Manitowoc

Countertop Nugget Ice Machines

RNS012 & RNS020

Technician's Handbook



Part Number STH044 1/18

Manitowoc

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.

⚠ 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.

⚠ 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.
- Ice machines require a deflector when installed on an ice storage bin. Prior to using a non-OEM ice storage system with this ice machine, contact the bin manufacturer to assure their ice deflector is compatible.
- Remove all removable panels 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.
- Installation of the line sets must be performed by a properly trained and EPA certified refrigeration technician aware of the dangers of dealing with refrigerant charged equipment.

⚠ 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.
- Some 50 Hz models may contain 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 (LEL lower explosion limit and UEL upper explosion limit). An ignition source at a temperature higher than 470°C is needed for a combustion to occur.
- 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

⚠ Warning

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.
- Units with two power cords must be plugged into individual branch circuits. During movement, cleaning or repair it is necessary to unplug both power cords.

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General Information

Model Numbers

Self-Contained Air-Cooled

RNS012AL - Air-cooled lever dispense model

RNS012AT - Air-cooled touchless dispense model

RNS020AL - Air-cooled lever dispense model

RNS020AT - Air-cooled touchless dispense model

Model/Serial Number Location

These numbers are required when requesting information from your local Manitowoc Distributor, service representative, or Manitowoc Ice, Inc. The model and serial number are listed on the OWNER WARRANTY REGISTRATION CARD. They are also listed on the MODEL/SERIAL NUMBER DECAL affixed to the ice machine.

Manitowoc Cleaner and Sanitizer

Manitowoc Ice Machine Cleaner and Sanitizer are available in 16 oz. (473 ml) bottles. These are the only cleaners and sanitizer approved for use with Manitowoc products.

⚠ Caution

Nugget models must use cleaner part number **000000084 ONLY** (clear cleaner). Damage to the evaporator will result with repeated use or high concentrations of standard (green) cleaner. This damage is not covered by the warranty.

Cleaner Part Number		Sanitizer Part Number	
16 oz.	000000084	16 oz.	9405653
1 gal	N/A	1 gal.	9405813

Legs

Optional four inch adjustable legs are available.

SEALING TO COUNTERTOP OR STAND

Ice machines installed without legs must be sealed to the countertop or stand. This prevent liquids or debris from infiltrating beneath the ice machine.

Touchless Sensing Option

Touchless sensing can be ordered installed on the ice machine from the factory or a field conversion kit is available. The field conversion kit includes a replacement front panel and instructions for installation

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

⚠Warning

PERSONAL INJURY POTENTIAL

Remove all ice machine panels before lifting and installing.

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 and free of airborne and other contaminants..
- The air temperature must be at least 45°F (7°C), but must not exceed 110°F (43°C).
- The water temperature must be at least 45°F (7°C), but must not exceed 90°F (32°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 and allow the ice machine to be level front to back and side to side.
- The location must allow enough clearance for water and electrical connections in the rear of the ice machine. The drain can be routed out the rear or bottom of dispenser.
- The location must not obstruct airflow through or around the ice machine. Airflow is in the left side and out the top. Refer to chart 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. See “Removal from Service/ Winterization”

Ice Machine Clearance Requirements

RNS012 - RNS020	Self-Contained Air-Cooled
Top	24" (61.0 cm)
Sides	8" (20.3 cm)
Back	5" (12.7 cm)
RNS012 - RNS020 airflow is in the left side and out the top.	

Ice Machine Heat of Rejection

Series Ice Machine	Heat of Rejection*
	Air Conditioning
RNS012 - RNS020	2,300
* BTU/Hour. Because the heat of rejection varies during the ice making cycle, the figure shown is an average.	

Ice machines, like other refrigeration equipment, reject heat through the condenser. It is helpful to know the amount of heat rejected by the ice machine when sizing air conditioning equipment where self-contained air-cooled ice machines are installed.

Electrical Service

General

⚠Warning

All wiring must conform to local, state and national codes.

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. Circuit breakers must be H.A.C.R. rated (does not apply in Canada).

⚠Warning

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

CIRCUIT AMPACITY

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.)

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

Self Contained Air-Cooled			
Ice Machine	**Voltage Phase Cycle**	**Max. Fuse/ Circuit Breaker**	**Total Amps**
RNS012	115/1/60	15	10.3
RNS020	230/1/50	15	5.4

Ice Machine Water Supply and Drains

POTABLE WATER SUPPLY

The ice machine must be connected to a potable water supply only. Local water conditions may require treatment of the water to inhibit scale formation, filter sediment, remove chlorine, and improve taste and clarity.

Important

If you are installing a Manitowoc water filter system, refer to the Installation Instructions supplied with the filter system for ice making water inlet connections.

POTABLE WATER INLET LINES

Follow these guidelines to install water inlet lines:

- Do not connect the ice machine to a hot water supply. Be sure all hot water restrictors installed for other equipment are working. (Check valves on sink faucets, dishwashers, etc.)
- If water pressure exceeds the maximum recommended pressure of 80 psig (5.5 Bar), obtain a water pressure regulator from your Manitowoc Distributor.
- Install a water shut-off valve and union for both the ice making and condenser water lines.
- Insulate water inlet lines to prevent condensation.

DRAIN CONNECTIONS

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

- Drain lines must have a 1.5 in. drop per 5 ft. 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.
- Run separate bin drain line. Insulate to prevent condensation.
- Vent the bin drain to the atmosphere.
- Drains must have a union or other suitable means to allow a place of disconnection from the ice machine when servicing is required.

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Ice Making Sequence of Operation

RNS012 - RNS020 NUGGET MACHINES

Ice Making Sequence of Operation

PRIOR TO START-UP

When the toggle switch is placed in the ICE position, the following must occur in the listed order before ice making will start.

- The 15-minute delay period must be expired. The delay period starts upon application of power or a change in toggle switch position.
- The ice chute damper must be in the closed or down position.
- The water sensing switch must be closed (water reservoir full of water and water sensing float in the up position).

INITIAL START-UP

A 15-minute delay period must expire. The delay period starts to time out upon application of power and can only be overridden by depressing the test switch on the control board. The gear motor energizes and when water in the reservoir closes the water sensing (float switch) the compressor and condenser fan motor energize.

FREEZE CYCLE

The float valve automatically maintains the water level in the reservoir. The ice damper will open and close to verify ice production. The ice machine will continue to make ice until the ice damper is held open (up) as ice fills the bin.

AUTOMATIC SHUTOFF

When the ice damper is held open by ice, the gear motor, compressor and condenser fan de-energize. The ice machine will remain off until the 15-minute delay period expires and the ice damper closes.

RESTART AFTER AUTOMATIC SHUTOFF

The 15-minute delay period must be expired. The delay period starts when the ice machine enters Automatic Shutoff and can not be overridden.

The restart sequence is dependent on the amount of time the ice machine has been off:

1. The ice machine was off for less than 30 minutes.

When the 15-minute delay period expires, the gear motor, compressor and condenser fan motor energize.

2. The ice machine was off for more than 30 minutes.

The gear motor and dump valve energize to drain the water from the evaporator and reservoir. After 45 seconds, the dump valve de-energizes. When the reservoir fills with water, the water sensing switch closes and the compressor and condenser fan motor energize.

CHANGING TOGGLE SWITCH POSITION IN THE FREEZE CYCLE

Moving the toggle switch from ICE to OFF will start a 15-minute delay period.

- Moving the toggle switch immediately to the ICE position - The ice machine waits 15 minutes, then starts.
- Moving the toggle switch to the ICE position after 15 minutes have elapsed - The ice machine immediately starts.

Control Board Features

POWER INTERRUPTION DELAY

If power is disconnected, the ice machine stops. When power is reapplied, a 15-minute delay is initiated.

SAFEGUARDS

The ice machine control board has safety features to protect the ice machine from severe failures. The ice machine will stop when conditions arise that would cause major component failure. Refer to Safeguards for details.

TOUCH PAD SEQUENCE OF OPERATION

Step 1 The control board monitors the touch pad. Pressing/selecting Ice, Water, or Ice & Water will energize the corresponding blue LED selection and waits for dispense lever or touchless sensor activation.

Step 2 Depressing the dispense lever or activating the touchless sensor closes the relay selected with the touch pad. Depending on selection, either the water solenoid, ice dispense motor or both components activate.

WATER LEVEL CHECK

The float valve maintains the correct water level. The water level is factory set and normally will not require adjustment. The water level is correct if the Water Level indicator light is energized and no water is entering the overflow tube.

The float valve is secured with 2 stop nuts. If an adjustment is required, raise or lower the stop nuts as needed.

SEQUENCE OF OPERATION CHART

Nugget Machines

Sequence	Contactor Coil	Dump Valve	Gear Motor	Ice Damper	Duration
Initial Start-Up Time Delay	Off	Off	Off	Closed	15 Minutes
Gear Motor Start	Off	Off	On	Closed	5 Seconds
Compressor Start	On	Off	On	Closed	Until Ice Holds Damper Open
Freeze Cycle	On	Off	On	Moves to Verify Ice Production	
Automatic Shut-Off	Off	Off	Off	Open	Until Damper Closes
Restart More than 30 minutes have passed since automatic shutoff cycle initiated	Off	On	Off	Closed	45 Second Flush cycle,
Initial Startup	Off	Off	On	Closed	5 Seconds
Restart Less than 30 minutes have passed since automatic shutoff cycle initiated	Off	Off	On	Closed	15 minute delay from full bin initiation must expire, then gear motor starts

Maintenance

Maintenance procedures or failures due to a lack of maintenance are not covered by the warranty.

Manitowoc Ice Machine Cleaner and Sanitizer are the only products approved for use in Manitowoc ice machines.

⚠ Caution

Use the correct Manitowoc approved metal safe Ice Machine Cleaner (part number 000000084) and Sanitizer (part number 9405653). It is a violation of Federal law to use these solutions in a manner inconsistent with their labeling. Read and understand all labels printed on bottles before use.

⚠ Caution

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

⚠ Warning

Wear rubber gloves and safety goggles (and/or face shield) when handling ice machine Cleaner or Sanitizer.

⚠ Warning

If you do not understand the procedures or the safety precautions that must be followed, call your local Manitowoc Distributor or Manitowoc Ice.

Manitowoc's Cleaning Technology

Manitowoc RNS012 - RNS020 Ice Machines allow the initiation and completion of a cleaning cycle at the flip of a switch. This cycle will permit cleaning of all surfaces that come in contact with the water distribution system. Periodic maintenance must be performed that includes sanitizing the bin and adjacent surface areas, which are not contacted by the water distribution system.

Depending on local water conditions Manitowoc recommends initiating preventative maintenance cleaning procedures between the 6-month cleanings. This preventive maintenance removes mineral build-up from the evaporator, which results in peak efficiency and lower operating costs.

This technology allows initiation and completion of a clean cycle, after which the ice machine automatically starts ice making again.

There are three separate cleaning procedures.

Heavily Scaled Cleaning Procedure

Perform this procedure if you have some or all of these symptoms.

- Grinding, popping or squealing noises from the evaporator.
- Grinding noise from gearbox.
- Ice machine trips speed sensor.

A Cleaning/Sanitizing Procedure must be performed after this procedure.

Cleaning/Sanitizing Procedure

This procedure must be performed a minimum of once every six months:

- All ice must be removed from the bin/dispenser.
- The ice machine and bin/dispenser must be disassembled, cleaned and sanitized.
- The ice machine produces ice with the cleaner and sanitizer solutions.
- All ice produced during the cleaning and sanitizing procedure must be discarded.

Preventative Maintenance Cleaning Procedure

Perform this procedure as often as required for your water conditions:

- Allows cleaning the ice machine without removing all of the ice from the bin/dispenser.
- Removes mineral deposits from areas that are in direct contact with water during the Freeze cycle (reservoir, evaporator, auger, drain lines).

EXTERIOR CLEANING

Clean the area around the ice machine as often as necessary to maintain cleanliness and efficient operation. Use cleaners designed for use with stainless steel products.

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

Heavy stains should be removed with stainless steel wool. Never use plain steel wool or abrasive pads. They will scratch the panels.

WEEKLY

Remove grill from scrap ice tray and wipe splash panel, scrap ice tray and grill with sanitizer & water solution. Pour excess solution in scrap ice tray to clear drain.

TOUCHLESS SENSOR ONLY

Wipe sensor window with a soft cloth and mild detergent. Rinse with clear water and dry with a clean soft cloth.

Dust and dirt can be removed from exterior surfaces with mild household dish-washing detergent and warm water. Wipe dry with a clean, soft cloth.

Preventative Maintenance Procedure

Ice machine cleaner is used to remove lime scale or other mineral deposits. It is not used to remove algae or slime. Refer to “Sanitizing Procedure” for removal of algae and slime. To initiate a cleaning cycle using Manitowoc’s Cleaning Technology use the following procedure.

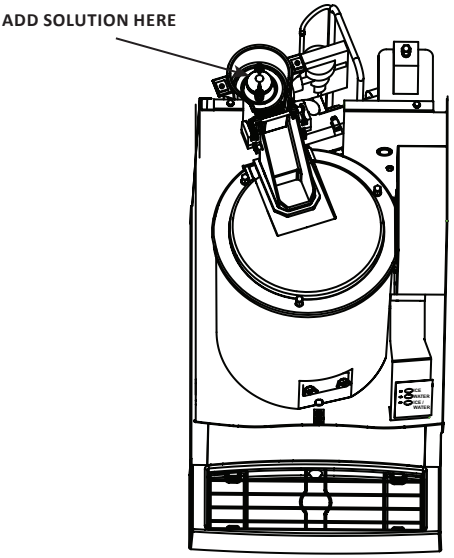
Step 1 To start a cleaning cycle, move the toggle switch to the CLEAN position. Water will flow through the water dump valve and down the drain.

Step 2 Remove the top panel and translucent plastic ice chute cover. Wait about one minute then add the proper amount of Manitowoc Ice Machine Cleaner. Rinse the cleaner from the top of the evaporator with 2 ounces (60 ml) of clear water and re-install cover

⚠ Caution

Use only Manitowoc approved Ice Machine Cleaner part number 000000084. It is a violation of Federal law to use these solutions in a manner inconsistent with their labeling. Read and understand all labels printed on bottles before use.

Model	Amount of Cleaner Part Number 000000084
RNS012 RNS020	2 ounces (60 ml)



Step 3 The ice machine will run a wash cycle, a series of rinse cycles and then stop. This entire cycle lasts approximately 30 minutes.

NOTE: Periodic cleaning must be performed on adjacent surface areas not contacted by the water distribution system.

NOTE: The ice machine may be set to start and finish a cleaning procedure, and then automatically start ice making again

A. After cleaner is added, move the switch from CLEAN to ICE position.

B. When the cleaning cycle is complete, ice making will start automatically.

Changing toggle switch position during clean cycle:

1. Less than 60 seconds into Clean cycle - The Clean cycle will end when the toggle switch is moved to the OFF position.
2. More than 60 seconds into Clean cycle - The ice machine will complete the clean cycle. Toggle switch position will determine the next cycle after the Clean cycle is completed.
    - CLEAN POSITION - The ice machine will wait for a change in toggle switch position.
    - OFF POSITION - The ice machine will wait for a change in toggle switch position.
    - ICE POSITION - The ice machine will start making ice automatically.
3. To abort the clean cycle move the toggle switch from CLEAN to OFF to CLEAN and back to OFF within a 15 second time period.

Manitowoc recommends disassembling, cleaning and sanitizing the ice machine and dispenser every six months.

Heavily Scaled Cleaning Procedure

Ice machines that are heavily scaled or have not been cleaned on a regular basis will need to run this Procedure. Failure to do so may result in binding of the auger as the lime scale releases from the auger and evaporator barrel.

Step 1 Remove panels and set the ICE/OFF/CLEAN toggle switch to the OFF position.

Step 2 Remove all ice from the bin.

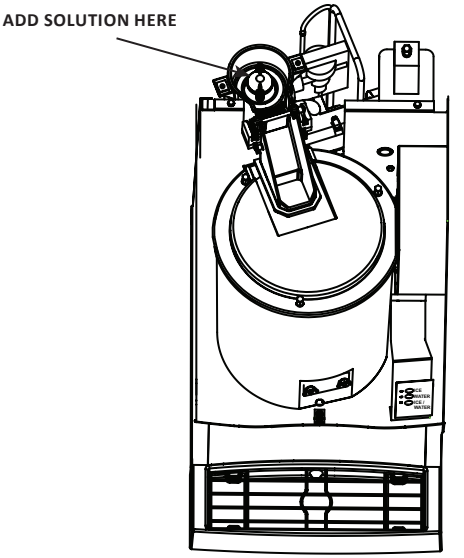
Step 3 Turn off the water supply to the ice machine.

Step 4 Place ICE/OFF/CLEAN toggle switch in the CLEAN position. The dump valve will open and drain the water from the evaporator and reservoir.

Step 5 Wait approximately 30 seconds (or until the evaporator is drained) and place the toggle switch in the OFF position.

Step 6 Refer to chart and add the correct amount of cleaner for your model ice machine.

Model	Amount of Cleaner Part Number 000000084
RNS012 RNS020	12 ounces (355 ml)



Step 7 Turn on the water supply to the ice machine.

Important

Leave the cleaner/water solution in the evaporator for a minimum of 4 hours.

Step 8 Move the toggle switch to the ICE position. The compressor will energize and produce ice with the cleaning solution. Continue the freeze cycle for 15 minutes.

Step 9 Move the toggle switch to the OFF position, then follow the standard cleaning and sanitizing procedures.

Cleaning Procedure

Ice machines that are heavily scaled or have not been cleaned on a regular basis will need to run the Heavily Scaled Cleaning Procedure before this one. Failure to do so may result in binding of the auger as the lime scale releases from the auger and evaporator barrel.

Ice machine cleaner is used to remove lime scale or other mineral deposits. Ice machine sanitizer is used to remove algae or slime.

Step 1 Remove panels and set the ICE/OFF/CLEAN toggle switch to the OFF position.

Step 2 Turn off the water supply to the ice machine.

Step 3 Remove all ice from the bin.

Step 4 Place ICE/OFF/CLEAN toggle switch in the CLEAN position. The dump valve will open and drain the water from the evaporator and reservoir.

Step 5 Wait approximately 30 seconds (or until the evaporator is drained) and place the toggle switch in the OFF position.

⚠ Caution

Use only Manitowoc approved Ice Machine Cleaner part number 000000084. It is a violation of Federal law to use these solutions in a manner inconsistent with their labeling. Read and understand all labels printed on bottles before use.

Step 6 Refer to chart and premix the correct solution of cleaner and cool water for your model ice machine.

Model	Amount of Cleaner Part Number 000000084	Amount of Water
RNS012 RNS020	2 oz (60 ml)	32 oz (1 liter)

Step 7 Remove the top cover from the ice chute and pour the cleaner/water solution into the evaporator. Add the entire amount of premixed solution (excess solution will exit through the overflow tube in the water reservoir).

Step 8 Replace the ice chute cover and allow the ice machine to stand for 30 minutes.

Step 9 Turn on the water supply to the ice machine.

Step 10 Move the toggle switch to the ICE position. The compressor will energize and produce ice with the cleaning solution.

Step 11 The ice machine will freeze and discharge the cleaning solution into the bin. Allow the cycle to run for 15 minutes.

NOTE: Discard all ice produced during the cleaning process. Cleaning and sanitizing must be performed on adjacent surface areas not contacted by the water distribution system. Refer to “Removal of Parts for Cleaning or Sanitizing” on page 38 - Disassemble, clean and sanitize the ice machine a minimum of once every six months.

Sanitizing Procedure

Ice machine sanitizer is used to remove algae or slime. It is not used to remove lime scale or other mineral deposits. Refer to the "Cleaning Procedure" for removal of lime scale or other mineral deposits.

NOTE: Sanitizing must be performed on adjacent surface areas not contacted by the water distribution system. Always perform Component Disassembly for Cleaning/ Sanitizing procedure and a Cleaning Procedure before sanitizing the ice machine.

Step 1 Turn off the water supply to the ice machine.

Step 2 Place ICE/OFF/CLEAN toggle switch in the CLEAN position. The dump valve will open and drain the water from the evaporator and reservoir.

Step 3 Wait approximately 30 seconds (or until the evaporator is drained) and place the toggle switch in the OFF position.

Step 4 Refer to chart and premix the correct solution of sanitizer and cool water for your model ice machine.

Model	Amount of Sanitizer Part Number 94-0565-3	Amount of Water
RNS012 RNS020	2 ounces (60 ml)	3 gallons (11.4L)

Step 5 Remove the top cover from the ice chute and pour the sanitizer/water solution into the evaporator. Add the entire amount of premixed solution (excess solution will exit through the overflow tube in the water reservoir).

Step 6 Replace the ice chute cover and allow the ice machine to stand for 30 minutes.

Step 7 Turn on the water supply to the ice machine.

Step 8 Move the toggle switch to the ICE position. The compressor will energize after the 15 minute delay and produce ice with the sanitizing solution.

Step 9 The ice machine will freeze and discharge the sanitizing solution into the bin. Allow the cycle to run for 15 minutes.

Step 10 Discard all ice produced during the sanitizing process.

Step 11 Place the toggle switch in the CLEAN position. The ice machine will automatically time out a series of flush and rinse cycles, and then stops. This entire cycle lasts approximately 30 minutes.

Step 12 Refer to Component Disassembly for Cleaning and Sanitizing and remove, clean and sanitize all parts listed.

Component Disassembly for Cleaning and Sanitizing

⚠Warning

Disconnect electric power to the ice machine at the electric switch box before proceeding.

⚠Warning

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

⚠Caution

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

GENERAL INFORMATION

The ice machine must be disassembled, cleaned and sanitized every six months.

1. Turn off the water supply to the ice machine at the water service valve, or disconnect water supply line at float valve quick disconnect by depressing stainless steel lever.
2. Remove the components you want to clean or sanitize. See the pages specific to the model you are working on for removal procedures.
3. Soak the removed parts to clean and sanitize.

Solution Type	Water	Mixed With
Cleaner	1 gal. (4 L)	16 oz. (500 ml) cleaner
Sanitizer	6 gal. (23 L)	4 oz. (120 ml) sanitizer

4. Use a soft-bristle brush or sponge (NOT a wire brush) to carefully clean the parts.
5. Use the solution and a brush to clean all disassembled components and the inside of the bin.
6. Re-install the removed parts and turn on the water and electrical supply.

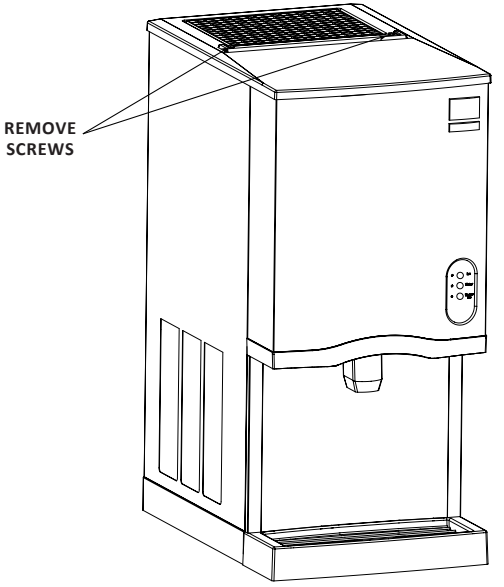
Removal of Parts for Cleaning or Sanitizing

1. Turn off water supply to ice machine.
2. Place toggle switch in the clean position for 30 seconds to drain water from reservoir, then move toggle switch to Off position.
3. Run dispenser to transfer all ice from the bin to a container.

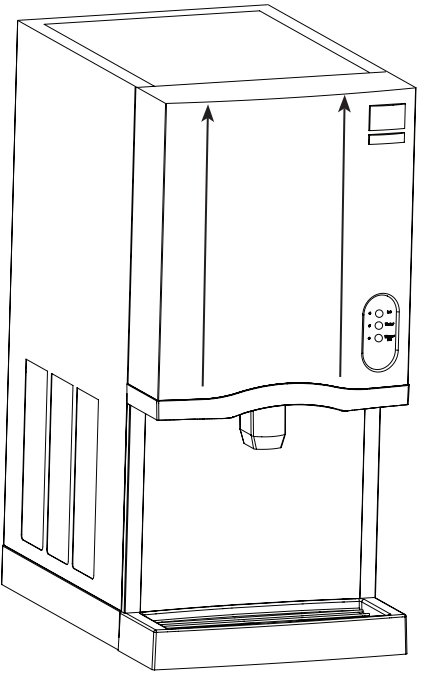
⚠Warning

Disconnect electric power to the ice machine at the electric switch box before proceeding.

4. Disconnect electrical power to the ice machine.
5. Remove top cover.
   A. Remove two screws.
   B. Lift up on top cover to remove.

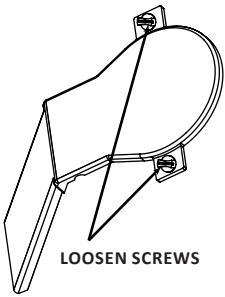

REMOVE
SCREWS

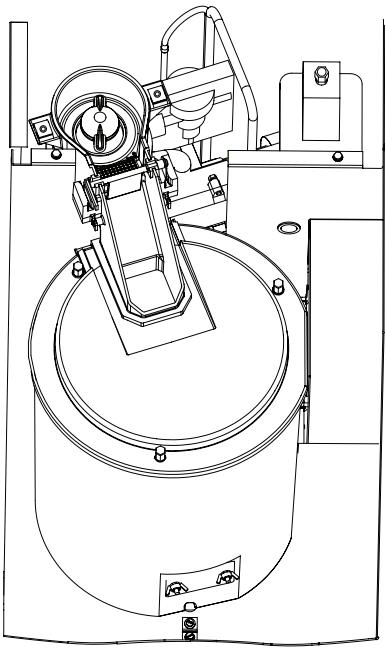
6. Remove front cover.
   A. Lift up on front cover.
   B. Pull forward to disengage keyhole slots.



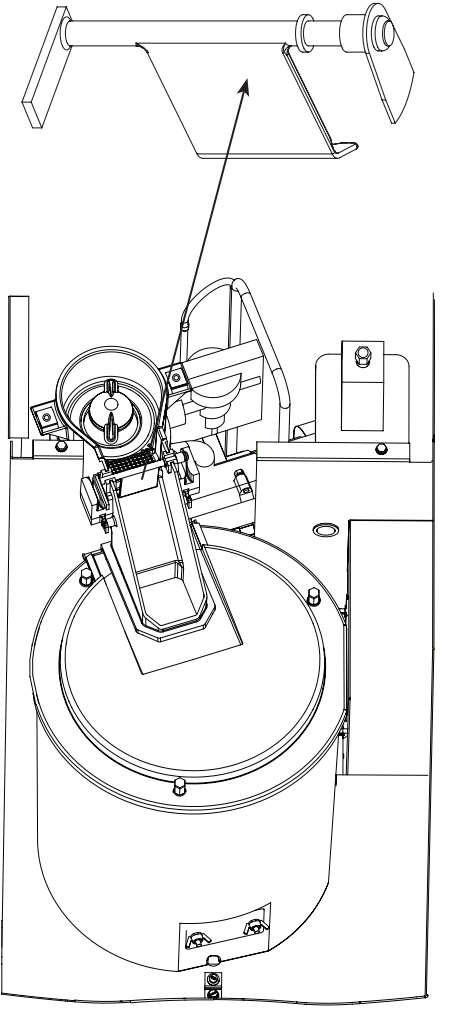
7. Remove side panels.

8. Remove ice chute cover
   A. Turn the two thumbscrews 1/4 turn.
   B. Lift to remove cover.

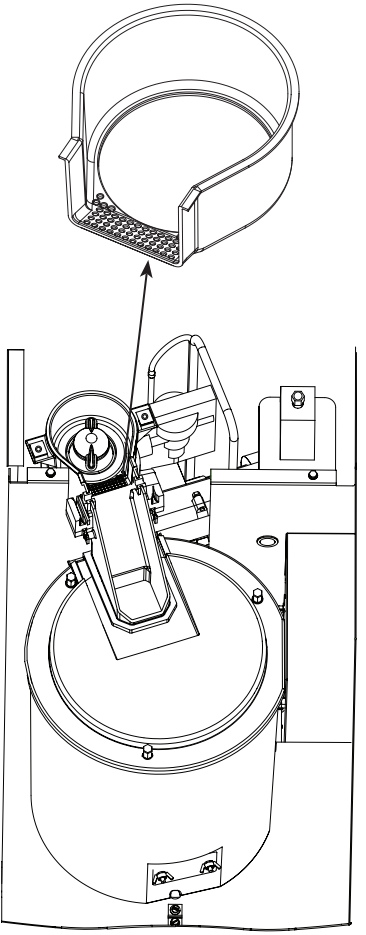




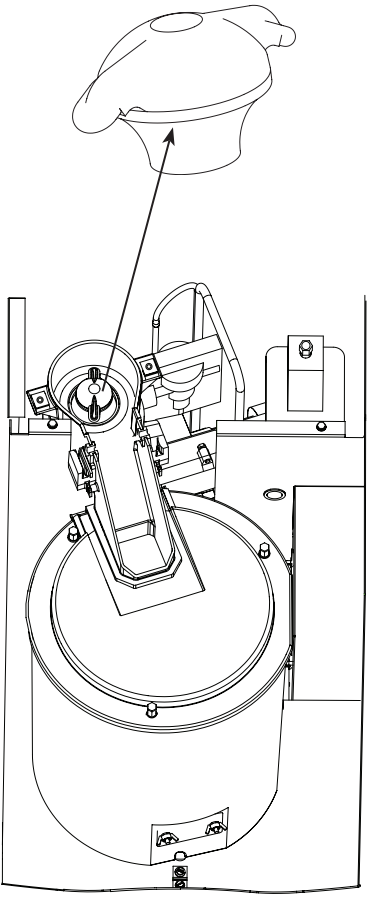
9. Lift out ice damper.



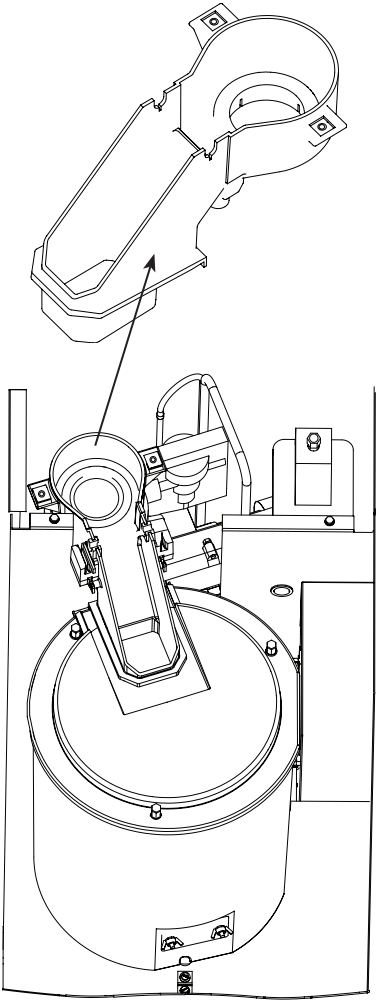
10. Lift out ice strainer ramp.



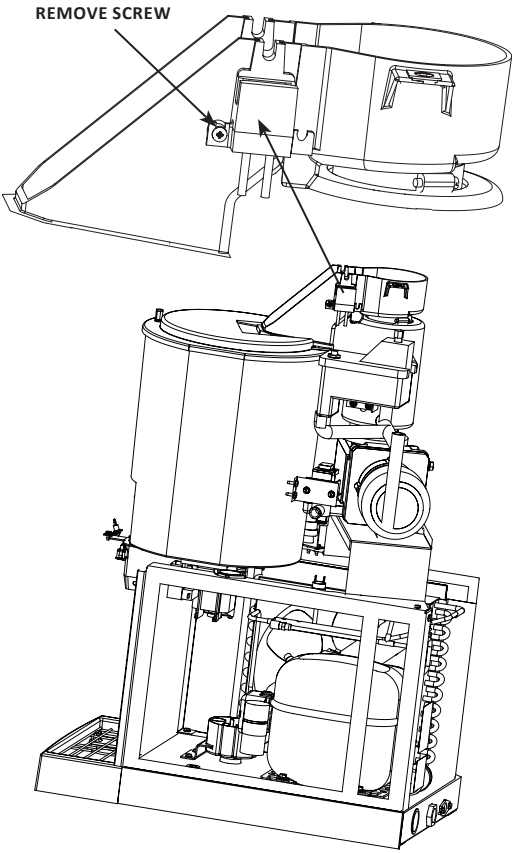
11. Turn ice wiper counterclockwise to remove.



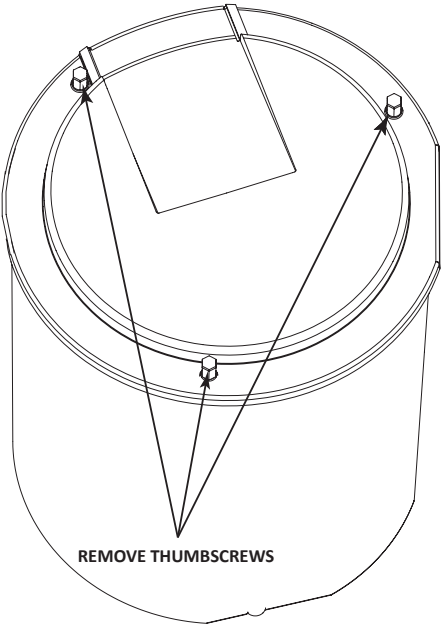
12. Loosen ice chute hose clamp.
13. Disconnect ice chute drain.
14. Lift up on ice chute to remove. The ice chute must be removed before the bin cover can be removed.



15. The ice chute can be cleaned in place. If complete removal is desired, use a Phillips screwdriver to remove the Hall Effect switch assembly from the ice chute.



16. Remove three thumbscrews, then remove bin cover.

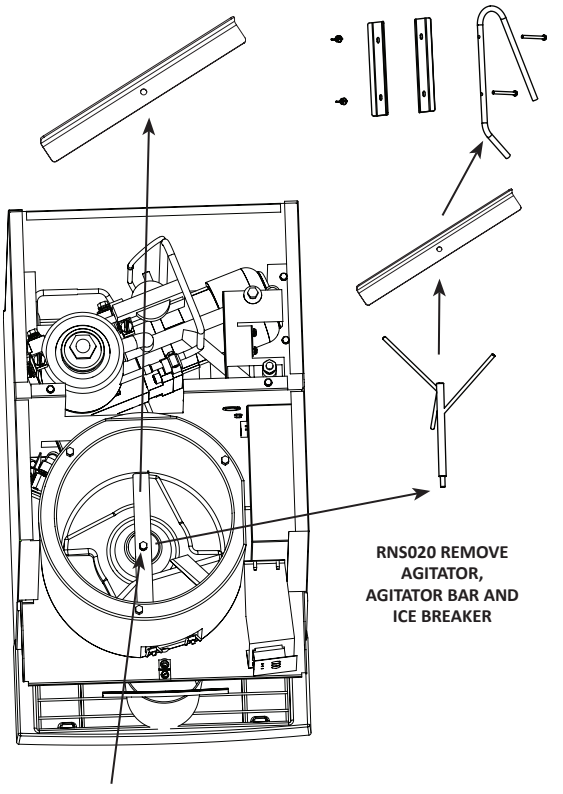


Important

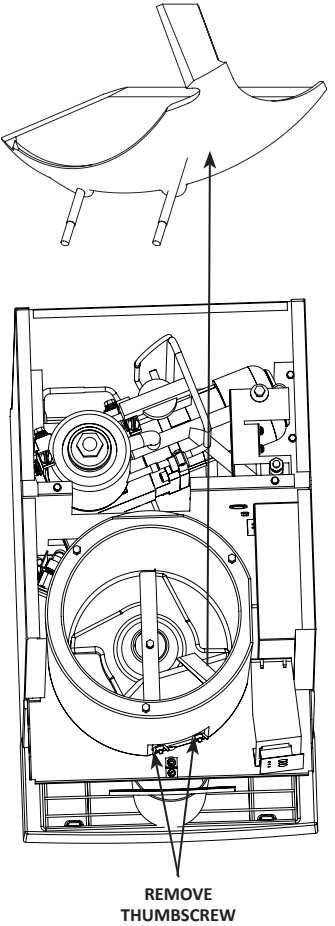
Do not pour cleaner or sanitizer solutions into the bin. The solution will leak out of the front of the bin and into the compressor compartment.

17. Remove agitator bar.
    - RNS012 - Remove the thumbscrew and lift off.
    - RNS020 - Unscrew the upright agitator bar.

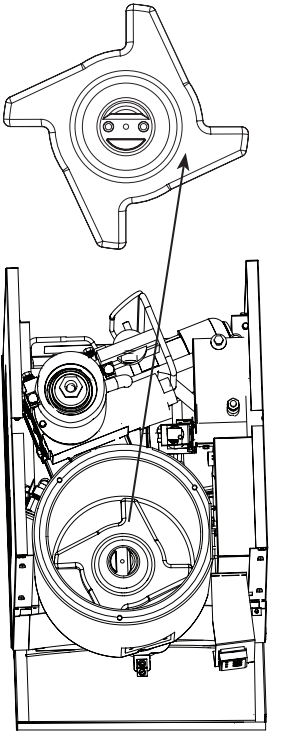
NOTE: Bar must be reassembled by inserting front edge into the paddle wheel, then lowering the back edge (rounded 90 angle) to prevent water leakage into the compressor compartment.



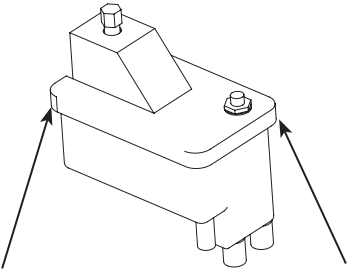
18. Remove ice deflector.
    A. Remove the two thumbscrews.
    B. Lift the ice deflector out.



19. Remove ice dispensing wheel by lifting straight out.



20. Water Reservoir Cover Removal
    A. Push up on cover to snap off.



CLEANING THE CONDENSER

⚠Warning

Disconnect electric power to the ice machine at the electric service switch before cleaning the condenser. The condenser fins are sharp. Use care when cleaning them.

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. Follow the steps below.

1. The washable foam filter on self-contained ice machines is designed to catch dust, dirt, lint and grease. This helps keep the condenser clean. Clean the filter with a mild soap and water solution.
2. Clean the outside of the condenser with a soft brush or a vacuum with a brush attachment. Clean from top to bottom, not side to side. Be careful not to bend the condenser fins.
3. Shine a flashlight through the condenser to check for dirt between the fins. If dirt remains:
   A. Blow compressed air through the condenser fins from the inside. Be careful not to bend the fan blades.
   B. Use a commercial condenser coil cleaner. Follow the directions and cautions supplied with the cleaner.
4. Straighten any bent condenser fins with a fin comb.
5. Carefully wipe off the fan blades and motor with a soft cloth. Do not bend the fan blades. If the fan blades are excessively dirty, wash with warm, soapy water and rinse thoroughly.

⚠Warning

If you are cleaning the condenser fan blades with water, cover the fan motor to prevent water damage.

Removal from Service/Winterization

GENERAL

Special precautions must be taken if the ice machine is to be removed from service for an extended period of time or exposed to ambient temperatures of 32°F (0°C) or below.

> **⚠ Caution**
>
> If water is allowed to remain in the ice machine in freezing temperatures, severe damage to some components could result. Damage of this nature is not covered by the warranty.

1. Disconnect the electric power at the circuit breaker or the electric service switch.
2. Turn off the water supply.
3. Disconnect and drain the incoming ice-making water line at the rear of the ice machine.
4. Disconnect drain tubing (from the inlet to dump valve) and drain water into container and discard.
5. Make sure water is not trapped in any of the water or drain lines.

SafeGuard Feature

The ice machine will stop when conditions arise that would cause major component failure.

Standby Mode

The first time a failure occurs, the ice machine de-energizes and initiates a Standby Mode. The ice machine will remain off for 60 minutes, then automatically restart to see if the problem reoccurs. If the same failure keeps occurring, the ice machine will initiate a SafeGuard Mode and remain off until manually restarted.

SafeGuard Indicator Lights

During a SafeGuard Mode, the corresponding control board light will flash continuously.

The SafeGuard will remain in memory for 48 hours of ice making time. After 48 hours of ice making time, the SafeGuard will automatically be erased. If power is interrupted during the 48 hours, the timing will resume when power is applied to the ice machine.

Placing the toggle switch in the OFF position:

The corresponding light will flash continuously.

Placing the toggle switch in the ICE position:

The light will de-energize and a start-up sequence will initiate. The corresponding light will flash anytime the toggle switch is placed in the OFF position provided 48 hours of ice making time has not been exceeded.

Reset Procedure

1. Move the ICE/OFF/CLEAN toggle switch to OFF.
   A. If a safeguard 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.”
2. Allow the ice machine to run to determine if the condition is reoccurring.
   A. If the ice machine continues to run, the condition has corrected itself. Allow the ice machine to continue running.
   B. If the ice machine stops, determine the safeguard mode, then refer to the specific safeguard for troubleshooting procedures.

SafeGuards

- No Water
- No Ice Production

NO WATER

The water sensing switch opens for more than 30 seconds.

Operation

When the float switch is open at initial start-up, the ice machine will wait for the switch to close before starting.

During the freeze cycle, if the water float opens for 30 seconds, the ice machine will:

1. De-energize the compressor and gear motor.
2. The Water Ok light on the control board will de-energize.
3. A 15-minute delay is initiated.

The water Ok light will flash when the float switch closes or when the toggle switch is placed in the OFF position.

The ice machine will remain off until the 15-minute delay period expires and the water float switch closes.

NO ICE PRODUCTION

The ice damper did not open and close at least once every 90 seconds in the freeze cycle.

Operation

During the first 12 minutes of operation:

The control board must see the ice damper open/close at least once. This allows time for ice production to start at all ambient temperatures.

After the initial 12-minute period:

The control board must see the ice damper open/close at least once every 90 seconds.

When the ice damper does not open/close within the specified time, the control board will:

1. De-energize the compressor and gear motor.
2. HES #1 light on the control board will flash (the light will not flash if the ice damper is open).
3. A 15-minute delay is initiated.
4. After the 15-minute delay the ice machine will:
   A. Energize the dump valve for 30 seconds
   B. Energize the gear motor
   C. Wait until the water float valve closes and then energize the compressor and fan motor.

5. If the ice damper fails to open/close at least once in the initial 12-minute period, the control board will initiate another safety shutdown. This sequence will repeat until:
    A. The ice machine restarts and operates normally for 10 minutes.
    B. The ice machine is unable to run normally within 300 minutes of the initial shutdown.

If the ice machine does not run normally within 300 minutes of the initial shutdown, the control board will lock out and require a manual reset.

The control board will flash the HES #1 light anytime the toggle switch is placed in the OFF position for the first 48 hours after the failure.

Reset Procedure

Move the ICE/OFF/CLEAN toggle switch from OFF to ICE or disconnect and reapply power to the ice machine.

Ice Machine Will Not Run Diagnostics

⚠Warning

High (line) voltage is applied to the control board (terminals #39 and #90) at all times. Removing control board fuse or moving the toggle switch to OFF will not remove the power supplied to the control board.

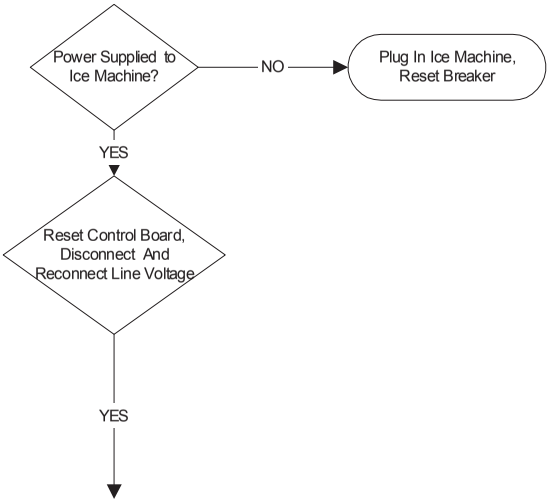
The following sequence describes the normal start-up procedure for the ice machine when line voltage is disconnected then reconnected to the ice machine.

1. Power is supplied to the control board.
2. The control board lights race (energize/de-energize in sequence) to indicate the ice machine is in a 15-minute delay mode.
3. When the 15-minute delay ends, the ice machine starts. The following lights are energized:
   - HES #1
   - HES #2
   - Water OK

The HES #1 light will de-energize and re-energize as ice passes beneath the ice damper.

When the ice damper lifts approximately 45 degrees, HES #2 de-energizes and the ice machine shuts off immediately on full bin. A 15-minute time delay is initiated, which prevents the ice machine from immediately restarting.

Ice Machine Will Not Run

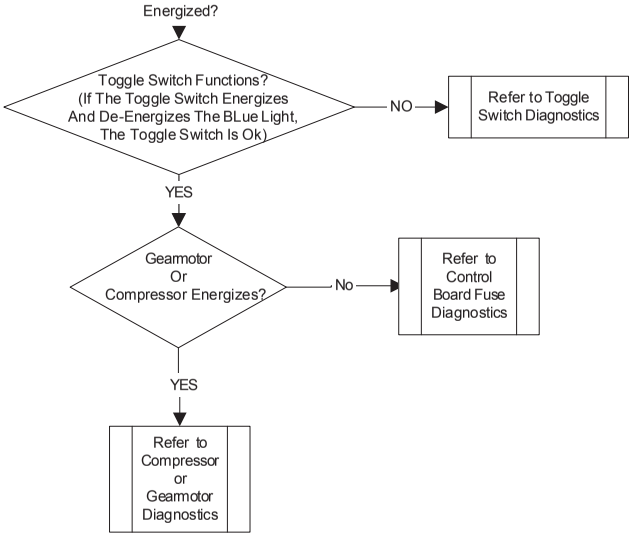


IMPORTANT
A 15-Minute Delay Initiates After The Problem Is Corrected. This Delay Must Expire Before The Ice Machine Will Start.

YES
Power At Terminals #90 & #39?
NO
Refer To Low and High Pressure Cutout Specifications.
YES
Nugget Control Board Light Energized?
NO
Disconnect HES #2 From Control Board. Light Energizes?
NO
Replace Control Board
YES
Replace HES #2
YES
IMPORTANT
A 15-Minute Delay Initiates After The Problem Is Corrected. This Delay Must Expire Before The Ice Machine Will Start.

YES
Reservoir Full Of Water?
NO
Restore Water Supply
YES
Water Light On?
NO
Refer To Float Switch Diagnostics
YES
Damper Door Closed?
NO
Install/Close Damper Door
YES
IMPORTANT
A 15-Minute Delay Initiates After The Problem Is Corrected. This Delay Must Expire Before The Ice Machine Will Start.

IMPORTANT
A 15-Minute Delay Initiates After The Problem Is Corrected. This Delay Must Expire Before The Ice Machine Will Start.



IMPORTANT
A 15-Minute Delay Initiates After The Problem Is Corrected. This Delay Must Expire Before The Ice Machine Will Start.

Refrigeration Diagnostics

BEFORE BEGINNING SERVICE

Ice machines may experience operational problems only during certain times of the day or night. A machine may function properly while it is being serviced, but malfunctions later. Information provided by the user can help the technician start in the right direction, and may be a determining factor in the final diagnosis.

Ask these questions before beginning service:

- When does the ice machine malfunction? (night, day, all the time, only during the Freeze cycle, etc.)
- When do you notice low ice production? (one day a week, every day, on weekends, etc.)
- Can you describe exactly what the ice machine seems to be doing?
- Has anyone been working on the ice machine?
- During "store shutdown," is the circuit breaker, water supply or air temperature altered?
- Is there any reason why incoming water pressure might rise or drop substantially?

INSTALLATION/VISUAL INSPECTION CHECKLIST

Possible Problem List	Corrective Action List
Filter and/or condenser is dirty.	Clean the filter and condenser.
Water filtration is plugged (if used).	Install a new water filter.
Water drain is not vented or is improperly installed.	Run and vent drains according to the installation manual.

WATER SYSTEM CHECKLIST

A water-related problem could cause component misdiagnosis.

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

Possible Problem List	Corrective Action List
Water area (evaporator) is dirty.	Clean as needed.
Water inlet pressure not between 20 and 80 psig.	Install a water regulator valve or increase the water pressure.
Incoming water temperature is not between 45°F (1.7°C) and 90°F (32.2°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.
Vent tube is not installed on water outlet drain.	See installation instructions.
Hoses, fittings, etc., are leaking water.	Repair/replace as needed.
Water float valve is stuck open or closed.	Clean/replace as needed.
Dump valve is leaking.	Clean dump valve. Ice machine will shut off on Low Water SafeGuard.

ICE PRODUCTION/QUALITY CHECK

QUALITY CHECK

Ice quality will vary with ambient and water temperatures, and is measured by the amount of excess water in the ice. An easy test is to squeeze a handful of ice. High quality ice releases only a small amount of water. As ice quality drops, more water can be removed.

Generally speaking, higher incoming water temperature results in lower ice quality.

Lower water temperature results in higher ice quality.

ICE PRODUCTION CHECK

1. Run the ice machine a minimum of 10 minutes to allow the system to stabilize.
2. Catch the ice in a non-perforated container for 7 minutes and 12 seconds or for more accuracy 14 minutes and 24 seconds.
3. Weigh the container and ice, then deduct the weight of the container.
4. Convert ounces to pounds.
   Example: 3 lbs. 12 oz. converts to 3.75 lbs.
   (12 oz. ÷ 16 oz. =.75 lb.)
5. Determine the 24-hour ice production capacity.
   - 7 minutes 12 seconds: Multiply the total ice weight by 200.
   - 14 minutes 24 seconds: Multiply the total ice weight by 100.

Example:

1. Collected ice for 7 minutes 12 seconds.
2. Total weight (minus container) = 3.75 lbs.
3. 3.75 lbs. x 200 = 750 lbs. of ice every 24 hours.
4. Compare the capacity to the 24-hour ice production chart for the model being tested.
5. Ice production checks that are within 10% of the charted capacity are considered normal due to variances in air and water temperatures. Actual temperatures will seldom match the chart exactly.

ANALYZING DISCHARGE PRESSURE

1. Determine the ice machine operating conditions:
   - Air temperature entering condenser
   - Air temperature around ice machine
   - Water temperature entering water reservoir
2. Refer to 24-Hour Ice Production/Refrigeration Pressure Chart for ice machine being checked.

   Use the operating conditions determined in Step 1 to find the published normal discharge pressures and compare to actual discharge pressure readings.
3. Measure the actual discharge pressure.
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.

Discharge Pressure High Checklist

Problem	Cause
Improper installation	Refer to "Installation/Visual Inspection Checklist."
Restricted condenser air flow	Dirty air filter High inlet air temperature Condenser discharge air recirculation 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 line/component restricted (before mid-condenser)

Discharge Pressure Low Checklist

Problem	Cause
Improper installation	Refer to “Installation/Visual Inspection Checklist.”
Improper refrigerant charge	Undercharged Wrong type of refrigerant
Other	Low ambient temperature Non-Manitowoc components in system High side refrigerant lines/component restricted (before mid-condenser) Suction pressure is too low and affecting discharge pressure. (Refer to “Suction Pressure Low Checklist.”) No water or insufficient pressure Expansion valve incorrectly adjusted Defective compressor Moisture in refrigeration system

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

ANALYZING SUCTION PRESSURE

NOTE: Analyze discharge pressure before analyzing suction pressure.

High or low discharge pressure may be causing high or low suction pressure.

Suction Pressure High Checklist

Problem	Cause
Improper installation	Refer to “Installation/Visual Inspection Checklist.”
Discharge pressure	Discharge pressure is too high and is affecting suction pressure. Refer to “Discharge Pressure High Checklist.”
Improper refrigerant charge	Overcharged Wrong type of refrigerant Non condensible in system
Other	Dump valve leaking Non-Manitowoc components in system Expansion valve incorrectly adjusted Defective compressor

Suction Pressure Low Checklist

Problem	Cause
Improper installation	Refer to “Installation/Visual Inspection Checklist.”
Discharge pressure	Discharge pressure is too low and is affecting suction pressure. Refer to “Discharge Pressure Low Checklist.”
Improper refrigerant charge	Undercharged Wrong type of refrigerant
Other	Non-Manitowoc components in system Restricted/plugged liquid line drier Restricted/plugged tubing in suction side of refrigeration system Expansion valve starving No water or insufficient pressure Moisture in refrigeration system Dirty Evaporator

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

Component Check Procedures

Electrical Components

MAIN FUSE

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, time delay.

⚠Warning

High (line) voltage is applied to the control board at all times. Removing the control board fuse or moving the toggle switch to OFF will not remove the power supplied to the control board.

CHECK PROCEDURE

1. Energized control board lights do not indicate a good fuse.

⚠Warning

Disconnect electrical power to the entire ice machine before proceeding.

2. Remove the fuse. Check for continuity across the fuse with an ohmmeter.

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

ICE/OFF/CLEAN TOGGLE SWITCH

FUNCTION

The switch is used to place the ice machine in ICE, OFF or CLEAN mode of operation.

SPECIFICATIONS

Single-pole, double-throw switch. The switch is connected into a varying low D.C. voltage circuit.

CHECK PROCEDURE

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

1. Inspect the toggle switch for correct wiring.
2. Isolate the toggle switch by disconnecting the molex connector.
3. Check continuity across the toggle switch terminals. Note where the wire numbers are connected to the switch terminals, or refer to the wiring diagram to take proper readings.

Switch Setting	Terminals	Ohm Reading
ICE	1-6	Open
	1-2	Closed
	2-6	Open
CLEAN	1-6	Closed
	1-2	Open
	2-6	Open
OFF	1-6	Open
	1-2	Open
	2-6	Open

4. Replace the toggle switch if continuity readings do not match all three switch settings.

FLOAT SWITCH

FUNCTION

The float switch prevents the ice machine from running when the water level is below the control setpoint.

The float switch must be closed (float in up position) before the ice machine will start, and must remained closed throughout the freeze cycle.

SPECIFICATIONS

A mechanical liquid level sensor, that magnetically operates a reed switch.

CHECK PROCEDURE

NOTE: The water float switch is connected to the water reservoir cover. The reservoir cover must be in place and water must be present in the reservoir to close the switch. Verify water is supplied to the float valve, the water inlet screen is clean, and the float and float arm are free moving.

1. Disconnect power to the ice machine.
2. Disconnect the float switch from the control board and connect an ohm meter to the switch wires.
3. Verify the switch is in the up position (reservoir full of water), then check continuity.

Step 3 Check for Continuity	
Reading	**Result**
Closed	The switch is working properly
Open	Replace the switch

4. Remove cover from reservoir by lifting straight up. Verify the switch opens as the float drops.

ICE DAMPER AND HALL EFFECT SWITCHES

Damper Door

FUNCTION

Opens and closes as ice passes from the ice chute to the bin. A metal lever attached to the damper interrupts the magnetic field sensed by the Hall Effect switches as the damper opens and closes.

Hall Effect Switch #1 - Operational Sensing

This switch will open and re-close in conjunction with the ice damper as ice is discharged from the evaporator. The control board must see this switch open and close at least once every 90 seconds during the freeze cycle.

Hall Effect Switch #2 - Shut-Off and Restart

This switch also works in conjunction with the ice damper. When the switch opens, the ice machine stops immediately. The ice machine restarts when the switch re-closes and the five-minute delay period expires.

FUNCTION TEST

Place toggle switch in OFF position. HES#1 and HES#2 lights will energize. Move ice damper slowly to open position.

- HES#1 light de-energizes, HES#2 remains energized.
- HES#2 light de-energizes as damper continues to open.

Move damper slowly to closed position. HES#2 energizes, HES#1 remains de-energized.

HES#1 energizes as the damper continues to close.

Hall Effect Switch Diagnostics

All diagnostics must be performed with the ice damper installed and in the closed position. The control board lights will not indicate as described below with the ice damper in the open position. The ice damper must swing freely, if the damper is binding adjust/loosen screws that hold the Hall Effect switch housing in place.

SWITCH FAILS OPEN OR IS DISCONNECTED

HES#1

1. Reset line voltage to the ice machine
2. Wait 15 minutes for delay to expire.
3. HES#1 light energizes and ice machine starts.
4. When 15-minute delay period ends, the ice machine shuts off and flashes the HES#1 light.

HES#2

1. Reset line voltage to the ice machine.
2. Wait 15 minutes for delay to expire.
3. HES#2 light is energized and HES#1 light is de-energized.
4. Ice machine starts.
5. After 15 minutes the ice machine shuts off. HES#1 is de-energized and HES#2 is energized.

SWITCH FAILS CLOSED

HES#1

1. Reset line voltage to the ice machine
2. Wait 15 minutes for delay to expire.
3. HES#1 light de-energized.
4. The ice machine starts, runs for 20 seconds, then de-energizes.
5. HES#1 light is de-energized.

HES#2

1. Reset line voltage to the ice machine
2. Wait 15 minutes for delay to expire.

HES #2 is a three wire switch and can stop in three separate failure modes.

- HES #1 is energized, HES #2 is de-energized, and the ice machine will not start.
- HES #1 and HES #2 lights are de-energized, and the ice machine will not start.
- HES #1 and HES #2 are energized. The ice machine starts, immediately shuts off and starts another 15-minute delay period (control board lights race to indicate 15-minute delay period). The ice machine will repeat the sequence until the toggle switch is moved to OFF or power is disconnected to the ice machine.

In all failure modes, disconnecting HES #2 from the control board will result in Switch Fails Open or Is Disconnected symptoms (see previous page).

SELECTOR SWITCH

FUNCTION

Selects product dispensed. Ice, Water or Ice and Water.

CHECK

DISPENSE LEVER ACTIVATED

Step 1 Verify line voltage is present at control board wires #20 & #22. Note - If a blue indicator light is energized on the touch pad, the control board has line voltage.

Step 2 Depress each selection on the touch pad.

- 1 or more LEDs do not energize/de-energize when a selection is pressed - Replace touch pad
- Each touch pad LED energizes/de-energizes as selections are pressed - Go to next step

Step 3 Isolate and ohm the ice dispense switch (Wires #59 & #60). The selector switch closes when depressed and opens when released.

- Switch does not close/open when the switch is pressed/released - Replace switch
- Switch closes/opens as the switch is pressed/released - Go to next step

Step 4 Reconnect dispense switch and test both relays for line voltage:

- Wires #58 & #54 = Ice Dispense Motor
- Wires #52 & #56 = Water Solenoid
- Replace wiring, component or control board as required.

TOUCHLESS SENSOR ACTIVATED

Step 1 Verify line voltage is present at control board wires #20 & #22. Note - If a blue indicator light is energized on the touch pad, the control board has line voltage.

Step 2 Depress each selection on the touch pad.

- 1 or more LEDs do not energize/de-energize when a selection is pressed - Replace touch pad
- Each touch pad LED energizes/de-energizes as selections are pressed - Go to next step

Step 3 Verify line voltage is supplied to touchless sensing control board at wires #49 & #50.

Will Not Dispense

- Disconnect wires from C (common) and NO (normally open) terminals on the sensor control board.
- Use an ohm meter to verify the switch is opening and closing. Place hand in front of sensor, if the sensor activates and closes the switch, the sensor is working correctly.
- If the sensor does not activate the switch, disconnect the sensor wire from the sensor control board. Short +5 and SIG.
    - If the contacts close, replace the sensor.
    - If the contacts remain open, replace the sensor control board.

Will Not Stop Dispensing

- Disconnect sensor plug from sensor control board.
    - If the dispensing stops, replace the sensor
    - If the dispensing continues, disconnect wires #59 & #60 from the control board
- Check resistance across control board contacts
    - Closed = Replace the touchless sensing control board
    - Open = Dispense control board is not functioning correctly, check control board relays

Replace the selector switch if ohm readings do not match all three switch settings.

DISPENSE SWITCH

FUNCTION

Supplies power to the product selector switch when activation lever is depressed.

CHECK

1. Inspect the selector switch for correct wiring.
2. Isolate the switch by disconnecting all wires from the switch.
3. Check across the switch terminals with an ohm meter.

Activation Lever Position	Resistance Reading
Depressed	Closed
Released	Open

Replace the selector switch if ohm readings do not match.

TOUCHLESS SENSOR

FUNCTION

Supplies power to the product selector switch when container activates sensor.

CHECK

Container must be within an inch of sensor to activate.

Will Not Dispense

1. Verify power is supplied to the ice machine. When the toggle switch is in ICE position, the blue LED light will be on.
2. Disconnect wires from C (common) and NO (normally open) terminals on the sensor control board.
3. Use an ohm meter to verify the switch is opening and closing. Place hand in front of sensor, if the sensor activates and closes the switch, the sensor is working correctly.
4. If the sensor does not activate, disconnect the sensor wire from the sensor control board. Short +5 and SIG.
    - If the contacts close, replace the sensor.
    - If the contacts remain open, replace the sensor control board.

Will Not Stop Dispensing

1. Disconnect sensor plug from sensor control board.
    - If the dispensing stops, replace the sensor.
    - If the dispensing continues, disconnect wires 22 & 59/60 from the control board.
2. Check resistance across control board contacts.
    - Closed = Replace the sensor control board
    - Open = Refer to selector switch diagnostics

HIGH PRESSURE CUTOUT CONTROL

FUNCTION

Stops the ice machine if subjected to excessive high-side pressure.

The HPCO control is normally closed, and opens on a rise in discharge pressure.

Specifications	
Cut-Out	**Cut-In**
450 psig ±10 (3103 kPa ±69) 31 bar ±.69	Automatic Reset
(Must be below 300 psig [2068 kPa 20.68 bar] to reset.)	

CHECK PROCEDURE

1. Set ICE/OFF/CLEAN switch to OFF, (Manual reset HPCO reset if tripped).
2. Disconnect main power supply to the ice machine.
3. Connect manifold gauges to the access valves.
4. Hook voltmeter in parallel across the HPCO, leaving wires attached.
5. Reconnect main power supply to the ice machine.
6. Set ICE/OFF/CLEAN switch to ICE.
7. No water or air flowing through the condenser will cause the HPCO control to open because of excessive pressure. Watch the pressure gauge and record the cut-out pressure.

⚠Warning

If discharge pressure exceeds 460 psig (3172 kPa 31.72 bar) and the HPCO control does not cut out, set ICE/OFF/CLEAN switch to OFF to stop ice machine operation.

Replace the HPCO control if it:

1. Will not reset (below 300 psig [2068 kPa 20.68 bar]).
2. Does not open at the specified cut-out point.

FAN CYCLE CONTROL

FUNCTION

Energizes and de-energizes the condenser fan motor.

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

Specifications	
Cut-In (Close)	**Cut-Out (Open)**
250 psig ±5	200 psig ±5

CHECK PROCEDURE

1. Verify fan motor windings are not open or grounded, and fan spins freely.
2. Connect manifold gauge set to ice machine.
3. Hook voltmeter in parallel across the fan cycle control, leaving wires attached.
4. Refer to chart below.

FCC Setpoint:	Reading Should Be:	Fan Should Be:
Above Cut-In	0 Volts	Running
Below Cut-Out	Line Voltage	Off

LOW PRESSURE CUTOUT (LPCO) CONTROL

FUNCTION

Stops the ice machine if the low side pressure is too low. The LPCO control is closed at pressures above setpoint and opens at pressures below setpoint.

	Specifications	
	Cut-Out	**Cut-In**
Current Production & Replacement Part	17 psig ±5	35 psig ±7

CHECK PROCEDURE

1. Connect manifold gauge set to suction access valve.
2. Disconnect wires from low pressure switch and connect ohm meter across LPCO terminals.

Replace the LPCO control if it:

1. Is not closed at the specified setpoint.
2. Does not open at the specified setpoint.

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 assure that the overload is closed and the resistance readings will be accurate.

SINGLE PHASE COMPRESSORS

1. Disconnect power, then 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.

Compressor Drawing Locked Rotor

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

The two likely causes of this are a defective starting component and a mechanically seized compressor.

To determine which you have:

1. Install gauge on high and low side.
2. Try to start the compressor.
3. Watch the pressures closely.
    A. If the pressures do not move, the compressor is seized. Replace the compressor.
    B. 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.

Diagnosing Capacitors

- If the compressor attempts to start, or hums and trips the overload protector, check the starting components before replacing the compressor.
- Visual evidence of capacitor failure can include a bulged terminal end or a ruptured membrane. Do not assume a capacitor is good if no visual evidence is present.
- A good test is to install a known good substitute capacitor.
- Use a capacitor tester when checking a suspect capacitor. Clip the bleed resistor off the capacitor terminals before testing.

DIAGNOSING START COMPONENTS

If the compressor attempts to start, or hums and trips the overload protector, check the start components before replacing the compressor.

Capacitor

Visual evidence of capacitor failure can include a bulged terminal end or a ruptured membrane. Do not assume a capacitor is good if no visual evidence is present. A good test is to install a known good substitute capacitor. Use a capacitor tester when checking a suspect capacitor. Clip the bleed resistor off the capacitor terminals before testing.

Relay

The relay has a set of contacts that connect and disconnect the start capacitor from the compressor start winding. The contacts on the relay are normally closed (start capacitor in series with the start winding). The relay senses the voltage generated by the start winding and opens the contacts as the compressor motor starts. The contacts remain open until the compressor is de-energized.

Relay Operation Check

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

1. Disconnect wires from relay terminals.
2. Verify the contacts are closed.
   Measure the resistance between terminals 1 and 2. No continuity indicates open contacts. Replace the relay.
3. Check the relay coil.
   Measure the resistance between terminals 2 and 5. No resistance indicates an open coil. Replace the relay.
4. Move toggle switch to the ICE position.
5. The compressor start winding should energize for less than 1 second. Continued high amperage draw could indicate:
   - Low incoming power supply.
     (Check voltage at compressor start-up when load is greatest.)
   - Defective relay.
   - Defective capacitor.
   - Defective compressor.
6. Verify voltage and replace all start components.
7. If all of the previous tests are satisfactory and the compressor will not operate or continue to operate, replace the compressor.

Refrigerant Recovery/Evacuation

NORMAL SELF-CONTAINED PROCEDURES

Do not purge refrigerant to the atmosphere. Capture refrigerant using recovery equipment. Follow the manufacturer's recommendations.

Important

Manitowoc Ice assumes no responsibility for the use of contaminated refrigerant. Damage resulting from the use of contaminated refrigerant is the sole responsibility of the servicing company.

Important

Replace the liquid line drier before evacuating and recharging. Use only a Manitowoc (OEM) liquid line filter-drier to prevent voiding the warranty.

CONNECTIONS

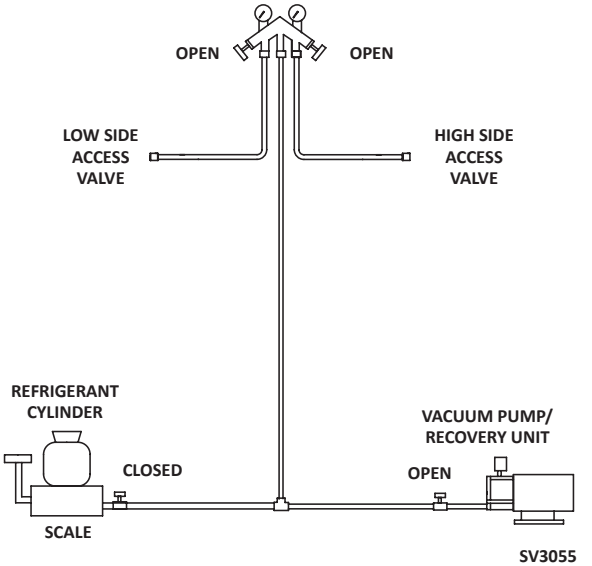
Manifold gauge sets must utilize low loss fittings to comply with U.S. Government rules and regulations.

Make these connections:

- Suction side of the compressor through the suction service valve.
- Discharge side of the compressor through the discharge service valve.

Recovery/Evacuation Procedures

1. Place the toggle switch in the OFF position.
2. Install manifold gauge set, scale, and recovery unit or two-stage vacuum pump.



RECOVERY/EVACUATION CONNECTIONS

3. Perform recovery or evacuation:
   A. Recovery: Operate the recovery unit as directed by the manufacturer's instructions.
   B. Evacuation prior to recharging: Pull the system down to 250 microns. Then allow the pump to run for an additional half hour. Turn off the pump and perform a standing vacuum leak check.

NOTE: Check for leaks using an electronic leak detector after charging the ice machine.

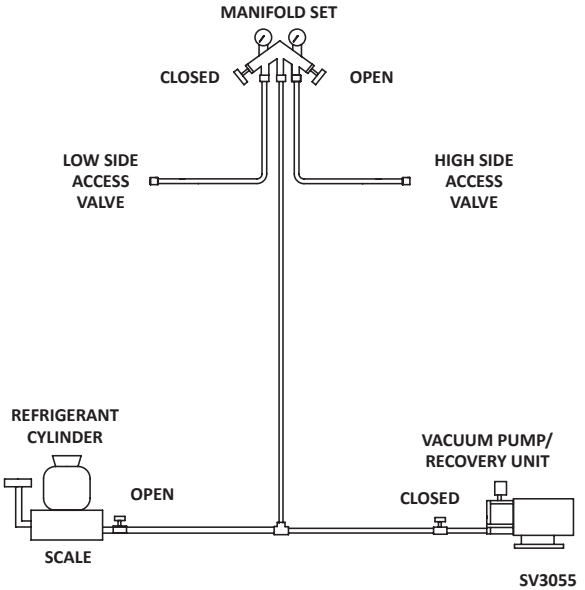
4. Follow the Charging Procedures on the next page.

Charging Procedures

Important

The charge is critical on all Manitowoc ice machines. Use a scale to ensure the proper charge is installed.

1. Be sure the toggle switch is in the OFF position.



CHARGING CONNECTIONS

2. Close the vacuum pump valve and the low side manifold gauge valve.
3. Open the high side manifold gauge valve.
4. Open the refrigerant cylinder and add the proper refrigerant charge (shown on nameplate) through the discharge access valve.
5. Let the system “settle” for 2 to 3 minutes.
6. Place the toggle switch in the ICE position.

7. Close the high side on the manifold gauge set. Add any remaining vapor charge through the suction access valve (if necessary).

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

8. Make sure that all of the vapor in the charging hoses is drawn into the ice machine before disconnecting the charging hoses.
    A. Run the ice machine in the Freeze cycle.
    B. Remove the quick disconnect fitting from the high side access valve at the ice machine.
    C. Open the low side service valve at the ice machine.
    D. 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.
    E. Allow the pressures to equalize while the ice machine is in the Freeze cycle.
    F. Remove the quick disconnect fitting from the low side access valve at the ice machine and install both access valve caps.

System Contamination Clean-Up

General

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

Important

Manitowoc Ice assumes no responsibility for the use of contaminated refrigerant. Damage resulting from the use of contaminated refrigerant is the sole responsibility of the servicing company.

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 Total Test Kit from Totaline or a similar diagnostic tool. These devices sample refrigerant, eliminating the need to take an oil sample. Follow the manufacturer's directions.

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.

Check the chart on the next page 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 Leak in water cooled condenser 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

CLEANUP PROCEDURE

Mild System Contamination

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.

Important

Dry nitrogen is recommended for this procedure. This will prevent refrigeration release.

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 (35 kPa, .35 bar).
   B. Pull vacuum to 500 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of 5 psig (35 kPa, .35 bar).
   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 standing vacuum test to make 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 charge.
6. Operate the ice machine.

Severe System Contamination

1. Remove the refrigerant charge.
2. Remove the compressor.
3. Wipe away any burnout deposits from suction and discharge lines at compressor.
4. Sweep through the open system with dry nitrogen.

Important

Refrigerant sweeps are not recommended, as they release refrigerant into the atmosphere.

5. Install a new compressor and new start components.
6. Install a suction line filter-drier with acid and moisture removal capability. Place the filter drier as close to the compressor as possible.
7. Install an access valve at the inlet of the suction line drier.
8. Install a new liquid line drier.

Important

Dry nitrogen is recommended for this procedure. This will prevent refrigerant release.

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 (35 kPa, .35 bar).
   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 (35 kPa, .35 bar).
   D. Change the vacuum pump oil.
   E. 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 standing vacuum test to make a preliminary leak check. You should use an electronic leak detector after system charging to be sure there are no leaks.

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 1 psig (7 kPa, .7 bar), the filter-drier should be adequate for complete cleanup.
    B. If the pressure drop exceeds 1 psig (7 kPa, .7 bar), 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. Then remove the suction line drier and change the liquid line drier.
13. Follow normal evacuation procedures.

REPLACING PRESSURE CONTROLS WITHOUT REMOVING REFRIGERANT CHARGE

This procedure reduces repair time and cost. Use it when any of the following components require replacement, and the refrigeration system is operational and leak-free.

- Fan cycle control
- High pressure cut-out control
- Low pressure control
- High side service valve
- Low side service valve

Important

This is a required in-warranty repair procedure.

1. Disconnect power to the ice machine.
2. Follow all manufacturer's instructions supplied with the pinch-off tool. Position the pinch-off tool around the tubing as far from the pressure control as feasible. (See the figure on next page.) Clamp down on the tubing until the pinch-off is complete.

⚠Warning

Do not unsolder a defective component. Cut it out of the system. Do not remove the pinch-off tool until the new component is securely in place.

3. Cut the tubing of the defective component with a small tubing cutter.
4. Solder the replacement component in place. Allow the solder joint to cool.
5. Remove the pinch-off tool.
6. Re-round the tubing. Position the flattened tubing in the proper hole in the pinch-off tool. Tighten the wing nuts until the block is tight and the tubing is rounded.

NOTE: The pressure controls will operate normally once the tubing is re-rounded. Tubing may not re-round 100%.

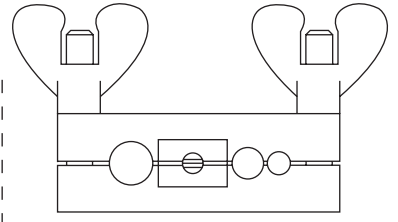


FIG. A - "PINCHING OFF" TUBING

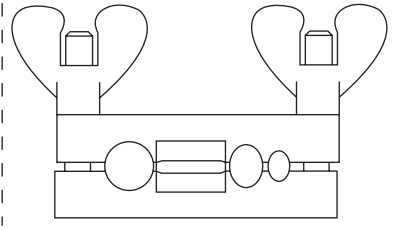


FIG. B - RE-ROUNDING TUBING

SV1406

USING PINCH OFF TOOL

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Component Specifications

MAIN FUSE

The main fuse is 250 Volt, 10 amp.

ICE/OFF/CLEAN TOGGLE SWITCH

Single-pole, double-throw switch. The switch is connected into a varying low D.C. voltage circuit.

HIGH PRESSURE CUTOUT (HPCO) CONTROL

Cut-Out	Cut-In
450 psig ±10 (3103 kPa ±69) 31 bar ±.69	Automatic Reset
(Must be below 300 psig [2068 kPa 20.68 bar] to reset.)	

FILTER-DRIERS

Driers are covered as a warranty part. The drier must be replaced any time the system is opened for repairs.

The size of the filter-drier is important. The refrigerant charge is critical. Using an improperly sized filter-drier will cause the ice machine to be improperly charged with refrigerant. Listed below is the recommended OEM field replacement drier:

Model	Drier Size	End Connection Size
RNS012 RNS020	DML-032S	1/4"

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	Refrigerant Charge
RNS012A/RNS020A	9 oz. / 255 g

NOTE: All ice machines are charged using R-404A refrigerant.

Cycle Times/24-Hour Ice Production/ Refrigerant Pressure Charts

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

Accurate collection of data is essential to obtain the correct diagnosis.

- Refer to “Refrigeration System Diagnostics” for the data that must be collected. This list includes: before beginning service, ice production check, installation/ visual inspection, water system checklist, safeguards, discharge and suction pressure analysis.
- 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.
- Zero out manifold gauge set before obtaining pressure readings to avoid misdiagnosis.
- Discharge and suction pressure are highest at the beginning of the cycle. Allow system to stabilize, then verify the pressures are within the range indicated.
- All pressure readings must be obtained at the ice machine head section. Line set length will affect pressures at the condensing unit.
- Water temperature will affect suction and discharge pressure - 50° water temperature will result in pressures on the lower end of the ranges specified. 90° water temperatures will result in pressures on the upper end of the ranges specified.

RNS012A

SELF-CONTAINED AIR-COOLED

NOTE: These characteristics will vary depending on operating conditions.

24-Hour Ice Production

Air Temperature Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
50/10	325	300	280
70/21	300	275	255
80/27	265	250	230
90/32	240	225	210
100/38	210	195	185

Operating Pressures (PSIG)

Air Temperature Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50/10	170-180	38-42
70/21	230-260	38-42
90/32	270-320	38-42
100/38	320-375	38-42
110/43	340-400	38-42

RNS020A

SELF-CONTAINED AIR-COOLED

NOTE: These characteristics will vary depending on operating conditions.

24-Hour Ice Production

Air Temperature Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
50/10	325	300	280
70/21	300	275	255
80/27	265	250	230
90/32	240	225	210
100/38	210	195	185

Operating Pressures (PSIG)

Air Temperature Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50/10	170-180	38-42
70/21	230-270	38-42
90/32	280-330	38-42
100/38	330-385	38-42
110/43	260-420	38-42

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