Rapid Freeze ICE FLAKERS

INSTALLATION & SERVICE MANUAL

and parts catalog

Selective Purpose Flake Ice Machines

5, 7.5, 10 & 20 ton/day capacity

- **Remote Low Side series (RL)**
- **Remote High Side Condensing Units (RHS)**

TECHNICAL ASSISTANCE LINE

1-773-235-0200

Howe Corporation

1650 North Elston Avenue

Chicago, IL 60642-1585

www.howecorp.com

e-mail: howeinfo@howecorp.com

Notice

This manual and all information contained herein are provided "**as is**" and are subject to change without notice. **Howe Corporation makes no warranty of any kind with regard to this manual, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.** Howe Corporation shall not be liable for any errors or for incidental or consequential damages in connection with the furnishing, performance, or use of this manual.

The information contained herein is applicable to the specified models current at the time of publication. Some information in this manual will be of use to owners of older model machines. The reader is cautioned that use of this manual with older equipment is at the user's risk. Howe Corporation makes no warranty or guarantee, explicit or implicit with regard to the use of this manual with equipment models outside the scope of this manual. If in doubt of the scope of this manual, contact Howe Corporation.

Howe Corporation
1650 North Elston Avenue
Chicago, IL 60642-1585
Phone: (773) 235-0200
Fax: (773) 235-0269
e-mail: howeinfo@howecorp.com
web: www.howecorp.com

Revision date: August 2010

TABLE OF CONTENTS

2. Introduction 1

Introduction to the *Rapid Freeze*® Ice Flaker 2

Important Safety Information 4

Safety Symbols and What They Mean 4

3. Receiving and Inspection of Equipment 5

4. Installation of the Rapid Freeze Flaker 7

Installation Conditions 8

Installation without ice bin 8

Installation on Ice Storage Bins 9

Recommended Installation Method on Ice Bin 9

Water Supply & Filter Connections 10

Refrigerant Charging 11

Wiring & Electrical Connections 13

Piping Connections 14

5. Installation of the Condensing Unit 19

Roof Mounting 20

Access 20

Spring Mounted Compressor 20

Rigid Mounted Compressor 20

Refrigerant Piping 23

6. Accessories 27

Electric Eye Ice Level Control 28

Installation Instructions for Photoeye Ice Level Controls 28

Ice Bin Thermostats 29

Rib Heating Elements 30

7. Start & Adjust 31

Checklist 32

8. Electrical Systems 35

Control Panel Layout 36

Control Module 38

9. Maintenance 39

Ice Machine Cleaning Instructions 40

10. Troubleshooting 45

Operation 46

Freezing and Refrigeration..... 47
Ice Storage and Removal 49
Speed Reducer..... 50
11. Service & Adjustment 52
Replacement of Photoeye Ice Level Controls 54
Replacement and Adjustment of Ice Deflector 54
Replacement and Adjustment Of The Squeegee & Squeegee Wrapper 55
Replacement Of Water Pump..... 56
Replacement Of Drive Motor..... 56
Replacement Of Speed Reducer and Flexible Coupling 57
Replacement and Adjustment Of Water Float Valve..... 58
Replacement of Solenoid Valve..... 59
Replacement and Adjustment of the Expansion Valve (TXV) 59
Replacement and Adjustment of Ice Blade 62
Replacement of rotary blade bearings (20 ton model only)……62
Bearing Replacement 62
12. Appendix A Ice Flaker and Condensing Unit Drawings..... 65
13. Appendix B Wiring Diagrams..... 69
14. Appendix C Parts List..... 84

2. Introduction

2.Introduction

The Rapid Freeze by Howe ice flaker is backed by over 50 years of proven performance and innovation. Long known for durability and reliability, our flake ice equipment is unsurpassed in energy efficiency and low maintenance.

Available in a wide variety of sizes and configurations, the rugged Rapid Freeze flaker can be found in diverse applications from supermarkets and food processors to remote fishing villages.

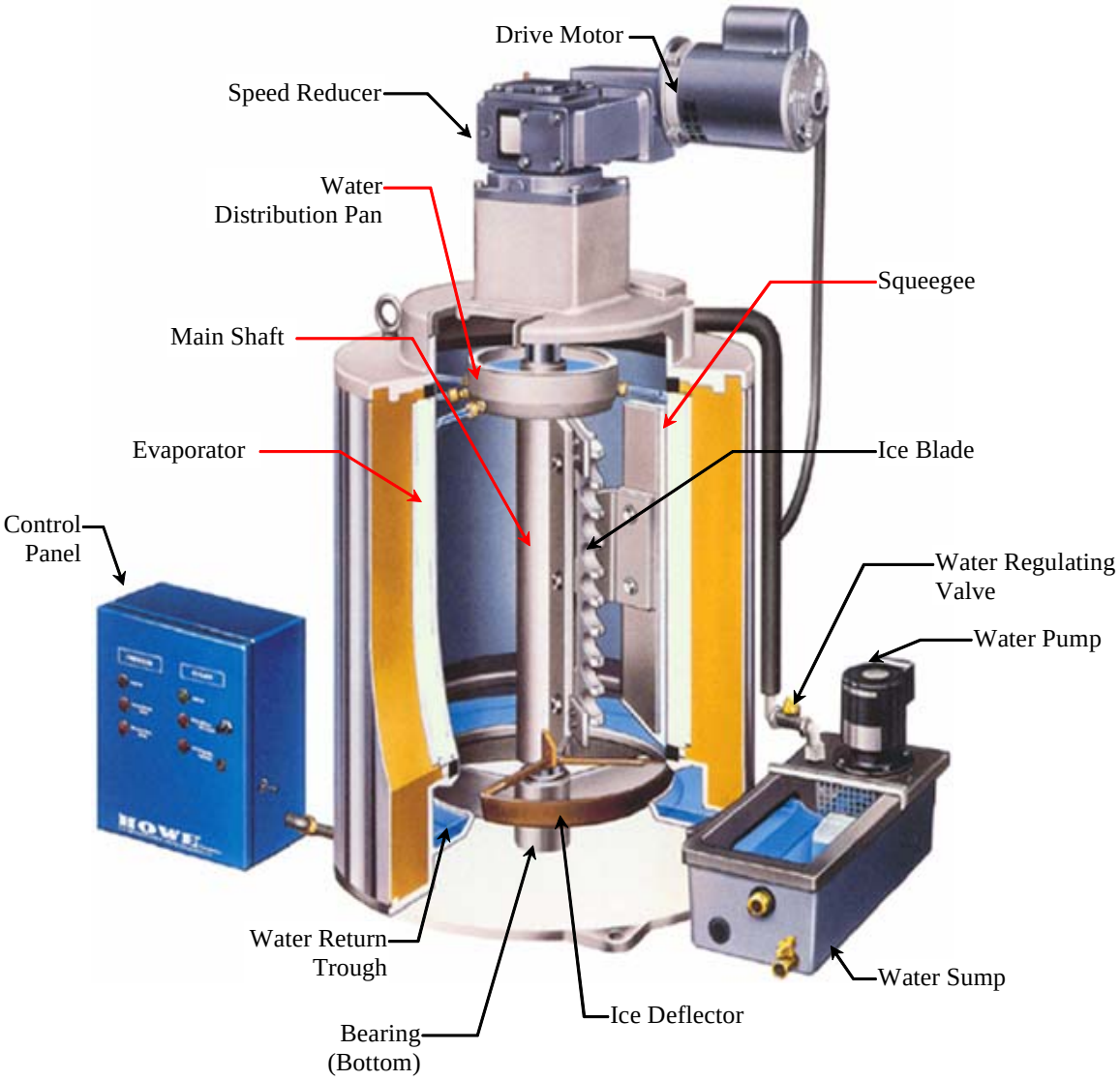
Introduction to the *Rapid Freeze*® Ice Flaker

Refer to Figure 1 for a guide to the major components of the Howe ice flaker. Among the key features are:

- Evaporator: The heart of the Howe ice flaker is the carbon steel, direct-expansion evaporator. The carbon steel construction provides exceptional heat transfer properties, while the hard chrome lining provides a clean, sanitary, corrosion-resistant freezing surface.
- Ice Blade: An investment-cast stainless steel ice blade removes the ice from the freezing surface. The material and method of fabrication mean that the blade will never need re-sharpening.
- Squeegee: Made of USDA-approved material, the squeegee removes excess water from the surface of the ice, guaranteeing that the ice produced by the flaker is dry and sub-cooled.
- Ice Deflector: Mounted underneath the ice blade, the deflector directs the harvested ice toward the center of the drop zone.
- Water Distribution Pan: The water distribution pan and tubes provide a continuous flow of water over the evaporator surface. Ice production is rapid and continuous, with no interruption in production.
- Water Sump: Collects water that was not frozen on the evaporator, and re-circulates it to the water distribution pan. The incoming water supply is connected here, through a float valve that maintains a constant water level in the sump.
- Bearings: Oversized bronze bearings ensure a long service life.
- Control Panel: The “brains” of the ice flaker, the control panel governs all of the functions of the ice flaker. Available in a NEMA4 weatherproof enclosure for harsh environments or frequent washdown applications.
- Drive Motor: Open, drip-proof drive motor. Totally enclosed, fan-cooled motor available for harsh environments or frequent washdown applications.

2.Introduction

Figure 1
Howe *Rapid Freeze*® Ice Flaker
Major Components



2.Introduction

Important Safety Information

The information found in this manual is intended for use by individuals possessing adequate backgrounds of electrical, refrigeration and mechanical experience. Any attempt to repair or make alterations to this equipment may result in personal injury or property damage. The manufacturer or seller cannot be responsible for the interpretation of this information, nor can it assume any liability in connection with its use.

Safety Symbols and What They Mean

Please read and understand this manual prior to installing or operating this Rapid Freeze ice flaker. You must be completely familiar with the start-up, operation and service of this flaker **before** you attempt to start, operate or adjust this piece of equipment.

The following safety symbols will alert you to any special precautions throughout this manual:

DANGER
BEWARE OF HAZARDS THAT CAN RESULT IN PERSONAL INJURY
DANGER

WARNING
"DO IT RIGHT" OR RISK SEVERE PERSONAL INJURY. FOLLOW INSTRUCTIONS CAREFULLY
WARNING

CAUTION
RISK OF PERSONAL INJURY OR DAMAGE TO EQUIPMENT FOLLOW INSTRUCTIONS CAREFULLY
CAUTION

3. Receiving and Inspection of Equipment

3.Receiving and Inspection of Equipment

Upon receipt of your Rapid Freeze ice flaker, you should first inspect the carton very carefully, to determine if any damage might have occurred during shipment. If you suspect any damage has occurred, it should be noted immediately on the freight bill. In addition, a written notice must be sent to the agent representing the freight carrier. The written notice should request an inspection by the agent to verify damage during shipment. If the damage was noticed after un-crating of the carton, it is necessary to keep the original shipping container so that the carrier's agent can investigate the damage claim thoroughly. If a repair is necessary for the Rapid Freeze machine, you must first obtain written permission from the factory before beginning any repairs. Unauthorized work on your Rapid Freeze ice flaker could result in voiding the machine's warranty.

Remote low side units are shipped with a holding charge of dry nitrogen to insure the evaporator is kept clean and moisture free. They must be pumped down and evacuated after they are connected to the condensing unit, before the entire system is charged with it's refrigerant charge.

Immediately upon receipt of equipment, before placement or installation of equipment, verify the electrical, and refrigerant configuration are correct as ordered. If any discrepancies are found, notify Howe Corporation immediately prior to any installation.

4. Installation of the Rapid Freeze Flaker

4.Installation of the Rapid Freeze Flaker

Installation Conditions

Rapid Freeze Ice Flakers are designed to operate in ambient temperatures warmer than 50°F. Do not install ice flaker(s) in refrigerated cold rooms or in areas where the ambient temperature is lower than 50°F (10°C). If it is unavoidable, ice flakers may be installed in areas down to 45°F (7°C) provided that three (3) electric rib heaters (available from the factory) are installed to heat the bottom casting to prevent ice buildup on the three supporting ribs for the bottom bearing. If installed in cold ambient conditions, it is advisable to supply the ice flaker with warmer water through a water mixing valve, around 60°F (15°C).

When a combination of cold water and cold air temperature exists, the mixing valve and rib heaters must be used. **Failure to do so will cause the lower water collecting trough and sump to plug up with ice to the extent that the water may overflow into the ice storage bin in addition to blocking the water inlet to the pump.** Also, it is advisable to direct air blowers and fans away from the ice flaker as air velocity over the ice flaker will reduce the effectiveness of the heaters.

*****CAUTION*****

<u>NEVER</u> INSTALL AN ICE FLAKER IN A COLD ROOM 45°F (7°C) OR LOWER. THE ICE FLAKER WARRANTY IS VOID IF THE ICE FLAKER IS INSTALLED IN A COLD ROOM, OR OUTSIDE WHERE THE AMBIENT TEMPERATURE MAY DROP BELOW 45°F (7°C) OR LOWER.

*****CAUTION*****

Optimum surrounding air temperature range	60°F (15°C) to 95°F (35°C)
Minimum air temperature (without heater)	50°F (10°C)
Minimum air temperature (with heater)	45°F (7°C)
Maximum air temperature	100°F (38°C)
Optimum water temperature range	60°F (15°C) to 80°F (25°C)
Minimum water temperature (without water mixing valve)	45°F (7°C)
Minimum water temperature (water mixing valve must be used)	36°F (2°C)
Maximum water temperature	90°F (32°C)

Installation without ice bin

Rapid Freeze Ice Flakers may be installed under certain conditions without a typical ice bin. When the flaker is installed without a bin, it must have a drainable condensate pan located under the machine. The flaker must also be mounted high enough off the floor so there is no chance that somebody may reach into the evaporator from below either with a pole, or their arm, while the flaker is operating.

Refrigerating the ice storage bin is not normally necessary nor is it recommended. However, in those cases where ice is to be discharged into an existing freezer room then, as a minimum, electric heaters should be installed on the bottom casting regardless of the actual ambient temperature of the air surrounding the ice flaker. Air from the freezer room should be directed away from the ice flaker opening otherwise, the effectiveness of the heaters will be reduced. If the storage area is held at 28°F (-8°C) or colder, it is advisable to install the ice flaker 1 to 2 feet above the freezer and use a duct section to direct the ice into the storage bin.

4.Installation of the Rapid Freeze Flaker

Installation on Ice Storage Bins

Rapid Freeze7 Ice Flakers are designed to run smoothly and without vibration. The machines are usually mounted directly on top of an insulated ice storage bin. The storage bin must have an insulated top, with a drip pan that is an integral part of the top designed specifically for the Rapid Freeze Ice Flaker model installed on it. The ice bin should be designed to support the weight of the flaker, and the ice stored inside the bin. ***It is recommended that the bin manufacturer be consulted before any ice flaker is placed on top of a bin.*** The weight of each ice flaker machine, along with the diameter of the hole required for ice entry into the bin, is given on the specification sheet for that particular model.

Allow for a MINIMUM OF 10" clearance on top of the10,000, 15,000, 20,000 and MINIMUM 12" CLEARANCE for a model 40,000 pound capacity ice flaker for removal of the speed reducer, and sufficient space around the unit (approximately 3 feet) for inspection and service.

Recommended Installation Method on Ice Bin

Refer to bin manufacturer's installation instructions for proper assembly and set up procedures. Locate and set the bin on a solid level footing. Once the bin is set in place and leveled, the Rapid Freeze ice flaker can be placed inside the drip pan.

Exhibit 2 illustrates the forklift and block method of placing the ice flaker on the bin.

Forklift & Block Method

You will need:

- ✓ Forklift truck with adequate load and height capacities
- ✓ (8) 2 X 4 wood blocks approximately 6-8" long
- ✓ (2) 2 X 4 's approximately 36" long
- ✓ Pry Bars

Step 1. Position ice flaker on forks.

Step 2. Stack two wood blocks in each corner of the drip pan on the ice bin.

Step 3. Lift ice flaker over the wood blocks, position ice drop zone over the bin top opening, then set the flaker on the blocks.

Step 4. Remove forklift.

Step 5. Stack the two 36" long 2 X 4's on the side of the bin beside the drip pan, overlapping the front and back of the bin.

Step 6. Using a pry bar as a lever on the 2 X 4's raise the side of the flaker and remove the **TOP** blocks only.

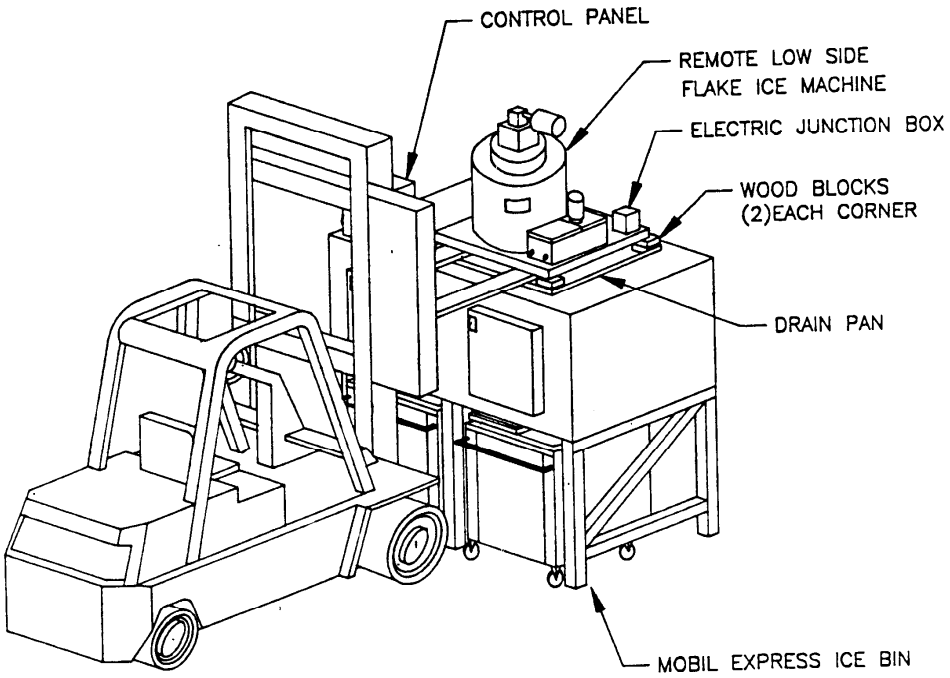
Step 7. Repeat steps 5 & 6 on the other side.

Step 8. With the flaker sitting on one (1) block under each corner, repeat steps 5, 6 & 7 removing the remaining blocks. Drip pan flanges ***MAY*** bend slightly.

Step 9. Straighten the drip pan flanges (if necessary)

4.Installation of the Rapid Freeze Flaker

Figure 2
Ice Flaker Installation



Water Supply & Filter Connections

WATER LINE: To ensure proper water flow and pressure, connect an adequately sized Galvanized, or Copper ODS water pipe from the closest convenient water line to within 2 to 4 feet of the ice flaker water sump. Install a water line shutoff valve near the ice flaker. Use copper tubing between water valve & water inlet connection located on water sump.

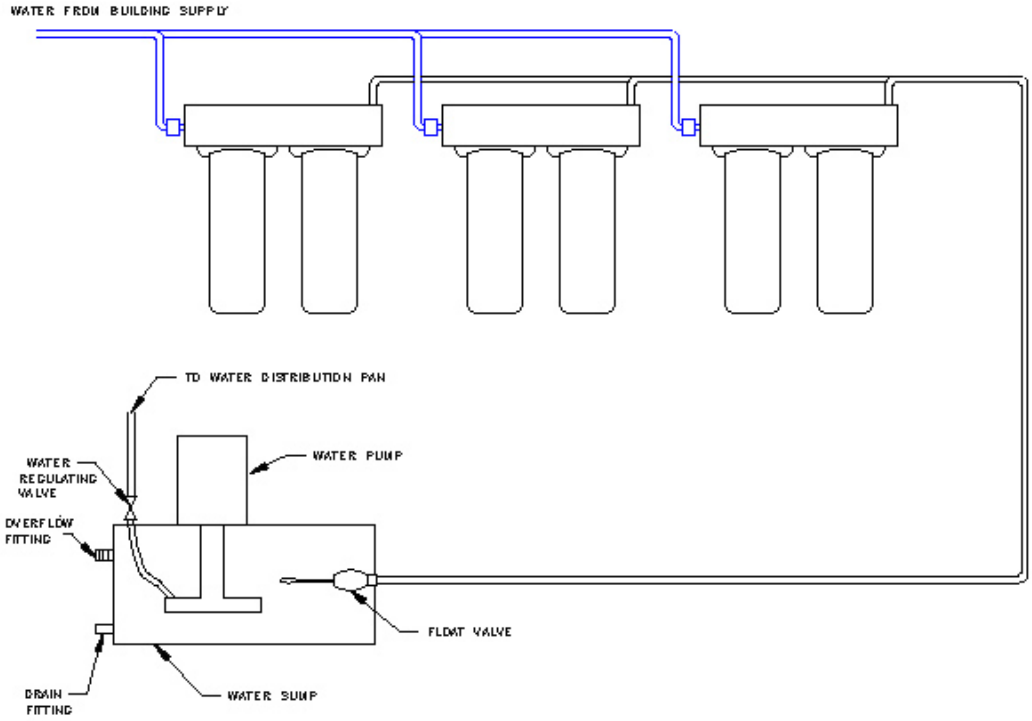
Refer to the engineering sheet for the line size connection from the ice flaker sump to the water supply line. If water supply has silt or sand in it, a coarse water filter is recommended.

Refer to water filter drawing on following page. The 5 ton ice flaker uses (2) dual core filter systems, the 7.5 ton & 10 ton ice flakers use (3) dual core filter systems, while the 20 ton ice flaker, requires the use of (6) dual core filter systems, all piped in parallel for proper water filtration requirements.

4.Installation of the Rapid Freeze Flaker

CAUTION
MINIMUM WATER PRESSURE OF 20 PSIG IS REQUIRED AT THE ICE FLAKER FOAT VALVE TO INSURE ADEQUATE WATER FLOW.
MAXIMUM ALLLOWABLE WATER PRESSURE TO THE FLOAT VALVE IS 60 PSIG.
CAUTION

Figure 3
Water Supply & Filter Connections



PIPING DIAGRAM FOR WATER FILTER

Refrigerant Charging

Special Precautions to be Observed When Charging Refrigeration Systems

Only technically qualified persons trained and certified in the handling of refrigerant and operation of refrigeration systems, should perform the operations described in this manual.

If a refrigeration system is being charged from refrigerant cylinders, disconnect each cylinder when empty or when system is fully charged. A gauge should be installed in the charging line to indicate the refrigerant cylinder pressure. The cylinder may be considered empty of liquid refrigerant when the gauge pressure is 25 psi or less, and there is no frost on the cylinder. Close the refrigerant charging valve and cylinder valve before disconnecting the cylinder. Loosen the union in the refrigerant line, SLOWLY and CAREFULLY, to relieve refrigerant pressure in the charging hose.

4.Installation of the Rapid Freeze Flaker

*****WARNING*****

NEVER OPEN CHARGING VALVE, ALLOWING REFRRIGERANT TO VENT DIRECTLY TO THE ATMOSPHERE. REFRIGERANT MUST BE RECLAIMED THROUGH A RECOVERY SYSTEM.

*****WARNING*****

Always store cylinders containing refrigerant in a cool place. They should never be exposed to temperatures higher than 125°F (52°C) and should be stored and secured in a manor to prevent abnormal mechanical shocks.

*****CAUTION*****

SERVICE/INSTALLATION PERSONNEL MUST HAVE KNOWLEDGE OF REFRIGERATION SYSTEMS TO PROPERLY CHARGE THIS FLAKER.

*****CAUTION*****

Verify that the thermostatic expansion valve supplied with the ice flaker matches the refrigerant for the refrigeration system or condensing unit.

*****WARNING*****

ALL RAPID FREEZE REMOTE MODEL ICE FLAKERS ARE SHIPPED WITH A SMALL HOLDING CHARGE OF DRY NITROGEN.

SYSTEM MUST BE EVACUATED PRIOR TO CHARGING REFRIGERANT.

*****WARNING*****

Follow accepted practice and procedures to charge refrigerant into the system briefly outlined as follows. Consult the rack or condensing unit manufacturer for full details.

1) After all piping is completed, attach high pressure hose (normally red) from refrigeration manifold gauge set to **Condensing Unit** at either Schrader connection to King valve on receiver, Schrader connection to filter dryer, or Schrader connection to isolation valve on liquid line.
2) Attach low pressure hose (normally blue) from refrigeration manifold gauge set to Schrader connection on compressor's suction service valve.
3) If either gauge hose is connected to an isolation valve, it is important to make sure the isolation valve is not back seated, which will prevent the gauge from taking an accurate reading.
4) Fully open all remaining isolation valves to the refrigeration system, i.e. at receiver, at compressor, at liquid line and at suction line.
5) Attach charging hose (normally yellow) from refrigeration manifold gauge set to Nitrogen canister for pressure testing.
6) At **Ice Flaker**, attach low pressure hose (normally blue) from another refrigeration manifold gauge set (two sets required).
7) Pressurize system with dry nitrogen at the **Condensing Unit** to a maximum of 150 PSIG and hold for a minimum of 12 hrs. Verify pressure is holding at 150 PSIG at both sets of the refrigeration manifold gauge, at **Ice Flaker** and **Condensing Unit.**

8) Purge Nitrogen from system and attach vacuum hose (normally yellow) from refrigeration manifold gauge set to vacuum pump at **Condensing Unit**. Disconnect nitrogen canister from refrigeration manifold gauge and connect it to refrigeration canister
9) Turn Vacuum Pump on and evacuate system until 1500 microns absolute pressure is reached on both sets of refrigeration manifold gauges. Break vacuum with introduction of refrigerant to be used in the system until system pressure rises to above 0 PSIG on both sets of refrigeration manifold gauges.
10) Repeat procedure in step 8 two additional times until system is evacuated to 500 microns absolute pressure on both sets of refrigeration manifold gauges. On third evacuation, verify both moisture indicators - one at the **Condensing Unit** and one at the **Ice Flaker** - are green indicating the absence of moisture in the system.
11) Break vacuum condition by raising pressure in system with refrigerant to 2 PSIG.

Remove Vacuum Pump and charge system according to information supplied in Condensing Unit Quick Step Guide with Ice Flaker and in Howe Service Manual.

Wiring & Electrical Connections

*****CAUTION*****
ELECTRICAL WIRING SHOULD BE PERFORMED BY QUALIFIED TECHNICIANS FOLLOWING ALL APPLICALBLE ELECTRICAL CODES.
*****CAUTION*****

The electrical control panel is supplied with large-capacity, remote low side (-RL) machines, but is shipped loose to be mounted on the wall (near the bin) for easy access to controls. To install control panel:

1) Install disconnect (not supplied by factory), and connect main power to terminals marked L1, L2 and L3(L3 only on three phase panels) in the ice flaker control panel.
2) Install optional on-off switch to the two terminals designated "On-Off switch". Remove wire jumper on these terminals if you are installing a remote switch.
3) A jumper is installed between terminal marked “Line A” and terminal marked "Line B". This will enable the liquid line solenoid on the ice flaker to operate properly. If a Howe condensing unit has been supplied with the ice flaker, remove this jumper and connect condensing unit control wiring as directed.
4) Following all applicable electric codes, wire the remote panel to the component junction box (drive motor # 1 & 2, water pump # 3 & 4, and solenoid valve # 5 & 6) on the flaker. The drive motor and water pump should be wired to terminals $T_{1,}$ $T_{2,}$ and T_3 respectively, in the control panel. The solenoid valve is wired to terminals marked, “solenoid valve” in the flaker control panel.
5) If the flaker has factory installed/supplied photo eye ice level controls, connect the cables from the ice flaker to the terminals below the relay base in the control panel. The wires are color-coded and must be connected to the proper terminals. The BLUE leads from both the emitter and receiver cables connect to terminal marked “BLUE”, the BLACK

lead from the receiver only is connected to terminal marked “BLACK”, the Black wire from the emitter is to be insulated (taped), NOT connected to anything, and the BROWN leads for both the emitter & receiver connect to terminal marked “BROWN”.

*****WARNING*****

THE SENSOR LEADS FOR THE ICE LEVEL CONTROLS MUST NOT BE RUN IN THE SAME CONDUIT AS THE MOTOR AND SOLENOID WIRES. SENSOR WIRES MUST BE RUN IN SEPARATE CONDUIT.

*****WARNING*****

Piping Connections

When installing the ice flaker, it is important that the flaker is properly piped as indicated below. When connecting to a dedicated, oversized condensing unit or refrigeration rack system, an EPR valve must also be provided and installed to regulate the evaporator suction temperature to between –5°F and -10°F (-20.4°C to -23.2°C)

Table 1
Piping Connection Sizes

MODEL	SUCTION LINE		LIQUID LINE	
	EVAPORATOR CONNECTION	LINE SIZE	EVAPORATOR CONNECTION	LINE SIZE
10E	1" FPT	1 1/8" OD	3/8" MPT	1/2" OD
15E	1 1/4" FPT	1 3/8" OD	1/2" MPT	1/2" OD
20E	1 1/4" FPT	1 3/8" OD	1/2" MPT	1/2" OD
30E	1 1/2" MPT	1 5/8" OD	1/2" MPT	5/8" OD
51-RL, 50E	2" MPT	2 1/8” OD	3/4" MPT	7/8" OD
76-1-RL, 75E-1	2" MPT	2 1/8" OD	3/4" MPT	7/8" OD
76-2-RL, 75E-2	(2) 2" MPT	(2) 1 5/8" OD	(2) 3/4" MPT	(2) 7/8" OD
101-1-RL, 101E-1	2" MPT	2-5/8" OD	3/4" MPT	1-1/8" OD
101-2-RL, 101E-2	(2) 2” MPT	(2) 2-1/8” OD	(2) ¾” MPT	(2) 7/8” OD
201-2-RL	(2) 2-1/2” FPT	(2) 2-5/8" OD	(2) 1” MPT	(2) 1-1/8" OD

*****CAUTION*****

WHEN PIPING ICE FLAKER TO A CENTRAL REFRIGERATION RACK, LIQUID LINE MUST BE CONNECTED TO THE RECEIVER SIDE OF ANY DEFROST SOLENOID/CONTROL VALVE TO INSURE UNINTERRUPTED LIQUID FEED/SUPPLY DURING NORMAL DEFROST CYCLES OF THE RACK.

*****CAUTION*****

4.Installation of the Rapid Freeze Flaker

The ice flaker as, supplied by Howe Corporation, was thoroughly cleaned and dehydrated at the factory. Foreign matter may enter the system by way of the field piping. Therefore, care must be used during installation of the piping to prevent entrance of foreign matter.

Install all refrigeration system components in accordance with applicable local and national codes in conformance with good practice required for the proper operation of the system.

The following procedures should be followed:

a. Do not leave dehydrated equipment or lines open to atmosphere any longer that is absolutely necessary.

b. Use only clean new refrigeration grade copper tubing.

c. Suction lines should be sloped ¼" per 10 feet towards the compressor.

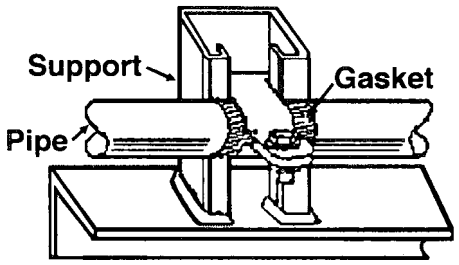
d. Suitable P-type oil traps should be located at the base of each suction riser of four (4) feet or more to enhance oil return to the compressor.

e. When brazing refrigerant lines, an inert gas should be passed through the line at low pressure to prevent scaling and oxidation inside the tube. Dry nitrogen is preferred.

f. Use only a suitable silver solder alloy on suction and liquid lines.

g. Limit the soldering paste or flux to the minimum required to prevent contamination of the solder joint internally. Flux only the male portion of the connection, never the female. After brazing, remove the excess flux.

Figure 4
Refrigerant Piping Support



1. Ensure that refrigerant lines are supported and fastened properly. See Figure 4 for an example.
2. Straight runs of tubing should be supported in at least two locations, near each end of the run. Long runs may require additional support. In general, 3/8" to 7/8" lines should be supported every 5 feet; 1-1/8" and 1-3/8" lines every 7 feet, and 1-5/8" and 2-1/8" lines every 9-10 feet.
3. When changing directions in a run of tubing, no corner should be left unsupported. Supports should be placed a maximum of 2 feet in each direction from the corner.
4. Piping attached to a vibrating object (such as a compressor or compressor base) must be supported in such a manner that will not restrict the movement of the vibrating object. Rigid mounting will fatigue the copper tubing.

5. Do not use short radius ells. Short radius elbows have points of excessive stress concentration and are subject to breakage at these points.
6. Thoroughly inspect all piping after the equipment is in operation and add supports wherever line vibration is significant. Extra supports are relatively inexpensive as compared to refrigerant loss.

Liquid Line:

For long runs, good refrigeration practice dictates that the liquid line size be increased by one size to prevent flashing due to excessive pressure drop. If the system is fully charged, the presence of bubbles in the sight glass at the ice flaker is a visible indication that flashing is occurring. It may not be possible to adjust the thermostatic expansion valve properly when this condition exists. Note: Flashing may also occur if the liquid line is run through hot areas of the building such as boiler rooms or smoke rooms. If this is the case, the liquid line should be insulated.

*****CAUTION*****

WHEN CONNECTING THE ICE FLAKER TO A LOW-TEMPERATURE RACK, A SUCTION PRESSURE REGULATOR (EPR) MUST BE INSTALLED TO MAINTAIN SUCTION PRESSURE AT THE ICE FLAKER AT APPROXIMATELY 28 PSIG FOR R-404A, 20 PSIG FOR R-22 (-5°F)

*****CAUTION*****

Suction Line:

For runs longer than 150 feet, the next size suction line may be used for horizontal runs and slightly pitched towards the compressor rack. Vertical risers should be the same size as the ice flaker connection size to maintain proper velocity for oil return. If the vertical riser is more than 10 feet, it is necessary to install a P-trap at the bottom of the riser. Install an additional trap for each 15ft of riser to facilitate oil lift. The suction line should always be insulated.

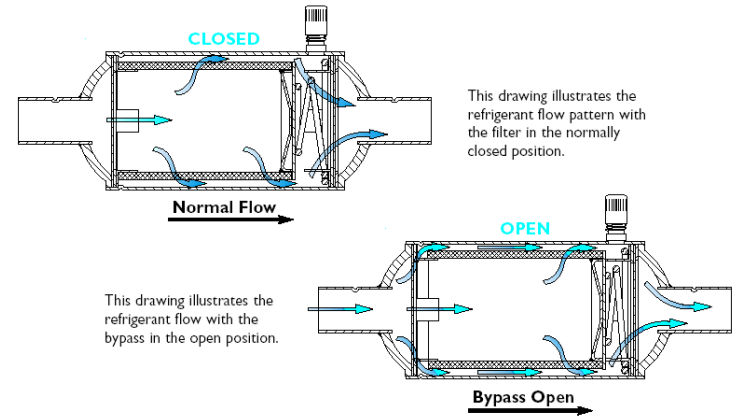
EPR Valve

When connecting to a refrigeration rack system, the ice flaker should be connected to a low temp rack. An EPR (evaporator pressure regulator) valve must also be installed on the suction line, preferably near the ice flaker. Also true for properly sized spit systems as well. EPR valves are available, shipped loose as an option with Howe flakers. See Price list for pricing.

Suction Strainer

Howe strongly recommends installing a suction strainer between the ice flaker evaporator & the EPR valve when connecting to a rack system. Suction strainers offer the following benefits; protects the compressor from dirt, a relief device opens if the filter plugs, full flow design for low-pressure drop. The following suction strainer is recommended for your Rapid Freeze ice flaker.

Figure 5
Suction Strainer



"Bi-directional" means the Suction Filter can be installed in **either one flow direction or the other** — it does not mean the Suction Filter is suitable for **reversible** flow.

Install the strainer with flow in direction of the arrow on the top of the strainer. By-pass feature will be operational and pressure port is at outlet.

Install strainer in horizontal lines only. Suction Strainers are available, shipped loose as an option with Howe flakers. See Price list for pricing.

Line Insulation

After the final leak test, refrigerant lines should be insulated to reduce heat pick-up and prevent the formation of flash gas in the liquid lines. Suction lines should insulated with ¾" wall Armstrong "Armaflex" or equal. Liquid lines should be insulated with ½" wall insulation or better. Insulation located in outdoor environments should be protected from UV exposure to prevent deterioration of the insulation.

4.Installation of the Rapid Freeze Flaker

5. Installation of the Condensing Unit

5.Installation of the Condensing Unit

After inspecting for damage locate and install condensing unit in a location accessible for service.

Rigging holes have been provided on all condensing units. Caution should be exercised when moving these units. To prevent damage to the unit housing during rigging, cables and chains used must be held apart by spacer bars. The mounting platform or base should be level and located so as to permit free access of supply air.

Ground Mounting

A concrete slab raised six inches above ground level provides a suitable base. Raising the base above ground level provides some protection from ground water and wind blown matter. Before tightening mounting bolts, recheck level of unit. The unit should in all cases be located with a clear space in all directions that is at a minimum, equal to the height of the unit above the mounting surface. A condensing unit mounted in a corner formed by two walls, may result in discharge air recirculation with resulting loss of capacity.

Roof Mounting

Due to the weight of the units, a structural analysis by a qualified engineer may be required before mounting. Roof mounted units should be installed level on steel channels or an I-beam frame capable of supporting the weight of the unit. Vibration absorbing pads or springs should be installed between the condensing unit legs or frame and the roof mounting assembly.

Access

Provide adequate space at the compressor end of the unit for servicing. Provide adequate space on the connection side to permit service of components.

Spring Mounted Compressor

Compressors are secured to make sure there is no transit damage. Before operating the unit, it is necessary to follow these steps:

a. Remove upper nuts & washers.

b. Discard the shipping spacers.

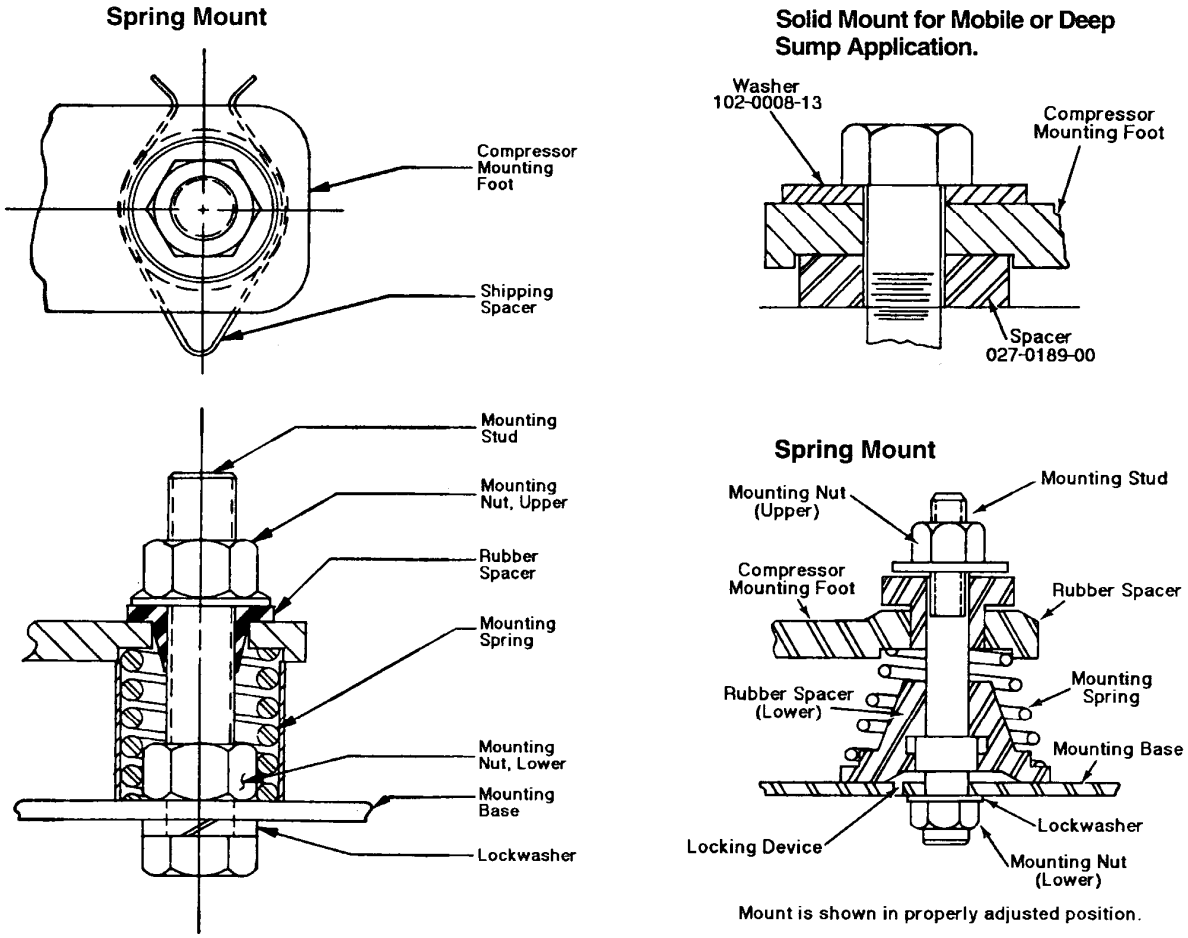
c. Install the neoprene spacers (spacers are located in the electrical panel, or tied to compressor).

d. Replace the upper mounting nuts and washers. Allow 1/16” space between the mounting nut/washer and the neoprene spacer.

Rigid Mounted Compressor

Some condensing units use rigid mounted compressors. Check the compressor mounting bolts to insure they have not vibrated loose during shipment.

Figure 6
Compressor Mounting



5.Installation of the Condensing Unit

Electrical

Follow local applicable wiring codes to wire main electrical power from building distribution center to main power terminals in condensing unit panel.

Single compressor units

Install wiring race (conduit) between ice flaker control panel and condensing unit control panel. For full annunciation (indicating lights) of condensing unit operation, you will need to pull up to (9 wires for single compressor units, 15 wires for dual compressor units) between the flaker control panel & condensing unit panel, as detailed below:

- Two wires will be connected between the condensing unit & ice flaker panel to terminals marked “A” & “B” respectively. (terminals A to A, B to B).
- The remaining wires will be used to monitor the operation of the condensing unit. (7 for single compressor, 13, for dual compressor)

Indicator light		Flaker panel terminal #	Condensing Unit Terminal #
GREEN	Compressor Run	1	4
		2	11
AMBER	Low Pressure ***pumpdown***	3	3
		4	5
RED	Low Oil Pressure ***Failure****	5	1
		6	11
RED	High discharge pressure ***failure***	7	2
		8	6

For Dual compressor units these additional connections must be made.

Indicator light		Flaker panel terminal #	Condensing Unit Terminal #
GREEN	Compressor Run	9	16
		10	11
AMBER	Low Pressure ***pumpdown***	11	15
		12	17
RED	Low Oil Pressure ***Failure****	13	13
		14	11
RED	High discharge pressure ***failure***	15	14
		16	18

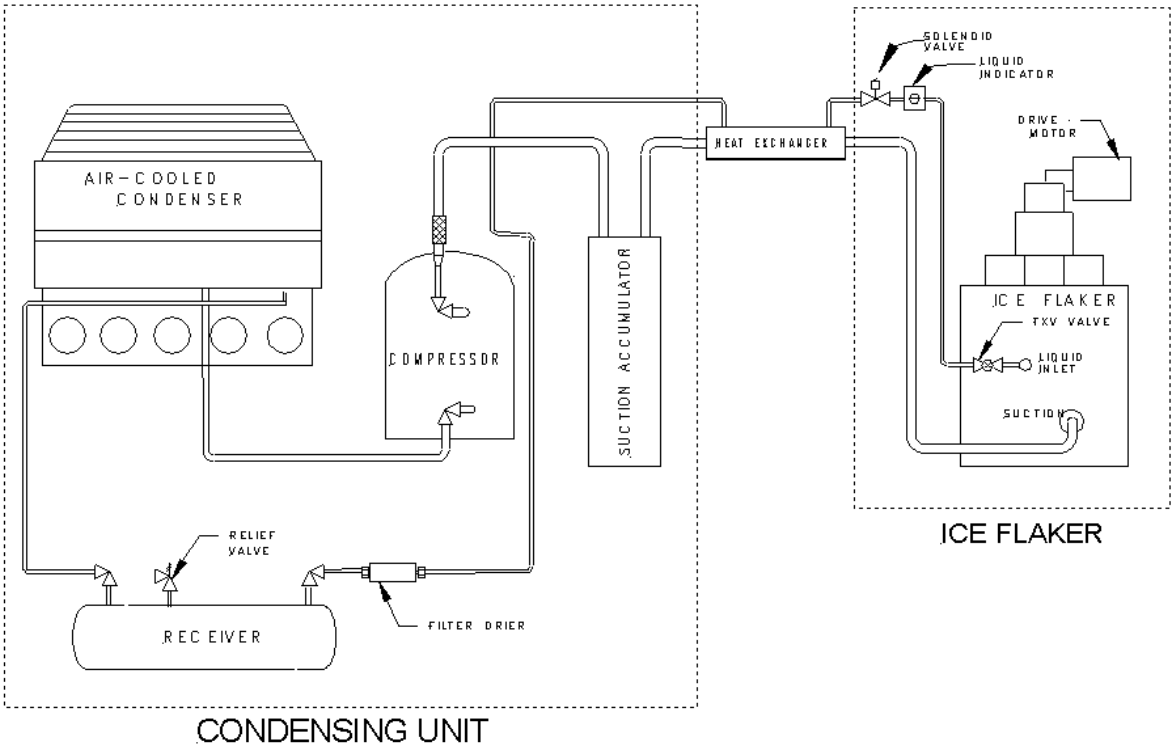
* Some model condensing units do not require oil failure switch, omit wiring when not present.

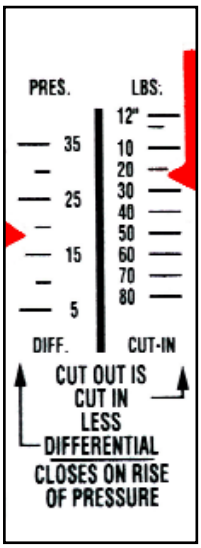
5.Installation of the Condensing Unit

Refrigerant Piping

If the ice machine is less than 20 running feet from the condensing unit, good refrigeration piping practice dictates that you field install a heat exchanger (SLHE supplied by factory when applicable.) next to the ice machine.

Figure 7
Ice Flaker Refrigeration System Piping (typical)





ADJUST LOW PRESSURE SWITCH

All Rapid Freeze Remote Condensing units have a Low pressure Operating (pump down) switch. This low pressure switch needs to be set at 3-5 PSIG cut out (R-22 or R-404A) to cut out the compressor when the suction pressure reaches this setting. To Adjust the Low Pressure switch turn the adjustment stem clockwise to raise the cut in setting, counterclockwise to lower the cut in setting. The cut in (right adjustment stem) setting should be set at 23 PSIG for R-404A, 16 PSIG for R-22. The differential setting (cut out)(left adjustment stem) should be set at 18 PSIG for R-404A, 11 PSIG for R-22.

5.Installation of the Condensing Unit

Approximate Refrigerant Charge

Model	System [1]			Lbs./100 Linear ft of liquid line [3]	
	R-404A	R-22		R-404A	R-22
10,000	81	93		21.2	24.4
15,000	123	142		21.2	24.4
20,000	188	216		36.1	41.6
40,000 [2]	269 x 2	309 x 2		36.1 x 2	41.6 x 2

[1] System charge is approximate for ice flaker & condensing unit(s) only. Add additional charge required for liquid line length.

[2] 40,000 pound ice flaker uses two (2) separate condensing units.

[3] Table above gives approximate additional refrigeration charge for each 100 linear ft. of liquid line.

*** IMPORTANT NOTICE ***

DO NOT ATTEMT TO ADJUST ICE FLAKER SPLIT SYSTEM FOR EVAPORATOR SUPERHEAT

REFER TO START & ADJUST SECTION OF THIS MANUAL FOR PROPER ADJUSTMENT OF EPR AND TXV VALVE ON ALL HOWE ICE FLAKERS

*** IMPORTANT NOTICE ***

5.Installation of the Condensing Unit

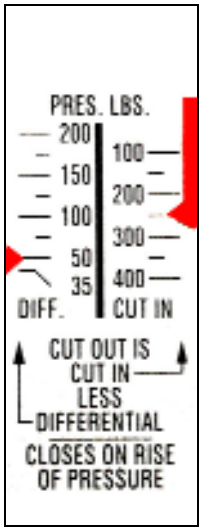
Fan Cycling Control adjustment

On large capacity (5-20 ton models) multiple fan condensing units, the fan(s) closest to the header (compressor) is controlled by ambient switch, to be set 50 F. The additional fan(s) is operated on a pressure switch. The pressure switch should be set to cut in @ 250 PSI, differential set to 50 PSI.

Howe 10 ton & 20 ton ice flaker condensing units, the fans are cycled in banks.

Fan Ambient Control

Fan Pressure control



R-404A		R-22	
Diff./Pres.	Cut-in / Lbs	Diff. / Pres.	Cut-in / Lbs.
50 PSIG	250 PSIG	50 PSIG	250 PSIG

Condenser Fan Controls					
Model	# Fans	Lead Fan	Second Fan	Lead bank of Fans(2)	Second bank of Fans(2)
10,000	2	Ambient	Pressure		
15,000	2	Ambient	Pressure		
20,000	4			Ambient	Pressure
40,000	4			Ambient	Pressure

HEAD PRESSURE CONTROLS

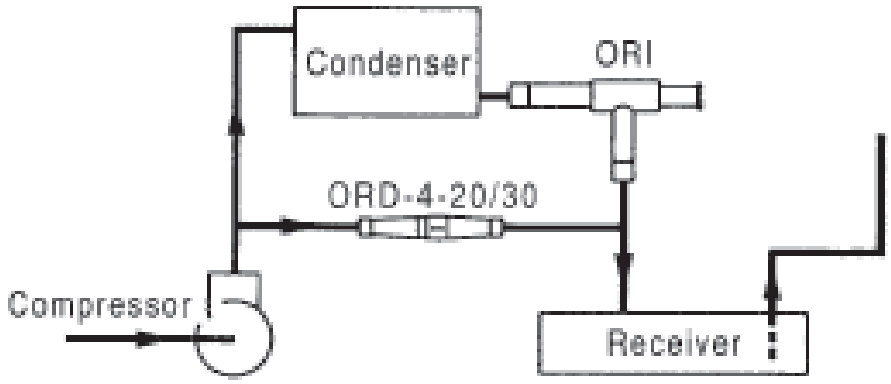
All Howe supplied condensing units 15 HP & larger use a two valve head pressure control system.

The system employs an ORI (open on rise of inlet pressure) valve and an ORD (open on rise of differential pressure) valve. The high pressure discharge gas is introduced above the liquid in the receiver tank. The receiver discharge is regulated by the ORI valve. The discharge pressure of the ORI valve must be adjusted to regulate the unit for proper operating conditions. Adjust the ORI valve shown on the following diagram to maintain a discharge pressure of 220 PSIG.

To set ORI valve, turn on all fans, head pressure will go down to approximately 180 PSI or so, then raise ORI valve set-point until head pressure reaches about 220 PSI. This will increase velocity & cause less fan cycling. Once adjusted, return the fan controls to their normal settings (see page 25).

Special NOTE
The ORI valve should be adjusted for winter conditions. If installed, & adjusted during summer months, you may need to return during the winter to re-adjust the setting. This is because during winter the valve will hold liquid in the condenser to maintain head pressure.

Figure 14. Dual Valve Piping Arrangement



6. Accessories

6.Accessories

Electric Eye Ice Level Control

The use of a suitable ice level control to shut off the ice flaker when the storage bin fills is mandatory. Failure to use the proper ice level control will cause the ice to build within the ice flaker evaporator after the bin is full to capacity. Operating the flaker with a full bin will cause the ice deflector to bend or break as it "churns" the ice. In extreme cases it may result in damage to the speed reducer and/or the electric drive motor and flexible coupling.

The proper and approved bin level control is the photoelectric eye. When ordered with the machine, the eyes are mounted on brackets that will attach to the bin top or wall. The cables are routed through the bottom casting of the ice flaker. The power module is mounted inside the ice flaker control panel.

Figure 8
Electric Eye Ice Level Control

Installation Instructions for Photoeye Ice Level Controls

1) Turn off the ice flaker at the control panel and at the main shut-off disconnect. Cover or remove any ice that may be present in the ice storage bin.
2) Open the front cover of the flaker control panel. Locate the 11-pin mounting base for the photoeye control module. If the control module is installed in the base, unplug the control module.
3) Mount the photoeye emitter. If the storage bin top was supplied by Howe, there will be recessed pockets in the bin top for placement of the photoeye elements. If pockets are not present, mount the emitter securely to the top or side wall of the bin, and align the emitter so that it projects its beam directly across the ice drop opening.
4) Locate the photoeye receiver. Again, if the storage bin top was supplied by Howe, there will be recessed pockets in the bin top for placement of the photoeye elements. If pockets are not present, mount the emitter securely to the top or side wall of the bin, and align the receiver so

that it is directly across the ice drop opening from the emitter. **DO NOT** permanently affix the receiver. Leave enough adjustment to ensure proper alignment with the emitter.

5) Run the long cables through one of the knockouts furnished on the side of the control panel and connect the wire form the cables to the terminal strip. The Blue wires from both the emitter & receiver should be connected to the Blue terminal, the Brown wires from both the emitter & receiver should be connected to the terminal marked Brown, and the black wire from the receiver only, should be connected to the terminal marked black. The black wire from the emitter should be insulated (taped, or wire nutted) to prevent accidental contact to live terminals.
6) NOTE: If a wire jumper is installed between terminals 5 & 6, (on relay mounting base) it must be removed for the photoeye control to operate properly.
7) Plug the control module into the base.
8) Check to ensure that the control panel ON/OFF switch is in the *Off* position. Turn *on* the main power disconnect.
9) Align the photoeye receiver. This alignment is critical to the proper operation of the level controls.
    a. Check the LED on the emitter. With the disconnect switch *ON*, the red LED on the emitter should be glowing. If the light does not come on, check the connections on the base or terminal strip until the LED lights.
    b. Move the receiver until the LED on the receiver lights. When proper alignment has been achieved, secure the receiver.
    c. Check once more that the LEDs on both the emitter and receiver are lit. Realign or tighten loose connections as necessary to keep both LEDs lit.
10) Reroute and fasten cables as necessary. If the photoeye elements are installed in the ice bin (as opposed to in recessed housings in the bin tops), leave enough slack in the cables to provide for “drip loops” in the cables, so that condensation will travel down the cables and drip into the bin, and not onto the emitter or receiver. DO NOT run the photoeye cables close to high-voltage wires. High-voltage wires will interfere with the low voltage control signals, and may cause the ice flaker to shut down.
11) Turn on the control panel ON/OFF switch. The flaker should begin making ice within minutes.

Ice Bin Thermostats

The use of a bin thermostat ***is not recommended and is not permitted***. The Rapid Freeze ice flaker is designed so that the freezing drum (operating at –5°F) is located directly over the ice drop opening in the bin. This large opening permits cold air to cascade off the evaporator down into the bin. Since the air temperature in the bin is equal to or lower than the ice temperature, the set point of the thermostat cannot be adjusted with sufficient accuracy to distinguish temperature difference upon contact with the ice. Use of a bin thermostat for level control will void the product warranty.

6.Accessories

Rib Heating Elements

Rapid Freeze ice flakers are designed to operate in ambient temperatures between 50°F (10°C) and 100°F (38°C). When operating in ambient temperatures between 50°F (10°C) and 45°F (7°C), rib heaters ***must*** be installed on the ice flaker. Under no circumstances is the machine to be allowed to operate in ambient conditions below 45°F (7°C).

Factory installed rib heaters are available on all sizes and configurations when ordered with the ice machine. These heaters are installed in the three ribs on the bottom casting, inside the evaporator section of the ice flaker. These heaters warm the ribs and water return trough to prevent the accumulation of ice inside the evaporator.

Large capacity (10,000 – 40,000 lb/day) ice flakers can be retrofitted with rib heaters, even if they were not installed at the factory. Retrofit kits are available from Howe, and come with all necessary parts and instructions to install rib heaters in the field.

7. Start & Adjust

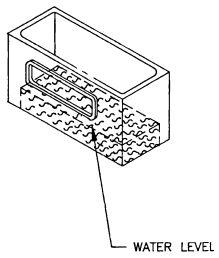
7.Start & Adjust

Once installation has been completed, the ice flaker has been properly evacuated and charged with the Freon identified on the ice flaker label, you may proceed with the check and adjust section.

Checklist

1) _____ Before power is turned on, open inlet water valve (field supplied & installed near the back of the ice flaker) and check water level in sump. The water level in the sump should be just below the water return trough. (see Figure 9 below).

Figure 9
Sump Water Level



2) _____ Make sure the ON/OFF switch is in the OFF position, then turn on the main disconnect.

3) _____ Check voltage between line 1 and line 2, and verify that it is within nameplate ratings.

4) _____ Turn the ON/OFF switch ON.

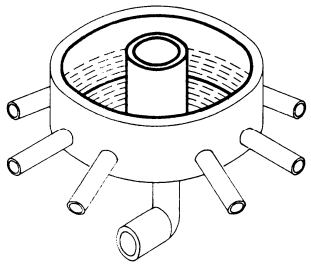
5) _____ Verify that the solenoid valve has opened (the valve will click loudly).

6) _____ Verify that the drive motor and water pump start.

7) _____ Verify that water is delivered to the distribution pan located inside the evaporator.

8) _____ Verify that the distribution pan water level is maintained at the half full point. Open or close the water adjustment valve until the water level is maintained at the proper level (see Figure 10 below).

Figure 10
Water Distribution Pan Water Level



9) _____ Allow 10-15 minutes to let the ice flaker come down to temperature and balance out.

10) _____ Verify that ice is being frozen and harvested over the entire surface of the evaporator. If it is, skip to step 14) below. If it is not, continue to the next step.

11) _____ Check for bubbles in the sight glass, (located on the liquid line of the flaker). If present, add additional refrigerant to the system until the bubbles disappear.

12) _____ Check the suction pressure at the ice machine (connect a low pressure gauge to the charging valve located on the suction line at the rear of the ice flaker). Suction temperature must be maintained at -5°F and -10°F at all times.

13) _____ If suction temperature is between -5°F and -10°F, Adjust the expansion valve. Remove the adjustment stem cover and turn the adjustment stem 1/8 to 1/4 turn at a time (counterclockwise to open the valve if the evaporator was not freezing ice on its entire length). Wait 10-15 minutes between each adjustment to allow the valve and machine balance out. Repeat this step until ice is produced and harvested all the way down to the bottom of the evaporator. For 7-1/2 & 10 ton Single circuit flakers, adjust both TXV valves equally. (7-1/2 & 10 ton flakers all have two circuit evaporators, however they may be headered into a single refrigeration circuit).

14) _____ When the ice maker is adjusted and operating properly, turn ON/OFF switch OFF, and verify that the solenoid valve closes (the valve will click loudly).

15) _____ Verify that the off-delay is set correctly. After the ice flaker is turned OFF, the drive motor and water pump will continue to operate for a period of time. This ensures that, when the drive motor and water pump stop, the evaporator will be free of ice. If necessary, adjust the off-delay (see page 38 for location).

16) _____ Turn the ON/OFF switch ON.

17) _____ Verify operation of the photoeye level controls. Block the path of the infrared beam. After a built-in 15 second delay, the shutdown cycle will begin. If the ice flaker does not begin shutdown, adjust the photoeyes per instructions of page 28.

18) _____ Unblock the photoeye beam, and verify that the ice flaker re-starts immediately.

19) _____ Adjust the electronic overload setting (see page 38 for location). Slowly turn the overload setting counterclockwise, just to the point that the flaker shuts down on overload. Turn the overload adjustment ¼ turn clockwise, reset the overload device, and re-start the flaker. This will insure that the drive motor is adequately protected, but will not cause nuisance shutdowns.

20) _____ Verify that the ice flaker is adjusted and producing dry flake of ice.

21) _____ Verify that water is NOT dripping into the bin. If it is, locate the dripping point and correct it (i.e., distribution pan overflowing, water recovery trough overflowing, or distribution tubes broken or misaligned).

ADJUST LOW PRESSURE SWITCH (split systems)

All Rapid Freeze Remote Condensing units have a Low pressure Operating (pump down) switch. This low pressure switch needs to be set at 3-5 PSIG cut out (R-22 or R-404A) to cut out the compressor when the suction pressure reaches this setting. To Adjust the Low Pressure switch turn the adjustment stem clockwise to raise the cut in setting, counterclockwise to lower the cut in setting. The cut in (right adjustment stem) setting should be set at 23 PSIG for R-404A, 16 PSIG for R-22. The differential setting (cut out)(left adjustment stem) should be set at 18 PSIG for R-404A, 11 PSIG for R-22.

*** IMPORTANT NOTICE ***

DO NOT ATTEMT TO ADJUST ICE FLAKER SPLIT SYSTEM FOR EVAPORATOR SUPERHEAT

REFER TO START & ADJUST SECTION OF THIS MANUAL FOR PROPER ADJUSTMENT OF EPR AND TXV VALVE ON ALL HOWE ICE FLAKERS

*** IMPORTANT NOTICE ***

8. Electrical Systems

8. Electrical Systems

Control Panel Layout

Figure 11
E20T40-RL Exterior Panel Layout
Remote Low Side Ice Flakers

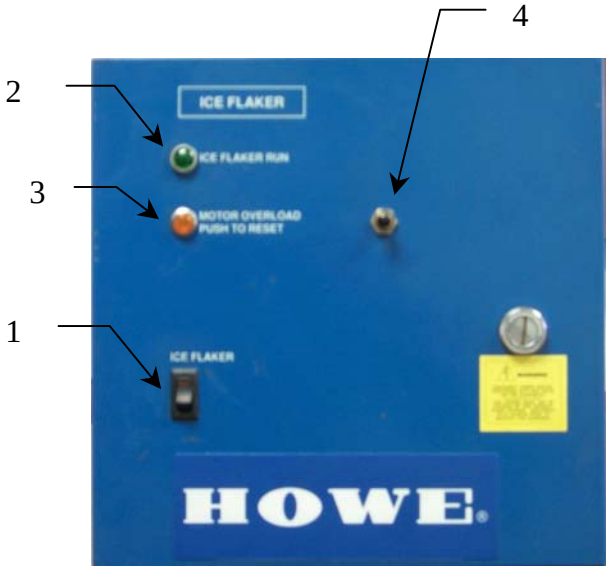
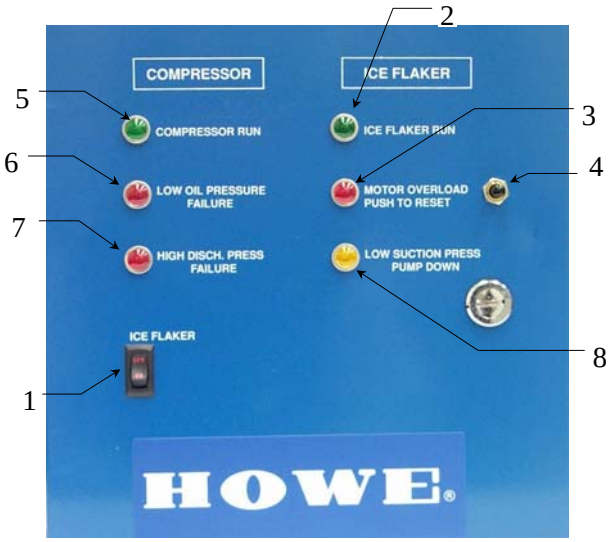
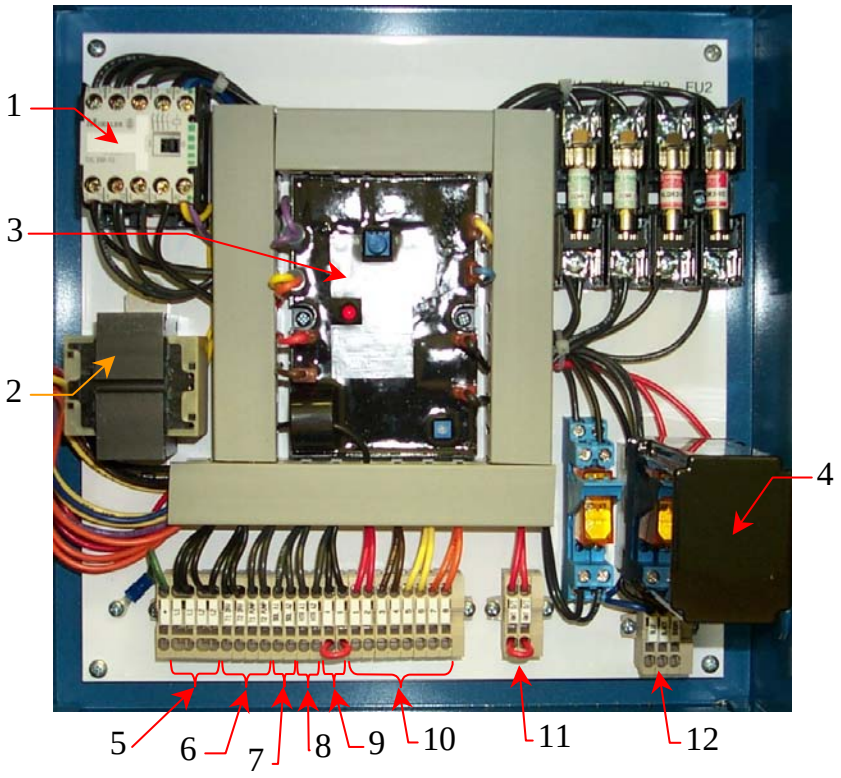


Figure 12
E20T40-SCA Exterior Panel Layout
Ice Flakers with Condensing Units



1) **On/Off Switch:** Main On/Off switch for the control circuit. This switch is wired in series with the (optional) field-installed switch and the photoeye ice level control.
2) **Ice Flaker Run Light:** Green light is on whenever the contactor and drive motor are energized.
3) **Motor Overload Light:** Amber light is on whenever the electronic overload opens, stopping the drive motor and water pump.
4) **Overload Reset Button:** Normally-open reset button, resets overload circuit following overload condition.
5) **Compressor Run Light:** Green Light is on when the compressor contactor is engaged.
6) **Low Oil Pressure Failure Light:** Red light is on when low oil pressure switch opens, shutting down the compressor. Light will stay on until pressure switch is manually reset.
7) **High Discharge Pressure Light:** Red light is on when high discharge pressure switch opens, shutting down the compressor. Light will stay on until pressure switch is manually reset.
8) **Low Suction Pump Down Light:** Amber light is on when the ice flaker is off and low-pressure switch is open, pumping down and shutting off the compressor.

Figure 13
Ice flaker Control Panel Interior Layout



1) **Motor Contactor:** Provides power to the drive motor and water pump. Energized during freezing and pump down cycle, then timed off for shut down. Auxiliary contact provides power to the liquid solenoid valve when the contactor is energized.

2) **Control Transformer:** Provides 24V control power to the control panel components, control module, motor contactor, and indicating lights.

3) **Control Module:** Main control processor. Incorporates motor overload, operating circuit, and off-delay circuit. Controls motor contactor and solenoid valve power.

4) **Photoeye Power Module:** Processes signals from electronic eye level control, with built in time delay. Shuts machine off when ice bin is full, to prevent damage to the flaker due to ice backing up into the evaporator.

5) **L1, L2, L3 Terminals:** Main power terminals for field-wiring electric power to control panel. Single-phase (standard) power is wired to L1 and L2. Three-phase power is wired to L1, L2, and L3.

6) **T1, T2, Motor/Pump Terminals:** Terminals for wiring drive motor and water pump. May be factory- or field-wired.

7) **Solenoid A1, A2 Terminals:** Terminals for field-wiring liquid solenoid valve wires.

8) **Heater A1, A2 Terminals:** terminals for field-wiring electric rib heater wires.

9) **A, B Terminals:** Terminals for providing Line 2 power to solenoid valve. On models with condensing units, wired through compressor safety switches (high discharge pressure and

high oil pressure) to assure liquid solenoid valve will de-energize if the compressor shuts down on a safety failure. When connected to a refrigeration rack, a wire jumper is placed between line "A" and line "B" in the flaker control panel.

10) **Terminals 1-8:** Terminals for field-wiring condensing unit indicator lights.

11) **On/Off Switch Terminals:** Terminals for installing a remote On/Off switch or auxiliary control such as a 7-day clock timer, or remote modem. These auxiliary controls ***must*** be wired in series with the panel-mounted On/Off switch, and factory-wired photoeye ice level control, so that all three switches must be closed to start the machine, but opening ***any*** switch will shut the machine off.

12) **Photoeye Terminals:** Terminals for installing photoeye level control emitter and receiver.

Control Module

The E20T48 control module is the main processor for the ice flaker control panel. It incorporates the timer functions, control relay functions, and overload relay functions:

Motor Overload Adjustment: Adjusts the sensitivity of the motor overload protection device. Set at factory. Adjust ***only*** if the motor shuts off on overload and there is nothing preventing the motor from turning (i.e., ice collecting in the evaporator, very soft ice, seized bearings, etc.).

Off-delay Timer Adjustment: Sets the delay between turning the flaker off (closing the solenoid valve) and shutoff of the motor and water pump. Factory set. Adjust only if ice is still present in the evaporator when the motor and water pump shut off, or if the motor and water pump operate for an excessive period of time after the evaporator stops freezing the feed water.

Terminal Number	Description
1,2	24 VAC input power.
3	Ice Flaker run input signal (all ON/OFF switches, ice level controls, and any special controls must be in this circuit).
4	Overload reset input (normally open, momentary contact).
5	Motor overload output (for overload indicating light). Energized upon overload condition, stays on until overload is manually reset. Red LED on control module indicates overload condition. This LED will glow prior to actual shutdown of drive contactor.
6	Ice flaker contactor output (output is energized when input signal is present and control is not in overload condition). When input signal is removed (switch or ice level control open) timer circuit is started. Output will stay energized until timing circuit releases output. Output is de-energized immediately upon overload condition.
7,8	Isolated output contacts for liquid solenoid valve (normally open). Contacts close immediately upon input signal (#3), stay closed until input signal is removed. Contacts open when input signal is removed, or when overload condition exists.

9. Maintenance

9. Maintenance

Evaporator

To keep the evaporator in peak performance, the ice flaker should be cleaned with an approved ice machine cleaner at least twice a year (more often if water conditions cause mineral build up) using an approved food grade ice machine cleaner. The water pump is used to circulate ice machine cleaner through the system. Refer to cleaning instructions below for complete cleaning instructions.

Ice Machine Cleaning Instructions

An important part of ice flaker maintenance is to clean it frequently so that the water passages are not clogged and the freezing surface is clear and free of scale caused by calcium and iron deposits. Frequency of cleaning depends upon the quality of water. In extreme hard water areas, it may be necessary to clean the flaker as often as every 2 months, whereas in normal or "soft" water areas twice a year may be sufficient.

When cleaning is necessary, proceed as follows:

1. Turn off refrigeration compressor. If flaker is connected to a compressor rack, close the liquid line shut off valve.
2. Turn off the ice flaker switch, and adjust the off delay time adjustment fully clockwise.
3. Remove all ice in storage bin.
4. Close water supply shut off valve.
5. Drain water from the drain connection in water sump. Some models are equipped with a drain valve, others have a drain plug, located below the water float valve connection.
6. Prepare the cleaning solution, following the instructions on the bottle.

*****CAUTION*****

USE APPROVED ICE MACHINE CLEANERS ONLY. MIX SOLUTIONS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

ICE MACHINES CLEANERS CONTAIN ACIDS, WHICH MAY CAUSE BURNS. HANDLE WITH CARE. IN CASE OF EXTERNAL CONTACT, FOLLOW FIRST AID INSTRUCTIONS ON THE BOTTLE. IF SWALLOWED, SEEK IMMEDIATE MEDICAL ATTENTION

*****CAUTION*****

7. Pour solution of ice machine cleaner into sump, to normal operating level. Do not overfill, as the water may overflow into the ice storage bin.
8. Start the ice flaker drive motor and water pump by turning the switch on, then immediately off. This will allow the gear motor & water pump to run for approximately 30 minutes with out refrigeration, to circulate cleaning solution over the freezing surface and all water passages. Operate until all scale is removed. This may require from half hour up to 2 hours if scale build up is heavy.
9. When system is clean, drain cleaning solution and rinse with 2 or more complete rinses to insure that cleaning solution is flushed away thoroughly. At each rinse, fill sump with fresh water and run drive motor and water pump for 10 minutes, then drain.

9. Maintenance

Water Distribution Tubes

Water distribution tubes should be kept clean and free of any mineral buildup. When they do accumulate mineral deposits, the flaker must be thoroughly cleaned. Remove each tube and clean with cleaning solution and small tubing brush. Carefully inspect each distribution tube and fitting for leaks or cracks. Replace defective tubes when necessary.

Water Sump

Water sump and pump should be kept clean and free of any mineral buildup. When mineral deposits accumulate the machine must be thoroughly cleaned. The water sump will be cleaned when you normally clean the equipment by circulating the ice machine cleaner through the water system. In extreme cases of mineral or slime buildup, shut off the main power and remove the top covers from the sump, and using the ice machine cleaner and a scrub brush clean the aluminum sump body until the deposits are removed.

TO SANITIZE:

10. Mix a solution of approved sanitizer, or mix 16 oz. of household bleach with 2 gallons of warm water, 90-115°F.
11. Pour solution into sump, to normal operating level (as in #7 above), then re-circulate sanitizing solution for approximately 20 minutes, by turning on drive motor & water pump.
12. Drain solution and rinse thoroughly with fresh water at least twice, following procedure described in #9 above.
13. After ice flaker is thoroughly rinsed, return machine to normal operation by opening water supply valve, readjusting off delay timer setting to previous set point, restoring refrigeration, and turning the machine back to ON.

Water Filter Back Flushing

A unique feature of the Howe water filter system is the cartridge back flush capability. The unique omni-directional cartridge design permits back flushing of the cartridge in the event of a premature plugging before the 6-month life has occurred. In most cases, this will not be necessary, however when there are large accumulations of sediment and dirt caused by line interruptions (construction and heavy rain conditions), back flushing will permit the cartridges to be used for their rated life.

To back flush the cartridges, perform the following functions:

1. Close shut-off valve on outlet of manifold.
2. Close shut-off valve on inlet of manifold.
3. Release bottom manifold from quick disconnect fittings on filters.
4. Reverse direction of filters on manifold system.
5. Re-attach bottom manifold to filters.
6. Open flush valve on bottom manifold and put flush hose into bucket or drain.
7. Open shut-off valve on inlet of manifold and accumulated dirt will be flushed out of filter.

8. Close shut-off valve on flush hose and open outlet valve on manifold. The pressure in the system should now be operational for use.
   Note: If pressure does not return to normal zone on gauges, reverse the filters and re-perform functions 5 through 8.

When the pre filter element in the clear pre filter housing becomes discolored, this is the indication that it needs to be replaced.

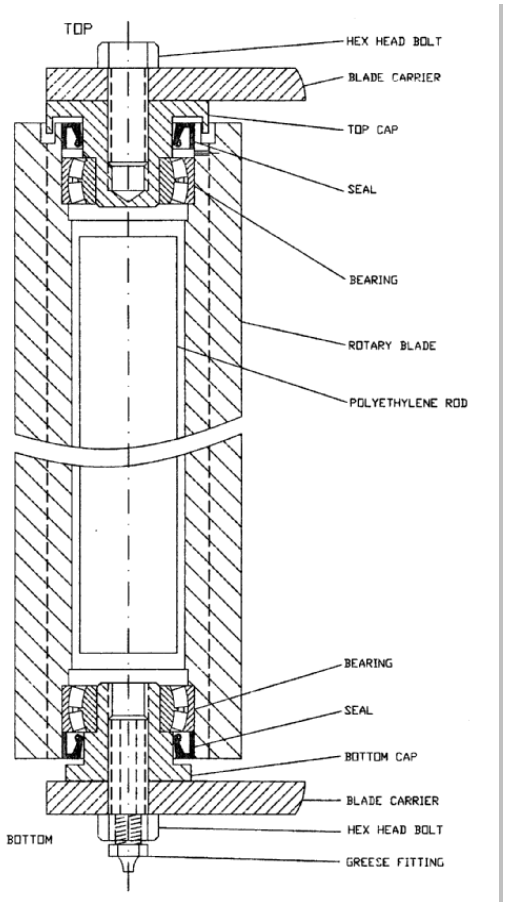
Lubrication

Bearings & Seals

Main bearings on the ice flaker should be greased every three months using FDA-approved food grade edible grease. The grease fittings are easily accessible from the front of the flaker; the top bearing is lubricated through the inspection (service) opening, the bottom bearing is lubricated through the grease fitting on the center hub, in the bottom casting. **NOTE**: One pump of a grease gun is normally adequate to grease the bearings. Do not over-grease, as this may damage the grease seals at the bearings.

Rotary Blade bearing lubrication

Lubricate the bearings on the rotary blade(s) (20 ton flaker only) using food grade grease.



Speed reducer

The bearing on the top slow-speed gear in the speed reducer must be lubricated (greased) every six months with standard bearing grease (not food grade).

The oil in a new speed reducer should be changed at the end of 250 hours of operation. Under normal conditions, after the initial oil change the oil should be changed after every 2,500 hours, or every six months, whichever occurs first. Periodic examination of oil samples taken from the unit will help establish the appropriate interval.

When operating the ice flaker in low ambient temperatures (colder than 50°F), synthetic oil should be used in the speed reducer.

Preventative Maintenance

The ice flaker should be visually checked daily by a designated employee. This inspection should ensure that:

- Bin doors are working (closing) properly,
- Bin doors are kept closed,
- Photo eyes and brackets are in proper alignment,
- Ice quality (size of ice flakes) appears normal,
- Ice quantity appears normal,
- No bubbles are visible in the sight glass,
- The flaker is clean,
- No unusual noises are present.

When these items are checked on a daily basis, any change will be easily detected prior to any service call for a malfunction of the machine.

Figure 14
Preventative Maintenance Schedule

	3 months	6 months	9 months	12 months
Clean ice machine *	X	X	X	X
Check ice harvesting	X	X	X	X
Clean electric eyes & check alignment	X	X	X	X
Inspect flaker for damaged parts **	X	X	X	X
Inspect squeegee	X	X	X	X
Inspect water float valve	X	X	X	X
Inspect deflector scraper	X	X	X	X
Grease top & bottom bearings	X	X	X	X
Grease Bearings on Rotary blade (20 ton units only)	X	X	X	X

9. Maintenance

	3 months	6 months	9 months	12 months
Check and replace speed reducer oil (standard oil) ***	X	X	X	X
Check and replace speed reducer oil (synthetic oil) ***		X		X
Grease speed reducer bearings †		X		X
Sanitize ice machine *				X
Check bearing wear ††				X
Check cutting blade clearance ‡				X
Check rib heaters for proper operation (if furnished)				X
Replace squeegee	As necessary			
Replace water float valve	As necessary			

* Clean and sanitize at least annually, more frequently if necessary.

** Inspection should include, at a minimum, the following parts: ice deflector, squeegee, squeegee wrapper, water distribution tubes, and float valve.

*** Speed reducer oil should be changed every 2,500 hours of operation (5,000 hours with synthetic oil), or every six months, whichever occurs first. The above chart assumes continuous operation of the ice flaker.

† Only required on speed reducers equipped with grease fittings at the bearings. Use food-grade grease such as Chevron FM or equal.

†† Use an industrial feeler gauge. If wear is greater than 0.007", bearings may be wearing excessively. Contact factory for guidance.

‡ Use an industrial feeler gauge. Check blade at top and bottom, in at least four locations around the evaporator (quarter points). Clearance should be 0.004" - 0.006" in all locations. If clearance is not within these parameters, contact factory for guidance.

10. Troubleshooting

10. Troubleshooting

Problem	Possible Cause	Remedy
Operation		
1. Ice flaker will not start.	a. ON/OF switch is open.	Turn all power switches "ON".
	b. Control transformer is defective.	Check voltage between terminals 1 and 2 on the flaker control module (part E20T48). Normal reading is 24 VAC. If 24VAC is not present, replace the transformer.
	c. Control switches are open.	Check voltage between terminals 1 and 3 on the flaker control module. With all control switches open, normal reading is 0 VAC. With all control switches closed, normal reading is 24 VAC.
	d. Photoeye emitter is defective.	Check LED on emitter. If LED is lit, emitter is functioning properly. If LED is *not* lit, check to see that power is turned on, and that all connections between the emitter and control panel are secure. If LED still is not lit, replace emitter.
	e. Photoeye receiver is defective.	Check LED on receiver. If LED is lit, receiver is functioning properly. If LED is *not* lit, check to see that power is turned on, and that all connections between the emitter and control panel are secure. Check alignment of sensors. If possible, remove sensors form their housings, and hold them a few inches apart. If LED still is not lit, replace receiver.
	f. Photoeye control module is defective.	If both sensors are operating properly (see d. and e. above), replace control module.
2. Solenoid valve energizes, drive motor contactor does *not* energize.	a. Control module is defective	Check voltage between terminals 2 and 6 on control module. If voltage reads 24VAC, replace the control module.
	b. Contactor coil is defective.	Check voltage between terminals 2 and 6 on control module. If voltage reads 0VAC, check wiring and contactor coil for defects.
3. Solenoid valve does *not* energize, drive motor contactor energizes.	a. Control module is defective.	Close all switches; remove wires from terminals 7 and 8 on the control module. With voltmeter set to "ohms," check for continuity between terminals 7 and 8. If contacts are open, replace the control module. Control panel power must be on for this test. 7&8 are an isolated contact, with no wires connected, there is no power going through contact to harm the ohm meter.

Problem	Possible Cause	Remedy
	b. There is a wiring defect.	Close all switches; remove wires from terminals 7 and 8 on the control module. With voltmeter set to "ohms," check for continuity between terminals 7 and 8. If contacts are closed, check the line "A" jumper, CR_3contacts, wiring, and solenoid coil. Control panel power must be on for this test. 7&8 are an isolated contact, with no wires connected, there is no power going through contact to harm the ohm meter.
4. Drive motor is always on.	a. ON/OFF switch is defective.	Replace ON/OFF switch.
	b. Photoeye controls are defective.	Check per 1.d-1.f above.
5. Solenoid valve is always energized.	a. Control module is defective.	Replace control module.
6. Ice maker does *not* shut off when bin is full.	a. Photoeyes are not installed.	Install photoeyes per instructions on page 28.
	b. Photoeyes are defective.	Check per 1.d-1.f above.
7. Drive motor cuts out on overload.	a. A speed reducer gear is worn or broken.	Repair or replace the speed reducer.
	b. Electronic overload is set too low.	Check amp draw on drive motor. If amps do not exceed the nameplate rating, adjust the potentiometer on the control module clockwise until flaker operates properly. Turn potentiometer *counter*-clockwise just to the point that the overload trips, then turn potentiometer clockwise 1/8 turn.
	c. Thermal overloads may be improperly sized.	Check ratings and install properly sized overloads if necessary.
	d. Ice blade is "dragging" on the drum.	Readjust the clearance on the ice blade as specified on page 62.
8. Drive motor runs, but main shaft only turns when there is no ice on the drum.	a. The woodruff key on the slow speed output shaft of the speed reducer has sheared.	Repair or replace the speed reducer.
Freezing and Refrigeration		
1. Ice freezes along entire length of drum, but	a. System is short of refrigerant.	Charge system until there are no bubbles in the sight glass.

10. Troubleshooting

Problem	Possible Cause	Remedy
harvests only on the upper half.	b. Superheat setting is too high.	Open the TXV ¼ - ½ turn at a time until ice is harvested over entire evaporator. Wait 10-15 minutes between adjustments to allow the system to balance.
	c. TXV sensing bulb is improperly located.	Relocate the bulb approximately 6" from the inlet side of the suction line heat exchanger, or on the horizontal section of the suction line.
	d. Head pressure is too low.	Adjust or replace head pressure controls as necessary.
	e. The liquid line filter/drier is dirty.	Replace the filter/drier.
2. Ice freezes *and* harvests entire height of evaporator, but harvests on only one side of the drum.	a. Main bearings are worn.	Replace worn bearings. Repair or replace main shaft bearing sleeve if excessive wear is detected.
	b. Ice blade clearance is too high.	Check and adjust blade clearance as necessary
3. Ice freezes *and* harvests entire height of evaporator, but harvests poorly or at random.	a. Feed water is too hard	Install a water softening system.
	b. Freezing surface is coated with hard water deposits.	Clean the evaporator surface with ice machine cleaner.
4. Ice freezes soft on entire height of drum, and drive motor cuts out on overload shortly after starting.	a. Entire refrigerant charge is in accumulator.	Pump out accumulator and restart the system. Adjust TXV as necessary.
5. No ice freezes on the evaporator, and compressor short cycles.	a. Loss of refrigerant charge.	Inspect refrigeration system for leaks. Repair as necessary, and recharge system.
	b. Power element on the TXV is defective.	Replace power element or TXV.
6. Flaker makes ice intermittently, and compressor short cycles.	a. Undersized water line.	Install properly sized water line.
	b. Low water pressure (under 20 psi).	Contact factory for guidance.
	c. Water filters are clogged.	Replace water filters.

10. Troubleshooting

Problem	Possible Cause	Remedy
7. Ice flakes are too thin.	a. Evaporator temperature is too high.	• Check and adjust EPR valve (if equipped). EPR should be set between –5°F and –10°F. • Close the TXV ¼ - ½ turn at a time until ice quality is acceptable. Wait 10-15 minutes between adjustments to allow the system to balance.
	b. Condensing unit is not producing rated capacity.	• Compressor valves may be broken. Repair/replace as necessary. • Condenser may be dirty. Clean fin coils or tubes. • Head pressure controls may be defective. Repair/replace as necessary.
	c. Condensing unit is undersized.	Replace with a properly sized condensing unit.
8. Ice flakes are too small, with an excessive amount of "snow".	a. Evaporator temperature is too low.	• Check and adjust EPR valve (if equipped). EPR should be set between –5°F and –10°F. • Open the TXV ¼ - ½ turn at a time until ice quality is acceptable. Wait 10-15 minutes between adjustments to allow the system to balance.
9. Ice flaker "chatters" and does not run smoothly.	a. Ice blade clearance is too high.	Check clearance and adjust as necessary.
	b. Main bearings are worn.	Replace worn bearings. Repair or replace main shaft bearing sleeve if excessive wear is detected.
10. Ice accumulates in the water return trough.	a. Ice deflector is not positioned properly.	Adjust ice deflector position as specified on page 54.
11. Ice accumulates in the water return trough, sump, and on the "ribs" in the bottom casting.	a. Ambient temperature is too low.	• If ambient temperature is between 45°F and 50°F, install rib heaters. • If ambient temperature is below 45°F relocate the flaker to a warmer area. See Installation conditions on page 8.
Ice Storage and Removal		
1. Ice flakes are frozen together in a hard block.	a. Ice has been left in the storage bin too long.	• Remove ice from the storage bin daily. • Install a clock timer to limit the ice flaker production.

Problem	Possible Cause	Remedy
	b. Water level in the sump is too high, causing water to overflow the return trough.	Adjust the water float valve to maintain water level approximately ¼" below the return trough.
	c. Water is overflowing the distribution pan.	• Distribution tubes may be plugged. Clean or replace tubes as necessary. • Level in distribution pan may be too high. Adjust the water-regulating valve to set level in the distribution pan to half-full.
	d. One or more water distribution tubes is missing or broken.	Replace as necessary.
	e. The lead water tube may be splashing water into the bin.	Adjust lead water tube as necessary.
	f. Condensate drip pan is leaking into the storage bin.	Repair or replace drip pan.
	g. Humidity level in storage bin is too high.	• Check and repair bin insulation as necessary. • Check and repair seals on the bin. • Bin door has been left open too long. Close door when not removing ice.
2. Ice in storage bin is too wet.	a. Water level in the sump is too high, causing water to overflow the return trough.	Adjust the water float valve to maintain water level approximately ¼" below the return trough.
	b. Water is overflowing the distribution pan.	• Distribution tubes may be plugged. Clean or replace tubes as necessary. • Level in distribution pan may be too high. Adjust the water-regulating valve to set level in the distribution pan to half-full.
	c. One or more water distribution tubes is missing or broken.	Replace as necessary.
Speed Reducer		
1. Oil is leaking between the front of the motor and the motor mounting flange.	a. High-speed oil seal in the speed reducer is worn.	Replace seal.

10. Troubleshooting

Problem	Possible Cause	Remedy
2. Oil leaking is evident on the top of the flexible coupling.	a. Slow-speed oil seal in the speed reducer is worn.	Replace seal.

11. Service & Adjustment

11. Service & Adjustment

*****CAUTION*****

THIS INFORMATION IS INTENDED FOR USE BY INDIVIDUALS POSSESSING ADEQUATE BACKGROUND IN ELECTRICAL, REFRIGERATION, AND MECHANICAL SERVICE. ANY ATTEMPT TO REPAIR MAJOR EQUIPMENT MAY RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE. THE MANUFACTURER OR SELLER IS NOT RESPONSIBLE FOR THE INTERPRETATION OF THIS INFORMATION, NOR WILL THEY ASSUME ANY LIABLITY IN CONNECTION WITH ITS USE,

*****CAUTION*****

*****DANGER*****

THE CONTROL PANEL ON THIS ICE FLAKER MAY BE POWERED BY TWO SEPARATE POWER SOURCES. DISCONNECT BOTH SOURCES PRIOR TO SERVICING THIS PIECE OF EQUIPMENT. FAILURE TO DO SO MAY RESULT IN AN ELECTROCULTION HAZARD.

*****DANGER*****

*****WARNING*****

ONLY TECHNICALLY QUALIFIED PERSONS, EXPERIENCED IN THE HANDLING OF REFRIGERANTS AND THE OPERATION OF REFRIGERATION SYSTEMS, SHOULD PERFORM THE OPERATIONS DESCRIBED IN THIS MANUAL.

*****WARNING*****

Replacement of Photoeye Ice Level Controls

1. Turn off the main power and remove the 11-pin power module.
2. Locate the sensor to be replaced, and remove the sensor housing cover (if present).
3. Using two open-ended wrenches, and placing one on the back nut and one on the forward nut, remove the sensor.
4. Disconnect the sensor from the terminal strip (under the relay base).
5. Connect the replacement sensor to the terminal strip. (Connect black wire from receiver only to terminal marked “Black”).
6. Install the sensor in the mounting bracket, and tighten the locknuts.
7. Re-install the power module into the base.
8. Turn on main power.
9. Check alignment of the sensors. When proper alignment is achieved, the LED on the receiver will light. Adjust the mounting brackets as necessary to ensure that the sensors are properly aligned.
10. Reinstall the sensor housing covers.

Replacement and Adjustment of Ice Deflector

To properly install, the upper edge of the deflector should be positioned approximately 1/4" BELOW the aluminum lip under the evaporator.

The ice deflector should be centered beneath the ice cutter blade so that as the ice is removed from the evaporator, it will be deflected into the ice bin opening, away from the water-collecting trough. The ice deflector prevents ice from dropping into the water-collecting trough.

TO REPLACE ICE DEFLECTOR PROCEED AS FOLLOWS:

1. Shut off ice flaker and allow machine to "pump down" (de-ice). Once the machine is clear of ice, disconnect the main power to the ice flaker and LOCK THE DISCONNECT SWITCH IN THE OFF POSITION (to prevent accidental start up).
2. Reaching up from the bin into the freezing chamber, loosen and remove the bolts holding the existing ice deflector in place.
3. Remove the damaged ice deflector and deflector brackets if necessary, through the bottom opening.
4. Position and bolt the new ice deflector and brackets to the shaft. Tighten the bolts with the deflector adjusted to within ¼” but NOT touching the evaporator surface or aluminum casting.
5. Remove all tools from inside the machine.
6. Remove lockout device from the main power disconnect and turn on the main power.
7. Turn on the ice flaker switch (you may need to press the overload reset button), and check the deflector to insure that it does not touch the evaporator or aluminum casting.

8. If the deflector makes contact with the evaporator surface or aluminum casting at any point, then shut down the machine and repeat the above steps to readjust the deflector.

Replacement and Adjustment of the Squeegee & Squeegee Wrapper

Shut off ice flaker and allow machine to "pump down" (de-ice). Once the machine is clear of ice, disconnect the main power to the ice flaker and **LOCK THE DISCONNECT SWITCH IN THE OFF POSITION** (to prevent accidental start up).

1. Remove the service access cover on the top casting.
2. Remove 2 or 3 water distribution tubes for easier access.
3. Reaching into the freezing chamber, loosen and remove the two bolts holding the existing squeegee and squeegee wrapper in place.
4. Remove the squeegee and wrapper assembly through the service opening. If the squeegee wrapper is not bent out of shape or pitted with rust, then you can remove the rubber squeegee from the wrapper and install a new squeegee in the existing wrapper.
5. Reinstall the squeegee and wrapper assembly onto the mounting bracket in the freezing chamber, hand tighten the nuts with the squeegee touching the evaporator surface, then move the squeegee assembly approximately 1/16" to 1/8" closer to put pressure on the squeegee causing it to bend **slightly** so that it will drag on the evaporator surface.
6. Do not install the squeegee assembly so close to the evaporator that the squeegee bends excessively. This may cause premature squeegee wear and increase load on the gearbox and drive motor.
7. Tighten the nuts and bolts only till the lock washers lock. **Do not over tighten bolts**, as this may cause distortion of the squeegee wrapper and possibly cause premature squeegee wear.
8. Re-install the water distribution tubes.
9. Remove all tools from inside the machine and re-attach the service access cover.
10. Remove lockout device from the main power disconnect and turn on the main power.
11. Turn on the ice flaker switch (you may need to press the overload reset button) and check the squeegee to insure that it touches the evaporator on the entire circumference of the freezing chamber.
12. If the squeegee looses contact with the evaporator surface at any point, then shut down the machine repeating the above steps to readjust the squeegee a little closer.

Replacement and Adjustment of Water Distribution tubes

Adjust lead tube (bottom spout with 90N Elbow), so that the water is dispersed over the evaporator and it doesn't splash water over the ice deflector. If it is adjusted too far forward, the water may cascade down onto the ice deflector and “dribble” onto the ice in the storage bin. If water is running onto the ice deflector, turn the lead tube away from the ice blade, so water does not run onto the ice deflector.

The side spouts are positioned so the ends of the tubes are approximately 3" away from the surface, along the top edge of the evaporator, pointed slightly down towards away from the distribution pan. Ensure that the water level is at least ½ full in the distribution pan, but not overflowing the top. Inadequate water level may cause water to "dribble" out of the distribution tube(s) down onto the ice in the bin, & not on the evaporator.

Replacement of Water Pump

1. Turn off & lock out the main power to the flaker.
2. Remove the screws securing the stationary sump cover.
3. Loosen and remove water tube fitting (Nylon compression fitting).
4. Remove the cover from the electric motor, and disconnect the water pump wires from the terminal strip.
5. Lift the water pump (with cover attached) off the sump.
6. Remove the water tube hose and clamp.
7. Loosen and remove the four nuts holding the water pump onto the sump cover. Remove the pump from the cover.
8. To install the new pump, simply reverse the above procedure. Use caution when routing the new cables to insure they are secured to avoid accidental damage.

Replacement of Drive Motor

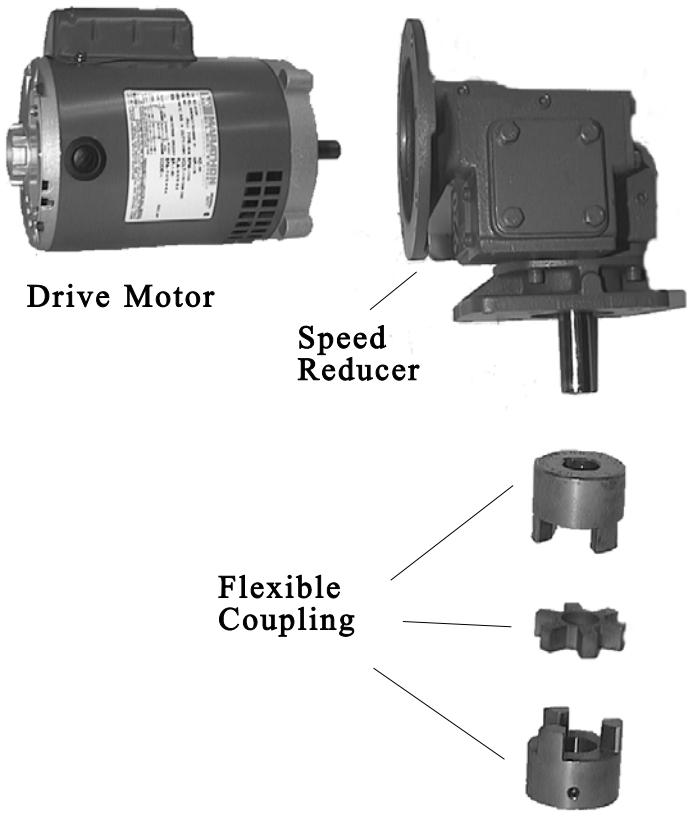
1. Turn off & lock out main power to the ice flaker. Remove electric wiring cover on the drive motor. Remove the power leads attached to terminals marked L_1 and L_2.
2. Refer to Figure 15. The drive motor is attached to the gearbox with (4) bolts, through the motor mounting plate. Remove the (4) bolts. The motor may be removed by pulling it away from the gearbox. There are no setscrews or couplings; the motor shaft fits directly into the hollow high-speed input shaft on the speed reducer with a ¼" key. If the old motor cannot be removed easily, then locate two threaded holes on the motor mounting plate. They will be on the horizontal centerline, one on each side of the input shaft. Insert one of the mounting bolts into each threaded hole so they push against the drive motor (you may have to rotate the motor housing so the bolts can press against the mounting lugs on the motor, making sure the bolts do not thread into the mounting lugs). Turn both bolts until they are hand tight, and then turn each bolt alternately 1/2 turn at a time, until the motor is free enough to remove by hand.
3. When installing the new motor, place the ¼" key on the shaft, lightly grease the surface of the motor shaft, and insert in the hole on the high-speed input shaft, keeping the keyway aligned with the key. When the motor is in place, rotate it until the mounting lugs are aligned with the (4) mounting holes on the motor mounting plate on the speed reducer. Insert a bolt in each hole and tighten.
4. Re attach the flexible power cable to the motor, connect the power leads to terminals, check to insure the motor is wired for the correct power (115V or 230V, single phase, 460V or 380V three phase) and for the correct rotation (CCW). Refer to wiring connections on the motor nameplate for the correct connections.

5. When the motor is reattached and connected, turn on power and check operation. Place an ammeter on the power line and check to insure the motor is drawing within the nameplate FLA.

Replacement of Speed Reducer and Flexible Coupling

1. Turn off & lock out main power to the ice flaker.
2. Remove the drive motor as described above.
3. Remove the (4) mounting bolts attaching the gearbox to the top aluminum casting. The gearbox can then be lifted straight up. The top part of the flexible coupling will lift off with the gearbox; the bronze star and bottom part of the coupling will stay attached to the main shaft.
4. Loosen the setscrew on the top part of the coupling to remove it from the gearbox. Care should be taken to avoid oil from seeping out of the relief vent (located on the top of the gearbox in a set screw) if the gearbox is turned on its side or up side down.
5. The bottom part of the flexible coupling is attached to the shaft with a setscrew. Loosen the setscrew, and then lift the coupling off the shaft. The use of a gear puller may be required to assist in removing either part of the coupling.
6. Install the new (or existing if it is not damaged) flexible coupling to the shaft and speed reducer, lining up the keyways with the key. Re-tighten the setscrews in both parts.
7. Place the bronze star on the bottom part of the coupling.
8. Install the gearbox (with top coupling attached) onto the top casting, over the bottom part of the flexible coupling. If the gearbox does not sit on the top casting properly, you may need to loosen one or both of the setscrews on the flexible coupling to allow the gearbox to seat on the machined surface of the casting. There should be a 1/16" gap between the top coupling half and the bronze star.
9. Rotate the gearbox COUNTERCLOCKWISE ONLY until the mounting holes line up. Once aligned re-install the mounting bolts. Re-position the coupling halves with required clearance and re-tighten.

Figure 15
Drive Motor and Speed Reducer Disassembly



Replacement and Adjustment Of Water Float Valve

1. Shut off the water supply to the ice flaker and drain the supply line.
2. Loosen and remove the compression fitting at the float valve.
3. While holding the float valve body with pliers or a crescent wrench, remove the water float valve fitting from the valve body.
4. Using a 13/16" socket (a spark plug wrench works well), remove the locking nut from the valve body (you may need to hold the valve body to keep it from turning).
5. Remove the old valve and fiber washer. Install new valve (with fiber washer on the inside of the water sump) and tighten the locking nut with the socket. The valve body should be held in place with the discharge port facing straight down.
6. Re-install the float valve fitting and reattach the water supply line.
7. Turn on water shut off valve and check for leaks at the compression fitting and at the float valve fitting. The water level should be maintained to the point just below the lower edge of the water return trough while the flaker is operating. To adjust the operating level, hold the float in one hand, and push or pull on the brass shaft (depending on whether the water

level is too high or too low.) Watch the operation for a while to verify the water level. If the water level is still not where it should be, re-adjust the float.

Replacement of Solenoid Valve

*****CAUTION*****
ON ICE FLAKERS THAT ARE CONNECTED TO A CENTRAL REFRIGERATION RACK, A JUMPER WIRE MUST BE PLACED BETWEEN TERMINAL "A" AND TERMINAL "B" ON THE TERMINAL STRIP AT THE BOTTOM OF THE CONTROL PANEL. THIS JUMPER WILL ALLOW THE SOLENOID VALVE TO ENERGIZE WHEN THE OPERATING CIRCUIT IS ENERGIZED.
*****CAUTION*****

1. Pump down the ice flaker and evacuate refrigerant from the liquid line.
2. Turn off main power to ice flaker, and disconnect wires leads from the solenoid valve and remove the armored cable.
3. Cut out, or de-solder the solenoid valve from the liquid line and remove the old valve.
4. Install and solder the new valve into the liquid line.
5. Using a high-quality vacuum pump, evacuate the liquid line to remove any moisture that may have entered the system while the line was open to the atmosphere.
6. Re-connect armored cable and solenoid wires.
7. Turn on main power, turn on ice flaker switch, and check operation of the solenoid valve.

*****CAUTION*****
THE ARROW MARKED ON THE SOLENOID VALVE *MUST* POINT IN THE DIRECTION OF REFRIGERANT FLOW (TOWARD THE ICE FLAKER).
*****CAUTION*****

Replacement and Adjustment of the Expansion Valve (TXV)

Note: When the ice flaker is in a cold ambient location, and / or the machine is supplied with cold water, the standard TXV valves may appear to overfeed, however when properly adjusted, they should feed properly. In extreme cases of cold ambient and / or cold water temperature, the next smaller sized expansion valve may need to be installed.

1. Pump down the ice flaker and evacuate refrigerant from the liquid line.
2. Carefully cut back the insulation on the suction line and remove the remote bulb. The bulb is secures to the suction line with two straps.
3. Remove the old expansion valve.
4. Install the new valve.

5. Re-attach the bulb to the suction line, at approximately the 5 o'clock position. Secure the bulb using two straps.
6. Re-insulate the suction line.
7. Using a high-quality vacuum pump, evacuate the liquid line to remove any moisture that may have entered the system while the line was open to the atmosphere.
8. Restart the ice flaker, and adjust the TXV as necessary.
    a. If ice freezes on the surface of the evaporator (top to bottom) but harvests only on the upper portion with each revolution of the shaft ***and*** there are no bubbles in the sight glass, then the expansion valve must be opened to feed more refrigerant.
    b. If frost accumulates on the compressor body, the valve is overfeeding and must be closed.
9. To adjust the TXV, remove the adjustment stem cover and turn the adjustment stem 1/8 to ¼ turn at a time (clockwise to close the valve if it was overfeeding, counterclockwise to open the valve). Wait 5-10 minutes between each adjustment to allow the system to stabilize. Repeat this step until ice is produced ***and*** harvested from the top all the way to the bottom of the evaporator. If a ring of ice is left on the bottom of the evaporator, (or in the middle for a 7-1/2, or 10 ton flaker), then the expansion valve is underfeeding, and must be opened accordingly (top expansion valve for a ring of ice in the middle of the evaporator, bottom expansion valve for a ring of ice at the bottom of the evaporator). Note: balanced-port expansion valves are more sensitive than standard TXVs, so adjustment of the stem should be limited to 1/8 turn at a time. Non Balanced port TXV's are standard equipment for split systems. Balanced port TXV's are more difficult to adjust properly and require more time.

*****SPECIAL NOTE*****

SINGLE-CIRCUIT SYSTEMS WITH TWO EVAPORATOR CIRCUITS, (MODEL 76-1, 101-1,) HAVE DUAL EXPANSION VALVES AND ARE DIFFICULT & TIME COMSUMING TO ADJUST.

CLOSE BOTH VALVES, THEN OPEN BOTH EQUALLY ¼ TO ½ TURN EACH UNTIL ICE IS MADE AND HARVESTED ON THE ENTIRE LENGTH OF THE EVAPORATOR. WAIT 5-10 MINUTES BETWEEN EACH ADJUSTMENT.

*****SPECIAL NOTE*****

		
Improperly adjusted TXV	***Use one gauge for each circuit***	***Properly adjusted TXV***

Adjusting TXV valves on dual circuit evaporators with common refrigeration circuit (76-1-RL & 101-1-RL)

Use two refrigeration gauge manifolds.

Connect the low pressure hose from the gauge manifold to the Schraeder connection on the suction line outlet for each circuit.

Pressures should be equal, if not, it is an indication the TXV valves may not be adjusted (balanced) properly.

We don't use SUPERHEAT settings for adjusting the TXV valves on the ice flaker,

Howe Flake Ice Equipment's Thermal Expansion Valve(s) (TXV) must be adjusted visually (by sight) to assure optimum ice quality and ice harvesting. Superheat settings are not a reliable method of adjusting TXV on Howe Flaker. Please note how ice appears in photo above for a properly adjusted TXV. An even layer of ice should form completely from top to bottom of the evaporator circuit(s) (models 76, 101, & 201 evaporators have 2 circuits). If ice on the lower 1" to 4" of the evaporator circuit(s) looks different than the ice above it, this normally indicates the TXV is underfeeding and requires opening.

If one circuit appears to be underfeeding, (ice is shinny or blade does not remove the ice nearest the bottom of the circuit,) and the other circuit appears to be fine, Then CLOSE the TVX slightly on the "Good" circuit until it also indicates underfeeding). (This is to ensure the TXV is not OVERFEEDING). Let the valves "balance out". Now adjust the TXV for the circuit that is underfeeding the most, so that both circuits appear to be feeding equally. At that point, adjust both TXV valves EQUALLY simultaneously 1/8 to ¼ turn each, until ice is made and harvested over the entire length of the evaporator.

Check the pressure gauges to ensure equal pressure for both circuits.

Failure to make proper TXV adjustments may cause unwanted ice build-ups in evaporator, damaging component parts, and void warranty.

Replacement and Adjustment of Ice Blade

Ice blade adjustment is not normally required (except after bearing replacement). If you suspect the blade needs adjustment because of excessive clearance, it is more likely that the bearings have worn. **Do not** try to adjust the blade clearance without checking for and correcting worn bearings. When checking tolerances, do NOT use automotive-type feeler gauges. Automotive types are too short, and not flexible enough to give a true reading. You **MUST** use industrial machine tool feeler gauges (these are about 1/2" wide by 12" long). These machine tool feeler gauges are available from the factory if you cannot locate them locally.

Clearance between the ice blade and the evaporator freezing surface must be between 0.004" and 0.006" (.005" to .008" for Rotary Blades – 20 Ton only) with the evaporator at room temperature. If it is determined that the ice blade clearance must be adjusted:

1. Locate the exact position on the evaporator freezing surface where the clearance between the tip of the ice blade and freezing surface is the least. Check clearance at the top and bottom of the blade(s), rotate the blade 60 degrees and check clearance again. Repeat this operation at a minimum of six points around the evaporator to accurately determine the point of least clearance.
2. With the ice blade rotated to the point of least clearance, set the gap between the ice blade and evaporator surface to between 0.004" and 0.006" at the top and bottom of the blade. Tighten the blade mounting bolts and re-check clearance.

Rotary Blade Bearing replacement (20 ton models only)

1. Remove blade assembly from machine by the top and bottom 5/8" bolts.
2. Remove bearing caps and seals from both the top and bottom. Note the caps are different and should not be mixed up.
3. If needed, clean bearing caps of any deposits using a wire brush or Scotch pad.
4. Pull/press out the bearings. You may have to make your own tool to do this. One method that works is to use a 1-1/4" diameter WOODEN dowel (not metal) to drive the bearings out against the inner plastic filler rod.
5. If the plastic filler rod "mushrooms" on the ends, make sure to trim the O.D. of the plastic down to the proper diameter. This is important to clear the I.D. of the blade to allow grease to pass through from the bottom bearing to the top.
6. Clean out old grease from the blade and repack with fresh grease. Use food grade grease.
7. Pack the new bearings with fresh grease before installing.
8. Press new bearings in place. They are the same for top and bottom. Press against the OUTER race only. DO NOT press in using the inner bearing race or damage may occur. Again, you may use a block of wood with the center hollowed out to clear the inner race and tamp in place. Drive the bearings down into the blade so they seat within the counter bore.
9. Drive the seals in similarly with the open end of the seal lip facing inward to the blade. Make sure they are square and flush with the blade ends.
10. Re-install the end caps noting the top and bottom caps. Install the blade in the machine using the 5/8" screws. Note the grease fitting goes on the bottom.
11. Confirm and adjust blade spacing from the blade tips to the evaporator wall. There should be 0.008" nominal gap at the blade tips to the wall. Check the gap along the length of the blade at (3) points minimum – top, bottom, and middle. +/-0.003 can be expected.

12. Top off the grease with a few pumps until you feel resistance in the grease gun. This is to eliminate any air trapped in the blade assembly.
13. Return ice machine to service.

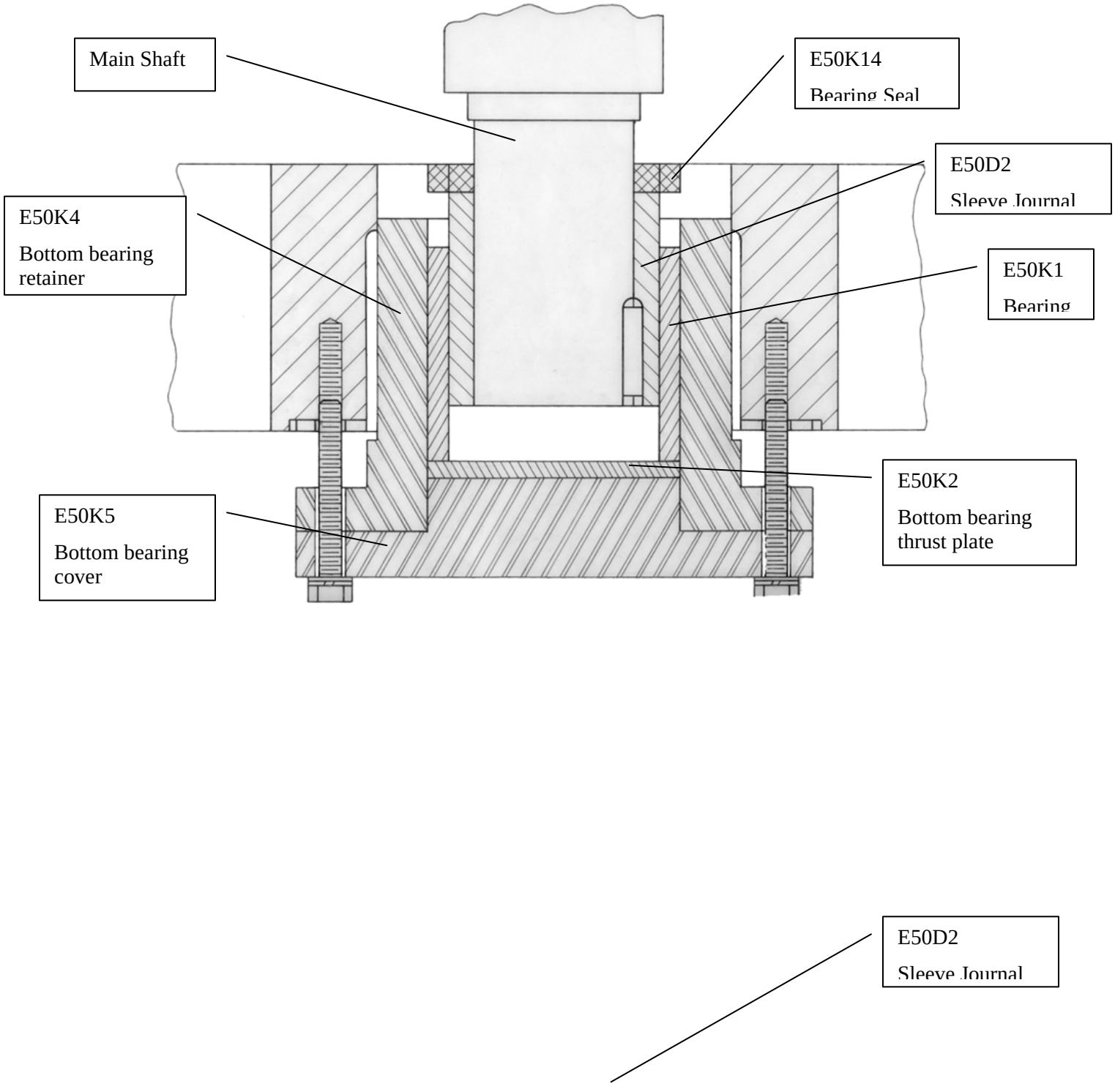
Bearing Replacement

Bearing replacement on large capacity machines is accomplished without removing the shaft from the flaker.

1. Turn the ice flaker off and pump down until all ice is removed from the evaporator.
2. Shut off main disconnect and lock out power.
3. Remove the speed reducer and drive motor from the machine (refer to instructions on page 57). Leave the flexible coupling in place for now (this will help keep the main shaft from dropping when the bottom bearing is removed).
4. The bottom bearing retainer and bottom bearing cover are attached to the bottom casting with (4) bolts. Remove the (4) bolts from the cover and retainer. Once the bearing cover is removed, you will see the bottom bearing retainer and the end of the shaft. There are two threaded holes in the retainer. Install two of the removed bolts into these threaded holes, turning each one an equal amount to "jack" the retainer out of its normal position in the bottom casting.
5. After the retainer has been removed, press the old bearing out of the aluminum retainer.
6. There is a stainless steel shaft sleeve between the shaft and the bearing. The shaft sleeve will probably come off the shaft with the bearing and retainer. If it did not, then remove the sleeve from the shaft (it is kept in place by a keyway; there is not setscrew. It will slide freely, but rotate with the shaft).
7. Examine shaft journals for wear. If worn, repair or replace shaft.
8. Press the new bearing into place, centering it in the retainer.
9. Press the new oil seals in place. The auxiliary seal is placed inside the main seal.
10. Place the new shaft sleeve on the shaft and install the bearing retainer (with new bearing and oil seals in place) and bottom bearing cover. Align the bolt holes with the threaded holes in the casting and re-install the (4) mounting bolts, taking care to tighten them equally so the retainer goes in straight.
11. Remove the flexible coupling from the top of the flaker shaft, then remove the (4) bolts holding the top bearing retainer in place.
12. Repeat steps 4-9 above for the top bearing and retainer removal. Note: there will not be a bearing plate on the top bearing, and there will be two sets of oil seals (top and bottom).
13. Rotate the shaft to check for proper clearances before re-installing the drive assembly.
14. Re-install the flexible coupling, speed reducer, and drive motor.
15. Remove power lockout and turn the flaker on. Check rotation and amp draw prior to opening the liquid solenoid valve.

16. Energize the liquid solenoid valve and allow the machine to begin making ice.
17. Discard the first half-bin of ice. Clean and sanitize the storage bin prior to using ice for consumable products

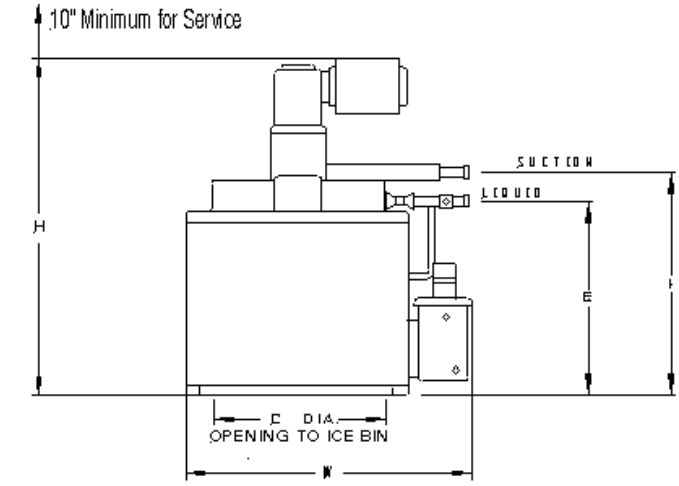
.

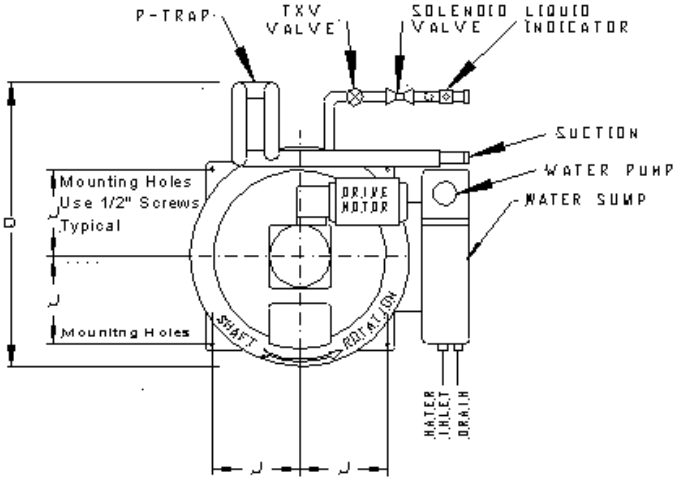


12. Appendix A Ice Flaker and Condensing Unit Drawings

12. Ice Flaker and Condensing Unit Drawings

Figure 16
Assembly Drawing: 51-, 76-, and 101-RL



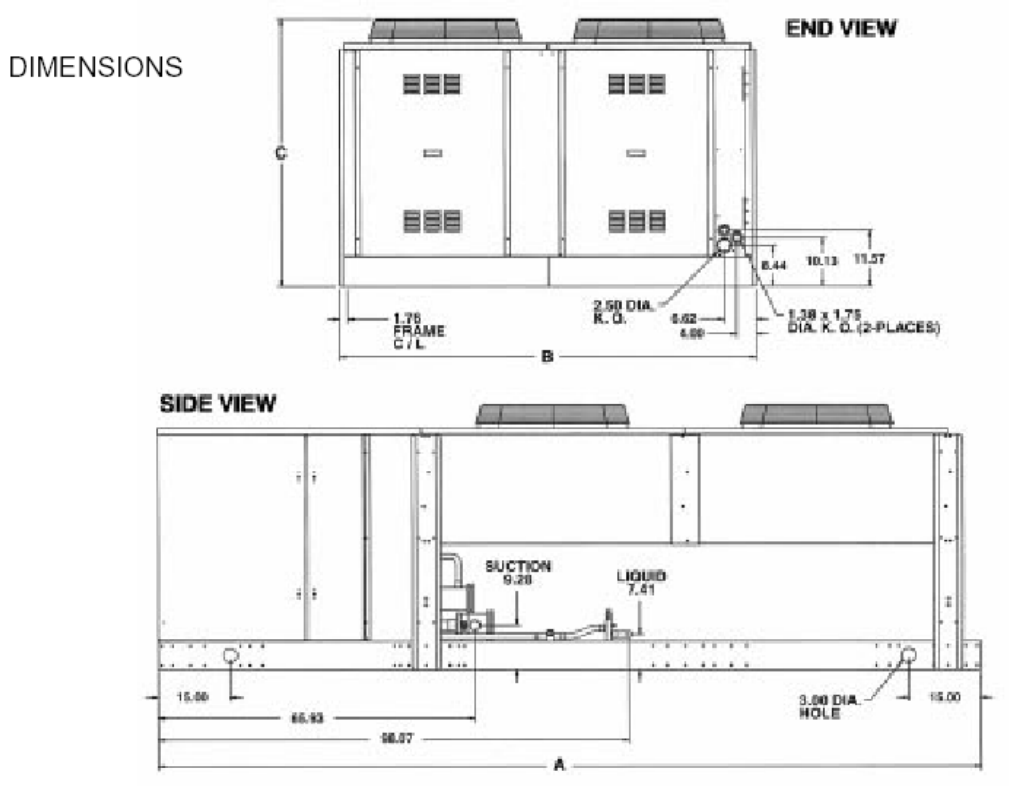


Model	DIMENSIONS (INCHES)							Connection Sizes			Refrigeration Requirements @-5°F evap. 70°F water temp
								Suction	Liquid	Water Supply	
	C	D	E	H	I	J	W	ODS	ODS	OD	BTU/HR
51-RL	30	52	31	58	35 ¼	16 ¼	53 ½	2	7/8	½	85,250
76-RL	30	52	43 ½	70	47 ¾	16 ¼	57	2 1/8	7/8	½	128,000
101-RL	30	52	51 ½	77	55 ¾	16 ¼	57	2 5/8	1 1/8	½	170,500
201-RL	48	73	69	100	75 ½	22 1/8	72 ¾	(2) 2-5/8	(2) 1-1/8	1/2	346,500*

***Model 201-RL ice flaker is to be run at -10°F Evaporator temperature.**

12. Ice Flaker and Condensing Unit Drawings

Figure 17
Condensing Unit Dimensions



Condensing Unit Information

	Model No.	*DIMENSIONS*			*Connection Sizes*		*Shipping Weight*
		A	*B*	*C*	*Suction*	*Liquid*	
		INCHES			*OD*	*OD*	*Pounds*
R-22	*51-RHS*	*144*	*44.5*	*56.0*	*2-1/8*	*7/8*	*1800*
	76-RHS	*170*	*44.5*	*56.0*	*2-1/8*	*7/8*	*1965*
	101-RHS	*144*	*87.07*	*56.0*	*2-5/8*	*1-1/8*	*3600*
	201-RHS	*144*	*87.07*	*56.0*	*2-5/8*	*1-1/8*	*3750*
R-404	*51-RHS*	*144*	*44.5*	*56.0*	*2-1/8*	*7/8*	*1800*
	76-RHS	*144*	*44.5*	*56.0*	*2-1/8*	*7/8*	*1965*
	101-RHS	*144*	*87.07*	*56.0*	*2-5/8*	*1-1/8*	*3600*
	201-RHS	*144*	*87.07*	*56.0*	*2-5/8*	*1-1/8*	*3750*

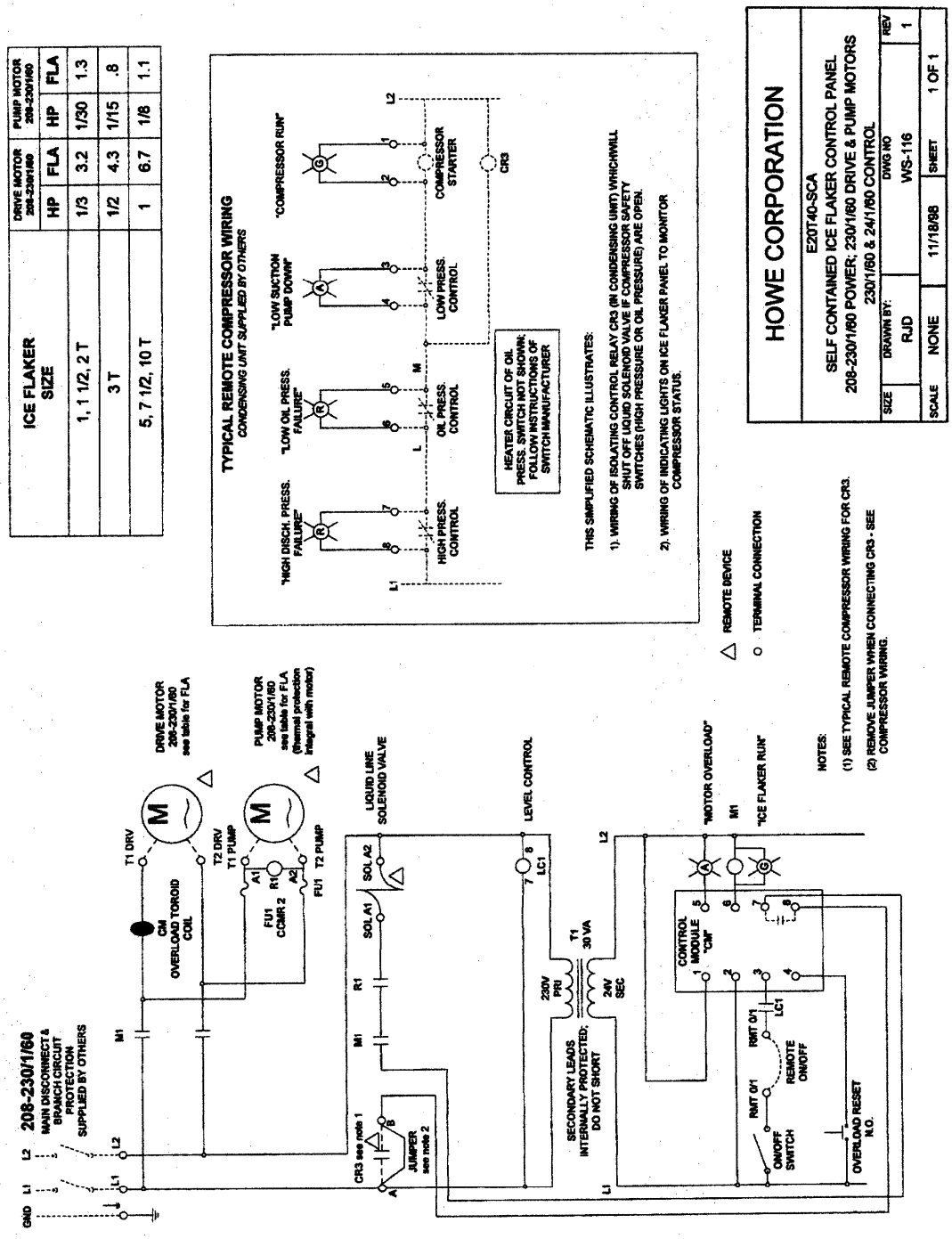
Model 201-RL ice flaker requires Two (2) model 201-RHS condensing units, one for each circuit. Weights & dimensions are per each condensing unit.

12. Ice Flaker and Condensing Unit Drawings

13. Appendix B Wiring Diagrams

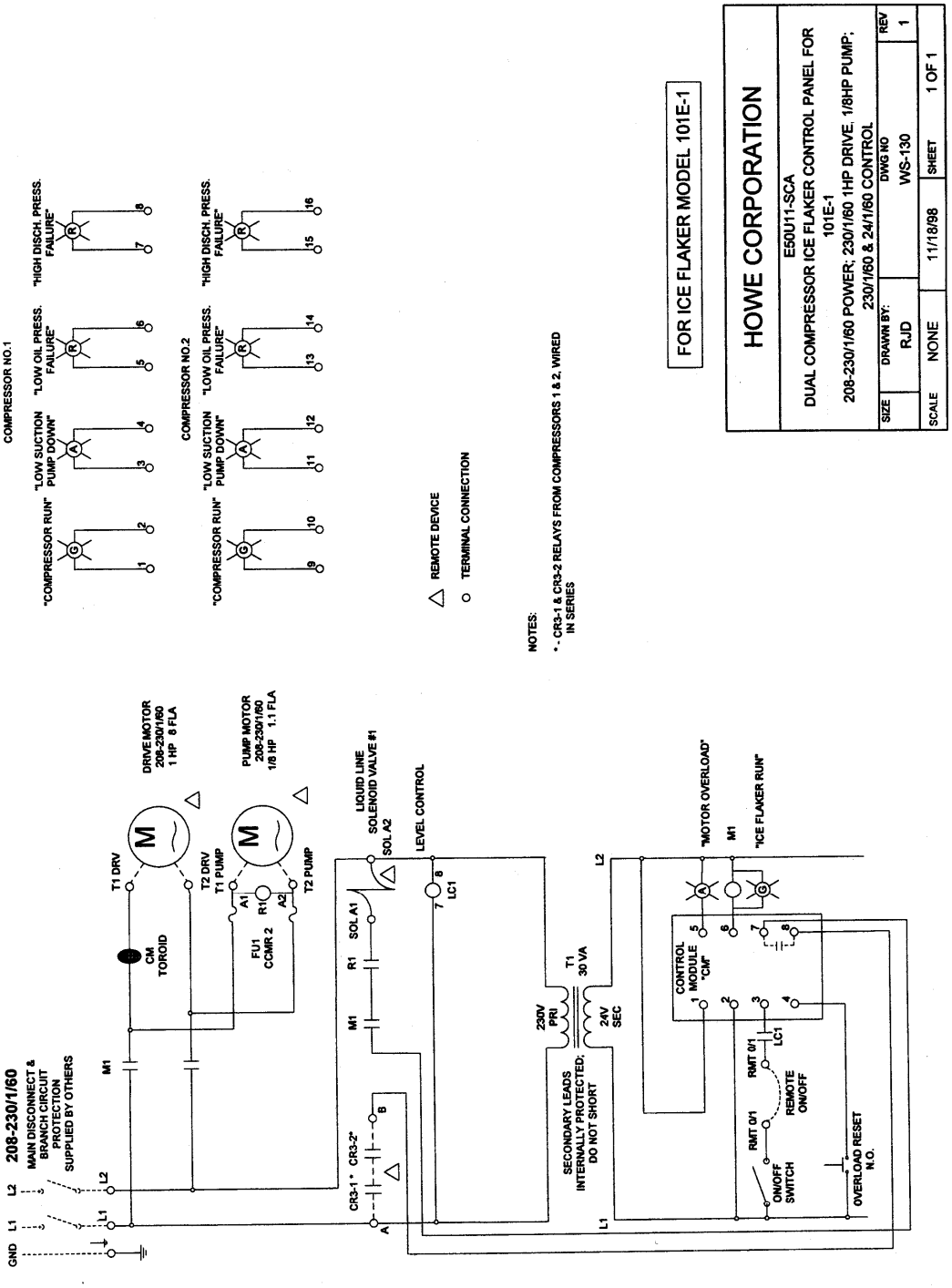
13. Wiring Diagrams

Figure 18
Remote Low Side Electrical Schematic
230/1/60 (Standard)



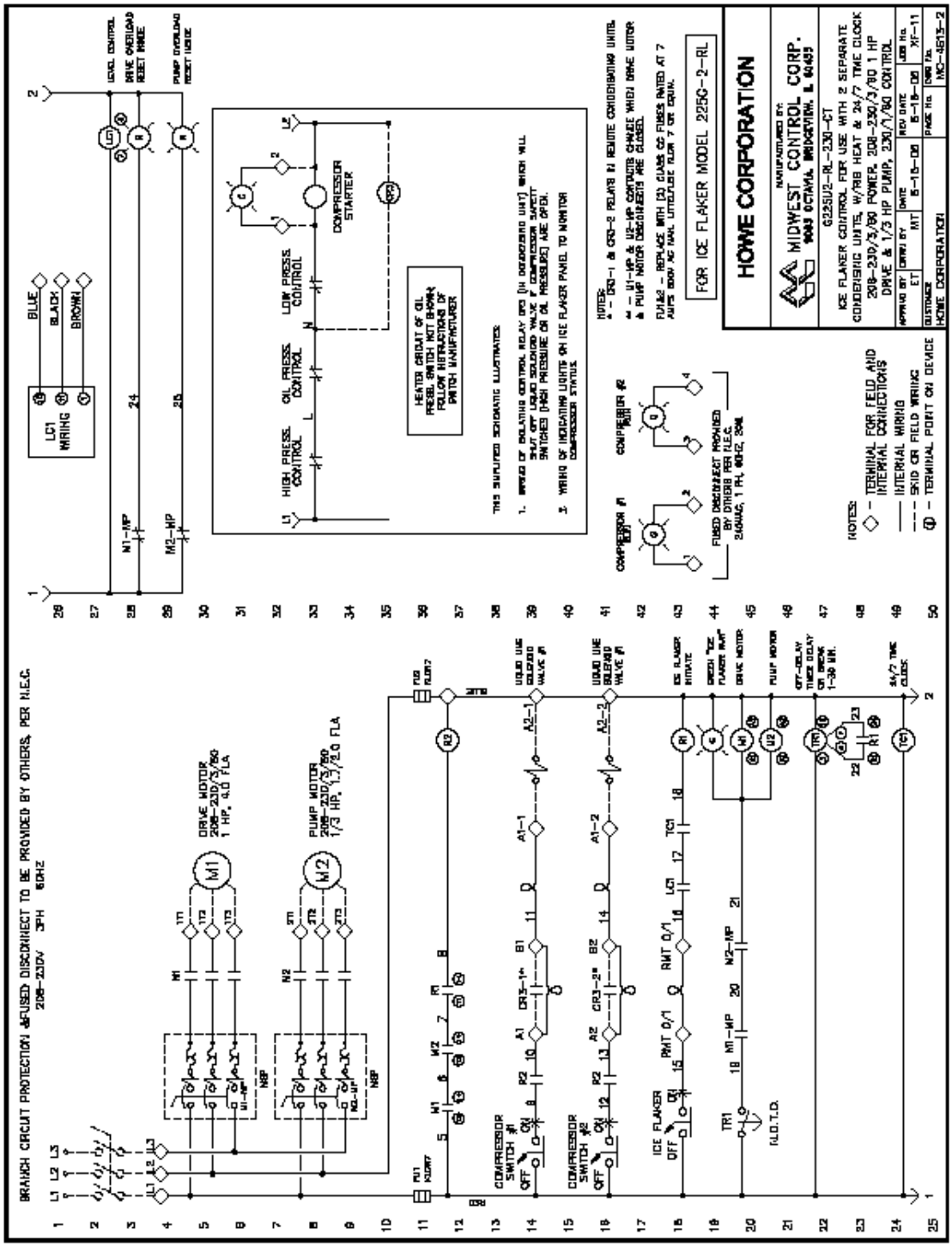
13. Wiring Diagrams

Figure 19
Remote Low Side Electrical Schematic
230/1/60 (Dual-Compressor Condensing Units)



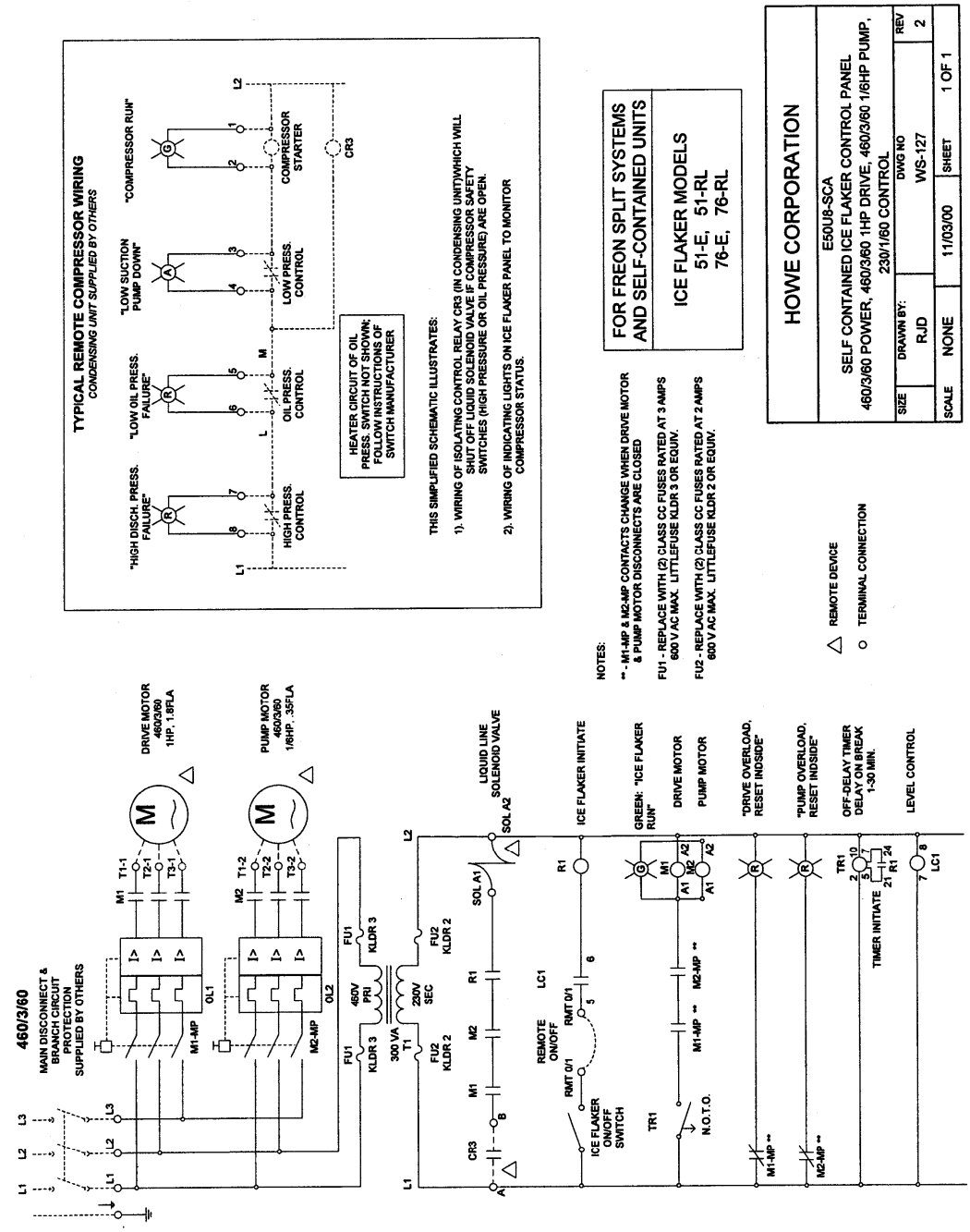
13. Wiring Diagrams

Remote Low Side Electrical Schematic
230/3/60 (Dual-Compressor Condensing Units)



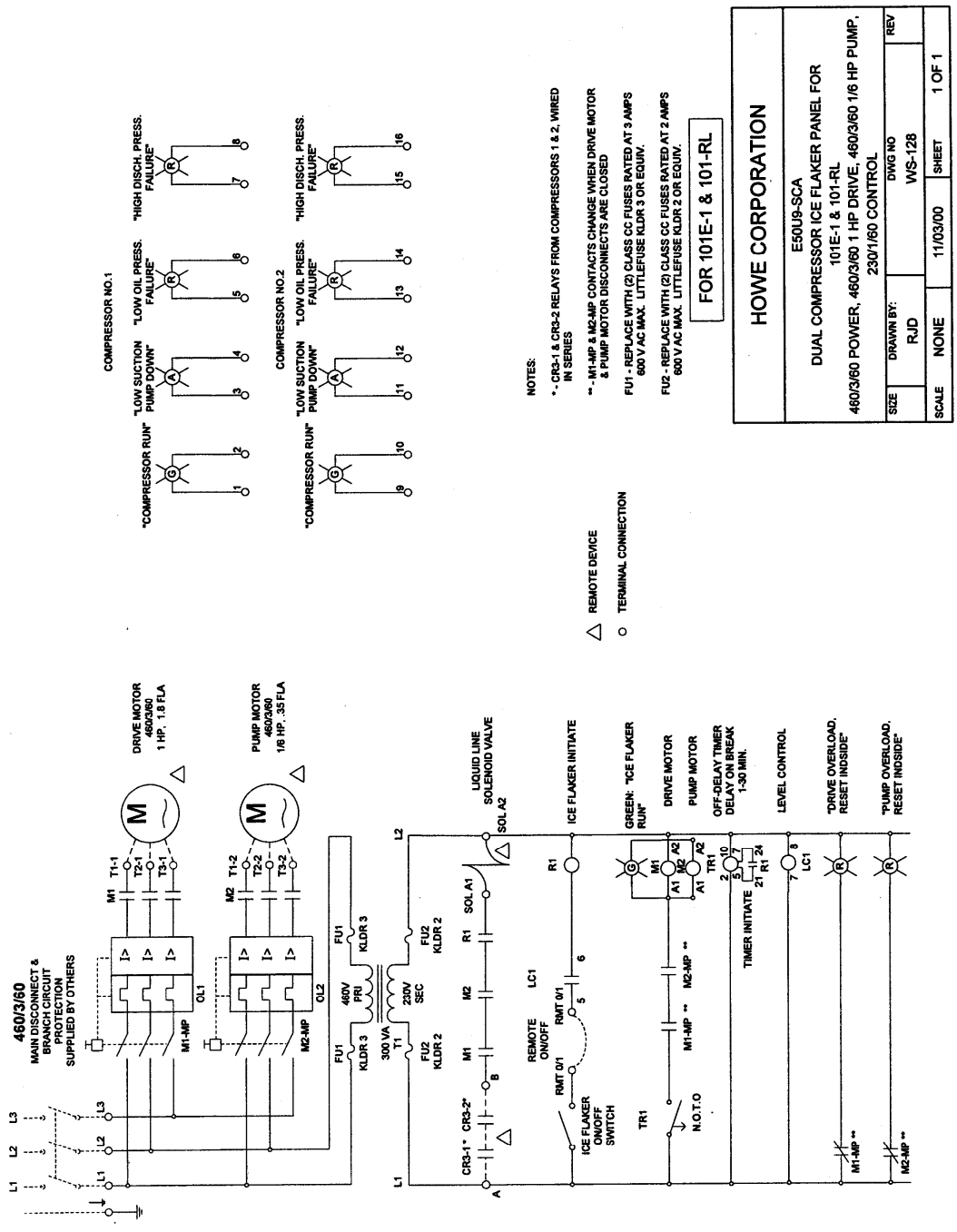
13. Wiring Diagrams

Figure 20
Remote Low Side Electrical Schematic
460/3/60
(Standard)



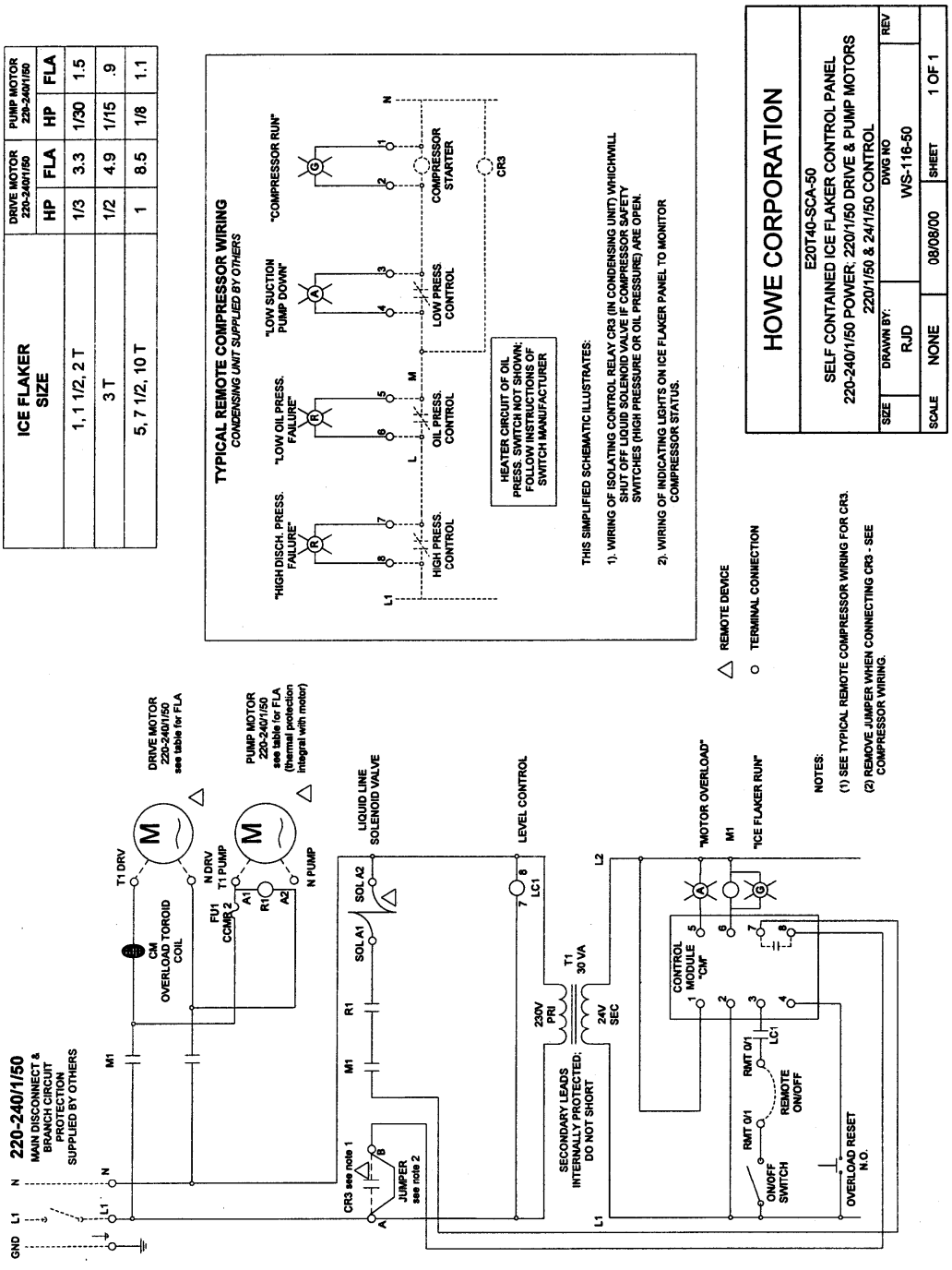
13. Wiring Diagrams

Figure 21
Remote Low Side Electrical Schematic
460/3/60 (Dual Compressor Condensing Units)



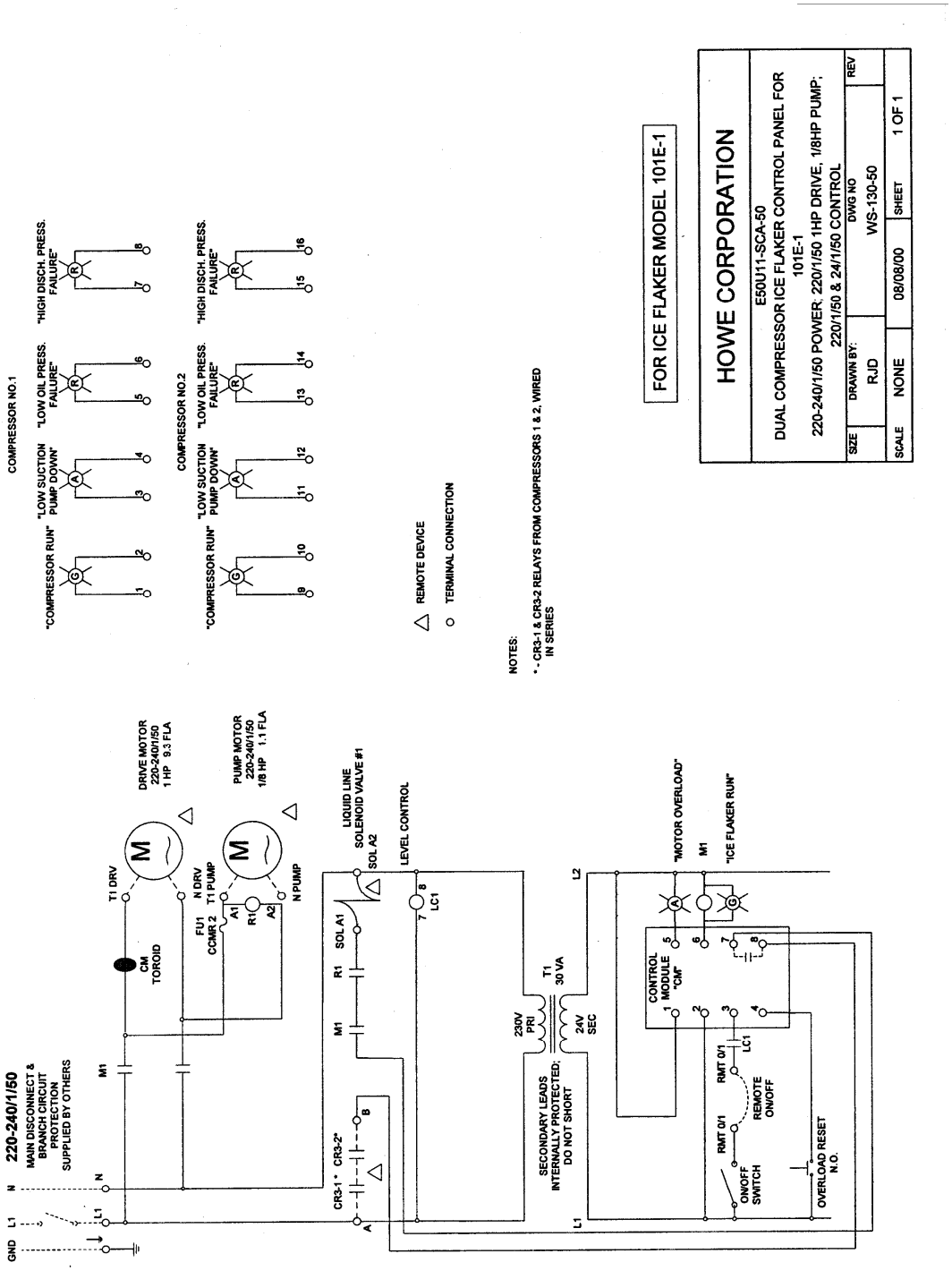
13. Wiring Diagrams

Figure 22
Remote Low Side Electrical Schematic
220/1/50 (Standard)



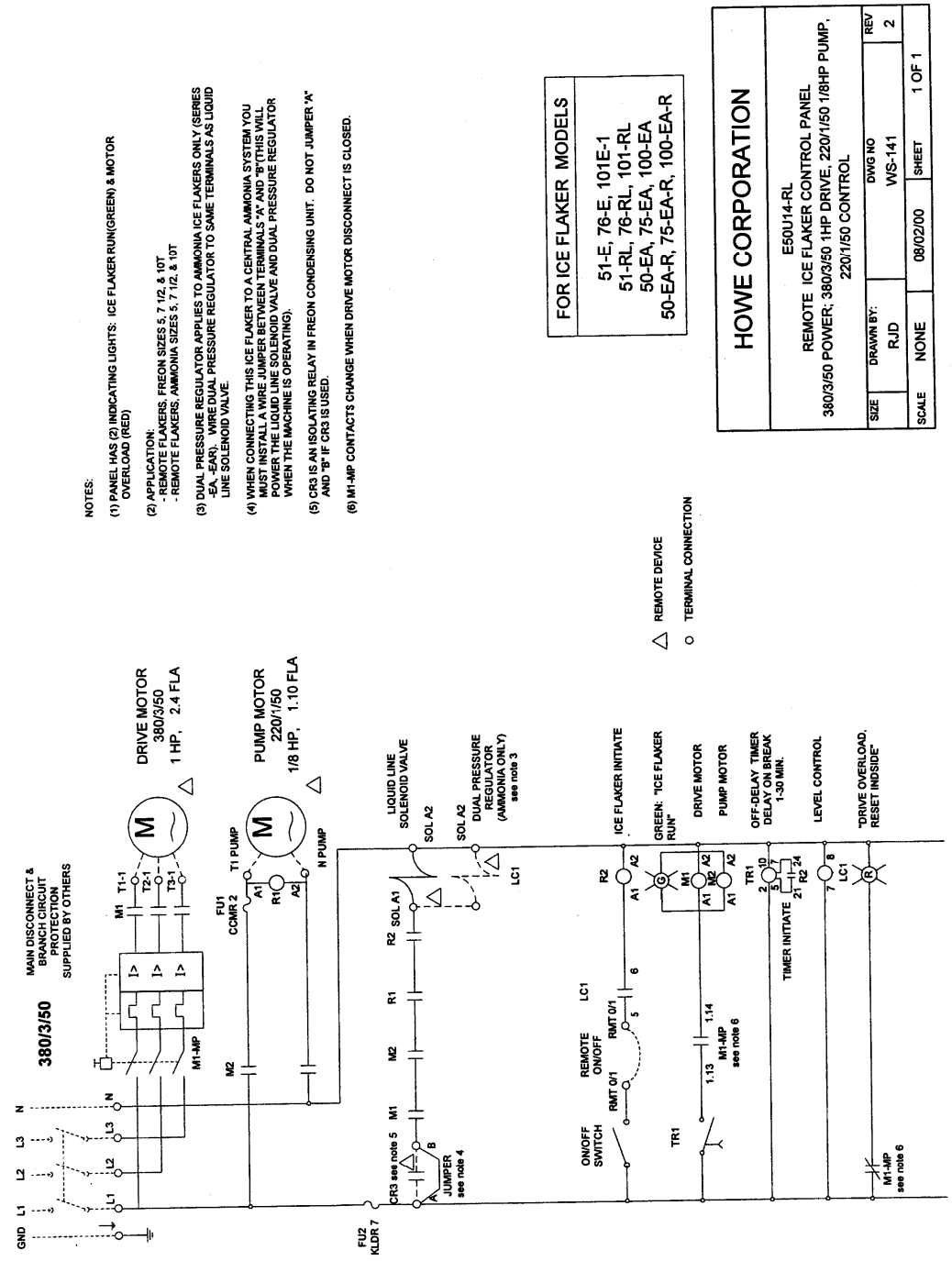
13. Wiring Diagrams

Figure 23
Remote Low Side Electrical Schematic
220/1/50 (Dual Compressor Condensing Units)



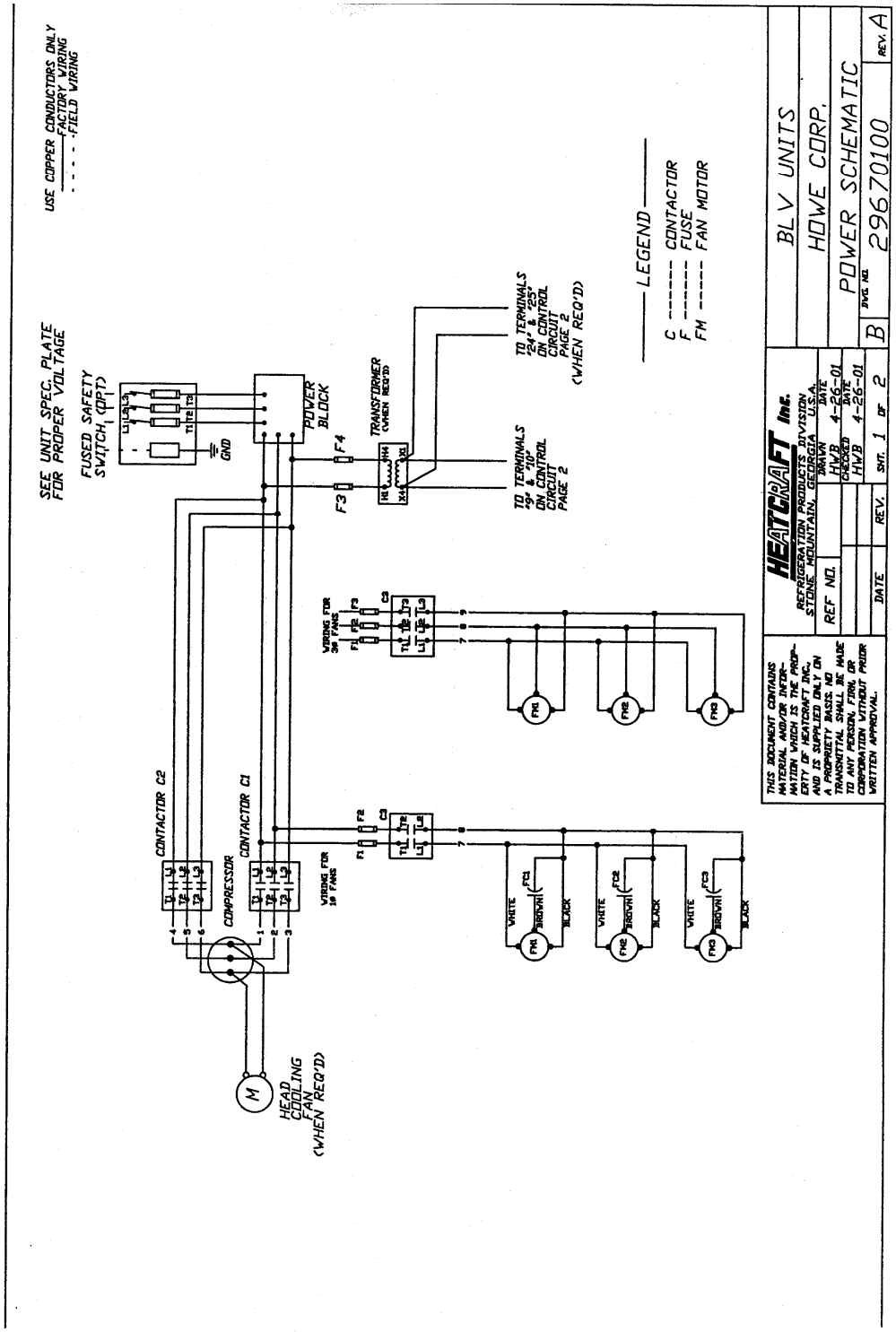
13. Wiring Diagrams

Figure 24
Remote Low Side Electrical Schematic
380/3/50 (Standard)



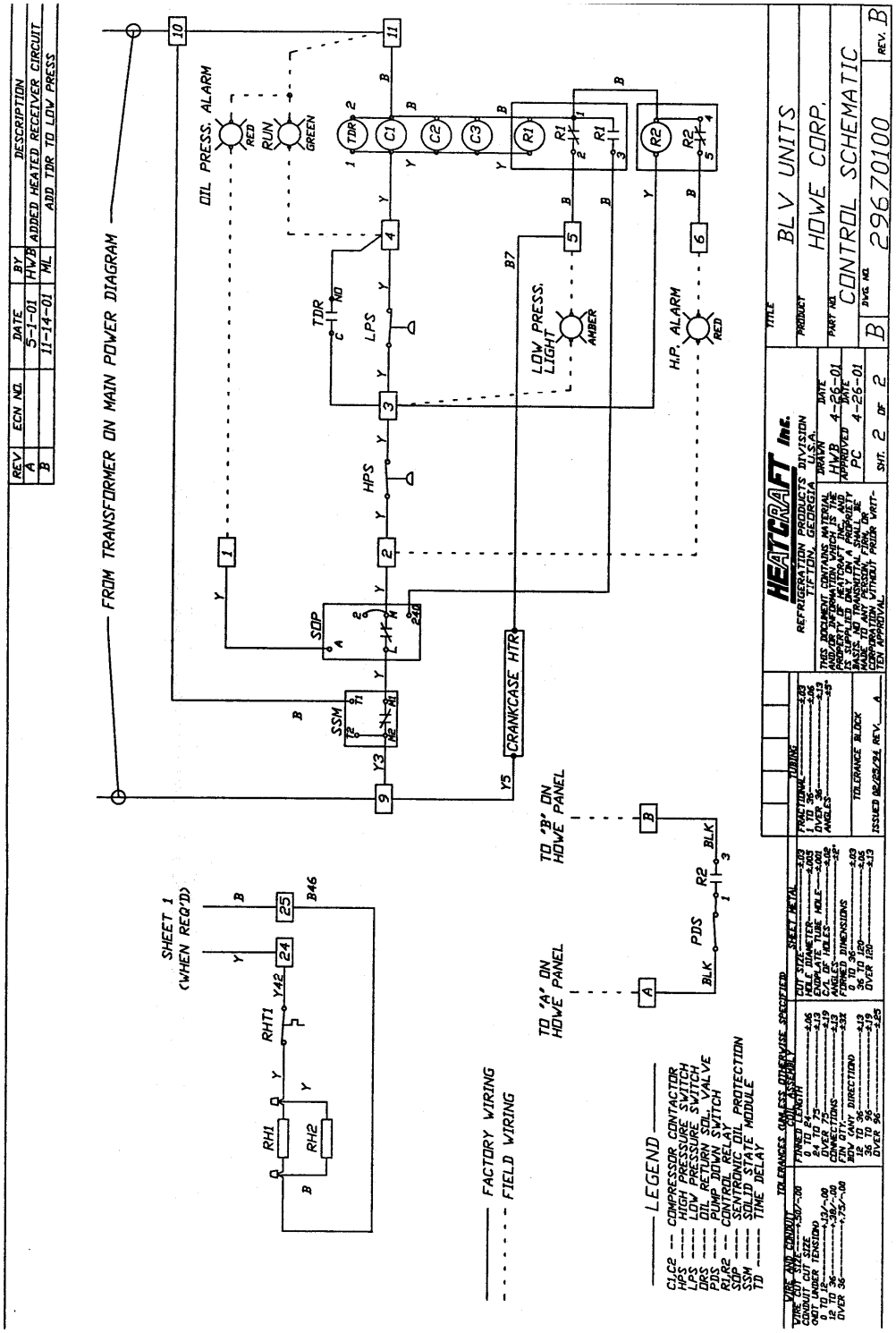
13. Wiring Diagrams

Figure 25
51-RHS, 76-RHS Condensing Units
Power Schematic



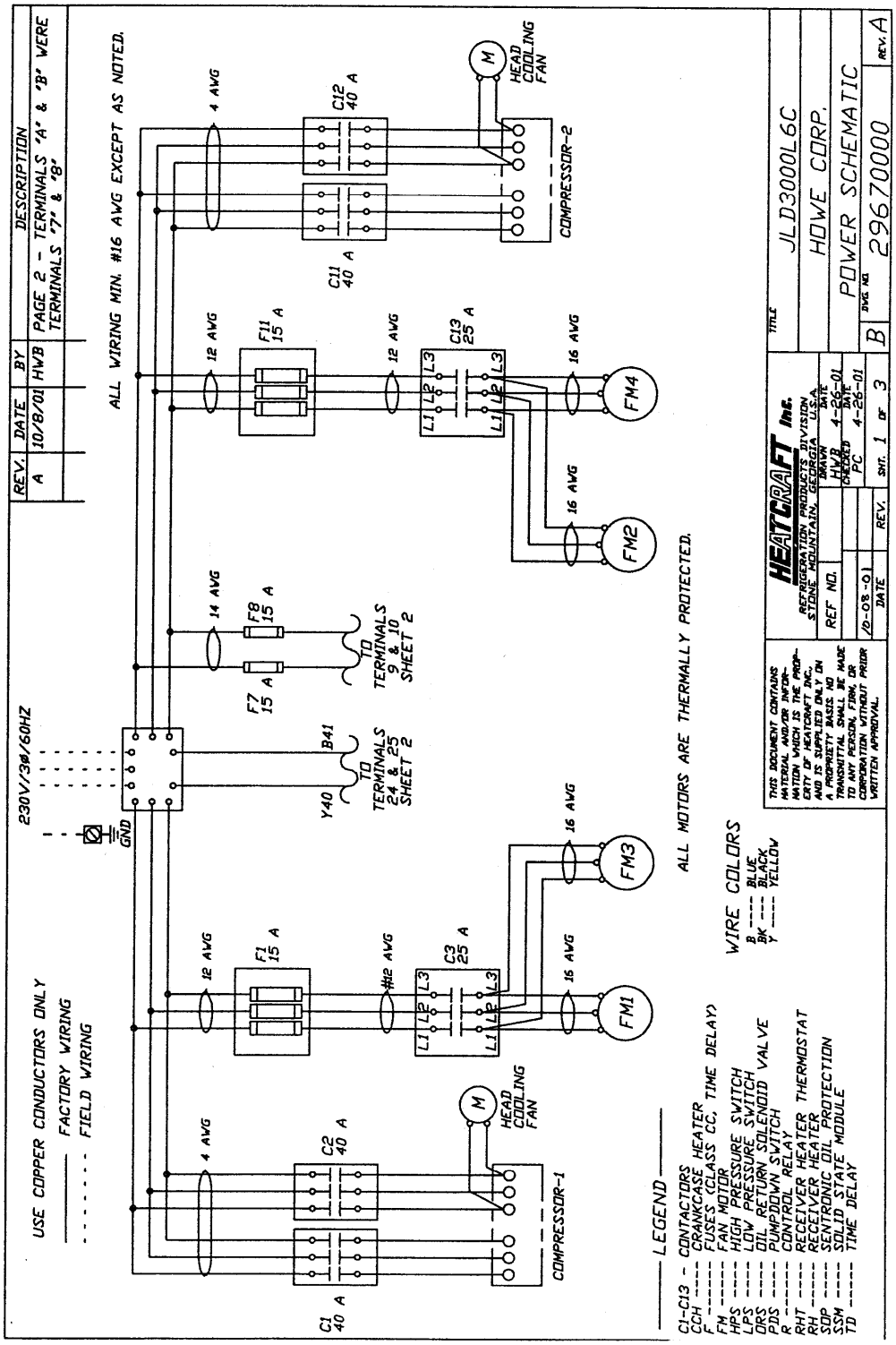
13. Wiring Diagrams

Figure 26
51-RHS, 76-RHS Condensing Units
Control Schematic



13. Wiring Diagrams

Figure 27
101-RHS & 201-RHS Condensing Units
Power Schematic



13. Wiring Diagrams

Figure 28
101-RHS & 201-RHS Condensing Units
Control Schematic (Page 1)

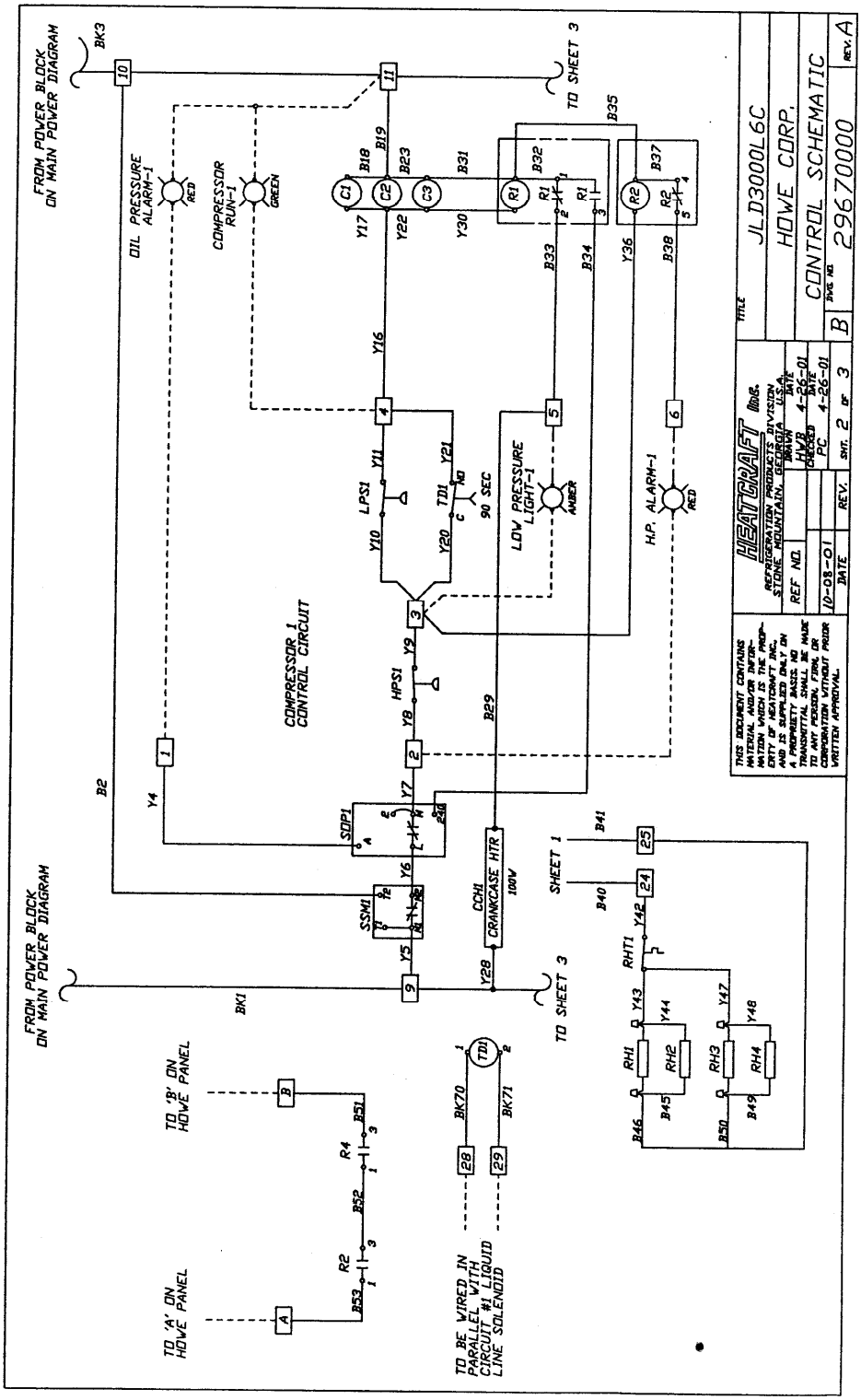
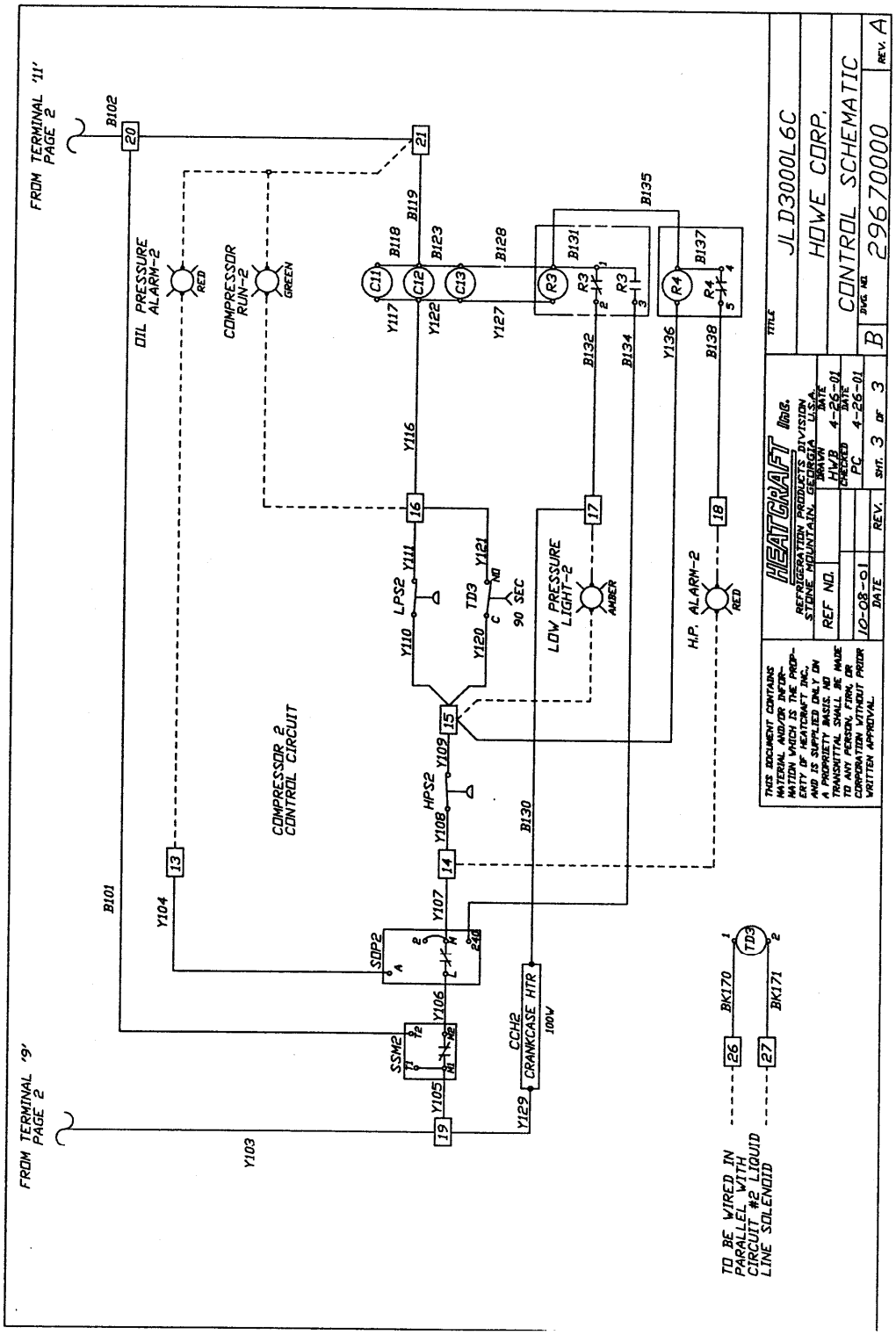
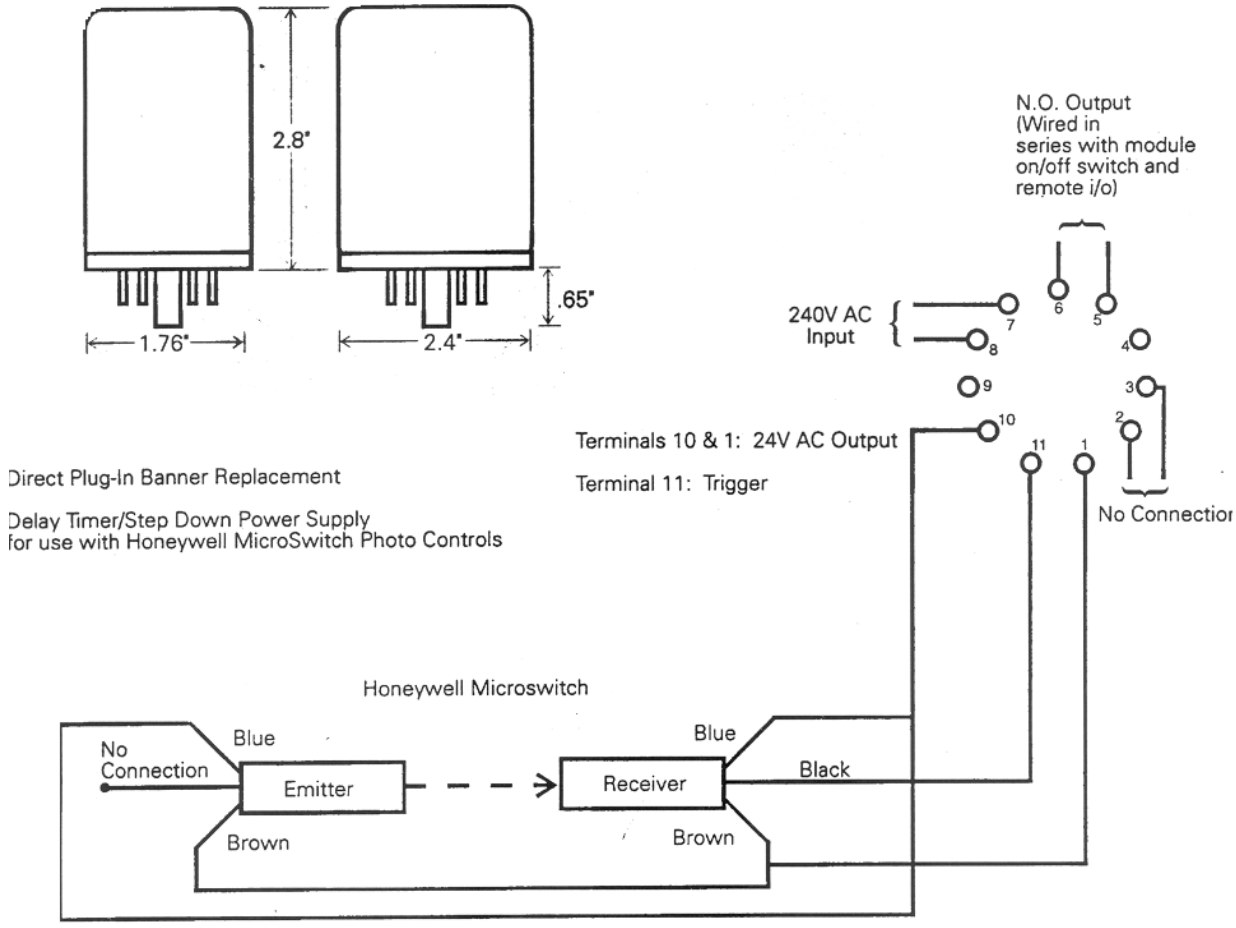


Figure 29
101-RHS & 201-RHS Condensing Unit
Control Schematic (Page 2)



13. Wiring Diagrams

Figure 30
Photoeye Ice Level Controls



14. Appendix C
Parts List

Number in parentheses indicates quantities if more than one is required.

HOWE®

Replacement Parts for

Rapid Freeze® Ice Flakers

Effective January 1, 2006

	Description	Page
Table 2	Replacement parts for 5-20 ton ice flakers	86
Table 3	Reduction Ratios For Large Capacity Flaker Speed Reducers	89
Table 4	Electric Panel Parts	90
Table 5	Miscellaneous Accessories and Parts	91
Figure 31	Ice Flaker Cross Section Models 51-RL, 76-1-RL, 76-2-RL, 101-1-RL, 101-2-RL, 201-2-RL	92

Number in parentheses indicates quantities if more than one is required.

14.: Parts List

Table 2 Replacement parts for 5-20 ton ice flakers

		51-RL	76-1-RL, 76-2-RL	101-1-RL, 101-2-RL	201-2-RL
Item No.	**Part Description**	**Part Number**			
3	Insulated lug spacers (8)	E50J2			G225J1
7	Main shaft	E50D1	E75D1	E100D1	G225D1
8	Shaft sleeve	E50D2			G225D2
9	Top ice blade: 20 ½" L, 12 ½" L, 20 ½" L	E30E3	E20E2	E30E3	-
	Top Rotary Blade Assembly with carrier	-			G225E5
9a	Nuts, bolts, and washers (top ice blade)	E30E5	E20E6	E30E5	-
10	Bottom ice blade	--	E30E3		-
	Bottom rotary blade assembly with carrier	-			G225E5
10a	Nuts, bolts, and washers (bottom ice blade)	--	E30E5		-
11	Ice deflector blade	E50G5			G225G1
11a	Nuts, bolts, and washers (ice deflector)	E50G8			G225G3
12	Insulating ring (2)	E50J1			GK-RA-60 (4PCS)
12a	Insulating ring adhesive - 1/2 pint	7V033			
13	Ice deflector bracket (2)	E50G9			-
14, 15	Auxiliary ice scraper (2)	E20E4			-
15a	Nuts, bolts, and washers (auxiliary ice scraper)	E20E7			-
16	Squeegee	E30F3	E75F3	E100F3	G225F3
17	Squeegee wrapper	E30F8	E75F4	E100F4	G225F4
17a	Nuts, bolts, and washers (squeegee wrapper)	E30F22	E75F8	E100F8	G225F5

Number in parentheses indicates quantities if more than one is required.

14.: Parts List

		51-RL	76-1-RL, 76-2-RL	101-1-RL, 101-2-RL	201-2-RL
Item No.	**Part Description**	**Part Number**			
18	Top squeegee bracket	E50F1	E75F1	E50F1	G225F1
19	Bottom squeegee bracket	--	E50F1		G225F2
20	Main shaft bearings (2)	E50K1			G200K1
21	Bottom bearing thrust plate	E50K2			G200K2
22, 23	Top main bearing grease seal (2)	E50K13			G225K7
	Bottom main bearing grease seal (1)	E50K14			G225K7-PL
25	Top main bearing retainer	E50K3			G225K3
25a	Top bearing replacement kit (includes bearing, 2 seals, shaft sleeve)	E50K10			-
26	Bottom main bearing retainer	E50K4			G225K3
26a	Bottom bearing replacement kit (includes bearing, 1 seal, shaft sleeve)	E50K11			-
27	Bottom bearing cover	E50K5			G225K5
28	Main bearing pull-out washer (2)	E50K6			G225K6
35, 36	Water distribution side spout and fitting (12)	E50H19			-
	Water distribution Trailing spout and fitting	-			G225H4
37, 38	Water distribution bottom spout and fitting	E50H31			-
	Water Distribution Leading spout & fitting (5)	-			G225H3
39	Water sump tank	E50H8			G225H5
40	Water sump bolt down cover	E50H11			G225H6

Number in parentheses indicates quantities if more than one is required.

14.: Parts List

		51-RL	76-1-RL, 76-2-RL	101-1-RL, 101-2-RL	201-2-RL
Item No.	**Part Description**	**Part Number**			
41	Water sump removable cover	E50H15			G200-HA
42	Water sump gasket	E50J3			-
43	Water float valve	E50H18			G200P1
44	Water float valve fitting	CNBHF-SG-BR08			
53	Water tube	E50H22	E75H4	E100H1	-
54	Water tube insulation	E50H32	E75H2	E100H2	-
55	Water tube valve brass nipple	NPBR-075/CL			-
56	Water tube fitting	CNM-SG-BR14/12			-
57	Water tube regulating valve	E50H24			-
62	Water pump 230-460V/3/50-60	E50Q1			G200Q1
	Water pump 220-230V/1/50-60	E50Q2			-
	Water pump 575V/3/60	E50Q9			-
63	Drive motor 208-230-460/3/50-60, 1HP, ODP	E50M1			G200M1
	Drive motor 115-230/1/50-60, 3/4HP, 1HP, ODP	E50M2			
	Drive motor 208-230-460/3/50-60, 1HP, TEFC	E50M4			G200M2
	Drive motor 220-380/1/60, 1HP, TEFC	E50M6			
	Drive motor 110-200-220/1/50, 1HP, ODP	E50M7			
	Drive motor 220-380/3/50, ODP	E50M9			
63A	Drive motor key	E50M8			G200M3
65, 66, 67	Flexible coupling – complete	E50N1			G225N1

Number in parentheses indicates quantities if more than one is required.

		51-RL	76-1-RL, 76-2-RL	101-1-RL, 101-2-RL	201-2-RL
Item No.	**Part Description**	**Part Number**			
67A	Flexible coupling key for shaft	E50N4			G225N2
	Flexible coupling key for reducer	-			G225N3
68	Speed reducer, 60-cycle	E50R1-935			G200R1
	Speed reducer, 50-cycle	E50R2-935			-
75	Handhole cover (removable)	E50A2			G225A2
	Thermostatic expansion valve –R-404a	E50V6	(2) E75V3	(2) E50V6	
	Thermostatic expansion valve – R-22	E50V5	(2) E75V2	(2) E50V5	
	Liquid Line Solenoid Valve (Single Circuit)	B14S2	B19S2	B25S2	
	Liquid Line Solenoid Valve (Dual Circuit)	-	(2) B14S2	(2) B14S2	
	Control panel 230/1/60 (2-light)	E20T40-RL			
	Control panel 230/1/60 (6-light)	E20T40-SCA			

Table 3 Reduction Ratios For Large Capacity Flaker Speed Reducers

Flaker model sizes	Status	Speed Reducer model	60-cycle	50-cycle
5, 7-1/2, 10 ton/day	Current	935MDVD	750:1	600:1
20 ton/day	Current	943MDVD	600:1	500:1

Number in parentheses indicates quantities if more than one is required.

14.: Parts List

Table 4 Electric Panel Parts

Part Description	Part Number
Parts for E20T40 Control Panels	
Control transformer, 230VAC primary, 24VAC secondary	E20T31
Solid-state control module	E20T48
Overload reset button, normally-open	E20T23
ON/OFF rocker switch	E20T24
4-pole contactor 24VAC coil for drive motor	E20T44
230VAC single-pole, double-throw relay	E20T45
Relay base/socket for E20T45 relay	E20T46
Parts for E20T42 Control Panels (380V/3/50, CE mark)	
Disconnect switch (DSC1)	E20T53
Drive motor starter with overload (M1/M1-DSC)	E20T54
Pump motor starter with overload (M2/M2-DSC)	E20T55
10 Amp single pole circuit breaker (CB1)	E20T56
Red oil tight indicating lamp (2) (LP1, LP2)	E20T57
Green Oil tight indicating lamp (LP3)	E20T58
Oil light On/Off switch (SW1)	E20T59
Off delay timer (TMR1)	E20T61
DPDT Mini Relay (R1)	E20T62
Relay Socket Base for Timer/Relay	E20T63
Relay socket base for Mini Relay	E20T64
Parts for E20T47 Control Panels (480V/3/60)	
Drive motor starter with overload	E20T54
Water Pump Contactor	E20T72
Control Transformer 480v Pri, 240v Sec. 300VA	E20T74
Ice Flaker initiate relay	E20T62
Water pump run relay	E20T62
Mini relay base	E20T46
Off delay timer	5V012
Timer base	5V013
3 amp fuse (600V)	CCMR-3
2 amp fuse (600 V)	CCMR-2
2 Amp fuse (250V)	KLDR-2

Number in parentheses indicates quantities if more than one is required.

14.: Parts List

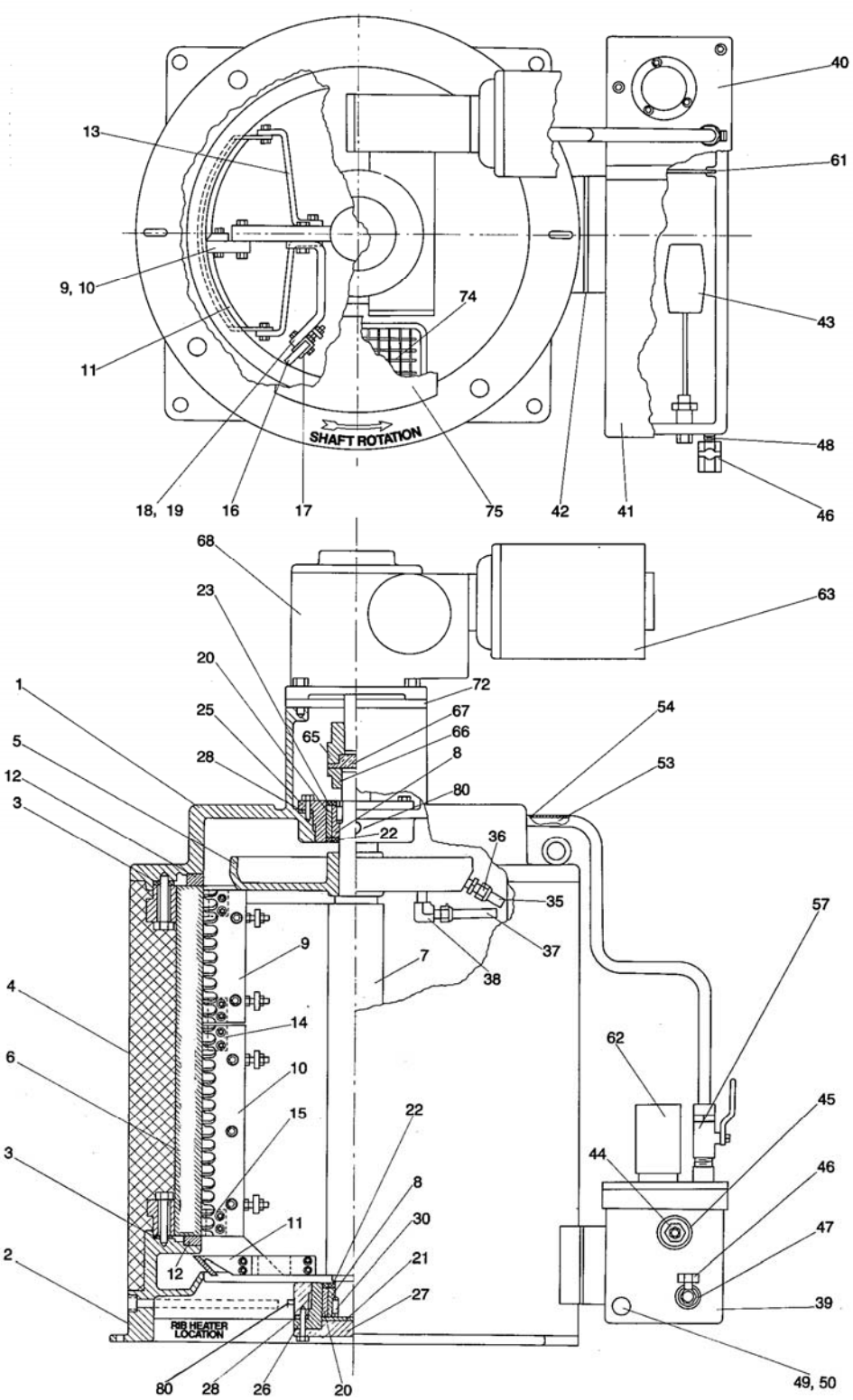
Replacement Neon Indicating Lights	
Green, 230VAC	LGX-2
Amber, 230VAC	LAN-2
Red, 230VAC	LRN-2
Green, 24VAC	LGX-24
Amber, 24VAC	LAN-24
Parts for E20T73 Photoeye Level Controls	
Power module/relay	E20T68
Sensor, emitter (with 15’ lead, no plug)	E20T104-15NP
Sensor, receiver (with 15’ lead, no plug)	E20T105-15NP
11-pin socket base for photoeye power module	5V013
Photoeye sensor mounting brackets (pair)	E10U44

Table 5 Miscellaneous Accessories and Parts

Part Description	Part Number
USDA-approved bearing grease	E20K6
Speed reducer oil (natural) (1 Quart)	SR-OIL
Speed reducer oil (synthetic) (1 Quart)	SR-OIL-SYN
Replacement 20-micron water filter cartridge (with Quick Connect fittings)	E10H43
Replacement 20” water filter pre-filter core	E10H46
Replacement 20” water filter pre-filter housing cover (blue)	E10H45
Replacement Water filter core	E10H57
Ice machine cleaner	E10V1

Number in parentheses indicates quantities if more than one is required.

Figure 31
Ice Flaker Cross Section
Models 51-RL, 76-1-RL, 76-2-RL, 101-1-RL, 101-2-RL, 201-2-RL



Number in parentheses indicates quantities if more than one is required.