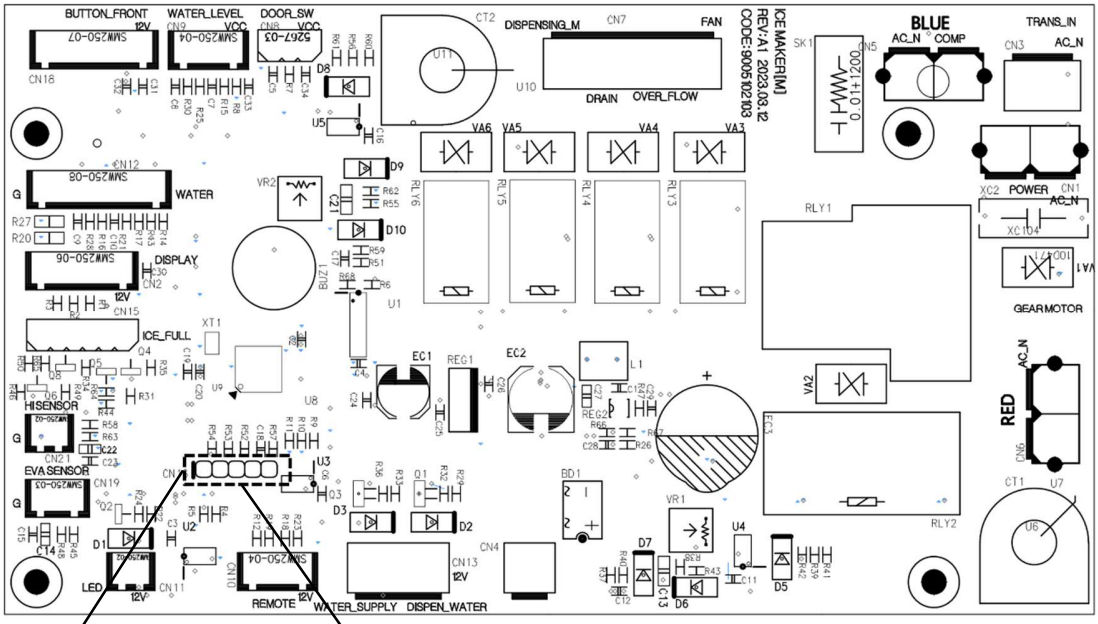
2) Water Level Sensor

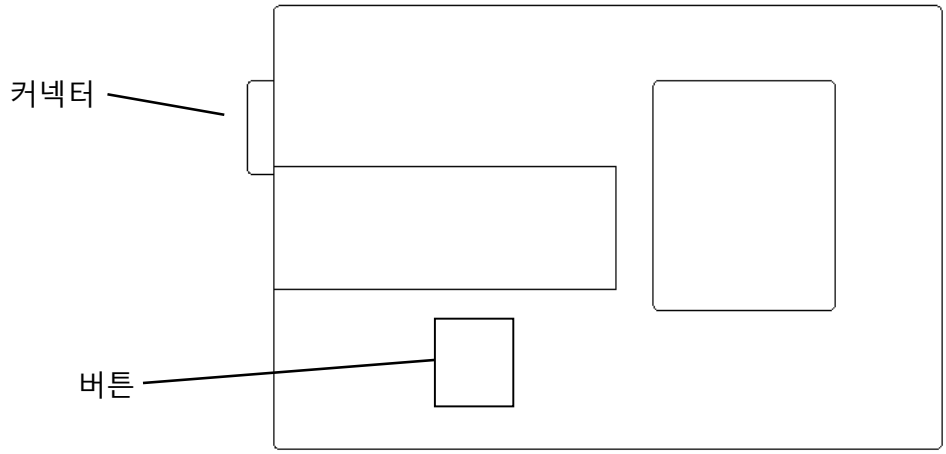


- Operation check is possible when the ice machine is operating (Water supply stage, ice making stage)
- Pulling down the low water level float will initiate water supply to the water tank.
- Pulling up the full water level float will stop water supply to the water tank.

Update of the Main Control Board Program

- **The program can be updated using EPGM+ without replacing the main control board.**



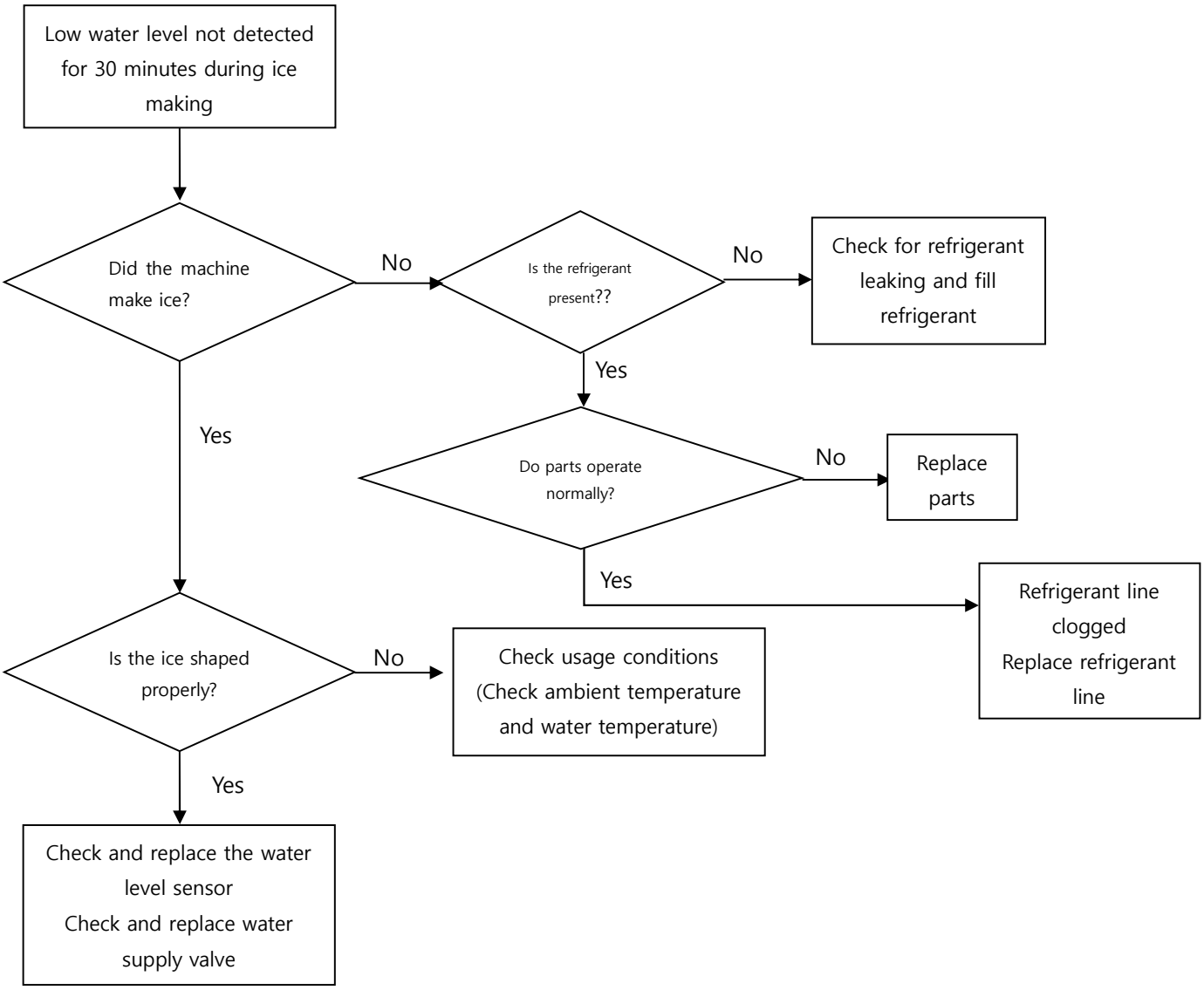


- If the ice machine is operating, press the 'On/Off' button to turn off the ice machine.
- Remove the main power supply.
  If the main power is connected to the ice machine, the program cannot be updated.
- Connect power to EPGM+, which contains the program.
- Connect the EPGM+ connector cable to the reset pin of the lighting pin on the main control board (Red line).

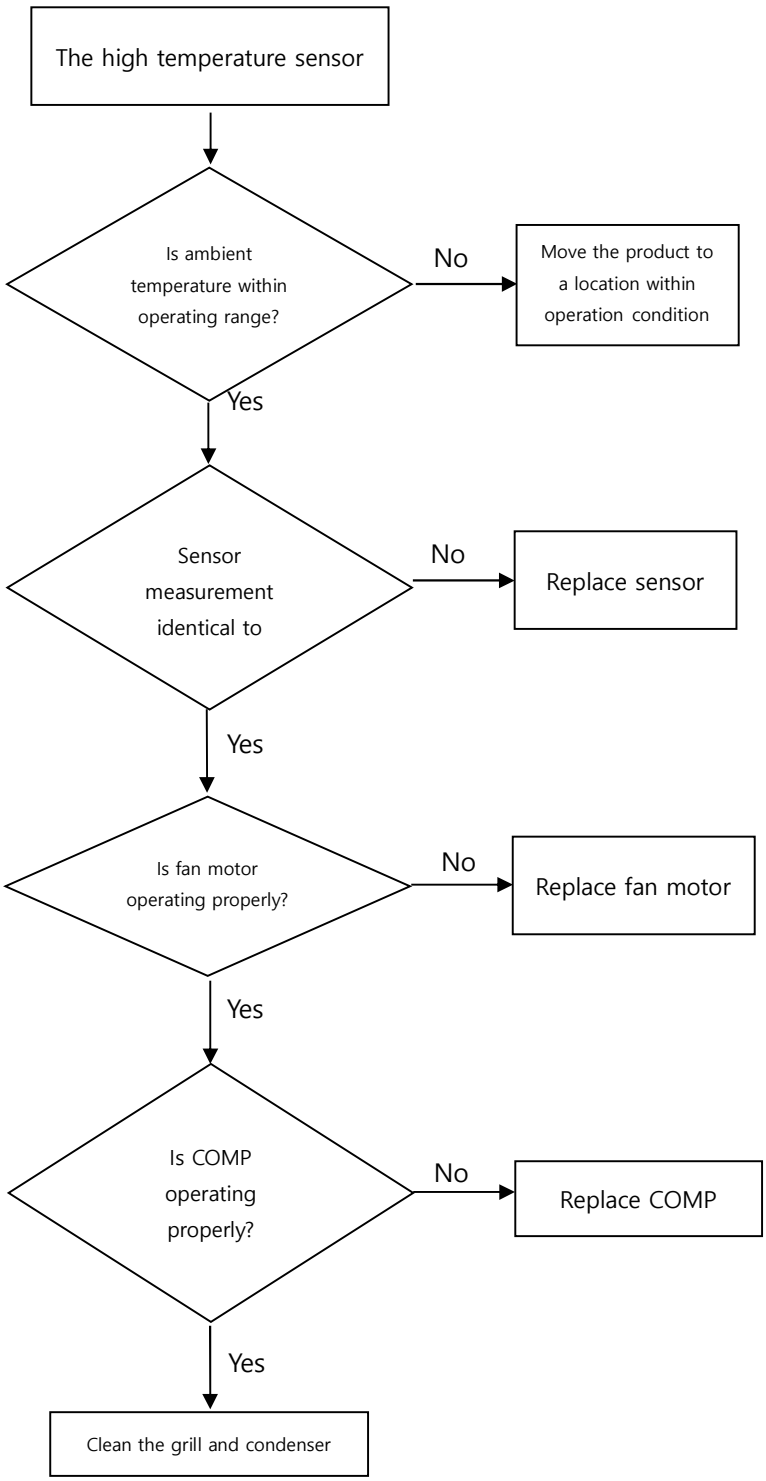
- Press the 'EPGM+' button.
- Once the program is updated, the process ends with a signal (Beep).

3.2. Correction of Error Codes

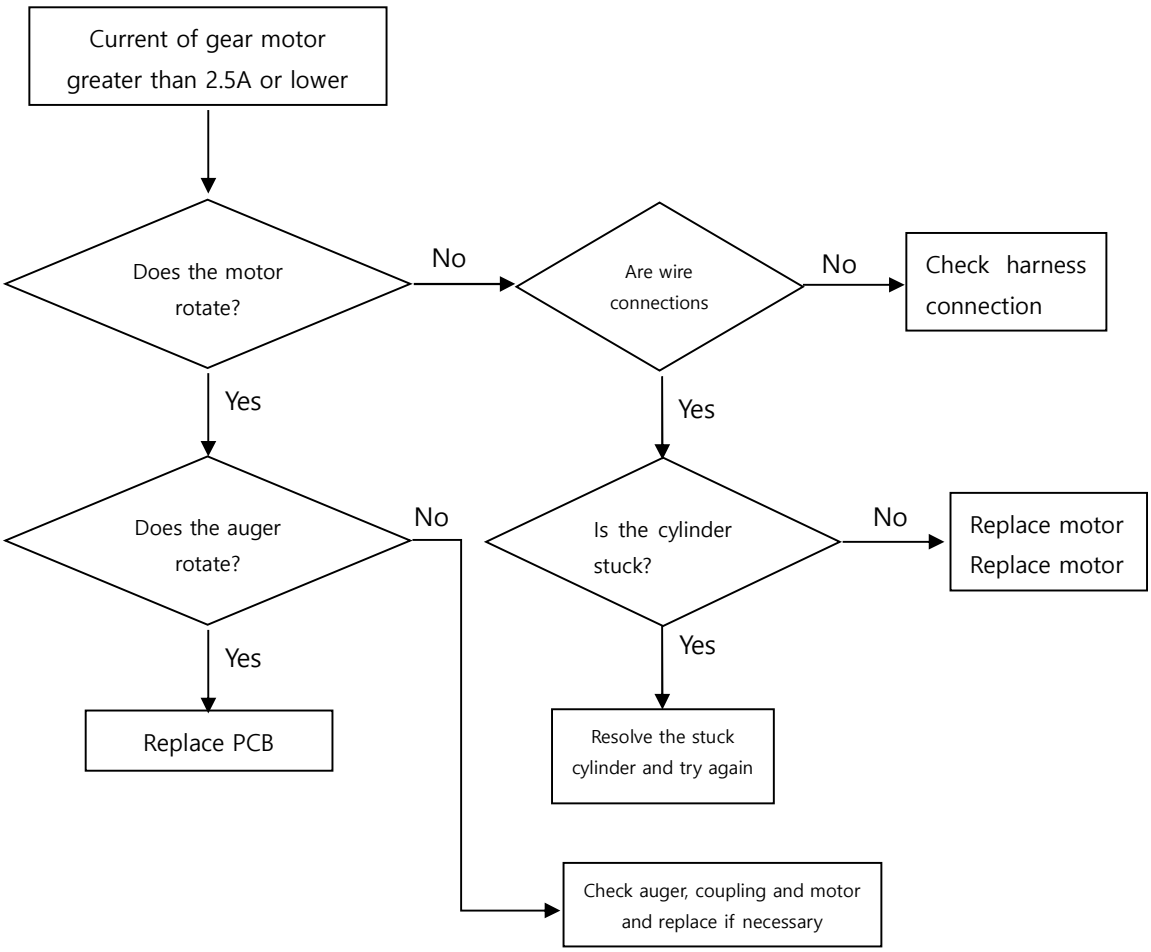
3.2.1. E01 Ice making time exceeded 30 minutes



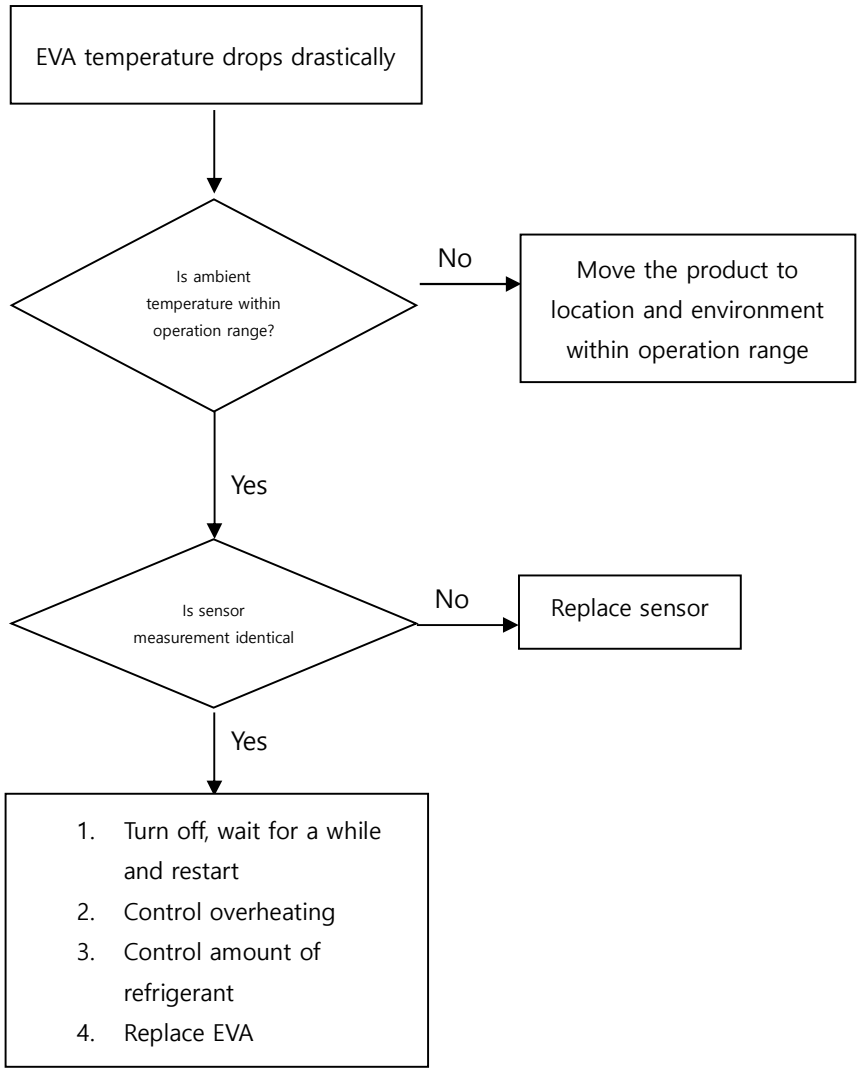
3.2.2. E02 High Temperature Sensor Error



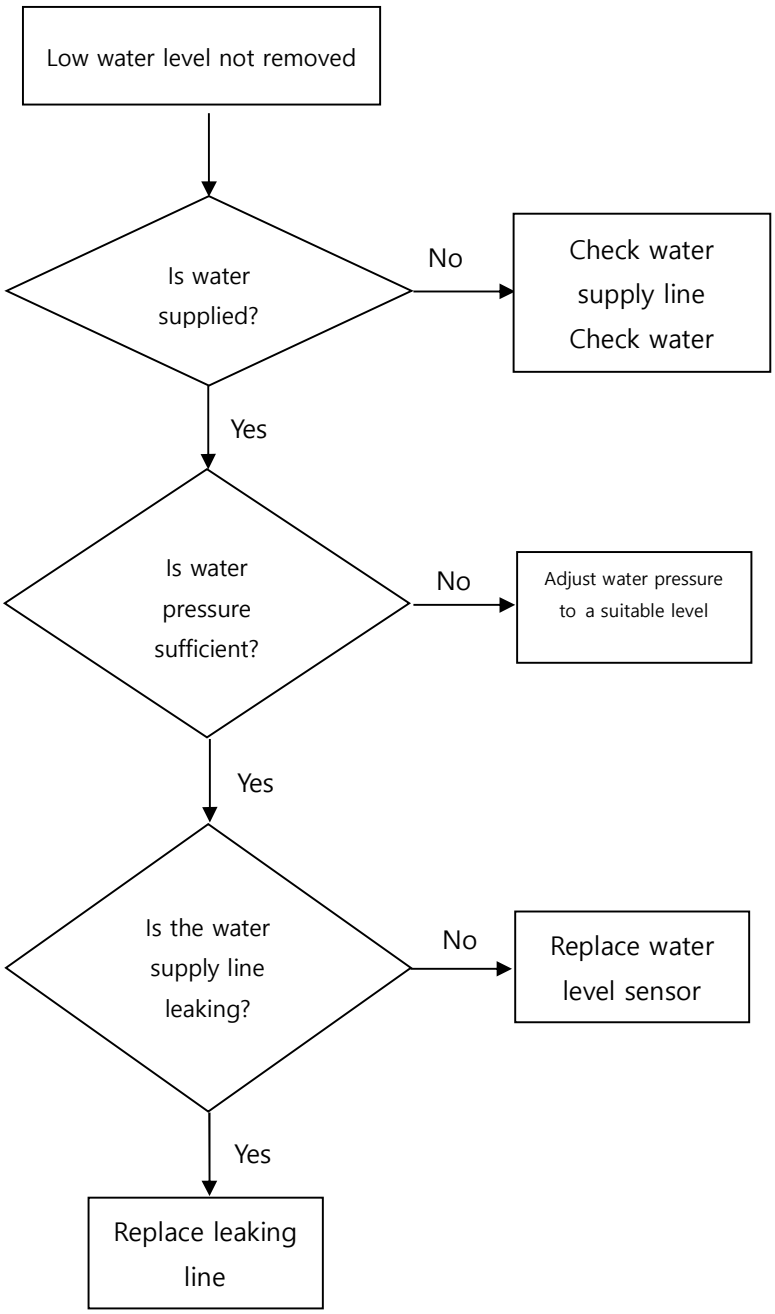
3.2.3. E03 Gear Motor Error



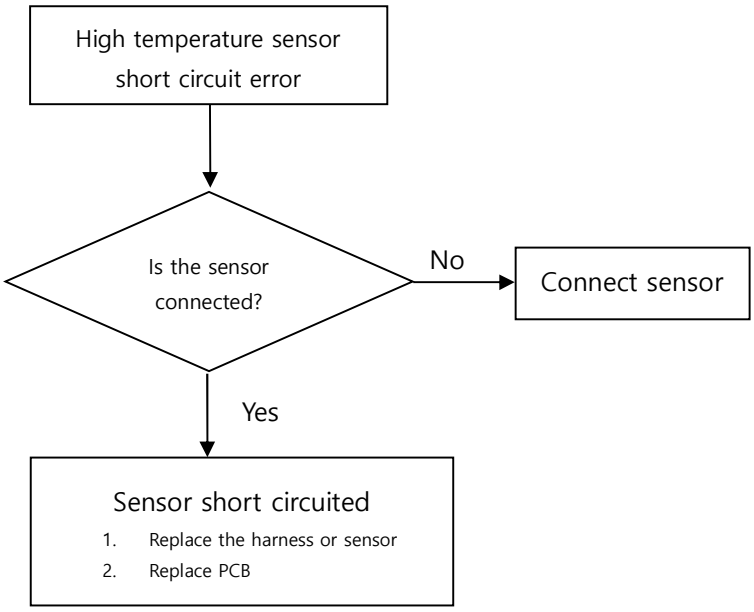
3.2.4. E04 EVA Icing Error



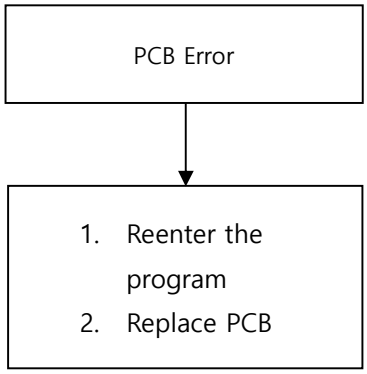
3.2.5. E05 Low Water Level Error



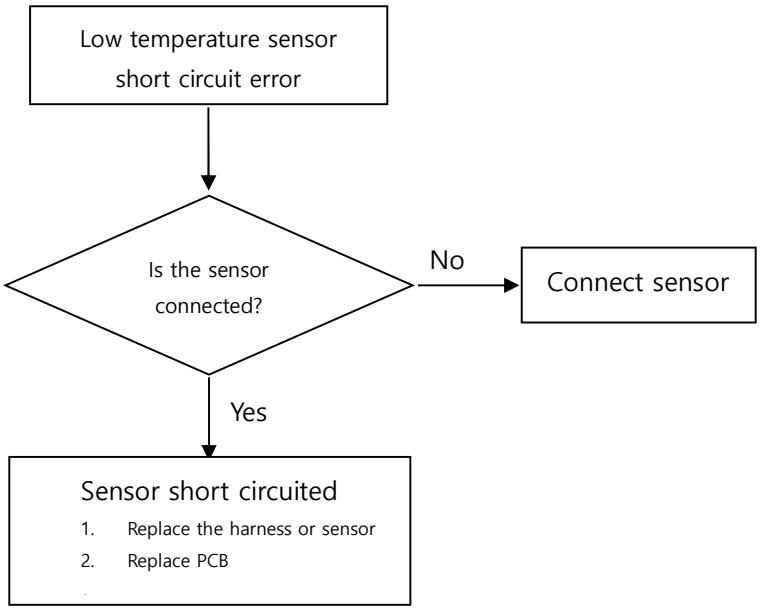
3.2.6. E06 High Temperature Sensor Error (Short Circuit)



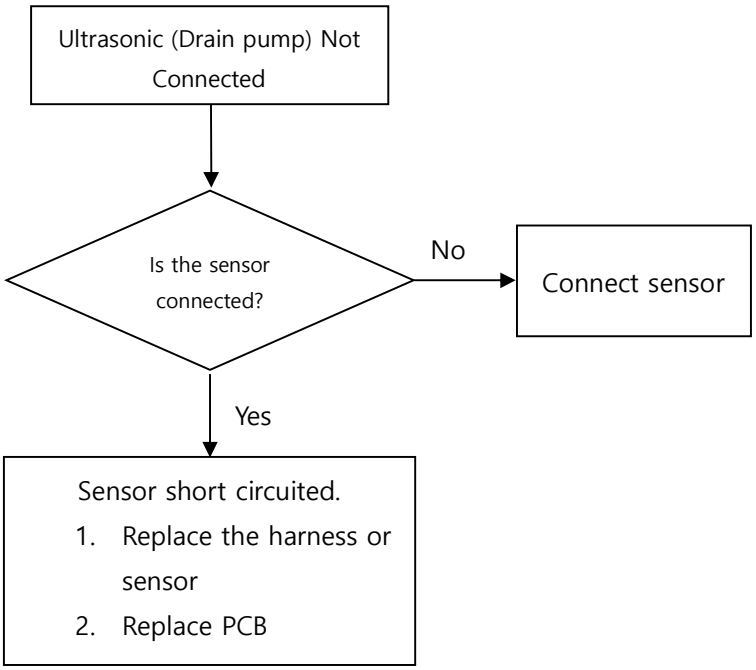
3.2.7. E07 EEPROM Error



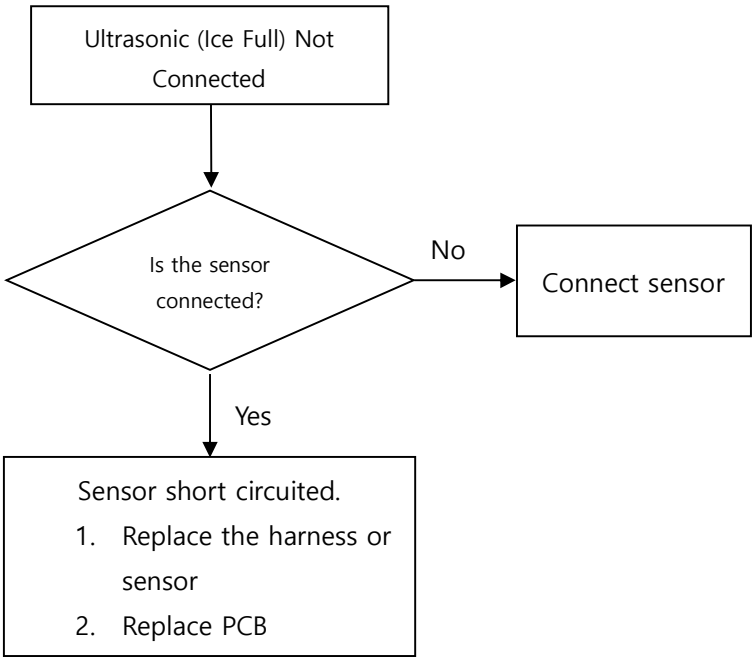
3.2.8. E08 Low Temperature Sensor Error (Short Circuit)



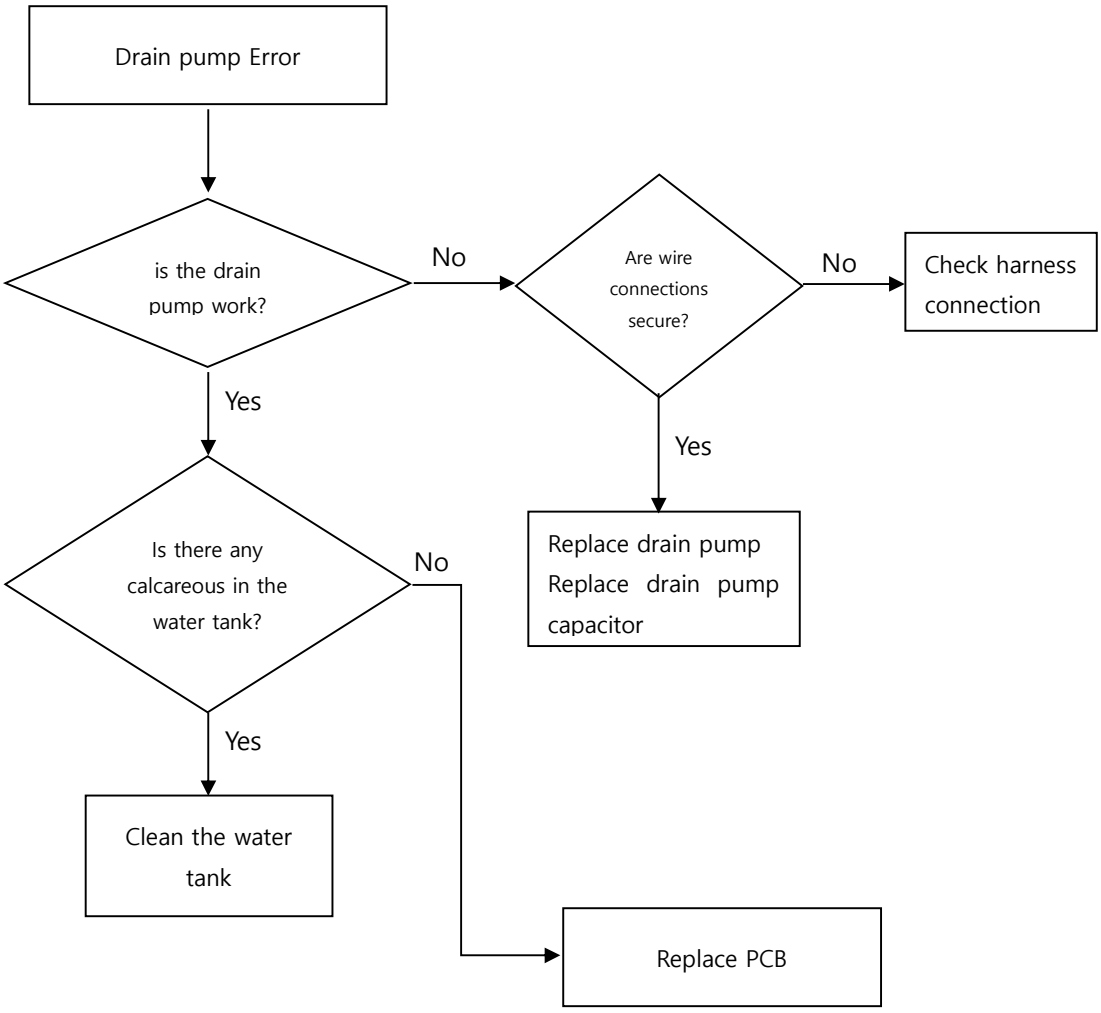
3.2.9. E09 Ultrasonic (Drain pump) Not Connected



3.2.10. E10 Ultrasonic (Ice Full) Not Connected



3.2.11. E11 Drain pump Error



3.3. Service Safety Information

3.3.1. Caution

⚠WARNING

- During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.

  Ensure that the apparatus is mounted securely.

  Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.
- Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.

  Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.

  Replace components only with parts specified by the manufacturer. Other parts can result in the ignition of refrigerant in the atmosphere from a leak.

  * NOTE The use of silicon sealant can inhibit the effectiveness of some types of leak detection equipment.

  Intrinsically safe components do not have to be isolated prior to working on them.
- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.
- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

  The following leak detection methods are deemed acceptable for all refrigerant systems.

  Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity might not be adequate, or might need recalibration.

  (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.

  Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.

  Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine can react with the refrigerant and corrode the copper pipe-work.

NOTE Examples of leak detection fluids are

– bubble method,

– fluorescent method agents.

If a leak is suspected, all naked flames shall be removed/extinguished.

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

- When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

    a) safely remove refrigerant following local and national regulations;

    b) purge the circuit with inert gas;

    c) evacuate (optional for A2L);

    d) purge with inert gas (optional for A2L);

    e) open the circuit by cutting or brazing.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times.

Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

- Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

    a) Become familiar with the equipment and its operation.

    b) Isolate the system electrically.

    c) Before attempting the procedure, ensure that:

        i) mechanical handling equipment is available, if required, for handling refrigerant cylinders;

        ii) all personal protective equipment is available and being used correctly;

        iii) the recovery process is supervised at all times by a competent person;

iv) recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.

e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

f) Make sure that cylinder is situated on the scales before recovery takes place.

g) Start the recovery machine and operate in accordance with instructions.

h) Do not overfill cylinders (no more than 80 % volume liquid charge).

i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

k) Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

- Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.
- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e., special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, FLAMMABLE REFRIGERANTS. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that FLAMMABLE REFRIGERANT does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

3.3.2. Service Manual Technology

- **Please familiarize yourself with the following points**

⚠WARNING
- The training should include the substance of the following. - Information about the explosion potential of FLAMMABLE REFRIGERANTS to show that flammables can be dangerous when handled without care. - Information about potential ignition sources, especially those that are not obvious, such as lighters, light switches, vacuum cleaners, electric heaters. - Information about the different safety concepts. - Safety of the appliance does not depend on ventilation of the housing. Switching off the appliance or opening of the housing has no significant effect on the safety. Nevertheless, it is possible that leaking refrigerant may accumulate inside the enclosure and flammable atmosphere will be released when the enclosure is opened. - Safety of the appliance depends on the ventilation of the room. Switching off the appliance or opening of the housing has no significant effect on the safety. The ventilation of the room should not be switched off during repair procedures. - Information about refrigerant detectors. a) Principle of function, including influences on the operation. b) Procedures, how to repair, check, or replace a refrigerant detector or parts of it in a safe way. c) Procedures, how to disable a refrigerant detector in case of repair work on the refrigerant carrying parts. - Information about the concept of sealed components and sealed enclosures according to IEC 60079-15. - Information about the correct working procedures. a) Commissioning i) Ensure that the floor area is sufficient for the REFRIGERANT CHARGE or that the ventilation duct is assembled in a correct manner. ii) Connect the pipes and carry out a leak test before charging with refrigerant. iii) Check safety equipment before putting into service. b) Maintenance i) Portable equipment is to be repaired outside or in a workshop specially equipped for servicing units with FLAMMABLE REFRIGERANTS. ii) Ensure sufficient ventilation at the repair place. iii) Be aware that malfunction of the equipment can be caused by refrigerant loss and a refrigerant leak is possible. iv) Discharge capacitors in a way that won't cause any spark. The standard procedure to short circuit the capacitor terminals usually creates sparks. v) Reassemble sealed enclosures accurately. If seals are worn, replace them. vi) Check safety equipment before putting into service.

c) Repair

i) Portable equipment is to be repaired outside or in a workshop specially equipped for servicing units with FLAMMABLE REFRIGERANTS.

ii) Ensure sufficient ventilation at the repair place.

iii) Be aware that malfunction of the equipment can be caused by refrigerant loss and a refrigerant leak is possible.

iv) Discharge capacitors in a way that won't cause any spark.

v) When brazing is required, the following procedures shall be carried out in the following order.

1) Safely remove the refrigerant following local and national regulations. If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.

2) Purge the refrigerant circuit with oxygen free nitrogen.

3) Evacuate the refrigerant circuit.

4) Purge the refrigerant circuit with nitrogen for 5 min (not required for A2L refrigerants).

5) Evacuate again (not required for A2L refrigerants).

6) Remove parts to be replaced by cutting or brazing.

7) Purge the braze point with nitrogen during the brazing procedure required for repair.

8) Carry out a leak test before charging with refrigerant.

vi) Reassemble sealed enclosures accurately. If seals are worn, replace them.

vii) Check safety equipment before putting into service.

d) Decommissioning

i) If the safety is affected when the equipment is putted out of service, the REFRIGERANT CHARGE is to be removed before decommissioning.

ii) Ensure sufficient ventilation at the equipment location.

iii) Be aware that malfunction of the equipment can be caused by refrigerant loss and a refrigerant leak is possible.

iv) Discharge capacitors in a way that will not cause any spark.

v) Remove the refrigerant. If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.

vi) When FLAMMABLE REFRIGERANTS except A2L REFRIGERANTS are used,

1) Evacuate the refrigerant circuit.

2) Purge the refrigerant circuit with nitrogen for 5 min.

3) Evacuate again.

4) Fill with nitrogen up to atmospheric pressure.

5) Put a label on the equipment that the refrigerant is removed.

e) Disposal

i) Ensure sufficient ventilation at the working place.

ii) Remove the refrigerant. If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.

iii) When FLAMMABLE REFRIGERANTS are used,

1) Evacuate the refrigerant circuit.

2) Purge the refrigerant circuit with oxygen free nitrogen.

3) Evacuate again (not required for A2L refrigerants).

4) Cut out the compressor and drain the oil.

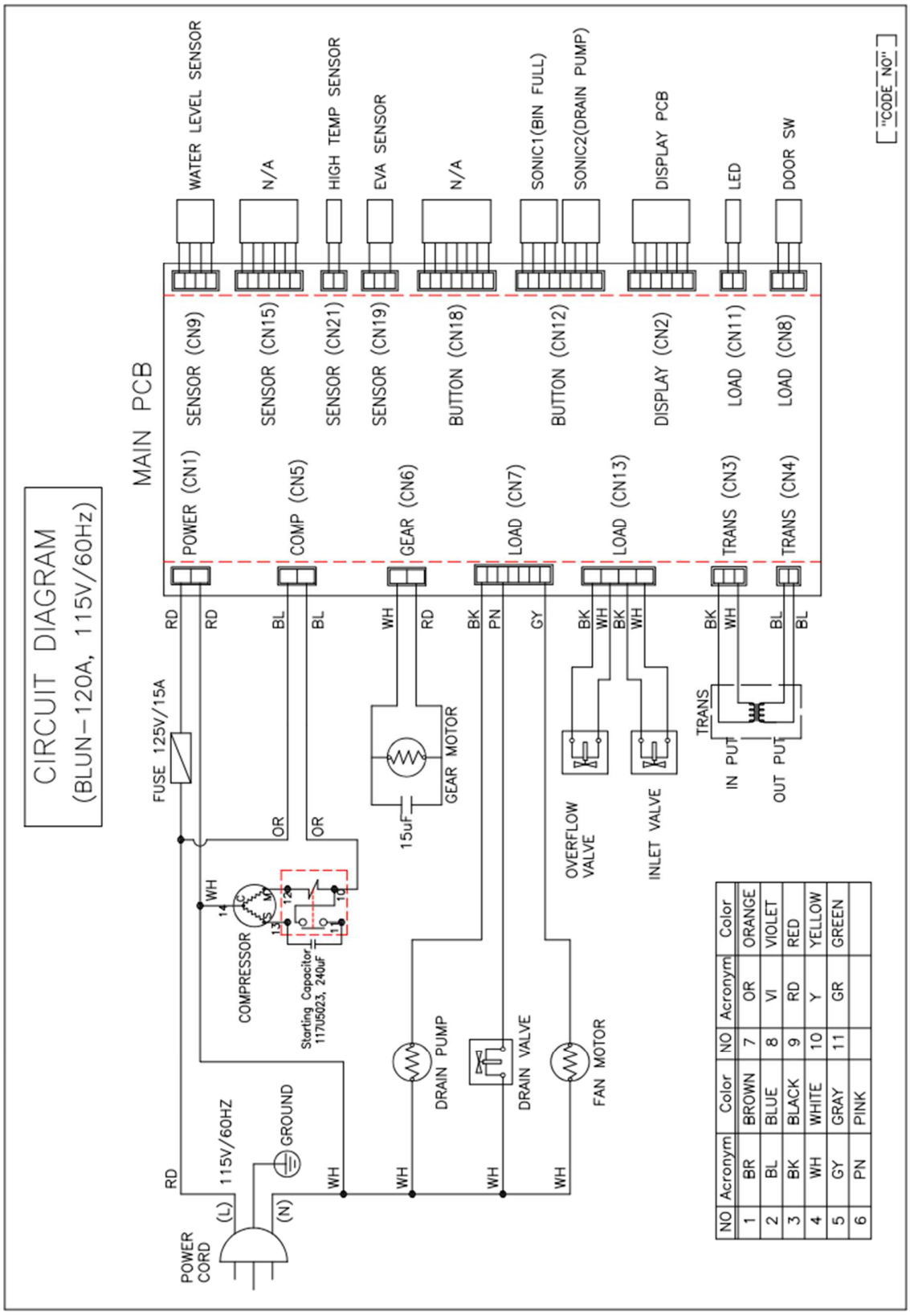
iv) Cut out the compressor and drain the oil.

4. Appendix

4.1. Circuit Diagram

4.1.1. BLUN-120A

1) 115V/60Hz



NO	Acronym	Color	NO	Acronym	Color
1	BR	BROWN	7	OR	ORANGE
2	BL	BLUE	8	VI	VIOLET
3	BK	BLACK	9	RD	RED
4	WH	WHITE	10	Y	YELLOW
5	GY	GRAY	11	GR	GREEN
6	PN	PINK			

4.2. Performance Data

4.2.1. BLUN-120A

1) 115V/60Hz

content	Ambient Temp (°F/°C)	Water temp(°F/°C)					
		50°F/10°C		70°F/21°C		90°F/32°C	
APPROXIMATE ICE PRODUCTION PER 24 HR. lbs./day (kg/day)	70/21	125.5	56.9	118.2	53.6	113.3	51.4
	80/27	117.5	53.3	112.2	50.9	105.8	48.0
	90/32	106.1	48.1	101.6	46.1	96.9	44.0
	100/38	94.1	42.7	89.2	40.5	85.2	38.7
APPROXIMATE ELECTRIC CONSUMPTION watts	70/21	268	--	269	--	270	--
	80/27	280	--	280	--	280	--
	90/32	289	--	290	--	290	--
	100/38	303	--	304	--	303	--
APPROXIMATE WATER CONSUMPTION PER 24 HR. (TOTAL) gal./day (l/day)	70/21	15.0	56.9	14.2	53.6	13.6	51.4
	80/27	14.1	53.3	13.4	50.9	12.7	48.0
	90/32	12.7	48.1	12.2	46.1	11.6	44.0
	100/38	11.3	42.7	10.7	40.5	10.2	38.7
EVAPOPATOR OUTLET TEMP. °F (℃)	70/21	30.8	-0.7	31.0	-0.6	30.9	-0.6
	80/27	31.1	-0.5	31.0	-0.5	31.0	-0.5
	90/32	31.1	-0.5	31.2	-0.4	31.3	-0.4
	100/38	31.3	-0.4	31.3	-0.4	31.2	-0.4
HEAD PRESSURE PSIG (kg/cm2G)	70/21	162.53	11.43	162.19	11.40	163.28	11.48
	80/27	188.08	13.22	188.51	13.25	188.55	13.26
	90/32	208.66	14.67	210.32	14.79	211.07	14.84
	100/38	239.52	16.84	240.14	16.88	240.18	16.89
SUCTION PRESSURE PSIG (kg/cm2G)	70/21	25.03	1.76	24.56	1.73	25.08	1.76
	80/27	27.97	1.97	28.26	1.99	28.30	1.99
	90/32	29.39	2.07	30.11	2.12	30.39	2.14
	100/38	33.38	2.35	33.71	2.37	33.71	2.37

4.3. Eva Sensor Date

T(℃)	Rcent(kΩ)	T(℃)	Rcent(kΩ)	T(℃)	Rcent(kΩ)	T(℃)	Rcent(kΩ)
-40	87.8	0	13.29	40	2.97	80	0.886
-39	83.3	1	12.75	41	2.87	81	0.862
-38	79.0	2	12.23	42	2.78	82	0.839
-37	75.0	3	11.73	43	2.69	83	0.817
-36	71.2	4	11.26	44	2.60	84	0.795
-35	67.6	5	10.81	45	2.52	85	0.774
-34	64.2	6	10.38	46	2.44	86	0.754
-33	61.0	7	9.97	47	2.36	87	0.734
-32	58.0	8	9.58	48	2.28	88	0.715
-31	55.1	9	9.21	49	2.21	89	0.697
-30	52.5	10	8.85	50	2.14	90	0.679
-29	49.9	11	8.51	51	2.08	91	0.661
-28	47.5	12	8.18	52	2.01	92	0.645
-27	45.2	13	7.87	53	1.95	93	0.628
-26	43.1	14	7.57	54	1.89	94	0.612
-25	41.0	15	7.28	55	1.83	95	0.597
-24	39.1	16	7.01	56	1.78	96	0.582
-23	37.2	17	6.75	57	1.72	97	0.568
-22	35.5	18	6.50	58	1.67	98	0.554
-21	33.9	19	6.26	59	1.62	99	0.540
-20	32.3	20	6.03	60	1.57	100	0.527
-19	30.8	21	5.80	61	1.53	101	0.514
-18	29.4	22	5.59	62	1.48	102	0.501
-17	28.1	23	5.39	63	1.44	103	0.489
-16	26.8	24	5.20	64	1.40	104	0.477
-15	25.6	25	5.01	65	1.35	105	0.466
-14	24.5	26	4.83	66	1.32	106	0.455
-13	23.4	27	4.66	67	1.28	107	0.444
-12	22.4	28	4.50	68	1.24	108	0.434
-11	21.4	29	4.34	69	1.21	109	0.423
-10	20.4	30	4.19	70	1.17	110	0.414
-9	19.6	31	4.04	71	1.14	111	0.404
-8	18.7	32	3.90	72	1.11	112	0.395
-7	17.9	33	3.77	73	1.08	113	0.385
-6	17.2	34	3.64	74	1.05	114	0.377
-5	16.4	35	3.52	75	1.02	115	0.368
-4	15.7	36	3.40	76	0.99	116	0.360
-3	15.1	37	3.29	77	0.96	117	0.351
-2	14.5	38	3.18	78	0.94	118	0.343
-1	13.9	39	3.07	79	0.91	119	0.336
0	13.3	40	2.97	80	0.89	120	0.328

4.4. High-temperature Sensor Data

T(℃)	Rcent(kΩ)	T(℃)	Rcent(kΩ)	T(℃)	Rcent(kΩ)	T(℃)	Rcent(kΩ)
-30.0	831.3	0.5	155.35	30.5	38.85	60.5	11.928
-29.5	806.5	1.0	151.51	31.0	38.03	61.0	11.714
-29.0	782.6	1.5	147.77	31.5	37.23	61.5	11.503
-28.5	759.4	2.0	144.14	32.0	36.45	62.0	11.297
-28.0	737.1	2.5	140.61	32.5	35.69	62.5	11.096
-27.5	715.4	3.0	137.17	33.0	34.95	63.0	10.898
-27.0	694.5	3.5	133.83	33.5	34.23	63.5	10.704
-26.5	674.2	4.0	130.57	34.0	33.52	64.0	10.515
-26.0	654.6	4.5	127.41	34.5	32.83	64.5	10.329
-25.5	635.6	5.0	124.33	35.0	32.150	65.0	10.147
-25.0	617.3	5.5	121.33	35.5	31.490	65.5	9.968
-24.5	599.5	6.0	118.41	36.0	30.845	66.0	9.793
-24.0	582.3	6.5	115.57	36.5	30.215	66.5	9.622
-23.5	565.6	7.0	112.81	37.0	29.599	67.0	9.454
-23.0	549.5	7.5	110.12	37.5	28.998	67.5	9.289
-22.5	533.9	8.0	107.50	38.0	28.410	68.0	9.128
-22.0	518.8	8.5	104.95	38.5	27.836	68.5	8.970
-21.5	504.1	9.0	102.47	39.0	27.275	69.0	8.815
-21.0	489.9	9.5	100.05	39.5	26.727	69.5	8.663
-20.5	476.2	10.0	97.70	40.0	26.191	70.0	8.514
-20.0	462.9	10.5	95.41	40.5	25.667	70.5	8.368
-19.5	450.0	11.0	93.17	41.0	25.155	71.0	8.225
-19.0	437.5	11.5	91.00	41.5	24.654	71.5	8.084
-18.5	425.3	12.0	88.88	42.0	24.165	72.0	7.947
-18.0	413.6	12.5	86.82	42.5	23.687	72.5	7.812
-17.5	402.2	13.0	84.81	43.0	23.219	73.0	7.680
-17.0	391.2	13.5	82.85	43.5	22.762	73.5	7.550
-16.5	380.5	14.0	80.95	44.0	22.315	74.0	7.423
-16.0	370.1	14.5	79.09	44.5	21.878	74.5	7.298
-15.5	360.0	15.0	77.28	45.0	21.450	75.0	7.175
-15.0	350.2	15.5	75.51	45.5	21.032	75.5	7.055
-14.5	340.8	16.0	73.79	46.0	20.623	76.0	6.938
-14.0	331.6	16.5	72.12	46.5	20.224	76.5	6.822
-13.5	322.7	17.0	70.48	47.0	19.833	77.0	6.709
-13.0	314.0	17.5	68.89	47.5	19.450	77.5	6.598
-12.5	305.6	18.0	67.34	48.0	19.076	78.0	6.489
-12.0	297.5	18.5	65.83	48.5	18.710	78.5	6.382
-11.5	289.6	19.0	64.35	49.0	18.352	79.0	6.277
-11.0	281.9	19.5	62.91	49.5	18.002	79.5	6.174
-10.5	274.5	20.0	61.51	50.0	17.659	80.0	6.073
-10.0	267.3	20.5	60.14	50.5	17.324	80.5	5.974
-9.5	260.2	21.0	58.81	51.0	16.996	81.0	5.876
-9.0	253.4	21.5	57.51	51.5	16.675	81.5	5.781
-8.5	246.8	22.0	56.24	52.0	16.360	82.0	5.687
-8.0	240.4	22.5	55.01	52.5	16.053	82.5	5.595
-7.5	234.2	23.0	53.80	53.0	15.752	83.0	5.505
-7.0	228.1	23.5	52.62	53.5	15.457	83.5	5.416
-6.5	222.2	24.0	51.47	54.0	15.169	84.0	5.330
-6.0	216.5	24.5	50.35	54.5	14.887	84.5	5.244
-5.5	210.96	25.0	49.26	55.0	14.611	85.0	5.160
-5.0	205.56	25.5	48.19	55.5	14.340	85.5	5.078
-4.5	200.32	26.0	47.15	56.0	14.076	86.0	4.998
-4.0	195.23	26.5	46.14	56.5	13.816	86.5	4.918
-3.5	190.28	27.0	45.15	57.0	13.563	87.0	4.841
-3.0	185.47	27.5	44.18	57.5	13.314	87.5	4.764
-2.5	180.79	28.0	43.24	58.0	13.071	88.0	4.689
-2.0	176.25	28.5	42.32	58.5	12.833	88.5	4.616
-1.5	171.83	29.0	41.42	59.0	12.600	89.0	4.543
-1.0	167.53	29.5	40.54	59.5	12.371	89.5	4.472

-0.5	163.36	30.0	39.68	60.0	12.147	90.0	4.403
0.0	159.30						