Manitowoc

INDIGO NXT

R290 Refrigerant Ice Machines

50 Hz Only

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 STH097 Rev 01 01/26

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.

Definitions

⚠ DANGER

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

⚠ Warning

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

⚠ Caution

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

Notice

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

NOTE: Indicates useful, 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.

⚠ 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.
- Connect to a potable water supply only.
- 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 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.
- 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.
- 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.
- Prior to installing a non-OEM ice storage system with this ice machine, follow the manufacturers installation procedures and verify the location and installation meets the local/national mechanical codes and stability requirements.

⚠ Warning

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

- 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.
- 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.

⚠ Warning

Temporary electrical installations of more than 600 volts may be used only during periods of tests, emergencies, or construction-like activities.

Temporary wiring must be removed immediately upon completion of the project or purpose for which the wiring was installed.

⚠ 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.
- Do not store or use electrical appliances inside the ice machine or ice storage areas.

⚠ DANGER

Follow these flammable refrigeration system requirements during installation, use or repair of this equipment.

- Minimum room size may be required; refer to ice machine label.
- Multiple R290 units can be installed in a single room but their cumulative refrigerant charge must be considered when determining safe room size.
- All lockout and tag out procedures must be followed when working on this equipment.
- This equipment contains high voltage electricity and refrigerant charge. Shorting electrical wires to refrigeration tubing may result in an explosion. All electrical power must be disconnected from the system before servicing the system. Refrigerant leaks, can result in serious injury or death from explosion, fire, or contact with refrigerant or lubricant mists.
- Do not damage the refrigeration circuit when installing, maintaining or servicing the unit. Never use sharp objects or tools to remove ice or frost. Do not use mechanical devices or other means to accelerate the defrosting process.
- Well-ventilated areas are recommended for installation and storage.
- Leak pressure, leak hole size, wind speed, and the presence of objects like furniture within the room can also affect the concentration and distribution of R290 during a leak.

⚠ DANGER

Follow these flammable refrigeration system requirements during installation, use or repair of this equipment.

- Refer to nameplate - Ice machine models may contain up to 500 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.
- To minimize the risk of ignition due to improper installation, replacement parts or service procedures, only refrigeration technicians with flammable refrigerant training who are aware of the dangers of dealing with high voltage electricity and refrigerant under pressure are allowed to work on this equipment.
- All replacement parts must be like components obtained from the equipment manufacturers authorized replacement part network.
- This equipment must be installed in accordance with the ASHRAE 15 Safety Standard for Refrigeration Systems.
- This equipment can not be installed in corridors or hallways of public buildings.
- Installation must comply with all applicable equipment fire and health codes with the authority having jurisdiction.

⚠ Warning

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

- 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.
- Never use a high-pressure water jet for cleaning on the interior or exterior of this unit. Do not use power cleaning equipment, steel wool, scrapers or wire brushes on stainless steel or painted surfaces.
- Two or more people are required to move this equipment to prevent tipping.
- Locking the front casters after moving is the owner's and operator's responsibility. 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.
- The on-site supervisor is responsible for ensuring that operators are made aware of the inherent dangers of operating this equipment.

Do not operate any appliance with a damaged cord or plug. All repairs must be performed by a qualified service company.

Notice
Ice Machine Data Security

All data collected/loaded into the ice machine is encrypted.

Encryption includes:

- Data sent through the user interface
- Data sent through the Bluetooth interface
- Data sent through the IOT (cloud-based)

Notice

This ice machine may contain Bluetooth.

A Bluetooth device may be at risk from any of the following:

- Eavesdropping
- Unauthorized Access
- Message modification
- Denial of service
- Data exfiltration
- Insecure data transmission
- Phishing

Notice

To help with data security measures and limit access to your ice machine's data, always lock the touchscreen. For increased security, enable the touchscreen’s four-digit PIN.

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Model Numbers

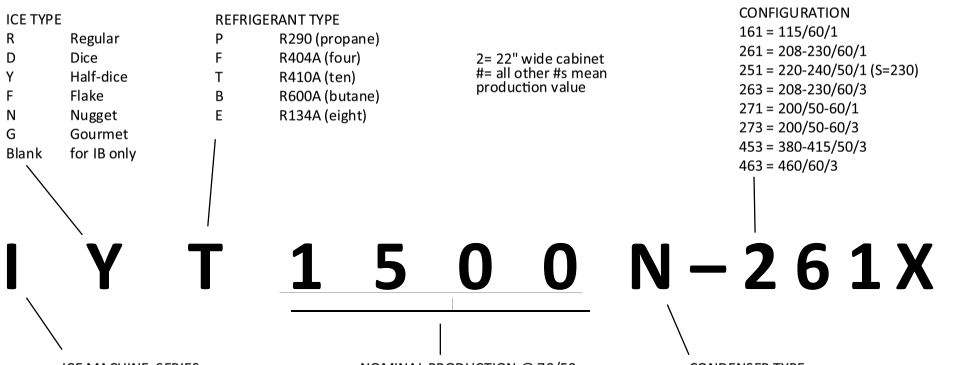
This manual covers the following models:

Air-Water-Remote Condenser Models

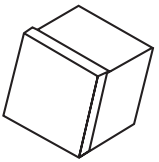
Self-Contained Air-Cooled	Self-Contained Water-Cooled
R290 - 22" Wide Models	
IDP0320A	----
IYP0320A	----
IDP0420A	IDP0420W
IYP0420A	IYP0420W
IDP0620A	IDP0620W
IYP0620A	IYP0620W
IRP0620A	IRP0620W
R290 - 30" Wide Models	
IDP0300A	IDP0300W
IYP0300A	IDY0300W
IDP0500A	IDP0500W
IYP0500A	IYP0500W
IRP0500A	IRP0500W
IDP0600A	IDP0600W
IYP0600A	IYP0600W
IDP0800A	IDP0800W
IYP0800A	IYP0800W
IDP1000A	IDP1000W
IYP1000A	IYP1000W

NOTE: Additional designators are used to identify Voltage, Specials or Country specific models - See “Model Nomenclature” on page 22.

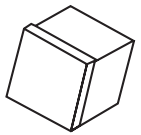
Model Nomenclature



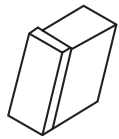
Ice Cube Sizes



Regular
1-1/8" x 1-1/8" x 7/8"
2.86 x 2.86 x 2.22 cm



Dice
7/8" x 7/8" x 7/8"
2.22 x 2.22 x2.22 cm



Half Dice
3/8" x 1-1/8" x 7/8"
0.95 x 2.86 x 2.22 cm

⚠Warning

All Manitowoc ice machines require the ice storage system (bin, dispenser, etc.) to incorporate an ice deflector.

Prior to using a non-Manitowoc ice storage system with other Manitowoc ice machines, contact the manufacturer to assure their ice deflector is compatible with Manitowoc ice machines.

Model/Serial Number Location

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

- The model and serial number can be viewed by pressing the information icon on the touchscreen.
- The owner warranty registration card.
- The model/serial number data plate located in the evaporator compartment and on the back of the ice machine.

The model and serial number displayed on the touchscreen must match the data plate for proper operation.

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.

To obtain a printed copy of warranty terms, please contact Manitowoc Ice at 800-545-5720.

LuminIce® II

The LuminIce® growth inhibitor recirculates the air in the ice machine foodzone over a UV bulb. This process will inhibit the growth of common micro-organisms on all exposed foodzone surfaces.

LuminIce® bulbs require replacement on a yearly basis.

The control board can be set to automatically display a reminder after 12 months.

LuminIce® and LuminIce® II bulbs are not interchangeable; verify your model before ordering a replacement bulb.

Cleanup Procedure for Accidental Bulb Breakage

The cleanup procedure is identical to the procedure used to clean up compact fluorescent (CFL) or fluorescent tube lights. These lights contain a small amount of mercury sealed within a glass tube. Breaking these types of lights will release mercury and mercury vapor. The broken bulb can continue to release mercury vapor until it is cleaned up and removed.

The latest EPA procedures can be viewed on their website at www.epa.gov/cfl/cflcleanup.html.

LuminIce® and LuminIce® II bulbs are not interchangeable; verify your model before ordering a replacement bulb. LuminIce® bulbs have a white base and LuminIce® II bulbs have a blue base.

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Installation

Location Requirements

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 must be free of airborne and other contaminants.
- The location must not be near garbage or other contaminants.
- The location must not be near heat-generating equipment or in direct sunlight and protected from weather.
- 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.
- The location must be capable of supporting the weight of the ice machine and a full bin of ice.
- All utilities must be within 6 feet (2 m) of the unit for installation and serviceability.
- Hinged Panels Only - Front panel must be able to open and swing freely. Recommended front clearance of 36" (91 cm) to swing open. Do not obstruct.

Installation Requirements

- The ice machine and bin must be level.
- Vent the ice machine and bin drains separately.
- Bin drain termination must have an air gap.
- The ice machine and bin must be descaled and sanitized after installation.
- The drain line must contain a union or other suitable means of disconnection at the ice machine.
- The location must allow room for servicing electrical, water, drain and refrigeration tubing.
- A service loop may be required to allow movement or rotation for service access to the machine (do not use hard rigid copper for service loops).

Ice Machine on a Dispenser Installation

Observe following recommendations unless required by the dispenser manufacturer.

An adapter is not required for ice machines that match the dispenser rate. A deflector is not required

Ice level management is recommended to prevent water leakage or movement of ice machine during agitation. A dispenser baffle is required to prevent ice from contacting the ice machine door and prevent possible water leakage.

Align sides and back of ice machine with sides and back of dispenser when placing ice machine.

Follow ice machine installation procedures in this manual and any additional installation requirements specified by the dispenser manufacturer.

Clearance Requirements

Air & Water Condenser Models

IP0300 IP0320	Self-Contained Air-Cooled	Water-Cooled
Top/Sides	16" (406 mm)	---
Back	5" (127 mm)	---

IP0420	Self-Contained Air-Cooled	Water-Cooled
Top/Sides	12" (305 mm)	---
Back	5" (127 mm)	---

IP0500 IP0800	Self-Contained Air-Cooled	Water-Cooled
Top/Sides	12" (203 mm)	---
Back	5" (127 mm)	---

IP0620	Self-Contained Air-Cooled	Water-Cooled
Top/Sides	12" (305 mm)	8" (203 mm)
Back	5" (127 mm)	5" (127 mm)

IP0500 IP0600 IP1000	Self-Contained Air-Cooled	Water-Cooled
Top/Sides	12" (30.5 cm)	8" (203 mm)
Back	5" (12.7 cm)	5" (127 mm)

Operating Temperatures

Model	Minimum Air Temperature	Maximum Air Temperature
All ice machine head sections	35°F 2°C	110°F 43°C

Top Air Discharge Kit

Top air discharge kits require the same clearance requirements as the comparable self-contained air-cooled model.

Notice

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.

Refrigerant Charge

Model	Self-Contained Air-Cooled	Self-Contained Water-Cooled
IP0300	3.5 oz (110 g)	---
IP0320	4.6 oz (130 g)	---
IP0420	8.5 oz (240 g)	---
IP0500	8.8 oz (250 g)	---
IP0600	8.0 oz (226 g)	11.6 oz (330 g)
IP0620	8.1 oz (230 g)	9.2 oz (260 g)
IP0800	17.1 oz (486 g)	15.5 oz (440 g)
IP1000	15.9 oz (450 g)	15.9 oz (450 g)

Multiple R290 units can be installed in a single room, but their cumulative refrigerant charge must be considered when determining the safe room size.

Minimum Room Size

In order to avoid the creation of a flammable gas-air mixture if a leak in the refrigeration system occurs, the size of the room in which the machine may be installed depends on the amount of refrigerant used. The ice machines listed below cannot be installed in hallways, public corridors, public lobbies, evacuation routes and/or small spaces.

Model	Minimum Room Size sq ft (sq m)	
	Self-Contained Air-Cooled	**Self-Contained Water-Cooled**
IP0320	N/A	N/A
IP0300	N/A	N/A
IP0420	87.0 sq ft (8.1 sq m)	77.5 sq ft (7.2 sq m)
IP0450	87.0 sq ft (8.1 sq m)	77.5 sq ft (7.2 sq m)
IP0500	77.5 sq ft (7.2 sq m)	77.5 sq ft (7.2 sq m)
IP0600	139 sq ft (12.9 sq m)	98 sq ft (9.1 sq m)
IP0620	124 sq ft (11.5 sq m)	124 sq ft (11.5 sq m)
IP0800	206 sq ft (19.1 sq m)	206 sq ft (19.1 sq m)
IP1000	232 sq ft (21.5 sq m)	232 sq ft (21.5 sq m)

Ice Machine Heat of Rejection

Series Ice Machine	Heat of Rejection*	
	Air Conditioning	Peak
IP0300	4600 BTU/hr (1160 kcal/hr)	5450 BTU/hr (1374 kcal/hr)
IP0420	6304 BTU/hr (1590 kcal/hr)	6435 BTU/hr (1623 kcal/hr)
IP0500	3753 BTU/hr (946 kcal/hr)	6702 BTU/hr (1690 kcal/hr)
IP0620	8935 BTU/hr (2253 kcal/hr)	10915 BTU/hr (2752 kcal/hr)
IP0600	8935 BTU/hr (2253 kcal/hr)	10915 BTU/hr (2752 kcal/hr)
IP0800	7300 BTU/hr (1841 kcal/hr)	13035 BTU/hr (3287 kcal/hr)
IP1000A	8490 BTU/hr (2141 kcal/hr)	15160 BTU/hr (3822 kcal/hr)
IP1000W	7386 BTU/hr (1862 kcal/hr)	13190 BTU/hr (3326 kcal/hr)

* Heat of rejection data varies during the ice making cycle, data shown is average. Because the heat of rejection varies during the ice making cycle, the figure shown is an average.

Use this information when:

- Sizing air conditioning equipment where self-contained air-cooled ice machines are installed.
- Determining the load on a cooling tower. Use the peak figure for sizing the load.

Installation on a Bin

An ice deflector is required for all bin installations and is included with all Manitowoc bins. Order the appropriate deflector kit (30" or 48") for any bin without a deflector.

NOTE: An optional safety kit is available to attach the ice machine to D model bins. Contact your local distributor for details.

⚠Warning

PERSONAL INJURY POTENTIAL

Do not operate any ice machine with the deflector removed.

Ice Machine on a Dispenser Installation

Observe following recommendations unless required by the dispenser manufacturer.

- An adapter is not required for ice machines that match the dispenser size.
- A deflector is not required.
- Ice level management is recommended to prevent water leakage or movement of ice machine during agitation. A dispenser baffle is required to prevent ice from contacting the ice machine door and prevent possible water leakage.
- Align sides and back of ice machine with sides and back of dispenser when placing ice machine.
- Follow ice machine installation procedures in this manual and any additional installation requirements specified by the dispenser manufacturer.

Front Panel Removal

HINGED PANEL MODELS

⚠Warning

Follow all steps for removing and reinstalling the front panel. Failure to follow these steps, leaving off parts, or over-tightening screws, can lead to the panel falling off and result in injury and property damage. The panel is heavy.

⚠Caution

It is a UL requirement to properly install ALL panel screws. Only remove screws from one side of the ice machine at a time.

Lifting Hazard: A single person removal could cause injury or unit damage. Always have assistance when handling, removing or lifting panels. While handling, grasp firmly to ensure the panel does not fall or scratch the finish.

Keep fingers out of “pinch point” areas; clearances between the panel and between the panel and ice machine cabinet are small.

Step 1 Use a #2 Phillips screwdriver to loosen the two screws securing the front panel. Do not remove they are secured to prevent loss.

Step 2 Open front panel.

Step 3 Support with right hand, depress top pin, tilt top of panel forward and lift straight up off of the bottom pin to remove. Place panels on a protected surface.

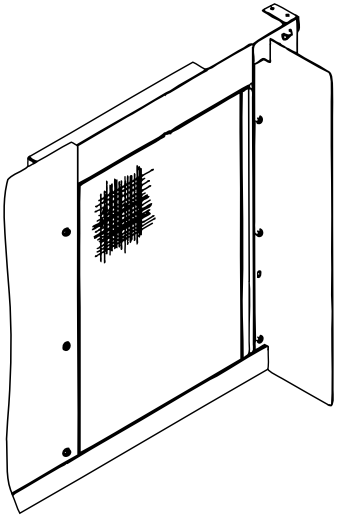
Step 4 When reinstalling, once top pin is reengaged, hold the panel firmly against the ice machine. Verify there are no gaps and fully tighten the screws.

Air Baffle

Self-Contained Air-cooled Only

The air-cooled baffle prevents condenser air from recirculating. To install:

1. Loosen the back panel screws next to the condenser.
2. Align the keyhole slots in the air baffle with the screw holes and slide the baffle down to lock in place.



Bin Installation Requirements

- The installation area must be capable of supporting the combined weight of the equipment and product.
- All ice machines installed on a bin require an ice deflector.
- Manitowoc bins have a deflector installed and require no modifications when used with a forward-facing evaporator.
- Ice machines with multiple evaporators require a deflector kit.
- Align sides and back of ice machine with sides and back of bin when placing ice machine on bin.
- Optional sales kits are available to adapt various sized or multiple ice machines on large bins.

Bin Installation

NOTE: When using casters, the units must be tethered or 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.

1. Remove threaded plug from drain fitting.
2. Screw the leveling legs onto the bottom of the bin.
3. Screw the foot of each leg in as far as possible.
4. Move the bin into its final position.
5. Level the bin to assure that the bin door closes and seals properly. Use a level on top of the bin. Turn the base of each foot as necessary to level the bin.
6. Inspect bin gasket prior to ice machine installation. (Manitowoc bins come with a closed cell foam gasket installed along the top surface of the bin.)
7. Remove all panels from ice machine before lifting and installing on bin. Remove front panel, top cover, left and right side panels.

Dispenser Requirements

Observe following recommendations unless required by the dispenser manufacturer.

- The installation area must be capable of supporting the combined weight of the equipment and product.
- Dispensers requires separate electrical outlet from the ice machine.
- An adapter is not required for ice machines that match the dispenser size.
- Refer to Manitowoc Ice's "Suggested List Price Standard Equipment and Accessories" for required adapters, deflectors, and dispenser baffles. Requirements vary by model.
- Ice level management is recommended to prevent water leakage or movement of ice machine during agitation.
- Align sides and back of ice machine with sides and back of dispenser when placing ice machine.
- Front Panel must swing freely for service access.
- Follow ice machine installation procedures in this manual and any additional installation requirements specified by the dispenser manufacturer.

Electrical Requirements

All electrical work, including wire routing and grounding, must conform to local, state and national electrical codes. The following precautions must be observed:

- The ice machine must be grounded.
- A separate fuse/circuit breaker (dedicated circuit) must be provided for each ice machine head section, condenser or condensing unit.
- A qualified electrician must determine proper wire size dependent upon location, materials used and length of run (minimum circuit ampacity can be used to help select the wire size).

⚠Warning

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

Voltage

The maximum allowable voltage variation is +10%/-5% of the rated voltage at ice machine start-up (when the electrical load is highest).

⚠Warning

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

Fuse/Circuit Breaker

A separate electrical disconnect, which disconnects all poles and has 1/8" (3 mm) contact separation, must be provided for fixed wiring.

Circuit breakers must be H.A.C.R. rated in USA.

Minimum 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) also depends on location, materials used, length of run, etc., must be determined by a qualified electrician.

Ground Fault Circuit Interrupter

We do not recommend the use of a GFCI/GFI circuit protection with our equipment. If a GFCI/GFI is required by code, use a GFCI/GFI breaker rather than an outlet, which is more prone to intermittent nuisance trips than panel circuit breakers.

Minimum Power Cord Specifications

All electrical work, including wire routing and grounding, must conform to local, state and national electrical codes. The following precautions must be observed:

Maximum Breaker Size	Maximum Wire Size	Maximum Length of Power Cord
15 amp	14 gauge	6 feet (1.83 m)
20 amp	12 gauge	6 feet (1.83 m)
30 amp	10 gauge	6 feet (1.83 m)
40 amp	8 gauge	6 feet (1.83 m)

⚠Warning

Temporary electrical installation of more than 600 volts may be used only during periods of tests, emergencies, or construction-like activities.

Temporary wiring must be removed immediately upon completion of the project or purpose for which the wiring was installed.

Maximum Breaker Size & Minimum Circuit Amperage Charts

NOTE: Due to continuous product improvements, this information is for reference only. Please refer to the ice machine data plate to verify electrical data. Model/Serial data plate information overrides information listed on this page.

Ice Machine Model Number	230/1/50 Hz Air-Cooled	
	Maximum Fuse/ Circuit Breaker	Minimum Circuit Amps
IP0300	15	4.9
IP0320	15	6.0
IP0420	15	4.6
IP0500	15	2.2
IP0600	15	6.7
IP0620	15	5.4
IP0800	15	9.1
IP1000	25	13.4

Ice Machine Model Number	230/1/50 Hz Water-Cooled	
	Maximum Fuse/ Circuit Breaker	Minimum Circuit Amps
IP0600	15	3.9
IP0620	15	4.4
IP0800	15	6.3
IP1000	20	12.1

Water Connections

- Local water conditions may require treatment of the water to inhibit scale formation, filter sediment, and remove chlorine odor and taste.
- All water and drains must conform to all applicable codes of the authority having jurisdiction. It is the responsibility of the end user to satisfy all local codes.
- Connect ice making water inlet to potable water only.
- Install a water shut-off valve for potable water and water cooled condenser lines.
- Do not connect the ice machine to a hot water supply. Verify hot water restrictors installed on other equipment are functioning correctly. (Check valves on sink, faucets, dishwashers, etc.)
- Install a water regulating valve if water pressure exceeds the maximum valve rating.
- Insulate water and drain lines to prevent condensation
- Do not connect the ice machine to a hot water supply. Verify hot water restrictors installed on other equipment are functioning correctly. (Check valves on sink, faucets, dishwashers, etc.)
- Install a water regulating valve if water pressure exceeds the maximum valve rating.
- Insulate water and drain lines to prevent condensation.

Drain Connections

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

- Drain lines must have a 1.5 inch drop per 5 feet (2.5 cm per meter) of run and must not create traps.
- The floor drain must be large enough to accommodate drainage from all drains.
- Run separate bin and ice machine drain lines. Insulate them to prevent condensation.
- Install a tee at the ice machine drain outlet and install an 18" (46 cm) vent above the drain line.
- Drain termination must have an air gap that meets local code.

Auxiliary Base Drain Installation

An auxiliary drain is located in the ice machine base to remove moisture in high humidity areas.

1. View the back of the ice machine base on the compressor side and locate and remove the cap plug.
2. Route tubing to an open site drain:
    - Use 1/2 inch CPVC tubing.
    - Apply a bead of silicone around the exterior of the ice machine tubing and insert into ice machine base. The silicone will secure the tubing and provide a watertight seal.

Provide support for tubing

⚠ Caution

Do not apply heat to water inlet valve or water drain fittings. Heating will damage the nonmetallic connector. Do not over-tighten fittings. Two turns after hand tight is the maximum.

Water Supply and Drain Line Sizing/Connections

Location	Water Temperature	Water Pressure	Ice Machine Fitting	Tubing Size up to Ice Machine Fitting
Ice Making Water Inlet	40°F (4.4°C) Min. 90°F (32°C) Max.	20 psi Min. (140 kPa) 80 psi Max. (550 kPa)	3/8" (10 mm) Female Pipe Thread	3/8" (10 mm) Minimum Inside Diameter
Ice Making Water Drain	—	—	1/2" (13 mm) Female Pipe Thread	1/2" (13 mm) Minimum Inside Diameter
Condenser Water Inlet	40°F (4.4°C) Min. 90°F (32°C) Max.	20 psi Min. (140 kPa) 275 psi Max. (1890 kPa)	I0300 - I1200 = 3/8" (10 mm) Female Pipe Thread I1500 - I1900 = 1/2" (13mm) Female Pipe Thread	
Condenser Water Drain	—	—	1/2" (13 mm) Female Pipe Thread	1/2" (13 mm) Minimum Inside Diameter
Bin Drain	—	—	3/4" (19 mm) Female Pipe Thread	3/4" (19 mm) Minimum Inside Diameter
Large Capacity Bin Drain	—	—	1" (25 mm) Female Pipe Thread	1" (25 mm) Minimum Inside Diameter

Water Supply and Drains

Potable Water

- Water temperature must be between 40°F (4.4°C) and 90°F (32°C).
- Water pressure must be between 20 psi (140 kPa) and 80 psi (550 kPa).
- Minimum internal diameter of tubing 3/8" (10mm).

Drain Connections

- Drain lines must have a 1.5 inch drop per 5 feet (2.5 cm per meter) of run and must not create traps.
- The floor drain must be large enough to accommodate drainage from all drains.
- Run separate bin and ice machine drain lines.
- Insulate drain lines to prevent condensation.
- Vent the ice machine drain to the atmosphere.
- Drain termination must have an air gap that meets local code.

Starting the Ice Machine

Starting the ice machine and completing the Operational Checks are the responsibilities of the owner/operator.

Adjustments and maintenance procedures outlined in this manual are not covered by the warranty.

REMOVE ICE THICKNESS PROBE SHIPPING BRACKETS

Remove and discard shipping brackets before starting the ice machine.

Step 1 Ice machine must be programmed. Refer to "Setup Wizard" on page 66 for details.

Step 2 Refer to "Descaling and Sanitizing" on page 47. Descale and sanitize the ice machine and bin before placing the machine into operation.



Step 3 Refer to "Ice Making Sequence of Operation" on page 83 for operational details.

MINIMUM/MAXIMUM SLAB WEIGHT

Adjust ice thickness to maintain the correct bridge thickness and "Minimum/Maximum Slab Weight" on page 81.

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Descaling and Sanitizing

General

You are responsible for maintaining the ice machine in accordance with the instructions in this manual. Maintenance procedures are not covered by the warranty.

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

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. An extremely dirty ice machine must be taken apart for descaling and sanitizing.

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

Using non Manitowoc descalers, sanitizers, descalers or solutions may result in bodily harm and/or cause damage to the ice machine that is not covered under the warranty.

Ice Machine Inspection

Check all water fittings and lines for leaks. Also, confirm 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.

Wipe surfaces with a damp cloth rinsed in water to remove dust and dirt from the outside of the ice machine. If a greasy residue persists, use a damp cloth rinsed in a mild dish soap and water solution. Wipe dry with a clean, soft cloth.

Products containing abrasives will damage the coating and scratch the panels.

- Never use steel wool or abrasive pads for cleaning.
- Never use chlorinated, citrus based or abrasive cleaners on exterior panels and plastic trim pieces.

Remedial Descaling Procedure

- This procedure descales all components in the water flow path, and is used between the bi-yearly detailed descaling and sanitizing procedure.

Detailed Descaling/Sanitizing Procedure

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

- The ice machine and bin must be disassembled descaled and sanitized.
- All ice produced during the descaling and sanitizing procedures must be discarded.

Descaler and Sanitizer Solutions

⚠ Caution

Use only Manitowoc approved Ice Machine Cleaner and Sanitizer for this application (Manitowoc Cleaner part number 9405463 and Manitowoc 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.

⚠ Caution

Use only Manitowoc approved Ice Machine Descaler and Sanitizer for this application. Do not use descaler or sanitizer quantities that exceed the amounts listed in this manual. 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.

Liquid De-scaler	Liquid Sanitizer
16 oz - 9405463	16 oz - 9405653
1 gal - 9405803	1 gal - 9405813

NOTE: Powdered descaler and rinse are available. Please follow the instructions included with the packets for number of packets needed for your model.

Touchscreen Operation for the Clean Cycle

STARTING A CLEAN CYCLE

Pressing the clean icon will display a Continue/Abort screen, and a warning that pressing Continue will result in a clean cycle that can last up to 35 minutes.

WATER CURTAIN/DAMPER OPERATION DURING THE CLEAN CYCLE

The water curtain/damper must remain closed during the clean sequence. When the curtain/damper is open for more than 3 seconds the clean cycle stops and a message is displayed on the touchscreen with a choice to continue or stop the clean cycle. Stopping the clean cycle will result in a series of rinse and dump cycles to verify cleaner or sanitizer has been removed before ice making.

PAUSING A CLEAN CYCLE

The clean cycle can be paused and resumed at any time by pressing the on/off button. The clean cycle will resume from the beginning of either the wash or rinse cycle depending on the point of interruption.

POWER INTERRUPTION DURING CLEAN CYCLE

If the power supply is interrupted during the clean cycle the state is retained in the circuit board. When power is reapplied the clean cycle will resume from the beginning of either the wash or rinse cycle depending on the point of interruption

ABORTING A CLEAN CYCLE

Verify cleaner/sanitizer is not present in the water system before aborting a clean cycle.

1. Press and hold the Clean button, then press and release the On/Off button.
2. Release the Clean button and select Abort from the touchscreen.

Detailed Descaling/Sanitizing Procedure

⚠ Caution

Use only Manitowoc approved Ice Machine Descaler and Sanitizer for this application (Manitowoc Descaler part number 9405463 and Manitowoc 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.

DESCALING PROCEDURE

⚠ Caution

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

⚠ Warning

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

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

NOTE: Although not required and dependent on your installation, removing the ice machine top cover may allow easier access.

Step 1 Open the front door to access the evaporator compartment. Ice must not be on the evaporator during the descale/sanitize cycle. Follow one of the methods below:

- Press the power switch at the end of a harvest cycle after ice falls from the evaporator(s).
- Press the power switch and allow the ice to melt
- Use the touchpad to initiate a manual harvest cycle.

⚠Caution

Never use anything to force ice from the evaporator. Damage may result.

Step 2 Remove all ice from the bin/dispenser.

Step 3 Press the Clean button and select "Turn off when complete". Water will flow through the water dump valve and down the drain. Wait approximately 1 minute until the water trough refills and the display indicates Add Chemical. Add the proper amount of ice machine cleaner to the water trough by pouring between the water curtain and evaporator, then confirm the chemical was added.

NOTE: There is a 10 minute time limit to confirm chemical was added.

- Confirmation is pushed within 10 minutes - The ice machine will start a 10 minute wash cycle, followed by 6 rinse and flush cycles.
- Confirmation is not pushed within 10 minutes - The ice machine will skip the 10 minute wash cycle and start 6 rinse and flush cycles.

Model	Amount of Liquid Descaler P/N# 9405463
IP0300/IP0320 IP0420/IP0620	3 oz (90 ml)
IP0500/IP0600 IP0800/IP1000	5 oz (150 ml)

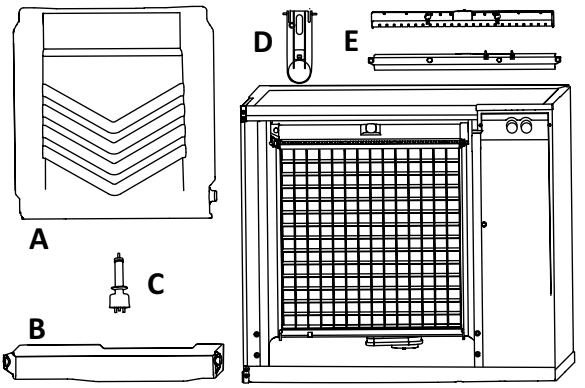
Step 4 Wait until the cycle is complete (approximately 24 minutes.) Then, disconnect power to the ice machine (and dispenser when used).

> **⚠Warning**
>
> Disconnect the electric power to the ice machine at the electric service switch box.

Step 5 Remove parts for cleaning.

A. Remove the water curtain

- Gently flex the curtain in the center and remove it from the right side.
- Slide the left pin out.



B. Remove the water trough

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

C. Remove the water level probe

- Pull the water level probe straight down to disengage.
- Lower the water level probe until the wiring connector is visible.
- Disconnect the wire lead from the water level probe.
- Remove the water level probe from the ice machine.

D. Remove the ice thickness probe

- Compress the hinge pin on the top of the ice thickness probe.
- Pivot the ice thickness probe to disengage one pin then the other. The ice thickness probe can be cleaned at this point without complete removal. If complete removal is desired, disconnect the ice thickness control wiring from the control board.

E. Remove the water distribution tube

NOTE: Distribution tube thumbscrews are retained to prevent loss. Loosen thumbscrews but do not pull thumbscrews out of distribution tube.

- Loosen the two outer screws (do not remove screws completely they are retained to prevent loss) and pull forward on the distribution tube to release from slip joint.

Disassemble distribution tube by loosening the two (2) middle thumbscrews and dividing the distribution tube into two pieces. Please refer to the proper parts removal for your ice machine. Continue with step 6 when the parts have been removed.

Step 6 Mix a solution of descaler and lukewarm water. Depending upon the amount of mineral buildup, a larger quantity of solution may be required. Use the ratio in the table below to mix enough solution to thoroughly descale all parts.

Solution Type	Water	Mixed With
Descaler	1 gal. (4 L)	16 oz (500 ml) descaler

Step 7 Use 1/2 of the descaler/water mixture to descale all components. The descaler solution will foam when it contacts lime scale and mineral deposits; once the foaming stops use a soft-bristle nylon brush, sponge or cloth (NOT a wire brush) to carefully descale the parts. Soak parts for 5 minutes (15 - 20 minutes for heavily scaled parts). Rinse all components with clean water.

⚠ Caution

Do not attempt to clean or descale the ice thickness probe in a dishwasher. Permanent damage to the ice thickness probe will occur.

Ice Thickness Probe & Water Level Probe

Descale the probes using the following procedure.

NOTE: Do not soak electrical connectors in descaler or sanitizer solution.

1. Mix a solution of Manitowoc ice machine descaler and water (2 ounces of descaler to 16 ounces of water) in a container.
2. Clean all probe surfaces including all plastic parts (do not use abrasives). Verify all surfaces have been descaled. Thoroughly rinse probes with clean water.
3. Reinstall probe, then sanitize the ice machine and bin/dispenser interior surfaces.

Step 8 While components are soaking, use 1/2 of the descaler/water solution to descale all food zone surfaces of the ice machine and bin (or dispenser). Use a nylon brush or cloth to thoroughly descale the following ice machine areas:

- Side walls
- Base (area above water trough)
- Evaporator plastic parts
  - including top, bottom, and sides
- Bin or dispenser

Rinse all areas thoroughly with clean water.

SANITIZING PROCEDURE

Step 9 Mix a solution of sanitizer and lukewarm water.

Solution Type	Water	Mixed With
Sanitizer	3 gal. (12 L)	2 oz (60 ml) sanitizer

Step 10 Use 1/2 of the sanitizer/water solution to sanitize all removed components. Use a spray bottle to liberally apply the solution to all surfaces of the removed parts or soak the removed parts in the sanitizer/water solution. Do not rinse parts after sanitizing.

Step 11 Use 1/2 of the sanitizer/water solution to sanitize all food zone surfaces of the ice machine and bin (or dispenser). Use a spray bottle to liberally apply the solution. When sanitizing, pay particular attention to the following areas:

- Side walls
- Base (area above water trough)
- Evaporator plastic parts - including top, bottom and sides
- Bin or dispenser

Do not rinse the sanitized areas.

Step 12 Replace all removed components.

Step 13 Wait 20 minutes.

Step 14 Reapply power to the ice machine and press the Clean button.

Step 15 Press the Clean button and select "Make ice when complete". Water will flow through the water dump valve and down the drain. Wait approximately 1 minute until the water trough refills and the display indicates Add Chemical. Add the proper amount of ice machine sanitizer to the water trough by pouring between the water curtain and evaporator, then confirm the chemical was added.

Model	Amount of Sanitizer
IP0300/IP0320/IP0420/IP0620/ IP0450/IP0500/IP0500/IP0600/ IP0800/IP1000	3 ounces (90 ml) P/N# 9405463

Step 16 The ice machine will automatically start ice making after the sanitize cycle is complete.

Water Inlet Valve

The water inlet valve normally does not require removal for descaling. Refer to “Water System Checklist” on page 123, if you are troubleshooting water related problems.

1. When the ice machine is off, the water inlet valve must completely stop water flow into the machine. Watch for water flow.

When the ice machine is on, the water inlet valve must allow the proper water flow through it. Press the Power button to energize the ice machine. Watch for water flow into the ice machine. If the water flow is slow or only trickles into the ice machine, refer to water system checklist.

NOTE: The valve can also be energized by navigating to the service diagnostic menu, selecting control board, then selecting “enable all relays”.

⚠Warning

Disconnect the electric power to the ice machine and dispenser at the electric service switch box and turn off the water supply before proceeding.

Preventative Maintenance Descaling Procedure

This procedure descales all components in the water flow path, and is used to descale the ice machine between the bi-yearly descaling/sanitizing procedure.

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

NOTE: Although not required and dependent on your installation, removing the ice machine top cover may allow easier access.

1. Ice must not be on the evaporator during the descale/sanitize cycle. Follow one of the methods below:
   - Press the power switch at the end of a harvest cycle after ice falls from the evaporator(s).
   - Press the power switch and allow the ice to melt.

> **⚠ Caution**
>
> Never use anything to force ice from the evaporator. Damage may result.

2. Open the front door to access the evaporator.

Water Dump Valve

The water dump valve normally does not require removal for cleaning. To determine if removal is necessary:

1. Locate the water dump valve.
2. While the ice machine is in the freeze mode, check the drain to determine if the dump valve is leaking. If there is no or little water in the water trough (during the freeze cycle) the dump valve is leaking.
    A. If the dump valve is leaking, remove, disassemble and clean it.
    B. If the dump valve is not leaking, do not remove it. Instead, follow the “Ice Machine Cleaning Procedure”.

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.

Follow the applicable procedure below.

SELF CONTAINED AIR-COOLED ICE MACHINES

1. Press the power button.
2. Turn off the water supply.
3. Remove the water from the water trough.
4. Disconnect and drain the incoming ice-making water line at the rear of the ice machine.
5. Energize the ice machine and wait one minute for the water inlet valve to open
   - or -
   Energize all relays in the touchscreen service menu.
6. Blow compressed air in both the incoming water and the drain openings in the rear of the ice machine until no more water comes out of the water inlet lines or the drain.
7. Disconnect the electric power at the circuit breaker or the electric service switch.
8. Make sure water is not trapped in any of the water lines, drain lines, distribution tubes, etc.

WATER-COOLED ICE MACHINES

1. Perform steps 1-6 under “Self-Contained Air-Cooled Ice Machines” on page 61 then proceed to step 2.
2. Disconnect the incoming water and drain line from the water-cooled condenser.
3. Energize the ice machine in the freeze cycle. The increasing refrigerant pressure will open the water regulating valve.
4. Blow compressed air through the condenser until no water remains.

Cleaning the Condenser

GENERAL

⚠Warning

Disconnect electric power to the ice machine by disconnecting the power cord before 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.

⚠Warning

The condenser fins are sharp. Use care when cleaning them.

- Shine a flashlight through the condenser to check for dirt between the fins.
- Blow compressed air or rinse with water from the inside out (opposite direction of airflow).
- If dirt still remains, clean the condenser.



Touch Screen Features

The Indigo® NXT control panel offers a series of pressure-sensitive buttons and an interactive touchscreen.

Buttons

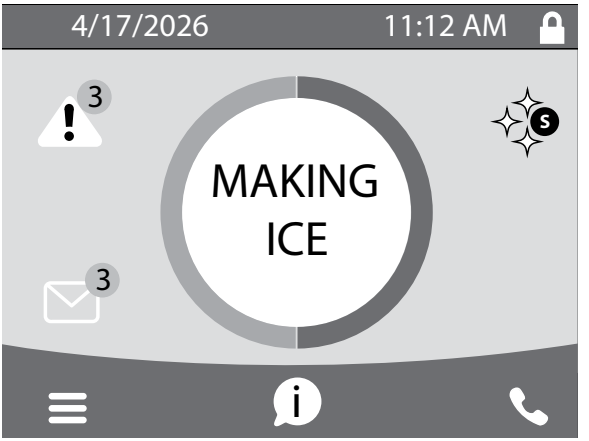
Power Button: Provides On/Off functions for the ice machine.

Lock/Unlock Button: Allows or prevents touchscreen navigation.

Cleaning Button: Initiates a cleaning cycle. Refer to "Descaling and Sanitizing" on page 47 for details.

Notice

To help with data security measures and limit access to your ice machine's data, always lock the touchscreen. For increased security, enable the touchscreen's four-digit PIN.



Touchscreen

Home screen allows viewing of ice machine status, alerts and messages. Navigation with the touchscreen provides access to menu items, machine information, settings and event logs. Setup and Energy Saver settings can be adjusted along with access to service and troubleshooting information.

NOTE: Touchscreen is to be activated with finger tips only.

Icons: Provide status indication and allow navigation by pressing the icon.

Performance Specifications

NOTE: The performance statistics are calculated based on the performance of the ice machine at 90°F (32°C) ambient temperature and 70°F (21°C) water temperature. The actual statistics will vary dependent on your environmental conditions.

HOME SCREEN ICON DESCRIPTIONS

Icon	Description
Home Screen 	Pressing this icon at any time will return the display to the home screen. State of ice Machine is the center portion of the screen which displays the current condition of the ice machine - Making ice, bin full, program mode or machine off
Alert 	Alert icon with number of messages. Pressing this icon will display the alert log which will allow viewing and resetting of alerts
Message 	Message icon with umber of messages. Pressing this icon will display the routine maintenance reminder screen which will allow viewing and resetting of the reminder
Menu 	Menu icon will take you to the main menu
Information 	Information icon provides model and serial number, installation date and other information specific to the ice machine
Service Locator 	Provides contact information for your local service support - Default is the Manitowoc Ice website service locator
Lock/Unlock 	Indicates if screen is locked or unlocked
LuminIce 	Only visible when a LuminIce II accessory is connected. Blue S - Normal operation Red S - Replace bulb Red/Blue alternating - Incorrect bulb installed

Setup Wizard

Screens will automatically advance after a selection is made or press the arrows to advance/go back one screen. All settings can be accessed and changed without the wizard by using menu screen navigation.

Setup	Description
Press ON/OFF Button	On/Off button is used to start/Stop ice making.
Enter Model Number	Only visible if model number cannot be automatically identified. The ice machine will not start without model identification.
Select Language	Default is English. Scroll to select a different language.
Start Wizard	Setup wizard will guide ice machine programming
Accessory Detection	Detects if Ice Level Sensor, LuminIce II or iAuCS are connected. ✓= yes X = no
USB Setup	Only used when setup features have been transferred to a USB drive. Skip screen by selecting right arrow.
Configure Date and Time Formats	Select Month/Day/Year or Day/Month/Year. Select 12 hour or 24 hour time format.
Set Time	Use arrows to set local time.
Set Date	Use arrows to set date for your location.
Units	Select standard or metric
Brightness	Configure screen brightness during normal operation.

Setup	Description
Ice Program	Program ice machine run times or press right arrow to skip this setup.
Cleaning Reminder	Set descale or sanitize reminder or press right arrow to skip this setup.
iAuCS® (only when detected)	Set frequency of operation.
Air Filter	Set to ON for self-contained air-cooled models.
Water Usage	Choose one the following options: • Factory default • Use less water (for reverse-osmosis systems) • Use more water (to improve clarity when using unfiltered water)
Water Filter	Select either 'Yes' or 'No'. Set reminder interval
LuminIce® II (only when detected)	12-month reminder is automatically set.
Wizard Complete	Press right arrow or Home icon to return to home screen

Main Menu Screen Navigation

Select the MENU Icon ☰ from the Home Screen to access the Main Menu screen.

Energy	**Service**	**Setting**	**Reset Defaults**
Ice Program	Data	Language	Require Setup Wizard
Water Usage	Alert Log	Reminders	Backup Current Settings
Statistics	Manual Harvest	Time & Date	Reset to Factory Defaults
	Control Board Replacement	Units	
	Diagnostics	Brightness	
	Contact Information	USB	
	USB	*iAuCS®	
	*iAuCS®		
	*Prime iAuCS® Pump		

* Only visible when this optional accessory is installed.

Menu Navigation Overview

SETTINGS MENU SCREEN NAVIGATION

Select SETTINGS Icon from the Home Screen to access Main Menu screen. The main menu screen contains four main headings which allow access to subheadings under each main heading.

	**Energy**
	**Ice Program**
	Continuous Mode - Default, No Program
	Time Program - Select Daily On/Off times
	Weight Program - Select Daily Production Weight
	**Water Usage**
	Use Factory Default
	Use Less Water With Reverse Osmosis
	Use More Water To Improve Ice Clarity
	**Statistics**
	Ice Production - Previous 7 Days
	Water Usage - Previous 7 Days
	Energy Usage - Previous 7 Days

NOTE: The performance statistics are calculated based on the performance of the ice machine at 90°F (32°C) ambient temperature and 70°F (21°C) water temperature. The actual statistics will vary dependent on your environmental conditions.

	Service
	Data
	Real Time Data
	Time and Temperature
	Inputs
	Outputs
	Data History for 5 Previous Days Minimum and Maximum Freeze (Length, Time of day, Thermistor Temperatures) Minimum and Maximum Harvest (Length, Time of day, Thermistor Temperatures)
	Lifetime Data History Installation Date Control Board Replacement Date Control Board Manufacture Date Runtime Cycle Count Potable Water Clean Cycles
	Alert Log
	Lists/Clears Alerts
	Manual Harvest
	Off or On
	Control Board Replacement
	Manual Replacement Manually enter model number Manually enter serial number Manually enter condenser serial number (optional) Verification
	USB Replacement Import to ice machine Export to USB

	Service
	**Diagnostics**
	Control board
	Enable All Relays
	Self Check
	Temperature Sensors
	Lists Sensor Temperatures
	Inputs
	Lists Control Board Input Information
	User Interface Screen Calibration Button Diagnostics Screen Diagnostics
	Screen Calibration
	**Contact information**
	Factory defaults to QR code and website address to Manitowoc Ice's Global Locater. Edit Contact Information Button.
	**USB**
	Upgrade Firmware
	Export Data
	**iAuCS**
	Manually initiate the iAuCS pump for pump/hose priming. NOTE The clean button does not initiate the iAuCS pump.
	**Reset Defaults**
	Require Setup Wizard Optional Setup Wizard Restart for training purposes or resale of equipment Backup Current Settings Import To Ice Machine Export To USB Reset Factory Defaults.

EVENT LOG

Refer to Event Log Detail For Code descriptions.

Displayed Text	Code	Description
Long Freeze	E01	Long Freeze Cycle
Long Harvest	E02	Long Harvest Cycle
Power Loss	E03	Input Power Loss
Hi Cnd Temp or Wtr Cnd Fault	E04	High Condenser Temperature
HPC Fault	E05	High Pressure Control Opened
	E06	Spare
Starving TXV	E07	Starving TXV Single Evaporator or Low On Charge
TXV Fault	E08	TXV Fault Single or Dual Circuit Evaporators
Flood Evap1	E09	Flooding Evaporator Fault Single Evaporator, Single Circuit
Flood Evap2	E10	Flooding Evaporator Fault Dual TXV, Dual Circuit
Refrig Fault	E11	Refrigeration Fault
Curtain Fault	E12	Curtain Switch Fault - Open more than 24 hours
	E13	Spare
	E14	Spare
Low liq temp	E15	Fan Cycle Control Fault - Low Liquid Line Temperature
Rmt Cnd Fault	E16	Remote Condensing Unit Fault (CVD Only)
	E17	Spare
	E18	Spare
ITP Fault	E19	Ice Thickness Probe Fault
WTR Fault	E20	Water System Fault
T1 Fault	E21	T1 Temperature Sensor Issue
T2 Fault	E22	T2 Temperature Sensor Issue
T3 Fault	E23	T3 Temperature Sensor Issue
T4 Fault	E24	T4 Temperature Sensor Issue
Bin Probe Fault	E25	Bin Level Probe Low Sensor Fault
AUCS	E26	T6 or T7 Temperature Sensor Issue
USB COMM	E27	T6 or T7 Temperature Sensor Issue
USB DNLD	E28	iAuCS
	E29	USB Communication Fault
	E30	USB Download Fault
Safe Mode	E31	Safe Mode
RS485 COMM	E32	RS485 Communication Fault
Keyboard	E33	Touchscreen Fault
Display	E34	Display Fault

Displayed Text	Code	Description
Checksum	E36	Check Sum Error
WatchDog	E37	Watch Dog Event
UI Comm	E38	UI Comm Event

EVENT LOG DETAIL

E01 Long Freeze

3 consecutive 35-minute freeze cycles = Ice machine is off.

E02 Long Harvest

3 consecutive 7-minute harvest cycles = Ice machine is off.

E03 Power Loss

When power is interrupted to the ice machine the control board will log the event in the ELOG and stamp the loss of power on power-up.

E04 High Condenser Temperature

Liquid Line Temperature too high for Self-contained Air Cooled Ice machine = Air Cooled Condenser Fault

E05 High Pressure Control Opened

The high pressure cutout switch (HPCO) opened.

E06 Spare

E07 Starving TXV Single Evaporator or Low On Charge

The difference of the average evaporator inlet (T3) and outlet (T4) is greater than 12°F in the last 1 minute of the freeze cycle.

E08 TXV Fault Single or Dual Circuit Evaporators

The difference of the average evaporator inlet (T3) and outlet (T4) is greater than 12°F in the last 1 minute of the freeze cycle.

E09 Flooding Evaporator Fault Single Evaporator, Single Circuit

Average compressor discharge line temperature during the first 6 minutes of the freeze cycle (T2) compared to the average of the Prechill (T1) +50°F is less than 1.05°F.

E10 Not applicable to these models.

E11 Refrigeration Fault

The compressor discharge temperature did not increase by at least 10° F and the evaporator temperature did not decrease by at least 10° F - Measured from Refrigeration Start up or Prechill until 2 minutes into the Freeze cycle.

E12 Curtain Switch Fault Open more than 24 hours

The ice machine is set to ice making and remains in bin full condition for more than 24 hours. The curtain switch is open or curtain is off.

E13 Spare

E14 Spare

E15 Fan Cycle Control Fault - Low Liquid Line Temperature

The liquid line temperature dropped below 60°F for more than one continuous minute during the freeze cycle.

E16 Not applicable to these models.

E17 Spare

E18 Spare

E19 Ice Thickness Probe Fault

The monitored Frequencies is out of the appropriate range (Probe unplugged or problem with microphone).

E20 Water System Fault

Any of the following:

1. Sensing high water probe and not low water probe.
2. Evaporator outlet temperature is less than -10°F 6.5 to 7.5 minutes in freeze cycle.
3. Low water probe is satisfied at the end of harvest.
4. Low or high water probe is satisfied at end of freeze cycle.

E21 T1 Temperature Sensor Issue

During Pre-chill the thermistor had an average value reading outside the valid range.

E22 T2 Temperature Sensor Issue

During Pre-chill the thermistor had an average value reading outside the valid range.

E23 T3 Temperature Sensor Issue

During Pre-chill the thermistor had an average value reading outside the valid range.

E24 T4 Temperature Sensor Issue

During Pre-chill the thermistor had an average value reading outside the valid range.

E25 Bin Level Probe Low Sensor Fault

The thermistor had an average value reading outside of the valid range for 10 continuous minutes.

E26 T6 or T7 Temperature Issue

The thermistor had an average value reading outside of the valid range.

E27 T6 or T7 Temperature Issue

The thermistor had an average value reading outside of the valid range.

E28 AuCS

When the AuCS clean option is selected from the menu, the control checks for the presence of the AUCS board. When the AUCS is not connected it will signal an Event which will clear as soon as the hardware is detected.

E29 USB Communication Fault

USB Communication error; No USB drive in port or defective USB drive.

E30 USB Download Fault

USB Download error related to USB drive or a defective USB drive.

E31 Safe Mode

Safe mode allows the ice machine to operate for a period of time in the event of a Water level or ice thickness probe failure. The controller allows the machine to operate based on model data and historical cycle information.

E32 RS485 Communication Fault

The device plugged into the RS485 port is not communicating between the control board and gateway.

E33 Touchscreen Fault

The Touchscreen is not plugged into the control board or is faulty.

E34 Display Fault

The touchscreen is not plugged into the control board or is faulty.

E36 Check Sum Error

Event Log Only: Activates on power loss.

E37 Watch Dog Event

Event Log Only: Micro Process time out, possible electrical noise.

E38 UI Comm Event

Event Log Only: User interface communication error: loose communication cable, power interruption.

USB FLASH DRIVE SPECIFICATIONS AND FORMATTING

Updating firmware on Indigo™ model ice machines requires a properly formatted 32 GB or smaller USB flash drive. All USB flash drives must be formatted before use to remove any software programs or files currently on the flash drive.

USB Flash Drive Specifications:

- USB 2 Version
- 32 GB or less capacity
- Fat32 File System

USB Flash Drive Formatting:

Procedure to format a USB flash drive varies with operating system software. Refer to operating system software manufacturer's website for formatting instructions.

UPGRADING FIRMWARE WITH A FLASH DRIVE

Important

The flash drive must be formatted before using. All files and software on the flash drive are removed during the formatting process.

1. Drag and drop the files from website or email onto a flash drive, insuring they are not in a folder.
2. Ensure that the ice machine's power is on.
3. Navigate to USB - Menu / Service / USB.
4. Insert the flash drive into the USB port on the ice machine control board.
   (Do not remove flash drive until update is complete).

NOTE: See "Electronic Control Board" on page 216 for USB location.

5. Select 'Upgrade Firmware'.
6. Remove USB drive when the transfer is complete.

EXPORTING DATA TO A FLASH DRIVE

Data can be copied from the control board memory to a flash drive and used to transfer setup and/or cycle data to a replacement control board or to transfer setup information to multiple ice machines. Data may also be requested by service department personnel for analysis or as an aid to troubleshooting. The data files are small and can be attached to an email.

Important

The flash drive must be formatted before using. All files and software on the flash drive are removed during the formatting process.

1. Ensure that the ice machine's power is on.
2. Press the Menu button.
3. Navigate to USB - Menu / Service / USB.
4. Insert the flash drive into the USB port on the ice machine control board. Do not remove flash drive until transfer is complete.
5. Select Export Data (do not remove flash drive until update is complete) and remove USB drive when the transfer is complete.

Operational Checks

GENERAL

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 cleaning and sanitizing

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

Important

Refrigeration compressors must be operated for a minimum break in period of 24 hours before full ice production will be reached.

Minimum/Maximum Slab Weight

Adjust ice thickness to meet chart specifications.

Model	Minimum Ice Weight Per Cycle	Maximum Ice Weight Per Cycle
IP0300 IP0320	2.40 lbs 1089 grams	2.80 lbs 1270 grams
IP0420 IP0620	3.40 lbs 1542 grams	3.90 lbs 1769 grams
IP0500	4.60 lbs 2087 grams	5.20 lbs 2359 grams
IP0600	4.12 lbs 1869 grams	4.75 lbs 2155 grams
IP0800	13.20 lbs 5987 grams	14.80 lbs 6713 grams
IP1000	4.12 lbs 1869 grams	4.75 lbs 2155 grams

Notice

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

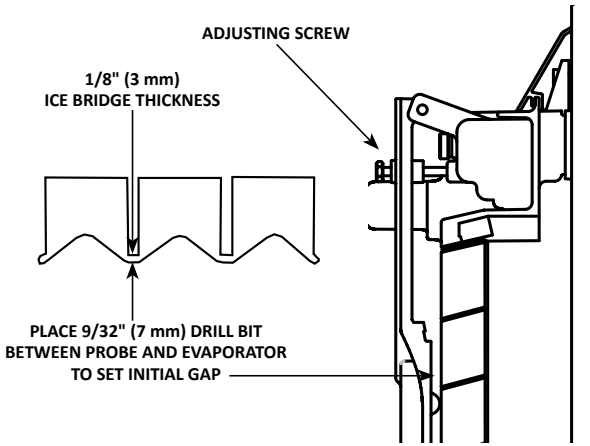
ICE THICKNESS CHECK

After a harvest cycle, inspect the ice cubes in the ice storage bin. The ice thickness probe is factory-set to maintain the ice bridge thickness at 1/8" (3 mm).

Make sure the water curtain is in place when performing this check. It prevents water from splashing out of the water trough.

1. Inspect the bridge connecting the cubes. It must be approximately 1/8" (3 mm) thick.
2. If adjustment is necessary, turn the ice thickness probe adjustment screw clockwise to increase bridge thickness, counterclockwise to decrease bridge thickness. Set a 9/32" (7 mm) gap between ice thickness probe and evaporator as starting point, then adjust to achieve a 1/8" (3 mm) bridge thickness.
3. Make sure the ice thickness probe wire and the bracket do not restrict movement of the probe.

NOTE: Turning the adjustment one-third of a turn will change the ice thickness about 1/16" (1.5 mm).



Ice Making Sequence of Operation

The On/Off button must be depressed and the water curtain/ice dampers must be in place on the evaporator before the ice machine will start.

Water Purge Cycle

The ice machine purges any remaining water from the water trough down the drain.

Prechill Cycle

The refrigeration system cools the evaporator before the water pump is energized.

Freeze Cycle

Water flows across the evaporator and the refrigeration system chills the evaporator. Ice builds on the evaporator and the freeze cycle continues until the ice thickness probe senses a sheet of ice has formed. The ice thickness probe signals the control board to start a harvest.

Harvest Cycle

Every fourth cycle, any remaining water is purged down the drain as refrigerant gas warms the evaporator. When the evaporator warms, the sheet of cubes slides off the evaporator and into the storage bin. If all cubes fall clear of the water curtain (or ice damper) the ice machine starts another freeze cycle.

Off Cycle

If the water curtain or ice damper are held open by ice cubes the ice machine shuts off. When the water curtain or ice damper closes, the ice machine starts a new cycle at the water purge.

Control Board Timers

The control board has the following non-adjustable timers:

- The ice machine control board will set its own install date after 100 freeze and harvest cycles.
- The ice machine is locked into the freeze cycle for 6 minutes before a harvest cycle can be initiated.
- The maximum freeze time is 35 minutes at which time, the control board will perform a water thaw cycle and then return the ice machine to the freeze cycle.
- The maximum harvest time is 7 minutes, the control board will perform a water thaw cycle and then return the ice machine to the freeze cycle.

Service Faults

Service faults are stored and indicated by the control board after three cycle. The number of cycles required to stop the ice machine varies for each service fault.

- Long Freeze Cycle - If the freeze time reaches 35 minutes, the control board automatically initiates a harvest cycle. If three consecutive 35 minute freeze cycles occur: the ice machine stops.
- Long Harvest Cycle - If the harvest time reaches 7 minutes: the control board automatically returns the ice machine to the freeze cycle. After 3 consecutive long harvest cycles, the ice machine stops.

Refer to Troubleshooting on page 99 if an alert for Service Fault E01 or E02 is received.

Safe Operation Mode

Allows the ice machine to operate up to 72 hours if the ice thickness probe and/or water level probe sensors fail.

- When the control board starts the safe mode, an alert is flashed on the display to notify the end-user they have a production problem.
- The control board automatically initiates and monitors the safe mode. The control will automatically exit the safe mode if a normal signal is received from the input.
- After 72 consecutive hours, the control board will enter a standby mode and turn off.

NOTE: When the ice machine is first powered up or there is a power loss and restarted, water fill time will be calculated using the average of the five cycles.

Water Assist Harvest

When the damper/curtain does not open within 3.5 minutes in the harvest cycle the following occurs:

- 3.5 minutes - The water inlet valve energizes until water touches the high water level probe.
- 4 minutes - The water pump energizes.
- 6.5 to 7 minutes - The water dump valve energizes.

Water Thaw Cycle

When the damper/curtain does not open during the 7 minute harvest cycle the following water thaw cycle occurs:

- 7 minutes - The compressor, harvest solenoid valve, and dump valve de-energize.
    1. The water pump remains energized and the water inlet valve energizes until water touches the high water level probe.
    2. Water is circulated over the evaporator.
    3. Water is circulated, dumped and refilled to the high water level probe for approximately 1 - 1.75 hours.
- At the end of the thaw cycle the ice machine will start another freeze cycle (approximately 1 - 1.75 hours).

Water Purge Options

To change when the ice machine purges remaining water after harvest cycles:

- Select the MENU icon on the Home Screen. Next select the ENERGY icon.
- Select WATER icon for three options:
    1. “Use More Water to Improve Ice Clarity” to purge every harvest cycle (will increase water usage).
    2. “Use Less Water with Reverse Osmosis” to never purge after the harvest cycle.
    3. “FACTORY DEFAULT” to reinstate fourth harvest cycle - water purge.

Sequence of Operation

SELF CONTAINED AIR OR WATER COOLED

NOTE: The power button must be depressed and the water curtain/ice dampers must be in place on the evaporator before the ice machine will start.

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

1. Water Purge

Before the compressor starts, the water pump and water dump solenoid energize to purge the ice machine of old water. This feature ensures that the ice making cycle starts with fresh water.

2. Refrigeration System Equalization and Start-Up

The harvest valve(s) and air pump(s) energize to equalize high and low side refrigeration pressure.

After 5 seconds the contactor energizes the compressor and supplies power to the condenser fan motor. After 5 seconds the harvest valve(s) and air pump(s) de-energize.

NOTE: The fan motor is wired through a fan cycle pressure control. When the discharge pressure exceeds the cut in pressure the fan cycle switch closes and energizes the fan

Freeze Sequence

3. Prechill

The compressor is on for 30 seconds (120 seconds on initial start-up, 90 seconds on consecutive ice making cycles) to lower the temperature of the evaporator(s) before the water pump is energized. The water fill valve will energize and remain on until water touches the low and high, water level probes.

4. Freeze

Water Pump

The water pump(s) energizes and water flows over the evaporator. The water pump is energized throughout the freeze cycle.

Water Inlet Valve

The water inlet valve energized in prechill (30 seconds)and will energize one more time in the freeze cycle. The control board will prevent the water fill valve from energizing after a 6-minute water fill time limit.

After water contacts the low and high water probes the water fill valve de-energizes. Ice builds on the evaporator and the water level drops. When water loses contact with the high water probe, the water fill valve energizes until water contacts the high water probe again.

Ice Thickness Probe

The freeze cycle continues until the six minute freeze lock expires and enough ice has formed to send a signal from the ice thickness probe to the control board.

During the first 6 minutes of the freeze cycle the ice thickness probe microphone samples ambient noise. 6 minutes into the freeze cycle baseline readings are recorded. Ice formation on the evaporator will change the readings; when the baseline readings are exceeded a harvest cycle starts.

Harvest Sequence

5. Water Purge

The air pump(s) (when used) and the harvest valve(s) open at the beginning of the water purge to divert discharge refrigerant gas into the evaporator.

The water pump(s) continues to run, and the water dump valve energizes to purge any remain water in the water trough down the drain.

6. Harvest

The air pump (when used) remains energized and the harvest valve(s) remains open. The refrigerant gas warms the evaporator causing the cubes to slide, as a sheet, off the evaporator and into the storage bin. If the damper/curtain does not open within 3.5 minutes in the harvest cycle the following occurs:

- 3.5 minutes - The water inlet valve energizes until water touches the high water level probe.
- 4 minutes - The water pump energizes.
- 6.5 to 7 minutes - The water dump valve energizes.

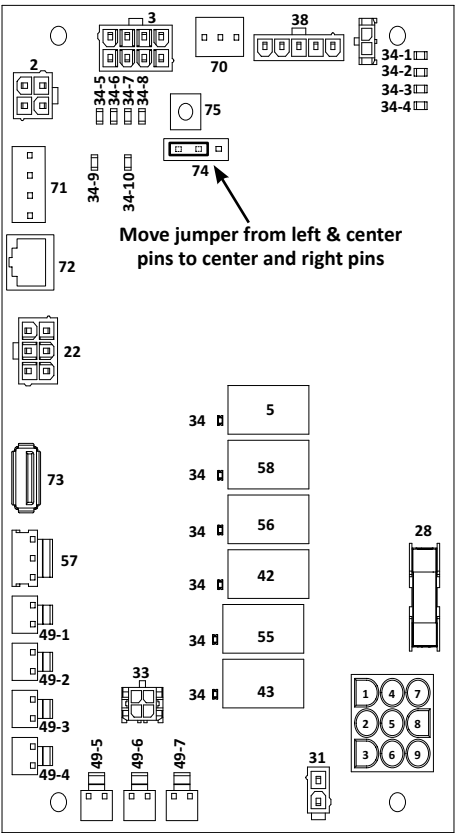
When the sliding sheet of cubes opens and closes within 30 seconds the bin switch terminates the harvest sequence and returns the ice machine to the freeze sequence (Step 3 - 4).

NOTE: If bin switch does not open before 7 minutes the ice machine will start a Remove Ice Cycle - Refer to “Remove Ice Cycle” on page 98 for details.

Reverse Osmosis or Deionized Water Usage

When using water with low total dissolved solid content (low TDS) the water level probe sensitivity can be increased by moving the jumper over one pin.

The Electronic Control Board diagram shows the default position of the jumper covering the left and center pins. Moving the jumper to the center and right pins and enabling R.O. menu “Use less water with reverse osmosis” (Settings/Energy/Water Usage/Use Less Water With Reverse Osmosis) will increase the sensitivity of the water level probe.



Operational Checks

GENERAL

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 cleaning and sanitizing

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

Important

Refrigeration compressors must be operated for a minimum break in period of 24 hours before full ice production will be reached.

7. Automatic Shut-Off

When the storage bin is full at the end of a harvest sequence, the sheet of cubes fails to clear the water curtain/ice damper and will hold it open. After the water curtain/ice damper is held open for 30 seconds, the ice machine shuts off. The ice machine remains off for 3 minutes before it can automatically restart.

The ice machine remains off until enough ice has been removed from the storage bin to allow the ice to fall clear of the water curtain or all of the ice dampers. As the water curtain/ice dampers swing back to the closed position, the bin switch re-closes and the ice machine restarts (steps 1 - 2), provided the 3 minute delay period is complete.

ENERGIZED PARTS CHART SELF CONTAINED MODELS

Self Contained Air & Water-Cooled Models

Ice Making Sequence of Operation	Water Pump	Harvest Valve(s)	Air Pump(s)*	Water Inlet Valve	Water Dump Valve	Contactor Coil	Compressor	Condenser Fan Motor	Length of Time
Start-Up 1. Water Purge 2. Pressure Equalization	**On**	**Off**	**Off**	**Off**	**On**	**Off**	**Off**	**Off**	*45 Seconds*
	Off	**On**	**On**	**Off**	**Off**	**Off**	**Off**	**Off**	*5 Seconds*
Compressor Startup	**Off**	**On**	**On**	**Off**	**Off**	**On**	**On**	**Off**	*5 Seconds*
Freeze Sequence 3. Prechill	**Off**	**Off**	**Off**	**May Cycle On/Off during prechill**	**Off**	**On**	**On**	May Cycle **On/Off**	*Initial Start-Up is 120 Seconds* *30 Seconds thereafter*

Self Contained Air & Water-Cooled Models (Continued)

Ice Making Sequence of Operation	Water Pump	Harvest Valve(s)	Air Pump(s)*	Water Inlet Valve	Water Dump Valve	Contactor Coil	Compressor	Condenser Fan Motor	Length of Time
4. Freeze	**On**	**Off**	**Off**	**Cycles Off then On one more time**	**Off**	**On**	**On**	May Cycle **On/Off**	*Until Ice Contact w/ Ice Thickness Probe*
Harvest Sequence	**On**	**On**	**On**	**Off**	**On**	**On**	**On**	May Cycle **On/Off**	*Factory Set at 45 Seconds*
5. Water Purge 6. Harvest	**Off**	**On**	**On**	**Off**	**Off**	**On**	**On**	May Cycle **On/Off**	*Bin Switch Activation*
Water Assist Starts 3.5 minutes in harvest cycle	**Off**	**On**	**On**	**On**	**Off**	**On**	**On**	May Cycle **On/Off**	*Until Water Contact w/ Water Level Probe*

Self Contained Air & Water-Cooled Models (Continued)

Ice Making Sequence of Operation	Water Pump	Harvest Valve(s)	Air Pump(s)*	Water Inlet Valve	Water Dump Valve	Contactor Coil	Compressor	Condenser Fan Motor	Length of Time
Water Assist Water pump energizes at 4 minutes in harvest cycle	**On**	**On**	**On**	**Off**	**Off**	**On**	**On**	May Cycle **On/Off**	*Bin Switch Activation or 7 minutes*
Water Assist Dump valve energizes at 6.5 minutes in harvest cycle	**On**	**On**	**On**	**Off**	**On**	**On**	**On**	May Cycle **On/Off**	***Bin Switch Activation or 7 minutes*
7. Automatic Shut-Off	**Off**	**Off**	**Off**	**Off**	**Off**	**Off**	**Off**	**Off**	*Until 3-Minute Delay Expires and Bin Switch Re-closes*

* Not used on all models

** A Remove Ice cycle will start when the bin switch does not open within 7 minutes of the start of a harvest cycle.

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Troubleshooting

LONG FREEZE CYCLE

If the freeze time reaches 35 minutes, the control board automatically initiates a harvest cycle. If 3 consecutive 35-minute freeze cycles occur, the ice machine stops.

LONG HARVEST CYCLE

If the harvest time reaches 7 minutes, the control board will start a remove ice cycle and automatically return the ice machine to the freeze cycle. After 3 consecutive long harvest cycles the ice machine stops.

SAFE OPERATION MODE

Allows the ice machine to operate up to 72 hours if the ice thickness probe (E19 fault) and/or water level probe sensors fail (E20 fault).

- When the control board starts the safe mode an alert is indicated to notify the end-user they have a production problem.
- The control board automatically initiates and monitors the safe mode. The control will automatically exit the safe mode if a normal signal is received from the input.
- After 72 hours the control board will enter a standby mode and turn off.

The control board needs a five-cycle history to operate safe mode. If five cycles have never been successfully completed the ice machine will shut-off.

REMOVE ICE CYCLE

When the damper/curtain does not open during the 7-minute harvest cycle the following remove ice cycle occurs:

- 7 minutes - The compressor, harvest solenoid valve and dump valve de-energize.
  The water pump remains energized and the water inlet valve energizes until water touches the high water level probe.
- Water is circulated, dumped and refilled to the high water level probe 18 times (approximately 1 hour).
- At the end of the thaw cycle (approximately 1 - 1.75 hour) the ice machine will start another freeze cycle.

Curtain Operation In Water Assist Harvest

- Open & close damper = Continue Thaw Cycle
- Open damper 30 seconds = Full Bin Shutoff

NOTE: Use the keypad and turn the ice machine off and then on to terminate the cycle. Disconnecting and reconnecting power to end the cycle will result in the ice machine restarting in a harvest cycle.

ANALYZING WHY A SERVICE FAULT (E01 & E02) STOPPED THE ICE MACHINE

Service Faults are designed to stop the ice machine prior to major component failures, most often a minor problem or something external to the ice machine. This may be difficult to diagnose, as many external problems occur intermittently.

Example: An ice machine stops intermittently on Service Fault (long freeze times). The problem could be a low ambient temperature at night, a water pressure drop, the water is turned off one night a week, etc.

Refrigeration and electrical component failures will cause a Service Fault trip. Eliminate all electrical components and external causes first. If it appears that the refrigeration system is causing the problem, use Manitowoc's Freeze Cycle Refrigeration System Operational Analysis Table, along with detailed charts, checklists, and other references to determine the cause.

The following checklists are designed to assist the service technician in analysis. However, because there are many possible external problems, do not limit your diagnosis to only the items listed.

E01 LONG FREEZE

Freeze time exceeds 35 minutes for 3 consecutive freeze cycles.

Possible cause checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 122

Water System

- Dirty/defective water level probe
- Low water pressure (20 psig min.)
- High water pressure (80 psig max.)
- High water temperature (90°F/32.2°C max.)
- Clogged water distribution tube
- Dirty/defective water fill valve
- Dirty/defective water dump valve
- Defective water pump
- Loss of water from sump area

Electrical System

- Low incoming voltage
- Ice thickness probe out of adjustment
- Harvest cycle not initiated electrically
- Contactor not energizing
- Compressor electrically non-operational
- Defective fan cycling control
- Defective fan motor

Refrigeration/Miscellaneous

- Non-Manitowoc components
- Improper refrigerant charge
- Defective head pressure control
- Defective harvest valve
- Defective compressor
- TXV starving or flooding (check bulb mounting)
- Non-condensable in refrigeration system
- Plugged or restricted high side refrigerant lines or component
- Restricted air flow/dirty condenser fins
- High inlet air temperature
- Condenser discharge air recirculation

E02 LONG HARVEST

Harvest time exceeds 7 minutes for 3 consecutive harvest cycles.

Possible Cause Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 122

Water System

- Water area (evaporator) dirty
- Dirty/defective water dump valve
- Vent tube not installed on water outlet drain
- Water freezing behind evaporator
- Plastic extrusions and gaskets not securely mounted to the evaporator
- Clogged water distribution tube

Electrical System

- Ice thickness probe out of adjustment
- Bin switch closed/defective
- Premature harvest - The control board initiates a harvest cycle when the high water level probe circuit is complete and the low water level probe is open.

Refrigeration System

- Non-Manitowoc components
- Improper refrigerant charge
- Defective head pressure control valve
- Defective harvest valve
- TXV flooding (check bulb mounting)
- Defective fan cycling control
- Water-cooled only - Water regulating valve is incorrectly adjusted or will not close during harvest cycle.

Troubleshooting By Symptom

The troubleshooting procedures follow diagnostic charts. There are four symptoms, the symptom that you are experiencing will determine which diagnostic chart to use. The chart asks yes and no questions to determine the problem. The diagnostic chart will direct you to a procedure to correct the problem. Remote condenser, and self contained models use separate charts.

SYMPTOM #1

Ice Machine Stops Running, Ice machine is in Ice Making cycle, or Has a History of Shutting Down

- Refer to Ice Machine Stops Running diagnostic chart

SYMPTOM #2

Ice Machine has a Long Freeze Cycle, Ice Formation is Thick, Thin Ice Fill on Inlet, or Outlet of Evaporator or Low Production

Service Fault (possible)

- Refer to Freeze Cycle Refrigeration System Operational Analysis Table

SYMPTOM #3

Ice Machine Will Not Harvest - Freeze Cycle is Normal and Ice Cubes are Not Melted After Harvest

Long Harvest (possible)

- Refer to Refrigeration Harvest Flow Chart

SYMPTOM #4

Ice Machine Will Not Harvest - Freeze Cycle is Normal and Ice Cubes are Melted After Harvest

- Refer to Ice Melt out Flow Chart

RESET TO FACTORY DEFAULTS

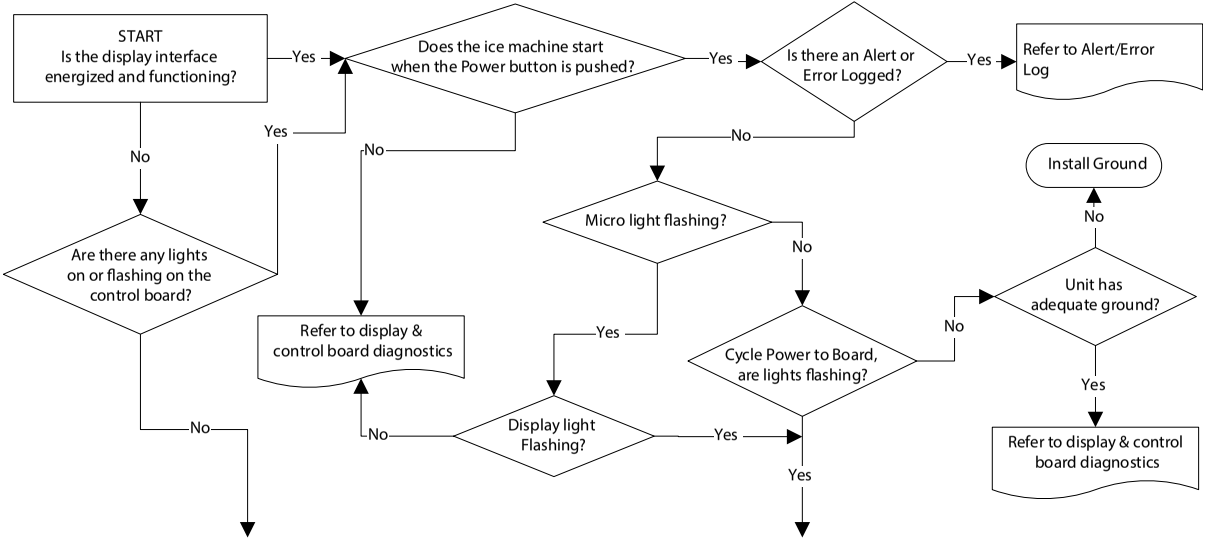
Before starting troubleshooting procedures, reset the control board to factory defaults to prevent mis-diagnosis. Before resetting to factory defaults do one of the following:

A. Copy settings to a USB device and flash settings into the control board when diagnostics are complete.

B. Write down any customer settings so they can be re-entered when diagnostics are complete.

To reset the ice machine to factory defaults, select Menu then Reset Defaults.

SYMPTOM #1 ICE MACHINE WILL NOT RUN



No
Line voltage at wires 55 & 56 on 9 pin control board connector?
No
Supply power to the ice machine
Yes
Control board fuse is good?
No
Replace fuse & determine which component caused fuse to blow
Yes
Refer to display & control board diagnostics
Yes
Bin switch light on? (Multi evap all lights on)?
No
All water curtains or dampers in place?
No
Install the water curtain/damper.
Yes
Yes

Yes
Press power button to start ice making
Ice machine starts?
Yes
Test run ice machine
No
Refer to display & control board diagnostics
Yes
Is magnet on the water curtain/damper?
No
Replace the water curtain/damper.
Yes
Refer to bin switch diagnostics.

SYMPTOM #2 - LOW PRODUCTION, LONG FREEZE CYCLE

Ice Machine has a Long Freeze Cycle, Ice Formation is Thick or Thin on Inlet or Outlet of Evaporator or Low Production

How to Use the Freeze Cycle Refrigeration System Operational Analysis Table (page 109)

GENERAL

These tables must be used with charts, checklists, and other references to eliminate refrigeration components not listed on the tables, as well as external items and problems which can cause good refrigeration components to appear defective.

The tables list five different defects that may affect the ice machine's operation.

NOTE: A low-on-charge ice machine and a starving expansion valve have very similar characteristics and are listed under the same column.

NOTE: Before starting, see "Before Beginning Service" for a few questions to ask when talking to the ice machine owner.

PROCEDURE

Step 1 Complete the "Operational Analysis" column.

Read down the left "Operational Analysis" column. Perform all procedures and check all information listed. Each item in this column has supporting reference material to help analyze each step.

While analyzing each item separately, you may find an "external problem" causing a good refrigerant component to appear bad. Correct problems as they are found. If the operational problem is found, it is not necessary to complete the remaining procedures. Enter Checkmarks (√).

Each time the actual findings of an item in the "Operational Analysis" column matches the published findings on the table, enter a Checkmark.

Example: Freeze cycle suction pressure is determined to be low. Enter a Checkmark in the "low" column.

Step 2 Add the Checkmarks listed under each of the four columns. Note the column number with the highest total and proceed to "Final Analysis."

NOTE: If two columns have matching high numbers, a procedure was not performed properly, supporting material was not analyzed correctly or the problem component is not covered by the analysis table.

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?

SYMPTOM #2 - FREEZE CYCLE REFRIGERATION SYSTEM OPERATIONAL ANALYSIS TABLES

SINGLE EVAPORATOR, SINGLE EXPANSION VALVE
SELF CONTAINED AIR & WATER CONDENSER

Operational Analysis	1	2	3	4
Ice Production Reference "Ice Production Check" on page 120	Air-Temperature Entering Condenser_____ Water Temperature Entering Ice Machine _____ Published 24 hour ice production_____ Calculated (actual) ice production _____ NOTE: The ice machine is operating properly if the ice fill patterns is normal and ice production is within 10% of charted capacity.			
Installation and Water System Reference "Water System Checklist" on page 123	All installation and water related problems must be corrected before proceeding with chart.			
Ice Formation Pattern Reference "Ice Formation Pattern" on page 124	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on the entire evaporator	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- Ice formation is extremely thin on inlet of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- No ice formation on entire evaporator

SINGLE EVAPORATOR, SINGLE EXPANSION VALVE
SELF CONTAINED AIR & WATER CONDENSER

Operational Analysis	1	2	3	4
Freeze Cycle **Discharge Pressure** _____ _____ _____ **1 minute Middle End** **into cycle**	If discharge pressure is High or Low, refer to Freeze Cycle Discharge Pressure High Checklist on page 130 or Freeze Cycle Discharge Pressure Low Checklist page 131 to eliminate problems and/or components not listed on this table before proceeding.			
Freeze Cycle **Suction Pressure** _____ _____ _____ **1 minute Middle End**	If suction pressure is High or Low, refer to Suction Pressure High Checklist on page 133 or Suction Pressure Low Checklist on page 134 to eliminate problems and/or components not listed on this table before proceeding.			
	Suction pressure is **High**	Suction pressure is **Low or Normal**	Suction pressure is **High**	Suction pressure is **High**

SINGLE EVAPORATOR, SINGLE EXPANSION VALVE
SELF CONTAINED AIR & WATER CONDENSER

Operational Analysis	1	2	3	4
Wait 5 minutes into the freeze cycle. Compare temperatures of **evaporator inlet** and **evaporator outlet**. **Inlet T3**_____**°F (°C)** **Outlet T4**_____ **°F (°C)** **Difference** **T3 & T4**_____ **°F (°C)** Reference "Comparing Evaporator Inlet and Outlet Temperatures - Self-contained Ice Machines" on page 135	Inlet and outlet **within 7°F (4°C)** of each other	Inlet and outlet **not within 7°F (4°C)** of each other -and- Inlet is colder than outlet	Inlet and outlet **within 7°F (4°C)** of each other -or- Inlet and outlet **not within 7°F (4°C)** of each other -and- Inlet is warmer than outlet	Inlet and outlet **within 7°F (4°C)** of each other

R290 REFRIGERANT SINGLE EVAPORATOR, SINGLE EXPANSION VALVE
SELF CONTAINED AIR CONDENSER

Operational Analysis	1	2	3	4
Ice Production Reference "Ice Production Check" on page 120	Air-Temperature Entering Condenser_____ Water Temperature Entering Ice Machine _____ Published 24 hour ice production_____ Calculated (actual) ice production _____ NOTE: The ice machine is operating properly if the ice fill patterns is normal and ice production is within 10% of charted capacity.			
Installation and Water System Reference "Water System Checklist" on page 123	All installation and water related problems must be corrected before proceeding with chart.			
Ice Formation Pattern Reference "Ice Formation Pattern" on page 124	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on the entire evaporator	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- Ice formation is extremely thin on inlet of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- No ice formation on entire evaporator
Suction Line Temperature 3 minutes into the freeze cycle	Normal or High	Normal or High	Low	Normal or High

Operational Analysis	1	2	3	4
Freeze Cycle **Suction Temperature** _____ _____ _____ **1 minute Middle End**	If suction temperature is High or Low, refer to Analyzing Discharge Pressure or Temperature in the Freeze Cycle on page 129 to eliminate problems and/or components not listed on this table before proceeding.			
	Suction pressure is **High**	Suction pressure is **Low or Normal**	Suction pressure is **High**	Suction pressure is **High**
Wait 5 minutes into the freeze cycle. Compare temperatures of evaporator inlet and evaporator outlet. Inlet _____°C (F) Outlet _____ °C (F) Difference_____ °C (F)	Inlet and outlet within 4°C of each other	Inlet and outlet not within 4°C of each other -and- Inlet is colder than outlet	Inlet and outlet within 4°C of each other -or- Inlet and outlet not within 4°C of each other -and- Inlet is warmer than outlet	Inlet and outlet within 4°C of each other

Operational Analysis	1	2	3	4
Wait 5 minutes into the freeze cycle. Compare temperatures of compressor discharge line and harvest valve inlet.	The harvest valve inlet is Hot -and- Approaches the temperature of a Hot compressor discharge line.	The harvest valve inlet is Cool enough to hold hand on -and- The compressor discharge line is Hot.	The harvest valve inlet is Cool enough to hold hand on -and- The compressor discharge line is Cool enough to hold hand on.	The harvest valve inlet is Cool enough to hold hand on -and- the compressor discharge line is Hot.
Discharge Line Temperature Record freeze cycle discharge line temperature at the end of the freeze cycle _____°C	Discharge line temperature 71°C or higher at the end of the freeze cycle	Discharge line temperature 71°C or higher at the end of the freeze cycle	Discharge line temperature 71°C or lower at the end of the freeze cycle	Discharge line temperature 71°C or higher at the end of the freeze cycle
Final Analysis Enter total number of boxes checked in each column.	Harvest Valve Leaking	Low On Charge -Or- TXV Starving	TXV Flooding	Compressor
The following are the procedures for completing each step of the Freeze Cycle Refrigeration System Operational Analysis Tables. Each procedure must be performed exactly for the table to work correctly.				

SINGLE EVAPORATOR, SINGLE EXPANSION VALVE
SELF CONTAINED AIR, WATER CONDENSERS

Operational Analysis	1	2	3	4
Wait 5 minutes into the freeze cycle. Compare temperatures of **compressor discharge line** and **harvest valve inlet.** Reference "Harvest Valve Analysis" on page 136	The harvest valve inlet is **Hot** -and- approaches the temperature of a **Hot** compressor discharge line.	The harvest valve inlet is **Cool** enough to hold hand on -and- the compressor discharge line is **Hot**.	The harvest valve inlet is **Cool** enough to hold hand on -and- the compressor discharge line is **Cool** enough to hold hand on.	The harvest valve inlet is **Cool** enough to hold hand on -and- the compressor discharge line is **Hot**.
Discharge Line Temperature Record freeze cycle discharge line temperature at the end of the freeze cycle. **T2 _____°F (°C)** Reference "Discharge Line Temperature Analysis" on page 138	Discharge line temp. **150°F (65°C) or higher** at the end of the freeze cycle	Discharge line temp. **150°F (65°C) or higher** at the end of the freeze cycle	Discharge line temp. **less than 150°F (65°C)** at the end of the freeze cycle	Discharge line temp. **150°F (65°C) or higher** at the end of the freeze cycle

SINGLE EVAPORATOR, SINGLE EXPANSION VALVE
SELF CONTAINED AIR, WATER CONDENSERS

Operational Analysis	1	2	3	4
Final Analysis Enter total number of boxes checked in each column. Reference "Final Analysis - Self-contained Air & Water Models" on page 140	**Harvest Valve Leaking**	**Low On Charge -Or- TXV Starving**	**TXV Flooding**	**Compressor**

The following are the procedures for completing each step of the Freeze Cycle Refrigeration System Operational Analysis Tables. Each procedure must be performed exactly for the table to work correctly.

SINGLE EVAPORATOR, DUAL EXPANSION VALVE
SELF CONTAINED AIR & WATER CONDENSER

Operational Analysis	1	2	3	4
Ice Production	Air-Temperature Entering Condenser_____ Water Temperature Entering Ice Machine _____ Published 24 hour ice production_____ Calculated (actual) ice production _____ NOTE: The ice machine is operating properly if the ice fill patterns is normal and ice production is within 10% of charted capacity.			
Installation and Water System	All installation and water related problems must be corrected before proceeding with table.			
Ice Formation Pattern **Top or 1 Side_____** **Bottom or 1 Side_____**	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on one side or Top or Bottom of evaporator	Ice formation is extremely thin on outlet of one side or Top or Bottom of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- Ice formation is extremely thin at inlet of one side or Top or Bottom of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- No ice formation on entire evaporator

SINGLE EVAPORATOR, DUAL EXPANSION VALVE
SELF CONTAINED AIR & WATER CONDENSER

Operational Analysis	1	2	3	4
Freeze Cycle **Discharge Pressure** _____ _____ _____ **1 minute Middle End** **into cycle**	If discharge pressure is High or Low, refer to freeze cycle high or low discharge pressure problem checklist page 130 to eliminate problems and/or components not listed on this table before proceeding.			
Freeze Cycle **Suction Pressure** _____ _____ _____ **1 minute Middle End**	If suction pressure is High or Low refer to freeze cycle high or low suction pressure problem checklist page 133 to eliminate problems and/or components not listed on this table before proceeding.			
	Suction pressure is **High**	Suction pressure is **Low or Normal**	Suction pressure is **High**	Suction pressure is **High**
Wait 5 minutes into the freeze cycle. Compare temperatures of **compressor discharge line and both harvest valve inlets.**	The harvest valve inlet is **Hot** -and- approaches the temperature of a **Hot** compressor discharge line.	The harvest valve inlet is **Cool** enough to hold hand on -and- the compressor discharge line is **Hot**.	The harvest valve inlet is **Cool** enough to hold hand on -and- the compressor discharge line is **Cool** enough to hold hand on.	The harvest valve inlet is **Cool** enough to hold hand on -and- the compressor discharge line is **Hot**.

SINGLE EVAPORATOR, DUAL EXPANSION VALVE
SELF CONTAINED AIR & WATER CONDENSER

Operational Analysis	1	2	3	4
Discharge Line Temperature Record freeze cycle discharge line temperature at the end of the freeze cycle _____**°F (°C)**	Discharge line temp. **150°F (65°C) or higher** at the end of the freeze cycle	Discharge line temp. **150°F (65°C) or higher** at the end of the freeze cycle	Discharge line temp. **less than 150°F (65°C)** at the end of the freeze cycle	Discharge line temp. **150°F (65°C) or higher** at the end of the freeze cycle
Final Analysis Enter total number of boxes checked in each column.	**Harvest Valve Leaking**	**Low On Charge -Or- TXV Starving**	**TXV Flooding**	**Compressor**

The following are the procedures for completing each step of the Freeze Cycle Refrigeration System Operational Analysis Tables. Each procedure must be performed exactly for the table to work correctly.

Ice Production Check

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

1. Determine the ice machine operating conditions:
   Air temp entering condenser:____°
   Water temp entering sump trough:____°
2. Refer to the appropriate 24-Hour Ice Production Chart (starting on page 193). 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	

4. Compare the results of step 3 with step 2. Ice production checks that are within 10% of the chart are considered normal. If they match closely, determine if:
    - Another ice machine is required.
    - More storage capacity is required.
    - Relocating the existing equipment to lower the load conditions is required.

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

Installation/Visual Inspection Checklist

Inadequate Clearances

- Check all clearances on sides, back and top. Reference “Clearance Requirements” on page 29

Ice machine is not level

- Level the ice machine

Condenser is dirty

- Clean the condenser

Water filtration is plugged (if used)

- 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
- Floor drain must have an air gap
- Install condensation drain in the ice machine base

Line set is improperly installed

- Reinstall according to the Installation Operation Manual, reference “Calculating Installation Distances” beginning on page 29.

Water System Checklist

A water-related problem often causes the same symptoms as a refrigeration system component malfunction. Water system problems must be identified and eliminated prior to replacing refrigeration components.

Water area (evaporator) is dirty

- Clean as needed

Water inlet pressure not between 20 and 80 psig (1-5 Bar, 138-552 kPa).

- Install water regulator or increase water pressure

Incoming water temperature is not between 35°F (2°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

Water dump valve leaking during the Freeze cycle

- Clean/replace dump valve as needed

Vent tube is not installed on water outlet drain

- See Installation Instructions

Hoses, fittings, etc., are leaking water

- Repair/replace as needed

Water fill valve is stuck open or closed

- Clean/replace as needed

Water is leaking out of the sump trough area

- Stop the water loss

Uneven water flow across the evaporator

- Clean the ice machine

Plastic extrusions and gaskets are not secured to the evaporator

- Remount/replace as needed

Ice Formation Pattern

Evaporator ice formation pattern analysis is helpful in ice machine diagnostics.

Analyzing the ice formation pattern alone cannot diagnose an ice machine malfunction. However, when this analysis is used along with Manitowoc's Freeze Cycle Refrigeration System Operational Analysis Tables, it can help diagnose an ice machine malfunction.

Any number of problems can cause improper ice formation.

> Keep the water curtain/ice dampers in place while checking the ice formation pattern to ensure no water is lost.

1. 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 on the outlet. At the end of the Freeze cycle, ice formation at the outlet will be close to, or just a bit thinner than, ice formation at the inlet. The dimples in the cubes at the outlet of the evaporator may be more pronounced than those on the inlet. This is normal.

It is normal for ice thickness to vary up to 3 mm across the surface of the evaporator. The ice bridge thickness at the ice thickness control probe should be at least 7 mm.

The ice thickness probe must be set to maintain the ice bridge thickness at approximately 7 mm. If ice forms uniformly across the evaporator surface, but does not reach 7 mm within the proper amount of time, this is still considered a normal ice fill pattern.

2. Extremely Thin at Evaporator Outlet

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

Examples: No ice at all on the outlet half of the evaporator, but ice forms on the inlet half of the evaporator. Or, the ice at the outlet of the evaporator reaches 1/8 inch (3.2 mm) to initiate a harvest, but the inlet of the evaporator already has a 12.7 mm to 25.4 mm of ice formation.

3. No Ice Formation

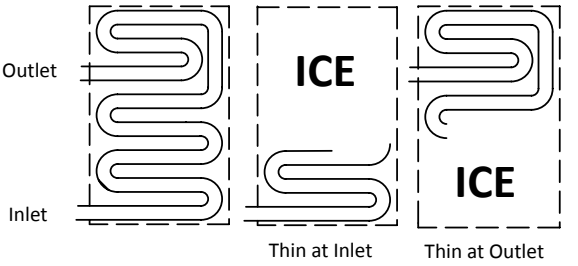
The ice machine operates for an extended period, but there is no ice formation at all on the evaporator.

Evaporator Tubing Routing

Routing of the tubing on the back of the evaporator determines the ice fill pattern failure mode.

One Evaporator, One TXV models

The evaporator outlet tubing does not exit directly at the top of the evaporator, but exits several inches below the top of the evaporator. Extremely Thin at the Evaporator Outlet will first be visible several inches below the top of the evaporator. Extremely Thin at Evaporator Inlet will first be visible at the bottom of the evaporator.

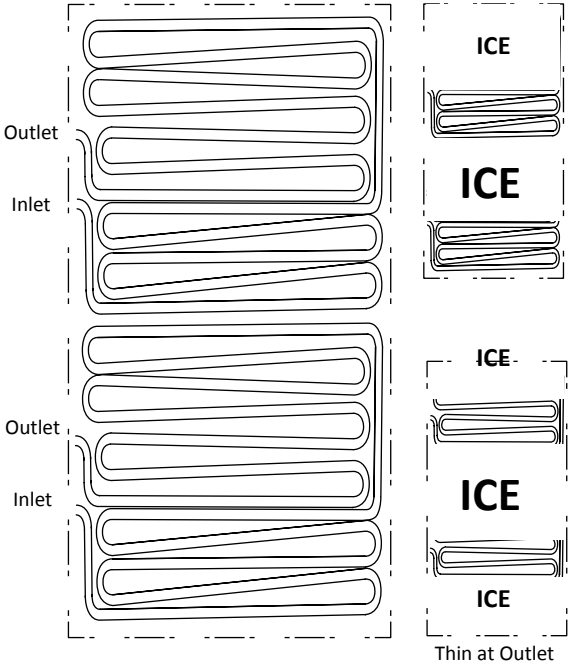


One Evaporator, Two TXV 30" Models

Tubing routing for one evaporator with two TXVs is different. The evaporator has two inlets and outlets. Fill pattern varies depending on which circuit is affected,

Extremely Thin at the Evaporator Outlet will first be visible either 1/4 or 3/4 of the way down the evaporator.

Extremely Thin at the Evaporator Inlet will show at the bottom of the evaporator or 1/2 of the way down depending on the circuit affected.

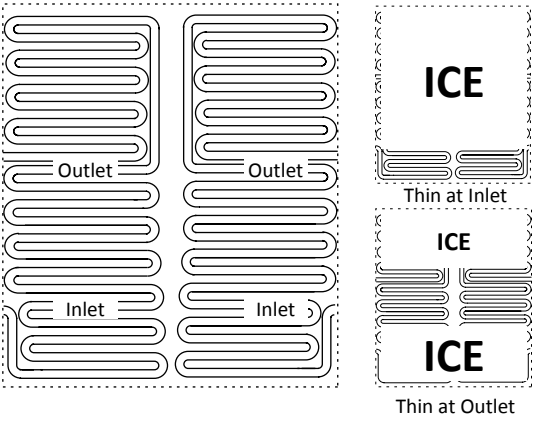


One Evaporator, Two TXV 48" Models

Tubing routing for one evaporator with two TXVs is different. The evaporator has two inlets and outlets. Fill pattern varies depending on which circuit is affected:

Extremely Thin at the Evaporator Outlet will first be visible 1/3 of the way down the evaporator. Only one side of the evaporator may be affected depending on failure. A TXV failure will usually show on only one side, while low on refrigerant can affect one or both sides depending on the amount of refrigerant loss and ambient temperature.

Extremely Thin at the Evaporator Inlet will show at the bottom of the evaporator. Depending on the failure either the entire bottom of the evaporator or one side of the bottom of the evaporator may be affected.



Analyzing Discharge Pressure or temperature in the Freeze Cycle

NOTE: This procedure can be used for flammable refrigerants also by substituting temperature for pressure.

1. Determine the ice machine operating conditions:
   Air temperature entering condenser _____
   Water temperature entering sump trough _____
2. Refer to Operating Pressure or temperature table (starting on page 193) for ice machine being checked.
   Use the operating conditions determined in step 1 to find the published normal discharge pressures or temperatures.
   Freeze Cycle _____
   Harvest Cycle _____
3. Perform an actual discharge pressure check.

	Freeze Cycle psig (kPa)
1 Minute into the Freeze Cycle	_____
Middle of Freeze Cycle	_____
End of Freeze Cycle	_____

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

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

Freeze Cycle Discharge Pressure High Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 122

Air Condenser

- Dirty condenser filter
- Dirty condenser fins
- High inlet air temperature
- Condenser discharge air recirculation
- Defective fan cycling control
- Defective fan motor

Water Condenser

- Low water pressure [20 psig (138 kPa) min.]
- High inlet water temperature (90°F/32°C max.)
- Dirty condenser
- Dirty/Defective water regulating valve
- Water regulating valve out of adjustment

Other

- Overcharged
- Non-condensable (air) in system
- Wrong type of refrigerant
- Non-Manitowoc components in system
- High side refrigerant lines/component restricted

Freeze Cycle Discharge Pressure Low Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 122

Air Cooled Condensers

- Defective head pressure control valve, won’t bypass See “Total System Refrigerant Charge” on page 192
- Defective fan cycle control, stuck closed See “Fan Cycle Control” on page 171

Water Cooled Condensers

- Water Regulating Valve out of adjustment
- Water Regulating Valve Defective

Other

- Undercharged
- Wrong type of refrigerant
- Non-Manitowoc components in system
- Liquid line/component restricted

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.

1. Determine the ice machine operating conditions:
   Air temp. entering condenser _____
   Water temp. entering sump trough _____
2. Refer to Operating Pressure table (starting on page 193) 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 suction pressure check.

	Freeze Cycle psig (kPa)
1 Min. into the Freeze Cycle	_____
Middle of Freeze Cycle	_____
End of Freeze Cycle	_____
4. Compare the actual suction pressure (step 3) with the published suction pressure (step 2).

   NOTE: The suction 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 suction pressure to be higher at the beginning of the Freeze cycle (when load is greatest), then drop throughout the Freeze cycle.

Suction Pressure High Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 122

Discharge Pressure

- Discharge pressure is too high and is affecting suction pressure – refer to “Freeze Cycle Discharge Pressure High Checklist” on page 130

Improper Refrigerant Charge

- Overcharged (also see “Freeze Cycle Discharge Pressure High Checklist” on page 130)
- Wrong type of refrigerant
- Non-condensable in system

Components

- Harvest valve leaking
- Harvest pressure solenoid valve leaking
- TXV flooding
- Defective compressor

Other

- Non-Manitowoc components in system

Suction Pressure Low Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 122

Discharge Pressure

- Discharge pressure is too low and is affecting low side – refer to “Freeze Cycle Discharge Pressure Low Checklist” on page 131

Improper Refrigerant Charge

- Undercharged
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- Improper water supply over evaporator – refer to “Water System Checklist” on page 123
- Restricted/plugged liquid line drier
- Restricted/plugged tubing in suction side or liquid line of refrigeration system
- TXV starving

Comparing Evaporator Inlet and Outlet Temperatures - Self-contained Ice Machines

The temperatures of the suction lines entering and leaving the evaporator alone cannot diagnose an ice machine. However, comparing these temperatures during the freeze cycle, along with using Manitowoc's Freeze Cycle Refrigeration System Operational Analysis Table, can help diagnose an ice machine malfunction.

The actual temperatures entering and leaving the evaporator vary by model, and change throughout the freeze cycle. This makes documenting the "normal" inlet and outlet temperature readings difficult. The key to the diagnosis lies in the difference between the two temperatures five minutes into the freeze cycle. These temperatures should be within 7° of each other.

Use this procedure to document freeze cycle inlet and outlet temperatures.

1. Navigate to Service / Diagnostics / Temperature Sensors.
2. Wait five minutes into the freeze cycle.
3. Record the evaporator inlet (T3) and outlet (T4) temperatures at 5 minutes into the freeze cycle. Determine the difference.
4. Record the information on the table.

Harvest Valve Analysis

Symptoms of a harvest valve remaining partially open during the freeze cycle can be similar to symptoms of either an expansion valve or compressor problem. The best way to diagnose a harvest valve is by using Manitowoc's Ice Machine Freeze Cycle Refrigeration System Operational Analysis Table.

Use the following procedures to determine if a harvest valve is remaining partially open during the freeze cycle.

SELF-CONTAINED OR REMOTE CONDENSER MODELS HARVEST VALVE ANALYSIS

1. Wait five minutes into the freeze cycle.
2. Feel the inlet of the harvest valve(s).

Important

Feeling the harvest valve outlet or across the harvest valve itself will not work for this comparison.

The harvest 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.
4. Compare the temperature of the inlet of the harvest valves to the temperature of the compressor discharge line.

⚠Warning

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

Findings	Comments
The inlet of the harvest valve is cool enough to touch and the compressor discharge line is hot. **Cool & Hot**	**Normal Operation** 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**	**Leaking Harvest Valve** The harvest valve inlet did not cool down during the freeze cycle due to continual leakage of compressor discharge gas through the valve.
Both the inlet of the harvest valve and the compressor discharge line are cool enough to touch. **Cool & Cool**	**Harvest Valve Not Leaking** The compressor discharge line should not be cool to the touch 5 minutes into the freeze cycle. This symptom would not be caused by a harvest valve leaking.

5. Record your findings on the table.

Discharge Line Temperature Analysis

GENERAL

Knowing if the discharge line temperature is increasing, decreasing or remaining constant can be an important diagnostic tool. Compressor discharge line temperature on a normally operating ice machine steadily increases throughout the freeze cycle.

Ambient air temperatures affect the discharge line temperature.

Higher ambient air temperatures at the condenser and/or higher inlet water temperature = higher discharge line temperatures at the compressor.

Lower ambient air temperatures at the condenser and/or lower supply water temperature= lower discharge line temperatures at the compressor.

Regardless of ambient and water temperatures, the freeze cycle discharge line temperature should be higher than 150°F (66°C) at the end of the freeze cycle.

PROCEDURE

1. Navigate to Service / Diagnostics / Temperature Sensors / T2 Thermistor.
2. Observe the discharge line temperature (T2) for the last three minutes of the freeze cycle and record on the table.

Water Regulating Valve Affecting Pressure or Temperature

WATER-COOLED MODELS ONLY

Problem (Freeze Cycle)

Valve not maintaining discharge pressure.

- Valve incorrectly set, dirty or defective. Adjust valve to correct discharge pressure for your model (refer to cycle times/24 hour productions charts), clean or replace valve.

Discharge pressure or temperature extremely high; Liquid line feels hot.

- Water regulating valve incorrectly set or not opening
- Insufficient water volume - undersized/kinked lines, mineral or scale buildup in lines.

Discharge pressure low, Liquid line feels warm to hot.

- Ice machine low on charge, verify refrigerant amount.

Water pressure forces water regulating valve open.

- Reduce incoming water pressure.

Final Analysis - Self-contained Air & Water Models

The column with the highest number of check marks identifies the refrigeration problem.

COLUMN 1 - HARVEST VALVE LEAKING

Replace the valve as required.

COLUMN 2 - LOW CHARGE/TXV STARVING

Normally, a starving expansion valve only affects the freeze cycle pressures, not the harvest cycle pressures. A low refrigerant charge normally affects both pressures. Verify the ice machine is not low on charge before replacing an expansion valve.

1. Add refrigerant charge to verify a low charge (air and water self-contained only). Do not add more than 30% of nameplate refrigerant charge. If the problem is corrected, the ice machine is low on charge.

NOTE: Do not add charge to remote models. The symptoms of a remote low on charge will result in a safety long freeze in cool ambient temperatures. Check the liquid line temperature at the ice machine. The liquid line will be hot with a normal or below normal head pressure in freeze when the ice machine is low on refrigerant.

2. Find the refrigerant leak. The ice machine must operate with the nameplate charge. If the leak cannot be found, proper refrigerant procedures must still be followed Change the liquid line drier. Then, evacuate and weigh in the proper charge.
3. If the problem is not corrected by adding charge, the expansion valve is faulty.

COLUMN 3 - TXV FLOODING OR REFRIGERANT OVERCHARGE

A loose or improperly mounted expansion valve bulb causes the expansion valve to flood. Check bulb mounting, insulation, etc., before changing the valve. Verify refrigerant amount is correct by weighing recovered refrigerant before replacing a TXV.

COLUMN 4 - COMPRESSOR

Replace the compressor. To receive warranty credit, the compressor ports must be properly sealed by crimping and soldering them closed.

SYMPTOM #3 & #4 HARVEST PROBLEMS
SELF-CONTAINED AIR & WATER MODELS

Definition of a harvest problem; At the end of a 3.5-minute harvest cycle the slab of ice is still contacting the evaporator. The slab of ice may or may not be removable by hand.

Harvest problems can be split into two symptoms.

- Symptom 3 - Normal sheet of cubes at the end of the harvest cycle. Ice is difficult to remove from the evaporator by hand. Once removed the back of the cubes are square and show no signs of melting. This indicates a refrigeration problem. The source of the problem could be in the freeze or harvest cycle. Use the appropriate flow chart (in Troubleshooting) to determine the cause of the problem.
- Symptom 4 - Melted sheet of cubes at the end of the harvest cycle. Ice can be removed rather easily by hand. The back of the cubes are misshapen and melted. This indicates something is preventing the ice slab from releasing. Follow the appropriate flow chart (in Troubleshooting) to determine the cause of the problem. A manual cleaning procedure must always be performed when this problem is encountered.

NO
Self Contained Air-cooled Condenser?
YES
Fan cycling control operates correctly in freeze cycle?
NO
Replace Fan Cycling Control
YES
Fan cycling control opens below setpoint in harvest cycle?
NO
YES
Are you sure Discharge line temperature is normal?
Repeat this flowchart & verify all data
NO
Self Contained Water-cooled Condenser?
YES
Maintains correct pressure in freeze cycle?
NO
Adjust or Replace Water Regulating Valve
YES
Stops water flow 100% in harvest cycle?
NO
YES
NO
Traditional Remote Air-cooled Condenser?
YES
Refer to Symptom #3 Traditional Remotes Only Chart

Before Calling for Service Checklist

If a problem arises during operation of your ice machine, follow the checklist below before calling service. Routine adjustments and maintenance procedures are not covered by the warranty.

Problem	Possible Cause	To Correct
Ice machine does not run.	No electrical power to the ice machine and/or condensing unit.	Replace the fuse/reset the breaker/turn on the main switch.
	High pressure cutout tripping.	Clean condenser coil. (See page 62)
	Energy Saver or other field entered programming is stopping ice machine.	Reset to factory defaults.
	Water curtain off or stuck open.	Water curtain must be installed and swinging freely.
	Ice machine is not turned on.	Press On/Off button, display must indicate “Making Ice”.
	IB Models Only - Dispenser ice level thermostat is open.	Adjust thermostat to maintain correct dispenser level.
Ice machine stops and can be restarted by pressing the power switch.	Service Fault feature stopping the ice machine.	Refer to “Service Faults” (See page 148)

Problem	Possible Cause	To Correct
Ice machine does not release ice or is slow to harvest.	Ice machine is dirty.	De-scale and sanitize the ice machine. (See page 47)
	Ice machine is not level.	Level the ice machine.
	Low air temperature around ice machine head section.	Air temperature must be at least 35°F (2°C).
	Fan cycle control does not de-energize condenser fan motor.	Call for service.
	Water regulating valve incorrectly adjusted or will not close.	Check for water at condenser drain outlet in harvest cycle. Contact a qualified service company to adjust/replace valve if water is present.
Ice machine does not cycle into harvest mode.	The six-minute freeze time lock-in has not expired yet.	Wait for the freeze lock-in to expire.
	Ice thickness probe is dirty.	Descale and sanitize the ice machine. (See page 47)
	Ice thickness probe is disconnected.	Connect the probe to the control board.
	Ice thickness probe is out of adjustment.	Adjust the ice thickness probe. (See page 162)
	Uneven ice fill (thin at the top of evaporator).	Verify sufficient water level in sump trough. Contact a qualified service company to check refrigeration system.

Problem	Possible Cause	To Correct
Ice quality is poor (soft or not clear).	Poor incoming water quality.	Contact a qualified service company to 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. (See page 47)
	Water dump valve is not working.	Disassemble and descale the water dump valve.
	Water softener is working improperly (if applicable).	Repair the water softener.
Ice machine produces shallow or incomplete cubes, or the ice fill pattern on the evaporator is incomplete.	Ice thickness probe is out of adjustment.	Adjust the ice thickness probe. (See page 162)
	Water trough level is too low.	Check the water level probe position.
	Water inlet valve filter screen is dirty.	Remove the water inlet valve and descale the filter screen.
	Water filtration is poor.	Replace the filter.
	Hot incoming water.	Connect the ice machine to a cold water supply. (See page 41)
	Water inlet valve is not working.	Replace the water inlet valve.
	Incorrect incoming water pressure.	Water pressure must be: 20 psi - 80 psi (140 kPa - 550 kPa).
	Ice machine is not level.	Level the ice machine.

Problem	Possible Cause	To Correct
Low ice capacity.	Water inlet valve filter screen is dirty.	Remove the water inlet valve and descale the filter screen.
	Incoming water supply is shut off.	Open the water service valve.
	Water inlet valve stuck open or leaking.	Press the On/Off button and turn off the ice machine. If water continues to enter water trough, replace the water inlet valve.
	The condenser is dirty.	Clean the condenser.
	High air temperature entering condenser.	Refer to minimum/ maximum air temperature chart for your model. (See page 43)
	The harvest assist air compressor is not functioning.	Call for service.

Service Faults

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

Before calling for service, re-start the ice machine using the following procedure:

1. Press the On/Off button. The display reads “Off”. Press the On/Off button again, and the display reads “Making Ice”.
   A. If a service fault 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” within the ‘Before Calling For Service’ checklist on page 108.
2. Allow the ice machine to run to determine if the condition repeats.
   A. If the ice machine stops again, the condition has repeated. Call for service.
   B. If the ice machine continues to run, the condition has corrected itself. Allow the ice machine to continue running.

Component Check Procedures

Electrical Components

CONTROL BOARD, DISPLAY AND TOUCHSCREEN

FUNCTION

The control board, display and touch screen provide user input and control the ice machine sequence of operation.

NOTE: Anytime power is supplied to wires #55 & #56 on the control board, the “Display” and “Micro” lights will flash on and off. The two green lights are located on the top corner of the control board.

Display Diagnostics

Symptom - Micro light flashes and display light is off.

1. Reboot ice machine by disconnecting power for a minimum of 15 seconds, reapplying power and checking micro light for normal flashing.
2. Disconnect the display module communication cable from the control board and inspect for damaged or corroded pins. Reconnect after inspection
3. Press the power button on the display and watch the green Display light on the control board.
   A. Display light flashes - Test run ice machine.
   B. Display light is off - Replace display/touch pad assembly.

Control Board Diagnostics

1. Micro light is not flashing.
2. Disconnect line voltage power supply to the ice machine and wait a minimum of 15 seconds, then reapply power.
    A. Micro light flashes - continue with step 3.
    B. Micro light is off - Test fuse for continuity. If fuse tests good replace control board.
3. Perform a control board self-test.

- Menu / Service / Diagnostics / Control Board / Self Check

The control board performs a self test. As the test progresses the display will show pass or fail as the tests are completed.

- Status passed - The control board is functioning normally, continue with touch pad diagnostics on next page.
- Status failed - Replace control board.

Touchscreen Diagnostics

Verify touchscreen is unlocked prior to performing diagnostics.

1. Navigate to User Interface on the display and perform the on-screen instructions.

- Menu / Service / Diagnostics / User Interface.

NOTE: During screen calibration it is important to touch and hold down the cross hairs for three seconds at a time.

2. The calibration will either pass or fail. If the touchscreen fails calibration and will not function correctly in other menu functions replace the touchscreen module.

NOTE: Verify you have followed all of the instructions for screen calibration. Skipping steps will result in a failed calibration message.

Important

The ice machine can be run without a touchscreen by pressing the test button on the control board.

CONTROL BOARD RELAY TEST

The control board can be set to energize all relays for 3.5 minutes. This allows testing to verify control board relays are closed and line voltage is available for ice machine components - Water pump, dump valve, water inlet valve, harvest valve(s), air compressor(s), contactor/compressor/fan motor - The fan cycle control must close to energize the fan motor.

Press power button to turn off ice machine and navigate in menu to enable all relays.

- Menu / Service / Diagnostics / Control Board / Enable All Relays

The control board will energize all relays and the red light next to the relay. The red light indicates the relay coil is energized.

3. Test for line voltage at the individual components.
   - Line voltage is present, component non-functional - Replace component
   - Voltage is not present at the component - Proceed to step 5

Refer to wiring diagram and determine wire location on the 9 pin Molex connector for the component you are testing.

Check for line voltage at the control board 9 pin Molex connector.

- Line voltage at 9 pin connector - Repair wiring to component
- No power at 9 pin connector - Replace control board

PROGRAMMING A REPLACEMENT CONTROL BOARD

Indigo NXT™ replacement control boards require the Model number to be entered to activate the appropriate look up tables for operation and diagnostic. This can be done two different ways, USB Setup or Manual Setup.

USB Setup - Applicable when the control board is operational and has a mechanical issue such as a sticking relay. The asset data is transferred to the replacement control board from the faulty control board. Refer to page 79 “Exporting Data To A Flash Drive” before installing the replacement board.

Manual Setup - Applicable when the control board is non-operational or data from the faulty board is suspect.

Install replacement control board and reapply power.

Navigate to control board replacement and follow the on screen prompts:

- Menu / Service / Control Board Replacement.

NOTE: If a replacement control board is installed into the ice machine without a display and model number, the “Test/Display Bypass Button” push button can still activate the ice making mode without the display.

NOTE: Pressing the bypass button will allow the ice machine to temporarily run until a new display can be installed.

NOTE: Once a new display is installed, the correct model number will have to be entered into the ice machine.

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, 6.3 amp.

> **⚠Warning**
>
> High (line) voltage is applied to the control board (terminals #55 and #56) at all times. Removing the control board fuse or pressing the On/Off button will not remove the power supplied to the control board.

CHECK PROCEDURE

1. If the display is energized or the bin switch light is on with the water curtain/ice dampers closed, the fuse is good.

> **⚠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

BIN SWITCH

FUNCTION

Movement of the water curtain/ice dampers control bin switch operation. The bin switch has two main functions:

1. Terminating the Harvest cycle and returning the ice machine to the Freeze cycle. This occurs when the bin switch is opened and closed again within 30 seconds during the Harvest cycle.
2. Automatic ice machine shut-off.
   If the storage bin is full at the end of a Harvest cycle, the sheet of cubes fails to clear the water curtain/ice dampers and holds it open. After the water curtain/ice dampers are held open for 30 seconds, the ice machine shuts off. The ice machine remains off until enough ice is removed from the storage bin to allow the sheet of cubes to drop clear of the water curtain/ice dampers. As the water curtain/ice dampers swing back to the operating position, the bin switch closes and the ice machine restarts, provide the 3-minute delay has expired.

Important

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

SPECIFICATIONS

The bin switch is a magnetically operated reed switch. The magnet is attached to the lower right corner of the water curtain and both ends of ice dampers.

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

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

Bin Switch Diagnostics

SYMPTOMS

Bin Switch Fails Open

- The ice machine will not start an ice making cycle and the display indicates “Full Bin”.
- The ice machine displays “Full Bin Remove Ice” in the clean cycle.

Bin Switch Fails Closed

- When running a “Long Harvest” alert is displayed.
- May be off on a E02 Long Harvest.
- The harvest cycle continues after ice opens and closes the ice damper (harvest cycle is 3.5 minutes).
- A curtain fault is displayed in the event log.

DIAGNOSTICS

1. Verify bin switch, curtain/damper and curtain/damper magnet are in place and navigate to Inputs.

- Menu / Service / Diagnostics / Inputs

2. Open and close the ice damper(s) repeatedly while observing the display and control board lights.
    A. Curtain switch cycles open/closed - The display indicates open/closed and the control board light energizes/de-energizes - Bin switch is operating normally
    B. Curtain switch remains closed, the display indicates closed and control board light remains on - Go to step 3
    C. Curtain switch remains open, display indicates open and control board light remains off - Go to step 3
3. Disconnect bin switch wire from control board.
4. Jumper control board bin switch wire to ground, press the power button and observe the display and control board lights.
    A. Curtain switch closes, display indicates closed, control board light energizes and the ice machine starts - Replace bin switch
    B. Curtain switch remains open, display indicates open and the control board light is off - Verify procedure was correctly followed - Replace control board.

WATER LEVEL CONTROL CIRCUITRY

FUNCTION

The water level probe controls the water level by sensing whether water is or is not contacting the water level probe. The water level probe has three sensing probes. Two probes are equal in length and are used to measures conductivity for diagnostics, ice clarity and water miser options. Factory default settings measure resistance from both long probes to the short probe.

SPECIFICATIONS

Freeze Cycle Water Level Setting

The water level is not adjustable. If the water level is incorrect, check the water level probe position. Reposition or clean the probe as necessary.

Water Inlet Valve Safety Shut-Off

In the event of a water level probe failure, this feature limits the maximum amount of time the water inlet valve can remain.

SINGLE EVAPORATOR MODELS

Regardless of the water level probe input, the control board automatically shuts off the water inlet valve if it remains on for 6 continuous minutes.

Prechill & Freeze Cycle Operation

The water inlet valve energizes and de-energizes in conjunction with the water level probe located in the water trough.

- The water inlet valve is ON when there is no water in contact with the water level probes.
- The water inlet valve turns OFF after water contacts the water level probes for 6 continuous seconds.
- The water inlet valve can cycle ON and OFF once in the prechill and up to two times in the freeze cycle.
- Maximum fill time for a single evaporator 6 minutes.

The water inlet valve energizes in the Prechill cycle and will de-energize if water touches the high level probe (in most instances the water trough can't fill in the prechill cycle and the water inlet valve will remain energized into the freeze cycle). The water inlet valve will remain energized until water contacts the high water probe. The water inlet valve will cycle ON, and then OFF one more time to refill the water trough. The water inlet valve is now OFF for the duration of the freeze cycle.

REVERSE OSMOSIS OR DEIONIZED WATER USAGE

When using water with low total dissolved solid content (low TDS) the water level probe sensitivity can be increased by moving the jumper over one pin (refer to "Electronic Control Board" on page 216 for location.

The Electronic Control Board diagrams shows the default position of the jumper covering the left and center pins. Moving the jumper to the center and right pins and enabling R.O. menu "Use less water with reverse osmosis" will increase the sensitivity of the water level probe.

Diagnostics

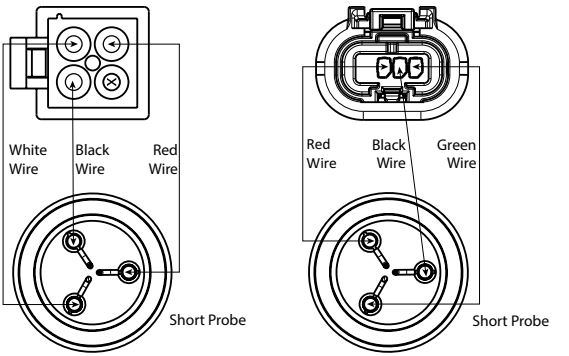
Check real time data

1. Navigate to Menu/Service/Diagnostics/Inputs
2. Focus on Water LVL Low and Water LVL High display

- Not sensing displayed: indicates not touching water.
- Sensing displayed: Indicates touching water.

NOTE: If using reverse osmosis or deionized water, increase sensitivity by moving the jumper over one pin (refer to “Electronic Control Board” on page 216) and enabling R.O. menu “Use less water with reverse osmosis”.

3. Disconnect the water level probe wiring harness from the control board and ohm harness and water level probe. Normal readings will show no resistance.



Ohm Water Level Probe and Wiring Harness

<u>WATER LEVEL PROBE CIRCUIT CHECK AT CONTROL BOARD</u>

Wait until prechill cycle starts, then jumper water level probe connections (Red/Black) on the control board.

A. Sensing displays and the water stops. Repair wire or replace water level probe.

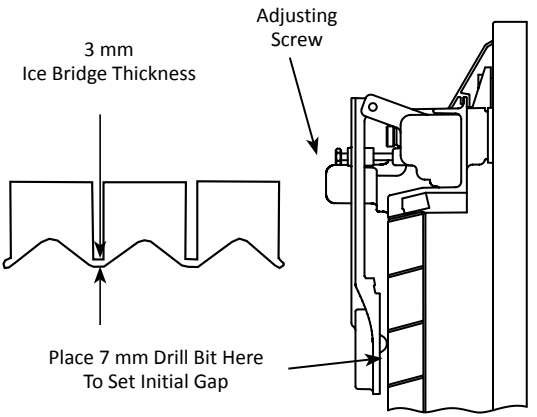
B. Not Sensing displays and the water continues to flow. Replace control board.

Ice Thickness Check

The ice thickness probe is factory-set to maintain the ice bridge thickness at 3 mm.

NOTE: Initial gap should be set with the ice machine off. Verify the water curtain/splash shields are in place when performing this check. It prevents water from splashing out of the water trough. Remove the curtain to make an adjustment, then replace immediately after the adjustment is made.

1. Inspect the bridge connecting the cubes. It should be about 3 mm thick.
2. If adjustment is necessary, turn the ice thickness probe adjustment screw clockwise to increase bridge thickness or counterclockwise to decrease bridge thickness. Set a 7 mm gap between the ice thickness probe and evaporator as a starting point. Then adjust to achieve 3 mm ice thickness.
3. Make sure the ice thickness probe wire and the bracket do not restrict movement of the probe.



ICE THICKNESS ADJUSTMENT

Ice Thickness Probe Diagnostics

Perform Control Board Self Check and ensure the internal ITP circuit passes before proceeding.

(Menu/Service/Diagnostics/Control Board/Self Check)

- Ice Thickness Circuit: Pass - Continue with step #2.
- Ice Thickness Circuit: Fail - Change control board.

Remove all ice from the evaporator when present.

Press the power button and turn off the ice machine.

Disconnect power to the ice machine at the main disconnect.

Inspect the ice thickness probe for physical damage. On the face of the probe: look for bulging or cracks around the nipple, deformed pivot pins or pivot pin arms.

Verify the ice thickness probe gap is approximately 9/32" (7 mm). Ensure the ice thickness probe wire and bracket do not restrict movement of the probe. See “Ice Thickness Check” on page 82.

Reapply power to the ice machine at the main disconnect and confirm the ice machine is off.

Navigate to Real Time data (Menu / Service / Data /Real Time data / Inputs and observe ITP FFT 100Hz & 120 Hz.

Observe the initial number range and perform a tap test.

- Remove the water curtain or splash shield if present.
- Lift the ice thickness probe and carefully tap the nipple on the face of the probe for at least 10 seconds.

NOTE: When performing tap test:

- Pass = ITP is not the problem
- Fail = Check DC Voltage on the control board

The initial numbers displayed are constantly changing and are greater than 3000.

When the initial reading is 300 or lower and the tap test reading exceeds the initial reading by 3000 or more, the ice thickness probe and control board are both operating correctly.

The initial numbers displayed do not change or initial numbers did not increase by 3000 during tap test.

- Verify the ice thickness probe connector is properly plugged into the board and the ice thickness probe wiring is correct. If the wiring is incorrect replace the ice thickness probe.

Ice Probe Connector On Control Board	
Pin 1 (+)	Red
Pin 2 (-)	Black
Pin 3	Twisted Wire

Unplug the ice thickness probe and set a VOM to DC voltage scale - Measure voltage across Pin 1 (+) Red Wire and Pin 2 (-) Black Wire. Refer to “Wiring Diagram Legend” on page 207.

Voltage measures 3.25 to 3.35 VDC- Replace ice thickness probe.

Voltage does not measure 3.25 to 3.35 VDC - Replace the control board.

BIN LEVEL PROBE

The bin level probe accessory will place the ice machine in a full bin cycle when ice lowers the temperature to 2.2°C or less. A lower ice level in dispensers will prevent overfilling or dispense wheel or motor damage.

- The bin probe reads actual temperature and must be connected to the T5 terminal on the control board.
- The control board recognizes the bin level probe automatically when installed. If the bin level probe has not been recognized by the control board, restore factory defaults and run the startup wizard.

Normal Operation

The control board will initiate a full bin cycle and a 3-minute time delay when both of the following occur:

The control board receives a temperature input of 2.2°C or less from the bin probe (T5 thermistor) at the end of the freeze cycle.

The temperature reading remains at or below 2.2°C throughout the entire harvest cycle.

The ice machine will restart when the delay period ends and the bin probe reads 2.8°C or higher. Ice making will resume at the Initial Start-Up or Start-Up After Automatic Shut-Off (See Sequence of Operation on page 87).

Bin Level Probe Troubleshooting:

Refer to normal operation before troubleshooting - The T5 thermistor reading must indicate 36°F (2°C) or less in the freeze cycle and throughout the harvest cycle to shutoff on full bin at the end of the harvest cycle.

View the T5 thermistor temperature on the touch screen (menu/service/diagnostics/temperatures).

Probe shorted - Temperature displayed is above 204.4°C:

A shorted bin level probe wire/thermistor will indicate a temperature higher than 204.4°F. This issue will result in the ice machine only stopping on full bin when the bin switch (curtain) is open at the end of a harvest cycle. The ice machine will restart when the curtain closes.

Probe open - Temperature displayed reads -25.5°C

A shorted bin level probe wire/thermistor will indicate a temperature lower than -23.3°F. This issue will result in the ice machine only stopping on full bin when the bin switch (curtain) is open at the end of a harvest cycle. The ice machine will restart when the curtain closes.

Probe out of range - Temperature reads lower or higher than the actual temperature at the bin level probe

An out of range thermistor can indicate a temperature higher or lower than the actual temperature at the bin level probe location.

Verify actual temperature at the bin level probe location with a thermometer.

Refer to “Thermistor Test” on page 167.

Thermistor Matrix

Four thermistors are standard on the ice machine. They are labeled T1, T2, T3, T4.

TEMPERATURE SENSOR LOCATION SELF CONTAINED AIR OR WATER COOLED MODELS

22" & 30" Models with 1 evaporator, 1 evaporator circuit and an air or water cooled condenser

T1 - Condenser Liquid Line

T2 - Compressor Discharge

T3 - Evaporator Inlet

T4 - Evaporator Outlet

30" & 48" Models with 1 evaporator, 2 evaporator circuits and an air or water cooled condenser

T1 - Condenser Liquid Line

T2 - Compressor Discharge

T3 - Evaporator Outlet for second evaporator circuit

T4 - Evaporator Outlet for first evaporator circuit

SYMPTOM

Alert icon on the display indicates a T1, T2, T3, or T4 fault.

CHECK PROCEDURE

From the home screen, navigate to:
Menu/Service/Data/Real Time Data/Time & Temperature

NOTE: An open thermistor will display less than -10°F (-23°C) and a shorted thermistor will display higher than 400°F (204°C)

Thermistor Test

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

Control Board Test

1. Disconnect thermistor from control board - The display temperature reading, dropping below -10°F (-23°C) indicates the control board is good.
2. Short thermistor pins - The display temperature reading increasing higher than 400°F (204°C) indicates the control board is good.

SYMPTOM

Alert icon on the display and the alert indicates a T1, T2, T3, or T4 Fault.

CHECK PROCEDURE

Navigate to Menu / Service / Data / Real Time data / Time & Temperature

NOTE: An open thermistor will display less than -10°F (-23°C) and a shorted thermistor will display higher than 400°F (204°C).

Thermistor Test

Disconnect thermistor from control board and measure resistance.

Measure temperature at the thermistor.

Compare measured resistance/temperature readings to resistance/temperature relationship chart.

Within 10% of the published resistance value - Thermistor is good

Not within 10% of the published resistance value - Thermistor is defective.

Control Board Test

Disconnect thermistor from control board - The display temperature reading, dropping below -10°F (-23°C) indicates the control board is good.

Short thermistor pins - The display temperature reading, climbing higher than 400°F (204°C) indicates the control board is good.

HIGH PRESSURE CUTOUT (HPCO) 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
24.13 bar ±0.69 (2413 kPa ±69) (350 psig ±10)	17.23 bar ±0.69 (1723 kPa ±69) (250 psig ±10)

SYMPTOM

Opening the HPCO will cause the control board to initiate a 10-minute delay after which the ice machine attempts a restart. If the HPCO is closed the ice machine will continue to run. If the HPCO remains open after the 10 minute delay or reopens when the compressor starts, the ice machine will start another 10 minute delay period.

NOTE: Machine is off and the Alert Log indicates E5 HPC Trip, the number of trips and the time and date of the last trip.

NOTE: Machine is running and the display has an alert notification - Select the Alert Log to display the fault.

CHECK PROCEDURE

Symptom #1
Machine is off, display indicates an E5 HPC Trip in the Alert Log.

Install a manifold gauge set.

Start a new freeze cycle by cycling the power button.

Run the system to see if the control trips at the rated pressure. If HPCO opens at a pressure significantly lower or higher than the control setting replace the HPCO.

If the control opens at the correct pressure find the root cause - Fan motor, dirty condenser, refrigeration system issue, etc. The ice machine will go to an initial start sequence if the HPCO is closed. If the HPCO is open, another 10 minute delay period starts. When the compressor relay closes the control board checks the HPCO.

Symptom #2
Machine is running, display has an alert indication. The display indicates an E5 HPC Trip in the Alert Log.

Open the event and view when and how often HPCO Fault has occurred.

If this is a one time event it may be intermittent and caused by conditions around the unit changing. For example: High ambient temperature, water turned off to condenser (water cooled unit) etc.

Run the system to see if the control trips at the rated pressure. If HPCO opens at a pressure significantly lower than the control setting replace the HPCO.

If the control opens at the correct pressure find the root cause - Fan motor, dirty condenser, refrigeration system issue, etc.

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

Specifications		
Model	**Cut-In (Close)**	**Cut-Out (Open)**
IP0300/IP0320 IP0500/IP0600 IP0620	17.23 bar ±0.34 (1723 kPa ±34)	15.17 bar ±0.34 (1517 kPa ±34)
IP0420 IP0800 IP1000	13.8 bar ±0.3 (1380 kPa ±30)	10.3 bar ±0.3 (1030 kPa ±30)

CHECK PROCEDURE

Verify fan motor windings are not open or grounded, and fan spins freely. Connect manifold gauge to ice machine.

Hook voltmeter in parallel across the fan cycle control, leaving wires attached. Refer to chart below:

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

HARVEST ASSIST AIR PUMP

FUNCTION

The air pump helps break the vacuum between the sheet of ice and the evaporator which results in shorter harvest cycles.

SPECIFICATIONS

115 Volt or 230 Volt - matches the ice machine voltage.

CHECK PROCEDURE

The air pump is wired in parallel with the harvest valve - Verify the ice machine is in the harvest cycle and the harvest valve is energized.

If there is voltage at the air pump connector, use a volt ohm meter to verify there is no continuity through the motor windings then replace motor.

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

Disconnect power then remove the wires from the compressor terminals.

The resistance values between C and S and between C and R, when added together, should equal the resistance value between S and R.

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.

THREE PHASE COMPRESSORS

Disconnect power and remove the wires from the compressor terminals.

The resistance values between L1 and L2, between L2 and L3, and between L3 and L1 should all be equal.

If the overload is open, there will be open readings between L1 and L2, between L2 and L3, and between L3 and L1. 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 or a mechanically seized compressor.

To determine which you have: Install high and low side gauge. Try to start the compressor. 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.

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

Disconnect wires from relay terminals.

Verify the contacts are closed.
Measure the resistance between terminals 1 and 2. No continuity indicates open contacts. Replace the relay.

Check the relay coil.
Measure the resistance between terminals 2 and 5. No resistance indicates an open coil. Replace the relay.

PTCR

The PTCR allows current to flow through the start winding at compressor startup. Current flow heats the ceramic discs in the PTCR. The electrical resistance increases with temperature and stops all except a trickle of current flow through the start winding. The small flow of current keeps the PTCR hot (260°F/127°C) and the start winding out of the circuit.

The PTCR must be cooled before attempting to start the compressor, otherwise the PTCR will heat up too quickly and stop current flow through the start winding before the compressor motor reaches full speed.

⚠Warning

Disconnect electrical power to the entire ice machine at the building electrical disconnect box before proceeding.

If a PTCR is dropped, internal damage can occur to the ceramic PTCR discs. The ceramic disc can chip and cause arcing which leads to PTCR failure. Since there is no way to open the PTCR in order to determine if the ceramic disc is chipped or not, it must be discarded when dropped.

Flammable Refrigerant Procedures

SERVICING REQUIREMENTS

- This equipment must be installed in accordance with the ASHRAE 15 Safety Standard for Refrigeration Systems.
- This equipment can not be installed in corridors or hallways of public buildings. Installation must comply with all applicable fire and health codes with the authority having jurisdiction.
- To minimize the risk of ignition due to improper parts or service procedures, only refrigeration technicians with flammable refrigerant training are allowed to service or dispose of equipment containing hydrocarbon refrigerants.
- All replacement parts must be like components obtained from the equipment manufacturers authorized replacement part network.
- An accessible Class B 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 operate per detector manufacturers instruction.
- Color-coded red process tubes indicate use of a flammable refrigerant - Process tube color coding must be maintained and visible after brazing or other service procedures.
- 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.
- The filter drier must be replaced whenever the system is opened to the atmosphere.
- All lockout and tag out procedures must be followed when working on this equipment.

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.

FLAMMABLE REFRIGERANT CHARGING

Due to the small refrigerant quantities, a cap tube in the 0.50" to 0.85" 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.

14. Invert the charging bottle, and place on a scale capable of reading grams and ounces.
15. 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.

16. 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.
17. Press the power button.

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

18. 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.
19. Use a pinch-off tool on the access fitting and remove temporary access valves and seal the refrigeration system.

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 harmful levels of contamination are suspected, perform the following procedure.

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 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.

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, 0.35 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, 0.35 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.
    E. 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 and inspect the refrigeration lines. If burnout deposits are found, install a new harvest valve, replace the manifold strainer, TXV and harvest pressure regulating valve.
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 required 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, 0.35 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, 0.35 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.

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, 0.7 bar), the filter-drier should be adequate for complete cleanup.
    B. If the pressure drop exceeds 1 psig (7 kPa, 0.7 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.

LIQUID LINE FILTER-DRIERS

The filter-driers used on Manitowoc ice machines are manufactured to Manitowoc specifications and have an access fitting for charging with refrigerant. A Manitowoc drier also 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 high moisture and acid removal capability.

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.

Important

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

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 (air cooled only)
- Water regulating valve (water cooled only)
- High pressure cut-out control
- High side service valve

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. 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.

Cut the tubing of the defective component with a small tubing cutter.

3. Solder the replacement component in place. Allow the solder joint to cool.
4. Remove the pinch-off tool.
5. Re-round the tubing. The pressure control will operate normally once the tubing is re-rounded. Tubing may not re-round 100%.

Recovered refrigerant must come from a “contaminant-free” system. To decide whether the system is contaminant free, consider:

- Type(s) of previous failure(s)
- Whether the system was cleaned, evacuated and recharged properly following failure(s).
- Whether the system has been contaminated by this failure.
- Compressor motor burnouts and improper past service prevent refrigerant re-use.

Refer to “Determining Severity Of Contamination” on page 182 to test for contamination.

6. “Substitute” or “Alternative” Refrigerant
   - Must use only Manitowoc-approved alternative refrigerants.
   - Must follow Manitowoc-published conversion procedures.

Self-Contained Model Procedure

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

Important

Manitowoc 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 after recovering the refrigerant and 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 local rules and regulations.

Make these connections:

- Suction side of the compressor through the suction access valve.
- Discharge side of the compressor through the discharge access valve.
- Liquid side through the liquid line drier.

Self-Contained Recovery/Evacuation

Press the power button and cycle the ice machine off.

Install manifold gauge, scale and recovery unit or two-stage vacuum pump and open high, low and charging ports.

Perform either recovery or evacuation:

Recovery:
Operate the recovery unit as directed by the manufacturer's instructions.

Evacuation prior to recharging:
Pull the system down to 500 microns. Then, allow the pump to run for an additional half hour. Turn off the pump and perform a standing vacuum leak check.

Follow the Charging Procedures as directed in "Self-Contained Model Procedure" on page 190.

TOTAL SYSTEM REFRIGERANT CHARGE

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 these pages.

Self-Contained Air & Water Cooled

Model	Refrigerant Type	Air Cooled	Water Cooled
IP0300	R290	3.5 oz (110 g)	---
IP0320	R290	4.6 oz (130 g)	---
IP0420	R290	8.5 oz (240 g)	---
IP0500	R290	8.8 oz (250 g)	---
IP0600	R290	8.0 oz (226 g)	11.6 oz (330 g)
IP0620	R290	8.1 oz (230 g)	9.2 oz (260 g)
IP0800	R290	17.1 oz (486 g)	15.5 oz (440 g)
IP1000	R290	15.9 oz (450 g)	15.9 oz (450 g)

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.

- Production and cycle times are for dice cube - Half dice cube cycle times can be 2 - 3 minutes faster, depending on model and ambient temperature.
- Regular cube production derate is 7%.
- 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 mis-diagnosis.
- Discharge and suction pressure are highest at the beginning of the cycle. Suction pressure will drop throughout the cycle. Verify the pressures are within the range indicated.
- Record beginning of freeze cycle suction pressure one minute after water pump energizes.
- 50 Hz dice and half dice production derate is 12%.
- 50 Hz regular cube total production derate is 14%.

IP0300 SERIES

IP0300A

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
21°C	11.1 - 11.7	11.8 - 13.3	13.7 - 13.9	0.5 - 1.5
27°C	12.3 - 13.0	12.7 - 14.1	13.7 - 15.0	
32°C	13.2 - 13.5	14.0 - 15.4	16.0 - 16.3	
38°C	15.1 - 15.3	16.0 - 17.2	15.9 - 17.9	
43°C	15.6 - 16.8	19.1 - 19.7	18.0 - 19.4	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
21°C	135 kgs	122 kgs	116 kgs
27°C	125 kgs	114 kgs	108 kgs
32°C	119 kgs	108 kgs	99 kgs
38°C	105 kgs	98 kgs	91 kgs
43°C	97 kgs	85 kgs	85 kgs

1 Ice slab weight of one harvest cycle = 1.1 kgs to 1.3 kgs

OPERATING PRESSURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Pressure bar	Suction Pressure bar [1]	Discharge Pressure bar	Suction Pressure bar
10°C	41 - 79	-7 - 10	38 - 80	-2 - 9
21°C	41 - 70	-8 - 11	32 - 70	-2 - 10
27°C	40 - 77	-4 - 13	33 - 77	-2 - 13
32°C	42 - 85	-5 - 15	36 - 86	3 - 16
43°C	55 - 104	-4 - 19	45 - 92	9 - 24

1 Suction pressure drops gradually throughout the freeze cycle

IP0320 SERIES - BEFORE 2025

IP0320A

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
21°C	13.1 - 15.2	15.7 - 18.2	16.6 - 19.3	1.0 - 2.5
27°C	15.7 - 18.2	17.3 - 20.1	18.9 - 21.9	
32°C	18.1 - 21.0	20.3 - 23.5	21.3 - 24.6	
38°C	21.3 - 24.6	23.0 - 26.6	24.3 - 28.1	
43°C	24.3 - 28.1	26.5 - 30.6	28.2 - 32.5	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
21°C	152 kgs	129 kgs	122 kgs
27°C	129 kgs	118 kgs	109 kgs
32°C	122 kgs	118 kgs	98 kgs
38°C	97 kgs	91 kgs	79 kgs
43°C	86 kgs	79 kgs	75 kgs

1 ice slab weight of one harvest cycle = 1.1 kgs to 1.3 kgs

OPERATING PRESSURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG [1]	Discharge Pressure PSIG	Suction Pressure PSIG
10°C	60 - 68	7 - 3	38 - 54	11 - 6
21°C	63 - 71	10 - 6	41 - 63	11 - 7
27 °C	66 - 82	16 - 7	49 - 66	13 - 8
32 °C	71 - 88	18 - 8	60 - 66	16 - 9
38 °C	82 - 99	24 - 12	63 - 82	20 - 12
43 °C	88 - 104	26 - 13	66 - 85	22 - 13

1 Suction pressure drops gradually throughout the freeze cycle

IP0420 SERIES

IP0420A

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
21°C	9.9 - 10.4	10.4 - 12.2	13.1 - 15.3	1.0 - 2.5
27°C	9.9 - 11.6	11.4 - 13.3	13.6 - 15.8	
32°C	10.7 - 12.5	13.6 - 15.8	13.8 - 16.1	
38°C	12.1 - 14.1	13.8 - 16.1	14.3 - 16.6	
43°C	12.9 - 15.0	14.0 - 16.3	14.8 - 17.2	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
21°C	213 kgs	186 kgs	152 kgs
27°C	195 kgs	195 kgs	147 kgs
32°C	181 kgs	181 kgs	145 kgs
38°C	163 kgs	163 kgs	141 kgs
43°C	154 kgs	154 kgs	136 kgs

1 Ice slab weight of one harvest cycle = 1.5 to 1.8 kgs

OPERATING PRESSURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Pressure bar	Suction Pressure bar [1]	Discharge Pressure bar	Suction Pressure bar
10°C	9.7 - 14.5	1.3 - 2.9	6.5 - 7.6	4.1 - 5.5
21°C	10.0 - 15.2	1.4 - 3.1	6.5 - 7.6	4.1 - 5.5
27°C	11.7 - 15.5	1.5 - 3.1	6.9 - 7.9	4.1 - 5.9
32°C	10.3 - 15.9	1.7 - 3.4	7.2 - 8.3	4.1 - 5.9
38°C	10.7 - 16.2	1.8 - 3.4	7.2 - 8.3	4.5 - 6.2
43°C	10.7 - 16.5	1.9 - 3.6	7.6 - 8.6	4.8 - 6.5

1 Suction pressure drops gradually throughout the freeze cycle

IP0500 SERIES - AFTER 2025

IP0500A

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
21°C	13.6 - 15.5	15.5 - 17.7	16.4 - 18.7	1 - 2.5
27°C	15.5 - 17.7	16.2 - 18.5	17.4 - 19.9	
32°C	16.2 - 18.5	16.9 - 19.3	19.2 - 21.9	
38°C	17.4 - 19.9	19.2 - 21.9	21.3 - 24.3	
43°C	18.9 - 21.5	21.0 - 23.9	23.5 - 26.8	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
21°C	200 kgs	177 kgs	168 kgs
27°C	177 kgs	170 kgs	159 kgs
32°C	170 kgs	163 kgs	145 kgs
38°C	159 kgs	145 kgs	132 kgs
43°C	147 kgs	134 kgs	120 kgs

1 Ice slab weight of one harvest cycle = 2.1 to 2.4 kgs

OPERATING TEMPERATURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Temp (°C) T2	Suction Temp (°C) T4	Discharge Temp (°C) T2	Suction Temp (°C) T4
10°C	57 - 74	9 - 4	52 - 38	2 - 7
21°C	60 - 77	10 - 6	54 - 41	2 - 7
27°C	66 - 88	16 - 10	54 - 63	3 - 10
32°C	77 - 93	18 - 11	54 - 66	7 - 13
38°C	88 - 107	19 - 17	60 - 79	9 - 18
43°C	93 - 110	19 - 18	63 - 82	10 - 18

IP0500 SERIES - BEFORE 2025

IP0500A

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
21°C	13.6 - 15.5	15.5 - 17.7	16.4 - 18.7	1 - 2.5
27°C	15.5 - 17.7	16.2 - 18.5	17.4 - 19.9	
32°C	16.2 - 18.5	16.9 - 19.3	19.2 - 21.9	
38°C	17.4 - 19.9	19.2 - 21.9	21.3 - 24.3	
43°C	18.9 - 21.5	21.0 - 23.9	23.5 - 26.8	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °F/°C [1 2]		
	50/10	70/21	90/32
21°C	200 kgs	177 kgs	168 kgs
27°C	177 kgs	170 kgs	159 kgs
32°C	170 kgs	163 kgs	145 kgs
38°C	159 kgs	145 kgs	132 kgs
43°C	147 kgs	134 kgs	120 kgs

1 Ice slab weight of one harvest cycle = 1.5-1.7 kgs

OPERATING TEMPERATURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Temp (°C) T2	Suction Temp (°C) T4	Discharge Temp (°C) T2	Suction Temp (°C) T4
10°C	135 - 165	18 - 40	125 - 100	35 - 45
21°C	140 - 170	50 - 42	130 - 105	35 - 45
27°C	150 - 190	60 - 50	130 - 145	38 - 50
32°C	170 - 200	65 - 52	130 - 150	45 - 55
43°C	190 - 225	66 - 63	140 - 175	48 - 65
110/43	200 - 230	66 - 64	145 - 180	50 - 65

1 Suction pressure drops gradually throughout the freeze cycle

IP0600 SERIES

IP0600A

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
10°C	9.4 - 9.5	11.2 - 11.3	11.8 - 12.2	0.5 - 1.5
21°C	10.2 - 10.4	10.9 - 11.1	11.9 - 12.0	
27°C	10.3 - 10.5	11.8 - 12.2	12.6 - 12.7	
32°C	11.2 - 11.4	12.5 - 12.6	14.2 - 14.9	
43°C	12.9 - 13.1	13.8 - 14.0	15.9 - 16.2	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
10°C	285 kgs	254 kgs	241 kgs
21°C	281 kgs	264 kgs	247 kgs
27°C	279 kgs	246 kgs	235 kgs
32°C	257 kgs	235 kgs	206 kgs
43°C	230 kgs	214 kgs	191 kgs

1 Ice slab weight of one harvest cycle = 1.9 kgs to 2.2 kgs

OPERATING TEMPERATURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Temp (°C) T2	Suction Temp (°C) T4	Discharge Temp (°C) T2	Suction Temp (°C) T4
10°C	39 - 55	-7 - 25	37 - 53	-5 - 5
21°C	41 - 56	-4 - 25	40 - 56	0 - 9
27°C	45 - 62	4 - 19	44 - 62	4 - 10
32°C	50 - 70	-2 - 19	50 - 70	5 - 14
43°C	65 - 88	1 - 24	62 - 89	10 - 23

IP0600W

Self-Contained Water-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
10°C	9.8 - 10.0	10.8 - 11.1	11.8 - 12.2	0.5 - 1.0
21°C	9.8 - 9.9	10.9 - 11.1	11.9 - 12.3	
27°C	10.0 - 10.2	11.2 - 11.4	12.3 - 12.5	
32°C	10.1 - 10.3	11.3 - 11.4	12.5 - 12.6	
43°C	10.1 - 10.3	11.6 - 11.9	12.5 - 12.9	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
10°C	290 kgs	267 kgs	242 kgs
21°C	288 kgs	261 kgs	245 kgs
27°C	286 kgs	263 kgs	240 kgs
32°C	280 kgs	262 kgs	235 kgs
43°C	277 kgs	255 kgs	231 kgs

1 Ice slab weight of one harvest cycle = 1.9 kgs to 2.2 kgs

OPERATING TEMPERATURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Temp (°C) T2	Suction Temp (°C) T4	Discharge Temp (°C) T2	Suction Temp (°C) T4
10°C	44 - 61	-8 - 16	42 - 60	1 - 10
21°C	43 - 62	-6 - 18	43 - 62	3 - 12
27°C	43 - 61	-0 - 22	43 - 62	6 - 14
32°C	43 - 62	-3 - 20	41 - 60	7 - 15
43°C	46 - 66	-5 - 19	46 - 66	4 - 13

1 Suction pressure drops gradually throughout the freeze cycle
2 Water regulating valve set to maintain 11.7 bar
3 Condenser Water Usage = 193 liters/45.5 kgs of ice

IP0620 SERIES

IP0620A

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
10°C	8.3 - 8.6	9.2 - 9.4	9.8 - 10.0	1.0 - 2.0
21°C	8.7 - 8.8	9.5 - 10.0	10.3 - 10.6	
27°C	9.4 - 9.5	10.9 - 11.0	11.0 - 11.2	
32°C	9.9 - 10.0	13.8 - 14.0	12.0 - 12.4	
43°C	10.6 - 11.0	12.0 - 12.6	12.8 - 13.3	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
10°C	237 kgs	212 kgs	198 kgs
21°C	225 kgs	208 kgs	197 kgs
27°C	214 kgs	199 kgs	184 kgs
32°C	201 kgs	184 kgs	171 kgs
43°C	198 kgs	162 kgs	160 kgs

1 Ice slab weight of one harvest cycle = 1.5 to 1.8 kgs

OPERATING TEMPERATURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Temp (°C) T2	Suction Temp (°C) T4	Discharge Temp (°C) T2	Suction Temp (°C) T4
10°C	52 - 69	4 - 25	53 - 67	-2 - 5
21°C	51 - 59	2 - 22	51 - 61	-1 - 5
27°C	60 - 68	4 - 27	61 - 69	2 - 16
32°C	69 - 77	4 - 31	69 - 78	4 - 20
43°C	85 - 95	10 - 39	84 - 95	10 - 29

IP0620W

Self-Contained Water-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
10°C	9.3 - 9.7	10.5 - 10.8	11.8 - 12.3	1.0 - 1.5
21°C	9.2 - 9.9	10.5 - 10.9	11.4 - 11.6	
27°C	9.2 - 9.8	10.9 - 11.1	11.9 - 12.1	
32°C	9.2 - 9.4	10.4 - 10.6	11.4 - 11.5	
43°C	9.1 - 9.9	10.4 - 10.7	11.4 - 11.7	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
10°C	235 kgs	216 kgs	196 kgs
21°C	232 kgs	217 kgs	195 kgs
27°C	233 kgs	213 kgs	193 kgs
32°C	229 kgs	209 kgs	189 kgs
43°C	219 kgs	207 kgs	189 kgs

1 Ice slab weight of one harvest cycle = 1.5 to 1.8 kgs

OPERATING TEMPERATURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Temp (°C) T2	Suction Temp (°C) T4	Discharge Temp (°C) T2	Suction Temp (°C) T4
10°C	54 - 65	-8 - 19	53 - 65	1 - 11
21°C	56 - 67	-6 - 15	56 - 67	2 - 11
27°C	57 - 68	-5 - 18	58 - 67	3 - 12
32°C	58 - 68	-4 - 17	59 - 68	3 - 12
43°C	60 - 70	-1 - 20	61 - 70	6 - 14

1 Suction pressure drops gradually throughout the freeze cycle
2 Water regulating valve set to maintain 11.7 bar
3 Condenser Water Usage = 538-608 liters/45.5 kgs of ice

IP0800 SERIES

IP0800A

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
10°C	9.5 - 10.2	10.0 - 11.1	10.5 - 12.5	1.0 - 2.5
21°C	9.9 - 11.8	10.2 - 11.5	11.0 - 12.9	
27°C	10.2 - 12.2	11.7 - 13.0	12.0 - 13.5	
32°C	11.5 - 12.8	12.0 - 14.2	12.5 - 14.7	
43°C	12.3 - 13.5	13.3 - 15.5	15.1 - 16.6	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
10°C	318 kgs	299 kgs	281 kgs
21°C	315 kgs	293 kgs	280 kgs
27°C	312 kgs	297 kgs	278 kgs
32°C	311 kgs	293 kgs	273 kgs
43°C	309 kgs	289 kgs	276 kgs

1 Ice slab weight of one harvest cycle = 1.9 kgs to 2.2 kgs

OPERATING PRESSURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Pressure bar	Suction Pressure bar [1]	Discharge Pressure bar	Suction Pressure bar
10°C	9.0 - 14.8	1.0 - 2.4	5.2 - 7.2	3.1 - 3.8
21°C	12.1 - 12.8	1.0 - 2.6	5.2 - 7.2	3.1 - 3.8
27°C	12.1 - 12.8	1.0 - 2.8	6.9 - 7.9	3.4 - 4.1
32°C	12.4 - 13.1	1.2 - 2.6	7.9 - 9.3	3.4 - 4.5
38°C	12.4 - 13.1)	1.2 - 2.6	10.3 - 12.4	4.1 - 6.5
43°C	17.9 - 19.6)	1.4 - 3.4	11.0. - 13.4	4.3 - 6.9

1 Suction pressure drops gradually throughout the freeze cycle

IP0800W

Self-Contained Water-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
10°C	10.2 - 12.0	11.2 - 13.0	12.6 - 14.1	1.0 - 2.5
21°C	10.5 - 12.2	11.4 - 13.5	12.7 - 14.2	
27°C	10.7 - 12.3	11.5 - 13.7	13.1 - 14.8	
32°C	10.9 - 12.5	12.0 - 14.0	13.3 - 15.2	
43°C	11.0 - 12.7	12.8 - 14.2	13.6 - 15.9	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
10°C	318 kgs	299 kgs	281 kgs
21°C	315 kgs	293 kgs	280 kgs
27°C	312 kgs	297 kgs	278 kgs
32°C	311 kgs	293 kgs	273 kgs
43°C	309 kgs	289 kgs	276 kgs

1 Ice slab weight of one harvest cycle = 1.9 kgs to 2.2 kgs

OPERATING PRESSURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Pressure bar	Suction Pressure bar [1]	Discharge Pressure bar	Suction Pressure bar
10°C	12.1 - 12.8	1.0 - 2.0	5.2 - 7.6	3.4 - 4.1
21°C	12.1 - 12.8	1.0 - 2.1	5.5 - 7.2	3.4 - 4.1
27°C	12.1 - 12.8	1.1 - 2.3	5.5 - 7.2	3.4 - 4.1
32°C	12.4 - 13.1	1.2 - 2.4	5.5 - 7.6	3.4 - 4.5
38°C	12.4 - 13.1	1.2 - 2.6	5.5 - 7.9	3.4 - 4.5
43°C	12.4 - 13.1	1.2 - 2.6	5.5 - 7.9	3.4 - 4.5

1 Suction pressure drops gradually throughout the freeze cycle
2 Water regulating valve set to maintain 11.7 bar
3 Condenser Water Usage = 510 liters/45.5 kgs of ice

IP1000 SERIES

IP1000A

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
10°C	9.8 - 11.4	10.4 - 12.7	13.0 - 14.2	1.0 - 2.5
21°C	10.3 - 12.2	12.5 - 13.9	12.2 - 14.7	
27°C	11.9 - 12.7	13.2 - 14.3	13.6 - 15.1	
32°C	12.5 - 13.5	14.0 - 15.1	14.8 - 17.8	
43°C	13.0 - 15.7	15.3 - 18.1	18.0 - 19.5	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
10°C	493 kgs	477 kgs	446 kgs
21°C	490 kgs	460 kgs	437 kgs
27°C	464 kgs	439 kgs	423 kgs
32°C	455 kgs	431 kgs	406 kgs
43°C	437 kgs	407 kgs	382 kgs

1 Ice slab weight of one harvest cycle = 2.8 kgs to 3.3 kgs

OPERATING PRESSURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Pressure bar	Suction Pressure bar [1]	Discharge Pressure bar	Suction Pressure bar
10°C	10.0 - 14.1	10.0 - 14.1	5.5 - 6.9	3.8 - 4.5
21°C	10.3 - 14.1	10.3 - 14.1	5.5 - 7.2	3.8 - 4.5
27°C	10.7 - 14.5	10.7 - 14.5	5.9 - 7.6	3.8 - 4.7
32°C	13.4 - 14.8	13.4 - 14.8	1.2 - 2.8	4.7 - 5.1
38°C	15.9 - 17.9	15.9 - 17.9	1.4 - 2.9	5.0 - 5.6
43°C	16.2 - 18.6	16.2 - 18.6	1.4 - 3.1	5.2 - 5.9

1 Suction pressure drops gradually throughout the freeze cycle

IP1000W

Self-Contained Water-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temperature Around the Ice Machine	Freeze Time			Harvest Time [1]
	Water Temperature			
	10°C	21°C	32°C	
10°C	9.5 - 10.4	10.5 - 11.6	11.6 - 12.7	1.0 - 2.5
21°C	9.9 - 10.8	11.0 - 12.1	11.9 - 12.9	
27°C	10.0 - 10.9	11.2 - 12.3	12.0 - 13.1	
32°C	10.1 - 11.0	11.4 - 12.5	12.1 - 13.3	
43°C	10.3 - 11.2	11.5 - 12.7	12.2 - 13.5	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temperature Entering Condenser	Water Temperature °C [1]		
	10°C	21°C	32°C
10°C	485 kgs	460 kgs	426 kgs
21°C	483 kgs	450 kgs	423 kgs
27°C	479 kgs	449 kgs	413 kgs
32°C	479 kgs	444 kgs	415 kgs
43°C	474 kgs	446 kgs	417 kgs

1 Ice slab weight of one harvest cycle = 2.8 kgs to 3.3 kgs

OPERATING PRESSURES

Air Temp Entering Condenser	Freeze Cycle		Harvest Cycle	
	Discharge Pressure bar	Suction Pressure bar [1]	Discharge Pressure bar	Suction Pressure bar
10°C	12.1 - 12.8	1.2 - 2.2	4.8 - 8.3	3.1 - 4.1
21°C	12.1 - 12.8	1.2 - 2.2	4.8 - 8.3	3.1 - 4.1
27°C	12.1 - 12.8	1.4 - 2.3	5.2 - 8.6	3.3 - 4.3
32°C	12.4 - 13.1	1.5 - 2.5	5.2 - 8.6	3.6 - 4.5
38°C	12.4 - 13.1	1.5 - 2.5	5.5 - 9.0	3.7 - 4.7
43°C	12.4 - 13.1	1.9 - 3.1	5.5 - 9.0	4.0 - 4.8

1 Suction pressure drops gradually throughout the freeze cycle
2 Water regulating valve set to maintain 11.7 bar
3 Condenser Water Usage = 475 liters/45.5 kgs of ice

Diagrams

Wiring Diagrams

The following pages contain electrical wiring diagrams. Be sure you are referring to the correct diagram for the ice machine you are servicing.

> **⚠Warning**
>
> Always disconnect power before working on electrical circuitry.

Some components are wired differently on energy efficient machines. Please verify your model number (see “Model Nomenclature” on page 22) to reference the correct diagrams.

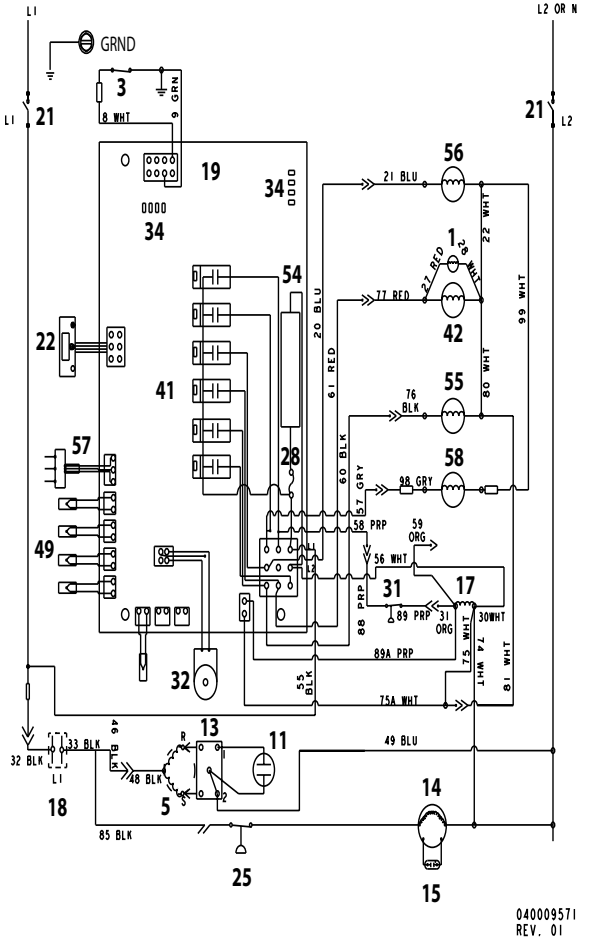
WIRING DIAGRAM LEGEND

The following symbols are used on all of the wiring diagrams:

*	Internal Compressor Overload (Some models have external compressor overloads)
**	Fan Motor Run Capacitor (Some models do not incorporate fan motor run capacitor)
( )	Wire Number Designation (The number is marked at each end of the wire)
—>>—	Multi-Pin Connection (Electrical Box Side) —>>— (Compressor Compartment Side)

IP0300

1 Ph - Self Contained Air-cooled Model

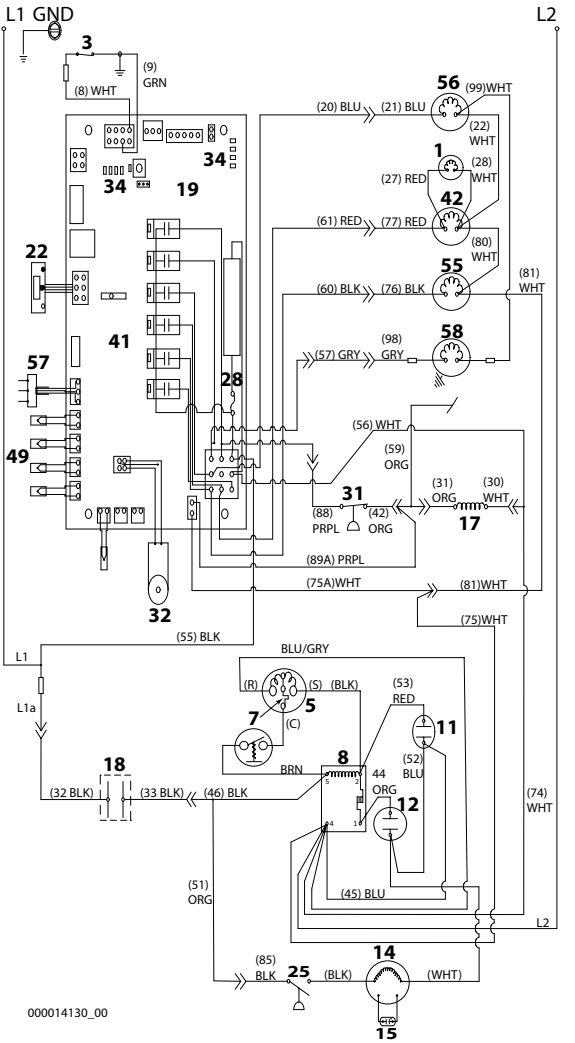


IP0300

Number	Component
1	Air Pump Harvest Assist
3	Bin Switch
5	Compressor
7	Compressor Overload (230/50-60/1 is internal)
8	Compressor Potential Relay
11	Compressor Run Capacitor
12	Compressor Start Capacitor
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts Note: Must be enclosed in sealed box)
19	Control Board
22	Touchscreen
25	Fan Cycle Control
28	Fuse
31	High Pressure Cutout
32	Ice Thickness Probe
34	LED
41	See Control Board Schematic For Detail
42	Solenoid Valve - Harvest Left Hand
49	Thermistors
55	Water Dump Valve
56	Water Inlet Valve
57	Water Level Probe
58	Water Pump
	Wire Colors
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

IP0320/IP0500 - BEFORE 2025

Self Contained Air-cooled & Water-cooled Models

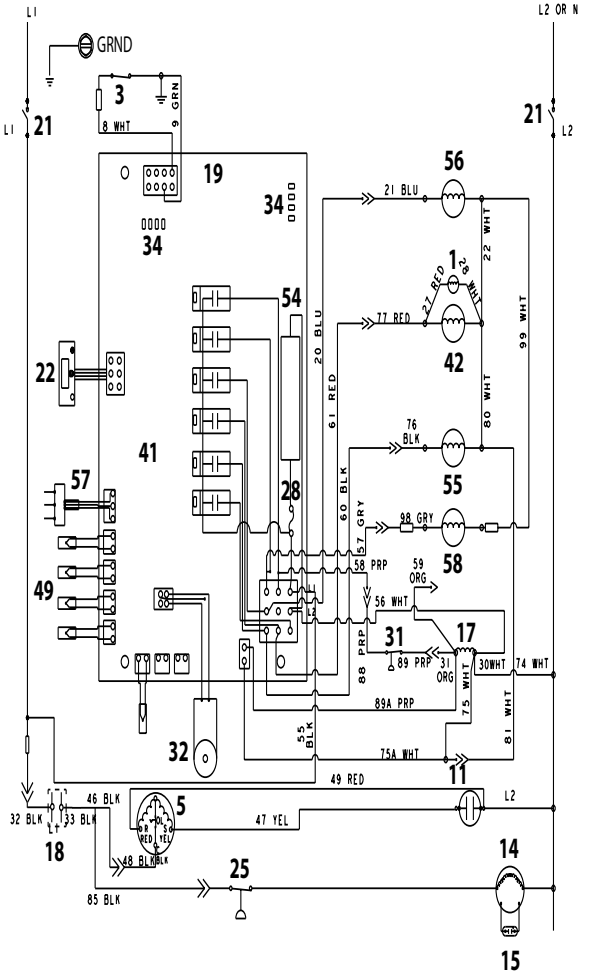


IP0320/IP0500 - BEFORE 2025

Number	Component
1	Air Pump Harvest Assist
3	Bin Switch
5	Compressor
7	Compressor Overload
9	Compressor PTCR
11	Compressor Run Capacitor
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
22	Touchscreen
25	Fan Cycle Control
28	Fuse
31	High Pressure Cutout
32	Ice Thickness Probe
34	LED
41	See Control Board Schematic For Detail
42	Solenoid Valve - Harvest Left Hand
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55	Water Dump Valve
56	Water Inlet Valve
57	Water Level Probe
58	Water Pump
	Wire Colors
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

IP0420/IP0500/IP0600/IP0620/IP0800

Self Contained Air-cooled & Water-cooled Models



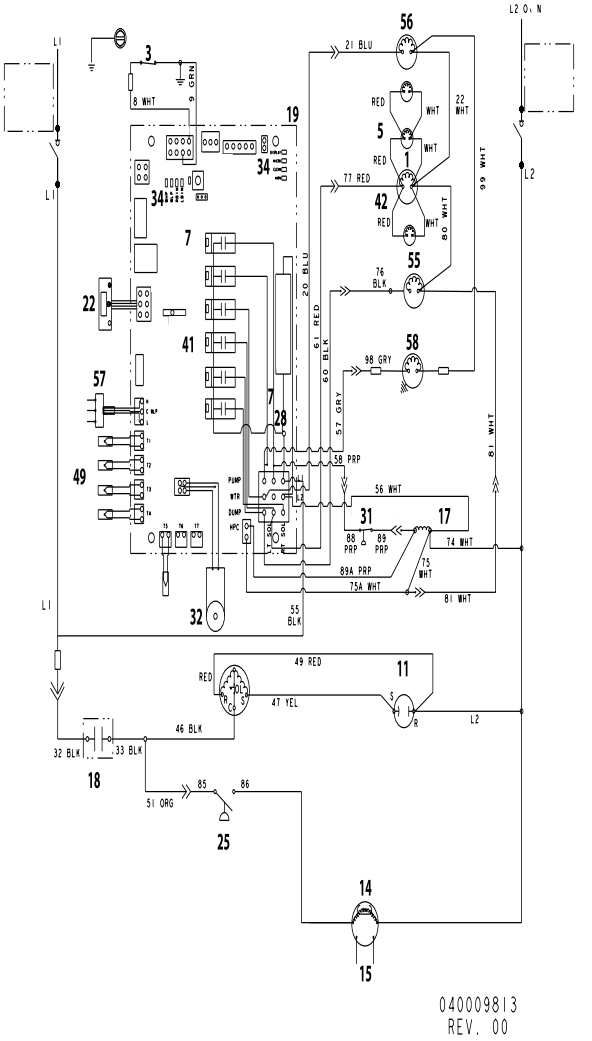
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IP0420/IP0500/IP0600/IP0620/IP0800

Number	Component
1	Air Pump Harvest Assist
3	Bin Switch
5	Compressor
7	Compressor Overload
9	Compressor PTCR
11	Compressor Run Capacitor
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
22	Touchscreen
25	Fan Cycle Control
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34	LED
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58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

IP1000

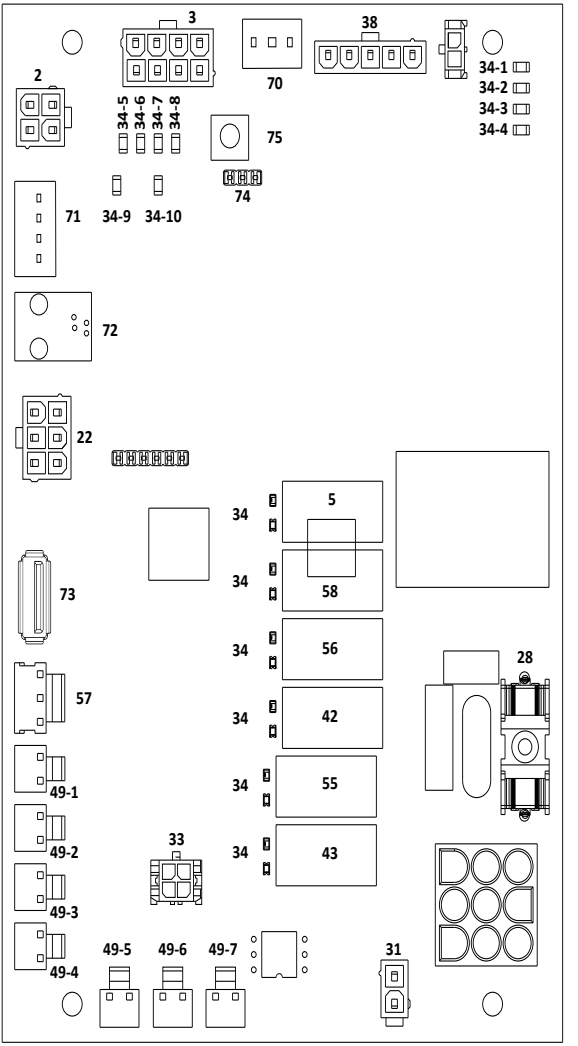
Self Contained Air-cooled & Water-cooled Models



IP1000

Number	Component
1	Air Pump Harvest Assist
3	Bin Switch
5	Compressor
7	Compressor Overload
9	Compressor PTCR
11	Compressor Run Capacitor
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
22	Touchscreen
25	Fan Cycle Control
28	Fuse
31	High Pressure Cutout
32	Ice Thickness Probe
34	LED
41	See Control Board Schematic For Detail
42	Solenoid Valve - Harvest Left Hand
49	Thermistors
55	Water Dump Valve
56	Water Inlet Valve
57	Water Level Probe
58	Water Pump
	Wire Colors
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

ELECTRONIC CONTROL BOARD

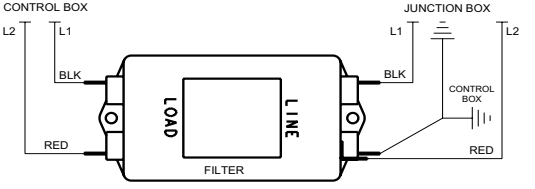


Electronic Control Board

Number	Description
2	iAuCs
3	Bin Switch
5	Compressor Contactor Coil Relay
22	Touchscreen
28	Fuse
31	High Pressure Cutout
33	Ice Thickness Probe
34	LED - Relays
34-1	LED - Display
34-2	LED - Micro
34-2	LED - Clean
34-4	LED - Harvest
34-5	LED - Ice Thickness Probe
34-6	LED - High Water Probe
34-7	LED - Low Water Probe
34-8	LED - Display Bypass Is Active
34-9	LED - Right Bin Switch
34-10	LED - Left Bin Switch
38	LuminIce
42	Relay Solenoid Valve - Harvest Left Hand
43	Relay Solenoid Valve - Harvest Right Hand
49-1	Thermistor T1 Liquid Line Temperature
49-2	Thermistor T2 - Discharge Line Temperature
49-3	Thermistor T3 - Evaporator Inlet Temperature Single Evaporator models - Evaporator Outlet Temperature Dual Evaporator Models
49-4	Thermistor T4 - Evaporator Outlet Temperature
49-5	Thermistor T5 - Bin Level Probe
49-6	Thermistor T6 - Potable water Temperature
49-7	Thermistor T7 - Ambient Air Temperature
55	Relay Water Dump Valve
56	Relay Water Inlet Valve
57	Water Level Probe
58	Relay Water Pump
70	RS232 Communication Port
71	RS485 Communication Port
72	12VDC Power Supply
73	USB Connector
74	Reverse Osmosis/De-ionized Water Usage Jumper
75	Test/Display Bypass Button

ELECTRICAL NOISE FILTER

Filter is installed to the incoming line voltage power supply on Korean models.



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