

Hoshizaki America, Inc.

Stackable Crescent Cuber

Models

KM-160ISAH/3

KM-160ISWH/3

KM-160ISRH/3



“A Superior Degree
of Reliability”

www.hoshizaki.com

SERVICE MANUAL



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IMPORTANT

Only qualified service technicians should install, service, and maintain the icemaker. No service or maintenance should be undertaken until the technician has thoroughly read this Service Manual. Failure to service and maintain the equipment in accordance with this manual may adversely affect safety, performance, component life, and warranty coverage.

Hoshizaki provides this manual primarily to assist qualified service technicians in the service and maintenance of the icemaker.

Should the reader have any questions or concerns which have not been satisfactorily addressed, please call, write, or send an e-mail message 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 icemaker is serviced or maintenance operations are performed. Only qualified service technicians should install, service, and maintain the icemaker. Read the warnings contained in this booklet carefully as they give important information regarding safety. Please retain this booklet for any further reference that may be necessary.

CONTENTS

Important Safety Information	5
I. Specifications.....	6
A. Icemaker	6
B. Condenser Unit	16
II. General Information	18
A. Construction	18
B. Sequence of Operation	21
1. Sequence Cycles and Shutdown	21
a) KM-1601SAH/3 "G" Control Board	21
b) KM-1601SWH/3 and KM-1601SRH/3 "E" Control Board.....	23
2. Sequence Flow Chart	25
a) KM-1601SAH/3 "G" Control Board	25
b) KM-1601SWH/3 and KM-1601SRH/3 "E" Control Board.....	26
C. Control Board	27
1. Control Board Layout	28
a) KM-1601SAH/3 "G" Control Board	28
b) KM-1601SWH/3 and KM-1601SRH/3 "E" Control Board.....	29
2. LED Lights and Audible Alarm Safeties	30
a) KM-1601SAH/3 "G" Control Board	30
b) KM-1601SWH/3 and KM-1601SRH/3 "E" Control Board.....	31
3. Controls and Adjustments.....	32
a) Default Dip Switch Settings.....	32
b) Harvest Timer (S4 dip switch 1 & 2).....	33
c) Pump-Out Timer (S4 dip switch 3 & 4)	33
d) Pump-Out Frequency Control (S4 dip switch 5 & 6).....	34
e) Harvest Pump Timer/Bin Control Selector (S4 dip switch 7)	34
f) Factory Use (S4 dip switch 8)	35
g) Freeze Timer (S4 dip switch 9 & 10)	35
h) Float Switch Selector (S5 dip switch 1), KM-1601SAH/3 "G" Control Board....	35
i) Refill Counter (S5 dip switch 2 through 5), KM-1601SAH/3 "G" Control Board .	35
D. Control Switch	36
III. Technical Information	37
A. Water Circuit and Refrigeration Circuit	37
1. KM-1601SAH/3 (air-cooled).....	37
2. KM-1601SWH/3 (water-cooled)	38
3. KM-1601SRH/3 (remote air-cooled).....	39

B. Wiring Diagrams.....	40
1. KM-1601SAH (air-cooled).....	40
2. KM-1601SAH3 (air-cooled).....	41
3. KM-1601SWH (water-cooled), KM-1601SRH (remote air-cooled)	42
4. KM-1601SWH3 (water-cooled), KM-1601SRH3 (remote air-cooled)	43
C. Performance Data	44
IV. Service Diagnosis.....	54
A. Diagnostic Procedure	54
B. Control Board Check.....	58
C. Bin Control Check.....	59
D. Float Switch Check and Cleaning	60
1. Float Switch Check	60
2. Float Switch Cleaning.....	61
E. Thermistor Check.....	62
F. Adjustment of Water Regulating Valve (water-cooled model)	62
G. Diagnostic Charts	63
1. No Ice Production.....	63
2. Freeze Up.....	65
3. Low Ice Production	66
V. Replacement of Components	68
A. Service for Refrigerant Lines.....	68
1. Refrigerant Recovery	68
2. Brazing	69
3. Evacuation and Recharge (R-404A).....	69
B. Important Notes for Component Replacement.....	71
VI. Cleaning and Maintenance.....	72
A. Cleaning and Sanitizing Instructions.....	72
1. Cleaning Procedure.....	73
2. Sanitizing Procedure - Following Cleaning Procedure	74
B. Maintenance.....	75
C. Preparing the Icemaker for Long Storage	75

Important Safety Information

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

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

CAUTION Indicates a situation which could result in damage to the unit.

IMPORTANT Indicates important information about the use and care of the unit.

⚠ WARNING

This icemaker 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.

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

- Only qualified service technicians should install, service, and maintain the icemaker.
- 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 severe damage to equipment.
- This unit requires an independent power supply. See the nameplate for proper voltage and breaker/fuse size. Failure to use a proper breaker or fuse can result in a tripped breaker, blown fuse, or damage to existing wiring. 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.
- Do not make any alterations to the unit. Alterations could result in electric shock, injury, fire, or damage to the unit.

Additional Warning for Remote Air-Cooled Model

- **THE REMOTE CONDENSER UNIT MUST BE GROUNDED.** The power supply and ground wire 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.

I. Specifications

A. Icemaker

1. KM-1601SAH (air-cooled)

AC SUPPLY VOLTAGE	208-230/60/1 (3 wire with neutral for 115V)			
AMPERAGE	15.0 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION PER 24 HR. lbs./day (kg/day) Reference without *marks	Ambient Temp.(°F)	WATER TEMP. (°F)		
		50	70	90
	70	*1462 (663)	1427 (647)	1307 (593)
	80	1435 (651)	1381 (627)	1221 (554)
	90	1427 (647)	*1343 (609)	1198 (543)
	100	1379 (625)	1309 (594)	1064 (483)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	31.4 lbs. (14.3 kg) 1440pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F		
ELECTRIC W (kWH/100 lbs.)	2630(4.70)	2450(4.03)		
WATER gal./24HR (gal./100 lbs.)	228(17.0)	709(48.5)		
CEC/CEE TIER LEVEL	2			
ENERGY STAR	YES			
EXTERIOR DIMENSIONS (WxDxH)	48" x 27-3/8" x 27-3/8" (1219 x 695 x 695 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 275 lbs. (125 kg), Shipping 315 lbs. (143 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT		
- DRAIN	Outlet	3/4" FPT		
- CONDENSATE DRAIN		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	N/A			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-PFV-237			
CONDENSER	Air-Cooled , Fin and tube type			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
REFRIGERANT CHARGE	R404A, 3 lb. 12.5 oz. (1715g)			
DESIGN PRESSURE	High 467PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Storage Bin			
OPERATING CONDITIONS	VOLTAGE RANGE	187 - 253 V		
	AMBIENT TEMP.	45 -100° F		
	WATER SUPPLY TEMP.	45 - 90° F		
	WATER SUPPLY PRESSURE	10 - 113 PSIG		

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

2. KM-1601SAH3 (air-cooled)

AC SUPPLY VOLTAGE	208-230/60/3			
AMPERAGE	12.0 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION PER 24 HR. lbs./day (kg/day) Reference without *marks	Ambient Temp.(°F)	WATER TEMP. (°F)		
		50	70	90
	70	*1456 (660)	1423 (646)	1313 (596)
	80	1431 (649)	1381 (626)	1234 (560)
	90	1423 (646)	*1345 (610)	1211 (549)
	100	1379 (626)	1314 (596)	1088 (494)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	32.5 lbs. (14.8 kg) 1440pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F		
ELECTRIC W (kWH/100 lbs.)	2610(4.65)	2370(3.91)		
WATER gal./24HR (gal./100 lbs.)	249(18.5)	708(48.6)		
CEC/CEE TIER LEVEL	3			
ENERGY STAR	YES			
EXTERIOR DIMENSIONS (WxDxH)	48" x 27-3/8" x 27-3/8" (1219 x 695 x 695 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 275 lbs. (125 kg), Shipping 315 lbs. (143 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT		
- DRAIN	Outlet	3/4" FPT		
- CONDENSATE DRAIN		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	N/A			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-TF5-237			
CONDENSER	Air-Cooled, Fin and tube type			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
REFRIGERANT CHARGE	R404A, 3 lb. 12.5 oz. (1715g)			
DESIGN PRESSURE	High 467PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Storage Bin			
OPERATING CONDITIONS	VOLTAGE RANGE	187 - 253 V		
	AMBIENT TEMP.	45 -100° F		
	WATER SUPPLY TEMP.	45 - 90° F		
	WATER SUPPLY PRESSURE	10 - 113 PSIG		

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

3. KM-1601SWH (water-cooled)

AC SUPPLY VOLTAGE	208-230/60/1 (3 wire with neutral for 115V)			
AMPERAGE	13.4 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION PER 24 HR. lbs./day (kg/day) Reference without *marks	Ambient	WATER TEMP. (°F)		
	Temp.(°F)	50	70	90
	70	*1492 (677)	1501 (681)	1419 (643)
	80	1499 (680)	1513 (686)	1378 (625)
	90	1501 (681)	*1523 (691)	1408 (639)
	100	1453 (659)	1496 (679)	1303 (591)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	30.2 lbs. (13.7 kg) 1440 pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F		
ELECTRIC W (kWH/100 lbs.)	2410(3.8)	2300(3.7)		
WATER gal./24HR (gal./100 lbs.)	373(24.5)	698(46.8)		
WATER COOLED CONDENSER gal./24HR (gal./100 lbs.)	1493(98)	930(62)		
EXTERIOR DIMENSIONS (WxDxH)	48" x 27-3/8" x 27-3/8" (1219 x 695 x 695 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 310 lbs. (141 kg), Shipping 360 lbs. (163 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT	Condenser Inlet 1/2" FPT	
- DRAIN	Outlet	3/4" FPT	Condenser Outlet 3/8" FPT	
		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	Water Regulating Valve			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-PFV-237			
CONDENSER	Water-cooled, Tube in tube type			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
REFRIGERANT CHARGE	R-404A, 3 lbs. 1 oz. (1400g)			
DESIGN PRESSURE	High 427PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Storage Bin			
OPERATING CONDITIONS	VOLTAGE RANGE	187 - 253 V		
	AMBIENT TEMP.	45 -100° F		
	WATER SUPPLY TEMP.	45 - 90° F		
	WATER SUPPLY PRESSURE	10 - 113 PSIG		

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

4. KM-1601SWH3 (water-cooled)

AC SUPPLY VOLTAGE	208-230/60/3			
AMPERAGE	9.0 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION PER 24 HR. lbs./day (kg/day) Reference without *marks	Ambient Temp.(°F)	WATER TEMP. (°F)		
		50	70	90
	70	*1555 (705)	1558 (707)	1466 (665)
	80	1557 (706)	1562 (708)	1417 (643)
	90	1558 (707)	*1565 (710)	1440 (653)
	100	1507 (684)	1536 (697)	1326 (601)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	30.2 lbs. (13.7 kg) 1440 pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F		
ELECTRIC W (kWH/100 lbs.)	2390(3.66)	2270(3.5)		
WATER gal./24HR (gal./100 lbs.)	372(23.8)	804(51.7)		
WATER COOLED CONDENSER gal./24HR (gal./100 lbs.)	1565(100)	910(59)		
CEC/CEE TIER LEVEL	2			
ENERGY STAR	N/A			
EXTERIOR DIMENSIONS (WxDxH)	48" x 27-3/8" x 27-3/8" (1219 x 695 x 695 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 310 lbs. (141 kg), Shipping 360 lbs. (163 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT	Condenser Inlet 1/2" FPT	
- DRAIN	Outlet	3/4" FPT	Condenser Outlet 3/8" FPT	
		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	Water Regulating Valve			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-TF5-237			
CONDENSER	Water-cooled, Tube in tube type			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
REFRIGERANT CHARGE	R-404A, 3 lbs. 1 oz. (1400g)			
DESIGN PRESSURE	High 427PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Storage Bin			
OPERATING CONDITIONS	VOLTAGE RANGE	187 - 253 V		
	AMBIENT TEMP.	45 -100° F		
	WATER SUPPLY TEMP.	45 - 90° F		
	WATER SUPPLY PRESSURE	10 - 113 PSIG		

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

5. KM-1601SRH with URC-21F (remote air-cooled) (auxiliary codes: R-0; R-1; some S-1)

This data applies to units with an 8 l/min water valve. The 8 l/min water valve is part number 3U0111-02 and has J248-032 stamped on the side of the valve facing the rear of the unit.

AC SUPPLY VOLTAGE	208-230/60/1 (3 wire with neutral for 115V)			
AMPERAGE	12.8 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION PER 24 HR. lbs./day (kg/day) Reference without *marks	Ambient Temp.(°F)	WATER TEMP. (°F)		
		50	70	90
	70	*1583 (718)	1550 (703)	1435 (651)
	80	1558 (707)	1507 (684)	1353 (614)
	90	1550 (703)	*1472 (668)	1332 (604)
	100	1503 (682)	1439 (653)	1203 (546)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	29.4 lbs. (13.3 kg) 1440 pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F		
ELECTRIC W (kWH/100 lbs.)	2640(4.3)	2440(3.7)		
WATER gal./24HR (gal./100 lbs.)	255(17.3)	503(31.8)		
EXTERIOR DIMENSIONS (WxDxH)	48" x 27 3/8" x 27 3/8" (1219 x 695 x 695 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 275 lbs. (125 kg), Shipping 350 lbs. (159 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT		
- DRAIN	Outlet	3/4" FPT		
- CONDENSATE DRAIN		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	N/A			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-PFV			
CONDENSER	Air-Cooled Remote, Condenser Unit URC-21F			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
	Condensing Pressure Regulator on URC-21F			
REFRIGERANT CHARGE	R404A, 24 lb. 14.6 oz. (11300g) (Icemaker 15 lb. 3.4 oz. Cond. Unit 9 lb. 11.2 oz.)			
DESIGN PRESSURE	High 467PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Dispenser or Ice Storage Bin, Remote Condenser Unit			
OPERATING CONDITIONS	VOLTAGE RANGE	187 - 253 V		
	AMBIENT TEMP.	45 -100° F		
	WATER SUPPLY TEMP.	45 - 90° F		
	WATER SUPPLY PRESSURE	10 - 113 PSIG		

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

6. KM-1601SRH with URC-21F (remote air-cooled) (auxiliary codes: some S-1; S-2 and later)

This data applies to units with a 15 l/min or 11 l/min water valve. The 15 l/min water valve is part number 3U0111-01 and has J248-030 stamped on the side of the valve facing the rear of the unit. The 11 l/min water valve is either part number 4A1176-04 or 4A5251-04 and has the part number stamped on the side of the valve facing the front of the unit.

AC SUPPLY VOLTAGE	208-230/60/1 (3 wire with neutral for 115V)			
AMPERAGE	12.8 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION PER 24 HR. lbs./day (kg/day) Reference without *marks	Ambient Temp.(°F)	WATER TEMP. (°F)		
		50	70	90
	70	*1564 (709)	1547 (702)	1468 (666)
	80	1551 (703)	1524 (691)	1415 (642)
	90	1547 (702)	*1505 (683)	1407 (638)
	100	1512 (686)	1482 (672)	1317 (597)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	31.2 lbs. (14.2 kg) 1440 pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F		
ELECTRIC W (kWH/100 lbs.)	2700(4.30)	2610(4.00)		
WATER gal./24HR (gal./100 lbs.)	375(24.9)	785(50.2)		
CEC/CEE TIER LEVEL	2			
ENERGY STAR	YES			
EXTERIOR DIMENSIONS (WxDxH)	48" x 27 3/8" x 27 3/8" (1219 x 695 x 695 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 275 lbs. (125 kg), Shipping 350 lbs. (159 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT		
- DRAIN	Outlet	3/4" FPT		
- CONDENSATE DRAIN		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	N/A			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-PFV			
CONDENSER	Air-Cooled Remote, Condenser Unit URC-21F			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
REFRIGERANT CHARGE	Condensing Pressure Regulator on URC-21F R404A, 24 lb. 14.6 oz. (11300g) (Icemaker 15 lb. 3.4 oz. Cond. Unit 9 lb. 11.2 oz.)			
DESIGN PRESSURE	High 467PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Dispenser or Ice Storage Bin, Remote Condenser Unit			
OPERATING CONDITIONS	VOLTAGE RANGE	187 - 253 V		
	AMBIENT TEMP.	45 -100° F		
	WATER SUPPLY TEMP.	45 - 90° F		
	WATER SUPPLY PRESSURE	10 - 113 PSIG		

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

7. KM-1601SRH with URC-22F (remote air-cooled) (auxiliary codes: S-2 and later)

This data applies to units with an 11 l/min water valve. The 11 l/min water valve is either part number 4A1176-04 or 4A5251-04 and has the part number stamped on the side of the valve facing the front of the unit.

AC SUPPLY VOLTAGE	208-230/60/1 (3 wire with neutral for 115V)			
AMPERAGE	12.8 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION PER 24 HR. lbs./day (kg/day) Reference without *marks	Ambient Temp.(°F)	WATER TEMP. (°F)		
		50	70	90
	70	*1531 (694)	1519 (689)	1426 (647)
	80	1522 (690)	1503 (682)	1368 (620)
	90	1519 (689)	*1490 (676)	1371 (622)
	100	1475 (669)	1462 (663)	1261 (572)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	31.6 lbs. (14.3 kg) 1440 pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F		
ELECTRIC W (kWH/100 lbs.)	2710(4.36)	2560(4.01)		
WATER gal./24HR (gal./100 lbs.)	352(23.6)	755(49.3)		
CEC/CEE TIER LEVEL	2			
ENERGY STAR	YES			
EXTERIOR DIMENSIONS (WxDxH)	48" x 27 3/8" x 27 3/8" (1219 x 695 x 695 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 275 lbs. (125 kg), Shipping 350 lbs. (159 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT		
- DRAIN	Outlet	3/4" FPT		
- CONDENSATE DRAIN		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	N/A			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-PFV			
CONDENSER	Air-Cooled Remote, Condenser Unit URC-22F			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
	Condensing Pressure Regulator on URC-22F			
REFRIGERANT CHARGE	R404A, 22 lb. 14.8 oz. (10400g) (Icemaker 15 lb. 3.4 oz. Cond. Unit 7 lb. 11.5 oz.)			
DESIGN PRESSURE	High 467PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Dispenser or Ice Storage Bin, Remote Condenser Unit			
OPERATING CONDITIONS	VOLTAGE RANGE	187 - 253 V		
	AMBIENT TEMP.	45 -100° F		
	WATER SUPPLY TEMP.	45 - 90° F		
	WATER SUPPLY PRESSURE	10 - 113 PSIG		

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

8. KM-1601SRH3 with URC-21F (remote air-cooled) (auxiliary codes: R-0; R-1; some S-1)

This data applies to units with an 8 l/min water valve. The 8 l/min water valve is part number 3U0111-02 and has J248-032 stamped on the side of the valve facing the rear of the unit.

AC SUPPLY VOLTAGE	208-230/60/3			
AMPERAGE	7.9 A (5 Min. Freeze AT 104°F / WT 80°F)			
MINIMUM CIRCUIT AMPACITY	20 A			
MAXIMUM FUSE SIZE	20 A			
APPROXIMATE ICE PRODUCTION PER 24 HR. lbs./day (kg/day) Reference without *marks	Ambient Temp.(°F)	WATER TEMP. (°F)		
		50	70	90
	70	*1596 (724)	1556 (706)	1436 (651)
	80	1565 (710)	1503 (682)	1347 (611)
	90	1556 (706)	*1459 (662)	1316 (597)
	100	1510 (685)	1426 (647)	1184 (537)
SHAPE OF ICE	Crescent Cube			
ICE PRODUCTION PER CYCLE	29.4 lbs. (13.3 kg) 1440 pcs.			
APPROXIMATE STORAGE CAPACITY	N/A			
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F		
ELECTRIC W (kWH/100 lbs.)	2580(4.3)	2450(3.7)		
WATER gal./24HR (gal./100 lbs.)	261(17.9)	504(31.6)		
EXTERIOR DIMENSIONS (WxDxH)	48" x 27 3/8" x 27 3/8" (1219 x 695 x 695 mm)			
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)			
WEIGHT	Net 275 lbs. (125 kg), Shipping 350 lbs. (159 kg)			
CONNECTIONS - ELECTRIC	Permanent - Connection			
- WATER SUPPLY	Inlet	1/2" FPT		
- DRAIN	Outlet	3/4" FPT		
- CONDENSATE DRAIN		3/8" OD Tube		
CUBE CONTROL SYSTEM	Float Switch			
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer			
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe			
COOLING WATER CONTROL	N/A			
BIN CONTROL SYSTEM	Thermostat			
COMPRESSOR	Hermetic, Model CS18K6E-TF5			
CONDENSER	Air-Cooled Remote, Condenser Unit URC-21F			
EVAPORATOR	Vertical type, Stainless Steel and Copper			
REFRIGERANT CONTROL	Thermostatic Expansion Valve			
	Condensing Pressure Regulator on URC-21F			
REFRIGERANT CHARGE	R404A, 24 lb. 14.6 oz. (11300g) (Icemaker 15 lb. 3.4 oz. Cond. Unit 9 lb. 11.2 oz.)			
DESIGN PRESSURE	High 467PSIG, Low 230PSIG			
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)			
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)			
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch			
LOW WATER PROTECTION	Float Switch			
ACCESSORIES -SUPPLIED	N/A			
-REQUIRED	Ice Dispenser or Ice Storage Bin, Remote Condenser Unit			
OPERATING CONDITIONS	VOLTAGE RANGE	187 - 253 V		
	AMBIENT TEMP.	45 -100° F		
	WATER SUPPLY TEMP.	45 - 90° F		
	WATER SUPPLY PRESSURE	10 - 113 PSIG		

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

9. KM-1601SRH3 with URC-21F (remote air-cooled) (auxiliary codes: some S-1; S-2 and later)

This data applies to units with a 15 l/min or 11 l/min water valve. The 15 l/min water valve is part number 3U0111-01 and has J248-030 stamped on the side of the valve facing the rear of the unit. The 11 l/min water valve is either part number 4A1176-04 or 4A5251-04 and has the part number stamped on the side of the valve facing the front of the unit.

AC SUPPLY VOLTAGE	208-230/60/3		
AMPERAGE	7.9 A (5 Min. Freeze AT 104°F / WT 80°F)		
MINIMUM CIRCUIT AMPACITY	20 A		
MAXIMUM FUSE SIZE	20 A		
APPROXIMATE ICE PRODUCTION PER 24 HR.	Ambient Temp.(°F)	WATER TEMP. (°F)	
lbs./day (kg/day)		50	70
Reference without *marks	70	*1585 (719)	1563 (709)
	80	1568 (711)	1535 (696)
	90	1563 (709)	*1511 (685)
	100	1520 (689)	1482 (672)
		90	1273 (577)
SHAPE OF ICE	Crescent Cube		
ICE PRODUCTION PER CYCLE	31.2 lbs. (14.2 kg) 1440 pcs.		
APPROXIMATE STORAGE CAPACITY	N/A		
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F	
ELECTRIC W (kWH/100 lbs.)	2960(4.70)	2580(3.90)	
WATER gal./24HR (gal./100 lbs.)	363(24.0)	781(49.3)	
CEC/CEE TIER LEVEL	1		
ENERGY STAR	NO		
EXTERIOR DIMENSIONS (WxDxH)	48" x 27 3/8" x 27 3/8" (1219 x 695 x 695 mm)		
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)		
WEIGHT	Net 275 lbs. (125 kg), Shipping 350 lbs. (159 kg)		
CONNECTIONS - ELECTRIC	Permanent - Connection		
- WATER SUPPLY	Inlet	1/2" FPT	
- DRAIN	Outlet	3/4" FPT	
- CONDENSATE DRAIN		3/8" OD Tube	
CUBE CONTROL SYSTEM	Float Switch		
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer		
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe		
COOLING WATER CONTROL	N/A		
BIN CONTROL SYSTEM	Thermostat		
COMPRESSOR	Hermetic, Model CS18K6E-TF5		
CONDENSER	Air-Cooled Remote, Condenser Unit URC-21F		
EVAPORATOR	Vertical type, Stainless Steel and Copper		
REFRIGERANT CONTROL	Thermostatic Expansion Valve		
	Condensing Pressure Regulator on URC-21F		
REFRIGERANT CHARGE	R404A, 24 lb. 14.6 oz. (11300g)		
	(Icemaker 15 lb. 3.4 oz. Cond. Unit 9 lb. 11.2 oz.)		
DESIGN PRESSURE	High 467PSIG, Low 230PSIG		
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)		
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)		
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch		
LOW WATER PROTECTION	Float Switch		
ACCESSORIES -SUPPLIED	N/A		
-REQUIRED	Ice Dispenser or Ice Storage Bin, Remote Condenser Unit		
OPERATING CONDITIONS	VOLTAGE RANGE	187 - 253 V	
	AMBIENT TEMP.	45 -100° F	
	WATER SUPPLY TEMP.	45 - 90° F	
	WATER SUPPLY PRESSURE	10 - 113 PSIG	

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

10. KM-1601SRH3 with URC-22F (remote air-cooled) (auxiliary codes: S-2 and later)

This data applies to units with an 11 l/min water valve. The 11 l/min water valve is either part number 4A1176-04 or 4A5251-04 and has the part number stamped on the side of the valve facing the front of the unit.

AC SUPPLY VOLTAGE	208-230/60/3		
AMPERAGE	7.9 A (5 Min. Freeze AT 104°F / WT 80°F)		
MINIMUM CIRCUIT AMPACITY	20 A		
MAXIMUM FUSE SIZE	20 A		
APPROXIMATE ICE PRODUCTION PER 24 HR. lbs./day (kg/day) Reference without *marks	Ambient Temp.(°F)	WATER TEMP. (°F)	
		50	70
	70	*1530 (694)	1521 (690)
	80	1523 (691)	1508 (684)
	90	1521 (690)	*1498 (679)
	100	1468 (666)	1465 (665)
SHAPE OF ICE	Crescent Cube		
ICE PRODUCTION PER CYCLE	32.1 lbs. (14.6 kg) 1440 pcs.		
APPROXIMATE STORAGE CAPACITY	N/A		
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F	
ELECTRIC W (kWH/100 lbs.)	2780(4.46)	2490(3.90)	
WATER gal./24HR (gal./100 lbs.)	348(23.2)	704(46.0)	
CEC/CEE TIER LEVEL	2		
ENERGY STAR	YES		
EXTERIOR DIMENSIONS (WxDxH)	48" x 27 3/8" x 27 3/8" (1219 x 695 x 695 mm)		
EXTERIOR FINISH	Stainless Steel, Galvanized Steel (Rear)		
WEIGHT	Net 275 lbs. (125 kg), Shipping 350 lbs. (159 kg)		
CONNECTIONS - ELECTRIC	Permanent - Connection		
- WATER SUPPLY	Inlet	1/2" FPT	
- DRAIN	Outlet	3/4" FPT	
- CONDENSATE DRAIN		3/8" OD Tube	
CUBE CONTROL SYSTEM	Float Switch		
HARVESTING CONTROL SYSTEM	Hot Gas and Water, Thermistor and Timer		
ICE MAKING WATER CONTROL	Timer Controlled. Overflow Pipe		
COOLING WATER CONTROL	N/A		
BIN CONTROL SYSTEM	Thermostat		
COMPRESSOR	Hermetic, Model CS18K6E-TF5		
CONDENSER	Air-Cooled Remote, Condenser Unit URC-22F		
EVAPORATOR	Vertical type, Stainless Steel and Copper		
REFRIGERANT CONTROL	Thermostatic Expansion Valve		
REFRIGERANT CHARGE	Condensing Pressure Regulator on URC-22F R404A, 22 lb. 14.8 oz. (10400g) (Icemaker 15 lb. 3.4 oz. Cond. Unit 7 lb. 11.5 oz.)		
DESIGN PRESSURE	High 467PSIG, Low 230PSIG		
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-out (Internal)		
COMPRESSOR PROTECTION	Auto-reset Overload Protector (Internal)		
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch		
LOW WATER PROTECTION	Float Switch		
ACCESSORIES -SUPPLIED	N/A		
-REQUIRED	Ice Dispenser or Ice Storage Bin, Remote Condenser Unit		
OPERATING CONDITIONS	VOLTAGE RANGE	187 - 253 V	
	AMBIENT TEMP.	45 -100° F	
	WATER SUPPLY TEMP.	45 - 90° F	
	WATER SUPPLY PRESSURE	10 - 113 PSIG	

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

B. Condenser Unit

1. URC-21F

AC SUPPLY VOLTAGE	115/60/1 (Connection to Icemaker)		
FAN MOTOR	115 V	Total 2.6FLA	130W
EXTERIOR DIMENSIONS (WxDxH)	46-3/8" x 15-11/16" x 25-15/16" (1178 x 398 x 659 mm)		
DIMENSIONS INCLUDING LEGS (WxDxH)	48-7/16" x 18-1/8" x 40-7/8" (1230 x 460 x 1039 mm)		
EXTERIOR FINISH	Galvanized Steel		
WEIGHT	Net 158 lbs. (72 kg)	Shipping 169 lbs. (77 kg)	
CONNECTIONS - ELECTRIC	Permanent - Connection		
- REFRIGERANT	Discharge Line 1-1/16"-12 UNF Fitting (#10 PARKER)		
	Liquid Line	5/8"-18 UNF Fitting (#6 PARKER)	
CONDENSER	Air-cooled, Fin and tube type		
FAN MOTOR PROTECTION	Thermal Protection		
REFRIGERANT CONTROL	Condensing Pressure Regulator		
REFRIGERANT CHARGE	R-404A	9 lb. 11oz.	(4400g)
DESIGN PRESSURE	High 467 PSIG	32.2 Bar	
OPERATING CONDITIONS	VOLTAGE RANGE	104 ~ 127 V	
	AMBIENT TEMP.	-20 ~ 122 °F	
ACCESSORIES -SUPPLIED	Leg		2 pcs
	Hex. Head Bolt w/Washer 8 x 16		8 pcs
	Hex. Nut	8	8 pcs

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

2. URC-22F

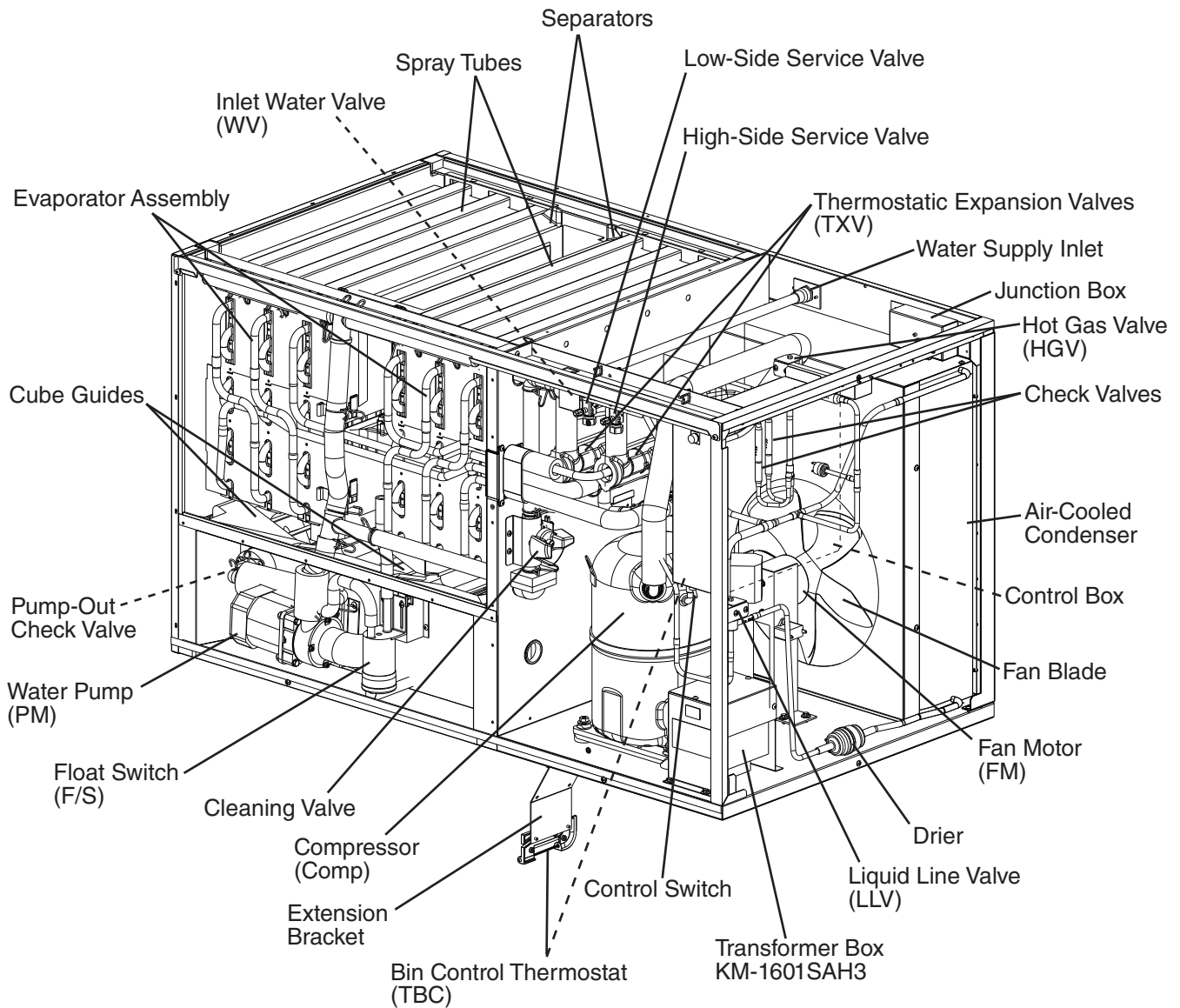
AC SUPPLY VOLTAGE	115/60/1 (Connection to Icemaker)		
FAN MOTOR	115 V	Total 2.6FLA	130W
EXTERIOR DIMENSIONS (WxDxH)	46-3/8" x 15-11/16" x 25-15/16" (1178 x 398 x 659 mm)		
DIMENSIONS INCLUDING LEGS (WxDxH)	48-7/16" x 18-1/8" x 40-7/8" (1230 x 460 x 1039 mm)		
EXTERIOR FINISH	Galvanized Steel		
WEIGHT	Net 134 lbs. (61 kg)	Shipping 145 lbs. (66 kg)	
CONNECTIONS - ELECTRIC	Permanent - Connection		
- REFRIGERANT	Discharge Line 1-1/16"-12 UNF Fitting (#10 PARKER)		
	Liquid Line	5/8"-18 UNF Fitting (#6 PARKER)	
CONDENSER	Air-cooled, Fin and tube type		
FAN MOTOR PROTECTION	Thermal Protection		
REFRIGERANT CONTROL	Condensing Pressure Regulator		
REFRIGERANT CHARGE	R-404A	7 lb. 11.5 oz.	(3500g)
DESIGN PRESSURE	High 467 PSIG	32.2 Bar	
OPERATING CONDITIONS	VOLTAGE RANGE	104 ~ 127 V	
	AMBIENT TEMP.	-20 ~ 122 °F	
ACCESSORIES -SUPPLIED	Leg		2 pcs
	Hex. Head Bolt w/Washer 8 x 16		8 pcs
	Hex. Nut	8	8 pcs

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

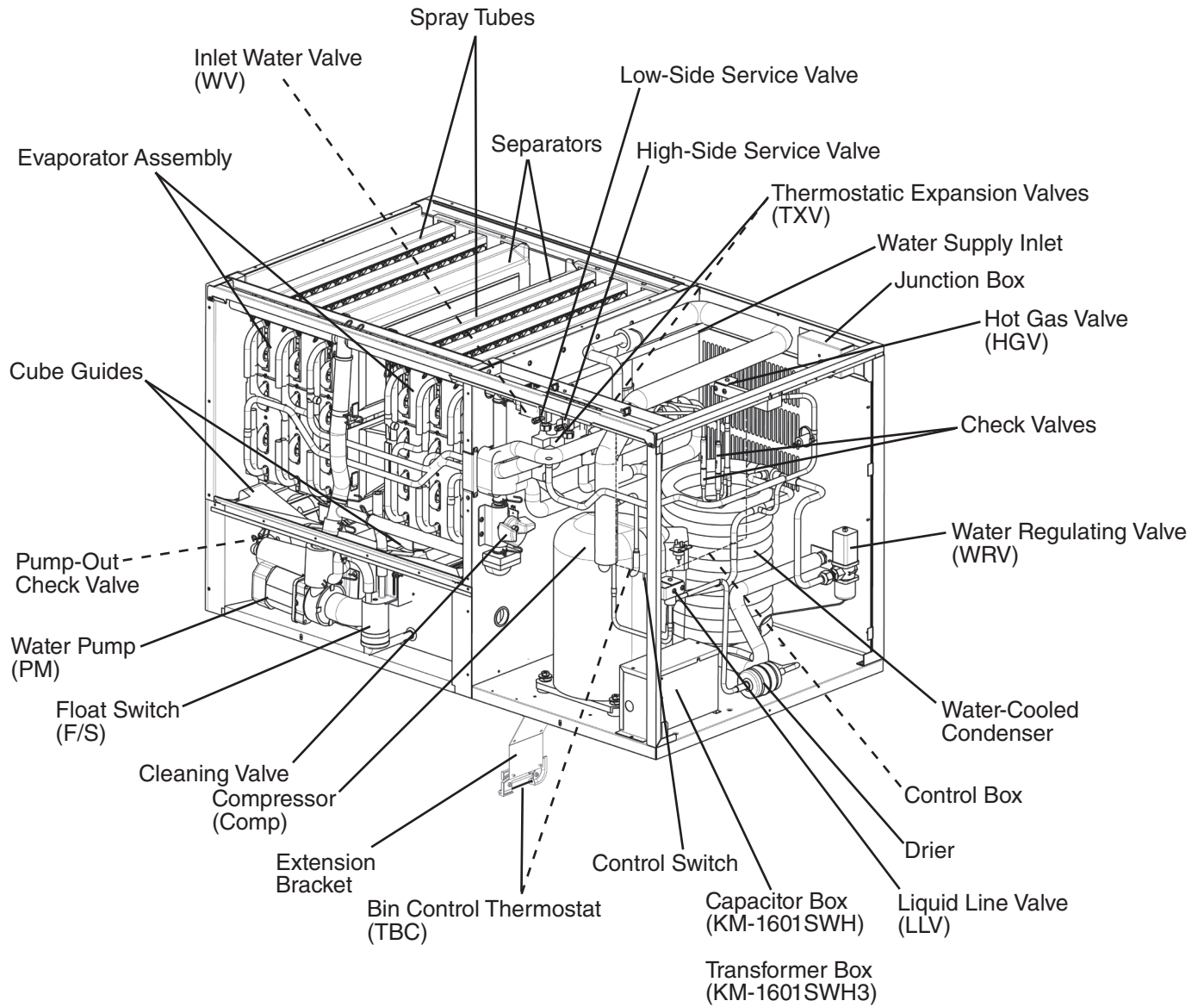
II. General Information

A. Construction

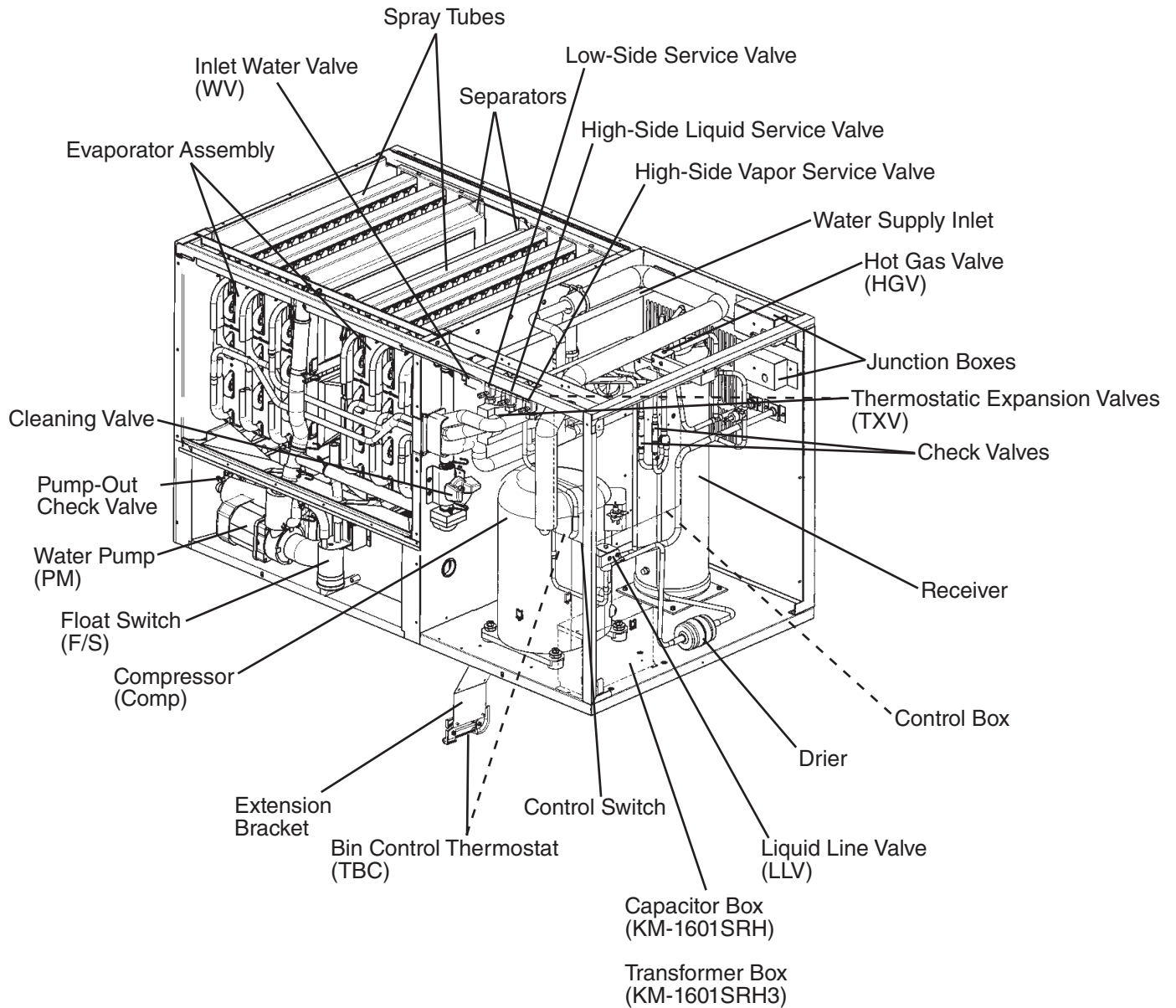
1. KM-1601SAH/3 (air-cooled)



2. KM-1601SWH/3 (water-cooled)



3. KM-1601SRH/3 (remote air-cooled)



B. Sequence of Operation

1. Sequence Cycles and Shutdown

a) KM-1601SAH/3 "G" Control Board

IMPORTANT

KM-1601SAH/3 utilize a "G" control board and TBC. For KM-1601SAH/3 operation, the K4 jumper (4A4883G01) must be in place on the control board RED K4 connector or the unit will not operate.

The steps in the sequence are as outlined below. When power is supplied, CB red "POWER OK" LED and green "BC CLOSED" LED turn on. If red "POWER OK" LED is off, clear ice away from TBC bulb in the storage bin area. If yellow "BC OPEN" LED is on, the unit will not start. In this case check that CB has the K4 jumper in place on CB RED K4 connector. There is a 5-second delay before startup. Note that the order of the component LEDs from the outer edge of CB is 1, 4, 3, 2.

(1) 1-Minute Fill Cycle

LED 4 is on. WV and X11 relay energize and the 1-minute fill cycle begins. After 1 minute, CB checks for a closed F/S. If F/S is closed, the harvest cycle begins. If open, WV remains energized through additional 1-minute fill cycles until water fills the water tank and closes F/S. This serves as a low water safety to protect PM.

(2) Initial Harvest Cycle

LEDs 1, 4, and 2 are on. WV and X11 relay remain energized, Comp, FM, 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 a 3.9 kΩ signal 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 seconds. For details, see "II.C.3.b) Harvest Timer (S4 dip switch 1 & 2)." WV is energized during harvest for a maximum of 6 minutes or the length of harvest minus 0 or 50 seconds (harvest pump timer (S4 dip switch 7)), whichever is shorter. **CAUTION! Do not adjust S4 dip switch 7 out of the factory default position on this model. Adjustment outside of the factory default position may result in damage to the icemaker.** LED 4 turns off when WV and X11 relay de-energize. LED 3 turns on and PM energizes and runs for the last 0 or 50 seconds of harvest depending on S4 dip switch 7 setting. This circulates water over the evaporator for the last 0 or 50 seconds of harvest. PM is energized through CB K1 ten-pin connector pin #5 (DBU wire) and the X10 relay. When the harvest timer terminates, the harvest cycle is complete. CB checks the position of F/S and proceeds to the freeze cycle if it is closed or calls for a 1-minute fill cycle if it is open. The minimum total time allowed by CB for a complete harvest cycle is 2 minutes.

(3) Freeze Cycle

LED 1 is on. Comp and FM remain energized, PM energizes or remains energized depending on harvest pump timer (S4 dip switch 7) setting. LLV energizes. HGV and X10 relay de-energize. The unit is held in freeze by a 5-minute short cycle protection timer (CB will not accept a signal from F/S during the first 5 minutes of freeze). After the 5-minute short cycle protection timer terminates, CB turns freeze termination over to F/S. As ice builds on the evaporator, the water level in the water tank lowers. The freeze cycle

continues until F/S opens and terminates the cycle. There is a 15 second delay before CB acknowledges an open F/S.

(4) Pump-Out Cycle

LEDs 1, 3, and 2 are on. LED 4 is on when S4 dip switch 3 & 4 are set to 3 off and 4 on. For details, see "II.C.3.c) Pump-Out Timer (S4 dip switch 3 & 4)." **CAUTION! Do not adjust S4 dip switch 3 & 4 to 3 off and 4 on. Adjustment to this position on this model prevents the pump motor from rotating in the pump-out direction.** Comp and FM remain energized, HGV energizes, WV energizes if S4 dip switch 3 off and 4 on. LLV de-energizes. PM stops for 2 seconds then reverses, taking water from the bottom of the water tank and forcing pressure against the pump-out check valve seat allowing water to go through the pump-out check valve and down the drain. At the same time, water flows through the small tube to power flush F/S. When the pump-out timer terminates, pump-out is complete.

The first pump-out occurs after the 11th freeze cycle, then every 10th cycle thereafter. The pump-out frequency control is factory set, and 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 (S4 dip switch 5 & 6) can be set to have a pump-out occur every cycle, or every 2, 5, or 10 cycles. Timing of the first pump-out is dependent on S4 dip switch 5 & 6 settings. 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 Cycle

Same as the initial harvest cycle. See "II.B.1.a)(2) Initial Harvest Cycle."

Note: Unit continues to cycle until TBC is satisfied or power is turned off. The unit always restarts at the 1-minute fill cycle.

(6) Shutdown

When ice contacts TBC bulb (TBC open), TBC shuts down the unit within 10 seconds. TBC is factory set, and generally no adjustment is required. However, adjustment may be needed in some conditions, particularly at higher altitude locations.

Legend: **CB**—control board; **Comp**—compressor; **FM**—fan motor; **F/S**—float switch; **HGV**—hot gas valve; **LLV**—liquid line valve; **PM**—pump motor; **TBC**—thermostatic bin control; **WV**—inlet water valve

b) KM-1601SWH/3 and KM-1601SRH/3 "E" Control Board

IMPORTANT

KM-1601SWH/3 and KM-1601SRH/3 utilize an "E" control board and TBC.

The steps in the sequence are as outlined below. When power is supplied, CB red "POWER OK" LED turns on. There is a 5-second delay before startup. Note that the order of the component LEDs from the outer edge of CB is 1, 4, 3, 2.

(1) 1-Minute Fill Cycle

LED 4 is on. WV energizes and the 1-minute fill cycle begins. After 1 minute, CB checks for a closed F/S. If F/S is closed, the harvest cycle begins. If open, WV remains energized through additional 1-minute fill cycles until water fills the water tank and closes F/S. This serves as a low water safety to protect PM.

(2) Initial Harvest Cycle

LEDs 1, 4, and 2 are on. WV remains energized, Comp, FMR, 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 a 3.9 kΩ signal 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 seconds. For details, see "II.C.3.b) Harvest Timer (S4 dip switch 1 & 2)." WV is energized during harvest for a maximum of 6 minutes or the length of harvest, whichever is shorter. LED 4 turns off when WV de-energizes. When the harvest timer terminates, the harvest cycle is complete. CB checks the position of F/S and proceeds to the next cycle if it is closed or calls for a 1-minute fill cycle if it is open. The minimum total time allowed by CB for a complete harvest cycle is 2 minutes.

(3) Freeze Cycle

LED 1 is on. Comp and FMR remain energized, PM and LLV energize, HGV and WV de-energize. The unit is held in freeze by a 5-minute short cycle protection timer (CB will not accept a signal from F/S during the first 5 minutes of freeze). After the 5-minute short cycle protection timer terminates, CB turns freeze termination over to F/S. As ice builds on the evaporator, the water level in the water tank lowers. The freeze cycle continues until F/S opens and terminates the cycle.

(4) Pump-Out Cycle

LEDs 1, 3, and 2 are on. LED 4 is on when S4 dip switch 3 & 4 are set to 3 off and 4 on. For details, see "II.C.3.c) Pump-Out Timer (S4 dip switch 3 & 4)." Comp and FMR remain energized. HGV energizes. WV energizes if S4 dip switch 3 off and 4 on. LLV de-energizes. PM stops for 2 seconds then reverses, taking water from the bottom of the water tank and forcing pressure against the pump-out check valve seat allowing water to go through the pump-out check valve and down the drain. At the same time, water flows through the small tube to power flush F/S. When the pump-out timer terminates, the pump-out is complete.

The first pump-out occurs after the 1st freeze cycle, then every 10th cycle thereafter. The pump-out frequency is factory set, and 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 (S4 dip switch 5 & 6) can be set to have a pump-out occur every cycle, or every 2, 5, or 10 cycles. For details, see "II.C.3.d) Pump-Out Frequency Control (S4 dip switch 5 & 6)."

(5) *Harvest Cycle*

Same as the initial harvest cycle. See "II.B.1.b)(2) Initial Harvest Cycle."

Note: Unit continues to cycle until TBC is satisfied or power is turned off. The unit always restarts at the 1-minute fill cycle.

(6) *Shutdown*

When ice contacts TBC bulb (TBC switch open), TBC shuts down the unit within 10 seconds. TBC is factory set, and generally no adjustment is required. However, adjustment may be needed in some conditions, particularly at higher altitude locations.

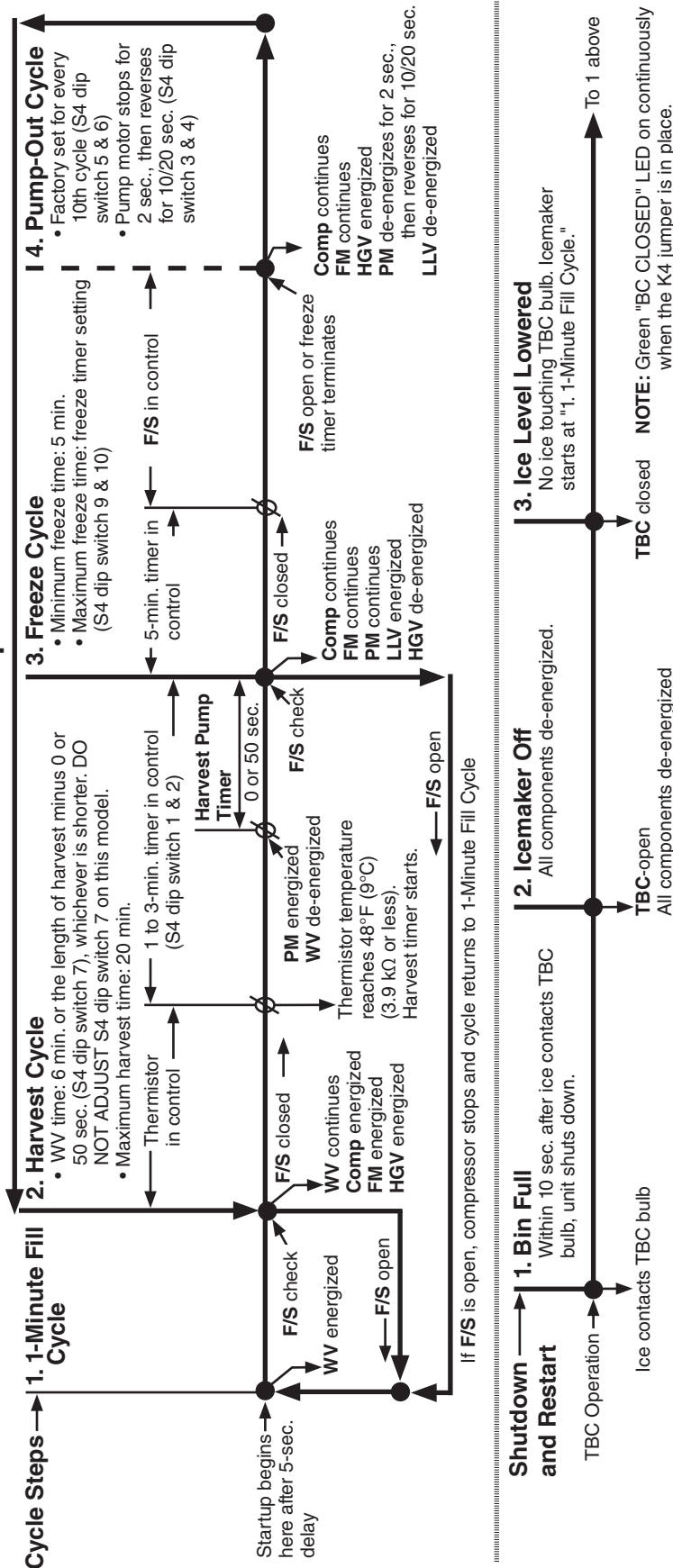
CAUTION! Do not adjust S4 dip switch 7 out of the factory default position on this model. This dip switch must be left in the factory default position or this unit will not operate correctly.

Legend: **CB**—control board; **Comp**—compressor; **FMR**—fan motor-remote; **F/S**—float switch; **HGV**—hot gas valve; **LLV**—liquid line valve; **PM**—pump motor; **TBC**—thermostatic bin control; **WV**—inlet water valve

2. Sequence Flow Chart

a) KM-1601SAH/3 "G" Control Board

KM-1601SAH/3 "G" Control Board Sequence Flow Chart



Components Energized when the Control Switch is in the "WASH" Position

The "WASH" position on the control switch is used when cleaning and sanitizing the unit. When in the "WASH" position, power is supplied to the pump motor. With the cleaning valve closed, the cleaner and sanitizer flow over the outside of the evaporator plate assembly. With the cleaning valve open, the cleaner and sanitizer flow over both the outside and the inside of the evaporator plate assembly.

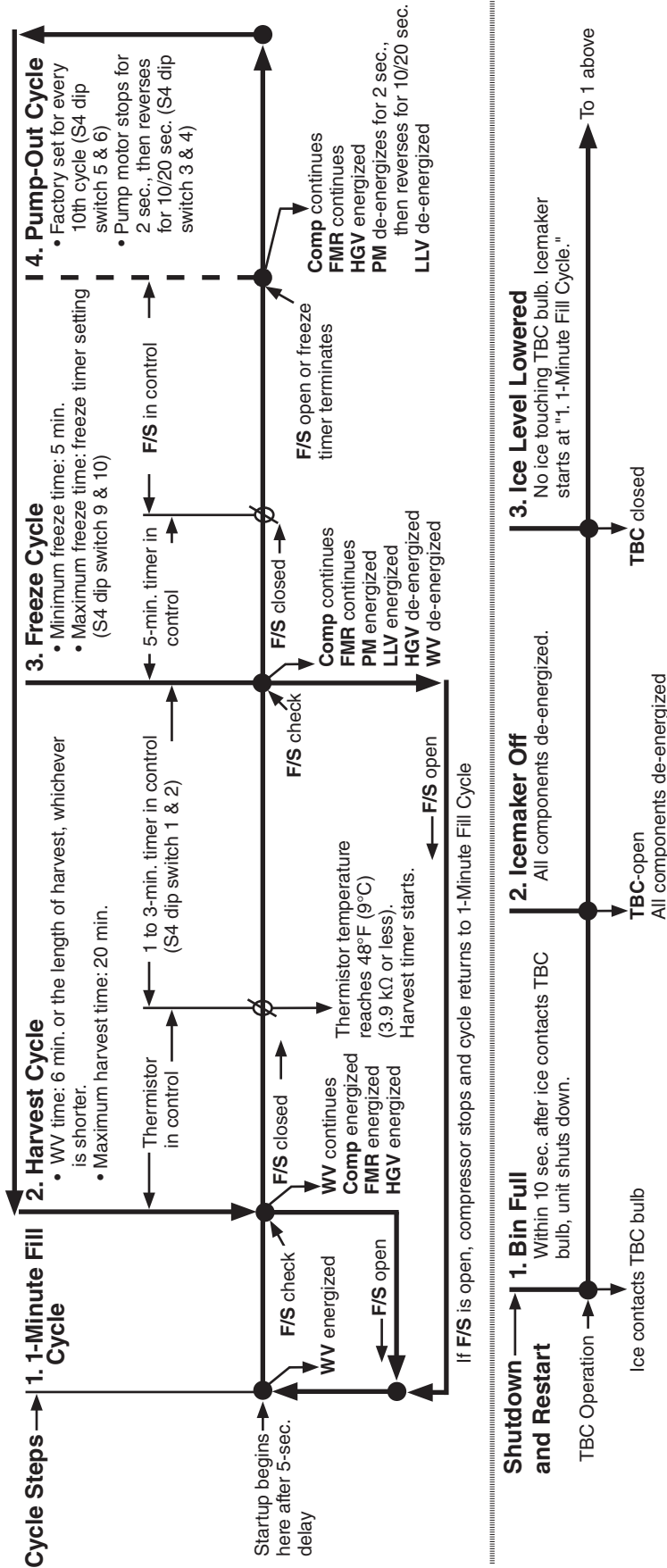
Note: Close the cleaning valve after cleaning and sanitizing are complete, otherwise the unit will not restart when the control switch is placed in the "ICE" position.

Legend:

- LLV—liquid line valve
- Comp—compressor
- PM—pump motor
- TBC—thermostatic bin control
- F/S—float switch
- HGV—hot gas valve

b) KM-1601SWH/3 and KM-1601SRH/3 "E" Control Board

**KM-1601SWH/3 and KM-1601SRH/3
"E" Control Board Sequence Flow Chart**



Components Energized when the Control Switch is in the "WASH" Position

The "WASH" position on the control switch is used when cleaning and sanitizing the unit. When in the "WASH" position, power is supplied to the pump motor. With the cleaning valve closed, the cleaner and sanitizer flow over the outside of the evaporator plate assembly. With the cleaning valve open, the cleaner and sanitizer flow over both the outside and the inside of the evaporator plate assembly.

Note: Close the cleaning valve after cleaning and sanitizing are complete, otherwise the unit will not restart when the control switch is placed in the "ICE" position.

C. Control Board

- A Hoshizaki exclusive control board is employed in Hoshizaki Stackable Crescent Cubers.
- All models are pretested and factory set.
- For a control board check procedure, see "IV.B. Control Board Check."

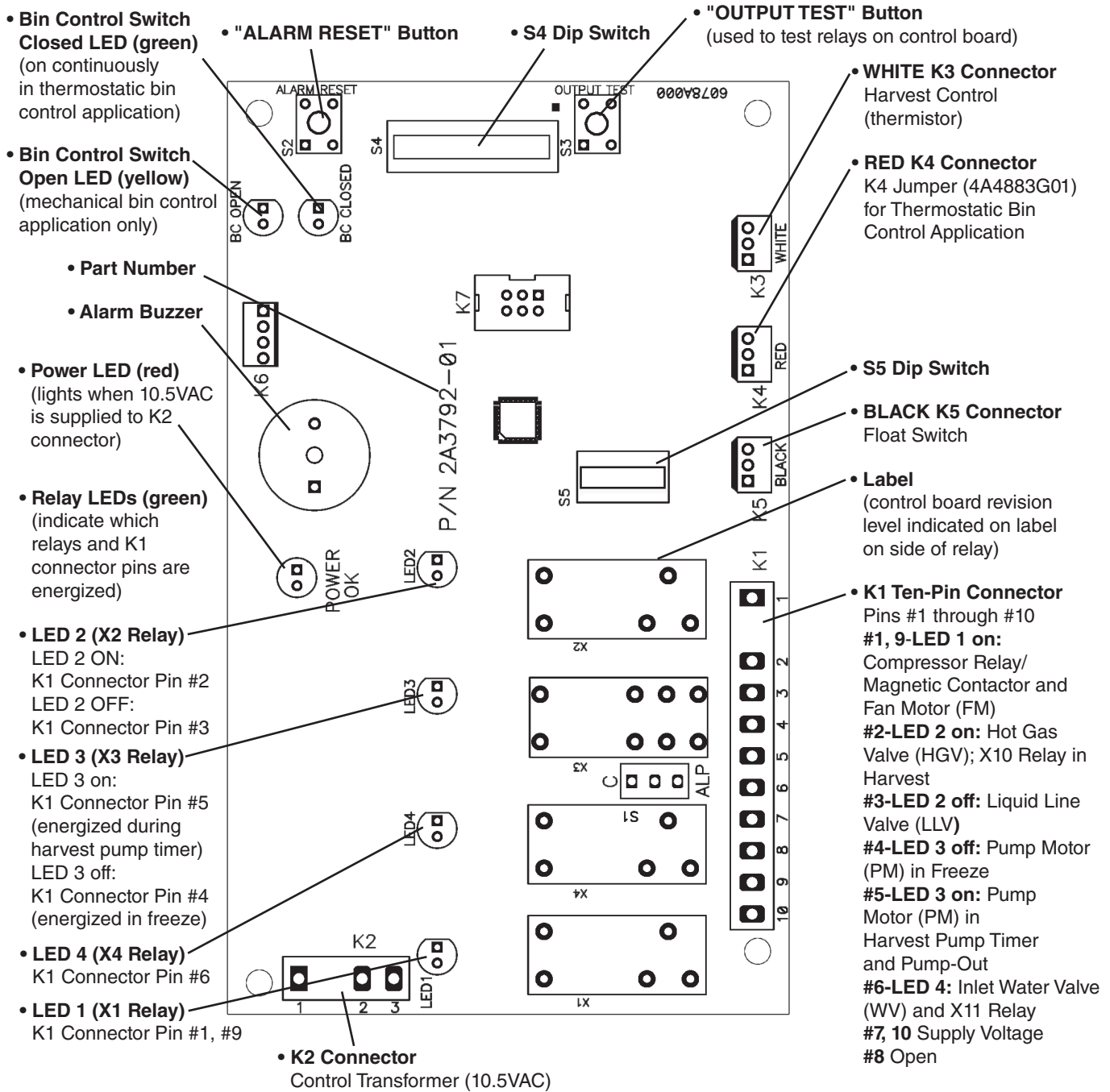
CAUTION

1. The control board is fragile; handle very carefully.
2. 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 unit before handling or replacing the control board.
3. Do not touch the electronic devices on the control board or the back of the control board.
4. Do not change wiring and connections. Do not misconnect K3, K4, and K5, because the same connector is used for all three.
K3 = Thermistor
K4 = Jumper (4A4883G01) on KM-1601SAH/3 "G" control board
K4 = Open on KM-1601SWH/3 and KM-1601SRH/3 "E" control board
K5 = Float Switch
5. Always replace the whole control board assembly if it goes bad.
6. Do not short out power supply to test for voltage.

1. Control Board Layout

a) KM-1601SAH/3 "G" Control Board

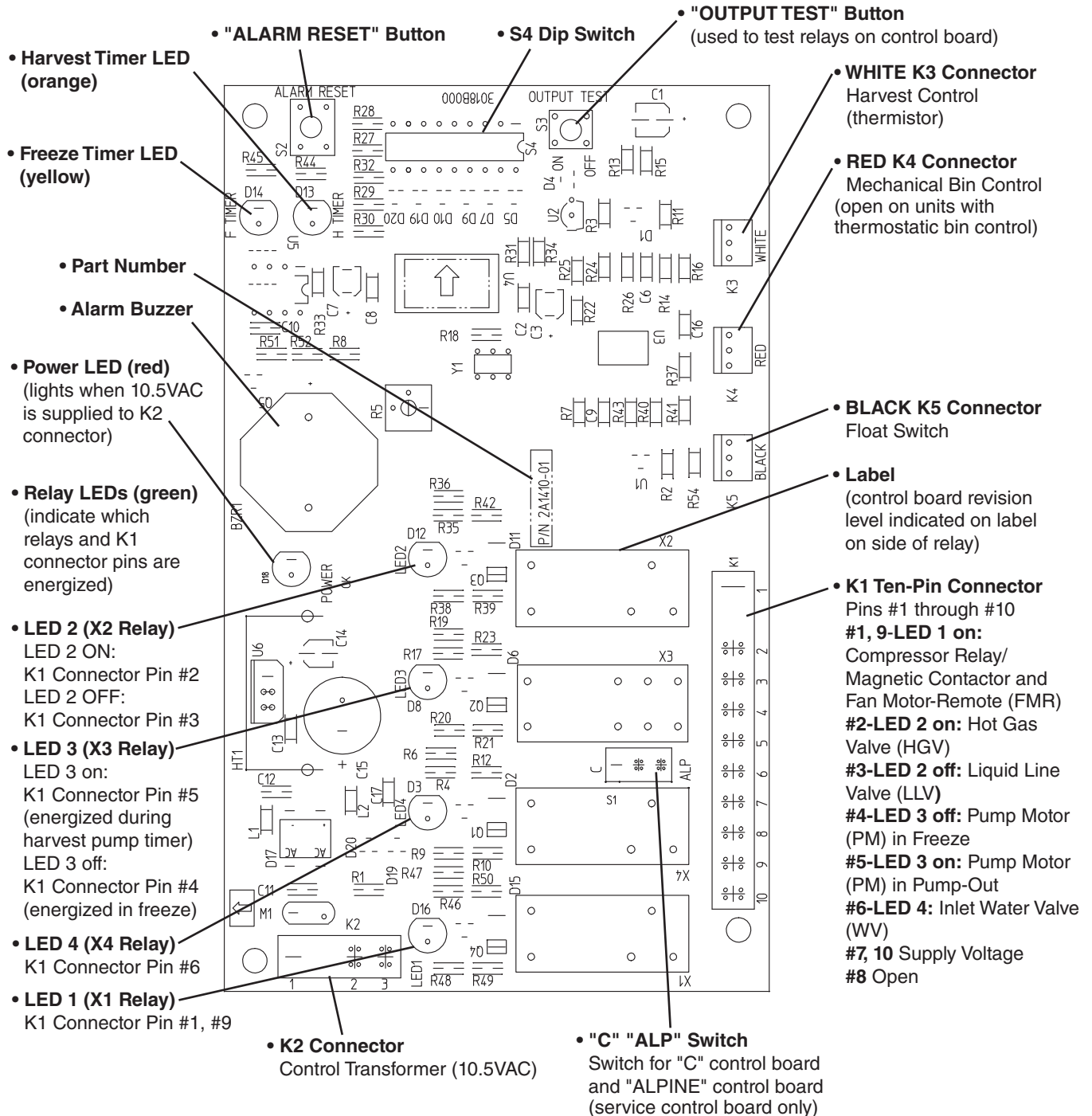
"G" Control Board



"G" Control Board	
Part Number	2A3792-01

b) KM-1601SWH/3 and KM-1601SRH/3 "E" Control Board

"E" Control Board



"E" Control Board	
Part Number	2A1410-01 (factory); 2A1410-02 (service)

2. LED Lights and Audible Alarm Safeties

a) KM-1601SAH/3 "G" Control Board

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 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. For details, see "II.B. Sequence of Operation."

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, FM, WV, HGV	2 minutes	20 minutes	3 to 5 minutes
Harvest Pump Timer	1, 3, 2	Comp, FM, PM, HGV	0 seconds	50 seconds	harvest pump timer setting
Freeze Cycle	1	Comp, FM, PM, LLV	5 minutes	freeze timer setting	30 to 35 minutes
Pump-Out Cycle	1, 4*, 3, 2	Comp, FM, WV*, PM, HGV	10 seconds	20 seconds	*pump-out timer setting

The built-in safeties shut down the unit 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 unit, 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.
3	Freeze Timer (freeze > freeze timer setting for two cycles in a row) Timer is factory set using S4 dip switch 9 & 10	Check for F/S stuck closed (up), WV leaking by, HGV leaking by, PM not pumping, TXV not feeding properly, LLV not opening, low charge, 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; **FM**—fan motor; **F/S**—float switch; **HGV**—hot gas valve; **LLV**—liquid line valve; **PM**—pump motor; **TXV**—thermostatic expansion valve; **WV**—inlet water valve

b) KM-1601SWH/3 and KM-1601SRH/3 "E" Control Board

At startup, a 5-second delay occurs while the control board conducts an internal timer check. A beep occurs when power is turned off. The red 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. For details, see "II.B. Sequence of Operation."

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, WV, HGV	2 minutes	20 minutes	3 to 5 minutes
Freeze Cycle	1	Comp, FMR, PM, LLV	5 minutes	freeze timer setting	30 to 35 minutes
Pump-Out Cycle	1, 4*, 3, 2	Comp, FMR, WV*, PM, HGV	10 seconds	20 seconds	*pump-out timer setting

The built-in safeties shut down the unit 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 unit, stuck HM, or shorted thermistor.
2	Harvest Backup Timer (harvest > 20 min. for two cycles in a row)	Orange "H TIMER" LED on. Check for open thermistor, HGV not opening, TXV or LLV leaking by, low charge, inefficient Comp, or WRV leaking by.
3	Freeze Timer (freeze > freeze timer setting for two cycles in a row) Timer is factory set using S4 dip switch 9 & 10	Yellow "F TIMER" LED on. Check for F/S 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; **FMR**—fan motor-remote; **F/S**—float switch; **HGV**—hot gas valve; **HM**—headmaster (C.P.R.); **LLV**—liquid line valve; **PM**—pump motor; **TXV**—thermostatic expansion valve; **WRV**—water regulating valve; **WV**—inlet water valve

3. Controls and Adjustments

CAUTION

Dip switches are factory set. Failure to maintain factory settings may adversely affect performance and warranty coverage. For more information, contact Hoshizaki Technical Support at 1-800-233-1940.

a) Default Dip Switch Settings

Note that the settings vary for KM-1601SRH/3 depending on the water valve installed. The dip switches are factory set to the following positions:

S4 Dip Switch														
Model	Auxiliary Code	Water Valve Part Number	Code on Water Valve	S4 Dip Switch No.										
				1	2	3	4	5	6	7	8	9	10	
KM-1601SAH/3 "G" Control Board	Dip switch settings for air-cooled units are as listed, regardless of auxiliary code.			OFF	OFF	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF
KM-1601SWH/3 "E" Control Board	Dip switch settings for water-cooled units are as listed, regardless of auxiliary code.			OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	ON
KM-1601SRH/3 "E" Control Board	R-0, R-1, some S-1	3U0111-02 (8 l/min)	J248-032	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	Some S-1	3U0111-01 (15 l/min)	J248-030	ON	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
	S-2 & later	4A1176-04 (11 l/min)												
	V-1 (M) & later	4A5251-04 (11 l/min)												

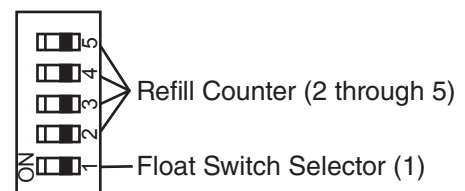
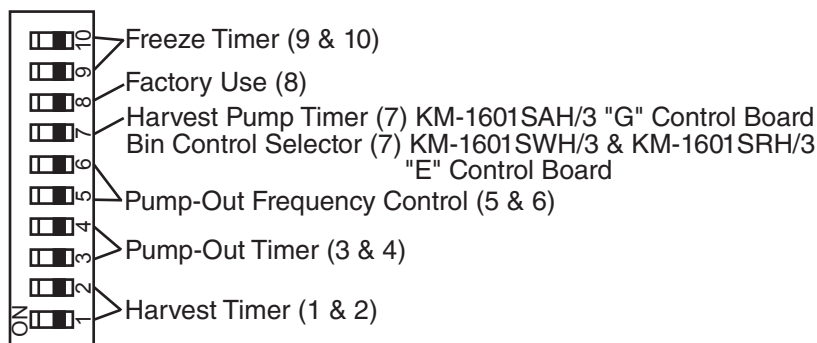
S5 Dip Switch (Do Not Adjust)					
Model	S5 Dip Switch No.				
	1	2	3	4	5
KM-1601SAH/3	OFF	OFF	OFF	OFF	OFF
KM-1601SWH/3	Not Applicable				
KM-1601SRH/3					

S4 Dip Switch

All Models

S5 Dip Switch

KM-1601SAH/3 "G" Control Board



b) Harvest Timer (S4 dip switch 1 & 2)

The harvest timer starts when the thermistor reads 48°F (9°C) at the evaporator outlet and the control board reads the thermistor's 3.9 kΩ signal. 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 flush 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 "II.C.3.c) Pump-Out Timer (S4 dip switch 3 & 4)."

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

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

CAUTION

Do not adjust S4 dip switch 3 off and S4 dip switch 4 on for KM-1601SAH/3. Otherwise, pump motor does not rotate in the pump-out direction.

When a pump-out is called for, the pump motor stops after the preceding freeze cycle. The pump motor restarts 2 seconds later in the reverse direction, taking water from the bottom of the water tank and forcing pressure against the pump-out check valve seat allowing water to go through the pump-out check valve and down the drain. At the same time, water flows through the small tube to power flush the float switch. The pump motor 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 (seconds)		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

d) Pump-Out Frequency Control (S4 dip switch 5 & 6)

The pump-out frequency control is factory set to drain the water tank every 10 cycles (except for KM-1601SRH/3 utilizing 3U0111-02 water valve), and 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.

Timing of the first pump-out is dependent on the control board. For KM-1601SAH/3 ("G" control board), first pump-out is dependent on S4 dip switch 5 & 6. See the table below. For KM-1601SWH/3 and KM-1601SRH/3 ("E" control board), first pump-out is after the first freeze cycle.

KM-1601 SAH/3 "G" & KM-1601SWH/3 & KM-1610SRH/3 "E" Control Board				
S4 Dip Switch Setting		Pump-Out Frequency	1st Pump-Out	
			KM-1601SAH/3 "G" Control Board	KM-1601SWH/3 KM-1601SRH/3 "E" Control Board
No. 5	No. 6			
OFF	OFF	Every cycle	After 2nd freeze cycle	After 1st 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	

e) Harvest Pump Timer/Bin Control Selector (S4 dip switch 7)

Depending on the control board, S4 dip switch 7 is either a harvest pump timer or bin control selector.

(1) Harvest Pump Timer, KM-1601SAH/3 "G" Control Board

CAUTION

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

Depending on the harvest pump timer setting, the pump motor energizes and runs the last 0 or 50 seconds of harvest. When the pump is on, water circulates over the evaporator. The 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 on, the pump motor is energized through the #5 pin (DBU wire) on the control board K1 ten-pin connector and the X10 relay. The #5 pin (DBU wire) is used in most applications to reverse the pump motor or energize the drain valve in pump-out cycles. In this application, it is used for the pump-out cycle (reverse rotation) as well as the harvest pump timer (freeze rotation). Therefore, the harvest pump timer relays are needed to control the pump motor direction during the pump-out and harvest cycles. See "III.B. Wiring Diagrams."

KM-1601SAH/3 "G" Control Board	
S4 Dip Switch Setting	Pump Motor Time (seconds)
No. 7	
ON	50
OFF	0

(2) Bin Control Selector, KM-1601SWH/3 & KM-1601SRH/3 "E" Control Board

Factory set for proper operation. Do not adjust. When set to the on position on a unit with a thermostatic bin control, a 5-beep alarm sounds (open circuit) and the unit does not operate.

KM-1601SWH/3 & KM-1601SRH/3 "E" Control Board	
S4 Dip Switch Setting	Bin Control
No. 7	
ON	Mechanical
OFF	Thermostatic

f) Factory Use (S4 dip switch 8)

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

g) Freeze Timer (S4 dip switch 9 & 10)

CAUTION

Adjust to proper specification, or the unit 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. After 2 consecutive freeze timer terminations, the control board shuts down the icemaker. In this case, see "IV.G.3. Low Ice Production" for possible solutions. The freeze timer is factory set, and generally no adjustment is required. Before changing this setting, contact Hoshizaki Technical Support at 1-800-233-1940 for recommendations.

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

h) Float Switch Selector (S5 dip switch 1), KM-1601SAH/3 "G" Control Board

CAUTION

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

S5 dip switch 1 allows for single or double float switch applications. The KM-1601SAH/3 use a single float switch.

i) Refill Counter (S5 dip switch 2 through 5), KM-1601SAH/3 "G" Control Board

CAUTION

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

S5 dip switch 2 through 5 allows for refills during the freeze cycle. The KM-1601SAH/3 do not refill.

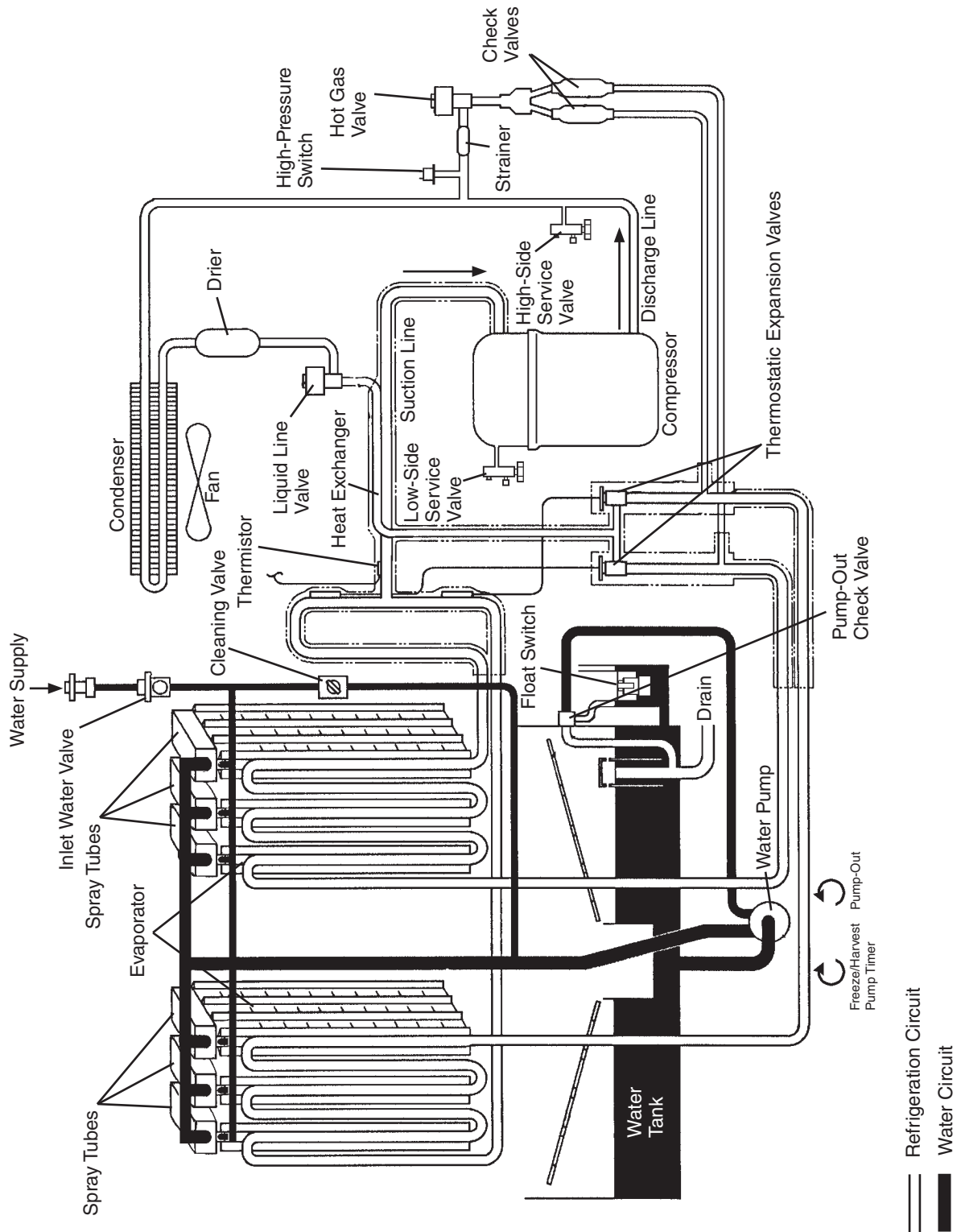
D. Control Switch

The control switch has three positions: "OFF" for power off, "ICE" for icemaking, and "WASH" to activate the water pump when cleaning and sanitizing.

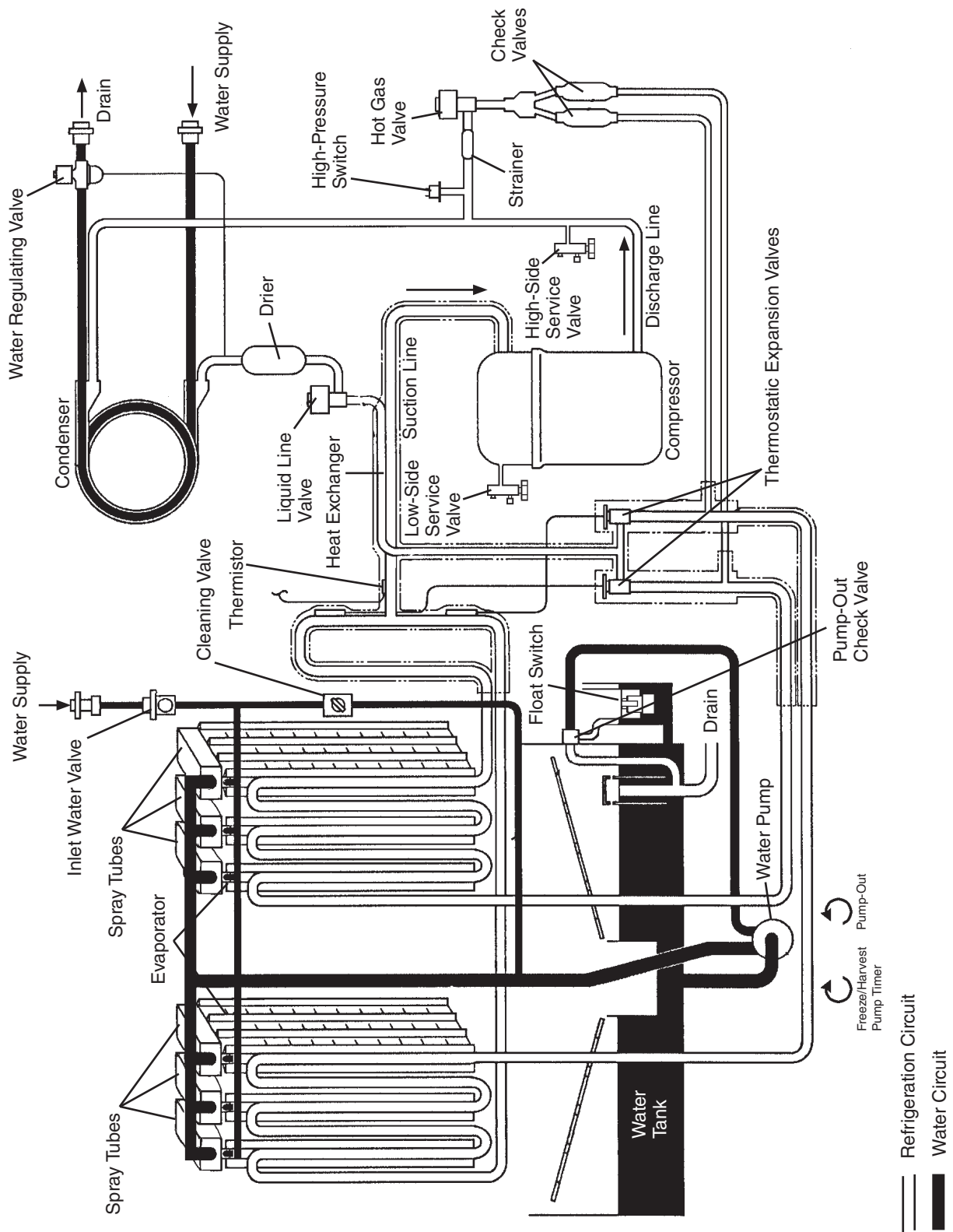
III. Technical Information

A. Water Circuit and Refrigeration Circuit

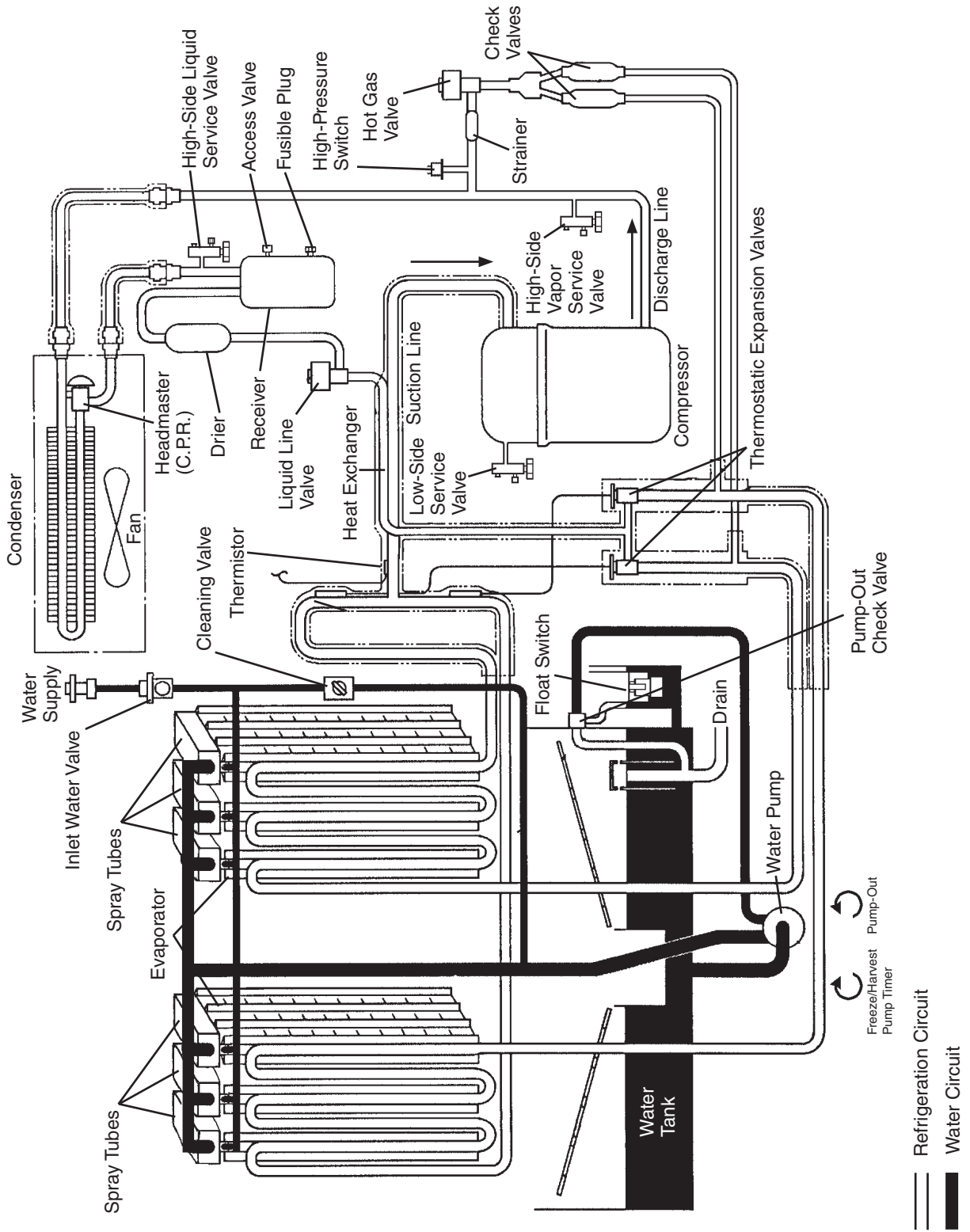
1. KM-1601SAH/3 (air-cooled)



2. KM-1601SWH/3 (water-cooled)

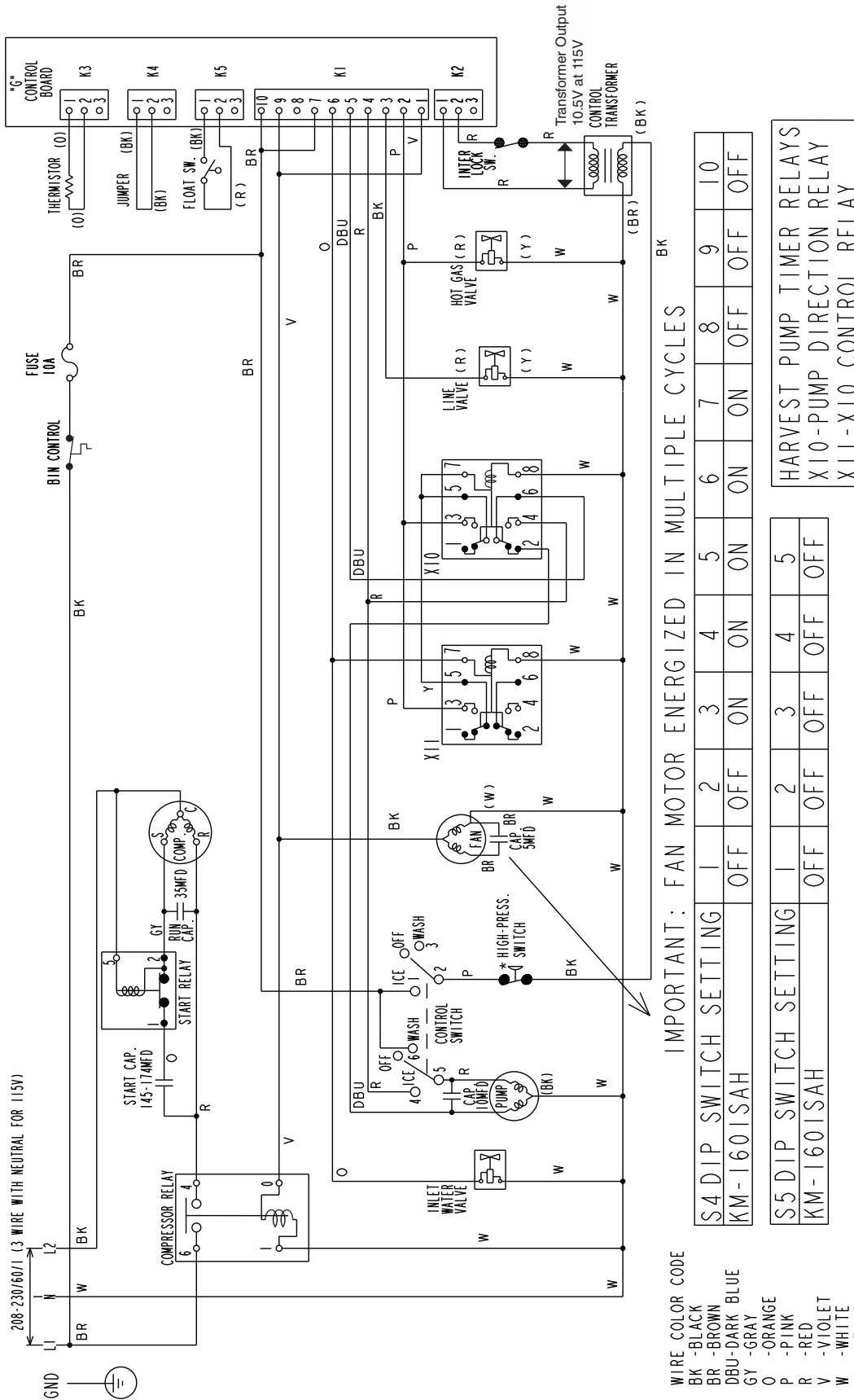


3. KM-1601SRH/3 (remote air-cooled)



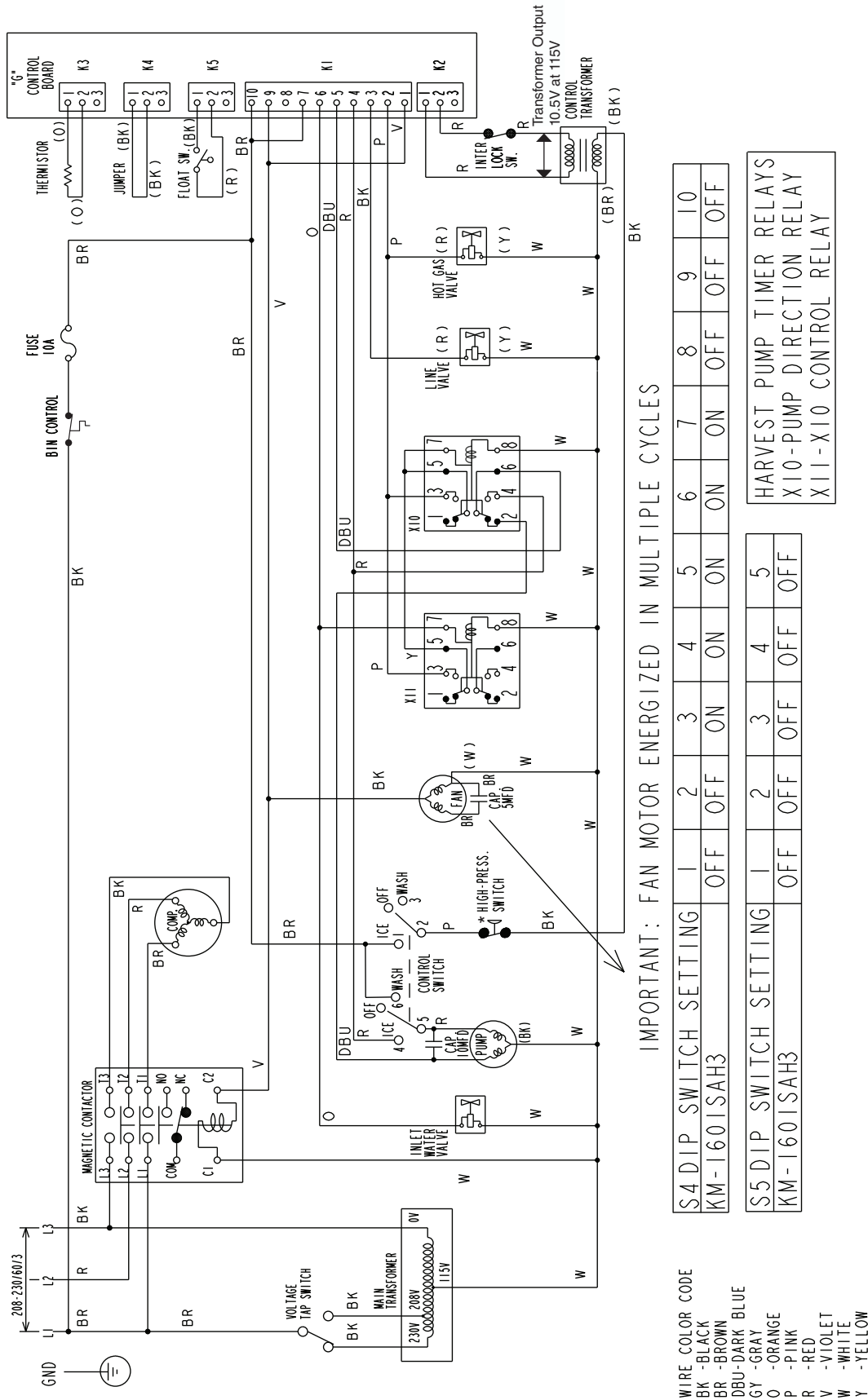
B. Wiring Diagrams

1. KM-1601SAH (air-cooled)

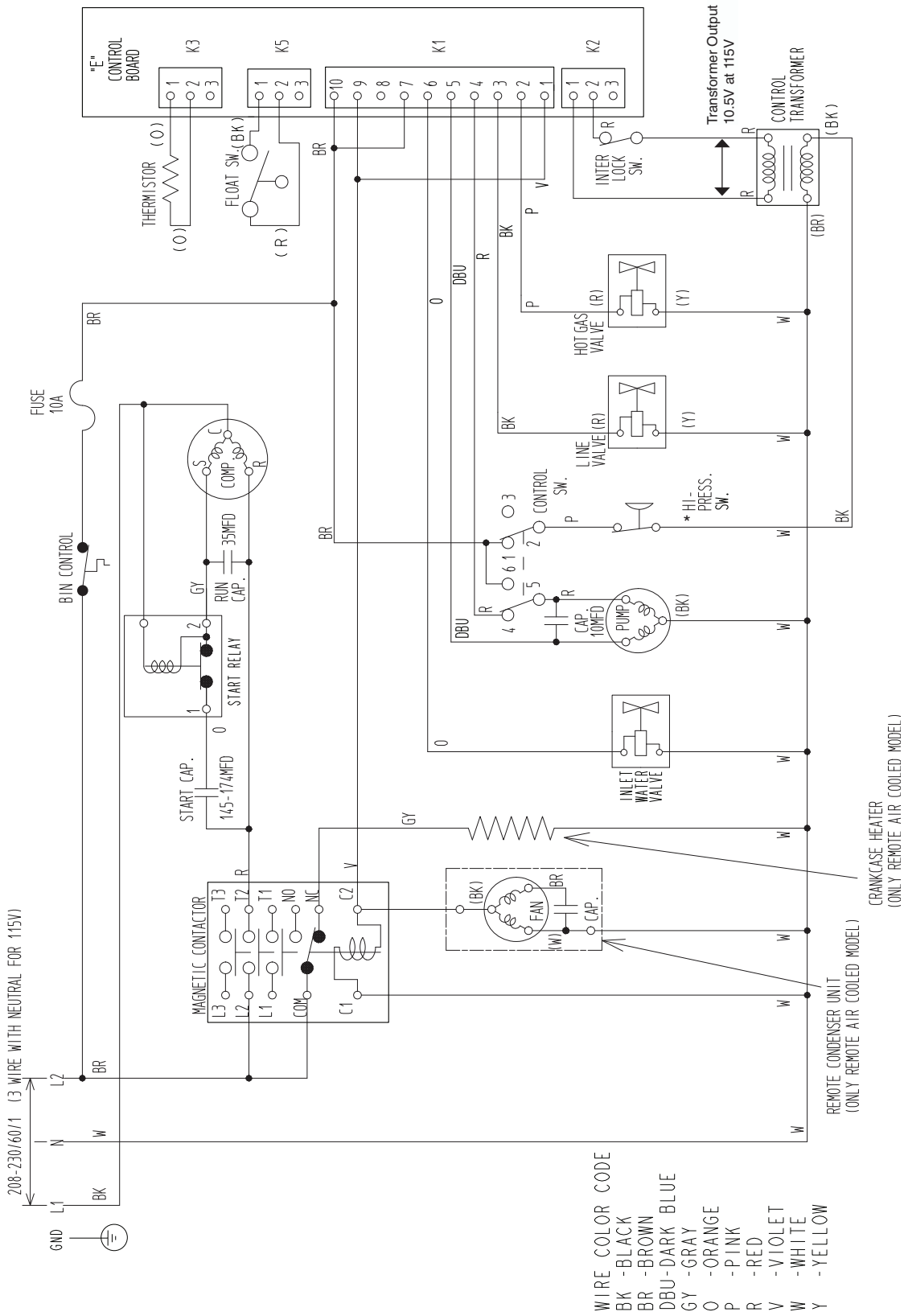


* High-Pressure Switch	
Cut-Out	412±21 PSIG
Cut-In	327±21 PSIG

2. KM-1601SAH3 (air-cooled)

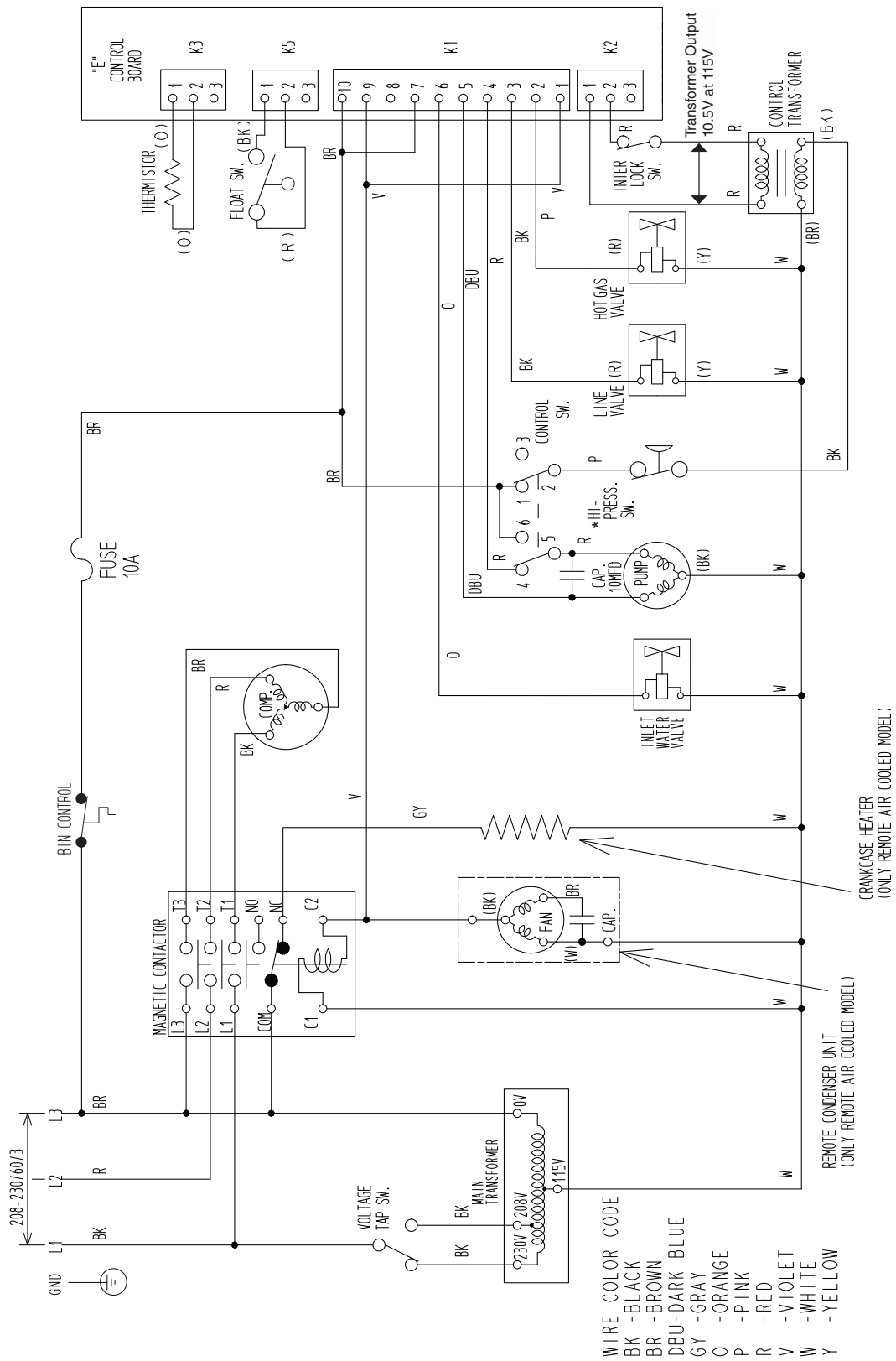


3. KM-1601SWH (water-cooled), KM-1601SRH (remote air-cooled)



* High-Pressure Switch	
Water-Cooled Model	Remote Model
Cut-Out 384± ²¹ ₀ PSIG	412± ²¹ ₀ PSIG
Cut-In 284± ²¹ PSIG	327± ²¹ PSIG

4. KM-1601SWH3 (water-cooled), KM-1601SRH3 (remote air-cooled)



C. Performance Data

1. KM-1601SAH (air-cooled)

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1462	<u>663</u>	1427	<u>647</u>	1307	<u>593</u>
	80/27	1435	<u>651</u>	1381	<u>627</u>	1221	<u>554</u>
	90/32	1427	<u>647</u>	1343	<u>609</u>	1198	<u>543</u>
lbs./day <u>kg./day</u>	100/38	1379	<u>625</u>	1309	<u>594</u>	1064	<u>483</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2450		2503		2563	
	80/27	2490		2572		2625	
	90/32	2503		2630		2687	
watts	100/38	2511		2643		2740	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	709	<u>2.68</u>	568	<u>2.15</u>	505	<u>1.91</u>
	80/27	602	<u>2.28</u>	383	<u>1.45</u>	392	<u>1.49</u>
	90/32	568	<u>2.15</u>	228	<u>0.86</u>	206	<u>0.78</u>
gal./day <u>m³/day</u>	100/38	411	<u>1.56</u>	223	<u>0.84</u>	185	<u>0.70</u>
FREEZING CYCLE TIME	70/21	29		30		33	
	80/27	30		31		35	
	90/32	30		33		36	
min.	100/38	31		33		39	
HARVEST CYCLE TIME	70/21	4.6		3.9		3.6	
	80/27	4.0		2.9		3.1	
	90/32	3.9		2.1		2.1	
min.	100/38	3.1		2.1		2.1	
HEAD PRESSURE	70/21	273	<u>19.2</u>	287	<u>20.2</u>	312	<u>21.9</u>
	80/27	283	<u>19.9</u>	305	<u>21.4</u>	333	<u>23.4</u>
	90/32	287	<u>20.2</u>	320	<u>22.5</u>	348	<u>24.4</u>
PSIG <u>kg/cm²G</u>	100/38	294	<u>20.7</u>	326	<u>23.0</u>	373	<u>26.2</u>
SUCTION PRESSURE	70/21	41	<u>2.9</u>	41	<u>2.9</u>	46	<u>3.2</u>
	80/27	41	<u>2.9</u>	42	<u>2.9</u>	49	<u>3.4</u>
	90/32	41	<u>2.9</u>	42	<u>3.0</u>	48	<u>3.4</u>
PSIG <u>kg/cm²G</u>	100/38	44	<u>3.1</u>	43	<u>3.1</u>	54	<u>3.8</u>

TOTAL HEAT OF REJECTION FROM CONDENSER 20,700 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

2. KM-1601SAH3 (air-cooled)

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1456	<u>660</u>	1423	<u>646</u>	1313	<u>596</u>
	80/27	1431	<u>649</u>	1381	<u>626</u>	1234	<u>560</u>
	90/32	1423	<u>646</u>	1345	<u>610</u>	1211	<u>549</u>
lbs./day <u>kg./day</u>	100/38	1379	<u>626</u>	1314	<u>596</u>	1088	<u>494</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2370		2440		2463	
	80/27	2424		2533		2515	
	90/32	2440		2610		2610	
watts	100/38	2420		2610		2610	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	708	<u>2.68</u>	573	<u>2.17</u>	510	<u>1.93</u>
	80/27	605	<u>2.29</u>	396	<u>1.50</u>	400	<u>1.51</u>
	90/32	573	<u>2.17</u>	249	<u>0.94</u>	222	<u>0.84</u>
gal./day <u>m³/day</u>	100/38	422	<u>1.60</u>	243	<u>0.92</u>	198	<u>0.75</u>
FREEZING CYCLE TIME	70/21	28		30		33	
	80/27	30		32		35	
	90/32	30		33		37	
min.	100/38	31		34		39	
HARVEST CYCLE TIME	70/21	4.8		4.1		3.8	
	80/27	4.2		3.1		3.2	
	90/32	4.1		2.4		2.3	
min.	100/38	3.3		2.4		2.2	
HEAD PRESSURE	70/21	267	<u>18.8</u>	291	<u>20.5</u>	316	<u>22.2</u>
	80/27	286	<u>20.1</u>	323	<u>22.7</u>	343	<u>24.1</u>
	90/32	291	<u>20.5</u>	350	<u>24.6</u>	372	<u>26.1</u>
PSIG <u>kg/cm²G</u>	100/38	293	<u>20.6</u>	355	<u>25.0</u>	392	<u>27.6</u>
SUCTION PRESSURE	70/21	41	<u>2.9</u>	45	<u>3.1</u>	48	<u>3.4</u>
	80/27	44	<u>3.1</u>	49	<u>3.5</u>	52	<u>3.7</u>
	90/32	45	<u>3.1</u>	53	<u>3.7</u>	57	<u>4.0</u>
PSIG <u>kg/cm²G</u>	100/38	45	<u>3.2</u>	54	<u>3.8</u>	60	<u>4.2</u>

TOTAL HEAT OF REJECTION FROM CONDENSER

24,400 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

3. KM-1601SWH (water-cooled)

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1492	<u>677</u>	1501	<u>681</u>	1419	<u>643</u>
	80/27	1499	<u>680</u>	1513	<u>686</u>	1378	<u>625</u>
	90/32	1501	<u>681</u>	1523	<u>691</u>	1408	<u>639</u>
lbs./day <u>kg./day</u>	100/38	1453	<u>659</u>	1496	<u>679</u>	1303	<u>591</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2300		2332		2335	
	80/27	2325		2375		2354	
	90/32	2332		2410		2400	
watts	100/38	2319		2408		2390	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	1628	<u>6.16</u>	1697	<u>6.43</u>	2042	<u>7.73</u>
	80/27	1681	<u>6.36</u>	1789	<u>6.77</u>	2272	<u>8.60</u>
	90/32	1697	<u>6.43</u>	1866	<u>7.06</u>	2297	<u>8.70</u>
gal./day <u>m³/day</u>	100/38	1908	<u>7.22</u>	1967	<u>7.44</u>	2693	<u>10.20</u>
FREEZING CYCLE TIME	70/21	25		25		27	
	80/27	25		26		28	
	90/32	25		27		29	
min.	100/38	26		27		30	
HARVEST CYCLE TIME	70/21	5.0		4.2		3.8	
	80/27	4.4		3.3		3.2	
	90/32	4.2		2.5		2.2	
min.	100/38	3.4		2.4		2.0	
HEAD PRESSURE	70/21	241	<u>16.9</u>	246	<u>17.3</u>	257	<u>18.0</u>
	80/27	244	<u>17.2</u>	252	<u>17.7</u>	265	<u>18.6</u>
	90/32	246	<u>17.3</u>	257	<u>18.0</u>	269	<u>18.9</u>
PSIG <u>kg/cm²G</u>	100/38	249	<u>17.5</u>	260	<u>18.3</u>	281	<u>19.8</u>
SUCTION PRESSURE	70/21	43	<u>3.0</u>	44	<u>3.1</u>	45	<u>3.2</u>
	80/27	43	<u>3.1</u>	44	<u>3.1</u>	47	<u>3.3</u>
	90/32	44	<u>3.1</u>	44	<u>3.1</u>	47	<u>3.3</u>
PSIG <u>kg/cm²G</u>	100/38	44	<u>3.1</u>	45	<u>3.2</u>	49	<u>3.4</u>

TOTAL HEAT OF REJECTION FROM CONDENSER 23,100 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]

TOTAL HEAT OF REJECTION FROM COMPRESSOR 3,300 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]

WATER FLOW FOR CONDENSER 101 gal./h [AT 100°F (38°C) / WT 90°F (32°C)]

PRESSURE DROP OF COOLING WATER LINE less than 10 PSIG

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

4. KM-1601SWH3 (water-cooled)

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
lbs./day <u>kg./day</u>	70/21	1555	<u>705</u>	1558	<u>707</u>	1466	<u>665</u>
	80/27	1557	<u>706</u>	1562	<u>708</u>	1417	<u>643</u>
	90/32	1558	<u>707</u>	1565	<u>710</u>	1440	<u>653</u>
	100/38	1507	<u>684</u>	1536	<u>697</u>	1326	<u>601</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2270		2305		2332	
	80/27	2297		2351		2367	
	90/32	2305		2390		2411	
	watts	2303		2395		2430	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	1714	<u>6.49</u>	1779	<u>6.73</u>	2186	<u>8.28</u>
	80/27	1764	<u>6.68</u>	1866	<u>7.06</u>	2449	<u>9.27</u>
	90/32	1779	<u>6.73</u>	1937	<u>7.33</u>	2455	<u>9.29</u>
	gal./day <u>m³/day</u>	2013	<u>7.62</u>	2059	<u>7.79</u>	2930	<u>11.09</u>
FREEZING CYCLE TIME	70/21	24		24		26	
	80/27	24		25		27	
	90/32	24		26		28	
	min.	25		26		30	
HARVEST CYCLE TIME	70/21	6.0		4.9		4.4	
	80/27	5.2		3.6		3.6	
	90/32	4.9		2.4		2.2	
	min.	3.8		2.4		2.0	
HEAD PRESSURE	70/21	239	<u>16.8</u>	241	<u>16.9</u>	257	<u>18.1</u>
	80/27	240	<u>16.9</u>	244	<u>17.1</u>	268	<u>18.8</u>
	90/32	241	<u>16.9</u>	246	<u>17.3</u>	267	<u>18.8</u>
	PSIG <u>kg/cm²G</u>	249	<u>17.5</u>	251	<u>17.6</u>	287	<u>20.2</u>
SUCTION PRESSURE	70/21	41	<u>2.9</u>	42	<u>3.0</u>	45	<u>3.2</u>
	80/27	42	<u>2.9</u>	44	<u>3.1</u>	47	<u>3.3</u>
	90/32	42	<u>3.0</u>	45	<u>3.2</u>	48	<u>3.4</u>
	PSIG <u>kg/cm²G</u>	43	<u>3.0</u>	46	<u>3.2</u>	51	<u>3.6</u>

TOTAL HEAT OF REJECTION FROM CONDENSER	23,500 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]
TOTAL HEAT OF REJECTION FROM COMPRESSOR	3,200 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]
WATER FLOW FOR CONDENSER	111 gal./h [AT 100°F (38°C) / WT 90°F (32°C)]
PRESSURE DROP OF COOLING WATER LINE	less than 10 PSIG

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

5. KM-1601SRH with URC-21F (remote air-cooled) (auxiliary codes: R-0; R-1; some S-1)

This data applies to units with an 8 l/min water valve. The 8 l/min water valve is part number 3U0111-02 and has J248-032 stamped on the side of the valve facing the rear of the unit.

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1583	<u>718</u>	1550	<u>703</u>	1435	<u>651</u>
	80/27	1558	<u>707</u>	1507	<u>684</u>	1353	<u>614</u>
	90/32	1550	<u>703</u>	1472	<u>668</u>	1332	<u>604</u>
lbs./day <u>kg./day</u>	100/38	1503	<u>682</u>	1439	<u>653</u>	1203	<u>546</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2440		2499		2564	
	80/27	2485		2576		2633	
	90/32	2499		2640		2703	
	watts	2507		2655		2760	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	503	<u>1.90</u>	430	<u>1.63</u>	396	<u>1.50</u>
	80/27	448	<u>1.69</u>	335	<u>1.27</u>	336	<u>1.27</u>
	90/32	430	<u>1.63</u>	255	<u>0.96</u>	240	<u>0.91</u>
	gal./day <u>m³/day</u>	100/38	348	<u>1.32</u>	251	<u>0.95</u>	226
FREEZING CYCLE TIME	70/21	22		23		26	
	80/27	23		25		28	
	90/32	23		26		29	
	min.	24		27		31	
HARVEST CYCLE TIME	70/21	6.7		5.7		5.4	
	80/27	5.9		4.3		4.6	
	90/32	5.7		3.2		3.2	
	min.	4.6		3.2		3.2	
HEAD PRESSURE	70/21	201	<u>14.1</u>	215	<u>15.1</u>	235	<u>16.5</u>
	80/27	211	<u>14.9</u>	233	<u>16.4</u>	254	<u>17.8</u>
	90/32	215	<u>15.1</u>	248	<u>17.4</u>	269	<u>18.9</u>
	PSIG <u>kg/cm²G</u>	100/38	219	<u>15.4</u>	253	<u>17.8</u>	288
SUCTION PRESSURE	70/21	36	<u>2.5</u>	38	<u>2.7</u>	41	<u>2.9</u>
	80/27	38	<u>2.6</u>	41	<u>2.9</u>	44	<u>3.1</u>
	90/32	38	<u>2.7</u>	43	<u>3.0</u>	47	<u>3.3</u>
	PSIG <u>kg/cm²G</u>	100/38	39	<u>2.7</u>	44	<u>3.1</u>	50

TOTAL HEAT OF REJECTION FROM CONDENSER 24,600 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]

TOTAL HEAT OF REJECTION FROM COMPRESSOR 3,300 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]

CONDENSER VOLUME 441 CU. IN (URC-21F)

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

6. KM-1601SRH with URC-21F (remote air-cooled) (auxiliary codes: some S-1; S-2 and later)

This data applies to units with a 15 l/min or 11 l/min water valve. The 15 l/min water valve is part number 3U0111-01 and has J248-030 stamped on the side of the valve facing the rear of the unit. The 11 l/min water valve is either part number 4A1176-04 or 4A5251-04 and has the part number stamped on the side of the valve facing the front of the unit.

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1564	<u>709</u>	1547	<u>702</u>	1468	<u>666</u>
	80/27	1551	<u>703</u>	1524	<u>691</u>	1415	<u>642</u>
	90/32	1547	<u>702</u>	1505	<u>683</u>	1407	<u>638</u>
lbs./day kg./day	100/38	1512	<u>686</u>	1482	<u>672</u>	1317	<u>597</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2610		2636		2684	
	80/27	2630		2671		2725	
	90/32	2636		2700		2752	
	watts	2650		2712		2800	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	785	<u>2.97</u>	665	<u>2.52</u>	583	<u>2.21</u>
	80/27	694	<u>2.63</u>	507	<u>1.92</u>	471	<u>1.78</u>
	90/32	665	<u>2.52</u>	375	<u>1.42</u>	318	<u>1.20</u>
	gal./day m ³ /day	100/38	519	<u>1.97</u>	361	<u>1.37</u>	266
FREEZING CYCLE TIME	70/21	24		25		27	
	80/27	25		27		29	
	90/32	25		28		30	
	min.	100/38	26		29		32
HARVEST CYCLE TIME	70/21	5.6		4.6		4.2	
	80/27	4.8		3.4		3.4	
	90/32	4.6		2.4		2.2	
	min.	100/38	3.6		2.3		2.0
HEAD PRESSURE	70/21	213	<u>15.0</u>	226	<u>15.9</u>	245	<u>17.2</u>
	80/27	223	<u>15.7</u>	243	<u>17.1</u>	263	<u>18.5</u>
	90/32	226	<u>15.9</u>	257	<u>18.1</u>	277	<u>19.5</u>
	PSIG kg/cm ² G	100/38	230	<u>16.2</u>	262	<u>18.4</u>	296
SUCTION PRESSURE	70/21	40	<u>2.8</u>	41	<u>2.9</u>	44	<u>3.1</u>
	80/27	41	<u>2.9</u>	43	<u>3.1</u>	47	<u>3.3</u>
	90/32	41	<u>2.9</u>	45	<u>3.2</u>	48	<u>3.4</u>
	PSIG kg/cm ² G	100/38	42	<u>3.0</u>	46	<u>3.2</u>	51

TOTAL HEAT OF REJECTION FROM CONDENSER	22,800 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]
TOTAL HEAT OF REJECTION FROM COMPRESSOR	3,300 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]
CONDENSER VOLUME	441 CU. IN (URC-21F)

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

7. KM-1601SRH with URC-22F (remote air-cooled) (auxiliary codes: S-2 and later)

This data applies to units with an 11 l/min water valve. The 11 l/min water valve is either part number 4A1176-04 or 4A5251-04 and has the part number stamped on the side of the valve facing the front of the unit.

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1531	<u>694</u>	1519	<u>689</u>	1426	<u>647</u>
	80/27	1522	<u>690</u>	1503	<u>682</u>	1368	<u>620</u>
	90/32	1519	<u>689</u>	1490	<u>676</u>	1371	<u>622</u>
lbs./day <u>kg./day</u>	100/38	1475	<u>669</u>	1462	<u>663</u>	1261	<u>572</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2560		2604		2645	
	80/27	2593		2662		2693	
	90/32	2604		2710		2746	
	watts	2606		2719		2780	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	755	<u>2.86</u>	637	<u>2.41</u>	555	<u>2.10</u>
	80/27	665	<u>2.52</u>	481	<u>1.82</u>	444	<u>1.68</u>
	90/32	637	<u>2.41</u>	352	<u>1.33</u>	294	<u>1.11</u>
	gal./day <u>m³/day</u>	100/38	493	<u>1.87</u>	338	<u>1.28</u>	241
FREEZING CYCLE TIME	70/21	25		26		28	
	80/27	26		28		30	
	90/32	26		29		31	
	min.	27		29		34	
HARVEST CYCLE TIME	70/21	5.5		4.6		4.1	
	80/27	4.8		3.5		3.4	
	90/32	4.6		2.6		2.3	
	min.	3.6		2.5		2.0	
HEAD PRESSURE	70/21	207	<u>14.5</u>	220	<u>15.5</u>	240	<u>16.9</u>
	80/27	217	<u>15.2</u>	237	<u>16.7</u>	258	<u>18.1</u>
	90/32	220	<u>15.5</u>	252	<u>17.7</u>	273	<u>19.2</u>
	PSIG <u>kg/cm²G</u>	100/38	224	<u>15.8</u>	257	<u>18.1</u>	292
SUCTION PRESSURE	70/21	40	<u>2.8</u>	42	<u>2.9</u>	44	<u>3.1</u>
	80/27	41	<u>2.9</u>	44	<u>3.1</u>	47	<u>3.3</u>
	90/32	42	<u>2.9</u>	46	<u>3.2</u>	49	<u>3.4</u>
	PSIG <u>kg/cm²G</u>	100/38	42	<u>3.0</u>	46	<u>3.3</u>	51

TOTAL HEAT OF REJECTION FROM CONDENSER	21,000 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]
TOTAL HEAT OF REJECTION FROM COMPRESSOR	2,800 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]
CONDENSER VOLUME	214 CU. IN (URC-22F)

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

8. KM-1601SRH3 with URC-21F (remote air-cooled) (auxiliary codes: R-0; R-1; some S-1)

This data applies to units with an 8 l/min water valve. The 8 l/min water valve is part number 3U0111-02 and has J248-032 stamped on the side of the valve facing the rear of the unit.

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1583	<u>718</u>	1550	<u>703</u>	1435	<u>651</u>
	80/27	1558	<u>707</u>	1507	<u>684</u>	1353	<u>614</u>
	90/32	1550	<u>703</u>	1472	<u>668</u>	1332	<u>604</u>
lbs./day <u>kg./day</u>	100/38	1503	<u>682</u>	1439	<u>653</u>	1203	<u>546</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2440		2499		2564	
	80/27	2485		2576		2633	
	90/32	2499		2640		2703	
	watts	2507		2655		2760	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	503	<u>1.90</u>	430	<u>1.63</u>	396	<u>1.50</u>
	80/27	448	<u>1.69</u>	335	<u>1.27</u>	336	<u>1.27</u>
	90/32	430	<u>1.63</u>	255	<u>0.96</u>	240	<u>0.91</u>
	gal./day <u>m³/day</u>	100/38	348	<u>1.32</u>	251	<u>0.95</u>	226
FREEZING CYCLE TIME	70/21	22		23		26	
	80/27	23		25		28	
	90/32	23		26		29	
	min.	24		27		31	
HARVEST CYCLE TIME	70/21	6.7		5.7		5.4	
	80/27	5.9		4.3		4.6	
	90/32	5.7		3.2		3.2	
	min.	4.6		3.2		3.2	
HEAD PRESSURE	70/21	201	<u>14.1</u>	215	<u>15.1</u>	235	<u>16.5</u>
	80/27	211	<u>14.9</u>	233	<u>16.4</u>	254	<u>17.8</u>
	90/32	215	<u>15.1</u>	248	<u>17.4</u>	269	<u>18.9</u>
	PSIG <u>kg/cm²G</u>	100/38	219	<u>15.4</u>	253	<u>17.8</u>	288
SUCTION PRESSURE	70/21	36	<u>2.5</u>	38	<u>2.7</u>	41	<u>2.9</u>
	80/27	38	<u>2.6</u>	41	<u>2.9</u>	44	<u>3.1</u>
	90/32	38	<u>2.7</u>	43	<u>3.0</u>	47	<u>3.3</u>
	PSIG <u>kg/cm²G</u>	100/38	39	<u>2.7</u>	44	<u>3.1</u>	50

TOTAL HEAT OF REJECTION FROM CONDENSER	24,600 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]
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TOTAL HEAT OF REJECTION FROM COMPRESSOR	3,300 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]
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CONDENSER VOLUME	441 CU. IN (URC-21F)
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Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

9. KM-1601SRH3 with URC-21F (remote air-cooled) (auxiliary codes: some S-1; S-2 and later)

This data applies to units with a 15 l/min or 11 l/min water valve. The 15 l/min water valve is part number 3U0111-01 and has J248-030 stamped on the side of the valve facing the rear of the unit. The 11 l/min water valve is either part number 4A1176-04 or 4A5251-04 and has the part number stamped on the side of the valve facing the front of the unit.

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1585	<u>719</u>	1563	<u>709</u>	1464	<u>664</u>
	80/27	1568	<u>711</u>	1535	<u>696</u>	1396	<u>633</u>
	90/32	1563	<u>709</u>	1511	<u>685</u>	1387	<u>629</u>
lbs./day <u>kg./day</u>	100/38	1520	<u>689</u>	1482	<u>672</u>	1273	<u>577</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2580		2691		2712	
	80/27	2665		2838		2785	
	90/32	2691		2960		2939	
watts	100/38	2651		2955		2920	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	781	<u>2.96</u>	659	<u>2.49</u>	585	<u>2.21</u>
	80/27	688	<u>2.60</u>	497	<u>1.88</u>	476	<u>1.80</u>
	90/32	659	<u>2.49</u>	363	<u>1.37</u>	318	<u>1.20</u>
gal./day <u>m³/day</u>	100/38	514	<u>1.95</u>	352	<u>1.33</u>	276	<u>1.05</u>
FREEZING CYCLE TIME	70/21	24		25		27	
	80/27	25		27		29	
	90/32	25		28		30	
min.	100/38	26		29		32	
HARVEST CYCLE TIME	70/21	5.5		4.6		4.1	
	80/27	4.8		3.4		3.4	
	90/32	4.6		2.4		2.2	
min.	100/38	3.6		2.4		2.0	
HEAD PRESSURE	70/21	202	<u>14.2</u>	215	<u>15.1</u>	237	<u>16.7</u>
	80/27	212	<u>14.9</u>	233	<u>16.3</u>	257	<u>18.1</u>
	90/32	215	<u>15.1</u>	247	<u>17.4</u>	271	<u>19.1</u>
PSIG <u>kg/cm²G</u>	100/38	221	<u>15.5</u>	253	<u>17.8</u>	293	<u>20.6</u>
SUCTION PRESSURE	70/21	37	<u>2.6</u>	39	<u>2.7</u>	42	<u>3.0</u>
	80/27	38	<u>2.7</u>	41	<u>2.9</u>	45	<u>3.2</u>
	90/32	39	<u>2.7</u>	43	<u>3.0</u>	47	<u>3.3</u>
PSIG <u>kg/cm²G</u>	100/38	40	<u>2.8</u>	44	<u>3.1</u>	51	<u>3.6</u>

TOTAL HEAT OF REJECTION FROM CONDENSER 22,000 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]

TOTAL HEAT OF REJECTION FROM COMPRESSOR 3,200 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]

CONDENSER VOLUME 441 CU. IN (URC-21F)

Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

10. KM-1601SRH3 with URC-22F (remote air-cooled) (auxiliary codes: S-2 and later)

This data applies to units with an 11 l/min water valve. The 11 l/min water valve is either part number 4A1176-04 or 4A5251-04 and has the part number stamped on the side of the valve facing the front of the unit.

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	1530	<u>694</u>	1521	<u>690</u>	1414	<u>641</u>
	80/27	1523	<u>691</u>	1508	<u>684</u>	1349	<u>612</u>
	90/32	1521	<u>690</u>	1498	<u>679</u>	1359	<u>616</u>
lbs./day <u>kg./day</u>	100/38	1468	<u>666</u>	1465	<u>665</u>	1231	<u>558</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	2490		2575		2599	
	80/27	2555		2687		2659	
	90/32	2575		2780		2775	
watts	100/38	2548		2779		2770	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	704	<u>2.66</u>	599	<u>2.27</u>	531	<u>2.01</u>
	80/27	624	<u>2.36</u>	462	<u>1.75</u>	435	<u>1.65</u>
	90/32	599	<u>2.27</u>	348	<u>1.32</u>	301	<u>1.14</u>
gal./day <u>m³/day</u>	100/38	474	<u>1.79</u>	337	<u>1.27</u>	259	<u>0.98</u>
FREEZING CYCLE TIME	70/21	26		27		29	
	80/27	26		28		31	
	90/32	27		29		32	
min.	100/38	27		30		34	
HARVEST CYCLE TIME	70/21	5.3		4.5		4.1	
	80/27	4.7		3.5		3.4	
	90/32	4.5		2.7		2.4	
min.	100/38	3.6		2.6		2.2	
HEAD PRESSURE	70/21	220	<u>15.4</u>	237	<u>16.7</u>	244	<u>17.2</u>
	80/27	233	<u>16.4</u>	260	<u>18.3</u>	258	<u>18.2</u>
	90/32	237	<u>16.7</u>	279	<u>19.6</u>	281	<u>19.8</u>
PSIG <u>kg/cm²G</u>	100/38	233	<u>16.4</u>	279	<u>19.6</u>	283	<u>19.9</u>
SUCTION PRESSURE	70/21	40	<u>2.8</u>	42	<u>3.0</u>	45	<u>3.2</u>
	80/27	42	<u>2.9</u>	45	<u>3.2</u>	48	<u>3.4</u>
	90/32	42	<u>3.0</u>	47.6	<u>3.3</u>	50	<u>3.5</u>
PSIG <u>kg/cm²G</u>	100/38	43	<u>3.0</u>	48	<u>3.4</u>	53	<u>3.7</u>

TOTAL HEAT OF REJECTION FROM CONDENSER	26,400 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]
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TOTAL HEAT OF REJECTION FROM COMPRESSOR	3,500 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]
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CONDENSER VOLUME	214 CU. IN (URC-22F)
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Note:

1. Pressure data is recorded at 5 minutes into freezing cycle. The data not in **bold** should be used for reference only.
2. We reserve the right to make changes in specifications and design without prior notice.

IV. Service Diagnosis

WARNING

1. This unit should be diagnosed and repaired only by qualified service personnel to reduce the risk of death, electric shock, serious injury, or fire.
2. Risk of electric shock. Use extreme caution and exercise safe electrical practices.
3. Moving parts (e.g., fan blade) can crush and cut. Keep hands clear.
4. **CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after the unit is serviced. Make sure that none have fallen into the storage bin.
5. Make sure all food zones in the icemaker and storage bin are clean after the unit is serviced. For cleaning procedures, see "VI. Cleaning and Maintenance."

A. Diagnostic Procedure

The diagnostic procedure is basically a sequence check which can be used at unit startup or for system diagnosis. Before conducting the diagnostic procedure, check for correct installation, proper voltage per unit nameplate, and adequate water supply. Check CB using the steps in "IV.B. Control Board Check." Check the dip switch settings to assure that S4 dip switch 3, 4, 7, 8, 9, 10 and S5 (KM-1601SAH/3 "G" CB) 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 "II.C.3.a) Default Dip Switch Settings." As you go through the procedure, check to assure the components energize and de-energize correctly. If not, those components and controls are suspect.

- 1) Turn off the power supply, then access the control box. Clear any ice from TBC.
- 2) Turn on the power supply, then move the control switch to the "ICE" position. A 5-second delay occurs. CB red "POWER OK" LED and green "BC CLOSED" LED (KM-1601SAH/3 "G" CB) turn on. If red "POWER OK" LED is off, clear ice away from TBC bulb in the storage bin area. If no ice is near TBC bulb or the LED does not turn on even after clearing away ice, check TBC. See "IV.C. Bin Control Check." If yellow "BC OPEN" LED (KM-1601SAH/3 "G" CB) is on (indicating a full bin), confirm that CB K4 jumper is in place.
- 3) **1-Minute Fill Cycle – LED 4 is on.** WV and X11 relay (KM-1601SAH/3) energize and the 1-minute fill cycle begins. After 1 minute, CB checks for a closed F/S. If F/S is closed, the harvest cycle begins. If closed, continue to step 4. If open, WV remains energized through additional 1-minute fill cycles until water fills the water tank and closes F/S (low water safety). **Diagnosis:** Confirm that water is filling the water tank. If not, check that the water supply shut-off valve is open and WV screen and any external filters are clear. If WV does not energize (LED 4 on), check CB K1 ten-pin connector pin #6 (O wire) for 115VAC. If no voltage is present, CB is bad and must be replaced. If voltage is present, check WV connections and solenoid continuity. If unit fails to start harvest, check for open F/S or bad 1-minute timer in CB. See "IV.D. Float Switch Check and Cleaning."

- 4) **Initial Harvest Cycle – LEDs 1, 4, and 2 are on.** WV and X11 relay (KM-1601SAH/3) remain energized, Comp, FM/FMR, HGV, and X10 relay (KM-1601SAH/3) 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 a 3.9 kΩ signal 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 seconds.

KM-1601SAH/3 "G" CB: WV is energized during harvest for a maximum of 6 minutes or the length of harvest minus 50 seconds, whichever is shorter. 50 seconds before the harvest timer terminates, LED 4 turns off, WV and X-11 relay de-energize, LED 3 turns on and PM energizes for the last 50 seconds of harvest. **CAUTION! S4 dip switch 7 must remain in the factory default position of 7 on. Otherwise, PM will not energize during the last 50 seconds of harvest. Adjustment outside of the factory default position may result in damage to the icemaker.** PM is energized through CB K1 ten-pin connector pin #5 (DBU wire) and the X10 relay.

KM-1601SWH/3, KM-1601SRH/3 "E" CB: WV is energized during harvest for a maximum of 6 minutes or the length of harvest, whichever is shorter.

When the harvest timer terminates, the harvest cycle is complete. CB checks the position of F/S and proceeds to the next cycle if it is closed, or calls for a 1-minute fill cycle if it is open. The minimum total time allowed by CB for a complete harvest cycle is 2 minutes.

Diagnosis: Check that Comp, FM/FMR, HGV, and WV are energized. Average initial harvest cycle at factory setting is 2 to 3 minutes. 1.5 minutes after initial harvest begins, touch Comp discharge line. Is it hot? If not, check that Comp is energized, refrigerant pressures are in range, HGV is energized and open, LLV is de-energized and closed. If discharge line is hot, touch the inlet line to the evaporator. If discharge line is hot, 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 "IV.E. Thermistor Check."

KM-1601SAH/3 "G" CB: If temperature has been reached, check that WV and X-11 relay de-energize (LED 4 off) and PM energizes (LED 3 on) to circulate water over evaporator for the last 50 seconds of harvest. If not, make sure S4 dip switch 7 is in the factory default position. Check CB K1 ten-pin connector pin #5 (DBU wire) for 115VAC. Also check X10 relay. X10 relay and X10 relay terminal #4 must be energized for PM to rotate in the proper direction.

All: If 1-minute fill cycle starts after the harvest timer terminates, see "IV.D. Float Switch Check and Cleaning." If the thermistor reading is in proper range and CB fails to terminate the harvest cycle and initiate the freeze cycle, CB is bad and must be replaced.

5) **Freeze Cycle – LED 1 is on.** Comp and FM/FMR remain energized, PM energizes or, for KM-1601SAH/3, remains energized. LLV energizes. HGV and X10 relay (KM-1601SAH/3) de-energize. The unit is held in freeze by a 5-minute short cycle protection timer (CB will not accept a signal from F/S during the first 5 minutes of freeze). After the 5-minute short cycle protection timer terminates, CB turns freeze termination over to F/S. **Diagnosis:** Check that Comp, FM/FMR, PM, and LLV are energized. Confirm that the evaporator temperature drops. If not, confirm that LLV has energized and is open. Make sure WV and HGV are de-energized and closed. Next, confirm proper unit pressures and TXV operation, check for an inefficient Comp or an inoperative HM. After 5 minutes in freeze, disconnect black F/S connector from CB BLACK K5 connector. After a 15 second delay, the unit should switch out of freeze. If the unit switches out of freeze with F/S connector removed, but would previously not switch out of freeze with F/S connected (long freeze - 3 beep alarm), F/S may be sticking. To check and clean F/S, see "IV.D. Float Switch Check and Cleaning." If the unit remains in freeze longer than 15 seconds after disconnecting black F/S connector, replace CB. For short freeze cycle, check that reservoir is full at beginning of freeze, pump-out check valve is not leaking by, and drain plug is in and not leaking.
 Note: Normal freeze cycle will last 20 to 40 minutes depending on model and conditions. Cycle times and pressures should follow performance data provided in this manual. See "III.C. Performance Data."

6) **Pump-Out Cycle – (10/20 second pump-out) – LEDs 1, 3, and 2 are on.** LED 4 is on when S4 dip switch 3 & 4 are set to 3 off and 4 on. **CAUTION! for KM-1601SAH/3: Do not adjust S4 dip switch 3 & 4 to 3 off and 4 on. Adjustment to this position on this model prevents the pump motor from rotating in the pump-out direction.** Comp and FM/FMR remain energized, HGV energizes. WV energizes if S4 dip switch 3 off and 4 on. LLV de-energizes. PM de-energizes for 2 seconds, then reverses for 10/20 seconds depending on pump-out timer S4 dip switch 3 & 4 setting. When the pump-out timer terminates, the pump-out is complete. The pump-out frequency control is factory set for every 10th cycle (except for KM-1601SRH/3 utilizing 3U0111-02 water valve), and 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 (S4 dip switch 5 & 6) can be set to have a pump-out occur every cycle, or every 2, 5, or 10 cycles. Timing of the first pump-out is dependent on the control board. For KM-1601SAH/3 "G" CB, first pump-out is dependent on S4 dip switch 5 & 6. See the table below. For KM-1601SWH/3 and KM-1601SRH/3 "E" CB, first pump-out occurs after the first freeze cycle.

KM-1601 SAH/3 "G" & KM-1601SWH/3 & KM-1610SRH/3 "E" Control Board Settings				
S4 Dip Switch Setting		Pump-Out Frequency	1st Pump-Out	
			KM-1601SAH/3 "G" Control Board	KM-1601SWH/3 KM-1601SRH/3 "E" Control Board
No. 5	No. 6			
OFF	OFF	Every cycle	After 2nd freeze cycle	After 1st 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	

Diagnosis:

KM-1601SAH/3 "G" CB: If PM does not reverse, check to see if S4 and S5 dip switch settings are in the factory default position. If S4 dip switch 3 and 4 are adjusted to 3 off and 4 on, WV and harvest pump timer relays energize. Once these relays energize, PM rotates in the freeze cycle rotation. See "III.B. Wiring Diagrams." Check PM circuit and capacitor, check CB K1 ten-pin connector pin #5 (DBU wire) for voltage. Also check X10 relay. X10 relay must be de-energized and X10 relay terminal #2 must be energized for PM to rotate in the proper direction. If water does not pump out, check and clean the pump-out check valve assembly and tubing.

KM-1601SWH/3, KM-1601SRH/3 "E" CB: If PM does not energize, check PM circuit and capacitor, check CB K1 ten-pin connector pin #5 (DBU wire) for voltage. If water does not pump out, check and clean the pump-out check valve assembly and tubing.

- 7) **Normal Harvest Cycle** – same as the initial harvest cycle – Return to "IV.A.4) Initial Harvest Cycle."
- 8) **Shutdown** – When the unit is running hold ice in contact with TBC bulb, TBC switch opens within 10 seconds, shutting down the unit (CB red "POWER OK" LED turns off). 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 "IV.C. Bin Control Check."

Legend: **CB**–control board; **Comp**–compressor; **FM**–fan motor; **FMR**–fan motor-remote; **F/S**–float switch; **HGV**–hot gas valve; **HM**–headmaster (C.P.R.); **LLV**–liquid line valve; **PM**–pump motor; **TBC**–thermostatic bin control; **TXV**–thermostatic expansion valve; **WV**–inlet water valve

B. 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. Always choose a white neutral wire to establish a good neutral connection when checking voltages.

Alarm Reset: If CB is in alarm (beeping), press the "ALARM RESET" button on CB while it is beeping. **WARNING! Risk of electric shock. Care should be taken not to touch live terminals.** Once reset, the unit starts at the 1-minute fill cycle. For audible alarm information, see "II.C.2. 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 (KM-1601SAH/3 "G" CB) 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 "II.C.3.a) Default Dip Switch Settings."
- 2) Move the control switch to the "ICE" position. If CB red "POWER OK" LED is on, the control voltage is good. If CB red "POWER OK" LED is off, clear ice away from TBC bulb in the storage bin area. If no ice is near TBC bulb or CB red "POWER OK" LED does not turn on even after clearing away ice, check TBC. See "IV.C. Bin Control Check." If TBC is okay (closed) and CB red "POWER OK" LED is off, check the fuse, control switch contacts, HPS, and CT secondary circuit. CT output is 10.5V at 115V primary input. If the secondary circuit has proper voltage and CB red "POWER OK" LED is off, CB is bad and should be replaced.

If CT secondary circuit does not have proper voltage, check the CT primary circuit. Check for 115V at CB K1 ten-pin connector. Check the #10 pin (BR wire) to a white neutral wire for 115V. For additional checks, see "IV.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 CB is 1, 4, 3, 2. Components (e.g., compressor) will cycle during the test.

Model	Control Board	Correct LED Lighting Sequence
KM-1601SAH/3	"G"	1, 4, 3, 2
KM-1601SWH/3, KM-1601SRH/3	"E"	2, 3, 4, 1

Following the test, the icemaker resumes operation. If the LEDs do not turn on as described above, CB is bad and should be replaced.

- 4) To verify voltage output from CB to the components, slide CB K1 ten-pin connector out far enough to allow multimeter lead contact. With the unit in the cycle to be tested, check output voltage from the corresponding pin on CB K1 ten-pin connector to ground. If output voltage is not present and the appropriate LED is on, CB is bad and must be replaced.

Legend: **CB**—control board; **CT**—control transformer; **HPS**—high-pressure switch;
TBC—thermostatic bin control

C. Bin Control Check

To check TBC, follow the steps below.

CAUTION

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

TBC is factory set, and generally no adjustment is required. However, adjustment may be needed in some conditions, particularly at higher altitude locations. Note that when TBC switch is open, CB red "POWER OK" LED is off.

- 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 TBC bulb.
- 4) Remove the control box cover, then disconnect TBC wires from TBC switch.
- 5) Hold your hand around TBC 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 seconds, TBC switch should open (no continuity). If it remains closed, adjust or replace TBC.

Legend: **CB**—control board; **TBC**—thermostatic bin control

D. Float Switch Check and Cleaning

F/S is used to determine that there is sufficient water in the water tank after the 1-minute fill cycle and after each harvest cycle. F/S 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 F/S, 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 insulation panel, then remove the drain plug located on the lower front part of the ice chute. See Fig. 1. Allow the water tank to drain.
- 4) Replace the drain plug in its correct position. Be careful not to cross thread it.
- 5) Remove the control box cover.
- 6) Disconnect the black F/S connector from CB BLACK K5 connector.
- 7) Check for continuity across F/S leads. With the water tank empty, F/S should be open. If open, continue to step 8. If closed, follow the steps in "IV.D.2. Float Switch Cleaning." After cleaning F/S, check it again. Replace if necessary.
- 8) Reconnect the black F/S connector to CB BLACK K5 connector, then replace the control box cover in its correct position.
- 9) Move the control switch to the "ICE" position. Replace the insulation panel and the front panel in their correct positions, then turn on the power supply. After 1 minute, the 1-minute fill cycle should end and the initial harvest cycle should begin. If the initial harvest cycle begins, F/S is good and the check is complete. If the initial harvest cycle does not begin, continue to step 10.
- 10) Turn off the power supply.
- 11) Remove the front panel, then move the control switch to the "OFF" position.
- 12) Remove the control box cover.
- 13) Disconnect the black F/S connector from CB BLACK K5 connector.
- 14) Check for continuity across F/S leads. With the water tank full, F/S should be closed. If F/S is closed and the icemaker will not switch from the 1-minute fill cycle to the initial harvest cycle, replace CB.

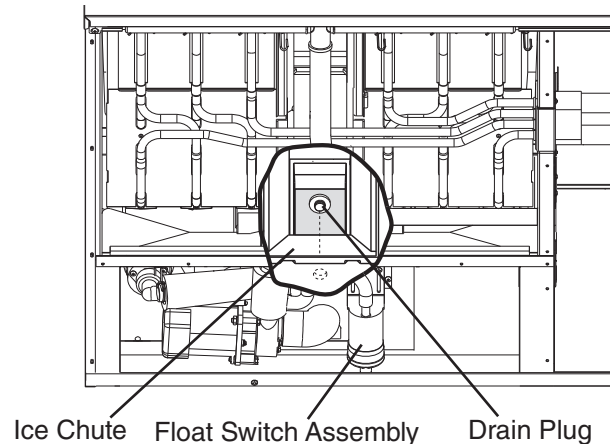


Fig. 1

If open, confirm that the water tank is full. If the water tank is not full, check the water supply, water filters, and WV. If the water tank is full, follow the steps in "IV.D.2. Float Switch Cleaning." After cleaning F/S, check it again. Replace if necessary.

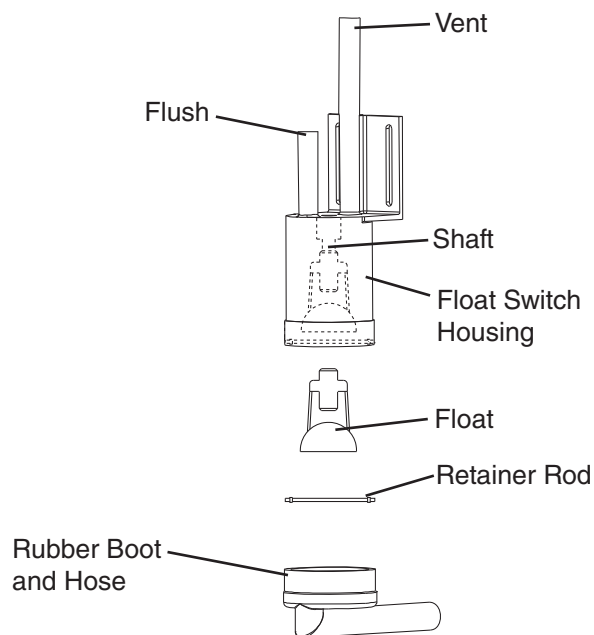
2. Float Switch Cleaning

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

- 1) Turn off the power supply.
- 2) Remove the front panel, then move the control switch to the "OFF" position.
- 3) Remove the insulation panel, then remove the drain plug located on the lower front part of the ice chute. See Fig. 1. Allow the water tank to drain.
- 4) Replace the drain plug in its correct position. Be careful not to cross thread it.
- 5) Disconnect the vent tube and the flush tube from the top of F/S, then remove F/S assembly from the mounting bracket and remove the rubber boot from the bottom of F/S assembly. See Fig. 2.
- 6) Remove the retainer rod from the bottom of F/S assembly, then remove the float. Be careful not to bend the retainer rod excessively when removing it.
- 7) Wipe down F/S assembly's housing, shaft, float, and retainer rod with a mixture of 1 part Hoshizaki "Scale Away" and 25 parts warm water. Clean the inside of the rubber boot and hose with cleaning solution. Rinse the parts thoroughly with clean water.
- 8) Reassemble F/S assembly and replace it and the rubber boot in their correct positions. Reconnect the vent tube and the flush tube.
- 9) Move the control switch to the "ICE" position.
- 10) Replace the insulation panel and front panel in their correct positions.
- 11) Turn on the power supply to start the automatic icemaking process.

Legend: **CB**—control board; **F/S**—float switch; **WV**—inlet water valve

Fig. 2



E. Thermistor Check

To check thermistor resistance, 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.
- 4) Remove the thermistor.
- 5) Immerse the thermistor sensor portion in a glass containing ice and water for 2 or 3 minutes.
- 6) Disconnect the white thermistor connector from CB WHITE K3 connector and check the resistance between thermistor leads. Normal range is 4.7 to 6.2 k Ω . If outside the normal range, replace the thermistor. See "V.B. Important Notes for Component Replacement." If within the normal range, continue to the next step.
- 7) Replace the thermistor in its correct position. See "V.B. Important Notes for Component Replacement."
- 8) Reconnect the white thermistor connector to CB WHITE K3 connector.
- 9) Replace the control box cover in its correct position, then turn on the power supply.
- 10) Move the control switch to the "ICE" position.
- 11) Once the harvest cycle starts, begin timing the harvest cycle.
- 12) The harvest timer should terminate and end the harvest cycle within 2 to 3 minutes. If the harvest timer does not terminate and end the harvest cycle, the harvest timer is bad and CB must be replaced.

Legend: **CB**—control board

F. Adjustment of Water Regulating Valve (water-cooled model)

WRV is factory set, and generally no adjustment is required. However, when necessary, adjust WRV using the procedure below.

- 1) Prepare a thermometer to check the condenser drain temperature. Attach a pressure gauge to the high-side line of the system.
- 2) Five minutes after a freeze cycle starts, confirm that the thermometer reads 104°F to 115°F (40°C to 46°C). If it does not, use a flat blade screwdriver to rotate the adjustment screw on WRV until the temperature is in the proper range (rotate counterclockwise to raise the temperature or clockwise to lower the temperature). See Fig. 3. 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.
- 3) Check that the condenser drain temperature is stable.

Legend: **WRV**—water-regulating valve

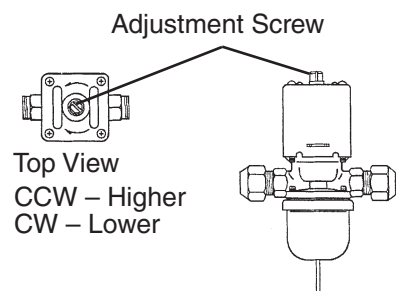


Fig. 3

G. Diagnostic Charts

Before consulting the diagnostic charts, check for correct installation, proper voltage per unit nameplate, and adequate water supply. Check the control board using the steps in "IV.B. Control Board Check." Check the dip switch settings to assure that S4 dip switch 3, 4, 7, 8, 9, 10 and S5 (KM-1601SAH/3 "G" CB) 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 "II.C.3.a) Default Dip Switch Settings."

1. No Ice Production

No Ice Production - Possible Cause	
1. Power Supply	a) Off, blown fuse, or tripped breaker.
	b) Not within specifications.
2. Main Transformer (230V/115V) (3 Phase Only)	a) Coil winding open or shorted.
3. Water Supply	a) Water supply off or improper water pressure.
	b) External water filters clogged.
4. Interlock Switch (Cleaning Valve)	a) Open position.
	b) Bad contacts.
5. Thermostatic Bin Control See "IV.C. 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) Bad contacts.
6. Fuse (Control Box)	a) Blown.
7. Control Switch	a) Bad contacts.
8. High-Pressure Switch	a) Bad contacts.
	b) Dirty air filter (air-cooled models).
	c) Clogged condenser.
	d) Ambient temperature too warm.
	e) Refrigerant overcharged.
	f) Fan not operating (air-cooled and remote air-cooled models).
	g) Refrigerant lines or components plugged.
	h) Headmaster (C.P.R.) open (remote air-cooled models).
	i) Condenser water temperature too warm (water-cooled models).
	j) Insufficient water supply to condenser (water-cooled models).
	k) Water regulating valve out of adjustment or defective (water-cooled models).
	l) Condenser water temperature too warm.
9. Control Transformer (115V/10.5V)	a) Coil winding open or shorted.
10. Control Board See "IV.B. Control Board Check."	a) In alarm.
	b) Defective.
11. Thermistor See "IV.E. Thermistor Check."	a) Leads shorted or open.
12. Hot Gas Valve	a) Open in freeze cycle.
	b) Closed in harvest cycle.

No Ice Production - Possible Cause	
13. Inlet Water Valve	a) Mesh filter or orifice clogged.
	b) Coil winding open.
	c) Open in freeze cycle.
14. Float Switch See "IV.D. Float Switch Check and Cleaning."	a) Float does not move freely.
	b) Defective.
15. Compressor	a) Compressor relay/magnetic contactor contacts bad or coil winding open.
	b) Start capacitor or run capacitor defective.
	c) Internal overload protector open.
	d) Starter contacts bad or coil winding open.
	e) Protector tripped.
	f) Compressor defective.
16. Pump Motor	a) Motor winding open.
	b) Bearing worn out or locked rotor.
	c) Defective capacitor.
	d) Mechanical seal worn out.
17. Pump-Out Check Valve	a) Leaking by.
18. Water System	a) Water leaks causing short freeze time.
19. Fan Motor	a) Motor winding open.
	b) Bearing worn out or locked rotor.
	c) Defective capacitor.
20. Liquid Line Valve (if applicable)	a) Closed in freeze cycle.
	b) Open in harvest cycle.
21. Thermostatic Expansion Valve (TXV)	a) Bulb loose.
	b) Operating erratically.
22. Headmaster (C.P.R.) (remote condenser unit)	a) Open out of temperature/pressure range.
23. Water Regulating Valve (water-cooled model) See "IV.F. Adjustment of Water Regulating Valve."	a) Insufficient water supply.
	b) Out of adjustment or defective.
	c) Clogged.

2. Freeze Up

Defrost and clean the unit prior to diagnosing freeze up. See "VI.A. Cleaning and Sanitizing Instructions."

Freeze Up - Possible Cause	
Harvest Cycle	
1. Evaporator	a) Scaled up. b) Damaged.
2. Separators	a) Out of position. b) Damaged.
3. Cube Guide	a) Out of position. b) Damaged.
4. Inlet Water Valve	a) Water valve screen clogged. b) Defective.
5. Spray Tubes and/or Spray Guides	a) Dirty. b) Out of position.
6. Refrigerant Charge	a) Low.
7. Ambient Temperature	a) Too cool.
8. Water Supply	a) Low water pressure. b) External water filters clogged. c) Insufficient water line size. Minimum 3/8" nominal ID copper water tubing or equivalent.
9. Thermostatic Bin Control See "IV.C. Bin Control Check."	a) Extension bracket not installed. b) Bulb out of position. c) Bad contacts.
10. Control Board See "IV.B. Control Board Check."	a) Harvest timer set too short. b) Defective.
11. Thermistor See "IV.E. Thermistor Check."	a) Loose, disconnected, or defective.
12. Hot Gas Valve	a) Closed.
13. Liquid Line Valve (if applicable)	a) Open.
14. Thermostatic Expansion Valve (TXV)	a) Defective.
15. Water Regulating Valve (water-cooled model)	a) Leaking by. b) Defective.
Freeze Cycle	
1. Evaporator	a) Scaled up. b) Damaged.
2. Separators	a) Out of position. b) Damaged.
3. Spray Tubes and/or Spray Guides	a) Dirty. b) Out of position.
4. Refrigerant charge.	a) Low.
5. Check Valve	a) Defective.
6. Control Board See "IV.B. Control Board Check."	a) Freeze timer set incorrectly. b) Defective.

Freeze Up - Possible Cause	
7. Inlet Water Valve	a) Leaking by.
8. Float Switch See "IV.D. Float Switch Check and Cleaning."	a) Float does not move freely.
	b) Defective.
9. Pump Motor	a) RPM too slow.
	b) Impeller damaged.
10. Thermostatic Expansion Valve (TXV)	a) Defective.
11. Headmaster (C.P.R.) (remote condenser unit)	a) Defective.
12. Water Regulating Valve (water-cooled model) See "IV.F. Adjustment of Water Regulating Valve."	a) Out of adjustment.

3. Low Ice Production

Low Ice Production - Possible Cause	
Long Harvest Cycle	
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 3/8" nominal ID copper water tubing or equivalent.
	d) Too cold.
5. Control Board See "IV.B. Control Board Check."	a) Thermistor connection loose (K3).
	b) Defective.
6. Thermistor See "IV.E. Thermistor Check."	a) Loose, disconnected, or defective.
7. Hot Gas Valve	a) Erratic or closed.
8. Inlet Water Valve	a) Water valve screen clogged.
9. Compressor	a) Inefficient or off.
10. Liquid Line Valve (if applicable)	a) Erratic or open.
11. Thermostatic Expansion Valve (TXV)	a) Defective.
12. Water Regulating Valve (water-cooled model)	a) Leaking by.
Long Freeze Cycle	
1. Evaporator	a) Scaled up.
2. Refrigerant Charge	a) Low.
3. Air Filter (air-cooled model)	a) Clogged.
4. Condenser	a) Clogged.
5. Condenser (water-cooled model)	a) Water temperature out of specification.

Low Ice Production - Possible Cause	
6. Control Board See "IV.B. Control Board Check."	a) Float switch connection loose (K5).
	b) Defective.
7. Hot Gas Valve	a) Erratic or open.
8. Inlet Water Valve	a) Leaking by.
9. Float Switch See "IV.D. Float Switch Check and Cleaning."	a) Float does not move freely or defective switch.
10. Compressor	a) Inefficient or off.
11. Pump Motor	a) RPM too slow.
12. Liquid Line Valve (if applicable)	a) Erratic or closed.
13. Expansion Valve (TXV)	a) Bulb loose.
	b) Defective.
14. Headmaster (C.P.R.) (remote condenser unit)	a) Not bypassing.
15. Water Regulating Valve (water-cooled model) See "IV.F. Adjustment of Water Regulating Valve."	a) Insufficient water supply.
	b) Out of adjustment or defective.
	c) Clogged.

V. Replacement of Components

⚠ WARNING

1. This unit should be diagnosed and repaired only by qualified service personnel to reduce the risk of death, electric shock, serious injury, or fire.
2. Move the control switch to the "OFF" position and turn off the power supply before servicing. Lockout/Tagout to prevent the power from being turned back on inadvertently.
3. **CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after the unit is serviced. Make sure that none have fallen into the storage bin.
4. Make sure all food zones in the icemaker and storage bin are clean after the unit is serviced. For cleaning procedures, see "VI. Cleaning and Maintenance."

A. Service for Refrigerant Lines

⚠ WARNING

1. Repairs requiring the refrigeration circuit to be opened must be performed by properly trained and EPA-certified service personnel.
2. Always recover the refrigerant and store it in an approved container. Do not discharge the refrigerant into the atmosphere.
3. 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.

⚠ CAUTION

1. Do not leave the system open for longer than 15 minutes when replacing or servicing parts. The Polyol Ester (POE) oils used in R-404A units can absorb moisture quickly. Therefore it is important to prevent moisture from entering the system when replacing or servicing parts.
2. Always install a new drier every time the sealed refrigeration system is opened.
3. 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.
4. 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 service valves. Using proper refrigerant practices, recover the refrigerant from the service valves and store it in an approved container. Do not discharge the refrigerant into the atmosphere.

2. Brazing

⚠ WARNING

1. R-404A itself is not flammable at atmospheric pressure and temperatures up to 176°F (80°C).
2. 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.
3. Do not use silver alloy or copper alloy containing arsenic.
4. 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.

- 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.

⚠ CAUTION

1. Always install a new drier every time the sealed refrigeration system is opened.
2. 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.
3. 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 service 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.

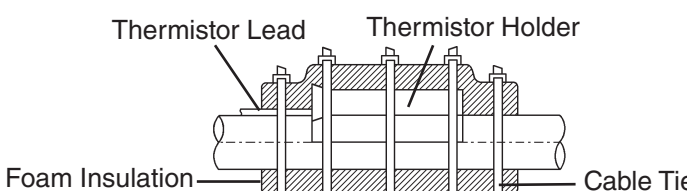
- 2) Turn on the vacuum pump. Open the gauge manifold valves, then open the high and low-side service valves. Never allow the oil in the vacuum pump to flow backwards.
- 3) Allow the vacuum pump to pull down to a 29.9" Hg vacuum. Evacuating period depends on pump capacity.

- 4) Close the high and low-side valves 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 air-cooled and water-cooled models, see the nameplate for the required refrigerant charge. For remote air-cooled model, see the rating label inside the icemaker. Hoshizaki recommends only virgin refrigerant or reclaimed refrigerant which meets ARI Standard 700 (latest edition) be used.
- 6) A liquid charge is required when charging an R-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.
CAUTION! To prevent compressor damage, use a throttling valve or liquid dispensing device to add the remaining liquid charge through the low-side service valve with the unit running.
- 9) Close the high and low-side service valves. Close the high and low-side gauge manifold valves, then disconnect the gauge manifold hoses.
- 10) Cap the service valves to prevent a possible leak.

B. Important Notes for Component Replacement

CAUTION

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

Component	Notes
Compressor	Install a new start capacitor, run capacitor, and start relay.
Thermostatic Expansion Valve	<ul style="list-style-type: none"> • Attach the thermostatic expansion valve bulb to the suction line in the same location as the previous bulb. • The bulb should be between the 10 and 2 o'clock position on the tube. • Secure the bulb with the clamp and holder, then insulate it.
Hot Gas Valve Liquid Line Valve	<ul style="list-style-type: none"> • Replace the strainer when replacing the hot gas valve. • Use copper tube of the same diameter and length when replacing valve lines.
Fan Motor	Install a new capacitor.
Pump Motor	Install a new capacitor.
Thermistor	<ul style="list-style-type: none"> • Attach the new thermistor to the suction line in the same location as the previous thermistor. • The thermistor should be at the 12 o'clock position on the tube. • 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. • Secure the thermistor with the holder, then insulate it. • Be very careful to prevent damage to the leads. <div style="text-align: center;">  <p>The diagram illustrates the correct installation of a thermistor on a suction line. It shows a cross-section of the tube with a thermistor holder mounted on top. The holder is secured to the tube with a cable tie. The thermistor lead is inserted into the holder. The area around the holder is filled with foam insulation. Labels include: Thermistor Lead, Thermistor Holder, Foam Insulation, and Cable Tie.</p> </div>

VI. Cleaning and Maintenance

This icemaker must be cleaned and maintained in accordance with the instruction manual and labels provided with the icemaker. Consult with your local distributor about cleaning and maintenance service. To obtain the name and phone number of your local distributor, visit www.hoshizaki.com or call Hoshizaki Technical Support at 1-800-233-1940 in the USA.

⚠ WARNING

1. Only qualified service technicians should service this icemaker.
2. **CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after any cleaning or maintenance is done to the unit. Make sure that none have fallen into the storage bin.
3. The storage bin is for ice use only. Do not store anything else in the storage bin.

A. Cleaning and Sanitizing Instructions

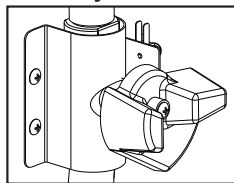
Hoshizaki recommends cleaning and sanitizing this unit at least once a year. More frequent cleaning and sanitizing, however, may be required in some existing water conditions.

⚠ WARNING

1. To prevent injury to individuals and damage to the icemaker, do not use ammonia type cleaners.
2. Carefully follow any instructions provided with the bottles of cleaning and sanitizing solution.
3. Always wear liquid-proof gloves and goggles to prevent the cleaning and sanitizing solutions from coming into contact with skin or eyes.
4. To prevent damage to the water pump seal, do not operate the icemaker with the control switch in the "WASH" position when the water tank is empty.

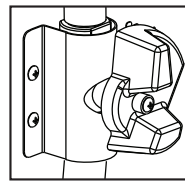
IMPORTANT

1. The cleaning valve is opened during cleaning and sanitizing to allow solution flow to the inside of the evaporator. It should be closed for all icemaking operation. The compressor will not operate unless this valve is completely closed.
2. To close the cleaning valve, the valve handle should be at a right angle to the valve body. To open the cleaning valve, the valve handle should be parallel to the valve body.



CLOSED

Normal Icemaking Operation



OPEN

Cleaning and Sanitizing Operation
(allows solution flow to the inside of the evaporator)

1. Cleaning Procedure

- 1) Dilute 27 fl. oz. (800 ml) of Hoshizaki "Scale Away" with 5 gal. (19 l) of warm water.
- 2) Remove all ice from the evaporator and the storage bin.
Note: To remove cubes on the evaporator, turn off the power supply and turn it back on after 3 minutes. The harvest cycle starts and the cubes will be removed from the evaporator.
- 3) Turn off the power supply.
- 4) Remove the front panel, then remove the insulation panel by first removing the thumbscrew, lifting up the panel slightly and pulling it towards you.
- 5) Remove the drain plug located on the lower front part of the ice chute. Allow the water tank to drain.
- 6) Replace the drain plug in its correct position. Be careful not to cross thread it.
- 7) In bad or severe water conditions, clean the float switch assembly as described below. Otherwise, continue to step 8.
 - a. Disconnect the vent tube and the flush tube from the top of the float switch, then remove the float switch assembly. Remove the rubber boot from the bottom of the assembly.
 - b. Remove the retainer rod from the bottom of the float switch housing, then remove the float. Be careful not to bend the retainer rod excessively when removing it.
 - c. Wipe down the float switch assembly's housing, shaft, float, and retainer rod with cleaning solution. Clean the inside of the rubber boot and hose with cleaning solution. Rinse the parts thoroughly with clean water.
 - d. Reassemble the float switch assembly and replace it and the rubber boot in their correct positions. Reconnect the vent tube and the flush tube.
- 8) Pour the cleaning solution into the water tank.
- 9) Fully open the cleaning valve on the left side wall of the machine compartment.
- 10) Move the control switch on the control box to the "WASH" position.
- 11) Replace the insulation panel and the front panel in their correct positions.
- 12) Turn on the power supply to start the washing process.
- 13) Turn off the power supply after 30 minutes.
- 14) Remove the front panel and the insulation panel.
- 15) Remove the drain plug. Allow the water tank to drain. Replace the drain plug and the insulation panel in their correct positions.
- 16) Move the control switch to the "ICE" position.
- 17) Close the cleaning valve.
Note: The icemaker will not operate unless the cleaning valve is completely closed.
- 18) Replace the front panel in its correct position.
- 19) Turn on the power supply to fill the water tank with water.
- 20) Turn off the power supply after 3 minutes.

- 21) Remove the front panel and fully open the cleaning valve.
- 22) Move the control switch to the "WASH" position.
- 23) Replace the front panel in its correct position.
- 24) Turn on the power supply to rinse off the cleaning solution.
- 25) Turn off the power supply after 5 minutes.
- 26) Remove the front panel and the insulation panel.
- 27) Remove the drain plug. Allow the water tank to drain. Replace the drain plug and the insulation panel in their correct positions.
Note: Do not replace the insulation panel when you proceed to "2. Sanitizing Procedure."
- 28) Repeat steps 16 through 27 three more times to rinse thoroughly.
Note: If you do not sanitize the icemaker, go to step 9 in "2. Sanitizing Procedure."

2. Sanitizing Procedure - Following Cleaning Procedure

- 1) Dilute 2.5 fl. oz. (74 ml or 5 tbs) of a 5.25% sodium hypochlorite solution (chlorine bleach) with 5 gal. (19 l) of warm water.
- 2) Pour the sanitizing solution into the water tank.
- 3) Replace the insulation panel and the front panel in their correct positions.
Note: Make sure the control switch is in the "WASH" position and the cleaning valve is open.
- 4) Turn on the power supply to start the sanitizing process.
- 5) Turn off the power supply after 15 minutes.
- 6) Remove the front panel and the insulation panel.
- 7) Remove the drain plug. Allow the water tank to drain. Replace the drain plug and the insulation panel in their correct positions.
- 8) Repeat steps 16 through 27 in "1. Cleaning Procedure" two times to rinse thoroughly.
- 9) Close the cleaning valve.
- 10) Move the control switch to the "ICE" position.
- 11) Replace the front panel in its correct position.
- 12) Clean the storage bin liner using a neutral cleaner. Rinse thoroughly after cleaning.
- 13) Turn on the power supply to start the automatic icemaking process.

B. Maintenance

This icemaker must be maintained individually, referring to the instruction manual and labels provided with the icemaker.

⚠ WARNING

1. Only qualified service technicians should service this icemaker.
2. 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.

1. Stainless Steel Exterior

To prevent corrosion, wipe the exterior occasionally with a clean, soft cloth. Use a damp cloth containing a neutral cleaner to wipe off oil or dirt buildup.

2. Storage Bin and Scoop

- Wash your hands before removing ice. Use the plastic scoop provided (bin accessory).
- The storage bin is for ice use only. Do not store anything else in the storage bin.
- Clean the scoop and the storage bin liner using a neutral cleaner. Rinse thoroughly after cleaning.

3. Air Filters (air-cooled model)

Plastic mesh air filters remove dirt and dust from the air, and keep the condenser from getting clogged. As the filters get clogged, the icemaker's performance will be reduced. Check the filters at least twice a month. When clogged, use warm water and a neutral cleaner to wash the filters.

4. Condenser (air-cooled and remote air-cooled models)

Check the condenser once a year, and clean the coil if required by using a brush or vacuum cleaner. More frequent cleaning may be required depending on location.

C. Preparing the Icemaker for Long Storage

CAUTION

1. When storing the icemaker for an extended time or in sub-freezing temperatures, follow the instructions below to prevent damage.
2. To prevent damage to the water pump seal, do not operate the icemaker with the control switch in the "WASH" position when the water tank is empty.

When the icemaker 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 icemaker for an extended time or in sub-freezing temperatures, follow the instructions below.

1. Remove the water from the icemaker water supply 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 a 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 the compressed air or carbon dioxide supply.
- 9) Close the icemaker water supply line drain valve.

2. Drain the water tank:

- 1) Turn off the power supply, then remove the front panel. Move the control switch to the "OFF" position.
- 2) Remove the insulation panel. Remove the drain plug located on the lower front part of the ice chute. See Fig. 1. Allow the water tank to drain.
- 3) Replace the drain plug and the insulation panel in their correct positions. Be careful not to cross thread the drain plug.
- 4) Remove all ice from the storage bin. Clean the storage bin using a neutral cleaner. Rinse thoroughly after cleaning.
- 5) Replace the front panel in its correct position.

3. On water-cooled model only, first 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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