KOOLAIRE®

K, KP & KT Models

Air/Water/Remote Condenser Modular Ice Machines

Technician's Handbook

Part Number 000018624 Rev 00 4/26

Manitowoc®

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.kool-aire.com for manual updates, translations, or contact information for service agents in your area.
- This equipment contains high voltage electricity and refrigerant charge. Installation and repairs are to be performed by properly trained technicians aware of the dangers of dealing with high voltage electricity and refrigerant under pressure. The technician must also be certified in proper refrigerant handling and servicing procedures. All lockout and tag out procedures must be followed when working on this equipment.
- This equipment is intended for indoor use only. Do not install or operate this equipment in outdoor areas.
- As you work on this equipment, be sure to pay close attention to the safety notices in this handbook. Disregarding the notices may lead to serious injury and/or damage to the equipment.

Definitions

⚠ DANGER

Indicates a hazardous situation that, if not avoided, will result in death or serious injury. This applies to the most extreme situations.

⚠ Warning

Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

⚠ Caution

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

Notice

Indicates information considered important, but not hazard-related (e.g. messages relating to property damage)

NOTE: Indicates useful, extra information about the procedure you are performing.

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

⚠ 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.

⚠ 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.

⚠ 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.
- Connect to a potable water supply only.
- 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 removable 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.
- 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.
- Ice machines require a deflector when installed on an ice storage bin. Prior to using a non-OEM ice storage system with this ice machine, contact the bin manufacturer to assure their ice deflector is compatible.
- Prior to installing a non-OEM ice storage system with this ice machine, follow the manufacturers installation procedures and verify the location and installation meets the local/national mechanical codes and stability requirements.

⚠ Warning

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

- 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.
- 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.
- Objects placed or dropped in the bin can affect human health and safety. Locate and remove any objects immediately.

⚠ 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.
- Do not store or use electrical appliances inside the ice machine or ice storage areas.

⚠ 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. Refer to nameplate to identify the type of refrigerant in your equipment.
- 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.
- Installation must comply with all applicable equipment fire and health codes with the authority having jurisdiction.

⚠ DANGER

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

- Minimum room size may be required; refer to ice machine label.
- Multiple R290 units can be installed in a single room but their cumulative refrigerant charge must be considered when determining safe room size.
- All lockout and tag out procedures must be followed when working on this equipment.
- 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.
- 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.
- Well-ventilated areas are recommended for installation and storage.
- Leak pressure, leak hole size, wind speed, and the presence of objects like furniture within the room can also affect the concentration and distribution of R290 during a leak.

⚠ DANGER

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

- 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.
- 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.
- Two or more people are required to move this equipment to prevent tipping.
- Locking the front casters after moving is the owner's and operator's responsibility. 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.
- The on-site supervisor is responsible for ensuring that operators are made aware of the inherent dangers of operating this equipment.
- Do not operate any appliance with a damaged cord or plug. All repairs must be performed by a qualified service company.

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Model Numbers

This manual covers the following models:

KP MODELS

Self-Contained Air-Cooled	Self-Contained Water-Cooled
KDP0300A	----
KYP0300A	----
KDP0400A	KDP0400W
KYP0400A	KYP0400W
KDP0420A	KDP0420W
KYP0420A	KYP0420W
KDP0500A	KDP0500W
KYP0500A	KYP0500W
KDP0700A	KDP0700W
KYP0700A	KYP0700W
KDP1000A	KDP1000W
KYP1000A	KYP1000W

KT MODELS

Self-Contained Air-Cooled	Self-Contained Water-Cooled	Remote
KDT0300A	----	----
KYT0300A	----	----
KDT0400A	KDT0400W	----
KYT0400A	KYT0400W	----
KDT0420A	KDT0420W	----
KYT0420A	KYT0420W	----
KDT0500A	KDT0500W	----
KYT0500A	KYT0500W	----
KDT0700A	KDT0700W	----
KYT0700A	KYT0700W	----
KDT1000A	KDT1000W	KDT1000N
KYT1000A	KYT1000W	KYT1000N
KDT1700A	KDT1700W	KYT1700N
KYT1700A	KYT1700W	KDT1700N

K MODELS

Self-Contained Air-Cooled	Self-Contained Water-Cooled	Remote
KD0250A	----	----
KY0250A	----	----
KD0350A	KD0350W	----
KY0350A	KY0350W	----
KD0420A	KD0420W	----
KY0420A	KY0420W	----
KD0500A	KD0500W	----
KY0500A	KY0500W	----
KD0600A	KD0600W	----
KY0600A	KY0600W	----
KD1000A	KD1000W	KY1000N
KY1000A	KY1000W	KD1000N
KD1350A	KD1350W	KY1350N
KY1350A	KY1350W	KD1350N
KD1800A	KD1800W	KY1800N
KY1800A	KY1800W	KD1800N

Ice Machine Warranty Information

Warranty

For warranty information visit:

www.kool-aire.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.kool-aire.com/Service/Warranty

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

How to Read a Model Number

K Y T 1 0 0 0 A – 2 6 1 A

ICE MACHINE SERIES
- I Indigo
- U UnderCounter
- K Koolaire
- R Flake/Nugget
- B Big shot
- S S-series
- IB Ice Beverage
- C Countertop

ICE TYPE
- R Regular
- D Dice
- Y Half-dice
- F Flake
- N Nugget
- G Gourmet
- Blank for IB only

REFRIGERANT TYPE
- P R290 (propane)
- F R404A (four)
- T R410A (ten)
- B R600A (butane)
- E R134A (eight)

NOMINAL PRODUCTION @ 70/50
- 0300 produces ~300 #/day
- 0320 produces ~320 #/day
- 0350 produces ~350 #/day
- etc. . .

Sotto is stated in kg/day

2= 22" wide cabinet
#= all other #s mean production value

CONDENSER TYPE
- A air cooled
- W water cooled
- N remote (traditional)
- C CVD (remote)

ELECTRICAL CONFIGURATION
- 161 = 115/60/1
- 261 = 208-230/60/1
- 251 = 220-240/50/1 (S=230)
- 263 = 208-230/60/3
- 271 = 200/50-60/1
- 273 = 200/50-60/3
- 453 = 380-415/50/3
- 463 = 460/60/3

POWER CORD OPTION
- Blank junction box
- Z cord without plug
- B NEMA plug (USA)
- F schuko plug (EU)
- G 13A blade (GBR)
- I (AUS) oblique V blades

SPECIAL USE
- A/E alternate compressor
- Blank general use
- Q coated condenser
- H high pressure
- M marine
- P correctional
- T top air discharge
- X Luminice/Sanitation
- L lever
- V space maker

MARKET IDENTIFIER
- Blank not market specific
- S Saudi Arabia (GCC)
- K Korea (KC)
- C China (CCC)
- D Germany (GS)
- N Brazil (InMetro)

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 free of airborne and other contaminants.
- Air temperature: Must be at least 35°F (2°C) but must not exceed 110°F (43.4°C).
- The location must not be near heat-generating equipment or in direct sunlight and protected from weather.
- 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 air flow is in the back and out the sides). Refer to the chart for clearance requirements.
- 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.
- All utilities must be within 6 feet (2 m) of the unit for installation and serviceability.

Ice Machine Clearance Requirements

⚠ Warning

Do not obstruct ice machine vents or openings.

KP0300	Self-Contained Air-Cooled	Self-Contained Water-Cooled
Top/Sides	16" (40.6 cm)	n/a
Back	5" (12.7 cm)*	n/a

KT0300 KP0420	Self-Contained Air-Cooled	Self-Contained Water-Cooled
Top/Sides	12" (30.5 cm)	n/a
Back	5" (12.7 cm)*	n/a

KT0400/KP0400 KT0420 KP0500/KT0500 KP0700/KT0700 KP1000/KT1000 KT1700	Self-Contained Air-Cooled	Water-Cooled and Remote
Top/Sides	8" (20.3 cm)	8" (20.3 cm)
Back	5" (12.7 cm)	5" (12.7 cm)

K0250	Self-Contained Air-Cooled	Self-Contained Water-Cooled
Top/Sides	12" (30.5 cm)	n/a
Back	5" (12.7 cm)*	n/a

K0350 - K0420 K0500 - K0600 K1000 - K1350 K1800	Self-Contained Air-Cooled	Water-Cooled and Remote
Top/Sides	8" (20.3 cm)	8" (20.3 cm)
Back	5" (12.7 cm)	5" (12.7 cm)

⚠ Caution

The ice machine must be protected if it will be subjected to temperatures below 32°F (0°C). Failure caused by exposure to freezing temperatures is not covered by the warranty.

Minimum Room Size

R290 ONLY

In order to avoid the creation of a flammable gas-air mixture if a leak in the refrigeration system occurs, the size of the room in which the machine may be installed depends on the amount of refrigerant used.

The ice machines listed below cannot be installed in hallways, public corridors, public lobbies, evacuation routes and/or small spaces.

Model	Minimum Room Size sq ft (sq m)	
	Self-Contained Air-Cooled	Self-Contained Water-Cooled
KP0300	77.5 sq ft (7.2 sq m)	---
KP0400	87.0 sq ft (8.1 sq m)	77.5 sq ft (7.2 sq m)
KP0420		
KP0500	77.5 sq ft (7.2 sq m)	93 sq ft (8.6 sq m)
KP0700	159 sq ft (14.8 sq m)	159 sq ft (14.8 sq m)
KP1000	206 sq ft (19.1 sq m)	206 sq ft (19.1 sq m)

Refrigerant Charge

R290 ONLY

Model	Self-Contained Air-Cooled	Self-Contained Water-Cooled
KP0300	5.3 oz (150 g)	---
KP0400	5.9 oz (170 g)	5.3 oz (150 g)
KP0420		
KP0500	5.3 oz (150 g)	6.5 oz (180 g)
KP0700	10.9 oz (310 g)	
KP1000	14.1 oz (400 g)	

Multiple R290 units can be installed in a single room, but their cumulative refrigerant charge needs to be considered when determining the safe room size.

Ice Machine Heat of Rejection

Series Ice Machine	Heat of Rejection[1]	
	Air Conditioning[2]	Peak
KP0300	5120	6160
KP0400	7515	8905
KP0420	7516	8906
KP0500	7515	8905
KP0700	9470	11510
KP1000	14080	16340

Series Ice Machine	Heat of Rejection[1]	
	Air Conditioning[2]	Peak
KT0300	4600	5450
KT0400	3800	6000
KT0420	5400	6300
KT0500	5300	6100
KT0700	12400	13900
KT1000 60 Hz	15400	17100
KT1000 50 Hz	14600	16200
KT1700	24700	29000

Series Ice Machine	Heat of Rejection[1]	
	Air Conditioning[2]	Peak
K0250	4600	5450
K0350	3800	6000
K0420	5400	6300
K0500	5300	6100
K0600	9000	13900
K1000	17000	20700
K1350	23900	29000
K1800	29800	34700
1 BTU/Hour		
2 Because the heat of rejection varies during the ice making cycle, the figure shown is an average.		

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

Leveling the Ice Machine

1. The leveling legs must be screwed into the bottom of the bin as far as possible.

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

2. Move the bin into its final position.
3. Use a level on top of the bin. Adjust each foot as necessary and level from front to back and side to side.

Electrical Requirements

Voltage

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

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.

Total Circuit Ampacity

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

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

Refer to ice machine data plate, for electrical requirements. The ice machine data plate information overrides all other published data.

⚠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.

Minimum Power Cord Specifications

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

⚠ Warning

Temporary electrical installations of more than 600 volts may be used only during periods of tests, emergencies, or construction-like activities.

Temporary wiring must be removed immediately upon completion of the project or purpose for which the wiring was installed.

Water Service/Drains

WATER SUPPLY

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

⚠ Caution

Do not apply heat to water inlet valve or water drain fittings. Heating will damage the nonmetallic connector. Do not over tighten fittings. Two turns after hand tight is the maximum.

⚠ Warning

Connect to a potable water supply only. Plumbing must conform to state, local and national codes.

WATER INLET LINES

Follow these guidelines to install water inlet lines:

- Do not connect the ice machine to a hot water supply. Be sure all hot water restrictors installed for other equipment are working. (Check valves on sink faucets, dishwashers, etc.)
- If water pressure exceeds the maximum recommended pressure, 80 psig (5.5 bar) obtain a water pressure regulator from your Koolaire distributor.
- Install a water shut-off valve for ice making potable water.
- Insulate water inlet lines to prevent condensation.
- If you are installing a water filter system, refer to the Installation Instructions supplied with the filter system for ice making water inlet connections.

⚠ Caution

Plumbing must conform to state and local codes

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.
- Install a tee at the ice machine drain outlet and install an 18.0” (46 cm) vent above the drain line.
- Insulate drain lines to prevent condensation.
- Vent the bin and ice machine drain to the atmosphere. Do not vent the condenser drain on water-cooled models.

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 (0.48 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 SUPPLY AND DRAIN LINE SIZING/ CONNECTIONS

Location	Water Temperature	Water Pressure	Ice Machine Fitting	Tubing Size Up to Ice Machine Fitting
Ice Making Water Inlet	35°F (2°C) min. 90°F (32.2°C) max.	20 psi (1.38 bar) min. 80 psi (5.5 bar) max.	3/8" (9.5 mm) Female Pipe Thread	3/8" (9.5 mm) min. inside diameter
Ice Making Water Drain	—	—	1/2" (12 mm) Female Pipe Thread	1/2" (12 mm) min. inside diameter
Condenser Water Inlet	33°F (0.6°C) min. 90°F (32.2°C) max.	20 psi (1.38 bar) min. 275 psi (19 bar) max.	3/8” (9.5 mm) Female Pipe Thread	3/8" (9.5 mm) min. inside diameter
Condenser Water Drain	—	—	1/2” (12 mm) Female Pipe Thread	1/2" (12 mm) min. inside diameter

REMOTE CONDENSER KT MODELS

Ice Machine	Remote Single Circuit Condenser	Line Set*
KT1000	JCT1200	RT-20R-R410A RT-35R-R410A RT-50R-R410A
KT1700	JCT1500	RL-20R-R410A RL-35R-R410A RL-50R-R410A

*Line Set	Discharge Line	Liquid Line
RT	1/2" (1.27 cm)	5/16" (0.79 cm)
RL	1/2" (1.27 cm)	3/8" (0.95 cm)

NOTE: All line sets must be insulated with 1/4" wall thickness Armaflex.

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

Notice

Condensers must be mounted horizontally with the fan motor on top with nothing obstructing it. There must be at least a 16" (41 cm) clearance from the bottom for air intake.

Additional Refrigerant Charge For 51' to 100' Line Sets

Ice Machine	Condenser	Additional Amount of Refrigerant To Be Added To The Nameplate Charge
KT1000	JCT1200	2 lbs - 907g
KT1700	JCT1500	2 lbs - 907g

REMOTE CONDENSER K MODELS

Ice Machine	Remote Single Circuit Condenser	Line Set*
K1000	KC1000	RTK-20-R410A RTK-35-R410A RTK-50-R410A
K1350 K1800	KC1350	RLK-20-R410A RLK-35-R410A RLK-50-R410A

*Line Set	Discharge Line	Liquid Line
RTK	1/2" (1.27 cm)	5/16" (0.79 cm)
RLK	1/2" (1.27 cm)	3/8" (0.95 cm)

NOTE: All line sets must be insulated with 1/4" wall thickness Armaflex.

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

Notice

Condensers must be mounted horizontally with the fan motor on top with nothing obstructing it. There must be at least a 16" (41 cm) clearance from the bottom for air intake.

Additional Refrigerant Charge For 51' to 100' Line Sets

Ice Machine	Condenser	Additional Amount of Refrigerant To Be Added To The Nameplate Charge
K1000	KC1000	2 lbs - 907g
K1350	KC1350	2 lbs - 907g
K1800		2 lbs - 907g

Calculating Allowable Lineset Distance

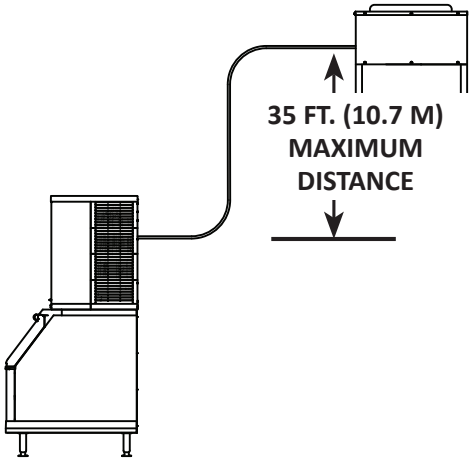
Line Set Length

The maximum length is 100' (30.5 m).

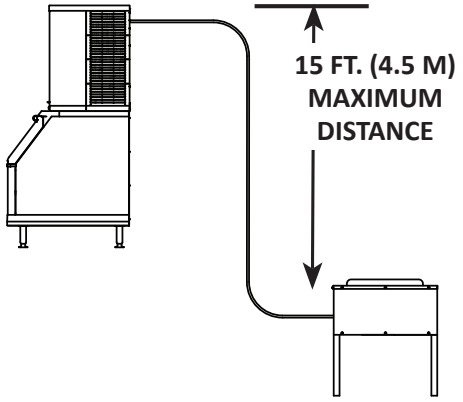
Line Set Rise/Drop

The maximum rise is 35' (10.7 m).

The maximum drop is 15' (4.5 m).



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



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

Calculated Line Set Distance

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

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

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

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

Maximum Line Set Distance Formula

Step 1

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

Step 2

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

Step 3

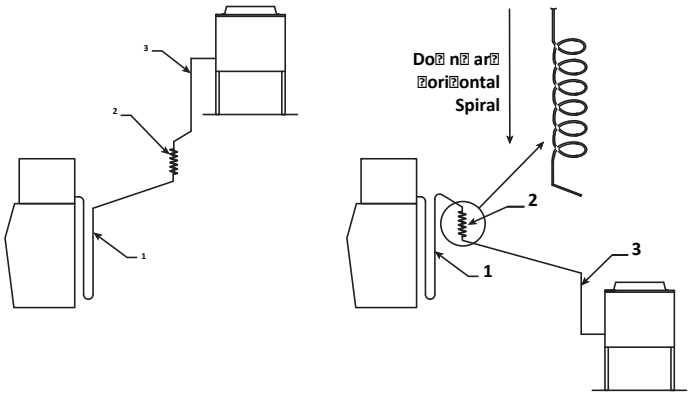
Measured Horizontal Distance = _____Horizontal
(100 ft. Max.) Distance

Step 4

Total Calculated Distance = _____Total Calculated
(150 ft. Max.) Distance

Follow these guidelines when routing the refrigerant lines. This will help ensure proper performance and service accessibility.

1. Optional - Make the service loop in the line sets (as shown in Routing Line Sets graphic). This permits easy access to the ice machine for cleaning and service. Do not use hard rigid copper at this location.
2. Required - Do not form traps in the refrigeration lines (except the service loop). Refrigerant oil must be free to drain toward the ice machine or the condenser. Route excess tubing in a supported downward horizontal spiral (as shown below). Do not coil tubing vertically.
3. Required - Keep outdoor refrigerant line runs as short as possible.



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De-scaling and Sanitizing

GENERAL

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.

The ice machine must be taken apart for de-scaling and sanitizing.

Maintenance procedures are not covered by the warranty.

⚠ Caution

Use only Manitowoc Ice Machine De-scaler (part number 9405463) and Sanitizer (part number 9405653). Do not mix De-scaler and Sanitizer solutions together. 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.

ICE MACHINE INSPECTION

Check all water fittings and lines for leaks. Also, confirm 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.

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

- 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

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.

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.

TOGGLE SWITCH OPERATION

Moving the toggle switch to clean will start a Clean cycle.

- **Setting the ice machine to stop after the clean cycle:** Place the toggle switch in the clean position. The ice machine will stop after the clean cycle.
- **Pausing the cleaning cycle:** Move the toggle switch to Off. Moving the toggle switch to clean will restart the clean cycle.
- **Setting the ice machine to start ice making after the clean cycle:** Place the toggle switch in the Ice position more than 2 minutes into the clean cycle.

Step 1 Remove the front door to access the evaporator compartment. Ice must not be on the evaporator during the clean/sanitize cycle. Set the toggle switch to the OFF position after ice falls from the evaporator at the end of a harvest cycle. Or, set the switch to 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/dispenser.

> **⚠ 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.

Step 3 Place the toggle switch in the CLEAN position. Water will flow through the water dump valve and down the drain. Wait until the water trough refills, then add the proper amount of ice machine de-scaler.

Model	Amount of De-scaler
K0300 K0400 K0420 K0500 K0600 K0700 K1000	5 ounces (150 ml)
K1350 K1700 K1800	9 ounces (265 ml)

Step 4 Wait until the cycle is complete (approximately 24-30 minutes) then place the toggle switch in the off position and disconnect power and water supplies to the ice machine (and dispenser when used).

Warning

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

Step 5 Remove parts for 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 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	1 gal. (4 l)	16 oz (500 ml) de-scaler

Step 7 Use half of the de-scaler & 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 8 While components are soaking, use half of the de-scaler & water solution to clean all foodzone surfaces of the ice machine and bin/dispenser. Use a nylon brush or cloth to thoroughly clean 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

Step 9 Mix a solution of sanitizer and warm water.

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

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

Step 11 Use half of the sanitizer/water solution to sanitize all foodzone 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:

- Evaporator plastic parts - including top, bottom and sides
- Ice machine base (top of bin) and area above the water trough
- Bin bottom, sides and top

Do not rinse the sanitized areas.

Step 12 Replace all removed components.

Step 13 Wait 20 minutes.

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

Step 15 Water will flow through the water dump valve and down the drain. Wait until the water trough refills, then add the proper amount of ice machine sanitizer to the water trough.

Model	Amount of Sanitizer
K0300 K0400 K0420 K0500 K0600 K0700 K1000	3 ounces (90 ml)
K1350 K1700 K1800	6 ounces (180 ml)

Step 16 After the sanitize cycle is complete (approximately 24 minutes) move the toggle switch to the ICE position to start ice making.

Notice

Electrical connector must never be exposed to any liquids.

REMOVE PARTS FOR DE-SCALING/SANITIZING

⚠ Warning

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

1. Remove the water curtain
   - Gently flex the curtain in the center and remove it from the right side.
   - Slide the left pin out.
2. Remove the water trough and water diverter from the bottom of the evaporator.
   - Depress tabs on right and left side of the water trough.
   - Allow front of water trough to drop as you pull forward to disengage the rear pins.
   - Loosen thumbscrew on left side of water diverter tray.
3. Remove the ice thickness and harvest float switches
   - Pull the float switch straight down to disengage.
   - Lower the float switch until the wiring connector is visible.
   - Disconnect the wire lead from the float switch.
   - Remove the float switch from the ice machine.

4. Remove the water distribution tube

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

- Loosen the two outer screws (do not remove screws completely they are retained to prevent loss) and pull forward on the distribution tube to release from slip joint.
- Disassemble distribution tube by loosening the two middle thumbscrews and dividing the distribution tube into two pieces.
- Proceed to page 43 Step 6.

5. Remove the Water Trough
    - Depress tabs on right and left side of the water trough.
    - Allow front of water trough to drop as you pull forward to disengage the rear pins.
    - Remove the water trough from the bin area.

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.

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

- Move the toggle switch to the OFF position at the end of a harvest cycle after ice falls from the evaporator.
- Move the toggle switch to the OFF position and allow the ice to melt.

⚠ Caution

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

⚠ Warning

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

Step 2 Open the front door and move the toggle switch to the CLEAN position. Wait until the water trough refills (approximately 1 minute) and then add the proper amount of Ice Machine Descaler to the water trough.

Model	Amount of De-scaler
K0300 K0400 K0420 K0500 K0600 K0700 K1000	5 ounces (150 ml)
K1350 K1700 K1800	9 ounces (265 ml)

Step 3 After 1 minute place the toggle switch in the ICE position and close and secure the front door. The ice machine will automatically start ice making after the Clean cycle is complete (approximately 24 minutes).

Door Removal

1. Use a Phillips screwdriver to loosen the two screws securing the door. Do not remove, they are retained to prevent loss.
2. Tilt door forward and lift up to remove.

Cleaning the Air Filter & AirCondenser

⚠Warning

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

The washable filter on self-contained ice machines is designed to catch dust, dirt, lint and grease. Clean the filter once a month with mild soap and water.

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

⚠Warning

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

- 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.

Removal from Service/Winterization

AIR-COOLED MODELS

1. Turn off the ice machine by pressing the On/Off button.
2. Turn off the water supply.
3. Remove the water from the water trough.
4. Disconnect and drain the incoming ice-making water line at the rear of the ice machine.
5. Energize the ice machine and wait one minute for the water inlet valve to open - or - Energize all relays in the touchscreen service menu.
6. Blow compressed air in both the incoming water and the drain openings in the rear of the ice machine until no more water comes out of the water inlet lines or the drain.
7. Disconnect the electric power at the circuit breaker or the electric service switch.
8. Make sure water is not trapped in any of the water lines, drain lines, distribution tubes, etc.
9. Replace all panels.

WATER-COOLED MODELS

1. Perform Steps 1 – 6 under “Air-Cooled Models.”
2. Disconnect the incoming water and drain line from the water-cooled condenser.
3. Start the ice making cycle by pressing the On/Off button and wait for the freeze cycle. The increasing refrigerant pressure will open the water regulating valve.
4. Blow compressed air through the condenser until no water remains.
5. Turn off ice machine by pressing the On/Off button and then disconnecting power to the ice machine.
6. Replace all panels.

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Ice Making Sequence of Operation

NOTE: The toggle switch must be in the ICE position and the water curtain 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 and the refrigeration compressor starts and the refrigeration 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 pre-chill and remains on until the ice thickness float switch is satisfied.

Freeze - Water flowing across the evaporator freezes and builds ice on the evaporator. After a sheet of ice has formed, the Harvest float switch signals the control board to start a harvest cycle.

Dump Cycle

Upon initial start-up or start-up after an auto shut-off, water flows through the water dump valve and down the drain. If the water trough fails to drain after the water dump valve has energized/
de-energized, a clean light will flash.

Harvest 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 water curtain, the ice machine starts another freeze cycle.

Full Bin Cycle

If the water curtain is held open by ice cubes, the ice machine shuts off and starts a 3-minute delay period. When the water curtain closes, the ice machine starts a new cycle at the water purge, provided the 3-minute delay period has expired.

CONTROL BOARD TIMERS

- 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/safety limit condition).
- If the harvest float switch is in the down position for 10 continuous seconds during the start of an initial freeze cycle, a harvest sequence is initiated. If the harvest float is in the down position in subsequent cycles a safety limit 3 cycle is initiated.
- The maximum freeze time is 35 minutes (60 minutes prior to software revision 3.2) at which time the control board automatically initiates a harvest sequence.
- The maximum harvest time is 3.5 minutes (software revision 3.2 and later, 7 minute max harvest, with water assist after 3.5 minutes. SL#2 will shut down after 100 cycles). The control board automatically initiates a freeze sequence when these times are exceeded.
- The ice machine will continue to fill with water for up to six minutes, or until the high water float opens for 5 continuous seconds. The control board will energize the water inlet valve one more time 3 minutes into the freeze cycle.

SERVICE LIMITS

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 cycling the toggle switch Off/On and starting a new ice making cycle.

A service limit is indicated by a flashing light on the control board.

Service Limit 1

Software revision 3.2 and later:

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

- After 3 consecutive 35 minute cycles control board light SL#1 light will flash on/off at 1 second intervals.
- If 6 consecutive 35-minute freeze cycles occur, the ice machine stops and the SL#1 light on the control board will be on continuously.

NOTE: Prior to control board software revision 3.2 the maximum freeze time is 60 minutes rather than 35 minutes.

Service Limit 2

If the harvest time reaches 3.5 minutes, the control board automatically returns the ice machine to the freeze cycle (software revision 3.2 and later, 7 minute max harvest, with water assist after 3.5 minutes. SL#2 will shut down after 3 attempts).

- If 3 consecutive 3.5 minute harvest cycles occur the SL#2 light on the control board will flash on/off at 1 second intervals. After 75 consecutive 3.5 minutes harvest cycles the SL#2 light will be energized continuously.
- If 100 consecutive 3.5 minute harvest cycles occur, the ice machine stops and the SL#2 light on the control board will be on continuously.

Service Limit 3

If the harvest float switch hasn't opened for 10 continuous seconds within 4 minutes of the water inlet valve energizing the ice machine stops.

- Service Limit 3 is bypassed on the initial cycle (manual start or after a full bin/safety limit condition). For all subsequent cycles the ice machine stops for 30 minutes when the water inlet valve is energized for 4 minutes and the harvest float valve didn't open. Control board lights SL#1 and SL#2 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 lights.
- If 100 consecutive failures occur the ice machine stops and the SL#1 & SL#2 lights flash on/off at 1 second intervals.
- SL#1 & SL#2 will flash 3 times on startup and automatically erase after 100 normal cycles.

ENERGIZED PARTS CHART

Self-Contained Ice Machines

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 1a. Water purge	on	on	off	on	off	closed	closed	**45 seconds**
1b. Delay period	off	off	off	off	off	closed	closed	**5 seconds**
2. Refrigeration System Start-up 2a. Equalize Pressure	off	on	off	off	off	closed	closed	**5 seconds**
2b. Compressor Start-up	off	on	off	off	on	closed	closed	**5 seconds**
Freeze Sequence 3. Pre chill	off	off	on	off	on	open	closed	**120 Seconds initial cycle Thereafter 30 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
4. Freeze	on	off	on	off	on	open then closed	closed then open	**Until Harvest Float Switch closes for 10 continual seconds**
Harvest Sequence **5. Water Purge**	on	on	off	on	on	closed	closed	**45 seconds**
6. Harvest	off	on	off	off	on	closed	closed	**Bin switch activation**
7. Automatic Shut-off	off	off	off	off	off	closed	closed	**Until bin switch re-closes**

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

Operational Checks

ICE THICKNESS CHECK

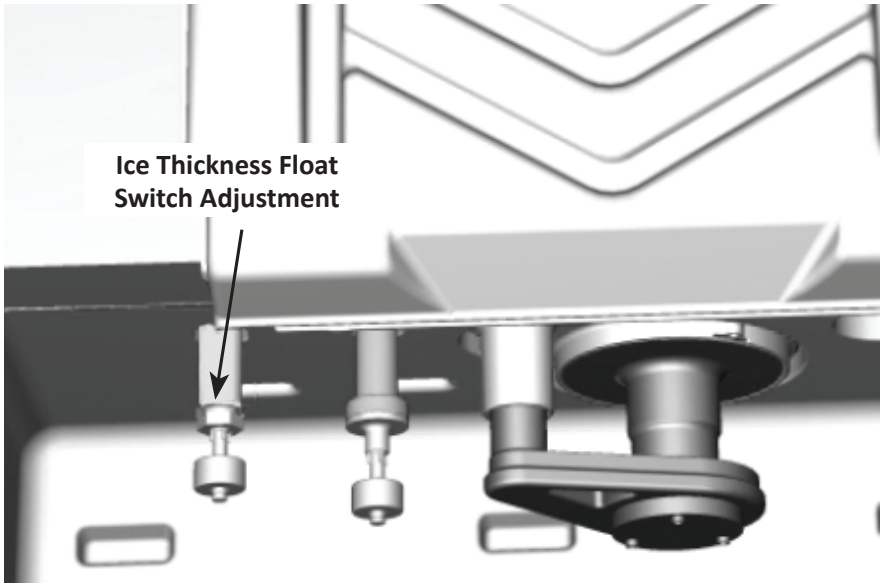
After a harvest cycle, inspect the ice cubes in the ice storage bin. The ice thickness float switch is factory-set to maintain the ice bridge thickness at 1/8” (3 mm).

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

1. Inspect the bridge connecting the cubes. It should be about 1/8” (3 mm) thick.
2. If adjustment is necessary make the following adjustment as you face the machine.

NOTE: The float can be adjusted with a 3/4” wrench while the water trough is in place.

- Turn the ice thickness float switch to the right to increase bridge thickness
- Turn the ice thickness float switch to the left to decrease bridge thickness.
- Test run two cycles to verify bridge thickness.



MINIMUM/MAXIMUM SLAB WEIGHTS

Adjust ice thickness to meet chart specifications.

Model	Minimum Ice Weight Per Cycle	Maximum Ice Weight Per Cycle
KP0300 KT0300	3.4 lbs 1542 g	3.9 lbs 1769 g
KP0400 KT0400	3.4 lbs 1542 g	3.9 lbs 1769 g
KP0420 KT0420	3.4 lbs 1542 g	3.9 lbs 1769 g
KP0500 KT0500	4.125 lbs 1871 g	4.75 lbs 2154 g
KP0700 KT0700	4.125 lbs 1871 g	4.75 lbs 2154 g
KP1000 KT1000	7.25 lbs 3288 g	7.75 lbs 3515 g
KT1700	13.2 lbs 5987 g	14.8 lbs 6713 g

Model	Minimum Ice Weight Per Cycle	Maximum Ice Weight Per Cycle
K0250 K0350 K0420	3.4 lbs 1542 g	3.9 lbs 1769 g
K0500 K0600	4.6 lbs 2.1 kg	5.2 lbs 2.36 kg
K1350	12.75 lbs 5.78 kg	14.75 lbs 6.69 kg
K1800	12.80 5.8 kg	14.4 lbs 6.5 kg

Service Limits

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 cycling the toggle switch Off/On and starting a new ice making cycle.

A service limit is indicated by a flashing light on the control board.

Service Limit 1

Software revision 3.2 and later:

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

- After 3 consecutive 35 minute cycles control board light SL#1 light will flash on/off at 1 second intervals.
- If 6 consecutive 35-minute freeze cycles occur, the ice machine stops and the SL#1 light on the control board will be on continuously.

NOTE: Prior to control board software revision 3.2 the maximum freeze time is 60 minutes rather than 35 minutes.

Service Limit 2

Software revision 3.2 and later:

If the harvest time reaches 7 minutes, the control board automatically returns the ice machine to the freeze cycle.

- If 3 consecutive 7 minute harvest cycles occur the SL#2 light on the control board will flash on/off at 1 second intervals. After 100 consecutive 7 minute harvest cycles the SL#2 light will be energized continuously.
- If 100 consecutive 3.5 minute harvest cycles occur, the ice machine stops and the SL#2 light on the control board will be on continuously.

Software revision 3.1 and before:

If the harvest time reaches 3.5 minutes, the control board automatically returns the ice machine to the freeze cycle (software revision 3.2 and later, 7 minute max harvest, with water assist after 3.5 minutes. SL#2 will shut down after 3 attempts).

- If 3 consecutive 3.5 minute harvest cycles occur the SL#2 light on the control board will flash on/off at 1 second intervals. After 75 consecutive 3.5 minutes harvest cycles the SL#2 light will be energized continuously.
- If 100 consecutive 3.5 minute harvest cycles occur, the ice machine stops and the SL#2 light on the control board will be on continuously.

Service Limit 3

If the harvest float switch hasn't opened for 10 continuous seconds within 4 minutes of the water inlet valve energizing the ice machine stops.

- Service Limit 3 is bypassed on the initial cycle (manual start or after a full bin/safety limit condition). For all subsequent cycles the ice machine stops for 30 minutes when the water inlet valve is energized for 4 minutes and the harvest float valve didn't open. Control board lights SL#1 and SL#2 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 lights.
- If 100 consecutive failures occur the ice machine stops and the SL#1 & SL#2 lights flash on/off at 1 second intervals.
- SL#1 & SL#2 will flash 3 times on startup and automatically erase after 100 normal cycles.

Determining Which Service Limit Stopped the Ice Machine:

1. Cycle the toggle switch Off.
2. Cycle the toggle switch On to start ice making.
3. Watch the service limit lights.
    - One will flash corresponding to service limits 1 or 2.
4. Service limit 3 is indicated by both SL#1 & SL#2 flashing.

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

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

Control board software revision 3.2 and higher

Freeze time exceeds 35 minutes for 6 consecutive freeze cycles.

Possible Cause Checklist

Improper installation

- Refer to “Installation/Visual Inspection Checklist” on page 84

Water System

- Float switch or 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
- Dirty/defective water inlet valve
- 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
- Dirty condenser

NOTE: Prior to control board software revision 3.2 the maximum freeze time is 60 minutes rather than 35 minutes.

Refrigeration System

- Non-OEM 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 7 minutes for 100 Consecutive harvest cycles.

Possible Cause Checklist

Improper installation

- Refer to “Installation/Visual Inspection Checklist” on page 84

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

Electrical System

- Bin switch defective
- Premature harvest

Refrigeration System

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

Service Limit 3

The harvest float switch hasn't opened for 10 continuous seconds in the first 4 minutes of the freeze cycle.

Possible Cause Checklist

Improper installation

- Refer to "Installation/Visual Inspection Checklist" on page 84

Water System

- Water dump valve
- Harvest float valve dirty or defective
- Low water pressure (20 psig min.)
- Dirty defective water filter (when used)
- Loss of water from sump area
- Dirty/defective water inlet valve

Electrical System

- Water inlet valve coil defective
- Harvest float valve defective

Control Board Test Mode

NOTE: The water curtain/bin switch can be open or closed and does not affect the operation of the test mode.

To enter the test mode, move the toggle switch to off, then press and hold the test button on the control board for 3 seconds. 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

After 2 minutes, the control board will automatically initiate and complete one ice-making cycle, then stop (On software revision 2.70 or earlier). On software version 2.71 or later the control board will complete 500 ice making cycles and shutdown.

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.

Diagnosing an Ice Machine that Will Not Run

⚠ 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.

1. Verify primary voltage is supplied to ice machine and the fuse/circuit breaker is closed.
2. Verify control board fuse is okay.

NOTE: If any control board lights are on, the fuse is okay.

3. Verify the bin switch functions properly. A defective bin switch can falsely indicate a full bin of ice.
4. Verify toggle switch functions properly. A defective toggle switch may keep the ice machine in the OFF mode. Refer to toggle switch diagnostics when Steps 1 – 3 test good.
5. Be sure Steps 1 – 4 were followed thoroughly. Intermittent problems are not usually related to the control board. Replace control board if toggle switch operation is correct.

Troubleshooting By Symptom

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. Remote condenser, and self contained models use separate charts.

SYMPTOM #1

Ice Machine Stops Running

Ice machine is in Ice Making cycle

or

Has a History of Shutting Down

- Refer to Ice Machine Stops Running diagnostic chart

SYMPTOM #2

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

SYMPTOM #3

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

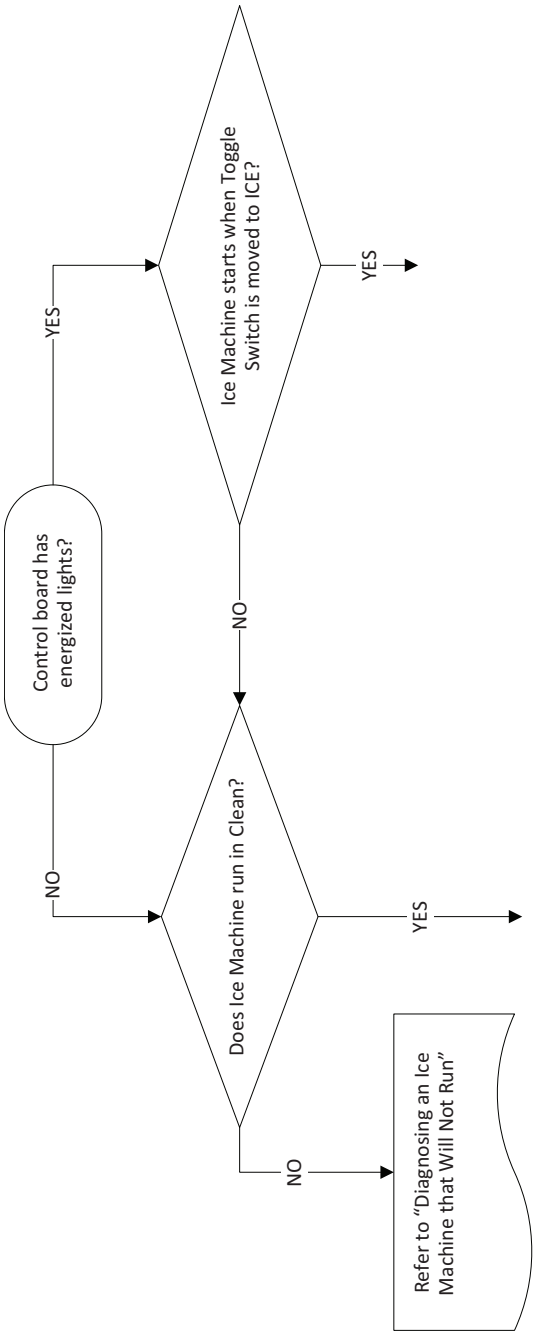
SYMPTOM #4

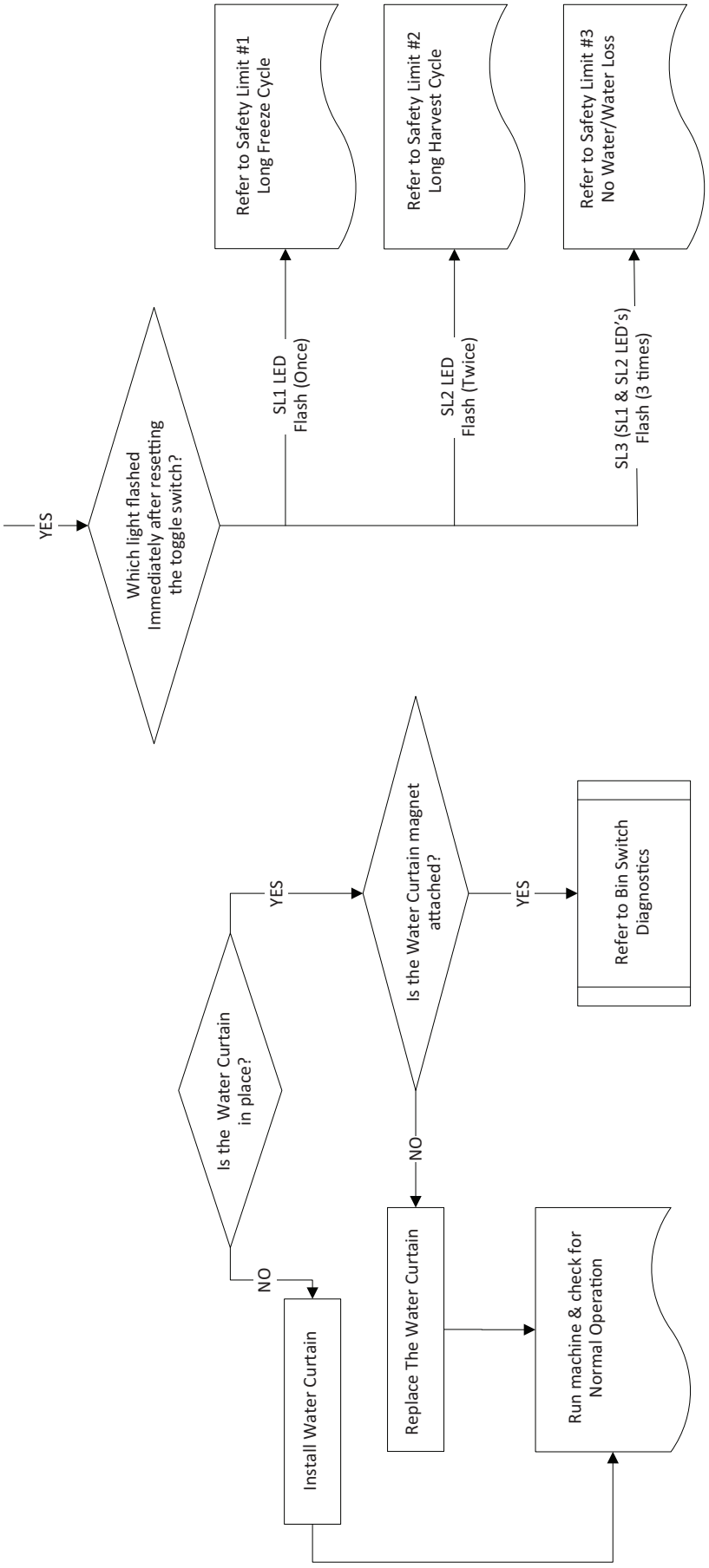
Ice Machine Will Not Harvest - Freeze Cycle is Normal and Ice Cubes are Melted After Harvest

- Refer to Ice Meltout Flow Chart

SYMPTOM #1 - SELF-CONTAINED AIR, WATER-COOLED TRADITIONAL REMOTE

Ice Machine stops running or has history of shutting down




YES
Which light flashed Immediately after resetting the toggle switch?
SL1 LED Flash (Once)
SL2 LED Flash (Twice)
SL3 (SL1 & SL2 LED's) Flash (3 times)
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
Is the Water Curtain in place?
YES
NO
Is the Water Curtain magnet attached?
YES
NO
Refer to Bin Switch Diagnostics
Install Water Curtain
Replace The Water Curtain
Run machine & check for Normal Operation

#2 - LOW PRODUCTION, LONG FREEZE CYCLE

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?

SYMPTOM #2 - REFRIGERATION COMPONENT DIAGNOSTIC 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.			

Operational Analysis	1	2	3	4
Ice Formation Pattern	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on entire evaporator	Ice formation 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

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.

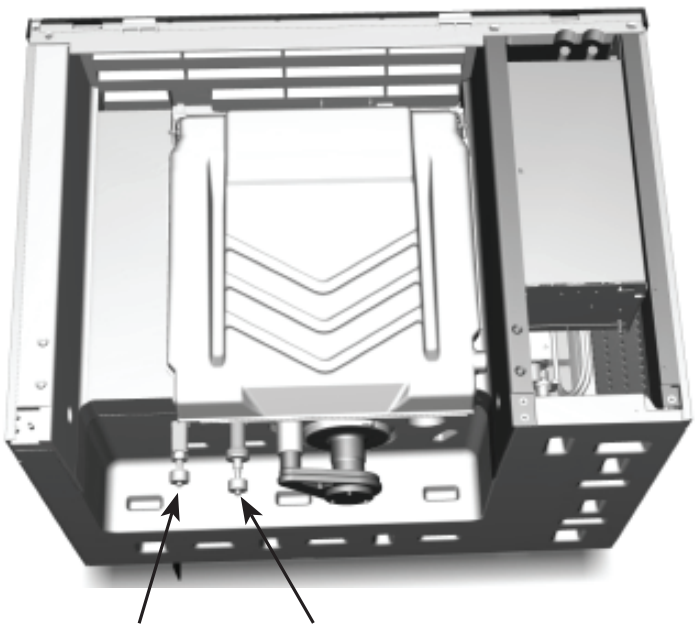
Two of the most common scenarios are:

- Power is cycled off/on with ice on the evaporator.
- The water curtain/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 moving the toggle switch to OFF and back to ON.



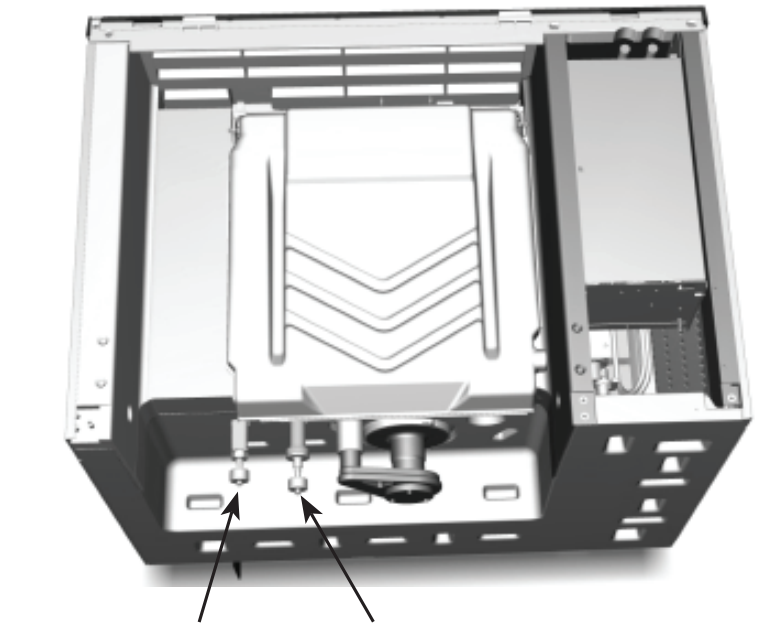
Step 1 Disconnect power to the ice machine, remove the electrical panel to allow viewing of the control board lights. Disconnect the harvest float switch wire from the control board and place a jumper on the control board harvest switch terminals.

Step 2 Bypass the freeze time lock-in feature by moving the toggle switch Off/On 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 are 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

Step 1 Disconnect power to the ice machine, remove the electrical panel to allow viewing of the control board lights and disconnect the float switch harness from the control board.



Step 2 Reapply power and move the toggle switch to Ice to 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 are causing the malfunction. Refer to float switch diagnostics.
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

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 24-Hour Ice Production Chart. 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

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

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

- Clean 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 35°F (1.7°C) and 90°F (32.2°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

- Clean/replace as needed

Water is spraying out of the sump trough area

- Stop the water spray

Uneven water flow across the evaporator

- Clean 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

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 the Refrigeration System Operational Analysis Table, it can help diagnose an ice machine malfunction.

Example 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" (12 to 25 mm) of ice formation.

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.

No Ice Formation

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

Evaporator Tubing Routing

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

One Evaporator, One TXV Models

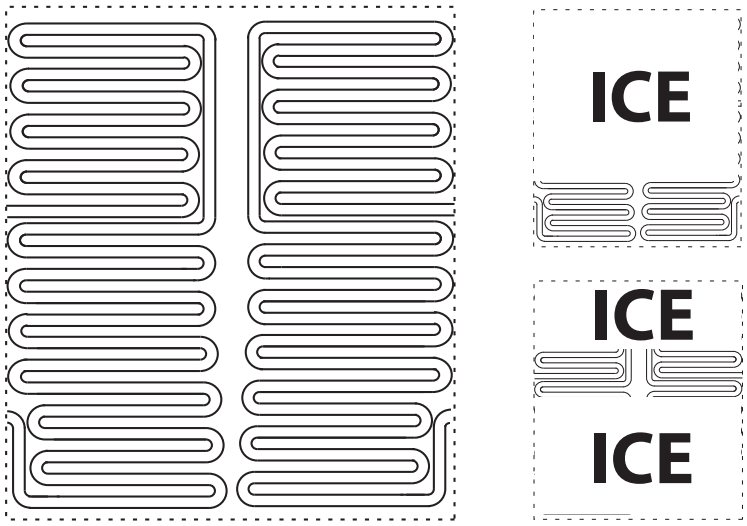
The evaporator outlet tubing does not exit directly at the top of the evaporator, but exits several inches below the top of the evaporator. Extremely Thin at the Evaporator Outlet will first be visible several inches below the top of the evaporator. Extremely Thin at Evaporator Inlet will first be visible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

One Evaporator, Two TXV 48" Models

Tubing routing for one evaporator with two TXV’s is different. The evaporator has two inlets and outlets. Fill pattern varies depending on which circuit is affected,

Extremely Thin at the Evaporator Outlet

Will first be visible 1/3 of the way down the evaporator. Only one side of the evaporator may be affected depending on failure. A TXV failure will usually show on only one side, while low on refrigerant can affect one or both sides depending on the amount of refrigerant loss and ambient temperature.



Extremely Thin at the Evaporator Inlet

Will show at the bottom of the evaporator. Depending on the failure either the entire bottom of the evaporator or one side of the bottom of the evaporator may be affected.

Analyzing Suction Pressure

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 temp. entering condenser: 90°F/32.2°C* *Air temp. around ice machine: 80°F/26.7°C* *Water temp. 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:* *Published Freeze Cycle Time (minutes)* 1 2 4 7 10 12 14 | | | | | | | 65 55 47 39 34 30 26 *Published Freeze Cycle Suction Pressure (psig)* *In the example, the proper suction pressure should be approximately 39 psig at 7 minutes; 30 psig at 12 minutes; etc.*
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 gauges were 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

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 84.

Discharge Pressure

- Discharge pressure is too high and is affecting suction pressure, refer to “Discharge Pressure High Checklist” on page 96.

Improper Refrigerant Charge

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

Other

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

SUCTION PRESSURE LOW CHECKLIST

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 84.

Discharge Pressure

- Discharge pressure is too low, and is affecting suction pressure, refer to “Freeze Cycle Discharge Pressure Low Checklist” on page 96

Improper Refrigerant Charge

- Undercharged
- Wrong type of refrigerant

Other

- Non-OEM components in system
- Improper water supply over evaporator refer to “Water System Checklist” on page 85.
- 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 and Outlet Temperatures

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 the 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.

Analyzing Discharge Pressure

1. Determine the ice machine operating conditions:

   Air temp. entering condenser _____

   Air temp. around ice machine _____

   Water temp. entering sump trough _____

2. Refer to “Cycle Times, 24 Hr. Ice Production and Refrigerant Pressure Charts” on page 149 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 drop throughout the freeze cycle.

DISCHARGE PRESSURE HIGH CHECKLIST

Improper Installation

- Refer to “Installation/Visual Inspection Checklist” on page 84.

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-OEM 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 84.

Improper Refrigerant Charge

- Undercharged
- Wrong type of refrigerant

Other

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

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

Harvest Valve

General

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 compressor discharge line 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 discharge line 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 Time/24 Hour Ice Production/ Refrigerant Pressure Charts in this book.

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 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” 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.

Discharge Line Temperature Analysis

GENERAL

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 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 - Self-contained Air, Water & Remote Condenser Models

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

COLUMN 1 - HARVEST VALVE LEAKING

Replace the valve as required.

COLUMN 2 - LOW CHARGE/TXV STARVING

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

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

NOTE: Do not add charge to remote models. The symptoms of a remote low on charge will result in a service long freeze in cool ambient temperatures. Check the liquid line temperature at the ice machine. The liquid line will be hot with a normal or below normal head pressure in freeze when the ice machine is low on refrigerant.

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

COLUMN 3 - TXV FLOODING OR REFRIGERANT OVERCHARGE

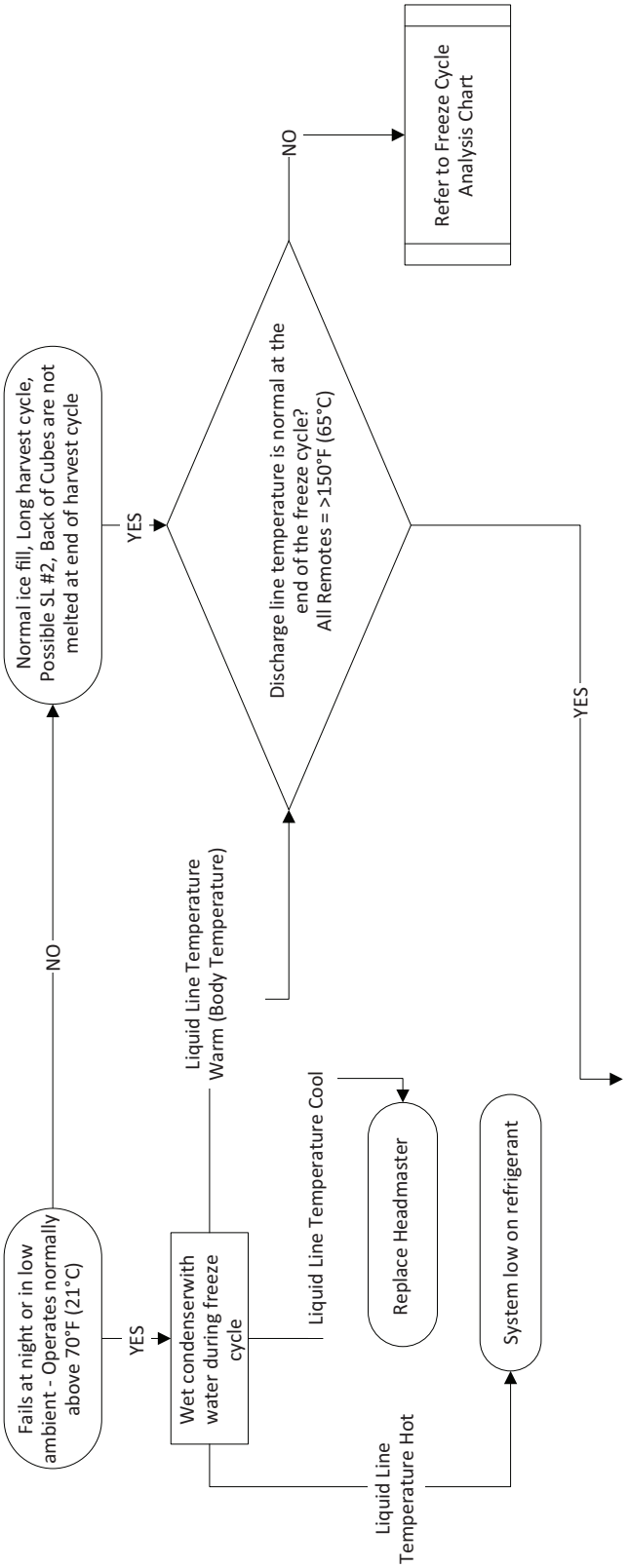
A loose or improperly mounted expansion valve bulb causes the expansion valve to flood. Check bulb mounting, insulation, etc, before changing the valve. Verify refrigerant amount is correct by weighing recovered refrigerant before replacing a TXV.

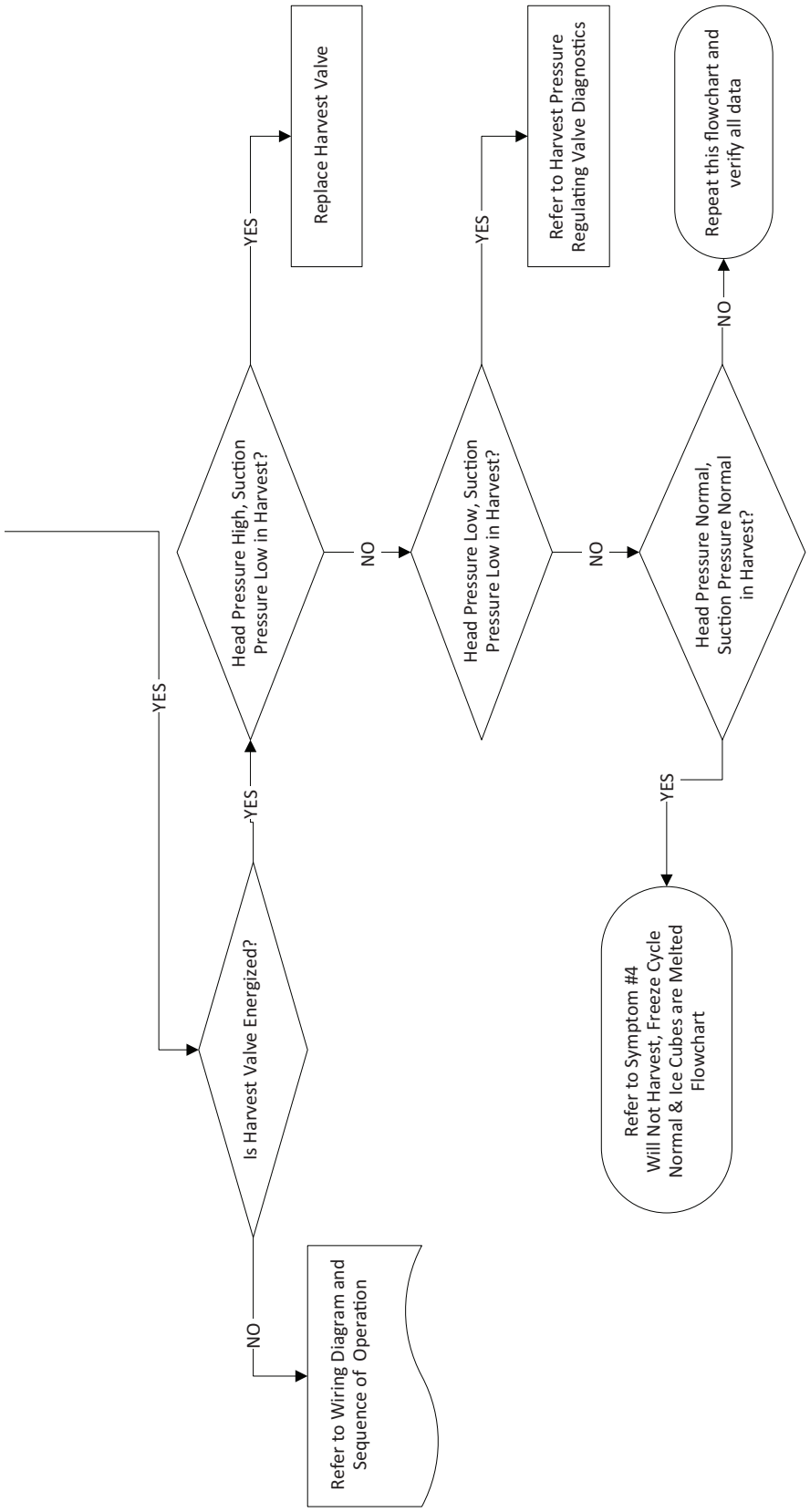
COLUMN 4 - COMPRESSOR

Replace the compressor. To receive warranty credit, the compressor ports must be properly sealed by crimping and soldering them closed.

SYMPTOM #3 - REMOTE CONDENSER

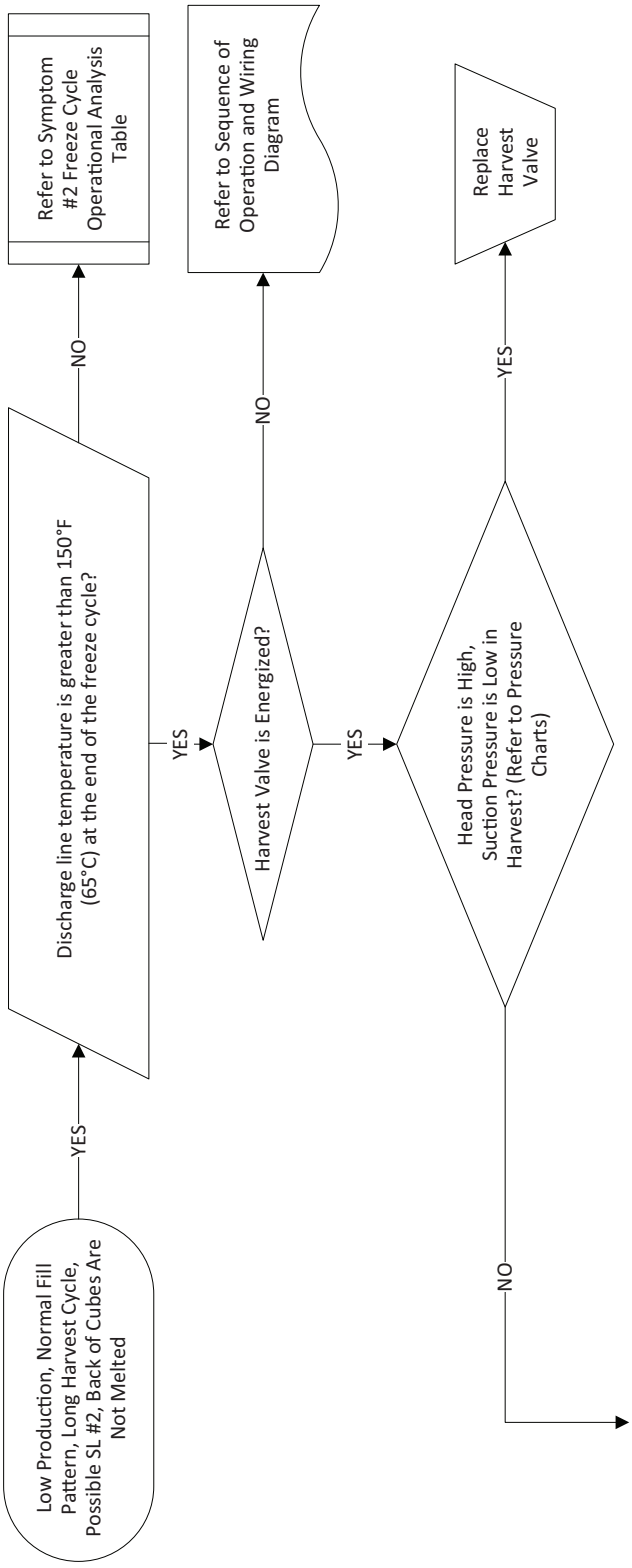
Traditional Remote Ice Machine – Long Harvest/Low Production/Intermittent Service Limit 2

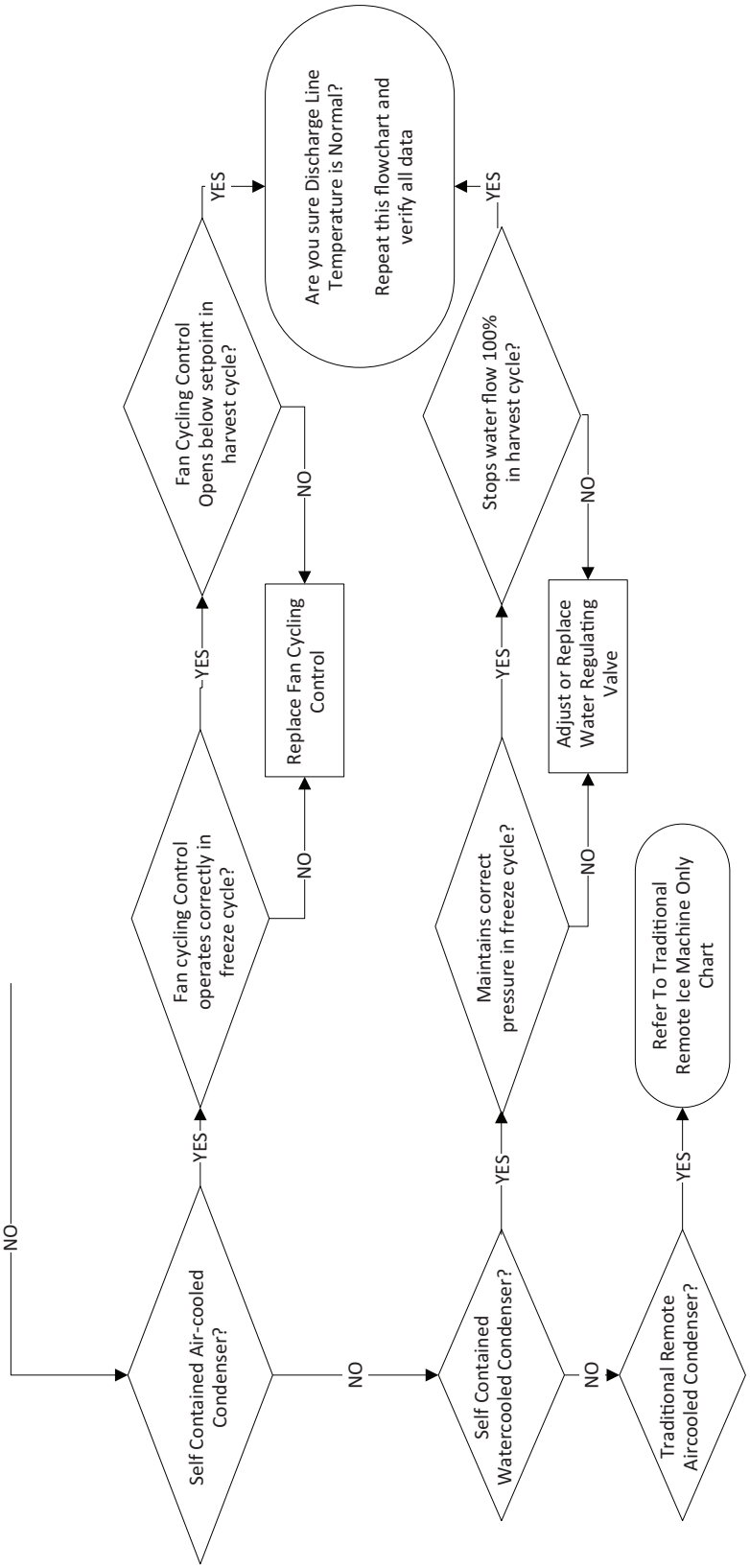



Is Harvest Valve Energized?
NO
Refer to Wiring Diagram and Sequence of Operation
YES
YES
Head Pressure High, Suction Pressure Low in Harvest?
YES
Replace Harvest Valve
NO
Head Pressure Low, Suction Pressure Low in Harvest?
YES
Refer to Harvest Pressure Regulating Valve Diagnostics
NO
Head Pressure Normal, Suction Pressure Normal in Harvest?
YES
Refer to Symptom #4 Will Not Harvest, Freeze Cycle Normal & Ice Cubes are Melted Flowchart
NO
Repeat this flowchart and verify all data

SYMPTOM #3 - SELF-CONTAINED AIR OR WATER-COOLED

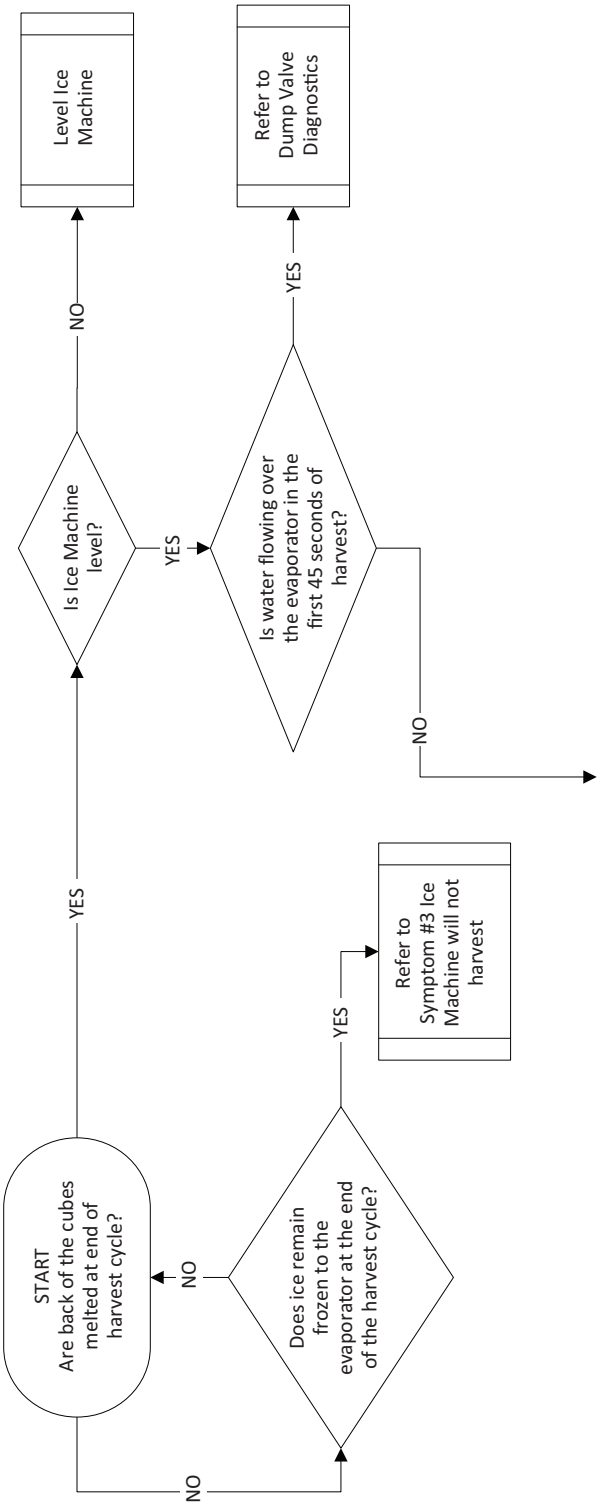
Ice Machine Will Not Harvest – Freeze Cycle is Normal and ice Cubes Are Not Melted After Harvest

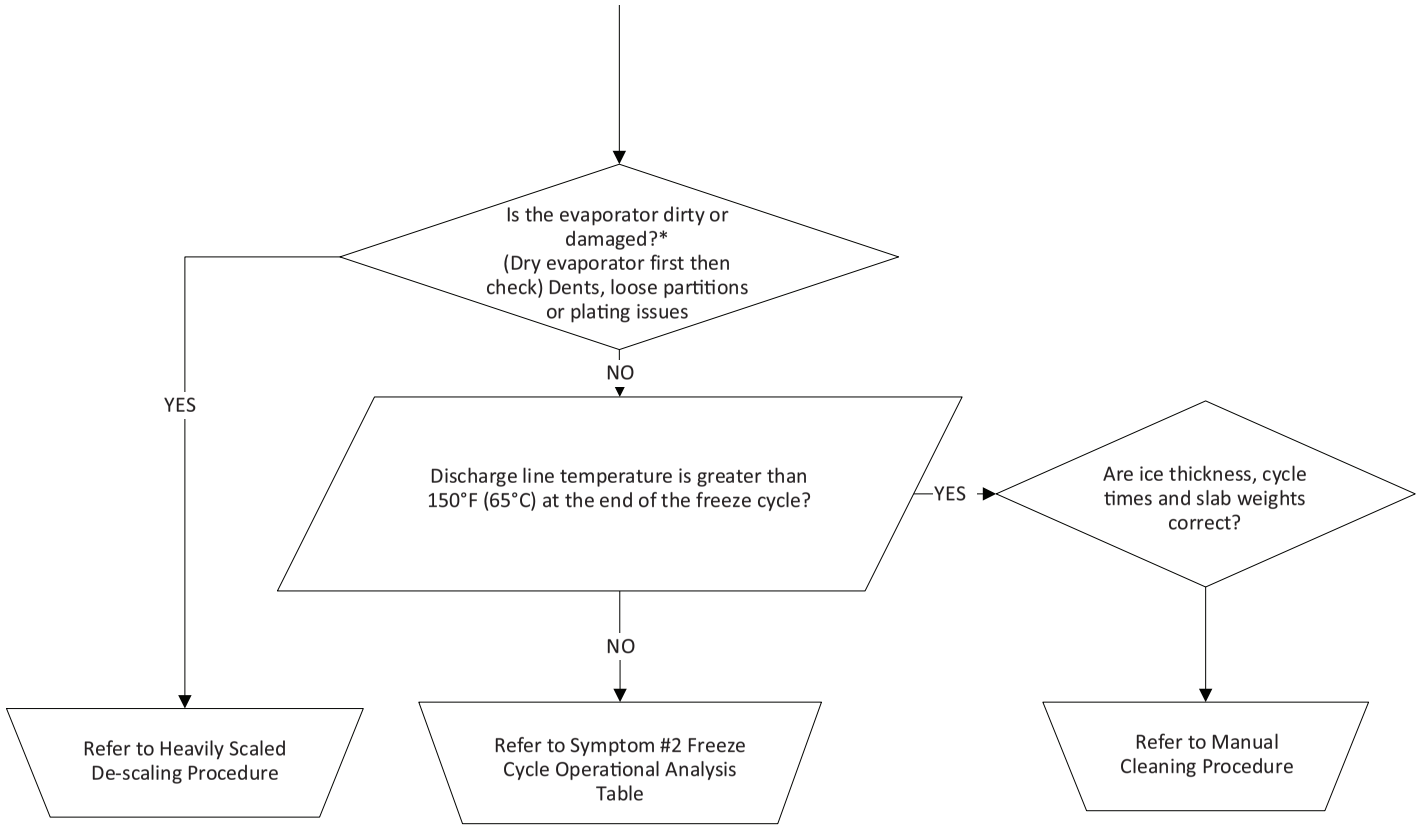



NO
Self Contained Air-cooled Condenser?
YES
Fan cycling Control operates correctly in freeze cycle?
NO
Replace Fan Cycling Control
YES
Fan Cycling Control Opens below setpoint in harvest cycle?
NO
YES
Are you sure Discharge Line Temperature is Normal?
Repeat this flowchart and verify all data
NO
Self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

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.

Component Check Procedures

Main Fuse

Function

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

Specifications

- The main fuse is 250 Volt, 3.15 amp.

⚠ Warning

High (line) voltage is applied to the control board at all times. Removing the control board fuse or cycling the toggle switch Off/On will not remove the power supplied to the control board.

Check Procedure

1. If the curtain light is on with the water curtain 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

Function

Bin switch operation is controlled by the movement of the water curtain. 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 water curtain and holds it down. After the water curtain 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 water curtain. As the water curtain swings back to the operating position, the bin switch closes and the ice machine restarts.

Important

The water curtain must be installed (bin switch closed) to start ice making.

Check Procedure

1. Cycle the toggle switch OFF.
2. Watch the curtain light on the control board.
3. Move the water curtain upward, toward the evaporator. The bin switch must close. The curtain light “on” indicates the bin switch has closed properly.
4. Move the water curtain 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 from the control board.
2. Connect an ohmmeter to the disconnected bin switch.
3. Cycle the bin switch open and closed numerous times by opening and closing the water curtain.

NOTE: To prevent misdiagnosis:

- 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).

Float Switch

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.

Ice Thickness Float Switch:

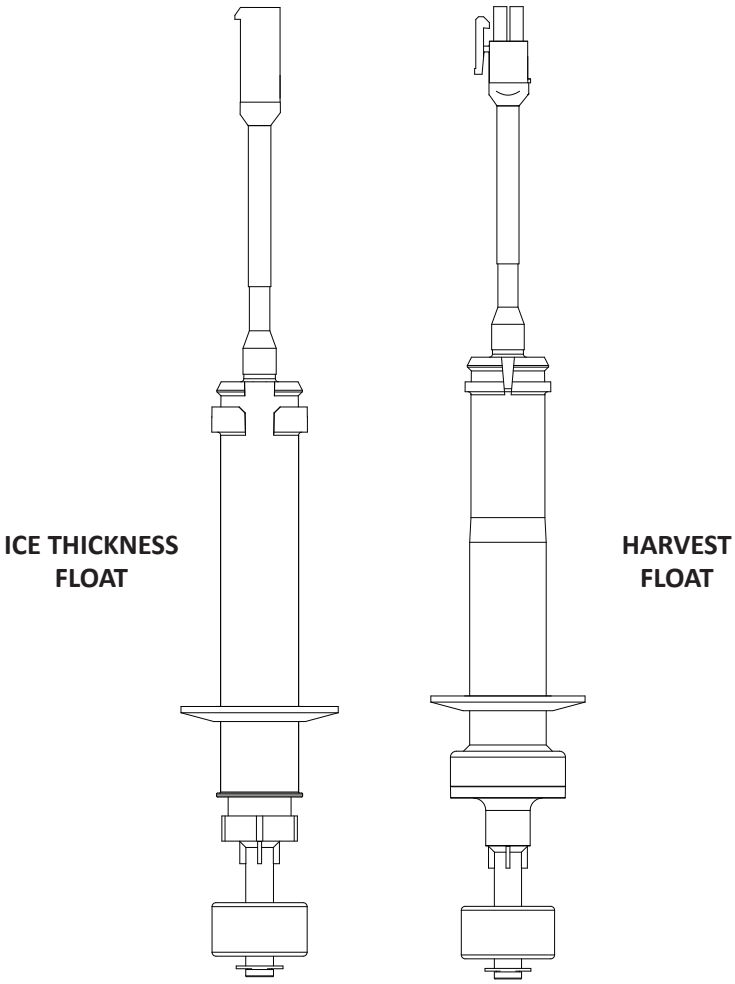
A. The light must be off in the down position.

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 and pull the float switch and connector through the ice machine base 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.
5. If the float tests good, ohm the interconnecting wires to the control board and inspect connectors.

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.



Compressor Electrical Diagnostics

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

Check Resistance (Ohm) Values

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

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

Single Phase Compressors

1. Disconnect power 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 start components.

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.

PTCR

The PTCR allows current to flow through the start winding at compressor startup. Current flow heats the ceramic discs in the PTCR. The electrical resistance increases with temperature and stops all except a trickle of current flow through the start winding. The small flow of current keeps the PTCR hot (260°F/127°C) and the start winding out of the circuit.

The PTCR must be cooled before attempting to start the compressor, otherwise the PTCR will heat up too quickly and stop current flow through the start winding before the compressor motor reaches full speed.

⚠Warning

Disconnect electrical power to the entire ice machine at the building electrical disconnect box before proceeding.

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

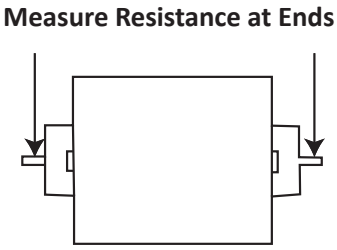
PTCR Operation Check

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

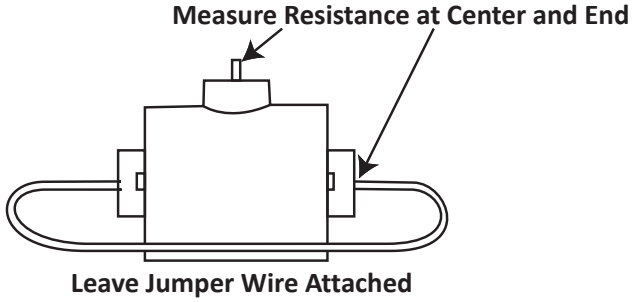
NOTE: The PTCR case temperature may reach 210°F (100°C) while the compressor is running. This is normal. Do not change a PTCR just because it is hot.

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

PTCR	Ohm Value	Amp	Part Number
Two Terminal Black Cera-Mite 305C2	60 to 110	12	000014323
Two Terminal Black or Blue Cera-Mite 305C20	24 to 46	10	8505003
Three Terminal Blue or Tan Cera-Mite 305C19	21 to 39	18	8504993
Three Terminal Blue or Tan Cera-Mite 305C09	10 to 20	36	8504913



Two Terminal PTCR



Three Terminal PTCR

Fan Cycle Control

Function

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

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

Specifications

Model	Cut-In (Close)	Cut-Out (Open)
KT0300 K0350 KT0400 KT0420 K0420 KT0500 K0500 K0600 KT0700 KT1000 KT1700	335 psig ±5 2310 kPa ±5	275 psig ±5 1896 kPa ±5
K1000 K1350 K1800	385 psig ±5 2654 kPa ±5	305 psig ±5 2103 kPa ±5
KP0300 KP0400 KP0420 KP0500 KP0700 KP1000	200 psig ±5 (1379 kPa ±34)	150 psig ±5 (1030 kPa ±34)

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 Cycle the toggle switch 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

Function

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

Specifications

Specifications		
Refrigerant	**Cut-Out**	**Cut-In**
R410A	600 psig ±10 (4136 kPa ±69)	450 psig ±20 (3103 kPa ±138)
R290	250 psig ±10 (1724 kPa ±69)	350 psig ±20 (2413 kPa ±138)
Automatic Reset		

Check Procedure

1. Move toggle 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. Move toggle switch to ON.
6. No water or air flowing through the condenser will cause the HPCO control to open because of excessive pressure. Watch the pressure gauge and record the cut-out pressure.

⚠Warning

If discharge pressure exceeds 600 psig - 4137 kPa and the HPCO control does not cut out, cycle the toggle switch Off to stop ice machine operation.

Replace the HPCO control if it:

- Will not reset
- Does not open at the specified cut-out point

Refrigeration Components

HEAD PRESSURE CONTROL VALVE

Koolaire remote systems require head pressure control valves with special settings. Replace defective head pressure control valves only with “original” Koolaire replacement parts.

Refrigerant Charge Verification

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

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

- Works during the day and malfunctions at night, and/ or fails whenever the outdoor temperature drops.
- A Safety limit is stored in control board memory.

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

When the refrigerant charge and ambient temperature create an undercharge of refrigerant in the freeze cycle, the receiver dip tube will lose it’s liquid seal. Without liquid refrigerant to the TXV, the ice machine fails to make a full sheet of ice in 60 minutes and a safety limit #1 results.

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

FREEZE CYCLE OPERATION ALL MODELS

The head pressure control valve is non adjustable.

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

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

HARVEST CYCLE OPERATION

Remote Condenser Models

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

Diagnostics

FREEZE CYCLE - REMOTE CONDENSER

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

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

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

Undercharge Symptoms

- Safety limit #1 or Safety limit #2 in control board memory.
- Harvest cycle suction pressure is low.
- Harvest cycle discharge pressure is low.
- Liquid line entering receiver feels warm to hot in the freeze cycle.

Overcharge Symptoms

- Safety limit #2 in control board memory, a flashing alert and after pressing left arrow Long Harvest is displayed.
- Harvest cycle discharge pressure is normal.
- Freeze cycle time, suction and discharge pressure are normal and the ice machine will not harvest. The sheet of ice cubes show little or no sign of melting when removed from the evaporator after the harvest cycle has been completed. (If the cubes are melted you have a release problem, clean the ice machine).

HARVEST PRESSURE REGULATING VALVE (HPR) SYSTEM REMOTE CONDENSER ONLY

GENERAL

The harvest pressure regulating (HPR) system includes:

- Harvest pressure regulating solenoid valve (HPR solenoid). This is an electrically operated valve which opens when energized, and closes when de-energized.
- Harvest pressure regulating valve (HPR valve). This is a pressure regulating valve which modulates open and closed, based on the refrigerant pressure at the outlet of the valve. The valve closes completely and stops refrigerant flow when the pressure at the outlet rises above the valve setting.
- The harvest pressure regulating valve is not adjustable.

FREEZE CYCLE

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

HARVEST CYCLE

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

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

In general, harvest cycle suction pressure rises, then stabilize. Exact pressures vary from model to model. Refer to cycle time/24 hour ice production and operational pressure charts.

HPR DIAGNOSTICS

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

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

1. Liquid line warm?
   (Body temperature is normal)
   If liquid line is cooler than body temperature, refer to head pressure control valve diagnostics.
2. Ice fill pattern normal?
   Refer to “Ice Formation Pattern” if ice fill is not normal.
3. Freeze time normal?
   (Refer to Cycle Times/Refrigerant Pressures/24 Hour Ice Production Charts).
   A. Shorter freeze cycles?
      Refer to head pressure control valve diagnostics.
   B. Longer freeze cycles?
      Refer to water system checklist, then refer to Refrigeration Diagnostic Procedures.
4. Harvest time is longer than normal and control board indicates safety limit #2?
   (Refer to Cycle Times/Refrigerant Pressures/24 Hour Ice Production Charts).
5. Discharge line temperature is greater than 160°F at the end of the freeze cycle?
   (Refer to Discharge Line Temperature Analysis)

6. Connect refrigeration manifold gauge set to the access valves on the front of the ice machine. Establish baseline by recording suction and discharge pressure and freeze & harvest cycle times. (Refer to “Freeze Cycle Refrigeration System Operational Analysis Tables” for data collection detail).
7. Freeze cycle Head Pressure is in the range indicated in the cycle time/24 hour ice production and operational pressure chart?
   If the head pressure is low refer to head pressure control valve diagnostics.
8. Freeze cycle Suction Pressure normal?
   Refer to analyzing suction pressure if suction pressure is high or low.
9. Harvest cycle suction and discharge pressures are lower than indicated in the cycle times/refrigerant pressures/24 hour ice production chart?
   Replace Harvest Pressure Regulating solenoid

WATER REGULATING VALVE

Water-Cooled Models Only

FUNCTION

The water regulating valve maintains the freeze cycle discharge pressure.

CHECK PROCEDURE

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

Problem (Freeze Cycle)

VALVE NOT MAINTAINING DISCHARGE PRESSURE.

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

DISCHARGE PRESSURE EXTREMELY HIGH; LIQUID LINE ENTERING RECEIVER FEELS HOT.

- Water regulating valve incorrectly set or not opening.

DISCHARGE PRESSURE LOW, LIQUID LINE ENTERING RECEIVER FEELS WARM TO HOT.

- Ice machine low on charge - Verify Total System Refrigerant Charge

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

Koolaire recognizes and supports the need for proper handling, re-use, and disposal of refrigerants. Koolaire 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

Koolaire 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.

Koolaire 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 Koolaire product. Re-use of recovered or recycled refrigerant from other products is not approved.
    - Recycling equipment must be certified to ARI Standard 740 (latest edition) and be maintained to consistently meet this standard.

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 “Determining Severity of Contamination” on page 140 to test for contamination.
5. “Substitute” or “Alternative” Refrigerant
    - Must use only Koolaire-approved alternative refrigerants.
    - Must follow Koolaire-published conversion procedures.

RECOVERY AND RECHARGING PROCEDURES

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

Important

Koolaire 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 Koolaire (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.
3. Liquid side through the liquid line drier.

SELF-CONTAINED RECOVERY/EVACUATION

1. Cycle the toggle switch Off.
2. Install manifold gauge, scale and recovery unit or two-stage vacuum pump and open high, low and charging ports.
3. Perform recovery or evacuation:
    A. Recovery: Operate the recovery unit as directed by the manufacturer's instructions.
    B. Evacuation prior to recharging: Pull the system down to 500 microns. Then, allow the pump to run for an additional half hour. Turn off the pump and perform a standing vacuum leak check.
4. Follow the Charging Procedures.

CHARGING PROCEDURES

Important

The charge is critical on all Koolaire machines. Use a scale or a charging cylinder to ensure the proper charge is installed.

1. Cycle the toggle switch Off.
2. Isolate the vacuum pump valve, low side and high side access valves from the refrigeration system. The refrigerant charging access valve remains open.
3. Open the high side manifold gauge valve.
4. Open the refrigerant cylinder and add the proper refrigerant charge (shown on nameplate) through the liquid line drier.

⚠ Caution

Damage may occur when charging liquid into the front discharge line access port.

Replacement driers have a Schrader valve built into the inlet of the drier. Filter driers without an access port must be replaced with the current OEM part before recharging the ice machine. All Liquid refrigerant must be added through the liquid line drier access port.

5. Let the system “settle” for 2 to 3 minutes.
6. Cycle the toggle switch On.

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

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

REMOTE CONDENSER MODEL PROCEDURE

Refrigerant Recovery/Evacuation

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

Important

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

Important

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

Important

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

MAKE THESE CONNECTIONS:

- Suction side of the compressor through the suction service valve.
- Discharge side of the compressor through the discharge service valve.
- Receiver outlet service valve, which evacuates the area between the check valve in the liquid line and the pump down solenoid.

- Access valve on the discharge line quick-connect fitting, located on the outside of the compressor/ evaporator compartment. This connection evacuates the condenser. Without it, the magnetic check valves would close when the pressure drops during evacuation, preventing complete evacuation of the condenser.

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

REMOTE CONDENSER RECOVERY/EVACUATION

1. Stop the ice machine.
2. Install manifold gauge set, scale and recovery unit or two-stage vacuum pump.
3. Open high and low side on the manifold gauge set.
4. Perform recovery or evacuation:
    A. Recovery: Operate the recovery unit as directed by the manufacturer's instructions.
    B. Evacuation prior to recharging: Pull the system down to 500 microns. Then, allow the pump to run for an additional hour. Turn off the pump and perform a standing vacuum leak check.

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

5. Follow the Remote Charging Procedures.

REMOTE CHARGING PROCEDURES

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

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

4. Verify all of the vapor in the charging hoses is drawn into the refrigeration system before disconnecting the charging hoses.
    A. Run the ice machine in freeze cycle.
    B. Remove the high side low loss fitting.
    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 suction pressures in the refrigeration system and the manifold gauge set to equalize while the ice machine is in the freeze cycle.
    E. Isolate and remove the low side hose.
    F. Install access valve caps.

System Contamination Cleanup

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

Important

Koolaire 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 harmful levels of contamination are suspected, perform the following procedure.

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

CLEANUP PROCEDURE

Mild System Contamination

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

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 and inspect the refrigeration lines. If burnout deposits are found, install a new harvest valve, replace the manifold strainer, TXV and harvest pressure regulating valve.
3. Wipe away any burnout deposits from suction and discharge lines at compressor.
4. Sweep through the open system with dry nitrogen.
5. Install a new compressor and new start components.
6. Install suction line filter-drier in front of compressor.
7. Install an access valve at the inlet of the suction line drier.
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.

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

10. Charge the system with the proper refrigerant to the nameplate charge.
11. Operate the ice machine for one hour. Then, check the pressure drop across the suction line filter-drier.
    A. If the pressure drop is less than 1 psig the filter-drier should be adequate for complete cleanup.
    B. If the pressure drop exceeds 1 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.

LIQUID LINE FILTER DRIERS

The filter-driers used on Koolaire ice machines are manufactured to Koolaire specifications and have an access fitting for charging with refrigerant. A Koolaire drier also 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 Koolaire filter-drier has high moisture and acid removal capability.

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

Important

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

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. Position the flattened tubing in the proper hole in the pinch off tool. Tighten the wing nuts until the block is tight and the tubing is rounded.

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

Refrigerant Amount

KP MODELS

NOTE: All models charged with R290 refrigerant.

Nameplate information overrides all data in this chart.

Model	Self-Contained Air-Cooled	Self-Contained Water-Cooled
KP0300	5.3 oz 150 g	N/A
KP0400	5.9 oz 170 g	5.3 oz 150 g
KP0420	5.9 oz 170 g	5.3 oz 150 g
KP0500	5.3 oz 150 g	6.5 oz 180 g
KP0700	10.9 oz 310 g	10.9 oz 310 g
KP1000	14.1 oz 400 g	14.1 oz 400 g

KT MODELS

NOTE: All models charged with R410A refrigerant.

Nameplate information overrides all data in this chart.

Model	Air-Cooled	Water-Cooled	Remote	51' to 100' Line sets*
KT0300 60 Hz	15 oz 425 g	N/A	N/A	N/A
KT0300 50 Hz	17 oz 482 g	N/A	N/A	N/A
KT0400 60 Hz	18 oz 510 g	14 oz 397 g	N/A	N/A
KT0400 50 Hz	21 oz 595 g	N/A	N/A	N/A
KT0420 60 Hz	16 oz 454 g	14 oz 397 g	N/A	N/A
KT0420 50 Hz	16 oz 454 g	N/A	N/A	N/A
KT0500 60 Hz	18 oz 510 g	18 oz 510 g	N/A	N/A
KT0500 50 Hz	18 oz 510 g	N/A	N/A	N/A
KT0700 60 Hz	22 oz 624 g	18 oz 510 g	N/A	N/A
KT0700 50 Hz	22 oz 624 g	N/A	N/A	N/A
KT1000 60 Hz	28 oz 794 g	26 oz 624 g	7 lbs 3.2 kg	2 lbs 907 g
KT1000 50 Hz	28 oz 794 g	N/A	N/A	N/A
KT1700 60 Hz	42 oz 1191 g	34 oz 964 g	7 lbs 3.2 kg	2 lbs 907 g
KT1700 50 Hz	42 oz 1191 g	N/A	N/A	N/A
* Additional amount of refrigerant to be added for remote condenser with line sets that are 51' to 100' in length				

K MODELS

NOTE: All models charged with R410A refrigerant.

Nameplate information overrides all data in this chart.

Model	Air-Cooled	Water-Cooled	Remote	51' to 100' Line sets*
K0250 60 Hz	15 oz 425 g	N/A	N/A	N/A
K0250 50 Hz	17 oz 482 g	N/A	N/A	N/A
K0350 60 Hz	18 oz 510 g	14 oz 397 g	N/A	N/A
K0350 50 Hz	21 oz 595 g	14 oz 397 g	N/A	N/A
K0420 60 Hz and 50 Hz	16 oz 454 g	14 oz 397 g	N/A	N/A
K0500 60 Hz and 50 Hz	18 oz 510 g	18 oz 510 g	N/A	N/A
K0600 60 Hz and 50 Hz	24 oz 680 g	18 oz 510 g	N/A	N/A
K1000 60 Hz	28 oz 794 g	24 oz 680 g	7 lbs 5 oz 3.4 kg	2 lbs 907 g
K1000 50 Hz	44 oz 1247 g	24 oz 680 g	7 lbs 5 oz 3.4 kg	2 lbs 907 g
K1350 60 Hz	42 oz 1191 g	32 oz 907 g	11 lbs 5 oz 5.2 kg	2 lbs 907 g
K1350 50 Hz	42 oz 1191 g	N/A	11 lbs 5 oz 5.2 kg	2 lbs 907 g
K1800 60 Hz and 50 Hz	46 oz 1304 g	N/A	12 lbs 5.4 kg	2 lbs 907 g
* Additional amount of refrigerant to be added for remote condenser with line sets that are 51' to 100' in length				

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.

K0250A SELF-CONTAINED AIR-COOLED

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	
70/21	9.3-11.5	10.8-12.9	12.3-14.6	1.0-2.5
80/27	10.6-12.6	12.3-14.6	13.5-16.0	
90/32	11.8-14.0	13.9-16.4	15.0-17.7	
100/38	13.2-15.7	14.6-17.3	16.2-19.2	
110/43	15.0-17.7	15.8-18.7	17.7-20.9	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	310 lbs 141 kgs	280 lbs 127 kgs	250 lbs 113 kgs
80/27	285 lbs 129 kgs	250 lbs 113 kgs	230 lbs 104 kgs
90/32	260 lbs 118 kgs	225 lbs 102 kgs	210 lbs 95 kgs
100/38	235 lbs 107 kgs	215 lbs 98 kgs	195 lbs 88 kgs
110/43	210 lbs 95 kgs	200 lbs 91 kgs	180 lbs 82 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.79 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	300-335 psig 20.7-23.1 bar	70-38 psig 4.8-2.6 bar
70/21	310-340 psig 21.4-23.4 bar	75-40 psig 5.2-2.8 bar
80/27	315-360 psig 21.7-24.8 bar	80-42 psig 5.5-2.9 bar
90/32	320-375 psig 22.1-25.9 bar	90-44 psig 6.2-3.0 bar
100/38	420-510 psig 29.0-35.2 bar	100-49 psig 6.9-3.4 bar
110/43	450-540 psig 31.0-37.2 bar	120-52 psig 8.3-3.6 bar
Suction pressure drops gradually throughout the freeze cycle		

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	160-180 psig 11.0-12.4 bar	150-175 psig 10.3-12.1 bar
70/21	180-200 psig 12.4-13.8 bar	150-175 psig 10.3-12.1 bar
80/27	185-210 psig 12.8-14.5 bar	150-175 psig 10.3-12.1 bar
90/32	190-215 psig 13.1-14.8 bar	150-175 psig 10.3-12.1 bar
100/38	300-330 psig 20.7-22.8 bar	200-250 psig 13.8-17.2 bar
110/43	355-370 psig 24.5-25.5 bar	270-290 psig 18.6-20.0 bar

KP0300A SELF-CONTAINED AIR-COOLED

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	
70/21	13.0 - 15.5	15.5 - 18.5	18.0 - 21.0	1.0-2.5
80/27	15.5 - 18.0	17.9 - 20.8	19.5 - 22.5	
90/32	17.2 - 20.0	19.2 - 22.5	21.5 - 25.0	
100/38	19.1 - 22.2	21.0 - 24.5	23.5 - 27.0	
110/43	21.5 - 25.0	23.0 - 26.5	25.5 - 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
70/21	330 lbs (150 kgs)	280 lbs (127 kgs)	250 lbs (113 kgs)
80/27	285 lbs (129 kgs)	250 lbs (113 kgs)	230 lbs (104 kgs)
90/32	260 lbs (118 kgs)	230 lbs (104 kg)	210 lbs (95 kgs)
100/38	235 lbs (107 kgs)	215 lbs (98 kgs)	195 lbs (88 kgs)
110/43	210 lbs (95 kgs)	200 lbs (91 kgs)	180 lbs (82 kgs)

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.77 kg)

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	145 - 200 psig (10.0 -13.8 bar)	40 - 19 psig (2.8-1.3 bar)
70/21	150 - 210 psig (10.3 - 14.5 bar)	42 - 20 psig (2.9-1.4 bar)
80/27	155 - 220 psig (10.7 - 15.2 bar)	44 - 21 psig (3.0-1.4 bar)
90/32	160 - 220 psig (11.0 - 15.2 bar)	47 - 23 psig (3.2-1.6 bar)
100/38	220 - 265 psig (15.2 - 18.3 bar)	50 - 24 psig (3.4-1.7 bar)
110/43	230 - 285 psig (15.9 - 19.6 bar)	58 - 25 psig (4.0-1.7 bar)

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	70 -85 psig (4.8 - 5.9 bar)	55 -65 psig (3.8 - 4.5 bar)
70/21	75 - 90 psig (5.2 - 6.2 bar)	60 -70 psig (4.1 - 4.8 bar)
80/27	80 - 90 psig (5.2 - 6.2 bar)	60 - 70 psig (4.1 - 4.8 bar)
90/32	105 - 115 psig (7.2 - 7.9 bar)	70 - 85 psig (4.8 - 5.9 bar)
100/38	115 -135 psig (7.9 - 9.3 bar)	80 - 100 psig (5.5 - 5.9 bar)
110/43	125 -145 psig (8.6 - 10.0 bar)	85 - 105 psig (5.9 - 7.2 bar)

KT0300A SELF-CONTAINED AIR-COOLED

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	
70/21	13.3-15.5	16.0-18.6	18.1-21.0	1.0-2.5
80/27	15.7-18.2	18.1-21.0	19.8-22.9	
90/32	17.3-20.1	19.3-22.4	21.8-25.2	
100/38	19.3-22.4	21.3-24.6	23.6-27.3	
110/43	21.8-25.2	23.0-26.6	25.7-29.7	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	330 lbs 150 kgs	280 lbs 127 kgs	250 lbs 113 kgs
80/27	285 lbs 129 kgs	250 lbs 113 kgs	230 lbs 104 kgs
90/32	260 lbs 118 kgs	230 lbs 104 kgs	210 lbs 95 kgs
100/38	235 lbs 107 kgs	215 lbs 98 kgs	195 lbs 88 kgs
110/43	210 lbs 95 kgs	200 lbs 91 kgs	180 lbs 82 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.77 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	300-335 psig 20.7-23.1 bar	70-38 psig 4.8-2.6 bar
70/21	310-340 psig 21.4-23.4 bar	75-40 psig 5.2-2.8 bar
80/27	315-360 psig 21.7-24.8 bar	80-42 psig 5.5-2.9 bar
90/32	320-375 psig 22.1-25.9 bar	90-44 psig 6.2-3.0 bar
100/38	420-510 psig 29.0-35.2 bar	100-49 psig 6.9-3.4 bar
110/43	450-540 psig 31.0-37.2 bar	120-52 psig 8.3-3.6 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	160-180 psig 11.0-12.4 bar	150-175 psig 10.3-12.1 bar
70/21	180-200 psig 12.4-13.8 bar	150-175 psig 10.3-12.1 bar
80/27	185-210 psig 12.8-14.5 bar	150-175 psig 10.3-12.1 bar
90/32	190-215 psig 13.1-14.8 bar	150-175 psig 10.3-12.1 bar
100/38	300-330 psig 20.7-22.8 bar	200-250 psig 13.8-17.2 bar
110/43	355-370 psig 24.5-25.5 bar	270-290 psig 18.6-20.0 bar

K0350A SELF-CONTAINED AIR-COOLED

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	
70/21	11.6-13.5	12.7-14.8	14.0-16.3	1.0-2.5
80/27	12.5-14.5	14.0-16.3	15.1-17.5	
90/32	13.6-15.8	14.8-17.2	15.7-18.2	
100/38	14.8-17.2	15.4-17.9	16.6-19.3	
110/43	15.7-18.2	16.3-18.9	17.0-19.7	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	375 lbs 170 kgs	345 lbs 156 kgs	315 lbs 143 kgs
80/27	350 lbs 159 kgs	315 lbs 143 kgs	295 lbs 134 kgs
90/32	325 lbs 147 kgs	300 lbs 136 kgs	285 lbs 129 kgs
100/38	300 lbs 136 kgs	290 lbs 132 kgs	270 lbs 122 kgs
110/43	285 lbs 129 kgs	275 lbs 125 kgs	265 lbs 120 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.79 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	260-320 psig 17.9-22.1 bar	55-32 psig 3.8-2.2 bar
70/21	275-340 psig 19.0-23.4 bar	60-33 psig 4.1-2.3 bar
80/27	285-395 psig 19.7-27.2 bar	65-34 psig 4.5-2.3 bar
90/32	335-410 psig 23.1-28.3 bar	70-35 psig 4.8-2.4 bar
100/38	400-500 psig 27.6-34.5 bar	80-40 psig 5.5-2.8 bar
110/43	450-520 psig 31.0-35.9 bar	85-42 psig 5.9-2.9 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	130-200 psig 9.0-13.8 bar	90-140 psig 6.2-9.7 bar
70/21	150-200 psig 10.3-13.8 bar	100-140 psig 6.9-9.7 bar
80/27	170-230 psig 11.7-15.9 bar	105-165 psig 7.2-11.4 bar
90/32	190-250 psig 13.1-17.2 bar	110-175 psig 7.6-12.1 bar
100/38	280-340 psig 19.3-23.4 bar	160-220 psig 11.0-15.2 bar
110/43	320-360 psig 22.1-24.8 bar	190-235 psig 13.1-16.2 bar

K0350W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	11.4-13.3	12.3-14.3	13.1-15.3	1.0-2.5
80/27	11.6-13.5	12.5-14.5	13.3-15.5	
90/32	11.7-13.7	14.6-16.1	13.6-15.8	
100/38	11.9-13.9	12.9-15.0	13.8-16.1	
110/43	12.1-14.1	13.8-16.1	14.0-16.3	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	380 lbs 172 kgs	355 lbs 161 kgs	335 lbs 152 kgs
80/27	375 lbs 170 kgs	350 lbs 159 kgs	330 lbs 150 kgs
90/32	370 lbs 168 kgs	340 lbs 154 kgs	325 lbs 147 kgs
100/38	365 lbs 166 kgs	330 lbs 150 kgs	320 lbs 145 kgs
110/43	360 lbs 163 kgs	320 lbs 145 kgs	315 lbs 143 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.79 kg)
Water regulating valve set to maintain 320 PSIG discharge pressure
Condenser Water usage per 100 lbs ice = 170 gal (45 kg = 644 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	315-330 psig 21.7-22.8 bar	60-34 psig 4.1-2.3 bar
70/21	315-330 psig 21.7-22.8 bar	60-34 psig 4.1-2.3 bar
80/27	315-330 psig 21.7-22.8 bar	60-34 psig 4.1-2.3 bar
90/32	315-330 psig 21.7-22.8 bar	60-34 psig 4.1-2.3 bar
100/38	315-335 psig 21.7-23.1 bar	60-34 psig 4.1-2.3 bar
110/43	315-340 psig 21.7-23.4 bar	65-36 psig 4.5-2.5 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar
70/21	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar
80/27	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar
90/32	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar
100/38	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar
110/43	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar

KP0400A SELF-CONTAINED AIR-COOLED

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	
70/21	9.5 - 11.0	10.5 - 12.1	10.5 - 12.1	1.0-2.5
80/27	10.2 - 11.8	11.1 - 13.1	11.1 - 13.1	
90/32	11.0 - 13.0	12.3 - 14.5	12.3 - 14.5	
100/38	12.5 - 14.0	14.2 - 16.5	14.2 - 16.5	
110/43	13.0 - 16.0	15.5 - 18.0	15.5 - 18.0	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	450 lbs 204 kgs	425 lbs 193 kgs	400 lbs 181 kgs
80/27	420 lbs 190 kgs	400 lbs 181 kgs	380 lbs 172 kgs
90/32	400 lbs 181 kgs	390 lbs 177 kgs	375 lbs 170 kgs
100/38	385 lbs 175 kgs	365 lbs 166 kgs	350 lbs 159 kgs
110/43	370 lbs 345 kgs	345 lbs 156 kgs	320 lbs 145 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.77 kg)

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	155 - 205 psig (10.7 - 14.1 bar)	30 - 14 psig (2.1 - 1.0 bar)
70/21	165 - 205 psig (11.4 - 14.1 bar)	32 - 15 psig (2.2 - 1.0. bar)
80/27	170 - 205 psig (11.7 - 14.1 bar)	36 -15 psig (2.5 - 1.0 bar)
90/32	185 - 205 psig (12.8 - 14.1 bar)	35 - 15 psig (2.4 - 1.0 bar)
100/38	250 - 265 psig (17.2 - 18.3 bar)	48 - 20 psig (3.3 - 1.4 bar)
110/43	260 - 285 psig (17.9 - 19.6 bar)	50 - 20 psig (3.4 - 1.4 bar)

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	95 - 105 psig (6.5 - 7.2 bar)	52 - 62 psig (3.6 - 4.3 bar)
70/21	105 - 115 psig (7.2 - 7.9 bar)	60 - 70 psig (4.1 - 4.8 bar)
80/27	110 - 120 psig (7.6 - 8.3 bar)	60 - 70 psig (4.1 - 4.8 bar)
90/32	120 - 130 psig (8.3 - 9.0 bar)	65 - 75 psig (4.5 - 5.2 bar)
100/38	120 - 130 psig (8.3 - 9.0 bar)	66 - 75 psig (4.5 - 5.2 bar)
110/43	120 - 135 psig (8.3 - 9.3 bar)	70 - 80 psig (4.8 - 5.5 bar)

KP0400W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	9.2 - 10.3	9.4 - 10.2	10.3 - 11.1	1.0-2.5
80/27	9.5 - 10.6	9.5 - 11.3	10.6 - 11.7	
90/32	9.7 - 10.8	9.9 - 11.4	10.9 - 12.0	
100/38	10.3 - 11.5	10.3 - 11.9	11.2 - 12.2	
110/43	10.8 - 11.7	11.1 - 12.1	11.5 - 12.6	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	470 lbs 213 kgs	445 lbs 202 kgs	420 lbs 190 kgs
80/27	460 lbs 209 kgs	461 lbs 209 kgs	410 lbs 186 kgs
90/32	450 lbs 204 kgs	450 lbs 204 kgs	400 lbs 181 kgs
100/38	451 lbs 204 kgs	451 lbs 204 kgs	395 lbs 179 kgs
110/43	445 lbs 202 kgs	446 lbs 202 kgs	380 lbs 172 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.77 kg)
Water regulating valve set to maintain 170 PSIG
Condenser Water usage per 100 lbs ice = 170 gal (45 kg = 644 L)

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	175 - 185 psig (12.1 - 12.8 bar)	30 - 15 psig (2.1 - 1.0 bar)
70/21	175 - 185 psig (12.1 - 12.8 bar)	35 - 16 psig (2.4 - 1.1. bar)
80/27	175 - 185 psig (12.1 - 12.8 bar)	35 -17 psig (2.4 - 1.2 bar)
90/32	175 - 185 psig (12.1 - 12.8 bar)	36 - 18 psig (2.5 - 1.2 bar)
100/38	180 - 190 psig (12.4 - 13.1 bar)	37 - 19 psig (2.6 - 1.3 bar)
110/43	180 - 190 psig (12.4 - 13.1 bar)	38 - 20 psig (2.6 - 1.4 bar)

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	100 - 125 psig (6.9 - 8.6 bar)	58 - 73 psig (4.0 - 5.0 bar)
70/21	100 - 120 psig (6.9 - 8.3 bar)	60 - 75 psig (4.1 - 5.2 bar)
80/27	100 - 120 psig (6.9 - 8.3 bar)	60 - 75 psig (4.1 - 5.2 bar)
90/32	105 - 125 psig (7.2 - 8.6 bar)	60 - 75 psig (4.1 - 5.2 bar)
100/38	105 - 125 psig (7.2 - 8.6 bar)	60 - 75 psig (4.1 - 5.2 bar)
110/43	105 - 125 psig (7.2 - 8.6 bar)	60 - 75 psig (4.1 - 5.2 bar)

KT0400A SELF-CONTAINED AIR-COOLED

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	
70/21	9.6-11.3	10.4-12.2	12.5-14.5	1.0-2.5
80/27	10.2-11.9	11.2-13.1	14.0-16.3	
90/32	11.1-12.9	12.7-14.8	14.8-17.2	
100/38	12.1-14.1	14.3-16.6	16.3-18.9	
110/43	14.0-16.3	15.7-18.2	17.0-19.7	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	440 lbs 200 kgs	410 lbs 186 kgs	350 lbs 159 kgs
80/27	420 lbs 191 kgs	385 lbs 175 kgs	315 lbs 143 kgs
90/32	390 lbs 177 kgs	345 lbs 156 kgs	300 lbs 136 kgs
100/38	360 lbs 163 kgs	310 lbs 141 kgs	275 lbs 125 kgs
110/43	315 lbs 143 kgs	285 lbs 129 kgs	265 lbs 120 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.77 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	260-320 psig 17.9-22.1 bar	55-32 psig 3.8-2.2 bar
70/21	275-340 psig 19.0-23.4 bar	60-33 psig 4.1-2.3 bar
80/27	285-395 psig 19.7-27.2 bar	65-34 psig 4.5-2.3 bar
90/32	335-410 psig 23.1-28.3 bar	70-35 psig 4.8-2.4 bar
100/38	400-500 psig 27.6-34.5 bar	80-40 psig 5.5-2.8 bar
110/43	450-520 psig 31.0-35.9 bar	85-42 psig 5.9-2.9 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	130-200 psig 9.0-13.8 bar	90-140 psig 6.2-9.7 bar
70/21	150-200 psig 10.3-13.8 bar	100-140 psig 6.9-9.7 bar
80/27	170-230 psig 11.7-15.9 bar	105-165 psig 7.2-11.4 bar
90/32	190-250 psig 13.1-17.2 bar	110-175 psig 7.6-12.1 bar
100/38	280-340 psig 19.3-23.4 bar	160-220 psig 11.0-15.2 bar
110/43	320-360 psig 22.1-24.8 bar	190-235 psig 13.1-16.2 bar

KT0400W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	10.0-11.7	9.9-11.6	11.7-13.7	1.0-2.5
80/27	10.9-12.7	11.7-13.7	12.5-14.5	
90/32	11.1-12.9	12.1-14.1	12.7-14.8	
100/38	11.2-13.1	12.7-14.8	13.8-16.1	
110/43	11.7-13.7	13.3-15.5	14.6-16.9	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	425 lbs 193 kgs	430 lbs 195 kgs	370 lbs 168 kgs
80/27	395 lbs 179 kgs	370 lbs 168 kgs	350 lbs 159 kgs
90/32	390 lbs 177 kgs	360 lbs 163 kgs	345 lbs 156 kgs
100/38	385 lbs 175 kgs	345 lbs 156 kgs	320 lbs 145 kgs
110/43	370 lbs 168 kgs	330 lbs 150 kgs	305 lbs 138 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.77 kg)
Water regulating valve set to maintain 320 PSIG discharge pressure
Condenser Water usage per 100 lbs ice = 170 gal (45 kg = 644 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	315-330 psig 21.7-22.8 bar	60-34 psig 4.1-2.3 bar
70/21	315-330 psig 21.7-22.8 bar	60-34 psig 4.1-2.3 bar
80/27	315-330 psig 21.7-22.8 bar	60-34 psig 4.1-2.3 bar
90/32	315-330 psig 21.7-22.8 bar	60-34 psig 4.1-2.3 bar
100/38	315-335 psig 21.7-23.1 bar	60-34 psig 4.1-2.3 bar
110/43	315-340 psig 21.7-23.4 bar	65-36 psig 4.5-2.5 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar
70/21	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar
80/27	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar
90/32	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar
100/38	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar
110/43	150-210 psig 10.3-14.5 bar	110-150 psig 7.6-10.3 bar

K0420A SELF-CONTAINED AIR-COOLED

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	
70/21	11.7-13.7	12.5-14.5	13.6-15.8	1.0-2.5
80/27	12.9-15.0	13.8-16.1	15.4-17.9	
90/32	14.0-16.3	14.6-16.9	16.6-19.3	
100/38	15.7-18.2	17.0-19.7	18.1-21.0	
110/43	17.7-20.5	18.9-21.9	20.3-23.5	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	370 lbs 168 kgs	350 lbs 159 kgs	325 lbs 147 kgs
80/27	340 lbs 154 kgs	320 lbs 145 kgs	290 lbs 132 kgs
90/32	315 lbs 143 kgs	305 lbs 138 kgs	270 lbs 122 kgs
100/38	285 lbs 129 kgs	265 lbs 120 kgs	250 lbs 113 kgs
110/43	255 lbs 116 kgs	240 lbs 109 kgs	225 lbs 102 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.79 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	275-360 psig 19.0-24.8 bar	60-31 psig 4.1-2.1 bar
70/21	290-380 psig 20.0-26.2 bar	65-32 psig 4.5-2.2 bar
80/27	300-390 psig 20.7-26.9 bar	65-33 psig 4.5-2.3 bar
90/32	330-400 psig 22.8-27.6 bar	70-34 psig 4.8-2.3 bar
100/38	400-500 psig 27.6-34.5 bar	80-34 psig 5.5-2.3 bar
110/43	430-520 psig 29.6-35.9 bar	95-34 psig 6.6-2.3 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	180-220 psig 12.4-15.2 bar	130-160 psig 9.0-11.0 bar
70/21	200-220 psig 13.8-15.2 bar	140-160 psig 9.7-11.0 bar
80/27	215-235 psig 14.8-16.2 bar	150-170 psig 10.3-11.7 bar
90/32	235-245 psig 16.2-16.9 bar	160-180 psig 11.0-12.4 bar
100/38	355-370 psig 24.5-25.5 bar	240-270 psig 16.5-18.6 bar
110/43	370-375 psig 25.5-25.9 bar	255-275 psig 17.6-19.0 bar

K0420W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	11.7-13.7	11.2-15.2	12.7-13.5	1.0-2.5
80/27	13.1-14.0	14.6-15.5	12.9-17.7	
90/32	13.3-14.2	11.7-15.8	13.1-18.1	
100/38	13.1-14.9	15.1-17.5	17.3-18.4	
110/43	14.0-15.0	15.4-16.4	17.7-18.8	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	370 lbs 168 kgs	310 lbs 141 kgs	275 lbs 125 kgs
80/27	335 lbs 152 kgs	305 lbs 138 kgs	270 lbs 122 kgs
90/32	330 lbs 150 kgs	300 lbs 136 kgs	265 lbs 120 kgs
100/38	320 lbs 145 kgs	295 lbs 134 kgs	260 lbs 118 kgs
110/43	315 lbs 143 kgs	290 lbs 132 kgs	255 lbs 116 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.79 kg)
Water regulating valve set to maintain 320 PSIG discharge pressure
Condenser Water usage per 100 lbs ice = 170 gal (45 kg = 644 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	325-335 psig 22.4-23.1 bar	70-31 psig 4.8-2.1 bar
70/21	325-335 psig 22.4-23.1 bar	70-31 psig 4.8-2.1 bar
80/27	325-335 psig 22.4-23.1 bar	70-31 psig 4.8-2.1 bar
90/32	325-335 psig 22.4-23.1 bar	75-31 psig 5.2-2.1 bar
100/38	325-345 psig 22.4-23.8 bar	80-31 psig 5.5-2.1 bar
110/43	325-350 psig 22.4-24.1 bar	80-31 psig 5.5-2.1 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	155-230 psig 10.7-15.9 bar	110-165 psig 7.6-11.4 bar
70/21	155-235 psig 10.7-16.2 bar	110-170 psig 7.6-11.7 bar
80/27	160-240 psig 11.0-16.5 bar	110-170 psig 7.6-11.7 bar
90/32	160-245 psig 11.0-16.9 bar	110-175 psig 7.6-12.1 bar
100/38	160-245 psig 11.0-16.9 bar	115-180 psig 7.9-12.4 bar
110/43	160-245 psig 11.0-16.9 bar	115-180 psig 7.9-12.4 bar

KP0420A SELF-CONTAINED AIR-COOLED

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	
70/21	9.5 - 11.5	10.2 - 12.2	12.5 - 14.5	1.0-2.5
80/27	10.1 - 11.9	11.1 - 13.1	14.0 - 16.0	
90/32	11.0 - 13.0	12.5 - 14.5	14.7 - 17.2	
100/38	12.0 - 14.0	14.0 - 16.5	16.0 - 19.0	
110/43	14.2 - 16.2	15.5 - 18.0	17.0 - 19.5	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	430 lbs 190 kgs	395 lbs 179 kgs	360 lbs 163 kgs
80/27	420 lbs 190 kgs	385 lbs 175 kgs	335 lbs 152 kgs
90/32	390 lbs 177 kgs	375 lbs 170 kgs	310 lbs 141 kgs
100/38	355 lbs 161 kgs	335 lbs 152 kgs	300 lbs 136 kgs
110/43	320 lbs 145 kgs	300 lbs 136 kgs	285 lbs 129 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.77 kg)

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	140 - 200 psig (9.7 - 13.8 bar)	36 - 16 psig (2.5 - 1.1 bar)
70/21	150 - 205 psig (10.3 - 14.1 bar)	38 - 18 psig (2.6 - 1.2 bar)
80/27	160 - 210 psig (11.0 - 14.5 bar)	42 -20 psig (2.9 - 1.4 bar)
90/32	185 - 215 psig (12.8 - 14.8bar)	46 - 20 psig (3.2 - 1.4 bar)
100/38	190 - 240 psig (13.1 - 16.5 bar)	48 - 22 psig (3.3 - 1.5 bar)
110/43	240 - 270 psig (16.5 - 18.6 bar)	50 - 22 psig (3.4 - 1.5 bar)

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	90 - 105 psig (6.2 - 7.2 bar)	60 - 70 psig (4.1 - 4.8 bar)
70/21	95 - 115 psig (6.5 - 7.9 bar)	65 - 75 psig (4.5 - 5.2 bar)
80/27	105 - 120 psig (7.2 - 8.3 bar)	75 - 90 psig (5.2 - 6.2 bar)
90/32	105 - 120 psig (7.2 - 8.3 bar)	75 - 90 psig (5.2 - 6.2 bar)
100/38	110 - 135 psig (7.6 - 9.3 bar)	80 - 95 psig (5.5 - 6.5 bar)
110/43	120 -145 psig (8.3 -10.0 bar)	85 - 110 psig (5.9 - 7.6 bar)

KP0420W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	10.0 - 11.5	10.2 - 11.7	11.7 - 13.7	1.0-2.5
80/27	10.5 - 12.5	11.5 - 13.5	12.5 - 14.5	
90/32	11.0 - 12.8	12.0 - 14.0	12.5 - 14.7	
100/38	11.2 - 13.0	12.5 - 14.7	13.2 - 16.0	
110/43	11.5 - 13.5	13.0 - 15.5	14.5 - 16.8	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	450 lbs 204 kgs	435 lbs 197 kgs	390 lbs 177 kgs
80/27	425 lbs 193 kgs	430 lbs 195 kgs	360 lbs 163 kgs
90/32	420 lbs 190 kgs	425 lbs 193 kgs	345 lbs 156 kgs
100/38	400 lbs 181 kgs	390 lbs 177 kgs	330 lbs 150 kgs
110/43	390 lbs 177 kgs	350 lbs 159 kgs	325 lbs 147 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.77 kg)
Water regulating valve set to maintain 170 PSIG Condenser Water
Usage per 100 lbs (45 kg) ice =

Half-dice: 128.6 gallons (487 liters), Dice: 119.4 gallons (452 liters)

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	175 - 185 psig (12.1 - 12.8 bar)	35 - 12 psig (2.4 - 0.8 bar)
70/21	175 - 185 psig (12.1 - 12.8 bar)	38 - 15 psig (2.6 - 1.0 bar)
80/27	175 - 185 psig (12.1 - 12.8 bar)	39 - 16 psig (2.7 - 1.1 bar)
90/32	180 - 190 psig (12.4 - 13.1 bar)	40 - 18 psig (2.8 - 1.2 bar)
100/38	180 - 190 psig (12.4 - 13.1 bar)	42 -20 psig (2.9 - 1.4 bar)
110/43	185 - 195 psig (12.8 - 13.4 bar)	45 -20 psig (3.1 -1.4 bar)

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	90 - 110 psig (6.2 - 7.6 bar)	52 - 75 psig (3.6 - 5.2 bar)
70/21	95 - 115 psig (6.5 - 7.9 bar)	55 - 75 psig (3.8 - 5.2 bar)
80/27	95 - 115 psig (6.5 - 7.9 bar)	55 - 75 psig (3.8 - 5.2 bar)
90/32	100 - 120 psig (6.9 - 8.3 bar)	60 - 75 psig (4.1 - 5.2 bar)
100/38	100 - 120 psig (6.9 - 8.3 bar)	60 - 75 psig (4.1 - 5.2 bar)
110/43	100 - 125 psig (6.9 - 8.6 bar)	65 - 75 psig (4.5 - 5.2 bar)

KT0420A SELF-CONTAINED AIR-COOLED

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	
70/21	9.6-11.3	10.4-12.2	12.5-14.5	1.0-2.5
80/27	10.2-11.9	11.2-13.1	14.0-16.3	
90/32	11.1-12.9	12.5-14.5	14.8-17.2	
100/38	12.1-14.1	14.3-16.6	16.3-18.9	
110/43	14.0-16.3	15.7-18.2	17.0-19.7	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	440 lbs 200 kgs	410 lbs 186 kgs	350 lbs 159 kgs
80/27	420 lbs 191 kgs	385 lbs 175 kgs	315 lbs 143 kgs
90/32	390 lbs 177 kgs	350 lbs 159 kgs	300 lbs 136 kgs
100/38	360 lbs 163 kgs	310 lbs 141 kgs	275 lbs 125 kgs
110/43	315 lbs 143 kgs	285 lbs 129 kgs	265 lbs 120 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.77 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	275-360 psig 19.0-24.8 bar	60-31 psig 4.1-2.1 bar
70/21	290-380 psig 20.0-26.2 bar	65-32 psig 4.5-2.2 bar
80/27	300-390 psig 20.7-26.9 bar	65-33 psig 4.5-2.3 bar
90/32	330-400 psig 22.8-27.6 bar	70-34 psig 4.8-2.3 bar
100/38	400-500 psig 27.6-34.5 bar	80-34 psig 5.5-2.3 bar
110/43	430-520 psig 29.6-35.9 bar	95-34 psig 6.6-2.3 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	180-220 psig 12.4-15.2 bar	130-160 psig 9.0-11.0 bar
70/21	200-220 psig 13.8-15.2 bar	140-160 psig 9.7-11.0 bar
80/27	215-235 psig 14.8-16.2 bar	150-170 psig 10.3-11.7 bar
90/32	235-245 psig 16.2-16.9 bar	160-180 psig 11.0-12.4 bar
100/38	355-370 psig 24.5-25.5 bar	240-270 psig 16.5-18.6 bar
110/43	370-375 psig 25.5-25.9 bar	255-275 psig 17.6-19.0 bar

KT0420W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	10.0-11.7	9.9-11.6	11.7-13.7	1.0-2.5
80/27	10.9-12.7	11.7-13.7	12.5-14.5	
90/32	11.1-12.9	12.1-14.1	12.7-14.8	
100/38	11.2-13.1	12.7-14.8	13.8-16.1	
110/43	11.7-13.7	13.3-15.5	14.6-16.9	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	425 lbs 193 kgs	430 lbs 195 kgs	370 lbs 168 kgs
80/27	395 lbs 179 kgs	370 lbs 168 kgs	350 lbs 159 kgs
90/32	390 lbs 177 kgs	360 lbs 163 kgs	345 lbs 156 kgs
100/38	385 lbs 175 kgs	345 lbs 156 kgs	320 lbs 145 kgs
110/43	370 lbs 168 kgs	330 lbs 150 kgs	305 lbs 138 kgs

Based on average ice slab weight of 3.40 – 3.90 lb (1.54 – 1.77 kg)
Water regulating valve set to maintain 330 PSIG discharge pressure
Condenser Water usage per 100 lbs ice =170 gal (45 kg = 644 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	325-335 psig 22.4-23.1 bar	70-31 psig 4.8-2.1 bar
70/21	325-335 psig 22.4-23.1 bar	70-31 psig 4.8-2.1 bar
80/27	325-335 psig 22.4-23.1 bar	70-31 psig 4.8-2.1 bar
90/32	325-335 psig 22.4-23.1 bar	75-31 psig 5.2-2.1 bar
100/38	325-345 psig 22.4-23.8 bar	80-31 psig 5.5-2.1 bar
110/43	325-350 psig 22.4-24.1 bar	80-31 psig 5.5-2.1 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	155-230 psig 10.7-15.9 bar	110-165 psig 7.6-11.4 bar
70/21	155-235 psig 10.7-16.2 bar	110-170 psig 7.6-11.7 bar
80/27	160-240 psig 11.0-16.5 bar	110-170 psig 7.6-11.7 bar
90/32	160-245 psig 11.0-16.9 bar	110-175 psig 7.6-12.1 bar
100/38	160-245 psig 11.0-16.9 bar	115-180 psig 7.9-12.4 bar
110/43	160-245 psig 11.0-16.9 bar	115-180 psig 7.9-12.4 bar

K0500A SELF-CONTAINED AIR-COOLED

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	
70/21	11.9-13.6	14.1-16.1	15.7-17.9	1.0-2.5
80/27	13.6-15.5	15.1-17.2	16.6-19.0	
90/32	14.9-17.0	15.5-17.7	17.7-20.2	
100/38	16.6-19.0	18.3-20.9	20.2-23.1	
110/43	18.9-21.5	19.5-22.3	20.6-23.5	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	495 lbs 225 kgs	425 lbs 193 kgs	385 lbs 175 kgs
80/27	440 lbs 200 kgs	400 lbs 181 kgs	365 lbs 166 kgs
90/32	405 lbs 184 kgs	390 lbs 177 kgs	345 lbs 156 kgs
100/38	365 lbs 166 kgs	335 lbs 152 kgs	305 lbs 138 kgs
110/43	325 lbs 147 kgs	315 lbs 143 kgs	300 lbs 136 kgs

Based on average ice slab weight of 4.6 – 5.2 lb (2.1 – 2.36 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	260-325 psig 17.9-22.4 bar	60-36 psig 4.1-2.5 bar
70/21	270-340 psig 18.6-23.4 bar	65-37 psig 4.5-2.6 bar
80/27	275-380 psig 19.0-26.2 bar	65-37 psig 4.5-2.6 bar
90/32	340-400 psig 23.4-27.6 bar	75-38 psig 5.2-2.6 bar
100/38	380-500 psig 26.2-34.5 bar	80-42 psig 5.5-2.9 bar
110/43	440-520 psig 30.3-35.9 bar	80-44 psig 5.5-3.0 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	140-175 psig 9.7-12.1 bar	100-120 psig 6.9-8.3 bar
70/21	150-185 psig 10.3-12.8 bar	105-130 psig 7.2-9.0 bar
80/27	165-200 psig 11.4-13.8 bar	110-150 psig 7.6-10.3 bar
90/32	190-220 psig 13.1-15.2 bar	130-160 psig 9.0-11.0 bar
100/38	280-320 psig 19.3-22.1 bar	180-235 psig 12.4-16.2 bar
110/43	290-330 psig 20.0-22.8 bar	185-240 psig 12.8-16.5 bar

K0500W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	10.7-13.7	13.6-15.5	15.7-17.7	1.0-2.5
80/27	12.0-13.8	13.7-15.7	15.5-17.9	
90/32	12.4-14.3	13.9-15.9	16.4-18.7	
100/38	12.7-14.6	14.5-16.5	16.6-19.0	
110/43	13.1-15.0	14.7-16.8	16.9-19.3	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	545 lbs 247 kgs	440 lbs 200 kgs	390 lbs 177 kgs
80/27	490 lbs 222 kgs	435 lbs 197 kgs	385 lbs 175 kgs
90/32	475 lbs 215 kgs	430 lbs 195 kgs	370 lbs 168 kgs
100/38	465 lbs 211 kgs	415 lbs 188 kgs	365 lbs 166 kgs
110/43	455 lbs 206 kgs	410 lbs 186 kgs	360 lbs 163 kgs

Based on average ice slab weight of 4.6 – 5.2 lb (2.1– 2.4 kg)
Water regulating valve set to maintain 330 PSI discharge pressure
Condenser Water usage per 100 lbs ice = 160 gal (45 kg = 606 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	325-335 psig 22.4-23.1 bar	70-38 psig 4.8-2.6 bar
70/21	325-335 psig 22.4-23.1 bar	70-39 psig 4.8-2.7 bar
80/27	325-335 psig 22.4-23.1 bar	75-39 psig 5.2-2.7 bar
90/32	325-340 psig 22.4-23.4 bar	80-39 psig 5.5-2.7 bar
100/38	325-340 psig 22.4-23.4 bar	80-39 psig 5.5-2.7 bar
110/43	325-345 psig 22.4-23.8 bar	80-39 psig 5.5-2.7 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	145-175 psig 10.0-12.1 bar	105-130 psig 7.2-9.0 bar
70/21	150-180 psig 10.3-12.4 bar	110-135 psig 7.6-9.3 bar
80/27	150-185 psig 10.3-12.8 bar	110-135 psig 7.6-9.3 bar
90/32	150-190 psig 10.3-13.1 bar	110-135 psig 7.6-9.3 bar
100/38	150-190 psig 10.3-13.1 bar	110-135 psig 7.6-9.3 bar
110/43	150-190 psig 10.3-13.1 bar	110-135 psig 7.6-9.3 bar

KP0500A SELF-CONTAINED AIR-COOLED

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	
70/21	11.7 - 13.3	13.2 - 15.0	14.5 - 16.0	1.0-2.5
80/27	12.3 - 14.1	14.5 - 16.5	14.8 - 16.4	
90/32	12.4 - 14.3	15.1 - 17.2	15.5 - 18.0	
100/38	12.6 - 14.4	15.5 - 17.7	16.0 - 18.0	
110/43	15.0 - 17.0	15.9 - 18.2	17.5 - 19.0	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	500 lbs 227 kgs	465 lbs 211 kgs	435 lbs 197 kgs
80/27	480 lbs 218 kgs	445 lbs 202 kgs	420 lbs 190 kgs
90/32	460 lbs 209 kgs	425 lbs 193 kgs	405 lbs 184 kgs
100/38	450 lbs 204 kgs	415 lbs 188 kgs	390 lbs 177 kgs
110/43	430 lbs 195 kgs	400 lbs 181 kgs	370 lbs 168 kgs

Based on average ice slab weight of 4.125 – 4.75 lb (1.87 – 2.15 kg)

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	150 -200 psig (10.3 -13.8 bar)	34 - 7 psig (2.3 - 0.5 bar)
70/21	150 - 200 psig (10.3 - 13.8 bar)	34 - 8 psig (2.3 - 0.6 bar)
80/27	165 - 185 psig (11.4 - 12.8 bar)	36 - 11 psig (2.5 - 0.8 bar)
90/32	165 - 185 psig (11.4 - 12.8 bar)	38 - 13 psig (2.6 - 0.9 bar)
100/38	170 - 190 psig (11.4 - 12.8 bar)	40 - 15 psig (2.7 - 1.0 bar)
110/43	175 - 200 psig (11.4 - 12.8 bar)	42 - 18 psig (2.9 - 1.2 bar)

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	70 - 100 psig (4.8 - 6.9 bar)	50 - 75 psig (3.4 - 5.2 bar)
70/21	70 - 100 psig (4.8 - 6.9 bar)	50 - 75 psig (3.4 - 5.2 bar)
80/27	95 - 110 psig (6.5 -7.6 bar)	55 - 75 psig (3.8 - 5.2 bar)
90/32	95 - 110 psig (6.5 -7.6 bar)	58 - 78 psig (4.0 - 5.4 bar)
100/38	95 - 110 psig (6.5 -7.6 bar)	60 - 80 psig (4.1 - 5.5 bar)
110/43	100 - 120 psig (6.9 - 8.3 bar)	61 - 85 psig (4.5 - 5.9 bar)

KP0500W SELF-CONTAINED WATER-COOLED

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	10.8 - 12.0	11.5 - 12.9	12.7 - 14.1	1.0-2.5
80/27	11.2 - 12.3	12.1 - 13.1	12.9 - 14.3	
90/32	11.8 - 12.9	12.2 - 13.3	13.1 - 14.6	
100/38	12.4 - 14.2	12.7 - 13.5	13.4 - 14.9	
110/43	12.9 - 14.8	13.3 - 15.6	13.7 - 15.4	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	500 lbs 227 kgs	460 lbs 209 kgs	420 lbs 190 kgs
80/27	495 lbs 224 kgs	455 lbs 206 kgs	415 lbs 188 kgs
90/32	490 lbs 222 kgs	450 lbs 204 kgs	410 lbs 186 kgs
100/38	480 lbs 218 kgs	445 lbs 202 kgs	405 lbs 184 kgs
110/43	475 lbs 215 kgs	440 lbs 200 kgs	400 lbs 181 kgs

Based on average ice slab weight of 4.125 – 4.75 lb (1.87 – 2.15 kg)
Water regulating valve set to maintain 330 PSI discharge pressure
Condenser Water usage per 100 lbs ice = 160 gal (45 kg = 606 L)

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	165 - 185 psig (11.4 - 12.8 bar)	38 - 16 psig (2.6 - 1.1 bar)
70/21	165 - 185 psig (11.4 - 12.8 bar)	38 - 17 psig (2.6 - 1.2 bar)
80/27	165 - 185 psig (11.4 - 12.8 bar)	40 - 19 psig (2.8 - 1.3 bar)
90/32	165 - 185 psig (11.4 - 12.8 bar)	40 - 19 psig (2.8 - 1.3 bar)
100/38	170 - 190 psig (11.7 - 13.1 bar)	43 - 20 psig (3.0 - 1.4 bar)
110/43	175 - 200 psig (12.1 - 13.8 bar)	43 - 20 psig (3.0 - 1.4 bar)

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	75 - 90 psig (5.2 - 6.2 bar)	55 - 70 psig (3.8 - 4.8 bar)
70/21	75 - 90 psig (5.2 - 6.2 bar)	55 - 70 psig (3.8 - 4.8 bar)
80/27	80 - 110 psig (5.5 - 7.6 bar)	58 - 72 psig (4.0 - 5.0 bar)
90/32	80 - 100 psig (5.5 - 6.9 bar)	60 - 70 psig (4.1 - 4.8 bar)
100/38	85 - 110 psig (5.9 - 7.6 bar)	65 - 75 psig (4.5 - 5.2 bar)
110/43	85 - 110 psig (5.9 - 7.6 bar)	65 - 75 psig (4.5 - 5.2 bar)

KT0500A SELF-CONTAINED AIR-COOLED

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	
70/21	10.0-11.8	12.5-14.6	13.4-15.6	1.0-2.5
80/27	11.7-13.7	12.6-14.8	14.3-16.7	
90/32	12.6-14.8	15.5-17.7	15.5-18.0	
100/38	13.9-16.3	15.5-18.0	16.8-19.5	
110/43	14.8-17.2	16.8-19.5	18.3-21.3	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	515 lbs 234 kgs	425 lbs 193 kgs	400 lbs 181 kgs
80/27	450 lbs 204 kgs	420 lbs 191 kgs	375 lbs 170 kgs
90/32	420 lbs 191 kgs	400 lbs 181 kgs	350 lbs 159 kgs
100/38	385 lbs 175 kgs	350 lbs 159 kgs	325 lbs 147 kgs
110/43	365 lbs 166 kgs	325 lbs 147 kgs	300 lbs 136 kgs

Based on average ice slab weight of 4.125 – 4.75 lb (1.87 – 2.15 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	260-325 psig 17.9-22.4 bar	60-36 psig 4.1-2.5 bar
70/21	270-340 psig 18.6-23.4 bar	65-37 psig 4.5-2.6 bar
80/27	275-380 psig 19.0-26.2 bar	65-37 psig 4.5-2.6 bar
90/32	340-400 psig 23.4-27.6 bar	75-38 psig 5.2-2.6 bar
100/38	380-500 psig 26.2-34.5 bar	80-42 psig 5.5-2.9 bar
110/43	440-520 psig 30.3-35.9 bar	80-44 psig 5.5-3.0 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	140-175 psig 9.7-12.1 bar	100-120 psig 6.9-8.3 bar
70/21	150-185 psig 10.3-12.8 bar	105-130 psig 7.2-9.0 bar
80/27	165-200 psig 11.4-13.8 bar	110-150 psig 7.6-10.3 bar
90/32	190-220 psig 13.1-15.2 bar	130-160 psig 9.0-11.0 bar
100/38	280-320 psig 19.3-22.1 bar	180-235 psig 12.4-16.2 bar
110/43	290-330 psig 20.0-22.8 bar	185-240 psig 12.8-16.5 bar

KT0500W SELF-CONTAINED WATER-COOLED

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	9.7-11.4	12.0-14.0	13.0-15.2	1.0-2.5
80/27	12.0-13.8	13.7-15.7	15.5-17.9	
90/32	12.4-14.3	12.6-14.8	16.4-18.7	
100/38	12.7-14.6	14.5-16.5	16.6-19.0	
110/43	13.1-15.0	14.7-16.8	16.9-19.3	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	530 lbs 240 kgs	440 lbs 200 kgs	410 lbs 186 kgs
80/27	490 lbs 222 kgs	435 lbs 197 kgs	385 lbs 175 kgs
90/32	475 lbs 215 kgs	420 lbs 191 kgs	370 lbs 168 kgs
100/38	465 lbs 211 kgs	415 lbs 188 kgs	365 lbs 166 kgs
110/43	455 lbs 206 kgs	410 lbs 186 kgs	360 lbs 163 kgs

Based on average ice slab weight of 4.125 – 4.75 lb (1.87 – 2.15 kg)
Water regulating valve set to maintain 330 PSI discharge pressure
Condenser Water usage per 100 lbs ice = 160 gal (45 kg = 606 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	325-335 psig 22.4-23.1 bar	70-38 psig 4.8-2.6 bar
70/21	325-335 psig 22.4-23.1 bar	70-39 psig 4.8-2.7 bar
80/27	325-335 psig 22.4-23.1 bar	75-39 psig 5.2-2.7 bar
90/32	325-340 psig 22.4-23.4 bar	80-39 psig 5.5-2.7 bar
100/38	325-340 psig 22.4-23.4 bar	80-39 psig 5.5-2.7 bar
110/43	325-345 psig 22.4-23.8 bar	80-39 psig 5.5-2.7 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	145-175 psig 10.0-12.1 bar	105-130 psig 7.2-9.0 bar
70/21	150-180 psig 10.3-12.4 bar	110-135 psig 7.6-9.3 bar
80/27	150-185 psig 10.3-12.8 bar	110-135 psig 7.6-9.3 bar
90/32	150-190 psig 10.3-13.1 bar	110-135 psig 7.6-9.3 bar
100/38	150-190 psig 10.3-13.1 bar	110-135 psig 7.6-9.3 bar
110/43	150-190 psig 10.3-13.1 bar	110-135 psig 7.6-9.3 bar

K0600A SELF-CONTAINED AIR-COOLED

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	
70/21	8.5-11.0	11.5-13.2	12.4-14.3	1.0-2.5
80/27	10.5-12.1	12.0-13.8	12.7-14.6	
90/32	11.7-13.5	12.2-13.9	13.9-15.9	
100/38	12.9-14.8	13.2-15.1	14.1-16.1	
110/43	13.6-15.5	14.1-16.1	14.5-16.5	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	600 lbs 272 kgs	510 lbs 231 kgs	475 lbs 215 kgs
80/27	550 lbs 249 kgs	490 lbs 222 kgs	465 lbs 211 kgs
90/32	500 lbs 227 kgs	485 lbs 220 kgs	430 lbs 195 kgs
100/38	460 lbs 209 kgs	450 lbs 204 kgs	425 lbs 193 kgs
110/43	440 lbs 200 kgs	425 lbs 193 kgs	415 lbs 188 kgs

Based on average ice slab weight of 4.6 – 5.2 lb (2.1 – 2.4 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	260-325 psig 17.9-22.4 bar	60-28 psig 4.1-1.9 bar
70/21	275-350 psig 19.0-24.1 bar	65-30 psig 4.5-2.1 bar
80/27	275-380 psig 19.0-26.2 bar	70-31 psig 4.8-2.1 bar
90/32	350-415 psig 24.1-28.6 bar	75-35 psig 5.2-2.4 bar
100/38	380-520 psig 26.2-35.9 bar	80-36 psig 5.5-2.5 bar
110/43	440-540 psig 30.3-37.2 bar	80-36 psig 5.5-2.5 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	140-175 psig 9.7-12.1 bar	90-120 psig 6.2-8.3 bar
70/21	165-200 psig 11.4-13.8 bar	100-130 psig 6.9-9.0 bar
80/27	165-210 psig 11.4-14.5 bar	105-150 psig 7.2-10.3 bar
90/32	310-370 psig 21.4-25.5 bar	170-215 psig 11.7-14.8 bar
100/38	310-375 psig 21.4-25.9 bar	170-235 psig 11.7-16.2 bar
110/43	310-375 psig 21.4-25.9 bar	170-225 psig 11.7-15.5 bar

K0600W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	9.5-11.0	10.9-12.5	11.5-13.2	1.0-2.5
80/27	9.8-11.3	11.1-12.8	11.7-13.5	
90/32	10.9-12.5	11.2-12.9	12.7-14.6	
100/38	11.9-13.6	12.2-13.9	12.9-14.8	
110/43	12.4-14.3	12.9-14.8	13.2-15.1	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	600 lbs 272 kgs	535 lbs 243 kgs	510 lbs 231 kgs
80/27	585 lbs 265 kgs	525 lbs 238 kgs	500 lbs 227 kgs
90/32	535 lbs 243 kgs	520 lbs 236 kgs	465 lbs 211 kgs
100/38	495 lbs 225 kgs	485 lbs 220 kgs	460 lbs 209 kgs
110/43	475 lbs 215 kgs	460 lbs 209 kgs	450 lbs 204 kgs

Based on average ice slab weight of 4.6 – 5.2 lb (2.1 – 2.4 kg)
Water regulating valve set to maintain 320 PSI discharge pressure
Condenser Water usage per 100 lbs ice = 170 gal (45 kg = 644 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	315-325 psig 21.7-22.4 bar	55-31 psig 3.8-2.1 bar
70/21	315-325 psig 21.7-22.4 bar	55-32 psig 3.8-2.2 bar
80/27	315-325 psig 21.7-22.4 bar	60-32 psig 4.1-2.2 bar
90/32	315-325 psig 21.7-22.4 bar	65-32 psig 4.5-2.2 bar
100/38	315-325 psig 21.7-22.4 bar	65-32 psig 4.5-2.2 bar
110/43	315-325 psig 21.7-22.4 bar	65-32 psig 4.5-2.2 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	160-210 psig 11.0-14.5 bar	100-135 psig 6.9-9.3 bar
70/21	180-225 psig 12.4-15.5 bar	100-140 psig 6.9-9.7 bar
80/27	180-230 psig 12.4-15.9 bar	105-140 psig 7.2-9.7 bar
90/32	180-230 psig 12.4-15.9 bar	105-140 psig 7.2-9.7 bar
100/38	180-230 psig 12.4-15.9 bar	105-140 psig 7.2-9.7 bar
110/43	180-230 psig 12.4-15.9 bar	105-140 psig 7.2-9.7 bar

KP0700A SELF-CONTAINED AIR-COOLED

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	
70/21	7.1 - 8.5	8.6 - 10.2	9.5 - 11.0	1.0-2.5
80/27	8.0 - 9.2	9.0 - 10.7	10.5 - 12.3	
90/32	8.8 - 10.5	9.5 - 11.3	11.5 - 13.7	
100/38	9.8 - 11.5	11.0 - 12.7	13.5 - 15.6	
110/43	11.9 - 13.2	12.4 - 14.2	14.0 - 16.0	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	725 lbs 329 kgs	620 lbs 281 kgs	530 lbs 240 kgs
80/27	675 lbs 306 kgs	600 lbs 272 kgs	500 lbs 227 kgs
90/32	625 lbs 283 kgs	585 lbs 265 kgs	470 lbs 213 kgs
100/38	550 lbs 249 kgs	510 lbs 231 kgs	440 lbs 200 lbs
110/43	470 lbs 213 kgs	440 lbs 200 kgs	415 lbs 188 kgs

Based on average ice slab weight of 4.125 – 4.75 lb (1.87 – 2.15 kg)

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	145 - 200 psig (10.0 - 13.8 bar)	37-15 psig (2.6-1.0 bar)
70/21	150 - 210 psig (10.3 - 14.5 bar)	38-16 psig (2.6-1.1 bar)
80/27	160 -215 psig (11.0 - 14.8 bar)	40-18 psig (2.8-1.2 bar)
90/32	180 - 220 psig (12.4 - 15.2 bar)	43-20 psig (3.0-1.4 bar)
100/38	215 - 280 psig (14.8 - 19.3 bar)	48-20 psig (3.3-1.4 bar)
110/43	250 - 300 psig (17.2 - 20.7 bar)	55-22 psig (3.8-1.5 bar)

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	85 - 110 psig (5.9 - 7.6 bar)	50 - 60 psig (3.4 - 4.1 bar)
70/21	86 - 110 psig (5.9 - 7.6 bar)	52 - 62 psig (3.6 - 4.3 bar)
80/27	95 - 110 psig (6.5. - 7.6 bar)	52 - 64 psig (3.6 - 4.4 bar)
90/32	100 - 120 psig (6.5. - 7.6 bar)	55 - 68 psig (3.8 - 4.7 bar)
100/38	110 - 120 psig (6.5. - 7.6 bar)	60 - 70 psig (4.1 - 5.8 bar)
110/43	120 - 150 psig (6.5. - 7.6 bar)	65 - 75 psig (4.5 - 5.2 bar)

KP0700W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	7.6 - 8.5	8.1 - 10.0	10.8 - 11.4	1.0-2.5
80/27	7.8 - 9.1	8.7 - 10.3	9.7 - 11.5	
90/32	8.1 - 9.4	9.4 - 10.8	10.1 - 11.8	
100/38	8.4 - 9.8	9.8 - 11.4	10.2 - 12.0	
110/43	8.8 - 10.5	10.2 - 12.2	11.6 - 12.6	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	710 lbs 322 kgs	610 lbs 277 kgs	515 lbs 234 kgs
80/27	675 lbs 306 kgs	590 lbs 268 kgs	505 lbs 229 kgs
90/32	640 lbs 290 kgs	585 lbs 265 kgs	495 lbs 224 kgs
100/38	605 lbs 274 kgs	555 lbs 252 kgs	485 lbs 220 kgs
110/43	570 lbs 259 kgs	525 lbs 238 kgs	475 lbs 215 kgs

Based on average ice slab weight of 4.125 – 4.75 lb (1.87 – 2.15 kg)
Water regulating valve set to maintain 170 PSI discharge pressure
Condenser Water usage per 100 lbs ice = 125 gal (45 kg = 473 L)

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	175 - 185 psig (12.1 - 12.8 bar)	31-15 psig (2.1-1.0 bar)
70/21	176 - 185 psig (12.1 - 12.8 bar)	34-15 psig (2.3-1.1 bar)
80/27	177 - 185 psig (12.1 - 12.8 bar)	36-16 psig (2.5-1.2 bar)
90/32	180 - 190 psig (12.4 - 13.1 bar)	37-17 psig (2.6-1.2 bar)
100/38	181 - 190 psig (12.4 - 13.1 bar)	38-17 psig (2.6-1.2 bar)
110/43	182 - 190 psig (12.4 - 13.1 bar)	40-17 psig (2.8-1.2 bar)

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	85 - 115 psig (5.9 - 7.9 bar)	50 - 60 psig (3.4 - 4.1 bar)
70/21	85 - 115 psig (5.9 - 7.9 bar)	52 - 62 psig (3.6 - 4.3 bar)
80/27	85 - 115 psig (5.9 - 7.9 bar)	52 - 64 psig (3.6 - 4.4 bar)
90/32	85 - 115 psig (5.9 - 7.9 bar)	55 - 68 psig (3.8 - 4.7 bar)
100/38	90 - 120 psig (6.5. - 7.6 bar)	60 - 70 psig (4.1 - 5.8 bar)
110/43	90 - 120 psig (6.5. - 7.6 bar)	65 - 75 psig (4.5 - 5.2 bar)

KT0700A SELF-CONTAINED AIR-COOLED

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	
70/21	7.3-8.6	8.7-10.2	9.3-10.9	1.0-2.5
80/27	8.0-9.4	9.2-10.8	10.4-12.2	
90/32	8.8-10.4	9.7-11.4	11.7-13.7	
100/38	9.8-11.5	10.9-12.8	13.4-15.6	
110/43	11.0-12.9	12.3-14.4	14.3-16.7	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	675 lbs 306 kgs	585 lbs 265 kgs	550 lbs 249 kgs
80/27	625 lbs 283 kgs	555 lbs 252 kgs	500 lbs 227 kgs
90/32	575 lbs 261 kgs	530 lbs 240 kgs	450 lbs 204 kgs
100/38	525 lbs 238 kgs	480 lbs 218 kgs	400 lbs 181 kgs
110/43	475 lbs 215 kgs	430 lbs 195 kgs	375 lbs 170 kgs

Based on average ice slab weight of4.125 – 4.75 lb (1.87 – 2.15 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	260-340 psig 17.9-23.4 bar	60-28 psig 4.1-1.9 bar
70/21	275-350 psig 19.0-24.1 bar	65-30 psig 4.5-2.1 bar
80/27	275-380 psig 19.0-26.2 bar	70-31 psig 4.8-2.1 bar
90/32	350-415 psig 24.1-28.6 bar	75-35 psig 5.2-2.4 bar
100/38	380-520 psig 26.2-35.9 bar	80-36 psig 5.5-2.5 bar
110/43	440-540 psig 30.3-37.2 bar	80-36 psig 5.5-2.5 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	150-175 psig 10.3-12.1 bar	115-130 psig 7.9-9.0 bar
70/21	165-200 psig 11.4-13.8 bar	115-130 psig 7.9-9.0 bar
80/27	175-200 psig 12.1-13.8 bar	115-135 psig 7.9-9.3 bar
90/32	185-200 psig 12.8-13.8 bar	135-145 psig 9.3-10.0 bar
100/38	200-215 psig 13.8-14.8 bar	140-160 psig 9.7-11.0 bar
110/43	210-220 psig 14.5-15.2 bar	155-175 psig 10.7-12.1 bar

KT0700W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	7.5-8.9	8.2-9.7	9.6-11.3	1.0-2.5
80/27	7.8-9.2	8.5-10.0	9.8-11.5	
90/32	7.9-9.4	9.3-10.9	10.0-11.8	
100/38	8.4-9.9	9.8-11.5	10.3-12.0	
110/43	8.7-10.2	10.4-12.2	11.0-12.9	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	660 lbs 299 kgs	610 lbs 277 kgs	535 lbs 243 kgs
80/27	640 lbs 290 kgs	595 lbs 270 kgs	525 lbs 238 kgs
90/32	630 lbs 286 kgs	550 lbs 249 kgs	515 lbs 234 kgs
100/38	600 lbs 272 kgs	525 lbs 238 kgs	505 lbs 229 kgs
110/43	585 lbs 265 kgs	500 lbs 227 kgs	475 lbs 215 kgs

Based on average ice slab weight of 4.125 – 4.75 lb (1.87 – 2.15 kg)
Water regulating valve set to maintain 300 PSI discharge pressure
Condenser Water usage per 100 lbs ice = 140 gal (45 kg = 530 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	295-305 psig 20.3-21.0 bar	55-31 psig 3.8-2.1 bar
70/21	295-305 psig 20.3-21.0 bar	55-32 psig 3.8-2.2 bar
80/27	295-305 psig 20.3-21.0 bar	60-32 psig 4.1-2.2 bar
90/32	295-305 psig 20.3-21.0 bar	65-32 psig 4.5-2.2 bar
100/38	300-325 psig 20.7-22.4 bar	65-32 psig 4.5-2.2 bar
110/43	300-325 psig 20.7-22.4 bar	65-32 psig 4.5-2.2 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	145-180 psig 10.0-12.4 bar	115-140 psig 7.9-9.7 bar
70/21	155-190 psig 10.7-13.1 bar	120-140 psig 8.3-9.7 bar
80/27	155-190 psig 10.7-13.1 bar	120-140 psig 8.3-9.7 bar
90/32	155-190 psig 10.7-13.1 bar	120-150 psig 8.3-10.3 bar
100/38	160-190 psig 11.0-13.1 bar	125-150 psig 8.6-10.3 bar
110/43	165-190 psig 11.4-13.1 bar	130-150 psig 9.0-10.3 bar

K1000A SELF-CONTAINED AIR-COOLED

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	
70/21	8.5-10.1	9.9-11.7	11.6-12.6	1.0-2.5
80/27	9.4-11.1	10.2-12.1	10.9-12.9	
90/32	10.2-12.1	11.0-13.0	12.0-14.2	
100/38	11.1-13.1	12.6-14.8	13.1-15.5	
110/43	12.1-14.3	13.0-15.4	13.9-16.4	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	895 lbs 406 kgs	785 lbs 356 kgs	735 lbs 333 kgs
80/27	820 lbs 372 kgs	765 lbs 347 kgs	720 lbs 327 kgs
90/32	765 lbs 347 kgs	715 lbs 324 kgs	660 lbs 299 kgs
100/38	710 lbs 322 kgs	635 lbs 288 kgs	610 lbs 277 kgs
110/43	655 lbs 297 kgs	615 lbs 279 kgs	580 lbs 263 kgs

Based on average ice slab weight of 6.2 – 7.2 lb (2.8 – 3.3 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	**Suction Pressure PSIG**
50/10	280-375 psig 19.3-25.9 bar	60-28 psig 4.1-1.9 bar
70/21	300-390 psig 20.7-26.9 bar	65-28 psig 4.5-1.9 bar
80/27	320-400 psig 22.1-27.6 bar	70-32 psig 4.8-2.2 bar
90/32	350-415 psig 24.1-28.6 bar	75-33 psig 5.2-2.3 bar
100/38	450-520 psig 31.0-35.9 bar	80-37 psig 5.5-2.6 bar
110/43	440-540 psig 30.3-37.2 bar	85-39 psig 5.9-2.7 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	**Suction Pressure PSIG**
50/10	140-200 psig 9.7-13.8 bar	100-140 psig 6.9-9.7 bar
70/21	145-200 psig 10.0-13.8 bar	105-140 psig 7.2-9.7 bar
80/27	150-205 psig 10.3-14.1 bar	105-150 psig 7.2-10.3 bar
90/32	160-210 psig 11.0-14.5 bar	110-150 psig 7.6-10.3 bar
100/38	170-240 psig 11.7-16.5 bar	115-155 psig 7.9-10.7 bar
110/43	200-250 psig 13.8-17.2 bar	125-160 psig 8.6-11.0 bar

K1000W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	8.3-9.8	8.8-10.4	9.7-11.5	1.0-2.5
80/27	9.0-10.7	9.7-11.5	10.8-12.8	
90/32	9.9-11.8	10.7-12.7	11.0-13.0	
100/38	10.2-12.1	11.1-13.1	11.4-13.5	
110/43	10.8-12.8	11.3-13.4	11.8-14.0	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	915 lbs 415 kgs	870 lbs 395 kgs	800 lbs 363 kgs
80/27	850 lbs 386 kgs	800 lbs 363 kgs	725 lbs 329 kgs
90/32	780 lbs 354 kgs	730 lbs 331 kgs	715 lbs 324 kgs
100/38	765 lbs 347 kgs	710 lbs 322 kgs	690 lbs 313 kgs
110/43	725 lbs 329 kgs	695 lbs 315 kgs	670 lbs 304 kgs

Based on average ice slab weight of 6.2 – 7.2 lb (2.8 – 3.3 kg)
Water regulating valve set to maintain 320 PSI discharge pressure.
Condenser Water usage per 100 lbs ice = 180 gal (45 kg = 681 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	295-310 psig 20.3-21.4 bar	65-30 psig 4.5-2.1 bar
70/21	295-310 psig 20.3-21.4 bar	65-30 psig 4.5-2.1 bar
80/27	295-310 psig 20.3-21.4 bar	65-32 psig 4.5-2.2 bar
90/32	295-310 psig 20.3-21.4 bar	65-32 psig 4.5-2.2 bar
100/38	300-330 psig 20.7-22.8 bar	68-33 psig 4.7-2.3 bar
110/43	310-345 psig 21.4-23.8 bar	70-34 psig 4.8-2.3 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	140-220 psig 9.7-15.2 bar	100-155 psig 6.9-10.7 bar
70/21	140-220 psig 9.7-15.2 bar	100-155 psig 6.9-10.7 bar
80/27	145-225 psig 10.0-15.5 bar	100-160 psig 6.9-11.0 bar
90/32	150-225 psig 10.3-15.5 bar	105-160 psig 7.2-11.0 bar
100/38	150-230 psig 10.3-15.9 bar	105-165 psig 7.2-11.4 bar
110/43	150-235 psig 10.3-16.2 bar	105-165 psig 7.2-11.4 bar

K1000N REMOTE AIR-COOLED

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	
70/21	8.2-9.7	8.5-10.1	9.4-11.1	1.0-2.5
80/27	9.1-10.8	9.9-11.7	10.2-12.1	
90/32	9.7-11.5	10.8-12.5	11.3-13.3	
100/38	10.6-12.5	11.4-13.5	12.2-14.5	
110/43	12.0-14.2	12.5-14.7	13.4-15.8	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	925 lbs 420 kgs	890 lbs 404 kgs	820 lbs 372 kgs
80/27	845 lbs 383 kgs	785 lbs 356 kgs	760 lbs 345 kgs
90/32	800 lbs 363 kgs	725 lbs 329 kgs	700 lbs 318 kgs
100/38	740 lbs 336 kgs	690 lbs 313 kgs	650 lbs 295 kgs
110/43	660 lbs 299 kgs	640 lbs 290 kgs	600 lbs 272 kgs

Based on average ice slab weight of 6.2 – 7.2 lb (2.8 – 3.3 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	300-350 psig 20.7-24.1 bar	60-36 psig 4.1-2.5 bar
70/21	310-365 psig 21.4-25.2 bar	60-38 psig 4.1-2.6 bar
80/27	315-370 psig 21.7-25.5 bar	65-38 psig 4.5-2.6 bar
90/32	320-375 psig 22.1-25.9 bar	65-38 psig 4.5-2.6 bar
100/38	380-500 psig 26.2-34.5 bar	70-45 psig 4.8-3.1 bar
110/43	405-520 psig 27.9-35.9 bar	75-46 psig 5.2-3.2 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	190-210 psig 13.1-14.5 bar	110-130 psig 7.6-9.0 bar
70/21	200-220 psig 13.8-15.2 bar	120-140 psig 8.3-9.7 bar
80/27	205-225 psig 14.1-15.5 bar	120-150 psig 8.3-10.3 bar
90/32	210-225 psig 14.5-15.5 bar	130-150 psig 9.0-10.3 bar
100/38	220-250 psig 15.2-17.2 bar	135-155 psig 9.3-10.7 bar
110/43	230-250 psig 15.9-17.2 bar	140-160 psig 9.7-11.0 bar

KP1000A SELF-CONTAINED AIR-COOLED

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	
70/21	10.5 - 11.5	12.1 - 13.2	13.3 - 14.8	1.0-2.5
80/27	11.7 - 12.5	12.6 - 13.9	13.9 - 15.7	
90/32	12.6 - 13.4	12.9 - 14.6	14.5 - 16.2	
100/38	13.0 - 14.5	14.5 - 15.7	15.9 - 16.7	
110/43	13.3 - 14.4	15.1 - 16.3	16.5 - 18.0	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	890 lbs 404 kgs	850 lbs 385 kgs	810 lbs 367 kgs
80/27	850 lbs 385 kgs	820 lbs 372 kgs	790 lbs 358 kgs
90/32	810 lbs 367 kgs	790 lbs 358 kgs	750 lbs 340 kgs
100/38	750 lbs 340 kgs	730 lbs 331 kgs	710 lbs 322 kgs
110/43	700 lbs 317 kgs	680 lbs 308 kgs	670 lbs 304 kgs

Based on average ice slab weight of 7.25 – 7.75 lb (3.3 – 3.5 kg)

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	150 - 210 psig (10.3 - 14.5 bar)	37 - 18 psig (2.6 - 1.2 bar)
70/21	150 - 210 psig (10.3 - 14.5 bar)	37 - 18 psig (2.6 - 1.2 bar)
80/27	160 - 220 psig (11.0 - 15.2 bar)	39 - 19 psig (2.7 - 1.3 bar)
90/32	175 - 225 psig (12.1 - 15.5 bar)	44 - 20 psig (3.0 - 1.4 bar)
100/38	200 - 235 psig (13.8 - 16.2 bar)	49 - 20 psig (3.4 - 1.4 bar)
110/43	215 - 300 psig (14.8 - 20.7 bar)	55 - 21 psig (3.8 - 1.4 bar)

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	65 - 105 psig (4.5 - 7.2 bar)	45 - 58 psig (3.1 - 4.0 bar)
70/21	70 - 110 psig (4.8 - 7.6 bar)	48 - 60 psig (3.3 - 4.1 bar)
80/27	75 - 115 psig (5.2 - 7.9 bar)	50 - 60 psig (3.4 - 4.1 bar)
90/32	100 - 125 psig (6.9 - 8.6 bar)	52 - 78 psig (3.6 - 5.4 bar)
100/38	110 - 140 psig (7.6 - 9.7 bar)	54 - 82 psig (3.7 - 5.7 bar)
110/43	115 - 150 psig (7.9 - 10.3 bar)	60 - 90 psig (4.1 - 6.2 bar)

KP1000W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	9.5 - 10.4	11.5 - 12.5	12.4 - 13.1	1.0-2.5
80/27	9.7 - 10.5	11.8 - 12.7	12.5 - 13.3	
90/32	10.1 - 10.9	11.9 - 12.9	12.8 - 13.6	
100/38	10.8 - 11.7	12.1 - 13.1	12.9 - 13.8	
110/43	11.0 - 12.2	12.3 - 13.3	13.1 - 14.1	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	910 lbs 413 kgs	880 lbs 399 kgs	760 lbs 399 kgs
80/27	900 lbs 408 kgs	870 lbs 395 kgs	870 lbs 395 kgs
90/32	890 lbs 404 kgs	860 lbs 390 kgs	740 lbs 336 kgs
100/38	880 lbs 399 kgs	850 lbs 385 kgs	730 lbs 331 kgs
110/43	870 lbs 395 kgs	840 lbs 381 kgs	720 lbs 327 kgs

Based on average ice slab weight of 7.25 – 7.75 lb (3.3 – 3.5 kg)
Water regulating valve set to maintain 300 PSI discharge pressure.
Condenser Water usage per 100 lbs ice = 125 gal (45 kg = 473 L)

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	175 - 185 psig (12.1 - 12.8 bar)	32 - 16 psig (2.2 -1.1 bar)
70/21	175 - 185 psig (12.1 - 12.8 bar)	32 - 16 psig (2.2 -1.1 bar)
80/27	175 - 185 psig (12.1 - 12.8 bar)	35 - 19 psig (2.4 - 1.3 bar)
90/32	180 - 190 psig (12.4 - 13.1 bar)	35 - 22 psig (2.4 - 1.5 bar)
100/38	180 - 190 psig (12.4 - 13.1 bar)	37 - 24 psig (2.6 - 1.7 bar)
110/43	180 - 190 psig (12.4 - 13.1 bar)	38 - 25 psig (2.6 - 1.7 bar)

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	75 - 100 psig (5.2 - 6.9 bar)	50 - 60 psig (3.4 - 4.1 bar)
70/21	75 - 100 psig (5.2 - 6.9 bar)	50 - 60 psig (3.4 - 4.1 bar)
80/27	75 - 100 psig (5.2 - 6.9 bar)	52 - 62 psig (3.6 - 4.3 bar)
90/32	80 - 100 psig (5.5 - 6.9 bar)	55 - 66 psig (3.8 - 4.6 bar)
100/38	85 - 105 psig (5.9 - 7.2 bar)	56 - 58 psig (3.9 - 4.0 bar)
110/43	85 - 105 psig (5.9 - 7.2 bar)	57 - 70 psig (3.9 - 4.8 bar)

KT1000A SELF-CONTAINED AIR-COOLED

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	
70/21	10.2-11.0	11.6-12.5	12.6-13.6	1.0-2.5
80/27	11.2-12.1	12.2-13.2	13.4-14.4	
90/32	12.1-13.0	13.9-14.9	14.8-15.9	
100/38	13.2-14.2	14.2-15.3	16.2-17.4	
110/43	14.3-15.4	16.3-17.6	17.8-19.2	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	890 lbs 404 kgs	800 lbs 363 kgs	740 lbs 336 kgs
80/27	820 lbs 372 kgs	760 lbs 345 kgs	700 lbs 318 kgs
90/32	770 lbs 349 kgs	680 lbs 308 kgs	640 lbs 290 kgs
100/38	710 lbs 322 kgs	665 lbs 302 kgs	590 lbs 268 kgs
110/43	660 lbs 299 kgs	585 lbs 265 kgs	540 lbs 245 kgs

Based on average ice slab weight of 7.25 – 7.75 lb (3.3 – 3.5 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	280-350 psig 19.3-24.1 bar	60-36 psig 4.1-2.5 bar
70/21	280-350 psig 19.3-24.1 bar	65-36 psig 4.5-2.5 bar
80/27	300-400 psig 20.7-27.6 bar	70-38 psig 4.8-2.6 bar
90/32	350-420 psig 24.1-29.0 bar	75-39 psig 5.2-2.7 bar
100/38	425-520 psig 29.3-35.9 bar	80-40 psig 5.5-2.8 bar
110/43	440-540 psig 30.3-37.2 bar	85-41 psig 5.9-2.8 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	135-150 psig 9.3-10.3 bar	100-140 psig 6.9-9.7 bar
70/21	135-155 psig 9.3-10.7 bar	105-140 psig 7.2-9.7 bar
80/27	150-180 psig 10.3-12.4 bar	105-150 psig 7.2-10.3 bar
90/32	160-210 psig 11.0-14.5 bar	120-150 psig 8.3-10.3 bar
100/38	170-240 psig 11.7-16.5 bar	130-155 psig 9.0-10.7 bar
110/43	190-250 psig 13.1-17.2 bar	135-160 psig 9.3-11.0 bar

KT1000W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	11.0-11.9	11.6-12.5	13.4-14.4	1.0-2.5
80/27	11.2-12.0	11.5-12.4	13.5-14.6	
90/32	11.4-12.3	13.0-14.0	13.6-14.7	
100/38	11.6-12.5	13.3-14.3	13.9-14.9	
110/43	11.7-12.6	13.5-14.6	14.1-15.2	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	835 lbs 379 kgs	800 lbs 363 kgs	700 lbs 318 kgs
80/27	825 lbs 374 kgs	805 lbs 365 kgs	695 lbs 315 kgs
90/32	810 lbs 367 kgs	720 lbs 327 kgs	690 lbs 313 kgs
100/38	800 lbs 363 kgs	705 lbs 320 kgs	680 lbs 308 kgs
110/43	790 lbs 358 kgs	695 lbs 315 kgs	670 lbs 304 kgs

Based on average ice slab weight of 7.25 – 7.75 lb (3.3 – 3.5 kg)
Water regulating valve set to maintain 300 PSI discharge pressure.
Condenser Water usage per 100 lbs ice = 131 gal (45 kg = 496 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	290-305 psig 20.0-21.0 bar	64-36 psig 4.4-2.5 bar
70/21	290-305 psig 20.0-21.0 bar	64-36 4.4-2.5 bar
80/27	290-310 psig 20.0-21.4 bar	68-37 psig 4.7-2.6 bar
90/32	295-335 psig 20.3-23.1 bar	72-39 psig 5.0-2.7 bar
100/38	305-335 psig 21.0-23.1 bar	73-41 psig 5.0-2.8 bar
110/43	310-345 psig 21.4-23.8 bar	74-44 psig 5.1-3.0 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	150-165 psig 10.3-11.4 bar	100-125 psig 6.9-8.6 bar
70/21	150-165 psig 10.3-11.4 bar	100-125 psig 6.9-8.6 bar
80/27	155-175 psig 10.7-12.1 bar	100-125 psig 6.9-8.6 bar
90/32	160-180 psig 11.0-12.4 bar	110-125 psig 7.6-8.6 bar
100/38	160-180 psig 11.0-12.4 bar	110-130 psig 7.6-9.0 bar
110/43	165-185 psig 11.4-12.8 bar	115-130 psig 7.9-9.0 bar

KT1000N REMOTE AIR-COOLED

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	
70/21	10.8-11.6	11.2-12.1	11.4-12.3	1.0-2.5
80/27	10.9-11.7	11.8-12.7	13.0-14.0	
90/32	11.5-12.4	13.4-14.4	13.6-14.7	
100/38	11.9-12.8	13.9-14.9	15.1-16.2	
110/43	13.5-14.6	14.9-16.1	16.3-17.6	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
-20-50/-29-10	850 lbs 386 kgs	820 lbs 372 kgs	810 lbs 367 kgs
70/21	845 lbs 383 kgs	785 lbs 356 kgs	720 lbs 327 kgs
80/27	805 lbs 365 kgs	745 lbs 338 kgs	690 lbs 313 kgs
90/32	780 lbs 354 kgs	700 lbs 318 kgs	660 lbs 299 kgs
100/38	735 lbs 333 kgs	680 lbs 308 kgs	630 lbs 286 kgs
110/43	695 lbs 315 kgs	635 lbs 288 kgs	585 lbs 265 kgs

Based on average ice slab weight of 7.25 – 7.75 lb (3.3 – 3.5 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
-20/-29	260-280 psig 17.9-19.3 bar	65-42 psig 4.5-2.9 bar
70/21	300-315 psig 20.7-21.7 bar	65-43 psig 4.5-3.0 bar
80/27	350-320 psig 24.1-22.1 bar	68-44 psig 4.7-3.0 bar
90/32	370-325 psig 25.5-22.4 bar	70-45 psig 4.8-3.1 bar
100/38	470-420 psig 32.4-29.0 bar	80-50 psig 5.5-3.4 bar
110/43	480-425 psig 33.1-29.3 bar	95-50 psig 6.6-3.4 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
-20/-29	160-180 psig 11.0-12.4 bar	120-130 psig 8.3-9.0 bar
70/21	180-195 psig 12.4-13.4 bar	130-145 psig 9.0-10.0 bar
80/27	180-195 psig 12.4-13.4 bar	130-145 psig 9.0-10.0 bar
90/32	180-195 psig 12.4-13.4 bar	130-145 psig 9.0-10.0 bar
100/38	195-200 psig 13.4-13.8 bar	130-145 psig 9.0-10.0 bar
110/43	200-210 psig 13.8-14.5 bar	135-150 psig 9.3-10.3 bar

K1350A SELF-CONTAINED AIR-COOLED

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	
70/21	10.7-12.6	12.1-14.2	13.8-16.2	1.0-2.5
80/27	11.2-13.2	12.5-14.7	13.1-15.4	
90/32	11.7-13.8	12.9-15.2	14.1-16.6	
100/38	12.8-15.1	14.1-16.6	15.5-18.2	
110/43	14.4-16.9	16.2-19.0	18.9-22.1	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	1540 lbs 699 kgs	1350 lbs 612 kgs	1190 lbs 540 kgs
80/27	1350 lbs 612 kgs	1215 lbs 551 kgs	1090 lbs 494 kgs
90/32	1235 lbs 560 kgs	1145 lbs 519 kgs	990 lbs 449 kgs
100/38	1160 lbs 526 kgs	1080 lbs 490 kgs	920 lbs 417 kgs
110/43	1040 lbs 472 kgs	950 lbs 431 kgs	870 lbs 395 kgs

Based on average ice slab weight of 12.75 - 14.75 lb (5.78–6.69 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	300-380 psig 20.7-26.2 bar	66-34 psig 4.6-2.3 bar
70/21	300-380 psig 20.7-26.2 bar	66-34 psig 4.6-2.3 bar
80/27	315-410 psig 21.7-28.3 bar	73-36 psig 5.0-2.5 bar
90/32	330-450 psig 22.8-31.0 bar	81-39 psig 5.6-2.7 bar
100/38	375-490 psig 25.9-33.8 bar	91-42 psig 6.3-2.9 bar
110/43	420-530 psig 29.0-36.5 bar	101-46 psig 7.0-3.2 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	165-190 psig 11.4-13.1 bar	125-135 psig 8.6-9.3 bar
70/21	165-190 psig 11.4-13.1 bar	125-135 psig 8.6-9.3 bar
80/27	175-205 psig 12.1-14.1 bar	130-140 psig 9.0-9.7 bar
90/32	185-220 psig 12.8-15.2 bar	135-150 psig 9.3-10.3 bar
100/38	200-240 psig 13.8-16.5 bar	150-170 psig 10.3-11.7 bar
110/43	230-260 psig 15.9-17.9 bar	165-185 psig 11.4-12.8 bar

K1350W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	10.7-12.7	11.2-13.1	11.6-13.7	1.0-2.5
80/27	10.9-12.8	11.3-13.3	11.7-13.7	
90/32	11.0-13.0	11.4-13.4	11.8-13.8	
100/38	11.3-13.4	11.7-13.8	12.2-14.9	
110/43	11.6-13.7	12.1-14.2	12.7-14.9	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	1510 lbs 685 kgs	1290 lbs 585 kgs	1215 lbs 551 kgs
80/27	1500 lbs 680 kgs	1280 lbs 581 kgs	1205 lbs 547 kgs
90/32	1495 lbs 678 kgs	1225 lbs 556 kgs	1190 lbs 540 kgs
100/38	1485 lbs 674 kgs	1210 lbs 549 kgs	1170 lbs 531 kgs
110/43	1470 lbs 667 kgs	1190 lbs 540 kgs	1140 lbs 517 kgs

Based on average ice slab weight of 12.75 - 14.75 lb (5.78 – 6.69 kg)
Water regulating valve set to maintain 300 PSIG discharge pressure
Condenser Water usage per 100 lbs ice = 160 gal (45 kg = 606 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	290-305 psig 20.0-21.0 bar	64-36 psig 4.4-2.5 bar
70/21	290-305 psig 20.0-21.0 bar	64-36 psig 4.4-2.5 bar
80/27	290-310 psig 20.0-21.4 bar	68-37 psig 4.7-2.6 bar
90/32	295-335 psig 20.3-23.1 bar	72-39 psig 5.0-2.7 bar
100/38	305-335 psig 21.0-23.1 bar	73-41 psig 5.0-2.8 bar
110/43	310-340 psig 21.4-23.4 bar	74-44 psig 5.1-3.0 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	150-165 psig 10.3-11.4 bar	110-125 psig 7.6-8.6 bar
70/21	150-165 psig 10.3-11.4 bar	110-125 psig 7.6-8.6 bar
80/27	155-175 psig 10.7-12.1 bar	110-125 psig 7.6-8.6 bar
90/32	160-180 psig 11.0-12.4 bar	110-125 psig 7.6-8.6 bar
100/38	160-180 psig 11.0-12.4 bar	110-130 psig 7.6-9.0 bar
110/43	165-185 psig 11.4-12.8 bar	115-130 psig 7.9-9.0 bar

K1350N REMOTE AIR-COOLED

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	
70/21	10.6-12.5	12.0-14.2	12.2-14.3	1.0-2.5
80/27	11.1-13.0	11.6-13.6	12.8-15.0	
90/32	11.2-13.2	11.3-13.4	12.5-16.0	
100/38	11.9-14.0	12.7-14.9	14.4-16.9	
110/43	12.8-15.0	13.9-16.3	15.3-18.0	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	1470 lbs 667 kgs	1295 lbs 587 kgs	1195 lbs 542 kgs
80/27	1410 lbs 640 kgs	1250 lbs 567kgs	1175 lbs 533 kgs
90/32	1340 lbs 608 kgs	1200 lbs 544 kgs	1130 lbs 513 kgs
100/38	1280 lbs 581 kgs	1115 lbs kgs506	1040 lbs 472 kgs
110/43	1160 lbs 526 kgs	1095 lbs 497kgs	975 lbs 442 kgs

Based on average ice slab weight of 12.75 - 14.75 lb (4.65 – 5.22 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	300-365 psig 20.7-25.2 bar	70-33 psig 4.8-2.3 bar
70/21	300-365 psig 20.7-25.2 bar	70-33 psig 4.8-2.3 bar
80/27	305-370 psig 21.0-25.5 bar	75-35 psig 5.2-2.4 bar
90/32	305-380 psig 21.0-26.2 bar	75-38 psig 5.2-2.6 bar
100/38	330-410 psig 22.8-28.3 bar	82-42 psig 5.7-2.9 bar
110/43	400-490 psig 27.6-33.8 bar	95-48 psig 6.6-3.3 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	165-190 psig 11.4-13.1 bar	115-140 psig 7.9-9.7 bar
70/21	165-190 psig 11.4-13.1 bar	115-140 psig 7.9-9.7 bar
80/27	170-190 psig 11.7-13.1 bar	115-140 psig 7.9-9.7 bar
90/32	170-195 psig 11.7-13.4 bar	120-145 psig 8.3-10.0 bar
100/38	175-195 psig 12.1-13.4 bar	125-145 psig 8.6-10.0 bar
110/43	180-200 psig 12.4-13.8 bar	130-150 psig 9.0-10.3 bar

KT1700A SELF-CONTAINED AIR-COOLED

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	
70/21	9.1-10.3	9.7-11.1	10.3-11.7	1.0-2.5
80/27	10.5-11.9	11.3-12.9	12.5-14.2	
90/32	11.8-13.4	12.6-14.3	14.3-16.2	
100/38	13.1-14.8	14.1-16.0	16.1-18.2	
110/43	15.6-17.7	17.1-19.4	18.2-20.6	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	1800 lbs 816 kgs	1690 lbs 767 kgs	1610 lbs 730 kgs
80/27	1590 lbs 721 kgs	1480 lbs 671 kgs	1360 lbs 617 kgs
90/32	1430 lbs 649 kgs	1350 lbs 612 kgs	1205 lbs 547 kgs
100/38	1305 lbs 592 kgs	1215 lbs 551 kgs	1080 lbs 490 kgs
110/43	1110 lbs 503 kgs	1020 lbs 463 kgs	965 lbs 438 kgs

Based on average ice slab weight of 13.20 - 14.80 lb (5.99 – 6.71 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	255-340 psig 17.6-23.4 bar	70-33 psig 4.8-2.3 bar
70/21	275-350 psig 19.0-24.1 bar	75-35 psig 5.2-2.4 bar
80/27	300-380 psig 20.7-26.2 bar	80-40 psig 5.5-2.8 bar
90/32	330-400 psig 22.8-27.6 bar	80-45 psig 5.5-3.1 bar
100/38	500-415 psig 34.5-28.6 bar	85-48 psig 5.9-3.3 bar
110/43	530-425 psig 36.5-29.3 bar	100-50 psig 6.9-3.4 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	150-160 psig 10.3-11.0 bar	110-115 psig 7.6-7.9 bar
70/21	165-170 psig 11.4-11.7 bar	120-125 psig 8.3-8.6 bar
80/27	185-200 psig 12.8-13.8 bar	135-145 psig 9.3-10.0 bar
90/32	200-205 psig 13.8-14.1 bar	145-150 psig 10.0-10.3 bar
100/38	230-245 psig 15.9-16.9 bar	165-180 psig 11.4-12.4 bar
110/43	245-255 psig 16.9-17.6 bar	175-190 psig 12.1-13.1 bar

KT1700W SELF-CONTAINED WATER-COOLED

NOTE: These characteristics may vary depending on operating conditions.

CYCLE TIMES

Freeze Time + Harvest Time = Total Cycle Time

Air Temp. Around Ice Machine °F/°C	Freeze Time			Harvest Time
	Water Temperature °F/°C			
	50/10	70/21	90/32	
70/21	9.3-10.6	9.6-10.9	11.3-12.6	1.0-2.5
80/27	9.8-11.1	10.0-11.4	11.7-13.2	
90/32	9.9-11.3	11.5-13.1	12.0-13.6	
100/38	10.0-11.3	12.1-13.7	12.5-14.2	
110/43	10.0-11.4	12.3-14.0	12.9-14.6	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Around Ice Machine °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	1765 lbs 801 kgs	1720 lbs 780 kgs	1515 lbs 687 kgs
80/27	1685 lbs 764 kgs	1650 lbs 748 kgs	1445 lbs 655 kgs
90/32	1670 lbs 757 kgs	1460 lbs 662 kgs	1410 lbs 640 kgs
100/38	1660 lbs 753 kgs	1400 lbs 635 kgs	1355 lbs 615 kgs
110/43	1650 lbs 748 kgs	1375 lbs 624 kgs	1320 lbs 599 kgs

Based on average ice slab weight of 13.20 - 14.80 lb (5.99 – 6.71 kg)
Water regulating valve set to maintain 310 PSIG discharge pressure
Condenser Water usage per 100 lbs ice = 139 gal (45 kg = 526 L)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Around Ice Machine °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	310-320 psig 21.4-22.1 bar	68-40 psig 4.7-2.8 bar
70/21	310-320 psig 21.4-22.1 bar	72-40 psig 5.0-2.8 bar
80/27	310-320 psig 21.4-22.1 bar	75-40 psig 5.2-2.8 bar
90/32	310-325 psig 21.4-22.4 bar	80-40 psig 5.5-2.8 bar
100/38	310-335 psig 21.4-23.1 bar	81-45 psig 5.6-3.1 bar
110/43	320-370 psig 22.1-25.5 bar	82-50 psig 5.7-3.4 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Around Ice Machine °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	145-160 psig 10.0-11.0 bar	110-115 psig 7.6-7.9 bar
70/21	165-180 psig 11.4-12.4 bar	120-130 psig 8.3-9.0 bar
80/27	165-180 psig 11.4-12.4 bar	120-130 psig 8.3-9.0 bar
90/32	165-180 psig 11.4-12.4 bar	120-130 psig 8.3-9.0 bar
100/38	170-180 psig 11.7-12.4 bar	120-130 psig 8.3-9.0 bar
110/43	175-180 psig 12.1-12.4 bar	125-135 psig 8.6-9.3 bar

KT1700N REMOTE AIR-COOLED

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	
70/21	9.8-11.2	10.2-14.8	10.6-12.1	1.0-2.5
80/27	10.0-11.4	10.6-12.1	11.5-13.1	
90/32	10.7-12.2	11.9-13.5	13.4-15.2	
100/38	12.3-13.9	12.6-14.3	14.5-16.4	
110/43	12.6-14.3	13.6-15.4	15.2-17.2	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	1650 lbs 748 kgs	1565 lbs 710 kgs	1460 lbs 662 kgs
80/27	1560 lbs 708 kgs	1480 lbs 671 kgs	1370 lbs 621 kgs
90/32	1470 lbs 667 kgs	1420 lbs 644 kgs	1280 lbs 581 kgs
100/38	1380 lbs 626 kgs	1345 lbs 610 kgs	1190 lbs 540 kgs
110/43	1345 lbs 610 kgs	1260 lbs 572 kgs	1140 lbs 517 kgs

Based on average ice slab weight of 13.20 - 14.80 lb (5.99 – 6.71 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
-20-50/-29-10	270-285 psig 18.6-19.7 bar	60-38 psig 4.1-2.6 bar
70/21	300-320 psig 20.7-22.1 bar	60-38 psig 4.1-2.6 bar
80/27	300-340 psig 20.7-23.4 bar	60-39 psig 4.1-2.7 bar
90/32	310-380 psig 21.4-26.2 bar	70-40 psig 4.8-2.8 bar
100/38	380-460 psig 26.2-31.7 bar	80-41 psig 5.5-2.8 bar
110/43	400-480 psig 27.6-33.1 bar	85-42 psig 5.9-2.9 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
-20-50/-29-10	170-190 psig 11.7-13.1 bar	120-135 psig 8.3-9.3 bar
70/21	180-210 psig 12.4-14.5 bar	130-140 psig 9.0-9.7 bar
80/27	180-210 psig 12.4-14.5 bar	130-140 psig 9.0-9.7 bar
90/32	180-210 psig 12.4-14.5 bar	130-140 psig 9.0-9.7 bar
100/38	200-210 psig 13.8-14.5 bar	135-150 psig 9.3-10.3 bar
110/43	210-220 psig 14.5-15.2 bar	140-155 psig 9.7-10.7 bar

K1800A SELF-CONTAINED AIR-COOLED

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	
70/21	9.1-10.5	9.8-11.2	10.6-12.1	1.0-2.5
80/27	9.9-11.4	10.6-12.1	11.6-13.2	
90/32	11.0-12.5	11.4-13.0	12.7-14.5	
100/38	12.2-13.9	12.9-14.7	14.5-16.5	
110/43	13.6-15.5	14.9-16.9	16.4-18.6	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	1735 lbs 787 kgs	1630 lbs 739 kgs	1520 lbs 689 kgs
80/27	1610 lbs 730 kgs	1520 lbs 689 kgs	1410 lbs 640 kgs
90/32	1480 lbs 671 kgs	1430 lbs 649 kgs	1295 lbs 587 kgs
100/38	1350 lbs 612 kgs	1280 lbs 581 kgs	1155 lbs 524 kgs
110/43	1220 lbs 553 kgs	1125 lbs 510 kgs	1030 lbs 467 kgs

Based on average ice slab weight of 12.80 - 14.4 lb (5.8– 6.5 kg).
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	295-395 psig 20.3-27.2 bar	85-35 psig 5.9-2.4 bar
70/21	295-395 psig 20.3-27.2 bar	85-35 psig 5.9-2.4 bar
80/27	310-410 psig 21.4-28.3 bar	85-36 psig 5.9-2.5 bar
90/32	330-430 psig 22.8-29.6 bar	85-38 psig 5.9-2.6 bar
100/38	400-500 psig 27.6-34.5 bar	90-40 psig 6.2-2.8 bar
110/43	430-555 psig 29.6-38.3 bar	110-45 psig 7.6-3.1 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	175-205 psig 12.1-14.1 bar	115-145 psig 7.9-10.0 bar
70/21	175-205 psig 12.1-14.1 bar	115-145 psig 7.9-10.0 bar
80/27	185-215 psig 12.8-14.8 bar	125-150 psig 8.6-10.3 bar
90/32	195-225 psig 13.4-15.5 bar	135-155 psig 9.3-10.7 bar
100/38	210-250 psig 14.5-17.2 bar	150-170 psig 10.3-11.7 bar
110/43	230-290 psig 15.9-20.0 bar	160-190 psig 11.0-13.1 bar

K1800N REMOTE AIR-COOLED

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	
70/21	9.5-10.8	10.1-11.5	10.7-12.2	1.0-2.5
80/27	10.0-11.5	10.7-12.2	11.5-13.1	
90/32	10.7-12.2	11.5-13.2	12.4-14.1	
100/38	11.4-13.0	12.3-14.0	13.3-15.2	
110/43	12.2-13.9	13.2-15.1	14.5-16.5	

Times in minutes

24 HOUR ICE PRODUCTION

Air Temp. Entering Condenser °F/°C	Water Temperature °F/°C		
	50/10	70/21	90/32
70/21	1680 lbs 762 kgs	1595 lbs 723 kgs	1510 lbs 685 kgs
80/27	1600 lbs 726 kgs	1510 lbs 685 kgs	1420 lbs 644 kgs
90/32	1515 lbs 687 kgs	1415 lbs 642 kgs	1330 lbs 603 kgs
100/38	1430 lbs 649 kgs	1335 lbs 606 kgs	1245 lbs 565 kgs
110/43	1345 lbs 610 kgs	1250 lbs 567 kgs	1150 lbs 522 kgs

Based on average ice slab weight of 12.8 - 14.4 lb (5.8 - 6.5 kg)
230/50/1 production is approximately 12% lower than 230/60/1.

OPERATING PRESSURES

Air Temp. Entering Condenser °F/°C	Freeze Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	300-365 psig 20.7-25.2 bar	70-35 psig 4.8-2.4 bar
70/21	300-365 psig 20.7-25.2 bar	70-35 psig 4.8-2.4 bar
80/27	300-380 psig 20.7-26.2 bar	75-37 psig 5.2-2.6 bar
90/32	300-400 psig 20.7-27.6 bar	80-38 psig 5.5-2.6 bar
100/38	350-480 psig 24.1-33.1 bar	90-40 psig 6.2-2.8 bar
110/43	450-520 psig 31.0-35.9 bar	95-42 psig 6.6-2.9 bar

Suction pressure drops gradually throughout the freeze cycle

Air Temp. Entering Condenser °F/°C	Harvest Cycle	
	Discharge Pressure PSIG	Suction Pressure PSIG
50/10	175-195 psig 12.1-13.4 bar	110-135 psig 7.6-9.3 bar
70/21	175-195 psig 12.1-13.4 bar	110-135 psig 7.6-9.3 bar
80/27	180-200 psig 12.4-13.8 bar	115-140 psig 7.9-9.7 bar
90/32	180-205 psig 12.4-14.1 bar	120-140 psig 8.3-9.7 bar
100/38	190-215 psig 13.1-14.8 bar	125-145 psig 8.6-10.0 bar
110/43	205-225 psig 14.1-15.5 bar	135-150 psig 9.3-10.3 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.

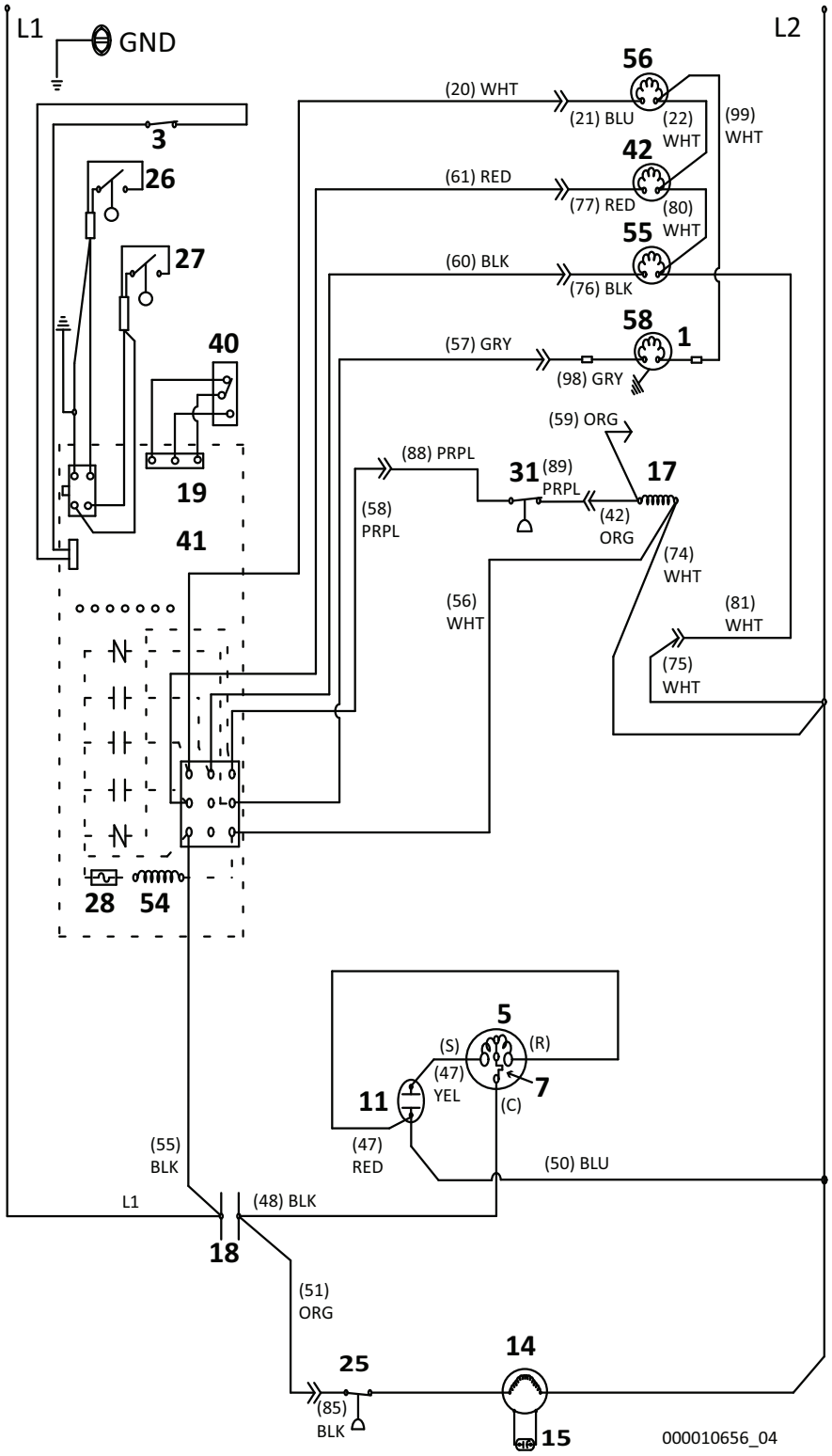
> ⚠
>
> Always disconnect power before working on electrical circuitry.

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)>—

K0250, KT0300, K0350, KT400, K0420, KT0420, K0500, K0600, KT0700, K1000, KT1000
WITHOUT PTCR
1 PH SELF-CONTAINED AIR/WATER-COOLED



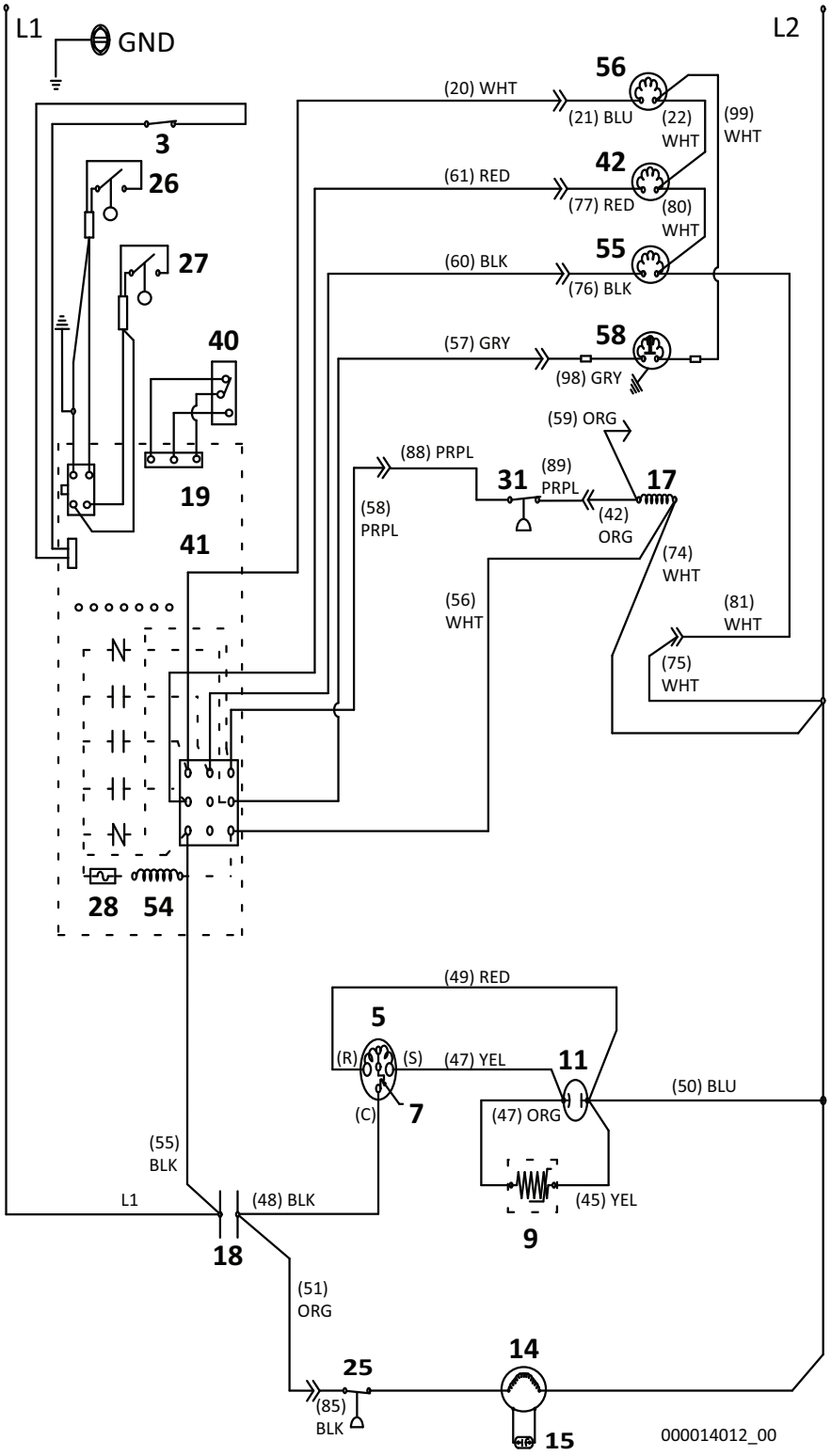
K0250, KT0300, K0350, KT400, K0420, KT0420, K0500, K0600, KT0700, K1000, KT1000

Without PTCR

1 Ph Self-contained Air/Water-cooled

Number	Component
3	Bin Switch
5	Compressor
7	Compressor Overload
11	Compressor Run Capacitor
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Harvest Float Switch
27	Water Level Float Switch
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve - Harvest
54	Transformer
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

K0250, KT0300, K0350, KT400, K0420, KT0420, K0500, KT0500, KT0700, K1000, KT1000
WITH PTCR
1 PH SELF-CONTAINED AIR/WATER-COOLED



K0250, KT0300, K0350, KT400, K0420, KT0420, K0500, KT0500, KT0700, K1000, KT1000
WITH PTCR
1 Ph Self-contained Air/Water-cooled

Number	Component
3	Bin Switch
5	Compressor
7	Compressor Overload
9	Compressor PTCR
11	Compressor Run Capacitor
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Harvest Float Switch
27	Water Level Float Switch
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
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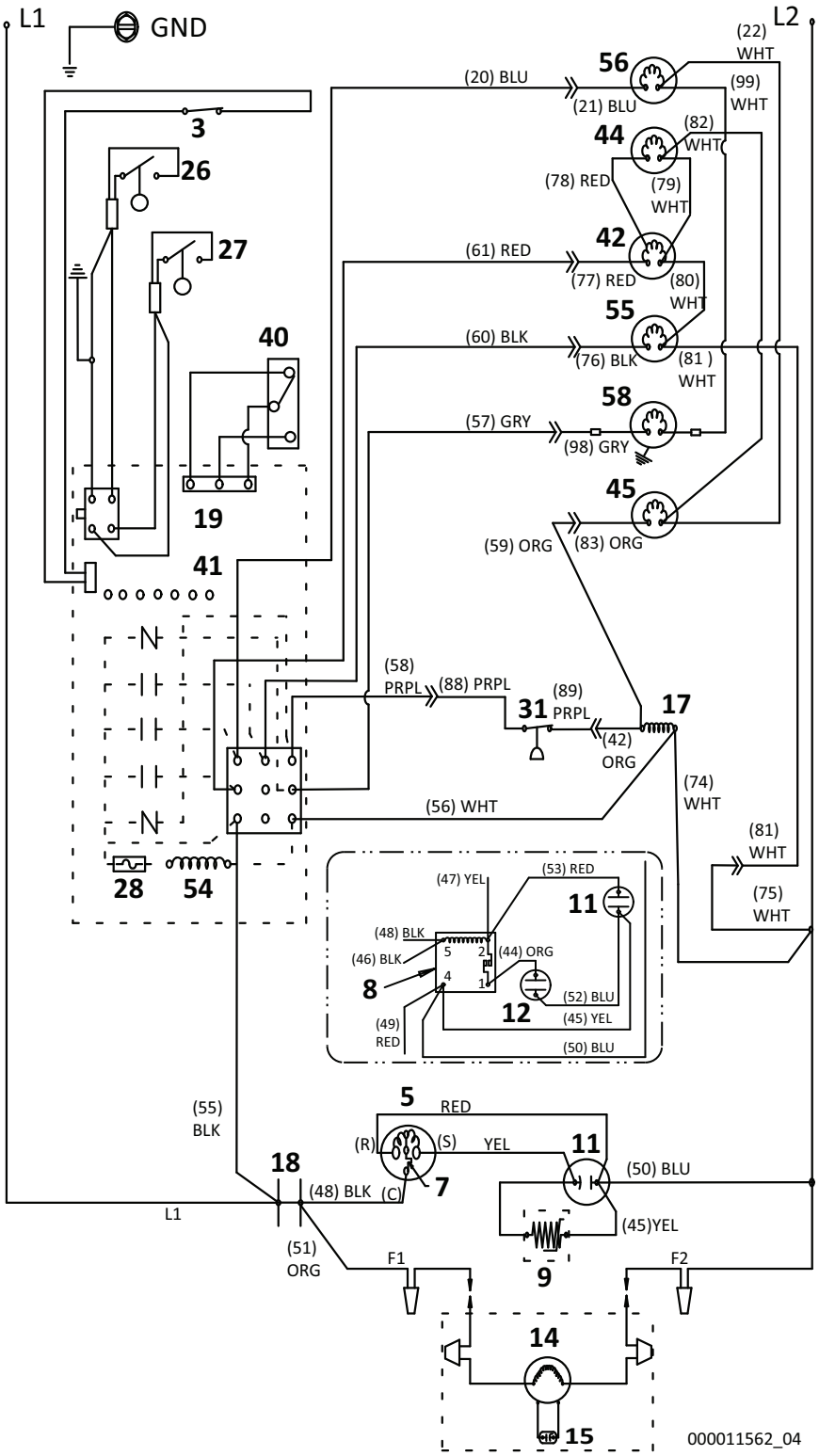
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

K1000, KT1000
1PH REMOTE AIR-COOLED CONDENSER

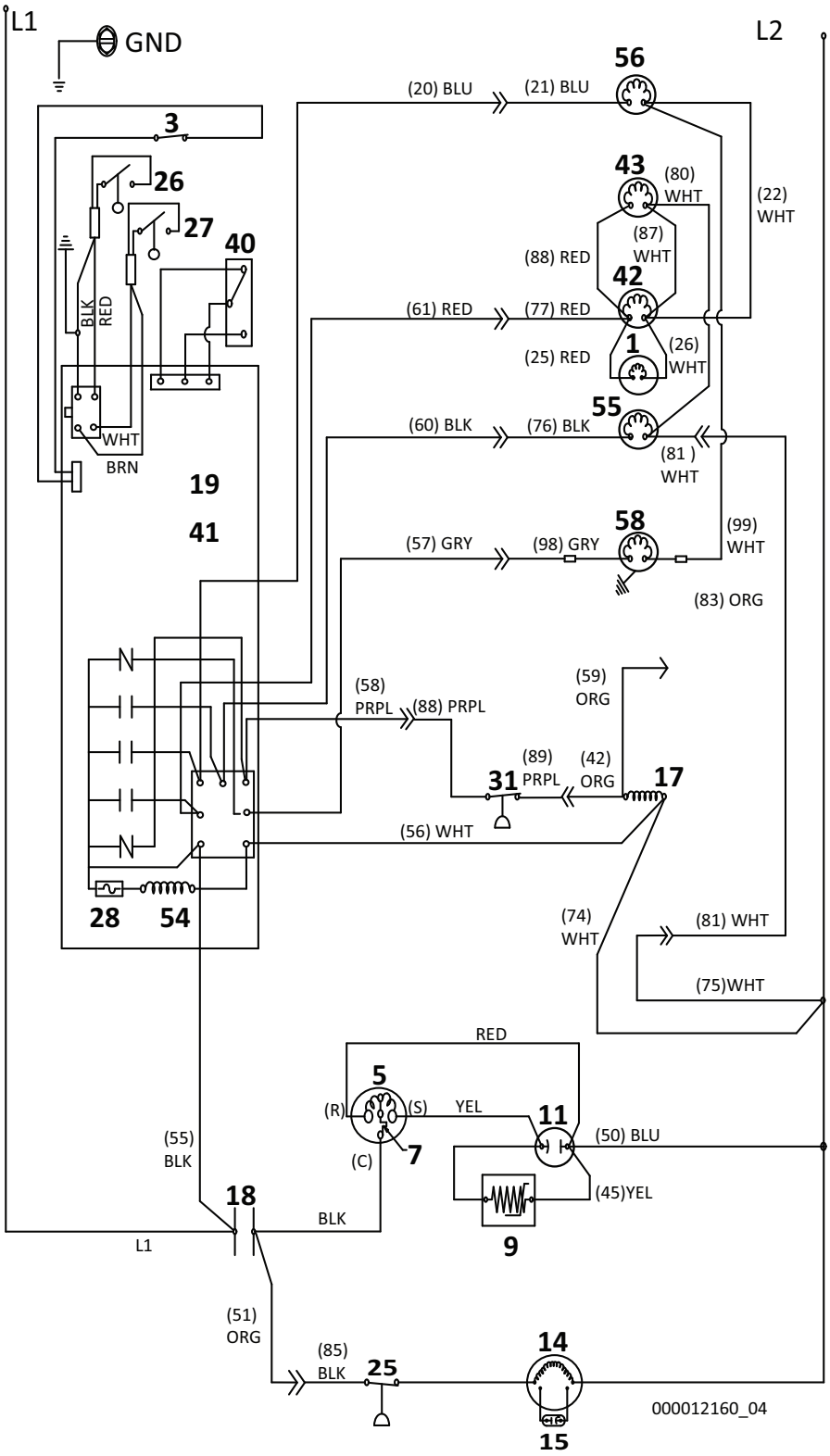


K1000, KT1000

1Ph Remote Air-cooled Condenser

Number	Component
3	Bin Switch
5	Compressor
7	Compressor Overload
8	Compressor Potential Relay - When Used
9	Compressor PTCR - When Used
11	Compressor Run Capacitor
12	Compressor Start Capacitor - When Used
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
26	Harvest Float Switch
27	Water Level Float Switch
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve - Harvest
44	Solenoid Valve - Harvest Pressure Regulating
45	Solenoid Valve - Liquid Line Solenoid
54	Transformer
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

K1350, KT1700, K1800
1 PH SELF-CONTAINED AIR/WATER-COOLED

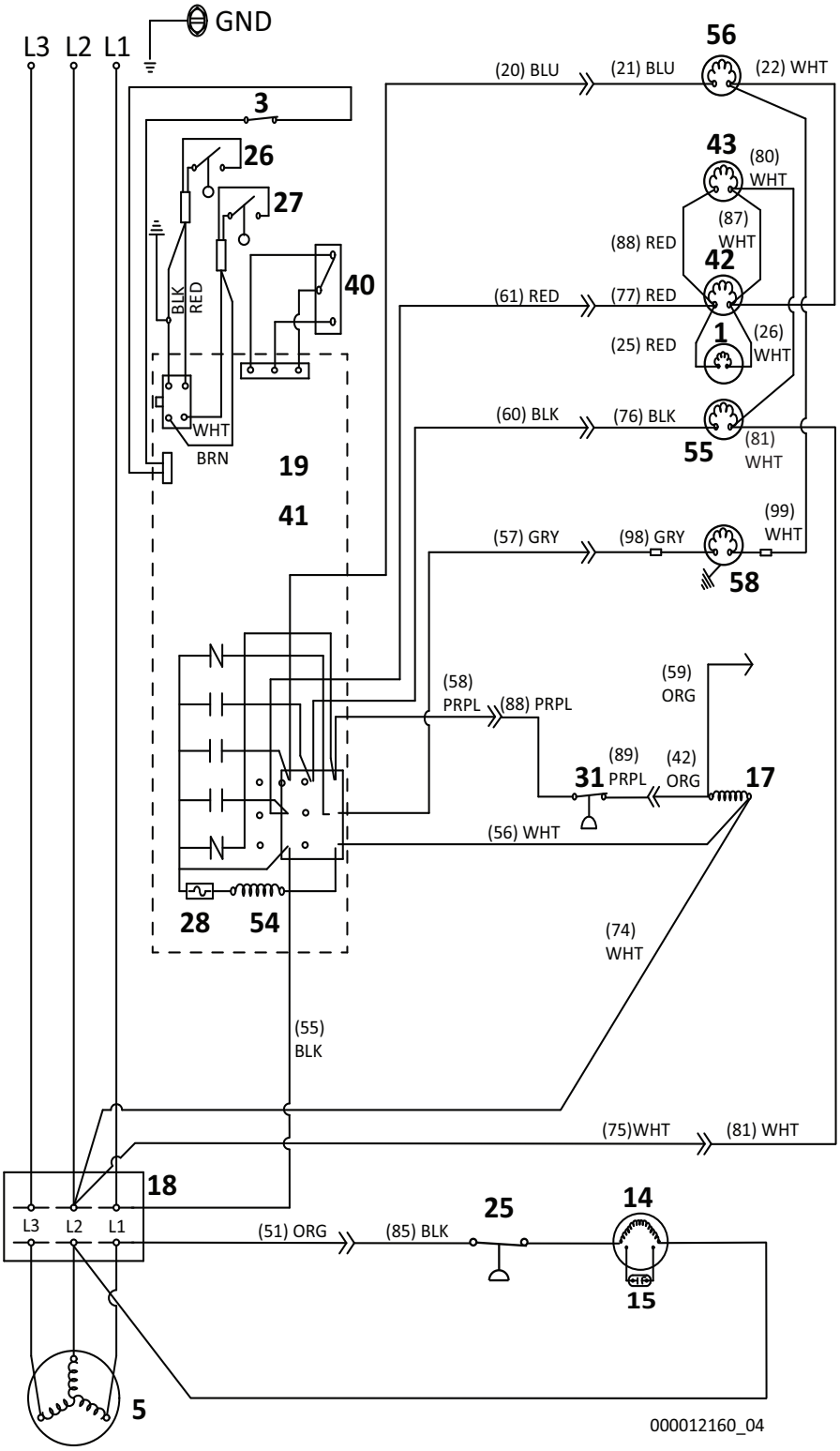


K1350, KT1700, K1800

1 Ph Self-contained Air/Water-cooled

Number	Component
1	Air Pump Harvest Assist
3	Bin Switch
5	Compressor
7	Compressor Overload
9	Compressor PTCR
11	Compressor Run Capacitor
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Harvest Float Switch
27	Water Level Float Switch
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve - Harvest Left Hand
43	Solenoid Valve - Harvest Right Hand
54	Transformer
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

K1350, KT1700, K1800
3 PH SELF-CONTAINED AIR/WATER-COOLED

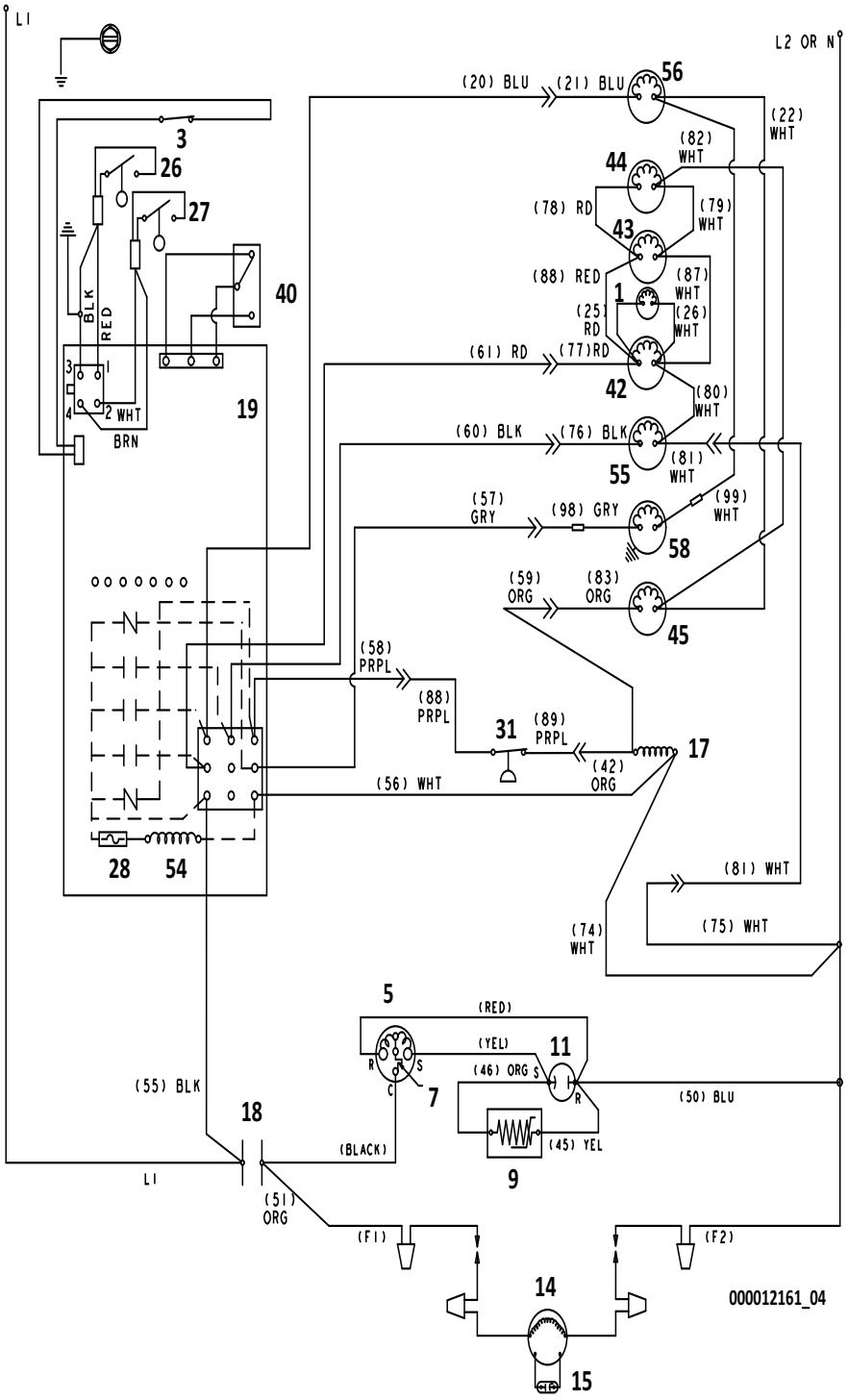


K1350, KT1700, K1800

3 Ph Self-contained Air/Water-cooled

Number	Component
1	Air Pump Harvest Assist
3	Bin Switch
5	Compressor
7	Compressor Overload
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Harvest Float Switch
27	Water Level Float Switch
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve - Harvest Left Hand
43	Solenoid Valve - Harvest Right Hand
54	Transformer
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

K1350, KT1700, K1800
1PH REMOTE AIR-COOLED CONDENSER

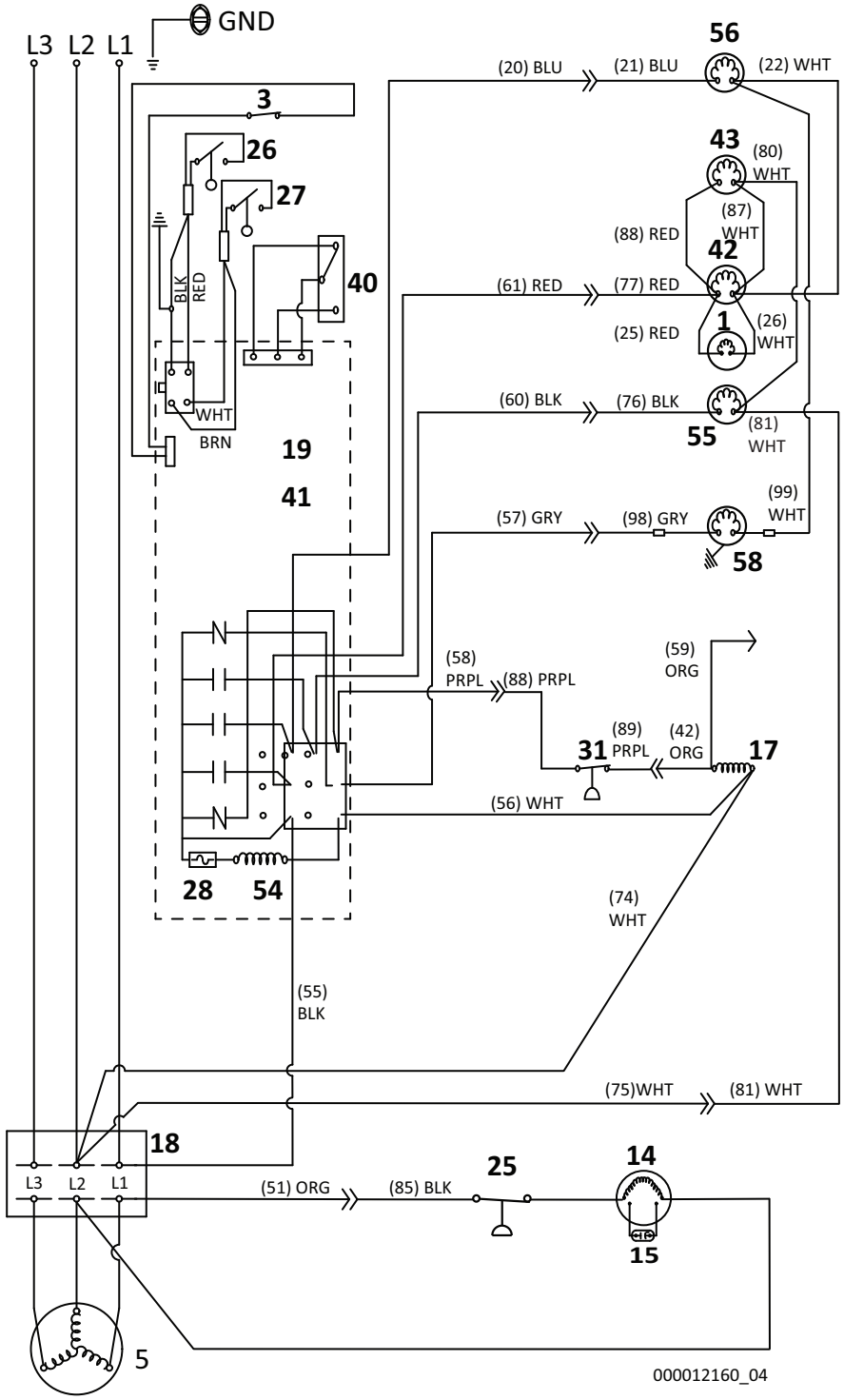


K1350, KT1700, K1800

1Ph Remote Air-cooled Condenser

Number	Component
1	Air Pump Harvest Assist
3	Bin Switch
5	Compressor
7	Compressor Overload
9	Compressor PTCR
11	Compressor Run Capacitor
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Harvest Float Switch
27	Water Level Float Switch
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve - Harvest Left Hand
43	Solenoid Valve - Harvest Right Hand
44	Solenoid Valve - Harvest Pressure Regulating
45	Solenoid Valve - Liquid Line
54	Transformer
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

K1350, KT1700, K1800
3 PH REMOTE AIR-COOLED CONDENSER



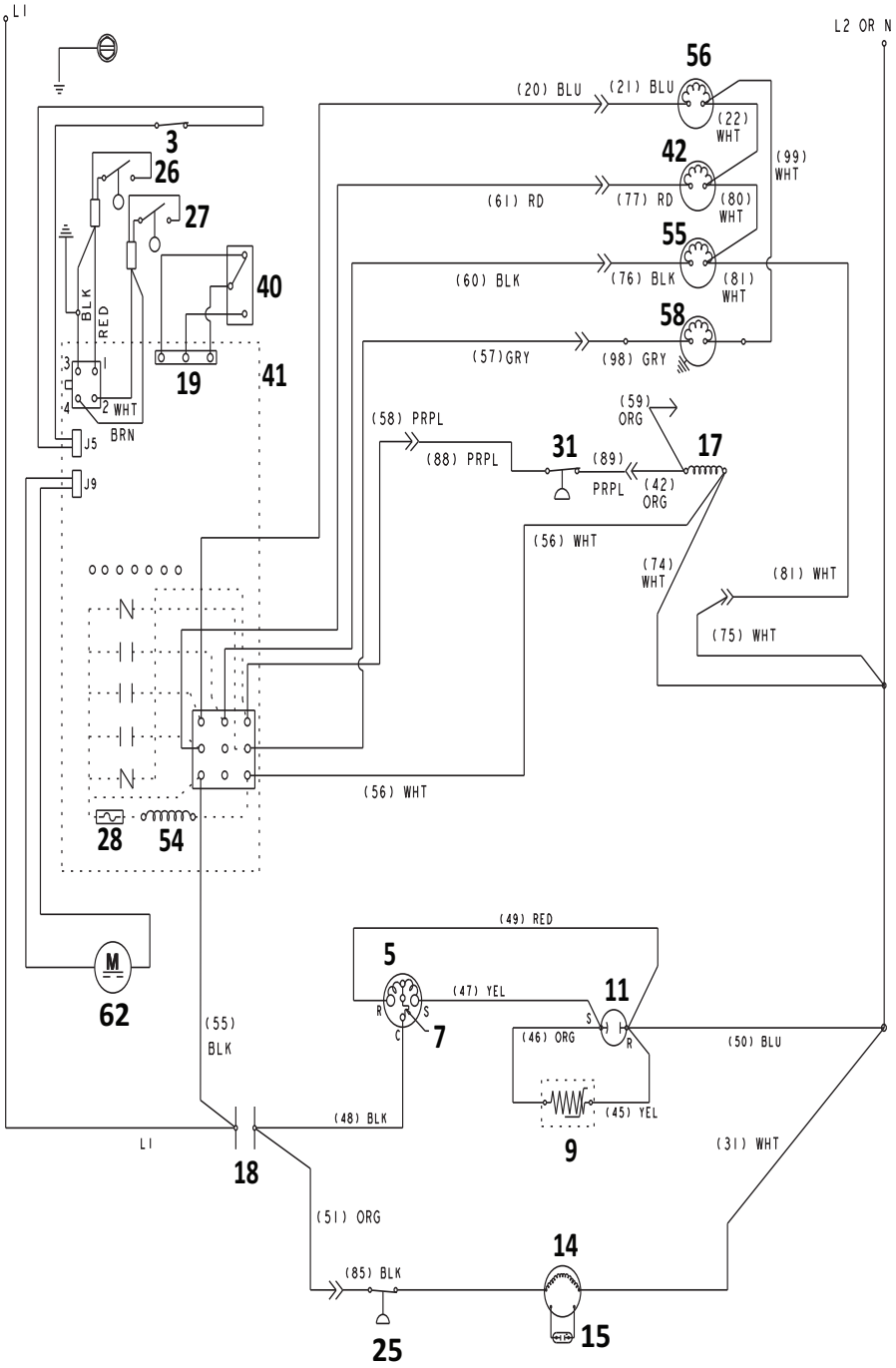
K1350, KT1700, K1800

3 Ph Remote Air-cooled Condenser

Number	Component
1	Air Pump Harvest Assist
3	Bin Switch
5	Compressor
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Harvest Float Switch
27	Water Level Float Switch
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve - Harvest Left Hand
43	Solenoid Valve - Harvest Right Hand
44	Solenoid Valve - Harvest Pressure Regulating
45	Solenoid Valve - Liquid Line
54	Transformer
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

KP0300/KP0400/KP0500/KP0700/KP1000

1 Ph Self-contained Air/Water-cooled



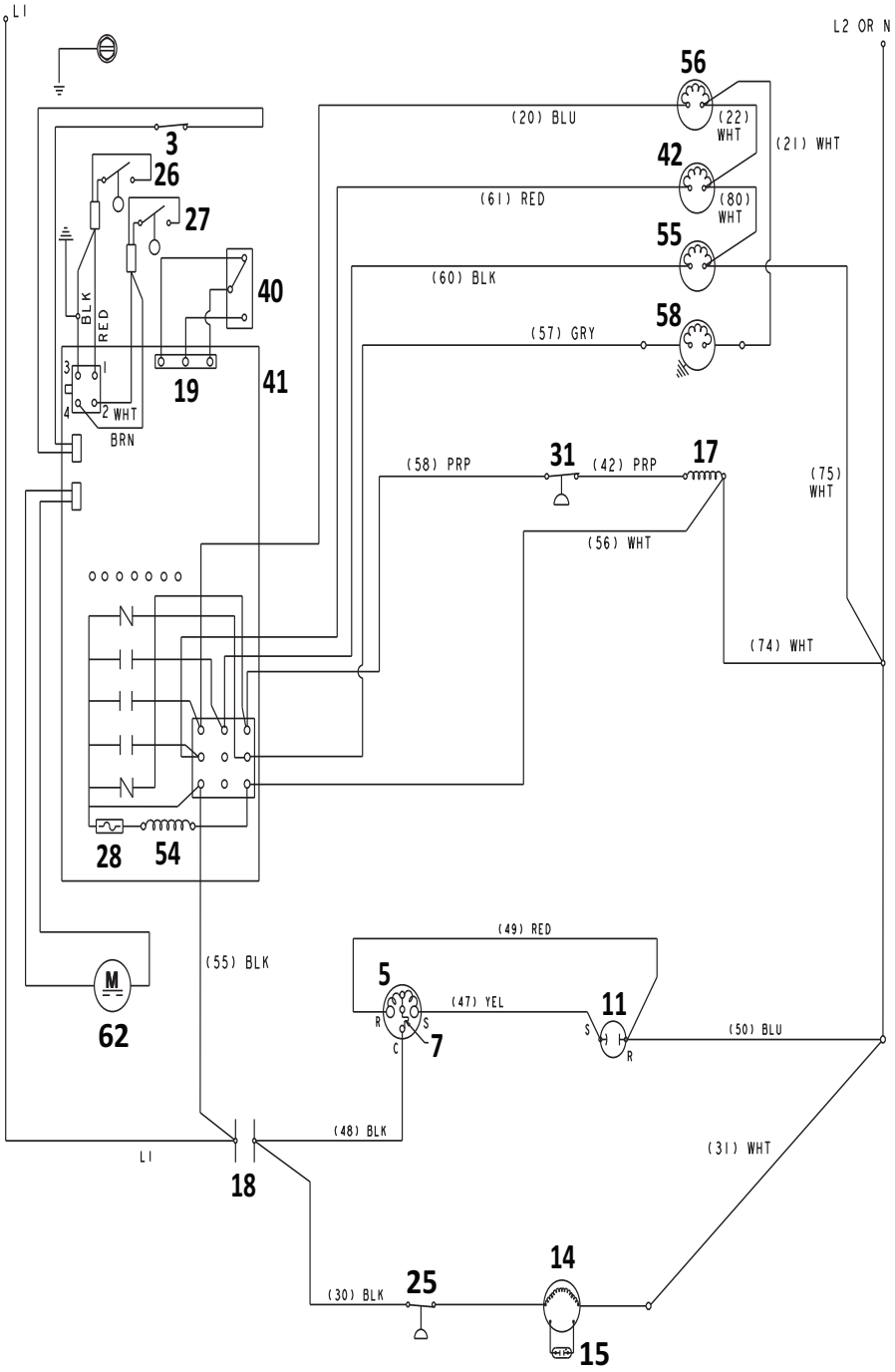
KP0300/KP0400/KP0500/KP0700/KP1000

1 Ph Self-contained Air/Water-cooled

Number	Component
3	Bin Switch
5	Compressor
7	Compressor Overload
9	Compressor PTCR (when used)
11	Compressor Run Capacitor
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Harvest Float Switch
27	Water Level Float Switch
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve - Harvest
54	Transformer
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
62	Vent Fan (when used)
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

KP0420

1 Ph Self-contained Air/Water-cooled



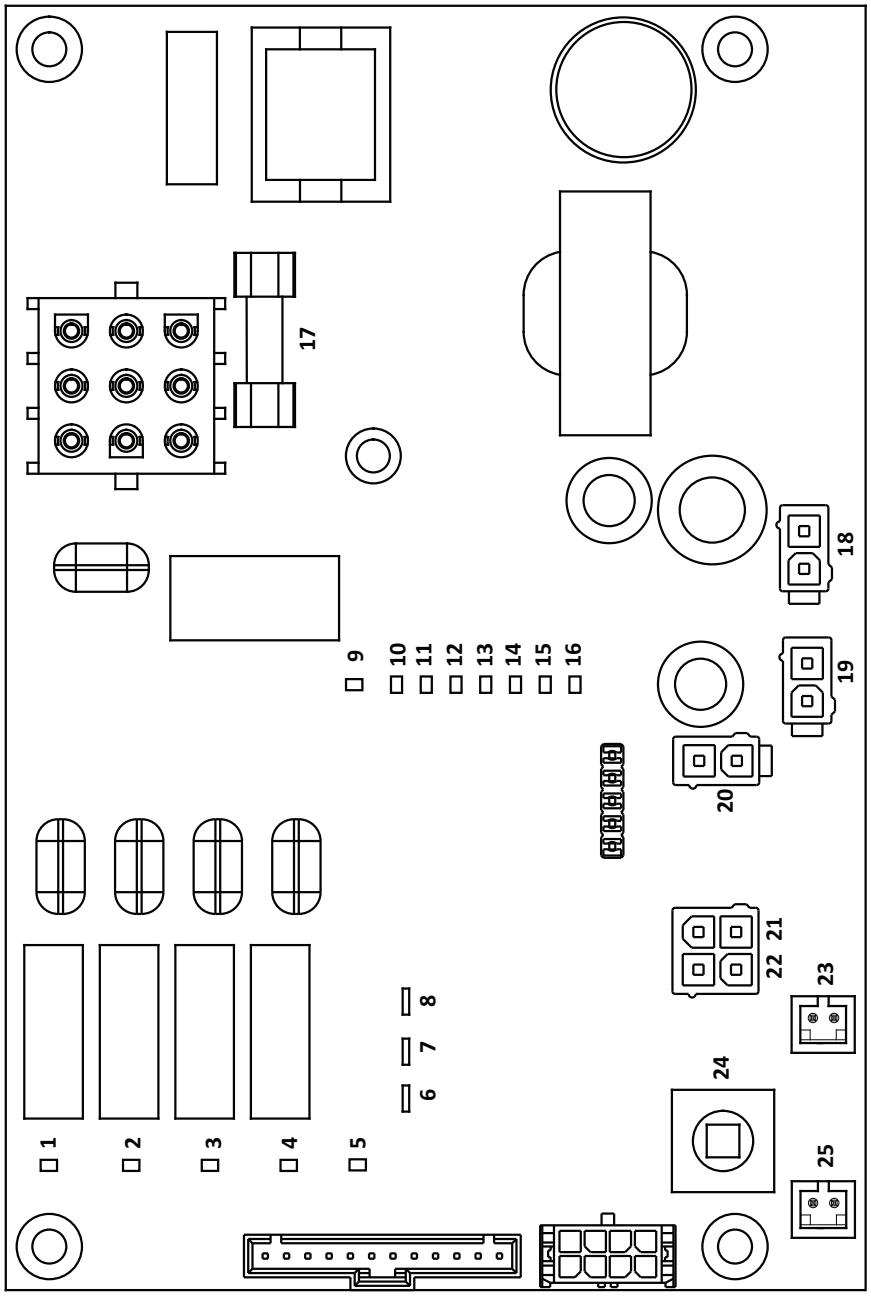
KP0420

1 Ph Self-contained Air/Water-cooled

Number	Component
3	Bin Switch
5	Compressor
7	Compressor Overload
11	Compressor Run Capacitor
14	Condenser Fan Motor
15	Condenser Fan Motor Run Capacitor
17	Contactor Coil
18	Contactor Contacts
19	Control Board
25	Fan Cycle Control
26	Harvest Float Switch
27	Water Level Float Switch
28	Fuse
31	High Pressure Cutout
40	On/Off/Clean Switch
41	See Control Board Schematic For Detail
42	Solenoid Valve - Harvest
54	Transformer
55	Water Dump Valve
56	Water Inlet Valve
58	Water Pump
62	Vent Fan (when used)
Wire Colors	
BLK	Black
BLU	Blue
BRN	Brown
GRY	Grey
ORG	Orange
PRPL	Purple
RED	Red
WHT	White
YEL	Yellow
Refer to control board schematic for control board detail	

Electronic Control Board

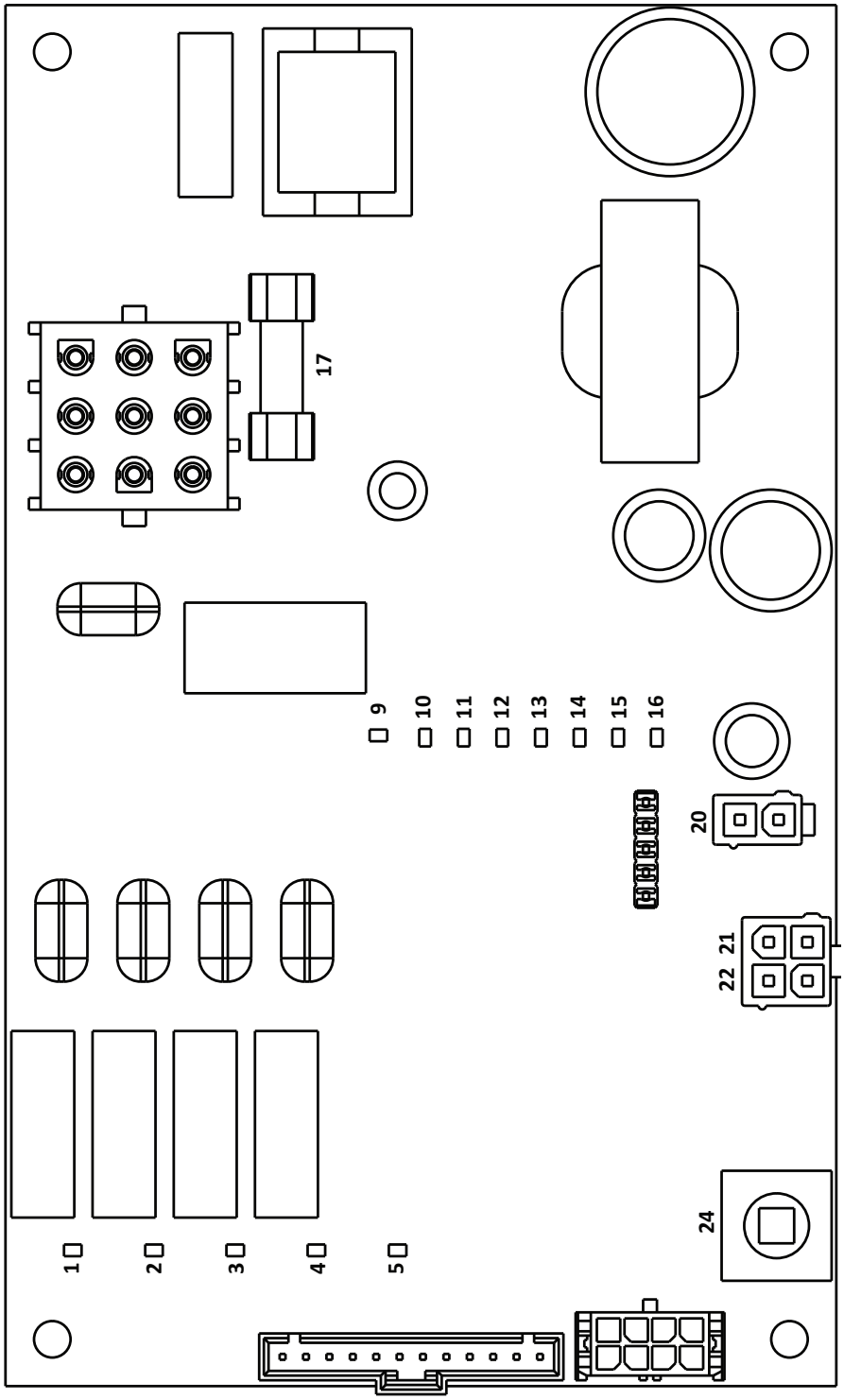
KP & KT MODELS



Electronic Control Board

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	Thermistor
7	Thermistor
8	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
19	EC Fan Motor Connector
20	Bin Switch Connector
21	Float Switch Water Level
22	Float Switch Harvest
23	Thermistor 2
24	Test Switch
25	Thermistor 1

K MODELS



Electronic Control Board

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
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 3.15 Amp
20	Bin Switch Connector
21	Float Switch Water Level
22	Float Switch Harvest
24	Test Switch

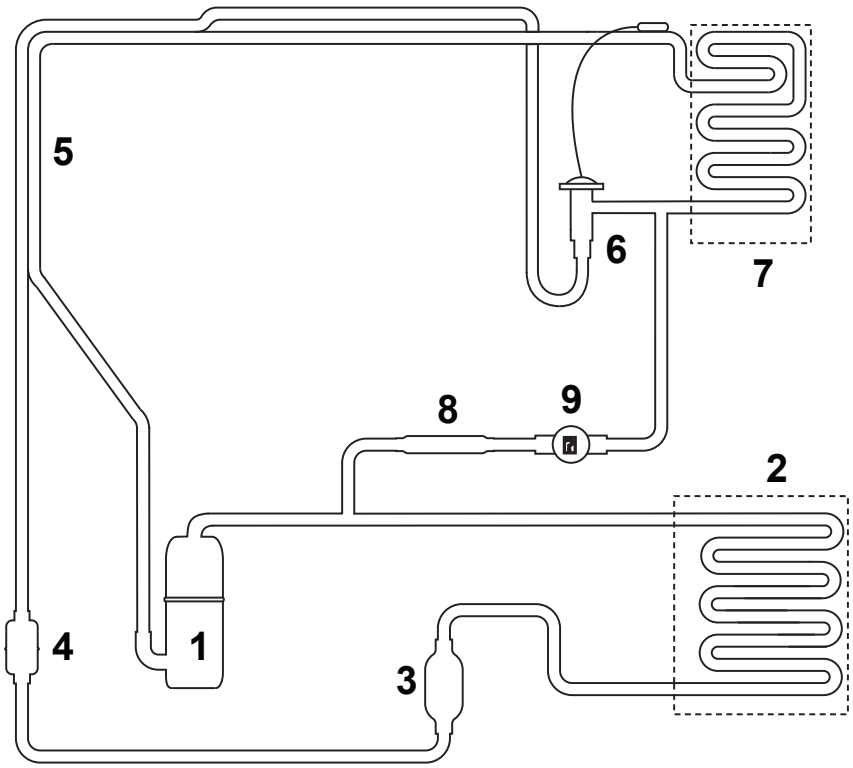
Refrigeration Tubing Schematics

SELF-CONTAINED AIR OR WATER-COOLED

K0250, K0350, K0420, K0500, K0600, K1000

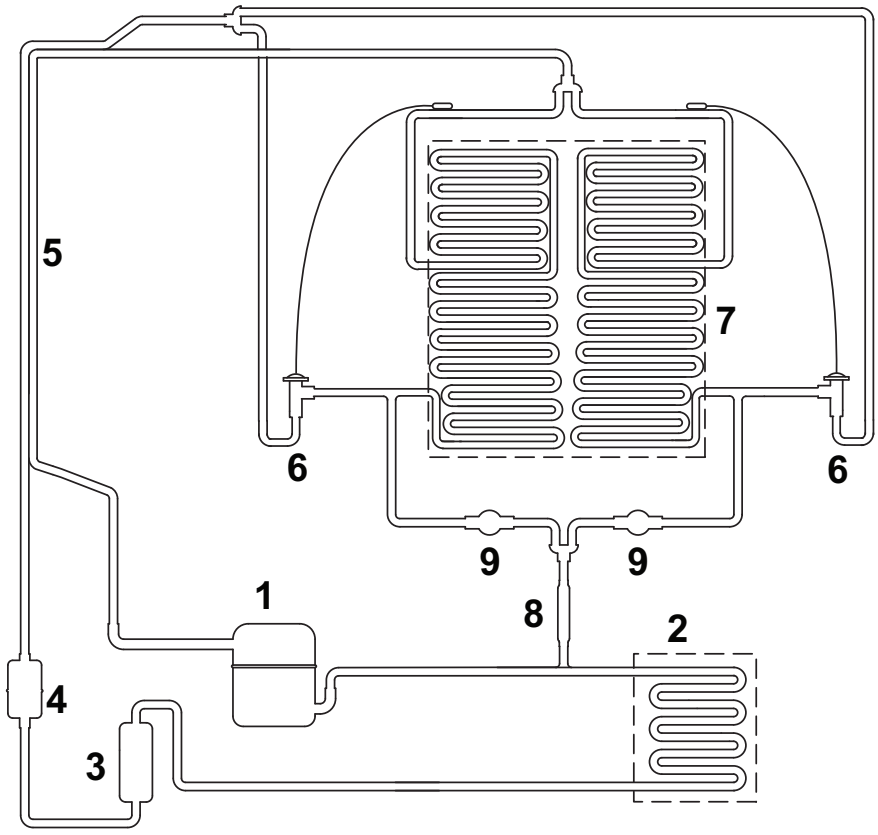
KP0300, KP0400, KP0420, KP0500, KP0700, KP1000

KT0300, KT0400, KT0420, KT0500, KT0700, KT1000



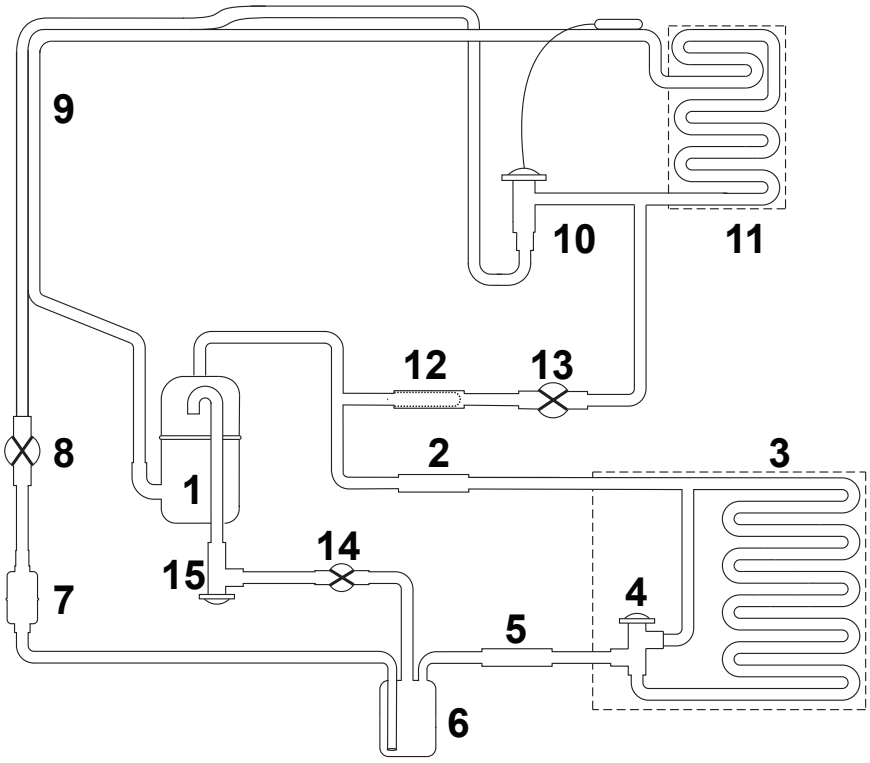
Number	Component
1	Compressor
2	Condenser-Air or Water-cooled
3	Receiver - Water-cooled Only
4	Liquid Line Filter Drier
5	Heat Exchanger
6	TXV - Thermostatic Expansion Valve
7	Evaporator
8	Strainer
9	Harvest Solenoid Valve

K1350, KT1700, K1800
SELF-CONTAINED AIR OR WATER-COOLED



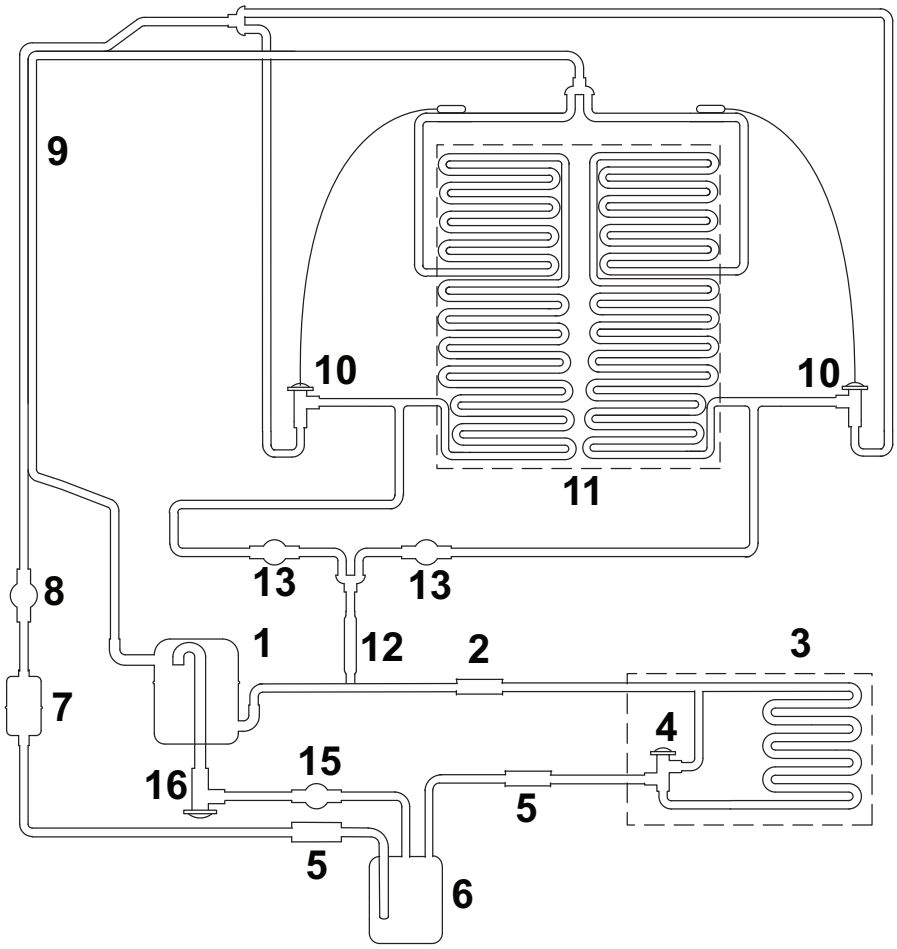
Number	Component
1	Compressor
2	Condenser-Air or Water-cooled
3	Receiver - Water-cooled Only
4	Liquid Line Filter Drier
5	Heat Exchanger
6	TXV - Thermostatic Expansion Valve
7	Evaporator
8	Strainer
9	Harvest Solenoid Valve

K1000, KT1000 REMOTE AIR-COOLED CONDENSER



Number	Component
1	Compressor
2	Discharge Check Valve
3	Condenser - Remote Air-Cooled
4	Head Pressure Control Valve
5	Liquid Line Check Valve
6	Receiver
7	Liquid Line Filter Drier
8	Liquid Line Solenoid Valve
9	Heat Exchanger
10	TXV - Thermostatic Expansion Valve
11	Evaporator
12	Strainer
13	Harvest Solenoid Valve
14	Harvest Pressure Solenoid Valve
15	Harvest Pressure Regulating Valve

K1350, KT1700, K1800
REMOTE AIR-COOLED CONDENSER



Number	Component
1	Compressor
2	Discharge Check Valve
3	Condenser - Remote Air-Cooled
4	Head Pressure Control Valve
5	Liquid Line Check Valve
6	Receiver
7	Liquid Line Filter Drier
8	Liquid Line Solenoid Valve
9	Heat Exchanger
10	TXV - Thermostatic Expansion Valve
11	Evaporator
12	Strainer
13	Harvest Solenoid Valve
14	Harvest Pressure Solenoid Valve
15	Harvest Pressure Regulating Valve

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MANITOWOC ICE
2110 SOUTH 26TH STREET
MANITOWOC, WI 54220

800-545-5720
WWW.KOOL-AIRE.COM

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