



HOSHIZAKI

Service Manual

Modular Flaker

Models

F-I530MAK2(-C)(-SC), MWK2(-C)(-SC)

F-I530MRKZ2(-C)(-SC)

F-2030MVVK2, MRKZ2/3(-C), MLKZ



hoshizakiamerica.com

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WARNING

Only qualified service technicians should install and service the appliance. To obtain the name and phone number of your local Hoshizaki Certified Service Representative, visit www.hoshizakiamerica.com. No service should be undertaken until the technician has thoroughly read this Service Manual. Failure to service and maintain the appliance in accordance with this manual will adversely affect safety, performance, component life, and warranty coverage and may result in costly water damage. Proper installation is the responsibility of the installer. Product failure or property damage due to improper installation is not covered under warranty.

Hoshizaki provides this manual primarily to assist qualified service technicians in the service of the appliance.

Should the reader have any questions or concerns which have not been satisfactorily addressed, please call, send an e-mail message, or write to the Hoshizaki Technical Support Department for assistance.

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Peachtree City, GA 30269

Attn: Hoshizaki Technical Support Department

NOTE: To expedite assistance, all correspondence/communication **MUST** include the following information:

- Model Number _____
- Serial Number _____
- Complete and detailed explanation of the problem.

IMPORTANT

This manual should be read carefully before the appliance is serviced. Read the warnings and guidelines contained in this manual carefully as they provide essential information for the continued safe use, service, and maintenance of the appliance. Retain this manual for any further reference that may be necessary.

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Important Safety Information

Throughout this manual, notices appear to bring your attention to situations which could result in death, serious injury, damage to the appliance, or damage to property.

⚠ WARNING Indicates a hazardous situation which could result in death or serious injury.

NOTICE Indicates a situation which could result in damage to the appliance or property.

IMPORTANT Indicates important information about the installation, use, and care of the appliance.

⚠ WARNING

The appliance should be destined only to the use for which it has been expressly conceived. Any other use should be considered improper and therefore dangerous. The manufacturer cannot be held responsible for injury or damage resulting from improper, incorrect, and unreasonable use. Failure to install, operate, and maintain the appliance in accordance with this manual will adversely affect safety, performance, component life, and warranty coverage and may result in costly water damage.

To reduce the risk of death, electric shock, serious injury, or fire, follow basic precautions including the following:

- Only qualified service technicians should install and service the appliance.
- The appliance must be installed in accordance with applicable national, state, and local codes and regulations.
- Electrical connection must be hard-wired and must meet national, state, and local electrical code requirements. Failure to meet these code requirements could result in death, electric shock, serious injury, fire, or damage.
- The icemaker requires an independent power supply of proper capacity. See the nameplate for electrical specifications. Failure to use an independent power supply of proper capacity can result in a tripped breaker, blown fuse, damage to existing wiring, or component failure. This could lead to heat generation or fire.
- **THE ICEMAKER MUST BE GROUNDED.** Failure to properly ground the icemaker could result in death or serious injury.
- To reduce the risk of electric shock, do not touch the power switch or control switch with damp hands.
- Move the power switch to the "OFF" position and turn off the power supply before servicing. Lockout/Tagout to prevent the power supply from being turned back on inadvertently.
- Do not place fingers or any other objects into the ice discharge opening.
- Do not make any alterations to the appliance. Alterations could result in electric shock, injury, fire, or damage.

⚠ WARNING, continued

- The appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be properly supervised around the appliance.
- Do not climb, stand, or hang on the appliance or allow children or animals to do so. Serious injury could occur or the appliance could be damaged.
- Do not use combustible spray or place volatile or flammable substances near the appliance. They might catch fire.
- Keep the area around the appliance clean. Dirt, dust, or insects in the appliance could cause harm to individuals or damage to the appliance.

Additional Warning for Remote Models

- **THE REMOTE CONDENSER UNIT MUST BE GROUNDED.** The power supply and ground connection to the remote condenser unit are supplied from the icemaker. Failure to properly ground the remote condenser unit could result in death or serious injury.
- Wire routing (conduit) and disconnect (if required) must meet national, state, and local electrical code requirements. Failure to meet these code requirements could result in death, electric shock, serious injury, fire, or damage.

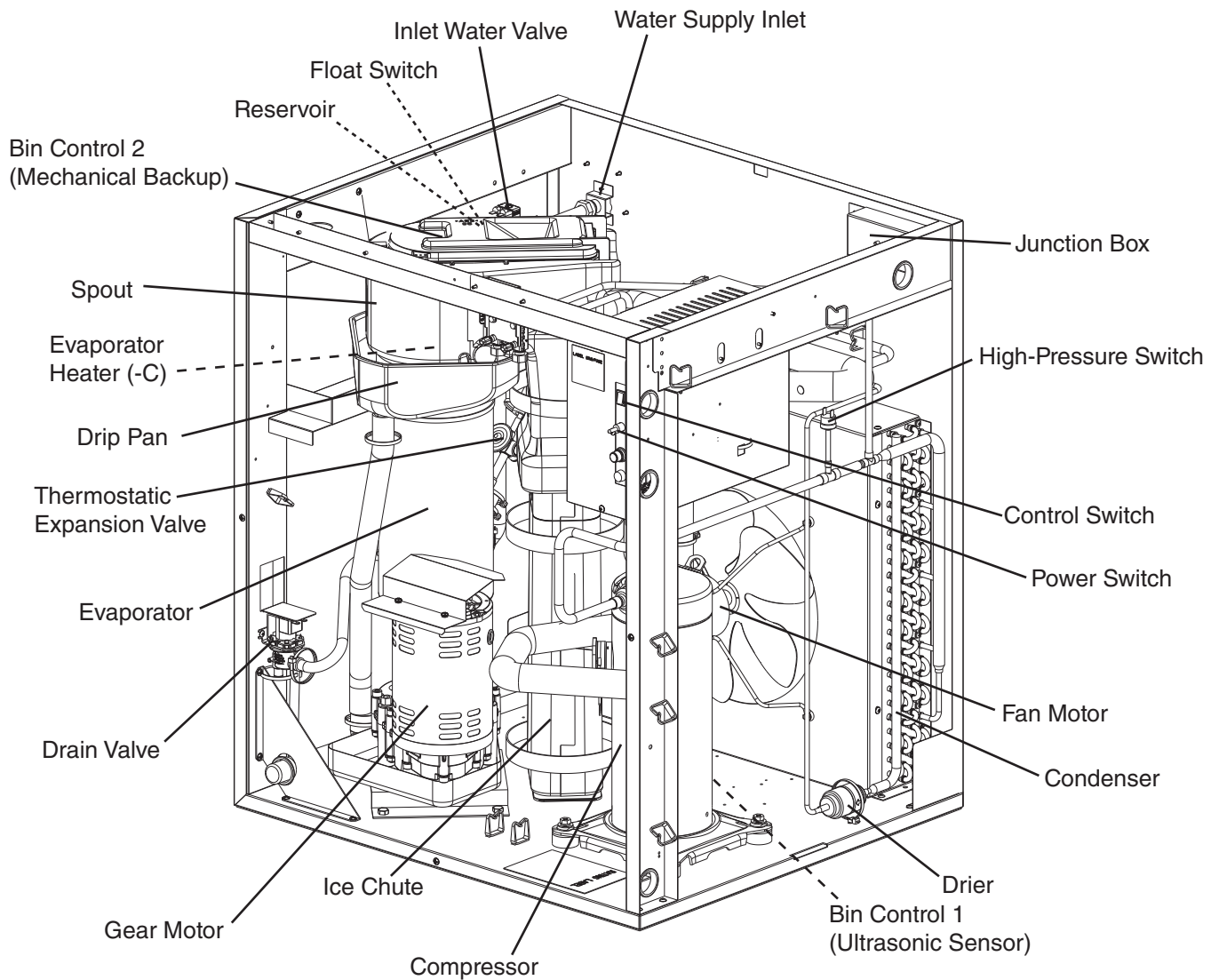
NOTICE

- Follow the instructions in this manual carefully to reduce the risk of costly water damage.
- In areas where water damage is a concern, install in a contained area with a floor drain.
- Install the appliance in a location that stays above freezing. Normal operating ambient temperature must be within 45°F to 100°F (7°C to 38°C).
- Do not leave the icemaker on during extended periods of non-use, extended absences, or in sub-freezing temperatures. To properly prepare the icemaker for these occasions, follow the instructions provided in the instruction manual.
- Do not place objects on top of the appliance.
- The dispenser unit/ice storage bin is for ice use only. Do not store anything else in the dispenser unit/ice storage bin.

I. Construction and Water/Refrigeration Circuit Diagram

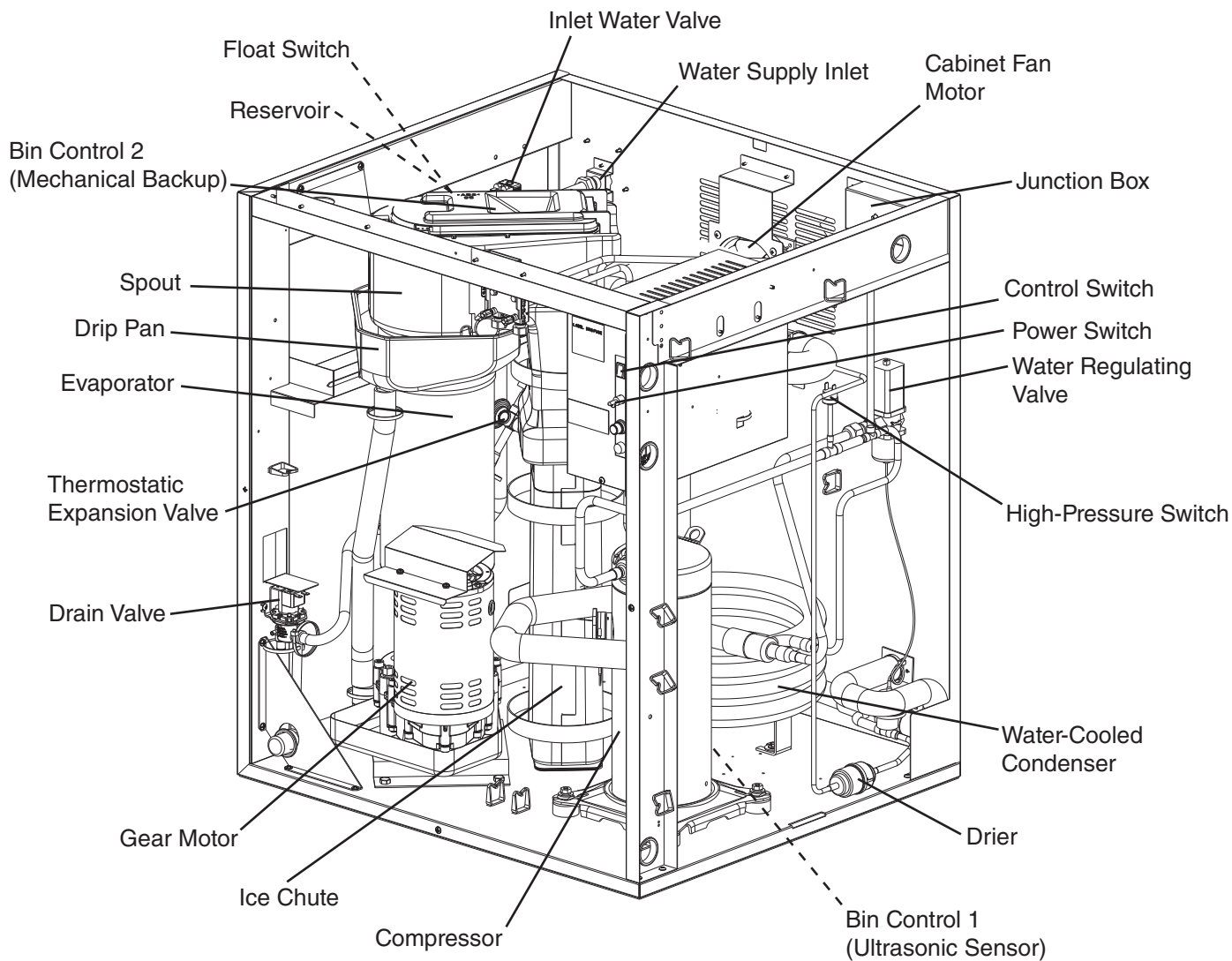
A. Construction

1. Air-Cooled Models



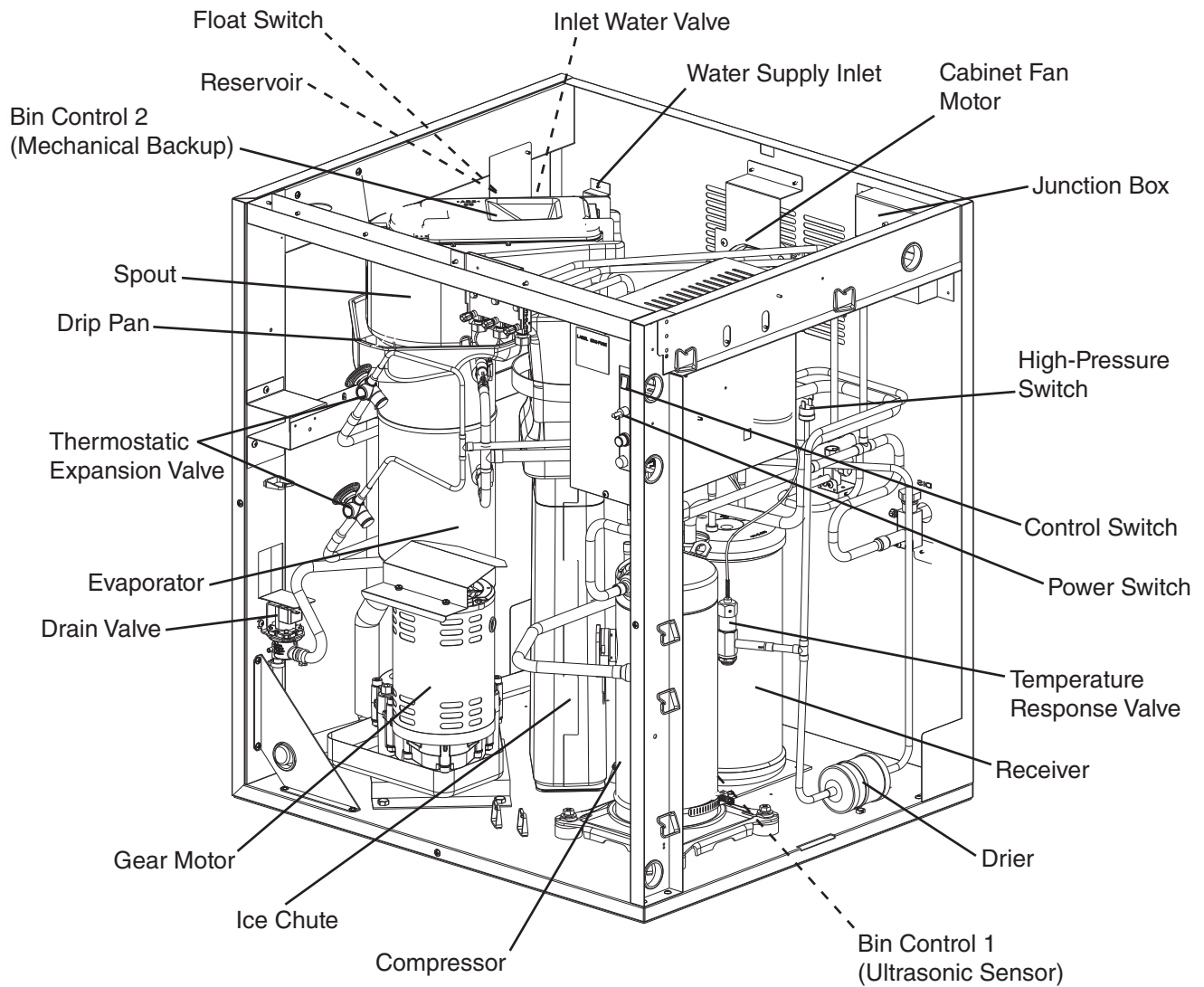
Model Shown: F-1530MAK2

2. Water-Cooled Models



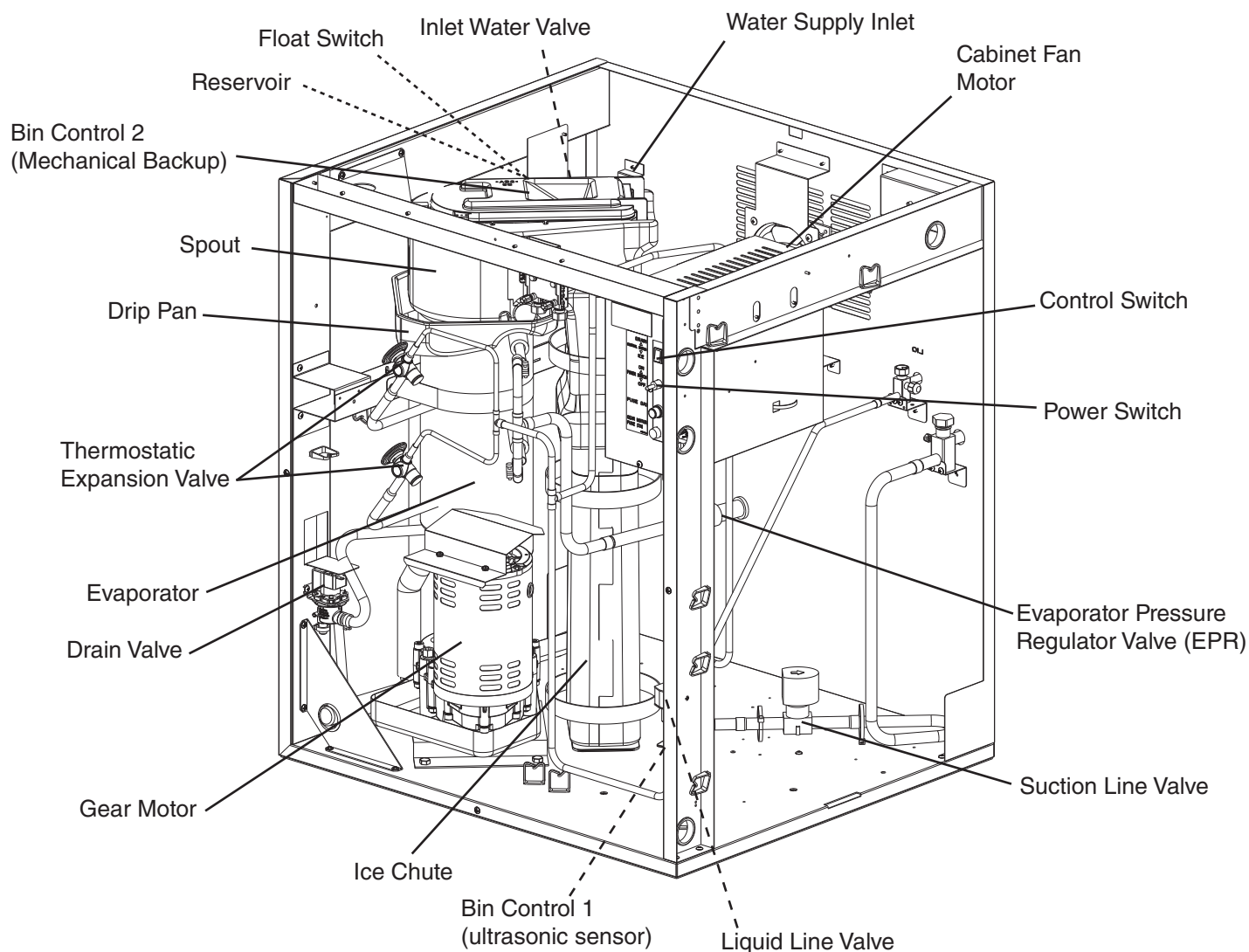
Model Shown: F-1530MWK2-C

3. Remote Air-Cooled Models



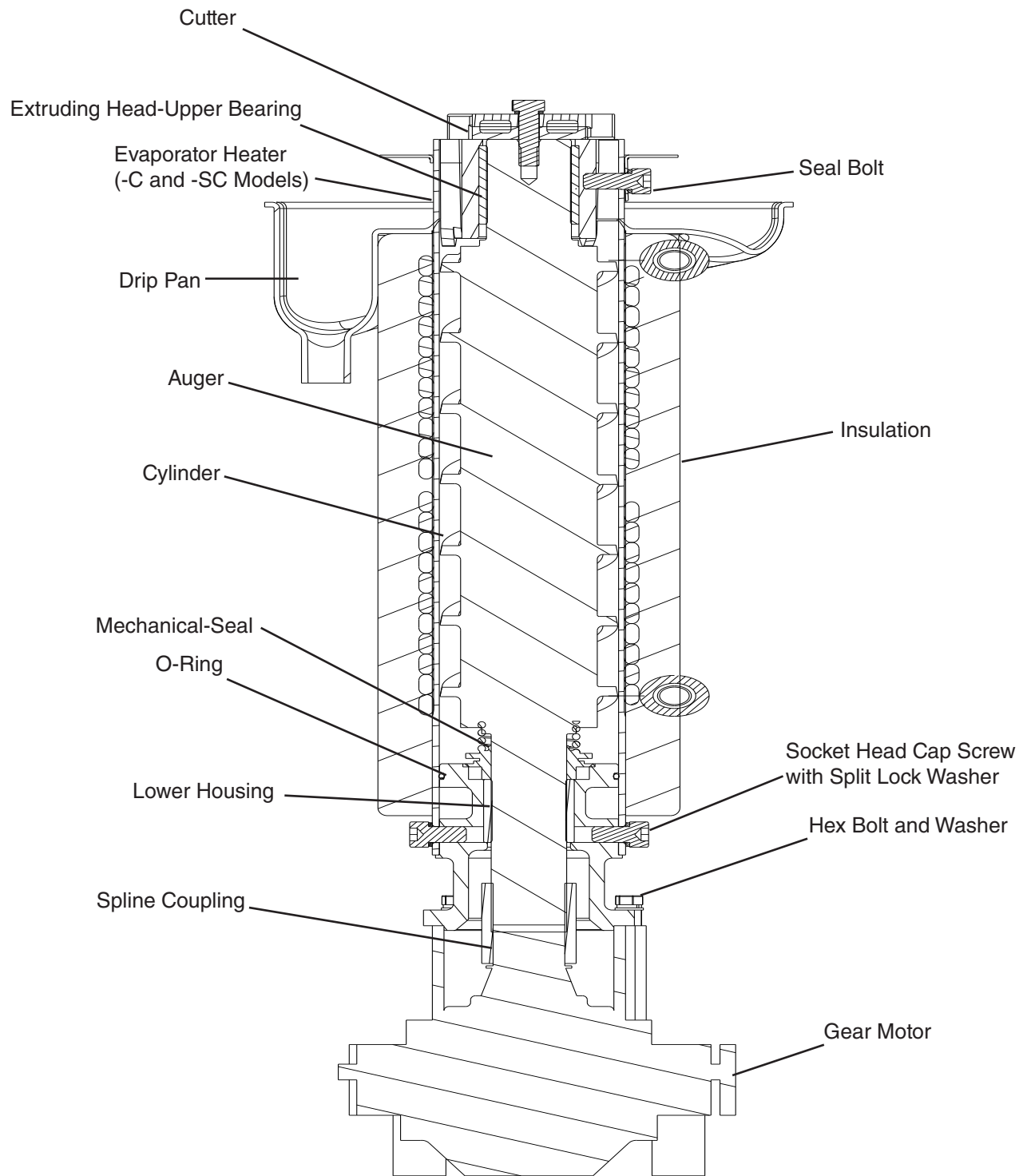
Model Shown: F-2030MRKZ2-C

4. Low-Side, Parallel Rack System Models



Model Shown: F-2030MLKZ

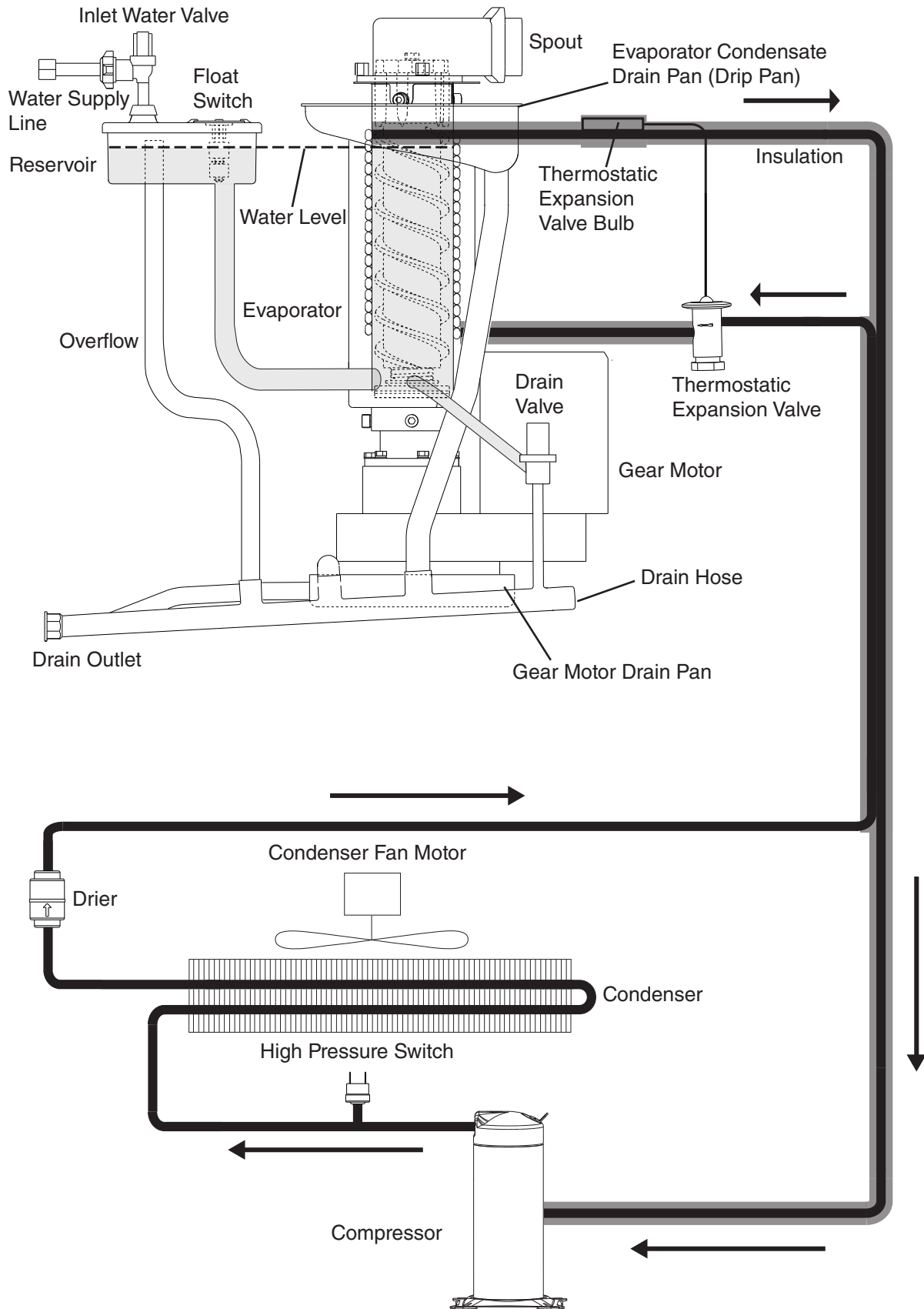
B. Icemaking Unit



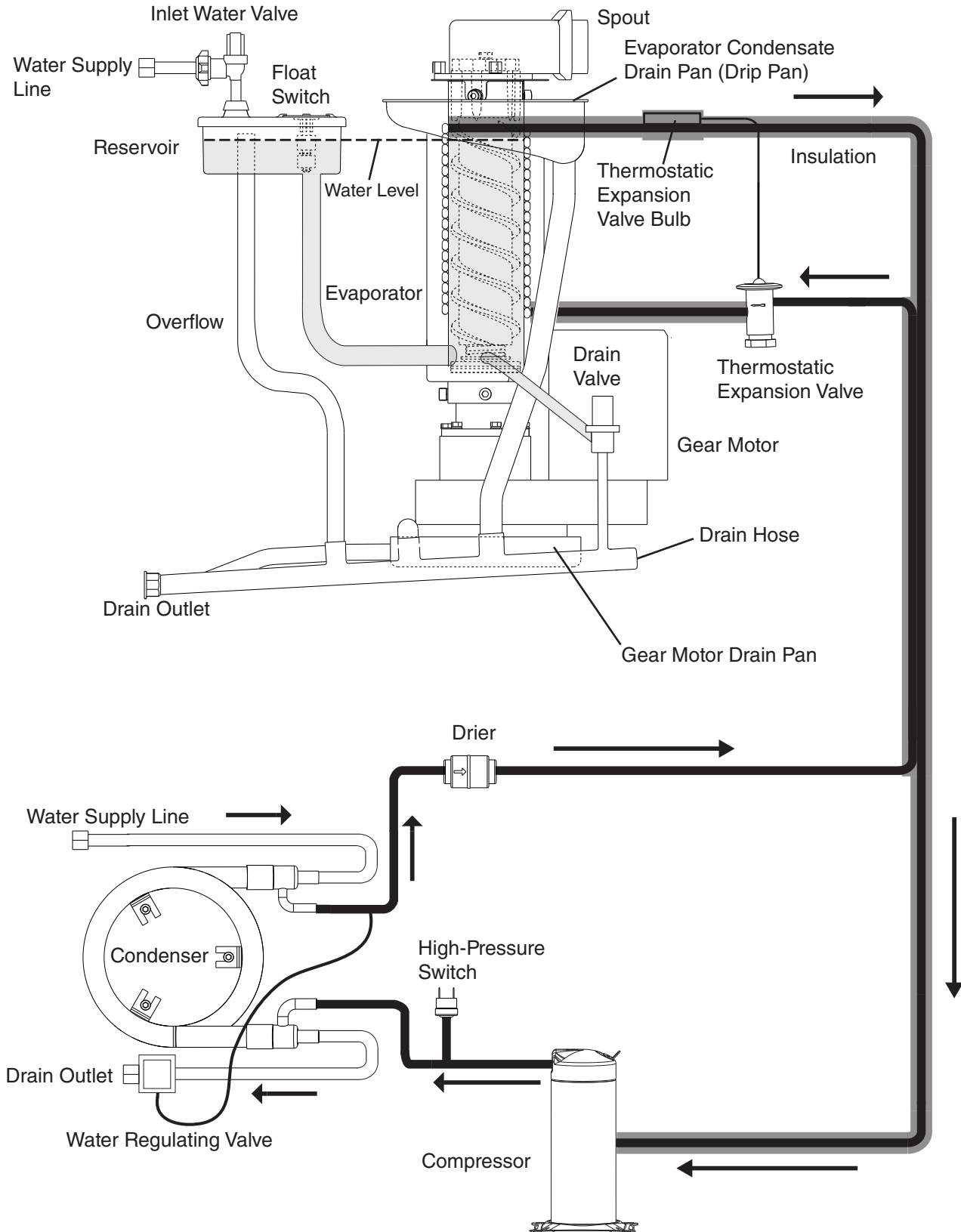
Model Shown: F-1530MAK2

C. Water/Refrigeration Circuit Diagram

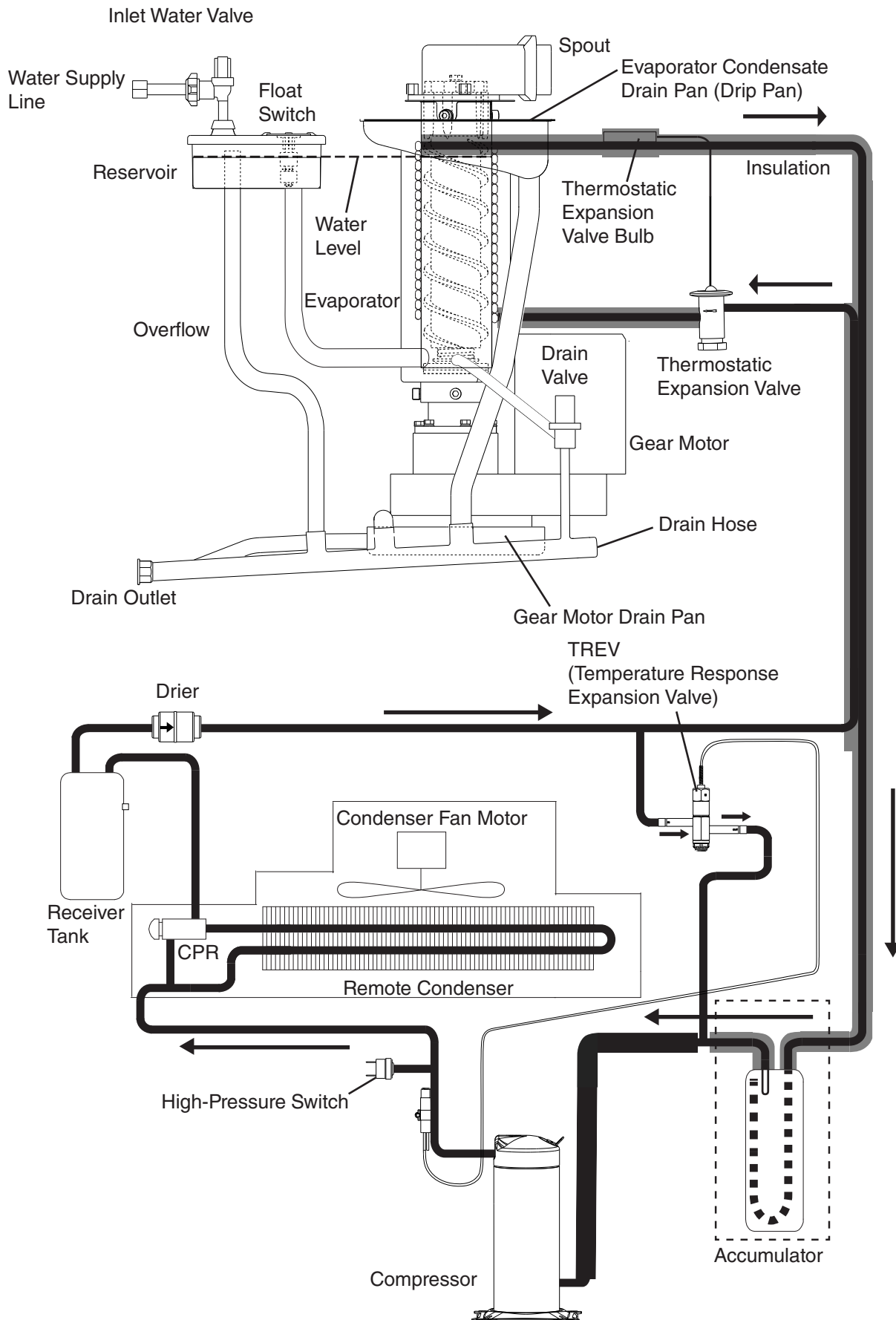
1. Air-Cooled Models



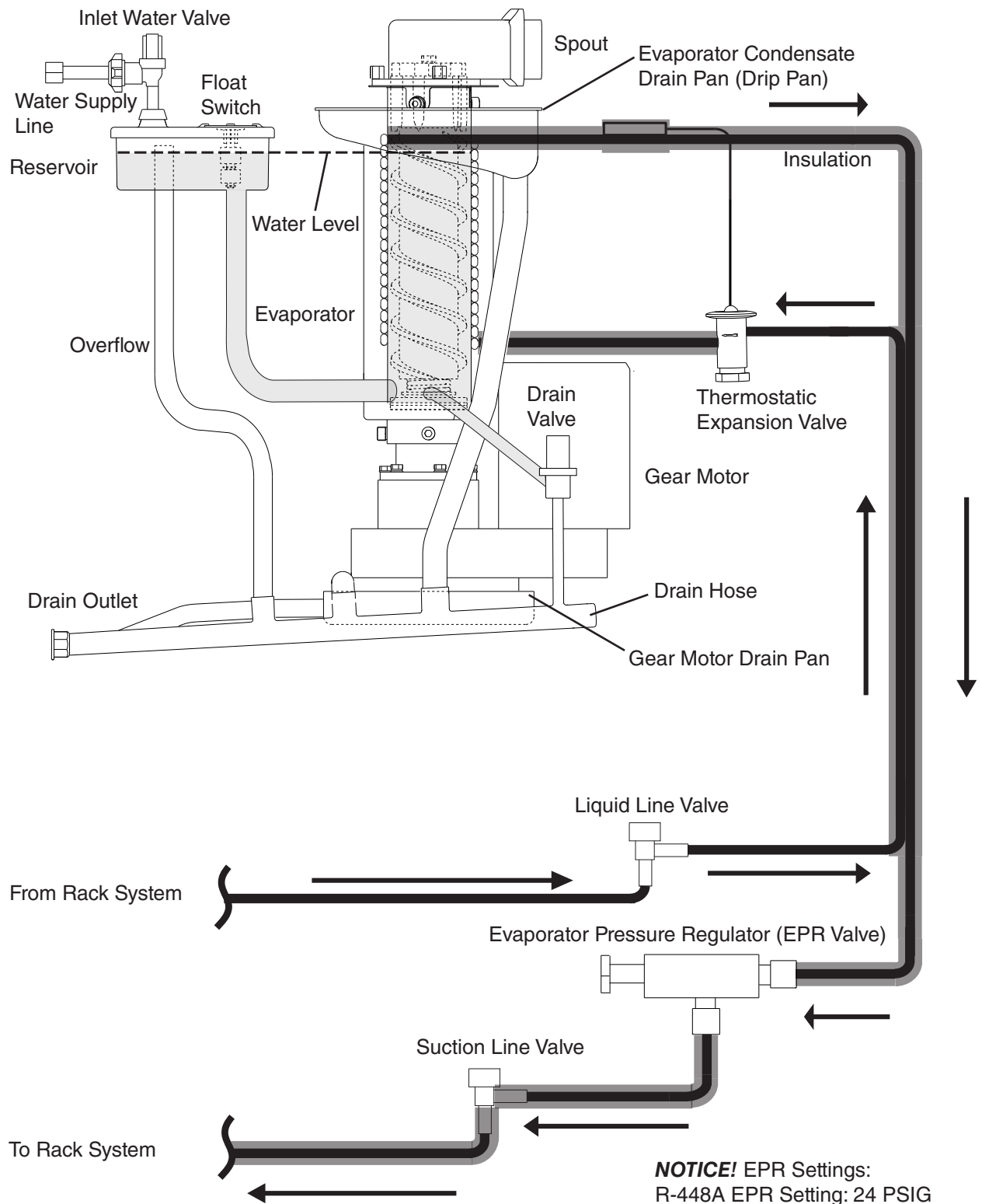
2. Water-Cooled Models



3. Remote Air-Cooled Models



4. Low-Side, Parallel Rack System Models

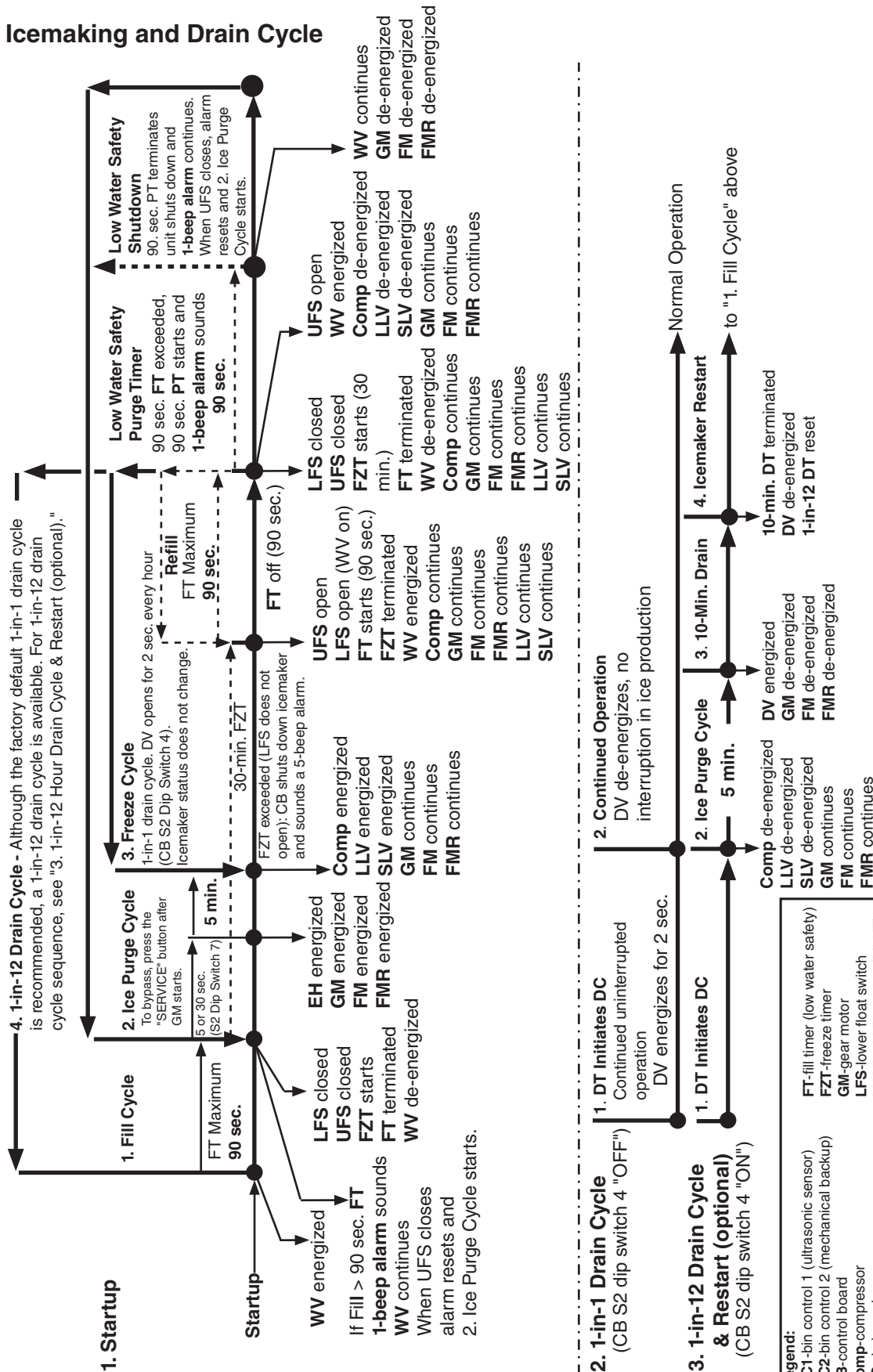


II. Sequence of Operation and Service Diagnosis

A. Sequence of Operation Flow Chart

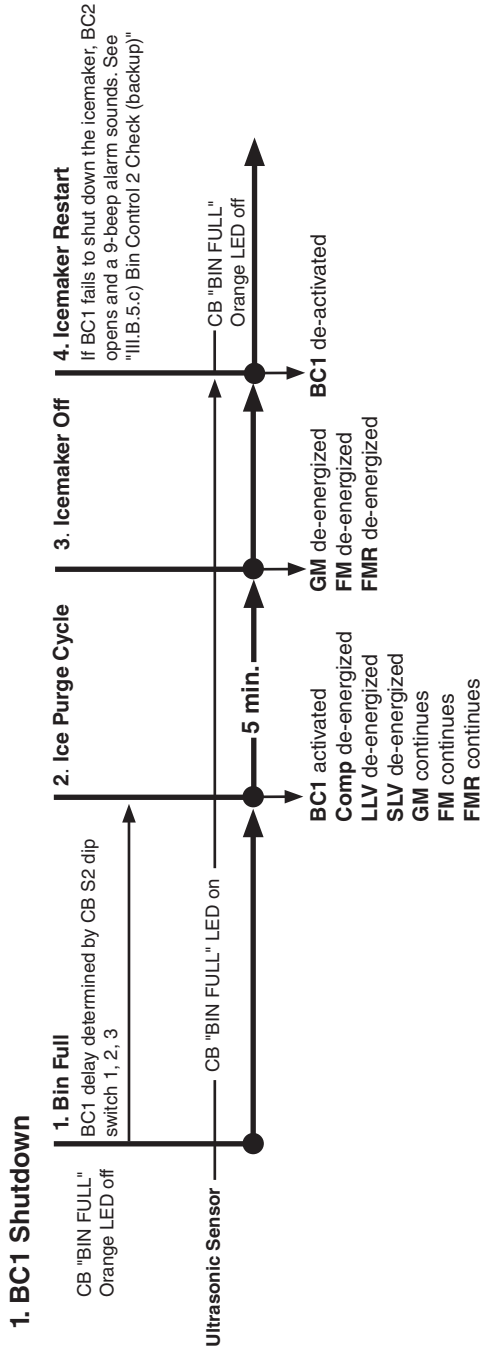
1. Icemaking and Drain Cycle

Control Board Sequence of Operation Flow Chart - Icemaking and Drain Cycle

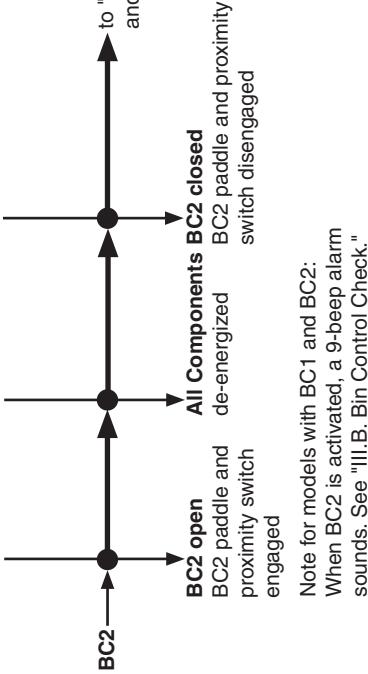


2. Shutdown

Control Board Sequence of Operation Flow Chart - Shutdown



2. BC2 Shutdown (backup)



Legend:

- BC1-bin control 1 (ultrasonic sensor)
- BC2-bin control 2 (backup)
- CB-control board
- Comp-compressor
- FM-fan motor
- FMR-fan motor-remote
- GM-gear motor
- LLV-liquid line valve (MLKZ)
- SLV-suction line valve (MLKZ)

B. Service Diagnosis

WARNING

- The appliance should be diagnosed and repaired only by qualified service personnel to reduce the risk of death, electric shock, serious injury, or fire.
- Risk of electric shock. Use extreme caution and exercise safe electrical practices.
- Moving parts (e.g., fan blade or auger) can crush and cut. Keep hands clear.
- **CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after the appliance is serviced. Make sure that none have fallen into the dispenser unit/ice storage bin.
- Make sure all food zones in the icemaker and dispenser unit/ice storage bin are clean after service.

1. Ice Production Check

To check production, prepare a bucket or pan to catch the ice and a set of scales to weigh the ice. After the appliance has operated for 10 to 20 min., catch the ice production for 10 min. Weigh the ice to establish the batch weight. Multiply the batch weight by 144 for the total production in 24 hours. When confirming production or diagnosing low production, reference production information found in "VIII.A. Specification and Performance Data."

2. Diagnostic Procedure

This diagnostic procedure is a sequence check that allows you to diagnose the electrical system and components. Before proceeding, check for correct installation, proper voltage per appliance nameplate, and adequate water pressure (10 PSIG to 113 PSIG).

Note: • When checking high voltage (115VAC), always choose a neutral (W) wire to establish a good neutral connection.

- When checking low voltage (24VAC), always choose a neutral (LBU) wire to establish a good neutral connection.
 - When checking control board DC voltage (5VDC), always place the red positive test lead from the multimeter to CB K7:1 red connector (open) pin 1, closest to CB K8:2 white connector. See "II.C. Control Board Check."
 - When checking BC1 (ultrasonic sensor), check that the CB orange "BIN FULL" LED comes on when an object is placed in front of the sensor. This orange LED confirms power from CB K10 to the ultrasonic sensor and remains on constantly. If CB orange "BIN FULL" LED does not come on, see "II.D. Bin Control Check and Adjustment." Note: It is strongly advised to keep a known "good" ultrasonic sensor on your truck, for troubleshooting assistance.
 - To speed up the diagnostic process, the 5-min. ice purge cycle may be bypassed by pressing the "SERVICE" button on the control board after the gear motor starts. **WARNING! Risk of electric shock. Care should be taken not to touch live terminals.**
 - If the icemaker is in alarm, see "III.A.2. LED Lights and Audible Alarm Safeties."
 - FM/FMR and EH (-C models) energize when "GM" LED turns on.
 - MLKZ Model: CB X1 relay energizes LLV and SLV.
 - CB monitors the following switches with 5VDC during the icemaking process: Control Switch (CS), High-Pressure Switch (HPS), Float Switch (FS), Compressor Control Relay/Gear Motor Protect Relay (CCR/GMPR), and Bin Control 2 (mechanical stand-alone or backup). When 5VDC is present across any of these switches, the switch is open.
- 1) Remove the front panel, then move the power switch to the "OFF" position. Move the control switch to the "DRAIN" position, then move the power switch back to the "ON" position. Replace the front panel in its correct position.
 - 2) Allow the water system to drain completely.
 - 3) Remove the front panel. Move the power switch to the "OFF" position, then turn off the power supply.
 - 4) Remove the control box cover and access CB.
 - 5) Check the CB S2 dip switch settings, see "III.B.1. Default Dip Switch Settings" to assure that they are in the correct positions. For proper operation of BC1 (ultrasonic sensor), confirm that S2 dip switch 7 is in the "ON" position.

- 6) **Startup—CB "POWER" LED is on.** Turn on the power supply, then move the power switch to the "ON" position. Make sure the control switch is in the "ICE" position. CB "POWER" LED and "BIN FULL" orange LED is off.
- Diagnosis CB "POWER" LED:** Check that CB "POWER" LED is on. If not, check for 115VAC at control transformer brown (BR) (on 208/230VAC models and black (BK) on 115VAC models) to neutral (W). If 115VAC is not present, check the power switch and breaker. If 115VAC is present, check control transformer continuity. Replace as needed. Next, check for 24VAC at control transformer red (R) wire to neutral (LBU). If 24VAC is not present, check control transformer continuity. Replace as needed. If 24VAC is present, check 24VAC 1A fuse. If fuse is good, check for 24VAC at CB K8 #1 (W/R) to CB K8 #2 (LBU). If 24VAC is present and "POWER" LED is off, replace CB.
- Diagnosis BC2 (mechanical backup):** Check that the actuator paddle is properly positioned. Check continuity across BC2. If open, replace BC2. Next, check for 0VDC at CB K8 #3 (GY) to CB K8 #4 (GY). When BC2 is closed 0VDC is read. Move the actuator paddle to open BC2. When open, 5VDC is present between CB K8 #3 (GY) and CB K8 #4 (GY). If 5VDC is not present when BC2 is open, replace CB. Return actuator to its normal position.
- Diagnosis BC1 (ultrasonic sensor):** If CB "POWER" LED is on and BC1 orange "BIN FULL" LED is on, check that the BC1 is connected to the CB white K10 connector. If not, connect BC1 wire connector to CB K10 connector. After 30 seconds, CB orange "BIN FULL" LED will turn off. If not, check for ice in front of sensor lens. If no ice is present, clean the lens with a warm, clean damp cloth. If cleaning the lens does not work, replace BC1.
- 7) **Fill Cycle – "WTRIN" LED is on.** Reservoir is empty and LFS and UFS are open. 90-sec. FT starts. WV energizes and fill cycle starts. LFS closes. Nothing occurs at this time. Reservoir continues to fill until UFS closes. When UFS closes, WV de-energizes, 90-sec. FT is terminated, and CB "WTRIN" LED turns off. 30-min. FZT and 30-sec. GM delay timer start. If UFS remains open longer than 90 sec. after LFS opens, FT exceeded and CB sounds a 1-beep alarm. WV remains energized until UFS closes. Alarm resets automatically when UFS closes.
- Diagnosis:** If reservoir is empty and "WTRIN" LED is off, confirm LFS status. See "II.E. Float Switch Check and Cleaning." If LFS is open and "WTRIN" LED is off, replace CB. If "WTRIN" LED is on, check that the reservoir fills. If not, check water supply line shut-off valve, water filters, and WV screen. If "WTRIN" LED is on and WV is off, check CB K2 #8 (O) to a neutral (LBU) for 24VAC. If 24VAC is not present, check CB K2 #9 (W/R) to a neutral (LBU) for 24VAC. If 24VAC is present on CB K2 #9 (W/R) and not on CB K2 #8 (O), replace CB. If 24VAC is present on CB K2 #8 (O), check continuity through WV solenoid. If open, replace WV. If WV is energized and refill exceeds FT with no water in the reservoir, check for DV leaking. If reservoir is full and overflowing check for open UFS. See "II.E. Float Switch Check and Cleaning." If UFS is closed, check that WV de-energizes. If not, check CB K2 #8 (O) to a neutral (LBU) for 24VAC. If 24VAC is present, replace CB. If WV de-energizes and water continues to fill the reservoir, replace WV.

- 8) **Ice Purge Cycle – "GM" LED is on.** 30-sec. GM delay timer terminates. GM, CCR, FM/FMR, and EH (-C and -SC models) energize. Once CCR energizes, 5VDC circuit closes through CCR terminal #3 (W/O) and terminal #5 (W/O) and CB K9 #5 (W/O) and K9 #6 (W/O). After 5VDC circuit closes, 5-min. ice purge timer starts. To bypass the 5-min. Ice Purge Cycle, press the "SERVICE" button on CB after the "GM" LED turns on. **WARNING! Risk of electric shock. Care should be taken not to touch live terminals.**

Diagnosis: If "GM" LED is off, check that UFS closes and WV de-energizes. If UFS is closed, 30 sec. has passed, and "GM" LED remains off, replace CB. If "GM" LED is on and GM is off, check CB K1 #2 (BK or BR) to a neutral (W) for 115VAC. If 115VAC is not present, check 115VAC power supply. If 115VAC is present, check CB K1 #3 (P or BK) to a neutral (W). If 115VAC is present on CB K1 #2 (BK or BR) and not on CB K1 #3 (P or BK), replace CB. If 115VAC is present on CB K1 #3 (P or BK), check GM fuse, GM internal protector, GM windings and capacitor, and GM coupling between auger and GM. When GM energizes, CCR energizes starting 5-min. ice purge timer. If FM/FMR does not start, check FM/FMR capacitor, FM/FMR windings, and FM/FMR bearings.

- 9) **Freeze Cycle – "COMP" and "GM" LEDs are on.** The 5-min. ice purge timer terminates. GM, EH, CCR, and FM/FMR continue. Comp or LLV/SLV (MLKZ model) energize. Ice production starts 4 to 6 min. after Comp or LLV/SLV (MLKZ model) energize depending on ambient and water conditions. As ice is produced, the water level in the reservoir drops. UFS opens. Nothing happens at this time. When LFS opens, WV energizes and refill cycle begins, FZT terminates, and FT starts.

FZT: 30-Min. Freeze Safety Timer – FZT starts when UFS closes and terminates when LFS opens. If LFS does not open within 30 min. of UFS closing, CB shuts down the icemaker and sounds a 5-beep alarm. See "III.A.2. LED Lights and Audible Alarm Safeties." To reset, turn the power supply off and on again. See "II.G. Diagnostic Tables" for troubleshooting details.

Icemaker Diagnosis (CCR): 5-min. ice purge timer terminates, CB "COMP" LED is on and COMP or LLV/SLV (MLKZ model) energizes. If not, check for 5VDC between CB K5 connector pin closest to CB K4 connector and CB K9 connector #5 (W/O). If 5VDC is not present, replace CB. If 5VDC is present, check for 5VDC between CB K5 connector pin closest to CB K4 connector and CB K9 connector #6 (W/O). If 5VDC is present and CB "Comp" LED is off (CR, COMP, or LLV/SLV (MLKZ model) not energized), replace CB. If 5VDC is not present, check for 115VAC between CCR terminal #7 (O) to CCR terminal #8 (W) for 115VAC. If 115VAC is not present (GM not energized), see step 8 above. If 115VAC is present and CCR contacts are open (5VDC present between terminals #3 (W/O) and #5 (W/O)), check CCR solenoid voltage and solenoid continuity. Replace CCR if necessary.

Icemaker Diagnosis (COMP or LLV/SLV (MLKZ model)): If "COMP" LED is on and COMP or LLV/SLV (MLKZ model) is not energized, check CB X1 relay BK or BR wire to a neutral (W) and CB X1 relay V or R wire to a neutral (W) for 115VAC. If 115VAC is present on CB X1 BK or BR wire and not on CB X1 V or R wire, replace CB. If 115VAC is present on CB X1 V or R wire and COMP or LLV/SLV (MLKZ model) is not energized, check for 115VAC at CB X1 Comp relay, Comp or LLV/SLV (MLKZ model). Check Comp internal overload (motor protector), start relay, and capacitors. Check LLV/SLV (MLKZ model) solenoid continuity.

Icemaker Diagnosis (TREV (Remote models)): The TREV (temperature response expansion valve) is a compressor safety device. It is used to keep the compressor cool under extreme high temperatures. Once the TREV bulb senses a discharge temperature of 220°F (104°C) or above, the TREV starts throttling liquid into the suction line to cool the COMP.

10) Refill Cycle – "GM", "COMP", and "WTRIN" LEDs are on.

LFS opens. WV energizes and 90-sec. FT starts. Comp or LLV/SLV (MLKZ model), GM, CCR, and FM/FMR continue. LFS closes. Nothing occurs at this time. Reservoir continues to fill until UFS closes. When UFS closes, WV de-energizes, 90-sec. FT terminates, and 30-min. FZT starts. If UFS remains open longer than 90 sec. after LFS opens, FT exceeded and CB sounds a 1-beep alarm. WV remains energized until UFS closes. Alarm resets automatically when UFS closes.

Diagnosis – Confirm that the water level has dropped and the UFS and LFS are open. See "II.E. Float Switch Check and Cleaning." Check that "WTRIN" LED is on. If LFS is open and "WTRIN" LED is off, replace CB. If "WTRIN" LED is on, check that the reservoir fills. If not, check water supply line shut-off valve, water filters, and WV screen. If "WTRIN" LED is on and WV is off, check CB K2 #8 (O) to a neutral (LBU) for 24VAC. If 24VAC is not present, check CB K2 #9 (W/R) to a neutral (LBU) for 24VAC. If 24VAC is present on CB K2 #9 (W/R) and not on CB K2 #8 (O), replace CB. If 24VAC is present on CB K2 #8 (O), check continuity through WV solenoid. If open, replace WV. If WV is energized and refill exceeds FT with no water in the reservoir, check for DV leaking. If reservoir is full and overflowing check for open UFS. See "II.E. Float Switch Check and Cleaning." If UFS is closed, check that WV de energizes. If not, check CB K2 #8 (O) to a neutral (LBU) for 24VAC. If 24VAC is present, replace CB. If WV de-energizes and water continues to fill the reservoir, replace WV.

Note: Each time UFS closes, 30-min. freeze timer starts. The 30-min. freeze timer resets when UFS closes again. If UFS does not close again within 30 min., CB shuts down the unit and sounds a 5-beep alarm every 5 sec.

See "III.A.2 LED Lights and Audible Alarm Safeties."

FT: 90-Sec. Low Water Safety Timer – When LFS opens, 90-sec. low water safety timer starts. If UFS does not close within 90 sec. after LFS opens (FT exceeded), CB sounds a 1-beep alarm and a 90-sec. shutdown cycle starts

See "III.A.2. LED Lights and Audible Alarm Safeties." Comp or LLV/SLV (MLKZ model) de-energizes. GM, CCR, and EH continue. 90-sec. purge timer terminates, GM, EH, and CCR de-energize. WV and 1-beep alarm continue until UFS closes.

11) Drain Cycle

a) **1-in-1 Drain Cycle:** DV energizes once every hour when the 1-in-1 drain cycle is activated (S2 dip switch 4 in the "OFF" position (factory default position)).

GM, FM/FMR, Comp, LLV/SLV (MLKZ model), continue. DV energizes for 2 sec. every hour. This setting is recommended for optimum icemaker performance.

The 1-in-1 drain cycle allows any sediment to drain from the evaporator without interrupting the icemaking process.

- b) **1-in-12 Drain Cycle (optional):** DV energizes once every 12 hours when the 1-in-12 drain cycle is activated (S2 dip switch 4 in the on position (optional)). 12-hour drain cycle timer terminates, Comp or LLV/SLV (MLKZ model) de-energize. GM, and FM/FMR continue. The 5-min. ice purge timer starts. When the 5-min. ice purge timer terminates, GM and FM/FMR de-energize. 10-min. DT starts, DV energizes. After 10-min. DT terminates, DV de-energizes icemaking process restarts and 12-hour drain cycle timer starts.
- c) **Manual Drain:** Manual drain is used when servicing evaporator components and cleaning and sanitizing the unit. When the unit is making ice and the control switch is moved to the "DRAIN" position, there is a 3-sec. delay, then Comp or LLV/SLV (MLKZ models) de-energize and the 5-min. ice purge timer begins. When the 5-min. ice purge timer terminates, GM, and FM/FMR de-energize. DV energizes to drain the evaporator and reservoir. To avoid the 5-min. shutdown delay, turn off the power supply, then move the control switch to the "DRAIN" position. Turn on the power supply. DV energizes to drain the evaporator and reservoir. DV de-energizes when the control switch is moved to the "ICE" position.

12) Shutdown

- a) **BC1 (ultrasonic sensor):** When power is supplied to the icemaker, the green LED on BC1 turns on. The green LED remains on constantly. As ice fills the storage bin to the level of activating BC1, BC1 yellow LED turns on (flashing or steady). The yellow LED flashes when ice is at the outer limit of its range and turns steady as ice nears. After the yellow LED turns on (flashing or steady), BC1 shutdown delay timer (S2 dip switch 1, 2, 3) starts. For a typical dispenser unit application, a 100-sec. shutdown delay is recommended. When used with a standard Hoshizaki storage bin, any shutdown delay setting is acceptable. See "II.B.2. BC1 (Ultrasonic sensor) Shutdown Delay (S2 dip switch 1, 2, 3)." Once BC1 shutdown delay timer terminates, Comp or LLV/SLV (MLKZ models) de-energize and the 5-min. ice purge timer starts. When the 5-min. ice purge timer terminates, GM, CCR, and FM/FMR de-energize.
Diagnosis: See "II.D.1. Bin Control 1 (ultrasonic sensor) Check."
Note: If BC1 fails to shut down the icemaker, BC2 opens, CB shuts down the icemaker and sounds a 9-beep alarm.
- b) **BC2 (mechanical backup):** BC2 opens (actuator paddle engaged). CB shuts down the icemaker immediately and sounds a 9-beep alarm.
Diagnosis: See "II.D.2. Bin Control 2 (mechanical backup) Check."

Legend: **BC1**—bin control 1 (ultrasonic sensor); **BC2**—bin control 2 (mechanical backup); **CB**—control board; **CCR**—compressor control relay; **Comp**—compressor; **DV**—drain valve; **EH**—evaporator heater (-C and -SC models); **FM**—fan motor; **FMR**—fan motor-remote; **GM**—gear motor; **LFS**—lower float switch; **LLV**—liquid line valve (MLKZ model); **SLV**—suction line valve (MLKZ model); **TREV**—temperature response expansion valve; **UFS**—upper float switch; **WV**—inlet water valve

C. Control Board Check

Before replacing a control board that does not show a visible defect and that you suspect is bad, always conduct the following check procedure. This procedure will help you verify your diagnosis.

- 1) Check CB S2 dip switch settings to assure that they are in the factory default position. For factory default settings, see "III.B. Controls and Adjustments."

Note: S2 dip switch 7 determines bin control application:

BC2 (mechanical backup only): S2 dip switch 7 in the "OFF" position. **WARNING! Do not put S2 dip switch 9 in the "OFF" position when S2 dip switch 7 is in the "OFF" position.**

BC1 (ultrasonic sensor) or with BC2 (backup): S2 dip switch 7 in the "ON" position.

- 2) Move the power switch to the "ON" position and move the control switch to the "ICE" position. The "POWER" LED turns on. **Diagnosis "POWER" LED:** Check that the CB "POWER" LED is on. If not, check for proper supply voltage (115VAC) input to the control transformer (power switch, breaker, and fuse). Next, check for proper low-voltage (24VAC) output from the control transformer and that the 1A fuse is good. Check for 24VAC at CB K8 #1 (W/R) to CB K8 #2 (LBU). If 24VAC is present and the "POWER" LED is off, replace CB.

- 3) **BC1 (ultrasonic sensor) Power Supply (K10 connector):** CB K10 connector is supplied with a 60 kHz signal.

Diagnosis: Check that CB BC1 "BIN FULL" orange LED is off. Disconnect BC1 from K10 connector. See Fig. 2. CB BC1 "BIN FULL" orange LED should come on. If not, replace CB. Reconnect BC1 to K10 connector. If LED is on, move ice away from lens. If no ice is present, clean the lens with a warm, clean damp cloth. If cleaning the lens does not work, replace BC1 (ultrasonic sensor).

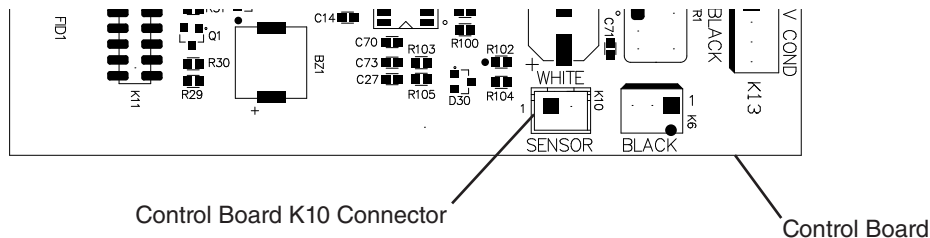


Fig. 1

4) 5VDC Output Checks:

CB K9 Connector: Control Switch (CB K9 #1 and #2) (open contacts for icemaking, closed contacts for drain), High-Pressure Switch (CB K9 #3 and #4), Compressor Control Relay/Gear Motor Protect Relay (K9 #5 and #6).

CB K8 Connector: Bin Control 2 (K8 #3 and #4) and Float Switch (K8 #5 (common), #6 (upper), and #7 (lower)). When checking 5VDC control voltage, always place the red positive test lead from the multimeter to the CB K7:1 red connector (open) pin 1, (closest to CB K8:2 white connector). See Fig. 2. Then place the black negative test lead from the multimeter to the corresponding pin to complete the 5VDC check.

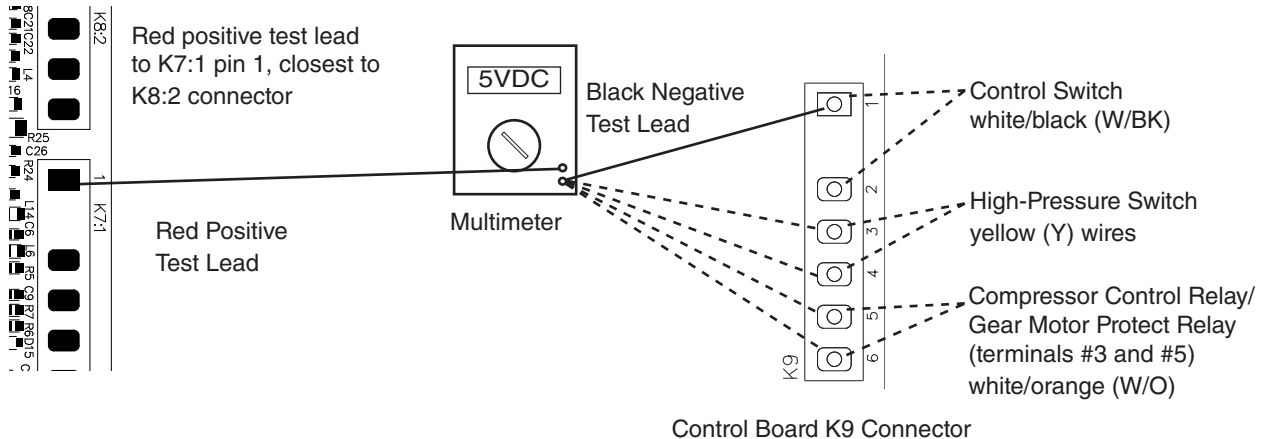


Fig. 2

a) **Control Switch** – CB K9 #1 (W/BK) and CB K9 #2 (W/BK):

5VDC is present between CB K7:1 red connector (open) pin 1, (closest to CB K8:2 white connector) and CB K9 #1 (W/BK) at all times. If 5VDC is not present, replace CB. When the control switch is in the "ICE" position, the control switch contacts are open. 0VDC is present between CB K7:1 red connector (open) pin 1, (closest to CB K8:2 white connector) and CB K9 #2 (W/BK). When in the "ICE" position, 5VDC is present between CB K9 #1 (W/BK) to CB K9 #2 (W/BK). When the control switch is in the "DRAIN" position, the control switch contacts are closed. 5VDC is present between CB K7:1 red connector (open) pin 1, (closest to CB K8:2 white connector), to CB K9 #1 (W/BK) or #2 (W/BK). If 5VDC is not present, replace CB. 0VDC is present from CB K9 #1 (W/BK) to CB K9 #2 (W/BK).

b) **High-Pressure Switch** – CB K9 #3 (Y) and CB K9 #4 (Y):

5VDC is present between CB K7:1 red connector (open) pin 1, (closest to CB K8:2 white connector) and CB K9 #3 (Y) at all times. When the high-pressure switch is closed, 5VDC is present between CB K7:1 red connector (open) pin 1, (closest to CB K8:2 white connector) to CB K9 #3 (Y) and CB K9 #4 (Y). If 5VDC is not present, replace CB. When the high-pressure switch is closed, 0VDC is present at CB K9 #3 (Y) to CB K9 #4 (Y). When the high-pressure switch is open, 5VDC is present at CB K9 #3 (Y) to CB K9 #4 (Y). If the high-pressure switch is open and CB is not in alarm, replace CB. If 5VDC is present at CB K9 #3 (Y) and not at CB K9 #4 (Y), the high-pressure switch is open and CB sounds a 3-beep alarm. Check continuity across the high-pressure switch (CB K9 #3 (Y) and CB K9 #4 (Y)).

c) Compressor Control Relay/Gear Motor Protect Relay (CCR/GMPR) –

CB K9 #5 (W/O) and CB K9 #6 (W/O): 5VDC is present from CB white K5 connector, pin closest to CB red K4 connector to CB K9 #5 (W/O) at all times. If 5VDC is not present, replace CB. When CCR/GMPR terminals #3 (W/O) and #5 (W/O) are open (CCR/GMPR de-energized), 5VDC is present between CB K9 #5 (W/O) and CB K9 #6 (W/O). When CCR/GMPR terminals #3 (W/O) and #5 (W/O) are closed (CCR/GMPR energized), 5VDC is present between CB K9 #5 (W/O) and CB K9 #6 (W/O). When CCR/GMPR terminals #3 (W/O) & #5 (W/O) are open CB may be in an 8-beep alarm. See "III.A.2. LED Lights and Audible Alarm Safeties."

d) Bin Control 2 (backup) –

CB K8 #3 (GY) and CB K8 #4 (GY): 5VDC is present from CB white K5 connector, pin closest to CB red K4 connector to CB K8 #3 (GY) at all times. If 5VDC is not present, replace CB. When BC(2) is closed (calling for ice), 5VDC is present from CB K7:1 red connector (open) pin 1, (closest to CB K8:2 white connector) to CB K8 #3 (GY) and CB K8 #4 (GY). If 5VDC is not present to either CB K8 #3 (GY) or CB K8 #4 (GY), replace CB. If 5VDC is present at CB K8 #3 (GY) and not to CB K8 #4 (GY), BC(2) is open. See "III.D.2. Bin Control 2 Check (backup)."

e) Float Switch (LFS and UFS) –

CB K8 #5 (BK) (common), CB K8 #6 (R) (upper), and CB K8 #7 (BU) (lower): 5VDC is present from CB K7:1 red connector (open) pin 1, (closest to CB K8:2 white connector) at all times. If not, replace CB. 5VDC is present from CB K7:1 red connector (open) pin 1, (closest to CB K8:2 white connector) to CB K8 #6 (R) (upper) and CB K8 #7 (BU) (lower) when FS is open. If 5VDC is present between CB K8 #5 (BK) and CB K8 #6 (R) (upper) or CB K8 #7 (BU) (lower), FS is open. For further FS diagnostics, see "II.E. Float Switch Check and Cleaning."

5) Fill "WTRIN" LED is on:

24VAC is present at CB K2 #9 (W/R) at all times. If not, confirm 24VAC from CB K2 #9 (W/R) to a neutral (LBU). When LFS open at startup or opens during normal operation, "WTRIN" LED turns on, fill timer (FT) starts, freeze timer (FZT) terminates (only during normal operation), and WV energizes. If LFS is open and "WTRIN" LED is off, confirm LFS status. See "II.E. Float Switch Check and Cleaning." If LFS is open and "WTRIN" LED is off, replace CB. If "WTRIN" LED is on and WV is not energized, check for 24VAC at CB K2 #8 (O) to a neutral (LBU). If 24VAC is not present at CB K2 #8 (O), replace CB. "WTRIN" LED turns off once UFS closes. If not, confirm UFS status. See "II.E. Float Switch Check and Cleaning." If UFS is closed and "WTRIN" LED is on, replace CB. If "WTRIN" LED is off and WV is open, check for 24VAC at CB K2 #8 (O). If 24VAC is present at CB K2 #8 (O), replace CB. If 24VAC is not present, check WV diaphragm.

6) **Ice Purge Cycle "GM" LED is on:**

When UFS closes, GM delay timer starts (5 or 30 sec. depending on CB S2 dip switch #7). Once GM delay timer terminates, "GM" LED turns on, GM and EH (-C model) energize and 5-min. ice purge timer starts. If GM does not energize 30 sec. after UFS closes, confirm UFS status. See "II.E. Float Switch Check and Cleaning." If UFS is closed and GM LED does not turn, replace CB. If "GM" LED is on and GM and EH are off, check for 115VAC from CB K1 #2 to a neutral (W). If 115VAC is not present, check 115VAC power supply connections from power switch. If 115VAC is present, check for 115VAC from CB K1 #3 to a neutral (W). If 115VAC is present on CB K1 #2 and not on CB K1 #3, replace CB.

7) **Freeze Cycle "GM" and "COMP" LED are on:**

The 5-min. ice purge timer terminates or the ice purge cycle bypass button ("SERVICE") is pressed, "COMP" LED turns on. To bypass the 5-min. Ice Purge Cycle, press the "SERVICE" button on CB after the "GM" LED turns on. **WARNING! Risk of electric shock. Care should be taken not to touch live terminals.** 115VAC is present between CB X1 relay power supply brown (BR) or black (BK) wire and neutral (W) at all times. If not, check 115VAC power supply wire connections from power switch. If "COMP" LED is not on after 5-min. ice purge timer terminates, replace CB. When "COMP" LED turns on, CR (if applicable) and compressor energize. If "COMP" LED is on and compressor relay (CR) (if applicable) and compressor are not, check for 115VAC from CB X1 relay power supply brown (BR) or black (BK) wire to neutral (W). If 115VAC is present, check X1 relay red (R), violet (V), or brown (BR) to neutral (W). If 115VAC is present on X1 relay brown (BR) or black (BK) and not on X1 relay red (R), violet (V), or brown (BR), replace CB.

8) **Refill "WTRIN" LED is on:** See "5) Fill "WTRIN" LED is on:" above.

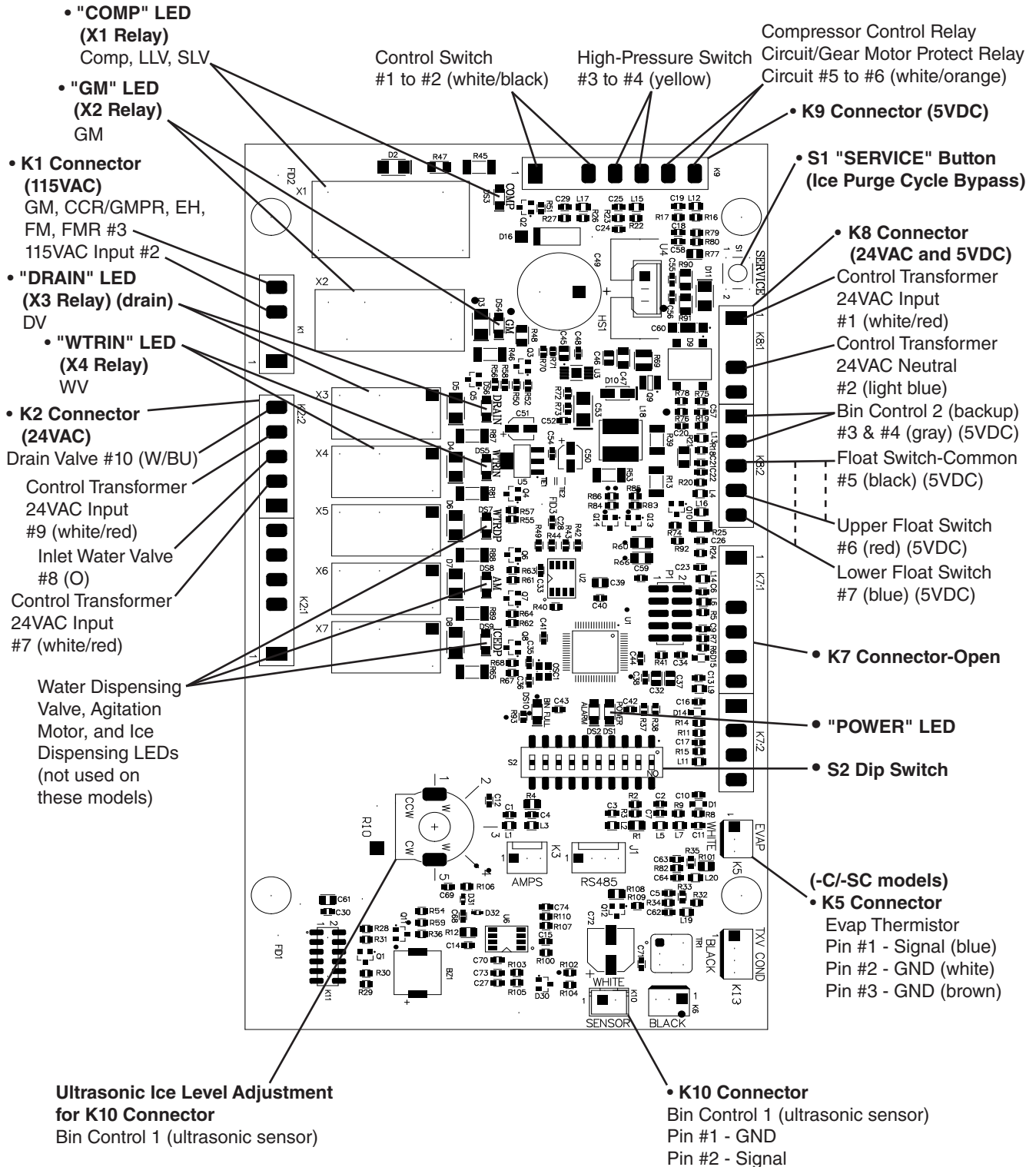
Legend: **BC1**—bin control 1 (ultrasonic sensor); **BC2**—bin control 2 (backup);

CB—control board; **CR**—compressor relay; **CCR/GMPR**—compressor control relay/gear motor protect relay; **EH**—evaporator heater (-C model);

FS—float switch; **GM**—gear motor; **LFS**—lower float switch; **UFS**—upper float switch;

WV—inlet water valve

Control Board



Control Board	
Part Number	2A9874-03

Fig. 3

D. Bin Control Check

a) Bin Control 1 Check (ultrasonic sensor)

IMPORTANT

Make sure CB S2 dip switch 7 is in the "ON" position. This allows the control board to monitor BC1 (ultrasonic sensor) along with BC2 (mechanical) backup bin control.

- 1) Turn off the power supply.
- 2) Remove the front panel, top panel, and control box cover.
- 3) See "III.B.2. BC1 (Ultrasonic Sensor) Shutdown Delay (S2 dip switch 1, 2, 3)."
- 4) Confirm that BC1 is connected to CB K10 connector. Wipe down BC1 lens with a warm, clean, damp cloth. If the bottom of the icemaker is not accessible in your application, remove the thumbscrew securing the BC1 housing, then remove the housing from the base. See Fig. 4.
- 5) Move the control switch to the "ICE" position, then move the power switch to the "ON" position.
- 6) Turn on the power supply to start the automatic icemaking process. Check that CB BC1 orange "BIN FULL" LED is off.
Diagnosis: If the CB BC1 orange "BIN FULL" LED is on, move ice away from lens. If no ice is present, clean the lens with a warm, clean damp cloth. If cleaning the lens does not work, replace BC1 (ultrasonic sensor). See step "3) BC1 (ultrasonic sensor) Power Supply," under "II.C. Control Board Check."
- 7) Make sure CB "GM" LED is on. There is a delay of at least 30 sec. before the "GM" LED turns on after power-up. After CB "GM" LED turns on, press CB "SERVICE" button to bypass the 5-min. ice purge cycle. **WARNING! Risk of electric shock. Care should be taken not to touch live terminals.**

BC1 (ultrasonic sensor)

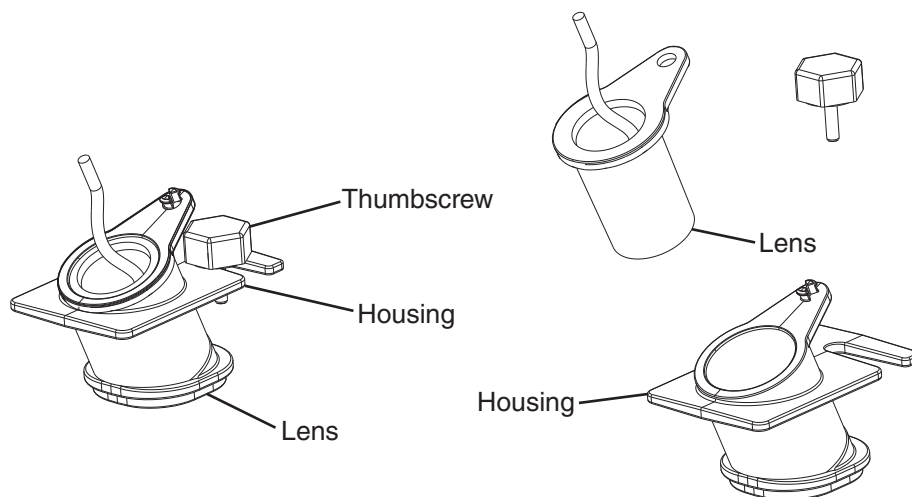


Fig. 4

- 8) CB "GM" and "COMP" LEDs are on. Use an object to cover BC1 lens at the bottom of the icemaker. If the bottom of the icemaker is not accessible in your application, remove the thumbscrew securing BC1 housing, remove the housing from the base, then cover BC1 lens. See Fig. 4. The CB BC1 "BIN FULL" orange LED on turns on. After the orange LED turns on, BC1 shutdown delay timer starts. See "III.B.2. BC1 (Ultrasonic Sensor) Shutdown Delay (S2 dip switch 1, 2, 3)." Comp (LLV/SLV on MLKZ model) should de-energize immediately after the shutdown delay timer terminates. 5 min. later, GM and FM/FMR should de-energize.

Diagnosis: If CB BC1 "BIN FULL" orange LED is not on after covering the lens, replace BC1. If the appliance remains on after BC1 shutdown delay timer terminates and the 5-min. ice purge timer terminates, replace CB. If BC1 fails to shut down the icemaker and the level of ice activates BC2, the icemaker shuts down and a 9-beep alarm sounds. To reset, move the power switch to the "OFF" position, and then back to the "ON" position.

- 9) Remove the object covering the lens. If you removed BC1 housing from the base, replace it in its correct position, and secure it with the thumbscrew.
- 10) Move the power switch to the "OFF" position. Turn off the power supply, then proceed to "II.D.2. Bin Control 2 Check (backup)".

Legend: **BC1**—bin control 1 (ultrasonic sensor); **BC2**—bin control 2 (backup); **CB**—control board; **Comp**—compressor; **FM**—fan motor; **FMR**—fan motor-remote; **GM**—gear motor; **LLV**—liquid line valve; **SLV**—suction line valve

b) Bin Control 1 Adjustment (ultrasonic sensor)

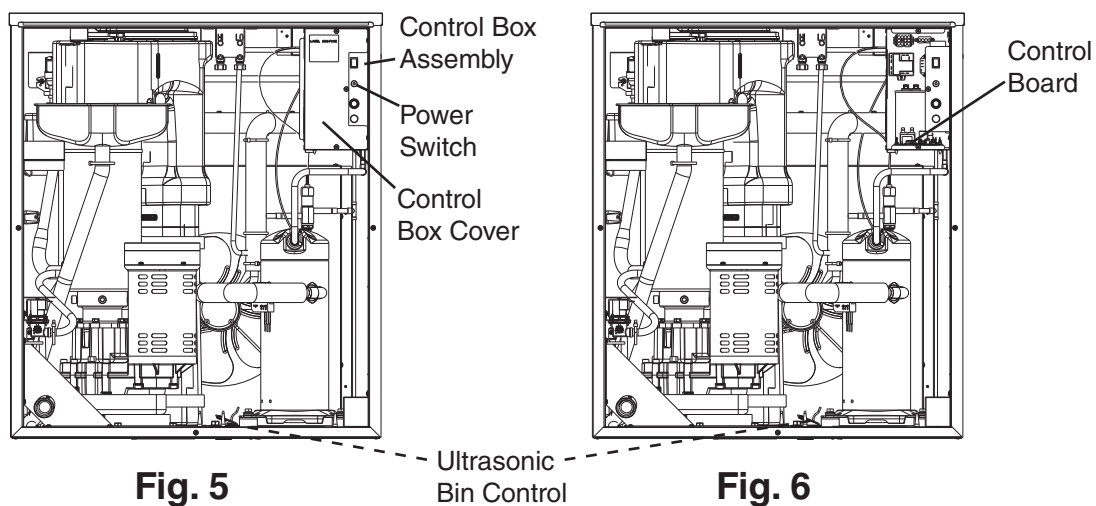
⚠ WARNING

- Improper adjustment may adversely affect safety, performance, component life, and warranty coverage.
- On dispenser unit applications, do not increase ice level above the recommended setting listed below. Higher ice levels could result in icemaker movement, water leakage, or ice overflow.

NOTICE

Do not allow top kits or top kit risers (if applicable) to interfere with the bin control lens sensing area or the icemaker will not operate properly.

- 1) Remove the front panel. Move the power switch to the "OFF" position. Make sure the power supply is off to the icemaker and condensing unit. See Fig. 5. Remove the control box cover to access the control board. See Fig. 6.



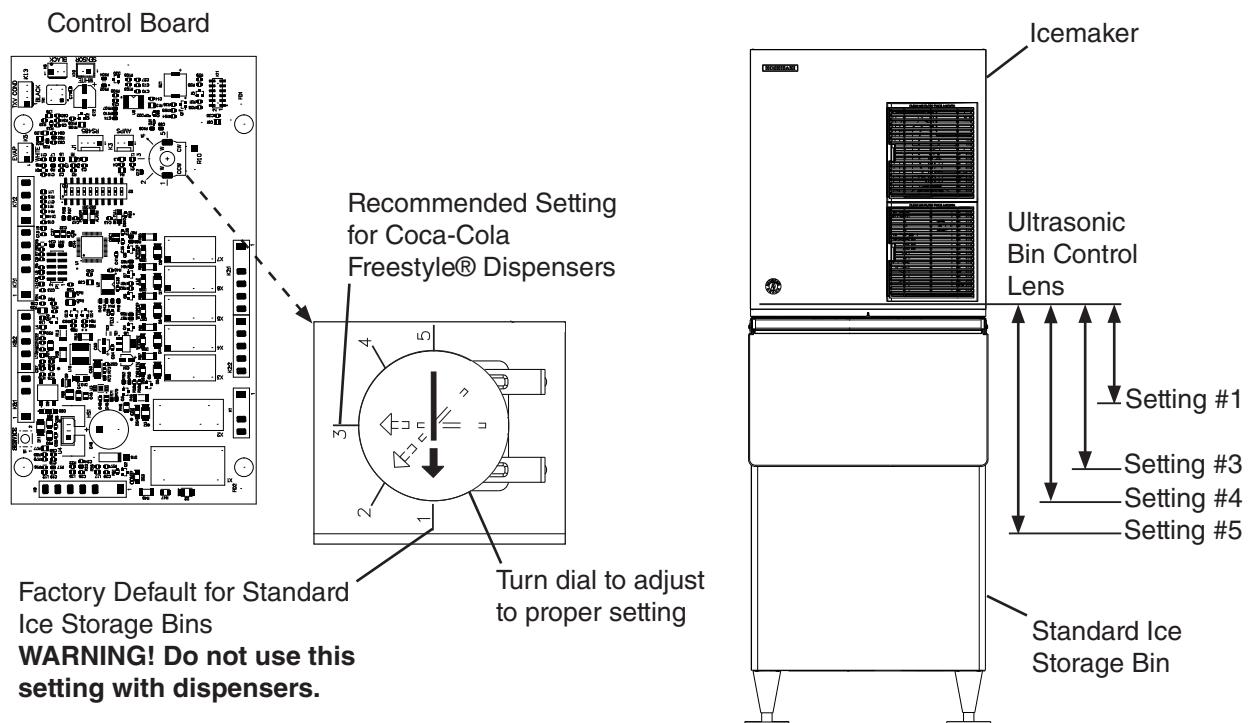
- 2) Confirm the correct control board bin control setting required for your application and adjust according to the following tables. See Fig. 7 and Fig. 8.

For Standard Ice Storage Bins, and Coca-Cola Freestyle® Dispenser Units

Application	Bin Control Ice Level Settings	
	Bin Control Setting	Shutdown Distance From Ultrasonic Bin Control Lens (Restart is 4 in. (102 mm) below shutdown distance)
Standard Ice Storage Bins	1 (Factory Default)	127 mm (5") Do not adjust dispensers to this setting.
Coca-Cola Freestyle® Dispensers	3	254 mm (10")
Optional Setting	4	356 mm (14")
	5	457 mm (18")

⚠ WARNING

Confirm that the final ice level location does not allow for icemaker movement, water leakage, or ice overflow.



Model Shown:
F-1530MAK2 with BD-500SF

Fig. 7

For Non-Hoshizaki Dispenser Units

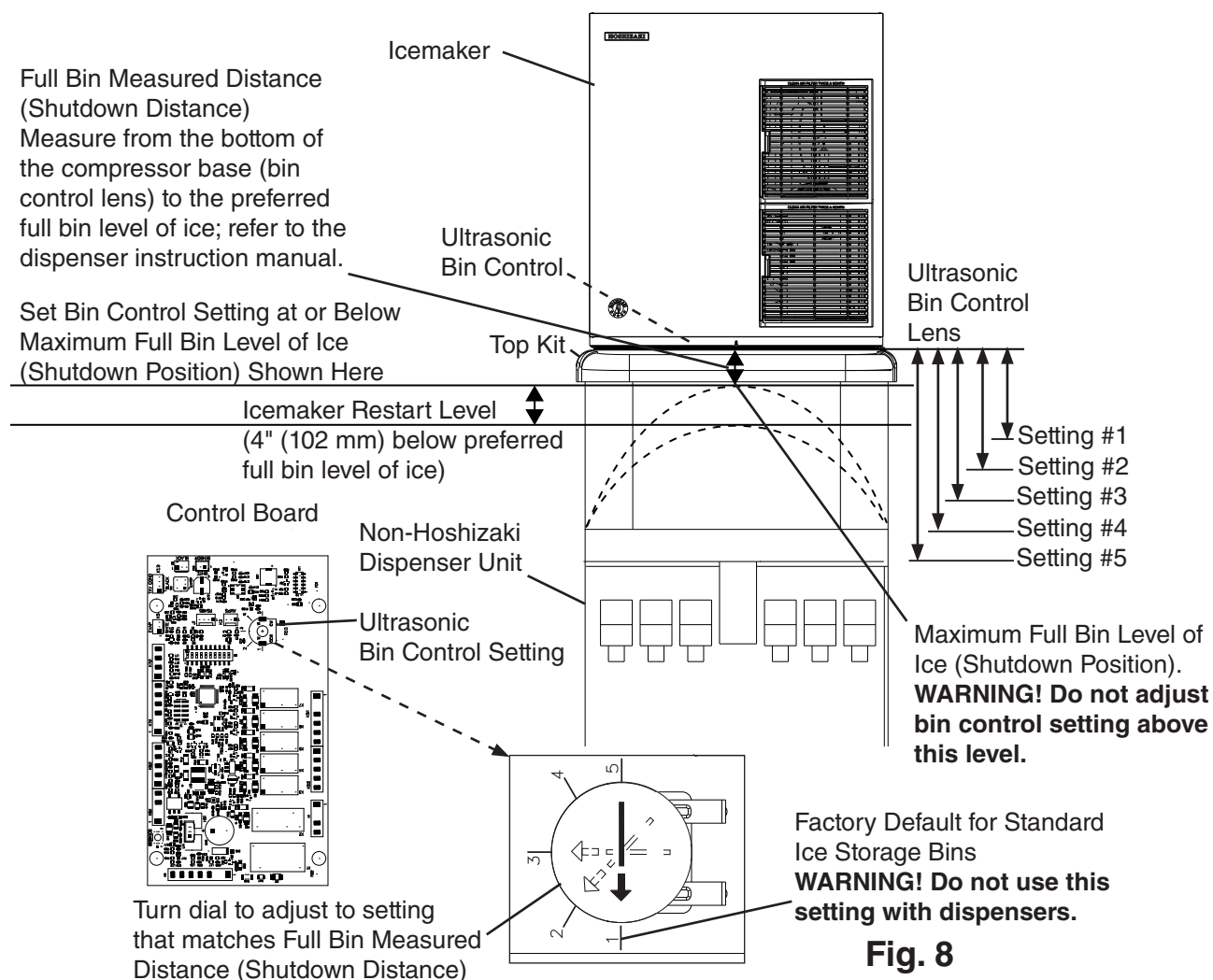
Bin Control Ice Level Settings	
Bin Control Setting	Shutdown Distance From Bin Control Lens (Restart is 4 in. (102 mm) below shutdown distance)
1 (Factory Default)	127 mm (5") Do not adjust dispensers to this setting.
2	178 mm (7")
3	254 mm (10")
4	356 mm (14")
5	457 mm (18")

⚠ WARNING

Confirm that the final ice level location does not allow for icemaker movement, water leakage, or ice overflow.

NOTICE

The ice level must be lower than the top of the dispenser unit. Also, be sure the top kit or top kit riser (if applicable) are clear from the bin control lens sensing area.

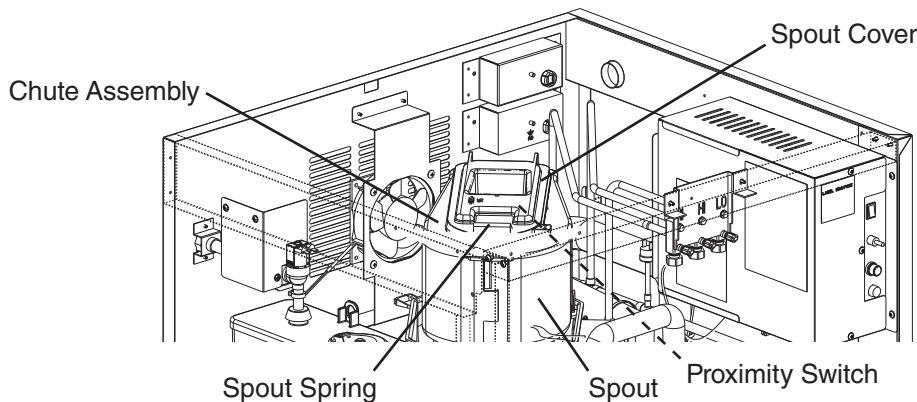


2. Bin Control 2 (mechanical backup) Check

When the actuator paddle is not engaged BC2 is closed and the icemaker produces ice.

a) Bin Control 2 (Mechanical Backup): With CB S2 dip switch 7 placed in the "ON" position, BC2 is used as a backup bin control safety. When ice fills the chute and engages the actuator paddle, BC2 opens and CB shuts down the icemaker immediately and sounds a 9-beep alarm.

- 1) Make sure the power supply is off. Remove the front panel, top panel, and control box cover.
- 2) Remove the spout-to-chute strap connecting the spout to the chute assembly. See Fig. 9. Pull up the chute assembly slightly so that you can access the actuator paddle located in the top of the chute.



Model Shown: F-2030MRKZ2

Fig. 9

- 3) Move the power switch to the "ON" position.
- 4) Turn on the power supply to start the automatic icemaking process.
- 5) Make sure CB "GM" LED is on. There is a delay of at least 30 sec. before "GM" LED turns on after power-up. After "GM" LED turns on, press CB "SERVICE" button to bypass the 5-min. compressor delay. **WARNING! Risk of electric shock. Care should be taken not to touch live terminals.** The "COMP" LED turns on.
- 6) Press the actuator paddle located in the top of the chute. Comp (LLV and SLV on MLKZ model) and GM de-energize within 10 sec.

Diagnosis: If BC2 does not open and the icemaker continues to make ice (mechanical stand-alone or backup), CB fails to shutdown icemaker within 10 sec. or go into alarm, check that the actuator paddle is engaged. Check for continuity across BC2 wires.

If BC2 contacts are found open and the icemaker continues to make ice or CB fails to go into alarm (BC2), replace CB. If BC2 is closed with the actuator paddle engaged, replace BC2. **WARNING! If dip switch 9 is in the "OFF" position, the shut down delay is too long. This could lead to icemaker movement or ice overflow.**

- 7) Move the power switch to the "OFF" position and turn off the power supply.

- 8) Replace the chute assembly and strap in their correct positions.
- 9) Move the power switch to the "ON" position.
- 10) Replace the control box cover, top panel, and front panel in their correct positions.
- 11) Turn on the power supply to start the automatic icemaking process.

Legend: **BC1**—bin control 1 (ultrasonic sensor); **BC2**—bin control 2 (backup);
CB—control board; **Comp**—compressor; **GM**—gear motor; **LLV**—liquid line valve;
SLV—suction line valve

E. Float Switch Check and Cleaning

1. Float Switch Check

A dual float switch is used to determine that there is sufficient water in the reservoir during fill and refill. CB monitors UFS to de-energize WV when UFS closes during fill and refill. CB monitors LFS to energize WV when LFS opens during the freeze cycle (refill). CB monitors the time between LFS opening and UFS closing (90-sec. low water safety). CB also monitors the time between UFS closing and LFS opening (30-min. freeze timer). No adjustment is required.

- 1) Remove the front panel and move the power switch to the "OFF" position. Move the control switch to the "DRAIN" position.
- 2) Move the power switch to the "ON" position.
- 3) Allow the water to drain from the reservoir, then move the power switch to the "OFF" position and the control switch to the "ICE" position.
- 4) Disconnect the molex plug from the control box and check continuity across FS wires. (BK) to (R) for UFS and (BK) to (BU) for LFS. See Fig. 10. With the water reservoir empty, FS switches are open. If open, continue to step 5. If closed, follow the steps in "II.E.2. Float Switch Cleaning." After cleaning the floats, check them again. Replace if necessary.
- 5) Reconnect the molex plug on the control box.
- 6) Move the power switch to the "ON" position and let the water reservoir fill.
- 7) Once the reservoir is full and GM starts, move the power switch to the "OFF" position.
- 8) Disconnect the molex plug from the control box and check continuity across FS wires. (BK) to (R) for UFS and (BK) to (BU) for LFS. They should be closed. Clean or replace if necessary.

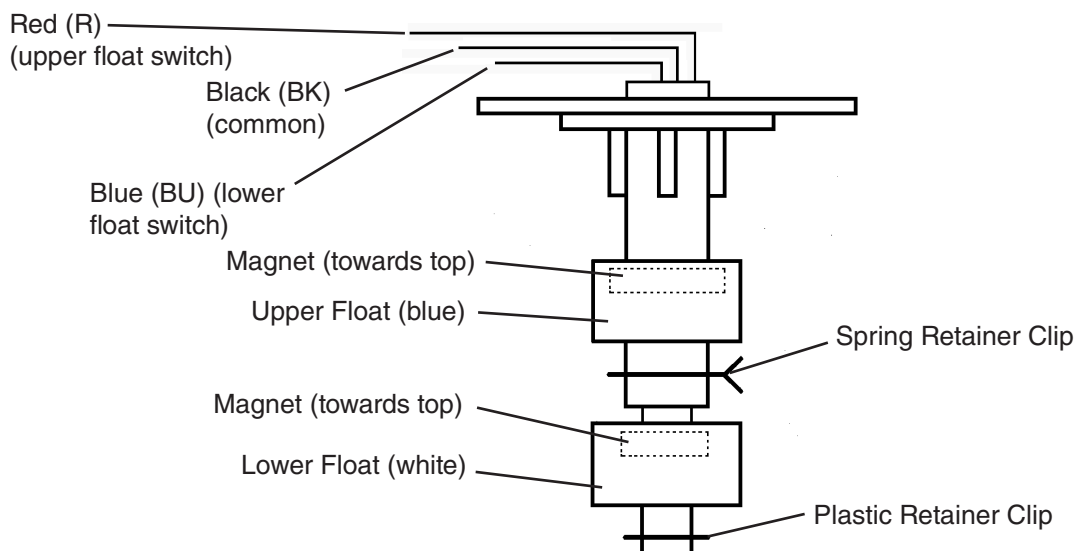


Fig. 10

2. Float Switch Cleaning

Depending on local water conditions, scale may build up on FS. Scale on FS can cause the floats to stick. In this case, FS should be cleaned and checked.

- 1) Turn off the power supply.
- 2) Remove the float switch assembly from the reservoir cover. See Fig. 11.
- 3) Wipe down FS assembly with a mixture of 1 part Hoshizaki "Scale Away" and 25 parts warm water.
- 4) While not necessary, the floats can be removed from the shaft during cleaning. If you remove them, note that the blue float is on top. The floats must be installed with the magnets inside them towards the top of the switch. See Fig. 6. Installing the floats upside down will affect the timing of FS operation.
- 5) Rinse FS assembly thoroughly with clean water and replace in its original position.

Legend: **CB**—control board; **FS**—float switch; **GM**—gear motor; **LFS**—lower float switch; **UFS**—upper float switch; **WV**—inlet water valve

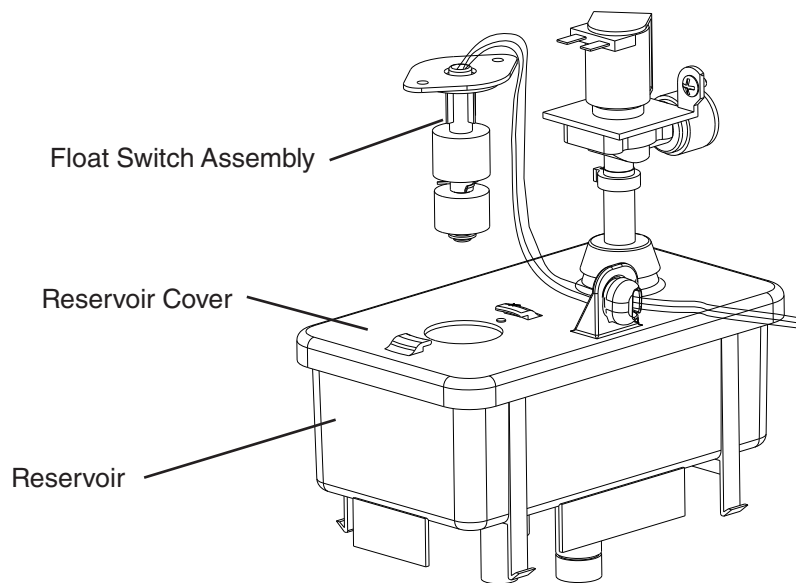


Fig. 11

F. Power Switch and Control Switch

The power switch and the control switch are used to control the icemaker. They are located on the control box.

1. Power Switch

The power switch has 2 positions, "OFF" and "ON." When the power switch is in the "OFF" position, no power is supplied to the components. When in the "ON" position, power is supplied to the control transformer and control board. The control board then supplies 5VDC to the control switch for unit operation.

2. Control Switch

The control switch has 2 positions, "ICE" and "DRAIN."

When the control switch is in the "ICE" position (open), icemaking begins.

When the control switch is in the "DRAIN" position (closed), the drain valve energizes.

a) ICE

When the control switch is in the "ICE" position, the control board reads an open circuit through the control switch contacts and starts the icemaking process.

b) DRAIN

When the control switch is in the "DRAIN" position, the control board reads a closed circuit through the control switch and the drain valve energizes. See "IV. Refrigeration Circuit and Component Service Information."

G. Diagnostic Tables

Before consulting the diagnostic charts, check for correct installation, proper voltage per appliance nameplate, and adequate water supply. Check control board using the steps in "III.C. Control Board Check."

1. No Ice Production

No Ice Production - Possible Cause	
Startup	
1. Power Supply	a) Off, blown fuse, or tripped breaker. b) Loose connection. c) Bad contacts. d) Not within specifications.
2. Water Supply	a) Water supply off or pressure too low.
3. Power Switch (Control Box)	a) "OFF" position. b) Bad contacts.
4. Control Transformer	a) Coil winding opened.
5. Fuse (Control Box)	a) Blown.
6. BC1 (Ultrasonic sensor) See "II.D. Bin Control Check."	a) No power or defective.
7. BC2 (Mechanical Backup) See "II.D. Bin Control Check."	a) Tripped with bin filled with ice. (9-beep alarm when used in conjunction with BC1 (ultrasonic sensor)) b) Switch stuck open. c) Actuator paddle does not move freely.
8. TREV (Temperature Response Expansion Valve) F-2030MRKZ2(3)(-C)	a) Defective.
9. High-Pressure Switch	a) Bad Contacts. b) Dirty air filter or condenser. c) Ambient or condenser water temperature too warm. d) Refrigerant overcharged. e) Fan not operating (except water-cooled model). f) Refrigerant line or component restricted. g) Condenser water pressure too low or off (water-cooled model). h) Water regulating valve set too high (water-cooled model).
10. Control Switch	a) "DRAIN" position. 2-beep alarm if in "DRAIN" position for more than 15 min. b) Bad contacts.
Fill Cycle	
1. Control Board	a) No Power to inlet water valve. b) No power to float switch or not reading float switch condition.
2. Inlet Water Valve	a) Screen or orifice clogged. b) Coil winding opened.
3. Float Switch	a) Float does not move freely. b) Defective.
4. Drain Water Valve	a) Valve seat clogged and water leaking.
5. Hoses	a) Disconnected.

Ice Purge Cycle	
1. Control Board	a) No power to gear motor.
	b) No power to compressor control relay.
2. Gear Motor	a) Blown fuse.
	b) Internal protector open.
	c) Defective.
Freeze Cycle	
1. Compressor Control Relay	a) No voltage from gear motor.
	b) Defective.
2. Control Board	a) Defective.
3. Start Relay	a) Bad contacts.
	b) Coil winding opened.
	c) Loose connections.
4. Capacitor (start or run)	a) Defective, weak.
5. Power Supply	a) Not within specifications.
6. Refrigerant Line	a) Gas leaks.
	b) Refrigerant line or component restricted.
7. Thermostatic Expansion Valve (TXV) (not adjustable)	a) Defective.
8. Compressor	a) Defective.
9. Liquid Line Valve (MLKZ models)	a) Defective.
10. Suction Line Valve (MLKZ models)	a) Defective.
11. Fan Motor (if applicable)	a) Compressor Control Relay/Magnetic Contactor defective.
	b) Defective capacitor.
	c) Defective.
	d) Control board defective.
12. Evaporator	a) Dirty.
	b) Damaged or defective.
13. Headmaster (C.P.R.) (remote air-cooled model)	a) Not operating properly and liquid line temperature too warm.
14. Water Supply Line (water-cooled model)	a) Condenser water pressure too low or off and high pressure control opens and closes frequently.
15. Water Regulating Valve (water-cooled model)	a) Set too high.
16. Magnetic Contactor (if applicable)	a) Defective.
17. Drain Valve	a) Dirty, leaking by.
	b) Defective.
18. Water System	a) Water leaks.

Refill	
1. Float Switch	a) Dirty/sticking.
	b) Defective.
2. Inlet Water Valve	a) Clogged or defective.
3. Water Supply	a) Off.
4. Control Board	a) No power to float switch or not reading float switch condition.
	b) No power to inlet water valve.
Shutdown	
1. BC1 (Ultrasonic sensor) See "II.D. Bin Control Check."	a) Dirty lens.
	b) Defective.
2. BC2 (Mechanical Backup) See "II.D. Bin Control Check."	a) Actuator paddle does not move freely.
	b) Defective.
3. Control Board	a) Control board dip switches set incorrectly.
	b) In alarm.
	c) Defective.
Drain Cycle	
1. Drain Valve	a) Screen or orifice clogged.
	b) Defective.
2. Control Board	a) Defective.

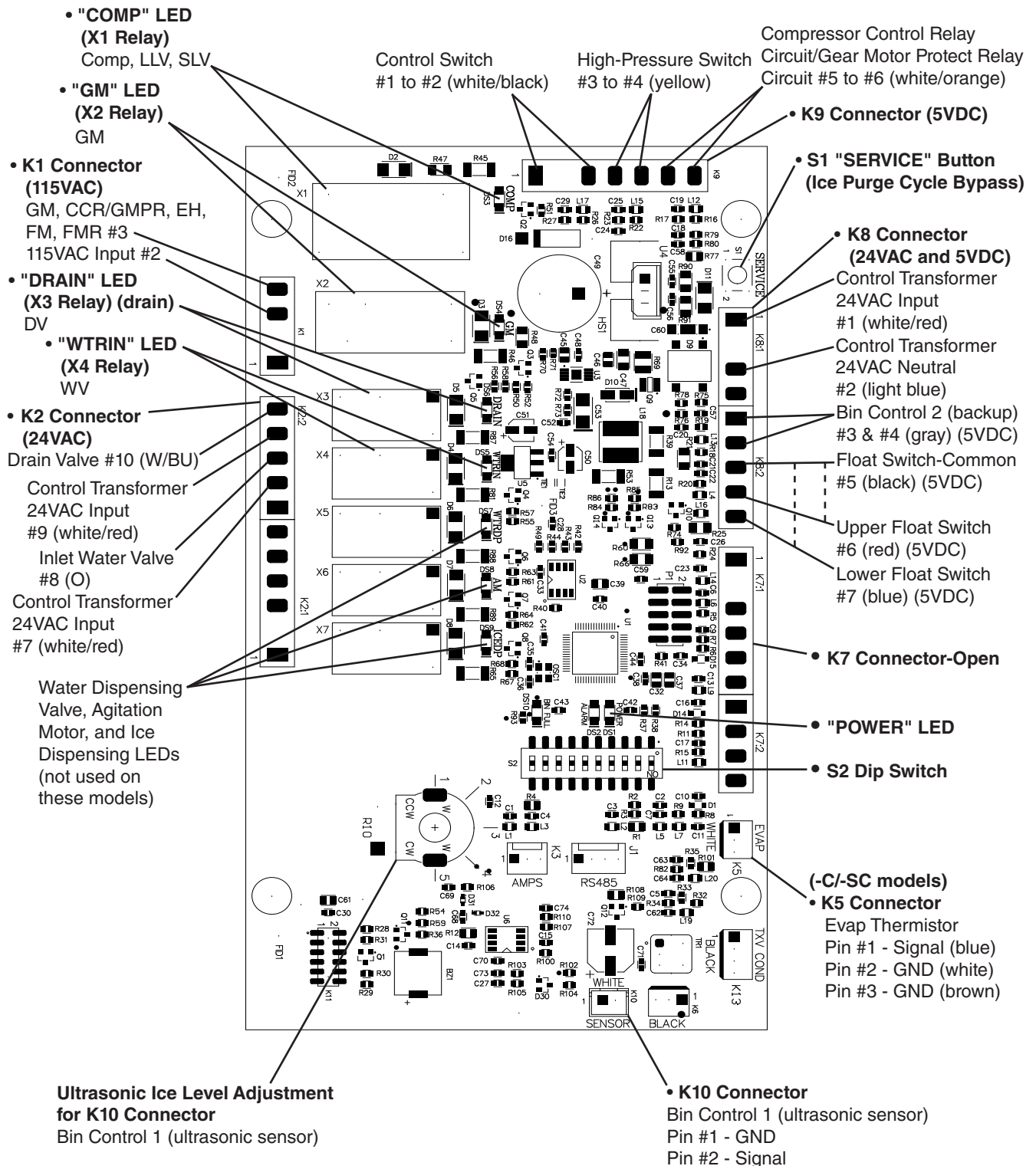
III. Controls and Adjustments

A. Control Board

- A Hoshizaki exclusive control board is employed.
- All models are pretested and factory adjusted.
- For a control board check procedure, see "II.C. Control Board Check."

<i>NOTICE</i>
• Fragile, handle very carefully. • The control board contains integrated circuits, which are susceptible to failure due to static discharge. It is especially important to touch the metal part of the icemaker when handling or replacing the control board. • Do not touch the electronic devices on the control board or the back of the control board. • Do not change wiring and connections. Do not misconnect terminals. • Do not short out power supply to test for voltage. • Always replace the whole control board assembly if it goes bad.

1. Control Board Layout



Control Board	
Part Number	2A9874-03

2. LED Lights and Audible Alarm Safeties

The "POWER" LED indicates proper control voltage and will remain on unless a control voltage problem occurs. For further details, see "II.A. Sequence of Operation Flow Chart."

Sequence Step	LED	Energized Components	Min.	Max.
Fill Cycle	WTRIN	WV	-	-
Ice Purge Cycle	GM	GM, FM/FMR	5 min.	5 min.
Freeze Cycle (with refill)	GM, WTRIN* (refill), COMP	GM, Comp, FM/FMR, LLV, SLV, WV* (refill)	-	*On until UFS closes. Alarm sounds after 90 sec.
1-in-1 Drain Cycle (S2 dip switch 4 off)	FLUSH (Drain)	DV	2 sec.	2 sec.

The built-in alarm safeties shut down the unit.

No. of Beeps (every 5 sec.)	Type of Alarm	Reset Options
1	Low Water Safety UFS open > 90 sec. after WV energized.	Automatic reset once water supply is restored and UFS closes.
2	Control Switch In "DRAIN" position longer than 15 min..	Automatic reset once the control switch is moved to the "ICE" position.
3	High-Pressure Switch First and sec. activation in 1 hour.	Automatic reset once pressure drops below the high pressure threshold and the high pressure switch closes.
4	High-Pressure Switch Third activation in 1 hour.	Call for service. To avoid possible catastrophic failure, it is recommended to leave the icemaker off until this alarm is resolved. Manual reset. Turn power off and on again.
5	Freeze Timer WV off > 30 min. since last WV activation.	Manual reset. Turn power off and on again.
6	Low Voltage (92VAC±5% or less)	"POWER" LED turns off if voltage protection operates.
7	High Voltage (147VAC±5% or more)	The control voltage safeties automatically reset when voltage is corrected.
8	Gear Motor CCR contacts fail to close.	Manual reset. Turn power off and on again.
9	BC1 (ultrasonic sensor) fails (CB S2 dip switch 7 on) BC2 (mechanical backup) actuator paddle engaged.	Manual reset. Turn power off and on again.

Legend: **BC1**—bin control (ultrasonic sensor); **BC2**—bin control 2 (mechanical backup); **CB**—control board; **CCR**—compressor control relay; **Comp**—compressor; **DV**—drain valve; **FM**—fan motor; **FMR**—fan motor-remote; **GM**—gear motor; **LLV**—liquid line valve (MLKZ model); **SLV**—suction line valve (MLKZ model); **UFS**—upper float switch; **WV**—inlet water valve

3. Ice Purge Cycle Bypass

To speed up the diagnostic process, the 5-min. ice purge cycle may be bypassed by pressing the "SERVICE" button on the control board after the gear motor starts.

WARNING! Risk of electric shock. Care should be taken not to touch live terminals.

B. Controls and Adjustments

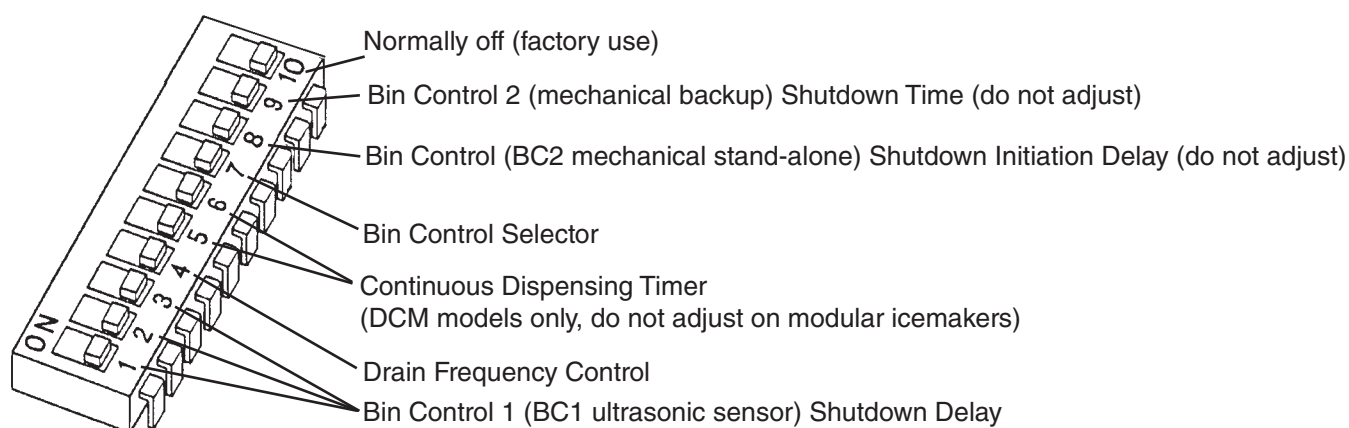
NOTICE

Dip switches are factory set. Failure to maintain factory settings may adversely affect performance and warranty coverage. For more information, contact your Hoshizaki Certified Service Representative.

1. Default Dip Switch Settings

The S2 dip switch settings are factory-set to the following positions:

Dip Switch No.	1	2	3	4	5	6	7	8	9	10
F-1530M_K(-C)(-SC)	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF
F-2030M_K(Z)/3(-C)	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF



2. BC1 (Ultrasonic Sensor) Shutdown Delay (S2 dip switch 1, 2, 3)

Ultrasonic sensor shutdown delay is the delay between the ultrasonic sensor detecting ice (CB "BIN FULL" orange LED on) and the start of the shutdown sequence.

Note: For ice level adjustment, reference the Instruction Manual for this appliance.

S2 Dip Switch Setting			Ultrasonic Sensor Shutdown Delay
No. 1	No. 2	No. 3	
OFF	OFF	OFF	30 seconds
ON	OFF	OFF	
OFF	ON	OFF	
OFF	OFF	ON	
ON	ON	OFF	
OFF	ON	ON	
ON	ON	ON	

3. Drain Frequency Control (S2 dip switch 4)

This appliance is factory set for optimum performance with the 1-in-1 drain cycle (S2 dip switch 4 in the off position). This setting allows for removal of sediment from the evaporator without interrupting the icemaking process. An optional 1-in-12 drain cycle is available.

S2 Dip Switch Setting	Drain Timer Interval	Drain Valve Open
No. 4		
OFF (1-in-1)	1 Hour	2 Seconds
ON (1-in-12)	11 Hours 45 Minutes	10 Minutes

4. Continuous Dispensing Timer (S2 dip switch 5 & 6)

DCM models only. The dispense mode switch on DCMs must be in the "CONTINUOUS" position for this setting to apply. The factory setting allows ice to be dispensed continuously as long as the dispense solenoid is activated.

S2 Dip Switch Setting		Dispense Time
No. 5	No. 6	
OFF	OFF	No Limit
ON	OFF	20 Seconds
OFF	ON	60 Seconds
ON	ON	No Limit

5. Bin Control Selector (S2 dip switch 7)

The bin control is factory set. No adjustment required. **WARNING! Do not place S2 dip switch 7 in the "OFF" position on dispenser unit applications. This could lead to icemaker movement or ice overflow.**

S2 Dip Switch Setting	Bin Control Application	Gear Motor Delay
No. 7		
OFF	BC2 (mechanical stand-alone) (Standard Ice Storage Bins Only) Use for emergency use only, if needed.	5 seconds
ON	BC1 (ultrasonic sensor) Stand-Alone with BC2 (backup)	30 seconds

6. BC2 (Mech. Backup) Shutdown Initiation Delay (S2 dip switch 8)

Only available when S2 dip switch 7 is in the "OFF" position. Factory set for normal operation. No adjustment is required. The shutdown initiation delay is the time between the mechanical bin control opening and dip switch 9 timer starting.

S2 Dip Switch Setting	Shutdown Delay
No. 8	
OFF	0.25 Seconds
ON	6.7 Seconds

7. BC2 (Mech. Backup) Shutdown Time (S2 Dip Switch 9)

Only available when S2 dip switch 7 is in the "OFF" position. Factory set for optimum performance. Do not adjust. Dip switch 9 shutdown timing starts when Dip Switch 8 timer terminates.

S2 Dip Switch Setting	Shutdown Sequence
No. 9	
OFF	Slow timing (90s after dip switch 8 timer terminates, the COMP shuts down; 60 sec. later, the GM shuts down)
ON	Fast timing (immediate)(after dip switch 8 timer terminates, both COMP & GM shuts down at the same time)

8. Factory Use (S2 Dip Switch 10)

Factory set for optimum performance. Do not adjust.

IV. Refrigeration Circuit and Component Service Information

WARNING

- This appliance should be diagnosed and repaired only by qualified service personnel to reduce the risk of death, electric shock, serious injury, or fire.
- Move the power switch to the "OFF" position and turn off the power supply. Place the disconnect in the "OFF" position. Lockout/Tagout to prevent the power supply from being turned back on inadvertently.
- **CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after the appliance is serviced. Make sure that none have fallen into the dispenser unit/ice storage bin.
- Make sure all food zones in the icemaker and dispenser unit/ice storage bin are clean after service.

A. Refrigeration Circuit Service Information

WARNING

- Repairs requiring the refrigeration circuit to be opened must be performed by properly trained and EPA-certified service personnel.
- Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the system (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140 PSIG). Do not use R-448A as a mixture with pressurized air for leak testing.

NOTICE

- Always recover the refrigerant and store it in an approved container. Do not discharge the refrigerant into the atmosphere.
- Do not leave the system open for longer than 15 min. when replacing or servicing parts. The Polyol Ester (POE) oils used in R-448A applications can absorb moisture quickly. Therefore it is important to prevent moisture from entering the system when replacing or servicing parts.
- Always install a new drier every time the sealed refrigeration system is opened. Do not replace the drier until after all other repair or replacement has been made. Install the new drier with the arrow on the drier in the direction of the refrigerant flow.
- When brazing, protect the drier by using a wet cloth to prevent the drier from overheating. Do not allow the drier to exceed 250°F (121°C).

1. Refrigerant Recovery

Using proper refrigerant practices, recover the refrigerant. Recover via the access valves. Store the refrigerant in an approved container. Do not discharge the refrigerant into the atmosphere.

2. Brazing

⚠ WARNING

- R-448A itself is not flammable at atmospheric pressure and temperatures up to 212°F (100°C).
- R-448A itself is not explosive or poisonous. However, when exposed to high temperatures (open flames), R-448A can be decomposed to form hydrofluoric acid and carbonyl fluoride both of which are hazardous.
- Do not use silver alloy or copper alloy containing arsenic.
- Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the line set tubing through the service valve access ports (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140 PSIG (965 kPaG)). Do not use R-448A as a mixture with pressurized air for leak testing.

- 1) Braze all fittings while purging with nitrogen gas flowing at a pressure of 3 to 5 PSIG.

NOTICE

- Always install a new drier every time the sealed refrigeration system is opened.
- Do not replace the drier until after all other repair or replacement has been made. Install the new drier with the arrow on the drier in the direction of the refrigerant flow.
- When brazing, protect the drier by using a wet cloth to prevent the drier from overheating. Do not allow the drier to exceed 250°F (121°C).

- 2) Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the system (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140 PSIG). Do not use R-448A as a mixture with pressurized air for leak testing.

3. Evacuation and Recharge (R-448A)

- 1) Attach a vacuum pump to the system. Be sure to connect the charging hoses to both high and low-side refrigerant access valves.

IMPORTANT

The vacuum level and vacuum pump may be the same as those for current refrigerants. However, the rubber hose and gauge manifold to be used for evacuation and refrigerant charge should be exclusively for POE oils.

- 2) Turn on the vacuum pump, then open the gauge manifold valves. Never allow the oil in the vacuum pump to flow backwards.
- 3) Allow the vacuum pump to pull down to a 29.9" Hg vacuum. Evacuating period depends on pump capacity.
- 4) Close the low-side valve and high-side valve on the gauge manifold.

- 5) Disconnect the gauge manifold hose from the vacuum pump and attach it to a refrigerant service cylinder. Remember to loosen the connection and purge the air from the hose. For the required refrigerant charge, see the nameplate. Hoshizaki recommends only virgin refrigerant or reclaimed refrigerant which meets ARI Standard 700 (latest edition) be used.
- 6) A liquid charge is required when charging an R-448A system (to prevent fractionation). Place the service cylinder on the scales; if the service cylinder is not equipped with a dip tube, invert the service cylinder, then place it on the scales. Open the high-side valve on the gauge manifold.
- 7) Allow the system to charge with liquid until the proper charge weight is met.
- 8) If necessary, add any remaining charge to the system through the low-side.
NOTICE! To prevent compressor damage, use a throttling valve or liquid dispensing device to add the remaining liquid charge through the low-side refrigerant access valve with the icemaker running.
- 9) Close the high and low-side gauge manifold valves, then disconnect the gauge manifold hoses.
- 10) Cap the refrigerant access valves to prevent a possible leak.

B. Component Service Information

NOTICE

- When replacing a component listed below, see the notes to help ensure proper operation.
- When replacing evaporator assembly and water circuit components, make sure there are no water leaks after the repair is complete.
- Seal bolts must be replaced once removed because seal material is one-time use only. If new seal bolts do not have preapplied threadlocker, apply Loctite 243 or equivalent threadlocker to seal bolt threads. Tighten to the torque values listed below.

Torque for F-1530 and Larger: 25.8 ft-lb/35 N·m Tighten 2 times. Allow at least 5 sec. in between each tightening.

Component	Notes
Compressor	• Install a new drier, start capacitor, and start relay.
Upper and Lower Bearings	• Inspect the upper bearing for wear. See "IV.B.1. Upper Bearing Wear Check." Replace if necessary. • When replacing the upper bearing it is advised to also change the lower bearing at the same time.
Evaporator	• Install a new drier. • Inspect the mechanical seal and O-ring prior to installing the new evaporator. If worn, cracked, or scratched, the mechanical seal should also be replaced.
Gear Motor	• Install a new gear motor capacitor.
Evaporator Pressure Regulator (EPR Valve)	Use with R-448A. R-448A EPR setting: 24 PSIG.

Evaporator Assembly

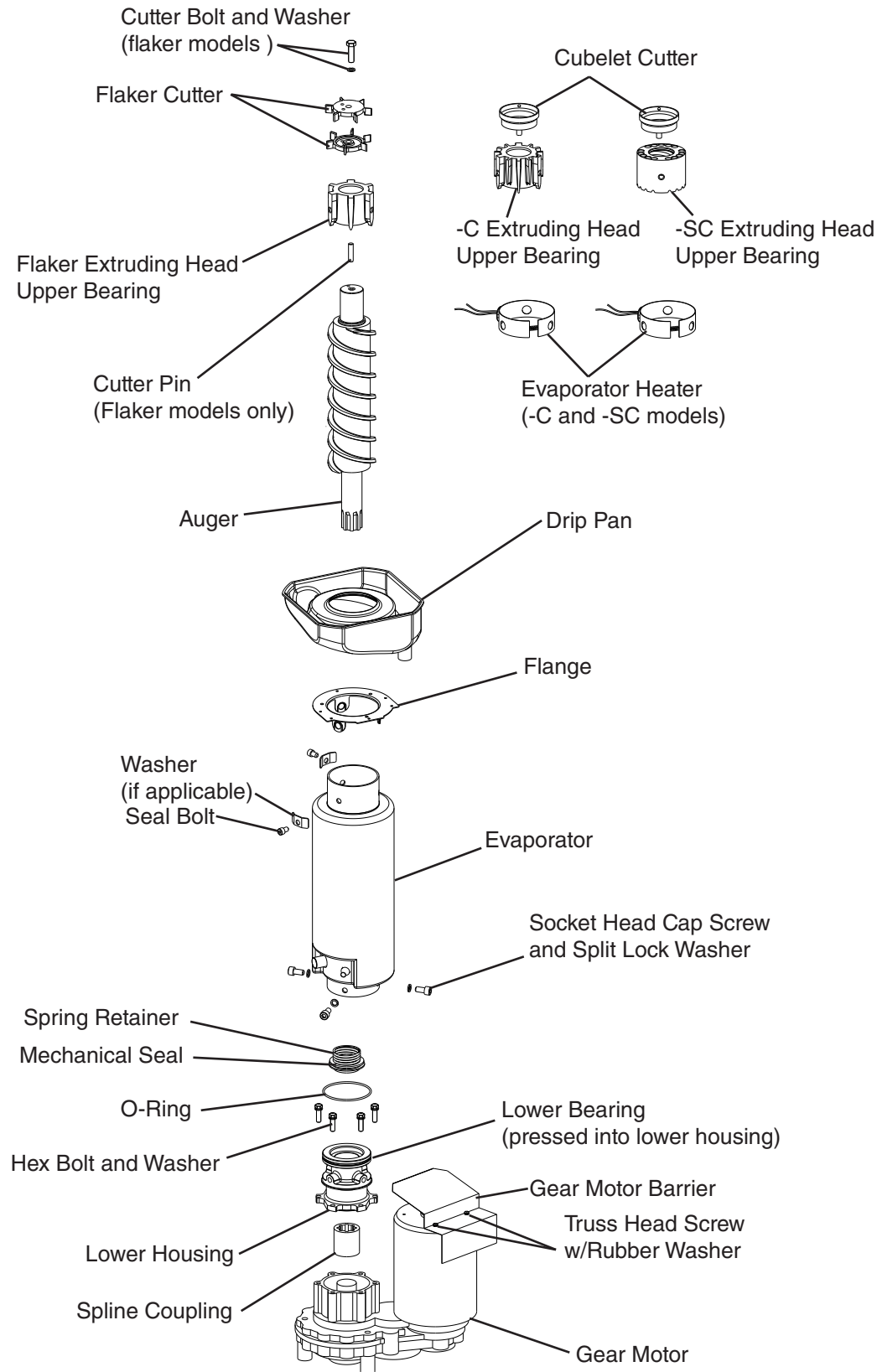


Fig. 12

1. Upper Bearing Wear Check

To ensure that the bearing inside the extruding head does not exceed the wear tolerance of .02", follow the instructions below.

- 1) Remove the front panel. Move the power switch to the "OFF" position, then turn off the power supply.
- 2) Remove the top and side panels.
- 3) Remove the insulation strap, spout insulation, and spout.
- 4) Remove the bolt (if applicable) or cutter from the auger and lift off the cutter and washer (if applicable).

- 5) Replace the bolt in the auger (if applicable). See Fig. 13. Move the auger towards you and then try to insert a .02" round stock or pin gauge in between the back side of the auger shaft and the bearing surface. Check several locations around the auger shaft. If the gauge goes between the shaft and the bearing at any point or if the bearing is scratched or cracked, both the top bearing in the extruding head and the lower bearing in the housing should be replaced. Instructions for removing the extruding head and housing are located later in this procedure.

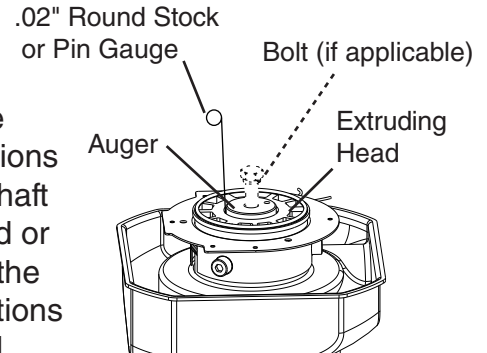


Fig. 13

Note: Replacing the bearing requires a bearing press adaptor. If one is not available, replace the whole extruding head and housing.

- 6) Replace the washer (if applicable), cutter, and cutter bolt (if applicable).
- 7) Replace the spout, spout insulation, and insulation strap.
- 8) Replace the top and side panels in their correct positions.
- 9) Move the power switch to the "ON" position, then turn on the power supply.
- 10) Replace the front panel in its correct position.

2. Removal and Replacement of Cutter

- 1) Remove the front panel. Move the power switch to the "OFF" position, then turn off the power supply.
- 2) Remove the top and side panels.
- 3) Remove the insulation strap, spout insulation, and spout.
- 4) Remove the bolt (if applicable) or cutter and lift off the cutter.
- 5) Install the new cutter. Replace the bolt (if applicable).
- 6) Replace the spout, spout insulation, and insulation strap.
- 7) Replace the top and side panels in their correct position.
- 8) Move the power switch to the "ON" position, then turn on the power supply.
- 9) Replace the front panel in its correct position.

IMPORTANT! Seal Bolt Removal and Installation Instructions: Seal bolts must be replaced once removed because seal material is one-time use only. If new seal bolts do not have preapplied threadlocker, apply Loctite 243 or equivalent threadlocker to seal bolt threads.

- Torque for F-1530 and Larger: 25.8 ft-lb/35 N·m Tighten 2 times. Allow at least 5 sec. in between each tightening.

3. Removal and Replacement of Extruding Head

- 1) Drain the water from the evaporator.
 - a) Remove the front panel, then move the power switch to the "OFF" position.
 - b) Move the control switch to the "DRAIN" position.
 - c) Move the power switch to the "ON" position and allow the water to drain from the evaporator.
 - d) Move the power switch to the "OFF" position, then turn off the power supply.
- 2) Remove the top and side panels.
- 3) Remove the insulation strap, spout insulation, and spout.
- 4) Remove the cutter bolt (if applicable) or cutter and lift off the cutter and washer (if applicable).
- 5) Remove the seal bolts from the extruding head and lift off the extruding head.
- 6) Place the new extruding head in place and tighten down with new seal bolts.
See "Seal Bolt Removal and Installation Instructions" above.
- 7) Replace the washer (if applicable), cutter, cutter bolt (if applicable), spout, spout insulation, and insulation strap.
- 8) Replace the top and side panels in their correct positions.
- 9) Move the control switch to the "ICE" position.
- 10) Move the power switch to the "ON" position, then turn on the power supply.
- 11) Replace the front panel in its correct position.

4. Removal and Replacement of Auger

- 1) Drain the water from the evaporator.
 - a) Remove the front panel, then move the power switch to the "OFF" position.
 - b) Move the control switch to the "DRAIN" position.
 - c) Move the power switch to the "ON" position and allow the water to drain from the evaporator.
 - d) Move the power switch to the "OFF" position, then turn off the power supply.
- 2) Remove the top and side panels.
- 3) Remove the insulation strap, spout insulation, and spout.
- 4) Remove the extruding head seal bolts. Using the cutter, lift out the auger assembly.
- 5) Remove the cutter bolt (if applicable), cutter, washer (if applicable), and dowel pin (if applicable). Remove the extruding head from the auger and place on the new auger.
- 6) Install the new auger.
- 7) Replace the removed parts in the reverse order of which they were removed.
Note: Be sure to use new seal bolts. See "Seal Bolt Removal and Installation Instructions" above.
- 8) Replace the top and side panels in their correct positions.
- 9) Move the control switch to the "ICE" position.
- 10) Move the power switch to the "ON" position, then turn on the power supply.
- 11) Replace the front panel in its correct position.

5. Removal and Replacement of Evaporator

IMPORTANT

Always install a new drier every time the sealed refrigeration system is opened. Do not replace the drier until after all other repair or replacement has been made.

- 1) Drain the water from the evaporator.
 - a) Remove the front panel, then move the power switch to the "OFF" position.
 - b) Move the control switch to the "DRAIN" position.
 - c) Move the power switch to the "ON" position and allow the water to drain from the evaporator.
 - d) Move the power switch to the "OFF" position, then turn off the power supply.
- 2) Remove the top and side panels.
- 3) Recover the refrigerant and store it in an approved container.
- 4) Remove the insulation strap, spout insulation, and spout.
- 5) Disconnect the water hoses.
- 6) Remove the extruding head seal bolts. Using the cutter, lift out the auger assembly.
- 7) Remove the insulation and the expansion valve bulb on the suction line.
- 8) Disconnect the inlet and outlet tubing.
- 9) Remove the socket head cap screws and split lock washers securing the evaporator to the lower housing.
- 10) Lift off the evaporator.
- 11) Inspect the mechanical seal and O-ring prior to installing the new evaporator. The mechanical seal consists of two parts. One moves along with the auger, and the other is fixed on the lower housing. If the contact surfaces of these two parts are worn, cracked, or scratched, the mechanical seal may cause water leaks and should be replaced. Instructions for removing the mechanical seal and lower housing are located later in this procedure.
- 12) Make sure the lower mechanical seal is in place, then place the evaporator in position. Secure the evaporator to the lower housing using the socket head cap screws and split lock washers.
- 13) Remove the drier, then place the new drier in position.
- 14) Braze all fittings while purging with nitrogen gas flowing at a pressure of 3 to 5 PSIG.
- 15) Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the system (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140 PSIG). Do not use R-448A as a mixture with pressurized air for leak testing.
- 16) Evacuate the system, and charge it with refrigerant. For air-cooled and water-cooled models, see the nameplate for the required refrigerant charge. For remote models, see the rating label inside the icemaker. Hoshizaki recommends only virgin refrigerant or reclaimed refrigerant which meets AHRI Standard 700 (latest edition) be used.

- 17) Replace the removed parts in the reverse order of which they were removed.
Note: Be sure to use new seal bolts. See "Seal Bolt Removal and Installation Instructions" earlier in this section.
- 18) Replace the top and side panels in their correct positions.
- 19) Move the control switch to the "ICE" position.
- 20) Move the power switch to the "ON" position, then turn on the power supply.
- 21) Replace the front panel in its correct position.

6. Removal and Replacement of Mechanical Seal and Lower Housing

6a. Mechanical Seal

- 1) Drain the water from the evaporator.
 - a) Remove the front panel, then move the power switch to the "OFF" position.
 - b) Move the control switch to the "DRAIN" position.
 - c) Move the power switch to the "ON" position and allow the water to drain from the evaporator.
 - d) Move the power switch to the "OFF" position, then turn off the power supply.
- 2) Remove the top and side panels.
- 3) Remove the insulation strap, spout insulation, and spout.
- 4) Remove the extruding head seal bolts. Using the cutter, lift out the auger assembly.
- 5) The mechanical seal consists of two parts. One moves along with the auger, and the other is fixed on the lower housing. If the contact surfaces of these two parts are worn, cracked, or scratched, the mechanical seal may cause water leaks and should be replaced.
- 6) Remove the socket head cap screws and split lock washers securing the evaporator to the lower bearing housing.
- 7) Raise the evaporator up to access the lower housing.
- 8) Remove the O-ring and mechanical seal from the housing. If only replacing the mechanical seal, proceed to step 11.

<i>NOTICE</i>
To help prevent water leaks, be careful not to damage the surfaces of the O-ring or mechanical seal.

6b. Lower Housing

- 9) Remove the hex bolts w/washers securing the lower housing to the gear motor and remove the lower housing from the gear motor. If inspection of the upper bearing inside the extruding head (see "IV.B.1. Upper Bearing Wear Check") indicates that it is out of tolerance, replace both it and the bearing inside the lower housing.

Note: Replacing the bearing requires a bearing press adaptor. If one is not available, replace the whole extruding head and lower housing.

- 10) Mount the lower housing on the gear motor.
- 11) Install the O-ring and lower part of the mechanical seal on the lower housing.
- 12) Make sure the lower mechanical seal is in place, then place the evaporator in position. Secure the evaporator to the lower housing using the socket head cap screws and split lock washers.
- 13) Install the auger assembly with the upper part of the mechanical seal attached.
- 14) Replace the removed parts in the reverse order of which they were removed.
Note: Be sure to use new seal bolts. See "Seal Bolt Removal and Installation Instructions" earlier in this section.
- 15) Replace the top and side panels in their correct positions.
- 16) Move the control switch to the "ICE" position.
- 17) Move the power switch to the "ON" position, then turn on the power supply.
- 18) Replace the front panel in its correct position.

7. Removal and Replacement of Gear Motor

- 1) Drain the water from the evaporator.
 - a) Remove the front panel, then move the power switch to the "OFF" position.
 - b) Move the control switch to the "DRAIN" position.
 - c) Move the power switch to the "ON" position and allow the water to drain from the evaporator.
 - d) Move the power switch to the "OFF" position, then turn off the power supply.
- 2) Remove the top and side panels.
- 3) Remove the insulation strap, spout insulation, and spout.
- 4) Remove the hex head bolts and washers securing the lower housing to the gear motor.
Lift the evaporator up slightly.
- 5) Remove the socket head cap screws and split lock washers securing the gear motor.
- 6) Disconnect the gear motor wiring, then remove the gear motor.
- 7) Remove the gear motor bracket and spline coupling from the old gear motor and place on the new gear motor.
- 8) Install the new gear motor and re-connect the electrical wires.
- 9) Replace the removed parts in the reverse order of which they were removed.
- 10) Replace the top and side panels in their correct positions.
- 11) Move the control switch to the "ICE" position.
- 12) Move the power switch to the "ON" position, then turn on the power supply.
- 13) Replace the front panel in its correct position.

V. Maintenance

The appliance must be maintained in accordance with the instruction manual and labels provided. Consult with your local Hoshizaki Certified Service Representative about maintenance service.

WARNING

- Only qualified service technicians should service the appliance.
- To reduce the risk of electric shock, do not touch the icemaker power switch or control switch with damp hands.
- **Before Servicing:** Move the icemaker's power switch to the "OFF" position. Turn off the power supply. Place the disconnect (if applicable) in the off position. Lockout/Tagout to prevent the power supply from being turned back on inadvertently.
- **CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after any maintenance is done to the appliance. Make sure that none have fallen into the dispenser unit/ice storage bin.

A. Maintenance Schedule

The maintenance schedule below is a guideline. More frequent maintenance may be required depending on water quality, the appliance's environment, and local sanitation regulations.

Maintenance Schedule		
Frequency	Area	Task
Daily	Scoop	Clean the ice scoop using a neutral cleaner. Rinse thoroughly after cleaning.
Bi-Weekly	Air Filters	Inspect. Wash with warm water and neutral cleaner if dirty.
Monthly	External Water Filters	Check for proper pressure and change if necessary.
	Icemaker Exterior	Wipe down with a clean, soft cloth. Use a damp cloth containing a neutral cleaner to wipe off oil or dirt build up. Clean any chlorine staining (rust colored spots) using a non-abrasive cleanser.
	Ultrasonic sensor Lens; Underside of Icemaker and Top Kits; Bin Door and Snout	Wipe down with a clean cloth and warm water.
Every 6 Months	Icemaker and Dispenser Unit/Ice Storage Bin	Clean and sanitize per the cleaning and sanitizing instructions provided in the instruction manual or on maintenance label.
	Evaporator Condensate Drain Pan and Gear Motor Drain Pan	Wipe down with a clean cloth and warm water. Slowly pour one cup of sanitizing solution (prepare as outlined in the sanitizing instructions provided in the instruction manual) into the evaporator condensate drain pan and then slowly pour one cup into the gear motor drain pan. Be careful not to overflow the pans. Repeat with a cup of clean water to rinse.
	Icemaker and Dispenser Unit/Ice Storage Bin Drains	Check to make sure they are clear.
	Extruding Head Seal Bolts	Inspect for leakage around seal bolts. Tighten (see torque values below) or replace as necessary. Seal bolts must be replaced once removed because seal material is one-time use only. If new seal bolts do not have preapplied threadlocker, apply Loctite 243 or equivalent threadlocker to seal bolt threads. • <i>Torque for F-1530 and Larger: 25.8 ft-lb/35 N·m Tighten 2 times. Allow at least 5 sec. in between each tightening.</i>
Yearly	Inlet Water Valve and Drain Valve	Close the water supply line shut-off valve and drain the water system. Clean the inlet water valve screen and clean and inspect the drain valve.
	Water Hoses	Inspect the water hoses and clean/replace if necessary.
	Condenser	Inspect. Clean if necessary by using a brush or vacuum cleaner.
	Icemaker	Inspect for oil spots, loose components, fasteners, and wires.
	Upper Bearing (extruding head)	Check for wear using .02" round stock or pin gauge. Replace both upper bearing and lower bearing if wear exceeds factory recommendations.
After 3 Years, then Yearly	Upper Bearing (extruding head); Lower Bearing and O-Ring (lower housing); Mechanical Seal; Evaporator Cylinder; Auger	Inspect. Replace both upper bearing and lower bearing if wear exceeds factory recommendations. Replace the mechanical seal if the seal's contact surfaces are worn, cracked, or scratched.

VI. Preparing the Appliance for Periods of Non-Use

⚠ WARNING

Only qualified service technicians should service this appliance.

<i>NOTICE</i>

- | |
|---|
| <ul style="list-style-type: none">• During extended periods of non-use, extended absences, or in sub-freezing temperatures, follow the instructions below to reduce the risk of costly water damage.• When the appliance is not used for two or three days under normal conditions, it is sufficient to move the power switch to the "OFF" position. |
|---|

1. Remove the water from the icemaker water supply line:

- 1) Turn off the power supply, then remove the front panel.
- 2) Move the power switch to the "OFF" position.
- 3) Close the icemaker water supply line shut-off valve, then open the icemaker water supply line drain valve.
- 4) Allow the line to drain by gravity.
- 5) Attach a compressed air or carbon dioxide supply to the icemaker water supply line drain valve.
- 6) Move the control switch to the "ICE" position, then move the power switch to the "ON" position. Replace the front panel in its correct position, then turn on the power supply.
- 7) Blow the icemaker water line out using the compressed air or carbon dioxide supply.
- 8) Close the icemaker water supply line drain valve.

2. Drain the evaporator:

- 1) Turn off the power supply, then remove the front panel.
- 2) Move the control switch to the "DRAIN" position, then replace the front panel in its correct position.
- 3) Turn on the power supply and allow the water system to drain for 5 minutes.
- 4) Turn off the power supply, then remove the front panel. Move the power switch to the "OFF" position.
- 5) Remove the evaporator drain line hose from the evaporator and attach a compressed air or carbon dioxide supply to the hose.
- 6) Turn on the power supply, then move the power switch to the "ON" position. Blow out the evaporator drain line using the compressed air or carbon dioxide supply until water stops coming out.
- 7) Move the power switch to the "OFF" position, then turn off the power supply. Reconnect the evaporator drain line hose removed in step 5.
- 8) Move the control switch to the "ICE" position. Replace the front panel in its correct position.
- 9) Remove all ice from the dispenser unit/ice storage bin. Clean the dispenser unit/ice storage bin liner using a neutral cleaner. Rinse thoroughly after cleaning.

3. On water-cooled models, remove the water from the water-cooled condenser:

- 1) Make sure the power supply is off, then remove the front panel, top panel, and right side panel.
- 2) Close the condenser water supply line shut-off valve. If connected to a closed loop system, also close the condenser return line shut-off valve.
- 3) Open the condenser water supply line drain valve. If connected to a closed loop system, also open the condenser return line drain valve.
- 4) Attach a compressed air or carbon dioxide supply to the condenser water supply line drain valve.
- 5) Open the water regulating valve by using a screwdriver to pry up on the spring retainer underneath the spring. While holding the valve open, blow out the condenser using the compressed air or carbon dioxide supply until water stops coming out.
- 6) Close the drain valve(s).
- 7) Replace the right side, top, and front panels in their correct positions.

VII. Disposal

The appliance contains refrigerant and must be disposed of in accordance with applicable national, state, and local codes and regulations. Refrigerant must be recovered by properly certified service personnel.

VIII. Technical Information

A. Specification & Performance Data Sheets

Note: The data in bold should be used for reference.

1. F-1530MAK2

Specification Sheet

AC SUPPLY VOLTAGE (V/Hz/PH)	~208-230/60/1	
AMPERAGE (A)	13.1	
MINIMUM CIRCUIT AMPACITY (A)	20	
MAXIMUM FUSE SIZE (A)	20	
ELECTRIC & WATER CONSUMPTION Air/Wtr °F (°C)	90/70 (32/21)	70/50 (21/10)
ELECTRIC W (kWH/100 lb)	2240 (4.12)	1940 (2.68)
WATER gal./24HR (gal./100 lb)	160.8 (12)	208.1 (12)
SHAPE OF ICE	FLAKE -	
ICE HARDNESS (%)	70.0	
HARVEST RATE (lb/day)	>1200	
ICE MAKING SYSTEM	Auger Type	
ICE MAKING WATER CONTROL	Float Switch	
BIN CONTROL SYSTEM (Primary)	Ultra Sonic Sensor	
BIN CONTROL SYSTEM (Secondary)	Mechanical	
REFRIGERANT CHARGE g (oz.)	R-448A, 1250 (44.1)	
FOAM BLOWING AGENT	HFO 1233zd(E)	
DESIGN PRESSURE kPaG (PSIG)	HI-3220 (467) LO-1724 (250)	

Performance Data

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1734	786	1618	734	1684	764
	80/27	1646	747	1466	665	1527	693
	90/32	1618	734	1340	608	1312	595
lbs./day kg./day	100/38	1611	731	1217	552	1144	519
APPROXIMATE ELECTRIC CONSUMPTION	70/21	1940		2028		2158	
	80/27	2007		2144		2278	
	90/32	2028		2240		2375	
	100/38	2057		2272		2500	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	208	0.79	194	0.74	181	0.68
	80/27	198	0.75	176	0.67	165	0.63
	90/32	194	0.74	161	0.61	149	0.56
	100/38	176	0.66	158	0.60	137	0.52
EVAPORATOR OUTLET TEMP	70/21	-10	14.0	-9	15.1	-9	15.4
	80/27	-10	14.8	-9	16.4	-9	16.2
	90/32	-9	15.1	-8	17.6	-8	17.6
	100/38	-10	14.8	-8	17.6	-8	17.6
HEAD PRESSURE	70/21	201	14.1	219	15.4	242	17.0
	80/27	215	15.1	244	17.1	264	18.6
	90/32	219	15.4	264	18.6	286	20.1
	100/38	223	15.7	269	18.9	306	21.5
SUCTION PRESSURE	70/21	22	1.5	23	1.6	23	1.6
	80/27	22	1.6	23	1.6	24	1.7
	90/32	23	1.6	24	1.7	25	1.7
	100/38	23	1.6	24	1.7	25	1.8
TOTAL HEAT OF REJECTION FROM CONDENSER		15,000 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]					
TOTAL HEAT OF REJECTION FROM COMPRESSOR		2,700 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]					

2. F-1530MAK2-C

Specification Sheet

AC SUPPLY VOLTAGE (V/Hz/PH)	~208-230/60/1	
AMPERAGE (A)	13.1	
MINIMUM CIRCUIT AMPACITY (A)	20	
MAXIMUM FUSE SIZE (A)	20	
ELECTRIC & WATER CONSUMPTION Air/Wtr °F (°C)	90/70 (32/21)	70/50 (21/10)
ELECTRIC W (kWH/100 lb)	2340 (4.6)	2010 (3.13)
WATER gal./24HR (gal./100 lb)	151.2 (12)	185.2 (12)
SHAPE OF ICE	CUBELET -	
ICE HARDNESS (%)	81.0	
HARVEST RATE (lb/day)	>1200	
ICE MAKING SYSTEM	Auger Type	
ICE MAKING WATER CONTROL	Float Switch	
BIN CONTROL SYSTEM (Primary)	Ultra Sonic Sensor	
BIN CONTROL SYSTEM (Secondary)	Mechanical	
REFRIGERANT CHARGE g (oz.)	R-448A, 1250 (44.1)	
FOAM BLOWING AGENT	HFO 1233zd(E)	
DESIGN PRESSURE kPaG (PSIG)	HI-3220 (467) LO-1724 (250)	

Performance Data Sheet

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP.	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1543	700	1460	662	1501	681
	80/27	1480	671	1351	613	1370	621
	90/32	1460	662	1260	572	1189	539
lbs./day kg./day	100/38	1440	653	1107	502	1047	475
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2010		2107		2239	
	80/27	2084		2234		2367	
	90/32	2107		2340		2475	
watts	100/38	2133		2372		2600	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	185	0.70	175	0.66	162	0.61
	80/27	178	0.67	162	0.61	149	0.56
	90/32	175	0.66	151	0.57	138	0.52
gal./day m3/day	100/38	160	0.61	148	0.56	126	0.48
EVAPORATOR OUTLET TEMP °C °F	70/21	-9	15.8	-8	16.9	-8	17.9
	80/27	-9	16.6	-8	18.2	-7	19.1
	90/32	-8	16.9	-7	19.4	-6	20.3
	100/38	-8	16.9	-7	19.4	-6	21.2
HEAD PRESSURE	70/21	200	14.1	218	15.4	240	16.9
	80/27	214	15.1	243	17.1	262	18.4
	90/32	218	15.4	263	18.5	284	20.0
PSIG kg/cm2G	100/38	221	15.6	268	18.8	303	21.3
SUCTION PRESSURE	70/21	22	1.5	23	1.6	23	1.6
	80/27	22	1.6	23	1.6	24	1.7
	90/32	23	1.6	24	1.7	25	1.7
PSIG kg/cm2G	100/38	23	1.6	24	1.7	25	1.8
TOTAL HEAT OF REJECTION FROM CONDENSER				15,000 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			
TOTAL HEAT OF REJECTION FROM COMPRESSOR				2,700 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			

3. F-1530MAK2-SC

Specification Sheet

AC SUPPLY VOLTAGE (V/Hz/PH)	~208-230/60/1	
AMPERAGE (A)	13.1	
MINIMUM CIRCUIT AMPACITY (A)	20	
MAXIMUM FUSE SIZE (A)	20	
ELECTRIC & WATER CONSUMPTION Air/Wtr °F (°C)	90/70 (32/21)	70/50 (21/10)
ELECTRIC W (kWH/100 lb)	2320 (4.4)	2040 (2.97)
WATER gal./24HR (gal./100 lb)	153.6 (12)	197.9 (12)
SHAPE OF ICE	SOFT CUBELET -	
ICE HARDNESS (%)	75.0	
HARVEST RATE (lb/day)	>1200	
ICE MAKING SYSTEM	Auger Type	
ICE MAKING WATER CONTROL	Float Switch	
BIN CONTROL SYSTEM (Primary)	Ultra Sonic Sensor	
BIN CONTROL SYSTEM (Secondary)	Mechanical	
REFRIGERANT CHARGE g (oz.)	R-448A, 1250 (44.1)	
FOAM BLOWING AGENT	HFO 1233zd(E)	
DESIGN PRESSURE kPaG (PSIG)	HI-3220 (467) LO-1724 (250)	

Performance Data Sheet

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1649	748	1541	699	1600	726
	80/27	1567	711	1399	634	1446	656
	90/32	1541	699	1280	581	1242	564
lbs./day kg./day	100/38	1532	695	1151	522	1091	495
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2040		2122		2254	
	80/27	2103		2230		2372	
	90/32	2122		2320		2461	
	100/38	2155		2353		2590	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	198	0.75	185	0.70	172	0.65
	80/27	188	0.71	168	0.64	157	0.60
	90/32	185	0.70	154	0.58	142	0.54
	100/38	167	0.63	151	0.57	131	0.50
EVAPORATOR OUTLET TEMP	70/21	-11	12.2	-10	13.3	-10	14.3
	80/27	-11	13.0	-10	14.6	-9	15.5
	90/32	-10	13.3	-9	15.8	-8	16.7
	100/38	-10	13.3	-9	15.8	-8	17.6
HEAD PRESSURE	70/21	200	14.1	218	15.4	241	16.9
	80/27	214	15.1	243	17.1	263	18.5
	90/32	218	15.4	263	18.5	285	20.0
	100/38	222	15.6	268	18.9	305	21.4
SUCTION PRESSURE	70/21	22	1.5	23	1.6	23	1.6
	80/27	22	1.6	23	1.6	24	1.7
	90/32	23	1.6	24	1.7	25	1.7
	100/38	23	1.6	24	1.7	25	1.8
TOTAL HEAT OF REJECTION FROM CONDENSER				15,000 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			
TOTAL HEAT OF REJECTION FROM COMPRESSOR				2,700 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			

4. F-1530MWK2

Specification Sheet

AC SUPPLY VOLTAGE (V/Hz/PH)	~208-230/60/1
AMPERAGE (A)	10.6
MINIMUM CIRCUIT AMPACITY (A)	20
MAXIMUM FUSE SIZE (A)	20
ELECTRIC & WATER CONSUMPTION Air/Wtr °F (°C)	90/70 (32/21) 70/50 (21/10)
ELECTRIC W (kWH/100 lb)	1740 (3.15) 1760 (2.6)
WATER gal./24HR (gal./100 lb)	163.1 (12) 194.7 (12)
WATER CONDENSER gal./24HR (gal./100 lb)	115 (1563.3) 43 (702.4)
SHAPE OF ICE	FLAKE -
ICE HARDNESS (%)	72.0
HARVEST RATE (lb/day)	>1200
ICE MAKING SYSTEM	Auger Type
ICE MAKING WATER CONTROL	Float Switch
BIN CONTROL SYSTEM (Primary)	Ultra Sonic Sensor
BIN CONTROL SYSTEM (Secondary)	Mechanical
REFRIGERANT CHARGE g (oz.)	R-448A, 500 (17.6)
FOAM BLOWING AGENT	HFO 1233zd(E)
DESIGN PRESSURE kPaG (PSIG)	HI-3220 (467) LO-1724 (250)

Performance Data Sheet

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1622	736	1545	701	1588	720
	80/27	1564	709	1444	655	1465	664
	90/32	1545	701	1360	617	1265	574
lbs./day kg./day	100/38	1505	683	1175	533	1060	481
APPROXIMATE ELECTRIC CONSUMPTION	70/21	1760		1754		1803	
	80/27	1756		1746		1826	
	90/32	1754		1740		1808	
watts	100/38	1783		1756		1870	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	897	3.40	1140	4.32	1744	6.60
	80/27	1082	4.10	1460	5.53	2215	8.38
	90/32	1140	4.32	1726	6.54	2431	9.20
gal./day m ³ /day	100/38	1622	6.14	1891	7.16	3078	11.65
EVAPORATOR OUTLET TEMP	70/21	-5	23.0	-5	23.5	-4	25.1
	80/27	-5	23.4	-4	24.2	-3	26.3
	90/32	-5	23.5	-4	24.8	-3	26.7
°C °F	100/38	-4	24.1	-4	24.8	-2	28.4
HEAD PRESSURE	70/21	209	14.7	210	14.8	219	15.4
	80/27	210	14.7	211	14.8	225	15.8
	90/32	210	14.8	212	14.9	225	15.8
PSIG kg/cm ² G	100/38	215	15.1	215	15.1	236	16.6
SUCTION PRESSURE	70/21	27	1.9	27	1.9	27	1.9
	80/27	27	1.9	27	1.9	26	1.9
	90/32	27	1.9	27	1.9	26	1.9
PSIG kg/cm ² G	100/38	27	1.9	27	1.9	26	1.8
TOTAL HEAT OF REJECTION FROM CONDENSER	12,700 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
TOTAL HEAT OF REJECTION FROM COMPRESSOR	1,900 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						

5. F-1530MWK2-C

Specification Sheet

AC SUPPLY VOLTAGE (V/Hz/PH)	~208-230/60/1	
AMPERAGE (A)	10.6	
MINIMUM CIRCUIT AMPACITY (A)	20	
MAXIMUM FUSE SIZE (A)	20	
ELECTRIC & WATER CONSUMPTION Air/Wtr °F (°C)	90/70 (32/21)	70/50 (21/10)
ELECTRIC W (kWH/100 lb)	1890 (3.7)	1850 (3.12)
WATER gal./24HR (gal./100 lb)	151.2 (12)	170.4 (12)
WATER CONDENSER gal./24HR (gal./100 lb)	130 (1637.7)	49 (689)
SHAPE OF ICE	CUBELET -	
ICE HARDNESS (%)	84.0	
HARVEST RATE (lb/day)	>1200	
ICE MAKING SYSTEM	Auger Type	
ICE MAKING WATER CONTROL	Float Switch	
BIN CONTROL SYSTEM (Primary)	Ultra Sonic Sensor	
BIN CONTROL SYSTEM (Secondary)	Mechanical	
REFRIGERANT CHARGE g (oz.)	R-448A, 500 (17.6)	
FOAM BLOWING AGENT	HFO 1233zd(E)	
DESIGN PRESSURE kPaG (PSIG)	HI-2655 (385) LO-1965 (285)	

Performance Data Sheet

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1420	644	1373	623	1393	632
	80/27	1384	628	1311	595	1298	589
	90/32	1373	623	1260	571	1144	519
lbs./day kg./day	100/38	1329	603	1074	487	987	448
APPROXIMATE ELECTRIC CONSUMPTION watts	70/21	1850		1862		1897	
	80/27	1859		1877		1923	
	90/32	1862		1890		1932	
	100/38	1875		1900		1970	
APPROXIMATE WATER CONSUMPTION PER 24 HR. gal./day m³/day	70/21	859	3.25	1132	4.28	1630	6.17
	80/27	1067	4.04	1490	5.64	2058	7.79
	90/32	1132	4.28	1789	6.77	2338	8.85
	100/38	1596	6.04	1918	7.26	2843	10.76
EVAPORATOR OUTLET TEMP °C °F	70/21	-4	24.8	-4	24.8	-3	26.2
	80/27	-4	24.8	-4	24.8	-3	27.0
	90/32	-4	24.8	-4	24.8	-3	26.7
	100/38	-4	25.6	-4	24.8	-2	28.4
HEAD PRESSURE PSIG kg/cm²G	70/21	209	14.7	210	14.8	221	15.5
	80/27	210	14.8	212	14.9	227	16.0
	90/32	210	14.8	213	15.0	227	15.9
	100/38	215	15.1	216	15.2	239	16.8
SUCTION PRESSURE PSIG kg/cm²G	70/21	27	1.9	27	1.9	27	1.9
	80/27	27	1.9	27	1.9	27	1.9
	90/32	27	1.9	27	1.9	27	1.9
	100/38	27	1.9	27	1.9	27	1.9
TOTAL HEAT OF REJECTION FROM CONDENSER				12,700 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			
TOTAL HEAT OF REJECTION FROM COMPRESSOR				1,900 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			

6. F-1530MWK2-SC

Specification Sheet

AC SUPPLY VOLTAGE (V/Hz/PH)	~208-230/60/1	
AMPERAGE (A)	10.6	
MINIMUM CIRCUIT AMPACITY (A)	20	
MAXIMUM FUSE SIZE (A)	20	
ELECTRIC & WATER CONSUMPTION Air/Wtr °F (°C)	90/70 (32/21)	70/50 (21/10)
ELECTRIC W (kWH/100 lb)	1840 (3.39)	1870 (2.89)
WATER gal./24HR (gal./100 lb)	156 (12)	186.1 (12)
WATER CONDENSER gal./24HR (gal./100 lb)	120 (1560.8)	45 (703.4)
SHAPE OF ICE	SOFT CUBELET -	
ICE HARDNESS (%)	75.0	
HARVEST RATE (lb/day)	>1200	
ICE MAKING SYSTEM	Auger Type	
ICE MAKING WATER CONTROL	Float Switch	
BIN CONTROL SYSTEM (Primary)	Ultra Sonic Sensor	
BIN CONTROL SYSTEM (Secondary)	Mechanical	
REFRIGERANT CHARGE g (oz.)	R-448A, 500 (17.6)	
FOAM BLOWING AGENT	HFO 1233zd(E)	
DESIGN PRESSURE kPaG (PSIG)	HI-2655 (385) LO-1965 (285)	

Performance Data Sheet

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1551	703	1477	670	1518	689
	80/27	1495	678	1381	626	1401	636
	90/32	1477	670	1300	590	1213	550
lbs./day kg./day	100/38	1441	653	1128	512	1023	464
APPROXIMATE ELECTRIC CONSUMPTION watts	70/21	1870		1861		1905	
	80/27	1863		1850		1924	
	90/32	1861		1840		1903	
	100/38	1889		1855		1960	
APPROXIMATE WATER CONSUMPTION PER 24 HR. gal./day m ³ /day	70/21	890	3.37	1132	4.28	1724	6.53
	80/27	1074	4.07	1451	5.49	2188	8.28
	90/32	1132	4.28	1717	6.50	2406	9.11
	100/38	1608	6.09	1878	7.11	3038	11.50
EVAPORATOR OUTLET TEMP °C °F	70/21	-5	23.0	-5	23.5	-4	25.1
	80/27	-5	23.4	-4	24.2	-3	26.3
	90/32	-5	23.5	-4	24.8	-3	26.7
	100/38	-4	24.1	-4	24.8	-2	28.4
HEAD PRESSURE PSIG kg/cm ² G	70/21	209	14.7	210	14.8	219	15.4
	80/27	210	14.8	212	14.9	225	15.8
	90/32	210	14.8	213	15.0	225	15.8
	100/38	215	15.1	216	15.2	236	16.6
SUCTION PRESSURE PSIG kg/cm ² G	70/21	27	1.9	27	1.9	27	1.9
	80/27	27	1.9	27	1.9	27	1.9
	90/32	27	1.9	27	1.9	27	1.9
	100/38	27	1.9	27	1.9	27	1.9
TOTAL HEAT OF REJECTION FROM CONDENSER				12,700 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			
TOTAL HEAT OF REJECTION FROM COMPRESSOR				1,900 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			

7. F-1530MRKZ2

Specification Sheet

AC SUPPLY VOLTAGE (V/Hz/PH)	~208-230/60/1	
AMPERAGE (A)	13.4	
MINIMUM CIRCUIT AMPACITY (A)	20	
MAXIMUM FUSE SIZE (A)	20	
ELECTRIC & WATER CONSUMPTION Air/Wtr °F (°C)	90/70 (32/21)	70/50 (21/10)
ELECTRIC W (kWH/100 lb)	2060 (3.95)	1940 (2.98)
WATER gal./24HR (gal./100 lb)	154.8 (12)	187.2 (12)
SHAPE OF ICE	FLAKE -	
ICE HARDNESS (%)	74.0	
HARVEST RATE (lb/day)	>1200	
ICE MAKING SYSTEM	Auger Type	
ICE MAKING WATER CONTROL	Float Switch	
BIN CONTROL SYSTEM (Primary)	Ultra Sonic Sensor	
BIN CONTROL SYSTEM (Secondary)	Mechanical	
REFRIGERANT CHARGE g (oz.)	R-448A, 5650 (199.3)	
FOAM BLOWING AGENT	HFO 1233zd(E)	
DESIGN PRESSURE kPaG (PSIG)	HI-3220 (467) LO-1724 (250)	

Performance Data Sheet

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP.	ER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1560	707	1481	672	1521	690
	80/27	1499	680	1377	624	1404	637
	90/32	1481	672	1290	585	1236	561
lbs./day kg./day	100/38	1462	663	1160	526	1094	496
APPROXIMATE ELECTRIC CONSUMPTION	70/21	1940		1975		2041	
	80/27	1967		2021		2097	
	90/32	1975		2060		2133	
	100/38	1994		2077		2200	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	187	0.71	178	0.67	165	0.63
	80/27	180	0.68	165	0.63	153	0.58
	90/32	178	0.67	155	0.59	143	0.54
	100/38	164	0.62	152	0.58	131	0.50
EVAPORATOR OUTLET TEMP	70/21	-4	24.8	-3	25.9	-3	26.9
	80/27	-4	25.6	-3	27.2	-2	28.1
	90/32	-3	25.9	-2	28.4	-1	29.3
	100/38	-3	25.9	-2	28.4	-1	30.2
HEAD PRESSURE	70/21	198	13.9	206	14.5	222	15.6
	80/27	204	14.3	216	15.2	235	16.6
	90/32	206	14.5	224	15.7	243	17.1
	100/38	211	14.8	228	16.1	260	18.3
SUCTION PRESSURE	70/21	26	1.8	26	1.8	27	1.9
	80/27	26	1.8	27	1.9	27	1.9
	90/32	26	1.8	27	1.9	28	1.9
	100/38	26	1.9	27	1.9	28	2.0
TOTAL HEAT OF REJECTION FROM CONDENSER				11,500 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			
TOTAL HEAT OF REJECTION FROM COMPRESSOR				1,900 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			

8. F-1530MRKZ2-C

Specification Sheet

AC SUPPLY VOLTAGE (V/Hz/PH)	~208-230/60/1
AMPERAGE (A)	13.4
MINIMUM CIRCUIT AMPACITY (A)	20
MAXIMUM FUSE SIZE (A)	20
ELECTRIC & WATER CONSUMPTION Air/Wtr °F (°C)	90/70 (32/21) 70/50 (21/10)
ELECTRIC W (kWH/100 lb)	2150 (4.45) 2050 (3.57)
WATER gal./24HR (gal./100 lb)	139.2 (12) 165 (12)
SHAPE OF ICE	CUBELET -
ICE HARDNESS (%)	87.0
HARVEST RATE (lb/day)	>1200
ICE MAKING SYSTEM	Auger Type
ICE MAKING WATER CONTROL	Float Switch
BIN CONTROL SYSTEM (Primary)	Ultra Sonic Sensor
BIN CONTROL SYSTEM (Secondary)	Mechanical
REFRIGERANT CHARGE g (oz.)	R-448A, 5650 (199.3)
FOAM BLOWING AGENT	HFO 1233zd(E)
DESIGN PRESSURE kPaG (PSIG)	HI-3220 (467) LO-1724 (250)

Performance Data Sheet

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1375	624	1312	595	1343	609
	80/27	1327	602	1229	558	1252	568
	90/32	1312	595	1160	526	1117	507
lbs./day kg./day	100/38	1297	588	1055	479	999	453
APPROXIMATE ELECTRIC CONSUMPTION watts	70/21	2050		2079		2155	
	80/27	2072		2118		2213	
	90/32	2079		2150		2239	
	100/38	2106		2171		2320	
APPROXIMATE WATER CONSUMPTION PER 24 HR. gal./day m ³ /day	70/21	165	0.62	157	0.60	147	0.56
	80/27	159	0.60	148	0.56	138	0.52
	90/32	157	0.60	139	0.53	129	0.49
	100/38	146	0.55	137	0.52	120	0.45
EVAPORATOR OUTLET TEMP °C °F	70/21	-4	24.8	-4	25.3	-3	26.2
	80/27	-4	25.2	-3	26.0	-3	27.0
	90/32	-4	25.3	-3	26.6	-2	27.5
	100/38	-4	25.6	-3	26.6	-2	28.4
HEAD PRESSURE PSIG kg/cm ² G	70/21	200	14.1	207	14.6	223	15.6
	80/27	205	14.4	216	15.2	235	16.5
	90/32	207	14.6	224	15.7	242	17.0
	100/38	212	14.9	228	16.0	258	18.1
SUCTION PRESSURE PSIG kg/cm ² G	70/21	26	1.8	26	1.8	27	1.9
	80/27	26	1.8	27	1.9	27	1.9
	90/32	26	1.8	27	1.9	28	1.9
	100/38	26	1.9	27	1.9	28	2.0
TOTAL HEAT OF REJECTION FROM CONDENSER				11,500 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			
TOTAL HEAT OF REJECTION FROM COMPRESSOR				1,900 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			

9. F-1530MRKZ2-SC

Specification Sheet

AC SUPPLY VOLTAGE (V/Hz/PH)	~208-230/60/1	
AMPERAGE (A)	13.4	
MINIMUM CIRCUIT AMPACITY (A)	20	
MAXIMUM FUSE SIZE (A)	20	
ELECTRIC & WATER CONSUMPTION Air/Wtr °F (°C)	90/70 (32/21)	70/50 (21/10)
ELECTRIC W (kWH/100 lb)	2090 (4.15)	2010 (3.31)
WATER gal./24HR (gal./100 lb)	145.8 (12)	175.2 (12)
SHAPE OF ICE	SOFT CUBELET -	
ICE HARDNESS (%)	80.0	
HARVEST RATE (lb/day)	>1200	
ICE MAKING SYSTEM	Auger Type	
ICE MAKING WATER CONTROL	Float Switch	
BIN CONTROL SYSTEM (Primary)	Ultra Sonic Sensor	
BIN CONTROL SYSTEM (Secondary)	Mechanical	
REFRIGERANT CHARGE g (oz.)	R-448A, 5650 (199.3)	
FOAM BLOWING AGENT	HFO 1233zd(E)	
DESIGN PRESSURE kPaG (PSIG)	HI-3220 (467) LO-1724 (250)	

Performance Data Sheet

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1460	662	1388	630	1428	648
	80/27	1405	637	1294	587	1326	601
	90/32	1388	630	1215	551	1175	533
lbs./day kg./day	100/38	1373	623	1106	502	1042	473
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2010		2033		2107	
	80/27	2028		2064		2161	
	90/32	2033		2090		2179	
watts	100/38	2062		2111		2260	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	175	0.66	167	0.63	156	0.59
	80/27	169	0.64	155	0.59	145	0.55
	90/32	167	0.63	146	0.55	135	0.51
gal./day m³/day	100/38	154	0.58	143	0.54	125	0.47
EVAPORATOR OUTLET TEMP	70/21	-3	26.6	-3	27.1	-2	28.0
	80/27	-3	27.0	-2	27.8	-2	28.8
	90/32	-3	27.1	-2	28.4	-1	29.3
°C °F	100/38	-3	27.4	-2	28.4	-1	30.2
HEAD PRESSURE	70/21	198	13.9	205	14.4	222	15.6
	80/27	204	14.3	215	15.1	235	16.5
	90/32	205	14.4	223	15.7	242	17.0
PSIG kg/cm²G	100/38	211	14.8	227	16.0	259	18.2
SUCTION PRESSURE	70/21	26	1.8	26	1.8	27	1.9
	80/27	26	1.8	27	1.9	27	1.9
	90/32	26	1.8	27	1.9	28	1.9
PSIG kg/cm²G	100/38	26	1.9	27	1.9	28	2.0
TOTAL HEAT OF REJECTION FROM CONDENSER				11,500 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			
TOTAL HEAT OF REJECTION FROM COMPRESSOR				1,900 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]			

10. F-2030MWK2

Specification Sheet

AC SUPPLY VOLTAGE (V/Hz/PH)	~208-230/60/1	
AMPERAGE (A)	14.3	
MINIMUM CIRCUIT AMPACITY (A)	30	
MAXIMUM FUSE SIZE (A)	30	
ELECTRIC & WATER CONSUMPTION Air/Wtr °F (°C)	90/70 (32/21)	70/50 (21/10)
ELECTRIC W (kWH/100 lb)	2550 (3.43)	2500 (2.78)
WATER gal./24HR (gal./100 lb)	213.7 (12)	258.6 (12)
WATER CONDENSER gal./24HR (gal./100 lb)	115 (2046.8)	47 (1022.5)
SHAPE OF ICE	FLAKE -	
ICE HARDNESS (%)	75.5	
HARVEST RATE (lb/day)	>1200	
ICE MAKING SYSTEM	Auger Type	
HARVESTING SYSTEM	Direct Driven Auger	
ICE MAKING WATER CONTROL	Float Switch	
COOLING WATER CONTROL	Automatic Water Regulator	
BIN CONTROL SYSTEM (Primary)	Ultra Sonic Sensor	
BIN CONTROL SYSTEM (Secondary)	Mechanical	
REFRIGERANT CHARGE g (oz.)	R-448A, 850 (30)	
FOAM BLOWING AGENT	HFO 1233zd(E)	
DESIGN PRESSURE kPaG (PSIG)	HI-2945 (427) LO-1724 (250)	

Performance Data Sheet

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	2155	978	2045	928	2094	950
	80/27	2072	940	1901	862	1937	879
	90/32	2045	928	1780	808	1716	778
lbs./day kg./day	100/38	2026	919	1615	733	1537	697
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2500		2515		2589	
	80/27	2511		2534		2639	
	90/32	2515		2550		2644	
watts	100/38	2548		2572		2730	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	1281	4.85	1568	5.94	1828	6.92
	80/27	1500	5.68	1946	7.37	2132	8.07
	90/32	1568	5.94	2260	8.56	2483	9.40
gal./day m ³ /day	100/38	1944	7.36	2313	8.75	2688	10.18
EVAPORATOR OUTLET TEMP	70/21	-16	3.2	-16	3.7	-15	5.3
	80/27	-16	3.6	-15	4.4	-14	6.5
	90/32	-16	3.7	-15	5.0	-14	6.9
°C °F	100/38	-15	4.3	-15	5.0	-13	8.6
HEAD PRESSURE	70/21	230	16.2	232	16.3	239	16.8
	80/27	231	16.3	234	16.5	245	17.2
	90/32	232	16.3	236	16.6	245	17.3
PSIG kg/cm ² G	100/38	235	16.5	238	16.7	254	17.9
SUCTION PRESSURE	70/21	18	1.3	18	1.3	19	1.3
	80/27	18	1.3	19	1.3	19	1.4
	90/32	18	1.3	19	1.3	20	1.4
PSIG kg/cm ² G	100/38	18	1.3	19	1.3	20	1.4
TOTAL HEAT OF REJECTION FROM CONDENSER	16,900 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
TOTAL HEAT OF REJECTION FROM COMPRESSOR	3,100 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						

Data Pending

Data Pending

Data Pending

14. F-2030MLKZ

Specification Sheet

AC SUPPLY VOLTAGE (V/Hz/PH)	~115/60/1	
AMPERAGE (A)	6.8	
MINIMUM CIRCUIT AMPACITY (A)	15	
MAXIMUM FUSE SIZE (A)	15	
ELECTRIC & WATER CONSUMPTION (Wtr/Air)(°C/°F)	32/21 (90/70)	21/10 (70/50)
ELECTRIC W (kWH/100 lbs.)	1140 (1.62)	1070 (1.2)
WATER gal./24HR (gal./100 lbs.)	206 (12)	257.4 (12)
SHAPE OF ICE	Flake	
ICE HARDNESS	Approx. 70%, Ice (32/21 (90/70))	
HARVEST RATE (lbs/day)	<=1200	
APPROXIMATE STORAGE CAPACITY (lbs/kg)	NA	
ICE MAKING SYSTEM	Auger Type	
HARVESTING CONTROL SYSTEM	Direct Drive Auger	
ICE MAKING WATER CONTROL	Float Switch	
BIN CONTROL SYSTEM	Ultrasonic Sensor	
REFRIGERANT CHARGE (g/oz.)	Nitrogen Holding Pressure 15 (PSI)	
CONDENSING UNIT	Required refrigeration capacity for ice maker is 15,000BTU/h at discharge pressure 215 PSIG and set suction pressure to 24 PSIG (165 kPaG) with R-448A refrigerant.	
FOAM BLOWING AGENT	HFO 1233zd(E)	
DESIGN PRESSURE kPa (PSI)	HI- 3220 (467) LO-1724 (250)	

Performance Data Sheet

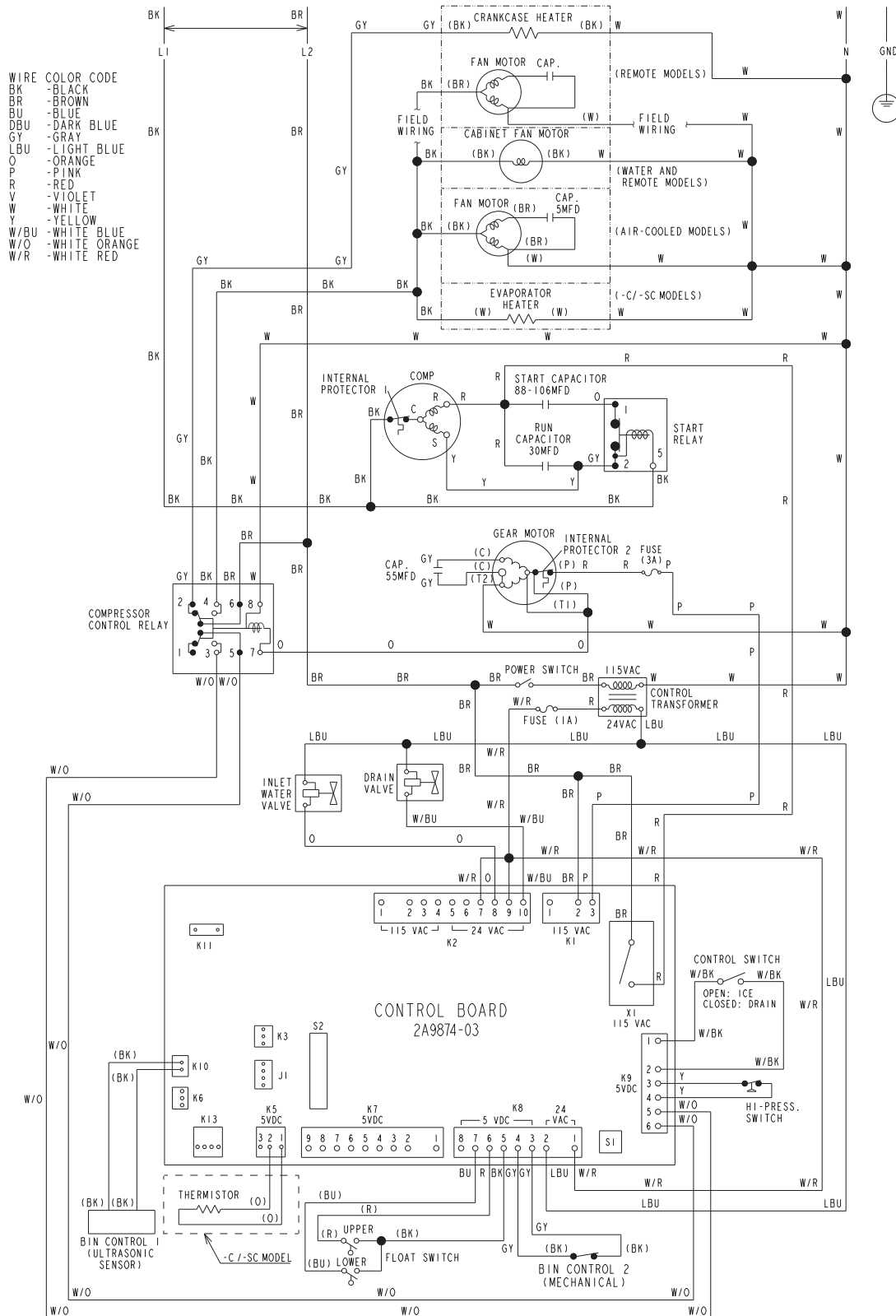
APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	2145	<u>973</u>	2019	<u>916</u>	888	<u>403</u>
	80/27	2049	<u>930</u>	1854	<u>841</u>	802	<u>364</u>
	90/32	2019	<u>916</u>	1716	<u>779</u>	689	<u>312</u>
lbs./day (kg./day)	100/38	1983	<u>900</u>	638	<u>289</u>	604	<u>274</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	1070		1091		1097	
	80/27	1086		1118		1112	
	90/32	1091		1140		1140	
watts	100/38	1085		1140		1140	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	257	<u>0.97</u>	242	<u>0.92</u>	221	<u>0.84</u>
	80/27	246	<u>0.93</u>	222	<u>0.84</u>	201	<u>0.76</u>
	90/32	242	<u>0.92</u>	206	<u>0.78</u>	184	<u>0.70</u>
gal./day (m ³ /day)	100/38	219	<u>0.83</u>	201	<u>0.76</u>	164	<u>0.62</u>
EVAPORATOR OUTLET TEMP. °F (°C)	70/21	12	<u>-11</u>	13	<u>-11</u>	13	<u>-11</u>
	80/27	13	<u>-11</u>	13	<u>-10</u>	13	<u>-10</u>
	90/32	13	<u>-11</u>	14	<u>-10</u>	14	<u>-10</u>
	100/38	13	<u>-11</u>	14	<u>-10</u>	14	<u>-10</u>
HEAD PRESSURE	70/21	148	<u>10.4</u>	161	<u>11.3</u>	176	<u>12.4</u>
	80/27	158	<u>11.1</u>	179	<u>12.6</u>	192	<u>13.5</u>
	90/32	161	<u>11.3</u>	193	<u>13.6</u>	208	<u>14.6</u>
PSIG (kg/cm ² G)	100/38	163	<u>11.5</u>	196	<u>13.8</u>	221	<u>15.5</u>
SUCTION PRESSURE	70/21	25	<u>1.8</u>	26	<u>1.8</u>	27	<u>1.9</u>
	80/27	26	<u>1.8</u>	27	<u>1.9</u>	27	<u>1.9</u>
	90/32	26	<u>1.8</u>	28	<u>2.0</u>	29	<u>2.0</u>
PSIG (kg/cm ² G)	100/38	26	<u>1.8</u>	28	<u>2.0</u>	29	<u>2.0</u>

B. Wiring Diagrams

1. F-1530M_K(Z)2(-C)(-SC)

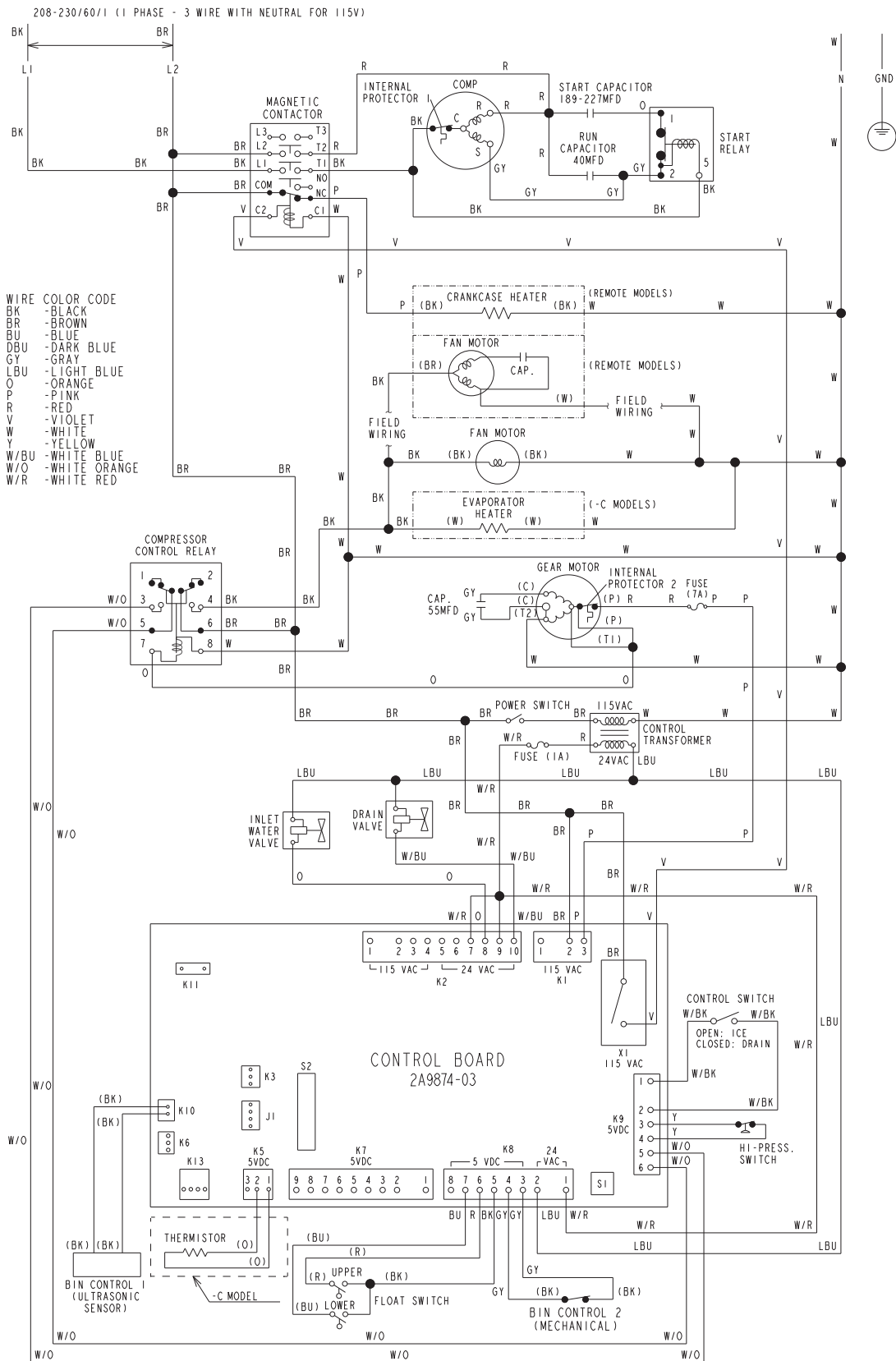
S2 DIP SWITCH SETTING	1	2	3	4	5	6	7	8	9	10
F-1530M_K221-C/-SC	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF

208-230/60/1 (3 WIRE WITH NEUTRAL)



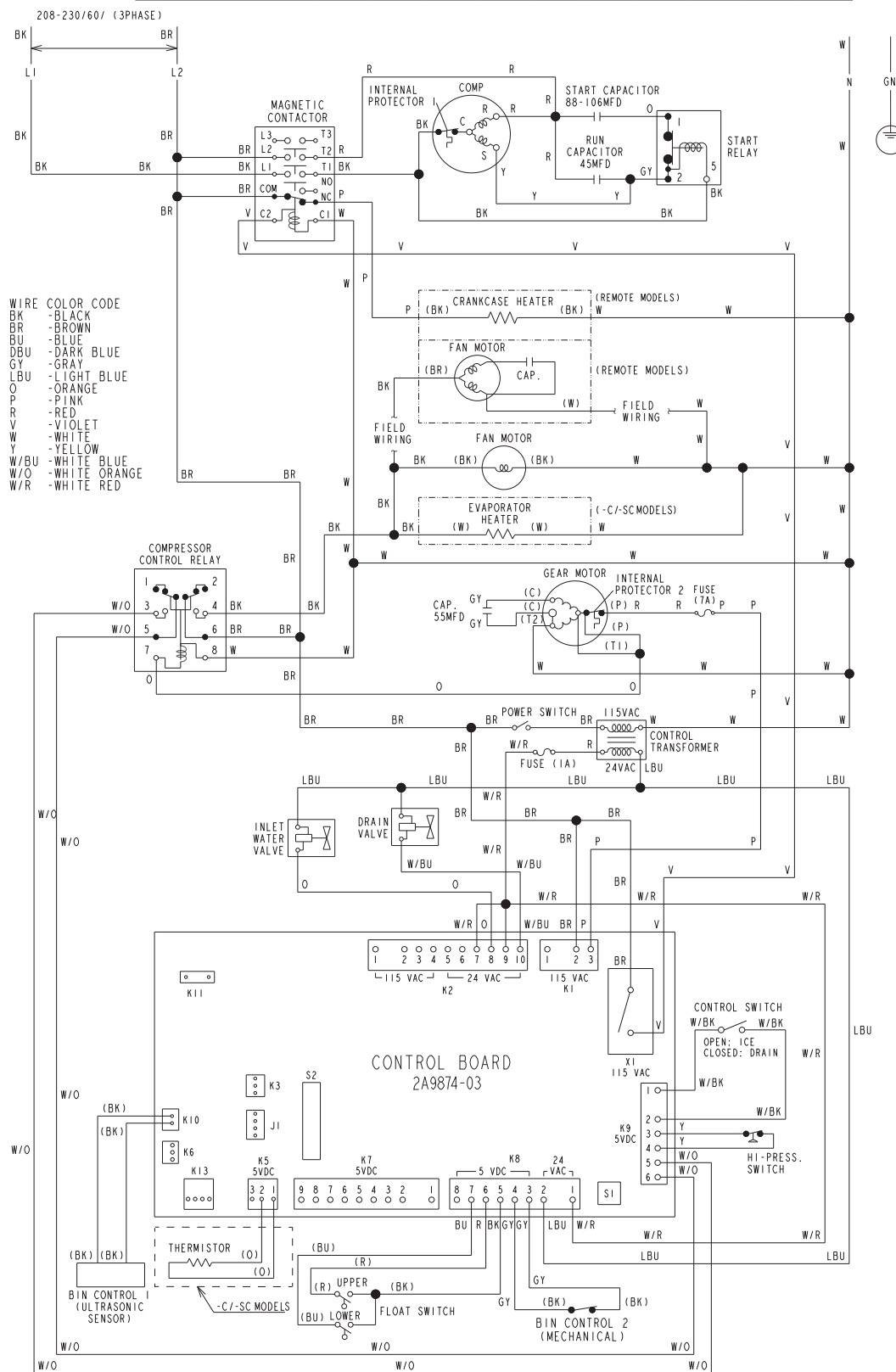
2. F-2030MWK2, F-2030MRKZ2(-C)

S2 DIP SWITCH SETTING	1	2	3	4	5	6	7	8	9	10
F-2030M_K(Z)2/-C	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF



3. F-2030MRKZ3

S2 DIP SWITCH SETTING	1	2	3	4	5	6	7	8	9	10
F-2030MRKZ3	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF



4. F-2030MLKZ

S2 DIP SWITCH SETTING	1	2	3	4	5	6	7	8	9	10
F-2030MLKZ (-C)	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF

CAPACITOR & FUSE TABLE		
MODEL	GM CAP.	FUSE
F-2030	65MFD	7A

