

# Seminar Topics



- **Product Introduction:**
  - BG260 Gourmet Cube
  - Koolaire UnderCounter
- **Indigo Air, Water**
  - Sequence of Operation 運轉順序
  - Troubleshooting 故障排除
- **NEO:**
  - Component Identification 元件識別
  - Sequence of operation 運轉順序
  - Troubleshooting 故障排除
- **KOOLAIRE:**
  - Introduction and Overview 簡介 & 總覽
  - Sequence of operation 運轉順序
  - Troubleshooting 故障排除

Indigo

# Introduction & Overview

簡介 & 總覽



- Display Interface (顯示介面)
- Menu Map (選單)
- Data Plate (訊息版)
- Model Number Definition (型號定義)
- Interface Model and Serial Number (介面型號與序號)
- Sequence of Operation (運轉順序)
- 4 Symptoms of Troubleshooting (4 種故障現象排除)
  - Air, Water

# Introduction & Overview (簡介 & 總覽)

## Display Interface (顯示介面)



# Display Interface (顯示介面)

This ice maker is equipped with a Liquid Crystal Display Module and Custom Keypad.

On / Off Button  
(開 / 關 按鈕)

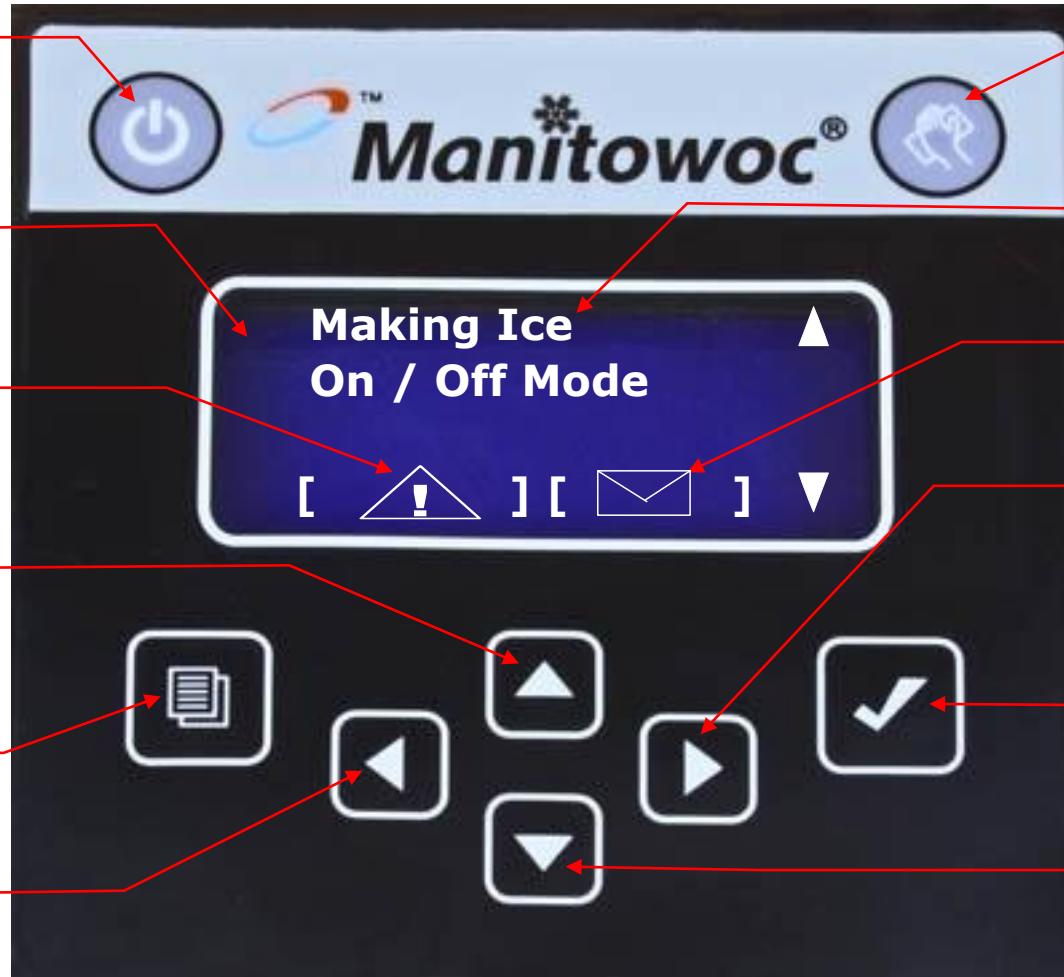
LCD Display  
(LCD 液晶顯示)

Error Icon  
(錯誤 圖示)

Up Arrow  
(Scrolls Up)  
(往上 箭頭)  
(捲上)

Menu  
(選單)

Left Arrow  
(Back Out)  
(往左 箭頭)  
(回上一層)



Clean Button  
(清潔按鈕)

Ice machine Status  
(製冰機狀態)

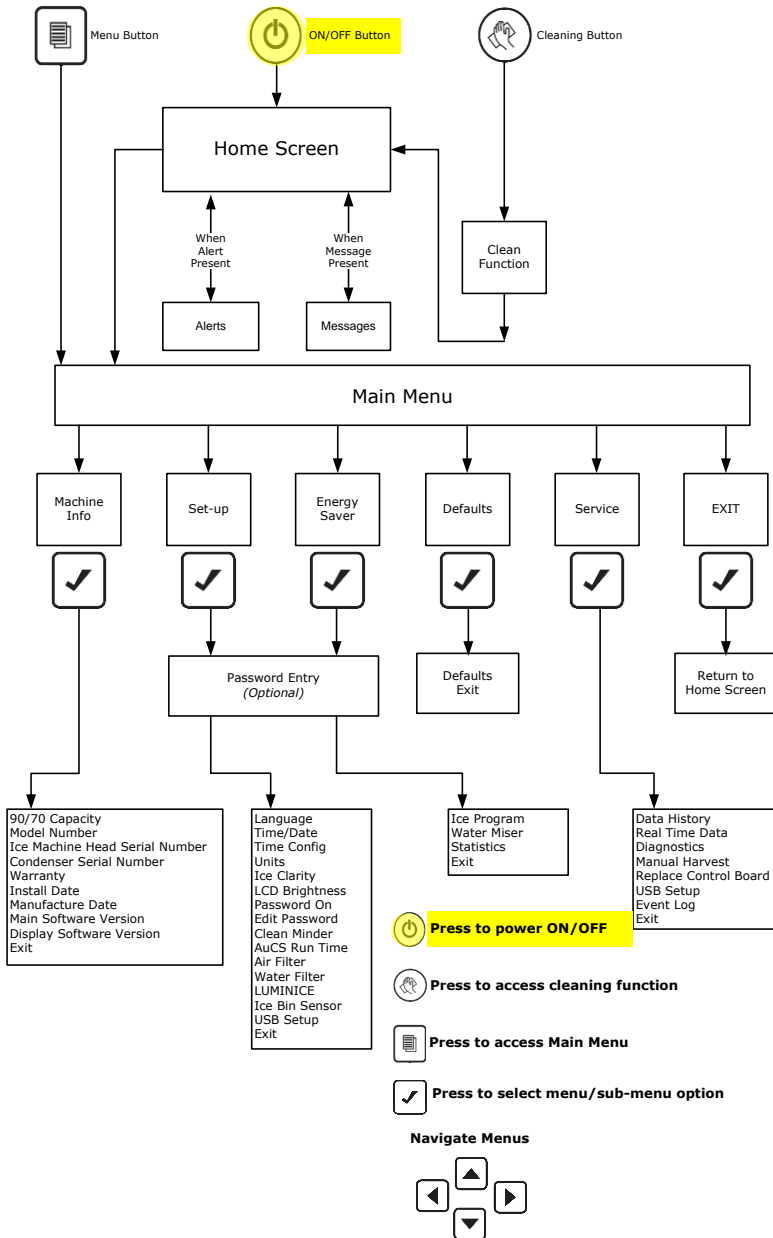
Message Icon  
(訊息 圖示)

Right Arrow  
(Drills In)  
(往右 箭頭)  
(進入下一層)

Check  
(確認)

Down Arrow  
(Scrolls Down)  
(往下 箭頭)  
(捲下)

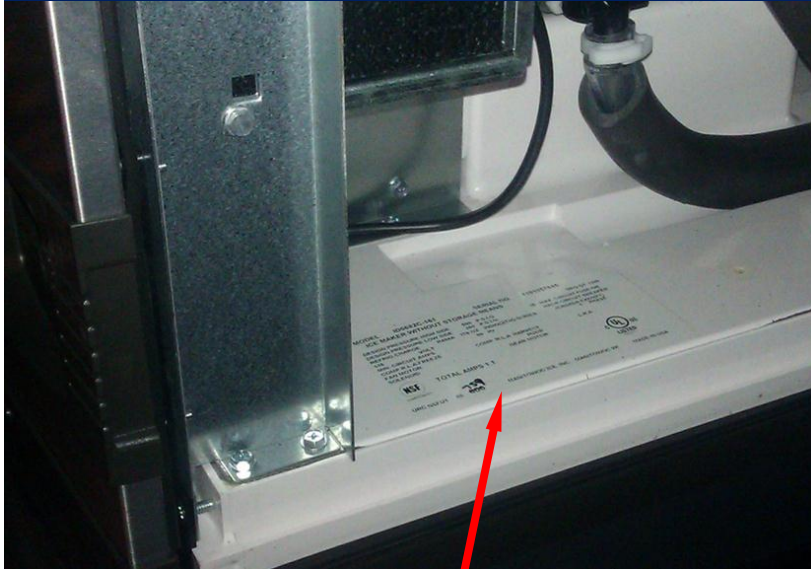
# Menu Map (選單)



- Power Buttons takes the place of a traditional Toggle Switch
- Pushing the Button, starts and stops the ice making sequence of operation.

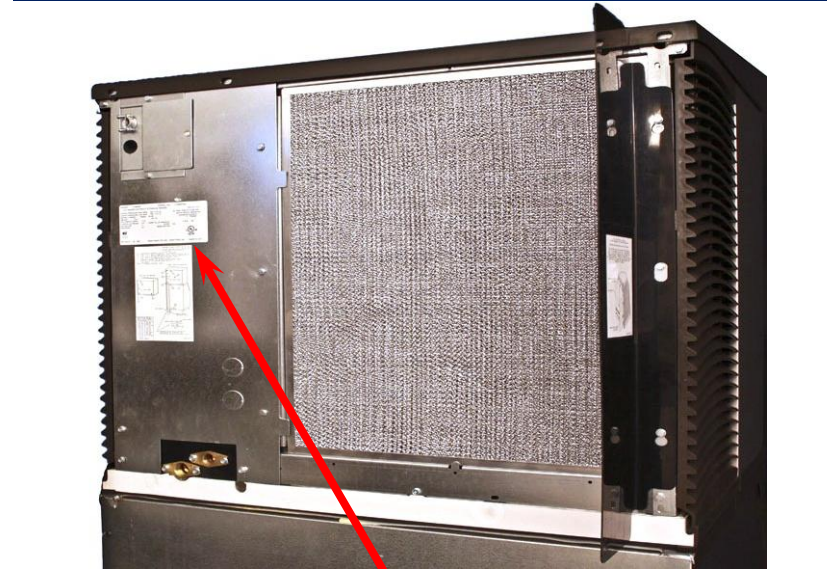
# Data Plate Location (訊息版位置)

Right Side View



Inside of Ice Machine  
(製冰機內)

Rear View



Back of Ice Machine  
(製冰機背面)



*\*\*Note\*The Model and Serial number on the Data Plate should match the Model and Serial number on the Interface for proper operation*

# Data Plate (訊息版)

Model  
(型號)

Refrigerant  
(冷媒)

Serial Number  
(序號)

<b>MODEL</b> IY0504A	<b>SERIAL NO.</b> 110560198	<b>MFG DT</b> 1208
<b>ICE MAKER WITHOUT STORAGE MEANS</b>		
DESIGN PRESSURE HIGH SIDE 500 P.S.I.G		20 MAX. CIRCUIT FUSE OR HACR CIRCUIT BREAKER (CANADA EXEMPT) 1 PHASE
DESIGN PRESSURE LOW SIDE 250 P.S.I.G		
<b>REFRIG.CHARGE</b> R404A 24 OZ		
115 VOLT 60 Hz		
MIN. CIRCUIT AMPS. 16.3		
COMP. R.L.A. FREEZE 12.1	COMP. R.L.A. HARVEST	L.R.A. 66.0
FAN MOTOR 0.7	PUMP 0.4	
SOLENOID 0.1	GEAR MOTOR	
		
URC NSFU1 02 143	MANITOWOC ICE, INC. – MANITOWOC WI	MADE IN USA

Voltage  
(電壓)

Manufactured Date  
(製造日期)



NOTE: There is no date code in the serial number. The Manufactured Date is by Year then Month (1208 = 2012 / August).



# Model Number Definition (型號定義)



# CUBE SIZE    CONDENSER TYPE  
 0 REGULARAIR-COOLED  
 1 REGULARWATER-COOLED  
 2 DICE            AIR-COOLED  
 3 DICE            WATER-COOLED  
 4 HALF-DICE     AIR-COOLED  
 5 HALF-DICE     WATER-COOLED  
 6 INDIGO™ PERFORMANCE PLUS

CONDENSER TYPE  
 A SELF-CONTAINED AIR-COOLED  
 W SELF-CONTAINED WATER-COOLED  
 N REMOTE AIR-COOLED  
 C CVD AIR-COOLED

ADDITIONAL SPECS  
 3 PHASE  
 E – WRAS 50 Cycle Only  
 NO INDICATOR – 1 Phase

ICE CUBE SIZE  
 R REGULAR  
 D DICE  
 Y HALF DICE  
 Not Used On IB Models

# HERTZ  
 5 -50HZ  
 6 -60HZ  
 P – Correctional Model  
 M – Marine Model

ICE MACHINE MODEL  
 I – Indigo Model  
 IB – Ice Beverage

Ice Machine Series

0 to 6 & 8 – Self-Contained Unit  
 7&8 – CVD Remote Condensing Unit  
 9 – Remote Air-Cooled Condense  
 Or  
 9 – Ice Beverage Remote Condensing Unit

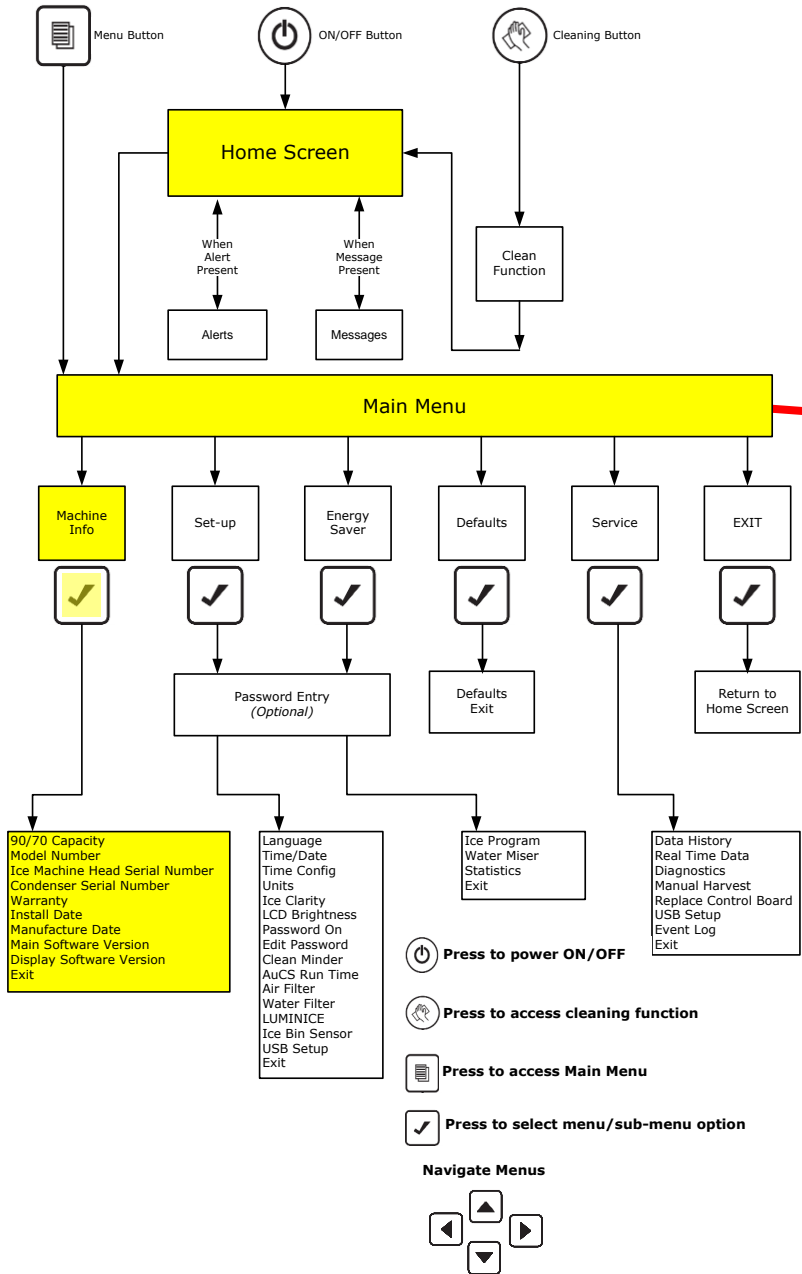
# VOLTAGE  
 161 - 115/60/1  
 261 – 208-230/60/1  
 251 – 230/50/1  
 263 – 208-230/60/3  
 463 – 460/60/3

X - Luminice  
 HP – High Pressure Water  
 Regulating Valve

I Y 0504 A 3 - 263 P H P X

**NOTE: This section of the Model number is the only portion used to manually program replacement Indigo Control boards.**

# Interface Model and Serial (介面型號與序號)





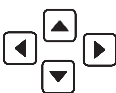


•To Find the Menu and to get to the Machine information, press menu button.

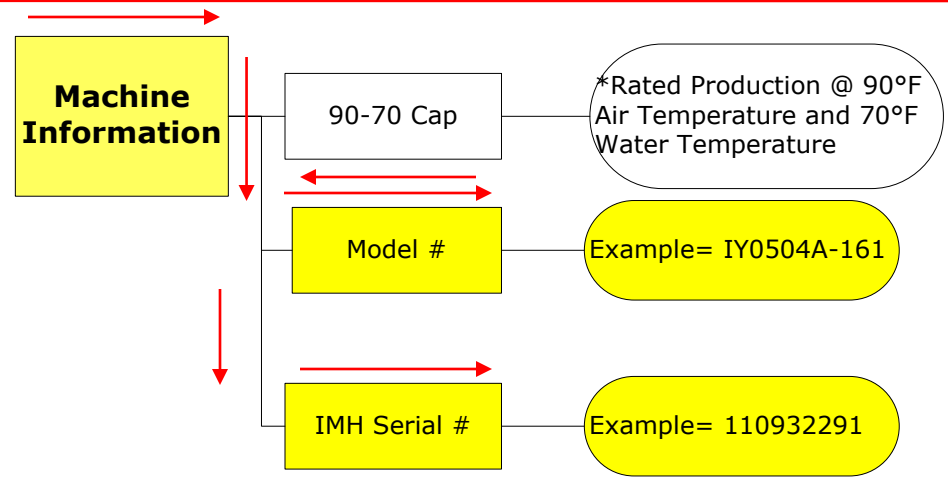


•With the Brackets around Machine information press the Checkmark or Right Arrow.



-  Press to power ON/OFF
  -  Press to access cleaning function
  -  Press to access Main Menu
  -  Press to select menu/sub-menu option
- Navigate Menus**
- 

# Interface Model and Serial (介面型號與序號)





- Indigo Overview (總覽)
- Display Interface (顯示介面)
- Menu Map (選單)
- Data Plate (訊息版)
  - *Location* (位置)
  - *Information* (信息)
- Model Number Definition (型號定義)
- Interface Model and Serial (介面型號與序號)

Indigo

# SEQUENCE OF OPERATION

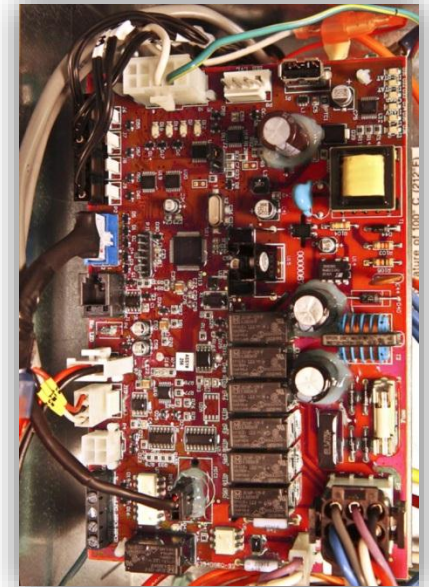
## (運轉順序)

# Sequence of Operation (運轉順序)

Indigo self-contained air, water, and traditional remote



## 控制機板



## 顯示介面



## Indigo Control Boards (控制機板)



“E” Control Board  
 (“E” 控制機板)



“G” Control Board  
 “G” 控制機板



“H” Control Board  
 “H” 控制機板

 Press the Power Button to start Making Ice!

The Power Button and the water curtain/ice dampers must be in place on the evaporator before the ice machine will start.





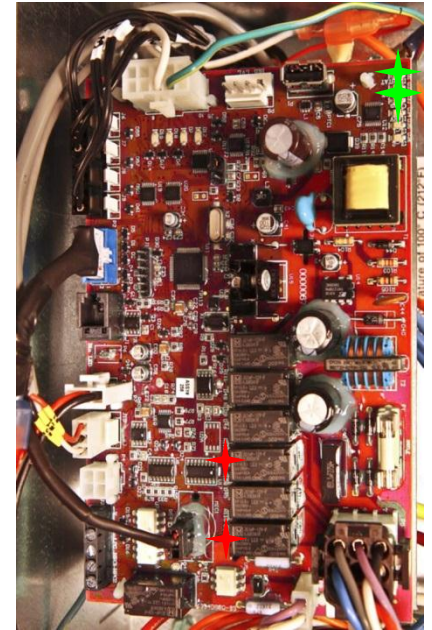
1

Purge  
45 Sec



## Energized Parts

- Water Pump (水泵)
- Dump Valve (排水閥)



# Pressure Equalization (壓力均衡)

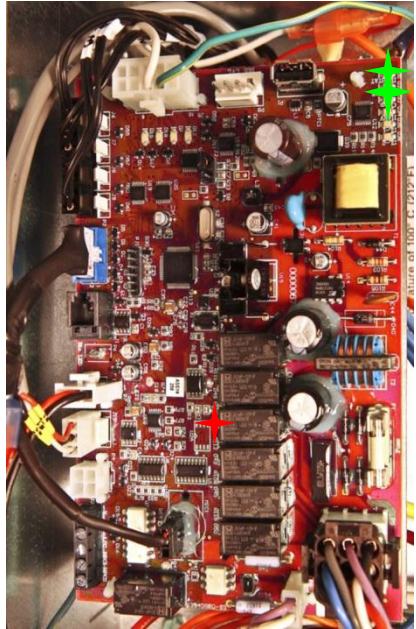
1

Purge	Equalize
45 Sec	5 Sec



## Energized Parts

- Harvest Valve (收冰閥)
- Air Pumps (氣泵)



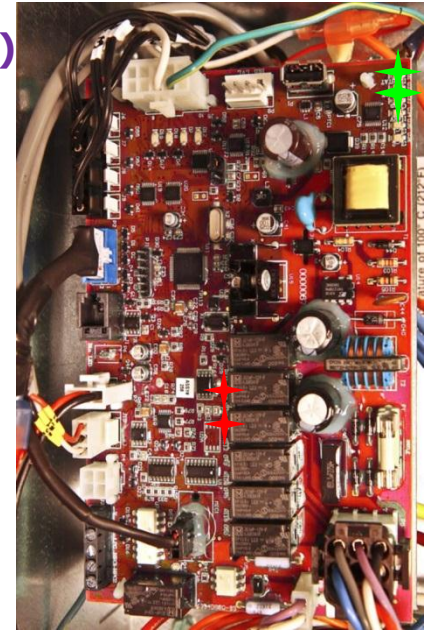
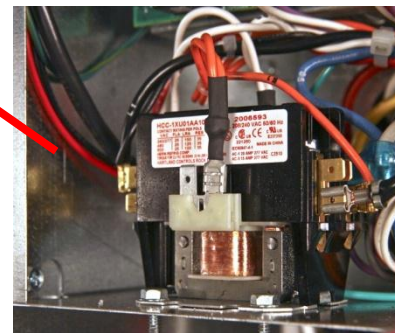
# Start-Up (起機)

1	2	
Purge	Equalize	Start
45 Sec	5 Sec	5 Sec



## Energized Parts

- Harvest Valve (收冰閥)
- Air Pump (氣泵)
- Contactor Coil (接觸電磁閥)  
(Compressor and Fan)



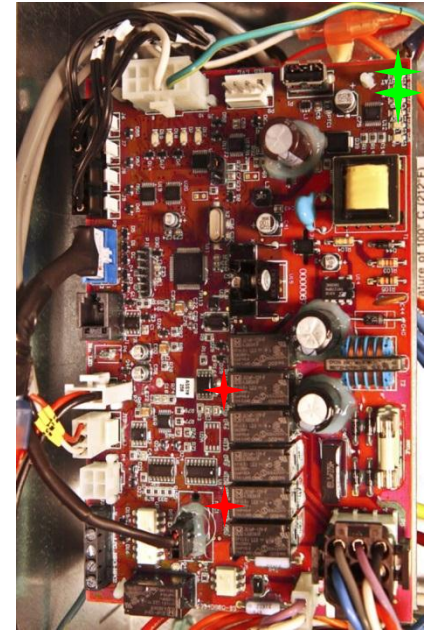
# Pre-Chill (預冷)

1	2	3
Purge	Equalize	Start
45 Sec	5 Sec	5 Sec
		<b>Pre-Chill</b> <b>120 Sec.</b> <b>(first cycle)</b> <b>30 Sec.</b> <b>(thereafter)</b>



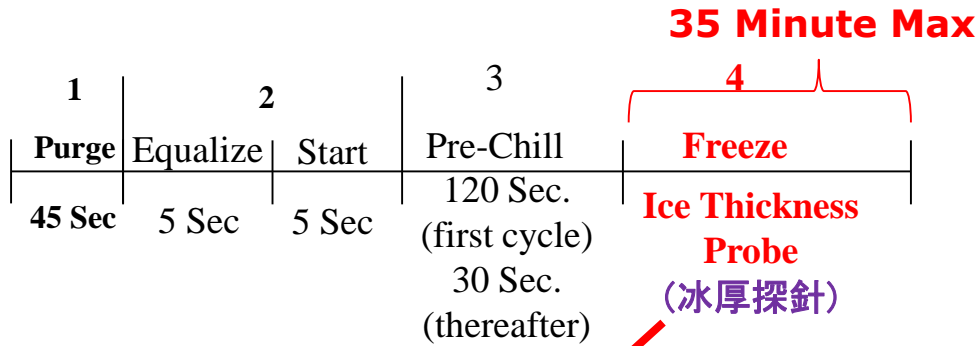
## Energized Parts

- **Water Fill Valve**  
(進水閥)  
(Looking for WLP)
- **Contactor Coil**  
(接觸電磁閥)  
(Compressor and Fan)



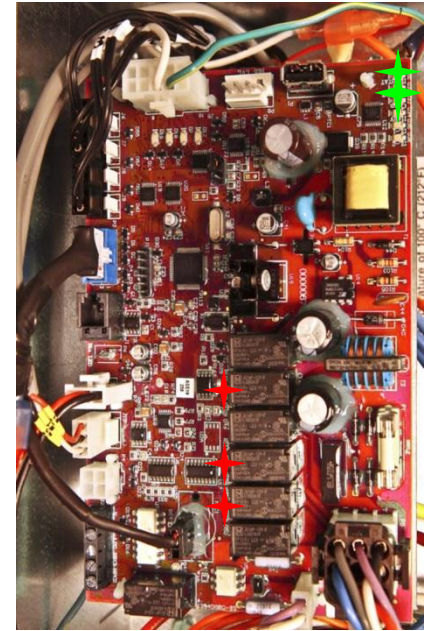
**Water Level Probe (水位探針)**

# Freeze (冷凍) "H" Control Board with Revision 5.010 and newer

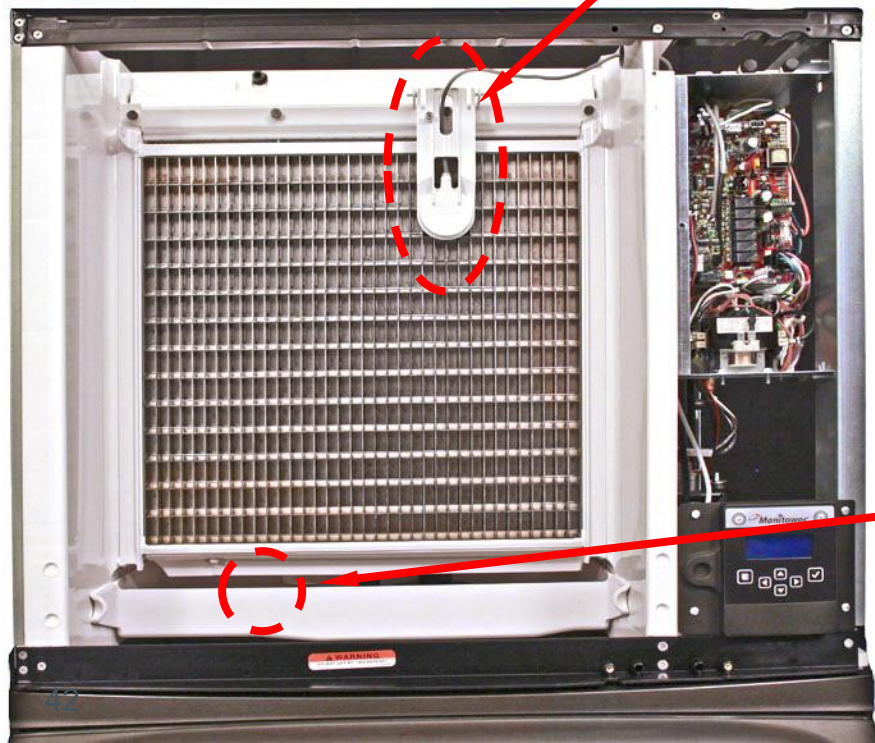


## Energized Parts

- **Water Pump (水泵)**
- **Water Fill Valve (進水閥)**  
(Looking for WLP)
- **Contactor Coil (接觸電磁閥)**  
(Compressor and Fan)



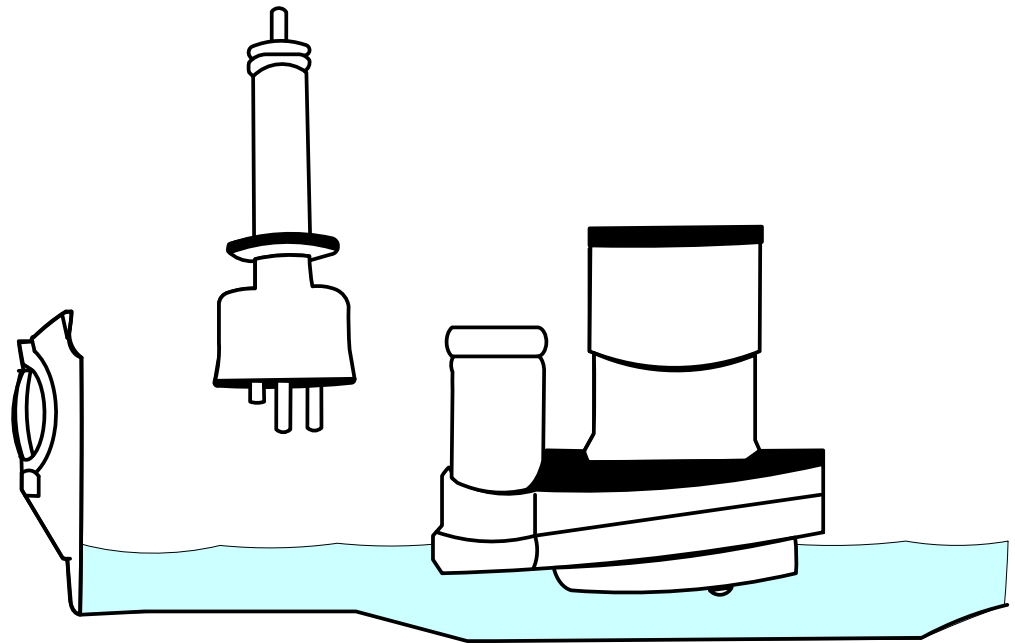
**Water Level Probe (水位探針)**



# Water Level Probe Operation (WLP)

- During freeze cycle the water level will drop away from the “High” Probe.
- Water valve will energize again until the “High” probe is satisfied and stay energized for an additional 6 seconds.
- **Single Evaporator:** Maximum water fill time is **6.5** minutes per fill **X2** fills during freeze.
- **Dual Evaporator:** Maximum water fill time is **8.5** minutes per fill **X2** fills during freeze.

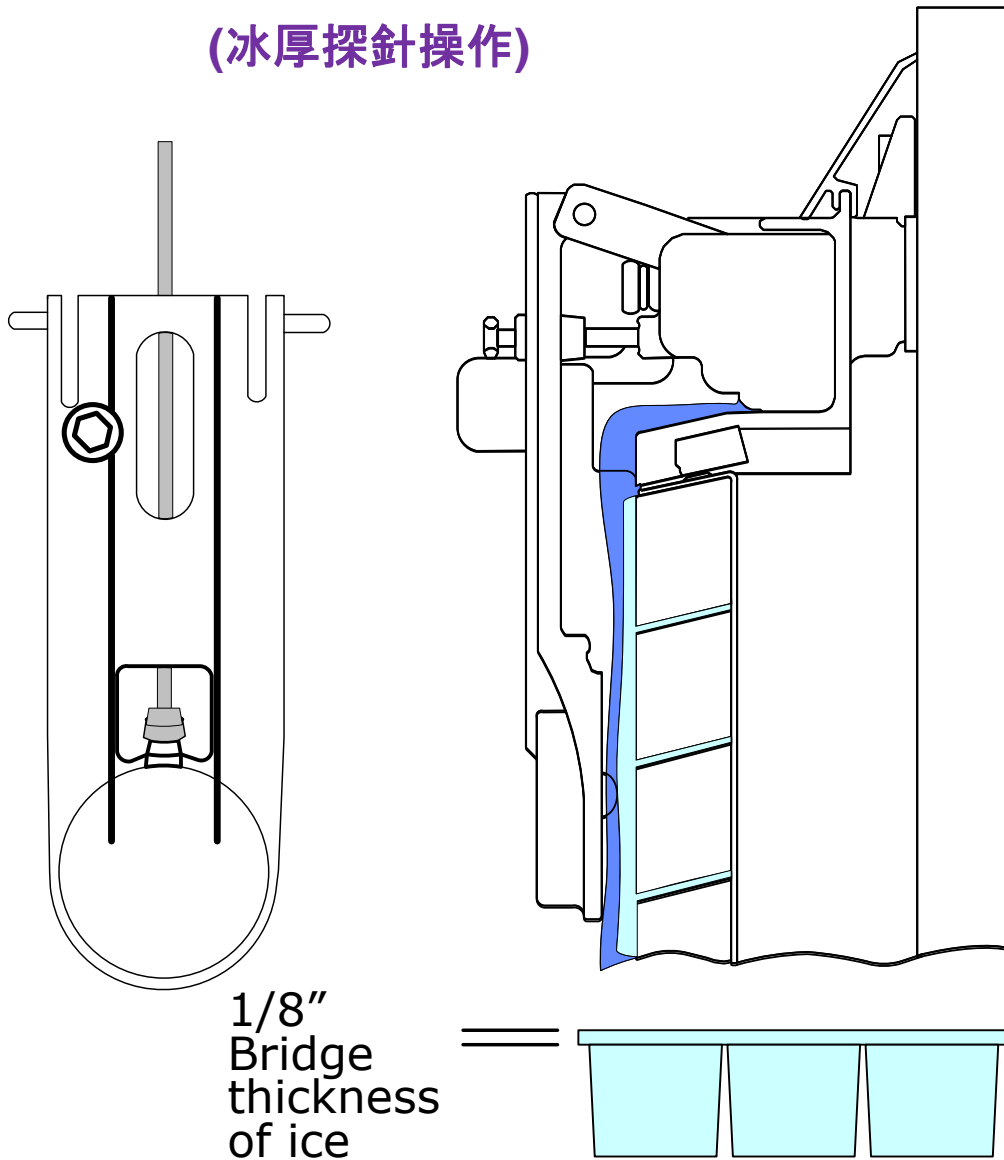
## (水位探針操作)



**NOTE:** at the end of Freeze the water level should not be touching the WLP.

# Ice Thickness Probe Operation (ITP)

## (冰厚探針操作)



- The Ice Thickness Probe (ITP) senses ice on the evaporator and signals the control board to start a harvest cycle.
- At the start of every freeze cycle the Ice Machine is locked into a 6 Minute Freeze cycle
- The 6 Minute Lock in can be overridden only by the manual harvest through the interface display.
- When the ITP comes in contact with the ice and after the 6 minute Lock in, the ice machine will go into harvest.

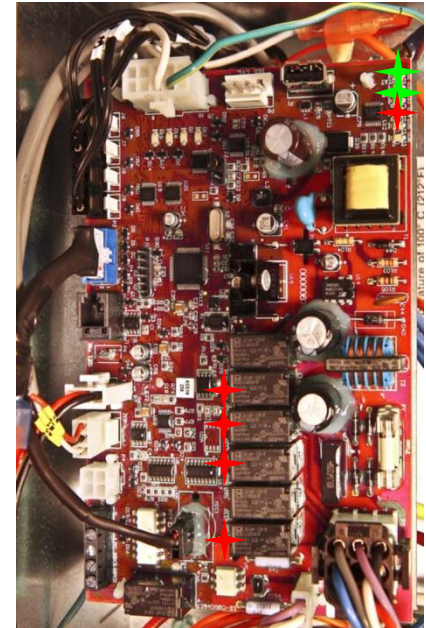
# Harvest Purge (收冰與清除)

1	2	3	4	5 Harvest
Purge	Equalize	Start	Pre-Chill	Purge
45 Sec	5 Sec	5 Sec	120 Sec. (first cycle) 30 Sec. (thereafter)	45 Sec
			Ice Thickness Probe	



## Energized Parts

- Harvest Valve (收冰閥)
- Air Pump (氣泵)
- Water Pump (水泵)
- Dump Valve (排水閥)
- Contactor Coil (接觸電磁閥)  
(Compressor and Fan)





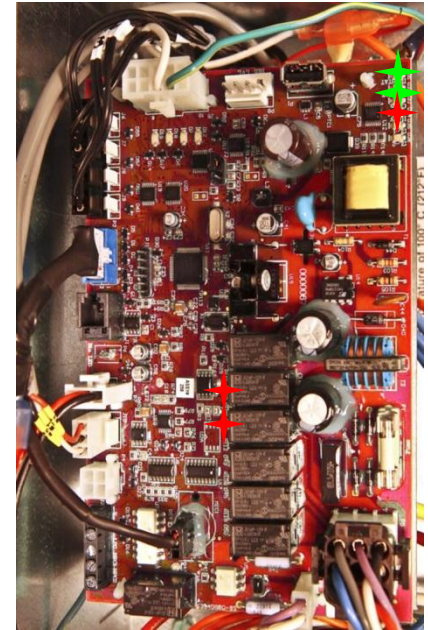
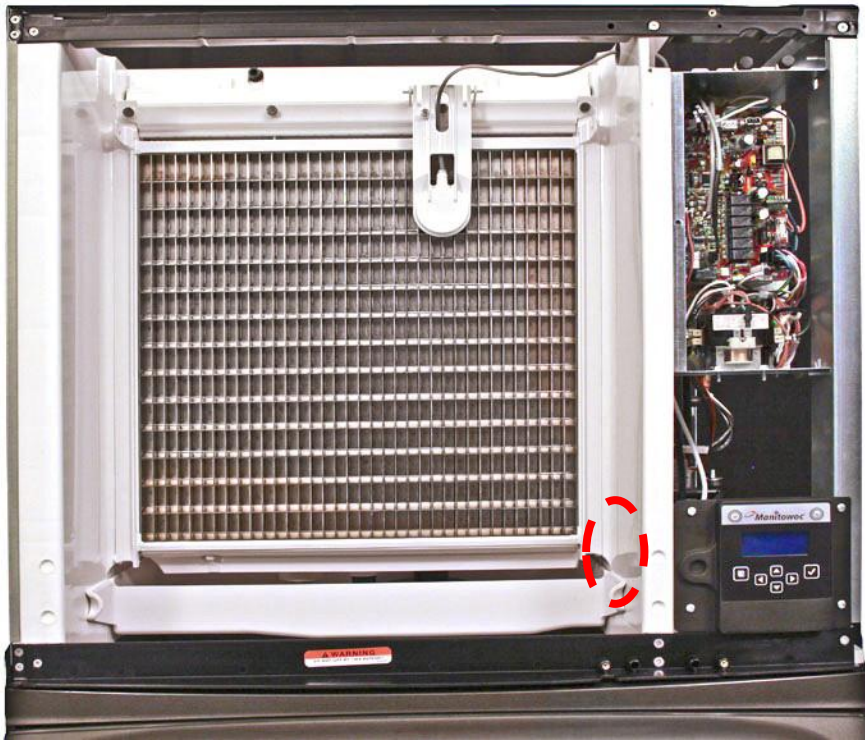
# Harvest (收冰) "H" Control Board with Revision 5.010 and newer

1	2	3	4	5 Harvest	6
Purge	Equalize	Start	Pre-Chill	Purge	Harvest
45 Sec	5 Sec	5 Sec	120 Sec. (first cycle) 30 Sec. (thereafter)	45 Sec	Bin Switch (盒子開關)
			Ice Thickness Probe	7 Minute Max	

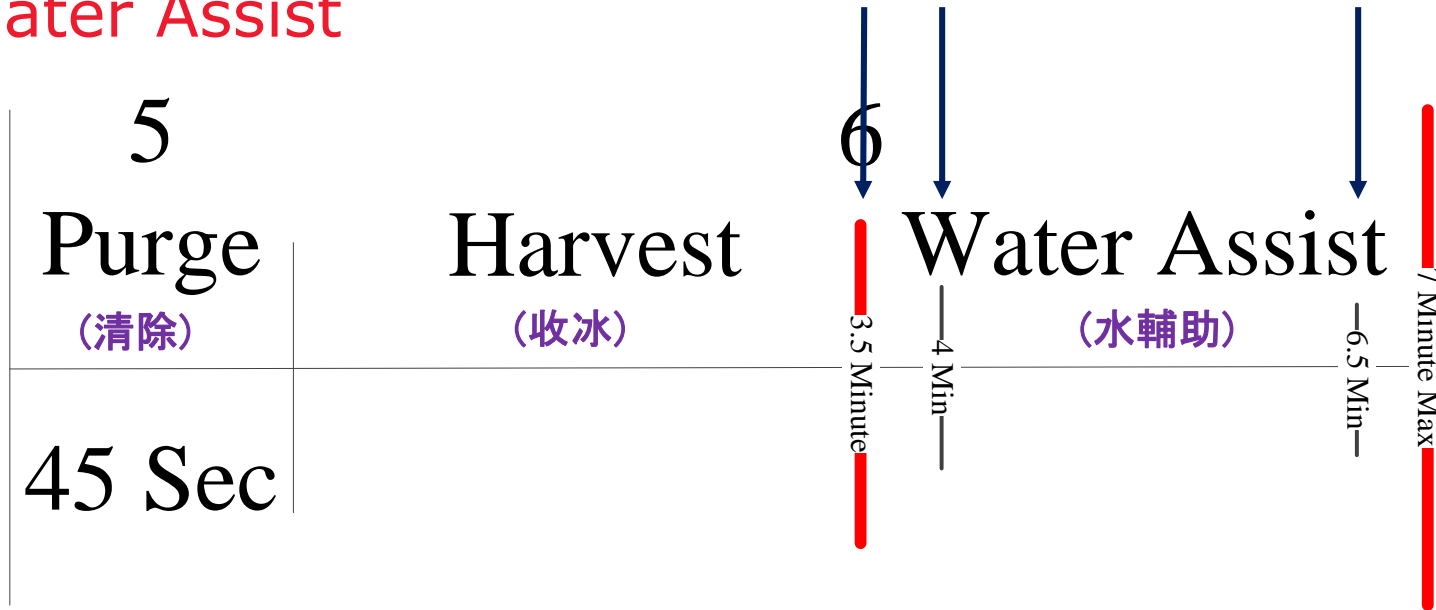


## Energized Parts

- Harvest Valve (收冰閥)
- Air Pump (氣泵)
- Contactor Coil (接觸電磁閥)  
(Compressor and Fan)



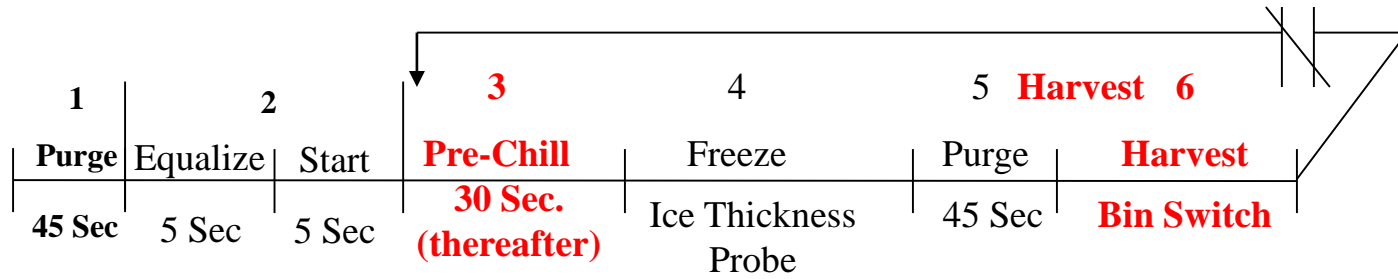
## Water Assist



- @ 3.5 Minutes = Water Solenoid is energized and fills to the high water level probe, (Full Water trough of ambient Water).
- @ 4.0 Minutes = Water pump will come on, (Circulate Water).
- @ 6.5 Minutes = Dump valve is energized for 30 seconds, (Clearing the water trough of water)

**NOTE:** The Curtain Switch can terminate harvest anytime during harvest.

# Return to pre-chill (返回預冷)

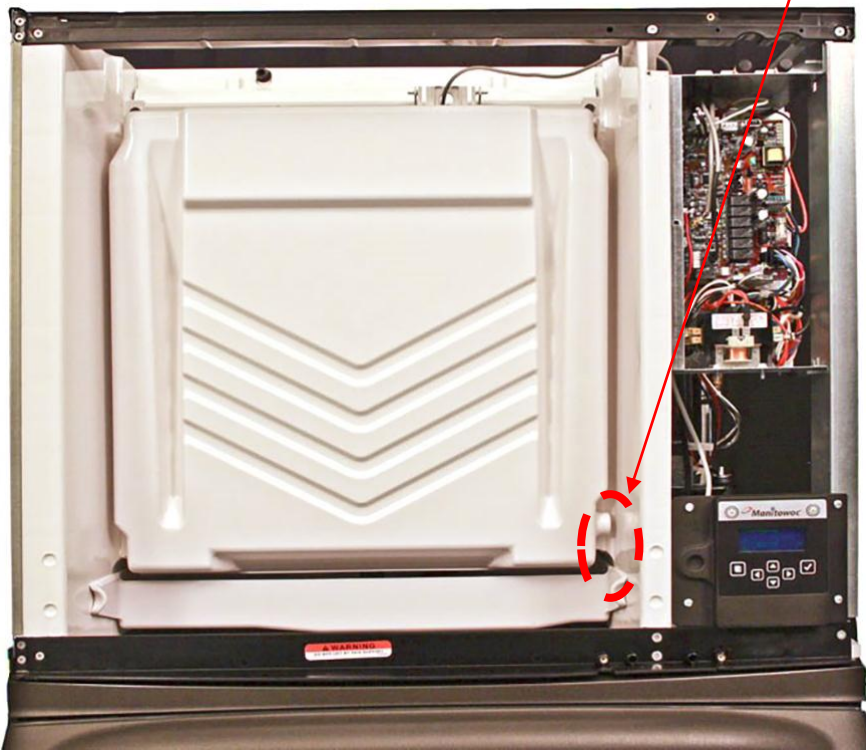


Bin Switch  
Opens &  
Closes  
Within 30  
Seconds

(盒子開關  
30秒以內打  
開侯關閉)

## Bin Switch Activation

- Return to Pre-chill

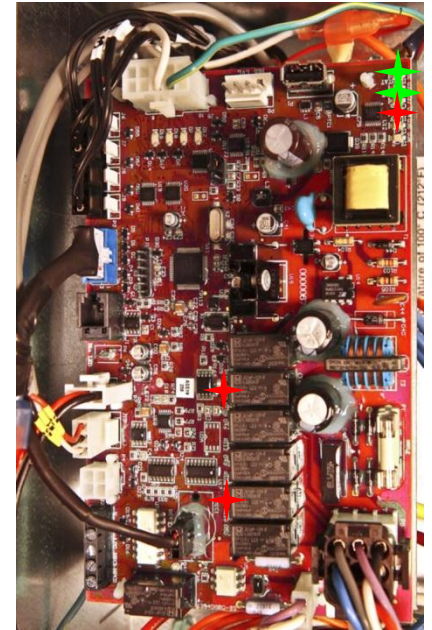


## Energized Parts

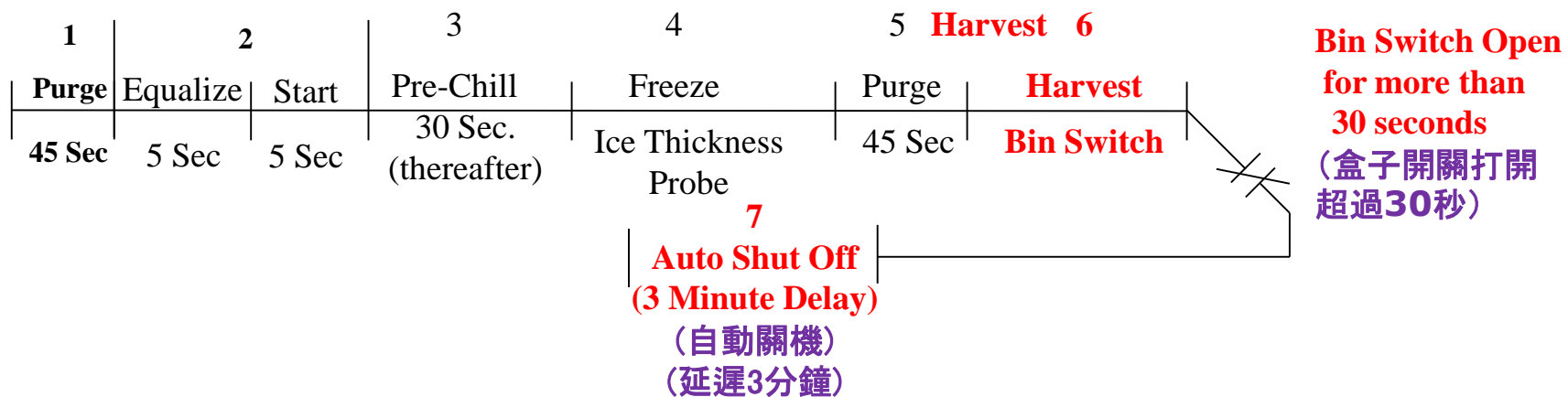
- Water Fill Valve (進水閥)  
(Looking for WLP)
- Contactor Coil (接觸電磁閥)  
(Compressor and Fan)



Water Level Probe (水位探針)



# Auto Shut-Off (自動關機)

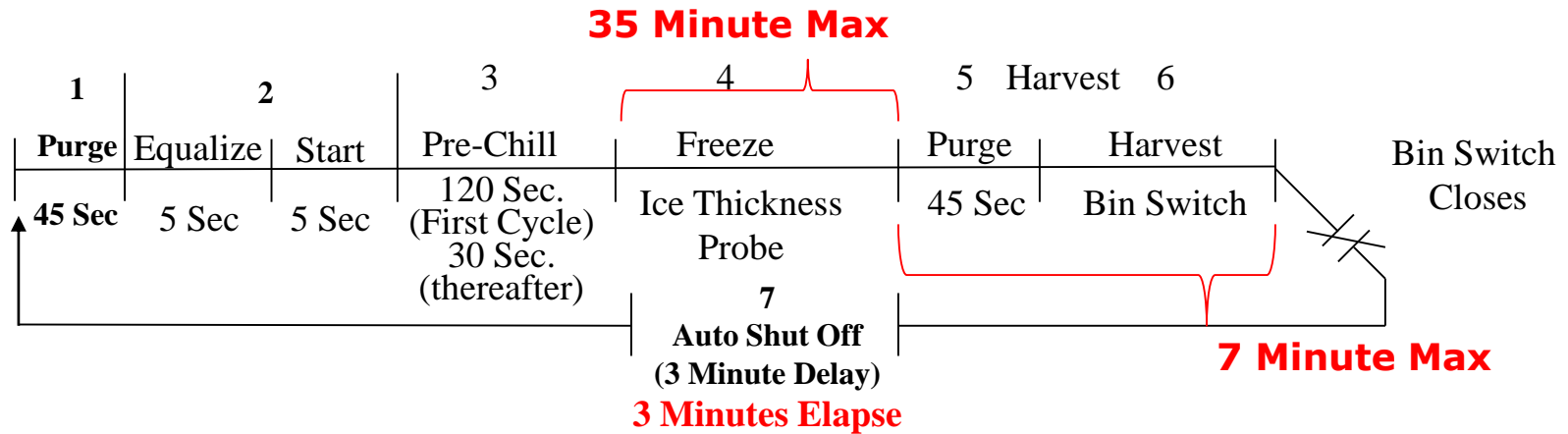


## Auto Shut-Off

- Bin Switch Open for 30 Seconds
- 3 Minute Delay for a Restart



# Auto Restart (自動重啟) With Revision 5.010



## “H” Control Board with\*5.010 Firmware Timers:

- *6 Minute Lock in on all Freeze Cycles*
- *35 Minute Max Freeze Cycle*
- *7 Minute Max Harvest Cycle*
- *Water Assist*
- *Water fill*
  - *Single Evap (6.5 min max X2 fills)*
  - *Dual Evap (8.5 min max X2 fills)*



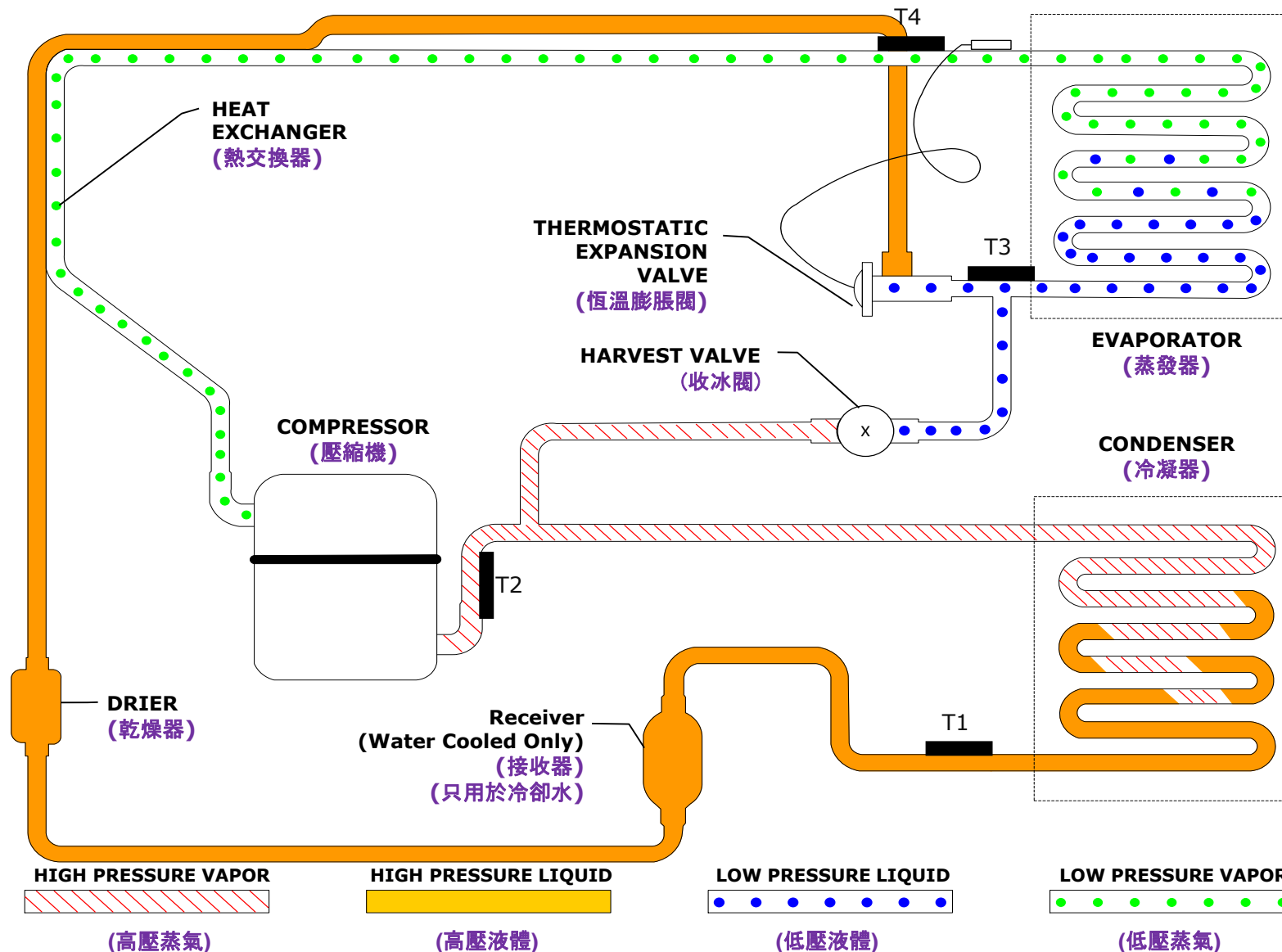


- Sequence of operation (運轉順序)
  - Purge (清除)
  - Equalize (壓力均衡)
  - Refrigeration start (開始製冷)
  - Pre-Chill (預冷)
  - Freeze (冷凍)
  - Water Purge (清除)
  - Harvest (收冷)
  - Auto shut off (自動關機)

# Refrigeration System

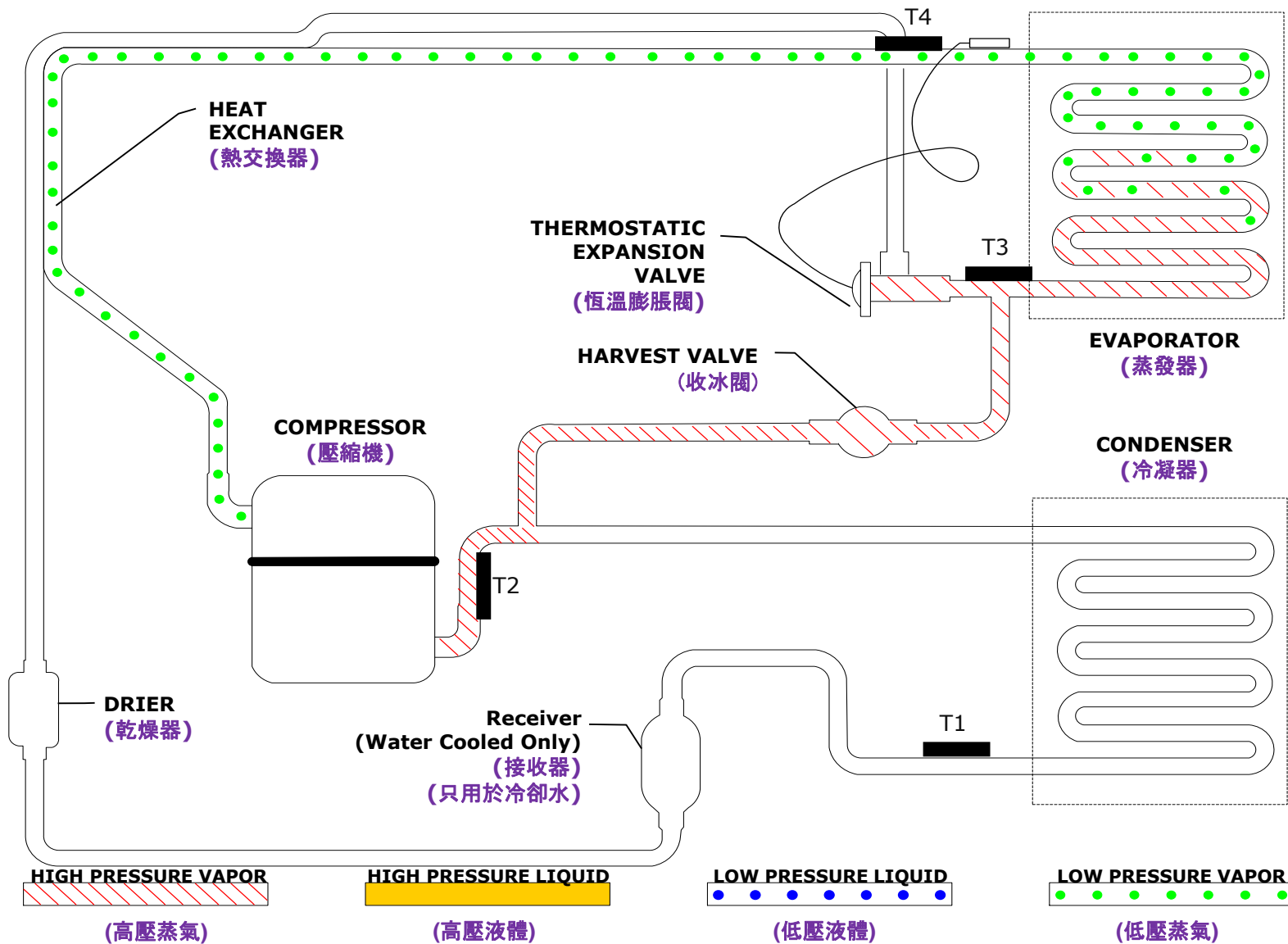


# Self-Contained Tubing Freeze Cycle





# Self-Contained Tubing Harvest Cycle



# Self-Contained Air Cooled

## Top Air Discharge Kit

(頂空排氣)



Kit	For use with Series
K-00379	S Series 450, 500 and 600 models Top Air Discharge Kit.
K-00438	22" Indigo or S-Series 322 and 522 models.
K-00439	30" Indigo 450, 500, 600 and 606 models.

### Top Air Discharge Kit Installation Instructions

**WARNING**  
Disconnect electric power to the ice machine (and dispenser if applicable) at the electric switch box before proceeding.

1. Open front door
2. Remove top panel
3. Remove louvered left and right side panels
4. Install new solid left and right side panels and secure with Qty(2) screws each.
5. Install louvered top panel
6. Secure front door
7. Apply power

Manitowoc Ice  
2110 South 26<sup>th</sup> Street, P.O. Box 1720, Manitowoc, WI 54221-1720 USA  
Telephone 920-682-0161, Fax - Sales: 920-683-7589, Service/Parts: 920-683-7585, Other: 920-683-7879  
Web Site - [www.manitowocice.com](http://www.manitowocice.com)

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Revision 00



- Refrigeration System
  - Air-Cooled/Water-Cooled
    - Top Air Discharge

## Four Symptoms of Troubleshooting

### (4 種故障現象排除)

- **Symptom #1** - Ice Machine Stops Running (製冰機停止運行)
  - Power Button has been Pushed  
AND/OR
  - Has a History of Shutting Down
- **Symptom #2** - Ice Machine has a Long Freeze Cycle (過長冷凍週期)
  - Ice Formation is Thick or Thin on Top or Bottom of Evaporator  
OR
  - Low (slow) Ice Production
- **Symptom #3** - Ice Machine Will Not Harvest – Freeze Cycle is Normal and Ice Cubes are NOT Melted After Attempted Harvest (製冰機不會收冰)
  - Safety Limit #2 (possible) •(冷凍週期正常,嘗試收冰後, 冰塊不融化)
- **Symptom #4** - Ice Machine Will Not Harvest – Freeze Cycle is Normal and Ice Cubes are Melted After Attempted Harvest (製冰機不會收冰)
  - Safety Limit #2 (possible) •(冷凍週期正常,嘗試收冰後, 冰塊融化)

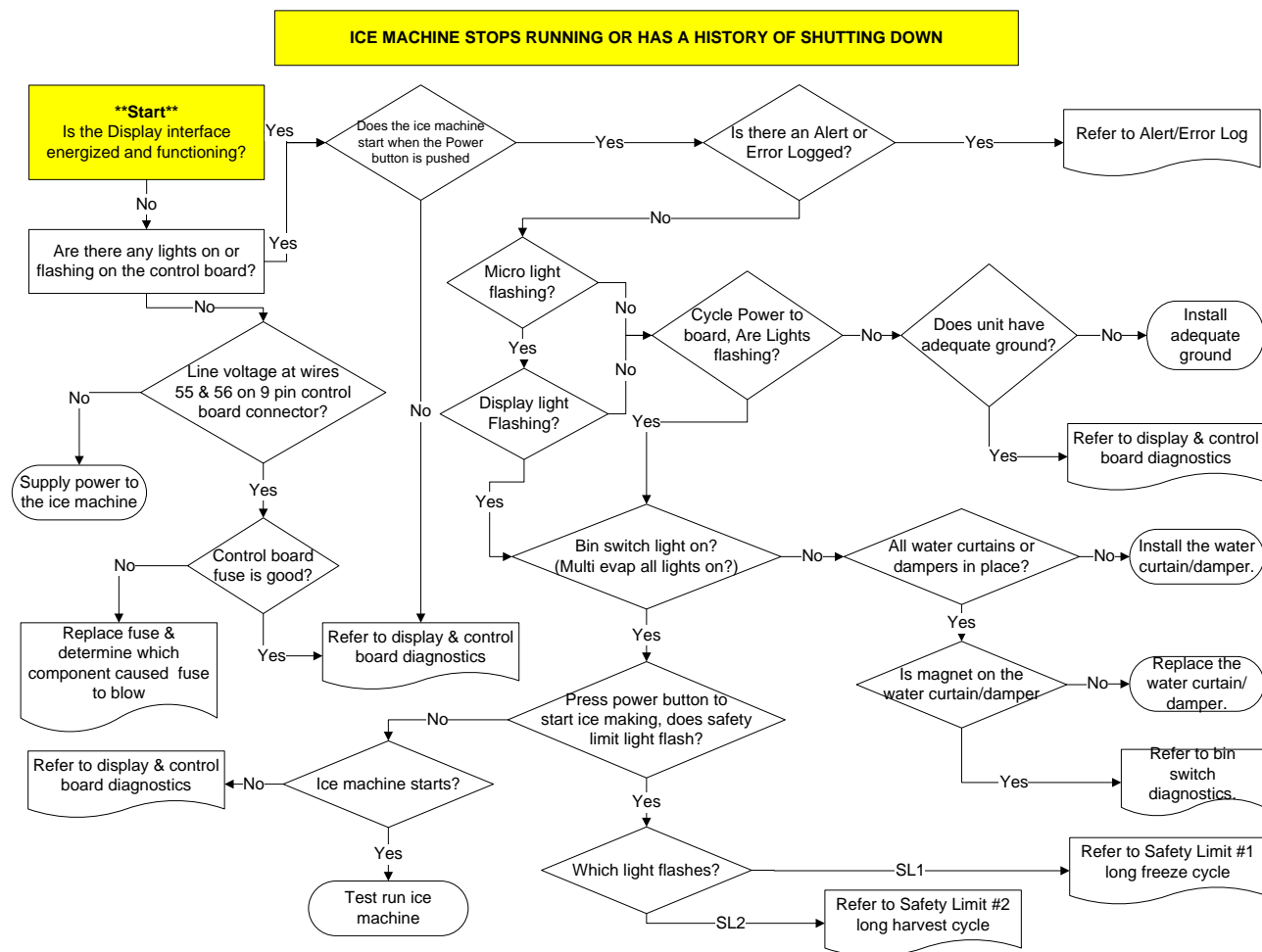
# Symptom #1 (故障現象 #1)

Ice Machine Stops Running

(製冰機停止運行)

AND/OR

Has a History of Shutting Down



# Symptom #2 (製冷系統操作分析表)

## Refrigeration Operational Analysis Table

Operational Analysis	1	2	3	4
<b>Ice Production</b> Air-Temperature Entering Condenser _____ Water Temperature Entering Ice Machine _____ Published 24 hour ice production _____ Calculated (actual) ice production _____ NOTE: The ice machine is operating properly if the ice fill patterns is normal and ice production is within 10% of charted capacity.				
<b>Installation and Water System</b> All installation and water related problems must be corrected before proceeding with chart.				
<b>Ice Formation Pattern</b> Ice formation is extremely thin on outlet of evaporator -or- No ice formation on the entire evaporator	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- Ice formation is extremely thin on inlet of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- No ice formation on entire evaporator	
<b>Freeze Cycle Discharge Pressure</b> 1 minute Middle End into cycle	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.			
<b>Freeze Cycle Suction Pressure</b> _____ 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.			
	<b>Suction pressure is High</b>	<b>Suction pressure is Low or Normal</b>	<b>Suction pressure is High</b>	<b>Suction pressure is High</b>
Wait 5 minutes into the freeze cycle. Compare temperatures of <b>evaporator inlet &amp; evaporator outlet.</b> Inlet _____ °F (°C) Outlet _____ °F (°C) Difference _____ °F (°C)	Inlet and outlet <b>within 7°F (4°C)</b> of each other	Inlet and outlet <b>not within 7°F (4°C)</b> of each other -and- Inlet is colder than outlet	Inlet and outlet <b>within 7°F (4°C)</b> of each other -and- Inlet and outlet <b>not within 7°F (4°C)</b> of each other -and- Inlet is warmer than outlet	Inlet and outlet <b>within 7°F (4°C)</b> of each other
Wait 5 minutes into the freeze cycle. Compare temperatures of <b>compressor discharge line and harvest valve inlet.</b>	The harvest valve inlet is <b>Hot</b> -and- approaches the temperature of a <b>Hot</b> compressor discharge line.	The harvest valve inlet is <b>Cool</b> enough to hold hand on -and- the compressor discharge line is <b>Hot</b> .	The harvest valve inlet is <b>Cool</b> enough to hold hand on -and- the compressor discharge line is <b>Cool</b> enough to hold hand on.	The harvest valve inlet is <b>Cool</b> enough to hold hand on -and- the compressor discharge line is <b>Hot</b> .
<b>Discharge Line Temperature</b> Record freeze cycle discharge line temperature at the end of the freeze cycle _____ °F (°C)	Discharge line temperature <b>150°F (65°C) or higher</b> at the end of the freeze cycle. <b>S850/S1000 Air &amp; Water Only</b> Discharge Line Temperature <b>140°F (60°C) or higher</b> at the end of the freeze cycle	Discharge line temperature <b>150°F (65°C) or higher</b> at the end of the freeze cycle. <b>S850/S1000 Air &amp; Water Only</b> Discharge Line Temperature <b>140°F (60°C) or higher</b> at the end of the freeze cycle	Discharge line temperature <b>less than 150°F (65°C)</b> at the end of the freeze cycle. <b>S850/S1000 Air &amp; Water Only</b> Discharge Line Temperature <b>less than 140°F (60°C)</b> at the end of the freeze cycle	Discharge line temperature <b>150°F (65°C) or higher</b> at the end of the freeze cycle. <b>S850/S1000 Air &amp; Water Only</b> Discharge Line Temperature <b>140°F (60°C) or higher</b> at the end of the freeze cycle
<b>Final Analysis</b> Enter total number of boxes checked in each column.	<b>Harvest Valve Leaking</b>	<b>Low on Charge</b> -or- <b>TXV Starving</b>	<b>TXV Flooding</b>	<b>Compressor</b>

# INDIGO®



## Symptom #3 (故障現象 #3)

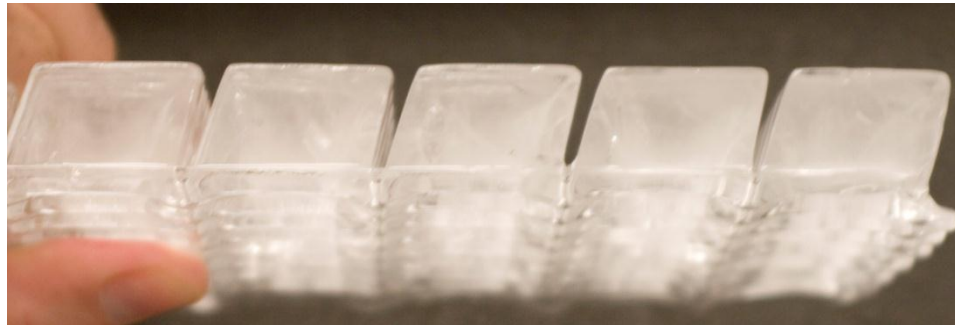
Ice Machine Will Not Harvest – Freeze Cycle is Normal and Ice Cubes are NOT Melted After Harvest.

Near the end of a 3.5 minute harvest cycle the sheet of ice cubes has not dropped. The sheet of ice may have to be pulled out by hand.

- Safety Limit #2 (possible)

(製冰機不會收冰)

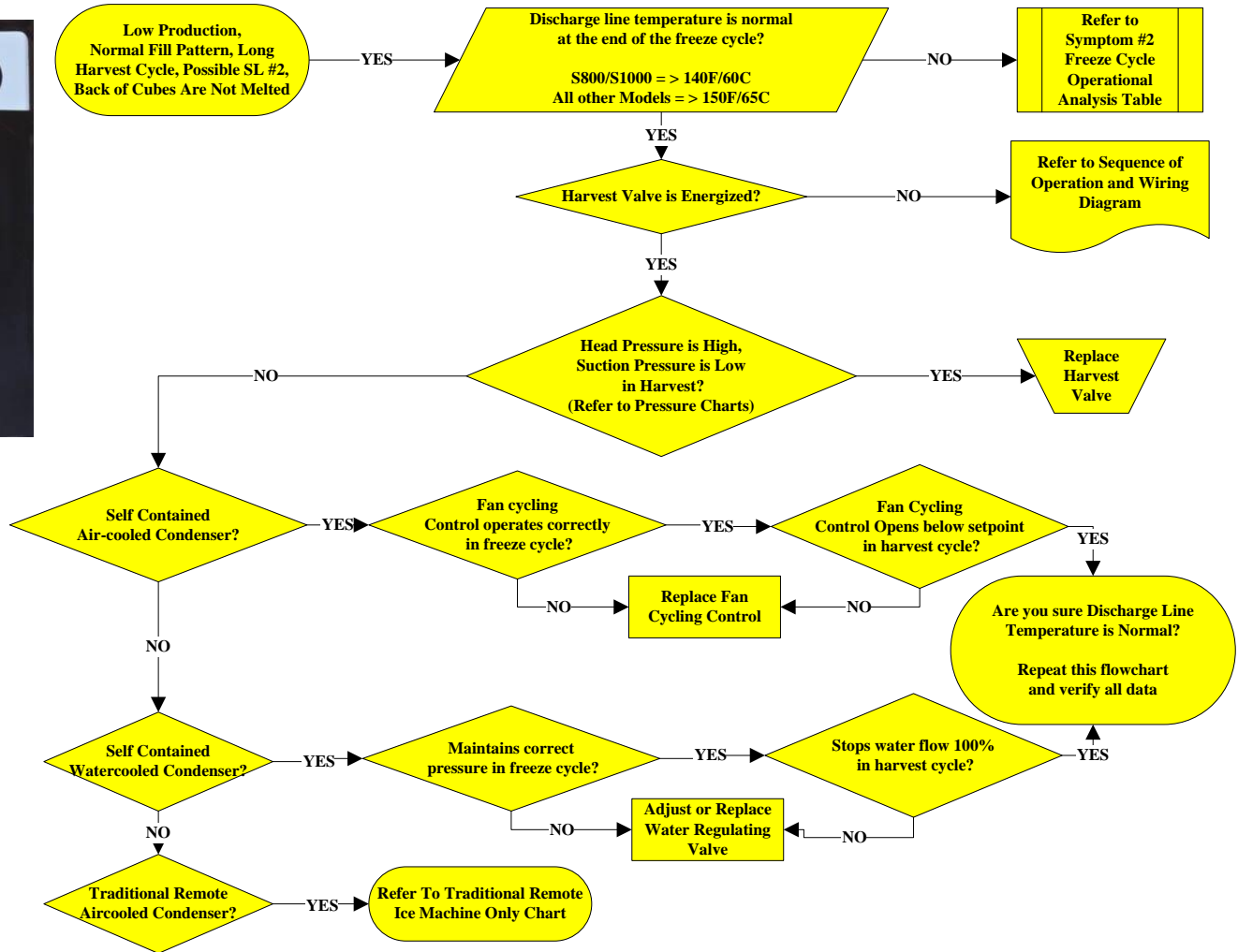
- (冷凍週期正常,嘗試收冰後, 冰塊不融化)



**Ice Cubes are Not Melted After Harvest (Normal)**

# Flow Chart #3 (流程圖 #3)

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



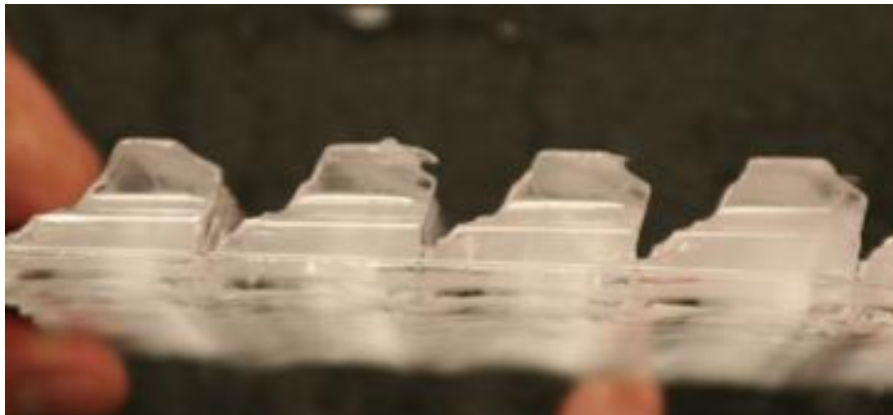


## Symptom #4 (故障現象 #4)

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

Near the end of a 3.5 minute harvest cycle the sheet of ice cubes has not dropped. The sheet of ice may have to be pulled out by hand.

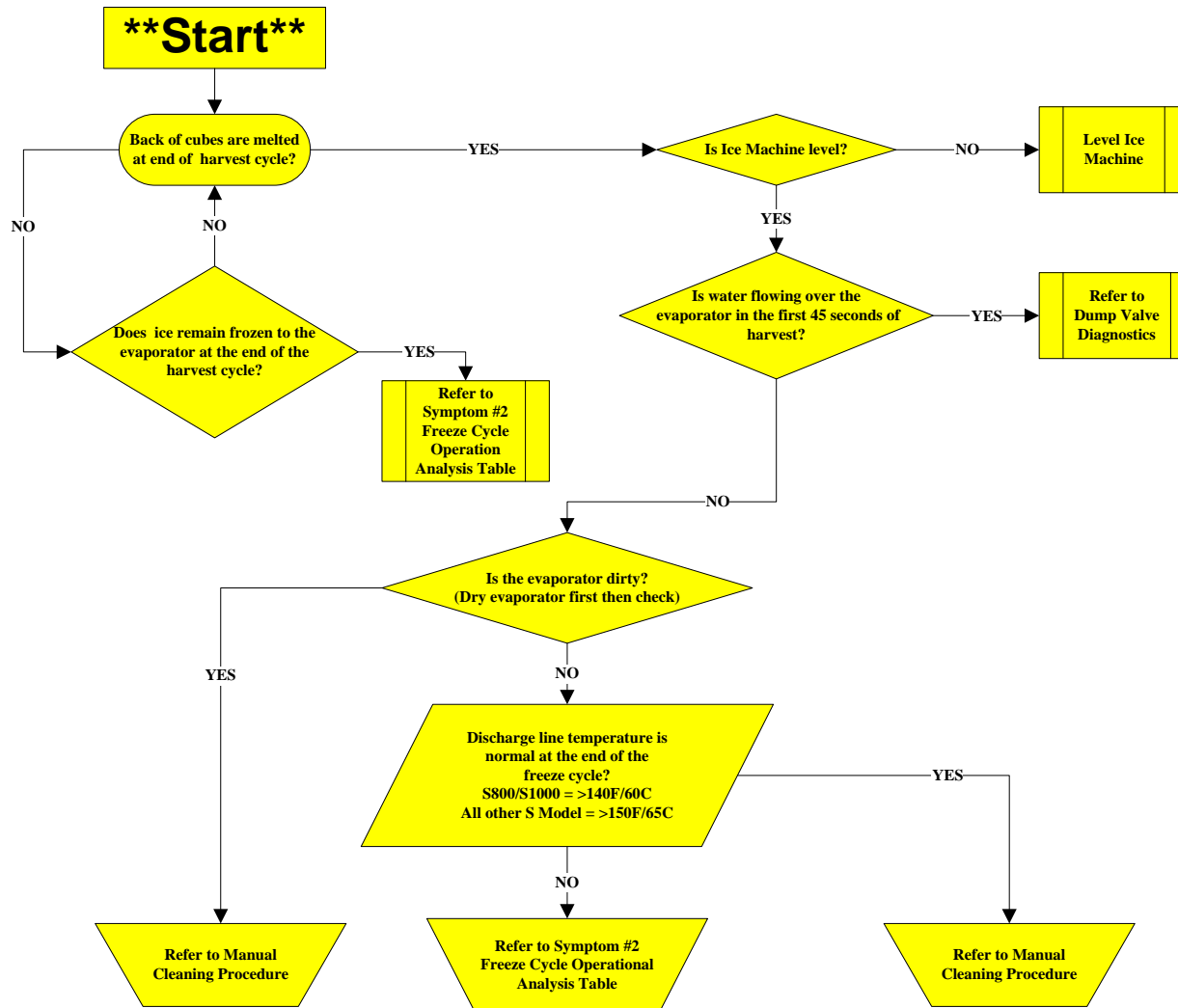
- Safety Limit #2 possible
- Refer to Ice Melt-out Flow Chart



**Ice Cubes are Melted  
After Harvest  
(Melt Out)**

# Flow Chart #4 (流程圖 #4)

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



Ice weight (Hollow Cubes) can result in a long harvest and melting out.

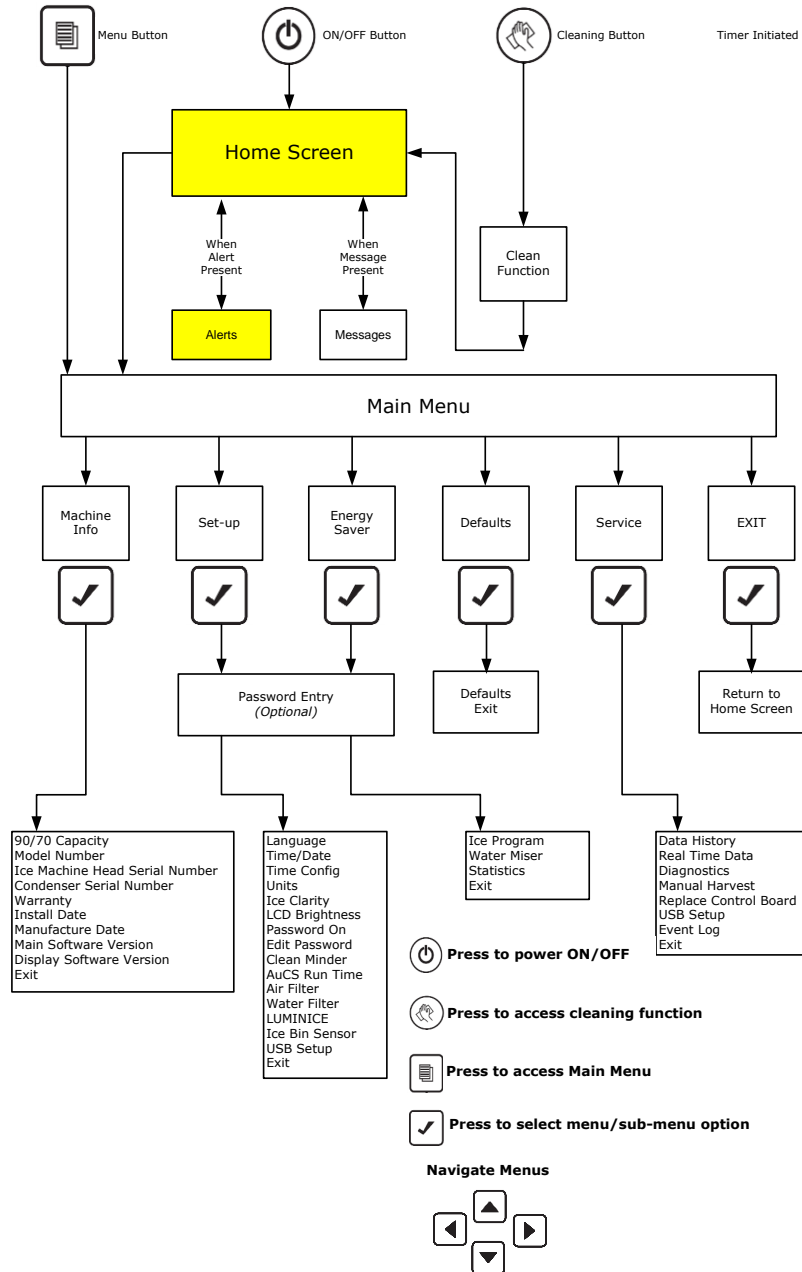


- Symptom #1 (故障現象 #3)
- Symptom #2 (故障現象 #3)
- Symptom #3 (故障現象 #3)
  - Air, Water (風冷/水冷)
- Symptom #4 (故障現象 #3)

Indigo

# DATA HISTORY

## (歷史資訊)



## Alert Menu (警報選單)



**When the Alert Icon appears and flashes, it means there is an Alert Present to inform the end-user there is a production problem before the bin is empty of ice.**

- Press the left Arrow
- Once viewing the Alert or Alerts, Scroll up and down to view; Date and Time Stamp, Cycle Count, Possible Causes, Call for Service, Exit, and Clear.

## Event Log (事件紀錄)

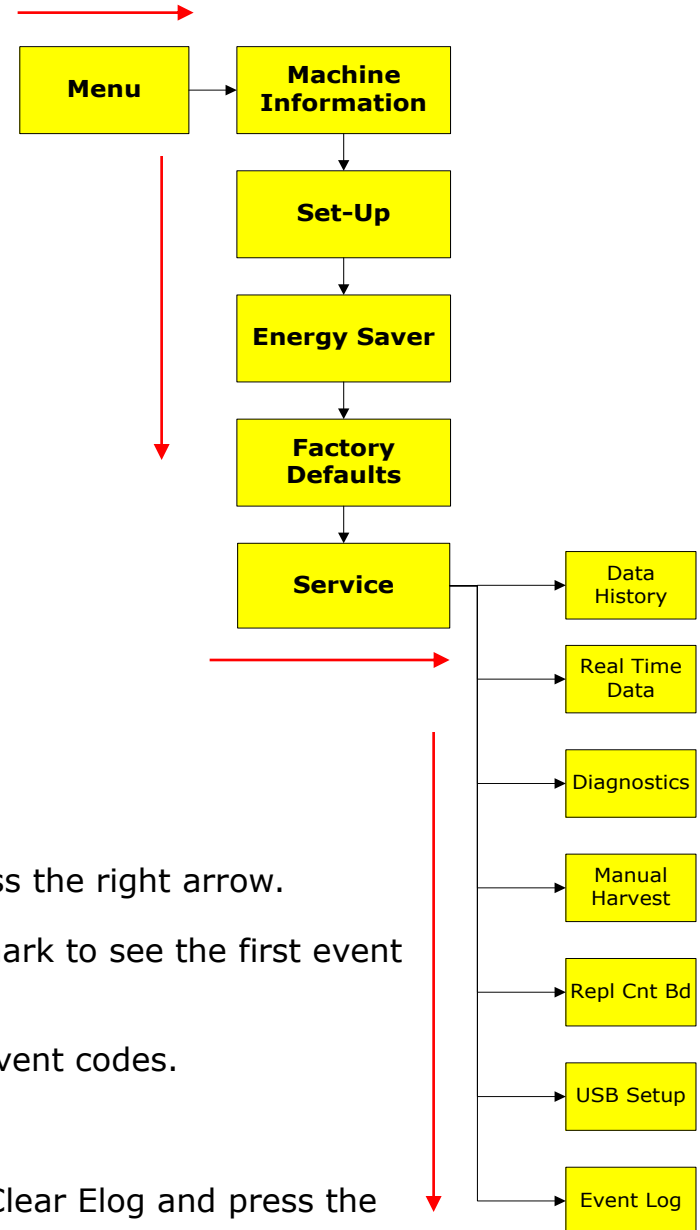


### To access the Event Log from the Service Menu:

- Use the Down arrow to navigate to the Event log and press the right arrow.
- Ensure the View Elog is highlighted and press the Checkmark to see the first event code, when it occurred and how many times.
- Use the Down arrow to view information on subsequent event codes.

### To Clear the event log:

- In the Event Log Menu, use the Down arrow to highlight Clear Elog and press the Checkmark. Press the Left arrow to return to previous screens.



## Firmware 5.010

### Safety Limit #1: Long Freeze Cycle (E01) (安全極限 #1: 過長冷凍週期)

- 6 – Consecutive **35 Minute Freeze cycles**
  - Ice machine will switch to the “Off” State
  - SL #1 LED on control board will flash
  - Alert is initiated and logged in the Event Log

### Safety Limit #2: Long Harvest Cycle (E02) (安全極限 #2: 過長收冷週期)

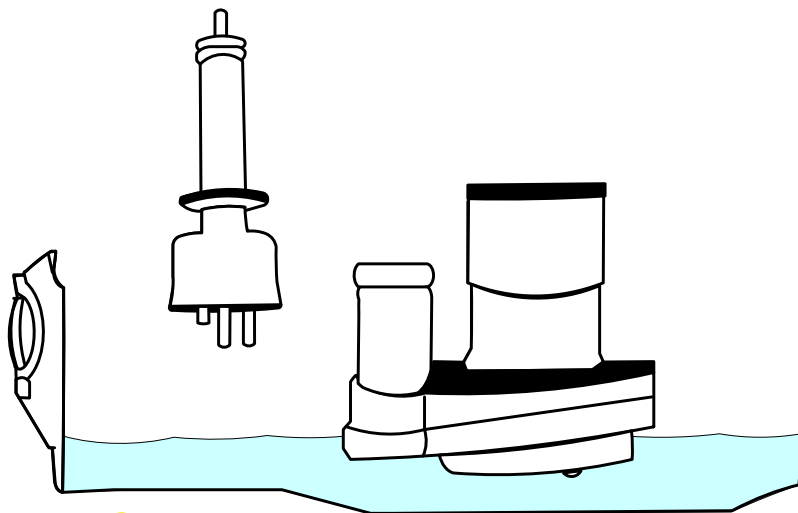
- 3 – Consecutive **7 Minute Harvest Cycles**
  - Ice machine will switch to the “Off” State
  - SL #2 LED on control board will flash
  - Alert is initiated and logged in the Event Log

# Water Thaw Cycle (水解凍週期)

Firmware 5.010 (To prevent Double Slab (防止雙層厚冰))

If after a 7 minute harvest cycle and the water curtain did not activate, Indigo will enter a Water Thaw Cycle:

- Ice Machine will shut down.
- Water pump remain running.
- Water inlet valve fills the water trough to the "High" Probe.
- Circulates approximately 3 min
- Dump Valve purges water down drain
- Repeats fill/circulation/purge cycle **X18 times**
- After completion (**Approximately 1 hour**) the ice machine will restart in an initial Start-up.



NOTE: Water curtain activation (open & closed) will not terminate the water thaw cycle. You can bypass by turning the ice machine off and back on – not by disconnecting power.



# Water Thaw Cycle (水解凍週期)

Firmware 5.010 (To prevent Double Slab (防止雙層厚冰))

If after a 7 minute harvest cycle and the water curtain did not activate, Indigo will enter a Water Thaw Cycle:



## During the Water Thaw Cycle:

- The display **Home Screen** will continue to read "Making Ice"
- The display **Real Time** Data Screen will read "Remove Ice"



NOTE: Water curtain activation (open & closed) will not terminate the water thaw cycle. You can bypass by turning the ice machine off and back on – not by disconnecting power.

# Alert/Event Log and Service Definition

Detail Event Log Service Definition			
E-Log	Display Text	Error Description	Definition
E01	<b>Long Freeze</b>	Long Freeze	6 consecutive 60 Minute Freeze cycle, shut down and flash the SL#1 light on board
E02	<b>Long Harvest</b>	Long Harvest	3 - 3.5 Minute Harvests logs SL#2 in memory but doesn't shut down until 500 long harvest cycles.
E03	<b>Power Loss</b>	Power Supply (Event Log only - No Alarm)	When power is interrupted to the ice machine the control board will log the event in the ELOG and stamp the loss of power on power-up.
E04	<b>Hi Cnd Temp or Wtr Cnd Fault</b>	Air Condenser High temp, or water Condenser High temperature	1). Air Cooled Condenser Fault = Liquid Line Temperature too Hi for Selfcontained Air Cooled Ice machine. 2). Water Cooled Condenser Fault = Liquid Line Temperature too Hi for Selfcontained Water Cooled Ice machine. (G-board rev 4.017 forward: Alert
E05	<b>HPC Fault</b>	High Pressure Cutout (HPC)	The high pressure cutout switch (HPCO) opened. Alert will show after 3 trips in 4 hours.
E06		Spare	
E07	<b>Starving TXV</b>	Starving Evaporator for single TXV or low on charge	When harvest is initiated by the ITP: the board compares the last one minute of Freeze average temperature difference between the inlet (T3) and the outlet (T4). If the difference between the outlet minus the inlet is greater than 12°F E07 is recorded.
E08	<b>TXV Fault</b>	TXV malfunction in dual circuit/ single evaps (TXV Fault)	When harvest is initiated by the ITP: the board compares the last one minute of Freeze average temperature difference between the outlet (T3) and the outlet (T4). If the difference between the outlet minus the inlet is greater than 12°F E07 is recorded.
E09	<b>Flood Evap 1</b>	Flooding evaporator for single circuit single evaporator (flooding evap)	Discharged line temp. is monitored in 6 second increments for the first 6 min. of freeze. Each minute is averaged and the highest average is stored as T2max(3). During the last 6 seconds of pre chill the liquid line temp exiting the condenser is averaged
E10	<b>Flood Evap 2</b>	Flooding evaporator for dual TXV dual circuit / single evaporator (Flooding Evap)	Discharged line temp. is monitored in 6 second increments for the first 6 min. of freeze. Each minute is averaged and the highest average is stored as T2max(3). During the last 6 seconds of pre chill the liquid line temp exiting the condenser is averaged
E11	<b>Refig Fault (Air, Water only)</b>	Refrigeration System (Refig Fault)	If the compressor discharge temperature has not increased by at least 10 F, and the evaporator temperature has not decreased by at least 10 F from the Refrigeration Start up or start of prechill to Two Minutes into the Freeze cycle. (G-board rev 4.017 f
E12	<b>Curtain Fault</b>	Curtain Switch open for more than 12 hours (Curtain Fault)	If the ice machine is set in an ice making position and in bin full condition for more than 12 hours then the curtain switch is open or curtain is off. (12 hrs all E- Boards / 24 hrs G-Boards after revision 4.017)
E13		Spare	
E14		Spare	
E15	<b>Low Liq Temp</b>	Low amb control fault during low amb	If the liquid line temperature drops below 60 F for any period exceeding 1 continuous minute during the freeze cycle. (G-board rev 4.017 forward: Event log only-no alert)
E16	<b>Rmt Cnd Fault</b>	Remot Condenser Fault	If the liquid line temperature drops below 40 F, or exceeds 140 F for any period exceeding 1 continuous minute during the freeze cycle. (G-board rev 4.017 forward: Event log only-no alert)
E17		Spare	
E18		Spare	
E19	<b>ITP Fault</b>	Ice Probe (ITP)	If the monitored Frequencies go out of appropriate ranges (Probe unplugged or problem with microphone). (G-board rev 4.017 forward: Event log only-no alert)
E20	<b>WTR Fault</b>	Water System Fault	Any of the following: 1)Sensing hi water probe and not low probe= Water fault. 2)If the Evaporator outlet temperature is less than -10°F @ 6.5 to 7.5 minutes into freeze. 3)If the Low Water probe satisfied at the end of harvest. 4)Freeze cycle ends with
E21	<b>T1 Fault</b>	T1 Sensor	Each thermistor reading should be monitored continuously using six second average values. If at any time during Pre-chill state, if any of the six second average thermistor values fall outside of the valid temperature range for the sensing circuit, then s
E22	<b>T2 Fault</b>	T2 Sensor	
E23	<b>T3 Fault</b>	T3 Sensor	
E24	<b>T4 Fault</b>	T4 Sensor	
E25	<b>Bin Prb Fault</b>	Bin Low Sens	Each thermistor reading should be monitored continuously using six second average values. The thermistors shall have a six second average value outside of the valid range for the sensing circuit for more than 10 minutes continuously, then set flag = "Bin
E26	<b>Bin Prb Fault</b>	Bin Med Sens	
E27	<b>Bin Prb Fault</b>	Bin Hi Sens	
E28	<b>AUCS</b>	AUCS (Aucs not Present) (Event Log only - No alarm)	When the AUCS clean option is selected from the menu, the control checks for the presence of the AUCS board and if the AUCS is not connected it will signal an Event "AUCS". This will be cleared either as soon as the hardware detects the presence or if use
E29	<b>USB COMM</b>	USB Comm (Event Log only - No Alarm)	USB communication error related to the flash drive not in the port while uploading or downloading software. Also could be a related to a defective flash drive.
E30	<b>USB DNLD</b>	USB download error (dnd) Event Log only - No alarm)	USB download error related to the flash drive or defective flash drive.
E31	<b>Safe Mode</b>	Safe Mode (Event Log only - No alarm)	Safe mode allows the ice machine to operate for a period of time in the event of a WLP or ITP Sensor failure. The controller allows the machine to operate based on historical information collected and model data information stored in the controllers mem

## (警報/事件紀錄 and 服務定義)

When an Alert / E Log is triggered;

- Alerts shows up on the Home screen as an Error Icon.

- If highlighted and clicked it takes you to the Alert Menu where it spells out alert and list Probable Causes.

- Errors are also kept track of on what we call E Log

- E Log list time stamp of last error along with count of how many times it has tripped. Still visible even if the Alert was cleared by the end-user





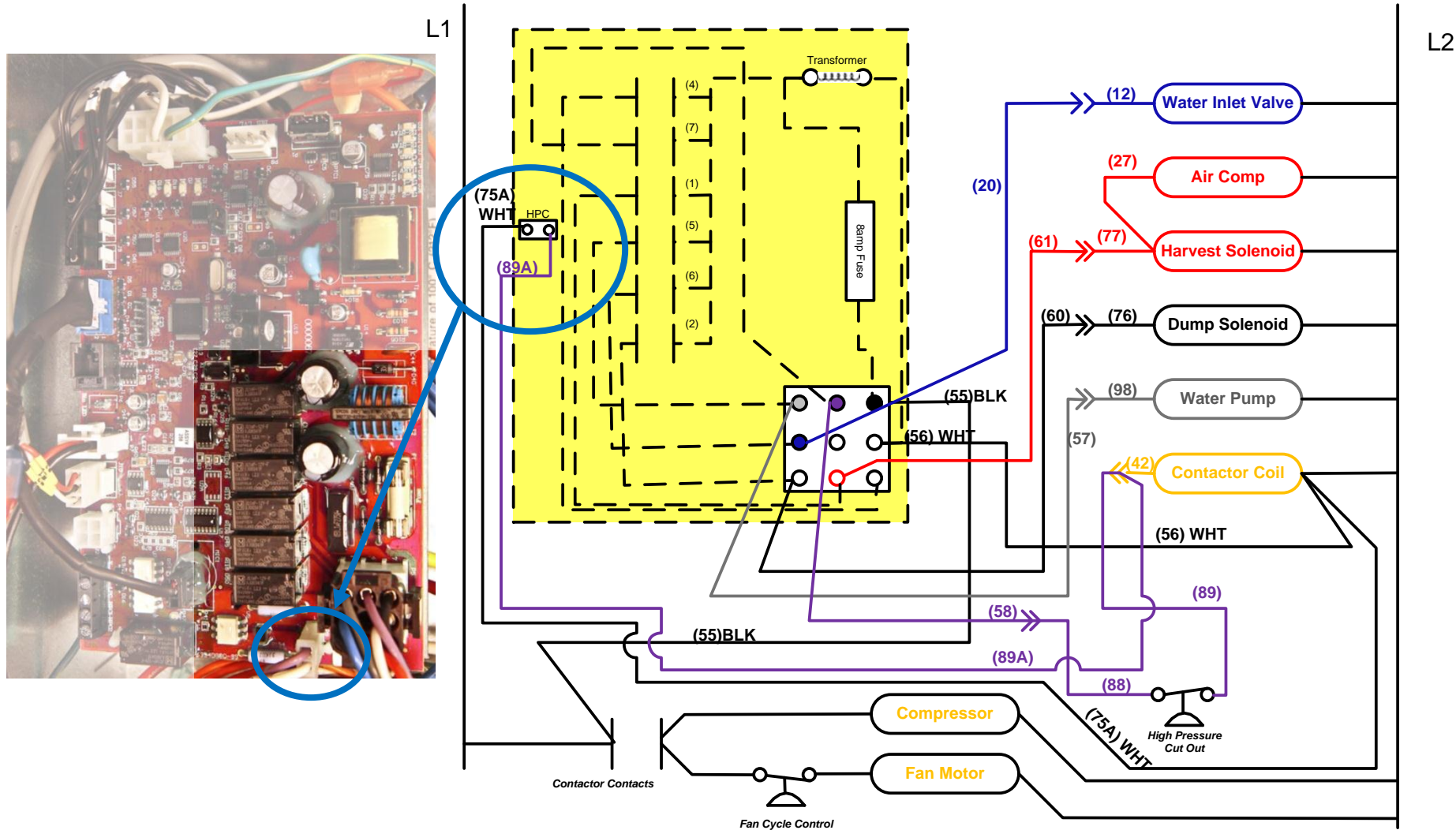
**If the High Pressure cut out trips (opens) the ice machine will:**

- Shut down
- 60 Minute Countdown timer will be displayed on the home screen
- After 60 Minute Countdown timer the ice machine will restart into a System Start Up
- If there is a power interrupt and the HPCO is still open, the 60 minute delay is reset.



***Note: Power interruptions will cause the ice machine to restart in a harvest cycle if the ice machine was in a Ice making mode when the power outage occurred.***<sup>78</sup>

# Line Voltage Components

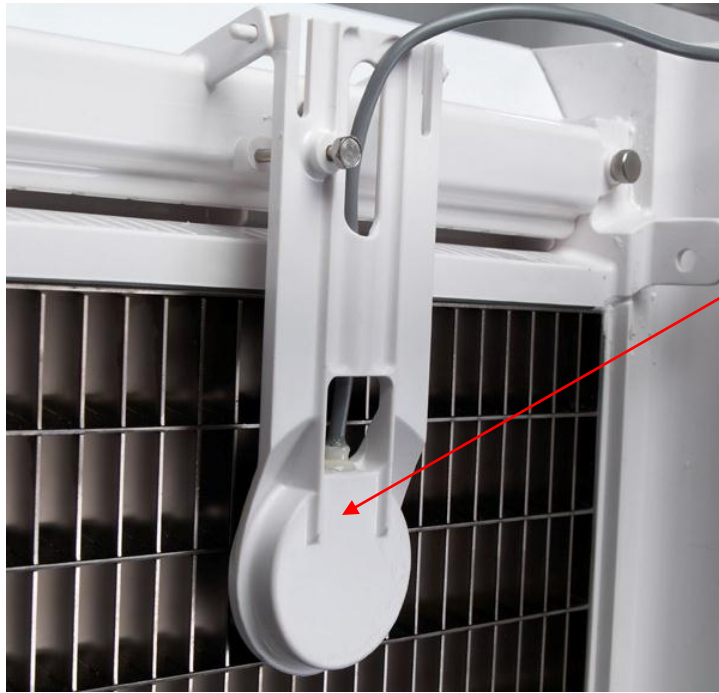


**\*\*Note\*\*** High Pressure cut out is in series with the Contactor Coil. The control board is monitoring voltage of the contactor coil while relay #7 is closed. If the board sees a drop during this time, it time stamps in memory that the High Pressure cut out tripped.

Indigo

**ICE THICKNESS PROBE**  
**DIAGNOSTICS**  
(診斷冰厚探針)

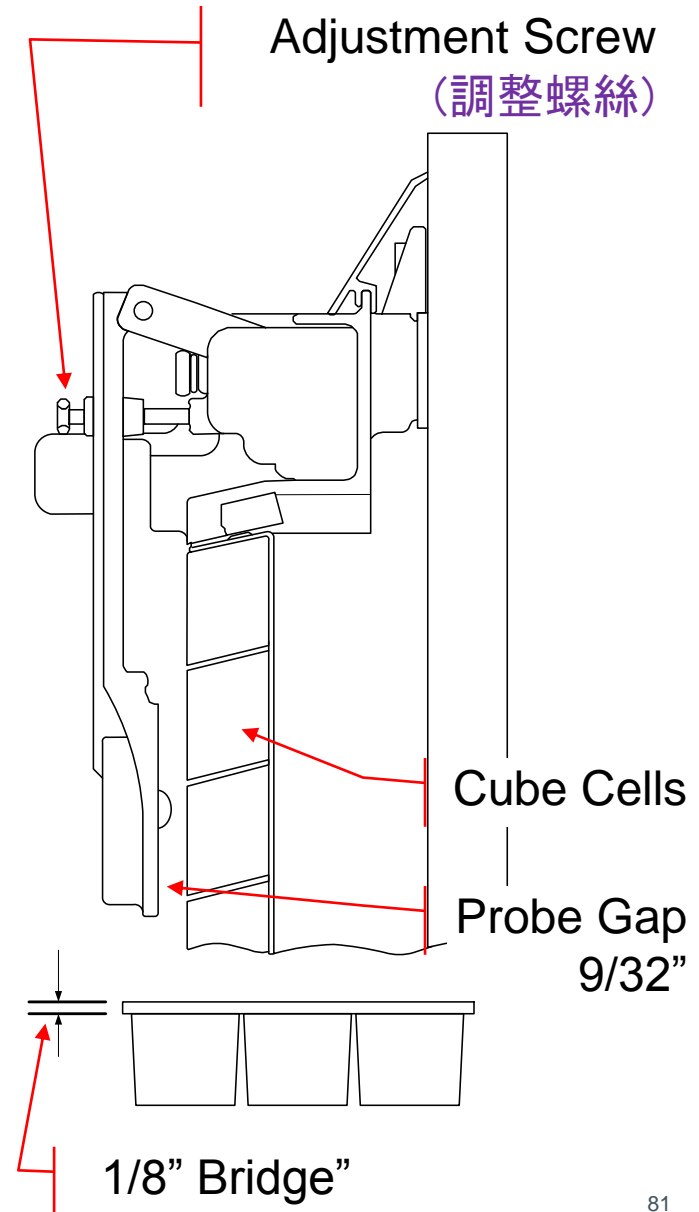
# Ice Thickness Probe Diagnostics



**Microphone**  
(麥克風)

Should be adjusted to maintain 1/8" ice bridge thickness

In order to achieve proper bridge thickness the **gap** between the flat part of the ITP and the grid should be set to **9/32"** with no ice on it as shown.



# Will Not Cycle Into Harvest (不收冰)

## With Ice Contacting the Ice Thickness Control Probe

**If ice is on the evaporator initiate a Manual Harvest through the display.**

*Note: Do not proceed until all ice has been removed from the evaporator and Ice Thickness Probe*

### **Step 1**

Disconnect the ice thickness probe from the control board, then reboot the control board by disconnecting the reconnecting the line voltage to the ice machine.

### **Step 2**

Wait six minutes into the freeze cycle (timing starts when the water pump energizes).

- Ice Machine cycles into harvest normally- Perform steps 1 & 2 under "Ice Machine Cycle into Harvest before ice contact the ice thickness probe".
- Ice Machine will not cycle into harvest – Replace control board.



## With No Ice Contacting the Ice Thickness Probe

### Step 1

Cycle unit off and inspect the Ice Thickness Probe for any physical damage. Look for any bulging or cracking in the area of the nipple. Inspect pivot pins and verify there is no deformation.



**\*\* Note \*\* The ITP is not Dishwasher safe. Follow cleaning procedure in the install use and care manual.**



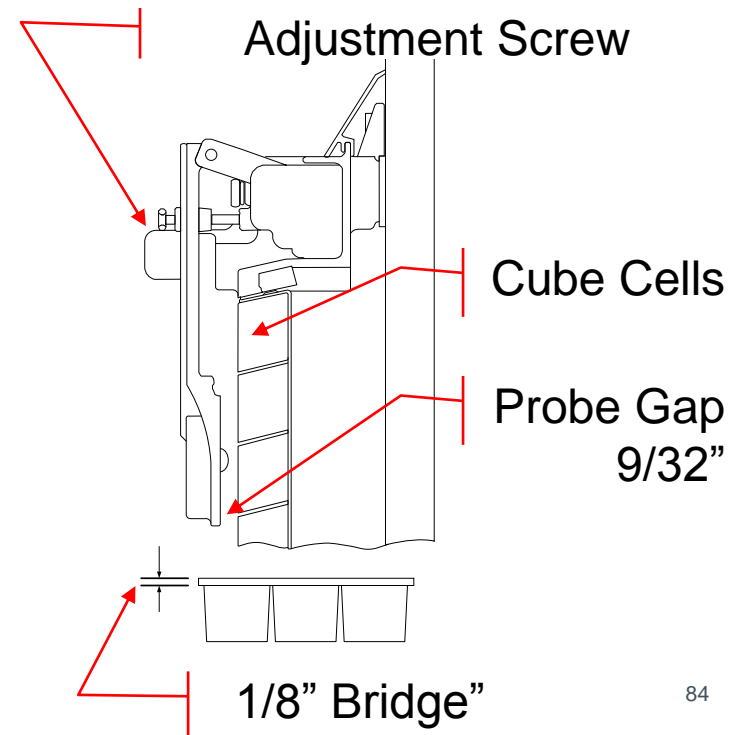
## With No Ice Contacting the Ice Thickness Probe

### Step 1

Cycle unit off and inspect the Ice Thickness Probe for any physical damage. Look for any bulging or cracking in the area of the nipple. Inspect pivot pins and verify there is no deformation.

### Step 2

Verify ice thickness probe gap is approximately  $9/32''$  (7mm), good starting point



## With No Ice Contacting the Ice Thickness Probe

### Step 1

Cycle unit off and inspect the Ice Thickness Probe for any physical damage. Look for any bulging or cracking in the area of the nipple. Inspect pivot pins and verify there is no deformation.

### Step 2

Verify ice thickness probe gap is approximately 9/32" (7mm), good starting point

### Step 3

Verify that the Ice Thickness Probe wire isn't restricting movement and is connected properly to the board.

# Premature Harvest (過早收冰)

## With No Ice Contacting the Ice Thickness Probe

### Step 4

Perform the Ice Thickness Probe Tap Test:

- Follow Key strokes to Real Time Data/Time and Temperature.
- Scroll down until 100 Hz and 120 Hz is displayed.
- Lift ITP and continuously tap the nipple while watching the numbers to the right of the Hz.



# Premature Harvest (過早收冰)

## With No Ice Contacting the Ice Thickness Probe

### Step 4 <continued>

- If the number increase into the thousands, the board and probe are working properly.
- If Numbers do not move or do not increase into the thousands:
  - Ohm out the ITP,
  - If probe doesn't ohm out correctly, change probe.

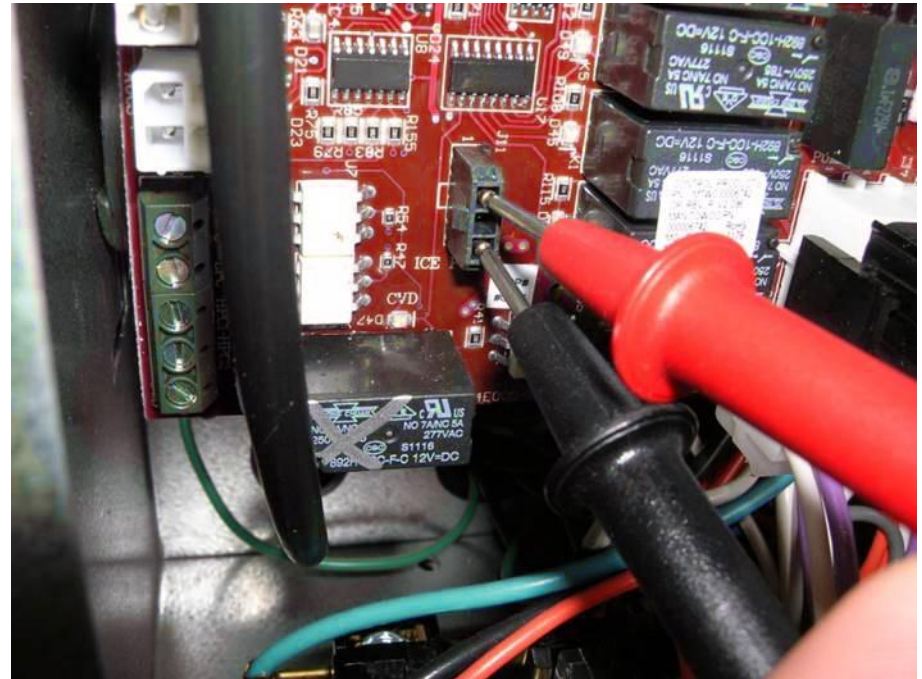


# Premature Harvest (過早收冰)

## With No Ice Contacting the Ice Thickness Probe

### Step 4 <continued>

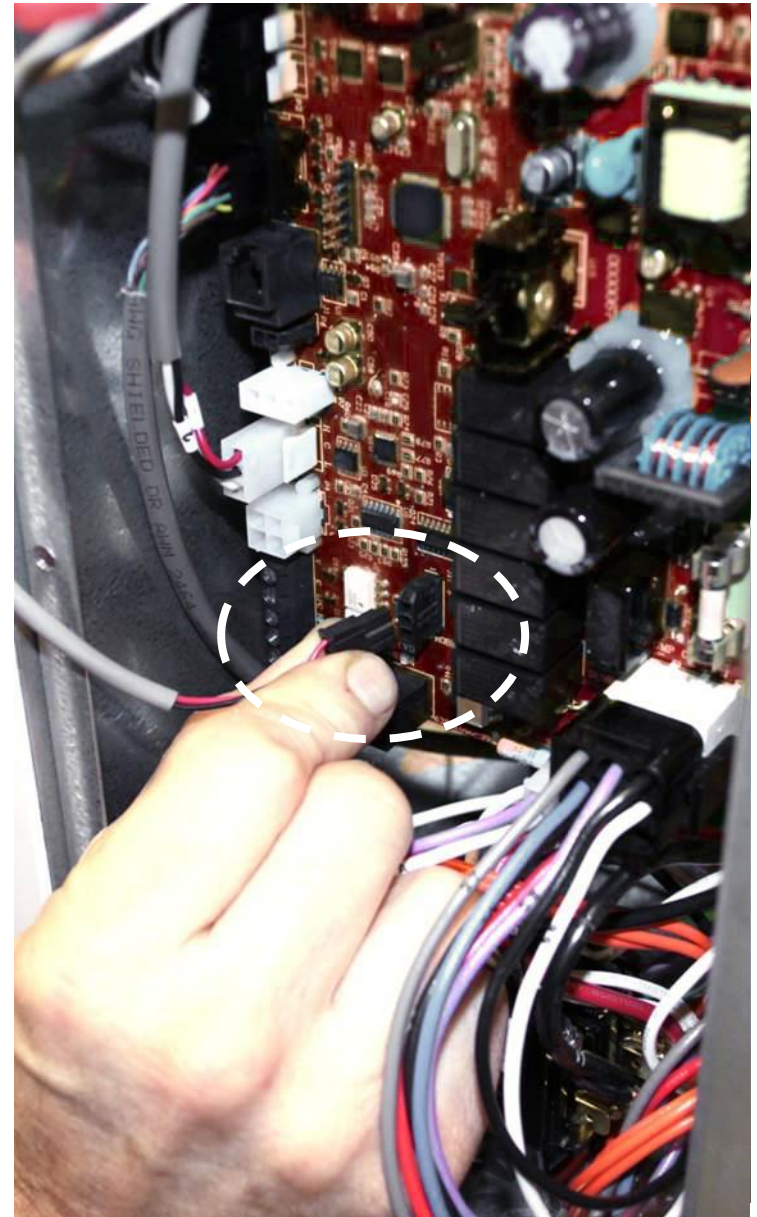
- If the probe does ohm out correctly, check the voltage at the ITP plug on the board.



With the ITP unplugged from the board and the meter set for the DC voltage scale, check voltage across the top and bottom pin. You should read between 3.25 to 3.35 volts DC Positive or Negative. If the Voltage does not fall into this range, replace the control board.

# Premature Harvest (過早收冰)

\*\* Note \*\* if the ITP is disconnected from the control board during the first 6 minutes in freeze, the ice machine is programmed to initiate harvest @ 6 Minutes into freeze cycle and Alert the “ITP Fault”.



# Premature Harvest (過早收冰)

**\*\* Note: Dirty or shorting out Water Level Probe**

Water level Low = No

Water level Hi = Yes

Will initiate a (Premature) harvest at the beginning of freeze cycle, to clear the evaporator of ice, before starting a Safe Mode (timed water fill) cycle.



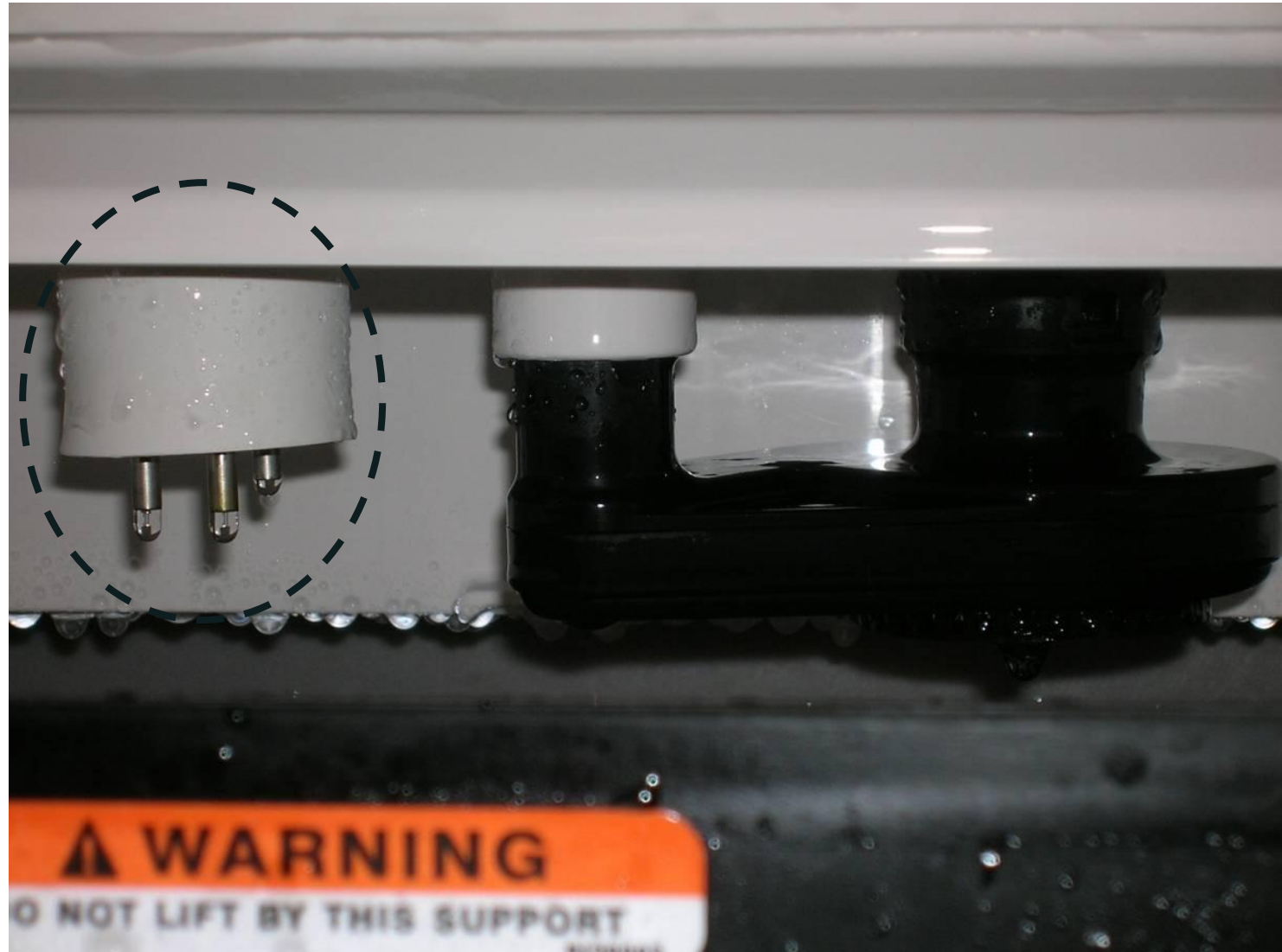
Indigo

# **WATER LEVEL PROBE DIAGNOSTICS**

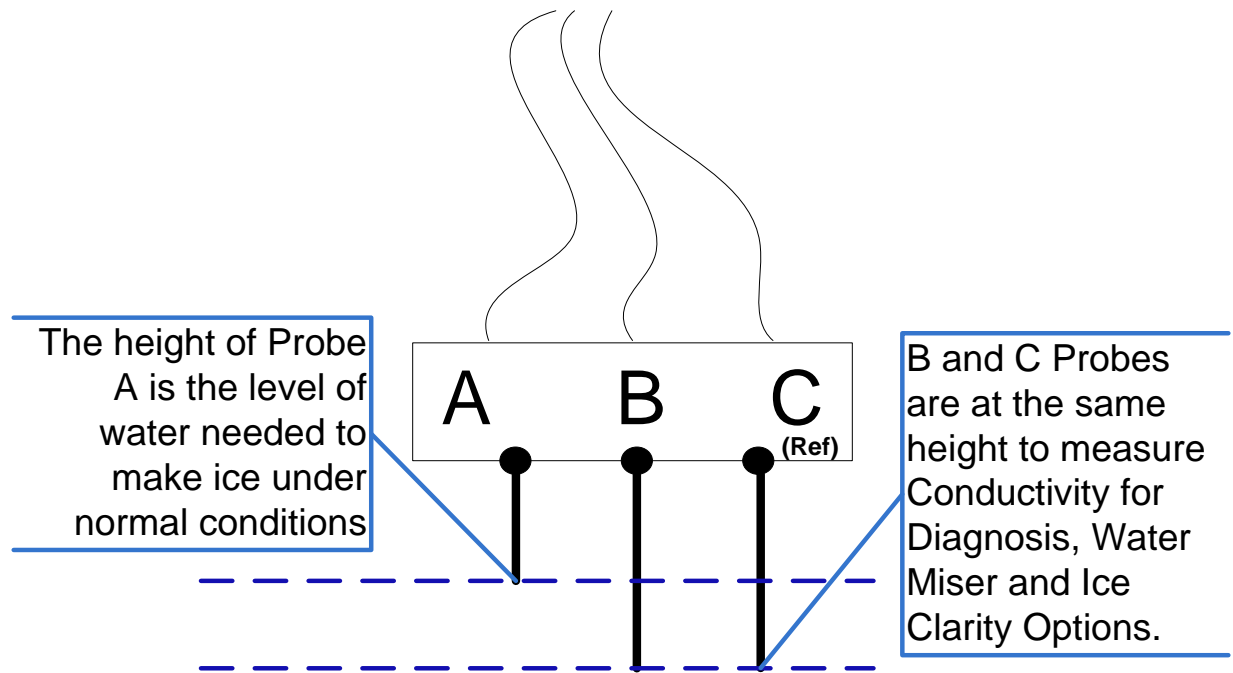
**(水位探針診斷)**



# Water Level Probe Diagnostics



# Water Level Probe Diagnostics



The water level probe controls the water level by sensing whether water is or is not contacting the water level probe. There are three sensing probes. Two probes are equal in length and are used to measure conductivity for diagnostics, ice clarity and water miser options. Factory default settings measure resistance from both long probes to the short probe.

- When in the default or factory setting the Resistance level is taken at BC and continues to fill to level "A".

# Water Trough Overfills (水槽溢滿)

***Assuming the Water Level Probe is clean:***

**Step 1** - Turn the machine to OFF by pushing the power button and insure water turns off.

**Step 2** - If water continues to flow in with the ice machine off, check for voltage at the Water Inlet Valve. If present, replace control board. If no voltage is present and water continues to flow verify water pressure is below 80 psig before replacing the water inlet valve.



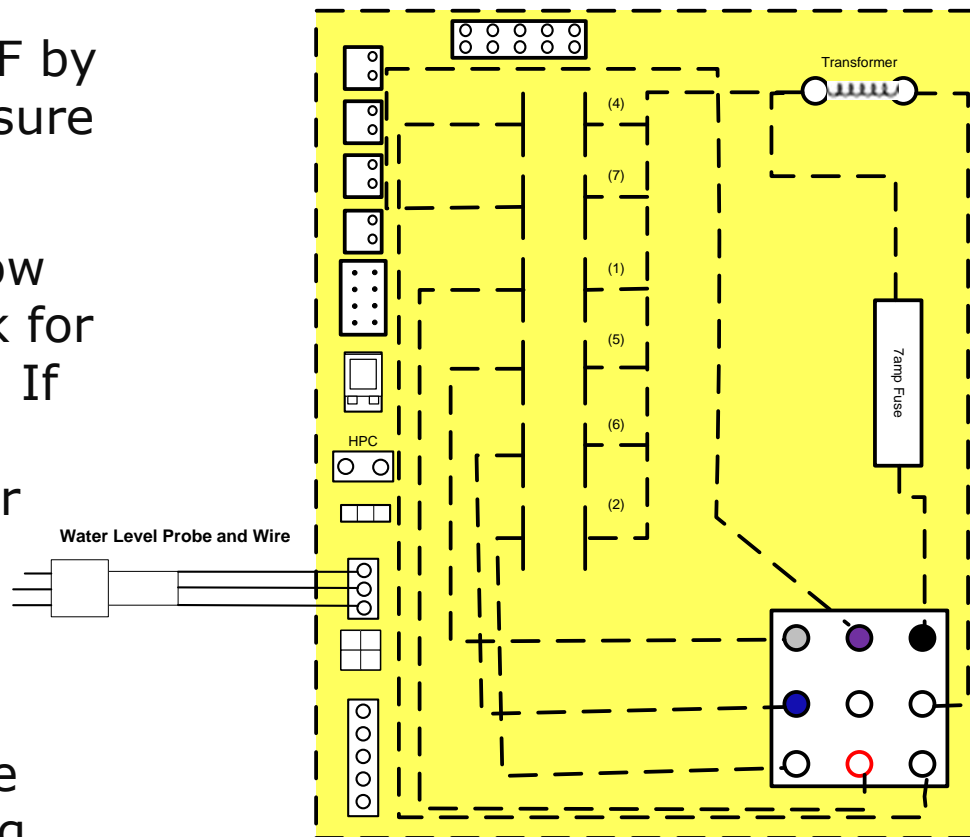
# Water Trough Overfills (水槽溢滿)

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**Step 3** - Check water level probe mounting and verify secure wiring connection at the probe and control board



**Step 4** – Scroll to Service/Diagnostics/Inputs and press down arrow until **Wtr Low** and **Wtr High** are displayed.

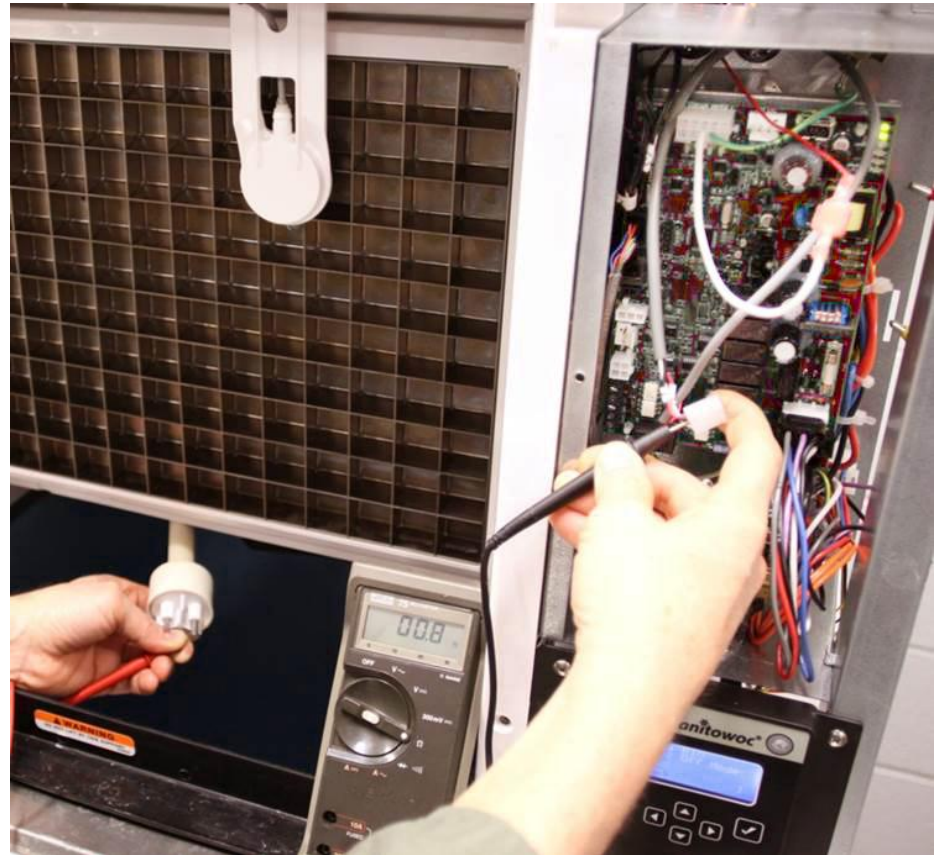
- **If No is displayed on both Wtr Low and Wtr High** – then the water level probe is not conducting properly or the control board is not receiving the signal.
- **If Yes is displayed** – Control board is receiving a sensing water signal. If water level probes are touching water level in the water trough then continue with step 5. If not then ohm out probe and wiring and look for a short.



# Water Trough Overfills (水槽溢滿)

**Step 5** – Unplug the probe from the board and pull the water level probe out of its mount. Ohm out from the connector to the three probes.

- **Red wire** to short probe = 0 ohms.
- **Black wire** to both long probes = 0 ohms to only one of the long probes and infinity to the other long probe.
- **White wire** to the probe that showed infinity to the black wire should now show 0 ohms.



**With Continuity DO NOT Change Probe!**  
**Without Continuity, the Probe is Defective**

# MII085, RO / DI Water Setting

**Manitowoc** Parts & Service Communicator

MII-085  
01/12

## Subject: Indigo Control Board Setting For RO or DI Water

When water is purified and minerals are removed the water has a lower electrical resistance. The lower resistance makes the water more difficult for the control board to detect. Indigo Ice Machines that use conditioned water with a purity between 600,000 & 1,000,000 ohms will require a jumper change on the control board to indicate highly conditioned water is in use.

Two different control boards have been used on Indigo model ice machines and function to different water purities:

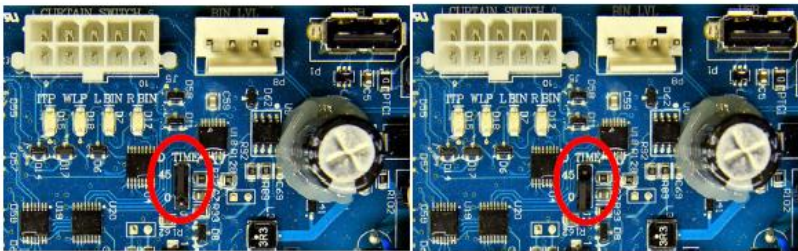
- Indigo E series control board (green circuit board) functions to 600,000 ohms
- Indigo G series control board (blue circuit board) functions to 1,000,000 ohms

If you are using RO (Reverse Osmosis) or DI (De-ionized) water and are experiencing a water trough that overflows, perform the following steps.

1. Determine the purity/resistance of the conditioned water and identify the control board.

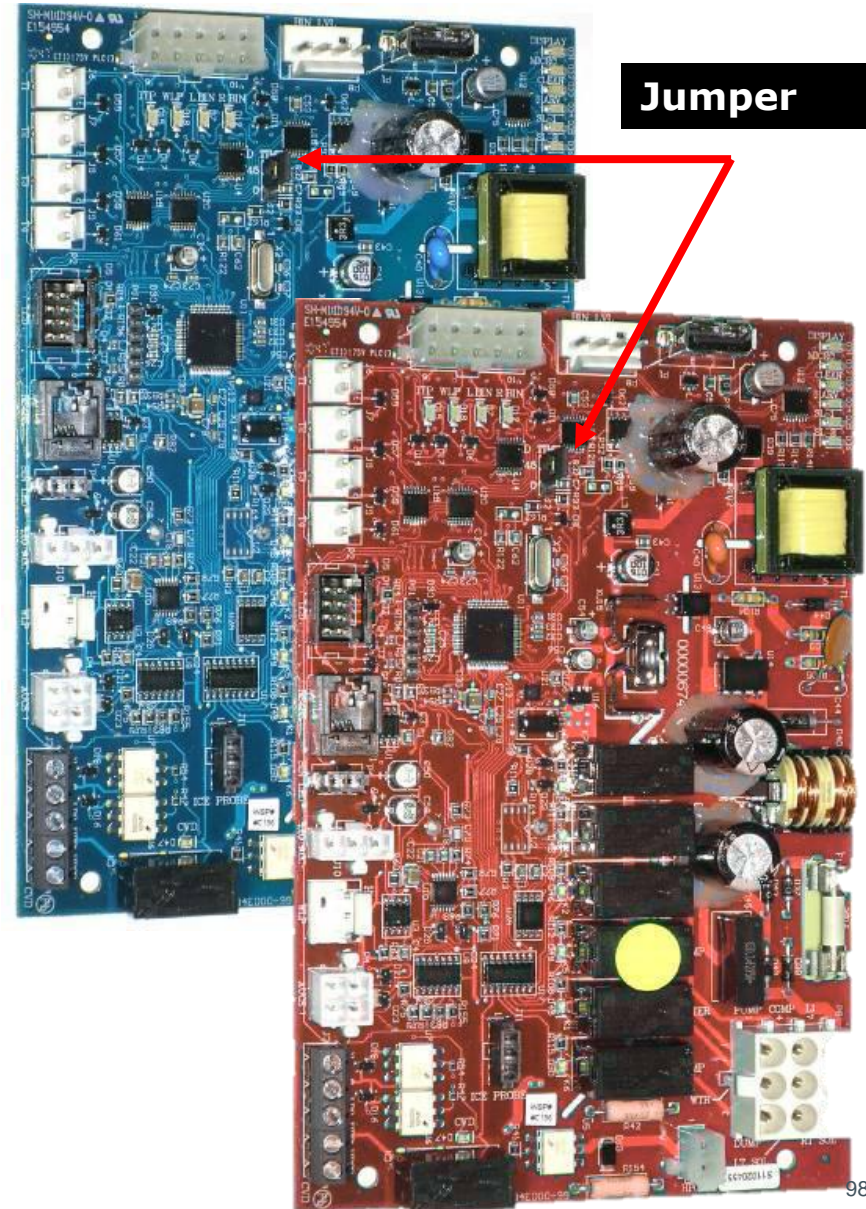
Note: E series control boards must be replaced with the blue G series board in applications that use RO/DI water with a resistance in the 600,000 to 1,000,000 ohms range.

2. Refer to graphics below and move the jumper from the top and center pins, to the center and bottom pins to set the control board for highly conditioned water.



Standard Water Jumper Position

Reverse Osmosis or De-ionized Water Jumper Position



# Water Trough Will Not Fill (水槽不會填滿)

## Voltage Is Not Present at Water Inlet Valve and Water Is Not Contacting the Water Level Probe

**Step 1** – Verify water is supplied to the ice machine.

**Step 2** – Scroll to Service/Diagnostics/Input and press down arrow until Wtr Low and Wtr High are displayed.

- A. Yes is displayed – Control board is receiving a sensing water signal. Proceed to step 3.
- B. No is displayed – Control board is not receiving a sensing water signal. Proceed to Step #4



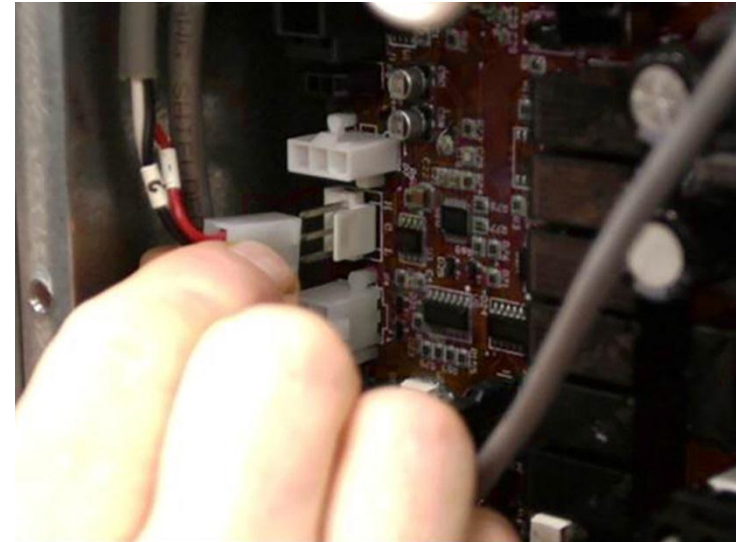
**NOTE:** A quick way to verify there is a water supply, and the water fill solenoid valve system works is to enable all relays under Service/Diagnostics/Control Board/Enable Relays.



# Water Trough Will Not Fill (水槽不會填滿)

**Step 3** – Disconnect water level probe, observe LCD display Text.

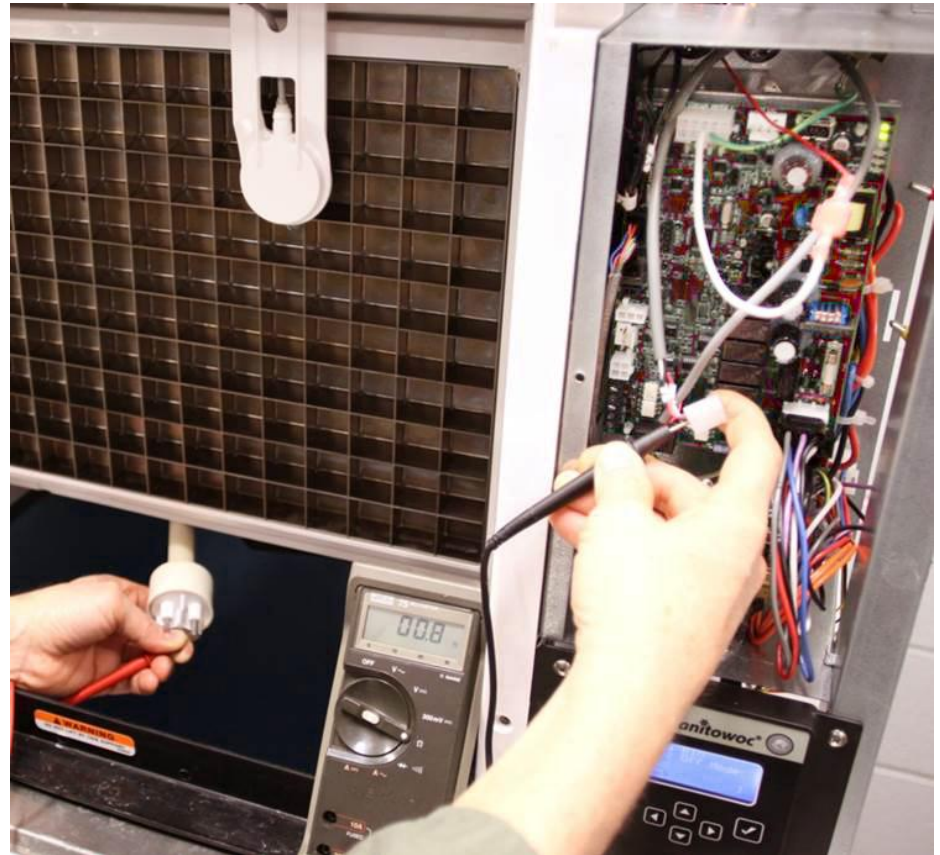
- A. No is displayed – Proceed to step #4.
- B. Yes is displayed – replace control board.



# Water Trough Will Not Fill (水槽不會填滿)

**Step 4** – Unplug the probe from the board and pull the water level probe out of its mount. Ohm out from the connector to the three probes.

- **Red wire** to short probe = 0 ohms.
- **Black wire** to both long probes = 0 ohms to only one of the long probes and infinity to the other long probe.
- **White wire** to the probe that showed infinity to the black wire should now show 0 ohms.

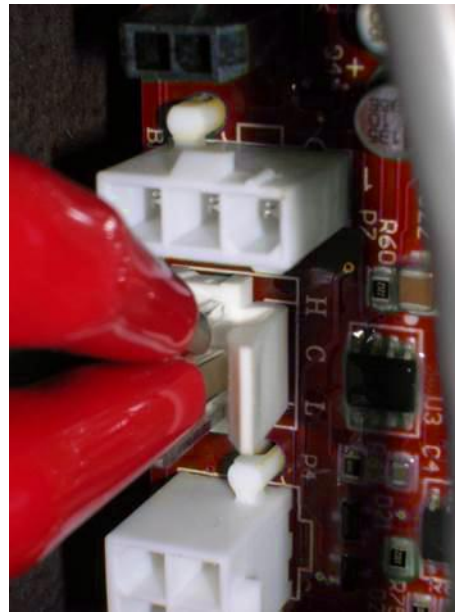
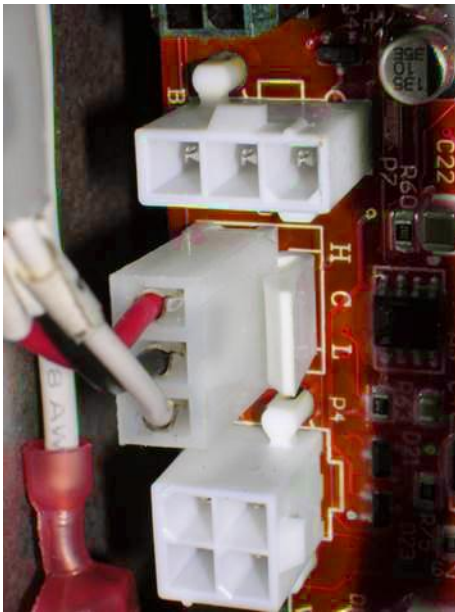


**With Continuity DO NOT Change Probe!**  
**Without Continuity, the Probe is Defective**

# Water Level Probe Circuit Check at Control Board

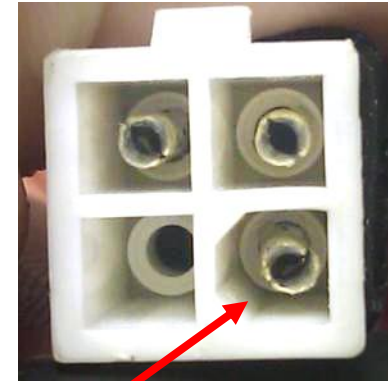
Wait until the pre-chill cycle begins, then jumper water level probe connection #2 and #3 at the control board.

- A. Display reads Wtr High: Yes (Water level light energizes) and water flow stops. Repair Wire or replace water level probe.
- B. Display Wtr High: No (Water level light does not energize) and water continues to flow. Replace the control board.



# Water level probe and harness connection

- Intermittent Water faults
- Connector on wiring harness that goes to the board has loose female terminals. In this particular case, the female connector was loose and would not make connection with the male connector from the water level probe.
- This female connection was too loose and would not make good connection with the male connector. It has already been repaired prior to photo.
- In this particular instance, the high water probe was the one that was loose.



***NOTE: If the high water level probe completes the circuit with the Low Water Level probe open, the ice machine is programmed to initiate harvest and enter Safe Mode.***

*So if you have Intermittent Water faults, Safety Limit #2, and Safe Mode in memory and watch it go into premature harvest, check Water Level Probe and Connections.*

Indigo


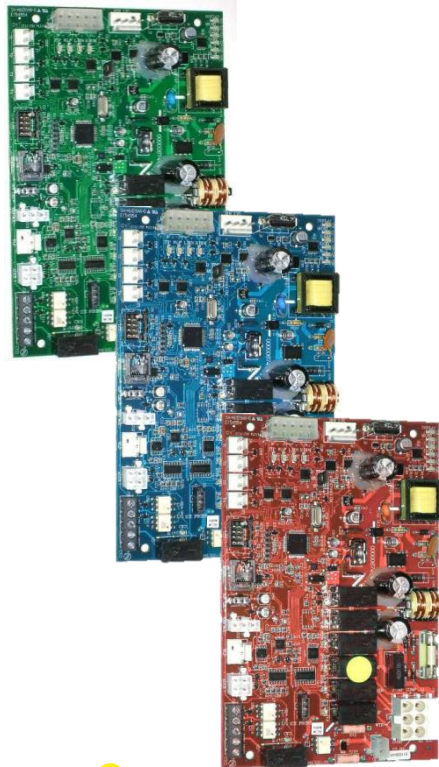
# **REPLACEMENT CONTROL BOARD PROCEDURE**

(更換控制機板程序)

# Replacement Control Board Procedures

## Step by Step Instructions, come with replacement control board:

- Manual (手動輸入)
- USB Transfer (USB傳輸)



Indigo™ ice machines will function normally with the factory default Handbook for details on customized settings. Replacement control boards should be installed **MANUALLY FROM THE SETUP MENU** or through the SERVICE MENU.


**MANUALLY FROM THE SETUP MENU**  
From the Main menu, use the Down button to navigate to Setup and press the left button to return to previous screens.

**FACTORY DEFAULTS**

Setting	Default
Language	English
Time & Date	USA (Central Time) Set below from
Time Configuration	Month/Day/Year (dd/mm/yy)
Units	Pounds/lbs./Liters (lb./l)
Ice Capacity	2.0
LED3 Brightness	Level 2
Password ON	Off
Default Password	Default Password
RFID Password	Off
Scan Monitor	Off
Auto Washtime	Off
Air Filter	Off
Water Filter	Off
ILLUMINATE	None
Ice Bin Sensor	None


**SERVICE/USB SETUP**  
This is to transfer the Settings of the old control board into the new board.

1. Ensure that the ice machine's power is on.
2. Press the Menu button.
3. Press the Down button until Service is highlighted.
4. Press the Checkmark button. The Service menu will be displayed.
5. Press the Down button until USB Setup is highlighted.
6. Press the Checkmark button again. A submenu with <Download> will appear.
7. Press the Checkmark button again. A submenu with <Download Cbf> and press the Checkmark button.
8. Highlight <Download Cbf> and press the Checkmark button.
9. Follow these on-screen instructions:
  - a. Insert Drive (Insert the flash drive into the USB port)
  - b. Press Check (Press the Checkmark button.)
  - c. Wait for Copy (Wait only a few seconds for the download to complete.)
  - d. SUCCESS will appear on the display.




**MANUAL SETUP**  
(Menu Service/Replacement Control Board/Manual Setup)  
Down Manual Setup is highlighted.

1. Press the Checkmark button.
2. Specify the auto-reloading date is correct.
3. (If the date is not correct) highlight date and press the Right button, a blinking cursor should appear at the left bracket.
4. Enter the correct date by using the Up and Down buttons and press Right button until the blinking cursor disappears.
5. (If the date is correct) press the Down button until the bracket is below "Input Module."
6. Press the Right button and a blinking cursor should appear at the left bracket.
7. Press the Up button and the letter "A" will appear. Continue to press the Up button until you get to the first letter of the Model Number "1".



9. Press the Right button and the cursor will move to the right. Scroll Up or Down until you get to the next letter in the model number and press the Right button. Repeat this step until the complete Model Number is displayed between the brackets as it appears on the data plate.




**\*\* Note \*\*** The voltage measurement is required at the end of the model number. Verify voltage from the nameplate and add the nomenclature below (including the dash) to complete model identification. Example: [D092A-051 ]

**SETUP MENU (Optional)**

Manitowoc Inc  
2110 South 26th Street, P.O. Box 1700, Manitowoc, WI 54220-1700 USA  
Telephone: 920-683-0161, Fax: 920-683-2979, Service/Parts: 920-683-2978, Other: 920-683-2979  
Web Site - www.manitowocusa.com

000008098  
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**Indigo™ Control Board Replacement Instructions**  
Indigo™ replacement control boards require the Model and Serial number to be entered to activate the appropriate look up tables for operation and diagnosis. This can be done one of two different ways, USB Setup or Manual Setup.

**USB Setup:** would be for control boards that are still operational but have problems like a mechanical relay sticking or intermittent issues where asset data would be able to be retrieved from the faulty control board. When replacing a control board exporting old data to a flash drive will allow transfer from the old control board to the new control board. This procedure needs to be completed while the old control board is still in the ice machine. Proceed to EXPORTING DATA FROM OLD CONTROL BOARD TO FLASH DRIVE / REPLACEMENT CONTROL BOARD / MANUAL SETUP.

**Manual Setup:** If the control board is nonoperational, replace the control board and proceed to Manual Setup to set the time and date and enter the model and serial number. This would be for situations where a faulty control board was started or where asset data would be unable to be retrieved from the replacement control board. Proceed to REPLACEMENT CONTROL BOARD / MANUAL SETUP.

**EXPORTING DATA FROM OLD CONTROL BOARD TO A FLASH DRIVE**  
Data can be copied from the control board memory to a flash drive and used to transfer setup and/or cycle data to a replacement control board. NOTE: Do not use a flash drive with a built-in software program. For proper flash drive formatting order to MLC-000 USB Flash Drive Specification and Formatting.

1. Ensure that the ice machine's power supply is on.
2. Press the Menu button.
3. Press the Down button until Service is highlighted.
4. Press the Checkmark button. The Service menu will be displayed.
5. Press the Down button until USB Setup is highlighted.
6. Press the Checkmark button. USB Stick will appear highlighted.
7. Press the Checkmark button again. A submenu with Export ALL appears.

**NOTE**  
Export ALL writes four files to the flash drive: ASDATA000.CSV (Asset Data), CFDATA000.CSV (Operating Data), RTDATA000.CSV (Real Time Data), SETTING000.CSV (Settings).

**Export Setup** only exports the SETTING000 (Settings) File. This method can be used for setting up multiple ice machines with the same set up.


8. Highlight Export All and press the Checkmark button. A display of instructions will appear.
9. Follow these on-screen instructions:
  - a. Insert Drive (Insert the flash drive into the USB port on the ice machine's control board.)
  - b. Press Check (Press the Checkmark button.)
  - c. Wait for Copy (Wait approximately 3 to 10 minutes for the download to complete.)
  - d. Export Complete or Success will appear on the display.

Disconnect power and replace control board.

Manitowoc Inc  
2110 South 26th Street, P.O. Box 1700, Manitowoc, WI 54220-1700 USA  
Telephone: 920-683-0161, Fax: 920-683-2979, Service/Parts: 920-683-2978, Other: 920-683-2979  
Web Site - www.manitowocusa.com

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**REPLACE CONTROL BOARD**  
After applying power to the replacement control board the screen should show Manual Setup and USB Setup.



If the replacement control board has an earlier firmware version you will need to navigate to Replacement Control Board under the Service Menu.

**NAVIGATE TO REPLACEMENT CONTROL BOARD**

1. Press the Menu button.
2. Press the Down button until Service is highlighted.
3. Press the Checkmark button. The Service menu will be displayed.
4. Press the Down button until Replacement Control Board is highlighted.
5. Press the Checkmark button again. A submenu with Manual Setup and USB Setup appears.

**USB SETUP:**  
(Menu Service/Replacement Control Board/USB Setup)

1. Press the Down button until the USB Setup is highlighted.
2. Press the Checkmark button.
3. Follow these on-screen instructions:
  - a. Insert Drive (Insert the flash drive into the USB port on the replacement control board.)
  - b. Press Check (Press the Checkmark button.)
  - c. Wait for Copy (Wait only a few seconds for the download to complete.)
  - d. Manual Setup and USB Setup will appear on the display once the download is complete.

**\*\* In order to Transfer Settings from an old control board to a new control board Proceed to SERVICE/USB SETUP.**

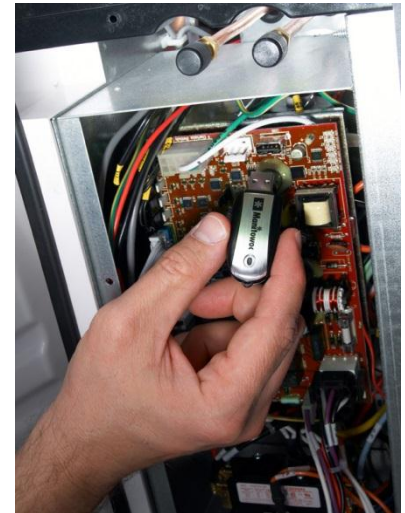
000008098  
Page 2 of 3  
Rev. 2-11/13



**NOTE: Model number in the Control board Must Match Data plate for proper operation.**

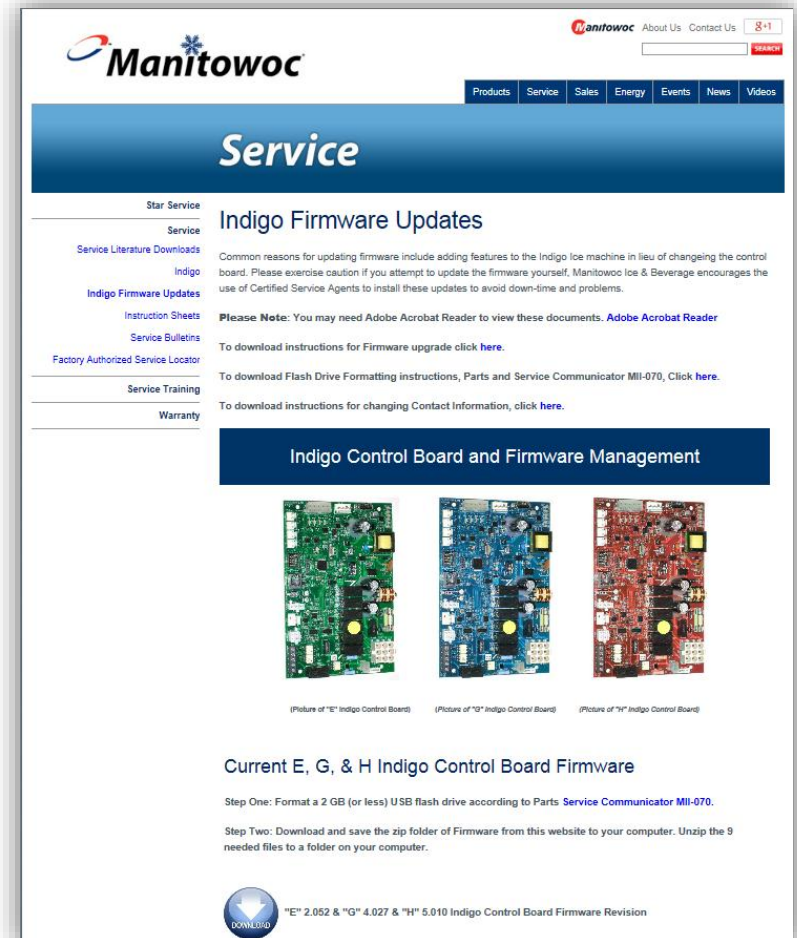
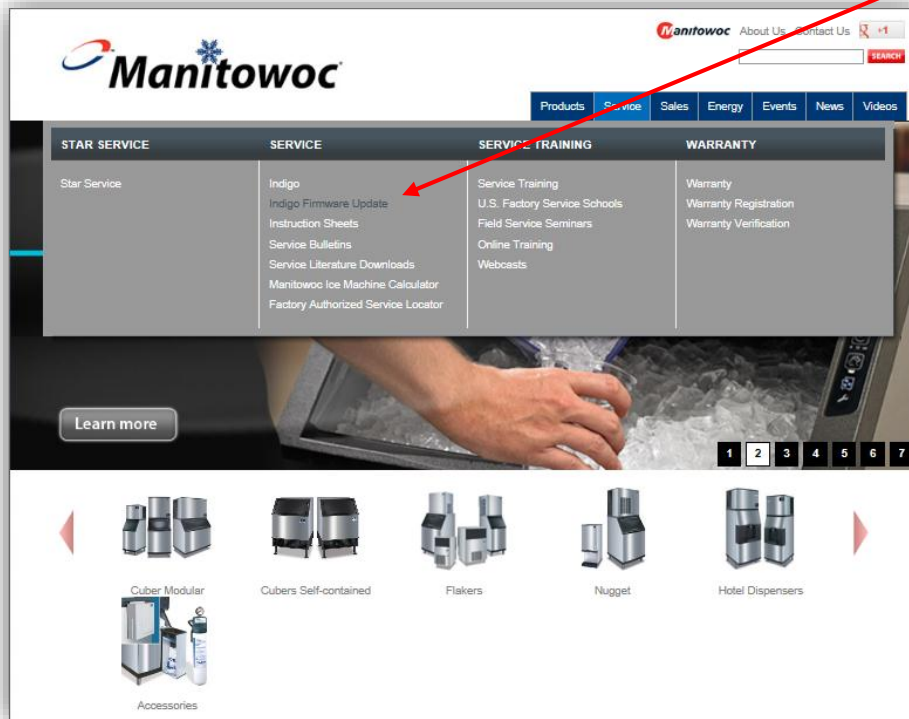
Indigo

# **FIRMWARE UPGRADE** **(韌體升級)**



# Control Board Firmware Upgrade Procedure

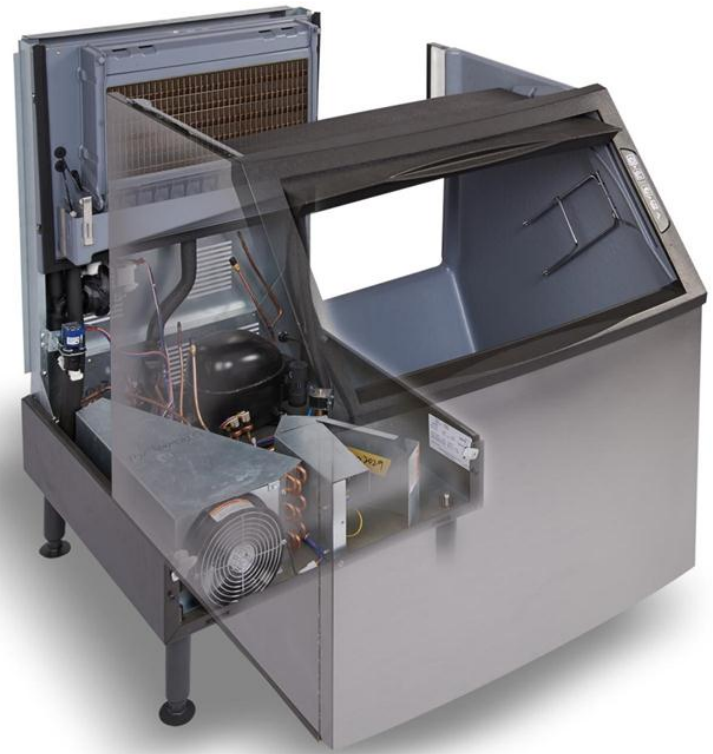
- Log on to [www.manitowocice.com](http://www.manitowocice.com)
- Click on Service/Indigo Firmware Update







- Data History  
(歷史資訊)
- Ice Thickness Probe Diagnostic  
(冰厚探針診斷)
- Water Level Probe Diagnostic  
(水位探針診斷)
- Replacement Control Board Procedure  
(更換控制機板程序)
- Firmware Upgrade  
(韌體升級程序)



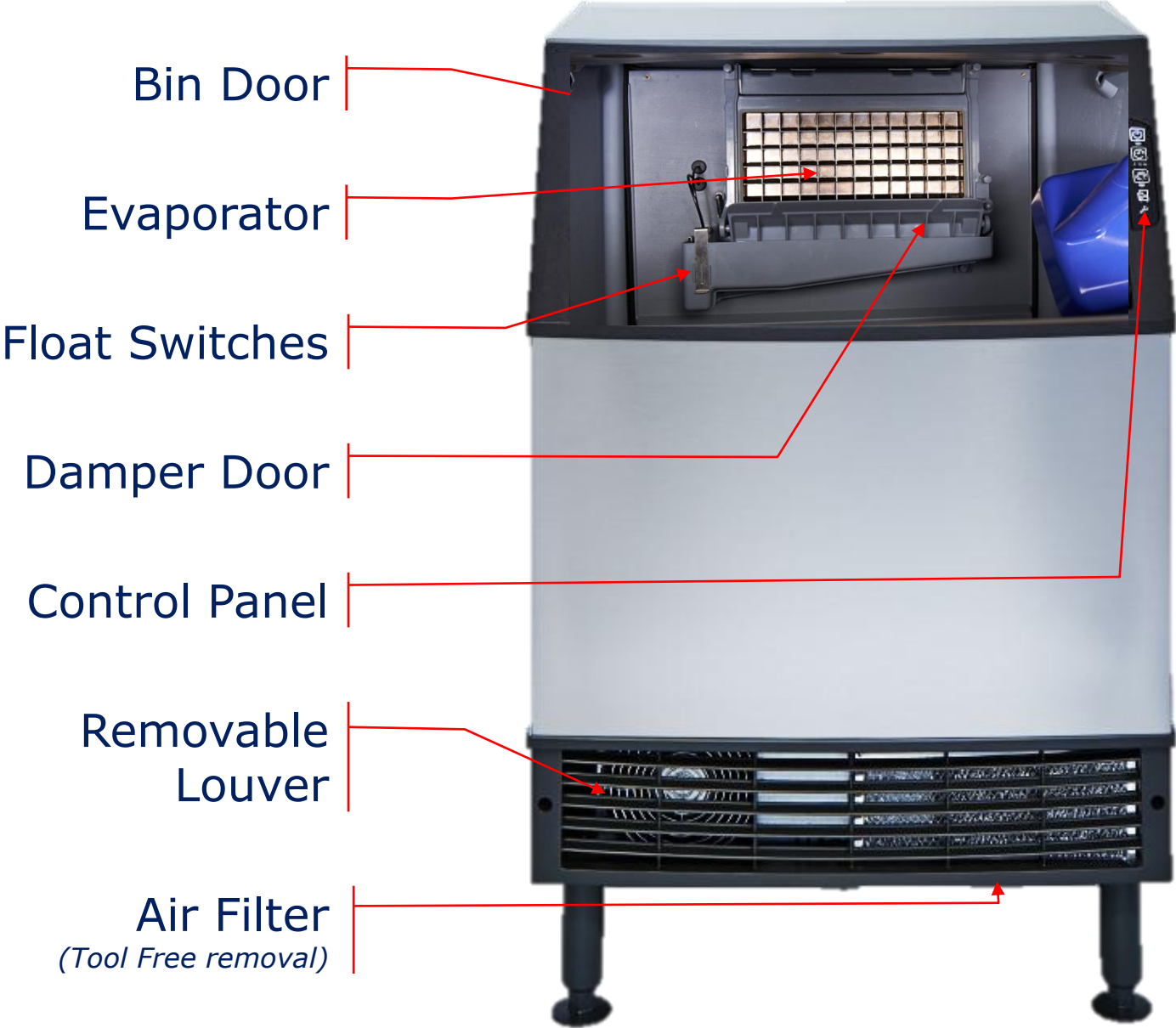
NEO™

# UnderCounter Ice Machine

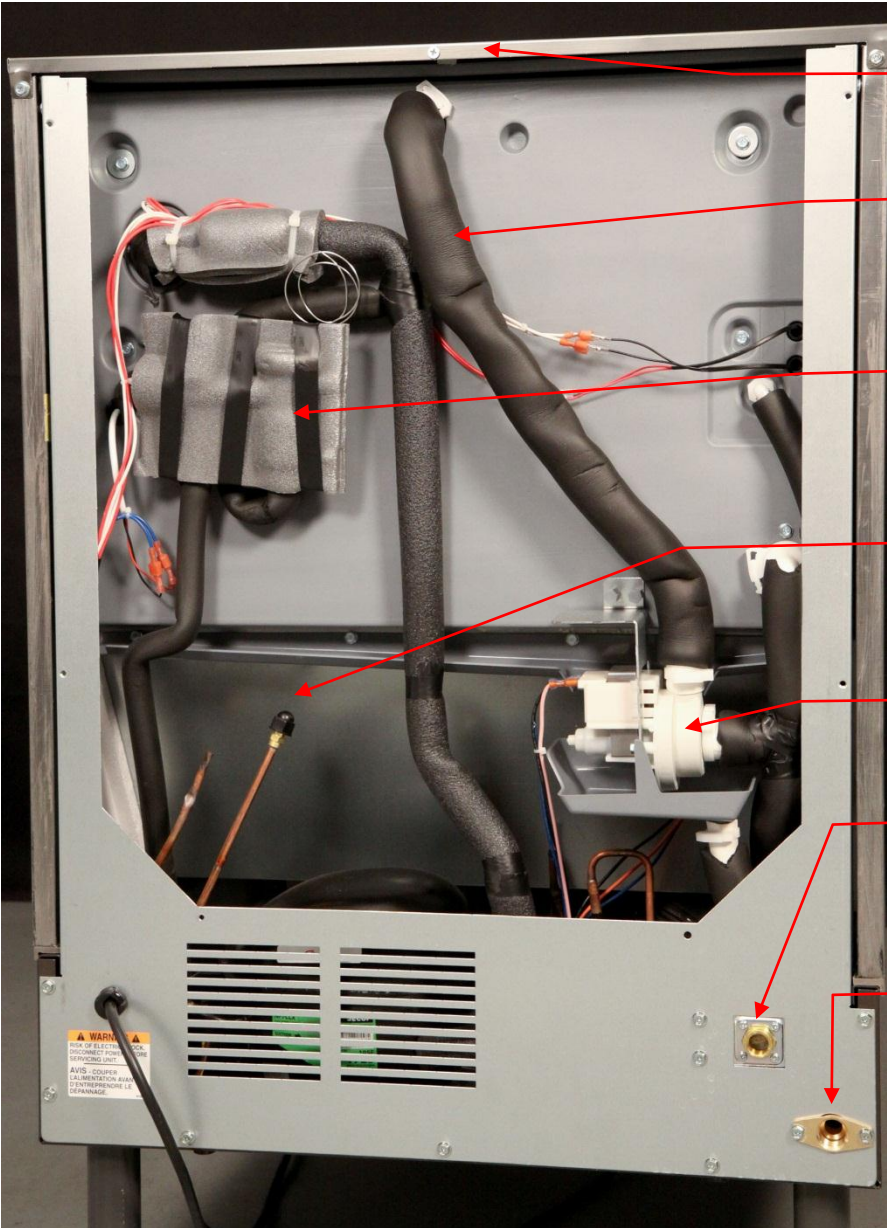


- Component Identification
- Ice Making Sequence of Operation
- Troubleshooting
  - Safety Limits
  - Control Board Test Mode
  - Ice Machine will not run
  - Ice Machine not cycling into harvest
  - Ice Machine premature harvest
  - Refrigeration System

# NEO™ - Component Identification



# Component Identification



Top Cover

Water Pump Discharge  
Hose

Thermostatic Expansion  
Valve

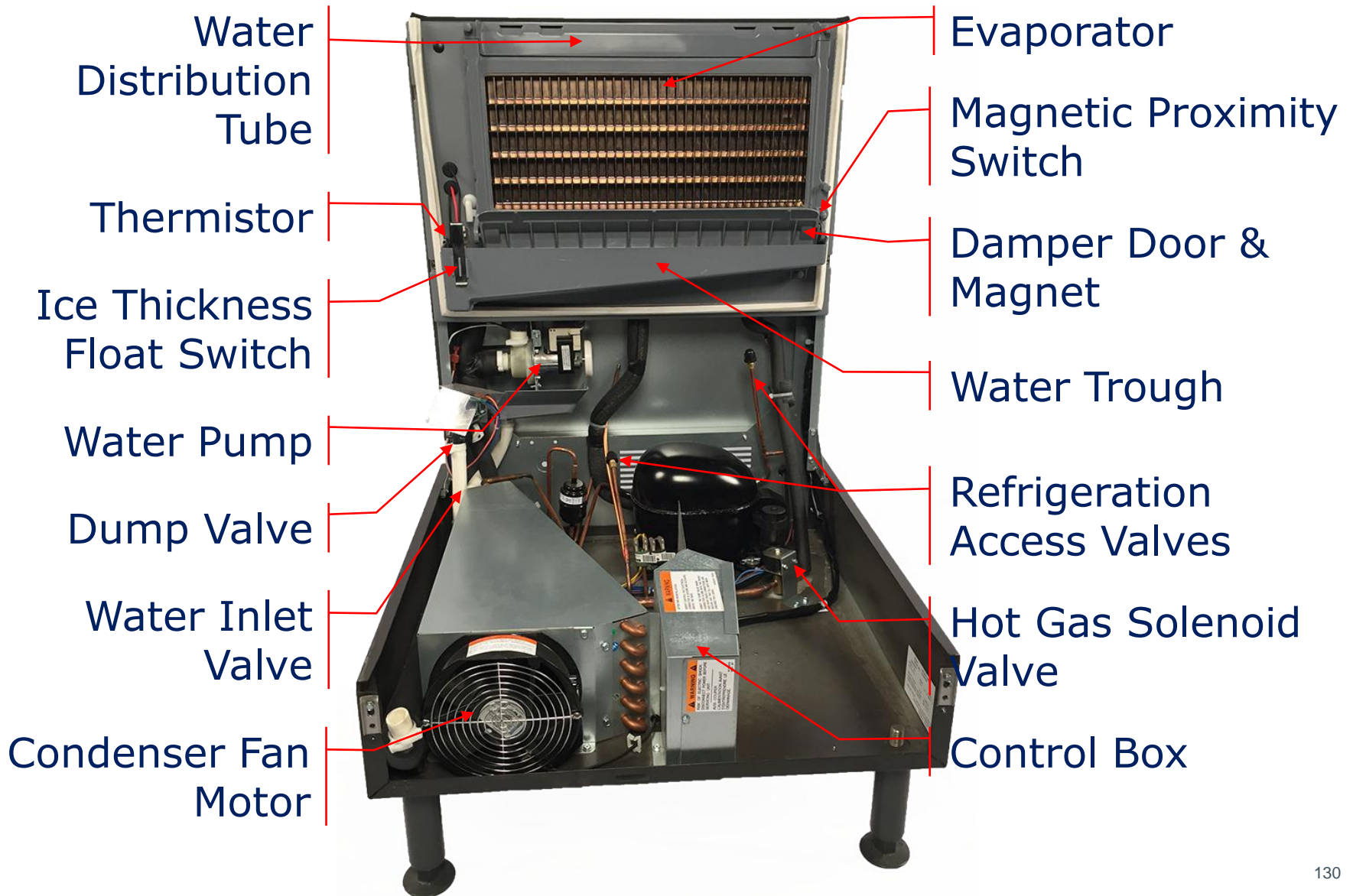
Refrigeration Access  
Valves

Water Pump

Water Inlet, 3/8" Female  
Pipe Thread

Drain, 1/2" Female Pipe  
Thread

# Disassembly / Removal



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# ICE MAKING SEQUENCE OF OPERATION

## Control Touch Pad Features

The Control Touch Pad offers a series of pressure sensitive buttons to control the ice machine operation and provide operational status.



Power Button: Blue Light On = Machine On  
Blue Light Off = Machine Is Off  
*(Push and hold for 3 seconds turns ice machine off).*

Delay Button: Blue Light On = Delay Mode On  
Blue Light Off = Delay Mode Is Off

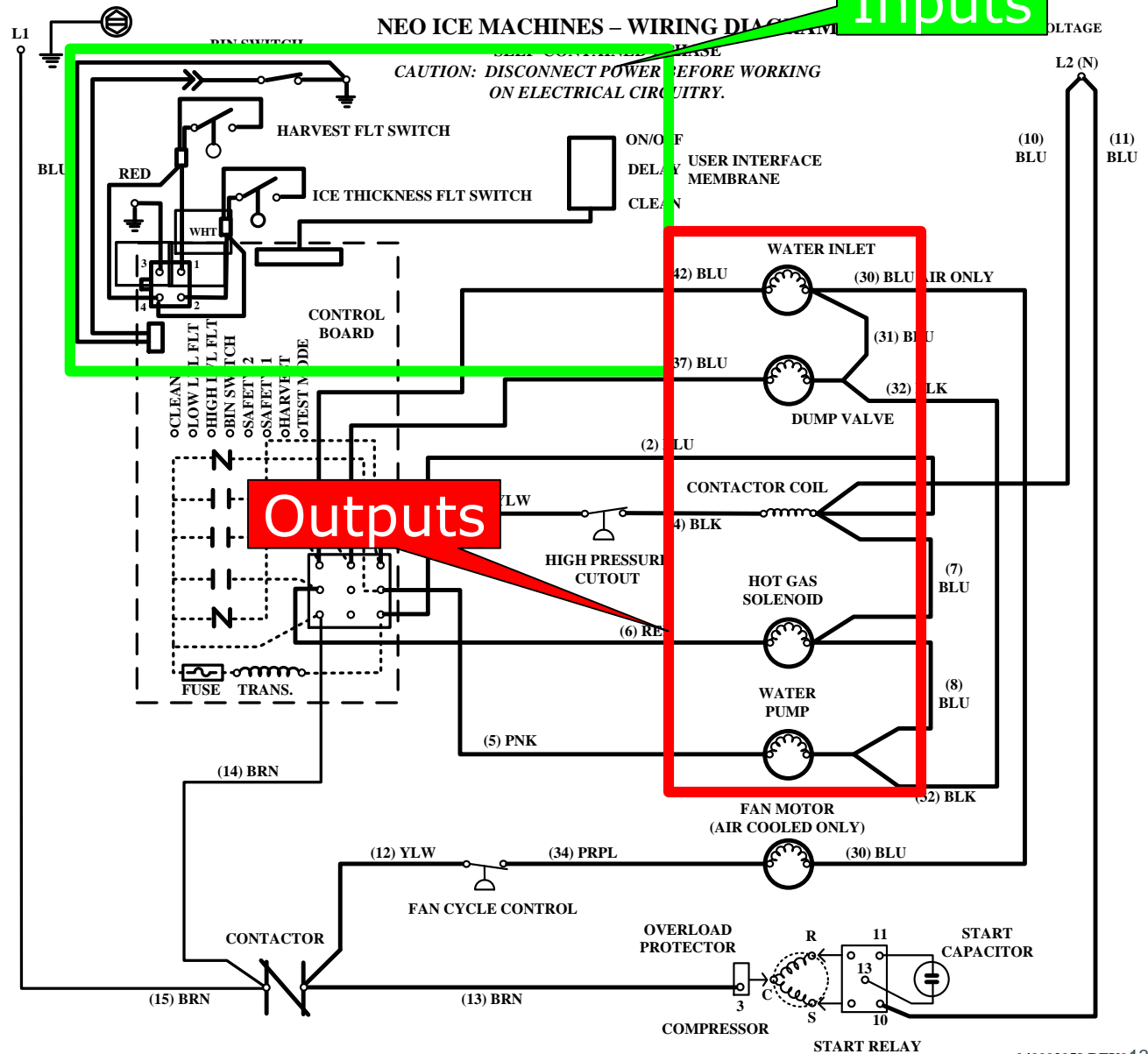
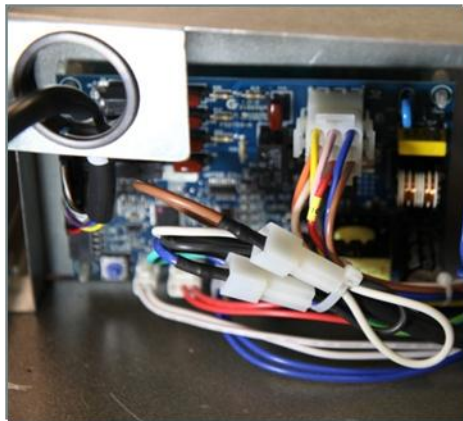
Clean Button: Yellow Light On = Clean Cycle On  
Yellow Light Off = Clean Sequence of Operation Off

Bin Full Icon: Blue Cube Lights On = Bin Is Full  
Blue Cube Lights Off = Bin Is Not Full

Service Icon LED: Red Light On or Flashing = Needs Service  
*(Flashes corresponding Safety limit number upon restart if Safety limit is in memory of the control board).*

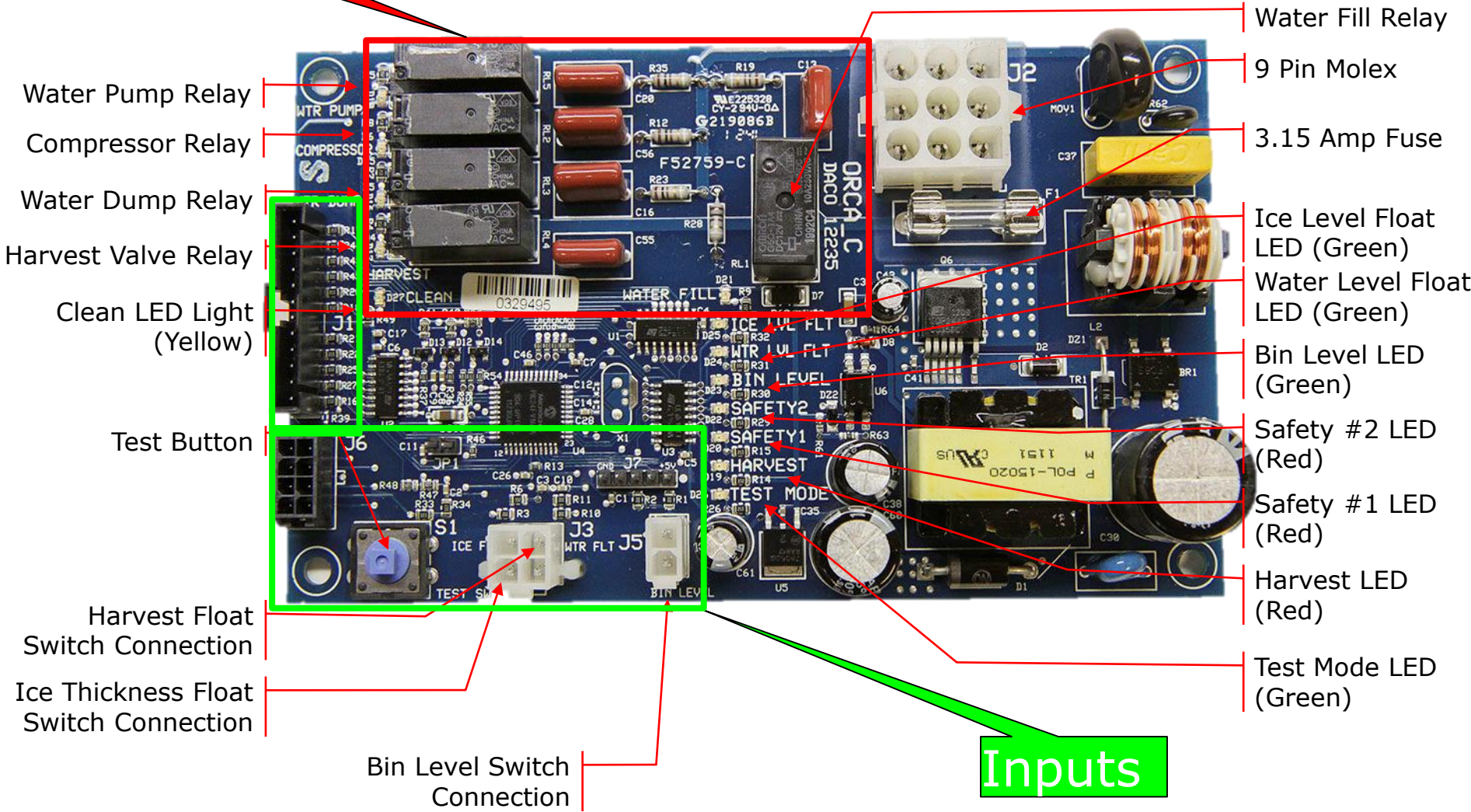


# Sequence of Operation



# Control Board

## Outputs



## Inputs



Press the Power Button to start Making Ice!

The power button must be depressed and the ice damper must be closed before the ice machine will start.



Initial Start

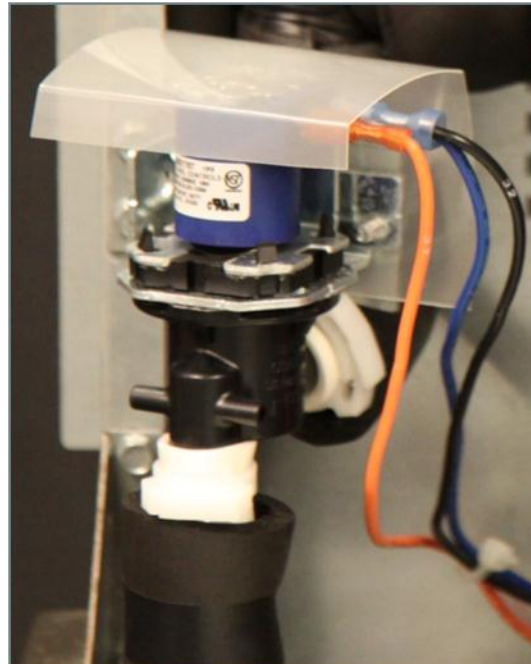
1

Purge

20 Sec

## Energized Parts

- Dump Valve
- Harvest Valve



## Initial Start

1	2
Purge	Start-Up
20 Sec	5 Sec

## Energized Parts

- Harvest Valve
- Contactor Coil  
(Compressor and Fan)



## Initial Start

1	2	3
Purge	Start-Up	Pre-Chill
20 Sec	5 Sec	120 Sec. (first cycle) 60 Sec. (thereafter)



## Energized Parts

- **Contactor Coil**  
(Compressor and Fan)
- **Water Inlet**(After 60 in pre-chill: On until the Ice Thickness float switch is satisfied)

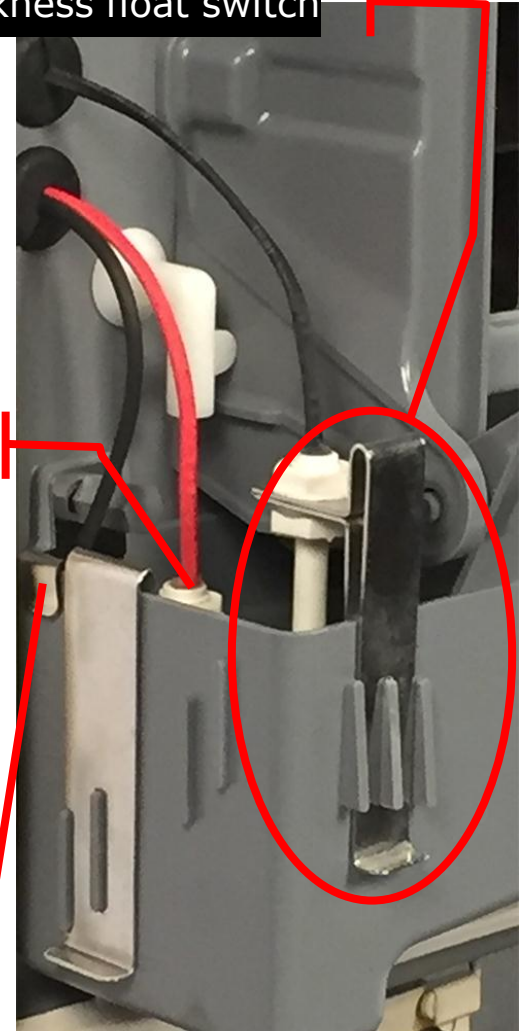


Initial Start			
1	2	3	4
Purge	Start-Up	Pre-Chill	Freeze
20 Sec	5 Sec	120 Sec. (first cycle) 60 Sec. (thereafter)	Harvest Float Switch (45 min. Max)

High/Ice-Thickness float switch

Low/Harvest float switch

Water Trough Thermistor

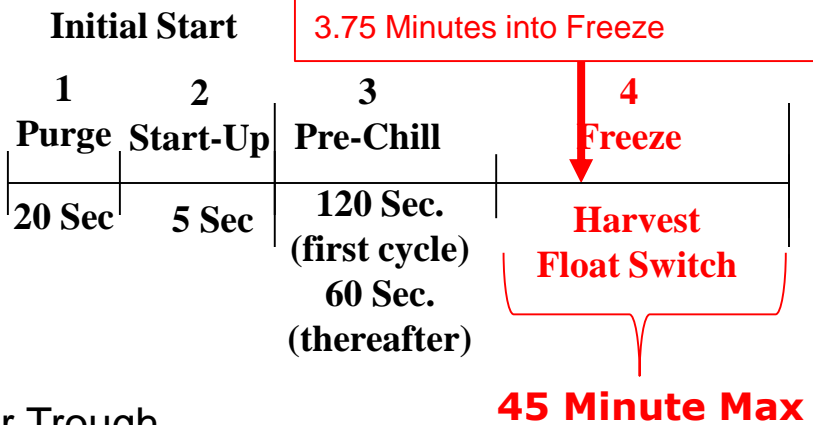


## Energized Parts

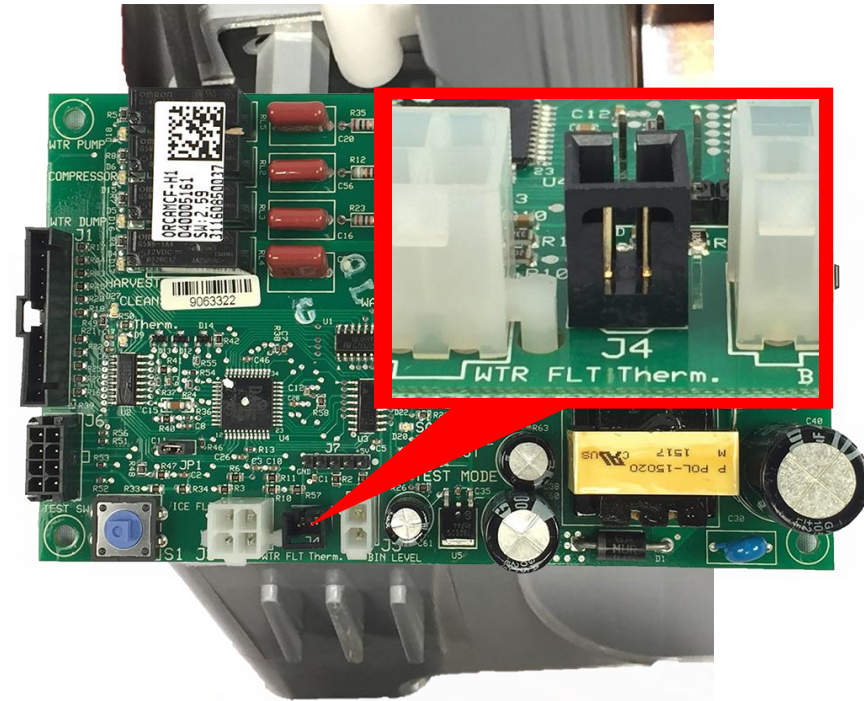
- **Contactor Coil**  
(Compressor and Fan)
- **Water Inlet (On until *Ice Thickness* float switch is satisfied or Max water fill time limit of 2 min.)**
- **Water Pump**



\*When the water temperature is = 34° F the water pump pauses for 25 seconds. Following the restart of the pump, the water inlet is energized for 7 seconds.



Water Trough Thermistor



## Pump Pause

- a. When the water temperature is = 34° F (1.11° C) the water pump pauses for 25 seconds. .
- b. If the thermistor is out of range (**removed from the control board**): At 3.75 minutes from the start of the freeze cycle, the pump will de-energize for 25 seconds and the Thermistor LED light will flash.

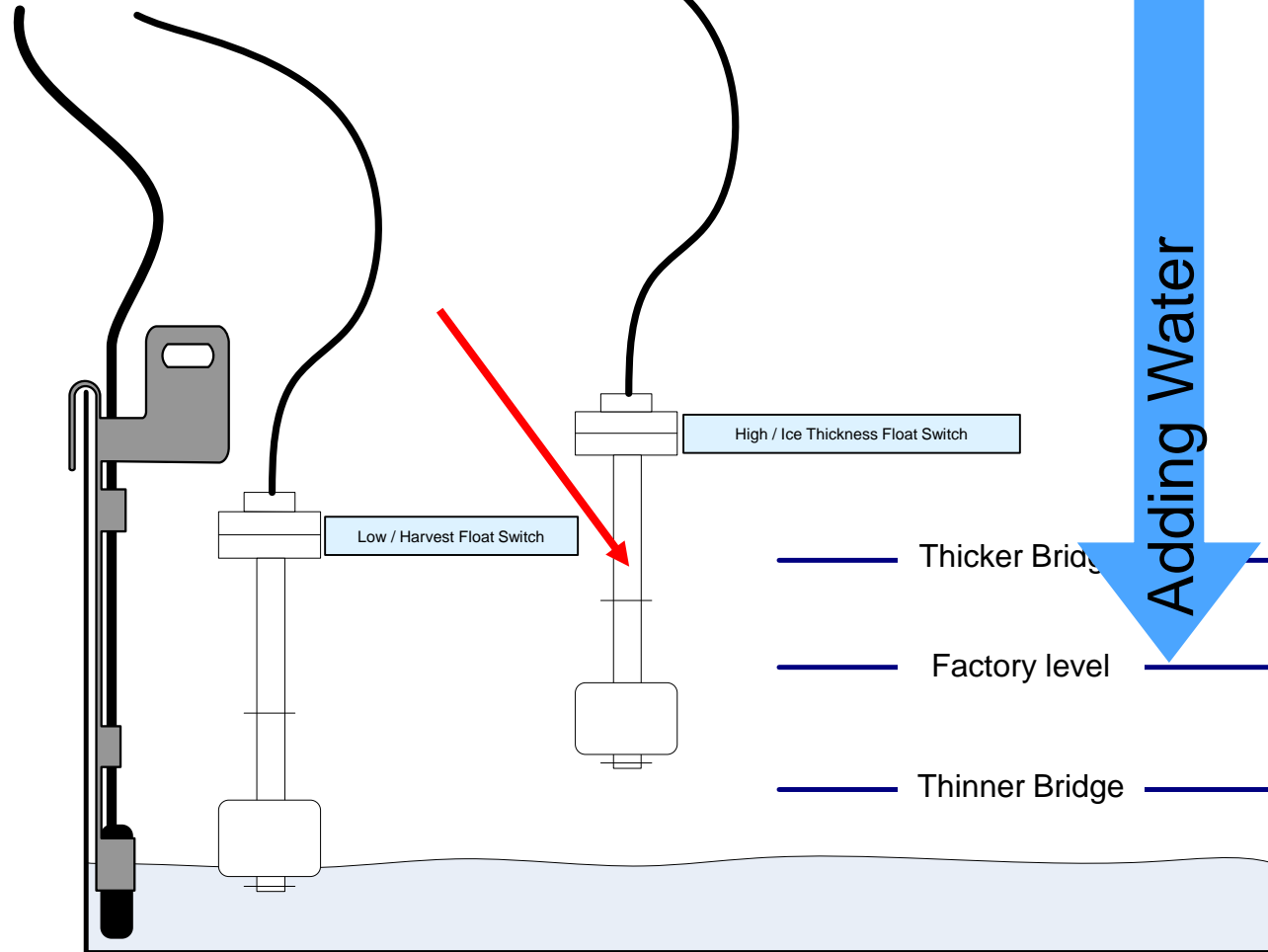


If the harvest float switch does not drop, the control board will initiate harvest after reaching it's maximum freeze cycle time of 45 minutes.



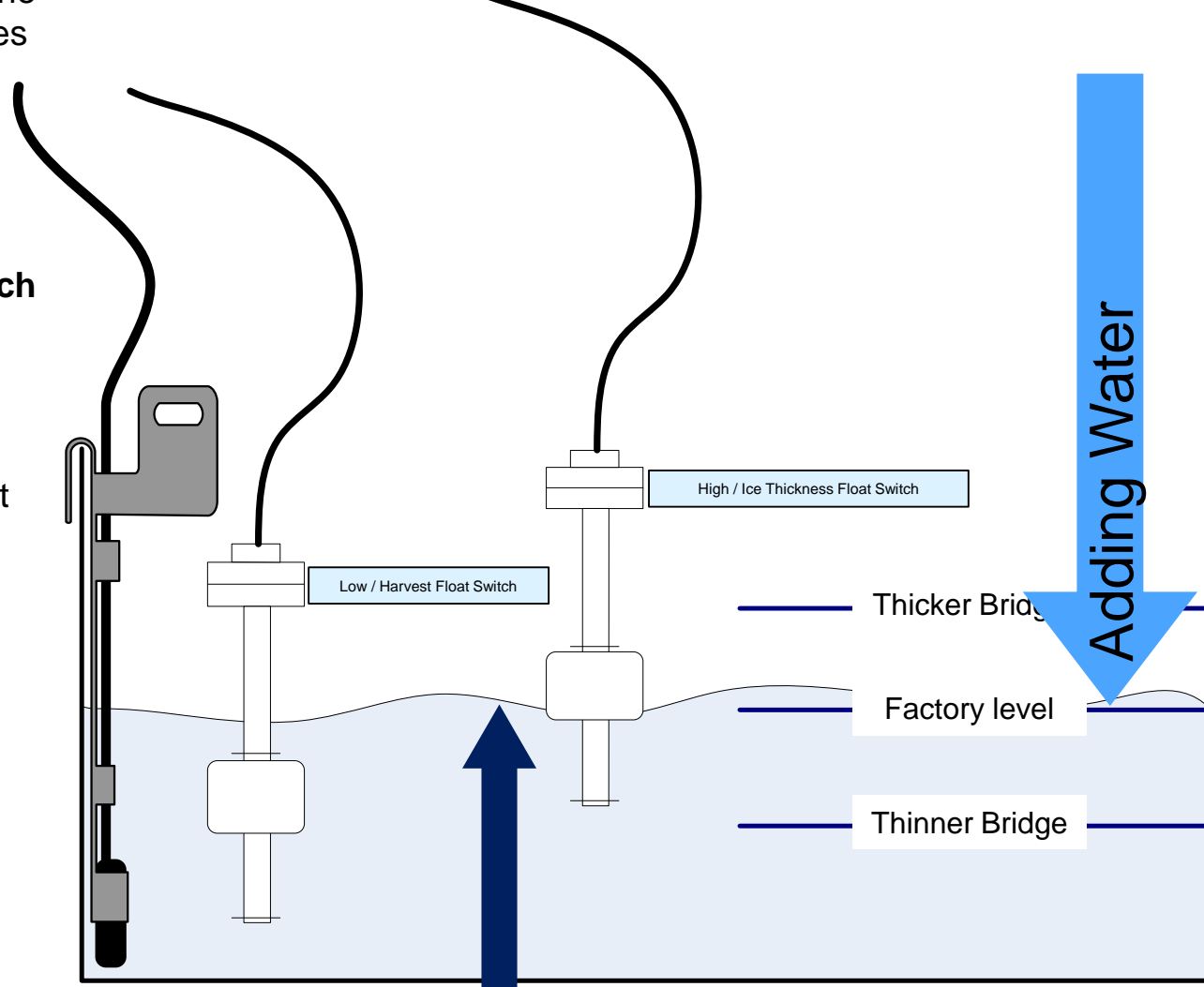
- During the Pre-chill and up to 2 minutes into the Freeze cycle the Ice Thickness Float Switch gives input to the control board to determine whether or not the water inlet valve should be energized.

## Float Switches



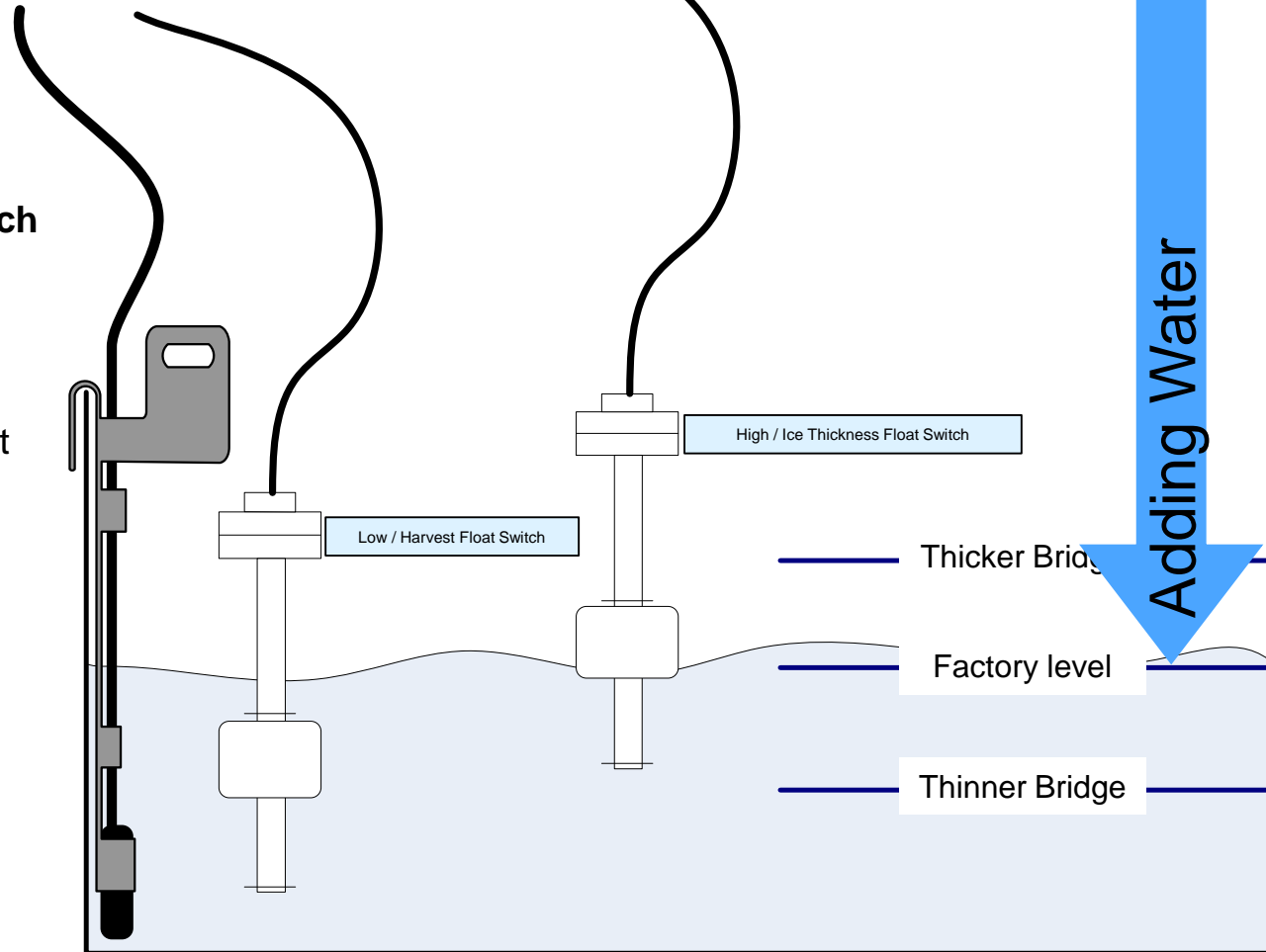
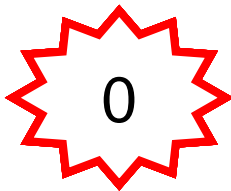
- During the Pre-chill and up to 2 minutes into the Freeze cycle the Ice Thickness Float Switch gives input to the control board to determine whether or not the water inlet valve should be energized.
- The Ice **Thickness Float Switch** comes from the Factory in the middle position, however if the end user wishes to increase or decrease the bridge thickness they can raise or lower the float switch.

## Float Switches



## Float Switches

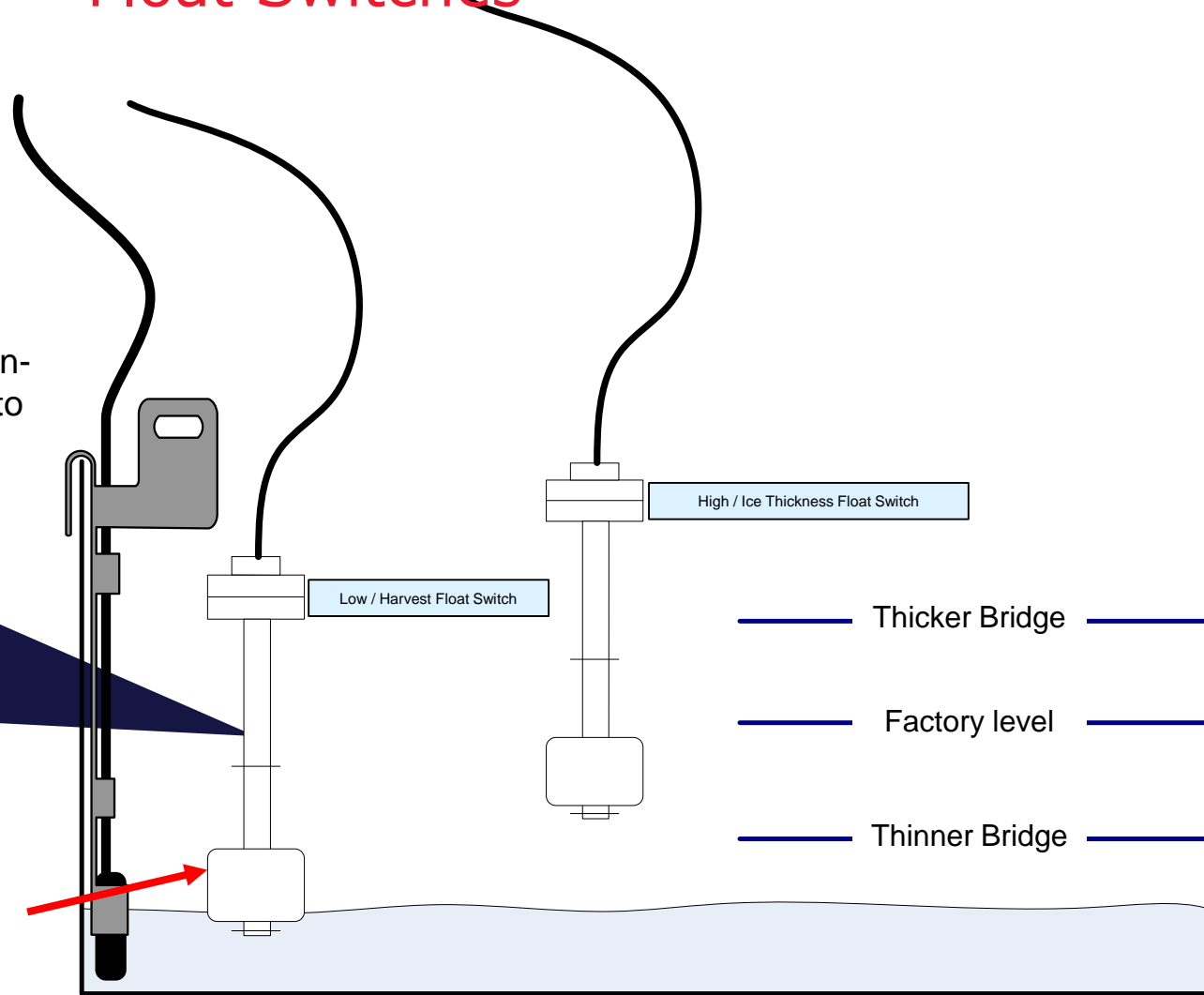
- During the Pre-chill and up to 2 minutes into the Freeze cycle the Ice Thickness Float Switch gives input to the control board to determine whether or not the water inlet valve should be energized.
- The Ice Thickness Float Switch comes from the Factory in the middle position, however if the end user wishes to increase or decrease the bridge thickness they can raise or lower the float switch.



\*After the water pump pause in the Freeze Cycle, the water fill solenoid activates for 7 seconds regardless of water level. (Prevent Slushing)

## Float Switches

- The **Harvest Float switch** is non-adjustable and only gives input to the control board to initiate harvest.



NOTE: The Float switches have Closed contacts with the floats in the down position and Open contacts in the up position.

# Harvest Purge

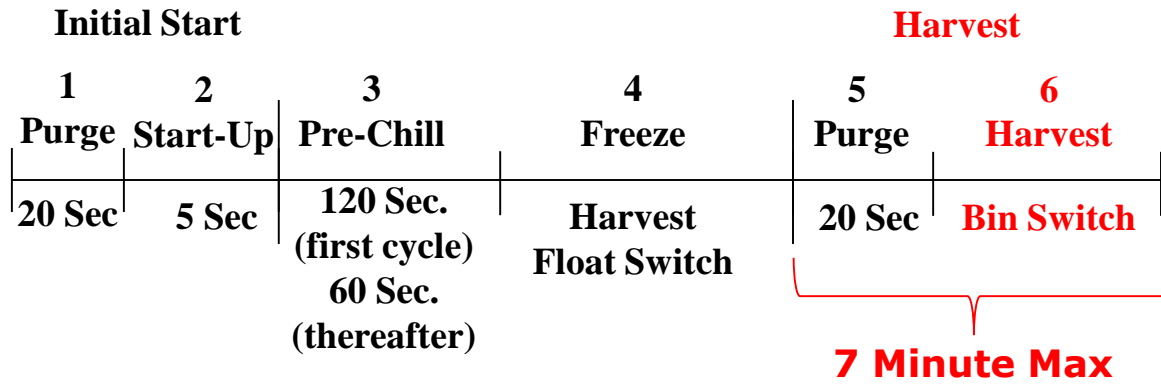
Initial Start			Harvest	
1	2	3	4	5
Purge	Start-Up	Pre-Chill	Freeze	Purge
20 Sec	5 Sec	120 Sec. (first cycle) 60 Sec. (thereafter)	Harvest Float Switch	20 Sec



## Energized Parts

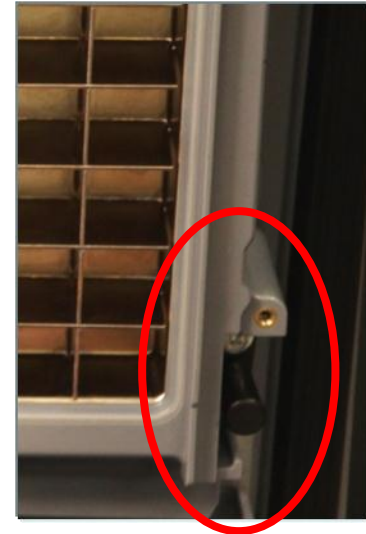
- **Contactor Coil**  
(Compressor and Fan)
- **Harvest Valve**
- **Dump Valve**





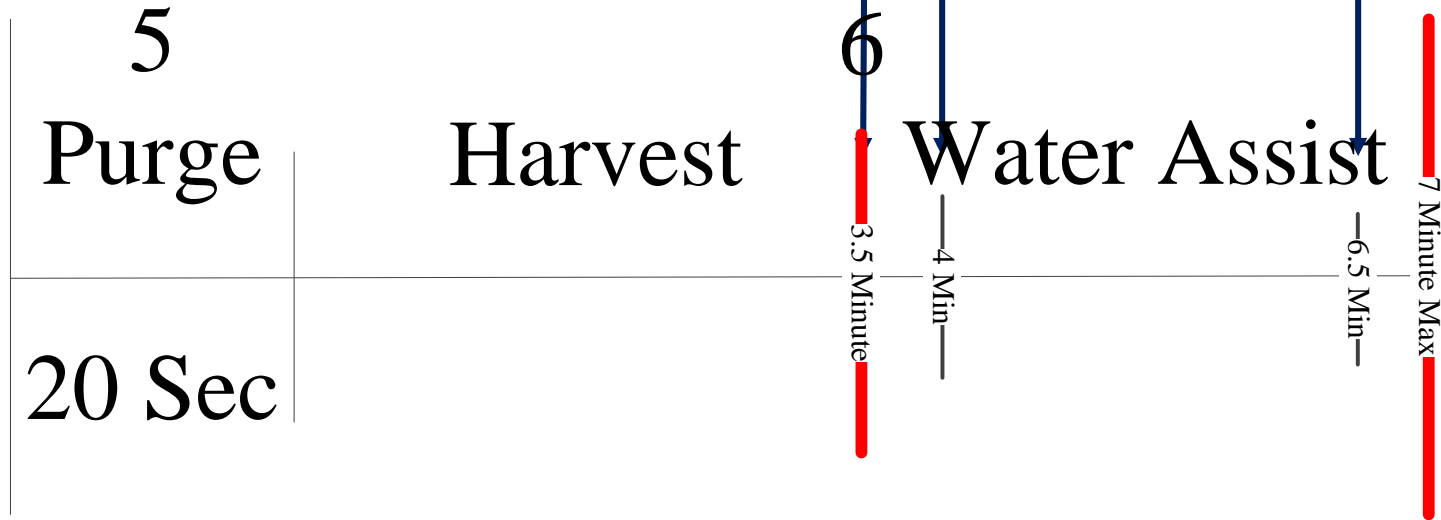
## Energized Parts

- **Contactor Coil**  
(Compressor and Fan)
- **Harvest Valve**



\*Waiting on activation of the damper door / Magnetic Proximity Switch or maximum harvest time limit of 7 minutes.

## Water Assist



@ 3.5 Minutes = Water Solenoid is energized and fills until the (high) **Ice Thickness Float Switch** raises. (Full Water trough of ambient Water). *Max water fill is 105 seconds.*

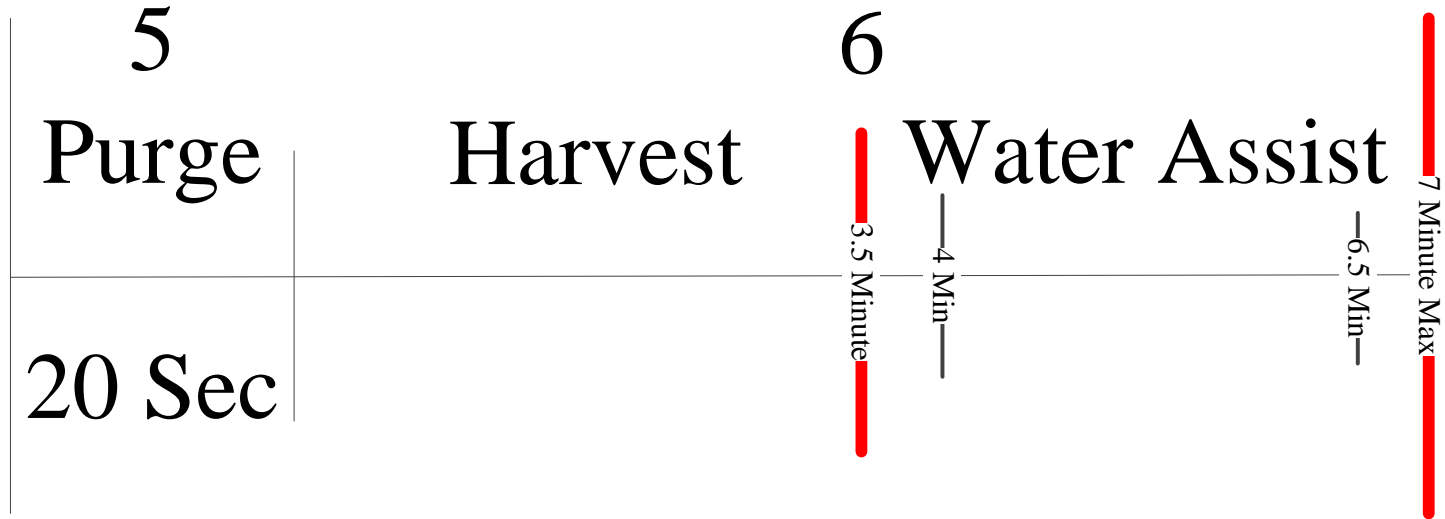
@ 4.0 Minutes = Water pump will come on, (Circulate Water).

@ 6.5 Minutes = Dump valve is energized and Water pump is De-energized for 30 seconds, (Clearing the water trough of water)



NOTE: The Damper Door can terminate harvest anytime during harvest.

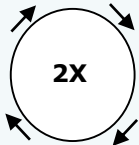
## Water Assist



NOTE: if the Damper door does not open and close by the **7 Minute Maximum harvest** cycle time the Ice Machine will initiate a **Water Thaw cycle**.

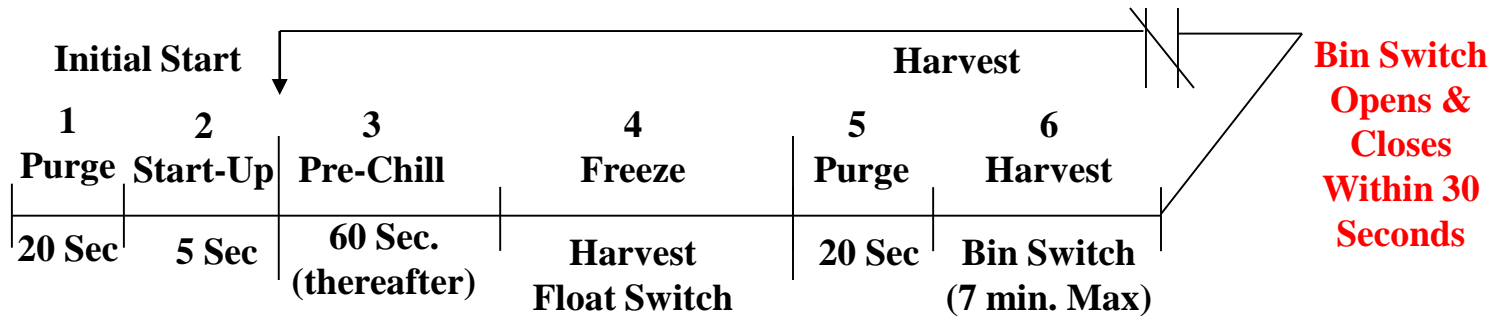


## Water Thaw Cycle: *(Approximately 5.7 minutes)*

	Time (Seconds)	Dump Valve	Water Pump	Harvest Valve	Compressor	Water Inlet
	0	Off	Off	Off	Off	On, unit the ITF raises.
	30	Off	On	Off	Off	
	150	On	Off	Off	Off	Off
	170	Dump valve turns off.				

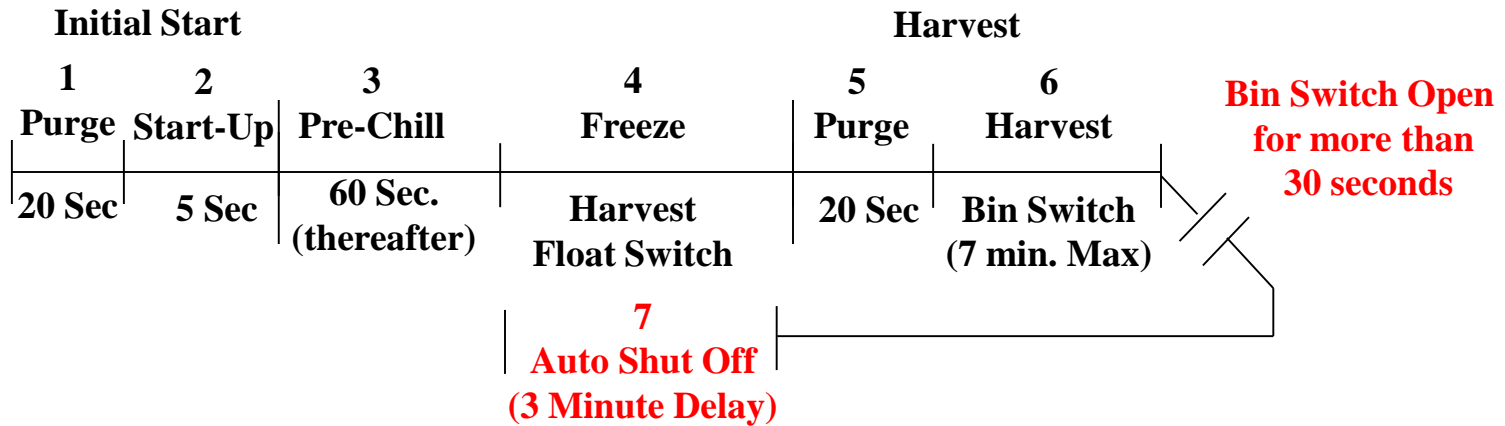
- Water inlet valve is energized and fills the water trough until the (High) Ice Thickness Float Switch rises. Maximum water fill at this time is 105 seconds
- At 30 seconds: the water pump energizes and stays running for 2 minutes
- At 2.5 minutes: the water pump de-energizes and the dump valve energizes for 20 seconds
- If the damper opens and recloses within 30 seconds during the water thaw cycle, the ice machine will continue the water thaw cycle.
- If the damper opens and remains open for 30 seconds at any point during the 2<sup>nd</sup> ice thaw cycle, the ice machine will enter an automatic shutdown.

# Return to pre-chill



## Energized Parts

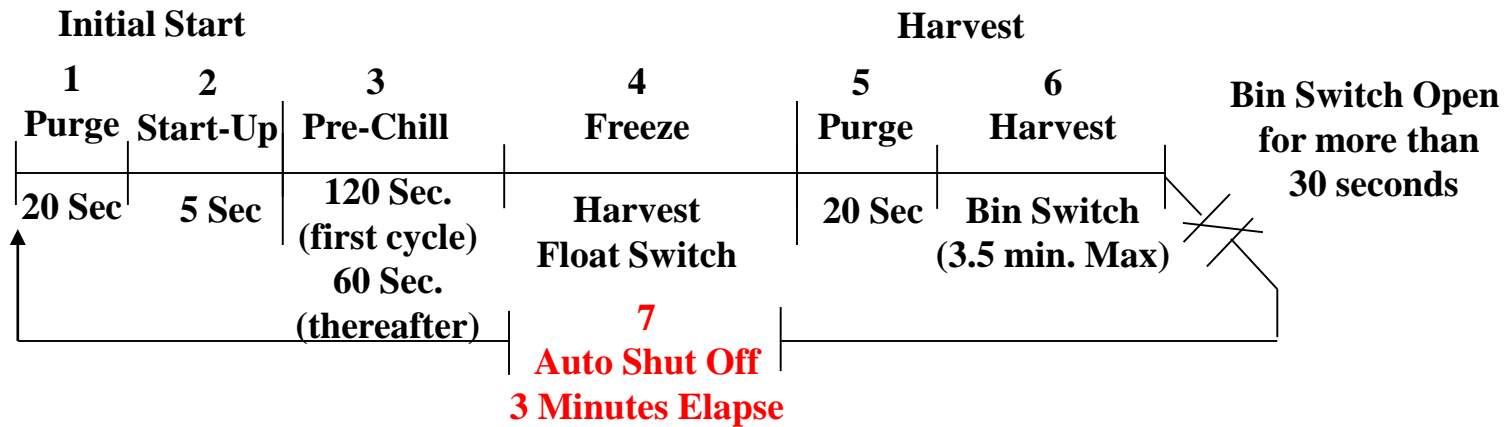
- **Contactor Coil**  
(Compressor and Fan)
- **Water Fill Valve** (Ice Thickness Float Switch Activation)



## Auto Shut-Off

- Bin Switch Open for 30 Seconds
- 3 Minute Delay for Restart

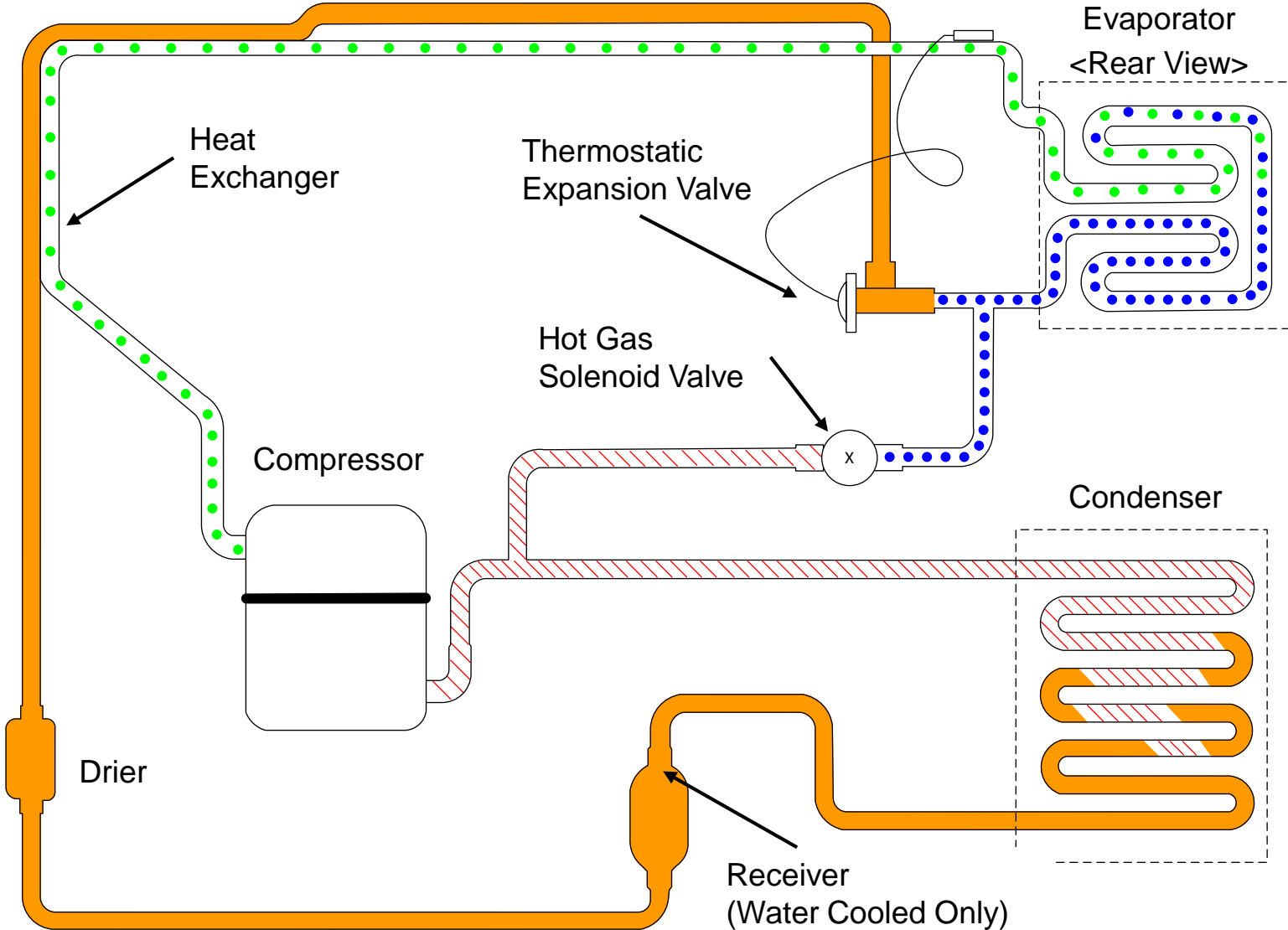




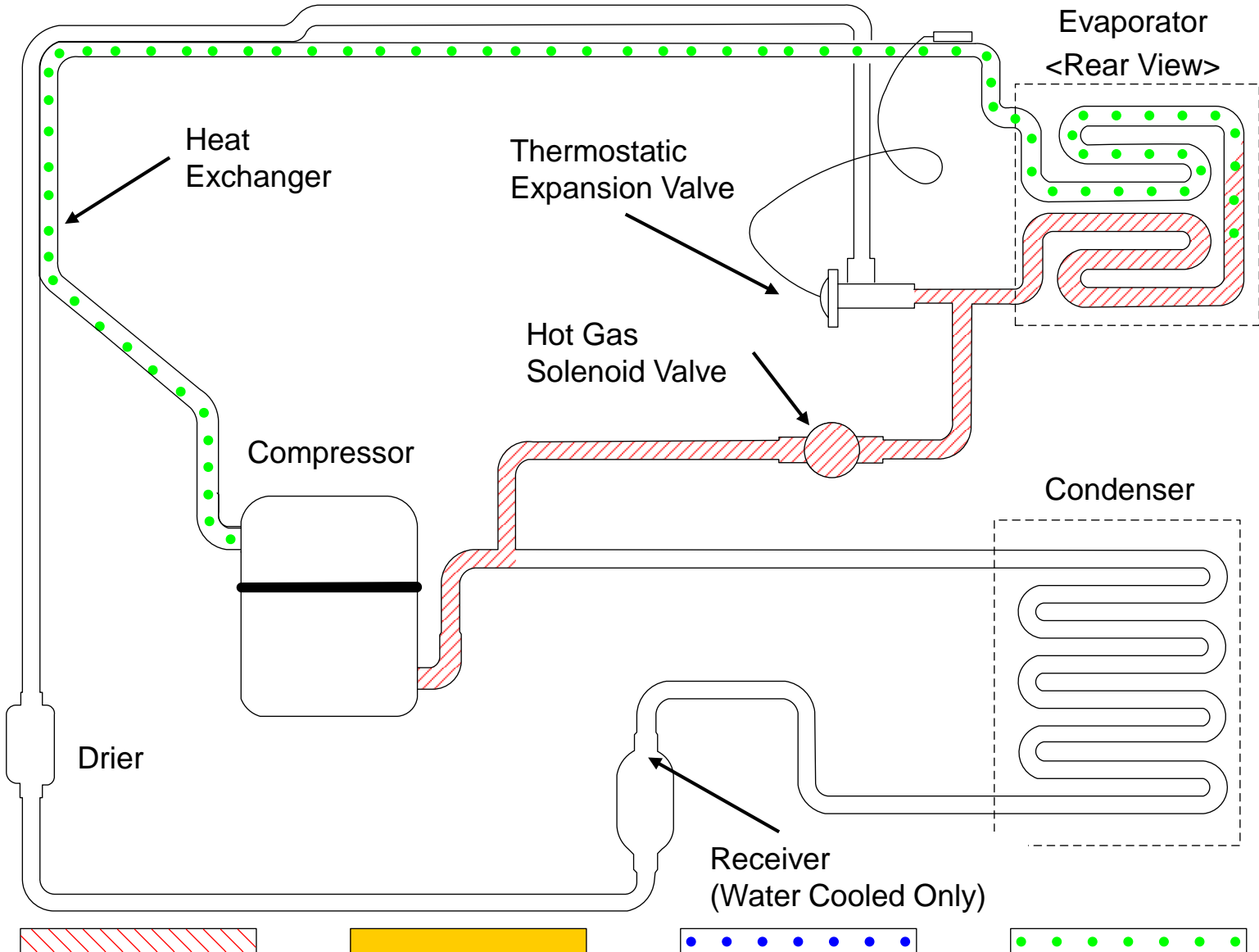
## Restart from Auto Shut-Off

- Bin Switch Closes and 3 Minute Delay has Expired

# Refrigeration System (Freeze Cycle)



# Refrigeration System (Harvest Cycle)



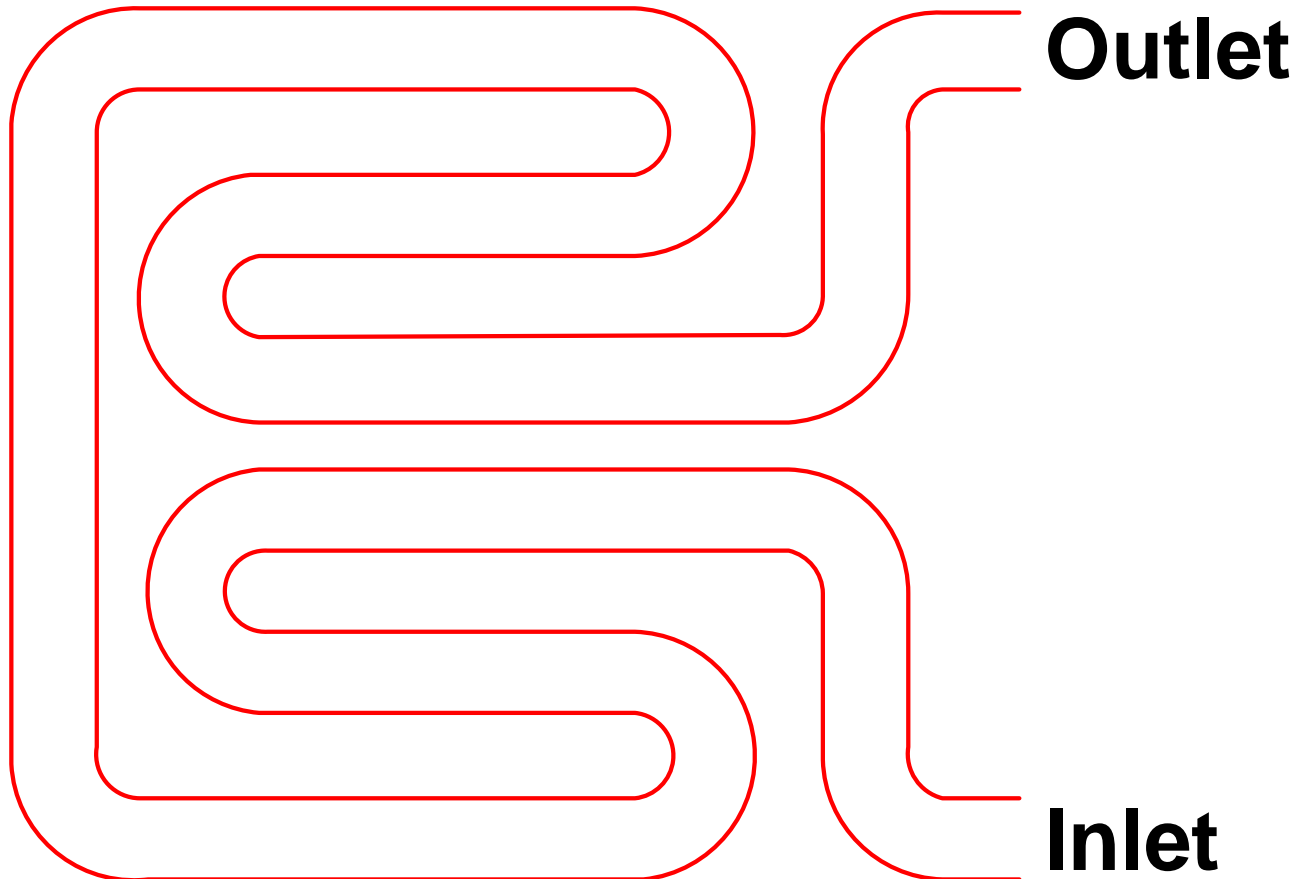
HIGH PRESSURE VAPOR

HIGH PRESSURE LIQUID

LOW PRESSURE LIQUID

LOW PRESSURE VAPOR

## NEO™ Evaporator <Front View>



- Ice Making Sequence of Operation
  - Initial Start
    - Purge
    - Refrigeration Start
  - Pre-Chill
  - Freeze
  - Harvest
    - Harvest Purge
    - Harvest
  - Auto Shut off
- Refrigeration System





NEO™

# TROUBLESHOOTING: THERMISTOR

## Operation / Troubleshooting:

- If the thermistor values fall outside of the valid temperature range of 20° F to 115° F (-7° C to 46° C) the Thermistor LED will flash and the pump pause will default to 3.75 minutes into the freeze cycle.

Temperature °C	Temperature (°F)	Resistance (Ω)
0.0	32.0	1

**32.65 kΩ**

**Therm.**

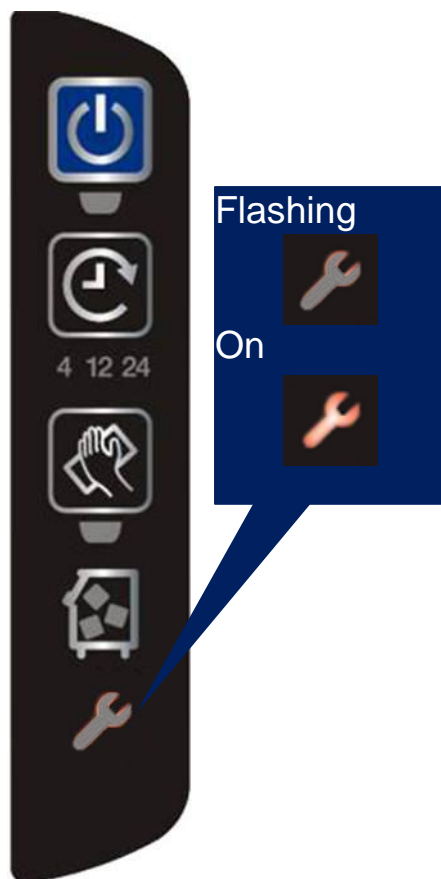
**\*NOTE:** If replacing an older control board with a new one and you don't install the Thermistor Kit, the Thermistor LED light will flash and this is normal operation. No Action is needed.



NEO™

# **TROUBLESHOOTING: SAFETY LIMITS**

## Service LED / Control Board LED's



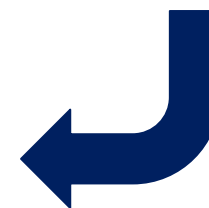
Safety Limit



To check to see which Safety Limit, push the power button off and then back on.

The Service LED light will flash depending on which safety limit is in memory of the control board.

- 1 Flash = Safety Limit #1
- 2 Flash = Safety Limit #2
- 3 Flash = Safety Limit #3





## Safety Limit #1: Long Freeze cycles

- After 3 consecutive 45 minute freeze cycles, the ice machine will record a safety limit #1 in the memory of the control board. The SL1 LED on the control board will flash on / off in 1 second intervals.
- After 6 consecutive 45 minute freeze cycles, the ice machine will shut down and energize the SL1 LED on the control board along with the UI service LED wrench.

## Safety Limit #2: Long Harvest cycles

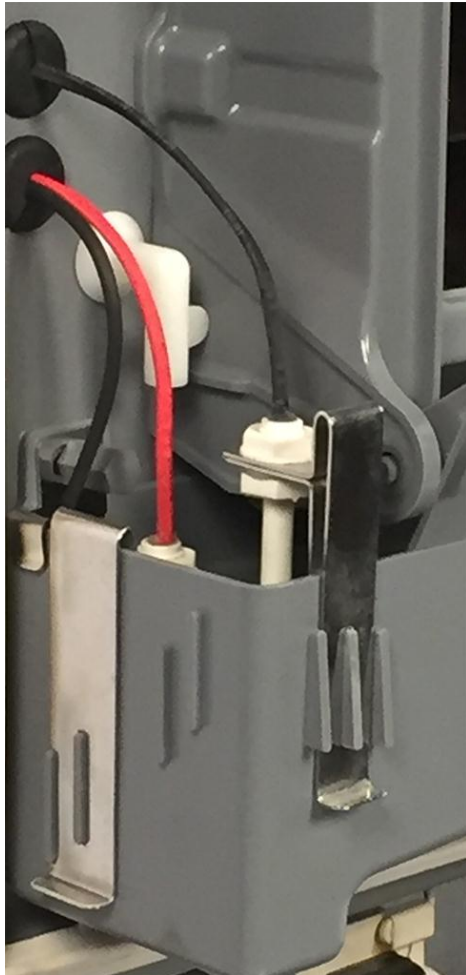
- If the Harvest time reaches its maximum of 7 minutes, the ice machine will initiate a Water Thaw Cycle, flag the harvest limit and flash the SL 2 LED light on the Control board.
- After 3 consecutive 7 minute Harvest cycles, the ice machine will shut off after completing the Water Thaw cycle and energize the SL 2 LED light on the control board along with the UI service LED wrench.

*Note: Safety limit #1 or #2 are recorded in the memory of the control board until either 100 consecutive good cycles or until another Safety limit condition has been indicated.*

*To check the memory, turn the ice machine off and on, then look for either **SL1** to flash once before start up or **SL2** to flash twice before start up on the control board.*

*You may also see the **Service LED flash either once or twice** before start up to indicate which safety limit is in the memory of the control board.*

# Safety #3, Water Loss Safety



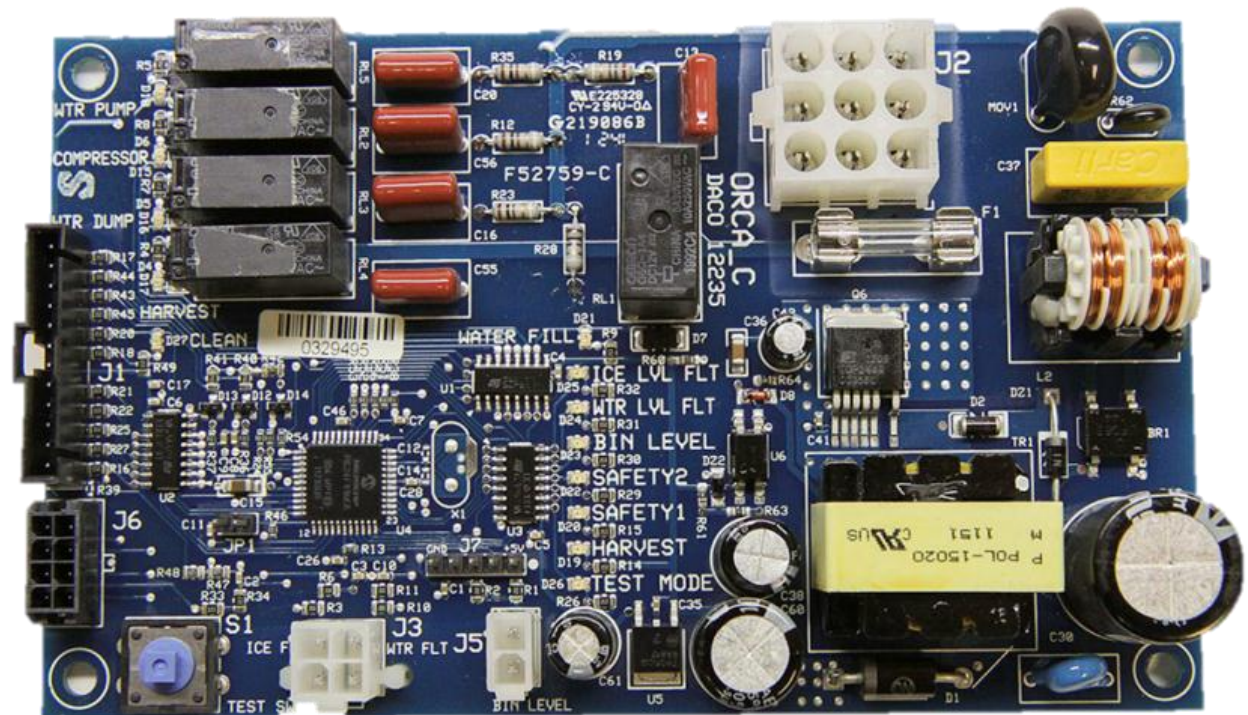
1	2	3	4
Purge	Equalize	Pre-Chill	Freeze
20 Sec	5 Sec	120 Sec. (first cycle) 60 Sec. (thereafter)	Harvest Float Switch (45 min. Max)

**If the Harvest float switch is still down (have never opened) after 4 minutes of the water valve energizing, the program will initiate the following:**

- Safety limit #3.
- Service LED & Both SL1/SL2 Lights on the control board will flash over and over until system restart. (This indicates no water).
- Restart in 30 minutes after shutdown.
- Auto restart for only 100 consecutive cycles, then stay off.
- Over ride 30 minute delay for restart by turning machine off and on. Upon restart the **Service Light and SL1/SL2 light will flash 2 times**.

Safety Limit #3 is bypassed (will not register) on the initial start up (manual start or after a full bin/safety limit condition).





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# TROUBLESHOOTING: CONTROL BOARD TEST MODE

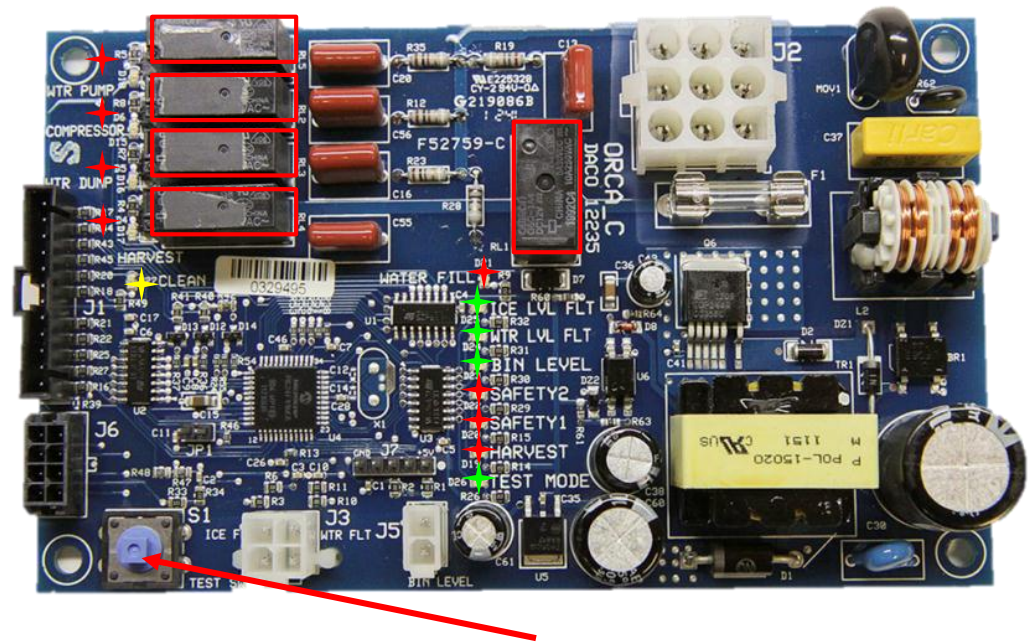
# Troubleshooting

## Control Board Test Mode:

*Purpose is to energize all relays and run one cycle with out bin and interface attached.*

The control board test mode performs the following function for a 2 minute time period:

- Energizes all control board relays.
- Energizes all control board lights.



Press and Hold Test button for 3 seconds.

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



## Control Board Test Mode:

*Purpose is to energize all relays and run one cycle with out bin and interface attached.*

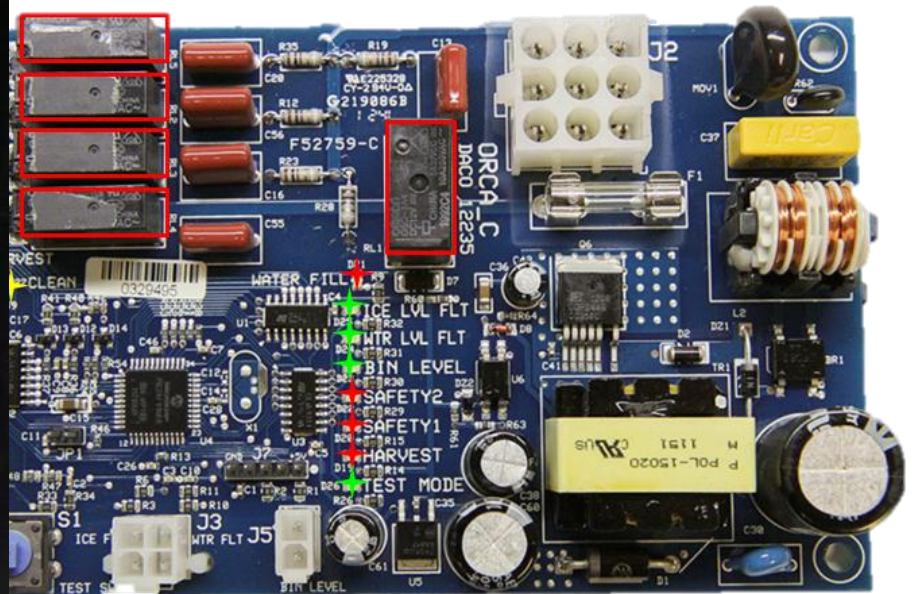
The control board test mode performs the following function for a 2 minute time period:

- Energizes all control board relays.
- Energizes all control board lights.
- Energizes all user interface control lights.

After 2 Minutes the control board will automatically initiate and complete one ice making cycle which includes harvest and then Stop.

### To Cancel a Test Cycle:

Press the test button a Second Time

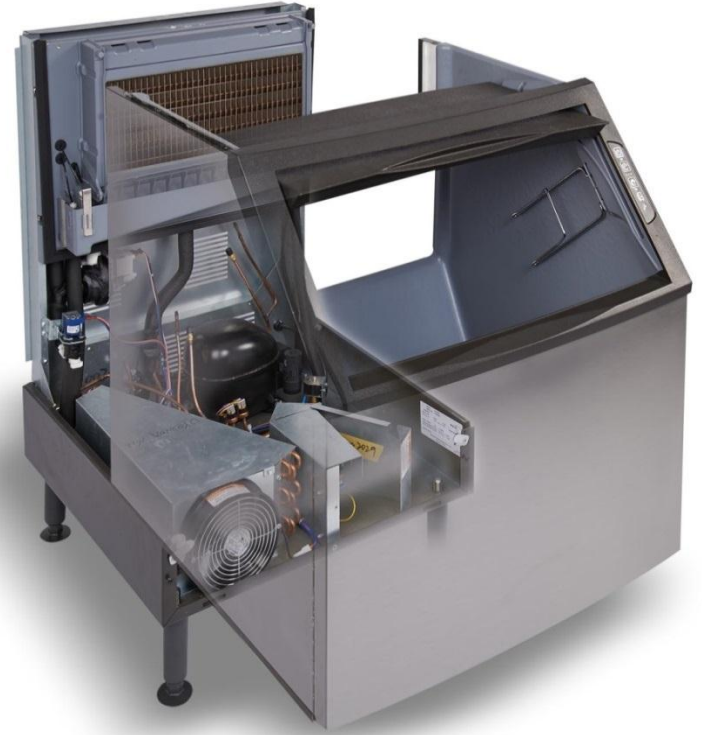


*NOTE: The ice damper/bin switch can be open or closed and does not effect the operation of the test mode.*

## Troubleshooting

- Safety Limits
- Control Board Test Mode





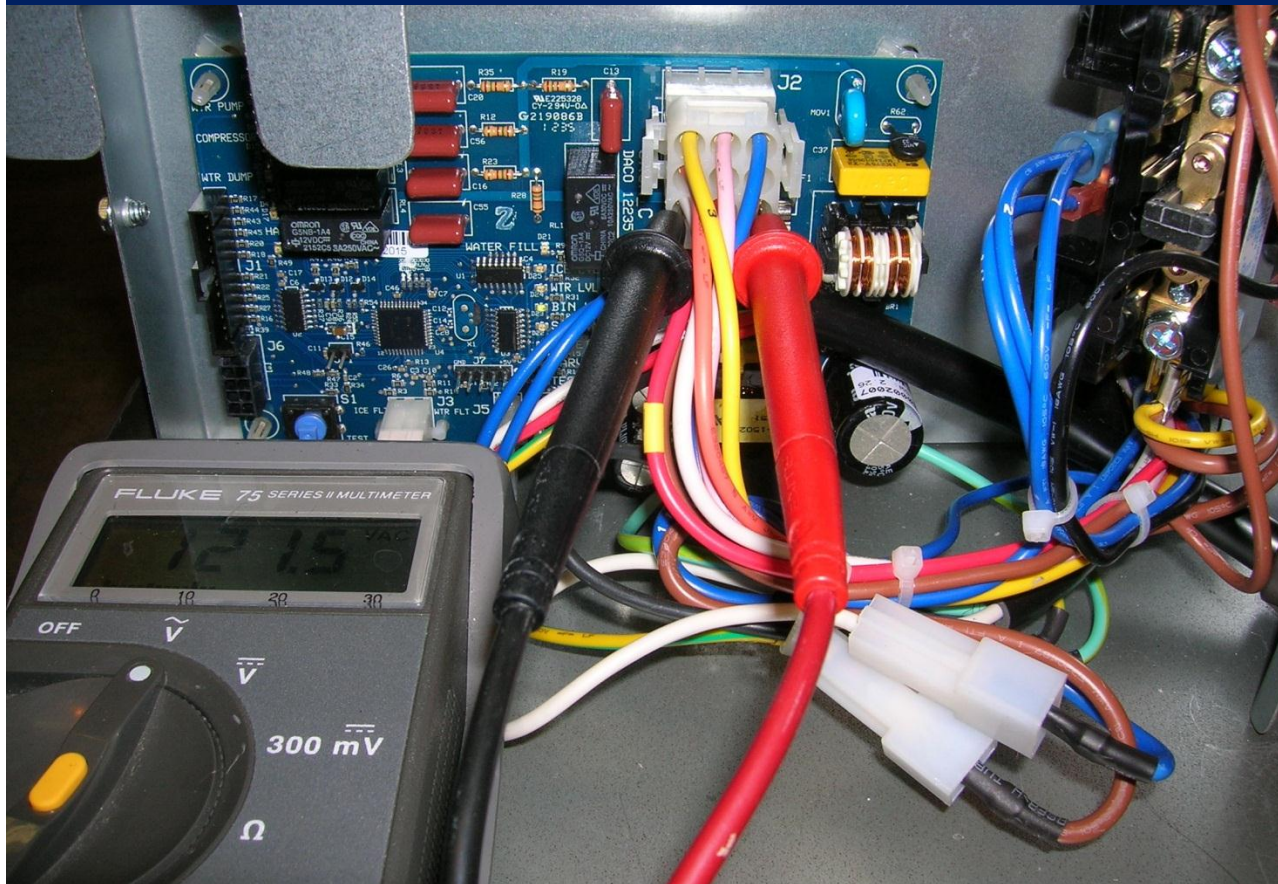
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# **TROUBLESHOOTING: DIAGNOSING AN ICE MACHINE THAT WILL NOT RUN.**

## Diagnosing an Ice Machine that will not run.

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

Wire # 14 (L1) and #2 (L2)

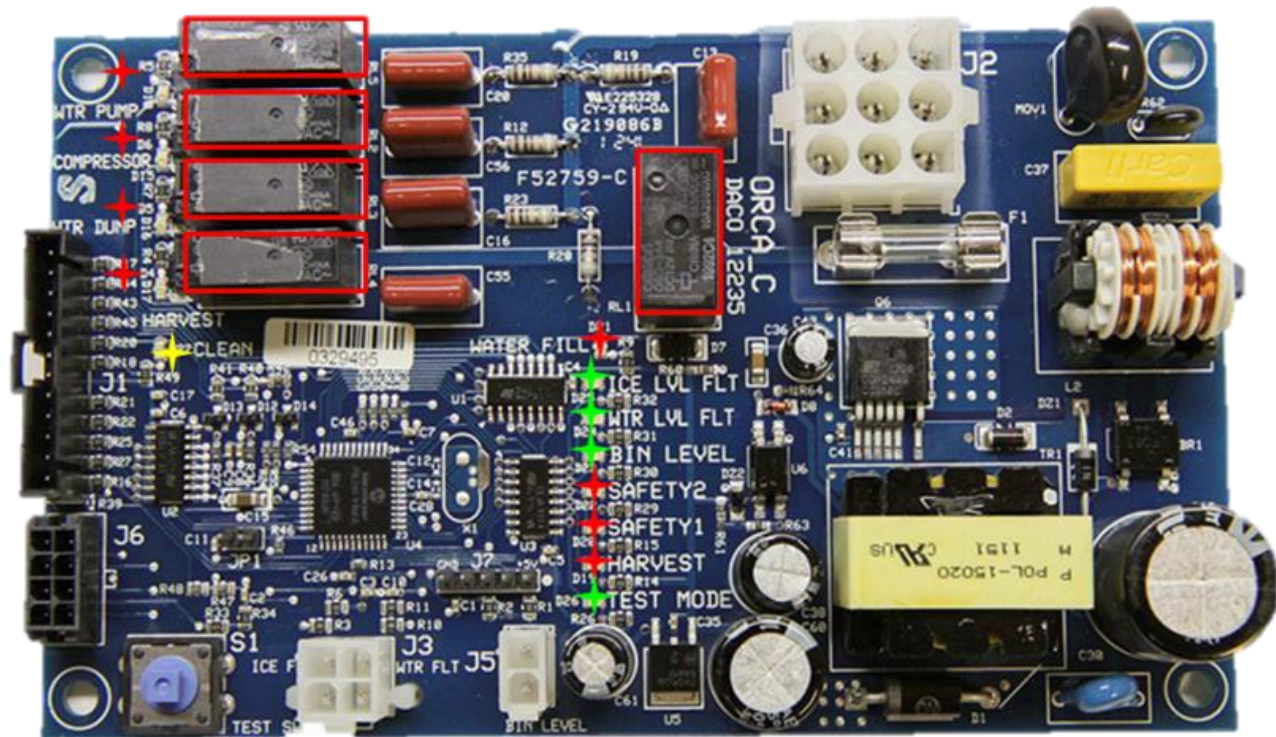
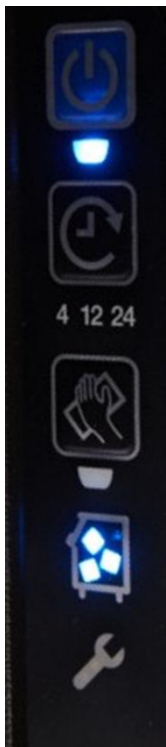


NOTE: For Easier Access while troubleshooting, remove Cabinet.

## Diagnosing an Ice Machine that will not run.

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.*



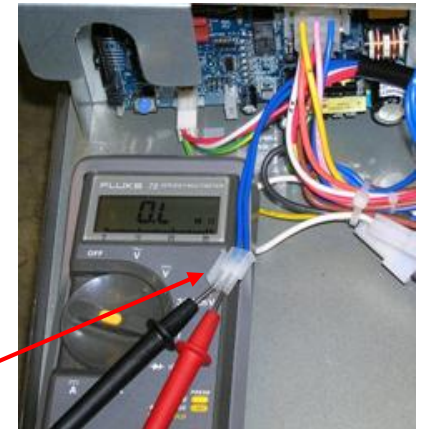
## Diagnosing an Ice Machine that will not run.

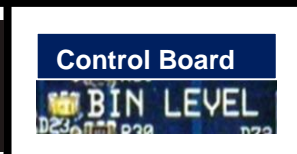
1. Verify primary voltage is supplied to ice machine and the fuse/circuit breaker is closed.
2. Verify control board fuse is okay.

*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.

*NOTE: Be careful not to push leads to far into plug while ohming. This will cause a poor connection to board when you reconnect.*



Damper Closed	Damper Open
 	 

## Diagnosing an Ice Machine that will not run.

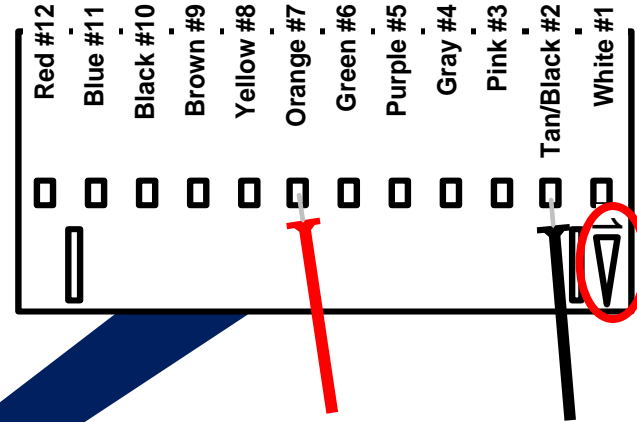
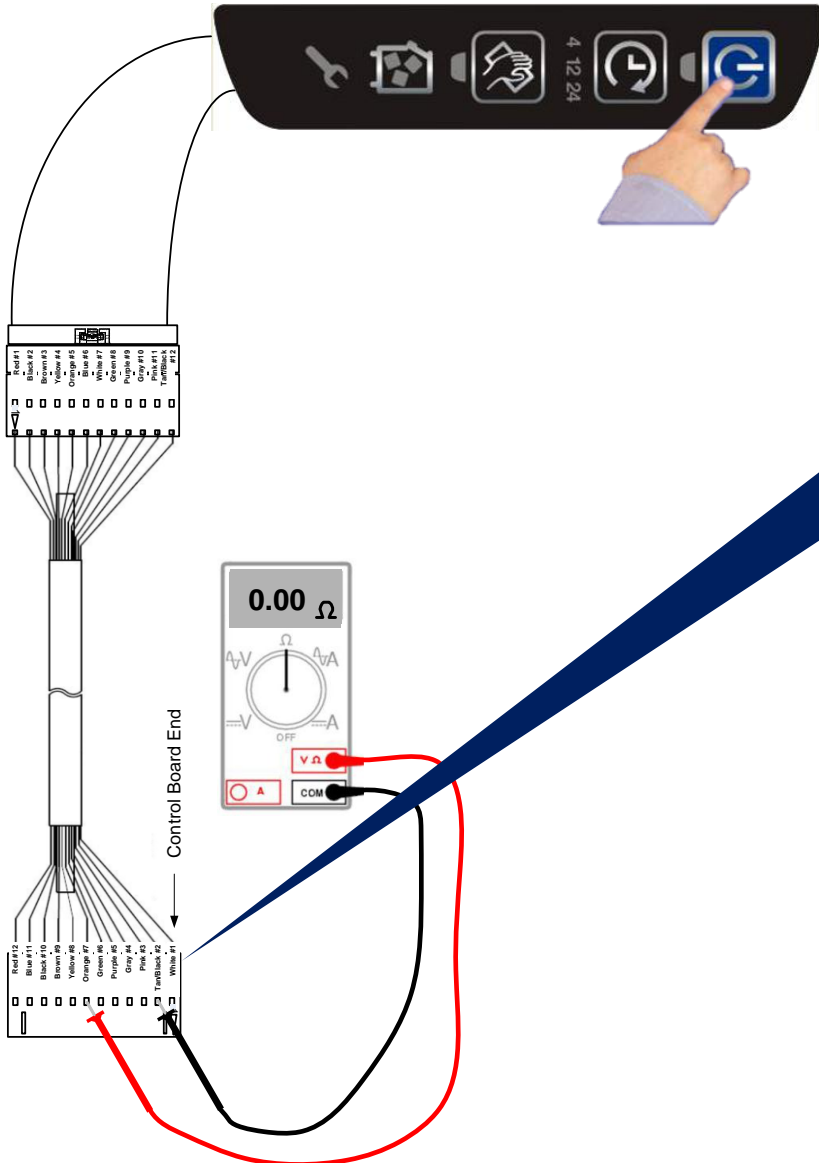
1. Verify primary voltage is supplied to ice machine and the fuse/circuit breaker is closed.
2. Verify control board fuse is okay.


*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 power button functions properly. A defective power button may keep the ice machine in the OFF mode.



## Touch Pad Diagnostics

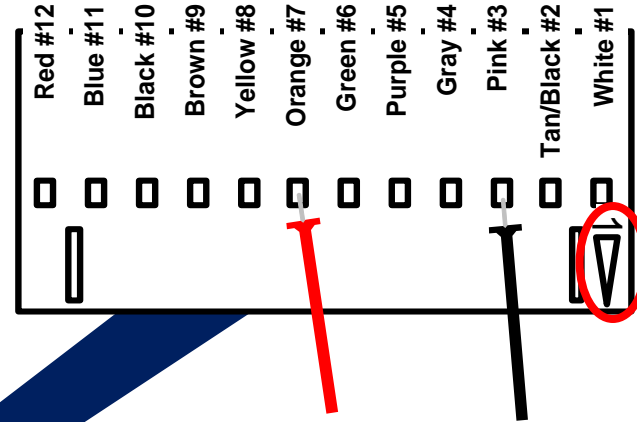
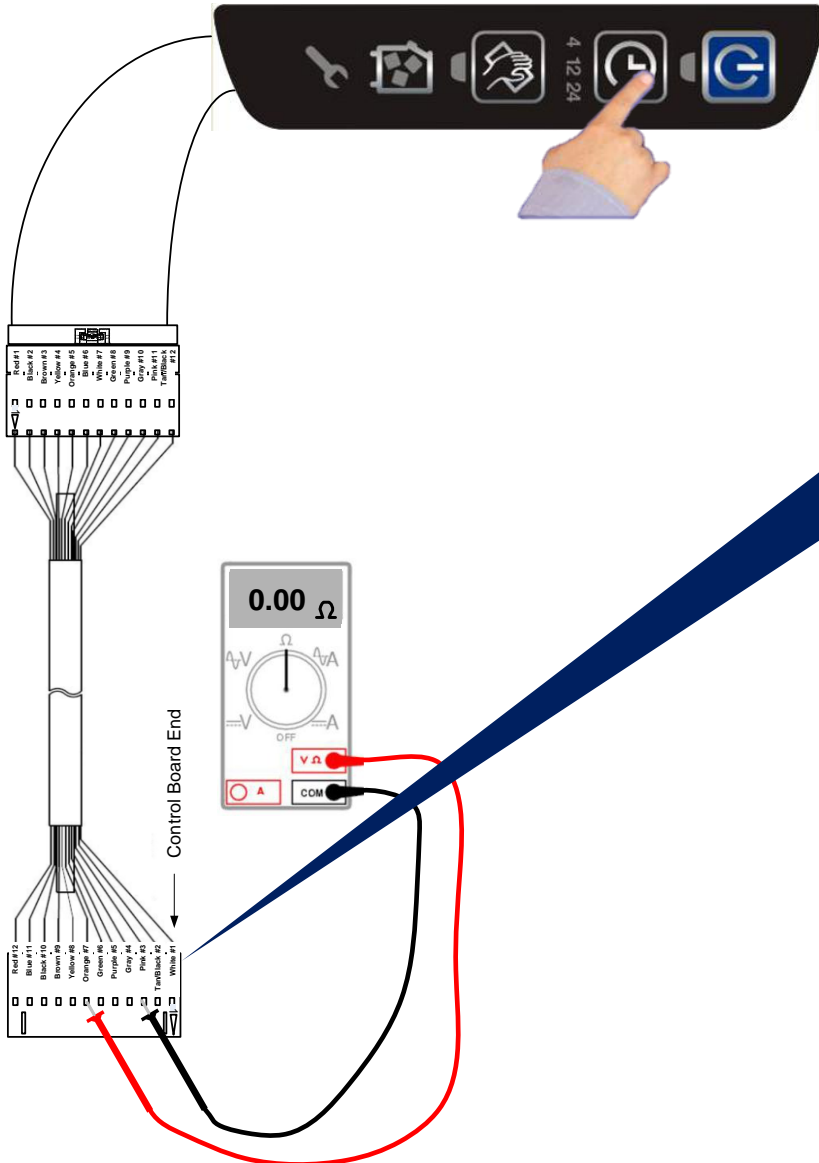




Touch Pad Button	Wire Numbers (Control Board Plug)	Ohm Value (Not Pushed)	Ohm Value (Pushed)
ON/OFF BUTTON 	#7 = Orange #2 = Tan/Black	Open 	Closed ⎓



# Troubleshooting

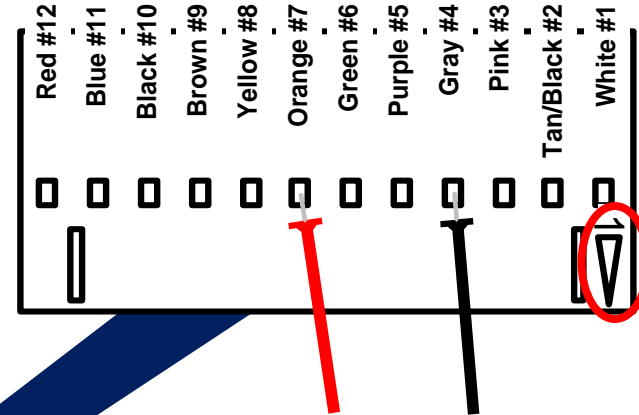
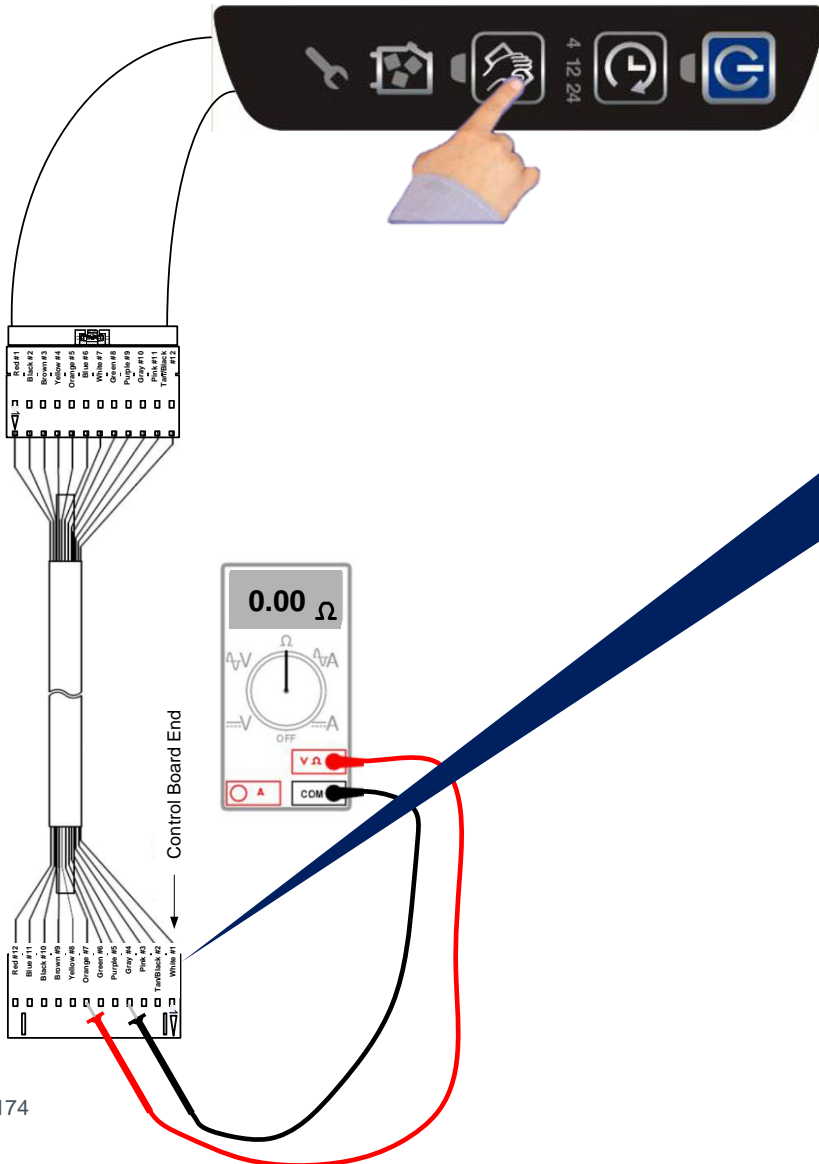
## Touch Pad Diagnostics






Touch Pad Button	Wire Numbers (Control Board Plug)	Ohm Value (Not Pushed)	Ohm Value (Pushed)
ON/OFF BUTTON 	# 7 = Orange # 2 = Tan/Black	Open ++	Closed ⊘
Delay button 	# 7 = Orange # 3 = Pink	Open ++	Closed ⊘

# Troubleshooting

## Touch Pad Diagnostics



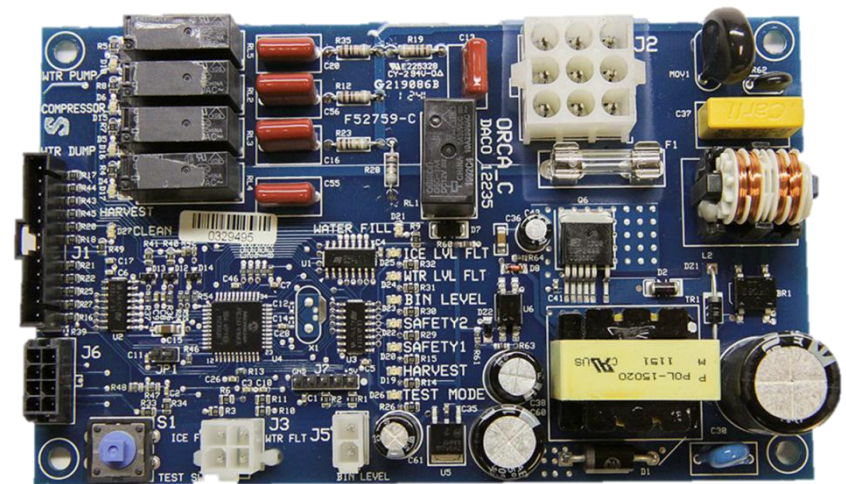
Touch Pad Button	Wire Numbers (Control Board Plug)	Ohm Value (Not Pushed)	Ohm Value (Pushed)
ON/OFF BUTTON 	#7 = Orange #2 = Tan/Black	Open ++	Closed //
Delay button 	#7 = Orange #3 = Pink	Open ++	Closed //
Clean Button 	#7 = Orange #4 = Gray	Open ++	Closed //

## Diagnosing an Ice Machine that will not run.

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 power button functions properly. A defective power button may keep the ice machine in the OFF mode.
5. Be sure Steps 1 – 4 were followed thoroughly. Intermittent problems are not usually related to the control board. Replace control board if user interface board does not correct the problem.



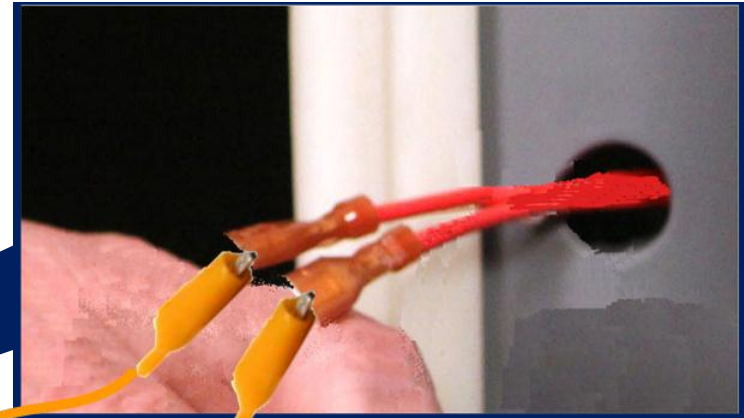


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# **TROUBLESHOOTING: ICE MACHINE NOT CYCLING INTO HARVEST.**

## Ice Machine not cycling into Harvest

**Step 1:** Remove the electrical panel to allow viewing of the control board lights and pull the wire connector for the **Harvest Float Switch (Low Float Switch) through the bulkhead and disconnect.** Attach a jumper wire to the wire terminals connected to the control board.



## Ice Machine not cycling into Harvest

**Step 1:** Remove the electrical panel to allow viewing of the control board lights and pull the wire connector for the **Harvest Float Switch (Low Float Switch) through the bulkhead and disconnect.** Attach a jumper wire to the wire terminals connected to the control board.

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

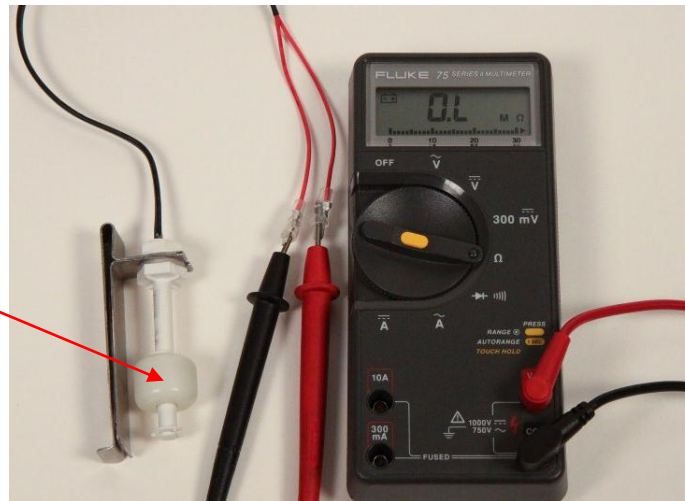
Result	Correction
<i>10 seconds into the freeze cycle the ice machine cycles from freeze to harvest and the control board harvest light energizes</i>	Refer to Float Switch Diagnostics
The harvest light stays off and the ice machine remains in freeze.	Proceed to Step 3

## Float Switch Diagnostics:

Float Down = Closed Switch



Float Up = Open Switch



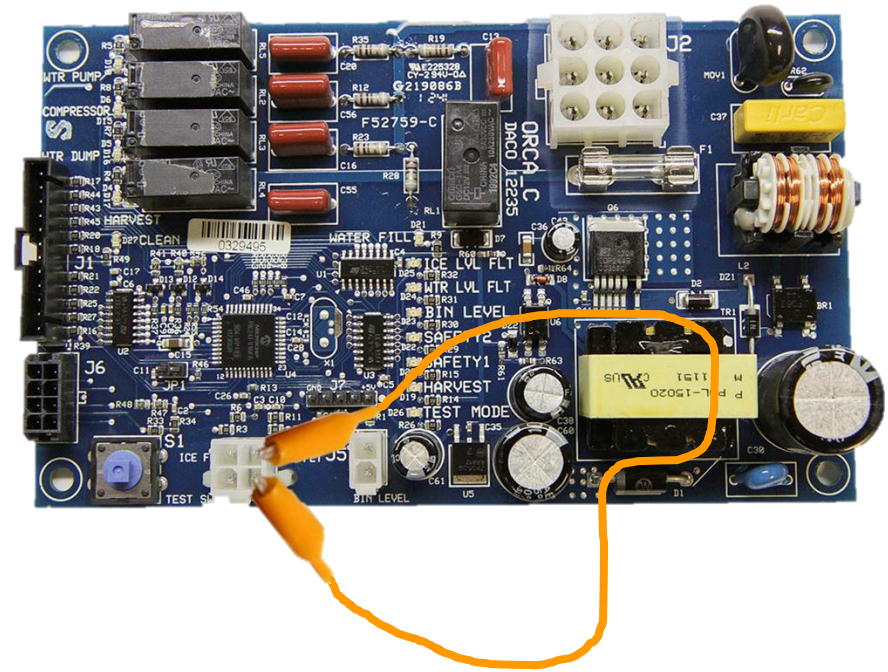
**NOTE:** Both Float Switch (Low and High) operate and Ohm out the same.

## Ice Machine not cycling into Harvest

**Step 1:** Remove the electrical panel to allow viewing of the control board lights and pull the wire connector for the **Harvest Float Switch (Low Float Switch)** through the bulkhead and **disconnect**. Attach a jumper wire to the wire terminals connected to the control board.

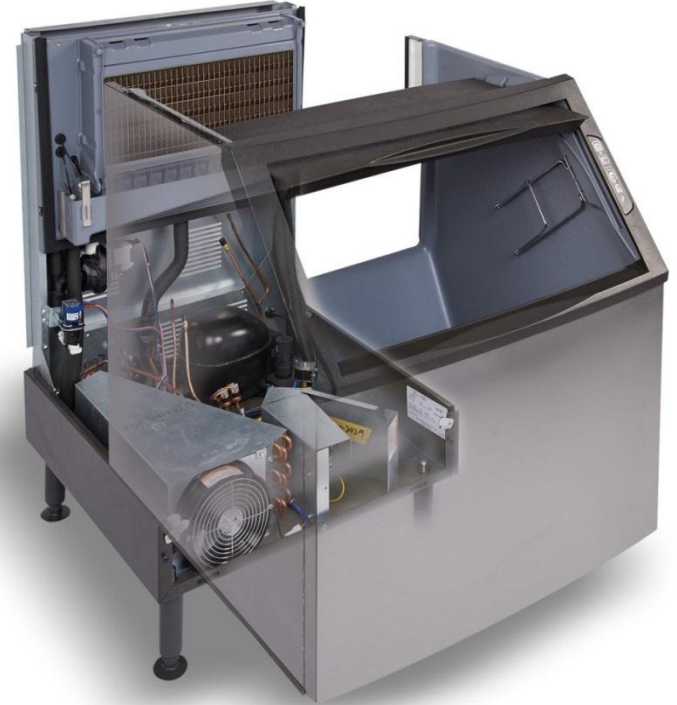
**Step 2:** Bypass the freeze time lock-in feature by pressing the power button to cycle the ice machine on. Wait until water flows over the evaporator, then refer to chart.

**Step 3:** Disconnect the Harvest (*low water*) float wire from the control board and install a jumper wire across the two pins, then refer to chart.



Result	Correction
The harvest light stays off and the ice machine remains in freeze.	Replace Control Board.
10 seconds into the freeze cycle the ice machine cycles from freeze to harvest and the control board harvest light energizes	Refer to Float Switch Diagnostics and or wiring problem.





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# **TROUBLESHOOTING: ICE MACHINE CYCLES INTO PREMATURE HARVEST.**

# Troubleshooting

## Ice Machine Cycles into Premature Harvest, *Before the Harvest Float Drops.*

**Step 1:** Remove the electrical panel to allow viewing of the control board lights and **pull the wire connector for the Harvest Float (low water) switch through the bulkhead and disconnect.**



Harvest (Low Water) Float  
Switch & Bracket

## Ice Machine Cycles into Premature Harvest, *Before the Harvest Float Drops.*

**Step 1:** Remove the electrical panel to allow viewing of the control board lights and **pull the wire connector for the Harvest Float (low water) switch through the bulkhead and disconnect.**

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

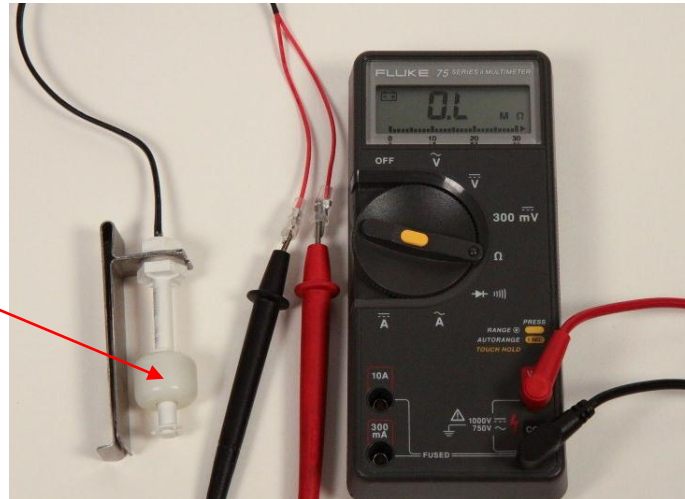
Result	Correction
The harvest light does not come on and the ice machine stays in Freeze.	Refer to Float Switch Diagnostics
The harvest light comes on but the ice machine stays in a freeze cycle.	Verify the ice machine was cycled off then on and the ice machine is not in a six minute freeze time lock-in.
10 seconds into the freeze cycle the ice machine cycles from freeze to harvest and the control board harvest light energizes.	Proceed to Step 3.

## Float Switch Diagnostics:

Float Down = Closed Switch



Float Up = Open Switch



**NOTE:** Both Float Switch (Low and High) operate and Ohm out the same.

## Ice Machine Cycles into Premature Harvest, *Before the Harvest Float Drops.*

**Step 1:** Remove the electrical panel to allow viewing of the control board lights and **pull the wire connector for the Harvest Float (low water) switch through the bulkhead and disconnect.**

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

**Step 3:** Disconnect the low water float wire from the control board, then refer to chart.

Result	Correction
The harvest light does not come on.	The low water float wire is causing the malfunction.
The harvest light comes on but the ice machine stays in a freeze cycle.	Verify the ice machine was cycled off then on and the ice machine is not in a six minute freeze time lock-in.
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.



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# **TROUBLESHOOTING: REFRIGERATION SYSTEM.**

# Refrigeration Troubleshooting

- Ice Production
- Installation
- Ice Formation
- Safety Limits
- Discharge Pressure
- Suction Pressure
- Harvest Valve Test **Complete**
- Discharge Line Temperature Test
- **Final Analysis**

<b>Under Counter Ice machine</b> Refrigeration System Operational Analysis Table				
This table must be used with charts, checklists and other references to eliminate refrigeration components not listed on the table and external items and problems which can cause good refrigeration components to appear defective.				
Operational Analysis	1	2	3	4
<b>Ice Production</b>	Air-Temperature Entering Condenser _____ Water Temperature Entering Ice Machine _____ Published 24 hour ice production _____ Calculated (actual) ice production _____ NOTE: The ice machine is operating properly if the ice fill patterns is normal and ice production is within 10% of charted capacity.			
<b>Installation and Water System</b>	All installation and water related problems must be corrected before proceeding with chart.			
<b>Ice Formation Pattern</b>	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on the entire evaporator	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- Ice formation is extremely thin on inlet of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- No ice formation on entire evaporator
<b>Safety Limits</b> Refer to "Analyzing Safety Limits" to eliminate all non-refrigeration problems	Stops on Safety Limit: 1 or 2	Stops on Safety Limit: 1	Stops on Safety Limit: 1 or 2	Stops on Safety Limit: 1
<b>Freeze Cycle Discharge Pressure</b>  1 minute    Middle    End into cycle	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.			
<b>Freeze Cycle Suction Pressure</b>  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.			
	<b>Suction pressure is High</b>	<b>Suction pressure is Low or Normal</b>	<b>Suction pressure is High</b>	<b>Suction pressure is High</b>
Wait 5 minutes into the freeze cycle. Compare temperatures of <b>compressor discharge line and harvest valve inlet.</b>	The harvest valve inlet is <b>HOT</b> -and- approaches the temperature of a <b>HOT</b> compressor discharge line.	The harvest valve inlet is <b>COOL</b> enough to hold hand on -and- the compressor discharge line is <b>HOT</b> .	The harvest valve inlet is <b>COOL</b> enough to hold hand on -and- the compressor discharge line is <b>COOL</b> enough to hold hand on.	The harvest valve inlet is <b>COOL</b> enough to hold hand on -and- the compressor discharge line is <b>HOT</b> .
<b>Discharge Line Temperature</b> Record freeze cycle discharge line temperature at the end of the freeze cycle _____ °F (°C)	Discharge line temperature <b>150°F (65°C) or higher</b> at the end of the freeze cycle.	Discharge line temperature <b>150°F (65°C) or higher</b> at the end of the freeze cycle.	Discharge line temperature <b>less than 150°F (65°C)</b> at the end of the freeze cycle.	Discharge line temperature <b>150°F (65°C) or higher</b> at the end of the freeze cycle.
<b>Final Analysis</b> Enter total number of boxes checked in each column.	<b>Harvest Valve Leaking</b>	<b>Low on Charge -or- TXV Starving</b>	<b>TXV Flooding</b>	<b>Compressor</b>

NOTE: For Easier Access to the Refrigeration System, Run Machine in Test Mode with Cabinet off while filling out Refrigeration Analysis Form.

## Troubleshooting

- Safety Limits
- Control Board Test Mode
- Will not Run
- Touchpad Diagnostics
- Not Cycling into Harvest
- Prematurely Harvesting
- Float Switch Diagnostics
- Refrigeration System







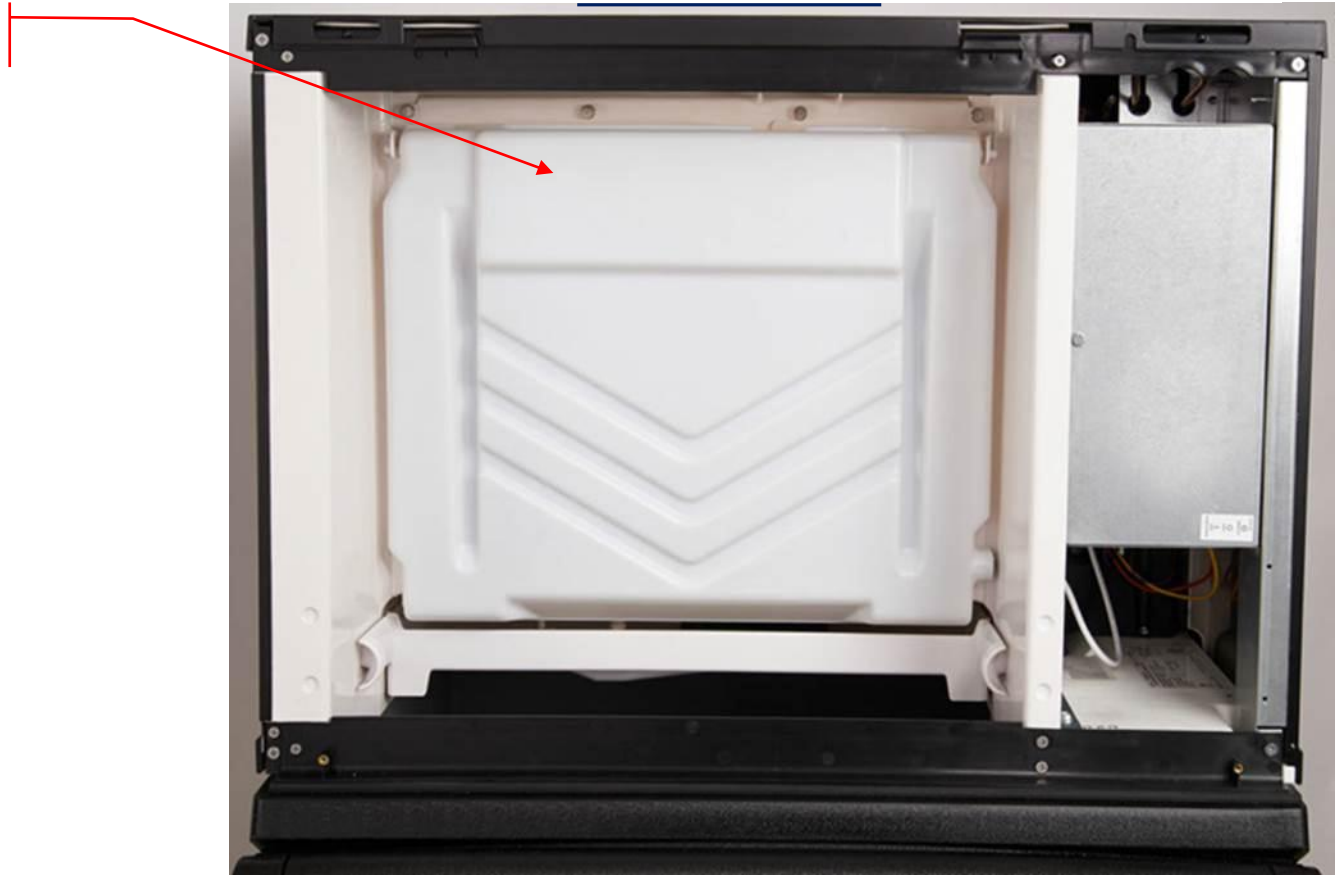
Koolaire

# **OVERVIEW**

## Component Identification

### Front View

Water Curtain



## Component Identification

### Front View

Evaporator

Refrigeration  
Access Valves

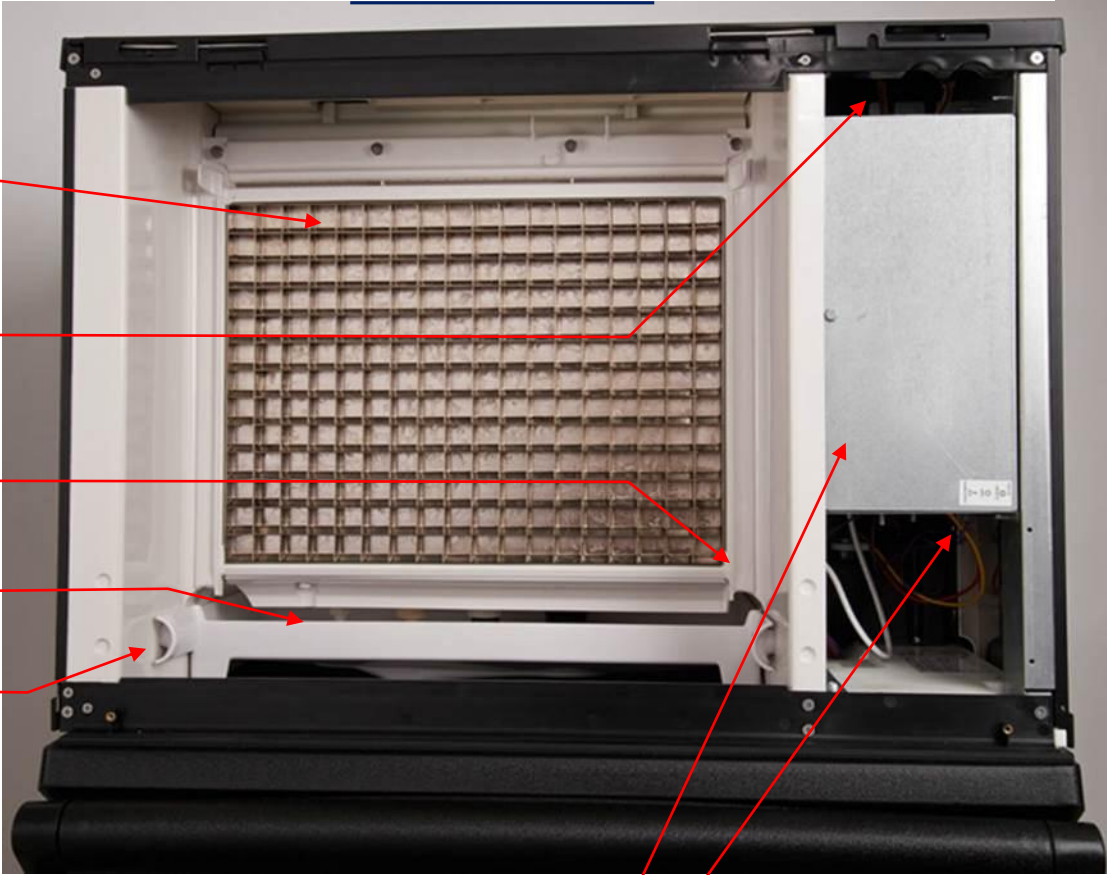
Curtain Switch

Float Switches

Water Trough

Control Box

Toggle Switch



## Front View Control Area

## Component Identification



R-410a Refrigeration Access Service Valves

Control Board

Compressor Run Capacitor

Compressor Contactor

On/Off/Clean Toggle Switch



## Component Identification

### Water Trough Compartment



Water Pump

Harvest Float Switch

Ice Thickness Float Switch



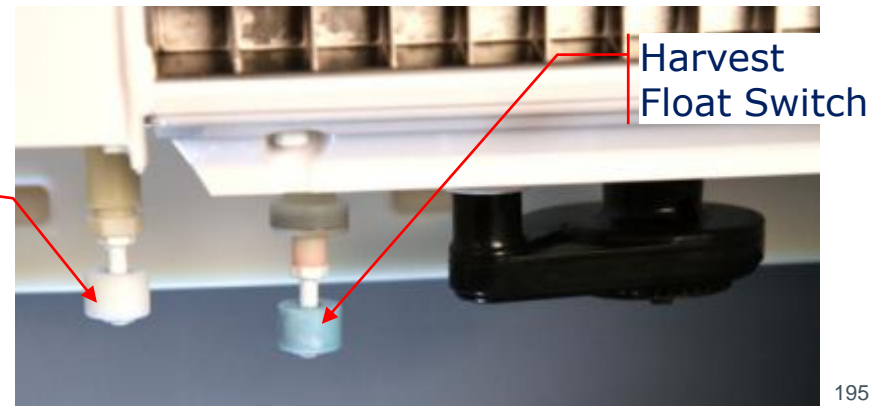
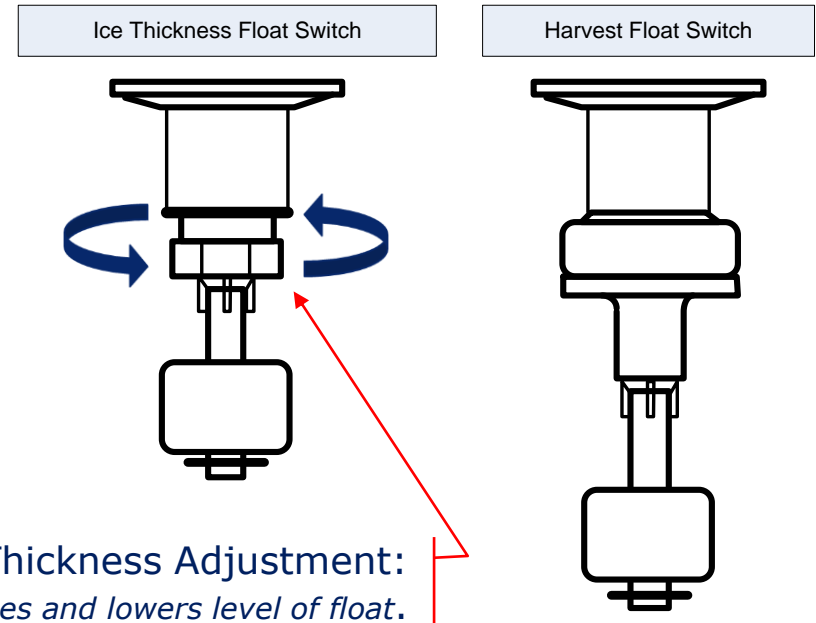
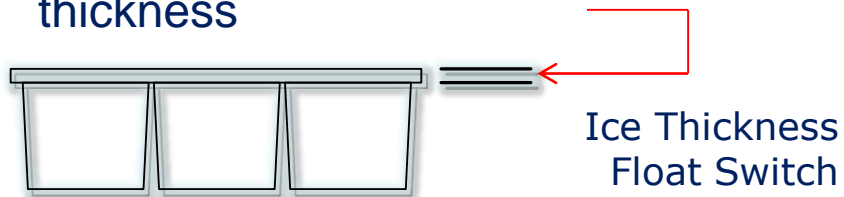
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# **ICE MAKING SEQUENCE OF OPERATION**

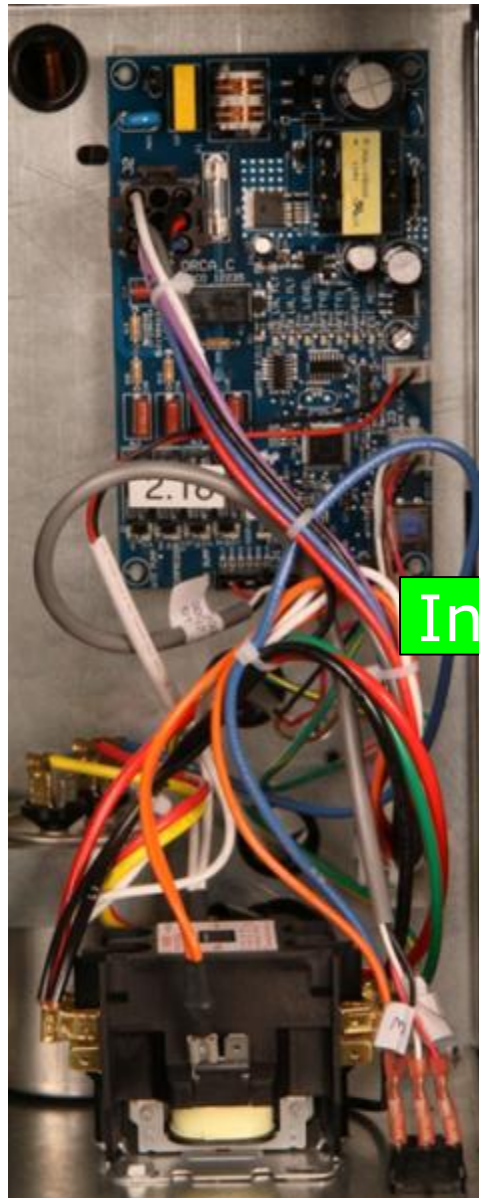
## ICE THICKNESS / WATER LEVEL ADJUSTMENT

**Note:** Cube Thickness is controlled by amount of water in the water trough.

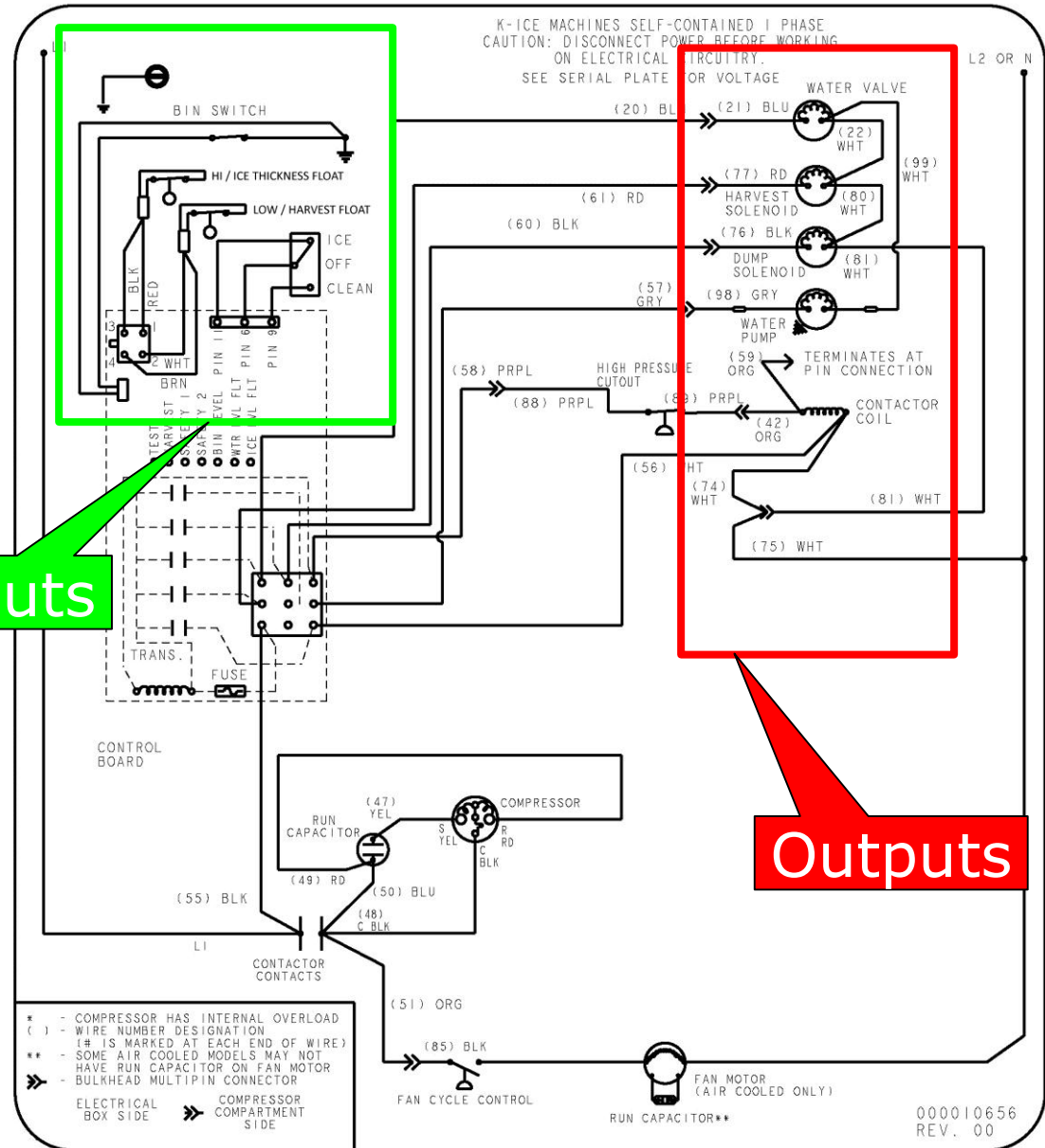
1. Inspect the bridge connecting the cubes. It should be about 1/8" (3 mm) thick.
2. If adjustment is necessary, turn the high water float clockwise to increase bridge thickness (**raising water level**), counterclockwise to decrease bridge thickness (**lowering water level**). Adjust to achieve a 1/8" (3 mm) bridge thickness



# Sequence of Operation



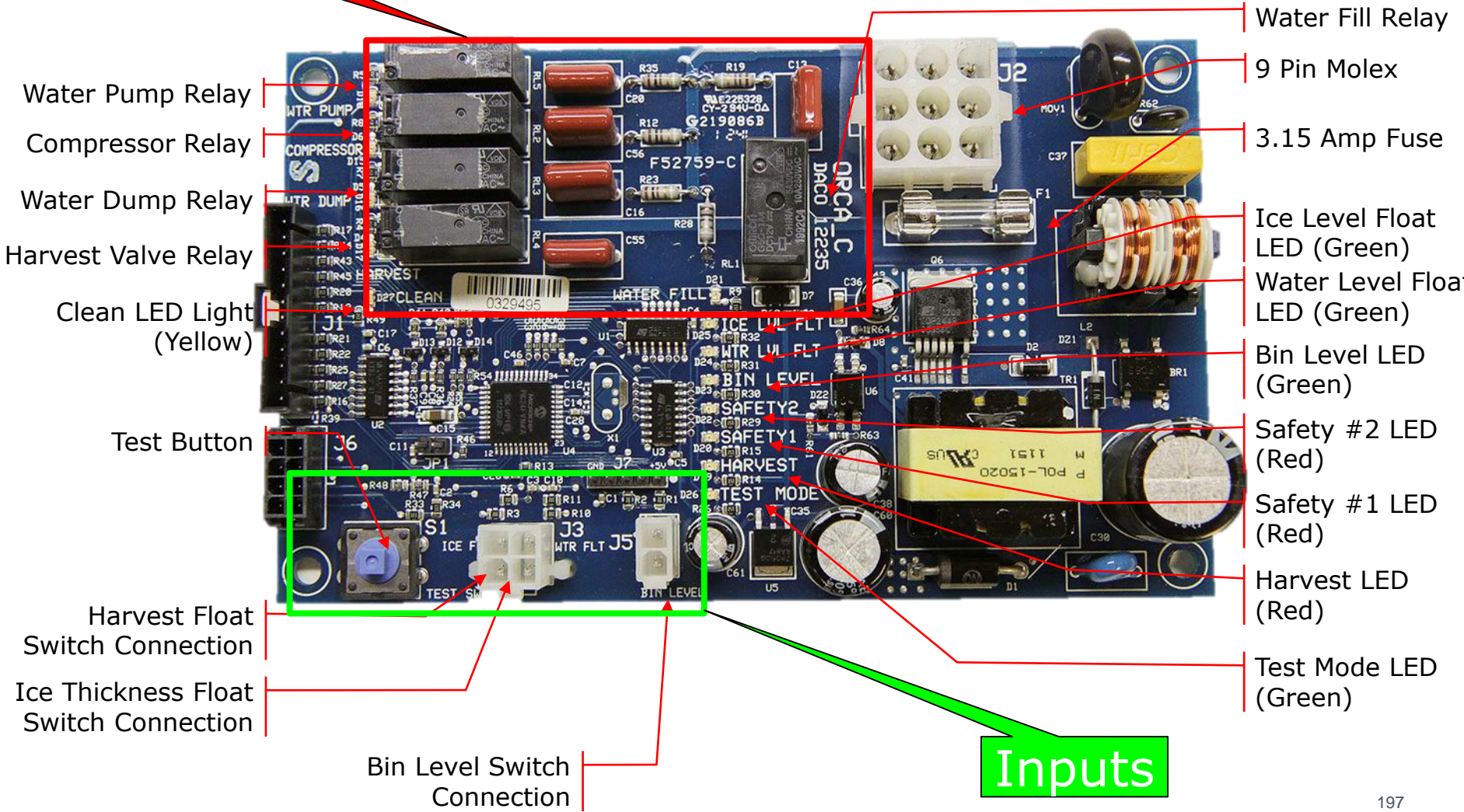
**Inputs**



**Outputs**



## Outputs

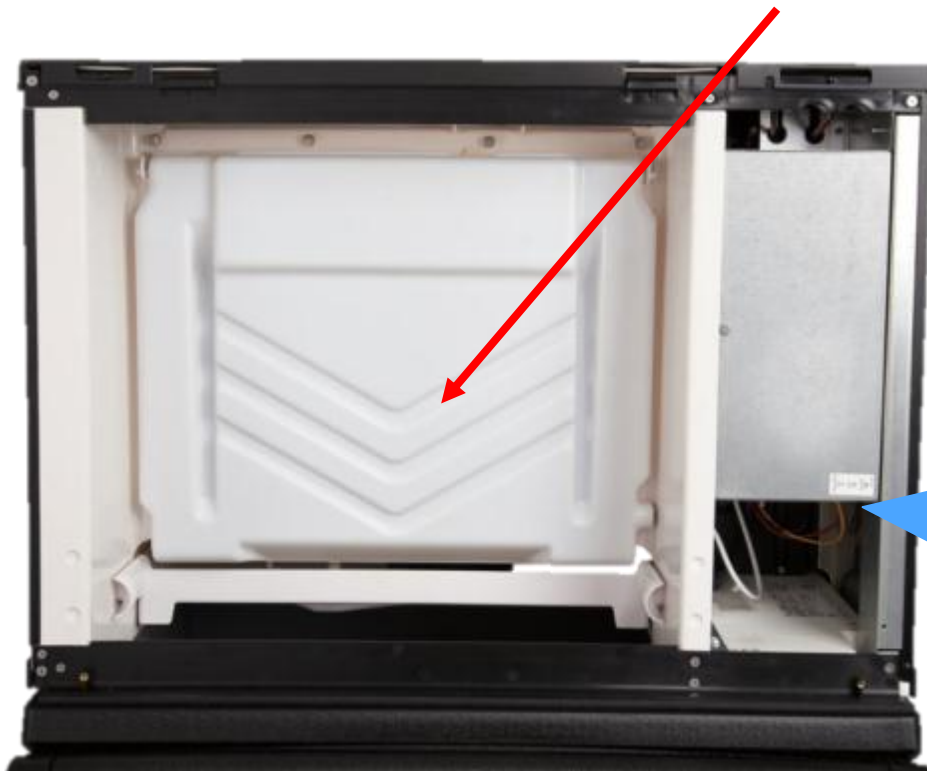


## Inputs



Push Toggle Switch to Start Making Ice!

- The toggle switch must be in the Ice Position
- Water curtain must be in place on the evaporator before the ice machine will start.



<b>1</b>	
<b>Start-Up</b>	
<b>45 Sec</b>	
<b>Purge</b>	

## **Energized Parts**

- **Water Pump**
- **Dump Valve**



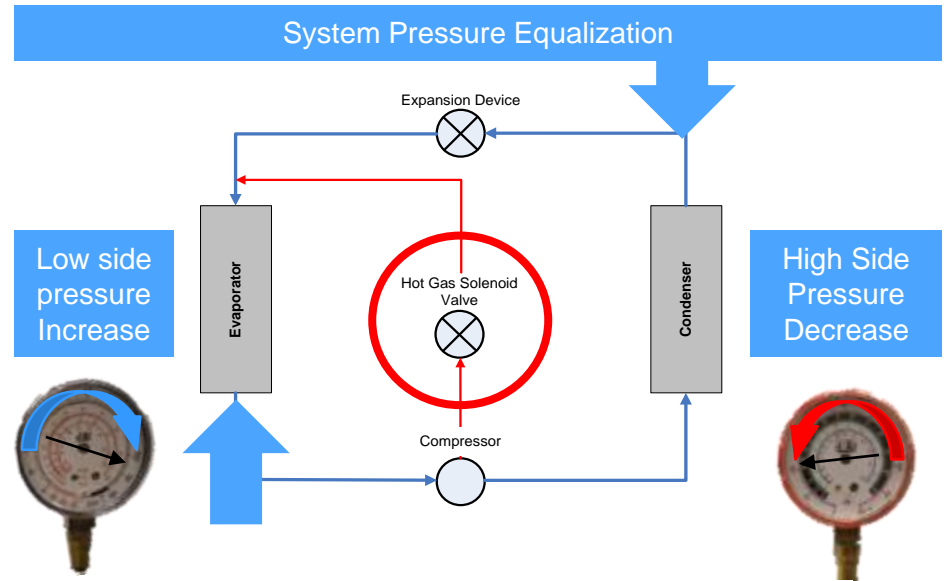
<b>1</b>	
<b>Start-Up</b>	
<b>45 Sec</b>	<b>5 Sec</b>
<b>Purge</b>	<b>Delay</b>

## ***Energized Parts***

- **Nothing is energized**

# Pressure Equalization

1 Start-Up		2 Refrigeration Start	
45 Sec Purge	5 Sec Delay	5 Sec Equalize	



## Energized Parts

- Hot Gas Solenoid Valve

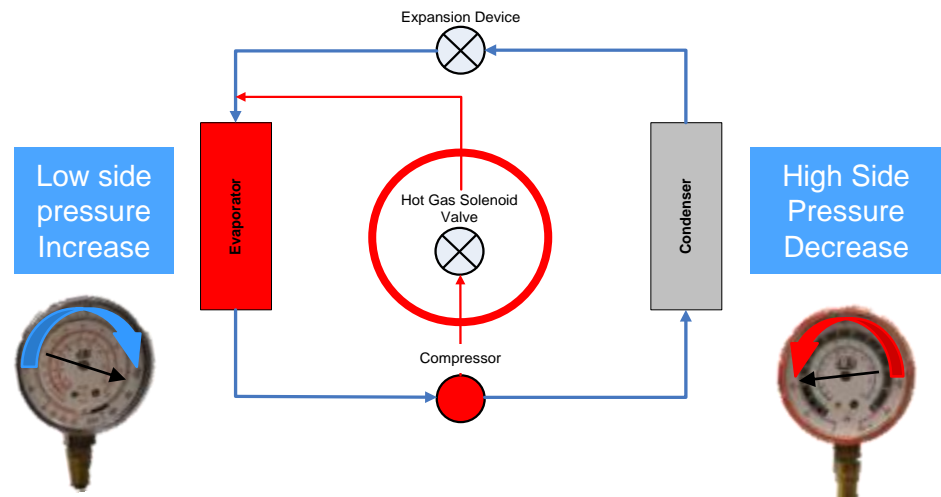


*NOTE: R-410A Refrigerant requires special Gauges.*

# Refrigeration Start

Refrigeration system running unloaded

1 Start-Up		2 Refrigeration Start	
45 Sec Purge	5 Sec Delay	5 Sec Equalize	5 Sec Compressor



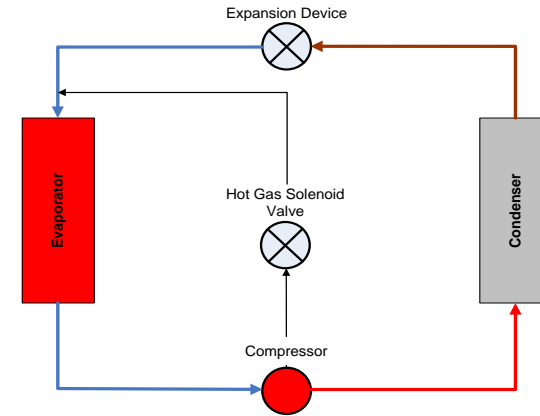
## Energized Parts

- **Contactor Coil**  
(Compressor and Fan)
- **Hot Gas Solenoid Valve**



**NOTE: R-410A Refrigerant requires special Gauges.**

1		2		3
Start-Up		Refrigeration Start		Pre-Chill
45 Sec Purge	5 Sec Delay	5 Sec Equalize	5 Sec Compressor	<b>120 Sec.</b> <b>(first cycle)</b> <b>30 Sec.</b> <b>(thereafter)</b>



## Energized Parts

- **Contactor Coil**

*(Compressor and Fan)*

- **Water Inlet**

*(Float Switch Activation)*

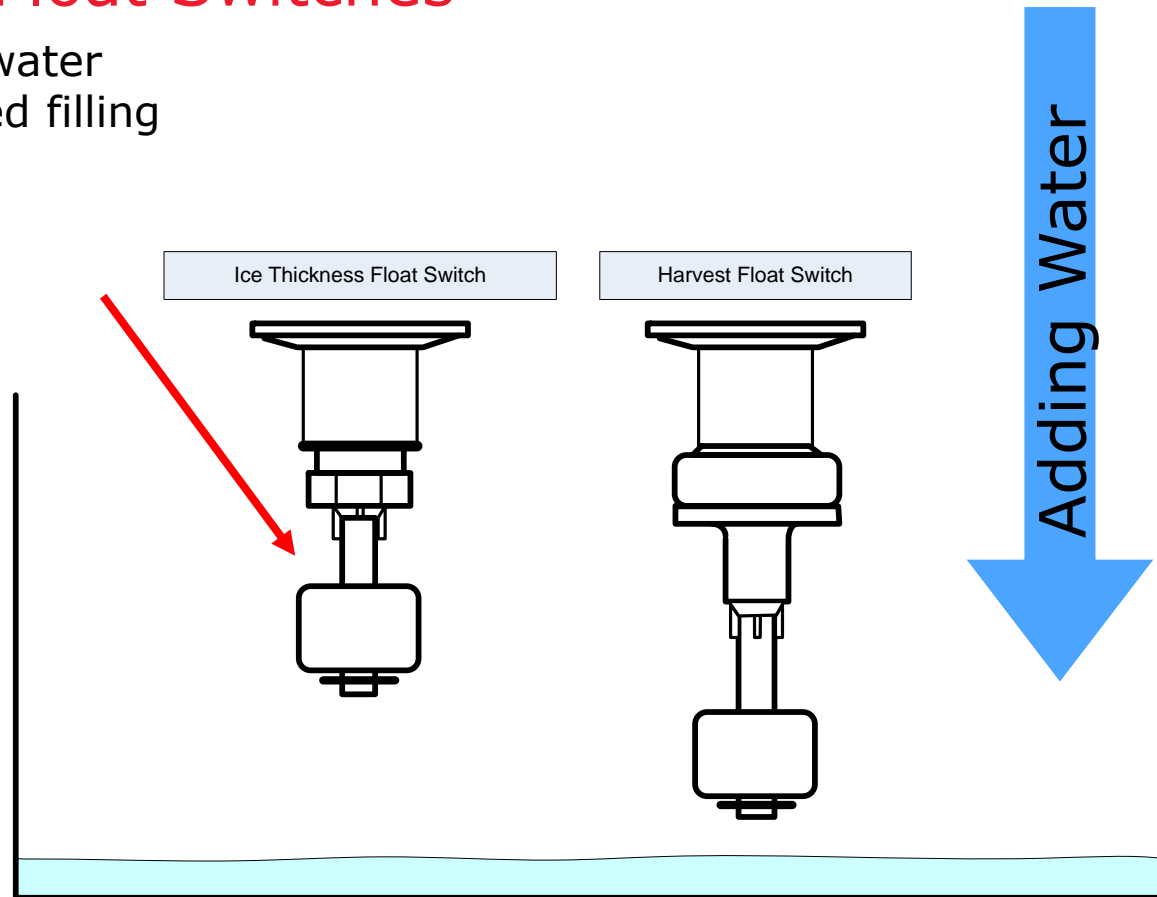


**NOTE:** *R-410A Refrigerant requires special Gauges.*

## Float Switches

During the Pre-Chill cycle the water inlet Solenoid Valve is energized filling the water trough.

- Ice Thickness float switch gives input to control board for water fill.



*NOTE: R-410A Refrigerant requires special Gauges.*



\*NOTE: Can initiate Harvest at any time on *Initial Cycle*.

1		2		3	4
Start-Up		Refrigeration Start		Pre-Chill	Freeze
45 Sec Purge	5 Sec Delay	5 Sec Equalize	5 Sec Compressor	120 Sec. (first cycle) 30 Sec. (thereafter)	<b>Harvest Float Switch (60 min. Max)</b>

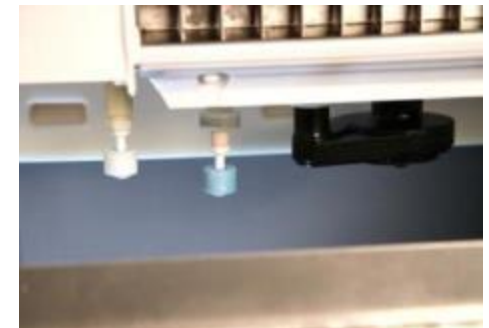
## Energized Parts

### •Contactor Coil

*(Compressor and Fan)*

### •Water Pump

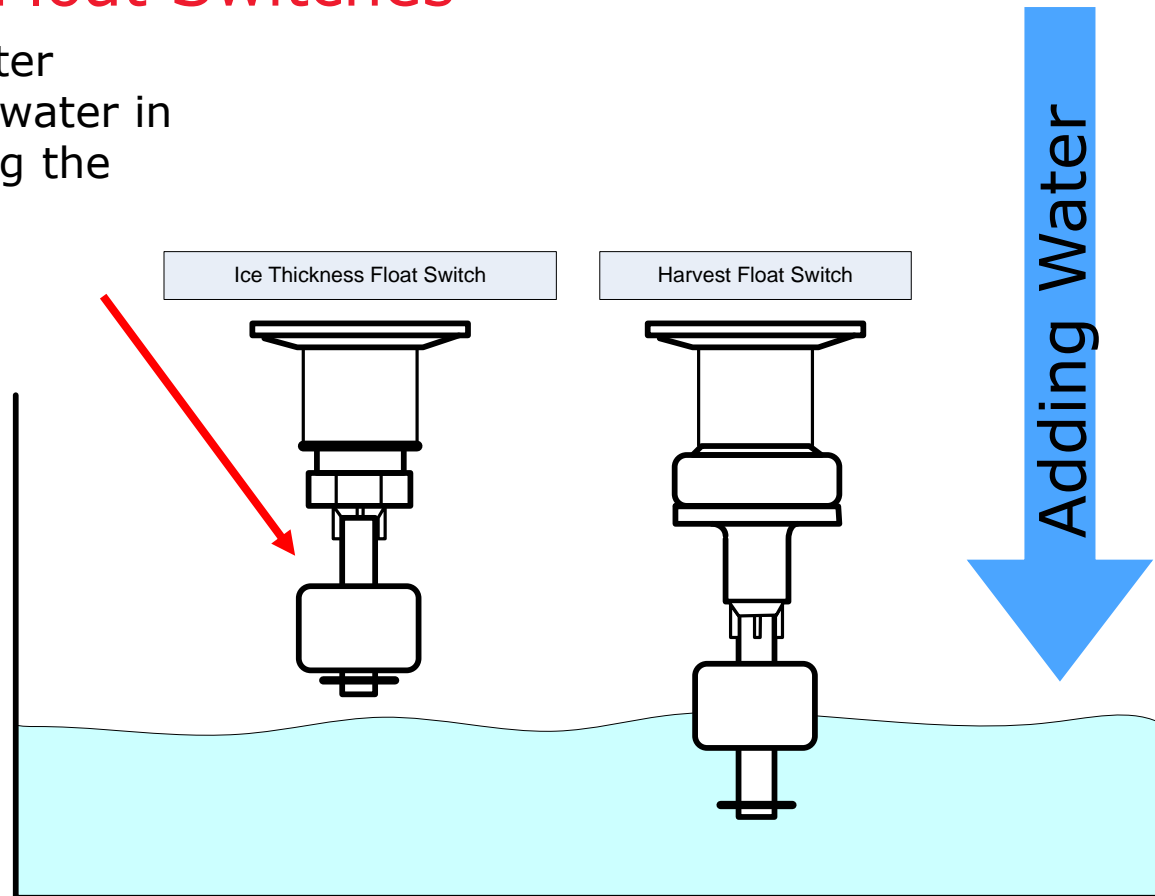
### •Water Inlet (Float Switch Activation)



## Float Switches

During the freeze cycle the water pump energizes, dropping the water in the sump trough and circulating the water over the evaporator.

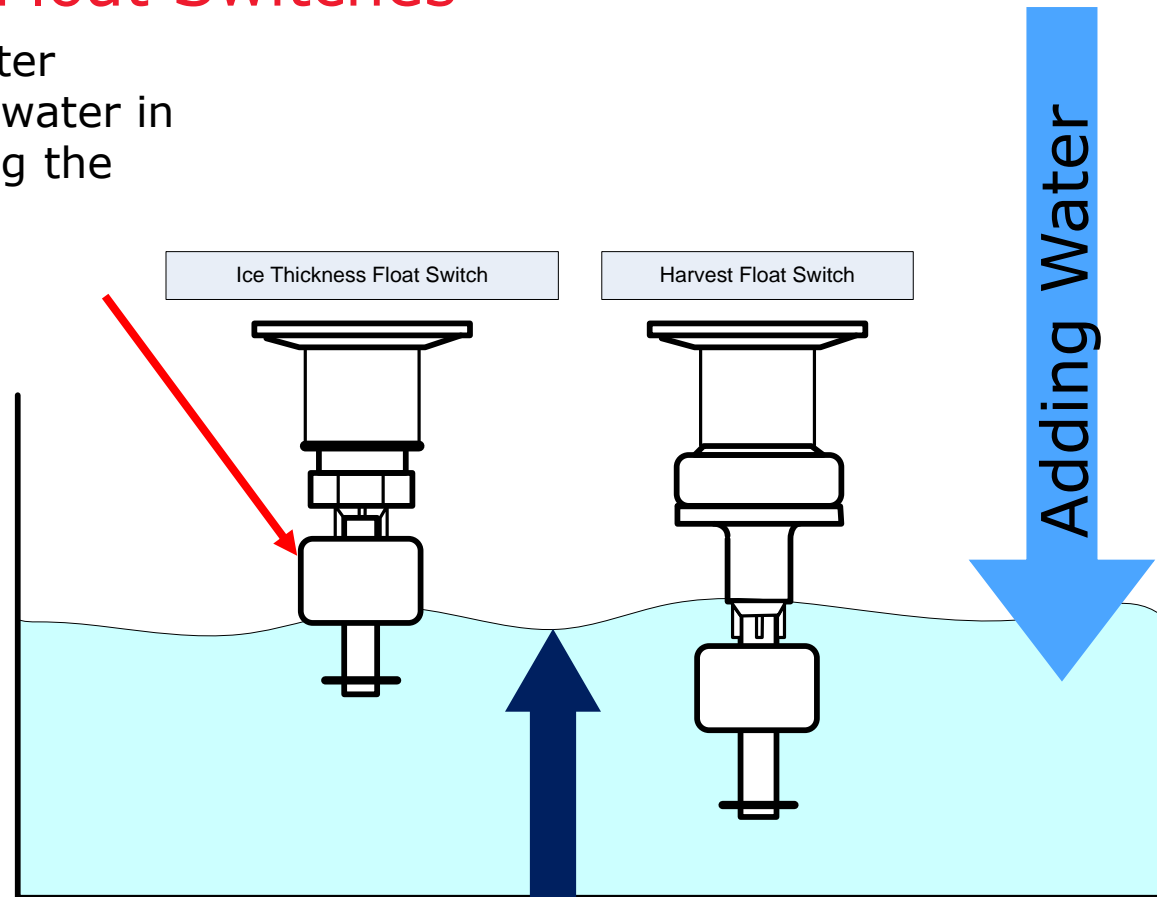
- Ice Thickness float switch gives input to control board for water fill.
- Maximum Water fill time limit is 6 Minutes.



## Float Switches

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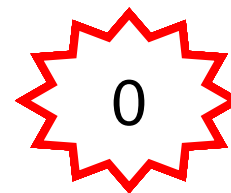
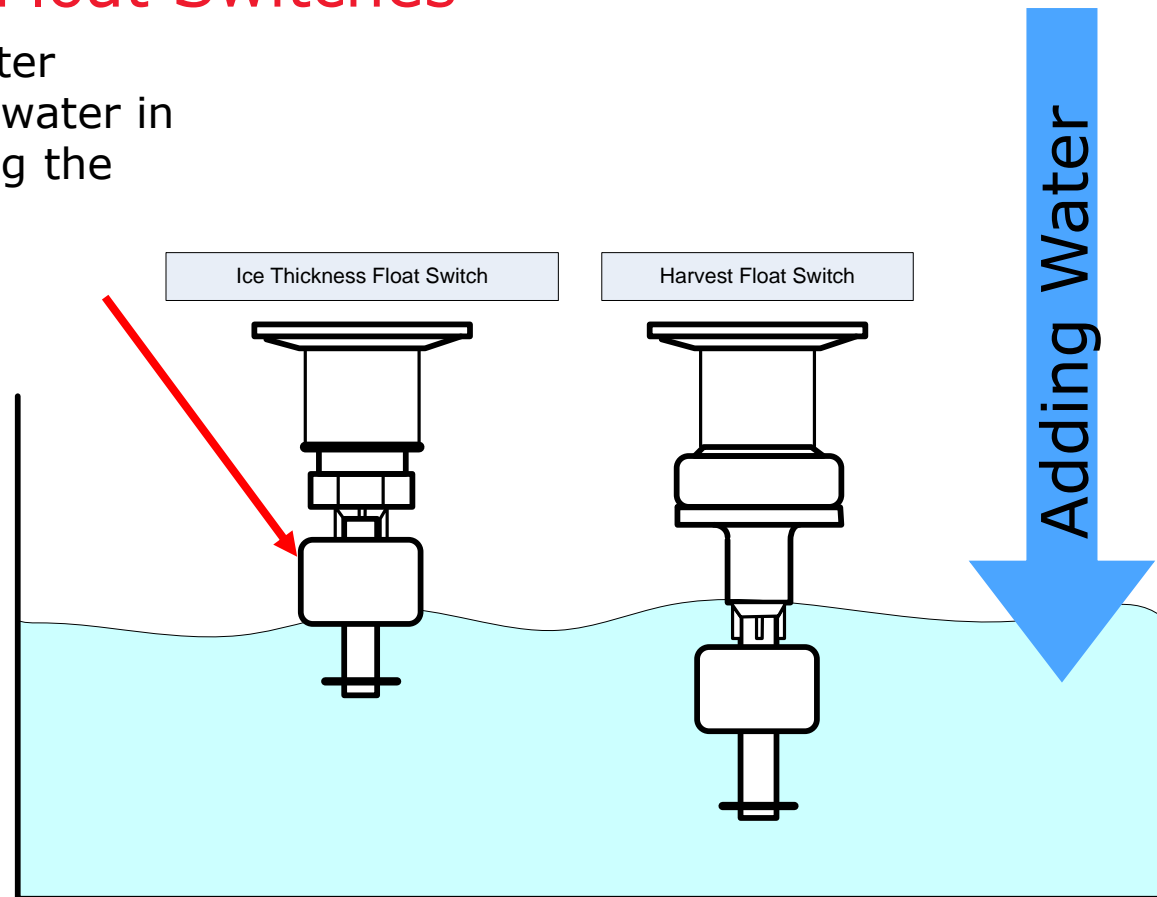
- Ice Thickness float switch gives input to control board for water fill.
- Maximum Water fill time limit is 6 Minutes.
- Water level raises float switch (5 seconds) and control board de-energizes water inlet valve.
- Batch System = One water trough of water is equal to one batch of ice.



## Float Switches

During the freeze cycle the water pump energizes, dropping the water in the sump trough and circulating the water over the evaporator.

- Ice Thickness float switch gives input to control board for water fill.
- Maximum Water fill time limit is 6 Minutes.
- Water level raises float switch (5 seconds) and control board de-energizes water inlet valve.
- Batch System = One water trough of water is equal to one batch of ice.
- **\*3 Minutes into the Freeze Cycle 12 Seconds of Water Fill**

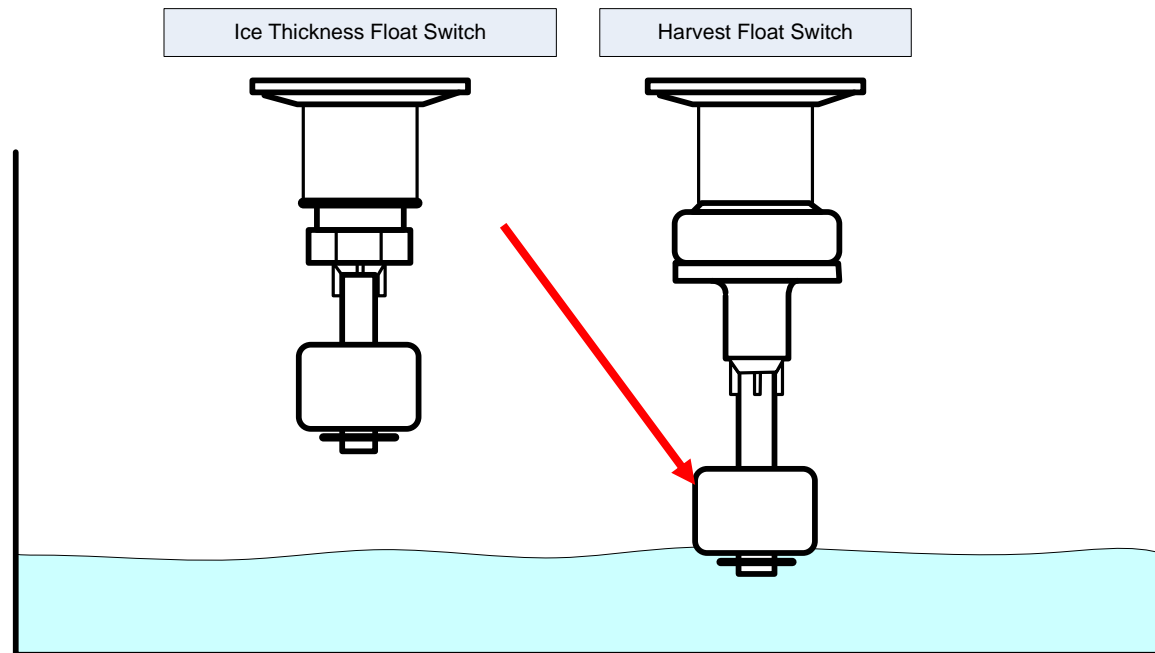


**\*NOTE: 12 second fill is only for prevention/recovery from slushing.** 208

## Float Switches

During the freeze cycle the water in the trough freezes onto the evaporator surface dropping the water level:

- When the Harvest Float Switch drops to its lowest position (for 10 seconds) the control board initiates the Harvest Sequence.
- 6 Minute Freeze Lock in time on the 2<sup>nd</sup> or more cycles.
- To bypass the 6 Minute lock in: turn toggle off and back on to start the Initial Start Up.

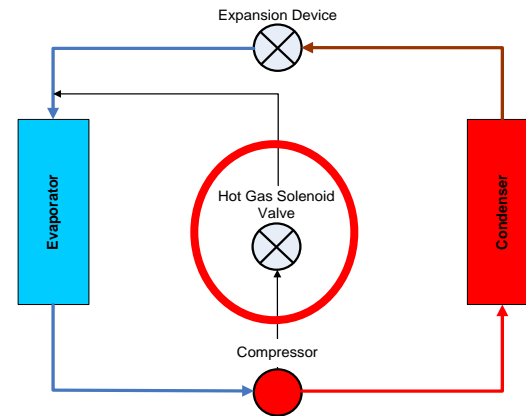


**NOTE: The Float switches have *Closed contacts with the floats in the down position and Open contacts in the up position.***

1		2		3	4	5
Start-Up		Refrigeration Start		Pre-Chill	Freeze	Purge
45 Sec Purge	5 Sec Delay	5 Sec Equalize	5 Sec Compressor	120 Sec. (first cycle) 30 Sec. (thereafter)	Ice Thickness Float Switch	45 Sec

## Energized Parts

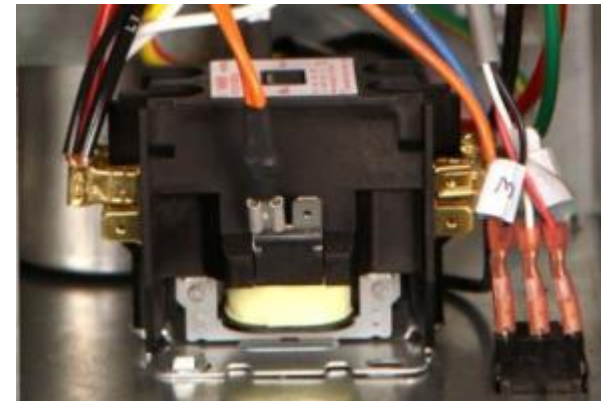
- **Contactor Coil**  
*(Compressor and Fan)*
- **Water Pump**
- **Dump Valve**
- **Hot Gas Solenoid Valve**



1		2		3	4	5	6
Start-Up		Refrigeration Start		Pre-Chill	Freeze	Purge	Harvest
45 Sec Purge	5 Sec Delay	5 Sec Equalize	5 Sec Compressor	120 Sec. (first cycle) 30 Sec. (thereafter)	Ice Thickness Float Switch	45 Sec <b>(3.5 min. Max)</b>	<b>*Bin Switch</b>

## Energized Parts

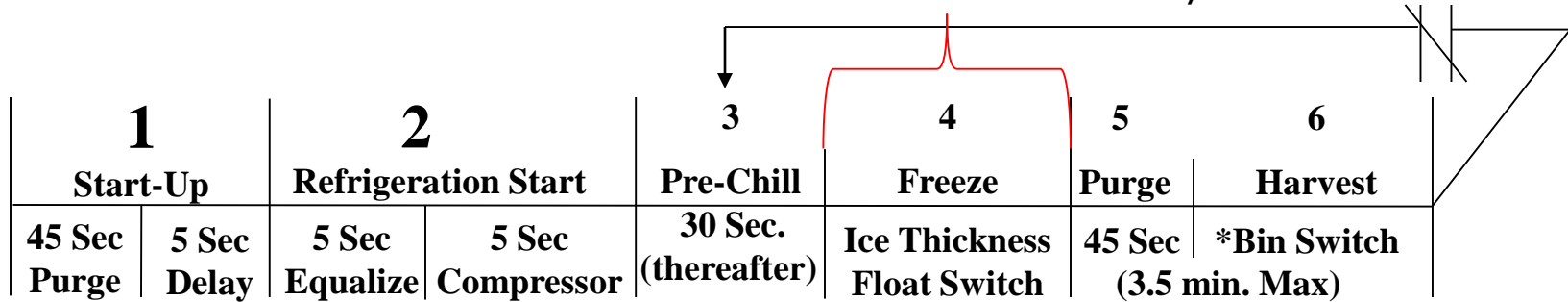
- Hot Gas Solenoid Valve
- Contactor Coil  
*(Compressor and Fan)*



\*Waiting on activation of the Bin Switch / Magnetic Proximity Switch or maximum harvest time limit of 3.5 minutes.

# Return to Pre-Chill

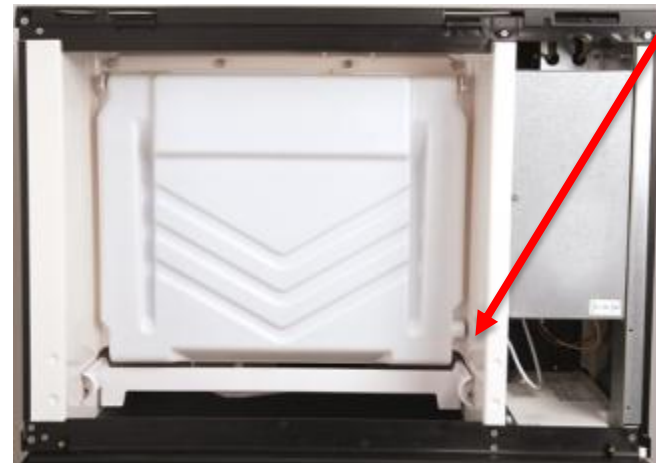
6 Minute Lock-In after Initial Cycle



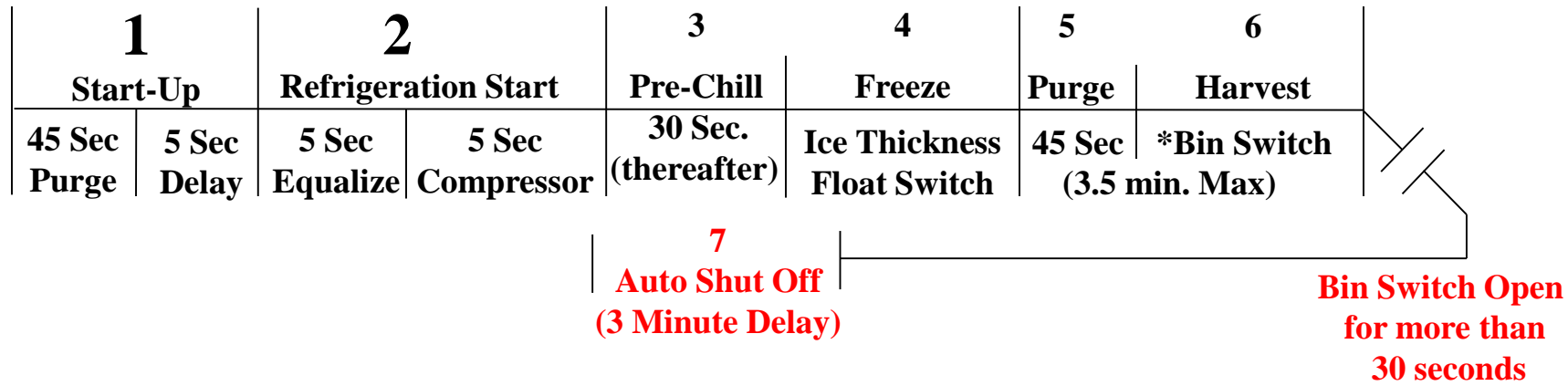
**Bin Switch Opens & Closes Within 30 Seconds**

## Energized Parts

- **Contactor Coil**  
(Compressor and Fan)
- **Water Fill Valve**  
(Float Switch Activation)

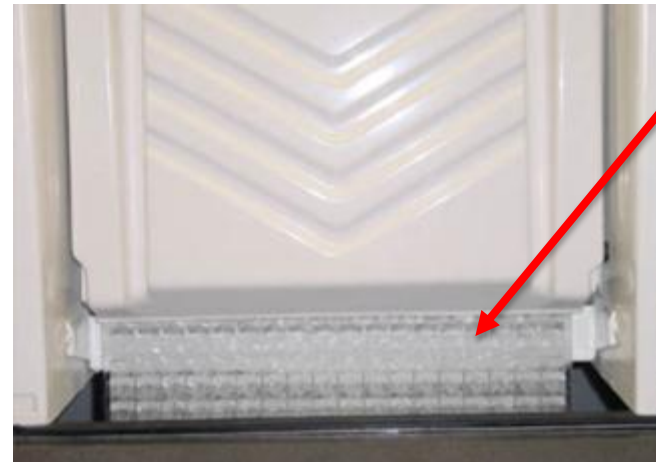


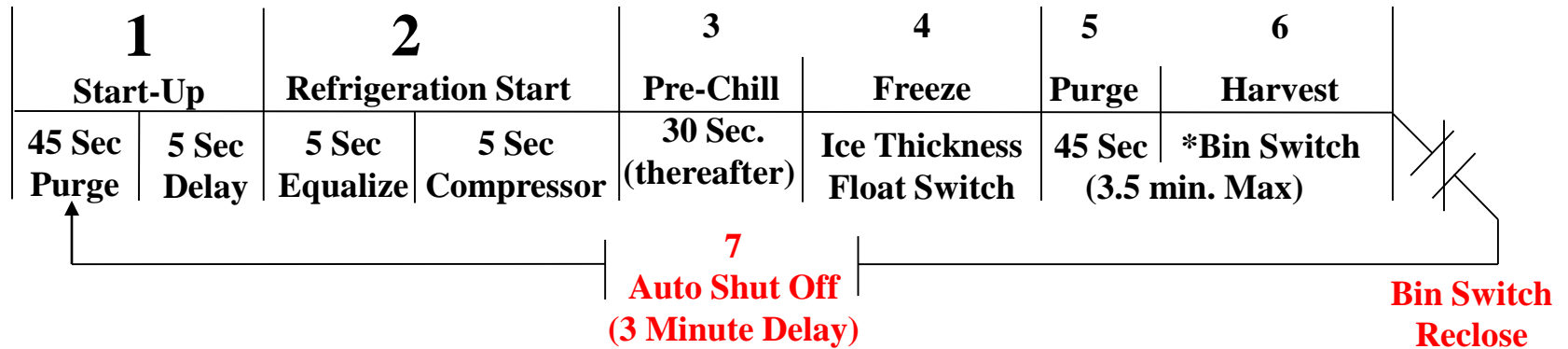




## Auto Shut-Off

- Bin Switch Open for 30 Seconds
- 3 Minute Delay for Restart





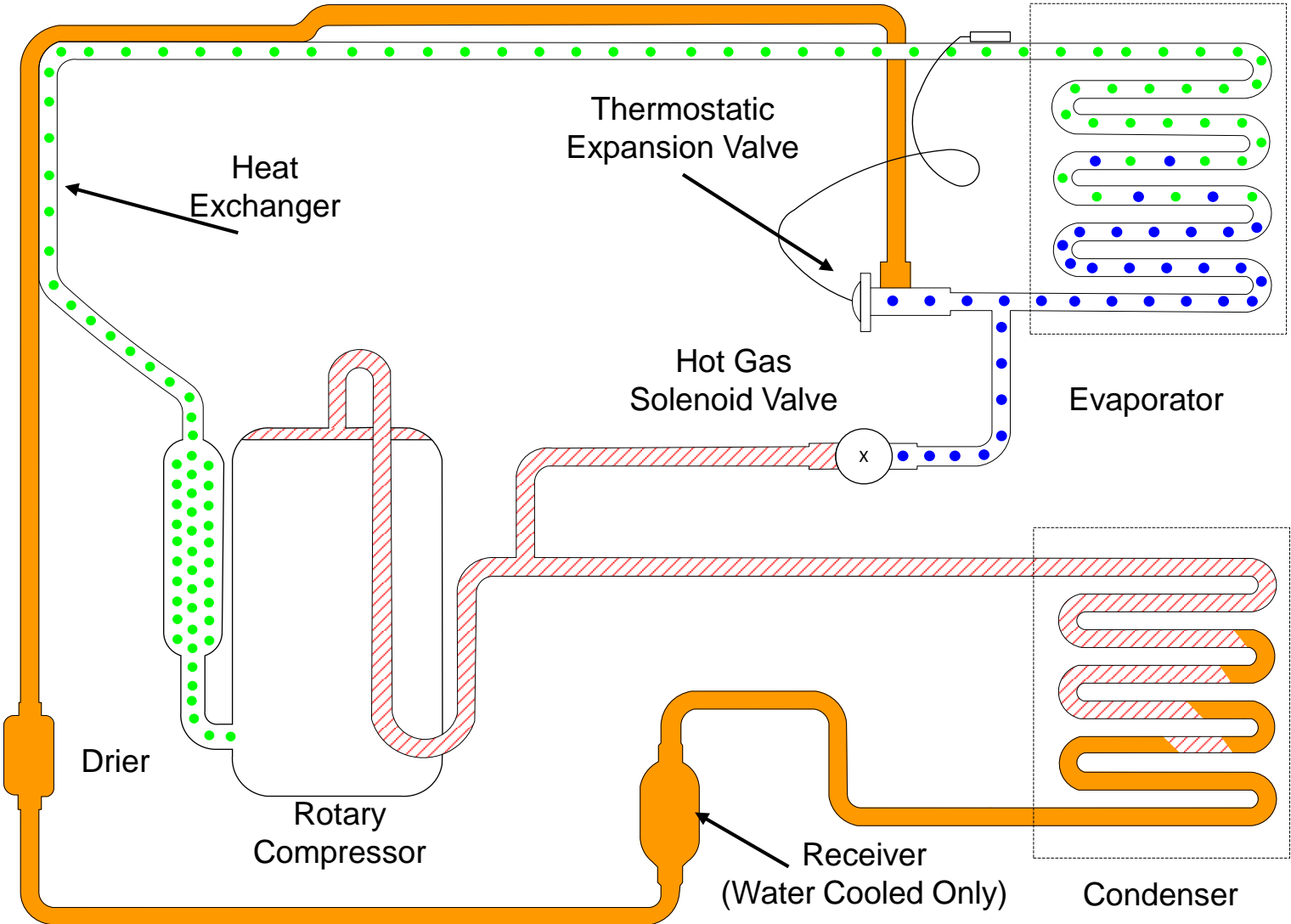
## Restart from Auto Shut-Off

- Bin Switch Closes and 3 Minute Delay has Expired

R410a

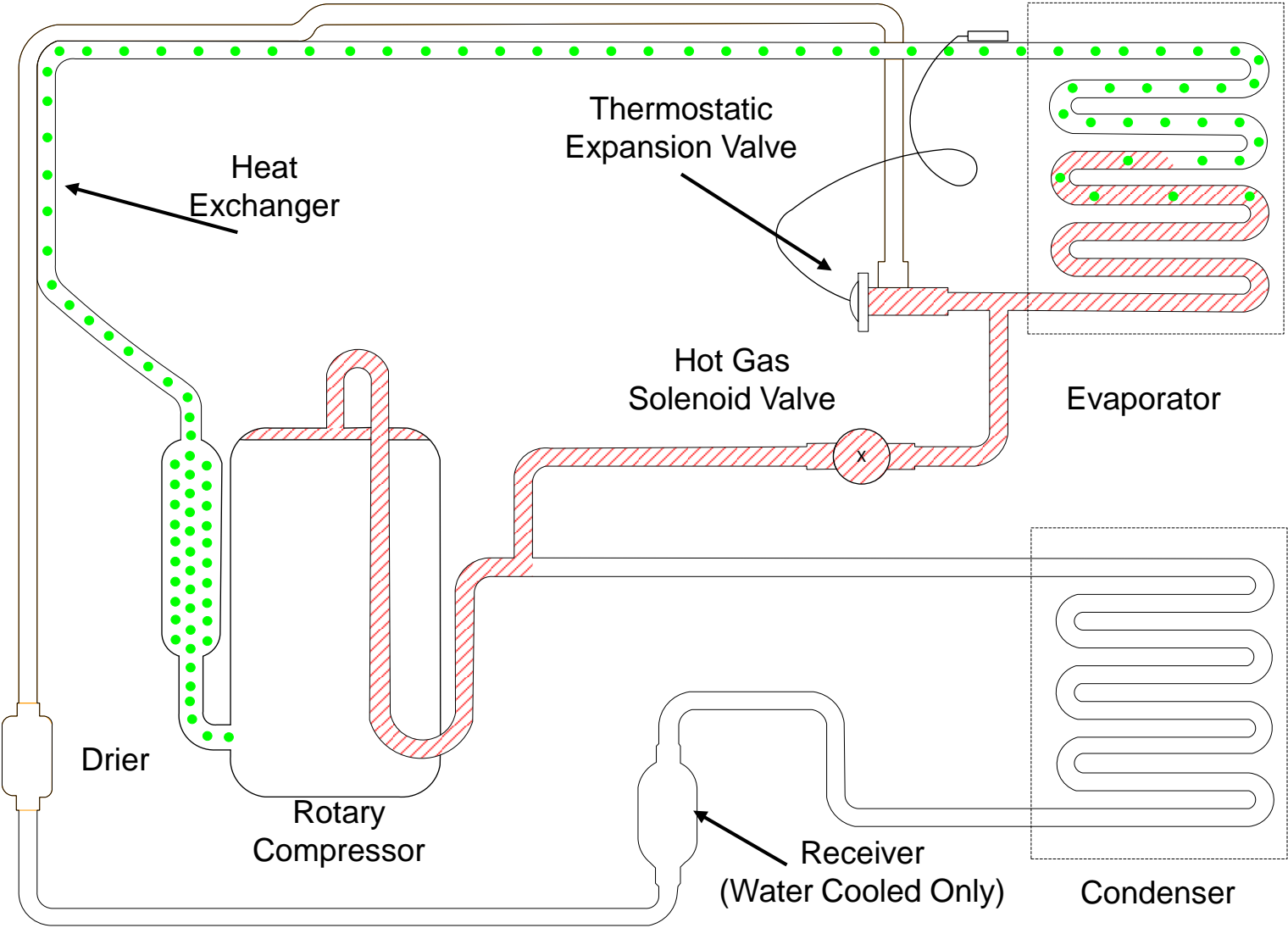
# **REFRIGERATION SYSTEM**

# Refrigeration System (Freeze Cycle)




HIGH PRESSURE VAPOR	HIGH PRESSURE LIQUID	LOW PRESSURE LIQUID	LOW PRESSURE VAPOR


# Refrigeration System (Harvest Cycle)



 HIGH PRESSURE VAPOR

 HIGH PRESSURE LIQUID

 LOW PRESSURE LIQUID

 LOW PRESSURE VAPOR

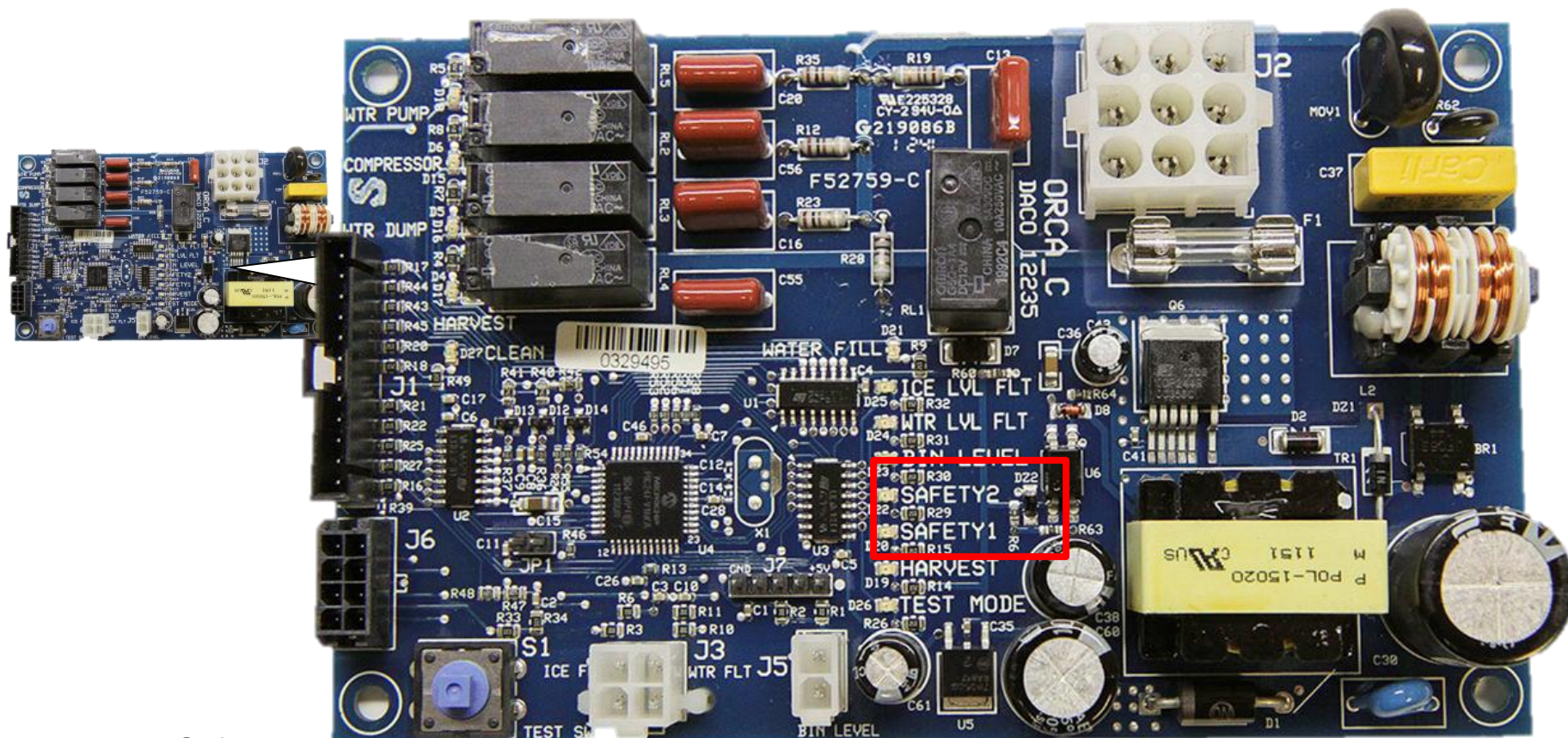
- Component Identification
- Ice Making Sequence of Operation
  - Ice Thickness Adjustment
  - Initial Start
    - Purge
    - Refrigeration Start
  - Pre-Chill
  - Freeze
  - Harvest
    - Harvest Purge
    - Harvest
  - Auto Shut off
- Refrigeration System



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# **TROUBLESHOOTING: SAFETY LIMITS**

## Control Board LED's

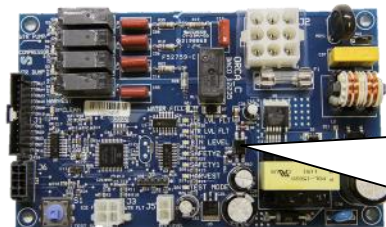




*Note: Safety limit #1 or #2 are recorded in the memory of the control board until either 100 consecutive good cycles or until another Safety limit condition has been indicated.*

*To check the memory for a safety limit, turn the ice machine off and on then look for: either SL1 to flash once before start up or SL2 to flash twice before start up on the control board or Both SL1&SL2 to flash three times.*



## Control Board LED's




Description	Board LED (Control Board)
<b>SL #2 (Long Harvest)</b> <i>After 3 Consecutive 3.5 Minute Harvest Cycles</i>	
<i>After 100 Consecutive 3.5 minute Harvest Cycles</i>	

*Note: Safety limit #1 or #2 are recorded in the memory of the control board until either 100 consecutive good cycles or until another Safety limit condition has been indicated.*

*To check the memory for a safety limit, turn the ice machine off and on then look for: either SL1 to flash once before start up or SL2 to flash twice before start up on the control board or Both SL1&SL2 to flash three times.*

## Service LED / Control Board LED's



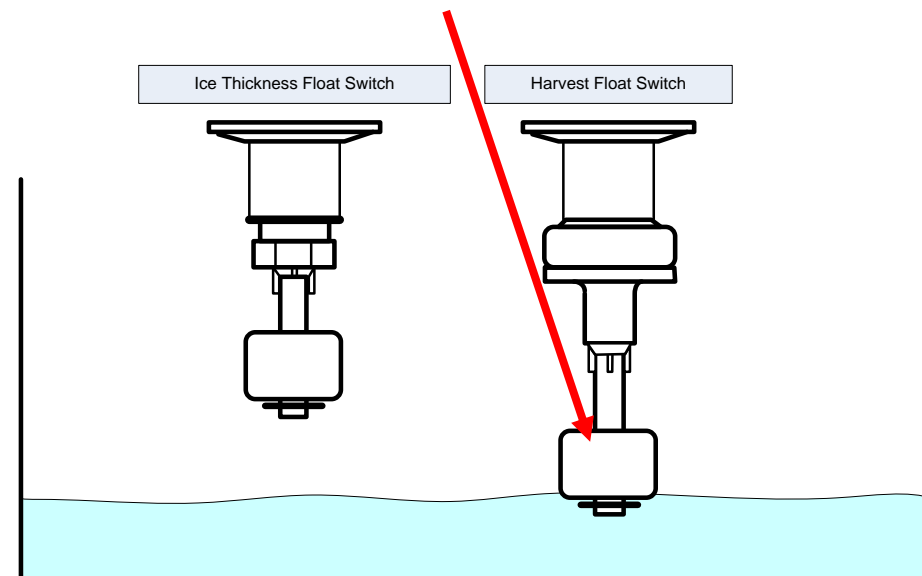
Description	Board LED (Control Board)
<b>SL #3 (Water)</b> <i>After 4 minutes energizing the water inlet valve with the Harvest Float Switch down.</i>	

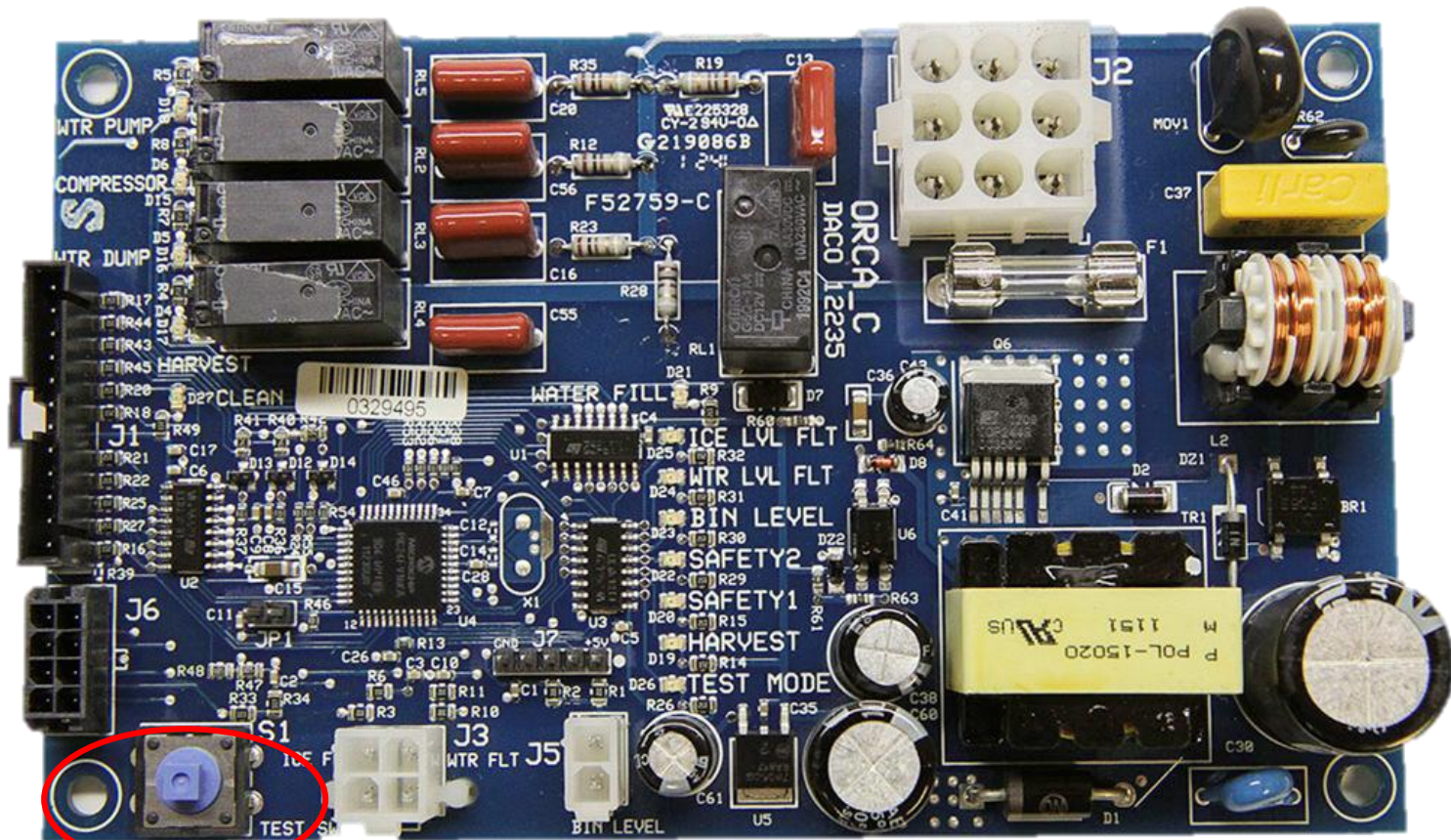
# Safety #3, Water Loss Safety

1		2		3	4
Start-Up		Refrigeration Start		Pre-Chill	Freeze
45 Sec Purge	5 Sec Delay	5 Sec Equalize	5 Sec Compressor	120 Sec. (first cycle) 30 Sec. (thereafter)	Harvest Float Switch (60 min. Max)

If Harvest Float is still down ( have never opened) after **4 minutes energizing the water inlet**, the program will initiate the following:

- Safety limit #3.
- Both SL1/SL2 Lights on the control board will flash over and over until system restart. (This indicates no water).
- Restart in 30 minutes after shutdown.
- Auto restart for only 100 consecutive times, then stay off.
- Over ride 30 minute delay for restart by turning machine off and on. Upon restart the **SL1/SL2 light will flash 3 times.**



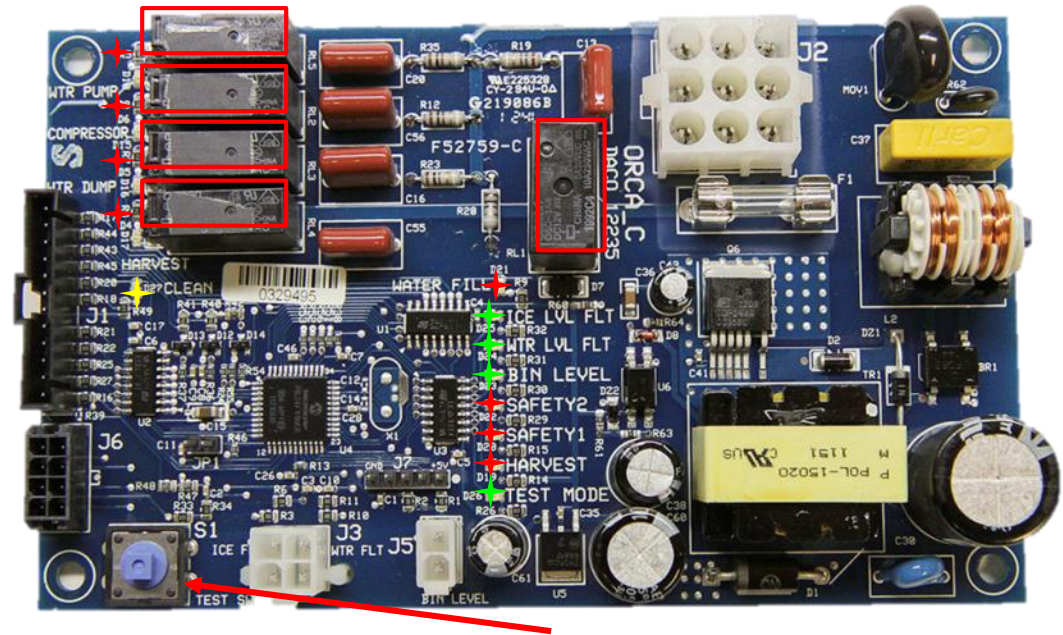


# Troubleshooting: Control Board Test Mode

## Control Board Test Mode: *Press and Hold Test button for 3 seconds.*

The control board test mode performs the following function for a 2 minute time period:

- Energizes all control board lights.
- Energizes control board relays in one second interval:
  - Harvest Valve Solenoid
  - Water Pump
  - Dump Valve
  - Water Inlet Valve
  - Compressor Contactor.



**Press and Hold Test button for 3 seconds.**

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

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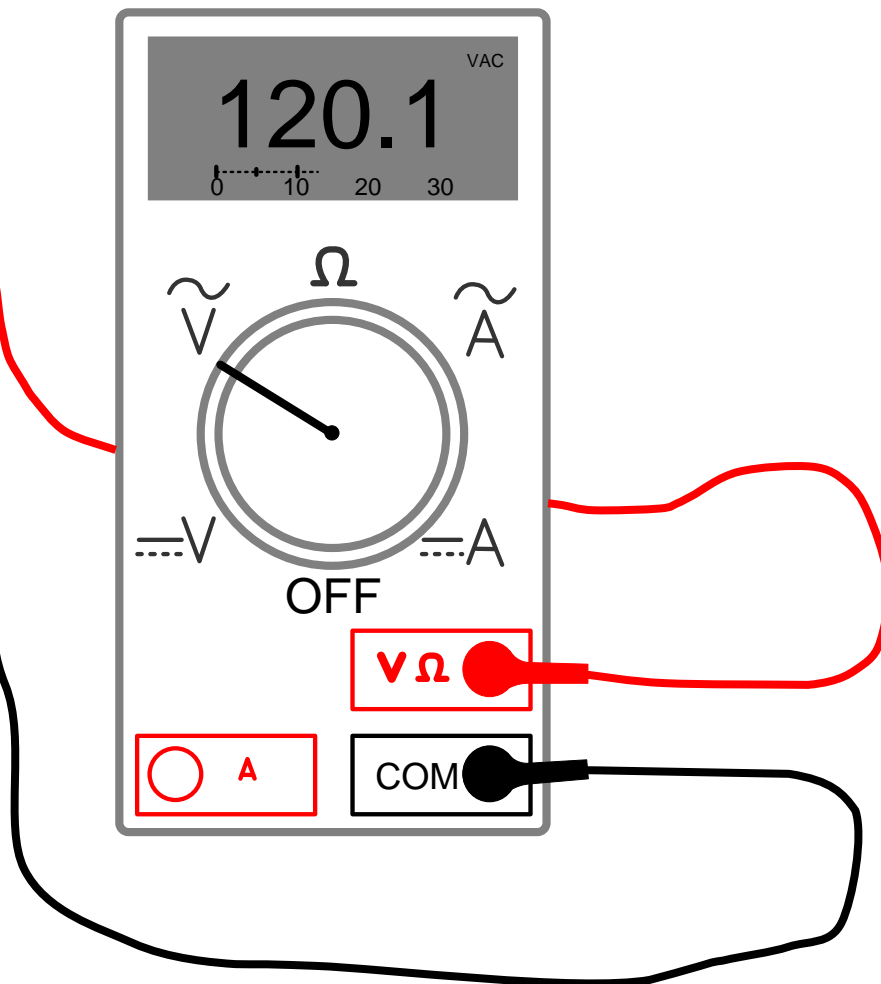
**TROUBLESHOOTING:  
DIAGNOSING AN ICE MACHINE  
THAT WILL NOT RUN.**

## Diagnosing an Ice Machine that will not run.

Wire # 55 (L1) and #56

(L2)

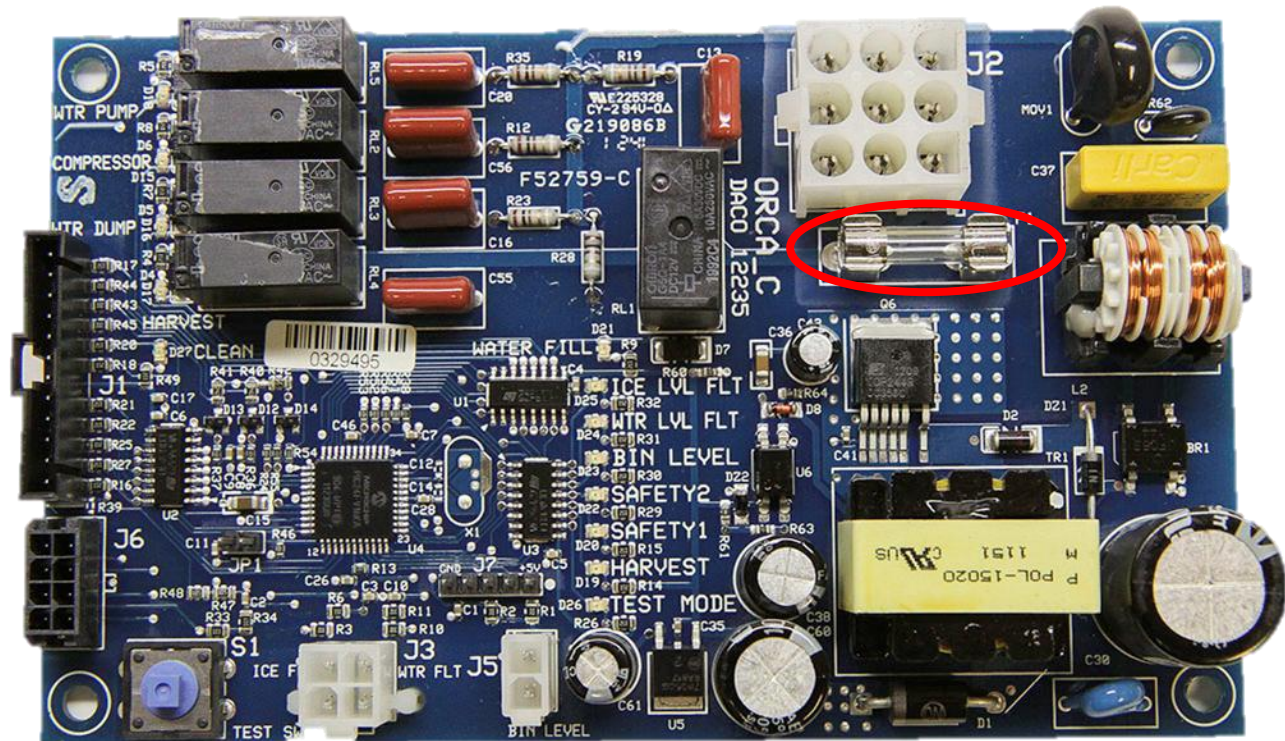
1. Verify primary voltage is supplied to ice machine and the fuse/circuit breaker is closed.



## Diagnosing an Ice Machine that will not run.

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.*







## Diagnosing an Ice Machine that will not run.

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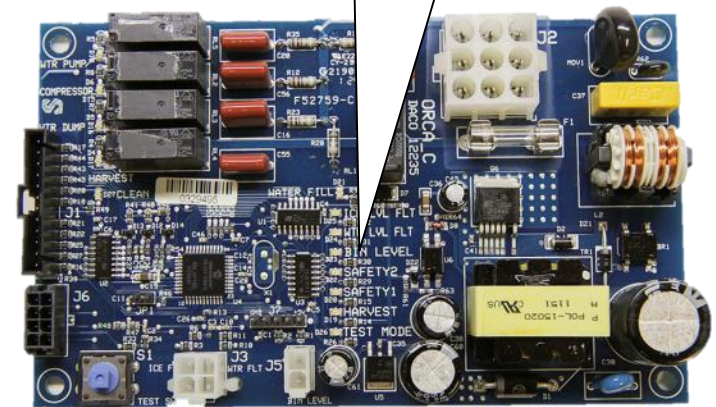
3. Verify the bin switch functions properly. A defective bin switch can falsely indicate a full bin of ice.

Curtain Closed	Curtain Open
	

**Curtain Closed**



**Curtain Open**

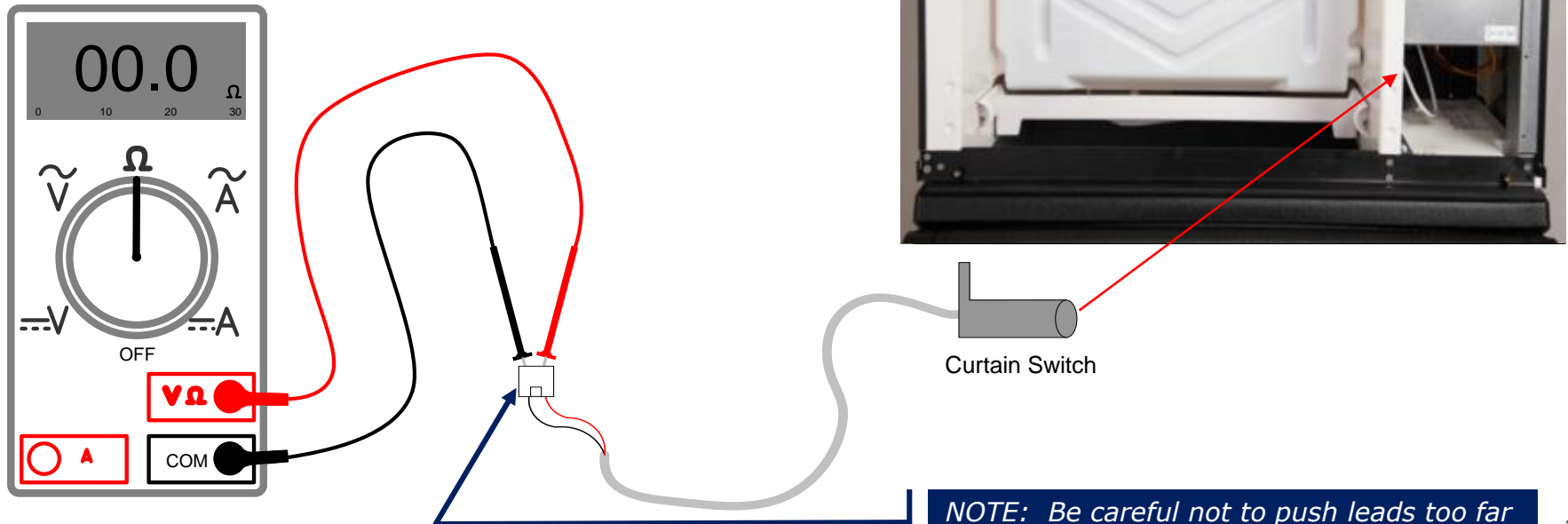


## Diagnosing an Ice Machine that will not run.

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.



**NOTE:** Be careful not to push leads too far into plug while ohming.

## Diagnosing an Ice Machine that will not run.

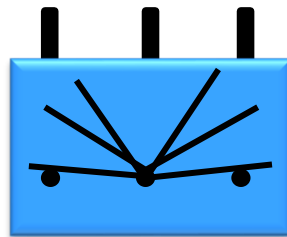
1. Verify primary voltage is supplied to ice machine and the fuse/circuit breaker is closed.
2. Verify control board fuse is okay.

*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.



Ice/Off/Clean



Clean

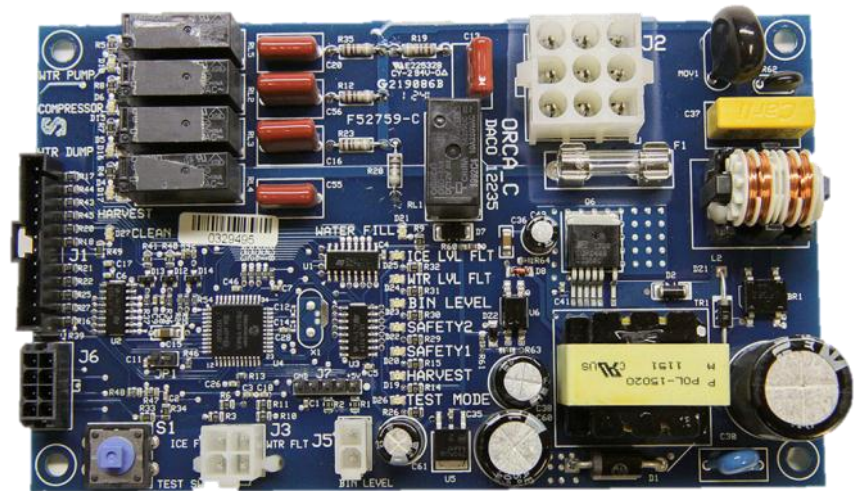


## Diagnosing an Ice Machine that will not run.

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.
5. Be sure Steps 1 – 4 were followed thoroughly. Intermittent problems are not usually related to the control board. Replace control board if user interface board does not correct the problem.



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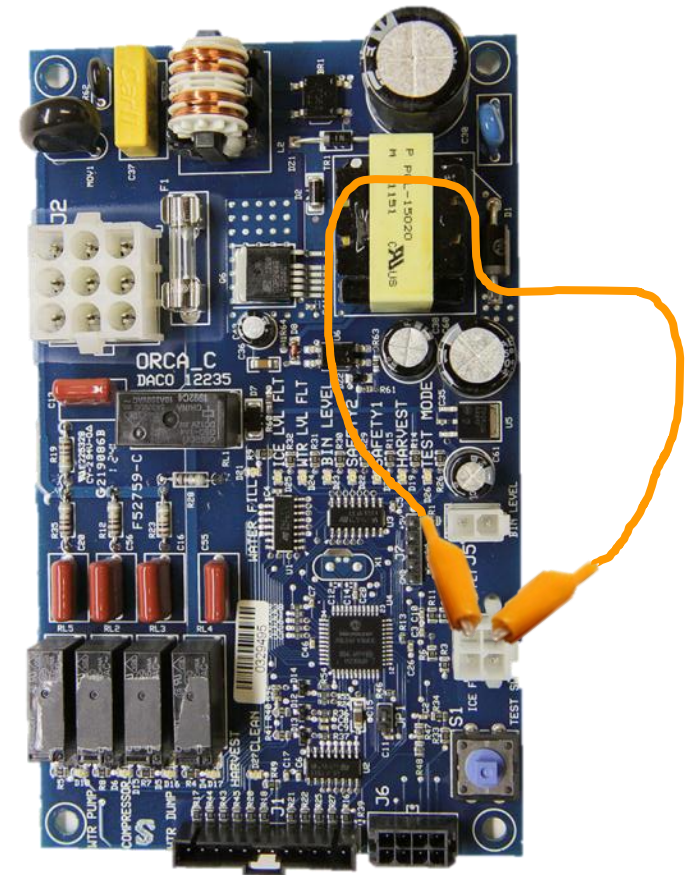
**TROUBLESHOOTING:  
ICE MACHINE NOT CYCLING  
INTO HARVEST.**

## Ice Machine not cycling into Harvest

**Step 1:** Remove the Control Box Cover to allow viewing of the control board lights and pull the wire connector for the **Harvest Float Switch (Low Float Switch)**. Attach a jumper wire to the wire terminals connected to the control board.

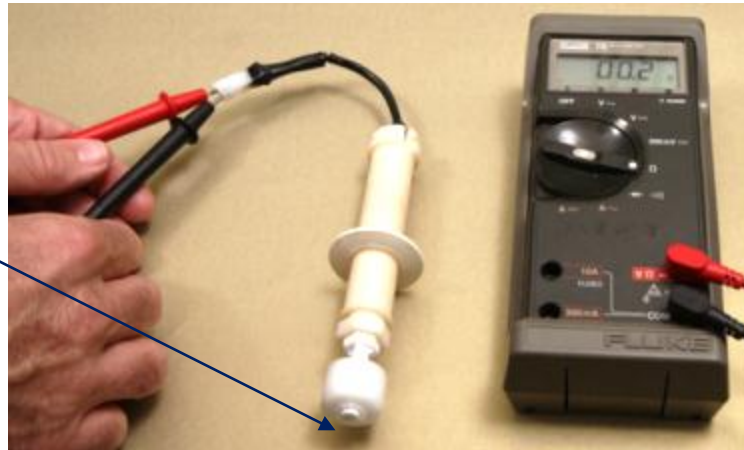
**Step 2:** Bypass the freeze time lock-in feature by cycling the toggle switch off and then back on. Wait until water flows over the evaporator, then refer to chart.

Result	Correction
The harvest light stays off and the ice machine remains in freeze.	Replace Control Board.
10 seconds into the freeze cycle the ice machine cycles from freeze to harvest and the control board harvest light energizes	Refer to Float Switch Diagnostics and or wiring problem.



## Float Switch Diagnostics:

Float Down =  
Closed Switch



Float Up =  
Open Switch



***NOTE: Both Float Switch's operate and Ohm out the same.***

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**TROUBLESHOOTING:  
ICE MACHINE CYCLES INTO  
PREMATURE HARVEST.**



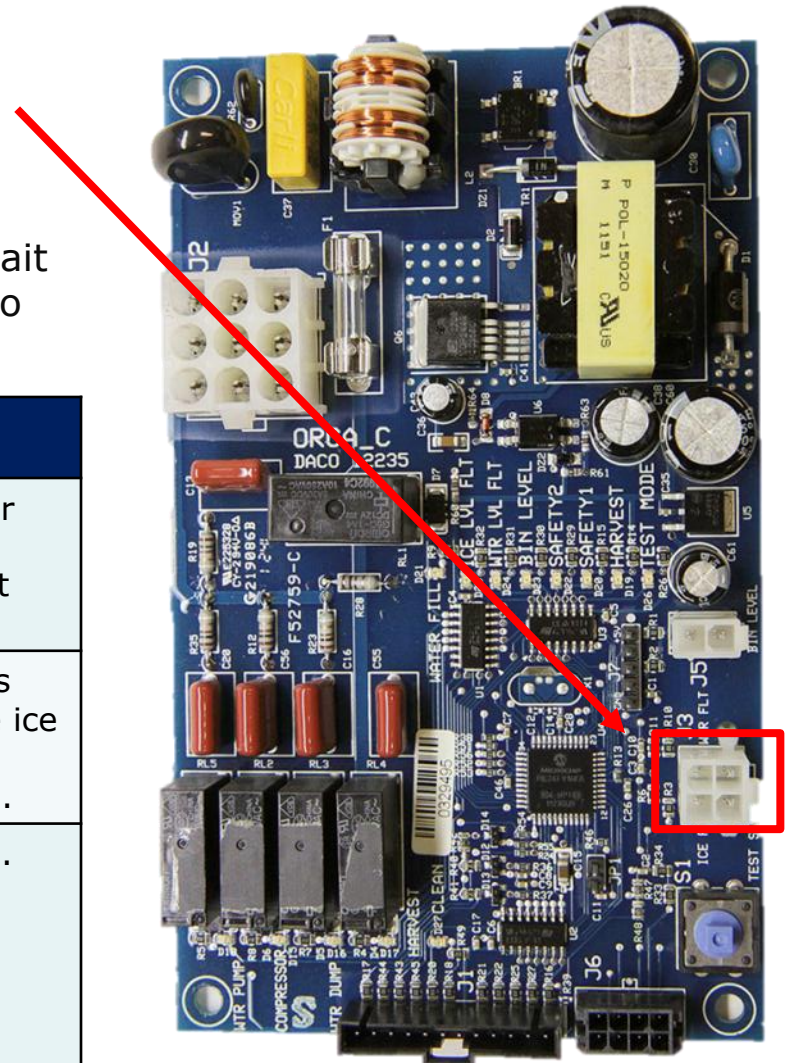
# Troubleshooting

## Ice Machine Cycles into Premature Harvest, Before the Harvest Float Drops.

**Step 1:** Disconnect the Harvest float switch plug from the control board.

**Step 2:** Bypass the freeze time lock-in feature by cycling the toggle switch off and then back on. Wait until water flows over the evaporator, then refer to chart.

Result	Correction
The harvest light does not come on.	The Harvest float switch or wire is causing the malfunction. Refer to Float Switch Diagnostics.
The harvest light comes on but the ice machine stays in a freeze cycle.	Verify the ice machine was cycled off then on and the ice machine is not in a six minute freeze time lock-in.
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.



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# **TROUBLESHOOTING: REFRIGERATION SYSTEM.**

- Ice Production
- Installation
- Ice Formation
- Discharge Pressure
- Suction Pressure
- Evaporator Inlet & Outlet
- Harvest Valve Test
- Discharge Line Temperature Test
- Final Analysis

<b>KOOLAIRE® Single Evaporator, Single Expansion Valve</b>				
Air, Water and Traditional Remote Refrigeration System Operational Analysis Table				
This table must be used with charts, checklists and other references to eliminate refrigeration components not listed on the table and external items and problems which can cause good refrigeration components to appear defective.				
Operational Analysis	1	2	3	4
<b>Ice Production</b>	Air-Temperature Entering Condenser _____ Water Temperature Entering Ice Machine _____ Published 24 hour ice production _____ Calculated (actual) ice production _____ NOTE: The ice machine is operating properly if the ice fill patterns is normal and ice production is within 10% of charted capacity.			
<b>Installation and Water System</b>	All installation and water related problems must be corrected before proceeding with chart.			
<b>Ice Formation Pattern</b>	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on the entire evaporator	Ice formation is extremely thin on outlet of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- Ice formation is extremely thin on inlet of evaporator -or- No ice formation on entire evaporator	Ice formation normal -or- No ice formation on entire evaporator
<b>Freeze Cycle Discharge Pressure</b>	_____ 1 minute    Middle    End into cycle 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.			
<b>Freeze Cycle Suction Pressure</b>	_____ 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.			
<b>Evaporator Inlet &amp; Outlet</b>	Inlet and outlet within 7°F (4°C) of each other	Inlet and outlet <u>not</u> within 7°F (4°C) of each other -and- Inlet is colder than outlet	Inlet and outlet within 7°F (4°C) of each other -or- Inlet and outlet <u>not</u> within 7°F (4°C) of each other -and- Inlet is warmer than outlet	Inlet and outlet within 7°F (4°C) of each other
Wait 5 minutes into the freeze cycle. Compare temperatures of <b>evaporator inlet &amp; evaporator outlet.</b> Inlet _____ °F (°C) Outlet _____ °F (°C) Difference _____ °F (°C)	The harvest valve inlet is <b>Hot</b> -and- approaches the temperature of a <b>Hot</b> compressor discharge line.	The harvest valve inlet is <b>Cool</b> enough to hold hand on -and- the compressor discharge line is <b>Hot</b> .	The harvest valve inlet is <b>Cool</b> enough to hold hand on -and- the compressor discharge line is <b>Cool</b> enough to hold hand on.	The harvest valve inlet is <b>Cool</b> enough to hold hand on -and- the compressor discharge line is <b>Hot</b> .
<b>Discharge Line Temperature</b>	Discharge line temperature <b>150°F (65°C) or higher</b> at the end of the freeze cycle.  <b>S850/S1000 Air &amp; Water Only</b> Discharge Line Temperature <b>140°F (60°C) or higher</b> at the end of the freeze cycle	Discharge line temperature <b>150°F (65°C) or higher</b> at the end of the freeze cycle.  <b>S850/S1000 Air &amp; Water Only</b> Discharge Line Temperature <b>140°F (60°C) or higher</b> at the end of the freeze cycle	Discharge line temperature <b>less than 150°F (65°C)</b> at the end of the freeze cycle.  <b>S850/S1000 Air &amp; Water Only</b> Discharge Line Temperature <b>less than 140°F (60°C)</b> at the end of the freeze cycle	Discharge line temperature <b>150°F (65°C) or higher</b> at the end of the freeze cycle.  <b>S850/S1000 Air &amp; Water Only</b> Discharge Line Temperature <b>140°F (60°C) or higher</b> at the end of the freeze cycle
<b>Final Analysis</b>	<b>Harvest Valve Leaking</b>	<b>Low on Charge</b> -or- <b>TXV Starving</b>	<b>TXV Flooding</b>	<b>Compressor</b>

## Troubleshooting

- Safety Limits
- Control Board Test Mode
- Will not Run
- Touchpad Diagnostics
- Not Cycling into Harvest
- Prematurely Harvesting
- Float Switch Diagnostics
- Refrigeration System





Thank You for Attending  
this Training!

