Manitowoc



Indigo™ Series Ice Machines With R290 Refrigerant

Technician's Handbook

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

America's #1 Selling Ice Machine

Part Number STH038 05/12

Safety Notices

As you work on Manitowoc 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.

Throughout this handbook, you will see the following types of safety notices:

⚠ Warning

Text in a Warning box alerts you to a potential personal injury situation. Be sure to read the Warning statement before proceeding, and work carefully.

⚠ Caution

Text in a Caution box alerts you to a situation in which you could damage the equipment. Be sure to read the Caution statement before proceeding, and work carefully.

Procedural Notices

As you work on Manitowoc equipment, be sure to read the procedural notices in this handbook. These notices supply helpful information which may assist you as you work.

Throughout this handbook, you will see the following types of procedural notices:

Important

Text in an Important box provides you with information that may help you perform a procedure more efficiently. Disregarding this information will not cause damage or injury, but it may slow you down as you work.

NOTE: Text set off as a Note provides you with simple, but useful, extra information about the procedure you are performing.

Read These Before Proceeding:

⚠ Caution

Proper installation, care and maintenance are essential for maximum performance and trouble-free operation of your Manitowoc equipment. If you encounter problems not covered by this manual, do not proceed, contact Manitowoc Foodservice Group. We will be happy to provide assistance.

⚠ Caution

Proper installation, care and maintenance are essential for maximum performance and trouble-free operation of your equipment. Visit our website www.manitowocfsg.com for manual updates, translations, or contact information for service agents in your area.

Important

Routine adjustments and maintenance procedures outlined in this handbook are not covered by the warranty.

⚠ Warning

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.

⚠ Warning

Do not use electrical appliances or accessories other than those supplied by Manitowoc for your ice machine model.

⚠ Warning

Two or more people or a lifting device are required to lift this appliance.

⚠ Warning

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.

⚠ Warning

Do not damage the refrigeration circuit when installing, maintaining or servicing the unit.

⚠ Warning

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 this appliance.

⚠ Warning

All covers and access panels must be in place and properly secured, before operating this equipment.

⚠ Warning

Do not obstruct machine vents or openings.

⚠ Warning

Do not store gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.

⚠ Warning

Do not clean with water jet.

⚠ Warning

It is the responsibility of the equipment owner to perform a Personal Protective Equipment Hazard Assessment to ensure adequate protection during maintenance procedures.

⚠ Warning

Two or more people are required to move this equipment to prevent tipping.

⚠ Warning

Some 50 hz models may contain up to 150 grams of R290 (propane) refrigerant. R290 (propane) is flammable in concentrations of air between approximately 2.1% and 9.5% by volume (LEL lower explosion limit and UEL upper explosion limit). An ignition source at a temperature higher than 470°C is needed for a combustion to occur. Refer to nameplate to identify the type of refrigerant in your equipment. Only trained and qualified personnel aware of the dangers are allowed to work on the equipment.

⚠ Warning

When using electric appliances, basic precautions must always be followed, including the following:

a. Read all the instructions before using the appliance.
b. To reduce the risk of injury, close supervision is necessary when an appliance is used near children.
c. Do not contact moving parts.
d. Only use attachments recommended or sold by the manufacturer.
e. Do not use outdoors.
f. For a cord-connected appliance, the following must be included:
   - Do not unplug by pulling on cord. To unplug, grasp the plug, not the cord.
   - Unplug from outlet when not in use and before servicing or cleaning.
   - Do not operate any appliance with a damaged cord or plug, or after the appliance malfunctions or is dropped or damaged in any manner. Contact the nearest authorized service facility for examination, repair, or electrical or mechanical adjustment.
g. Follow applicable lock out tag out procedures before working on equipment.
h. Connect to a properly grounded outlet only.

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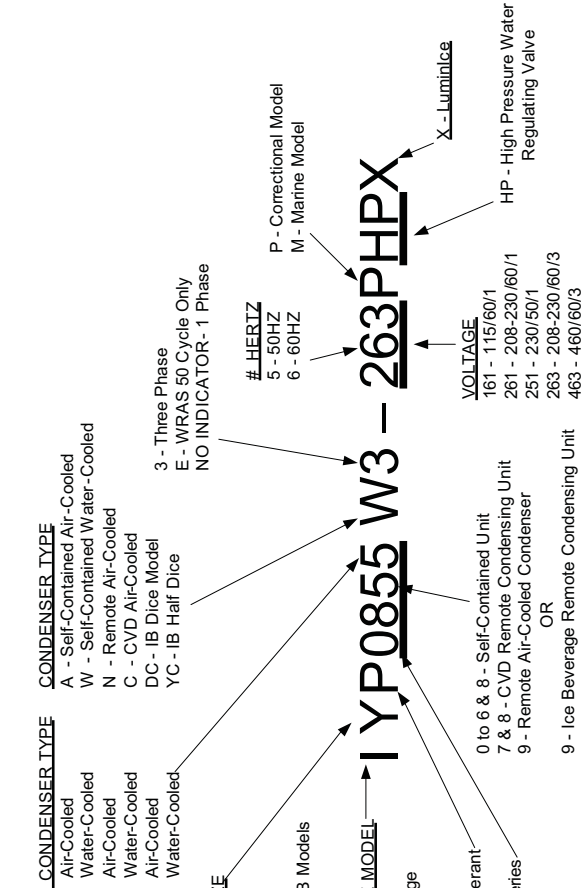
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How to Read a Model Number



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 are listed on the OWNER WARRANTY REGISTRATION CARD. They are also listed on the MODEL/SERIAL NUMBER DECAL affixed to the front and rear of the ice machine.

Ice Machine Warranty Information

OWNER WARRANTY REGISTRATION CARD

Warranty coverage begins the day the ice machine is installed.

Important

Complete and mail the OWNER WARRANTY REGISTRATION CARD as soon as possible to validate the installation date.

If the OWNER WARRANTY REGISTRATION CARD is not returned, Manitowoc will use the born on date recorded in the control board or the date of sale to the Manitowoc Distributor as the first day of warranty coverage for your new ice machine.

COMMERCIAL WARRANTY COVERAGE

Manitowoc Ice, (hereinafter referred to as the “COMPANY”) warrants for a period of thirty-six months from the installation date (except as limited below) that new ice machines manufactured by the COMPANY shall be free of defects in material or workmanship under normal and proper use and maintenance as specified by the COMPANY and upon proper installation and start-up in accordance with the instruction manual supplied with the ice machine.

The COMPANY'S warranty hereunder with respect to the compressor shall apply for an additional twenty-four months, excluding all labor charges, and with respect to the evaporator for an additional twenty-four months, including labor charges.

The obligation of the COMPANY under this warranty is limited to the repair or replacement of parts, components, or assemblies that in the opinion of the COMPANY are defective. This warranty is further limited to the cost of parts, components or assemblies and standard straight time labor charges at the servicing location. Time and hourly rate schedules, as published from time to time by the COMPANY, apply to all service procedures.

Additional expenses including without limitation, travel time, overtime premium, material cost, accessing or removal of the ice machine, or shipping are the responsibility of the owner, along with all maintenance, adjustments, cleaning, and ice purchases.

Labor covered under this warranty must be performed by a COMPANY Contracted Service Representative or a refrigeration service agency as qualified and authorized by the COMPANY'S local Distributor.

The COMPANY'S liability under this warranty shall in no event be greater than the actual purchase price paid by customer for the ice machine.

The foregoing warranty shall not apply to (1) any part or assembly that has been altered, modified, or changed; (2) any part or assembly that has been subjected to misuse, abuse, neglect, or accidents; (3) any ice machine that has been installed and/or maintained inconsistent with the technical instructions provided by the COMPANY; or (4) any ice machine initially installed more than five years from the serial number production date. This warranty shall not apply if the Ice Machine's refrigeration system is modified with a condenser, heat reclaim device, or parts and assemblies other than those manufactured by the COMPANY, unless the COMPANY approves these modifications for specific locations in writing.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR GUARANTEES OF ANY KIND, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

In no event shall the COMPANY be liable for any special, indirect, incidental or consequential damages. Upon the expiration of the warranty period, the COMPANY'S liability under this warranty shall terminate. The foregoing warranty shall constitute the sole liability of the COMPANY and the exclusive remedy of the customer or user.

To secure prompt and continuing warranty service, the warranty registration card must be completed and sent to the COMPANY within five (5) days from the installation date.

To obtain warranty service or information regarding your Product, please contact us at:

MANITOWOC ICE

2110 So. 26th St. P.O. Box 1720,

Manitowoc, WI 54221-1720

Telephone: 920-682-0161 Fax: 920-683-7585

www.manitowocice.com

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Installation

⚠ Caution

The ice machine head section must be protected if it will be subjected to temperatures below 0°C (32°F). Failure caused by exposure to freezing temperatures is not covered by the warranty. See “Removal from Service/Winterization” page 36.

⚠ Warning

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

⚠ Warning

Some 50 hz models may contain up to 15 grams of R290 (propane) refrigerant. R290 (propane) is flammable in concentrations of air between approximately 2.1% and 9.5% by volume (LEL lower explosion limit and UEL upper explosion limit). An ignition source at a temperature higher than 470°C is needed for a combustion to occur. Refer to nameplate to identify the type of refrigerant in your equipment. Only trained and qualified personnel aware of the dangers are allowed to work on the equipment.

Location of Ice Machine

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

- The location must be free of airborne and other contaminants.
- Air temperature - Minimum 1.6°C maximum 43°C.
- Ice Making Water Inlet - Water Pressure must be at least 1.38 bar, but must not exceed 5.52 bar.
- The location must not be near heat-generating equipment or in direct sunlight and protected from weather.
- The location must not obstruct air flow through or around the ice machine. Refer to chart for clearance requirements.
- The ice machine must be protected if it will be subjected to temperatures below 0°C. Failure caused by exposure to freezing temperatures is not covered by the warranty. See “Removal from Service/Winterization”.

⚠ Warning

Do not obstruct machine vents or openings.

Clearance Requirements

I0320	Self-Contained Air-Cooled
Top/Sides	305 mm
Back	127 mm

I0500	Self-Contained Air-Cooled
Top/Sides	203 mm
Back	127 mm

Ice Machine Heat of Rejection

Series Ice Machine	Heat of Rejection	
	Air Conditioning*	Peak
I0320	3800	6000
I0500	6100	6900

*BTU/Hour
Because the heat of rejection varies during the ice making cycle, the figure shown is an average.

ICE DEFLECTOR

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 for any bin without a deflector. Align sides and back of ice machine with sides and back of bin, when placing ice machine on bin.

⚠ Warning

Do not operate any ice machine with the deflector removed.

INSTALLATION ON A DISPENSER

No deflector is needed for machines that match the size of the dispenser unless required by the dispenser manufacturer. Adapters are required when a smaller ice machine is going on a larger dispenser. Align sides and back of ice machine with sides and back of dispenser/adapter, when placing ice machine on dispenser.

Electrical Requirements

Voltage

The maximum allowable voltage variation is +10/-0% of the rated voltage on the ice machine model/serial number plate at start-up (when the electrical load is highest).

Fuse/Breaker

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

Total Circuit Ampacity

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

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

⚠ Warning

All wiring must conform to local, state and national codes and the appliance must be grounded.

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Maintenance

Cleaning 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.

Clean and sanitize the ice machine every six months for efficient operation. If the ice machine requires more frequent cleaning 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 cleaning and sanitizing.

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

⚠ 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 Cleaner and Sanitizer for this application (Manitowoc Cleaner part number 94-0546-3 and Manitowoc Sanitizer part number 94-0565-3). 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. Do not 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.

CLEANING/SANITIZING PROCEDURE

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

- The ice machine and bin must be disassembled cleaned and sanitized.
- All ice produced during the cleaning and sanitizing procedures must be discarded.
- Removes mineral deposits from areas or surfaces that are in direct contact with water.

PREVENTATIVE MAINTENANCE CLEANING PROCEDURE

- This procedure cleans all components in the water flow path, and is used to clean the ice machine between the bi-yearly cleaning/sanitizing procedure.

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.

The exterior panels have a clear coating that is stain resistant and easy to clean. 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.

Cleaning / Sanitizing Procedure

⚠ Caution

Use only Manitowoc approved Ice Machine Cleaner and Sanitizer for this application (Manitowoc Cleaner part number 94-0546-3 and Manitowoc Sanitizer part number 94-0565-3). 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.

CLEANING PROCEDURE

⚠ 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.

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

NOTE: Although not required and dependant 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 clean/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.

Step 2 Remove all ice from the bin/dispenser.

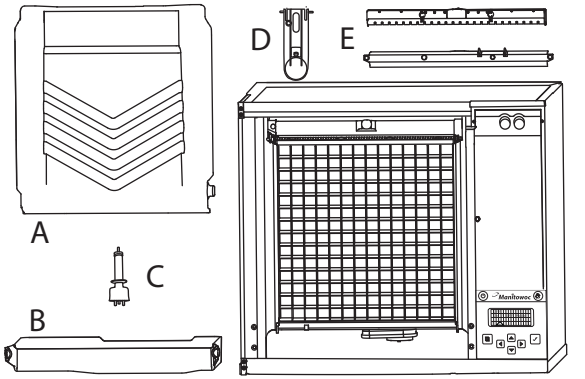
Step 3 Press the clean switch. Water will flow through the water dump valve and down the drain. Wait until the water trough refills and the display indicates “Add Chemical” (approximately 1 minute), then add the proper amount of ice machine cleaner.

Model	Amount of Cleaner
I0320	90 ml (3 oz)
I0500	150 ml (5 oz)

Step 4 Wait until the clean 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.

Step 6 Mix a solution of cleaner 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 clean all parts.

Solution Type	Water	Mixed With
Cleaner	4 L (1 gal)	500 ml (16 oz) cleaner

Step 7 Use 1/2 of the cleaner/water mixture to clean all components. The cleaner 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 clean the parts. Soak parts for 5 minutes (15 - 20 minutes for heavily scaled parts). Rinse all components with clean water.

Step 8 While components are soaking, use 1/2 of the cleaner/water solution to clean all food zone surfaces of the ice machine and bin (or dispenser). Use a nylon brush or cloth to thoroughly clean 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	12 L (3 gal)	60 ml (2 oz) 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 Wait until the water trough refills and the display indicates “Add Chemical” (approximately 1 minute). Add the proper amount of Manitowoc Ice Machine Sanitizer to the water trough by pouring between the water curtain and evaporator.

Model	Amount of Sanitizer
I0320	90 ml (3 oz)
I0500	90 ml (3 oz)

Step 16 Select “Auto Ice - on”, press the checkmark and close and secure the front door. The ice machine will automatically start ice making after the sanitize cycle is complete (approximately 24 minutes).

Ice Thickness Probe & Water Level Probe

Clean the probes using the following procedure.

1. Mix a solution of Manitowoc ice machine cleaner and water 60 ml (2 oz) of cleaner to 500 ml (16 oz) of water in a container.
2. Soak probes in container of cleaner/water solution while disassembling and cleaning water circuit components (soak probes for 10 minutes or longer).
3. Clean all probe surfaces including all plastic parts (do not use abrasives). Verify all surfaces are clean. Thoroughly rinse probes with clean water.
4. Reinstall probe, then sanitize the ice machine and bin/dispenser interior surfaces.

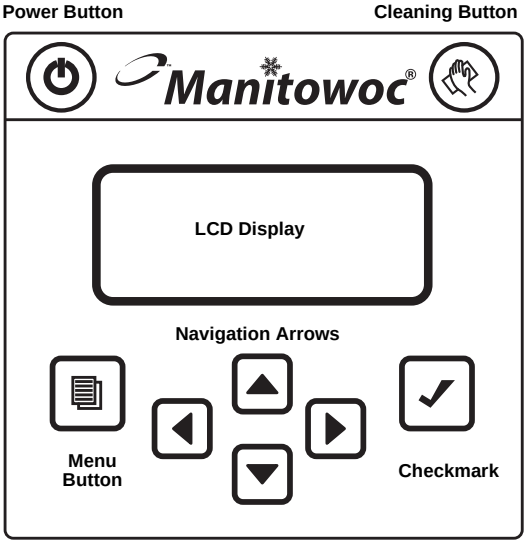
Removal from Service/Winterization

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 0°C (32°F) or below.

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

1. Press the power button.
2. Disconnect the electric power at the circuit breaker or the electric service switch.
3. Turn off the water supply.
4. Remove the water from the water trough.
5. Disconnect and drain the incoming ice-making water line at the rear of the ice machine.
6. Energize the ice machine and wait one minute for the water inlet valve to open.
7. 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.
8. Make sure water is not trapped in any of the water lines, drain lines, distribution tubes, etc.



Operation

Control Panel Features

The control panel offers a series of pressure sensitive buttons and a four-line interactive display panel.

BUTTONS

Power Button: Powers the ice machine when in the On/Off Mode. The ice machine can also be programmed to automatically power on and off in two Energy Saver modes.

Cleaning Button: Initiates a cleaning cycle. Refer to the *Maintenance* section for details.

Menu Button: Moves the display from the Home Screen, where ice machine status, alerts and messages are viewed, to the Main Menu, where machine information and its event log can be accessed, machine and Energy Saver settings can be adjusted, and service issues can be addressed.

Left and Right Arrows: The Left arrow moves the display to the previous screen, allowing the user to "back out" of programming. Both the Left and Right arrows will move the cursor (underline) within a line of settings. NOTE: The Right arrow can also be used on many screens interchangeably with the checkmark to make a selection.

Up and Down Arrows: Move the highlight [brackets] up one line or down one line.

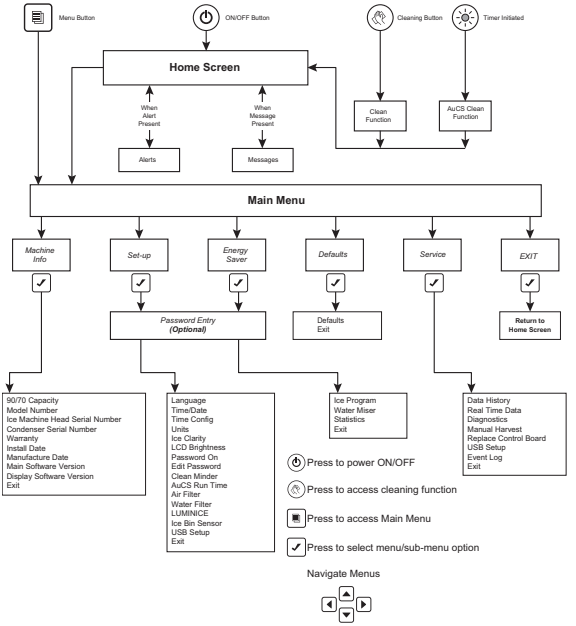
Checkmark: Makes a selection and/or moves to the next screen (or line).

DISPLAY PANEL

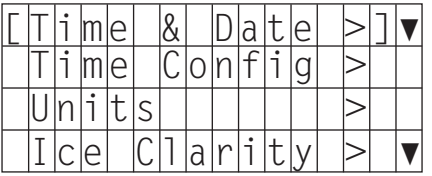
The LCD display panel is 16 characters wide and four lines deep. During ice machine operation and cleaning cycles, the Home screen's top three lines provide valuable status information and the fourth line shows alerts and messages. In programming, four lines of the current screen are displayed and highlights, arrows, cursor and selections inform the user of available actions.

Menu Navigation Overview

Indigo™ Models - Menu Navigation Overview

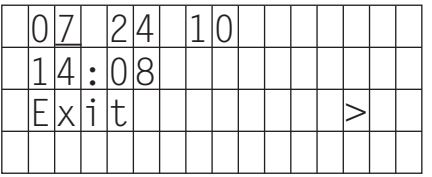


Display Panel Navigation

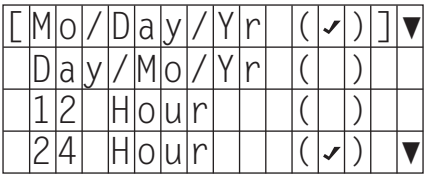


Highlights: Brackets indicate if a line on the screen is “highlighted” or actionable. Move the brackets from line to line using the Down or Up arrow. Move the brackets down from the fourth line to view more of the menu displayed.

Arrows: Two kinds of arrows give cues to additional information. “>” symbols show that another screen is available by pressing Checkmark while a line is highlighted. “▼” and “▲” symbols indicate the limits of the screen viewed. NOTE: Another cue to the length of a menu screen is that Exit is the last item.



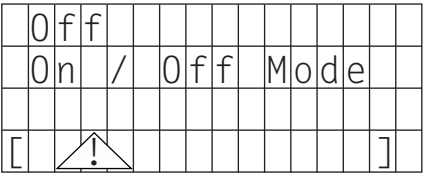
Cursor: A cursor (underline) is used within lines where actual settings can be adjusted. In these screens, use the Up and Down arrows to make changes to the value underlined. Move the cursor from digit to digit using the Right and Left arrows. Use the Checkmark to move the cursor down one line. Exit and re-enter the screen to start again at the top.



Selections: When parentheses ( ) appear, they indicate a selection is available by pressing Checkmark while the line is highlighted. If the choice is exclusive, selecting it with the Checkmark will uncheck another selection. That is, in the above Time Config example, selecting Day/Mo/Yr will deselect Mo/Day/Yr.

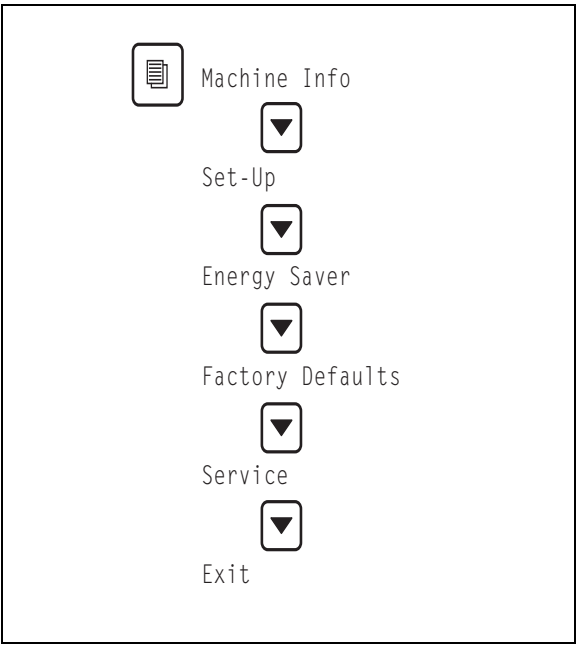
Alerts and Messages

When messages and alerts exist, they will be highlighted and can be selected with the Left arrow. Alerts displayed will have priority over messages.



For example, if alerts are appearing in the fourth line of the display:

1. Press the Left arrow. A list of alerts will appear in the display.
2. Choose the alert you wish to address by moving the highlight brackets with the Down arrow.
3. Press Checkmark again. A screen appears with the date, time and total number of times an alert has occurred. Pressing the Down arrow will list some possible causes for the alert. At the bottom of the screen you will be able to clear the alert by pressing the Checkmark.
4. Return to the Home screen by selecting Exit and pressing the Checkmark.



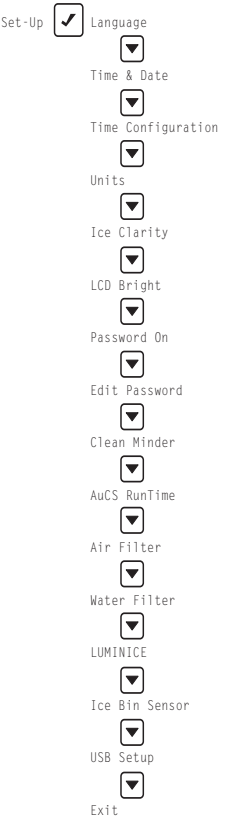
Main Menu

Main Menu

From the Home screen, press the Menu button to enter the Main menu, where you can choose to see machine information, make setup changes, set the Energy Saver mode, or enter the Service Menu.

Machine Info Menu

From the Main menu, ensure that Machine Info is highlighted and press the Checkmark to view a list including capacity, model number, IMH (Ice Machine Head) serial number, condenser serial number, warranty, installation date, date of manufacture and software version. Use the Down arrow to highlight an item and use the Checkmark to view the information. Press the Left arrow to return to previous screens.



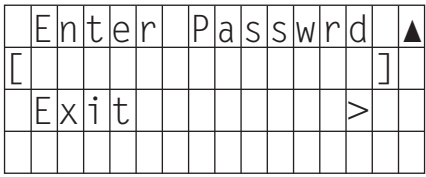
Set-Up Menu

Password Entry

A password is not required, although a password can be turned on to prevent unauthorized control setting modification. You can use the Factory Default Password of “1234” or enter a four digit custom pin number of your choosing.

To turn on the password feature use the following procedure.

1. Press the Menu button.
2. From the Main menu, use the Down arrow to highlight Set-Up and press the Right arrow.
3. Use the Down arrow to highlight Password ON and press the Right arrow.
4. Press the Right arrow again with Enter Passwrd highlighted and an icon will flash.
5. Use the Up & Down arrows to enter the factory password (1, 2, 3, 4). Enter the number 1 in the flashing icon (first digit of the factory password).
6. Press the right arrow to move to the next cell and use the Up & Down arrows to add the number 2. Repeat this process to add 3 & 4.
7. When the last number is entered press the Checkmark button to save your entry.



To enter a four digit password of your choosing use the following procedure.

1. Press the Menu button.
2. From the Main menu, use the Down arrow to highlight Set-Up and press the Right arrow.
3. Use the Down arrow to select Edit Passwrd and press the Right arrow.
4. Using the Up & Down arrows, enter the first digit of the factory password in the flashing icon.
5. Press the right arrow to move to the next cell and use the Up & Down arrows to add the number 2. Repeat this process to add 3 & 4.
6. When the last number is entered press the Checkmark button.
7. Follow steps 4 & 5 and enter your 4 digit password.
8. When the last number is entered press the Checkmark button to save your entry.

RESET PASSWORD TO FACTORY DEFAULTS

The password can be reset to the factory defaults when required. The default factory password is 1234. To reset the ice machine to factory defaults use the following procedure.

1. Press the Menu button.
2. From the Main menu, use the Down arrow to highlight Defaults.
3. Press the Checkmark button two times to reset the ice machine. The display will return to the Set-Up menu and the defaults listed below will be in effect. Refer to Set-Up Menu to adjust settings.

Setting	Default
Language	English
Time/Date	Month/Day/Year/Time
Time Configuration	Mo/Day/Yr/24 Hour
Units	Fahrenheit/Lbs/Gallons
Ice Clarity	Off
LCD Brightness	Level 2
Password On	Off - Enter Password Default Password = 1234
Edit Password	Off - Edit password
Clean Minder	Off
AuCS RunTime	Off
Air Filter Minder	Off
Water Filter Minder	Off
LuminIce Bulb Minder	No
Ice Bin Sensor	Off

Set-Up Menu

From the Main menu, use the Down arrow to navigate to Set-Up and press the Checkmark. Select and customize machine settings on this menu. Press the Left arrow to return to previous screens.

LANGUAGE

1. From the Set-Up menu, use the Down arrow to highlight Language.
2. Press the Checkmark. You can choose to view the display in a language other than English, by highlighting your choice and pressing the Checkmark. Selecting one language will deselect the others.
3. When the check reflects your preference, use the Down arrow to navigate to Exit and press the Checkmark. The display will return to the Set-Up menu.

TIME & DATE

When the ice machine is installed, the correct time and date needs to be set for its location.

[	M	o	/	D	a	y	/	Y	r		(	✓	)	]	▼
	D	a	y	/	M	o	/	Y	r		(		)		
	1	2		H	o	u	r				(		)		
	2	4		H	o	u	r				(	✓	)		▼

Set the Time and Date

1. Press the Menu button.
2. Press the Down arrow until Set-Up is highlighted [bracketed].
3. Press the Checkmark. The Set-Up menu will be displayed. Use the Down arrow to highlight Time & Date.

4. Press the Checkmark. The date will appear on the first line of the display (Mo/Day/Yr) and the time will appear on the second line (24 Hour). The month will have a blinking cursor.
5. Using the Up or Down arrow, adjust the month, if necessary.
6. When the correct month appears, use the Right arrow to move the blinking cursor to day.
7. Using the Up or Down arrow, adjust the day, if necessary.
8. When the correct day appears, use the Right arrow to move the blinking cursor to year.
9. Using the Up or Down arrow, adjust the year, if necessary.
10. When the correct year appears, press the Checkmark. Use the Right arrow to move the blinking cursor to hour.
11. Using the Up or Down arrow, adjust the hour, if necessary.
12. When the correct hour appears, use the Right arrow to move the blinking cursor to minutes.
13. Using the Up or Down arrow, adjust the minutes, if necessary.
14. When the correct minutes appear, press the Checkmark twice.

TIME CONFIGURATION

1. From the Set-Up menu, use the Down arrow to highlight Time Config.
2. Press the Checkmark. On this screen, you can choose whether the date will be displayed as Mo/Day/Yr or Day/Mo/Yr by highlighting your choice and pressing the Checkmark. Selecting one will deselect the other.
3. You can also choose whether the time will be displayed as 12 Hour or 24 Hour by highlighting your choice and pressing the Checkmark. Selecting one will deselect the other.
4. When the two checks reflect your preference, use the Down arrow to navigate to Exit and press the Checkmark. The display will return to the Set-Up menu.

UNITS

1. From the Set-Up menu, use the Down arrow to highlight Units.
2. Press the Checkmark. On this screen, you can choose whether the ice machine will display measurements in Celsius or Fahrenheit, kilograms or pounds, and gallons or liters by highlighting your choice of each pair and pressing the Checkmark. Selecting one of each pair will deselect the other. Make sure to navigate with the Down arrow to make all three choices.
3. When the three checks reflect your preferences, use the Down arrow to navigate to Exit and press the Checkmark. The display will return to the Set-Up menu.

ICE CLARITY

In areas with poor potable water quality, the ice machine may produce cloudier ice. Setting Ice Clarity to ON will add additional water during the freeze cycle to dilute the water that contains a high content of dissolved solids in the water trough. This feature decreases production and increases water usage. A water filter is recommended to produce the highest quality ice while maintaining the least expensive mode of operation.

1. From the Set-Up menu, use the Down arrow to highlight Ice Clarity.
2. Press the Checkmark. On this screen, you can choose to turn the ice clarity feature ON or OFF by highlighting your choice and pressing the Checkmark. Selecting one will deselect the other.
3. When the check reflects your preference, use the Down arrow to navigate to Exit and press the Checkmark. The display will return to the Set-Up menu.

LCD BRIGHTNESS

Here, the brightness of the LCD display can be adjusted.

1. From the Set-Up menu, use the Down arrow to highlight LCD Bright.
2. Press the Checkmark. You will see one of four checkmarks indicating the brightness levels of the display. Level 1 is one checkmark, level 2 is two checkmarks, Level 3 is three checkmarks, etc.
3. Use the Up and Down arrows to select your preference.
4. When the checkmarks reflect your preference, press the Checkmark. The display will return to the Set-Up menu.

PASSWORD ON

A password can be added to prevent unauthorized changes to ice machine settings.

1. From the Set-Up menu, use the Down arrow to highlight Password On.
2. Enter the password and press the Checkmark.
3. Press the Left arrow to return to previous screens and to the Set-Up menu.

EDIT PASSWORD

The password can be changed on this screen.

1. From the Set-Up menu, use the Down arrow to highlight Edit Passwrd.
2. Press the Checkmark and confirm current password.
3. Enter new password and press the Checkmark.
4. Press the Left arrow to return to previous screens and to the Set-Up menu.

CLEAN MINDER

Clean Minder is a feature that displays a cleaning reminder at a set time interval.

1. From the Set-Up menu, use the Down arrow to highlight Clean Minder.
2. Press the Checkmark. On this screen, you can choose to turn the reminder ON or OFF by highlighting your choice and pressing the Checkmark. Selecting one will deselect the other.
3. You can also choose the time interval from this screen by highlighting Set Interval and pressing the Checkmark.
4. Press the Left arrow to return to previous screens and to the Set-Up menu.

AUCS RUNTIME

Automatic Cleaning System is an optional accessory and will perform a cleaning cycle at a set time interval.

1. From the Set-Up menu, use the Down arrow to highlight AuCS RunTime.
2. Press the Checkmark. On this screen, you can choose to turn the feature ON or OFF by highlighting your choice and pressing the Checkmark. Selecting one will deselect the other.
3. You can also choose the time interval from this screen by highlighting Set Interval and pressing the Checkmark.
4. Press the Left arrow to return to previous screens and to the Set-Up menu.

AIR FILTER

The ice machine has a feature that displays a clean air filter reminder at a set time interval.

1. From the Set-Up menu, use the Down arrow to highlight Air Filter.
2. Press the Checkmark. On this screen, you can choose to turn the reminder to AUTO or OFF by highlighting your choice and pressing the Checkmark. Selecting one will deselect the other.
3. You can also choose the time interval from this screen by highlighting Set Interval and pressing the Checkmark.
4. Press the Left arrow to return to previous screens and to the Set-Up menu.

WATER FILTER

The ice machine has a feature that displays a replace water filter reminder at a set time interval.

1. From the Set-Up menu, use the Down arrow to highlight Water Filter.
2. Press the Checkmark. You can record the filter type on this screen by highlighting Filter Type and pressing the Checkmark.
3. After making your selection, press the Left arrow to return to the previous screen.
4. On this screen, you can also choose to turn the reminder to AUTO or OFF by highlighting your choice and pressing the Checkmark. Selecting one will deselect the other.
5. You can further choose the time interval from this screen by highlighting Set Interval and pressing the Checkmark.
6. Press the Left arrow to return to previous screens and to the Set-Up menu.

LUMINICE™ REMINDER

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.

The LuminIce is a feature that displays a reminder to change its bulb every 12 months.

1. From the Set-Up menu, use the Down arrow to highlight LuminIce.
2. Press the Checkmark. On this screen, you can choose to turn the reminder to AUTO or OFF by highlighting your choice and pressing the Checkmark. Selecting one will deselect the other.
3. When the check reflects your preference, use the Down arrow to navigate to Exit and press the Checkmark. The display will return to the Set-Up menu.

USB SETUP

Refer to “Upgrading Firmware with a Flash Drive” and “Exporting Data to a Flash Drive” for more information on this setting. Flash drives must be correctly sized and formatted - 2 gigabytes or smaller, Fat 32 file system, 512 allocation units - Refer to page 71 for full specification and formatting details.

FACTORY DEFAULTS

The entire setup can be reset to the factory defaults.

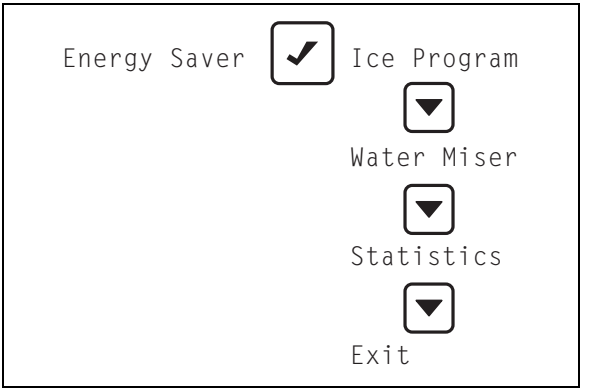
1. From the Set-Up menu, use the Down arrow to highlight Defaults.
2. Press the Checkmark two times to reset the ice machine. The display will return to the Set-Up menu.

Setting	Default
Language	English
Time/Date	Month/Day/Year/Time
Time Configuration	Mo/Day/Yr/24 Hour
Units	Fahrenheit/Lbs/Gallons
Ice Clarity	Off
LCD Brightness	Level 2
Password	Off - Enter Password Default Password = 1234
Edit Password	Off - Edit Password
Clean Minder	Off
AuCS RunTime	Off
Air Filter Minder	Off
Water Filter Minder	Off
LuminIce Bulb Minder	No
Ice Bin Sensor	Off

NOTE: For more details and instructions for changing ice machine settings, see “Set-Up Menu”.

Energy Saver Menu

From the Main menu, use the Down arrow to navigate to Energy Saver and press the Checkmark. Set up an energy saving ice program, enable the Water Miser and view usage statistics from this menu. Press the Left arrow to return to previous screens.



Energy Saver Menu

ICE PROGRAM

To save energy and water, the ice machine can be programmed to only power up during time periods that the ice will be used or when the bin level is being depleted by heavy use.

Important

Setting an ice program will take the ice machine out of the On/Off Mode and the Power button will be disabled.

1. In the Energy Saver menu, ensure that Ice Program is highlighted.
2. Press the Checkmark. On this screen, you can choose to turn on the time program (Time Prog) or the bin level program (Bin Level) by highlighting your choice and pressing the Checkmark. Selecting one will deselect the other. If one of them is selected and you wish to turn both off, highlight the choice and press Checkmark again.
3. If neither of the programs is selected, highlighting Next and pressing the Checkmark will simply return to the top of this screen. If one of the programs is selected, highlight Next and press the Checkmark to return to the top of this screen. NOTE: For details on how to use the cursor for the time program, refer to “Display Panel Navigation” in this section.
4. Select Exit to return to previous screens and again to the Energy Saver menu.

WATER MISER

Water Miser is a feature that reduces water usage by eliminating flush cycles. Enabling this feature is only recommended for systems with de-ionized or reverse osmosis filtering.

1. From the Energy Saver menu, use the Down arrow to highlight Water Miser.
2. Press the Checkmark. On this screen, you can choose to turn the Water Miser ON or OFF by highlighting your choice and pressing the Checkmark. Selecting one will deselect the other.

NOTE: Settings will not be saved if the Checkmark is not pressed after choosing On or Off.

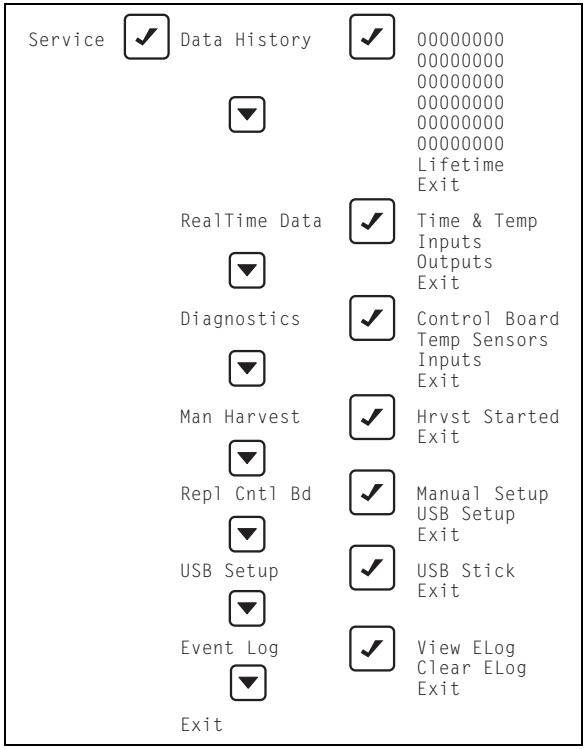
3. Press the Down arrow to Exit and press the Checkmark to return to the Energy Saver menu.

STATISTICS

1. From the Energy Saver menu, use the Down arrow to highlight Statistics.
2. Press the Checkmark. Choose to view ice production, potable water usage or energy usage statistics by highlighting your choice and pressing the Checkmark.
3. Press the Left arrow to return to previous screens and to the Energy Saver menu.

Service Menu

From the Main menu, use the Down arrow to navigate to Service and press the Checkmark. This menu is intended for the use of trained service personnel. Below is an overview of the Service menu. The following pages list the navigation options available by drilling into the menus with the Right arrow.



Service
Data History
Current Day
Current Day -1
Current Day -2
Current Day -3
Current Day -4
Current Day -5
Lifetime
Real Time Data
Time & Temp Inputs Outputs
Diagnostics
Control Board Temp Sensors Input
Manual Harvest
Harvest Started
Repl Cnt Bd
Manual Setup USB Setup
USB Setup
USB Stick
Download Firm
Download Conf
Export ALL
Export Setup
Event Log
Clear View

DATA HISTORY

Press the Checkmark with Data History highlighted to view a list of eight-digit dates (Current, Current + 1 ... Current + 5), along with Lifetime (be sure to use the Down arrow to reveal all the available information).

For each of the dates, use the Checkmark to view:

- Min Freeze - Minimum Freeze
- Max Freeze - Maximum Freeze
- Min Harvest - Minimum Harvest
- Max Harvest - Maximum Harvest
- MaxDeltaT3T4 - Maximum Temperature Delta T3 - T4
- Delta
- T3
- T4
- RunTime
- IceProd - Ice Production
- Cycle Cnt - Cycle Count
- Pot Water - Potable Water
- Cln Cycle - Clean Cycles
- Exit

For Lifetime, use the Checkmark to view:

- Install - Install Date
- Ctl Bd Replce - Control Board Replacement Date
- CntlBd DOM - Control Board DOM (Date Of Manufacture)
- RunTime
- Cycle Cnt - Cycle Count
- Pot Water - Potable Water
- Cln Cycle - Clean Cycles
- Exit

REAL TIME DATA

Press the Checkmark with RealTimeData highlighted to get readings on Time & Temp, Inputs and Outputs (be sure to use the Down arrow to reveal all the available information).

Use the Checkmark to view:

Time & Temp - Time and Temperature

- Status Off/On - Displays stage of cycle
- Time
- T1 Thermistor Temperature
- T2 Thermistor Temperature
- T3 Thermistor Temperature
- T4 Thermistor Temperature
- T3 & T4 Delta Temperature
- 100 hz
- 120 hz
- Exit

Inputs

- Status Off/On - Displays stage of cycle
- Curtain Sw1 - Curtain Switch 1
- Curtain Sw2 - Curtain Switch 2
- LPCO SW - LPCO Switch
- HPCO SW - HPCO Switch
- Bi LVL low - Bin Level - Low (Optional Bin Level Probe) Status
- Bin LVL Med - Bin Level - Medium (Optional Bin Level Probe) Status
- Bin LVL Hi - Bin Level High (Optional Bin Level Probe) Status
- Ice Sense - Sensing Ice No/Yes
- Wtr Low - Water Level Low No/Yes
- Wtr High - Water Level High No/Yes
- Exit

Outputs

- Status Off/On - Displays stage of cycle
- Wtr Pump - Water Pump Off/On
- HotGs VLV1 - Hot Gas Valve 1 Off/On
- HotGs VLV2 - Hot Gas Valve 2 Off/On
- Air Pump Off/On
- Wtr VLV - Water Valve Off/On
- Dump VLV - Dump Valve Off/On
- Comp Cntrl - Compressor Control Off/On
- AuCSRelay - AuCS Relay Off/On
- LuminIce Off/On
- Exit

DIAGNOSTICS

Press the Checkmark with Diagnostics highlighted to enter screens where you can run diagnostics on the control board, sensors and switches.

Control Board

- Self Check
- Enbl Relays - Enable Relays
- Exit

Temp Sensors - Temperature Sensors

- T1 Thermistor Temperature
- T2 Thermistor Temperature
- T3 Thermistor Temperature
- T4 Thermistor Temperature
- Exit

Inputs

- Curtain Sw1 - Curtain Switch 1 Closed/Open
- Curtain Sw2 - Curtain Switch 2 Closed/Open
- LPCO SW - LPCO Switch Closed/Open
- HPCO SW - HPCO Switch Closed/Open
- Bin LVL low - Bin Level - Low (Optional Bin Level Probe) Closed/Open
- Bin LVL Med - Bin Level - Medium (Optional Bin Level Probe) Closed/Open
- Bin LVL Hi - Bin Level - High (Optional Bin Level Probe) Closed/Open
- Ice Sense - Sensing Ice No/Yes
- Wtr Low - Water Level Low No/Yes
- Wtr High - Water Level High No/Yes
- Exit

MANUAL HARVEST

Press the Checkmark with Man Harvest highlighted to initiate a manual harvest.

Manual Harvest

- Hrvst Started - Harvest Started
- Exit

REPLACE CONTROL BOARD

Press the Checkmark with Repl Cntl Bd highlighted to program the replacement control board. The data can copied from the defective control board (refer to exporting data to a flash drive page 75), or entered manually through the Indigo interface.

- Manual Setup
  - Bd Inst Date - Board Install Date
  - Input Model# - Input Model Number
  - Input Serial# - Ice Machine Serial Number
  - Cond Serial # - Condenser/condensing unit serial number
- USB Setup
  - Insert Drive
  - Press Check - Press Checkmark
  - Wait for Comp - Wait for Completion
- Exit

USB SETUP

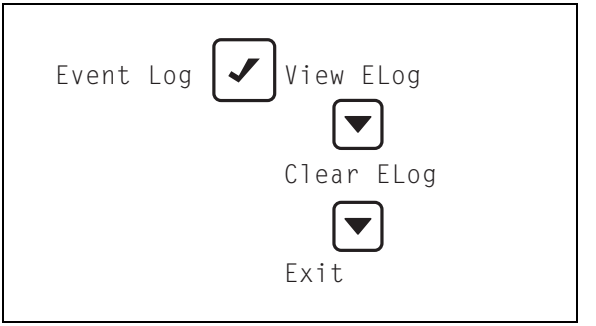
- USB Stick
  - Download Frm - Download Firmware
    Insert drive and wait for completion
  - Download Cnf - Download Configuration
    Insert drive and wait for completion
  - Export All
    Insert drive and wait for completion
  - Export Setup
    Insert drive and wait for completion
- Exit

EVENT LOG MENU

From the Service menu, use the Down arrow to navigate to Event Log and press the Checkmark.

Ensure View ELog is highlighted and press the Checkmark to see the first event code, when it occurred and how many times. Use the Down arrow to view information on subsequent event codes. For more information on event codes, see “Service Menu”. Use the Left arrow to return to the Event Log menu.

To clear the event log: In the Event Log Menu, use the Down arrow to highlight Clear ELog and press the Checkmark. Press the Left arrow to return to previous screens.



Event Log Menu

EVENT LOG

Refer to the following table for Event Code descriptions.

Code	Description
E01	Long Freeze Cycle
E02	Long Harvest Cycle
E03	Input Power Loss
E04	High Condenser Temperature
E05	High Pressure Control Opened
E06	Spare
E07	Starving TXV or Low On Charge
E08	TXV Fault
E09	#1 Evaporator Flooding
E10	#2 Evaporator Flooding
E11	Refrigeration Fault
E12	Curtain Switch Fault - Open more than 12 hours
E13	Spare
E14	Spare
E15	Fan Cycle Control Fault - Lo Liquid Line Temperature
E16	Remote Condenser Fault
E17	Spare
E18	Spare
E19	Ice Thickness Probe Fault
E20	Water System Fault
E21	T1 Temperature Sensor Issue
E22	T2 Temperature Sensor Issue
E23	T3 Temperature Sensor Issue
E24	T4 Temperature Sensor Issue
E25	Bin Level Probe Low Sensor Fault
E26	Bin Level Probe Medium Sensor Fault
E27	Bin Level Probe High Sensor Fault
E28	AuCS
E29	USB Communication Fault
E30	USB Download Fault
E31	Safe Mode
E32	RS485 Communication Fault
E33	KeyBoard Fault
E34	Display Fault

Event Log Detail

Detail Event Log Service Definition			
E-Log	**Display Text**	**Error Description**	**Definition**
E01	**Long Freeze**	Long Freeze	6 consecutive 60 Minute Freeze cycles = shut down and flash the SL#1 light on board
E02	**Long Harvest**	Long Harvest	3 consecutive - 3.5 Minute Harvests logs SL#2 in memory, but runs until 500 long harvest cycles occur.
E03	**Power Loss**	Power Supply (Event Log only - No Alarm)	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	**Hi Cnd Temp or Wtr Cnd Fault**	Air Condenser High temp, or water Condenser High temperature	1). Liquid Line Temperature too High for Self-contained Air Cooled Ice machine = Air Cooled Condenser Fault 2). Liquid Line Temperature too High for Self-contained Water Cooled ice machine = Water Cooled Condenser Fault
E05	**HPC Fault**	High Pressure Cutout (HPC)	The high pressure cutout switch (HPCO) opened
E06		Spare	
E07	**Starving TXV**	Starving Evaporator for single TXV or low on charge	10 consecutive occurrences where the Difference of the Average evaporator inlet (T3) and outlet (T4) is greater than 12°F (ELOG-E07)
E08	**TXV Fault**	TXV malfunction in dual circuit/ single evaps (TXV Fault)	10 consecutive occurrences where the Difference of the Average evaporator inlet (T3) and outlet (T4) is greater than 12°F (ELOG-E07)
E09	**Flood Evap 1**	Flooding evaporator for single circuit single evaporator (flooding evap)	During the first 6 minutes of the freeze cycle, the compressor discharge line temperature average (T2) fell below the average temperature of the 6 previous cycles.
E10	**Flood Evap 2**	Flooding evaporator for dual TXV dual circuit / single evaporator (Flooding Evap)	During the first 6 minutes of the freeze cycle, the compressor discharge line temperature average (T2) fell below the average temperature of the 6 previous cycles.

Detail Event Log Service Definition

E-Log	Display Text	Error Description	Definition
E11	**Refrig Fault**	Refrigeration System (Refrig Fault)	The compressor discharge temperature did not increase by at least 10 F, and the evaporator temperature did not decreased by at least 10 F - Measured from Refrigeration Start up to Two Minutes into the Freeze cycle.
E12	**Curtn Fault**	Curtain Switch open for more than 12 hours (Curtain Fault)	The ice machine is set to ice making and remains in bin full condition for more than 12 hours. The curtain switch is open or curtain is off.
E13		Spare	
E14		Spare	
E15	**AmbientTooLow**	Low amb control fault durring low amb	If the liquid line temperature drops below 60 F for any period exceeding 1 minute (contiguous) during the the freeze cycle.
E16	**Rmt Cnd Flt**	Remot Condenser Fault	If the liquid line temperature drops below 40 F, or exceeds 140 F for more than 1 continuos minute during the freeze cycle.
E17		Spare	
E18		Spare	
E19	**ITP Fault**	Ice Probe (ITP)	The monitored Frequencies is out of the appropriate range (Probe unplugged or problem with microphone).
E20	**WLP Fault**	Water System Fault	Any of the following: 1) Sensing high water probe and not low water probe = Water fault. 2) The Evaporator outlet temperature is less than -10°F @ 6 Minutes into freeze. 3) The Water probe is satisfied at the end of harvest.

Detail Event Log Service Definition

E-Log	Display Text	Error Description	Definition
E21	**T1 Fault**	T1 Sensor	Each thermistor reading is monitored continuously using six second average values. During Pre-chill a thermistor had a six second average thermistor values fall outside of the valid temperature range.
E22	**T2 Fault**	T2 Sensor	
E23	**T3 Fault**	T3 Sensor	
E24	**T4 Fault**	T4 Sensor	
E25	**Bin Prb Flt**	Bin Low Sens	Each thermistor reading is monitored continuously using six second average values. A thermistor had a six second average value outside of the valid range for more than 10 continous minutes
E26	**Bin Prb Flt**	Bin Med Sens	
E27	**Bin Prb Flt**	Bin Hi Sens	
E28	**AUCS**	AUCS (Aucs not Present) (Event Log only - No alarm)	When the AUCS clean option is selected from the menu, the control checks for the presence of the AUCS board and if the AUCS is not connected it will signal an Event “AUCS”. This will be cleared as soon as the hardware is detected.
E29	**USB Comm Err**	USB Comm (Event Log only - No Alarm)	Engineering purposes Only
E30	**USB DnLd Err**	USB download error (dlnd) Event Log only - No alarm)	Engineering purposes Only
E31	**Limp Mode**	Safe Mode (Event Log only - No alarm)	Safe mode is a Timed: Water Fill or Freeze cycle based on the last 5 good cycles. The controller can enter into safe mode as a result of the following sensor failures; Ice Thickness Probe (ITP) Water Level Probe (WLP)

USB FLASH DRIVE SPECIFICATIONS AND FORMATTING

Updating firmware on Indigo™ model ice machines requires a properly formatted 2 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
- 2 GB or less capacity
- Fat32 File System
- 512 MB File Allocation Unit

USB Flash Drive Formatting:

Procedure to format a USB flash drive varies with operating system software.

Windows 7 or Windows Vista Computers:

1. Insert USB flash drive; your computer may indicate:

- "Found New Hardware" follow the prompts to install the USB flash drive
- USB flash drive may auto play - Close auto play window

2. Press Windows Key and E key simultaneously to access windows explorer.
3. Right click on your USB Flash Drive.
4. Left click on "Format".
5. Verify or select the settings below:

- USB flash drive capacity - 2 GB or less
- File System - Fat32
- Allocation Unit Size - Must be 512 MB
- Volume Label is Optional - Rename if desired
- Deselect "Perform A Quick Format" (no checkmark)

6. Left click on "Start" - You will receive a warning - "Formatting will remove all data" left click "OK". A "Format Complete" box will display when formatting is finished. Close the pop up and windows explorer.

Windows XP Computers:

1. Insert USB flash drive; your computer may indicate:

- "Found New Hardware" follow the prompts to install the USB flash drive
- USB flash drive may auto launch - Close auto launch window.

2. To access Disk Management:

- Left click on the Windows Start Button
- Left click on "Run"
- Type compmgmt.msc and left click on "OK"
- Left click on "Disk Management".

3. Verify USB flash drive capacity is 2 GB or less
4. Right click on the USB flash drive, then left click on "Format" from the drop down list.
5. Verify or select the settings below:

- Volume Label is Optional - Rename if desired
- File System - Fat32
- Allocation Unit Size must be 512 MB
- Deselect "Perform A Quick Format" (no checkmark)

6. Left click on "OK" you will receive a warning - "Formatting will remove all data" left click on "OK", wait until formatting is complete and "status" indicates "Healthy", then close the disk management window.

UPGRADING FIRMWARE WITH A FLASH DRIVE OR TRANSFERRING SETUP DATA TO MULTIPLE MACHINES

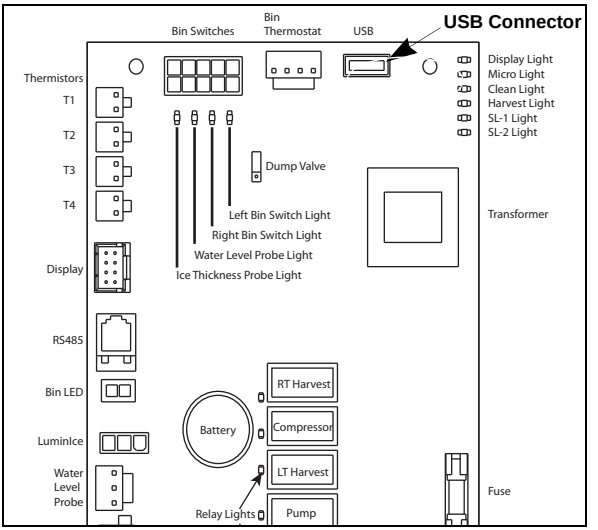
Important

The flash drive must be formatted before using, All files and software on the flash drive are removed during the formatting process. Refer to page 71 USB Flash Drive Specifications and Formatting.

1. Drag and drop the files from your email onto a flash drive or refer to Exporting data to a flash drive to transfer settings to multiple machines.
2. Ensure that the ice machine's power is on.
3. Press the Menu button.
4. Press the Down arrow until Service is highlighted.
5. Press the Checkmark. The Service menu will be displayed.



6. Press the Down arrow until USB Setup is highlighted.
7. Press the Checkmark. USB Stick will appear highlighted.
8. Press the Checkmark again. A submenu with Download Frm (Download Firmware) appears.
9. Ensure that Download Frm is highlighted and press the Checkmark. A display of instructions will appear.



Control Board

10. Follow the on-screen instructions:
    A. Insert Drive (Insert the flash drive into the USB port on the ice machine's control board.)
    B. Press Check (Press the Checkmark.)
    C. Wait For Comp (Wait approximately 5 to 10 minutes for the Firmware upgrade to complete.
11. Depending on software version either Complete, SUCCESS or the On/Off screen will appear.
12. Verify the new firmware version loaded by navigating to Menu/Machine Info/Main SW Ver and verify the firmware version number.

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, Refer to page 71 USB Flash Drive Specifications and Formatting.

1. Ensure that the ice machine's power is on.
2. Press the Menu button.
3. Press the Down arrow until Service is highlighted.
4. Press the Checkmark. The Service menu will be displayed.



5. Press the Down arrow until USB Setup is highlighted.
6. Press the Checkmark. USB Stick will appear highlighted.
7. Press the Checkmark again. A submenu with Export ALL and Export Setup appears.

NOTE:

There are four files stored in ice machine memory:

- Asset Data - ASDATAoo.CSV
- Operating Data - OPDATAoo.CSV
- Real Time Data - RTDATAoo.CSV
- Ice Machine Settings - Settinoo.CSV

Select only “Ice Machine Settings” file when multiple machines will be programmed with the same user specified settings. Select “Export All” if you are installing a replacement board.

8. Highlight Export ALL or Export Setup, depending on your requirements, and press the Checkmark. A display of instructions will appear.
9. Follow these on-screen instructions to:
    A. Insert Drive (Insert the flash drive into the USB port on the ice machine’s control board.)
    B. Press Check (Press the Checkmark.)
    C. Wait For Comp (Wait approximately 5 to 10 minutes for the download to complete.
    D. Depending on software version either Export Complete, SUCCESS or the On/Off screen will appear.

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 flashed on the LCD 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 hours the control board will enter a standby mode and turn off.

NOTE: 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.

- Example - The ice machine is a new installation and the water has not been turned on. The ice machine will stop after five cycles with five long freeze cycles and five water system faults in the event log.

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.

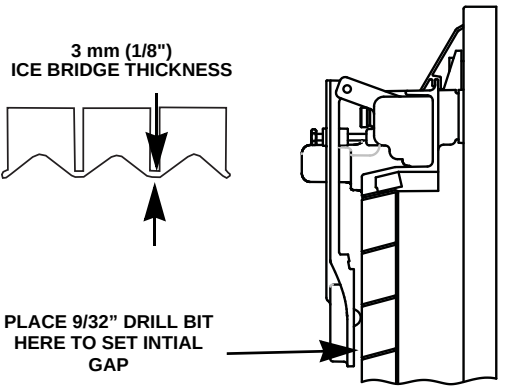
ICE THICKNESS CHECK

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 3 mm (1/8").

NOTE: 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 should be about 3 mm (1/8") thick.
2. If adjustment is necessary, turn the ice thickness probe adjustment screw clockwise to increase bridge thickness, counterclockwise to decrease bridge thickness. As a starting point place a 7 mm (9/32") drill bit between the ice thickness probe and the evaporator. Make final adjustments to achieve a 3 mm (1/8") thick bridge.

NOTE: Turning the adjustment 1/3 of a turn will change the ice thickness about 1.5 mm (1/16").



Ice Thickness Check

3. Make sure the ice thickness probe wire doesn't restrict movement of the probe.

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 refrigerant 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 and will cycle on and off when the room temperatures is below 21°C (70°F).

Freeze Sequence

3. Prechill

The compressor lowers the temperature of the evaporator(s) before the water pump is energized. The water fill valve will energize and remain on until water completes the water level probe circuit.

4. Freeze

The water pump(s) energizes and water flows over the evaporator. After water contacts the water level probe the water fill valve de-energizes. The control board will automatically cycle the water fill valve within the 6 minute water fill time limit. The valve energizes once in the pre-chill and up to twice in the freeze cycle.

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.

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 hot refrigerant gas into the evaporator.

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

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.

The sliding sheet of cubes opens the water curtain/ice damper and bin switch.

The momentary opening and re-closing of the bin switch terminates the harvest sequence and returns the ice machine to the freeze sequence (Step 3 - 4.)

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.

Control Board Timers

The control board has the following non-adjustable timers:

- The ice machine is locked into the freeze cycle for 6 minutes before a harvest cycle can be initiated. This can be overridden by initiating a manual harvest. Refer to “Manual Harvest” on page 65.
- The maximum freeze time is 60 minutes at which time the control board automatically initiates a harvest sequence.
- The maximum harvest time is 3.5 minutes. The control board automatically initiates a freeze sequence when these times are exceeded.
- The maximum water fill is 6 minutes.

Single Evaporator Models
Energized Parts Chart

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	**On**	**Off**	**Off**	**Off**	**On**	**Off**	**Off**	**Off**	*45 Seconds*
2. Refrigeration System Start-up	**Off**	**On**	**On**	**Off**	**Off**	**Off**	**Off**	**Off**	*5 Seconds*
	Off	**On**	**On**	**Off**	**Off**	**On**	**On**	**On**	*5 Seconds*
Freeze Sequence 3. Prechill	**Off**	**Off**	**Off**	May Cycle **On/Off** during pre-chill	**Off**	**On**	**On**	May Cycle **On/Off**	*Initial Start-Up is 120 Seconds* *90 Seconds thereafter*
4. Freeze	**On**	**Off**	**Off**	**Cycles Off then On two more times**	**Off**	**On**	**On**	May Cycle **On/Off**	*Until Ice Contact w/Ice Thickness Probe*

Single Evaporator Models
Energized Parts Chart (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
Harvest Sequence 5. Water Purge	**On**	**On**	**On**	**Off**	**On**	**On**	**On**	May Cycle **On/Off**	*Factory Set at 45 Seconds*
6. Harvest	**Off**	**On**	**On**	**Off**	**Off**	**On**	**On**	May Cycle **On/Off**	*Bin Switch Activation*
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**

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Safety Limits

In addition to standard safety controls, the control board has built in safety limit controls which protect the ice machine from major component failures.

Safety limits are stored and indicated by the control board after three cycles. The number of cycles required to stop the ice machine varies for each safety limit.

- **Safety Limit 1** - If the freeze time reaches 60 minutes, the control board automatically initiates a harvest cycle. If 6 consecutive 60-minute freeze cycles occur, the ice machine stops.
- **Safety Limit 2** - If the harvest time reaches 3.5 minutes, the control board automatically returns the ice machine to the freeze cycle. If 500 consecutive 3.5 minute harvest cycles occur, the ice machine stops.

SAFETY LIMIT #1

Freeze time exceeds 60 minutes for 6 consecutive freeze cycles.

Possible cause list

Water System

- Loss of water from sump area
- Low water pressure 1.37 bar min (20 psig)
- High water pressure 5.51 bar max (80 psig)
- High water temperature 32°C max (90°F)
- Clogged water distribution tube
- Dirty/defective water fill valve
- Dirty/defective water dump valve
- Defective water pump
- Dirty/defective water level probe

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

Miscellaneous

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

SAFETY LIMIT #2

Harvest time exceeds 3.5 minutes for 500 consecutive harvest cycles

Possible Cause Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” page 102

Water System

- Loss of water from sump area
- Water area (evaporator) dirty
- Dirty/defective water dump valve
- Low water pressure 1.37 bar min (20 psig)
- Vent tube not installed on water outlet drain
- Clogged water distribution tube
- Dirty/defective water fill valve
- Defective water pump
- Water freezing behind evaporator
- Plastic extrusions and gaskets not securely mounted to the evaporator

Electrical System

- Ice thickness probe out of adjustment
- Ice thickness probe dirty
- Bin switch closed/defective
- Premature harvest

Refrigeration System

- Defective harvest valve
- TXV flooding (check bulb mounting)
- Defective fan cycling control
- Non-Manitowoc components
- Improper refrigerant charge

Troubleshooting By Symptom

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

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 Flow Chart

SYMPTOM #2

Ice Machine has a Long Freeze Cycle

Ice Formation is Thick
or
Thin Ice Fill on Top or Bottom of Evaporator
or
Low Production

Safety Limit #1 (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

Safety Limit #2 (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 Meltout Flow Chart

Reset To Factory Defaults

Before starting troubleshooting procedures, reset the control board to factory defaults to prevent misdiagnosis. 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.

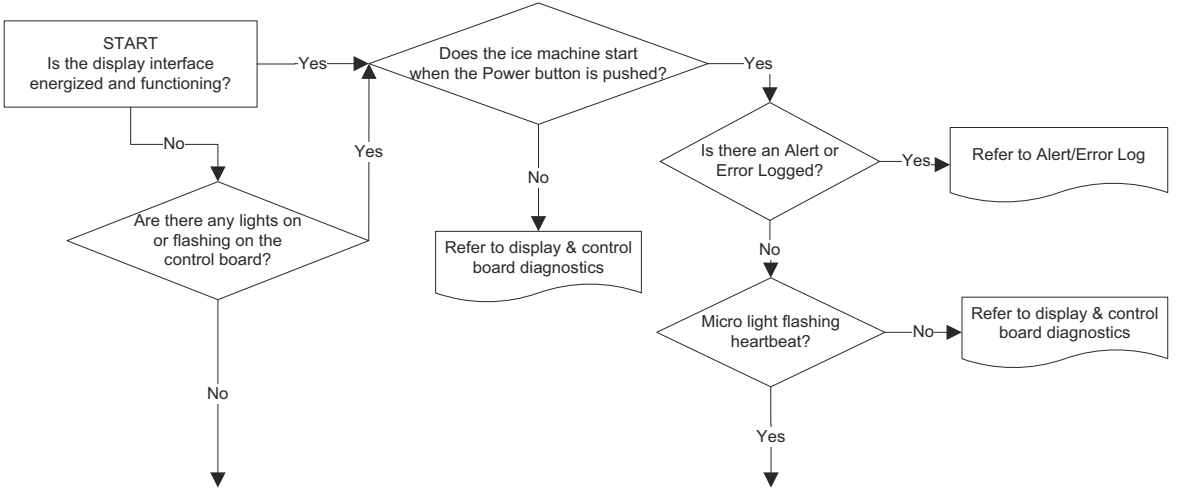
B. Write down any customer settings so they can be re-entered when diagnostics are complete.

This procedure also resets the password to the factory default. The default factory password is 1234. To reset the ice machine to factory defaults use the following procedure.

1. Ensure that the ice machine's power is on.
2. Press the Menu button.
3. From the Main menu, use the Down button to highlight Defaults.
4. Press either the Checkmark or right arrow two times to reset the ice machine. The display will return to the Set-Up menu and the defaults listed below will be in affect. Refer to Set-Up Menu to adjust settings.

Setting	Default
Language	English
Time/Date	Month/Day/Year/Time
Time Configuration	Mo/Day/Yr/24 Hour
Units	Fahrenheit/Lbs/Gallons
Ice Clarity	Off
LCD Brightness	Level 2
Password On	Off - Enter Password Default Password = 1234
Edit Password	Off - Edit password
Clean Minder	Off
AuCS RunTime	Off
Air Filter Minder	Off
Water Filter Minder	Off

SYMPTOM #1 ICE MACHINE WILL NOT RUN



Yes
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
Display light flashing heartbeat?
No
Refer to display & control board diagnostics
Yes
Install the water curtain/damper.
No
Bin switch light on? (Multi evap all lights on?)
No
All water curtains or dampers in place?
Yes
Yes

Yes
Press power button to start ice making, does safety limit light flash?
No
Ice machine starts?
No
Refer to display & control board diagnostics
Yes
Test run ice machine
Yes
Which light flashes?
SL1
Refer to Safety Limit #1 long freeze cycle
SL2
Refer to Safety Limit #2 long harvest cycle
Yes
Is magnet on the water curtain/damper
No
Replace the water curtain/damper.
Yes
Refer to bin switch diagnostics.

Diagnosing an Ice Machine That Will Not Run

⚠ Warning

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

1. Verify primary voltage is supplied to ice machine and the fuse/circuit breaker is closed.
2. Verify the high pressure cutout is closed.
3. Verify control board fuse is okay. If the micro or display lights on the control board are energized the fuse is okay.
4. Verify all bin switches function properly. A defective bin switch can falsely indicate a full bin of ice.
5. Perform control board, display board and touch screen diagnostics. Be sure steps 1-6 were followed thoroughly. Intermittent problems are not usually related to the control board.

SYMPTOM #2 LOW PRODUCTION, LONG FREEZE

Ice Machine has a Long Freeze Cycle.

Ice Formation is Thick
or
Thin on Top or Bottom of Evaporator
or
Low Production

How to Use the Freeze Cycle Refrigeration System Operational Analysis Table

GENERAL

These tables must be used with charts, checklists and other references to eliminate refrigeration components not listed on the tables and external items and problems which can cause good refrigeration components to appear defective. The tables list different defects that may affect the ice machine's operation.

The items listed below must be followed to provide accurate data:

1. Before starting, see "Before Beginning Service" for a few questions to ask when talking to the ice machine owner.
2. All doors and panels must be in place.
3. Initial freeze cycle is not used for diagnostics.
4. Wait 3 minutes into the second freeze cycle before monitoring temperatures. This will allow the system to stabilize and minimizes fluctuations.

PROCEDURE

Step 1 Complete the "Operation 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.

Step 2 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 temperature is determined to be low. Enter a Checkmark in the "low" column.

Step 3 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.

SYMPTOM #2 - FREEZE CYCLE REFRIGERATION SYSTEM OPERATIONAL ANALYSIS TABLES

SINGLE EXPANSION VALVE SELF CONTAINED AIR and WATERCOOLED 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 chart.			
Ice Formation Pattern	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
Discharge Line Temperature 3 minutes into the freeze cycle	Normal or High	Normal or High	Low	Normal or High

SINGLE EXPANSION VALVE SELF CONTAINED AIR and WATERCOOLED CONDENSER

Operational Analysis	**1**	**2**	**3**	**4**
Suction Line Temperature 3 minutes into the freeze cycle	Normal or High	Normal or High	Low	Normal or High
Freeze Cycle Suction Temperature	If suction temperature is High or Low refer to freeze cycle high or low suction temperature problem checklist page 109 to eliminate problems and/or components not listed on this table before proceeding.			
_____ _____ _____ **1 minute Middle End**	Suction temperature is **High**	Suction temperature is **Low or Normal**	Suction temperature is **High**	Suction temperature is **High**
Wait 5 minutes into the freeze cycle. Compare temperatures of **evaporator inlet** and **evaporator outlet.** **Inlet** _____**°C** **Outlet** _____ **°C** **Difference**_____ **°C**	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

SINGLE EXPANSION VALVE SELF CONTAINED AIR and WATERCOOLED CONDENSER

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.

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?

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 21°C ambient temperature and 10°C water produces more ice than the same model condensing unit with a 32°C ambient temperature and 21°C water.

1. Determine the ice machine operating conditions:
   Air temp entering condenser:____°
   Air temp around ice machine:____°
   Water temp entering sump trough:____°
2. Refer to the appropriate 24-Hour Ice Production Chart (starting on page 167). 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 kilograms.
- 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	×	_____ Cycles per Day	=	_____ Actual 24-Hour Production	

Weighing the ice is the only 100% accurate check. However, if the ice pattern is normal and the 3 mm bridge thickness is maintained, the ice slab weights listed with the 24-Hour Ice Production Charts may be used.

3. 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.

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

Line set is improperly installed

- Reinstall according to the Installation Manual

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 1-5 Bar, 138-552 kPa.

- Install water regulator or increase water pressure

Incoming water temperature is not between 2°C & 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.

Important

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 1.5 mm across the surface of the evaporator. The ice bridge thickness at the ice thickness control probe should be at least 3 mm.

The ice thickness probe must be set to maintain the ice bridge thickness at approximately 3 mm. If ice forms uniformly across the evaporator surface, but does not reach 3 mm. in 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 3 mm. to initiate a harvest, but the inlet of the evaporator already has 12 mm to 24 mm of ice formation.

3. Extremely Thin at Evaporator Inlet

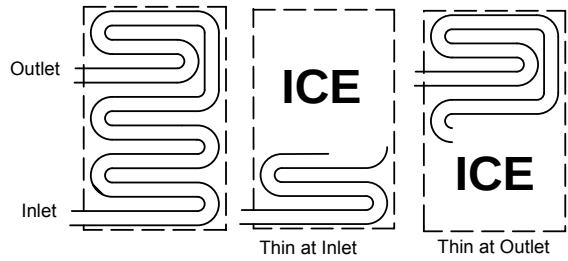
There is no ice, or a considerable lack of ice formation at the inlet of the evaporator. Examples: The ice at the outlet of the evaporator reaches 3 mm to initiate a harvest, but there is no ice formation at all on the inlet of the evaporator.

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



Analyzing Discharge Temperature in the Freeze Cycle

1. Determine the ice machine operating conditions:

   Air temp. entering condenser_____

   Air temp. around ice machine_____

   Water temp. entering sump trough_____

2. Refer to Operating Temperature (starting on page 167) for ice machine being checked.

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

   Freeze Cycle_____

   Harvest Cycle_____

3. Perform an actual discharge temperature check.

	Freeze Cycle Temperature
3 Minutes into the Freeze Cycle	_____
Middle of Freeze Cycle	_____
End of Freeze Cycle	_____

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

   The discharge temperature is normal when the actual temperature falls within the published temperature range for the ice machine's operating conditions.

FREEZE CYCLE DISCHARGE TEMPERATURE HIGH CHECKLIST

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” (page 102)

Air Condenser

- Dirty condenser filter
- Dirty condenser fins
- High inlet air temperature
- Condenser discharge air recirculation
- Defective fan cycling control (page 154)
- Defective fan motor

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 TEMPERATURE LOW CHECKLIST

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” (page 102)

Other

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

Analyzing Suction Temperature

The suction temperature gradually drops throughout the freeze cycle. The actual suction temperature (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 temperature drop throughout the freeze cycle, compare the published suction temperature to the published freeze cycle time.

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

Procedure
Step
1. Determine the ice machine operating conditions. *Temperature of air entering the condenser. Look up and determine the published suction temperature range.
2. Perform an actual suction temperature check at the 3 minutes into the freeze cycle, middle and end of the Freeze cycle. *Freeze cycle begins when the water pump starts
3. Compare the actual Freeze cycle suction temperature (step 2) to the published Freeze cycle temperature. Determine if the suction temperature is high, low or normal.

SUCTION TEMPERATURE HIGH CHECKLIST

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” page 102

Discharge Temperature

- Discharge temperature is too high and is affecting suction temperature – refer to “Freeze Cycle Discharge Temperature High Checklist” (page 107)

Improper Refrigerant Charge

- Overcharged (also see “Freeze Cycle Discharge Temperature High Checklist” page 107)
- Wrong type of refrigerant
- Non condensable in system

Components

- Harvest valve leaking - continue the table
- TXV flooding - continue the table
- Defective compressor - continue the table

Other

- Non-Manitowoc components in system

SUCTION TEMPERATURE LOW CHECKLIST

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” (page 102)

Discharge Temperature

- Discharge temperature is too low and is affecting low side – refer to “Freeze Cycle Discharge Temperature Low Checklist” (page 108)

Improper Refrigerant Charge

- Undercharged
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- Improper water supply over evaporator – refer to “Water System Checklist” (page 103)
- Restricted/plugged liquid line drier
- Restricted/plugged tubing in suction side of refrigeration system
- TXV starving - continue the table

Comparing Evaporator Inlet and Outlet Temperatures

The temperatures of the suction line 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 must be within 4°C of each other.

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

1. Navigate to Service / RealTimeData / Time & Temp / T3 & T4 Thermistors (See page 59 Service Menu Navigation for details).
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.

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

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 will be higher than 71°C at the end of the freeze cycle.

PROCEDURE

1. Navigate to Service / RealTimeData / Time & Temp / T2 Thermistor (See page 59 Service Menu Navigation for details).
2. Observe the discharge line temperature (T2) for the last three minutes of the freeze cycle and record on the table.

Discharge Line Temperature Above 71°C At The End Of Freeze Cycle:

Ice machines that are operating normally will have consistent minimum discharge line temperature of 71°C.

Final Analysis

The column with the highest number of Checkmarks 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, not the harvest cycle. A low refrigerant charge normally affects both cycles. Verify the ice machine is not low on charge before replacing an expansion valve.

1. Add refrigerant charge to verify a low charge. Do not add more than 20% of nameplate refrigerant charge. If the problem is corrected, the ice machine is low on charge.
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.

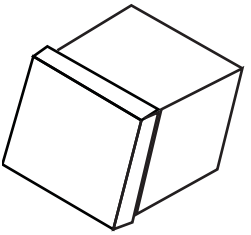
COLUMN 3 - TXV FLOODING OR REFRIGERANT OVERCHARGE

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.

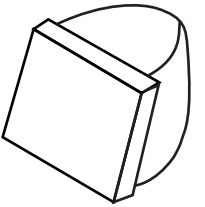
COLUMN 4 - COMPRESSOR

Replace the compressor. To receive warranty credit, the compressor ports must be properly sealed.

SYMPTOM #3 HARVEST PROBLEMS



Normal Ice Cube



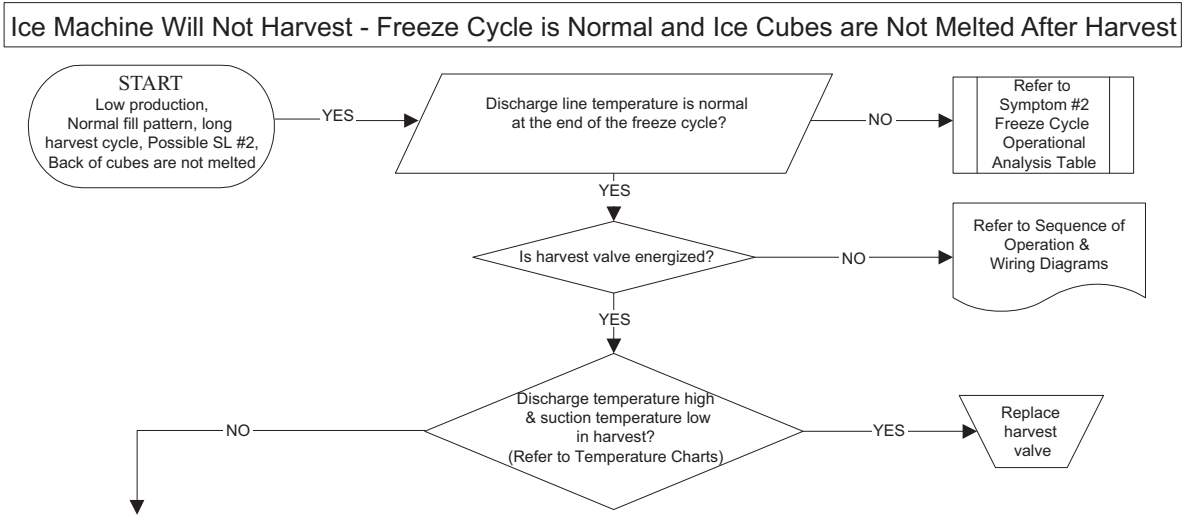
Melted Out Ice Cube

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 categorizes.

- 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 on the evaporator 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.
- 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.

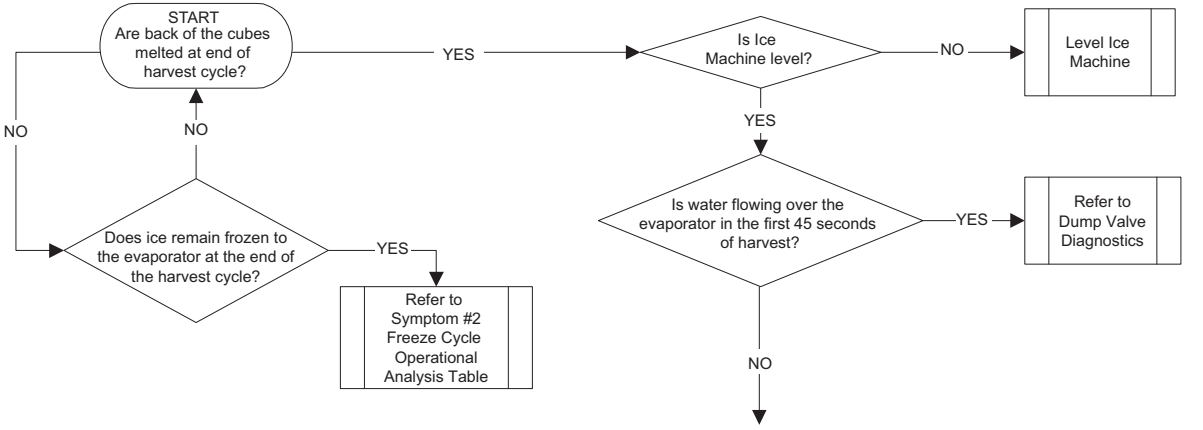
SYMPTOM #3 WILL NOT HARVEST, CUBES NOT MELTED



YES
Self Contained
Air-cooled Condenser?
YES
Fan cycling
control operates correctly
in freeze cycle?
YES
Fan cycling
control opens below setpoint
in harvest cycle?
YES
Are you sure Discharge line
temperature is normal?
Repeat this flowchart
& verify all data
NO
Replace Fan
Cycling Control
NO

SYMPTOM #4 WILL NOT HARVEST, CUBES MELTED

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



NO
Is the evaporator dirty?
(Dry evaporator first then check)
YES
NO
Discharge line temperature is normal
at the end of the freeze cycle?
YES
NO
Refer to Heavily Scaled
Cleaning Procedure
Refer to Symptom #2
Freeze Cycle Operational
Analysis Table
Refer to Manual
Cleaning Procedure

Component Check Procedures

Electrical Components

CONTROL BOARD, DISPLAY BOARD AND TOUCH PAD

FUNCTION

The control board, display board and touch pad 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 like a heartbeat. The two green lights are located on the top right corner of the control board.

Display Diagnostics

1. Micro light flashes and display light is off.
2. Disconnect and reconnect both ends of the communication cable running between the control board and the back of the display module.
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 communication cable first as a test, then replace display/ touch pad assembly if required.

Control Board Diagnostics

1. Micro light is not flashing a heartbeat.
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 - Replace control board.
3. Perform the following keystrokes on the display.

- Press Menu, scroll down to Service and press right arrow
- Scroll down to Diagnostics and press right arrow
- Display reads ControlBoard, press right arrow
- Display reads Self Check, press right arrow to start control board test

The control board performs a self test. As the test progresses the display will show Checkmarks at the top left of the display screen. When the fifth Checkmark appears the display will show “StatusPassed” indicating the control board is functioning normally.

Touch Pad Diagnostics

Follow the control board diagnostics to the StatusPassed display. Perform the following keystrokes on the display.

- Display reads StatusPassed, press the right arrow
- Display reads Passed Yes, press the right arrow
- Display reads Keypad Test, press the right arrow

4. Test the functionality of all buttons on the touch pad.

NOTE: Pushing the power button will start and stop the ice machine. Testing it last will allow the ice machine to continue running a freeze cycle.

- As you press the buttons the first letter of the corresponding word will flash indicating the push button is operating correctly
- Press the right arrow 5 times rapidly to exit.

5. Display reads Passed Yes and Passed No.

- Press left arrow 4 times to exit to home screen.

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, contactor/compressor/fan motor - The fan cycle control must close to energize the fan motor.

1. Press power button to turn off ice machine.
2. Perform the following keystrokes on the display.

- Press Menu, scroll down to Service and press the right arrow
- Scroll down to Diagnostics, press the right arrow and select Diagnostics
- Display reads ControlBoard, press right arrow
- Scroll down to Enbl Relays and press right arrow to start control board test

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

4. Test for line voltage at the individual components.
   A. Line voltage is present and the component is non functional - Replace component
   B. Voltage is not present at the component - Proceed to step 5
5. Refer to wiring diagram and determine wire location on the 9 pin molex connector for the component you are testing.
6. Check for line voltage at the control board 9 pin molex connector.
   A. Line voltage at 9 pin connector - Repair wiring to component
   B. No power at 9 pin connector - Replace control board

USB FLASH DRIVE SPECIFICATIONS AND FORMATTING

Updating firmware on Indigo™ model ice machines requires a properly formatted 2 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
- 2 GB or less capacity
- Fat32 File System
- 512 Byte File Allocation Unit

USB Flash Drive Formatting:

Procedure to format a USB flash drive varies with operating system software.

Windows 7 or Windows Vista Computers:

1. Insert USB flash drive; your computer may indicate:

- "Found New Hardware" follow the prompts to install the USB flash drive
- USB flash drive may auto play - Close auto play window

2. Press Windows Key and E key simultaneously to access windows explorer.
3. Right click on your USB Flash Drive.
4. Left click on "Format".
5. Verify or select the settings below:

- USB flash drive capacity - 2 GB or less
- File System - Fat32
- Allocation Unit Size - Must be 512 Byte
- Volume Label is Optional - Rename if desired
- Deselect "Perform A Quick Format" (no checkmark)

6. Left click on "Start" - You will receive a warning - "Formatting will remove all data" left click "OK". A "Format Complete" box will display when formatting is finished. Close the pop up and windows explorer.

Windows XP Computers:

1. Insert USB flash drive; your computer may indicate:

- "Found New Hardware" follow the prompts to install the USB flash drive
- USB flash drive may auto launch - Close auto launch window.

2. To access Disk Management:

- Left click on the Windows Start Button
- Left click on "Run"
- Type compmgmt.msc and left click on "OK"
- Left click on "Disk Management".

3. Verify USB flash drive capacity is 2 GB or less
4. Right click on the USB flash drive, then left click on "Format" from the drop down list.
5. Verify or select the settings below:

- Volume Label is Optional - Rename if desired
- File System - Fat32
- Allocation Unit Size must be 512 Byte
- Deselect "Perform A Quick Format" (no checkmark)

6. Left click on "OK" you will receive a warning - "Formatting will remove all data" left click on "OK", wait until formatting is complete and "status" indicates "Healthy", then close the disk management window.

UPGRADING FIRMWARE WITH A FLASH DRIVE OR TRANSFERRING SETUP DATA TO MULTIPLE MACHINES

Important

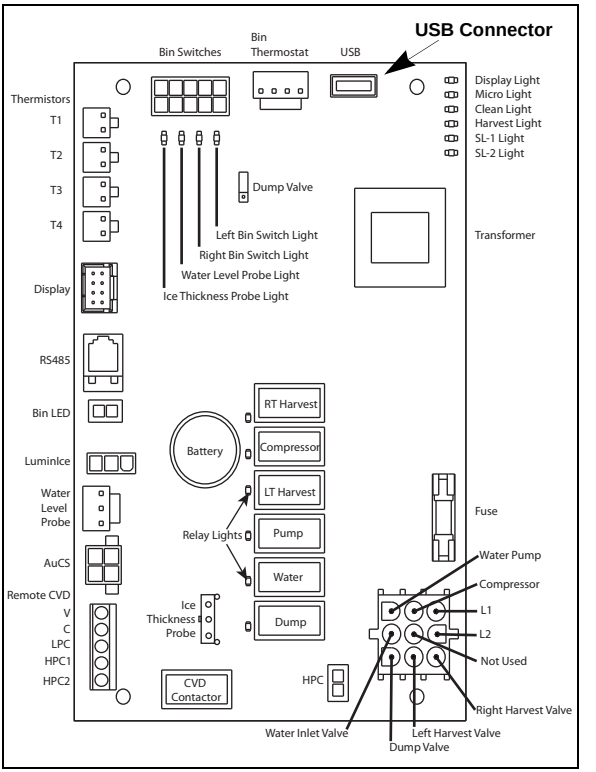
Do not use a flash drive with a built-in software program, such as Sandisk brand.

1. Refer to USB Flashdrive Specifications and Formatting page 128 and prepare the flash drive.
2. Drag and drop the firmware file onto a flash drive or refer to Exporting data to a flash drive to transfer settings to multiple machines.
3. Ensure that the ice machine's power is on.
4. Press the Menu button.
5. Press the Down arrow until Service is highlighted.
6. Press the Checkmark. The Service menu will be displayed.



7. Press the Down arrow until USB Setup is highlighted.
8. Press the Checkmark. USB Stick will appear highlighted.
9. Press the Checkmark.
10. Select Download Cnf and press the Checkmark. A display of instructions will appear.

11. Follow these on-screen instructions to:
    A. Insert Drive (Insert the flash drive into the USB port on the ice machine's control board.)
    B. Press Check (Press the Checkmark.)
    C. Wait For Comp (Wait approximately 5 to 10 minutes for the Firmware upgrade to complete.
12. Depending on software version either Complete, SUCCESS or the On/Off screen will appear.
13. Verify the new firmware version loaded by navigating to Menu/Machine Info/Main SW Ver and verify the firmware version number.



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

Do not use a flash drive with a built-in software program, such as Sandisk brand.

1. Ensure that the ice machine's power is on.
2. Press the Menu button.
3. Press the Down arrow until Service is highlighted.
4. Press the Checkmark. The Service menu will be displayed.



5. Press the Down arrow until USB Setup is highlighted.
6. Press the Checkmark. USB Stick will appear highlighted.

7. Press the Checkmark again. A submenu with Export ALL and Export Setup appears.

NOTE:

There are four files stored in ice machine memory:

- Asset Data - ASDATAoo.CSV
- Operating Data - OPDATAoo.CSV
- Real Time Data - RTDATAoo.CSV
- Ice Machine Settings - Settinoo.CSV

Select only “Ice Machine Settings” file when multiple machines will be programmed with the same user specified settings. Select “Export All” if you are installing a replacement board.

8. Highlight Export ALL or Export Setup, depending on your requirements, and press the Checkmark. A display of instructions will appear.
9. Follow these on-screen instructions to:
    A. Insert Drive (Insert the flash drive into the USB port on the ice machine’s control board.)
    B. Press Check (Press the Checkmark.)
    C. Wait For Comp (Wait approximately 5 to 10 minutes for the download to complete.
    D. Depending on software version either Export Complete, SUCCESS or the On/Off screen will appear.

PROGRAMMING A REPLACEMENT CONTROL BOARD

Indigo™ replacement control boards require the Model and Serial 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 133 “Exporting Data To A Flash Drive” before installing the replacement board.

Follow the instructions on page 131 “Upgrading Firmware with a Flash Drive or Transferring Setup Data To Multiple Machines”.

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. Dependant on firmware version the screen will either display “Manual Setup” directly or you will need to navigate to the screen.

If you need to navigate to the control board screen:

1. Press the Menu button.
2. Press the Down arrow until Service is highlighted, then press the Checkmark.
3. Scroll down to Repl Cntl Bd (Replacement Control Board) and press the Checkmark.
4. Select “Manual Setup” and press the Checkmark.

Verify the date correctly auto populates.

- Yes - Go to step **5**
- No - Highlight date with the right arrow, then use up/down arrows to enter the correct date. Use the right arrow to exit the date columns.

5. Scroll down to Input Model, then use up/down arrows to enter the model number. Use the right arrow to exit the model columns.
6. Scroll down to Input Serial#, then use up/down arrows to enter the model number. Use the right arrow to exit the model columns.
7. Scroll down and select Exit, then press Checkmark.

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, 8 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 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/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.

Diagnostics

SYMPTOMS

Bin Switch Fails Open

- The ice machine will not start an ice making cycle and the display indicates “Curtain Open”.
- The ice machine will run in the clean cycle.

Bin Switch Fails Closed

- When running a “Long Harvest” alert is displayed and safety limit 2 indicated.
- May be off on a safety limit 2.
- The harvest cycle continues after ice opens and closes the ice damper (harvest cycle is 3.5 minutes).

DIAGNOSTICS

1. Verify bin switch, damper and damper magnet are in place.

- Press the Menu button.
- Scroll down to Service and press right arrow.
- Scroll down to Diagnostics and press right arrow
- Scroll down to Inputs and press right arrow to display curtain switch readings (Curt SW1, Curt SW2, etc).

2. Open and close the ice damper(s) repeatedly while observing the display and control board lights.
   A. Curtain switch cycles open/closed and control board light energizes/de-energizes - Bin switch is operating normally
   B. Curtain switch remains closed and control board light remains on - Replace bin switch
   C. Curtain switch remains open and control board light remains off - Go to next step
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, control board light energizes and ice machine starts - Replace bin switch
   B. Curtain switch remains open and 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

During the Freeze cycle, the water level probe is set to maintain the proper water level above the water pump housing. The water level is not adjustable. If the water level is incorrect, check the water level probe position. Reposition or replace the probe as necessary.

Water Inlet Valve Safety Shut-Off

In the event of a water level probe failure, this feature limits the water inlet valve to a six-minutes. 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.

Freeze Cycle Operation

During the Freeze cycle, the water inlet valve energizes and de-energizes in conjunction with the water level probe located in the water trough.

During the first 45 seconds of the Freeze cycle:

- 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 3 continuous seconds.
- The water inlet valve will cycle ON and OFF once in the prechill and up to two times in the freeze cycle.
- Maximum fill time is 6 minutes for single evaporator.

After 45 seconds into the Freeze cycle:
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.

Diagnostics

SYMPTOMS

- Water trough overfills
- Water trough will not fill
- Display indicates a “Long Freeze” alert and may or may not also indicate a safety limit 1
- Ice production is low

WATER TROUGH OVERFILLING DURING THE FREEZE CYCLE

Step 1 Press the power button and turn off the ice machine.

Step 2 If water continues to flow with the ice machine off, disconnect power. If water continues to flow verify water pressure is below 80 psig before replacing the water inlet valve.

Step 3 Check water level probe mounting and verify secure wiring connections at the probe and control board.

Step 4 Scroll to Service/Diagnostics/Inputs and press down arrow until Wtr Low and Wtr High are displayed.

- No is displayed - Control board is not receiving a sensing water signal. Continue with step 5.
- Yes is displayed - Control board is receiving a sensing water signal. Clean the water level probe and test run.

Step 5 Start a new freeze cycle by pressing the power button.

Step 6 Wait until the pre-chill cycle begins, then jumper water level probe connection #2 & #3 at the control board.

A. Water level light energizes and water flow stops - Repair wire or replace water level probe.

B. Water level light does not energize and water continues to flow - Replace control board.

Step 6. Water level probe wires #2 & #3 jumpered at the control board connector			
Is Water Flowing into the Water Trough?	**The Water Level Light Is:**	**The Water Inlet Valve Solenoid Coil Is:**	**Cause**
No	On	De-energized	The interconnecting wire or water level probe is causing the problem. Ohm, then clean or replace the water level probe or wire.
Yes	Off	Energized	The control board is causing the problem.
Yes	On	De-energized	The water fill valve is causing the problem.

WATER WILL NOT RUN INTO THE SUMP TROUGH DURING THE FREEZE CYCLE

Step 1 Verify water is supplied to the ice machine.

Step 2 Scroll to Service/Diagnostics/Inputs and press down arrow until Wtr Low and Wtr High are displayed.

A. Yes is displayed - Control board is receiving a sensing water signal. Proceed to step 3.

B. No is displayed - Control board is not receiving a sensing water signal. Proceed to Control Board Diagnostics page 124.

Step 3 Disconnect water level probe, observe LCD display text.

A. No is displayed - Clean the water level probe and test interconnecting wiring.

B. Yes is displayed - Refer to Control Board Diagnostics page 124

ICE THICKNESS PROBE (HARVEST INITIATION)

FUNCTION

The ice thickness probe senses ice on the evaporator and signals the control board to start a harvest cycle. After ice forms on the evaporator, the ice will contact the ice thickness probe and a harvest cycle is initiated.

SPECIFICATIONS

Freeze Time Lock-In Feature

The ice machine control system incorporates a freeze time lock-in feature. This prevents the ice machine from short cycling in and out of harvest.

The control board locks the ice machine in the freeze cycle and a harvest cycle can not start for six minutes.

Maximum Freeze Time

The control system includes a built-in safety which will automatically cycle the ice machine into harvest after 60 minutes in the freeze cycle.

Maximum Temperature

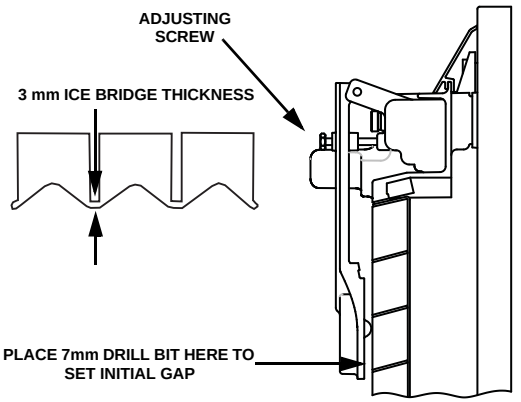
Maximum temperature for the ice thickness probe is 49 degree's C. Do not clean probe in a dishwasher or expose to temperatures above the maximum.

Ice Thickness Check

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

NOTE: Make sure the water curtain/splash shields are in place when performing this check. It prevents water from splashing out of the water trough.

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

Diagnostics

SYMPTOMS

Premature harvest

- Display indicates ITP Fault
- Low ice production
- Thin ice in bin
- Freeze cycles are faster than published cycle times

Will not harvest

- Display indicates ITP Fault
- Low ice production
- Thick ice in bin
- Large sheet of ice on evaporator
- Harvest cycle doesn't start
- Freeze cycles are slower than published cycle times

ICE MACHINE CYCLES INTO HARVEST BEFORE ICE CONTACTS THE ICE THICKNESS PROBE

1. Reboot the control board by disconnecting and reconnecting line voltage to the ice machine.
2. Verify ice thickness probe gap is approximately 7 mm.
3. Wait six minutes:

- Ice Machine remains in freeze cycle - Allow ice machine to run.
- Ice machine cycles into harvest - Replace ice thickness probe to determine if problem is resolved. If problem persists replace the control board.

NOTE: Do not disconnect the ITP leads from the control board as this will cause the ice machine to go into harvest after the 6 min lock in.

ICE MACHINE DOES NOT CYCLE INTO HARVEST

If ice is on the evaporator initiate a manual harvest cycle by performing the following keystrokes.

- Press Menu
- Scroll down to Service and press right arrow
- Scroll down to Man Harvest and press right arrow - A new freeze cycle will start after the manual harvest cycle is complete.

1. Reboot the control board by disconnecting and reconnecting line voltage to the ice machine.
2. Verify ice thickness probe gap is approximately 7 mm.
3. Wait for ice to contact the ice thickness probe.

- Ice Machine cycles into harvest normally - Allow ice machine to run.
- Ice machine will not cycle into harvest - Replace ice thickness probe to determine if problem is resolved. If problem persists replace the control board.

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.

Specifications	
Cut-Out	**Cut-In**
2413 kPa ±24.13 bar ±.69 350 psig ±10	Automatic Reset
Must be below 1723 kPa 17.23 bar (250 psig) to reset.	

SYMPTOM

Opening the HPCO will cause the control board to initiate a 60 minute delay. The display counts down from 60 minutes to 0 minutes, at which point 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 60 minute delay or reopens when the compressor starts, the ice machine will start another 60 minute delay period. The ice machine will lockout after 10 failed attempts.

1. Machine is off and the display indicates "Delay min, HPCO Active"
2. Machine is running and the display indicates "HPC Fault" and an alert triangle

CHECK PROCEDURE

Symptom #1 Machine is off and the display indicates “Delay min, HPCO Active”.

1. Leave all wiring connectors attached and perform testing within the 60 minute time delay period
2. Check for line voltage at P9 connector on control board (Two wire connector adjacent to 9 pin connector).
   A. Line voltage present - HPCO switch has reset and closed.
   B. No line voltage present - HPCO switch is open.
3. Depending on timing either wait for the delay period to end or start a new freeze cycle. The ice machine will go to an initial start sequence. When the compressor relay closes the control board checks the HPCO
   A. HPCO is open - Another 60 minute delay period starts.
   B. HPCO closed - A 3.5 minute harvest cycle starts followed by an ice making cycle.
4. Run the system to see if the control trips. If HPCO opens, find the root cause - Fan motor, dirty condenser, refrigeration system issue, etc.

Symptom #2 Machine is running and the display indicates “HPC Fault” and an alert triangle

1. Navigate to Event Log on the Service menu. Scroll down to HPC Fault #5. Open the event and view when and how often HPCO Fault has occurred.
2. If this is a one time event it may be intermittent and caused by conditions around the unit changing. For example: High ambient temperature, blocked vents, etc.
3. Run the system to see if the control trips. If HPCO opens, find the root cause - Fan motor, dirty condenser, refrigeration system issue, etc.

FAN CYCLE CONTROL

FUNCTION

Cycles the fan motor on and off.

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)**
I0320 I0520	1723 kPa ±.34 (17.23 bar ±.34)	1517 kPa ±.34 (15.17 bar ±.34)

CHECK PROCEDURE

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

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

THERMISTORS

FUNCTION

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

SPECIFICATIONS:

Temperature of Thermistor		Resistance
°C	°F	K Ohms (x 1000)
-30° - -20°	-22° - -4°	820.85 - 466.35
-20° - -10°	-4° - 14°	466.35 - 269.05
-10° - 0°	14° - 32°	269.05 - 160.70
0° - 10°	32° - 50°	160.70 - 98.930
10° - 20°	50° - 68°	98.930 - 62.015
20° - 30°	68° - 86°	62.015 - 39.695
30° - 40°	86° - 104°	39.695 - 25.070
40° - 50°	104° - 122°	25.070 - 17.481
50° - 60°	122° - 140°	17.481 - 11.860
60° - 70°	140° - 158°	11.860 - 8.1900
70° - 80°	158° - 176°	8.1900 - 5.7530
80° - 90°	176° - 194°	5.7530 - 4.1015
90° - 100°	194° - 212°	4.1015 - 2.9735
100° - 110°	212° -230°	2.9735 - 2.1885
110° - 120°	230° - 248°	2.1885 - 1.6290
120° - 130°	248° - 266°	1.6290 - 1.2245
130° - 140°	266° - 284°	1.2245 - 0.9319
140° - 150°	284° - 302°	0.9319 - 0.7183
150° - 160°	302° - 320°	0.7183 - 0.5624
160° - 170°	320° - 338°	0.5624 - 0.4448
170° - 180°	338° - 356°	0.4448 - 0.3530
180° - 190°	356° - 374°	0.3530 - 0.2831
190° - 200°	374° - 392°	0.2831 - 0.2273

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

T1 - Air or Water cooled Models

- Liquid line temperature sensor located at the outlet of the condenser.

T2 - Air or Water cooled Models

- Discharge line temperature sensor located near the compressor.

T3 - Single Expansion Valve Models

- Suction line temperature sensor located at the inlet of the evaporator.

T4 - Single Expansion Valve Models

- Suction line temperature sensor located at the outlet of the evaporator.

Thermistor Matrix

Condensing Option	Temperature Sensing Universal Location							Machine Category Description
	R404a Ent Evap [Evap In]	[Left] R404a Lvg Evap [Evap Out]	[Right] R404a Lvg Evap [Evap Out]	Compressor Discharge	R404a Lvg Condenser [Liquid Line]	R404a Ent Receiver	R404a Lvg Receiver [DipTube]	
A [1]	T3	T4		T2	T1			Self Contained- Air Cooled: Hot- Gas Defrost
W [1]	T3	T4		T2	T1			Self Contained- Water Cooled: Hot Gas Defrost
A & W [48]		T4	T3	T2	T1			Self Contained- Air Cooled & Water Cooled: Hot Gas Defrost
N [1]	T3	T4		T2		T1		Split System - Remote Condenser: Hot Gas Defrost
N [48]		T4	T3	T2		T1		Split System - Remote Condenser: Hot Gas Defrost
C [1]	T3	T4				T1	T2	Split System - Remote Condensing Unit: Cool Vapor Defrost
C [2] [5]		T4	T3			T1	T2	Split System - Remote Condensing Unit: Cool Vapor Defrost

SYMPTOM

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

CHECK PROCEDURE

- Press the Menu button.
- Scroll down to Service and press right arrow.
- Scroll down to Diagnostics and press right arrow
- Scroll down to Temp Sensors and press right arrow to display thermistor temperature readings.

NOTE: An open thermistor will display -30°C and a shorted thermistor displays 246°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. Within 10% of the published resistance value - Thermistor is good
   B. 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 to -30°C indicates the control board is good.
2. Short thermistor pins - The display temperature reading, climbing to 246°C indicates the control board is good.

HARVEST ASSIST AIR PUMP

FUNCTION

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

SPECIFICATIONS

230 Volt - matches the ice machine voltage.

CHECK PROCEDURE

1. 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.
2. 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

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

CHECK MOTOR WINDINGS TO GROUND

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

COMPRESSOR DRAWING LOCKED ROTOR

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

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

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.

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

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

1. Disconnect wires from relay terminals.
2. Verify the contacts are closed.
   Measure the resistance between terminals 1 and 2. No continuity indicates open contacts. Replace the relay.
3. Check the relay coil.
   Measure the resistance between terminals 2 and 5. No resistance indicates an open coil. Replace the relay.

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 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.

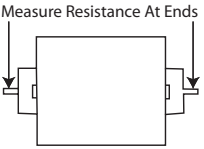
NOTE: If a PTCR is dropped internal damage can occur to the ceramic PTCR discs. The ceramic disc can chip and cause arcing which leads to PTCR failure. Since there is no way to open the PTCR in order to determine if the ceramic disc is chipped or not, it must be discarded when dropped.

PTCR Operation Check

1. Visually inspect the PTCR. Check for signs of physical damage.

NOTE: The PTCR case temperature may reach 100°C while the compressor is running. This is normal. Do not change a PTCR just because it is hot.

2. Wait at least 10 minutes for the PTCR to cool to room temperature.
3. Remove the PTCR from the ice machine.
4. Measure the resistance of the PTCR as shown. The resistance reading must be between 18 and 40 ohms



PTCR

Refrigerant Recovery/Evacuation/ Charging procedures

Requirements and procedures vary by location. Follow your local laws governing the recovery, evacuation and charging of equipment that contains propane refrigerant.

Liquid Line Filter-Driers

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

The difference between a Manitowoc drier and an off-the-shelf drier is in filtration. A Manitowoc drier has dirt-retaining filtration, with 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.

Total System Refrigerant Charge

NOTE: All machines listed use R-290 refrigerant - 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.

Model	Air Cooled
I0320	Data Not Available At This Time
I0500	140 grams

Cycle Times/24-Hour Ice Production/ Charts

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

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

- Ice production checks that are within 10% of the chart are considered normal. This is due to variances in water and air temperature. Actual temperatures will seldom match the chart exactly.
- Refer to “Symptom #2 - Operational Analysis Table” page 96 for the list of data that must be collected for refrigeration diagnostics.

I0320A AIR-COOLED MODEL

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °C/°F	Freeze Time			Harvest Time[1]
	Water Temperature °C/°F			
	10°C/50°F	21°C/70°F	32°C/90°F	
21°C/70°F				1-2.5
27°C/80°F	NO	DATA		
32°C/90°F				
38°C/100°F				

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °C/°F	Water Temperature °C/°F[1]		
	10°C 50°F	21°C 70°F	32°C 90°F
21°C - kgs 70°F - lbs			
27°C - kgs 80°F - lbs	NO	DATA	
32°C - kgs 90°F - lbs			
38°C - kgs 100°F - lbs			

1 Based on average ice slab weight of 2087 - 2359 g (4.60 - 5.20 lb.)

OPERATING TEMPERATURES

10°C Water Temperature

Air Temp Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Temp T2	Suction Temp[1] T4	Discharge Temp T2	Suction Temp T4
10°C 50°F				
21°C 70°F				
27°C 80°F		NO	DATA	
32°C 90°F				
38°C 100°F				

1 Suction temperature drops gradually throughout the freeze cycle

21°C Water Temperature

Air Temp Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Temp T2	Suction Temp[1] T4	Discharge Temp T2	Suction Temp T4
10°C 50°F				
21°C 70°F		NO	DATA	
27°C 80°F				
32°C 90°F				
38°C 100°F				

1 Suction temperature drops gradually throughout the freeze cycle

32°C Water Temperature

Air Temp Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Temp T2	Suction Temp[1] T4	Discharge Temp T2	Suction Temp T4
10°C 50°F				
21°C 70°F				
27°C 80°F		NO	DATA	
32°C 90°F				
38°C 100°F				

1 Suction temperature drops gradually throughout the freeze cycle

I0500A AIR-COOLED MODEL

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °C/°F	Freeze Time			Harvest Time[1]
	Water Temperature °C/°F			
	10°C/50°F	21°C/70°F	32°C/90°F	
21°C/70°F	13.4-15.3	14.5-16.5	15.7-17.9	1-2.5
27°C/80°F	14.5-16.5	15.5-17.7	16.6-19.0	
32°C/90°F	15.7-17.9	16.9-19.3	18.9-21.5	
38°C/100°F	17.2-19.6	18.9-21.5	21.0-23.9	

1 Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °C/°F	Water Temperature °C/°F[1]		
	10°C 50°F	21°C 70°F	32°C 90°F
21°C - kgs 70°F - lbs	202 445	188 415	175 385
27°C - kgs 80°F - lbs	188 415	177 390	165 365
32°C - kgs 90°F - lbs	175 385	163 360	147 325
38°C - kgs 100°F - lbs	161 355	147 325	134 295

1 Based on average ice slab weight of 1474- 1655 g (3.25 - 3.65lb.)

OPERATING TEMPERATURES

10°C Water Temperature

Air Temp Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Temp T2	Suction Temp[1] T4	Discharge Temp T2	Suction Temp T4
10°C 50°F	74 / 82 165 / 180	-6 / -12 20 / 10	43 / 52 115 / 125	2 / 10 35 / 50
21°C 70°F	77 / 85 170 / 185	-5 / -11 22 / 12	49 / 57 120 / 135	3 / 11 38 / 52
27°C 80°F	82 / 91 180 / 195	-4 / -10 24 / 10	54 / 66 130 / 150	3 / 13 38 / 55
32°C 90°F	83 / 104 182 / 220	-3 / -9 26 / 16	60 / 79 140 / 175	3 / 16 38 / 60
38°C 100°F	93 / 113 200 / 235	-2 / -7 28 / 18	79 / 82 150 / 180	4 / 16 40 / 60

1 Suction temperature drops gradually throughout the freeze cycle

21°C Water Temperature

Air Temp Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Temp T2	Suction Temp[1] T4	Discharge Temp T2	Suction Temp T4
10°C **50°F**	77 / 85 170 / 185	-6 / -11 21 / 11	46 / 52 115 / 125	2 / 13 35 / 55
21°C **70°F**	23 / 88 175 / 190	-5 / -10 22 / 13	49 / 57 120 / 135	2 / 13 36 / 55
27°C **80°F**	82 / 91 108 / 195	-4 / -9 24 / 15	52 / 63 15 / 145	3 / 13 37 / 55
32°C **90°F**	88 / 93 190 / 200	-4 / -9 25 / 15	60 / 66 140 / 150	3 / 13 37 / 55
38°C **100°F**	96 / 113 205 / 235	-4 / -6 25 / 20	68 / 85 155 / 185	4 / 13 40 / 55

1 Suction temperature drops gradually throughout the freeze cycle

32°C Water Temperature

Air Temp Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Temp T2	Suction Temp[1] T4	Discharge Temp T2	Suction Temp T4
10°C **50°F**	78 / 88 173 / 190	-5 / -11 22 / 12	47 / 54 117 / 130	3 / 14 38 / 58
21°C **70°F**	82 / 92 180 / 198	-4 / -10 24 / 14	50 / 60 122 / 140	4 / 16 40 / 60
27°C **80°F**	88 / 102 190 / 215	-3 / -9 26 / 16	54 / 68 130 / 155	6 / 17 42 / 62
32°C **90°F**	93 / 113 200 / 235	-2 / -7 28 / 18	60 / 82 140 / 180	6 / 18 43 / 64
38°C **100°F**	99 / 118 210 / 245	-1 / -6 30 / 20	68 / 88 155 / 190	7 / 18 15 / 65

1 Suction temperature drops gradually throughout the freeze cycle

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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.

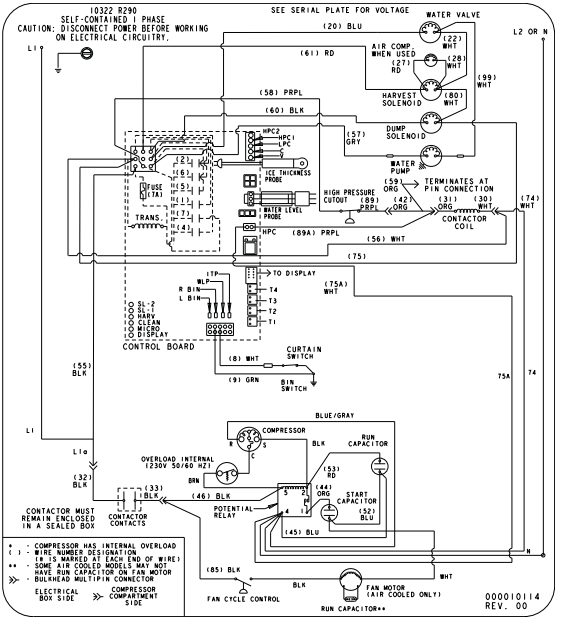
> **⚠ Warning**
>
> Always disconnect power before working on electrical circuitry.

WIRING DIAGRAM LEGEND

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

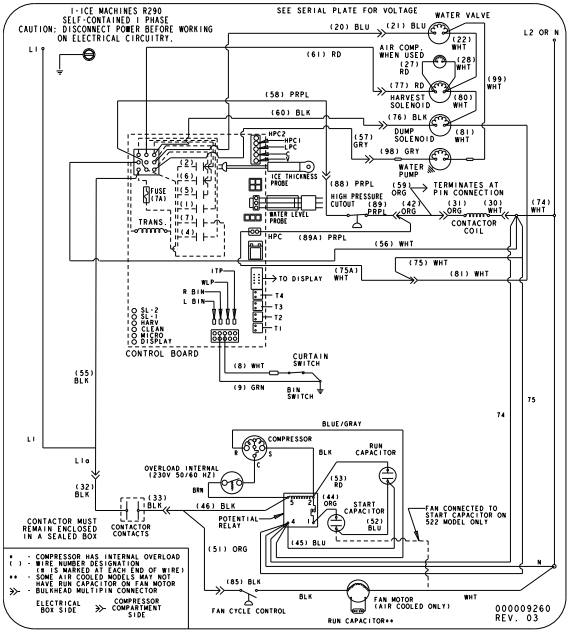
*	Internal Compressor Overload (Some models have external compressor overloads)
**	Fan Motor Run Capacitor (Some models do not incorporate fan motor run capacitor)
( )	Wire Number Designation (The number is marked at each end of the wire)
—>>—	Multi-Pin Connection (Electrical Box Side) —>>— (Compressor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

I0320
Self Contained - 1 Ph

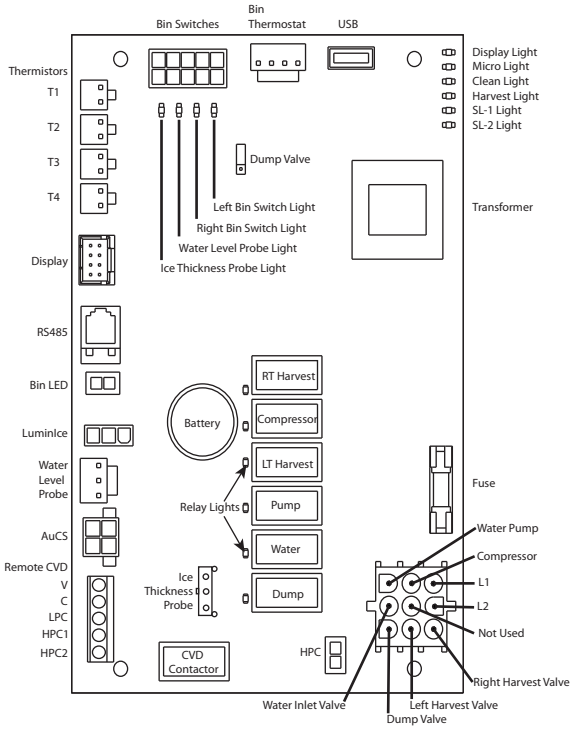


I0500

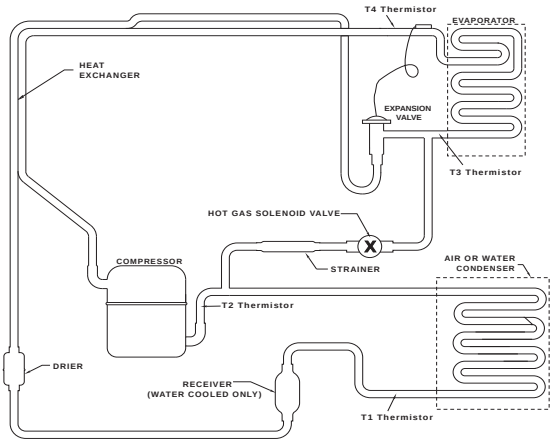
Self Contained - 1 Ph



Electronic Control Board



Refrigeration Tubing Schematics





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