Manitowoc®

UCP0050 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 STH115 Rev 00 04/24

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.
- Refer to nameplate to identify the type of refrigerant in your equipment.
- 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.
- Turn off and lockout all utilities (gas, electric, water) according to approved practices during maintenance or servicing.

⚠ Warning

When installing, using, or servicing this equipment, follow these flammable refrigeration system requirements.

- Refer to the nameplate - The ice machine contains up to 150 grams of R290 (propane) refrigerant. R290 (propane) is flammable in concentrations of air between approximately 2.1% and 9.5% by volume. R290 (propane) may burn if exposed to a heat source above 470 °C. Refer to nameplate to identify the type of refrigerant in your equipment.
- To reduce the risk of fire due to improper installation, replacement of parts, or improper use of procedure, only refrigeration technicians trained in flammable refrigerants who understand the dangers of high voltage electricity and refrigerants under pressure are allowed to work on this equipment.
- Only use parts recommended or provided by the manufacturer.
- This equipment cannot be installed in a corridor or hallway of a public building.
- Equipment installation must comply with local sanitation and fire regulations.
- When servicing this equipment, be sure to lock the circuit breaker, and display an in-service notice.
- This device contains a high-voltage power supply and refrigerant charge. Shorting wires to the cooling system piping may cause an explosion. Before servicing the system, be sure to disconnect all power to the system. Refrigerant leakage can result in serious injury or death from explosion, fire, or contact with refrigerant or lubricant mist.
- Do not damage the refrigeration circuit when installing, maintaining or servicing the unit.

⚠ 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.

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

Safety Notices. 3
Safety Definitions 4

General Information
Model Numbers. 17
How to Read a Model Number. 17
Model/Serial Number Location 18
Warranty 18

Installation
Location of Ice Machine 19
Ice Machine Clearance Requirements 20
Ice Machine Heat of Rejection 20
Leveling the Ice Machine 20
Electrical Requirements 21
Electrical Specifications. 22
Water Service/Drains. 23

Maintenance
Interior Descaling and Sanitizing 27
Descaling and Sanitizing Procedures 28
Remedial Descaling Procedure. 29
De-scaling Procedure 32
Removal of Parts for De-scaling/Sanitizing 35
Removal from Service/Long Term Storage/ Winterization 45

Operation
Ice Making Sequence of Operation. 47
Operational Checks. 50
Water Level 50
Bin Thermostat Adjustment 50
Sequence of Operation 51

Troubleshooting

Ice Machine Will Not Run 57
Installation/Visual Inspection Checklist 63
Water System Checklist 64
Analyzing Discharge Pressures 65
Discharge Pressure High Checklist. 66
Freeze Cycle Discharge Pressure Low Checklist . . 66
Analyzing Suction Pressure 67
Suction Pressure High Checklist 69
Suction Pressure Low Checklist 70
Freeze Cycle Analysis Chart 71
Hot Gas Valve 72
Ice Production Check 75

Component Check Procedures

Main Fuse 81
Bin Thermistor 82
Liquid Line Thermistor. 85
Temperature/Resistance Chart. 87
Fan Cycle Control. 88
Compressor Electrical Diagnostics. 89
Filter-Driers 91
Refrigerant Procedures 92
System Contamination Cleanup. 98
Total System Refrigerant Charge 102

Charts

Cycle Times, 24 Hr. Ice Production and Refrigerant Temperature Charts 103

Diagrams

Wiring Diagram 107
Tubing Schematic 108

THIS PAGE INTENTIONALLY LEFT BLANK

THIS PAGE INTENTIONALLY LEFT BLANK

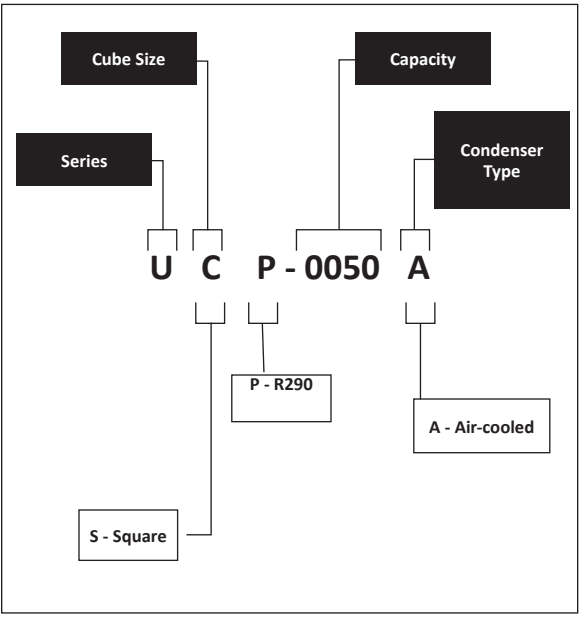
General Information

Model Numbers

This manual covers the following models:

Self-contained Air-cooled
UCP0050A

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.

Installation

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 110°F (43°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.

MINIMUM CUT-OUT FOR BUILT-IN INSTALLATION

Height	Width	Depth
35” (89 cm)	15” (38 cm)	26” (65 cm)

Ice Machine Clearance Requirements

Self-contained Air-cooled*	
Top/Sides	5" (13 cm)
Back	5” (13 cm)
Front	24” (61 cm)

*The ice machine may be built into a cabinet.

Ice Machine Heat of Rejection

Air Conditioning: 1,145 BTU/hr (289 kcal/hr)

Peak: 2,300 BTU/hr (560 kcal/hr)

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.

Minimum Circuit Amapcity

The minimum circuit ampacity is used to help select the wire size of the electrical supply. (Minimum circuit ampacity is not the ice machine's running amp load.)

Manitowoc's recommended minimum wire size is #14 for less than 100' or #12 for more than 100' to 200' (solid copper conductor only). The recommended breaker is 15 amp. Local or state electrical code, length of run or materials used, can increase the minimum wire gauge required. A qualified electrician must determine the proper wire size, although #14 is the minimum size allowed.

Electrical Specifications

Air-cooled Ice Machine

Ice Machine	Voltage Phase Cycle	Max. Fuse/ Circuit Breaker	Min. Circuit Ampacity
UCP0050A	115/1/60	15 amp	4.1 amp
NOTE: Model/serial plate information overrides all data listed in this chart. Power cord: 6 ft (182 cm), NEMA 5-15P plug			

⚠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.

NOTE: Do not use an extension cord, two-prong adapter, or remove the power cord ground prong

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

- Plumbing must conform to state and local codes
- 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 PUMP OPTION

Disconnect power to ice machine before proceeding.

1. Remove top cover screws and slide cover off. Remove back panel screws and lift panel off.
2. Assemble the outlet tube and vent tube to the drain pump.
3. Plug the drain pump's wire assembly into the ice machine's wire assembly. Slide drain pump into cavity.
4. Swap out existing Bin Drain Tube for Bin Drain Tube packaged with drain pump.
5. Route the vent tube and outlet tube.
6. Reassemble ice machine.

NOTE: See instructions packaged with drain pump for details. Upon activation, be sure to check all connections for water leakage.

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	35°F (1.6°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

Water Filter: AR-2800

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 Metal Safe Descaler (000000084) 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 metal safe 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 Metal Safe Descaler (part number 000000084) and Sanitizer (part number 9405653) only.

Remedial Descaling Procedure

This procedure allows monthly in place de-scaling of all surfaces that come in contact with the water system. The ice machine requires disassembly and de-scaling/sanitizing a minimum of once every 12 months. The quality of your potable water supply may require more frequent de-scaling intervals.

Ice machine Metal Safe De-scaler is used to remove lime scale and mineral deposits. Ice machine Sanitizer disinfects and removes algae and slime.

NOTE: All ice must be removed from the bin.

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.

NOTE: All ice must be removed from the bin.

Step 1 Prepare 4 oz (1/2 cup) of undiluted Manitowoc Ice Machine Metal Safe De-scaler (part number 000000084 only) in a container that will fit easily under the lifted water shutters. Refer to “Component Identification” identify the water shutters.

Model	Amount of Metal Safe De-scaler 000000084
UCP0050	4 ounces (120 ml)

Step 2 Press the Clean button. The ice machine will initiate a 2 minute harvest to remove any remaining ice from the evaporator.

Step 3 Remove all ice from the bin.

Step 4 Wait 3 minutes until the Clean light flashes, then add the prepared Metal Safe De-scaler by lifting the water shutters and pouring directly into the spray area.

Step 5 The ice machine will automatically time out a ten minute de-scaling cycle, followed by eight rinse cycles, and stop. The Clean light will turn off to indicate the cycle is complete. This entire cycle lasts approximately 30 minutes.

Step 6 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 9405653
UCP0050	1/2 Ounce (15ml)

Step 7 Press the Clean button. Wait 3 minutes until the Clean light flashes, then add the prepared Manitowoc Sanitizer by lifting the water shutters and pouring directly into the spray area. The ice machine will automatically time out a ten minute sanitizing cycle, followed by eight rinse cycles, and stop. The Clean light will turn off to indicate the sanitizing cycle is complete. This entire cycle lasts approximately 30 minutes.

NOTE: The ice machine will automatically continue from the previous point before the cycle was initiated.

A. If the ice machine was in the ice making cycle, the control board will start ice making again.

B. If the ice machine was in the off cycle, the control board will turn off.

Step 8 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.

De-scaling Procedure

Ice machine Metal Safe De-scaler is used to remove lime scale and mineral deposits. Ice machine Sanitizer disinfects and removes algae and slime.

NOTE: All ice must be removed from the bin.

Step 1 Prepare 4 oz (1/2 cup) of undiluted Manitowoc Metal Safe De-scaler (part number 000000084 only) in a container that will fit easily under the lifted water shutters. Refer to "Component Identification" to identify the water shutters.

Model	Amount of Metal Safe De-scaler 000000084
UCP0050	4 oz. (120 ml)

Step 2 Press the Clean button. The ice machine will initiate a 2 minute harvest to remove any remaining ice from the evaporator.

Step 3 Remove all ice from the bin.

Step 4 Wait 3 minutes until the Clean light flashes, then add the prepared Manitowoc Metal Safe De-scaler by lifting the water shutters and pouring directly into the spray area. The ice machine will automatically time out a ten minute de-scaling cycle, followed by eight rinse cycles, and stop. The Clean light will turn off to indicate the cycle is complete. This entire cycle lasts approximately 30 minutes.

Step 5 When the de-scaling process stops, disconnect power and remove all parts as described in Removal of Parts for De-scaling and Sanitizing.

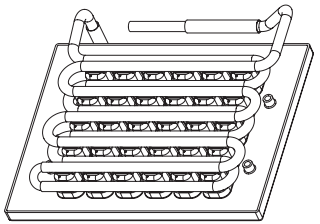
Step 6 Mix 16 oz (2 cups) Manitowoc Metal Safe De-scaler with 2 gal of warm water.

Model	Amount of Metal Safe Descaler 000000084	Water Amount
UCP0050	16 oz (473 ml)	2 gal. (8L)

Step 7 Take all removed components to a sink for

de-scaling. Use 1/2 of the Manitowoc Metal Safe De-scaler/water mixture to de-scale all components. The metal safe de-scaler 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 de-scale the parts.

Step 8 While components are soaking, use the other 1/2 of the Manitowoc Metal Safe De-scaler/water solution and a nylon brush or cloth to de-scale inside of ice bin. De-scale inside of door, door gasket, bin, top of evaporator and evaporator bucket. Rinse all areas thoroughly with clean water



De-scale The Top Of The Evaporator With A Brush

Step 9 Mix 1 oz (2 tablespoons) sanitizer with 2 gal of warm water.

Model	Sanitizer Amount 9405653	Water Amount
UCP0050	1 oz (30ml)	2 gal (8L)

Step 10 Use 1/2 of the sanitizer/water mixture to sanitize all removed components. Use a cloth or sponge to liberally apply the solution to all surfaces of the removed parts or soak the removed parts in the sanitizer/solution. Rinsing is not required.

Step 11 Use the other 1/2 of the sanitizer/water solution and a sponge or cloth to sanitize the inside of ice bin. Sanitize inside of door, door gasket, bin, top of evaporator and evaporator bucket. Rinsing is not required.

Step 12 Replace all removed components.

Step 13 Prepare 1/2 oz (1 tablespoon) of undiluted Manitowoc Sanitizer.

Step 14 Reapply power to the ice machine, then press the Clean button. Wait 3 minutes until the Clean light flashes, then add the prepared Manitowoc Sanitizer by lifting the water shutters and pouring directly into the spray area.

Step 15 The ice machine will automatically time out a ten minute sanitizing cycle, followed by eight rinse cycles, and stop. The Clean light will turn off to indicate the sanitizing cycle is complete. This entire cycle lasts approximately 30 minutes.

NOTE: The ice machine will automatically continue from the previous point before the cycle was initiated.

A. If the ice machine was in the ice making cycle, the control board will start ice making again.

B. If the ice machine was in the off cycle, the control board will turn off.

Removal of Parts for De-scaling/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 de-scaled 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 De-scaler or Sanitizer.

4. Soak the removed part(s) in a properly mixed solution of de-scaler.

Solution Type	Water	Solution Amount
De-scaler 000000084	1 gal. (4 l)	8 oz (240 ml)
Sanitizer 9405653	2 gal. (8 l)	1 oz (30 ml)

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

⚠Caution

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

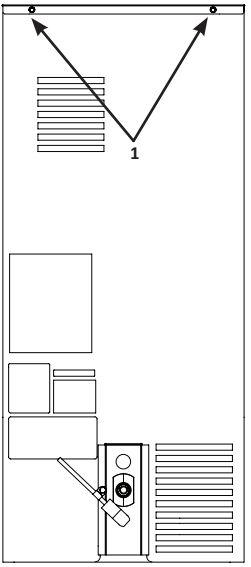
⚠Caution

Do not immerse the water pump motor in the de-scaling or sanitizing solution.

6. Thoroughly rinse all the parts with clear 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 sponge or cloth to sanitize (wipe) the interior of the ice machine and bin.
10. Rinsing is not required 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.



FRONT GRILL

1. Remove two screws.
2. Tilt top forward and lift.

WATER SHUTTERS

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

TO REMOVE JUST THE WATER SHUTTERS:

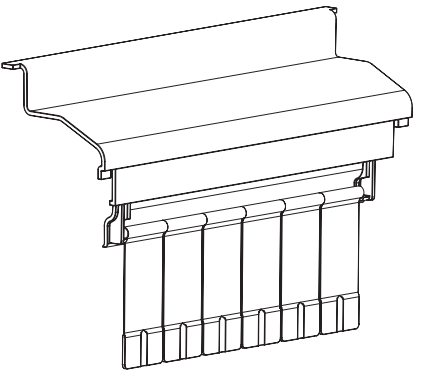
1. Grasp one end of the water shutter and lift up.
2. Pivot water shutter and disengage remaining end.
3. To re-install into ice machine, grasp one end of the water shutters, install one end, pivot the opposite end and pull down into position. Make sure tabs are secure in grooves.

TO REMOVE WATER SHUTTER ASSEMBLY:

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

⚠Warning

Removing the water shutters 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.

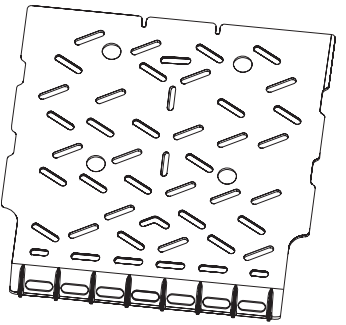


Ice Chute

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.

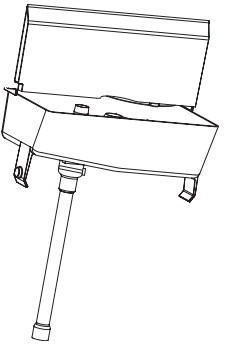
1. Grasp and lift up and forward to remove.
2. Reverse procedure to re-install ice chute and position over Water Distribution Assembly.

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



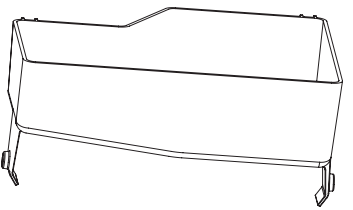
SUMP DRAIN OVERFLOW TUBE

1. Remove clamp.
2. Pull down to remove overflow tube and tubing as an assembly. The sump trough water will drain into the bin.
3. Remove overflow tube from vinyl tubing by pulling.



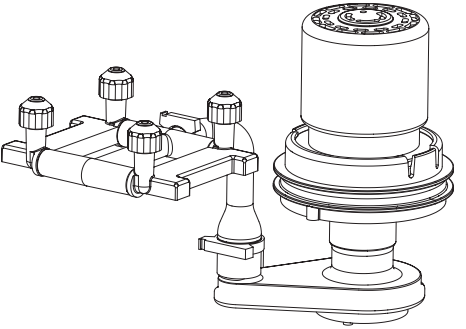
Water Trough

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.

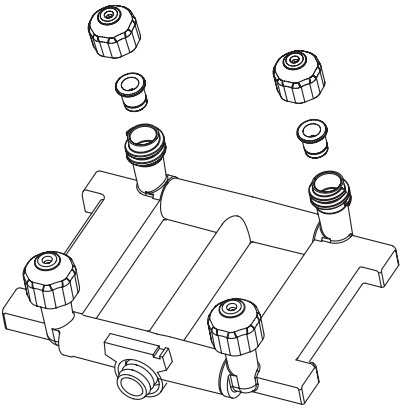


Spray Bar Disassembly

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 descaling by unscrewing nozzles. Inserts are located inside the spray bar ports. The spray bar also disassembles for easy descaling.



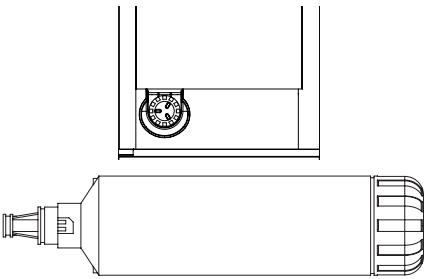
Bin Light

If the ice machine is shut down for a long period of time the bin light cover must be de-scaled 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.

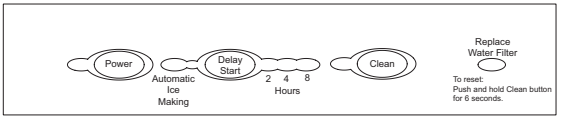
- Clean the condenser at least every six months.
- Shine a flashlight through the condenser to check for dirt between the fins.
- Compressed air can be blown through the condenser fins. This procedure will raise considerable dust and is best performed outside. Be careful not to bend the fan blades.
- 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

1. Perform a de-scaling and sanitizing procedure to prevent mildew growth.
2. Disconnect the electric power at the circuit breaker or the electric service switch.
3. Turn off the water supply.
4. Remove the water from the water trough.
5. Disconnect and drain the incoming ice-making water line at the rear of the ice machine.
6. Disconnect vinyl hose from water pump and allow to drain.
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.
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.
9. Block the door partially open to provide air exchange and prevent mildew growth.

THIS PAGE INTENTIONALLY LEFT BLANK

Ice Making Sequence of Operation



FUNCTIONS

Power Button (Green)

Pressing the “Power” button once will “power on” the ice machine and green Power light. Pressing the “Power” button a second time will “power off” the ice machine.

Automatic Ice Making Light (Blue)

This light is ON when the ice machine is the ice making position. The light is OFF when the ice machine is in the CLEAN cycle (de-scaling or sanitizing).

Delay Start

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

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

Clean (Green)

Pressing the “CLEAN” button will initiate a clean cycle and de-energize the “Automatic Ice Making” light. The clean light will flash during the clean cycle to indicate the proper time to add ice machine metal safe cleaner/de-scaler 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.

REPEAT DELAY PERIOD EVERY 24 HOURS

1. Press power button to stop the ice machine.
2. Press the delay button - The power LED will energize and the 2 hour delay LED will blink 3 seconds on and 1/2 second off to indicate a 2 hour delay is in effect every 24 hours.
3. Pressing the delay button again will energize the 4 hour light and initiate a four hour delay period every 24 hours.
4. Pressing the delay button again will energize the 8 hour light and initiate an eight hour delay period every 24 hours.
5. Pressing the 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 3 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 24 hour delay period

- Press the power button while a delay period is active.
- Follow “Repeat Delay Period every 24 Hours” to step 5.
- Disconnect/reconnect the main power supply

Operational Checks

Manitowoc ice machines are factory-operated and adjusted before shipment. Normally, new installations do not require any adjustment.

To ensure proper operation, always follow the Operational Checks:

- when starting the ice machine for the first time
- after a prolonged out of service period
- after de-scaling and sanitizing

NOTE: Routine adjustments and maintenance procedures are not covered by the warranty.

WATER LEVEL

The ice machine maintains the correct water level. The water level is not adjustable.

BIN THERMOSTAT ADJUSTMENT

The bin thermostat stops the ice machine when the bin is full. Turn the thermostat to the left to decrease the level of ice in bin or to the right to increase the level of ice in bin.

Sequence of Operation

Depending on ambient conditions and cold water supply temperature, the ice making process will take approximately 30 minutes.

Step 1 Initial Start-Up or Start-Up After Automatic Shut- Off — Water Fill

Before the compressor starts, the water inlet valve will energize to purge old water from the system for about 3 minutes.

Step 2 Refrigeration System Start-Up

The compressor starts after the Water Fill cycle and remains on throughout the Freeze and Harvest cycles. The condenser fan motor starts and runs throughout the Freeze cycle.

Step 3 Freeze

The water pump sprays water into the inverted cups. The water freezes layer by layer, until an ice cube forms in each cup. The control system will adjust the length of the Freeze cycle to conditions.

Step 4 Harvest

The water pump shuts off and the water inlet valve starts up to assist harvest and refill the water sump. The evaporator is warmed, allowing the cubes to release from the evaporator and drop into the storage bin. The control system will adjust length of time the ice machine remains in the harvest cycle and when the condenser fan motor is on or off during the harvest cycle. At the end of the harvest cycle the ice machine will start another freeze cycle (step 3).

Step 5 Automatic Shut-Off

The level of ice in the storage bin controls the ice machine shut-off. When the bin is full, ice will contact the bin thermostat bulb holder. The bin thermostat bulb cools, which stops the ice machine. The ice machine remains off until ice no longer contacts the bin thermostat bulb holder and the thermostat bulb warms up. The increase in temperature will restart the ice machine (step 1).

SAFETY TIMERS

The control board has the following non-adjustable safety timers:

- Initial cycle is 5 minutes longer than subsequent cycles.
- The ice machine is locked into the freeze cycle for 10 minutes (15 minutes initial cycle) before a harvest cycle can be initiated.
- The maximum freeze time is 120 minutes at which time the control board automatically initiates a harvest cycle (step 4).
- The maximum harvest time is 5 minutes at which time the control board automatically starts a freeze cycle

Ice Making Sequence of Operation	Water Pump	Water Inlet Valve	Harvest Valve	Compressor	Fan Motor	Length of Time
Initial Start-up 1. Water purge	On	On	On	Off	Off	175 Seconds
2. Refrigeration System Start-up	On	On	On	On	On	5 seconds
Freeze Cycle	On	Off	Off	On	On	Automatically determined*
4.Harvest	Off	On	On	On	On or off	Automatically determined*
7. Automatic Shutoff	Off	Off	Off	Off	Off	Until bin Thermostat Re-closes

* Liquid line thermistor determines the length of the freeze and harvest cycles. Liquid line temperature also determines fan motor operation during the harvest cycle.

THIS PAGE INTENTIONALLY LEFT BLANK

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.
Ice machine stops, and can be restarted by turning the ice machine OFF/ ON.	Service Limit Feature stopping the ice machine.	Refer to “Service Limit Feature”
Ice sheet is thick.	Power button was turned OFF/ON during freeze cycle and ice remained on evaporator.	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 temperature must be at least 40° F (4°C).
Ice machine does not cycle into harvest mode.	The 6-minute freeze time lock-in has not expired yet.	Wait for freeze lock-in to expire.
	Uneven ice fill.	Clean the ice machine.
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.	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.

Problem	Possible Cause	Correction
Low ice capacity.	High air temperature around ice machine (air-cooled models).	Air temperature must not exceed 110° F (43°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.

SERVICE LIMIT FEATURE

In addition to the standard safety controls, such as the high pressure cutout, your Manitowoc ice machine features built-in Service Limits, which will stop the ice machine if conditions arise which could cause a major component failure.

Re-start the ice machine using the following procedure:

1. Press the Power button to turn off the ice machine, then press the Power button again to start the ice machine.
   A. If the Safety Limit Feature has stopped the ice machine, it will restart after a short delay. Proceed to step 2.
   B. If the ice machine does not restart, see “Ice machine does not operate” on the previous page.
2. Allow the ice machine to run to determine if the condition is recurring.
   A. If the ice machine stops again, the condition has recurred.
   B. If the ice machine continues to run, the condition has corrected itself. Allow the ice machine to continue running.

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 ice machine.
2. Verify that the fuse or circuit breaker is closed and the ice machine is plugged into a receptacle.
3. Verify control board fuse is OK.
4. Verify the transformer is supplying power to the control board.
   - If the interior light functions or the red control board light is energized the transformer is OK.
   - If the transformer is supplying power to the control board and the red control board light will not energize, replace the control board.
5. Verify the “Power” switch functions properly.
   - If the red control board light is energized and depressing the “Power” switch does not energize the green “Power” light, check the interconnecting wire, then replace the interface board.
6. Verify the bin thermostat functions properly.
   - The green “Power” light will be energized and the ice machine will function in the “Clean” cycle when the bin thermostat is open.
7. Check control board light to see if ice machine shutdown on over temperature limit (control board light will flash rapidly).
8. Replace the control board.
   - Be sure Steps 1-6 were followed thoroughly. Intermittent problems are not usually related to the control board.

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

1. Verify cubes are present in evaporator and freeze time exceeds freeze chart cycle time.
    - Initial freeze cycle after resetting at toggle switch will be 5 minutes longer than chart time (refer to "Sequence of Operation").
    - Verify control board is not set for additional freeze time to fill out the ice cubes, see "Cube Weight Adjustment."
2. Observe control board light:
    - Steady light indicates thermistor operation is normal.
    - Slow flash indicates a thermistor problem (open or disconnected). Verify liquid line thermistor is connected to control board, securely attached to liquid line and insulated. Refer to Resistance chart and Ohm thermistor.
    - Rapid flash indicates liquid line temperature exceeded 170°F (76.7°C) (refer to "Discharge Pressure High Checklist"). If unable to determine cause, refer to Resistance chart and Ohm thermistor.
3. Reset ice machine.
    - Wait freeze cycle time plus an additional 5 minutes (refer to "Sequence of Operation").

4. Verify the water inlet valve is energized during the entire harvest cycle and water flow is normal.
    - Although the hot gas valve is energized, the ice machine will not consistently harvest if the water inlet valve does not energize or has low water flow.
    - Check for power at the hot gas valve
    - Power is present – replace coil/valve.
    - No power at hot gas valve – check for power at circuit board connector, replace control board if no power is present.

ICE QUALITY IS POOR - CUBES ARE SHALLOW, INCOMPLETE, OR WHITE

Ice machine is dirty

- Clean and sanitize the ice machine Water filtration is poor

Water filtration is poor

- Replace the filter

Water softener is working improperly (if applicable)

- Repair the water softener

Poor incoming water quality

- Contact a qualified company to test the quality of the incoming water and make appropriate filter recommendations

Water escaping from sump during freeze cycle

- Check standpipe and drain
- Check for water tracking out of water circuit

FREEZE CYCLE IS LONG, LOW ICE PRODUCTION

Water temperature is too high

- Connect to a cold water supply, verify check valves in faucets and other equipment are functioning correctly

Dirty Condenser

- Clean condenser

High air temperature entering condenser

- Air temperature must not exceed 120°F (39°C) Water inlet valve filter screen is dirty

Water inlet valve filter screen is dirty

- Remove the water inlet valve and clean the filter screen

Water inlet valve stuck open or leaking

- Turn off ice machine, if water continues to enter ice machine, verify water pressure is OK then replace water inlet valve

Water Inlet Valve is Not Working

- Water inlet valve must be replaced

Refrigeration Problem

- Refer to refrigeration diagnostics

Water Escaping from Sump During Freezing

- Check standpipe and drain
- Check for water tracking out of water circuit

ICE MACHINE RUNS AND NO ICE IS PRODUCED

No water to ice machine

- Correct water supply

Incorrect incoming water pressure

- Water pressure must be 20-80 psi (1.4-5.5 bar)

Spray nozzle is blocked with mineral buildup

- Clean and sanitize the ice machine

Ambient temperature is too high or low

- Ambient temperature must be between 50°F and 110°F (10°C and 43°C)

Thermistor Disconnected or Open

- Refer to thermistor diagnostics

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.

Analyzing Discharge Pressures

1. Determine the ice machine operating conditions:
   - Air temp. entering condenser _____
   - Air temp. around ice machine _____
   - Water temp. entering sump trough _____
2. Refer to "Cycle Times, 24 Hr. Ice Production and Refrigerant Pressure Charts" for ice machine being checked.

Use the operating conditions determined in step 1 to find the published normal discharge pressures.

- Freeze Cycle _____
- Harvest Cycle_____

3. Perform an actual discharge pressure check.

	Freeze Cycle PSIG	Harvest Cycle PSIG
Beginning of Cycle		
Middle of Cycle		
End of Cycle		

4. Compare the actual discharge pressure (step 3) with the published discharge pressure (step 2).

The discharge pressure is normal when the actual pressure falls within the published pressure range for the ice machine's operating conditions. It is normal for the discharge pressure to be higher at the beginning of the freeze cycle (when load is greatest), then drop throughout the freeze cycle.

Discharge Pressure High Checklist

Improper Installation

- Refer to “Installation and Visual Inspection Checklist”

Restricted Condenser Air Flow

- High inlet air temperature
- Condenser discharge air re-circulation
- Dirty condenser fins
- Defective fan motor

Improper Refrigerant Charge

- Overcharged
- Non-condensible in system
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- High side refrigerant lines/component restricted (before mid-condenser)

Freeze Cycle Discharge Pressure Low Checklist

Improper Installation

- Refer to “Installation and Visual Inspection Checklist”

Improper Refrigerant Charge

- Undercharged
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- High side refrigerant lines/component restricted (before mid-condenser)
- Ambient temperature too low.

NOTE: Do not limit your diagnosis to only the items listed in the checklists.

Analyzing Suction Pressure

The suction pressure gradually drops throughout the freeze cycle. The actual suction pressure (and drop rate) changes as the air and water temperature entering the ice machine changes. These variables also determine the freeze cycle times.

To analyze and identify the proper suction pressure drop throughout the freeze cycle, compare the published suction pressure to the published freeze cycle time.

NOTE: Analyze discharge pressure before analyzing suction pressure. High or low discharge pressure may be causing high or low suction pressure.

PROCEDURE

Step
Determine the ice machine operating conditions. Example: • Air temp. entering condenser: 90°F/32.2°C • Air temp. around ice machine: 80°F/26.7°C • Water temp. entering water fill valve: 70°F/21.1°C
Refer to “Cycle Time” and “Operating Pressure” charts for ice machine model being checked. Using operating conditions from Step 1, determine published freeze cycle time and published freeze cycle suction pressure. Example: • Published freeze cycle time: 19.1 - 21.7 minutes • Published freeze cycle suction pressure: 20 - 3 psig
Compare the published freeze cycle time and published freeze cycle suction pressure. Develop a chart. Example: Published Freeze Cycle Time (minutes) 1 5 10 15 20 | | | | | 20 16 12 8 3 Published Freeze Cycle Suction Pressure (psig) In the example, the proper suction pressure should be approximately 16 psig at 5 minutes; 12 psig at 10 minutes; etc.

Perform an actual suction pressure check at the beginning, middle and end of the freeze cycle. Note the times at which the readings are taken. Example: Manifold gauges were connected to the example ice machine and suction pressure readings taken as follows: _____ psig Beginning of Freeze cycle: 30 (at 1 min.) Middle of freeze cycle: 22 (at 10 min.) End of freeze cycle: 8 (at 20 min.)
Compare the actual freeze cycle suction pressure (step 3) to the published freeze cycle time and pressure comparison (step 2B). Determine if the suction pressure is high, low or acceptable Example: In this example, the suction pressure is considered high throughout the freeze cycle. It should have been: Approximately 20 psig (at 1 minute) – not 30 Approximately 12 psig (at 10 minutes) – not 22 Approximately 3 psig (at 20 minutes) – not 8

Suction Pressure High Checklist

Improper Installation

- Refer to “Installation and Visual Inspection Checklist”

Discharge Pressure

- Discharge pressure is too high, and is affecting suction pressure, refer to “Discharge Pressure High Checklist” on page 150.

Improper Refrigerant Charge

- Overcharged
- Wrong type of refrigerant
- Non-condensible in system

Other

- Non-Manitowoc components in system
- Hot gas valve leaking
- Defective compressor
- Water inlet valve leaking

Suction Pressure Low Checklist

Improper Installation

- • Refer to “Installation and Visual Inspection Checklist”

Discharge Pressure

- Discharge pressure is too low, and is affecting suction pressure, refer to “Freeze Cycle Discharge Pressure Low Checklist” on page 150.

Improper Refrigerant Charge

- Undercharged
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- Improper water supply over evaporator refer to “Water System Checklist”
- Loss of heat transfer from tubing on back side of evaporator
- Restricted/plugged liquid line drier
- Restricted/plugged tubing in suction side of refrigeration system

NOTE: Do not limit your diagnosis

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						

Hot Gas Valve

GENERAL

The hot gas valve is an electrically operated valve that opens when energized, and closes when de-energized.

NORMAL OPERATION

The valve is de-energized (closed) during the freeze cycle and energized (open) during the harvest cycle. The valve is positioned between the receiver and the evaporator and performs two functions:

1. Prevents refrigerant from entering the evaporator during the freeze cycle. The hot gas valve is not used during the freeze cycle. The hot gas valve is de-energized (closed) preventing refrigerant flow from the receiver into the evaporator.

2. Allows refrigerant vapor to enter the evaporator in the harvest cycle. During the harvest cycle, the hot gas valve is energized (open) allowing refrigerant gas from the discharge line of the compressor to flow into the evaporator. The heat is absorbed by the evaporator and allows release of the ice slab.

Exact pressures vary according to ambient temperature. Harvest pressures can be found in the “Cycle Time/24 Hour Ice Production/Refrigerant Pressure Charts” in this book.

Hot Gas Valve Analysis

The valve can fail in two positions:

- Valve will not open in the harvest cycle.
- Valve remains open during the freeze cycle.

VALVE WILL NOT OPEN IN THE HARVEST CYCLE

Although the circuit board has initiated a harvest cycle, the evaporator temperature remains unchanged from the freeze cycle.

VALVE REMAINS OPEN IN THE FREEZE CYCLE

Symptoms are dependent on the amount of leakage in the freeze cycle. A small amount of leakage will cause increased freeze cycle times. A large amount of leakage will result in no ice produced.

Use the following procedure and table to help determine if a hot gas valve is remaining partially open during the freeze cycle.

Feeling the hot gas valve outlet or across the hot gas valve itself will not work for this comparison. The hot gas valve outlet is on the suction side (cool refrigerant). It may be cool enough to touch even if the valve is leaking.

The inlet of the hot gas valve and the compressor discharge line could be hot enough to burn your hand. Just touch them momentarily.

1. Wait five minutes into the freeze cycle.
2. Feel the inlet of the hot gas valve(

Important

Feeling the hot gas valve outlet or across the hot gas valve itself will not work for this comparison. The hot gas valve outlet is on the suction side (cool refrigerant). It may be cool enough to touch even if the valve is leaking.

3. Feel the compressor discharge line.

⚠Warning

The inlet of the hot gas valve and the compressor discharge line could be hot enough to burn your hand. Just touch them momentarily.

4. Compare the temperature of the inlet of the hot gas valves to the temperature of the compressor discharge line.
5. Record your findings on the table.

Findings	Comments
The inlet of the harvest valve is cool enough to touch and the compressor discharge line is hot. **Cool and Hot**	This is normal as the discharge line should always be too hot to touch and the harvest valve inlet, although too hot to touch during harvest, should be cool enough to touch after 5 minutes into the freeze cycle.
The inlet of the harvest valve is hot and approaches the temperature of a hot compressor discharge line. **Hot & Hot**	This is an indication something is wrong, as the harvest valve inlet did not cool down during the freeze cycle. If the compressor dome is also entirely hot, the problem is not a harvest valve leaking, but rather something causing the compressor (and the entire ice machine) to get hot.
Both the inlet of the harvest valve and the compressor discharge line are cool enough to touch. **Cool & Cool**	This is an indication something is wrong, causing the compressor discharge line to be cool to the touch. This is not caused by a harvest valve leaking.

Ice Production Check

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 81, 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 <?>. 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.

ADJUSTING CUBE WEIGHT

The cube weight can be increased from the factory setting by adjusting the finish time.

ADDITIONAL FINISHING TIME CHECK

Press and hold the power button for 5 seconds.

- Count the flashes on the Automatic Ice Making light. The light will flash once for each additional minute of freeze cycle time.

ADJUSTING FINISHING TIME

Adjust in 1-minute increments and allow the ice machine to run several freeze/harvest cycles, and then inspect the ice cubes. If a heavier cube weight is desired add another minute of freeze time and repeat the process.

Press and hold the power button.

- Press and release the clean button once for each additional minute of freeze cycle time desired. Five minutes is the maximum additional freeze time that can be added. Pressing the clean button 6 times will reset the finishing time to zero additional minutes.

THIS PAGE INTENTIONALLY LEFT BLANK

Main Fuse

⚠Warning

Disconnect electrical power to the entire ice machine before proceeding.

Function

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

Specifications

The main fuse is 250 Volt, 10 amp.

Check Procedure

1. If the bin switch light is on with the ice damper closed, the fuse is good.
2. If the light is not on: Remove the fuse. Check the resistance across the fuse with the ohmmeter.

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

Bin Thermistor

Function

The bin thermostat stops the ice machine when the bin is full. It is preset for normal ambient temperatures and adjustments are usually not required.

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 thermostat bulb holder, which cools down and opens the bin thermostat to stop the ice machine. The ice machine remains off until enough ice has been removed from the bin. This causes the thermostat bulb holder to warm and closes the bin thermostat, restarting the ice machine.

The thermostat is functioning correctly if, when three ice cubes are placed on the thermostat tube for 5 minutes, the ice machine stops. The ice machine should restart 5 minutes after the cubes are removed.

Specifications

Control	Setting
Bin Thermostat	Cut in: 40°F (4.5°C) Cut out: 34°F (1.0°C)

Adjustment

⚠Warning

Power is supplied to ice machine during this procedure. Avoid contact with the fan blade and electrical connections.

If the ice machine stops before the bin is full or runs after the bin is full, ambient temperatures are probably high or low and the bin thermostat can be adjusted as follows:

1. To access the thermostat, remove the two screws attaching the front grill and remove the grill.
2. Remove the lower white plastic panel by pulling straight down.
3. Turn the thermostat to the left to decrease the level of ice before automatic shut-off. Turn to the right to increase the level of ice before automatic shut-off.
4. Reassemble the plastic panel and grill.

CHECK PROCEDURE

⚠Warning

High (line) voltage is applied to the control board (terminals #20 and #21) at all times. Removing the control board fuse or depressing the power button will not remove the power supplied to the control board.

⚠Warning

Disconnect electrical power to the entire ice machine before proceeding.

1. Verify the capillary tube is inserted correctly in the bulb holder (17”/43 cm).
2. Remove the 2 bottom front panels to access the bin thermostat.
3. Disconnect wires #45 and #46 from the bin thermostat or control board and check the resistance across the bin thermostat terminals.

No Ice on Bulb	Ice on Bulb	Result
Closed (O)	Open (OL)	Thermostat good
Open (OL)	Closed (O)	Replace Thermostat

NOTE: After covering/uncovering the bulb holder with ice, wait at least three minutes to allow the thermostat to react. (Open/Close)

Liquid Line Thermistor

NOTE: Use only Manitowoc thermistors.

FUNCTION

The liquid line thermistor senses the refrigeration system liquid line temperature. This is used in conjunction with the control board to determine the length of the freeze and harvest cycles.

SPECIFICATIONS

10,000 Ohms ± 2% at 25°C (77°F)

CHECK PROCEDURE

Thermistors generally fail because of moisture or physical damage. Manitowoc liquid line thermistors are encased in a specially designed, moisture-sealed aluminum block. This eliminates physical damage and moisture concerns.

Verify that the thermistor resistance is accurate and corresponds to the high and low temperature ranges.

1. Disconnect the thermistor at the control board. Connect the ohmmeter to the isolated thermistor wire leads.
2. Using a temperature meter capable of taking readings on curved copper lines, attach the temperature meter sensing device to the liquid line next to the thermistor aluminum block.

Important

Do not simply “insert” the sensing device under the insulation. It must be attached to and reading the actual temperature of the copper liquid line.

3. With the ice machine running, verify that the temperature of the discharge line (step 2) corresponds to the thermistor resistance reading (step 1) as stated in the temperature/resistant chart.

Important

If the thermistor would fail closed, the light on the control board will flash rapidly. If the thermistor would fail open, the light on the control board will flash slowly.

Temperature/Resistance Chart

As the temperature rises at the thermistor block, the resistance drops.

Important

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

Temperature of Thermistor		Resistance
°C	°F	K Ohms (x 1000)
15.6° - 21.1°	60° - 70°	15.31 - 11.88
21.1° - 26.7°	70° - 80°	11.88 - 9.29
26.7° - 32.2°	80° - 90°	9.29 - 7.33
32.2° - 37.8°	90° - 100°	90° - 100°
37.8° - 43.3°	100° - 110°	5.82 - 4.66
43.3° - 48.9°	110° - 120°	4.66 - 3.75
48.9° - 54.4°	120° - 130°	3.75 - 3.05
54.4° - 60.0°	130° - 140°	3.05 - 2.49
60.0° - 65.6°	140° - 150°	2.49 - 2.04
65.6° - 71.1°	150° - 160°	2.04 - 1.68
71.1° - 76.7°	160° - 170°	1.68 - 1.40
76.7° - 82.2°	170° - 180°	1.40 - 1.17
82.2° - 87.8°	180° - 190°	1.17 - 0.98
87.8° - 93.3°	190° - 200°	0.98 - 0.82
93.3° - 98.9°	200° - 210°	0.82 - 0.70
100° (Boiling water bath)	212°	0.73 - 0.62
104.4° - 110.0°	220° - 230°	0.59 - 0.51
110.0° - 115.6°	230° - 240°	0.51 - 0.43
115.6° - 121.1°	240° - 250°	0.43 - 0.37
121.1° - 126.7°	250° - 260°	0.37 - 0.33

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

SERVICING REQUIREMENTS

- It is recommended that only technicians specifically trained in handling flammable refrigerants, service or dispose of equipment containing hydrocarbon refrigerants.
- Color-coded red process tubes indicate use of a flammable refrigerant - Process tubes must be replaced after brazing or other service procedures.
- An accessible fire extinguisher is required when brazing.
- A combustible gas leak detector with a minimum sensitivity of 8 grams per cubic meter is required. The meter must be on while servicing the equipment. Place the detector on the floor and set the detector to beep at approximately heart beat rate.
- Equipment using hydrocarbon refrigerants have fittings unique to flammable refrigerants.
- Work in well-ventilated, open spaces - A ventilation fan can be used to disperse any residual refrigerant. Place the fan a minimum of 10’ (3m) away from the work area.
- Eliminate all ignition sources.
- The filter drier must be replaced whenever the system is opened to the atmosphere.

Important

- Remove piercing valves after charging.
- Unit is critically charged. Nitrogen must be purged through the system while brazing to prevent build up of copper oxide in the refrigeration system.
- Manifold gauge set must be removed properly to ensure that no refrigerant contamination or loss occurs. A quick disconnect is required for the high side connection.

REFRIGERANT PURGING REQUIREMENTS

NOTE: Country and Local Codes for removal and processing of this refrigerant must always take precedence over these procedures.

- Minimum of 10 feet from building, verify wind direction will not introduce refrigerant into building.
- Verify refrigerant does not enter buildings through intake air vents.
- Although not required hydrocarbon refrigerants can be recovered, instead of venting to the atmosphere.
- Purge system with dry nitrogen to displace any trapped propane.

DANGER

Disconnect all electric power to the system. Shorting electrical wires to refrigeration tubing may result in an explosion.

REFRIGERANT PURGING PROCEDURE

1. Disconnect all electric power to the system and lockout tag out the power source(s).

NOTE: Some systems may have more than one power supply.

2. Work in well-ventilated, open space and eliminate all ignition sources.
3. Install piercing valves on the high and low side access fittings.
4. 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.
5. Purge refrigerant from both low and high side.
6. Purge the system with dry nitrogen for 3 minutes.
7. Evacuate the system with a vacuum pump.
8. Purge the system again with dry nitrogen
9. Open the system by cutting the tubes with a tube cutter. Do not use a torch to open the system.

BRAZING PROCEDURE

10. 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

11. 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.
12. Do not over pressurize the system. Check the name plate for the maximum test pressure.

DANGER

Failure to properly purge or pressure test a system for leaks, can result in serious injury or death from explosion, fire, or contact with refrigerant or lubricant mists.

EVACUATION

13. 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.

1. Invert the charging bottle, and place on a scale capable of reading grams and ounces.
2. 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. A quick disconnect is required for the high side connection.

3. 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.
4. Press the power button.

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

5. 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.
6. 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
UCP050A	2.5 oz (0.07 kg)	R290

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 Temperature Entering Condenser °F / °C	Water Temperature			Harvest Time
	50°F 10°C	70°F 21°C	90°F 32°C	
70°F/ 21°C	15.6-17.8	15.3-17.4	15.6-17.8	1.0-3.5
80°F/ 27°C	16.6-18.9	17.0-19.4	17.4-19.8	
90°F/ 32°C	17.4-19.8	19.1-21.7	18.2-20.7	
100°F/ 38°C	19.2-22.1	19.8-22.7	22.4-25.4	
110°F/ 43°C	24.9-28.2	25.7-29.1	31.4-35.5	
Freeze Time in minutes. Cycle times and pressures vary with operating condition.				

24 Hour Ice Production

Air Temperature Entering Condenser	Water Temperature		
	50°F 10°C	70°F 21°C	90°F 32°C
70°F/ 21°C	53 lbs 24 kgs	54 lbs 25 kgs	53 lbs 24kgs
80°F/ 27°C	50 lbs 23 kgs	49 lbs 22 kgs	48 lbs 22 kgs
90°F/ 32°C	48 lbs 22 kgs	44 lbs 20 kgs	46 lbs 21 kgs
100°F/ 38°C	40lbs 18kgs	39lbs 18kgs	38lbs 17kgs
110°F/ 43°C	35lbs 16kgs	34lbs 14kgs	28lbs 13kgs
Ice weight of one harvest cycle = 10 oz to 11.4 oz (286 g to 322 g). Cubes of one harvest cycle = 16 Individual Cube Weight - 0.70 oz (30 g)			

Operating Pressures - Freeze Cycle

Air Temperature Entering Condenser °F / °C	DISCHARGE PRESSURE	SUCTION PRESSURE
50°F/ 10°C	125-70 psig 8.62-4.83 bar	18-0 psig 1.24-0 bar
70°F/ 21°C	135-95 psig 9.31-6.55 bar	18-0 psig 1.24-0 bar
80°F/ 27°C	165-115 psig 11.38-7.93 bar	19-2 psig 1.31-0.14 bar
90°F/ 32°C	195-135 psig 13.44-9.31 bar	20-3 psig 1.38-0.21bar
100/ 37.8	235-165 psig 16.20-11.34 bar	24-5 psig 1.65-0.34 bar
110°F/ 43°C	155-185 psig 10.69-12.76 bar	28-7 psig 1.93-0.48 bar

Operating Pressures - Harvest Cycle

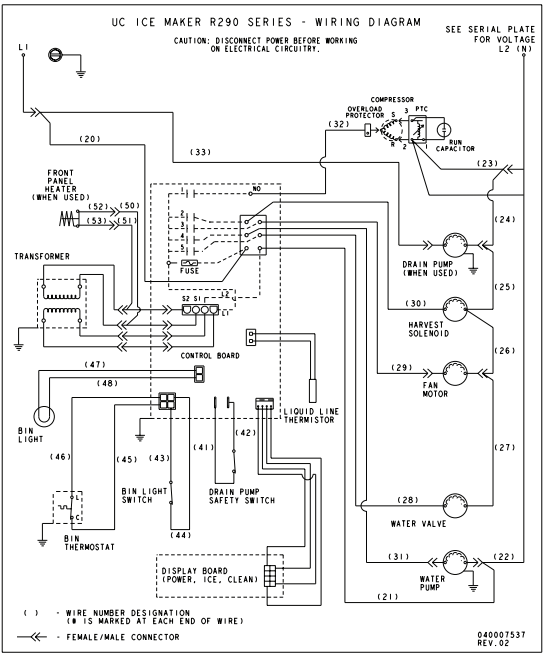
Air Temperature Entering Condenser °F / °C	DISCHARGE PRESSURE	SUCTION PRESSURE
50°F/ 10°C	50-75 psig 3.45-5.17 bar	20-55 psig 1.38-3.80 bar
70°F/ 21°C	65-85 psig 4.48-5.86 bar	35-60 psig 2.41-4.14 bar
80°F/ 27°C	75-100 psig 5.17-6.89 bar	40-70 psig 2.76-4.83 bar
90°F/ 32°C	85-120 psig 5.86-8.27 bar	40-70 psig 2.76-4.83 bar
100/ 37.8	100-135 psig 6.89-9.31 bar	50-80 psig 3.45-5.52 bar
110°F/ 43°C	110-155 psig 7.58-10.69 bar	50-90 50-90 psig 3.45-6.21 bar

NOTE: Suction pressure drops gradually throughout the freeze cycle.

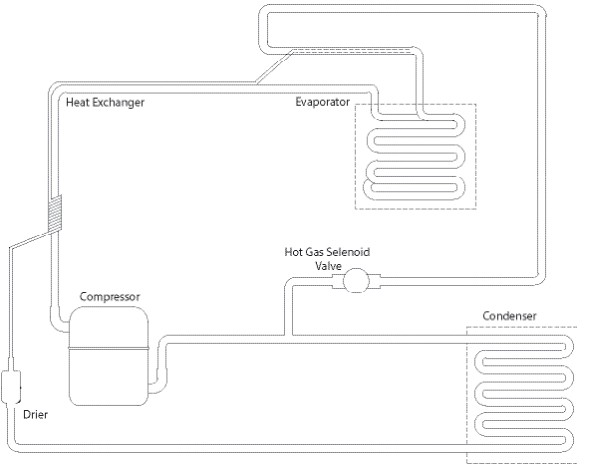
THIS PAGE INTENTIONALLY LEFT BLANK

Diagrams

Wiring Diagram



Tubing Schematic



MANITOWOC ICE
2110 SOUTH 26TH STREET
MANITOWOC, WI 54220

800-545-5720
WWW.MANITOWOCICE.COM

©2024 Manitowoc Ice except where explicitly stated otherwise. All rights reserved.
Part Number STH115 Rev 00 04/24