Manitowoc

USE0050 Ice Machine

Technician's Handbook

This manual is updated as new information and models are released. Visit our website for the latest manual.
www.manitowocice.com



Part Number STH111 Rev 01 08/23

Safety Notices

Read these precautions to prevent personal injury:

- Read this manual thoroughly before operating, installing or performing maintenance on the equipment. Failure to follow instructions in this manual can cause property damage, injury or death.
- Routine adjustments and maintenance procedures outlined in this manual are not covered by the warranty.
- Proper installation, care and maintenance are essential for maximum performance and trouble-free operation of your equipment.
- Visit our website www.manitowocice.com for manual updates, translations, or contact information for service agents in your area.
- This equipment contains high voltage electricity and refrigerant charge. Installation and repairs are to be performed by properly trained technicians aware of the dangers of dealing with high voltage electricity and refrigerant under pressure. The technician must also be certified in proper refrigerant handling and servicing procedures. All lockout and tag out procedures must be followed when working on this equipment.
- This equipment is intended for indoor use only. Do not install or operate this equipment in outdoor areas.
- As you work on this equipment, be sure to pay close attention to the safety notices in this handbook. Disregarding the notices may lead to serious injury and/or damage to the equipment.

Safety Definitions

⚠ DANGER

Indicates a hazardous situation that, if not avoided, may result in death or serious injury. This applies to the most extreme situations.

⚠ Warning

Indicates a hazardous situation that, if not avoided, may result in death or serious injury.

⚠ Caution

Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

Important

Indicates information considered important, but not hazard related (e.g. messages relating to property damage).

NOTE: Indicates useful and extra information about the procedure you are performing.

⚠ Warning

Follow these electrical requirements during installation of this equipment.

- All field wiring must conform to all applicable codes of the authority having jurisdiction. It is the responsibility of the end user to provide the disconnect means to satisfy local codes. Refer to rating plate for proper voltage.
- This appliance must be grounded.
- This equipment must be positioned so that the plug is accessible unless other means for disconnection from the power supply (e.g., circuit breaker or disconnect switch) is provided.
- Check all wiring connections, including factory terminals, before operation. Connections can become loose during shipment and installation.
- For a cord-connected appliance, the following must be included:
    - Do not unplug by pulling on cord. To unplug, grasp the plug, not the cord.
    - Unplug from outlet when not in use and before servicing or cleaning.
    - Do not operate any appliance with a damaged cord or plug, or after the appliance malfunctions or is dropped or damaged in any manner. Contact the nearest authorized service facility for examination, repair, or electrical or mechanical adjustment.

⚠ Warning

Follow these precautions to prevent personal injury during installation of this equipment:

- Installation must comply with all applicable equipment fire and health codes with the authority having jurisdiction.
- To avoid instability the installation area must be capable of supporting the combined weight of the equipment and product. Additionally the equipment must be level side to side and front to back.
- Remove front panel before lifting and installing and use appropriate safety equipment during installation and servicing. Two or more people are required to lift or move this appliance to prevent tipping and/or injury.
- Do not damage the refrigeration circuit when installing, maintaining or servicing the unit.
- Connect to a potable water supply only.
- This equipment contains refrigerant charge.

⚠ Warning

Follow these precautions to prevent personal injury while operating or maintaining this equipment.

- Legs or casters must be installed and the legs/casters must be screwed in completely. When casters are installed the mass of this unit will allow it to move uncontrolled on an inclined surface. These units must be tethered/secured to comply with all applicable codes. Swivel casters must be mounted on the front and rigid casters must be mounted on the rear. Lock the front casters after installation is complete.
- Only trained and qualified personnel aware of the dangers are allowed to work on the equipment.
- Read this manual thoroughly before operating, installing or performing maintenance on the equipment. Failure to follow instructions in this manual can cause property damage, injury or death.
- Crush/Pinch Hazard. Keep hands clear of moving components. Components can move without warning unless power is disconnected and all potential energy is removed.
- Moisture collecting on the floor will create a slippery surface. Clean up any water on the floor immediately to prevent a slip hazard.

⚠ Warning

Follow these precautions to prevent personal injury while operating or maintaining this equipment.

- Objects placed or dropped in the bin can affect human health and safety. Locate and remove any objects immediately.
- Never use sharp objects or tools to remove ice or frost.
- Do not use mechanical devices or other means to accelerate the defrosting process.
- When using cleaning fluids or chemicals, rubber gloves and eye protection (and/or face shield) must be worn.

⚠ DANGER

Do not operate equipment that has been misused, abused, neglected, damaged, or altered/modified from that of original manufactured specifications. This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision concerning use of the appliance by a person responsible for their safety. Do not allow children to play with, clean or maintain this appliance without proper supervision.

⚠ DANGER

Follow these precautions to prevent personal injury during use and maintenance of this equipment:

- It is the responsibility of the equipment owner to perform a Personal Protective Equipment Hazard Assessment to ensure adequate protection during maintenance procedures.
- Do Not Store Or Use Gasoline Or Other Flammable Vapors Or Liquids In The Vicinity Of This Or Any Other Appliance.
- Never use flammable oil soaked cloths or combustible cleaning solutions for cleaning.
- All covers and access panels must be in place and properly secured when operating this equipment.
- Risk of fire/shock. All minimum clearances must be maintained. Do not obstruct vents or openings.
- Failure to disconnect power at the main power supply disconnect could result in serious injury or death. The power switch DOES NOT disconnect all incoming power.
- All utility connections and fixtures must be maintained in accordance with the authority having jurisdiction.

⚠ Warning

Follow these precautions to prevent personal injury during use and maintenance of this equipment:

- It is the responsibility of the site supervisor to ensure that operators fully understand the dangers inherent in operating this equipment.
- Turn off and lockout all utilities (gas, electric, water) according to approved practices during maintenance or servicing.
- Do not operate any equipment with damaged cords or plugs. All repairs must be performed by a qualified service company.
- Moisture collecting on the floor will create a slippery surface. Clean up any water on the floor immediately to prevent a slip hazard.
- Do not use high-pressure water guns to spray or rinse the interior or exterior of the unit. Do not use power cleaning equipment, steel wool, wire brushes, scrapers, etc. to clean the exterior of the equipment.
- To prevent tipping, two or more people are needed to move this appliance.

We reserve the right to make product improvements at any time. Specifications and design are subject to change without notice.

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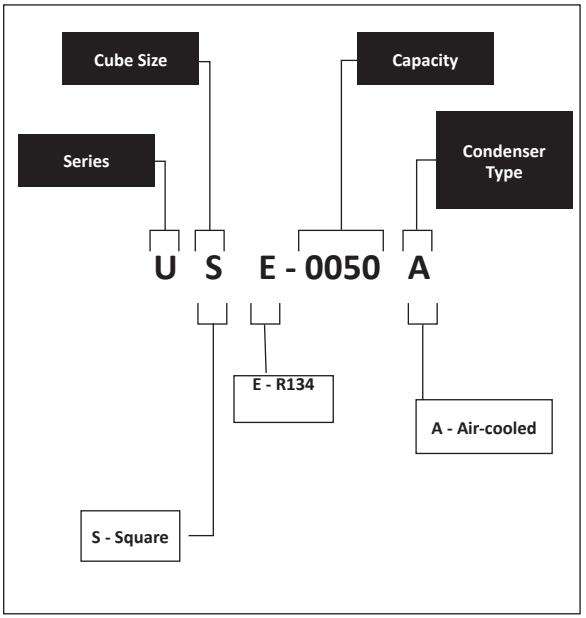
General Information

Model Numbers

This manual covers the following models:

Self-contained Air-cooled
USE0050A

How to Read a Model Number



⚠Warning

An ice machine contains high voltage electricity and refrigerant charge. Repairs are to be performed by properly trained refrigeration technicians aware of the dangers of dealing with high voltage electricity and refrigerant under pressure.

Model/Serial Number Location

These numbers are required when requesting information from your local Manitowoc Distributor, Service Representative, or Manitowoc Ice.

The model/serial number data plate is located in the evaporator compartment and on the back of the ice machine.

Warranty

For warranty information visit:

www.manitowocice.com/Service/Warranty

- Warranty Coverage Information
- Warranty Registration
- Warranty Verification

Warranty coverage begins the day the ice machine is installed.

WARRANTY REGISTRATION

Completing the warranty registration process is a quick and easy way to protect your investment.
Scan the QR code with your smart device or enter the link in a web browser to complete your warranty registration.

WWW.MANITOWOCICE.COM/SERVICE/WARRANTY#WARRANTY-REGISTRATION

Registering your product insures warranty coverage and streamlines the process if any warranty work is required.

Location of Ice Machine

The location selected for the ice machine must meet the following criteria. If any of these criteria are not met, select another location.

- The location must be indoors.
- The location must be free of airborne and other contaminants.
- Air temperature: Must be at least 50°F (10°C) but must not exceed 100°F (38°C).
- The location must not be near heat-generating equipment or in direct sunlight.
- The location must be capable of supporting the weight of the ice machine and a full bin of ice.
- The location must allow enough clearance for water, drain, and electrical connections in the rear of the ice machine.
- The location must not obstruct airflow through or around the ice machine (condenser airflow is in and out the front). Refer to the chart below for clearance requirements.
- The ice machine must be protected if it will be subjected to temperatures below 32°F (0°C). Failure caused by exposure to freezing temperatures is not covered by the warranty.
- If built into a cabinet, ice machine must be removable for the cleaning procedure.

Ice Machine Clearance Requirements

Self-contained Air-cooled	
Top/Sides	0" (0 mm)*
Back	0" (0 mm)*

*The ice machine may be built into a cabinet.

Leveling the Ice Machine

1. Screw the legs onto the bottom of the ice machine.
2. Screw the foot of each leg in as far as possible.

> **⚠ Caution**
>
> The legs must be screwed in tightly to prevent them from bending.

3. Move the ice machine into its final position.
4. Level the ice machine to ensure that the drain system functions correctly. Use a level on top of the ice machine. Turn each foot as necessary to level the ice machine from front to back and side to side.

Electrical Requirements

Voltage

The maximum allowable voltage variation is ±10% of the rated voltage on the ice machine model/serial number plate at start-up (when the electrical load is highest).

Fuse/Circuit Breaker

A separate fuse/circuit breaker must be provided for each ice machine.

Total Circuit Ampacity

The total circuit ampacity is used to help select the wire size of the electrical supply.

The wire size (or gauge) is also dependent upon location, materials used, length of run, etc., so it must be determined by a qualified electrician.

Electrical Specifications

Air-cooled Ice Machine

Ice Machine	Voltage Phase Cycle	Max. Fuse/ Circuit Breaker	Total Amps
USE0050A	115/1/60	15 amp	10 amp
NOTE: Model/serial plate information overrides all data listed in this chart.			

⚠ Warning

All wiring must conform to local and national codes.

⚠ Warning

The ice machine must be grounded in accordance with national and local electrical code.

Water Service/Drains

WATER SUPPLY

Local water conditions may require treatment of the water to inhibit scale formation, filter sediment, and remove chlorine odor and taste. Installation requires a 1/4" ID copper cold water line and compression fitting (not supplied). The ice machine is supplied with a drain hose for gravity draining. The optional drain pump must be purchased if a gravity drain is not possible. Both drain methods require routing to an open site drain. Do not connect directly to drain line as bacteria from drain line may contaminate the ice machine.

The included water filter is designed to inhibit scale formation, filter sediment, and remove chlorine odor and taste. The life expectancy of the water filter is 6 months during normal usage. The ice machine control board will monitor water usage and indicate when replacement is required.

⚠ Warning

For ice making, connect to a potable water supply only.

Water Inlet Lines

- Do not connect the ice machine to a hot water supply. Be sure all hot water restrictors installed for other equipment are working. (Check valves on sink faucets, dishwashers, etc.).
- Water pressure must remain between 20 and 80 psig (14 to 55 bar). If water pressure exceeds the maximum recommended pressure (80 psi - 55 bar), obtain a water pressure regulator from your Manitowoc distributor.
- Install a water shut-off valve for ice making potable water.
- Insulate water inlet lines to prevent condensation.

DRAIN CONNECTIONS

Follow these guidelines when installing drain lines to prevent drain water from flowing back into the ice machine and storage bin:

- Drain lines must have a 1.5-inch drop per 5 feet of run (2.5 cm per meter), and must not create traps.
- The floor drain must be large enough to accommodate drainage from all drains.
- Drain pump discharge line must terminate at an open site drain.
- Maximum rise - 12 feet (3.7 m)
- Maximum run - 100 feet (30.5 m)

⚠ Caution

Plumbing must conform to state and local codes.

Approximate Height of Ice Machine Drain	
Leg Levelers	3” (76 mm)
Installation with Leg Option	7” (179 mm)

Water Supply and Drain Line Sizing/Connections

Location	Water Temperature	Water Pressure	Ice Machine Fitting	Tubing Size Up to Ice Machine Fitting
Ice Making Water Inlet	40°F (4°C) min. 90°F (32°C) max.	20 psi (138 kPa) min. 80 psi (550 kPa) max.	1/4" (6 mm) OD Copper Tubing	1/4" (6 mm) Minimum Outside Diameter
Bin Drain	---	---	3/4" (19 mm) Hose Barb	3/4" (19 mm) Minimum Inside Diameter
Drain Pump	---	---	3/8" (9 mm) Hose	3/8" (9 mm) Minimum Inside Diameter

Interior Descaling and Sanitizing

GENERAL

Descale and sanitize the ice machine every six months for efficient operation. If the ice machine requires more frequent descaling and sanitizing, consult a qualified service company to test the water quality and recommend appropriate water treatment.

Sanitizing for Exterior, Remedial, and Detailed procedures can be performed independently and more frequently than descaling when needed.

The ice machine must be taken apart for descaling and sanitizing.

Using non-Manitowoc descalers, sanitizers, cleaners or solutions may result in bodily harm and/or cause damage to the ice machine that is not covered under the warranty The ice machine must be taken apart for descaling and sanitizing.

⚠ Warning

If you do not understand the procedures or the safety precautions that must be followed, call your local Manitowoc service representative to perform the maintenance procedures for you.

⚠ Caution

Use only Manitowoc approved Ice Machine Descaler (9405463) and Sanitizer (9405653). Using a non Manitowoc descaler or sanitizer may result in bodily harm and/or cause damage to the ice machine that is not covered under the warranty. Do not use descaler or sanitizer quantities that exceed the amounts listed in this manual. Do not use these solutions in a manner inconsistent with their labeling. Read and understand all labels printed on bottles before use.

Descaling and Sanitizing Procedures

Ice machine descaler is used to remove lime scale and mineral deposits. Ice machine sanitizer disinfects and removes algae and slime.

Perform an In Place Descaling/Sanitizing procedure every 6 months and a Descaling/Sanitizing procedure every 12 months for efficient operation. If the ice machine requires more frequent descaling and sanitizing, consult a qualified service company to test the water quality and recommend appropriate water treatment. An extremely dirty ice machine must be taken apart for descaling and sanitizing.

⚠ CAUTION

Damage to the ice machine evaporator caused by incorrect chemical usage is not covered by the warranty. Use Manitowoc Ice Machine Descaler (part number 9405463) and Sanitizer (part number 9405653) only.

Remedial Descaling Procedure

This procedure allows in place descaling of all surfaces that come in contact with the water system. The ice machine requires disassembly and descaling/sanitizing a minimum of once every 6 months. The quality of your potable water supply may require more frequent cleaning intervals.

CLEAN BUTTON OPERATION

- When the cycle is complete, default is to start ice making. The ice machine will shutoff at the end of the cycle, when the power button is pressed during the cycle.
- The cycle is aborted when the clean button is pressed and held for 3 seconds.
- If the curtain switch is open for more than 2 seconds, the cycle is paused until the curtain switch closes.
- Pressing and holding the clean button for 3 seconds will abort the clean cycle.

Step 1 Press power after ice falls from the evaporator at the end of a harvest cycle. Or, press power and allow the ice to melt off the evaporator

Step 2 Remove all ice from the bin.

Step 3 Prepare 4 oz (1/2 cup) of undiluted Manitowoc Ice Machine Descaler (part number 9405463 only) in a container that will fit easily under the lifted water curtain.

Model	Amount of Descaler
USE0050	4 ounces (120 ml)

Step 4 Press and hold the clean button for 3 seconds.

Step 5 Wait until the water pump sprays water onto the evaporator(approximately 3 minutes) then add the prepared Manitowoc Descaler by lifting the water curtain and pouring directly into the spray area.

Step 6 Press the power button to have the ice machine stop at the end of the cycle. The ice machine will automatically time out a ten minute cycle, followed by five rinse cycles and stop. This entire cycle lasts approximately 30 minutes.

Step 7 Prepare 1/2 oz (1 tablespoon) of undiluted Manitowoc Ice Machine Sanitizer (part number 9405653 only) in a container that will fit into the same area.

Model	Amount of Sanitizer
USE0050	1/2 Ounce (15ml)

Step 8 Press and hold the clean button for 3 seconds.

Step 9 Wait until the water pump sprays water onto the evaporator(approximately 3 minutes) then add the prepared Manitowoc Sanitizer by lifting the water curtain and pouring directly into the spray area. The ice machine will automatically time out a ten minute sanitizing cycle, followed by five rinse cycles. This entire cycle lasts approximately 30 minutes. When the clean cycle is complete the ice machine will start a freeze cycle.

Step 10 Mix a solution of 1/4 oz. (7.4 ml) of sanitizer and 1/2 gallon (1.9 L) of water. Use a spray bottle, sponge or cloth to sanitize the bin. Rinsing is not required

Detailed Descaling and Sanitizing Procedure

Ice machine descaler is used to remove lime scale and other mineral deposits. Ice machine sanitizer disinfects and removes algae and slime.

Step 1 Press power after ice falls from the evaporator at the end of a harvest cycle. Or, press power and allow the ice to melt off the evaporator

Step 2 Remove all ice from the bin.

Step 3 Prepare 4 oz (1/2 cup) of undiluted Manitowoc Ice Machine Descaler (part number 9405463 only) in a container that will fit easily under the lifted water curtain.

Model	Amount Of Descaler
USE0050	4 oz. (120 ml)

Step 4 Press and hold the clean button for 3 seconds.

Step 5 Wait until the water pump sprays water onto the evaporator(approximately 3 minutes) then add the prepared Manitowoc Descaler by lifting the water curtain and pouring directly into the spray area.

Step 6 Press the power button to have the ice machine stop at the end of the cycle. The ice machine will automatically time out a ten minute cycle, followed by five rinse cycles and stop. This entire cycle lasts approximately 30 minutes.

Step 7 Disconnect electric power to the ice machine.

Step 8 Mix 16 oz (2 cups) Manitowoc Descaler with 2 gal of warm water.

Model	Descaler Amount	Water Amount
USE0050	16 oz (473 ml)	1 gal. (4L)

Step 9 Remove the following components for descaling and sanitizing:

Tongs, Tong Holder, Water Curtain, Ice Ramp, Water Pump, and Spray Nozzle Assembly. Refer to "Removal of Parts for Descaling/Sanitizing" on page 31.

Step 10 Take all removed components to a sink for descaling. Use 1/2 of the descaler/water mixture to descale all components. The solution will foam when it contacts lime scale and mineral deposits; once the foaming stops, use a soft-bristle nylon brush, sponge or cloth (NOT a wire brush) to carefully descale the parts.

Step 11 Place floats in a small container filled with descaler water solution to soak.



Step 12 While components are soaking, use the other 1/2 of the descaler/water solution and a nylon brush or cloth to descale inside the ice bin. Descale inside of door, door gasket, bin, and evaporator bucket. Rinse all areas thoroughly with clean water.

Step 13 Mix 1 oz (2 tablespoons) sanitizer with 2 gal of warm water.

Model	Sanitizer Amount	Water Amount
USE0050	1 oz (30ml)	2 gal (8L)

Step 14 Remove floats from container, empty container and rinse floats and container with clean water. Fill container with sanitizer water solution and place floats in container to soak. Soak floats for 10 minutes then remove. Do not rinse sanitized floats.

Step 15 Use 1/2 of the sanitizer/water mixture to sanitize all removed components. Use a spray bottle, cloth or sponge to liberally apply the solution to all surfaces of the removed parts or soak the removed parts in the sanitizer/solution. Do not rinse sanitized components.

Step 16 Use the other 1/2 of the sanitizer/water solution and a spray bottle, sponge or cloth to sanitize the inside of ice bin. Sanitize inside of door, door gasket, bin and evaporator bucket. Do not rinse sanitized areas.

Step 17 Replace all removed components.

Step 18 Reapply power to the ice machine, then press the Clean button. Wait until the water pump sprays water onto the evaporator (approximately 3 minutes) then add 1/2 oz (1 tablespoon) of undiluted Manitowoc Sanitizer by lifting the water curtain and pouring directly into the spray area. This entire cycle lasts approximately 30 minutes. When the clean cycle is complete the ice machine will start a freeze cycle.

Removal of Parts for Descaling/Sanitizing

1. Turn off the electrical and water supply to the ice machine.

⚠ Warning

Disconnect electric power to the ice machine before proceeding with any of the following procedures.

2. Remove all ice from the bin.
3. Remove the components that must be descaled and sanitized. See the following pages for removal procedures for these parts.

⚠ Warning

Wear rubber gloves and safety goggles (and/or face shield) when handling Manitowoc Ice Machine Descaler or Sanitizer.

4. Soak the removed part(s) in a properly mixed solution of descaler.

Solution Type	Water	Mixed With
Descaler	1 gal. (4 l)	16 oz (4l) descaler
Sanitizer	2 gal. (8 l)	1 oz (30 ml) sanitizer

5. The descaler will foam; once the foaming stops use a soft-bristle nylon brush, sponge or cloth (NOT a wire brush) to carefully descale the parts.

⚠ Caution

Do not mix Descaler and Sanitizer solutions together. It is a violation of Federal law to use these solutions in a manner inconsistent with their labeling.

⚠ Caution

Do not immerse the water pump motor in the descaling or sanitizing solution.

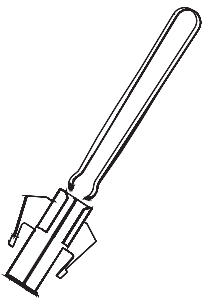
6. Thoroughly rinse all the parts with clean water.
7. Soak the removed parts in a properly mixed solution of sanitizer for 5 minutes.
8. Use a soft-bristle nylon brush, sponge or cloth (NOT a wire brush) to carefully sanitize the parts.
9. Use the sanitizing solution and a spray bottle, sponge or cloth to sanitize (wipe) the interior of the ice machine and bin.
10. Do not rinse sanitized areas when using Manitowoc Sanitizer.
11. Install the removed parts.
12. Turn on the water and electrical supply

TOP COVER

1. Disconnect power to the ice machine.
2. Remove two back screws.
3. Slide top cover backward slightly and lift cover off.

Tongs and Tong Holder

1. Slightly compress and pull upward on tongs to remove.
2. Slide tong holder upward to remove.



Water Curtain

The water curtain is designed to keep the spraying water from escaping the evaporator compartment.

TO REMOVE JUST THE WATER CURTAIN:

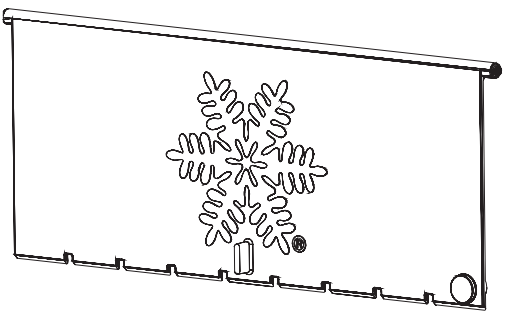
1. Grasp one end of the water curtain and lift up.
2. Pivot water curtain and disengage remaining end.
3. To re-install into ice machine, grasp one end of the water curtain, install one end, pivot the opposite end and pull down into position. Make sure tabs are secure in grooves.

TO REMOVE WATER CURTAIN ASSEMBLY:

1. Slide evaporator bucket forward 1/2" (13 mm).
2. Lift curtain assembly straight up.

⚠Warning

Removing the water curtain while the water pump is running will allow water to spray from ice machine. Disconnect electrical power to the ice machine at the electric service switch box and turn off the water supply.

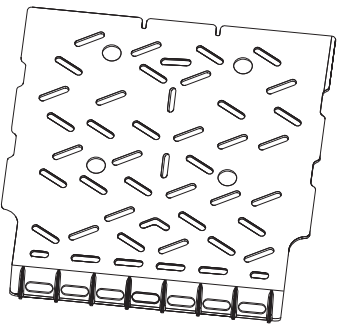


Ice Chute

The ice chute is positioned over the spray nozzles and allows the ice to easily fall into the bin. It must be firmly positioned over the spray bar, with the front edge inside the water trough. Spray nozzles must be align with the spray holes or spray water will fall into the bin.

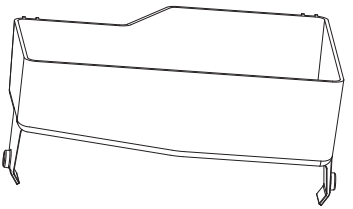
1. Grasp and lift up and forward to remove.
2. Reverse procedure to re-install ice chute and position over Water Distribution Assembly.

Make sure rear supports are over spray bar, and front edge is inside of water trough.



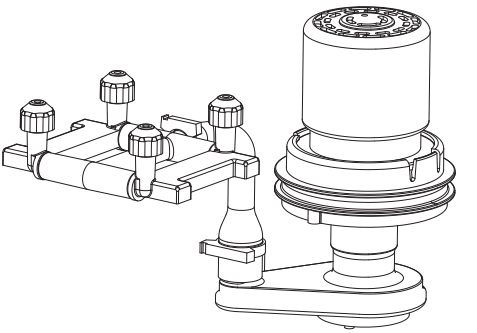
Water Trough

1. Depress tabs on right and left side of the water trough.
2. Allow front of water trough to drop as you pull forward to disengage the rear pins.



Spray Bar, Water Pump and Hose

1. Remove spray bar clamp and spray bar.
2. Remove the 5/16” water pump mounting screw.
3. Grasp pump and pull straight down until water pump disengages and electrical connector is visible.
4. Disconnect the electrical connector.
5. Remove the water pump from ice machine.
6. Remove clamp from hose to remove from pump.
7. Do not soak the water pump in descaler or sanitizer. Wipe the pump and ice machine base clean.

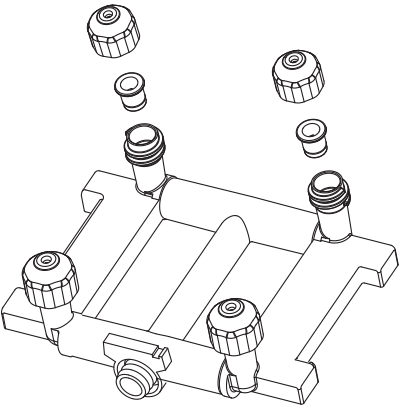


Spray Bar Disassembly

The spray bar supplies water to the individual ice making cups. Water from the water pump sprays through the nozzles, located on the upper portion of the tubes.

1. Grasp one end of the spray bar, lift up and remove from seat formed in evaporator bucket.
2. Remove clamp on water inlet tubing by grasping both ears on clip and separating.
3. Apply food grade lubricant to ease re-assembly of spray bar components when necessary.
4. To re-install spray bar, position water inlet tubing on inlet ports, and squeeze clips until tight.
5. Reposition assembly on water trough seat.

Nozzles and inserts can be removed for cleaning by unscrewing nozzles. Inserts are located inside the spray bar ports. The spray bar also disassembles for easy cleaning.



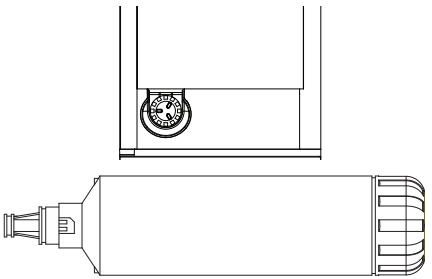
Bin Light

If the ice machine is shut down for a long period of time the bin light cover must be cleaned and sanitized. The light is provided for your convenience. If you experience operational problems with the light a replacement appliance bulb can be obtained from your local hardware store.

Water Filter

To replace the water filter incoming water does not need to be turned off. This system is equipped with an internal shut-off valve.

1. Turn cartridge slowly to the left, about 1/4 turn, until it stops. At this position, both inlet and outlet ports are closed and water pressure has been relieved.
2. Pull used cartridge forward to remove, then discard. There may be a small amount of residual water drainage after pressure is relieved and during cartridge removal.
3. Remove cap from top of new cartridge and push new cartridge into filter head. Turn cartridge 1/4 turn to the right until it stops. Top surface of cartridge will become flush with bottom of the head when fully engaged.
4. Run a 3-minute fill cycle of the ice machine to flush the filter. Then power off unit and restart to begin a new fill sequence and ice making cycle.
5. Press and hold the “Clean” button for 6 seconds to reset the counter and de-energize the filter light.



ICE MACHINE INSPECTION

Check all water fittings and lines for leaks. Also, make sure the refrigeration tubing is not rubbing or vibrating against other tubing, panels, etc.

Do not put anything (boxes, etc.) in front of the ice machine. There must be adequate airflow through and around the ice machine to maximize ice production and ensure long component life.

EXTERIOR CLEANING

Clean the area around the ice machine as often as necessary to maintain cleanliness and efficient operation.

Sponge any dust and dirt off the outside of the ice machine with mild soap and water. Wipe dry with a clean, soft cloth.

Clean up any fallen ice or water spills as they occur.

CLEANING THE CONDENSER

A dirty condenser restricts airflow, resulting in excessively high operating temperatures. This reduces ice production and shortens component life.

- Clean the condenser at least every six months.
- Shine a flashlight through the condenser to check for dirt between the fins.
- Compressed air can be blown through the condenser fins. This procedure will raise considerable dust and is best performed outside. Be careful not to bend the fan blades.
- If dirt or grease remains between the fins or the condenser fins are bent or flattened, consult your service representative.

Removal from Service/Long Term Storage/ Winterization

Step 1 Perform a descaling and sanitizing procedure to prevent mildew growth.

Step 2 Disconnect the electric power at the circuit breaker or the electric service switch.

Step 3 Turn off the water supply.

Step 4 Remove the water from the water trough.

Step 5 Disconnect and drain the incoming ice-making water line at the rear of the ice machine.

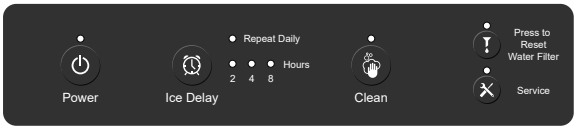
Step 6 Disconnect vinyl hose from water pump and allow to drain.

Step 7 Make sure water is not trapped in any of the water or drain lines. Compressed air can be used to blow out the lines.

Step 8 Use a spray bottle and a solution of sanitizer/ water (0.50 oz/ 1 gal) and spray all interior surfaces. Do not rinse, allow to air dry.

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Ice Making Sequence of Operation



FUNCTIONS

Power Button (Blue)

Pressing the “Power” button once will energize the ice machine and blue Power light. Pressing the “Power” button a second time will de-energize the ice machine.

Clean (Blue)

Pressing the “Clean” button will initiate a clean cycle and energize the clean light. The clean light will flash during the clean cycle to indicate the proper time to add ice machine descaler or sanitizer.

Replace Filter (Red)

When the ice machine completes 8000 freeze/harvest cycles the light will energize to indicate the filter needs replacement. Depressing the “Clean” button for 6 seconds will reset the counter and de-energize the light.

Service (Red)

Flashes to indicate a service limit has been exceeded. Pressing the service light allows viewing of service limits.

Press and hold the “Service” button to initiate a harvest cycle during the freeze cycle.

ICE DELAY START

Pressing the “Ice Delay” button will initiate a delay cycle. The ice machine will not run until the delay time expires.

NOTE: The power button must be on to adjust delay start.

- Pressing the ice delay button once will energize the 2 hour light and initiate a two hour delay period.
- Pressing the ice delay button a second time will energize the 4 hour light and initiate a four hour delay period.
- Pressing the ice delay button a third time will energize the 8 hour light and initiate an eight hour delay period.
- Pressing the ice delay button a fourth time will cancel the delay cycle.

REPEAT ICE DELAY PERIOD EVERY 24 HOURS

1. Press the power button to start the ice machine.
2. Press and hold the ice delay button for 3 seconds.
3. Pressing the ice delay button will energize the 2 hour light and initiate a two hour delay period every 24 hours.
4. Pressing the ice delay button again will energize the 4 hour light and initiate a four hour delay period every 24 hours.
5. Pressing the ice delay button again will energize the 8 hour light and initiate an eight hour delay period every 24 hours.
6. Pressing the ice delay button again will cancel the 24 hour repeat delay. Start with step 1 to reenter 24 hour delay setup.

EXAMPLE

Setting a daily 4 hour delay from 1 pm to 5 pm.

At 1 pm perform steps 1 through 4 above. The 4 hour delay light will blink every 3 seconds to indicate it is in a delay period. After 5 pm the ice machine will fill the bin as needed. At 1 pm on all following days the ice machine will initiate a delay period at 1 pm and flash the 4 hour delay LED.

Canceling a delay period

A delay period can be ended by pressing the power button off/on.

Canceling a 24 hour delay period

- Press the power button while a delay period is active.
- Follow “Repeat Delay Period every 24 Hours” to step 6.

Sequence of Operation

Depending on ambient conditions and cold water supply temperature, the ice making process will take approximately 45-105 minutes.

Initial Start-Up or Start-Up After Automatic Shut- Off:

Step 1 Water Purge/Refrigeration Equalization

Before the compressor starts, the harvest valve and dump valve will energize for 15 seconds to equalize pressure in the refrigeration system and purge old water from the system.

Step 2 Prechill

The compressor, condenser fan motor, liquid line solenoid and water inlet valve energize. The prechill cycle continues until the water trough fills (float valve opens) and the 0.5-5 minute prechill time expires.

Freeze Sequence

Step 3 Freeze-1

The water pump energizes and sprays water onto the evaporator. When the evaporator temperature reaches less than 10° F (-12° C) and the 15-45 minute freeze time expires the liquid line solenoid valve de-energizes.

Step 4 Freeze-2

The water continues to freeze on the evaporator and dropping the water trough level. When the low water float closes and the 15-60 minute freeze time expires, the freeze cycle ends.

Harvest Sequence

Step 5 Water Purge

The water pump, dump valve, water inlet valve remain on for 45 seconds, then shutoff.

Step 6 Harvest

The evaporator is warmed, allowing the cubes to release from the evaporator, pass through the water curtain and drop into the storage bin. As the cubes pass through the water curtain a 60 second timer starts. The harvest cycle ends when the 60 second timer expires.

- When the bin is not full of ice the control will start a new prechill cycle (step 2).
- When the bin is full of ice the control initiates step 7 automatic shutoff.
- Maximum harvest time is 7 minutes.

Step 7 Automatic Shut-Off

When the bin is full, ice will either contact the bin thermistor or hold the water curtain open and stop ice production. The ice machine shuts off if either the water curtain is held open for 30 seconds or the bin thermistor temperature is below 39°F (4°C).

The ice machine initiates a 3 minute delay and remains off until ice no longer holds the water curtain open, or the thermistor temperature is higher than 39°F (4°C).

Soft Start - After Power Loss

Soft start is a sequence to remove the ice from the evaporator after a power interuption.

- The Power LED will flash indicating the unit is in Soft Start.
- Bypass Soft Start by turning machine off and back on using the Power Button.

Service Limits

Service limits protect the machine from major system failures. The service LED will flash when one of the five service limits are exceeded. When the service button is pressed the LED will flash the corresponding number for the fault condition. For example if service limit 2 occurs the service light will flash twice. Only the most recent service limit is saved to memory.

SERVICE LIMIT 1 LONG FREEZE CYCLE (Freeze 2 only)

The maximum freeze time of Freeze 2 is 60 minutes at which time the control board automatically initiates a harvest cycle (step 4).

SERVICE LIMIT 2 LONG HARVEST CYCLE

The maximum harvest time is 7 minutes at which time the control board either starts a prechill cycle (step 2) or enters automatic shutoff (step 4).

SERVICE LIMIT 3 WATER LOSS

In the Prechill cycle (step 2) when the high and low water level float switches do not open within 4 minutes the ice machine stops.

SERVICE LIMIT 4 CONDENSATE PUMP FAULT

When the float switch on the condensate pump is open or the float switch jumper is disconnected from the wire harness the ice machine stops.

SERVICE LIMIT 5 FULL BIN FAULT

When power is on and the ice machine has remained off for 48 hours the Service LED will flash.

Refer to Troubleshooting for further service limit detail.

Ice Making Sequence of Operation	Control Board Relays					Contactor		Length of Time
	Water Pump	Dump Valve & Harvest Valves	Water Inlet Valve	Liquid Line Solenoid Valve	Contactor Coil	Compressor	*Condenser Fan Motor	
Initial Startup 1. Water Purge	ON	ON	OFF	OFF	OFF	OFF	OFF	15 Seconds
2. Prechill	OFF	OFF	ON	ON	ON	ON	ON	30 Seconds & Ice Thickness Float Opens
Freeze Sequence 3. Freeze-1	ON	OFF	OFF	ON	ON	ON	ON	Evaporator Thermistor Temperature less than 10°F
4. Freeze-2	ON	OFF	OFF	OFF	ON	ON	ON	Harvest Float Switch Closes
Harvest Sequence 5. Water Purge	ON	ON	ON	OFF	ON	ON	ON	45 Seconds
6. Harvest	OFF	ON	OFF	OFF	ON	ON	ON	Water Curtain Switch Activation plus 60 Seconds
Automatic Shutoff 7. Automatic Shutoff	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Until 3 Minute Delay Expires, Curtain Switch Closes & Bin Thermistor Temperature Above 39°F
NOTE: *Condenser Fan Motor Is Wired Through a Fan Cycling Control And May Cycle ON/OFF								

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Troubleshooting

PROBLEM CHECKLIST

Problem	Possible Cause	Correction
Ice machine does not operate.	No electrical power to the ice machine.	Replace the fuse/reset the breaker/turn on the main switch/plug power cord into receptacle.
	Ice machine needs to be turned on.	Press the On/Off button to start ice making.
	Water curtain in open position (down).	Water curtain must be closed and capable of swinging freely.
Ice machine stops, and can be restarted by turning the ice machine OFF/ ON.	Service Fault stopping the ice machine..	Refer to “Service Fault”
Ice sheet is thick.	Water trough level is too high.	Adjust ice thickness float.
	Power button was turned OFF/ON during freeze cycle and ice remained on evaporator.	Allow ice to thaw and release from evaporator, then restart
	Water curtain was opened then closed in the harvest cycle before the ice released.	Allow ice to thaw and release from evaporator, then restart
Ice machine does not release ice or is slow to harvest.	Ice machine is dirty.	Descale and sanitize the ice machine
	Ice machine is not level.	Level the ice machine
	Low air temperature around ice machine (air-cooled models).	Air temperature must be at least 50° F (10°C).
Ice machine does not cycle into harvest mode.	The 15-minute freeze time lock-in has not expired yet.	Wait for freeze lock-in to expire.
	Harvest float switch is dirty.	Descale and sanitize the ice machine.
	Harvest float switch wire is disconnected.	Connect the wire
	Harvest float switch is out of adjustment.	Adjust the harvest float switch.
	Uneven ice fill.	Clean the ice machine.

Problem	Possible Cause	Correction
Ice quality is poor (soft or not clear).	Poor incoming water quality.	Test the quality of the incoming water and make appropriate filter recommendations.
	Water filtration is poor.	Replace the filter.
	Ice machine is dirty.	Descale and sanitize the ice machine.
	Water softener is working improperly (if applicable).	Repair the water softener.
Ice machine produces shallow or incomplete cubes, or the ice fill pattern on the evaporator is incomplete.	Ice thickness float is out of adjustment.	Adjust the ice thickness switch.
	Water trough level is too high or too low.	Check the water level.
	Water filtration is poor.	Replace the filter.
	Hot incoming water.	Connect the ice machine to a cold water supply.
	Incorrect incoming water pressure.	Water pressure must be 20-80 psi (137.9 -551.5 kPa)
	Ice machine is not level.	Level the ice machine.
Low ice capacity.	High air temperature around ice machine (air-cooled models).	Air temperature must not exceed 100° F (38°C).
	Inadequate clearance around the ice machine.	Provide adequate clearance.
	Objects stacked around ice machine, blocking condenser airflow.	Remove items blocking airflow.
	Hot incoming water.	Connect to cold water.
	Incorrect incoming water pressure. Water pressure is too low or water filter is restricted..	Water pressure must be 20-80 psi (137.9 -551.5 kPa). Replace water filter.
Ice sheet is thick	Water trough level is too high.	Adjust ice thickness float.
	Power button was turned off/on during the freeze cycle and ice remained on the evaporator.	Allow ice to thaw and release from the evaporator, then restart.
	Water curtain was opened and closed in the harvest cycle before the ice released.	Allow ice to thaw and release from the evaporator, then restart.
	Long harvest cycles with repeated Service Fault indication.	Descale the ice machine & perform diagnostic procedures as required.

ANALYZING WHY THE MACHINE TURNED OFF

Service Limits

Service limits stop the ice machine if conditions arise which could cause a major component failure.

The service LED will flash when one of five service limits are exceeded. When the service button is pressed the LED will flash the corresponding number for the fault condition. For example if service limit 2 occurs the service light will flash twice.

- Only the most recent service limit is saved to memory.
- Service limits are stored in memory for 100 cycles, then erased.
- The service LED will flash once every second when the machine is off on a service limit.

Turning the machine back on will restart the machine, and the service LED will flash 1-5 times to indicate which Service Limit was exceeded. You can retrieve the most recent service limit at any time by pushing the Service Button.

SERVICE LIMIT 1: LONG FREEZE-2 CYCLE. 1 FLASH

If the max time limit in Freeze 2-time is reached (60 Minutes) for 3 consecutive cycles the ice machine will shut down and the power LED will turn off.

Possible Causes:

- Harvest Float is not closed.
  Refer to "Float Switch."
- Refrigeration Problem.
  Refer to "Refrigeration System Diagnostics."
- Electrical Problem.
  Refer to "Wiring Diagram."

SERVICE LIMIT 2: LONG HARVEST CYCLE. 2 FLASHES

If the maximum harvest is reached for 3 consecutive cycles (7 minutes) the ice machine will shut down and the power LED will turn OFF.

Possible Causes:

- Closed/Stuck Bin Switch.
- Dirty Evaporator.
  Refer to "Descaling/Sanitizing Procedures."
- Refrigeration Problem.
  Refer to "Refrigeration System Diagnostics."
- Electrical Problem.
  Refer to "Wiring Diagram."

SERVICE LIMIT 3: WATER LOSS/NO WATER. 3 FLASHES

If the high- and low-level float switch does not open within 4 minutes into prechill, the machine will shutdown and the power LED will turn off.

The machine will attempt a re-start after a 30-minute delay. If the same symptom is observed the machine will shut off for another 30 minutes.

The machine will attempt 100 re-starts before going off on Service Limit 3.

Possible Causes:

- No water supplied to machine.
- Plugged water filter.
- Failed water inlet valve.

SERVICE LIMIT 4: CONDENSATE PUMP FAULT. 4 FLASHES

If the float switch in the condensate pump is open, or the jumper in the wire harness in the ice machine is not in place the ice machine will shut down.

Possible Causes:

- Failed condensate pump.
- Restricted drain line from condensate pump.
- Jumper not in place.

SERVICE LIMIT 5: FULL BIN FAULT. 5 FLASHES

Wehn power is on and the ice machine has remained off for 48 hours with full bin condition.

Possible Causes:

- Water curtain removed from machine.
- Magnet missing from water curtain.
- Open Bin Switch.
- Bin Switch not plugged in to the control board.

CONTROL BOARD TEST MODE

NOTE: The water curtain/bin switch can be open or closed and does not effect the operation of the test mode.

To enter the test mode press and hold the test switch on the control board for 3 seconds. The control board test mode performs the following functions for a 2 minute time period:

- Energizes all control board relays
- Energizes all control board lights
- Energizes all touch pad control lights

Canceling a test cycle:

To cancel a test cycle press the test button a second time.

Restarting a test cycle:

The test cycle will restart each time the test button is pressed for a 3 second time period.

DIAGNOSING AN ICE MACHINE THAT WILL NOT RUN

⚠ Warning

High (line) voltage is applied to the control board at all times.

1. Verify primary voltage is supplied to the ice machine.
2. Test for line voltage on the 9 pin connector wires number 39 & 32. If line voltage is not present test the high pressure cutout.
3. Verify control board fuse functions properly. Refer to “Main Fuse” on page 69.
4. Verify power button functions properly. Refer to ”Touch Pad” on page 70.
5. Verify the water curtain switch is operating correctly. Refer to “Water Curtain Switch” on page 74.
6. Verify bin thermistor is operating correctly. Refer to “Bin Thermistor” on page 76.

DIAGNOSING AN ICE MACHINE THAT DOES NOT CYCLE INTO HARVEST OR WILL NOT RELEASE THE ICE

1. Verify the harvest float is closed. Refer to “Float Switch” on page 72.
2. Verify evaporator temperature is below 10°F.
3. Verify the evaporator thermistor is operating correctly. Refer to “Evaporator Thermistor Chart” on page 79.
4. Verify 15 minutes have passed after the evaporator thermister has reached 10°F or lower.
5. Line voltage on control board 9 pin connector 4 & 3?
   - No - Replace control board.
   - Yes - Go to next step
6. Line voltage on both harvest solenoid coils?
   - No - Repair Wiring
   - Yes - Test coils for continuity - If open repair or continue to next step when coils test good.
7. Verify valves open fully when energized. Refer to “Cycle Times, 24 Hr. Ice Production and Refrigerant Temperature Charts” on page 93.
   - Replace the defective harvest valve when found.
   - Clean the ice machine and inspect the evaporator and evaporator extrusions.

DIAGNOSING AN ICE MACHINE THAT CYCLES INTO HARVEST PREMATURELY

1. Verify the harvest float valve is open. Replace if closed in the up position or erratic when opened/closed repeatedly.
2. Verify evaporator thermistor value matches the evaporator temperature and is above 10°F. Refer to “Evaporator Thermistor” on page 78.
3. Evaporator temperature reaches 10°F and the 15 minute finishing timer has not expired. Refer to “Harvest Sequence” on page 45 - If 15 minutes have not passed and a harvest cycle starts, replace the control board.

ELIMINATE ALL NON REFRIGERATION PROBLEMS BEFORE DIAGNOSING THE REFRIGERATION SYSTEM.

- Perform a visual inspection for clearances, drains, dirty condenser/filter and water filter replacement.
- Verify water spray is even across the entire evaporator.
- Run an ice production check - Ice production checks within 10% are considered normal.

INSTALLATION/VISUAL INSPECTION CHECKLIST

Ice machine is not level

- Level the ice machine

Condenser is dirty

- Clean the condenser

Water filtration is plugged

- Install a new water filter

Water drains are not run separately and/or are not vented

- Run and vent drains according to the Installation Manual

WATER SYSTEM CHECKLIST

A water-related problem often causes the same symptoms as a refrigeration system component malfunction.

Example: Water loss during the freeze cycle, a system low on charge, and a restricted TXV have similar symptoms.

Water system problems must be identified and eliminated prior to replacing refrigeration components.

Water area (evaporator) is dirty

- Descale as needed

Water inlet pressure not between 20 and 80 psig (1–5 bar, 138–552 kPa)

- Install a water regulator valve or increase the water pressure

Incoming water temperature is not between 50°F (10°C) and 90°F (32°C)

- If too hot, check the hot water line check valves in other store equipment

Water filtration is plugged (if used)

- Install a new water filter

Hoses, fittings, etc., are leaking water

- Repair/replace as needed

Water valve is stuck open, closed or is leaking

- Descale/replace as needed

Water is spraying out of the sump trough area

- Stop the water spray

Uneven water flow across the evaporator

- Descale the ice machine

Plastic extrusions and gaskets are not secured to the evaporator

- Remount/replace as need.

ICE CUBE PATTERN

Ice cube formation is helpful in ice machine diagnostics.

Analyzing the ice formation alone cannot diagnose an ice machine malfunction. However, when this analysis is used along with the “TXV Failure/Low Refrigerant Charge Symptoms” on page 66, it can help diagnose an ice machine malfunction.

Normal Ice Formation

Ice forms across the entire evaporator surface.

At the beginning of the Freeze cycle, it may appear that more ice is forming on the inlet of the evaporator than at the outlet. At the end of the Freeze cycle, ice formation at the outlet will be close to ice formation at the inlet.

If ice forms uniformly across the evaporator surface, but does not do so in the proper amount of time, this is still considered a normal ice fill pattern.

Extremely Thin at Evaporator Outlet

There is no ice, or a considerable lack of ice formation on the outlet of the evaporator.

Examples: No ice at all at the outlet of the evaporator, but ice forms at the inlet half of the evaporator. Or, the ice at the outlet of the evaporator reaches the correct thickness, but the inlet of the evaporator already has thick ice.

Possible cause: Water loss, low on refrigerant, restricted TXV, hot water supply or leaking water inlet valve.

Extremely Thin at Evaporator Inlet

There is no ice, or a considerable lack of ice formation at the inlet of the evaporator. Examples: The ice at the outlet of the evaporator reaches the correct thickness, but there is no ice formation at all at the inlet of the evaporator.

Possible cause: Obstructed nozzles, Insufficient water flow, incorrect refrigerant charge.

Spotty Ice Formation

There are small sections on the evaporator where there is no ice formation. This could be a single corner, or an area of the evaporator.

Possible cause: Obstructed nozzles and the ice machine requires descaling or tubing separation from the evaporator.

No Ice Formation

The ice machine operates for an extended period, but there is no ice formation at all on the evaporator.

Possible cause: Water valve leaking, water pump, TXV, low refrigerant charge, compressor, etc.

ICE PRODUCTION CHECK

The amount of ice a machine produces directly relates to the operating water and air temperatures. This means an ice machine with a 70°F (21°C) ambient temperature and 50°F (10°C) water produces more ice than the same ice machine with 90°F (32°C) ambient and 70°F (21°C) water.

1. Determine the ice machine operating conditions:
   Air temp entering condenser:____°
   Air temp around ice machine:____°
   Water temp entering sump trough:____°
2. Refer to the "Cycle Times, 24 Hr. Ice Production and Refrigerant Temperature Charts" on page 93. Use the operating conditions determined in Step 1 to find published 24-Hour Ice Production:_____
   - Times are in minutes.
     Example: 1 min. 15 sec. converts to 1.25 min.
     (15 seconds ÷ 60 seconds = .25 minutes)
   - Weights are in pounds.
     Example: 2 lb. 6 oz. converts to 2.375 lb.
     (6 oz. ÷ 16 oz. = .375 lb.)

3. Perform an ice production check using the formula below.

1.	_____ Freeze Time	+	_____ Harvest Time	=	_____ Total Cycle Time	
2.	1440 Minutes in 24 Hrs.	÷	_____ Total Cycle Time	=	_____ Cycles per Day	
3.	_____ Weight of One Harvest	x	_____ Cycles per Day	=	_____ Actual 24-Hour Production	

Weighing the ice is the only 100% accurate check.

4. Compare the results of step 3 with step 2. Ice production is normal when these numbers match closely. If they match closely, determine if:
   - Another larger ice machine is required.
   - Relocating the existing equipment to lower the load conditions is required.

Contact the local Manitowoc distributor for information on available options and accessories.

Refrigeration System Diagnostics

Refrigeration access fittings are not installed during production and the ice machine should be diagnosed with temperatures and then pressure if necessary.

REFRIGERATION DIAGNOSTIC PROCEDURE

1. Verify that your water spray pattern covers the entire evaporator before diagnosing the refrigeration system. Mineral buildup can cause nozzle blockage, water tracking and an erratic ice fill pattern. Descale with Manitowoc Ice Machine cleaner to remove any mineral buildup before diagnosing the refrigeration system.
2. Install and insulate temperature leads: Digital thermometers with remote insulated thermocouples must be used to obtain temperatures.
    - Suction line within 4” of the compressor.
    - Discharge line within 4” of the compressor.
    - Harvest valve within 4” of the inlet.
3. All doors and panels must be in place during the diagnostic procedure.
4. Refer to the “Cycle Times, 24 Hr. Ice Production and Refrigerant Temperature Charts” on page 93 to determine the correct operating temperature range for your air and water temperature. Normal operating temperatures will be within 10% of the data in the charts.
5. The first cycle is not used for refrigeration system diagnostics. Start monitoring temperatures 3 minutes into the second freeze cycle and record the temperatures throughout the freeze and harvest cycles.

FREEZE CYCLE ANALYSIS CHART

Discharge Temperature	Evaporator Outlet Temperature	Freeze Time	Harvest Valve Inlet Temperature	Evaporator Ice Formation	Evaporator Inlet Colder Than Outlet	Final Analysis Enter number of boxes checked in each row
Lower Than Normal	Higher Than Normal	Longer Than Normal	Higher Than Normal	Thin on Inlet, not all cubes formed or Normal	No	Harvest Valve(s) Leaking
Lower Than Normal	Lower Than Normal	Shorter Than Normal	Normal	Normal or Thick On Outlet or Not all cubes drop in harvest	No	TXV(s) Flooding or Overcharged
Normal	Higher Than Normal	Longer Than Normal	Normal	Thin On Outlet or No Ice	Yes	TXV(s) Starving or Low On Charge
Normal	Higher Than Normal	Longer Than Normal	Normal	Normal or No Ice	Yes	Compressor
Restricted TXV/Low on Charge and Compressor diagnostics should be verified by pressure prior to replacement. See“Cycle Times, 24 Hr. Ice Production and Refrigerant Temperature Charts” on page 93						

STARVING TXV/LOW REFRIGERANT CHARGE SYMPTOMS

- A starving TXV or low refrigerant charge will have a suction line temperature higher than normal and a discharge line temperature slightly higher than normal.
- Low refrigerant charge will have both the suction and discharge line temperatures slightly higher than normal in the freeze and harvest cycles.

Diagnosis can be confirmed by installing a temporary access valve and adding 2 oz (57 g) of refrigerant: If the suction line temperature drops or the ice fill pattern on the inlet of the evaporator fills in, the ice machine is low on refrigerant. Refer to charging procedures for access valve installation/removal procedure.

HIGHER THAN NORMAL FREEZE CYCLE TEMPERATURES

- A dirty filter or condenser will result in higher than normal temperatures. Always clean the filter and condenser before diagnosing the refrigeration system.
- Hot water entering the ice machine will result in high suction and discharge line temperatures in the freeze cycle.
- Inefficient Compressor
  Suction temperatures will be slightly high to high during the freeze cycle. Remove refrigerant and weigh in the correct refrigerant amount. When the ice machine continues to make ice slowly (or makes little to no ice or trips the internal compressor overload) the compressor will require replacement.

DISCHARGE LINE TEMPERATURE

Maximum compressor discharge line temperature on a normally operating ice machine steadily increases throughout the freeze cycle. Compare the maximum discharge line temperature with the published discharge line temperature. Discharge line temperature must be equal or higher than the published temperature.

SUCTION LINE TEMPERATURE

The actual suction temperature changes throughout the freeze cycle. Determine if the suction line temperature is within the range listed in “Cycle Times, 24 Hr. Ice Production and Refrigerant Temperature Charts” on page 93.

LEAKING HARVEST VALVE

The inlet to the harvest valve temperature will be the same temperature as the discharge line after 8 minutes into the freeze cycle.

OVERCHARGED SYSTEM SYMPTOMS

Suction and discharge line temperature will be low during the freeze cycle. Overcharge diagnosis can be difficult. USE0050 ice machines ship without access valves; Look for signs that an access valve has previously been added. When an overcharge is suspected remove the refrigerant and weigh in the correct refrigerant amount.

FREEZE CYCLE ANALYSIS CHART

Discharge Temperature	Evaporator Outlet Temperature	Freeze Time	Harvest Valve Inlet Temperature	Evaporator Ice Formation	Evaporator Inlet Colder Than Outlet	Final Analysis Enter number of boxes checked in each row
Lower Than Normal	Higher Than Normal	Longer Than Normal	Higher Than Normal	Thin on Inlet, not all cubes formed or Normal	No	Harvest Valve(s) Leaking
Lower Than Normal	Lower Than Normal	Shorter Than Normal	Normal	Normal or Thick On Outlet or Not all cubes drop in harvest	No	TXV(s) Flooding or Overcharged
Slightly Higher Than Normal	Higher Than Normal	Longer Than Normal	Normal	Thin On Outlet or No Ice	Yes	TXV(s) Starving or Low On Charge
Normal	Higher Than Normal	Longer Than Normal	Normal	Normal or Thin Ice	Yes	Compressor
Restricted TXV/Low on Charge and Compressor diagnostics should be verified by pressure prior to replacement. See"Cycle Times, 24 Hr. Ice Production and Refrigerant Temperature Charts" on page 93.						

Main Fuse

Function

The control board fuse stops ice machine operation if electrical components fail causing high amp draw.

Specifications

- 250 Volt, 10 amp.

Check Procedure

1. If the curtain light is on with the water curtain closed, the fuse is good.

> **⚠ Warning**
>
> Disconnect electrical power to the entire ice machine before proceeding.

2. Remove the fuse. Check the resistance across the fuse with an ohmmeter.

Reading	Result
Open (OL)	Replace fuse
Closed (O)	Fuse is good

Touch Pad

Function

User interface to select ice making, delay start or cleaning cycle and provides feedback on ice machine operation.

Check For Normal Operation

Action	Normal Function
Press and hold the control board test button for 3 seconds	All Touch Pad lights turn on
Press test button	All Touch Pad lights turn off
Press power button	Power light turns on
With power light energized press the delay button 4 times	Cycles through 4 hour delay, 12 hour delay, 24 hour delay and off
Press and hold the power button for 3 seconds	Power light turns off
Press and hold the clean button for 3 seconds	Clean light turns on
Press and hold the clean button for 3 seconds	Clean light turns off
If any switches do not operate correctly, disconnect main power to the ice machine to reset the control board and perform a second test. If the second test doesn't show normal function, perform the Ohm test to verify the issue is not a wiring or control board issue.	

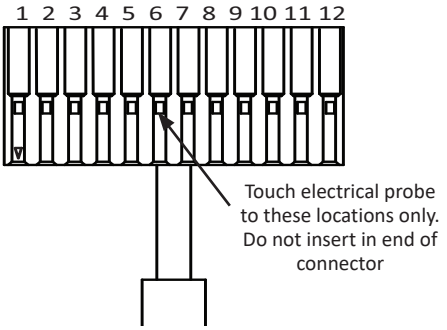
Ohm Test

Disconnect power from ice machine.

Disconnect wire from control board and Ohm touch pad and interconnecting wire to verify correct operation. Pressing and depressing the touch pad must open and close the circuit. A switch that functions correctly will close as the button is pressed and open as the button is released.

Do not insert electrical probe into end of connector. This will stretch the connector and cause intermittent connection issues. All readings must be taken on the flat exterior of the connector.

Selection	Wires
On/Off	#2 & #7
Delay	#3 & #7
Clean	#4 & #7



Float Switch

Function

Open and close to indicate to the control board the level of water in the water trough.

Specifications

Normally closed, float operated magnetic reed switch.

The float switch contacts are closed in the down position. When water raises the float to the up position the magnet in the float opens the contacts.

Operation

The ice machine uses two float switches.

Ice Thickness Float - Indicates the water level has been reached.

Harvest Float - Indicates a harvest cycle needs to be initiated.

Check Procedure

Initial testing can be performed by viewing the control board light(s) while raising and lowering the float. The corresponding control board light must turn on and off when the float is raised (open contacts) and lowered (closed contacts).

Ice Thickness or Harvest Float Switch:

A. The light must be on in the down position.

B. The light must be off in the up position.

If the control board light does not respond to the float, proceed with Step 1 below.

1. Disconnect power to the ice machine and pull the float switch and connector through the ice machine base and disconnect.
2. Attach an ohm meter lead to each float switch wire.
3. Place the float in the down position - The float switch must be closed.
4. Place the float in the up position - The float switch must be open.
5. If the float tests good, ohm the interconnecting wires to the control board and inspect connectors.

NOTE: Make adjustments with the ice machine off. Making adjustments during the freeze cycle may produce an initial sheet of ice that is thicker than future cycles.

Water Curtain Switch

FUNCTION

Movement of the water curtain controls bin switch operation. The bin switch has two main functions:

1. Harvest Cycle:
   When ice drops from the evaporator it passes through the water curtain and starts a harvest finish timer. This will allow additional individual cubes to harvest before entering back into the prechill cycle. The additional finish time is 60 seconds.
2. Automatic ice machine shut-off.
   If the storage bin is full at the end of a Harvest cycle, the cubes fail to clear the water curtain and hold it open. After the water curtain is held open for 30 seconds, the ice machine shuts off. The ice machine remains off until enough ice is removed from the storage bin to allow the cubes to drop clear of the water curtain. As the water curtain swings back to the operating position, the bin switch closes and the ice machine restarts, provide the bin thermistor is closed and the 3-minute delay has expired.

NOTE: The water curtain must be ON (bin switch closed) to start ice making.

SPECIFICATIONS

The bin switch is a magnetically operated reed switch. The magnet is attached to the lower right corner of the water curtain.

The bin switch is connected to a varying D.C. voltage circuit. (Voltage does not remain constant.)

NOTE: Because of a wide variation in D.C. voltage, it is not recommended that a voltmeter be used to check bin switch operation.

Diagnostics

SYMPTOMS

Bin Switch Fails Open

- The ice machine will not start an ice making cycle and the display indicates “Full Bin”.

Bin Switch Fails Closed

The harvest cycle continues after ice opens and closes the water curtain (harvest cycle is 7 minutes).

Bin Thermistor

Function

The bin thermistor stops the ice machine when the bin is full. The level of ice in the ice storage bin controls the ice machine shut-off. When the bin is full, ice cubes contact the bin thermistor, which cools down and signals the control board to stop the ice machine. The ice machine remains off until enough ice has been removed from the bin. This causes the thermistor to warm, which signals the control board to restart the ice machine.

NOTE: The bin thermistor and water curtain must both be closed and the 3 minute delay period expired before the ice machine will start after an Automatic shutoff period.

Check Procedure

> **⚠ Warning**
>
> Disconnect electrical power to the entire ice machine before proceeding.

1. Disconnect power to the ice machine.
2. Disconnect both wires from the bin thermistor and check the resistance across the bin thermistor terminals.
3. Compare measured resistance/temperature readings to resistance/temperature relationship chart.
4. Within 10% of the published resistance value - Thermistor is good.
5. Not within 10% of the published resistance value - Thermistor is defective.

NOTE: After covering/uncovering the bulb holder with ice, wait at least three minutes to allow the thermistor to react.

BIN THERMISTOR CHART

Important

If the ohmmeter reads "OL," check the scale setting on the meter before assuming the thermistor is bad.

Temperature of Thermistor		Resistance K Ohms (x1000)
°C	°F	Nominal
0.0	32.0	16.330
1.0	33.8	15.520
2.0	35.6	14.750
3.0	37.4	14.020
4.0	39.2	13.330
5.0	41.0	12.690
6.0	42.8	12.070
7.0	44.6	11.490
8.0	46.4	10.940
9.0	48.2	10.430
10.0	50.0	9.932
11.0	51.8	9.466
12.0	53.6	9.025
13.0	55.4	8.608
14.0	57.2	8.211
15.0	59.0	7.836
16.0	60.8	7.480
17.0	62.6	7.142
18.0	64.4	6.821
19.0	66.2	6.516
20.	68.0	6.228
21.0	69.8	5.953
22.0	71.6	5.692
23.0	73.4	5.444
24.0	75.2	5.208
25.0	77.0	4.984

Evaporator Thermistor

Function

Thermistor resistance values change with temperature. The value supplied to the control board is used to identify temperature at the thermistor location.

Check Procedure

> **⚠ Warning**
>
> Disconnect electrical power to the entire ice machine before proceeding.

1. Disconnect thermistor from control board and measure resistance.
2. Measure temperature at the thermistor.
3. Compare measured resistance/temperature readings to resistance/temperature relationship chart.
   A. Within 10% of the published resistance value Thermistor is good
   B. Not within 10% of the published resistance value - Thermistor is defective.

CONTROL BOARD OPERATION

1. Disconnect thermistor from control board - The control board thermistor LED will flash 1 second on and 1 second off.
2. The control board will default to the 3.75 minute pump delay in the freeze cycle.

Important

If the ohmmeter reads “OL,” check the scale setting on the meter before assuming the thermistor is bad.

EVAPORATOR THERMISTOR CHART

Temperature of Thermistor		Resistance K Ohms (x1000)
°C	°F	Nominal
-13.0	8.6	65.240
-12.0	10.4	61.730
-11.0	12.2	58.429
-10.0	14.0	55.324
-9.0	15.8	52.402
-8.0	17.6	49.652
-7.0	19.4	47.062
-6.0	21.2	44.623
-5.0	23.0	42.324
-4.0	24.8	40.157
-3.0	26.6	38.114
-2.0	28.4	36.186
-1.0	30.2	34.367
0.0	32	32.650
1.0	33.8	31.030
2.0	35.6	29.499
3.0	37.4	28.052
4.0	39.2	26.685
5.0	41.0	25.393
6.0	42.8	24.170
7.0	44.6	23.014
8.0	46.4	21.919
9.0	48.2	20.882
10.0	50.0	19.901

NOTE: The control board will default to a 3.75 minute pump delay in the freeze cycle, whenever the thermistor is disconnected or reads outside the resistance ranges in the table.

Fan Cycle Control

Function

Cycles the fan motor on and off to maintain proper operating discharge pressure.

The fan cycle control closes on an increase, and opens on a decrease in discharge pressure.

Specifications

Cut-In (Close)	Cut-Out (Open)
140 psig	110 psig

Check Procedure

1. Disconnect electrical power to the ice machine at the electrical service disconnect.
2. Verify fan motor windings are not open or grounded, and fan spins freely.
3. Connect manifold gauge to ice machine.
4. Hook voltmeter in parallel across the fan cycle control, leaving wires attached.
5. Reconnect electrical power to the ice machine and press the power button to ON.
6. Wait until water flows over the evaporator then refer to chart below.

System Pressure:	Reading Should Be:	Fan Should Be:
Above cut-in	0 volts	Running
Below cut-out	Line voltage	Off

Compressor Electrical Diagnostics

The compressor does not start or will trip repeatedly on overload.

Check Resistance (Ohm) Values

NOTE: Compressor windings can have very low ohm values. Use a properly calibrated meter.

Perform the resistance test after the compressor cools. The compressor dome should be cool enough to touch (below 120°F/49°C) to ensure that the overload is closed and the resistance readings will be accurate.

Single Phase Compressors

1. Disconnect power from the condensing unit and remove the wires from the compressor terminals.
2. The resistance values between C and S and between C and R, when added together should equal the resistance value between S and R.
3. If the overload is open, there will be a resistance reading between S and R, and open readings between C and S and between C and R. Allow the compressor to cool, then check the readings again.

Check Motor Windings to Ground

Check continuity between all three terminals and the compressor shell or copper refrigeration line. Scrape metal surface to get good contact. If continuity is present, the compressor windings are grounded and the compressor should be replaced.

To determine if the compressor is seized check the amp draw while the compressor is trying to start.

Compressor Drawing Locked Rotor

The two likely causes of this are:

- Defective starting component
- Mechanically seized compressor

To determine which you have:

1. Install high and low side gauge.
2. Try to start the compressor.
3. Watch the pressures closely.
    - If the pressures do not move, the compressor is seized. Replace the compressor.
    - If the pressures move, the compressor is turning slowly and is not seized. Check the capacitors and relay.

Compressor Drawing High Amps

The continuous amperage draw on start-up should not be near the maximum fuse size indicated on the serial tag.

The wiring must be correctly sized to minimize voltage drop at compressor start-up. The voltage when the compressor is trying to start must be within ±10% of the nameplate voltage.

Filter-Driers

Liquid Line Filter Drier

The filter-drier used on Manitowoc ice machines are manufactured to Manitowoc specifications.

The difference between a Manitowoc drier and an off-the-shelf drier is in filtration. A Manitowoc drier has dirt-retaining filtration, with fiberglass filters on both the inlet and outlet ends. This is very important because ice machines have a back-flushing action that takes place during every harvest cycle.

A Manitowoc filter-drier has a very high moisture removal capability and a good acid removal capacity.

Important

The liquid line drier is covered as a warranty part. The liquid line drier must be replaced any time the system is opened for repair.

Refrigerant Procedures

REFRIGERANT PURGING PROCEDURE

1. Disconnect all electric power to the system and lockout tag out the power source(s).
2. Install piercing valves on the high and low side access fittings.
3. Attach manifold gauge set to the low and high side fittings. Hoses need to be as short as practical, due to the small refrigerant charge.
4. Purge refrigerant from both low and high side.
5. Evacuate the system with a vacuum pump

BRAZING PROCEDURE

6. Always purge nitrogen whenever using a torch. The nitrogen pressure regulator must be equipped with two gauges; One gauge to measure the cylinder pressure, and one to measure the discharge (refrigeration system psig). The pressure regulator must be capable of reducing the pressure to 2 or 3 psig and steadily maintaining this pressure.

PRESSURE TESTING

7. Pressure test with dry nitrogen to detect leaks. Use nitrogen and a trace amount of refrigerant to locate the leak if a pressure test indicates a leak is present.
8. Do not over pressurize the system. Check the name plate for the maximum test pressure.

EVACUATION

9. Slowly release the nitrogen and evacuate to a minimum of 500 microns.

NOTE: Do not start the compressor while it is in a vacuum or energize the compressor with the terminal cover off. Always break a vacuum with refrigerant before energizing (starting) the compressor.

Refrigerant Charging

Due to the small refrigerant quantities, a cap tube in the .50 to .85 ID range with a shutoff valve at the access port can be used to control the flow of refrigerant. The charge accuracy must be within +/- 1% of the nameplate listed charge.

10. Invert the charging bottle, and place on a scale capable of reading grams and ounces.
11. Purge liquid refrigerant to the shutoff valve, then zero out the scale and allow the reading to settle.

NOTE: It is important that the scales and hoses are positioned so that they will not be disturbed when adding refrigerant.

Important

The charge is critical on all Manitowoc ice machines. Use a scale to ensure the proper charge is installed. Quick disconnect fittings are required on the manifold gauge set to prevent refrigerant loss.

12. Add refrigerant through the high side and close the valve just before the nameplate refrigerant amount is reached, then add refrigerant to reach the final charge amount. If all of the refrigerant can not be added to the high side, the remainder can be added as vapor to the low side while the compressor is running.
13. Press the power button.

NOTE: Manifold gauge set must be removed properly to ensure no refrigerant contamination or loss occurs.

14. Verify all of the vapor in the charging hoses is drawn into the refrigeration system before disconnecting the charging hoses.
    A. Run the ice machine in freeze cycle.
    B. Remove the high side low loss fitting.
    C. Open the high and low side valves on the manifold gauge set. Any refrigerant in the lines will be pulled into the low side of the system.
    D. Allow the suction pressures in the refrigeration system and the manifold gauge set to equalize while the ice machine is in the freeze cycle.
    E. Isolate and remove the low side hose.
15. Use a pinch-off tool on the access fitting and remove temporary access valves and seal the refrigeration system.

System Contamination Cleanup

This section describes the basic requirements for restoring contaminated systems to reliable service.

DETERMINING SEVERITY OF CONTAMINATION

System contamination is generally caused by either moisture or residue from compressor burnout entering the refrigeration system.

Inspection of the refrigerant usually provides the first indication of system contamination. Obvious moisture or an acrid odor in the refrigerant indicates contamination.

If either condition is found, or if contamination is suspected use a test kit.

If a refrigerant test kit indicates harmful levels of contamination, or if a test kit is not available, inspect the compressor oil.

1. Remove the refrigerant charge from the ice machine.
2. Remove the compressor from the system.
3. Check the odor and appearance of the oil.
4. Inspect open suction and discharge lines at the compressor for burnout deposits.
5. If no signs of contamination are present, perform an acid oil test to determine the type of cleanup required.

Contamination/Cleanup Chart	
Symptoms/Findings	**Required Cleanup Procedure**
No symptoms or suspicion of contamination	Normal evacuation/ recharging procedure
Moisture/Air Contamination symptoms Refrigeration system open to atmosphere for longer than 15 minutes Refrigeration test kit and/or acid oil test shows contamination No burnout deposits in open compressor lines	Mild contamination cleanup procedure
Mild Compressor Burnout symptoms Oil appears clean but smells acrid Refrigeration test kit or acid oil test shows harmful acid content No burnout deposits in open compressor lines	Mild contamination cleanup procedure
Severe Compressor Burnout symptoms Oil is discolored, acidic, and smells acrid Burnout deposits found in the compressor, lines, and other components	Severe contamination cleanup procedure

MILD SYSTEM CONTAMINATION CLEANUP PROCEDURE

1. Replace any failed components.
2. If the compressor is good, change the oil.
3. Replace the liquid line drier.

NOTE: If the contamination is from moisture, use heat lamps during evacuation. Position them at the compressor, condenser and evaporator prior to evacuation. Do not position heat lamps too close to plastic components, or they may melt or warp.

4. Follow the normal evacuation procedure, except replace the evacuation step with the following:
    A. Pull vacuum to 1000 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of 5 psig.
    B. Pull vacuum to 500 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of 5 psig.
    C. Change the vacuum pump oil.
    D. Pull vacuum to 500 microns. Run the vacuum pump for 1/2 hour on self-contained models, 1 hour on remotes.

NOTE: You may perform a pressure test as a preliminary leak check. You should use an electronic leak detector after system charging to be sure there are no leaks.

5. Charge the system with the proper refrigerant to the nameplate amount.
6. Operate the ice machine.

SEVERE SYSTEM CONTAMINATION CLEANUP PROCEDURE

1. Remove the refrigerant charge.
2. Remove the compressor.
3. If burnout deposits are found, replace the TXV.
4. Wipe away any burnout deposits from suction and discharge lines at compressor.
5. Sweep through the open system with dry nitrogen.
6. Install a new compressor and new start components.
7. Install suction line filter-drier in front of compressor.
8. Install a new liquid line drier.
9. Follow the normal evacuation procedure, except replace the evacuation step with the following:
    A. Pull vacuum to 1000 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of 5 psig.
    B. Change the vacuum pump oil.
    C. Pull vacuum to 500 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of 5 psig.
    D. Change the vacuum pump oil.
    E. Pull vacuum to 500 microns. Run the vacuum pump for 1 additional hour.

10. Charge the system with the proper refrigerant to the nameplate charge.
11. Operate the ice machine for one hour. Then, check the pressure drop across the suction line filter-drier.
    A. If the pressure drop is less than 2 psig, the filter-drier should be adequate for complete cleanup.
    B. If the pressure drop exceeds 2 psig, change the suction line filter-drier and the liquid line drier. Repeat until the pressure drop is acceptable.
12. Operate the ice machine for 48 – 72 hours. Replace the suction line and liquid line drier if necessary.

Total System Refrigerant Charge

Important

This information is for reference only. Refer to the ice machine serial number tag to verify the system charge. Serial plate information overrides information listed on this page.

Model	Air-Cooled	Refrigerant Type
USE0050A	340 grams (12 oz)	R134a

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Cycle Times, 24 Hr. Ice Production and Refrigerant Temperature Charts

These charts are used as guidelines to verify correct ice machine operation.

- Accurate collection of data is essential to obtain the correct diagnosis. Eliminate all non refrigeration problems before diagnosing the refrigeration system.
- Perform a visual inspection for clearances, drains, dirty condenser/filter and water filter replacement.
- Verify water flow is even across the entire evaporator.
- Ice production checks that are within 10% of the chart are considered normal. This is due to variances in water and air temperature. Actual temperatures will seldom match the chart exactly.
- Refer to “Refrigeration Diagnostics” for the list of data that must be collected for refrigeration diagnostics.

USE0050A AIR-COOLED

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°/21°	43-46	46-48	48-52	2-4.5
80°/27°	44-48	48-51	51-55	
90°/32°	52-56	55-57	56-60	
100°/38°	50-57	56-60	62-65	
110°/43°	69-74	70-75	72-78	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°/21°	43	42	41
80°/27°	40	38	37
90°/32°	39	34	33
100°/38°	35	30	30
110°/43°	30	29	28

Based on average harvest weight of 600 to 662 grams (1.32 - 1.46 lbs)

Pressure Chart

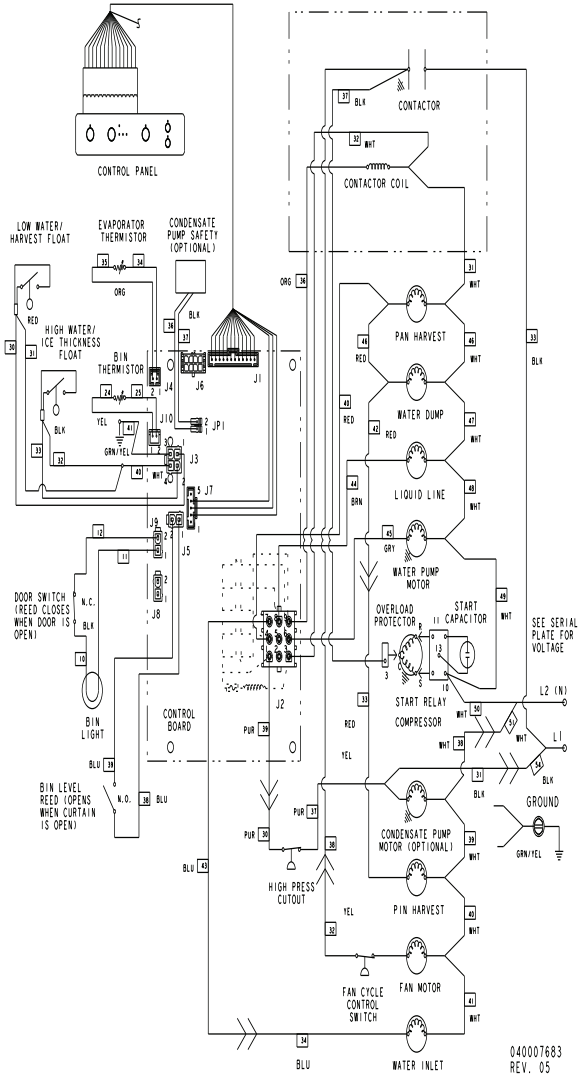
Air Temperature Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG	Discharge Pressure PSIG	Suction Pressure PSIG
50°/10°	140-110	55-0	110-55	30-50
70°/21°	160-115	55-0	125-75	50-75
80°/27°	160-135	45-0	135-80	60-80
90°/32°	220-160	48-1	140-100	75-85
100°/38°	280-180	45-5	160-110	75-90
110°/43°	320-220	60-10	180-110	85-110

Temperature Chart

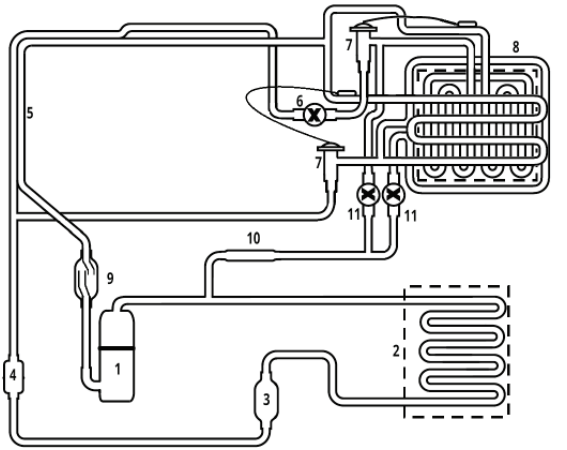
Air Temperature Entering Condenser °F/°C		40°/4°	50°/10°	70°/21°	80°/27°	90°/32°	100°/38°
Freeze Cycle	Discharge Temperature (5)	130-160	104-160	150-160	170-188	170-200	190-215
	Suction Temperature (4)	30-5	34-10	40-10	48-10	56-11	60-11
	Pin HGV1 Inlet (14)	75-90	77-90	80-90	80-90	85-95	90-100
	Pan HGV2 Inlet (17)	75-90	77-90	80-90	80-90	85-95	90-100
Harvest Cycle	Suction Temperature	20-50	35-70	40-70	40-80	42-85	43-90
	Liquid Line Temperature (20)	70-92	78-95	80-95	90-110	100-120	110-140
	Discharge Temperature (5)	145-118	148-120	150-120	160-132	170-143	180-155
	Pan Evaporator Outlet (11)	30-65	33-68	35-70	40-77	45-85	50-90
	Pin Evaporator Outlet (9)	30-65	33-68	35-70	40-77	45-85	50-90

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USE0050A 1Ph Air-Cooled Wiring Diagram



Tubing Schematic



Number	Component
1	Compressor
2	Condenser
3	Receiver
4	Liquid Line Filter Drier
5	Heat Exchanger
6	Liquid Line Solenoid Valve
7	TXV - Thermostatic Expansion Valve
8	Evaporator
9	Suction Accumulator
10	Strainer
11	Harvest Solenoid Valves

MANITOWOC ICE
2110 SOUTH 26TH STREET
MANITOWOC, WI 54220

800-545-5720
WWW.MANITOWOCICE.COM

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