

# Hoshizaki America, Inc.

## Modular Crescent Cuber with "G" Control Board

### Models

KMD-460MAH, MWH

KMD-530MAH, MWH, MRH

KML-250MAH, MWH

KML-35 IMAH, MWH

KML-45 IMAH, MWH

KML-63 IMAH, MWH, MRH

## SERVICE MANUAL



"A Superior Degree  
of Reliability"

[www.hoshizaki.com](http://www.hoshizaki.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.hoshizaki.com](http://www.hoshizaki.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.

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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**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 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 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.

**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 this 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 fuses, 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.
- Move the control 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.
- To reduce the risk of electric shock, do not touch the control switch or service switch with damp hands.
- Do not make any alterations to the unit. Alterations could result in electric shock, injury, fire, or damage to the unit.
- 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.

**⚠ WARNING, continued**

- Children should be properly supervised around this 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.
- Move the icemaker control switch to the "OFF" position and turn off the power supply to the icemaker before servicing the remote condenser unit. Lockout/Tagout to prevent the power supply from being turned back on inadvertently.

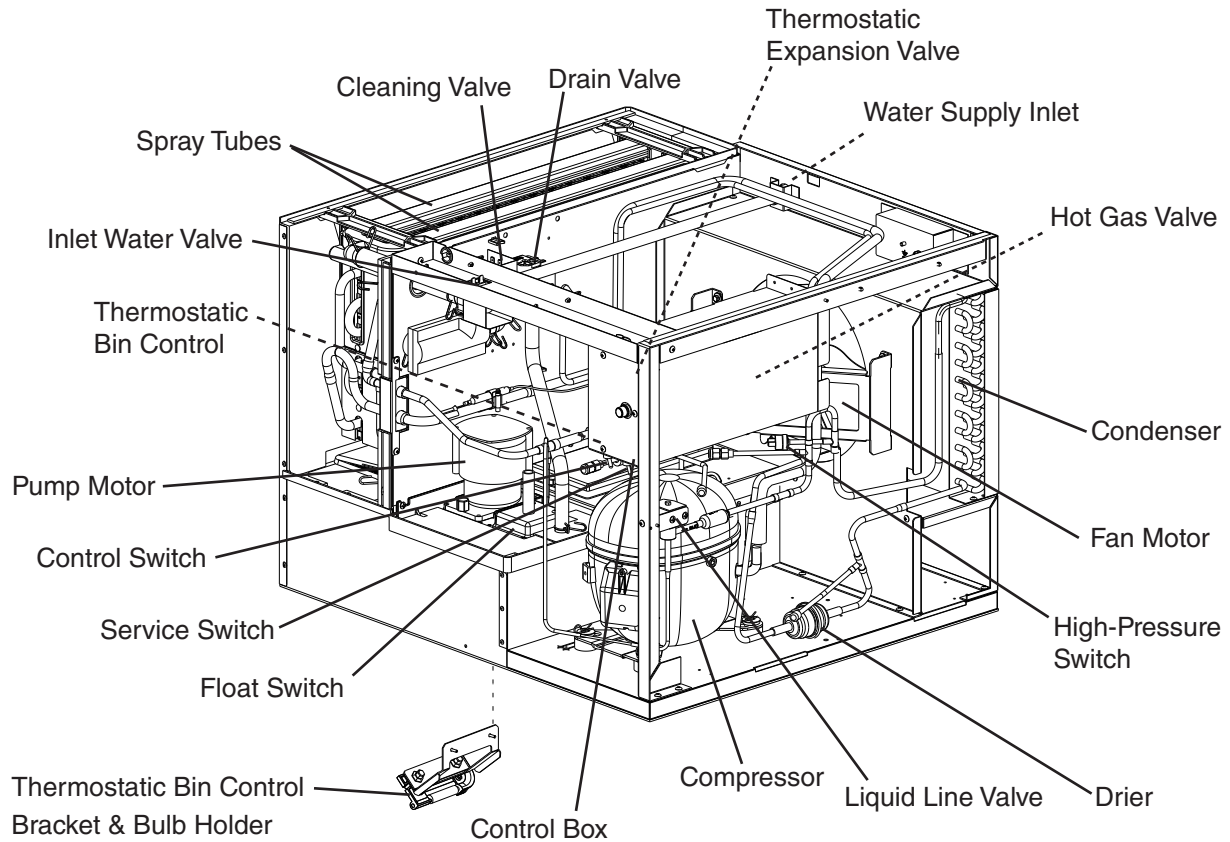
***NOTICE***

- 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 in "VI. Preparing the Appliance for Periods of Non-Use."
- 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.

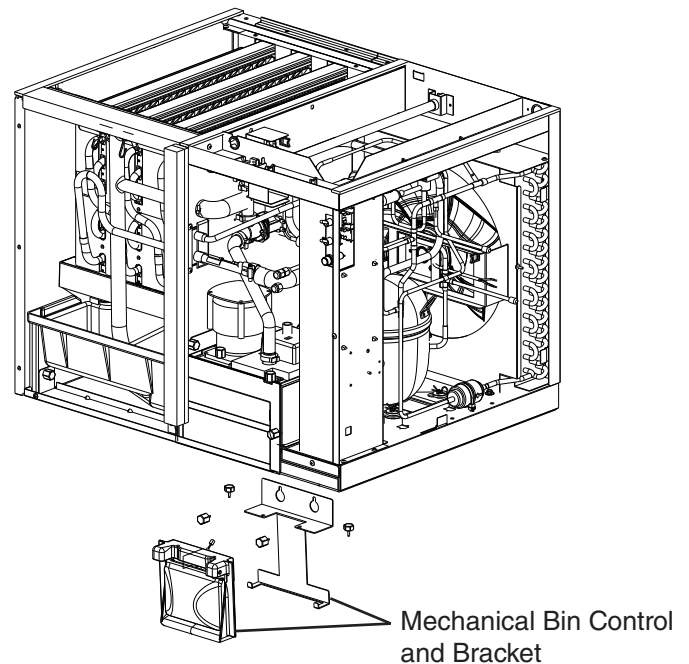
# I. Construction and Water/Refrigeration Circuit Diagram

## A. Construction

### 1. Air-Cooled (MAH)

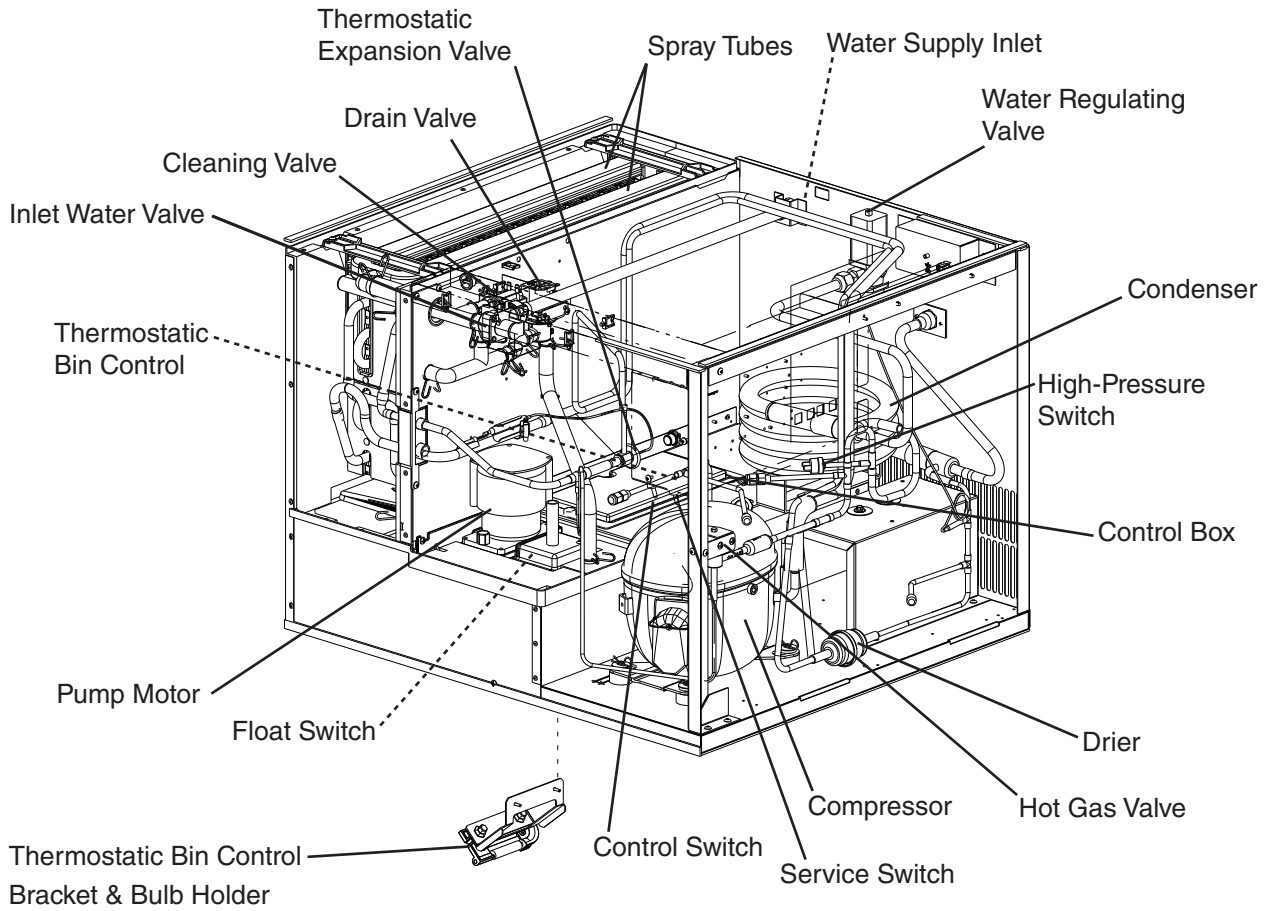


Model Shown: KML-351MAH

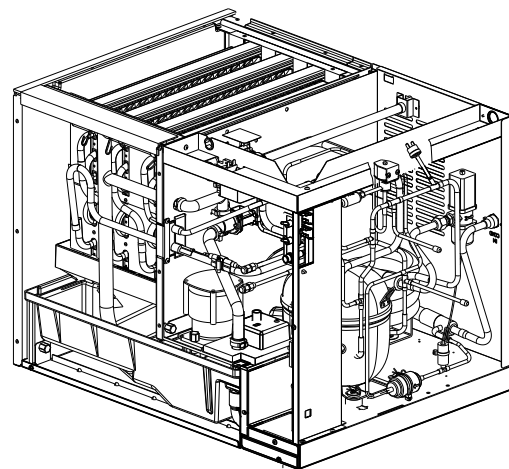


Model Shown: KMD-460MAH

## 2. Water-Cooled (MWH)



**Model Shown: KML-451MAH**

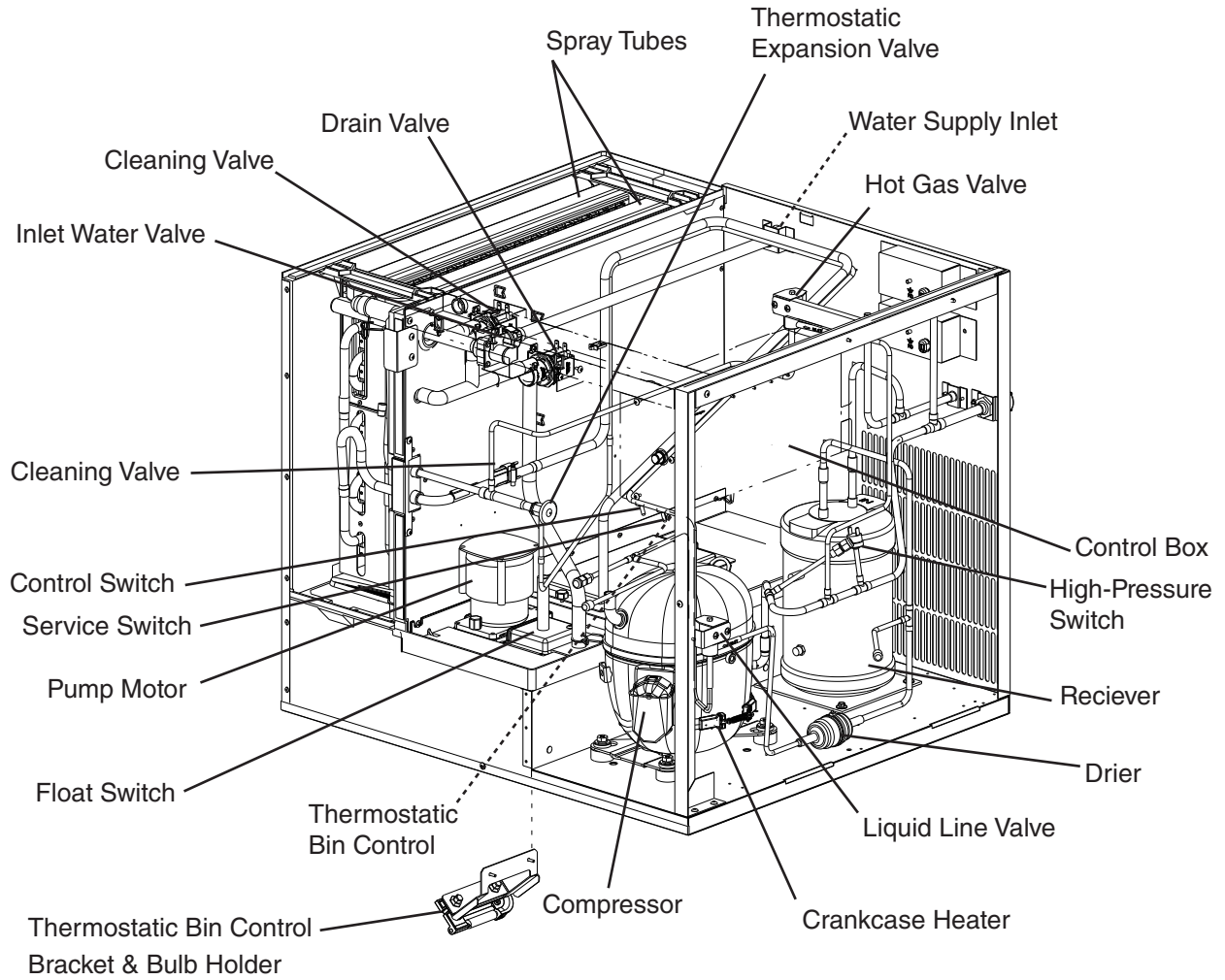


Mechanical Bin Control and Bracket

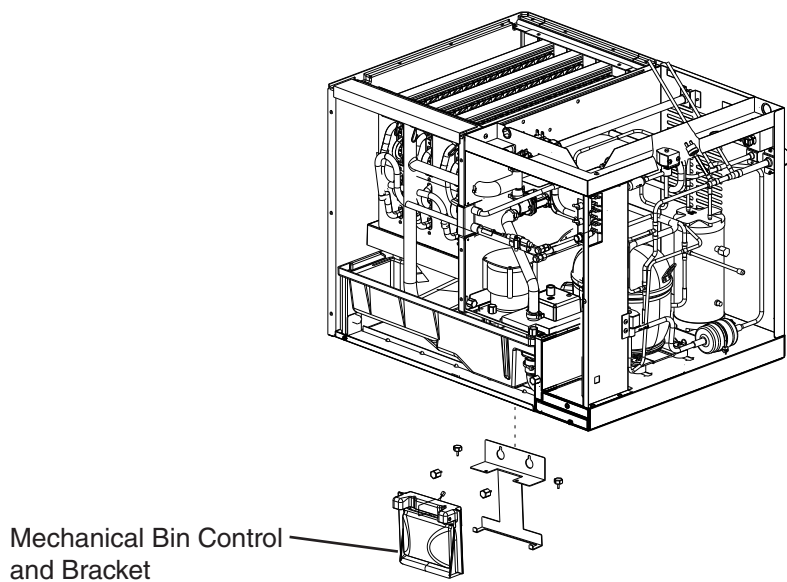
**Model Shown: KMD-460MWH**



### 3. Remote Air-Cooled (MRH)



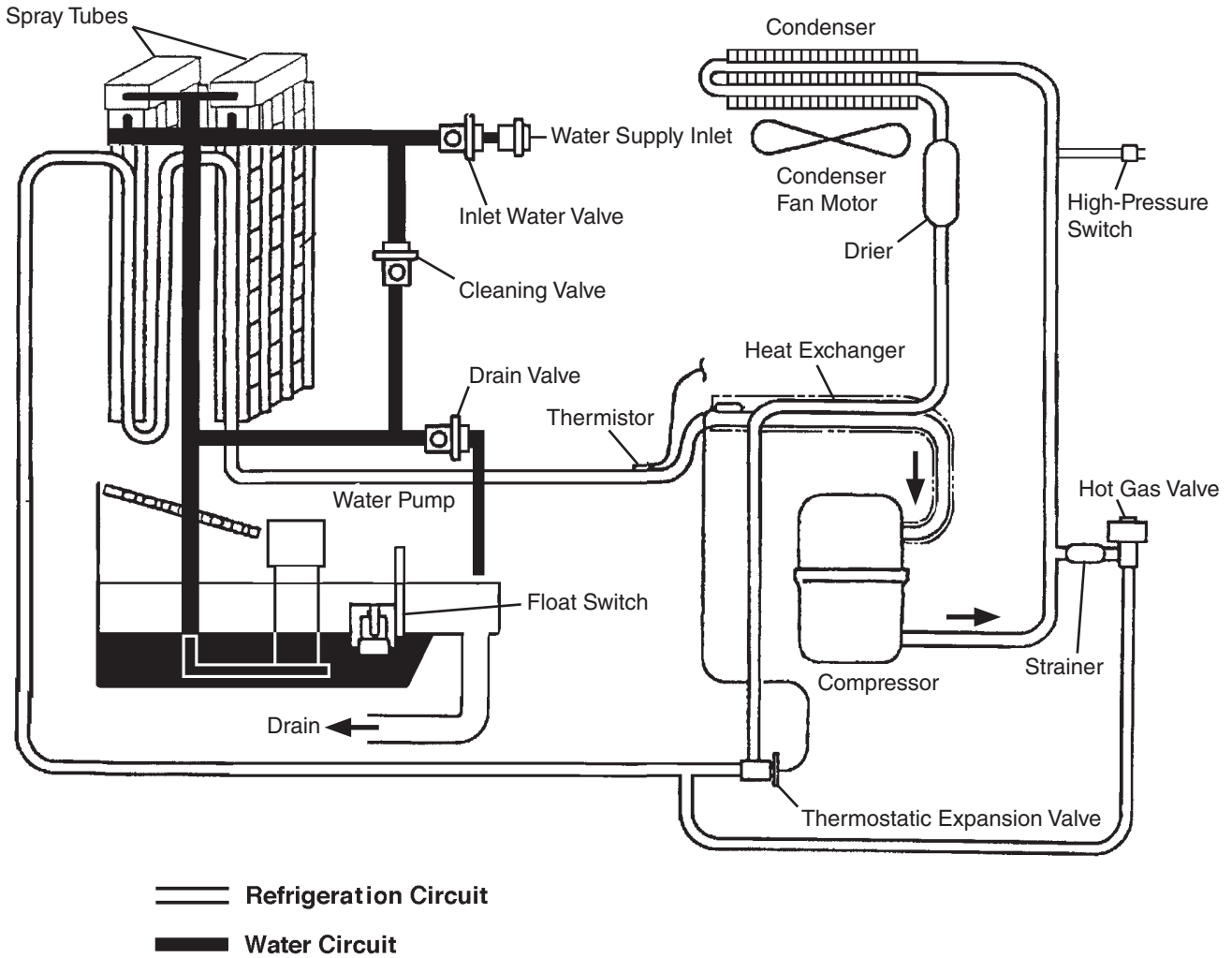
**Model Shown: KML-631MRH**



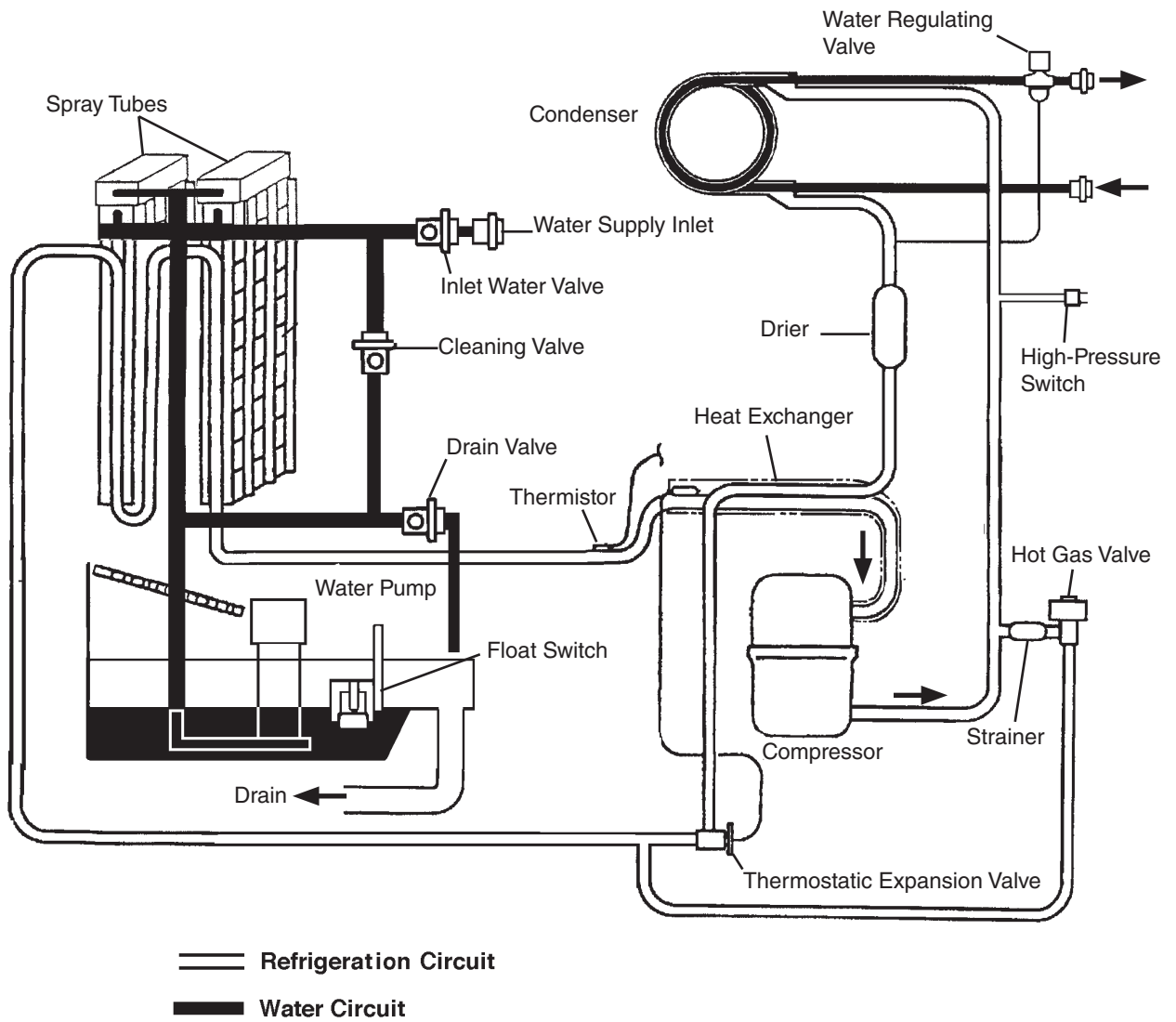
**Model Shown: KMD-530MRH**

# B. Water/Refrigeration Circuit Diagram

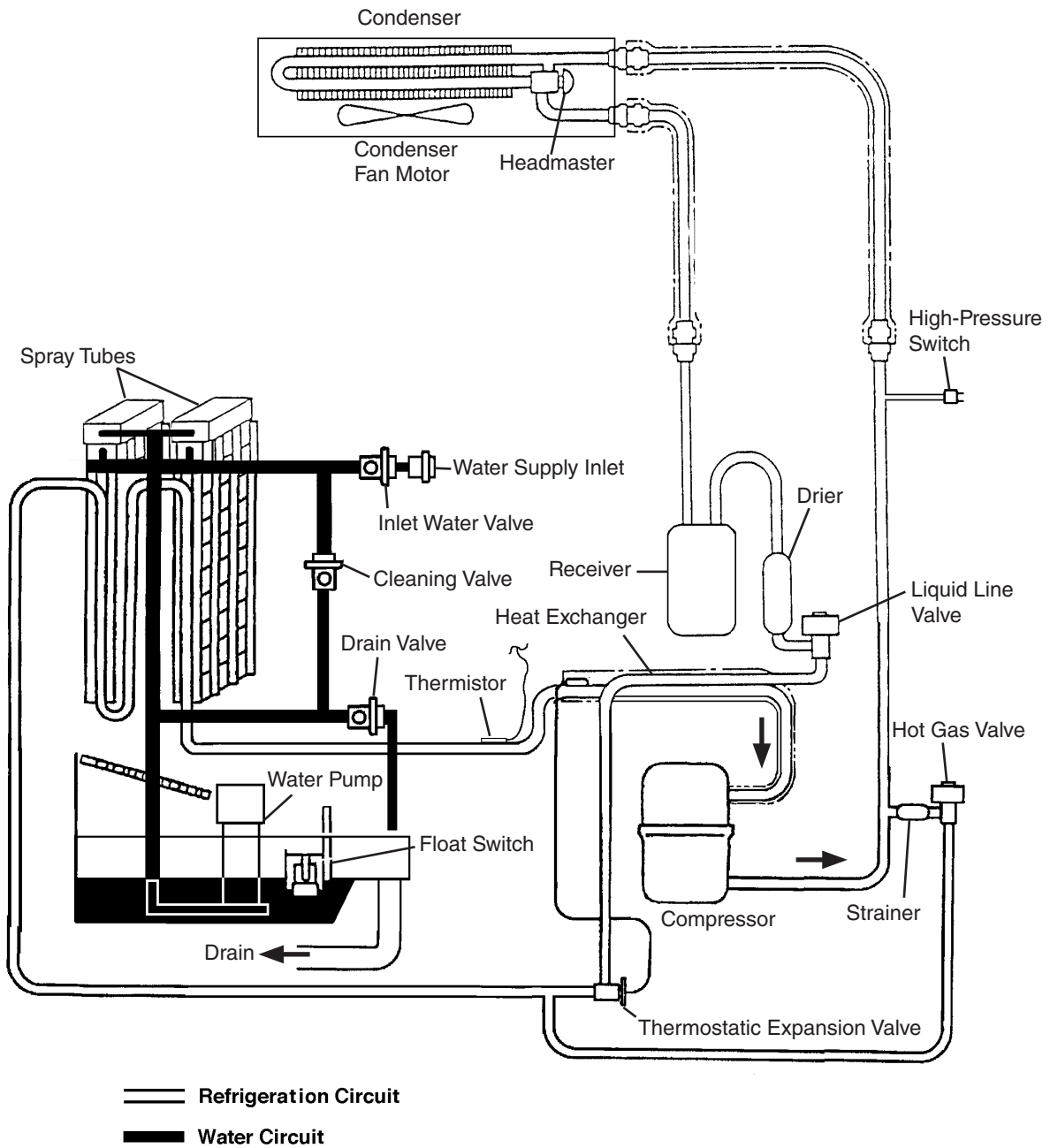
## 1. Air-Cooled Models (MAH)



## 2. Water-Cooled Models (MWH)



### 3. Remote Models (MRH)

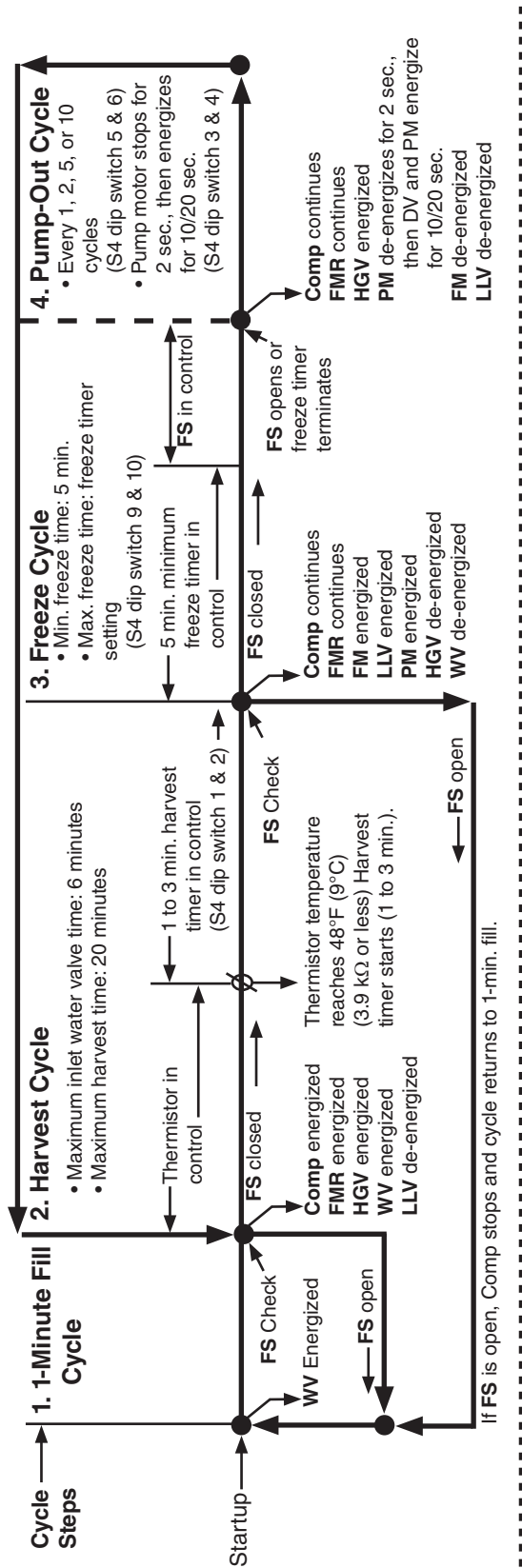


## II. Sequence of Operation and Service Diagnosis

### A. Sequence of Operation Flow Chart

#### 1. "G" Control Board without Harvest Pump Timer Operation

**"G" Control Board without Harvest Pump Timer Operation Flow Chart**



Shutdown and Restart See "II.A.3. Thermostatic and Mechanical Bin Control Shutdown Operation"

**Legend:**

Comp	—compressor
DV	—drain valve
FM	—fan motor
FMR	—fan motor-remote
FS	—float switch
HGV	—hot gas valve
LLV	—liquid line valve
PM	—pump motor
WV	—inlet water valve

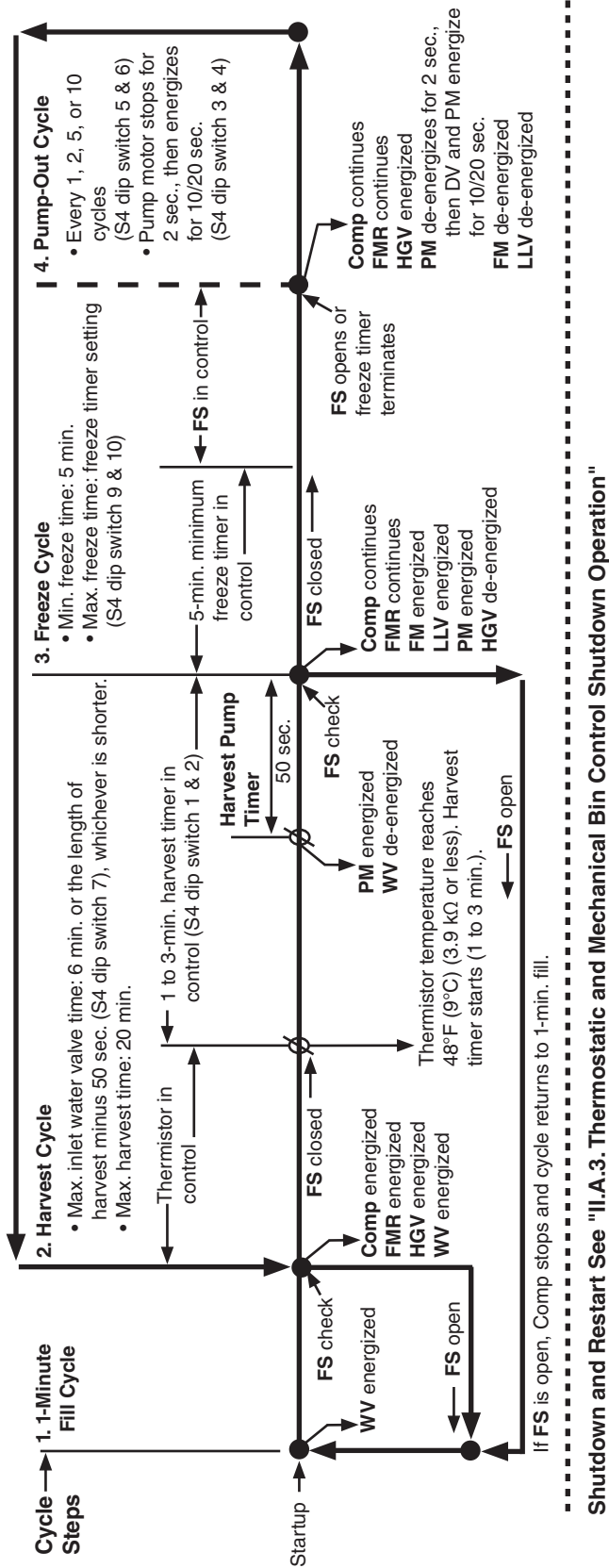
#### Components Energized when the Control Switch is in the "SERVICE" Position

When in the "SERVICE" position, the control switch supplies power to the service switch and the machine is in service mode. The service switch has three positions: "DRAIN," "CIRCULATE" and "WASH." See the information below for details of each function.

DRAIN	Power is supplied to the pump motor and drain valve. This drains the water tank.
CIRCULATE	Power is supplied to the pump motor only. This can be used to circulate cleaner over the outside surface of the evaporator for extended periods of time.
WASH	Power is supplied to the pump motor and wash valve. This is used to circulate cleaner and sanitizer over both the inside and outside surfaces of the evaporator.

## 2. "G" Control Board with Harvest Pump Timer Operation

### "G" Control Board with Harvest Pump Timer Operation Sequence Flow Chart



**Components Energized when the Control Switch is in the "SERVICE" Position**  
 When in the "SERVICE" position, the control switch supplies power to the service switch and the machine is in service mode. The service switch has three positions: "DRAIN," "CIRCULATE" and "WASH." See the information below for details of each function.

DRAIN	Power is supplied to the pump motor and drain valve. This drains the water tank.
CIRCULATE	Power is supplied to the pump motor only. This can be used to circulate cleaner over the outside surface of the evaporator for extended periods of time.
WASH	Power is supplied to the pump motor and wash valve. This is used to circulate cleaner and sanitizer over both the inside and outside surfaces of the evaporator.

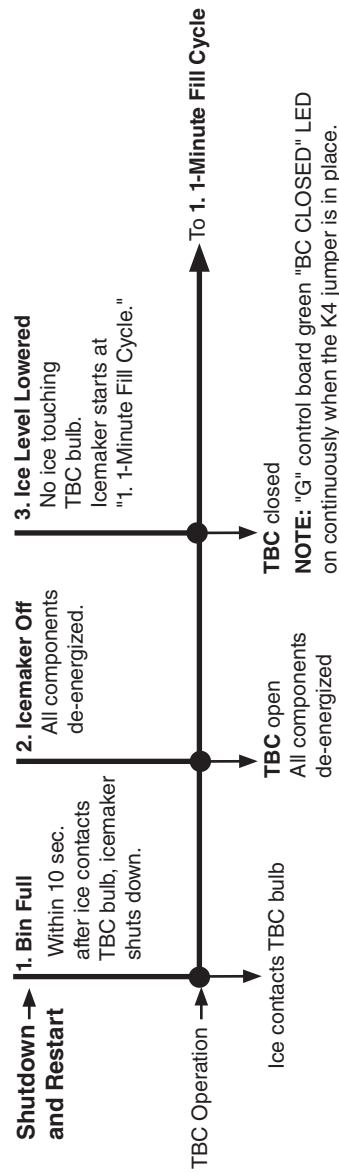
**Legend:**

- Comp—compressor
- DV—drain valve
- FM—fan motor
- FMR—fan motor-remote
- FS—float switch
- HGV—hot gas valve
- LLV—liquid line valve
- PM—pump motor
- WV—inlet water valve

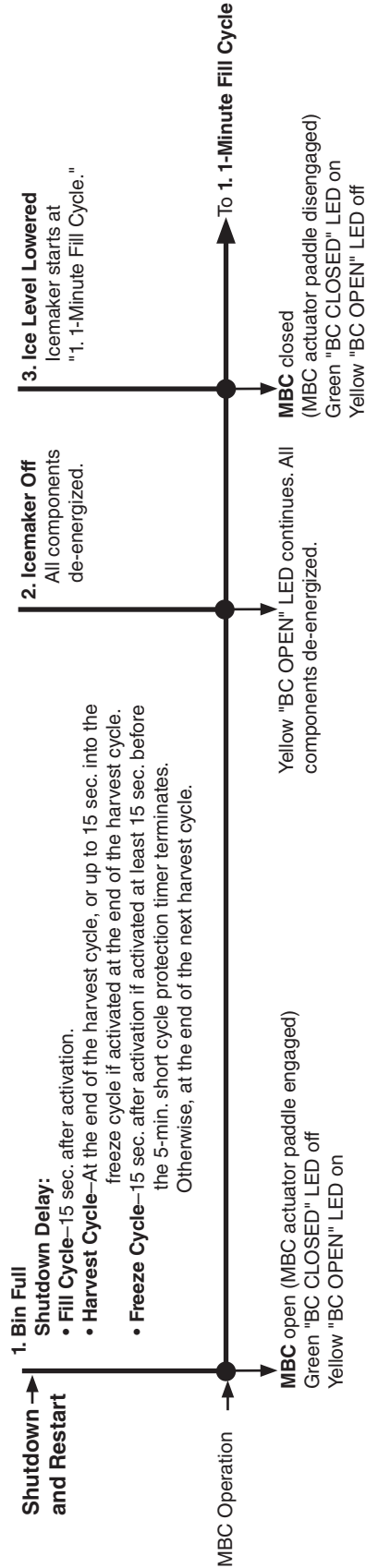
### 3. Thermostatic and Mechanical Bin Control Shutdown Operation

#### Shutdown Operation

**Thermostatic Bin Control Shutdown Sequence Flow Chart**



**Mechanical Bin Control Shutdown Sequence Flow Chart**



**Legend:**  
MBC—mechanical bin control  
TBC—thermostatic bin control

## 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. Control switch in "OFF" position does not de-energize all loads Use extreme caution and exercise safe electrical practices.
- Moving parts (e.g., fan blade) can crush and cut. Keep hands clear.
- Before servicing the appliance, move the control switch to the "OFF" position and turn off the power supply.
- **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 appliance and dispenser unit/ice storage bin are clean after service.

The 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 nameplate, and adequate water supply. Check CB using the steps in "II.C. Control Board Check." Check dip switch settings to assure that S4 dip switch 3, 4, 7, 8, 9, 10 and S5 dip switch 1 through 5 are in the factory default position. S4 dip switch 1, 2, 5, 6 are cleaning adjustments and the settings are flexible. For factory default settings, see "III.C.1. Default Dip Switch Settings."

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

- When checking voltage from the CB K1 connector (10 pin connector), pull CB K1 connector out slightly to allow room for multimeter test leads contact.

- 1) Turn off the power supply, then access the control box. Move the control switch to the "OFF" position. Clear any ice from BC.
- 2) Check that the 115VAC 10A fuse is good.



## 1. "G" Control Board without Harvest Pump Timer Operation Diagnosis

- 3) **Power On:** Turn on the power supply, then move the control switch to the "ICE" position. A 5-sec. delay occurs. CB red "POWER OK" LED and green "BC CLOSED" LED turn on. If yellow "BC OPEN" LED is on (indicating a missing or loose jumper (4A4883G01)), check that the jumper is securely in place. Move ice away from TBC bulb. If yellow "BC OPEN" LED stays on, see "II.D.1. Thermostatic Bin Control (TBC) Check."

**NOTICE! Do not adjust S4 dip switch 7 out of the factory default position. This dip switch must be left in the factory default position or the appliance will not operate correctly.**

Note: CB red "POWER" LED remains on unless the 10.5VAC power supply is interrupted (K2 connector).

- a) **Power On Diagnosis:** If CB red "POWER OK" LED is off, confirm 10A fuse is good. Check for 115VAC at control switch #2 (BR) to neutral (W) then at control switch #3 (P) to neutral (W). If 115VAC is present on #2 (BR) and not on #3 (P), replace control switch. If 115VAC is present on control switch #3 (P), check for 115VAC at HPS (P) to neutral (W) then HPS (BK) to neutral (W). If 115VAC is present at HPS (P) and not at HPS (BK), HPS is open. See HPS Diagnosis below. If 115VAC is present at HPS (BK), check for 10.5VAC at CB K2 #1 (R) to CB K2 #2 (R). If 10.5VAC is not present, check CT continuity. If open replace CT.
- b) **HPS Diagnosis:** Check that the condenser coil is not clogged or restricted. Let refrigeration circuit pressures equalize. If HPS does not reset and pressures are equalized, replace HPS. If pressures are not equalized, reclaim refrigerant and diagnose refrigeration circuit restriction. Check that there are no restrictions in the refrigeration circuit.
- Harvest Cycle: HGV, strainer, or check valve.  
Freeze Cycle: FM, FMR, TXV, WRV, HM, LLV, strainer, check valve, drier, and damaged line set or fitting. On water-cooled models, confirm WRV opens in freeze cycle.

Confirm that the location meets installation requirements:

- The appliance is not intended for outdoor use. Normal operating ambient temperature should be within 45°F to 100°F (7°C to 38°C).
- Allow 6" (15 cm) clearance at rear, sides, and top for proper air circulation and ease of maintenance and/or service should they be required.
- The appliance should not be located in a corrosive environment.

4) **1-Minute Fill Cycle – LED 4 is on.** WV energizes. After 1 min., CB checks for a closed FS. If FS is closed, harvest cycle begins. If harvest cycle begins (Comp, HGV, and FMR energize), continue to step 5. If FS is open, WV remains energized through additional 1-min. fill cycles until water enters the water tank and FS closes (low water safety protection during initial start up and at the end of each harvest).

**Diagnosis:** Check that water enters the water tank. If not, check that the water supply line shut-off valve is open and screens or external filters are clear. Check for 115VAC at CB K1 #6 (O) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present, and WV does not energize, check for 115VAC at WV. If 115VAC is present, check coil continuity. If open, replace WV. If the water tank fills, but the appliance fails to start harvest (Comp energized), check for open FS. See "II.E. Float Switch Check and Cleaning." If FS is closed and CB fails to start the harvest cycle after 1 min., replace CB.

5) **Initial Harvest Cycle – LEDs 1, 4, and 2 are on.** WV continues. Comp, FMR, and HGV energize. CB monitors the warming of the evaporator via the thermistor located on the suction line. When the thermistor reaches 48°F (9°C), CB reads 3.9 kΩ from the thermistor and turns harvest termination over to the harvest timer (S4 dip switch 1 & 2). The harvest timer has settings of 60, 90, 120, and 180 sec. The pump-out timer (S4 dip switch 3 & 4) acts in place of the harvest timer during cycles with a pump-out (S4 dip switch 5 & 6). WV remains energized during harvest for a maximum of 6 min. or the length of harvest, whichever is shorter.

a) **Comp Diagnosis:** Check that evaporator is warming. If not, confirm that Comp energizes. If not, check for 115VAC at CB K1 #1 or #9 (V) to neutral (W). If 115VAC is not present, check for 115VAC at CB K1 #7 or #10 (BR) to neutral (W). If 115VAC is present at #7 or #10 (BR) and not at #1 or #9 (V), replace CB. If 115VAC is present, check for 115VAC at CR or MC solenoid. If 115VAC is present, confirm contacts are closed. If not, replace CR or MC. If CR or MC contacts are closed, check Comp external protector, Comp start and run capacitors, Comp start relay, and Comp motor winding.

b) **HGV Diagnosis:** If Comp is energized and evaporator is not warming, check that HGV energizes and opens. Check for 115VAC at CB K1 #2 (P) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present, check for 115VAC at HGV coil and check HGV coil continuity. Replace as needed.

c) **LLV Diagnosis:** Confirm that LLV is de-energized and closed (not bypassing). If energized, replace CB. If de-energized and bypassing, replace LLV.

d) **WRV Diagnosis:** Confirm WRV is not leaking by.

e) **Initial Harvest Cycle Termination Diagnosis:** When the thermistor reaches 48°F (9°C), CB reads 3.9 kΩ from the thermistor and turns harvest termination over to the harvest timer (S4 dip switch 1 & 2). Check discharge line temperature. For a thermistor check, see "II.F. Thermistor Check." If 1-min. fill cycle starts after harvest timer terminates, check that FS is clean and operating properly, see "II.E. Float Switch Check and Cleaning." If FS is closed, CB proceeds to the next cycle. If not, replace CB.

Note: The minimum total time allowed by CB for a complete harvest cycle is 2 min.  
Maximum harvest time allowed is 20 min.

**NOTICE! On models without harvest pump timer relays, S4 dip switch 7 must remain off. Otherwise, WV de-energizes the last 50 seconds of harvest.**

- 6) **Freeze Cycle – LED 1 is on.** Comp and FMR continue. PM, FM, and LLV energize. WV and HGV de-energize. Appliance is held in freeze by a 5-min. short cycle protection timer. After 5-min. timer terminates and FS opens, freeze cycle terminates.
- a) **Freeze Cycle Diagnosis:** Confirm Comp and FMR continue. Confirm that PM, FM, and LLV energize. Confirm WRV opens. Next, confirm WV and HGV de-energize. During the first 5 min. of freeze, confirm evaporator is cooling. If not, confirm WV de-energized (not leaking by), HGV de-energized (not bypassing), LLV and FM energize, TXV and HM operate correctly, WRV opens, Comp is efficient, and refrigerant charge is correct. See "VIII.A. Specification and Performance Data Sheets."
- b) **Comp and FMR Diagnosis:** If Comp and FMR de-energize once freeze begins, check that appliance has not shut off on HPS ("POWER OK" LED off). If so, check "3)b) HPS Diagnosis." If "POWER OK" LED is on, check for 115VAC at CB K1 #1 (V) or #9 (V) to neutral (W). If 115VAC is not present and LED 1 is on, replace CB. If 115VAC is present, check for 115VAC at CR or MC coil. If 115VAC is present, check CR or MC coil and contact continuity. Replace as needed. If CR or MC is ok, check Comp external overload, start relay, and start and run capacitors. Next, check Comp motor winding continuity. If Comp is energized but evaporator is not cooling, check for an inefficient Comp. See "VIII.A. Specification and Performance Data Sheets." If Comp is energized but FMR is not, check for 115VAC at the FMR junction box. If 115VAC is not present, check icemaker wiring connections. If 115VAC is present, check for voltage at condenser unit. If 115VAC is not present, check field wiring connections. If 115VAC is present, check FMR capacitor, motor winding, and fan blade for binding.
- c) **WV and HGV Diagnosis:** If WV is energized, check for 115VAC at CB K1 #6 (O) to neutral (W). If 115VAC is present after PM energizes, replace CB. If 115VAC is not present, replace WV (bypassing). If HGV did not de-energize, check for 115VAC at CB K1 #2 (P) to neutral (W). If 115VAC is present after PM energizes, replace CB. If 115VAC is not present, replace HGV (bypassing).

- d) **PM Diagnosis:** Confirm water is flowing over evaporator from PM and not WV. If PM de-energizes once freeze begins, check for 115VAC at CB K1 #4 (R) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present and PM is de-energized, check for 115VAC at control switch #5 (Y) to neutral (W). If 115VAC is present at CB K1 #4 (R) and not at control switch #5 (Y), check control switch continuity between #5 (Y) and #6 (R). Replace as needed. If 115VAC is present at control switch #5 (Y) to neutral (W), check PM capacitor and motor winding continuity.
- e) **FM and LLV Diagnosis:** If FM or LLV does not energize, check for 115VAC at CB K1 #3 (BK) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present: For FM, check capacitor, motor winding, and blade for binding. For LLV, check coil voltage and continuity.
- f) **Refrigerant Pressures, HM, and TXV Diagnosis:** If evaporator is still not cooling, check refrigerant pressures. See "VIII.A. Specification and Performance Data Sheets." Next, check HM operation. If refrigeration pressures are above HM setpoint and HM is bypassing, replace HM. Check TXV for proper operation. Remove TXV bulb and hold it in your hand, refrigerant low-side pressure should rise, place TXV bulb in ice water, refrigerant low-side pressure should drop. A 10 to 15 pound pressure swing between warm and cold conditions indicate a good TXV. If a 10 to 15 pound swing is not present, replace TXV.
- g) **WRV Diagnosis:** WRV is factory set and generally no adjustment is required. If WRV fails to open in freeze, check for proper refrigerant pressures. See "VIII.A. Specification and Performance Data Sheets." If refrigerant pressures are correct and WRV does not open, adjust or replace as needed. See "IV.C. Water Regulating Valve Adjustment (water-cooled model)."
- h) **Freeze Termination Diagnosis:** After 5 min. in freeze, disconnect CB K5 FS connector. 15 sec. later appliance should switch out of the freeze cycle (15 second delay after FS opens before terminating the freeze cycle). If appliance remains in freeze longer than 15 sec. after FS removed, replace CB. If appliance switches with FS removed but would previously not switch out of freeze with FS connected (long freeze - 3 beep alarm), see "II.E. Float Switch Check and Cleaning."

Note: Normal freeze cycle will last 20 to 40 min. depending on model and conditions. Cycle times and pressures should follow performance data provided in this manual. See "VIII.A. Specification and Performance Data Sheets."

- i) **Short Freeze Cycle Diagnosis:** Confirm water tank fills and overflows during 1 min. fill and harvest cycles. If not, check water supply filters, shut-off valve, WV screen. If water tank empties before 5 min. timer terminates and freeze cycle is short, check that DV is not leaking by or energized (water flowing down the potable drain). If DV is leaking by, clean DV, replace as needed. If DV is energized during the freeze cycle, replace CB. If water tank is full, see "II.E. Float Switch Check and Cleaning" for erratic operating FS.

- 7) **Pump-Out Cycle – LEDs 1, 3, and 2 are on (10/20 second pump-out).** Timing of the first pump-out is dependent on CB. The first pump-out is determined by S4 dip switch 5 & 6. See the table below.

"G" Control Board Settings		1st Pump-Out	
S4 Dip Switch Setting		Pump-Out Frequency	"G" Control Board
No. 5	No. 6		
OFF	OFF	Every cycle	After 2nd freeze cycle
ON	OFF	Every 2 cycles	After 3rd freeze cycle
OFF	ON	Every 5 cycles	After 6th freeze cycle
ON	ON	Every 10 cycles	After 11th freeze cycle

Comp and FMR continue, HGV energizes, LLV and FM de-energize. If S4 dip switch 3 & 4 are set to 3 off and 4 on, LED 4 turns on and WV energizes. PM stops for 2 sec., then PM and DV energize for 10/20 sec. depending on pump-out timer (S4 dip switch 3 & 4) setting. When the pump-out timer terminates, pump-out is complete. The pump-out frequency control (S4 dip switch 5 & 6) is factory set, and generally no adjustment is required. However, the pump-out frequency control can be set to have a pump-out occur every cycle, or every 2, 5, or 10 cycles. For details, see "III.C.4. Pump-Out Frequency Control (S4 dip switch 5 & 6)."

**Pump-Out Diagnosis:** In the freeze cycle before pump-out (see table above), after 5 min. of freeze disconnect CB black K5 connector (FS connector) . Check that PM stops and re-starts and that DV energizes and water is flowing down the drain through DV. If PM does not stop and re-start and DV does not energize, check that CB LEDs 1, 3, and 2 are on. If not, replace CB. If LEDs 1, 3, and 2 are on and PM and DV do not energize, check for 115VAC at CB K1 #5 (DBU) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present, check for 115VAC at X10 relay #8 (DBU) to neutral (W). If 115VAC is present at X10 relay #8 (DBU) to neutral (W):

**PM:** Check for 115VAC at X10 relay #6 (BR) and X10 relay #4 (Y) to neutral (W). If 115VAC is present at X10 relay #6 (BR) and not at X10 relay #4 (Y), replace X10 relay. If 115VAC is present at X10 relay #4 (Y), check PM capacitor, motor winding, and impeller for binding.

**DV:** Check for 115VAC from X10 relay #5 (DBU) and X10 relay #3 (GY) to neutral (W). If 115VAC is present at X10 relay #5 (DBU) and not at X10 relay #3 (GY), replace X10 relay. If 115VAC is present at X10 relay #3 (GY), check DV solenoid, replace as needed. Next, confirm that the drain line is not clogged.

Confirm FM and LLV de-energize. If FM or LLV are energized with LEDs 1, 3, and 2 on, replace CB.

- 8) **Normal Harvest Cycle** – Same as the initial harvest cycle. Return to step 5 above. Note: Appliance continues to cycle until TBC is satisfied or power is turned off. The appliance always restarts at the 1-min. fill cycle.

## 9) Shutdown

### a) **Thermostatic Bin Control (TBC):**

When the appliance is running, hold ice in contact with the thermostatic bulb. BC switch opens within 10 sec., shutting down the appliance. TBC is factory set, and generally no adjustment is required. However, adjustment may be needed in some conditions, particularly at higher altitude locations.

**Diagnosis:** See "II.D.1. Thermostatic Bin Control Check." CB red K4 connector must have the jumper in place. When the jumper is in place, the green "BC CLOSED" LED remains on. If the jumper is not in place, yellow "BC OPEN" LED turns on and the icemaker turns off and remains off until the jumper is replaced in its original position. **IMPORTANT! CB red K4 connector jumper (4A4883G01) must be in place.**

Legend: **BC**—bin control; **CB**—control board; **Comp**—compressor; **CR**—compressor relay; **DV**—drain valve; **FM**—fan motor; **FMR**—fan motor-remote; **FS**—float switch; **HGV**—hot gas valve; **HM**—headmaster (C.P.R.); **HPS**—high-pressure switch; **LLV**—liquid line valve; **MC**—magnetic contactor; **PM**—pump motor; **TBC**—thermostatic bin control; **TXV**—thermostatic expansion valve; **WRV**—water regulating valve; **WV**—inlet water valve

## 2. "G" Control Board with Harvest Pump Timer Operation Diagnosis

- 3) **Power On:** Turn on the power supply, then move the control switch to the "ICE" position. A 5-sec. delay occurs. CB red "POWER OK" LED and green "BC CLOSED" LED turn on. If yellow "BC OPEN" LED is on (indicating a full bin):

**KML-351MAH, KML-631M\_H:** If yellow "BC OPEN" LED is on (indicating a missing or loose jumper (4A4883G01)), check that the jumper is securely in place. Move ice away from TBC bulb. If yellow "BC OPEN" LED stays on, see "II.D.1. Thermostatic Bin Control (TBC) Check."

**KMD-460M\_H, KMD-530M\_H:** Check MBC. Move ice away from MBC actuator paddle. If yellow "BC OPEN" LED stays on, see "II.D.2. Mechanical Bin Control (MBC) Check and Cleaning."

**NOTICE! Do not adjust S4 dip switch 7 out of the factory default position. This dip switch must be left in the factory default position or the appliance will not operate correctly.**

Note: CB red "POWER OK" LED remains on unless the 10.5VAC power supply is interrupted (K2 connector).

- a) **Power On Diagnosis:** If CB red "POWER OK" LED is off, confirm 10A fuse is good. Check for 115VAC at control switch #2 (BR or BK) to neutral (W) then at control switch #3 (P) to neutral (W). If 115VAC is present on #2 (BR or BK) and not on #3 (P), replace control switch. If 115VAC is present on control switch #3 (P), check for 115VAC at HPS (P) to neutral (W) then HPS (BK) to neutral (W). If 115VAC is present at HPS (P) and not at HPS (BK), HPS is open. See HPS Diagnosis below. If 115VAC is present at HPS (BK), check for 10.5VAC at CB K2 #1 (R) to CB K2 #2 (R). If 10.5VAC is not present, check CT continuity. If open, replace CT.
- b) **HPS Diagnosis:** Check that the condenser coil is not clogged or restricted. Let refrigeration circuit pressures equalize. If HPS does not reset and pressures are equalized, replace HPS. If pressures are not equalized, reclaim refrigerant and diagnose refrigeration circuit restriction. Check that there are no restrictions in the refrigeration circuit.  
Harvest Cycle: HGV, strainer, or check valve.  
Freeze Cycle: FM, FMR, TXV, WRV, HM, LLV, strainer, check valve, drier, and damaged line set or fitting. On water-cooled models, confirm WRV opens in freeze cycle.

Confirm that the location meets installation requirements:

- The appliance is not intended for outdoor use. Normal operating ambient temperature should be within 45°F to 100°F (7°C to 38°C).
- Allow 6" (15 cm) clearance at rear, sides, and top. KMD-460/530MAH require 12" (30 cm) clearance at right side.
- The appliance should not be located in a corrosive environment.

- 4) **1-Min. Fill Cycle – LED 4 is on.** WV and X11 relay energize. After 1 min., CB checks for a closed FS. If FS is closed, the harvest cycle begins (X10, Comp, HGV, FMR energize), Continue to step 5a. If FS is open, WV remains energized through additional 1-min. fill cycles until water enters the water tank and FS closes (low water safety protection during initial start up and at the end of each harvest). **Diagnosis:** Check that water enters the water tank. If not, check that the water supply line shut-off valve is open and screens or external filters are clear. Check for 115VAC at CB K1 #6 (O) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present, and WV does not energize, check for 115VAC at WV. If 115VAC is present, check coil continuity. If open, replace WV. If the water tank fills, but the appliance fails to start harvest (Comp energized), check for open FS. See "II.E. Float Switch Check and Cleaning." If FS is closed and CB fails to start the harvest cycle after 1 min., replace CB.
- 5a) **Initial Harvest Cycle – LEDs 1, 4, and 2 are on.** WV and X11 relay continue. Comp, FMR, HGV, and X10 relay energize. CB monitors the warming of the evaporator via the thermistor located on the suction line. When the thermistor reaches 48°F (9°C), CB reads 3.9 kΩ from the thermistor and turns harvest termination over to the harvest timer (S4 dip switch 1 & 2). The harvest timer has settings of 60, 90, 120, and 180 sec. The pump-out timer (S4 dip switch 3 & 4) acts in place of the harvest timer during cycles with a pump-out (S4 dip switch 5 & 6). WV and X11 relay are energized during harvest for a maximum of 6 min. or the length of harvest minus 50 sec., whichever is shorter. 50 sec. before harvest terminates, PM energizes. See step 5b below.
- a) **Comp Diagnosis:** Check that evaporator is warming. If not, confirm that Comp energizes. If not, check for 115VAC at CB K1 #1 or #9 (V) to neutral (W). If 115VAC is not present, check for 115VAC at CB K1 #7 or #10 (BR or BK) to neutral (W). If 115VAC is present at #7 or #10 (BR or BK) and not at #1 or #9 (V), replace CB. If 115VAC is present, check for 115VAC at CR solenoid. If 115VAC is present, confirm contacts are closed. If not, replace CR. If CR contacts are closed, check Comp external overload, Comp start and run capacitors, Comp start relay, and Comp motor winding.
- b) **HGV Diagnosis:** If Comp is energized and evaporator is not warming, check that HGV energizes and opens. Check for 115VAC at CB K1 #2 (P) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present, check for 115VAC at HGV coil and check HGV coil continuity. Replace as needed.
- c) **LLV Diagnosis:** Confirm that LLV is de-energized and closed (not bypassing). If energized, replace CB. If de-energized and bypassing, replace LLV.
- d) **WRV Diagnosis:** Confirm WRV is not leaking by.



5b) **Harvest Pump Timer – LEDs 1, 3, and 2 are on.** When the thermistor reaches 48°F (9°C), CB reads 3.9 kΩ from the thermistor and turns harvest termination over to the harvest timer (S4 dip switch 1 & 2). 50 sec. before the harvest timer terminates, LED turns on and PM energizes. Comp, FMR, HGV, and X10 relay continue. LED 4 turns off, WV and X11 relay de-energize.

**Diagnosis:** Place a thermometer on the suction line next to the thermistor. Has it warmed to 48°F (9°C) or warmer? Confirm thermistor status. See "II.F. Thermistor Check." If the thermistor reading is in proper range, dip switch 7 is on, and WV continues, check for 115VAC at CB K1 #6 (O). If 115VAC is present, and LED 4 is off, replace CB. If LED 3 is on and PM is not energized, check for 115VAC at CB K1 #5 (DBU). If 115VAC is not present, replace CB. If 115VAC is present and PM is not energized, check for 115VAC at X10 relay terminal #8 (Y) to neutral (W). If 115VAC is not present, check for 115VAC at X10 relay terminal #4 (P) and X10 relay terminal #6 (Y) to neutral (W). If 115VAC is present at terminal #4 (P) and not at terminal #6 (Y), replace X10 relay. If 115VAC is present on X10 relay terminal #8 (Y) and PM is not energized, check for 115VAC at X10 relay terminal #3 (R) and X10 relay terminal #5 (DBU) to neutral (W). If 115VAC is present at X10 relay terminal #5 (DBU) and not at X10 relay terminal #3 (R), replace X10 relay. If 115VAC is present at X10 relay terminal #3 (R), check control switch contact continuity between control switch terminals #6 (R) and control switch terminal #5 (Y). If contacts are open, replace control switch. If contacts are closed and 115VAC is present between control switch terminal #5 (Y) and neutral (W), check PM capacitor and motor winding continuity.

5c) **Initial Harvest Cycle Termination Diagnosis:** When the harvest timer (S4 dip switch 1 & 2) terminates, harvest cycle terminates. Check discharge line temperature. For a thermistor check, see "II.F. Thermistor Check." If 1-min. fill cycle starts after harvest timer terminates, check that FS is clean and operating properly, see "II.E. Float Switch Check and Cleaning." If FS is closed, CB proceeds to the next cycle. If not, replace CB. Note: The minimum total time allowed by CB for a complete harvest cycle is 2 min.

Maximum harvest time allowed is 20 min.

**IMPORTANT! S4 dip switch 7 must remain on. Otherwise, PM will not energize during the last 50 sec. of harvest.**

6) **Freeze Cycle – LED 1 is on.** Comp, FMR, and PM continue. FM and LLV energize. HGV and X10 relay de-energize. Appliance is held in freeze by a 5-min. short cycle protection timer. After 5-min. timer terminates and FS opens, freeze cycle terminates. Note: PM power supply switches from CB K1 #5 (DBU) in harvest to K1 #4 (R) in freeze.

a) **Freeze Cycle Diagnosis:** Confirm Comp, FMR, and PM continue. Confirm that FM and LLV energize. Confirm WRV opens. Next, confirm HGV and X10 relay de-energize. During the first 5 min. of freeze, confirm evaporator is cooling. If not, confirm WV de-energized (not leaking by), HGV de-energized (not bypassing), LLV and FM energize, TXV and HM operate correctly, WRV opens, Comp is efficient, and refrigerant charge is correct. See "VIII.A. Specification and Performance Data Sheets."

- b) **Comp and FMR Diagnosis:** If Comp and FMR de-energize once freeze begins, check that appliance has not shut off on HPS ("POWER OK" LED off). If so, check "3)b HPS Diagnosis." If "POWER OK" LED is on, check for 115VAC at CB K1 #1 (V) or #9 (V) to neutral (W). If 115VAC is not present and LED 1 is on, replace CB. If 115VAC is present, check for 115VAC at CR coil. If 115VAC is present, check CR coil and contact continuity. Replace as needed. If CR is okay, check Comp start relay and start and run capacitors. Next, check Comp motor winding continuity. If Comp is energized but evaporator is not cooling, check for an inefficient Comp. See "VIII.A. Specification and Performance Data Sheets." If Comp is energized but FMR is not, check for 115VAC at the FMR junction box. If 115VAC is not present, check icemaker wiring connections. If 115VAC is present, check for voltage at condenser unit. If 115VAC is not present, check field wiring connections. If 115VAC is present, check FMR capacitor, motor winding, and fan blade for binding.
- c) **WV and HGV Diagnosis:** If WV is energized, check for 115VAC at CB K1 #6 (O) to neutral (W). If 115VAC is present after PM energizes in harvest cycle, replace CB. If 115VAC is not present, replace WV (bypassing). If HGV did not de-energize at the end of harvest, check for 115VAC at CB K1 #2 (P) to neutral (W). If 115VAC is present 50 sec. after PM energizes, replace CB. If 115VAC is not present, replace HGV (bypassing).
- d) **PM Diagnosis:** Confirm water is flowing over evaporator from PM and not WV. If PM de-energizes once freeze begins, check for 115VAC at CB K1 #4 (R) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present and PM is de-energized, check for 115VAC at control switch #5 (Y) to neutral (W). If 115VAC is present at CB K1 #4 (R) and not at control switch #5 (Y), check control switch continuity between #5 (Y) and #6 (R). Replace as needed. If 115VAC is present at control switch #5 (Y) to neutral (W), check PM capacitor and motor winding continuity.
- e) **FM and LLV Diagnosis:** If FM or LLV does not energize, check for 115VAC at CB K1 #3 (BK) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present: For FM, check capacitor, motor winding, and blade for binding. For LLV, check coil voltage and continuity.
- f) **Refrigerant Pressures, HM, and TXV Diagnosis:** If evaporator is still not cooling, check refrigerant pressures. See "VIII.A. Specification and Performance Data Sheets." Next, check HM operation. If refrigeration pressures are above HM setpoint and HM is bypassing, replace HM. Check TXV for proper operation. Remove TXV bulb and hold it in your hand, refrigerant low-side pressure should rise, place TXV bulb in ice water, refrigerant low-side pressure should drop. A 10 to 15 pound pressure swing between warm and cold conditions indicate a good TXV. If a 10 to 15 pound swing is not present, replace TXV.
- g) **WRV Diagnosis:** WRV is factory set and generally no adjustment is required. If WRV fails to open in freeze, check for proper refrigerant pressures. See "VIII.A. Specification and Performance Data Sheets." If refrigerant pressures are correct and WRV does not open, adjust or replace as needed. See "IV.C. Water Regulating Valve Adjustment (water-cooled models)."

h) **Freeze Termination Diagnosis:** After 5 min. in freeze, disconnect CB K5 FS connector. 15 sec. later appliance should switch out of the freeze cycle (15 second delay after FS opens before terminating the freeze cycle). If appliance remains in freeze longer than 15 sec. after FS removed, replace CB. If appliance switches with FS removed but would previously not switch out of freeze with FS connected (long freeze - 3 beep alarm), see "II.E. Float Switch Check and Cleaning."

Note: Normal freeze cycle will last 20 to 40 min. depending on model and conditions. Cycle times and pressures should follow performance data provided in this manual. See "VIII.A. Specification and Performance Data Sheets."

i) **Short Freeze Cycle Diagnosis:** Confirm water tank fills and overflows during 1 min. fill and harvest cycles. If not, check water supply filters, shut-off valve, WV screen. If water tank empties before 5 min. timer terminates and freeze cycle is short, check that DV is not leaking by or energized (water flowing through DV). If DV is leaking by, remove and clean DV, replace as needed. If water tank is full, see "II.E. Float Switch Check and Cleaning." for erratic operating FS.

7) **Pump-Out Cycle – LEDs 1, 3, and 2 are on (10/20 second pump-out).** Timing of the first pump-out is determined by S4 dip switch 5 & 6. See the table below.

"G" Control Board Settings		1st Pump-Out	
S4 Dip Switch Setting		Pump-Out Frequency	"G" Control Board
No. 5	No. 6		
OFF	OFF	Every cycle	After 2nd freeze cycle
ON	OFF	Every 2 cycles	After 3rd freeze cycle
OFF	ON	Every 5 cycles	After 6th freeze cycle
ON	ON	Every 10 cycles	After 11th freeze cycle

Comp and FMR continue, HGV energizes, LLV and FM de-energize. **NOTICE! S4 dip switch 3 & 4 must not be set to 3 off and 4 on. Otherwise, LED 4 turns on energizing WV and X11 relay. This energizes the X10 relay which prevents the X12 relay and DV from energizing.** PM stops for 2 sec., then PM and DV energize for 10/20 sec. depending on pump-out timer (S4 dip switch 3 & 4) setting. When the pump-out timer terminates, pump-out is complete. The pump-out frequency control (S4 dip switch 5 & 6) is factory set, and generally no adjustment is required. However, the pump-out frequency control can be set to have a pump-out occur every cycle, or every 2, 5, or 10 cycles. For details, see "III.C.4. Pump-Out Frequency Control (S4 dip switch 5 & 6)."

**Pump-Out Diagnosis:** In the freeze cycle before pump-out (see table above), after 5 min. of freeze disconnect CB black K5 connector (FS connector). Check that PM stops and re-starts and that DV energizes and water is flowing down the drain through DV. If PM does not stop and re-start and DV does not energize, check that CB LEDs 1, 3, and 2 are on. If not, replace CB. If LEDs 1, 3, and 2 are on and PM and DV do not energize, check for 115VAC at CB K1 #5 (DBU) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present, check for 115VAC at X12 relay #8 (DBU) to neutral (W). If 115VAC is not present, check that X10 relay is de-energized. If not, check X11 relay status. If X11 relay is energized, check that S4 dip switch 3 and 4 are not set to 3 on and 4 off positions, if not and X11 is energized, replace CB. Next, If X11 relay is de-energized and X10 relay is energized, replace X11 relay (contacts sticking). If X10 relay is de-energized, check for 115VAC at X10 relay terminal #5 (DBU) and terminal #1 (DBU) to neutral (W). If 115VAC is present at terminal #5 (DBU) and not at terminal #1 (DBU), replace X10 relay.

If 115VAC is present at X12 relay #8 (DBU) to neutral (W):

**PM:** Check for 115VAC at X12 relay #6 (BR or BK) and X12 relay #4 (Y) to neutral (W). If 115VAC is present at X12 relay #6 (BR or BK) and not at X12 relay #4 (Y), replace X12 relay. If 115VAC is present at X12 relay #4 (Y), check PM capacitor, motor winding, and impeller for binding.

**DV:** Check for 115VAC at X12 relay #5 (DBU) and X12 relay #3 (GY) to neutral (W). If 115VAC is present at X12 relay #5 (DBU) and not at X12 relay #3 (GY), replace X12 relay. If 115VAC is present at X12 relay #3 (GY), check DV solenoid, replace as needed. Next, confirm that the drain line is not clogged.

Confirm FM and LLV de-energize. If FM or LLV are energized with LEDs 1, 3, and 2 on, replace CB.

- 8) **Normal Harvest Cycle** – Same as the initial harvest cycle. Return to step 5a) above.  
Note: Appliance continues to cycle until TBC or MBC is satisfied or power is switched off. The appliance always restarts at the 1-min. fill cycle.

## 9) Shutdown

### a) **Thermostatic Bin Control (TBC):**

When the appliance is running, hold ice in contact with the thermostatic bulb. BC switch opens within 10 sec., shutting down the appliance. TBC is factory set, and generally no adjustment is required. However, adjustment may be needed in some conditions, particularly at higher altitude locations.

**Diagnosis:** See "II.D.1. Thermostatic Bin Control Check." CB red K4 connector must have the jumper in place. When the jumper is in place, the green "BC CLOSED" LED remains on. If the jumper is not in place, yellow "BC OPEN" LED turns on and the icemaker turns off and remains off until the jumper is replaced in its original position.

**NOTICE! CB red K4 connector jumper (4A4883G01) must be in place.**

### b) **Mechanical Bin Control (MBC):**

See "II.D.2. Mechanical Bin Control Check and Cleaning."

Legend: **BC**—bin control; **CB**—control board; **Comp**—compressor; **CR**—compressor relay; **DV**—drain valve; **FM**—fan motor; **FMR**—fan motor remote; **FS**—float switch; **HGV**—hot gas valve; **HM**—headmaster (C.P.R.); **HPS**—high-pressure switch; **LLV**—liquid line valve; **MBC**—mechanical bin control; **PM**—pump motor; **TBC**; thermostatic bin control; **TXV**—thermostatic expansion valve; **WRV**—water regulating Valve; **WV**—inlet water valve

## C. Control Board Check

Before replacing CB 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.

Alarm Reset: If CB is in alarm (beeping), press the "ALARM RESET" button on CB while CB is beeping. **WARNING! Risk of electric shock. Care should be taken not to touch live terminals.** Once reset, the icemaker starts at the 1-minute fill cycle. For audible alarm information, see "III.B. LED Lights and Audible Alarm Safeties."

- 1) Check the dip switch settings to assure that S4 dip switch 3, 4, 7, 8, 9, 10 and S5 dip switch 1 through 5 are in the factory default position. S4 dip switch 1, 2, 5, 6 are cleaning adjustments and the settings are flexible. For factory default settings, see "III.C.1. Default Dip Switch Settings."
- 2) Move the control switch to the "ICE" position. If the red "POWER OK" LED is on, control voltage is good, continue to step 3. If the "POWER OK" LED is off, check CT secondary circuit. CT output is 10.5VAC at 115VAC primary input. If the secondary circuit has proper voltage and the red LED is off, replace CB.

If the secondary circuit does not have proper voltage (10.5VAC), check CT primary circuit. Check for 115VAC at control switch terminal #2 (BR or BK) and control switch terminal #3 (P) to neutral (W). If 115VAC is present at control switch terminal #2 (BR or BK) and not at control switch terminal #3 (P), replace control switch. If 115VAC is present at control switch terminal #3 (P), check for 115VAC at HPS (BK) to neutral (W). If 115VAC is not present, see "B.1. or 2. 3)b) HPS Diagnosis." If 115VAC is present check CT coil continuity. Replace as needed. For additional checks, see "II.G.1. No Ice Production."

- 3) The "OUTPUT TEST" button provides a relay sequence test. Make sure the control switch is in the "ICE" position, then press the "OUTPUT TEST" button. For the correct lighting sequence, see the table below. Note that the order of the LEDs from the outer edge of the control board is 1, 4, 3, 2. Components (e.g., compressor) cycle during the test.

Control Board	Correct LED Lighting Sequence
"G"	1, 4, 3, 2

Following the test, the icemaker begins operation at the 1-minute fill cycle. If the LEDs do not light as described above, replace CB.

- 4) To verify voltage output from CB to the components, slide the CB K1 connector out far enough to allow multimeter lead contact. With the icemaker in the cycle to be tested, check output voltage from the corresponding pin on CB K1 connector to a neutral (W wire). If output voltage is not found and the appropriate LED is on, replace CB.

Legend: **CB**—control board; **CT**—control transformer

## D. Bin Control Check

### 1. Thermostatic Bin Control Check

TBC shuts down the icemaker within 10 sec. when ice contacts the thermostatic bulb, regardless of the cycle at activation.

#### **NOTICE**

When the ambient temperature is below 45°F (7°C), TBC opens and shuts down the appliance even if the ice storage bin is empty. When BC is set in the prohibited range, the appliance operates continuously even if the ice storage bin is filled with ice. Setting in the prohibited range may result in severe damage to the appliance.

TBC is factory set, and generally no adjustment is required. However, adjustment may be needed in some conditions, particularly at higher altitude locations.

Note: On "G" control boards, a jumper (4A4883G01) must be placed on CB red K4 connector. Otherwise, CB yellow "BC OPEN" LED is on and appliance will not start.

To check TBC, follow the steps below.

- 1) Turn off the power supply.
- 2) Remove the front panel, then move the control switch to the "OFF" position.
- 3) Remove the control box cover, then clear any ice away from TBC bulb.
- 4) Disconnect TBC wires from TBC switch.
- 5) Hold your hand around the bulb to warm it up.
- 6) Check for continuity across TBC switch. If closed, continue to step 6. If open, adjust or replace TBC.
- 7) With the multimeter test leads still in place, hold ice on TBC bulb to lower the temperature. Within 10 sec., TBC switch should open. If it remains closed, adjust or replace TBC.

Legend: **TBC**—thermostatic bin control

## 2. Mechanical Bin Control Check and Cleaning

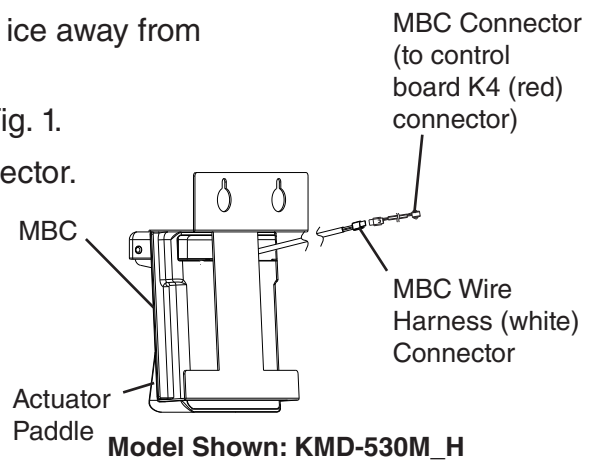
### a) Mechanical Bin Control Check

A lever-actuated proximity switch is used to control the ice level in the storage bin.

No adjustment is required.

To check MBC, follow the steps below.

- 1) Turn off the power supply.
- 2) Remove the front panel, then move the control switch to the "OFF" position.
- 3) Remove the control box cover, then clear any ice away from MBC.
- 4) Check MBC wire harness connections. See Fig. 1.
- 5) Disconnect MBC connector from CB K4 connector.
- 6) Check for continuity across the wires of MBC connector. When the actuator paddle is not engaged, MBC switch is closed. If open, check that the wire harness connector is properly connected and that the actuator paddle is not sticking. Clean if necessary. See "II.D.2.b) Mechanical Bin Control Cleaning." If MBC switch still reads open, replace MBC.
- 7) Press and hold the actuator paddle; check for continuity across the wires of MBC connector. When the actuator paddle is engaged, MBC switch is open. If closed, check that the actuator paddle is not restricted. Clean if necessary. See "II.D.2.b) Mechanical Bin Control Cleaning." If MBC switch still reads closed, replace MBC.
- 8) Reconnect MBC connector to CB K4 connector, then move the control switch to the "ICE" position. Turn on the power supply.
- 9) Check that CB green "BC CLOSED" LED is on.
- 10) Allow the icemaker to cycle on. Press and hold the actuator paddle. CB yellow "BC OPEN" LED should turn on and the icemaker should shut down according to the chart below. If it does not, replace CB.



**Fig. 1**

Cycle at Mechanical Bin Control Activation	Shutdown
Fill Cycle	15 sec. after activation.
Harvest Cycle	At the end of the harvest cycle, or up to 15 sec. into the freeze cycle if activated at the end of the harvest cycle.
Freeze Cycle	15 sec. after activation if activated at least 15 sec. before the 5-min. short cycle protection timer terminates. Otherwise, at the end of the next harvest cycle.

Legend: **MBC**—mechanical bin control; **CB**—control board



### b) Mechanical Bin Control Cleaning

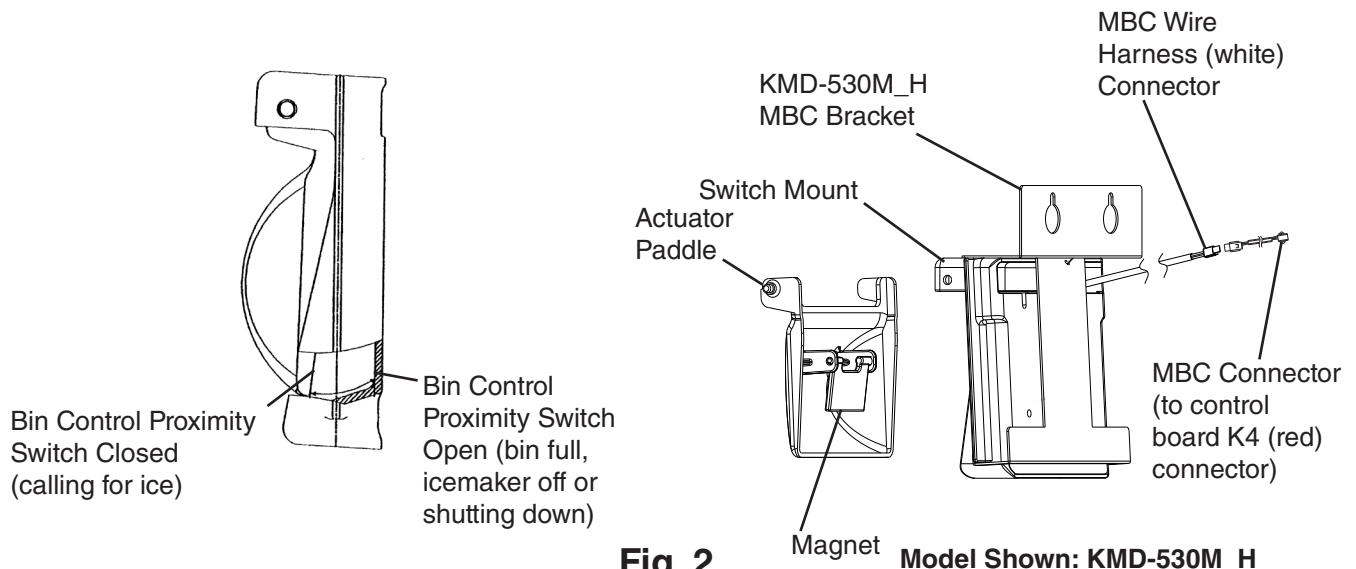
Scale may build up on MBC. Scale can cause the actuator paddle and magnet to stick. In this case, MBC should be cleaned.

#### **⚠ WARNING**

**CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after the icemaker is serviced. Make sure that none have fallen into the dispense unit/ice storage bin.

- 1) Turn off the power supply.
- 2) Remove the front panel, then move the control switch to the "OFF" position.
- 3) Clear any ice away from MBC.
- 4) Disconnect MBC connector from CB K4 connector, then remove MBC from the icemaker.
- 5) Remove the actuator paddle from the switch mount. See Fig. 2.
- 6) Wipe down MBC with a mixture of 1 part of Hoshizaki "Scale Away" and 25 parts of warm water. Rinse the parts thoroughly with clean water.
- 7) Reassemble MBC and replace it in its correct position.  
Note: If the magnet was removed for cleaning, be sure to replace it in its correct position.
- 8) Reconnect MBC connector to CB K4 connector, then move the control switch to the "ICE" position.
- 9) Replace the control box cover in its correct position.
- 10) Turn on the power supply to start the automatic icemaking process.
- 11) Replace the front panel in its correct position.

Legend: **MBC**—mechanical bin control; **CB**—control board



**Fig. 2**

## E. Float Switch Check and Cleaning

FS is used to determine that there is sufficient water in the water tank after the 1-min. fill cycle and after each harvest cycle. FS is also used to determine that the appropriate volume of water has been converted into ice before switching out of the freeze cycle. No adjustment is required.

### 1. Float Switch Check

To check FS, follow the steps below.

- 1) Remove the front panel, then move the control switch to the "SERVICE" position. Move the service switch to the "DRAIN" position.
- 2) Allow the water to drain from the water tank, then move the control switch to the "OFF" position. Turn off the power supply.
- 3) Remove the control box cover.
- 4) Disconnect FS connector from CB K5 (black) connector.
- 5) Check for continuity across FS leads. With the water tank empty, FS should be open. If open, continue to step 9. If closed, follow the steps in "II.E.2. Float Switch Cleaning." After cleaning FS, check it again. Replace if necessary.
- 6) Reconnect FS connector to CB K5 (black) connector, then replace the control box cover in its correct position.
- 7) Move the control switch to the "ICE" position. Replace the front panel in its correct position, then turn on the power supply. After 1 min., the 1-min. fill cycle should end and the initial harvest cycle should begin. If the initial harvest cycle begins, FS is good and the check is complete. If the initial harvest cycle does not begin, continue to step 11.
- 8) Turn off the power supply.
- 9) Remove the front panel. Move the control switch to the "OFF" position.
- 10) Remove the control box cover.
- 11) Disconnect FS connector from CB K5 (black) connector.
- 12) Check for continuity across FS leads. With the water tank full, FS should be closed. If FS is closed and the icemaker will not switch from the 1-min. fill cycle to the initial harvest cycle, replace CB.  
  
If FS is open, confirm that the water tank is full. If the water tank is not full, check the water supply, water filters, and inlet water valve. If the water tank is full, follow the steps in "II.E.2. Float Switch Cleaning." After cleaning FS, check it again. Replace if needed.

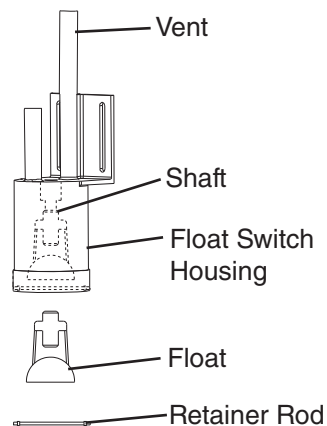
Legend: **CB**—control board; **FS**—float switch

## 2. Float Switch Cleaning

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

- 1) Remove the front panel, then move the control switch to the "SERVICE" position. Move the service switch to the "DRAIN" position.
- 2) Allow the water to drain from the water tank, then move the control switch to the "OFF" position. Turn off the power supply.
- 6) Remove the FS from the PM bracket and water tank.
- 7) Remove the retainer rod from the bottom of FS housing, then remove the float. Be careful not to bend the retainer rod excessively when removing it. See Fig. 3.
- 6) Wipe down FS housing, shaft, float, and retainer rod with a mixture of 1 part Hoshizaki "Scale Away" and 25 parts warm water. Rinse the parts thoroughly with clean water.
- 7) Reassemble FS assembly and replace it in its correct position.
- 8) Move the control switch to the "ICE" position.
- 9) Replace the front panel in its correct position.
- 10) Turn on the power supply to start the automatic icemaking process.

Legend: **CB**–control board; **FS**–float switch; **PM**–pump motor



**Fig. 3**

## F. Thermistor Check

To check thermistor resistance, follow the steps below.

- 1) Turn off the power supply.
- 2) Remove the front panel. Move the control switch to the "OFF" position.
- 3) Remove the control box cover.
- 4) Remove the thermistor from the refrigerant tubing.
- 5) Immerse the thermistor sensor portion in a glass containing ice and water for 2 or 3 min.
- 6) Disconnect the thermistor connector from CB K3 connector and check the resistance between thermistor leads. Normal range is 4.7 to 6.2 k $\Omega$ . If outside the normal range, replace the thermistor. See "IV.B. Component Service Information." If within the normal range, continue to the next step.
- 7) Replace the thermistor in its correct position. See "IV.B. Component Service Information."
- 8) Reconnect the thermistor connector to CB K3 connector.
- 9) Replace the control box cover in its correct position.
- 10) Move the control switch to the "ICE" position.
- 11) Replace the front panel in its correct position.
- 12) Turn on the power supply.
- 13) Once the harvest cycle starts (Comp energizes), begin timing the harvest cycle.
- 14) The harvest timer and harvest cycle should terminate within 2 to 5 min. If the harvest cycle does not terminate within 2 to 5 min., replace CB.

Legend: **CB**—control board; **Comp**—compressor

## G. Diagnostic Tables

### 1. No Ice Production

No Ice Production - Possible Cause	
1. Power Supply	a) Off, blown fuse, or tripped breaker.
	b) Not within specifications.
2. Fuse (inside fused disconnect, if any)	a) Blown.
3. Thermostatic Bin Control See "II.D.1. Thermostatic Bin Control Check"	a) Tripped with bin filled with ice.
	b) Ambient temperature too cool.
	c) Set too warm.
	d) Bulb out of position.
	e) Open contacts, defective.
4. Fuse (Control Box)	a) Blown.
5. Control Switch	a) In "OFF" or "SERVICE" position.
	b) Bad contacts.
6. High-Pressure Switch	a) Dirty condenser.
	b) Fan motor not operating.
	c) Refrigerant overcharged.
	d) Bad contacts.
	e) Refrigerant lines or components plugged.
7. Control Transformer (115VAC/10.5VAC)	a) Coil winding open or shorted.
8. Control Board See "II.C. Control Board Check"	a) In alarm.
	b) Yellow "BC OPEN" LED on: Jumper loose or missing on models with TBC. Bin full on models with MBC.
	c) Defective.
9. Mechanical Bin Control See "II.D.2. Mechanical Bin Control Check and Cleaning"	a) Tripped with bin filled with ice.
	b) Actuator does not move freely.
	c) Defective.
10. Water Supply	a) Water supply off or improper water pressure.
	b) External water filters clogged.
11. Inlet Water Valve	a) Screen or orifice clogged.
	b) Coil winding open.
	c) Water valve open in freeze cycle.
12. Float Switch See "II.E. Float Switch Check and Cleaning"	a) Float does not move freely.
	b) Defective.
13. Compressor	a) Compressor relay/magnetic contactor contacts bad or coil winding open.
	b) Start capacitor or run capacitor defective.
	c) Internal protector open.
	d) Start relay contacts bad or coil winding open (single phase).
	e) Compressor defective.

<b>No Ice Production - Possible Cause</b>	
14. Hot Gas Valve	a) Closed in harvest cycle.
	b) Open in freeze cycle.
15. Thermistor See "II.F. Thermistor Check"	a) Loose, disconnected, or defective.
16. Pump Motor	a) Motor winding open.
	b) Bearing worn out or locked rotor.
	c) Defective capacitor.
17. Thermostatic Expansion Valve	a) Bulb loose.
	b) Operating erratically.
18. Liquid Line Valve	a) Closed in freeze cycle.
	b) Open in harvest cycle.
19. Fan Motor	a) Motor winding open.
	b) Bearing worn out or locked rotor.
	c) Defective capacitor.
20. Water System	a) Water leaks causing short freeze time.

## 2. Freeze-Up

Defrost and clean the icemaker prior to diagnosing freeze-up. Fill out a freeze-up checklist. See the Hoshizaki America Technician's Pocket Guide or contact your local distributor for a copy of the freeze-up checklist.

<b>Freeze-Up - Possible Cause</b>	
<b>Harvest Cycle</b>	
1. Evaporator	a) Scaled up.
	b) Damaged.
2. Cube Guides	a) Out of position.
	b) Damaged.
3. Spray Tubes and/or Spray Guides	a) Dirty.
	b) Out of position.
4. Water Supply	a) Low water pressure.
	b) External water filters clogged.
	c) Insufficient water line size. Minimum 1/4" Nominal ID (6 mm Nominal OD in the EU) copper water tubing or equivalent.
5. Inlet Water Valve	a) Screen or orifice clogged.
	b) Defective.
6. Float Switch See "II.E. Float Switch Check and Cleaning"	a) Dirty, sticking.
	b) Defective.
7. Refrigerant Charge	a) Low.
8. Control Board See "III.C. Settings and Adjustments" and "II.C. Control Board Check"	a) Harvest timer (S4 dip switch 1 & 2) set too short.
	b) Harvest pump timer (S4 dip switch 7) not in factory default position.
	c) Defective.
9. Bin Control See "II.D. Bin Control Check"	a) Thermostatic: Thermostat switch sticking.
	b) Mechanical: Actuator does not move freely.

<b>Freeze-Up - Possible Cause</b>	
10. Thermistor See "II.F. Thermistor Check"	a) Loose, disconnected, or defective.
11. Thermostatic Expansion Valve	a) Defective.
12. Hot Gas Valve	a) Closed or restricted.
13. Liquid Line Valve	a) Open.
<b>Freeze Cycle</b>	
1. Evaporator	a) Scaled up.
	b) Damaged.
2. Spray Tubes and/or Spray Guides	a) Dirty.
	b) Out of position.
3. Refrigerant Charge	a) Low.
4. Control Board See "II.C. Control Board Check"	a) Freeze timer (S4 dip switch 9 & 10) set incorrectly.
	b) Defective.
5. Inlet Water Valve	a) Leaking by.
6. Float Switch See "II.E. Float Switch Check and Cleaning"	a) Float does not move freely.
	b) Defective.
7. Pump Motor	a) RPM too slow.
	b) Impeller damaged.
8. Thermostatic Expansion Valve	a) Bulb loose or defective.
9. Liquid Line Valve	a) Restricted.
10. Headmaster (C.P.R.) (remote models)	a) Not bypassing.

### 3. Low Ice Production

<b>Low Ice Production - Possible Cause</b>	
<b>Long Harvest Cycle</b>	
1. Evaporator	a) Scaled up.
2. Spray Tubes and/or Spray Guides	a) Dirty.
	b) Out of position.
3. Refrigerant Charge	a) Low.
4. Water Supply	a) Low water pressure.
	b) External water filters clogged.
	c) Insufficient water line size. Minimum 1/4" Nominal ID (6 mm Nominal OD in the EU) water tubing or equivalent.
	d) Too cold.
5. Control Board See "II.C. Control Board Check"	a) Thermistor connection loose (K3).
	b) Defective.
6. Thermistor See "II.F. Thermistor Check"	a) Loose, disconnected, or defective.
7. Hot Gas Valve	a) Erratic or closed.
8. Inlet Water Valve	a) Screen or orifice clogged.
9. Compressor	a) Inefficient or off.

<b>Low Ice Production - Possible Cause</b>	
10. Liquid Line Valve	a) Erratic or open.
11. Thermostatic Expansion Valve	a) Defective.
<b>Long Freeze Cycle</b>	
1. Evaporator	a) Scaled up, dirty.
2. Float Switch See "II.E. Float Switch Check and Cleaning"	a) Scaled up, dirty.
	b) Float sticking.
	c) Defective switch.
3. Inlet Water Valve	a) Leaking by.
4. Hot Gas Valve	a) Erratic or open.
5. Condenser	a) Clogged.
6. Control Board See "II.C. Control Board Check"	a) Float switch connection loose (K5).
	b) Defective.
7. Refrigerant Charge	a) Low.
8. Thermostatic Expansion Valve	a) Bulb loose.
	b) Defective.
9. Compressor	a) Inefficient or off.
10. Pump Motor	a) RPM too slow.
11. Liquid Line Valve	a) Erratic or restricted.
12. Headmaster (C.P.R.) (remote models)	a) Not bypassing.



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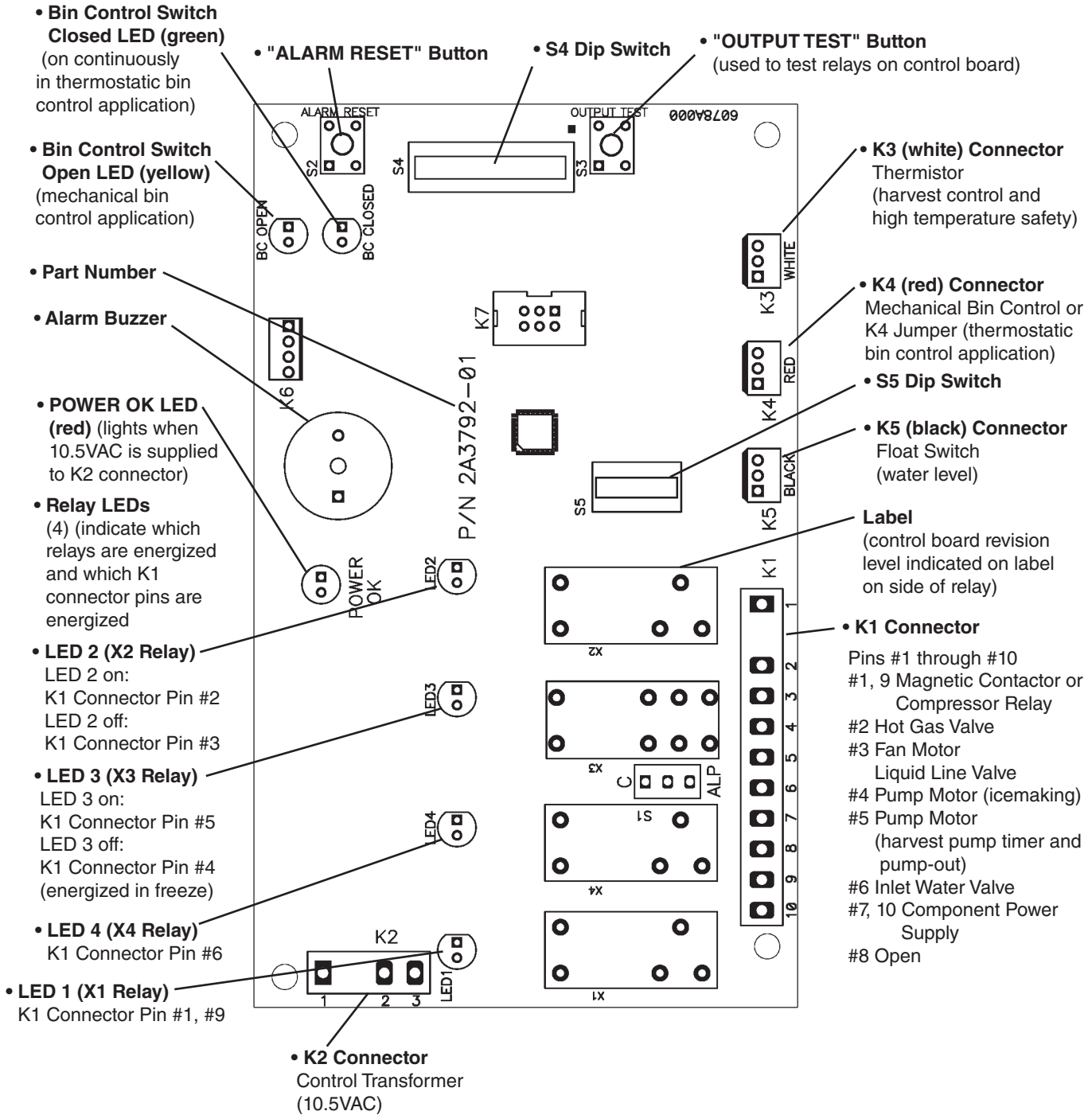
### III. Controls and Adjustments

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

<b><i>NOTICE</i></b>
<ul style="list-style-type: none"><li>• Fragile, handle very carefully.</li><li>• 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.</li><li>• Do not touch the electronic devices on the control board or the back of the control board.</li><li>• Do not change wiring and connections. Do not misconnect K3 WHITE, K4 RED, and K5 BLACK, because the same connector is used for the thermistor, mechanical bin control, K4 jumper, and float switch.</li><li>• Do not short out power supply to test for voltage.</li><li>• Always replace the whole control board assembly if it goes bad.</li></ul>

# A. Control Board Layout

## "G" Control Board



"G" Control Board	
Part Number	2A3792-01

## B. LED Lights and Audible Alarm Safeties

At startup, a 5-second delay occurs while the control board conducts an internal timer check. A beep occurs when the control switch is moved to the "ICE" position. The red "POWER OK" LED indicates proper control voltage and remains on unless a control voltage problem occurs. The green LEDs 1 through 4 energize and sequence from initial startup as listed in the table below. Note that the order of the LEDs from the outer edge of the control board is 1, 4, 3, 2.

Sequence Step	LED	Energized Components	Time LEDs are On		
			Min.	Max.	Avg.
1-Minute Fill Cycle	4	WV			1 minute
Harvest Cycle	1, 4, 2	Comp, FMR, HGV, WV	2 minutes	20 minutes	3 to 5 minutes
Harvest Pump Timer	1, 3, 2	Comp, FMR, HGV, PM	0 seconds	50 seconds	harvest pump timer setting
Freeze Cycle	1	Comp, FM/ FMR, PM, LLV	5 minutes	freeze timer setting	30 to 35 minutes
Pump-Out Cycle	1, 4*, 3, 2	Comp, DV, FMR, HGV, PM, SR, WV*	10 seconds	20 seconds	*pump-out timer setting

The built-in safeties shut down the icemaker and have alarms as listed below.

No. of Beeps (every 3 sec.)	Type of Alarm	Notes
1	High Evaporator Temp. (temperature > 127°F) (53°C)	Check for harvest problem (stuck HGV or relay), hot water entering icemaker, or shorted thermistor.
2	Harvest Backup Timer (harvest > 20 min. for two cycles in a row)	Check for open thermistor, HGV not opening, TXV or LLV leaking by, low charge, or inefficient Comp, or WRV leaking by.
3	Freeze Timer (freeze > freeze timer setting for two cycles in a row)	Check for FS stuck closed (up), WV leaking by, HGV leaking by, PM not pumping, TXV not feeding properly, LLV not opening, low charge, HM not bypassing, or inefficient Comp.
To reset the above safeties, press the "ALARM RESET" button with the power supply on.		
6	Low Voltage (92Vac±5% or less)	Red LED turns off if voltage protection operates. The control voltage safeties automatically reset when voltage is corrected.
7	High Voltage (147Vac±5% or more)	

Legend: **Comp**—compressor; **DV**—drain valve; **FM**—fan motor; **FMR**—fan motor-remote; **FS**—float switch; **HGV**—hot gas valve; **HM**—headmaster (C.P.R.); **LLV**—liquid line valve; **PM**—pump motor; **SR**—service relay; **TXV**—thermostatic expansion valve; **WRV**—water regulating valve; **WV**—inlet water valve

## C. Settings 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 Service Center.

#### 1. Default Dip Switch Settings

The dip switches are factory-adjusted to the following positions:

##### a) "G" Control Board without Harvest Pump Timer Operation

S4 Dip Switch											
Model	Auxiliary Code	1	2	3	4	5	6	7	8	9	10
KML-250MAH	B-1 and Later	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	ON	OFF
KML-250MWH	B-1 and Later	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF	ON
KML-351MWH	C-1 and Later	ON	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
KML-451MAH	B-1 and Later	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
KML-451MWH	B-1 and Later	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	ON
KML-631MAH	B-1 and Later	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	ON
KML-631MWH	C-0 and Later	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	ON
KML-631MRH	C-0 and Later	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	ON

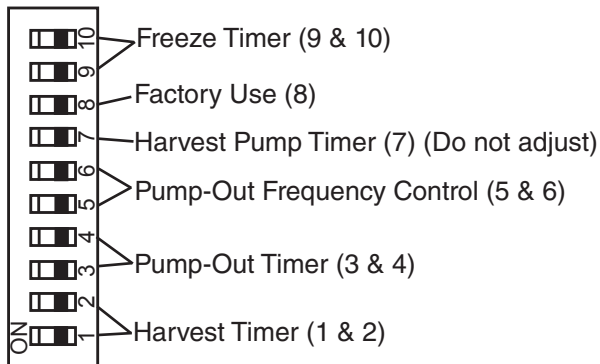
##### b) "G" Control Board with Harvest Pump Timer Operation

S4 Dip Switch											
Model	Auxiliary Code	1	2	3	4	5	6	7	8	9	10
KML-351MAH	V-1 and Later	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON
KMD-460MAH	All	ON	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
KMD-460MWH	All	OFF	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
KMD-530MAH	All	OFF	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
KMD-530MWH	All	OFF	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
KMD-530MRH	All	OFF	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	OFF

##### c) Float Switch Selector, Refill Counter, Program Selector

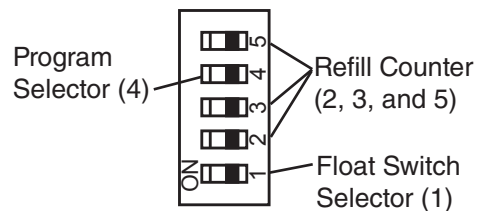
S5 Dip Switch (Do Not Adjust)					
Model	1	2	3	4	5
All Models	OFF	OFF	OFF	OFF	OFF

#### S4 Dip Switch



#### S5 Dip Switch

Do Not Adjust



## 2. Harvest Timer (S4 dip switch 1 & 2)

The harvest timer starts counting when the thermistor reaches 48°F (9°C) at the evaporator outlet and the control board reads 3.9 kΩ from the thermistor. The harvest timer is factory set, and generally no adjustment is required. However, a setting longer than the factory setting may be advised in cases where the drain provided at harvest needs to be prolonged for extra cleaning. Before changing this setting, contact Hoshizaki Technical Support at 1-800-233-1940 for recommendations. Keep in mind that setting the harvest timer to a longer setting decreases 24-hour production.

Note that the pump-out timer (S4 dip switch 3 & 4) acts in place of the harvest timer during cycles with a pump out. For details, see "III.C.3. Pump-Out Timer (S4 dip switch 3 & 4)."

Note: On models with a pump-out every cycle, the harvest timer is only relevant during the initial harvest cycle since a pump out occurs every cycle thereafter.

S4 Dip Switch Setting		Time (sec.)
No. 1	No. 2	
OFF	OFF	60
ON	OFF	90
OFF	ON	120
ON	ON	180

## 3. Pump-Out Timer (S4 dip switch 3 & 4)

### **NOTICE**

On models with harvest pump timer, do not adjust 3 off and 4 on. Drain valve does not energize in this setting.

The pump motor stops for 2 seconds, then the X12 relay energizes, allowing the pump motor and drain valve to energize. Water is removed from the bottom of the water tank and sent down the drain. The pump-out drains the water tank for the time determined by the pump-out timer. The pump-out timer also acts in place of the harvest timer during cycles with a pump-out. The pump-out timer is factory set, and generally no adjustment is required. The pump-out timer control can be set to pump-out for 10 or 20 seconds.

S4 Dip Switch Setting		Time (sec.)		Inlet Water Valve
No. 3	No. 4	T1	T2	
OFF	OFF	10	150	Closed
ON	OFF	10	180	Closed
OFF	ON	10	120	Open
ON	ON	20	180	Closed

T1: Time to drain the water tank

T2: Harvest timer at pump out

#### 4. Pump-Out Frequency Control (S4 dip switch 5 & 6)

The pump-out frequency control is factory set. Generally no adjustment is required. However, where water quality is bad and the icemaker needs a pump-out more often, the pump-out frequency can be adjusted. The pump-out frequency control can be set to have a pump-out occur every cycle, or every 2, 5, or 10 cycles.

The first pump-out is dependent on S4 dip switch 5 & 6. See the table below.

S4 Dip Switch Setting		Pump-Out Frequency	1st Pump-Out
No. 5	No. 6		
OFF	OFF	Every cycle	After 2nd freeze cycle
ON	OFF	Every 2 cycles	After 3rd freeze cycle
OFF	ON	Every 5 cycles	After 6th freeze cycle
ON	ON	Every 10 cycles	After 11th freeze cycle

#### 5. Harvest Pump Timer Operation (S4 dip switch 7)

##### **NOTICE**

Factory set for proper operation. Do not adjust. Adjustment outside of the factory default setting may result in damage to the appliance.

Depending on the harvest pump timer setting, the pump motor either stays off or is energized the last 50 seconds of harvest. When the pump motor is energized, water circulates over the evaporator. The harvest water valve is open during harvest for a maximum of 6 minutes or the length of harvest minus 0 or 50 seconds (determined by the harvest pump timer setting), whichever is shorter.

When S4 dip switch 7 is in the on position and harvest begins, X11 and X10 relays energize. A latching circuit is created through the X11 and X10 relays. For further details, see "VIII.B. Wiring Diagrams."

50 sec. before harvest termination, LED 4 turns off, inlet water valve and X11 relay de-energize. X10 relay remains energized through the latching circuit. Next, LED 3 turns on and control board K1 connector pin #5 (DBU wire) energizes, energizing the pump motor for the last 50 sec. of harvest.

S4 Dip Switch Setting	Pump Motor Time (sec.)
No. 7	
ON	50
OFF	0

#### 6. Factory Use (S4 dip switch 8)

Factory set for proper operation. Do not adjust. This must be left in the factory default position.

## 7. Freeze Timer (S4 dip switch 9 & 10)

### **NOTICE**

Adjust to proper specification, or the icemaker may not operate correctly.

The freeze timer setting determines the maximum allowed freeze time to prevent possible freeze-up issues. Upon termination of the freeze timer, the control board initiates the harvest cycle or pump-out cycle. After 2 consecutive freeze timer terminations, the control board shuts down the icemaker. In this case, see "II.G.3. Low Ice Production" for possible solutions. The freeze timer is factory set and no adjustment is required. Before changing this setting, contact Hoshizaki Technical Support at 1-800-233-1940 for recommendations.

S4 Dip Switch Setting		Time (min.)
No. 9	No. 10	
OFF	OFF	60
OFF	ON	50
ON	OFF	70
ON	ON	75

## 8. Float Switch Selector (S5 dip switch 1)

### **NOTICE**

Do not adjust. This must be left in the factory default position or the icemaker will not operate correctly.

## 9. Refill Counter (S5 dip switch 2, 3, and 5), Program Selector (4)

### **NOTICE**

Do not adjust. These must be left in the factory default position or the icemaker will not operate correctly.

## **D. Switches**

Two control switches are used to control operation in KMD and KML Series Modular Crescent Cubers. These switches are referred to as the "control switch" and the "service switch" and are located on the control box.

### **1. Control Switch**

The control switch has three positions: "OFF" for power off; "ICE" for icemaking, and "SERVICE" to activate the service switch.

### **2. Service Switch**

When the control switch is in the "SERVICE" position, the control switch supplies power to the service switch and the machine is in service mode. The service switch has three positions: "DRAIN," "CIRCULATE," and "WASH." See the information below for details of each function.

Note:

1. When the service switch is activated, power is supplied to the water pump in all three positions.
2. When the control switch is in the "OFF" position or in the "ICE" position, the service switch has no power and can be left in any position.

#### **a) DRAIN**

This appliance utilizes a pump-out drain system. When the service switch is active and placed in the "DRAIN" position, power is supplied to the pump motor and drain valve.

#### **b) CIRCULATE**

When the service switch is active and placed in the "CIRCULATE" position, power is supplied to the pump motor only. This operation can be used to circulate cleaner for extended periods of time over the outside surface of the evaporator.

#### **c) WASH**

This appliance utilizes an electric solenoid operated cleaning (bypass) valve. When the service switch is active and placed in the "WASH" position, power is supplied to the pump motor and cleaning valve. This operation is used to circulate cleaner and sanitizer over both the inside and outside of the evaporator.



## 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 control 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 icemaker 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-404A 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-404A 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

The icemaker is provided with refrigerant access valves. Using proper refrigerant practices, recover the refrigerant. Store the refrigerant in an approved container. Do not discharge the refrigerant into the atmosphere.

## 2. Brazing

### **⚠ WARNING**

- R-404A itself is not flammable at atmospheric pressure and temperatures up to 176°F (80°C).
- R-404A itself is not explosive or poisonous. However, when exposed to high temperatures (open flames), R-404A 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.

1) Braze all fittings while purging with nitrogen gas flowing at a pressure of 3 to 4 PSIG.

Note: Because the pipes in the evaporator case are specially coated to resist corrosion, it is important to make connections outside the evaporator case when possible. If it is necessary to braze inside the evaporator case, use sandpaper to remove the coating from the brazing connections before unbrazing the components.

### **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-404A as a mixture with pressurized air for leak testing.

## 3. Evacuation and Recharge (R-404A)

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. 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 rating label inside the icemaker. Hoshizaki recommends only virgin refrigerant or reclaimed refrigerant which meets AHRI Standard 700 (latest edition) be used.
- 6) A liquid charge is required when charging an R-404A 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

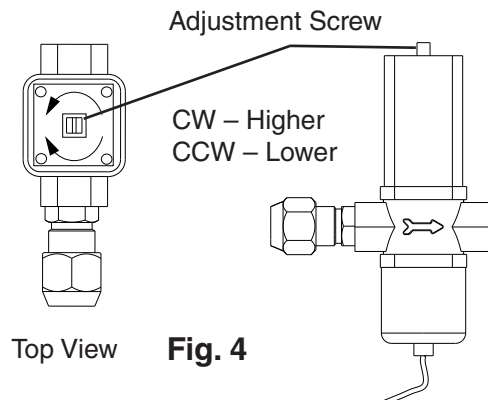
When replacing a component listed below, see the notes to help ensure proper operation.

Component	Notes
Compressor	1 phase: Install a new start capacitor, run capacitor, and start relay. 3 phase: Install a new magnetic contactor.
Thermostatic Expansion Valves	<ul style="list-style-type: none"> <li>• Attach the thermostatic expansion valve bulb to the suction line in the same location as the previous bulb.</li> <li>• The bulb should be between the 10 and 2 o'clock positions on the tube.</li> <li>• Secure the bulb with the clamp and holder, then insulate it.</li> </ul>
Hot Gas Valves Liquid Line Valves	<ul style="list-style-type: none"> <li>• Replace the strainer if applicable.</li> <li>• Use copper tube of the same diameter and length when replacing valve lines.</li> </ul>
Fan Motors	Install a new capacitor.
Pump Motor	Install a new capacitor.
Thermistor	<ul style="list-style-type: none"> <li>• Attach the new thermistor to the suction line in the same location as the previous thermistor.</li> <li>• The thermistor should be at the 12 o'clock position on the tube.</li> <li>• Smoothly fill the recessed area of the thermistor holder with high thermal conductive type sealant. Hoshizaki America part number 4A0683-01 (Silicone Heat Sink Compound 10-8108 manufactured by GC Electronics), KE-4560 RTV (manufactured by ShinEtsu Silicones), or equivalent are recommended.</li> <li>• Secure the thermistor with the holder, then insulate it.</li> <li>• Be very careful to prevent damage to the leads.</li> </ul>

## C. Water Regulating Valve Adjustment (water-cooled model)

The water regulating valve is factory set, and generally no adjustment is required. However, when necessary, adjust the water regulator using the following procedure.

- 1) Prepare a thermometer to check the condenser drain temperature. Attach a pressure gauge to the high-side line of the system.
- 2) 5 min. after a freeze cycle starts, confirm that the thermometer reads 104°F to 115°F (40°C to 46°C). If it does not, rotate the adjustment screw by using a flat blade screwdriver until the temperature is in the proper range. See Fig. 4. Next, check that the reference pressure is in the range indicated in the Head Pressure table in the Performance Data section. If it is not in the proper range, verify the refrigerant charge.



**Fig. 4**

- 3) Check that the condenser drain temperature is stable.

## V. Maintenance

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

<b>⚠ WARNING</b>	
<ul style="list-style-type: none"> <li>• Only qualified service technicians should service the appliance.</li> <li>• To reduce the risk of electric shock, do not touch the control switch or service switch with damp hands</li> <li>• Before servicing: Move the control 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.</li> <li>• <b>CHOKING HAZARD:</b> Ensure all components, fasteners, and thumbscrews are securely in place after any maintenance is done to the icemaker. Make sure that none have fallen into the dispenser unit/ice storage bin.</li> </ul>	

<b>Maintenance Schedule</b>		
<b>Frequency</b>	<b>Area</b>	<b>Task</b>
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.
	Underside of Icemaker and Top Kits; Bin Door and Snout	Wipe down with a clean cloth and warm water.
Yearly	Icemaker and Dispenser Unit/Ice Storage Bin Liner	Clean and sanitize per the cleaning and sanitizing instructions provided in the instruction manual or maintenance label on the icemaker.
	Water Supply Inlet	Close the icemaker water supply line shut-off valve and drain the water system. Clean the water supply inlet screen.
	Condenser	Inspect. Clean if necessary by using a brush or vacuum cleaner. More frequent cleaning may be required depending on location.
	Water Hoses	Inspect the water hoses and clean/replace if necessary.

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## VI. Preparing the Appliance for Periods of Non-Use

<b>NOTICE</b>
<ul style="list-style-type: none"><li>• When storing the appliance for an extended time or in sub-freezing temperatures, follow the instructions below to prevent damage.</li><li>• The pump motor is energized continuously when the control switch is in the "SERVICE" position.</li></ul>



When the appliance is not used for two or three days under normal conditions, it is sufficient to move the control switch to the "OFF" position. When storing the appliance for an extended time or in sub-freezing temperatures, follow the instructions below.

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

- 1) Turn off the power supply, then remove the front panel.
- 2) Move the control switch on the control box 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 compressed air or carbon dioxide supply to the icemaker water supply line drain valve.
- 6) Move the control switch to the "ICE" position.
- 7) Replace the front panel in its correct position, then turn on the power supply.
- 8) Blow the icemaker water supply line out using compressed air or carbon dioxide.

### 2. Drain the water tank:

- 1) Turn off the power supply, then remove the front panel.
- 2) Move the service switch to the "DRAIN" position, then move the control switch to the "SERVICE" position.
- 3) Replace the front panel in its correct position, then turn on the power supply for 2 minutes.
- 4) Turn off the power supply, then remove the front panel.
- 5) Move the control switch to the "OFF" position.
- 6) Replace the front panel in its correct position.
- 7) Remove all ice from the dispenser unit/storage bin. Clean the dispenser unit/storage bin using a neutral cleaner. Rinse thoroughly after cleaning.
- 8) Close the icemaker water supply line drain valve.

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

- 1) Make sure the power supply is off, then remove the front 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 panel and front panel in their correct positions.

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## **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

We reserve the right to make changes in specifications and design without prior notice.

### A. Specification and Performance Data Sheets

Pressure data is recorded at 5 min. into freezing cycle. The data not in bold should be used for reference only.

#### 1. KMD-460MAH

##### Specification Sheet

AC SUPPLY VOLTAGE	115/60/1	
AMPERAGE	10.0 A ( 5 Min. Freeze AT 104°F / WT 80°F)	
MINIMUM CIRCUIT AMPACITY	15 A	
MAXIMUM FUSE SIZE	15 A	
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F
ELECTRIC W (kWH/100 lbs.)	880 (5.48)	810 (4.28)
WATER gal./24HR (gal./100 lbs.)	73 (18.9)	192 (42.1)
ICE PRODUCTION PER CYCLE	9.6 lbs. (4.3 kg) 432pcs.	
BIN CONTROL SYSTEM	Mechanical Bin Control	
REFRIGERANT CHARGE	R404A, 1 lb. 5.2 oz. (600g)	

##### 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	<b>457</b>	<u>207</u>	436	<u>198</u>	398	<u>180</u>
	80/27	441	<u>200</u>	409	<u>186</u>	365	<u>165</u>
	90/32	436	<u>198</u>	<b>387</b>	<u>176</u>	344	<u>156</u>
lbs./day kg./day	100/38	425	<u>193</u>	377	<u>171</u>	304	<u>138</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	<b>810</b>		831		853	
	80/27	826		858		876	
	90/32	831		<b>880</b>		901	
watts	100/38	833		885		920	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	<b>192</b>	<u>0.73</u>	157	<u>0.60</u>	139	<u>0.53</u>
	80/27	166	<u>0.63</u>	111	<u>0.42</u>	109	<u>0.41</u>
	90/32	157	<u>0.60</u>	<b>73</b>	<u>0.28</u>	64	<u>0.24</u>
gal./day m <sup>3</sup> /day	100/38	117	<u>0.44</u>	71	<u>0.27</u>	55	<u>0.21</u>
FREEZING CYCLE TIME	70/21	<b>26</b>		29		33	
	80/27	28		32		36	
	90/32	29		<b>34</b>		39	
min.	100/38	30		35		43	
HARVEST CYCLE TIME	70/21	<b>3.6</b>		3.1		3.0	
	80/27	3.2		2.5		2.6	
	90/32	3.1		<b>2.0</b>		2.0	
min.	100/38	2.6		2.0		2.0	
HEAD PRESSURE	70/21	<b>245</b>	<u>17.2</u>	264	<u>18.6</u>	288	<u>20.2</u>
	80/27	260	<u>18.2</u>	289	<u>20.3</u>	311	<u>21.9</u>
	90/32	264	<u>18.6</u>	<b>310</b>	<u>21.8</u>	333	<u>23.4</u>
PSIG kg/cm <sup>2</sup> G	100/38	268	<u>18.8</u>	315	<u>22.2</u>	355	<u>25.0</u>
SUCTION PRESSURE	70/21	<b>53</b>	<u>3.7</u>	55	<u>3.8</u>	56	<u>3.9</u>
	80/27	54	<u>3.8</u>	57	<u>4.0</u>	58	<u>4.1</u>
	90/32	55	<u>3.8</u>	<b>59</b>	<u>4.1</u>	60	<u>4.2</u>
PSIG kg/cm <sup>2</sup> G	100/38	55	<u>3.8</u>	59	<u>4.2</u>	61	<u>4.3</u>
TOTAL HEAT OF REJECTION FROM CONDENSER		7,700 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]					

## 2. KMD-460MWH

### Specification Sheet

AC SUPPLY VOLTAGE	115/60/1
AMPERAGE	8.5A ( 5 Min. Freeze AT 104°F / WT 80°F)
MINIMUM CIRCUIT AMPACITY	15 A
MAXIMUM FUSE SIZE	15 A
ELECTRIC & WATER CONSUMPTION	90/70°F 70/50°F
ELECTRIC W (kWH/100 lbs.)	800(4.11) 770(3.67)
WATER gal./24HR (gal./100 lbs.)	79(16.9) 141(28.0)
WATER COOLED CONDENSER	639(136) 303(60)
gal./24HR (gal./100 lbs.)	
ICE PRODUCTION PER CYCLE	9.4 lbs. (4.3 kg) 432pcs.
BIN CONTROL SYSTEM	Mechanical Bin Control
REFRIGERANT CHARGE	R404A, 0 lb. 14.1 oz. (400g)

### 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	<b>505</b>	<u>229</u>	495	<u>224</u>	457	<u>207</u>
	80/27	497	<u>226</u>	481	<u>218</u>	430	<u>195</u>
	90/32	495	<u>224</u>	<b>470</b>	<u>213</u>	424	<u>192</u>
lbs./day <u>kg./day</u>	100/38	479	<u>217</u>	459	<u>208</u>	381	<u>173</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	<b>770</b>		779		786	
	80/27	777		790		794	
	90/32	779		<b>800</b>		805	
watts	100/38	778		801		810	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	<b>444</b>	<u>1.68</u>	525	<u>1.99</u>	888	<u>3.36</u>
	80/27	506	<u>1.91</u>	630	<u>2.39</u>	1135	<u>4.30</u>
	90/32	525	<u>1.99</u>	<b>719</b>	<u>2.72</u>	1171	<u>4.43</u>
gal./day <u>m<sup>3</sup>/day</u>	100/38	754	<u>2.85</u>	825	<u>3.12</u>	1586	<u>6.01</u>
FREEZING CYCLE TIME	70/21	<b>25</b>		25		28	
	80/27	25		26		30	
	90/32	25		<b>27</b>		30	
min.	100/38	26		28		33	
HARVEST CYCLE TIME	70/21	<b>2.8</b>		2.6		2.5	
	80/27	2.6		2.3		2.4	
	90/32	2.6		<b>2.1</b>		2.1	
min.	100/38	2.4		2.1		2.1	
HEAD PRESSURE	70/21	<b>257</b>	<u>18.1</u>	261	<u>18.3</u>	271	<u>19.1</u>
	80/27	260	<u>18.3</u>	266	<u>18.7</u>	279	<u>19.6</u>
	90/32	261	<u>18.3</u>	<b>270</b>	<u>19.0</u>	282	<u>19.8</u>
PSIG <u>kg/cm<sup>2</sup>G</u>	100/38	265	<u>18.6</u>	273	<u>19.2</u>	293	<u>20.6</u>
SUCTION PRESSURE	70/21	<b>45</b>	<u>3.2</u>	47	<u>3.3</u>	48	<u>3.4</u>
	80/27	46	<u>3.3</u>	49	<u>3.5</u>	50	<u>3.5</u>
	90/32	47	<u>3.3</u>	<b>51</b>	<u>3.6</u>	52	<u>3.7</u>
PSIG <u>kg/cm<sup>2</sup>G</u>	100/38	47	<u>3.3</u>	51	<u>3.6</u>	53	<u>3.7</u>
TOTAL HEAT OF REJECTION FROM CONDENSER	6,400 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
TOTAL HEAT OF REJECTION FROM COMPRESSOR	1,000 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
WATER FLOW FOR CONDENSER	63 gal./h [AT 100°F (38°C) / WT 90°F (32°C)]						
PRESSURE DROP OF COOLING WATER LINE	less than 10 PSIG						

### 3. KMD-530MAH

**Data Pending**

#### 4. KMD-530MWH

**Data Pending**

## 5. KMD-530MRH

**Data Pending**

## 6. KML-250MAH

### Specification Sheet

AC SUPPLY VOLTAGE	115/60/1	
AMPERAGE	8.2A (5 Min. Freeze AT 104°F/WT 80°F)	
MINIMUM CIRCUIT AMPACITY	20 A	
MAXIMUM FUSE SIZE	20 A	
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F
ELECTRIC W (kWH/100 lbs.)	813 (8.2)	755 (5.9)
WATER gal./24HR (gal./100 lbs.)	84 (35.2)	194 (63.1)
ICE PRODUCTION PER CYCLE	6.6 lbs. (3.0 kg) 360 pcs.	
BIN CONTROL SYSTEM	Thermostatic Bin Control	
REFRIGERANT CHARGE	R-404A, 1 lb. 2 oz. (505 g)	

### 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	<b>307</b>	<u>139</u>	287	<u>130</u>	267	<u>121</u>
	80/27	292	<u>132</u>	260	<u>118</u>	245	<u>111</u>
	90/32	287	<u>130</u>	<b>238</b>	<u>108</u>	220	<u>100</u>
lbs./day kg./day	100/38	260	<u>118</u>	234	<u>106</u>	204	<u>93</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	<b>755</b>		772		779	
	80/27	768		794		792	
	90/32	772		<b>813</b>		815	
watts	100/38	791		814		816	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	<b>194</b>	<u>0.73</u>	162	<u>0.61</u>	142	<u>0.54</u>
	80/27	169	<u>0.64</u>	119	<u>0.45</u>	114	<u>0.43</u>
	90/32	162	<u>0.61</u>	<b>84</b>	<u>0.32</u>	72	<u>0.27</u>
gal./day m <sup>3</sup> /day	100/38	124	<u>0.47</u>	81	<u>0.31</u>	61	<u>0.23</u>
FREEZING CYCLE TIME	70/21	<b>27</b>		29		32	
	80/27	29		32		35	
	90/32	29		<b>35</b>		38	
min.	100/38	33		36		41	
HARVEST CYCLE TIME	70/21	<b>4.7</b>		4.0		3.7	
	80/27	4.1		3.0		3.1	
	90/32	4.0		<b>2.2</b>		2.1	
min.	100/38	3.2		2.2		2.0	
HEAD PRESSURE	70/21	<b>247</b>	<u>17.4</u>	266	<u>18.7</u>	293	<u>20.6</u>
	80/27	261	<u>18.4</u>	290	<u>20.4</u>	319	<u>22.4</u>
	90/32	266	<u>18.7</u>	<b>311</b>	<u>21.9</u>	340	<u>23.9</u>
PSIG kg/cm <sup>2</sup> G	100/38	295	<u>20.7</u>	318	<u>22.3</u>	366	<u>25.7</u>
SUCTION PRESSURE	70/21	<b>58</b>	<u>4.1</u>	59	<u>4.2</u>	60	<u>4.2</u>
	80/27	59	<u>4.1</u>	61	<u>4.3</u>	62	<u>4.3</u>
	90/32	59	<u>4.2</u>	<b>62</b>	<u>4.4</u>	63	<u>4.4</u>
PSIG kg/cm <sup>2</sup> G	100/38	61	<u>4.3</u>	62	<u>4.4</u>	<b>64</b>	<u>4.5</u>
TOTAL HEAT OF REJECTION	5560 BTU / hr [AT 90°F (32°C) / WT 70°F (21°C)]						

## 7. KML-250MWH

### Specification Sheet

AC SUPPLY VOLTAGE	115/60/1	
AMPERAGE	7.5 A (5 Min. Freeze AT 104°F/WT 80°F)	
MINIMUM CIRCUIT AMPACITY	20 A	
MAXIMUM FUSE SIZE	20 A	
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F
ELECTRIC W (kWH/100 lbs.)	0 (0.00)	0 (0.0)
WATER gal./24HR (gal./100 lbs.)	252 (0.0)	21 (284.0)
WATER COOLED CONDENSER	767 (7)	21 (737)
gal./24HR (gal./100 lbs.)		
ICE PRODUCTION PER CYCLE	6.6 lbs. (3.0 kg) 360 pcs.	
BIN CONTROL SYSTEM	Thermostatic Bin Control	
REFRIGERANT CHARGE	R-404A,	14.1 oz. (400 g)

### 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	<b>*314</b>	<u>142</u>	305	<u>138</u>	290	<u>132</u>
	80/27	307	<u>139</u>	294	<u>133</u>	277	<u>126</u>
	90/32	305	<u>138</u>	<b>*284</b>	<u>129</u>	267	<u>121</u>
lbs./day <u>kg./day</u>	100/38	301	<u>137</u>	280	<u>127</u>	252	<u>114</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	<b>*720</b>		725		738	
	80/27	724		732		748	
	90/32	725		<b>*737</b>		752	
watts	100/38	735		741		767	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	<b>*398</b>	<u>1.51</u>	420	<u>1.59</u>	525	<u>1.99</u>
	80/27	415	<u>1.57</u>	471	<u>1.78</u>	595	<u>2.25</u>
	90/32	420	<u>1.59</u>	<b>*473</b>	<u>1.79</u>	604	<u>2.29</u>
gal./day <u>m<sup>3</sup>/day</u>	100/38	466	<u>1.76</u>	504	<u>1.91</u>	724	<u>2.74</u>
FREEZING CYCLE TIME	70/21	<b>*28</b>		29		31	
	80/27	29		30		32	
	90/32	29		<b>*31</b>		33	
min.	100/38	29		31		35	
HARVEST CYCLE TIME	70/21	<b>*4.1</b>		3.6		3.3	
	80/27	3.7		3.0		2.8	
	90/32	3.6		<b>*2.5</b>		2.2	
min.	100/38	3.4		2.4		2.0	
HEAD PRESSURE	70/21	<b>*280</b>	<u>19.7</u>	280	<u>19.7</u>	284	<u>20.0</u>
	80/27	280	<u>19.7</u>	280	<u>19.7</u>	286	<u>20.1</u>
	90/32	280	<u>19.7</u>	<b>*280</b>	<u>19.7</u>	285	<u>20.1</u>
PSIG <u>kg/cm<sup>2</sup>G</u>	100/38	282	<u>19.8</u>	284	<u>20.0</u>	290	<u>20.4</u>
SUCTION PRESSURE	70/21	<b>*61</b>	<u>4.3</u>	61	<u>4.3</u>	63	<u>4.4</u>
	80/27	61	<u>4.3</u>	62	<u>4.3</u>	63	<u>4.5</u>
	90/32	61	<u>4.3</u>	<b>*62</b>	<u>4.4</u>	64	<u>4.5</u>
PSIG <u>kg/cm<sup>2</sup>G</u>	100/38	62	<u>4.3</u>	62	<u>4.4</u>	65	<u>4.6</u>
TOTAL HEAT OF REJECTION FROM CONDENSER	5000 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
TOTAL HEAT OF REJECTION FROM COMPRESSOR	930 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
WATER FLOW FOR CONDENSER	27 gal. / h (AT 100°F (38°C) / WT 90°F (32°C))						
PRESSURE DROP OF COOLING WATER LINE	less than 10 PSIG						

## 8. KML-351MAH

### Specification Sheet

AC SUPPLY VOLTAGE	115/60/1	
AMPERAGE	7.4 A (5 Min. Freeze AT 104°F/WT 80°F)	
MINIMUM CIRCUIT AMPACITY	20 A	
MAXIMUM FUSE SIZE	20 A	
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F
ELECTRIC W (kWH/100 lbs.)	750(6.4)	70/21(0.0)
WATER gal./24HR (gal./100 lbs.)	57(20.3)	10(0.0)
ICE PRODUCTION PER CYCLE	8 lbs. (3.6 kg) 360pcs.	
BIN CONTROL SYSTEM	Thermostatic Bin Control	
REFRIGERANT CHARGE	R404A, 1 lb. 9.4 oz. (720g)	

### 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	<b>333</b>	<u>151</u>	318	<u>144</u>	288	<u>130</u>
	80/27	322	<u>146</u>	298	<u>135</u>	262	<u>119</u>
	90/32	318	<u>144</u>	<b>282</b>	<u>128</u>	248	<u>112</u>
lbs./day kg./day	100/38	309	<u>140</u>	274	<u>124</u>	216	<u>98</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	<b>680</b>		701		719	
	80/27	696		728		740	
	90/32	701		<b>750</b>		766	
watts	100/38	701		754		780	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	<b>147</b>	<u>0.56</u>	121	<u>0.46</u>	109	<u>0.41</u>
	80/27	127	<u>0.48</u>	86	<u>0.33</u>	88	<u>0.33</u>
	90/32	121	<u>0.46</u>	<b>57</b>	<u>0.22</u>	53	<u>0.20</u>
gal./day m <sup>3</sup> /day	100/38	91	<u>0.35</u>	56	<u>0.21</u>	49	<u>0.18</u>
FREEZING CYCLE TIME	70/21	<b>30</b>		32		36	
	80/27	32		36		40	
	90/32	32		<b>38</b>		42	
min.	100/38	33		39		46	
HARVEST CYCLE TIME	70/21	<b>4.9</b>		4.3		4.1	
	80/27	4.4		3.5		3.6	
	90/32	4.3		<b>2.8</b>		2.8	
min.	100/38	3.6		2.8		2.8	
HEAD PRESSURE	70/21	<b>209</b>	<u>14.7</u>	230	<u>16.1</u>	251	<u>17.7</u>
	80/27	225	<u>15.8</u>	257	<u>18.0</u>	275	<u>19.3</u>
	90/32	230	<u>16.1</u>	<b>279</b>	<u>19.6</u>	299	<u>21.0</u>
PSIG kg/cm <sup>2</sup> G	100/38	232	<u>16.3</u>	284	<u>20.0</u>	318	<u>22.4</u>
SUCTION PRESSURE	70/21	<b>39</b>	<u>2.7</u>	40	<u>2.8</u>	42	<u>3.0</u>
	80/27	40	<u>2.8</u>	42	<u>2.9</u>	44	<u>3.1</u>
	90/32	40	<u>2.8</u>	<b>43</b>	<u>3.0</u>	45	<u>3.2</u>
PSIG kg/cm <sup>2</sup> G	100/38	41	<u>2.9</u>	43	<u>3.1</u>	47	<u>3.3</u>
TOTAL HEAT OF REJECTION FROM CONDENSER	6,600 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						



## 9. KML-351MWH

### Specification Sheet

AC SUPPLY VOLTAGE	115/60/1	
AMPERAGE	7.5 A (5 Min. Freeze AT 104°F/WT 80°F)	
MINIMUM CIRCUIT AMPACITY	20 A	
MAXIMUM FUSE SIZE	20 A	
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F
ELECTRIC W (kWH/100 lbs.)	690 (5.41)	710 (4.85)
WATER gal./24HR (gal./100 lbs.)	63 (20.5)	102 (29.2)
WATER COOLED CONDENSER	440 (143)	202 (58)
gal./24HR (gal./100 lbs.)		
ICE PRODUCTION PER CYCLE	7.2 lbs. (3.3 kg) 360 pcs.	
BIN CONTROL SYSTEM	Thermostatic Bin Control	
REFRIGERANT CHARGE	R-404A, 1 lb. 1.6 oz. (500g)	

### 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	<b>349</b>	<u>158</u>	337	<u>153</u>	314	<u>142</u>
	80/27	340	<u>154</u>	320	<u>145</u>	295	<u>134</u>
	90/32	337	<u>153</u>	<b>307</b>	<u>139</u>	282	<u>128</u>
lbs./day kg./day	100/38	330	<u>150</u>	301	<u>137</u>	259	<u>117</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	<b>710</b>		704		718	
	80/27	706		696		722	
	90/32	704		<b>690</b>		711	
watts	100/38	714		695		730	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	<b>304</b>	<u>1.15</u>	363	<u>1.37</u>	720	<u>2.73</u>
	80/27	349	<u>1.32</u>	439	<u>1.66</u>	951	<u>3.60</u>
	90/32	363	<u>1.37</u>	<b>503</b>	<u>1.90</u>	958	<u>3.62</u>
gal./day m <sup>3</sup> /day	100/38	569	<u>2.15</u>	610	<u>2.31</u>	1375	<u>5.20</u>
FREEZING CYCLE TIME	70/21	<b>25</b>		27		29	
	80/27	26		28		31	
	90/32	27		<b>30</b>		33	
min.	100/38	27		31		35	
HARVEST CYCLE TIME	70/21	<b>4.8</b>		4.4		4.3	
	80/27	4.5		4.0		4.0	
	90/32	4.4		<b>3.6</b>		3.6	
min.	100/38	4.0		3.6		3.6	
HEAD PRESSURE	70/21	<b>268</b>	<u>18.9</u>	269	<u>18.9</u>	281	<u>19.7</u>
	80/27	269	<u>18.9</u>	269	<u>18.9</u>	287	<u>20.2</u>
	90/32	269	<u>18.9</u>	<b>270</b>	<u>19.0</u>	286	<u>20.1</u>
PSIG kg/cm <sup>2</sup> G	100/38	275	<u>19.3</u>	274	<u>19.2</u>	300	<u>21.1</u>
SUCTION PRESSURE	70/21	<b>48</b>	<u>3.4</u>	48	<u>3.4</u>	50	<u>3.5</u>
	80/27	48	<u>3.4</u>	48	<u>3.4</u>	50	<u>3.5</u>
	90/32	48	<u>3.4</u>	<b>48</b>	<u>3.4</u>	50	<u>3.5</u>
PSIG kg/cm <sup>2</sup> G	100/38	49	<u>3.4</u>	49	<u>3.4</u>	52	<u>3.6</u>
TOTAL HEAT OF REJECTION FROM CONDENSER	4,700 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
TOTAL HEAT OF REJECTION FROM COMPRESSOR	900 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
WATER FLOW FOR CONDENSER	55 gal./h [AT 100°F (38°C) / WT 90°F (32°C)]						
PRESSURE DROP OF COOLING WATER LINE	less than 10 PSIG						

## 10. KML-451MAH

### Specification Sheet

AC SUPPLY VOLTAGE	115/60/1	
AMPERAGE	9.5 A ( 5 Min. Freeze AT 104°F / WT 80°F)	
MINIMUM CIRCUIT AMPACITY	20 A	
MAXIMUM FUSE SIZE	20 A	
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F
ELECTRIC W (kWH/100 lbs.)	890 (6.1)	770 (4.6)
WATER gal./24HR (gal./100 lbs.)	63 (18.0)	111 (27.6)
ICE PRODUCTION PER CYCLE	7.6 lbs. (3.4 kg) 360pcs.	
BIN CONTROL SYSTEM	Thermostatic Bin Control	
REFRIGERANT CHARGE	R404A, 1 lb. 8.7 oz. (700g)	

### 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	<b>401</b>	<u>182</u>	386	<u>175</u>	355	<u>161</u>
	80/27	389	<u>177</u>	366	<u>166</u>	329	<u>149</u>
	90/32	386	<u>175</u>	<b>349</b>	<u>158</u>	314	<u>142</u>
lbs./day <u>kg./day</u>	100/38	376	<u>171</u>	341	<u>155</u>	282	<u>128</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	<b>770</b>		805		828	
	80/27	797		851		861	
	90/32	805		<b>890</b>		906	
watts	100/38	801		894		920	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	<b>111</b>	<u>0.42</u>	97	<u>0.37</u>	88	<u>0.33</u>
	80/27	100	<u>0.38</u>	78	<u>0.30</u>	75	<u>0.28</u>
	90/32	97	<u>0.37</u>	<b>63</b>	<u>0.24</u>	57	<u>0.22</u>
gal./day <u>m<sup>3</sup>/day</u>	100/38	80	<u>0.30</u>	61	<u>0.23</u>	52	<u>0.20</u>
FREEZING CYCLE TIME	70/21	<b>24</b>		25		28	
	80/27	25		28		30	
	90/32	25		<b>29</b>		32	
min.	100/38	26		30		34	
HARVEST CYCLE TIME	70/21	<b>4.5</b>		4.0		3.8	
	80/27	4.1		3.3		3.4	
	90/32	4.0		<b>2.7</b>		2.7	
min.	100/38	3.4		2.7		2.7	
HEAD PRESSURE	70/21	<b>218</b>	<u>15.3</u>	240	<u>16.9</u>	264	<u>18.6</u>
	80/27	235	<u>16.5</u>	270	<u>19.0</u>	290	<u>20.4</u>
	90/32	240	<u>16.9</u>	<b>294</b>	<u>20.7</u>	316	<u>22.2</u>
PSIG <u>kg/cm<sup>2</sup>G</u>	100/38	243	<u>17.1</u>	299	<u>21.0</u>	337	<u>23.7</u>
SUCTION PRESSURE	70/21	<b>45</b>	<u>3.2</u>	47	<u>3.3</u>	50	<u>3.5</u>
	80/27	47	<u>3.3</u>	50	<u>3.5</u>	52	<u>3.7</u>
	90/32	47	<u>3.3</u>	<b>53</b>	<u>3.7</u>	55	<u>3.9</u>
PSIG <u>kg/cm<sup>2</sup>G</u>	100/38	48	<u>3.3</u>	53	<u>3.8</u>	57	<u>4.0</u>
TOTAL HEAT OF REJECTION FROM CONDENSER	7,300 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						

# 11. KML-451MWH

## Specification Sheet

AC SUPPLY VOLTAGE	115/60/1	
AMPERAGE	9.8 A (5 Min. Freeze AT 104°F/WT 80°F)	
MINIMUM CIRCUIT AMPACITY	20 A	
MAXIMUM FUSE SIZE	20 A	
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F
ELECTRIC W (kWH/100 lbs.)	950 (5.5)	920 (5.3)
POTABLE WATER gal./24HR (gal./100 lbs.)	87 (20.9)	124 (29.9)
WATER COOLED CONDENSER	432 (104)	234 (57)
gal./24HR (gal./100 lbs.)		
ICE PRODUCTION PER CYCLE	7.2 lbs. (3.3 kg) 360pcs.	
BIN CONTROL SYSTEM	Thermostatic Bin Control	
REFRIGERANT CHARGE	R404A, 0 lb. 15.2 oz. (430g)	

## 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	<b>415</b>	<u>188</u>	415	<u>188</u>	395	<u>179</u>
	80/27	415	<u>188</u>	414	<u>188</u>	384	<u>174</u>
	90/32	415	<u>188</u>	<b>414</b>	<u>188</u>	388	<u>176</u>
lbs./day kg./day	100/38	404	<u>183</u>	408	<u>185</u>	364	<u>165</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	<b>920</b>		929		924	
	80/27	927		940		926	
	90/32	929		<b>950</b>		940	
watts	100/38	922		948		930	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	<b>359</b>	<u>1.36</u>	405	<u>1.53</u>	644	<u>2.44</u>
	80/27	394	<u>1.49</u>	467	<u>1.77</u>	802	<u>3.04</u>
	90/32	405	<u>1.53</u>	<b>519</b>	<u>1.96</u>	817	<u>3.09</u>
gal./day m <sup>3</sup> /day	100/38	550	<u>2.08</u>	589	<u>2.23</u>	1092	<u>4.13</u>
FREEZING CYCLE TIME	70/21	<b>21</b>		22		23	
	80/27	21		22		24	
	90/32	22		<b>23</b>		24	
min.	100/38	22		24		26	
HARVEST CYCLE TIME	70/21	<b>4.2</b>		3.7		3.5	
	80/27	3.8		3.1		3.1	
	90/32	3.7		<b>2.7</b>		2.5	
min.	100/38	3.2		2.6		2.4	
HEAD PRESSURE	70/21	<b>273</b>	<u>19.2</u>	273	<u>19.2</u>	276	<u>19.4</u>
	80/27	273	<u>19.2</u>	272	<u>19.1</u>	277	<u>19.5</u>
	90/32	273	<u>19.2</u>	<b>272</b>	<u>19.1</u>	276	<u>19.4</u>
PSIG kg/cm <sup>2</sup> G	100/38	274	<u>19.3</u>	273	<u>19.2</u>	280	<u>19.7</u>
SUCTION PRESSURE	70/21	<b>46</b>	<u>3.2</u>	47	<u>3.3</u>	48	<u>3.4</u>
	80/27	47	<u>3.3</u>	48	<u>3.4</u>	50	<u>3.5</u>
	90/32	47	<u>3.3</u>	<b>49</b>	<u>3.4</u>	51	<u>3.6</u>
PSIG kg/cm <sup>2</sup> G	100/38	47	<u>3.3</u>	49	<u>3.5</u>	52	<u>3.7</u>
TOTAL HEAT OF REJECTION FROM CONDENSER	7,300 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
TOTAL HEAT OF REJECTION FROM COMPRESSOR	1,300 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
WATER FLOW FOR CONDENSER	43 gal./h [AT 100°F (38°C) / WT 90°F (32°C)]						
PRESSURE DROP OF COOLING WATER LINE	less than 10 PSIG						

## 12. KML-631MAH

### Specification Sheet

AC SUPPLY VOLTAGE	208-230/60/1 (3 wire with neutral for 115V)	
AMPERAGE	8.1 A ( 5 Min. Freeze AT 104°F / WT 80°F)	
MINIMUM CIRCUIT AMPACITY	20 A	
MAXIMUM FUSE SIZE	20 A	
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F
ELECTRIC W (kWH/100 lbs.)	1210(5.7)	1130(4.5)
WATER gal./24HR (gal./100 lbs.)	82(16.0)	191(31.6)
ICE PRODUCTION PER CYCLE	10.5 lbs. (4.8 kg) 480 pcs.	
BIN CONTROL SYSTEM	Thermostatic Bin Control	
REFRIGERANT CHARGE	R404A, 2 lb. 10.3 oz. (1200g)	

### 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	<b>605</b>	<u>274</u>	577	<u>262</u>	538	<u>244</u>
	80/27	584	<u>265</u>	541	<u>245</u>	500	<u>227</u>
lbs./day <u>kg./day</u>	100/38	569	<u>258</u>	500	<u>227</u>	432	<u>196</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	<b>1130</b>		1153		1192	
	80/27	1148		1184		1227	
	90/32	1153		<b>1210</b>		1252	
watts	100/38	1163		1220		1290	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	<b>191</b>	<u>0.72</u>	159	<u>0.60</u>	144	<u>0.54</u>
	80/27	167	<u>0.63</u>	117	<u>0.44</u>	117	<u>0.44</u>
	90/32	159	<u>0.60</u>	<b>82</b>	<u>0.31</u>	75	<u>0.28</u>
gal./day <u>m<sup>3</sup>/day</u>	100/38	123	<u>0.47</u>	80	<u>0.30</u>	69	<u>0.26</u>
FREEZING CYCLE TIME	70/21	<b>22</b>		23		26	
	80/27	23		25		28	
	90/32	23		<b>27</b>		30	
min.	100/38	24		28		32	
HARVEST CYCLE TIME	70/21	<b>3.3</b>		3.0		2.9	
	80/27	3.1		2.5		2.6	
	90/32	3.0		<b>2.1</b>		2.1	
min.	100/38	2.6		2.1		2.1	
HEAD PRESSURE	70/21	<b>223</b>	<u>15.7</u>	243	<u>17.1</u>	270	<u>19.0</u>
	80/27	238	<u>16.8</u>	270	<u>19.0</u>	296	<u>20.8</u>
	90/32	243	<u>17.1</u>	<b>292</b>	<u>20.5</u>	319	<u>22.4</u>
PSIG <u>kg/cm<sup>2</sup>G</u>	100/38	248	<u>17.5</u>	298	<u>21.0</u>	344	<u>24.2</u>
SUCTION PRESSURE	70/21	<b>36</b>	<u>2.5</u>	39	<u>2.7</u>	44	<u>3.1</u>
	80/27	38	<u>2.7</u>	42	<u>3.0</u>	48	<u>3.4</u>
	90/32	39	<u>2.7</u>	<b>45</b>	<u>3.2</u>	51	<u>3.6</u>
PSIG <u>kg/cm<sup>2</sup>G</u>	100/38	40	<u>2.8</u>	46	<u>3.3</u>	56	<u>3.9</u>
TOTAL HEAT OF REJECTION	8900 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						

### 13. KML-631MWH

#### Specification Sheet

AC SUPPLY VOLTAGE	208-230/60/1 (3 wire with neutral for 115V)	
AMPERAGE	8.0 A ( 5 Min. Freeze AT 104°F / WT 80°F)	
MINIMUM CIRCUIT AMPACITY	20 A	
MAXIMUM FUSE SIZE	20 A	
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F
ELECTRIC W (kWH/100 lbs.)	1090(4.2)	1050(3.8)
WATER gal./24HR (gal./100 lbs.)	99(16.0)	195(29.1)
WATER COOLED CONDENSER	744(120)	436(65)
gal./24HR (gal./100 lbs.)		
ICE PRODUCTION PER CYCLE	10.5 lbs. (4.8 kg) 480 pcs.	
BIN CONTROL SYSTEM	Thermostatic Bin Control	
REFRIGERANT CHARGE	R-404A, 1 lb. 6.0 oz. (625g)	

#### 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	<b>671</b>	<u>304</u>	656	<u>298</u>	622	<u>282</u>
	80/27	660	<u>299</u>	636	<u>289</u>	595	<u>270</u>
	90/32	656	<u>298</u>	<b>620</b>	<u>281</u>	581	<u>264</u>
lbs./day    kg./day	100/38	645	<u>293</u>	611	<u>277</u>	546	<u>248</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	<b>1050</b>		1062		1073	
	80/27	1059		1077		1086	
	90/32	1062		<b>1090</b>		1100	
watts	100/38	1063		1092		1110	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	<b>631</b>	<u>2.39</u>	693	<u>2.62</u>	1060	<u>4.01</u>
	80/27	679	<u>2.57</u>	775	<u>2.93</u>	1298	<u>4.91</u>
	90/32	693	<u>2.62</u>	<b>843</b>	<u>3.19</u>	1307	<u>4.95</u>
gal./day    m <sup>3</sup> /day	100/38	907	<u>3.43</u>	952	<u>3.60</u>	1734	<u>6.56</u>
FREEZING CYCLE TIME	70/21	<b>20</b>		21		22	
	80/27	21		21		23	
	90/32	21		<b>22</b>		24	
min.	100/38	21		22		25	
HARVEST CYCLE TIME	70/21	<b>3.2</b>		2.9		2.8	
	80/27	3.0		2.5		2.5	
	90/32	2.9		<b>2.1</b>		2.1	
min.	100/38	2.5		2.1		2.1	
HEAD PRESSURE	70/21	<b>239</b>	<u>16.8</u>	240	<u>16.9</u>	246	<u>17.3</u>
	80/27	240	<u>16.9</u>	241	<u>16.9</u>	249	<u>17.5</u>
	90/32	240	<u>16.9</u>	<b>242</b>	<u>17.0</u>	249	<u>17.5</u>
PSIG    kg/cm <sup>2</sup> G	100/38	243	<u>17.1</u>	244	<u>17.1</u>	256	<u>18.0</u>
SUCTION PRESSURE	70/21	<b>34</b>	<u>2.4</u>	35	<u>2.5</u>	39	<u>2.8</u>
	80/27	35	<u>2.4</u>	37	<u>2.6</u>	42	<u>3.0</u>
	90/32	35	<u>2.5</u>	<b>38</b>	<u>2.7</u>	43	<u>3.0</u>
PSIG    kg/cm <sup>2</sup> G	100/38	37	<u>2.6</u>	39	<u>2.8</u>	48	<u>3.4</u>
TOTAL HEAT OF REJECTION FROM CONDENSER	8,400 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
TOTAL HEAT OF REJECTION FROM COMPRESSOR	1,400 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
WATER FLOW FOR CONDENSER	68.6 gal./h [AT 100°F (38°C) / WT 90°F (32°C)]						
PRESSURE DROP OF COOLING WATER LINE	less than 10 PSIG						

## 14. KML-631MRH

### Specification Sheet

AC SUPPLY VOLTAGE	208-230/60/1 (3 wire with neutral for 115V)	
AMPERAGE	7.6 A ( 5 Min. Freeze AT 104°F / WT 80°F)	
MINIMUM CIRCUIT AMPACITY	20 A	
MAXIMUM FUSE SIZE	20 A	
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F
ELECTRIC W (kWH/100 lbs.)	1310(5.3)	1170(4.4)
WATER gal./24HR (gal./100 lbs.)	96(16.0)	190(29.5)
ICE PRODUCTION PER CYCLE	10.7 lbs. (4.8 kg) 480 pcs.	
BIN CONTROL SYSTEM	Thermostatic Bin Control	
CONDENSER	Air-Cooled Remote, Condenser Unit URC-9F	
REFRIGERANT CHARGE	R404A, 9 lb. 8.4 oz. (4320g) (Icemaker 5 lb. 9.6 oz. Cond. Unit 3 lb. 14.8 oz.)	

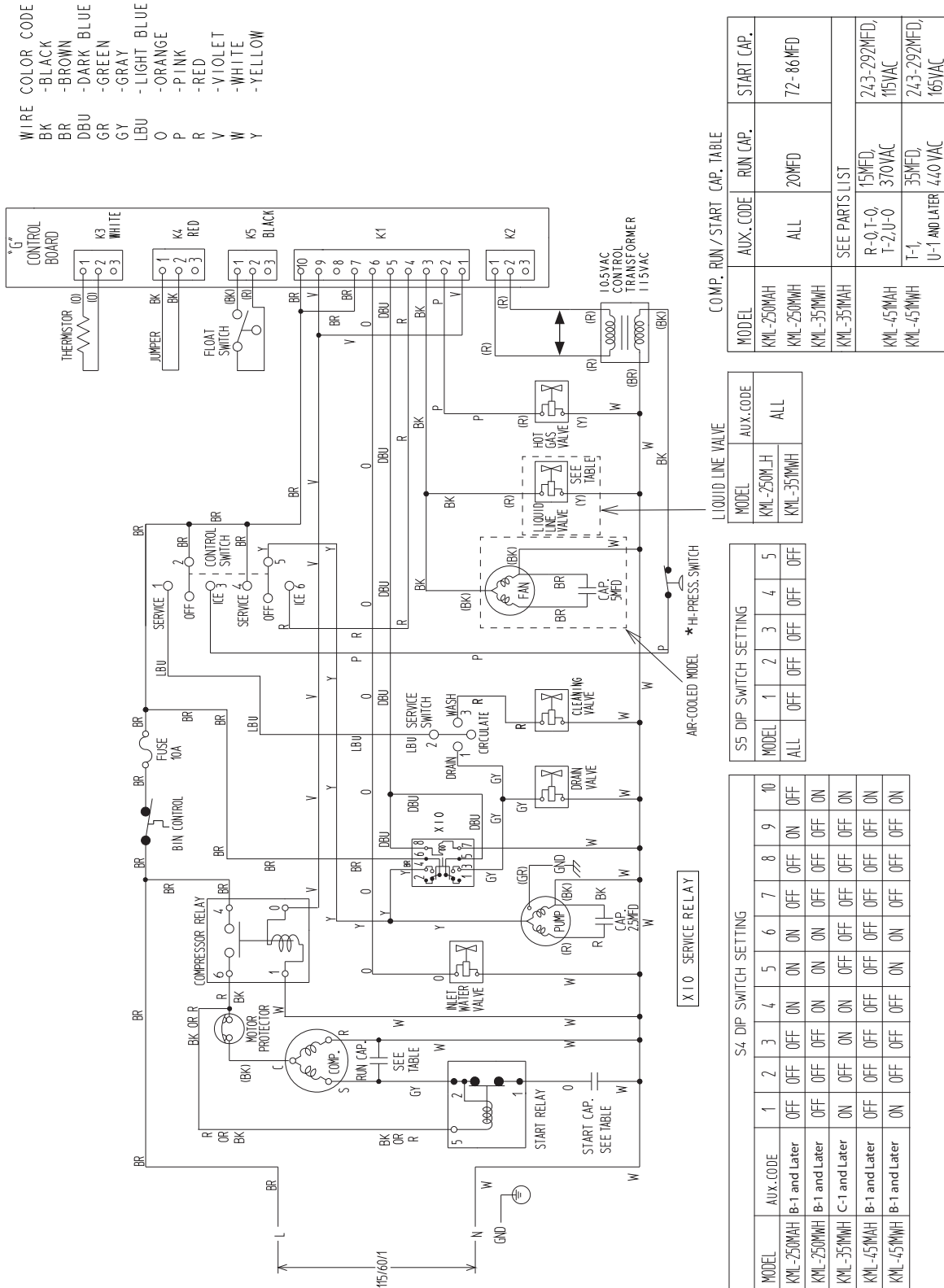
### Performance Data Sheet

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	<b>645</b>	<u>293</u>	632	<u>287</u>	591	<u>268</u>
	80/27	635	<u>288</u>	614	<u>279</u>	561	<u>254</u>
	90/32	632	<u>287</u>	<b>600</b>	<u>272</u>	551	<u>250</u>
lbs./day kg./day	100/38	616	<u>279</u>	589	<u>267</u>	506	<u>230</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	<b>1170</b>		1211		1217	
	80/27	1201		1265		1243	
	90/32	1211		<b>1310</b>		1300	
watts	100/38	1195		1308		1290	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	<b>190</b>	<u>0.72</u>	163	<u>0.62</u>	148	<u>0.56</u>
	80/27	169	<u>0.64</u>	126	<u>0.48</u>	124	<u>0.47</u>
	90/32	163	<u>0.62</u>	<b>96</b>	<u>0.36</u>	88	<u>0.33</u>
gal./day m <sup>3</sup> /day	100/38	131	<u>0.50</u>	94	<u>0.36</u>	81	<u>0.31</u>
FREEZING CYCLE TIME	70/21	<b>21</b>		22		24	
	80/27	22		23		25	
	90/32	22		<b>24</b>		26	
min.	100/38	22		24		28	
HARVEST CYCLE TIME	70/21	<b>3.1</b>		2.8		2.7	
	80/27	2.9		2.4		2.5	
	90/32	2.8		<b>2.1</b>		2.1	
min.	100/38	2.5		2.1		2.1	
HEAD PRESSURE	70/21	<b>199</b>	<u>14.0</u>	214	<u>15.0</u>	235	<u>16.5</u>
	80/27	210	<u>14.8</u>	234	<u>16.4</u>	255	<u>17.9</u>
	90/32	214	<u>15.0</u>	<b>250</b>	<u>17.6</u>	271	<u>19.1</u>
PSIG kg/cm <sup>2</sup> G	100/38	218	<u>15.3</u>	255	<u>17.9</u>	291	<u>20.5</u>
SUCTION PRESSURE	70/21	<b>36</b>	<u>2.5</u>	38	<u>2.7</u>	44	<u>3.1</u>
	80/27	37	<u>2.6</u>	40	<u>2.8</u>	48	<u>3.3</u>
	90/32	38	<u>2.7</u>	<b>42</b>	<u>3.0</u>	49	<u>3.4</u>
PSIG kg/cm <sup>2</sup> G	100/38	40	<u>2.8</u>	44	<u>3.1</u>	55	<u>3.9</u>
TOTAL HEAT OF REJECTION FROM CONDENSER	9,100 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
TOTAL HEAT OF REJECTION FROM COMPRESSOR	1,400 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]						
CONDENSER VOLUME	121 CU. IN (URC-9F)						

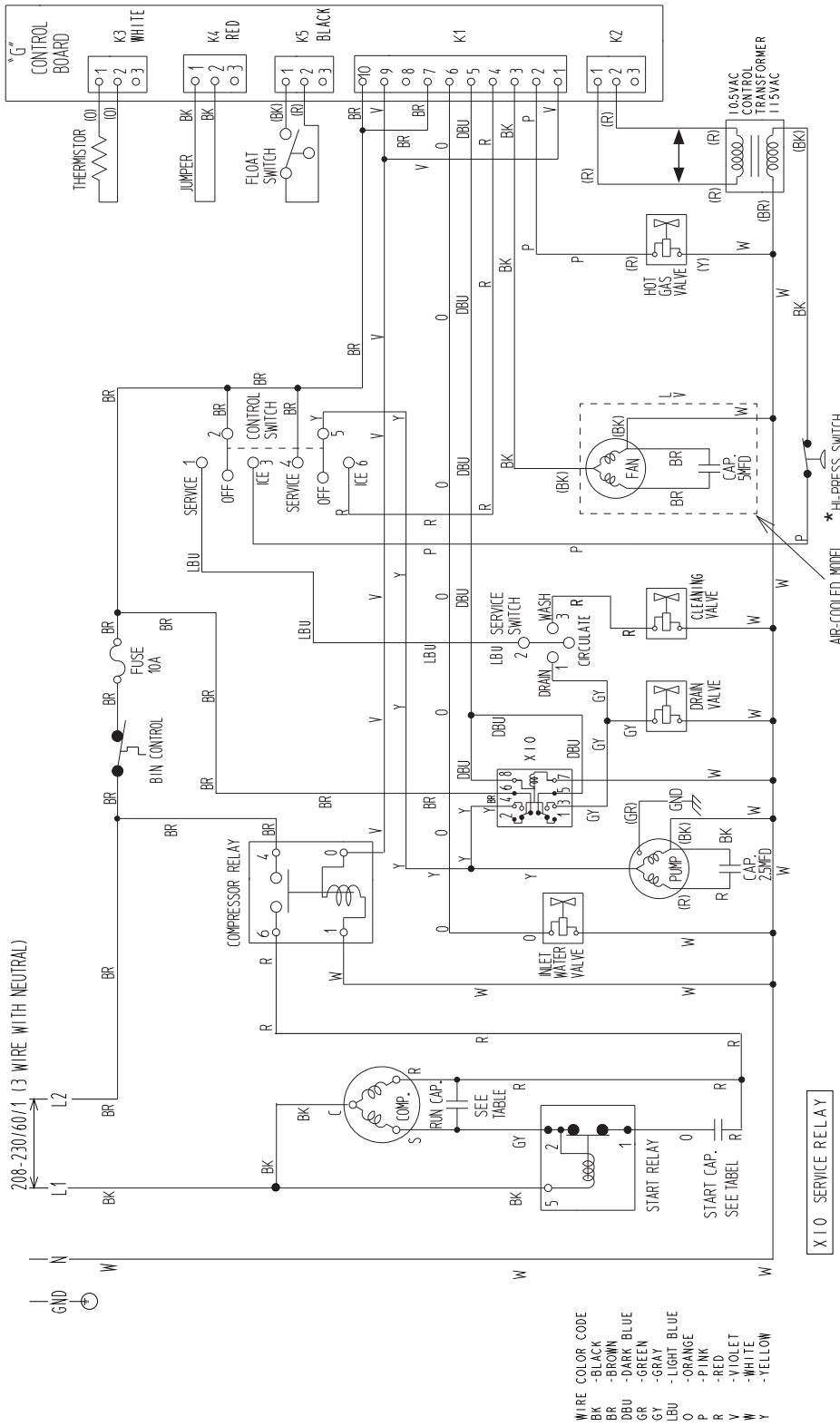
## B. Wiring Diagrams

### 1. Operation with Thermostatic Bin Control and without Harvest Pump Timer

#### a) KML-250M\_H, KML-351MWH, KML-451M\_H



**b) KML-631MAH, KML-631MWH**



- WIRE COLOR CODE  
 BR - BLACK  
 BK - BROWN  
 DBU - DARK BLUE  
 GR - GREEN  
 GY - GRAY  
 LBU - LIGHT BLUE  
 O - ORANGE  
 P - PINK  
 R - RED  
 V - VIOLET  
 W - WHITE  
 Y - YELLOW

COMP. RUN / START CAP. TABLE			
MODEL	AUX. CODE	RUN CAP.	START CAP.
KML-631MAH	ALL	30MFD	145-174MFD

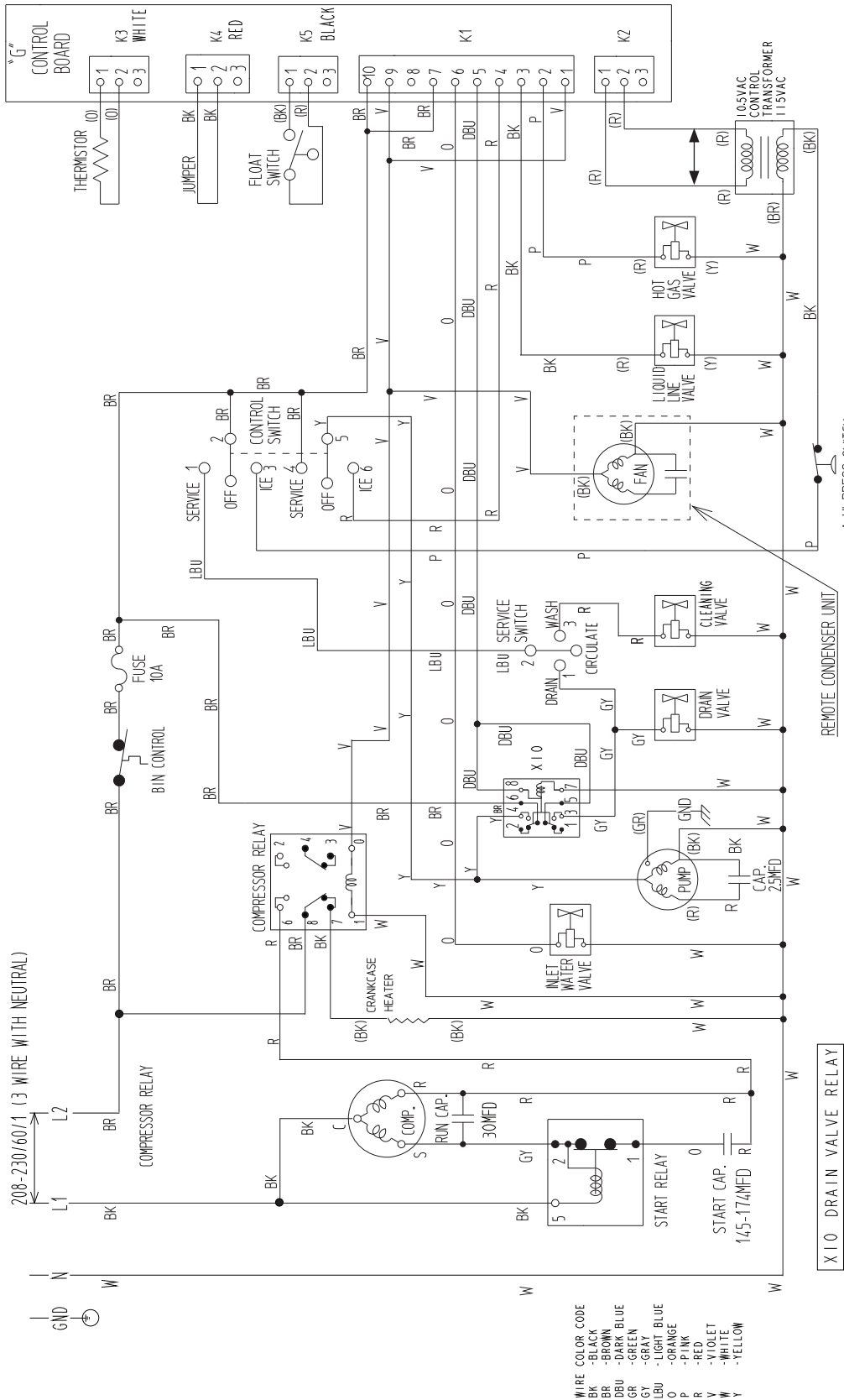
S4 DIP SWITCH SETTING										
MODEL	1	2	3	4	5	6	7	8	9	10
ALL	ON	OFF	OFF	ON	ON	ON	OFF	OFF	OFF	ON

S5 DIP SWITCH SETTING					
MODEL	1	2	3	4	5
ALL	OFF	OFF	OFF	OFF	OFF

* High-Pressure Switch		
Air-Cooled Model	Water-Cooled Model	
Cut-out	412±2 <sup>1.3</sup> PSIG	384±2 <sup>1.3</sup> PSIG
Cut-in	327±21.3 PSIG	284±21.3 PSIG



c) KML-631MRH



- WIRE COLOR CODE  
 BK - BLACK  
 BR - BROWN  
 DBU - DARK BLUE  
 GR - GREEN  
 LBU - LIGHT BLUE  
 O - ORANGE  
 P - PINK  
 R - RED  
 V - VIOLET  
 W - WHITE  
 Y - YELLOW

X10 DRAIN VALVE RELAY

S4 DIP SWITCH SETTING

MODEL	1	2	3	4	5	6	7	8	9	10
KML-631MRH	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	ON

S5 DIP SWITCH SETTING

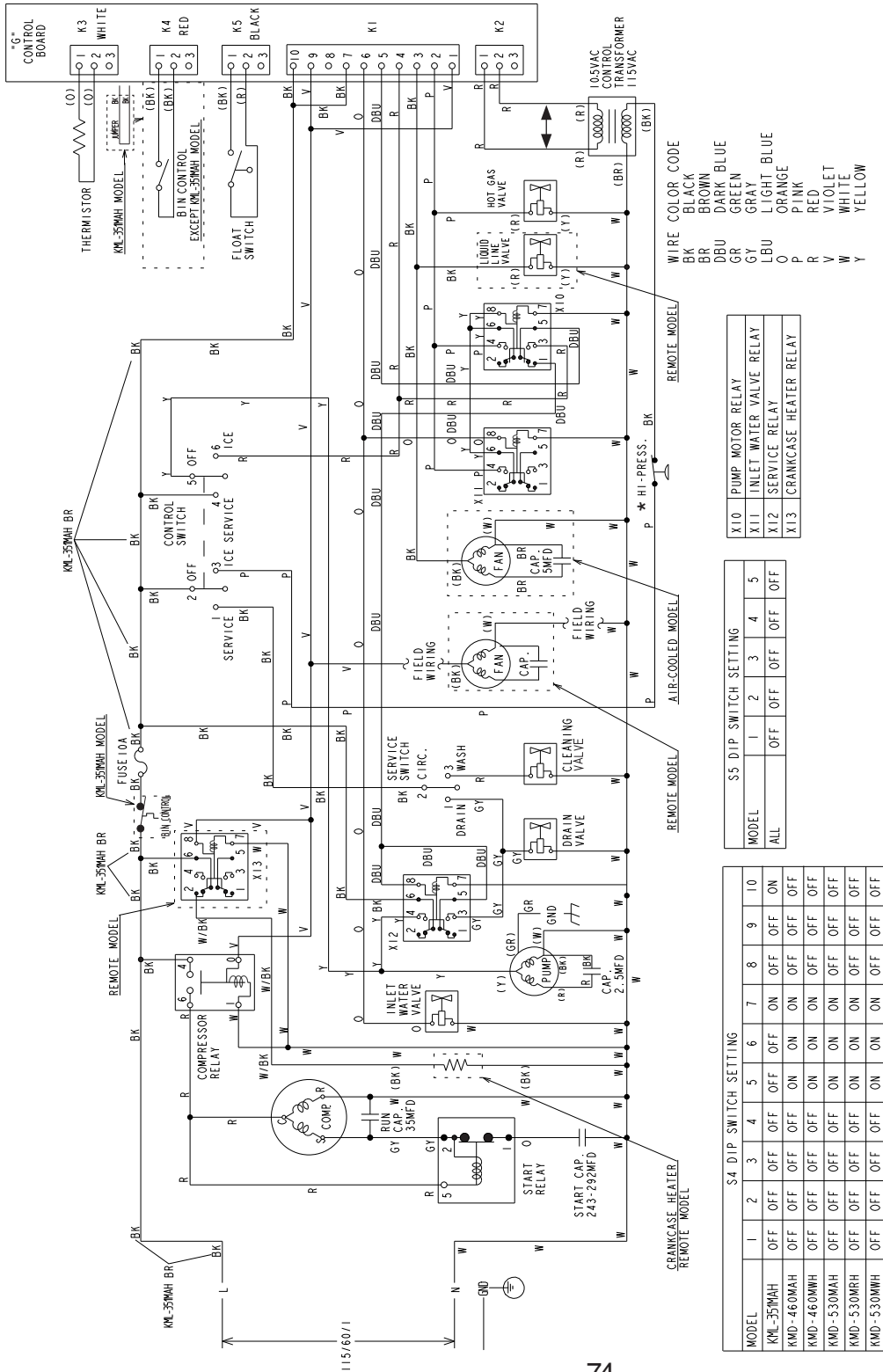
1	2	3	4	5
OFF	OFF	OFF	OFF	OFF

\* High-Pressure Switch

Remote Air-Cooled Model	
Cut-out	412± <sup>21.3</sup> <sub>0</sub> PSIG
Cut-in	327±21.3 PSIG

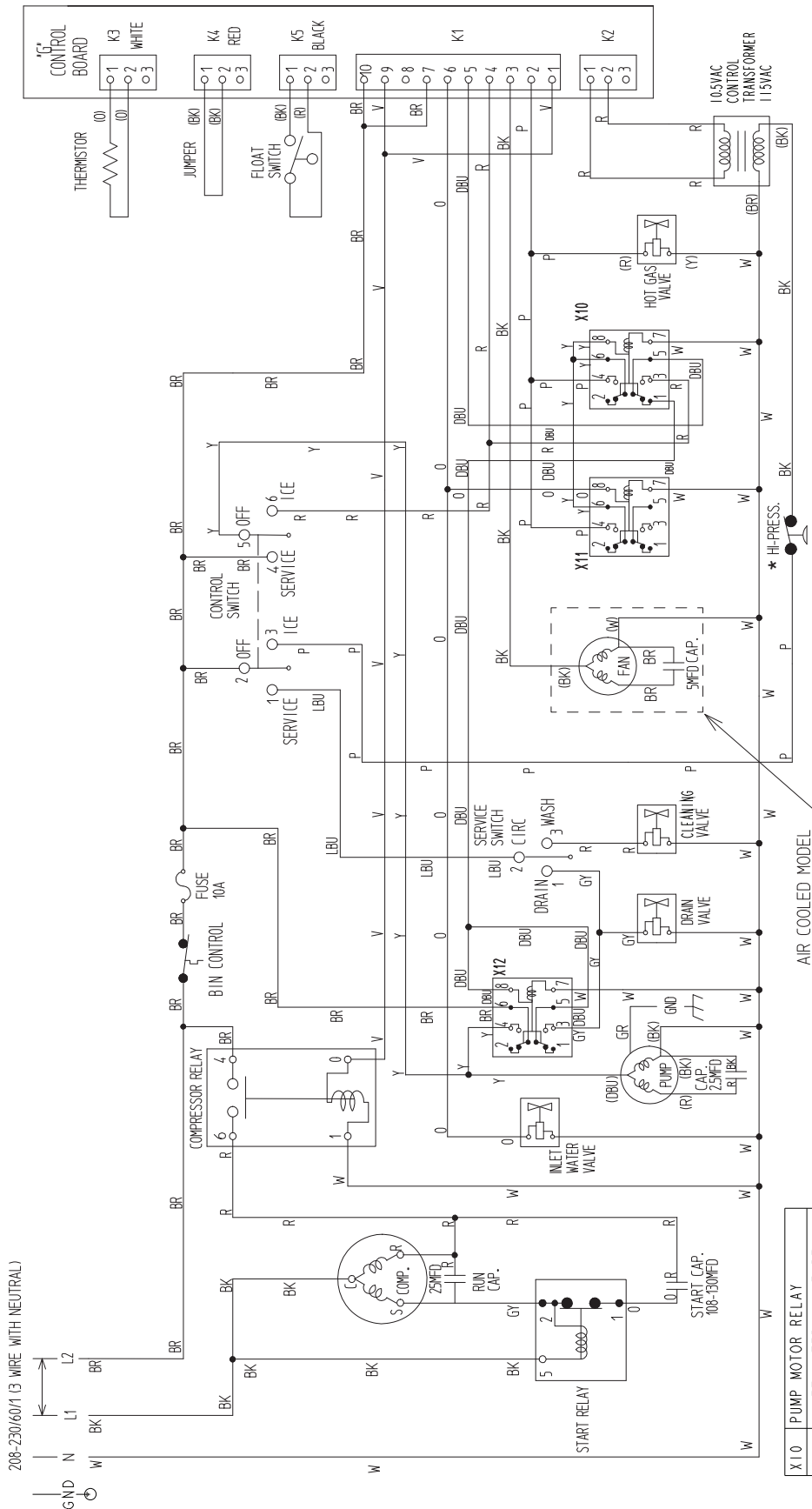
## 2. Harvest Pump Timer Operation with Thermostatic or Mechanical Bin Control

### a) KML-351MAH, KMD-460M\_H, KMD-530M\_H



* High-Pressure Switch	
Air-Cooled and Remote Air-Cooled Models	Water-Cooled Model
Cut-out	384±21.3 PSIG
Cut-in	284±21.3 PSIG

**b) KML-631MAH, KML-631MWH**



208-230/60/13 WIRE WITH NEUTRAL

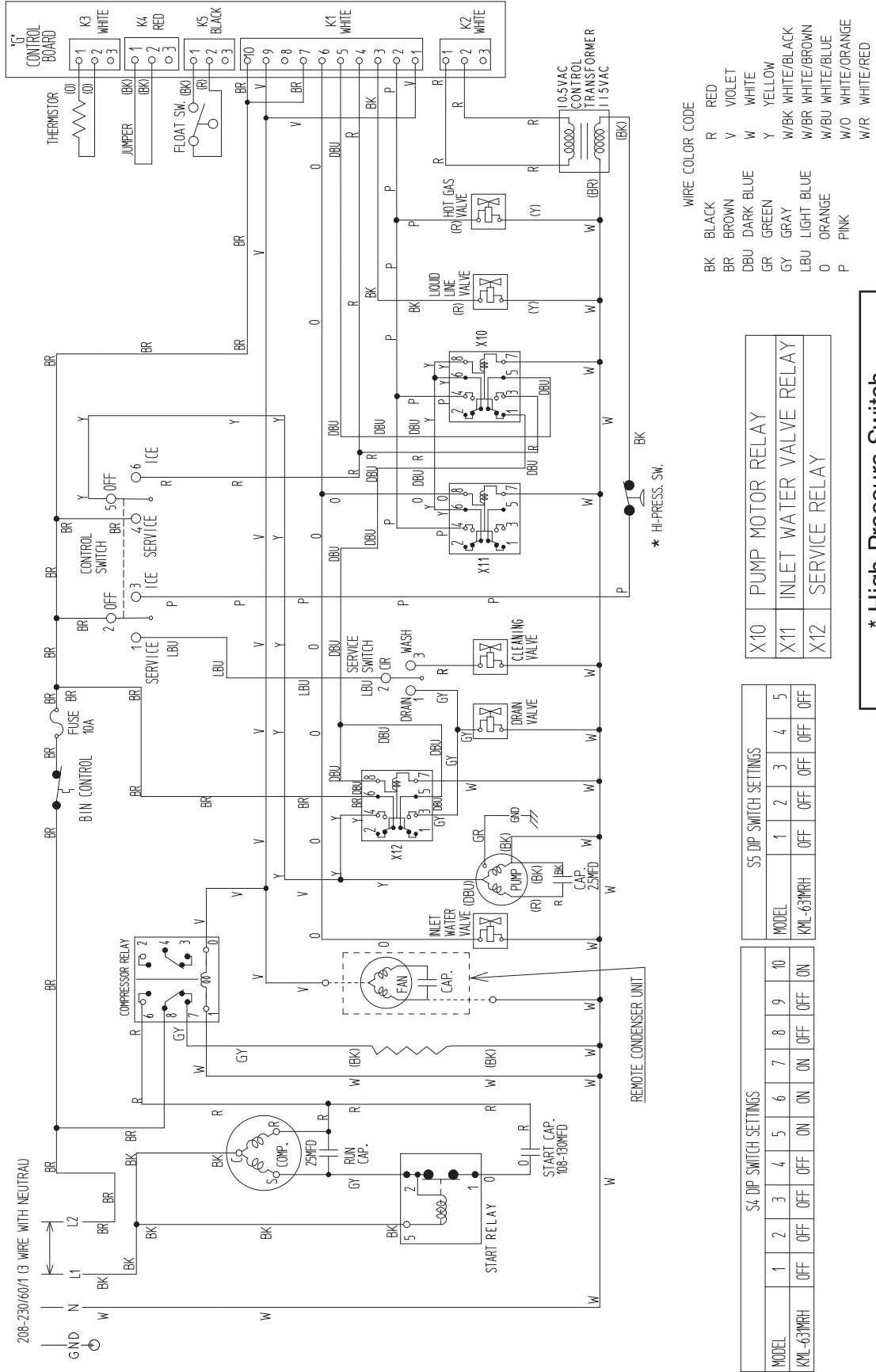
S4 DIP SWITCH SETTING	
X10 PUMP MOTOR RELAY	1
X11 INLET WATER VALVE RELAY	2
X12 SERVICE RELAY	3

S4 DIP SWITCH SETTING	
MODEL	1 2 3 4 5 6 7 8 9 10
KML-631MAH	OFF OFF OFF ON ON ON OFF OFF ON
KML-631MWH	OFF OFF OFF ON ON ON OFF OFF ON

S5 DIP SWITCH SETTING	
MODEL	1 2 3 4 5
KML-631MAH	OFF OFF OFF OFF OFF
KML-631MWH	OFF OFF OFF OFF OFF

* High-Pressure Switch	
Air-Cooled Model	Water-Cooled Model
Cut-out	412±2 <sup>1.3</sup> PSIG
Cut-in	327±21.3 PSIG
	384±2 <sup>1.3</sup> PSIG
	284±21.3 PSIG

### c) KML-631MRH - C-1 to D-0 (No Crankcase Heater Relay)



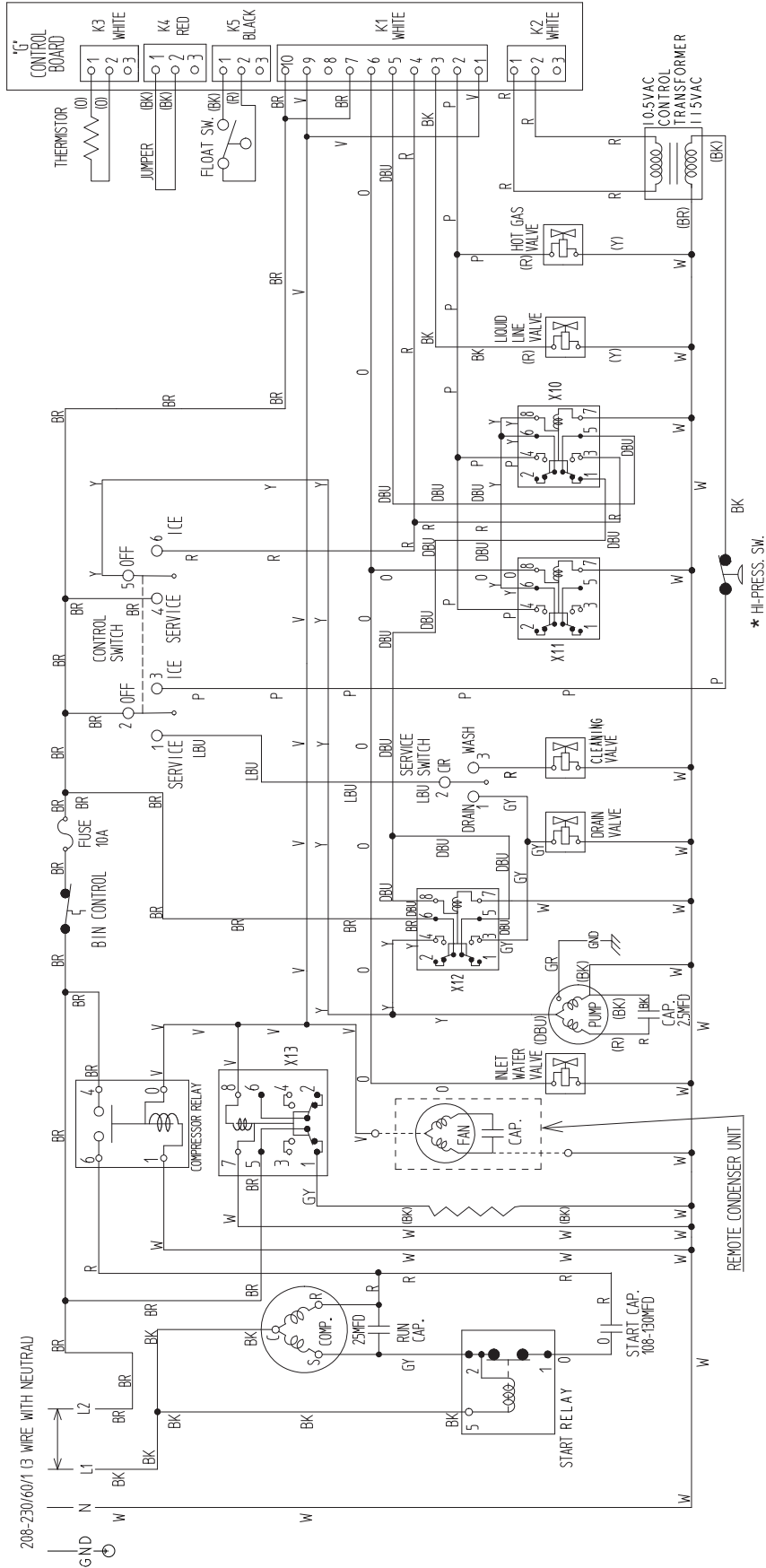
X10	PUMP MOTOR RELAY
X11	INLET WATER VALVE RELAY
X12	SERVICE RELAY

S5 DIP SWITCH SETTINGS					
MODEL	1	2	3	4	5
KML-631MRH	OFF	OFF	OFF	OFF	OFF

S4 DIP SWITCH SETTINGS										
MODEL	1	2	3	4	5	6	7	8	9	10
KML-631MRH	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	ON

* High-Pressure Switch	
Remote Air-Cooled Model	
Cut-out	412±21.3 PSIG
Cut-in	327±21.3 PSIG

### d) KML-631MRH - D-1 and Later (Crankcase Heater Relay)



WIRE COLOR CODE

BK	BLACK	R	RED
BR	BROWN	V	VIOLET
DBU	DARK BLUE	W	WHITE
GR	GREEN	Y	YELLOW
GY	GRAY	W/BK	WHITE/BLACK
LBU	LIGHT BLUE	W/BR	WHITE/BROWN
O	ORANGE	W/BU	WHITE/BLUE
P	PINK	W/O	WHITE/ORANGE
		W/R	WHITE/RED

X10	PUMP MOTOR RELAY
X11	INLET WATER VALVE RELAY
X12	SERVICE RELAY
X13	CRANKCASE HEATER RELAY

S5 DIP SWITCH SETTINGS					
MODEL	1	2	3	4	5
KML-631MRH	OFF	OFF	OFF	OFF	OFF

S4 DIP SWITCH SETTINGS										
MODEL	1	2	3	4	5	6	7	8	9	10
KML-631MRH	OFF	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	ON

<b>* High-Pressure Switch</b>	
Remote Air-Cooled Model	
Cut-out	412±21.3 PSIG
Cut-in	327±21.3 PSIG