



Zamboni FastICE™ Ice Making System Training Manual

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FastICE System Overview

The Zamboni FastICE system creates a sheet of ice that is harder than a sheet of ice produced by conventional towel-based methods. Our system pressurizes and atomizes the ice-making water to convert the water into fine droplets that rapidly freeze to the ice surface.

The key to the FastICE system is the ability of the system to freeze the Ice Making Water rapidly.

The onboard computer console is a water flow management system that integrates the spray thickness with the ground speed to produce a water application rate that is consistent throughout the ice resurfacing session. This produces a consistency in the ice sheet that is independent of the machine operator. Simple controls allow the operator to increase or decrease the spray output in response to programming usage demands.

FastICE Onboard Controls

The operator controls the real time functions of the system with seven switches in the two switch banks and one rotary knob on the display. The enclosure for the display and switch banks also features a USB port that allows an operator to insert a USB drive into the port immediately after an ice resurfacing session, to download the data from that ice resurfacing session.

The following section depicts each control switch and button and describes its function.

Master Switch:

- OFF – Disables the system
- ON – Provides power to the system

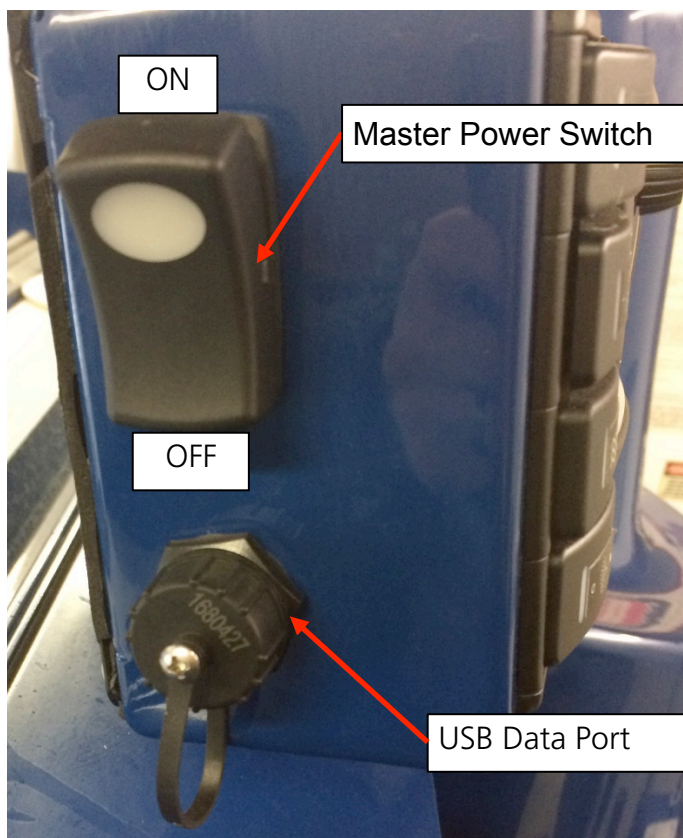


Figure 1: Master Power Switch (shown in the OFF position) and USB data port

Switch Bank 1

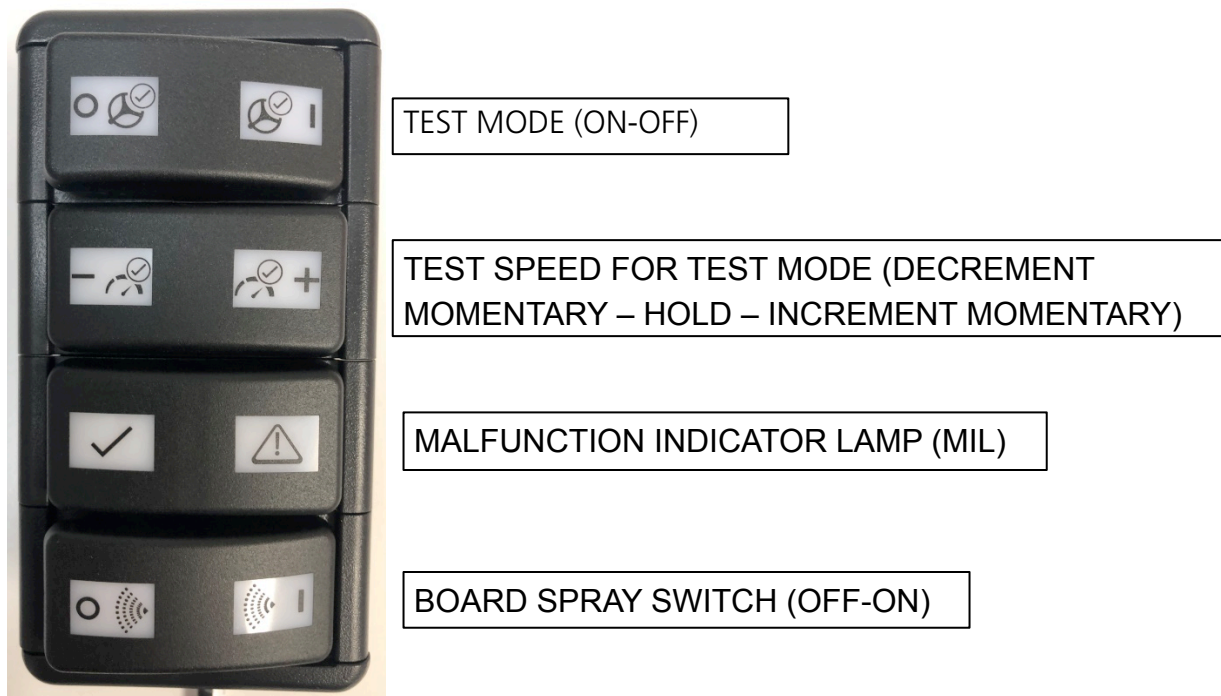


Figure 2: Switch Bank 1; contains the switches used to control flow to the upper and lower boom

Test Mode

- This switch allows the machine operator to put the system into a mode where a driving speed is simulated, thereby producing ice making water flow from the booms that are activated.
- This mode allows for an assessment of the health of the spray system, and allows for the operator to assess the quality of the spray coming from each spray nozzle.

Test Speed Decrement / Increment

- This switch increases or decreases the TEST MODE simulated speed.

Malfunction Indicator Lamp

- Left-hand light illuminates **Green** when the system has no malfunctions are detected
- Left light illuminates **Red** when there is a malfunction detected. The right-hand light will be off when there is no fault active and flash the fault numeric code in a **White** blinking light when the left hand light is **Red**. The details of the blink codes are detailed in the “Troubleshooting” section of this manual.

Board Spray Valve control switch

- This switch controls water flow to the board spray valve, which can produce water flow from its spray nozzle only if the lower boom is on and spraying water.

Switch Bank 2

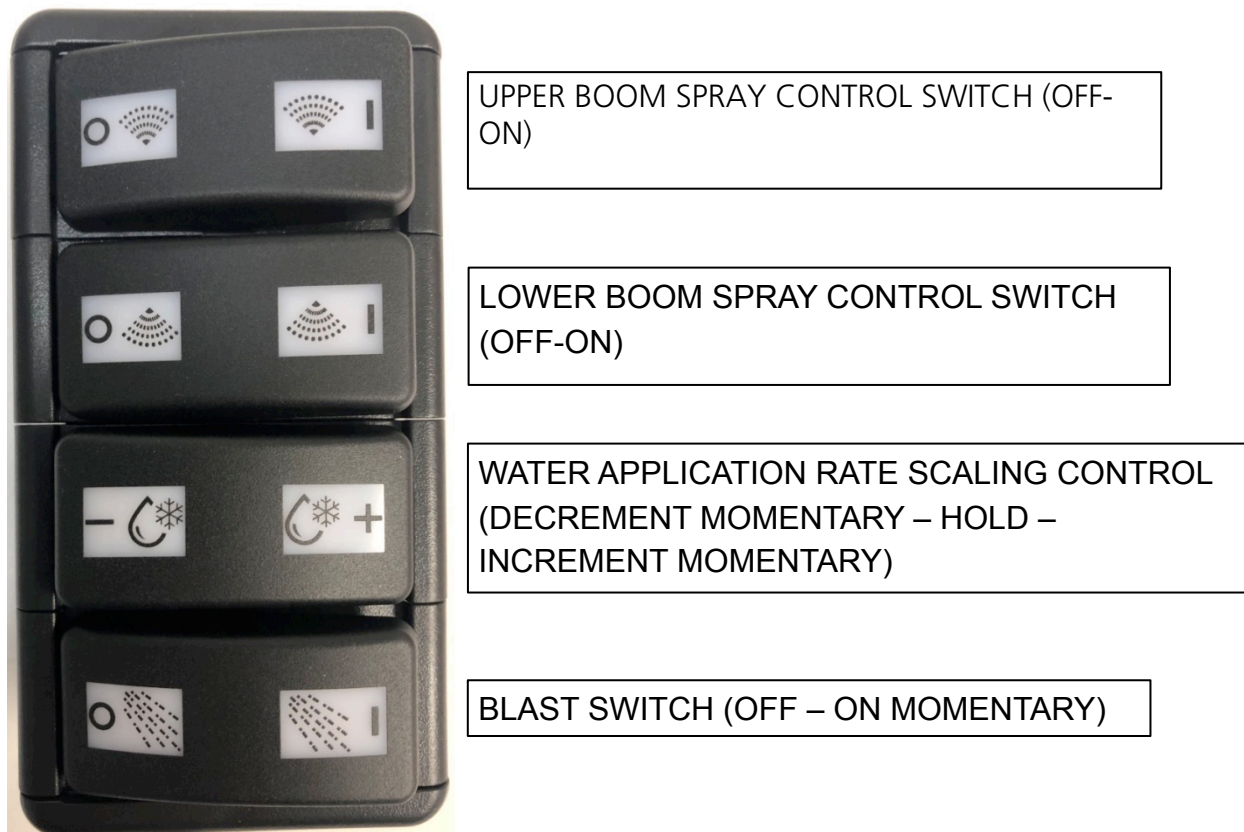


Figure 2: Switch Bank 2; contains the switches used to control flow to the upper and lower spray boom

Upper Boom Control Switch

- The upper boom switch initiates or turns off flow from the upper boom.

Lower Boom Control Switch

- The lower boom switch initiates or turns off flow from the lower boom.

Water Application Rate Scaling Switch

- This switch allows the operator to increase or decrease the water flow rate from as low as 50% of its pre-calibrated value to as high as 150% of its pre-calibrated value.
 - The factory-set system flow rates are 10.5 GPM from the Upper Boom and 3.8 GPM from the Lower Boom at a 5 MPH reference speed. The total flow from both booms for these flow rates is 14.3 GPM.

Blast Button

- This function allows the operator to apply the maximum water flow rate set in the control system for up to 10 seconds at a time.
 - The factory setting for the maximum water flow rate is 25.7 GPM.

FastICE Display

Operational “Dashboard” Display

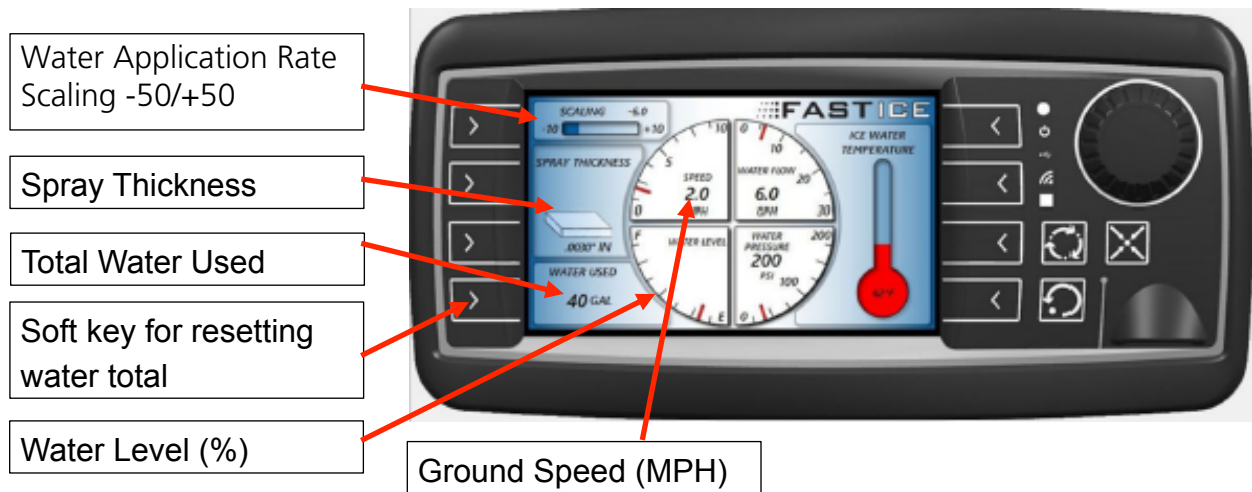


Figure 3: Fast Ice Operational Screens

Water Application Rate Scaling

This allows the water flow calibration point to be increased or decreased for a given vehicle speed. This parameter allows the operator to increase or decrease the ice thickness.

The factory-set system flow rates are 10.5 GPM from the Upper Boom and 3.8 GPM from the Lower Boom at a 5 MPH reference speed. The total flow from both booms for these flow rates is 14.3 GPM.

Spray Thickness

The spray thickness can be increased or decreased with the water application rate scaling control rocker switch, or with the rotary knob on the display. This is a calculated value based on the water flow rate, the overall spray width value stored in the control system, and the traveling speed of the machine.

Ground Speed

This is the actual speed of the ice resurfacing machine. The water flow produced by the system is based on the ground speed of the machine.

Water Flow

This is the amount of water being dispersed by the system, per minute. This value is monitored by the control system, and a fault is raised if:

- The system is not producing enough flow
- The system is producing too much flow

Water Pressure

This is the pressure of the spray water. While this value is not used as a flow control parameter, it does inform the control system of various fault conditions, such as:

- Water system leaks
- Water system clogs, such as clogged spray nozzles
- Water pump performance problems (in the case of a worn-out water pump)

Water Temperature

This is the temperature of the spray water. This allows the operator to monitor the temperature of the water used in making ice. This is not used to control the system.

Total Water Used

This is the total amount of water used by the system, since the last time the total was reset with the soft key to the left of the number for total water used.

Summary Screen

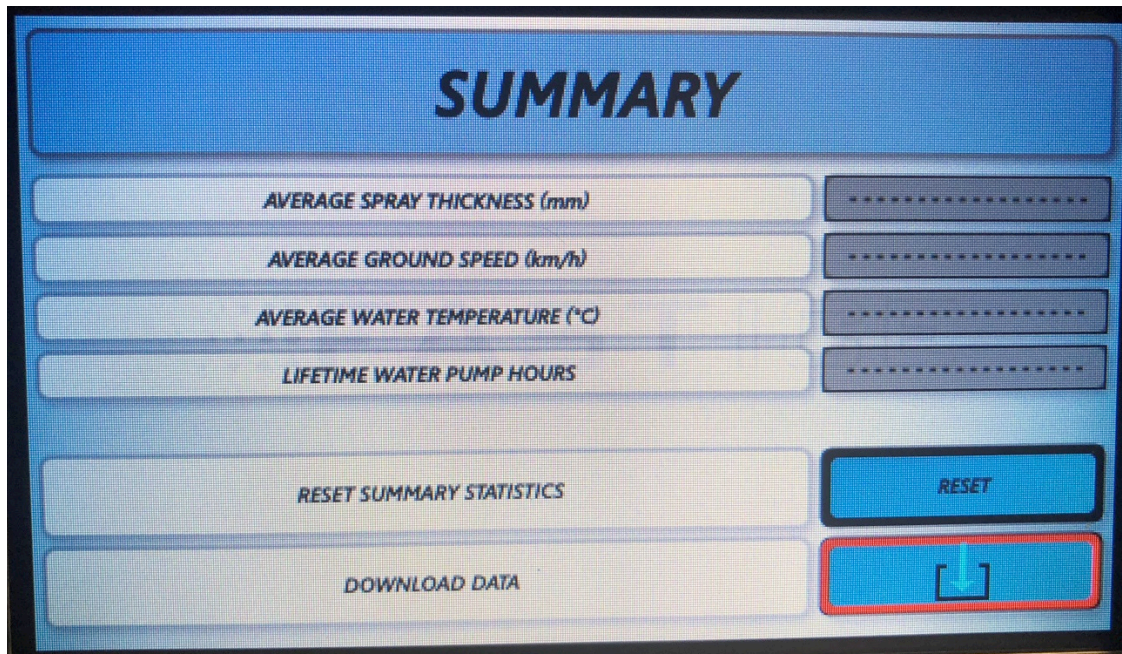


Figure 4: Summary screen: this screen displays the average readings for the most recent ice resurfacing session

This screen displays:

- Average spray thickness in the unit system selected
- Average ground speed for the most recent ice resurfacing session
- Average ice making water temperature for the most recent ice resurfacing session

The values for ground speed, water used, water temperature, and spray pressure for the most recent resurfacing session can be downloaded to a USB flash drive from this screen.

Use the rotary knob to select a value or action (reset or download), and push the knob to execute that action.

Setup Screen

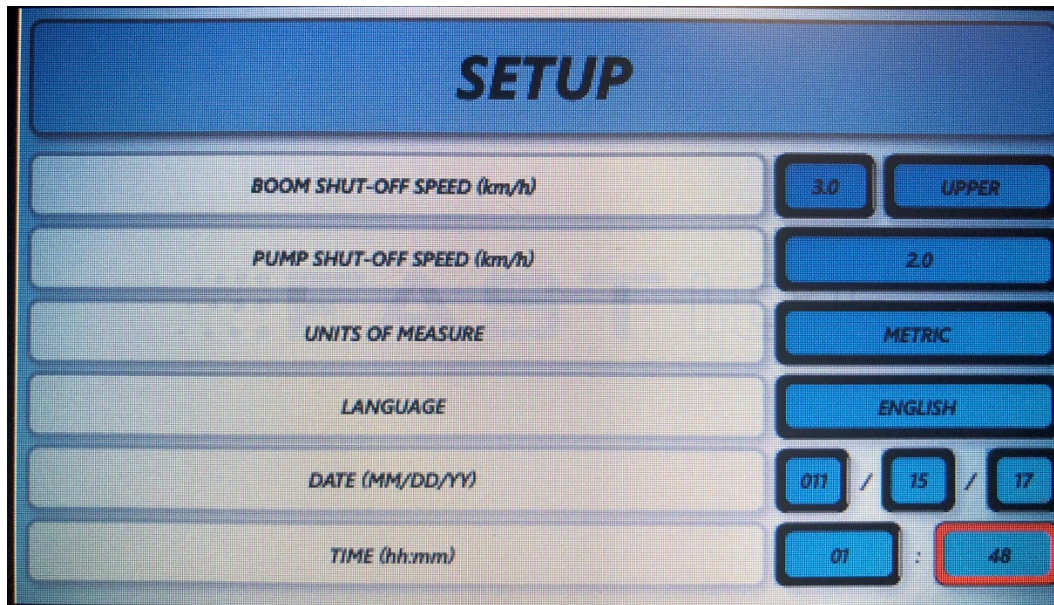


Figure 5: Setup Screen: This screen displays the selection for unit system, upper boom shutoff speed, display language setting and...

The Setup screen allows the operator to select or set operational parameters of the control screen, including measurement unit system, boom shutoff speed, and display language setting.

To change a value on this screen, rotate the knob until the value of interest is highlighted by the red box shown in the above figure, and press the knob to change the value. The color of the box will change from red to white. When the desired value is reached, press the knob again to set the value.

Diagnostics Screen



Figure 6: Diagnostics Screen:

The Diagnostics Screen provides a read-out of the current state of the solenoid valves, communication status (between the display and machine controller), FastICE ECU supply voltage, display software version and controller software version. This is a passive display – no operator interaction is allowed.

Recommended Ice Making Conditions

Ambient air and relative humidity conditions for making ice should follow guidelines put forward by industry training groups such as the Ontario Recreational Facilities Association (ORFA), Ice Sports Industry (ISI) and the US Ice Rink Association (USIRA)..

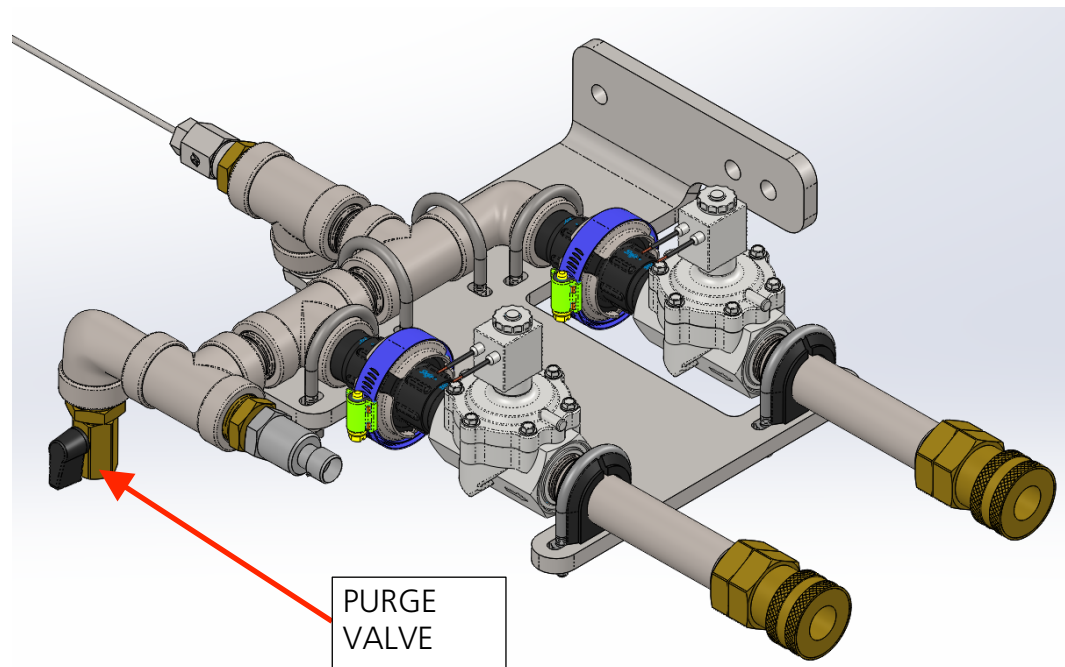
Preparation for Use of the Zamboni FastICE System

1. Ice Making Water Tank
 - 1.1. Before filling the ice making water tank with water, drain any residual water from past resurfacings, as any water that has sat for an extended period of time has likely cooled too much for use with the Fast Ice system.
 - 1.2. Fill the ice making water tank to the desired level with hot water. The maximum recommended temperature for ice making water is 140 degrees Fahrenheit (60 degrees Celsius).
2. Perform a test spray by putting the system in test mode for 20 to 30 seconds.
3. Check nozzles
 - 3.1. During the test spray, check the spray nozzles to confirm adequate flow and spray atomization from each spray nozzle. No spray nozzle blockage or leak should exist.

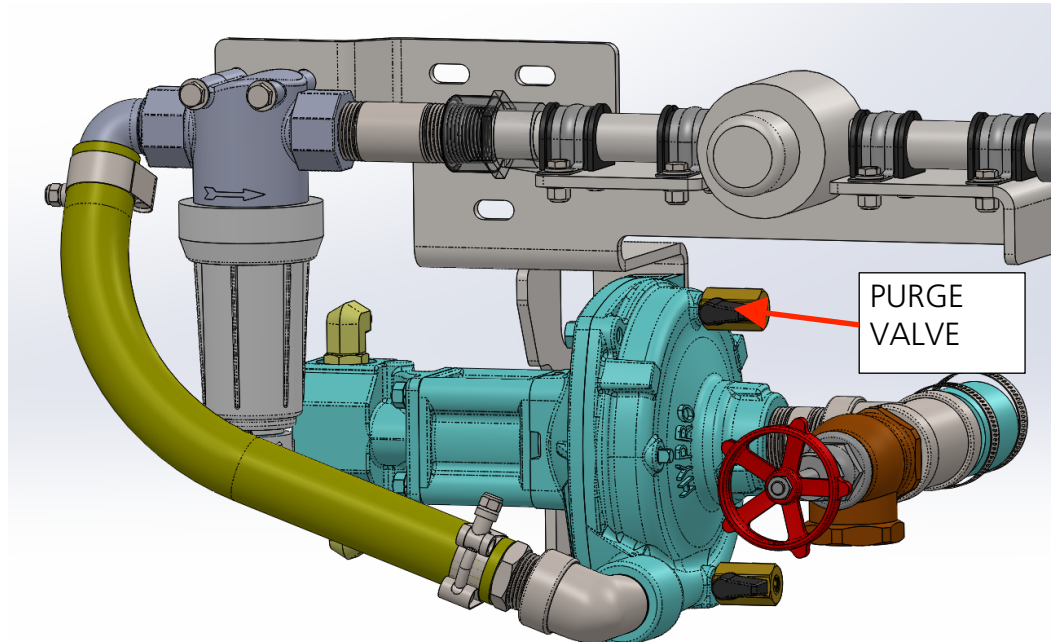
Recommended Ice Resurfacing Procedure

1. Fill the Ice Making Water tank to between 50% and 100% full. The amount of water in the tank should be determined by how much ice thickness you plan to build.
2. If you are using the system for either the first time or are using it after draining the Ice Making Water tank completely, you will need to purge the pump housing of air, and the control valve manifold assembly of air. With the machine and system off, open the upper valve on the pump housing until a continuous stream of water comes out of the valve:

2.a. Pump purge valve location:



- 2.b. Water valve manifold purge valve location:



3. Turn on the machine
- 3.a. If the machine is fuel powered, increase the engine speed to 2500 RPM
 - 3.b. If your machine is a Zamboni Model 546, turn on the FastICE PTO switch before increasing the engine speed (recommended).
4. Turn on FastICE system
- 4.a. Turn the Master Power Switch to the ON position. If the machine was turned off since the last FastICE session, then the restart process will take a little less than 30 seconds.
5. Set the blade cutting depth
- 5.a. Drive onto the ice, lower the conditioner, and set the blade depth into the ice before turning on the spray booms.
 - 5.a.i. If the machine is battery-powered, turn on the augers
 - 5.b. Once the blade depth into the ice is set, turn on the upper and lower spray booms.

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6. Adjust ice water spray scaling factor to set the target ice thickness
 - 6.a. Adjust desired spray thickness according to ice conditions.
7. Recommended resurfacing speed
 - 7.a. We recommended a speed for FastICE Sessions of 5 MPH (8 km/h). This speed should be maintained throughout the ice resurfacing session, both in the straights and in the turns.
8. Turn Upper spray boom OFF in the crease area
 - 8.a. We recommended turning off the Upper boom OFF in the goal crease area, and behind the goal line, as this will avoid putting too much water in these areas.
 - 8.b. We recommend experimenting with the system to determine which boom you prefer to turn off while going through these areas.
 - 8.c. Note that there is an automatic setting within the SETUP screen that allows you to select which boom is turned off once your speed drops below a certain value. This feature can be helpful to operators who prefer to drive more slowly in the crease and behind the goal line, and to have the boom shutoff process be automatic.
9. Turn the Upper and Lower spray boom switches off
 - 9.a. Turn the FastICE spray booms off once the ice resurfacing session is complete.
10. Drain Ice Making Water Tank
 - 10.a. Drain the Ice Making Water tank at the end of the ice resurfacing session. We recommend that the tank be filled only to what will be used during the resurfacing session to guarantee that only hot water is used to make ice.

Recommended Ice Building Procedure

1. Fill the Ice Making Water tank to 100% full.
2. Turn Master Power Switch ON
3. Leave Conditioner Raised in the Air
 - 3.a. For best ice building results, we recommend that you leave the conditioner raised during an ice-building session.
4. Turn Ice Making Water Spray ON
 - 4.a. Turn on the Ice Making Water Flow for both the Upper and Lower Boom.
5. Set Desired Spray Thickness
 - 5.a. Adjust the spray thickness according to ice making conditions.

Note:

- For best results, and to reduce spray “drifting”, we recommend a consistent ground speed during resurfacing of 5 MPH (8 km/h).
 - Turn the boom control switches OFF when driving over applied areas to avoid uneven ice thickness resulting from multiple spray passes over the same area.
-

6. Use BLAST Switch for Leveling
 - 6.a. To apply additional spray to low areas, press the Blast button while passing over the target area.
7. Turn Ice Making Water Spray OFF
 - 7.a. Turn the spray switch to the OFF position when all areas of the ice have water applied and the resurfacing session is complete.
8. Drain Ice Making Water Tank
 - 8.a. To ensure that only hot water is used for ice making, we recommend that the ice making water tank be emptied follow each ice resurfacing session.

System Troubleshooting

The system is equipped with self-diagnostic features that perform the following functions:

- Detect whether or not a water or hydraulic valve is malfunctioning
- Detect whether or not a valve is disconnected or damaged (open circuit)
- Detect when the water system has become clogged with debris
- Detect when spray nozzles are worn out and in need of replacement
- Detect when a leak has developed in the water system
- Detect when the water pump is not meeting performance requirements

For more information on fault activation, please refer to the FastICE Operating Manual.

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Revisions

Revision	Date	Revision Description
0	31/7/2018	Initial production release