IM-Series
Air/Water/Remote Ice Machines

Technician's Handbook

Revision Date: 3/7/24

THIS PAGE INTENTIONALLY LEFT BLANK

Safety Notices

Read these precautions to prevent personal injury:

- Read this manual thoroughly before operating, installing or performing maintenance on the equipment. Failure to follow instructions in this manual can cause property damage, injury or death.
- Routine adjustments and maintenance procedures outlined in this manual are not covered by the warranty.
- Proper installation, care and maintenance are essential for maximum performance and trouble-free operation of your equipment.
- Visit our website www.icetroamerica.com for manual updates.
- This equipment contains high voltage electricity and refrigerant charge. Installation and repairs are to be performed by properly trained technicians aware of the dangers of dealing with high voltage electricity and refrigerant under pressure. The technician must also be certified in proper refrigerant handling and servicing procedures. All lockout and tag out procedures must be followed when working on this equipment.
- This equipment is intended for indoor use only. Do not install or operate this equipment in outdoor areas.
- As you work on this equipment, be sure to pay close attention to the safety notices in this handbook. Disregarding the notices may lead to serious injury and/or damage to the equipment.

Warning

Follow these electrical requirements during installation of this equipment.

- All field wiring must conform to all applicable codes of the authority having jurisdiction. It is the responsibility of the end user to provide the disconnect means to satisfy local codes. Refer to rating plate for proper voltage.
- This appliance must be grounded.
- This equipment must be positioned so that the plug is accessible unless other means for disconnection from the power supply (e.g., circuit breaker or disconnect switch) is provided.
- Check all wiring connections, including factory terminals, before operation. Connections can become loose during shipment and installation.
- For a cord-connected appliance, the following must be included:
    - Do not unplug by pulling on cord. To unplug, grasp the plug, not the cord.
    - Unplug from outlet when not in use and before servicing or cleaning.
    - Do not operate any appliance with a damaged cord or plug, or after the appliance malfunctions or is dropped or damaged in any manner. Contact the nearest authorized service facility for examination, repair, or electrical or mechanical adjustment

Warning

Follow these precautions to prevent personal injury during installation of this equipment:

- Installation must comply with all applicable equipment fire and health codes with the authority having jurisdiction.
- To avoid instability the installation area must be capable of supporting the combined weight of the equipment and product. Additionally the equipment must be level side to side and front to back.
- Use appropriate safety equipment during installation and servicing. Two or more people are required to lift or move this appliance to prevent tipping and/or injury.
- Do not damage the refrigeration circuit when installing, maintaining or servicing the unit.
- Connect to a potable water supply only.
- This equipment contains refrigerant charge.

Warning

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

- Objects placed or dropped in the bin can affect human health and safety. Locate and remove any objects immediately.
- Never use sharp objects or tools to remove ice or frost as they can damage the evaporator.
- Do not use mechanical devices or other means to accelerate the defrosting process. Instead use the 'Forced Harvest' feature explained in this handbook.

⚠ DANGER

Do not operate equipment that has been misused, abused, neglected, damaged, or altered/ modified from that of original manufactured specifications. This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision concerning use of the appliance by a person responsible for their safety. Do not allow children to play with, clean or maintain this appliance without proper supervision.

⚠ DANGER

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

- It is the responsibility of the equipment owner to perform a Personal Protective Equipment Hazard Assessment to ensure adequate protection during maintenance procedures.
- Do Not Store Or Use Gasoline Or Other Flammable Vapors Or Liquids In The Vicinity Of This Or Any Other Appliance.
- Never use flammable oil soaked cloths or combustible cleaning solutions for cleaning.
- All covers and access panels must be in place and properly secured when operating this equipment.
- Risk of fire/shock. All minimum clearances must be maintained. Do not obstruct vents or openings.
- Failure to disconnect power at the main power supply disconnect could result in serious injury or death. The power switch DOES NOT disconnect all incoming power.
- All utility connections and fixtures must be maintained in accordance with the authority having jurisdiction.
- Turn off and lockout all utilities (gas, electric, water) according to approved practices during maintenance or servicing.
- Units with two power cords must be plugged into individual branch circuits. During movement, cleaning or repair it is necessary to unplug both power cords.

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

Table of Contents

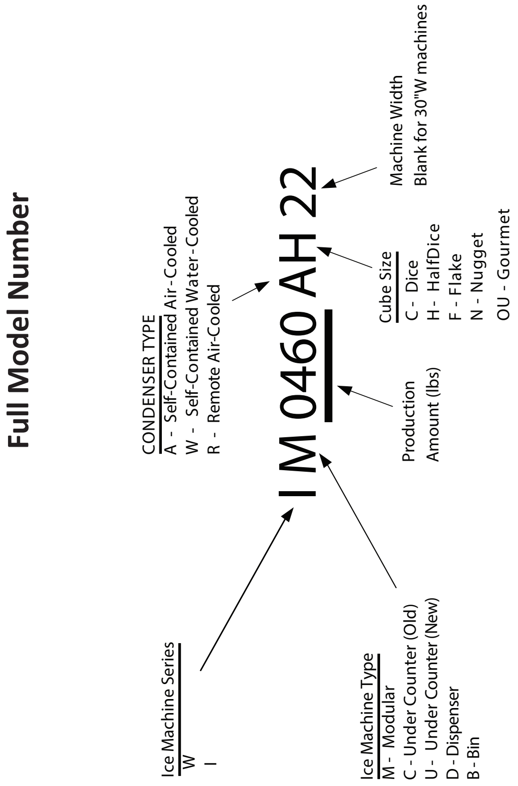
Table of Contents

Table of Contents

Table of Contents

THIS PAGE INTENTIONALLY LEFT BLANK

How to Read a Model Number

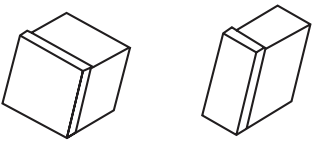


Full Serial Number

First Letter	O	P	Q	R	S	T	U	V	W	X	Y	Z
Manufacture Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026

Second Letter	A	B	C	D	E	F	G	H	I	J	K	L
Manufacture Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Ice Cube Sizes



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

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

Warning

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

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

Model/Serial Number Location

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

On 30" wide models, the MODEL/SERIAL NUMBER DECAL is located just behind the front panel, on the right-hand side.

On 22" wide models, the MODEL/SERIAL NUMBER DECAL is located on the back side of the front panel.

Model Numbers

AIR-WATER-REMOTE CONDENSER MODELS

Self-Contained Air-Cooled	Self-Contained Water-Cooled	Remote
IM-0350-AC	----	----
IM-0350-AH	----	----
IM-0350-AC-22	----	----
IM-0350-AH-22	----	----
IM-0460-AC	IM-0460-WC	----
IM-0460AH	IM-0460-WH	----
IM-0460-AC-22	----	----
IM-0460-AH-22	----	----
IM-0550-AC	IM-0550-WC	----
IM-0550AH	IM-0550-WH	----
IM-0550-AC-22	----	----
IM-0550-AH-22	----	----
IM-0680-AC	----	----
IM-0680AH	----	----
IM-0750-AC	----	----
IM-0750AH	----	----
IM-1100-AC	IM-1100-WC	IM-1100-RC
IM-1100AH	IM-1100-WH	IM-1100-RH
IM-1700-AC	IM-1700-WC	IM-1700-RC
IM-1700AH	IM-1700-WH	IM-1700-RH
IM-2000-AC	IM-2000-WC	IM-2000-RC
IM-2000AH	IM-2000-WH	IM-2000-RH

Ice Machine Warranty Information

For warranty information visit:

http://www.icetroamerica.com/service-support

- Warranty Registration
- Warranty Procedure Form
- Warranty Claim Form
- Labor Allowance Form

Warranty coverage begins the day the ice machine is installed.

Installation

Warning

PERSONAL INJURY POTENTIAL

Remove all ice machine panels before lifting.

Caution

The ice machine head section 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.

ICE DEFLECTOR

An ice deflector is required for all ice machines installed on non-Icetro or upright bins.

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.
- Self contained air and water cooled - The air temperature must be at least 50°F (10°C), but must not exceed 100°F (37°C).
- Self contained air, water cooled, remote air cooled - The pottable water temperature must be at least 50° F (10°C), but must not exceed 90°F (32°C).
- Remote air cooled - The air temperature must be at least -20°F (-29°C), but must not exceed 120°F (49°C)
- Ice Making Water Inlet - Water Pressure must be at least 20 psi (1.38 bar), but must not exceed 80 psi (5.52 bar).
- Condenser Water Inlet - Water Pressure must be at least 20 psi (1.38 bar), but must not exceed 150 psi (10.34 bar).
- Condenser Water Inlet - Water Temperature must be at least 50°F (10°C), but must not exceed 90°F (32°C).
- The location must not be near heat-generating equipment or in direct sunlight and protected from weather.
- The location must not obstruct air flow through or around the ice machine. Refer to chart below for clearance requirements.

Clearance Requirements

AIR, WATER, REMOTE CONDENSER MODELS

IM0350, IM0460 IM0550, IM0680 IM0770, IM1100	Self-Contained Air-Cooled	Water-Cooled and Remote
Top	12" (30.4 cm)	12" (30.4 cm)
Sides & Back	8" (20.3cm)	8" (20.3cm)

Ice Machine Heat of Rejection

Series Ice Machine	Heat of Rejection	
	Air Conditioning*	Peak
IM-0350	4600	5450
IM-0460	5400	6300
IM-0500	6100	6900
IM-0680/IM-0750	9000	13900
IM-1100	18300	24500
IM-1700	22950	27000
IM-2000	29750	35000

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

Installation on a Bin

An ice deflector is required for all bin installations and is included with all Icetro bins.

Warning

PERSONAL INJURY POTENTIAL

Do not operate any ice machine with the deflector removed.

Ice Machine on a Dispenser Installation

Adapters are required when installing an ice machine on a dispenser (22" or 30" ice machine) and is supplied by the dispenser manufacturer.

A thermostat kit is also required when installing an ice machine on a dispenser (22" or 30" ice machine) and can be purchased from your local Icetro distributor (part # IBO-150KIT).

Lineset Applications

Warning

The 60-month compressor warranty (including the 36-month labor replacement warranty) will not apply if the Icetro Ice Machine or Condenser Unit were 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 Icetro America.

Caution

Recovery locations vary by model. Verify you are making the correct connections for your model to prevent accidental release of high pressure refrigerant.

REMOTE CONDENSER

Ice Machine	Remote Single Circuit Condenser	Line Set*
IM-1100R	IRC-1100	IRT-20R404 IRT-35R404 IRT-50R404
IM-1700R IM-2000R	IRC-2000	IRT-20R410 IRT-35R410 IRT-50R410

*Line Set	Discharge	Return
IRT	1/2" (1.27 cm)	3/8" (.375cm)

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

Calculating Allowable Lineset Distance

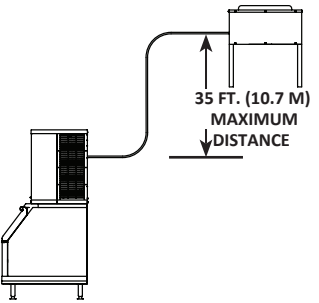
Line Set Length

The maximum length is 100' (30.5 m).

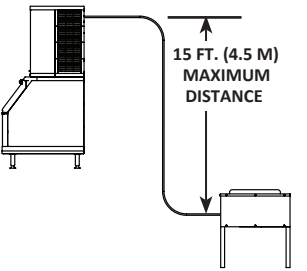
Line Set Rise/Drop

The maximum rise is 35' (10.7 m).

The maximum drop is 15' (4.5 m).



35 ft. (10.7 m) Rise: The maximum distance the Condenser or Condensing Unit can be above the ice machine.



15 ft. (4.5 m) Drop: The maximum distance the Condenser or Condensing Unit can be below the ice machine.

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.

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.

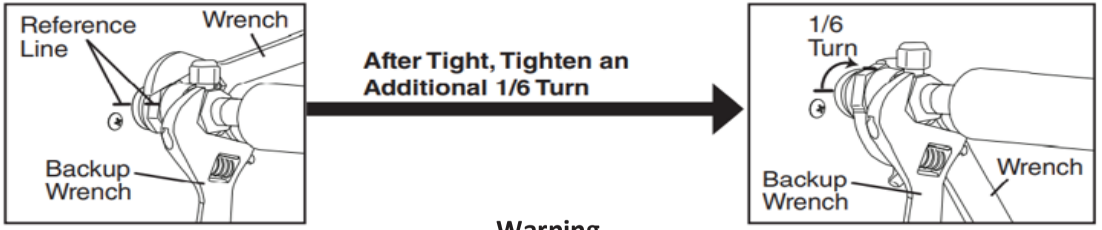
Maximum Line Set Distance Formula

Step 1
Measured Rise ____ X 1.7 = _____Calculated Rise (35 ft. Max)

Step 2
Measured Drop ____ X 6.6 = _____Calculated Drop (15 ft. Max.)

Step 3
Measured Horizontal Distance = _____ Horizontal (100 ft. Max.) Distance

Step 4
Total Calculated Distance = _____ Total Calculated (150 ft. Max.) Distance



Warning

Apply POE oil to the entire male fitting, including the o-ring, diaphragm, and threads. Properly align the male and female fittings and then start the connections by hand to ensure the fittings are not cross threaded. Use a backup wrench on the back of the female coupling and tighten connection until tight. Mark a reference line on the female coupling and the remote condenser/ice machine. Using a backup wrench, tighten the fittings an additional 1/6" turn. Check for leaks using an electronic leak detector and/or soap bubbles.

Remote Ice Machine Usage with Non-Icetro 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 Icetro America. Performance may vary from Sales specifications. ARI certified standard ratings only apply when used with an Icetro remote condenser.

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

Headmaster Valve

Any remote condenser connected to an Icetro Ice Machine must have a headmaster valve (available from Icetro Distributors) installed on the condenser package. Icetro will not accept substitute "off the shelf" headmaster 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 an Icetro condenser. It is recommended that this circuit be used to control the condenser fan 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 Icetro (see chart on page 31). Do not exceed internal volume and try to add charge to compensate, as compressor failure will result.

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.

Remote Condenser Internal Volume

Ice Machine Model	Refrigerant		Heat of Rejection		Internal Remote Condenser Volume (cu ft)		Pressure Tollerance	Head Pressure Control Valve
	Type	Charge	Average Btu/hr	Peak Btu/ hr	Min	Max	Design Burst	
IM-1100-R	R404A	11.4625 lbs.	18300	24500	0.085	0.0105	500 psig 2500 psig	P/N 340031800
IM-1700-R	R410A	18.298 lbs.	22950	27000	0.138	0.172	500 psig 2500 psig	P/N 340032800
IM-2000-R	R410A	18.739 lbs.	29750	35000	0.138	0.172	500 psig 2500 psig	P/N 340032800

Visual Inspection Checklist

Inadequate Clearances

- Check all clearances on sides, back and top. Reference ”Clearance Requirements” on page 20.

Ice machine is not level

- Level the ice machine.

Condenser is dirty

- Clean the condenser.

Water filtration is plugged (if used)

- Install a new water filter.

Water drains are not run separately and/or are not vented

- Run and vent drains according to the Installation Manual.

Line set is improperly installed

- Reinstall according to the Installation Manual Reference “Lineset Applications” on page 23.

Water System Checklist

A water-related problem often causes the same symptoms as a refrigeration system component malfunction.

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

Water area (evaporator) is dirty

- *Clean as needed.*

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

- *Install water regulator or increase water pressure.*

Incoming water temperature is not between 50°F (10° C) and 90°F (32°C)

- *If too hot, check the hot water line check valves in other store equipment.*

Water filtration is plugged (if used)

- *Install a new water filter.*

Water dump valve leaking during the Freeze cycle

- *Clean/replace dump valve as needed.*

Vent tube is not installed on water outlet drain

- *See Installation Instructions.*

Hoses, fittings, etc., are leaking water

- *Repair/replace as needed.*

Water fill valve is stuck open or closed

- *Clean/replace as needed.*

Water is leaking out of the water trough area

- *Stop the water loss.*

Uneven water flow across the evaporator

- *Clean the ice machine.*

THIS PAGE INTENTIONALL Y LEFT BLANK

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.

Nickle Safe ice machine cleaner & sanitizer are the only products approved for use in Icetro ice machines.

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.

CLEANING/SANITIZING PROCEDURE

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

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

PREVENTATIVE MAINTENANCE CLEANING PROCEDURE

- The automatic 'WASH' procedure cleans all components in the water flow path, and is used to clean the ice machine during the bi-yearly cleaning/ sanitizing procedure.
- This technology will also allow initiation and completion of a clean or sanitize cycle, after which the ice machine will stop and the 'ICE/OFF/WASH' switch returned to 'ICE' again.

EXTERIOR CLEANING

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

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

- Never use steel wool or abrasive pads for cleaning.

Cleaning / Sanitizing Procedure

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

- Set the 'ICE/OFF/WASH switch to 'OFF' and wait for the ice machine to stop after the harvest cycle ends and ice falls from the evaporator.
- Use the FND to 'Force Harvest' by pressing the 'UP' and 'DOWN' buttons simultaniously for 3 seconds.

Caution

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

Step 2 Remove all ice from the bin/dispenser.

Step 3 Set the 'ICE/OFF/WASH' switch to 'OFF'. Add the appropriate amount of cleaner into the water trough. Set the 'ICE/OFF/WASH' switch to 'WASH'. Water will flow into the trough until it reaches the high-level probe on the water level sensor. The water pump will energize and begin to circulate the water/cleaning solution mixture throughout the water circuit.

Model	Amount of Cleaner
IM0350-22/ IM0460-22 IM0550-22	3 ounces (90 ml)
IM0350/IM0460/IM0550 IM-0680/IM0750/IM1100	5 ounces (150 ml)
IM1700 & IM2000	9 ounces (150 ml)

Step 4 Wait until the 'WASH' cycle is complete (approximately 20-30 minutes). All ice machine operation will stop when complete. Then set 'ICE/OFF/ WASH' switch to 'OFF'.

Warning

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

Step 5 Remove parts for cleaning.

Please refer to the proper parts removal for your ice machine. Continue with step 6 when the parts have been removed.

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

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

CAUTION

Do not clean the ice thickness probe or water level sensor in a dishwasher. Permanent damage to the parts will occur.

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

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

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

Rinse all areas thoroughly with clean water.

SANITIZING PROCEDURE

Step 9 *Mix a solution of sanitizer and lukewarm water.*

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

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

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

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

Do not rinse the sanitized areas.

Step 12 Replace all removed components.

Step 13 Wait 20 minutes.

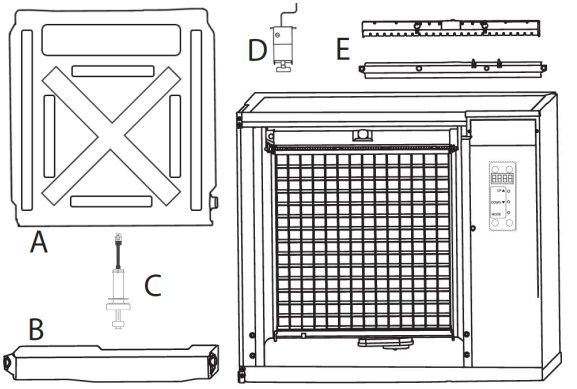
Step 14 Re-apply the power to the ice machine but do not move the 'ICE/OFF/WASH switch from the 'OFF' position. Add the appropriate amount of sanitizer to the trough.

Step 15 Set the 'ICE/OFF/WASH' switch to 'WASH'. Water will flow into the through until it reaches the high-level probe on the water level sensor. The water pump will energize and being to circulate the water/ sanitizer solution mixture throughout the water circuit.

Model	Amount of Cleaner
IM0350-22/ IM0460-22 IM0550-22	3 ounces (90 ml)
IM0350/IM0460/IM0550 IM-0680/IM0750/IM1100	3 ounces (90 ml)
IM1700 & IM2000	6 ounces (90 ml)

Step 16 Wait until the 'WASH' cycle is complete (approximately 20-30 minutes). All ice machine operation will stop when complete. Then set 'ICE/OFF/ WASH' switch to 'ICE'.

PARTS REMOVAL FOR CLEANING/SANITIZING



A. Remove the water curtain

- Pull the curtain open abut 30° then lift up & pull forward to remove.

B. Remove the water trough

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

C. Remove the water level probe

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

D. Remove the ice thickness probe

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

E. Remove the water distribution tube

- Remove the three thumbscrews to divide the distribution tube into two pieces.
- Hold in the left and right tabs on the remaining piece of the distribution tube and pull it forward.

Proceed to page 38, Step 6

Ice Thickness Probe & Water Level Probe Clean

the probes using the following procedure.

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

Removal from Service/Winterization

General

Special precautions must be taken if the ice machine is to be removed from service for an extended period of time or exposed to ambient temperatures of 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.

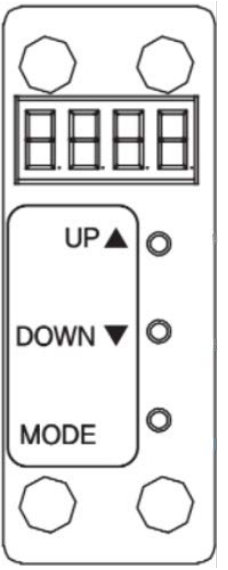
AIR-COOLED ICE MACHINES

1. Turn off the water supply.
2. Remove the water from the water trough.
3. Disconnect and drain the incoming ice-making water line at the rear of the ice machine.
4. Place 'ICE/OFF/WASH' switch to 'ICE' and wait for the water inlet valve to be energized.
5. Blow compressed air into the incoming water opening in the rear of the ice machine until no more water comes out of the water inlet line.
6. Press the "MODE" button on the FND so it lights up. Next, press "MODE" and "DOWN" together for 4 seconds to force the dump valve to energize.
7. Blow compressed air into the drain opening in the rear of the ice machine until no more water comes out of the drain line.
8. Place 'ICE/OFF/WASH switch back to 'OFF' and disconnect the electric power at the circuit breaker or the electric service switch.
9. 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 line from the water-cooled condenser.
3. Remove the cover from the control box and push in the contactor so that the compressor starts. The increasing refrigerant pressure will open the water regulating valve.
4. Blow compressed air through the condenser until no water remains.

FND Operation



FND Features

The Flexible Numeric Display (FND) offers a series of ice machine settings and error codes, which can be displayed on the FND's display panel, for quick machine diagnostics and performance customization.

BUTTONS

Mode Button: Initializes the FND and saves adjusted settings.

Up Button: Used to navigate through the different error codes and settings. Also used to increase numerical settings.

Down Button: Used to navigate through the different error codes and settings. Also used to decrease numerical settings.

Operation: In standby mode, the FND is off.

Pressing the 'MODE' button will turn on the FND display and either show the latest error code (if there is one) OR the first setting.

While the FND is on, press the 'UP' of 'DOWN' buttons to navigate through the available settings.

Pressing the 'MODE' button again, will display the default value for the selected setting.

Using the 'UP' or 'DOWN' buttons will change the default value.

Pressing the 'MODE' button again will save the new value.

If there are two values for one setting, pressing the 'MODE' button will move between the two.

The FND will automatically turn off when it has no input for 30 seconds.

Forced Harvest: Press 'UP' + 'DOWN' simultaneously for 3 seconds to force the harvest cycle on the ice machine. (**Note:** The forced harvest will NOT stop on it's own. Once ice has been removed from the evaporator, perform a forced drain to end the harvest sequence)

Forced Drain: Press 'DOWN' + 'MODE' simultaneously for 3 seconds to force a 30 second drain.

Rest to Default Values: Press 'UP' + 'DOWN' + 'MODE' simultaneously for 3 seconds to reset the FND values to their factory default settings.

Flexible Numeric Display (FND) Functions

Item	Display	Description	Set range	Default
Initial Drain Time	Id.tI	Adjust initial drain time.	0 ~ 30 sec (by 1 second)	20 sec
Drain Time after Harvest	Hd.tI	Adjust drain time after harvest.	0 ~ 90 sec (by 1 second)	10 sec
Drain Time after ICE Making	cd.tI	Adjust drain time after making ice.	0 ~ 30 sec (by 1 second)	10 sec
Water Supply Delay Time	ur.tI	Adjust the delay time after detecting high water level. (0.5 seconds) Maximum water supply time: 5 minutes If high water level has already been detected when the water is supplied, the delay is not applied.	0 ~ 30 sec (by 1 second)	15 sec (Different by model)
Harvest Assist Temperature (Optional)	drA.t	With hot gas, run the sub-motor if the preset condenser temperature is exceeded.	-56° ~ 138°F (by 1°F)	0°F
Pump Standby Time during Ice Making (Optional)	PUn.t	Stops pump for the preset time when the water temperature in the water vessel turns to 0°C.	0 ~ 120 sec (by 1 second)	15 sec
Temperature Selection	tE.ch	Choose Celsius or Fahrenheit.	°C / °F	°C
Water Vessel Water Temp. (Optional)	uESE	Displays current water temperature in the water vessel.	-56° ~ 138°F (by 1°F)	N/A on IM
Condenser Outlet Temperature	cond	Display current temperature at the condenser Outlet.	32° ~ 212°F (by 1°F)	
Evaporator Inlet Temperature	EuAI	Display current temperature at the evaporator Inlet.	-56° ~ 138°F (by 1°F)	
Evaporator Outlet Temperature	EuAo	Display current temperature at evaporator outlet	-56° ~ 138°F (by 1°F)	

Operational Checks

GENERAL

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

To ensure proper operation, always follow the Operational Checks:

- When starting the ice machine for the first time
- After a prolonged out of service period
- After cleaning and sanitizing

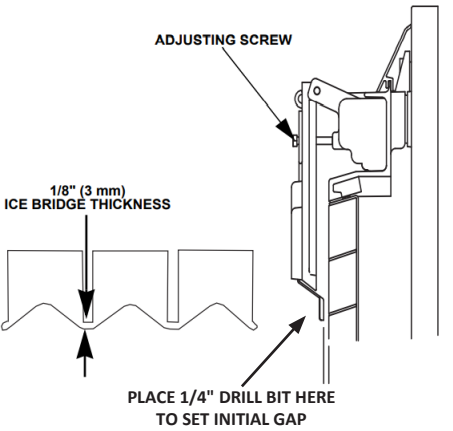
NOTE: Routine adjustments and maintenance procedures are not covered by the warranty.

ICE THICKNESS CHECK

The ice thickness probe should be set to maintain an ice bridge thickness of approximately 1/8" thick.

NOTE: If the water curtain is removed while the ice machine is in a freeze cycle, the machine's magnetic bin switch will open and the machine will stop until the water curtain is replaced.

1. Inspect the bridge connecting the cubes. It should be about 1/8" thick.
2. If adjustment is necessary, turn the ice thickness probe adjustment screw clockwise to increase bridge thickness or counterclockwise to decrease bridge thickness. Set a 1/4" gap between the ice thickness probe and evaporator as a starting point. Then adjust to achieve 1/8" ice thickness.
3. Make sure the ice thickness probe wire and the bracket do not restrict movement of the probe.



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

FND Timeouts

The FND board has the following non-adjustable timeouts:

- When the 'ICE/OFF/WASH' switch is moved from 'ICE' to 'OFF' the ice machine will not stop until the current freeze/harvest cycle is completed. This can be overridden by initiating a forced harvest. Refer to page 46 for further details.
- The maximum freeze time is 65 minutes. Once the machine's freeze time exceeds 65 minutes, 3 consecutive times, it will trip Error Code 11.
- The maximum harvest time is 5 minutes. Once the machine's harvest time exceeds 5 minutes, 3 consecutive times, it will trip Error Code 12.
- The maximum water fill is 5 minutes. Once the machine's water fill time exceeds 5 minutes, it will trip Error Code 15.

Sequence of Operation

SELF CONTAINED AIR OR WATER COOLED

NOTE: The 'ICE/OFF/WASH' switch must be in the 'ICE' position and the water curtain must be in place on the evaporator before the ice machine will start.

Initial Start-Up or Start-Up After Automatic Shutdown

1. Water Fill

Water inlet valve energizes to allow the water trough to fill, until it satisfies the water level sensor.

2. Water Flush

The dump valve and water pump are then energized to discard the remaining water in the trough for 20 seconds. The dump valve and water pump is de-energized and the water inlet valve energizes a second time to allow the water trough to fill, until it satisfies the water level sensor.

3. Refrigeration System Equalization and Start-Up

The hot gas valve energizes for 10-20 seconds to allow for pressure equalization and to reduce compressor starting torque.

The PCB supplies control voltage to the contactor, which energizes the compressor. At the same time, the PCB sends power to the condenser fan motor.

NOTE: The fan motor is wired through a fan cycle pressure control and will not cycle on until/unless the compressor is running.

Freeze Sequence

3. Prechill

The compressor runs for approximately 15 seconds, with no water circulation, to lower the temperature of the evaporator before the water pump is energized.

4. Freeze

Water Pump

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

Water Inlet Valve

The water inlet valve will energize and fill the trough with additional water once the water level float is in the down position.
NOTE: This only happens with the 1st cycle. From the 2nd cycle onward, even if low water is detected, no additional water is supplied.

Ice Thickness Probe

The freeze cycle continues until water touches the ice thickness sensor for 5 continuous seconds, which initiates the harvest cycle.

Harvest Sequence

5. Harvest

With the water pump de-energized, the hot gas valve is energized. The refrigerant gas warms the evaporator causing the cubes to slide, as a sheet, off the evaporator and into the storage bin.

Also during harvest, the dump valve is energized to purge water from the water trough. This purge cycle can be extended via the FND if need be.

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 returns the ice machine to the freeze sequence (Step 4).

6. Water Purge/Fill

Once ice drops, the hot gas valve closes and the water inlet valve, is energized until the water level sensor is satisfied.

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 and will hold it open. After the water curtain is held open for 10 seconds, the ice machine shuts off.

The ice machine remains off until enough ice has been removed from the storage bin to allow the ice to clear the water curtain. As the water curtain swings back to the closed position, the bin switch closes and the ice machine restarts (beginning with step 1).

ENERGIZED PARTS CHART SELF CONTAINED MODELS

Self Contained Air & Water-Cooled Models

Ice Making Sequence of Operation	Water Pump	Hot Gas Valve	Water Inlet Valve	Water Dump Valve	Compressor	Condenser	Approximate Length of Time
Start-Up							
1. Water Fill	**Off**	**Off**	**On**	**Off**	**Off**	**Off**	*30 Seconds*
2. Water Flush	**On**	**Off**	**Off**	**On**	**Off**	**Off**	*25 Seconds*
3. Water Fill	**Off**	**Off**	**On**	**Off**	**Off**	**Off**	*45 Seconds*
4. Pressure Equalization	**Off**	**On**	**On**	**Off**	**Off**	**Off**	*4 Seconds*
5. Compressor Startup	**Off**	**Off**	**On**	**Off**	**On**	**On**	*6 Seconds*
Freeze Sequence							
6. Prechill	**Off**	**Off**	**On**	**Off**	**On**	**On**	*20 Seconds*

Self Contained Air & Water-Cooled Models (Continued)

Ice Making Sequence of Operation	Water Pump	Hot Gas Valve	Water Inlet Valve	Water Dump Valve	Compressor	Condenser	Approximate Length of Time
8. Freeze	**On**	**Off**	**Off**	**Off**	**On**	**On**	*Until Water Contact w/ Ice Thickness Probe*
9. Harvest	**Off**	**On**	**Off**	**Off**	**On**	**Off**	*Bin Switch Activation*
10. Water Flush	**On**	**Off**	**Off**	**On**	**On**	**On**	*10-30 Seconds*
11. Water Fill	**On**	**Off**	**On**	**Off**	**On**	**On**	*45 Seconds*
12. Automatic Shut-Off	**Off**	**Off**	**Off**	**Off**	**Off**	**Off**	*Until 3 Minute Delay Expires and Bin Switch Re-closes*

Sequence of Operation

REMOTE AIR-COOLED CONDENSER

NOTE: The 'ICE/OFF/WASH' switch must be in the 'ICE' position and the water curtain must be in place on the evaporator before the ice machine will start.

Initial Start-Up or Start-Up After Automatic Shutdown

1. Water Fill

Water inlet valve energizes to allow the water trough to fill, until it satisfies the water level sensor.

2. Water Flush

The dump valve and water pump are then energized to discard the remaining water in the trough for 20 seconds. The dump valve and water pump is de-energized and the water inlet valve energizes a second time to allow the water trough to fill, until it satisfies the water level sensor.

2. Refrigeration System Equalization and Start-Up

The hot gas valve and harvest pressure regulating (HPR) solenoid valves energize to equalize high and low side refrigeration pressure.

After 4 seconds the liquid line solenoid valve energizes and the contactor energizes the compressor and condenser fan motor.

Freeze Sequence

3. Prechill

The compressor runs for approximately 15 seconds, with no water circulation, to lower the temperature of the evaporator before the water pump is energized.

4. Freeze

Water Pump

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

Water Inlet Valve

The water inlet valve will energize and fill the trough with additional water once the water level float sits in the down position.
NOTE: This only happens with the 1st cycle. From the 2nd cycle onward, even if low water is detected, no additional water is supplied.

Ice Thickness Probe

The freeze cycle continues until water touches the ice thickness sensor for 5 continuous seconds, which initiates the harvest cycle.

Harvest Sequence

5. Harvest

With the water pump de-energized, the hot gas & HPR valves are energized. The refrigerant gas warms the evaporator causing the cubes to slide, as a sheet, off the evaporator and into the storage bin.

Also during harvest, the dump valve is energized to purge water from the water trough. This purge cycle can be extended via the FND if need be.

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 returns the ice machine to the freeze sequence (Step 4).

6. Water Purge/Fill

Once ice drops, the hot gas & HPR valves closes and the water inlet valve, is energized until the water level sensor is satisfied.

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 and will hold it open. After the water curtain is held open for 10 seconds, the ice machine shuts off.

The ice machine remains off until enough ice has been removed from the storage bin to allow the ice to clear the water curtain. As the water curtain swings back to the closed position, the bin switch closes and the ice machine restarts (beginning with step 1).

Remote Air-Cooled Condenser Models
Energized Parts Chart

Ice Making Sequence of Operation	Water Pump	Hot Gas Valve	Water Inlet Valve	Water Dump Valve	Liquid Line Solenoid	HPR Solenoid	Compressor	Retmote Condenser	Approximate Length of Time
Start-Up									
1. Water Fill	Off	Off	On	Off	Off	Off	Off	Off	*30 Seconds*
2. Water Flush	On	Off	Off	On	Off	Off	Off	Off	*25 Seconds*
3. Water Fill	Off	Off	On	Off	Off	Off	Off	Off	*45 Seconds*
4. Pressure Equalization	Off	On	On	Off	Off	On	Off	Off	*4 Seconds*
5. Compressor Startup	Off	Off	On	Off	On	Off	On	On	*6 Seconds*
Freeze Sequence									
6. Prechill	Off	Off	On	Off	On	Off	On	On	*20 Seconds*

Remote Air-Cooled Condenser Models
Energized Parts Chart (Continued)

Ice Making Sequence of Operation	Water Pump	Hot Gas Valve	Water Inlet Valve	Water Dump Valve	Liquid Line Solenoid	HPR Solenoid	Compressor	Retmote Condenser	Approximate Length of Time
8. Freeze	On	Off	Off	Off	On	Off	On	On	*Until Water Contact w/ Ice Thickness Probe*
9. Harvest	Off	On	Off	Off	On	On	On	On	*Bin Switch Activation*
10. Water Flush	On	Off	Off	On	On	On	On	On	*10-30 Seconds*
11. Water Fill	On	Off	On	Off	On	Off	On	On	*45 Seconds*
12. Automatic Shut-Off	Off	Off	Off	Off	Off	Off	Off	Off	*Until 3 Minute Delay Expires and Bin Switch Re-closes*

Troubleshooting

Error Codes

In addition to standard safety controls, the Flexible Numeric Display (FND) board will display Error Codes, which protect the ice machine from major component failures. Additionally, the LED lights on the front panel will light solid, or flash, to indicate an Error Code.

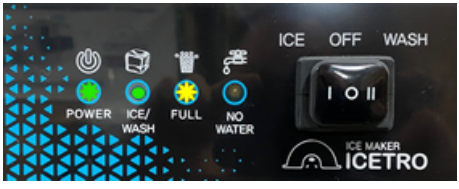
Error Codes are stored and displayed by the FND. The number of cycles, if any, required to stop the ice machine varies for each safety limit.

Note: Error Codes willbe cleared from the FND if the 'ICE/OFF/WASH' switch is moved to the 'OFF' position or the machine's power is disconnected.

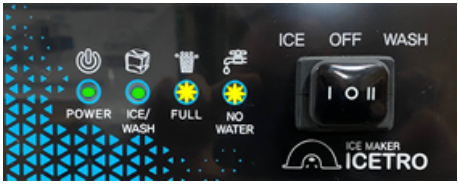
- **Error Code 1** - If the evaporator temperature is 32°F or higher after 30 minutes in the freeze cycle, the ice machine stops and displays Er_1 on the FND.

- **Error Code 3** - If the evaporator temperature exceeds 23°F after 30 minutes in the freeze cycle, the machine will continue to run and display Er_3 on the FND.

- **Error Code 11** - If the ice thickness probe does not sense water contact after 65 minutes, 3 consecutive times, the machine will stop and display Er_11.



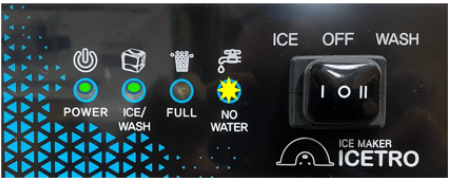
- **Error Code 12** - If curtain switch is not detected 5 minutes into the harvest cycle, 3 consecutive times, the machine will stop and display Er_12.



- **Error Code 13** - If the high pressure switch opens, the machine will stop and display Er_13 and close when the pressure drops.

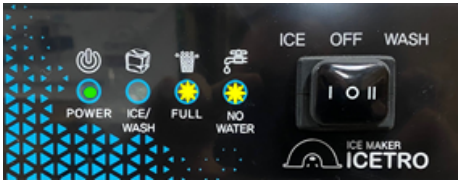
- **Error Code 14** - If high pressure switch opens, 3 consecutive times, the machine will stop and display Er_14. Water-cooled machines will attempt to restart every hour.

- **Error Code 15** - If the water level sensor (high-level probe) is not detected after 5 minutes from start of a water fill, the machine will stop and display Er_15. The machine will resume operation if the problem is resolved after automatically attempting to re-start every hour.



- **Error Code 16** - If water level sensor detects water at the high-level probe at the end of a freeze cycle, the machine will stop and display Er_16. The machine will resume operation if the problem is resolved after automatically attempting to re-sart every hour.

- **Error Code 17** - If excessive cooling is detected when the machine is FULL, the machine will continue to run, but display Er_17.
  WATER-COOLED ONLY!



- **Error Code 17** - If excessive cooling is detected when the machine is OFF, the machine will continue to run, but display Er_17.
  WATER-COOLED ONLY!

- **Error Code 18** - If dump valve is energized, but the water level sensor does not reach low-level probe within 5 minutes, the machine will stop and display Er_18.

TROUBLESHOOTING ERROR CODES

Error codes are designed to notify the technician of a problem and, in some cases, stop the ice machine prior to a major component failure. This may be difficult to diagnose, as many external problems occur intermittently.

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

ERROR CODE #1

If the evaporator temperature is 32°F or higher after 30 minutes in the freeze cycle, the ice machine stops and displays Er_1 on the FND.

Possible cause checklist

Refrigeration System

- Overcharged (too much refrigerant).
- TXV flooding the evaporator.
- Hot gas valve leaking by.
- Compressor or start components.
- Headmaster stuck in bypass **(REMOTE ONLY).**

Electrical System

- Suction-line thermistor open or shorted.
- Defective fan cycling control.

Air System

- Improper Air Ventilation
- Air filter or condenser needs cleaning.
- Condenser discharge air recirculation.

Water System

- Water inlet valve leaking by.
- Water regulator restricting water flow. **(WATER-COOLED ONLY)**.

ANALYZING WHY AN ERROR CODE STOPPED THE ICE MACHINE (CONTINUED)

ERROR CODE #3

Error Code 3 - If the evaporator temperature exceeds 23°F after 30 minutes in the freeze cycle, the machine will continue to run and display Er_3 on the FND.

Possible cause checklist

Refrigeration System

- Overcharged (too much refrigerant).
- TXV flooding the evaporator.
- Hot gas valve leaking by.
- Headmaster stuck in bypass **(REMOTE ONLY)**.

Electrical System

- Suction-line thermistor open or shorted.
- Defective fan cycling control.

Air System

- Improper Air Ventilation.
- Air filter or condenser needs cleaning.
- Condenser discharge air recirculation.

Water System

- Water inlet valve leaking by.
- Water regulator restricting water flow **(WATER-COOLED ONLY).**

ANALYZING WHY AN ERROR CODE STOPPED THE ICE MACHINE (CONTINUED)

ERROR CODE #11

Error Code 11 - If the ice thickness probe does not sense water contact after 65 minutes, 3 consecutive times, the machine will stop and display Er_11.

Possible cause checklist

Refrigeration System

- Undercharged system (too little refrigerant).
- TXV starving the evaporator.
- Hot gas valve leaking by.

Electrical System

- Ice thickness probe not adjusted properly or faulty.

Water System

- Insufficient water supply.
- Insufficient water pressure.
- Water level sensor improperly installed or giving a false reading.
- Water pump not running.
- Water distribution tube scaled up.
- Dump valve stuck open.

ANALYZING WHY AN ERROR CODE STOPPED THE ICE MACHINE (CONTINUED)

ERROR CODE #12

Error Code 12 - If curtain switch is not detected 5 minutes into the harvest cycle, 3 consecutive times, the machine will stop and display Er_12.

Possible cause checklist

Refrigeration System

- Hot gas valve not opening.

Electrical System

- Faulty curtain sensor.
- Magnet no longer attached to the curtain.
- Ice thickness sensor not adjusted properly, faulty, or needs cleaning.

ANALYZING WHY AN ERROR CODE STOPPED THE ICE MACHINE (CONTINUED)

ERROR CODE #13

Error Code 13 - If the high pressure switch opens, the machine will stop and display Er_13 and close when the pressure drops.

Possible cause checklist

Refrigeration System

- Overcharged system (too much refrigerant).
- Hot gas valve leaking by.
- Headmaster stuck in bypass. **(REMOTE ONLY)**

Air System

- Improper air ventilation.
- Air filter or condenser needs cleaning.
- Condenser blocked.
- Condenser discharge air recirculation.
- Condenser fan motor failure.
- Condenser fan blade broken.

Water System (WATER-COOLED ONLY)

- Insufficient water supply.
- Insufficient water pressure.
- Water regulator restricting water flow.

ANALYZING WHY AN ERROR CODE STOPPED THE ICE MACHINE (CONTINUED)

ERROR CODE #14

Error Code 14 - If high pressure switch opens, 3 consecutive times, the machine will stop and display Er_14. Water-cooled machines will attempt to restart every hour.

Possible cause checklist

Refrigeration System

- Overcharged system (too much refrigerant).
- Hot gas valve leaking by.
- Headmaster stuck in bypass. **(REMOTE ONLY)**

Air System

- Improper air ventilation.
- Air filter or condenser needs cleaning.
- Condenser blocked.
- Condenser discharge air recirculation.
- Condenser fan motor failure.
- Condenser fan blade broken.

Water System (WATER-COOLED ONLY)

- Insufficient water supply.
- Insufficient water pressure.
- Water regulator restricting water flow.

ANALYZING WHY AN ERROR CODE STOPPED THE ICE MACHINE (CONTINUED)

ERROR CODE #15

Error Code 15 - If the water level sensor (high-level probe) is not detected after 5 minutes from start of a water fill, the machine will stop and display Er_15. The machine will resume operation if the problem is resolved after automatically attempting to re-start every hour.

Possible cause checklist

Water System

- Insufficient water supply.
- Insufficient water pressure.
- Water inlet valve stuck closed or needs cleaning.
- Water inlet valve has no power or has shorted solenoid.
- Water filter needs to be changed.
- Water level sensor faulty or needs cleaning.
- Dump valve stuck open.

ANALYZING WHY AN ERROR CODE STOPPED THE ICE MACHINE (CONTINUED)

ERROR CODE #16

Error Code 16 - If water level sensor detects water at the high-level probe at the end of a freeze cycle, the machine will stop and display Er_16. The machine will resume operation if the problem is resolved after automatically attempting to re-sart every hour.

Possible cause checklist

Water System

- Water level sensor faulty or in need of cleaning.
- Water inlet valve suck open.
- Faulty PCB.

ANALYZING WHY AN ERROR CODE STOPPED THE ICE MACHINE (CONTINUED)

ERROR CODE #17 (WATER-COOLED ONLY)

Error Code 17 - If excessive cooling is detected when the machine is FULL or OFF, the machine will continue to run, but display Er_17.

Possible cause checklist

Water System

- Water regulating valve is faulty or stuck open.
- Liquid-line thermistor is open or shorted.

NOTE: Temporarily disconnecting the thermistor from the PCB will allow the machine to continue to make ice even if the error continues to occur.

ANALYZING WHY AN ERROR CODE STOPPED THE ICE MACHINE (CONTINUED)

ERROR CODE #18

Error Code 18 - If dump valve is energized, but the water level sensor does not reach low-level probe within 5 minutes, the machine will stop and display Er_18.

Possible cause checklist

Water System

- Dump valve faulty or in need of cleaning.
- Dump valve has no power or has shorted solenoid.
- Machine drain line is clogged with scale.
- Water level sensor faulty or out of place.
- Water pump faulty or in need of cleaning.

Ice Production Check

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

1. Determine the ice machine operating conditions:
   Air temp entering condenser:____°
   Air temp around ice machine:____°
   Water temp entering sump trough:____°
2. Refer to the appropriate spec sheet and use the operating conditions determined in step 1 to find published 24-Hour Ice Production:_____

- Times are in minutes.
  Example: 1 min. 15 sec. converts to 1.25 min.
  (15 seconds ÷ 60 seconds = .25 minutes)
- Weights are in pounds.
  Example: 2 lb. 6 oz. converts to 2.375 lb.
  (6 oz. ÷ 16 oz. = .375 lb.)

3. Perform an ice production check using the formula below.

1. + Freeze Time		Harvest Time	=	Total Cycle Time
2. 1440 Minutes in 24 Hrs.	÷	Total Cycle Time	=	Cycles per Day
3. x Weight of One Harvest		Cycles per Day	=	Actual 24-Hour Production

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

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

Ice Formation Pattern

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

Analyzing the ice formation pattern can help diagnose an ice machine malfunction.

However, it's important to keep in mind that any number of problems can cause improper ice formation.

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

1. Normal Ice Formation

Ice forms across the entire evaporator surface.

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

It is normal for ice thickness to vary up to 1/16" across the surface of the evaporator. The ice bridge thickness at the ice thickness control probe should be at least 1/8".

The ice thickness probe must be set to maintain the ice bridge thickness at approximately 1/8 in. If ice forms uniformly across the evaporator surface, but does not reach 1/8 in. in the proper amount of time, this is still considered a normal ice fill pattern.

2. Extremely Thin at Evaporator Outlet

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

Examples: No ice at all on the outlet half of the evaporator, but ice forms on the inlet half of the evaporator. Or, the ice at the outlet of the evaporator reaches 1/8 in. to initiate a harvest, but the inlet of the evaporator already has 1/2 in. to 1 in. of ice formation.

3. Extremely Thin at Evaporator Inlet

There is no ice, or a considerable lack of ice formation at the inlet of the evaporator. Examples: The ice at the outlet of the evaporator reaches 1/8 in. to initiate a harvest, but there is no ice formation at all on the inlet of the evaporator.

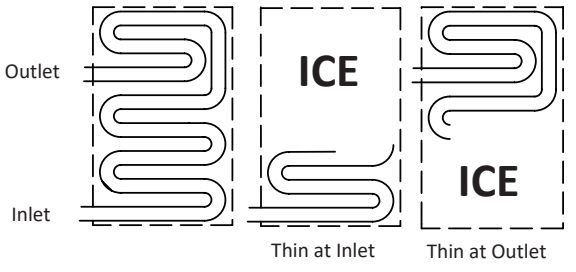
4. No Ice Formation

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

Evaporator Tubing Routing

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

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



5. Testing the Expansion Valve

The expansion valve (TXV) is designed to modulate the flow of refrigerant, depending upon the needs of the evaporator.

Extremely thin ice at the evaporator outlet could be a sign that the machine is undercharged or that the TXV is starving the evaporator for refrigerant.

Similarly, extremely thin ice at the evaporator inlet could be a sign that the machine is overcharged or that the TXV is flooding the evaporator with refrigerant.

To test the TXV, remove the sensing bulb from the suction line, just after the evaporator outlet. While watching the low-side on the manifold gauge set, hold the bulb tightly in you hand and watch to see if the low-side pressure begins to rise, indicating more refrigerant is entering the evaporator.

Next, place the bulb in a cup of ice water and watch to see if the low-side pressure drops again, indicating less refrigerant is entering the evaporator.

Hot Gas Valve Analysis

Symptoms of a hot gas valve remaining partially open during the freeze cycle can be similar to symptoms of either an expansion valve or compressor problem. The best way to diagnose a hot gas valve is by using the following procedures to determine if a hot gas valve is remaining partially open during the freeze cycle.

SELF-CONTAINED OR REMOTE CONDENSER MODELS HOT GAS VALVE ANALYSIS

1. Wait five minutes into the freeze cycle.
2. Feel the inlet and outlet of the hot gas valve.

Important

Sometimes feeling the hot gas valve outlet or across the hot gas valve itself will not work for this comparison.

The hot gas valve outlet is on the suction side (cool refrigerant). It may be cool enough to touch even if the valve is leaking.

3. Feel the compressor discharge line.
4. Compare the temperature of the inlet of the hot gas valve to the temperature of the compressor discharge line.

Warning

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

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

Discharge Line Temperature Analysis

GENERAL

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

Ambient air temperatures affect the discharge line temperature.

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

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

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

Freeze Cycle Discharge Pressure High Checklist

Improper Installation

- Refer to "Installation/Visual Inspection Checklist" on page 32.

Air Condenser

- Dirty condenser filter.
- Dirty condenser fins.
- High inlet air temperature.
- Condenser discharge air recirculation.
- Defective fan cycling control.
- Defective fan motor.
- Defective headmaster valve (Remote).

Water Condenser

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

Other

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

Freeze Cycle Discharge Pressure Low Checklist

Improper Installation

- Refer to "Installation/Visual Inspection Checklist" on page 32.

Air Cooled Condensers

- Defective headmaster valve, won't bypass "Headmaster Valve" on page 118.
- Defective fan cycle control, stuck closed "Fan Cycle Control" on page 113.

Water Cooled Condensers

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

Other

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

Suction Pressure High Checklist

Improper Installation

- Refer to "Installation/Visual Inspection Checklist" on page 32.

Discharge Pressure

- Discharge pressure is too high and is affecting suction pressure – refer to "Freeze Cycle Discharge Pressure High Checklist" on page 85.

Improper Refrigerant Charge

- Overcharged (also see "Freeze Cycle Discharge Pressure High Checklist" on page 85).
- Wrong type of refrigerant.
- Non-condensables in system.

Components

- Hot Gas valve leaking.
- HPR solenoid valve leaking.
- TXV flooding.
- Defective compressor.

Other

- Non-Icetro components in system.

Suction Pressure Low Checklist

Improper Installation

- Refer to "Installation/Visual Inspection Checklist" on page 32.

Discharge Pressure

- Discharge pressure is too low and is affecting low side – refer to "Freeze Cycle Discharge Pressure Low Checklist" on page 86.

Improper Refrigerant Charge

- Undercharged.
- Wrong type of refrigerant.

Other

- Non-Icetro components in system.
- Improper water supply over evaporator – refer to "Water System Checklist" on page 33.
- Restricted/plugged liquid line drier.
- Restricted/plugged tubing in suction side or liquid line of refrigeration system.
- TXV starving.

Water Regulating Valve

Problem (Freeze Cycle)

Valve not maintaining discharge pressure.

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

Discharge pressure extremely high; Liquid line entering receiver feels hot.

- Water regulating valve incorrectly set or not opening
- Insufficient water volume - undersized/kinked lines, mineral or scale buildup in lines. Verify Head Pressure Control Valve operation before changing water regulating valve.

Discharge pressure low, Liquid line entering receiver feels warm to hot.

- Ice machine low on charge. Verify "Total System Refrigerant Charge" on page 143.

Final Analysis - Self-contained Air, Water & Remote Condenser Models

HOT GAS VALVE LEAKING

Replace the valve as required.

LOW CHARGE/TXV STARVING

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

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

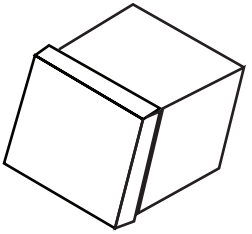
   *Do not add charge to remote models. The symptoms of a remote low on charge will result in error code #11 in cool ambient temperatures.

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

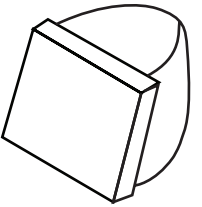
TXV FLOODING OR REFRIGERANT OVERCHARGE

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

HARVEST PROBLEMS SELF-CONTAINED AIR, WATER & REMOTE CONDENSER MODELS



Normal Ice Cube



Melted Out ice Cube

Definition of a harvest problem: At the end of a 5 minute harvest cycle the slab of ice is still contacting the evaporator. The slab of ice may or may not be removable by hand.

Harvest problems can be split into two symptoms.

- Symptom 1 - Normal sheet of cubes at the end of the harvest cycle. Ice is difficult to remove from the evaporator by hand. Once removed the back of the cubes are square and show no signs of melting. This indicates a refrigeration problem. The source of the problem could be in the freeze or harvest cycle.
- Symptom 2 - Melted sheet of cubes at the end of the harvest cycle. Ice can be removed rather easily by hand. The back of the cubes are misshapen and melted. This indicates something is preventing the ice slab from releasing. A manual cleaning procedure must always be performed when this problem is encountered.

THIS PAGE INTENTIONALLY LEFT BLANK

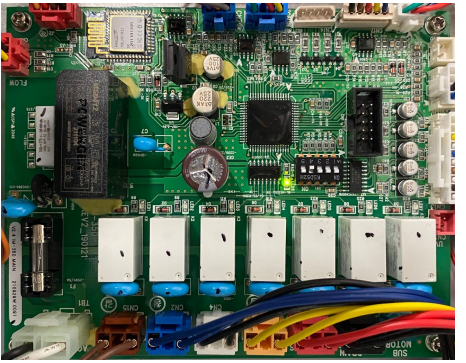
Electrical Components

CONTROL BOARD (PCB)

FUNCTION

The PCB is what controls the operation of all the major components within the ice machine. Each major component has a white relay above it's terminal connection on the PCB. Above that relay is a green light that will illuminate anytime power is being sent to that component. This, along with the sequence of operation, makes troubleshooting a breeze for the service technician, as a simple visual check to the PCB will indicate whether or not a specific component should be operating.

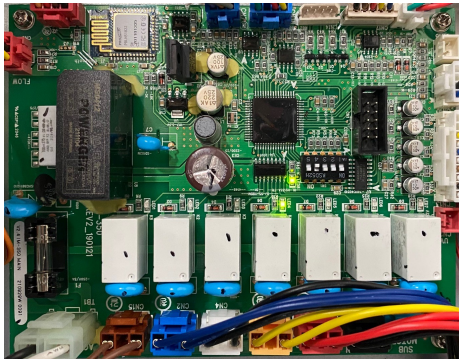
STANDBY MODE



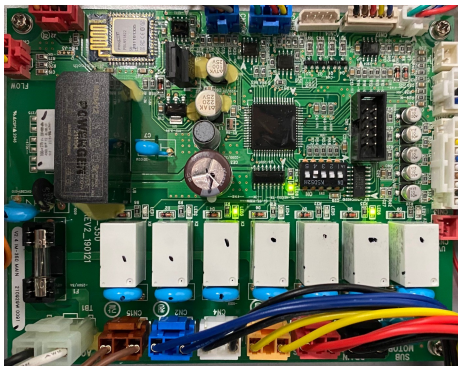
Only LED next to dipswitches lights up.

CONTROL BOARD (PCB) Cont.

FREEZE MODE: Sequence of Operation



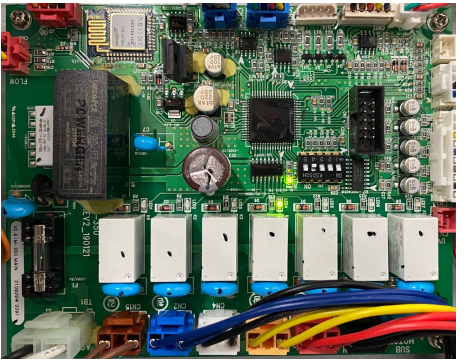
Water inlet valve (yellow)
energized for water fill.



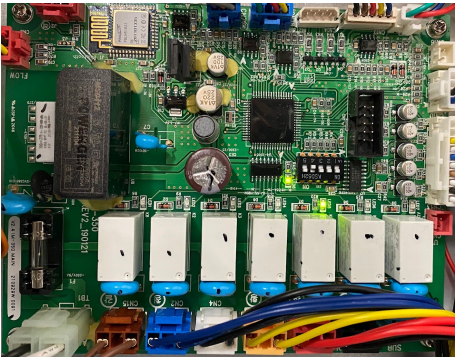
Water pump (white) & dump valve
(black) energized for water flush.

CONTROL BOARD (PCB) Cont.

FREEZE MODE: Sequence of Operation



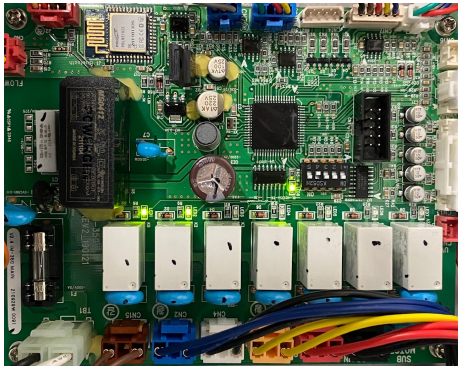
Water inlet valve (yellow)
energized for 2nd water fill.



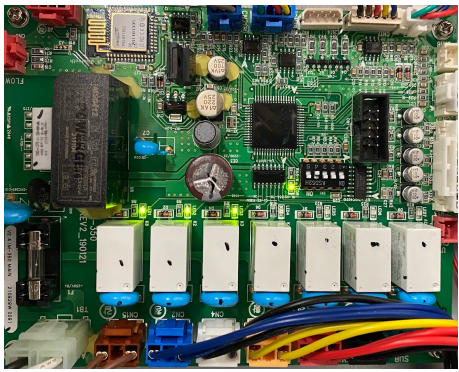
Hot gas valve (red) energized
to equalize pressure.

CONTROL BOARD (PCB) Cont.

FREEZE MODE: Sequence of Operation



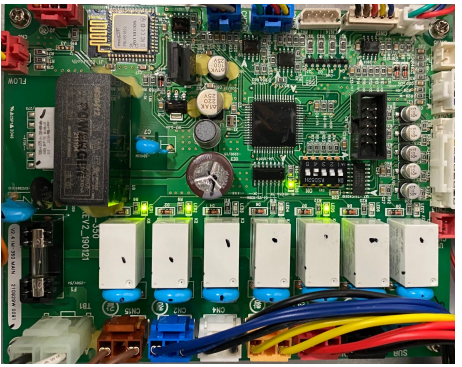
Compressor (brown) & condenser (blue) energized during pre-chill.



Compressor (brown), condenser (blue), water pump (white) energized to circulate & freeze water to evaporator.

CONTROL BOARD (PCB) Cont.

HARVEST MODE: Sequence of Operation



Compressor (brown), condenser (blue) , & hot gas valve (red) energized for harvest.

MAIN FUSE

FUNCTION

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

SPECIFICATIONS

The main fuse is 250 Volt, 5 amp.

Warning

High (line) voltage is applied to the control board (TB1) at all times. Removing the control board fuse or turning the 'ICE/OFF/WASH' switch to 'OFF' will not remove the power supplied to the control board.

CHECK PROCEDURE

1. If the power LED light is energized on the front panel of the ice machine, the fuse is good.

Warning

Disconnect electrical power to the entire ice machine before proceeding.

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

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

BIN SWITCH

FUNCTION

Movement of the water curtain bin switch operation. The bin switch has two main functions:

1. Terminating the Harvest cycle and returning the ice machine to the Freeze cycle. This occurs when the bin switch is opened and closed again within 10 seconds during the Harvest cycle.
2. Automatic ice machine shut-off.
   If the storage bin is full at the end of a Harvest cycle, the sheet of cubes fails to clear the water curtain and holds it open. After the water curtain is held open for 10 seconds, the ice machine shuts off. The ice machine remains off until enough ice is removed from the storage bin to allow the sheet of cubes to drop clear of the water curtain. As the water curtain swings back to the operating position, the bin switch closes and the ice machine restarts, providing the 3-minute delay has expired.

Important
The water curtain must be in place (bin switch closed) to start ice making.

SPECIFICATIONS

The bin switch is a magnetically operated reed switch. The magnet is attached to the lower right corner of the water curtain.

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

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

Diagnostics

SYMPTOMS

Bin Switch Fails Open

- The ice machine will not start an ice making cycle and the display indicates “Full Bin”.

Bin Switch Fails Closed

- If running, error code 12 (Er_12) is displayed on the FND indicating a long harvest.
- Machine may be off on error code 12.
- The harvest cycle continues after ice opens and closes the water curtain (harvest cycle is about 1.5 minutes).

DIAGNOSTICS

1. Verify bin switch, curtain and curtain magnet are in place.
2. Open and close the water curtain repeatedly while observing the 'FULL' LED light on the front panel.
   A. Curtain switch cycles open/closed and 'FULL' LED light energizes/de-energizes - Bin switch is operating normally
   B. Curtain switch remains closed and 'FULL' LED light remains on - Go to step 3
   C. Curtain switch remains open and 'FULL' LED light remains off - Go to step 3
3. Disconnect bin switch wire from control board.
4. Jumper control board bin switch wire to ground and observe the 'FULL' LED light.
   A. Curtain switch closes, 'FULL' LED light de-energizes and ice machine starts - Replace bin switch
   B. Curtain switch remains open and 'FULL' LED light remains on - Verify procedure was correctly followed - Replace control board.

WATER LEVEL CONTROL

FUNCTION

Icetro has two possible water level probes. Older machines use a 3-prong water level probe. The water level probe controls the water level by sensing whether water is or is not contacting the water level probe. The water level probe has three sensing probes. Two probes are equal in length and measure resistance from both long probes to the short probe.

Current machines use a water level float. When the float is in the down position, the switch is closed and the water inlet valve is energized to fill the water trough. When the float rises to the top, the switch opens and the water inlet vavle is no longer energized.

SPECIFICATIONS

Freeze Cycle Water Level Setting

During the Freeze cycle, the water level probe is set to maintain the proper water level above the water pump housing. The water fill time is adjustable (page 47). If the water level is incorrect, check the water level probe position. Reposition or clean the probe as necessary.

Water Inlet Valve Safety Shut-Off

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

Regardless of the water level probe input, the control board automatically shuts off the water inlet valve if it remains on for 5 continuous minutes, and will display error code 15 (Er_15).

Prechill & Freeze Cycle Operation

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

- The water inlet valve is ON when there is no water in contact with the water level probes.
- The water inlet valve turns OFF after water contacts the high-level probe for 5 continuous seconds.
- The water inlet valve can cycle ON and OFF once in the initial freeze cycle, but not after the first cycle has finished.
- Maximum fill time is:
  5 minutes.

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

Diagnostics

SYMPTOMS

- Water trough overfills
- Water trough will not fill

WATER TROUGH OVERFILLING DURING THE FREEZE CYCLE

Step 1 Move the 'OFF/ICE/WASH' switch to the 'OFF' position to turn the machine off.

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

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

WATER TROUGH NOT FILLING DURING THE FREEZE CYCLE

Step 1 Verify that the water supply is on and the water pressure is not below 20 psig.

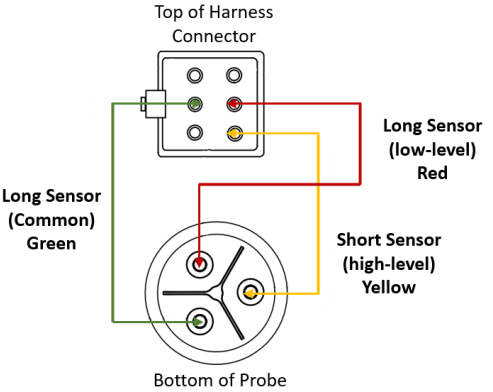
Step 2 Verify that the correct voltage is supplied to the machine.

Step 3 Verify that power is being sent to the water inlet valve.

Step 4 If the water supply and power both check out, and no water is exiting the valve, continue to step 5 before replacing the valve.

Step 5 Check water level sensor mounting and verify secure wiring connections at the sensor and control board. Additionally, check if the water level sensor is in need of cleaning.

Testing the water level sensor (Before S/N Starting With VC)



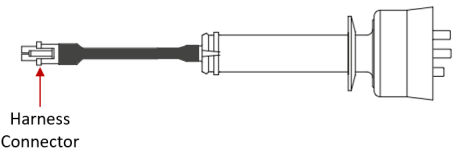
With the probe disconnected from the harness, perform the following tests:

High-level probe to common probe

Low-level probe to common probe

High-level probe to low-level probe

All should read ∞ resistance.



With the probe disconnected from the harness, perform the following tests:

High-level probe to high-level harness connector

Low-level probe to low-level harness connector

Common probe to common harness connector

All should read 0 ohm.

Testing the water level sensor (After S/N Starting With VC)

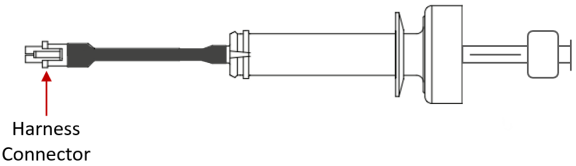
For machines manufactured after January 1, 2022, the water level sensor was changed from the 3-probe sensor to a float switch.

To test the float switch, simply check for continuity between the to wires found in the harness connector.

- When the float is in the down position, the switch is closed.
- When the float is in the up position, the switch is open.

If the float switch tests good, check the wiring harness for continuity.

If the float switch and the harness test good, the problem is with the control board.



ICE THICKNESS PROBE (INITIATES HARVEST)

FUNCTION

The ice thickness probe senses proper ice thickness when the ice bridge is thick enough to allow water to touch the probe, which signals the control board to start a harvest cycle.

SPECIFICATIONS

Maximum Freeze Time

The maximum freeze time is 65 minutes at which time the control board automatically initiates a harvest sequence.

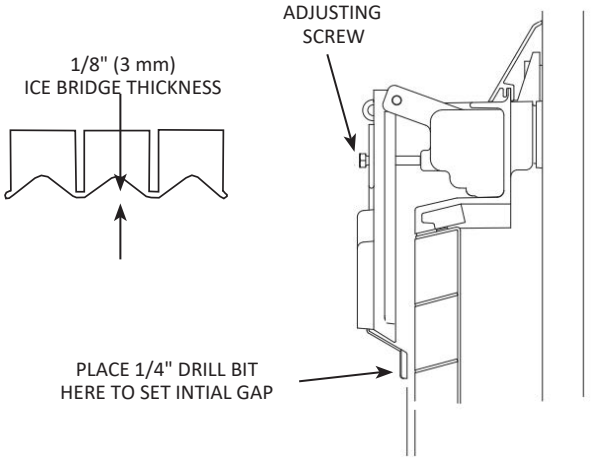
NOTE: Do not clean ice thickness probe in a dishwasher.

Ice Thickness Check

The ice thickness probe is factory-set to maintain the ice bridge thickness at 1/8 inch.

NOTE: Make sure the water curtain is in place when performing this check. It prevents water from splashing out of the water trough. Remove the curtain to make an adjustment, then replace immediately after the adjustment is made.

1. Inspect the bridge connecting the cubes. It should be about 1/8 in. (3 mm) thick.
2. If adjustment is necessary, turn the ice thickness probe adjustment screw clockwise to increase bridge thickness or counterclockwise to decrease bridge thickness. Set a 1/4" gap between the ice thickness probe and evaporator as a starting point. Then adjust to achieve 1/8" ice thickness.
3. Make sure the ice thickness probe wire and the bracket do not restrict movement of the probe.



ICE THICKNESS ADJUSTMENT

Ice Machine Doesn't Harvest Properly

ICE MACHINE CYCLES INTO HARVEST PREMATURELY

OR

ICE MACHINE DOES NOT CYCLE INTO HARVEST

Symptoms

- Low ice production
- Thin or thick ice in bin
- Freeze cycles are shorter or longer than published cycle times
- Large sheet of ice on evaporator
- Ice thickness probe freezing into the ice sheet.

Diagnostics

1. Remove all ice from the evaporator when present. Use the 'FORCE HARVEST' function on the FND if necessary.
2. Turn the 'ICE/OFF/WASH' switch to the 'OFF' position.
3. Disconnect power to the ice machine at the main disconnect.
4. Inspect the ice thickness probe for physical damage and/or scale buildup. Clean if necessary.
5. Verify the ice thickness probe gap is approximately 1/4" -3/8". See "Ice Thickness Check" on page 108.
6. Make sure the ice thickness probe wire and the bracket do not restrict movement of the probe.
7. Reapply power to the ice machine at the main disconnect.
8. Return the 'OFF/ICE/WASH' switch to the 'ICE' position.

9. If the problem persists, use a jumper wire between the (red) ice thickness connector at the control box and any cabinet ground. If after 5 seconds the machine goes into harvest, replace the probe. If the machine continues in the freeze cycle, the control board is causing the malfunction.

NOTE: If you suspect a defective probe, check the wire harness between the ice thickness probe & control board for continuity before replacing.

HIGH PRESSURE CUTOUT (HPCO) CONTROL

FUNCTION

Stops the ice machine if subjected to excessive high-side pressure. The HPCO control is normally closed, and opens on a rise in discharge pressure.

SPECIFICATIONS

R-404A	specifications	
	CUT-OUT	CUT- IN
Air, Water, Remote	426	355

Automatic Reset

R-410A	specifications	
	CUT-OUT	CUT- IN
Air-cooled, Remote	600.4 PSI	449.6 PSI
Water-cooled	549.6 PSI	400.3 PSI

Automatic Reset

SYMPTOM

Opening the HPCO will cause machine operation to stop. The ice machine will restart once the HPCO closes.

If the HPCO is opens 3 consecutive times, the machine operation will stop and the FND will display error code 14 (Er_14).

NOTE: Water-cooled machines will attempt to restart every hour.

CHECK PROCEDURE

Testing HPCO switch

1. Leave all wiring connectors attached and perform testing within the 60 minute time delay period
2. Check for line voltage at CN10 connector on control board (Two wire connector with black & blue wires).
   A. Line voltage present - HPCO switch has reset and closed.
   B. No line voltage present - HPCO switch is open. Verify pressure.
      - If the HPCO is opening at a pressure significantly lower or higher than the control setting of 426 psig, replace the HPCO.
      - If the HPCO is open at a pressure that is above cut-in, find root cause problem. Fan motor, dirty condenser, refrigeration system issue, etc. The ice machine will go to an initial start sequence when the HPCO closes.

FAN CYCLE CONTROL

FUNCTION

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

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

SPECIFICATIONS

Specifications		
Model	Cut-In(Close)	Cut-Out(Open)
IM-0350 (22")	203 psi ± 5	151 psi ± 5
IM-0350 (30")	248 psi ± 5	199 psi ± 5
IM-0460 (22")	232 psi ± 5	180 psi ± 5
IM-0460 (30")	248 psi ± 5	199 psi ± 5
IM-0550 (22")	203 psi ± 5	151 psi ± 5
IM-0550 (30")	203 psi ± 5	151 psi ± 5
IM-0680 (30")	248 psi ± 5	199 psi ± 5
IM-0750 (30")	248 psi ± 5	199 psi ± 5
IM-1100 (30")	232 psi ± 5	180 psi ± 5
IM-1700 (48")	335 psi ± 5	275 psi ± 5
IM-2000 (48")	335 psi ± 5	275 psi ± 5

CHECK PROCEDURE

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

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

THERMISTORS

FUNCTION

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

CHECK PROCEDURE

Using an electrical meter, check to see if the thermistor is open or shorted. If it is, replace it.

Using a temperature probe/clamp, check the temperature of the line that the thermistor is attached to after 5 minutes of operation and compare the reading with that displayed on the FND for the thermistor being tested. The two temperature readings should be similar ± 5°.

To obtain the thermistor temperature reading, press the 'MODE' button on the FND and cycle through the available settings until you reach the one for the desired thermistor.

NOTE: Refer to page 47 to determine which setting matches the desired thermistor.

COMPRESSOR ELECTRICAL DIAGNOSTICS

The compressor does not start or will trip repeatedly on overload.

Check Resistance (Ohm) Values

NOTE: Compressor windings can have very low ohm values. Use a properly calibrated meter.

Perform the resistance test after the compressor cools. The compressor dome should be cool enough to touch (below 120°F/49°C) to assure that the overload is closed and the resistance readings will be accurate.

SINGLE PHASE COMPRESSORS

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

THREE PHASE COMPRESSORS

1. Disconnect power and remove the wires from the compressor terminals.
2. The resistance values between L1 and L2, between L2 and L3, and between L3 and L1 should all be equal.
3. If the overload is open, there will be open readings between L1 and L2, between L2 and L3, and between L3 and L1. Allow the compressor to cool, then check the readings again.

CHECK MOTOR WINDINGS TO GROUND

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

COMPRESSOR DRAWING LOCKED ROTOR

To determine if the compressor is seized, check the amp draw while the compressor is trying to start and compare it to the LRA rating on the machine's data plate.

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

To determine which you have:

1. Install high and low side gauges.
2. Try to start the compressor.
3. Watch the pressures closely.
    A. If the pressures do not move, the compressor is seized. Replace the compressor.
    B. If the pressures move, the compressor is turning slowly and is not seized. Check the capacitors and relay.

COMPRESSOR DRAWING HIGH AMPS

The continuous amperage draw on start-up should not be near the maximum fuse size indicated on the serial tag.

DIAGNOSING START COMPONENTS

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

Capacitor

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

Relay

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

RELAY OPERATION CHECK

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

Refrigeration Components

HEADMASTER VALVE

Icetro remote systems require a headmaster valve with special settings. Replace defective headmaster valves only with (O.E.M.) Icetro replacement parts.

Refrigerant Charge Verification

The correct amount of refrigerant (name plate charge) is required to operate correctly at all ambient conditions.

An ice machine with an overcharge or undercharge of refrigerant may function properly at higher ambient temperatures and fails at lower ambient temperatures. Symptoms of incorrect refrigerant amount are:

- Works during the day and malfunctions at night, and/or fails whenever the outdoor temperature drops.

Refrigerant loss and ambient temperature are directly related to each other. As the ambient temperature drops, more refrigerant is stored in the condenser.

When the refrigerant charge and ambient temperature create an undercharge of refrigerant in the freeze cycle, the receiver dip tube will lose it's liquid seal. Without liquid refrigerant to the TXV, the ice machine fails to make a full sheet of ice in 65 minutes and error code #11 (Er_11) is displayed on the FND.

NOTE: When a head pressure control valve is being replaced or refrigerant charge is suspected, verify the refrigerant charge is correct by recovering the refrigerant, weighing and comparing to the nameplate amount. Refer to "Refrigerant Recovery/Evacuation" page 126 for recovery procedures.

Freeze Cycle Operation All Models

The headmaster valve is non adjustable.

At ambient temperatures of approximately 70°F (21°C) or above, refrigerant flows through the valve from the condenser to the receiver inlet. At temperatures below this (or at higher temperatures if it is raining), the head pressure control dome's nitrogen charge closes the condenser port and opens the bypass port from the compressor discharge line.

In this modulating mode, the valve maintains minimum head pressure by building up liquid in the condenser and bypassing discharge gas directly to the receiver.

Harvest Cycle Operation
Remote Condenser Models

The headmaster valve cycles into full bypass due to the pressure drop when the hot gas valve opens. Refrigerant flows from the compressor to the evaporator through the hot gas valve and the headmaster valve is out of the circuit.

Diagnostics

FREEZE CYCLE - REMOTE CONDENSER

1. Determine if the coil is clean.
2. Determine the air temperature entering the condenser.
3. Determine if the head pressure is high or low in relationship to the outside temperature. (Refer to the proper "Cycle Times/24-Hour Ice Production/ Refrigerant Pressure Charts" page 146).
4. Determine the temperature of the liquid line entering the receiver by feeling it. This line is normally warm; "body temperature."
5. Using the information gathered, refer to the chart.

NOTE: A headmaster valve that will not bypass, will function properly with condenser air temperatures of approximately 70°F (21°C) or above. When the temperature drops below 70°F (21°C), the head pressure control valve fails to bypass and the ice machine malfunctions. Lower ambient conditions can be simulated by rinsing the condenser with cool water during the freeze cycle.

Condition	Probable Cause	Corrective Measure
Discharge Pressure - High Liquid Line Temperature - Hot	Valve stuck in bypass	Replace valve
Discharge Pressure - Low Liquid Line Temperature - Cold	Valve not bypassing	Replace valve
Discharge Pressure - Low Liquid Line Temperature - Hot	Ice Machine Low on Charge	Refrigerant Charge Verification

Harvest Cycle

REMOTE CONDENSER

The headmaster valve cycles into full bypass due to the pressure drop when the hot gas valve opens. Refrigerant flows from the compressor to the evaporator through the hot gas valve and the headmaster valve is out of the circuit.

Undercharge Symptoms

- Error code #11 (Er_11) or error code #12 (Er_12) displayed on the FND, indicating Long Freeze or Long Harvest has taken place.
- Harvest cycle suction pressure is low.
- Harvest cycle discharge pressure is low.
- Liquid line entering receiver feels warm to hot in the freeze cycle.

Overcharge Symptoms

- Error code #12 (Er_12) displayed on the FND, indicating Long Harvest has taken place.
- Harvest cycle discharge pressure is normal.
- Freeze cycle time, suction and discharge pressure are normal and the ice machine will not harvest. The sheet of ice cubes show little or no sign of melting when removed from the evaporator after the harvest cycle has been completed. (If the cubes are melted you have a release problem, clean the ice machine).

HARVEST PRESSURE REGULATING (HPR) SYSTEM REMOTE CONDENSER ONLY

GENERAL

The harvest pressure regulating (HPR) system includes:

- Harvest pressure regulating solenoid valve (HPR solenoid). This is an electrically operated valve which opens when energized, and closes when de-energized.
- Harvest pressure regulating valve (HPR valve). This is a pressure regulating valve which modulates open and closed, based on the refrigerant pressure at the outlet of the valve. The valve closes completely and stops refrigerant flow when the pressure at the outlet rises above the valve setting.

FREEZE CYCLE

The HPR system is not used during the freeze cycle. The HPR solenoid is closed (de-energized), preventing refrigerant flow into the HPR valve.

HARVEST CYCLE

During the harvest cycle, the check valve in the discharge line prevents refrigerant in the remote condenser and receiver from back feeding into the evaporator and condensing to liquid.

The HPR solenoid is opened (energized) during the harvest cycle, allowing refrigerant gas from the top of the receiver to flow into the HPR valve. The HPR valve modulates open and closed, raising the suction pressure high enough to sustain heat for the harvest cycle, without allowing refrigerant to condense to liquid in the evaporator.

In general, harvest cycle suction pressure rises, then stabilizes in the range of 70-100 psig (517-758 kPa).

HPR DIAGNOSTICS

Steps 1 through 5 can be quickly verified without attaching a manifold gauge set or thermometer.

All questions must have a yes answer to continue the diagnostic procedure.

1. Liquid line warm?
   (Body temperature is normal)
   If liquid line is cooler than body temperature, refer to “Headmaster Valve” on page 118.
2. Ice fill pattern normal?
3. Freeze time normal?
   Shorter freeze cycles - Refer to “Headmaster Valve” on page 118.
   Longer freeze cycles - Refer to “Water System Checklist” on page 33, then refer to "Analyzing Why an Error Code Stopped the Ice Machine" on page 68.
4. Harvest time is longer than normal and FND indicates error code #12 (Er_12)?

5. Discharge line temperature is greater than 150°F (66°C) at the end of the freeze cycle? See “Discharge Line Temperature Analysis” on page 84.
6. Connect refrigeration manifold gauge set to the access valves on the front of the ice machine. Establish baseline by recording suction and discharge pressure and freeze & harvest cycle times.
7. Freeze cycle Head Pressure is in the range indicated in the cycle time/24 hour ice production and operational pressure chart?
   If the head pressure is low refer to “Freeze Cycle Discharge Pressure Low Checklist” on page 86
8. Freeze cycle Suction Pressure normal?
   Refer to pages 87 - 88 if suction pressure is high or low.
9. Harvest cycle suction and discharge pressures are lower than indicated in the cycle times/refrigerant pressures/24 hour ice production chart?
10. Replace Harvest Pressure Regulating solenoid.

WATER REGULATING VALVE

Water-Cooled Models Only

FUNCTION

The water regulating valve maintains the freeze cycle discharge pressure.

CHECK PROCEDURE

1. Determine if the head pressure is high or low (refer to cycle time/24 hour ice production and operational pressure chart for the model you are servicing).
2. Verify the condenser water meets specifications.
3. Adjust valve to increase or decrease discharge pressure.
4. Determine the temperature of the liquid line entering the receiver by feeling it. This line is normally warm; body temperature.

Problem (Freeze Cycle)

Valve not maintaining discharge pressure.

- Valve incorrectly set, dirty or defective. Adjust, clean or replace valve.

Discharge pressure extremely high; Liquid line entering receiver feels hot.

- Water regulating valve incorrectly set or not opening.

Discharge pressure low, Liquid line entering receiver feels warm to hot.

- Ice machine low on charge.

Refrigerant Recovery/Evacuation

SELF-CONTAINED MODEL PROCEDURE

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

IMPORTANT

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

IMPORTANT

Replace the liquid line drier after recovering the refrigerant and before evacuating and recharging. Use only an Icetro (O.E.M.) liquid line filter-drier to prevent voiding the warranty.

Connections

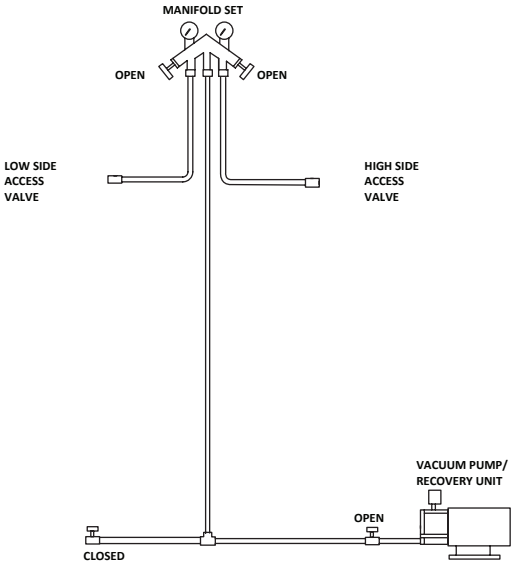
Manifold gauge sets must utilize low loss fittings to comply with U.S. Government rules and regulations.

Make these connections:

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

Self-Contained Recovery/Evacuation

1. Use the 'ICE/OFF/WASH' switch to turn the ice machine off.
2. Install manifold gauges, scale and recovery unit or two-stage vacuum pump and open high and low side on manifold gauges.



RECOVERY/EVACUATION CONNECTIONS

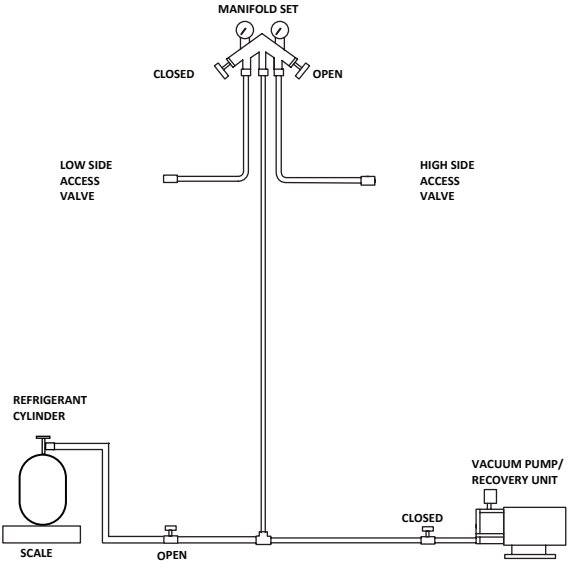
3. Perform recovery or evacuation:
   A. Recovery: Operate the recovery unit as directed by the manufacturer's instructions.
   B. Evacuation prior to recharging: Pull the system down to 500 microns. Turn off the pump and perform a standing vacuum leak check to ensure the micron level does not rise beyond 1,000 microns within 5 minutes.
4. Follow the Charging Procedures.

Self-Contained Charging Procedures

IMPORTANT

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

1. Be sure the ice machine is off.



CHARGING CONNECTIONS

2. Close the vacuum pump valve, the low side service valve, and the low side manifold gauge valve.
3. Open the high side manifold gauge valve.
4. Open the charging cylinder and add the proper refrigerant charge (shown on nameplate) through the discharge service valve.
5. Let the system “settle” for 2 to 3 minutes.
6. Close the high side on the manifold gauge set.
7. Turn the 'ICE/OFF/WASH' switch to 'ICE'.
8. Add any remaining refrigerant through the suction service valve (if necessary).

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

9. Make sure that all of the vapor in the charging hoses is drawn into the ice machine before disconnecting the charging hoses.
    A. Run the ice machine in freeze cycle.
    B. Remove the high side low loss fitting from the access valve.
    C. Open the high and low side valves on the manifold gauge set. Any refrigerant in the lines will be pulled into the low side of the system.
    D. Allow the pressures to equalize while the ice machine is in the freeze cycle.
    E. Remove the hoses from the ice machine and install the caps.

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

REMOTE CONDENSER MODEL PROCEDURE

Refrigerant Recovery/Evacuation

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

IMPORTANT

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

IMPORTANT

Replace the liquid line drier after recovering the refrigerant and before evacuating and recharging. Use only an Icetro (O.E.M.) liquid line filter drier to prevent voiding the warranty.

CONNECTIONS

IMPORTANT

Recovery/evacuation of a remote system requires connections at four points for complete system evacuation.

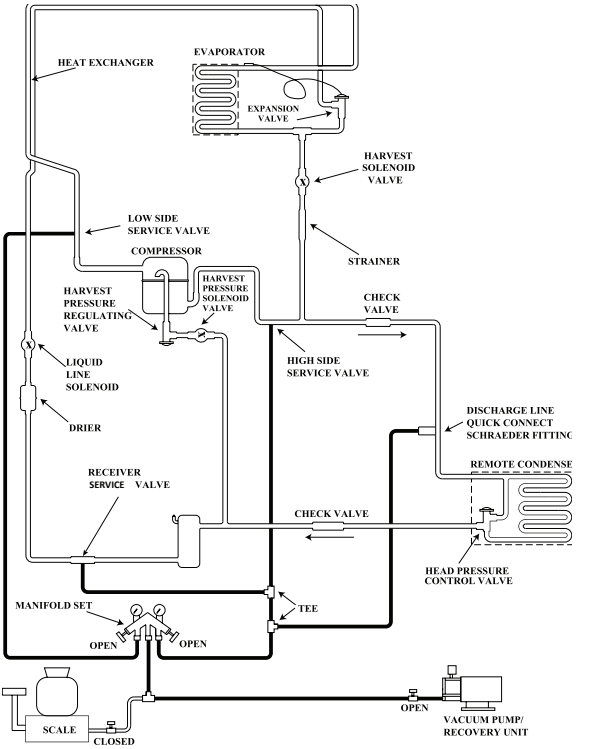
Make these connections:

- Suction side of the compressor through the suction service valve.
- Discharge side of the compressor through the discharge service valve.
- Receiver outlet service valve, which evacuates the area between the check valve in the liquid line and the liquid line solenoid.
- Access (Schraeder) valve on the discharge line quick-connect fitting, located on the outside of the compressor/evaporator compartment. This connection evacuates the condenser. Without it, the magnetic check valves would close when the pressure drops during evacuation, preventing complete evacuation of the condenser.

NOTE: Icetro recommends using an access valve core removal and installation tool on the discharge line quick-connect fitting. This permits access valve core removal. This allows for faster evacuation and charging, without removing the manifold gauge hose.

REMOTE CONDENSER RECOVERY/EVACUATION

1. Use the 'ICE/OFF/WASH' switch to turn the ice machine off.
2. Install manifold gauges, scale and recovery unit or two-stage vacuum pump.
3. Open high and low side on the manifold gauge set.
4. Perform recovery or evacuation:
   A. Recovery: Operate the recovery unit as directed by the manufacturer's instructions.
   B. Evacuation prior to recharging: Pull the system down to 500 microns. Turn off the pump and perform a standing vacuum leak check to ensure the micron level does not rise beyond 1,000 microns within 5 minutes.
5. Follow the Charging Procedures.



REMOTE RECOVERY/EVACUATION CONNECTIONS

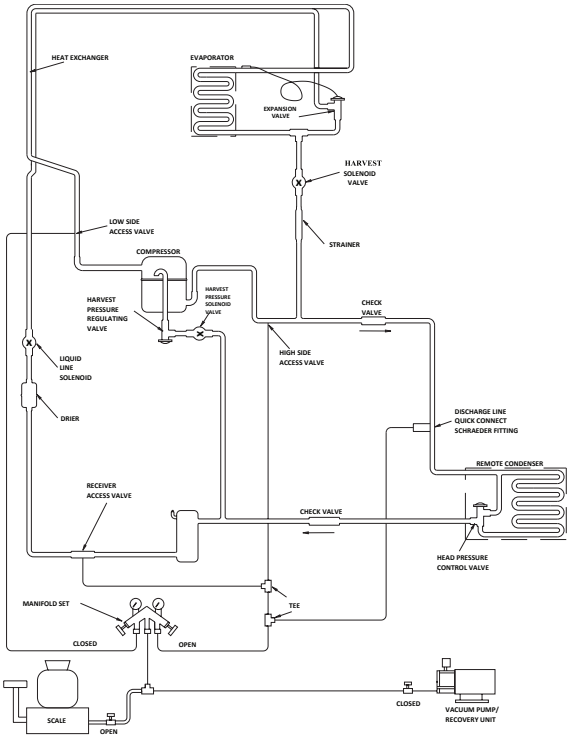
Remote Charging Procedures

1. Close the vacuum pump valve and the low side manifold gauge valve.
2. Open the refrigerant cylinder and add the proper refrigerant charge (shown on nameplate) into the system high side (receiver outlet valve and discharge lines quick-connect fitting).
3. If the high side does not take the entire charge, close the high side on the manifold gauge set and start the ice machine. Add the remaining refrigerant through the low side until the machine is fully charged.

NOTE: If an access valve core removal and installation tool is used on any of the Schrader valves, reinstall the cores before disconnecting the access tool and hose.

4. Remove the high side low loss fitting from the access valve.
5. Open the high and low side valves on the manifold gauge set. Any refrigerant in the lines will be pulled into the low side of the system.
6. Allow the pressures to equalize while the ice machine is in the freeze cycle.
7. Remove the low side hose from the access valve and install the caps.

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



REMOTE CHARGING CONNECTIONS

System Contamination Clean-Up

General

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

iMPORTANT

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

DETERMINING SEVERITY OF CONTAMINATION

System contamination is generally caused by either moisture or residue from compressor burnout entering the refrigeration system.

Inspection of the refrigerant usually provides the first indication of system contamination. Obvious moisture or an acrid odor in the refrigerant indicates contamination.

If either condition is found, or if contamination is suspected, use a Total Test Kit from Totaline or a similar diagnostic tool. These devices sample refrigerant, eliminating the need to take an oil sample. Follow the manufacturer's directions.

If a refrigerant test kit indicates harmful levels of contamination, or if a test kit is not available, inspect the compressor oil.

1. Remove the refrigerant charge from the ice machine.
2. Remove the compressor from the system.
3. Check the odor and appearance of the oil.
4. Inspect open suction and discharge lines at the compressor for burnout deposits.
5. If no signs of contamination are present, perform an acid oil test.

Check the chart on the next page to determine the type of cleanup required.

Contamination Cleanup Chart	
Symptoms/Findings	**Required Cleanup Procedure**
No symptoms or suspicion of contamination.	Normal evacuation/ recharging procedure
Moisture/Air Contamination symptoms. Refrigeration system open to atmosphere for longer than 15 minutes. Refrigeration test kit and/or acid oil test shows contamination. Leak in water cooled condenser. No burnout deposits in open compressor lines.	Mild contamination cleanup procedure
Mild Compressor Burnout symptoms. Oil appears clean but smells acrid. Refrigeration test kit or acid oil test shows harmful acid content. No burnout deposits in open compressor lines.	Mild contamination cleanup procedure
Severe Compressor Burnout symptoms. Oil is discolored, acidic, and smells acrid. Burnout deposits found in the compressor, lines, and other components.	Severe contamination cleanup procedure

CLEANUP PROCEDURE Mild

System Contamination

1. Replace any failed components.
2. If the compressor is good, change the oil.
3. Replace the liquid line drier.

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

4. Follow the normal evacuation procedure, except replace the evacuation step with the following:
   A. Pull vacuum to 1000 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of 5 psig (35 kPa,.35 bar).
   B. Pull vacuum to 500 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of 5 psig (35 kPa,.35 bar).
   C. Change the vacuum pump oil.
   D. Pull vacuum to 500 microns. Run the vacuum pump for an additional 1/2 hour on self-contained models, 1 hour on remotes.

NOTE: You may perform a standing vacuum test to make a preliminary leak check. You should use an electronic leak detector after system charging to be sure there are no leaks.

5. Charge the system with the proper refrigerant to the nameplate charge.
6. Operate the ice machine.

Severe System Contamination

1. Remove the refrigerant charge.
2. Remove the compressor and inspect the refrigeration lines. If burnout deposits are found, install a new hot gas valve, replace the manifold strainer, TXV and HPR valve.
3. Wipe away any burnout deposits from suction and discharge lines at compressor.
4. Sweep through the open system with dry nitrogen.

IMPORTANT

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

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

IMPORTANT

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

9. Follow the normal evacuation procedure, except replace the evacuation step with the following:
    A. Pull vacuum to 1000 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of 5 psig (35 kPa,.35 bar).
    B. Change the vacuum pump oil.
    C. Pull vacuum to 500 microns. Break the vacuum with dry nitrogen and sweep the system. Pressurize to a minimum of 5 psig (35 kPa,.35 bar).
    D. Change the vacuum pump oil.
    E. Pull vacuum to 500 microns. Run the vacuum pump for an additional 1/2 hour on self-contained models, 1 hour on remotes.

NOTE: You may perform a standing vacuum test to make a preliminary leak check. You should use an electronic leak detector after system charging to be sure there are no leaks.

10. Charge the system with the proper refrigerant to the nameplate charge.
11. Operate the ice machine for one hour. Then, check the pressure drop across the suction line filter-drier.
    A. If the pressure drop is less than 1 psig (7 kPa,.7 bar), the filter-drier should be adequate for complete cleanup.
    B. If the pressure drop exceeds 1 psig (7 kPa,.7 bar), change the suction line filter-drier and the liquid line drier. Repeat until the pressure drop is acceptable.
12. Operate the ice machine for 48-72 hours. Then remove the suction line drier and change the liquid line drier.
13. Follow normal evacuation procedures.

REPLACING PRESSURE CONTROLS WITHOUT REMOVING REFRIGERANT CHARGE

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

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

IMPORTANT
This is a required in-warranty repair procedure.

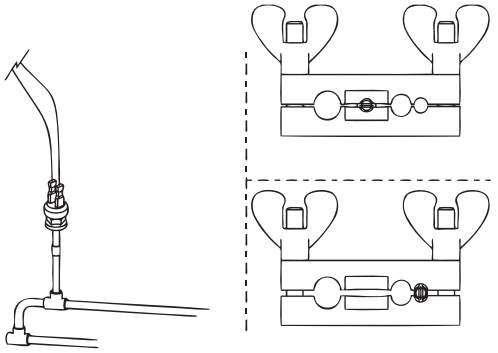
1. Disconnect power to the ice machine.
2. Follow all manufacturer's instructions supplied with the pinch-off tool. Position the pinch-off tool around the tubing as far from the pressure control as feasible. (See the figure on next page.) Clamp down on the tubing until the pinch-off is complete.

Warning

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

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

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



USING PINCH-OFF TOOL

LIQUID LINE FILTER-DRIERS

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

The size of the filter-drier is important. The refrigerant charge is critical. Using an improperly sized filter-drier will cause the ice machine to be improperly charged with refrigerant.

IMPORTANT

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

TOTAL SYSTEM REFRIGERANT CHARGE

This information is for reference only. Refer to the ice machine serial number tag to verify the system charge. Serial plate information overrides information listed on these pages.

Model	Air Cooled	Water Cooled	Remote	Additional Refrigerant for Line Sets 51'-100'	Maximum System Charge
IM0350	26.5 oz.	NA	NA	NA	NA
IM0350-22	25.7 oz.	NA	NA	NA	NA
IM0460	24.7 oz.	19.4 oz.	NA	NA	NA
IM0460-22	25.4 oz.	NA	NA	NA	NA
IM0550	24.7 oz.	22.9 oz.	NA	NA	NA
IM0550-22	28.2 oz.	NA	NA	NA	NA
IM0680	41.3 oz	NA	NA	NA	NA
IM0750	41.3 oz.	NA	NA	NA	NA
IM1100	60.3 oz.	39.9 oz.	183.4 oz.	32 oz.	215.4 oz.
IM1700	73.01 oz.	42.3 oz.	292.8oz.	32 oz.	324.8 oz.
IM2000	77.6 oz.	52.9 oz.	299.8 oz.	32 oz.	333.8 oz.

THIS PAGE INTENTIONALLY LEFT BLANK

Charts

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

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

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

- Production and cycle times are for dice cube - Half dice cube cycle times can be 2 - 3 minutes faster, depending on model and ambient temperature.
- Ice production checks that are within 10% of the chart are considered normal. This is due to variances in water and air temperature. Actual temperatures will seldom match the chart exactly.
- Zero out manifold gauge set before obtaining pressure readings to avoid misdiagnosis.
- Discharge and suction pressure are highest at the beginning of the cycle. Suction pressure will drop throughout the cycle. Verify the pressures are within the range indicated.
- Record beginning of freeze cycle suction pressure one minute after water pump energizes.

IM0350 SERIES

IM0350A(22)

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Model					
IM-0350-AC/AH	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	391.3	367.1	292.3	219.6
	Freeze Cycle Time(min)	16	16.9	23.3	31.6
	Defrost Cycle Time(min)	1.4	1.2	0.9	0.8
	1 Cycle Time(min)	17.4	18.1	24.2	32.3
	Electric Consumption(W)	720	730	770	800
	Head Pressure[Peak] (psig)	251	253	272	321
	Suction Pressure Peak (psig)	28	29	29	31
	Evaporator Inlet Temp.(F)	11.3	7	8.4	8.4

Model					
IM-0350-AC/AH-22	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	381	394	311	239
	Freeze Cycle Time(min)	10.9	12.2	16.7	21.7
	Defrost Cycle Time(min)	2.7	1.3	0.7	0.6
	1 Cycle Time(min)	13.6	13.5	17.4	22.3
	Electric Consumption(W)	700	750	810	820
	Head Pressure[Peak] (psig)	206	224	298	341
	Suction Pressure Peak (psig)	25	30	32	37
	Evaporator Inlet Temp.(F)	12.2	14	14	14

IM0460 SERIES

IM0460A(22)

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Model	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
IM-0460-AC/AH	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	469	444	363	267
	Freeze Cycle Time(min)	11.3	13.7	19.6	24.7
	Defrost Cycle Time(min)	2	1.7	0.8	0.6
	1 Cycle Time(min)	13.3	15.5	20.4	25.3
	Electric Consumption(W)	700	730	800	860
	Head Pressure[Peak] (psig)	222	226	280	340
	Suction Pressure Peak (psig)	30	29	30	33
	Evaporator Inlet Temp.(F)	13	11.1	10.6	10.4

Model	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
IM-0460-AC/AH-22	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	465	443	327	253
	Freeze Cycle Time(min)	10.3	10.8	14.8	18.9
	Defrost Cycle Time(min)	1.2	1.1	0.7	0.6
	1 Cycle Time(min)	11.5	11.9	15.5	19.6
	Electric Consumption(W)	790	820	870	990
	Head Pressure[Peak] (psig)	230	233	283	335
	Suction Pressure Peak (psig)	30	31	35	35
	Evaporator Inlet Temp.(F)	13.6	14.5	15.8	15.4

IM0460 SERIES

IM0460W

Self-Contained Water-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Model	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
IM-0460-WC/WH	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	488	463	405	382
	Freeze Cycle Time(min)	13.7	13.6	16	18
	Defrost Cycle Time(min)	0.8	1	0.9	0.7
	1 Cycle Time(min)	14.5	14.6	16.9	18.7
	Electric Consumption(W)	730	730	750	760
	Head Pressure[Peak] (psig)	273	273	279	280
	Suction Pressure Peak (psig)	33	34	34	35
	Evaporator Inlet Temp.(F)	15.6	16.7	13.3	13.3

IM0550 SERIES

IM0550A(22)

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

<u>CYCLE TIMES</u>

Model	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
IM-0550-AC/AH	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	585	551	399	315
	Freeze Cycle Time(min)	12.2	13.1	19.3	25.5
	Defrost Cycle Time(min)	1.4	1.1	0.7	0.5
	1 Cycle Time(min)	13.6	14.2	20	26
	Electric Consumption(W)	820	870	960	1020
	Head Pressure[Peak] (psig)	224	224	284	327
	Suction Pressure Peak (psig)	24	25	26	27
	Evaporator Inlet Temp.(F)	10.2	9.1	7	5.7

Model	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
IM-0550-AC/AH-22	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	475	508	383	301
	Freeze Cycle Time(min)	8.9	9.6	13.2	16.3
	Defrost Cycle Time(min)	2.6	1.1	0.7	0.6
	1 Cycle Time(min)	11.5	10.7	13.9	17.2
	Electric Consumption(W)	800	880	970	1030
	Head Pressure[Peak] (psig)	197	224	300	351
	Suction Pressure Peak (psig)	20	26	27	30
	Evaporator Inlet Temp.(F)	11.3	14.7	11.7	13.5

IM0550 SERIES

IM0550W

Self-Contained Water-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Model	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
IM-0550-WC/WH	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	552	548	483	433
	Freeze Cycle Time(min)	12.6	12.5	14.9	16.6
	Defrost Cycle Time(min)	0.7	0.7	0.7	0.6
	1 Cycle Time(min)	13.3	13.2	15.5	17.2
	Electric Consumption(W)	880	890	890	910
	Head Pressure[Peak] (psig)	265	267	268	280
	Suction Pressure Peak (psig)	27	28	27	28
	Evaporator Inlet Temp.(F)	12.4	12	9.1	9.2

IM0680/0750 SERIES

IM0680/0750A

Self-Contained Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Model	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
IM-0750-AC/AH	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	794	736	575	463
	Freeze Cycle Time(min)	8.3	8.9	12.2	15.8
	Defrost Cycle Time(min)	0.8	0.8	0.6	0.5
	1 Cycle Time(min)	9.1	9.7	12.8	16.3
	Electric Consumption(W)	1250	1290	1370	1410
	Head Pressure[Peak] (psig)	250	253	294	335
	Suction Pressure Peak (psig)	22	23	26	28
	Evaporator Inlet Temp.(F)	11.8	8.2	9	7

IM1100 SERIES

IM1100A/W

Self-Contained Air and Water-Cooled Models Characteristics vary depending on operating conditions.

<u>CYCLE TIMES</u>

Model					
IM-1100-AC/AH	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	1198	1105	872	710
	Freeze Cycle Time(min)	10.2	11.4	15	18.7
	Defrost Cycle Time(min)	0.9	0.9	0.5	0.5
	1 Cycle Time(min)	11.1	12.3	15.6	19.1
	Electric Consumption(W)	1650	1720	1820	1880
	Head Pressure[Peak] (psig)	233	248	313	365
	Suction Pressure Peak (psig)	21	21	24	26
	Evaporator Inlet Temp.(F)	6.6	7.5	6.3	6.3

Model					
IM-1100-WC/WH	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	1044	1036	1003	721
	Freeze Cycle Time(min)	10.2	10.3	11.3	14.8
	Defrost Cycle Time(min)	1.6	1.6	1	1
	1 Cycle Time(min)	11.7	11.9	12.3	15.8
	Electric Consumption(W)	1660	1660	1710	1790
	Head Pressure[Peak] (psig)	290	281	274	342
	Suction Pressure Peak (psig)	25	25	26	30
	Evaporator Inlet Temp.(F)	8.6	8.2	8.6	8.6

IM1100 SERIES

IM1100R

Remote Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Model	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
IM-1100-RC/RH	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	1103	1081	970	823
	Freeze Cycle Time(min)	10.7	10.7	12.4	14.3
	Defrost Cycle Time(min)	0.9	0.9	0.9	0.8
	1 Cycle Time(min)	12	12	13.2	15.1
	Electric Consumption(W)	1880	1880	1900	1970
	Head Pressure[Peak] (psig)	233	236	264	292
	Suction Pressure Peak (psig)	22	22	23	25
	Evaporator Inlet Temp.(F)	0	0	1	1.4

IM1700 SERIES

IM1700A/W

Self-Contained Air and Water-Cooled Models Characteristics vary depending on operating conditions.

<u>CYCLE TIMES</u>

Model	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
IM-1700AH/AC	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	1788	1747	1398	1147
	Freeze Cycle Time(min)	10.4	10.8	14.3	16.9
	Defrost Cycle Time(min)	1.1	1.0	0.8	0.7
	1 Cycle Time(min)	11.6	11.8	15.1	17.6
	Electric Consumption(W)	2420	2540	2700	2940
	Head Pressure[Peak] (psig)	331.9	336.0	390.5	449.6
	Suction Pressure Peak (psig)	36.5	38.0	39.3	44.3
	Evaporator Inlet Temp.(F)	-5.08	-3.1	-2.38	1.94

Model	Ambient Temp(C/F)	10/50	21/70	27/81	32/90	38/100
IM-1700-WH	WATER Temp(C/F)	10/50	10/50	21/70	21/70	32/90
	Ice Production(lb/d)	1,989.2	2,005.8	1,837.6	1,821.0	1,586.7
	Freeze Cycle Time(min)	9.1	8.7	9.7	9.9	10.6
	Defrost Cycle Time(min)	1.4	1.3	1.1	1.1	0.8
	1 Cycle time(min)	10.5	10.0	10.9	11.0	11.4
	Electric Consumption(W)	2,157	2,237	2,217	2,207	2,373
	High pressure(peak) psig	322	322.8	331.0	334.0	390.0
	Suction pressure(peak) psig	38.0	39.8	38.5	39.0	57.4
	Evaporator inlet Temp(F)	-5.1	-4.7	-6.5	-6.9	-18.8

IM1700 SERIES

IM1700R

Remote Air-Cooled Model

Characteristics vary depending on operating conditions.

<u>CYCLE TIMES</u>

Model	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
IM-1700-RH/RC	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	1726	1767	1557	1345
	Freeze Cycle Time(min)	9.7	10	12	14
	Defrost Cycle Time(min)	2	1.6	1.3	1.2
	1 Cycle Time(min)	11.7	11.5	13.3	15.2
	Electric Consumption(W)	2230	2280	2360	2460
	Head Pressure[Peak] (psig)	330	350.5	396.8	454.5
	Suction Pressure Peak (psig)	114.2	118.1	38	41.6
	Evaporator Inlet Temp.(F)	-2.02	-2.56	-2.2	0.32

IM2000 SERIES

IM2000A/W

Self-Contained Air and Water-Cooled Models Characteristics vary depending on operating conditions.

CYCLE TIMES

Model					
IM-2000AH/AC	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	2058	2032	1708	1397
	Freeze Cycle Time(min)	8.4	9.0	11.4	13.8
	Defrost Cycle Time(min)	1.4	1.1	0.7	0.7
	1 Cycle Time(min)	9.8	10.1	12.1	14.6
	Electric Consumption(W)	2970	3050	3.370	3.680
	Head Pressure[Peak] (psig)	338.3	340.6	406.7	460.2
	Suction Pressure Peak (psig)	33.3	32.9	38.2	39.1
	Evaporator Inlet Temp.(F)	-5.98	-7.06	-1.66	-2.2

Model						
IM-2000-WH	Ambient Temp(C/F)	10/50	21/70	27/81	32/90	38/100
	WATER Temp(C/F)	10/50	10/50	21/70	21/70	32/90
	Ice Production(lb/d)	1,989.2	2,005.8	1,837.6	1,821.0	1,586.7
	Freeze Cycle Time(min)	9.1	8.7	9.7	9.9	10.6
	Defrost Cycle Time(min)	1.4	1.3	1.1	1.1	0.8
	1 Cycle time(min)	10.5	10.0	10.9	11.0	11.4
	Electric Consumption(W)	2,157	2,237	2,217	2,207	2,373
	High pressure(peak) psig	322	322.8	331.0	334.0	390.0
	Suction pressure(peak) psig	38.0	39.8	38.5	39.0	57.4
	Evaporator inlet Temp(F)	-5.1	-4.7	-6.5	-6.9	-18.8

IM2000 SERIES

IM2000R

Remote Air-Cooled Model

Characteristics vary depending on operating conditions.

CYCLE TIMES

Model	Ambient Temp.(C/F)	10/50	21/70	32/90	38/100
IM-2000-RH/RC	Water Temp.(C/F)	10/50	10/50	21/70	32/90
	Ice Production(lb/d)	1907	1943	1714	1499
	Freeze Cycle Time(min)	9.2	8.7	10.5	12.4
	Defrost Cycle Time(min)	1.5	1.4	1.2	1.1
	1 Cycle Time(min)	10.4	10.1	11.7	13.5
	Electric Consumption(W)	2740	2780	2890	3010
	Head Pressure[Peak] (psig)	334.7	359.1	401.6	449.5
	Suction Pressure Peak (psig)	39.9	39	39.2	42
	Evaporator Inlet Temp.(F)	-0.4	-0.94	6.4	8.4

THIS PAGE INTENTIONALLY LEFT BLANK

Diagrams

Wiring Diagrams

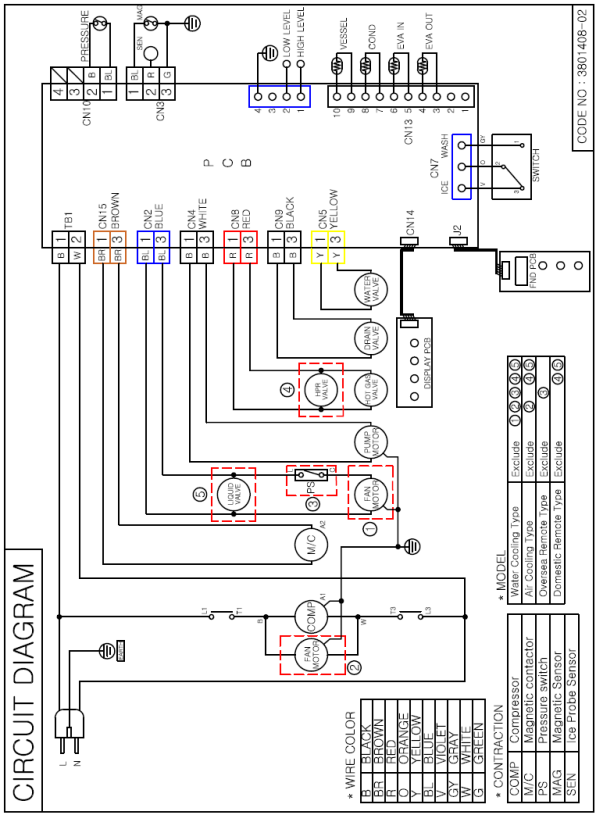
The following page contains an electrical wiring diagram.

Warning

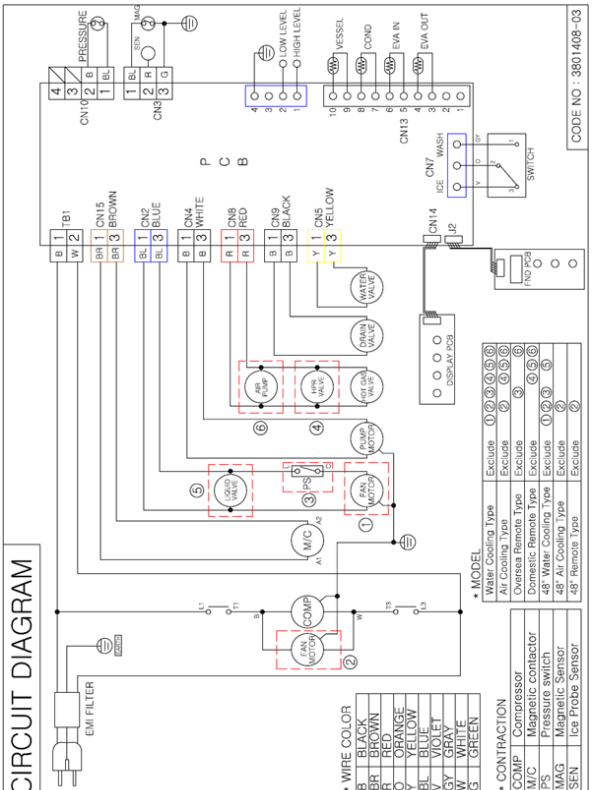
Always disconnect power before working on electrical circuitry.

Not all components are included on every machine. Please verify your model number to when using the diagram on the next page.

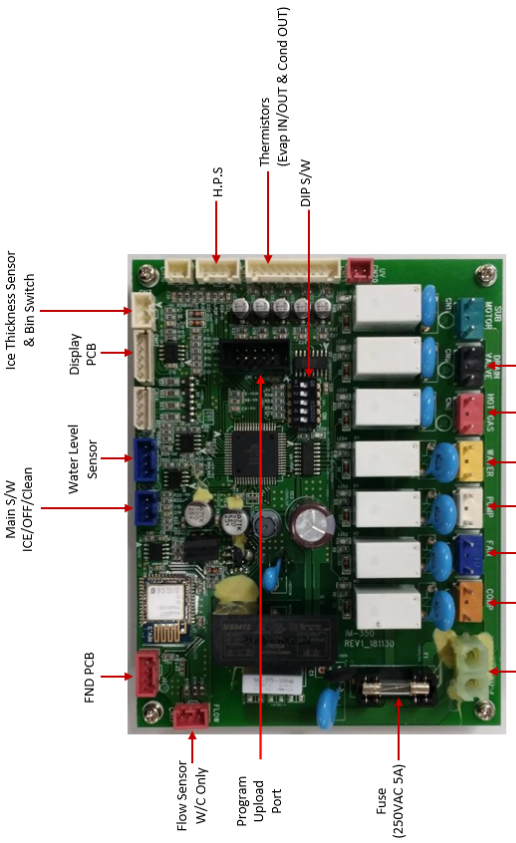
Wiring Diagram
IM0350, IM0460, IM0550, IM0750, IM1100



Wiring Diagram
IM1700 & IM2000



PCB Layout


H.P.S
Thermistors
(Evap IN/OUT & Cond OUT)
DIP S/W
Ice Thickness Sensor
& Bin Switch
Display
PCB
Water Level
Sensor
Main S/W
ICE/OFF/Clean
FND PCB
Flow Sensor
W/C Only
Program
Upload
Port
Fuse
(250VAC 5A)
Main Power
(AC 85~265V)
COMP
COND
PUMP
WATER
HOT GAS
DRAIN

Switches will be upside-down when facing the PCB

Turning dip switches down will put them in the "ON" position!

5	4	Descriptions
ON	ON	IM-0350/0460/0550-22 Series(22")
OFF	ON	IM-1100 Series
ON	OFF	IM-1100/1700/2000 Remote IM-1700/2000(48") Air/Water Cooled
OFF	OFF	IM-0350/0460 /0550/0680 Series(30")

3	Descriptions
ON	Air cooled
OFF	Water cooled

2	Descriptions
ON	Use drain function
OFF	Do not use drain function (All the drain time : OFF)

1	Descriptions
ON	Drain after harvest
OFF	Drain after ice making

Initial Dump: Basic Process

1) It only works at the beginning of the first "ice making" cycle.
2) Check the water level sensor and operate the dump valve and water pump in case of high-water level.
3) When the low level is detected, the dump valve and the water pump are stopped.
4) The maximum drain time is 30 seconds.
5) After the initial drainage is completed, the water supply enters operation.

Model	Initial drain time	Drain after harvest	Drain after ice making	Water supply delay time	Pump stop time during ice making	Harvest Assist Temperature
22" , 30", 48" Series	20s	10s	10s	0s	0s	0°C
IM-1100W	20s	30s	10s	0s	0s	0°C


IM-0460/0550 Water Cooled


IM-0350/0460 0550-22 (22") Water Cooled


IM-1100 Water Cooled


IM-1100/1700/2000 Remote
IM-1700/2000 Air Cooled


IM-0350/0460 0550/0680 Air Cooled


IM-0350/0460 0550-22 (22") Air Cooled

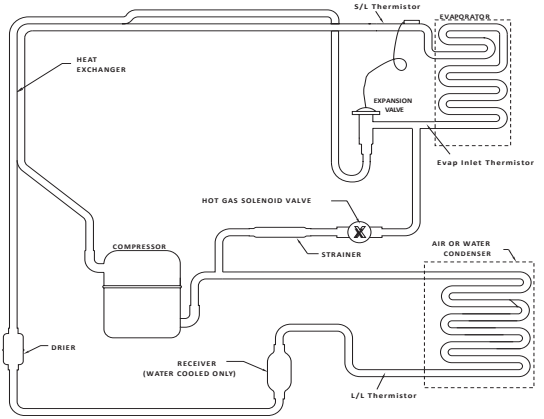

IM-1100 Air Cooled


IM-1700/2000 Water Cooled

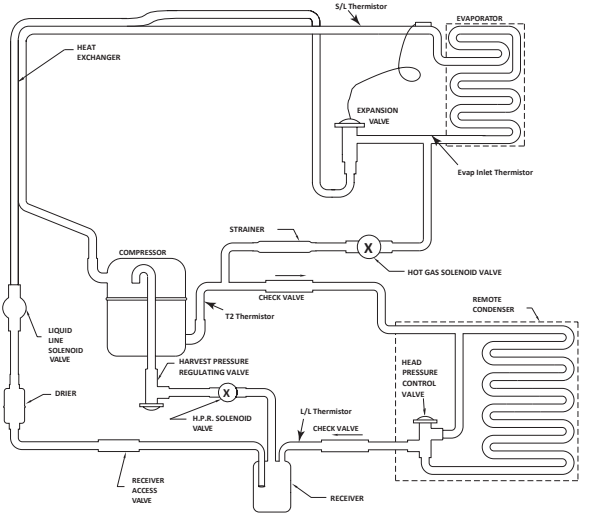
The red squares on the switches indicates the position of the switch.

Refrigeration Tubing Schematics

SELF-CONTAINED AIR OR WATER-COOLED IM0350 - IM1100

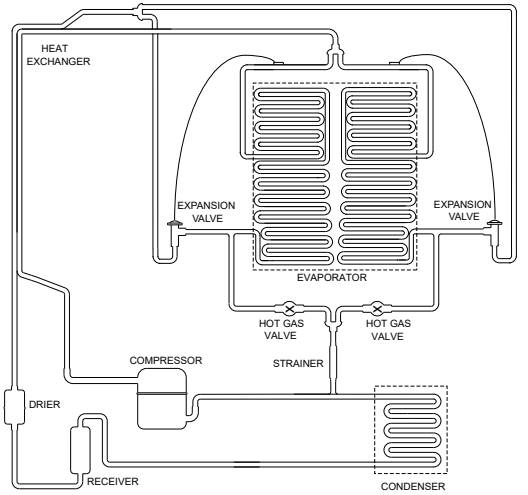


REMOTE CONDENSER MODELS IM1100 ONLY

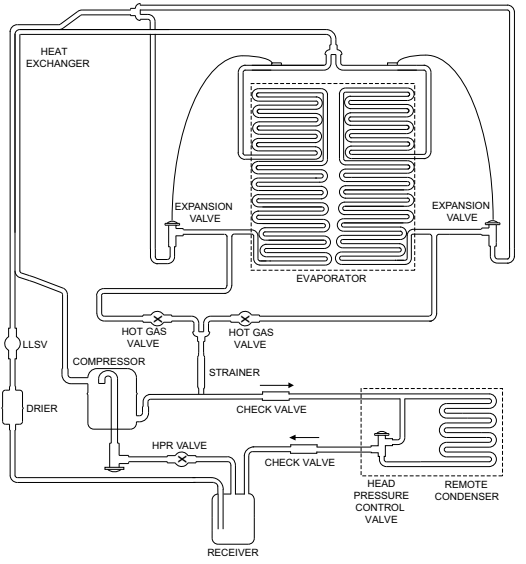


Refrigeration Tubing Schematics

SELF-CONTAINED AIR OR WATER-COOLED IM1700/2000



REMOTE CONDENSER MODELS IM1700/2000



SPACE FOR TECHNICIAN'S NOTES

SPACE FOR TECHNICIAN'S NOTES

SPACE FOR TECHNICIAN'S NOTES

SPACE FOR TECHNICIAN'S NOTES

ICETRO AMERICA
1202 W STRCUK AVE
ORANGE, CA 92867

(714) 215-4864
WWW.ICETROAMERICA.COM