TECH - SPEC'S
Technician's Pocket Guide
 # 80045

This technicians pocket guide covers all models using R-404A 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 # 80021 green pocket guide for newer models using R-22.

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

TABLE OF CONTENTS

HOSHIZAKI MODEL NUMBER IDENTIFICATION CODE

KM 1300 S A F-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
F= R404A refrigerant unit
H= R404A and rounded front

SPECIAL MODEL DESIGNATION

C- Cubelet
E - European
50- 50 HZ.

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.
	220-240 or 230V	198 - 254V.
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.

MODEL	Line Size	Fitting Size
KM-150 - KM-900	3/8" OD	1/2 FPT
KM-1300 - KM-2400	1/2" OD	1/2 FPT
All F/DCM	3/8" OD	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" OD	3/4 FPT
All KM/KML's	3/4" OD	3/4 FPT
Flakers	3/4" OD	3/4 FPT*
DCM	3/4" OD	3/4 FPT*

*Some models have 2 drain outlets.

Water Cooled Condenser outlet:

KM-150BWF, KM-250BWF, KM-1600SWH, KM-1600SWH3, KM-2000SWH3 have 1/2" FPT outlet.

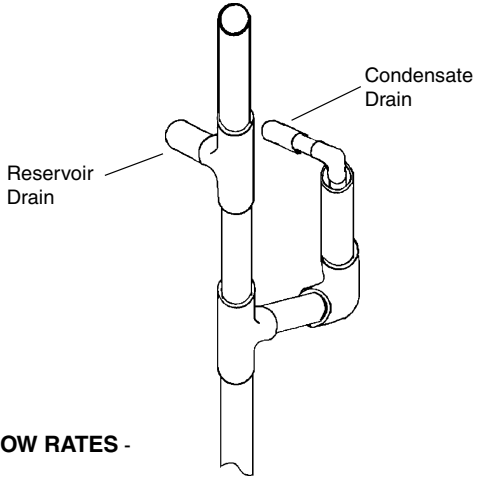
All other KM models, All KML, All Flaker, All DCM have 3/8" FPT outlet.

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:

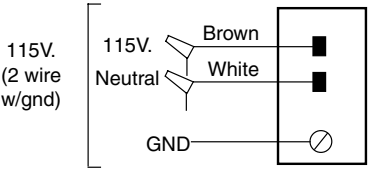
KM-150/250/280/All Flakers	1.05 GPM
KM-500	1.58 GPM
KM-630/900/All DCM's	2.11 GPM
KM-1300/1600	3.96 GPM
KM-2000/2400	4.23 GPM

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-150 through 900 and a 5 GPM flow rate filter for KM-1300 or larger.

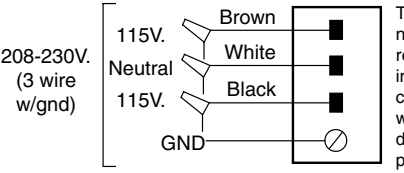
ELECTRICAL CONNECTIONS -

115 VOLT/1 PHASE



208-230 VOLT/1 PHASE

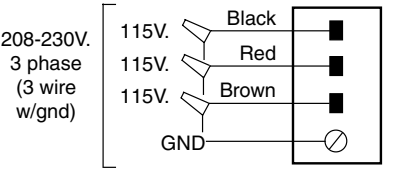
208-230V/1 Phase units require a dedicated neutral due to the use of 115V components.



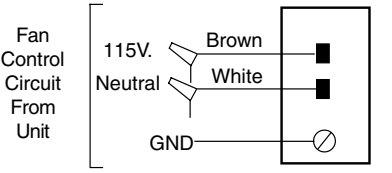
The dedicated neutral requires an insulated conductor which runs directly to the panel.

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

208-230 VOLT/3 PHASE



REMOTE CONDENSER CONNECTIONS



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

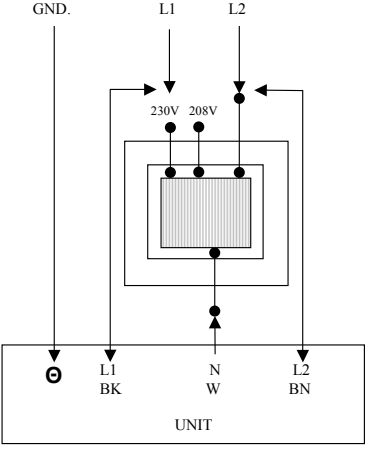
Transformer Application

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

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. The transformer should be mounted inside the compressor compartment and wired using the following generic diagram.



REMOTE APPLICATIONS

CONDENSER CHART

CONDENSER MODEL	MODEL NUMBERS
URC-6F	KM-500/630MRF, F-1000MRF
URC-7F	KML-600MRF
URC-12F	KM-900/1300MRF, KM-1300SRF
URC-20F	KM-1600MRF, KM-1600/2000SRF, F-2000MRF
URC-24F	KM-2400SRF

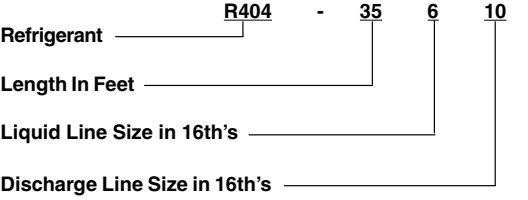
Note: F condensers will be used on either F or H series units as listed above.

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.

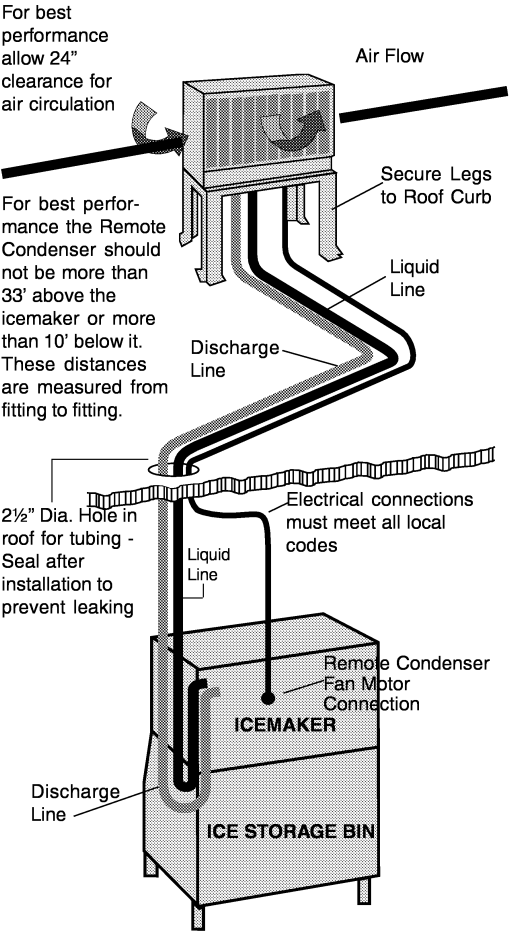
LINE SET IDENTIFICATION CODE



LINE SET APPLICATIONS

MODELS	LINE SET	LL (SIZE) DL
KML-600, KM-500/630, F-1000	R404-__46-2	1/4" OD 3/8" OD
KM-900/1300	R404-__68-2	3/8" OD 1/2" OD
KM-1600/2000/2400	R404-__610	3/8" OD 5/8" OD
F-2000	R404-__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-404A 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: Always 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-404A

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 16.5 ounces plus 0.4 oz. per foot over 66 feet. For units utilizing 3/8"L.L., add 0,4 oz. per foot over 66 feet.

NOTE:

(1) Recommended line sizes are same as listed in the line set application chart.

(2) Older models utilize R-502 refrigerant or R-22 refrigerant. Always check the unit nameplate for the correct refrigerant type.
Do not connect components using different type refrigerants!

(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-404A CHARGE CHART

NOTE: This Chart represents both F and H series models.

MODEL		TOTAL CHARGE	REFRIGERANT
KM-150	BAF	10.6 oz.	R-404A
	BAF-E	11.1 oz.	"
	BWF	12.7 oz.	"
	BWF-E	11.6 oz.	"
KM-250	BAF	12.7 oz.	"
	BWF	11 oz.	"
KM-280	MAF / MWF & -E	12 oz.	"
KML-250	MAH	1 lb. 2 oz.	"
	MWH	14.1 oz.	"
KML-350	MAF	1 lb. 2 oz.	"
	MWF	13.6 oz.	"
KML-450	MAF	1 lb. 5 oz.	"
	MWF	15 oz.	"
KM-500	MAF	1 lb. 10 oz.	"
	MAF-E	1 lb. 10 oz.	"
	MWF	13.4 oz.	"
	MWF-E	13.2 oz.	"
	MRF	3 lb. 15 oz.	"
KML-600	MAF	2 lb. 4 oz.	"
	MAF-E	1 lb. 6 oz.	"
	MWF &-E	1 lb. 5 oz.	"
	MRF	10 lb. 6 oz.	"
KM-630	MAF	1 lb. 7.6 oz.	"
	MWF	1 lb. 3 oz.	"
	MRF	4 lb. 4 oz.	"
KM-900	MAF	3 lb. 7 oz.	"
	MWF	1 lb. 7 oz.	"
	MRF1/3	9 lb. 14 oz.	"
KM-1300	SAF1/3 & -E	3 lb. 14 oz.	"
	SWF1/3 & -E	2 lb. 2 oz.	"
	SRF1/3 & -E	11 lb. 7 oz.	"
KM-1300	MAF	4lb.	"
	MWF	2lb. 3 oz.	"
	MRF	9lb. 15 oz.	"
KM-1300	NRF	11 lb. 7 oz.	"
KM-1600	MRF1/3	14 lb. 12 oz.	"
KM-1600	SWF1/3	3 lb. 1 oz.	"
	SRF1/3	14 lb. 12 oz.	"
KM-1800	SAH1/3	4 lb. 7 oz.	"
KM-2000	SWF3	3 lb. 7 oz.	"
	SRF3	16 lb. 2 oz.	"
KM-2400	SRF3	24 lb.	"

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

R-404A URC REMOTE CONDENSERS

(Condenser charge is included in total charge.)

MODEL	FACTORY CHARGE	REFRIGERANT
URC-6F	1 Lb. 14 Oz.	R-404A
URC-7F	2 Lbs. 5 Oz.	"
URC-12F	4 Lbs. 7 Oz.	"
URC-20F	7 Lbs. 11 Oz	"
URC-24F	11 Lbs	"

Note: F series condensers are used for both F and H series remote units.

REFRIGERANT OIL

All R-404A models use Polyol Ester (POE-EAL) oil. POE oil absorbs moisture easily. Extra care must be taken to reduce the possibility of moisture entering the system during service. If moisture contamination is suspected, the oil should be changed and the liquid line drier must be replaced. Changing the oil requires removal of the compressor so that the oil can be drained and replaced with the correct amount. See compressor data chart for oil amount. Replacement compressors are shipped with POE oil.

HOSHIZAKI FLAKERS/DCM'S
REFRIGERANT R-404A CHARGE CHART

NOTE: This Chart represents both F and H series models.

MODEL		TOTAL CHARGE	REFRIGERANT
F-300	BAF	10.5 oz.	R-404A
F-450	MAF	1 lb.	"
	MWF	12 oz.	"
F-500	BAF	1 lb.	"
F-800	MAF	1 lb. 10 oz.	"
	MWF	13 oz.	"
F-1000	MAF	1 lb. 12 oz.	"
	MWF	15 oz.	"
	MRF	4 lb. 1 oz.	"
F-1001	MAF	1 lb. 12 oz.	"
	MWF	15 oz.	"
	MRF	4 lb. 1 oz.	"
F-2000	MWF	2 lb.	"
	MRF	14 lb. 9 oz.	"
DCM-240	BAF	15.5 oz	"
DCM-500	BAF	1 lb. 4.1 oz.	"
	BWF	13.4 oz.	"
DCM-750	BAF	1 lb. 1.7 oz.	"
	BWF	1 lb. 1.7 oz.	"

HEAT LOAD FOR R-404A MODELS

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

CUBERS: MODEL	AIR COOLED	WATER-COOLED (CONDENSER ONLY)
KM-150B	3100	2800
KM-150B -E	3400	2900
KM-250BAF	5064	5707
KML-250M	5560	5000
KML-350M	6550	5370
KM-280M & -E	8159	6773
KML-450M	7480	6180
KM-500M	8206	6663
KM-500M -E	7371	6876
KML-600M	11580	12635
KM-630M -E	10375	12635
KM-900M	14800	14400
KM-1300S/M	19800	17150
KM-1300S3	18130	15450
KM-1300S -E	20400	17925
KM-1600SWF	—-	18000
KM-1600SWF3	—-	17560
KM-1800SAH	24720	—-
KM-1800SAH3	24150	—-
KM-2000SWF3	—-	22700

HEAT LOAD - R-404A FLAKERS/DCM'S

MODEL	AIR COOLED	WATER-COOLED (CONDENSER ONLY)
F-300B	3178	—-
F-450M	5090	—-
F-500B	4683	—-
F-800M	7500	6270
F-1000M	9050	7110
F-1000M/50	9000	7000
F-1001M	9050	7110
F-2000M	—-	15530
DCM-240B	3800	—-
DCM-270B	3532	—-
DCM-500B	6300	5575
DCM-750B	8314	5130

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.

"E" Control Board Adjustment Chart

The 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	seconds	10	10	10	20
Min Defrost Time	seconds	150	180	120	180
Inlet Water Valve	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
BIN CONTROL	7	OFF for thermostatic contol			
SWITCH		ON for mechanical control			
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:

1. **TO IMPROVE BUILT-IN CLEANING** Adjust switches 1&2 to provide for longer flush and switches 5&6 to every cycle pump-out 1/1. Do not adjust 1&2 on KM150/250 in high ambient area.
2. **DO NOT ADJUST 3, 4, 7, 8, 9 &10** from factory setting.
3. **DO NOT MAKE CONNECTION to the red K-4 terminal** unless a special bin control / red connector is provided.
4. Dip-switches 9&10 are on improved "E" board only. If original board has 8 dip-swithes, use default setting of OFF/OFF for 9 & 10. If original board has 10 dip-switches, match original "E" board settings.

SETTING CHART FOR R-404A (F/H) MODELS

FACTORY DIP SWITCH SETTINGS:	SWITCH CODE 1=ON 0=OFF									
MODEL:	1	2	3	4	5	6	7	8	9	10
KM-150BA/W/A-E/W-E	0	1	0	1	0	0	0	0	0	0
KML-250MA	0	0	0	1	1	1	0	0	1	0
KM-280MA	1	0	0	1	1	1	0	0	0	0
KM-280MA-E	1	0	0	0	0	0	0	0	1	0
KML-250MW, KML-350/450/600MA/W	0	0	0	1	1	1	0	0	0	1
KM-280/500MW-E	0	0	0	0	0	0	0	0	0	0
KM-280MWF,	0	0	0	1	1	1	0	0	0	0
KML-350MAF/MWF	0	0	0	1	1	1	0	0	0	1
KM-500MAF, KM630MAF/MRF	0	0	0	0	1	1	0	0	1	0
KM-250B, KM-500MWF/MRF, KM-630MWF	0	0	0	0	1	1	0	0	0	0
KM-500MAF-E, KM-630MAF-E/MWF-E	0	0	0	0	0	0	0	0	1	0
KML-600MRF	1	0	0	0	1	1	0	0	0	1
KM-1300S_F/SWF3, KM-2000SWF3/SRF3	0	0	1	1	1	1	0	0	0	0
KM-1300SAF-E/SRF-E	0	0	1	1	0	0	0	0	1	0
KM-1300SWF-E	0	0	1	1	0	0	0	0	0	0
KM-1300MAF/MRF	0	0	1	0	1	1	0	0	0	0
KM-1300NRF	0	0	1	1	1	1	1	0	0	0
KM-900M_F/MRF3, KM-1300MWF, KM-1600MRF/MRF3	0	0	1	0	1	1	0	0	0	1
KM-1600SRF/SRF3	1	0	1	1	1	1	0	0	0	0
KM-1600SWF3	0	0	1	1	1	1	0	0	0	1
KM-1800SAH	0	0	1	1	1	1	0	0	1	0
KM-2400SRF3	0	0	1	0	0	0	0	0	0	1

Note: The above chart reflects the factory dip-switch settings for models using R-404A refrigerant. Adjustments may be made to switches 1, 2, 5, & 6 to improve the built-in cleaning ability as per the DIP SWITCH SETTING GUIDE. If you replace the control board, match the cleaning settings with the original board. Switches 3, 4, 7, 8, 9, & 10 must remain in the factory position.

"E" Control Board Functions

An instruction label explaining the "E" board features is included somewhere on the unit. You should find it either on the control box cover, on the inside of the front panel, or under the top panel. A stick on label is also included with the service replacement board. If you are replacing an "E" board, be sure to place the new label over the original label. This will advise anyone performing future service that the original board has been replaced and explain the application switch as outlined below.

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, 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.

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 can have up to 5 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.
4 Beeps = Short circuit on mechanical bin control circuit.
5 Beeps = Open circuit on mechanical bin control circuit.

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 high and low voltage protections are the only board alarms that will automatically restart the unit when the voltage returns to normal. If constant voltage fluctuation occurs, additional external voltage protection will be required.

COMPRESSOR DATA

MODEL	PART #	MANUFACTURER #	LRA	(Ohms) SWR	(Ohms) RWR	OIL TYPE	CHARGE fl. oz. / cc.
KM-150B, DCM-240B, F-300B	4A1177-01	Copeland / JS25C1E-IAA-252	37	6.010	0.902	POE EAL	20 / 568
DCM-270B	4A2272-01	Copeland / ASE24C3E-1AA-252	39	7.3	1.2	ICI 224B	15 / 426
KM-150B -E	4A1845-01	Danfoss / SA10CL	13	11.8	6.7	RL 32DR	20 / 568
KML-250M	4A2456-01	Copeland / ASE32C3E-CAA-202	33.6	7.3	1.2	ICI 224B	12 / 341
KM-280M	4A1812-01	Tecumseh / AKA9438ZXA	59	4.22	0.590	POE EAL	18 / 512
KM-280M -E	4A1924-01	Tecumseh / AKA9438ZXC	26.3	7.149	2.746	“	18 / 511
KM-250B_F, KML-350M	4A2300-01	Copeland / RS43C1E-CAA-219	51	4.08	O.59	“	24 / 682
KML-450M,	4A1843-01	Copeland / RS55C2E-CAA	60	3.906 – 4.494	0.614 – 0.706	“	24 / 682
KM-500M	4A1820-01	Tecumseh / AKA9455ZXA	50	5.95	0.690	“	18 / 511
KM-500M -E	4A1925-01	Tecumseh / AKA9455ZXC	26.3	7.149	2.746	“	18 / 512
KML-600M	4A1539-01	Copeland / CS10K6E-PFV	56	2.883 – 3.317	1.079 1.241	“	45 / 1279
KM-630M	4A1683-01	Copeland / RS64C1E-CAV	37	7.366 – 8.474	1.442 – 1.659	“	24 / 682
KM-630M -E	4A1839-01	Copeland / RS64C1E-IAZ-219	33	6.512 – 7.492	1.692 – 1.947	“	24 / 682
KM-900M, KM-1300S/M	4A1412-01	Copeland / CS14K6E-PFV	61	2.474 – 2.846	1.004 – 1.156	“	45 / 1279
KM-900M/3, KM-1300S/3	4A1484-01	Copeland / CS14K6E-TF5	55	Line to line 1.496 – 1.722		“	45 / 1279
KM-1300S -E	4A1749-01	Copeland / CS14K6E-PFJ	58	2.455 – 2.836	1.302 – 1.498	“	45 / 1279
KM-1600M/S, F-2000M	4A1420-01	Copeland / CS20K6E-PFV	96	2.204 – 2.536	0.605 – 1.498	“	45 / 1279

* Remote units use –02 compressor which has crankcase heater.
-E = European model / 50 hz.
Resistance is measured with Wheatstone bridge under Controlled ambient conditions.

LRA = Lock Rotor Amperage
SWR = Start Winding Resistance
RWR = Run Winding Resistance
RLA = Running Load Amperage (see performance data)

COMPRESSOR DATA

MODEL	PART #	MANUFACTURER #	LRA	(Ohms) SWR	(Ohms) RWR	OIL TYPE	CHARGE Fl. oz. / cc.
KM-1300NRF	4A1412-02	Copeland / CS14K6E-PFV	61	2.474~2.846	1.004~1.156	POE EAL	45 / 1279
KM-1600M3/S3,	4A1419-01	Copeland / CS20K6E-TF5	75	Line to line 0.984 – 1.132		POE EAL	45 / 1279
KM-1800SAH	4A2334-01	Copeland / CS18K6E-PFV-237	82	2.623~3.017	0.688~0.792	POE EAL	45 / 1279
KM-1800SAH3	4A2330-01	Copeland / CS18K6E-TF5-237	65.5	Line to line 1.168 - 1.344		POE EAL	45 / 1279
KM-2000S3,F-2000M3	4A1419-01	Copeland / CS20K6E-TF5	75	Line to line 0.984 – 1.132		POE EAL	45 / 1279
KM-2400SRF3	4A2043-01	Maneurop / MTZ-56-HL3T	125	Line to line 0.62 "		POE EAL	78 / 2216
DCM-230FE-UK	4A1462-01	Danfoss / SC12DL	19	14.6	3.17	POE EAL	21 / 600
DCM-500B,F-450M, F-500B	4A1272-01	Copeland / RS43C1E-CAA-219	51	4.08	0.59	POE EAL	24 / 682
DCM-750B (Early models)	4A1387-01	Copeland / RS55C1E-PAA	60	4.464 - 5.136	0.512 - 0.560	POE EAL	24 / 682
F-800M (Late models)	4A1843-01	Copeland / RS55C2E-CAA		3.906 - 4.494	0.614 - 0.706	POE EAL	
F-1000M, F-1001M	4A1322-01	Copeland / RS70-C1E-PFV	34	4.584 - 5.232	1.823 - 2.097	POE EAL	24 / 682
F-1000M-22 (Special R-22)	434209-01	Copeland / REK3-0125-PFV	31	4.68 - 5.38	0.387 - 0.445	POE EAL	24 / 682
F-1000M-50	4A1581-01	Copeland / RS80-C1E-CAZ	31	8.175 - 9.405	1.990 - 2.290	POE EAL	45 / 1279

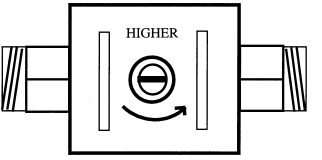
* Remote units use –02 compressor which has crankcase heater.
-E = European model / 50 hz. -C = Cubelet model is same as standard Flaker
Resistance is measured with wheatstone bridge under
Controlled ambient conditions.

LRA = Lock Rotor Amperage
SWR = Start Winding Resistance
RWR = Run Winding Resistance
RLA = Running Load Amperage
(see performance data)

HEAD PRESSURE CONTROLS

WATER-COOLED

An adjustable (Pressure Modulated) water-regulating valve is installed on the water-cooled condenser **outlet**. A # V46 Johnson Controls Penn valve is used. A label on the valve housing identifies the Penn valve.



PENN VALVE

Adjust:
CW - for lower pressure and outlet water temperature with higher water flow.
CCW – for higher pressure and outlet water pressure with lower water flow.

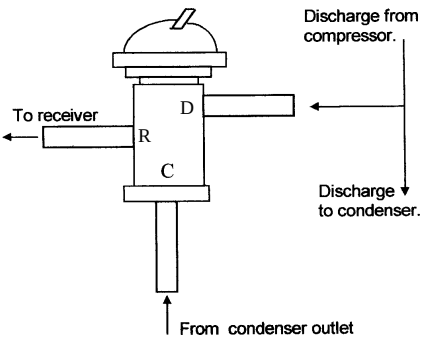
CONDENSER OUTLET WATER TEMPERATURE RANGE.

Model	Range	High side pressure
All KM	104 ~ 115 ºF	270 psig.
All DCM	100 ~ 104 ºF	260 psig.
All F	100 ~ 104 ºF	260 psig.

In some cases, if the water-cooled unit has been in operation for a long period of time, adjusting the water- regulating valve does not allow proper pressures. In this case the water-cooled condenser is likely scaled and requires cleaning. An acid based condenser cleaner should be circulated through the coil using an acid pump, until the inner tube is free of scale. Once the scale is removed, the water-regulating valve should be adjusted to maintain the range and pressure listed above.

REMOTE HEAD PRESSURE CONTROL

All remote condenser units utilize a condensing pressure regulating (CPR/Headmaster) valve to maintain head pressure in low ambient conditions. You will find a Sporland LAC-4 210 psig. valve mounted in the condenser of all R-404A remote units with the exception of the KM-2400SRF3. The KM-2400SRF3 model uses a Sporland LAC-5 210 psig valve which is mounted in the unit head.



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.

HIGH PRESSURE SAFETY SWITCH

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

Pressure switch chart for R-404A models:

Models	part number	cut out (psig.)	cut in (psig.)
DCM-240B	3A0740-01	400 ±10	270 ±10
All KM & DCM water-cooled, All F models	433441-05	384 ± 21.3	284± 21.3
DCM-500/750BAF All KM air & remote,	433441-07	412 ± 21.	327 ± 21.3

BIN CONTROL

KM BIN CONTROLS:

KM/KML cubers will use one of three types of bin controls. The type of bin control will vary depending on the unit style, or model and serial number.

1. THERMOSTATIC BIN CONTROL:

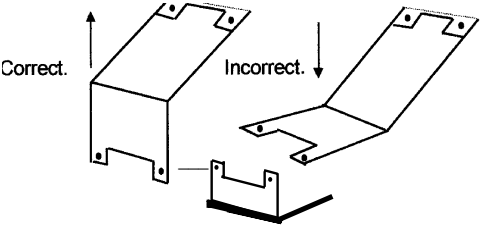
The thermostatic bin control is the primary control that supplies 115 volts to all major components in the unit except the compressor. When this control is closed, 115V is supplied to the control transformer and to the K1 control board connector which switches 115 volts to the components as the sequence dictates. A thermostatic capillary bulb is mounted in the ice drop zone area or on a drop down bracket which extends into the bin cavity.

The Thermostatic control is normally closed. (It opens on temperature drop and closes on temperature rise.) When ice touches the thermostatic bulb, the bulb pressure opens the bin control switch to shut the unit down. The thermostatic bin control will shut the unit down at any point in the sequence of operation if ice contacts the control bulb. The shut down time will depend on the control adjustment. This adjustment is factory set however it should always be checked at start-up to assure proper operation. ***High altitude areas require adjustment.*** When ice is moved away from the bulb, the unit will always restart in the 1-minute fill cycle.

Note: The unit will not operate in either ICE or WASH unless the thermostatic bin control switch is closed.

Larger M models and S models include a drop down bulb bracket. This bracket should be secured to the unit base and the control plug connection **must be made** before the unit will operate. A bin control extension bracket is included with all S models. Be sure to install the extension

bracket. When installing, make sure the bracket points downward so that the cubes will easily fall away from the bin control bulb.



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. Adjustment up to 30~45 seconds could be acceptable depending on the application. Adjust the control "CCW" for a faster shut down.

Note: Control board dip switch number 7 must be OFF for this control to operate the unit. A thermostatic bin control may be used on KML models and is required for some dispenser application.

2.MECHANICAL BIN CONTROL:

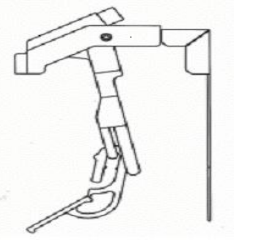
KML and some M models use a mechanical bin control. This control includes a proximity switch and actuator paddle assembly. The mechanical bin control assembly mounts in the ice drop zone area and will shut the unit dowm within 3 seconds when ice pushes the actuator paddle to the full right position, away from the proximity switch. Shut down will only occur during the first 5 minutes of the freeze cycle when the paddle is moved away from the proximity switch. If the paddle is moved away from the proximity switch and held at any other time during the sequence, the unit will continue to run until the next freeze cycle occurs. This feature allows for a full batch of ice every cycle so that there are no small cubes in the bin.

A resistor wireing harness connects the mechanical bin control to the red K4 connector on the control board. As the proximity switch opens and closes, the resistance value will change to either start up or shut down the unit.

a) When the control paddle is hanging in the normal position, the resistance at the red K4 connector will be 7.9 K ohms and the unit will start.

BIN EMPTY

Priximity switch closed.

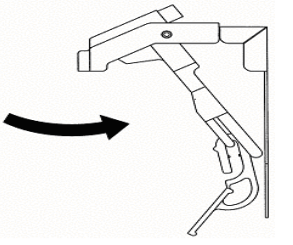


Mechanical control in the normal position supplies 7.9 K ohms at red K4 connector to start unit.

b) When the unit is held to the right, the resistance at the K4 red connector will be 15.8 K ohms and the unit will shut down within 3 seconds during the first 5 minutes of the freeze cycle or at the beginning of the next freeze cycle at any other time in the sequence of operation.

BIN FULL

Proximity switch open.



Mechanical bin control in the full right position supplies 15.8 K ohms at connector red K4 to shut unit down.

Note: Control board dip switch number 7 must be ON for this control to operate the unit.

3. CAPACATIVE PROXIMITY SWITCH: KM-1300NRF
This control is used only on the KM-1300NRF model which was designed tor 42 inch beverage dispenser applications. You will find it only on this specific model. The control works by sencing mass (in this case, ice) within 1/2 to 1

inch of the sensor. It also connects to the K4 red connector on the control board and has the same operating sequence as the mechanicam bin control.

The capacitive proximity control has 4 components including a sensor, bin control relay, 24VDC power supply and resistor harness. This resistor harness is slightly different from the harness used for the mechanical control. It will supply either 15.8 K ohms or 5.6 K ohms to the red K4 connector to control the unit.

As the sensor switches, the resistance value will change to either start up or shut down the unit through the control board K4 connector.
a) When no ice is present within 1/2~1 inch of the sensor end, the resistance at the K4 connector will be 5.6 K ohms and the unit will start. This is the bin empty signal.

b) When ice is present within 1/2~1 inch of the sensor, the resistance at the K4 connector will be 15.8 K ohms and the unit will shut down within the first 5 minutes of the freeze cycle. This is the bin full signal.

Note: Control board dip switch number 7 must be ON for this control to operate the unit.

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 since it is designed for dispenser applications. This control has a seperate DC power supply and an infrared sensor which is mounted to the base of the ice chute.

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, overamping, 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 start-up.

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. Thefreeze 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.

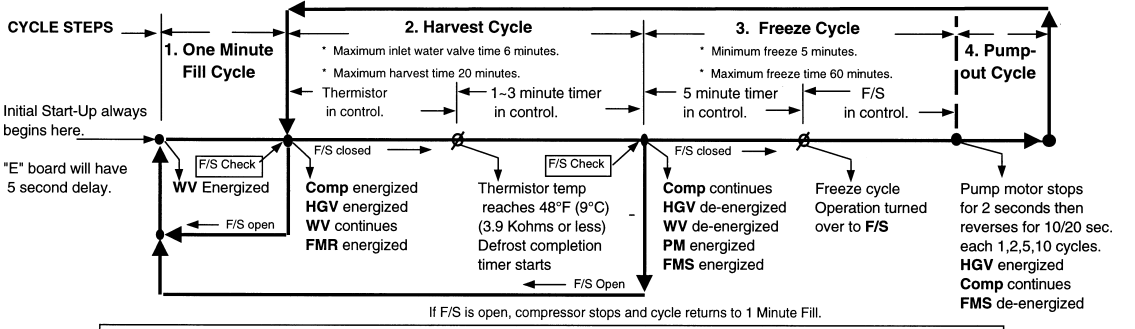
Pump out always occurs on the 2nd harvest after startup. The Alpine control board allows for adjustment for pump out to occur every cycle, or every 2nd, 5th or 10th cycle from this point.

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 watervalve 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; FMR - remote fan motor; FMS - self-contained fan motor; F/S - float switch; HGV - hot gas valve; PM - pump motor; WV - inlet water valve

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 start-up 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 likely 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 starts and drain valve solenoid opens to automatically drain the reservoir. In the CIRCULATE position, 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.

CONTROL BOARD FUSE

Beginning in May 2002 Hoshizaki began including a 10 Amp control fuse on KM models. This new feature was added to specific models as they were produced. The fuse is located in a fuse holder that is mounted on the control box and connected in the circuit supplying 115V to the control board 10-pin connector through pins 10 & 7.

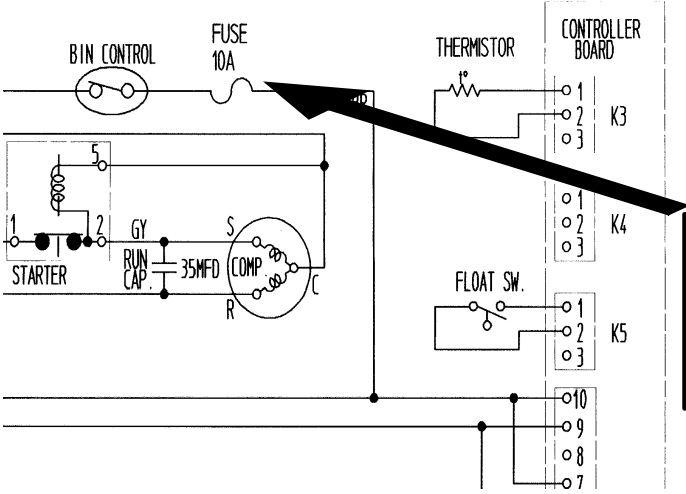
The purpose of this fuse is to protect the control board from damage in case of a short circuit in one of the components. This fuse will also offer some protection against external wiring problems, voltage spikes, and surges.

If the fuse is blown, you should isolate each individual component and check for shorts and grounded conditions. It is important that any external wiring connections, including the remote condenser circuit be checked before replacing this fuse. If the problem is not corrected, the fuse will blow again.

In general, you should check the component that connects to the pin that has a burnt trace on the back side of the board first. The fuse is a Bussman AGC 10 Amp 250VAC slow blow fuse, Hoshizaki part # **4A0893-07** and should only be replaced with one of identical size and type. A replacement fuse is taped to the control box.

Should you want to add this feature to an existing KM unit in the field, you can order fuse holder # 4A0892-01, fuse label # 4A2817-01 and fuse # 4A0893-07, through your local distributor. You should also make a note on the wiring diagram indicating the fuse addition, fuse size and type.

On the following page, you will find a typical wiring diagram showing where the fuse is wired in the circuit and the label that is included on the control box.



(Fuse Label)

CONTROL FUSE (10A)

If fuse blows, look for shorted component before replacing.

4A2817-01

COMPONENT CHECKS:

1.FLOAT SWITCH:

Check out the float switch with an ohm meter. When the float is up, the switch is closed. When the float is down, the switch is open.

STICKING FLOAT SWITCH:

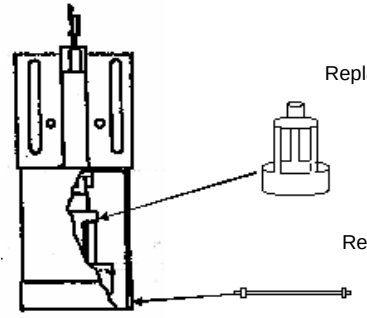
It is important to remember that the float switch is in the water circuit and is susceptible to scale buildup. This can cause the float to stick either up or down. If the float switch is sticking, it should be cleaned thoroughly with ice machine cleaner and checked for proper operation. If the float switch is defective, it should be replaced however, a dirty float switch is not considered a warranty item.

The symptoms of a sticking float are:

UP/CLOSED: 60 minute freeze cycle, larger cubes, and pump cavitates prior to harvest.
After 2 consecutive maximum freeze cycles, the unit will shut down on a 3 beep safety.
To reset this alarm, press the Alarm Reset button on the board with power ON.

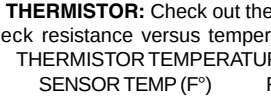
DOWN/OPEN: Unit shuts down on low water safety and water runs continuously.

Heavy scale can be difficult to remove from the float. The float is available as a replacement part as well as the float pin. If the housing is defective, replace the complete float switch assembly.



UNIVERSAL REPLACEMENT FLOAT SWITCH:
There are two styles of KM float switches. One has no hole in the outside pipe and one has a hole in the outside pipe. Float switch number **4A0886-02** can be used as a universal replacement on any KM unit. Simply seal off the small hole in the outside tube with silicone or a seal cap from 3/8" refrigeration tubing if it is not needed.

CONNECTOR BOOT:
The float switch boot will sometimes collect scale deposits since it is in a low area of the water circuit. The boot should be cleaned thoroughly during scheduled maintenance. Due to age and high amounts of chlorine in the local water supply, it can also deteriorate and may cup upward in the middle holding the float up . In this case, the boot should be replaced. Order part number **426799-01** as universal replacement part and cut the tube to length as needed.



Universal float boot
426799-01
(Cut tube to length)

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. The unit will shut down on a 2 beep safety after 2 consecutive 20 minute harvest cycles.

SHORTED: Unit locks out on manual reset high temperature 1 beep safety in this case.

High Temperature Safety: If evaporator reaches 127°F the thermistor signal (500 ohms) shuts down the unit on this manual reset. A 1 beep alarm will occur. ***To reset this alarm, press the Alarm 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. **CONTROL BOARD:** The electronic control board maintains the sequence of operation. There are 3 input connections to the board.
   1. The Float switch connects to the control board through the black K5 connector.
   2. The thermistor connects to the control board through the white K3 connector.
   3. If a mechanical bin control is used, it will connect to the K4 Red connector. (In this case, dip switch #7 must be set to the ON position.)

   The control transformer supplies 10.5 VAC control voltage to the K2 connection. The control board will not operate unless control voltage is present at K2. Proper control voltage is indicated by the Power OK red LED ON.

   The final connector on the control board is the K1 10-pin connector. This connector supplies 115 VAC into the control board switchin components or relay contacts and powers the individual components during the sequence of operation.

   The control board also has 10 dip switches that allow for board adjustments. These switches are set from the factory for proper operation and maximum efficiency. See control board adjustment chart for factory settings and adjustments.

   BOARD CHECKOUT: Before replacing a control board that does not show a visable defect and that you suspect is bad, always conduct the follow checkout procedure. This procedure will help you verify your diagnosis.

   1. Check the dip switch settings to assure that #3,4, 7, 8, 9, & 10 are in the factory setting. Output test switch S3 should also be OFF. Switches 1, 2, 4, & 5 are cleaning adjustments and the settings are flexible.

2. Turn the control switch to ICE and check for proper control voltage. If the Red LED is ON, the control voltage is good. If the Red LED is OFF, check the control transformer circuit. See checking control transformer.

3. Next, check the 115 volt input at the 10-pin connector. Check the brown wire at pin #10 to a white neutral wire for 115 volts. (Always choose a white neutral wire to establish a good neutral connection when checking voltages.) A jumper also feeds 115 volts into pin # 7. If no voltage is present, check the 115 volt supply circuit.

4. Check the board sequence using the S3 output test.
a) Turn the control switch to OFF and switch S3 ON.
b) Turn the Control switch to ICE and watch the lighting sequence of the 4 green LED's numbered 1, 4, 3, 2 from the board edge. The Red LED should light in about 3 seconds.
About 3 seconds later, LED 2 should light.
5 seconds later, Led 2 will go out and LED 3 will light.
5 seconds later, Led 3 will go out and LED 4 will light.
5 seconds later, Led 4 will go out and LED 1 will light.
5 seconds later, Led 1 will go out and LED 4 will light.
This sequence completes the output test and the unit is now in the 1 minute fill cycle.

Note: If the LED's light in a different sequence or the 5-second interval does not occur as explained, the control board is bad and should be replaced. If the test sequence is correct, turn the control switch OFF and switch S3 OFF. The S3 switch must remain in the OFF position during normal operation. The components will cycle during this test.

5. You have checked the board sequence and now need to check the output to each component through the K1 10-pin connector for 115 volts. Follow the wiring color code on the wiring diagram or use the generic drawing in the wiring diagram section to check each component for 115 volts through out the sequence and check from each pin to a white wire.

Note: Checking from pin to case ground can give a false reading in some instances. Always choose a white neutral wire to establish a good neutral connection when checking voltages.

4. BIN CONTROL:

Checkout for the bin control will vary depending on the model and control that is used.

a) **THERMOSTATIC BIN CONTROL:** The thermostatic bulb is mounted in the ice drop area to sense the ice buildup. To adjust the bin control, hold ice against the bulb while the unit is operating. You will find it easier to place the control switch to the wash position to check the bin control operation. It is easy to hear the pump motor stop when the bin control opens. The unit should shut down within a 10 second window when the control is adjusted properly. 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 adjustment 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 area. 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.

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". 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 flip the control switch to WASH. If the pump starts, the bin control is closed.

b) **MECHANICAL BIN CONTROL:** The mechanical bin control uses a moving actuator paddle to open and

closes a magnetic proximity switch. The control is connected to the red K5 connector on the control board through a resistor harness. As the proximity switch opens or closes, the resistance will change to signal the control board to start up or shut down. The control board will only respond to this change in resistance during the first 5 minutes of each freeze cycle.

Note: Dip switch # 7 must be in the ON position for this control. When dip switch # 7 is ON, the following 2 safeties will occur if the mechanical control fails:

4 Beeps = Short circuit on K5 bin control circuit.
5 Beeps = Open circuit on K5 bin control circuit.

To reset either safety, press the white reset button on the control board with the power ON.

CHECKOUT: To check this control with the unit running, you must be in the first 5 minutes of the freeze cycle. Turn the control switch to OFF and back to ICE. Allow the unit to cycle through the 1 minute fill cycle and the initial harvest cycle. Once the freeze cycle begins (LED 1 ON and when you hear the pump motor start you will know that the freeze cycle has begun), push the control paddle to the full right position and the unit should shut down within 3 seconds.

Another method to check this control is to unplug the wiring harness from the K5 Red connector and check the resistance at the end of the harness with an ohmmeter as the proximity switch opens and closes.

1) When the control paddle is hanging in the normal position, (Bin Empty) the resistance at the red K4 connector will be 7.9 K ohms.
2) When the control paddle is held to the full right position, (Bin Full) the resistance at the red K4 connector will be 15.8 K ohms.

c) **CAPACITIVE PROXMITY SWITCH:** This control is used on the KM-1300NRF model only. It operates with the same sequence as the mechanical control and has the same safeties. The difference is that this control has a separate 24VDC power supply and operates through a bin control relay.

CHECKOUT:
To check the operation of this control follow the same check out procedure as with the mechanical control. Instead of moving a paddle, you will place your hand within 1/2~1 inch of the sensor end. With the control switch in ICE, you should hear the bin control relay switch when you move your hand away from the sensor end and back again.

Check the resistance supplied at the Red K4 connector as you move your hand back and forth at the sensor end. Unplug the harness and use an ohmmeter to check the resistance. As the sensor switches, the resistance value will change as follows:
a) When your hand is away from the sensor end, the resistance at the K4 connector will be 5.6 K ohms. This is the bin empty signal.
b) When your hand is within 1/2~1 inch of the sensor, the resistance at the K4 connector will be 15.5 K ohms. This is the bin full signal.

If the relay does not switch or the resistance does not change, check the control wiring, relay operation, and the control power supply for 115 VAC input / 24 VAC output.

Note: Remember that dip switch # 7 must be ON and the control will have these safeties.
4 Beeps = Short circuit on K5 bin control circuit.
5 Beeps = Open circuit on K5 bin control circuit.

F/DCM BIN CONTROL:
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 except the F-450MAF-C 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 fuse will blow.

The F-450MAF-C has an infrared eye bin control. A separate power supply provides 24 VDC to the infrared eye. This power supply is mounted in a separate control box along with the bin control relay. The IR sensor is mounted on the outside of the chute base in a molded indentation. Two mounting holes mount the sensor to the chute base.

The sensor has two LED lamps that light to show that power is supplied. Since the voltage is DC, the sensor is polarity sensitive. The sensor has four wires. The orange wire is capped off and not used. The black wire connects to the coil of relay X7. The brown wire is the positive lead and connects to terminal J2-1 on the power supply. The blue wire is the negative lead and connects to terminal J2-2. If these wires are crossed, the sensor will not shut the unit down. The result will be that the spout will fill with ice causing higher gear motor current and the gear motor protect fuse will blow. In this case, the bin control is the first component to check.

The sensor has two adjustments that are factory set. The first adjustment sets the operation mode of the sensor. It must be in the D position. The second adjust the operating distance of the infrared beam at approximately 4". It should be set so that the white dot on the dial is at 12 o'clock (top dead center). These settings should not be altered.

5. KM CONTROL TRANSFORMER: The KM control transformer supplies 10.5 VAC to the control board through the K2 connector. This 115V/10.5V stepdown transformer is a heavy duty component with an internal thermal overload. The primary winding of this transformer will handle higher voltage without damage because the thermal overload will open to protect the winding in the case of improper supply voltage. The control board monitors the output voltage of this control transformer and provides automatic reset high and low voltage protection.

The red LED on the control board will not light if no control voltage is supplied. The 115V transformer primary circuit is supplied through the thermostatic bin control, control switch, high pressure switch, and low pressure switch if included. If either of these switches are open, there is not control voltage at the K2 connector and the unit will not operate.

The transformer secondary circuit includes the cleaning valve interlock switch. If this switch is open, no control voltage is supplied to the K2 connector so the unit will not operate. Always check the cleaning valve position and interlock switch if the red LED is off.

Because of the voltage protection, if the control transformer fails, it is important to use the correct OEM part.

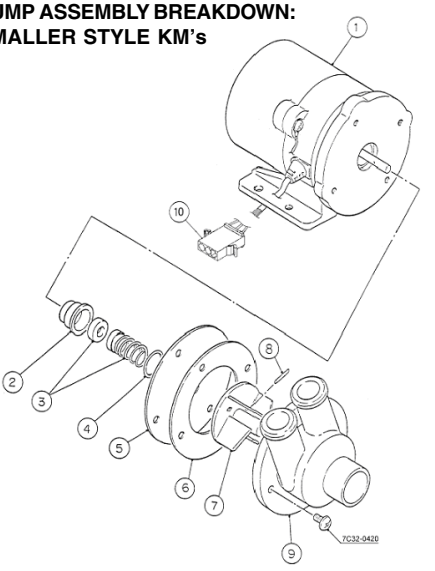
6. KM PUMP MOTOR ASSEMBLY:

The KM pump assembly has a dual winding PSC motor with an internal overload. The motor has a cast housing and sealed stainless steel roller bearings. No lubrication is required for these roller bearings.

If the pump motor fails, always repalce the pump motor capacitor. If other failures occur, the front end of the pump assembly is rebuildable. The mechanical seal is the most common failure part and can be replaced.

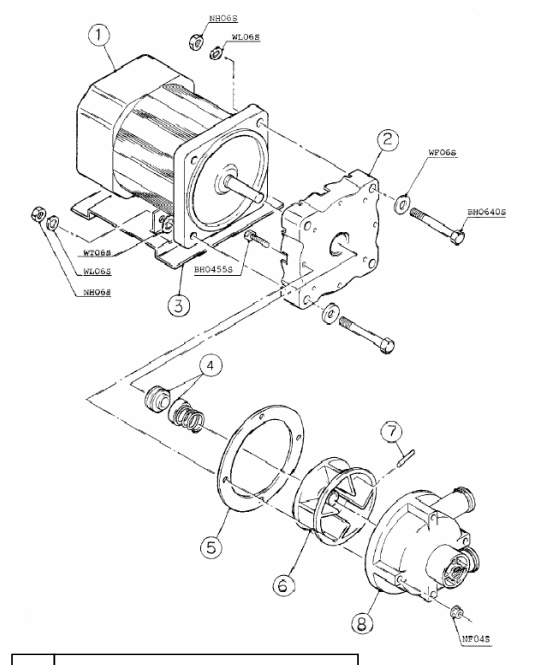
Following, are the assembly breakdown's for two generic pump assemblies. Use these drawings as a guide to reassemble a pump assembly that you are rebuilding.

PUMP ASSEMBLY BREAKDOWN:
SMALLER STYLE KM's



1	Motor	6	Pump Gasket
2	Retainer	7	Impeller
3	Mechanical Seal	8	Pin
4	"O" Ring	9	Pump Gasket
5	Plate		

LARGER STYLE KM's



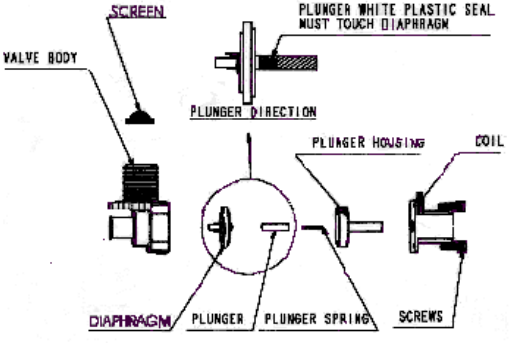
1	Motor
2	Pump Flange
3	Bracket
4	Mechanical Seal
5	Packing
6	Impeller
7	Pin
8	Pump Housing

7. INLET WATER VALVE: Hoshizaki uses inlet water valve solenoid to fill the reservoir for ice making. This constant duty solenoid valve is very reliable however, in areas of hard water and high levels of chlorine, the diaphragm is susceptible to failure.

Water quality is constantly changing and local municipalities are now adding higher levels of chlorine, chloramine, and chlorine dioxides to the water. These agents can damage rubber parts and effect the diaphragm life.

The diaphragm is made of rubber and ABS and has a bleed port on the inside ABS piece. This port allows the pressure to balance on the top and bottom of the diaphragm so that the valve will open and close properly with the spring pressure. If the rubber becomes dry and brittle or the bleed port is plugged with trash or debris, the valve will leak by. In this case the valve can be disassembled for cleaning and the diaphragm and inlet screen can be cleaned or replaced. It is important to remember that the warranty covers repair of defects and not cleaning. Should the valve be scaled or dirty, it should be cleaned and bill to the customer.

Below you will find an exploded view of the valve assembly and instructions for reassembly of the valve. When replacing the diaphragm and re-assembling the valvereplacing the diaphragm, it is important that the plunger is in the correct position. This plunger has a white plastic seal on one end and is metal on the other end. The white seal end of the plunger must be in contact with the diaphragm in order for the valve to work correctly.



Because of the different flow rates, it is important to use the correct OEM water valve when servicing a Hoshizaki ice maker. Use the following chart to identify the correct valve, diaphragm or inlet screen.

CKD VALVES

Replacement screen for all CKD valves # SP9200010

Part #	Vender #	Diaphragm #	Model #'s
3U0111-01	J248-030	SP8802237	KM-1200/1300/1600
3U0111-02	J248-032	"	KM-630/632/800/900
3U0111-03	J248-033	"	KM-450/452/500 KML-600
3U0111-04	J248-072	"	KM-250B_B KML-350/400/450
3U0150-01	J248-647	"	KM-280, KML-200
3U0145-01	J248-126	"	KM-250B_C/E/F/H
3U0152-01	J248-662	"	KM-150BAF
3U0133-01	J248-096	"	KM-250M_E/F
3U0136-01	J248-106	"	KM-1800/2000/2400
3U0085-01	J246-379	0000-0264	KM-451/1201
3U0070-02	J246-354	"	KM-601/631
3U0065-01	J246-086	"	F-251/250/441/450 F-650/1101/1001, F-1000M_B, F-2000M-E F-1000M_E >>Serial code F-0 DCM-231/230/240, DCM-451/450/701/700

EATON VALVE

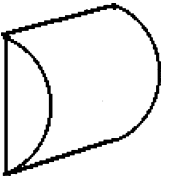
Replacement screen # SA0019

Part #	Vender #	Diaphragm #	Model #'s
4A0865-01	K-63310-01	SA0020	F-650/800, F-1000M_E F-1001, F-2000M_F DCM-270/500/750, DCM-450 Serial code F-1>>>

8. Check other components using a good quality multimeter normal electrical diagnostic procedures.

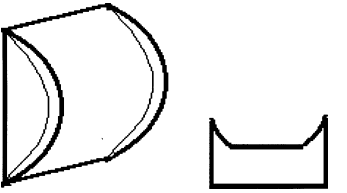
Diagnosing water problems.

Many common water related problems will cause cubes 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.

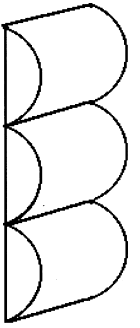
Average cube size 1/2" thick x
1 1/8" wide x 1 1/2" high.



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

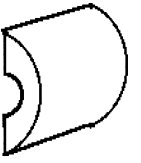
a) Bridging that occurs on all ribs of all evaporator plates is the result of excessive water in the reservoir. This is caused by the inlet water valve leaking by. Check for a plugged bleed port in the water valve diaphragm or a defective water valve.

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-150~KM-900?	[ ]	[ ]
9.	Only one water line per unit? If not _____	[ ]	[ ]
10.	Is water flow 5GPM for KM-1300 ~ 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. _____

PREVENTATIVE MAINTENENCE: Perventative Maintenance is the key to long equipment life and maximum efficiency. Hoshizaki recommends preforming the following maintenance steps at least annually. The PM frequency will depend on the local water quality and operating conditions.

PREVENTATIVE MAINTENANCE STEPS:

1. Clean the removable air filter. Hoshizaki air-cooled units include a front accessible, cleanable air filter. This filter collects dirt, dust, and grease can be cleaned with warm soapy water. Hoshizaki recommends cleaning the air filter twice a month or more as conditions dictate.

2. Service the external water filter system (if equipped) and check and clean inlet water valve screen.

3. Clean and sanitize the water system and bin. A cleaning label with detailed instructions is usually located on the inside of the front panel.

4. ***Check bearings for wear annually on Flaker/DCM.*** Pull the auger and inspect evaporator, auger, and bearing surfaces for wear. *More frequently bearing inspections may be needed in areas with poor water quality.*

5. Visually inspect the unit for loose wires, oil spots, water drips, etc.

6. Clean & wipe exterior with a soft cloth and neutral cleaner.

STAINLESS STEEL CLEANING:

Water quality is constantly changing and local municipalities are now adding higher levels of chlorine, chloramine, and sometimes, chlorine dioxides to reduce bacteria in the water. Stainless steel is a durable metal however it can be suseptable to corrosion from exposure to chlorine gas.

As ice forms on a cuber evaporator, chlorine outgases and the chlorine gas settles in the lowest point in the bin. This gas sticks to wet surfaces and around the mouth of the bin and forms hydrochloric acid. If this acid remains on the stainless steel, rust colored corrosion occurs. With enough exposure, the corrosion can pit and damage the stainless.

If rust colored corrosion is found, it should be cleaned throughly with a non-abrasive cleaner and protected with a stainless steel polish. Heavy corrosion will require some effort to remove and may require the use of a cleaning agent like “Brasso” or non-abrasive powdered cleaner like “Zud” or “Bon Ami”. Care should be taken so as not to scratch the stainless during the cleaning process.

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-150	5 Fl. Oz.	1 Gal.
DCM-240	6 Fl. Oz.	1 Gal.
KM-250B	7 Fl. Oz.	1.3 Gal.
KML-250/450	10.5 Fl. Oz.	2.0 Gal.
KM-280/500/630/900		
KML-600	16 Fl. Oz.	3.0 Gal.
KM-1300/1600	27 Fl. Oz.	5.0 Gal.
KM-2000/2400	38Fl. Oz.	7.0 Gal.
All Flakers &		
DCM-500/750	9.6 Fl. Oz.	1.6 Gal.

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

RECOMMENDED SANITIZING SOLUTION MIXTURE

MODEL	SANITIZER	WATER
KM-150	.5 Fl. Oz.	1 Gal.
KM-250B	.65 Fl. Oz.	1.3 Gal.
DCM-500/750	.82 Fl. Oz.	1.6 Gal.
KML-250/450	1 Fl. Oz.	2.0 Gal.
KM-280/500/630/900, KML-600,DCM-240	1.5 Fl. Oz.	3.0 Gal.
KM-1300/1600	3.5 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

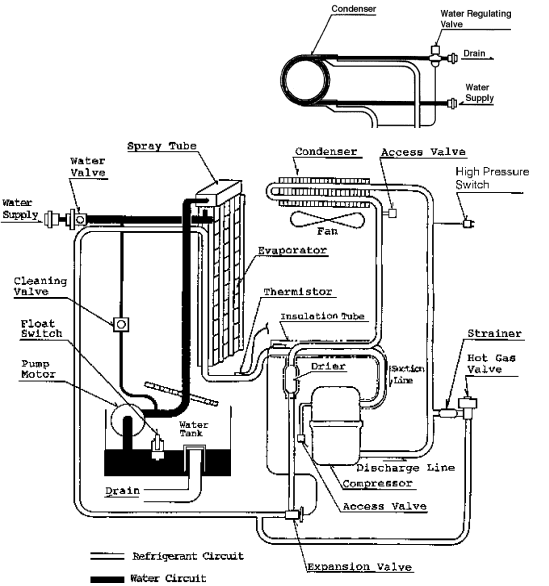
Once you calculate the production, check the incoming water temperature, and ambient condensing temperature at the cuber and cross reference to performance data included in this manual to see if the calculation falls within 10% of the specification.

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.

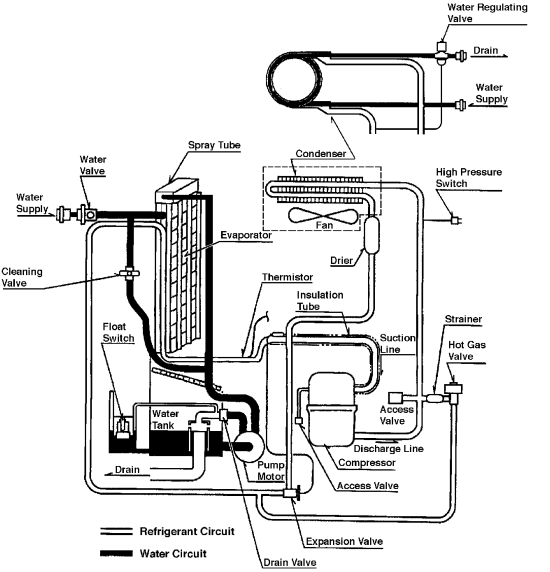
WATER AND REFRIGERATION CIRCUIT DRAWING REFERENCE CHART

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

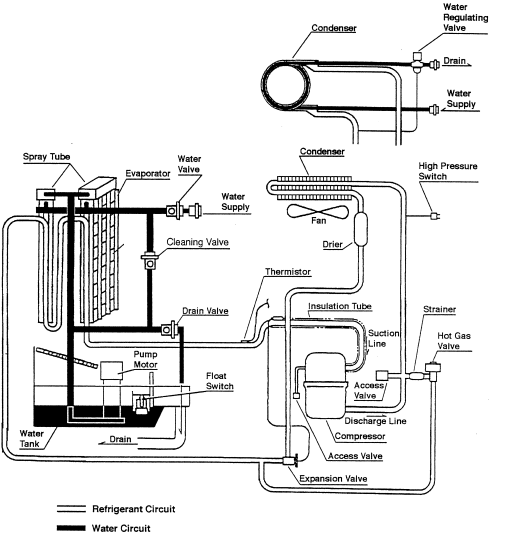
KM-150BAF, BWF
KM-150BAF-E, BWF-E



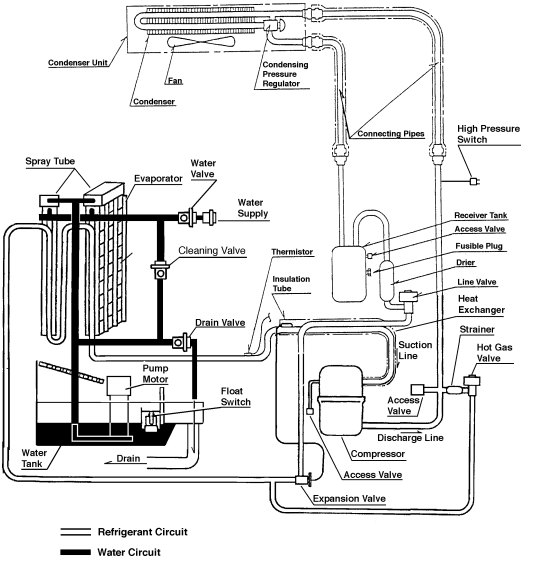
KM-280MAF/H, KM-280MWF/H
KM-280MAF/H-E, KM-280MWF/H-E



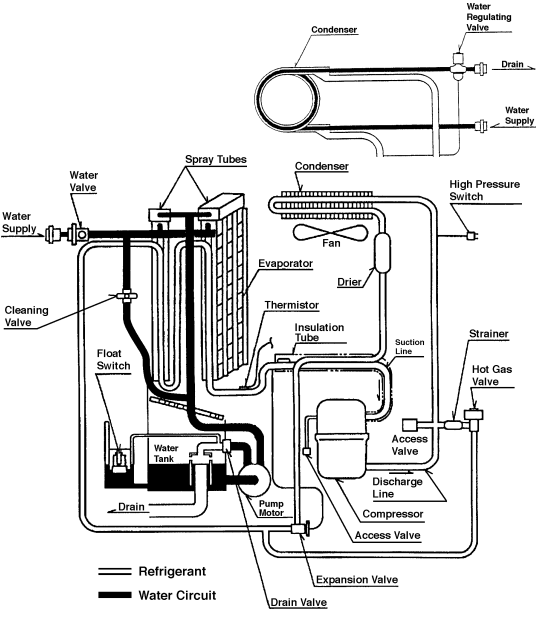
KML-250MAF/H, KML-250MWF/H
KML-350MAF/H, KML-350MWF/H
KML-450MAF/H, KML-450MWF/H
KML-600MAF/H, KML-600MWF/H



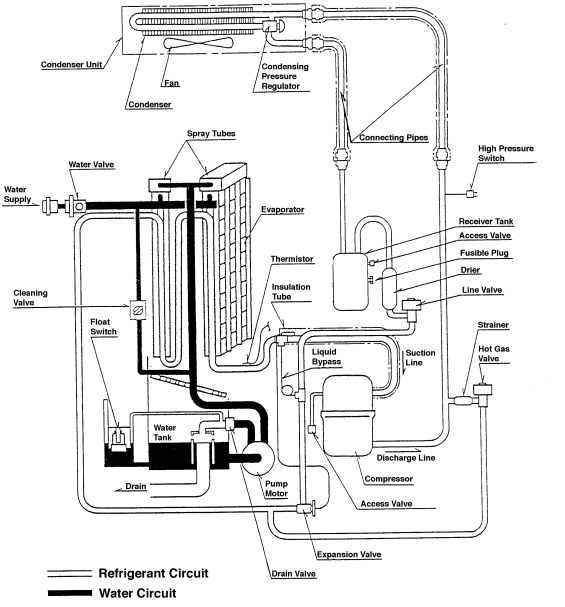
KML-600MRF/H


Condenser Unit
Fan
Condenser
Condensing Pressure Regulator
Connecting Pipes
High Pressure Switch
Spray Tube
Evaporator
Water Valve
Water Supply
Cleaning Valve
Thermistor
Insulation Tube
Drain Valve
Receiver Tank
Access Valve
Fusible Plug
Drier
Line Valve
Heat Exchanger
Strainer
Hot Gas Valve
Suction Line
Pump Motor
Float Switch
Access Valve
Discharge Line
Compressor
Access Valve
Expansion Valve
Water Tank
Drain
Refrigerant Circuit
Water Circuit

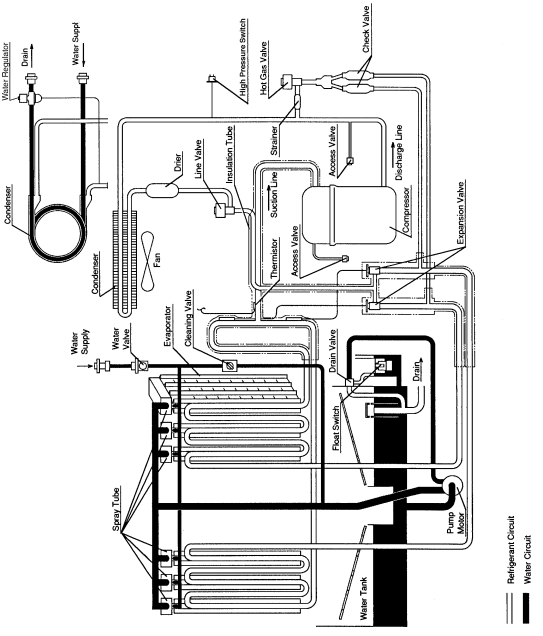
KM-500MAF/H, KM-500MWF/H
KM-500MAF/H-E, KM-500MWF/H-E
KM-630MAF/H, KM-630MWF/H
KM-630MAF/H-E, KM-630MWF/H-E
KM-900MAF/H, KM-900MWF/H



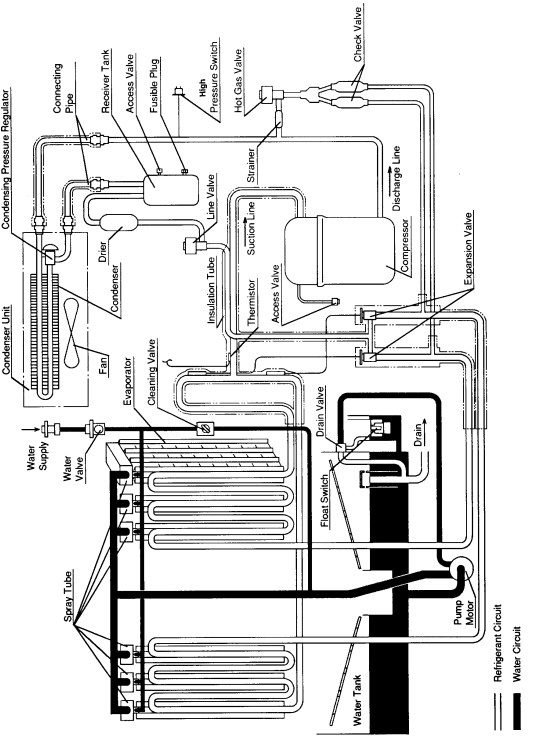
KM-500 MRF/H
KM-630 MRF/H
KM-900 MRF/H



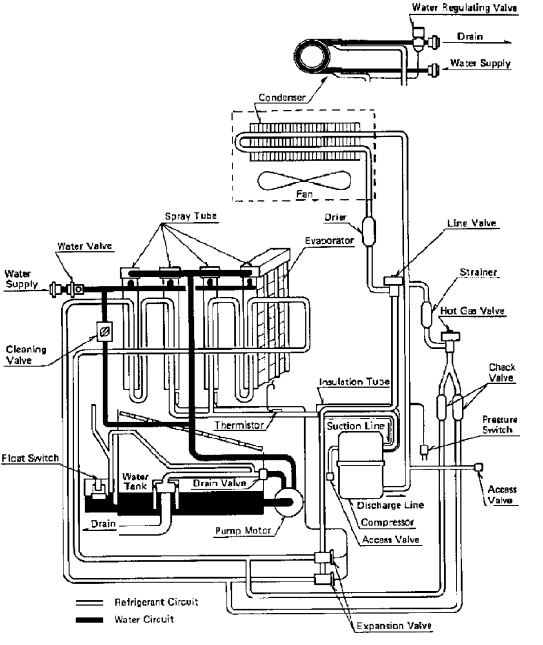
KM-1300SAF/H, SAF/H-E
KM-1300SWF/H, SWF/H-E
KM-1600SWF/H



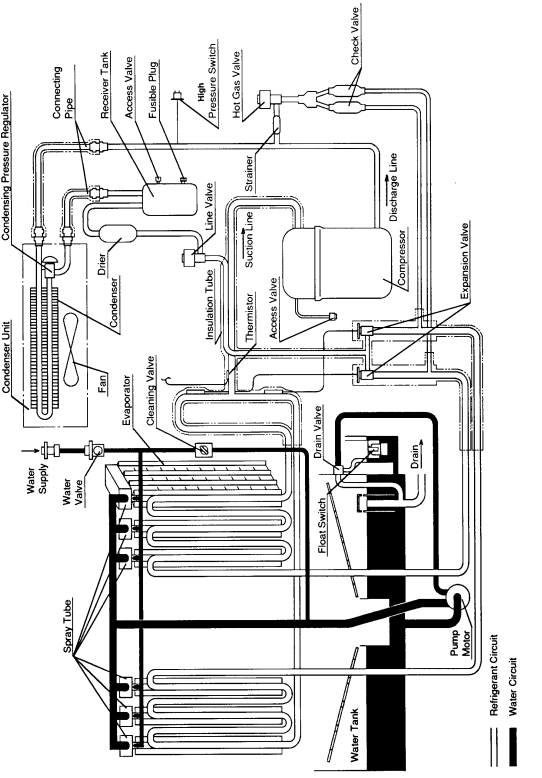
KM-1300 NRF
KM-1300SRF/H
KM-1600SRF/H



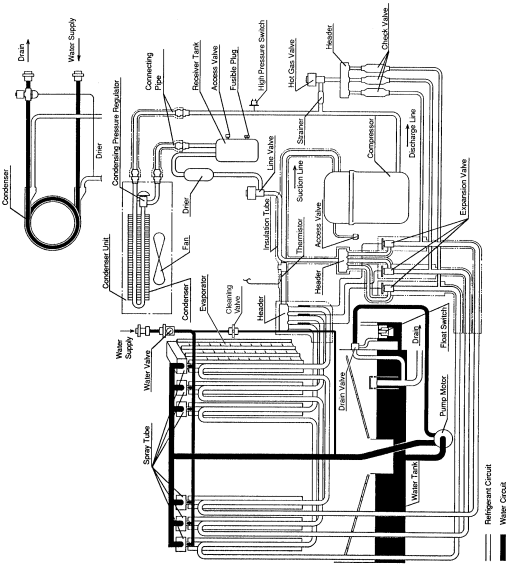
KM-1300MAF/H, MWF/H



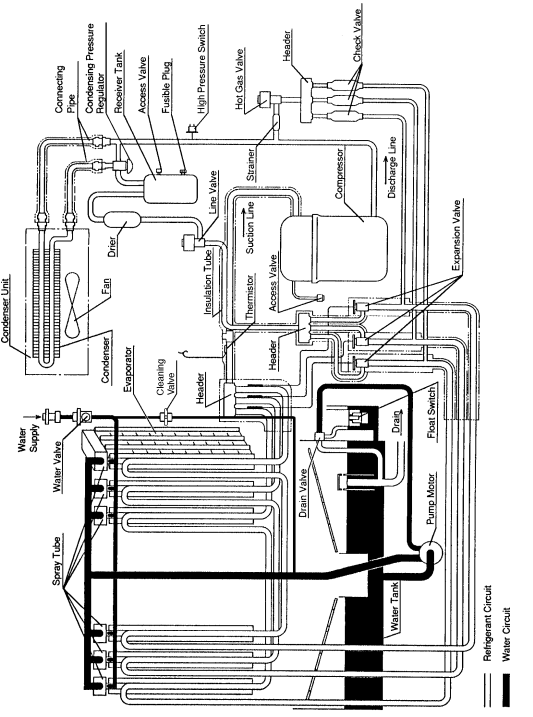
KM-1600MRF/H


Condensing Pressure Regulator
Connecting Pipe
Receiver Tank
Access Valve
Fusible Plug
High Pressure Switch
Hot Gas Valve
Check Valve
Strainer
Discharge Line
Line Valve
Suction Line
Drier
Condenser
Compressor
Insulation Tube
Thermistor
Access Valve
Expansion Valve
Condenser Unit
Fan
Evaporator
Cleaning Valve
Drain Valve
Water Supply
Water Valve
Drain
Float Switch
Spray Tube
Pump Motor
Water Tank
Refrigerant Circuit
Water Circuit

KM-1800SAH, SAH3
KM-2000SWF/H, KM-2000SRF/H



KM-2400 SRF/H


Condenser Unit
Fan
Condenser
Evaporator
Cleaning Valve
Header
Water Supply
Water Valve
Spray Tube
Drier
Connecting Pipe
Condensing Pressure Regulator
Receiver Tank
Access Valve
Fusible Plug
High Pressure Switch
Line Valve
Insulation Tube
Thermistor
Header
Access Valve
Suction Line
Strainer
Hot Gas Valve
Header
Check Valve
Compressor
Discharge Line
Expansion Valve
Drain
Float Switch
Drain Valve
Pump Motor
Water Tank
Refrigerant Circuit
Water Circuit

R-404A PERFORMANCE DATA

MODEL: **KM-150B_F** Supply Voltage: 115-120/60/1

Total Amperage (Compressor RLA): BAF 8A (6A) BWF: 7.5A (6A) Ice Production per cycle: 2.6 Lbs, 130 pcs.

Water Consumption for water cooled Condenser: 70/50 (21/9) 134 Gal/24 hr: 90/70 (32/21) 326 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs.)	50 / 9	150	141	135	134	124	130	100	128
	70 / 21	137	129	122	113	114	100	97	99
	90 / 32	124	122	108	112	100	96	95	93
Cycle Time Freeze	50 / 9	25	25	30	26	35	26	38	27
	70 / 21	26	26	32	29	34	31	39	31
	90 / 32	28	29	35	32	40	33	43	36
Cycle Time Harvest	50 / 9	3.5	3.3	3	3	3	3	3	3
	70 / 21	3	3	3	3	3	3	3	3
	90 / 32	3	3	3	3	3	3	3	2.8
Pressure High Side	50 / 9	215	278	245	278	260	279	305	280
	70 / 21	230	279	250	279	254	280	315	281
	90 / 32	230	282	265	284	275	284	310	288
Pressure Suction	50 / 9	35	48	36	48	37	48	38	49
	70 / 21	37	48	38	49	38	49	38	49
	90 / 32	38	49	38	50	38	50	39	51

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

R-404A PERFORMANCE DATA

MODEL: **KM-150B_F- E** Supply Voltage: 220-240/50/1

Total Amperage (Compressor RLA): BAF-E 5A (3.8A) BWF-E: 5.5A (3.8A) Ice Production per cycle: 2.6 Lbs, 130 pcs.

Water Consumption for water cooled Condenser: 70/50 (21/9) 132 Gal/24 hr: 90/70 (32/21) 243 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs./kg.)	50 / 9	138 / 63	150 / 68	130 / 59	143 / 65	127 / 58	141 / 64	125 / 57	139 / 63
	70 / 21	127 / 58	141 / 64	113 / 51	129 / 59	101 / 46	119 / 54	98 / 44	116 / 53
	90 / 32	114 / 52	129 / 59	101 / 46	118 / 54	88 / 40	108 / 49	76 / 34	97 / 44
Cycle Time Freeze	50 / 9	25	22	27	23	28	24	29	25
	70 / 21	28	24	32	26	35	28	36	29
	90 / 32	33	26	37	29	41	30	46	33
Cycle Time Harvest	50 / 9	3	3.2	3	3	3	3	3	3
	70 / 21	3	3	3	3	3	3	3	3
	90 / 32	3	3	3	3	2.5	3	2.5	2.7
Pressure High Side psig / kg/cm²G	50 / 9	260 / 18.3	280 / 19.7	276 / 19.4	281 / 19.8	281 / 19.7	281 / 19.8	282 / 19.9	282 / 19.8
	70 / 21	281 / 19.7	281 / 19.8	308 / 21.6	283 / 19.9	330 / 23.2	285 / 20.0	335 / 23.2	286 / 20.1
	90 / 32	303 / 21.3	284 / 20.0	326 / 23.0	286 / 20.1	351 / 24.7	288 / 20.2	370 / 26.0	290 / 20.4
Pressure Suction psig / kg/cm²G	50 / 9	45 / 3.2	45 / 3.2	46 / 3.2	46 / 3.2	46 / 3.2	46 / 3.2	46 / 3.2	46 / 3.2
	70 / 21	46 / 3.2	46 / 3.2	47 / 3.3	47 / 3.3	47 / 3.4	48 / 3.4	47 / 3.4	48 / 3.4
	90 / 32	47 / 3.3	48 / 3.4	48 / 3.4	49 / 3.5	49 / 3.4	50 / 3.5	50 / 3.5	52 / 3.7

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

PERFORMANCE DATA

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

Total Amperage (Compressor RLA): Air: 10.6A (9.2A) Water: 9.5A (8.5A) Ice Production per cycle: 3.98Lbs, 200 pcs.

Water Consumption for water cooled Condenser: 70/50 (21/9) 321 Gal/24 hr: 90/70 422.5 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs.)	50 / 9	236	222	226	214	222	211	215	210
	70 / 21	222	211	204	197	189	185	183	182
	90 / 32	197	199	176	186	161	173	136	163
Cycle Time Freeze	50 / 9	21	22	22	22	22	23	23	23
	70 / 21	22	23	24	24	26	25	27	25
	90 / 32	26	24	29	26	30	27	34	29
Cycle Time Harvest	50 / 9	3.3	4.5	3.0	4.2	2.9	4.1	2.6	3.6
	70 / 21	2.9	4.1	2.4	3.6	2.0	3.1	2.0	3.1
	90 / 32	2.8	3.8	2.3	3.5	2.0	3.0	2.0	2.8
Pressure High Side	50 / 9	261	260	275	264	279	266	283	270
	70 / 21	279	266	303	274	323	280	328	281
	90 / 32	301	270	324	275	345	283	365	285
Pressure Suction	50 / 9	43	47	44	47	44	47	44	48
	70 / 21	44	47	45	48	46	48	46	48
	90 / 32	46	48	47	49	48	49	50	50

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

PERFORMANCE DATA

MODEL: **KM-280M_F & H**

Supply Voltage: 115/60/1

Total Amperage (Compressor RLA): Air: 11.6A (10.2A) Water: 10A (9.2A)

Ice Production per cycle: 4.7 Lbs, 240 pcs.

Water Consumption for water cooled Condenser: 70/50 (21/9) 418 Gal/24 hr: 90/70 396 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs.)	50 / 9	269	252	251	243	245	240	242	238
	70 / 21	245	240	214	225	188	212	182	209
	90 / 32	219	226	192	211	164	197	141	184
Cycle Time Freeze	50 / 9	22	22	24	23	25	24	26	24
	70 / 21	25	24	28	25	31	26	32	27
	90 / 32	30	25	34	27	37	28	42	30
Cycle Time Harvest	50 / 9	3.0	3.5	2.8	3.3	2.7	3.2	2.5	3.2
	70 / 21	2.7	3.2	2.3	2.8	2.0	2.6	2.0	2.5
	90 / 32	2.6	3.0	2.4	2.8	2.0	2.4	2.0	2.4
Pressure High Side	50 / 9	236	279	254	279	259	279	262	281
	70 / 21	259	279	290	280	316	280	321	281
	90 / 32	285	283	312	286	339	285	361	290
Pressure Suction	50 / 9	45	46	49	48	50	48	50	49
	70 / 21	50	48	56	51	61	53	62	54
	90 / 32	54	52	60	55	65	57	69	61

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

PERFORMANCE DATA

MODEL: **KM-280M_F-E & KM-280MAH-E** Supply Voltage: 220-240/50/1

Total Amperage (Compressor RLA): MAF-E / H-E 5.1A (4.3A) MWF-E: 5A (3.8A) Ice Production per cycle: 4.7 Lbs, 240 pcs.

Water Consumption for water cooled Condenser: 70/50 (21/9) 163 Gal/24 hr: 90/70 (32/21) 290 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs./kg.)	50 / 9	258 / 117	230 / 104	237 / 108	222 / 100	231 / 105	219 / 99	229 / 104	215 / 97
	70 / 21	231 / 105	219 / 99	196 / 89	204 / 93	166 / 75	192 / 87	160 / 73	188 / 85
	90 / 32	204 / 93	201 / 91	175 / 79	185 / 84	142 / 64	173 / 79	120 / 54	156 / 71
Cycle Time Freeze	50 / 9	20	22	22	23	23	23	25	24
	70 / 21	23	23	28	24	31	25	33	26
	90 / 32	30	25	35	27	39	28	45	30
Cycle Time Harvest	50 / 9	3.1	3.2	3.1	3.2	3.1	3.1	3.0	3.1
	70 / 21	3.1	3.1	3.0	3.0	2.9	2.9	2.9	2.9
	90 / 32	3.0	3.1	2.5	3.0	2.9	2.9	2.9	2.9
Pressure High Side psig / kg/cm²G	50 / 9	245 17.2	275 / 19.3	262 / 18.4	278 / 19.6	267 / 18.8	279 / 29.6	269 / 18.9	282 / 19.8
	70 / 21	267 / 18.8	279 / 19.6	296 / 20.8	285 / 20.1	320 / 22.5	290 / 20.4	325 / 22.8	292 / 20.6
	90 / 32	290 / 20.4	289 / 20.3	315 / 22.1	296 / 20.8	341 / 24.0	300 / 21.1	360 / 25.3	30 / 21.8
Pressure Suction psig / kg/cm²G	50 / 9	55 / 3.9	50 / 3.5	57 / 4.0	52 / 3.7	58 / 4.1	53 / 3.7	58 / 4.1	54 / 3.8
	70 / 21	58 / 4.1	53 / 3.7	62 / 4.3	57 / 4.0	65 / 4.6	60 / 4.2	66 / 4.6	61 / 4.3
	90 / 32	61 / 4.3	57 / 4.0	64 / 4.5	61 / 4.3	68 / 4.8	64 / 4.5	70 / 4.9	68 / 4.8

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

PERFORMANCE DATA

MODEL: **KML-250M_H** Supply Voltage: 115/60/1

Total Amperage (Compressor RLA): Air 8.2A (7A) Water 7.5A (6.5A) Ice Production per cycle: 6.6 Lbs, 360 pcs.

Water Consumption for water cooled Condenser: 70/50 398 Gal/24 hr: 90/70 511 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs.)	50 / 9	307	314	289	306	284	304	255	301
	70 / 21	284	304	253	290	227	279	224	276
	90 / 32	267	290	245	277	215	265	204	252
Cycle Time Freeze	50 / 9	27	28	29	29	29	29	33	29
	70 / 21	29	29	32	30	35	31	36	31
	90 / 32	32	31	35	32	38	33	41	35
Cycle Time Harvest	50 / 9	4.7	4.1	4.1	3.7	4.0	3.6	3.2	3.4
	70 / 21	4.0	3.6	3.0	3.0	2.2	2.5	2.2	2.4
	90 / 32	3.7	3.3	3.1	2.8	2.1	2.2	2.0	2.0
Pressure High Side	50 / 9	247	280	261	280	266	280	295	282
	70 / 21	266	280	290	280	311	280	318	284
	90 / 32	293	284	319	286	340	285	366	290
Pressure Suction	50 / 9	58	61	59	61	59	61	61	62
	70 / 21	59	61	61	62	62	62	62	62
	90 / 32	60	63	62	63	63	64	64	65

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

R-404A PERFORMANCE DATA

MODEL: **KML-350M_F & H** ***MWH with SN up to M20060C** Supply Voltage: 115/60/1

Total Amperage (Compressor RLA): Air 11A (9A) Water 10.5A (9A) Ice Production per cycle: 7.3 Lbs, 360 pcs.

Water Consumption for water cooled Condenser: 70/50 240 Gal/24 hr: 90/70 469 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs.)	50 / 9	383	358	368	351	364	349	354	340
	70 / 21	364	349	338	336	317	326	308	319
	90 / 32	329	324	300	305	279	297	245	271
Cycle Time Freeze	50 / 9	25	28	26	29	27	29	28	30
	70 / 21	27	29	29	30	31	31	32	32
	90 / 32	30	31	33	33	35	34	38	37
Cycle Time Harvest	50 / 9	4.0	2.8	3.6	2.6	3.4	2.6	2.6	2.6
	70 / 21	3.4	2.6	2.6	2.3	2.0	2.0	2.0	2.0
	90 / 32	3.2	2.5	2.8	2.3	2.0	2.0	2.0	2.0
Pressure High Side	50 / 9	240	280	256	280	261	280	284	282
	70 / 21	261	280	288	280	310	280	315	284
	90 / 32	285	284	310	286	333	290	355	290
Pressure Suction	50 / 9	48	57	50	57	50	58	51	58
	70 / 21	50	58	53	58	55	59	56	59
	90 / 32	53	45	56	59	59	60	62	60

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

R-404A PERFORMANCE DATA

MODEL: **KML-350MWH With SN M30061E and after** Supply Voltage: 115/60/1

Total Amperage (Compressor): 10A (9A) Ice Production per cycle: 7.3 lbs. 360 pcs.

Water Consumption for water cooled Condenser: 70/50 (21/9) 397 Gal/24 hr: 90/70 489 Gal/24 hr.

Ambient Temp (F°)		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	Water temp F°C°	Water	Water	Water	Water
Production 24 hours (lbs.)	50 / 9	354	347	345	341
	70 / 21	345	334	324	320
	90 / 32	330	326	207	291
Cycle Time Freeze	50 / 9	25	25	26	26
	70 / 21	26	26	27	27
	90 / 32	27	29	29	31
Cycle Time Harvest	50 / 9	3.1	2.9	2.8	2.4
	70 / 21	2.8	2.4	2.0	2.0
	90 / 32	2.7	2.4	2.0	2.0
Pressure High Side	50 / 9	280	280	280	282
	70 / 21	280	280	280	284
	90 / 32	284	287	290	291
Pressure Suction	50 / 9	54	55	55	55
	70 / 21	55	56	57	57
	90 / 32	56	57	58	59

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

PERFORMANCE DATA

MODEL: **KML-450M_F & H** ***MWH with SN up to M10530** 76D

Supply Voltage: 115/60/1

Total Amperage (Compressor RLA): Air 13.3A (11.6A) Water 12A (10.6A)

Ice Production per cycle: 6.6 Lbs, 360 pcs.

Water Consumption for water cooled Condenser: 70/50 398 Gal/24 hr:

90/70 694 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs.)	50 / 9	432	447	408	434	400	430	390	425
	70 / 21	400	430	359	408	324	390	321	384
	90 / 32	381	406	353	384	313	365	302	342
Cycle Time Freeze	50 / 9	20	19	21	23	22	24	23	24
	70 / 21	22	24	24	31	26	36	26	37
	90 / 32	23	28	25	32	27	39	28	41
Cycle Time Harvest	50 / 9	3.0	2.8	2.8	2.6	2.7	2.6	2.6	2.6
	70 / 21	2.7	2.6	2.3	2.3	2.0	2.0	2.0	2.0
	90 / 32	2.6	2.5	2.4	2.3	2.0	2.0	2.0	2.0
Pressure High Side	50 / 9	250	280	270	280	276	280	284	283
	70 / 21	276	280	311	280	340	280	342	284
	90 / 32	293	286	316	289	350	290	360	295
Pressure Suction	50 / 9	42	40	45	41	46	41	46	43
	70 / 21	46	42	52	43	56	45	56	46
	90 / 32	49	45	52	48	58	50	59	54

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

R-404A PERFORMANCE DATA

MODEL: **KML-450MWH With SN M20531D and after** Supply Voltage: 115/60/1

Total Amperage (Compressor): 12A (10.6A) Ice Production per cycle: 6.6 lbs. 360 pcs.

Water Consumption for water cooled Condenser: 70/50 (21/9) 547 Gal/24 hr: 90/70 728 Gal/24 hr.

Ambient Temp (F°)		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	Water temp F°C°	Water	Water	Water	Water
Production 24 hours (lbs.)	50 / 9	433	428	426	417
	70 / 21	426	417	409	402
	90 / 32	402	385	380	354
Cycle Time Freeze	50 / 9	20	20	21	21
	70 / 21	21	21	22	22
	90 / 32	22	23	24	25
Cycle Time Harvest	50 / 9	3.5	3.2	3.1	3.2
	70 / 21	3.1	2.5	2.0	2.0
	90 / 32	2.9	2.6	2.0	2.0
Pressure High Side	50 / 9	280	280	280	283
	70 / 21	280	280	280	284
	90 / 32	286	289	290	295
Pressure Suction	50 / 9	47	47	48	50
	70 / 21	48	48	49	50
	90 / 32	52	55	55	60

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

PERFORMANCE DATA

MODEL: **KM-500M_F & H *MWH with SN up to M30961D** Supply Voltage: 115/60/1

Total Amperage (Compressor RLA): Air: 15A (11A) Water: 12A (10.5A) Remote: 16A (11A) Ice Production per cycle: 9.5 Lbs, 480 pcs.

Water Consumption for MWE Condenser: 70 / 50 (21/9) 380 Gal/24 hr: 90 / 70 (32/21) 723 Gal/24 hr.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	499	463	517	451	451	499	468	448	493	461	442	480
	70 / 21	468	448	493	428	428	462	393	411	436	384	405	425
	90 / 32	428	423	449	401	401	411	353	385	387	314	361	342
Cycle Time Freeze	50 / 9	27	29	26	30	30	27	29	30	27	30	31	28
	70 / 21	29	30	27	32	32	29	33	33	31	35	33	32
	90 / 32	33	32	31	34	34	33	38	35	34	43	37	38
Cycle Time Harvest	50 / 9	3.9	3.9	3.4	3.5	3.6	3.1	3.3	3.5	3.0	3.3	3.5	3.0
	70 / 21	3.3	3.5	3.0	2.6	2.9	2.5	2.0	2.5	2.1	2.0	2.4	2.0
	90 / 32	3.1	3.2	2.8	2.5	2.8	2.5	2.0	2.3	2.0	2.0	2.1	2.0
Pressure High Side	50 / 9	244	280	230	259	280	241	263	281	245	266	284	249
	70 / 21	263	281	245	289	281	264	310	282	280	315	284	285
	90 / 32	285	287	265	308	291	284	331	290	300	350	298	319
Pressure Suction	50 / 9	49	53	47	51	54	47	52	54	50	52	54	50
	70 / 21	52	54	50	56	56	53	59	57	56	59	57	56
	90 / 32	54	55	52	57	57	55	61	58	58	62	59	60

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

R-404A PERFORMANCE DATA

MODEL: **KM-500MWH With SN M30961D and after** Supply Voltage: 115/60/1

Total Amperage (Compressor): 12A (10.5A) Ice Production per cycle: 9.5 lbs. 480 pcs.

Water Consumption for water cooled Condenser: 70/50 (21/9) 661 Gal/24 hr: 90/70 832 Gal/24 hr.

Ambient Temp (F°)		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	Water temp F°C°	Water	Water	Water	Water
Production 24 hours (lbs.)	50 / 9	480	473	471	458
	70 / 21	471	458	448	439
	90 / 32	439	417	410	375
Cycle Time Freeze	50 / 9	27	27	28	28
	70 / 21	28	28	29	30
	90 / 32	30	31	32	34
Cycle Time Harvest	50 / 9	3.9	3.5	3.3	2.8
	70 / 21	3.3	2.6	2.0	2.0
	90 / 32	3.2	2.8	2.0	2.0
Pressure High Side	50 / 9	280	281	281	286
	70 / 21	281	283	285	285
	90 / 32	288	293	293	301
Pressure Suction	50 / 9	50	51	52	52
	70 / 21	52	54	56	56
	90 / 32	54	56	58	60

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

PERFORMANCE DATA

MODEL: **KM-500MAF-E / H-E**

Supply Voltage: 220-240/50/1

Total Amperage (Compressor RLA): 5.5A (4A)

Ice Production per cycle: 9.5 Lbs, 480 pcs.

Ambient Temp F°/C°		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	Water Temp (F°)	Air	Air	Air	Air
Production 24 hours (lbs.)	50/9	480 / 218	454 / 206	446 / 202	438 / 199
	70/21	446 / 202	402 / 182	365 / 166	355 / 161
	90/32	403 / 183	360 / 163	321 / 146	281 / 127
Cycle Time Freeze	50/9	29	31	32	33
	70/21	32	36	39	40
	90/32	37	41	44	50
Cycle Time Harvest	50/9	3	3	3	3
	70/21	3	3	2.9	2.8
	90/32	3	3	2.9	2.8
Pressure High Side	50/9	250 / 17.6	263 / 18.5	268 / 18.8	273 / 19.2
	70/21	268 / 18.8	291 / 20.4	310 / 21.8	316 / 22.2
	90/32	293 / 20.6	316 / 22.3	336 / 23.6	360 / 25.3
Pressure Suction	50/9	50 / 3.5	52 / 3.7	53 / 3.7	53 / 3.7
	70/21	53 / 3.7	56 / 3.9	59 / 4.1	59 / 4.2
	90/32	55 / 3.8	57 / 4.0	61 / 4.3	62 /4.4

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

PERFORMANCE DATA

MODEL: **KML-600M_F / H** Supply Voltage: 208-230/60/1 (3 wire with neutral for 115V)

Total Amperage (Compressor RLA.): Air 11A (9.5A), Water 9A (8.3 A), Remote: 11. 9A (9.8 A) Production per cycle: 10lbs. 480 pcs.

Water consumption for water cooled cond: 70/50 (21/ 9) 458 Gal/24 hr. 90/70 (32/21) 844 Gal/24 hr.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	631	572	635	605	553	616	575	547	610	540	535	602
	70 / 21	596	547	610	551	515	577	513	488	550	499	486	541
	90 / 32	542	534	574	492	513	540	455	481	512	401	475	478
Cycle Time Freeze	50 / 9	20	21	20	21	21	20	22	22	20	24	22	21
	70 / 21	21	22	20	23	22	21	24	23	21	25	23	21
	90 / 32	24	23	21	26	24	23	27	25	23	30	26	25
Cycle Time Harvest	50 / 9	3.5	3.9	3.5	3.2	3.6	3.3	2.9	3.5	3.2	2.5	3.5	3.2
	70 / 21	3.1	3.5	3.2	2.5	2.9	2.8	2.0	2.5	2.5	2.0	2.4	2.4
	90 / 32	2.9	3.2	2.9	2.6	2.8	2.6	2.0	2.2	2.2	2.0	2.0	2.0
Pressure High Side	50 / 9	250	270	220	266	272	229	280	272	232	310	275	239
	70 / 21	271	272	232	298	275	247	320	278	260	328	280	266
	90 / 32	302	280	255	332	285	274	354	287	286	385	295	310
Pressure Suction	50 / 9	38	35	32	40	36	34	41	36	35	43	39	37
	70 / 21	41	36	35	45	37	39	48	38	42	49	40	44
	90 / 32	47	42	41	51	46	46	54	46	49	60	53	55

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

PERFORMANCE DATA

MODEL: **KM-630M_F & H *MWH with SN up to M10961D** Supply Voltage: 208-230/60/1 (3 wire with neutral for 115V)

Total Amperage (Compressor RLA.): Air: 7.5A (6A), Water: 6.5A (6A), Remote: 9.5A (6A) Production per cycle: 14.3 lbs. 720 pcs.

Water consumption for water cooled cond: 70/50 (21/ 9) 458 Gal/24 hr. 90/70 (32/21) 844 Gal/24 hr.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	630	619	600	580	602	571	573	596	562	564	589	554
	70 / 21	573	596	562	532	566	512	499	541	470	489	533	459
	90 / 32	531	563	514	491	533	466	457	507	422	418	476	378
Cycle Time Freeze	50 / 9	31	31	31	33	32	33	33	32	34	34	33	35
	70 / 21	33	32	34	36	34	37	39	36	40	39	37	41
	90 / 32	37	35	38	40	37	41	43	39	44	47	41	48
Cycle Time Harvest	50 / 9	4.1	4.2	4.4	3.7	3.8	4.0	3.6	3.7	3.8	3.7	3.7	3.9
	70 / 21	3.6	3.7	3.8	2.9	3.0	3.0	2.4	2.5	2.4	2.4	2.4	2.4
	90 / 32	3.3	3.3	3.5	2.8	2.9	2.9	2.2	2.2	2.2	2.0	2.0	2.0
Pressure High Side	50 / 9	232	280	245	238	280	262	240	280	267	249	284	272
	70 / 21	240	280	267	251	280	267	260	280	320	266	282	327
	90 / 32	263	288	296	281	292	296	288	290	349	313	300	375
Pressure Suction	50 / 9	43	43	43	43	44	44	43	44	44	44	44	44
	70 / 21	43	44	44	42	46	46	42	47	47	43	47	47
	90 / 32	46	46	46	47	47	47	46	49	49	50	50	50

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

R-404A PERFORMANCE DATA

MODEL: **KM-630MWH With SN M20301E and after** Supply Voltage: 208-230/60/3

Total Amperage (Compressor): 6.5A (6A) Ice Production per cycle: 14.3 lbs. 720 pcs.

Water Consumption for water cooled Condenser: 70/50 (21/9) 653 Gal/24 hr: 90/70 745 Gal/24 hr.

Ambient Temp (F°)		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	Water temp F°C°	Water	Water	Water	Water
Production 24 hours (lbs.)	50 / 9	621	604	599	590
	70 / 21	599	570	546	537
	90 / 32	563	532	508	473
Cycle Time Freeze	50 / 9	31	32	32	33
	70 / 21	32	34	35	36
	90 / 32	35	37	38	41
Cycle Time Harvest	50 / 9	3.8	3.5	3.4	3.4
	70 / 21	3.4	2.8	2.3	2.3
	90 / 32	3.1	2.7	2.1	2.0
Pressure High Side	50 / 9	280	280	280	282
	70 / 21	280	280	280	285
	90 / 32	286	288	288	295
Pressure Suction	50 / 9	47	47	52	48
	70 / 21	47	48	56	48
	90 / 32	48	49	58	50

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

PERFORMANCE DATA

MODEL: **KM-630M_F-E & KM-630MAH-E** Supply Voltage: 220-240/50/ 1

Total Amperage (Compressor RLA): MAF-E / H-E 8.7A (7.1A) MWF-E 6.5A (5.9A) Ice Production per cycle: 14.3 lbs. 720 pcs.

Water consumption for water cooled condenser: 70/50 (21/ 9) 368 Gal/24 hr. 90/70 (32/21) 586 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs.)	50 / 9	624 / 283	541 / 245	587 / 266	525 / 238	576 / 261	520 / 236	568 / 258	510 / 231
	70 / 21	576 / 261	520 / 236	513 / 233	492 / 223	460 / 209	469 / 213	447 / 203	460 / 209
	90 / 32	420 / 236	483 / 219	463 / 210	452 / 195	406 / 184	429 / 195	357 / 162	393 / 178
Cycle Time Freeze	50 / 9	32	37	35	38	35	38	37	40
	70 / 21	35	38	40	40	44	42	45	43
	90 / 32	42	42	47	45	51	46	57	50
Cycle Time Harvest	50 / 9	3	3.4	3	3.3	3	3.3	3	3.3
	70 / 21	3	3.3	3	3.1	2.9	2.9	2.8	2.9
	90 / 32	3	3.2	3	3.1	2.9	2.9	2.8	2.9
Pressure High Side psig / kg/cm²G	50 / 9	270	280	286	280	291	280	391	282
	70 / 21	291	280	318	280	340	280	344	282
	90 / 32	309	284	330	286	356	285	370	290
Pressure Suction psig / kg/cm²G	50 / 9	50	48	50	48	51	48	51	49
	70 / 21	51	48	51	49	52	49	52	49
	90 / 32	52	49	53	50	54	50	55	51

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

PERFORMANCE DATA

MODEL: **KM-900M_F & H With SN M20500D and after** Supply Voltage: 208-230/60/1 (3 wire with neutral for 115V)

Total Amperage (Compressor RLA.): Air: 11.7A (10.2A), Water: 10.3A (9.7A), Remote: 12A (10A) Production per cycle: 14.3 lbs. 720 pcs.

Water consumption for water cooled cond: 70/50 (21/ 9) 580 Gal/24 hr. 90/70 (32/21) 1024 Gal/24 hr.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	Water Temp (F°)	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	838	853	835	812	840	821	804	836	817	795	818	808
	70 / 21	804	836	817	659	813	792	721	794	772	710	780	764
	90 / 32	759	787	786	715	750	758	676	736	739	634	683	708
Cycle Time Freeze	50 / 9	21	21	21	22	21	22	22	22	22	23	22	22
	70 / 21	22	22	22	24	22	23	26	23	24	27	23	24
	90 / 32	25	23	24	27	25	25	29	25	26	31	27	28
Cycle Time Harvest	50 / 9	4.5	3.5	4.5	4.1	3.3	4.1	4.0	3.2	3.9	3.9	3.2	22
	70 / 21	3.9	3.2	3.9	3.1	2.8	3.1	2.5	2.5	2.5	2.4	2.4	24
	90 / 32	3.5	2.9	3.5	3.0	2.6	3.0	2.2	2.2	2.2	2.0	2.0	28
Pressure High Side	50 / 9	245	278	220	262	280	230	267	280	233	272	285	239
	70 / 21	267	280	233	296	283	251	320	285	265	327	288	270
	90 / 32	296	290	255	324	297	274	349	298	288	375	310	310
Pressure Suction	50 / 9	33	37	32	35	38	34	36	38	34	37	39	35
	70 / 21	36	38	34	39	40	37	42	42	40	43	43	41
	90 / 32	40	41	37	43	43	40	46	45	43	50	47	45

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

R-404A PERFORMANCE DATA

MODEL: **KM-900MWH With SN M30501E and after** Supply Voltage: 208-230/60/3

Total Amperage (Compressor): 10.3A (9.7A) Ice Production per cycle: 14.3 lbs. 720 pcs.

Water Consumption for water cooled Condenser: 70/50 (21/9) 909 Gal/24 hr: 90/70 1185 Gal/24 hr.

Ambient Temp (F°)		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	Water temp F°C°	Water	Water	Water	Water
Production 24 hours (lbs.)	50 / 9	846	833	830	814
	70 / 21	830	808	790	778
	90 / 32	787	754	740	694
Cycle Time Freeze	50 / 9	21	21	22	22
	70 / 21	22	22	23	23
	90 / 32	23	25	25	27
Cycle Time Harvest	50 / 9	3.9	3.6	3.5	3..5
	70 / 21	3.5	2.9	2.4	2.4
	90 / 32	3.2	2.8	2.2	2.0
Pressure High Side	50 / 9	280	280	280	284
	70 / 21	280	280	280	284
	90 / 32	288	292	290	300
Pressure Suction	50 / 9	36	38	38	38
	70 / 21	38	41	43	43
	90 / 32	39	41	44	44

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

PERFORMANCE DATA

MODEL: **KM-900MRF3 / H3**
Total Amperage (Compressor): 10A (7A)

Supply Voltage: 208-230/60/3
Ice Production per cycle:14.3 lbs. 720 pcs.

Ambient Temp (F°)		70	80	90	100
Kg=lbs. x .454 Production 24 hours (lbs.)	Water Temp °F/°C	Remote	Remote	Remote	Remote
	50 / 9	842	830	826	811
	70 / 21	826	806	789	777
	90 / 32	784	753	739	694
Cycle Time Freeze	50 / 9	22`	22	23	23
	70 / 21	23	23	24	24
	90 / 32	24	26	26	28
Cycle Time Harvest	50 / 9	4.5	4.1	3.9	4.0
	70 / 21	3.9	3.1	2.5	2.4
	90 / 32	3.5	3.0	2.2	2.0
Pressure High Side	50 / 9	225	233	235	241
	70 / 21	235	249	260	265
	90 / 32	254	270	281	300
Pressure Suction	50 / 9	30	32	32	33
	70 / 21	32	35	38	39
	90 / 32	35	38	41	44

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-1300S_F & H** Supply Voltage: 208-230/60/1 (3 wire with neutral for 115V)

Total Amperage (Compressor RLA.): SAF 12.6A (10.2A), SWF 10.2A (9.7A), SRF 12.8A (10A) Production per cycle: 30.1 lbs.1440 pcs.

Water consumption for water cooled cond: 70/50 (21/ 9) 964 Gal/24 hr. 90/70 (32/21) 1521 Gal/24 hr.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	Water Temp °F/°C	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	1283	1252	1296	1249	1238	1260	1238	1233	1248	1203	1211	1230
	70 / 21	1238	1233	1248	1178	1209	1185	1129	1188	1133	1101	1172	1114
	90 / 32	1135	1176	1173	1053	1134	1105	1011	1119	1053	902	1056	980
Cycle Time Freeze	50 / 9	30	32	29	32	32	30	32	32	30	33	33	31
	70 / 21	32	32	30	35	33	31	37	33.6	32	38	34	33
	90 / 32	36	35	33	39	36	35	41	36	36	44	39	40
Cycle Time Harvest	50 / 9	4.5	4.3	5	4	4	4	4	4	4	4	4	4
	70 / 21	4	4	4	3	3	3	2.2	2.25	2.2	2	2	2
	90 / 32	4	3	4	3	3	3	2	2	2	2	2	2
Pressure High Side	50 / 9	255	275	220	268	277	229	273	278	232	277	282	235
	70 / 21	273	278	232	296	282	247	315	285	260	320	288	264
	90 / 32	296	288	247	318	295	262	338	297	276	360	308	290
Pressure Suction	50 / 9	45	47	45	46	47	46	47	48	47	47	48	47
	70 / 21	47	48	46	49	48	48	51	49	50	51	49	51
	90 / 32	49	49	49	51	49	51	53	50	53	55	51	55

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

PERFORMANCE DATA

MODEL: **KM-1300S_F3 & H3**

Supply Voltage: 208-230/60/3

Total Amperage (Compressor RLA.): SAF3 8.4A (6.1A), SWF3 7.3A (5.8A), SRF3 9.8A (7A)

Production per cycle: 30.1 lbs.1440 pcs.

Water consumption for water cooled cond: 70/50 885 Gal/24 hr.

90/70 1372 Gal/24 hr.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	Water Temp °F/°C	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	1320	1301	1308	1272	1279	1288	1257	1273	1282	1230	1250	1252
	70 / 21	1257	1273	1282	1174	1235	1247	1105	1204	1218	1079	1186	1196
	90 / 32	1153	1205	1203	1060	1152	1145	993	1126	1125	890	1055	1039
Cycle Time Freeze	50 / 9	30	30.2	30	32	31	30	32	31	31	33	32	31
	70 / 21	32	31	31	35	32	32	37.4	32.75	33	38	33	34
	90 / 32	36	33	33	39	34	35	41	35	36	44.75	36.5	39
Cycle Time Harvest	50 / 9	4	4.2	4.8	4	4	4	4	4	4	4	4	4
	70 / 21	3	4	4	3	3	3	2.1	2.2	2.2	2	2	2
	90 / 32	3	3	4	3	3	3	2	2	2	2	2	2
Pressure High Side	50 / 9	255	270	230	270	273	239	274	274	242	277	277	246
	70 / 21	274	274	242	299	280	257	320	285	270	325	287	274
	90 / 32	296	284	259	318	291	275	341	295	288	360	305	305
Pressure Suction	50 / 9	47	48	50	48	49	51	48	49	51	49	49	52
	70 / 21	48	49	51	50	50	52	52	51	53	52	51	54
	90 / 32	50	50	53	52	51	55	54	52	56	55	53	58

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

PERFORMANCE DATA

MODEL: **KM-1300NRF & H**

Supply Voltage: 208-230/60/1 (3 wire with neutral for 115V)

Total Amperage (Compressor): 18A (14A)

Ice Production per cycle: 30.9 lbs. 1440 pcs.

Ambient Temp (F°)		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454 Production 24 hours (lbs.)	Water Temp °F/°C	Remote	Remote	Remote	Remote
	50 / 9	1252	1234	1229	1196
	70 / 21	1229	1198	1172	1149
	90 / 32	1149	1091	1075	986
Cycle Time Freeze	50 / 9	31	32	32	33
	70 / 21	32	34	35	36
	90 / 32	35	37	38	41
Cycle Time Harvest	50 / 9	5.0	4.4	4.3	4.2
	70 / 21	4.3	3.3	2.5	2.4
	90 / 32	3.8	3.2	2.2	2.0
Pressure High Side	50 / 9	230	239	242	247
	70 / 21	242	257	270	275
	90 / 32	261	278	291	310
Pressure Suction	50 / 9	49	49	50	50
	70 / 21	50	50	51	51
	90 / 32	51	53	53	55

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-1300M_F & H** Supply Voltage: 208-230/60/1 (3 wire with neutral for 115V)

Total Amperage (Comp. RLA): Air: 12.6A (10.2A) Water: 10.2A (9.7A) Remote: 12.8A (10A) Production per cycle: 28.6 Lbs, 1440 pcs.

Water Consumption for MWE Condenser: 70 / 50 (21/9) 380 Gal/24 hr: 90 / 70 (32/21) 723 Gal/24 hr.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	Water Temp °F/°C	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	1289	1283	1322	1233	1259	1285	1216	1252	1273	1198	1229	1252
	70 / 21	1216	1252	1273	1120	1211	1209	1040	1177	1155	1017	1158	1135
	90 / 32	1120	1182	1193	1026	1126	1121	943	1097	1068	853	1046	989
Cycle Time Freeze	50 / 9	28	29	27	29	29	28	30	30	29	31	30	30
	70 / 21	30	30	29	33	31	31	35	32	32	36	32	33
	90 / 32	33	32	31	37	33	34	39	34	35	43	36	38
Cycle Time Harvest	50 / 9	4.5	4	4.4	4.2	3.7	4	4	3.6	3.9	3.3	3.6	3
	70 / 21	4	3.6	3.9	3.3	3	3.2	2.6	2.6	2.6	2.5	2.5	2.5
	90 / 32	3.6	3.3	3.5	2.5	3	3	2.3	2.4	2.3	2	2.3	2
Pressure High Side	50 / 9	247	275	227	264	277	236	269	278	239	272	282	243
	70 / 21	269	277	239	297	280	255	321	285	268	326	285	272
	90 / 32	293	287	256	318	294	271	344	297	285	365	307	300
Pressure Suction	50 / 9	49	49	47	50	49	48	50	49	48	50	50	48
	70 / 21	50	49	48	52	50	49	53.2	50.4	50	54	51	50
	90 / 32	52	51	49	53	51	51	55	52	52	56	53	53

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

PERFORMANCE DATA

MODEL: **KM-1300S_F-E** Supply Voltage: 220-240/50/1

Total Amperage (Compressor RLA.): SAF-E 10.3A (8.6A), SWF-E 9.5A (7.7A), SRF-E 10A (9A)

Water consumption for water cooled cond:70/50 964 Gal/24 hr. 90/70 1521 Gal/24 hr. Production per cycle: 30.1 lbs.1440 pcs.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	Water Temp °F/°C	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	1200	1145	1129	1129	1107	1089	1106	1096	1077	1086	1069	1053
	70 / 21	1106	1096	1077	983	1031	1008	880	977	950	853	953	927
	90 / 32	988	1004	987	871	926	908	763	875	853	655	782	763
Cycle Time Freeze	50 / 9	26	30	30	28	31	31	29	31	32	31	32	33
	70 / 21	29	31	32	33	33	35	37	34	37	38	35	38
	90 / 32	35	34	36	40	37	39	43	38	41	49	42	45
Cycle Time Harvest	50 / 9	5	5	5	4	5	5	4	5	5	4	5	5
	70 / 21	4	5	5	4	4	4	3.5	3.6	3.5	4	4	4
	90 / 32	4	4	4	4	4	4	4	4	4	3.5	3.6	3.5
Pressure High Side	50 / 9	240	280	230	261	281	239	268	281	242	265	286	244
	70 / 21	268	281	242	304	283	257	335	285	270	338	288	273
	90 / 32	287	292	255	313	298	269	348	298	283	360	310	295
Pressure Suction	50 / 9	50	52	50	51	53	50	51	53	51	52	54	51
	70 / 21	51	53	51	53	54	51	55	55	52	56	56	53
	90 / 32	54	55	53	56	57	54	58	58	55	60	60	57

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

PERFORMANCE DATA

MODEL: **KM-1600MRF & H**

Supply Voltage: 208-230/60/1 (3 wire with neutral for 115V)

Total Amperage (Compressor): 21A (18.6A)

Ice Production per cycle: 28.6 lbs. 1440 pcs.

Ambient Temp (F°)		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	Water Temp °F/°C	Remote	Remote	Remote	Remote
Production 24 hours (lbs.)	50 / 9	1486	1450	1438	1411
	70 / 21	1438	1375	1323	1299
	90 / 32	1347	1270	1221	1128
Cycle Time Freeze	50 / 9	23	24	24	25
	70 / 21	24	26	27	27
	90 / 32	26	28	29	31
Cycle Time Harvest	50 / 9	4.5	4.2	4.1	4.0
	70 / 21	4.1	3.5	3.0	2.9
	90 / 32	3.5	3.0	2.5	2.0
Pressure High Side	50 / 9	227	236	239	244
	70 / 21	229	254	267	272
	90 / 32	259	277	289	310
Pressure Suction	50 / 9	40	41	42	42
	70 / 21	42	44	46	46
	90 / 32	44	46	48	50

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-1600MRF3 & H3**

Supply Voltage: 208-230/60/3

Total Amperage (Compressor): 13.8A (11.4A)

Ice Production per cycle:28.6 lbs. 1440 pcs.

Ambient Temp (F°)		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	Water temp F°C°	Remote	Remote	Remote	Remote
Production 24 hours (lbs.)	50 / 9	1524	1480	1467	1453
	70 / 21	1467	1391	1328	1311
	90 / 32	1392	1319	1253	1185
Cycle Time Freeze	50 / 9	23	24	24	25
	70 / 21	24	26	27	27
	90 / 32	26	28	29	31
Cycle Time Harvest	50 / 9	4.5	4.2	4.1	4.0
	70 / 21	4.1	3.5	3.0	2.9
	90 / 32	3.5	3.0	2.5	2.0
Pressure High Side	50 / 9	225	234	237	244
	70 / 21	237	252	265	271
	90 / 32	260	279	291	315
Pressure Suction	50 / 9	35	37	37	38
	70 / 21	37	40	42	43
	90 / 32	40	42	45	47

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-1600SRF & H**

upply Voltage: 208-230/60/1 (3 wire with neutral for 115V)

Total Amperage (Compressor): 18A (14A)

Ice Production per cycle: 30.9 lbs. 1440 pcs.

Ambient Temp (F°)		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	Water Temp °F/°C	Remote	Remote	Remote	Remote
Production 24 hours (lbs.)	50 / 9	1430	1419	1415	1383
	70 / 21	1415	1396	1380	1359
	90 / 32	1343	1295	1290	1207
Cycle Time Freeze	50 / 9	25	26	26	26
	70 / 21	26	27	28	28
	90 / 32	28	29	30	32
Cycle Time Harvest	50 / 9	5.5	4.9	4.8	4.9
	70 / 21	4.8	3.8	3.0	2.9
	90 / 32	4.3	3.7	2.7	2.5
Pressure High Side	50 / 9	225	233	235	242
	70 / 21	235	249	260	265
	90 / 32	256	273	283	305
Pressure Suction	50 / 9	38	39	39	40
	70 / 21	39	41	41	43
	90 / 32	41	43	43	47

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

R-404A PERFORMANCE DATA

MODEL: **KM-1600S_F3 / H3** Supply Voltage: 208-230/60/3

Total Amperage (Compressor): SWF3 10.3A (9A), SRF3/H3 13.6A (9.5A) Ice Production per cycle: 30.9 lbs. 1440 pcs.

Water consumption for SWF3 Condenser: 70 / 50 (21/9) 2563 Gal/24 hr. 90 / 70 (32/21) 2597 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp °F/°C	Water	Remote	Water	Remote	Water	Remote	Water	Remote
Production 24 hours (lbs.)	50 / 9	1500	1430	1496	1434	1495	1426	1473	1409
	70 / 21	1495	1415	1489	1380	1484	1341	1470	1325
	90 / 32	1451	1343	1423	1311	1426	1274	1373	1213
Cycle Time Freeze	50 / 9	24	25	24	25	25	26	25	26
	70 / 21	25	26	25	26	26	27	26	27
	90 / 32	26	28	26	29	27	29	28	31
Cycle Time Harvest	50 / 9	4.0	5.5	4.4	4.9	4.3	4.8	4.0	4.9
	70 / 21	4.3	4.8	3.3	3.8	2.5	3.0	2.4	2.9
	90 / 32	4.0	4.3	3.2	3.7	2.2	2.7	2.0	2.5
Pressure High Side	50 / 9	270	225	271	233	271	235	272	240
	70 / 21	271	235	273	249	275	260	276	264
	90 / 32	274	256	276	267	278	278	280	195
Pressure Suction	50 / 9	40	38	41	38	41	38	42	39
	70 / 21	41	39	42	39	43	40	44	41
	90 / 32	43	41	45	43	46	44	48	47

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

PERFORMANCE DATA

MODEL: **KM-1800SA H**

Supply Voltage: 208-230/60/1 (3 wire with neutral for 115V)

Total Amperage (Compressor): 18A (14.5A)

Ice Production per cycle: 42.9 lbs. 2160 pcs.

Ambient Temp (F°)		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454 Production 24 hours (lbs.)	Water Temp °F/°C	Air	Air	Air	Air
	50 / 9	1756	1702	1685	1579
	70 / 21	1685	1592	1514	1491
	90 / 32	1589	1496	1416	1326
Cycle Time Freeze	50 / 9	31	33	33	37
	70 / 21	33	36	39	40
	90 / 32	36	39	42	45
Cycle Time Harvest	50 / 9	6.0	5.4	5.3	4.2
	70 / 21	5.3	4.3	3.5	3.4
	90 / 32	4.6	3.9	3.0	2.5
Pressure High Side	50 / 9	230	246	251	255
	70 / 21	251	278	300	306
	90 / 32	277	303	326	350
Pressure Suction	50 / 9	50	51	51	52
	70 / 21	51	53	55	56
	90 / 32	54	56	58	60

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-1800SAH3**

Supply Voltage: 208-230/60/3

Total Amperage (Compressor): 11A (7.5A)

Ice Production per cycle: 42.9 lbs. 2160 pcs.

Ambient Temp (F°)		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454 Production 24 hours (lbs.)	Water Temp °F/°C	Air	Air	Air	Air
	50 / 9	1757	1701	1683	1579
	70 / 21	1683	1587	1506	1486
	90 / 32	1597	1507	1422	1344
Cycle Time Freeze	50 / 9	32	34	34	38
	70 / 21	34	37	40	41
	90 / 32	37	40	43	45
Cycle Time Harvest	50 / 9	6.0	5.3	5.1	4.1
	70 / 21	5.1	4.0	3.0	2.9
	90 / 32	4.6	3.9	2.7	2.5
Pressure High Side	50 / 9	240	257	262	291
	70 / 21	262	291	315	319
	90 / 32	283	306	333	350
Pressure Suction	50 / 9	52	53	53	54
	70 / 21	53	54	55	56
	90 / 32	55	57	58	60

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-2000S_F3 & H3**
Total Amperage (Compressor): Water: 10.1A (9A), Remote: 11.4A (9A)

Supply Voltage: 208-230/60/3
Ice Production per cycle: 46.3 lbs. 2160 pcs.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp °F/°C	Water	Remote	Water	Remote	Water	Remote	Water	Remote
Production 24 hours (lbs.)	50 / 9	1907	1865	1901	1832	1899	1821	1863	1801
	70 / 21	1899	1821	1887	1764	1878	1716	1856	1697
	90 / 32	1826	1746	1781	1679	1784	1634	1698	1558
Cycle Time Freeze	50 / 9	29	30	29	31	30	31	30	32
	70 / 21	30	31	30	33	31	34	31	34
	90 / 32	31	33	33	35	33	36	35	38
Cycle Time Harvest	50 / 9	4.5	5	4.2	5	4.1	4	4.1	4
	70 / 21	4.1	4	3.5	4	3.0	3	2.9	3
	90 / 32	3.7	4	3.3	3	2.7	2	2.5	2
Pressure High Side	50 / 9	265	233	266	241	266	243	271	249
	70 / 21	266	243	268	257	270	268	273	273
	90 / 32	277	263	283	280	283	290	295	310
Pressure Suction	50 / 9	46	45	46	45	47	46	47	46
	70 / 21	47	46	47	46	48	47	48	47
	90 / 32	48	47	48	48	49	49	50	50

NOTE: Total Cycle Time = Freeze + Harvest.

Pressure data is recorded 5 minutes into the freeze cycle.

PERFORMANCE DATA

MODEL: **KM-2400SRF3 & H3**

Supply Voltage: 208-230/60/3

Total Amperage (Compressor): SRF3 19.7A (15A)

Ice Production per cycle: 45 lbs. 2160 pcs.

Ambient Temp (F°)		70 /21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454 Production 24 hours (lbs.)	Water Temp °F/°C	Remote	Remote	Remote	Remote
	50 / 9	2294	2260	2249	2194
	70 / 21	2249	2190	2141	2101
	90 / 32	2107	2003	1970	1813
Cycle Time Freeze	50 / 9	23	24	24	25
	70 / 21	24	26	27	27
	90 / 32	26	28	29	31
Cycle Time Harvest	50 / 9	5.6	5.1	5.0	3.0
	70 / 21	5.0	4.1	3.4	3.4
	90 / 32	4.7	4.1	3.3	3.2
Pressure High Side	50 / 9	250	257	259	266
	70 / 21	259	270	280	285
	90 / 32	279	295	303	325
Pressure Suction	50 / 9	50	50	50	50
	70 / 21	50	50	50	50
	90 / 32	50	51	51	51

NOTE: Total Cycle Time = Freeze + Harvest.

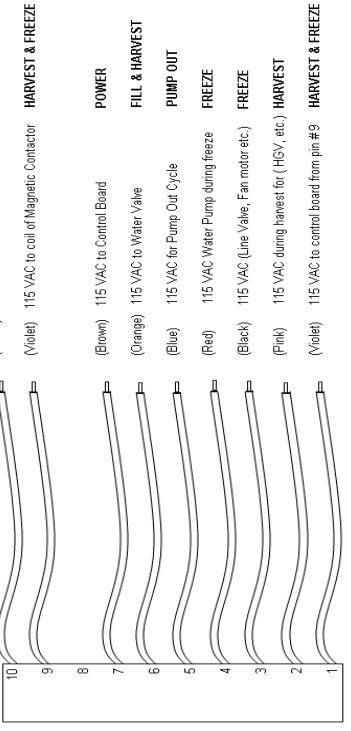
Pressure data is recorded 5 minutes into the freeze cycle.

WIRING DIAGRAMS:

The wiring diagrams provide on the following pages are generic in some cases because they can represent several models. Hoshizaki provides a specific wiring label on every unit for electrical diagnosis. See the following wiring diagram chart for your model and capacitor information.

10 - PIN CONNECTOR:

This connector diagram shows the standard color code and component layouts. Use it as a guide for circuit diagnosis.



KM Wiring Diagram Reference Chart for R-404A Models

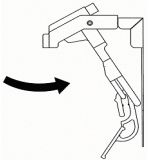
Model	Wiring Diagram	Page	Start Capacitor	Run Capacitor	Pump Capacitor	Fan Capacitor
Mechanical Bin Control		110				
Capacitive Bin Control		111				
KM-150BAF, BWF	**A**	112	145~174 MFD	None	2 MFD	None
KM-150BAF-E, BWF-E	**B**	113	80 MFD	None	2.MFD	None
KM-250BAF, BWF	**A**	112	243~292 MFD	15 MFD	5.5 MFD	5MFD
KM-280MAF, MWF	**C**	114	378~445 MFD	None	5.5 MFD	5 MFD
KM-280MAF-E, MWF-E	**D**	115	72~86 MFD	15 MFD	5.5 MFD	2.5 MFD
KML-250MAF/H,MWF/H	**E**	116	72~86 MFD	20 MFD	None	
KML-350MAF/H, MWF/H	**F**	117	243~292 MFD	15 MFD	None	5 MFD
KML-450MAF/H, MWF/H	**G**	118	189~227 MFD	25 MFD	None	5 MFD
KM-500MAF/H, MWF/H	**H**	119	72~88 MFD	25 MFD	5.5 MFD	5 MFD
KM-500MRF/H	**I**	120	72~88 MFD	25 MFD	5.5 MFD	10 MFD
KM-500MAF-H/H-E	**J**	121	72~86 MFD	15 MFD	5.5 MFD	2.5 MFD
KML-600MAF/H, MWF/H	**K**	122	145~174 MFD	30 MFD	None	5 MFD
KML-600MRF/H	**K**	122	145~174 MFD	30 MFD	None	10 MFD

KM Wiring Diagram Reference Chart

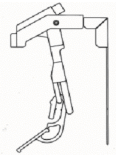
Model	Wiring Diagram	Page	Start Capacitor	Run Capacitor	Pump Capacitor	Fan Capacitor
KM-630MAF/H, MWF/H	**L**	123	88~108 MFD	15 MFD	5.5 MFD	5 MFD
KM-630MRF/H	**M**	124	88~108 MFD	15 MFD	5.5 MFD	10 MFD
KM-630MAF-E/H-E, MWF-E/H-E	**N**	125	88~108 MFD	None	5.5 MFD	2.5 MFD
KM-900MAF/H, MWF/H	**O**	126	145~174 MFD	35 MFD	10 MFD	5 MFD
KM-900MRF/H	**P**	127	145~174 MFD	35 MFD	5.5 MFD	10 MFD
KM-900MRF3/H3	**Q**	128	None	None	5.5 MFD	10.MFD
KM-1300SAF/H, SWF/H,	**R**	129	145~174 MFD	35 MFD	10 MFD	5 MFD
KM-1300MAF/H, MWF/H	**R**	129	145~174 MFD	35 MFD	10 MFD	5 MFD
KM-1300SRF/H, MRF/H	**S**	130	145~174 MFD	35 MFD	10 MFD	10 MFD
KM-1300SAF3/H3, SWF3/H3	**T**	131	None	None	10 MFD	5 MFD
KM-1300SRF3/H3	**U**	132	None	None	10 MFD	10 MFD
KM-1300SAF-E/H-E, SWF-E/H-E	**V**	133	160 MFD	35 MFD	15 MFD	5 MFD
KM-1300SRF-E/H-E	**W**	134	160 MFD	35 MFD	15 MFD	10 MFD
KM1600SWF/H, SRF/H, MRF/H	**X**	135	189~227 MFD	40 MFD	10 MFD	10 MFD
KM-1600SWF3/H3, SRF3/H3	**Y**	136	None	None	10 MFD	10 MFD

KM Wiring Diagram Reference Chart

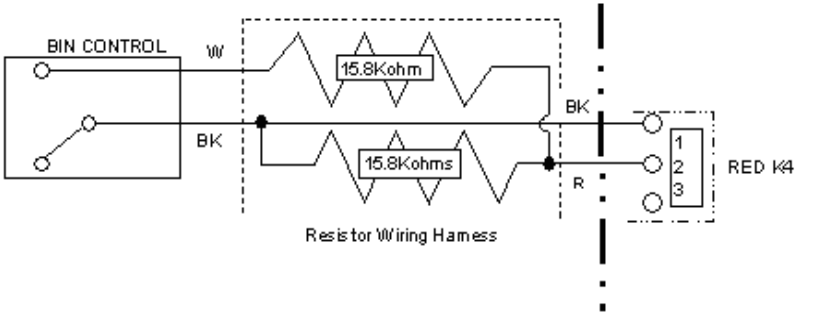
Model	Wiring Diagram	Page	Start Capacitor	Run Capacitor	Pump Capacitor	Fan Capacitor
KM-1600MRF3/H3	**Z**	137	None	None	10 MFD	10 MFD
KM-1800SAH3	**AA**	138	145~174 MFD	35 MFD	10 MFD	2 - 5 MFD
KM-1800SAH3	**BB**	139	None	None	10 MFD	2 - 5 MFD
KM-2000SWF3, SRF3	**AA**	140	None	None	10 MFD	10 MFD
KM-2400SRF3	**CC**	141	None	None	15 MFD	15 MFD
URC-6F						10 MFD
URC-7F						10 MFD
URC-12F						10 MFD
URC-20F						10 MFD
URC-24F						15 MFD
URC-6F-E, 12F-E						10 MFD



BIN FULL

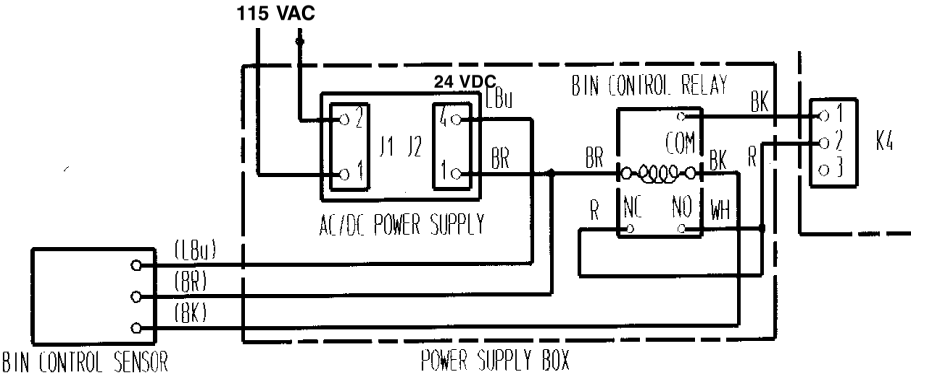


BIN EMPTY



MECHANICAL BIN CONTOL OPERATION:

The mechanical bin control is included on some modelsproduced in 2002. The mechanical assembly is located in the ice drop zone area .
When the actuator paddle is in the normal (Bin Empty) position, the bin control proximity switch will close.
1. When the switch contacts close, 7.6 K Ohms of resistance is supplied to the K4 board connector.
When ice pushes the paddle to the full right position (Bin Full), the proximity switch opens as shown above.
2. Bin control proximity switch is shown in the Bin Full position and will supply 15.8 K Ohms to the K4 board connector.

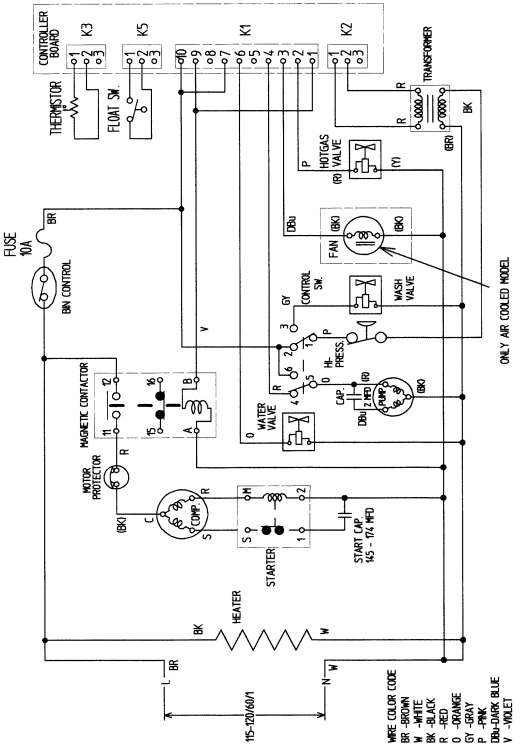


CAPACITIVE PROXIMITY BIN CONTROL: (Used on KM-1300NRF/H only)

The capacitive bin control requires DC voltage to operate. It has a seperate 24VDC power supply and switches a control relay to supply resistance to the K4 connector. The relay contacts isolates the 24VDC from the control board which switches by resistance.

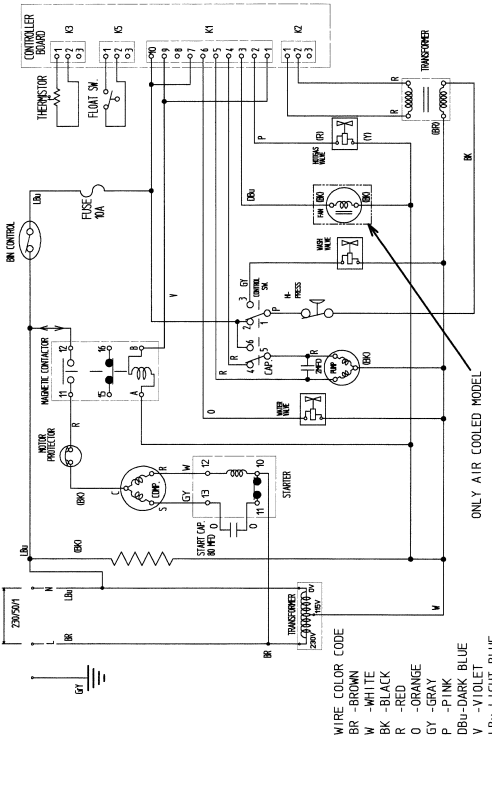
1. When the bin is empty, the resistance at K4 is 5.6 K Ohms.
2. When ice is within 1/2 to 1 inch of the sensor end, the resistance at K4 is 15.8 K Ohms to shut the unit down.

A
KM-150BAF, BWF,
KM-250BAF, BWF



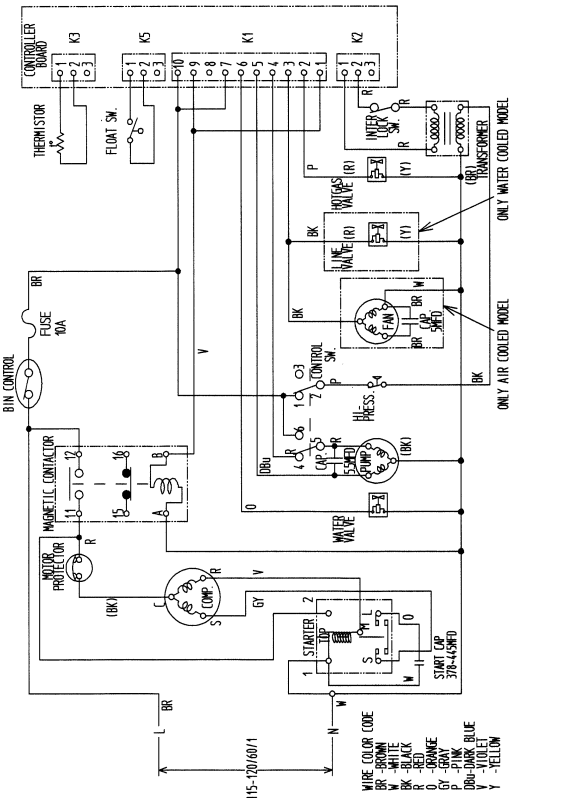
Note:
1. Fuse was added to H model on late 2002 production.
2. See wiring diagram chart for KM-250B capacitor sizes.

B
KM-150BAF-E, BWF-E



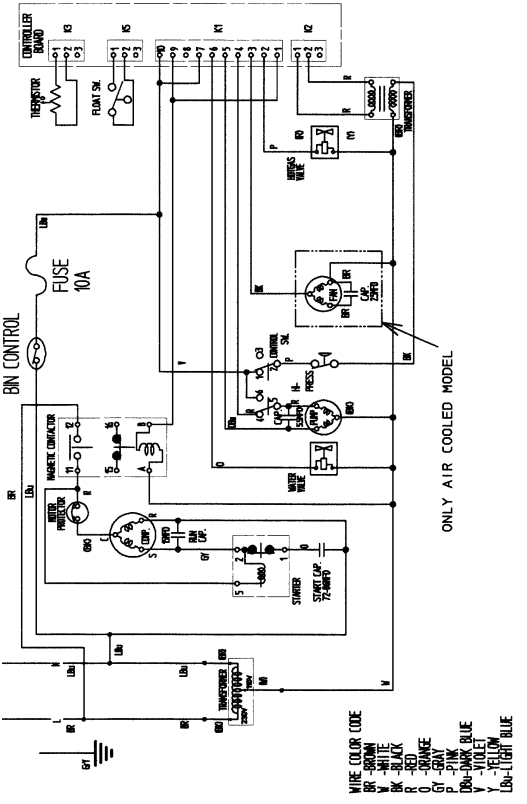
Note: Fuse was added to H model on late 2002 production

C
KM-280 MAF/H, MWF/H



Notes:
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

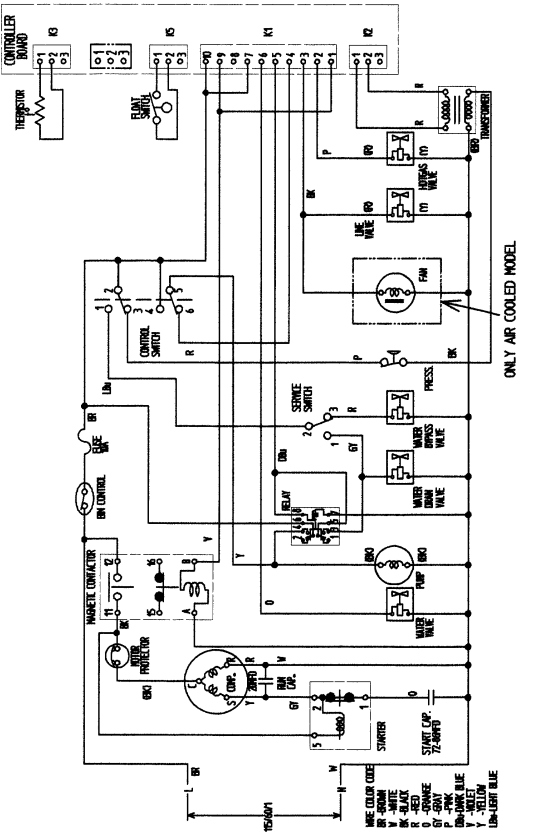
D
KM-280 MAF-E/H-E, MWF-E/H-E



Notes:

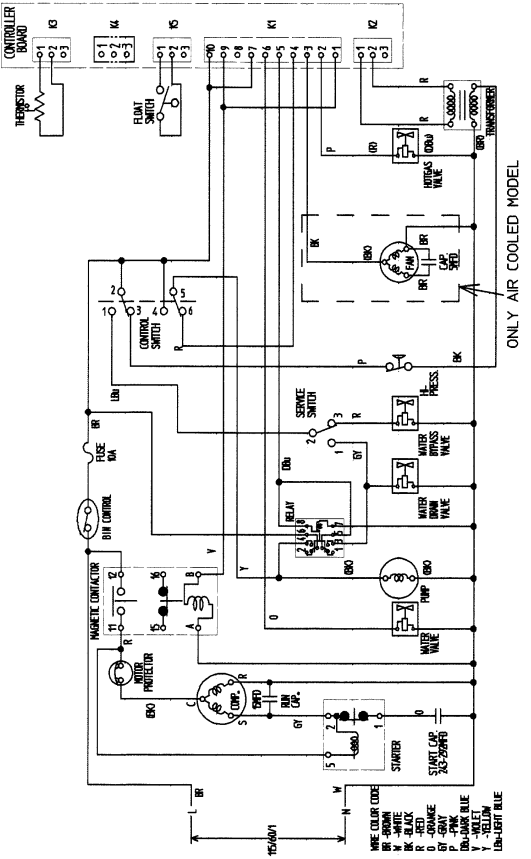
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

E
KML-250MAH, MWH



Notes:
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

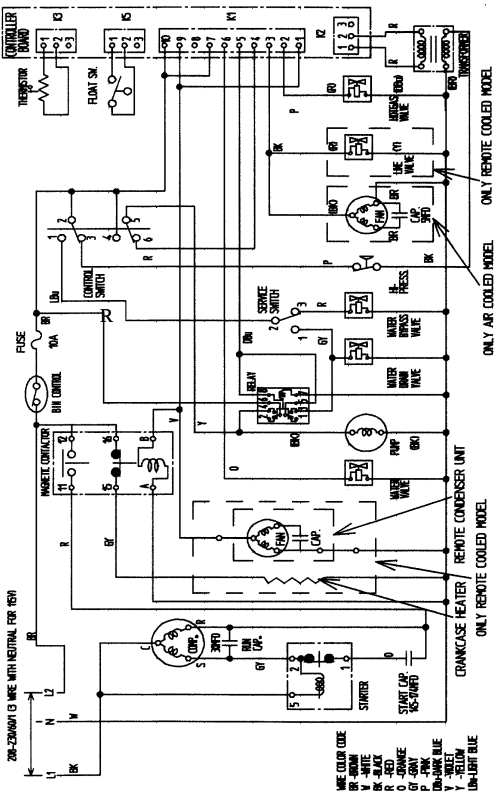
F
KML-350MAF/H, MWF/H



Notes:

1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

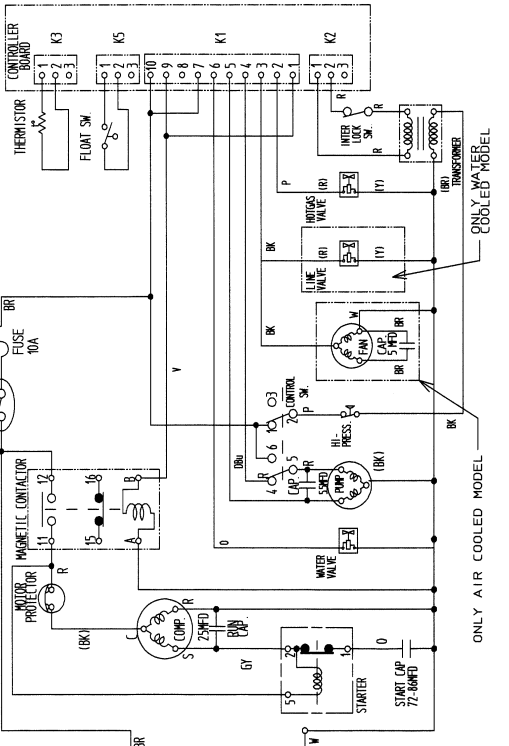
G
KML-450 MAF/H, MWF/H



Notes:

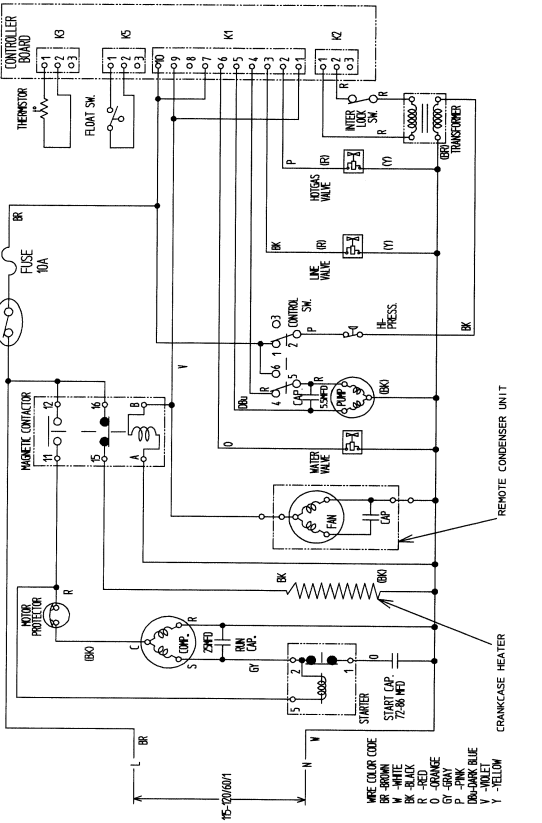
1. Some H series unit have mechanical bin control.
2. Fuse was added to H series in mid 2002.
3. This is a universal diagram, there is no KML-450 remote model.

H
KM-500 MAF/H, MWF/H



Notes:
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

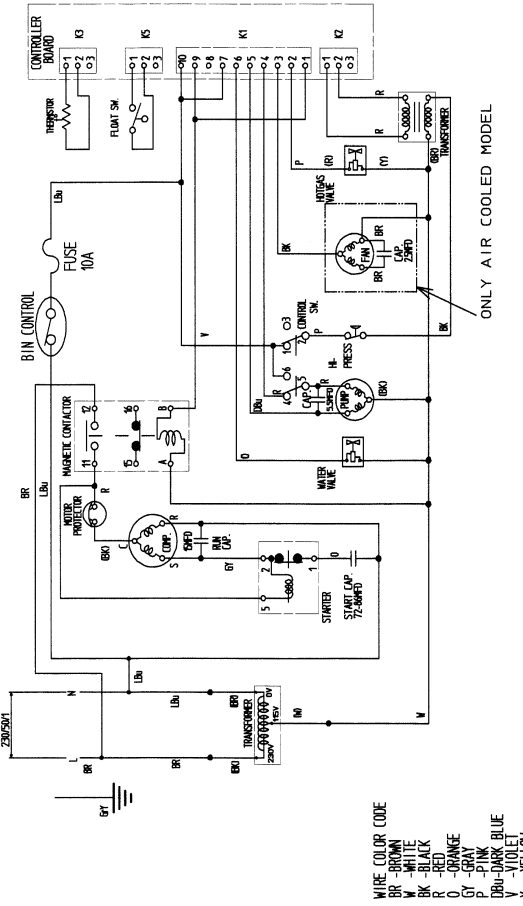
I
KM-500 MRF/H



Notes:

1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

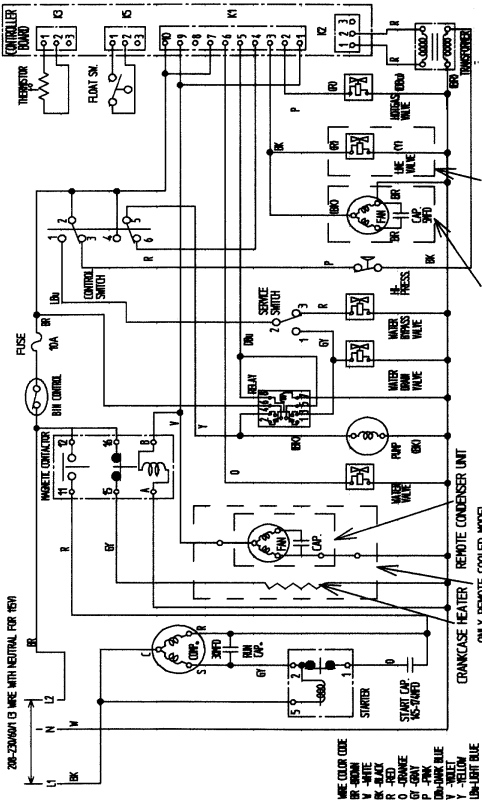
J
KM-500 MAF-E



Notes:

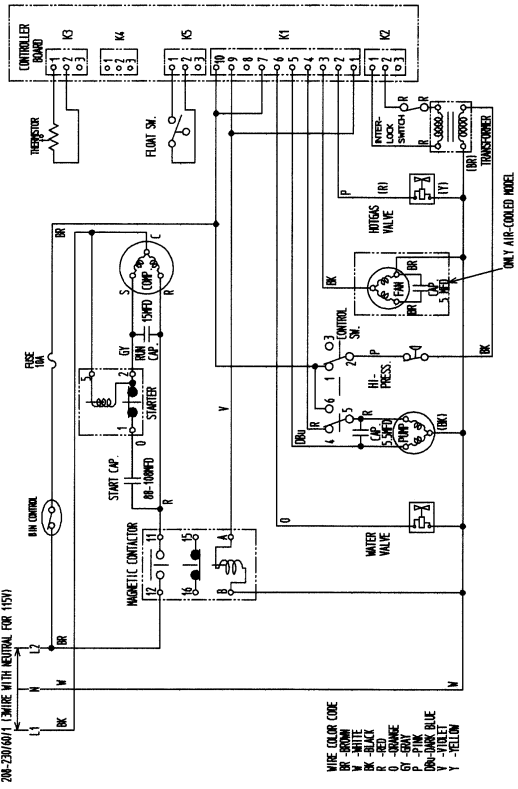
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

K
KML-600 MAF/H, MWF/H, MRF/H



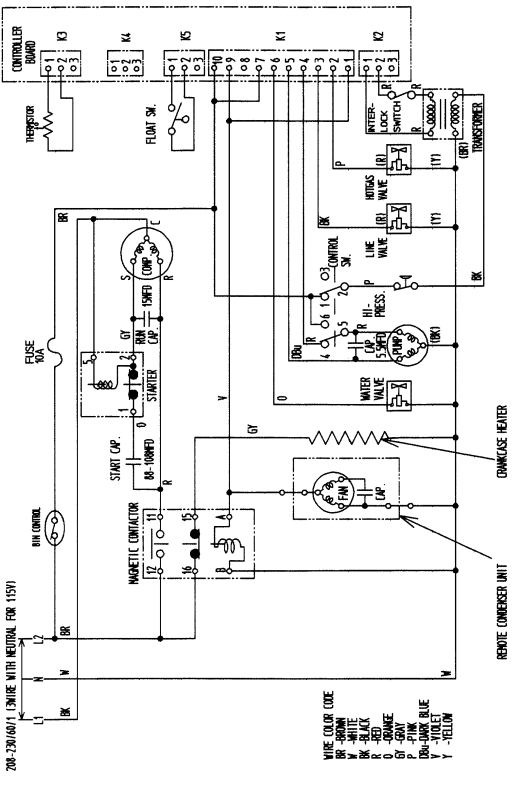
Notes:
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

L
KM-630 MAF/H, MWF/H



Notes:
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

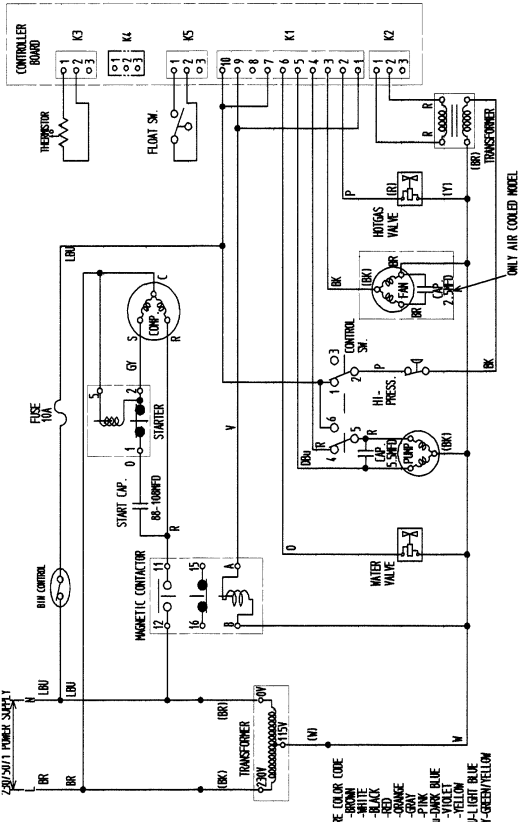
M
KM-630 MRF/H



Notes:

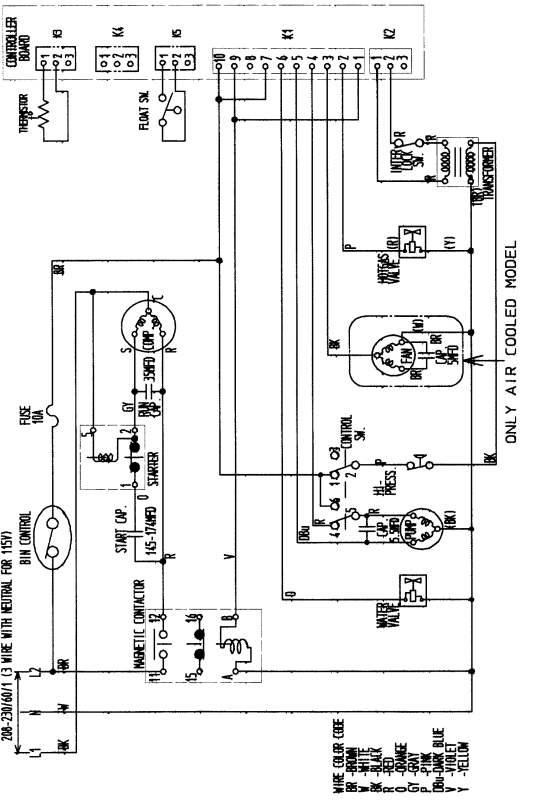
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

N
KM-630 MAF-E/H-E, MWF-E/H-E



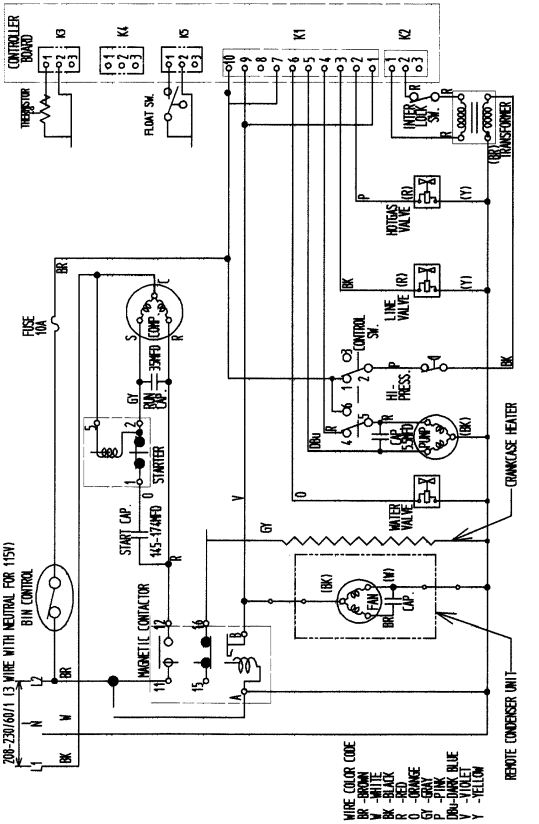
Notes:
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

O
KM-900 MAF/H, MWF/H



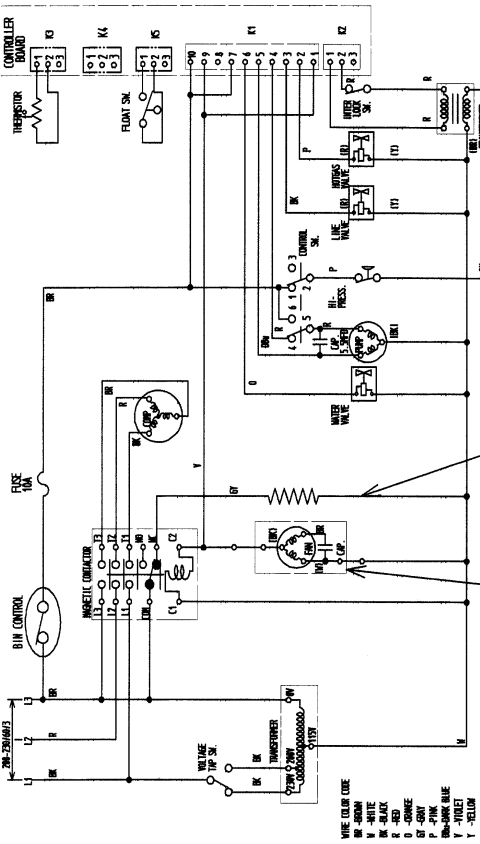
Notes:
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

P
KM-900 MRF/H



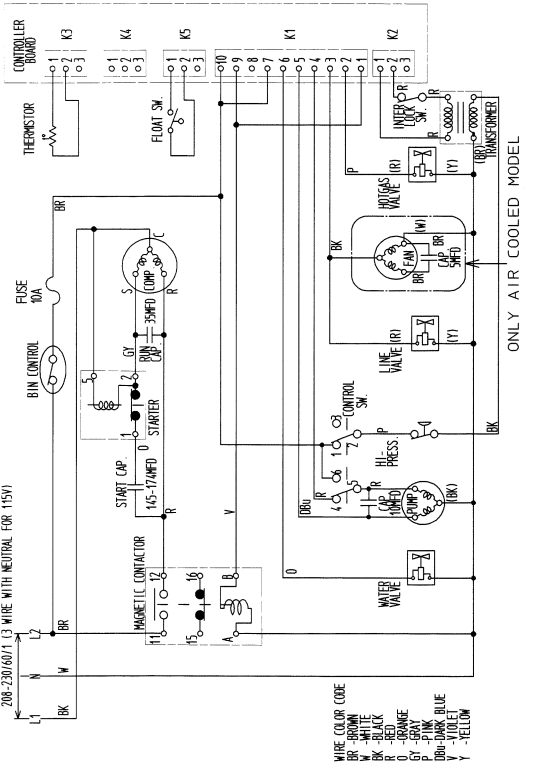
Notes:
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

Q
KM-900 MRF 3/H 3



Notes:
1.Some H series unit have mechanical bin control.
2.Fuse was added to H series in mid 2002.

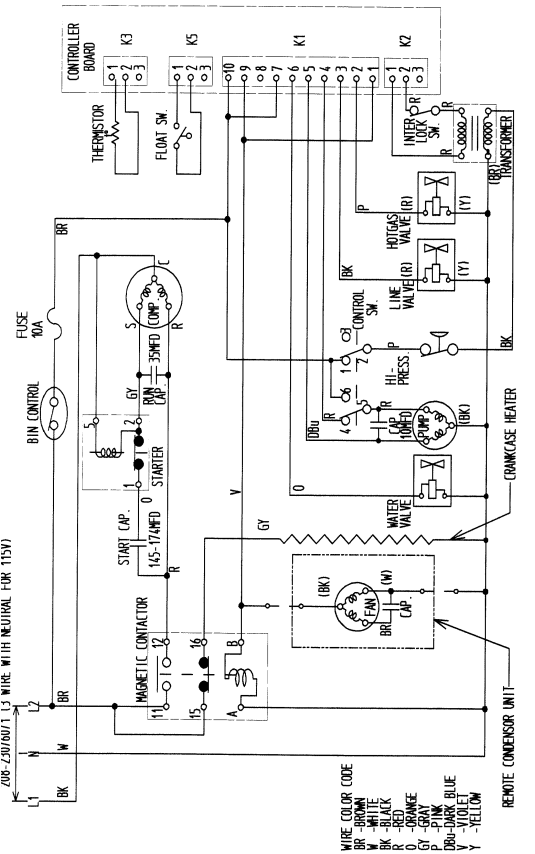
R
KM-1300 SAF/H, SWF/H
KM-1300 MAF/H, MWF/H



Note:

1. Fuse was added to H models on mid 2002 production.
2. M Series model has 2 condenser fan motors.

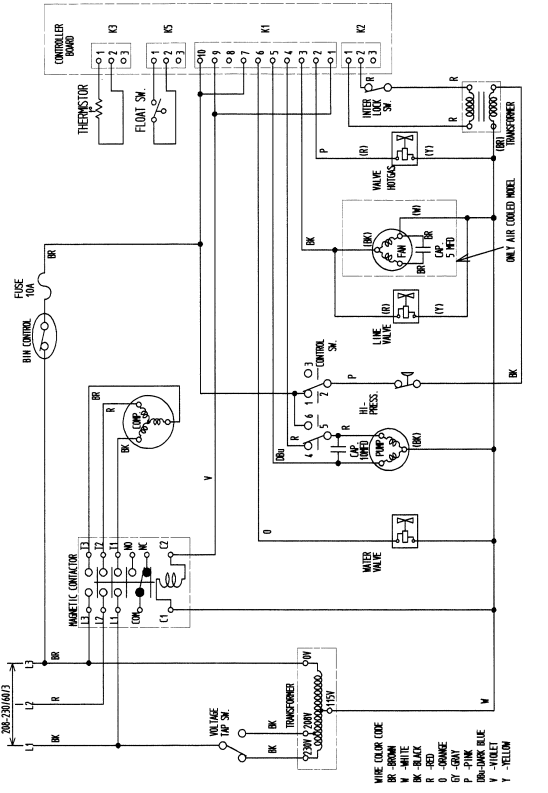
S
KM-1300 SRF/H, MRF/H



Note:

1. Fuse was added to H models on mid 2002 production.

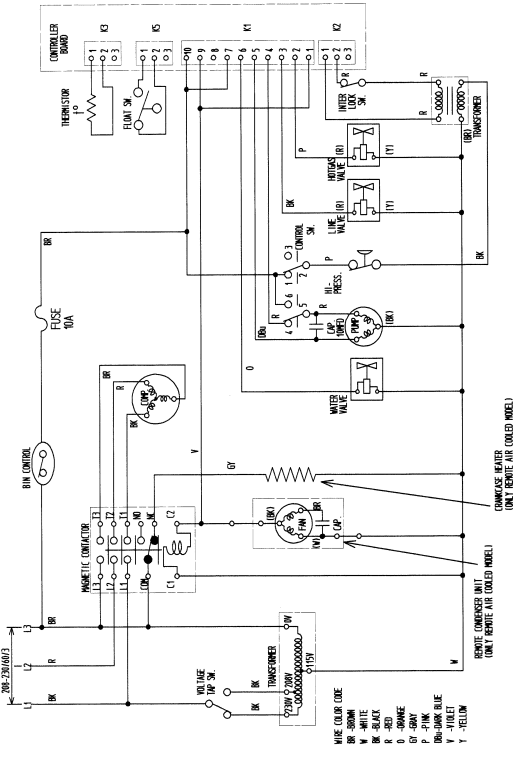
T
KM-1300 SAF3/H3, SWF3/H3



Note:

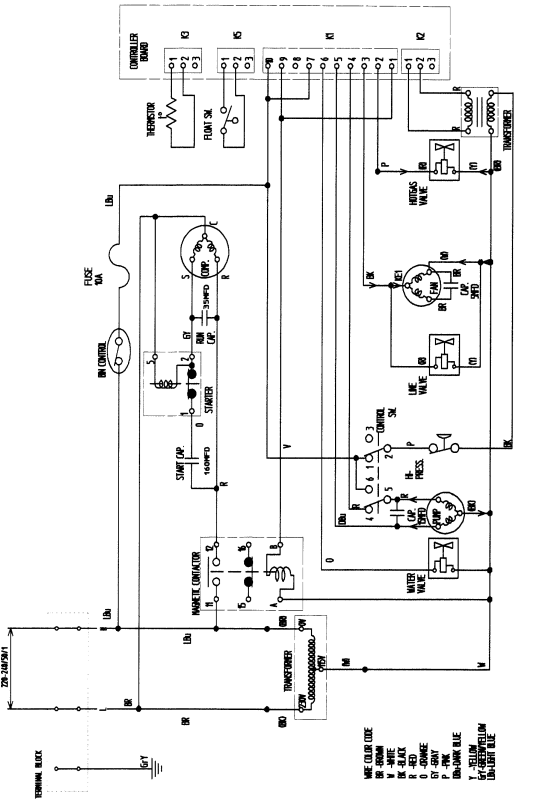
1. Fuse was added to H models on mid 2002 production.

U
KM-1300 SRF3/H3



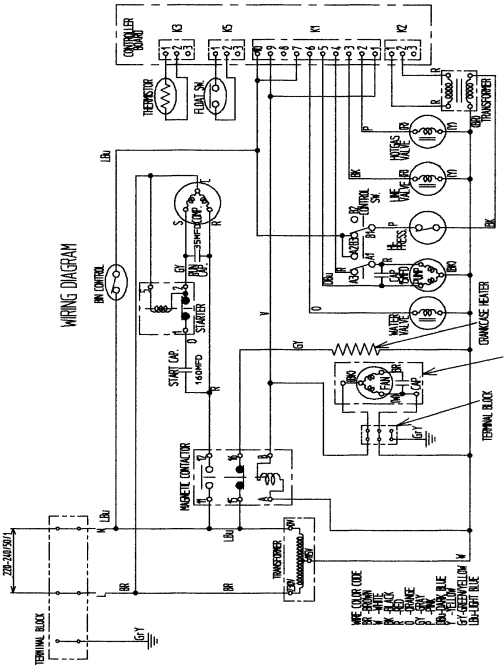
Note:
1. Fuse was added to H models on mid 2002 production.

V
KM-1300 SAF-E, SWF-E

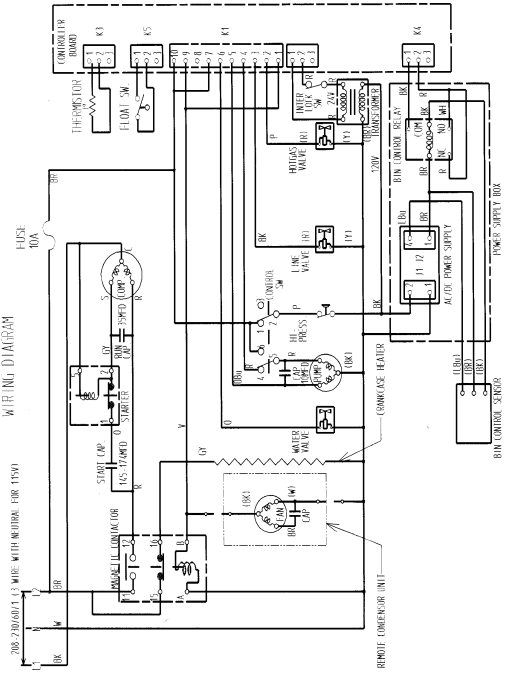


Note:
1. Fuse was added to H models on mid 2002 production.

W
KM-1300 SRF-E

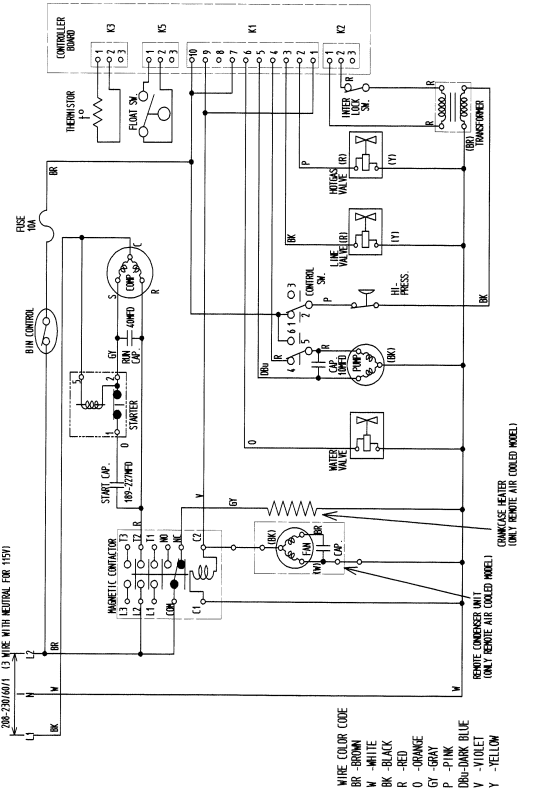


X
KM-1300 NRF / H



Y

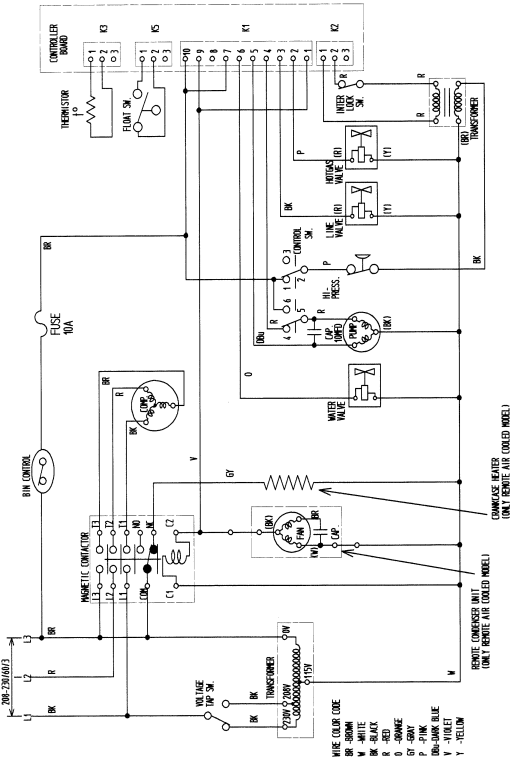
KM-1600 SWF/H, SRF/H, MRF/H



Note:

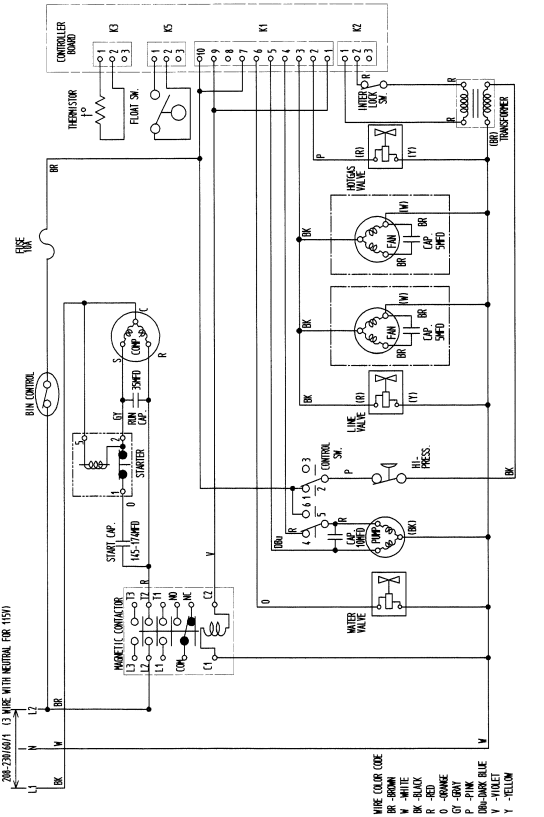
1. Fuse was added to H models on mid 2002 production.

Z
KM-1600SWF3/H3, SRF3/H3
KM-1600MRF3/H3,
KM-2000SWF3/H3, SRF3/H3



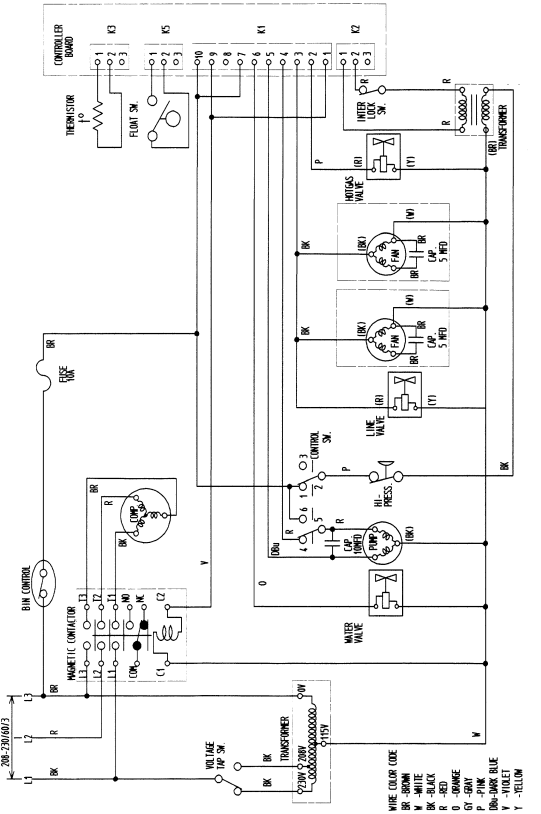
Note:
1. Fuse was added to H models on mid 2002 production.

AA
KM-1800 SAH



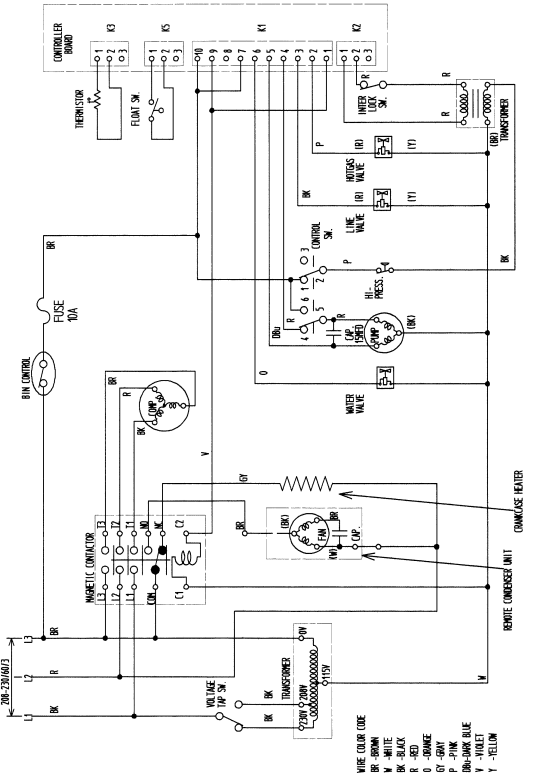
Note:
1. Fuse was added to H models on mid 2002 production.

BB
KM-1800 SAH3



Note:
1. Fuse was added to H models on mid 2002 production.

CC
KM-2400 SRF3/H3



Note:
1. Fuse was added to H models on mid 2002 production.

INSTALLATION - GENERAL

As always, you should follow the installation instructions that are provided in the instruction manual supplied with the unit. You will also find a yellow instruction sheet attached to the top of a new unit. This sheet highlights the installation steps. 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

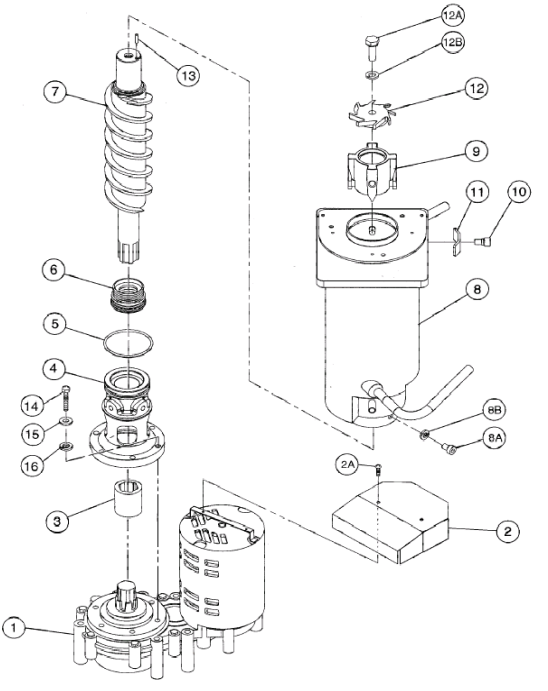
The DCM product produces Cubelet ice. Certain flaker models can also be converted to produce cubelet ice. This requires changing the extruding head and cutter at the top of the evaporator assembly. The F-450M, F-800M, and F-2000M models are produced as cubelet models and are designated by a - **C** at 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.

INTERNAL AUGER DESIGN

Hoshizaki Flakers and DCM's use an internal auger system to provide high quality crisp flakes and cubelet ice. The evaporator cylinder and auger are made of anti-magnetic stainless steel. This higher quality stainless steel elimnates pitting caused by harmful minerals in the water. This maintains a smooth surface to reduce ristriction to ice flow providing consistant production and quality.

The picture below is a generic breakdown of the F/DCM evaporator assembly. The extruding head # 9 and cutter #12 can be exchanged so that this Flaker assembly will produce Cubelet style (chunklet) ice like the DCM application. The sleeve type alignment bearings are pressed into the housing # 4 and extruding head # 9. The mechanical seal # 6 and "O" ring # 5 seal the lower end of the evaporator system.



COMPONENT TECHNICAL DATA

CONTROL TRANSFORMER

Hoshizaki Flaker units include a 24 volt control transformer. This transformer has a 115 volt primary and 24 volt secondary and is protected by a 1Amp control fuse. (The DCM has a dual output secondary of 10.5/24V) The 24 volt secondary supplies power to the solid state timer board, relay coils, inlet water valve and flush timer circuit. The flush valve will be either 24 volts AC or DC, depending on the model. A rectifier is provide in the flush valve circuit to convert to DC. Without control voltage on pins 1 and 2, the timer board will not allow the unit to start.

GEAR MOTOR PROTECTION

The auger gear motor circuit includes two overload safeties. The primary safety is a manual reset, current type protector or slow blow fuse located in the control box. This is a time delay protection which operates if high amp draw occurs. The secondary safety is a thermal protector which is incorporated into the gear motor windings.

The current type gear motor safety has been replaced with a slow blow fuse on most models. The Fuse provides more consistant protection in low voltage applications.

GEAR MOTOR PROTECTION:

MODEL	PROTECTION
F-300B & F-500B	Current type protector Later production uses a 1.5 amp fuse.
F-450M, F-800	1.5 Amp fuse
F-1000M	Current type protector Later production uses a 1.5 amp fuse.
F-1000M_F-C	2 amp fuse.
F-1001M_H	3 amp fuse.
F-2000M_F	Current type protector.
F-2000M_H	10 amp fuse.

Note: Some cases require a 2 amp fuse for the F-1000M.

Gear motor failure can be expensive and it is very important to find the cause of the failure when it is replaced. There are several possibilities for the cause of gear motor failure. The following check list is designed to help you find the reason your failure occurred.

F-1000M GEAR MOTOR CHECKOUT

NORMAL AMPERAGE: The amperage for the F-1000M gear motor should be 0.6~1.0 amps with no load and 1.0~1.4 amps when making ice.

Answer the following questions to discover the possible cause for your failure:

1. Is Ambient Temperature above 45 degrees F.

2. Does the unit have the *Wrong Extruding Head*. Check the Extruder Type. Is it a Flaker or Cubelet style. (The cubelet style head will have smaller openings for the ice to extrude.)

3. Does the unit have the *Wrong Cutter.* The cutter should match the extruding head style. Flake or Cubelet.

4. Do you have a *Damaged Extruder.* Look for following imperfections. A. Dents B. Fins Bent C. Scale D. Other Resistance

5. Does the unit have the *Correct Auger*. Is the auger a dual flight auger? (Double Spirals) Check the parts breakdown for the correct auger style.

6. Check the *Voltage Supply* and circuit amperage. Is this unit on it's own dedicated circuit? The supply voltage should be within +/- 10% of the rated voltage when the unit is making ice.

7. Check the *Running Voltage* at the gear motor. (While the unit is making Ice.)

8. Inspect bearings for wear. (Use bearing gauge) Are the *Bearings* OK? If the upper bearing is worn, both bearings should be replaced.

9. Check Evaporator Cylinder/ Barrel for signs of scoring.

10. Is there any condensation dripping onto the Gear Motor windings? If yes, find the source and take action to stop the moisture.

11. Is the galvanized shield mounted over the motor assembly?

12. Verify that you have the proper Gear Motor Capacitor.

13. Is the *Gear Motor Locked*. Check motor winding resistance.

2. WRONG GEAR MOTOR OVERLOAD / FUSE:

Check fuse size. Has the original overload reset been replaced with the fuse kit? The M_F Flaker requires Bussman GMD 1.5A Fuse P/N 4A0893-04. The M_F-C Cubelet requires Bussman GMD 2.0A Fuse P/N 4A0893-05. This fuse is a slow blow type. Replacing it with a standard fuse will cause the fuse to blow again.

Although it is common practice to install a larger fuse during service diagnosis, you should not leave a larger fuse in the unit when you leave the site. This could cause a serious unit failure.

3. MISWIRING
Is gear motor wired correctly and wire connections tight. Check the wiring diagram for the proper wiring.

4. BIN CONTROL SWITCH DOES NOT OPERATE
Check the bin control operation. A bad or miswired bin control can cause ice to back up in the spout and chute and cause higher gear motor amperage. Is Bin Control wired correctly and are the wire connections tight.

Make sure there are no metallic components interfering with the magnetic bin control. Verify top panel is non-magnetic. Assure that the proximity switch is mount properly. The switch must be secure and mounted level to the chute top. Does the *Bin Control Paddle* move freely and is it unobstructed?

As you can see, there are many factors that can cause a gear motor to fail. A gear motor check list comes with a service replacement part. The check list can be used as a diagnostic tool. If the gear motor is under warranty, the checklist should be completed and submitted with the warranty claim.

GEAR MOTOR STRESS

When looking for the cause of a gear motor failure, you should consider anything that will add stress to the assembly. Stress on the gear motor will increase the gear motor amperage and torque. The most common causes for stress is scale on the auger surface and evaporator walls. Scale nsulates the evaporator walls and causes reduced heat transfer. As a result, the ice will be wet and mushy. This poor quality ice does not extrude well and tends to pack in the evaporator outlet.

Heavy scale build up must be removed using an acid based cleaner which will loosen the scale. Follow the cleaning instructions provided on the cleaning label to preform a maintenance cleaning. If the unit has not been cleaned and maintained frequently, it may require you to pull the auger

and clean the cylinder wall with a Scotchbrite pad & cleaner. The extruding head surface may also have heavy scale and can be cleaned with Scotchbrite & cleaner as well.

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 for undamaged extruding heads and housings. The bearings should always be replaced as a set. Return the extruding head and housing to your distributor for an exchange set or to be returned for repressing.

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.

(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

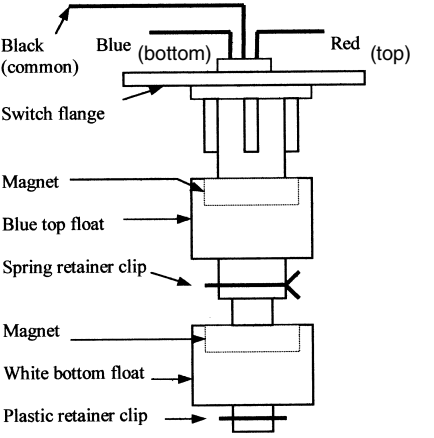
Hoshizaki float switch, part number 435490-01 can be used as a universal replacement on any Hoshizaki Flaker or DCM model in the field. It now subs for all previous float switch numbers in our parts system.

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 thetop 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 24 volts across pins 7 & 8. 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:

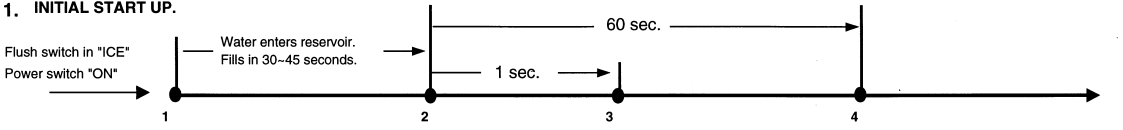
With proper voltage and water supplied to the Flaker and the flush and ice switch is in the ice position, power is supplied to the inlet water valve. The unit will not start unless the reservoir is full and both floats on the dual float switch are closed (in the up position). The operation is then turned 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.

FOR FACTORY SUPPORT
CONTACT HOSHIZAKI TECHNICAL SUPPORT AT:

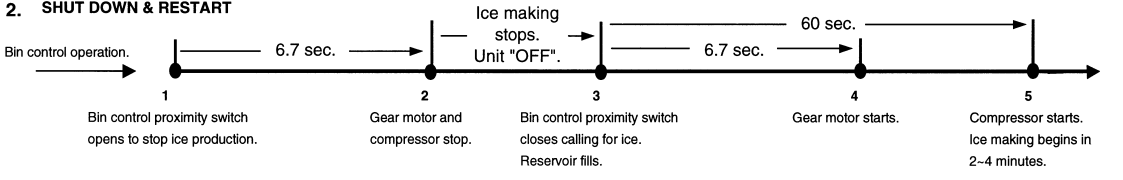
1 -800-233-1940
E-Mail: techsupport@hoshizaki.com

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-450M 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 20 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 20 minutes on the flush timer.
The F-500 will flush when the bin control is open.

DCM SEQUENCE OF OPERATION

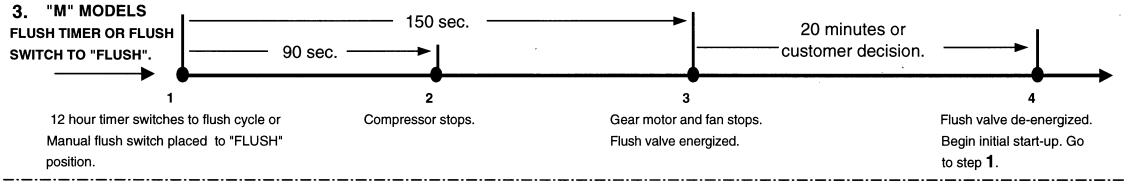
DCM sequence for the ice making unit is similar to the F-500, with a delay of the compressor at start up and a delay of the gear motor at shut down.

A periodic flush is also incorporated in the DCM units. All DCM models have periodic agitation in the bin to eliminate ice bridging. The DCM- 240 model uses a solid state relay to turn the gear motor for .2 seconds every 90 minutes. On DCM-500 and 750 models, the solid state timer board will start the agitation motor for .6 seconds every 12 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.

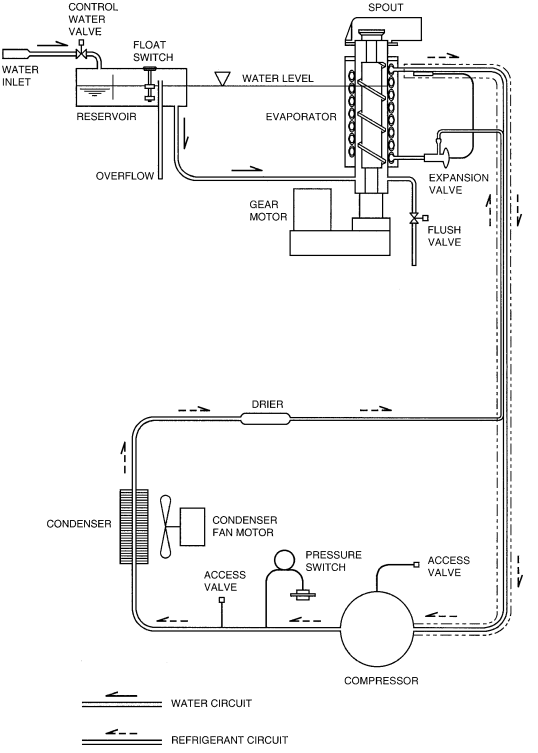
FLUSH SEQUENCE AND LOW WATER SAFETY



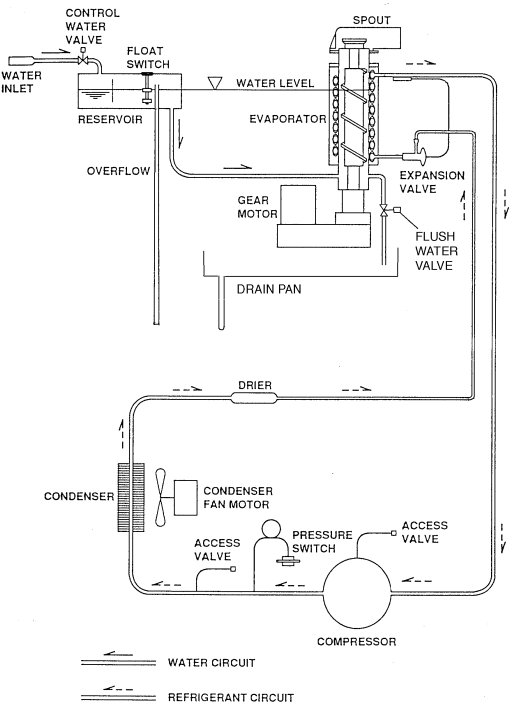
WATER AND REFRIGERATION CIRCUIT DRAWING REFERENCE CHART FOR R-404A MODELS

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

A
F-300 BAF

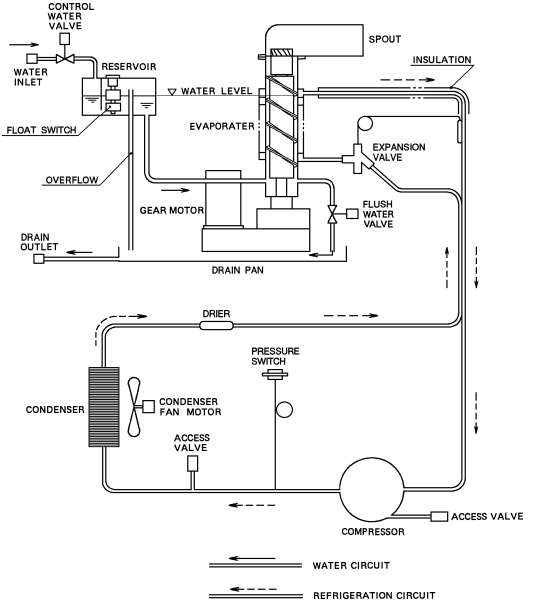

CONTROL
WATER
VALVE
FLOAT
SWITCH
WATER
INLET
WATER LEVEL
RESERVOIR
EVAPORATOR
SPOUT
OVERFLOW
EXPANSION
VALVE
GEAR
MOTOR
FLUSH
VALVE
DRIER
CONDENSER
CONDENSER
FAN MOTOR
PRESSURE
SWITCH
ACCESS
VALVE
ACCESS
VALVE
COMPRESSOR
WATER CIRCUIT
REFRIGERANT CIRCUIT

B
F-450 MAF/H
F-500 BAF

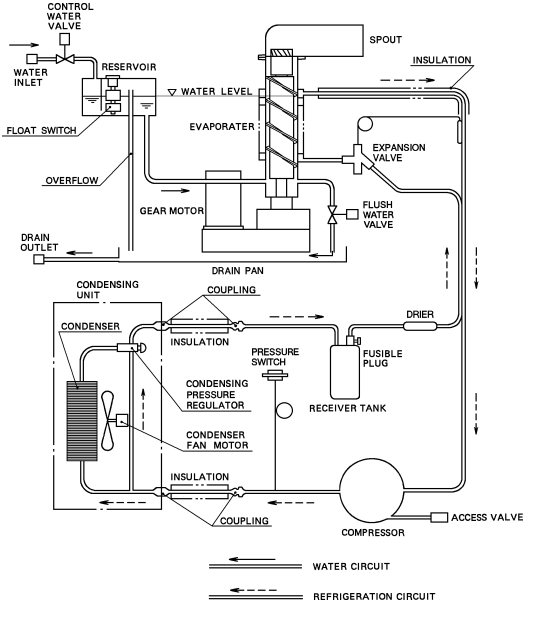


2/20/03

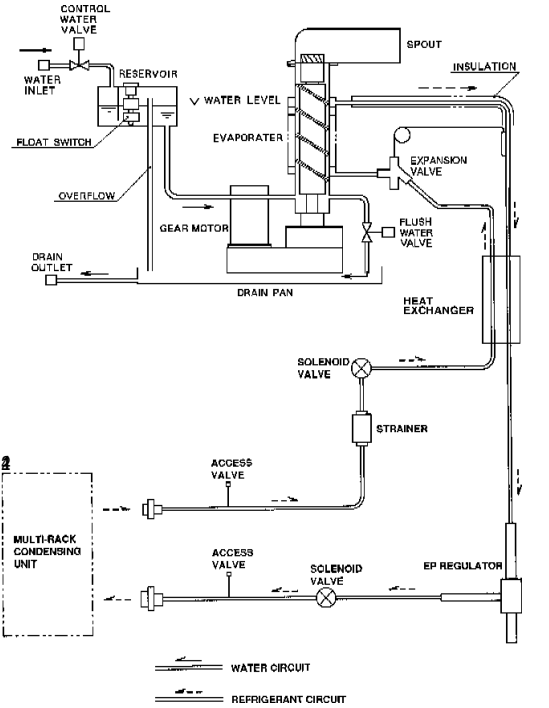
C
F-800MAF/H, MWF/H
F-1000 MAF, MWF
F-1001MAH, MWH



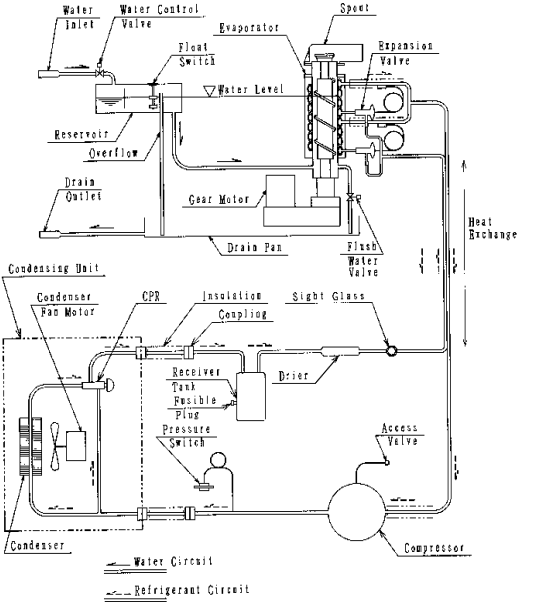
D
F-1000 MRF
F-1001 MRH



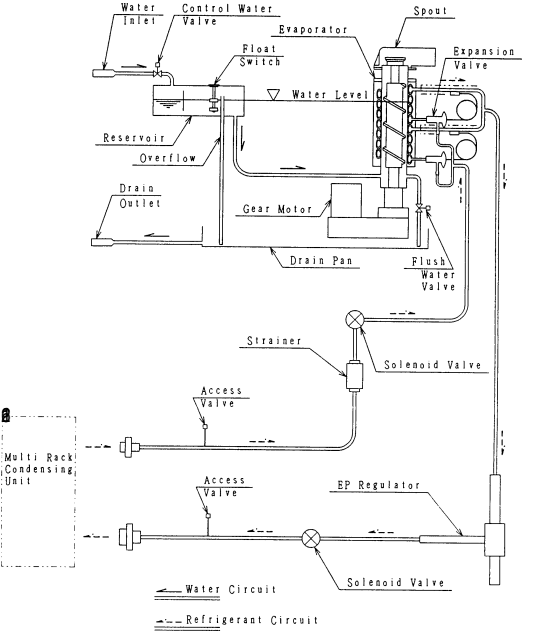
E
F-1000 MLF
F1001 MLH



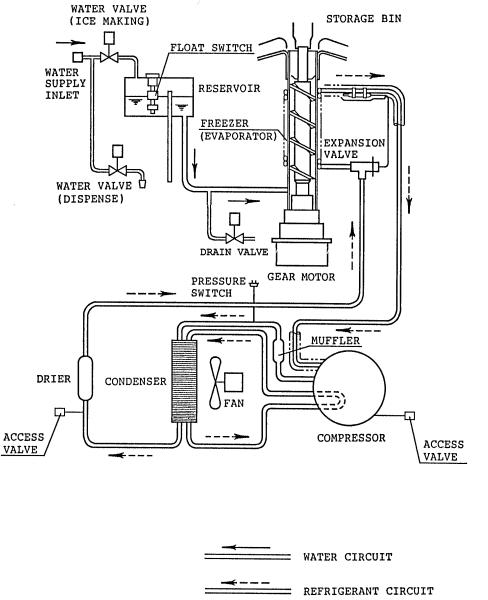
F
F-2000 MRF
F-2000 MRH



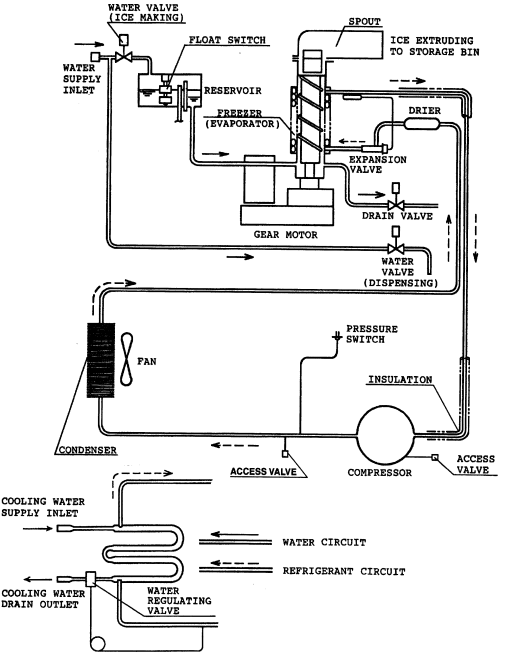
G
F-2000 MLF
F-2000 MLH



H
DCM-240 BAF
DCM-270 BAH



I
DCM-500 BAF/H, BWF/H
DCM-750 BAF/H, BWF/H



R-404A PERFORMANCE DATA

MODEL: **F-300BAF**

Total Amperage (Compressor RLA): 9A (7.6A) Supply Voltage: 115/60/1

Ambient Temp F°/C°		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	WaterTemp (F°/C°)	Air	Air	Air	Air
Production 24 hours (lbs.)	50/9	303	267	236	209
	70/21	290	256	232	201
	90/32	278	246	218	188
Evaporator Outlet temp. (°F)	50/9	19	19	22	26
	70/21	19	22	22	26
	90/32	19	22	22	26
Pressure High Side	50/9	250	280	311	351
	70/21	250	280	311	351
	90/32	250	280	311	351
Pressure Suction	50/9	35	37	39	43
	70/21	35	37	39	43
	90/32	35	37	39	43

R-404A PERFORMANCE DATA

MODEL: **F-450MAF/H & MAF -C/H-C** (cubelet)

Total Amperage (Compressor RLA): 11.25A (8.5A) Supply voltage: 115/60/1

Ambient Temp (F°/C°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp (F°/C°)	Air	-C	Air	-C	Air	-C	Air	-C
Production 24 hours (lbs.)	50 / 9	476	426	416	368	362	317	315	273
	70 / 21	456	407	397	350	355	310	301	260
	90 / 32	435	387	379	333	330	287	282	244
Evaporator Outlet temp. (°F)	50 / 9	16	16	16	16	16	16	16	16
	70 / 21	16	16	16	16	16	16	16	16
	90 / 32	16	16	16	16	16	16	16	16
Pressure High Side	50 / 9	235	236	272	273	308	310	348	351
	70 / 21	235	236	272	273	308	310	348	351
	90 / 32	235	236	272	273	308	310	348	351
Pressure Suction	50 / 9	29	30	33	34	36	37	39	41
	70 / 21	29	30	33	34	36	37	39	41
	90 / 32	29	30	33	34	36	37	39	41

R-404A PERFORMANCE DATA

MODEL: **F-500BAF & BAF -C** (cubelet)

Total Amperage (Compressor RLA): 9.95A (7.9A) Supply voltage: 115/60/1

Ambient Temp (F°/C°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp (F°/C°)	Air	Air -C	Air	Air -C	Air	Air -C	Air	Air-C
Production 24 hours (lbs.)	50 / 9	478	431	419	381	366	336	320	295
	70 / 21	458	315	400	365	359	333	306	283
	90 / 32	438	398	383	350	335	308	287	263
Evaporator Outlet temp. (°F)	50 / 9	8	9	8	9	12	12	15	15
	70 / 21	8	9	12	12	13	12	15	15
	90 / 32	8	9	12	12	15	15	15	15
Pressure High Side	50 / 9	221	225	253	258	285	292	327	332
	70 / 21	221	225	253	258	285	292	327	332
	90 / 32	221	225	253	258	285	292	327	332
Pressure Suction	50 / 9	26	27	28	30	31	32	34	35
	70 / 21	26	27	28	30	31	32	34	35
	90 / 32	26	27	28	30	31	32	34	35

MODEL: **F-800M _F / H**

R-404A **PERFORMANCE DATA**

Total Amperage (Compressor RLA): MAF 11.95A (9.2A), MWF 10.2A (8.3A)

Supply voltage: 115/60/1

Water consumption for water cooled cond: 70/50 (21/9) 318 Gal/24 hr.

90/70 (32/21) 539 Gal/24 hr.

Ambient Temp °F/°C		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	WaterTemp °F/°C	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs.)	50 / 9	800	720	710	670	630	640	560	605
	70 / 21	765	695	680	660	615	625	540	595
	90 / 32	735	680	655	650	585	620	505	555
Evaporator Outlet temp. (°F)	50 / 9	17	21	19	22	21	21	22	23
	70 / 21	18	22	21	22	20	22	23	23
	90 / 32	18	21	20	22	21	22	22	22
Pressure High Side	50 / 9	223	265	270	267	286	266	315	267
	70 / 21	239	267	287	266	287	266	325	269
	90 / 32	255	266	287	265	306	265	325	268
Pressure Suction	50 / 9	35	37	39	38	41	38	44	39
	70 / 21	37	37	41	37	41	38	45	39
	90 / 32	38	37	41	38	43	38	45	39

MODEL: **F-800M _F-C / H-C** (cubelet)

R-404A PERFORMANCE DATA

Total Amperage (Compressor RLA): MAF-C 11.95A (9.2A), MWF-C 10.2A (8.3A)

Supply voltage: 115/60/1

Water consumption for water cooled cond: 70/50 (21/9) 318 Gal/24 hr.

90/70 (32/21) 553 Gal/24 hr.

Ambient Temp °F/°C		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water temp °F/°C	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs.)	50 / 9	760	670	665	625	585	590	510	560
	70 / 21	730	650	640	615	575	590	490	550
	90 / 32	700	640	610	605	535	570	455	505
Evaporator Outlet temp. (°F)	50 / 9	16	21	18	22	21	21	22	23
	70 / 21	17	22	18	22	29	23	23	23
	90 / 32	17	21	19	22	21	22	23	23
Pressure High Side	50 / 9	221	265	254	267	286	266	325	267
	70 / 21	221	267	254	266	286	266	325	269
	90 / 32	221	266	254	265	286	265	325	268
Pressure Suction	50 / 9	35	37	38	38	41	38	45	39
	70 / 21	35	37	38	37	41	38	45	39
	90 / 32	35	37	38	38	41	38	45	39

R-404A PERFORMANCE DATA

MODEL: **F-1000M_F** Supply Voltage: 208-230/60/1 (3 wire with neutral for for 115V)

Total Amperage (Compressor RLA): MAF 6.85A (4.2A) MWF: 5.83A(4.2A), MRF: 8.9A (4.2A)

Water Consumption for water cooled cond. 70 / 50 (21/9) 303 Gal/24 hr: 90 / 70 (32/21) 480 Gal/24 hr.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	Water Temp F°/C°	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	970	890	930	855	820	835	755	770	750	665	720	675
	70 / 21	930	855	895	820	805	805	740	755	745	635	705	650
	90 / 32	890	840	865	785	785	780	695	735	700	595	655	605
Evaporator Outlet temp. (F°)	50 / 9	19	23	23	19	23	25	23	23	26	25	23	28
	70 / 21	19	23	24	23	23	26	23	23	27	25	23	28
	90 / 32	19	25	25	23	25	26	25	25	28	25	25	28
Pressure High Side	50 / 9	213	263	221	244	263	239	274	263	256	315	263	295
	70 / 21	213	266	221	244	266	239	274	266	256	315	266	296
	90 / 32	213	269	221	244	269	239	274	269	256	315	269	295
Pressure Suction	50 / 9	32	33	33	35	33	35	38	33	36	41	33	39
	70 / 21	32	34	33	35	34	35	38	34	36	41	34	39
	90 / 32	32	35	33	35	35	35	38	35	36	41	35	39

R-404A PERFORMANCE DATA

MODEL: **F- 1000M _F -C** (cubelet) Supply Voltage: 208-230/60/1 (3 wire with neutral for for 115V)

Total Amperage (Compressor RLA): MAF -C 6.85A (4.2A), MWF: 5.83A (4.2A), MRF: 8.9A (4.2A)

Water Consumption for water cooled cond. 70 / 50 (21/9) 303 Gal/24 hr. 90 / 70 (32/21) 492 Gal/24 hr.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	Water Temp F°/C°	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	860	790	840	765	735	765	680	695	700	610	660	640
	70 / 21	820	760	810	735	720	745	665	685	695	585	645	620
	90 / 32	790	750	790	710	710	720	635	670	660	550	600	575
Evaporator Outlet temp. (F°)	50 / 9	18	23	23	18	23	25	23	23	26	27	23	28
	70 / 21	18	23	24	23	23	26	23	23	25	27	23	28
	90 / 32	18	25	25	23	25	26	27	25	28	27	25	28
Pressure High Side	50 / 9	209	263	220	243	263	238	277	263	256	217	263	295
	70 / 21	209	266	220	243	266	238	277	266	256	317	266	295
	90 / 32	209	269	220	243	269	238	277	269	256	217	269	295
Pressure Suction	50 / 9	32	33	34	35	33	36	38	33	37	41	33	40
	70 / 21	32	34	34	35	34	36	38	34	37	41	34	40
	90 / 32	32	35	33	35	35	36	38	35	37	41	35	40

R-404A PERFORMANCE DATA

MODEL: **F-1000MLF & MLF-C** (cubelet)

Total Amperage 1.63A

Supply voltage: 115/60/1

This unit is designed for connection to a Rack System using R-404A refrigerant. The data below is calculated.

Ambient Temp °F/°C		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water Temp °F/°C	Low side	-C	Low side	-C	Low side	-C	Low side	-C
Production 24 hours (lbs.)	50 / 9	1150	1020	980	885	900	805	830	735
	70 / 21	1035	945	950	860	885	795	805	710
	90 / 32	1005	915	925	835	805	760	690	640
Evaporator Outlet temp. (°F)	50 / 9	21	21	21	21	21	21	23	23
	70 / 21	21	21	21	21	21	21	23	23
	90 / 32	21	21	21	21	23	23	23	23
Pressure High Side	50 / 9	106	106	125	125	143	143	166	166
	70 / 21	106	106	125	125	143	143	166	166
	90 / 32	106	106	125	125	143	143	166	166
Pressure Suction	50 / 9	26	26	30	30	33	33	35	35
	70 / 21	26	26	30	30	33	33	35	35
	90 / 32	26	26	30	30	33	33	35	35

Note: The data provided is calculated by using a refrigeration capacity of 5700 BTU/h with a high side pressure of 213 PSIG and suction pressure of 31.2 PSIG. The actual production and system operating pressures will vary depending on the specific R-404A rack system setup.

Factory setting for the Evaporator Pressure Regulating Valve (EPR) is 32 PSIG. for evaporator temperature no less than 0 °F (-17.7°C).

R-22 " SPECIAL MODEL" PERFORMANCE DATA

MODEL: **F-1000MAF-22** (Special production using **R-22** refrigerant)

Total Amperage (Compressor RLA): MAF 7.25A (4.5A) Supply Voltage: 115/60/1

Ambient Temp F°/C°		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	Water Temp °F/°C	Air	Air	Air	Air
Production 24 hours (lbs.)	50/9	860	680	680	615
	70/21	820	720	670	585
	90/32	790	710	635	555
Evaporator Outlet temp. (°F)	50/9	14	14	18	21
	70/21	14	18	18	21
	90/32	14	18	21	21
Pressure High Side	50/9	170	199	228	258
	70/21	170	199	228	258
	90/32	170	199	228	258
Pressure Suction	50/9	28	30	32	34
	70/21	28	30	32	34
	90/32	28	30	32	34

NOTE: R-22 refrigerant charge 1 lb. 7oz. (660g.).

R-404A PERFORMANCE DATA

MODEL: **F-1000M_F-50**

Total Amperage (Compressor RLA): MAF 6.8A (5.9A), MWF 6.3A (5.4A) Supply Voltage: 220-240 50/ 1

Water consumption for water cooled cond: 70/50 (21/9) 326 Gal/24 hr. 90/70 (32/21) 503 Gal/24 hr.

Ambient Temp °F /°C		70 / 21		80 / 27		90 / 32		100 / 38	
	Water Temp °F /°C	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs.)	50 / 9	935 / 424	860 / 390	835 / 383	820 / 379	750 / 353	770 / 365	717 / 325	777 / 352
	70 / 21	895 / 404	855 / 388	805 / 373	805 / 374	750 / 353	840 / 381	650 / 316	768 / 348
	90 / 32	865 / 393	840 / 383	780 / 363	785 / 370	737 / 334	735 / 357	655 / 297	690 / 313
Evaporator Outlet temp. °F /°C	50 / 9	14 / -10	16 / -9	14 / -10	16 / -9	16 / -9	16 / -9	17 / -9	16 / -9
	70 / 21	14 / -10	16 / -9	16 / -9	16 / -9	16 / -9	16 / -9	17 / -9	16 / -9
	90 / 32	14 / -10	16 / -9	16 / -9	16 / -9	17 / -9	16 / -9	17 / -9	16 / -9
Pressure High Side	50 / 9	224	260	257	260	289	260	329	260
	70 / 21	224	260	257	260	289	260	329	260
	90 / 32	224	261	257	261	289	261	329	261
Pressure Suction	50 / 9	33	35	36	35	39	35	43	35
	70 / 21	33	37	36	37	39	37	43	37
	90 / 32	33	39	36	39	39	39	43	39

R-404A PERFORMANCE DATA

MODEL: **F-1001M_H** Supply Voltage: 208-230/60/1 (3 wire with neutral for for 115V)

Total Amperage (Compressor RLA): MAH 6.85A (4.2A) MWH: 5.83A(4.2A), MRH: 8.9A (4.2A)

Water Consumption for water cooled cond. 70 / 50 (21/9) 303 Gal/24 hr: 90 / 70 (32/21) 480 Gal/24 hr.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	**Water Temp F°/C°**	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	970	890	930	835	820	835	755	770	750	665	720	675
	70 / 21	930	855	895	805	805	805	740	755	745	635	705	650
	90 / 32	890	840	865	780	785	780	695	735	700	595	655	605
Evaporator Outlet temp. (F°)	50 / 9	19	23	23	19	23	25	23	23	26	25	23	28
	70 / 21	19	23	24	23	23	26	23	23	27	25	23	28
	90 / 32	19	25	25	23	25	26	25	25	28	25	25	28
Pressure High Side	50 / 9	213	263	221	244	263	239	274	263	256	315	263	295
	70 / 21	213	266	221	244	266	239	274	266	256	315	266	296
	90 / 32	213	269	221	244	269	239	274	269	256	315	269	295
Pressure Suction	50 / 9	32	33	33	35	33	35	38	33	36	41	33	39
	70 / 21	32	34	33	35	34	35	38	34	36	41	34	39
	90 / 32	32	35	33	35	35	35	38	35	36	41	35	39

R-404A PERFORMANCE DATA

MODEL: **F- 1001M _H -C** (cubelet) Supply Voltage: 208-230/60/1 (3 wire with neutral for for 115V)

Total Amperage (Compressor RLA): MAH -C 8.08A (4.2A), MWH-C: 5.83A (4.2A), MRH-C: 10.23A (4.2A)

Water Consumption for water cooled cond. 70 / 50 (21/9) 303 Gal/24 hr. 90 / 70 (32/21) 492 Gal/24 hr.

Ambient Temp (F° / C°)		70 / 21			80 / 27			90 / 32			100 / 38		
Kg=lbs. x .454	**Water Temp F°/C°**	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote	Air	Water	Remote
Production 24 hours (lbs.)	50 / 9	860	790	840	765	735	765	680	695	700	610	660	640
	70 / 21	820	760	810	735	720	745	665	685	695	585	645	620
	90 / 32	790	750	790	710	710	720	635	670	660	550	600	575
Evaporator Outlet temp. (F°)	50 / 9	18	23	23	18	23	25	23	23	26	27	23	28
	70 / 21	18	23	24	23	23	26	23	23	25	27	23	28
	90 / 32	18	25	25	23	25	26	27	25	28	27	25	28
Pressure High Side	50 / 9	209	263	220	243	263	238	277	263	256	217	263	295
	70 / 21	209	266	220	243	266	238	277	266	256	317	266	295
	90 / 32	209	269	220	243	269	238	277	269	256	217	269	295
Pressure Suction	50 / 9	32	33	34	35	33	36	38	33	37	41	33	40
	70 / 21	32	34	34	35	34	36	38	34	37	41	34	40
	90 / 32	32	35	33	35	35	36	38	35	37	41	35	40

R-404A PERFORMANCE DATA

MODEL: **F-1001MLH & MLH-C** (cubelet)

Total Amperage: 3.03A

Supply voltage: 115/60/1

This unit is designed for connection to a Rack System using R-404A refrigerant. The data below is calculated.

Ambient Temp °F/°C		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	**Water Temp °F/°C**	Low side	-C	Low side	-C	Low side	-C	Low side	-C
Production 24 hours (lbs.)	50 / 9			980	885	900	805	830	735
	70 / 21			950	860	885	795	805	710
	90 / 32			925	835	805	760	690	640
Evaporator Outlet temp. (°F)	50 / 9	21	21	21	21	21	21	23	23
	70 / 21	21	21	21	21	21	21	23	23
	90 / 32	21	21	21	21	23	23	23	23
Pressure High Side	50 / 9	106	106	125	125	143	143	166	166
	70 / 21	106	106	125	125	143	143	166	166
	90 / 32	106	106	125	125	143	143	166	166
Pressure Suction	50 / 9	26	26	30	30	33	33	35	35
	70 / 21	26	26	30	30	33	33	35	35
	90 / 32	26	26	30	30	33	33	35	35

Note: The data provided is calculated by using a refrigeration capacity of 5700 BTU/h with a high side pressure of 213 PSIG and suction pressure of 31.2 PSIG. The actual production and system operating pressures will vary depending on the specific R-404A rack system setup. Factory setting for the Evaporator Pressure Regulating Valve (EPR) is 32 PSIG. for evaporator temperature no less than 0 °F (-17.7°C).

R-404A PERFORMANCE DATA

MODEL: **F-2000M_F/H**

Supply Voltage: 208-230/60/1

Total Amperage (Compressor RLA): Water 16.9 (10.8A), Remote 19.4A (10.8A)

Water consumption for water cooled cond: 70/50 (21/9) 735 Gal/24 hr.

90/70 (32/21) 1165 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water temp F°/C°	Water	Remote	Water	Remote	Water	Remote	Water	Remote
Production 24 hours (lbs.)	50 / 9	2030	1992	1875	1827	1759	1683	1651	1550
	70 / 21	1957	1930	1836	1777	1730	1676	1616	1508
	90 / 32	1916	1878	1797	1729	1686	1593	1500	1393
Evaporator Outlet temp. (°F)	50 / 9	11	12	11	12	11	12	11	14
	70 / 21	11	12	11	12	11	12	11	14
	90 / 32	11	12	11	12	11	14	11	14
Pressure High Side	50 / 9	262	221	262	230	262	238	262	274
	70 / 21	263	221	263	230	263	238	263	274
	90 / 32	265	221	265	230	265	238	265	274
Pressure Suction	50 / 9	26	25	26	26	26	26	26	29
	70 / 21	27	25	27	26	27	26	27	29
	90 / 32	28	25	28	26	28	26	28	29

R-404A PERFORMANCE DATA

MODEL: **F-2000M_F-C/H-C** (cubelet) Supply Voltage: 208-230/60/1

Total Amperage (Compressor RLA): Water 16.9 (10.8A), Remote 19.4A (10.8A)

Water consumption for water cooled cond: 70/50 (21/9) 765 Gal/24 hr. 90/70 (32/21) 1190 Gal/24 hr.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water temp F°/C°	Water	Remote	Water	Remote	Water	Remote	Water	Remote
Production 24 hours (lbs.)	50 / 9	1790	1714	1669	1595	1587	1498	1508	1408
	70 / 21	1727	1662	1641	1562	1560	1491	1483	1379
	90 / 32	1698	1628	1614	1530	1534	1437	1375	1272
Evaporator Outlet temp. (°F)	50 / 9	10	12	10	12	10	14	10	14
	70 / 21	10	12	10	14	10	14	10	14
	90 / 32	12	12	12	14	12	14	12	14
Pressure High Side	50 / 9	262	220	262	227	262	233	262	266
	70 / 21	263	220	263	227	263	233	263	266
	90 / 32	266	220	266	227	266	233	266	266
Pressure Suction	50 / 9	27	26	27	26	27	27	27	29
	70 / 21	27	26	27	26	27	27	27	29
	90 / 32	28	26	28	26	28	27	28	29

R-404A PERFORMANCE DATA

MODEL: **F-2000MRF/H3 & MRF3-C/H3-C** (cubelet)

Total Amperage (Compressor RLA): Remote 17.6A (9A) Supply Voltage: 208-230/60/3

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water temp F°/C°	Remote	-C	Remote	-C	Remote	-C	Remote	-C
Production 24 hours (lbs.)	50 / 9	2011	1725	1845	1613	1701	1526	1569	1420
	70 / 21	1948	1684	1796	1579	1693	1513	1527	1390
	90 / 32	1897	1648	1748	1546	1612	1450	1411	1274
Evaporator Outlet temp. (°F)	50 / 9	14	-1	14	-1	14	0	16	3
	70 / 21	14	-1	14	0	14	0	16	3
	90 / 32	14	-1	14	0	16	3	16	3
Pressure High Side	50 / 9	219	222	230	225	241	228	271	262
	70 / 21	219	222	230	225	241	228	271	262
	90 / 32	219	222	230	225	241	228	271	262
Pressure Suction	50 / 9	25	25	26	25	27	26	29	29
	70 / 21	25	25	26	25	27	26	29	29
	90 / 32	25	25	26	25	27	26	29	29

R-404A PERFORMANCE DATA

MODEL: **F-2000MLF/H & MLF-C/H-C** (cubelet)
Total Amperage: 6.14A
Supply Voltage: 115/60/1
This unit is designed for connection to a Rack System using R-404A refrigerant. The data below is calculated.

Ambient Temp (F°)		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	Water temp F°/C°	Remote	-C	Remote	-C	Remote	-C	Remote	-C
Production 24 hours (lbs.)	50 / 9	2280	1965	2010	1755	1760	1565	1650	1500
	70 / 21	1955	1680	1835	1615	1730	1540	1615	1475
	90 / 32	1915	1660	1795	1585	1685	1515	1370	1245
Evaporator Outlet temp. (°F)	50 / 9	12	12	12	12	12	12	14	14
	70 / 21	12	12	12	12	12	12	14	14
	90 / 32	12	12	12	12	14	14	14	14
Pressure High Side	50 / 9	190	190	190	190	190	190	190	190
	70 / 21	256	256	256	256	256	256	256	256
	90 / 32	297	297	297	297	297	297	297	297
Pressure Suction	50 / 9	16	16	16	16	16	16	16	16
	70 / 21	21	21	21	21	21	21	21	21
	90 / 32	22	22	22	22	22	22	22	22

Note: The data provided is calculated by using a refrigeration capacity of 11600 BTU/h with a high side pressure of 221 PSIG and suction pressure of 22 PSIG. The actual production and system operating pressures will vary depending on the specific R-404A rack system setup. Factory setting for the Evaporator Pressure Regulating Valve (EPR) is 22 PSIG for evaporator temperature no less than -14 °F (-25 °C).

R-404A PERFORMANCE DATA

MODEL: **DCM-240BAF**

Total Amperage (Compressor RLA): 8.5A (6.5A) Supply Voltage: 115/60/1

Ambient Temp F°/C°		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	Water Temp °F/°C	Air	Air	Air	Air
Production 24 hours (lbs.)	50/9	275	240	215	190
	70/21	265	230	210	190
	90/32	250	215	200	175
Evaporator Outlet temp. (°F)	50/9	21.2	24.8	24.8	25.7
	70/21	21.2	24.8	24.8	25.7
	90/32	21.2	24.8	24.8	25.7
Pressure High Side	50/9	215	245	260	305
	70/21	230	250	254	315
	90/32	230	265	275	310
Pressure Suction	50/9	38.5	40.0	43.5	46.3
	70/21	38.5	40.0	43.5	46.3
	90/32	38.5	40.0	43.5	46.3

R-404A PERFORMANCE DATA

MODEL: **DCM-270BAH**

Total Amperage (Compressor RLA): 8.5A (6.5A) Supply Voltage: 115/60/1

Ambient Temp F°/C°		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	**Water Temp °F/°C**	Air	Air	Air	Air
Production 24 hours (lbs.)	50/9	282	248	219	192
	70/21	271	238	215	184
	90/32	259	228	201	172
Evaporator Outlet temp. (°F)	50/9	20	20	23	23
	70/21	20	23	23	22
	90/32	20	23	24	21
Pressure High Side	50/9	217	251	285	327
	70/21	217	251	285	327
	90/32	217	251	285	327
Pressure Suction	50/9	37	40	43	46
	70/21	37	40	43	46
	90/32	37	40	43	46

R-404A PERFORMANCE DATA

MODEL: **DCM-500BAF/H**

Total Amperage (Compressor RLA): 11.2A (7.9A) Supply Voltage: 115/60/1

Ambient Temp F°/C°		70 / 21	80 / 27	90 / 32	100 / 38
Kg=lbs. x .454	**Water Temp °F/°C**	Air	Air	Air	Air
Production 24 hours (lbs.)	50/9	535	461	396	340
	70/21	510	438	385	323
	90/32	485	416	358	304
Evaporator Outlet temp. (°F)	50/9	23	23	26	28
	70/21	23	26	26	28
	90/32	23	26	28	28
Pressure High Side	50/9	230	264	297	335
	70/21	230	264	297	335
	90/32	230	264	297	335
Pressure Suction	50/9	33	35	37	43
	70/21	33	35	37	43
	90/32	33	35	37	43

R-404A PERFORMANCE DATA

MODEL: **DCM-750B_ F/H**

Total Amperage (Compressor RLA): BAF 16.4 (11A), BWF 14.5A (10A) Supply Voltage: 115/60/1

Water consumption for water cooled cond: 70/50 (21/9) 421 Gal/24 hr. 90/70 (32/21) 624 Gal/24 hr.

Ambient Temp °F /°C		70 / 21		80 / 27		90 / 32		100 / 38	
Kg=lbs. x .454	**Water Temp °F/°C**	Air	Water	Air	Water	Air	Water	Air	Water
Production 24 hours (lbs.)	50 / 9	803	879	684	809	573	751	480	697
	70 / 21	770	851	645	789	567	746	452	679
	90 / 32	726	830	608	770	509	714	423	628
Evaporator Outlet temp. (°F)	50 / 9	30	30	30	30	32	30	33	32
	70 / 21	30	30	32	30	32	30	33	32
	90 / 32	30	30	32	30	33	32	33	32
Pressure High Side	50 / 9	249	255	280	256	310	256	346	614
	70 / 21	249	255	280	256	310	256	346	614
	90 / 32	249	255	280	256	310	256	346	614
Pressure Suction	50 / 9	44	44	47	45	49	45	52	47
	70 / 21	44	44	47	45	49	45	52	47
	90 / 32	44	44	47	45	49	45	52	47

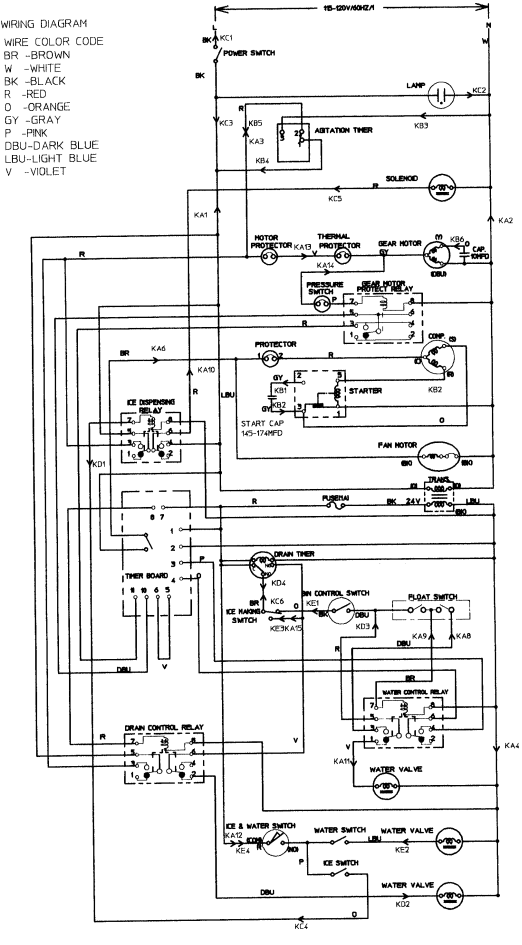
DCM/Flaker Wiring Diagram Reference Chart for R-404A Models

Model Number	Wiring Diagram	Page	Start Capacitor	Run Capacitor	Fan Capacitor	Gear Motor Capacitor
DCM-240BAF	**(A)**	189	145~174 MFD	None	None	10 MFD
DCM-270BAH	**(B)**	190	145~174 MFD	None	None	10 MFD
DCM-500BAF, BWF	**(C)/(D)**	191/192	243~292 MFD	15 MFD	5 MFD	12 MFD
DCM-500BAH, BWH	**(E)**	193	243~292 MFD	15 MFD	5 MFD	12 MFD
DCM-750BAF, BWF	**(F)/(G)**	194/195	88~108 MFD	15 MFD	5 MFD	24 MFD
DCM-750BAH. BWH	**(H)**	196	189~227 MFD	25 MFD	5 MFD	24 MFD
F-300BAF	**(I)**	197	145~174 MFD	None	None	10 MFD
F-450MAF/H	**(J)**	198	243~292 MFD	15 MFD	5 MFD	12 MFD
F-450MAF-C/H-C	**(K)**	199	243~292 MFD	15 MFD	5 MFD	12 MFD
F-500BAF	**(L)**	200	270~324 MFD	15 MFD	5 MFD	12 MFD
F-800MAF/H, MWF/H	**(M)**	201	124~149 MFD	25 MFD	5 MFD	12 MFD
F-1000MAF, MWF, MRF	**(N)**	202	108~130 MFD	25 MFD	5 MFD	12 MFD
F-1000MAF-22	**(O)**	203	108~130 MFD	25 MFD	5 MFD	12 MFD
F-1000MAF-50	**(P)**	204	64~77 MFD	20 MFD	2.5 MFD	12 MFD
F-1000MLF	**(Q)**	205	145~174 MFD	30 MFD	10 MFD	12 MFD

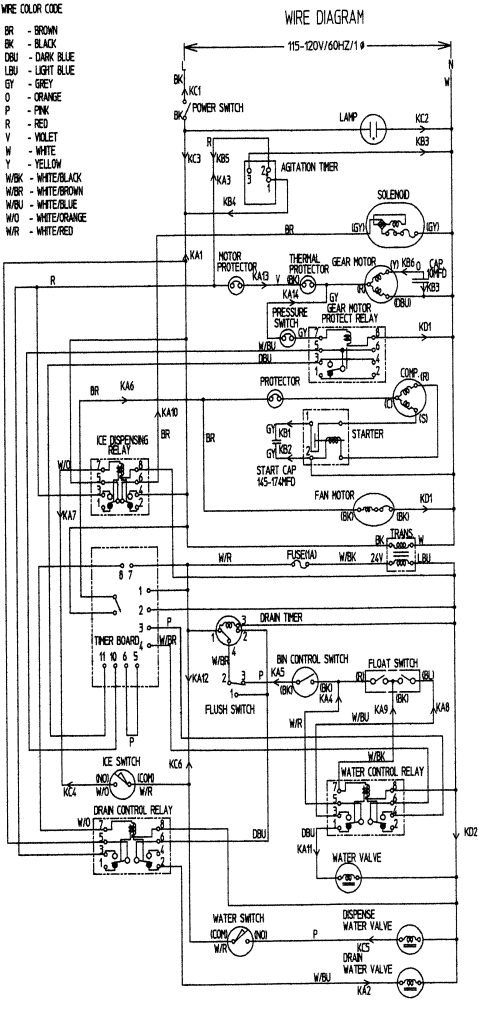
DCM/Flaker Wiring Diagram Reference Chart for R-404A Models

Model Number	Wiring Diagram	Page	Start Capacitor	Run Capacitor	Fan Capacitor	Gear Motor Capacitor
F-1001M_H	**(R)**	206	108~130 MFD	25 MFD	5 MFD	24 MFD
F-1001MLH	**(S)**	207	None	None	None	24 MFD
F-2000MRF/H, MWF/H	**(T)**	208	189~227 MFD	40 MFD	10 MFD	65 MFD
F-2000MRF3/H3	**(U)**	209	None	None	10 MFD	65 MFD
F-2000MLF/H	**(V)**	210	None	None	10 MFD	65 MFD
URC-6F,F					10 MFD	
URC-6F-E					10 MFD	
URC-20F					10 MFD	

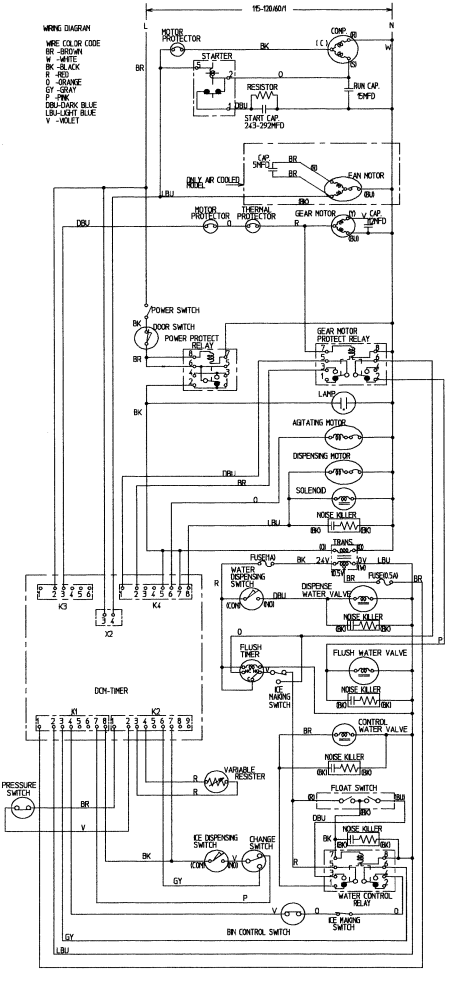
(A)
DCM-240 BAF


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
115-120V/60HZ/1
POWER SWITCH
LAMP
AGITATION TIMER
SOLENOID
MOTOR PROTECTOR
THERMAL PROTECTOR
GEAR MOTOR
CAP
PRESSURE SWITCH
GEAR MOTOR PROTECT RELAY
COMP
PROTECTOR
STARTER
START CAP 145-174MFD
ICE DISPENSING RELAY
FAN MOTOR
TRANS
FUSE/4A
24V
DRAIN TIMER
TIMER BOARD
ICE MAKING SWITCH
ICE MAKING CONTROL SWITCH
FLOAT SWITCH
WATER CONTROL RELAY
DRAIN CONTROL RELAY
WATER VALVE
ICE & WATER SWITCH
WATER SWITCH
ICE SWITCH

(B)
DCM-270 BAH

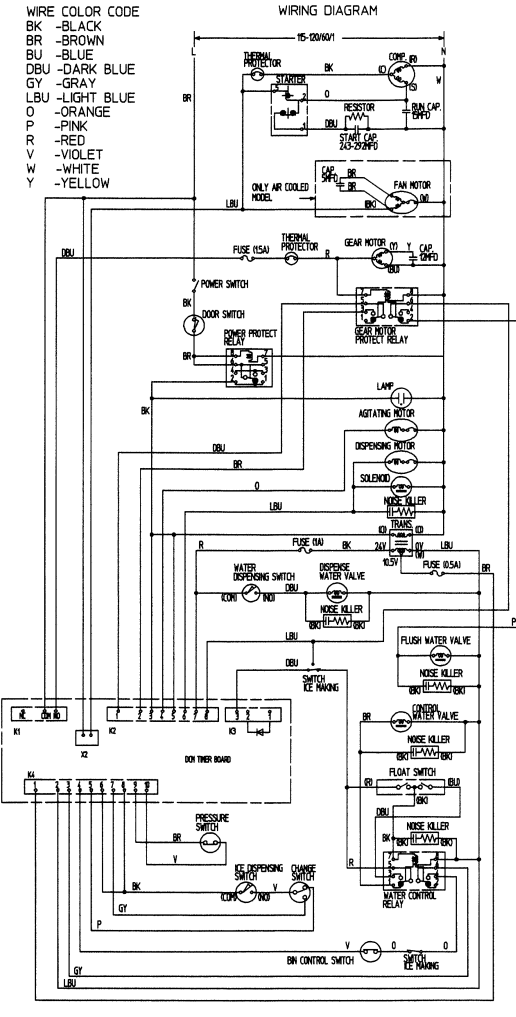

WIRE COLOR CODE
BR - BROWN
BK - BLACK
DBU - DARK BLUE
LBU - LIGHT BLUE
GY - GREY
O - ORANGE
P - PINK
R - RED
V - VIOLET
W - WHITE
Y - YELLOW
W/BK - WHITE/BLACK
W/BR - WHITE/BROWN
W/BU - WHITE/BLUE
W/O - WHITE/ORANGE
W/R - WHITE/RED
WIRE DIAGRAM
115-120V/60HZ/1φ
POWER SWITCH
LAMP
AGITATION TIMER
SOLENOID
MOTOR PROTECTOR
THERMAL PROTECTOR
GEAR MOTOR
CAP
PRESSURE SWITCH
GEAR MOTOR PROTECT RELAY
PROTECTOR
COMP
STARTER
START CAP 145-174MFD
ICE DISPENSING RELAY
FAN MOTOR
TRANS.
FUSE(4A)
DRAIN TIMER
TIMER BOARD
BIN CONTROL SWITCH
FLOAT SWITCH
FLUSH SWITCH
ICE SWITCH
WATER CONTROL RELAY
DRAIN CONTROL RELAY
WATER VALVE
WATER SWITCH
DISPENSE WATER VALVE
DRAIN WATER VALVE

(C)
DCM-500 BAF, BWF
Serial numbers H0 & J0



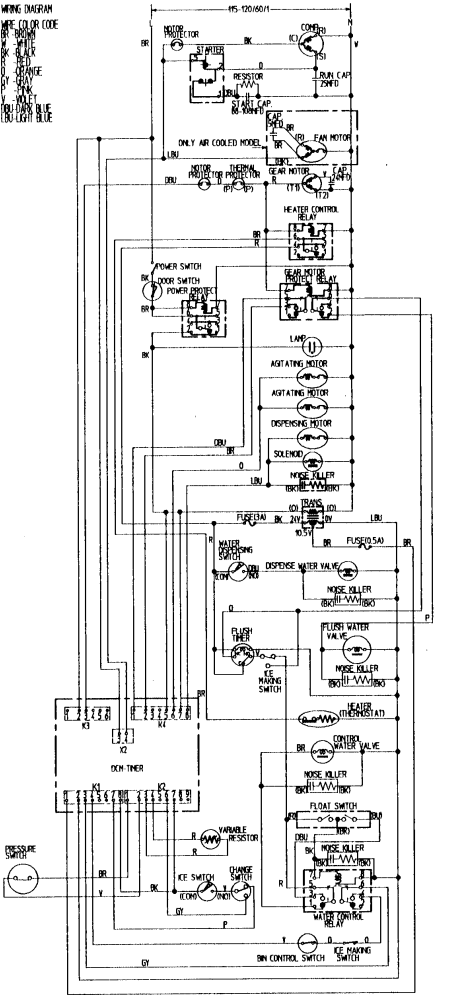
2/20/03

(D)
DCM-500 BAF, BWF
Serial numbers J1 & after.

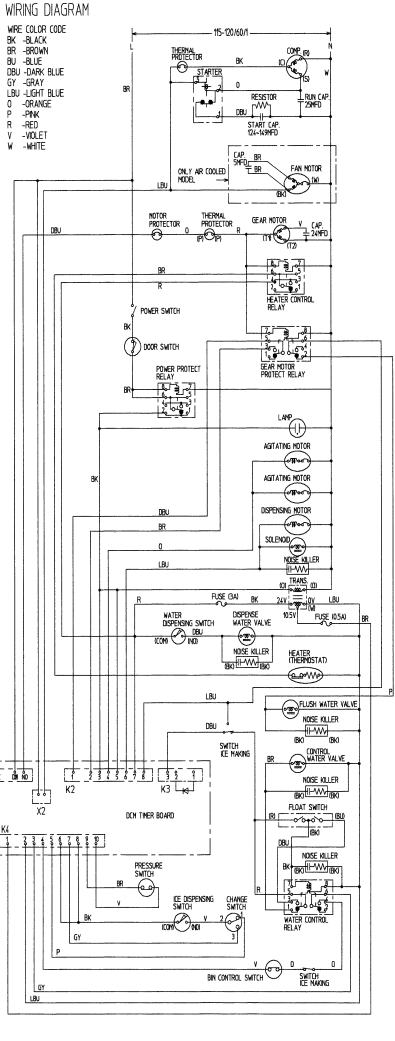


(E)
DCM-500 BAH, BWH

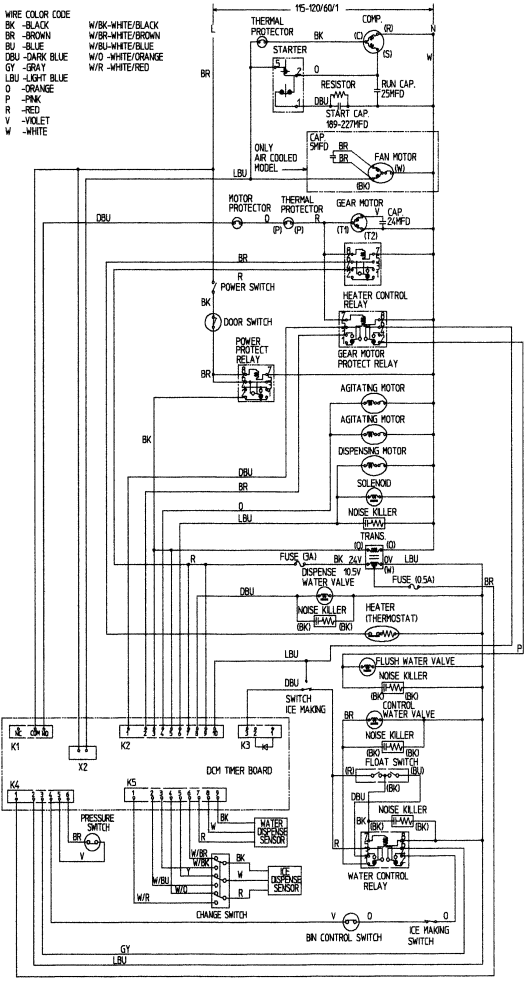
(F)
DCM-750 BAF, BWF
Serial numbers H0 & J0



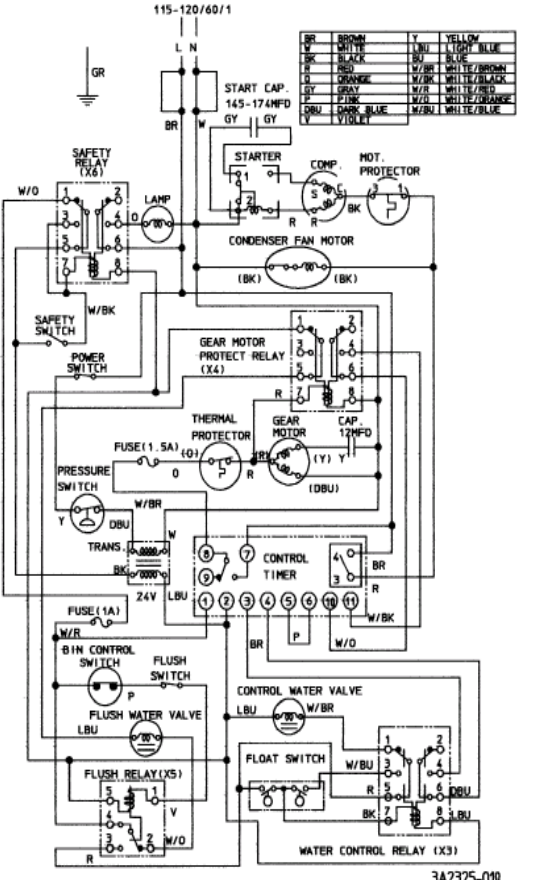
(G)
DCM-750 BAF, BWF
Serial numbers J1 & after.



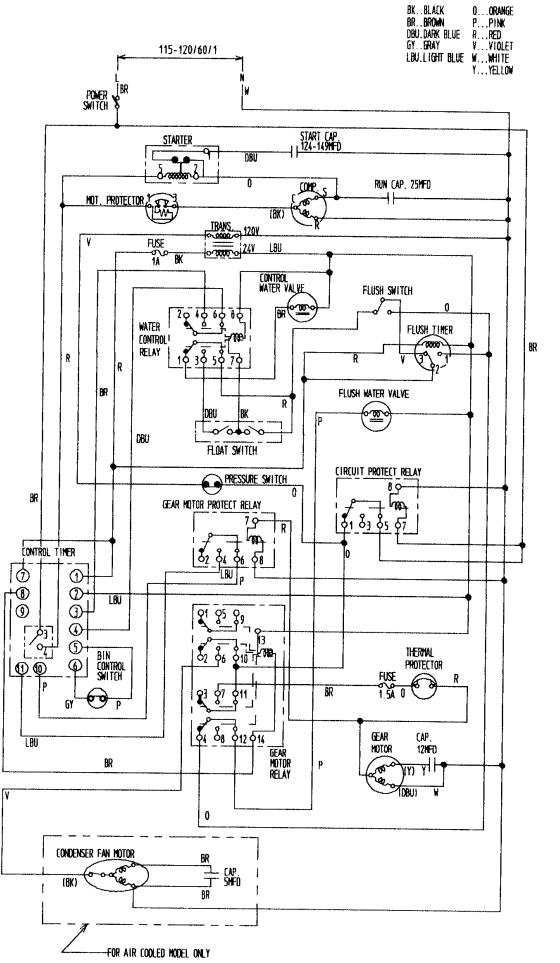
(H)
DCM-750 BAH, BWH



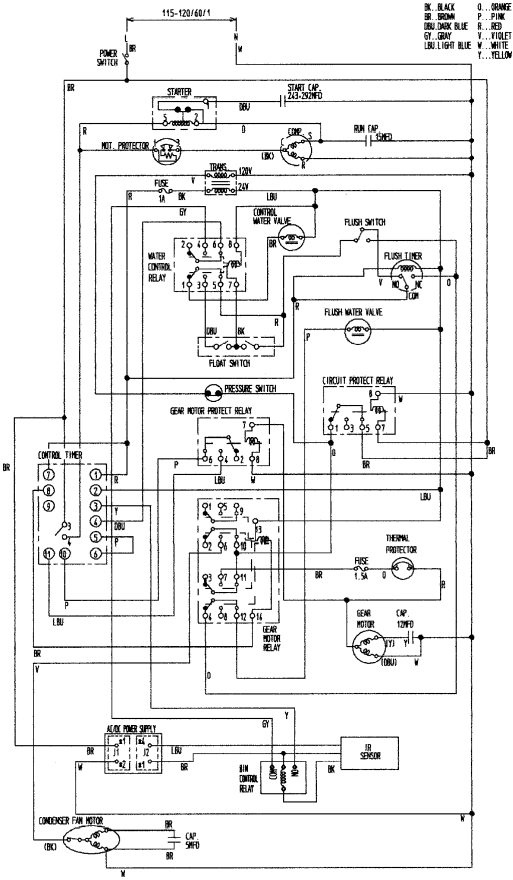
(I)
F-300 BAF


115-120/60/1
L N
GR
START CAP.
145-174MFD
GY GY
BR W
SAFETY
RELAY
(X6)
W/O
LAMP
STARTER
COMP.
MOT.
PROTECTOR
BK
R R
CONDENSER FAN MOTOR
(BK) (BK)
W/BK
SAFETY
SWITCH
POWER
SWITCH
GEAR MOTOR
PROTECT RELAY
(X4)
THERMAL
PROTECTOR
GEAR
MOTOR
CAP.
12MFD
FUSE(1.5A)
PRESSURE
SWITCH
(DBU)
W/BR
Y
DBU
TRANS.
W
BK
24V
LBU
CONTROL
TIMER
BR
R
W/BK
FUSE(1A)
W/R
BIN CONTROL
SWITCH
FLUSH
SWITCH
P
BR
W/O
CONTROL WATER VALVE
LBU
W/BR
FLUSH WATER VALVE
LBU
FLUSH RELAY(X5)
FLOAT SWITCH
W/BU
R
DBU
BK
LBU
WATER CONTROL RELAY (X3)
BR BROWN
W WHITE
BK BLACK
R RED
O ORANGE
GY GRAY
P PINK
DBU DARK BLUE
V VIOLET
Y YELLOW
LBU LIGHT BLUE
BU BLUE
W/BR WHITE/BROWN
W/BK WHITE/BLACK
W/R WHITE/RED
W/O WHITE/ORANGE
W/BU WHITE/BLUE

(J)
F-450 MAF/H


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
POWER SWITCH
STARTER
START CAP 124-149MFD
COMP
RUN CAP. 25MFD
MOT. PROTECTOR
TRANS.
120V
24V
FUSE 1A
CONTROL WATER VALVE
FLUSH SWITCH
FLUSH TIMER
WATER CONTROL RELAY
FLUSH WATER VALVE
FLOAT SWITCH
PRESSURE SWITCH
CIRCUIT PROTECT RELAY
GEAR MOTOR PROTECT RELAY
CONTROL TIMER
BIN CONTROL SWITCH
THERMAL PROTECTOR
FUSE 1.5A
GEAR MOTOR
CAP. 12MFD
GEAR MOTOR RELAY
CONDENSER FAN MOTOR
CAP. 5MFD
FOR AIR COOLED MODEL ONLY

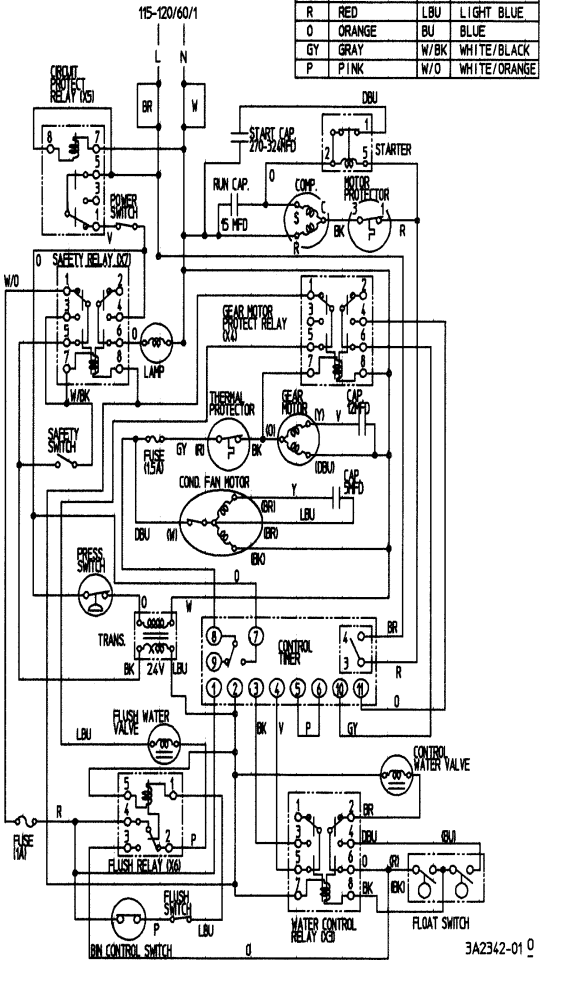
(K)
F-450 MAF-C/H-C



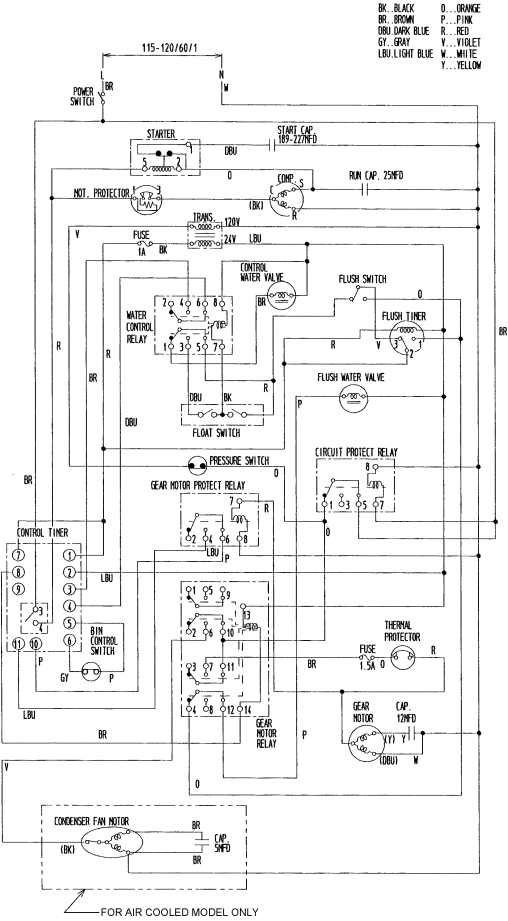
Note: Later Production will have proximity switch bin control like F-450MAF.

(L)
F-500 BAF

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



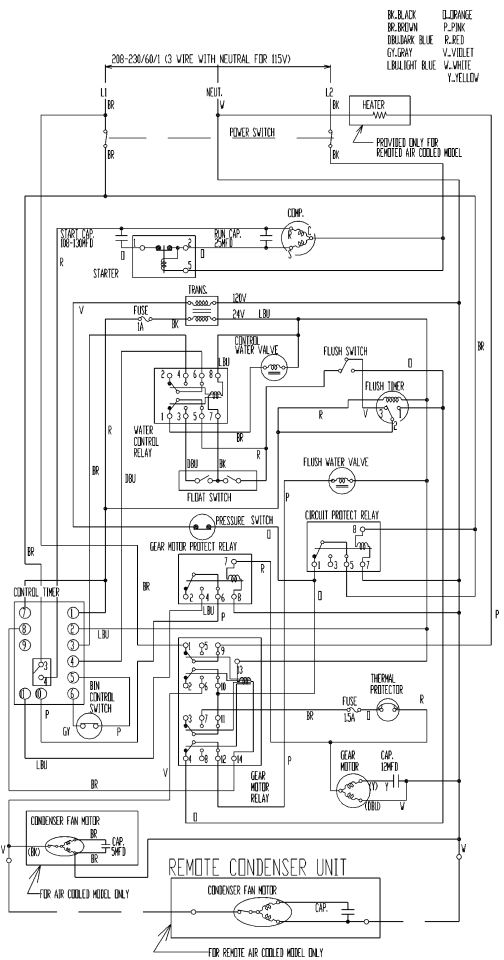
(M)
F-800 MAF/H, MWF/H



Note: Capacitors vary with compressor number

#RS55C1E	#RS55C2E
Start - 124~149 MFD	Start - 243~292 MFD
Run - 25 MFD	Run - 15 MFD

(N)
F-1000 MAF, MWF, MRF



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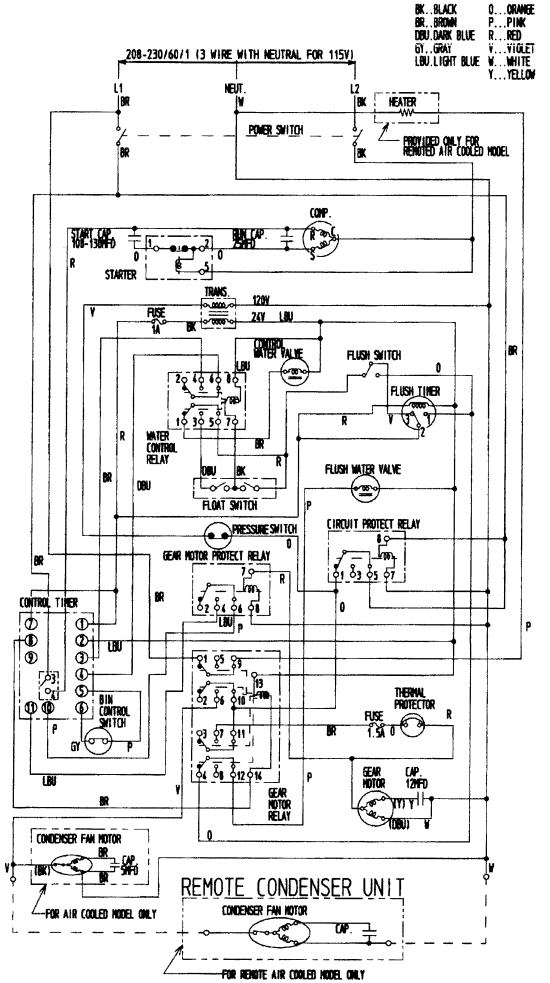
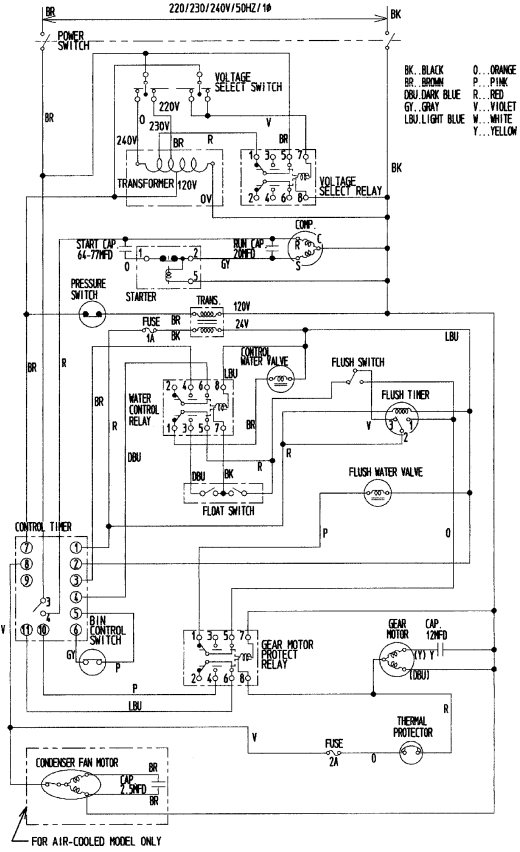
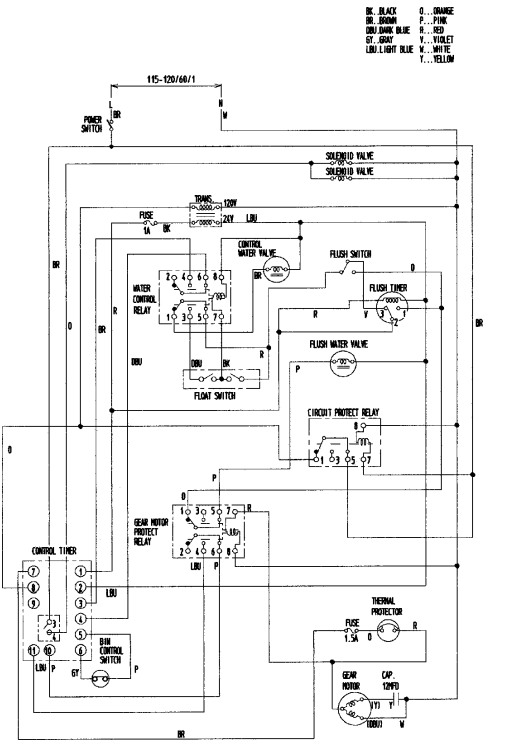
(O)
F-1000 MAF-22



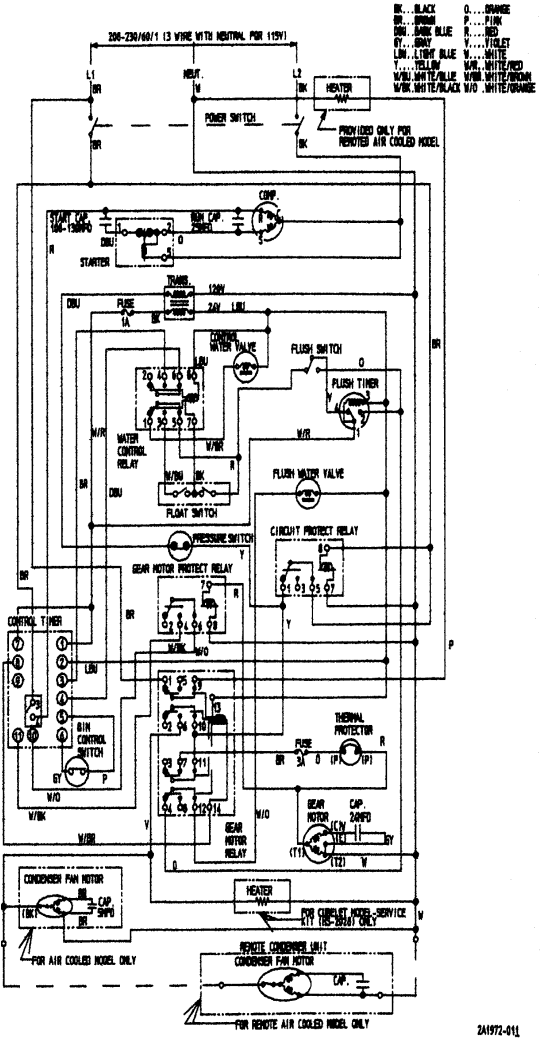
(P)
F-1000 MAF-50



(Q)
F-1000 MLF

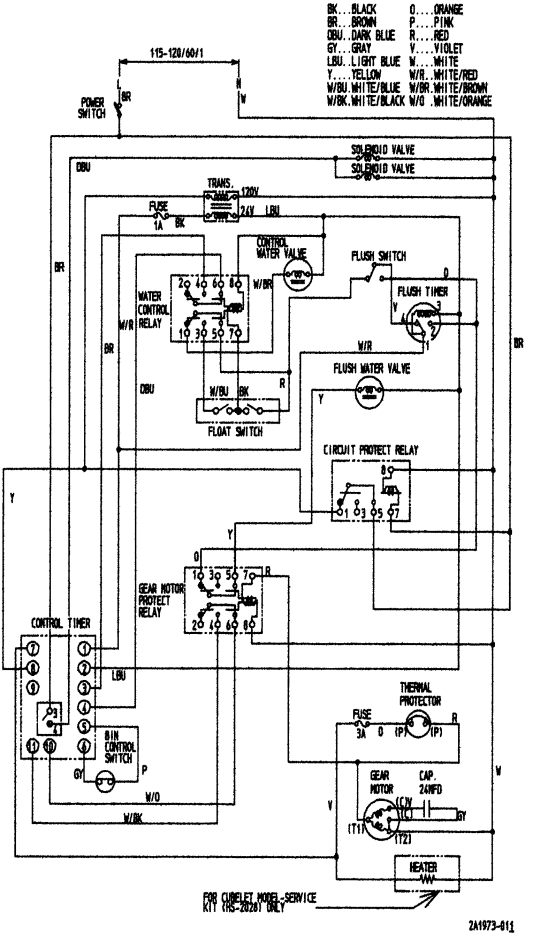

BK...BLACK
BR...BROWN
DBU..DARK BLUE
GY...GRAY
LBU..LIGHT BLUE
O...ORANGE
P...PINK
R...RED
V...VIOLET
W...WHITE
Y...YELLOW
115-120/60/1
POWER SWITCH
SOLENOID VALVE
SOLENOID VALVE
TRANS.
120V
24V
FUSE
1A
CONTROL WATER VALVE
FLUSH SWITCH
WATER CONTROL RELAY
FLUSH TIMER
FLUSH WATER VALVE
FLOAT SWITCH
CIRCUIT PROTECT RELAY
GEAR MOTOR PROTECT RELAY
CONTROL TIMER
BIN CONTROL SWITCH
THERMAL PROTECTOR
FUSE
1.5A
GEAR MOTOR
CAP.
12MFD
1050RPM

(R)
F-1001 MAH, MWH, MRH

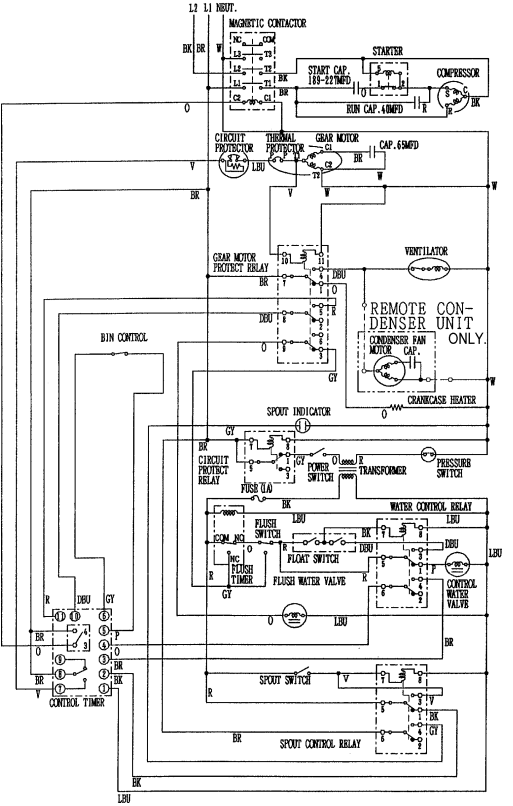


2A1972-011

(S)
F-1001 MLH

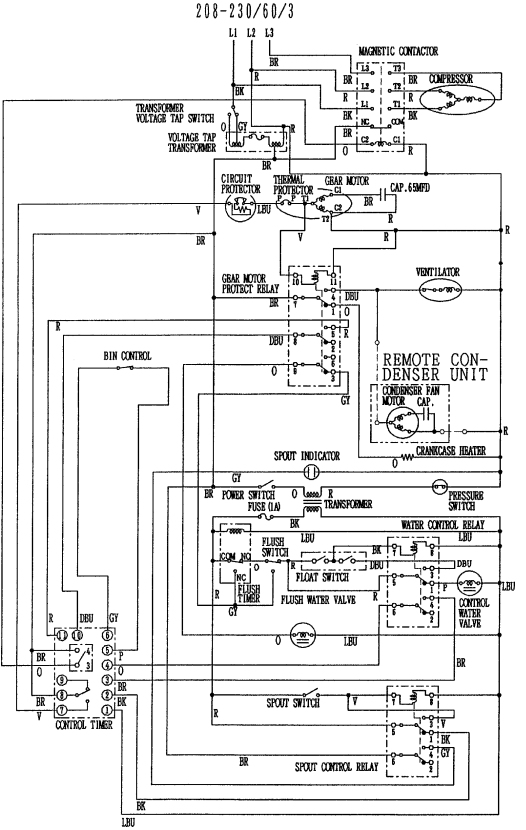

BK...BLACK
BR...BROWN
DBU..DARK BLUE
GY...GRAY
LBU..LIGHT BLUE
Y....YELLOW
W/BU.WHITE/BLUE
W/BK.WHITE/BLACK
O....ORANGE
P....PINK
R....RED
V....VIOLET
W....WHITE
W/R..WHITE/RED
W/BR.WHITE/BROWN
W/O .WHITE/ORANGE
115-120/60/1
POWER SWITCH
SOLENOID VALVE
SOLENOID VALVE
TRANS.
120V
24V
FUSE
1A
CONTROL WATER VALVE
FLUSH SWITCH
FLUSH TIMER
WATER CONTROL RELAY
FLUSH WATER VALVE
FLOAT SWITCH
CIRCUIT PROTECT RELAY
GEAR MOTOR PROTECT RELAY
CONTROL TIMER
BIN CONTROL SWITCH
THERMAL PROTECTOR
FUSE
3A
GEAR MOTOR
CAP. 24MFD
HEATER
FOR CUBELET MODEL-SERVICE KIT (KS-20281 ONLY
2A1973-01

(T)
F-2000 MRF/H, MWF/H



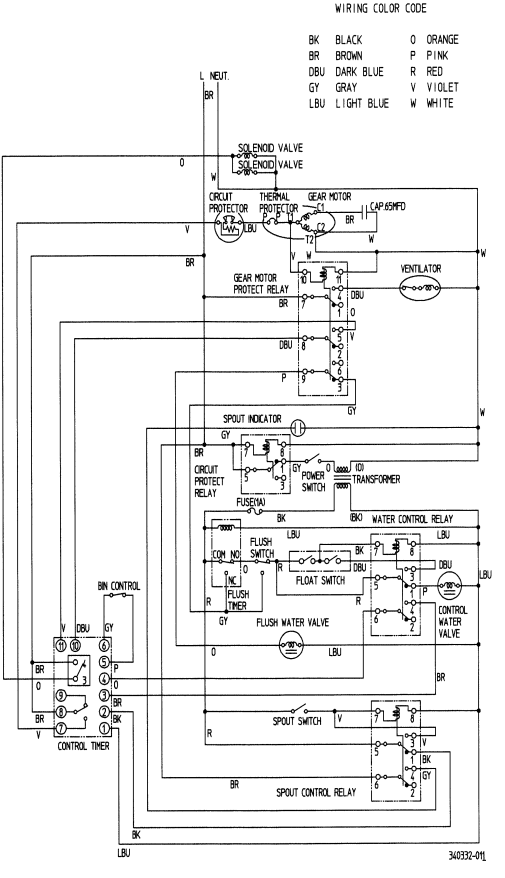
2/20/03

(U)
F-2000 MRF3/H3



2/20/03

(V)
F-2000 MLF/H


WIRING COLOR CODE
BK BLACK
BR BROWN
DBU DARK BLUE
GY GRAY
LBU LIGHT BLUE
O ORANGE
P PINK
R RED
V VIOLET
W WHITE
L NEUT.
SOLENOID VALVE
CIRCUIT PROTECTOR
THERMAL PROTECTOR
GEAR MOTOR
CAP.65MFD
VENTILATOR
GEAR MOTOR PROTECT RELAY
SPOUT INDICATOR
CIRCUIT PROTECT RELAY
POWER SWITCH
TRANSFORMER
FUSE(9A)
WATER CONTROL RELAY
FLUSH SWITCH
COM NO NC
FLUSH TIMER
FLOAT SWITCH
CONTROL WATER VALVE
FLUSH WATER VALVE
BIN CONTROL
CONTROL TIMER
SPOUT SWITCH
SPOUT CONTROL RELAY
340332-011

NOTES

NOTES

NOTES