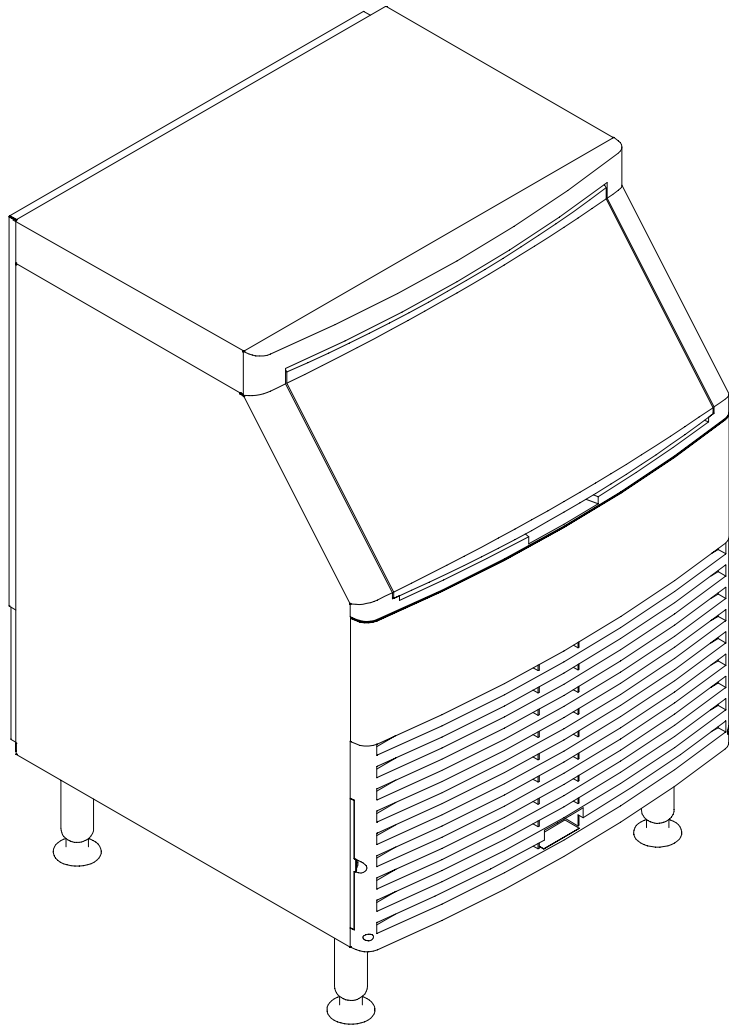


Manitowoc[®]



Q130/Q210/Q270 Series Ice Machines

**Installation, Use, Care
and Service Manual**

Thank you for selecting a Manitowoc Ice Machine, the dependability leader in ice making equipment and related products. With proper installation, care and maintenance, your new Manitowoc Ice Machine will provide you with many years of reliable and economical performance.

Safety Notices

When using or servicing a Q Model Ice Machine, be sure to pay close attention to the safety notices in this manual. Disregarding the notices may lead to serious injury and/or damage to the ice machine.

Throughout this manual, 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, and then proceed carefully.

CAUTION

Text in a Caution box alerts you to a situation in which you could damage the ice machine. Be sure to read the Caution statement, and then proceed carefully.

Procedural Notices

When using or servicing a Q Model Ice Machine, be sure to read the procedural notices in this manual. These notices supply helpful and important information.

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

Important

Important boxes serve two functions.

They call the operator's attention to important information.

They also provide the service technician with information that may help perform a procedure more efficiently. Disregarding this information may slow down the work.

NOTE: Text set off as a Note provides you with simple, but useful, extra information.

Please read the following Safety Notices before proceeding.

CAUTION

Proper installation, care and maintenance are essential for maximum ice production and trouble-free operation of your Manitowoc Ice Machine.

Read and understand this manual. It contains valuable care and maintenance information. If you encounter problems not covered by this manual, feel free to contact Manitowoc Ice, Inc. We will be happy to provide assistance.

Important

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

Warning

PERSONAL INJURY POTENTIAL

Do not operate equipment that has been, misused, abused, neglected, damaged, or altered/modified from that of original manufactured specifications.

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Section 1
General Information

Model Numbers

This manual covers the following models:

Self-Contained Air-Cooled	Self-Contained Water-Cooled
QRO130A	QRO131W
QDO132A	QDO133W
QYO134A	QYO135W
QRO210A	QRO211W
QDO212A	QDO213W
QYO214A	QYO215W
QRO270A	QRO271W
QDO272A	QDO273W
QYO274A	QYO275W

Accessories

Contact your Manitowoc distributor for these optional accessories:

BIN CASTER

Replaces standard legs.

TRI-LIMINATOR WATER FILTER SYSTEM

Engineered specifically for Manitowoc ice machines, Tri-Liminator water filters are an efficient, dependable, and affordable method of inhibiting scale formation, filtering sediment, and removing chlorine taste and odor.

MANITOWOC CLEANER AND SANITIZER

Manitowoc Ice Machine Cleaner and Sanitizer are available in convenient 16 oz. (473 ml) and 1 gal (3.78 l) bottles. These are the only cleaner and sanitizer approved for use with Manitowoc products.

Cleaner Part Number		Sanitizer Part number	
16oz	94-0456-3	16oz	94-0565-3
1 Gallon	94-0580-3	1 Gallon	94-0581-3

Note: The Manitowoc Automatic Cleaning System (AUCS®) accessory can not be used with models Q130, Q210 or Q270 ice machines.

Q130, Q210 and Q270 model ice machines do not have a water curtain covering the evaporator. The ice damper performs the functions of the water curtain see sections 4 and 6 for details.

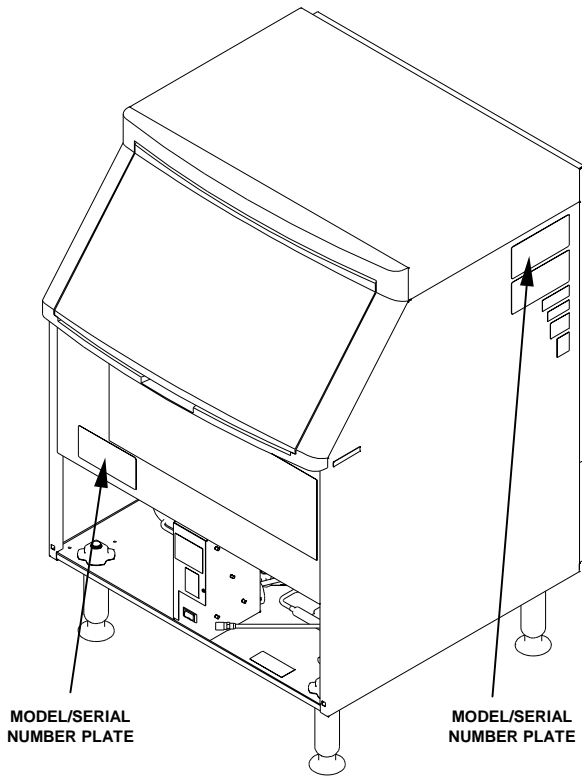
Model/Serial Number Location

Record the model and serial number of your ice machine in the space provided below. These numbers are required when requesting information from your local Manitowoc distributor, service representative, or Manitowoc Ice, Inc.

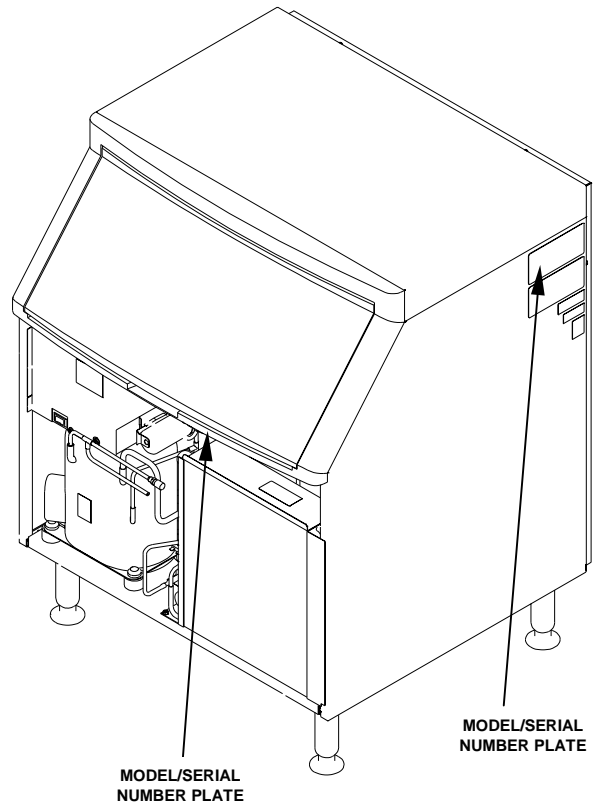
The model and serial number are listed on the OWNER WARRANTY REGISTRATION CARD. They are also listed on the MODEL/SERIAL NUMBER DECAL affixed to the ice machine.

Q130/Q210 MODELS

Q270 MODELS



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Model/Serial Number Location

Ice Machine	
Model Number	
Serial Number	

Owner Warranty Registration Card

GENERAL

The packet containing this manual also includes warranty information. Warranty coverage begins the day your new ice machine is installed.

Important

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

If you do not return your OWNER WARRANTY REGISTRATION CARD, Manitowoc will use the date of sale to the Manitowoc Distributor as the first day of warranty coverage for your new ice machine.

Warranty Coverage

GENERAL

The following Warranty outline is provided for your convenience. For a detailed explanation, read the warranty bond shipped with each product.

Contact your local Manitowoc representative or Manitowoc Ice, Inc. if you need further warranty information.

Important

This product is intended exclusively for commercial application. No warranty is extended for personal, family, or household purposes.

PARTS

1. Manitowoc warrants the ice machine against defects in materials and workmanship, under normal use and service for three (3) years from the date of original installation.
2. The evaporator and compressor are covered by an additional two (2) year (five years total) warranty beginning on the date of the original installation.

LABOR

1. Labor required to repair or replace defective components is covered for three (3) years from the date of original installation.
2. The evaporator is covered by an additional two (2) year (five years total) labor warranty beginning on the date of the original installation.

EXCLUSIONS

The following items are not included in the ice machine's warranty coverage:

1. Normal maintenance, adjustments and cleaning as outlined in this manual.
2. Repairs due to unauthorized modifications to the ice machine or use of non-standard parts without prior written approval from Manitowoc Ice, Inc.
3. Damage caused by improper installation of the ice machine, electrical supply, water supply or drainage, or damage caused by floods, storms, or other acts of God.
4. Premium labor rates due to holidays, overtime, etc.; travel time; flat rate service call charges; mileage and miscellaneous tools and material charges not listed on the payment schedule. Additional labor charges resulting from the inaccessibility of equipment are also excluded.
5. Parts or assemblies subjected to misuse, abuse, neglect or accidents.
6. Damage or problems caused by installation, cleaning and/or maintenance procedures inconsistent with the technical instructions provided in this manual.
7. This product is intended exclusively for commercial application. No warranty is extended for personal, family, or household purposes.

AUTHORIZED WARRANTY SERVICE

To comply with the provisions of the warranty, a refrigeration service company, qualified and authorized by your Manitowoc distributor, or a Contracted Service Representative must perform the warranty repair.

NOTE: If the dealer you purchased the ice machine from is not authorized to perform warranty service, contact your Manitowoc distributor or Manitowoc Ice, Inc. for the name of the nearest authorized service representative.

SERVICE CALLS

Normal maintenance, adjustments and cleaning as outlined in this manual are not covered by the warranty. If you have followed the procedures listed on page 5-1 of this manual, and the ice machine still does not perform properly, call your authorized service company.

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Section 2 Installation Instructions

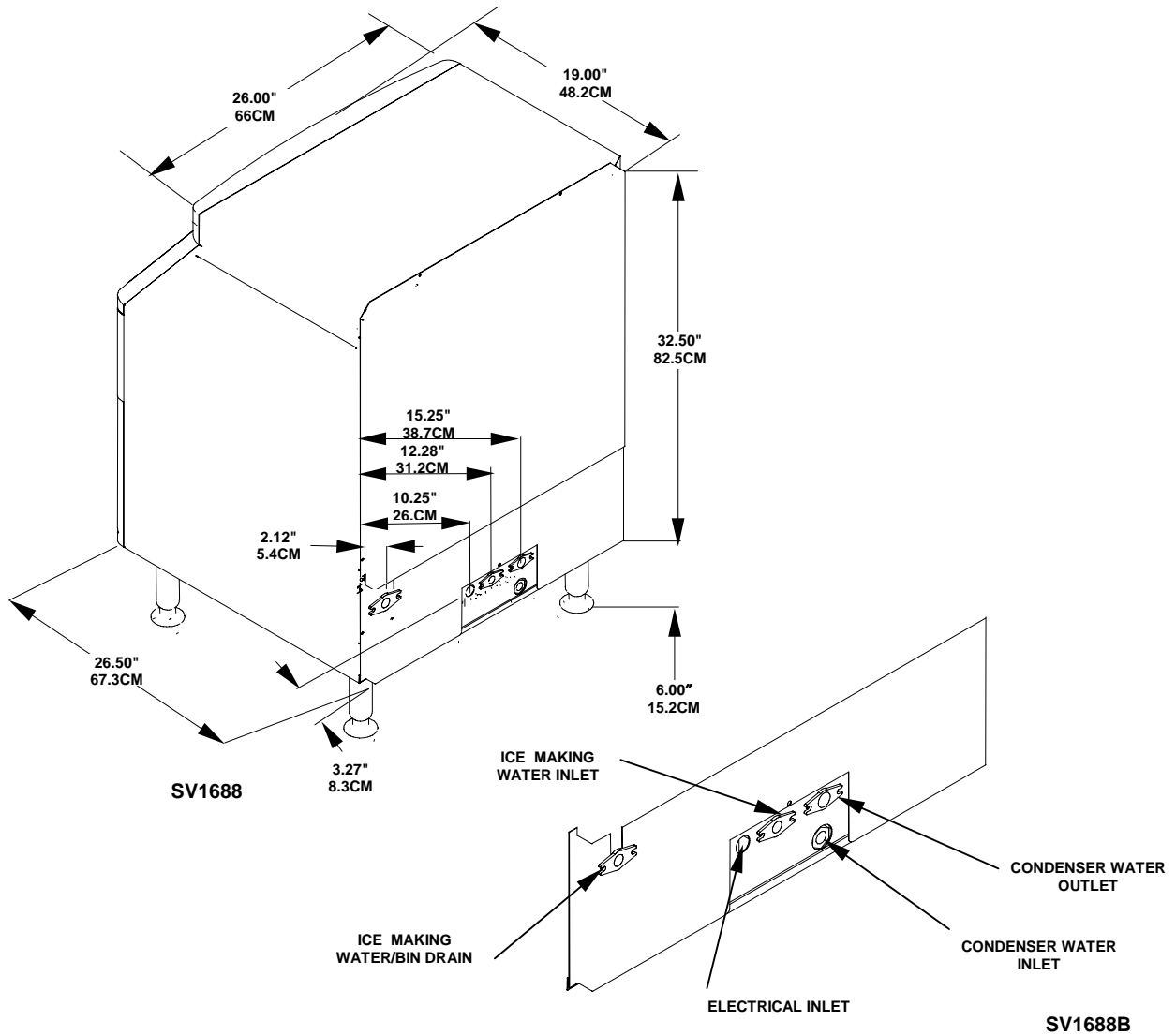
General

These instructions are provided to assist the qualified installer. Check your local Yellow Pages for the name of the nearest Manitowoc distributor, or call Manitowoc Ice, Inc. for information regarding start-up services.

Important
Failure to follow these installation guidelines may affect warranty coverage.

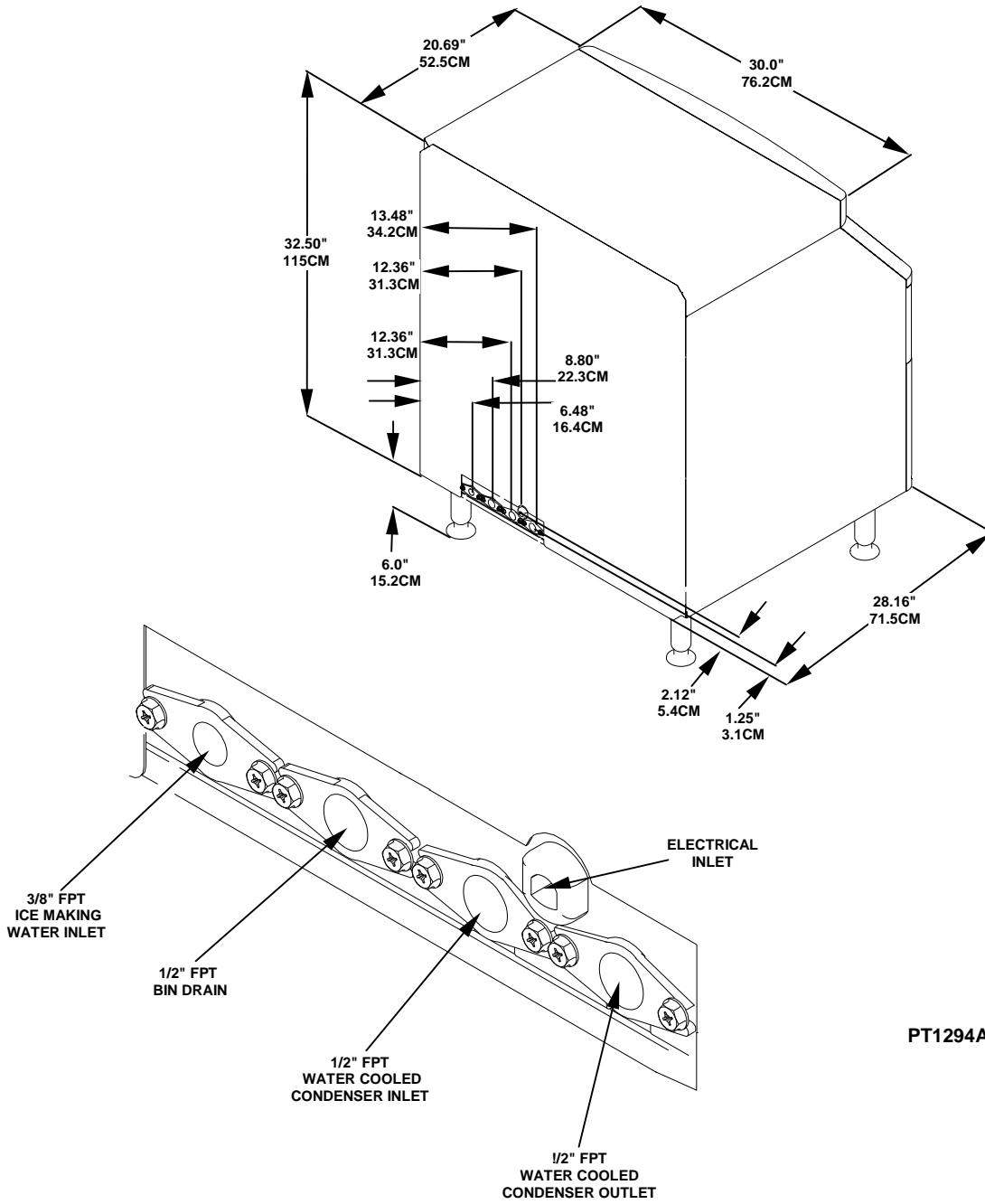
Ice Machine Dimensions

Q130/Q210 ICE MACHINES



Ice Machine Dimensions

Q270 ICE MACHINES




Location of Ice Machine

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

- The location must be indoors.
- The location must be free of airborne and other contaminants.
- The air temperature must be at least 35°F (1.7°C), but must not exceed 110°F (43.4°C).
- The location must not be near heat-generating equipment or in direct sunlight.
- The location must be capable of supporting the weight of the ice machine and a full bin of ice.
- The location must allow enough clearance for water, drain and electrical connections in the **rear of the ice machine**.
- The location must not obstruct airflow through or around the ice machine (condenser airflow is in and out the front). Refer to the chart below for clearance requirements.

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

* NOTE: The ice machine may be built into a cabinet. There is no minimum clearance requirement for the top or left and right sides of the ice machine. The listed values are recommended for efficient operation and servicing only.

 **CAUTION**

The ice machine must be protected if it will be subjected to temperatures below 32°F (0°C). Failure caused by exposure to freezing temperatures is not covered by the warranty. See "Removal from Service/Winterization" on page 4-11.

Ice Machine Heat of Rejection

Series Ice Machine	Heat of Rejection*	
	Air Conditioning**	Peak
Q130	2100	3300
Q210	2400	3400
Q270	3800	6000

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

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

Leveling the Ice Machine

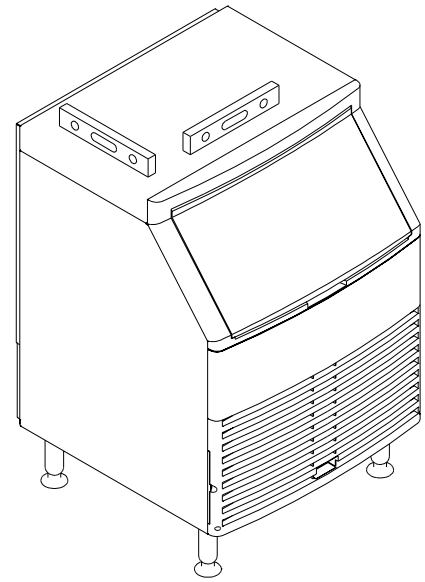
1. Screw the leveling legs onto the bottom of the ice machine.
2. Screw the foot of each leg in as far as possible.

CAUTION

The legs must be screwed in tightly to prevent them from bending.

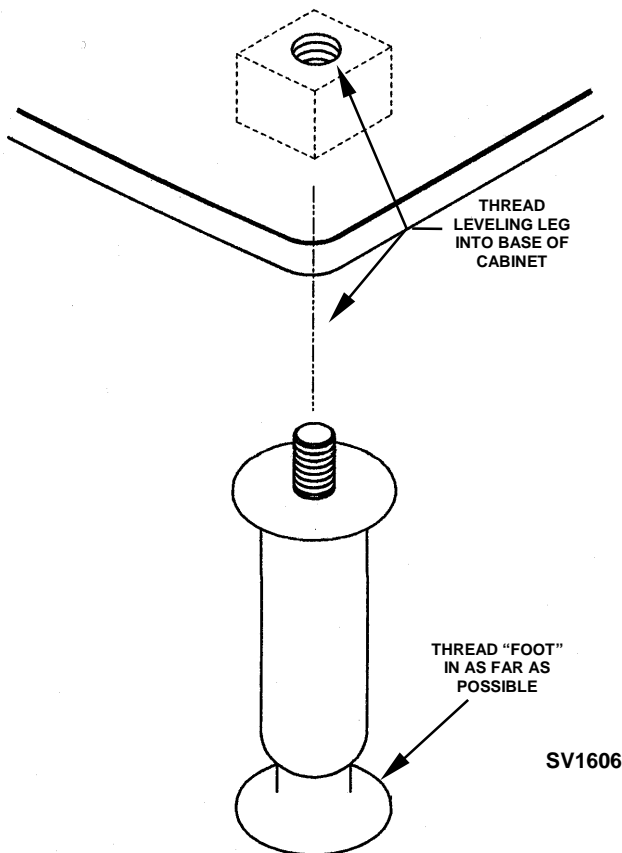
3. Move the ice machine into its final position.
4. Level the ice machine to assure that the siphon system functions correctly. Use a level on top of the ice machine. Turn each foot as necessary to level the ice machine from front to back and side to side.

NOTE: An optional 2 1/2" caster assembly is available for use in place of the legs on the Q130, Q210 and Q270. Installation instructions are supplied with the casters.



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Checking Ice Machine Level



SV1606

Electrical Service

GENERAL

⚠ WARNING

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

⚠ WARNING

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

VOLTAGE

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

The 115/1/60 ice machines are factory pre-wired with a 6' power cord, and NEMA 5-20P-plug configuration.

The 208-230/1/60 and 230/50/1 ice machines are factory pre-wired with a 6' power cord only, no plug is supplied.

FUSE/CIRCUIT BREAKER

A separate fuse/circuit breaker must be provided for each ice machine. Circuit breakers must be H.A.C.R. rated (does not apply in Canada).

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.

Q130/Q210/Q270 ICE MACHINE

Ice Machine	Voltage Phase Cycle	Air-Cooled		Water Cooled	
		Maximum Fuse/Circuit Breaker	Total Amps	Maximum Fuse/Circuit Breaker	Total Amps
Q130	115/1/60	15	7.6	15	6.8
	208-230/1/60	15	3.3	15	2.8
	230/1/50	15	3.3	15	2.8
Q210	115/1/60	15	8	15	8
	208-230/1/60	15	4	15	4
	230/1/50	15	4	15	4
Q270	115/1/60	15	9.9	15	9.1
	208-230/1/60	15	3.4	15	2.9
	230/1/50	15	3.4	15	2.9

For United Kingdom Only

As the colours of the wires in the mains lead of the appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The wire which is coloured green and yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth ground symbol  or coloured green or green and yellow.
- The wire coloured blue must be connected to the terminal which is marked with the letter N or coloured black.
- The wire coloured brown must be connected to the terminal which is marked with the letter L or coloured red.

Water Service/Drains

WATER SUPPLY

Local water conditions may require treatment of the water to inhibit scale formation, filter sediment, remove chlorine, and improve taste and clarity.

Important

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

WATER INLET LINES

Follow these guidelines to install water inlet lines:

- Do not connect the ice machine to a hot water supply. Be sure all hot water restrictors installed for other equipment are working. (Check valves on sink faucets, dishwashers, etc.)
- If water pressure exceeds the maximum (80 psig-551.5 kPA) recommended pressure, obtain a water pressure regulator from your Manitowoc distributor.
- Install a water shut-off valve and union for both the ice making and condenser water lines.
- Insulate water inlet lines to prevent condensation.

DRAIN CONNECTIONS

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

- Drain lines must have a 1.5 inch (3.8 cm) drop per 5 feet of run (2.5 cm per meter), and must not create traps.
- The floor drain must be large enough to accommodate drainage from all drains.
- Run separate bin and water-cooled condenser drain lines. Insulate them to prevent condensation.
- Vent the bin drain to the atmosphere. Do not vent the condenser drain on water-cooled models.

COOLING TOWER APPLICATIONS

(Water-Cooled Models)

A water cooling tower installation does not require modification of the ice machine. The water regulator valve for the condenser continues to control the refrigeration discharge pressure.

It is necessary to know the amount of heat rejection, (refer to page 2-3) and the pressure drop through the condenser and water valves (inlet and outlet) when using a cooling tower on an ice machine.

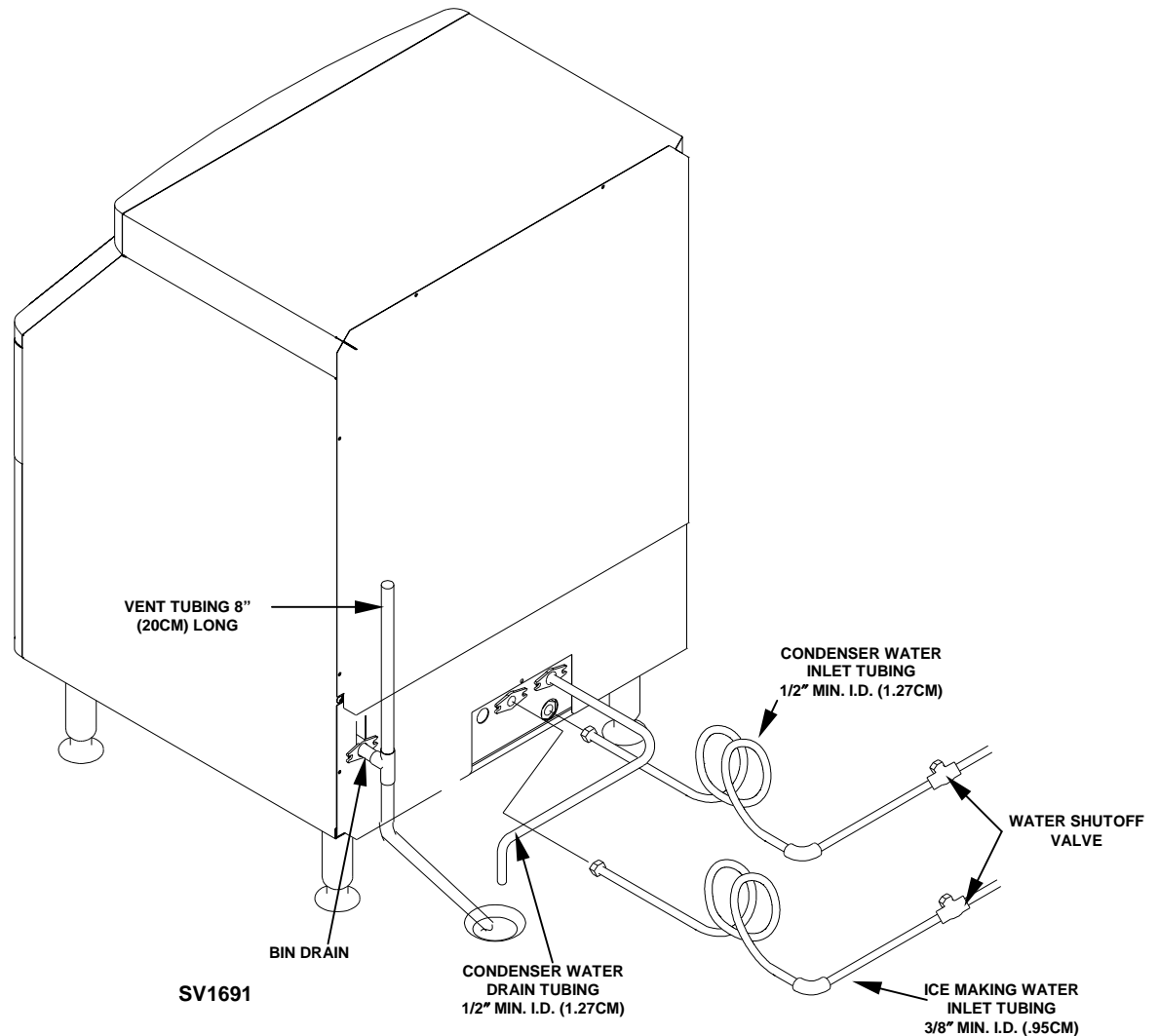
- Water entering the condenser must not exceed 90°F (32.2°C).
- Water flow through the condenser must not exceed 5 gallons (19 liters) per minute.
- Allow for a pressure drop of 7 psi (48 kPA) between the condenser water inlet and the outlet of the ice machine.
- Water exiting the condenser must not exceed 110°F (43.3°C).

WATER SUPPLY AND DRAIN LINE SIZING/CONNECTIONS

⚠ CAUTION
Plumbing must conform to state and local codes.

Location	Water Temperature	Water Pressure	Ice Machine Fitting	Tubing Size Up to Ice Machine Fitting
Ice Making Water Inlet	33°F (0.6°C) Min. 90°F (32.2°C) Max.	20 psi (137.9 kPA) Min. 80 psi (551.5 kPA) Max.	3/8" Female Pipe Thread	3/8" (9.5 mm) minimum inside diameter
Condenser Water Inlet	33°F (0.6°C) Min. 90°F (32.2°C) Max.	20 psi (137.9 kPA) Min. 150 psi (1034.2 kPA) Max.	1/2" Female Pipe Thread	1/2" (12.7 mm) minimum inside diameter
Condenser Water Drain	---	---	1/2" Female Pipe Thread	1/2" (12.7 mm) minimum inside diameter
Bin Drain	---	---	1/2" Female Pipe Thread	1/2" (12.7 mm) minimum inside diameter

Typical Water Supply Drain Installation



Installation Checklist

- Is the ice machine level?
- Has all of the internal packing been removed?
- Have all of the electrical and water connections been made?
- Has the supply voltage been tested and checked against the rating on the nameplate?
- Is there proper clearance around the ice machine for air circulation?
- Has the ice machine been installed where ambient temperatures will remain in the range of 35° - 110°F (1.7° - 43.3°C)?
- Has the ice machine been installed where the incoming water temperature will remain in the range of 33° - 90°F (0.6° - 32.2°C)?
- Is there a separate drain line for the water-cooled condenser?
- Are all electrical leads free from contact with refrigeration lines and moving equipment?
- Has the owner/operator been instructed regarding maintenance and the use of Manitowoc Cleaner and Sanitizer?
- Has the owner/operator completed the warranty registration card?
- Has the ice machine and bin been sanitized?
- Has this manual been given to the owner/operator?

Before Starting the Ice Machine

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

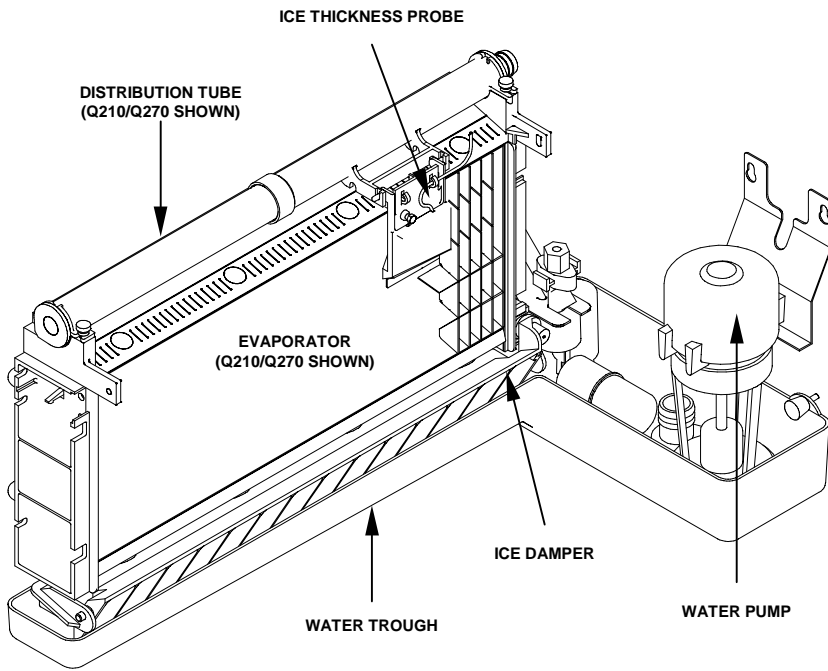
To ensure proper operation, follow the Operational Checks on page 3-4 of this manual. Starting the ice machine and completing the Operational Checks are the responsibilities of the owner/operator.

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

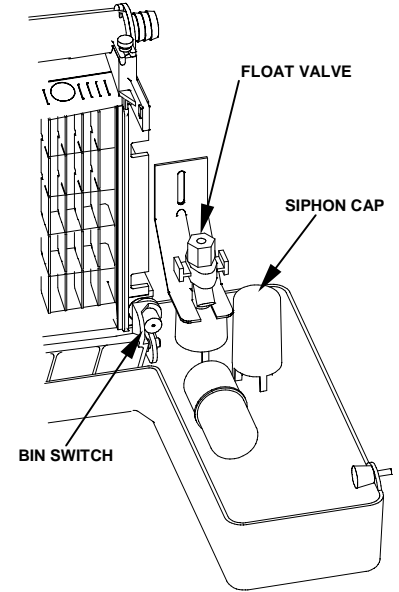
 **WARNING****PERSONAL INJURY POTENTIAL**

Do not operate equipment that has been misused, abused, neglected, damaged, or altered/modified from that of original manufactured specifications.

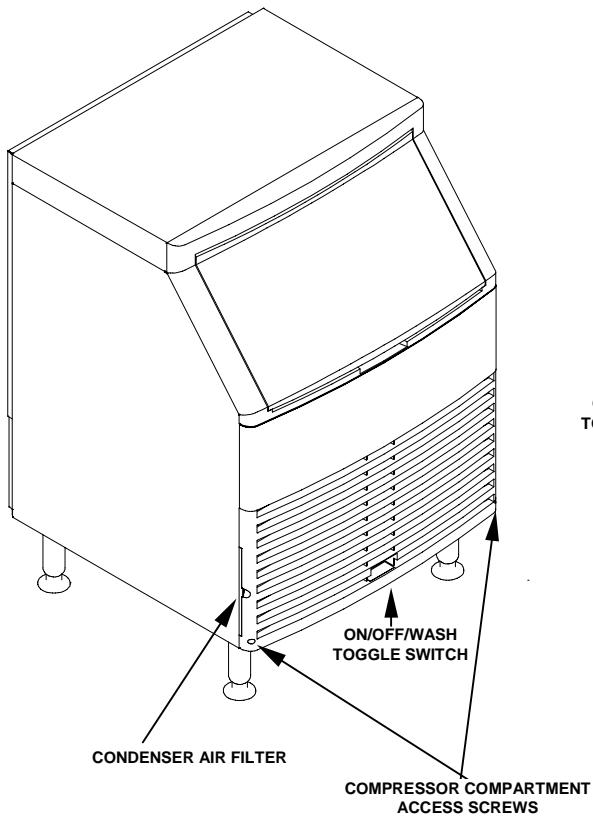
Ice Machine Operation
Component Identification



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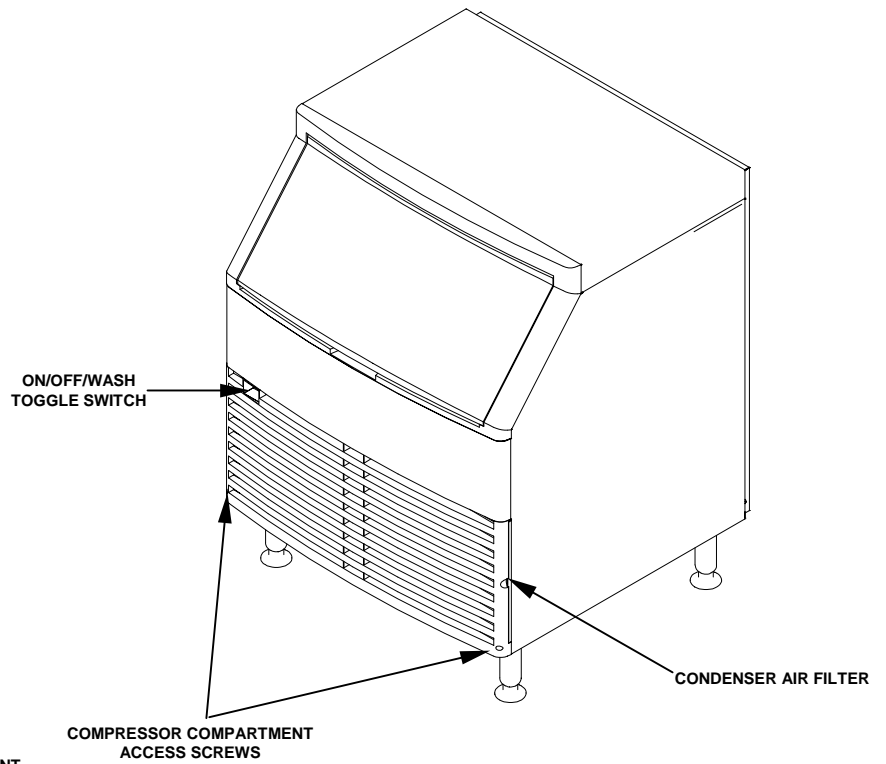


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Q130/Q210 ICE MACHINES



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Q270 ICE MACHINES

Ice Making Sequence of Operation

INITIAL START-UP OR START-UP AFTER AUTOMATIC SHUT-OFF

1. Pressure Equalization

Before the compressor starts the hot gas valve is energized for 15 seconds to equalize pressures during the initial refrigeration system start-up.

2. Refrigeration System Start-Up

The compressor starts after the 15-second pressure equalization, and remains on throughout the entire Freeze and Harvest Sequences. The hot gas valve remains on for 5 seconds during initial compressor start-up and then shuts off.

At the same time the compressor starts, the condenser fan motor (air-cooled models) is supplied with power throughout the entire Freeze and Harvest Sequences. The fan motor is wired through a fan cycle pressure control, therefore it may cycle on and off. (The compressor and condenser fan motor are wired through the relay. As a result, any time the relay coil is energized, the compressor and fan motor are supplied with power.)

FREEZE SEQUENCE

3. Prechill

The compressor is on for 30 seconds prior to water flow to Prechill the evaporator.

4. Freeze

The water pump starts after the 30-second Prechill. An even flow of water is directed across the evaporator and into each cube cell, where it freezes.

When sufficient ice has formed, the water flow (not the ice) contacts the ice thickness probe. After approximately 7 seconds of continual water contact, the Harvest Sequence is initiated. The ice machine cannot initiate a Harvest Sequence until a 6-minute freeze time has been surpassed.

HARVEST SEQUENCE

5. Harvest

The water pump de-energizes stopping flow over the evaporator. The rising level of water in the sump trough diverts water out of the overflow tube, purging excess minerals from the sump trough. The hot gas valve also opens to divert hot refrigerant gas into the evaporator.

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 contacts the ice damper, opening the 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 (steps 3 - 4).

AUTOMATIC SHUT-OFF

6. Automatic Shut-Off

When the storage bin is full at the end of a Harvest Sequence, the sheet of cubes fails to clear the ice damper and will hold it down. After the ice damper is held open for 7 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 damper. As the ice damper swings back to the operating position, the bin switch re-closes and the ice machine restarts (steps 1 - 2), provided the 3-minute delay period is complete.

Q130/Q210/Q270 SELF-CONTAINED ICE MACHINES

ENERGIZED PARTS CHART

ICE MAKING SEQUENCE OF OPERATION

	CONTROL BOARD RELAYS			RELAY		LENGTH of "ON" TIME
	1 WATER PUMP	2 HOT GAS VALVE	3 RELAY COIL	3A COMPRESSOR	3B CONDENSER * FAN MOTOR	
INITIAL START-UP/ START UP AFTER AUTO SHUT-OFF: 1. Pressure Equalization	OFF	ON	OFF	OFF	OFF	15 Seconds
	OFF	ON	ON	ON	ON	5 Seconds
FREEZE SEQUENCE: 3. Pre-Chill	OFF	OFF	ON	ON	ON	30 Seconds
	ON	OFF	ON	ON	ON	Until 7 sec. water contact with ice thickness probe
HARVEST SEQUENCE: 5. Harvest	OFF	ON	ON	ON	ON	Bin switch activation
AUTOMATIC SHUT-OFF: 6. Auto Shut-Off	OFF	OFF	OFF	OFF	OFF	Until bin switch re-closes

* **Condenser Fan Motor:** The fan motor is wired through a fan cycle pressure control, therefore, it may cycle on and off.

Operational Checks

GENERAL

Your Manitowoc ice machine was factory-operated and adjusted before shipment. Normally, a newly installed ice machine does not require any adjustment.

To ensure proper operation, always follow these Operational Checks when starting the ice machine:

- for the first time
- after a prolonged out of service period
- after cleaning and sanitizing

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

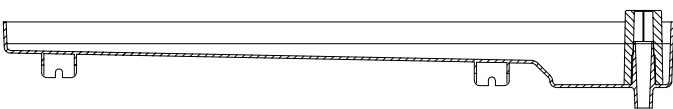
SIPHON SYSTEM

To reduce mineral build-up and cleaning frequency, the water in the sump trough must be purged during each harvest cycle.

When the water pump de-energizes the level in the water trough rises above the standpipe starting a siphon action. The siphon action stops when the water level in the sump trough drops. When the siphon action stops, the float valve refills the water trough to the correct level.

Siphon System Check

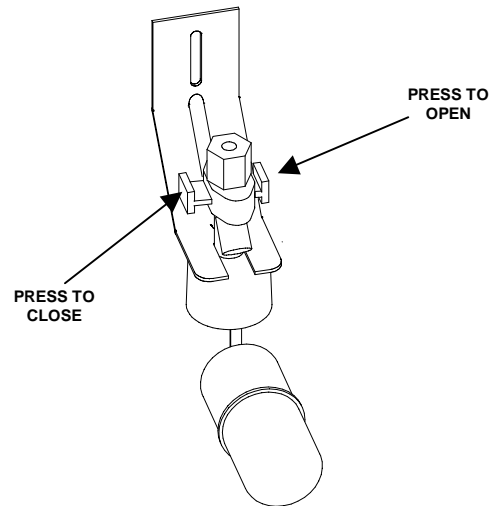
Follow steps 1 through 6 under water level check.



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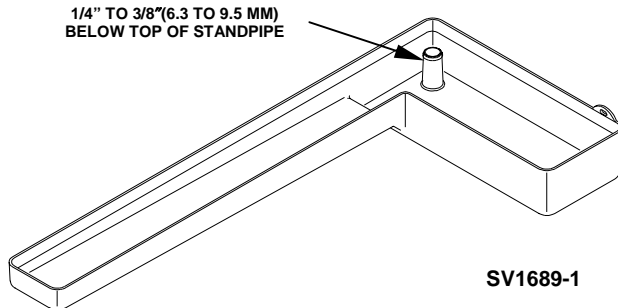
WATER FLOAT VALVE CHECK

Before water will flow into the water trough the float valve shut-off must be in the OPEN position.



WATER LEVEL CHECK

Check the water level while the ice machine is in the ice mode and the water pump is running. The correct water level is 1/4" (6.3mm) to 3/8" (9.5mm) below the top of the standpipe.



Water Level

The float valve is factory-set for the proper water level. If adjustments are necessary:

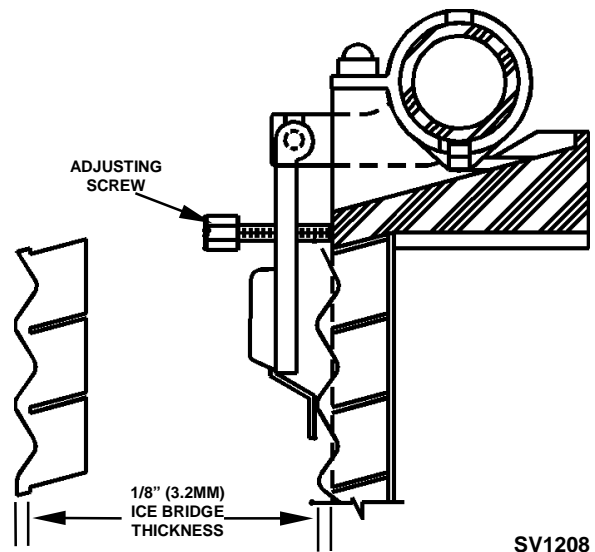
1. Verify the ice machine is level (see page 2-4).
2. Remove the siphon cap from the standpipe.
3. Place the main ON/OFF/WASH toggle switch to the ON position, and wait until the float valve stops adding water.
4. Adjust the water level to 1/4" to 3/8" (6.3 to 9.5 mm) below the standpipe:
 - A Loosen the two screws on the float valve bracket.
 - B Raise or lower the float valve assembly as necessary, then tighten the screws.
5. Move the main ON/OFF/ WASH toggle switch to the OFF position. The water level in the trough will rise above the standpipe and run down the drain.
6. Replace the siphon cap on the standpipe, and verify water level and siphon action by repeating steps 3 through 5.

ICE BRIDGE THICKNESS CHECK

The ice thickness probe is factory-set to maintain the ice bridge thickness at 1/8" (3.2 mm).

1. Inspect the bridge connecting the cubes. It should be about 1/8" (3.2 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.

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



Ice Thickness Check

Make sure the ice thickness probe wire and the bracket do not restrict movement of the probe.

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Section 4 Maintenance

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.

⚠ WARNING

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

We recommend that you perform the following maintenance procedures at least every six months to ensure reliable, trouble-free operation and maximum ice production.

Ice Machine Inspection

⚠ WARNING

Disconnect electric power to the ice machine at the electric service switch before cleaning the condenser.

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

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

Exterior Cleaning

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

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

A commercial grade stainless steel cleaner/polish can be used as necessary.

Cleaning the Condenser

⚠ WARNING

Disconnect electric power to the ice machine at the electric service switch before cleaning the condenser.

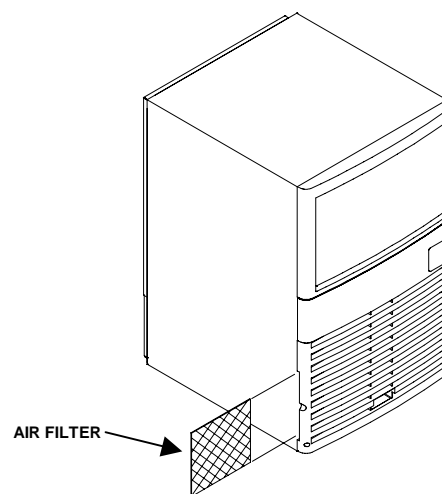
AIR-COOLED CONDENSER

A dirty condenser restricts airflow, resulting in excessively high operating temperatures. This reduces ice production and shortens component life. Clean the condenser at least every six months. Follow the steps below.

⚠ WARNING

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

1. The washable aluminum filter on self-contained ice machines is designed to catch dust, dirt, lint and grease. This helps keep the condenser clean. Clean the filter with a mild soap and water solution.



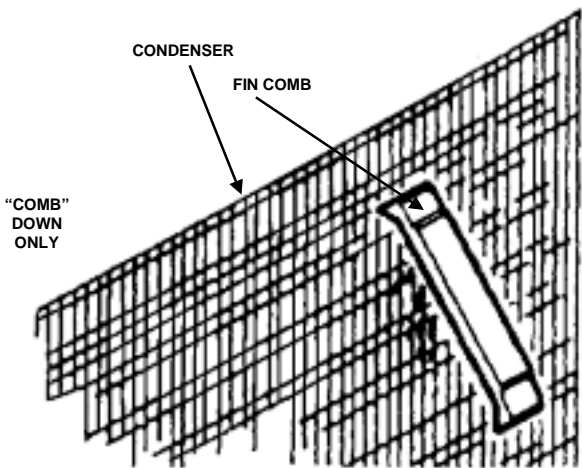
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2. Clean the outside of the condenser with a soft brush or a vacuum with a brush attachment. Clean from top to bottom not side to side. Be careful not to bend the condenser fins.
3. Shine a flashlight through the condenser to check for dirt between the fins. If dirt remains:
 - A. Blow compressed air through the condenser fins from the inside. Be careful not to bend the fan blades.
 - B. Use a commercial condenser coil cleaner. Follow the directions and cautions supplied with the cleaner.
5. Straighten any bent condenser fins with a fin comb. Carefully wipe off the fan blades and motor with a soft cloth. Do not bend the fan blades. If the fan blades are excessively dirty, wash with warm, soapy water and rinse thoroughly.

! CAUTION

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



Interior Cleaning and Sanitizing

GENERAL

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. If required, an extremely dirty ice machine may be taken apart for cleaning and sanitizing.

! CAUTION

Use only Manitowoc approved Ice Machine Cleaner (part number 94-0546-3) and 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 Ice Machine 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.

Manitowoc’s Patented Cleaning/Sanitizing Technology

Manitowoc ice machines include technology that allows the initiation and completion of a cleaning or sanitizing cycle at the flip of a switch. This cycle permits cleaning or sanitizing of all surfaces that come in contact with the water distribution system. Periodic maintenance must be performed that includes sanitizing the bin and adjacent surface areas, which can not be contacted by the water distribution system.


This technology will also allow initiation and completion of a clean or sanitize cycle after which the ice machine automatically starts ice making again.

Refer to the cleaning or sanitizing procedure for complete details.

CLEANING PROCEDURE

Ice machine cleaner is used to remove lime scale or other mineral deposits. It is not used to remove algae or slime. Refer to “Sanitizing Procedure” for removal of algae and slime.

Step 1 Set the toggle switch to the OFF position after ice falls from the evaporator at the end of a Harvest cycle. Or, set the switch to the OFF position and allow the ice to melt off the evaporator.

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

Step 2: Remove all ice from the bin.

Step 3 To start a cleaning cycle, move the toggle switch to the WASH position.

Step 4 Add the proper amount of Manitowoc Ice Machine Cleaner to the water trough.

Model	Amount of Cleaner
QM-45	1.5 ounces (45 ml)

Step 5 The ice machine will automatically time out a ten-minute cleaning cycle, followed by five rinse cycles, and then stop. This entire cycle lasts approximately 22 minutes.

Step 6 When the cleaning process stops, move the toggle switch to the OFF position. Refer to “Sanitizing Procedure”.


Step 7 The ice machine may be set to start and finish a cleaning procedure, and then automatically start ice making again.

- A. Wait about one minute into the cleaning cycle, then move the toggle switch from WASH to ON position.
- B. When the cleaning cycle is completed, an ice making sequence will start automatically.

SANITIZING PROCEDURE

Use sanitizer to remove algae or slime. Do not use it to remove lime scale or other mineral deposits.

Step 1 Set the toggle switch to the OFF position after ice falls from the evaporator at the end of a Harvest cycle. Or, set the switch to the OFF position and allow the ice to melt off the evaporator.

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

Step 2: Remove all ice from the bin.

Step 3 To start a sanitizing cycle, move the toggle switch to the WASH position.

Step 4 Add the proper amount of Manitowoc Ice Machine Sanitizer to the water trough.

Model	Amount of Sanitizer
QM-45	1.5 ounces (45 ml)

Step 5 The ice machine will automatically time out a ten-minute sanitizing cycle, followed by five rinse cycles, and then stop. This entire cycle lasts approximately 22 minutes.

Note: If the bin requires sanitizing, sanitize it with a solution of 1 ounce (30 ml) of sanitizer with 4 gallons (15 L) of water.

Step 6 When the sanitizing process stops, move the toggle switch to the ON position to start making ice again.

Step 7

The ice machine may be set to start and finish a sanitizing procedure, and then automatically start ice making again.

- A. Wait about one minute into the sanitizing cycle, then move the toggle switch from WASH to ON position.
- B. When the sanitizing cycle is completed, an ice making sequence will start automatically.

**REMOVAL OF PARTS FOR
CLEANING/SANITIZING**

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

1. Turn off the water supply to the ice machine at the water supply valve.
2. Remove the parts or components you want to clean or sanitize. See the following pages for removal procedures for these parts.

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

3. Soak the removed part(s) in a properly mixed solution.

Solution Type	Water	Mixed With
Cleaner	1 gal. (4 l)	16 oz (500 ml) cleaner
Sanitizer	4 gal. (15 l)	1 oz (30 ml) sanitizer

4. Use a soft-bristle brush or sponge (NOT a wire brush) to carefully clean the parts.

⚠ 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.

⚠ CAUTION
Do not immerse the water pump motor in the cleaning or sanitizing solution.

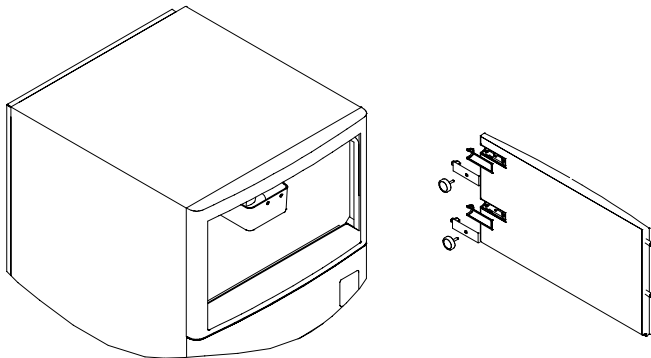
5. Use the solution and a brush to clean the top, sides, and bottom evaporator extrusions; the inside of the ice machine panels; and the entire inside of the bin.
 6. Thoroughly rinse all of the parts and surfaces with clean water.
 7. Install the removed parts.
- Turn on the water and electrical supply.

BIN DOOR REMOVAL

WARNING

Before removing any parts, unplug or disconnect the electric power to the ice machine at the electric service switch box, and turn off the water supply to the ice machine.

1. Disconnect the electric power to the ice machine and remove ice from bin.
2. Remove the rear thumbscrew while positioning your hand beneath the door pin and gasket.
3. Apply upward pressure on the door and remove the door pin and gasket.
4. Repeat steps 2 and 3 for the front thumbscrew, door pin and gasket.
5. Remove the door by lowering the right side and allowing the left side door pins to disengage the track.



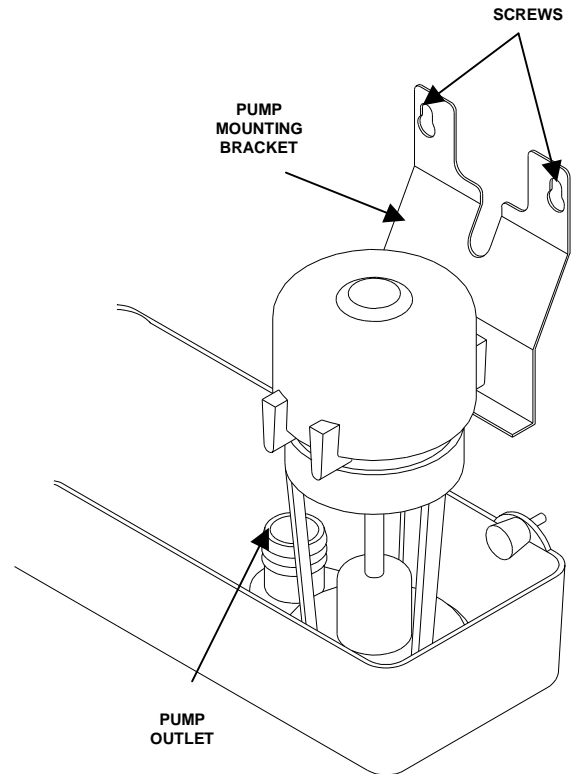
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Removing the Door

WATER PUMP REMOVAL

WARNING

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



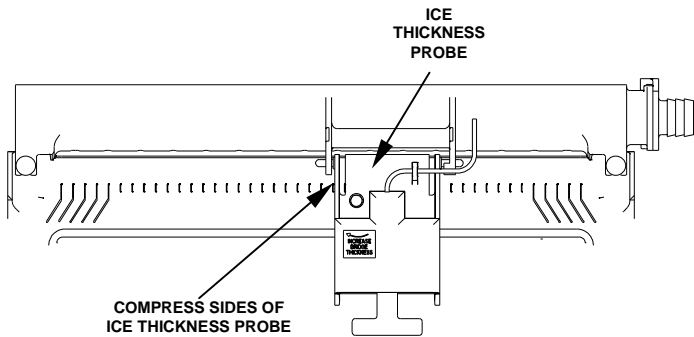
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Water Pump Removal

1. Disconnect the water pump power cord.
2. Disconnect the hose from the pump outlet.
3. Loosen the screws securing the pump-mounting bracket to the bulkhead.
4. Lift the pump and bracket assembly off the screws.

ICE THICKNESS PROBE REMOVAL

1. Compress the side of the ice thickness probe near the top hinge pin and remove it from the bracket.



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Ice Thickness Probe Removal

NOTE: At this point, the ice thickness probe can easily be cleaned. If complete removal is desired, continue with step 2 below.



WARNING

Disconnect the electric power to the ice machine at the electric service switch box.

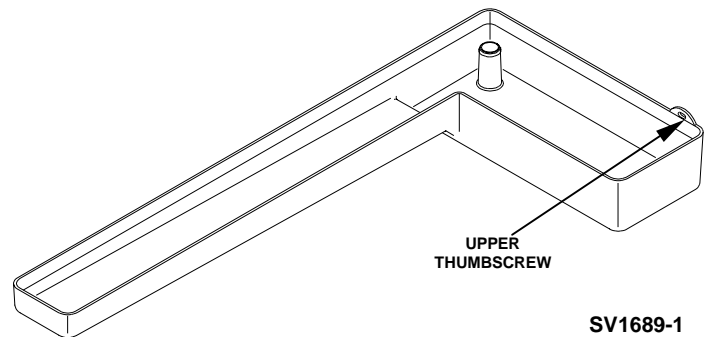
2. Follow the ice thickness probe wire to the bulkhead grommet (exit point) in the back wall. Pop the bulkhead grommet out of the back wall by inserting fingernails or a flat object between the back wall and the grommet and prying forward. Pull the bulkhead grommet and wire forward until the connector is accessible, then disconnect the wire lead from the connector.

Ice Thickness Probe Cleaning

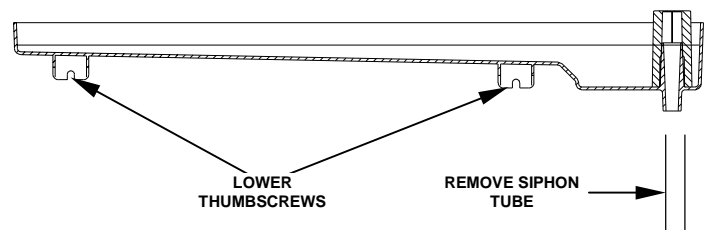
1. Mix a solution of Manitowoc ice machine cleaner and water (2 ounces of cleaner to 16 ounces of water) in a container.
2. Soak ice thickness probe in container of cleaner/water solution while disassembling and cleaning water circuit components (soak ice thickness probe for 10 minutes or longer).
3. Clean all ice thickness probe surfaces including all plastic parts (do not use abrasives). Verify the ice thickness probe cavity is clean. Thoroughly rinse ice thickness probe (including cavity) with clean water, then dry completely. **Incomplete rinsing and drying of the ice thickness probe can cause premature harvest.**
4. Reinstall ice thickness probe, then sanitize all ice machine and bin/dispenser interior surfaces.

WATER TROUGH REMOVAL

1. Apply downward pressure on the siphon tube and remove from the bottom of the water trough.
2. Remove the water pump.
3. Remove the upper thumbscrew.
4. While supporting the water trough remove the two thumbscrews from beneath the water trough.
5. Remove the water trough from the bin area



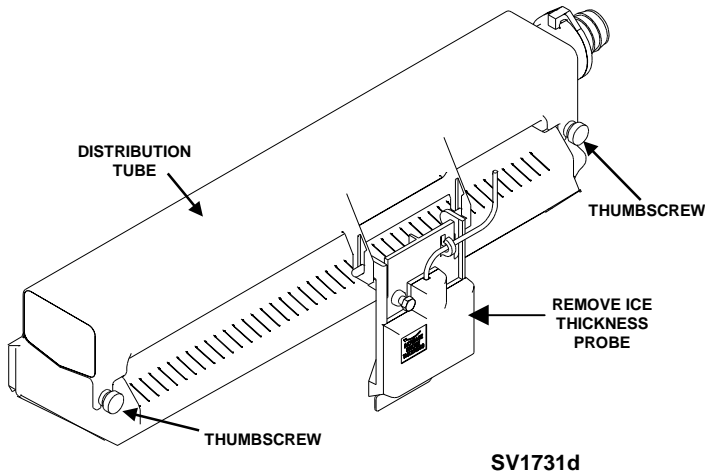
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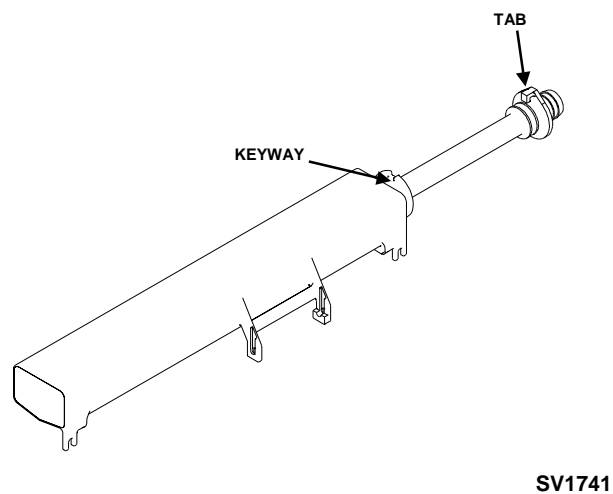
WATER DISTRIBUTION TUBE REMOVAL

1. Remove the ice thickness probe.
2. Disconnect the water hose from the distribution tube.



Water Distribution Tube Removal

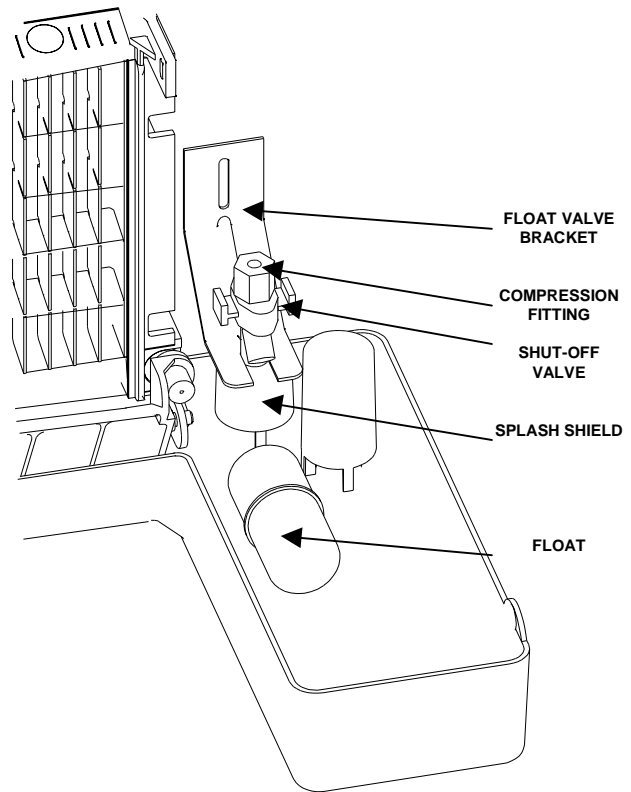
3. Loosen the two thumbscrews, which secure the distribution tube.
4. Lift the distribution tube up off the thumbscrews.
5. Disassembly for cleaning.
 - A. Twist the barbed end until the tab lines up with the keyway
 - B. Pull the inner tube end outward.



Water Distribution Tube Disassembly

FLOAT VALVE REMOVAL

1. Turn off the water supply to the ice machine at the water supply valve.
2. Turn the splash shield counterclockwise one or two turns.



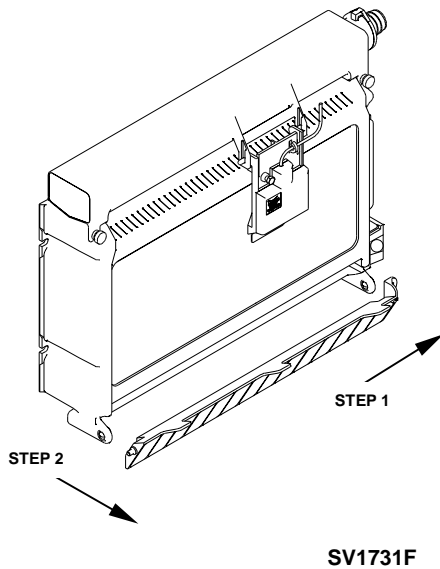
Float Valve Removal

3. Pull the float valve forward and off the mounting bracket.
4. Disconnect the water inlet tube from the float valve by unscrewing the compression fitting.
5. Remove the cap and filter screen for cleaning.

ICE DAMPER REMOVAL/INSTALLATION

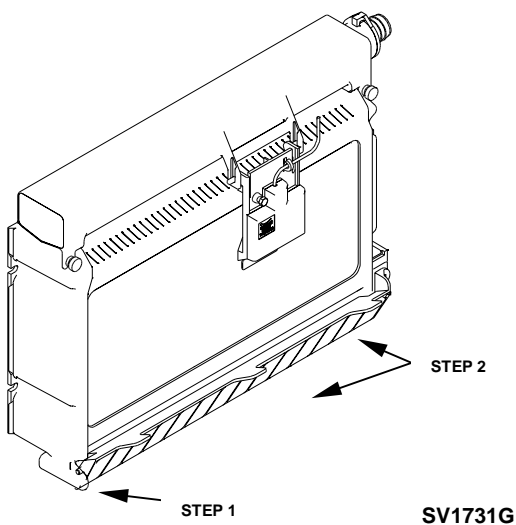
Removal

1. Grasp left side of ice damper and apply pressure against the right-hand ice damper mounting bracket.
2. Pull forward on the ice damper until the left-hand mounting pin disengages.



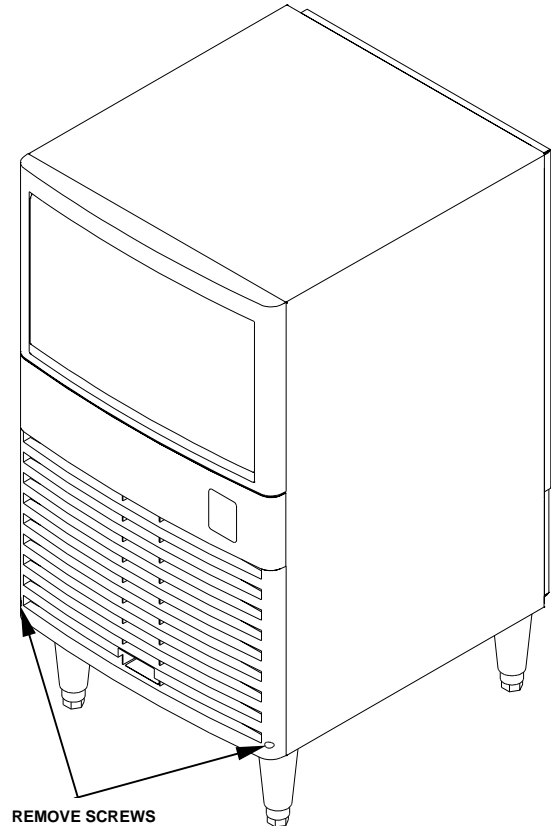
Installation

1. Grasp the right side of ice damper and place left hand pin in the mounting bracket.
2. While applying pressure against the left-hand mounting bracket push the damper until the right-hand mounting pin engages.



FRONT PANEL REMOVAL

1. Remove the two screws on the bottom of the front panel.
2. Pull forward and down on the bottom panel until the upper tabs disengage from the slot.



Water Treatment/Filtration

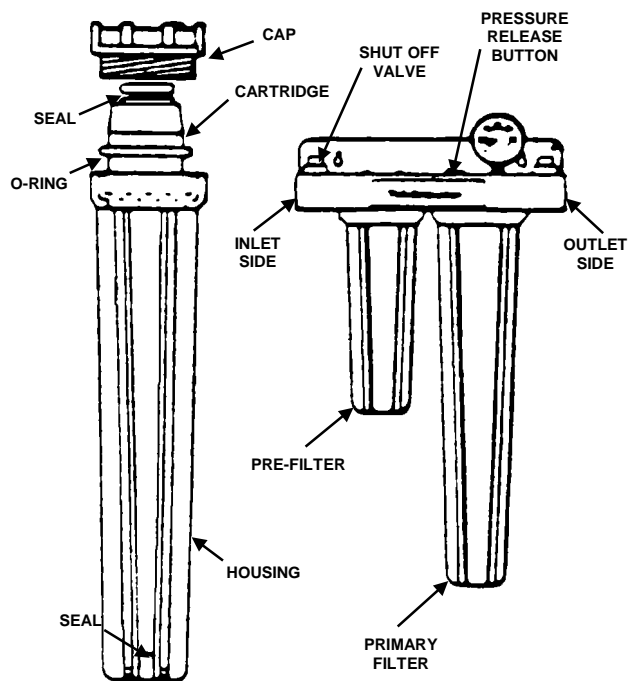
GENERAL

Local water conditions may require the installation of a water treatment system to inhibit scale formation, filter out sediment, remove chlorine, and improve taste and clarity. Consult your local distributor for information on Manitowoc's full line of NSF®-certified Tri-Limator® filtration systems.

FILTER REPLACEMENT PROCEDURE

Tri-Limator® systems include a pre-filter and a primary filter. For maximum filtration efficiency, replace the primary filter cartridge every six months. If the filter gauge reading drops below 20 psig prior to six months usage, replace the pre-filter first.

1. Turn off the water supply at the inlet shutoff valve.



Typical Tri-Limator® Water Filtration System

2. Depress the pressure release button to relieve the pressure.

3. Unscrew the housing from the cap.
4. Remove the used filter cartridge from the housing and discard it.
5. Remove the O-ring from the housing groove. Wipe the housing groove and the O-ring clean.
6. Lubricate the O-ring with petroleum jelly.
7. Press the O-ring into the housing groove.
8. Insert a new filter cartridge into the housing. Make sure it slips down over the housing standpipe.
9. Screw the housing on to the cap and carefully hand-tighten it.

CAUTION

Hand-tighten only. Do not overtighten. Do not use a spanner wrench.

10. Repeat steps 3-9 for each filter housing.
11. Turn on the water supply to allow the housing and filter to slowly fill with water.
12. Depress the pressure release button to release trapped air from the housing.
13. Check for leaks.

Removal from Service/Winterization

GENERAL

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



CAUTION

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

SELF-CONTAINED AIR-COOLED ICE MACHINES

1. Disconnect the electric power at the circuit breaker or the electric service switch.
2. Turn off the water supply.
3. Remove the water from the water trough.
4. Remove all ice from the bin.
5. Disconnect and drain the incoming ice-making water line at the rear of the ice machine.
6. Blow compressed air in both the incoming water and the drain openings until no more water comes out of the inlet water lines or the drain.
7. Make sure water is not trapped in any of the water lines, drain lines, distribution tubes, etc.

Section 5 Before Calling for Service

Checklist

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

Problem	Possible Cause	To Correct
Ice machine does not operate.	No electrical power to the ice machine.	Replace the fuse/reset the breaker/turn on the main switch/plug power cord into receptacle.
	ON/OFF/ WASH toggle switch set improperly.	Move the toggle switch to the ON position.
	Damper in open position (down).	Damper must be in upright position and capable of swinging freely.
Ice machine stops, and can be restarted by moving the toggle switch to OFF and back to ICE.	Safety limit feature stopping the ice machine.	Refer to "Safety Limit Feature" on the next page.
Ice machine does not release ice or is slow to harvest.	Ice machine is dirty.	Clean and sanitize the ice machine. See pages 4-3 and 4-4.
	Ice machine is not level.	Level the ice machine. See page 2-4.
	Low air temperature around ice machine (air-cooled models).	Air temperature must be at least 35°F (1.7°C).
	Water regulating valve leaks in harvest mode (water-cooled models).	Replace water regulating valve.
Ice machine does not cycle into harvest mode.	The six-minute freeze time lock-in has not expired yet.	Wait for freeze lock-in to expire.
	Ice thickness probe is dirty.	Clean and sanitize the ice machine. See pages 4-3 and 4-4.
	Ice thickness probe wire is disconnected.	Connect the wire.
	Ice thickness probe is out of adjustment.	Adjust the ice thickness probe. See page 3-5.
	Uneven ice fill (thin at top of evaporator).	See "Shallow or Incomplete Cubes" on the next page.
Ice quality is poor (soft or not clear).	Poor incoming water quality.	Contact a qualified service company to test the quality of the incoming water and make appropriate filter recommendations.
	Water filtration is poor.	Replace the filter.
	Ice machine is dirty.	Clean and sanitize the ice machine. See pages 4-3 and 4-4.
	Water siphon is not working.	Check the water siphon system. See page 3-4.
	Water softener is working improperly (if applicable).	Repair the water softener.

Continued on next page...

Problem	Possible Cause	To Correct
Ice machine produces shallow or incomplete cubes, or the ice fill pattern on the evaporator is incomplete.	Ice thickness probe is out of adjustment.	Adjust the ice thickness probe. See page 3-5.
	Water trough level is too high or too low.	Check the water level. See page 3-4.
	Water float valve filter screen is dirty.	Remove and clean the filter screen. See page 4-8.
	Water filtration is poor.	Replace the filter.
	Hot incoming water.	Connect the ice machine to a cold water supply. See page 2-7.
	Water float valve is not working.	Remove the water float valve and clean it. See page 4-8.
	Incorrect incoming water pressure.	Water pressure must be 20-80 psi (137.9 - 551.5 kPa).
Low ice capacity.	Ice machine is not level.	Level the ice machine. See page 2-4.
	Water float valve filter screen is dirty.	Remove and clean the filter screen. See page 4-8.
	Incoming water supply is shut off.	Open the water service valve.
	Water float valve stuck open or leaking.	Remove the water float valve and clean it. See page 4-8.
	The condenser is dirty.	Clean the condenser. See page 4-1.
	High air temperature around ice machine (air-cooled models).	Air temperature must not exceed 110°F (43.3°C).
	Inadequate clearance around the ice machine.	Provide adequate clearance. See page 2-3.
Objects stacked around ice machine, blocking airflow to condenser (air-cooled models).	Remove items blocking airflow.	

Safety Limit Feature

In addition to the standard safety controls, your Manitowoc ice machine features built-in safety limits that will stop the ice machine if conditions arise which could cause a major component failure.

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

1. Move the ON/OFF/ WASH switch to OFF and then back to ON.
 - A. If the safety limit feature has stopped the ice machine, it will restart after a short delay. Proceed to step 2.
 - B. If the ice machine does not restart, see “Ice machine does not operate” on the previous page.
2. Allow the ice machine to run to determine if the condition is reoccurring.
 - A. If the ice machine stops again, the condition has reoccurred. Call for service.
 - B. If the ice machine continues to run, the condition has corrected itself. Allow the ice machine to continue running.

SAFETY LIMITS

General

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

Safety Limit #1: If the freeze time reaches 60 minutes, the control board automatically initiates a harvest cycle. If three 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 three consecutive 3.5 minute harvest cycles occur, the ice machine stops.

Safety Limit Stand-By Mode:

The first time a safety limit shut down occurs, the ice machine turns off for 60 minutes (Stand-by Mode). The ice machine will then automatically restart to see if the problem reoccurs. During the Stand-By Mode the harvest light will be flashing continuously and a safety limit indication can be viewed. If the same safety limit is reached a second time (the problem has reoccurred) the ice machine will initiate a safety limit shut down and remain off until it is manually restarted. During a safety limit shut down the harvest light will be flashing continuously.

Determining Which Safety Limit Stopped The Ice Machine

When a safety limit condition causes the ice machine to stop, the harvest light on the control board continually flashes on and off. Use the following procedures to determine which safety limit has stopped the ice machine.

1. Move the toggle switch to OFF.
2. Move the toggle switch back to ON.
3. Watch the harvest light. It will flash one or two times, corresponding to safety limits 1 and 2, to indicate which safety limit stopped the ice machine.

After safety limit indication, the ice machine will restart and run until a safety limit is exceeded again.

Safety Limit Notes

- A safety limit indication is completed before the water pump starts. Water contacting the ice thickness probe in the freeze cycle will cause the harvest light to flash. Do not mistake a harvest light flashing in the freeze cycle with a safety limit indication.
- A continuous run of 100 harvests automatically erases the safety limit code.
- The control board will store and indicate only one safety limit – the last one exceeded.
- If the toggle switch is moved to the OFF position and then back to the ON position prior to reaching the 100-harvest point, the last safety limit exceeded will be indicated.
- If the harvest light did not flash prior to the ice machine restarting, then the ice machine did not stop because it exceeded a safety limit.

Safety Limit #1

Freeze time exceeds 60 minutes for 3 consecutive freeze cycles.

Possible Cause	Check/Correct
Improper installation	<ul style="list-style-type: none"> • See "Installation Instructions" Section 2 of this manual
Water system	<ul style="list-style-type: none"> • Low water pressure (20 psi minimum.) • High water pressure (80 psi maximum.) • High water temperature (90°F/32.2°C maximum.) • Clogged water distribution tube • Dirty/defective water float valve • Loss of water from sump area • Defective water pump
Electrical system	<ul style="list-style-type: none"> • Ice thickness probe out of adjustment • Harvest cycle not initiated electrically • Compressor relay not energizing • Compressor electrically non-operational
Restricted condenser air flow (air-cooled models)	<ul style="list-style-type: none"> • High inlet air temperature (110°F/43.3°C maximum.) • Condenser discharge air recirculation • Dirty condenser filter • Dirty condenser fins • Defective fan cycling control • Defective fan motor
Refrigeration system	<ul style="list-style-type: none"> • Non-Manitowoc components • Improper refrigerant charge • Defective hot gas valve • Defective compressor • TXV starving or flooding (check insulation and bulb mounting) • Non-condensables in refrigeration system • Plugged or restricted high side refrigerant lines or component

Safety Limit #2

Harvest time exceeds 3.5 minutes for 3 consecutive harvest cycles.

Possible Cause	Check/Correct
Improper installation	<ul style="list-style-type: none"> • See "Installation Instructions" Section 2 of this manual
Water system	<ul style="list-style-type: none"> • Water area (evaporator) dirty • Water freezing behind evaporator • Low water pressure (20 psi minimum.) • Loss of water from sump area • Clogged water distribution tube • Dirty/defective water float valve • Defective water pump
Electrical system	<ul style="list-style-type: none"> • Ice thickness probe out of adjustment • Ice thickness probe dirty • Bin switch defective • Premature harvest
Refrigeration system	<ul style="list-style-type: none"> • Non-Manitowoc components • Improper refrigerant charge • Defective hot gas valve • TXV flooding (check insulation and bulb mounting) • Defective fan cycling control

Because there are many possible external problems, do not limit your diagnosis to only the items listed in these charts.

Section 6 Service

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.

Main Fuse

Function

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

Specifications

The main fuse is 250 Volt, 10 amp.

Check Procedure

WARNING

High (line) voltage is applied to the control board (terminals #2 and #4) at all times. Removing the control board fuse or moving the toggle switch to OFF will not remove the power supplied to the control board.

1. If the bin switch light is on with the ice damper closed, the fuse is good.

WARNING

Disconnect electrical power to the entire ice machine before proceeding.

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

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

On/Off/ Wash Toggle Switch

Function

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

Specifications

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

Check Procedure

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

1. Inspect the toggle switch for correct wiring.
2. Isolate the toggle switch by disconnecting all wires from the switch, or by disconnecting the molex connector from the control board.
3. Check across the toggle switch terminals using a calibrated ohmmeter. Note where the wire numbers are connected to the switch terminals, or refer to the wiring diagram to take proper readings.

Switch Setting	Terminals	Ohm Reading
ON	24-21	Open
	24-20	Closed
	20-21	Open
WASH	24-20	Open
	24-21	Closed
	20-21	Open
OFF	24-20	Open
	24-21	Open
	20-21	Open

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

Bin Switch

Function

Bin switch operation is controlled by the movement of the ice damper. 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 7 seconds of opening 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 ice damper and holds it down. After the ice damper is held down for 7 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 ice damper. As the ice damper swings back to the operating position, the bin switch closes and the ice machine restarts.

Important

The ice damper must be up (bin switch closed) to start ice making.

Specifications

The bin switch is a magnetically operated reed switch. The magnet is attached to the upper right corner of the ice damper. The switch is attached to the evaporator mounting bracket.

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.

Check Procedure

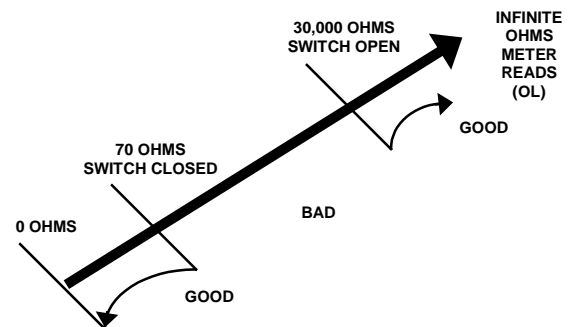
1. Set the toggle switch to OFF.
2. Watch the bin switch light on the control board.
3. Move the ice damper upward, toward the evaporator. The bin switch must close. The bin switch light “on” indicates the bin switch has closed properly.
4. Move the ice damper away from the evaporator. The bin switch must open. The bin switch light “off” indicates the bin switch has opened properly.

Ohm Test

1. Disconnect the bin switch wires to isolate the bin switch from the control board.
2. Connect an ohmmeter to the disconnected bin switch wires. Set the ohmmeter to the 10,000-ohm scale.
3. Cycle the bin switch by opening and closing the ice damper.
4. With the bin switch open: Resistance readings of more than 30,000 ohms indicate a correctly operating bin switch.
5. With the bin switch closed: Resistance readings of less than 70 ohms indicates a correctly operating bin switch.

Important

Any reading between 70 and 30,000 ohms, regardless of ice damper position, indicates a defective bin switch

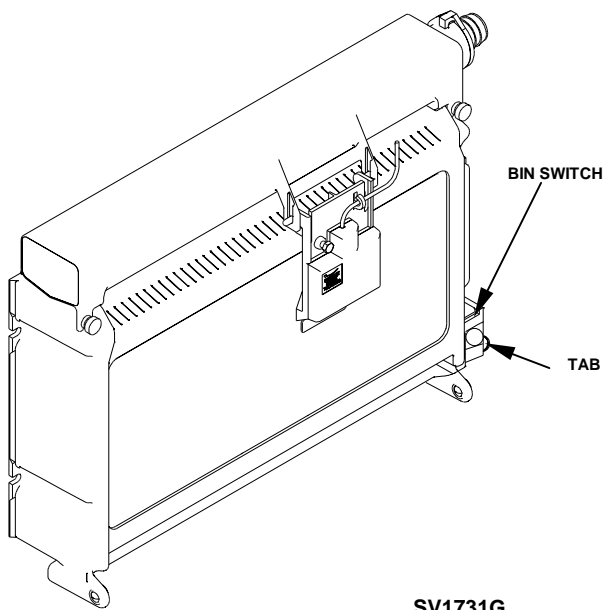


Bin Switch Resistance Readings

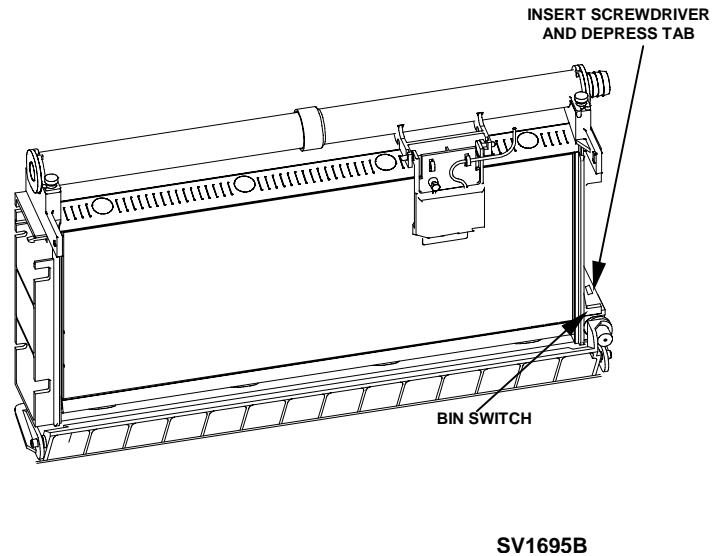
Bin Switch Removal

Q130

1. Disconnect power to the ice machine at service disconnect.
2. Disconnect bin switch wires in control box.
3. Depress tab on right side of evaporator with thumb.
4. Slide bin switch to right to remove.
5. Pull wiring into evaporator compartment.

**Q210/Q270**

1. Disconnect power to the ice machine at service disconnect.
2. Disconnect bin switch wires in control box.
3. Insert a small screwdriver through the hole located in the top of the bin switch, and depress mounting tab slightly.
4. While depressing mounting tab roll bin switch to right to release.
5. Pull wiring into evaporator compartment.



Fan Cycle Control

Function

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

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

Specifications

Model	Cut-In (Close)	Cut-Out (Open)
Q130	250 psig ±5	200 psig ±5
Q210	275 psig ±5	225 psig ±5
Q270	250 psig ±5	200 psig ±5

Check Procedure

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

System Pressure:	Reading Should Be:	Fan Should Be:
above cut-in	0 volts	running
below cut-out	line voltage	off

High Pressure Cutout (HPCO) Control

Function

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

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

Specifications


Cut-out: 450 psig ±10

Cut-in: Automatic reset

(Must be below 300 psig to reset).

Check Procedure

1. Set ON/OFF/WASH switch to OFF.
2. Connect manifold gauges.
3. Hook voltmeter in parallel across the HPCO, leaving wires attached.
4. On water-cooled models, close the water service valve to the water condenser inlet. On self-contained air-cooled models, disconnect the fan motor.
5. Set ON/OFF/WASH switch to ON.
6. No water or air flowing through the condenser will cause the HPCO control to open because of excessive pressure. Watch the pressure gauge and record the cut-out pressure.

 **WARNING**

If discharge pressure exceeds 460 psig and the HPCO control does not cut out, set ON/OFF/WASH switch to OFF to stop ice machine operation.

Replace the HPCO control if it:

- Will not reset (below 300 psig)
- Does not open at the specified cut-out point

Condenser Fan Motor Replacement

Access to remove, clean or replace the condenser fan/motor can be obtained by performing the following:

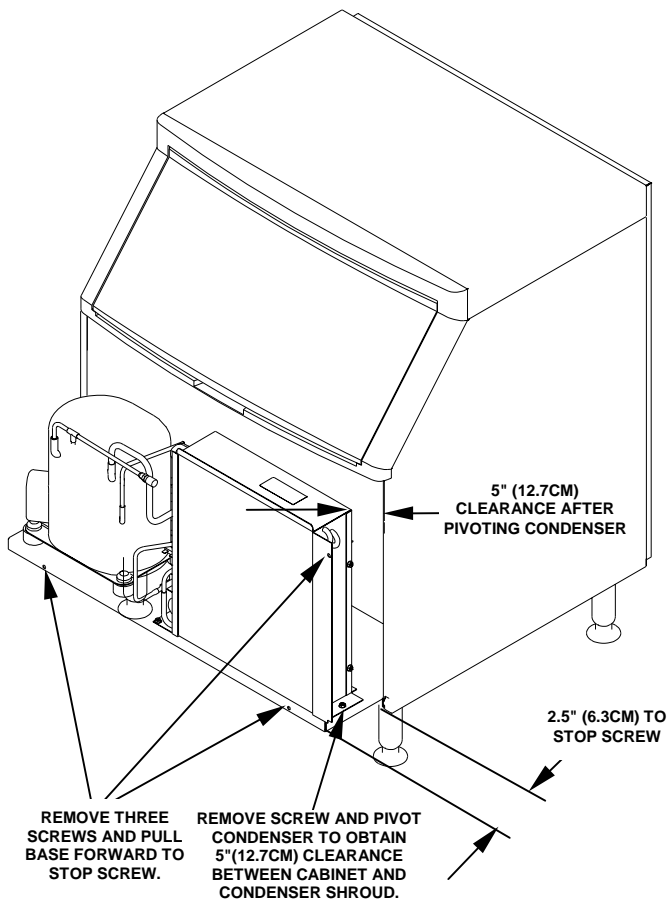
1. Disconnect electrical power to the ice machine at the electrical service disconnect.
2. Remove the screws that secure the condenser to the cabinet and the base to the cabinet.
3. Slide the base forward until contact is made with the stop screw (approximately 2.5" 6.3cm).



CAUTION

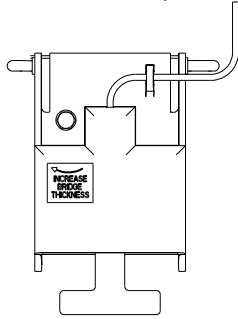
Do not move base past the stop screw, tubing damage could result.

4. Remove right hand screw securing condenser to base.
5. Pivot condenser forward to obtain 5" between the cabinet and condenser shroud. Take care not to kink refrigeration tubing.



PT1295A

Ice Thickness Probe (Harvest Initiation)

**Ice Thickness Probe****HOW THE PROBE WORKS**

SV1738A

Manitowoc's electronic sensing circuit does not rely on refrigerant pressure, evaporator temperature, water levels or timers to produce consistent ice formation.

As ice forms on the evaporator, water (not ice) contacts the ice thickness probe. After the water completes this circuit across the probe continuously for 6-10 seconds, a harvest cycle is initiated.

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 for six minutes. If water contacts the ice thickness probe during these six minutes, the harvest light will come on (to indicate that water is in contact with the probe), but the ice machine will stay in the freeze cycle. After the six minutes are up, a harvest cycle is initiated. This is important to remember when performing diagnostic procedures on the ice thickness control circuitry.

To allow the service technician to initiate a harvest cycle without delay, this feature is not used on the first cycle after moving the toggle switch OFF and back to ON.

MAXIMUM FREEZE TIME

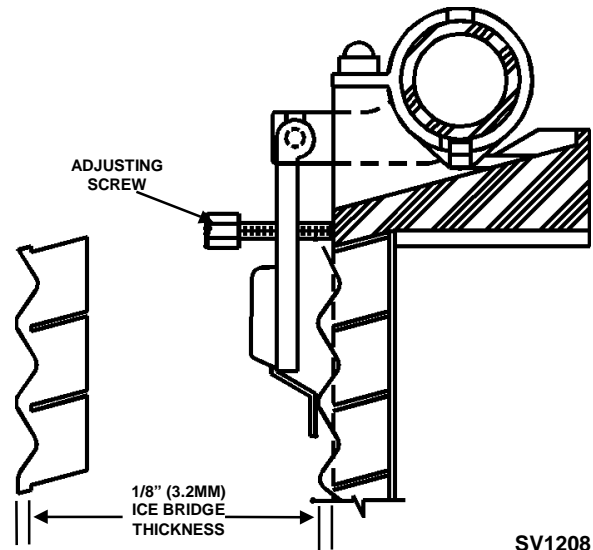
The control system includes a built-in safety, which will automatically cycle the ice machine into harvest after 60 minutes in the freeze cycle.

ICE THICKNESS CHECK

The ice thickness probe is factory-set to maintain the ice bridge thickness at 1/8" (3.2 mm).

1. Inspect the bridge connecting the cubes. It should be about 1/8" (3.2 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.

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



SV1208

Ice Thickness Check

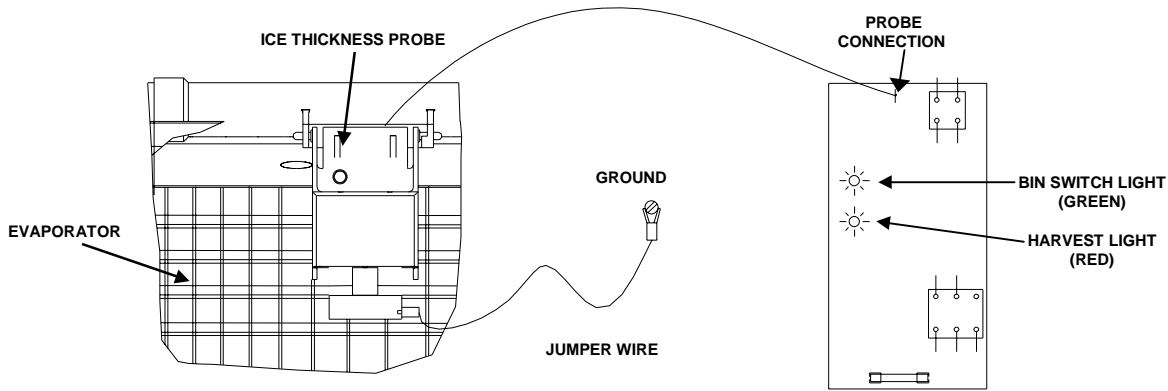
Make sure the ice thickness probe wire and the bracket do not restrict movement of the probe.

DIAGNOSING ICE THICKNESS CONTROL CIRCUITRY

Ice Machine Does Not Cycle Into Harvest When Water Contacts The Ice Thickness Control Probe

Step 1 Bypass the freeze time lock-in feature by moving the ON/OFF/WASH switch to OFF and back to ON. Wait until the water starts to flow over the evaporator.

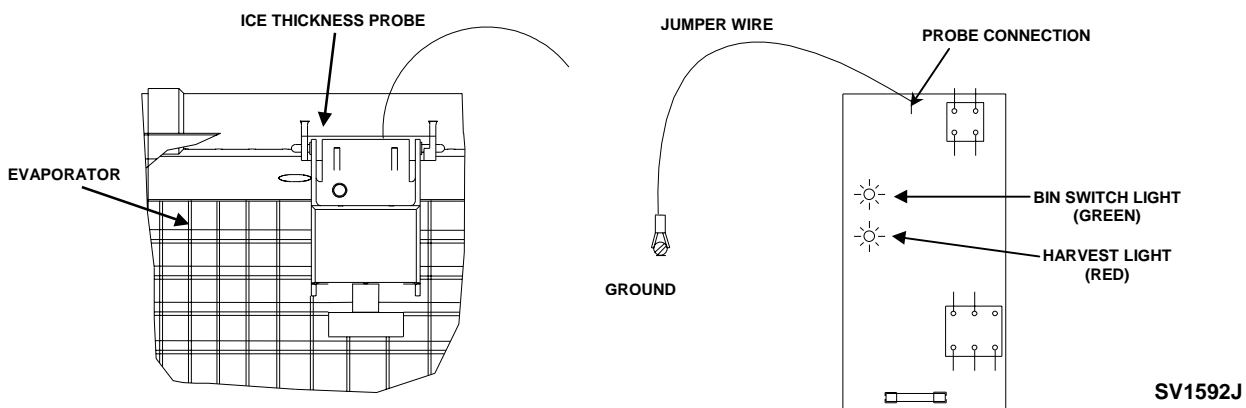
Step 2 Clip the jumper wire to the ice thickness probe and any cabinet ground.



SV1592I

Step 2 Jumper wire connected from probe to ground	
Monitoring of Harvest Light	Correction
The harvest light comes on, and 6-10 seconds later, ice machine cycles from freeze to harvest.	The ice thickness control circuitry is functioning properly. Do not change any parts.
The harvest light comes on but the ice machine stays in the freeze sequence.	The ice thickness control circuitry is functioning properly. The ice machine is in a six-minute freeze time lock-in. Verify step 1 of this procedure was followed correctly.
The harvest light does not come on.	Proceed to Step 3, below.

Step 3 Disconnect the ice thickness probe from the control board terminal. Clip the jumper wire to the terminal on the control board and any cabinet ground. Monitor the harvest light.



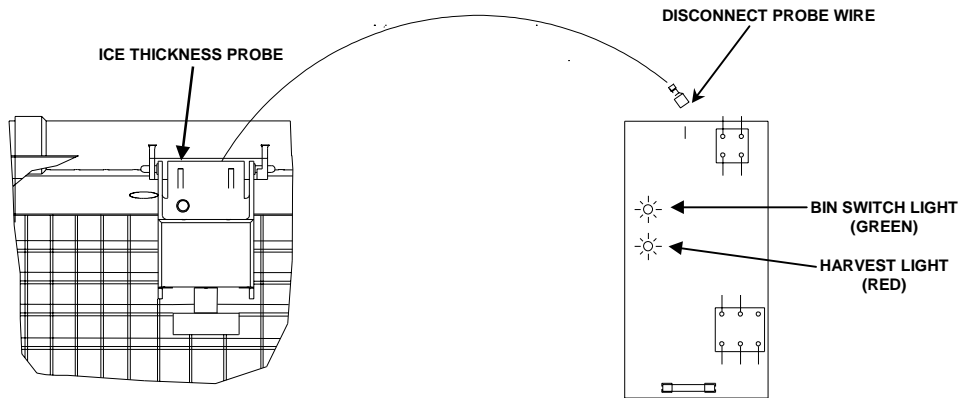
SV1592J

Step 3 Jumper wire connected from control board terminal to ground	
Monitoring of Harvest Light	Correction
The harvest light comes on, and 6-10 seconds later, ice machine cycles from freeze to harvest.	The ice thickness probe is causing the malfunction.
The harvest light comes on but the ice machine stays in the freeze sequence.	The control circuitry is functioning properly. The ice machine is in a six-minute freeze time lock-in (verify step 1 of this procedure was followed correctly).
The harvest light does not come on.	The control board is causing the malfunction.

Ice Machine Cycles Into Harvest Before Water Contact With The Ice Thickness Probe

Step 1 Disconnect the ice thickness probe from the control board terminal.

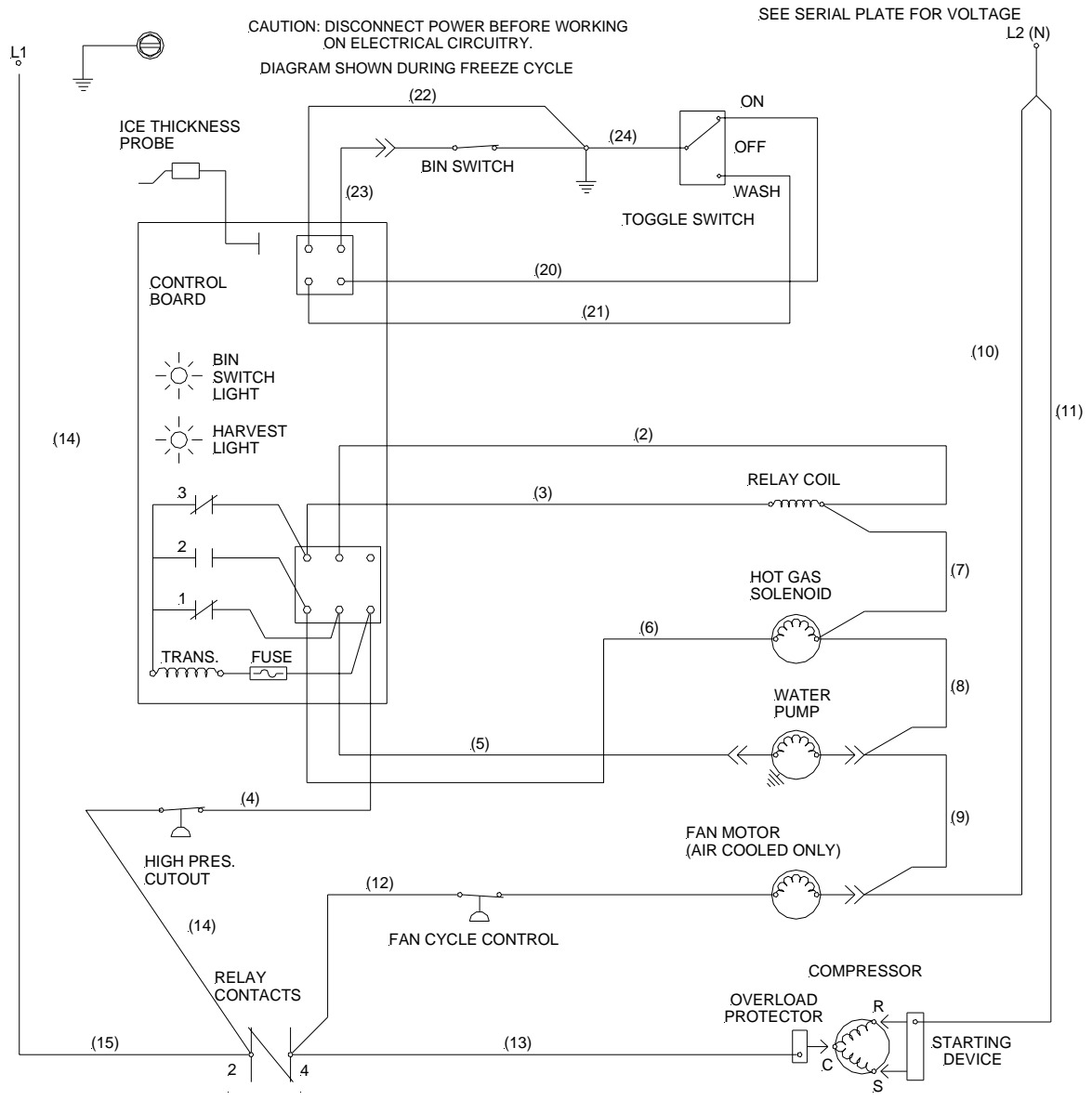
Step 2 Bypass the freeze time lock-in feature by moving the ON/OFF/WASH switch to OFF and back to ON. Wait until the water starts to flow over the evaporator, then monitor the harvest light



SV1592J

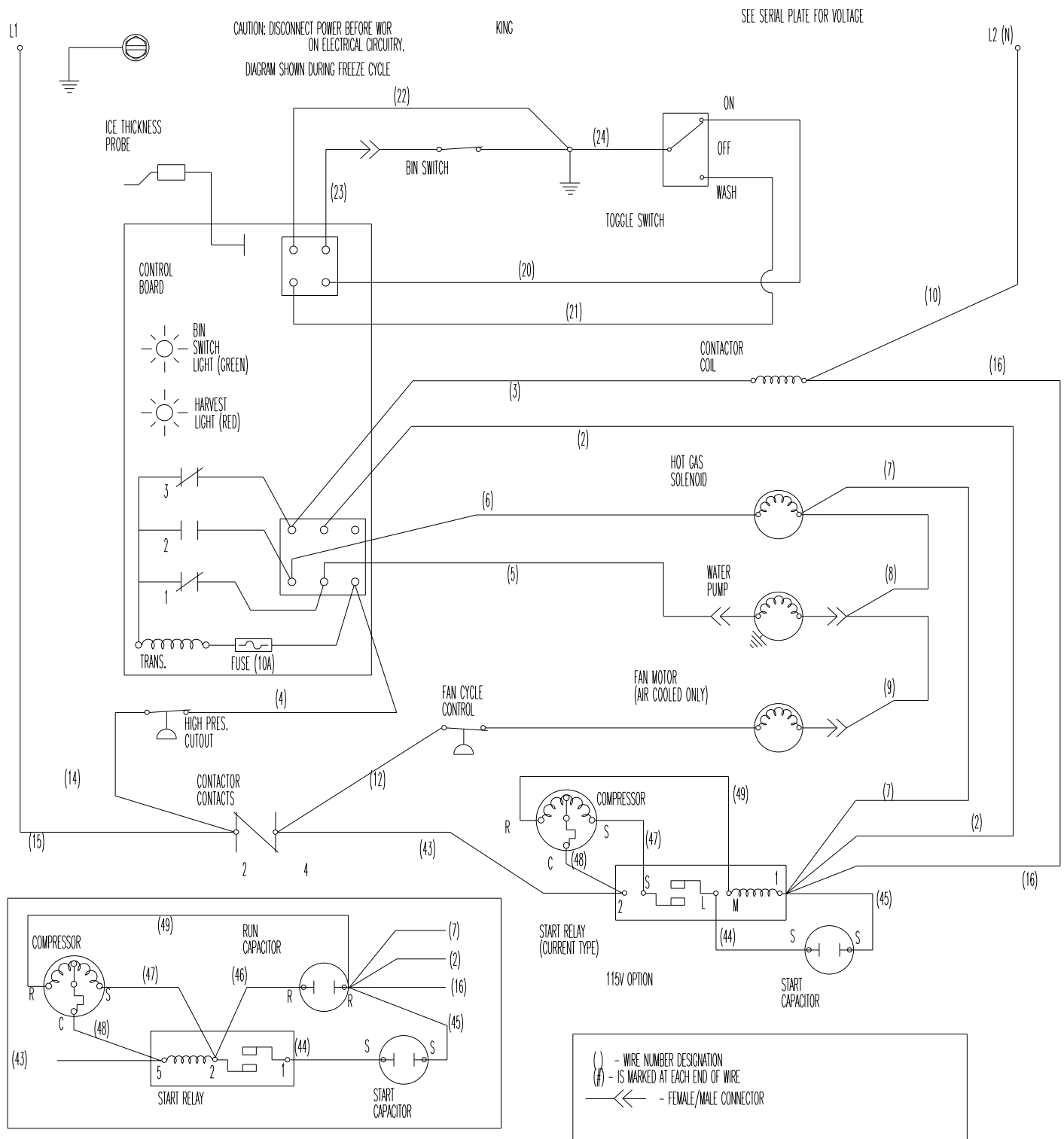
Step 2 Disconnect probe from control board terminal.	
Monitoring of Harvest Light	Correction
The harvest light stays off and the ice machine remains in the freeze sequence.	The ice thickness probe is causing the malfunction. Verify that the Ice Thickness probe is adjusted correctly.
The harvest light comes on, and 6-10 seconds later, the ice machine cycles from freeze to harvest.	The control board is causing the malfunction.

Wiring Diagram Q130/Q210



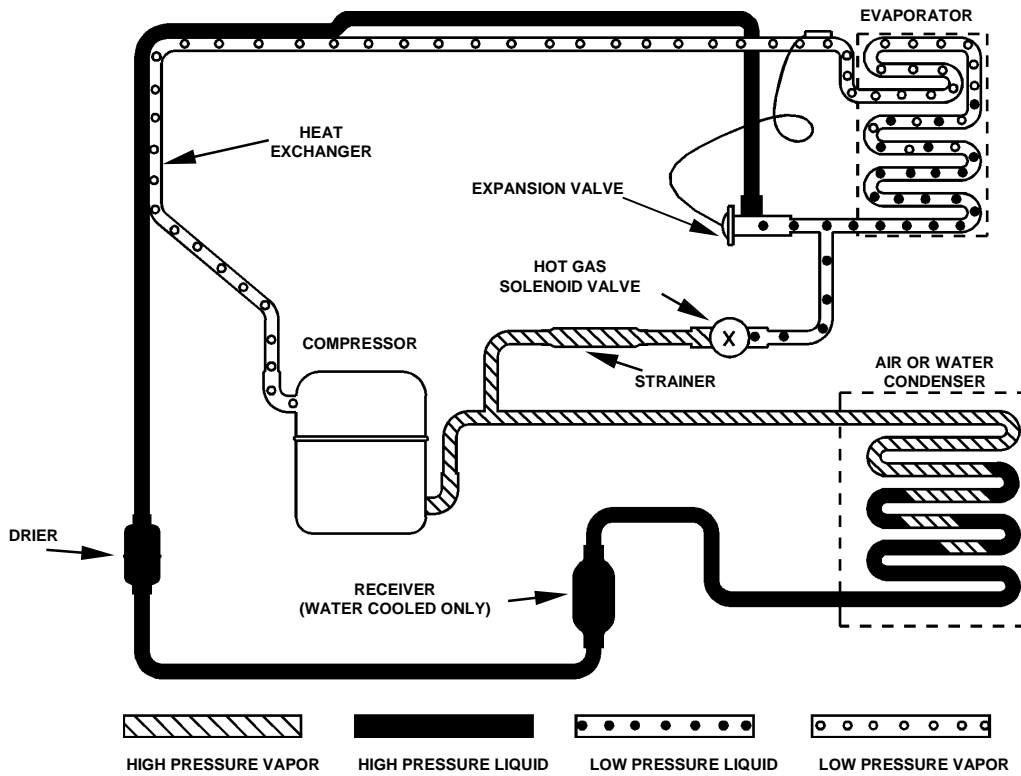
SV1693G

Wiring Diagram Q270



Tubing Diagram Q130/Q210/Q270

SELF-CONTAINED AIR OR WATER-COOLED MODELS



SV1569

Shown in Freeze Cycle

Total System Refrigerant Charge

Model	Refrigerant Type	Quantity
Q-130 Air-Cooled	R-404a	11 oz. (312 g)
Q-130 Water-Cooled	R-404a	11 oz. (312 g)
Q-210 Air-Cooled	R-404a	15 oz. (425 g)
Q-210 Water-Cooled	R-404a	11 oz. (312 g)
Q-270 Air-Cooled	R-404a	22 oz. (624 g)
Q-270 Water-Cooled	R-404a	16 oz. (455 g)

Q130 Cycle Times/24-Hour Ice Production Chart

SELF-CONTAINED AIR-COOLED

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10.0	70/21.1	90/32.2	
70/21.1	10.2-11.7	12.4-14.1	14.6-16.5	1.0-2.5
80/26.7	11.2-12.8	13.0-14.8	15.5-17.5	
90/32.2	13.0-14.8	15.5-17.5	17.6-19.9	
100/37.8	14.6-16.5	17.6-19.9	20.3-23.0	

¹Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10.0	70/21.1	90/32.2
70/21.1	130	110	95
80/26.7	120	105	90
90/32.2	105	90	80
100/37.8	95	80	70

¹Based on average ice slab weight of 1.06 lb. to 1.19 lb.

²Regular cube derate is 7%

Operating Pressures

Air Temp. Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG	Discharge Pressure PSIG	Suction Pressure PSIG
50/10.0	220-255	54-20	150-180	80-110
70/21.1	220-270	54-20	160-190	90-115
80/26.7	220-300	56-22	180-200	100-120
90/32.2	250-340	58-24	190-210	110-130
100/37.8	280-380	60-26	220-240	120-140
110/43.3	290-400	62-28	230-260	120-160

¹Suction pressure drops gradually throughout the freeze cycle

SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10.0	70/21.1	90/32.2	
70/21.1	8.9-10.2	10.5-12.0	12.6-14.4	1-2.5
80/26.7	9.1-10.4	10.6-12.1	12.9-14.7	
90/32.2	9.4-10.7	10.9-12.4	13.3-15.1	
100/37.8	10.0-11.40	11.4-13.0	13.6-15.5	

¹Times in minutes

24 Hour Ice Production

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10.0	70/21.1	90/32.2
70/21.1	147	127	108
80/26.7	144	126	106
90/32.2	140	123	103
100/37.8	133	118	101

¹Based on average ice slab weight of 1.06 lb. to 1.19 lb.

²Regular cube derate is 7%

Condenser Water Consumption Gal/24 hours	90/32.2 Air Temperature Around Ice Machine Water Temperature °F/°C		
	50/10.0	70/21.1	90/32.2
	130	230	1480

¹Water regulating valve set to maintain 230 PSIG discharge pressure

Operating Pressures

Air Temp. Around Ice Machine °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG	Discharge Pressure PSIG	Suction Pressure PSIG
50/10.0	225-235	54-20	160-180	80-110
70/21.1	225-235	54-21	160-190	80-115
80/26.7	225-240	55-22	165-200	90-120
90/32.2	225-245	56-22	165-200	95-125
100/37.8	225-245	57-22	170-200	100-130
110/43.3	225-245	58-23	180-210	105-140

¹Suction pressure drops gradually throughout the freeze cycle

Q210 Cycle Times/24-Hour Ice Production Chart

SELF-CONTAINED AIR-COOLED

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10.0	70/21.1	90/32.2	
70/21.1	14.8-16.9	17.5-19.9	19.8-22.5	1.0-2.5
80/26.7	16.1-18.3	19.2-21.8	21.9-24.9	
90/32.2	17.5-19.9	21.2-24.0	24.5-27.8	
100/37.8	19.2-21.8	23.6-26.8	27.8-31.5	

¹Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10.0	70/21.1	90/32.2
70/21.1	215	185	165
80/26.7	200	170	150
90/32.2	185	155	135
100/37.8	170	140	120

¹Based on average ice slab weight of 2.44 lb. to 2.75 lb.

²Regular cube derate is 7%

Operating Pressures

Air Temp. Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG	Discharge Pressure PSIG	Suction Pressure PSIG
50/10.0	220-270	60-36	180-205	90-110
70/21.1	220-270	60-36	185-210	95-115
80/26.7	235-280	66-36	190-215	100-120
90/32.2	265-310	70-38	200-225	105-125
100/37.8	310-360	76-40	220-245	110-130
110/43.3	320-380	80-42	230-255	115-135

¹Suction pressure drops gradually throughout the freeze cycle

SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10.0	70/21.1	90/32.2	
70/21.1	14.5-16.5	15.6-17.8	19.2-21.8	1-2.5
80/26.7	14.8-16.9	16.1-18.3	19.8-22.5	
90/32.2	15.6-17.8	17.0-19.3	21.2-24.0	
100/37.8	16.1-18.3	17.5-19.9	21.9-24.9	

¹Times in minutes

24 Hour Ice Production

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10.0	70/21.1	90/32.2
70/21.1	220	205	170
80/26.7	215	200	165
90/32.2	205	190	155
100/37.8	200	185	150

¹Based on average ice slab weight of 2.44 lb to 2.75 lb.

²Regular cube derate is 7%

Condenser Water Consumption Gal/24 hours	90/32.2 Air Temperature Around Ice Machine Water Temperature °F/°C		
	50/10.0	70/21.1	90/32.2
	160	270	1500

¹Water regulating valve set to maintain 230 PSIG discharge pressure

Operating Pressures

Air Temp. Around Ice Machine °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG	Discharge Pressure PSIG	Suction Pressure PSIG
50/10.0	225-235	60-35	160-180	70-95
70/21.1	225-235	60-36	160-180	70-95
80/26.7	225-235	60-36	165-185	80-100
90/32.2	225-240	60-37	170-190	90-115
100/37.8	225-240	60-38	175-195	100-120
110/43.3	225-245	60-38	180-200	100-120

¹Suction pressure drops gradually throughout the freeze cycle

Q270 Cycle Times/24-Hour Ice Production Chart

SELF-CONTAINED AIR-COOLED

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10.0	70/21.1	90/32.2	
70/21.1	11.0-12.6	12.8-14.7	14.5-16.5	1.0-2.5
80/26.7	11.3-12.9	13.1-15.0	14.8-16.9	
90/32.2	12.6-14.3	14.8-16.9	17.0-19.3	
100/37.8	14.1-16.1	17.0-19.3	19.8-22.5	

¹Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10.0	70/21.1	90/32.2
70/21.1	280	245	220
80/26.7	275	240	215
90/32.2	250	215	190
100/37.8	225	190	165

¹Based on average ice slab weight of 2.44 lb. to 2.75 lb.

²Regular cube derate is 7%

Operating Pressures

Air Temp. Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG	Discharge Pressure PSIG	Suction Pressure PSIG
50/10.0	200-255	60-22	165-200	70-95
70/21.1	200-255	60-22	170-205	70-100
80/26.7	200-295	61-23	175-210	75-100
90/32.2	240-330	65-26	205-240	80-100
100/37.8	265-375	66-30	220-260	85-115

¹Suction pressure drops gradually throughout the freeze cycle

SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10.0	70/21.1	90/32.2	
70/21.1	10.6-12.2	12.3-14.0	13.5-15.4	1-2.5
80/26.7	10.8-12.4	12.6-14.3	13.8-15.7	
90/32.2	11.0-12.6	12.8-14.7	14.1-16.1	
100/37.8	11.3-12.9	13.1-15.0	14.5-16.5	

¹Times in minutes

24 Hour Ice Production

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10.0	70/21.1	90/32.2
70/21.1	290	255	235
80/26.7	285	250	230
90/32.2	280	245	225
100/37.8	275	240	220

¹Based on average ice slab weight of 2.44 lb. to 2.75 lb.

²Regular cube derate is 7%

Condenser Water Consumption Gal/24 hours	90/32.2 Air Temperature Around Ice Machine Water Temperature °F/°C		
	50/10.0	70/21.1	90/32.2
	240	410	2740

¹Water regulating valve set to maintain 240 PSIG discharge pressure

Operating Pressures

Air Temp. Around Ice Machine °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG	Discharge Pressure PSIG	Suction Pressure PSIG
50/10.0	235-245	24-52	175-210	80-95
70/21.1	235-245	24-54	175-210	80-95
80/26.7	235-250	24-56	175-210	80-95
90/32.2	235-255	24-58	175-210	80-95
100/37.8	235-260	24-60	175-210	80-95

¹Suction pressure drops gradually throughout the freeze cycle

We reserve the right to make product improvements at any time.

Specifications and design are subject to change without notice.

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