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REVISED: SEPT. 2, 1989

SERVICE MANUAL

Modular Flaker

F-1101AU
F-1101ASU-1
F-1101AWU

HOSHIZAKI ELECTRIC CO., LTD.

FOREWORD

This Service Manual contains the specifications and the information in regard to transporting, unpacking, installing, operating and servicing the machine. You are encouraged to read it thoroughly in order to obtain maximum performance. You will find details on the construction, installation and maintenance.

If you encounter any problem not covered in this Service Manual, feel free to contact Hoshizaki America, Inc. We will be happy to provide whatever assistance is necessary.

Keep this Service Manual handy, and read it again when questions arise.

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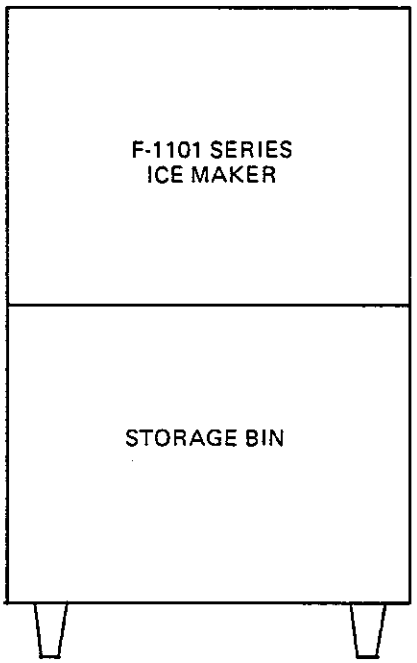
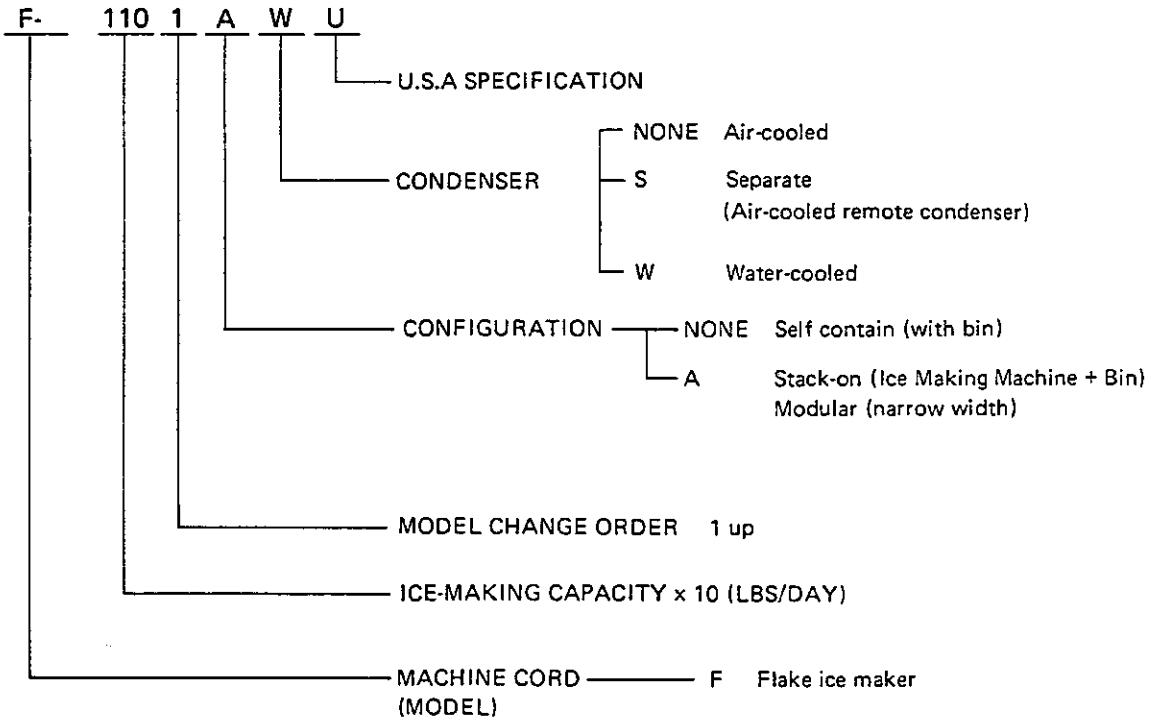
A. IDENTIFYING OF MODEL NUMBER





SPECIFICATION	NO. 83027	ISSUED Feb. 18, 1983
ITEM	HOSHIZAKI FLAKE ICE MAKER	
MODEL	F-1101AU	

AC SUPPLY VOLTAGE	230/240V 1 phase 60Hz
AMPERAGE	6.8 AMPS
ELECTRIC CONSUMPTION	1640W Ambient temp. 90°F /Water temp. 70°F
MAXIMUM FUSE SIZE	15 AMPS
MINIMUM CIRCUIT AMPACITY	15 AMPS

APPROXIMATE ICE PRODUCTION PER 24 HOURS

Ambient temp.	Water temp.		
	50°F (10°C)	70°F (21°C)	90°F (32°C)
70°F (21°C)	1054 lbs. (478 kg)	972 lbs. (441 kg)	917 lbs. (416 kg)
80°F (27°C)	981 lbs. (445 kg)	908 lbs. (412 kg)	862 lbs. (391 kg)
90°F (32°C)	917 lbs. (416 kg)	853 lbs. (387 kg)	827 lbs. (375 kg)
100°F (38°C)	853 lbs. (387 kg)	809 lbs. (367 kg)	780 lbs. (354 kg)

SHAPE OF ICE	Flake
APPROXIMATE STORAGE CAPACITY	Moduler
APPROXIMATE WATER CONSUMPTION PER 24 HOURS	126 gallons (478 ℓ) Ambient temp. 70°F/Water temp. 50°F 102 gallons (387 ℓ) Ambient temp. 90°F/Water temp. 70°F
DIMENSIONS	30" (762 mm) (W) x 26-1/2" (673 mm) (D) x 29-1/2" (750 mm) (H)
EXTERIOR	Brushed stainless steel (clear lacquer-coated front panel)
ICE MAKING SYSTEM	Auger type
HARVESTING SYSTEM	Direct driven Auger (200W gear motor)
WATER SUPPLY SYSTEM	Direct connection, 1/2" FPT
DRAINING SYSTEM	Over flow 27/32"DIA., Drain pan 3/4"DIA.
COMPRESSOR	Output 750W Model KL100TD-3
CONDENSER	Fin and tube type forced air cooling
EVAPORATOR	Copper tube on cylinder
REFRIGERANT CONTROL	Constant Pressure Expansion Valve
DESIGN PRESSURE	HI-400PSIG (28.1 kg/cm²G), LO-230PSIG (16.1 kg/cm²G)
REFRIGERANT CHARGE	R-502 1 lb. 12oz (800 g)
BIN CONTROL	Proximity Switch
ICE MAKING WATER CONTROL	Float Switch and Water Valve
CONTROL CIRCUIT PROTECTION	Fuse (1A)
OVERLOAD PROTECTION	Motor protector (Compressor and Gear Motor)
LOW WATER PROTECTION	Float switch and Timer to stop Compressor and Gear Motor
REFRIGERANT CIRCUIT	Pressure Switch
WEIGHT	Net weight 265 lbs. (120 kg), Gross weight 300 lbs. (136 kg)
ACCESSORIES	Fuse (1A), Scoop, Thumbscrew, Bin Control Assembly
OPERATION CONDITIONS	
AMBIENT TEMP.	45–100°F (7–38°C)
WATER SUPPLY PRESSURE	7–113 PSIG (0.5–8 kg/cm²G)
VOLTAGE RANGE	Rated voltage ±10%

NOTE: Performance data shown are typical data from ice maker with properly adjusted expansion valve etc. in 230V. These data are directly related to adjustment or maintenance of each part.

SPECIFICATION	NO. 83029	ISSUED Feb. 18, 1983
ITEM	HOSHIZAKI FLAKE ICE MAKER	
MODEL	F-1101ASU-1	

AC SUPPLY VOLTAGE	230/240V 1 Phase 60Hz
AMPERAGE	6.8 AMPS
ELECTRIC CONSUMPTION	1650W Ambient temp. 90°F /Water temp. 70°F
MAXIMUM FUSE SIZE	15 AMPS
MINIMUM CIRCUIT AMPACITY	15 AMPS

APPROXIMATE ICE PRODUCTION PER 24 HOURS

Ambient temp.	Water temp.		
	50°F (10°C)	70°F (21°C)	90°F (32°C)
70°F (21°C)	1054 lbs. (478 kg)	972 lbs. (441 kg)	917 lbs. (416 kg)
80°F (27°C)	981 lbs. (445 kg)	908 lbs. (412 kg)	862 lbs. (391 kg)
90°F (32°C)	917 lbs. (416 kg)	853 lbs. (387 kg)	827 lbs. (375 kg)
100°F (38°C)	853 lbs. (387 kg)	809 lbs. (367 kg)	780 lbs. (354 kg)

SHAPE OF ICE	Flake
APPROXIMATE STORAGE CAPACITY	Moduler
APPROXIMATE WATER CONSUMPTION PER 24 HOURS	126 gallons (478 ℓ) Ambient temp. 70°F/Water temp. 50°F 102 gallons (387 ℓ) Ambient temp. 90°F/Water temp. 70°F
DIMENSIONS	30" (762 mm) (W) x 26-1/2" (673 mm) (D) x 29-1/2" (750 mm) (H)
EXTERIOR	Brushed stainless steel (clear lacquer-coated front panel)
ICE MAKING SYSTEM	Auger type
HARVESTING SYSTEM	Direct driven Auger (200W gear motor)
WATER SUPPLY SYSTEM	Direct connection, 1/2" FPT
DRAINING SYSTEM	Over flow 27/32"DIA., Drain pan 3/4"DIA.
COMPRESSOR	Output 750W Model KL100TD-3
CONDENSER	Fin and tube air cooling (Remote type)
EVAPORATOR	Copper tube on cylinder
REFRIGERANT CONTROL	Constant Pressure Expansion Valve
DESIGN PRESSURE	HI-400PSIG (28.1 kg/cm²G), LO-230PSIG (16.1 kg/cm²G)
REFRIGERANT CHARGE	R-502 5 lbs. 1oz (2300 g) [ICE MAKER 3 lbs. 1oz · CONDENSER UNIT 2 lbs]
BIN CONTROL	Proximity Switch
ICE MAKING WATER CONTROL	Float Switch and Water Valve
ELECTRIC CIRCUIT PROTECTION	Fuse (1A)
OVERLOAD PROTECTION	Motor protecter (Compressor and Gear Motor)
LOW WATER PROTECTION	Float switch and Timer to stop Compressor and Gear Motor
REFRIGERANT CIRCUIT	Pressure Switch
WEIGHT	Net weight 254 lbs. (115 kg), Gross weight 290 lbs. (131 kg)
ACCESSORIES	Fuse (1A), Scoop, Tumbscrew, Bin Control Assembly
OPERATION CONDITIONS	
AMBIENT TEMP.	45–100°F (7–38°C)
WATER SUPPLY PRESSURE	7–113 PSIG (0.5–8 kg/cm²G)
VOLTAGE RANGE	Rated voltage ±10%

NOTE: Remote air cooled models should be used with HOSHIZAKI CONDENSER UNIT MODEL S-0387-1 (See Page 7). Performance data shown are typical data from ice maker with properly adjusted expansion valve etc. in 230V. These data are directly related to adjustment or maintenance of each part.

SPECIFICATION	NO. 83028	ISSUED Feb. 18, 1983
ITEM	HOSHIZAKI FLAKE ICE MAKER	
MODEL	F-1101AWU	

AC SUPPLY VOLTAGE	230/240V 1 phase 60Hz
AMPERAGE	5.8 AMPS
ELECTRIC CONSUMPTION	1470W Ambient temp. 90°F /Water temp. 70°F
MAXIMUM FUSE SIZE	15 AMPS
MINIMUM CIRCUIT AMPACITY	15 AMPS

APPROXIMATE ICE PRODUCTION PER 24 HOURS

Ambient temp.	Water temp.		
	50°F (10°C)	70°F (21°C)	90°F (32°C)
70°F (21°C)	1113 lbs. (505 kg)	1025 lbs. (465 kg)	961 lbs. (439 kg)
80°F (27°C)	1029 lbs. (467 kg)	959 lbs. (435 kg)	910 lbs. (413 kg)
90°F (32°C)	968 lbs. (439 kg)	901 lbs. (409 kg)	873 lbs. (396 kg)
100°F (38°C)	901 lbs. (409 kg)	853 lbs. (387 kg)	824 lbs. (374 kg)

SHAPE OF ICE	Flake
APPROXIMATE STORAGE CAPACITY	Moduler
APPROXIMATE WATER CONSUMPTION PER 24 HOURS	582 gallons (2.20 m^3) Ambient temp. 70°F /Water temp. 50°F 835 gallons (3.16 m^3) Ambient temp. 90°F /Water temp. 70°F
DIMENSIONS	30" (762 mm) (W) x 26-1/2" (673 mm) (D) x 29-1/2" (750 mm) (H)
EXTERIOR	Brushed stainless steel (clear laqcuer-coated front panel)
ICE MAKING SYSTEM	Auger type
HARVESTING SYSTEM	Direct driven Auger (200W gear motor)
WATER SUPPLY SYSTEM	Direct connection, 1/2" FPT
DRAINING SYSTEM	Over flow 27/32"DIA., Drain pan 3/4"DIA. Cooling water 1/2" FPT
COMPRESSOR	Output 750W Model KL100TD-3
CONDENSER	Double tube type water cooling
EVAPORATOR	Copper tube on cylinder
REFRIGERANT CONTROL	Constant Pressure Expansion Valve
DESIGN PRESSURE	HI-400PSIG (28.1 kg/cm^2G), LO-230PSIG (16.1 kg/cm^2G)
REFRIGERANT CHARGE	R-502 1 lb. 2oz (500 g)
BIN CONTROL	Proximity Switch
ICE MAKING WATER CONTROL	Float Switch and Water Valve
COOLING WATER CONTROL	Water Regulating Valve
ELECTRIC CIRCUIT PROTECTION	Fuse (1A)
OVERLOAD PROTECTION	Motor protecter (Compressor and Gear Motor)
LOW WATER PROTECTION	Float switch and Timer to stop Compressor and Gear Motor
REFRIGERANT CIRCUIT	Pressure Switch
WEIGHT	Net weight 254 lbs. (115 Kg), Gross weight 290 lbs. (131 kg)
ACCESSORIES	Fuse (1A), Scoop, Thumbscrew, Bin Control Assembly
OPERATION CONDITIONS	
AMBIENT TEMP.	45–100°F (7–38°C)
WATER SUPPLY PRESSURE	7–113 PSIG (0.5–8 kg/cm^2G)
VOLTAGE RANGE	Rated voltage ±10%

NOTE: Performance data shown are typical data from ice maker with properly adjusted expansion valve etc. in 230V. These data are directly related to adjustment or maintenance of each part.

C. DIMENSIONAL DRAWING

a. AIR COOLED MODELS

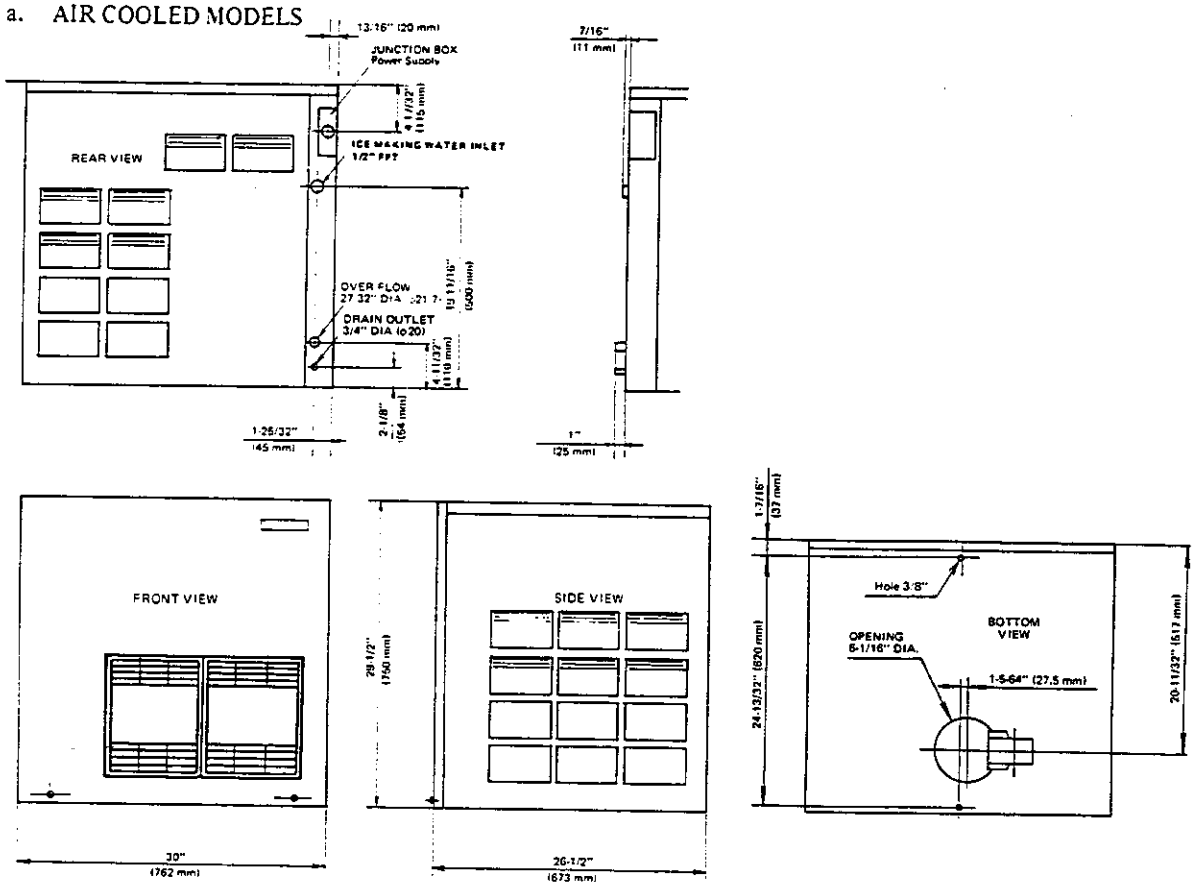


Fig. 1 Dimensional drawing for F-1101AU

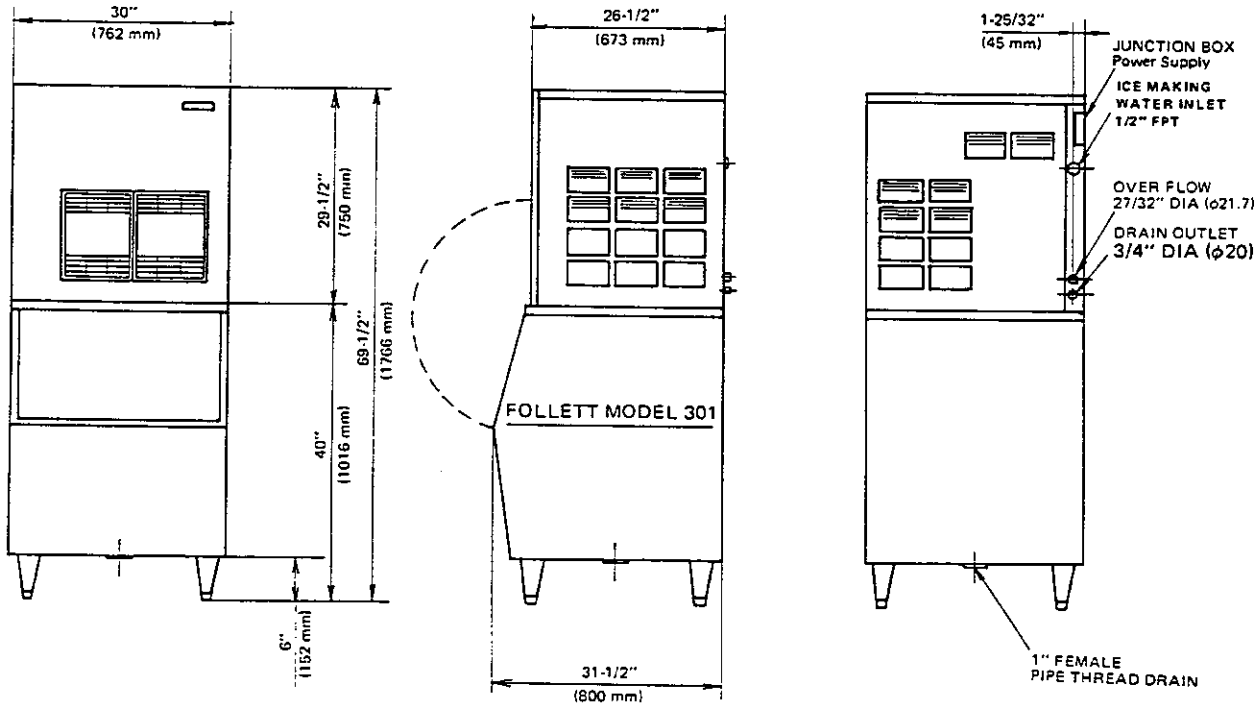


Fig. 2 Dimensional drawing for Ice Storage Bin Optional

b. REMOTE AIR COOLED MODELS

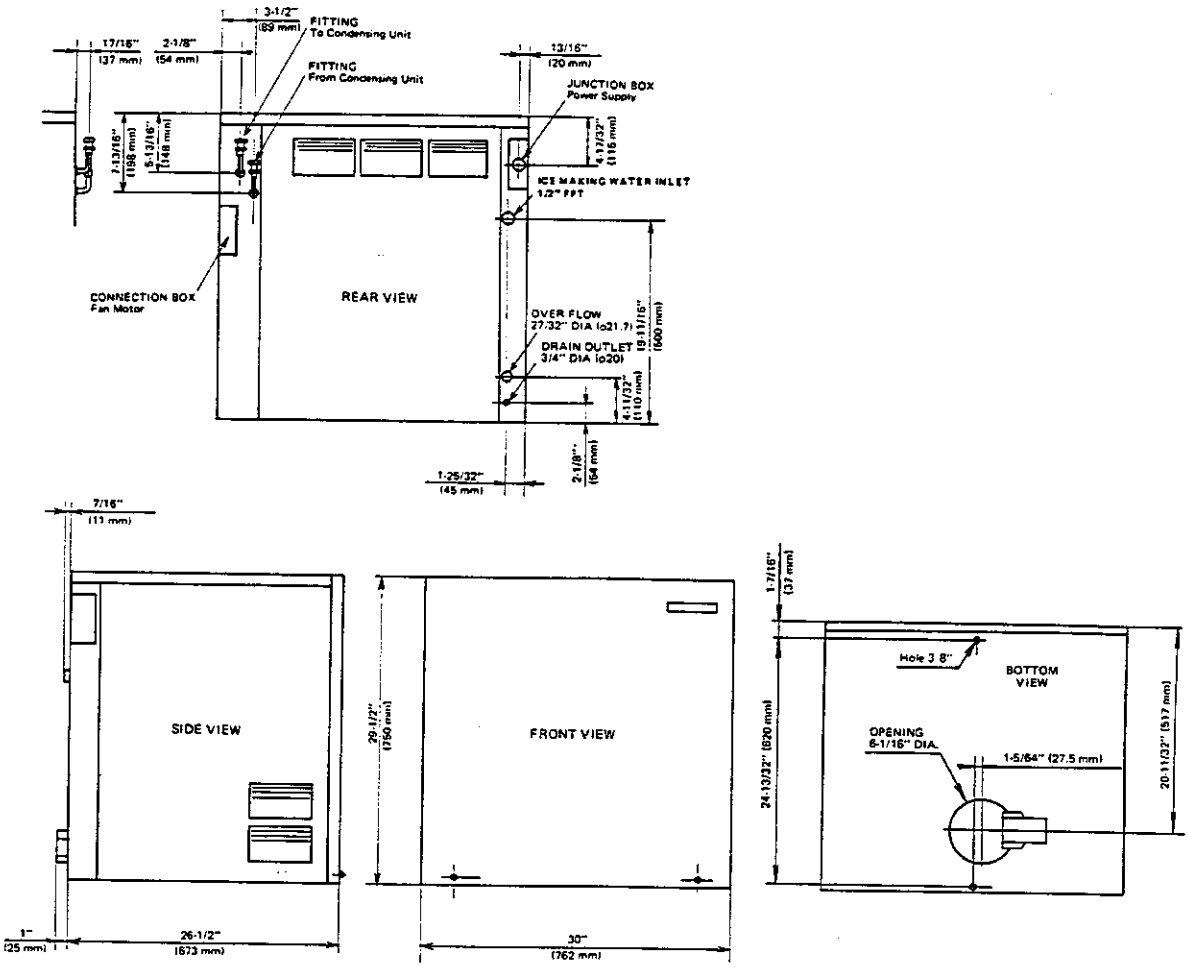


Fig. 3 Dimensional drawing for F-1101ASU-1

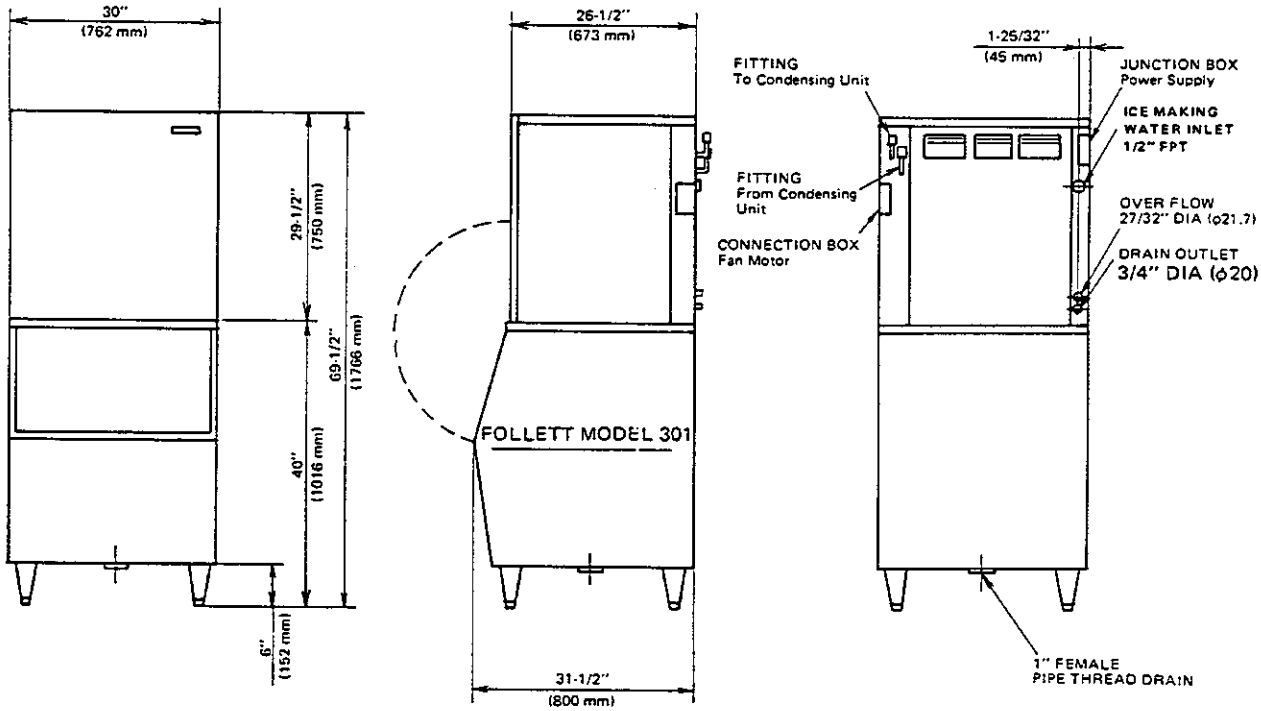


Fig. 4 Dimensional drawing for Ice Storage Bin Optional

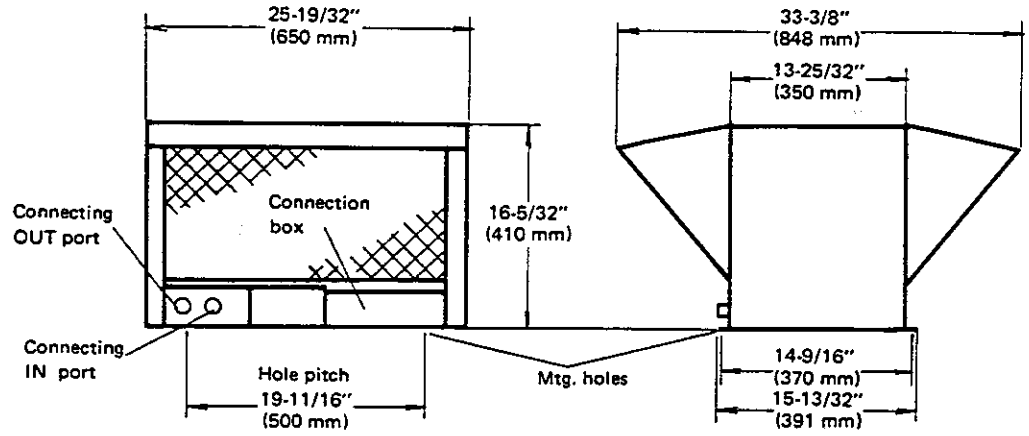


Fig. 5-1 Dimensional drawing for Condenser Unit

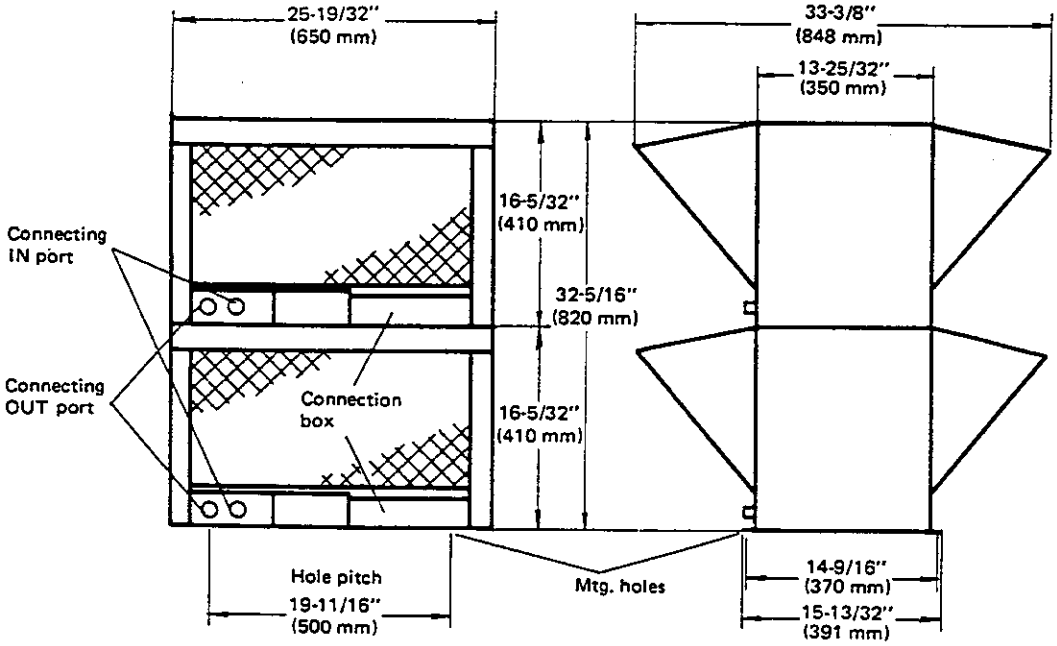


Fig. 5-2 Dimensional drawing for two Condenser Units

Remote Condenser Specifications

MODEL	HOSHIZAKI CONDENSER UNIT MODEL S-0387-1
EXTERIOR	Galvanized steel with polyester baked-on enamel
DIMENSIONS	
WIDTH	25-19/32" (650 mm)
DEPTH	33-3/8" (848 mm)
HEIGHT	16-5/32" (410 mm)
REFRIGERANT CHARGE	R-502 2 lbs. (900 g)
NET WEIGHT	51 lbs. (23 kg)
SHIPPING WEIGHT	62 lbs. (28 kg)
CONNECTING TO ICE MAKER	
REFRIGERANT CONNECTION	Quick connect refrigerant fittings
ELECTRICAL CONNECTION	Junction box
AMBIENT CONDITION	–20 ~ +110°F (–29 ~ +43°C)

c. WATER COOLED MODELS

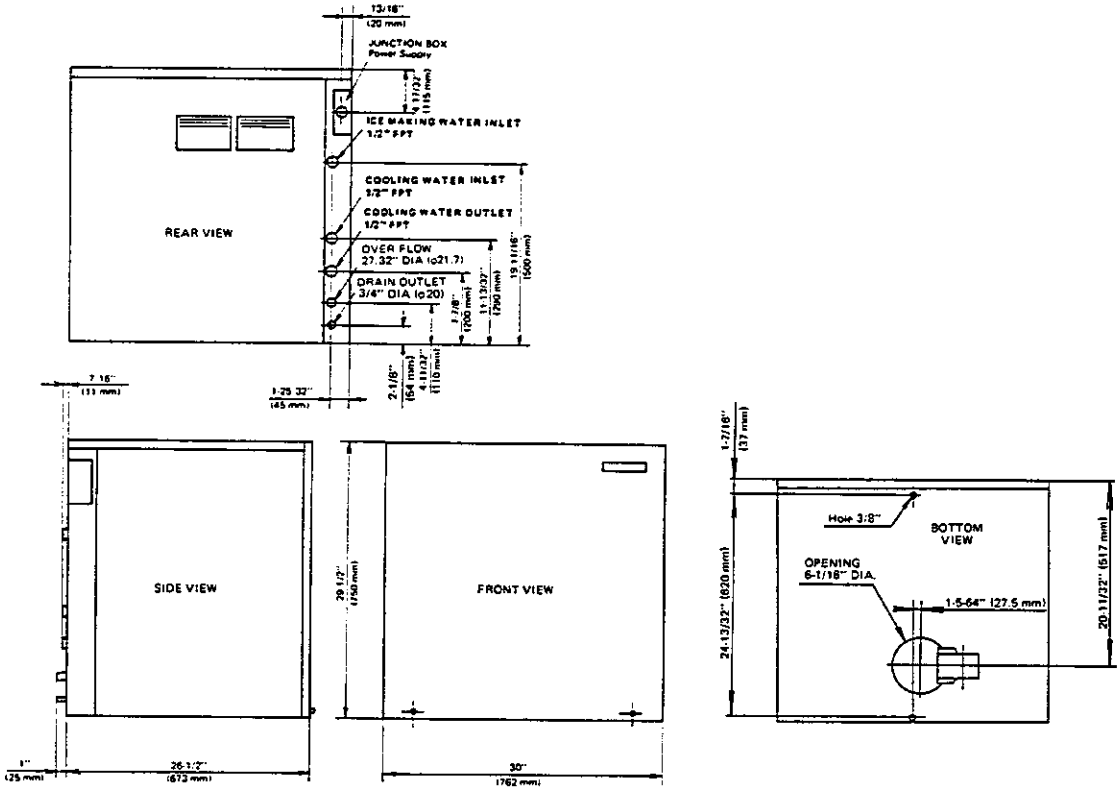


Fig. 6 Dimensional drawing for F-1101AWU

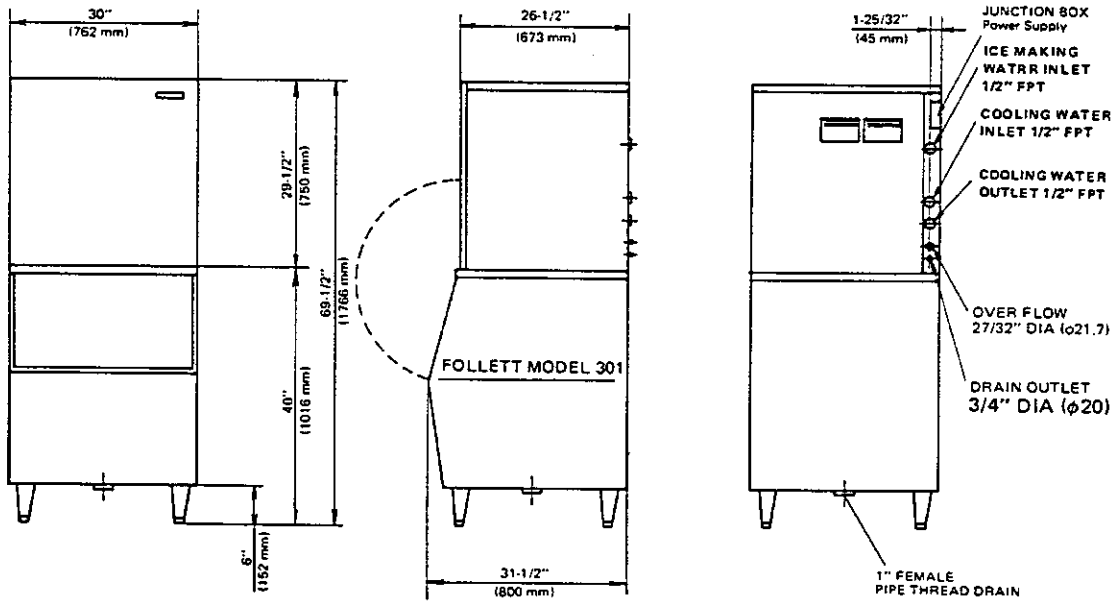


Fig. 7 Dimensional drawing for Ice Storage Bin Optional

2. TRANSPORTATION AND INSTALLATION

A. TRANSPORTATION

WARNING

During Transportation

1. Do not incline the ice maker more than 45°.
   Tipping the ice maker may cause a lubricant spill in the compressor and result in failure.
2. Carry/transport the ice maker carefully. Do not drop, handle roughly or allow to be impacted. Keep shipping tapes and supports in place until installation. Damage can easily result not only on the outside but on the inside (i.e., electricals may no longer function and thus make operation impossible).
3. Do not wet packing materials. Moisture will weaken the packing materials and cause the ice maker to be damaged mechanically or may result in failure of electrical components.
4. Do not step on packing. When piling up, fit each corner and do not pile more than 3.
   Otherwise, the ice maker may get damaged mechanically.

B. UNPACKING AND INSPECTION

1. Visually inspect the exterior of the shipping container. Any severe damage noted should be reported to the delivering carrier.
2. Do not dispose of packing materials until shipment is inspected.
3. Remove the shipping tapes and the front panel.
4. Remove the top panel.

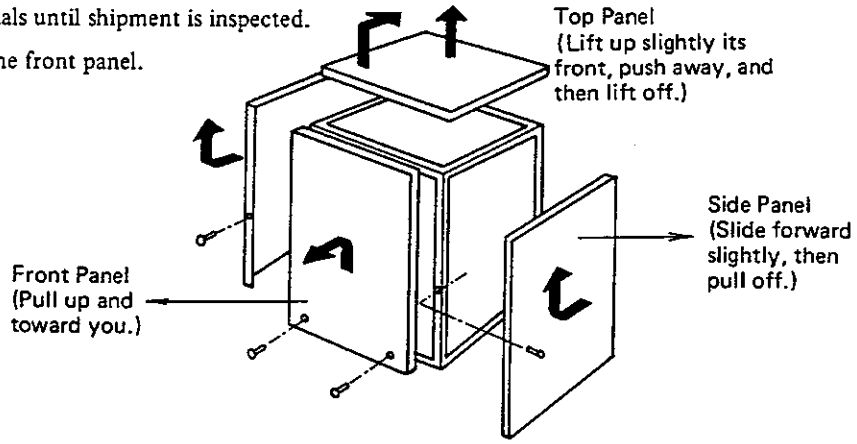


Fig. 8 Removal of cabinets

5. Inspect for any concealed damage.
   If damage is noticed, notify carrier immediately and ask to have it inspected.
6. Check to see that refrigerant lines do not touch other lines or surfaces, and that fan blade moves freely on air cooled models.

WARNING

Failure to check the above can lead to a failure (refrigerant leak in refrigerant circuit, etc.) that will make ice making impossible.

7. Take the accessories out of the ice maker.
8. Check that location source voltage corresponds with the voltage specified on the nameplate.
9. Remove the protective sheets on cabinets along the seams.

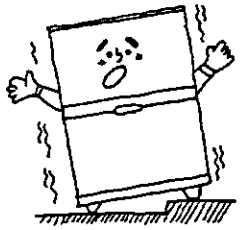
CAUTION

Remove protective sheets only after cabinets cool down after exposure to sun. Otherwise, sheet glue will have adhered to cabinets.

C. PLACE OF INSTALLATION

IMPORTANT

1. Install on a flat, firm surface.



Improper installation may result in upset, drainage failure, noise and vibration of the ice maker.

Fig. 9 Flat location

2. Do not install in a place where the ice maker is exposed to direct sunlight, rain, heat or water splashes. (This ice maker is for indoor use except the condenser unit.) Exposure to direct sunlight or heat will lead to greatly reduced ice production or melting of stored cubes. Electricals that become wet with rain or splash may malfunction and make ice making impossible. There is also the danger of electrical shock.

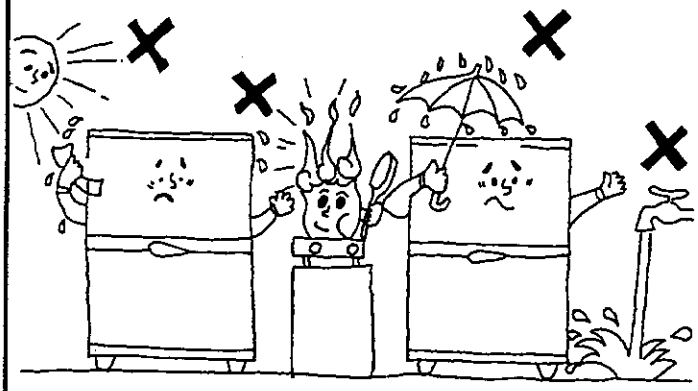


Fig. 10 Indoor use

3. Install in a place where the ambient temperature range is 45-100°F (7-38°C) and the water temperature range is 34-91°F (1-33°C). Ice maker will not work automatically if the ambient temperature is below 45°F (7°C). If the ambient temperature is sub-freezing, drain the ice maker in order to prevent the water pipes from freezing and bursting, referring to "SHUTDOWN FOR LOW AMBIENT AND FOR A LONG TIME."

   If the ice maker is operated at temperatures exceeding these limitations, the service life of the refrigerant circuit will be shortened.

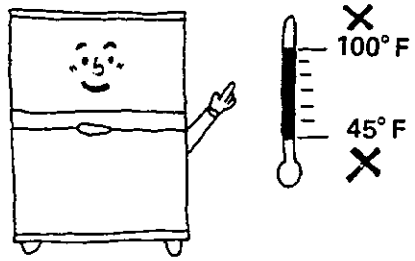


Fig. 11 Ambient temperature range

4. Do not install anywhere that drippage might damage floor or surroundings.
   Condensation may form on the cabinets during high humidity.

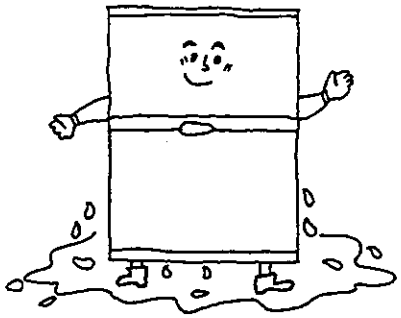


Fig. 12 Approval of drippage

5. Place where the water supply and drainage are handly. To prevent drainage backflow, ensure that the drain piping is lower than the drain outlet on the ice maker.
6. Allow space of more than 6" (15 cm) for ventilation on both sides and rear.
   Ice production may thus be hampered and operation may become well nigh impossible
7. Ice is a comestible, so keep the ice maker in a sanitary place.
   Unsanitary care can lead to contamination and possible food poisoning.
8. Be sure to ventilate, since the room temperature tends to rise. (except water cooled and remote air cooled models.)

D. INSTRUCTIONS FOR STACKABLE ICE MAKER INSTALLATION

Since this machine is without storage bin, storage bin is needed. Applicable storage bin is Follett Model 301.

a. ICE MAKER AND STORAGE BIN COMBINATION

1. After the storage bin carton has been removed, detach 4 legs from the inside of the storage bin.
2. Lay the storage bin on its back on blocks that are at least 3" high. *Be careful* not to damage the storage bin. Remove the bolts holding the skid to the storage bin.
3. Unpack the legs and screw them into the tapped holes provided in the storage bin bottom. *Be sure* that the legs are screwed in so that they are tight against the storage bin bottom.
4. Set the storage bin upright. Set it as close as possible to its final position while still allowing room for the ice maker installation. (After ice maker installation, the ice maker/storage bin combination can be moved to its final position.)

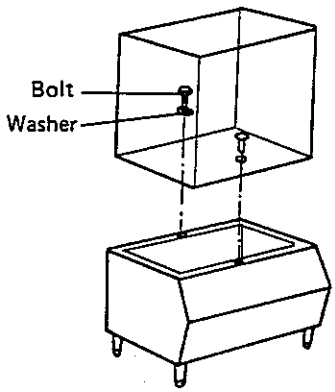


Fig. 13 Ice maker and bin combination

5. After unpacking, remove the cabinets as follows: (see Fig. 8).
   a. Front panel . . . . Pull up and toward you.
   b. Top . . . . . Lift up slightly its front, push away, and then lift off.
   c. Sides. . . . . Remove the screws and slide forward slightly, then pull off.
6. Remove the screws fastening the ice maker frame in the front and rear in the center.
7. Set the ice maker on top of the storage bin so that the front and rear frame holes line up with the corresponding holes in the bin top.

CAUTION

Do not attempt to slide the ice maker on the sealing gaskets. Raise and lower it until the proper alignment has been achieved.

8. Fasten the storage bin and ice maker in the front and rear in the center with the 2 bolts and plastic washers provided (see Fig. 13).
9. Clean the storage bin and the ice maker cabinets.
10. Secure the front panel using truss head screws provided (accessory).
11. Move the ice maker/storage bin combination to its permanent location.
12. Adjust the leg levelers so that the bin is level in both directions.
13. Position the latch (accessory) horizontally on the front panel of the ice maker as per Fig. 14. With the latch taped back and in position as shown, mark the latch location vertically.
14. Drill (2) 7/64" holes in the front panel for the latch.
15. Remove tape and install latch using the (2) 6 x 1/2" long sheet metal screws provided.

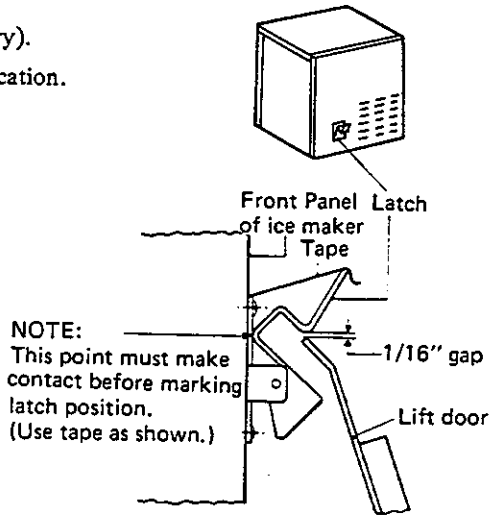


Fig. 14 Attachment of latch

CAUTION

In case you use other than the Hoshizaki-recommended storage bin, keep the following in mind.

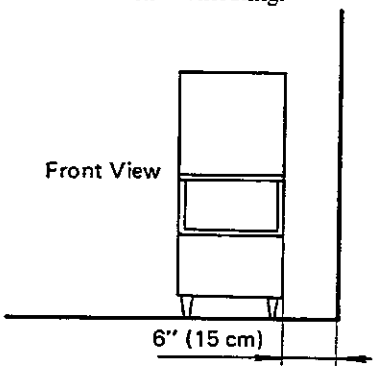
1. The ice maker must be joined to the top of the bin in such a manner that any voids between the bottom of the ice maker and the top of the bin are completely sealed.
   Entrance to such voids should not be possible from either the inside or outside of the bin.

   Sealing material must be smooth, nonporous, and nontoxic.
   Sealing material should be applied in a manner that prevents even a slight recess from occurring between the ice maker and the bin.

   Any provisions made to bolt the ice maker to the bin should not violate the above sealing requirements.
2. The ice maker/storage bin combination should be installed in a safe, steady manner so that there will be no tipping over. If you are going to use a storage bin not recommended by Hoshizaki, kindly consult with Hoshizaki America Inc., supplying information on storage bin height, leg pitch, weight and so on.

WARNING

Always keep a clearance of more than 6" (15 cm) at the back and right sides of the ice maker when installing it. Failure to do so may result in a serious failure from overheating.



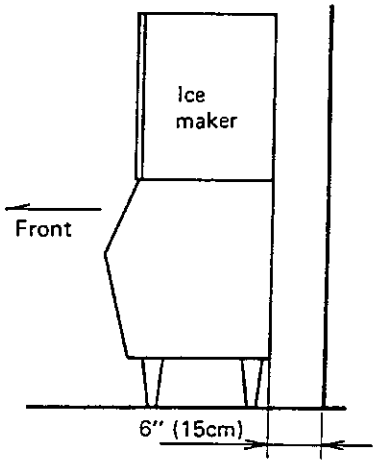
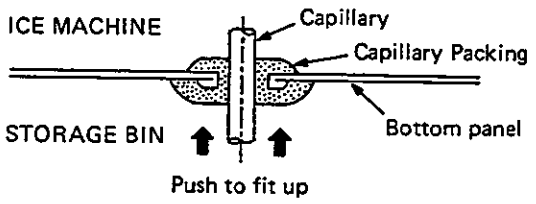


Fig. 15 Clearance around ice maker

E. INSTALLATION OF BIN CONTROL

1. Remove a truss head machine screw securing a bracket for Bin Control Assembly on the bottom of the Icemaker.
2. Put the Bulb of Bin Thermostat into storage bin through 10 mm dia. hole near the Chute opening.
3. Set the Capillary Packing (accessory) at the opening of Bottom panel as illustrated.



(SECTION A-A)

4. Put the Bulb of Bin Thermostat through the opening of Bulb holder as illustrated on the right.
5. Attach a Bin Control Assembly to the Bracket for Bin Control and secure by using three Thumbscrews.

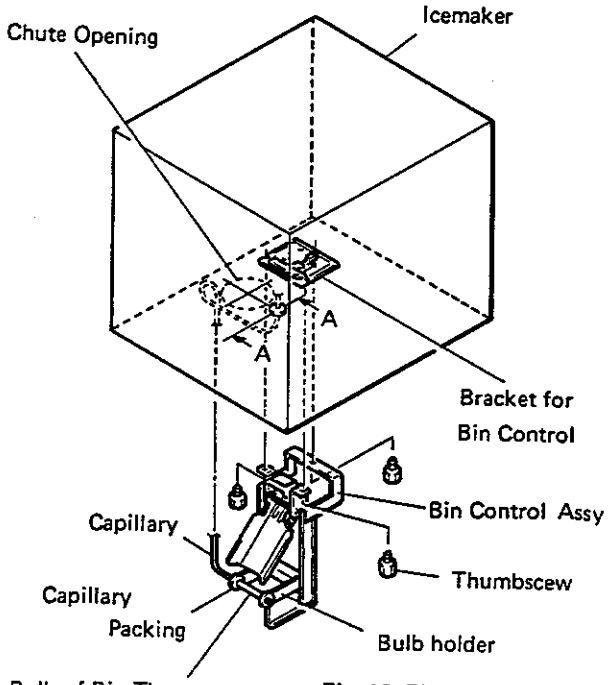


Fig. 16 Bin Control

F. INSTRUCTIONS ON INSTALLATION OF CONDENSER UNIT AND CONNECTING IT UP TO THE ICE MAKER (REMOTE AIR COOLED MODELS)

a. CHECKS BEFORE INSTALLATION

WARNING

Do not remove the tapes holding the roofs in place and the cushion materials until installation.
These keep the roof from coming loose and the condenser fins inside from being possibly damaged during installation.

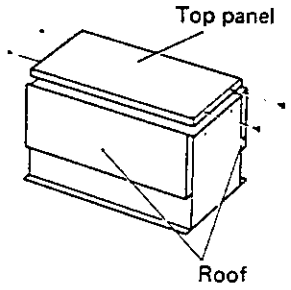


Fig. 17 Condenser unit

1. Visually inspect the exterior of the shipping container. Any severe damage noted should be reported to the delivering carrier.
2. Do not dispose of packing materials until shipment is inspected.
3. Remove the top panel.
4. Inspect for any concealed damage. If damage is noticed, notify carrier immediately and ask to have it inspected.
5. Check that refrigerant lines do not rub or touch lines or other surfaces, and that fan blade moves freely.

WARNING

Failure to check the above can lead to a failure (refrigerant leak in refrigerant circuit, etc.) that will make ice making impossible.

6. Purchase locally the following materials for connecting the ice maker to the condenser unit.

Connecting cord: Two-wire, AWG14–(1)
Cords which are not resistive to the effects of sunlight and become brittle at low temperatures are unacceptable.

Connecting pipe: Phosphors deoxidized copper pipe–1 ea.
(Recommended)
3/8" (9.52 mm) O.D. x 5/16" (7.93 mm) I.D.
1/4" (6.35 mm) O.D. x 3/16" (4.76 mm) I.D.

WARNING

Plug up each end with the rubber stopper or vinyl bag to prevent water and dirt from coming into the connecting pipes until the connection of the couplings.
When connected together with the dirt clogged inside, it may result in the failure of refrigerant circuit.

Insulation materials: Capable of withstanding about 250°F (120°C)–(2)

Bolts: Hex Bolts (5/16-18 UN)–(4)

b. PLACE OF INSTALLATION

IMPORTANT

1. Install on a flat, firm surface.
   Improper installation may result in upset, noise and vibration of the ice maker.
2. Area should be dry, with good ventilation.
   Otherwise, ice production may be greatly reduced and electricals may malfunction.
3. Leave a space of more than 20" (50 cm) for servicing, cleaning, etc. in front and back of the condenser unit.

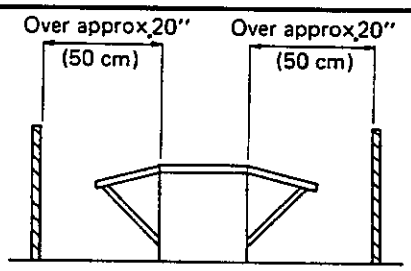


Fig. 18 Space around unit

4. The ice maker and the condenser unit should be installed so that they can be connected by pipes less than 33 ft. (10 m) in length.
   When the condenser unit locates lower than the ice maker, the difference of altitudes should be within 6.6 ft. (2 m). When vice versa, it should be within 20 ft. (6 m).
   If longer pipes are used or the ice maker and the condenser unit are installed with larger difference of altitudes, the service life of the refrigerant circuit will be shortened.
5. Use a location with an ambient temperature range of –20 to +110°F (–29 to +43°C).
   The adverse conditions resulting when the temperature is either lower or higher can cause a breakdown.
   If the site is indoors, the heat exhaust can cause the room temperature to rise, so provide ventilation.

c. INSTALLATION PROCEDURE

1. Prepare the installation site so that 4 bolts can secure the condenser unit. (see Fig. 19)
   (Drill holes if a concrete floor and sink anchors.)
2. Remove the tapes on the roofs and the cushion materials.
3. Secure the condenser unit with 4 bolts.
4. Install/secure the 4 roof support rods with capscrews (M4 x 8) and flat washers.
   (See Fig. 20; other side also has two.)
5. Remove the safety guard and the connecting inlet guard. (see Fig. 20)
6. Install the connecting pipes [3/8" (9.52 mm)–1 pc; 1/4" (6.35 mm)–1 pc.] and the connecting cord between the ice maker and the condenser unit.

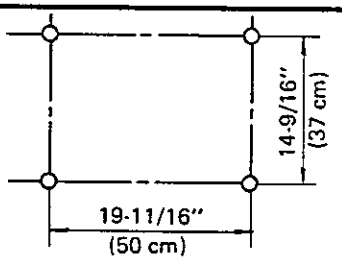


Fig. 19 Installation site

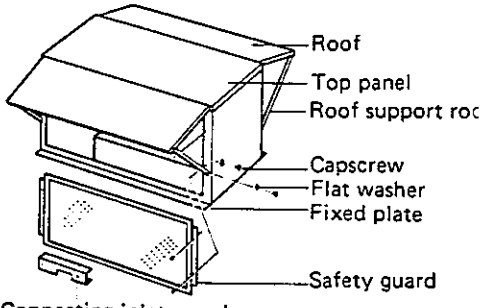


Fig. 20 Removal and placement

WARNING

The two pipes should be separately insulated [with the materials capable of withstanding about 250°F (120°C)]. Failure to do so may result in a serious failure from overheating.

7. Female couplings (total of 4) are installed on the ice maker and the condenser unit.
   Each side has a pair consisting of a 3/8" type and a 1/4" type.
   To make the connection to the pipe, flare the pipe first.
8. The female couplings on the ice maker have service ports, from which approx. 29.9" vacuum should be created in the connecting pipes for 20 minutes and then the refrigerant gas (R-502) should be filled at a pressure of 15–30 PSIG (1–2 kg/cm^{2}G).
9. Remove the coupling caps (plastic regin) of the connecting pipes and connect up the 3/8" (9.52 mm) type from the ice maker to the condenser unit and the 1/4" (6.35 mm) type on coming back, *being careful* not to mix up the IN and OUT ports. (see Fig. 21)
10. Check the refrigerant leaks of flare and coupling joint.
11. Replace the connecting inlet guard and the safety guard.
12. Remove the connection box covers of the condenser unit and the ice maker.
13. Connect up the lead wire from the fan motor in the connection box to the ice maker fan motor connecting wire. (see Fig. 21)

DANGER

Ground the condenser unit properly to prevent injury from electrical shock.

14. Replace the connection box covers.

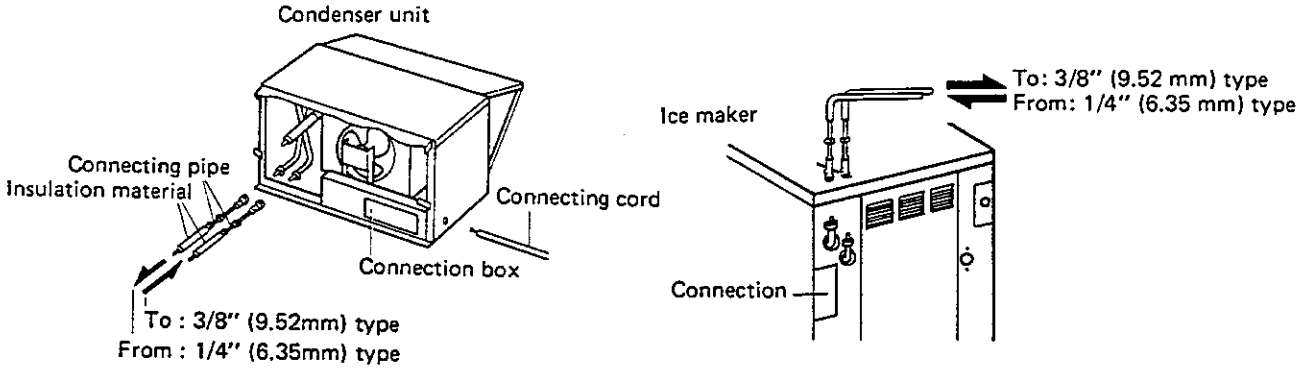


Fig. 21 Connecting the condenser unit and the ice maker

d. INSTALLING/CONNECTING TWO ICE MAKERS AND CONDENSER UNITS

WARNING

1. Arrange so that each will not draw in the other's exhaust.
   To draw in the other's exhaust will lead to greatly reduced ice production and the service life of the refrigerant circuit will be shortened.
2. Piping and wiring are in terms of the condenser unit and the ice maker.
   Improper connecting will lead to a breakdown of the ice maker.

- When lining up two condenser units:

  Connect up to the ice maker, referring to installing one ice maker and condenser unit.
- When stacking two condenser units:

1. Secure the lower condenser unit.
2. Remove the top panel from the lower condenser unit and then replace the screws as before.
   (When stacking two units, the top panel on the lower unit is not used, so simply store it away.)
3. Remove the fixed plate from the upper condenser unit.
   Face them inwards (180° from original position) and set them on the top of the lower unit, securing with tapping screws.
4. Face the condenser units the same way, and set the upper condenser unit on the top of the lower condenser unit, slipping the fixed plate secured according to (3) above in the bottom of the upper condenser unit.
5. Secure upper and lower condenser units with screws.
6. Do the piping and wiring (upper and lower), referring to installing one ice maker and condenser unit.

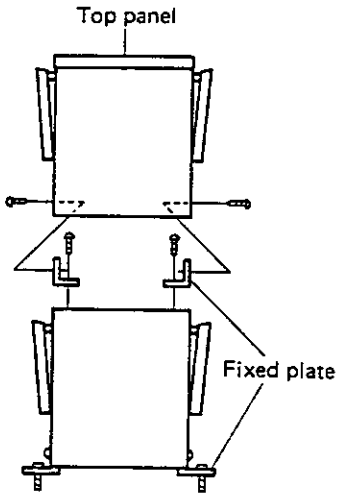


Fig. 22 Two condenser unit combination

G. WATER SUPPLY AND DRAIN CONNECTIONS

Pipe work may have to be done by a designated plumber in certain areas. Check and follow local plumbing codes.

a. WATER SUPPLY CONNECTIONS

(1) AIR COOLED MODELS

WARNING

1. Water supply pressure should be 7–113 PSIG (0.5–8 kg/cm²G).
   If pressure exceeds 113 PSIG, use a pressure reducing valve. Otherwise the water supply line inside will rupture.
2. External filters, strainers or softeners should be installed, depending on water quality. Any questions as to the type of water filters, strainers and softeners to be used can be answered by your local water treatment company or water department.
3. Flush out the pipe to remove particles and dirt. If the water supply line is clogged, no ice will be made.

1. Water supply inlet size is 1/2" FPT.
2. Place a water supply shut-off valve near the supply point and a drain valve at a lower point near the water inlet.

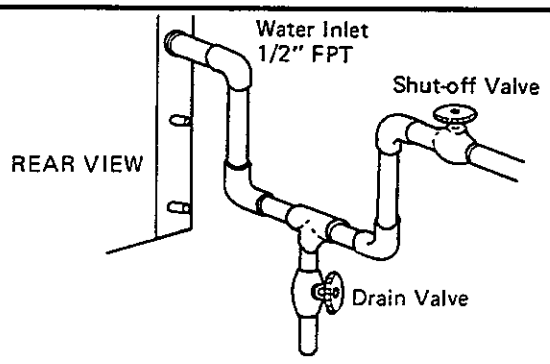


Fig. 23-1 Piping (Water supply)

(2) WATER COOLED MODELS

1. The ice maker has two water inlets. Their are 1/2" FPT.
2. Place a water supply shut-off valve near the supply point and a drain valve at a lower point near the water inlet.

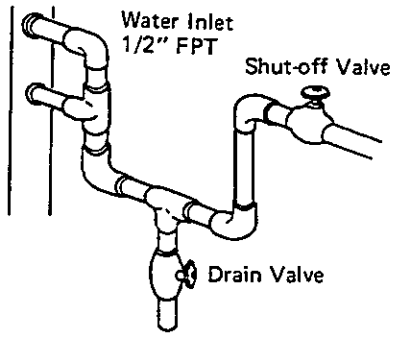


Fig. 23-2 Piping (Water supply)

b. DRAIN CONNECTIONS

1. Storage bin

The drain outlet is located in the bottom center of the bin drains of the melted ice water. It is a 1" I.P.S. female fitting.

2. Ice maker (AIR COOLED MODELS)

Ice maker has two drain outlets. The drain outlet is located on the rear side of the ice maker.
Drain outlet (27/32" DIA) for connecting a hose is for over flowing from reservoir.
Drain outlet (3/4" DIA) for connecting a hose is for drain water from drip pan.

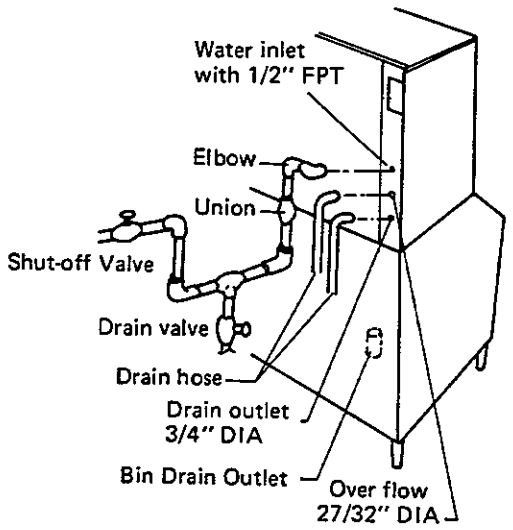


Fig. 24-1 Piping (Drain)

3. Ice maker (WATER COOLED MODELS)

Ice maker has three outlets. The drain outlets are located on the rear side of the ice maker.
Water outlet (1/2" FPT) is for cooling water of condenser.
Drain outlet (27/32" DIA) for connecting a hose is for over flowing from reservoir.
Drain outlet (3/4" DIA) for connecting a hose is drain water from drip pan.

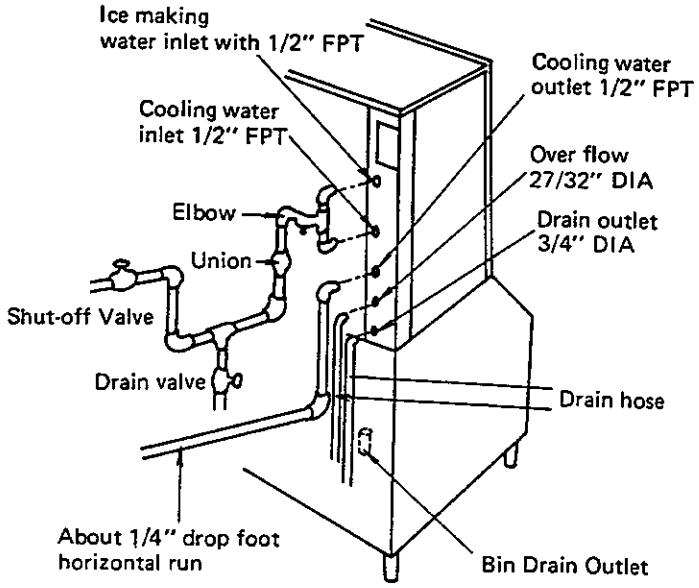


Fig. 24-2 Piping (Drain)

WARNING

If the drainage is badly arranged, the drain will back up inside the storage bin and conditions will become unsanitary (i.e., bacteria contamination, foul odor, etc.).
Be sure to adhere to the following procedures.

1. Always have one pipe for each function.
2. Incline the drain pipe downwards to assure good flow.
   (About 1/4" drop per foot in the horizontal run)
   Keep the drain pipe as short as possible, with few bends in it. Be sure that the drain pipe is not higher than the drain outlet at any point.
3. The drain pipe should lead to an open, trapped or vented drain.

IMPORTANT

All pipes should be covered with plumbing insulation material to prevent condensation.

H. ELECTRICAL WORK

1. A licensed electrician should be responsible for all electrical work.
   All external wiring should conform to the national, state and local electrical code requirements.
2. Connect the supply wires to ice maker leads located inside junction box.

DANGER

1. Use electrical wire rated equal or greater than the minimum circuit ampacity rating given on the nameplate. If the wire is less than the specified ampacity rating, it will heat up and possibly lead to a fire.
2. Ice maker must be on a separately fused circuit, which does not exceed the maximum fuse size on the nameplate. Failure to adhere to these guidelines will lead to machine electrical failure, the inability to perform repairs, possible electrical shocks and fire, because the machine will not stop.
3. If the voltage fluctuates more than ±10%, the ice maker cannot work properly.
4. Be sure to ground the ice maker properly to prevent injury from electrical shock. Never ground to a gas pipe.

I. FINAL CHECKS

1. Is the ice maker level?
2. Has all internal packing material been removed?
3. Have the storage bin and the cabinets been wiped clean?
4. Is the water supply line shut-off valve installed and electrical wiring properly connected?
5. Has the voltage been tested and checked against the nameplate rating?
6. Has water supply pressure been checked to assure 7-113 PSIG (0.5-8 kg/cm^2G)?
7. Is there at least a 6" (15 cm) clearance around the ice maker for proper ventilation?
8. Has the ice maker been installed in a place where the ambient temp. range is 45-100°F (7-38°C) and the water temp. range is 34-91°F (1-33°C)?
9. Is the operator aware of the proper operation procedure?
10. Check water and drain connections for water leaks.
11. Check all refrigerant lines for vibration, rubbing or possible failure.

3. OPERATION AND SHUTDOWN

A. OPERATION PROCEDURE

1. Clean the storage bin and the ice maker cabinets.
2. Remove the Front Panel by taking off the screws and lifting up and toward you.
3. Open the stop valve and let water flow.
4. Switch on the power.
   Automatic Ice Making operation continues until stocker is filled with ice.
   As a stock of ice gets in short, operation starts again automatically.

CAUTION

1. All components are factory-adjusted. Improper adjustments of expansion valve may result in a failure of ice production.
2. Once the ice maker operation is stopped, wait for at least 3 minutes before restarting operation in order to safeguard the compressor.

B. OPERATIONAL CHECKS

1. Check the water flow into the water line.
   a. Water flows into the Reservoir.
   b. Water flows through water feed line to bottom of the Evaporator.
   c. The Float Switch operates and shuts off the Water Supply Valve, and the water supply stops.
2. After the water supply valve operates, Gear Motor operates right after and then the Compressor start working, and the automatic ice making operation starts.
3. In 5 to 10 minutes, flake ice will be extruded into the storage bin.
4. Thirty minutes after beginning operation, check there is no abnormal noise from the Compressor, drive system, etc.
   a. Fan noise
   b. Ice-making noise: Low-pressure side pressure is too low.
   c. Vibration noise: Contact with piping.
      Compressor is not mounted properly; Attaching bolts are loose or off.
5. Check the temperature of the condenser drainage, after 30 min. operation, range from 100 to 108°F (38-42°C). (Water-cooled Model)
6. Make sure that the operator is completely familiar with the starting and operation procedures, as well as other features of machine operation.

C. SHUTDOWN FOR LOW AMBIENT AND/OR FOR A LONG TIME

a. AIR COOLED MODEL & REMOTE AIR COOLED MODELS

WARNING

1. If the ambient temperature is below 45°F (7°C), spout control starts to operate and stops ice maker. Once spout control operated, ice maker shall not start to operate again automatically. Remove the front panel and press the RESET SWITCH on control box.
2. If the ambient temperature is sub-freezing or the ice maker is not used for a long time, drain the ice maker in order to prevent the water pipes from freezing and bursting and keep the ice maker sanitary as follows.

1. Shut the shut-off valve.
2. Remove the front panel.
3. Open the drain valve.
4. Operate (approximately 10 minutes) until Compressor and Gear Motor stop the operation.
5. Switch off the ice maker power supply after ice making operation ends.
6. Lay down drain hose, unscrew the cap of the drain hose and drain water.

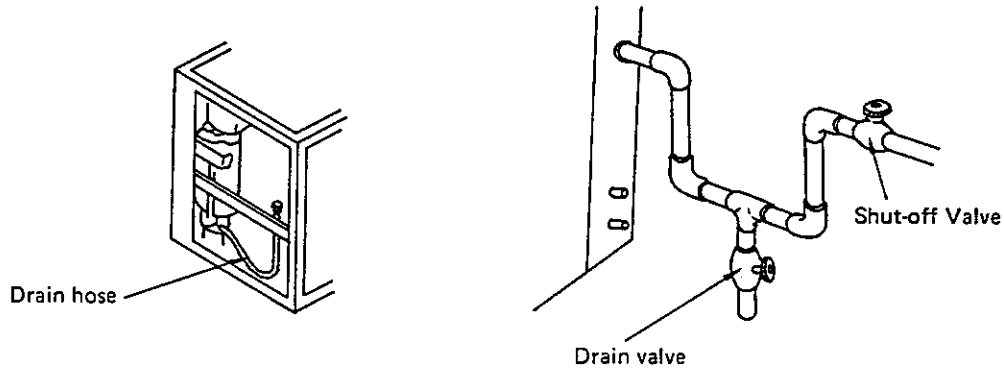


Fig. 25 Shut down (for Air cooled models)

IMPORTANT

Before beginning operation the next time, shut off the drain valve and open the shut-off valve.

b. WATER COOLED MODEL

WARNING

1. If the ambient temperature is below 45°F (7°C), spout control starts to operate and stops ice maker. Once spout control operated, ice maker shall not start to operate again automatically. Remove the front panel and press the RESET SWITCH on control box.
2. If the ambient temperature is sub-freezing or the ice maker is not used for a long time, drain the ice maker in order to prevent the water pipes from freezing and bursting and keep the ice maker sanitary as follows.

1. Switch on the ice maker.
2. Shut off the shut-off valve.
3. Open the drain valve (water supply line) and quickly blow from the drain valve to drain water in the condenser.

CAUTION

When you operate the ice maker for a while with stop of water supply, the pressure control operates and stops the ice maker.

4. When water in the condenser is drained, a sound can be heard.
5. Switch off the ice maker power supply.
6. Lay down drain hose, unscrew the cap of the drain hose and drain water.

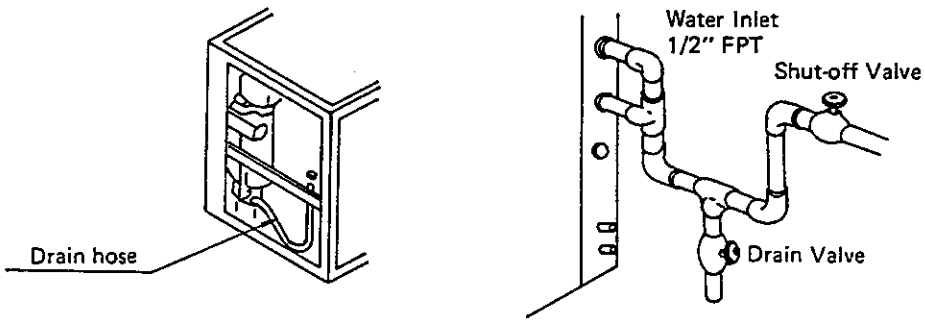


Fig. 26 Shut down (Water cooled models)

IMPORTANT

Before beginning operation the next time, shut off the drain valve and open the shut-off valve.

4. ELECTRIC CIRCUIT AND REFRIGERANT CIRCUIT

A. FOR AIR COOLED MODELS

a. WIRING DIAGRAM

MODEL F-1101AU

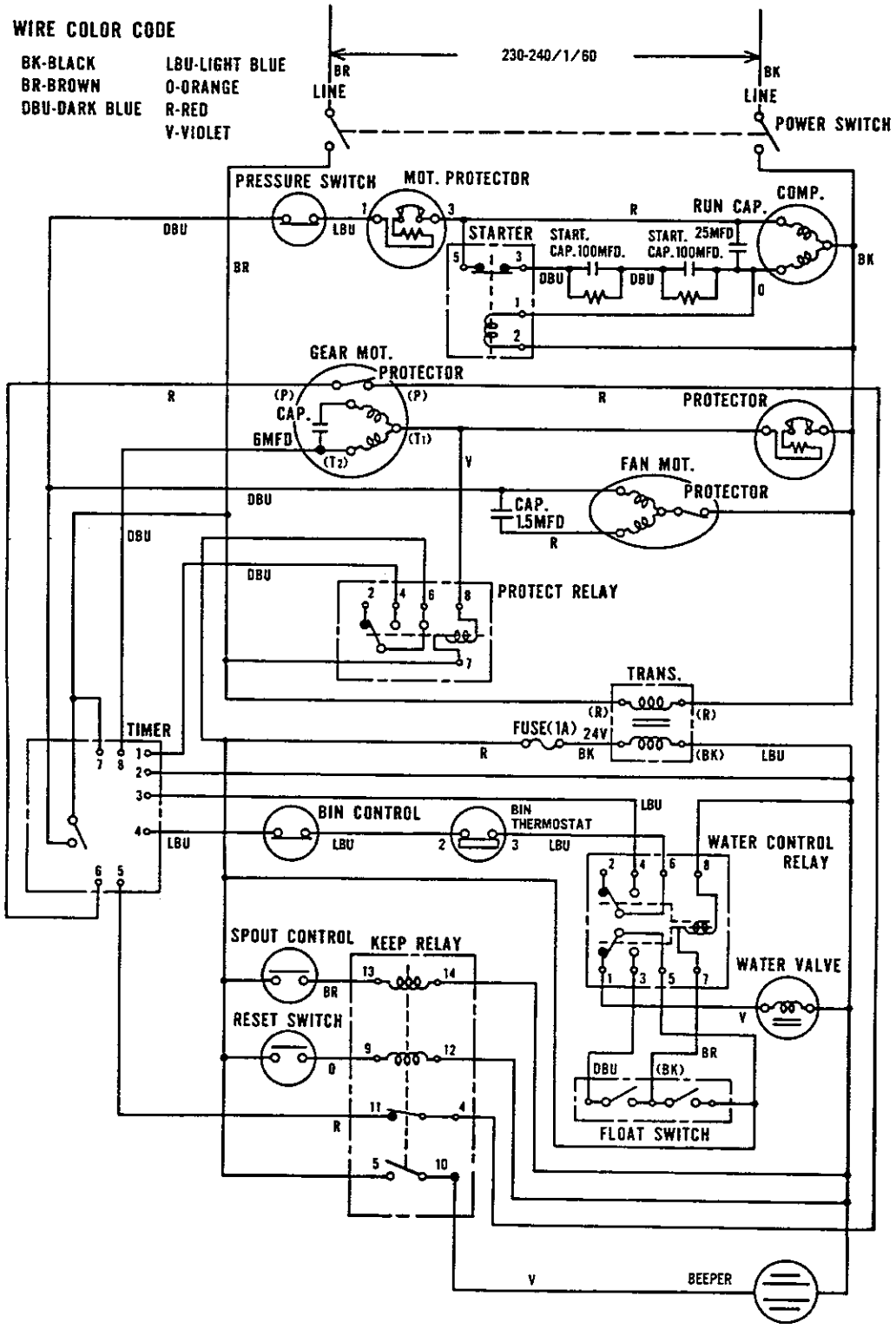


Fig. 27 Wiring diagram for air cooled models

b. WATER AND REFRIGERANT CIRCUIT

MODEL F-1101AU

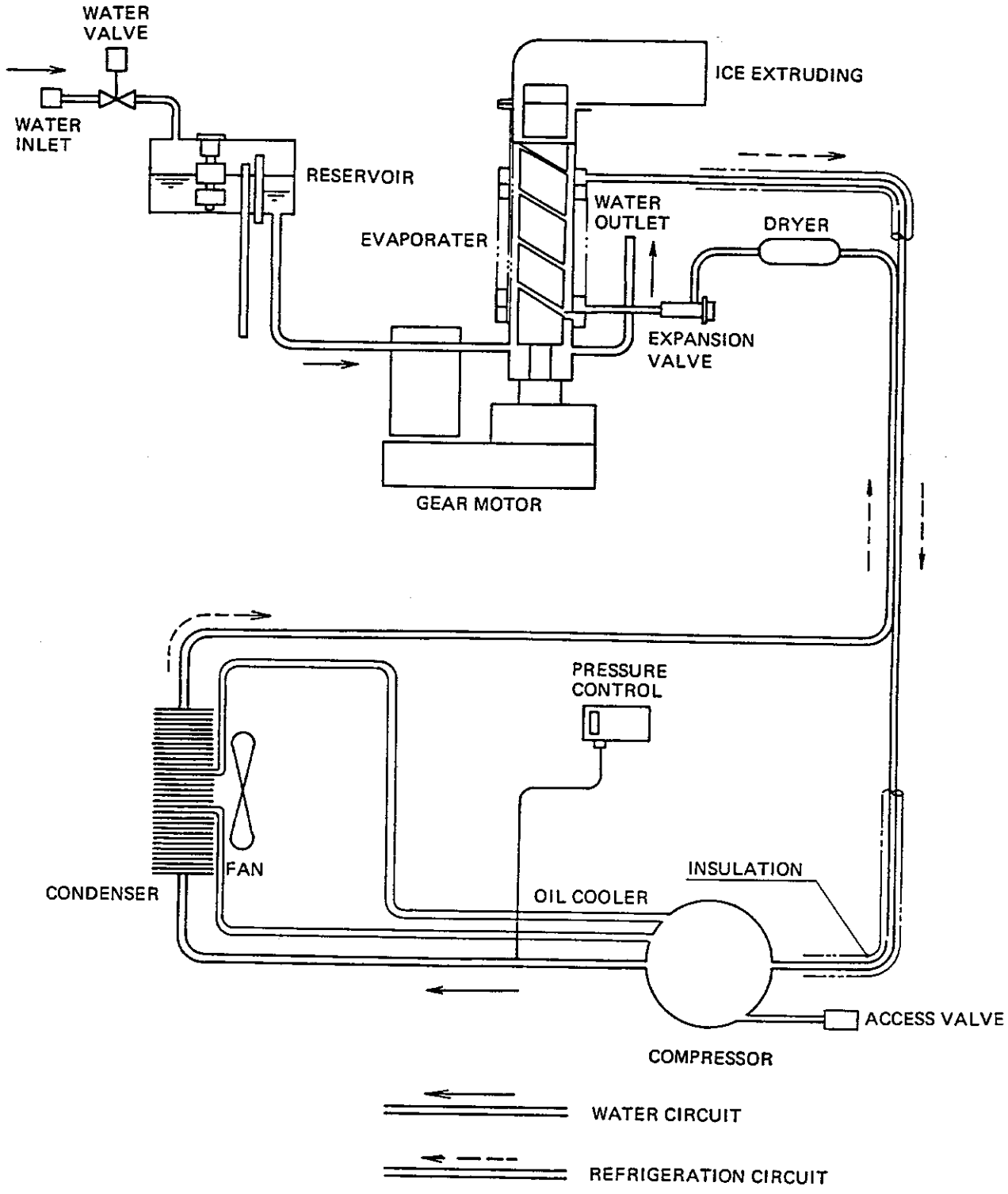


Fig. 28 Water and refrigerant circuit for air cooled models

B. FOR REMOTE AIR COOLED MODELS

a. WIRING DIAGRAM

MODEL F-1101ASU-1

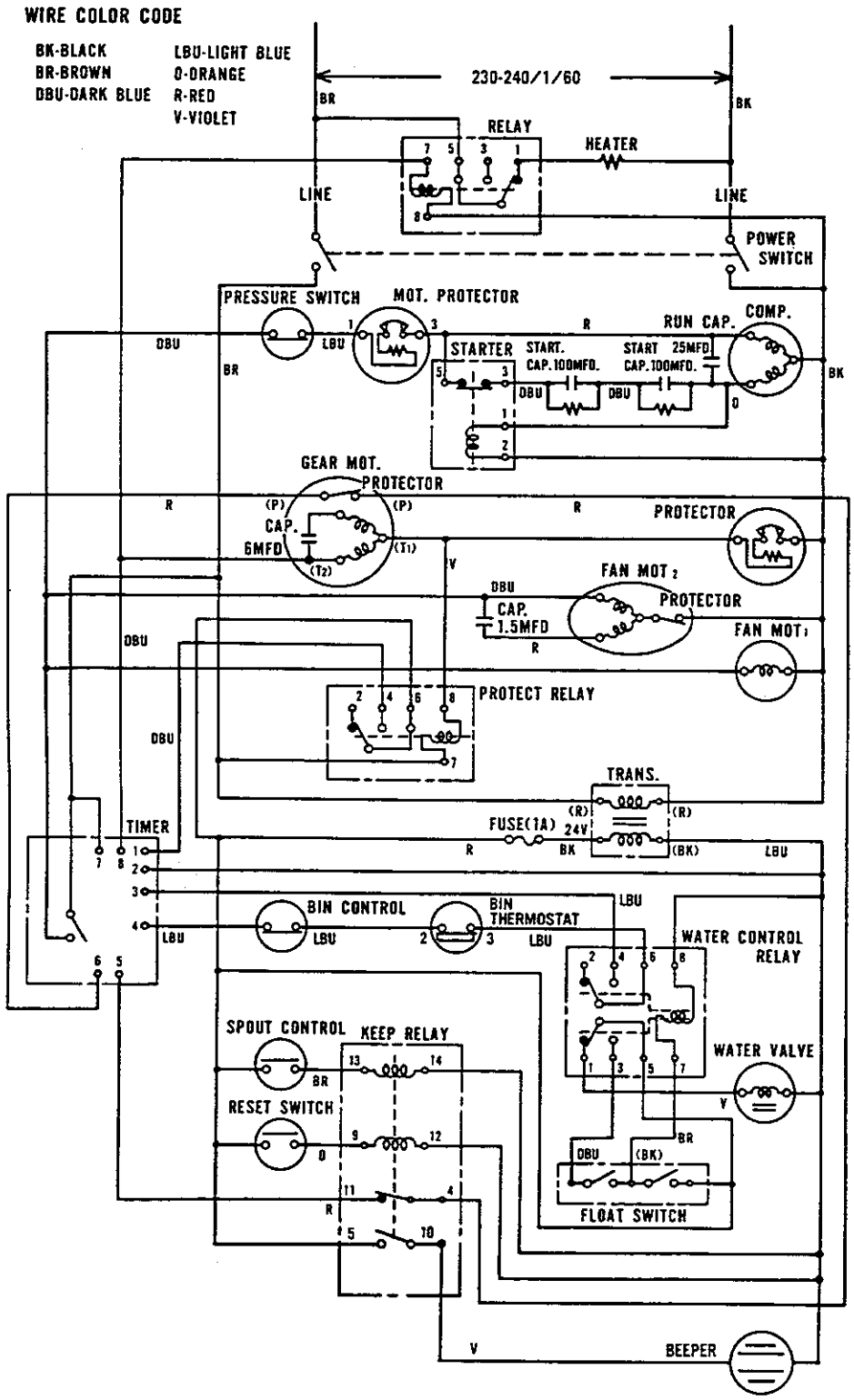


Fig. 29 Wiring diagram for remote air cooled models

b. WATER AND REFRIGERANT CIRCUIT

MODEL F-1101ASU-1

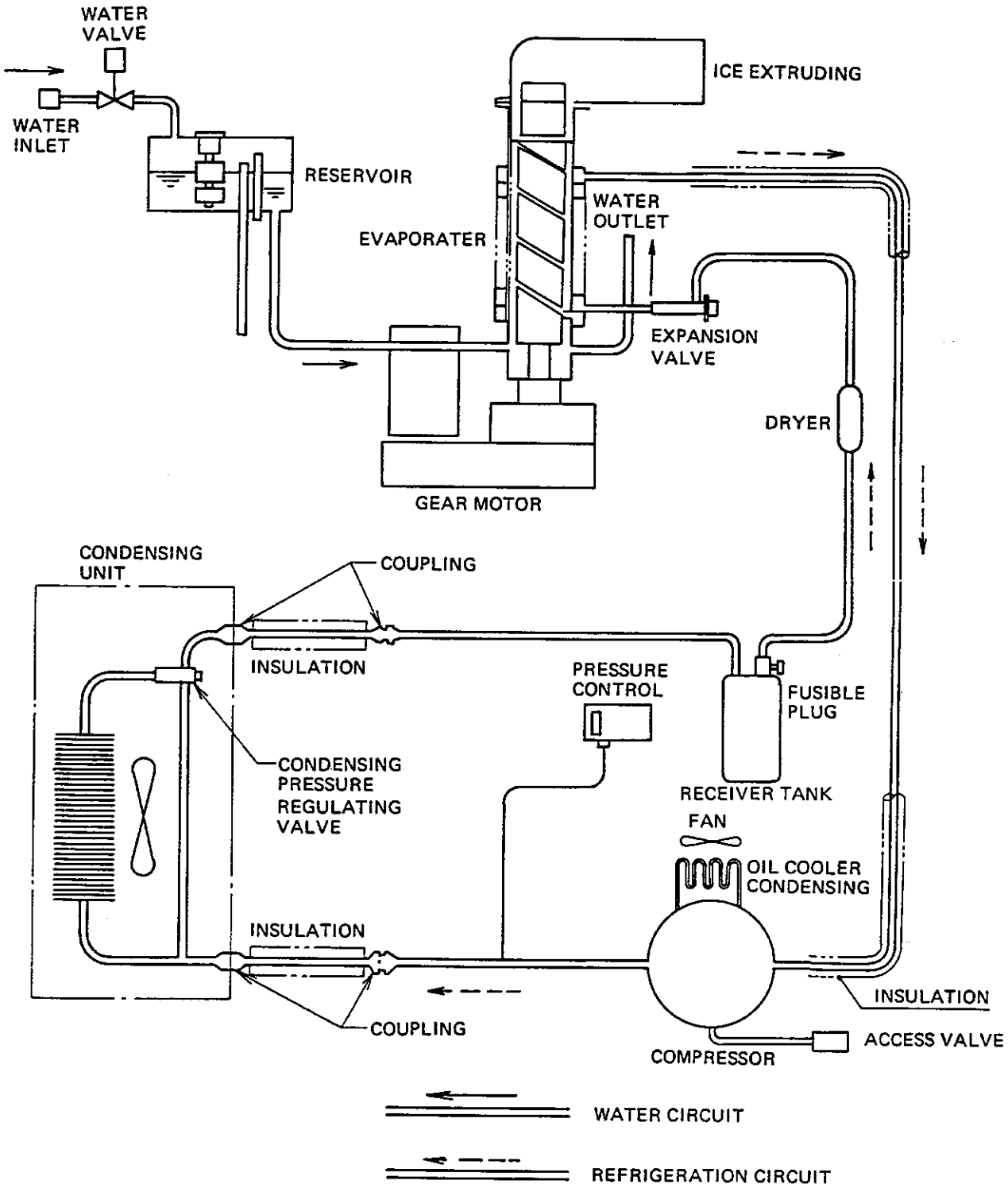


Fig. 30 Water and refrigerant circuit for remote cooled models

C. FOR WATER COOLED MODELS

a. WIRING DIAGRAM

MODEL F-1101AWU

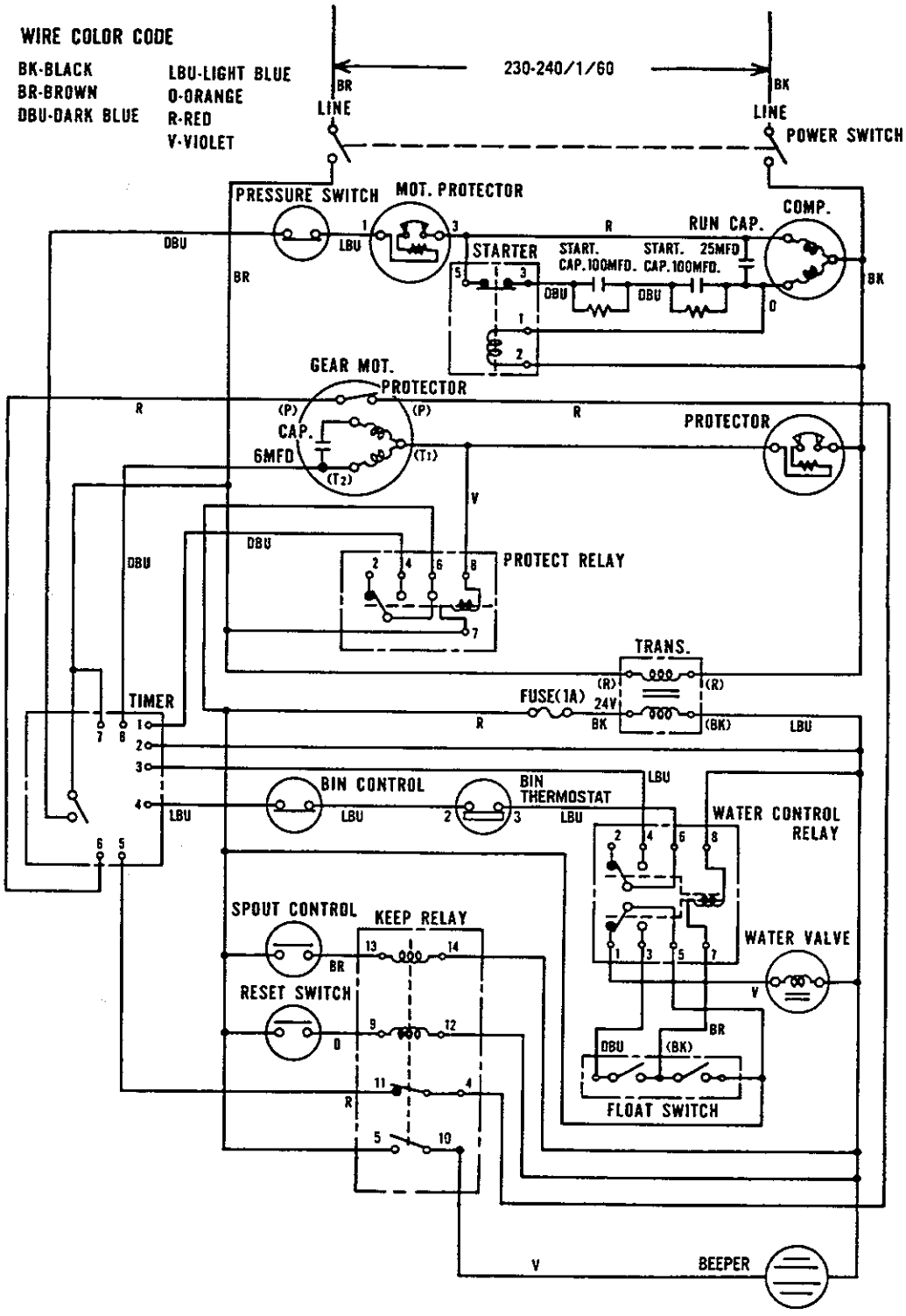


Fig. 31 Wiring diagram for water cooled models

b. WATER AND REFRIGERANT CIRCUIT

MODEL F-1101AWU

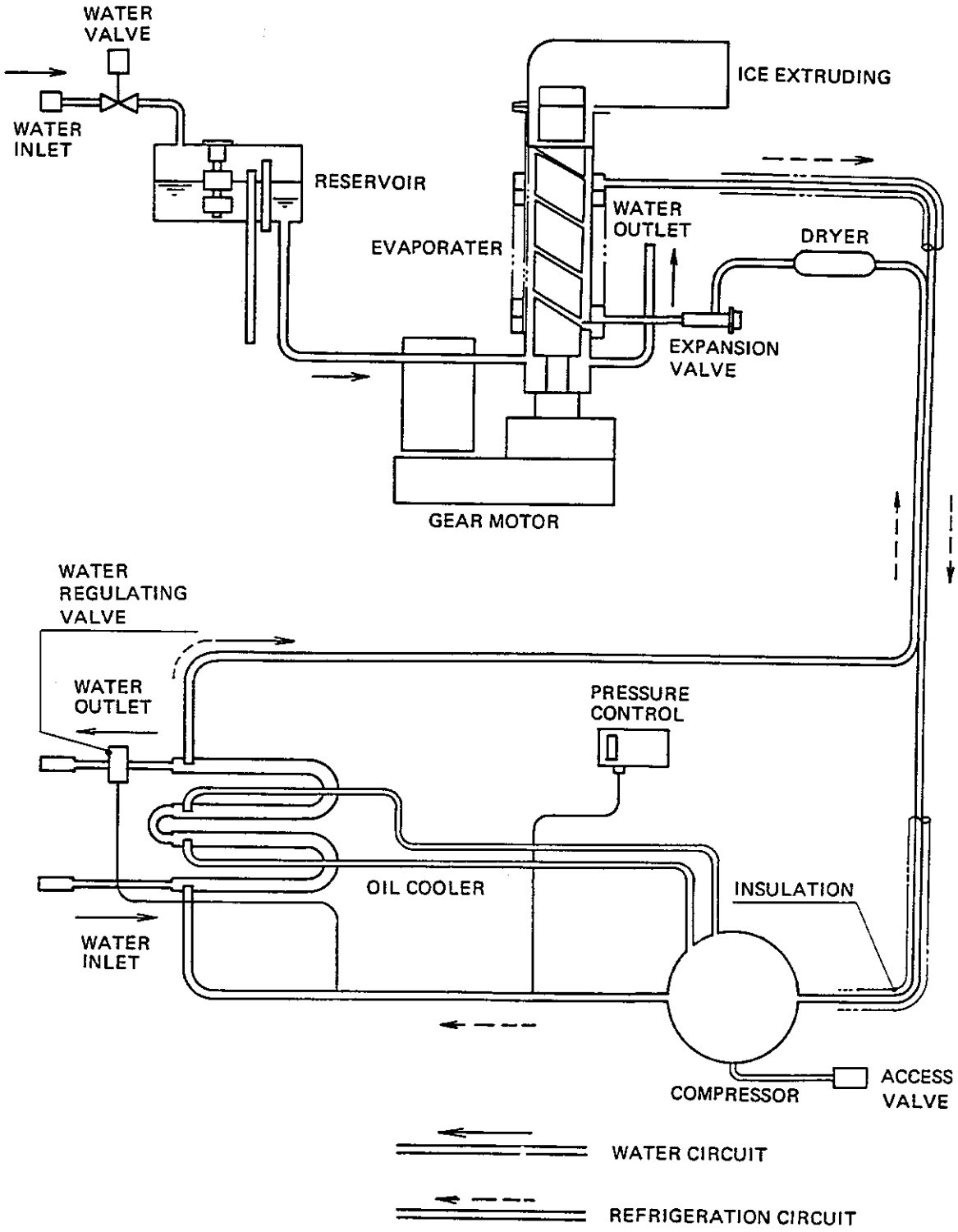


Fig. 32 Water and refrigerant circuit for water cooled models

5. CONSTRUCTION & FUNCTION

A. CONSTRUCTION

The Hoshizaki Ice Maker consists of a freezing system and ice-making part, a water circuit for supplying a uniform amount of water for ice making in the cylinder and a control system to regulate the operation of the machine parts involved.

B. FIRST STAGE OF ICE-MAKING PROCESS

Water is supplied from the water line to which the ice maker has been connected. The float switch in the reservoir keeps the water at a fixed level. The water for ice making in the reservoir is sent through the water line to the cylinder from below so that the water level will always remain the same.

When the power is switched on, the compressor and gear motor are activated. The refrigerant gas, at a high temperature and a high pressure due to the compressor, is then cooled and condensed by the condenser. The refrigerant thus condensed flows in terms of the expansion valve. When the refrigerant flows from below to above in the copper piping wrapped around the exterior of the cylinder, the cylinder loses its heat and is cooled so that ice forms on its inside wall.

The auger, driven with a powerful torque by the gear motor, slowly turns within the cylinder, scraping the ice upward to form sherbet-like ice, from which the water is squeezed out under the resistance encountered when passing through the extruding head. Thus, the resulting cubelets, with very little water content (i.e., not soggy), are then ejected into the storage bin.

When the storage bin is full, the stock control switch goes OFF and the machine comes to a stop.

As the ice is removed from the Ice Storage Bin, the stock control switch goes ON and the machine resumes automatic operation.

C. DIFFERENCE BETWEEN FLAKE ICE AND CUBELET ICE

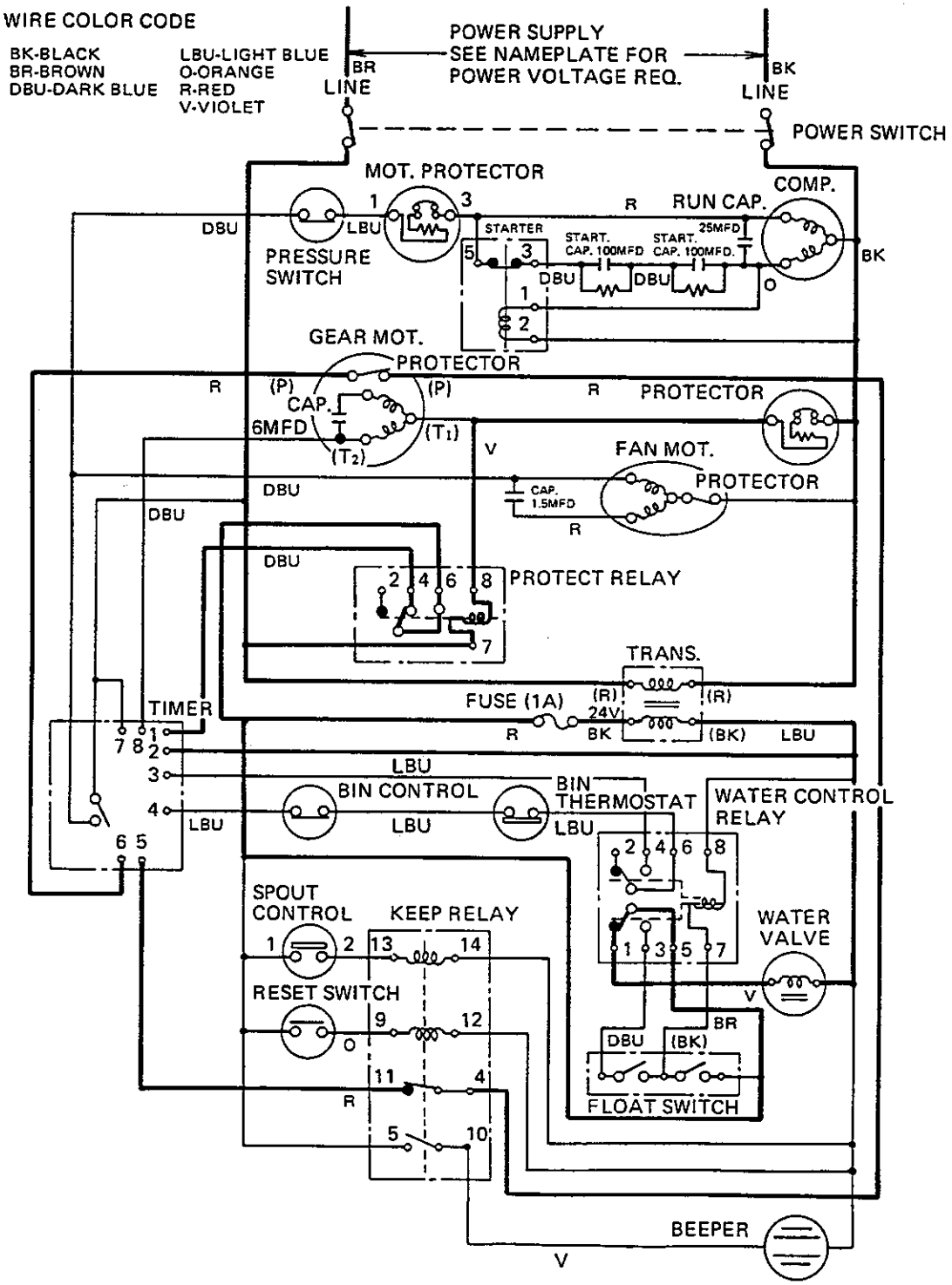
The ice making principles of Hoshizaki flake ice maker and the cubelet ice maker are completely same. But some parts such as evaporator, auger, extruding head and cutter are different in shape. When the water contained in the ice which forms in the evaporator is excluded, the wet ice becomes flake ice. And when the flake ice is compressed, the cubelet ice is produced.

D. SEQUENCE OF ELECTRICAL CIRCUITS

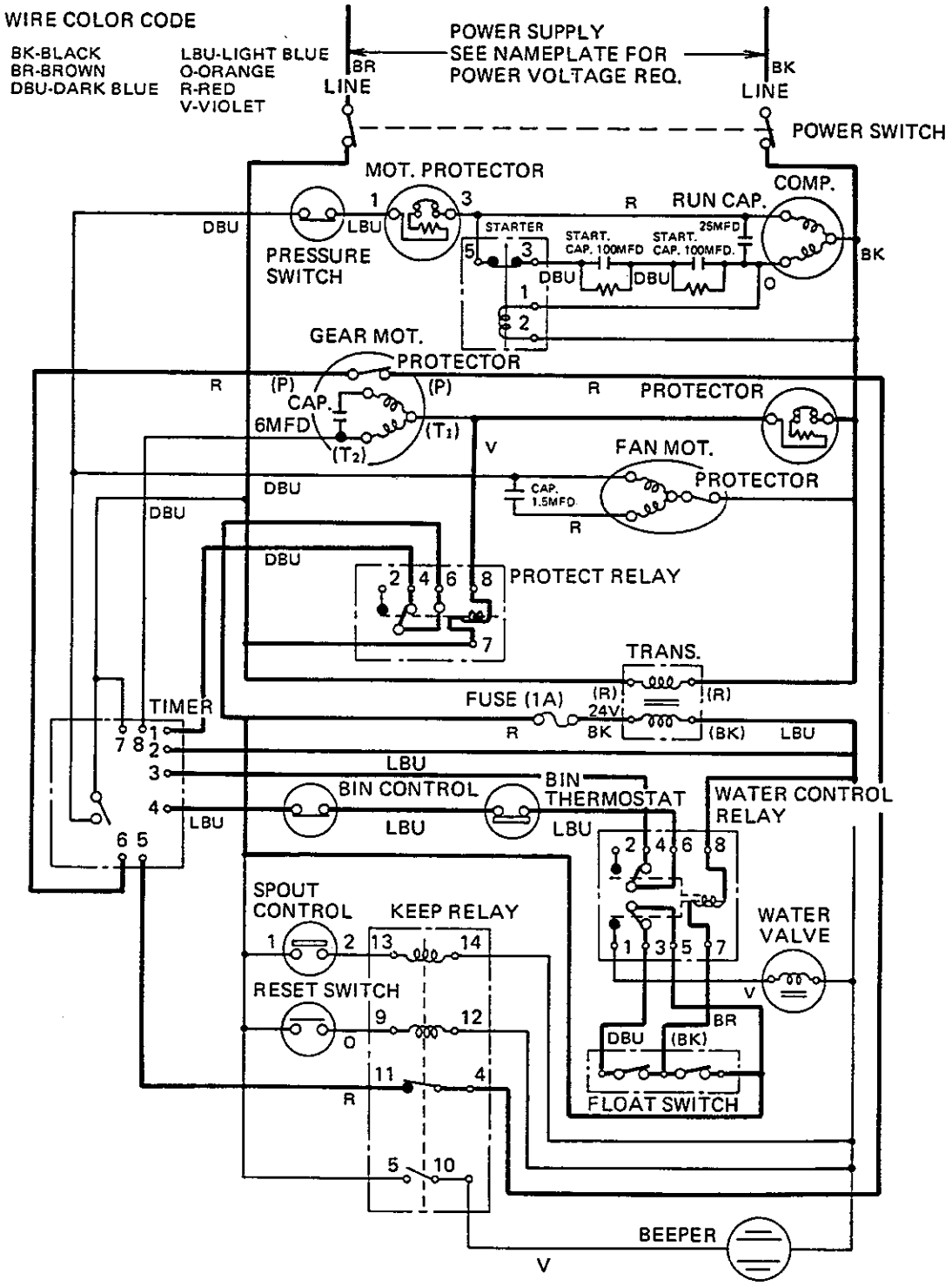
The following schematic wiring diagrams show current flow at the several steps in the operation of the air cooled model ice maker.

Air cooled models represent remote air cooled models and water cooled models due to their similarity. Please take a look at the variation of current flow referring to above "A. PRINCIPLE OF OPERATION."

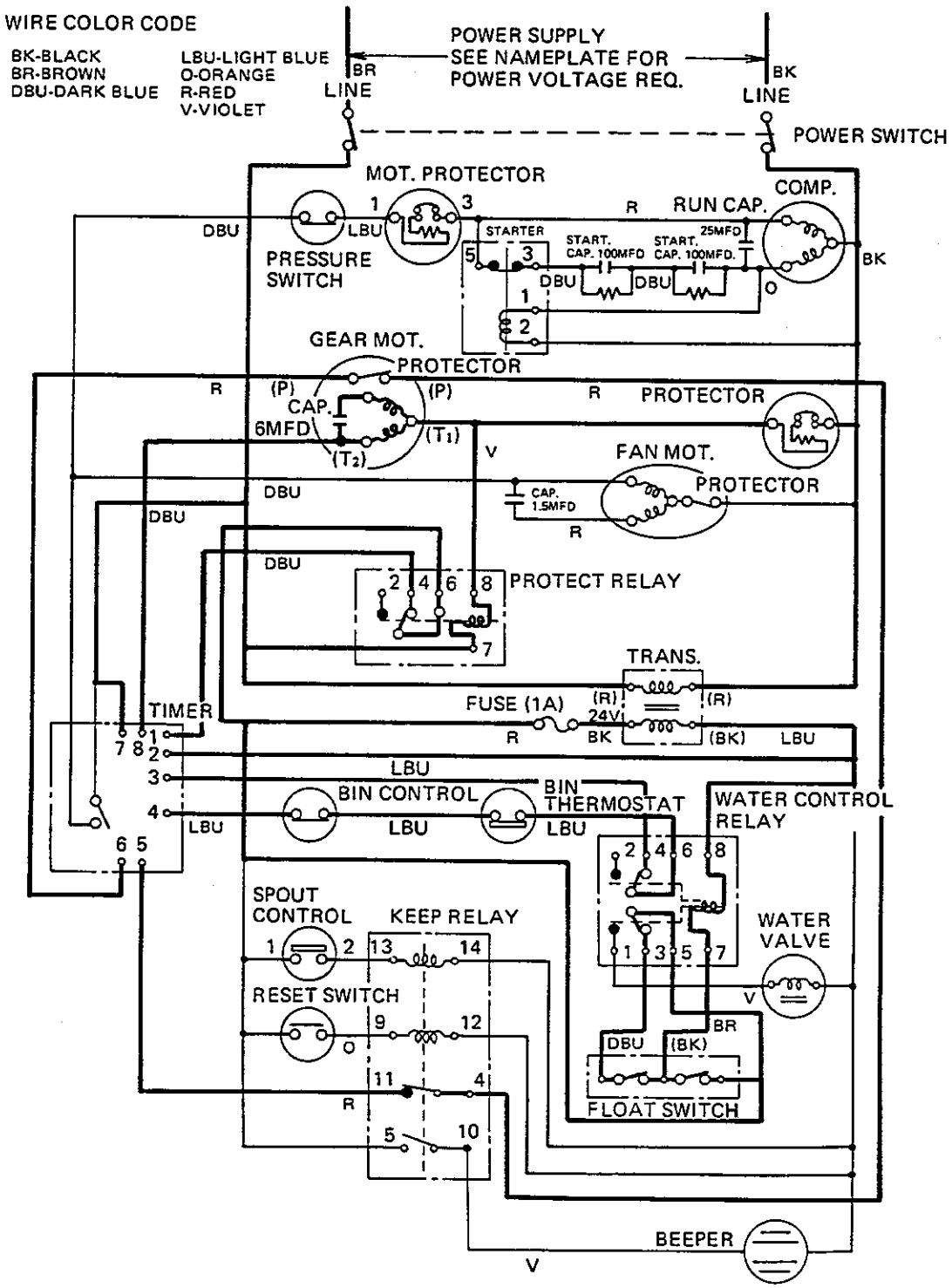
a. When the ice maker is switched on, water is supplied to the Reservoir.



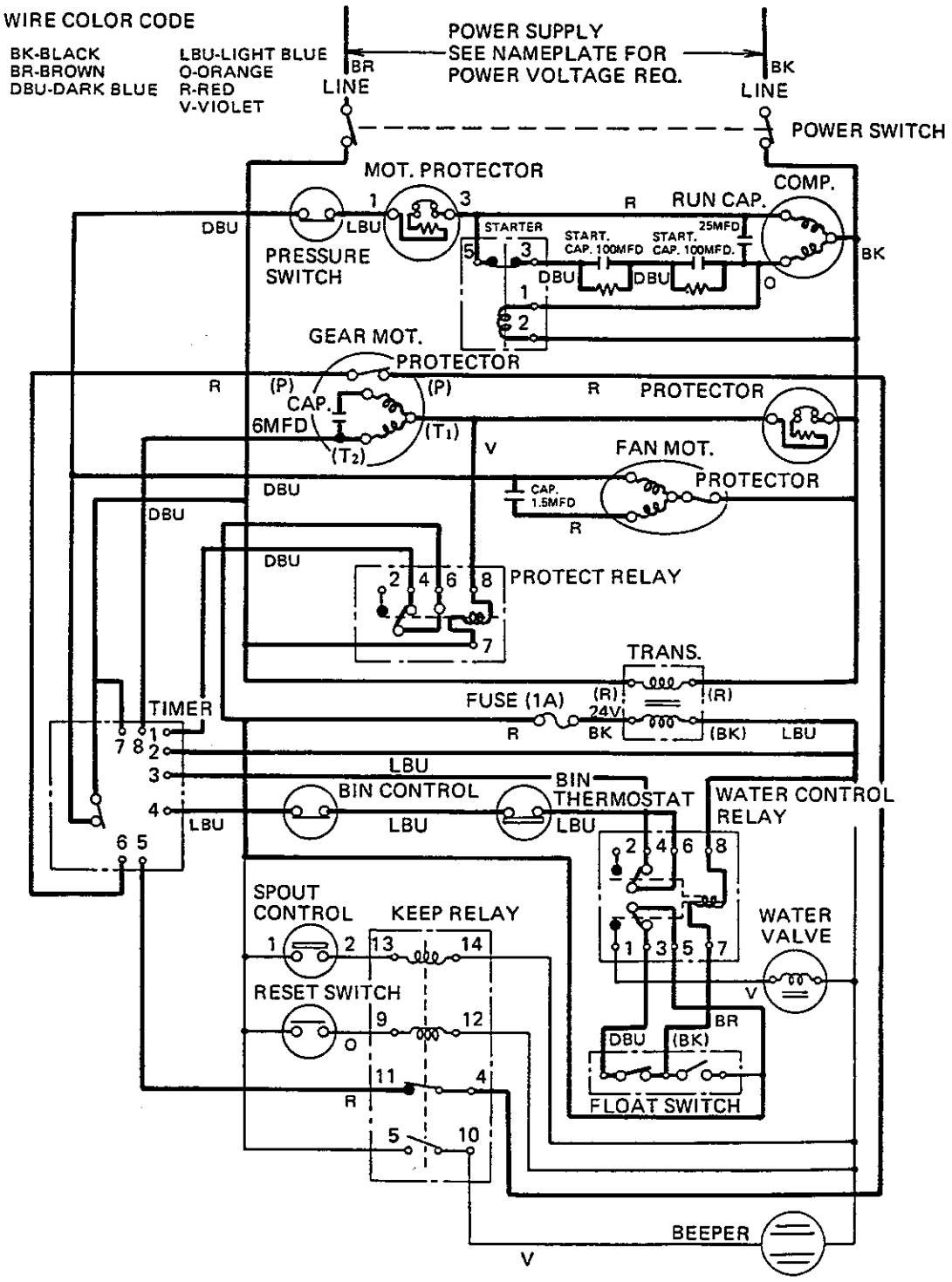
b. The Reservoir is filled with water.



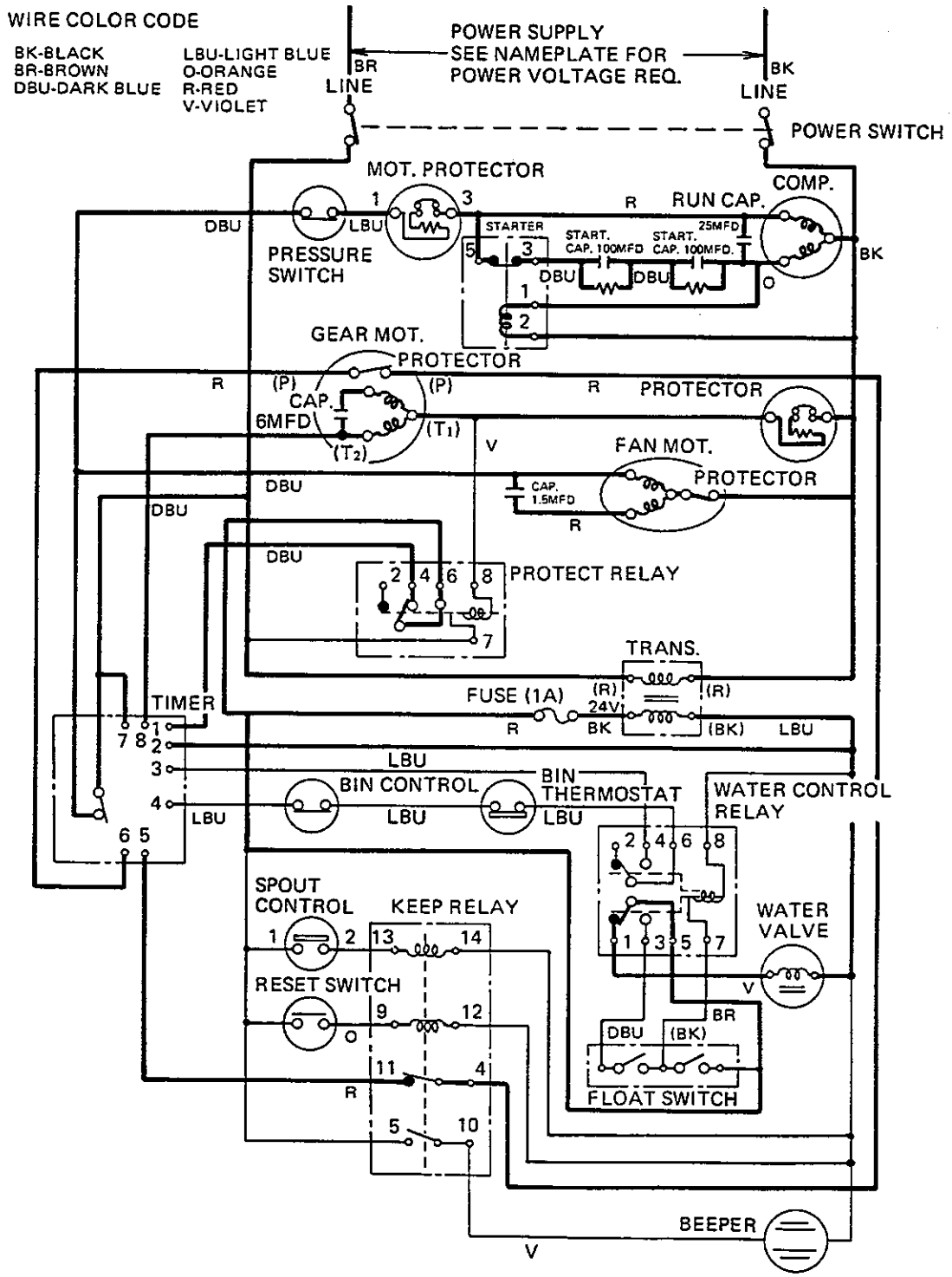
c. Gear Motor starts first.



d. The Compressor starts 10 sec after the Gear Motor.

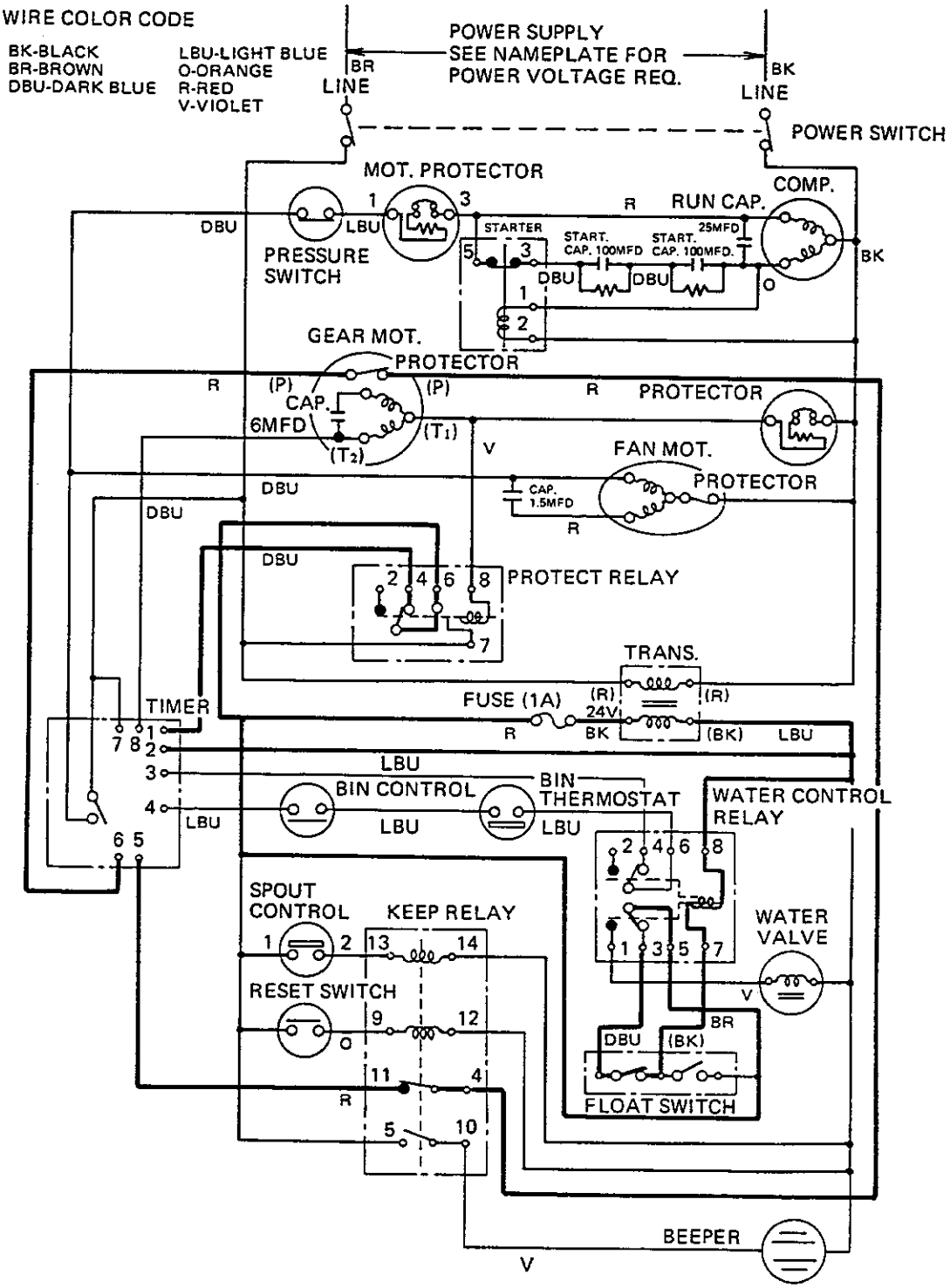


e. Ice Making operation continues.

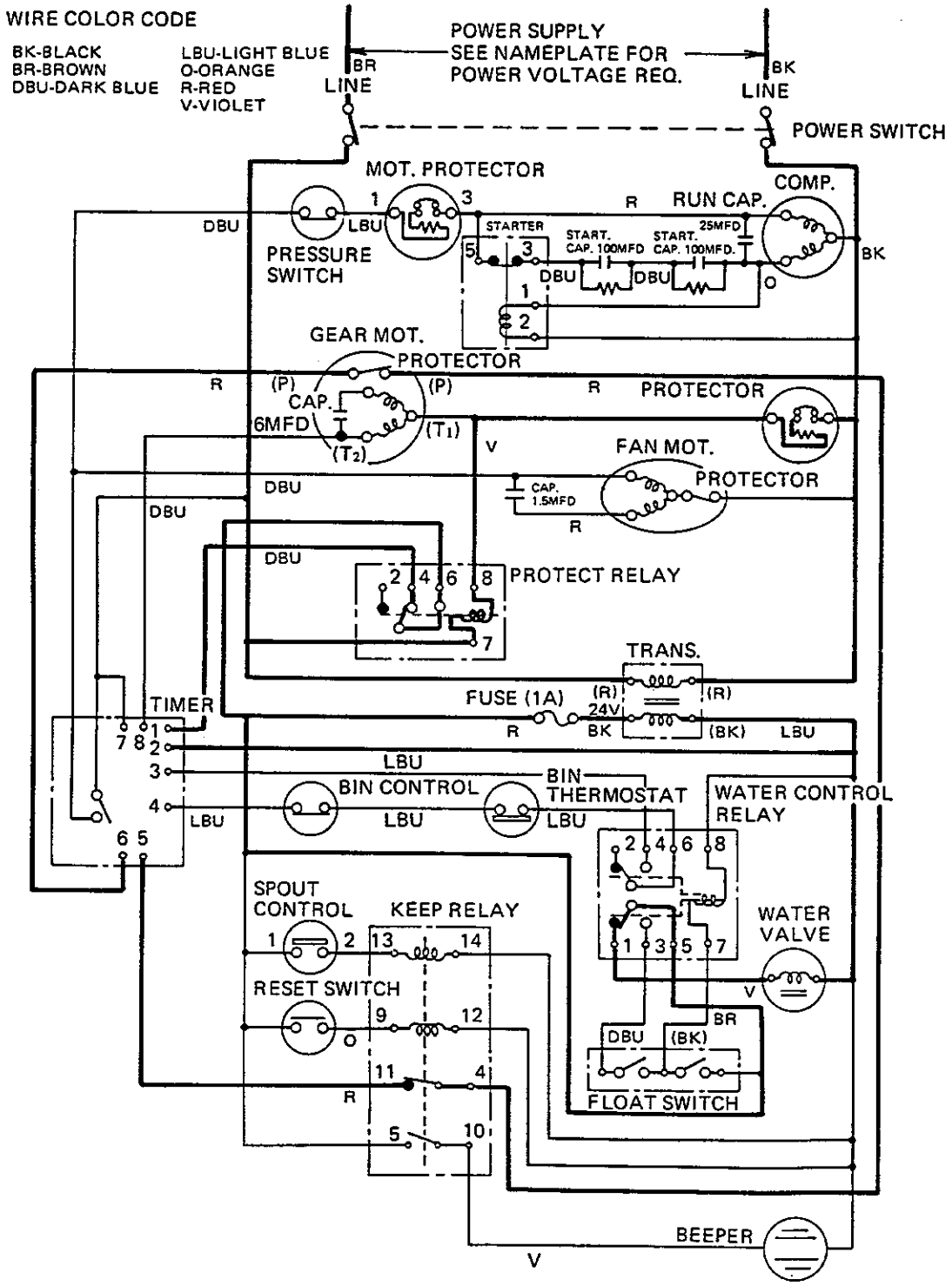


f. Bin Control operates.

The unit stops when either Bin Control or Bin Thermostat operates.

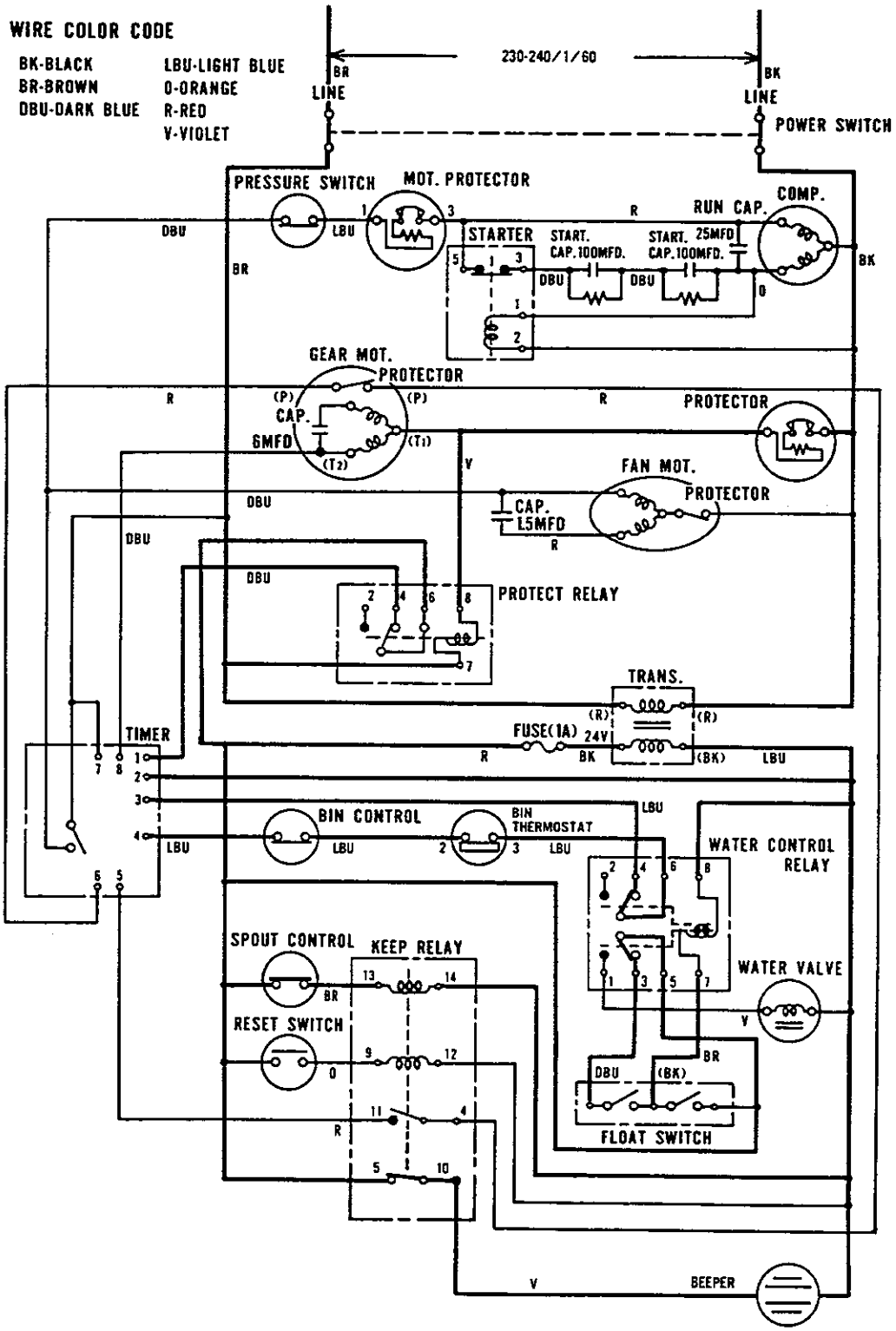


g. Low water.


WIRE COLOR CODE
BK-BLACK
BR-BROWN
DBU-DARK BLUE
LBU-LIGHT BLUE
O-ORANGE
R-RED
V-VIOLET
POWER SUPPLY
SEE NAMEPLATE FOR
POWER VOLTAGE REQ.
LINE
LINE
POWER SWITCH
MOT. PROTECTOR
COMP.
RUN CAP.
PRESSURE SWITCH
STARTER
START. CAP. 100MFD
START. CAP. 100MFD.
25MFD
GEAR MOT. PROTECTOR
CAP. 6MFD
PROTECTOR
FAN MOT. PROTECTOR
CAP. 1.5MFD
PROTECT RELAY
TRANS.
FUSE (1A)
TIMER
BIN CONTROL
BIN THERMOSTAT
WATER CONTROL RELAY
SPOUT CONTROL
KEEP RELAY
RESET SWITCH
WATER VALVE
FLOAT SWITCH
BEEPER

h. Bin Control Failure

When Spout Control operates, ice making operation stops, and Beeper gives an alarm sound to let you know the Bin Control failure. To resume ice making operation, check Bin Thermostat and Bin Control operation, and push on Reset Switch.



E. PERFORMANCE DATA

IMPORTANT: THE DATA SHOULD BE USED AS A BENCH MARK.
ALLOW 10% VARIATION FORM DATA FOR ERRORS.

a. F-1101AU

Table 1 Performance Data – F-1101AU

	Ice Production Capacity (lbs/day) (kg/day)			Head Pressure (PSI) (kg/cm²G)			Evaporator Outlet Temp. (°F) (°C)			Electric Consumption (W)			Water Consumption (gal/day) (m³/day)		
Water Temp. (°F) / Ambient Temp. (°F)	50	70	90	50	70	90	50	70	90	50	70	90	50	70	90
70	1054 478	972 441	917 416	204 14.3	204 14.3	204 14.3	7.3 ~7.7 -13.7 ~-13.5	7.2 ~8.1 -13.8 ~-13.3	7.9 ~8.8 -13.4 ~-12.9	1545	1545	1535	126 0.48	117 0.44	110 0.42
80	981 445	908 412	862 391	225 15.8	224 15.7	224 15.7	9.7 ~15.8 -12.4 ~-9.2	10.2 ~14.9 -12.1 ~-9.5	9.7 ~15.4 -12.4 ~-9.2	1575	1590	1570	118 0.45	109 0.41	103 0.39
90	917 416	853 387	827 375	252 17.7	252 17.7	252 17.7	11.5 ~18.9 -11.4 ~-7.3	17.6 ~19.8 -8.0 ~-6.8	16.9 ~18.9 -8.4 ~-7.3	1635	1640	1635	110 0.42	102 0.39	99 0.38
100	853 387	809 367	780 354	281 19.7	281 19.7	281 19.7	23.5 ~24.4 -4.7 ~-4.2	24.4 ~25.2 -4.2 ~-3.8	24.1 ~24.8 -4.4 ~-4.0	1680	1670	1670	102 0.39	97 0.37	94 0.35

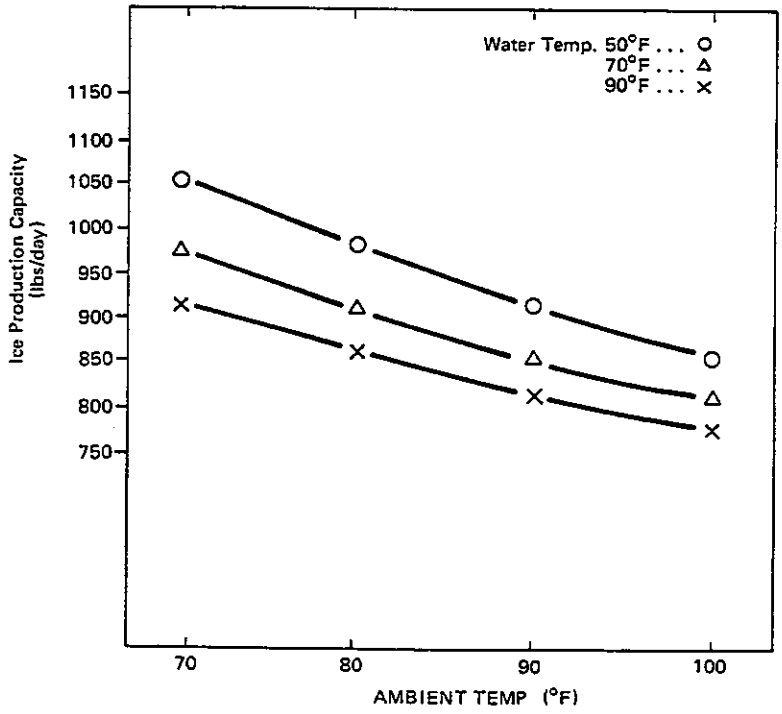


Fig. 33-1 Performance Data – F-1101AU

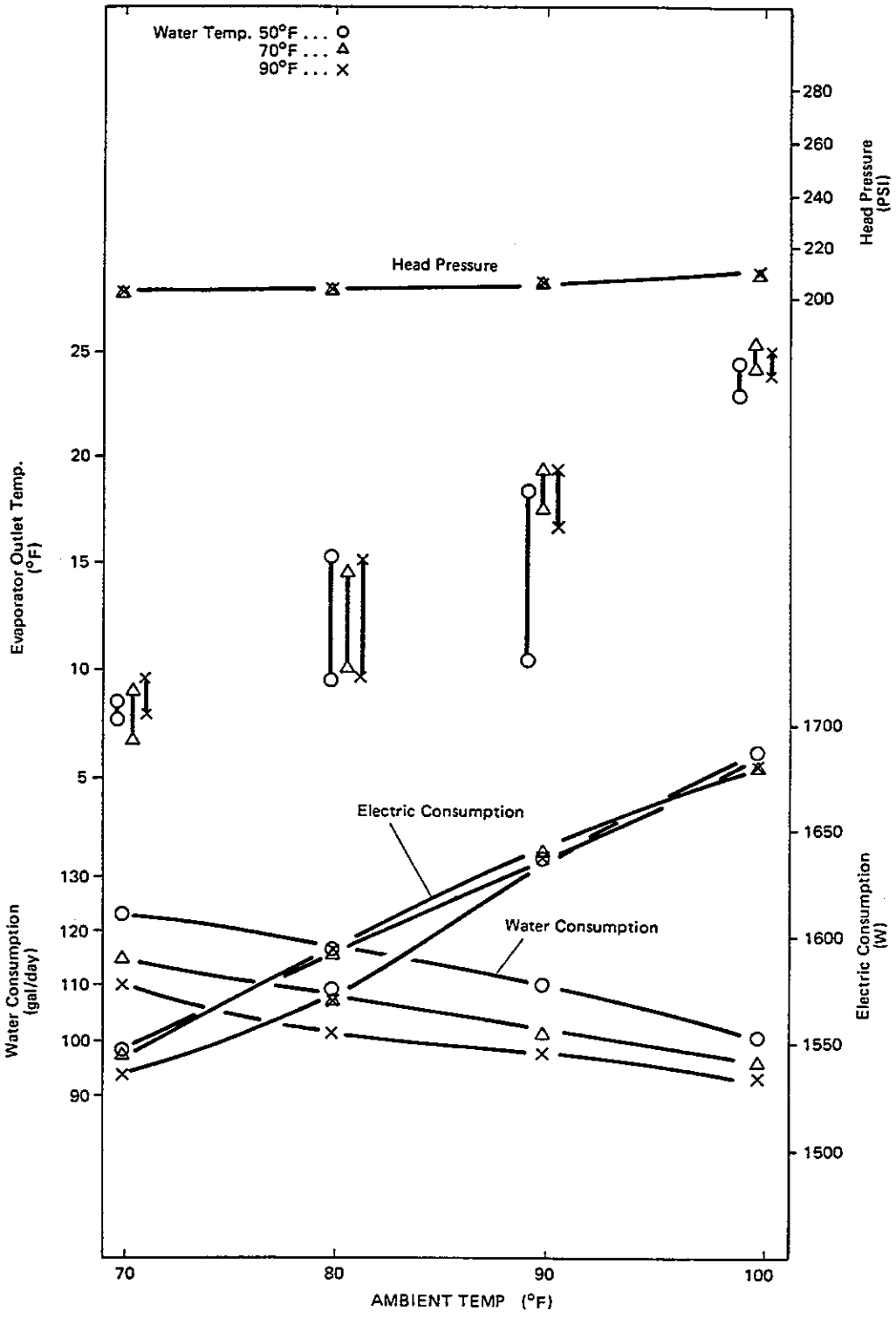


Fig. 33-2 Performance Data – F-1101AU

b. F-1101ASU-1

Table 2 Performance Data – F-1101ASU-1

Water Temp. (°F) / Ambient Temp. (°F)	Ice Production Capacity (lbs/day) (kg/day)			Head Pressure (PSI) (kg/cm²G)			Evaporator Outlet Temp. (°F) (°C)			Electric Consumption (W)			Water Consumption (gal/day) (m³/day)		
	50	70	90	50	70	90	50	70	90	50	70	90	50	70	90
70	1054 478	972 441	917 416	189 13.3	187 13.1	187 13.1	11.3 ~15.4 -11.5 ~-9.2	10.2 ~17.1 -12.1 ~-8.3	9.9 ~19.8 -12.3 ~-6.8	1600	1595	1595	126 0.48	117 0.44	110 0.42
80	981 445	908 412	862 391	199 14.0	198 13.9	198 13.9	11.7 ~21.2 -11.3 ~-6	13.8 ~21.7 -10.1 ~-5.7	18.1 ~22.6 -7.7 ~-5.2	1625	1615	1600	118 0.45	109 0.41	103 0.39
90	917 416	853 387	827 375	216 15.2	216 15.2	216 15.2	12.7 ~27.0 -10.7 ~-2.8	12.2 ~28.0 -11.0 ~-2.2	12.7 ~27.9 -10.7 ~-2.3	1665	1650	1650	110 0.42	102 0.39	99 0.38
100	853 387	809 367	780 354	235 16.5	232 16.3	232 16.3	15.3 ~20.1 -9.6 ~-6.6	19.0 ~26.1 -7.2 ~-3.3	23.2 ~26.8 -4.9 ~-2.9	1685	1670	1675	102 0.39	97 0.37	94 0.35

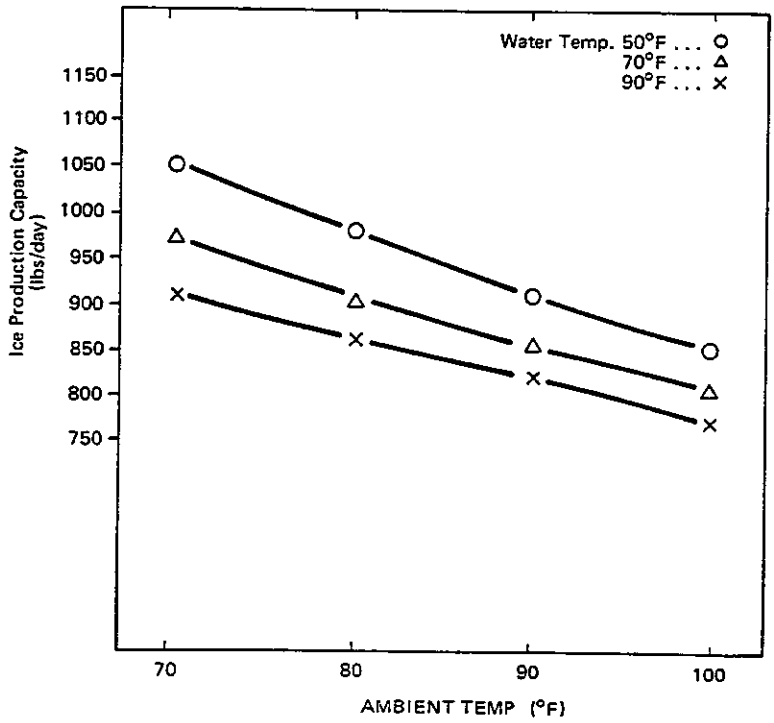


Fig. 34-1 Performance Data – F-1101ASU-1

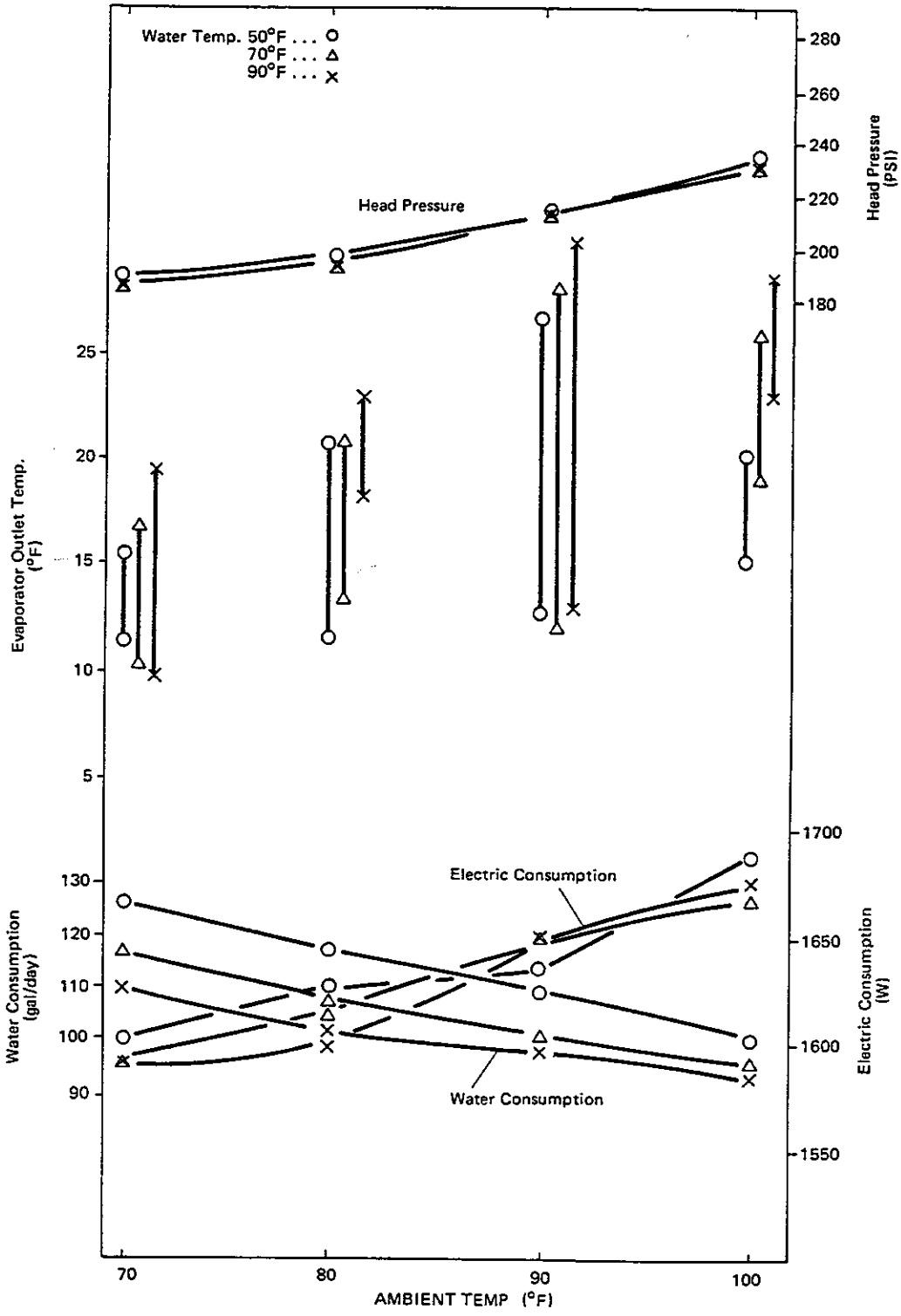


Fig. 34-2 Performance Data – F-1101ASU-1

c. F-1101AWU

Table 3 Performance Data – F-1101AWU

Water Temp. (°F) / Ambient Temp. (°F)	Ice Production Capacity (lbs/day) (kg/day)			Head Pressure (PSI) (kg/cm² G)			Evaporator Outlet Temp. (°F) (°C)			Electric Consumption (W)			Water Consumption (gal/day) (m³/day)		
	50	70	90	50	70	90	50	70	90	50	70	90	50	70	90
70	1113 505	1025 465	961 439	220 15.5	222 15.6	233 16.4	12.6 −10.8	12.0 −11.1	23.0 −5.0	1465	1460	1470	582 2.20	803 3.04	1580 5.97
80	1029 467	959 435	910 413	225 15.8	222 15.6	235 16.5	11.7 −11.3	12.0 −11.1	23.5 −4.7	1475	1465	1470	572 2.17	834 3.16	1570 5.94
90	968 439	901 409	873 396	225 15.8	222 15.6	236 16.6	11.7 −11.3	11.7 −11.3	22.6 −5.2	1475	1470	1470	573 2.17	835 3.16	1600 6.04
100	901 409	853 387	824 374	226 15.9	225 15.8	238 16.7	10.9 −11.7	11.5 −11.4	21.9 −5.6	1470	1460	1460	565 2.14	894 3.38	1600 6.06

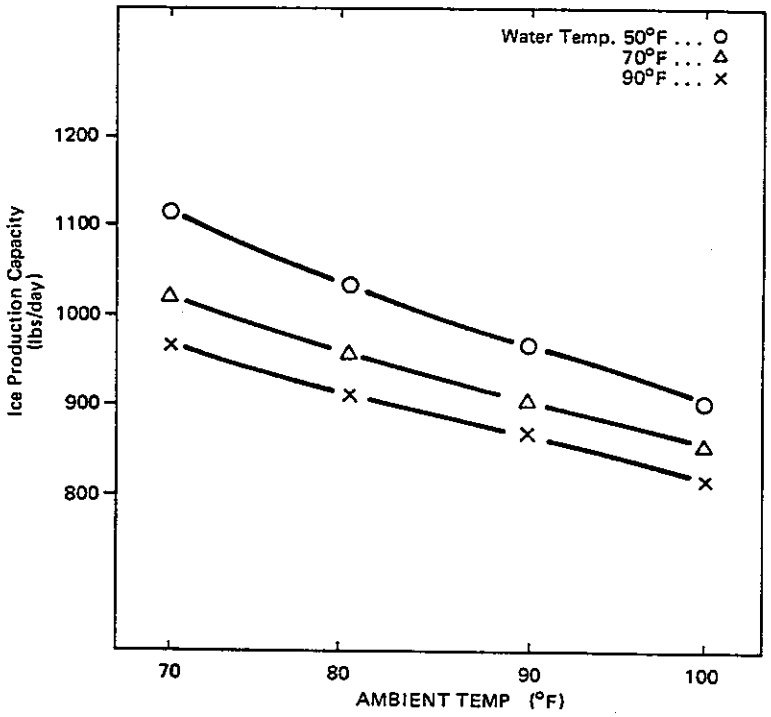


Fig. 35-1 Performance Data – F-1101AWU

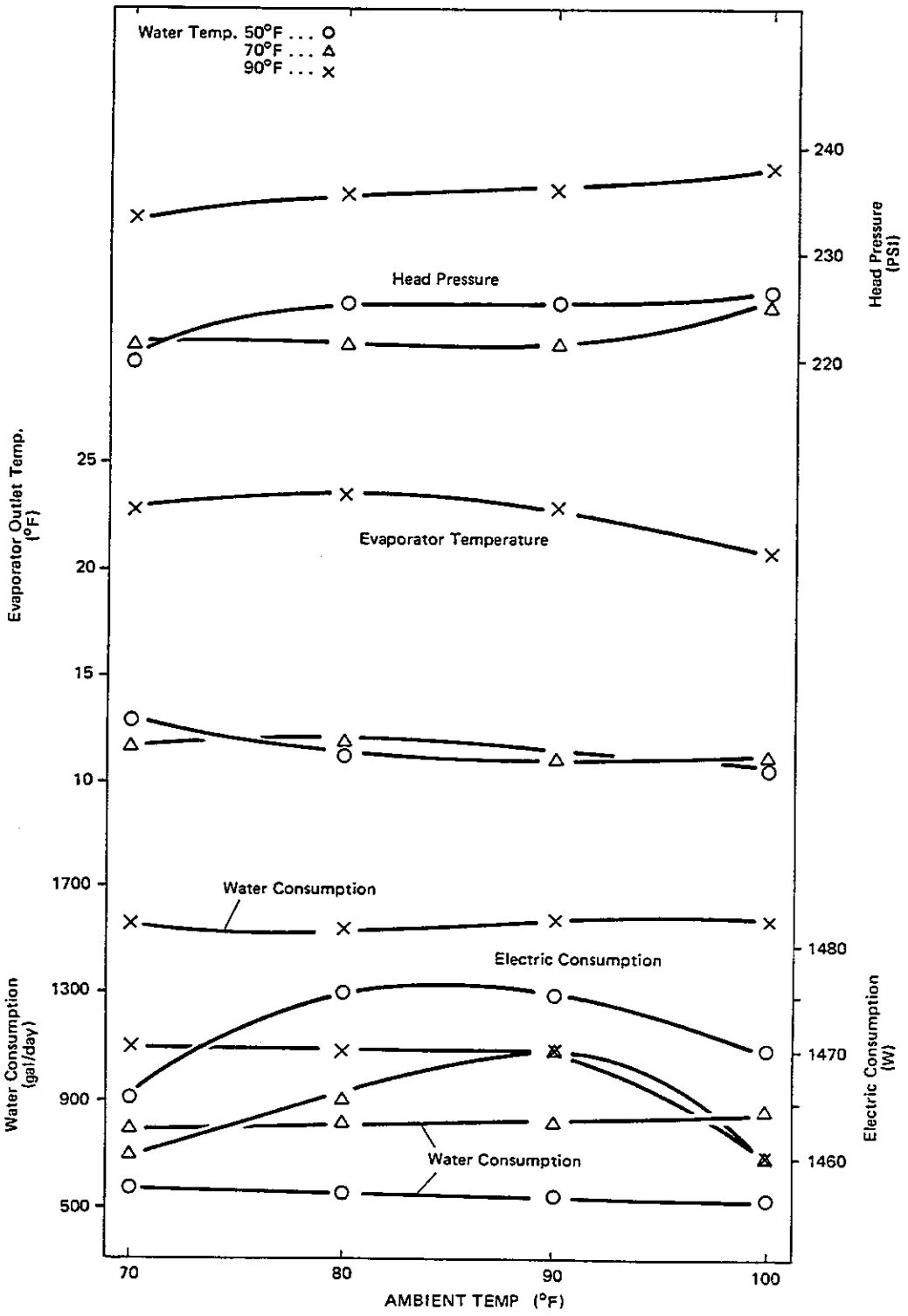


Fig. 35-2 Performance Data – F-1101AWU

6. ADJUSTMENT

A. CONSTANT-PRESSURE EXPANSION VALVE

The constant-pressure expansion valve is factory-adjusted to the ideal setting, so no adjustment is necessary. Should adjustment be required for some reason, perform the adjustment carefully in compliance with the following procedures.

a. HOW TO ADJUST

The *adjust screw is visible when the cap on the end has been removed.

- To decrease refrigerant flow, turn the adjust screw counter-clockwise.
- To increase refrigerant flow, turn the adjust screw clockwise.

IMPORTANT

1. Do not turn the screw more than 90 degrees.
2. Wait 2 or 3 minutes after performing an adjustment, before performing another one. This allows the system to stabilize.

b. Adjust carefully in terms of overall ice quality, ice production, ice maker friction sound and compressor heating conditions.

1. Frost condition on the evaporator outlet pipe
   - Frost on pipe: Turn screw left 90 degrees.
   - No frost pipe: Turn screw right 90 degrees.
2. Frost on the compressor suction pipe

   Fluid backflow is possible as long as no frost develops on the compressor itself. (OK to have frost on suction pipe.)

   Note: A 90-degree turn of the adjust screw results in a 1.4–1.71 PSIG (0.1–0.12 kg/cm²G) in the low pressure value.

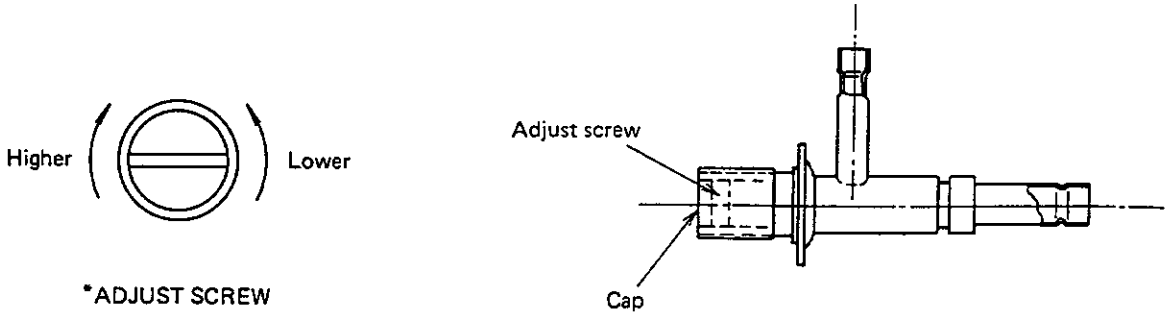


Fig. 36 Adjustment constant-pressure expansion valve

B. BIN CONTROL

IMPORTANT

The bin thermostat is factory-adjusted. Do not tamper with it. Adjust a new bin thermostat after it has been installed as follows.

Adjustment of Bin Thermostat

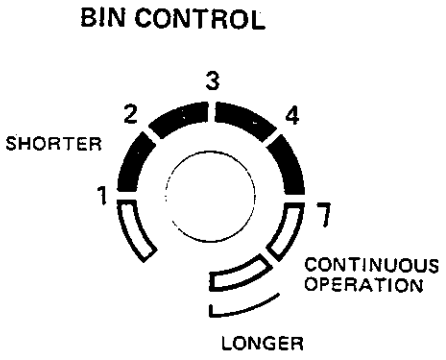


Fig. 37 Bin thermostat

Adjust the bin thermostat as the ice maker automatically stops within about 3 minutes after ice contacts the bin thermostat bulb which is attached to the bottom of ice maker.

1. Rotate the bin thermostat dial clockwise toward "LONGER" if the ice maker stops too soon.
2. Rotate the bin thermostat dial counter-clockwise toward "SHORTER" if the ice maker does not stops or stops too late.

WARNING

If the ambient temperature is below about 45°F (7°C), the bin thermostat operates and stops the ice maker. The ice maker operates continuously when the bin thermostat is set to continuous operation range. A mechanical bin control is equipped together with the bin thermostat. When it operates in a wrong way, ice fills even the ice chute, and operates the spout control. In that case, push Reset Switch on the control box, or ice will not be made even after restoration.

3. Do not set to continuous operation range.

C. WATER REGULATING VALVE (WATER COOLED MODEL)

IMPORTANT

The water regulating valve is factory-adjusted, so there is no need for adjustment. Standard condensing pressure is approx. 220 PSIG (15.5 kg/cm²G) when the water temperature is below about 68°F (20°C). The condensing pressure becomes greater than standard condensing pressure as the water temperature rises and/or freezing cycle begins. The drain water temperature from the condenser is approx. 104°F (40°C) during the normal operation. If the drain water temperature is beyond the limits of 100°F-108°F (38°C-42°C), perform the following procedure.

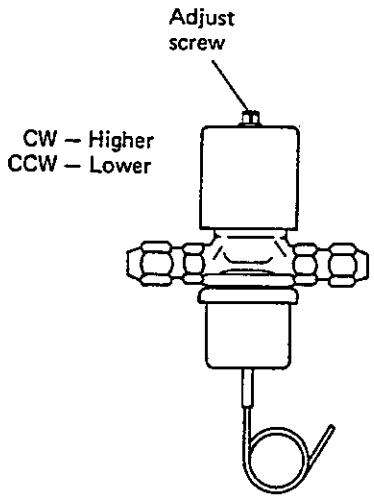


Fig. 38 Adjustment of water regulating valve

1. Turn the adjust screw clockwise and decrease flow quantity of cooling water if the drain water temperature is below 100°F (38°C).
2. Turn the adjust screw counter-clockwise and increase flow quantity of cooling water if the drain water temperature is above 108°F (42°C).

7. MAINTENANCE AND CLEANING INSTRUCTIONS

DANGER

1. Except when running the machine while cleaning the water system of the ice maker, always turn off the machine when performing maintenance: Switch off the machine, then turn off the water supply. Water and power should always be stopped to prevent dangerous leakage or possible electrical shock.
2. Never use ammonia-type fluids to clean any part of the ice maker. They can cause injury to user.

A. EXTERIOR

IMPORTANT

The cabinet is made of stainless steel but it might rust sometime without proper maintenance.

Switch off the ice maker power supply, and then wipe the cabinet from time to time with a clean, soft cloth to prevent rust.

Use lukewarm water containing a neutral cleaning agent to clean the cabinet whenever dirt builds up.

B. WATER SYSTEM

STEP 1

Dilute the solution with water as follows.

Cleaning solution: 6 oz of cleaning solution (LIME-A-WAY) with 0.8 gallons of water. This is minimum amount. Make this solution more, if necessary.

Disinfectant solution: 38 oz of 5.25% of sodium hypochlorite solution with 5 gallons of water.

IMPORTANT: Use these solution as soon as posible, or they won't be effective.

STEP 2

Use the cleaning solution to remove the lime deposited in the water line.

1. Remove all ice from the storage bin.
2. Remove the front panel and top panel.
3. Shut off the shut-off valve.
4. Switch off the unit.
5. Remove the drain cap, and drain all water from the water line.
6. Replace the drain cap.
7. Remove the cover of the reservoir.
8. Pour the solution slowly into the reservoir.
9. Replace the cover.

NOTE: This unit is designed to start operating when the reservoir is filled with water.

10. Leave the unit for about 10 minutes before the operation, then switch on the unit and make ice using the solution until the unit stops ice making.
11. Switch off the unit, and drain the solution. See 5 and 6.
12. Open the shut-off valve, switch on the unit and supply water to the reservoir.
13. Switch off the unit when the gear motor starts.
14. Drain out all water from the water line. See 5 and 6.

STEP 3

Use 3/4 gallons of disinfectant solution to sanitize the unit.

1. Shut off the shut-off valve, and remove the cover of the reservoir.
2. Pour the solution slowly into the reservoir.
3. Replace the cover.
4. Leave the unit for about 10 minutes before the operation, then switch on the unit and make ice using the solution until the unit stops ice making.
5. Switch off the unit, and drain the solution. See 5 and 6.

STEP 4

Use the disinfectant solution to sanitize the parts by removing them.

1. Remove the chute cover, gaskets, chute head, ice chute and bulb bracket. Remove the bulb of the thermostat from the ice chute.

NOTE: Be sure to remove the gasket located at the bottom of the ice chute.

2. Soak or wipe the parts removed, and wipe the bulb of the thermostat with the solution.
3. Rinse these parts thoroughly.

IMPORTANT: If the solution is left on these parts they will rust.

4. Replace them.
5. Open the shut-off valve, switch on the unit and supply water to the reservoir. Switch off the unit when the gear motor stops.
6. Drain out all water from the water line. See 5 and 6 of STEP 2.
7. Open the shut-off valve, switch on the unit for about 30 minutes before switching off.
8. Pour hot water into the storage bin to melt all ice, then clean the surface of the bin with the solution.
9. Flush out the solution.
10. Switch on the unit.
11. Replace the panels.

IMPORTANT: After cleaning, be sure not to use the ice made from the disinfectant solution. Be careful there are no such solution remained in the storage bin.
Follow carefully any instructions on the cleaning solution or disinfectant bottles.

C. STORAGE BIN AND SCOOP

IMPORTANT

To maintain sanitary conditions and prevent food contamination, clean the storage bin and ice scoop from time to time.
Ice is food, so careful attention to cleanliness is important.
Do not store anything except ice in the storage bin.
Do not leave the front door open.

1. Switch off the ice maker power supply and shut the shut-off valve.
2. Remove the bin control from the machine bottom.
3. Thoroughly clean and sanitize the storage bin, the scoop and any parts of the ice maker that are normally accessible from the storage bin.
4. Put the bin control back in its original position.
5. Open the shut-off valve and put on the power.

D. WATER VALVE

IMPORTANT

If the filter in the water valve becomes clogged with sediment or dirt, the water supply will be stopped and ice cannot be made. Disassemble the water valve and clean out the filter once every two months.

1. Switch off the ice maker power supply and shut the water supply shut-off valve.
2. Remove the inlet nut from the water valve. *Do not lose the packing.*
3. Remove the filter in the water valve, remove sediment or dirt, and rinse with the water.
4. Install the filter on the water valve.
5. Install the packing and secure carefully with the fitting to prevent leakage.
6. Open the water supply shut-off valve and switch on the power.
7. *Confirm that there is no water leak.*

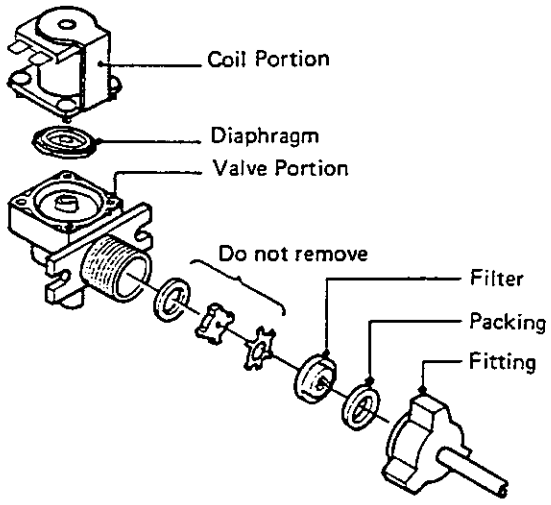


Fig. 39 Cleaning of filter in water valve

E. CONDENSER

a. AIR COOLED CONDENSER

IMPORTANT

Cooling performance markedly drops if the condenser becomes clogged.
Besides in efficient ice maker operation, the service life of the refrigerant circuit is shortened.
Do cleaning from time to time so that normal cubing is possible and in order to assure long service life.

Use a brush or vacuum cleaner for the cleaning, but do not bend or damage the fins.

b. WATER COOLED CONDENSER

IMPORTANT

Cooling performance markedly drops if the condenser becomes dirty.
Besides in efficient ice maker operation, the service life of the refrigerant circuit is shortened.
As the obstacles of the heat exchange there is sticking of the scale. Explain here how to remove the scale.

1. Provide the followings.
   - Pump motor: Equal capacity to the pump motor used in this ice maker
   - PV tube: Capable of connecting the condenser and the pump motor
   - Cleaner: Such as LIME-A-WAY from Economics Laboratory, Inc.
   - Washing bottle: Capable of pouring about 3 gallons of water
2. Mix about 20 oz. of cleaner in 3 gallons of water.
3. Switch off the ice maker power supply and shut the water supply valve.
4. Remove the two connecting pipes from inlet and outlet of condenser.
5. Connect the condenser, the pump motor and the washing bottle by PV tube to circulate the mixing cleaner.
6. Operate the pump motor and circulate the cleaner for about 1 hour.
7. Remove the cleaner from the washing bottle.
8. Pour the clear water into the washing bottle, circulate the clear water for a while and then remove the rinse water from the washing bottle.
9. Repeat this circulating and removing to thoroughly rinse till the rinse water becomes clear.
10. Secure carefully the two connecting pipes to prevent leakage and open the water supply valve.
11. Confirm that there is no water leak.
12. Put on the power.

F. AIR FILTER (ONLY FOR AIR COOLED MODELS, BUT OPTIONAL EXTRA FOR REMOTE AIR COOLED MODELS)

IMPORTANT

In case that the air filters are fixed, you need not clean the condenser as often as without the air filters. Although the cleaning of the air filters is needed, it is much easier than that of the condenser.
Cooling performance markedly drops if the air filters become clogged.
Besides in efficient ice maker operation, the service life of the refrigerant circuit is shortened. Clean at least twice a month. More frequent cleaning may be needed, depending on the presence of contaminants.

1. Switch off the ice maker power supply and remove the air filters.
   They are equipped inside the front panel and removes manually. (When the optional extra air filters are installed on remote air cooled models, consult the procedure under "10. INSTALLATION OF OPTIONAL PARTS.")
2. Rinse out the air filter with water. To remove stubborn grime, first wash in lukewarm water with detergent, then rinse out with water. Be careful not to damage the net when cleaning the air filter in this way.
3. Re-install the air filter after drying thoroughly. Failure to put it back in will lead to quick clogging of the condenser.

8. TROUBLE-SHOOTING

WARNING

Except when absolutely necessary, always turn off the machine and shut off the water when trouble-shooting the machine and performing service remedies.

MACHINE CONDITION	INSPECTION		REMEDY
	PLACE	PROBLEM	
1 Machine will not start operation.	Power switch. (outside machine)	OFF.	Put in on.
		Blown fuse?	Replace.
	Fuse (F) (inside machine)	Blown?	Replace.
2 Water valve operates but no ice is produced.	Water main valve.	Shut off?	Open it.
		Water failure?	Wait till water is supplied.
	Float switch (FS)	Water is not supplied.	Check water line. Strainer, water valve filters might be clogged.
		Faulty contacts.	Replace them.
	Room temperature	Room too cold (below 45°F)	Warm room.
	Spout control	Adjusted too warm.	See "6. ADJUSTMENT" and readjust.
	Relays (X_1) (X_4)	Faulty contacts.	Replace.
		Coil broken.	Replace.
		Loose, disconnected terminals.	Install correctly.
3 Compressor does not start.	Compressor (CM)	When no current between terminals, Coil break.	Replace.
	Relays (X_2)	Faulty contacts.	Replace.
		Coil broken.	Replace.
		Loose, disconnected terminals.	Install correctly.
	Pressure switch (PS)	Defective.	Replace.
	Motor protector	Faulty contacts.	Replace.
	Starter	Faulty contacts.	Replace.
	Starting capacitor	Faulty.	Replace.
	Running capacitor	Faulty.	Replace.
4 Compressor starts, but stops again. (intermittent operation)	Compressor. Motor protector (OL)	Overload protector has cut off due to overload.	Check power source voltage, condenser, Fan Motor.

MACHINE CONDITION	INSPECTION		REMEDY
	PLACE	PROBLEM	
	Water regulating valve (Water cooled Models)	Check drain cooling-water temperature and adjust within 100 to 108°F.	See "6. ADJUSTMENT" and readjust.
	Power source voltage. Rated voltage. 230V, 60Hz	When voltage exceeds ±10% of rated voltage, Motor protector cuts off.	Check voltage and wiring. Change location.
	Condenser (Air cooled Models)	Very dirty condenser.	Clean thoroughly.
		Vents (inlet, outlet) are blocked.	Clean, remove blockage.
	Fan Motor (FM) (Air cooled Models)	Fan revolving?	See No. 6 for measure.
5 Gear Motor alone not working.	Gear Motor (GM)	Coil break if no current between terminals.	Replace.
	Capacitor	Starting capacitor failure.	Replace.
6 Fan Motor inoperative. (Air cooled Models)	Fan Motor (FM)	Coil break if no current between terminals.	Replace.
	Capacitor	Starting Capacitor failure	Replace.
7 Abnormal noise.	Fan Motor (FM)	Bearing wear.	Replace.
	Compressor (CM)	Bearing wear. Valve break.	Replace.
	Gear Motor (GM)	Bearing wear. Gear wear or damaged.	Replace entire unit or failed part.
	Evaporator	Low-pressure side pressure too low.	Adjust expansion valve (turn screw to left.) See "6. ADJUSTMENT"
		Inside of freezing column is dirty (scale buildup)	Remove auger. Use Lime-away solution to clean off scale. Clean periodically. If water is found to be hard by testing, install softener.
8 No water or poor flow.	Water supply	Water failure or pressure too low.	Wait till turned back on or adjust the pressure range within 7 to 113 PSIG.
		Water main valve shut off. Opened insufficiently.	Open fully.
	Float switch	Contacts fused.	Replace.
		Filter clogged.	Take apart/clean.
		Coil break if no current between terminals.	Replace.
	Water valve	Clogged filter inside.	See "7. MAINTENANCE" and clean.
9 Overflow from Reservoir (Water does not stop.)	Water supply	Water pressure too high.	If pressure is consistently too high, install a low-pressure valve.

MACHINE CONDITION	INSPECTION		REMEDY
	PLACE	PROBLEM	
	Water valve (WV)	Water Valve sticks, does not open.	Take apart/clean. See "7. MAINTENANCE"
	Float switch (FS)	Faulty contacts	Replace.
		Float mulfunction.	Replace or clean float friction part.
	Relay (X_3)	Coil break if no current between terminals.	Replace.
		Faulty contacts.	Replace.
10 Cooling water dose not flow (Compressor dose not operate) (Water cooled Models)	Water regulating valve	Adjust screw too wring.	See "6. ADJUSTMENT" and readjust.
		Defective.	Replace.
	Gas leakage	Check freezing line, esp. welds, flare nuts, connection.	Check for leaks with leak detector. Reweld for high-pressure side leak location(s). Charge with refrigerant. Do same for low-pressure side leaks but replace Drier.
11 Machine will not stop even if bin is full of ice.	Bin control	Switch activator does not move freely.	Check and replace
	Relay (X_3)	Contacts fused.	Replace.
12 Much water drain from Gear Motor drain pipe.	Mechanical seal (Under 0.5 cc when normal)	Dirt stick in seal.	Take apart/clean and reassemble.
		Seal wear.	Replace.
13 Poor ice production capacity	Condenser	Condenser dirty.	Clean.
		Blocked ventilation (inlet, outlet)	Remove anything blocking vents.
	Expansion valve	Check low-pressure side pressure and adjust within 31 to 35 PSIG. May vary with ambient temperature.	Turn adjust screw right to decrease flow, left to increase it. Check production when varying from 31-35 PSIG.
	Installation conditions	Too high ambient temperature?	Check ventilation, location and change as needed to improve performance.
		6-inch clearance in back and on sides?	Obtain proper ventilation clearance.
	Water line	Scale buildup in line? Scale on inside wall of freezing cylinder causes poor performance.	See No. 7 above (evaporator).
	Water supply	Interrupted water supply or too low pressure.	Adjust water pressure.
	Condensing pressure regulator (Remote Air cooled Models)	Adjust too high pressure.	See "6. ADJUSTMENT" and readjust.

MACHINE CONDITION	INSPECTION		REMEDY
	PLACE	PROBLEM	
			If water analysis reveals less than the following levels, use a conditioner for the actual concentration. Hardness . . . 50 ppm Silica . . . 30 ppm
	Freezing line	Insufficient gas due to gas leak or filled too full.	Charge refrigerant. Use nameplate volume when filling.
14 Machine runs but does not produce ice.	Gas leakage	Check freezing line, esp. welds, flare nuts, connections.	Check for leaks with leak detector. Reweld for high-pressure side leak location(s). Charge with refrigerant. Do same for low-pressure side leaks but replace Drier.
	Expansion valve	Clogged? Moisture?	If moisture, replace drier.
	Water line	Sensor gas leak.	Replace.
		Air in hose between reservoir and ice-making cylinder?	Remove drain pipe and drain water from line; put in fresh water.
15 Machine does not run. Beeper beeping.	Spout Control	Bin control does not operate.	Check Bin thermostat and Bin control operation. Push on Reset Switch.

CAUTION

A freeze-up protective system at starting assures that the machine stops or starts after a given interval when the power or stock switch is put on or off.

9. MAIN PARTS FUNCTION AND REPLACEMENT PROCEDURE

DANGER

Unless otherwise indicated, always switch off the machine and shut off the water supply when replacing parts. This prevents electrical shocks and water splash.

A. REFRIGERANT CIRCUIT

a. REFRIGERANT

- Refrigerant Function

The refrigerant is used to chill the evaporator in order to make ice out of the water. The liquid refrigerant is vaporized at a low pressure in the evaporator, which is cooled. The evaporator is connected to the intake side of the compressor and kept under low pressure. Vaporized at low temperature, the refrigerant is then compressed by the compressor, where it is heated and under high pressure is next cooled and liquified in the condenser. The highly pressurized, now liquid refrigerant enters the evaporator under decreased pressure through the expansion valve.

In this way the freezing cycle is continued.

DANGER

The R-502 used for the refrigerant is not itself flammable and explosive. Not poisonous, apt to cause skin trouble or affect food, it is a safe refrigerant. However, take care as to the following.

1. Contact with flame creates a corrosive, toxic gas (phosgene, etc.) from the R-502.
2. In close quarters with no ventilation, it can cause trouble from overinhalation due to intoxication, and there is danger of suffocation IF THE ROOM FILLS WITH R-502.
3. In its liquid state, the refrigerant can cause frostbite because of the low temperature.

Thus, when discharging the refrigerant, do so only in a well-ventilated area where there is no flame or fire. In the liquid condition, it should not contact anyone directly. When repairing refrigerant circuit, always bleed all refrigerant before opening up the line with soldering.

- Refrigerant Discharge Method

1. Have a 1/4" charging hose with valve opener and a 1/4" shut-off valve on hand.
2. Remove the cap nut on the charge port connected to the compressor process tube.
3. Connect one end of the charging hose to the closed shut-off valve and the other to the charge port.
4. With the shut-off valve open, discharge the refrigerant gradually in a flame-free, well-ventilated area.

- Refrigerant Charge Method

1. Have on hand two 1/4" charging hoses with a valve opener and two 1/4" shut-off valves, as well as the vacuum pump.
2. Connect the shut-off valve and charging hose to the charge port connected to the compressor process tube. See "Refrigerant Discharge Method."
3. Connect the hoses of the vacuum pump to the shut-off valves hooked up under No. 2 and 3 above.
4. Open the shut-off valves and operate the vacuum pump.
5. When there is no moisture within the refrigerant line, run for more than 30 minutes at less than 29.9" vacuum. If, however, some moisture exists in the line, run it for at least 2 hours at less than 29.9" vacuum, while heating the line by means of a heat lamp.
6. Close the shut-off valves and remove the vacuum pump hoses from the shut-off valves.
7. Fill the charging cylinder with the specified amount of refrigerant (see "1. SPECIFICATION").
8. Connect the charging hose to the charging cylinder and the shut-off valve on the compressor's process tube side.

9. With the charging cylinder valve up and open, loosen slightly the charging hose hooked up to the shut-off valve and purge air from the charging hose. Then immediately secure the charging hose to the shut-off valve. Be careful lest you use too much refrigerant to purge air, or the line will be undercharged.
10. With the charging cylinder valve in the upright position, open the shut-off valve to charge the line with refrigerant.

WARNING

Do not open the shut-off valve on the receiver tank side.
With the charging cylinder valve downward during line charging, the liquid refrigerant will flow into the refrigerant line and possibly cause a compressor breakdown. ALWAYS CHARGE WITH THE CHARGING CYLINDER VALVE IN THE UPRIGHT POSITION.

11. All of the refrigerant will not enter the line. When the refrigerant flow comes to a halt, run the ice maker.
12. When the refrigerant line has been completely charged remove the charging hose from the charge port connected to the compressor process tube, and stop the machine operation.
13. Secure the cap nuts on the charge ports.
14. Check to be sure that there is no refrigerant leak from the refrigerant line.

b. COMPRESSOR

- Compressor Function
  The reciprocating piston motion in the compressor causes the low temperature refrigerant gas to be sucked in, pressurized and compressed before discharge at high temperature and high pressure. The compressor is the key component in the refrigerant line.
- Compressor Replacement Procedure

1. Switch off the machine and shut off the water.
2. Remove the cabinet.
3. Remove the lead wires and motor protector from the terminal box on the compressor. On remote air-cooled models, remove the crankcase heater wound around the compressor shell.
4. Discharge the refrigerant from the refrigerant line. See "a. REFRIGERANT" heading.
5. Unsolder and disconnect the discharge tube, suction tube, process tube and oil cooler tube (water-cooled model only) from the compressor.

WARNING

When repairing the refrigerant line, be careful not to let the burner flame contact the lead wires or insulation.

6. Remove the bolts holding the compressor, then take it out of the unit.

WARNING

The compressor is extremely heavy. Be careful when removing so as not to drop it and injure yourself (feet, etc.).

7. Remove the vibration rubber dampers and sleeves from the legs of the compressor.
8. Attach the dampers and sleeves to the new compressor before replacing.
9. With the plug in place, sand-paper the discharge tube, suction tube, process tube and oil cooler tube (remote air-cooled models and water-cooled models) for the compressor.
10. Bolt the compressor to the unit as originally installed.
11. Remove the plug in the compressor connecting tube and connect the pipes for the refrigerant line.
12. Blow approx. 3 PSIG nitrogen from the charge port connected to the compressor process tube, then solder the process tube, suction tube, discharge tube and oil cooler tube (remote air-cooled models and water-cooled models) joints.

WARNING

Solder the charge port so that it will not be hotter than about 250°F by wrapping with wet cloth to keep it cool. The charge port otherwise may not function properly.

13. Replace the dryer.

WARNING

Always replace the dryer when opening a sealed-off refrigerant circuit. The line may well become faulty if the dryer is not replaced.

14. After the connection is made, charge the refrigerant line with about 150 PSIG nitrogen, then coat joints with soapy water to check for possible leakage.
15. Connect the lead wires to the compressor terminal, and then attach the motor protector in the terminal box. On remote air-cooled models, install the crankcase heater on the compressor shell.
16. Charge the line with the refrigerant. See "a. REFRIGERANT" heading.
17. Install the cabinet and then operate the ice maker.

c. CONDENSER

- Condenser Function
  The condenser cools the refrigerant gas received under high pressure and high temperature from the compressor, lowering it to about saturation temperature to make the refrigerant achieve the liquid state. The condenser has the effective structure for the refrigerant to give off it heat easily.

d. FAN MOTOR

- Fan Motor Function
  The fan motor provides the air to cool the condenser or compressor. It cools the condenser to cool and thereby make liquid the refrigerant gas. It cools the compressor to keep the lubricant from deteriorating inside.

e. DRYER

- Dryer Function
  The dryer contains the desiccant and filter to remove moisture and foreign matter from the refrigerant line. Thus, when the sealed-off refrigerant line is opened, the dryer should always be replaced.
- Dryer Replacement Method
  1. Switch off the machine and shut off the water.
  2. Remove the cabinet.
  3. Remove the screw holding the dryer in place.
  4. Discharge the refrigerant from the refrigerant line.
  5. Unsolder and disconnect the dryer inlet and outlet pipes.

WARNING

When repairing the refrigerant line, always keep the burner flame away from lead wires and insulation.

6. Blow about 3 PSIG nitrogen from the receiver tank charge port and solder the new dryer inlet and outlet connections.

WARNING

If the dryer package is broken open and the dryer is not installed right away, the dryer performance will be poor. Install immediately after opening the package. The arrow indication should be kept in the refrigerant flow direction when installing. Mistaking the direction can lead to a refrigerant line failure.

7. After making the connection, charge the line with about 150 PSIG nitrogen, coat the joints with soapy water and check for leaks.

8. Install the dryer in its original position.
9. Charge the refrigerant line with refrigerant.
   See "a. REFRIGERANT" heading.
10. Install the cabinet and operate the ice maker.

f. EXPANSION VALVE

- Expansion Valve Function
  Refrigerant flow is automatically regulated so that the pressure of refrigerant passing through the expansion valve is maintained at a fixed level.

1. Switch off the machine and shut off the water.
2. Remove the Cabinet.
3. Discharge the refrigerant from the refrigerant line.
   See "Refrigerant Discharge Method"
4. Remove the expansion valve covers.
5. Blow about 3 PSIG nitrogen from the charge port and solder the new expansion valve.
6. Replace the dryer.

WARNING

When opening the sealed-off refrigerant line, always replace the dryer. Failure to do so will often cause a malfunction in the refrigerant line.

7. Charge the refrigerant line with about 150 PSIG nitrogen, coat the joints with soapy water and watch for leaks.
8. Charge the refrigerant line with refrigerant.
   See "a. REFRIGERANT" heading.
9. Check to be sure the expansion valve setting is correct, and adjust as required. See "6. ADJUSTMENT" heading.
10. Install the new expansion valve cover.
11. Install the cabinet and operate the ice maker.

g. EVAPORATOR

- EVAPORATOR Function

  The evaporator is copper tube coiled around the outside of the ice-making cylinder. Once the refrigerant has passed through the extremely small expansion valve passageway out into this thick copper tube, its pressure drops suddenly and it becomes vaporized all at once. A huge amount of heat is given off, so the temperature of the coil-wound ice-making cylinder falls and the water inside the cylinder freezes.

- EVAPORATOR Replacement Method

1. Switch off the machine and shut off the water.
2. Remove the Cabinet.
3. Discharge the refrigerant from the refrigerant line.
   (See "Refrigerant Discharge Method").
4. Remove the Ice Chute Head Covers A. B (insulation). Do not damage the insulation material when removing.
5. Remove the 2 assembly bolts attaching the Ice Chute Head to the machine frame.
6. Remove the 5 assembly bolts attaching the Ice Chute Head to the top of the Evaporator; lift off Ice Chute Head.
7. Remove small hexagon bolt and spring washer positioning Cutter and remove Cutter. (Flake Ice Maker).
8. Remove large hexagon bolt and spring washer holding Cutter.

9. Remove 3 hexagon bolts holding Extruding Head, and lift off the head.
10. Pull the Drain hose out of the way and drain the water from the water line.
11. Remove the Auger from above.
12. Remove the Expansion Valve.
    (See "a. Expansion Valve").
13. Unsolder the Evaporator.

CAUTION

Sandpaper off any coating (paint) found on welds before heating with the welder.

14. Remove the 4 hexagon bolts on the bottom of the Evaporator and lift out the Ice Making Cylinder.
15. Replace the Evaporator.

CAUTION

Before assembling make sure to check the Auger and its bearings, the Extruding Head, and the Housing and its bearings. If they are weared, replace with new parts. Wash the scale adhered on the parts. (See 7. WATER SYSTEM) Make sure to replace the O-ring with a new one. To replace the Evaporator reverse the Evaporator removal procedure.

CAUTION

Blow nitrogen gas in while welding the Evaporator pipe connections. After welding test for leakage using 140 PSIG nitrogen.

Install the mechanical seal in accordance with "C. Mechanical Seal". When installing the Auger in the Evaporator, rotate the Auger so that the spline portion on its end fits into the slots of the spline.

After assembling but before installing the Cabinet, plug in the machine and check after 30 minutes the ice volume, low-pressure side pressure, frost line, water leakage and any other abnormality. (See "6. ADJUSTMENT" and readjust)

h. CONDENSING PRESSURE REGULATOR (C.P.R.) (REMOTE AIR COOLED MODELS ONLY)

- C.P.R. Function
  The condensing pressure regulator keeps condensing pressure constant despite changes in the ambient temperature by allowing the refrigerant to pass through the condenser or to bypass it. Through this regulating action, the condenser's actual heat exchange volume is varied. If the condenser's pressure increases remarkably, the freezing cycle time grows longer; if, on the other hand, the condenser pressure markedly decreases, the harvest cycle lengthens. This has a direct effect on the ice maker efficiency. Other problems during the freezing cycle are prevented, thanks to the use of this C.P.R. However, an ambient temperature of over approx. 68°F and a very unclean condenser situation can cause the condensing pressure to elevate from the constant level.
- C.P.R. Replacement Method

1. Switch off the machine and shut off the water.
2. Remove the condenser unit cabinet.
3. Discharge the refrigerant from the refrigerant line.
   See "a. REFRIGERANT" heading.
4. Unsolder and disconnect the C.P.R. pipes at the 3 locations.

WARNING

When repairing the refrigerant line, do not allow the burner flame to contact the lead wires or insulation.

5. Blow approx. 3 PSIG nitrogen from the receiver tank charge port on air-cooled models or the coupling charge port on remote air-cooled models, while making the solder connection of the new C.P.R. in the pipe near the charge port.

WARNING

Wrap the C.P.R. with wet cloth when soldering so that it will not reach a temperature of more than about 250°F. Otherwise a C.P.R. failure may well result.

6. Replace the dryer.

WARNING

When opening a closed-off refrigerant line, always be sure to replace the dryer or a line failure may occur.

7. Charge the refrigerant line with approx. 150 PSIG nitrogen and use soapy water to check for possible leaks.
8. Charge the refrigerant line with refrigerant.
   See "a. REFRIGERANT" heading.
9. Install the cabinet and operate the ice maker.

i. WATER REGULATING VALVE (WATER COOLED MODELS ONLY)

- Water Regulating Valve Function
  The water regulating valve controls the amount of chilled water so that the condensing pressure will remain constant despite changes in condenser chilled water temperature. When the condensing pressure increases remarkably, the freezing cycle grows longer; on the other hand, if the pressure drops markedly, the harvest cycle lengthens, and chilled water is wasted. This has a direct effect on ice maker efficiency. Other problems can arise also without a water regulating valve.
  However, a chilled water temperature of over approx. 68°F and a very dirty condenser situation can cause the condensing pressure to elevate from the constant level.
- Water Regulating Valve Replacement Method
  - When replacing only the valve body and not the bellows portion:

1. Switch off the machine and remove the cabinet.
2. Turn the adjust screw on the water regulating valve all the way to the left (counterclockwise). Run the chilled water and lower the head pressure.
3. Stop the water supply, open the drain valve in the water supply line and drain out the water from the supply line.

4. Remove the flare nuts on the inlet and outlet of the water regulating valve.
5. Release the water regulating valve from the bracket.
6. Remove the 4 screws holding the valve body and bellows portion, then take off the valve body.
7. Secure a new valve body to the bellows portion just as before.

WARNING

Tighten screws diagonally in sequence so that the valve body will be secured snugly to the bellows portion.

8. Fasten the water regulating valve to the bracket.

WARNING

Be sure that the arrow indication on the water regulating valve is in the water flow direction, when securing the valve in place.

9. Fasten the flare nuts on the inlet and outlet of the water regulating valve.

WARNING

Always coat the contact surfaces of the pipe with refrigerator oil when securing the flare nuts, or the contact surface can be deformed and leaks will result.

10. Install the cabinet and run the machine.
11. Check to be sure that there are no water leaks from the water regulating valve connections.
12. See "6. ADJUSTMENT" heading if any adjustments must be made.

○ When replacing the whole water regulating valve:

1. Switch off the machine and shut off the water.
2. Open the drain valve in the water supply line, then drain out the water from the supply line.
3. Remove the cabinet.
4. Discharge the refrigerant from the refrigerant line.
   See "a. REFRIGERANT" heading.
5. Cut off the pipe in the soldered area of the capillary tube on the water regulating valve.
6. Cut the pressure control capillary tube at the soldered portion.

WARNING

Cut the capillary tube so that the cut-off portion will not be blocked.

7. Remove the flare nuts on the inlet and outlet of the water regulating valve.
8. Detach the water regulating valve from the bracket.
9. Check to be sure that the end of the capillary tube on the new water regulating valve is not blocked. If blocked, cut again near the end of the tube.
10. Install the new water regulating valve on the bracket.

WARNING

Be sure that the arrow indication is kept in the water flow direction when installing.

11. Secure the flare nuts on the water regulating valve inlet and outlet.

WARNING

Coat refrigerator oil on the flare contacting surfaces before installing the flare nuts. Otherwise a deformed surface can lead to water leakage.

12. Slip in approx. 1/2" and solder both capillary tubes for the water regulating valve and pressure control.
13. Replace the dryer.

WARNING

When opening a closed-off refrigerant line, the dryer must always be replaced or a line failure may result.

14. Charge the refrigerant line with approx. 150 PSIG nitrogen, while using soapy water to check for possible leaks.
15. Charge the refrigerant line with refrigerant. See "a. REFRIGERANT" heading.
16. Install the cabinet and run the machine.
17. Check for possible water leakage from the water regulating valve connections.
18. See "6. ADJUSTMENT" heading if adjustments must be made.

j. PRESSURE CONTROL

- Pressure Control Function

  The pressure control functions to shut down the compressor line and the compressor itself to protect the refrigerant line if the head pressure becomes too high. It automatically starts the compressor whenever the head pressure is sufficiently low again. The head pressure becomes too high in the following instances:

  - With an air-cooled condenser
    - Extremely high ambient temperature
    - Insufficient clearance around ice maker
    - Fan motor inoperative
    - Clogged condenser or air filter
  - With a water-cooled condenser
    - Water temperature extremely high (supply)
    - Water failure or shut-off water supply valve
    - Advanced scale buildup inside condenser

- Pressure Control Replacement Method

  See the whole unit replacement procedure in "i. WATER REGULATING VALVE" heading.

B. ICE MAKING MECHANISM & WATER SYSTEM

a. GEAR MOTOR AND BEARING (LOWER)

- Gear Motor Function

  The motor and gear train are unitized. To protect the gear motor from locking under overload, a thermal protector with a manually reset thermal relay is equipped. The gear train is equipped within an aluminum die-cast casing and packed with a grease lubricant. The gear train is a 3-step plane gear.

- Bearing (Lower) Function

  Made of copper alloy (BC6), the retainer is equipped with a force-fitted bearing inside. It is attached to the lower part of the evaporator and connected to the gear motor and evaporator.

- Gear Motor and Bearing (Lower) Removal

  1. Switch off the machine and shut off water.
  2. Remove the Cabinet.
  3. Remove the drain hose and drain out all water from the water line.
  4. Remove the Evaporator. (See "g. EVAPORATOR")

CAUTION

Make sure to drain out the water in the water line before removing the Auger. The Gear Motor can be removable without removing any refrigerant piping.

5. Remove the 6 hexagon bolts holding the Bearing (Lower) on the Gear Motor.
6. Cut the Gear Motor lead wire at the closed end connector.
7. Remove the 3 hexagon bolts holding the Gear Motor on the main frame, raise the Evaporator slightly and pull out the Gear Motor toward you.
8. Remove the 4 hexagon bolts securing the Bearing (Lower) to the Evaporator and pull out the Housing from below.

   N.B.: If the clearance between the Bearing (Lower) and the Auger shaft is more than 0.02" (0.5 mm), replace with a new Bearing (Lower).

- Gear Motor, Bearing (Lower) Installation

  When assembling, be careful not to damage the Bearing (Lower) and Extruding Head. Install the Mechanical Seal in accordance with procedure under. "C. Mechanical Seal"

  1. Install the Gear Motor. Insert the liner under the Gear Motor and secure with the 3 hexagon bolts.
  2. Assemble in the reverse order of the removal procedure.

CAUTION

After assembling, make sure to check that there is no water leakage.

b. EXTRUDING HEAD

- Extruding Head Function

  The compressing head is of stainless steel, with a resin bearing fastened inside under pressure. It is secured in the upper part of the evaporator. When the sherbet-like ice brought up by the auger passes the compressing head, the pressure resistance encountered compresses it into cubelets, and it is ejected above.

WARNING

The Extruding Head has a force-fitted resin bearing that wear for years. Inspect it every 2 to 3 years. Replace the bearing whenever the clearance between the bearing and the Auger shaft is more than 0.02" (0.5 mm).

- Extruding Head Replacement Method
  1. Switch off the machine and shut off the water.
  2. Remove the Cabinet.
  3. Remove the Ice Chute Head Cover. Do not damage the insulation material when removing.
  4. Remove the 3 bolts attaching the Ice Chute Head to the Evaporator; lift off Ice Chute Head.
  5. Remove the bolt and lift off Cutter.
  6. Remove 3 hexagon bolts holding Extruding Head and lift off the head.
  7. Install the new Extruding Head in its original position.
  8. Install the Cutter, Ice Chute Head and Cabinet.

WARNING

After assembling the Extruding Head make sure to check that the Auger does not contact with the inner surface of the Evaporator and there is not abnormal noise from the bearing.

Attach the Ice Chute Head Cover A, B after checking there is not water leakage during the freezing operation.

c. AUGER, MECHANICAL SEAL

- Auger Function

  Made of stainless steel, this auger is supported by a shaft bearing above and below in the evaporator. It turns slowly, scraping the ice away from the cylinder wall and pushing it upward for ejection.

- Mechanical Seal Function

  A mechanical seal is used over the shaft in the lower auger portion so that water for ice making in the evaporator will not leak out. Ceramics and graphite are used in the mechanical seal.

- Auger, Mechanical Seal Replacement Method
  1. Remove the Extruding Head (See "b. Extruding Head Replacement Method".)
  2. Remove the drain hose and drain out all water from the water line.
  3. The bellows portion of the Mechanical Seal is removed together with the Auger.
  4. The Floating Seat portion of the Mechanical Seal is removed from above on the Housing.

WARNING

Clean up scale and foreign matter before assembly (See "7. MAINTENANCE AND CLEANING INSTRUCTIONS".) Make sure to replace the O-Ring.

5. Install the new Auger and Mechanical Seal in its original position.
6. To replace reverse the removal procedure.

CAUTION

A. When installing the Mechanical Seal (bellows portion) onto the Auger, it should be perpendicular to the Auger. Be sure no dirt or foreign matter adheres to the contact surface of the Seal Ring contact surfaces.

B. When installing the Mechanical Seal (Floating Seat part) in the Bearing (Lower), be sure there is no dirt or foreign matter clinging to the contact surfaces of the Floating Seat.

d. WATER VALVE

- Water Valve Function
  The water valve regulates the water flow so that roughly the same flow amount is obtained regardless of change in water pressure with the water valve open. The valve also has a filter in the inlet to catch foreign particles.
- Water Valve Replacement Method
  - When replacing only the diaphragm in the water valve:
    1. Switch off the machine and shut off the water.
    2. Open the drain valve in the water supply line and drain out the water from the water supply line.
    3. Remove the front panel.
    4. The water valve is on the left end in front; remove the cover on the water valve.
    5. Release the clip holding the tube on the water valve outlet, then slip off the tube.
    6. Loosen the inlet nut on the water valve inlet, then take off the water valve. Do not lose the packing inside the inlet nut.
    7. Disconnect the electrical connector from the water valve.
    8. Remove the 4 screws holding the water valve coil portion.
    9. Separate the coil portion and the valve portion. Replace the diaphragm found inside.

CAUTION

- Be careful not to lose the spring and plunger inside the coil.
- Fit in the diaphragm carefully. Do not forget to put in the other inside parts.

    10. Install the water valve using the reverse of the above removal procedure.
    11. Check for possible water leakage.
  - When replacing the whole water valve:
    Follow the above procedure except for Nos. 8 and 9, which apply only to the diaphragm replacement.

e. WATER RESERVOIR

Water Reservoir Function

Reservoir

This resin reservoir holds a fixed amount of water needed for ice making. A float and float valve are equipped to control the water level. Water kept in the reservoir is supplied to the ice-making cylinder through the water line.

f. FLOAT SWITCH

Handle the Float Switch carefully. A strong impact can cause faulty performance. If the float works poorly because of scale and adherence of other foreign matter, install a Filter in the water supply pipe outside the machine and/or use a water softening device. Consult your local water authorities or specialists. The selection of this equipment must be in terms of the local water quality.

- Float Switch Replacement Method
  1. Switch off the machine and shut off the water.
  2. Remove the Front Panel and Top.

3. Disconnect the drain hose and drain out the water from the water line.
4. Cut the lead wire of the Float Switch at the closed end connector.
5. Unfasten the flanged top and turn it, and then remove the Float Switch.
6. To replace the Float Switch, reverse the removal procedure.

C. ELECTRICAL SYSTEM

a. BIN CONTROL

- Bin Control Function
  The bin controls are equipped at the bottom. When the storage bin is filled with ice, ice contacts the switch activator and Bulb of Bin Thermostat, which makes the switch tripped, or stop ice making.
  The switch is automatically reset when ice is removed.

b. SPOUT CONTROL

- Spout Control Function
  Spout Control is secured at the upper part of the Chute. Though storage bin gets full of ice and without the operation Bin Control, continuation of ice making cycle will result in a series machine failure.
  To prevent this incident, Spout Control operates suddenly when Chute gets full of ice to stop the machine. To start the machine again manual Reset switch is employed.

c. CRANKCASE HEATER (REMOTE AIR COOLED MODELS ONLY)

- Crankcase Heater Function
  The crankcase heater is wound around the compressor shell and secured to it. It works only when the compressor is stopped to heat the compressor shell.
  This keeps liquid refrigerant from building up below the compressor lubricant. Otherwise the refrigerant at the compressor start-up will vaporize and make the lubricant foam.
  The lubricant foaming may cause a compressor failure.

d. STARTER

- Starter Function
  The starter is a starting relay for the compressor. When the compressor does not work or starts up, its contacts are closed. The contacts open by means of the coil in the starter when the compressor runs and reaches a certain speed.
- Starter Replacement
  The starter is equipped in the control box, so take off the control box covers to replace it.

WARNING

The starter is position-sensitive. Install so that the arrow indication on the starter is oriented upward.
Failure to arrange it in this way will cause abnormal starter operation and adversely affect compressor operation as well.

e. STARTING AND RUNNING CAPACITORS

- Starting and Running Capacitor Function
  The starting capacitor is activated only when the compressor starts under starter operation, and it increases the starting torque of the compressor.
  The running capacitor reduces the current needed by the compressor for operation and thus improves the power factor.
- Starting and Running Capacitor Replacement Method
  These capacitors are equipped in the control box. Take off the control box covers to remove them and replace.

f. MOTOR PROTECTOR

- Motor Protector Function
  The motor protector is wired so that all current of the compressor circuit flows. It is secured to the compressor shell. It opens the circuit to stop the compressor whenever there is a current overload on the compressor and the compressor shell temperature becomes too high. The protector is an automatically reset type that resumes the compressor operation whenever the compressor shell cools down again.
- Motor Protector Replacement
  The motor protector is equipped in the compressor's terminal box. Remove the box cover to replace the protector.

10. INSTALLATION OF OPTIONAL PARTS

A. AIR FILTER (REMOTE AIR COOLED MODELS)

a. NECESSARY PARTS

- Air Filter Part No. 422543A01 req. number: 1 pc.

The above part is made up of the following parts.

PART NAME	PART NO.	Q'TY
Air Filter	313459G02	2
Notice Label	426177-01	1

b. INSTALLATION METHOD

1. Attach the Notice Label to the ice maker front panel.
2. Install the air filter to the air intake surface of the condenser in condenser unit, inserting air filter tabs between the condenser fins.

c. AIR FILTER CLEANING

See "7. MAINTENANCE" heading.

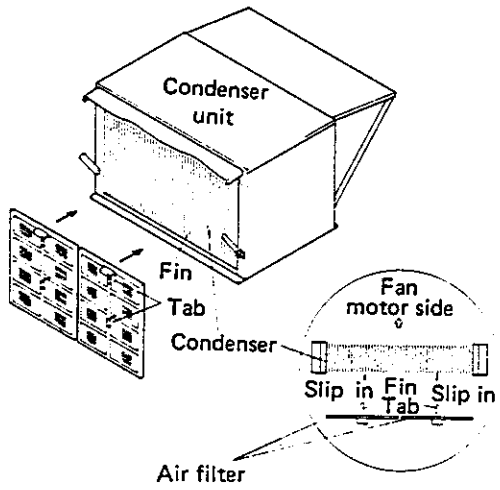


Fig. 40 Air filter installation

B. WATER STRAINER

a. NECESSARY PARTS

- Water Strainer Part No. 311166A01 req. number: 1pc.

The above part has the following components.

PART NAME	PART NO.	Q'TY
Strainer Body	311156-01	1
Filter	415380G01	1
Strainer Cap	418587-01	1
Packing	418588-01	1
Joint	418633-01	1

b. INSTALLATION METHOD

1. Attach the strainer in water supply line so that the arrow indication matches the actual water flow direction. Install in a location where the filter in the strainer can be easily removed, since the filter has to be cleaned from time to time.
2. After attaching, check to be sure there is no water leakage from the installation place.

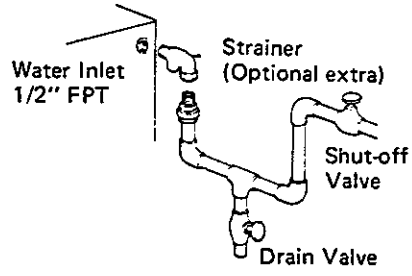


Fig. 41 Strainer installation

c. STRAINER CLEANING

IMPORTANT

A clogged strainer will block water supply and cause no ice to be made. Cleaning should be performed from time to time.

1. Switch off the machine and shut off the water.
2. Open the water supply line's drain valve and drain the water from the line.
3. Take off the strainer cap and remove the filter inside.
4. Use a toothbrush to clean out the filter, removing all grime, scale, etc.
   Then rinse clean.
5. Put the filter back into the strainer and secure carefully with the packing and the strainer cap.
6. Open the water supply valve again and put on the machine.
7. Check for possible water leakage from the strainer and cap connections.

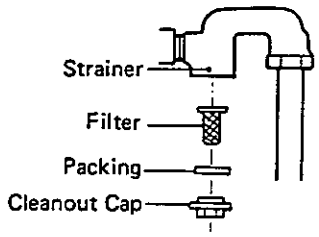


Fig. 42 Strainer cleaning

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