Manitowoc® Service Communicator

Subject: S Model QuietQube Ice Machine Sequence of Operation

Ice Making Sequence of Operation

Initial Start-Up or Start-Up After Automatic Shut-Off

1. Water Purge

Before the compressor starts, the water pump and water dump solenoid are energized for 45 seconds to purge the ice machine of old water. This ensures that the ice-making cycle starts with fresh water.

The Harvest solenoid valve is also energized during the water purge, although it stays on for an additional 5 seconds (50-second total on time) during the initial refrigeration system start-up.

S1000 Only - The air compressor energizes for the last 10 seconds of the cycle.

2. Refrigeration System Start-Up

Ice Machine Section: The liquid line solenoid valve energizes after the 45-second water purge, and remains on throughout the entire Freeze and Harvest sequences. The Harvest solenoid valve remains on for 5 seconds then shuts off.

The water fill valve is energized at the same time as the liquid line solenoid valve.

CVD® Condensing Unit: When the refrigerant pressure is high enough to close the low-pressure control (after the harvest valve energizes in step 1), the contactor coil is energized and the compressor starts. The compressor and fan cycling control are supplied with power throughout the entire Freeze and Harvest sequences. When the refrigerant pressure is high enough to close the fan cycling pressure control, the condenser fan motor starts.

Freeze Sequence

3. Prechill

The compressor is on for 30 seconds (60 seconds initial cycle) prior to water flow to prechill the evaporator. The water fill valve remains on until the water level probe is satisfied.

4. Freeze

The water pump restarts after the 30-second prechill. An even flow of water is directed across the evaporator and into each cube cell, where it freezes. The water fill valve will cycle on, then off one more time to refill the water trough.

When sufficient ice has formed, the water flow (not the ice) contacts the ice thickness probe. After approximately 10 seconds of continual water contact, the Harvest sequence is initiated. The ice machine cannot initiate a Harvest sequence until a 6-minute freeze lock has been surpassed.

Harvest Sequence

5. Water Purge

The water pump continues to run, and the water dump valve energizes for 45 seconds to purge the water in the sump trough. The water fill valve energizes for the last 15 seconds of the 45-second water purge.

After the 45-second water purge, the water fill valve, water pump and dump valve de-energize.

The harvest solenoid valve also opens at the beginning of the water purge to divert refrigerant gas into the evaporator.

When the refrigerant pressure is low enough to open the fan cycling pressure control, the condenser fan motor stops.

S1000 Only - The air compressor energizes after 35 seconds and remains energized throughout the entire harvest cycle. The air compressor will automatically energize after 60 seconds when the harvest cycle time exceeded 75 seconds the previous cycle.

6. Harvest

The harvest solenoid valve remains open and the refrigerant gas warms the evaporator causing the cubes to slide as a sheet, off the evaporator and into the storage bin. The sliding sheet of cubes swings the water curtain out, opening the bin switch.

The momentary opening and reclosing of the bin switch terminates the Harvest sequence and returns the ice machine to the Freeze sequence (steps 3-4).

Automatic Shut-Off

7. Automatic Shut-Off

Ice Machine Section: When the storage bin is full at the end of a Harvest sequence, the sheet of ice cubes fails to clear the water curtain and will hold it open. After the water curtain is held open for 30 seconds, the ice machine shuts off. The ice machine remains off for 3 minutes before it can automatically restart.

CVD® Condensing Unit: The liquid line solenoid valve closes, allowing the refrigeration system to pump down. When the refrigerant pressure is low enough to open the fan cycling pressure control, the condenser fan motor stops. When the refrigerant pressure is low enough to open the low-pressure control, the contactor coil is de-energized and the compressor stops.

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

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Safety Timers

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

- The ice machine is locked into the freeze cycle for 6 minutes before a harvest cycle can be initiated.
- The maximum freeze time is 60 minutes at which time the control board automatically initiates a harvest sequence (steps 5 & 6).

The maximum harvest time is 3.5 minutes at which time the control board automatically ends the harvest cycle. When the bin switch is closed a freeze sequence initiates (steps 3 & 4). When the bin switch is open an automatic shutoff sequence initiates.

Warm Water Rinse Cycle

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

After the 200th harvest cycle ends:

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

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