



Manitowoc



S Model Ice Machines

Installation, Use & Care Manual

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

America's #1 Selling Ice Machine
Part Number 000000966 03/09

Manitowoc



Safety Notices

As you work on Manitowoc equipment, 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 equipment.

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 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 manual. These notices supply helpful information which may assist you as you work.

Throughout this manual, 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. Read and understand this manual. It contains valuable care and maintenance information. If you encounter problems not covered by this manual, do not proceed, contact Manitowoc Foodservice Group. 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.

NOTE: SAVE THESE INSTRUCTIONS.

We reserve the right to make product improvements at any time. Specifications and design are subject to change without notice.

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Section 1 General Information

Model Numbers

This manual covers the following models:

Self-Contained Air-Cooled	Self-Contained Water-Cooled	Remote
SD0302A SY0304A	SD0303W SY0305W	----
SD0322A SY0324A	SD0323W SY0325W	----
SR0420A SD0422A SY0424A	SR0421W SD0423W SY0425W	----
SD0452A SY0454A	SD0453W SY0455W	----
SR0500A SD0502A SY0504A	SR0501W SD0503W SY0505W	SR0590N SD0592N SY0594N
SD0602A SY0604A	SD0603W SY0605W	SD0692N SY0694N
SR0850A SD0852A SY0854A	SR0851W SD0853W SY0855W	SR0890N SD0892N SY0894N
SD1002A SY1004A	SD1003W SY1005W	SD1092N SY1094N
SD1202A SY1204A	SD1203W SY1205W	---
SD1402A SY1404A	SD1403W SY1405W	SD1492N SY1494N
SR1600A SD1602A SY1604A	SR1601W SD1603W SY1605W	SR1690N SD1692N SY1694N
SR1800A SD1802A SY1804A	SR1801W SD1803W SY1805W	SR1890N SD1892N SY1894N
----	SD3303W SD3303WHP SY3305W SY3305WHP SD3303WM	----

NOTE: Model numbers ending in HP indicate High Pressure water regulating valve. Standard pressure = 150 psi (10.34 bar) High pressure = 350 psi (24.13 bar)

Warning

PERSONAL INJURY POTENTIAL

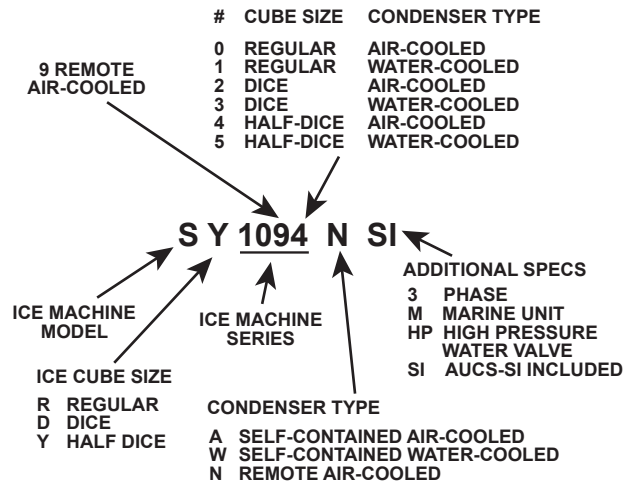
Do not operate equipment that has been misused, abused, neglected, damaged, or altered/modified from that of original manufactured specifications.

Warning

PERSONAL INJURY POTENTIAL

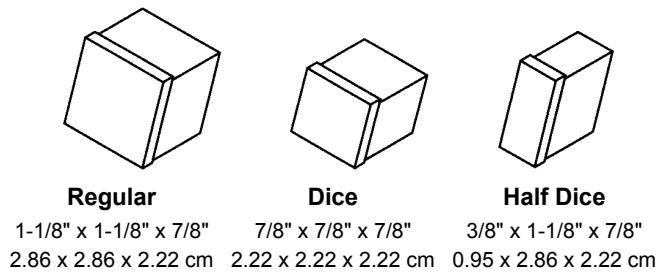
Remove all ice machine panels before lifting and installing.

How to Read a Model Number



NOTE: When referring to information in this manual refer to the Ice Machine Model (letter) and the first number of the Series followed by zeros. Example: If your model is SY1094NSI refer to S1000 throughout the manual.

Ice Cube Sizes



Accessories

Contact your Manitowoc distributor for these optional accessories:

BIN CASTER

Replaces standard legs.

ICE BAGGER

Maximize profits from bagged ice sales with this convenient accessory. This sturdy unit rests on the bin door frame, and adapts for left or right side filling.

GUARDIAN SACHET PACKETS

Guardian sachet packets release chlorine dioxide on a controlled basis to inhibit the growth of bacteria and slime.

Guardian sachet packets are available through your local Manitowoc Ice Machine dealer. Not available for S3300 machines.

ARCTIC PURE WATER FILTER SYSTEM

Engineered specifically for Manitowoc ice machines, This water filter is 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) bottles. These are the only cleaner and sanitizer approved for use with Manitowoc products.

Cleaner Part Number	Sanitizer Part Number
16 ounce Bottle - 94-0546-3	16 ounce Bottle - 94-0565-3
AuCS®-SO - 94-0546-3	AuCS®-SO - 94-0565-3
AuCS®-SI - 40-1326-3	AuCS®-SI - 40-1327-3

AUCS® AUTOMATIC CLEANING SYSTEM

This accessory reduces equipment cleaning expense. The AuCS® accessory monitors ice making cycles and initiates cleaning procedures automatically. Not available for S3300 machines.

DISPENSER

A counter-top dispenser is ideal for cafeterias and many types of self-service facilities. Manitowoc auto-fill, floor-standing ice dispensers meet the strict sanitary requirements of the food service, lodging and health care industries.

 **Warning**

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

48" wide S Model ice machines require adding Manitowoc Ice Deflector Kit K00349 when installing with non-Manitowoc ice storage systems.

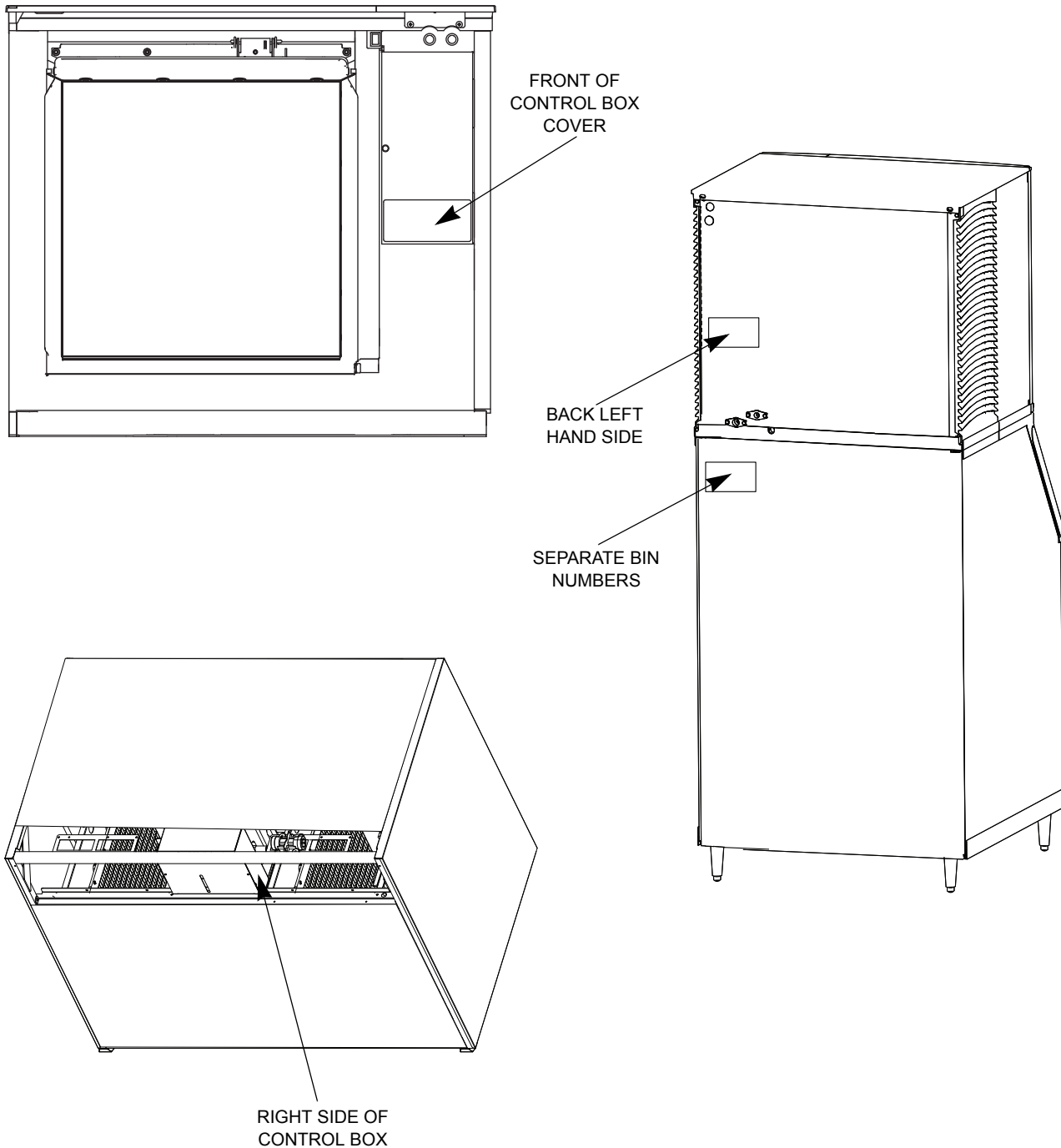
30" wide S Model ice machines require adding Manitowoc Ice Deflector Kit K00347 when installing with non-Manitowoc ice storage systems.

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

Model/Serial Number Location

These numbers are required when requesting information from your local Manitowoc distributor, or Manitowoc Foodservice.

The model and serial number are listed on the MODEL/SERIAL NUMBER DECAL affixed to the ice machine, remote condenser and storage bin.



Model/Serial Number Location

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.

Commercial 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 Distributor, Manitowoc Ice, Inc. or visit our website at www.manitowocice.com if you need further warranty information.

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.**
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.**

AUTHORIZED WARRANTY SERVICE

To comply with the provisions of the warranty, a **refrigeration service company qualified and authorized by a 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.

Residential Ice Machine Limited Warranty

WHAT DOES THIS LIMITED WARRANTY COVER?

Subject to the exclusions and limitations below, Manitowoc Ice, Inc. ("Manitowoc") warrants to the original consumer that any new ice machine manufactured by Manitowoc (the "Product") shall be free of defects in material or workmanship for the warranty period outlined below under normal use and maintenance, and upon proper installation and start-up in accordance with the instruction manual supplied with the Product.

HOW LONG DOES THIS LIMITED WARRANTY LAST?

<u>Product Covered</u>	<u>Warranty Period</u>
Ice Machine	Twelve (12) months from the sale date

WHO IS COVERED BY THIS LIMITED WARRANTY?

This limited warranty only applies to the original consumer of the Product and is not transferable.

WHAT ARE MANITOWOC ICE'S OBLIGATIONS UNDER THIS LIMITED WARRANTY?

If a defect arises and Manitowoc receives a valid warranty claim prior to the expiration of the warranty period, Manitowoc shall, at its option: (1) repair the Product at Manitowoc's cost, including standard straight time labor charges, (2) replace the Product with one that is new or at least as functionally equivalent as the original, or (3) refund the purchase price for the Product. Replacement parts are warranted for 90 days or the balance of the original warranty period, whichever is longer. The foregoing constitutes Manitowoc's sole obligation and the consumer's exclusive remedy for any breach of this limited warranty. Manitowoc's liability under this limited warranty is limited to the purchase price of Product. Additional expenses including, without limitation, service travel time, overtime or premium labor charges, accessing or removing the Product, or shipping are the responsibility of the consumer.

HOW TO OBTAIN WARRANTY SERVICE

To obtain warranty service or information regarding your Product, please contact us at:
MANITOWOC FOODSERVICE
 2110 So. 26th St.
 P.O. Box 1720,
 Manitowoc, WI 54221-1720
 Telephone: 920-682-0161 Fax: 920-683-7585
www.manitowocice.com

WHAT IS NOT COVERED?

This limited warranty does not cover, and you are solely responsible for the costs of: (1) periodic or routine maintenance, (2) repair or replacement of the Product or parts due to normal wear and tear, (3) defects or damage to the Product or parts resulting from misuse, abuse, neglect, or accidents, (4) defects or damage to the Product or parts resulting from improper or unauthorized alterations, modifications, or changes; and (5) defects or damage to any Product that has not been installed and/or maintained in accordance with the instruction manual or technical instructions provided by Manitowoc. To the extent that warranty exclusions are not permitted under some state laws, these exclusions may not apply to you.

EXCEPT AS STATED IN THE FOLLOWING SENTENCE, THIS LIMITED WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY OF MANITOWOC WITH REGARD TO THE PRODUCT. ALL IMPLIED WARRANTIES ARE STRICTLY LIMITED TO THE DURATION OF THE LIMITED WARRANTY APPLICABLE TO THE PRODUCTS AS STATED ABOVE, INCLUDING BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

IN NO EVENT SHALL MANITOWOC OR ANY OF ITS AFFILIATES BE LIABLE TO THE CONSUMER OR ANY OTHER PERSON FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND (INCLUDING, WITHOUT LIMITATION, LOSS PROFITS, REVENUE OR BUSINESS) ARISING FROM OR IN ANY MANNER CONNECTED WITH THE PRODUCT, ANY BREACH OF THIS LIMITED WARRANTY, OR ANY OTHER CAUSE WHATSOEVER, WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY OF LIABILITY. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

HOW STATE LAW APPLIES

This limited warranty gives you specific legal rights, and you may also have rights that vary from state to state or from one jurisdiction to another.

REGISTRATION CARD

To secure prompt and continuing warranty service, this warranty registration card must be completed and sent to Manitowoc within thirty (30) days from the sale date. Complete the registration card and send it to Manitowoc.

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Section 2 Installation Instructions

General

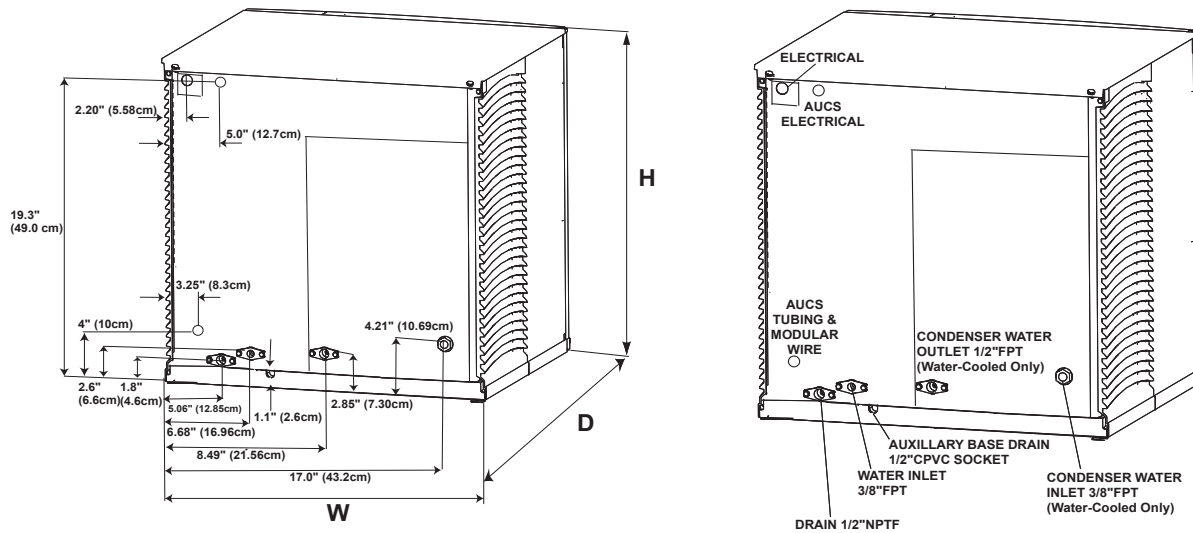
These instructions are provided to assist the qualified installer. Check your local Yellow Pages for the name of the nearest Manitowoc distributor, or call Manitowoc Foodservice for information regarding start-up services.

Important

Failure to follow these installation guidelines may affect warranty coverage.

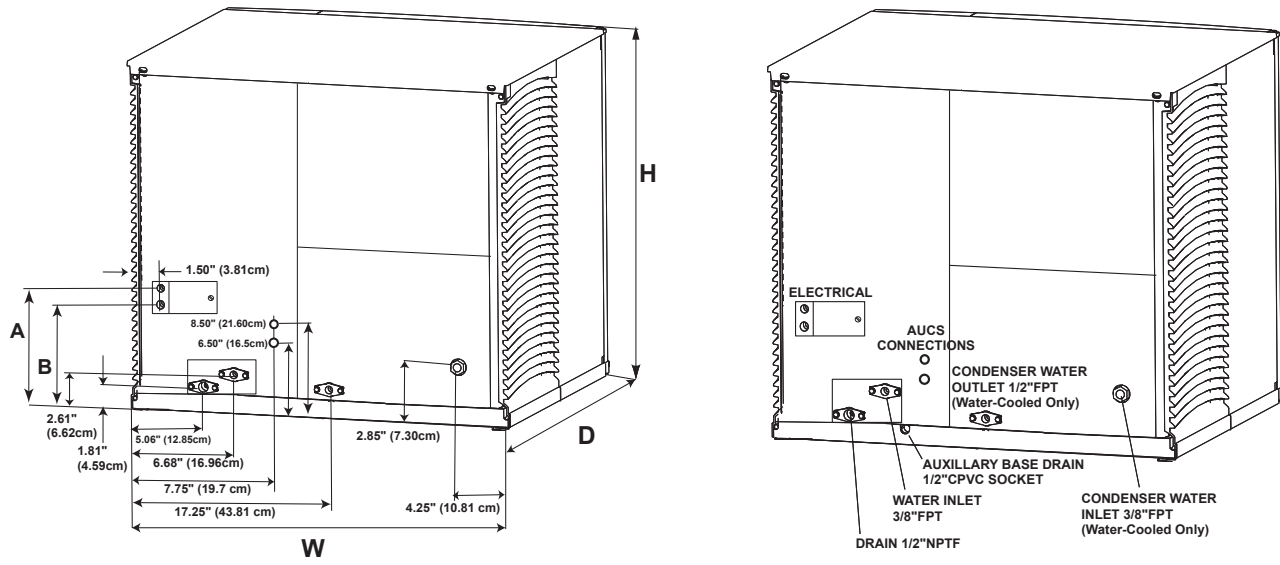
Ice Machine Dimensions

S320/S420 AIR AND WATER-COOLED ICE MACHINES



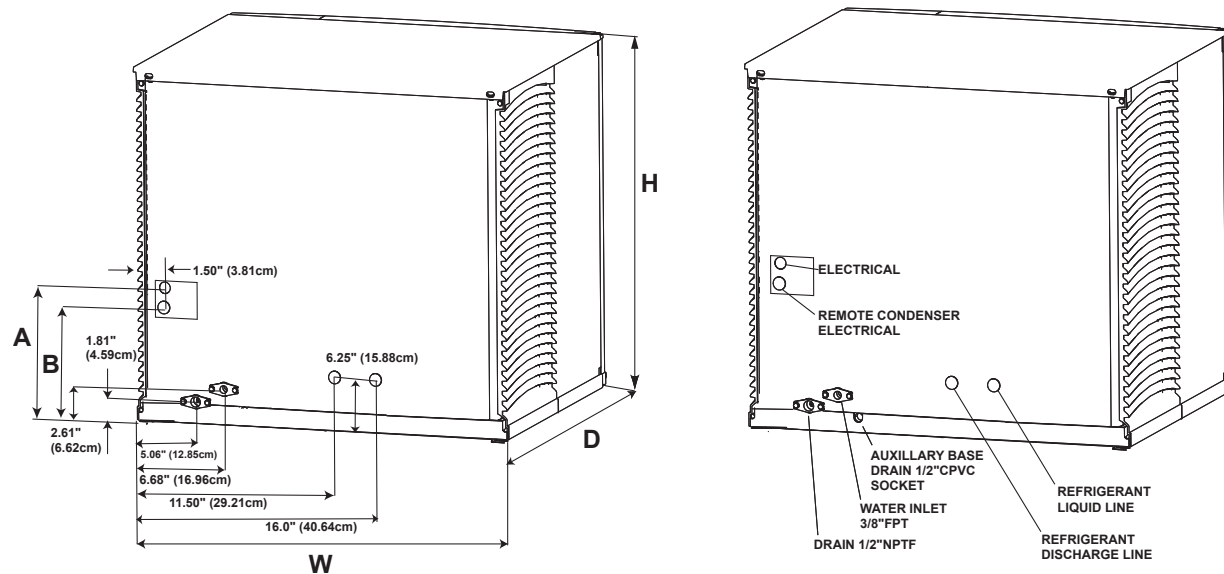
Ice Machine	Dimension W	Dimension D	Dimension H
S320	22 in. (55.9 cm)	24.5 in. (62.2 cm)	21.5 in (54.6 cm)
S420	22 in. (55.9 cm)	24.5 in. (62.2 cm)	21.5 in (54.6 cm)

S600 AIR AND WATER-COOLED ICE MACHINES



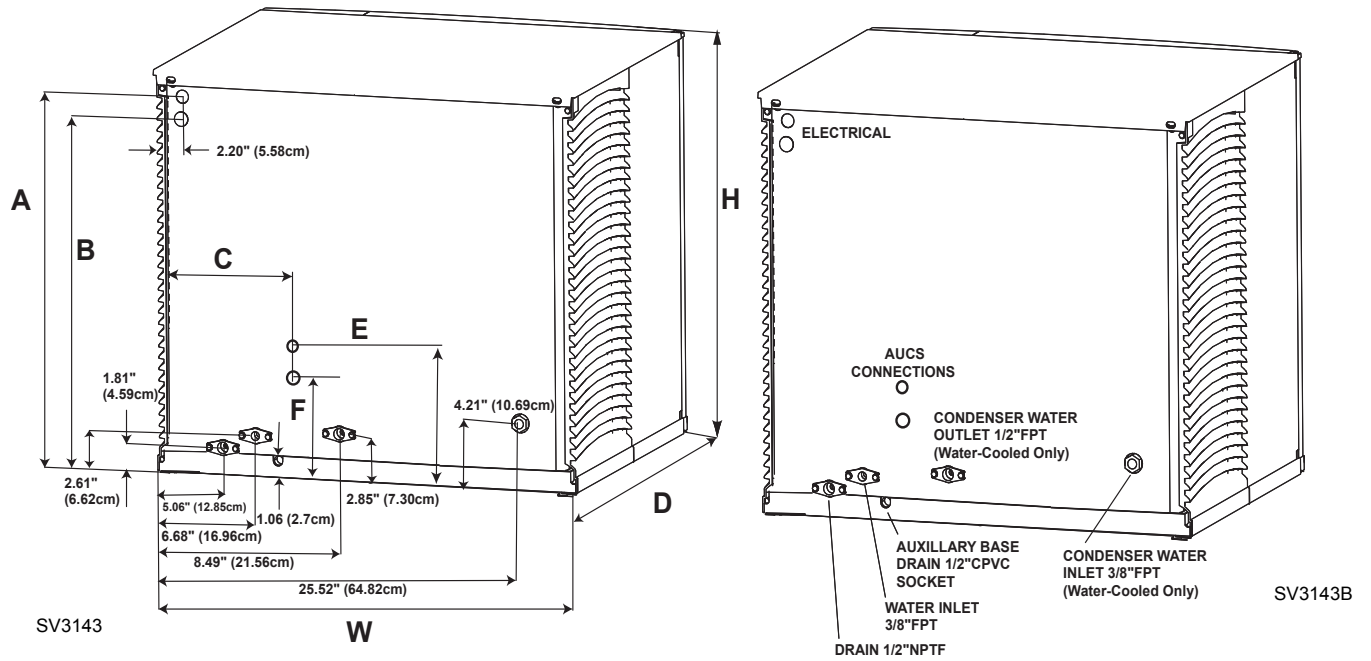
Ice Machine	Dimension A	Dimension B	Dimension W	Dimension D	Dimension H
S600	11.5 in (29.2 cm)	9.0 in (22.9 cm)	30 in. (76.2 cm)	24.5 in. (62.2 cm)	21.5 in (54.6 cm)

S600 REMOTE ICE MACHINES



Ice Machine	Dimension A	Dimension B	Dimension W	Dimension D	Dimension H
S600	11.5 in (29.2 cm)	9.0 in (22.9 cm)	30 in. (76.2 cm)	24.5 in. (62.2 cm)	21.5 in (54.6 cm)

S300/S450/S500/S850/S1000/S1200 AIR AND WATER-COOLED ICE MACHINES



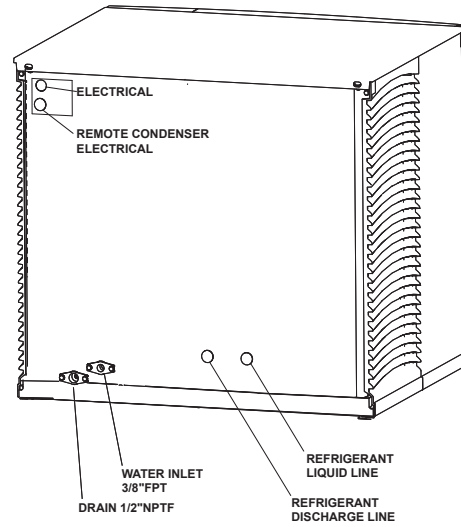
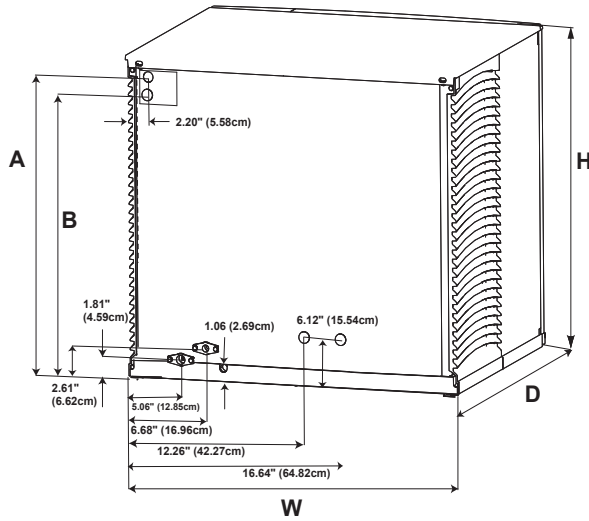
Width, Depth, and Height Dimensions

Ice Machine	Dimension W	Dimension D	Dimension H
S300	30 in. (76.2 cm)	24.50 in. (62.2 cm)	16.5 in (41.9 cm)
S450	30 in. (76.2 cm)	24.50 in. (62.2 cm)	21.5 in (54.6 cm)
S500	30 in. (76.2 cm)	24.50 in. (62.2 cm)	21.5 in (54.6 cm)
S850	30 in. (76.2 cm)	24.50 in. (62.2 cm)	26.5 in (67.3 cm)
S1000	30 in. (76.2 cm)	24.50 in. (62.2 cm)	26.5 in (67.3 cm)
S1200	30 in. (76.2 cm)	24.50 in. (62.2 cm)	29.5 in (74.9cm)

Electrical and AuCS Dimensions

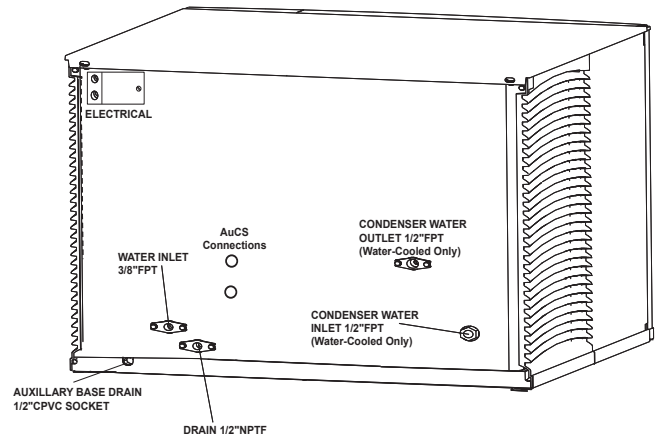
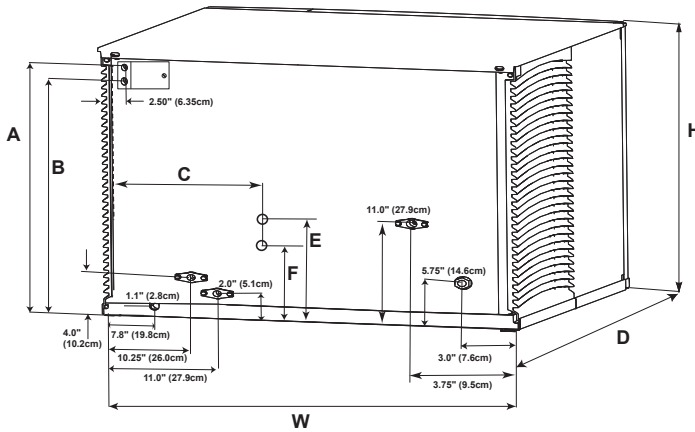
Ice Machine	Electrical		AuCS		
	Dimension A	Dimension B	Dimension C	Dimension E	Dimension F
S300	14.00 in (35.6 cm)	NA	10.0 in (25.4 cm)	6.0 in (15.24 cm)	4.0 in (10.16 cm)
S450	19.25 in (48.9 cm)	17.5 in (44.45 cm)	8.5 in (21.6 cm)	8.5 in (21.6 cm)	6.5 in (16.5 cm)
S500	19.25 in (48.9 cm)	17.5 in (44.45 cm)	8.5 in (21.6 cm)	8.5 in (21.6 cm)	6.5 in (16.5 cm)
S850	23.82 in (60.5 cm)	22.32 in (56.69 cm)	8.5 in (21.6 cm)	8.5 in (21.6 cm)	6.5 in (16.5 cm)
S1000	23.82 in (60.5 cm)	22.32 in (56.69 cm)	8.5 in (21.6 cm)	8.5 in (21.6 cm)	6.5 in (16.5 cm)
S1200	27.0 in (68.6 cm)	25.25 in (54.1 cm)	8.5 in (21.6 cm)	8.5 in (21.6 cm)	6.5 in (16.5 cm)

S500/S850/S1000 REMOTE ICE MACHINES



Ice Machine	Dimension A	Dimension B	Dimension W	Dimension D	Dimension H
S300	14.00 in (35.6 cm)	NA	30 in. (76.2 cm)	24.50 in. (62.2 cm)	16.5 in (41.9 cm)
S450	19.25 in (48.9 cm)	17.5 in (44.45 cm)	30 in. (76.2 cm)	24.50 in. (62.2 cm)	21.5 in (54.6 cm)
S500	19.25 in (48.9 cm)	17.5 in (44.45 cm)	30 in. (76.2 cm)	24.50 in. (62.2 cm)	21.5 in (54.6 cm)
S850	23.82 in (60.5 cm)	22.32 in (56.69 cm)	30 in. (76.2 cm)	24.50 in. (62.2 cm)	26.5 in (67.3 cm)
S1000	23.82 in (60.5 cm)	22.32 in (56.69 cm)	30 in. (76.2 cm)	24.50 in. (62.2 cm)	26.5 in (67.3 cm)

S1400 / S1600 / S1800 AIR AND WATER-COOLED ICE MACHINES



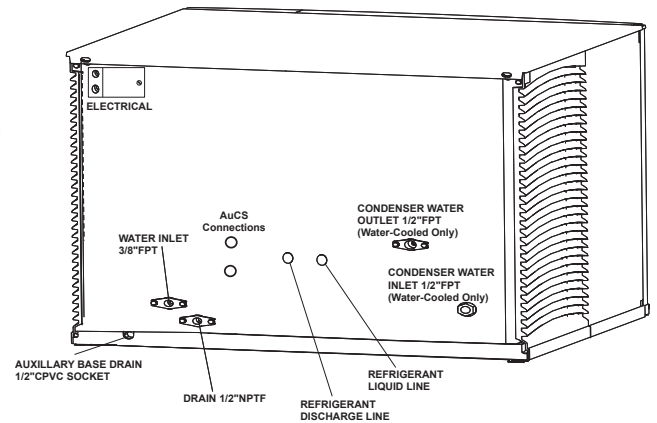
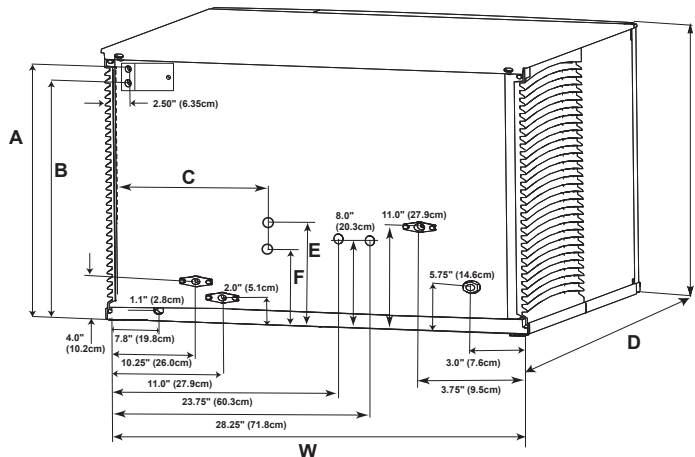
Width, Depth, and Height Dimensions

Ice Machine	Dimension W	Dimension D	Dimension H
S1400	48 in. (121.9 cm)	24.5 in. (62.2 cm)	29.5 in. (74.9 cm)
S1600	48 in. (121.9 cm)	24.5 in. (62.2 cm)	29.5 in. (74.9 cm)
S1800	48 in. (121.9 cm)	24.5 in. (62.2 cm)	29.5 in. (74.9 cm)

Electrical and AuCS Dimensions

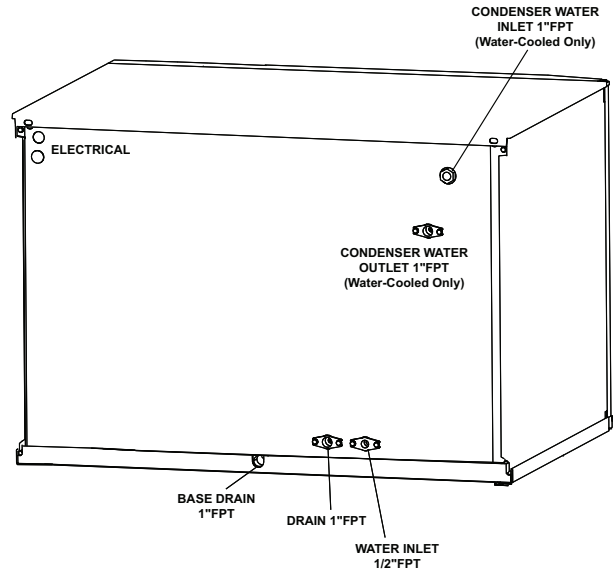
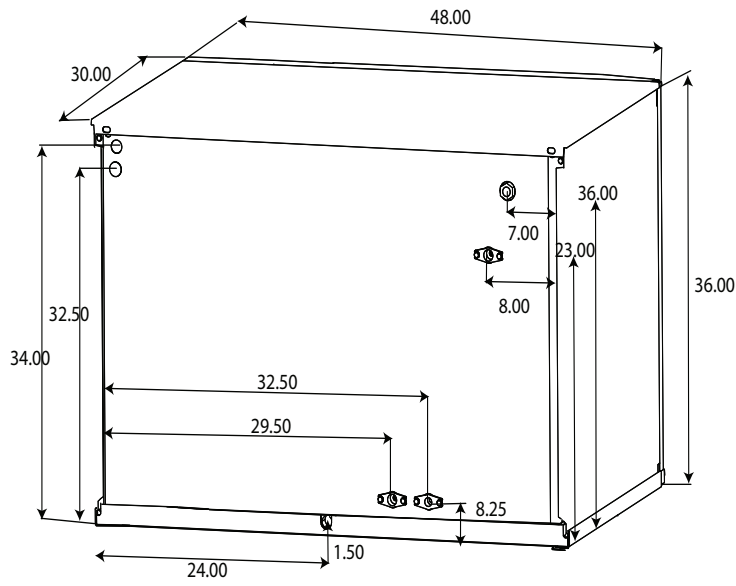
Ice Machine	Electrical			AuCS		
	Dimension A	Dimension B	Dimension C	Dimension E	Dimension F	
S1400	22.75 in (57.8 cm)	22.25 in (56.5 cm)	14.0 in (35.6 cm)	9.5 in (24.1 cm)	7.5 in (19.1 cm)	
S1600	22.75 in (57.8 cm)	22.25 in (56.5 cm)	14.0 in (35.6 cm)	9.5 in (24.1 cm)	7.5 in (19.1 cm)	
S1800	22.75 in (57.8 cm)	22.25 in (56.5 cm)	14.0 in (35.6 cm)	9.5 in (24.1 cm)	7.5 in (19.1 cm)	

S1400 / S1600 / S1800 REMOTE ICE MACHINES



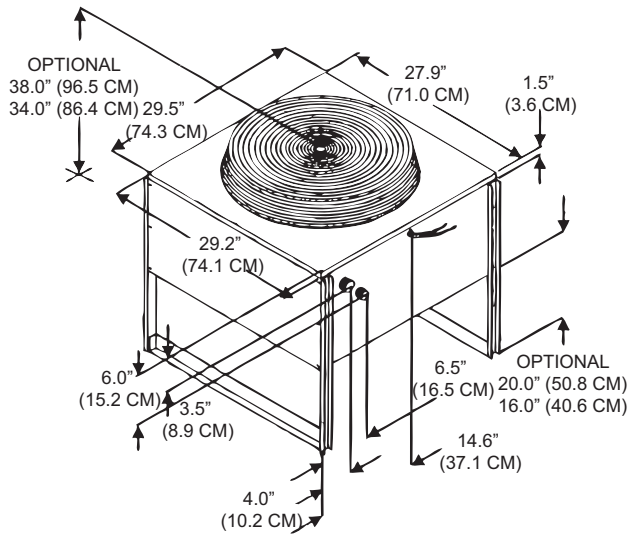
Ice Machine	Dimension A	Dimension B	Dimension W	Dimension D	Dimension H
S1400	22.75 in (57.8 cm)	22.25 in (56.5 cm)	48 in. (121.9 cm)	24.5 in. (62.2 cm)	29.5 in (74.9 cm)
S1600	22.75 in (57.8 cm)	22.25 in (56.5 cm)	48 in. (121.9 cm)	24.5 in. (62.2 cm)	29.5 in (74.9 cm)
S1800	22.75 in (57.8 cm)	22.25 in (56.5 cm)	48 in. (121.9 cm)	24.5 in. (62.2 cm)	29.5 in (74.9 cm)

S3300 WATER-COOLED MODEL



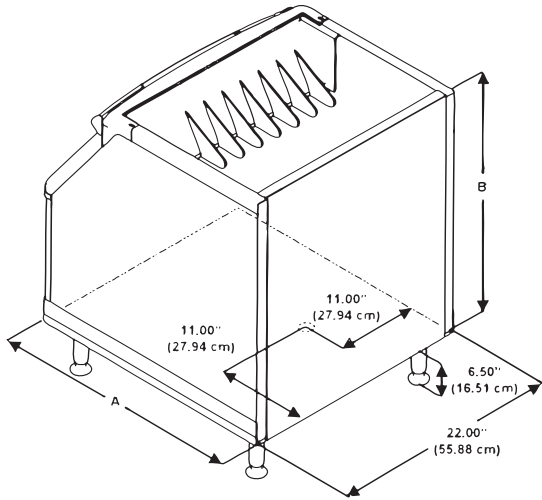
Remote Condenser Dimensions

JC0495/JC0895/JC1395



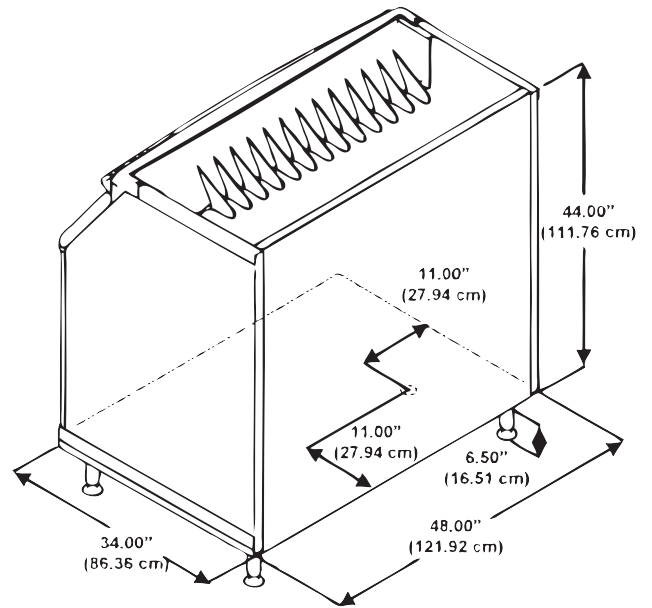
Ice Storage Bin Dimensions

22 INCH (56 CM) ICE STORAGE BINS



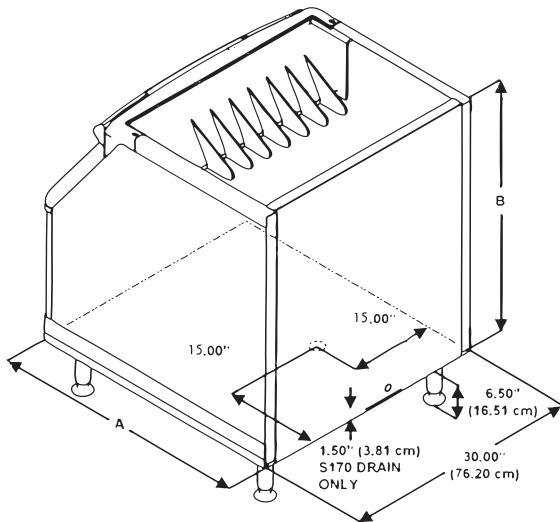
Bin Model	Dimension A	Dimension B
B320	34.0 in (86.3 cm)	32.0 in (81.3 cm)
B420	34.0 in (86.3 cm)	44.0 in (111.7 cm)

48 INCH (122 CM) ICE STORAGE BINS



B970

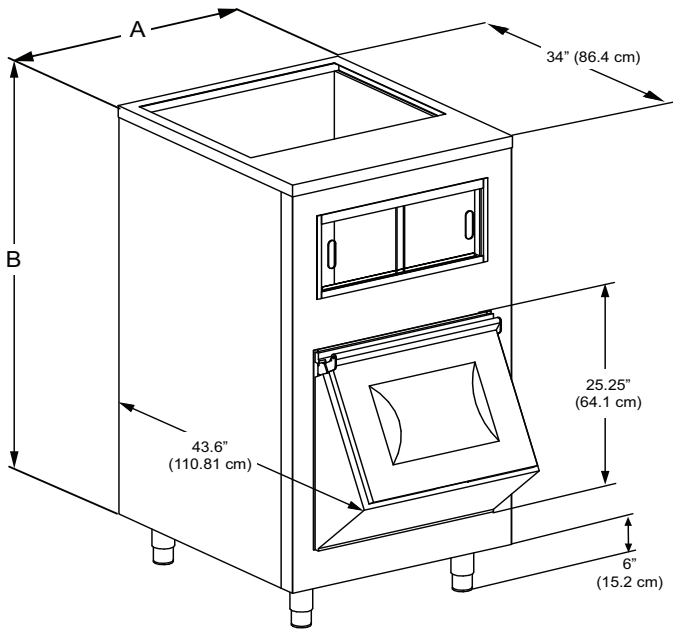
30 INCH (76 CM) ICE STORAGE BINS



Bin Model	Dimension A	Dimension B
B170	29.5 in (74.9 cm)	19.1 in (48.5 cm)
B400	34.0 in (86.3 cm)	32.0 in (81.3 cm)
B570	34.0 in (86.3 cm)	44.0 in (111.7 cm)

Large Capacity Ice Storage Bin Dimensions

30 INCH (76 CM)



Warning

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

The S600, S850, S1000 ice machines require adding Manitowoc Ice Deflector Kit K00347 when installing with non-Manitowoc ice storage systems.

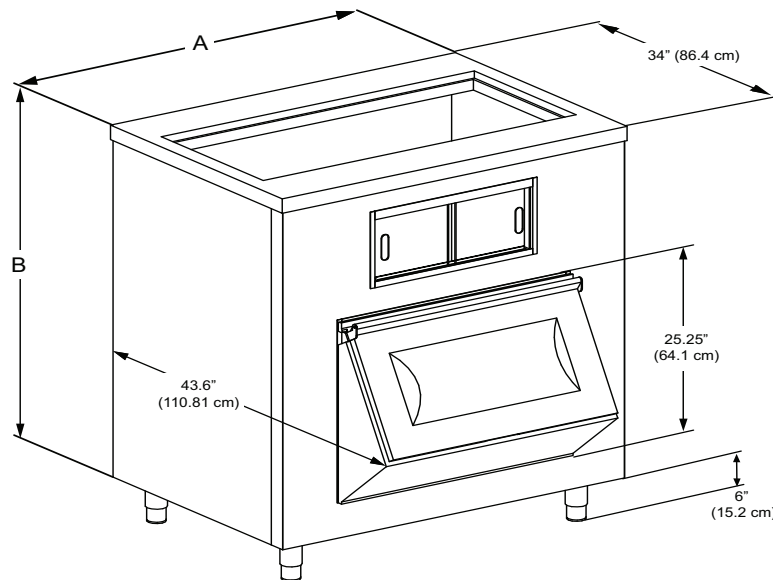
Prior to using a non-Manitowoc ice storage system with other Manitowoc ice machines, contact the manufacturer to assure their ice deflector is compatible with Manitowoc ice machines.

Caution

30" large capacity ice storage bins must be attached to the wall with the bracket provided with the bin.

Bin Model	Dimension A (Width)	Dimension B (Height)
B750	30 in. (76.2 cm.)	58 in. (147.3 cm.)
B1050	30 in. (76.2 cm.)	78 in. (198.1 cm.)
The bin drain is exactly in the center of the bin.		

48 INCH (122 CM) & 60 INCH (152 CM)



Bin Model	Dimension A (Width)	Dimension B (Height)
B1100/B110000	48.0 in. (121.9 cm.)	55.0 in. (139.7 cm.)
B1400/B140000	60.0 in. (152.4 cm.)	55.0 in. (139.7 cm.)
The bin drain is exactly in the center of the bin.		

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.
- The air temperature must be at least 35°F (1.6°C), but must not exceed 110°F (43.4°C).
- Remote air cooled - The air temperature must be at least -20°F (-29°C), but must not exceed 120°F (49°C)
- The location must not be near heat-generating equipment or in direct sunlight and must be protected from weather.
- The location must not obstruct air flow through or around the ice machine. Refer to the chart below for clearance requirements.

S300	Self-Contained Air-Cooled	Self-Contained Water-Cooled
Top/Sides	16" (40.6 cm)	8" (20.3 cm)
Back	5" (12.7 cm)	5" (12.7 cm)

S320/S450/S500/ S600/S850/S1000	Self-Contained Air-Cooled	Water-Cooled and Remote*
Top/Sides	8" (20.3 cm)	8" (20.3 cm)
Back	5" (12.7 cm)	5" (12.7 cm)

S420	Self-Contained Air-Cooled	Water-Cooled and Remote*
Top/Sides	12" (30.5 cm)	8" (20.3 cm)
Back	5" (12.7 cm)	5" (12.7 cm)

S1200	Self-Contained Air-Cooled	Water-Cooled and Remote*
Top	8" (20.3 cm)	8" (20.3 cm)
Sides	12" (30.5 cm)	8" (20.3 cm)
Back	5" (12.7 cm)	5" (12.7 cm)

S1400/S1600/S1800	Self-Contained Air-Cooled	Water-Cooled and Remote*
Top/Sides	24" (61.0 cm)	8" (20.3 cm)
Back	12" (30.5 cm)	5" (12.7 cm)

S3300**	Water-Cooled
Top/Sides	8" (20.3 cm)
Back	24" (61.0 cm)

*There is no minimum clearance required for water-cooled or remote ice machines. This value is recommended for efficient operation and servicing only.
 **S3300 - 24" on all sides is recommended to allow access without moving the bin/ice machine.

⚠ 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".

Ice Machine Heat of Rejection

Series Ice Machine	Heat of Rejection	
	Air Conditioning	Peak
S300	5000	6000
S320	3800	6000
S420	5900	6900
S450	5900	6900
S500	6100	6900
S600	9000	13900
S850	13000	16000
S1000	17700	21000
S1200	20700	24500
S1400	25000	28000
S1600	21000	31000
S1800	31000	36000
S3300	45000	51000

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.

This information is also necessary when evaluating the benefits of using water-cooled or remote condensers to reduce air conditioning loads. The amount of heat added to an air conditioned environment by an ice machine using a water-cooled or remote condenser is negligible.

Knowing the amount of heat rejected is also important when sizing a cooling tower for a water-cooled condenser. Use the peak figure for sizing the cooling tower.

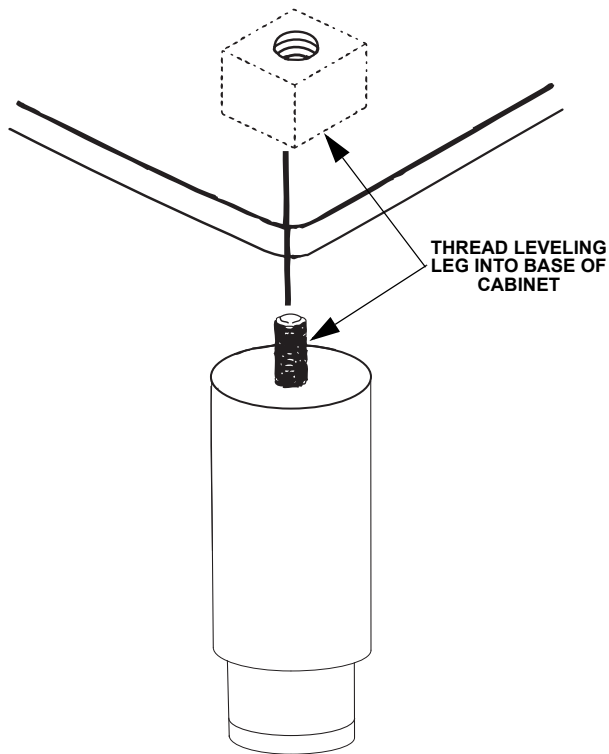
Removing Drain Plug and Leveling the Ice Storage Bin

1. Remove threaded plug from drain fitting.
2. Screw the leveling legs onto the bottom of the bin.
3. Screw the foot of each leg in as far as possible.

Caution

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

4. Move the bin into its final position.
5. Level the bin to assure that the bin door closes and seals properly. Use a level on top of the bin. Turn the base of each foot as necessary to level the bin.
6. Inspect bin gasket prior to ice machine installation. (Manitowoc bins come with a closed cell foam gasket installed along the top surface of the bin.)
7. Remove all panels from ice machine before lifting. Remove both front panels, top cover, left and right side panels.
8. Install ice machine on bin.



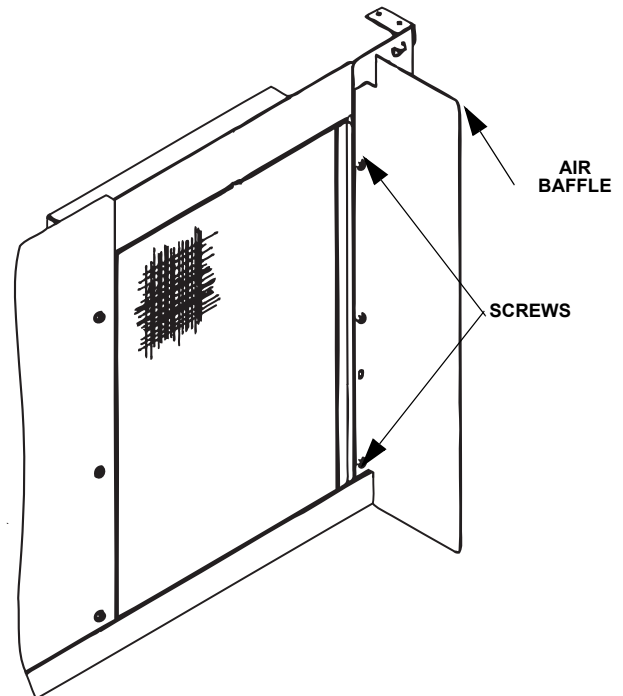
Leveling Leg and Foot

Air-Cooled Baffle

SELF-CONTAINED AIR-COOLED ONLY

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


1. Remove the back panel screws next to the condenser.
2. Align the mounting holes in the air baffle with the screw holes and reinstall the screws.



Air Baffle

Electrical Service


GENERAL

 **Warning**

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

VOLTAGE

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

 **Warning**

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

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

- The ice machine must be grounded.
- A separate fuse/circuit breaker must be provided for each ice machine.
- A qualified electrician must determine proper wire size dependent upon location, materials used and length of run (minimum circuit ampacity can be used to help select the wire size).
- The maximum allowable voltage variation is +/-10 of the rated voltage at ice machine start-up (when the electrical load is highest).
- Check all green ground screws in the control box and verify they are tight before starting the ice machine.

Important

Observe correct polarity of incoming line voltage.

Incorrect polarity can lead to erratic ice machine operation and a safety issue. This is especially critical on 230 volt / 50 cycle ice machines.

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).

MINIMUM CIRCUIT AMPACITY

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

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

ELECTRICAL REQUIREMENTS

Refer to Ice Machine Model/Serial Plate for voltage/ amperage specifications.

GROUND FAULT CIRCUIT INTERRUPTER

Ground Fault Circuit Interrupter (GFCI/GFI) protection is a system that shuts down the electric circuit (opens it) when it senses an unexpected loss of power, presumably to ground. Manitowoc Ice does not recommend the use of a GFCI/GFI circuit protection with our equipment. If code requires the use of a GFCI/GFI then you must follow the local code. The circuit must be dedicated, sized properly and there must be a panel GFCI/GFI breaker. We do not recommend GFCI/GFI outlets as they are known for more intermittent nuisance trips than panel breakers.

MINIMUM POWER CORD SPECIFICATIONS

Maximum Breaker Size	Minimum Wire Size	Maximum Length of Power Cord
15 amp	14 gauge	6 feet (1.83 m)
20 amp	12 gauge	6 feet (1.83 m)
30 amp	10 gauge	6 feet (1.83 m)
40 amp	8 gauge	6 feet 1(.83 m)

If a power cord is used the wire size to the receptacle is dependant upon location, materials used, length of run, etc., so it must be determined by a qualified electrician. Local, state or national requirements will supersede our minimum requirements.

MAXIMUM BREAKER SIZE & MINIMUM CIRCUIT AMPERAGE CHART

Important

Due to continuous improvements, this information is for reference only. Please refer to the ice machine serial number tag to verify electrical data. Serial tag information overrides information listed on this page.

Ice Machine	Voltage Phase Cycle	Air-Cooled		Water Cooled		Remote	
		Maximum Fuse/Circuit Breaker	Minimum Circuit Amps	Maximum Fuse/Circuit Breaker	Minimum Circuit Amps	Maximum Fuse/Circuit Breaker	Minimum Circuit Amps
S300	115/1/60	25	15.6	25	14.8	N/A	N/A
	230/1/50	15	7.4	15	6.9	N/A	N/A
	230/1/60	15	6.7	15	6.3	N/A	N/A
S320	115/1/60	15	11.3	15	10.5	N/A	N/A
	208-230/1/60	15	6.0	15	5.6	N/A	N/A
	230/1/50	15	6.0	15	5.6	N/A	N/A
S420/S450	115/1/60	20	14.2	20	13.5	N/A	N/A
	208-230/1/60	15	6.1	15	5.7	N/A	N/A
	230/1/50	15	7.1	15	6.8	N/A	N/A
S500	115/1/60	20	20.0	20	13.5	20	20.0
	208-230/1/60	15	6.1	15	5.7	15	8.3
	230/1/50	15	7.1	15	6.8	15	6.7
S600	208-230/1/60	15	8.3	15	7.9	15	8.9
	230/1/50	15	6.7	15	6.1	15	7.1
S850	208-230/1/60	20	11.9	20	10.9	20	11.9
	208-230/3/60	15	9.2	15	8.2	15	9.2
	230/1/50	20	10.8	20	9.4	15	10.4
S1000	208-230/1/60	30	17.3	30	16.3	25	12.8
	208-230/3/60	15	10.6	15	9.6	15	10.6
	230/1/50	20	12.7	20	11.3	20	12.3
S1200	208-230/1/60	35	25.0	35	25.0	N/A	N/A
	208-230/3/60	20	16.0	20	16.0	N/A	N/A
	230/1/50	30	20.0	30	20.0	N/A	N/A
S1400	208-230/1/60	30	17.5	30	16.1	30	17.1
	208-230/3/60	20	13.2	20	11.8	20	12.8
	230/1/50	30	15.1	30	13.7	30	14.7
S1600	208-230/1/60	30	19.8	30	18.4	30	19.4
	208-230/3/60	20	13.5	20	12.1	20	13.1
	230/1/50	30	16.7	30	15.3	30	16.3
S1800	208-230/1/60	40	23.5	40	22.1	40	23.1
	208-230/3/60	20	13.4	20	12.0	20	13.0
	230/1/50	40	21.9	40	20.5	40	21.5
S3300	208-230/1/60	N/A	N/A	N/A	N/A	N/A	N/A
	208-230/3/60	N/A	N/A	30	30	N/A	N/A
	230/1/50	N/A	N/A	N/A	N/A	N/A	N/A
	440-480/3/60	N/A	N/A	15	9.9	N/A	N/A

S3300 Only - Verify the direction of rotation correct is correct on the 3ph scroll compressor. The ice machine will have high suction pressure, low discharge pressure and will be noticeably loud. Reverse any two incoming power leads to reverse rotation.

Self-Contained Electrical Wiring Connections

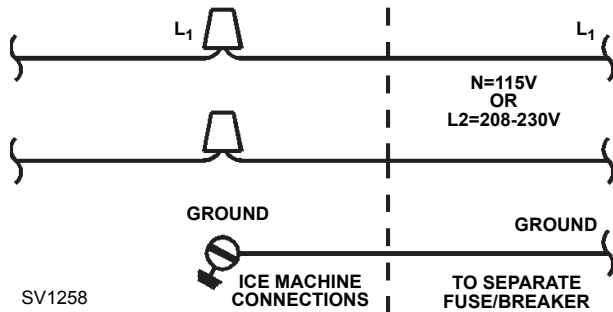
Warning

These diagrams are not intended to show proper wire routing, wire sizing, disconnects, etc., only the correct wire connections.

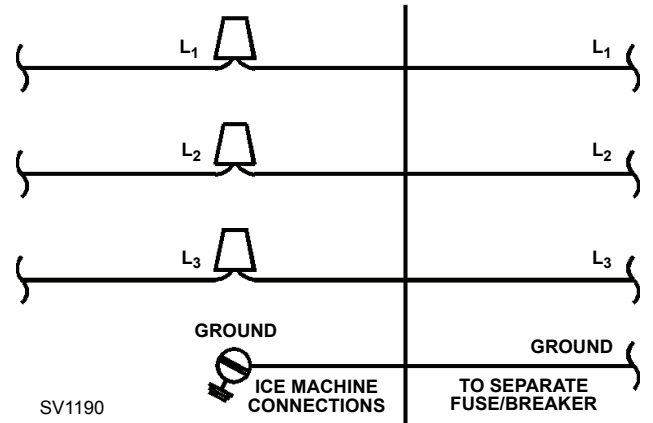
All electrical work, including wire routing and grounding, must conform to local, state and national electrical codes.

Though wire nuts are shown in the drawings, the ice machine field wiring connections may use either wire nuts or screw terminals.

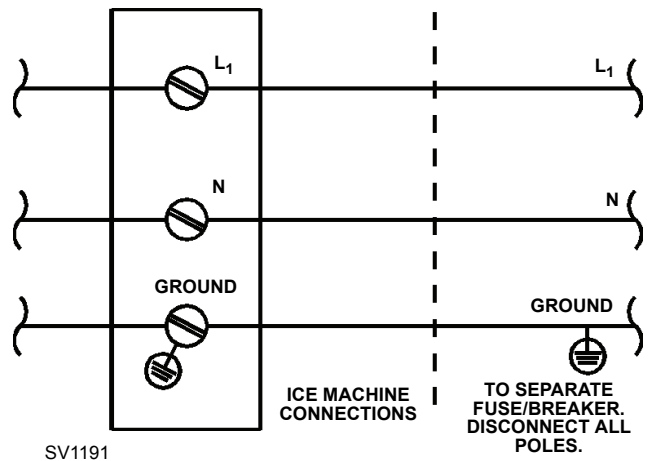
**SELF CONTAINED ICE MACHINE
115/1/60 OR 208-230/1/60**



**SELF CONTAINED ICE MACHINE
208-230/3/60 OR 440-480/3/60**




**SELF CONTAINED ICE MACHINE
230/1/50**



For United Kingdom Only

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

- The wire which is colored 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 colored green or green and yellow.
- The wire colored blue must be connected to the terminal which is marked with the letter N or colored black.
- The wire colored brown must be connected to the terminal which is marked with the letter L or colored red.

Remote Electrical Wiring Connections

Warning

These diagrams are not intended to show proper wire routing, wire sizing, disconnects, etc., only the correct wire connections.

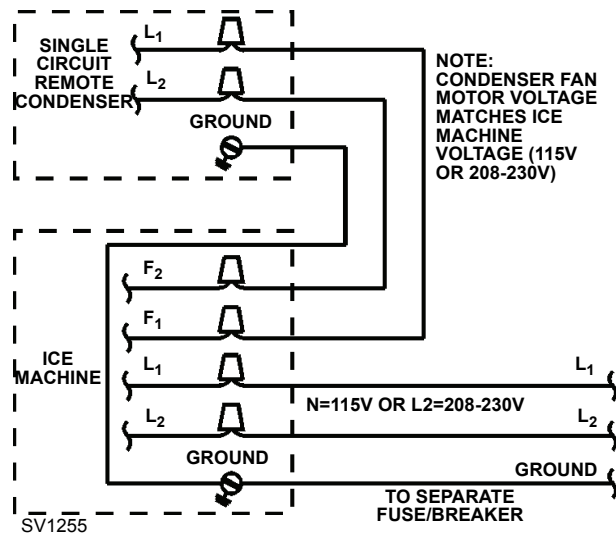
All electrical work, including wire routing and grounding, must conform to local, state and national electrical codes.

Though wire nuts are shown in the drawings, the ice machine field wiring connections may use either wire nuts or screw terminals.

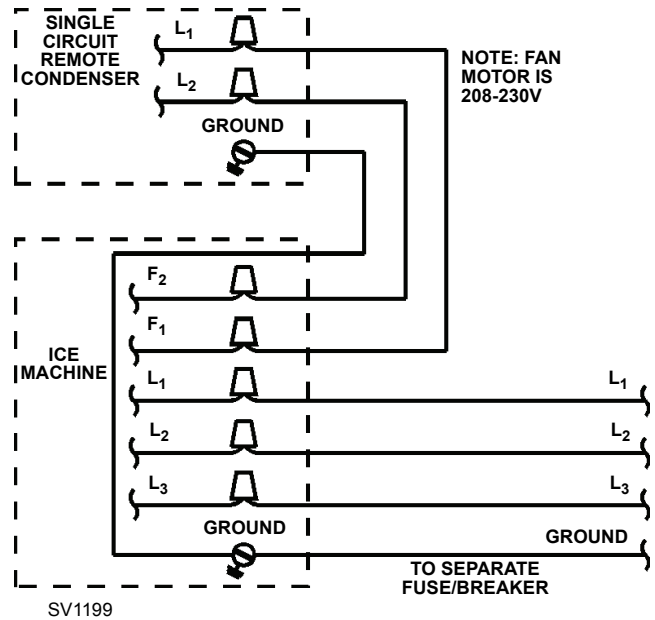
Important

F2 wire is located in the compressor compartment behind the control box. The wire is labeled F2 and capped with a wire nut.

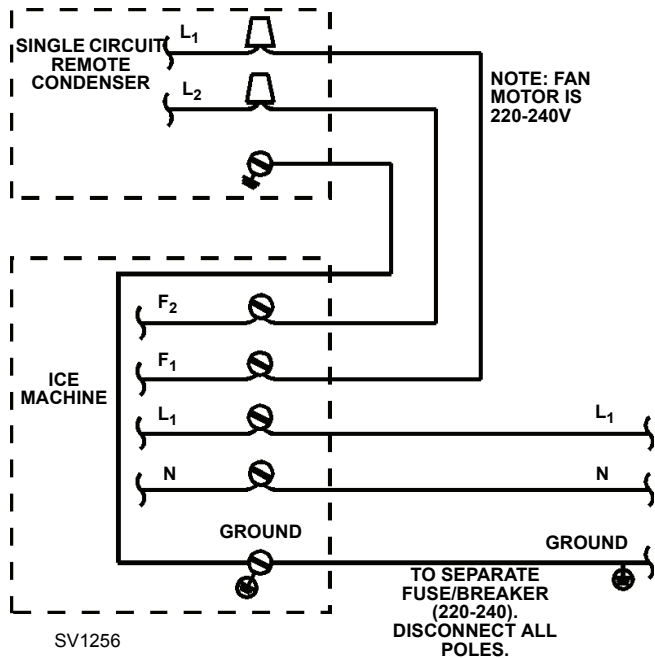
REMOTE ICE MACHINE WITH SINGLE CIRCUIT MODEL CONDENSER
115/1/60 OR 208-230/1/60



REMOTE ICE MACHINE WITH SINGLE CIRCUIT MODEL CONDENSER
208-230/3/60 OR 440-480/3/60



REMOTE ICE MACHINE WITH SINGLE CIRCUIT MODEL CONDENSER
230/1/50



Water Supply and Drain Requirements

WATER SUPPLY

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

Important

If you are installing a Manitowoc Arctic Pure 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 recommended pressure (80 psi), obtain a water pressure regulator from your Manitowoc distributor.
- Contact your distributor if your water pressure is greater than 150 psig (10.34 bar). A special order condensing unit is available that allows water pressure up to 350 psig (24.13 bar).
- Install a water shut-off valve for both the ice making and condenser water lines.
- Insulate water inlet lines to prevent condensation.

⚠ Caution

Do not apply heat to water valve inlet fitting. This will damage plastic water inlet connection.

DRAIN CONNECTIONS

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

- Drain lines must have a 1.5 inch drop per 5 feet of run (2.5 cm per meter), and must not create traps.
- The floor drain must be large enough to accommodate drainage from all drains.
- Run separate bin and ice machine drain lines. Insulate them to prevent condensation.
- Vent the bin and ice machine drain to the atmosphere. Do not vent the condenser drain on water-cooled models.
- S3300 requires base drain connection (1" FPT).

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, 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 (0.5 bar) between the condenser water inlet and the outlet of the ice machine.
- Water exiting the condenser must not exceed 110°F (43.3°C).

S3300 CONDENSER WATER PRESSURE

Water pressure at the condenser cannot exceed 150 psig (10.34 bar) with the standard water-regulating valve. Contact your distributor if your water pressure is greater than 150 psig (10.34 bar). A special order condensing unit is available that allows water pressure up to 350 psig (24.13 bar).

IMPORTANT

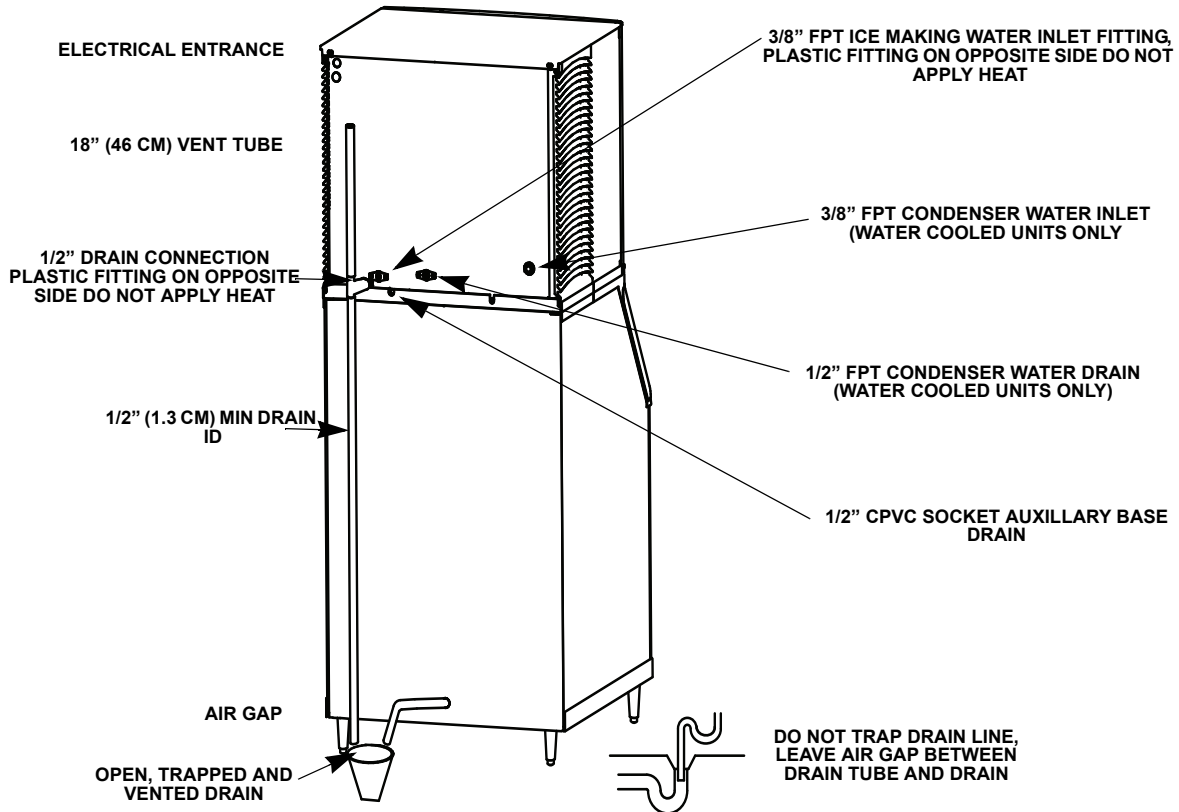
The Commonwealth of Massachusetts requires that all water-cooled models must be connected only to a closed loop, cooling tower system.

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	35°F (1.6°C) Min. 90°F (32.2°C) Max.	20 psi (1.4 bar) Min. 80 psi (5.52 bar) Max.	3/8" Female Pipe Thread 1/2" FPT S3300	3/8" (.95 cm) min inside diameter 1/2" (1.27 cm) S3300 Only
Ice Making Water Drain	---	---	1/2" Female Pipe Thread 1" FPT S3300 Only 1" FPT Base Drain S3300	1/2" (1.27 cm) min inside diameter 1" (2.54 cm) S3300 Only
Condenser Water Inlet	90°F (32.2°C) Max.	Standard 20 psi (1.4 bar) Min. 150 psi (10.34 bar) Max. High Pressure Option 20 psi (1.4 bar) Min. 350 psi (24.1 bar) Max.	3/8" Female Pipe Thread 1" Female Pipe Thread S3300 Only	
Condenser Water Drain	---	---	1/2" Female Pipe Thread 1" FPT S3300 Only	1/2" (1.27 cm) min inside diameter 1" (2.54 cm) S3300 Only
Bin Drain	---	---	3/4" Female Pipe Thread	3/4" (1.91 cm) minimum inside diameter
Large Capacity Bin Drain	---	---	1" Male Pipe Thread	1" (2.54 mm) min. inside diameter

Refer to "Ice Machine Dimensions" at the beginning of Section 2 for the exact locations of inlets and drains for the model you are working on.



Remote Condenser/Line Set Installation

Ice Machine	Remote Single Circuit Condenser	Line Set*
S500	JC0495	RT-20-R404A RT-35-R404A RT-50-R404A
S600/S800/S1000	JC0895	RT-20-R404A RT-35-R404A RT-50-R404A
S1400/S1600/ S1800	JC1395	RL-20-R404A RL-35-R404A RL-50-R404A

*Line Set	Discharge Line	Liquid Line
RT	1/2" (1.27 cm)	5/16" (.79 cm)
RL	1/2" (1.27 cm)	3/8" (.95 cm)

Air Temperature Around the Condenser	
Minimum	Maximum
-20°F (-29°C)	120°F (49°C)

Important

Manitowoc remote systems are only approved and warranted as a complete new package. Warranty on the refrigeration system will be void if a new ice machine head section is connected to pre-existing (used) tubing or remote condensers.


REMOTE ICE MACHINES REFRIGERANT CHARGE


Each remote ice machine ships from the factory with a refrigerant charge appropriate for installation with line sets of up to 50' (15.25 m). The serial tag on the ice machine indicates the refrigerant charge.

Additional refrigerant may be required for installations using line sets between 50' and 100' (15.25-30.5 m) long. If additional refrigerant is required, refer to the chart below for the correct amount to be added.

IMPORTANT EPA CERTIFIED TECHNICIANS
If remote line set length is between 50' and 100' (15.25-30.5 m), add additional refrigerant to the nameplate charge. Refer to the Installation Instructions in Installation Use and Care Manual for the model being worked on.
Tubing length: _____
Refrigerant added to nameplate: _____
New total refrigerant charge: _____

Typical Additional Refrigerant Label

 Warning
Potential Personal Injury Situation
The ice machine contains refrigerant charge. Installation of the line sets must be performed by a properly trained and EPA certified refrigeration technician aware of the dangers of dealing with refrigerant charged equipment.

 Caution
Never add more than nameplate charge to the refrigeration system for any application.

Ice Machine	Nameplate Charge (Charge Shipped in Ice Machine)	Refrigerant to be Added for 50'-100' Line Sets	Maximum System Charge (Never Exceed)
S500	6 lb. (96 oz.)	1.5 lb. (24 oz.)	7.5 lb. (120 oz.)
S600	6.5 lb. (104 oz.)	1.5 lb. (24 oz.)	8 lb. (128 oz.)
S850	8.5 lb. (136 oz.)	2 lb. (32 oz.)	10.5 lb. (168 oz.)
S1000	8.5 lb. (136 oz.)	2 lb. (32 oz.)	10.5 lb. (168 oz.)
S1400	11 lb. (176 oz.)	2 lb. (32 oz.)	13 lb. (208 oz.)
S1600	11.5 lb. (184 oz.)	2 lb. (32 oz.)	13.5 lb. (216 oz.)
S1800	12.5 lb. (200 oz.)	1 lb. (16 oz.)	13.5 lb. (216 oz.)

GENERAL

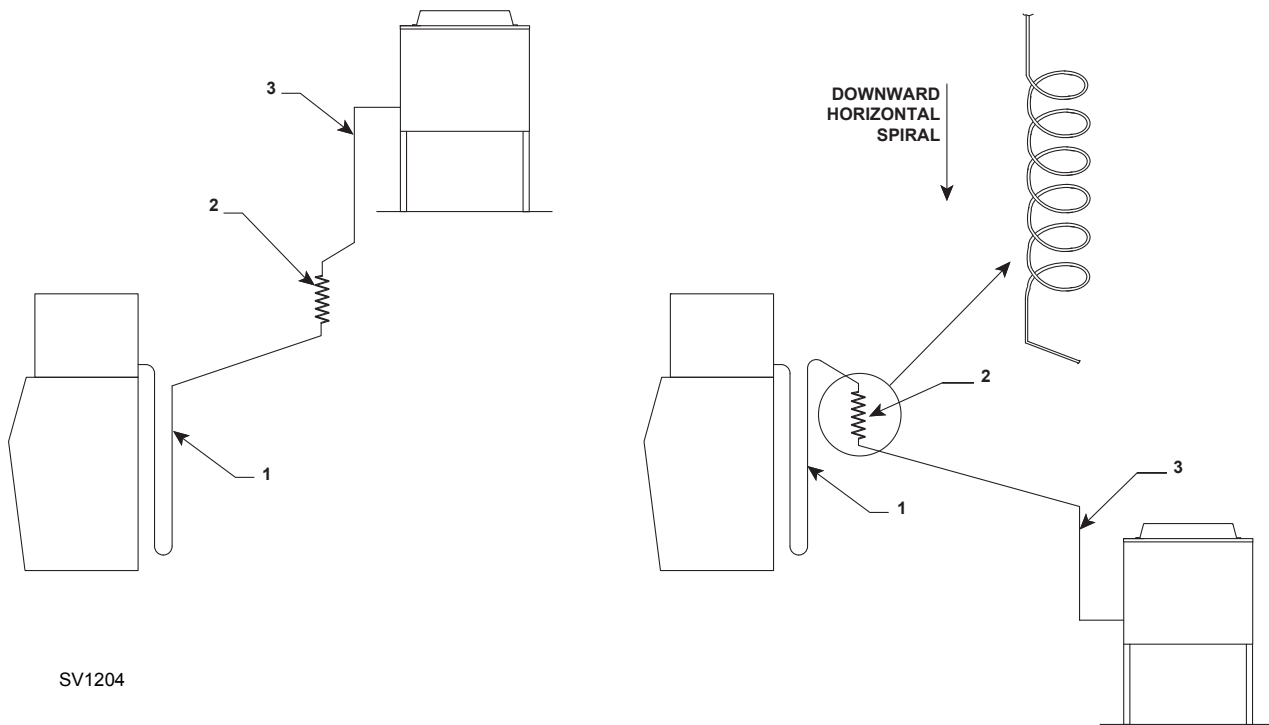
Condensers must be mounted horizontally with the fan motor on top with nothing obstructing it. There must be at least a 16" clearance from the bottom for air intake. The front coupling panel & one other panel (back or side) must also be unobstructed.

Remote condenser installations consist of vertical and horizontal line sets between the ice machine and the condenser. When combined, they must fit within approved specifications. The following guidelines, drawings and calculation methods must be followed to verify a proper remote condenser installation.

⚠ Caution

The 60 month compressor warranty (including the 36 month labor replacement warranty) will not apply if the remote ice machine is not installed according to specifications.

This warranty also will not apply if the refrigeration system is modified with a condenser, heat reclaim device, or other parts or assemblies not manufactured by Manitowoc Ice unless specifically approved in writing by Manitoc Ice.



SV1204

Routing Line Sets

CALCULATING REMOTE CONDENSER INSTALLATION DISTANCES

Line Set Length

The maximum length is 100' (30.5 m).

The ice machine compressor must have the proper oil return. The receiver is designed to hold a charge sufficient to operate the ice machine in ambient temperatures between -20°F (-29°C) and 120°F (49°C), with line set lengths of up to 100' (30.5 m).

Line Set Rise/Drop

The maximum rise is 35' (10.7 m).

The maximum drop is 15' (4.5 m).

⚠ Caution

If a line set has a rise followed by a drop, another rise cannot be made. Likewise, if a line set has a drop followed by a rise, another drop cannot be made.

Make the following calculations to make sure the line set layout is within specifications.

1. Insert the **measured rise** into the formula below. Multiply by 1.7 to get the **calculated rise**.
(Example: A condenser located 10 feet above the ice machine has a **calculated rise** of 17 feet.)
2. Insert the **measured drop** into the formula below. Multiply by 6.6 to get the **calculated drop**.
(Example. A condenser located 10 feet below the ice machine has a **calculated drop** of 66 feet.)
3. Insert the **measured horizontal distance** into the formula below. No calculation is necessary.
4. Add together the **calculated rise**, **calculated drop**, and **horizontal distance** to get the **total calculated distance**. If this total exceeds 150' (45.7 m), move the condenser to a new location and perform the calculations again.

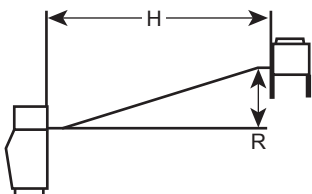
Calculated Line Set Distance

The maximum calculated distance is 150' (45.7 m).

Line set rises, drops, horizontal runs (or combinations of these) in excess of the stated maximums will exceed compressor start-up and design limits. This will cause poor oil return to the compressor.

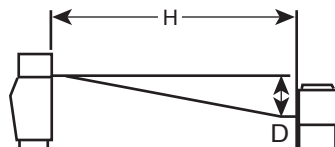
Maximum Line Set Distance Formula

Step 1.	Measured Rise (35' [10.7 m] Maximum)	_____ x 1.7	=	_____	Calculated Rise
Step 2.	Measured Drop (15' [4.5 m] Maximum)	_____ x 6.6	=	_____	Calculated Drop
Step 3.	Measured Horizontal Distance (100' [30.5 m] Maximum)			_____	Horizontal Distance
Step 4.	Total Calculated Distance 150' (45.7 m)			_____	Total Calculated Distance



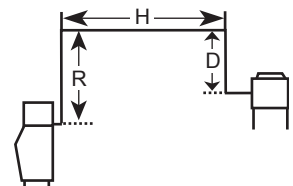
SV1196

Combination of a Rise and a Horizontal Run



SV1195

Combination of a Drop and a Horizontal Run



SV1194

Combination of a Rise, a Drop and a Horizontal Run

LENGTHENING OR REDUCING LINE SET LENGTHS

In most cases, by routing the line set properly, shortening will not be necessary. When shortening or lengthening is required, do so before connecting the line set to the ice machine or the remote condenser. This prevents the loss of refrigerant in the ice machine or condenser.

The quick connect fittings on the line sets are equipped with Schraeder valves. Use these valves to recover any vapor charge from the line set. When lengthening or shortening lines follow good refrigeration practices, purge with nitrogen and insulate all tubing. Do not change the tube sizes. Evacuate the lines and place about 5 oz (143g) of vapor refrigerant charge in each line.

CONNECTING A LINE SET

1. Remove the dust caps from the line set, condenser and ice machine.
2. Apply refrigeration oil to the threads on the quick disconnect couplers before connecting them to the condenser.
3. Carefully thread the female fitting to the condenser or ice machine by hand.
4. Tighten the couplings with a wrench until they bottom out.
5. Turn an additional 1/4 turn to ensure proper brass-to-brass seating. Torque to the following specifications:

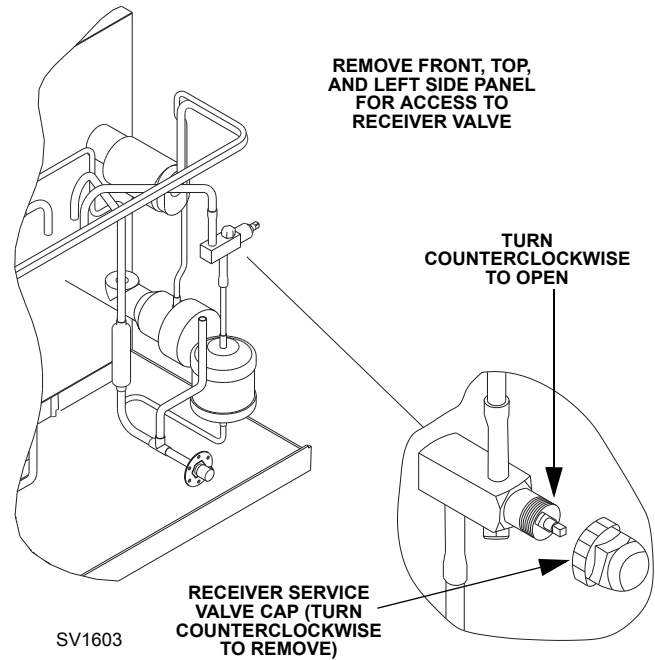
Liquid Line	Discharge Line
10-12 ft lb. (13.5-16.2 N•m)	35-45 ft lb. (47.5-61.0 N•m)

6. Check all fittings and valve caps for leaks.
7. Make sure Schraeder cores are seated and Schraeder caps are on and tight.

REMOTE RECEIVER SERVICE VALVE

The receiver service valve is closed during shipment. Open the valve prior to starting the ice machine.

1. Remove the top and left side panels.
2. Remove the receiver service valve cap.
3. Backseat (open) the valve.
4. Reinstall the cap and panels.



Backseating the Receiver Service Valve

Remote Ice Machine Usage with Non-Manitowoc Multi-Circuit Condensers

WARRANTY

The sixty (60) month compressor warranty, including thirty six (36) month labor replacement warranty, **shall not apply** when the remote ice machine is not installed within the remote specifications. The foregoing warranty shall not apply to any ice machine installed and/or maintained inconsistent with the technical instructions provided by Manitowoc Ice, Inc. Performance may vary from Sales specifications. S-Model ARI certified standard ratings only apply when used with a Manitowoc remote condenser.

If the design of the condenser meets the specifications, Manitowoc's only approval is for full warranty coverage to be extended to the Manitowoc manufactured part of the system. Since Manitowoc does not test the condenser in conjunction with the ice machine, Manitowoc will not endorse, recommend, or approve the condenser, and will not be responsible for its performance or reliability.

Important

Manitowoc warrants only complete new and unused remote packages. Guaranteeing the integrity of a new ice machine under the terms of our warranty prohibits the use of pre-existing (used) tubing or condensers.

HEAD PRESSURE CONTROL VALVE

Any remote condenser connected to a Manitowoc S-Model Ice Machine must have a head pressure control valve #836809-3 (available from Manitowoc Distributors) installed on the condenser package. Manitowoc **will not accept** substitute "off the shelf" head pressure control valves.

Caution

Do not use a fan cycling control to try to maintain discharge pressure. Compressor failure will result.

FAN MOTOR

The condenser fan must be **on** during the complete ice machine freeze cycle (do not cycle on fan cycle control). The ice maker has a condenser fan motor circuit for use with a Manitowoc condenser. It is recommended that this circuit be used to control the condenser fan(s) on the multi-circuit condenser to assure it is on at the proper time. **Do not exceed the rated amps for the fan motor circuit listed on the ice machine's serial tag.**

INTERNAL CONDENSER VOLUME

The multi-circuit condenser internal volume must not be less than or exceed that used by Manitowoc (see chart on next page). **Do not exceed internal volume and try to add charge to compensate, as compressor failure will result.**

CONDENSER ΔT

ΔT is the difference in temperature between the condensing refrigerant and entering air. The ΔT should be 15 to 20°F (-9.4 to -6.6°C) at the beginning of the freeze cycle (peak load conditions) and drop down to 12 to 17°F (-11.1 to -8.3°C) during the last 75% of the freeze cycle (average load conditions).

REFRIGERANT CHARGE

Remote ice machines have the serial plate refrigerant charge (total system charge) located in the ice maker section. (Remote condensers and line sets are supplied with only a vapor charge.)

Caution

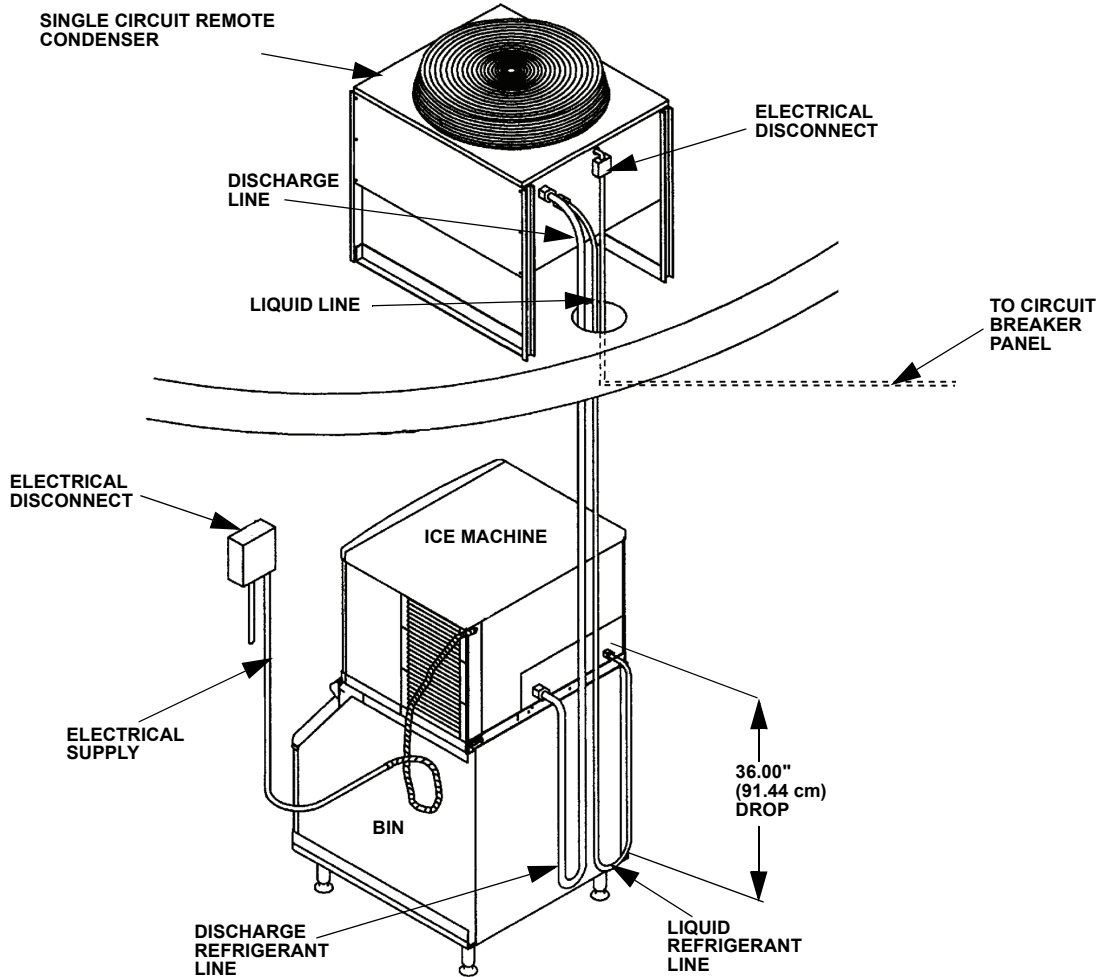
Never add more than nameplate charge to ice machine for any application.

QUICK CONNECT FITTINGS

The ice machine and line sets come with quick connect fittings. It is recommended that matching quick connects (available through Manitowoc Distributors) be installed in the multi-circuit condenser, and that a vapor "holding" charge (5 oz.) of proper refrigerant be added to the condenser prior to connection of the ice machine or line set to the condenser.

NON-MANITOWOC MULTI-CIRCUIT CONDENSER SIZING CHART

Ice Machine Model	Refrigerant		Heat of Rejection		Internal Condenser Volume (cu ft)		Design Pressure	Quick Connect Stubs-Male Ends		Head Pressure Control Valve
	Type	Charge	Average Btu/hr	Peak Btu/hr	Min	Max		Discharge	Liquid	
S500	R-404A	6 lbs.	6,100	6,900	0.020	0.035	500 psig (3447 kpa) (34.47 bar) safe working pressure 2,500 psig (17237 kpa) (172.37 bar) burst pressure	coupling P/N 83-6035-3	coupling P/N 83-6034-3	Manitowoc P/N 83-6809-3 no substitutes
S600	R404A	6.5 lbs.	9,000	13,900	0.045	0.060				
S850	R-404A	8.5 lbs.	13,000	16,000	0.045	0.060				
S1000	R-404A	8.5 lbs.	17,700	21,000	0.045	0.060		mounting flange P/N 83-6006-3	mounting flange P/N 83-6005-3	
S1400	R-404A	11 lbs.	20,700	24,500	0.085	0.105				
S1600	R-404A	11.5 lbs	21,000	31,000	0.085	0.105				
S1800	R-404A	12.5 lbs.	31,000	36,000	0.085	0.105				



SV1615

Typical Single Circuit Remote Condenser Installation

INSTALLATION CHECK LIST

- | | | | |
|--------------------------|---|--------------------------|---|
| <input type="checkbox"/> | Is the Ice Machine level? | <input type="checkbox"/> | Has the owner/operator completed the warranty registration card? |
| <input type="checkbox"/> | Has all of the internal packing been removed? | <input type="checkbox"/> | Has the ice machine and bin been sanitized? |
| <input type="checkbox"/> | Have all of the electrical and water connections been made? | <input type="checkbox"/> | Is the toggle switch set to ice? (The toggle switch is located directly behind the front panel). |
| <input type="checkbox"/> | Has the supply voltage been tested and checked against the rating on the nameplate? | <input type="checkbox"/> | Is the ice thickness control set correctly? (Refer to Operational Checks to check/set the correct ice bridge thickness). |
| <input type="checkbox"/> | Is there proper clearance around the ice machine for air circulation? | <input type="checkbox"/> | S3300 Only - Is the compressor direction of rotation correct? The ice machine will have high suction pressure, low discharge pressure and will be noticeably loud. Reverse any two incoming power leads to reverse rotation. |
| <input type="checkbox"/> | Is the ice machine grounded and polarity correct? | | |
| <input type="checkbox"/> | Has the ice machine been installed where ambient temperatures will remain in the range of 35° - 110°F (1.6° - 43.3°C)? | | |
| <input type="checkbox"/> | Has the ice machine been installed where the incoming water temperature will remain in the range of 35° - 90°F (1.6° - 32.2°C)? | | |
| <input type="checkbox"/> | Is there a separate drain for the water-cooled condenser? | | |
| <input type="checkbox"/> | Is there a separate drain for the bin? | | |
| <input type="checkbox"/> | Are the ice machine and bin drains vented? | | |
| <input type="checkbox"/> | Are all electrical leads free from contact with refrigeration lines and moving equipment? | | |
| <input type="checkbox"/> | Has the owner/operator been instructed regarding maintenance and the use of Manitowoc Cleaner and Sanitizer? | | |

ADDITIONAL CHECKS FOR REMOTE MODELS

- | | |
|--------------------------|---|
| <input type="checkbox"/> | Has the receiver service valve been opened? |
| <input type="checkbox"/> | Does the remote condenser fan operate properly after start-up? |
| <input type="checkbox"/> | Has the remote condenser been located where ambient temperatures will remain in the range of -20° - 120°F (-29 - 49°C). |
| <input type="checkbox"/> | Is the line set routed properly? |
| <input type="checkbox"/> | Are both refrigeration lines to remote condenser run so they do not lay in water and are properly insulated? |

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 in Section 3 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.

AuCS® Automatic Cleaning System

This optional accessory monitors ice making cycles and initiates cleaning procedures automatically. The AuCS® accessory can be set to automatically clean or sanitize the ice machine every 2, 4 or 12 weeks. Refer to the AuCS® Installation, Use and Care Manual for details.

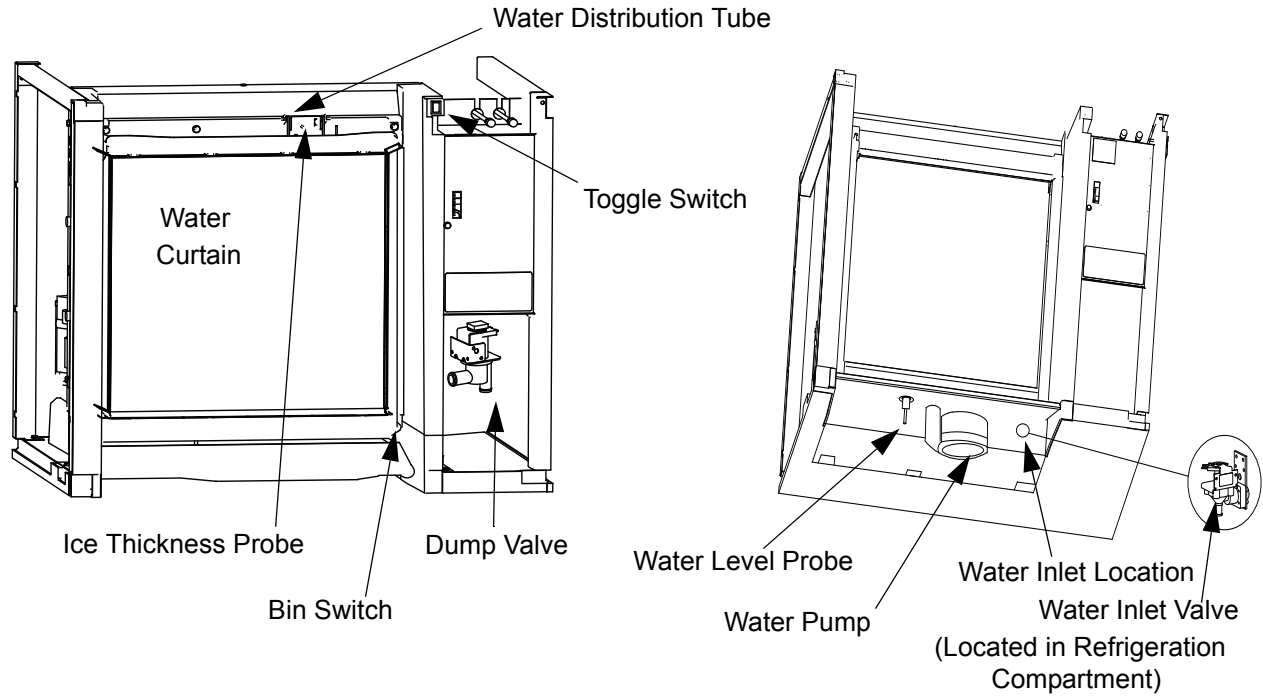
**Warning****Potential Personal Injury Situation**

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

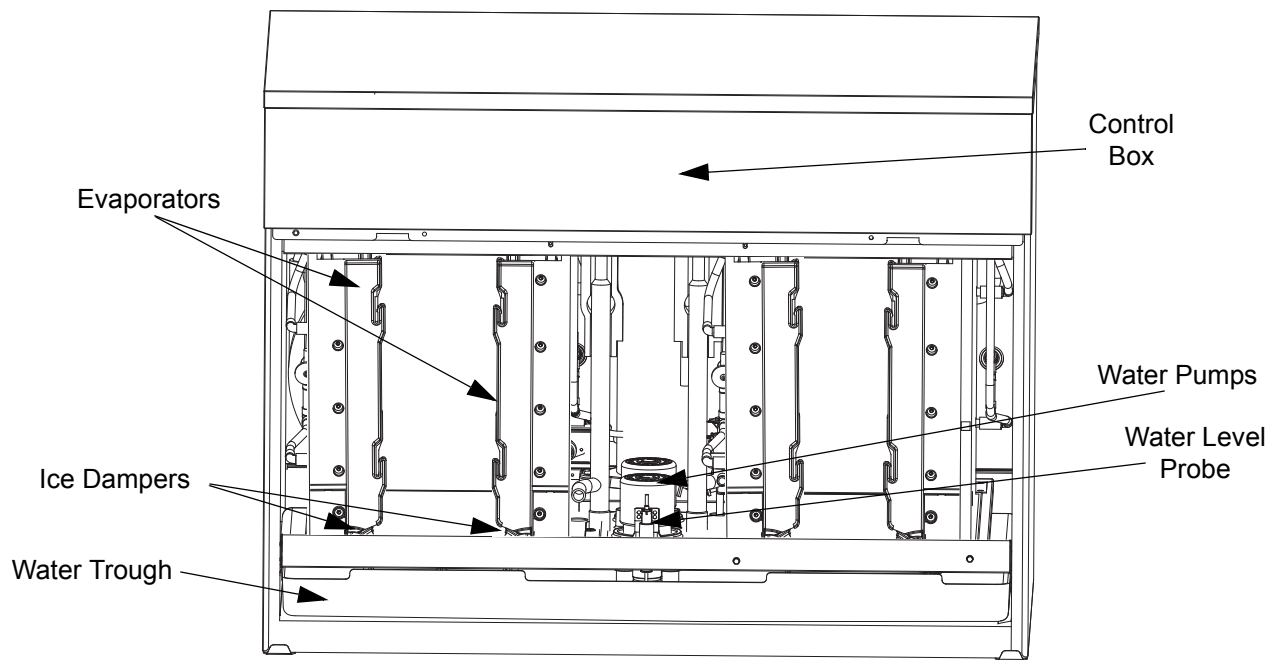
Section 3 Ice Machine Operation

Component Identification

S MODEL SINGLE EVAPORATOR MODELS



S MODEL MULTIPLE EVAPORATOR MODELS



Sequence Of Operation

NOTE: The toggle switch must be in the ice position 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.

Single evaporator models energize the harvest valve(s) and air compressor (when used) at the end of the water purge and they remain energized during refrigeration startup.

2. Refrigeration System Start-Up

The compressor, condenser fan motor and water fill valve energize and 5 seconds later the harvest valve(s) and air compressor(s) de-energize.

The fan motor is wired through a fan cycle pressure control and will cycle on and off when the room temperatures is below 70 F (21 C) .

FREEZE SEQUENCE

3. Prechill

The compressor lowers the temperature of the evaporator(s) before the water pump is energized. The water fill valve will remain energized until water contacts the water level probe.

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 water fill valve will cycle on and off one more time.

The freeze cycle continues until the six minute freeze lock expires and enough ice has formed to allow water to contact the ice thickness probe. After approximately 10 seconds of continual water contact, the harvest sequence is initiated.

NOTE: Freeze lock is bypassed after moving the toggle switch from OFF to ICE position for the first cycle only.

HARVEST SEQUENCE

5. Water Purge

The air compressor (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 continues to run, and the water dump valve energizes to purge the water in the water trough.

Single evaporator models energize the water fill valve for the last 15 seconds of the water purge cycle.

6. Harvest

The air compressor (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.

Single evaporator models - The sliding sheet of cubes opens the water curtain and bin switch.

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

Multiple evaporator models - The sliding sheet of cubes opens the ice damper and bin switch. The momentary opening and re-closing of the bin switch de-energized the harvest valve for the evaporator. When all of the bin switches have opened and closed the ice machine will terminate the harvest sequence and return to the freeze sequence (Step 3 - 4.)

AUTOMATIC SHUT-OFF

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.

SEQUENCE OF OPERATION CHART SINGLE EVAPORATOR

Ice Making Sequence Of Operation	Water Pump	Harvest Valve(s)	Air Compressor(s)	Water Inlet Valve	Dump Valve	Refrigeration Compressor & Condenser Fan Motor	Length Of Time
START-UP ¹ 1. Water Purge	On	On	35 sec. Off 10 sec. On	Off	On	Off	45 Seconds
2. Refrigeration System Start-Up	Off	On	Off	On	Off	On	5 Seconds
FREEZE SEQUENCE 3. Pre-Chill	Off	Off	Off	On	Off	On	Initial Start-Up is 60 Seconds 30 Seconds thereafter
4. Freeze	On	Off	Off	Cycles Off then On/Off, one more time	Off	On	Until 10 sec. water contact with ice thickness probe
HARVEST SEQUENCE 5. Water Purge	On	On	On	30 sec. Off, 15 sec. On	On	On	Factory-set at 45 Seconds
6. Harvest	Off	On	On	Off	Off	On	Bin switch activation
7. AUTOMATIC SHUT-OFF	Off	Off	Off	Off	Off	Off	Until bin switch re-closes & 3 min. delay expires

SEQUENCE OF OPERATION CHART MULTIPLE EVAPORATORS

Ice Making Sequence Of Operation	Water Pump	Harvest Valve(s)	Air Compressor(s)	Water Inlet Valve	Dump Valve	Refrigeration Compressor	Length Of Time
START-UP ¹ 1. Water Purge	On	Off	Off	Off	On	Off	45 Seconds
2. Refrigeration System Start-Up	Off	Off	Off	On	Off	On	5 Seconds
FREEZE SEQUENCE 3. Pre-Chill	Off	Off	Off	On	Off	On	30 Seconds
4. Freeze	On	Off	Off	Cycles Off then On/Off one more time	Off	On	Until 10 sec. water contact with ice thickness probe
HARVEST SEQUENCE 5. Water Purge	On	On	On	Off	On	On	45 Seconds
6. Harvest	Off	On	On	Off	Off	On	Bin switch activation
7. AUTOMATIC SHUT-OFF	Off	Off	Off	Off	Off	Off	Until bin switch re-closes & 3 min. delay expires

SAFETY TIMERS

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

- The ice machine is locked into the freeze cycle for 6 minutes before a harvest cycle can be initiated. Freeze lock is bypassed after moving the toggle switch from OFF to ICE position for the first cycle only.
- The maximum freeze time is 60 minutes at which time the control board automatically initiates a harvest sequence (steps 5 & 6).
- The maximum harvest time is 3.5 minutes for single evaporators and 7 minutes for multiple evaporator model. The control board automatically initiates a freeze sequence (steps 3 & 4) when these times are exceeded.

SAFETY LIMITS

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 single evaporator models - If the harvest time reaches 3.5 minutes, the control board automatically returns the ice machine to the freeze cycle. If three 500 consecutive 3.5 minute harvest cycles occur, the ice machine stops.
- Safety Limit 2 multiple evaporator models - If the harvest time reaches 7 minutes, the control board automatically returns the ice machine to the freeze cycle. If 500 consecutive 7 minute harvest cycles occur, the ice machine stops.
- Safety Limit 3 multiple evaporator models - If the low refrigerant pressure control opens, the ice machine shuts off and starts a 5 minute delay period. If 3 consecutive low pressure events occur the ice machine stops and flashes the safety/harvest light.

Use the following procedures to determine if the control board contains a safety limit indication.

1. Move the toggle switch to OFF.
2. Move the toggle switch back to ICE. Watch the safety limit lights on the control board. If a safety limit has been recorded, the corresponding light will blink once, twice or three times to indicate which safety limit stopped the ice machine.

WARM WATER RINSE CYCLE

Single evaporator models only - Closing the back of the evaporator allows ice to build up on the rear of the evaporator and the plastic evaporator frame parts. After 200 freeze/harvest cycles have been completed the control board will initiate a warm water rinse.

After the 200th harvest cycle ends:

- The Clean and Harvest LED's energize to indicate the ice machine is in a warm water rinse.
- The compressor and harvest valve remain energized.
- The water pump energizes.
- The water inlet valve energizes until water contacts the water level probe.
- The compressor and harvest valve warm the water for 5 minutes, then de-energize.
- The water pump remains energized for an additional 5 minutes (10 minute total on time) then de-energizes.

NOTE: The warm water rinse cycle can be terminated by moving the toggle switch to the OFF position, then back to ICE.

Operational Checks

GENERAL

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

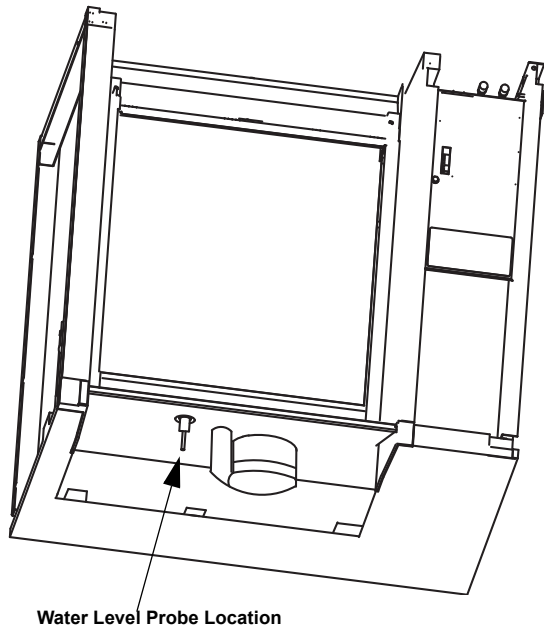
To ensure proper operation, always follow the Operational Checks:

- 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.

WATER LEVEL

The water level sensor 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 for damage (probe bent, etc.). Clean the water level probe with ice machine cleaner, rinse thoroughly and re-check operation. Repair or replace the probe as necessary.



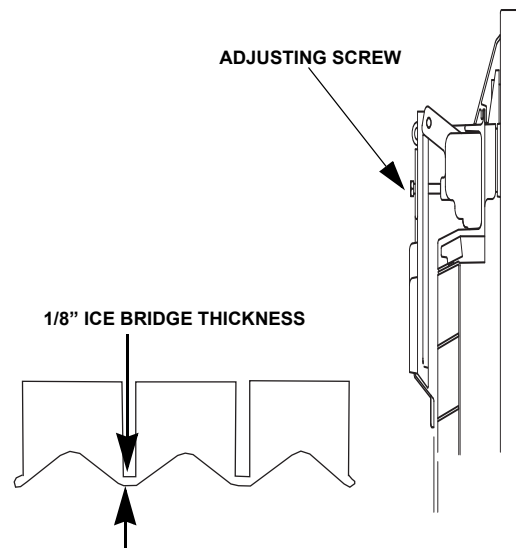
ICE THICKNESS CHECK

The ice thickness probe is factory-set to maintain the ice bridge thickness at 1/8" (.32 cm).

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 1/8" (.32 cm) thick.
2. If adjustment is necessary, turn the ice thickness probe adjustment screw clockwise to increase bridge thickness, counterclockwise to decrease bridge thickness. Set at 1/4" gap between ice machine and evaporator as starting point, then adjust to achieve a 1/8" bridge thickness.

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



SV3132

Ice Thickness Check

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

HARVEST SEQUENCE WATER PURGE

The harvest sequence water purge adjustment may be used when the ice machine is hooked up to special water systems, such as a de-ionized water treatment system.

Warning

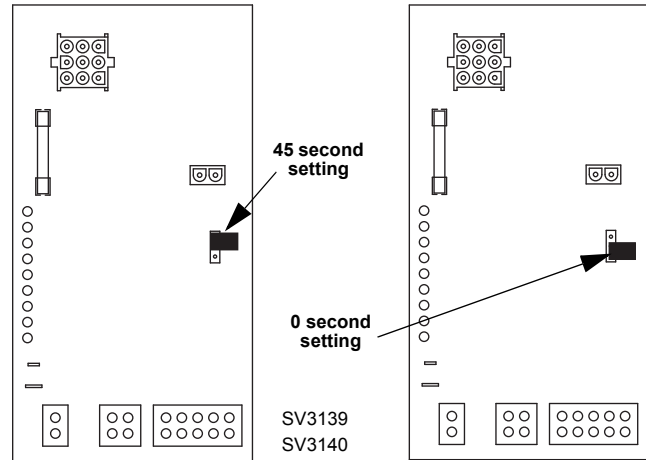
Disconnect electric power to the ice machine at the electrical disconnect before proceeding.

Important

The harvest sequence water purge is factory-set at 45 seconds. A shorter purge setting (with standard water supplies such as city water) is not recommended. This can increase water system cleaning and sanitizing requirements.

- The harvest sequence water purge is factory set. Repositioning the jumper will set the harvest water purge to 0 seconds. This setting does not affect the SeCs or AuCs (cleaning) sequences.

- During the harvest sequence water purge, the water fill valve energizes and de-energizes by time. The water purge must be at the factory setting of 45 seconds for the water fill valve to energize during the last 15 seconds of the water purge. If it is set to less than 45 seconds, the water fill valve will not energize during the water purge.



Water Purge Adjustment

For your safety and to eliminate errors, we recommend that a qualified service technician make the harvest water purge adjustment.

Section 4 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.

EXTERIOR CLEANING

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

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

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

 **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. 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 Cleaning Technology

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

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

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

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

This Manitowoc Ice Machine has two separate cleaning procedures.

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

Heavily Scaled Cleaning Procedure


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

- Ice machine stops on Safety Shutdown
- Your water has a high concentration of minerals
- The ice machine has not been on a regular maintenance schedule.

Cleaning / Sanitizing Procedure


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. The ice machine must be taken apart for cleaning and sanitizing.


 **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.

Step 1 Remove front door and top cover. This will allow easiest access for adding cleaning and sanitizing solutions.

Step 2 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 3 Remove all ice from the bin.

Step 4 Place the toggle switch in the CLEAN position. The water will flow through the water dump valve and down the drain. Wait until the water trough refills and water flows over the evaporator, then add the proper amount of ice machine cleaner.

Model	Amount of Cleaner
S300/S320/S420	3 ounces (90 ml)
S450/S500/S600/S850/ S1000/S1200	5 ounces (150 ml)
S1400/S1600/S1800	9 ounces (265 ml)
S3300	16 ounces (475 ml)

Step 5 Wait until the clean cycle is complete (approximately *35 minutes). then place the toggle switch in the OFF position and disconnect power to the ice machine (and dispenser when used)

NOTE: *S3300 Only - 80 minutes..

 **Warning**

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

Step 6 Remove parts for cleaning.

Please refer to the proper parts removal for your ice machine.

Singe Evaporator Ice Machines - page 4-2 & 4-3.

Multiple Evaporator Ice Machines - page 4-4 & 4-5.

PARTS REMOVAL FOR CLEANING/SANITIZING**Single Evaporator Ice Machines****A. Remove the water curtain**

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

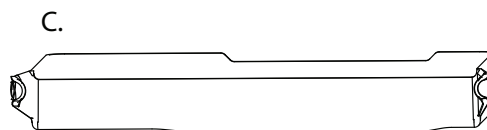
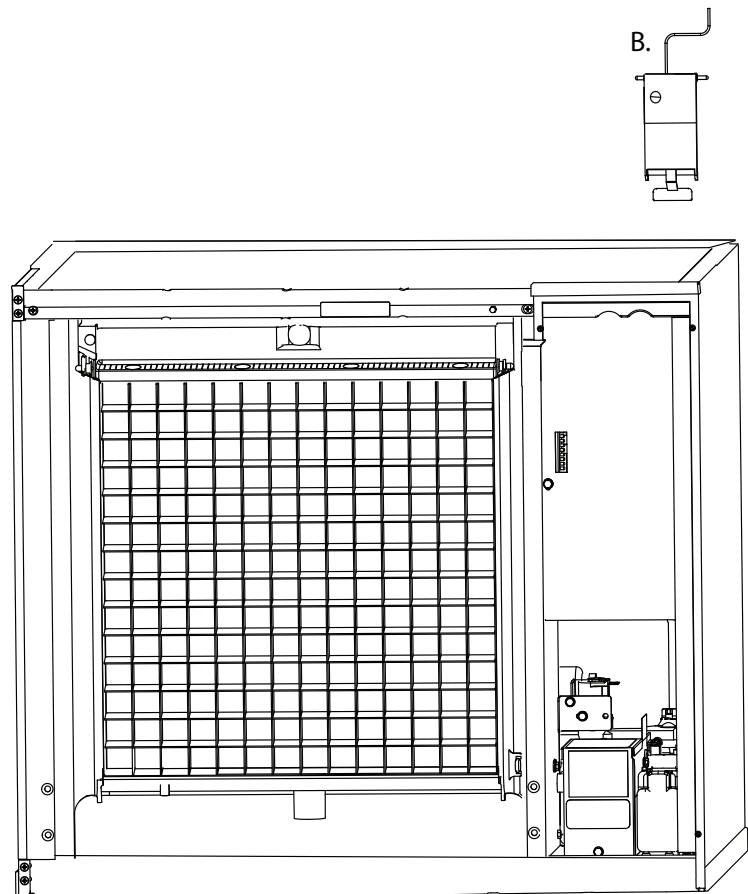
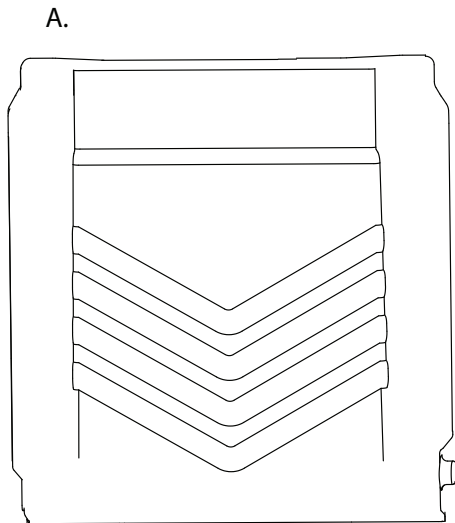
B. Remove the ice thickness probe

- 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.

C. 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.

NOTE: Proceed to page 4-6, Step 7.



Multiple Evaporator Ice Machines**A. Remove Splash Shields.**

- Grasp the top center of splash shields.
- Lift up and then out.

B. Remove 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.

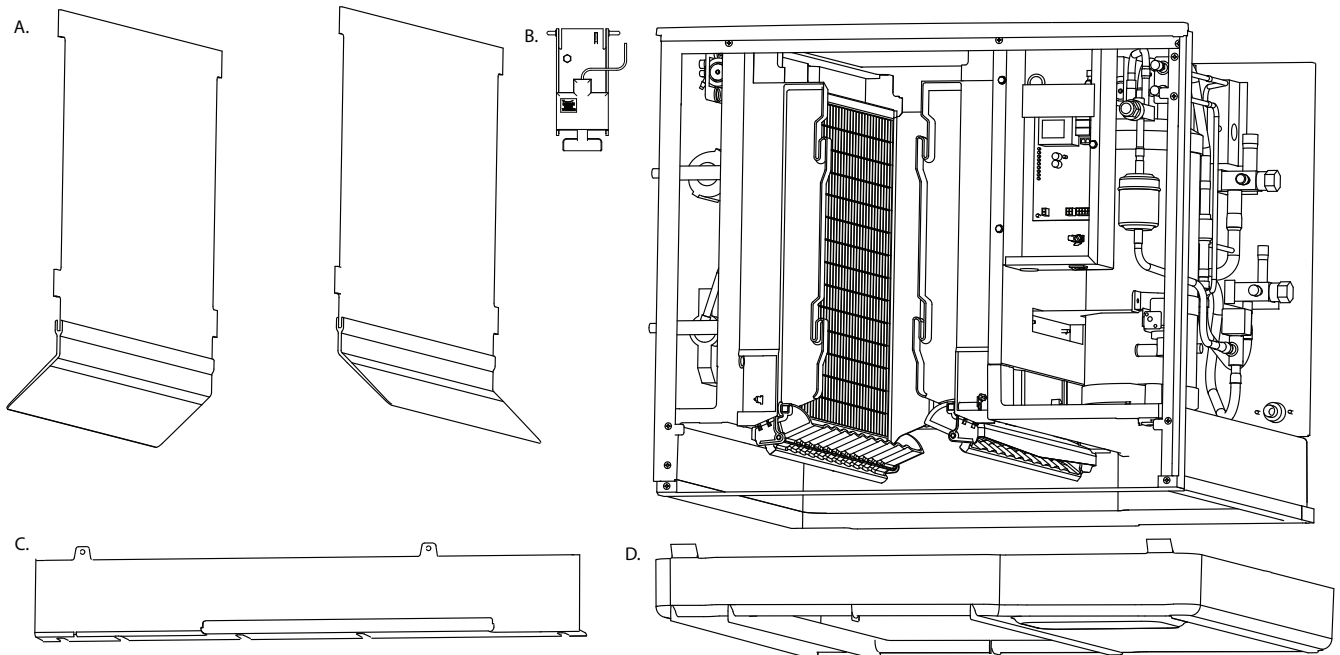
C. Remove the water trough shield.

- Grasp the water trough shield in the center and the left end.
- Flex the water trough shield in the center and pull the left end forward until clear of the side wall. Repeat for the right end.
- Pull water trough shield forward to remove.

D. Remove the water trough.

- Depress the two tabs on the top of the water trough.
- Turn left and right ice dampers down to clear water trough.
- Pull forward on the water trough to remove.

NOTE: Proceed to page 4-6, Step 7.



Step 7 Mix a solution of cleaner and warm 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	1 gal. (4 l)	16 oz (500 ml) cleaner

Step 8 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 9 While components are soaking, use 1/2 of the cleaner/water solution to clean all foodzone 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 10 Mix a solution of sanitizer and warm water.

Solution Type	Water	Mixed With
Sanitizer	6 gal. (23 l)	4 oz (120 ml) sanitizer

Step 11 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 12 Use 1/2 of the sanitizer/water solution to sanitize all foodzone 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 13 Replace all removed components.

Step 14 Wait 30 minutes.

Step 15 Reapply power to the ice machine and place the toggle switch in the CLEAN position.

Step 16 Wait until the water trough refills and water flows over the evaporator (approximately 3 minutes). 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
S300/S320/S420	3 ounces (90 ml)
S450/S500/S600/S850/ S1000/S1200	3 ounces (90 ml)
S1400/S1600/S1800	6 ounces (180 ml)
S3300	25 ounces (740 ml)

Step 17 Move the toggle switch to the ICE position and replace the front panel. The ice machine will automatically start ice making after the sanitize cycle is complete (approximately 35 minutes, S3300 - 80 minutes).

Procedure to Clean Heavily Scaled Ice Machines

Ice machines that are heavily scaled or have not been cleaned on a regular basis will need to run this procedure.

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. The ice machine must be taken apart for cleaning and sanitizing.

⚠ 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.

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 top cover. This will allow easiest access for adding cleaning and sanitizing solutions.

Step 3 Remove all ice from the bin.

Step 4 Place the toggle switch in the CLEAN position. The water will flow through the water dump valve and down the drain. Wait until the water trough refills and water flows over the evaporator, then add the proper amount of ice machine cleaner.

Model	Amount of Cleaner
S300/S320/S420	3 ounces (90 ml)
S450/S500/S600/S850/ S1000/S1200	5 ounces (150 ml)
S1400/S1600/S1800	9 ounces (265 ml)
S3300	16 ounces (475 ml)

Step 5 Wait until the clean cycle is complete (approximately *35 minutes). then place the toggle switch in the OFF position and disconnect power to the ice machine (and dispenser when used)

NOTE: *S3300 Only - 80 minutes..

⚠ Warning

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

Step 6 Remove parts for cleaning.

Please refer to the proper parts removal for your ice machine.

Singe Evaporator Ice Machines - page 4-8 & 4-9.

Multiple Evaporator Ice Machines - page 4-10 & 4-11.

PARTS REMOVAL FOR CLEANING/SANITIZING**Single Evaporator Ice Machines****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 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.

C. Remove the water distribution tube

- Loosen the two outer screws (do not remove screws completely they are retained to prevent loss) and pull forward on the distribution tube to release from slip joint.
- Disassemble distribution tube by loosening the two (2) middle thumbscrews and dividing the distribution tube into two pieces.
- 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.

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

D. Remove the water level probe

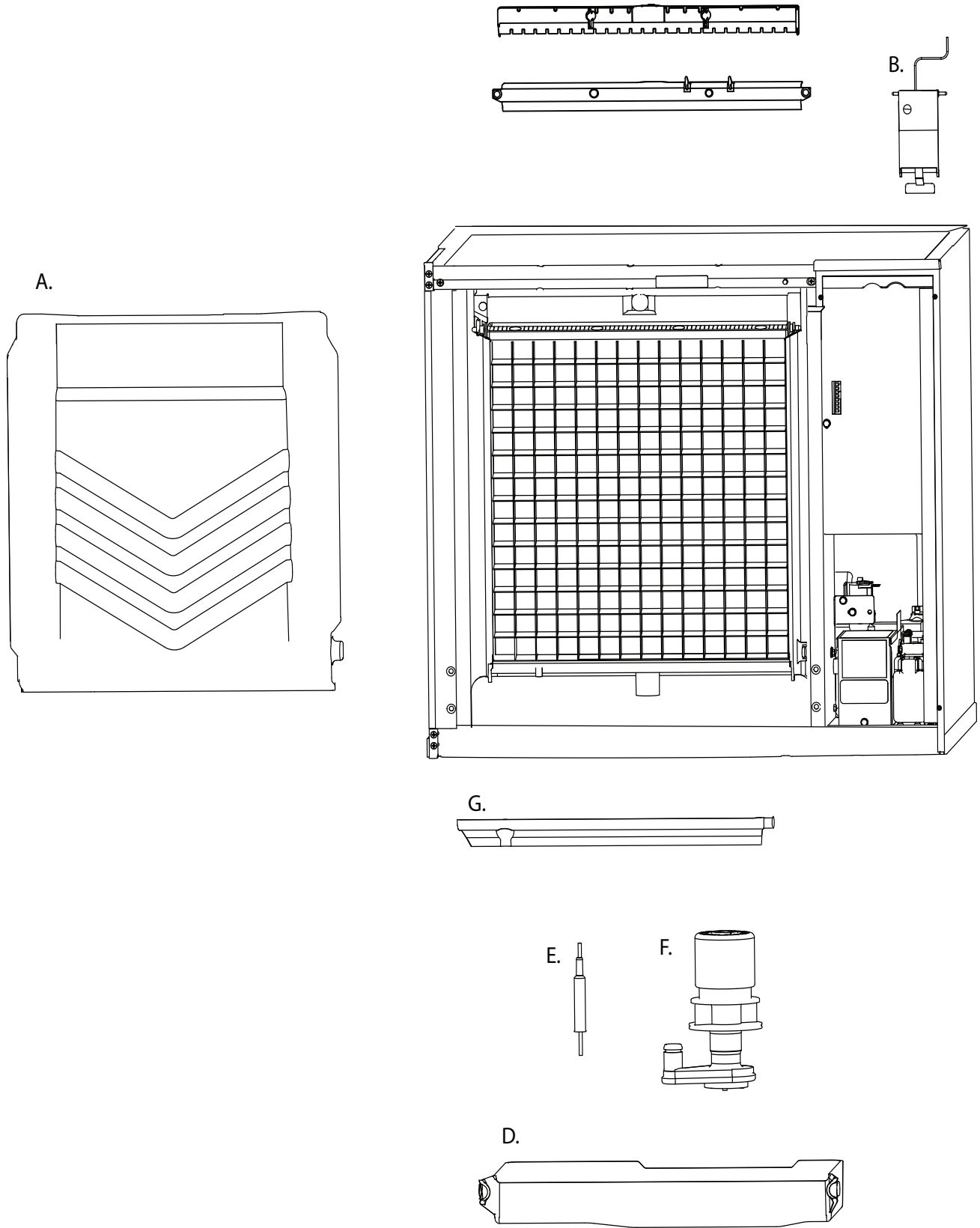
- Pull the water level probe straight down to disengage.
- Lower the water level probe until the wiring connector is visible.
- Disconnect the wire lead from the water level probe.
- Remove the water level probe from the ice machine.

E. Remove the water pump.

- Grasp pump and pull straight down on pump assembly until water pump disengages and electrical connector is visible.
- Disconnect the electrical connector.
- Remove the water pump assembly from ice machine.
- Do not soak the water pump motor in cleaner or sanitizer solution.

F. Remove the evaporator tray from the bottom of the evaporator. (when used)

- Loosen thumbscrew on left side of tray.
- Allow left side of tray to drop as you pull the tray to the left side. Continue until the outlet tube disengages from the right side.
- Proceed to page 4-12, Step 7.



Multiple Evaporator Ice Machines**A. Remove panels**

- Remove both front panels
- Remove top panel

B. Remove front evaporator shield.

- Remove four quarter turn connectors
- Remove splash shield

C. Remove left and right evaporator top covers.

- Remove two thumbscrews from the front of each evaporator top cover.
- Lift front of cover, pull forward to remove.

D. Remove Splash Shields.

- Grasp the top center of splash shields.
- Lift up and then out.

NOTE: Each evaporator has a splash shield that must be removed - total of four splash shields.

E. Remove 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.

F. Remove distribution tubes.

- Distribution tube thumbscrews are retained to prevent loss. Loosen thumbscrews but do not pull thumbscrews out of distribution tube.
- Loosen the two outer screws and pull forward on the distribution tube to release from slip joint.
- Disassemble distribution tube by loosening the two (2) middle thumbscrews and dividing the distribution tube into two pieces.

NOTE: Each evaporator has a distribution tube that must be removed - total of four distribution tubes.

G. Remove ice dampers.

- Grasp ice damper and apply pressure toward the back mounting bracket.
- Apply pressure to the front mounting bracket with thumb.
- Pull ice damper downward when the front ice damper pin disengages.

NOTE: Each evaporator has an ice damper that must be removed - total of four ice dampers

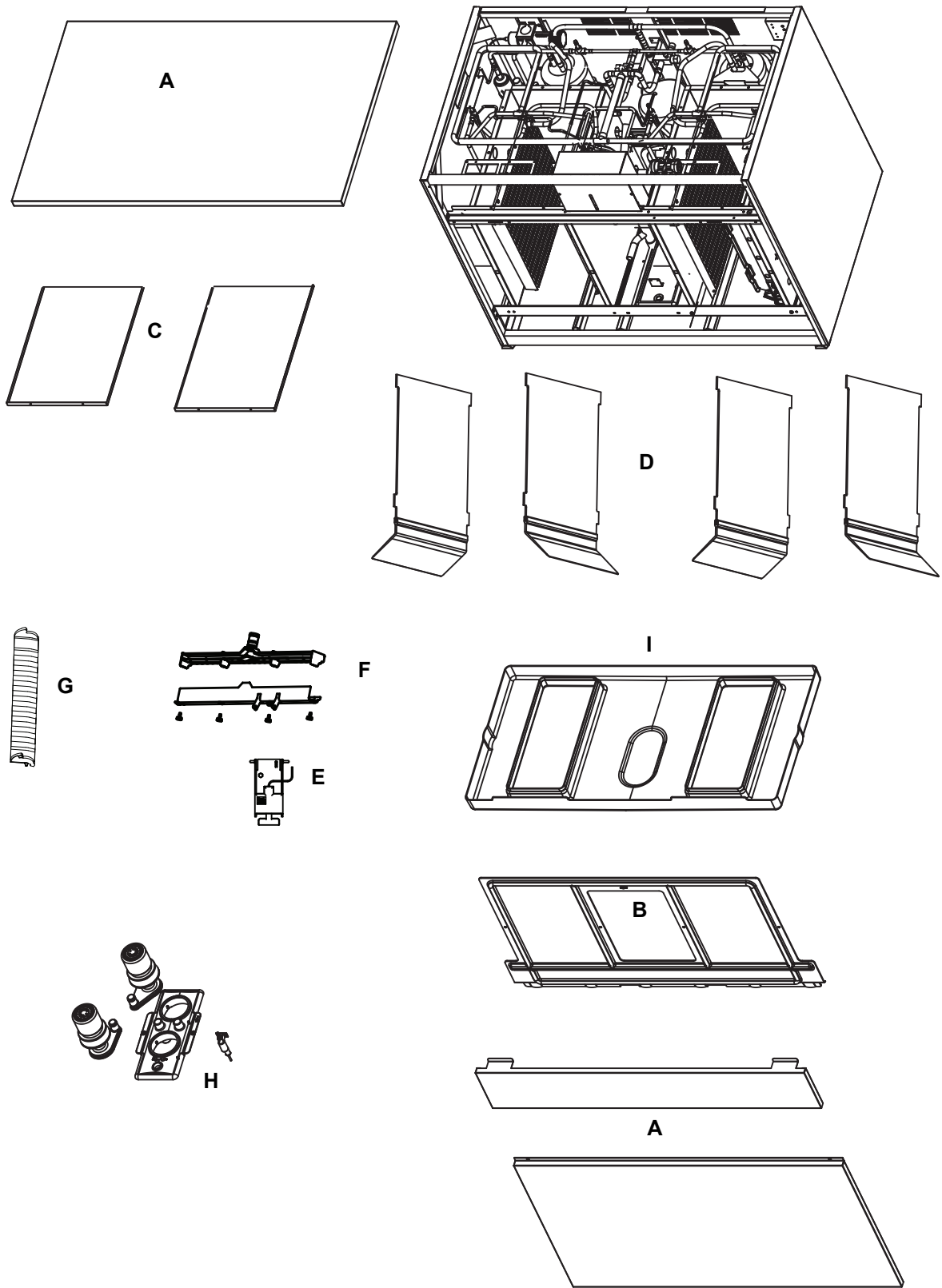
H. Remove the water pump assembly.

- Disconnect the vinyl distribution tube from both water pumps.
- Disconnect the water pump and water level probe electrical connections.
- After the wires are disconnected remove the two thumbscrews and lift the water pump assembly out of the ice machine.
- Remove the thumbscrews securing the water pumps (2 each pump) and remove water pumps. Do not immerse the water pump motor in cleaner or sanitizer solutions.
- Remove the water level probe from the assembly housing.

I. Remove the water trough.

- Pull forward on the water trough to remove.

NOTE: Proceed to page 4-12, Step 7.



Step 7 Mix a solution of cleaner and warm 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	1 gal. (4 l)	16 oz (500 ml) cleaner

Step 8 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 9 While components are soaking, use 1/2 of the cleaner/water solution to clean all foodzone 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 10 Mix a solution of sanitizer and warm water.

Solution Type	Water	Mixed With
Sanitizer	6 gal. (23 l)	4 oz (120 ml) sanitizer

Step 11 Use 1/2 of the sanitizer/water solution to sanitize all removed components. Use a cloth or sponge to liberally apply the solution to all surfaces of the removed parts or soak the removed parts in the sanitizer/water solution. Do not rinse parts after sanitizing.

Step 12 Use 1/2 of the sanitizer/water solution to sanitize all foodzone surfaces of the ice machine and bin (or dispenser). Use a cloth or sponge 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 13 Replace all removed components.

Step 14 Reapply power to the ice machine and place the toggle switch in the CLEAN position.

Step 15 Wait about two minutes or until water starts to flow over the evaporator. 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
S300/S320/S420	3 ounces (90 ml)
S450/S500/S600/S850/S1000/S1200	3 ounces (90 ml)
S1400/S1600/S1800	6 ounces (180 ml)
S3300	25 ounces (740 ml)

Step 16 The ice machine will stop after the sanitize cycle (approximately *35 minutes). Place the toggle switch in the OFF position and disconnect power to the ice machine.

**S3300 Only - 80 minutes.*

 **Warning**

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

Step 17 Refer to step 6 and disassemble components. After disassembling proceed to step 18.

Step 18 Mix a solution of sanitizer and warm water.

Solution Type	Water	Mixed With
Sanitizer	6 gal. (23 l)	4 oz (120 ml) sanitizer

Step 19 Use 1/2 of the sanitizer/water solution to sanitize all removed components. Use a cloth or sponge to liberally apply the solution to all surfaces of the removed parts or soak the removed parts in the sanitizer/water solution. Do not rinse parts after sanitizing.

Step 20 Use 1/2 of the sanitizer/water solution to sanitize all foodzone surfaces of the ice machine and bin (or dispenser). Use a cloth or sponge 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.

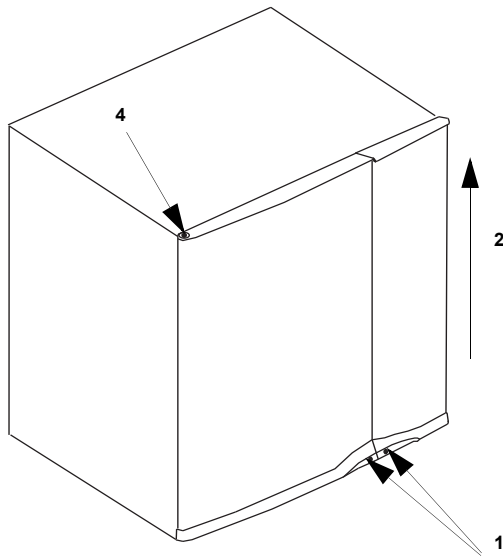
Step 21 Install the removed parts, restore power and place the toggle switch in the ICE position.

Additional Component Removal

The following components may be removed for easier access in some installations or they may need to be removed and cleaned to correct an operational problem.

Door Removal

1. Use a phillips screwdriver to loosen the two screws securing the left and right doors. Do not remove they are secured to prevent loss.
2. 30 Inch and 48 Inch Models: To remove right front door lift up and remove (22 inch ice machines have a single door, lift to remove entire door).



Door Removal

3. Open left front door to 45 degrees.
4. Support with right hand, depress top pin, tilt top of door forward and lift out of bottom pin to remove.

Water Inlet Valve

The water inlet valve normally does not require removal for cleaning. Refer to Section 5 for a list of causes for “No Water Entering Water Trough” or “Water Overflows Water Trough.”

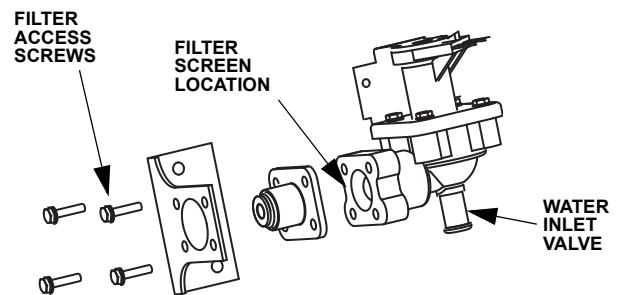
1. When the ice machine is off, the water inlet valve must completely stop water flow into the machine.
2. When the ice machine is on, the water inlet valve must allow the proper water flow through it. Set the toggle switch to ON. Watch for water flow into the ice machine. If the water flow is slow or only trickles into the ice machine, refer to Section 5.

Follow the procedure below to remove the water inlet valve.

Warning

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

1. Remove the 1/4" hex head screws.
2. Remove, clean, and install the filter screen.



Water Dump Valve

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

1. Set the toggle switch to ICE.
2. Verify the water trough fills with water at the beginning of the freeze cycle.
3. While the ice machine is in the freeze mode, check the water trough to determine if the dump valve is leaking. If there is no or little water in the water trough (during the freeze cycle) the dump valve is leaking.
 - A. If the dump valve is leaking, remove, disassemble and clean it.
 - B. If the dump valve is not leaking, do not remove it. Instead, follow the "Ice Machine Cleaning Procedure".

Follow the procedure below to remove the dump valve.

Warning

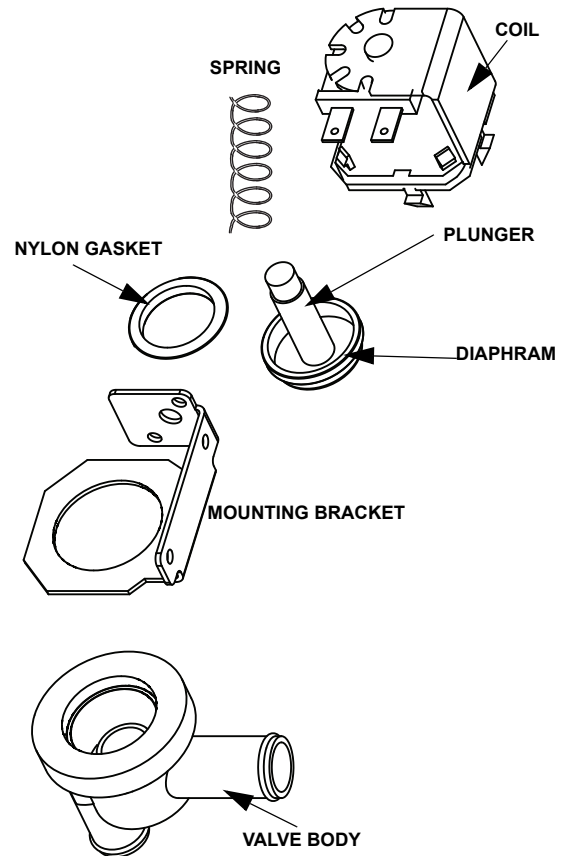
Disconnect the electric power to the ice machine at the electric service switch box and turn off the water supply before proceeding.

1. Leaving the wires attached, twist coil and rotate it counter-clockwise 1/4 turn.
2. Lift the coil assembly off the valve body.
3. Remove the spring, plunger, and nylon gasket from the valve body.

NOTE: At this point, the water dump valve can easily be cleaned. If complete removal is desired, continue with step 4.

NOTE: During cleaning, do not stretch or damage the spring.

4. Remove the tubing from the dump valve by twisting the clamps off.
5. Twist the valve body to remove from mounting bracket.



Dump Valve Disassembly

Ice Machine Inspection

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

Do not put anything (boxes, etc.) on the sides or back 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. Use cleaners designed for use with stainless steel products.

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

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

Cleaning the Condenser

GENERAL

Warning

Disconnect electric power to the ice machine head section and the remote condensing unit at the electric service switches before cleaning the condenser.

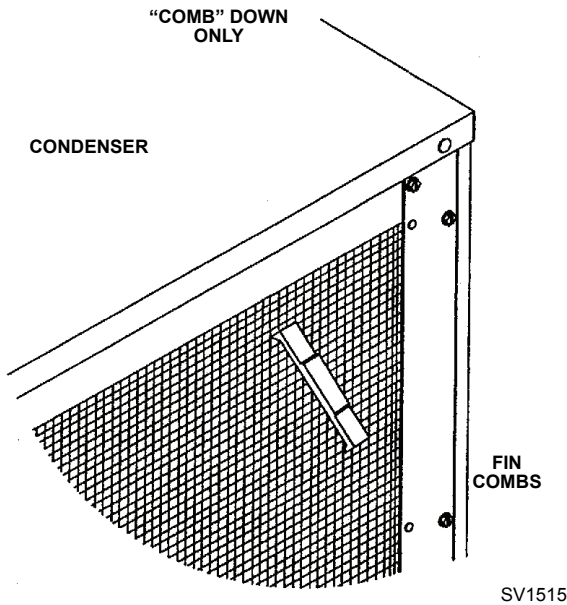
A dirty condenser restricts airflow, resulting in excessively high operating temperatures. This reduces ice production and shortens component life. Clean the condenser at least every six months. Follow the steps below.

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. Clean the filter with a mild soap and water.
2. Clean the outside of the condenser with a soft brush or a vacuum with a brush attachment. Be careful not to bend the condenser fins.
3. Shine a flashlight through the condenser to check for dirt between the fins. If dirt remains:
 - A. Blow compressed air through the condenser fins from the inside. Be careful not to bend the fan blades.
 - B. Use a commercial condenser coil cleaner. Follow the directions and cautions supplied with the cleaner.

4. Straighten any bent condenser fins with a fin comb.



Straighten Bent Condenser Fins

5. Carefully wipe off the fan blades and motor with a soft cloth. Do not bend the fan blades. If the fan blades are excessively dirty, wash with warm, soapy water and rinse thoroughly.

⚠ Caution

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

Water-Cooled Condenser and Water Regulating Valve

Symptoms of restrictions in the condenser water circuit include:

- Low ice production
- High water consumption
- High operating temperatures
- High operating pressures

If the ice machine is experiencing any of these symptoms, the water-cooled condenser and water regulating valve may require cleaning due to scale build-up.

Because the cleaning procedures require special pumps and cleaning solutions, qualified maintenance or service personnel must perform them.

AlphaSan

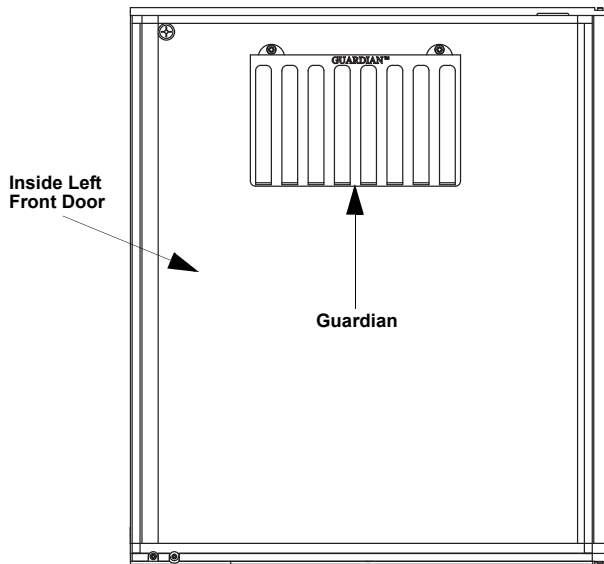
The goal of AlphaSan is to keep the plastic surfaces of an ice machine cleaner, by reducing or delaying the formation of bio-film. The active ingredient in AlphaSan is the element silver in the form of silver ions (Ag+). AlphaSan slowly releases silver ions via an ion exchange mechanism. When AlphaSan is compounded directly into a plastic part, a controlled release of silver ions from the surface is regulated to maintain an effective concentration at or near the surface of the plastic ice machine part. AlphaSan’s unique ability to effectively control the release of silver not only protects against undesired discoloration of the plastic, but also will last the life of the plastic part. Although AlphaSan helps prevent bio-film build up it does not eliminate the need for periodic cleaning and maintenance. AlphaSan has no adverse effect on the taste of the ice or beverage.

Guardian

Slime is a leading cause of ice machine breakdowns and biological growth is a health concern. The Guardian system releases chlorine dioxide on a controlled basis to inhibit the growth of bacteria and fungi that form slime and cause malodors in the food zone of ice machines.

The Guardian will not control mineral or other water borne buildup. Your water quality will determine the length of time before mineral buildup affects ice machine performance. Mineral buildup must be removed as often as necessary to ensure trouble-free operation of the ice machine.

The Guardian sachet holder is included with the sachet packets. Refer to installation/replacement procedure to install/change sachet holder/ packet.



Guardian Location

GUARDIAN SACHET REPLACEMENT FREQUENCY

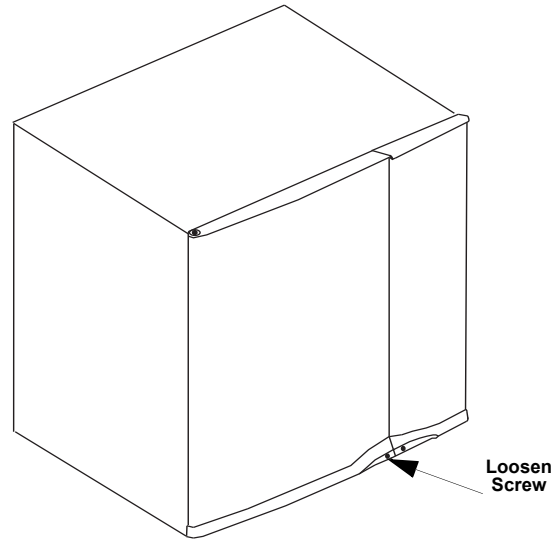
Sachet packet(s) require replacement every thirty (30) days or whenever they come in direct contact with water. Refer to chart below for requirements.

Ice Machine	Sachet Use
S300/S320/S420/S450/S500/S600	1
S850/S1000/S1200/S1400/S1600/S1800	1 or 2*
*Although one sachet is recommended, extreme conditions may necessitate using two sachet packets.	

Guardian sachet packets are available through your local Manitowoc ice machine dealer.

SACHET INSTALLATION/REPLACEMENT PROCEDURE

1. Loosen the left screw and open the left front door. The right front panel does not need to be removed.



Screw Location

2. Inside the front panel there are two thumbscrew holes covered by stickers, pierce the sticker with a screwdriver.
3. Attach the sachet holder to the front panel by inserting the thumbscrews through the holes in the sachet holder and tighten the thumbscrews.
4. Remove the new sachet packet from foil package and install into holder. Removing the foil package allows moisture in the air to activate the sachet contents.
5. Close the left front door and tighten the screw.
6. Discard the used sachet packet in the trash.

CLEAN UP PROCEDURE FOR DAMAGED SACHET PACKET

1. Remove all ice from bin/dispenser and discard.
2. Initiate a cleaning and sanitizing sequence on the ice machine (see next pages).
3. Clean the bin/dispenser. Flush the drain thoroughly to prevent future drain blockage.
4. Sanitize the bin/dispenser.
5. Install a replacement sachet packet and reinstall all panels.

Removal from Service/Winterization

GENERAL

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

Caution

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

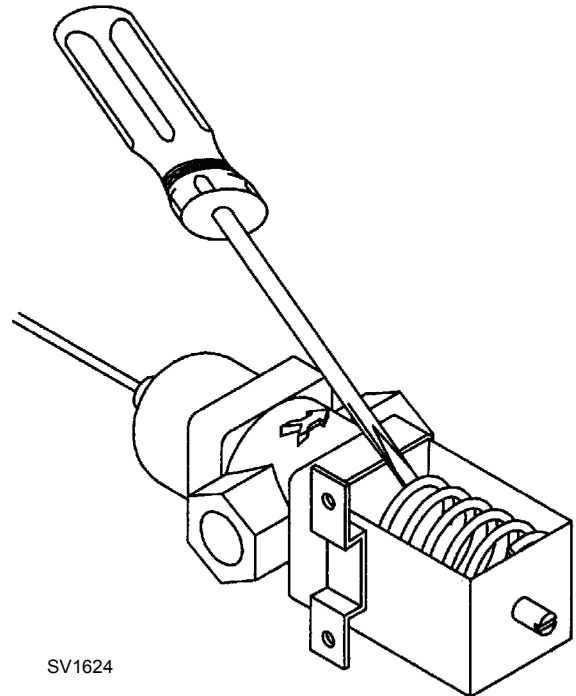
Follow the applicable procedure below.

SELF-CONTAINED AIR-COOLED ICE MACHINES

1. 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. Disconnect and drain the incoming ice-making water line at the rear of the ice machine.
5. Energize the ice machine and wait one minute for the water inlet valve to open.
6. Blow compressed air in both the incoming water and the drain openings in the rear of the ice machine until no more water comes out of the inlet water lines or the drain.
7. Make sure water is not trapped in any of the water lines, drain lines, distribution tubes, etc.

WATER-COOLED ICE MACHINES

1. Perform steps 1-6 under “Self-Contained Air-Cooled Ice Machines.”
2. Disconnect the incoming water and drain lines from the water-cooled condenser.
3. Insert a large screwdriver between the bottom spring coils of the water regulating valve. Pry upward to open the valve.



Pry Open the Water Regulating Valve

4. Hold the valve open and blow compressed air through the condenser until no water remains.

REMOTE ICE MACHINES

1. Move the ICE/OFF/CLEAN switch to OFF.
2. “Frontseat” (shut off) the receiver service valves. Hang a tag on the switch as a reminder to open the valves before restarting.
3. Perform steps 1-6 under “Self-Contained Air-Cooled Ice Machines.”

AUCS Accessory

Refer to the AuCS Accessory manual for winterization of the AuCS Accessory.

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Section 5 Before Calling For Service

Checklist

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

Problem	Possible Cause	To Correct
Ice machine does not operate.	No electrical power to the ice machine and/or condensing unit.	Replace the fuse/reset the breaker/turn on the main switch.
	High pressure cutout tripping.	Clean condenser coil. (See Section 4)
	ICE/OFF/CLEAN toggle switch set improperly.	Move the toggle switch to the ICE position.
	Water curtain stuck open.	Water curtain must be installed and swinging freely. (See Section 4)
	Remote receiver service valve and/or Liquid/suction line shut off valves are closed.	Open the valve(s). (See Section 2)
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 Section 4)
	Ice machine is not level.	Level the ice machine. (See Section 2)
	Low air temperature around ice machine head section.	Air temperature must be at least 35°F (1.6°C).
	Fan cycling control does not de-energize condenser fan motor.	Verify pressure is below cut-out setpoint, replace fan cycling control.
Ice machine does not cycle into harvest mode.	The six-minute freeze time lock-in has not expired yet.	Wait for the freeze lock-in to expire.
	Ice thickness probe is dirty.	Clean and sanitize the ice machine. (See Section 4)
	Ice thickness probe is disconnected.	Connect the wire.
	Ice thickness probe is out of adjustment.	Adjust the ice thickness probe. (See Section 3)
	Uneven ice fill (thin at the top of evaporator).	Verify sufficient water level in sump trough. Contact a qualified service company to check refrigeration system.
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 Section 4)
	Water dump valve is not working.	Disassemble and clean the water dump valve. (See Section 4)
	Water softener is working improperly (if applicable).	Repair the water softener.

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 Section 4)
	Water trough level is too low.	Check the water level probe for damage. (See Section 3)
	Water inlet valve filter screen is dirty.	Remove the water inlet valve and clean the filter screen. (See Section 4)
	Water filtration is poor.	Replace the filter.
	Hot incoming water.	Connect the ice machine to a cold water supply. (See Section 2)
	Water inlet valve is not working.	Replace the water inlet valve.
	Incorrect incoming water pressure.	Water pressure must be 20-80 psi (1.4 bar - 5.5 bar)
	Ice machine is not level.	Level the ice machine. (See Section 2)
Low ice capacity.	Water inlet valve filter screen is dirty.	Remove the water inlet valve and clean the filter screen. (See Section 4)
	Incoming water supply is shut off.	Open the water service valve.
	Water inlet valve stuck open or leaking.	Place toggle switch in OFF position, if water continues to enter water trough replace the water inlet valve.
	The condenser is dirty.	Clean the condenser. (See Section 4)
	High air temperature entering condenser.	Air temperature must not exceed 120°F (39°C)
	The harvest assist air compressor is not functioning.	Call for service.

Safety Limit Feature

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

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

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

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EC DECLARATION OF CONFORMITY

We hereby declare that our products, ice machines and Multiplex refrigeration equipment comply with all the essential requirements of the listed EC - directives.

Manufacturer:

Manitowoc Ice, Inc.
2110 S. 26th Street, P.O. Box 1720
Manitowoc, Wisconsin 54221-1720 USA

European Distributor:

Representative of Manitowoc Ice, Inc.:

Engineering Manager, (Printed name)

Representative of European Distributor:

Signature

Model and Serial No.

Applied EC Directives:

Applied Standards:

EN60335-1 Safety of household and similar electrical appliances
EN60335-2-24 Particular requirements refrigerators, food freezers and ice makers

EN55014 Electrical Motor Operated Appliances (Emissions)
EN55014 Electro Magnetic Compatibility (Immunity)
EN138 -1 to -4 Refrigeration Plants

Low Voltage 73/23/EEC
EMC 89/336/EEC
Pressure Equipment 97/23/EC



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Continuing product improvements
may necessitate change of
specifications without notice.
Part Number 00000966 03/09



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