TECH - SPEC'S
Technician's Pocket Guide
 # 80021

This technicians pocket guide covers all models using R-22 refrigerant. For additional technical information, full parts and service manuals are available for review and download on the Tech Support page of the Hoshizaki web site.

See "www.hoshizaki.com" for manuals, Tech-Tips and additional technical information on Hoshizaki products.

See Tech-Spec's # 80024 purple pocket guide for older models using R-12/502.

See Tech-Spec's # 80045 orange pocket guide for newer models using R-404A.

These guides can be downloaded from the Hoshizaki web site or purchased through your local Hoshizaki Distributor.

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HOSHIZAKI MODEL NUMBER IDENTIFICATION CODE

KM 1200 M A E

UNIT TYPE

KML - Low Profile Crescent Cuber
KM - Crescent Cuber
F - Flaker
DCM - Dispenser Cubelet Maker
DB - Dispenser Bin
B- Bin
DM - Countertop Dispenser

PRODUCTION

Approximate production/24 Hours
@70°F Air/50°F Water

UNIT STYLE

M- Modular
S- Stackable
B - Self contained with bin

CONDENSER STYLE

A - Air cooled
W - Water cooled
R - Remote air cooled

GENERATION

Model designation
(E = R-22 refrigerant unit / except F-250BAE and KM-2400SRB3)

The model number, serial number, electrical specifications and refrigerant data are found on the unit name plate. (See name plate)

NAMEPLATE

HOSHIZAKI ICE MAKER
MODEL NUMBER
SERIAL NUMBER
AC SUPPLY VOLTAGE
COMPRESSOR
FAN
MAXIMUM FUSE SIZE
MAX. HACR BREAKER (USA ONLY)
MAX. CIRC. BREAKER (CANADA ONLY)
MINIMUM CIRCUIT AMPACITY
DESIGN PRESSURE
REFRIGERANT
MOTOR-COMPRESSOR THERMALLY PROTECTED

HOSHIZAKI AMERICA, INC.
Peachtree City, GA

LISTED
ICE MAKER
WITHOUT
STORAGE MEANS
946Z

COMPONENT

See the Nameplate for electrical and refrigeration specifications. This Nameplate is located on the upper right hand side of rear panel. Since this Nameplate is located on the rear panel of the icemaker, it cannot be read when the back of the icemaker is against a wall or against another piece of kitchen equipment. Therefore, the necessary electrical and refrigeration information is also on the rating label, which can be easily seen by removing only the front panel of the icemaker. We reserve the right to make changes in specifications and design without prior notice.

WARRANTY INFORMATION

REGISTRATION-

Two warranty registration cards are supplied with the equipment. They must be completed and sent in to initiate warranty. The warranty begins on the date of installation if registration procedures are followed. If registration is not completed, the warranty date will be the date of sale or date of shipment from the factory, respectively.

WARRANTY COVERAGE-

The warranty will cover defects in material or workmanship under normal and proper use and maintenance service as specified by Hoshizaki. Coverage for parts and labor is limited to the repair or replacement of parts or assemblies that in Hoshizaki's opinion are defective.

COVERAGE CHART-

ITEM	PRODUCT	PARTS	LABOR
Total Unit	KM Cuber F/DCM B/DB/DM Bev. Valves	3 Years 1 Year 2 Years 1 Year	3 Years 1 Year 2 Years 1 Year
Compressor & Air-Cooled Condenser	KM Cuber F/DCM	5 Years 5 Years	3 Years 2 Years
Evaporator Plate	KM Cuber	5 Years	5 Years
Evaporator, Auger Gear Motor Assy.	F/DCM	2 Years	2 Years

Effective January 1, 1991

See Warranty Statement supplied with the unit for details. Warranty valid in United States, Canada, Mexico, Puerto Rico, and U. S. Virgin Islands.

Contact factory for warranty in other countries, territories, or possessions.

KM INSTALLATION

GENERAL -

The ice machine is not intended for outdoor use.

OPERATING CONDITIONS - ALL MODELS

ITEM	MODEL	RANGE
Voltage Range	115V units	104- 127V.
	208-230 V units	187 - 264 V.
Ambient Temperature	All	45 - 100 Deg. F.
	Remote Condenser	-20 - 122 Deg. F.
Water Supply Temperature	All	45 - 90 Deg. F.
Water Supply Pressure	All	10 -113 PSIG

Allow 6" clearance at rear, sides, and top for proper air circulation and ease of maintenance or service. 20" top clearance for F/DCM.

PLUMBING REQUIREMENTS -

Water Supply:
On KM units the water supply line size is critical due to the water assisted harvest and the use of a ported inlet water valve solenoid. * Plumbing tubing size or equivilent.

MODEL	Line Size	Fitting Size
KM-250 - KM-800	3/8" *	1/2 FPT
KM-1200 - KM-2400	1/2" *	1/2 FPT
All F/DCM	3/8" *	1/2 FPT

*Water cooled condenser units require two separate supplies sized as per list above.

Drain:

MODEL	Line Size	Fitting Size
All Bins	3/4" ID	3/4 FPT
All KM's	3/4" ID	3/4 FPT
Flakers	3/4" ID	3/4 FPT*
DCM	3/4" ID	3/4 FPT*

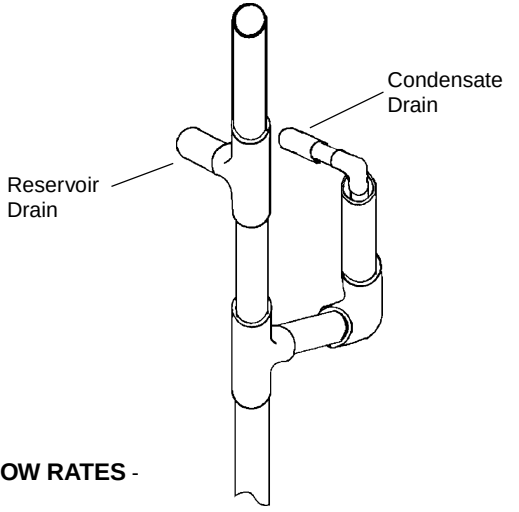
*Some models have 2 drain outlets.

Hoshizaki recommends that the ice machine drain and bin drain be piped separately to the drain connection point allowing 1/4" per foot fall.

CONDENSATE DRAIN -

The condensate drain is generally connected to the ice machine drain for simplicity. It can be piped separately to the drain exit if desired.

A 6" vent tee is recommended as per drawing:



FLOW RATES -

The minimum flow rate requirements for Hoshizaki ice maker units are as follows:

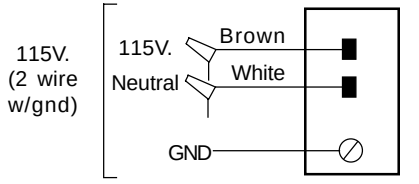
KM-250/280/AII Flakers	1.05 GPM
KM-500	1.58 GPM
KM-630/800/AII DCM's	2.11 GPM
KM-1200/1600	3.96 GPM
KM-2000/2400	4.23 GPM

Use this information when sizing a filter system for the ice machine application.

NOTE: A good rule of thumb is to utilize a 3 GPM flow rate filter for KM-250 through 800 and a 5 GPM flow rate filter for KM-1200 or larger.

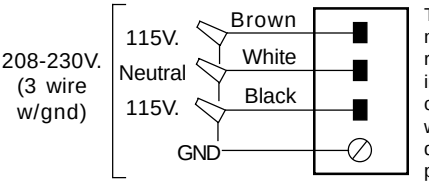
ELECTRICAL CONNECTIONS -

115 VOLT/1 PHASE



208-230 VOLT/1PHASE

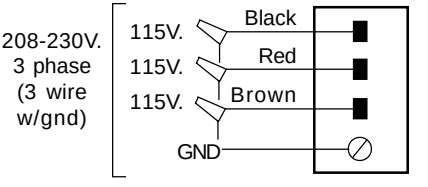
208-230V/1 Phase units require a dedicated neutral due to the use of 115V components.



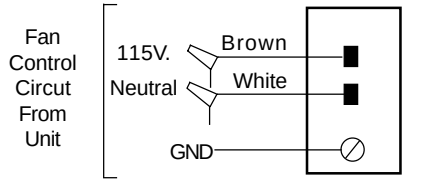
The dedicated neutral requires an insulated conductor which runs directly to the panel.

If high leg is present connect to black wire. A transformer can be used to provide 115v control circuit. See next page for details.

208-230 VOLT/3 PHASE



REMOTE CONDENSER CONNECTIONS



Note:
Electrical connections must be made in accordance with all national and local electrical codes.

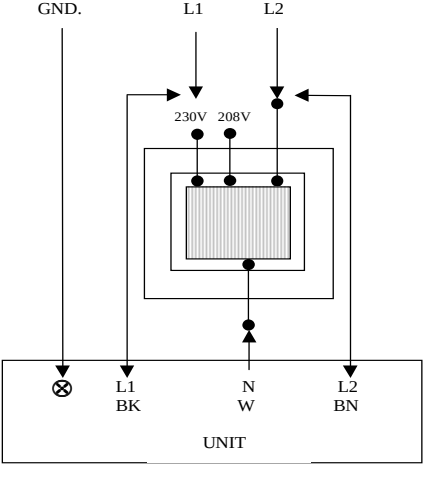
Transformer Application

All 3 phase models include a 115V transformer with a 208/230V selector switch. Be sure to select the position that best matches the in-coming voltage prior to supplying power to unit. (Voltage from the center tap to case ground will read 67.5V due to transformer circuit.)

208-230V models include 115V controls. They require a 115 / 208-230V circuit which has 4 wires including L1, L2, dedicated neutral, and gnd.

If a dedicated neutral is not available or the previous unit used a 3 wire circuit (L1,L2, & gnd.), a step-down transformer can be used at the unit to provide power to the 115V components. This will save on installation time and cost if a dedicated neutral is not present.

Transformer # 4A0817-01 or equivalent can be used for KM models. Transformer # 446240-01 or equivalent can be used for F-1000 models. This transformer should be mounted inside the compressor compartment and wired using the following generic diagram.



REMOTE APPLICATIONS

CONDENSER CHART

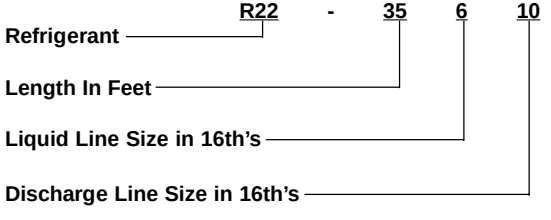
CONDENSER MODEL	MODEL NUMBERS
URC-6E	KM-500/630MRE, F-1000MRE
URC-12E	KM-800/1200MRE, KM-1200SRE
URC-20E	KM-1600MRE, KM-1600/2000SRE, F-2000MRE
URC-24C	KM-2400SRB

When installing a remote application the unit/condenser combination must match with the above chart. A non-OEM multi-pass condenser can be used with prior written factory approval.

REMOTE LINES-

Hoshizaki has 3 precharged line set lengths. 20 foot, 35 foot, and 55 foot sets are available. The line sets are available in different line sizes for different models.

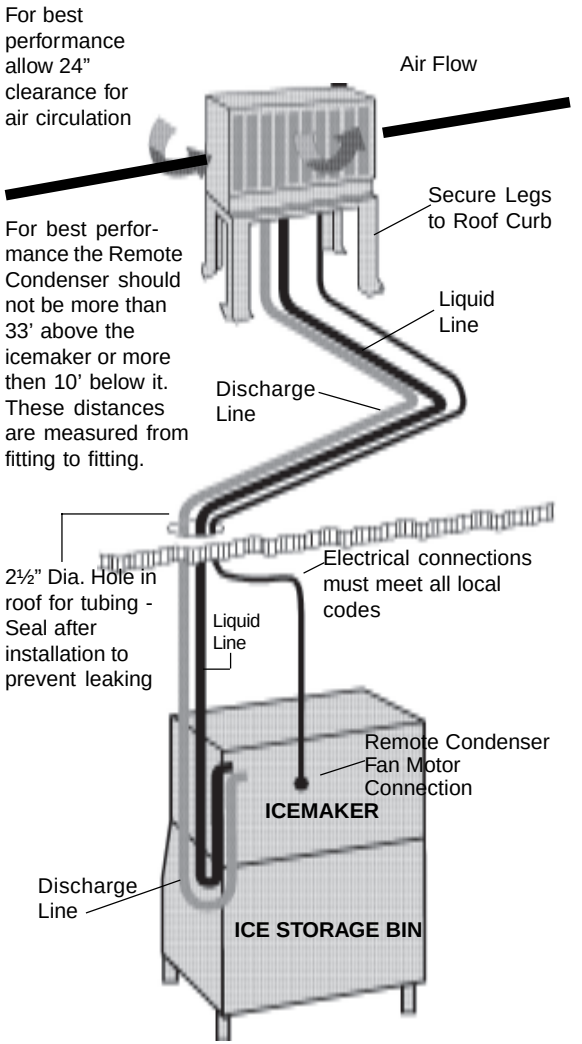
LINE SET IDENTIFICATION CODE



LINE SET APPLICATIONS

MODELS	LINE SET	LL (SIZE) DL
KM-500/630, F-1000	R22-__46-2	1/4" OD 3/8" OD
KM-800/1200	R22-__68-2	3/8" OD 1/2" OD
KM-1600/2000/2400	R22-__610	3/8" OD 5/8" OD
F-2000	R22-__610	3/8" OD 5/8" OD

Remote Condenser Installation on Roof



LINE SET INSTALLATION

A universal line set adapter kit, part number OS-QUICK, is available if you need to field engineer your line set. Both lines should be insulated separately the entire length of run.

The refrigerant charge for a new unit is distributed between the unit head and the URC condenser. The line set has a minimal holding charge of 15 to 30 psig refrigerant vapor.

If you need to field engineer your line set or shorten/lengthen a precharged line set you can do so by following these steps:

1. Using the OS-QUICK kit, braze the line set connections. (If you shorten or lengthen a precharged line set, recover the holding charge, cut or lengthen and braze the connections.)

2. Pressurize the lines and leak check all braze joints.

3. Evacuate the lines through the service ports on the Aeroquip quick connect fittings.

4. Charge both lines with 15 to 30 psig R-22 vapor.

To make Aeroquip connection to the unit head and condenser:

1. Lubricate the threads and O-ring with clean refrigerant oil.

2. Tighten the female connector until it bottoms out.

Note: Be sure to use a back up wrench when tightening these fittings.

3. Then turn an additional 1/4 turn to assure a good brass to brass seal. Leak check the joints with soap bubbles or an electronic leak detector.

SYSTEM CHARGE - R-22

The ice machine head and URC condenser are shipped with enough refrigerant charge for up to 66 feet of line set length. The maximum line set length is 100 equivalent feet from the head to the condenser.

For applications longer than 66 ft. up to the maximum 100 ft. length, additional refrigerant must be added. For units utilizing 1/4" L.L. and 3/8" D.L., the line size should be increased to 3/8"L.L. and 1/2"D.L. for the entire length of the run. Add 21 ounces plus 1/2 oz. per foot over 66 feet. For units utilizing 3/8"L.L., add 1/2 oz. per foot over 66 feet.

NOTE:

(1) Recommended line sizes are same as listed in the line set application chart. (Page 7)
(2) Older models utilize R-502 refrigerant or R-12 refrigerant. Always check the unit nameplate for the correct refrigerant type.
(3) If refrigerant is added due to extended line set length, mark the correct total charge on the unit nameplate for future reference.
(4) When routing and installing remote lines, always use standard refrigerant piping practices.
(5) Hoshizaki recommends eliminating any excess loops in a pre-charged line set application before making the unit connections. This will eliminate oil traps and possible crimps in the excess tubing.
(6) A service loop should be included behind the unit as shown in the illustration on page 13 to allow the unit to be moved away from the wall if needed.

CRITICAL CHARGE AMOUNT

The total system charge is critical for proper operation according to Hoshizaki specification. Always weigh in the proper charge per the following charge chart. (Remote units show standard charge good for up to 66 feet.) Unit charge information is also found on the unit Name Plate.

FOR FACTORY SUPPORT
CONTACT HOSHIZAKI TECHNICAL SUPPORT AT:

1 -800-233-1940
E-Mail techsupport@hoshizaki.com

HOSHIZAKI CUBER
REFRIGERANT R-22 CHARGE CHART

MODEL	TOTAL CHARGE	REFRIGERANT
KM-250 BAE/BWE	12 Oz.	R-22
KM-250 MAE	12 Oz.	"
KM-250 MWE	11 Oz.	"
KM-280 MAE	11 Oz.	"
MWE	11Oz.	"
KML-200 MAE	1Lb.	"
MWE	11Oz.	"
KML-400 MAE	1Lb. 5 Oz.	"
MWE	15 Oz.	"
KM-500 MAE	1 Lb. 8 Oz.	"
MWE	1 Lb.	"
MRE	4 Lbs.	"
KM-630 MAE 50/60	1 Lb. 6 Oz.	"
MWE 50/60	1 Lb. 2 Oz.	"
MRE	4 Lbs. 2 Oz.	"
KM-800 MAE	2 Lbs. 7 Oz.	"
MWE	1 Lb. 12 Oz.	"
MRE	11 Lbs.	"
KM-1200 MAE	3 Lbs. 10 Oz.	"
MWE	2 Lbs.	"
MRE	11 Lbs.	"
KM-1600 MRE 1/3	14 Lbs. 6 Oz.	"
KM-1200 SAE 50/60	3 Lbs. 8 Oz.	"
SWE 50/60	2 Lbs.	"
SRE 50/60	12 Lbs. 2 Oz.	"
KM-1600 SWE 1/3	2 Lbs. 14 Oz.	"
SRE1/3	14Lbs. 5 Oz.	"
KM-2000 SRE3	16 Lbs. 9 Oz.	"
SWE3	3 Lbs. 7 Oz.	"
KM-2400 SRB3	26 Lbs. 8 Oz.	"

URC (Condenser charge is included in remote total above.)

URC-6E	2 Lbs. 2 Oz.	"
URC-12E	4 Lbs. 7 Oz.	"
URC-20E	7 Lbs. 11 Oz	"
URC-24B	11 Lbs	"

NOTE: To convert to grams multiply oz. X 28.35.

HOSHIZAKI FLAKERS/DCM'S
REFRIGERANT CHARGE CHART

MODEL		TOTAL CHARGE	REFRIGERANT
F-250	BAE	8 Oz.	***R-134A**
F-450	BAE	1 Lb.	R-22
F-650	MAE	1 Lb. 5 Oz.	"
	MWE	10 Oz.	"
F-1000	MAE	1 Lb. 8 Oz.	"
	MWE	14 Oz.	"
	MRE	4 Lbs. 3 Oz.	"
F-2000	MWE	1Lb. 14 Oz.	"
	MRE	14 Lbs. 13 Oz.	"
DCM-240	BAE	11.6 oz.	"
DCM-450	BAE	1 Lb. 1.4 Oz.	"
	BWE	11.6/13.4 Oz. (see nameplate)	"
DCM-700	BAE	1 Lb. 9 Oz.	"
	BWE	13.4 Oz.	"

HEAT LOAD

The heat of rejection information listed below by model number should be used for sizing air conditioning equipment or for sizing a water cooled cooling tower application.

	TOTAL HEAT REJECTION	
	AIR	WATER COOLED
MODEL	COOLED	(CONDENSER ONLY)
KM-250B/M	5450 BTU/h	5250 BTU/h
KM-280M/KML-200M	5980	5650
KLM-400M	7400	6100
KM-500M	9400	8300
KM-630M	8990	9060
KM-630/50	7900	6060
KM-800M	14300	12700
KM-1200M	19500	17000
KM-1200S	18330	15850
KM-1200S/50	17020	14560
KM-1600S	---	24400
KM-2000S	---	23700
F-250B	4350	---
F-450B	5000	2860
F-650M	6830	5550
F-1000M	8200	6800
F-2000M	---	19000
DCM-240B	4200	---
DCM-450B	9000	7750
DCM-700B	10500	9680

Figures shown are at 90° F air temp. 70° F water temp. Allow for a pressure diffenential of 7 psi across the water cooled condenser.

COMPONENT TECHNICAL DATA -

KM Control Board Factory Setting

There are 8 dip switches on the Alpine control board utilized in R-22 units. The dip switches are factory set for optimum operation. The switches can be adjusted to provide flexibility when the unit is operating in a bad water location allowing more cleaning capability.

DIP SWITCH SETTING GUIDE					
ADJUSTMENTS	DIP				
DEFROST	1	0	1	0	1
TIMER	2	0	0	1	1
	seconds	60	90	120	180
PUMP OUT	3	0	1	0	1
	4	0	0	1	1
	seconds	10	10	10	20
MIN DEF		150	180	120	180
WTRVALVE		OFF	OFF	ON	OFF
PERIODIC	5	0	1	0	1
PUMP OUT					
FREQUENCY	6	0	0	1	1
	cycles	1/1	1/2	1/5	1/10
OPTIONAL	7	ALWAYS OFF			
SWITCH					
TEST	8	ALWAYS OFF			

Switch Code 1=ON 0=Off

INSTRUCTIONS:

1. **TO IMPROVE BUILT-IN CLEANING** Adjust switches per this guide. Switches 1& 2 provide for longer flush at the end of harvest. Switches 5 & 6 provide maxi mum cleaning at every harvest cycle 1 / 1 setting. The 1 / 10 setting will pump-out less to conserve water (less cleaning).
2. **DO NOT ADJUST SWITCHES 3, 4, 7, & 8 FROM THE FACTORY SETTINGS!**
3. **DO NOT MAKE CONNECTION TO THE RED K-4 TERMINAL!.**
4. The replacement board should be adjusted to the factory settings unless local condition requires alternate settings.

"E" Control Board Adjustment Chart

The new "E" control board is designed as a service replacement for "C" and Alpine boards. Early "E" boards have 8 dip switches. The latest "E" boards have 10 dip switches.

"E" BOARD DIP SWITCH SETTING GUIDE					
ADJUSTMENTS	DIP #	Switch Code		1=ON	0=OFF
DEFROST	1	0	1	0	1
COMPLETION	2	0	0	1	1
TIMER	seconds	60	90	120	180
PUMP OUT	3	0	1	0	1
TIME	4	0	0	1	1
Length of pump out Min, Defrost Time Inlet Water Valve	seconds	10	10	10	20
	seconds	150	180	120	180
	status	OFF	OFF	ON	OFF
PERIODIC	5	0	1	0	1
PUMP OUT					
FREQUENCY	6	0	0	1	1
	cycles	1/1	1/2	1/5	1/10
OPTIONAL		ALWAYS OFF			
SWITCH	7				
TEST	8	ALWAYS OFF			
					Default
MAX. FREEZE	9	1	1	0	0
TIME					
	10	1	0	1	0
(Improved E					
board only.)	minutes	75/50hz 70 60/60hz		50	60

NOTE:
Switches 1 ~ 8 are same as Alpine control board.
Switches 9 & 10 allow for adjustment of the maximum freeze cycle timer. If unit originally has board with 10 switches, adjust 9 & 10 to original setting. If original board has 8 switches adjust 9 & 10 to default setting OFF & OFF.

SETTING CHART -
FACTORY DIP SWITCH SETTING

SWITCH CODE: 1 = ON 0 = OFF

MODEL :	1	2	3	4	5	6	7	8
KM-250BAE/BWE	1	0	1	0	0	0	0	0
KM-250A/KML-400A/W	0	0	0	0	1	1	0	0
KM-250MWE	1	0	0	0	1	1	0	0
KM-280A/KML-200W	0	1	0	1	1	1	0	0
KM-280W/KML-200A	0	0	0	1	1	1	0	0
KM-500M A/W/R E	0	0	0	0	1	1	0	0
KM-630M A/W/R E	0	0	0	0	1	1	0	0
KM-800M A/W/R E	0	0	1	0	1	1	0	0
KM-1200M A/W/R E	0	0	1	0	1	1	0	0
KM-1200S A/W/R E	0	0	1	1	1	1	0	0
KM-1600MRE	0	0	1	0	1	1	0	0
KM-1600S W/R E	0	0	1	1	1	1	0	0
KM-2000S W/R E	0	0	1	1	1	1	0	0
KM-2400SRB	0	0	1	0	0	0	0	0

In case of 10 dip switches, 9 & 10 should be adjusted OFF for all models listed above.

The original Alpine board, #2U0127-01 was installed on all KM models produced prior to Feb. 98. Models produced after Feb 98 will have either #2U0127-01or the new “E” control board #2A0836-01. Universal Alpine board #2U0139-01 can replace a “C” or Alpine board. It has a black jumper between relay X3 & X4. This jumper makes this board a “C” board. Leave the jumper if there is a white wire in the 10 pin connector. This jumper must be cut for an Alpine application (no white wire on 10 pin connector).

NOTE:
Service replacement boards after Feb. 98 are #2A0836-02 or sub #2A1410-02. This “E” board is designed to replace “C”, Alpine, or original (01) “E” boards. An application switch is located between relay X3 & X4. Follow the instructions on the board label to set this switch. If the 10 pin connector has a white wire, switch to “C” position. If not, switch to “ALP”.

BE SURE TO FOLLOW THE INSTRUCTIONS SUPPLIED WITH THE BOARD.

The “E” service replacement board is smaller than the “C” or Alpine board. It will mount in the same location on 4 of the 6 mounting studs. You must cut the wire ties and stretch the wiring to install the connectors. Each connection is marked and connects the same as the original board.

If the black jumper is cut/not cut improperly”C” board) or the application switch (“E” board) is in the wrong position, the inlet water valve will not energize correctly or the compressor will operate continually when the power switch is turned OFF.

“E” Control Board Functions -

An instruction label explaining the “E” board features is included somewhere on the unit (usually under the top panel or on the control box cover). A stick-on label is also included with the service replacement. If you are replacing an “E” board, place the new label over the original label as it contains instructions for the application switch. This will advise anyone performing future service that the original board has been replaced and explain the application switch as outlined below.

See the information on the label or the following for the board features. The new diagnostic features are added when this board replaces a “C” or Alpine board.

"E" Control Board Functions continued:

The #2A1410-02 universal replacement board has an application switch between relays X3 & X4 that is not included on the original factory board supplied with the unit. This application switch allows this replacement board to be used on older C and Alpine control board models. The application switch has 2 positions (C & ALP). On R-404A models, this switch must be in the ALP position. If the switch is left in the C position, the compressor contactor will energize as soon as power is supplied to the unit whether the power switch is ON or OFF.

There are 4 green LED's which light in sequence throughout the unit operation. It is important to note that the green LED's are not numbered consecutively. LED1 is located at the edge of the board beside the K-2 transformer connection. The numbering sequence from the outside edge of the board is 1, 4, 3, and 2.

The green LED's are also used for a built-in output test which can be conducted to diagnose a bad board. The label explains the output test procedure. The correct lighting sequence for the output test is as follows. When the control switch is switched ON with the output test switch S-3 ON, you will observe the following:
the Red control power LED will light after 3 seconds. This indicates that the control transformer has correct output voltage. After a 5 second delay, LED**2** lights. 5 seconds later LED2 goes out and LED**3** lights. 5 seconds later LED3 goes out and LED**4** lights. 5 seconds later LED4 goes out and LED**1** lights. 5 seconds later LED1 goes out and LED**4** lights to begin the normal sequence of operation. If the LED's follow this sequence, the board is OK. If any other lighting sequence occurs, the board is bad.

Once the correct sequence is determined, the output test switch should be replaced in the OFF position.

A copy of the "E" board label is included on the next page. Review the board label thoroughly to understand the "E" board functions.

ATTENTION !

THIS UNIT HAS A CONTROL PRODUCTS IMPROVED "E" CONTROL BOARD INSTALLED. HOSHIZAKI PART NUMBER 2A1410-01.
The improved "E" board includes LED lights and audible alarm safeties. The red LED indicates proper control voltage and will remain on unless a control voltage problem occurs. At startup a 5 second delay occurs while the board conducts an internal timer check. A short beep occurs when the power switch is turned "ON" or "OFF".

The green LED's 1~4 represent the corresponding relays and energize and sequence 5 seconds from initial startup as follows:

Sequence Step	LED's on:	Length:Min.	Max.	Avg.
1 Minute Fill Cycle	LED 4			60 sec.
Harvest Cycle	LED 1, 4, & 2	2 min.	20 min.	3-5 min.
Freeze Cycle	LED 1	5 min.	60 min.	30-35 min.
Reverse Pump Out	LED 1, 3, & 2	10 sec.	20 sec.	Factory set.

{With light on, LED 1 = Comp/RFM; LED 2 = HGV; LED 3 = PM; LED 4 = WV}
Note: LED's are not numbered consecutively. They are # 1,4,3,2 from board edge.

The built in safeties shut down the unit and have alarms as follows:

1 beep every 3 sec. = **High Evaporator Temperature** >127° F. **Check** for defrost problem (stuck HGV or relay), hot water entering unit, stuck headmaster, or shorted thermistor.

2 beeps every 3 sec. = **Defrost Back Up Timer.** Defrost >20 minutes. Orange LED marked "H Timer" energizes. **Check** for open thermistor, HGV not opening, TXV leaking by, low charge, or inefficient compressor.

3 beeps every 3 sec. = **Freeze Back Up Timer.** Freeze > Specified Setting Yellow LED marked "F Timer" energizes. **Check** for F/S stuck closed (up), WV leaking by, HGV leaking by, PM not pumping, TXV not feeding properly, low charge, or inefficient comp. Dip switches 9 & 10 allow for factory adjustment of this back up timer feature.

Note: 2 & 3 beep alarms represent 2 consecutive occurrences.

Additional alarms for mechanical bin switch:

4 beeps every 3 sec. = **Short Circuit** between the K4 connection on the control board and the bin control. **Check** connections and replace wire harness if necessary.

5 beeps every 3 sec. = **Open Circuit** between the K4 connection on the control board and the bin control. **Check** connections and replace wire harness if necessary.

Note: Units with mechanical bin switch installed, dip switch No.7 must be in the "ON" position. If thermostatic control is used No. 7 must be "OFF".

To manually reset the above safeties, depress white alarm reset button with the power supply "ON".

6 beeps every 3 sec. = **Low Voltage.** Control voltage < 92 Vac ±5%. The red LED will de-energize if voltage protection operates.

7 beeps every 3 sec. = **High Voltage.** Control voltage > 147 Vac ±5%. The red LED will de-energize if voltage protection operates.

Note: The voltage safety automatically resets when voltage is corrected.

The **Output Test** switch "S3" provides a relay sequence test. With power OFF, place S3 on and switch power to ICE. The correct lighting sequence should be none, 2, 3, 4, 1, & 4, in 5 second intervals, then normal sequence. Components will cycle during test. S3 should remain in the "OFF" position for normal operation.

The dip switches should be adjusted per the adjustment chart published in the Tech Specs book. **No. 8 must remain in the "OFF" position.**

Manual Reset Safeties

The Alpine control board has one manual reset safety. It is the 127°F high evaporator temperature safety. There is no indication that the Alpine board is off on this safety. You will only notice that the unit will restart in the 1 minute fill cycle when the power switch is shut OFF and Back ON. This is the only way to reset this safety. If this occurs check for a hot gas circuit or valve problem, a headmaster stuck in bypass, hot water entering the unit, or a shorted thermistor. In case of a shorted thermistor, the unit will not restart. You will hear a relay click after approximately 2 seconds and the unit will remain off.

The "E" control board has 3 manual reset safeties. They are outlined in the control board function label. These safeties shut the unit down and assist the service technician in diagnosing the problem.
The safeties include audible and visual alarms as follows:
1 Beep = 127ºF (52.8ºC) high evaporator temp. safety.
2 Beeps & orange LED = 2 consecutive 20 minute harvest cycles.
3 Beeps & yellow LED = 2 consecutive maximum freeze cycles. (Factory setting for R-22 models is 60 minutes.)
4 Beeps = Short circuit on mechanical bin control circuit.
5 Beeps = Open circuit on mechanical bin control circuit.

Note: 4/5 beeps only function with dip 7 ON. **To reset either safety, press the white reset button on the control board with the power ON**. Next, proceed to check the items outlined on the function label.

The items listed on the function label represent the most common reasons that the safety would function. There may be other remote possibilities however, the items listed should be checked first.

VOLTAGE PROTECTION

Built-in voltage protection for the "E" board will automatically shut the unit down and beep if either a high or low voltage problem occurs as follows:
6 Beeps = Low voltage condition.
7 Beeps = High voltage condition.
The unit will automatically restart when the voltage returns to normal. If constant voltage fluctuation occurs, additional external voltage protection will be required. The high and low voltage protections are the only board alarms that will automatically restart.

COMPRESSOR DATA

MODEL	PART NUMBER	MANUFACTURER/NUMBER	LRA	(Ohms) SWR	(Ohms) RWR	OIL TYPE	CHARGE AMT/FL.OZ.
KM-250/280/F-450/KLM 200	436634-01	Copeland/RSU4-0050-CAA	51	3.79-4.37	.599-.631	3GS	24
KM-500/DCM-700/KLM 400	446521-01	Copeland/RSN6-0075-CAA	75	5.54	.48	3GS	24
KM-630/F-1000	434209-01	Copeland/REK3-0125-PFV**	31	4.68-5.38	1.89-2.16	3GS	24
KM-800/KM-1200	443304-01	Copeland/CR30K6-PFV **	82	2.62-3.02	.688-.792	3GS	45
KM-1600/KM-2000/F-2000	438202-01	Bristol/H23A463ABCA	118	2.23	.39	3GS	55
KM-1600/KM-2000 3 ph F-2000 3 Ph	4A0333-01	Bristol/M53A273DBDA	70	1.22	1.22	3GS	47
KM-2400 3 ph	440665-01	Toshiba/TM506JA-U	136	.56	.56	3GS	55
DCM-240	444746-01	Toshiba/CF180JIM-1U	38	3.16	.77	3GS	29
*F-250	446132-02	Toshiba/CE110Y-1ZU	29.3	5.1	1.2	ESTER BASE	12
F-650/DCM-450	444624-01	Copeland/RSF5-0075-CAA	66	2.93-3.37	.387-.445	3GS	24
F-1000 M/50	434209-01	Copeland / REB3-0150-PFJ	35	5.21	2.87	3GS	24

* The F-250 Utilizes R-134A refrigerant. All other models use R-22.

** 50 cycle compressor is PFJ model

Resistance measurements made with wheatstone bridge under controlled ambient conditions.

LRA = Lock Rotor Amps

SWR = Start Winding Resistance

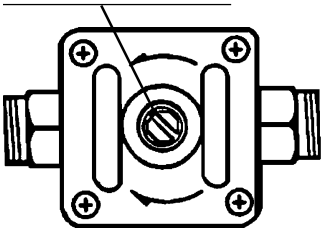
RWR = Run Winding Resistance

RLA = Running Load Amps) (see performance data)

HEAD PRESSURE CONTROLS

WATER COOLED

An adjustable (Pressure Modulated) water regulating valve is installed on the water cooled condenser outlet. Adjust the valve per this diagram to reflect the outlet temperature in the chart below.



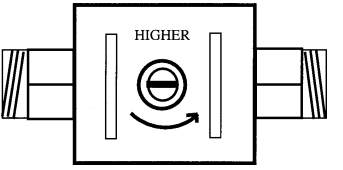
TOP VIEW

Adjust:

CW - for higher pressure and outlet water temperature, lower water flow.

CCW - for lower pressure and outlet water temperature, higher water flow.

Later models may have a # V46 Johnson Controls Penn valve. This valve adjusts opposite from the one above. A label on the valve housing identifies the Penn valve.



PENN VALVE

CONDENSER OUTLET WATER TEMPERATURE RANGE

Model	Range (F°)		
KM-250 BWE	104 ~ 112	KML-400 MWE	99 ~ 105
KM-250 MWE	108 ~ 114	KM-500 MWE	99 ~ 105
KM-280MAE	99 ~ 105	KM-630 MWE	102 ~ 108
KML-200MWE	99 ~ 105	KM-800 MWE	108 ~ 112
KM-1200MWE	110 ~ 114	KM-1200 SWE	118 ~ 124
KM-1600 MWE	99 ~ 108	KM-1600 SWE	99 ~ 105
KM-2000 SWE	100 ~ 104	All Flaker/DCM	100 ~104

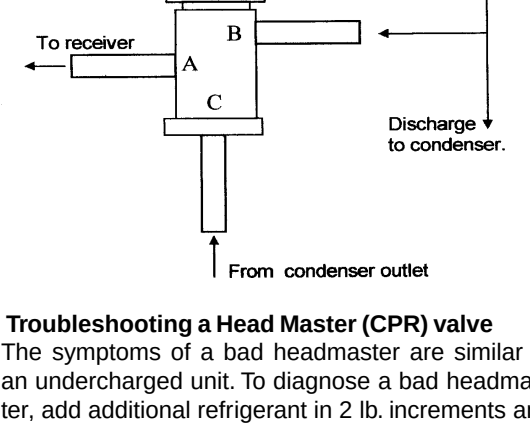
REMOTE HEAD PRESSURE CONTROL

All remote condenser units utilize a condensing pressure regulator (CPR/Headmaster) to maintain head pressure in low ambient conditions. The KM-2400 SRB3 has a Sporland LAC-5 140psi valve mounted in the unit head.

The URC-20E has a 156 psi valve.

All other KM and Flaker remotes have a Sporland LAC-4
190psi valve mounted in the condenser.

REMOTE HEAD PRESSURE CONTROL CONNECTIONS



Troubleshooting a Head Master (CPR) valve

The symptoms of a bad headmaster are similar to an undercharged unit. To diagnose a bad headmaster, add additional refrigerant in 2 lb. increments and watch the pressures. If the pressures begin to look normal, the unit was undercharged. In this case, leak check the system to find the leak and use normal refrigeration practices to recover, repair, evacuate and recharge the unit. If not, a bad headmaster is a possibility. Check to see if the valve is stuck open by conducting temperature checks at the outlet of the headmaster. Replace the headmaster as necessary. Use safe refrigeration practices when removing the valve and protect the valve from overheating.

Liquid Line Valve -

Hoshizaki KM remote cubers and some air and water cooled units include a liquid line solenoid down stream of the receiver and before to the expansion valve. The purpose of this normally closed solenoid valve is to isolate the high side refrigerant from the expansion valve. The valve eliminates any liquid migration through the expansion valve during the off cycle and will not allow refrigerant flow through the expansion valve during an extended harvest.

It is important to remember that the 115volt solenoid should be energized during the freeze cycle and de-energized during harvest.

Bypass Cooling -

R-22 refrigerant is very efficient in an ice machine application. The discharge temperature runs hotter and allows for a more efficient ice harvest as well as increased refrigerant capacity. The one concern with using R-22 in this application is compressor operating temperatures. Hoshizaki uses bypass cooling to maintain cooler operating temperatures. KM units beginning with the KM-630 and larger include some type of bypass cooling.

Bypass cooling is accomplished by using a bypass capillary to feed liquid refrigerant from the liquid line to the suction line. The liquid refrigerant flashes in the suction line and provides addition cool gas to maintain lower compressor operating temperatures. Bypass cooling can be continous or cycle depending on the model. The capillary will sometimes be connected to a bypass solenoid valve, which opens and closes as required to provide on-demand bypass cooling. Bypass may be controlled through a relay and a bypass thermo-disc mounted on the compressor dis-charge line. Review the unit wiring diagram and refrigerant circuit diagram to determine

how the bypass operates and trouble shooting procedures.

You will also find that the KM-1200S/MAE model opens the bypass valve during a long harvest to add more refrigerant to the harvest loop. This improves operation during a long harvest.

HIGH PRESSURE SAFETY SWITCH -

An automatic reset high pressure safety switch is utilized on all Hoshizaki "E" series ice makers. The pressure switch settings are as follows:

MODELS	PART NUMBER	CUT OUT (psig)	CUT IN (psig)
F-250	3U0069-03	228 ± 21.3	185 ± 21.3
All KM Water Cooled / F-650/F-1000/ DCM-450			
	433441-01	355.6 ± 21.3	256 ± 21.3
DCM-240	433441-03	377 ± 21.3	270 ± 21.3
All KM Air Cooled/ Remote			
	433441-05	384 ± 21.3	284.5 ± 21.3
F-450/F-2000/ DCM-700			
	433441-06	328± 21.3	228± 21.3

THERMO-DISC

A Thermo-Disc is used on certain models as a control or discharge line high temperature safety.

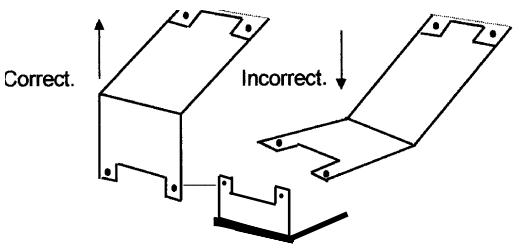
MODELS	PART NUMBER	CUT OUT	CUT IN
(Used as a control for bypass valve on these models)			
KM-1600	445595-01	221°F	200°F
F-2000 MWE	449112-01	225°F	203°F
(Used as safety on these models)			
KM-500 MWE			
KM-500 MRE			
KM-2400 SRB3	440664-01	266°F	239°F
F-2000 MWE / MRE	440664-03	257°F	230°F

BIN CONTROL

All KM - E and prior series units use a thermostatic bin control. The capillary bulb is mounted in the ice drop zone or on a drop down bracket which extends into the bin cavity. The drop down bracket should be secured to the unit base and plug connection **must be made** before the unit will operate.

When replacing a thermostatic bin control, check the operation by holding ice against the thermostatic bulb with the control switch in the wash position. The pump should stop within 6 to 10 seconds. Adjust the control "CCW" for a faster shut down.

If the bin control bulb is not contacting the ice pyramid, an extension bracket may be needed. A bin control extension bracket is included with all "S" models. Be sure to install the extension if it is supplied. When installing, make sure the bracket points downward so that the cubes will easily fall away from the bin control bulbs.



The bin control bulb and ABS holder assembly must be mounted on the back side of the extension bracket. This will eliminate premature shutoff due to ice hanging up on the holder. In case of stacked "S" models, both ABS holders will be attached together and mounted to the back of the extension bracket.

F/DCM Bin Control

Flaker / DCM units use a mechanical bin control. A paddle pivots on a hinge pin to operate either a micro- switch or magnetic proximity switch. For proper operation, make sure that the paddle swings freely. The F-450MAF-C cubelet unit uses an Infrared eye control as it is designed for dispenser applications.

CAPACITORS

See wiring diagram reference chart for capacitor ratings. Check capacitors with an ohm meter for a short or open circuit. A capacitor checker can be used to check the capacitance however, it is a good common practice to change a run capacator any time a PSC motor is replaced. Always check the run capacitor if a PSC motor will not start, is running slow, or overheating.

HOSHIZAKI KM CUBER SEQUENCE OF OPERATION

THE STEPS IN THE SEQUENCE ARE AS FOLLOWS:

NOTE: When power is supplied to the "E" Control board, a 5 second delay occurs at startup.

1. 1 Minute Fill Cycle

The unit always starts in the 1 minute fill cycle. When power is applied to the unit the water valve is energized and the fill period begins. After 1 minute the board checks for a closed float switch. If the float switch is closed the harvest cycle begins. If not, the unit will not start without adequate water in the sump. This serves as a low water safety shut off. The water valve will remain energized through additional 1 minute cycles until water enters the sump and the float switch closes.

2. 1st Harvest Cycle

The compressor starts, hot gas valve opens, water valve remains open and harvest begins. As the evaporator warms, the thermistor located on the suction line checks for a 48° F. temperature. When 48° F. is reached, the harvest is turned over to the adjustable control board defrost timer which is factory set for normal conditions. This adjustment can vary the defrost timer from 1 to 3 minutes.

3. Freeze Cycle

After the timer terminates the harvest cycle, the hot gas and water valves close, and the ice production cycle starts. For the first 5 minutes the controller board will not accept a signal from the float switch. This 5 minute minimum freeze acts as a short cycle protection. At the end of 5 minutes the float switch assumes control. As ice builds on the evaporator the water level in the sump lowers. The freeze continues until the float switch opens and terminates ice production.

4. Harvest Pump Out

When the float switch opens and signals the completion of the freeze cycle, the harvest cycle begins. The hot gas valve opens and the compressor continues to run. The drain timer starts counting the 10/20 second pump out.

The water pump stops for 2 seconds and reverses, taking water from the bottom of the sump and forcing pressure against the check valve seat allowing water to go through the check valve and down the drain. At the same time water flows through the small tube to power flush the float switch. When the drain timer stops counting, the pump out is complete.

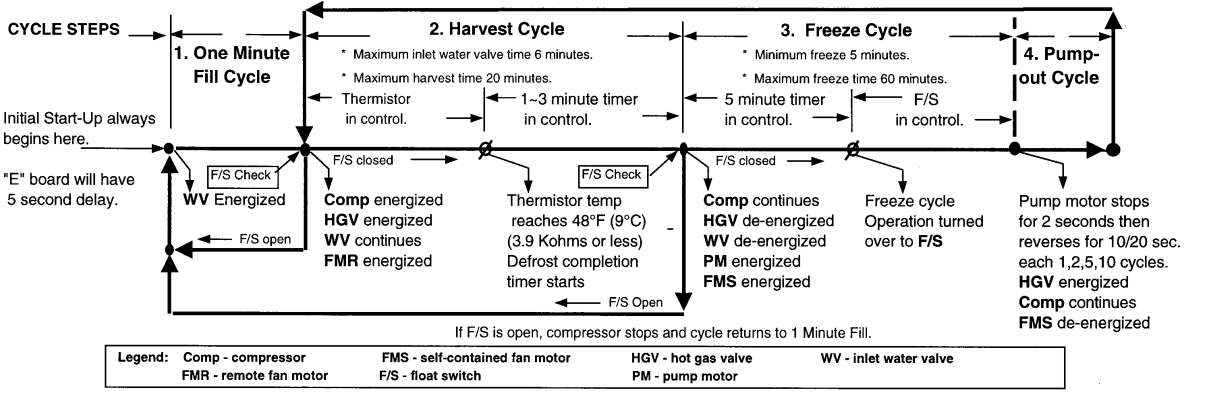
Pump out always occurs on the 2nd harvest after startup. The Alpine control board allows for adjustment for pump out to occur every cycle, or every 2nd, 5th or 10th cycle from this point.

5. Normal Harvest Cycle

The water valve opens to allow water to assist the harvest. As the evaporator warms, the thermistor reaches 48° F. The control board receives the thermistor signal and starts the defrost timer. The water valve is open during harvest (defrost) for a maximum of 6 minutes or the length of harvest, whichever is shorter. When the defrost timer completes its count down, the defrost cycle is complete and the next freeze cycle starts.

The unit continues to cycle through 3, 4 and 5 sequence until the bin control senses ice and shuts the unit down.

KM SEQUENCE FLOW CHART AND COMPONENT OPERATION.



Legend: **Comp - compressor** **FMS - self-contained fan motor** **HGV - hot gas valve** **WV - inlet water valve** **FMR - remote fan motor** **F/S - float switch** **PM - pump motor**

KM CHECK OUT PROCEDURE

The following is a detailed explanation of the KM 10 Minute Check Out procedure.

The 10 minute check out procedure is basically a sequence check which can be used at unit startup or for system diagnosis. Using this check out procedure will allow you to diagnose electrical system and component failures in approximately 10 minutes under normal operating conditions of 70°F or warmer air and 50°F or warmer water temperatures. Before conducting a 10 minute checkout, check for correct installation, proper voltage per unit nameplate and adequate water supply. As you go through the procedure, check to assure the components energize and de-energize correctly. If not, those components and controls are suspect.

10 MINUTE CHECK OUT PROCEDURE

1. Turn power OFF - gain access to unit control box.
2. Turn power ON – place control switch in ice position.
Note: A 5 second delay occurs for units with "E" control board.

A) 1 Minute Fill Cycle begins – **WV** energized. After 1 minute, control board checks **FS**. If **FS** is closed…unit cycles to Harvest. Continue to (B). If **FS** is open, unit repeats 1 minute fill cycle until water enters and **FS** closes (low water safety protection during initial start up and at the end of each harvest)

Diagnosis: If **WV** does not open, check for no supply voltage at **WV** terminals, bad coil, or plugged screen or external filter (no water flow). If unit fails to start harvest, check for open **FS** or bad 1 minute timer in board.

B) Initial Harvest Cycle – **WV** remains energized, **CC** energizes to start **C, HGV**, & (**FM** on **RS** model) energize. Evaporator warms…thermistor senses 48°F…turns operation of harvest to control board defrost completion timer. Timer completes counting (1 ~3 minutes)…Unit cycles to freeze.

Diagnosis: Check if **C** is running, **HGV** is open, **WV** still open. Avg. harvest cycle at factory setting is 2 ~ 3 minutes. How long does initial harvest last? 1.5 minutes after initial harvest begins, touch **C** discharge line. Is it hot? If not check refrigerant pressures and **C** operation. If it is hot, touch inlet line to the evaporator. Is it hot? If it is hot and unit is not starting freeze cycle, check defrost

completion timer adjustment, thermistor for open circuit, discharge line temperature, **C** efficiency, and if **HGV** is fully open.

C) Freeze cycle – **C** remains energized, **PM,** (**LV** on **RS** model), and **FM** energize…**WV** & **HGV** de-energize. Unit is held in freeze by 5 minute short cycle protection timer. After 5 minutes freeze cycle operation to transferred to FS for freeze termination. During first 5 minutes of freeze, confirm that evaporator temperature drops. After 7 minutes in freeze, remove black FS lead from K5 connector…Unit should immediately switch to pump out cycle.

Diagnosis: If evaporator is not cold, check for **HGV** still open, **TXV** not opening properly, **WV** continuing to fill reservoir, improper unit pres sures, and inoperative **C**. If unit remains in freeze with FS removed replace board. * Normal freeze cycle will last 20 ~ 40 minutes depending on model and conditions. Cycle times and pressures should follow performance data provided in Tech –Specs.

D) Pump Out Cycle – (10/20 second pump out) **C** remains energized, **HGV** energizes, **FM** de-energizes, **PM** stops for 2 seconds and starts in reverse rotation for 10/20 seconds.(This removes contaminants from the water reservoir through check valve and down the drain and allows for power flush of **FS**.) Check clear tubing at check valve housing or unit drain for water flow.

Diagnosis: If PM does not reverse, check PM circuit and capacitor. If water does not pump out, remove housing and check/clean valve assembly.

E) Normal Harvest Cycle –same as Initial Harvest Cycle – Return to B)…* Unit continues to cycle through B)…C)…& D) (Setting can be adjusted to skip D until every 2, 5, of 10 cycles)…until bin control is satisfied or power is switched OFF.
• Unit always restarts at A).

Legend:

C – Compressor	**CC** – Contactor Coil	**FM** – Condenser Fan Motor
FS – Float Switch	**HGV** – Hot Gas Valve	**LV** – Line Valve
PM – Pump Motor	**RS** – Remote System	**WV** – Inlet Water Valve

RESERVOIR FLUSH SYSTEM

A displacement device (cap or assembly) is positioned over the top of the overflow stand pipe. This device allows sediment to be pulled from the bottom of the reservoir and flush down the drain when overflow occurs. Water should always overflow the stand pipe for a short period towards the end of harvest to allow this flushing action. To extend this flushing action adjust dip switches 1 & 2 for longer harvest. If overflow does not occur, you have restricted water flow into the unit. Check the inlet water valve screen, incoming water line size, or the external filter system.

The displacement device must be in position for proper operation. If not, water goes down the drain during freeze and short cycling occurs.

PUMP-OUT CHECK VALVE

A mechanical spring & seat check valve is located in the pump-out housing. If this check valve sticks open, water flows down the drain during freeze and a 5 minute freeze cycle occurs. In this case, check for a displaced seat, trash or a weak spring. Replace the spring if it is weak. When reinstalling the check valve, the seat always faces the pump supply.

KML PUMP OUT

The Standard KM series has a dual winding pump motor that reverses direction during the pump-out cycle. The reverse rotation pumps sediment down the drain. The KML models have a single winding pump motor that does not reverse. Instead of a pump-out check valve and reversing pump, a drain solenoid and the pump motor are energized by a relay so that sediment is pumped out.

KM CONTROL SWITCH

The standard KM models have a three position control switch. The switch positions are “ICE-OFF-WASH”. Also, a manual cleaning valve includes a micro-switch which opens the control transformer circuit to the control board during the cleaning process. This cleaning valve must be in the horizontal position to make ice.

The KML models have 2 switches. The control switch positions are “ICE- OFF-SERVICE”. With the control switch in the SERVICE position, the SERVICE switch is energized.

The service switch also has three positions, “DRAIN-CIRCULATE-WASH”. With the control switch in SERVICE and the service switch in DRAIN, the pump strarts and drain valve solenoid opens to automatically drain the reservoir. In circulate, the pump motor circulates cleaner to the outside of the evaporator. In WASH, the cleaning solenoid energizes and the pump circulates cleaner to the inside and outside of the evaporator.

COMPONENT CHECKS:

1. **Float Switch:** Check out the float switch with an ohm meter. When the float is up, the switch is closed.

The symptoms of a sticking float are:

Up/Closed: 60 minute freeze cycle, larger cubes, and pump cavities prior to harvest.

Down/Open: Unit shuts down on low water safety and water runs continuously.

Note: Units using “E” board will shut down on 3 beep safety after 2 consecutive 60 minute freeze cycles.

2. **Thermistor:** Check out the thermistor mounting and check resistance versus temperature per this chart:

THERMISTOR TEMPERATURE / RESISTANCE

SENSOR TEMP (F°)	RESISTANCE (K OHMS)
0	14.4
10	10.6
32	6.0
50	3.9
70	2.5
90	1.6

The symptoms of a bad thermistor are:

Open: 20 minute harvest cycle

Note: Units using “E” board will shut down on 2 beep safety after 2 consecutive 20 minute harvest cycles.

Shorted: Unit locks out on manual reset high temperature safety.

Note: If evaporator reaches 127°F the thermistor signal (500 ohms) shuts down the unit on this manual reset. For “E” control boards, a 1 beep alarm will occur. To reset this alarm, press the white reset button on the board with power ON. Then check the items listed on the control board label for a 1 beep alarm.

Note: The Thermistor must be mounted using a heat sink compound to assure good heat transfer and accurate sensing. Use Hoshizaki: Part Number 4AO683-01 or equivalent. (Radio Shack #276-1372 or GE Electronics #10-8108, ect.)

3. The control board operates on 12VAC which is supplied by the control voltage transformer located in the control box. The secondary of this transformer is connected to the K2 connector on the control board. An interlock switch is in series with the secondary winding and is operated by the cleaning valve handle mounted on the side of the evaporator compartment. If this switch is not closed, no control voltage is supplied to K-2 and the control board will not operate. This switch eliminates the possibility of the compressor operating during the cleaning process.

4. The **bin control** used on all KM units is an adjustable, thermostatic control. The thermostatic bulb is mounted in the ice drop area. To adjust the bin con trol, hold ice against the bulb while the unit is oper ating. The unit should shut off within 6 to 10 sec onds. If this does not occur, adjust the thermostatic control by turning the screwdriver slot. Adjusting towards warmer will allow the unit to shut down quicker. This djustment should be checked at installation, when diagnosing a bin control problem, or if a replacement bin control is installed.

   KM 150 / 250 / 280 / 500 / 630 /900 units have a bin control mounted in the ice drop zone. KM-1300M / S and larger units have a drop down bracket that must be dropped down, secured, and plugged in at installation. The **ice must contact the bulb to operate the bin control**. Some bin applications require an extension bracket or relocation of the bulb mounting to allow for proper shut down. Check this positioning if the control is adjusted properly and ice continues to back up into the evaporator section. Assure that the extension bracket is installed if included in the accessory bag. (See drawing for proper installation of extention bracker under BIN CONTROL section.)

The symptoms of a bad thermostatic control are:
Stuck closed: The unit continues to operate when the bin is full. This allows ice to back up in the evaporator compartment and generally causes a freeze-up condition. This will also occur if the bin control is adjusted too cold or fully "CW" which is the continious position. Check the adjustment and bulb location before you diagnose a stuck bin control.
Stuck open : The unit will not start in the ice position. An easy method to check for an open bin control is to place the control switch to WASH. If the pump starts, the bin control is closed.

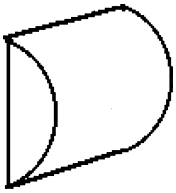
F/DCM bin controls may be a mechanical flapper with a magnetic proximity switch or a micro-switch assembly. Since these controls have moving parts, make sure that all parts move freely. Sticking can occur if scale builds up at the pivot points. All flakers "E" and prior model flakers use the mechanical proximity switch control. If the bin control fails, the spout will fill with ice causing higher gear motor current and the gear motor protect will trip or fuse will blow.
5. To check the KM control board, check for 12VAC at connector K-2. If control voltage is present, check for 115VAC from pin 10 on the K-1 connector to a white neutral wire. Checking from pin to case can give a false reading in 3-phase models which have a transformer to provide 115VAC for the 115V componants. If voltage is present, conduct the output test as outlined on the board function label. The output test will show that the board is sequenceing properly. If the output test results in an improper lighting sequence, replace the board. Conduct a thorough 10 minute check out procedure to pinpoint the problem area. See (10 MINUTE CHECK OUT).

Even though the output test result is correct, the output voltage could be bad. An additional check should be made to check for proper output to each individual componant. Follow the wiring color code on the wiring diagram to check the output voltage at the K-1 connector to each componant as the unit cycles through the 10 minute check. If voltage is not supplied to a componant when it should be or incorrect voltage is present, the board relay contacts are likely bad and the board should be replaced.

6. Check other components using a good quality multi-meter and normal electrical diagnostic procedures.

Diagnosing water problems.

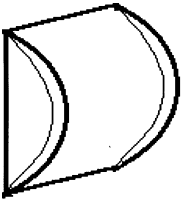
Many common water related problems will causecubes to look unnatural. Looking at the ice in the bin will point you towards the problem area. Study these shapes and causes to help you diagnose water related problems.



1.

Normal cube **No problem.**

Average cube size 1/2" thick x 1 1/8" wide x 1 1/2" high.

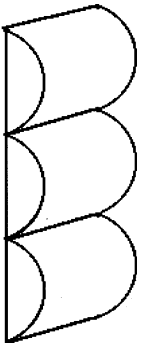


2.

Larger than normal cube with heavy saddled edges.

Note: Normal cube may have slight saddled edge.
If the float switch sticks in the up position, (closed) the unit will have a consistent 60 minute freeze cycle. This will result in heavy saddled edges and may cause pump cavitation and ice to stick on the evaporator or ice possible bridging.

A FREEZE UP MAY OCCUR IF ICE STICKS DUE TO THE LARGER EDGES.



3.

Bridging or ice strips

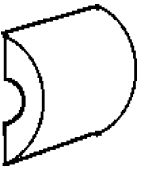
a) Bridging that occurs on all ribs of all evaporator plates is the result of excessive water in the reservoir. This is caused by the inlet water valve leaking by. Check for a plugged bleed port in the water valve diaphragm or a defective water valve.

b) May be the result of # 2.

c) Bridging can occur on a few ribs if some of the holes in the water distribution tubes are plugged. An inspection of the ice build up on the evaporator will show some ribs with no ice and others with strips. Clean the water distribution system.

d) Bridging on 1 or 2 plates of a multiple evaporator unit can result from water distribution problems or a refrigeration system problem. Eliminate water problems first then check TXV, hot gas valve, charge, etc....

BRIDGING WILL GENERALLY CAUSE A FREEZE UP.



4.

Melt away of back of cube

a) This can occur if the evaporator plate is scaled up. De-scaling is required.

b) Insufficient water flow during harvest can also cause the flat side of the cube to melt away. Check for a plugged inlet water valve screen, plugged external filter, low water pressure, or a small water line size.

EITHER OR BOTH OF THESE ITEMS CAN CAUSE THIS SYMPTOM.

5.

Small cube (Size will depend on how much water is in the reservoir.)

a) Can be caused by a low volume of water at the beginning of freeze. Check for adequate water flow during harvest. See item 4 b)

b) If the pump out check valve is stuck open or has a weak spring, the water left in the reservoir will be pumped out during the first five minutes of freeze. This results in a short cycle and slivers of ice or small cubes.

c) Any loss of water, whether by leak, water trail, or loose stand pipe can cause this problem.

6. Freeze ups can be caused by 2, 3, or 4 above in any combination. The major cause however is a dirty (scaled up) water system or evaporator. A thorough cleaning will eliminate most freeze ups. The second most common reason for freeze up is low water flow. Always check the evaporator, and water flow first, then go to other checks when diagnosing freeze ups.

PLEASE COMPLETE WHEN DIAGNOSING A FREEZE-UP, REFRIGERANT LEAK, OR LOW CHARGE.

MODEL#_____**SERIAL#**_____

INSL DATE _____**FAIL DATE**_____

	Single	Stacked
1. Single unit or stacked equipment?	[ ]	[ ]
	YES	**NO**
2. Condition of float switch - Dirty float?	[ ]	[ ]
Are contacts opening?	[ ]	[ ]
3. Is water pump always running during freeze?	[ ]	[ ]
4. Is thermistor properly mounted?	[ ]	[ ]
5. Is the TXV bulb tight and insulated?	[ ]	[ ]
6. Does water sump fill to overflow in 60 –90 secs. or less when empty?	[ ]	[ ]
7. Is the water line size 1/2"?If not _____"	[ ]	[ ]
8. Is water flow 3 GPM for KM-250~KM-800?	[ ]	[ ]
9. Only one water line per unit? If not _____	[ ]	[ ]
10.Is water flow 5GPM for KM-1200 ~ KM-2400?	[ ]	[ ]
11. Will bin control cycle OFF within 6-10 seconds when in contact with ice?	[ ]	[ ]
12. Have you checked that the bin control capillary is not touching a heated source?	[ ]	[ ]
13. Are the evaporator separators positioned properly?	[ ]	[ ]
14. Is the cube guide positioned correctly?	[ ]	[ ]

15. Date evaporators were last cleaned _____

16. Does the unit have any water filtration? [ ] [ ]
If so, please list the following:
Brand filter _____
Filter model _____
Water filter pressure gauge reading _____psig
Date filter last replaced _____

17. Date screen on water solenoid was last cleaned _____
Does water valve close completely when de-energized? [ ] [ ]

18. What is the water pressure? _____ psig
Temperature? _____°F

19. Please list the control board dip switch settings.
1 _____ 2 _____ 3 _____ 4 _____
5 _____ 6 _____ 7 _____ 8 _____

20. Is cube size consistent from inlet to outlet of evaporator? (full freeze pattern) **YES** [ ] **NO** [ ]

21. Is ice still dropping when unit cycles into the freeze mode? [ ] [ ]

22. After defrosting, was the unit leak checked? [ ] [ ]
Were any leaks found? [ ] [ ]
If so, where? (Be specific)

_____

23. Was any refrigerant added to the unit? [[[ ]
If so, how much?

_____

24. What is the head pressure?
Freeze _____ Harvest _____

25. What is the suction pressure?
Freeze _____Harvest _____

26. What is length of Freeze cycle_____
Harvest cycle? _____

27. Ambient temperature? _____ ° F

28. Water-cooled condenser outlet water temp._____°F

29. Is the hot gas valve opening? [ ] [ ]

30. List model and manufacturer of bin

_____

31. If non-Hoshizaki bin, what modifications have been made to bin control mounting? [ ] [ ]

32. Has extension bracket been added to the bin control bracket? [ ] [ ]

33. Check ice drop weight. _____

CLEANING/SANITIZING PROCEDURE

A label which details the step by step cleaning/sanitizing procedure is located on the inside front panel of the ice machine. These instructions are also provided in the Instruction Manual shipped with each unit. Follow these instructions to conduct a thorough cleaning and sanitizing of the water system.

Annual cleanings are recommended. More frequent cleanings may be required in bad water areas.

INLET WATER VALVE

The inlet water valve includes an 80 mesh screen to protect the water system from debris. Always check and clear this screen during the cleaning procedure.

CLEANERS-

Hoshizaki recommends "Hoshizaki Scale Away' or "Lime-A-Way" (by Economics Laboratory, Inc.) however any FDA approved ice machine cleaner is acceptable. If you carry a nickel safe cleaner, the acidic solution is weaker than normal cleaners to protect plated surfaces. You may need to use a heavier mixture of nickel safe to cut heavier scale deposits.

RECOMMENDED CLEANING SOLUTION MIXTURE

MODEL	CLEANER	WATER
KM-250	7 Fl. Oz.	1.3 Gal.
KML-200/400	10.5 Fl. Oz.	2.0 Gal.
KM-280/500/630/800	16 Fl. Oz.	3.0 Gal.
KM-1200/1600	27 Fl. Oz.	5.0 Gal.
KM-2000/2400	38 Fl. Oz.	7.0 Gal.
All Flakers	9.6 Fl. Oz.	1.6 Gal.

The system should be sanitized using a solution of water and 5.25% sodium hypochlorite. Any commercial sanitizer recommended for ice machine application is acceptable.

RECOMMENDED SANITIZING SOLUTION MIXTURE

MODEL	SANITIZER	WATER
KM-250	.65 Fl. Oz.	1.3 Gal.
KML-200/400	1 Fl. Oz.	2.0 Gal.
KM-280/500/630/800	1.5 Fl. Oz.	3.0 Gal.
KM-1200/1600	2.5 Fl. Oz.	5.0 Gal.
KM-2000/2400	3.7 Fl. Oz.	7.0 Gal.
All Flakers	2.5 Fl. Oz.	5.0 Gal.

KM PRODUCTION CHECK

The steps for a cuber production check are as follows:

1. Time a complete cycle from the beginning of one freeze cycle to the beginning of the next freeze cycle.
2. Catch all of the ice from this freeze cycle and weigh the total batch.
3. Divide the total minutes in a 24 hour day (1440 minutes) by the complete cycle time in minutes to obtain the number of cycles per day.
4. Multiply the number of cycles per day by the cycle batch weight for the cuber production per 24 hours.

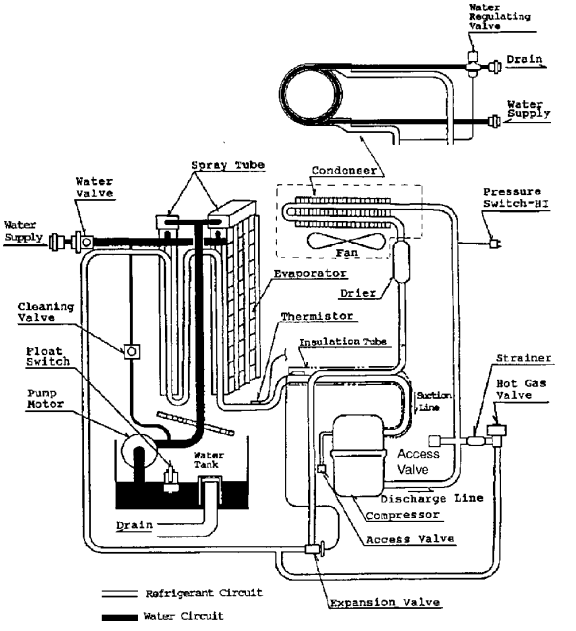
   (1440 • Total Cycle Time) x Ice Batch Weight= 24 Hour Production

Once you calculate the production, check the incoming water temperature, and ambient condensing temperature at the cuber and cross reference to performance data included in this manual to see if the calculation falls within 10% of the specification.

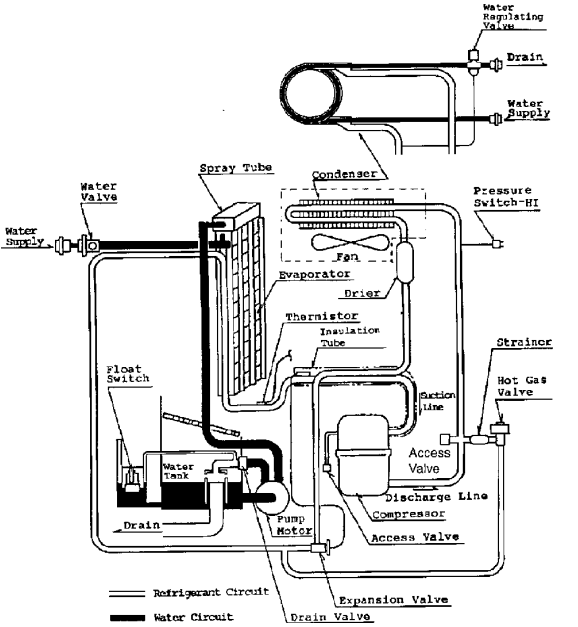
For the most accurate production check, a normal freeze cycle should be checked. If the evaporator compartment has been opened for service or if the unit has been cut off for a long period of time, the first freeze cycle will be longer than normal. Timing this cycle can result in an inaccurate production check. To avoid this, start the unit and allow it to operate for 10 minutes in the freeze cycle, unplug the float switch lead and cause the unit to cycle into harvest mode. Replug the float switch and start timing as soon as the next freeze begins. Also remember that the evaporator compartment must be closed during the production check. Removing the front cover to check the ice buildup during a production check will allow heat into the evaporator and will affect the total cycle time and actual production.

WATER AND REFRIGERATION CIRCUIT DRAWING REFERENCE CHART

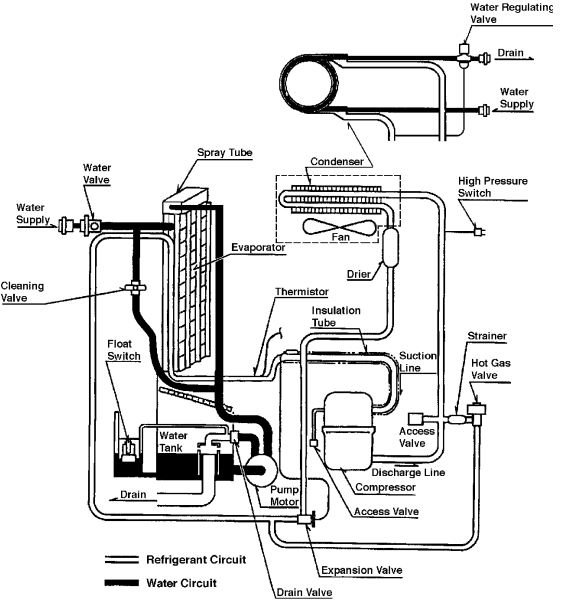
NOTE: Some drawings have been combined to represent more than one model.


Water Regulating Valve
Drain
Water Supply
Condenser
Spray Tube
Water Valve
Water Supply
Pressure Switch-HI
Fan
Evaporator
Drier
Cleaning Valve
Thermistor
Insulation Tube
Float Switch
Strainer
Hot Gas Valve
Pump Motor
Suction Line
Water Tank
Access Valve
Discharge Line
Compressor
Drain
Access Valve
Expansion Valve
Refrigerant Circuit
Water Circuit

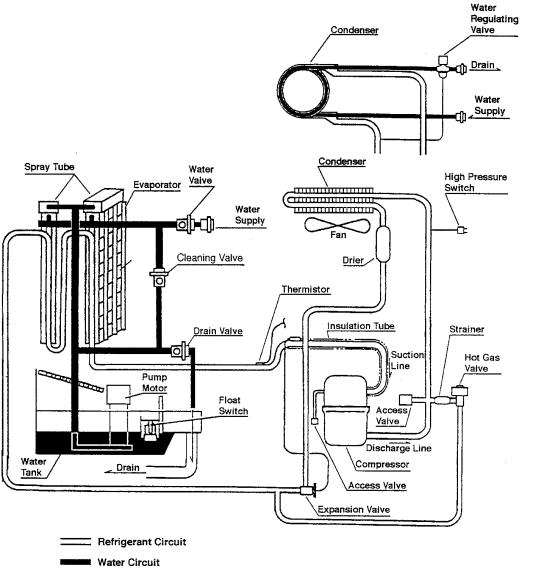
KM-250MAE, KM-250MWE



KM-280MAE, KM-280MWE

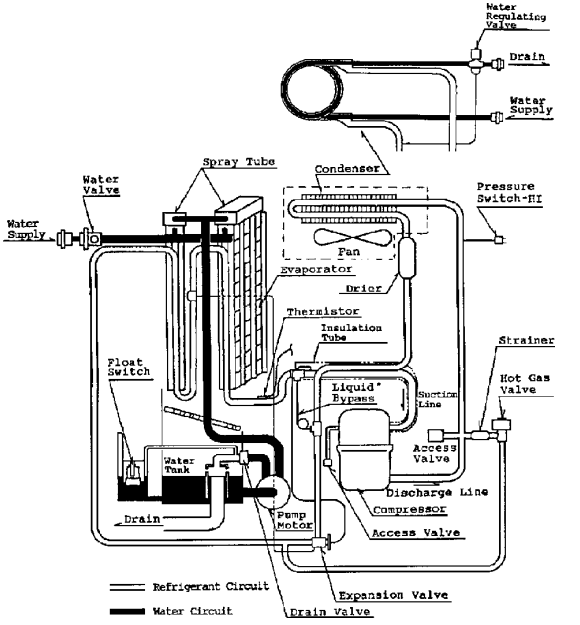


Note: KM-280MWE has heat exchanger



Note: KML-200 models have 1 evaporator plate.

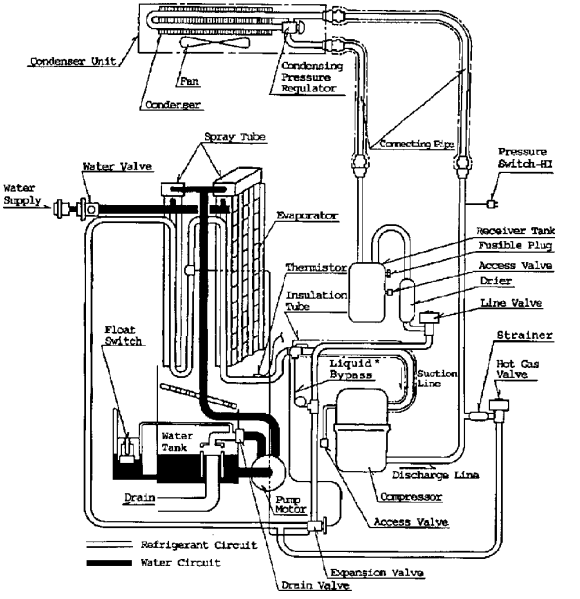
KM-500MAE, KM-500MWE
KM-630MAE, KM630MWE
KM-800MAE, KM-800MWE



Note: The liquid bypass and external equalized TXV are for KM-800 MAE/MWE only.

The KM-500 MAE and KM-630 MAE/MWE have no suction heat exchanger.

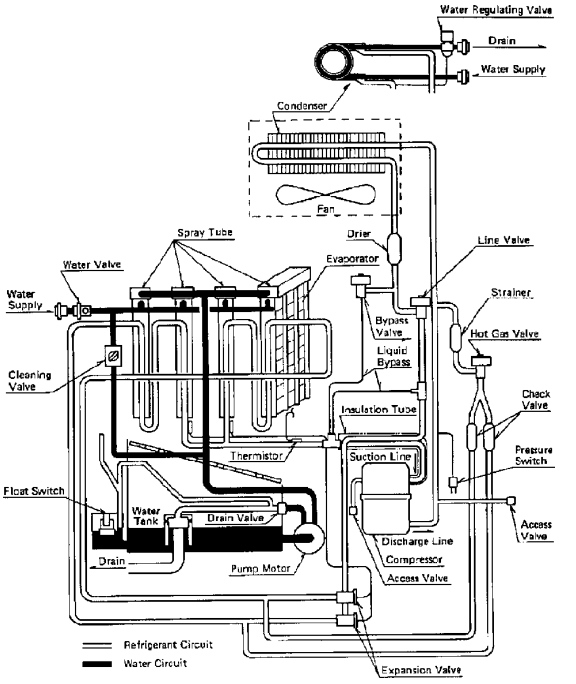
KM-630 MRE
KM-500 MRE
KM-800 MRE



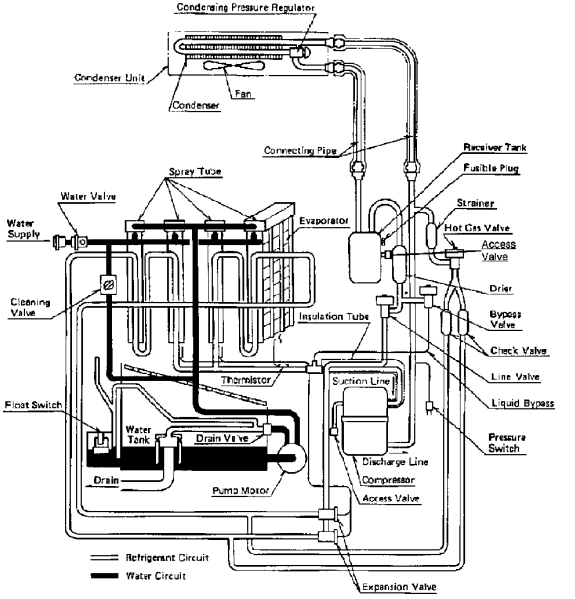
Note: The KM-500MRE has no suction heat exchanger.

The external equalized TXV is for KM-800 MRE only.

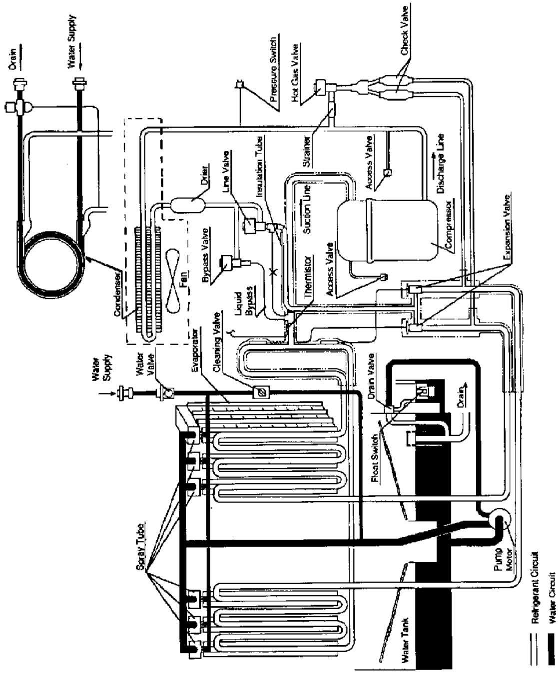
KM-1200 MAE
KM-1200 MWE



KM-1200 MRE
KM-1600 MRE

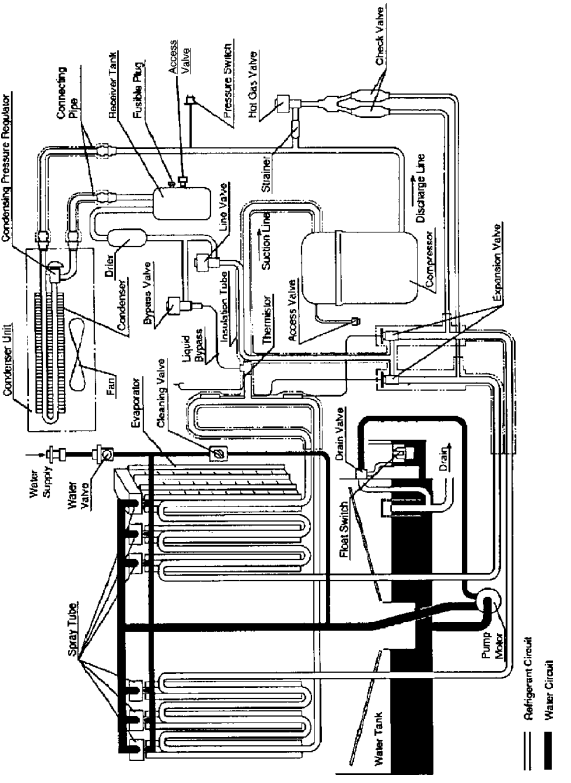


KM-1200 SAE
KM-1200 SWE
KM-1600 SWE

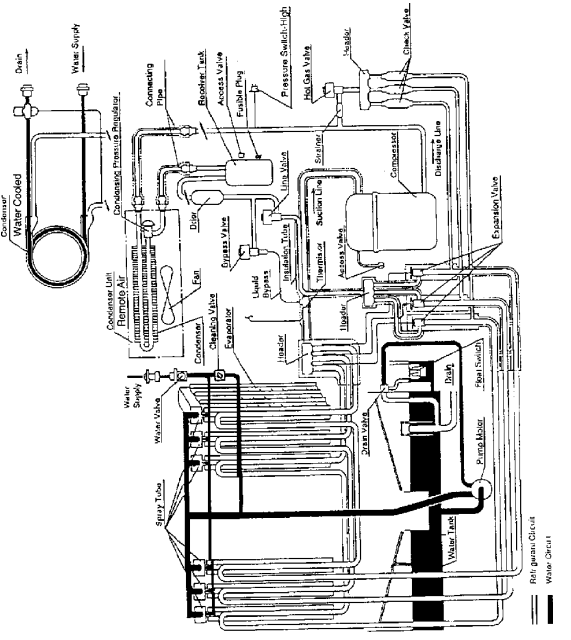


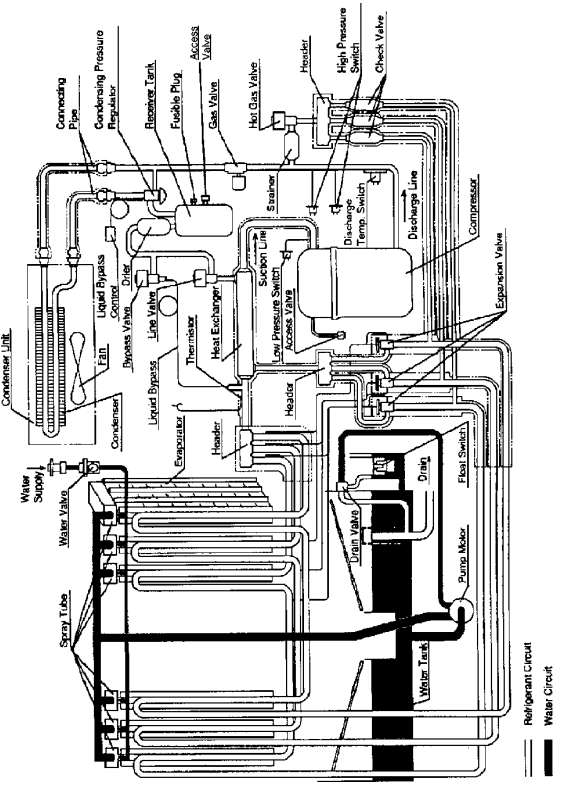
X - This liquid bypass is not included on the KM-1600 SWE

KM-1200 SRE
KM-1600 SRE



KM-2000 SWE
KM-2000 SRE




Condenser Unit
Fan
Condenser
Liquid Bypass
Bypass Valve
Line Valve
Dryer
Liquid Bypass Control
Connecting Pipe
Condensing Pressure Regulator
Receiver Tank
Fusible Plug
Access Valve
Gas Valve
Hot Gas Valve
Header
High Pressure Switch
Check Valve
Thermistor
Heat Exchanger
Evaporator
Header
Strainer
Suction Line
Low Pressure Switch
Access Valve
Header
Discharge Temp. Switch
Discharge Line
Compressor
Expansion Valve
Water Supply
Water Valve
Spray Tube
Drain
Float Switch
Drain Valve
Pump Motor
Water Tank
Refrigerant Circuit
Water Circuit

PERFORMANCE DATA

MODEL: **KML-200M_E** Supply Voltage: 115/60/1

Total Amperage (Compressor RLA): MAE10.8A (9.1A), MWE 8.3A Ice Production per cycle: 3.9 Lbs, 180 pcs.

Water consumption for MWF condenser: 90/70 406 Gal/24 hr. 70/50 226 Gal/24 Hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours	50	250	238	241	232	230	223	218	215
	70	240	220	226	208	214	199	203	190
	90	220	190	210	184	199	175	187	167
Cycle Time Freeze	50	20	24	21	22	21	22	24	23
	70	21	21.5	23	24	24	24.5	26	25
	90	28	24	32	25	32	26	40	27
Cycle Time Harvest	50	2.5	3	2	3	2	2.9	3	3
	70	2	2.9	2	2.9	2	2.8	2	2.8
	90	2	2.9	2	2.9	2	2.8	2	2.8
Pressure High Side	50	260	223	266	224	268	224	286	227
	70	268	224	278	225	286	226	288	228
	90	276	230	284	233	293	233	300	240
Pressure Suction	50	25	30	26	31	26	31	31	35
	70	26	31	28	33	30	35	33	37
	90	36	39	42	43	42	44	53	52

NOTE: Total Cycle Time = Freeze + Harvest. Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-250B_E** Supply Voltage: 115/60/1

Total Amperage (Compressor RLA): BAE 10A (9.3A), BWE: 9A, (8.3A) Ice Production per cycle: 3.97 Lbs, 220 pcs.

Water consumption for BWE condenser: 90/70 274 Gal/24 hr. 70/50 116 Gal/Hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours	50	230	215	194	213	170	210	140	209
	70	194	198	185	194	165	170	135	175
	90	183	179	152	176	146	174	130	170
Cycle Time Freeze	50	21	18	22	18	23.5	18	25.5	19
	70	22	20.5	24	22	29	22	29.5	22.5
	90	23	23	26.5	23.5	28.5	24	28.5	27
Cycle Time Harvest	50	5	4.5	4	5	4	5	3.5	5
	70	4	4	4	4	4	4	3.5	4
	90	4	4	4	4	3.5	4	3.5	4
Pressure High Side	50	245	236	284	236	316	236	339	236
	70	255	236	290	236	318	236	343	236
	90	269	247	303	248	326	249	356	249
Pressure Suction	50	48	39	48	40	50	40	50	41
	70	50	40	50	43	50	43	51	44
	90	51	44	53	44	53	44	54	49

NOTE: Total Cycle Time = Freeze + Harvest. Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-250M_E**

Supply Voltage: 115/60/1

Total Amperage (Compressor RLA): MAE 10A (8.6A) MWE: 9A, (8.2A)

Ice Production per cycle: 4.6 Lbs, 240 pcs.

Water Consumption for MWE Condenser: 90 / 70 314 Gal/24 hr:

70 / 50 233 Gal/24 hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours	50	242	224	208	213	178	204	147	196
	70	222	210	191	202	184	193	140	188
	90	200	198	182	187	170	180	132	175
Cycle Time Freeze	50	24	23	28	23	33	25	41	25
	70	26.5	23	33	24	33	25	43	26
	90	29	26.5	35	28.5	40	29	46	29.5
Cycle Time Harvest	50	3	3.5	3	3.5	3	3.5	3	3.5
	70	3	3.5	3	3.5	2	3.5	2	3.5
	90	3	3.5	3	3.5	2	3.5	2	3.5
Pressure High Side	50	242	233	271	234	304	236	331	236
	70	245	236	274	236	306	236	340	237
	90	250	239	278	243	310	244	343	246
Pressure Suction	50	39	40	40	40	43	41	46	41
	70	39	43	40	43	43	47	46	47
	90	39	43	40	43	44	49	46	50

NOTE: Total Cycle Time = Freeze + Harvest. Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-280M_E**

Supply Voltage: 115/60/1

Total Amperage (Compressor RLA): MAE 10.5A (A) MWE: 9A, (A)

Ice Production per cycle: 5.7 Lbs, 240 pcs.

Water Consumption for MWE Condenser: 90 / 70 3339 Gal/24 hr:

70 / 50 138 Gal/24 hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours	50	263	281	231	271	215	262	180	253
	70	240	259	215	251	202	242	164	236
	90	231	225	206	215	188	208	160	202
Cycle Time Freeze	50	27	29	32	29	34	30	42	31
	70	28	30	33	31	35	32	43	33
	90	30	31	36	32	41	33	47	34
Cycle Time Harvest	50	4	2	4	2	4	2	4	2
	70	4	2	4	2	3	2	3	2
	90	4	2	4	2	3	2	3	2
Pressure High Side	50	202	232	232	233	262	234	292	235
	70	215	235	246	235	277	235	310	236
	90	226	237	257	239	288	241	320	243
Pressure Suction	50	33	38	35	38	48	39	53	39
	70	33	42	35	43	48	46	53	46
	90	33	47	35	48	49	49	53	50

NOTE: Total Cycle Time = Freeze + Harvest. Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KML-400M_E** Supply Voltage: 115/60/1

Total Amperage (Compressor RLA): MAE 13.25 A (11.5A), MWE: 11.5 A Ice Production per cycle: 6.6 Lbs, 360 pcs.

Water consumption for MWF condenser: 90/70 684 Gal/24 hr. 70/50 529 Gal/24Hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours	50	410	429	390	421	375	419	360	412
	70	360	419	340	406	325	395	310	389
	90	305	397	290	379	275	370	255	347
Cycle Time Freeze	50	22	20	23	20	24	21	26	21
	70	24	21	26	21	28	22	29	22
	90	29	22	32	23	34	24	39	25
Cycle Time Harvest	50	3.5	3	3	2.8	3	2.7	3	2.8
	70	3	2.7	2	2.3	2	2	2	2
	90	3	2.6	3	2.4	2	2	2	2
Pressure High Side	50	200	233	218	233	223	234	225	236
	70	223	234	254	234	280	235	285	236
	90	247	238	273	241	301	241	320	247
Pressure Suction	50	35	30	38	30	39	30	40	31
	70	39	30	45	30	50	30	51	30
	90	45	31	50	32	55	32	60	33

NOTE: Total Cycle Time = Freeze + Harvest. Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-500M_E** Supply Voltage: 115- 120/60/1

Total Amperage (Compressor RLA): MAE 13A (11A) MWE: 12A (11A) MRE: 15A (11A) Ice Production per cycle: 10.4 Lbs, 480 pcs.

Water Consumption for MWE Condenser: 90 / 70 674 Gal/24 hr: 70 / 50 440 Gal/24 hr.

Ambient Temp (F°)		70			80			90			100		
	Water Temp (F°)	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours	50	470	470	450	440	460	420	405	450	390	375	440	360
	70	435	445	435	400	435	405	370	420	380	340	405	360
	90	410	390	415	370	380	385	330	365	355	290	345	325
Cycle Time Freeze	50	30	29	30	34	29	34	36	30	36	38	32	38
	70	32	31	32	35	31	35	38	32	38	42	34	42
	90	33	35	33	37	37	37	42	42	42	48	40	48
Cycle Time Harvest	50	3.5	3	3.5	2	3	2	2	3	2	2	3	2
	70	2	2	2	2	2	2	2	2	2	2	2	2
	90	2	2	2	2	2	2	2	2	2	2	2	2
Pressure High Side	50	216	232	199	239	232	218	264	232	235	292	232	256
	70	219	232	199	249	233	222	270	235	238	302	235	262
	90	220	238	203	253	238	223	284	239	245	320	239	270
Pressure Suction	50	40	28	34	41	28	37	43	28	40	44	34	43
	70	41	43	37	43	43	38	44	43	40	46	46	43
	90	43	44	43	46	46	43	50	47	43	54	50	44

NOTE: Total Cycle Time = Freeze + Harvest. Pressure data is recorded 5 minutes into the freeze cycle

PERFORMANCE DATA

MODEL: **KM-630M_E**

Supply Voltage: 208-230/60/1 (3-wire with neutral)

Total Amperage (Compressor RLA): MAE 8A (6A) MWE: 6.5A (5A) MRE: 10A (6A)

Ice Production per cycle: 14.3Lbs, 720 pcs.

Water Consumption for MWE Condenser: 90 / 70 828 Gal/24 hr: 70 / 50 512 Gal/24 hr.

Ambient Temp (F°)		70			80			90			100		
	Water Temp (F°)	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours	50	630	615	500	575	610	560	520	600	510	460	580	460
	70	595	540	580	545	535	545	490	525	495	430	505	445
	90	570	510	540	525	500	500	470	490	455	410	470	410
Cycle Time Freeze	50	32	33	35	34	33	36	37	34	37	43	35	42
	70	33	36	36	36	36	38	40	37	41	45	37	45
	90	35	39	39	38	41	40	42	41	43	48	42	48
Cycle Time Harvest	50	3	4	4	3	4	3.5	2	4	3	2	4	2
	70	2.5	2.5	2.5	2	2.5	2	2	2.5	2	2	2.5	2
	90	2	2	2	2	2	2	2	2	2	2	2	2
Pressure High Side	50	210	235	206	242	236	220	267	237	239	304	237	273
	70	216	237	210	246	237	228	279	237	256	313	239	286
	90	225	245	212	257	247	235	289	247	289	327	249	291
Pressure Suction	50	40	41	43	43	43	44	44	44	45	47	41	45
	70	44	45	44	46	45	47	46	45	48	48	45	53
	90	48	51	48	51	53	50	53	53	51	54	54	54

NOTE: Total Cycle Time = Freeze + Harvest. Pressure data is recorded 5 minutes into the freeze cycle

PERFORMANCE DATA

MODEL: **KM-630MAE/50**

Supply Voltage: 220-240/50/1

Total Amperage (Compressor RLA): MAE 7A (6A) MWE: 6.5A (6A)

Ice Production per cycle: 14.3 Lbs, 720 pcs.

Water Consumption for MWE Condenser: 90 / 70 828 Gal/24 hr.:

70 / 50 512 Gal/24 hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours	50	564	544	527	540	473	529	421	507
	70	546	504	493	500	448	489	388	469
	90	531	476	485	465	429	454	365	436
Cycle Time Freeze	50	35	34	36	34	41	35	47	38
	70	36	38	37	39	44	40	51	42
	90	37	41	40	42	46	43	54	45
Cycle Time Harvest	50	3	4	3	4	2	4	2	3.5
	70	2	2.5	2	2.5	2	2.5	2	2.5
	90	2	2	2	2	2	2	2	2
Pressure High Side	50	210	235	242	236	267	237	304	237
	70	216	237	246	237	279	237	313	239
	90	225	245	257	247	289	247	327	249
Pressure Suction	50	40	41	43	43	44	44	47	44
	70	44	45	46	45	46	45	48	45
	90	48	51	51	53	53	53	54	54

NOTE: Total Cycle Time = Freeze + Harvest. Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-800M_E**

Supply Voltage: 208-230/60/1 (3-wire with neutral)

Total Amperage (Compressor RLA): MAE 12A (10A) MWE: 11A (10A) MRE: 14A (10A)

Ice Production per cycle: 14.3 Lbs, 720 pcs.

Water Consumption for MWE Condenser: 90 / 70 711 Gal/24 hr: 70 / 50 508 Gal/24 hr.

Ambient Temp (F°)		70			80			90			100		
	Water Temp (F°)	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours	50	826	861	860	776	833	842	769	822	807	721	820	723
	70	818	833	838	767	802	820	760	780	790	694	767	705
	90	798	813	811	750	787	794	736	767	765	650	745	683
Cycle Time Freeze	50	21	20	20	22.5	21	20.5	23.5	21.5	22	26	22	25.5
	70	22.5	22.5	22	24.5	23.5	22.5	24.5	24	23.5	28	24.5	27
	90	24	23.5	23.5	25.5	24.5	24	26	25	25	30	26	28
Cycle Time Harvest	50	4	4	4	4	4	4	3.5	3.5	3.5	2.5	3	3
	70	3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2	2.5	2
	90	2	2	2	2	2	2	2	2	2	2	2	2
Pressure High Side	50	172	235	199	203	235	199	229	235	213	270	235	249
	70	185	235	201	211	235	202	236	235	213	279	235	256
	90	192	245	202	220	245	206	242	245	216	290	248	259
Pressure Suction	50	24	24	24	28	24	24	31	24	26	34	24	28
	70	28	24	26	31	24	26	34	24	26	38	24	31
	90	31	34	28	36	34	31	37	34	31	44	34	36

NOTE: Total Cycle Time = Freeze + Harvest. Pressure data is recorded 5 minutes into the freeze cycle

PERFORMANCE DATA

MODEL: **KM-1200M_E** Supply Voltage: 208-230/60/1 (3-wire with neutral)

Total Amperage (Compressor RLA): MAE 15A (11.5A) MWE: 12A (10.5A) MRE: 14A (11A) Ice Production per cycle: 28.6 Lbs, 1440 pcs.

Water Consumption for MWE Condenser: 70 / 50 678.4 Gal/24 hr: 90 / 70 1017 Gal/24 hr.

Ambient Temp (F°)		70			80			90			100		
	Water Temp (F°)	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours	50	1200	1224	1193	1182	1188	1146	1127	1179	1129	1052	1168	1065
	70	1190	1177	1191	1173	1142	1144	1080	1125	1125	1036	1120	1041
	90	1152	1078	1116	1113	1065	1100	1052	1049	1045	937	1043	977
Cycle Time Freeze	50	30	31.5	31.5	33	33	32.5	35	33	33	38	34	36.5
	70	31	33.5	32	34	35	34	36.5	35	34	39.5	35	37.5
	90	32.5	36.5	36	36	38	34	38.5	38	37	43	38	40
Cycle Time Harvest	50	3.5	3.5	5	3	3.5	5	3	3.5	4.5	2.5	3.5	4
	70	2.5	2.5	3	2	2.5	3	2	2.5	3	2	2.5	2.5
	90	2	2	2.5	2	2	2.5	2	2	2.5	2	2	2
Pressure High Side	50	228	256	228	249	256	228	277	263	242	320	263	270
	70	235	256	228	263	263	235	299	270	249	327	270	277
	90	242	263	228	270	263	235	299	270	258	341	270	284
Pressure Suction	50	44	60	53	60	63	53	65	63	55	80	64	63
	70	46	61	54	61	65	57	73	65	60	80	67	64
	90	54	64	57	65	67	60	73	67	64	81	67	68

NOTE: Total Cycle Time = Freeze + Harvest. Pressure data is recorded 5 minutes into the freeze cycle

PERFORMANCE DATA

MODEL: **KM-1200S_E**

Supply Voltage: 208-230/60/1 (3-wire with neutral)

Total Amperage (Compressor RLA): SAE 15A (11A) SWE: 12A (10.5A) SRE: 16A (11A)

Ice Production per cycle: 30.9 Lbs, 1440 pcs.

Water Consumption for MWE Condenser: 90 / 70 1155 Gal/24 hr: 70 / 50 740 Gal/24 hr.

Ambient Temp (F°)		70			80			90			100		
	Water Temp (F°)	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours	50	1245	1200	1240	1150	1150	1210	1100	1120	1190	1060	1110	1140
	70	1210	1150	1210	1145	1120	1160	1090	1130	1130	1050	1080	1160
	90	1190	1125	1100	1110	1110	1050	1040	1070	1010	990	950	950
Cycle Time Freeze	50	33	32	32	37	32	34	40	32	34	42	34	36
	70	36	35	33	39	35	36	41	35	36	43	35	39
	90	37	35	36	40	37	38	43	37	39	44	38	41
Cycle Time Harvest	50	4.5	4.5	4.5	4	4	4	3	4	4	2.5	3	3.5
	70	2.5	3	2.5	2.5	3	2.5	2.5	2.5	2	2	2.5	2
	90	2	2.2	2.5	2	2	2.5	2	2	2	2	2	2
Pressure High Side	50	205	235	199	240	235	222	263	235	237	298	235	270
	70	213	235	203	248	235	225	270	236	245	306	236	292
	90	220	243	199	256	245	228	284	249	256	313	249	294
Pressure Suction	50	36	53	50	38	53	50	38	53	50	41	53	53
	70	36	53	50	38	53	50	43	53	50	43	53	55
	90	37	57	50	38	57	51	47	57	54	47	57	58

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle

PERFORMANCE DATA

MODEL: **KM 1200S_E50** Supply Voltage: 220 - 240 / 50 / 1

Total Amperage (Compressor RLA, see unit name plate): SAE 13A, SWE 12A, SRE 13A Ice Production per cycle: 30.9 Lbs, 1440 pcs.

Water Consumption for SWE 50 Condenser: 90 / 70 1144 Gal/24 hr: 70 / 50 697 Gal/24 hr.

Ambient Temp (F°)		70			80			90			100		
	Water Temp (F°)	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours	50	1185	1150	1205	1060	1125	1140	990	1110	1100	955	1100	1050
	70	1145	1110	1175	1060	1105	1090	980	1085	1030	940	1070	975
	90	1125	1080	1070	1030	1070	985	935	1060	930	895	1050	875
Cycle Time Freeze	50	33	37.5	40	36.5	38	42	40	38	42	42	40	44
	70	35.5	41.5	40	38.5	41.5	43.5	40.5	41.5	43.5	42.5	41.5	46
	90	37	42	44	41.5	44.5	46	44	44.5	48	45.4	45.5	50
Cycle Time Harvest	50	4.5	5.5	4	4.5	5	4	3	5	3.5	2.5	4	3.5
	70	2.5	3	3	2.5	3	3	2.5	2.5	2.5	2	2.5	2.5
	90	2	2.5	2.5	2	2	2.5	2	2	2	2	2	2
Pressure High Side	50	213	223	206	248	223	218	272	223	225	308	223	242
	70	213	223	209	248	223	220	270	228	235	306	228	260
	90	220	232	206	256	233	223	284	237	245	313	237	263
Pressure Suction	50	43	53	41	46	53	41	46	53	41	50	53	43
	70	38	53	41	42	53	43	46	53	43	46	53	47
	90	40	54	41	42	54	43	47	54	46	47	54	50

NOTES: Total cycle time = Freeze + Harvest Pressure data is recorded 5 minutes into freeze cycle

PERFORMANCE DATA

MODEL: **KM-1600MRE**
Total Amperage (Compressor RLA): 20A (17A)

Supply Voltage: 208-230/60 / 1 (3 wire with neutral)
Ice Production per cycle: 28.6 Lbs, 1440 pcs.

Ambient Temp (F°)		70	80	90	100
	Water Temp (F°)	Remote	Remote	Remote	Remote
Production 24 hours	50	1590	1540	1470	1380
	70	1570	1515	1430	1350
	90	1470	1405	1325	1220
Cycle Time Freeze	50	23	24	25	27
	70	25	26	28	30
	90	27	30	31	34
Cycle Time Harvest	50	5	5	4.5	4
	70	3	3	3	2.5
	90	2.5	2.5	2.5	2
Pressure High Side	50	200	229	243	283
	70	203	231	246	286
	90	204	233	249	290
Pressure Suction	50	36	37	37	39
	70	36	37	39	39
	90	37	39	39	43

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-1600MRE3**

Supply Voltage: 208-230/60/3

Total Amperage (Compressor RLA): 13.5A (10A)

Ice Production per cycle: 28.6 Lbs, 1440 pcs.

Ambient Temp (F°)		70	80	90	100
	Water Temp (F°)	Remote	Remote	Remote	Remote
Production 24 hours	50	1560	1510	1440	1350
	70	1540	1485	1400	1320
	90	1440	1375	1295	1190
Cycle Time Freeze	50	23	24	25	27
	70	25	26	28	30
	90	27	30	31	34
Cycle Time Harvest	50	5	5	4.5	4
	70	3	3	3	2.5
	90	2.5	2.5	2.5	2
Pressure High Side	50	200	229	243	283
	70	203	231	246	286
	90	204	233	249	290
Pressure Suction	50	36	37	37	39
	70	36	37	39	39
	90	37	39	39	43

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-1600S_E** Supply Voltage: 208-230-60 / 1 (3 wire with neutral)

Total Amperage (Compressor RLA): SWE: 18A (16A), SRE: 21A (16A) Ice Production per cycle: 30.9 Lbs, 1440 pcs.

Water Consumption for SWE Condenser: 90 / 70 1442 Gal/24 hr: 70 / 50 889 Gal/24 hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Water	Remote	Water	Remote	Water	Remote	Water	Remote
Production 24 hours	50	1520	1540	1510	1500	1500	1440	1480	1340
	70	1465	1500	1455	1430	1445	1360	1425	1240
	90	1295	1350	1285	1300	1275	1230	1255	1100
Cycle Time Freeze	50	23	23	24	24	24.5	26	25	28
	70	27	26	27.5	27	27.5	28.5	28	32
	90	31	29	31.5	30	31.5	32	32	36
Cycle Time Harvest	50	5.5	5	5	5	5	4	5	4
	70	3	3	3	3	3	3	3	3
	90	3	3	3	3	3	3	3	3
Pressure High Side	50	235	199	235	216	235	239	235	277
	70	235	199	235	220	236	242	236	282
	90	249	199	250	225	252	245	253	284
Pressure Suction	50	36	33	36	33	36	34	36	37
	70	36	33	36	33	37	36	37	38
	90	37	34	38	34	38	37	40	41

NOTE: Total Cycle Time = Freeze + Harvest. Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-1600S_E3**

Supply Voltage: 208-230-60 / 3

Total Amperage (Compressor RLA): SWE3 11A (9.5A), SRE3: 15A (10A)

Ice Production per cycle: 30.9 Lbs, 1440 pcs.

Water Consumption for SWE3 Condenser: 90 / 70 1442 Gal/24 hr: 70 / 50 889 Gal/24 hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Water	Remote	Water	Remote	Water	Remote	Water	Remote
Production 24 hours	50	1520	1540	1510	1500	1500	1440	1480	1340
	70	1465	1500	1455	1440	1445	1360	1425	1240
	90	1295	1350	1285	1300	1275	1230	1255	1100
Cycle Time Freeze	50	23	23	24	24	24.5	26	25	28
	70	27	26	27.5	27	27.5	28.5	28	32
	90	31	29	31.5	30	31.5	32	32	36
Cycle Time Harvest	50	5.5	5	5	5	5	4	5	4
	70	3	3	3	3	3	3	3	3
	90	3	3	3	3	3	3	3	3
Pressure High Side	50	235	199	235	216	235	239	235	277
	70	235	199	235	220	236	242	236	282
	90	249	199	250	225	252	245	253	284
Pressure Suction	50	36	33	36	33	36	34	36	37
	70	36	33	36	33	37	36	37	38
	90	37	34	38	34	38	37	40	41

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-2000S E3**

Supply Voltage: 208-230-60 / 3

Total Amperage (Compressor RLA): SWE3 11A (8.8A), SRE3: 16 (11.1A)

Ice Production per cycle: 46.3 Lbs, 2160 pcs.

Water Consumption for SWE3 Condenser: 90 / 70 1893 Gal/24 hr: 70 / 50 1128 Gal/24 hr.

Ambient Temp (F°)		70 21°c		80 27°c		90 30°c		100 38°c	
	Water Temp (F°)	Water	Remote	Water	Remote	Water	Remote	Water	Remote
Production 24 hours	50	2026	1905	1990	1860	1970	1820	1940	1760
	70	1970	1900	1960	1905	1952	1733	1940	1650
	90	1810	1820	1780	1750	1740	1600	1710	1500
Cycle Time Freeze	50	28	32	28.5	32.5	28.5	33	29	35
	70	29.5	32.5	29.5	33	30	35.5	30.5	36.5
	90	33.5	33	34	34	35	36.5	35.5	39
Cycle Time Harvest	50	5	5.5	5	5.5	5	5.5	4.5	5.5
	70	3.5	3.5	3.5	3.5	3.5	3.5	3	3.5
	90	2.5	3.5	2.5	3.5	2.5	3.5	2.5	3.5
Pressure High Side	50	231	200	231	219	231	221	231	279
	70	231	200	231	221	233	250	233	281
	90	249	200	250	227	250	256	251	286
Pressure Suction	50	39	37	39	37	39	39	43	40
	70	40	39	41	39	41	39	43	41
	90	43	39	46	40	46	41	47	46

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-2400SRB3 R-22**

Supply Voltage: 208-230/60/3

Total Amperage (Compressor RLA): 17A(15 A)

Ice Production per cycle: 46.3 Lbs, 2160 pcs.

Ambient Temp (F°)		70	80	90	100
	Water Temp (F°)	Remote	Remote	Remote	Remote
Production 24 hours	50	2330	2200	2140	2070
	70	2400	2260	2200	2110
	90	2230	2160	2070	1980
Cycle Time Freeze	50	24	24	26	27
	70	24	25	26	27.5
	90	25	26	27.5	29
Cycle Time Harvest	50	4	6	5	5
	70	3	3.5	3.5	3
	90	3	3	3	3
Pressure High Side	50	161	187	209	223
	70	166	189	213	227
	90	173	196	229	256
Pressure Suction	50	28	30	31	36
	70	30	31	33	38
	90	36	37	38	40

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

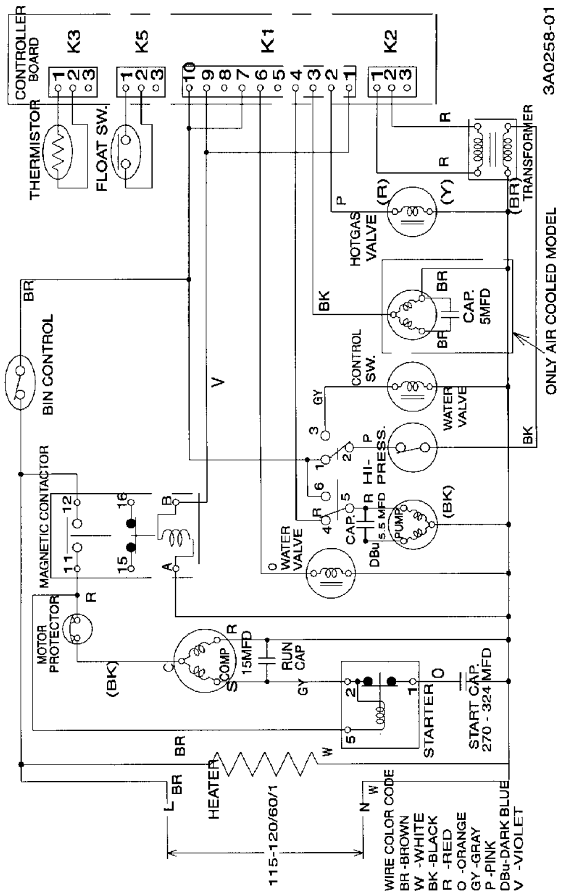
KM Wiring Diagram Reference Chart

Model Number	Wiring Diagram	Page	Start Capacitor	Run Capacitor	Pump Capacitor	Fan Capacitor
KML-200 MAE, MWE	D	83	270-324 MFD	15 MFD	NONE	5 MFD
KM-250 BAE, BWE	A	80	270-324 MFD	15 MFD	5.5 MFD	5 MFD
KM-250 MAE, MWE	B	81	270-324 MFD	15 MFD	5.5 MFD	5 MFD
KM-280 MAE, MWE	C	82	"	"	"	"
KML-400 MAE,MWE	D	83	88-108 MFD	25 MFD	None	5 MFD
KM-500 MAE, MWE, MRE	B	81	88-108 MFD	25 MFD	5.5 MFD	6
KM-630 MAE, MWE	E	84	88-130 MFD	"	"	5
KM-630 MRE	G	86	"	"	"	—
KM-630 MAE 50, MWE 50	F	85	88-108 MFD	"	5.0 MFD	2.5
KM-800 MAE, MWE	E	84	145-174 MFD	35	5.5 MFD	5
KM-800 MRE	G	86	"	"	"	—
KM-1200 MAE, MWE	H	87	"	"	5,0 MFD	5
KM-1200 MRE	G	86	"	"	"	—
KM-1200 SAE, SWE	H	87	"	"	10MFD	5
KM-1200 SRE	G	86	"	"	"	—

KM Wiring Diagram Reference Chart

Model Number	Wiring Diagram	Page	Start Capacitor	Run Capacitor	Pump Capacitor	Fan Capacitor
KM-1200 SAE 50, SWE 50	I	88	147-174MFD	40	15	5
KM-1200 SRE 50	J	89	"	"	"	10
KM-1600 MRE	M	92	135-155 MFD	40	10MFD	10MFD
KM-1600 MRE3	N	93	"	"	"	"
KM-1600 SWE	K	90	"	"	"	"
KM-1600 SWE 3	L	91	--	--	"	--
KM-1600 SRE	M	92	135-155MFD	40	"	10MFD
KM-1600 SRE 3	N	93	--	--	"	"
KM-2000 SRE 3, SWE3	O	94	--	--	"	"
KM-2400 SRB 3	P	95	--	--	15MFD	15MFD
URC-6E (KM 500 / 630)						10MFD
URC-12E (KM 800 / 1200)						10MFD
URC-20E (KM 1600 / 2000)						10MFD
URC-24B (KM 2400)						10MFD

A
KM-250 B_E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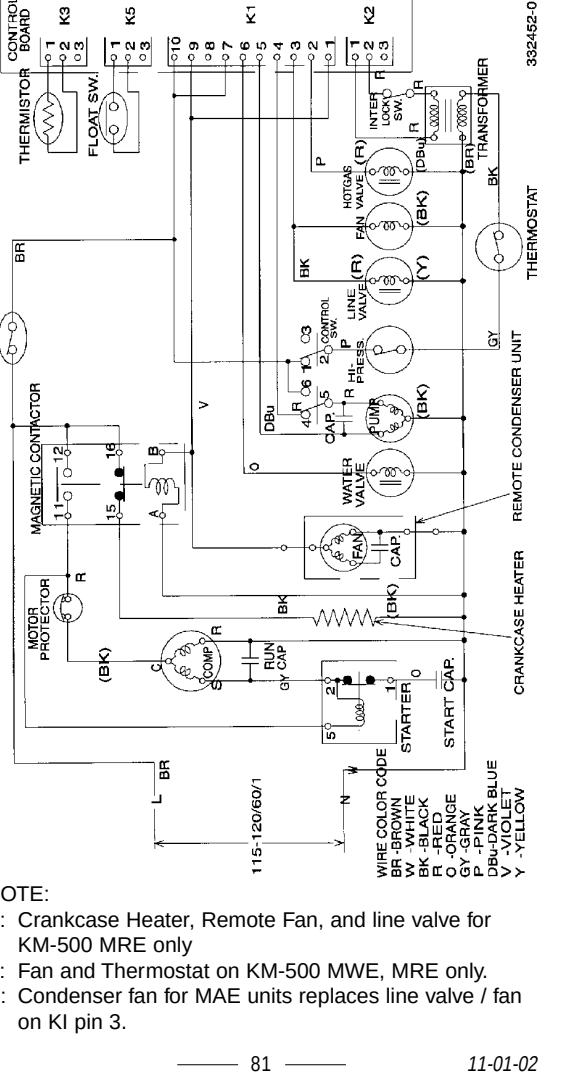
K3
K5
K1
K2
THERMISTOR
FLOAT SW.
TRANSFORMER
HOTGAS VALVE
CAP. 5MFD
ONLY AIR COOLED MODEL
CONTROL SW.
WATER VALVE
HI-PRESS.
BIN CONTROL
MAGNETIC CONTACTOR
CAP. 5.5 MFD
PUMP
WATER VALVE
MOTOR PROTECTOR
COMP
15MFD
RUN CAP
STARTER
START CAP. 270 - 324 MFD
HEATER
115-120/60/1
3A0258-01
WIRE COLOR CODE
BR -BROWN
W -WHITE
BK -BLACK
R -RED
O -ORANGE
GY -GRAY
P -PINK
DBu-DARK BLUE
V -VIOLET

B
KM-250 M_E
KM-500 M_E



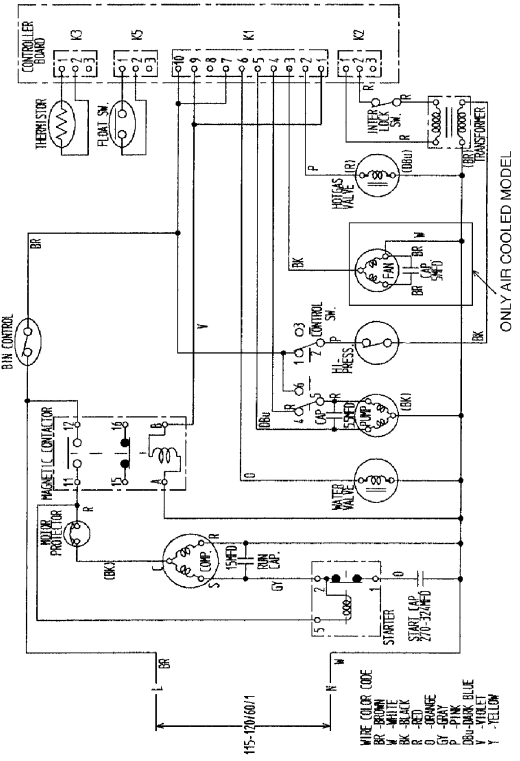
NOTE:

A: Crankcase Heater, Remote Fan, and line valve for KM-500 MRE only

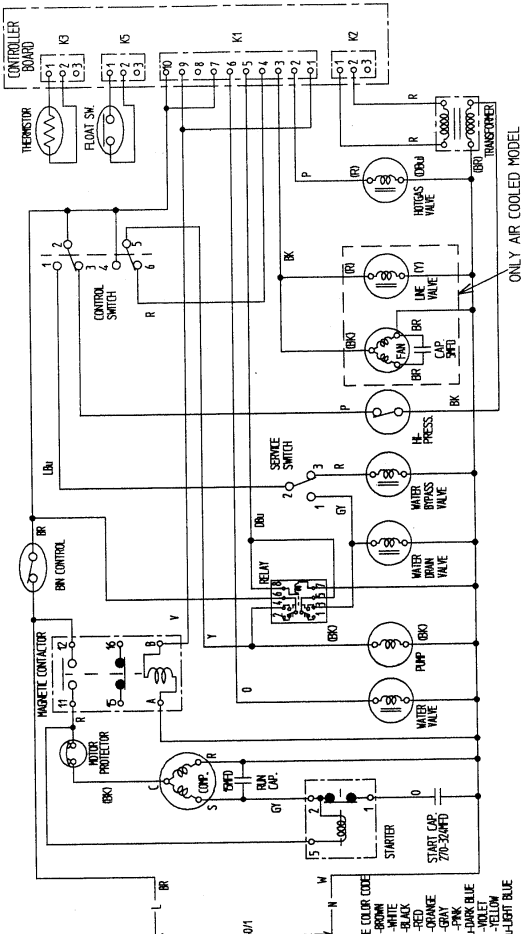
B: Fan and Thermostat on KM-500 MWE, MRE only.

C: Condenser fan for MAE units replaces line valve / fan on KI pin 3.

C
KM-280 M_E


CONTROLLER BOARD
K3
K5
K1
K2
THERMISTOR
FLOAT SW.
INTER-LOCK SW.
TRANSFORMER
HOT GAS VALVE
FAN
FAN MOTOR (CAP-SAVER)
ONLY AIR COOLED MODEL
BIN CONTROL
MAGNETIC CONTACTOR
HI-PRESS.
CONTROL SW.
COMP. CAP. (ESTER)
WATER VALVE
MOTOR PROTECTOR
COMP.
RUN CAP.
STARTER
START CAP. 276-324MFD
115-170V/60/1
WIRE COLOR CODE
BR -BROWN
W -WHITE
BK -BLACK
R -RED
O -ORANGE
GY -GRAY
P -PINK
DBu -DARK BLUE
V -VIOLET
Y -YELLOW

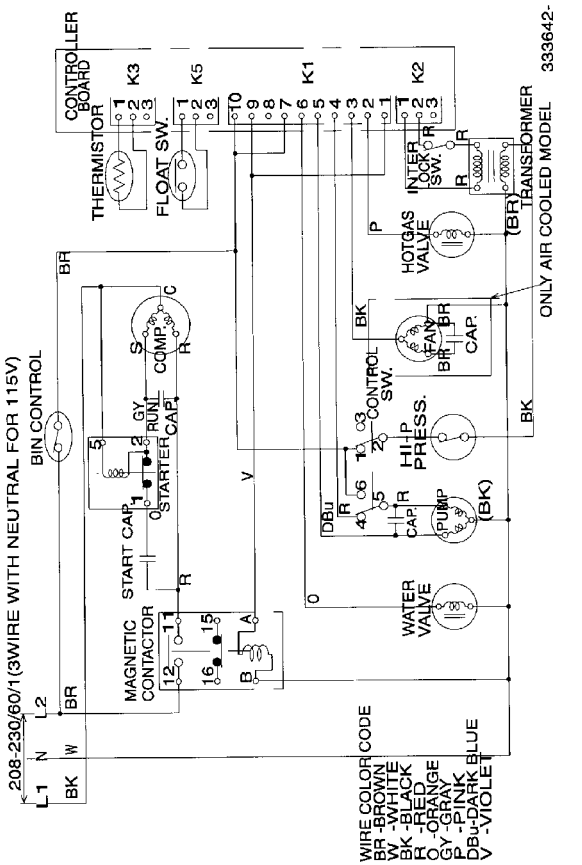
D
KML-200 MAE, MWE
KML-400 MAE, MWE



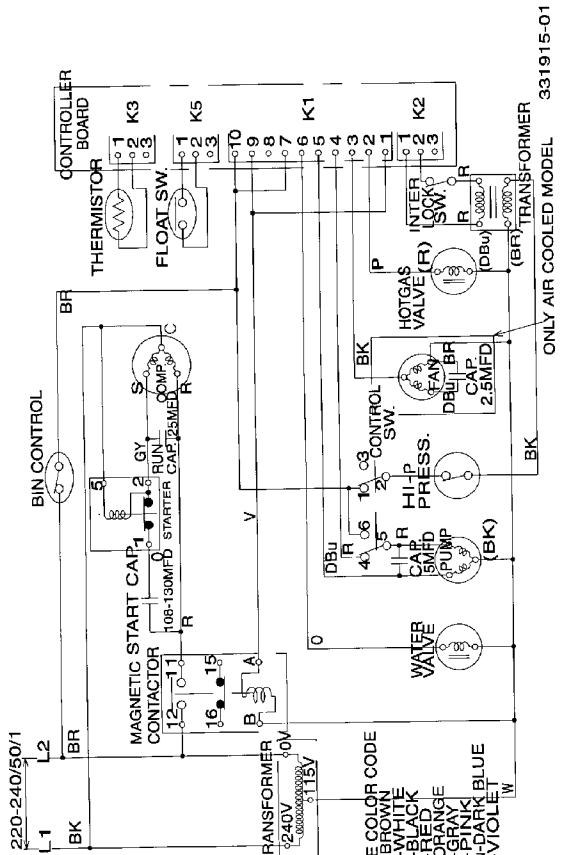
E

KM-630 MAE, MWE

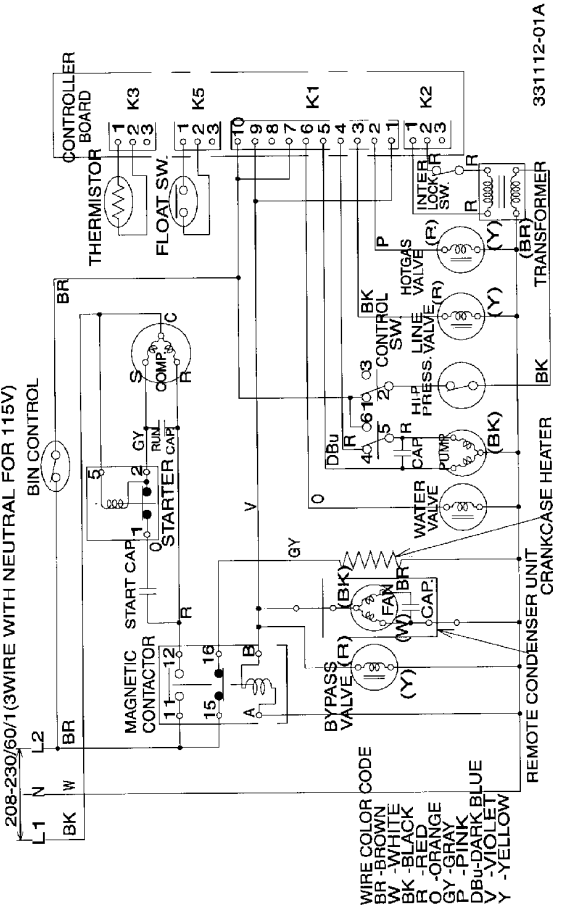
KM-800 MAE, MWE



F
KM-630 MAE 50, MWE 50

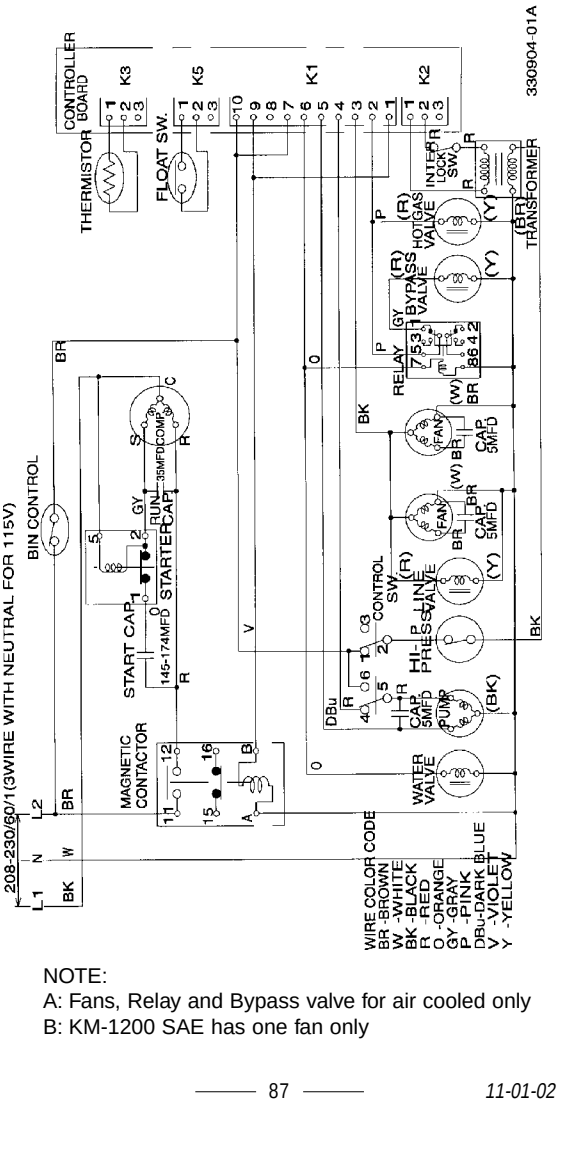


G
KM-630 MRE
KM-800 MRE
KM-1200 MRE, SRE



NOTE:
Bypass valve for KM-1200 remotes only

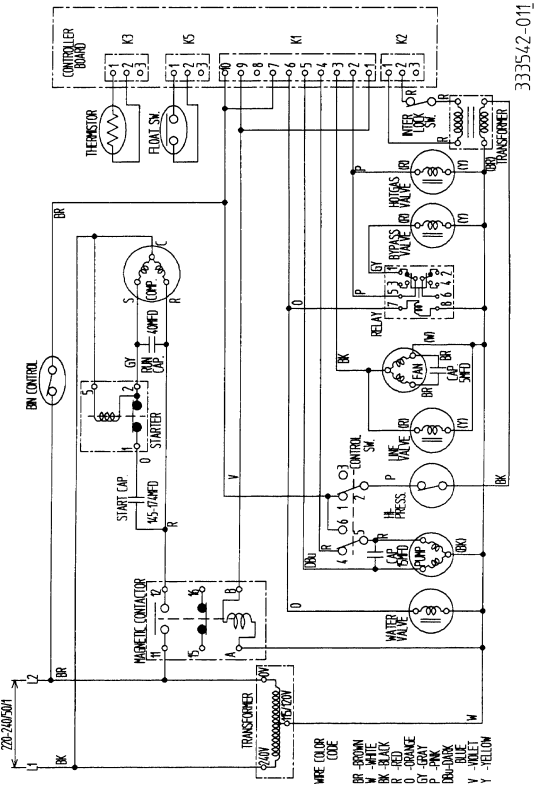
H
KM-1200 MAE, MWE
KM-1200 SAE, SWE



NOTE:
A: Fans, Relay and Bypass valve for air cooled only
B: KM-1200 SAE has one fan only

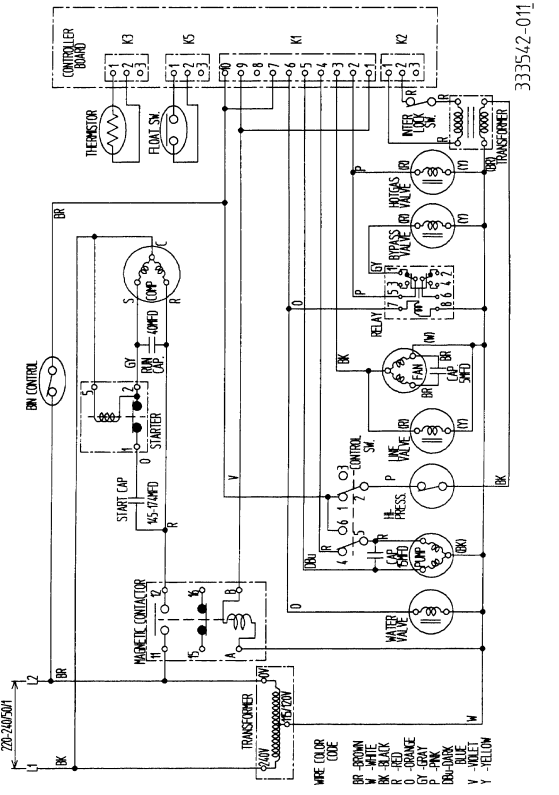
I

KM-1200 SAE 50
KM-1200 SWE 50

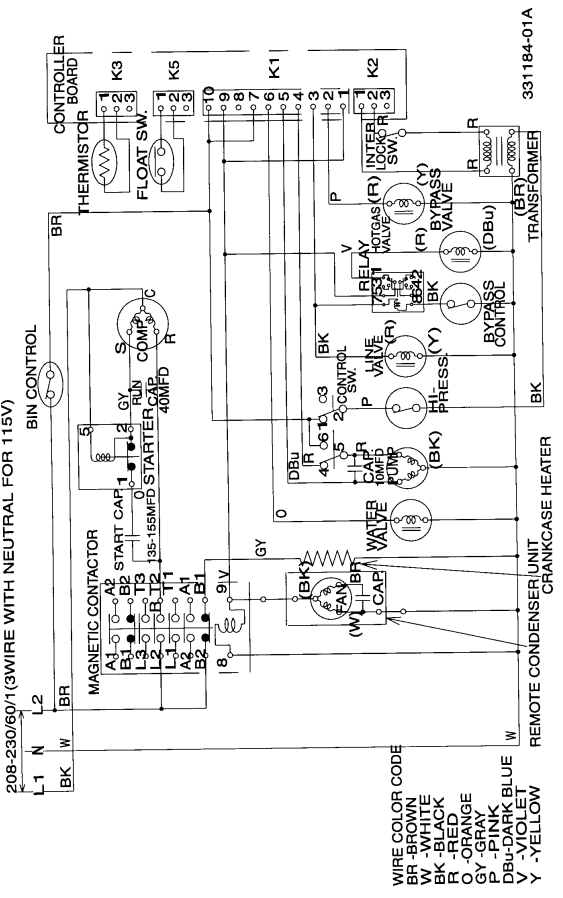


J

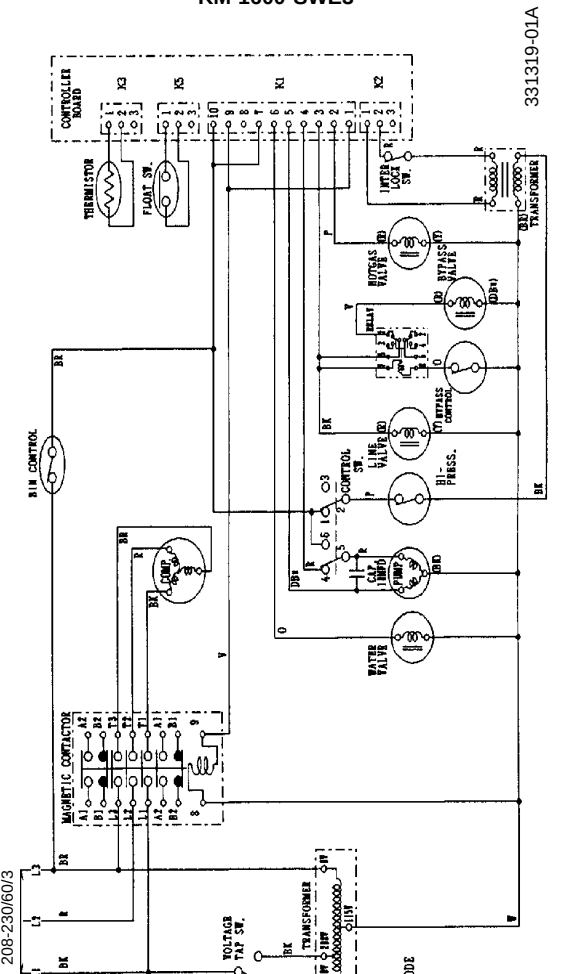
KM-1200 SRE 50



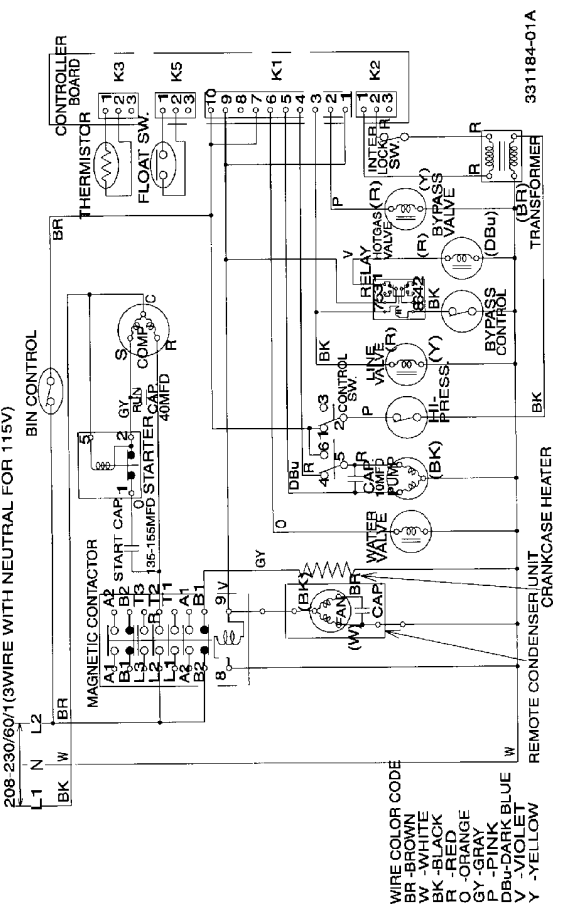
KM-1600 SWE


208-230/60/1(3WIRE WITH NEUTRAL FOR 115V)
L1 N L2
BIN CONTROL
BK W BR
CONTROLLER BOARD
THERMISTOR
FLOAT SW.
K3
K5
K1
K2
MAGNETIC CONTACTOR
START CAP
135-155MFD
STARTER
RUN CAP 40MFD
COMP
FAN
WATER VALVE
CAP 10MFD
PUMP
CONTROL SW.
HI PRESS
HOTGAS VALVE
RELAY
BYPASS VALVE
BYPASS CONTROL
INTER-LOCK SW.
TRANSFORMER
REMOTE CONDENSER UNIT
CRANKCASE HEATER
331184-01A
WIRE COLOR CODE
BR -BROWN
W -WHITE
BK -BLACK
R -RED
O -ORANGE
GY -GRAY
P -PINK
DBu-DARK BLUE
V -VIOLET
Y -YELLOW

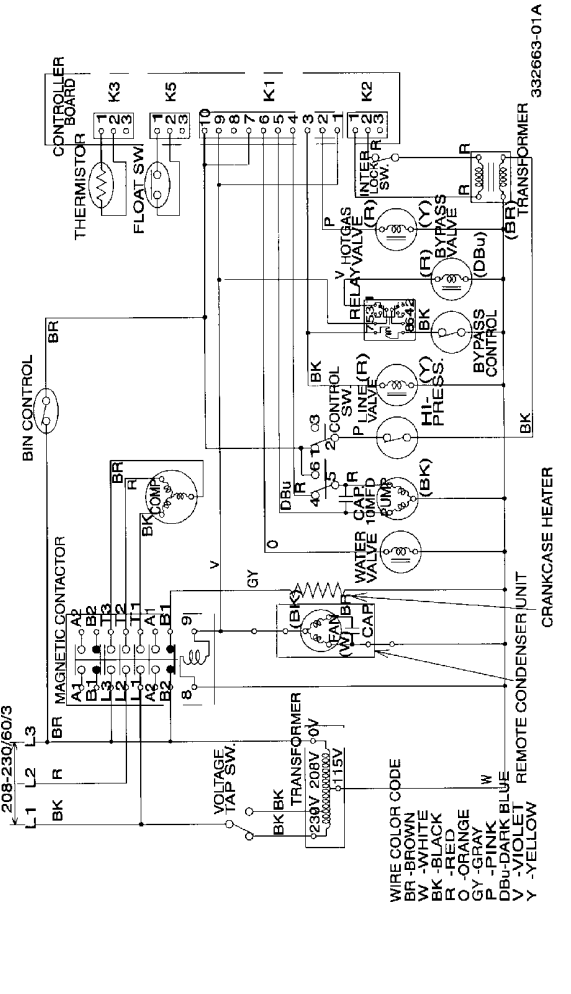
KM-1600 SWE3


331319-01A
CONTROLLER BOARD
X3
X5
X1
X2
THERMISTOR
FLOAT SW.
WATER LOCK SW.
TRANSFORMER
HOTGAS VALVE
BYPASS VALVE
RELAY
BYPASS CONTROL
BIN CONTROL
CONTROL SW.
LINE VALVE
HI-PRESS.
CAP. TUBE
PUMP
WATER VALVE
MAGNETIC CONTACTOR
208-230/60/3
VOLTAGE TAP SW.
TRANSFORMER
WIRE COLOR CODE
BR -BROWN
W -WHITE
BK -BLACK
R -RED
O -ORANGE
GY -GRAY
P -PINK
DBu -DARLBLUE
V -VIOLET
Y -YELLOW
WIRE COLOR CODE

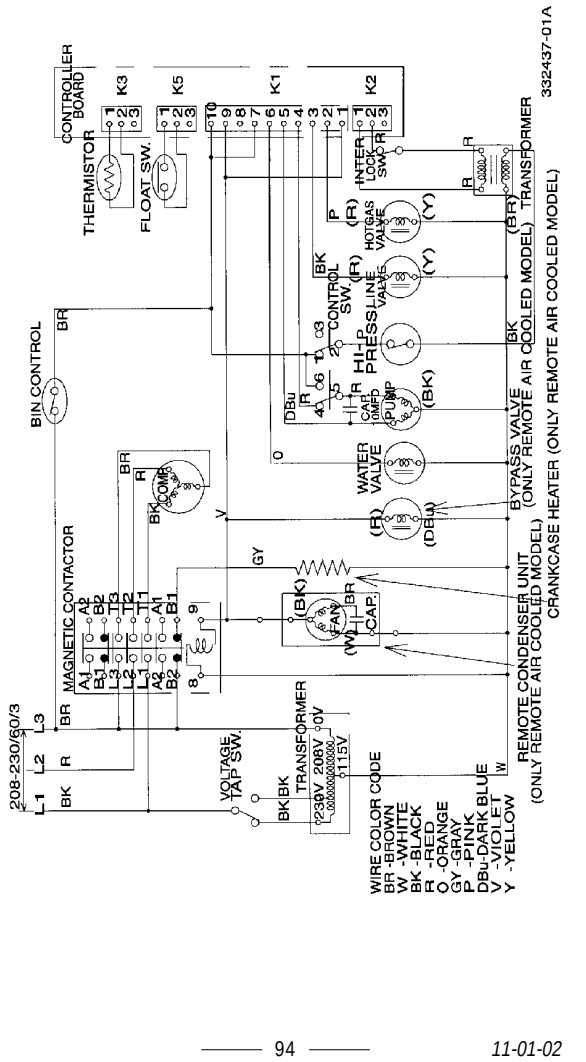
M
KM-1600 MRE, SRE

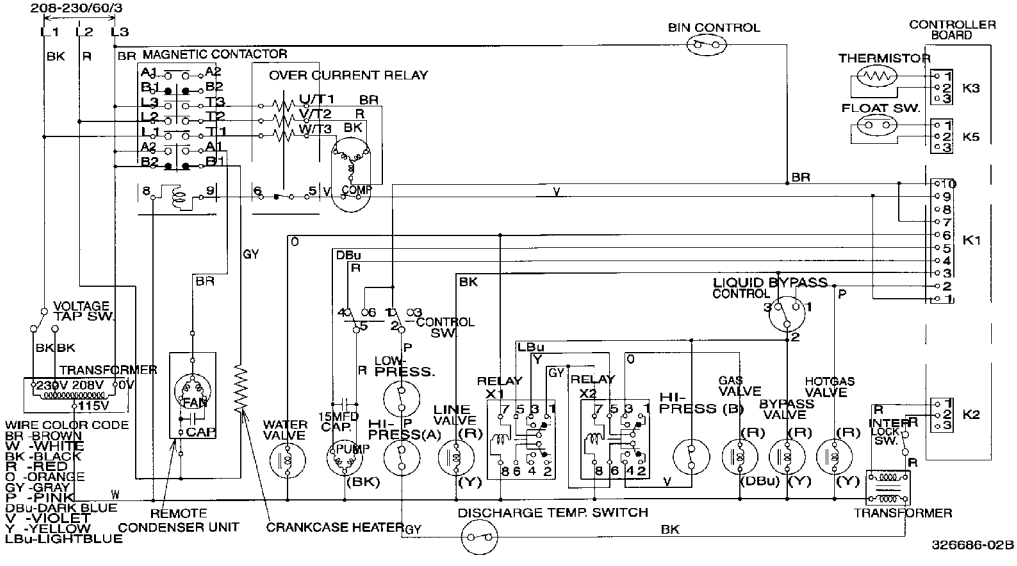


N
KM-1600 MRE3, SRE3



O
KM-2000 SRE3
KM-2000 SWE3




208-230/60/3
L1
L2
L3
BK
R
BR
MAGNETIC CONTACTOR
OVER CURRENT RELAY
A1
A2
B1
B2
L1
L2
L3
T1
T2
T3
U/T1
V/T2
W/T3
BR
R
BK
COMP
8
9
6
5
V
GY
O
DBu
R
BK
Y
BR
CONTROLLER BOARD
THERMISTOR
FLOAT SW.
K3
K5
K1
K2
LIQUID BYPASS CONTROL
P
CONTROL SW.
LBu
LOW PRESS.
RELAY X1
RELAY X2
HI-PRESS
GAS VALVE
HOTGAS VALVE
BYPASS VALVE
INTER LOCK SW.
VOLTAGE TAP SW.
BK BK
TRANSFORMER
230V 208V
0V
115V
FAN
CAP
15MFD CAP.
PUMP
WATER VALVE
LINE VOLTAGE
(BK)
(Y)
(R)
(DBu)
(Y)
(Y)
(R)
(R)
(R)
(R)
WIRE COLOR CODE
BR -BROWN
W -WHITE
BK -BLACK
R -RED
O -ORANGE
GY -GRAY
P -PINK
DBu-DARK BLUE
V -VIOLET
Y -YELLOW
LBu-LIGHTBLUE
REMOTE CONDENSER UNIT
CRANKCASE HEATER
DISCHARGE TEMP. SWITCH
TRANSFORMER
326686-02B

FLAKER/DCM

INSTALLATION - GENERAL

Three things are critical for a proper F/DCM installation:

1. The water temperature should fall within the 45° F to 90° F range.

   Colder water can cause excess stress on the auger gear motor which may activate the gear motor overload.

2. A filter system is very important in poor water quality areas as high mineral content can cause premature bearing wear.

3. The unit should be level, front to back, side to side to assure proper evaporator water level and maximum production.

CUBELET MODELS

The DCM product produces Cubelet ice. Certain flaker models can also be converted to produce cubelet ice. This requires changing the extruding head and cutter at the top of the evaporator assembly. The F-650M, F-1000M, and F-2000M models are produced as cubelet models and are designated by a - **C** at the end of the model number.

Converting a flaker to a cubelet maker reduces the overall production by around 8 %. The flaker gear motor is sized to handle the extra load of producing cubelet ice with only a slight increase in the running amperage. The evaporator outlet temperature and operating pressures will be similar to the standard flaker model. Use the temperature and pressure information provided on the standard flaker performance data provided as a bench mark when diagnosing a converted cubelet (- C) unit.

COMPONENT TECHNICAL DATA

GEAR MOTOR SAFETIES

The auger gear motor circuit includes two overload safeties. The primary safety is a manual reset, current type protector located in the control box. This is a time delay protector which operates at .9 amp over the normal gear motor amp draw. The secondary safety is a thermal protector which is incorporated into the gear motor windings.

AUGER BEARINGS -

Bearing Type: Sleeve/Alignment
Bearing Material: Poly/Carbon

The bearings are pressed into the top extruding head and lower brass housing. A repress program is available through the local Hoshizaki Distributor.

BEARING INSPECTIONS

Annual bearing inspections are recommended. More frequent inspections may be necessary in poor water quality areas.
The steps for bearing inspections are as follows:
(1) Gain access to the ice chute head by removing the top panel and spout connectors as necessary.
(2) Remove the thumbnuts which hold the ice chute head in place and lift it up and off of the evaporator (take care to place the O-ring in a safe location until you replace the head.)
(3) Remove the stainless steel bolt holding the cutter or breaker in place and lift off to access the extruding head and auger shaft.
(4) Replace the bolt into the auger shaft and use it to push the auger back and forth from left to right to check for excessive movement.
(5) Pull the auger towards you and try to insert a .02" round stock or pin gauge in between the back side of the auger shaft and bearing surface. Check several locations around the auger shaft. If the gauge will go in between the shaft and bearing, it is time to install new bearings. Both top and bottom bearings should be replaced if the top bearing is worn. If there is no excessive movement in the auger shaft and the gauge does not fit, the bearings are okay. Replace the cutter, O-ring, ice chute head and connectors.

AUGER INSPECTION / BEARING REPLACEMENT

A visual inspection of the auger bearing shaft surface is also recommended annually in poor water areas. The steps for this inspection is as follows:

Note: Clean the evaporator prior to removing the auger. This will loosen scale around the extruding head and allow for easier removal.

(1) Follow steps 1 through 5 of the bearing inspection procedure above.

(2) Remove the (metric) Allen head cap screws that secure the extruding head in place.

(3) Thoroughly drain the water supply system.

4) Turn the cutter up-side down, replace the bolt and use the cutter to lift the auger out of the evaporator. If heavy scale is present the auger may be difficult to remove. In this case, you will find it helpful to clean the evaporator system following the instructions located on the Inside front panel, before you attempt to remove the auger.

Older DCM units have a key welded on the inside of the evaporator cylinder. The auger has a key slot cut into the spiral flite. This keyway slot must align with the evaporator key before you can lift out the auger. Before attempting to remove the auger, remove the extruding head and look inside the cylinder to align the slot and key while turning the auger.

(5) With the auger removed, remove the cutter and slide the extruding head from the top of the auger. Visually inspect the bearing surface at the top and bottom of the auger. Also inspect the auger flight and mechanical seal for any damage. The extruding head contains the top bearing, the bottom bearing is pressed into the brass housing at the bottom of the evaporator. To remove the housing:

(6) Remove the Allen screws that secure the evaporator to the housing.

(7) Loosen the belly band screw and lift the evaporator up

and off of the housing. Holding the evaporator up, re-tighten the belly band. This will hold the evaporator up so that you can remove the housing.

(8) Remove the bolts that secure the housing to the gear motor assembly and remove the brass housing. The mechanical seal ceramic disk and boot are pressed into the top of the housing. Remove these parts before you exchange the bearings. The extruding head and brass housing will be exchanged for a repressed set at your local distributor. When you replace the new parts, reverse the order above. Use a light coat of food grade lubricant around the bottom of the evaporator and on the o-ring portion of the housing to the seal o-ring and help keep it in place as you lower the evaporator. Inspect the mechanical seal thoroughly and reuse it, if it is in good shape.

Flaker Safety's

Mechanical failures in an auger style ice machine can be time consuming and expensive repairs. Hoshizaki has incorporated several safety's in our Flaker and DCM units which add protection against this type of failure.

The following safety's are included in all Hoshizaki F and DCM units:

1. Low water safety: Designed to protect against dry operation or possible freeze up in the evaporator due to low water flow. This safety utilizes the dual float switch and a 90 second timer to shut down the unit when water flow is interrupted. The unit will automatically restart when water flow is resumed.

2. Protect relay safety: This safety incorporates a relay in the gear motor circuit and will not allow the refrigeration system to operate unless the gear motor is running. If the gear motor fails during normal operation, the protect relay shuts down the compressor to protect against evaporator freeze-up.

3. Gear motor circuit safety's: The gear motor has 2 additional safety's which will operate if the gear motor is subjected to excessive load or improper voltage. A current type manual reset safety or slow blow fuse is located in the control box and will trip when the gear motor amperage
exceeds normal amp draw. This acts as a primary safety for the gear motor. A secondary internal thermal overload

is included in the motor windings. Both will work in conjunction with the protect relay to shut the unit down.

4. Voltage protect relay: This relay will shut the unit off in case of a voltage surge and automatically restart the unit when the voltage is correct.

5. High pressure switch: All Hoshizaki ice machines include an automatic reset high pressure safety switch to shut down the unit in case of high head pressures.

6. Fuse protection: A lamp buss-type fuse is utilized in the control circuit. Smaller units like the DCM-240 and F-300 have a fuse in the incoming power circuit.

7. Short cycle protection timer: A 1 minute time delay is included in the start-up sequence to protect against short cycling the gear motor or compressor.

8. Compressor protection is provided either internally or by means of an external motor circuit protector. This is an automatic reset thermal type circuit breaker.

9. The F-2000 has a spout safety control to shut down the unit if the bin control fails for any reason. This is a manual reset safety and will notify the technician by means of a indicator light on the control box. To reset this safety, turn the control switch OFF and back ON. This re-sets the holding relay circuit and turns off the light.

The gear motor current protector serves as a back-up for the bin control on other models. These safety's protect the Flaker or DCM models from internal failures.

DUAL FLOAT SWITCH

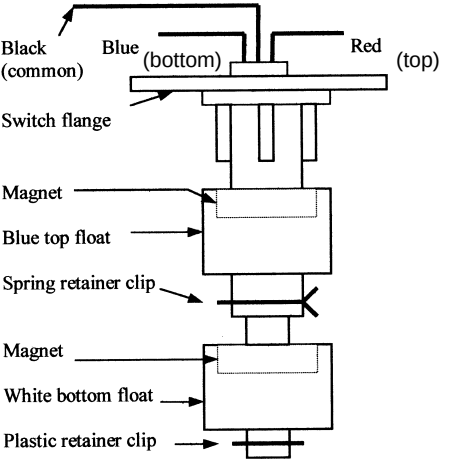
Hoshizaki float switch, part number 435490-01 can be used as a universal replacement on any Hoshizaki Flaker or DCM model in the field. It now subs for all previous float switch numbers in our parts system.

Since the float switch is mounted into the water reservoir, it is susceptible to scale build-up. The amount of scale build-up will depend on the local water quality. Scale on the

switch shaft can cause the floats to stick. This will effect the unit operation. In this case, the float switch should be cleaned and checked.

The float switch is held in place on the top cover by a twist lock bracket. To remove it, twist the switch flange and lift. Soak the switch assembly in ice machine cleaner. While it is not necessary to do so, some technicians remove the floats from the shaft during cleaning. If you remove them, note that the blue float is on top. Also it is important to clearly mark the top of the floats so that they can be replaced correctly. (See drawing below). Installing the floats upside down will effect the timing of the float switch operation. Once clean, rinse and wipe the cleaner off and check the switch with a good quality ohm meter.

This float switch has three wires (the black wire is common) and two separate switches. Check the top switch by ohming out the black and red wires. When the float is up the switch should be closed. Check the bottom switch by ohming out the black and blue wires in the same manner. If either switch fails, the assembly should be replaced.



FLAKER WATER FILL SYSTEM

The reservoir in a Hoshizaki auger type ice maker feeds water by gravity flow to the evaporator cylinder. The level of water in the reservoir is maintained by the operation of the dual float switch.

The dual float switch assembly is made up of two reed switches inside of a sealed shaft. The reed switch contacts are operated by individual magnets attached inside of the two separate floats.

As ice is made and extruded from the evaporator cylinder, the water level in the reservoir drops. When the level drops, the top float opens the top switch contacts (considered a latching circuit). Opening these contacts allows the bottom float switch control of the water control relay in the control circuit. As the water level continues to drop, the bottom float contacts open to de-energize the water control relay.

De-energizing the water control relay closes a circuit to supply 24 volts to the inlet water valve solenoid. This allows water to fill the reservoir. It also opens a circuit to the timer board which starts a 90 second low water safety shutdown timer.

When the water supply is available, the reservoir refills. As the reservoir level rises, these two switches swap jobs. The bottom float is now the latching circuit and the top float re-energizes the water control relay. This will stop the safety timer and shut off the water flow.

If no water is available, i.e. the filter is stopped up or the water supply is turned off, the unit cycles down and the water valve remains energized. When the water supply is restored, the reservoir fills and the top float switch re-energizes the water control relay to automatically restart the unit. This system provides a consistent water level in the reservoir and an automatic reset low water safety protection.

Since the float switch is mounted into the water reservoir, it is susceptible to scale build-up. The amount of scale build-up will depend on the local water quality. Scale on the switch shaft can cause the floats to stick. This will effect the unit operation. In this case, the float switch should be cleaned and checked.

FLAKER TIMER BOARD

The solid state timer board used in Hoshizaki Flakers is a simple electronic sequence timer. In order for the board to sequence, certain circuits must be closed. In order to diagnose a bad timer board, it is necessary to check these circuits to assure they are operating properly. If you are trouble-shooting a timer, the first thing you should check is the in coming control voltage. All Hoshizaki flakers have a 24 volt control transformer. The output of this transformer is protected by a 1 amp buss type fuse. Control voltage comes in the timer on pins 1 & 2. If you do not have 24 volts at pins 1 & 2, check the transformer and fuse.

Now check for voltage across pins 7 & 8. This could be line voltage or control voltage, depending on the model. Review the unit wiring diagram prior to checking 7 & 8 to determine the correct voltage. If voltage is present, the timer board has cycled up which indicates there is not a problem in the timer board. The problem is in the gear motor relay circuit. remember that there is a time delay from the time you turn the unit on to the time it cycles up completely. this time will be from 1 ~ 2.5 minutes, depending on the model of flaker.

In order for the flaker to start up, the reservoir must be full and both float switches must be closed. This closes the control circuit to pins 3 & 4. Do not confuse these pins with the line voltage terminals marked 3 & 4 on the compressor relay located on the board. You can check this circuit with a volt meter across the pins or by placing a jumper across them. If the unit cycles up with the jumper in place, the board is good and your problem is in the water relay control circuit.

Next, you should check the bin control circuit at pins 5 & 6. Check for a closed circuit with a volt meter or place a jumper across them. If the unit cycles up with the jumper in place, the board is good and the bin control circuit is the problem.

The last circuit check is across pins 10 & 11. These pins connect to the gear motor protect relay and will shut down the unit if the gear motor fails. Check for a closed circuit with a volt meter or place a jumper across them. If the unit cycles up with the jumper in place, the board is good and the gear motor protect circuit is suspect.

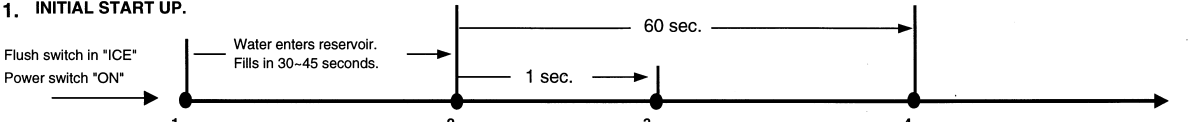
Flaker Sequence of Operation

The Hoshizaki Flaker utilizes a solid state sequence timer board to switch the components on and off as needed. The sequence is as follows:

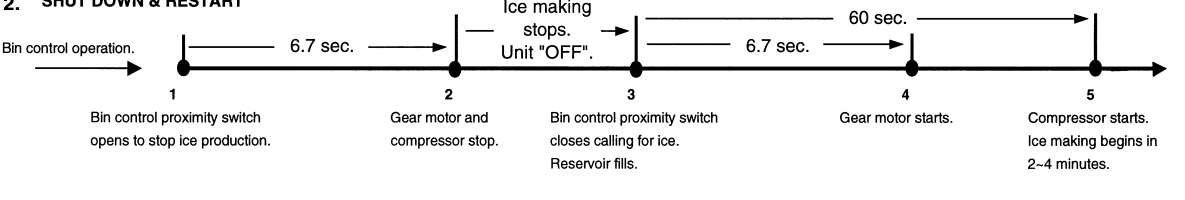
With proper voltage and water supplied to the Flaker and the flush and ice switch is in the ice position, power is supplied to the inlet water valve. The unit will not start unless the reservoir is full and both floats on the dual float switch are closed (in the up position). The operation is then turned over to the bin control. If the bin control is closed and calling for ice, the gear motor and condenser fan motor are energized. One minute later, the compressor starts. As the refrigeration systems cools the water in the evaporator, ice will start to form within 2 to 5 minutes. This depends on the inlet water temperature and ambient conditions. Ice production will continue until the bin control is satisfied (opens). The shut down process is very simple. On the F-450, F-800, F-1000, and F-2000 units, the entire unit shuts down within 6 seconds after the bin control switch opens. On the F-300 and F-500, approximately 90 seconds after the bin control switch opens, the compressor stops, on minute later the gear motor and condenser fan motor stop. This sequence of operation is accomplished through a series of timers within the solid state timer board.

SEQUENCE OF OPERATION FOR F-450B AND ALL "M" SERIES FLAKER AND DCM MODELS

1. INITIAL START UP.



2. SHUT DOWN & RESTART



FLAKER PERIODIC FLUSH

Beginning with the F-650 and larger flakers, a periodic flush cycle is included. A 12 hour timer will cycle the unit down and open the flush valve which allows the complete water system to drain. The unit will remain off for 15 minutes which allows any ice remaining in the evaporator to melt and flush the evaporator walls and mechanical seal out. The inlet water valve is not energized during this flush period. The unit will automatically restart after 15 minutes on the flush timer.
The F-450 will flush when the bin control is open.

DCM SEQUENCE OF OPERATION

DCM sequence for the ice making unit is similar to the F450, with a delay of the compressor at start up and a delay of the gear motor at shut down.

A periodic flush is not incorporated in the DCM units. DCM-450 and 700 models have periodic agitation in the bin to eliminate ice bridging. The solid state timer board will start the agitation motor for .6 seconds every 2 hours. It will also start the agitation motor for .6 seconds every 10 seconds of accumulated dispensing time.

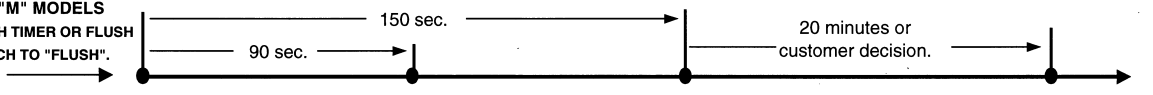
FLAKER/DCM PRODUCTION CHECK

Checking the production on a F/DCM is a simple process. To check the production you will need a bucket or pan to catch the ice and a set of scales to weigh the ice. After the unit has operated for 10 to 20 minutes, catch the ice production for 10 full minutes. Weigh the ice to establish the batch weight. Multiply the batch weight by 144 for the total production in 24 hours. Some prefer to catch the ice for 20 minutes and multiply the weight by 72 for a more realistic production check. It is true that a longer catch is more accurate, however, it doubles your test time and may only show a 1 to 2% difference in production. Performing a production check is an excellent way to prove proper F/DCM operation.

FLUSH SEQUENCE AND LOW WATER SAFETY

3. "M" MODELS

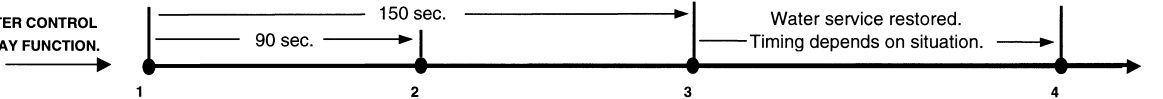
FLUSH TIMER OR FLUSH SWITCH TO "FLUSH".



1. 12 hour timer switches to flush cycle or Manual flush switch placed to "FLUSH" position.
2. Compressor stops.
3. Gear motor and fan stops. Flush valve energized.
4. Flush valve de-energized. Begin initial start-up. Go to step **1**.

4. LOW WATER SAFETY.

WATER CONTROL RELAY FUNCTION.

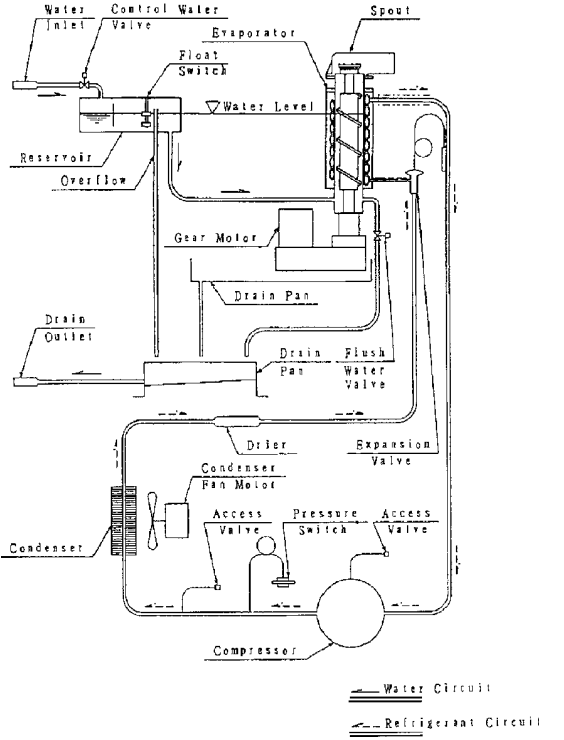


1. Bottom float switch open with no water entering. Water control relay de-energized. This opens # 3 & 4 on board to start shut-down timer and energizes the inlet water valve (no water).
2. Compressor stops.
3. Gear motor and fan stops. Water valve remains energized. Waiting for water.
4. Water restored, reseroir fills. Top float switch energizes water control relay. Begin initial start-up. Go to step 1.

WATER AND REFRIGERATION CIRCUIT DRAWING REFERENCE CHART

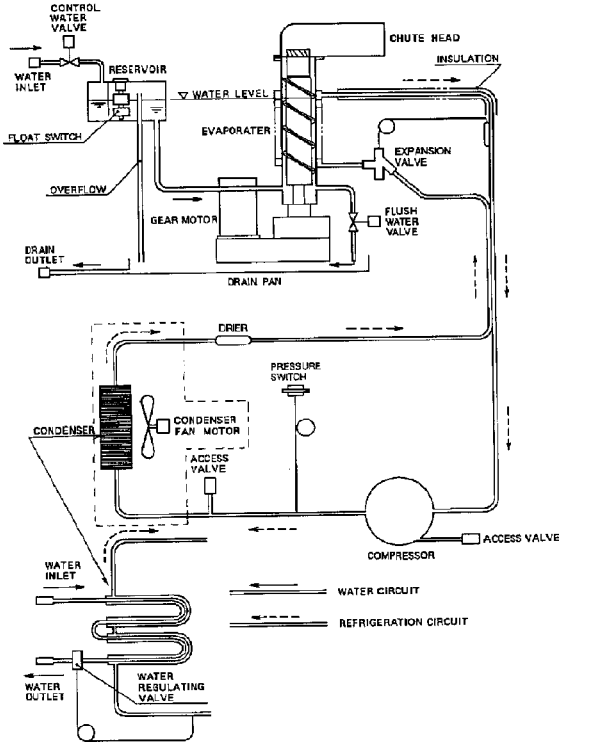
NOTE: Some drawings have been combined to represent more than one model.

A
F-250BAE
F-450BAE

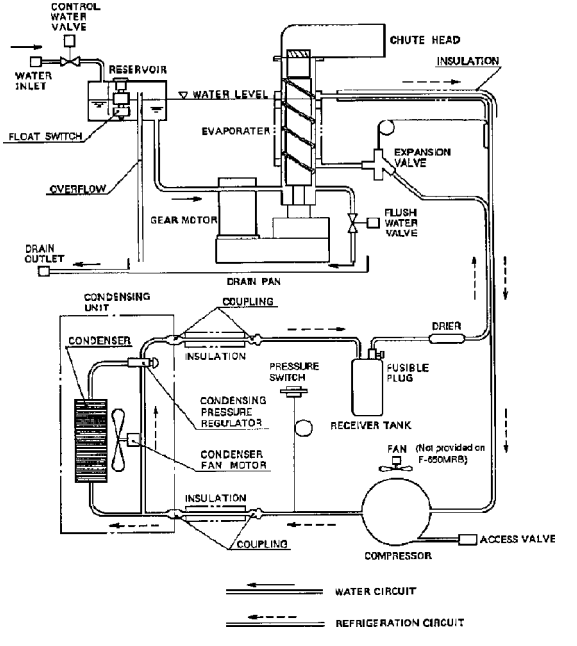


F-250 has a manual evaporator drain and no high side access valve.

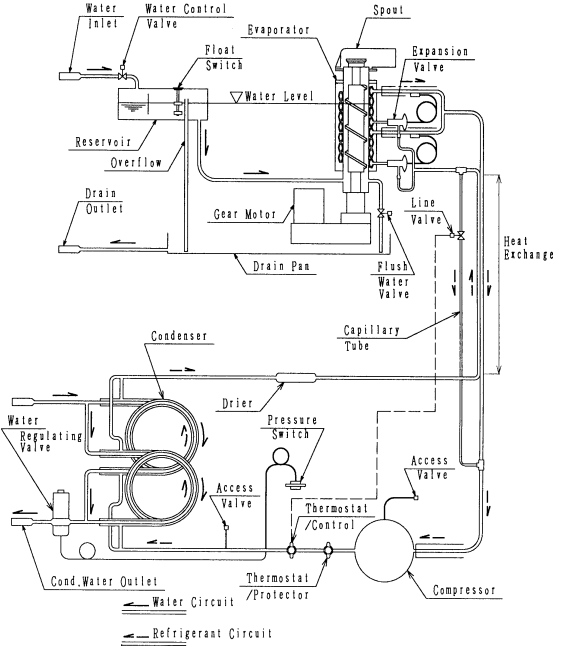
B
F-650MAE, F-650MWE
F-1000MAE, F-1000MWE



C
F-1000MRE

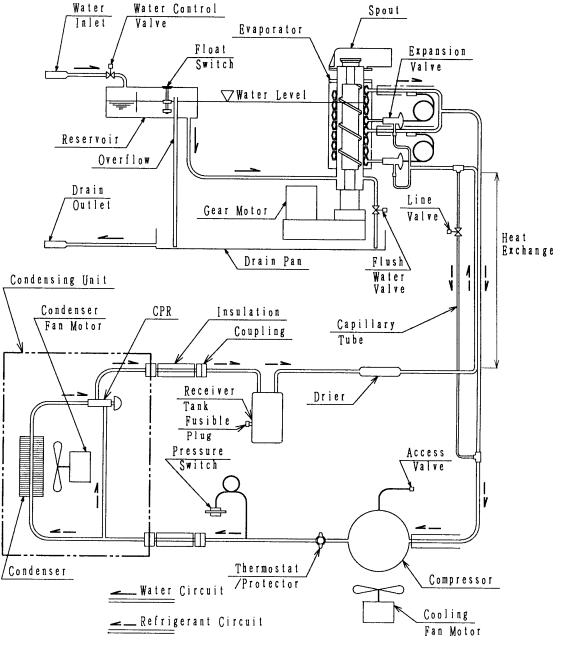

CONTROL WATER VALVE
WATER INLET
RESERVOIR
WATER LEVEL
FLOAT SWITCH
EVAPORATER
CHUTE HEAD
INSULATION
EXPANSION VALVE
OVERFLOW
GEAR MOTOR
FLUSH WATER VALVE
DRAIN OUTLET
DRAIN PAN
CONDENSING UNIT
COUPLING
DRIER
CONDENSER
INSULATION
PRESSURE SWITCH
FUSIBLE PLUG
CONDENSING PRESSURE REGULATOR
RECEIVER TANK
FAN (Not provided on F-650MRB)
CONDENSER FAN MOTOR
INSULATION
COUPLING
ACCESS VALVE
COMPRESSOR
WATER CIRCUIT
REFRIGERATION CIRCUIT

D
F-2000MWE

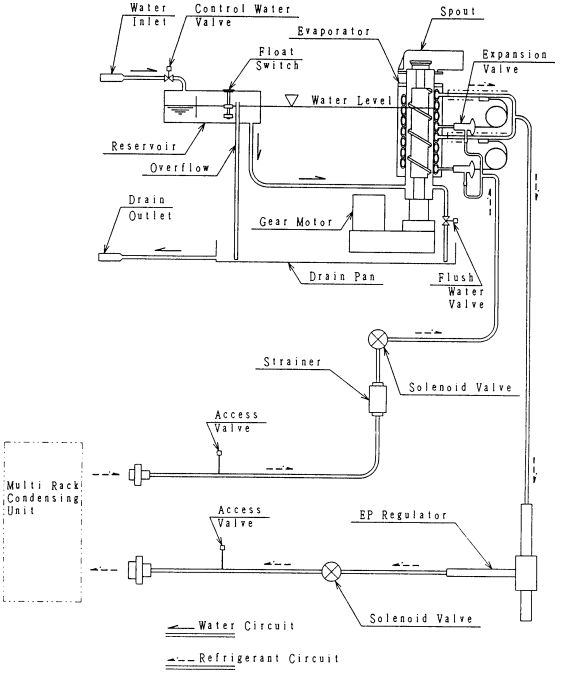

Water Inlet
Water Control Valve
Spout
Evaporator
Float Switch
Expansion Valve
Water Level
Reservoir
Overflow
Drain Outlet
Gear Motor
Line Valve
Heat Exchange
Drain Pan
Flush Water Valve
Condenser
Capillary Tube
Drier
Water Regulating Valve
Pressure Switch
Access Valve
Access Valve
Thermostat /Control
Cond.Water Outlet
Thermostat /Protector
Compressor
Water Circuit
Refrigerant Circuit

E

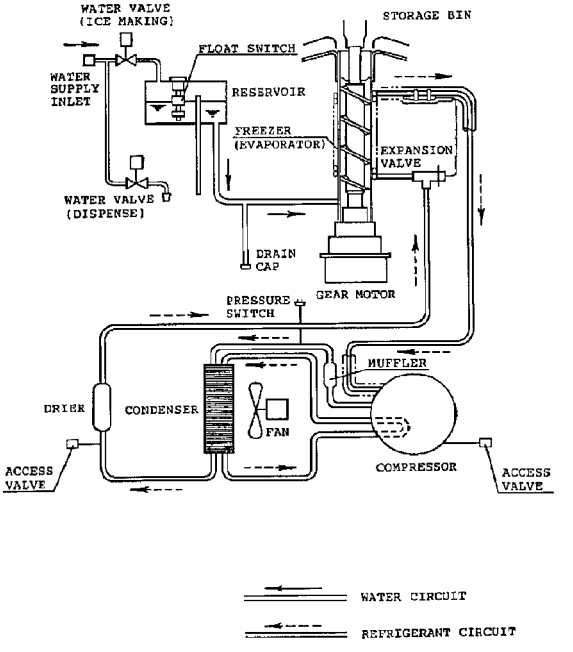
F-2000MRE3
F-2000MRE



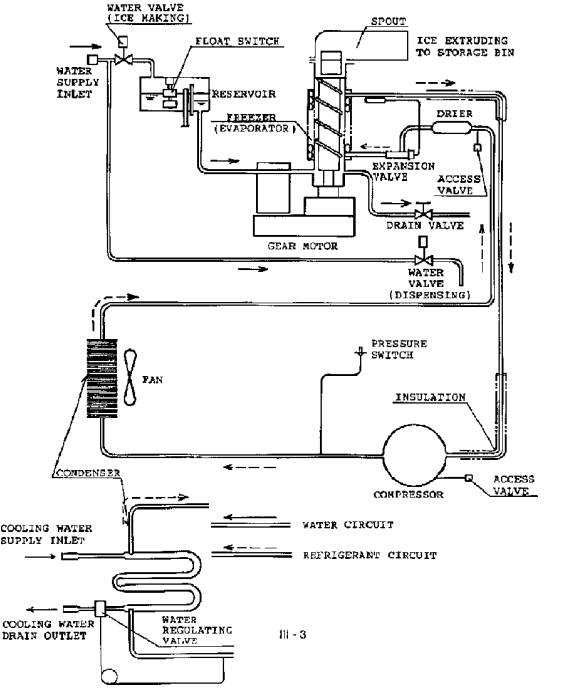
F
F-2000MLE


Water Inlet
Control Water Valve
Evaporator
Spout
Float Switch
Expansion Valve
Water Level
Reservoir
Overflow
Drain Outlet
Gear Motor
Drain Pan
Flush Water Valve
Strainer
Solenoid Valve
Access Valve
Multi Rack Condensing Unit
Access Valve
EP Regulator
Solenoid Valve
Water Circuit
Refrigerant Circuit

G
DCM-240BAE


WATER VALVE (ICE MAKING)
STORAGE BIN
FLOAT SWITCH
WATER SUPPLY INLET
RESERVOIR
FREEZER (EVAPORATOR)
EXPANSION VALVE
WATER VALVE (DISPENSE)
DRAIN CAP
GEAR MOTOR
PRESSURE SWITCH
MUFFLER
DRIER
CONDENSER
FAN
COMPRESSOR
ACCESS VALVE
ACCESS VALVE
WATER CIRCUIT
REFRIGERANT CIRCUIT

H
DCM-450BAE, DCM-450BWE
DCM-700BAE, DCM-700BWE



PERFORMANCE DATA

MODEL: **F-250 BAE**
Total Amperage: 5.6A (Compressor RLA): 3.8 A

Supply Voltage: 115-120 / 60 / 1
Refrigerant Charge: **R-134A** 8oz.

Ambient Temp (F°)		70	80	90	100
	Water Temp (F°)	Air-Cooled	Air-Cooled	Air-Cooled	Air-Cooled
Approximate Production 24 hours	50	275	253	231	209
	70	253	242	220	198
	90	242	220	209	187
Evaporator Outlet Temp. (°F)	50	8.6 ~ 15.8	10.4 ~ 16.7	12.2 ~ 17.6	13.1 ~ 19.4
	70	8.6 ~ 16.7	10.4 ~ 17.6	12.2 ~ 17.6	13.1 ~ 19.4
	90	8.6 ~ 16.7	10.4 ~ 17.6	12.2 ~ 18.5	13.1 ~ 20.3
Head Pressure PSIG	50	125	149	173	203
	70	125	149	173	203
	90	125	149	173	203
Suction Pressure PSIG	50	7	8.5	8.5	10
	70	7	8.5	8.5	10
	90	7	8.5	10	10

PERFORMANCE DATA

MODEL: **F-450 BAE** Supply Voltage: 115-120 / 60 / 1

Total Amperage: 8.9A (Compressor RLA): 7.5 A

Ambient Temp (F°)		70	80	90	100
	Water Temp (F°)	Air-Cooled	Air-Cooled	Air-Cooled	Air-Cooled
Approximate Production 24 hours	50	474	419	379	337
	70	441	403	364	322
	90	412	379	340	311
Evaporator Outlet Temp. (°F)	50	-4 ~ 5	-2 ~ 7	1 ~ 7	3 ~ 9
	70	-4 ~ 5	-2 ~ 7	1 ~ 9	3 ~ 11
	90	-4 ~ 5	0 ~ 7	1 ~ 9	3 ~ 9
Head Pressure PSIG	50	179	208	242	277
	70	178	211	242	277
	90	178	211	245	277
Suction Pressure PSIG	50	21	23	23	24
	70	21	23	22	24
	90	21	21	24	27

PERFORMANCE DATA

MODEL: **F-650M_E** Supply Voltage: 115-120 / 60 / 1

Total Amperage (Compressor RLA): MAE 11.8A (9.2A) MWE: 10.4A, (8.3A)

Water Consumption: (water cooled cond.) 70 / 50 322 Gal/24 hr, 90 / 70 461 Gal/24 hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Approximate Production 24 hours	50	685	644	640	633	590	620	545	606
	70	635	600	595	586	540	565	490	551
	90	588	553	553	540	511	527	463	511
Evaporator Outlet Temp (°F)	50	3 ~ 14	7 ~ 14	7 ~ 14	7 ~14	7 ~ 18	7 ~ 14	7 ~ 14	7 ~ 14
	70	3 ~ 14	7 ~ 14	7 ~ 14	7 ~14	7 ~ 18	7 ~ 14	7 ~ 14	7 ~ 14
	90	3 ~ 14	7 ~ 14	7 ~ 14	7 ~14	7 ~ 14	7 ~ 14	7 ~ 14	7 ~ 14
Head Pressure PSIG	50	171	214	206	214	228	214	263	214
	70	171	214	206	214	228	214	263	214
	90	171	214	206	221	228	221	263	221
Suction Pressure PSIG	50	21	26	24	26	26	28	32	28
	70	24	29	26	29	26	30	32	30
	90	24	29	28	30	29	32	32	33

PERFORMANCE DATA

MODEL: **F-1000M_E** Supply Voltage: 208 - 230 / 60 / 1 (3 wire with neutral)

Total Amperage (Compressor RLA): MAE: 7.1A (4.5A) MWE: 6.5A (4.3A) MRE: 8.1A (4.5A)

Water Consumption: (water cooled cond.) 70 / 50 382 Gal/24 hr: 90 / 70 608 Gal/24 hr.

Ambient Temp (F°)		70			80			90			100		
	Water Temp (F°)	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Approximate Production 24 hours	50	1000	930	920	920	910	860	850	890	820	767	870	760
	70	910	830	840	845	820	810	780	810	750	710	800	690
	90	840	750	760	790	720	730	720	720	700	680	710	630
Evaporator Outlet Temp (°F)	50	14	18	18	16	18	18	16	18	18	16	18	20
	70	14	18	18	16	18	18	16	18	20	16	18	20
	90	14	18	18	16	18	18	16	18	20	16	18	20
Head Pressure PSIG	50	171	215	193	199	215	196	220	215	202	256	215	238
	70	171	215	193	199	215	196	220	215	202	256	215	238
	90	171	215	193	199	215	196	220	215	202	256	215	238
Suction Pressure PSIG	50	24	30	26	28	30	26	31	30	26	36	30	33
	70	24	30	26	28	30	26	31	30	26	36	30	33
	90	24	32	26	28	32	26	31	32	26	36	32	33

PERFORMANCE DATA

MODEL: **F-1000M_E/50** Supply Voltage: 220-240 V / 50 H2 / 1 ph

Total Amperage: MAE50: 5.8A, MWE50: 5.4A Compressor RLA: MAE50: 4.4 , MWE50: 4.1

Water Consumption for MWE50 Condenser: 90 / 70 570 Gal/24 hr: 70 / 50 380 Gal/24 hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours	50	880	875	810	855	750	835	675	815
	70	800	780	745	770	690	760	625	750
	90	740	705	695	685	635	675	600	665
Evaporator Outlet Temp. (°F)	50	14	18	16	18	16	18	16	18
	70	14	18	16	18	16	18	16	18
	90	14	18	16	18	16	18	16	18
Pressure High Side	50	190	200	220	200	240	200	280	200
	70	190	200	220	200	240	200	280	200
	90	190	210	220	210	240	210	280	210
Pressure Suction	50	24	30	28	30	31	30	36	30
	70	24	30	28	30	31	30	36	30
	90	24	32	28	32	31	32	36	32

PERFORMANCE DATA

MODEL: **F-2000M_E** Supply Voltage: 208-230-60 / 1 (3 wire with neutral)

Total Amperage (Compressor RLA): MWE: 30A (13A), MRE: 30A (13A)

Water Consumption for MWE Condenser: 70 / 50 838 Gal/24 hr: 90 / 70 1280 Gal/24 hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Water	Remote	Water	Remote	Water	Remote	Water	Remote
Production 24 hours	50	2000	2000	1980	1950	1960	1920	1920	1810
	70	1770	1780	1750	1700	1730	1690	1660	1640
	90	1540	1570	1520	1490	1500	1470	1490	1450
Evaporator Outlet Temp. (°F)	50	3	5	3	5	3	5	3	7
	70	3	5	3	5	3	5	3	7
	90	3	5	3	5	3	5	3	7
Pressure High Side	50	209	162	209	171	209	211	209	228
	70	209	162	209	171	209	211	209	228
	90	216	162	216	171	216	213	216	228
Pressure Suction	50	18	18	18	20	18	20	18	21
	70	18	18	18	20	18	20	18	21
	90	18	18	18	20	18	20	18	21

PERFORMANCE DATA

MODEL: **F-2000MRE3** Supply Voltage: 208-230 / 60 / 3

Total Amperage (Compressor RLA): 20A (7.5A)

Ambient Temp (F°)		70	80	90	100
	Water Temp (F°)	Remote	Remote	Remote	Remote
Production 24 hours	50	2000	1950	1850	1750
	70	1820	1700	1630	1550
	90	1580	1520	1430	1410
Evaporator Outlet Temp. (°F)	50	3	3	3	3
	70	3	3	3	3
	90	3	3	3	3
Pressure High Side	50	149	164	192	220
	70	149	164	192	220
	90	149	164	192	220
Pressure Suction	50	18	18	18	18
	70	18	18	18	18
	90	18	18	18	18

PERFORMANCE DATA

MODEL: **F-2000 MLE** Supply Voltage: 115 / 60 / 1

Total Amperage: 15A

Ambient Temp (F°)		70	80	90	100
	Water Temp (F°)	Low Side	Low Side	Low Side	Low Side
Production 24 hours	50	2150	2000	1900	1800
	70	1850	1750	1650	1450
	90	1650	1800	1600	1290
Evaporator Pressure at EPR Valve	50	16	17	18	20
	70	16	17	19	20
	90	16	17	19	20

NOTE: Actual production head pressure and suction pressure will vary depending on the specific R-22 Rack System setup.
* the above data is accurate for F-2000MLE connected with a Copeland Condensing Unit CLAL-0300-TAC-001 and R-22.
Factory setting for the Evaporator Pressure Regulating Valve (EPR) is 16 PSIG for evaporator temperature of no less than -10 °F (-23.3 °C).

PERFORMANCE DATA

MODEL: **DCM-240 BAE**
Total Amperage: 7.4A (Compressor RLA): 5.2 A

Supply Voltage: 115-120 / 60 / 1
Refrigerant Charge: R-22 11.6oz.

Ambient Temp (F°)		70	80	90	100
	Water Temp (F°)	Air-Cooled	Air-Cooled	Air-Cooled	Air-Cooled
Approximate Production 24 hours	50	290	270	240	200
	70	280	250	230	180
	90	270	230	200	165
Evaporator Outlet Temp. (°F)	50	14	16	17.6	19.4
	70	14	16	16.9	19.4
	90	14.5	16	16	18.5
Head Pressure PSIG	50	221	255	285	324
	70	227	257	282	320
	90	231	258	291	317
Suction Pressure PSIG	50	28	30	31	34
	70	28	30	31	34
	90	30	30	31	34

Notes:

PERFORMANCE DATA

MODEL: **DCM-450 B_E** Supply Voltage: 115-120 / 60 / 1

Total Amperage (Compressor RLA): BAE 12.5A (8.3A) BWE: 12.4A, (8.3A)

Water Consumption: (water cooled cond.) 70 / 50 449 Gal/24 hr, 90 / 70 660 Gal/24 hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Approximate Production 24 hours	50	494	547	463	531	425	522	359	516
	70	421	516	401	505	277	481	315	478
	90	392	470	370	456	342	437	293	430
Evaporator Outlet Temp (°F)	50	12	6.8	14	8.6	14	8.6	14	8.6
	70	12.2	6.8	14	8.6	14	8.6	14	8.6
	90	12.2	6.8	14	8.6	14	8.6	14	8.6
Head Pressure PSIG	50	183	213	214	213	245	215	276	215
	70	183	213	214	213	245	213	276	215
	90	183	216	214	216	245	216	276	216
Suction Pressure PSIG	50	24	26	26	26	27	26	28	27
	70	24	26	26	26	28	26	30	27
	90	24	26	27	26	28	27	31	27

PERFORMANCE DATA

MODEL: **DCM-700 B_E** Supply Voltage: 115-120 / 60 / 1

Total Amperage (Compressor RLA): BAE 14.6A (10A) BWE: 14.1A, (10A)

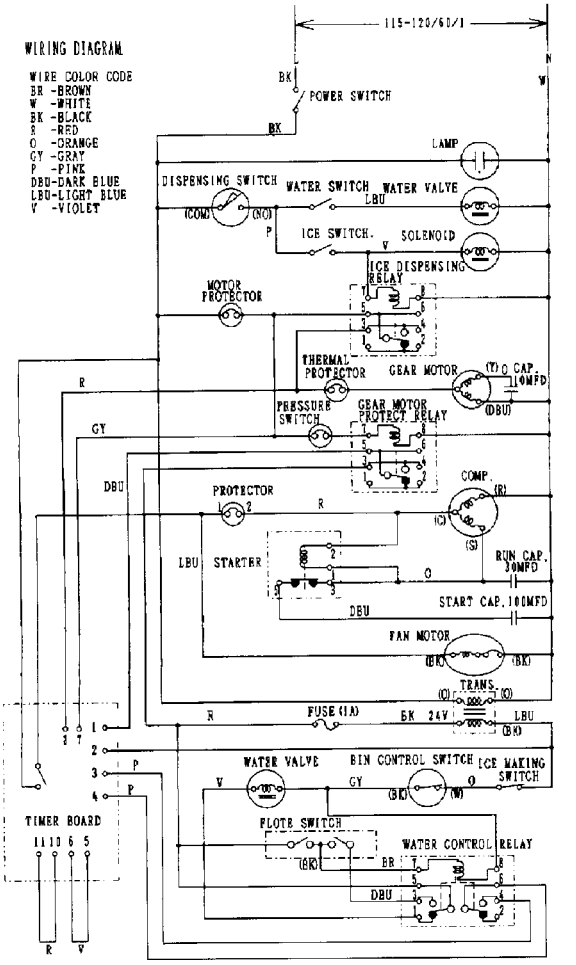
Water Consumption: (water cooled cond.) 70 / 50 340 Gal/24 hr, 90 / 70 467 Gal/24 hr.

Ambient Temp (F°)		70		80		90		100	
	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Approximate Production 24 hours	50	664	631	608	617	553	602	498	591
	70	631	584	582	567	547	547	478	534
	90	597	534	547	514	503	496	456	478
Evaporator Outlet Temp (°F)	50	14	15.8	14	15.8	15.8	17.6	17.6	17.6
	70	14	15.8	14	15.8	15.8	17.6	17.6	17.6
	90	15.8	17.6	15.8	17.6	17.6	17.6	19.4	17.6
Head Pressure PSIG	50	149	212	171	213	199	213	232	213
	70	152	213	176	213	201	215	233	215
	90	155	215	182	215	208	215	235	216
Suction Pressure PSIG	50	26	26	27	27	27	27	30	30
	70	26	26	27	27	30	30	31	31
	90	26	26	27	27	30	30	34	33

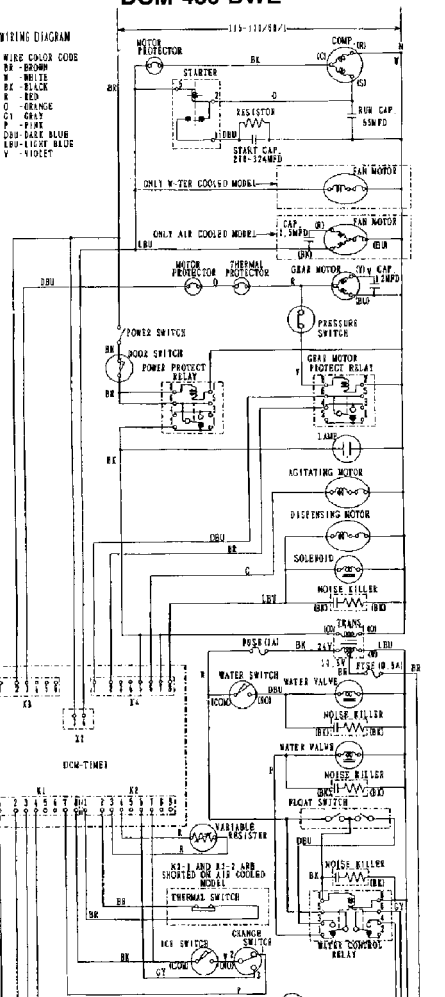
FLAKER / DCM Wiring Diagram Reference Chart

Model Number	Wiring Diagram	Page	Start Capacitor	Run Capacitor	Fan Capacitor	Gear Motor
DCM-240 BAE	M	129	100 MFD	30 MFD	- -	10 MFD
DCM-450 BAE, BWE	N	130	270 - 324 MFD	55 MFD	2.5 MFD	12 MFD
DCM-700 BAE, BWE	O	131	88 - 108 MFD	25 MFD	6 MFD	24 MFD
F250 BAE	P	132	150 MFD	20 MFD	- -	10 MFD
F-450 BAE	Q	133	270 - 324 MFD	15 MFD	2.5 MFD	10 MFD
F-650 MAE, MWE	R	134	270 - 324 MFD	55 MFD	6 MFD	10 MFD
F-1000 MAE, MWE, MRE	S	135	108 - 130 MFD	25 MFD	6 MFD	12 MFD
F-1000 MAE 50, MWE 50	T	136	189 - 227 MFD	25 MFD	5 MFD	12 MFD
F-2000 MWE, MRE	U	137	135 - 162 MFD	40 MFD	10 MFD	65 MFD
F2000 MRE3	V	138	—	—	—	65 MFD
F-2000 MLE	W	139	—	—	—	65 MFD

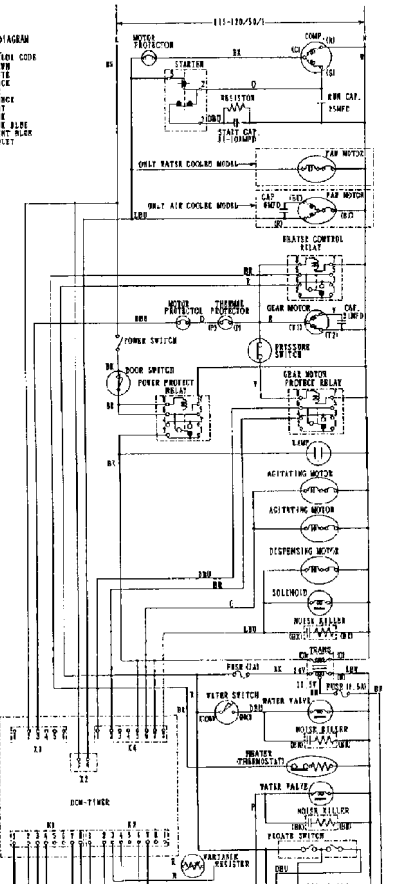
M
DCM-240 BAE


WIRING DIAGRAM
WIRE COLOR CODE
BR -BROWN
W -WHITE
BK -BLACK
R -RED
O -ORANGE
GY -GRAY
P -PINK
DBU-DARK BLUE
LBU-LIGHT BLUE
V -VIOLET
115-120/60/1
POWER SWITCH
LAMP
DISPENSING SWITCH
WATER SWITCH
WATER VALVE
ICE SWITCH.
SOLENOID
ICE DESPENSING RELAY
MOTOR PROTECTOR
THERMAL PROTECTOR
GEAR MOTOR
O CAP. 10MFD
PRESSURE SWITCH
GEAR MOTOR PROTECT RELAY
PROTECTOR
COMP.
STARTER
RUN CAP. 30MFD
START CAP. 100MFD
FAN MOTOR
TRANS.
FUSE (1A)
24V
WATER VALVE
BIN CONTROL SWITCH
ICE MAKING SWITCH
FLOTE SWITCH
WATER CONTROL RELAY
TIMER BOARD

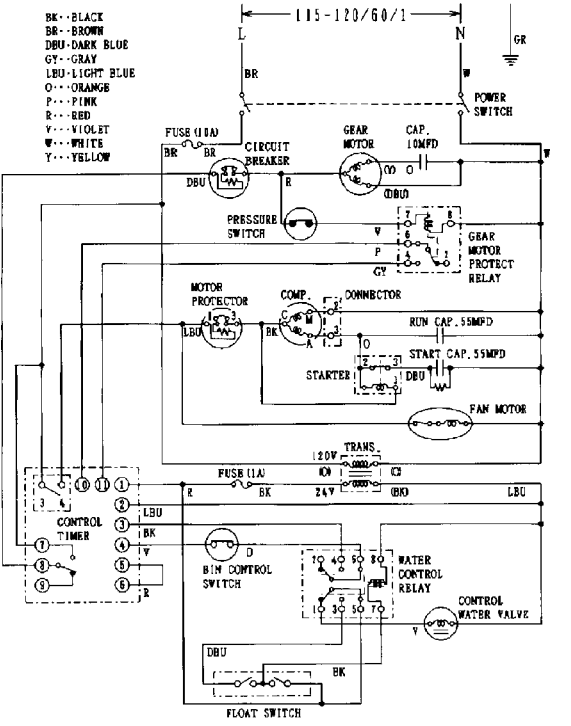
N
DCM-450 BAE
DCM-450 BWE



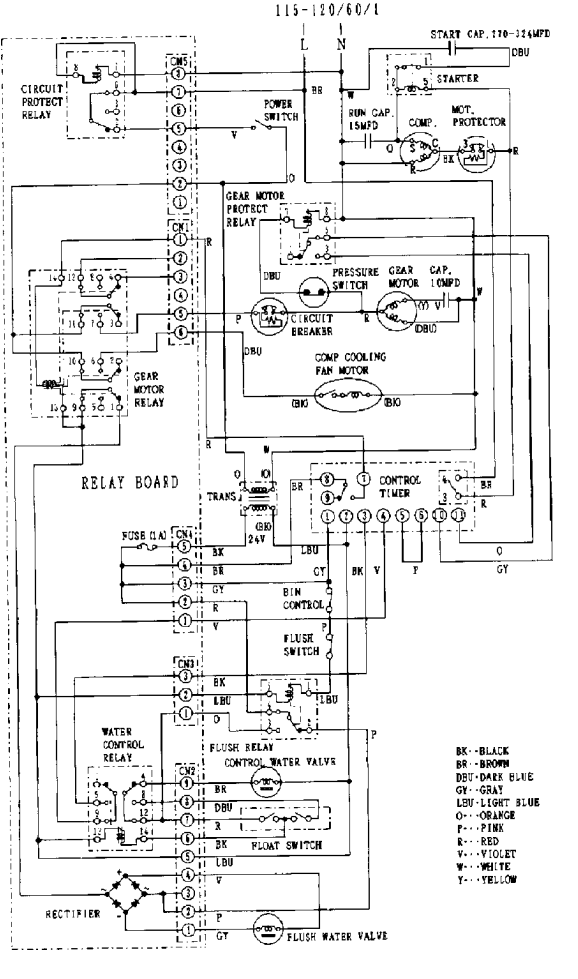
O
DCM-700 BAE
DCM-700 BWE



P
F-250 BAE

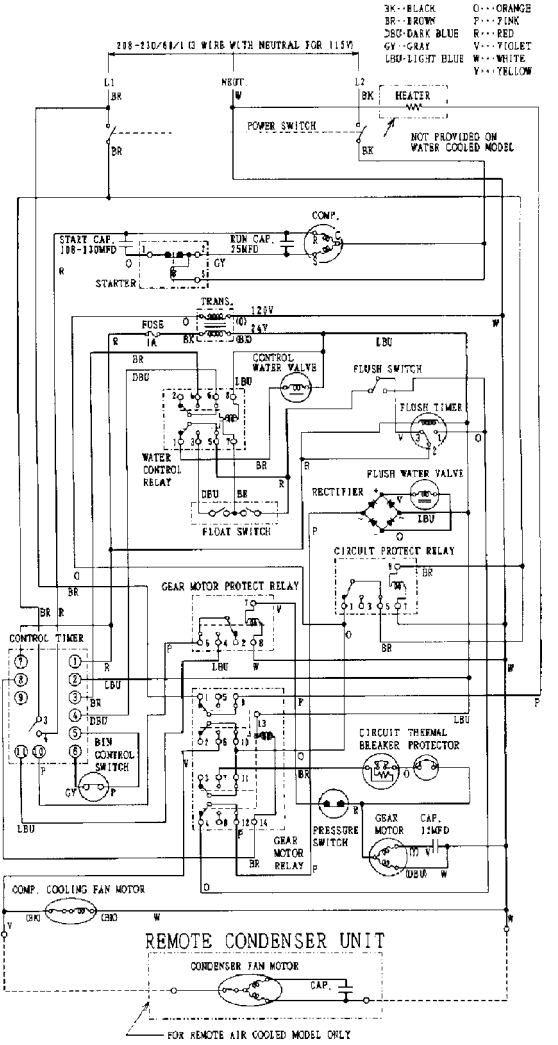

BK···BLACK
BR···BROWN
DBU·DARK BLUE
GY···GRAY
LBU·LIGHT BLUE
O···ORANGE
P···PINK
R···RED
V···VIOLET
W···WHITE
Y···YELLOW
115-120/60/1
L
N
GR
BR
W
POWER SWITCH
FUSE (10A)
CIRCUIT BREAKER
GEAR MOTOR
CAP. 10MFD
DBU
R
PRESSURE SWITCH
V
P
GY
GEAR MOTOR PROTECT RELAY
MOTOR PROTECTOR
COMP.
CONNECTOR
LBU
BK
RUN CAP. 55MFD
START CAP. 55MFD
STARTER
FAN MOTOR
TRANS.
120V
24V
FUSE (1A)
(BK)
CONTROL TIMER
BIN CONTROL SWITCH
WATER CONTROL RELAY
CONTROL WATER VALVE
FLOAT SWITCH

Q
F-450 BAE

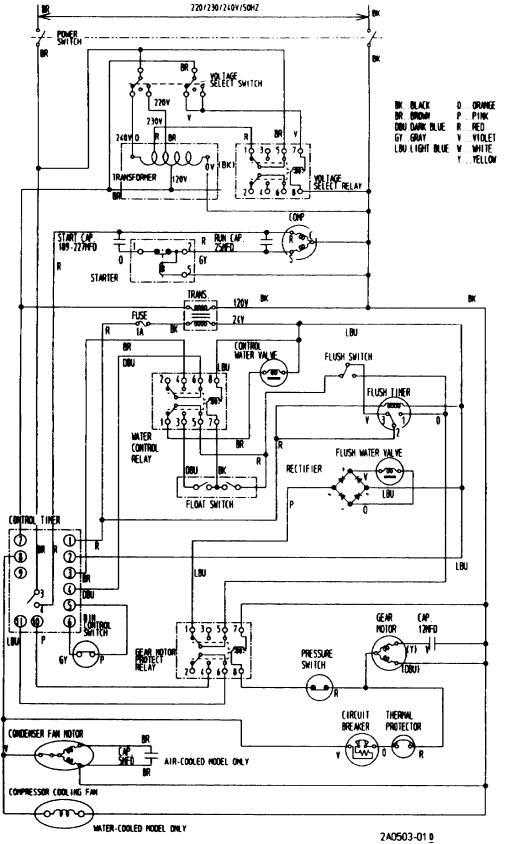

115-120/60/1
L
N
START CAP. 170-214MFD
DBU
STARTER
CIRCUIT PROTECT RELAY
POWER SWITCH
RUN CAP. 15MFD
COMP.
MOT. PROTECTOR
GEAR MOTOR PROTECT RELAY
PRESSURE SWITCH
GEAR MOTOR
CAP. 10MFD
CIRCUIT BREAKER
COMP COOLING FAN MOTOR
GEAR MOTOR RELAY
RELAY BOARD
TRANS.
CONTROL TIMER
FUSE (1A)
24V
BIN CONTROL
FLUSH SWITCH
WATER CONTROL RELAY
FLUSH RELAY
CONTROL WATER VALVE
FLOAT SWITCH
RECTIFIER
FLUSH WATER VALVE
BK--BLACK
BR--BROWN
DBU-DARK BLUE
GY--GRAY
LBU-LIGHT BLUE
O---ORANGE
P---PINK
R---RED
V---VIOLET
W---WHITE
Y---YELLOW

R
F-650 MAE
F-650 MWE

S
F-1000 MAE
F-1000 MWE
F-1000 MRE

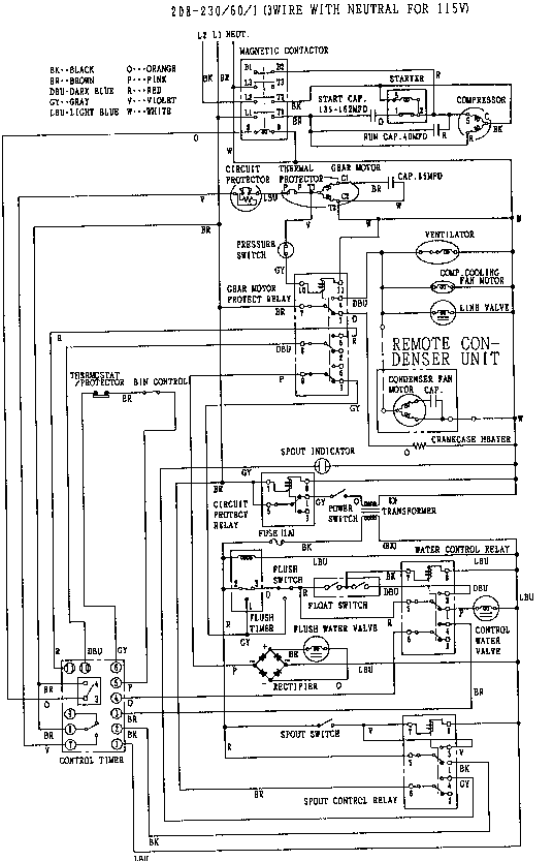


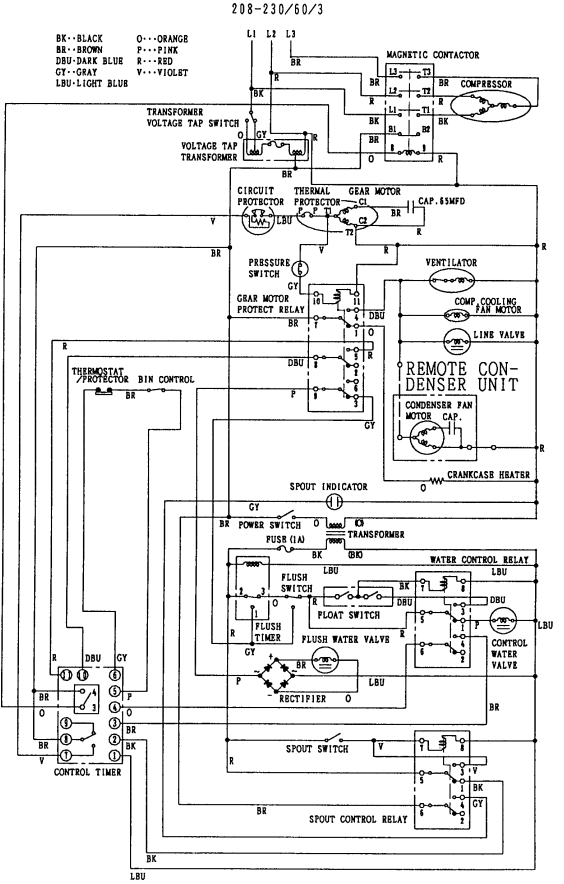
T
F-1000 MAE / 50
F-1000 MWE / 50



U

F-2000MRE
F-2000MWE

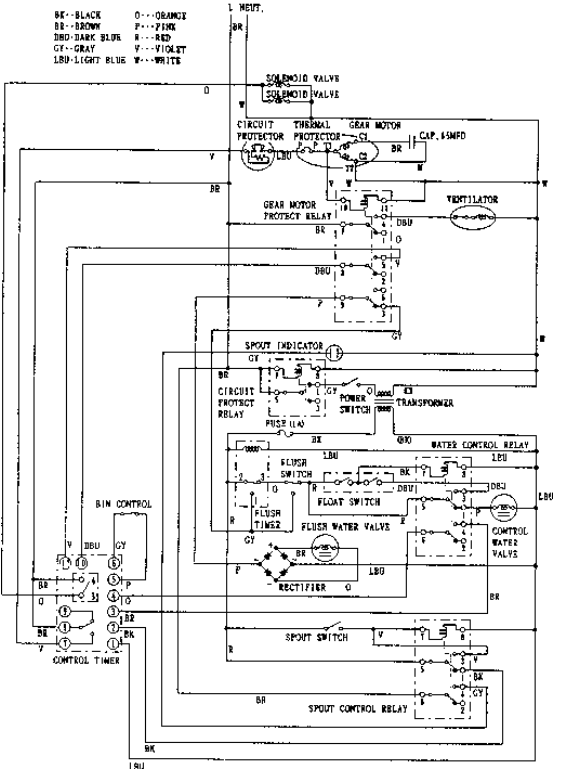



208-230/60/3
BK··BLACK
BR··BROWN
DBU·DARK BLUE
GY··GRAY
LBU·LIGHT BLUE
O···ORANGE
P···PINK
R···RED
V···VIOLET
L1 L2 L3
MAGNETIC CONTACTOR
COMPRESSOR
TRANSFORMER
VOLTAGE TAP SWITCH
VOLTAGE TAP TRANSFORMER
CIRCUIT PROTECTOR
THERMAL PROTECTOR
GEAR MOTOR
CAP.85MFD
PRESSURE SWITCH
VENTILATOR
GEAR MOTOR PROTECT RELAY
COMP.COOLING FAN MOTOR
LINE VALVE
THERMOSTAT /PROTECTOR
BIN CONTROL
REMOTE CONDENSER UNIT
CONDENSER FAN MOTOR CAP.
CRANKCASE HEATER
SPOUT INDICATOR
POWER SWITCH
TRANSFORMER
FUSE(1A)
WATER CONTROL RELAY
FLUSH SWITCH
FLOAT SWITCH
FLUSH TIMER
FLUSH WATER VALVE
CONTROL WATER VALVE
RECTIFIER
SPOUT SWITCH
CONTROL TIMER
SPOUT CONTROL RELAY

W

F-2000MLE

115/60/1



NOTES

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Litho - USA