Manitowoc®

NEO™

Undercounter Ice Machines

Technician's Handbook

Part Number 000018622 Rev 00 04/25

Safety Notices

Read these precautions to prevent personal injury:

- Read this manual thoroughly before operating, installing or performing maintenance on the equipment. Failure to follow instructions in this manual can cause property damage, injury or death.
- Routine adjustments and maintenance procedures outlined in this manual are not covered by the warranty.
- Proper installation, care and maintenance are essential for maximum performance and trouble-free operation of your equipment.
- Visit our website www.manitowocice.com for manual updates, translations, or contact information for service agents in your area.
- 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.
- Never use a high-pressure water jet for cleaning on the interior or exterior of this unit. Do not use power cleaning equipment, steel wool, scrapers or wire brushes on stainless steel or painted surfaces.

⚠ 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.
- Remove all removeable panels before lifting and installing and use appropriate safety equipment during installation and servicing. Two or more people are required to lift or move this appliance to prevent tipping and/or injury.
- Do not damage the refrigeration circuit when installing, maintaining or servicing the unit.
- Connect to a potable water supply only.
- This equipment contains refrigerant charge. Installation of the line sets must be performed by a properly trained and EPA certified refrigeration technician aware of the dangers of dealing with refrigerant charged equipment.

Warning

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

- Legs or casters must be installed and the legs/casters must be screwed in completely. When casters are installed the mass of this unit will allow it to move uncontrolled on an inclined surface. These units must be tethered/secured to comply with all applicable codes. Swivel casters must be mounted on the front and rigid casters must be mounted on the rear. Lock the front casters after installation is complete.
- Refer to nameplate to identify the type of refrigerant in your equipment.
- Only trained and qualified personnel aware of the dangers are allowed to work on the equipment.
- Read this manual thoroughly before operating, installing or performing maintenance on the equipment. Failure to follow instructions in this manual can cause property damage, injury or death.
- Crush/Pinch Hazard. Keep hands clear of moving components. Components can move without warning unless power is disconnected and all potential energy is removed.
- Moisture collecting on the floor will create a slippery surface. Clean up any water on the floor immediately to prevent a slip hazard.
- The on-site supervisor is responsible for ensuring that operators are made aware of the inherent dangers of operating this equipment.
- Do not store or use electrical appliances inside the ice machine or ice storage areas.

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.
- Do not damage the refrigeration circuit when installing, maintaining or servicing the unit. Never use sharp objects or tools to remove ice or frost.
- Do not use mechanical devices or other means to accelerate the defrosting process.
- When using cleaning fluids or chemicals, rubber gloves and eye protection (and/or face shield) must be worn.

DANGER

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

⚠ DANGER

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

- Refer to nameplate - ice machine models may contain up to 500 grams of R290 (propane) refrigerant. R290 (propane) is flammable in concentrations of air between approximately 2.1% and 9.5% by volume (LEL lower explosion limit and UEL upper explosion limit). An ignition source at a temperature higher than 470°C is needed for a combustion to occur.
- To minimize the risk of ignition due to improper installation, replacement parts or service procedures, only refrigeration technicians with flammable refrigerant training who are aware of the dangers of dealing with high voltage electricity and refrigerant under pressure are allowed to work on this equipment.
- All replacement parts must be like components obtained from the equipment manufacturers authorized replacement part network.
- This equipment must be installed in accordance with the ASHRAE 15 Safety Standard for Refrigeration Systems.
- This equipment can not be installed in corridors or hallways of public buildings.
- This equipment contains high voltage electricity and refrigerant charge. Shorting electrical wires to refrigeration tubing may result in an explosion. All electrical power must be disconnected from the system before servicing the system. Refrigerant leaks, can result in serious injury or death from explosion, fire, or contact with refrigerant or lubricant mists.

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.

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

Additional Safety Notices for Arctic Pure® Pro Water Filtration Systems

Arctic Pure® Pro Water Filters are manufactured by Pentair Everpure for Manitowoc, 1040 Muirfield Drive, Hanover Park, IL 60133. PH: 630.307.3000

⚠ Warning

DO NOT use with water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system. Systems certified for cyst reduction may be used on disinfected waters that may contain filterable cysts.

⚠ Caution

DO NOT use a torch or other high temperature sources near filter or cartridge. DO NOT solder plumbing connections.

Notice

Passing hot water through the water filter may seriously damage housings and/or cartridges and affect warranty coverage.

Do not disassemble manifold head. No user serviceable parts are available. The entire manifold head is the only available replacement part.

⚠ Caution

If the cartridge is dropped from a height greater than 3 feet (1 m), inspect the outer casing. DO NOT USE if the cartridge case is cracked or if there is any evidence of cracking.

Not for residential use. For foodservice applications only.

The Arctic Pure® Pro water filtration systems are designed to reduce coarse and fine particulate matter from the incoming potable water supply. Chlorine will be reduced in the water so as not to adversely affect the ice produced or the equipment components. Scale inhibitor is automatically fed into the water to inhibit the formation of scale on water solenoids and evaporator plates. The NSF mark indicates that these products have met certification requirements under the NSF/ANSI & CSA standards listed on the Performance Data Sheet.

Check for compliance with state and local laws and regulations. NSF/ANSI Standard 53 certified to reduce cysts such as Cryptosporidium and Giardia by mechanical means. EPA Est. No. 002623-IL-002.

'Bacteriostatic' indicates that the system limits the passage or growth of bacteria that may already exist in the incoming water. It does not mean that water leaving the system is safer to drink than water entering the system.

The contaminants or other substances removed or reduced by this water treatment system are not necessarily in your water.

Arctic Pure® Pro systems are tested and certified by NSF International against; NSF/ANSI 42, 53, 401, and/or CSA B483.1 for the reduction of claims specified on the Performance Data Sheet.

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General Information

Model Numbers

This manual covers the following models:

Self-contained Air-cooled	Self-contained Water-cooled
UD0065A	-
UDE0065A	-
UDP0065A	-
UD0080A	-
UDE0080A	-
UDP0080A	-
U0140A	U0140W
U0140AE	U0140WE
UF0140A	-
UP0140A	-
U0190A	-
U0190AE	-
UF0190A	-
UP0190A	-
U0240A	U0240W
U0240AE	U0240WE
UF0240A	UF0240W
UP0240A	UP0240W
U0310A	U0310W
U0310AE	U0310WE
UF0310A	UF0310W
UP0310A	UP0310W

<u>POWER CORD OPTION:</u>

Z - Cord without Plug

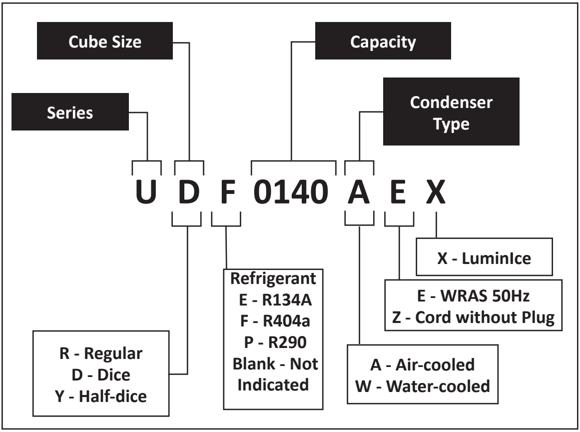
B - NEMA Plug (USA)

F - Schuko Plug (EU)

G- 13A Blade (GBR)

I - Oblique V Blade (AUS)

How to Read a Model Number



⚠ Warning

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

Model/Serial Number Location

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

The model/serial number data plate is located in the refrigeration compartment and on the back of the ice machine.

Warranty

For warranty information visit:

www.manitowocice.com/Service/Warranty

- Warranty Coverage Information
- Warranty Registration
- Warranty Verification

Warranty coverage begins the day the ice machine is installed.

WARRANTY REGISTRATION

Completing the warranty registration process is a quick and easy way to protect your investment.
Scan the QR code with your smart device or enter the link in a web browser to complete your warranty registration.

WWW.MANITOWOCICE.COM/SERVICE/WARRANTY#WARRANTY-REGISTRATION

Registering your product insures warranty coverage and streamlines the process if any warranty work is required.

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

LuminIce® II

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

- LuminIce® bulbs require replacement on a yearly basis.

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

Cleanup Procedure for Accidental Bulb Breakage

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

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

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

Installation

Location of Ice Machine

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

- The location must be indoors and must be free of airborne and other contaminants.
- The location must not be near heat-generating equipment or in direct sunlight and protected from weather.
- Air temperature:
    - 65 Series : Must be at least 50°F (10°C) but must not exceed 110°F (43°C)
    - 80 Series: Must be at least 35°F (2°C) but must not exceed 110°F (43°C)
    - 140/190/240/310 Series : Must be at least 50°F (10°C) but must not exceed 100°F (38°C)
    - The location must not be near heat-generating equipment or in direct sunlight.
- The location must be capable of supporting the weight of the ice machine and a full bin of ice.
- The location must allow enough clearance for water, drain, and electrical connections in the rear of the ice machine.
- The location must not obstruct airflow through or around the ice machine (condenser airflow is in and out the front). Refer to the chart below for clearance requirements.
- The location must not be near garbage or other contaminants.
- The ice machine must be protected if it will be subjected to temperatures below 32°F (0°C). Failure caused by exposure to freezing temperatures is not covered by the warranty.

- Minimum room size required, refer to ice machine label.
- The ice machine must use legs or be sealed to the floor. Before sealing to the floor, the rubber bumpers on the bottom of the ice machine must be removed.
- UP Models: Front Water Filter Panel & Air Filter - The water filter panel must be able to open and swing freely. The air filter and water filter must be able to be replaced from the front. Recommended front clearance of 36” (92 cm) to swing open and replace filters. Do not obstruct.

Installation Requirements

- The ice machine must be level.
- Vent the ice machine drains separately.
- Bin drain termination must have an air gap.
- The ice machine and bin must be de-scaled and sanitized after installation.
- The drain line must contain a union or other suitable means of disconnection at the ice machine.
- The water inlet and electrical connection must contain a service loop to allow future access.
- The location must not allow exhaust fan heat and/or grease to enter the condenser.

Ice Machine Clearance Requirements

	Self-contained Air-cooled	Self-contained Water-cooled
Top/Sides	5" (13 cm)*	5" (13 cm)*
Back	5" (13 cm)*	5" (13 cm)*
Front	36” (165 cm)*	36” (165 cm)*

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

Ice Machine Heat of Rejection

Series Ice Machine	Heat of Rejection*	
	Air Conditioning**	Peak
UDE0065	1600	2350
UDP0065	1600	2350
UDE0080	1750	2600
UDP0080	2050	2500
U0140/UF0140	2400	2900
UP0140	2500	2900
U0190/UF0190	2200	2600
UP0190	3200	3800
U0240/UF0240	2800	3300
UP0240	3700	4400
U0310/UF0310	3800	6000
UP0310	5500	6500

* B.T.U./Hour

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

Use this information when:

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

Leveling the Ice Machine

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

> ⚠ **Caution**
>
> The legs must be screwed in tightly to prevent them from bending.

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

Electrical Requirements

Voltage

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

The 115/1/60 ice machines are factory pre-wired with an 8’ (2.5 m) power cord and NEMA 5-15P-plug configuration.

The 208-230/1/60 and 230/1/50 ice machines are factory pre-wired with an 8’ (2.5 m) power cord only, no plug is supplied.

Fuse/Circuit Breaker

A separate electrical disconnect, which disconnects all poles and has 1/8” (3 mm) contact separation, must be provided for fixed wiring. Circuit breakers must be H.A.C.R. rated in USA.

Minimum Circuit Ampacity

The total circuit ampacity (MCA) is the minimum main power wire size needed to ensure that wiring won’t overheat under any operating conditions.

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

Ground Fault Circuit Interrupter

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

Electrical Specifications

Air-cooled Ice Machines

Ice Machine	Voltage Phase Cycle	Max. Fuse/ Circuit Breaker	Total Amps
UDE0065	115/1/60	15	5.3
	230/1/50	15	5.3
UDP0065	115/1/60	15	2.65
UDE0080	115/1/60	15	6.2
	230/1/50	15	6.2
	230/1/60	15	-
UDP0080	115/1/60	15	4.2
U0140 UF0140	115/1/60	15	5.0
	208-230/1/60	15	2.5
	230/1/50	15	2.5
UP0140	115/1/60	15	5.0
	230/1/50	15	2.5
U0190 UF0190	115/1/60	15	6.0
	208-230/1/60	15	3.0
	230/1/50	15	2.5
UP0190	115/1/60	15	6.0
	230/1/50	15	2.5
U0240 UF0240	115/1/60	15	7.0
	208-230/1/60	15	3.5
	230/1/50	15	4.0
UP0240	115/1/60	15	7.0
	208-230/1/60	15	3.5
	230/1/50	15	3.5
U0310 UF0310	115/1/60	15	10.0
	208-230/1/60	15	4.5
	230/1/50	15	4.5
UP0310	115/1/60	15	8.0
	208-230/1/60	15	5.0
	230/1/50	15	5.0
NOTE: Model/serial plate information overrides all data listed in this chart.			

Water-cooled Ice Machines

Ice Machine	Voltage Phase Cycle	Max. Fuse/ Circuit Breaker	Total Amps
U0240 UF0240	115/1/60	15	7.0
	208-230/1/60	15	4.0
	230/1/50	15	4.0
UP0240	115/1/60	15	6.0
	208-230/1/60	15	3.5
	230/1/50	15	3.0
U0310 UF0310	115/1/60	15	10.0
	208-230/1/60	15	4.5
	230/1/50	15	4.5
UP0310	115/1/60	15	7.0
	208-230/1/60	15	-
	230/1/50	15	-
NOTE: Model/serial plate information overrides all data listed in this chart.			

⚠ Warning

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

⚠ Warning

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

Water Service/Drains

WATER SUPPLY

⚠ Caution

Plumbing must conform to state and local codes.

Important

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

Water Inlet Lines

Follow these guidelines to install water inlet lines:

- Local water conditions may require treatment of the water to inhibit scale formation, filter sediment, and remove chlorine odor and taste.
- • All water and drains must conform to all applicable codes of the authority having jurisdiction. It is the responsibility of the end user to satisfy all local codes.
- Connect ice making water inlet to potable water only.
- Do not connect the ice machine to a hot water supply. Be sure all hot water restrictors installed for other equipment are working. (Check valves on sink faucets, dishwashers, etc.)
- If water pressure exceeds the maximum recommended pressure, 80 psig (5.5 bar) obtain a water pressure regulator.
- Install a water shut-off valve for ice making potable water.
- Insulate water inlet lines to prevent condensation.

Drain Connections

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

- Drain lines must have a 1.5-inch drop per 5 feet of run (2.5 cm per meter), and must not create traps.
- The floor drain must be large enough to accommodate drainage from all drains.
- Run separate bin and ice machine drain lines. Insulate them to prevent condensation.
- Install a tee at the ice making water drain outlet and install an 8.0” (20 cm) vent above the ice making water drain line.
- Drain termination must have an air gap that meets local code.

COOLING TOWER APPLICATIONS

Water-cooled Models Only

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

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

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

Water Temperature & Pressure

140/190/210/310

Location	Water Temperature	Water Pressure
Ice Making Water Inlet	40°F (4°C) min. 90°F (32°C) max.	20 psi (1.4 bar) min. 80 psi (5.5 bar) max.
Condenser Water Inlet	40°F (4°C) min. 90°F (32°C) max.	20 psi (1.4 bar) min. 150 psi (10.3 bar) max.
Condenser Water Drain	110°F (43.3°C) max.	—

UDE0065/UDP0065

Location	Water Temperature	Water Pressure
Ice Making Water Inlet	50°F (10°C) min. 86°F (30°C) max.	35 psi (2.4 bar) min. 90 psi (6.2 bar) max.

UDE0080/UDP0080

Location	Water Temperature	Water Pressure
Ice Making Water Inlet	33°F (0.6°C) min. 90°F (32°C) max.	20 psi (1.4 bar) min. 80 psi (5.5 bar) max.

Water Connection Sizes

140/190/210/310

Location	Ice Machine Fitting - Female Pipe Thread	Tubing Size to Ice Machine Fitting Inside Diameter
Ice Making Water Inlet	3/8” (9.5 mm)	3/8" (9.5 mm) min.
Ice Making Water Drain	1/2” (13 mm)	1/2” (13 mm)
Condenser Water Inlet	3/8” (9.5 mm) *U310 only*: 1/2” (13 mm)	3/8" (9.5 mm) min. *U310 only:* 1/2” (13 mm) min.
Condenser Water Drain	1/2” (13 mm) min.	1/2” (13 mm) min.
Bin Drain	1/2” (13 mm) min.	1/2” (13 mm) min.

UDE0065/UDP0065

Location	Ice Machine Fitting	Tubing Size to Ice Machine Fitting Inside Diameter
Ice Making Water Inlet	3/4” (9.5 mm)	3/8" (9.5 mm) min.
Ice Making Water Drain	5/8” (16 mm)	5/8” (16 mm) min.
Bin Drain	5/8” (16 mm)	5/8” (16 mm) min.

UDE0080/UDP0080

Location	Ice Machine Fitting	Tubing Size to Ice Machine Fitting Inside Diameter
Ice Making Water Inlet	3/8” (9.5 mm)	3/8" (9.5 mm) min.
Ice Making Water Drain	5/8” (16 mm)	5/8” (16 mm) min.
Bin Drain	5/8” (16 mm)	5/8” (16 mm) min.

Water Filter

UP0140/UP0190/UP0240/UP0310

SPECIFICATIONS

Pressure: 10 - 125 psi (69 - 862 kPa)

Temperature: 35 - 100°F (1.6 - 38°C)

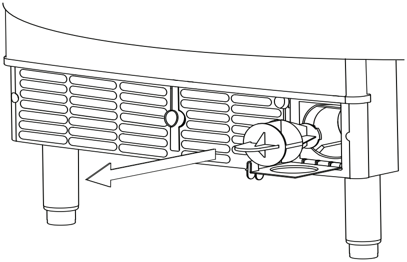
Replacement Cartridges:

Model	Rated Flow	Sediment Reduction	Reduction Capacity
K00530 **K00532**	0.32 gpm (1.2 lpm)	5.0 micron	4,000 g (15,142 l)
K00531	0.32 gpm (1.2 lpm)	0.5 micron	4,000 g (15,142 l)

Incoming water does not need to be turned off for installation and/or removal of the water filter. This system is equipped with a built-in bypass when the water filter is removed.

INSTALLATION

1. Press the On/Off button for 3 seconds to turn off the ice machine.
2. Open the water filter panel. Remove water filter manifold plug by turning left. The plug is factory installed to keep dirt out of the machine. Do not discard.

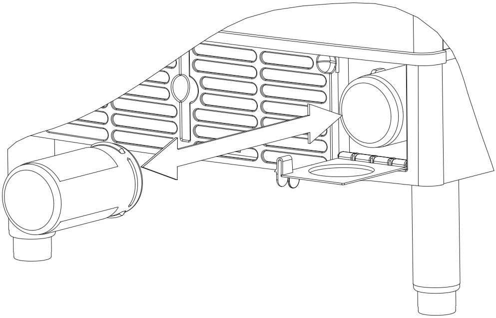


Water Filter Manifold Plug

3. Remove cap from top of new cartridge.
4. Insert new cartridge into water filter manifold. Turn cartridge to the right, until it firmly stops to lock the water filter into position.
5. Close the Water Filter panel and power on the unit.
6. Press the Water Filter button for 4 seconds to initiate a flush sequence. This will energize the water inlet valve and dump valve for 5 minutes and reset the water filter replacement light.
7. Power off unit and restart to begin a new fill sequence and ice making cycle.

REMOVAL

1. Turn cartridge slowly to the left, until it releases. At this position, both inlet and outlet ports are closed and water pressure has been relieved.
2. Remove and discard the cartridge. There may be a small amount of residual water drainage after pressure is relieved and during cartridge removal.



Water Filter Removal

3. Follow Water Filter - Installation to install a new water filter.
4. If a new water filter is not immediately available, install water filter manifold plug until a new water filter is available.

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Maintenance

De-scaling and Sanitizing

GENERAL

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

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

De-scale and sanitize the ice machine every six months for efficient operation. If the ice machine requires more frequent de-scaling 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 de-scaling and sanitizing.

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

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

ICE MACHINE INSPECTION

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

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

EXTERIOR CLEANING

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

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

The exterior panels have a clear coating that is stain resistant and easy to clean. Products containing abrasives will damage the coating and scratch the panels.

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

REMEDIAL DE-SCALING PROCEDURE

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

DETAILED DE-SCALING/SANITIZING PROCEDURE

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

- The ice machine and bin must be disassembled de-scaled and sanitized.
- All ice produced during the de-scaling and sanitizing procedures must be discarded.

⚠ Caution

Use only Manitowoc approved Ice Machine De-scaler and Sanitizer for this application (Manitowoc De-scaler part number 9405463 and Manitowoc Sanitizer part number 9405653). Do not use de-scaler or sanitizer quantities that exceed the amounts listed in this manual. It is a violation of Federal law to use these solutions in a manner inconsistent with their labeling. Read and understand all labels printed on bottles before use.

TOUCH PAD OPERATION

140/190/240/310

When the ice machine is Off, press and hold the Clean button for 3 seconds starts the clean cycle. The Clean and On/Off lights energize indicating the clean cycle has started and ice making will automatically start when the clean cycle is complete.

- **Setting the ice machine to stop after the clean cycle:** Press the On/Off button. The On/Off light will de-energize, indicating the ice machine will stop after the clean cycle.
- **Pausing the clean cycle:** Press the Clean button. The clean light will flash indicating the clean cycle has paused. Pressing the Clean button again will restart the clean cycle.

NOTE: If the ice damper is open for 2 seconds, the clean cycle will pause. If the damper is open for 30 seconds, the clean cycle will be canceled.

Detailed De-scaling and Sanitizing Procedure

140/190/240/310

(See page 58 for UD0065 Series and page 66 for UD0080 Series)

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

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

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

- Press the On/Off button for 3 seconds at the end of a harvest cycle after ice falls from the evaporator.
- Press the On/Off button for 3 seconds and allow the ice to melt.

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

Step 2 Remove all ice from the bin.

> ⚠ **Warning**
>
> Wear rubber gloves and safety goggles (and/or face shield) when handling Ice Machine De-scaler or Sanitizer.

> ⚠ **Caution**
>
> Do not mix Ice Machine De-scaler and Sanitizer solutions together. It is a violation of Federal law to use these solutions in a manner inconsistent with their labeling.

DE-SCALING PROCEDURE

Step 3 Press the Clean button. Water will flow through the water dump valve and down the drain. Wait approximately 1 minute until the water trough refills. Add the proper amount of ice machine de-scaler to the water trough.

Model	Amount of De-scaler #9405463
140	2 ounces (60 ml)
190/240/310	5 ounces (150 ml)

Step 4 Wait until the cycle is complete (approximately 24 minutes). Then press the On/Off button and disconnect power to the ice machine.

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

Step 5 Remove parts for de-scaling.
Refer to the proper parts removal for your machine.
Continue with step 6 when the parts have been removed.

Step 6 Mix a solution of de-scaler 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 de-scale all parts.

Solution Type	Water	Mixed with
De-scaler #9405463	1 gal (4 L)	16 oz (475 ml) de-scaler

> **⚠ Caution**
>
> Do not immerse electrical connectors or motors for any components in water, de-scaler or sanitizer solutions.

Step 7 Use half of the de-scaler & water mixture to de-scale all components. Use caution not to expose electrical connectors to liquid and soak parts for 5 minutes (15 - 20 minutes for heavily scaled parts). The 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 de-scale the parts. When de-scaling is complete rinse all removed components with clean water.

Step 8 While components are soaking, use half of the solution to de-scale all food zone surfaces of the ice machine and bin (or dispenser). Use a nylon brush or cloth to thoroughly de-scale the following ice machine areas:

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

Rinse all areas thoroughly with clean water.

SANITIZING PROCEDURE

NOTE: Sanitizing can be performed independently and more frequently than de-scaling when needed.

Step 9 Mix a solution of sanitizer and warm water.

Solution Type	Water	Mixed With
Sanitizer #9405653	3 gal (12 L)	2 oz (60 ml) sanitizer

Step 10 UUse half of the sanitizer/water solution to sanitize all removed components. Fill a spray bottle and use caution not to expose electrical connectors to liquid and 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 half of the sanitizer/water solution to sanitize all food zone surfaces of the ice machine and bin. 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

Do not rinse the sanitized areas.

Step 12 Replace all removed components back into their original configuration and wait 20 minutes.

Step 13 Reapply power and press the Clean button. Water will flow through the water dump valve and down the drain. Wait approximately 1 minute until the water trough refills. Add the proper amount of ice machine sanitizer to the water trough.

Model	Amount of Sanitizer Part Number 9405653
140	1 oz (30 ml)
190/240/310	2 oz (60 ml)

Step 14 Close and secure all panels and bin door. The ice machine will automatically start ice making after the sanitize cycle is complete (approximately 24 minutes).

Remove Parts for De-scaling and Sanitizing

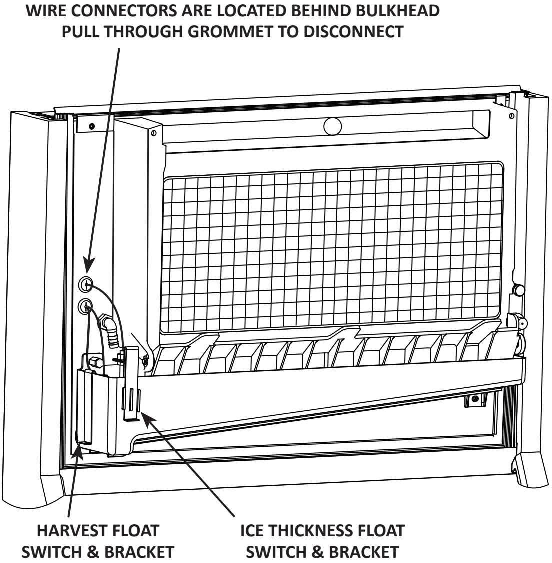
⚠ Warning

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

NOTE: Electrical connectors must never be exposed to any liquids.

A. Remove the ice thickness and harvest float switch.

- Pull forward on the bottom of the bracket until clear of the tab.
- Slide bracket upward to remove the bracket and float switch as an assembly.
- At this point, the component can easily be cleaned.
- If complete removal is desired, follow the wires to the bulkhead grommet (exit point) in the back wall. Pull the wire connector through the bulkhead grommet, then disconnect the wire leads from the connector.



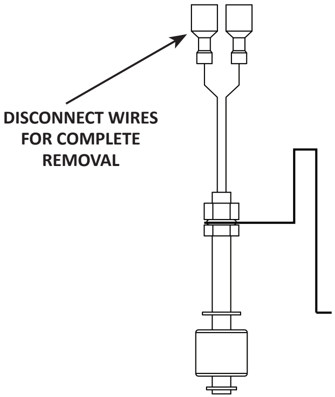
Notice

Reversing the mounting location of the ice thickness & harvest floats will result in a Service Limit #3 failure since the harvest float will never go up.

- The ice thickness float (black wire) must be mounted to the front of the water trough and the electrical connection must be in the top bulkhead grommet.
- The harvest float (red wire) must be mounted to the side of the water trough and the electrical connection must be in the bottom bulkhead grommet.
- The wire connectors for each float are different and will not allow incorrect electrical bulkhead connection.

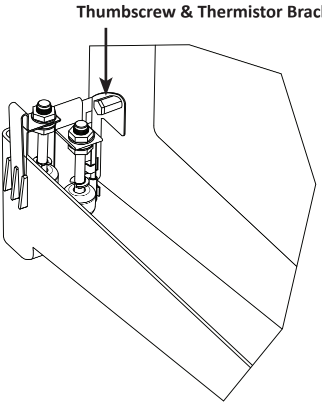
⚠ Caution

Do not disassemble the float switches for de-scaling and/or sanitizing - incorrect reassembly will result in an ice machine that will not harvest.



B. Remove the water trough thermistor and water trough.

- While supporting the water trough, remove the upper thumbscrew and lift off the thermistor.
- Continue supporting the water trough and remove the thumbscrew from beneath the water trough.
- Remove the water trough from the bin area.
- At this point, the component can easily be cleaned.
- If complete removal is desired, follow the wires to the bulkhead grommet (exit point) in the back wall. Pull the wire connector through the bulkhead grommet, then disconnect the wire leads from the connector.



C. Remove the ice damper.

- Remove thumbscrew from bin switch cover.
- Support ice damper and then pull bin switch cover and ice damper forward to remove.

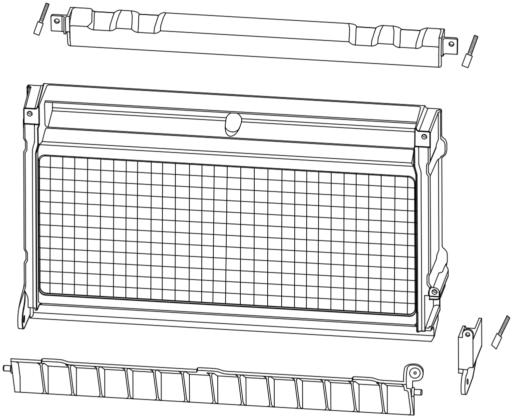
D. Remove the water distribution tube.

NOTE: Thumbscrews for the distribution tube are retained to prevent loss. Loosen thumbscrews, but do not pull thumbscrews out of distribution tube.

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

NOTE: When reinstalling, install top edge first.

Remove Thumbscrews from Distribution Tube and Remove



Remove Thumbscrew from Bin Switch Cover, Support The Damper, and Remove

REMEDIAL DE-SCALING PROCEDURE

This procedure de-scales all components in the water flow path, and is used to de-scale the ice machine between the bi-yearly detailed de-scaling and sanitizing procedure.

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

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

Step 1 Ice must not be on the evaporator during the de-scale/sanitize cycle. Follow one of the methods below:

- Press the On/Off button for 3 seconds at the end of a harvest cycle after ice falls from the evaporator.
- Press the On/Off button for 3 seconds and allow the ice to melt.

Notice

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

Step 2 Open the bin door to access the evaporator compartment.

Step 3 Press the Clean button. Water will flow through the water dump valve and down the drain. Wait approximately 1 minute until the water trough refills. Add the proper amount of ice machine de-scaler to the water trough.

Model	Amount of De-scaler #9405463
140	2 oz (60 ml)
190/240/310	5 oz (150 ml)

Step 4 Close and secure the bin door. The ice machine will automatically start ice-making after the clean cycle is complete (approximately 24 minutes).

Air Filter and Air Condenser Maintenance

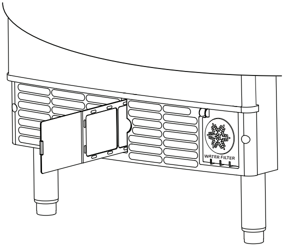
It is recommended to check the air filter and air condenser during De-scaling & Sanitizing Procedure.

AIR FILTER

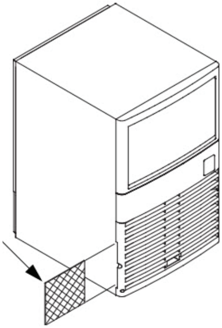
All Models

The washable air filter on self-contained ice machines is designed to catch dust, dirt, lint and grease.

- Clean the air filter once a month
- Wash with mild soap and water.



UP Models: Air Filter Location
(insert mesh end first)



Other Models: Air Filter located behind Front Grill

AIR CONDENSER

All Models

A dirty air condenser restricts airflow, resulting in excessively high operating temperatures. This reduces ice production and shortens component life.

> **⚠ Warning**
>
> Disconnect electric power to the ice machine at the electric service switch before cleaning the air filter or the condenser. The condenser fins are sharp; Use care when removing or installing the air filter.

- Clean the condenser at least every six months.
- Shine a flashlight through the condenser to check for dirt between the fins.
- Blow compressed air or rinse with water from the inside out (opposite direction of airflow).
- If dirt still remains, call a service agent to clean the condenser.

NOTE: Cleaning the air condenser will require the removal of the bin.

LuminIce® Bulb Maintenance

When Installed

It is recommended to check the LuminIce bulb during De-scaling & Sanitizing Procedure.

LuminIce bulbs require replacement on a yearly basis. The bulb will still illuminate after 12 months, the effectiveness of the bulb diminishes as operational hours increase. To retain maximum effectiveness, replace the bulb on a 12 month schedule.

BULB REPLACEMENT

LuminIce II has an indicator light on the device that will illuminate blue when operating normal or red when the bulb needs replacement.

- Replace with a Luminice II bulb with white bulb base: K00528.

CLEAN-UP PROCEDURE

Accidental Bulb Breakage

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

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

Water Filter Replacement

UP MODELS ONLY

It is recommended to check the Water Replacement light during De-scaling & Sanitizing Procedure.

Red Light = Replace Water Filter

When the ice machine completes 4,000 freeze/harvest cycles the water filter light will energize to indicate the filter needs replacement.

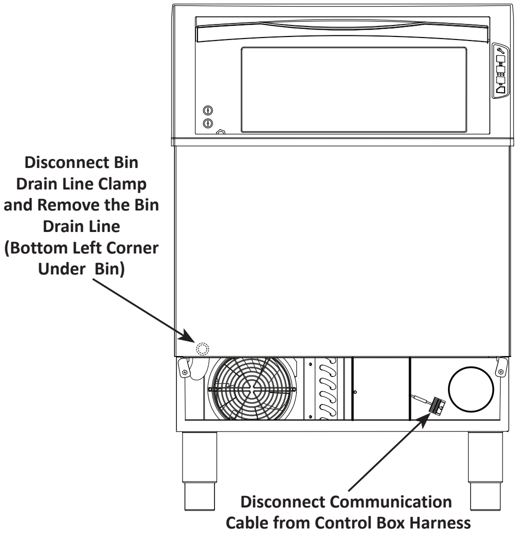
- Pressing the Water Filter Replacement button for 4 seconds will reset the counter. Once the 5 minute Flush Sequence is complete the light will de-energize.
- Pressing the Water Filter Replacement button once will de-energize the light for 24 hours but will not reset the water filter reminder.

NOTE: Arctic Pure® Pro water filter cartridges **must be replaced every 6 months** or when water pressure through the system drops below 20 psi (138 kPa), whichever occurs first.

Bin Removal

NOTE: Although not required and dependent on your installation, removing the bin may allow easier access.

- Disconnect power and remove all ice from bin.
- Remove air filter and louvered front panel/grill from lower front of machine.
- Loosen screws and rotate clips to release bin from base.
- Disconnect bin drain line clamp and remove bin drain line.
- Disconnect touch pad communication cable from the control board harness .
- Slide bin forward to remove.



The bin seal gasket must seal tightly to the cabinet. Confirm the bin seal gasket is not pinched or folded. A water tight seal is required to prevent future condensation and/or water leakage from entering the ice machine base and damaging the unit.

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.

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

1. De-scale and sanitize the ice machine.
2. Press the On/Off button for 3 seconds to turn off the ice machine.
3. Turn off the water supply, disconnect and drain the incoming ice-making water line at the rear of the ice machine, and drain the water trough.
4. Remove water filter (UP models only).
5. Energize the ice machine, wait one minute for the water inlet valve to open, and blow compressed air in both the incoming water and the drain openings in the rear of the ice machine to remove all water.
6. Press the On/Off button for 3 seconds to turn off the ice machine. Disconnect the electric power at the circuit breaker or the electric service switch.
7. Fill spray bottle with sanitizer and spray all interior food zone surfaces. Do not rinse and allow to air dry.
8. Install water filter manifold plug (UP models only).
9. Replace all panels.

Water-cooled Models Only

1. Perform steps 1-6.
2. Disconnect the incoming water and drain lines from the water-cooled condenser.
3. Insert a large screwdriver between the bottom spring coils of the water regulating valve. Pry upward to open the valve.
4. Hold the valve open and blow compressed air through the condenser until no water remains.
5. Replace all panels.

Detailed De-scaling and Sanitizing Procedure

UDE0065/UDP0065

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

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

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

Step 2 Remove all ice from the bin.

> **⚠ Warning**
>
> Wear rubber gloves and safety goggles (and/or face shield) when handling Ice Machine De-scaler or Sanitizer.

> **⚠ Caution**
>
> Do not mix Ice Machine De-scaler and Sanitizer solutions together. It is a violation of Federal law to use these solutions in a manner inconsistent with their labeling.

DE-SCALING PROCEDURE

Step 3 To start a cycle, set the toggle switch to Wash.

Step 4 Wait until water flows over the evaporator (about three minutes) then add the proper amount of Ice Machine De-scaler (9405463) to the water trough.

Model	Amount of De-scaler #9405463
UDE0065/UDP0065	1.5 oz (45 ml)

Step 5 Wait until the cycle is complete (approximately 45 minutes) then set the toggle switch in the Off position and disconnect power and water supplies to the ice machine.

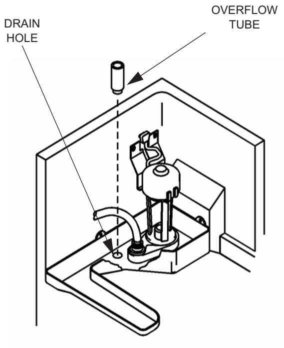
> **⚠ Warning**
>
> Disconnect electric power to the ice machine at the electric switch box before proceeding.

Step 6 Remove parts for de-scaling.

Remove the Overflow Tube

- To remove the tube, lift it up while using a slight back and forth motion to loosen it from the drain hole.

NOTE: When installing the tube, be sure it is completely inserted into the drain hole to prevent water leakage during normal operation.

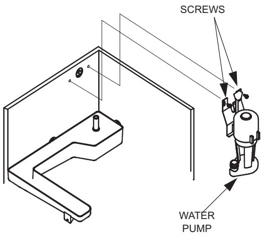


Remove Vinyl Hose

- Disconnect the water pump discharge hose from the distribution tube and water pump.

Remove the Water Pump

- Remove the two thumbscrews and the water pump cover.
- Disconnect the water pump power cord.
- Loosen the screws that hold the water pump in place.
- Lift the water pump and bracket assembly up and off the screws.



Remove the Water Trough

- Remove the screws holding the water trough to the walls of the cabinet.

Step 7 Mix a solution of de-scaler and warm water. Depending on 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 de-scale all parts.

Solution Type	Water	Mixed with
De-scaler #9405463	1 gal. (4 l)	16 oz (500 ml) de-scaler

Step 8 Use ½ of the de-scaler and water solution to de-scale all components. The solution will foam when it contacts lime scale and mineral deposits; once the foaming stops use a soft bristle brush, sponge or cloth (not a wire brush) to carefully de-scale the parts. Soak the parts for 5 minutes (15 – 20 minutes for heavily scaled parts). Rinse all components with clean water.

Step 9 While components are soaking, use ½ of the de-scaler and water solution to de-scale all foodzone surfaces of the ice machine and bin. Use a nylon brush or cloth to thoroughly de-scale the following ice machine areas:

- Evaporator plastic parts – including top, bottom and sides.
- Bin bottom, sides and top

Rinse all areas thoroughly with clean water.

SANITIZING PROCEDURE

NOTE: Sanitizing can be performed independently and more frequently than de-scaling when needed.

Step 10 Mix a solution of sanitizer part number 9405653 and warm water.

Solution Type	Water	Mixed With
Sanitizer #9405653	6 gal. (23 l)	4 oz (120 ml) sanitizer

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

Step 12 Use 1/2 of the sanitizer/water solution to sanitize all foodzone surfaces of the ice machine and bin. Use a cloth or sponge to liberally apply the solution. When sanitizing, pay particular attention to the following areas:

- Evaporator plastic parts - including top, bottom and sides
- Bin bottom, sides and top

Do not rinse the sanitized areas.

Step 13 Replace all removed components.

Step 14 Reapply power and water to the ice machine and set the toggle switch in the WASH position.

Step 15 Add the proper amount of Ice Machine Sanitizer to the water trough.

Model	Amount of Sanitizer #9405653
UDE0065/UDP0065	1.5 oz (45 ml)

Step 16 Wait until the sanitize cycle is complete (approximately 45 minutes) then set the toggle switch in the OFF position, disconnect power and water supplies to the ice machine.

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

Step 17 Repeat step 6 to remove parts for hand sanitizing.

Step 18 Mix a solution of sanitizer and warm water.

Solution Type	Water	Mixed With
Sanitizer #9405653	6 gal (23 L)	4 oz (120 ml) sanitizer

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

Step 20 Use 1/2 of the sanitizer/water solution to sanitize all foodzone surfaces of the ice machine and bin. Use a cloth or sponge to liberally apply the solution. When sanitizing, pay particular attention to the following areas:

- Evaporator plastic parts - including top, bottom and sides.
- Bin bottom, sides and top.

Do not rinse the sanitized areas.

Step 21 Replace all removed components.

Step 22 Reapply power and water to the ice machine and set the toggle switch in the ICE position.

Exterior Cleaning

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

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

Treat all exterior stainless steel surfaces with a commercial grade stainless steel polish.

Ice Machine Inspection

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

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

Air Filter and Air Condenser Maintenance

It is recommended to check the air filter and air condenser during De-scaling & Sanitizing Procedure.

AIR FILTER

The washable air filter on self-contained ice machines is designed to catch dust, dirt, lint and grease.

- Clean the air filter once a month
- Wash with mild soap and water

CLEANING THE AIR CONDENSER

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

1. The washable aluminum filter on self-contained ice machines is designed to catch dust, dirt, lint and grease. This helps keep the condenser clean. Clean the filter with a mild soap and water solution.
2. Clean the outside of the condenser with a soft brush or a vacuum with a brush attachment. Clean from top to bottom, not side to side. Be careful not to bend the condenser fins.
3. Shine a flashlight through the condenser to check for dirt between the fins. If dirt remains: Blow compressed air through the condenser fins from the inside. Be careful not to bend the fan blades.
4. Use a commercial condenser coil cleaner. Follow the directions and cautions supplied with the cleaner.
5. Straighten any bent condenser fins with a fin comb.
6. Carefully wipe off the fan blades and motor with a soft cloth. Do not bend the fan blades. If the fan blades are excessively dirty, wash with warm, soapy water and rinse thoroughly.

REMOVAL FROM SERVICE/WINTERIZATION

Self-contained Air-cooled ice machines

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.

1. Disconnect the electric power at the circuit breaker or the electric service switch.
2. Turn off the water supply.
3. Remove the water from the water trough.
4. Disconnect the drain and the incoming ice-making water line at the rear of the ice machine.
5. Make sure no water is trapped inside the ice machine incoming water lines, drain lines, distribution tubes, etc.

Detailed De-scaling and Sanitizing Procedure UDE0080/UDP0080

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

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

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

Step 2 Remove all ice from the bin.

> **⚠ Warning**
>
> Wear rubber gloves and safety goggles (and/or face shield) when handling Ice Machine De-scaler or Sanitizer.

> **⚠ Caution**
>
> Do not mix Ice Machine De-scaler (9405463) and Sanitizer (9405653) solutions together. It is a violation of Federal law to use these solutions in a manner inconsistent with their labeling.

DE-SCALING PROCEDURE

Step 3 To start a cycle set the toggle switch to Wash.

Step 4 Wait until water flows over the evaporator (about three minutes) then add the proper amount of Ice Machine De-scaler to the water trough.

Model	Amount of De-scaler Part Number 9405463
UDE0080/UDP0080	1.5 ounces (45 ml)

Step 5 Wait until the cycle is complete (approximately 22 minutes) then set the toggle switch in the Off position and disconnect power and water supplies to the ice machine.

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

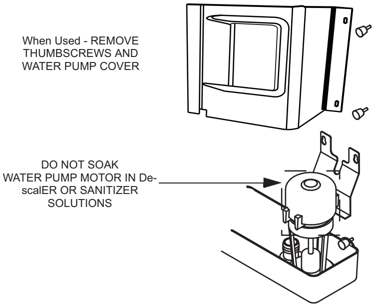
Step 6 Remove parts for de-scaling.

A. Remove Two Thumbscrews and Water Pump Cover.

B. Remove the Vinyl Hose Connecting the Water Pump and Water Distribution Tube.

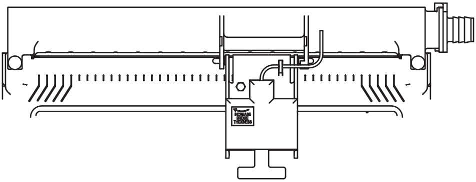
Remove Water Pump

- Disconnect the water pump power cord.
- Loosen the screws securing the pump mounting bracket to the bulkhead.
- Lift the pump and bracket assembly off the mounting screws.



Remove the Ice Thickness Probe

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



NOTE: At this point, the ice thickness probe can easily be de-scaled. If complete removal is desired follow the ice thickness probe wire to the bulkhead grommet (exit point) in the back wall. Pop the bulkhead grommet out of the back wall by inserting fingernails or a flat object between the back wall and the grommet and prying forward.
Pull the bulkhead grommet and wire forward until the connector is accessible, then disconnect the wire lead from the connector.

Ice Thickness Probe De-scaling

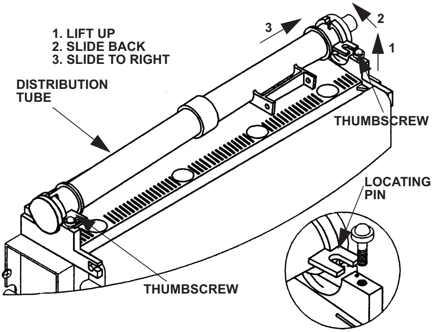
• Mix a solution of Ice Machine De-scaler and water (2 ounces of de-scaler to 16 ounces of water) in a container.

• Soak the ice thickness probe a minimum of 10 minutes.

De-scale all ice thickness probe surfaces and verify the ice thickness probe cavity is de-scaled. Rinse thoroughly with clean water, then dry completely. Incomplete rinsing and drying of the ice thickness probe can cause premature harvest.

Remove the Water Distribution Tube

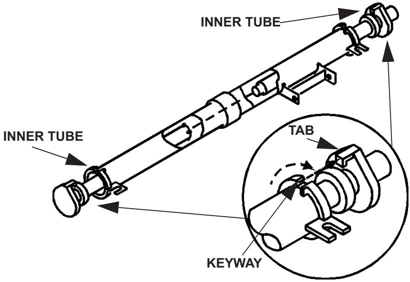
- Loosen the two thumbscrews, which secure the distribution tube.
- Lift the distribution tube up off the thumbscrews.



Disassembly

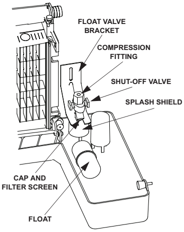
- Twist the barbed end until the tab lines up with the key way.

• Pull the inner tube end outward



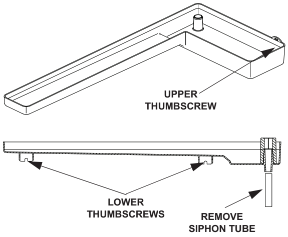
Remove the Float Valve

- Turn the splash shield counterclockwise one or two turns.
- Pull the float valve forward and off the mounting bracket.
- Disconnect the water inlet tube from the float valve at the compression fitting.
- Remove the cap and filter screen for de-scaling.



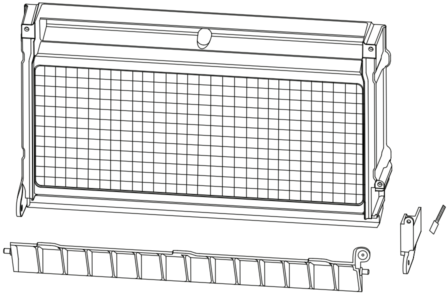
Remove the Water Trough

- Apply downward pressure on the siphon tube and remove from the bottom of the water trough.
- Remove the upper thumbscrew.
- While supporting the water trough remove the two thumbscrews from beneath the water trough.
- Remove the water trough from the bin area.



Remove the Ice Damper

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

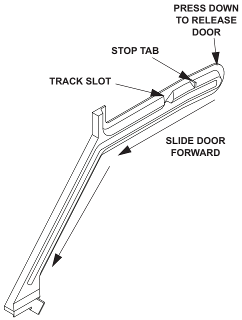


Installation

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

Remove the Bin Door

- Grasp the rear of the bin door and pull bin door forward approximately 5”.
- Slide bin door to the rear while applying upward pressure (The rear door pins will ride up into the track slot and slide backward to the stop tab).
- While applying pressure against the bin door pull down on the rear of each bin door track until the door pins clear the stop tabs.
- Slide the rear door pins off the end and then below the door track. Slide bin door forward allowing the back of the door to lower into the bin. Continue forward with the bin door until the front pins bottom out in the track.
- Lift right side of door until the front pins clear the track, then remove door from bin.
- Remove rollers (4) from all door pins.



Step 7 Mix a solution of de-scaler and warm water. Depending on 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 de-scale all parts.

Solution Type	Water	Mixed with
De-scaler # 9405463	1 gal. (4 l)	16 oz (500 ml) de-scaler

Step 8 Use 1/2 of the de-scaler and water solution to de-scale all components. The solution will foam when it contacts lime scale and mineral deposits; once the foaming stops use a soft bristle brush, sponge or cloth (not a wire brush) to carefully de-scale the parts. Soak the parts for 5 minutes (15 – 20 minutes for heavily scaled parts). Rinse all components with clean water.

Step 9 While components are soaking, use 1/2 of the de-scaler and water solution to de-scale all foodzone surfaces of the ice machine and bin. Use a nylon brush or cloth to thoroughly de-scale the following ice machine areas:

- Evaporator plastic parts – including top, bottom and sides.
- Bin bottom, sides and top.

Rinse all areas thoroughly with clean water.

SANITIZING PROCEDURE

NOTE: Sanitizing can be performed independently and more frequently than de-scaling when needed.

Step 10 Mix a solution of sanitizer and warm water.

Solution Type	Water	Mixed With
Sanitizer #9405653	6 gal. (23 l)	4 oz (120 ml) sanitizer

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

Step 12 Use 1/2 of the sanitizer/water solution to sanitize all foodzone surfaces of the ice machine and bin. Use a cloth or sponge to liberally apply the solution. When sanitizing, pay particular attention to the following areas:

- Evaporator plastic parts - including top, bottom and sides.
- Bin bottom, sides and top.

Do not rinse the sanitized areas.

Step 13 Replace all removed components.

Step 14 Reapply power and water to the ice machine and set the toggle switch in the WASH position.

Step 15 Add the proper amount of Ice Machine Sanitizer to the water trough.

Model	Amount of Sanitizer Part Number 9405653
UDE0080/UDP0080	1.5 ounces (45 ml)

Step 16 Wait until the sanitize cycle is complete (approximately 22 minutes) then set the toggle switch in the OFF position, disconnect power and water supplies to the ice machine.

⚠ Warning

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

Step 17 Repeat step 6 to remove parts for hand sanitizing.

Step 18 Mix a solution of sanitizer and warm water.

Solution Type	Water	Mixed With
Sanitizer	6 gal. (23 l)	4 oz (120 ml) sanitizer part number 9405653

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

Step 20 Use 1/2 of the sanitizer/water solution to sanitize all foodzone surfaces of the ice machine and bin. Use a cloth or sponge to liberally apply the solution. When sanitizing, pay particular attention to the following areas:

- Evaporator plastic parts - including top, bottom and sides
- Bin bottom, sides and top

Do not rinse the sanitized areas.

Step 21 Replace all removed components.

Step 22 Reapply power and water to the ice machine and set the toggle switch in the ICE position.

EXTERIOR CLEANING

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

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

Treat all exterior stainless steel surfaces with a commercial grade stainless steel polish.

ICE MACHINE INSPECTION

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

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

Air Filter and Air Condenser Maintenance

It is recommended to check the air filter and air condenser during De-scaling & Sanitizing Procedure.

AIR FILTER

The washable air filter on self-contained ice machines is designed to catch dust, dirt, lint and grease.

- Clean the air filter once a month
- Wash with mild soap and water

CLEANING THE AIR CONDENSER

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

1. The washable aluminum filter on self-contained ice machines is designed to catch dust, dirt, lint and grease. This helps keep the condenser clean. Clean the filter with a mild soap and water solution.
2. Clean the outside of the condenser with a soft brush or a vacuum with a brush attachment. Clean from top to bottom, not side to side. Be careful not to bend the condenser fins.
3. Shine a flashlight through the condenser to check for dirt between the fins. If dirt remains: Blow compressed air through the condenser fins from the inside. Be careful not to bend the fan blades.
4. Use a commercial condenser coil cleaner. Follow the directions and cautions supplied with the cleaner.
5. Straighten any bent condenser fins with a fin comb.
6. Carefully wipe off the fan blades and motor with a soft cloth. Do not bend the fan blades. If the fan blades are excessively dirty, wash with warm, soapy water and rinse thoroughly.

REMOVAL FROM SERVICE/WINTERIZATION

Self-contained Air-cooled ice machines

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.

1. Disconnect the electric power at the circuit breaker or the electric service switch.
2. Turn off the water supply.
3. Remove the water from the water trough.
4. Disconnect the drain and the incoming ice-making water line at the rear of the ice machine.
5. Make sure no water is trapped inside the ice machine incoming water lines, drain lines, distribution tubes, etc.

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Touch Pad

140/190/240/310 Series

The NEO touch pad offers a series of pressure-sensitive buttons to control ice machine operation and provide operational status.

LIGHTS (WITHOUT WATER FILTER - U/UF SERIES)

On/Off - Blue

On = Machine Is On
Off = Machine Is Off

Delay - BLUE
On = Delay Mode Is On
Off = Delay Mode Is Off

Clean - YELLOW
On = Clean Cycle Is On
Off = Cleaning Is Off
Flashing = Cleaning Is Paused

Bin - BLUE
On = Bin Is Full
Off = Bin Is Not Full

Service - RED
On = Service Limit
Off = Does Not Need Service

NOTE: Touch pad is to be activated with finger tips only. Do not disassemble touch pad.

LIGHTS (WITH WATER FILTER - UP SERIES ONLY)

	On/Off - BLUE **On = Machine Is On** **Off = Machine Is Off**
	Delay - BLUE **On = Delay Mode Is On** **Off = Delay Mode Is Off**
	Clean - YELLOW **On = Clean Cycle Is On** **Off = Cleaning Is Off** **Flashing = Cleaning Is Paused**
	Water Filter Replacement - RED **Flashing = Change Water Filter**
	Bin - BLUE **On = Bin Is Full** **Off = Bin Is Not Full**
	Service - RED **On = Service Limit** **Off = Does Not Need Service**

NOTE: Touch pad is to be activated with finger tips only.
Do not disassemble touch pad.

BUTTONS & ICONS

On/Off Button

The On/Off button is used to start and stop ice making.

- Pressing the On/Off button for 3 seconds will power off the unit.

The blue light indicates whether the ice machine is Ice Making (light on) or Off (light off).

NOTE: If ice is on the evaporator (during the freeze or harvest cycle) and the On/Off button is pressed, the next cycle will have a thick slab of ice. Press the On/Off button and allow the ice to melt off the evaporator, then start a new freeze cycle.

Delay Button

Pressing the Delay button will start a delay period. The ice machine will finish the freeze and harvest cycle and then start the delay period.

U/UF Models

- Pressing the button once will start a 4 hour delay.
- Pressing the button twice will start a 12 hour delay.
- Pressing the button three times will start a 24 hour delay.
- Pressing the button four times will cancel the delay.

UP Models

- Pressing the button once will start an 8 hour delay.
- Pressing the button twice will start a 16 hour delay.
- Pressing the button three times will cancel the delay or by pressing the button once during a delay.
- Press and hold the delay button for 3 seconds to set the delay to repeat daily.

NOTE: The delay period will be canceled if power is interrupted to the ice machine. When power is restored, the ice machine will remain Off.

Clean Button

Pressing the Clean button for 3 seconds with the machine off will start a clean cycle. After the clean cycle is complete, the ice machine will automatically start an ice making cycle.

- Pressing the Clean button again within 45 seconds of the clean cycle starting will abort the clean cycle.
- Pressing the On/Off button anytime during the clean cycle will de-energize the On/Off light and the ice machine will stop after the clean cycle is complete.
- Pressing the Clean button will pause the clean cycle. The On/Off and Clean lights will flash On/Off to indicate pause mode. Pressing the Clean button again will continue the clean cycle from the point of interruption.

NOTE: Opening the ice damper for 30 seconds will cancel the clean cycle.

Water Filter Replacement Button - UP Models Only

When the ice machine completes 4,000 freeze/harvest cycles the water filter light will energize to indicate the water filter needs replacement.

- Pressing the Water Filter button for 4 seconds will reset the counter and initiate a flush sequence. Once the 5 minute flush sequence is complete the light will de-energize.
- Pressing the Water Filter button once will de-energize the light for 24 hours but will not reset the change water filter reminder.

Bin Full Icon

The Bin Full light energizes when the bin is full or is de-energized if the bin is not full.

Service Icon

The Service light indicates the machine needs attention.

- Refer to service limits if this light is energized.

CONTROL BOARD REVISIONS

1. Original control board
2. Control board with J4 terminal, which can utilize a thermistor to control when/if a water pump delay occurs in the freeze cycle.
3. Control board with the addition of J8 & J9 terminals. The J8 terminal can control an EC fan motor.

NOTE: The replacement control board is backward compatible and can be used without thermistors or EC fan motors.

FIRMWARE REVISIONS

In addition to the primary sequence of operation the following firmware changes have been added.

Control boards with water trough thermistor and firmware version before 2.70

The water trough thermistor performs the following function in the freeze cycle:

- When the temperature of the water reaches 34° F the water pump de-energizes for 25 seconds,
then re energizes.
- When the water pump restarts the water inlet solenoid energizes for 7 seconds..

2.70 and Higher

- 120 second prechill cycle on initial start and 60 second prechill cycles thereafter.

ICE MAKING SEQUENCE OF OPERATION

U/UF Series

NOTE: The On/Off button must be powered On - light blue and the ice damper must be closed before the ice machine will start.

The following is the primary sequence of operation. Firmware revisions will alter some of the timing sequences and are noted in firmware revisions.

Initial Start-up From Shutoff

The dump valve energizes to purge any water in the water trough down the drain. The harvest valve energizes to equalize refrigerant pressures before the compressor starts.

Freeze Cycle

Prechill - The refrigeration system chills the evaporator before water flow over the evaporator starts. The water inlet valve energizes during the prechill and remains on until the ice thickness float switch is satisfied.

Freeze - Water flowing across the evaporator cools as the freeze cycle progresses. (Firmware version 2.58 or higher: The water pump turns off for 25 seconds and the water inlet valve energizes for 7 seconds when the pump restarts) Water flowing across the evaporator will start to freeze and build ice on the evaporator. After a sheet of ice has formed, the harvest float switch signals the control board to start a harvest cycle.

Harvest Cycle

Every third cycle the remaining water is purged down the drain. The refrigerant gas warms the evaporator and the sheet of cubes slides off the evaporator and into the storage bin. If all cubes fall clear of the ice damper the ice machine starts another freeze cycle. The maximum harvest time is a total of 7 minutes.
If the bin switch does not activate within 3.5 minutes, the harvest cycle extends another 3.5 minutes.

Full Bin Cycle

If the ice damper is held open by ice cubes the ice machine shuts off. When the ice damper closes the ice machine starts a new cycle at Initial Start-up From Shutoff. The ice machine will remain off for a 3 minute delay period.

Thaw Cycle

The maximum harvest time is a total of 7 minutes.
If the bin switch does not activate within 7 minutes a thaw cycle initiates using the following sequence:

1. The compressor de-energizes.
2. The water inlet valve energizes and fills the water trough.
3. The water pump energizes for 2 minutes and circulates water over the evaporator.

If the bin switch did not open & close.

4. The water dump valve energizes and drains water from the water trough.
5. Step 1 through 4 repeat.
6. If the damper does not open/close after step 5, the control board assumes no ice is on the evaporator and an initial startup cycle starts.

- If the bin switch opens & closes anytime during the thaw cycle the ice machine starts a new freeze cycle.
- If the bin switch opens and remains open for 30 seconds at any point in the thaw cycle the ice machine will enter an automatic shutoff cycle.
- The maximum water fill time for the thaw cycle is 105 seconds for each of the two possible thaw cycles.

CONTROL BOARD TIMERS

U/UF Series

- The ice machine is locked into the freeze cycle for 6 minutes before a harvest cycle can be initiated.
- The freeze time lock in feature is bypassed on the initial cycle (manual start or after a full bin/service limit condition).
- **Firmware version before 2.58:** The water fill valve is de-energized 1 minute after the freeze cycle starts. The control board will energize the water inlet valve one more time 3 minutes into the freeze cycle.
- If the harvest float switch is in the down position for 10 continuous seconds during the start of a freeze cycle, a harvest sequence is initiated.
- The maximum freeze time is 35 minutes at which time the control board automatically initiates a harvest sequence.
- The maximum harvest time is a total of 7 minutes. If the bin switch does not activate within 3.5 minutes, the harvest cycle extends another 3.5 minutes. If 7 minutes is exceeded a thaw cycle starts.
- After the initial harvest cycle from either an automatic shut off or initial start the dump valve solenoid will only energize and purge the water in the water trough every third cycle.

Control boards with thermistor and firmware version before 2.70

The water trough thermistor performs the following function in the freeze cycle:

- When the temperature of the water reaches 34° F the water pump de-energizes for 25 seconds, then re energizes.
- When the water pump restarts the water inlet solenoid energizes for 7 seconds.

SERVICE LIMITS

U/UF Series

Service limits are stored and indicated by the control board. The number of cycles required to stop the ice machine varies for each service limit.

Service limits can be reset by pressing the On/Off button and starting a new ice making cycle.

A service limit shutdown is indicated by the red Service light on the touch pad.

Service Limit 1

If the freeze time reaches 35-60 minutes*, the control board automatically initiates a harvest cycle.

- After 3 consecutive 35-60 minute* cycles control board light SL#1 along with the touch pad Service (wrench) light will flash on/off at 1 second intervals.
- If 6 consecutive 35-60 minute* freeze cycles occur, the ice machine stops and the SL#1 light on the control board and the Service (wrench) light on the touch pad will be on continuously.

NOTE: *Verify your firmware version (label on the control board) for freeze time.

Firmware Version	Freeze Time
V1.0 to V2.53	60 minutes
V2.54 to V2.9	45 minutes
UF Models: V3.0 to current	35 Minutes

Service Limit 2

- If the harvest time reaches 3.5 minutes, the control board automatically energizes the water pump and extends the harvest cycle another 3.5 minutes (7 minutes total).
- If the ice damper does not open and close within the 7 minute harvest cycle the ice machine enters a water thaw cycle for 170 seconds.
- If the damper does not open/close within the 170 second thaw cycle, a second thaw cycle starts.
- The control board automatically initiates a freeze sequence when the thaw cycle(s) is complete.
- If 3 consecutive 7 minute harvest/thaw cycles occur, the ice machine stops.

Service Limit 3

If the freeze time reaches 4 minutes and water is not sensed (float remains down for 10 continuous seconds) the ice machine stops.

- Service Limit 3 is bypassed on the initial cycle (manual start or after a full bin/service limit condition). For all subsequent cycles if the freeze time reaches 4 minutes and water is not sensed, the ice machine stops and initiates a 30 minute delay period. Control board lights SL#1 and SL#2 along with the touch pad Service (wrench) light will flash on/off at 1 second intervals.
- The ice machine automatically restarts at the end of the 30 minute delay period and stops flashing the control board and Service (wrench) lights.
- If 100 consecutive failures occur the ice machine stops and the touch pad Service (wrench) light remains energized.

ENERGIZED PARTS CHART

U/UF Series

ICE MAKING SEQUENCE OF OPERATION	Water Pump	Harvest Valve	Water Inlet Valve	Dump Valve	Compressor & Condenser Fan Motor *	Harvest Float Switch	Ice Thickness Float Switch	Length of Time
Initial Start-up **1. Water purge**	Off	On	Off	On	Off	Closed	Closed	**20 seconds**
2. Refrigeration System Start-up	Off	On	Off	Off	On	Closed	Closed	**5 seconds**
Freeze Sequence **3. Prechill**	Off	Off	On	Off	On	Open	Closed	**60 Seconds** **120 Seconds Initial Cycle After Automatic Shutoff**
4. Freeze	On**	Off	On **	Off	On	Open Then Closed	Closed Then Open	**Until Harvest Float Switch closes for 10 continual seconds**

ICE MAKING SEQUENCE OF OPERATION	Water Pump	Harvest Valve	Water Inlet Valve	Dump Valve	Compressor & Condenser Fan Motor *	Harvest Float Switch	Ice Thickness Float Switch	Length of Time
Harvest Sequence **5. Water Purge**	Off	On	Off	Initial cycle, then every 3rd	On	Closed	Closed	**20 seconds Water purge initial cycle, then every 3rd cycle thereafter**
6. Harvest	Off***	On	Off***	Off***	On	Closed	Closed	**Bin switch activation**
7. Automatic Shutoff	Off	Off	Off	Off	Off	Closed	Closed	**3 Minute delay and bin switch re-closure**

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

** Firmware 2.58 with thermistor - When the water temperature reaches 34°F the water pump de-energizes for 25 seconds . When the pump restarts the water inlet valve energizes for 7 seconds. Firmware 2.58 without thermistor - At 3.75 minutes the water pump de-energizes for 25 seconds. When the pump restarts the water inlet valve energizes for 7 seconds.
Firmware prior to 2.58 - The water fill valve is de-energized by the control board 1 minute after the freeze cycle starts - The control board will energize the water inlet valve for 7 seconds one last time, 3 minutes into the freeze cycle, regardless of float position.

*** Will be energized during harvest when time exceeds 3.5 minutes.

**** The water pump de-energizes for 25 seconds then re-energizes

ICE MAKING SEQUENCE OF OPERATION

UP Series

NOTE: The On/Off button must be powered On - light blue and the ice damper must be closed before the ice machine will start.

Water Purge Cycle

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

Freeze Cycle

Pre-chill - The refrigeration system chills the evaporator before water flow over the evaporator starts. The water inlet valve energizes during the pre-chill and remains on until the ice thickness float switch is satisfied.

- When the water temperature reaches 34°F (1°C), the water pump will
  de-energize for 25 seconds, then
  re-energizes.
- When the water pump restarts the water inlet solenoid energizes for 7 seconds.
- Water flowing across the evaporator will start to freeze and build ice on the evaporator. After a sheet of ice has formed, the harvest float switch signals the control board to start a harvest cycle.

Harvest Cycle

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

Full Bin Cycle

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

Control Board Timers

UP Series

The control board has the following non-adjustable timers:

- The ice machine is locked into the freeze cycle for 6 minutes before a harvest cycle can be initiated.
- The maximum freeze time is 45 minutes, at which time the control board automatically initiates a harvest sequence.
- The maximum harvest time is 7 minutes. When harvest is complete the control board automatically initiates a freeze sequence.
- If the ice damper does not open and close within the 7 minute harvest cycle, the ice machine enters a water thaw cycle for 170 seconds. If the damper does not open and close within the 170 second thaw cycle, a second thaw cycle starts. The control board automatically initiates a freeze sequence when the thaw cycle(s) is complete.

Service Limits

UP Series

Service limits are stored and indicated by the control board. The number of cycles required to stop the ice machine varies for each service limit.

Service limits can be reset by pressing the On/Off button and starting a new ice making cycle.

A service limit is indicated by an energized Service Light on the touch pad.

- **Service Limit 1** - If the freeze time reaches 45 minutes, the control board automatically initiates a harvest cycle. After 6 consecutive 45-minute freeze cycles occur, the ice machine stops.
- **Service Limit 2** - If the harvest time reaches 3.5 minutes, the control board automatically energizes the water pump and extends the harvest cycle another 3.5 minutes (7 minutes total). If the ice damper does not open and close within the 7 minute harvest cycle, the ice machine enters a water thaw cycle for 170 seconds. If the damper does not open and close within the 170 second thaw cycle, a second thaw cycle starts. The control board automatically initiates a freeze sequence when the thaw cycle(s) is complete. If 3 consecutive 7 minute harvest and thaw cycles occur, the ice machine stops.
- **Service Limit 3** - Harvest Float Only: If the freeze time reaches 4 minutes and water is not sensed, the ice machine stops and initiates a 30 minute delay period. The ice machine will automatically restart at the end of the 30 minute delay period. If 100 consecutive failures occur, the ice machine stops.

ENERGIZED PARTS CHART

UP Series

ICE MAKING SEQUENCE OF OPERATION	Water Pump	Harvest Valve	Water Inlet Valve	Dump Valve	Compressor & Condenser Fan Motor *	Harvest Float Switch	Ice Thickness Float Switch	Length of Time
Initial Start-up 1. Water purge	Off	On	Off	On	Off	Closed	Closed	**20 seconds**
2. Refrigeration System Start-up	Off	On	Off	Off	On	Closed	Closed	**5 seconds**
Freeze Sequence 3. Prechill	Off	Off	On	Off	On	Open	Closed	**60 Seconds 120 Seconds Initial Cycle After Automatic Shutoff**
4. Freeze	On**	Off	On **	Off	On	Open Then Closed	Closed Then Open	**Until Harvest Float Switch closes for 10 continual seconds**

ICE MAKING SEQUENCE OF OPERATION	Water Pump	Harvest Valve	Water Inlet Valve	Dump Valve	Compressor & Condenser Fan Motor *	Harvest Float Switch	Ice Thickness Float Switch	Length of Time
Harvest Sequence **5. Water Purge**	Off	On	Off	Initial cycle, then every 3rd	On	Closed	Closed	**20 seconds** **Water purge initial cycle, then every 3rd cycle thereafter**
6. Harvest	Off***	On	Off***	Off***	On	Closed	Closed	**Bin switch activation**
7. Automatic Shutoff	Off	Off	Off	Off	Off	Closed	Closed	**3 Minute delay and bin switch re-closure**

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

** Firmware 2.58 with thermistor - When the water temperature reaches 34°F the water pump de-energizes for 25 seconds When the pump restarts the water inlet valve energizes for 7 seconds

*** Every fourth cycle and will energize during harvest when time exceeds 3.5 minutes

**** The water pump de-energizes for 25 seconds then re-energizes

Operational Checks

140/190/240/310 Series

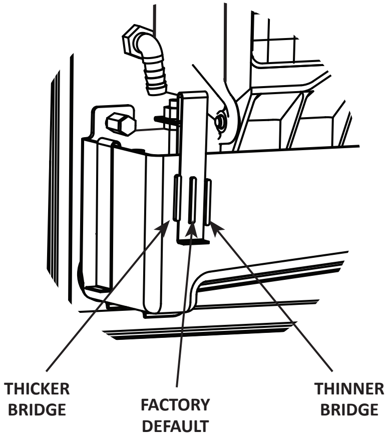
ICE THICKNESS CHECK

After a harvest cycle, inspect the ice cubes in the ice storage bin. The ice bridge connects the ice cubes and must be set to maintain an ice bridge thickness of 1/8" (3.2 mm). To adjust the thickness of the bridge refer to ice thickness adjustment.

ICE THICKNESS ADJUSTMENT

The ice thickness can be adjusted to three levels.

1. Pull forward on the bottom of the bracket until clear of the tab.
2. Slide the bracket over the desired tab and release.
    - The center position is the normal factory setting.
    - To increase bridge thickness, raise the water level.
    - To decrease bridge thickness, lower the water level.



MINIMUM/MAXIMUM SLAB WEIGHT

140/190/240/310 Series

Model	Minimum Ice Weight Per Cycle lbs Grams	Maximum Ice Weight Per Cycle lbs Grams
U0140 UF0140 UP0140	1.1 lbs 513 grams	1.4 lbs 617 grams
U0190 UF0190 UP0190	2.3 lbs 1025 grams	2.9 lbs 1329 grams
U0240 UF0240 UP0240	2.3 lbs 1025 grams	2.9 lbs 1329 grams
U0310 UF0310 UP0310	2.3 lbs 1025 grams	2.9 lbs 1329 grams

Optional Cycle Bypass - Water Purge

140/190/240/310 Series

To bypass this feature and purge every harvest cycle:

1. Press & hold the Clean button for 3 seconds while in the ice making cycle.
2. Press the Delay button.
3. The Service light will flash red, 5 times to indicate bypass. The machine will purge water every cycle.
4. Repeat steps to reinstate fourth cycle - water purge.
5. The Service light will flash red, 6 times to indicate fourth cycle - water purge.

NOTE: Bypassing the Water Purge will increase water usage.

UDE0065/UDP0065

ICE MAKING SEQUENCE OF OPERATION

Initial Startup or Startup After Automatic Shut-off

1. **Water Purge**

The water fill valve and the hot gas valve are energized for 2.9 minutes (175 seconds). This ensures that the ice making cycle starts with fresh water, and that the refrigerant pressures are equalized prior to refrigeration system start-up.

2. **Refrigeration System Start-up**

The compressor starts 2.9 minutes (175 seconds) after the water fill valve and hot gas valve are energized. (The water fill valve and hot gas valve remain energized for 5 seconds during compressor start-up, and then shut off.) The compressor remains on throughout the entire freeze and harvest cycles.

3. **Freeze Cycle**

The condenser fan motor and water pump are energized and remain on throughout the entire freeze cycle. An even flow of water is directed across the evaporator and into each cube cell, where it freezes. The control system automatically determines the length of the freeze cycle by monitoring the temperature of the refrigeration system liquid line.

4. Harvest Cycle

The condenser fan motor and water pump de-energize.

The water fill valve energizes to purge the water in the water trough. The hot gas valve also energizes at the beginning of the harvest cycle to divert hot refrigerant gas into the evaporator. The hot refrigerant gas warms the evaporator, causing the cubes to slide, as a sheet, off the evaporator and into the ice storage bin.

The control system automatically determines the length of the harvest cycle, based on the temperature of the refrigeration system liquid line at the end of the freeze cycle. At the end of the harvest cycle, the ice machine returns to another freeze cycle (step 3).

5. Automatic Shut-off

The level of ice in the ice storage bin controls the ice machine shut-off. When the bin is full, ice cubes contact the bin thermostat bulb holder, which cools down and opens to stop the ice machine. The ice machine remains off until enough ice has been removed from the bin. This causes the thermostat bulb holder to warm and close, restarting the ice machine.

When the ice machine restarts, it returns to the startup sequence (steps 1 – 2).

ENERGIZED PARTS CHART

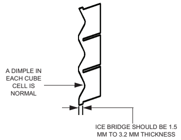
UDE0065/UDP0065

Ice Making Sequence Of Operation	Control Board Relays			Length of Time
	1 Compressor	2 Hot Gas Valve Water Fill Valve	3 Water Pump Fan Motor	
Initial Start-up 1. Water Purge	off	on	off	175 Seconds (2.9 minutes)
2. Refrigeration Start-up	on	on	off	5 Seconds
3. Freeze Cycle	on	off	on	Automatically Determined
4. Harvest cycle	on	on	off	Automatically Determined
5. Automatic Shut-off	off	off	off	Until Bin Thermostat Closes

ICE THICKNESS CONTROL DIAL ADJUSTMENT

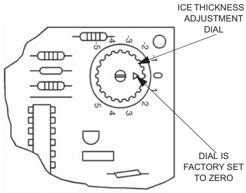
UDE0065/UDP0065

It is normal to have a dimple in the ice cube (a concave indentation in the cube). Cube size is determined by measuring the slab weight (the combined weight of all cubes from one harvest cycle). To determine proper slab weight follow the instructions listed below.



1. Ensure the air filter, front, and back panels are installed properly and close the bin door.
2. During the third harvest cycle open the bin door and catch the entire slab of ice.
3. Weigh the ice slab. The combined weight of all cubes from one harvest should weigh between 200 - 270g (7 - 9-oz). If the slab weight is within this range, the ice machine is working properly and no further action is needed. If the slab weight is not within this range or you desire a slightly thicker or thinner cube, continue to step four.
4. Remove the air filter, the two screws holding the front panel in place and remove the front cover.

5. Locate the ice thickness control dial on the control board (see below). Turn the dial clockwise for a thicker cube or counter clockwise for a thinner cube.



6. Assure all panels and the air filter are reinstalled properly and the bin door is closed. Repeat steps one through three.

MINIMUM/MAXIMUM SLAB WEIGHT

UDE0065/UDP0065

Adjust ice thickness to meet chart specifications.

Minimum Ice Weight Per Cycle	Maximum Ice Weight Per Cycle
0.44 lbs (200 g)	0.60 lbs (272g)

Notice

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

UDE0080/UDP0080

ICE MAKING SEQUENCE OF OPERATION

Initial start-up or start-up after automatic shut-off

1. **Pressure Equalization**

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

2. **Refrigeration System Start-up**

The compressor starts after the 15-second pressure equalization, and remains on throughout the entire Freeze and Harvest Sequences. The hot gas valve remains on for 5 seconds during initial compressor start-up and then shuts off. At the same time the compressor starts, the condenser fan motor (air-cooled models) is supplied with power throughout the entire Freeze and Harvest Sequences. The fan motor is wired through a fan cycle pressure control, therefore it may cycle on and off. (The compressor and condenser fan motor are wired through the relay. As a result, any time the relay coil is energized, the compressor and fan motor are supplied with power.)

3. **Prechill Cycle**

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

4. **Freeze Cycle**

The water pump starts after the 30-second prechill. An even flow of water is directed across the evaporator and into each cube cell, where it freezes. When sufficient ice has formed, the water flow (not the ice) contacts the ice thickness probe. After approximately 7 seconds of continual water contact, the Harvest Sequence is initiated. The ice machine cannot initiate a Harvest Sequence until a 6-minute freeze time has been surpassed.

5. Harvest Cycle

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

The refrigerant gas warms the evaporator causing the cubes to slide, as a sheet, off the evaporator and into the storage bin. The sliding sheet of cubes contacts the ice damper, opening the bin switch.

The momentary opening and re-closing of the bin switch terminates the Harvest Sequence and returns the ice machine to the Freeze Sequence.

6. Automatic Shut-Off

When the storage bin is full at the end of a Harvest Sequence, the sheet of cubes fails to clear the ice damper and will hold it down. After the ice damper is held open for 7 seconds, the ice machine shuts off. The ice machine remains off for 3 minutes before it can automatically restart.

The ice machine remains off until enough ice has been removed from the storage bin to allow the ice to fall clear of the damper. As the ice damper swings back to the operating position, the bin switch re-closes and the ice machine restarts (steps 1 - 2), provided the 3-minute delay period is complete.

ENERGIZED PARTS CHART

UDE0080/UDP0080

ICE MAKING SEQUENCE OF OPERATION	Control Board Relays			Relay		Length of Time
	1 Water Pump	2 Hot Gas Valve	3 Relay Coil	3A Compressor	3B Compressor Fan Motor*	
Initial Start-up 1. Water purge	off	on	off	off	off	15 seconds
2. Refrigeration System Start-up	off	on	on	on	on	5 seconds
Freeze Sequence 3. Prechill	off	off	on	on	on	30 seconds
4. Freeze	on	off	on	on	on	Until 7 sec. Water contact w/ice thickness probe

ICE MAKING SEQUENCE OF OPERATION	Control Board Relays			Relay		Length of Time
	1 Water Pump	**2 Hot Gas Valve**	**3 Relay Coil**	**3A Compressor**	**3B Compressor Fan Motor***	
Harvest Sequence 5. Harvest	off	on	on	on	on	Bin switch activation
Automatic Shut-off 6. Auto Shut-off	off	off	off	off	off	Until bin switch re-closes

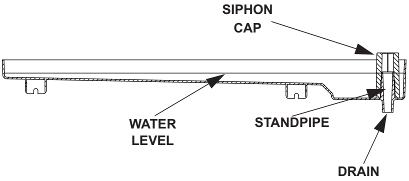
SIPHON SYSTEM CHECK

UDE0080/UDP0080

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

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

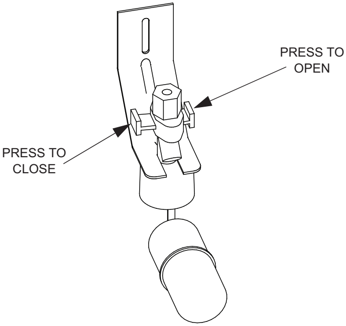
Follow steps 1 through 6 under water level check to verify the siphon system functions correctly.



WATER FLOAT VALVE CHECK

UDE0080/UDP0080

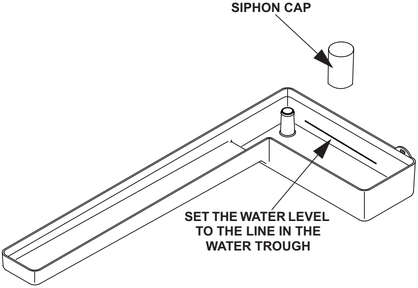
Before water will flow into the water trough the float valve shut-off must be in the OPEN position.



WATER LEVEL CHECK

UDE0080/UDP0080

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



WATER LEVEL CHECK

UDE0080/UDP0080

The float valve is factory-set for the proper water level.

If adjustments are necessary:

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

ICE THICKNESS PROBE ADJUSTMENT

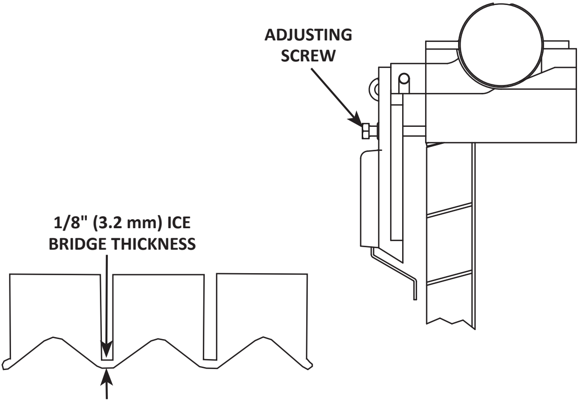
UDE0080/UDP0080

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

NOTE: Make sure the Ice Damper is in place when performing this check. It prevents water from splashing out of the water trough.

1. After a harvest cycle , inspect the bridge connecting the cubes. It should be about 1/8” (3.2 mm) thick.
2. If adjustment is necessary, turn the ice thickness probe adjustment screw clockwise to increase bridge thickness, or counterclockwise to decrease bridge thickness.

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



Ice Thickness Check

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

MINIMUM/MAXIMUM SLAB WEIGHT

UDE0080/UDP0080

Adjust ice thickness to meet chart specifications.

Minimum Ice Weight Per Cycle	Maximum Ice Weight Per Cycle
1.2 lbs (544 g)	1.4 lbs (635g)

Notice

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

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140/190/240/310 Series

See "Troubleshooting" on page 155 for U0065 Series and "Troubleshooting" on page 182 for U0080 Series

PROBLEM CHECKLIST

Problem	Possible Cause	Correction
Ice machine does not operate.	No electrical power to the ice machine.	Replace the fuse/reset the breaker/turn on the main switch/plug power cord into receptacle.
	Ice machine needs to be turned on.	Press the On/Off button to start ice making.
	Damper in open position (down).	Damper must be in upright position and capable of swinging freely.
Ice machine stops, and can be restarted by turning the ice machine OFF/ ON.	Service limit feature stopping the ice machine.	Refer to Service Limit Feature U/UF: page 87 UP: page 93
Ice machine does not release ice or is slow to harvest.	Ice machine is dirty.	Descale and sanitize the ice machine. page 42
	Ice machine is not level.	Level the ice machine. page 28
	Low air temperature around ice machine (air-cooled models).	Air temperature must be at least 40° F (4°C).
	Water regulating valve leaks in harvest mode (water-cooled models).	Replace water regulating valve.
Ice machine does not cycle into harvest mode.	The six-minute freeze time lock-in has not expired yet.	Wait for freeze lock-in to expire.
	Harvest float switch is dirty.	Descale and sanitize the ice machine. page 42
	Harvest float switch wire is disconnected.	Connect the wire.
	Harvest float switch is out of adjustment.	Adjust the harvest float switch. page 220
	Uneven ice fill (thin at top of evaporator).	Refer to Shallow or Incomplete Cubes.

Problem	Possible Cause	Correction
Ice quality is poor (soft or not clear).	Poor incoming water quality.	Test the quality of the incoming water and make appropriate filter recommendations.
	Water filtration is poor.	Replace the filter. page 51
	Ice machine is dirty.	Descale and sanitize the ice machine. page 42
	Water softener is working improperly (if applicable).	Repair the water softener. (if applicable).
Ice machine produces shallow or incomplete cubes, or the ice fill pattern on the evaporator is incomplete.	Ice thickness switch is out of adjustment.	Adjust the ice thickness switch. page 96
	Water trough level is too high or too low.	Check the water level.
	Water filtration is poor.	Replace the filter. page 51
	Hot incoming water.	Connect the ice machine to a cold water supply.
	Incorrect incoming water pressure.	Water pressure must be 20-80 psi (137.9 -551.5 kPa).
	Ice machine is not level.	Level the ice machine. page 28
Low ice capacity.	The condenser is dirty.	Clean the condenser. page 52
	High air temperature around ice machine (air-cooled models).	Air temperature must not exceed 110° F (43°C).
	Inadequate clearance around the ice machine.	Provide adequate clearance.
	Objects stacked around ice machine, blocking condenser airflow.	Remove items blocking airflow.
	Hot incoming water.	Connect to cold water.
	Incorrect incoming water pressure. Water pressure is too low or water filter is restricted.	Water pressure must be 20-80 psi (137.9 -551.5 kPa). Replace water filter.

Problem	Possible Cause	Correction
Ice sheet is thick.	Water trough level is too high.	Adjust ice thickness float. page 96
	Power button was turned off/on during the freeze cycle and ice remained on the evaporator.	Allow ice to thaw and release from the evaporator, then restart.
	Ice damper was opened and closed in the harvest cycle before the ice released	Allow ice to thaw and release from the evaporator, then restart
	Long harvest cycles with repeated service limit indication.	Descale the ice machine & perform diagnostic procedures as required.
	Incoming water pressure is over 80 psig (5 bar, 552 kPa).	Verify incoming water pressure.

CONTROL BOARD TEST MODE

140/190/240/310 SERIES

NOTE: The ice damper/bin switch can be open or closed and does not effect the operation of the test mode.

To enter the test mode press and hold the test switch on the control board for 3 seconds. Refer to “Electronic Control Boards” on page 306 for test button location. The control board test mode performs the following functions for a 2 minute time period:

- Energizes all control board relays
- Energizes all control board lights
- Energizes all touch pad control lights

After the 2 minute test period the control board will complete 500 ice making cycles, then stop.

Canceling a test cycle:

To cancel a test cycle press the test button a second time.

Restarting a test cycle:

The test cycle will restart each time the test button is pressed for a 3 second time period.

OPERATING ICE MACHINE WITH BIN AND TOUCH PAD REMOVED

The ice machine is designed to allow diagnostic procedures to be performed with the bin removed or to run ice making cycles if a touch pad is defective. The touch pad is attached to the bin and is disconnected during the removal process. Use the control board test mode to operate the ice machine without connecting the touch pad. Refer to “Electronic Control Boards” on page 306 for test button location

NOTE: Firmware versions before 2.70 operate for 1 cycle in test mode. Firmware versions after 2.70 operate for 500 cycles in test mode.

Troubleshooting By Symptom

140/190/240/310 SERIES

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

<u>SYMPTOM #1</u>

Ice Machine Stops Running

Ice machine is in Ice Making cycle

or

Has a History of Shutting Down

- Refer to Ice Machine Stops Running diagnostic chart

<u>SYMPTOM #2</u>

Ice Machine has a Long Freeze Cycle

Ice Formation is Thick

or

Thin Ice Fill on Inlet or Outlet of Evaporator

or

Low Production

Service Fault (possible)

- Refer to Freeze Cycle Refrigeration System Operational Analysis Table

<u>SYMPTOM #3</u>

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

Long Harvest (possible)

- Refer to Refrigeration Harvest Flow Chart

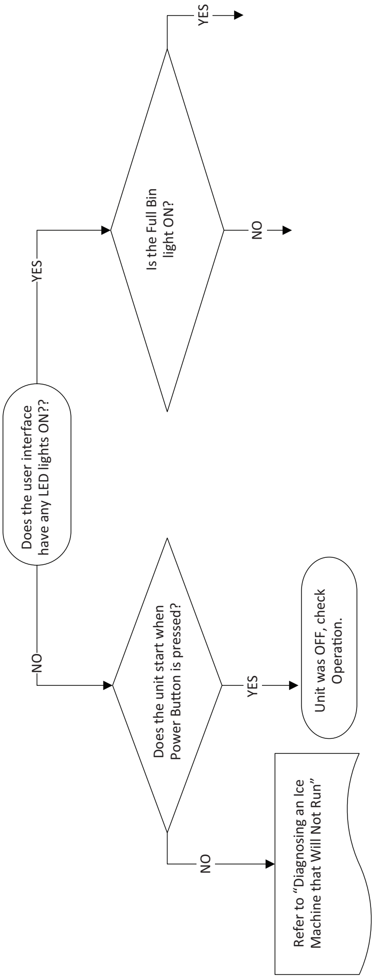
<u>SYMPTOM #4</u>

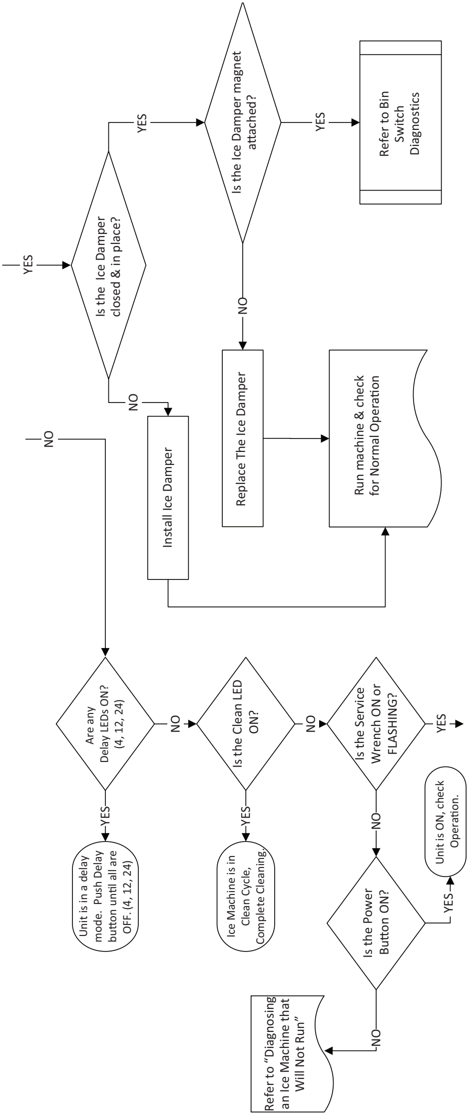
Ice Machine Will Not Harvest - Freeze Cycle is Normal and Ice Cubes are Melted After Harvest

- Refer to Ice Meltout Flow Chart

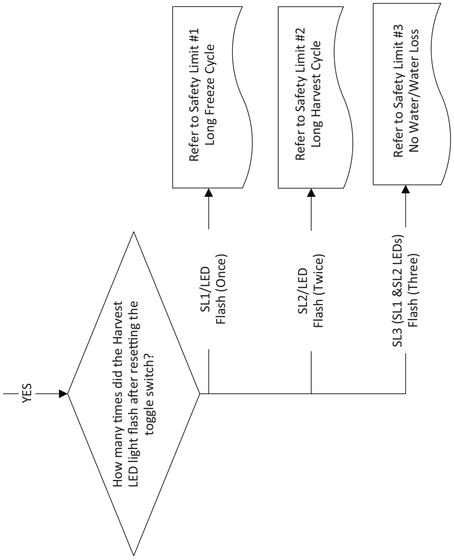
SYMPTOM #1

Ice Machine stops running or has history of shutting down





Are any Delay LEDs ON? (4, 12, 24)
YES
Unit is in a delay mode. Push Delay button until all are OFF. (4, 12, 24)
NO
Is the Clean LED ON?
YES
Ice Machine is in Clean Cycle, Complete Cleaning.
NO
Is the Service Wrench ON or FLASHING?
NO
Is the Power Button ON?
YES
Unit is ON, check Operation.
NO
Refer to "Diagnosing an Ice Machine that Will Not Run"
YES
NO
YES
Is the Ice Damper closed & in place?
NO
Install Ice Damper
YES
Is the Ice Damper magnet attached?
NO
Replace The Ice Damper
YES
Refer to Bin Switch Diagnostics
Run machine & check for Normal Operation


YES
How many times did the Harvest LED light flash after resetting the toggle switch?
SL1/LED Flash (Once)
SL2/LED Flash (Twice)
SL3 (SL1 &SL2 LEDs) Flash (Three)
Refer to Safety Limit #1 Long Freeze Cycle
Refer to Safety Limit #2 Long Harvest Cycle
Refer to Safety Limit #3 No Water/Water Loss

#2 - LOW PRODUCTION, LONG FREEZE CYCLE

140/190/240/310 Series

Ice Machine has a Long Freeze Cycle

Ice Formation is Thick
or
Thin on Inlet or Outlet of Evaporator
or
Low Production

How to Use the Freeze Cycle Refrigeration System Operational Analysis Table

GENERAL

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

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

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

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

PROCEDURE

Step 1 Complete the "Operation Analysis" column.

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

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

Step 2 Enter Checkmarks (√).

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

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

Step 3 Add the Checkmarks listed under each of the four columns. Note the column number with the highest total and proceed to "Final Analysis."

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

Before Beginning Service

Ice machines may experience operational problems only during certain times of the day or night. A machine may function properly while it is being serviced, but malfunctions later. Information provided by the user can help the technician start in the right direction, and may be a determining factor in the final diagnosis.

Ask these questions before beginning service:

- When does the ice machine malfunction? (night, day, all the time, only during the Freeze cycle, etc.)
- When do you notice low ice production? (one day a week, every day, on weekends, etc.)
- Can you describe exactly what the ice machine seems to be doing?
- Has anyone been working on the ice machine?
- During "store shutdown," is the circuit breaker, water supply or air temperature altered?
- Is there any reason why incoming water pressure might rise or drop substantially?

REFRIGERATION ANALYSIS CHART

Operational Analysis	1	2	3	4
Ice Production	Published 24 hour ice production________________ Calculated (actual) 24 hour ice production_______________ NOTE: The ice machine is operating properly if the ice fill pattern is normal and ice production is within 10% of charted capacity.			
Installation and Water System	All installation and water related problems must be corrected before proceeding with chart.			
Ice Formation Pattern	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on entire evaporator	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on entire evaporator	Ice formation is normal -or- Ice formation is extremely thin on the bottom of evaporator -or- No ice formation on evaporator	Ice formation is normal -or- No ice formation on entire evaporator

Operational Analysis	1	2	3	4
Service Limits Refer to “Analyzing Service Limits” to eliminate all non-refrigeration problems.	Stops on service limit: **1 or 2**	Stops on service limit: **1**	Stops on service limit: **1 or 2**	Stops on service limit: **1**
Ice Formation Pattern	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on entire evaporator	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on entire evaporator	Ice formation is normal -or- Ice formation is extremely thin on the bottom of evaporator -or- No ice formation on evaporator	Ice formation is normal -or- No ice formation on entire evaporator
Service Limits Refer to “Analyzing Service Limits” to eliminate all non-refrigeration problems.	Stops on service limit: **1 or 2**	Stops on service limit: **1**	Stops on service limit: **1 or 2**	Stops on service limit: **1**

Operational Analysis	1	2	3	4
Freeze Cycle Discharge Pressure ________ _______ _______ **1 minute Middle End**	If discharge pressure is High or Low, refer to freeze cycle high or low discharge pressure problem checklist to eliminate problems and/or components not listed on this table before proceeding.			
Freeze Cycle Suction Pressure ________ _______ _______ **1 minute Middle End**	If suction pressure is High or Low refer to freeze cycle high or low suction pressure problem checklist to eliminate problems and/or components not listed on this table before proceeding.			
	Suction pressure is **High**	Suction pressure is **Low**	Suction pressure is **High**	Suction pressure is **High**

Operational Analysis	**1**	**2**	**3**	**4**
Harvest Valve	The harvest valve inlet is **HOT** and The compressor discharge line is **HOT**	The harvest valve inlet is **COOL** and The compressor discharge line is **HOT**	The harvest valve inlet is **COOL** and The compressor discharge line is **COOL**	The harvest valve inlet is **COOL** and The compressor discharge line is **HOT**
Discharge Line Temp. Record freeze cycle discharge line temp at the end of freeze cycle.	Discharge line temp **150°F (66°C) or higher** at the end of freeze cycle	Discharge line temp **150°F (66°C) or higher** at the end of freeze cycle	Discharge line temp **less than 150°F (66°C)** at the end of freeze cycle	Discharge line temp **150°F (66°C) or higher** at the end of freeze cycle
Final Analysis Enter total number of boxes checked in each column.	Harvest Valve Leaking	Low On Charge -or- TXV Starving	TXV Flooding	Compressor

ICE MACHINE DOES NOT CYCLE INTO HARVEST WHEN THE HARVEST FLOAT IS DOWN/CLOSED

140/190/240/310 Series

NOTE: The ice machine will make a thick or double slab when a new freeze cycle is started with ice already present on the evaporator.

- The ice damper/bin switch is opened/closed in the harvest cycle before the ice releases.

Remove all ice from the evaporator before starting diagnostic procedures.

Freeze Time Lock-In Feature

The ice machine control system incorporates a freeze time lock-in feature. This prevents the ice machine from short cycling in and out of harvest. The control board locks the ice machine in the freeze cycle for six minutes. After six minutes a harvest cycle can be initiated. To allow the service technician to initiate a harvest cycle without delay, this feature is not used on the first cycle after pressing the power button OFF and back to ON.

Step 1 Disconnect power to the ice machine, remove the electrical panel to allow viewing of the control board lights and pull the wire connector for the harvest float switch through the bulkhead and disconnect. Attach a jumper wire to the wire terminals connected to the control board.

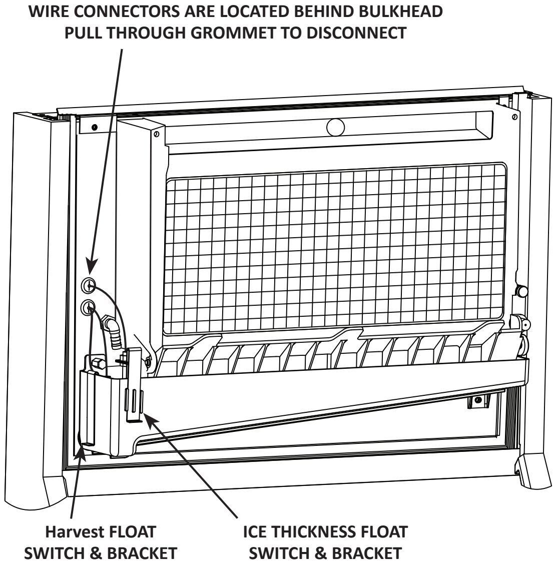
Step 2 Bypass the freeze time lock-in feature by pressing the power button to cycle the ice machine on. Wait until water flows over the evaporator, then refer to chart.

Result	Correction
10 seconds into the freeze cycle the ice machine cycles from freeze to harvest and the control board harvest light energizes.	The ice thickness float switch, connectors or wiring is causing the malfunction.
The harvest light comes on, but the ice machine remains in the freeze cycle.	The ice machine is in a 6 minute freeze lock - Cycle on/off and retest.
The harvest light stays off and the ice machine remains in freeze.	Replace the control board..

ICE MACHINE CYCLES INTO HARVEST BEFORE THE HARVEST FLOAT IS DOWN/CLOSED

140/190/240/310 Series

Step 1 Disconnect power to the ice machine, remove the electrical panel to allow viewing of the control board lights and pull the wire connector for the harvest float switch through the bulkhead and disconnect.



> ⚠ **Caution**
>
> Do not disassemble a float for descaling/sanitizing or troubleshooting. The float magnet is not located in the center of the float and incorrect reassembly will result in an ice machine that will not harvest.

Step 2 Reapply power and press the power button to cycle the ice machine off/on and bypass the freeze time lock-in feature. Wait until water flows over the evaporator, then refer to chart.

Result	Correction
The harvest light does not come on and the ice machine stays in freeze.	The ice thickness float switch, connectors or wiring is causing the malfunction.
10 seconds into the freeze cycle the ice machine cycles from freeze to harvest and the control board harvest light energizes.	Replace the control board.

ICE PRODUCTION CHECK

140/190/240/310 Series

The amount of ice a machine produces directly relates to the operating water and air temperatures. This means an ice machine with a 70°F (21°C) ambient temperature and 50°F (10°C) water produces more ice than the same ice machine with 90°F (32°C) ambient 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 "Cycle Times, 24 Hr. Ice Production and Refrigerant Pressure Charts" on page 251. Use the operating conditions determined in Step 1 to find published 24-Hour Ice Production:_____
   - Times are in minutes.
     Example: 1 min. 15 sec. converts to 1.25 min.
     (15 seconds ÷ 60 seconds = .25 minutes)
   - Weights are in pounds.
     Example: 2 lb. 6 oz. converts to 2.375 lb.
     (6 oz. ÷ 16 oz. = .375 lb.)
3. Perform an ice production check using the formula below.

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

Weighing the ice is the only 100% accurate check.

4. Compare the results of step 3 with step 2. Ice production is normal when these numbers match closely. If they match closely, determine if:
   - Another larger ice machine is required.
   - Relocating the existing equipment to lower the load conditions is required.

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

INSTALLATION/VISUAL INSPECTION CHECKLIST

140/190/240/310 Series

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 Install Manual

WATER SYSTEM CHECKLIST

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

Example: A water dump valve leaking during the freeze cycle, a system low on charge, and a starving TXV have similar symptoms.

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

Water area (evaporator) is dirty

- Descale as needed

Water inlet pressure not between 20 and 80 psig (1–5 bar, 138–552 kPa)

- Install a water regulator valve or increase the water pressure

Incoming water temperature is not between 40°F (3°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

Vent tube is not installed on water outlet drain

- See Installation Instructions

Hoses, fittings, etc., are leaking water

- Repair/replace as needed

Water valve is stuck open, closed or is leaking

- Descale/replace as needed

Water is spraying out of the sump trough area

- Stop the water spray

Uneven water flow across the evaporator

- Descale the ice machine

Water is freezing behind the evaporator

- Correct the water flow

Plastic extrusions and gaskets are not secured to the evaporator

- Remount/replace as need

Water trough will not drain, Clean LED is flashing

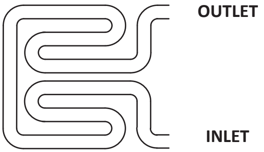
- Verify drain line is installed correctly and unrestricted
- Verify Harvest and Ice Floats are clean
- Refer to float diagnostics

ICE FORMATION PATTERN

140/190/240/310 Series

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

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



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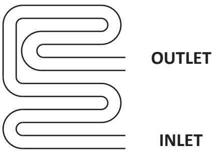

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Examples of Evaporator Tubing Routing

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 at 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 at the inlet. This is normal.

If ice forms uniformly across the evaporator surface, but does not do so in the proper amount of time, this is still considered a normal ice fill pattern.

Extremely Thin at Evaporator Outlet

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

Examples: No ice at all at the outlet of the evaporator, but ice forms at the inlet half of the evaporator. Or, the ice at the outlet of the evaporator reaches the correct thickness, but the outlet of the evaporator already has 1/2” to 1” of ice formation.

Possible cause: Water loss, low on refrigerant, starving TXV, hot water supply, faulty float valve, etc.

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 the correct thickness, but there is no ice formation at all at the inlet of the evaporator.

Possible cause: Insufficient water flow, flooding TXV, etc.

Spotty Ice Formation

There are small sections on the evaporator where there is no ice formation. This could be a single corner, or a single spot in the middle of the evaporator. This is generally caused by loss of heat transfer from the tubing on the backside of the evaporator.

No Ice Formation

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

Possible cause: Water float valve, water pump, starving expansion valve, low refrigerant charge, compressor, etc.

ANALYZING DISCHARGE PRESSURE

140/190/240/310 Series

1. Determine the ice machine operating conditions:

   Air temperature entering condenser ______

   Air temperature around ice machine ______

   Water temperature entering sump trough ______

2. Refer to “Installation/Visual Inspection Checklist” on page 133 for ice machine being checked.

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

   Freeze Cycle ______

   Harvest Cycle ______

3. Perform an actual discharge pressure check.

	Freeze Cycle PSIG	**Harvest Cycle PSIG**
Beginning of Cycle	__________	__________
Middle of Cycle	__________	__________
End of Cycle	__________	__________

4. Compare the actual discharge pressure (Step 3) with the published discharge pressure (Step 2).

The discharge pressure is normal when the actual pressure falls within the published pressure range for the ice machine’s operating conditions. It is normal for the discharge pressure to be higher at the beginning of the freeze cycle (when load is greatest), then drops throughout the freeze cycle.

Discharge Pressure High Checklist

Improper Installation

- Refer to "Installation/Visual Inspection Checklist" on page 133

Restricted Condenser Air Flow

- High inlet air temperature
- Condenser discharge air re-circulation
- Dirty condenser fins
- Defective fan cycling control
- Defective fan motor

Improper Refrigerant Charge

- Overcharged
- Non-condensible in system
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- High side refrigerant lines/component restricted (before mid-condenser)

Freeze Cycle Discharge Pressure Low Checklist

Improper Installation

- Refer to "Installation/Visual Inspection Checklist" on page 133

Improper Refrigerant Charge

- Undercharged
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- High side refrigerant lines/component restricted (before mid-condenser)
- Defective fan cycle control

ANALYZING SUCTION PRESSURE

140/190/240/310 Series

The suction pressure gradually drops throughout the freeze cycle. The actual suction pressure (and drop rate) changes as the air and water temperature entering the ice machine changes. These variables also determine the freeze cycle times.

To analyze and identify the proper suction pressure drop throughout the freeze cycle, compare the published suction pressure to the published freeze cycle time.

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

Procedure

Step
1. Determine the ice machine operating conditions. *Example:* *Air temperature entering condenser: 90°F/32.2°C* *Air temperature around ice machine: 80°F/26.7°C* *Water temperature entering water fill valve: 70°F/21.1°C*
2A. Refer to “Cycle Time” and “Operating Pressure” charts for ice machine model being checked. Using operating conditions from Step 1, determine published freeze cycle time and published freeze cycle suction pressure. *Example:* *Published freeze cycle time: 14.8 - 15.9 minutes* *Published freeze cycle suction pressure: 65 - 26 psig*
2B. Compare the published freeze cycle time and published freeze cycle suction pressure. Develop a chart. *Example:* <u>*Published Freeze Cycle Time (minutes)*</u> <u>*Published Freeze Cycle Suction Pressure (psig)*</u> *In the example, the proper suction pressure should be approximately 39 psig at 7 minutes; 30 psig at 12 minutes; etc.*

Step
3. Perform an actual suction pressure check at the beginning, middle and end of the freeze cycle. Note the times at which the readings are taken. *Example:* *Manifold gauge set was connected to the example ice machine and suction pressure readings taken as follows: ________ PSIG* *Beginning of freeze cycle: 79 (at 1 min.)* *Middle of freeze cycle: 48 (at 7 min.)* *End of freeze cycle: 40 (at 14 min.)*
4. Compare the actual freeze cycle suction pressure (Step 3) to the published freeze cycle time and pressure comparison (Step 2B). Determine if the suction pressure is high, low or acceptable. *Example:* *In this example, the suction pressure is considered high throughout the freeze cycle. It should have been:* *Approximately 65 psig (at 1 minute) – not 79* *Approximately 39 psig (at 7 minutes) – not 48* *Approximately 26 psig (at 14 minutes) – not 40*

Suction Pressure High Checklist

140/190/240/310 Series

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 133

Discharge Pressure

- Discharge pressure is too high, and is affecting suction pressure, refer to “Discharge Pressure High Checklist” on page 138.

Improper Refrigerant Charge

- Overcharged
- Wrong type of refrigerant
- Non-condensible in system

Other

- Non-Manitowoc components in system
- Harvest valve leaking
- TXV flooding (check bulb mounting)
- Defective compressor

Suspension Pressure Low Checklist

HARVEST VALVE

140/190/240/310 Series

The harvest valve is an electrically operated valve that opens when energized, and closes when de-energized.

Normal Operation

The valve is de-energized (closed) during the freeze cycle and energized (open) during the harvest cycle. The valve is positioned between the receiver and the evaporator and performs two functions:

1. Prevents refrigerant from entering the evaporator during the freeze cycle.

   The harvest valve is not used during the freeze cycle. The harvest valve is de-energized (closed) preventing refrigerant flow from the receiver into the evaporator.

2. Allows refrigerant vapor to enter the evaporator in the harvest cycle.

   During the harvest cycle, the harvest valve is energized (open) allowing refrigerant gas from the discharge line of the compressor to flow into the evaporator. The heat is absorbed by the evaporator and allows release of the ice slab.

Exact pressures vary according to ambient temperature and ice machine model. Harvest pressures can be found in the “Cycle Times, 24 Hr. Ice Production and Refrigerant Pressure Charts” on page 251.

Harvest Valve Analysis

The valve can fail in two positions:

- Valve will not open in the harvest cycle.
- Valve remains open during the freeze cycle.

VALVE WILL NOT OPEN IN THE HARVEST CYCLE

Although the circuit board has initiated a harvest cycle, the evaporator temperature remains unchanged from the freeze cycle.

VALVE REMAINS OPEN IN THE FREEZE CYCLE:

Symptoms of a harvest valve remaining partially open during the freeze cycle can be similar to symptoms of an expansion valve, float valve or compressor problem. Symptoms are dependent on the amount of leakage in the freeze cycle.

A small amount of leakage will cause increased freeze times and an ice fill pattern that is "Thin at the Outlet", but fills in at the end of the cycle.

As the amount of leakage increases the length of the freeze cycle increases and the amount of ice at the outlet of the evaporator decreases.

Refer to the Parts Manual for proper valve application. If replacement is necessary, use only "original" Manitowoc replacement parts.

Use the following procedure and table to help determine if a harvest valve is remaining partially open during the freeze cycle.

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

Important

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

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

3. Feel the compressor discharge line.

⚠ Warning

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

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

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

5. Record your findings on the table.

COMPARING EVAPORATOR INLET/OUTLET TEMPERATURES 140/190/240/310 Series

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

The actual temperatures entering and leaving the evaporator vary by model, and change throughout the freeze cycle. This makes documenting the "normal" inlet and outlet temperature readings difficult. The key to the diagnosis lies in the difference between the two temperatures five minutes into the freeze cycle. These temperatures must be within 7°F (4°C) of each other.

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

1. Use a quality temperature meter, capable of taking temperature readings on curved copper lines.
2. Attach the temperature meter sensing device to the copper lines entering and leaving the evaporator.

Important

Do not simply insert the sensing device under the insulation. It must be attached to and reading the actual temperature of the copper line.

3. Wait five minutes into the freeze cycle.
4. Record the temperatures below and determine the difference between them.

____________ Inlet Temperature	____________ Difference must be within 7°F (4°C) at 5 minutes into the freeze cycle	____________ Outlet Temperature

5. Use this with other information gathered on the Refrigeration System Operational Analysis Table to determine the ice machine malfunction.

DISCHARGE LINE TEMPERATURE ANALYSIS

140/190/240/310 Series

Knowing if the discharge line temperature is increasing, decreasing or remaining constant can be an important diagnostic tool. Maximum compressor discharge line temperature on a normally operating ice machine steadily increases throughout the freeze cycle. Comparing the temperatures over several cycles will result in a consistent maximum discharge line temperature.

Ambient air temperatures affect the maximum discharge line temperature.

Higher ambient air temperatures at the condenser = higher discharge line temperatures at the compressor.

Lower ambient air temperatures at the condenser = lower discharge line temperatures at the compressor.

Regardless of ambient temperature, the freeze cycle discharge line temperature will be higher than 150°F (66°C) on a normally operating ice machine.

PROCEDURE

Connect a temperature probe on the compressor discharge line within 6” (15.2 cm) of the compressor. Observe the discharge line temperature for the last three minutes of the freeze cycle and record the maximum discharge line temperature.

Discharge Line Temperature Above 150°F (66°C) at End of Freeze Cycle:

Ice machines that are operating normally will have consistent maximum discharge line temperatures above 150°F (66°C).

Verify the expansion valve sensing bulb is positioned and secured correctly.

Discharge Line Temperature Below 150°F (66°C) at End of Freeze Cycle

Ice machines that have a flooding expansion valve will have a maximum discharge line temperature that decreases each cycle.

Verify the expansion valve sensing bulb is 100% insulated and sealed airtight. Condenser air contacting an incorrectly insulated sensing bulb will cause overfeeding of the expansion valve.

Final Analysis

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

Column 1 – Harvest Valve Leaking

A leaking harvest valve must be replaced.

Column 2 – Low Charge/TXV Starving

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

Add refrigerant charge in 2 oz. increments as a diagnostic procedure to verify a low charge. (Do not add more than the total charge of refrigerant). If the problem is corrected, the ice machine is low on charge. 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, evacuate the system and weigh in the proper charge.

If the problem is not corrected by adding charge, the expansion valve is faulty.

Column 3 – TXV Flooding

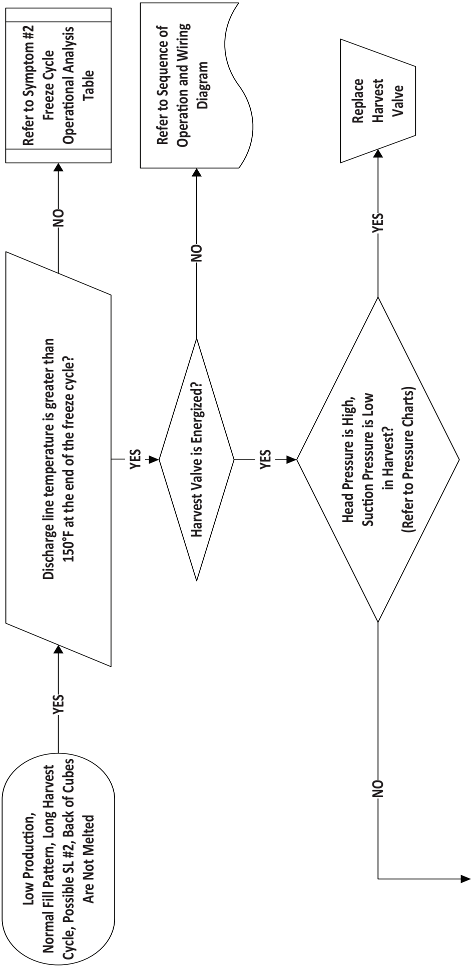
A loose or improperly mounted expansion valve bulb causes the expansion valve to flood. Check bulb mounting, insulation, etc., before changing the valve.

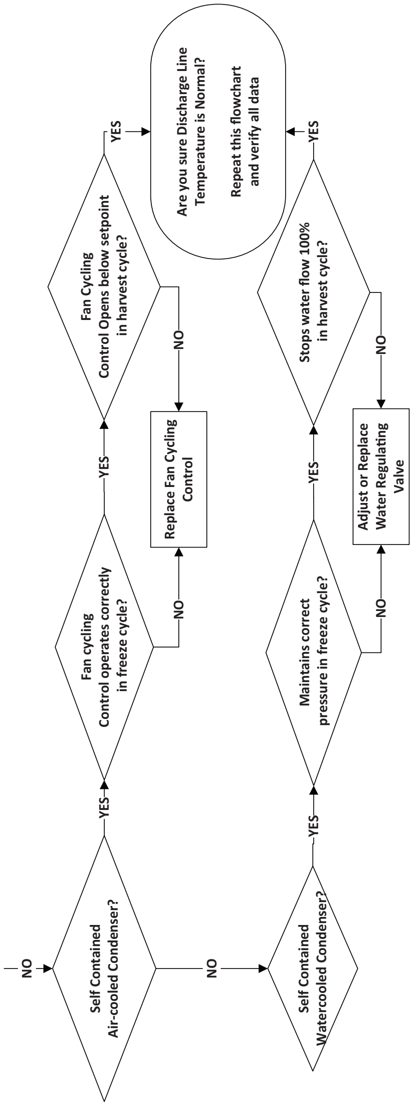
Column 4 – Compressor

Replace the compressor and start components. To receive warranty credit, the compressor ports must be properly sealed by crimping and soldering them closed. Old start components must be returned with the faulty compressor.

SYMPTOM #3

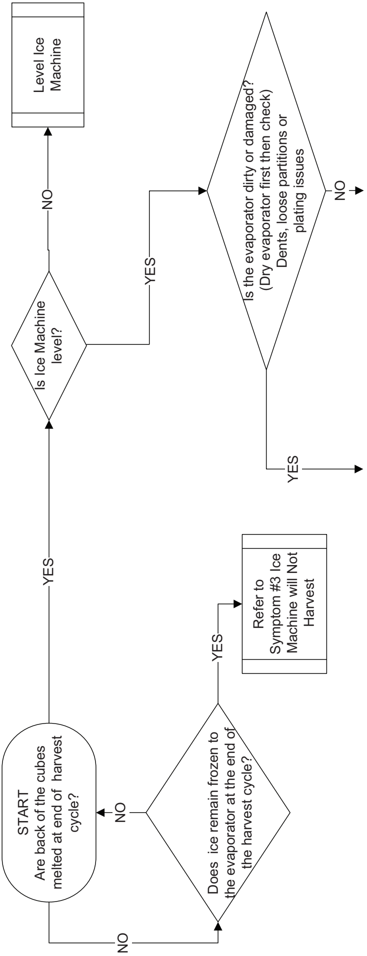
Ice Machine Will Not Harvest – Freeze Cycle Is Normal and Ice Cubes Are Not Melted After Harvest

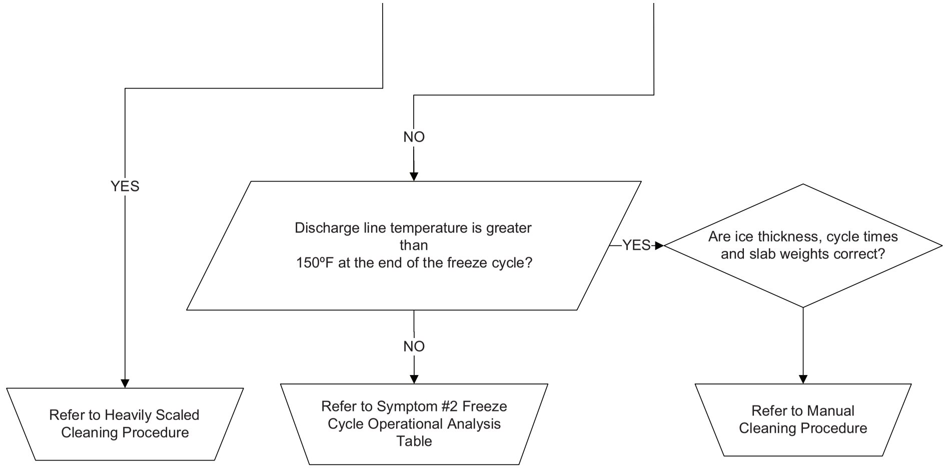



NO
Self Contained Air-cooled Condenser?
YES
Fan cycling Control operates correctly in freeze cycle?
YES
Fan Cycling Control Opens below setpoint in harvest cycle?
YES
Are you sure Discharge Line Temperature is Normal?
Repeat this flowchart and verify all data
NO
Replace Fan Cycling Control
NO
NO
Self Contained Watercooled Condenser?
YES
Maintains correct pressure in freeze cycle?
YES
Stops water flow 100% in harvest cycle?
YES
NO
Adjust or Replace Water Regulating Valve
NO

SYMPTOM #4

Ice Machine Will Not Harvest – Freeze Cycle is Normal and Ice Cubes Are Not Melted After Harvest





*A damaged evaporator may not be repairable. For example: the top molding assembly is replaceable however the side moldings and/or the evaporator grid is not repairable.

Troubleshooting

UDE0065/UDP0065

PROBLEM CHECKLIST

Problem	Possible Cause	Correction
Ice machine does not operate	No electrical power to the ice machine.	Replace the fuse/reset the breaker/turn on the main switch/plug power cord into receptacle.
	Toggle switch set improperly.	Move the toggle switch to the ON position.
	Low air temperature around ice machine.	Air temperature must be at least 50°F (10°C).
Ice machine does not release ice or is slow to harvest.	Ice machine is dirty.	Descale and sanitize the ice machine. (page 46)
	Ice machine is not level.	Level the ice machine. (page 23)
	Low air temperature around ice machine (air-cooled models).	Air temperature must be at least 50° F (10°C).
Ice quality is poor (soft or not clear).	Poor incoming water quality.	Test the quality of the incoming water and make appropriate filter recommendations.
	Ice machine is dirty.	Descale and sanitize the ice machine. (page 46)
	Water inlet valve filter screen is dirty.	Remove the water inlet valve and clean the filter screen.
	Water softener is working improperly (if applicable).	Repair the water softener.
Ice machine produces shallow or incomplete cubes, or the ice fill pattern on the evaporator is incomplete.	Water level is low.	Confirm the overflow tube is fully seated to prevent water leakage.
	Water inlet valve filter screen is dirty.	Remove the water inlet valve and clean the filter screen.
	Hot incoming water.	Connect the ice machine to a cold water supply.
	Ice thickness adjustment dial is not set properly.	Adjust the ice thickness adjustment dial. (page 97)
	Incorrect incoming water pressure.	Water pressure must be 34.8 psi - 89.9 psi (240 kPa - 620 kPa).
	Ice machine is not level.	Level the ice machine. (page 23)

Problem	Possible Cause	Correction
Low ice capacity.	Water inlet valve filter screen is dirty.	Remove the water inlet valve and clean the filter screen.
	Incoming water supply is off.	Open the water service valve.
	The air filter is dirty.	Clean the air filter. (page 65)
	The condenser is dirty.	Clean the condenser. (page 65)
	Inadequate airflow at the front of the ice machine.	Remove items blocking airflow at the front of the ice machine.
	Ice thickness adjustment dial is not set properly.	Adjust the ice thickness adjustment dial. (page 97)

DIAGNOSING AN ICE MACHINE THAT WILL NOT RUN

⚠ Warning

High (line) voltage is applied to the control board (terminals #2 and #8) at all times. Removing control board fuse or moving the toggle switch to OFF will not remove the power supplied to the control board.

1. Verify primary voltage is supplied to ice machine and the fuse/circuit breaker is closed.
2. Verify the jumper wire is installed and control board fuse is okay. If the bin switch light functions, the jumper wire and fuse are okay .
3. Verify the bin switch functions properly. A defective bin switch can falsely indicate a full bin of ice.
4. Verify ON/OFF/WASH toggle switch functions properly. A defective toggle switch may keep the ice machine in the OFF mode.
5. Verify low DC voltage is properly grounded. Loose DC wire connections may intermittently stop the ice machine.
6. Replace the control board - Be sure Steps 1 – 5 were followed thoroughly. Intermittent problems are not usually related to the control board.

NOTE: If replacing control board, the jumper wire from the old control board must be installed on the new control board.

REFRIGERATION DIAGNOSTICS OVERVIEW

UDE0065/UDP0065

65 Series ice machines have a very small refrigerant charge and we do not recommend diagnosing the ice machine using refrigerant pressures. For this reason refrigeration access fittings are not installed during production and the ice machine is diagnosed with temperatures.

Verify that your water flow is even across the entire evaporator before diagnosing the refrigeration system. Mineral build-up on the evaporator assembly can cause water tracking and an erratic ice fill pattern. Descale with Manitowoc Ice Machine cleaner/descaler to remove any mineral buildup before diagnosing the refrigeration system.

The following can be used for diagnostics:

1. Install a temperature lead on the compressor suction line within 6” of the compressor.
2. Install a temperature lead on the compressor discharge line within 6” of the compressor
3. Refer to the “Cycle Times, 24 Hr. Ice Production and Refrigerant Pressure Charts” on page 251 to determine the correct temperature operating range for your air and water temperature.
4. Record the temperatures throughout the freeze and harvest cycles.

NOTE: First cycle is not used for refrigeration system diagnostics. Run a minimum of two cycles to allow the system to stabilize and record the second cycle.

Normal Operation

Example below is for normal operation at 86°F (30°C) air temperature 68°F (20°C) water temperature.

FREEZE CYCLE

- Normal suction line temperature at the compressor will range from 86°F (30°C) three minutes into the cycle to 8°F (-13°C) at the end of the freeze cycle.
- Normal discharge line temperature at the compressor will range from 168°F (76°C) to 140°F (60°C) through the freeze cycle.

HARVEST CYCLE

Suction line temperature at the compressor will range from 64°F (18°C) to 111°F (44°C) through the harvest cycle. An obstructed capillary tube will not effect suction line temperature range during the harvest cycle. Low refrigerant charge will have a lower temperature than normal.

Discharge line temperature at the compressor will range from 180°F (82°C) to 150°F (60°C) through the harvest cycle.

Ice fill pattern will vary depending on severity of the obstruction or refrigeration loss. Ice fill patterns will range from no ice on the entire evaporator to thin only at the evaporator outlet (thin at the bottom, thick at the top of the evaporator).

Abnormal temperatures

Higher than normal freeze cycle temperatures.

- A dirty filter or condenser will result in higher than normal temperatures. Always clean the filter and condenser before diagnosing the refrigeration system.
- Hot water entering the ice machine will result in high suction and discharge line temperatures in the freeze cycle.

Capillary tube failures or low refrigerant charge will always result in a starving evaporator.

- An obstructed capillary tube or low refrigerant charge will have a suction line temperature higher than normal.
- An obstructed capillary tube or low refrigerant charge will have a discharge line temperature lower than normal.
- An obstructed capillary tube will not effect the discharge line temperature during the harvest cycle. A low freeze and discharge line temperature in the freeze cycle with a normal harvest cycle discharge line temperature indicates an obstructed capillary tube.
- Low refrigerant charge will have both the suction and discharge line temperatures lower than normal in the freeze and harvest cycles.

ICE PRODUCTION CHECK

UDE0065/UDP0065

The amount of ice a machine produces directly relates to the operating water and air temperatures. This means an ice machine with a 70°F (21°C) ambient temperature and 50°F (10°C) water produces more ice than the same ice machine with 90°F (32°C) ambient 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 "Cycle Times, 24 Hr. Ice Production and Refrigerant Pressure Charts" on page 251. Use the operating conditions determined in Step 1 to find published 24-Hour Ice Production:_____
   - Times are in minutes.
     Example: 1 min. 15 sec. converts to 1.25 min.
     (15 seconds ÷ 60 seconds = .25 minutes)
   - Weights are in pounds.
     Example: 2 lb. 6 oz. converts to 2.375 lb.
     (6 oz. ÷ 16 oz. = .375 lb.)
3. Perform an ice production check using the formula below.

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

Weighing the ice is the only 100% accurate check.

4. Compare the results of step 3 with step 2. Ice production is normal when these numbers match closely. If they match closely, determine if:
    - Another larger ice machine is required.
    - Relocating the existing equipment to lower the load conditions is required.

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

INSTALLATION/VISUAL INSPECTION CHECKLIST

UDE0065/UDP0065

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

WATER SYSTEM CHECKLIST

UDE0065/UDP0065

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

- Descale as needed

Water inlet pressure not between 20 and 80 psig (1–5 bar, 138–552 kPa)

- Install a water regulator valve or increase the water pressure

Incoming water temperature is not between 40°F (3°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

Vent tube is not installed on water outlet drain

- See Installation Instructions

Hoses, fittings, etc., are leaking water

- Repair/replace as needed

Water valve is stuck open, closed or is leaking

- Descale/replace as needed

Continued Next Page

Water is spraying out of the sump trough area

- Stop the water spray

Water is leaking through the sump trough overflow

- Set the water level 1/4”-3/8” below standpipe

Uneven water flow across the evaporator

- Descale the ice machine

Water is freezing behind the evaporator

- Correct the water flow

Plastic extrusions and gaskets are not secured to the evaporator

- Remount/replace as needed.

Refrigeration Diagnostics UDE0065/UDP0065

Perform the procedures on the preceding pages before performing refrigeration diagnostics. The first pages cover an overview of the diagnostic procedures followed by diagnostics checklists.

Install thermometer thermocouples on Suction and Discharge line:

- Digital thermometers with remote thermocouples must be used to obtain temperatures.
- Suction and Discharge line thermocouples must be within 3” (76.2 mm) of the compressor.
- Thermocouples must be insulated.
- Doors and all panels must be in place.
- Initial freeze cycle is not used for diagnostics.
- Start monitoring temperatures 3 minutes into the second freeze cycle.

Compare Suction and Discharge temperatures to your model in the charts starting on page 251.

The charts list normal suction and discharge temperatures.

Analysis

Discharge Line Temp	Suction Line Temp	Ice Fill Pattern	Refer to Diagnostics for:
Normal	Normal	Less fill on the left side of the evaporator	This is normal operation
Low (20°F [-7°C] or more)	Low 20°F (-7°C) or more)	Less fill on the left side of the evaporator	Expansion Valve Flooding
Normal or High	High 10°F (-12°C) or more)	Less fill on the left side and top 2 rows of the evaporator	Low on Refrigerant or Expansion Valve Starving
Normal	Low 5°F (-15°C) or less)	Less fill on the left side of the evaporator	Refrigerant Overcharge

FLOODING EXPANSION VALVE SYMPTOMS

A flooding expansion valve will have discharge and suction line temperatures 20°F (-7°C) lower than normal freeze cycle temperatures. Normal suction line temperature and low discharge line temperature DO NOT verify a flooding valve. Both discharge line temperature and suction line temperature must be low to verify a flooding expansion valve. Ice fill pattern is thin on the left hand side of the evaporator.

STARVING EXPANSION VALVE/LOW REFRIGERANT CHARGE SYMPTOMS:

A. Ice Fill Pattern

- Thin on top two rows of the evaporator
- Thin on entire left side of the evaporator
- Thick on the bottom of the evaporator

B. Freeze time longer than normal

Diagnosis can be confirmed by adding installing a temporary access valve and adding 2 oz (56.7 g) of refrigerant: If the suction line temperature drops or the ice fill pattern on the top two rows fills in, the ice machine is low on refrigerant. Refer to charging procedures for access valve installation/removal procedure.

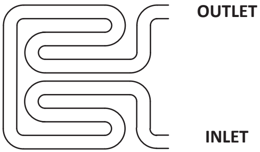
OVERCHARGED SYSTEM SYMPTOMS

Suction line temperature will be slightly low during freeze cycle 5°F (-15°C). Discharge line temperature is normal. Actual amperage readings will be higher than nameplate rating.

ANALYZING ICE FORMATION PATTERN

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

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



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 at 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 at the inlet. This is normal.

If ice forms uniformly across the evaporator surface, but does not do so in the proper amount of time, this is still considered a normal ice fill pattern.

Extremely Thin at Evaporator Outlet

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

Examples: No ice at all at the outlet of the evaporator, but ice forms at the inlet half of the evaporator. Or, the ice at the outlet of the evaporator reaches the correct thickness, but the outlet of the evaporator already has 1/2” to 1” of ice formation.

Possible cause: Water loss, low on refrigerant, starving TXV, hot water supply, faulty float valve, etc.

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 the correct thickness, but there is no ice formation at all at the inlet of the evaporator.

Possible cause: Insufficient water flow, flooding TXV, etc.

Spotty Ice Formation

There are small sections on the evaporator where there is no ice formation. This could be a single corner, or a single spot in the middle of the evaporator. This is generally caused by loss of heat transfer from the tubing on the backside of the evaporator.

No Ice Formation

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

Possible cause: Water float valve, water pump, starving expansion valve, low refrigerant charge, compressor, etc.

ANALYZING DISCHARGE LINE TEMPERATURE

UDE0065/UDP0065

1. Determine the ice machine operating conditions:

   Air temperature entering condenser ______

   Air temperature around ice machine ______

   Water temperature entering sump trough ______

2. Refer to "Installation/Visual Inspection Checklist" on page 163 for ice machine being checked.

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

   Freeze Cycle ______

   Harvest Cycle ______

3. Perform an actual discharge temperature check.

	Freeze Cycle Temperature	**Harvest Cycle Temperature**
Beginning of Cycle	__________	__________
Middle of Cycle	__________	__________
End of Cycle	__________	__________

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

The discharge temperature is normal when the actual temperature falls within the published temperature range for the ice machine's operating conditions. It is normal for the discharge temperature to be lower at the beginning of the freeze cycle, then climb through out the freeze cycle.

Discharge Line Temperature High Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 163

Restricted Condenser Air Flow

- High inlet air temperature
- Condenser discharge air re-circulation
- Dirty condenser fins
- Defective fan cycling control
- Defective fan motor

Improper Refrigerant Charge

- Overcharged
- Non-condensible in system
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- High side refrigerant lines/component restricted (before mid-condenser)

Freeze Cycle Discharge Temperature Low Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 163

Improper Refrigerant Charge

- Undercharged
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- High side refrigerant lines/component restricted (before mid-condenser)
- Defective fan cycle control

ANALYZING SUCTION LINE TEMPERATURE

UDE0065/UDP0065

The suction line temperature gradually drops throughout the freeze cycle. The actual suction temperature (and drop rate) changes as the air and water temperature entering the ice machine changes. These variables also determine the freeze cycle times. To analyze and identify the proper suction temperature drop throughout the freeze cycle, compare the published suction temperature to the published freeze cycle time.

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

1. Determine the ice machine operating conditions:

   Air temperature entering condenser ______

   Air temperature around ice machine ______

   Water temperature entering sump trough ______

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

   Freeze Cycle ______

   Harvest Cycle ______

2. Perform an actual suction temperature check.

	Freeze Cycle Temperature	Harvest Cycle Temperature
Beginning of Cycle	__________	__________
Middle of Cycle	__________	__________
End of Cycle	__________	__________

3. Compare the actual suction temperature (Step 3) with the published suction temperature (Step 2).

The suction temperature is normal when the actual temperature falls within the published temperature range for the ice machine's operating conditions. It is normal for the suction temperature to be higher at the beginning of the freeze cycle, then drop through out the freeze cycle.

Suction Temperature High Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 163

Discharge Pressure

- Discharge temperature is too high, and is affecting suction temperature, refer to “Discharge Line Temperature High Checklist” on page 171.

Improper Refrigerant Charge

- Overcharged
- Wrong type of refrigerant
- Non-condensible in system

Other

- Non-Manitowoc components in system
- Harvest valve leaking
- TXV flooding (check bulb mounting)
- Defective compressor

Suction Temperature Low Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 163

Discharge Pressure

- Discharge temperature is too low, and is affecting suction temperature, refer to “Freeze Cycle Discharge Temperature Low Checklist” on page 171.

Improper Refrigerant Charge

- Undercharged
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- Improper water supply over evaporator refer to ”Water System Checklist” on page 164.
- Loss of heat transfer from tubing on back side of evaporator
- Restricted/plugged liquid line drier
- Restricted/plugged tubing in suction side of refrigeration system
- TXV starving

NOTE: Do not limit your diagnosis to only the items listed in the checklists.

COMPARING EVAPORATOR INLET/OUTLET TEMPERATURES

UDE0065/UDP0065

The temperatures of the suction line entering and leaving the evaporator alone cannot diagnose an ice machine. However, comparing these temperatures during the freeze cycle can help diagnose an ice machine malfunction.

The actual temperatures entering and leaving the evaporator vary by model, and change throughout the freeze cycle. This makes documenting the “normal” inlet and outlet temperature readings difficult. The key to the diagnosis lies in the difference between the two temperatures five minutes into the freeze cycle. These temperatures must be within 7°F (4°C) of each other.

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

1. Use a quality temperature meter, capable of taking temperature readings on curved copper lines.
2. Attach the temperature meter sensing device to the copper lines entering and leaving the evaporator.

Important

Do not simply insert the sensing device under the insulation. It must be attached to and reading the actual temperature of the copper line.

3. Wait five minutes into the freeze cycle.
4. Record the temperatures below and determine the difference between them.

____________ Inlet Temperature	____________ Difference must be within 7°F (4°C) at 5 minutes into the freeze cycle	____________ Outlet Temperature

5. Use this with other information gathered on the Refrigeration System Operational Analysis Table to determine the ice machine malfunction.

DISCHARGE LINE TEMPERATURE ANALYSIS

UDE0065/UDP0065

Knowing if the discharge line temperature is increasing, decreasing or remaining constant can be an important diagnostic tool. Maximum compressor discharge line temperature on a normally operating ice machine steadily increases throughout the freeze cycle. Comparing the temperatures over several cycles will result in a consistent maximum discharge line temperature.

Ambient air temperatures affect the maximum discharge line temperature.

Higher ambient air temperatures at the condenser = higher discharge line temperatures at the compressor.

Lower ambient air temperatures at the condenser = lower discharge line temperatures at the compressor.

Regardless of ambient temperature, the freeze cycle discharge line temperature will be higher than 150°F (66°C) on a normally operating ice machine.

PROCEDURE

Connect a temperature probe on the compressor discharge line within 6” (15.2 cm) of the compressor. Observe the discharge line temperature for the last three minutes of the freeze cycle and record the maximum discharge line temperature.

Discharge Line Temperature Above 150°F (66°C) at End of Freeze Cycle:

Ice machines that are operating normally will have consistent maximum discharge line temperatures above 150°F (66°C).

Verify the expansion valve sensing bulb is positioned and secured correctly.

Discharge Line Temperature Below 150°F (66°C) at End of Freeze Cycle

Ice machines that have a flooding expansion valve will have a maximum discharge line temperature that decreases each cycle.

Verify the expansion valve sensing bulb is 100% insulated and sealed airtight. Condenser air contacting an incorrectly insulated sensing bulb will cause overfeeding of the expansion valve.

HARVEST VALVE

UDE0065/UDP0065

The harvest valve is an electrically operated valve that opens when energized, and closes when de-energized.

Normal Operation

The valve is de-energized (closed) during the freeze cycle and energized (open) during the harvest cycle. The valve is positioned between the and the evaporator and performs two functions:

1. Prevents refrigerant from entering the evaporator during the freeze cycle.

   The harvest valve is not used during the freeze cycle. The harvest valve is de-energized (closed) preventing refrigerant flow from the receiver into the evaporator.

2. Allows refrigerant vapor to enter the evaporator in the harvest cycle.

   During the harvest cycle, the harvest valve is energized (open) allowing refrigerant gas from the discharge line of the compressor to flow into the evaporator. The heat is absorbed by the evaporator and allows release of the ice slab.

Exact temperatures vary according to ambient temperature and ice machine model.

Harvest Valve Analysis

The valve can fail in two positions:

- Valve will not open in the harvest cycle.
- Valve remains open during the freeze cycle.

VALVE WILL NOT OPEN IN THE HARVEST CYCLE

Although the circuit board has initiated a harvest cycle, the evaporator temperature remains unchanged from the freeze cycle.

VALVE REMAINS OPEN IN THE FREEZE CYCLE:

Symptoms of a harvest valve remaining partially open during the freeze cycle can be similar to symptoms of an expansion valve, float valve or compressor problem. Symptoms are dependent on the amount of leakage in the freeze cycle.

A small amount of leakage will cause increased freeze times and an ice fill pattern that is “Thin at the Outlet”, but fills in at the end of the cycle.

As the amount of leakage increases the length of the freeze cycle increases and the amount of ice at the outlet of the evaporator decreases.

Refer to the Parts Manual for proper valve application. If replacement is necessary, use only “original” Manitowoc replacement parts.

Use the following procedure and table to help determine if a harvest valve is remaining partially open during the freeze cycle.

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

Important

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

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

3. Feel the compressor discharge line.

⚠ Warning

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

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

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

Troubleshooting

UDE0080/UDP0080

PROBLEM CHECKLIST

Problem	Possible Cause	Correction
Ice machine does not operate	No electrical power to the ice machine.	Replace the fuse/reset the breaker/turn on the main switch/plug power cord into receptacle.
	ON/OFF/WASH toggle switch set improperly.	Move the toggle switch to the ON position.
	Damper in open position (down).	Damper must be in upright position and capable of swinging freely.
Ice machine stops, and can be restarted by turning the ice machine OFF/ ON.	Service Limit stopping the ice machine.	Refer to “Service Limits”. (page 184)
Ice machine does not release ice or is slow to harvest.	Ice machine is dirty.	De-scale and sanitize the ice machine. (page 66)
	Ice machine is not level.	Level the ice machine. (page 23)
	Low air temperature around ice machine.	Air temperature must be at least 35° (2°C).
Ice machine does not cycle into harvest mode.	The six-minute freeze time lock-in has not expired yet.	Wait for the freeze lock-in to expire.
	Ice thickness probe is dirty.	De-scale and sanitize the ice machine. (page 66)
	Ice thickness probe wire is disconnected.	Connect the probe wire to the control board.
	Ice thickness probe is out of adjustment.	Adjust the ice thickness probe. (page 110)
	Uneven ice fill (thin at the top of evaporator).	Verify sufficient water level in sump trough. Contact a qualified service company to check refrigeration system.

Problem	Possible Cause	Correction
Ice quality is poor (soft or not clear).	Poor incoming water quality.	Contact a qualified service company to test the quality of the incoming water and make appropriate water filter recommendations.
	Ice machine is dirty.	De-scale and sanitize the ice machine. (page 66)
	Water siphon is not working.	Check the water siphon system.
	Water softener is working improperly (if applicable).	Repair the water softener.
Ice machine produces shallow or incomplete cubes, or the ice fill pattern on the evaporator is incomplete.	Ice thickness probe is out of adjustment.	Adjust the ice thickness probe. (page 110)
	Water trough level is too high or too low.	Check the water level probe position.
	Water float valve filter screen is dirty.	Remove and clean the filter screen.
	Hot incoming water.	Connect the ice machine to a cold water supply.
	Water float valve is not working.	Remove the water float valve and clean it.
	Incorrect incoming water pressure.	Water pressure must be 20 psi - 80 psi (140 kPa - 550 kPa)
	Ice machine is not level.	Level the ice machine. (page 28)
Low ice capacity.	Water float valve filter screen is dirty.	Remove and clean the filter screen.
	Incoming water supply is off	Open the water service valve.
	Water float valve stuck open or leaking.	Remove the water float valve and clean it.
	The condenser is dirty.	Clean the condenser.
	High air temperature entering condenser	Air temperature cannot exceed 110° (43°C).
	Inadequate cleaarance around ice machine.	Provide adequate clearance.
	Objects stacked around ice machine, blocking airflow to the condenser.	Remove items blocking airflow.

SERVICE LIMITS

UDE0080/UDP0080

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

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

1. Move the toggle switch to the Off position to turn off the ice machine, then move the toggle switch to the On position again to start the ice machine, blue light will .
   A. If the service limit feature has stopped the ice machine, it will restart after a short delay. Proceed to step 2.
   B. If the ice machine does not restart, see “Ice machine does not operate” on the previous page.
2. Allow the ice machine to run to determine if the condition is recurring.
   A. If the ice machine stops again, the condition has recurred.
      Call for service.

If the ice machine continues to run, the condition has corrected itself. Allow the ice machine to continue running.

DIAGNOSING AN ICE MACHINE THAT WILL NOT RUN

UDE0080/UDP0080

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

1. Verify primary voltage is supplied to ice machine and the fuse/circuit breaker is closed.
2. Verify control board fuse is okay.
3. If the bin switch light functions, the fuse is okay.
4. Verify the bin switch functions properly. A defective bin switch can falsely indicate a full bin of ice.
5. Verify ON/OFF/WASH toggle switch functions properly. A defective toggle switch may keep the ice machine in the OFF mode.
6. Verify low DC voltage is properly grounded. Loose DC wire connections may intermittently stop the ice machine.
7. Be sure Steps 1 – 6 were followed thoroughly. Intermittent problems are not usually related to the control board.
8. Replace the control board.

SERVICE LIMIT FEATURE

UDE0080/UDP0080

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

Service Limit #1:

If the freeze time reaches 60 minutes, the control board automatically initiates a harvest cycle. 3 cycles outside the time limit = 1 hour Stand-by Mode.

Service Limit #2:

If the harvest time reaches 3.5 minutes, the control board automatically returns the ice machine to the freeze cycle. 3 cycles outside the time limit = Service Limit (must be MANUALLY reset).

Service Limit Stand-by Mode:

The first time a service limit shut down occurs, the ice machine turns off for 60 minutes (Stand-by Mode). The ice machine will then automatically restart to see if the problem reoccurs.

During the Stand-by Mode the harvest light will be flashing continuously and a service limit indication can be viewed. If the same service limit is reached a second time (the problem has reoccurred), the ice machine will initiate a service limit shut down and remain off until it is manually restarted. During a service limit shut down the harvest light will be flashing continuously.

Determining Which Service Limit Stopped the Ice Machine: When a service limit condition causes the ice machine to stop, the harvest light on the control board continually flashes on and off. Use the following procedures to determine which service limit has stopped the ice machine.

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

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

Service Limit Notes

- A continuous run of 100 harvests automatically erases the service limit code.
- The control board will store and indicate only one service limit – the last one exceeded.
- If the toggle switch is cycled OFF and then ON prior to reaching the 100-harvest point, the last service limit exceeded will be indicated.

Service Limit Checklist

UDE0080/UDP0080

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.

Service Limit #1

Freeze time exceeds 60 minutes for 6 consecutive freeze cycles.

Possible Cause Checklist

Improper installation

- Refer to “Installation/Visual Inspection Checklist” on page 195

Water System

- Water Level too high or defective float (water escaping water trough)
- Low water pressure (20 psig min.)
- High water pressure (80 psig max.)
- High water temperature (90°F/32.2°C max.)
- Clogged water distribution tube
- Defective water pump

Electrical System

- Harvest cycle not initiated electrically
- Contactor not energizing
- Compressor electrically non-operational
- Restricted condenser air flow
- High inlet air temperature (110°F/43.3°C max.)
- Condenser discharge air re-circulation
- Dirty condenser fins
- Defective fan cycling control
- Defective fan motor
- Low water pressure (20 psig min.)
- High water temperature (90°F/32.2°C max.)
- Dirty condenser

Refrigeration System

- Non-Manitowoc components
- Improper refrigerant charge
- Defective compressor
- TXV starving or flooding (check bulb mounting)
- Non-condensible in refrigeration system
- Plugged or restricted high side refrigerant lines or component
- Defective harvest valve

Service Limit #2

Harvest time exceeds 3.5 minutes for 3 Consecutive harvest cycles.

Possible Cause Checklist

Improper installation

- Refer to "Installation/Visual Inspection Checklist" on page 195

Water System

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

Electrical system

- Bin switch defective
- Premature harvest

Refrigeration system

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

DIAGNOSING ICE THICKNESS CONTROL CIRCUITRY

UDE0080/UDP0080

Ice Machine Does Not Cycle Into Harvest when Water Contacts the Ice Thickness Control Probe

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

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

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

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

Step 3 Jumper wire connected from control board terminal to ground	
Monitoring Harvest Light	**Correction**
The harvest light comes on, and 6-10 seconds later, ice machine cycles from freeze to harvest.	The ice thickness probe is causing the malfunction.
The harvest light comes on but the ice machine stays in the freeze sequence.	The control circuitry is functioning properly. The ice machine is in a six minute freeze time lock-in (verify step 1 of this procedure was followed correctly).

Step 3 Jumper wire connected from control board terminal to ground	
Monitoring Harvest Light	**Correction**
The harvest light does not energize.	The control board is causing the malfunction.

Ice Machine Cycles Into Harvest Before Water Contact with the Ice Thickness Probe

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

Step 2 Disconnect the ice thickness probe from the control board terminal.

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

ICE PRODUCTION CHECK

UDE0080/UDP0080

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

1. Determine the ice machine operating conditions:
   Air temperature entering condenser: ____°
   Air temperature around ice machine: ____°
   Water temperature entering sump trough: ____°
2. Refer to the appropriate model in the "Cycle Times, 24 Hr. Ice Production and Refrigerant Pressure Charts" on page 251. Use the operating conditions determined in Step 1 to find published 24-Hour Ice Production:_____
   - Times are in minutes.
     Example: 1 min. 15 sec. converts to 1.25 min.
     (15 seconds ÷ 60 seconds = .25 minutes)
   - Weights are in pounds.
     Example: 2 lb. 6 oz. converts to 2.375 lb.
     (6 oz. ÷ 16 oz. = .375 lb.)

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

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

Weighing the ice is the only 100% accurate check.

4. Compare the results of step 3 with step 2. Ice production is normal when these numbers match closely. If they match closely, determine if:
   - Another larger ice machine is required.
   - Relocating the existing equipment to lower the load conditions is required.

INSTALLATION/VISUAL INSPECTION CHECKLIST

UDE0080/UDP0080

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

WATER SYSTEM CHECKLIST

UDE0080/UDP0080

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

- Descale as needed

Water inlet pressure not between 20 and 80 psig (1–5 bar, 138–552 kPa)

- Install a water regulator valve or increase the water pressure

Incoming water temperature is not between 40°F (3°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

Vent tube is not installed on water outlet drain

- See Installation Instructions

Hoses, fittings, etc., are leaking water

- Repair/replace as needed

Water valve is stuck open, closed or is leaking

- Descale/replace as needed

Water is spraying out of the sump trough area

- Stop the water spray

Water is leaking through the sump trough overflow

- Set the water level 1/4”-3/8” below standpipe

Uneven water flow across the evaporator

- Descale the ice machine

Water is freezing behind the evaporator

- Correct the water flow

Plastic extrusions and gaskets are not secured to the evaporator

- Remount/replace as need.

Refrigeration Diagnostics

UDE0080/UDP0080

Perform the procedures on the preceding pages before performing refrigeration diagnostics. The first pages cover an overview of the diagnostic procedures followed by diagnostics checklists.

Install thermometer thermocouples on Suction and Discharge line:

- Digital thermometers with remote thermocouples must be used to obtain temperatures.
- Suction and Discharge line thermocouples must be within 3” (76.2 mm) of the compressor.
- Thermocouples must be insulated.
- Doors and all panels must be in place.
- Initial freeze cycle is not used for diagnostics.
- Start monitoring temperatures 3 minutes into the second freeze cycle.

Compare Suction and Discharge temperatures to your model in the charts starting on page 204.

The charts list normal suction and discharge temperatures.

Analysis

Discharge Line Temp	Suction Line Temp	Ice Fill Pattern	Refer to Diagnostics for:
Normal	Normal	Less fill on the left side of the evaporator	This is normal operation
Low (20°F [-7°C] or more)	Low (20°F [-7°C] or more)	Less fill on the left side of the evaporator	Expansion Valve Flooding
Normal or High	High (10°F [-12°C] or more)	Less fill on the left side and top 2 rows of the evaporator	Low on Refrigerant or Expansion Valve Starving
Normal	Low (5°F [-15°C] or less)	Less fill on the left side of the evaporator	Refrigerant Overcharge

FLOODING EXPANSION VALVE SYMPTOMS

A flooding expansion valve will have discharge and suction line temperatures 20°F (-7°C) lower than normal freeze cycle temperatures. Normal suction line temperature and low discharge line temperature DO NOT verify a flooding valve. Both discharge line temperature and suction line temperature must be low to verify a flooding expansion valve. Ice fill pattern is thin on the left hand side of the evaporator.

STARVING EXPANSION VALVE/LOW REFRIGERANT CHARGE SYMPTOMS:

A. Ice Fill Pattern

- Thin on top two rows of the evaporator
- Thin on entire left side of the evaporator
- Thick on the bottom of the evaporator

B. Freeze time longer than normal

Diagnosis can be confirmed by adding installing a temporary access valve and adding 2 oz (56.7 g) of refrigerant: If the suction line temperature drops or the ice fill pattern on the top two rows fills in, the ice machine is low on refrigerant. Refer to charging procedures for access valve installation/removal procedure.

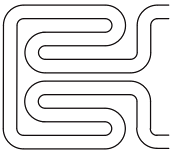
OVERCHARGED SYSTEM SYMPTOMS

Suction line temperature will be slightly low during freeze cycle 5°F (-15°C). Discharge line temperature is normal. Actual amperage readings will be higher than nameplate rating.

ANALYZING ICE FORMATION PATTERN

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

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



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 at 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 at the inlet. This is normal.

If ice forms uniformly across the evaporator surface, but does not do so in the proper amount of time, this is still considered a normal ice fill pattern.

Extremely Thin at Evaporator Outlet

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

Examples: No ice at all at the outlet of the evaporator, but ice forms at the inlet half of the evaporator. Or, the ice at the outlet of the evaporator reaches the correct thickness, but the inlet of the evaporator already has 1/2" to 1" of ice formation.

Possible cause: Water loss, low on refrigerant, starving TXV, hot water supply, faulty float valve, etc.

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 the correct thickness, but there is no ice formation at all at the inlet of the evaporator.

Possible cause: Insufficient water flow, flooding TXV, etc.

Spotty Ice Formation

There are small sections on the evaporator where there is no ice formation. This could be a single corner, or a single spot in the middle of the evaporator. This is generally caused by loss of heat transfer from the tubing on the backside of the evaporator.

No Ice Formation

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

Possible cause: Water float valve, water pump, starving expansion valve, low refrigerant charge, compressor, etc.

ANALYZING DISCHARGE LINE TEMPERATURE

UDE0080/UDP0080

1. Determine the ice machine operating conditions:

   Air temperature entering condenser ______

   Air temperature around ice machine ______

   Water temperature entering sump trough ______

2. Refer to “Installation/Visual Inspection Checklist” on page 195 for ice machine being checked.

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

Freeze Cycle ______

Harvest Cycle ______

3. Perform an actual discharge temperature check.

	Freeze Cycle Temperature	**Harvest Cycle Temperature**
Beginning of Cycle	__________	__________
Middle of Cycle	__________	__________
End of Cycle	__________	__________

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

The discharge temperature is normal when the actual temperature falls within the published temperature range for the ice machine’s operating conditions. It is normal for the discharge temperature to be lower at the beginning of the freeze cycle, then climb through out the freeze cycle.

Discharge Line Temperature High Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 195

Restricted Condenser Air Flow

- High inlet air temperature
- Condenser discharge air re-circulation
- Dirty condenser fins
- Defective fan cycling control
- Defective fan motor

Improper Refrigerant Charge

- Overcharged
- Non-condensible in system
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- High side refrigerant lines/component restricted (before mid-condenser)

Freeze Cycle Discharge Temperature Low Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 195

Improper Refrigerant Charge

- Undercharged
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- High side refrigerant lines/component restricted (before mid-condenser)
- Defective fan cycle control

ANALYZING SUCTION LINE TEMPERATURE

UDE0080/UDP0080

The suction line temperature gradually drops throughout the freeze cycle. The actual suction temperature (and drop rate) changes as the air and water temperature entering the ice machine changes. These variables also determine the freeze cycle times. To analyze and identify the proper suction temperature drop throughout the freeze cycle, compare the published suction temperature to the published freeze cycle time.

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

1. Determine the ice machine operating conditions:

   Air temperature entering condenser ______

   Air temperature around ice machine ______

   Water temperature entering sump trough ______

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

   Freeze Cycle ______

   Harvest Cycle ______

2. Perform an actual suction temperature check.

	Freeze Cycle Temperature	**Harvest Cycle Temperature**
Beginning of Cycle	__________	__________
Middle of Cycle	__________	__________
End of Cycle	__________	__________

3. Compare the actual suction temperature (Step 3) with the published suction temperature (Step 2).

The suction temperature is normal when the actual temperature falls within the published temperature range for the ice machine's operating conditions. It is normal for the suction temperature to be higher at the beginning of the freeze cycle, then drop through out the freeze cycle.

Suction Temperature High Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 195

Discharge Pressure

- Discharge temperature is too high, and is affecting suction temperature, refer to “Discharge Line Temperature High Checklist” on page 203.

Improper Refrigerant Charge

- Overcharged
- Wrong type of refrigerant
- Non-condensible in system

Other

- Non-Manitowoc components in system
- Harvest valve leaking
- TXV flooding (check bulb mounting)
- Defective compressor

Suction Temperature Low Checklist

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 195

Discharge Pressure

- Discharge temperature is too low, and is affecting suction temperature, refer to “Freeze Cycle Discharge Temperature Low Checklist” on page 203.

Improper Refrigerant Charge

- Undercharged
- Wrong type of refrigerant

Other

- Non-Manitowoc components in system
- Improper water supply over evaporator refer to ”Water System Checklist” on page 196.
- Loss of heat transfer from tubing on back side of evaporator
- Restricted/plugged liquid line drier
- Restricted/plugged tubing in suction side of refrigeration system
- TXV starving

NOTE: Do not limit your diagnosis to only the items listed in the checklists.

COMPARING EVAPORATOR INLET/OUTLET TEMPERATURES

UDE0080/UDP0080

The temperatures of the suction line entering and leaving the evaporator alone cannot diagnose an ice machine. However, comparing these temperatures during the freeze cycle can help diagnose an ice machine malfunction.

The actual temperatures entering and leaving the evaporator vary by model, and change throughout the freeze cycle. This makes documenting the “normal” inlet and outlet temperature readings difficult. The key to the diagnosis lies in the difference between the two temperatures five minutes into the freeze cycle. These temperatures must be within 7°F (4°C) of each other.

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

1. Use a quality temperature meter, capable of taking temperature readings on curved copper lines.
2. Attach the temperature meter sensing device to the copper lines entering and leaving the evaporator.

Important

Do not simply insert the sensing device under the insulation. It must be attached to and reading the actual temperature of the copper line.

3. Wait five minutes into the freeze cycle.
4. Record the temperatures below and determine the difference between them.

____________ Inlet Temperature	____________ Difference must be within 7°F (4°C) at 5 minutes into the freeze cycle	____________ Outlet Temperature

5. Use this with other information gathered on the Refrigeration System Operational Analysis Table to determine the ice machine malfunction.

DISCHARGE LINE TEMPERATURE ANALYSIS

UDE0080/UDP0080

Knowing if the discharge line temperature is increasing, decreasing or remaining constant can be an important diagnostic tool. Maximum compressor discharge line temperature on a normally operating ice machine steadily increases throughout the freeze cycle. Comparing the temperatures over several cycles will result in a consistent maximum discharge line temperature.

- Ambient air temperatures affect the maximum discharge line temperature.
- Higher ambient air temperatures at the condenser equal higher discharge line temperatures at the compressor.
- Lower ambient air temperatures at the condenser equal lower discharge line temperatures at the compressor.

NOTE: Regardless of ambient temperature, the freeze cycle discharge line temperature will be higher than 150°F (66°C) on a normally operating ice machine.

PROCEDURE

Connect a temperature probe on the compressor discharge line within 6” (15.2 cm) of the compressor. Observe the discharge line temperature for the last three minutes of the freeze cycle and record the maximum discharge line temperature.

Discharge Line Temperature Above 150°F (66°C) at End of Freeze Cycle:

Ice machines that are operating normally will have consistent maximum discharge line temperatures above 150°F (66°C).

Verify the expansion valve sensing bulb is positioned and secured correctly.

Discharge Line Temperature Below 150°F (66°C) at End of Freeze Cycle

Ice machines that have a flooding expansion valve will have a maximum discharge line temperature that decreases each cycle.

Verify the expansion valve sensing bulb is 100% insulated and sealed airtight. Condenser air contacting an incorrectly insulated sensing bulb will cause overfeeding of the expansion valve.

HARVEST VALVE

UDE0080/UDP0080

The harvest valve is an electrically operated valve that opens when energized, and closes when de-energized.

Normal Operation

The valve is de-energized (closed) during the freeze cycle and energized (open) during the harvest cycle. The valve is positioned between the and the evaporator and performs two functions:

1. Prevents refrigerant from entering the evaporator during the freeze cycle.

   The harvest valve is not used during the freeze cycle. The harvest valve is de-energized (closed) preventing refrigerant flow from the receiver into the evaporator.

2. Allows refrigerant vapor to enter the evaporator in the harvest cycle.

   During the harvest cycle, the harvest valve is energized (open) allowing refrigerant gas from the discharge line of the compressor to flow into the evaporator. The heat is absorbed by the evaporator and allows release of the ice slab.

Exact temperatures vary according to ambient temperature and ice machine model.

Harvest Valve Analysis

The valve can fail in two positions:

- Valve will not open in the harvest cycle.
- Valve remains open during the freeze cycle.

VALVE WILL NOT OPEN IN THE HARVEST CYCLE

Although the circuit board has initiated a harvest cycle, the evaporator temperature remains unchanged from the freeze cycle.

VALVE REMAINS OPEN IN THE FREEZE CYCLE:

Symptoms of a harvest valve remaining partially open during the freeze cycle can be similar to symptoms of an expansion valve, float valve or compressor problem. Symptoms are dependent on the amount of leakage in the freeze cycle.

A small amount of leakage will cause increased freeze times and an ice fill pattern that is “Thin at the Outlet”, but fills in at the end of the cycle.

As the amount of leakage increases the length of the freeze cycle increases and the amount of ice at the outlet of the evaporator decreases.

Refer to the Parts Manual for proper valve application. If replacement is necessary, use only “original” Manitowoc replacement parts.

Use the following procedure and table to help determine if a harvest valve is remaining partially open during the freeze cycle.

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

> **Important**
>
> Feeling the harvest valve outlet or across the harvest valve itself will not work for this comparison.
>
> The harvest valve outlet is on the suction side (cool refrigerant). It may be cool enough to touch even if the valve is leaking.

3. Feel the compressor discharge line.

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

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

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

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Component Check Procedures

MAIN FUSE

Function

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

Specifications

- 80/140/190/240/310 Series - 250 Volt, 10 amp.
- 65 Series - 250 Volt, 8 amp.

> **⚠ Warning**
>
> High (line) voltage is applied to the control board at all times. Removing the control board fuse or pressing the power button will not remove the power supplied to the control board.

Check Procedure

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

> **⚠ Warning**
>
> Disconnect electrical power to the entire ice machine before proceeding.

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

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

BIN SWITCH

80/140/190/240/310 Series

Function

Bin switch operation is controlled by the movement of the ice damper. The bin switch has two main functions:

1. Terminating the harvest cycle and returning the ice machine to the freeze cycle.

   This occurs when the bin switch is opened and closed again within 30 seconds of opening during the harvest cycle.

2. Automatic ice machine shut-off.

   If the storage bin is full at the end of a harvest cycle, the sheet of cubes fails to clear the ice damper and holds it down. After the ice damper is held down for 30 seconds, the ice machine shuts off.

   The ice machine remains off until enough ice is removed from the storage bin to allow the sheet of cubes to drop clear of the ice damper. As the ice damper swings back to the operating position, the bin switch closes and the ice machine restarts.

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

Check Procedure

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

Ohm Test

1. Disconnect the bin switch wires to isolate the bin switch from the control board.
2. Connect an ohmmeter to the disconnected bin switch wires.
3. Cycle the bin switch open and closed numerous times by opening and closing the water curtain.

NOTE: To prevent mis-diagnosis:

- Always use the water curtain magnet to cycle the switch (a larger or smaller magnet will affect switch operation).
- Watch for consistent readings when the bin switch is cycled open and closed (bin switch failure could be erratic).

TOUCH PAD

140/190/240/310 Series

Function

User interface to select ice making, delay start or cleaning cycle and provides feedback on ice machine operation.

Check For Normal Operation

Action	Normal Function
Press and hold the control board test button for 3 seconds	All Touch Pad lights turn on
Press test button	All Touch Pad lights turn off
Press power button	Power light turns on
With power light energized press the delay button 4 times	Cycles through 4 hour delay, 12 hour delay, 24 hour delay and off
Press and hold the power button for 3 seconds	Power light turns off
Press and hold the clean button for 3 seconds	Clean light turns on
Press and hold the clean button for 3 seconds	Clean light turns off
If any switches do not operate correctly, disconnect main power to the ice machine to reset the control board and perform a second test. If the second test doesn't show normal function, perform the Ohm test to verify the issue is not a wiring or control board issue.	

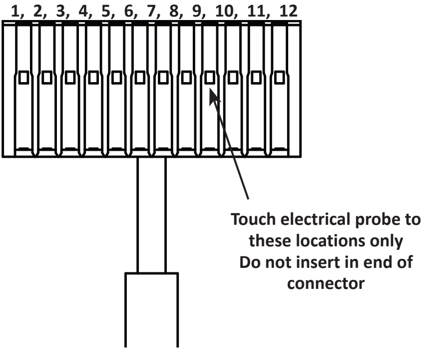
Ohm Test

Disconnect power from ice machine.

Disconnect wire from control board and Ohm touch pad and interconnecting wire to verify correct operation. Pressing and depressing the touch pad must open and close the circuit. A switch that functions correctly will close as the button is pressed and open as the button is released.

Do not insert electrical probe into end of connector. This will stretch the connector and cause intermittent connection issues. All readings must be taken on the flat exterior of the connector.

Selection	Wires
On/Off	#2 & #7
Delay	#3 & #7
Clean	#4 & #7



Control Board Connector

FLOAT SWITCHES

140/190/240/310 Series

Function

Open and close to indicate to the control board the level of water in the water trough.

Specifications

Normally closed, float operated magnetic reed switch.

The float switch contacts are closed in the down position. When water raises the float to the up position the magnet in the float opens the contacts.

Check Procedure

The ice machine uses two float switches.

Ice Thickness Float -Indicates the water level has been reached.

Harvest Float - Indicates a harvest cycle needs to be initiated.

Initial testing can be performed by viewing the control board light(s) while raising and lowering the float. The corresponding control board light must turn on and off when the float is raised and lowered.

Harvest Float Switch:

A. The light must be on in the up position.

B. The light must be off in the down position.

> ⚠ **Caution**
>
> Do not disassemble float for Descaling - Incorrect reassembly of the float will result in an ice machine that will not harvest.

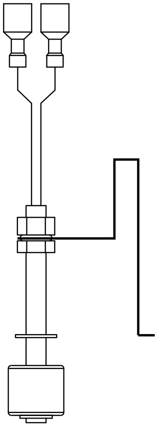
Ice Thickness Float Switch:

A. The light must be off in the down position.

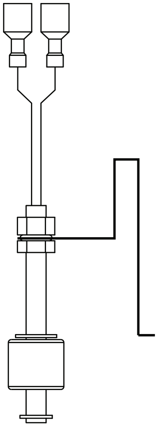
B. The light must be on in the up position.

If the control board light does not respond to the float proceed with step 1 below.

1. Disconnect power to the ice machine, pull the wire connector for the float switch through the bulkhead and disconnect.
2. Attach an ohm meter lead to each float switch wire.
3. Place the float in the down position - The float switch must be closed.
4. Place the float in the up position - The float switch must be open.



Float Closed



Float Open

NOTE: Make adjustments with the ice machine in the off position. Making adjustments during the freeze cycle may produce an initial sheet of ice that is thicker than future cycles.

Float	Float Up	Float Down
Ice Thickness Float	OL (Open)	Closed
Harvest Float	OL (Open)	Closed

WATER TROUGH THERMISTOR

140/190/240/310 Series

Function

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

When the resistance value indicates a temperature of 34°F (1.1°C) the control board will delay the water pump for 25 seconds. When the water pump restarts the water inlet valve will energize for 7 seconds then turn off.

NOTE: If the ice machine is experiencing long freeze cycle shut down, we recommend removing the thermistor and bracket permanently.

Check procedure

<u>THERMISTOR</u>

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

<u>CONTROL BOARD OPERATION</u>

1. Disconnect thermistor from control board - The control board thermistor LED will flash 1 second on and 1 second off.
2. The control board will default to the 3.75 minute pump delay in the freeze cycle.

THERMISTOR CHART

Important

If the ohmmeter reads "OL," check the scale setting on the meter before assuming the thermistor is bad.

Temperature of Thermistor		**Resistance**
°C	**°F**	**K Ohms (x1000)**
-7 - -1.0	19 - 30	47.06 - 34.36
0.0	32	32.65
0.5	33	31.82
1.0	33.8	31.03
1.1	34	30.85
1.5	34.7	30.25
2.0	35.6	29.49
2.5	36.5	28.76
3.0	37	28.05
3.5	38	27.36
4.0 - 10.5	39 - 51	26.68 - 19.43
11.0 - 15.0	52 - 59	18.97 - 15.71
15.5 - 20.0	60 - 68	15.35 - 12.49
20.5 - 25.0	69 - 77	12.21 - 10.00
25.5 - 30.0	78 - 86	9.78 - 8.05
30.5 - 35.0	87 - 95	7.88 - 6.39
36.5 - 40.0	98 - 104	6.14 - 5.32
40.5 - 46.0	105 - 115	5.22 - 4.20

NOTE: The control board will default to a 3.75 minute pump delay in the freeze cycle, whenever the thermistor is disconnected or reads outside the resistance ranges in the table.

BIN THERMOSTAT

UDE0065/UDP0065

Function

The bin thermostat stops the ice machine when the bin is full. The level of ice in the ice storage bin controls the ice machine shut-off. When the bin is full, ice cubes contact the bin thermostat bulb holder, which cools down and opens the bin thermostat to stop the ice machine. The ice machine remains off until enough ice has been removed from the bin. This causes the thermostat bulb holder to warm and closes the bin thermostat, restarting the ice machine.

Specifications

Control	Setting
Bin Thermostat	Cut in: 40°F (4.5°C) Cut out: 34°F (1.0°C)

⚠ Warning

Disconnect electrical power to the entire ice machine before proceeding.

1. Remove the back panel to access the bin thermostat.
2. Disconnect both wires from the bin thermostat and check the resistance across the bin thermostat terminals

No Ice On Bulb	Ice On Bulb	Result
Closed	Open	Thermostat good
Open	Closed	Replace Thermostat

NOTE: After covering/uncovering the bulb holder with ice, wait at least three minutes to allow the thermostat to react. (Open/Close)

LIQUID LINE THERMISTOR

UDE0065/UDP0065

Function

The liquid line thermistor senses the refrigeration system liquid line temperature. This is used in conjunction with the control board to determine the length of the freeze and harvest cycles.

Specifications

10,000 Ohms +/- 2% at 25°C (77°F)

Check Procedure

Verify that the thermistor resistance is accurate and corresponds to the high and low temperature ranges.

1. Disconnect the thermistor at the control board. Connect an ohmmeter to the isolated thermistor wire leads.
2. Using a temperature meter capable of taking readings on curved copper lines, attach the temperature meter sensing device to the liquid line next to the thermistor.

> **Important**
>
> Do not simply "insert" the sensing device under the insulation. It must be attached to and reading the actual temperature of the copper liquid line.

3. With the ice machine running, verify that the temperature of the discharge line (step 2) corresponds to the thermistor resistance reading (step 1) as stated in the temperature/resistant chart.

> **Important**
>
> If the thermistor would fail closed, the light on the control board will flash rapidly. If the thermistor would fail open, the light on the control board will flash slowly.

TEMPERATURE/RESISTANCE CHART

UDE0065/UDP0065

As the temperature rises at the thermistor block, the resistance drops.

> **Important**
>
> If the ohmmeter reads “OL,” check the scale setting on the meter before assuming the thermistor is bad.

Temperature of Thermistor		**Resistance**
°C	**°F**	**K Ohms (x1000)**
15.6 - 21.1	60 - 70	15.31 - 11.88
21.1 - 26.7	70 - 80	11.88 - 9.29
26.7 - 32.2	80 - 90	9.29 - 7.33
32.2 - 37.8	90 - 100	7.33 - 5.82
37.8-43.3	100 - 110	5.82 -4.66
43.3 - 48.9	110 - 120	4.66 - 3.75
48.9 - 54.5	120 - 130	3.75 - 3.05
54.5 - 60.0	130 - 140	3.05 - 2.49
60.0 - 65.6	140 - 150	2.49 - 2.04
65.6 - 17.1	150 - 160	2.04 - 1.68
76.7 - 82.2	170 - 180	1.40 - 1.17
82.2 - 87.3	180 - 190	1.17 - 0.98
87.8 - 93.3	190 - 200	0.98 - 0.82
93.3 - 98.9	200 - 210	0.82 - 0.70
100	212	0.73 - 0.62
Boiling water bath		
104.4 - 110.0	220 - 230	0.59 - 0.51
110.0 - 115.6	230 - 240	0.51 - 0.43
115.6 - 121.1	240 - 250	0.43 - 0.37
121.1 - 126.7	250 - 260	0.37 - 0.33

ON/OFF/WASH TOGGLE SWITCH

65/80 Series

FUNCTION

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

SPECIFICATIONS

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

CHECK PROCEDURE

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

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

COMPRESSOR ELECTRICAL DIAGNOSTICS

All Models

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 ensure that the overload is closed and the resistance readings will be accurate.

Single Phase Compressors

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

Check Motor Windings to Ground

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

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

Compressor Drawing Locked Rotor

The two likely causes of this are:

- Defective starting component
- Mechanically seized compressor

To determine which you have:

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

Compressor Drawing High Amps

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

The wiring must be correctly sized to minimize voltage drop at compressor start-up. The voltage when the compressor is trying to start must be within ±10% of the nameplate voltage.

FAN CYCLE CONTROL

80/140/190/240/310 Series

Function

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

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

Specifications

Model	Cut-In (Close)	Cut-Out (Open)
UDE0080	145 psig ±5	110 psig ±5
UDP0080	200 psig ±5	150 psig ±5
U0140/UF0140/ U0190/UF0190	250 psig ±5	200 psig ±5
UP0140/UP0190	200 psig ±5	150 psig ±5
U0240/UF0240/ U0310/UF0310	275 psig ±5	225 psig ±5
UP0240/ UP0310	200 psig ±5	150 psig ±5

Check Procedure

Disconnect electrical power to the ice machine at the electrical service disconnect.

Verify fan motor windings are not open or grounded, and fan spins freely.

Connect manifold gauge to ice machine.

Hook voltmeter in parallel across the fan cycle control, leaving wires attached.

Reconnect electrical power to the ice machine and press the power button to ON.

Wait until water flows over the evaporator then refer to chart below.

System Pressure:	Reading Should Be:	Fan Should Be:
Above cut-in	0 volts	Running
Below cut-out	Line voltage	Off

HIGH PRESSURE CUTOUT (HPCO) CONTROL

140/190/240/310 Series

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

Model	Cut-In (Close)	Cut-Out (Open)
U0140/UF0140/ U0190/UF0190*	300 psig ±10	450 psig ±10
UP0140/UP0190	250 psig ±10	350 psig ±10
U0240/UF0240/ U0310/UF0310*	300 psig ±10	450 psig ±10
UP0240/ UP0310	250 psig ±10	350 psig ±10
* Must be below 300 psig to reset		

Check Procedure

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

> **⚠ Warning**
>
> If discharge pressure exceeds 460 psig and the HPCO control does not open, press the power button to stop ice machine operation.

Replace the HPCO control if it:

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

FILTER-DRIERS

All Models

Liquid Line Filter Drier

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

The difference between a Manitowoc drier and an off-the-shelf drier is in filtration. A Manitowoc drier has dirt-retaining filtration, with fiberglass filters on both the inlet and outlet ends. This is very important because ice machines have a back-flushing action that takes place during every harvest cycle.

A Manitowoc filter-drier has a very high moisture removal capability and a good acid removal capacity.

Important

The liquid line drier is covered as a warranty part. The liquid line drier must be replaced any time the system is opened for repair.

Refrigerant Recovery/Evacuation

DEFINITIONS

Recover

To remove refrigerant, in any condition, from a system and store it in an external container, without necessarily testing or processing it in any way.

Recycle

To clean refrigerant for re-use by oil separation and single or multiple passes through devices, such as replaceable core filter-driers, which reduce moisture, acidity and particulate matter. This term usually applies to procedures implemented at the field job site or at a local service shop.

Reclaim

To reprocess refrigerant to new product specifications (see below) by means which may include distillation. A chemical analysis of the refrigerant is required after processing to be sure that product specifications are met. This term usually implies the use of processes and procedures available only at a reprocessing or manufacturing facility.

Chemical analysis is the key requirement in this definition. Regardless of the purity levels reached by a reprocessing method, refrigerant is not considered “reclaimed” unless it has been chemically analyzed and meets ARI Standard 700 (latest edition).

New Product Specifications

This means ARI Standard 700 (latest edition). Chemical analysis is required to assure that this standard is met.

REFRIGERANT RE-USE POLICY

Manitowoc recognizes and supports the need for proper handling, re-use, and disposal of refrigerants. Manitowoc service procedures require recapturing refrigerants, not venting them to the atmosphere.

It is not necessary, in or out of warranty, to reduce or compromise the quality and reliability of your customers' products to achieve this.

Important

Manitowoc Ice assumes no responsibility for use of contaminated refrigerant. Damage resulting from the use of contaminated, recovered, or recycled refrigerant is the sole responsibility of the servicing company.

Manitowoc approves the use of:

1. New Refrigerant
   - Must be of original nameplate type.
2. Reclaimed Refrigerant
   - Must be of original nameplate type.
   - Must meet ARI Standard 700 (latest edition) specifications.
3. Recovered or Recycled Refrigerant
   - Must be recovered or recycled in accordance with current local, state and federal laws.
   - Must be recovered from and re-used in the same Manitowoc product. Re-use of recovered or recycled refrigerant from other products is not approved.

4. Recovered refrigerant must come from a “contaminant-free” system. To decide whether the system is contaminant free, consider:
    - Type(s) of previous failure(s)
    - Whether the system was cleaned, evacuated and recharged properly following failure(s)
    - Whether the system has been contaminated by this failure
    - Compressor motor burnouts and improper past service prevent refrigerant re-use.
    - Refer to “System Contamination Cleanup” on page 242 to test for contamination.
5. “Substitute” or “Alternative” Refrigerant
    - Must use only Manitowoc-approved alternative refrigerants.
    - Must follow Manitowoc-published conversion procedures.

RECOVERY AND RECHARGING PROCEDURES

140/190/240/310 Series

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

Important

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

Important

Replace the liquid line drier before evacuating and recharging. Use only a Manitowoc (O.E.M.) liquid line filter drier to prevent voiding the warranty.

CONNECTIONS

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

SELF-CONTAINED RECOVERY/EVACUATION

1. Place the power button in the OFF position.
2. Install manifold gauge set, charging cylinder/scale, and recovery unit or two-stage vacuum pump.
3. Open (backseat) the high and low side ice machine service valves, and open high and low side on 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. Then, allow the pump to run for an additional half hour. Turn off the pump and perform a standing vacuum leak check.

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

Follow the Charging Procedures below.

CHARGING PROCEDURES

Important

The charge is critical on all Manitowoc ice machines. Use a scale or a charging cylinder to ensure the proper charge is installed.

1. Be sure the power button is in the OFF position.
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, and backseat the high side service 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. Press the power button to the on position.

7. Close the high side on the manifold gauge set.

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

8. 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. Close the high side service valve at the ice machine.
    C. Open the low side service valve at the ice machine (when supplied) or disconnect the low loss fitting from the access valve.
    D. 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.
    E. Allow the pressures to equalize while the ice machine is in the freeze cycle.
    F. Close the low side service valve at the ice machine.
9. Remove the hoses from the ice machine and install the caps.

RECOVERY AND RECHARGING PROCEDURES

65/80 SERIES

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

Important

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

Important

Replace the liquid line drier before evacuating and recharging. Use only a Manitowoc (OEM) liquid line filter drier to prevent voiding the warranty.

CONNECTIONS

These ice machines are critically charged. There are no refrigerant access ports on these ice machines.

1. Locate the high and low side process tubes.
2. Install a piercing valve (saddle valve) on both the high and low side process tubes.

Important

- Remove piercing valves after charging.
- Unit is critically charged. Nitrogen must be purged through the system while brazing to prevent build up of copper oxide in the refrigeration system.
- Manifold gauge set must be removed properly to ensure that no refrigerant contamination or loss occurs. A quick disconnect is required for the high side connection.

RECOVERY/EVACUATION

1. Place the toggle switch in the OFF position.
2. Install manifold gauge set, charging scale, and recovery unit or two-stage vacuum pump.
3. Open the high and low side valves on 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. Then, allow the pump to run for an additional half hour. Turn off the pump and perform a standing vacuum leak check.

NOTE: Check for leaks using a halide or electronic leak detector after charging the ice machine.

CHARGING PROCEDURES

> **Important**
>
> The charge is critical on all Manitowoc ice machines. Use a scale to ensure the proper charge is installed. A quick disconnect is required for the high side connection

1. Verify the toggle switch is in the OFF position.
2. Close the vacuum pump valve and the low side manifold gauge valve.
3. Open the high side manifold gauge valve.
4. Open the refrigerant cylinder and add the proper refrigerant charge (shown on nameplate) through the discharge service valve.
5. Close the high side on the manifold gauge set. Add any remaining vapor charge through the suction access fitting (if necessary).

Let the system "settle" for 2 to 3 minutes.

6. Place the toggle switch in the ICE position.

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

7. Verify 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 the freeze cycle.
   B. Verify the refrigerant cylinder valve is closed.
   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. Close the high and low side manifold gauge set and remove from the ice machine.
   F. Remove the temporary access fittings

System Contamination Cleanup

ALL MODELS

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

> **Important**
>
> Manitowoc Ice assumes no responsibility for the use of contaminated refrigerant. Damage resulting from the use of contaminated refrigerant is the sole responsibility of the servicing company.

DETERMINING SEVERITY OF CONTAMINATION

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

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

If either condition is found, or if contamination is suspected use a test kit.

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 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 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

MILD SYSTEM CONTAMINATION CLEANUP PROCEDURE

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

NOTE: If the contamination is from moisture, use heat lamps during evacuation. Position them at the compressor, condenser and evaporator prior to evacuation. Do not position heat lamps too close to plastic components, or they may melt or warp.

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

NOTE: You may perform a pressure test as 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 CLEANUP PROCEDURE

1. Remove the refrigerant charge.
2. Remove the compressor.
3. If burnout deposits are found, replace the TXV.
4. Wipe away any burnout deposits from suction and discharge lines at compressor.
5. Sweep through the open system with dry nitrogen.
6. Install a new compressor and new start components.
7. Install suction line filter-drier in front of compressor.
8. Install a new liquid line drier.
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.
   - 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.
   - D. Change the vacuum pump oil.
   - E. Pull vacuum to 500 microns. Run the vacuum pump for 1 additional hour.

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 2 psig, the filter-drier should be adequate for complete cleanup.
    B. If the pressure drop exceeds 2 psig, 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. Replace the suction line and liquid line drier if necessary.
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
- High pressure cut-out control
- High side access valve
- Low side access valve

1. Disconnect power to the ice machine.
2. Follow all manufacturers' 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.

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

Total System Refrigerant Charge

Important
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 in the charts.

UDE0065/UDP0065 & UDE0080/UDP0080

Model	Air-Cooled	Water-Cooled	Refrigerant Type
UDE0065	5.8 oz (165 g)	-	R134A
UDP0065	3.8 oz (110 g)	-	R290
UDE0080	8 oz (227 g)	-	R134A
UDP0080	3.8 oz (110 g)	-	R290

U0140/U0190/U0240/U0310 - R404A

Model	Air-Cooled	Water-Cooled	Refrigerant Type
U0140	10 oz (283 g)	11 oz (312 g)	R404A
U0190	12 oz (340 g)	-	R404A
U0240	13 oz (369 g)	12 oz (340 g)	R404A
U0310 Before Serial Number 310304977	15 oz (425 g)	14 oz (397 g)	R404A
U0310 After Serial Number 310304978	15 oz (425 g)	18 oz (510 g)	R404A

UF0140/UF0190/UF0240/UF0310 - R404A

Model	Air-Cooled	Water-Cooled	Refrigerant Type
UF0140	6.7 oz (12 g)	11 oz (312 g)	R404A
UF0190	12 oz (340 g)	-	R404A
UF0240	13 oz (369 g)	13 oz (369 g)	R404A
UF0310	15 oz (425 g)	18 oz (510 g)	R404A

UP0140/UP0190/UP0240/UP0310 - R290

Model	Air-Cooled	Water-Cooled	Refrigerant Type
UP0140	4.9 oz (140 g)	-	R290
UP0190	4.9 oz (140 g)	-	R290
UP0240	5.3 oz (150 g)	5.3 oz (150 g)	R290
UP0310	5.2 (147 g)	3.9 (110 g)	R290
UP0310 230V/60Hz Only	4.5 (127 g)	-	R290

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Cycle Times, 24 Hr. Ice Production and 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 1-2 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.
- Refer to “Operational Analysis Chart” for the list of data that must be collected for refrigeration diagnostics.
- Zero out manifold gauge set before obtaining pressure readings to avoid mis-diagnosis.
- Discharge and suction pressure are highest at the beginning of the cycle. Suction pressure will drop throughout the cycle. Verify the pressures are within the range indicated.
- Record beginning of freeze cycle suction pressure one minute after the water pump energizes.
- Ice Production De-rate %
    - 60 Hz Dice and Half Dice production de-rate as shown
    - 60 Hz Regular cube production de-rate is 7%.
    - 50 Hz Dice / Half Dice production de-rate is 12%.
    - 50 Hz Regular cube production de-rate is 14%.

UD0065A/UDE0065A SELF-CONTAINED AIR-COOLED

R134A

NOTE: These characteristics will vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
50°F 10°C	9.4-12.4	10.7-14.1	11.7-15.5	1.25 - 3.25
70°F 21°C	9.6-12.7	11.2-14.8	12.3-16.3	
80°F 27°C	10.7-14.1	12.6-16.7	14.0-18.6	
90°F 32°C	12.0-15.9	14.0-18.6	15.6-20.9	
100°F 38°C	15.2-20.2	16.6-22.2	18.3-24.5	
110°F 43°C	20.3-27.3	21.1-28.4	22.0-29.5	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
50°F 10°C	58 lbs 26 kgs	52 lbs 24 kgs	48 lbs 22 kgs
70°F 21°C	57 lbs 26 kgs	50 lbs 23 kgs	46 lbs 21 kgs
80°F 27°C	52 lbs 24 kgs	45 lbs 20 kgs	41 lbs 19 kgs
90°F 32°C	47 lbs 21 kgs	41 lbs 19 kgs	37 lbs 17 kgs
100°F 38°C	38 lbs 17 kgs	35 lbs 16 kgs	32 lbs 15 kgs
110°F 43°C	29 lbs 13 kgs	28 lbs 13 kgs	27 lbs 12 kgs

Based on average ice slab weight of 0.4 – 0.6 lbs (0.2 - 0.3 kgs).

Operating Temperatures
UD0065A/UDE0065A

Air Temp. Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Line Temp °F/°C	Suction Line Temp °F/°C	Discharge Line Temp °F/°C	Suction Line Temp °F/°C
50°F **10°C**	105-120 °F 40-50 °C	52-12 °F 11- -11 °C	130-140 °F 54-60 °C	100-115 °F 38-46 °C
70°F **21°C**	125-155 °F 51-68 °C	60- -4 °F 16- -20 °C	145-155 °F 63-68 °C	115-135 °F 46-57 °C
80°F **27°C**	130-160 °F 54-71 °C	70-0 °F 21- -18 °C	155-170 °F 68-77 °C	110-145 °F 43-63 °C
90°F **32°C**	150-165 °F 66-74 °C	75-5 °F 24- -15 °C	165-175 °F 74-79 °C	125-150 °F 51-66 °C
100°F **38°C**	175-185 °F 79-85 °C	85-10 °F 29-12 °C	185-195 °F 85-91 °C	145-165 °F 63-74 °C
110°F **43°C**	180-190 °F 82-88 °C	90-12 °F 32- -11 °C	190-200 °F 88-93 °C	145-170 °F 63-77 °C

UDP0065A SELF-CONTAINED AIR-COOLED

R290

NOTE: These characteristics will vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	9.5-12.5	10.7-14.1	11.7-15.5	1.25-3.25
80°F 27°C	10.7-12.7	12.5-16.7	12.3-16.5	
90°F 32°C	12.0-16.0	14.0-18.5	15.5-21.0	
100°F 38°C	15.2-20.2	16.5-22.2	18.5-24.5	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
50°F 10°C	58 lbs 26 kgs	52 lbs 23 kgs	48 lbs 22 kgs
70°F 21°C	57 lbs 26 kgs	50 lbs 23 kgs	46 lbs 21 kgs
80°F 27°C	56 lbs 25 kgs	45 lbs 20 kgs	41 lbs 19 kgs
90°F 32°C	53 lbs 24 kgs	47 lbs 21 kgs	37 lbs 17 kgs
100°F 38°C	47 lbs 21 kgs	40 lbs 18 kgs	34 lbs 15 kgs

Based on average ice slab weight of 0.4 – 0.6 lbs (0.2 - 0.3 kgs).

Operating Pressures
UDP0065A

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	150-220 psig 10.3-15.2 bar	40-21 psig 2.8-1.4 bar
70°F **21°C**	150-220 psig 10.3-15.2 bar	46-21 psig 3.2-1.4 bar
80°F **27°C**	150-230 psig 10.3-15.9 bar	53-23 psig 3.7-1.6 bar
90°F **32°C**	175-245 psig 12.1-16.9 bar	58-23 psig 4.0-1.6 bar
100°F **38°C**	220-270 psig 15.2-18.6 bar	60-23 psig 4.1-1.6 bar

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	100-115 psig 6.9-7.9 bar	55-70 psig 3.8-4.8 bar
70°F **21°C**	100-120 psig 6.9-8.3 bar	55-75 psig 3.8-5.2 bar
80°F **27°C**	115-130 psig 7.9-9.0 bar	55-85 psig 3.8-5.9 bar
90°F **32°C**	130-150 psig 9.0-10.3 bar	55-95 psig 3.8-6.6 bar
100°F **38°C**	150-170 psig 10.3-11.7 bar	60-110 psig 4.1-7.6 bar

UD0080A/UDE0080A SELF-CONTAINED AIR-COOLED

R134A

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	14.2-16.8	17.1-20.2	21.5-25.4	1.0 - 2.5
80°F 27°C	16.5-19.5	19.1-26.1	23.9-28.1	
90°F 32°C	18.8-22.2	21.5-25.4	27.3-32.1	
110°F 43°C	22.2-26.1	25.9-30.5	31.7-37.3	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	110 lbs 50 kgs	93 lbs 42 kgs	75 lbs 34 kgs
80°F 27°C	96 lbs 44 kgs	84 lbs 38 kgs	68 lbs 31 kgs
90°F 32°C	85 lbs 37 kgs	75 lbs 34 kgs	60 lbs 27 kgs
110°F 43°C	73 lbs 33 kgs	63 lbs 29 kgs	52 lbs 24 kgs

Based on average ice slab weight of 1.1 – 1.4 lbs (0.5 - 0.6 kgs).

Operating Temperatures
UD0080A/UE0080A

50°F/10°C WATER TEMPERATURE

Air Temp. Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Line Temp °F/°C	Suction Line Temp °F/°C	Discharge Line Temp °F/°C	Suction Line Temp °F/°C
50°F 10°C	150-165 °F 66-74 °C	67-50 °F 19-10 °C	155-190 °F 68-88 °C	50-60 °F 10-16 °C
70°F 21°C	155-185 °F 68-85 °C	67-50 °F 19-10 °C	160-190 °F 71-88 °C	50-60 °F 10-16 °C
80°F 27°C	170-190 °F 78-88 °C	71-58 °F 22-14 °C	175-190 °F 79-88 °C	52-65 °F 11-18 °C
90°F 32°C	180-205 °F 82-96 °C	75-65 °F 24-18 °C	185-210 °F 85-99 °C	55-75 °F 13-24 °C
100°F 38°C	190-215 °F 88-102 °C	85-70 °F 29-21 °C	195-220 °F 91-104 °C	60-75 °F 16-24 °C

70°F/21°C WATER TEMPERATURE

Air Temp. Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Line Temp °F/°C	Suction Line Temp °F/°C	Discharge Line Temp °F/°C	Suction Line Temp °F/°C
50°F 10°C	155-175 °F 68-79 °C	68-58 °F 20-14 °C	160-175 °F 71-79 °C	50-60 °F 10-16 °C
70°F 21°C	160-185 °F 71-85 °C	70-50 °F 21-10 °C	160-190 °F 71-85 °C	50-65 °F 10-18 °C
80°F 27°C	170-200 °F 77-93 °C	75-58 °F 24-14 °C	170-200 °F 77-94 °C	55-70 °F 13-21 °C
90°F 32°C	180-205 °F 82-96 °C	85-65 °F 29-18 °C	185-210 °F 85-99 °C	55-75 °F 13-24 °C
100°F 38°C	190-220 °F 88-104 °C	88-70 °F 31-21 °C	200-220 °F 93-104 °C	60-75 °F 16-24 °C

Operating Temperatures UD0080A/UDE0080A

90°F/32°C WATER TEMPERATURE

Air Temp. Entering Condenser °F/°C	Freeze Cycle		Harvest Cycle	
	Discharge Line Temp °F/°C	Suction Line Temp °F/°C	Discharge Line Temp °F/°C	Suction Line Temp °F/°C
50°F 10°C	155-180 °F 68-82 °C	75-50 °F 24-10 °C	160-185 °F 71-85 °C	52-65 °F 11-18 °C
70°F 21°C	160-185 °F 71-85 °C	75-53 °F 24-12 °C	165-190 °F 74-88 °C	52-65 °F 11-18 °C
80°F 27°C	170-195 °F 77-91 °C	80-58 °F 27-14 °C	175-195 °F 79-91 °C	57-75 °F 14-24 °C
90°F 32°C	190-205 °F 88-96 °C	85-64 °F 29-18 °C	195-215 °F 90-102 °C	55-75 °F 13-24 °C
100°F 38°C	190-215 °F 88-102 °C	91-70 °F 33-21 °C	195-220 °F 91-104 °C	60-80 °F 16-27 °C

UDP0080A SELF-CONTAINED AIR-COOLED

R290

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
50°F 10°C	9.8-11.3	13.2-14.7	14.4-15.9	1.0-2.5
70°F 21°C	10.6-12.1	15.0-18.5	16.7-18.2	
80°F 27°C	14.5-18.5	14.8-16.1	18.7-20.2	
90°F 32°C	16.1-19.0	19.1-24.7	21.5-23.0	
100°F 38°C	17.1-22.0	21.5-25.2	27.3-32.1	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
50°F 10°C	117 lbs 53 kgs	92 lbs 42 kgs	85 lbs 39 kgs
70°F 21°C	110 lbs 50 kgs	95 lbs 43 kgs	75 lbs 34 kgs
80°F 27°C	96 lbs 44 kgs	84 lbs 38 kgs	68 lbs 31 kgs
90°F 32°C	85 lbs 39 kgs	75 lbs 34 kgs	60 lbs 27 kgs
100°F 38°C	79 lbs 36 kgs	68 lbs 31 kgs	52 lbs 24 kgs

Based on average ice slab weight of 1.1 – 1.4 lbs (0.5 - 0.6 kgs).

Operating Pressures
UDP0080A

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	140-205 psig 9.7-14.1 bar	46-18 psig 3.2-1.2 bar
70°F **21°C**	145-205 psig 10.0-14.1 bar	46-18 psig 3.2-1.2 bar
80°F **27°C**	160-210 psig 11.0-14.5 bar	50-20 psig 3.4-1.4 bar
90°F **32°C**	165-225 psig 11.4-15.5 bar	50-20 psig 3.4-1.4 bar
100°F **38°C**	220-255 psig 15.2-17.6 bar	53-23 psig 3.7-1.6 bar

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	85-120 psig 5.9-8.3 bar	60-90 psig 4.1-6.2 bar
70°F **21°C**	85-120 psig 5.9-8.3 bar	60-90 psig 4.1-6.2 bar
80°F **27°C**	95-120 psig 6.6-8.3 bar	80-95 psig 5.5-6.6 bar
90°F **32°C**	100-125 psig 6.9-8.6 bar	90-105 psig 6.2-7.2 bar
100°F **38°C**	110-140 psig 7.6-9.7 bar	100-110 psig 6.9-7.6 bar

U0140A/UF0140A SELF-CONTAINED AIR-COOLED

R404A

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	10.2-11.7	12.4-14.1	13.0-14.8	1.0-2.5
80°F 27°C	11.2-12.8	13.0-14.8	14.6-16.5	
90°F 32°C	11.8-13.4	14.6-16.5	17.6-19.9	
100°F 38°C	14.6-16.5	17.6-19.9	19.9-17.6	
110°F 43°C	16.5-18.7	19.9-17.6	20.3-23.0	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	130 lbs 54 kgs	110 lbs 43 kgs	105 lbs 41 kgs
80°F 27°C	120 lbs 49 kgs	105 lbs 41 kgs	95 lbs 35 kgs
90°F 32°C	115 lbs 46 kgs	95 lbs 35 kgs	85 lbs 29 kgs
100°F 38°C	95 lbs 35 kgs	85 lbs 29 kgs	80 lbs 27 kgs
110°F 43°C	85 lbs 29 kgs	80 lbs 27 kgs	70 lbs 21 kgs

Based on average ice slab weight of 1.1 – 1.4 lbs (0.5 – 0.6 kgs).

Operating Pressures

U0140A/UF0140A

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50°F 10°C	200-250 psig 13.8-17.2 bar	55-18 psig 3.8-1.2 bar
70°F 21°C	200-250 psig 13.8-17.2 bar	60-20 psig 4.1-1.4 bar
80°F 27°C	220-265 psig 15.2-18.3 bar	65-22 psig 4.5-1.5 bar
90°F 32°C	240-315 psig 16.5-21.7 bar	70-24 psig 4.8-1.7 bar
100°F 38°C	300-380 psig 20.7-26.2 bar	80-30 psig 5.5-2.1 bar
110°F 43°C	310-400 psig 21.4-27.6 bar	90-32 psig 6.2-2.2 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	Suction Pressure
50°F 10°C	135-170 psig 9.3-11.7 bar	75-110 psig 5.2-7.6 bar
70°F 21°C	140-170 psig 9.7-11.7 bar	75-120 psig 5.2-8.3 bar
80°F 27°C	145-190 psig 10-13.1 bar	75-120 psig 5.2-8.3 bar
90°F 32°C	165-200 psig 11.4-13.8 bar	75-120 psig 5.2-8.3 bar
100°F 38°C	200-235 psig 13.8-16.2 bar	75-120 psig 5.2-8.3 bar
110°F 43°C	210-240 psig 14.5-16..5 bar	75-120 psig 5.2-8.3 bar

U0140W/UF0140W SELF-CONTAINED WATER-COOLED

R404A

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	9.8-11.2	11.2-12.8	13.0-14.8	1.0-2.5
80°F 27°C	10.2-11.7	11.8-13.4	13.8-15.6	
90°F 32°C	11.8-13.4	13.0-14.8	15.5-17.5	
100°F 38°C	13.0-14.8	15.5-17.5	17.6-19.9	
110°F 43°C	14.6-16.5	17.6-19.9	20.3-23.0	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	135 lbs 61 kgs	120 lbs 54 kgs	105 lbs 48 kgs
80°F 27°C	130 lbs 59 kgs	115 lbs 52 kgs	100 lbs 45 kgs
90°F 32°C	115 lbs 52 kgs	105 lbs 48 kgs	90 lbs 41 kgs
100°F 38°C	105 lbs 48 kgs	90 lbs 41 kgs	80 lbs 36 kgs
110°F 43°C	95 lbs 43 kgs	80 lbs 36 kgs	70 lbs 32 kgs

Based on average ice slab weight of 1.1 – 1.4 lbs (0.5 – 0.6 kgs).
Water Regulating Valve set to 230 PSIG discharge pressure
Condenser Water Usage = 185 gallons per 100 lbs of ice at 90°F/70°F.

Operating Pressures
U0140W/UF0140W

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	225-235 psig 15.5-16.2 bar	55-22 psig 3.8-1.5 bar
70°F **21°C**	225-235 psig 15.5-16.2 bar	65-24 psig 4.5-1.7 bar
80°F **27°C**	225-240 psig 15.5-16.5 bar	65-24 psig 4.5-1.7 bar
90°F **32°C**	225-245 psig 15.5-16.9 bar	65-24 psig 4.5-1.7 bar
100°F **38°C**	225-245 psig 15.5-16.9 bar	70-25 psig 4.8-1.7 bar
110°F **43°C**	225-245 psig 15.5-16.9 bar	70-26 psig 4.8-1.8 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	135-155 psig 9.3-10.7 bar	90-115 psig 6.2-7.9 bar
70°F **21°C**	145-160 psig 10.0-11.0 bar	100-130 psig 6.69-9.0 bar
80°F **27°C**	145-165 psig 10.0-11.4 bar	100-130 psig 6.69-9.0 bar
90°F **32°C**	145-165 psig 10.0-11.4 bar	110-130 psig 7.6-9.0 bar
100°F **38°C**	150-175 psig 10.3-12.1 bar	115-140 psig 7.9-9.7 bar
110°F **43°C**	150-180 psig 10.3-12.4 bar	115-145 psig 7.9-10.0 bar

UP0140A SELF-CONTAINED AIR-COOLED

R290

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	10.2-11.7	12.3-13.7	13.0-14.8	1.0-2.5
80°F 27°C	11.2-12.9	13.0-14.9	14.5-16.5	
90°F 32°C	11.8-13.7	14.5-16.5	17.5-20.0	
100°F 38°C	14.6-16.5	17.6-20.0	17.5-21.5	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	130 lbs 59 kgs	110 lbs 50 kgs	105 lbs 48 kgs
80°F 27°C	120 lbs 54 kgs	105 lbs 48 kgs	95 lbs 43 kgs
90°F 32°C	115 lbs 52 kgs	95 lbs 43 kgs	85 lbs 39 kgs
100°F 38°C	95 lbs 43 kgs	85 lbs 39 kgs	80 lbs 36 kgs

Based on average ice slab weight of 1.1 – 1.4 lbs (0.49 – 0.63 kgs).

Operating Pressures
UP0140A

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	140-210 psig 9.7-14.5 bar	45-17 psig 3.1-1.2 bar
70°F **21°C**	140-215 psig 9.7-14.8 bar	54-17 psig 3.7-1.2 bar
80°F **27°C**	150-220 psig 10.3-15.2 bar	55-17 psig 3.8-1.2 bar
90°F **32°C**	160-225 psig 11.0-15.5 bar	58-17 psig 4.0-1.2 bar
100°F **38°C**	205-230 psig 14.1-15.9 bar	60-20 psig 4.1-1.4 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	95-120 psig 6.6-8.3 bar	65-95 psig 4.5-6.6 bar
70°F **21°C**	100-120 psig 6.9-8.3 bar	70-95 psig 4.8-6.6 bar
80°F **27°C**	105-120 psig 7.2-8.3 bar	75-95 psig 5.2-6.6 bar
90°F **32°C**	120-140 psig 8.3-9.7 bar	90-114 psig 6.2-7.9 bar
100°F **38°C**	140-160 psig 9.7-11.0 bar	110-135 psig 7.6-9.3 bar

U0190A/UF0190A SELF-CONTAINED AIR-COOLED

R404A

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	16.1-18.3	19.8-22.5	21.2-24.0	1.0-2.5
80°F 27°C	19.8-22.5	21.9-24.9	24.5-27.8	
90°F 32°C	21.9-24.9	23.6-26.8	29.0-32.9	
100°F 38°C	25.5-29.0	29.1-32.9	32.0-36.2	
110°F 43°C	29.1-32.9	32.0-36.2	33.6-38.1	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	200 lbs 91 kgs	165 lbs 75 kgs	155 lbs 70 kgs
80°F 27°C	165 lbs 75 kgs	150 lbs 68 kgs	135 lbs 61 kgs
90°F 32°C	150 lbs 68 kgs	140 lbs 64 kgs	115 lbs 52 kgs
100°F 38°C	130 lbs 59 kgs	115 lbs 52 kgs	105 lbs 48 kgs
110°F 43°C	115 lbs 52 kgs	105 lbs 48 kgs	100 lbs 45 kgs

Based on average ice slab weight of 2.3 - 2.9 lbs (1.0 – 1.3 kgs).

Operating Pressures U0190A/UF0190A

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	**Suction Pressure**
50°F 10°C	200-250 psig 13.8-17.2 bar	60-38 psig 4.1-2.6 bar
70°F 21°C	200-260 psig 13.8-17.9 bar	80-38 psig 5.5-2.6 bar
80°F 27°C	240-290 psig 16.5-20.0 bar	80-39 psig 5.5-2.7 bar
90°F 32°C	260-330 psig 17.9-22.8 bar	80-40 psig 5.5-2.8 bar
100°F 38°C	310-380 psig 21.4-26.2 bar	85-41 psig 5.9-2.8 bar
110°F 43°C	315-390 psig 21.7-26.9 bar	90-41 psig 6.2-2.8 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	**Suction Pressure**
50°F 10°C	150-170 psig 10.3-11.7 bar	90-110 psig 6.2-7.6 bar
70°F 21°C	150-170 psig 10.3-11.7 bar	95-130 psig 6.6-9.0 bar
80°F 27°C	160-190 psig 11.0-13.1 bar	100-130 psig 6.9-9.0 bar
90°F 32°C	160-190 psig 11.0-13.1 bar	100-130 psig 6.9-9.0 bar
100°F 38°C	180-210 psig 12.4-14.5 bar	105-135 psig 7.2-9.3 bar
110°F 43°C	180-215 psig 12.4-14.8 bar	110-135 psig 7.6-9.3 bar

UP0190A SELF-CONTAINED AIR-COOLED

R290

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	13.9-16.0	16.9-18.9	18.0-20.3	1.0-2.5
80°F 27°C	15.0-17.2	17.0-20.1	19.4-22.4	
90°F 32°C	16.2-18.5	19.5-22.5	21.6-25.0	
100°F 38°C	19.0-21.5	20.4-24.0	23.4-26.5	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	200 lbs 91 kgs	165 lbs 75 kgs	155 lbs 70 kgs
80°F 27°C	165 lbs 75 kgs	150 lbs 68 kgs	135 lbs 61 kgs
90°F 32°C	150 lbs 68 kgs	140 lbs 64 kgs	115 lbs 52 kgs
100°F 38°C	130 lbs 59 kgs	115 lbs 52 kgs	105 lbs 48 kgs

Based on average ice slab weight of 2.3 - 2.9 lbs (1.0 – 1.3 kgs).

Operating Pressures
UP0190A

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	130-210 psig 9.0-14.5 bar	50-21 psig 3.4-1.4 bar
70°F **21°C**	150-210 psig 10.3-14.5 bar	53-23 psig 3.7-1.6 bar
80°F **27°C**	160-230 psig 11.0-15.9 bar	55-23 psig 3.8-1.6 bar
90°F **32°C**	195-260 psig 13.4-17.9 bar	60-24 psig 4.1-1.7 bar
100°F **38°C**	200-280 psig 13.8-19.3 bar	65-25 psig 4.5-1.7 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	80-110 psig 5.5-7.6 bar	68-72 psig 4.7-5.0 bar
70°F **21°C**	85-115 psig 5.9-7.9 bar	70-80 psig 4.8-5.5 bar
80°F **27°C**	95-120 psig 6.6-8.3 bar	70-85 psig 4.8-5.9 bar
90°F **32°C**	115-170 psig 7.9-11.7 bar	80-95 psig 5.5-6.6 bar
100°F **38°C**	120-175 psig 8.3-12.1 bar	70-105 psig 4.8-7.2 bar

U0240A/UF0240A SELF-CONTAINED AIR-COOLED

R404A

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	14.1-16.1	17.0-19.3	18.6-21.1	1.0-2.5
80°F 27°C	15.2-17.4	18.0-20.5	20.5-23.3	
90°F 32°C	16.5-18.8	20.5-23.3	22.7-25.8	
100°F 38°C	19.2-21.8	21.9-24.9	23.6-26.8	
110°F 43°C	21.9-24.9	23.6-26.8	24.5-27.8	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	225 lbs 102 kgs	190 lbs 86 kgs	175 lbs 79 kgs
80°F 27°C	210 lbs 95 kgs	180 lbs 82 kgs	160 lbs 73 kgs
90°F 32°C	195 lbs 88 kgs	160 lbs 73 kgs	145 lbs 66 kgs
100°F 38°C	170 lbs 77 kgs	150 lbs 68 kgs	140 lbs 64 kgs
110°F 43°C	150 lbs 68 kgs	140 lbs 64 kgs	135 lbs 61 kgs

Based on average ice slab weight of 2.3 - 2.9 lbs (1.0 – 1.3 kgs).

Operating Pressures
U0240A/UF0240A

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	**Suction Pressure**
50°F **10°C**	220-275 psig 15.2-19.0 bar	65-32 psig 4.5-2.2 bar
70°F **21°C**	220-310 psig 15.2-21.4 bar	75-34 psig 5.2-2.3 bar
80°F **27°C**	270-330 psig 18.6-22.8 bar	80-36 psig 5.5-2.5 bar
90°F **32°C**	290-350 psig 20.0-24.1 bar	80-38 psig 5.5-2.6 bar
100°F **38°C**	320-410 psig 22.1-28.3 bar	85-39 psig 5.9-2.7 bar
110°F **43°C**	355-430 psig 24.5-29.7 bar	90-40 psig 6.2-2.8 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	**Suction Pressure**
50°F **10°C**	145-200 psig 10.0-13.8 bar	85-110 psig 5.9-7.6 bar
70°F **21°C**	155-210 psig 10.7-14.5 bar	90-120 psig 6.2-8.3 bar
80°F **27°C**	175-225 psig 12.1-15.5 bar	90-140 psig 6.2-9.7 bar
90°F **32°C**	185-245 psig 12.8-16.9 bar	90-150 psig 6.2-10.3 bar
100°F **38°C**	200-260 psig 13.8-17.9 bar	90-155 psig 6.2-10.7 bar
110°F **43°C**	220-280 psig 15.2-19.3 bar	90-160 psig 6.2-11.0 bar

UP0240A SELF-CONTAINED AIR-COOLED

R290

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	13.9-16.0	16.9-18.9	18.0-20.3	1.0-2.5
80°F 27°C	15.0-17.2	17.0-20.1	19.4-22.4	
90°F 32°C	16.2-18.5	19.5-22.5	21.6-25.0	
100°F 38°C	19.0-21.5	20.4-24.0	23.4-26.5	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	225 lbs 102 kgs	190 lbs 86 kgs	175 lbs 79 kgs
80°F 27°C	210 lbs 95 kgs	180 lbs 82 kgs	160 lbs 73 kgs
90°F 32°C	195 lbs 88 kgs	160 lbs 73 kgs	145 lbs 66 kgs
100°F 38°C	170 lbs 77 kgs	150 lbs 68 kgs	140 lbs 64 kgs

Based on average ice slab weight of 2.3 - 2.9 lbs (1.0 – 1.3 kgs).

Operating Pressures
UP0240A

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	145-205 psig 10.0-14.1 bar	40-14 psig 2.8-1.0 bar
70°F **21°C**	150-210 psig 10.3-14.5 bar	42-15psig 2.9-1.0 bar
80°F **27°C**	160-230 psig 11.0-15.9 bar	46-18 psig 3.2-1.2 bar
90°F **32°C**	180-240 psig 12.4-16.5 bar	51-20 psig 3.5-1.4 bar
100°F **38°C**	230-280 psig 15.9-19.3 bar	54-24 psig 3.7-1.7 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	90-105 psig 6.2-7.2 bar	55-65 psig 3.8-4.5 bar
70°F **21°C**	90-105 psig 6.2-7.2 bar	60-70 psig 4.1-4.8 bar
80°F **27°C**	95-110 psig 6.6-7.6 bar	65-85 psig 4.5-5.9 bar
90°F **32°C**	105-125 psig 7.2-8.6 bar	65-95 psig 4.5-6.6 bar
100°F **38°C**	115-150 psig 7.9-10.3 bar	70-105 psig 4.8-7.2 bar

U0240W/UF0240W SELF-CONTAINED WATER-COOLED

R404A

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70°F 21°C	16.1-18.3	17.0-19.3	18.0-20.5	1.0-2.5
80°F 27°C	16.5-18.8	17.5-19.9	18.6-21.1	
90°F 32°C	18.0-20.5	19.2-21.8	20.5-23.3	
100°F 38°C	18.6-21.1	19.8-22.5	21.2-24.0	
110°F 43°C	19.2-21.8	20.5-23.3	21.9-24.9	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	200 lbs 91 kgs	190 lbs 86 kgs	180 lbs 82 kgs
80°F 27°C	195 lbs 88 kgs	185 lbs 84 kgs	175 lbs 79 kgs
90°F 32°C	180 lbs 82 kgs	170 lbs 77 kgs	160 lbs 73 kgs
100°F 38°C	175 lbs 79 kgs	165 lbs 75 kgs	155 lbs 70 kgs
110°F 43°C	170 lbs 77 kgs	160 lbs 73 kgs	150 lbs 68 kgs

Based on average ice slab weight of 2.3 - 2.9 lbs (1.0 – 1.3 kgs). Water regulating valve set to maintain 235 PSIG discharge pressure. Condenser water usage = 149 gallons per 100 lbs of ice at 90°F/70°F.

Operating Pressures
U0240W/UF0240W

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	**Suction Pressure**
50°F **10°C**	230-240 psig 15.9-16.5 bar	65-30 psig 4.5-2.1 bar
70°F **21°C**	230-240 psig 15.9-16.5 bar	70-32 psig 4.8-2.2 bar
80°F **27°C**	230-240 psig 15.9-16.5 bar	70-34 psig 4.8-2.3 bar
90°F **32°C**	230-240 psig 15.9-16.5 bar	70-36 psig 4.8-2.5 bar
100°F **38°C**	230-245 psig 15.9-16.9 bar	75-35 psig 5.2-2.4 bar
110°F **43°C**	230-250 psig 15.9-17.2 bar	80-38 psig 5.5-2.6 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	**Suction Pressure**
50°F **10°C**	130-150 psig 9.0-10.3 bar	80-110 psig 5.5-7.6 bar
70°F **21°C**	135-160 psig 9.3-11.0 bar	90-120 psig 6.2-8.3 bar
80°F **27°C**	135-160 psig 9.3-11.0 bar	90-120 psig 6.2-8.3 bar
90°F **32°C**	135-165 psig 9.3-11.4 bar	90-120 psig 6.2-8.3 bar
100°F **38°C**	135-170 psig 9.3-11.7 bar	90-120 psig 6.2-8.3 bar
110°F **43°C**	140-175 psig 9.7-12.1 bar	95-125 psig 6.6-8.6 bar

UP0240W SELF-CONTAINED WATER-COOLED

R290

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	15.9-17.9	16.9-18.9	18.0-20.3	1.0-2.5
80°F 27°C	16.3-18.4	17.3-19.5	18.4-20.5	
90°F 32°C	17.0-19.9	19.0-20.4	19.1-21.8	
100°F 38°C	18.0-21.0	19.5-21.8	20.8-24.0	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10 lbs/kgs	70/21 lbs/kgs	90/32 lbs/kgs
70°F 21°C	210 lbs 95.3 kgs	190 lbs 86.2 kgs	180 lbs 81.6 kgs
80°F 27°C	200 lbs 90.7 kgs	185 lbs 83.9 kgs	175 lbs 79.4 kgs
90°F 32°C	190 lbs 86.2 kgs	170 lbs 77.1 kgs	160 lbs 72.6 kgs
100°F 38°C	180 lbs 81.6 kgs	165 lbs 74.8 kgs	155 lbs 70.3 kgs

Based on average ice slab weight of 2.3 - 2.9 lbs (1.0 – 1.3 kgs). Water regulating valve set to maintain 235 PSIG discharge pressure. Condenser water usage = 166 gallons per 100 lbs of ice at 90°F/70°F.

Operating Pressures
UP0240W

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG/BAR	Suction Pressure PSIG/BAR
50°F **10°C**	160-180 psig 11.0-12.4 bar	48-17 psig 3.3-1.2 bar
70°F **21°C**	160-180 psig 11.0-12.4 bar	52-20 psig 3.6-1.4 bar
80°F **27°C**	160-180 psig 11.0-12.4 bar	52-20 psig 3.6-1.4 bar
90°F **32°C**	160-180 psig 11.0-12.4 bar	53-23 psig 3.7-1.6 bar
100°F **38°C**	160-180 psig 11.0-12.4 bar	54-24 psig 3.7-1.7 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG/BAR	Suction Pressure PSIG/BAR
50°F **10°C**	90-105 psig 6.2-7.2 bar	60-70 psig 4.1-4.8 bar
70°F **21°C**	90-110 psig 6.2-7.6 bar	60-70 psig 4.1-4.8 bar
80°F **27°C**	95-110 psig 6.6-7.6 bar	65-85 psig 4.5-5.9 bar
90°F **32°C**	105-125 psig 7.2-8.6 bar	65-95 psig 4.5-6.6 bar
100°F **38°C**	105-145 psig 7.2-10.0 bar	65-100 psig 4.5-6.9 bar

U0310A/UF0310A SELF-CONTAINED AIR-COOLED

R404A

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	10.0-11.5	11.8-13.4	14.1-16.1	1.0-2.5
80°F 27°C	10.4-11.9	12.3-14.0	13.5-15.4	
90°F 32°C	11.0-12.6	13.5-15.4	15.2-17.4	
100°F 38°C	12.3-14.0	15.2-17.4	17.5-19.9	
110°F 43°C	15.6-17.8	19.2-21.8	21.2-24.0	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	305 lbs 138 kgs	265 lbs 120 kgs	225 lbs 102 kgs
80°F 27°C	295 lbs 134 kgs	255 lbs 116 kgs	235 lbs 107 kgs
90°F 32°C	280 lbs 127 kgs	235 lbs 107 kgs	210 lbs 95 kgs
100°F 38°C	255 lbs 116 kgs	210 lbs 95 kgs	185 lbs 84 kgs
110°F 43°C	205 lbs 93 kgs	170 lbs 77 kgs	155 lbs 70 kgs

Based on average ice slab weight of 2.3 - 2.9 lbs (1.0 – 1.3 kgs).

Operating Pressures
U0310A/UF0310A

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	200-250 psig 13.8-17.2 bar	45-18 psig 3.1-1.2 bar
70°F **21°C**	200-250 psig 13.8-17.2 bar	50-18 psig 3.4-1.2 bar
80°F **27°C**	200-270 psig 13.8-18.6 bar	55-20 psig 3.8-1.4 bar
90°F **32°C**	240-300 psig 16.5-20.7 bar	60-22 psig 4.1-1.5 bar
100°F **38°C**	275-350 psig 19.0-24.1 bar	65-23 psig 4.5-1.6 bar
110°F **43°C**	300-375 psig 20.7-25.9 bar	70-25 psig 4.8-1.7 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	130-150 psig 9.0-10.3 bar	75-105 psig 5.2-7.2 bar
70°F **21°C**	135-150 psig 9.3-10.3 bar	75-105 psig 5.2-7.2 bar
80°F **27°C**	140-175 psig 9.7-12.1 bar	75-110 psig 5.2-7.6 bar
90°F **32°C**	165-185 psig 11.4-12.8 bar	105-125 psig 7.2-8.6 bar
100°F **38°C**	175-220 psig 12.1-15.2 bar	130-150 psig 9.0-10.3 bar
110°F **43°C**	210-240 psig 14.5-16.5 bar	135-155 psig 9.3-10.7 bar

UP0310A SELF-CONTAINED AIR-COOLED

R290

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	10.8-11.5	11.6-13.6	14.0-16.0	1.0-2.5
80°F 27°C	11.0-12.1	12.5-14.0	13.5-15.5	
90°F 32°C	11.3-12.8	13.5-15.7	15.2-17.5	
100°F 38°C	12.1-14.2	15.2-17.5	17.5-20.0	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	305 lbs 138 kgs	265 lbs 120 kgs	235 lbs 107 kgs
80°F 27°C	295 lbs 134 kgs	255 lbs 116 kgs	225 lbs 102 kgs
90°F 32°C	280 lbs 127 kgs	235 lbs 107 kgs	210 lbs 95 kgs
100°F 38°C	255 lbs 116 kgs	210 lbs 95 kgs	185 lbs 84 kgs

Based on average ice slab weight of 2.3 - 2.9 lbs (1.0 – 1.3 kgs).

Operating Pressures
UP0310A

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	150-220 psig 10.3-15.2 bar	40-9 psig 2.8-0.6 bar
70°F **21°C**	150-220 psig 10.3-15.2 bar	46-9 psig 3.2-0.6 bar
80°F **27°C**	150-230 psig 10.3-15.9 bar	53-10 psig 3.7-0.7 bar
90°F **32°C**	175-245 psig 12.1-16.9 bar	58-11 psig 4.0-0.8 bar
100°F **38°C**	220-270 psig 15.2-18.6 bar	60-11 psig 4.1-0.8 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	100-115 psig 6.9-7.9 bar	55-70 psig 3.8-4.8 bar
70°F **21°C**	100-120 psig 6.9-8.3 bar	55-75 psig 3.8-5.2 bar
80°F **27°C**	115-130 psig 7.9-9.0 bar	55-85 psig 3.8-5.9 bar
90°F **32°C**	130-150 psig 9.0-10.3 bar	55-95 psig 3.8-6.6 bar
100°F **38°C**	150-170 psig 10.3-11.7 bar	60-110 psig 4.1-7.6 bar

U0310W/UF0310W - SELF-CONTAINED WATER-COOLED

R404A

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	11.5-13.2	11.3-12.9	12.0-13.7	1.0-2.5
80°F 27°C	10.0-11.5	11.5-13.2	12.3-14.0	
90°F 32°C	10.2-11.7	12.6-14.3	13.1-15.0	
100°F 38°C	10.4-11.9	12.6-14.3	13.5-15.4	
110°F 43°C	10.6-12.2	12.8-14.7	13.8-15.7	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70°F 21°C	270 lbs 122 kgs	275 lbs 125 kgs	260 lbs 118 kgs
80°F 27°C	305 lbs 138 kgs	270 lbs 122 kgs	255 lbs 116 kgs
90°F 32°C	300 lbs 136 kgs	250 lbs 113 kgs	240 lbs 109 kgs
100°F 38°C	295 lbs 134 kgs	250 lbs 113 kgs	235 lbs 107 kgs
110°F 43°C	290 lbs 132 kgs	245 lbs 111 kgs	230 lbs 104 kgs

Based on average ice slab weight of 2.3 - 2.9 lbs (1.0 – 1.3 kgs). Water regulating valve set to maintain 235 PSIG discharge pressure. Condenser water usage = 149 gallons per 100 lbs of ice at 90°F/70°F.

Operating Pressures
U0310W/UF0310W

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	230-240 psig 15.9-16.5 bar	50-24 psig 3.4-1.7 bar
70°F **21°C**	230-240 psig 15.9-16.5 bar	50-25 psig 3.4-1.7 bar
80°F **27°C**	235-240 psig 16.2-16.5 bar	50-26 psig 3.4-1.8 bar
90°F **32°C**	235-240 psig 16.2-16.5 bar	55-27 psig 3.8-1.9 bar
100°F **38°C**	235-250 psig 16.2-17.2 bar	60-27 psig 4.1-1.9 bar
110°F **43°C**	235-255 psig 16.2-17.6 bar	60-28 psig 4.1-1.9 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure	Suction Pressure
50°F **10°C**	150-175 psig 10.3-12.1 bar	75-90 psig 5.2-6.2 bar
70°F **21°C**	150-175 psig 10.3-12.1 bar	75-90 psig 5.2-6.2 bar
80°F **27°C**	155-175 psig 10.7-12.1 bar	75-95 psig 5.2-6.6 bar
90°F **32°C**	165-180 psig 11.4-12.4 bar	80-100 psig 5.5-6.9 bar
100°F **38°C**	165-180 psig 11.4-12.4 bar	80-100 psig 5.5-6.9 bar
110°F **43°C**	165-180 psig 11.4-12.4 bar	80-100 psig 5.5-6.9 bar

UP0310W - SELF-CONTAINED WATER-COOLED

R290

NOTE: These characteristics may vary depending on operating conditions.

Cycle Times

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Entering Condenser °F/°C	Freeze Time Water Temperature °F/°C			Harvest Time
	50/10	70/21	90/32	
70°F 21°C	9.8-13.1	11.2-12.8	11.9-13.5	1.0-2.5
80°F 27°C	10.0-11.2	11.4-13.0	12.3-13.8	
90°F 32°C	10.0-11.4	12.1-14.1	13.0-15.0	
100°F 38°C	10.3-11.7	12.2-14.2	13.2-15.1	

Times in minutes

24 Hour Ice Production

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10 lbs/kgs	70/21 lbs/kgs	90/32 lbs/kgs
70°F 21°C	305 lbs 138 kgs	265 lbs 120 kgs	235 lbs 107 kgs
80°F 27°C	300 lbs 136 kgs	255 lbs 116 kgs	225 lbs 102 kgs
90°F 32°C	295 lbs 134 kgs	235 lbs 107 kgs	210 lbs 95 kgs
100°F 38°C	290 lbs 132 kgs	250 lbs 113 kgs	235 lbs 107 kgs

Based on average ice slab weight of 2.3 - 2.9 lbs (1.0 – 1.3 kgs). Water regulating valve set to maintain 235 PSIG discharge pressure - Condenser water usage = 160 gallons per 100 lbs of ice at 90°F/70°F.

Operating Pressures
UP0310W

FREEZE CYCLE

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG/BAR	Suction Pressure PSIG/BAR
50°F **10°C**	160-180 psig 11.0-12.4 bar	36-14 psig 2.5-1.0 bar
70°F **21°C**	160-180 psig 11.0-12.4 bar	37-15 psig 2.6-1.0 bar
80°F **27°C**	160-180 psig 11.0-12.4 bar	37-15 psig 2.6-1.0 bar
90°F **32°C**	160-180 psig 11.0-12.4 bar	42-12 psig 2.9-0.8 bar
100°F **38°C**	160-180 psig 11.0-12.4 bar	42-14 psig 2.9-1.0 bar

Suction pressure drops gradually throughout the freeze cycle

HARVEST CYCLE

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG/BAR	Suction Pressure PSIG/BAR
50°F **10°C**	100-140 psig 6.9-9.7 bar	55-70 psig 3.8-4.8 bar
70°F **21°C**	100-140 psig 6.9-9.7 bar	55-70 psig 3.8-4.8 bar
80°F **27°C**	100-140 psig 6.9-9.7 bar	55-70 psig 3.8-4.8 bar
90°F **32°C**	110-160 psig 7.6-11.0 bar	55-75 psig 3.8-5.2 bar
100°F **38°C**	110-160 psig 7.6-11.0 bar	55-75 psig 3.8-5.2 bar

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Diagrams

Wiring Diagrams

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

Warning

Always disconnect power before working on electrical circuitry.

Wiring Diagram Legend

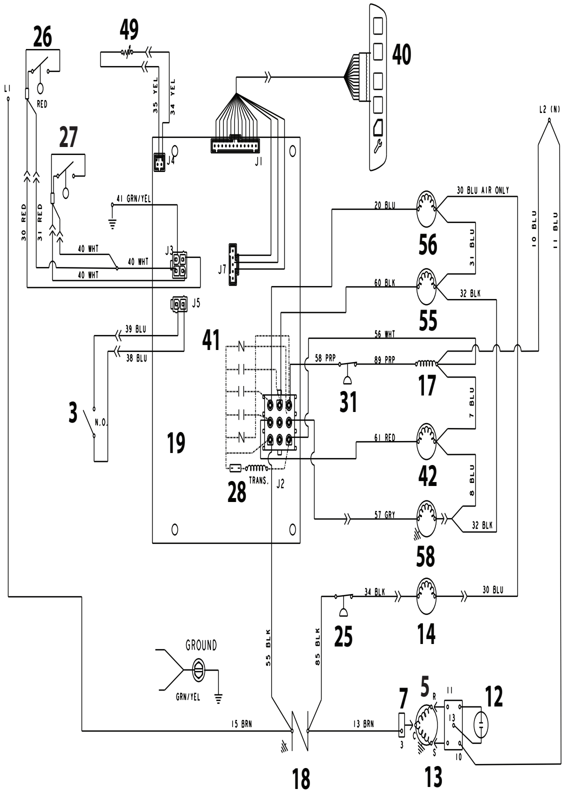
The following symbols are used on all of the wiring diagrams:

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

UP0140/UP0190/UP0240 & UP0310 (50 HZ)

1 Ph - Self Contained Air & Water-cooled

WIRING DIAGRAM



UP0140/UP0190/UP0240, UP0310 (50 HZ)

1 Ph - Self Contained Air & Water-cooled

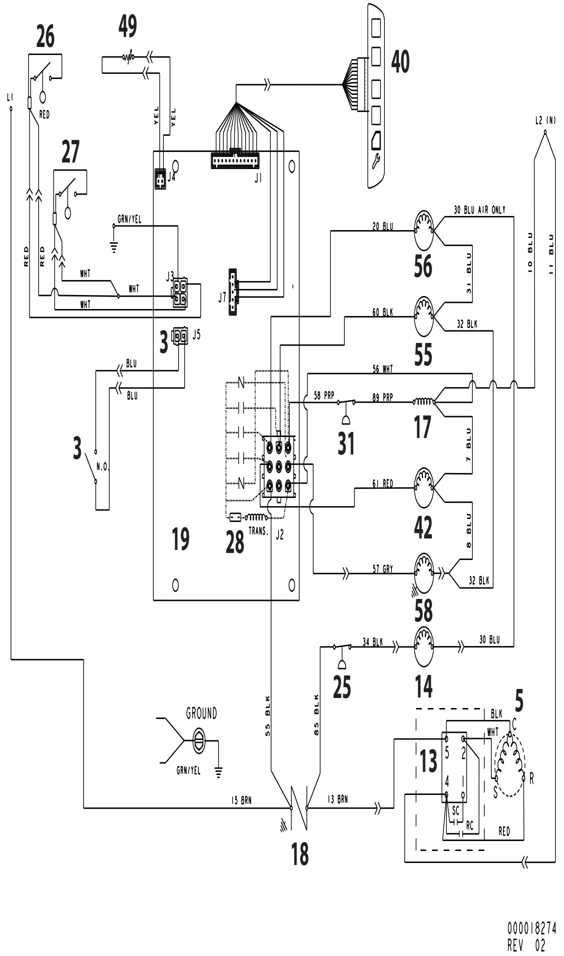
WIRING DIAGRAM COMPONENTS

Number	Component
3	Bin Switch
5	Compressor
7	Compressor Overload
12	Compressor Start Capacitor
13	Compressor Start Relay
14	Condenser Fan Motor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Float Switch - Harvest
27	Float Switch-Water Level
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve
49	Thermistor - J4
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
PNK	Pink
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

UP0310 (60 HZ)

1 Ph - Self Contained Air & Water-cooled

WIRING DIAGRAM



UP0310 (60 HZ)

1 Ph - Self Contained Air & Water-cooled

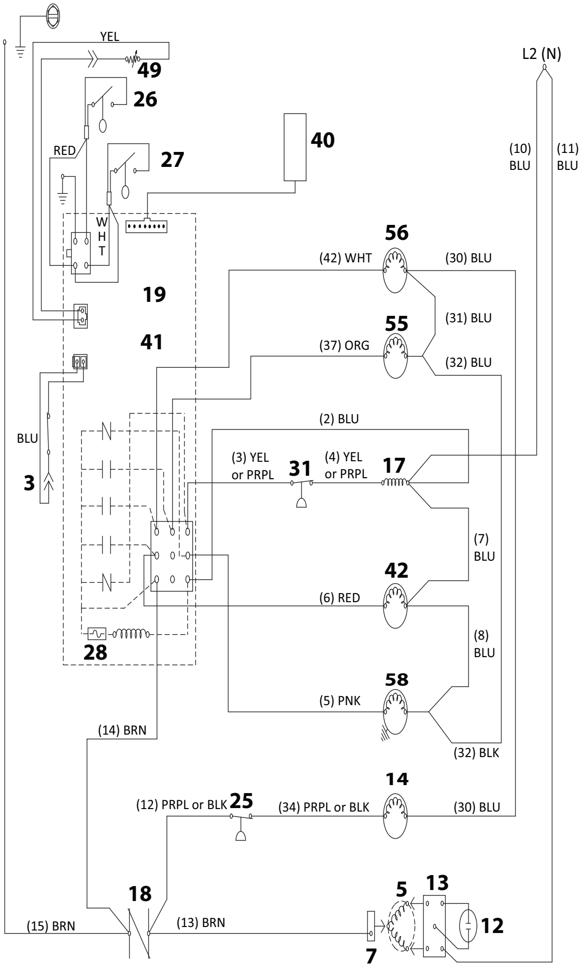
WIRING DIAGRAM COMPONENTS

Number	Component
3	Bin Switch
5	Compressor
13	Compressor Start Relay
14	Condenser Fan Motor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Float Switch - Harvest
27	Float Switch - Water Level
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
42	Solenoid Valve
49	Thermistor - J4
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
PNK	Pink
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

U0140/U0190/U0240
WITH J4 THERMISTOR TERMINAL

1 Ph - Self Contained Air & Water-cooled

WIRING DIAGRAM



U0140/U0190/U0240

With J4 Thermistor Terminal

1 Ph - Self Contained Air & Water-cooled

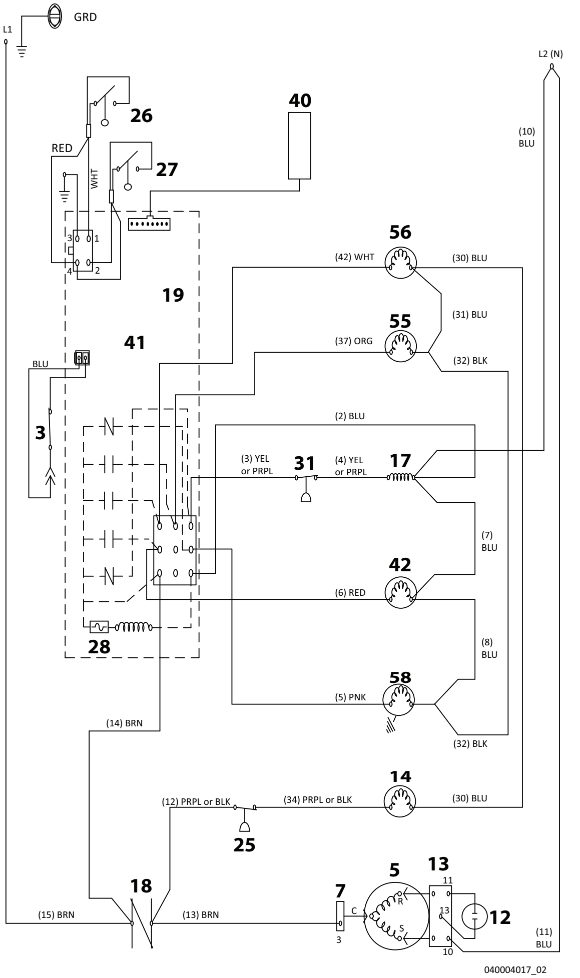
WIRING DIAGRAM COMPONENTS

Number	Component
3	Bin Switch
5	Compressor
7	Compressor Overload
12	Compressor Start Capacitor
13	Compressor Start Relay
14	Condenser Fan Motor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Float Switch - Harvest
27	Float Switch-Water Level
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve
49	Thermistor - J4
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
PNK	Pink
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

U0140/U0190/U0240
BEFORE J4 THERMISTOR TERMINAL

1 Ph - Self Contained Air & Water-cooled

WIRING DIAGRAM



U0140/U0190/U0240

Before Thermistor Terminal

1 Ph - Self Contained Air & Water-cooled

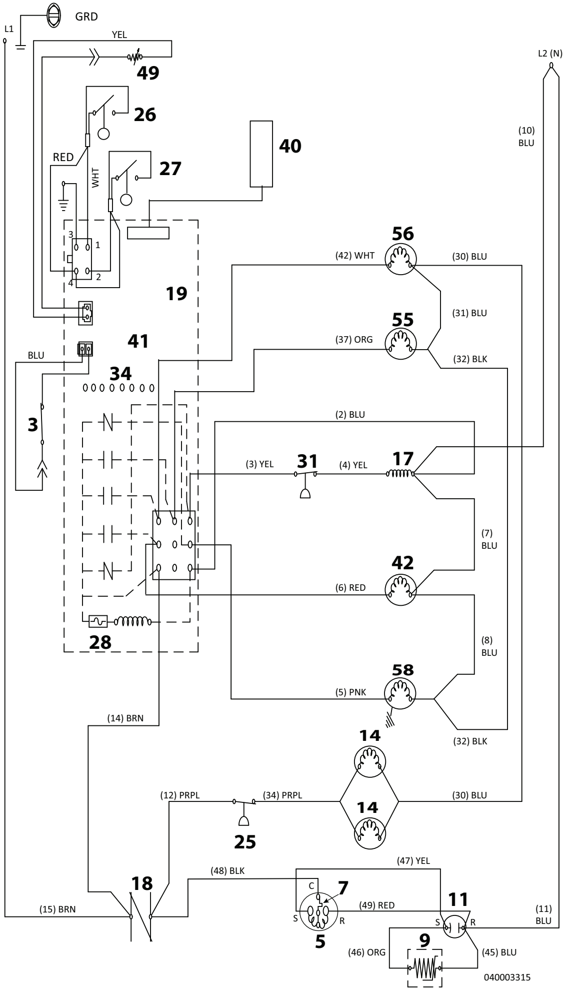
WIRING DIAGRAM COMPONENTS

Number	Component
3	Bin Switch
5	Compressor
7	Compressor Overload
12	Compressor Start Capacitor
13	Compressor Start Relay
14	Condenser Fan Motor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Float Switch - Harvest
27	Float Switch-Water Level
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
PNK	Pink
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

U0310
WITH J4 THERMISTOR TERMINAL

1 Ph - Self Contained Air & Water-cooled

WIRING DIAGRAM



U0310

With J4 Thermistor Terminal

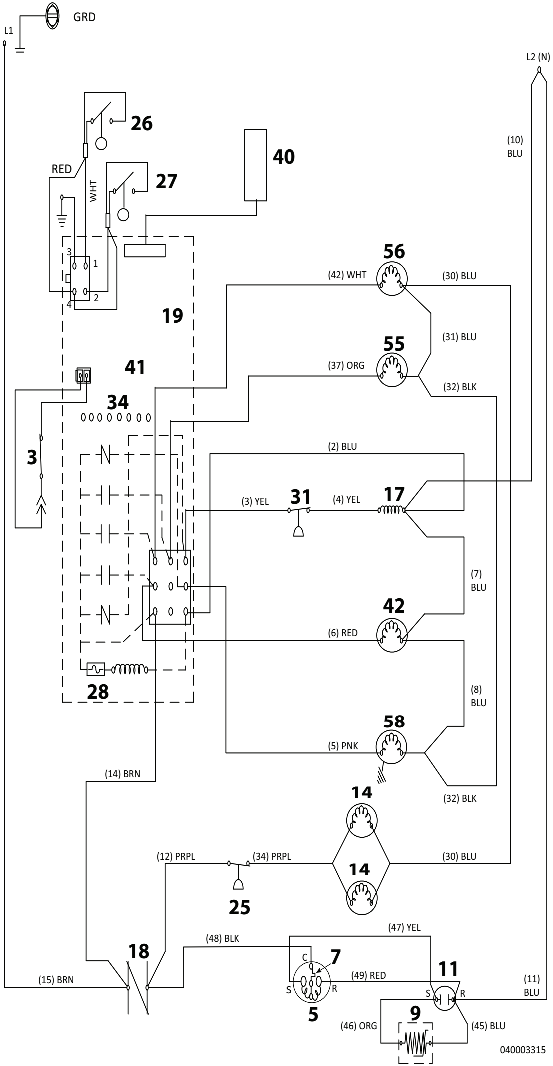
1 Ph - Self Contained Air & Water-cooled

WIRING DIAGRAM COMPONENTS

Number	Component
3	Bin Switch
5	Compressor
7	Compressor Overload
9	Compressor PTCR
11	Compressor Run capacitor
12	Compressor Start Capacitor
14	Condenser Fan Motor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Float Switch - Harvest
27	Float Switch - Water Level
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve
49	Thermistor - J4
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
PNK	Pink
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

U0310
BEFORE J4 THERMISTOR TERMINAL

1 Ph - Self Contained Air & Water-cooled



U0310
BEFORE J4 THERMISTOR TERMINAL

1 Ph - Self Contained Air & Water-cooled

WIRING DIAGRAM COMPONENTS

Number	Component
3	Bin Switch
5	Compressor
7	Compressor Overload
9	Compressor PTCR
11	Compressor Run capacitor
12	Compressor Start Capacitor
14	Condenser Fan Motor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
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Wire Colors	
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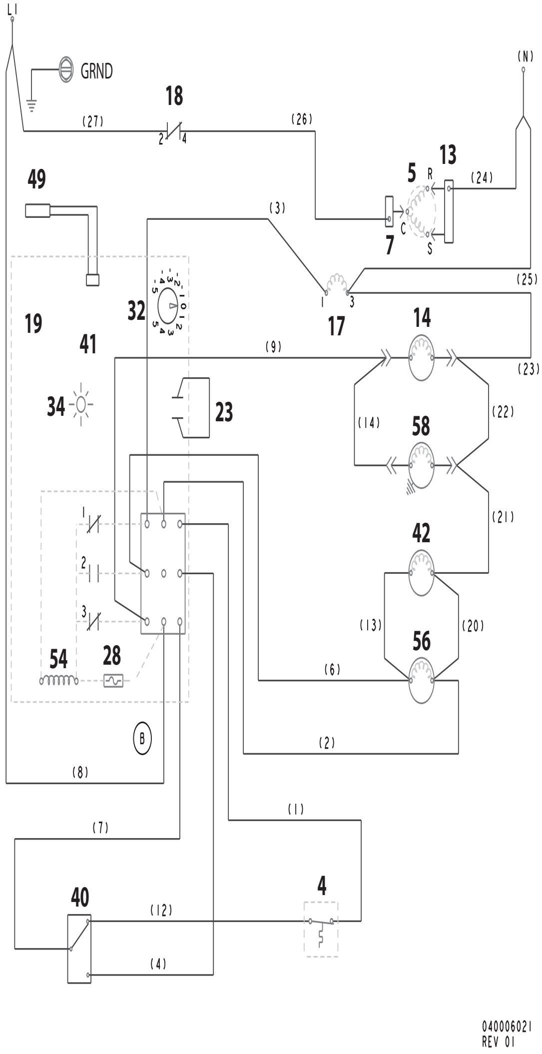
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

UD0065/UDE0065/UDP0065

1 Ph - Self Contained Air-cooled

WIRING DIAGRAM



UD0065/UDE0065/UDP0065

1 Ph Self Contained Air-cooled

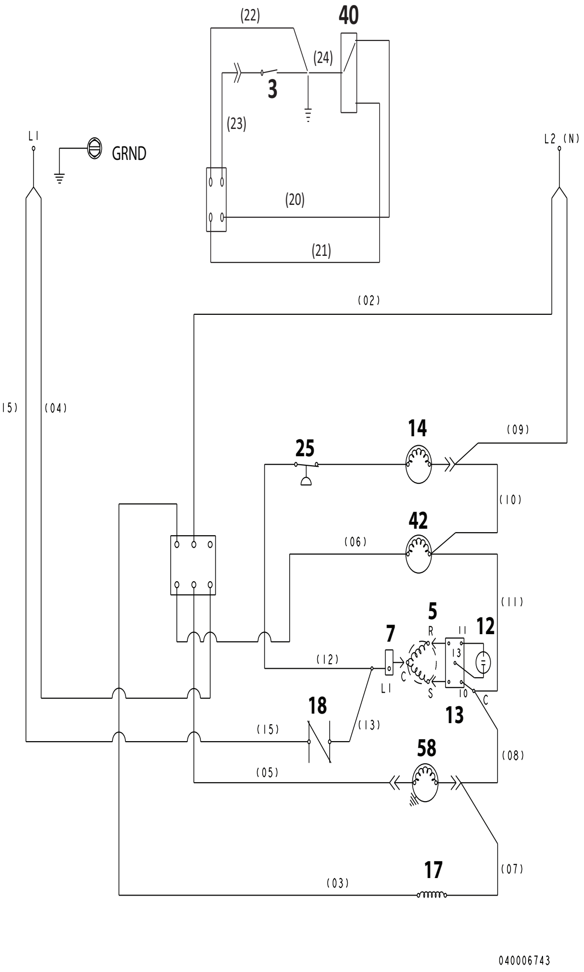
WIRING DIAGRAM COMPONENTS

Number	Component
4	Bin Thermostat
5	Compressor
7	Compressor Overload
13	Compressor Start Relay
14	Condenser Fan Motor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
23	Jumper Air cooled or Drain Pump Safety Switch Water-cooled
28	Fuse
32	Ice Thickness Control
34	Light Harvest
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve Harvest
49	Thermistor Liquid Line
54	Transformer
56	Water Inlet Valve
58	Water Pump
Refer to control board schematic for control board detail	

UE0080/UDE0080/UDP0080

1 Ph - Self Contained Air-cooled

WIRING DIAGRAM



UE0080/UDE0080/UDP0080

1 Ph Self Contained Air-cooled

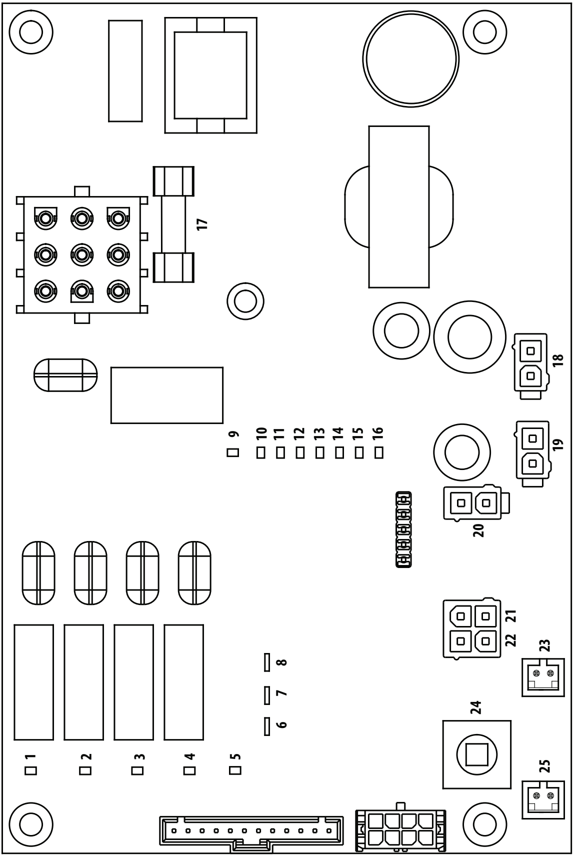
WIRING DIAGRAM COMPONENTS

Number	Component
3	Bin Switch
5	Compressor
7	Compressor Overload
12	Compressor Start Capacitor
13	Compressor Start Relay
14	Condenser Fan Motor
17	Contactor Coil
18	Contactor Contacts
25	Fan Cycle Control
40	On/Off/Clean Switch
42	Solenoid Valve Harvest
58	Water Pump
Refer to control board schematic for control board detail	

Electronic Control Boards

UF / UP MODELS

UF0140/UP0140
UF0190/UP0190
UF0240/UP0240
UF0310/UP0310



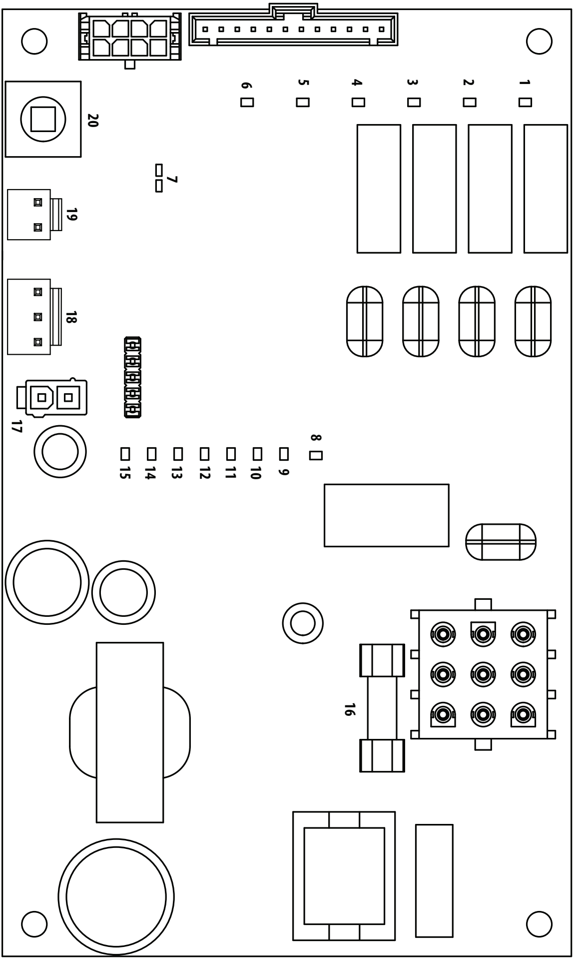
UF / UP Models

CONTROL BOARD COMPONENTS

Number	Component
1	LED Water Pump Relay
2	LED Compressor Relay
3	LED Water Dump Valve Relay
4	LED Harvest Solenoid Valve
5	LED Clean
6	LED Thermistor
7	LED Thermistor
8	LED Thermistor
9	LED Water Fill Valve
10	LED Harvest Float
11	LED Water Level Float
12	LED Bin Switch
13	LED Safety Limit 2
14	LED Safety Limit 1
15	LED Harvest
16	LED Test Mode
17	Fuse
18	Motor Connector 12V - J8
19	EC Fan Motor Connector 12V - J9
20	Bin Switch Connector - J5
21	Float Switch Water Level
22	Float Switch Harvest
23	Thermistor 2 - J10
24	Test Switch
25	Thermistor 1 - J4

CONTROL BOARD
U MODELS

with J4 Thermistor Terminal



U Models

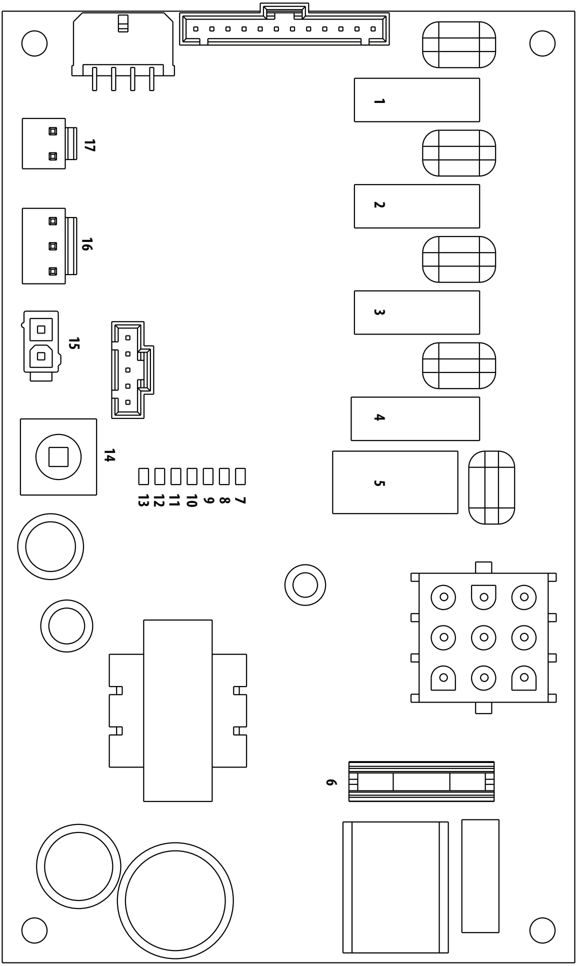
With J4 Thermistor Terminal

<u>CONTROL BOARD COMPONENTS</u>

Number	Component
1	LED Water Pump Relay
2	LED Compressor Relay
3	LED Water Dump Valve Relay
4	LED Harvest Solenoid Valve
5	LED Clean
6	LED Thermistor
7	JP1 Jumper or Thermistor Connector
8	LED Water Fill Valve
9	LED Harvest Float
10	LED Water Level Float
11	LED Bin Switch
12	LED Safety Limit 2
13	LED Safety Limit 1
14	LED Harvest
15	LED Test Mode
16	Fuse
17	Bin Switch Connector - J5
18	Float Switch Water Level
19	Float Switch Harvest
20	Test Switch

CONTROL BOARD
U MODELS

Before to J4 Thermistor Terminal



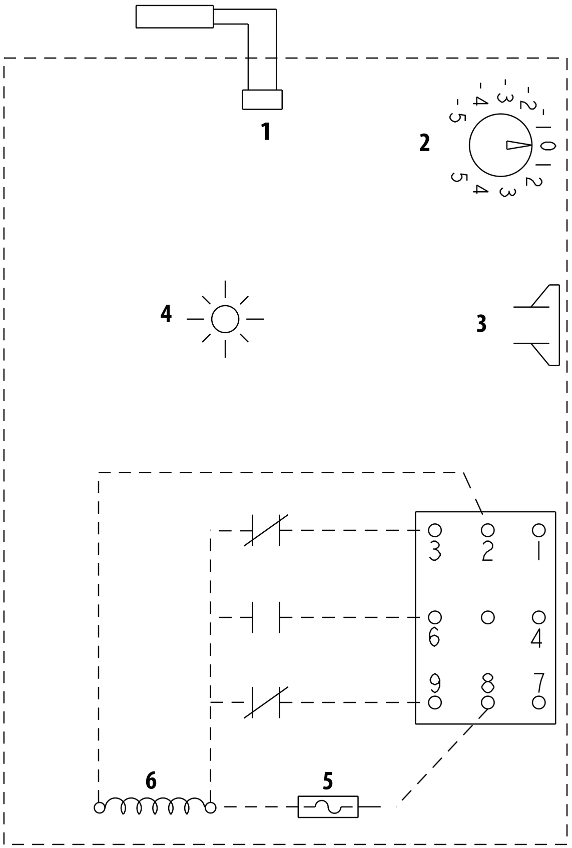
U Models

Before To J4 Thermistor Terminal

CONTROL BOARD COMPONENTS

Number	Component
1	Water Pump Relay
2	Compressor Relay
3	Water Dump Valve Relay
4	Harvest Solenoid Valve
5	Water Inlet Valve Relay
6	Fuse
7	LED Ice Level Float
8	LED Test Mode
9	LED Curtain Switch
10	LED Safety Limit 2
11	LED Safety Limit 1
12	LED Harvest
13	LED Water Level Float
14	Test Switch
15	Bin Switch Connector J5
16	Float Switch Water Level
17	Float Switch Harvest

ELECTRONIC CONTROL BOARD
UD0065/UDE0065/UDP0065

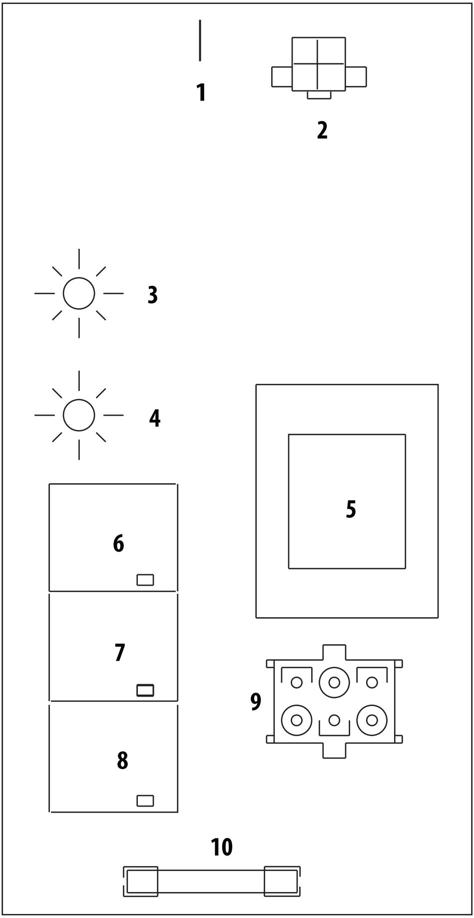


UD0065/UDE0065/UDP0065

CONTROL BOARD COMPONENTS

Number	Component
1	Liquid Line Thermistor
2	Ice Thickness Adjustment
3	Overflow Jumper Wire
4	Harvest Light
5	Fuse
6	Control Board Transformer

ELECTRONIC CONTROL BOARD
UE0080/UDE0080/UDP0080



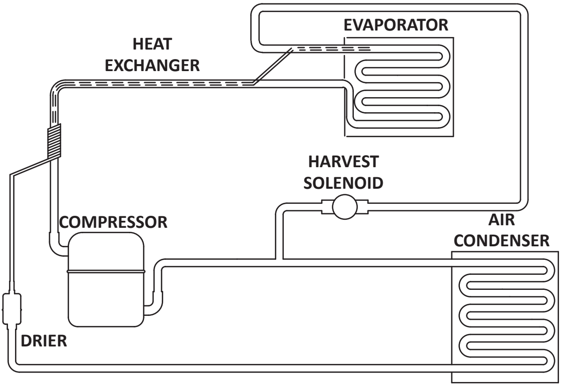
UDE0080/UDP0080

CONTROL BOARD COMPONENTS

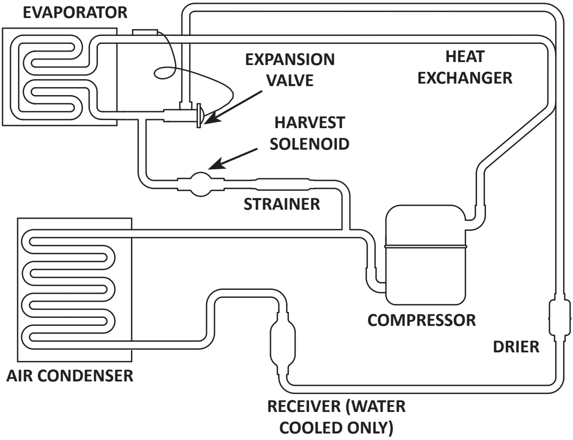
Number	Component
1	Ice Thickness Probe Connection
2	Ice/Off/Clean Toggle Switch Connection
3	Bin Switch Light
4	Harvest Light
5	Control Board Transformer
6	Compressor Relay
7	Harvest Valve Relay
8	Water Pump Relay
9	Line Voltage Connector
10	Fuse

Tubing Schematics

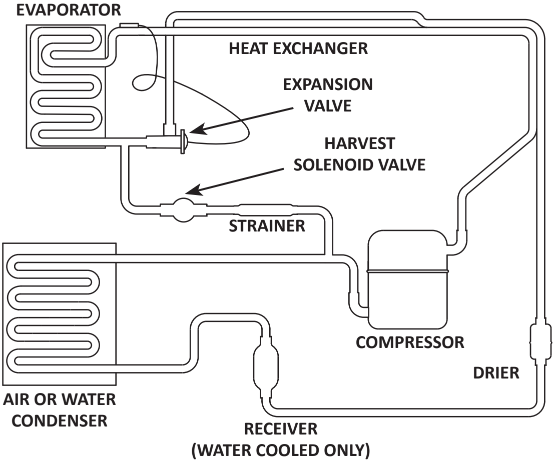
UDE0065/UDP0065



UDE0080/UDP0080 & U0140/UF0140/UP0140



U0190/UF0190/UP0190
U0240/UF0240/UP0240
U0310/UF0310/UP0310



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