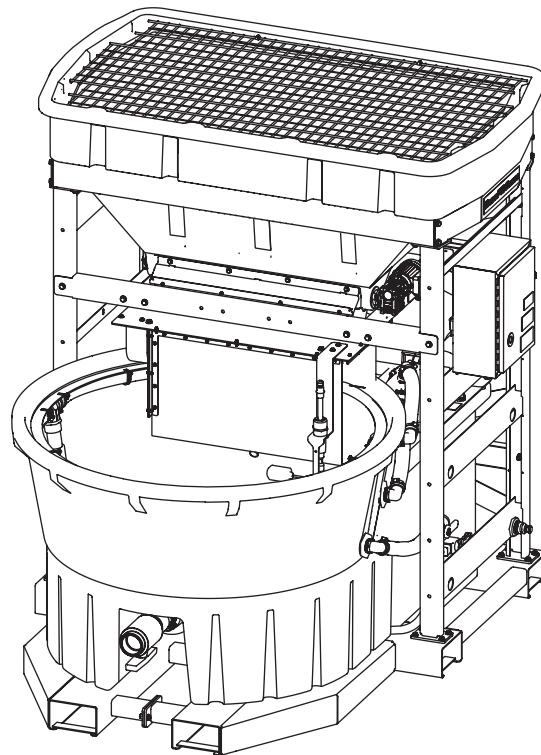




BP-2000

Brine Pro™ Brine Maker

Owner's Manual and Installation Instructions *Original Instructions*



⚠ CAUTION

Read this manual before installing or operating the equipment.

This Manual and Instructions are for BP-2000 brine makers with serial numbers beginning with 170701 and higher with PLC program 11081-3 and HMI program 11082-1.

This document supersedes all editions with an earlier date.

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PREFACE

This manual has been prepared to acquaint you with the safety information, operation and maintenance of your new machine. Improper installation and operation could cause personal injury and/or equipment and property damage. Read and understand the Owner's Manual before installing, operating, or making adjustments. Keep this manual accessible.

When service is necessary, call SnowEx® Technical Service at 1-800-725-8377.

NOTE: This brine maker is designed and programmed to mix rock salt (sodium chloride) and water *only*. It is not intended for use with magnesium chloride, calcium chloride, potassium chloride or any other material or additives. The use of additives during brine production will negatively affect the salinity sensor, and will make accurate salinity control impossible. Any additives must be added after brine has left the mixing tank. Do not use this equipment for purposes other than those specified in this manual.

NOTE: Do not modify or alter the machine. Altering the unit in any way will void the warranty

NOTE: The brine maker requires a licensed electrician for installation.

WARRANTY REGISTRATION

Warranty registration is available online at www.snowexproducts.com. Under "Support" click "Warranty Registration" and submit the form online.

OWNER'S INFORMATION

Owner's Name: _____

Date Purchased: _____

Outlet Name: _____ Phone: _____

Outlet Address: _____

Year: _____

Serial #: _____

SAFETY INFORMATION

SAFETY DEFINITIONS

WARNING

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

CAUTION

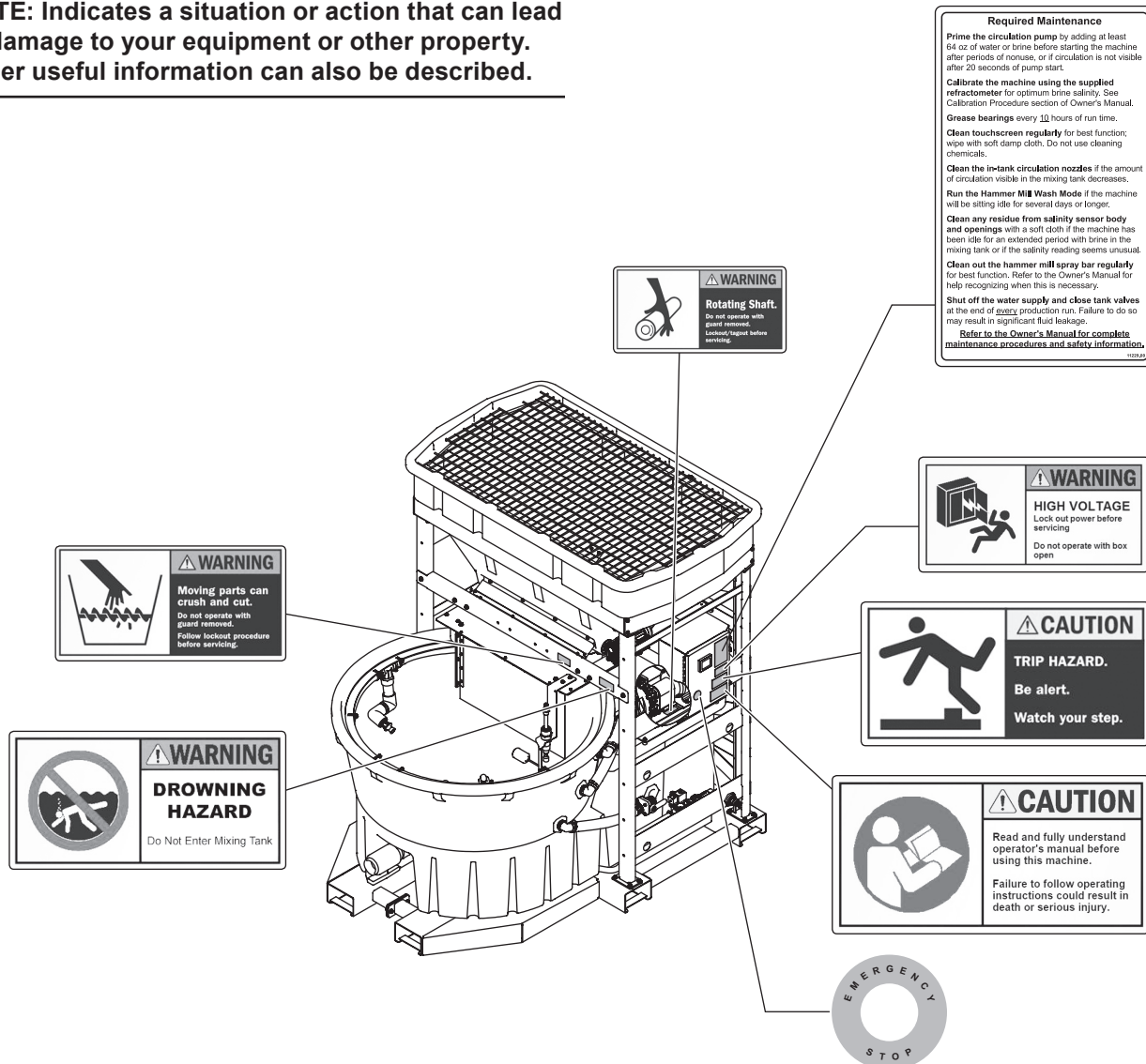
Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTE: Indicates a situation or action that can lead to damage to your equipment or other property. Other useful information can also be described.

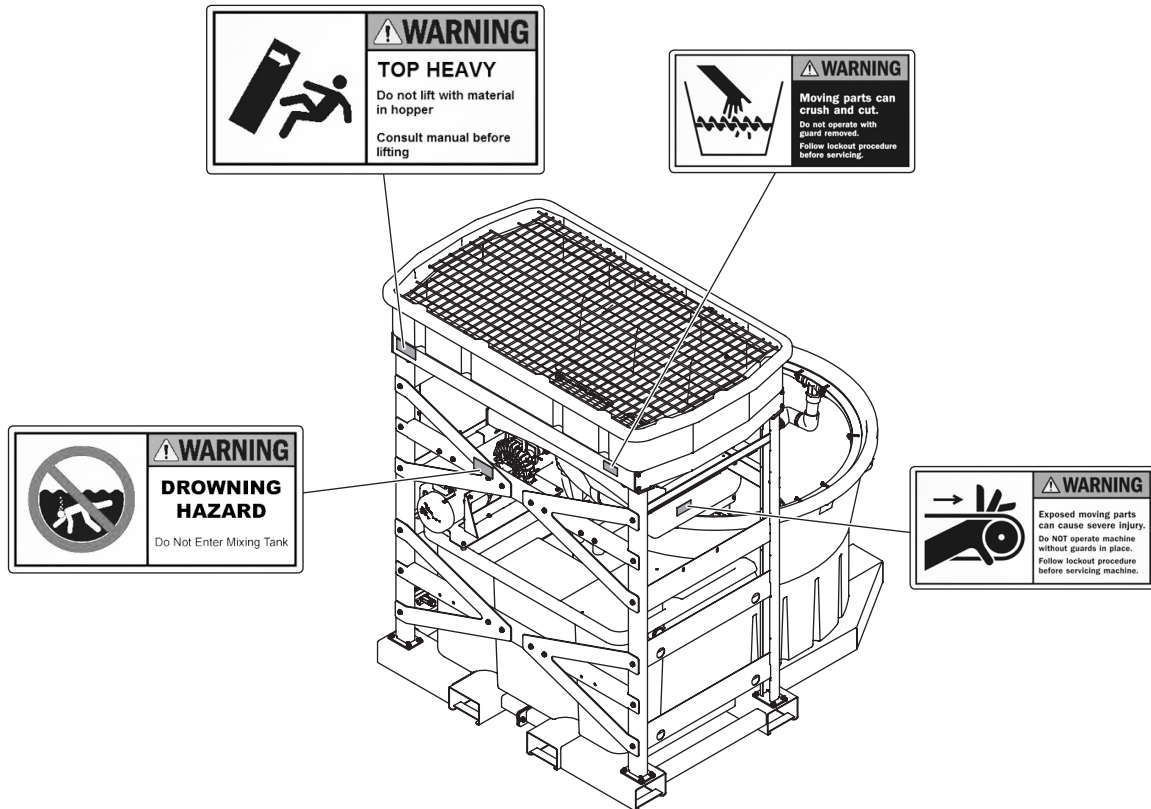
WARNING/CAUTION LABELS

Please become familiar with all the warning and caution labels on the machine.

If labels are missing or cannot be read, call 1-800-SALTERS (725-8377).

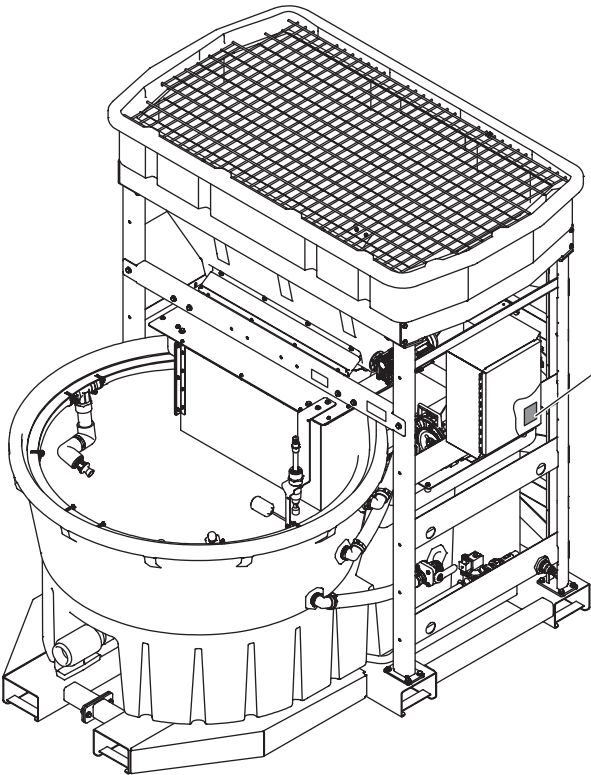


SAFETY INFORMATION



SAFETY INFORMATION

SERIAL NUMBER LABEL





TrynEx International
531 Ajax Drive
Madison Heights, MI 48071
www.snowexproducts.com

XXXXXXXXXXXXXXXXXXXXXXXXXXXX

YYMMDDLLXXXXZZZZZZ



Inside Cover

Code	Definition
YY	2-Digit Year
MM	2-Digit Month
DD	2-Digit Day
LL	2-Digit Location Code
XXXX	4-Digit Sequential Number
ZZZZZZ	Model #

SAFETY INFORMATION

SAFETY PRECAUTIONS

Improper installation and operation could cause personal injury and/or equipment and property damage. Follow all local laws and regulations when installing or operating the unit. Read and understand all product labels and the Owner's Manual before installing, operating or making adjustments. This unit requires a licensed electrician for installation. Install with a 50 A breaker.

⚠ WARNING

- Always keep hands, feet and clothing away from moving parts.
- All guards and covers must be in place before operating.
- Do not operate a machine in need of maintenance.
- Always make sure personnel are clear when using and filling equipment.
- Never allow children to operate or climb on equipment.

⚠ WARNING

Drowning Hazard: Do not climb into the mixing or brine tank.

⚠ WARNING

Do not climb into the salt hopper. Moving parts may cause serious injury.

⚠ WARNING

Before operating, servicing and cleaning, locate and become familiar with the EMERGENCY STOP button.

⚠ WARNING

Always shut off and lock out the power source before servicing.

⚠ WARNING

Overloading the salt hopper could cause an accident. Do not overfill.

⚠ CAUTION

- Before working with the machine, secure all loose-fitting clothing and unrestrained hair.
- Always wear safety glasses with side shields when operating and servicing. Failure to do this could result in serious injury to eyes.

⚠ CAUTION

For emergencies press the physical EMERGENCY STOP button on the Control Box. Do not attempt to manually stop the unit.

⚠ CAUTION

Brine is typically a clear to cloudy white liquid with no odor. It may be irritating to the eyes, skin and respiratory system. Refer to the Brine Solution Material Safety Data Sheet (MSDS) for more information.

⚠ CAUTION

Floor may be slippery when wet or covered with salt particles. Use caution when working around the unit.

⚠ CAUTION

Trip Hazard: Be aware of hoses and wires lying on the ground.

NOTE: This unit must be installed and operated in compliance with all OSHA standards and local laws and regulations.

NOTE: Do not leave unused material in hopper for a prolonged period of time. Material can solidify, causing blockage.

NOTE: This unit creates corrosive dust that may affect nearby equipment.

NOTE: Inspect and retighten fasteners after the first run and periodically to ensure structural integrity.

SAFETY INFORMATION & SPECIFICATIONS





TORQUE CHART

⚠ CAUTION





Read instructions before assembling. Use standard methods and practices, including proper personal protective safety equipment.

Recommended Fastener Torque Chart

Inch Fasteners Grade 5 and Grade 8

Size	Torque (ft-lb)		Size	Torque (ft-lb)	
	 Grade 5	 Grade 8		 Grade 5	 Grade 8
1/4-20	8.4	11.9	9/16-12	109	154
1/4-28	9.7	13.7	9/16-18	121	171
5/16-18	17.4	24.6	5/8-11	150	212
5/16-24	19.2	27.3	5/8-18	170	240
3/8-16	30.8	43.6	3/4-10	269	376
3/8-24	35.0	49.4	3/4-16	297	420
7/16-14	49.4	69.8	7/8-9	429	606
7/16-20	55.2	77.9	7/8-14	474	669
1/2-13	75.3	106.4	1-8	644	909
1/2-20	85.0	120.0	1-12	704	995

Metric Fasteners Class 8.8 and 10.9

Size	Torque (ft-lb)		Size	Torque (ft-lb)	
	 Class 8.8	 Class 10.9		 Class 8.8	 Class 10.9
M6 x 1.00	7.7	11.1	M20 x 2.50	325	450
M8 x 1.25	19.5	26.9	M22 x 2.50	428	613
M10 x 1.50	38.5	53.3	M24 x 3.00	562	778
M12 x 1.75	67	93	M27 x 3.00	796	1139
M14 x 2.00	107	148	M30 x 3.50	1117	1545
M16 x 2.00	167	231	M33 x 3.50	1468	2101
M18 x 2.50	222	318	M36 x 4.00	1952	2701

These torque values apply to fasteners except those noted in the instructions.

Brine Pro™ 2000 Brine Maker Specifications

Input Requirements

Inlet Flow Rate	5–20 gal/min
Electrical Connection	220 V AC, 50 A Service, Single Phase

Dimensions

Length	100 in
Width	86 in
Height	90 in

Weight

Empty	1,500 lb
One Cubic Yard of Salt	2,000 lb
One Gallon Brine	10 lb
Unit with Brine and Salt	9,000 lb

Capacity

Mixing Tank	265 gal
Holding Tank	285 gal
Hopper	1 cu yd

All values are approximate.

OVERVIEW

OPERATIONAL OVERVIEW

This section details how the Brine Pro™ 2000 brine maker works and highlights the major components used.

The brine maker creates salt brine using an onboard computer and conductivity sensor to automatically add salt and water to the mixing tank in a controlled fashion. Since conductivity is related to salinity, monitoring this value enables the machine to produce solution at the proper salinity level, ready to be used or stored.

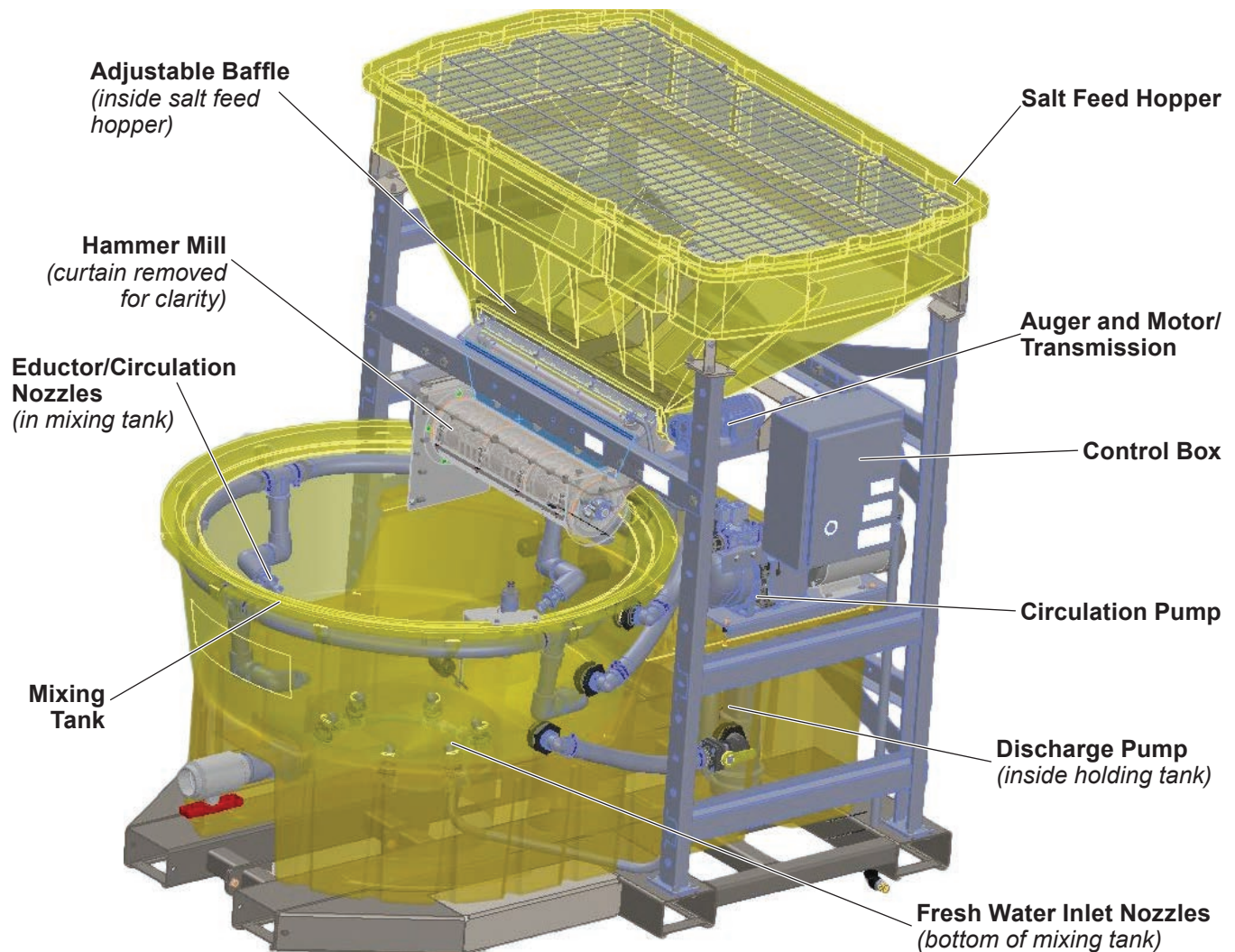
Salt flow is controlled by an auger at the bottom of the feed hopper. The computer continuously adjusts the speed of this auger, metering the salt flow into the hammer mill. The hammer mill pulverizes the rock salt, greatly increasing its surface area to increase the speed of brine production.

Water flow is also regulated by the computer, which turns the solenoid valve ON or OFF depending on the salinity in the tank and the mode of operation.

A large circulation pump mixes the water and salt solution in the large open tank at the front of the machine. Special nozzles, called eductors, are used to maximize the mixing energy in the tank.

Good brine is permitted to flow into the holding tank at the bottom of the machine, where it is either stored or pumped out. Discharge can either be manual or under computer control, depending on the mode of operation chosen, and is accomplished by a large stainless pump installed in the holding tank.

A valve on the discharge line is recommended; this should be closed at all times the machine is not in use or is in **BATCH MODE**. It must be open for proper discharge pump operation.



OVERVIEW

MACHINE CALIBRATION NOTICE

Since local water and salt supply quality can have a significant effect on the measurement of salinity, the brine maker is shipped from the factory calibrated to produce brine at a lower salinity than what is indicated on the touchscreen. For best results, it is strongly suggested to calibrate the unit on its first run with the supplied refractometer. Follow the instructions under "Calibration Procedure" in the Operation section to calibrate the machine.

Additionally, the user should verify the calibration whenever salt or water supplies change.

Please note that the conductivity sensor automatically compensates for mixture temperature. For this reason, manual measurements that do not account for temperature may differ from the indicated salinity. The included refractometer will perform best when kept at approximately the same temperature as the solution in the tank; keeping the refractometer with the unit is generally sufficient.

SALT QUALITY

The unit works best with dry, free flowing salt containing minimal impurities. Wet or clumpy salt can jam the auger and hammer mill, and significantly decrease the machine's efficiency and performance. Using clean, dry salt of good quality will increase throughput, simplify the operation of the unit, and reduce the frequency and difficulty of cleaning and maintenance. It is highly recommended to allow wet salt to dry before use if possible.

The Brine Pro™ 2000 brine maker features several standard features to improve functionality with less than ideal salt. The feed hopper is equipped with both a vibrator and an adjustable baffle assembly to compensate for salt that flows too freely or not freely enough. Both can be tuned by the user; see the relevant sections in this Owner's Manual.

A hammer mill sprayer system is installed on each unit to help prevent the hammer mill from jamming due to wet and clumpy salt.

Finally, the unit is programmed with a **CIRCULATE MODE** and a SaltMizer function to reduce the amount of usable salt left undissolved in the mixing tank. These halt salt flow while leaving the circulation system active and the water valve under computer control. For more information see "Machine Operation – Normal Modes" and "Machine Operation – Special Modes" in the Operation section and "User Controlled Settings" in the Optimization section of this manual.

INSTALLATION

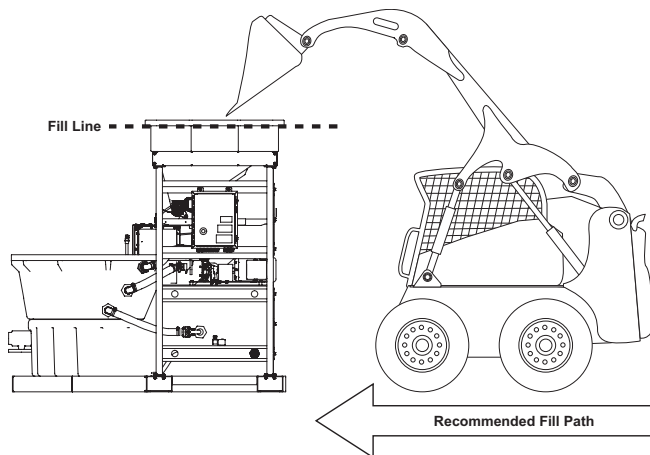
LOCATION

⚠ CAUTION

Failure to install in the proper environment may cause damage, malfunction, and may violate the manufacturer's warranty.

NOTE: This unit must be installed and operated in compliance with all OSHA and local laws and regulations.

The brine maker must be installed indoors, on a hard flat surface, and in an area that is suitable for spray-down cleaning. The ambient temperature must be kept above freezing or significant damage to the freshwater system will result. Damage caused by installing in an unsuitable environment is not covered under warranty. All electrical connections must be made by a licensed electrician. The unit should be installed in an area that provides access to the brine discharge, clean-out drain, salt hopper, water intake, control box, 220 V AC connection and garden hose connection.



SUPPLY REQUIREMENTS

⚠ WARNING

To prevent electrical overload and the danger of shock, install with a 50 A breaker.

⚠ WARNING

Do not attempt to lift or move unit when it is filled with salt or brine. Always empty unit before moving.

NOTE: To prevent leaks, use a thread sealing compound for all hose and pipe connections. Do not use Teflon® tape, as fragments could damage the flow sensor and clog the nozzles.

NOTE: The Brine Pro™ 2000 brine maker cannot be powered by a generator, as damage to the electronics may occur.

Moving the unit requires a forklift with a minimum 3,300 lb lifting capacity. Fork extensions at least 72" long are required. Lift the unit from hopper loading side as shown in the diagram below. Use caution when lifting and moving the unit to prevent damage to the machine and/or surroundings.

Once in place, the unit requires a 220 V AC single phase connection with a 50 A breaker. The brine maker must be installed in compliance with all OSHA and local laws and regulations. The unit also requires a standard garden water hose to be connected to the water intake located beneath the control box. Water source should provide between 5 and 20 gal/min of water flow. Please note that the machine will not function with water flow of less than 5 gal/min or greater than 20 gal/min.

NOTE: Large particles from the water source will negatively affect the accuracy of the flow meter and may cause damage. Particles larger than 50 microns should be filtered out. Do not use thread sealing tape, as fragments from the tape may damage the flow sensor.

Teflon® is a registered trademark of E. I. du Pont de Nemours and Company.

MACHINE INTRODUCTION

USER INTERFACE

⚠ WARNING

- All guards and covers must be in place before operating.
- Do not operate a machine in need of maintenance.

⚠ WARNING

Before operating, servicing and cleaning, locate and become familiar with the **EMERGENCY STOP** button.

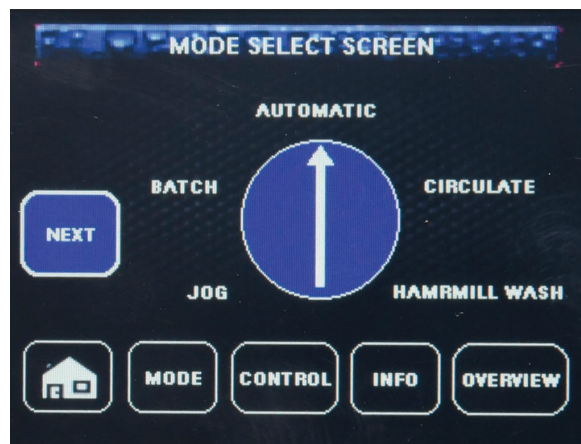
⚠ CAUTION

For emergencies press the physical **EMERGENCY STOP** button on the Control Box. Do not attempt to manually stop the unit.

This section provides a brief introduction to the control layout and interface and the most important modes of operation.

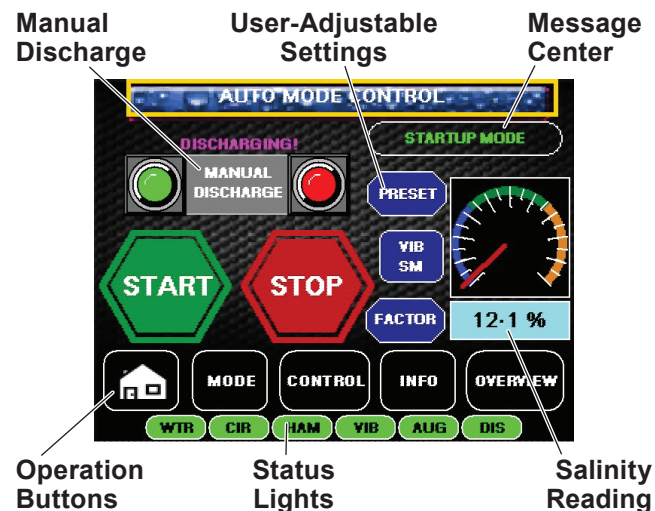
Mode Screen

Below is the *MODE SELECT SCREEN* which can be reached by touching the **MODE** button. This screen is used to select the operating mode of the brine maker.



Typical Operation Screen

Below is a typical control operation screen. A screen similar to this is shown after selecting **BATCH** or **AUTOMATIC MODE** from the *MODE SELECT SCREEN*. Not all items appear on every screen.



Operation Buttons: Used to operate the machine. Referenced in later sections, from left to right, as **HOME**, **MODE**, **CONTROL**, **INFO**, and **OVERVIEW**.

Status Lights: Used to display the sub-system status. Shown in green while sub-system is ON and not visible when the sub-system is OFF. From left to right:

- **WTR:** The water flow status light.
- **CIR:** The circulation pump status light.
- **HAM:** The hammer mill status light.
- **VIB:** The vibrator status light.
- **AUG:** The auger status light.
- **DIS:** The discharge pump status light.

Salinity Reading: Displays the indicated salinity reading of the mixing tank.

Message Center: Messages relating to the current operation of the machine such as "Startup Mode", "Preset Limit Reached", "Batch Done", "Hammer Mill Washing", and "SaltMizer Mode" will appear in this area.

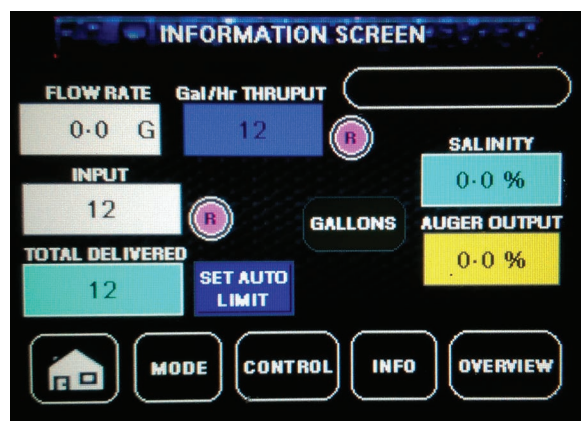
User-Adjustable Settings: These buttons are used to access various user-adjustable settings.

Manual Discharge: The green button on the left will start a manual discharge of the holding tank. The holding tank will discharge until empty or the red button on the right is pressed.

MACHINE INTRODUCTION

Information Screen

The *INFORMATION SCREEN* can be reached by touching the **INFO** button, and displays various information items about the machine's operation.



Flow Rate: The rate at which fresh water is being pumped into the mixing tank. Measured in gallons or liters per minute (this can be adjusted by pressing the button labeled **GALLONS** or **LITERS** depending on the current units).

Input: The amount of water added to the mixing tank since the last reset, similar to a trip counter. Reset by touching the adjacent **R** button.

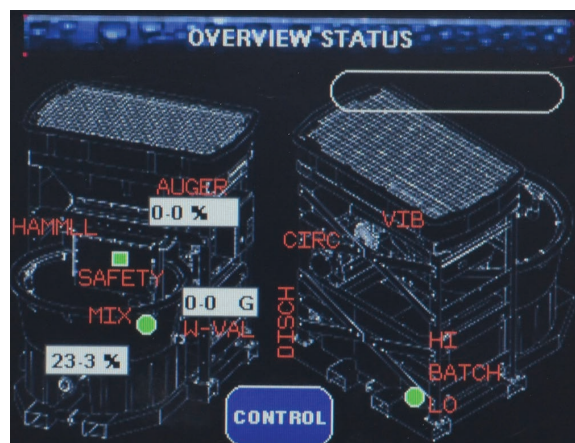
Total Delivered: The total amount of water added to the mixing tank. This value cannot be reset.

Gal/Hr Thruput: The total number of gallons of water added to the mixing tank in the last 60 minutes. The value is updated every 5 minutes of runtime. Reset by touching the adjacent **R** button.

Salinity: Displays the indicated salinity reading of the mixing tank.

Auger Output: Displays the auger's rotation speed as a percent of its maximum.

Overview Screen



This screen, accessed by touching the **OVERVIEW** button, shows an infographic of the Brine Pro™ 2000 brine maker and displays the current status of its various sensors and subsystems. Each status is located on the image near to the sensor or subsystem's actual location on the brine maker.

AUGER: Displays the auger's rotation speed as a percent of its maximum.

HAMMILL: A green dot indicates that the hammer mill is active.

CIRC: A yellow dot indicates that the circulation pump is active.

VIB: A green dot indicates that the vibrator is active.

SAFETY: A green square indicates that the hammer mill safety switch is closed.

MIX: A green dot indicates that the mix float sensor in the mixing bowl is in the up position.

W-VAL: A blue dot indicates that the solenoid water valve is open. The flow rate is displayed above this label.

DISCH: A yellow dot indicates that the discharge pump is active.

HI, BATCH, LO: These correspond to the three float switches located in the holding tank. A green dot next to a label indicates that the associated float switch is in the up position.

MACHINE INTRODUCTION

OPERATING MODES

Introduction

The Brine Pro™ 2000 brine maker has five different selectable modes and two non-selectable modes:

Automatic: This mode will run continuously until the user-entered number of gallons (RUN LIMIT) are produced, or the salt hopper is empty.

Batch: In this mode, the brine maker will run until the built in holding tank is full (approximately 250 gallons), or the salt hopper is empty.

Jog: This mode allows manual operation of each of the systems normally under computer control: water flow, circulation pump, hammer mill, vibrator, auger and discharge pump.

Hammer Mill Wash: In this mode, the hammer mill will spin while the circulation pump runs (pressurizing the sprayer feed) in order to clean out any residual salt inside the hammer mill. The hammer mill should be washed out prior to letting the machine sit for longer than 24 hours.

Circulate: This mode creates usable brine without adding additional salt by circulating the brine in the mixing tank and adding water as needed. This uses built-up salt remaining in the mixing tank to optimize brine production so you can return to normal operation. Once the unit reaches the lowest acceptable salinity it automatically stops brine production. This is typically run every 3,000 to 7,000 gallons of brine, or as needed—see "Periodic Maintenance" in the Maintenance section.

Startup (not-selectable): This mode triggers automatically upon a fresh start of the machine when running in either the **BATCH** or **AUTOMATIC MODE**, and will continue until the machine reaches 23.3% salinity for the first time. **STARTUP MODE** disables the low salinity alarm while active and otherwise is identical in function to whichever mode it activated in. The machine will indicate "Startup Mode" in the upper right corner of the **CONTROL SCREEN** while active. The machine will enter **STARTUP MODE** whenever the mixing tank float is low and the salinity is less than 5%.

SaltMizer (not selectable): This function operates automatically while in **AUTOMATIC** or **BATCH MODE**. It is an automatic triggering of the **CIRCULATE MODE** function to reduce salt accumulation and allows for the production of brine using the salt reserve in the mixing tank. Normal operation will resume automatically. Adjustment to the SaltMizer function can be made in User Controlled Settings.

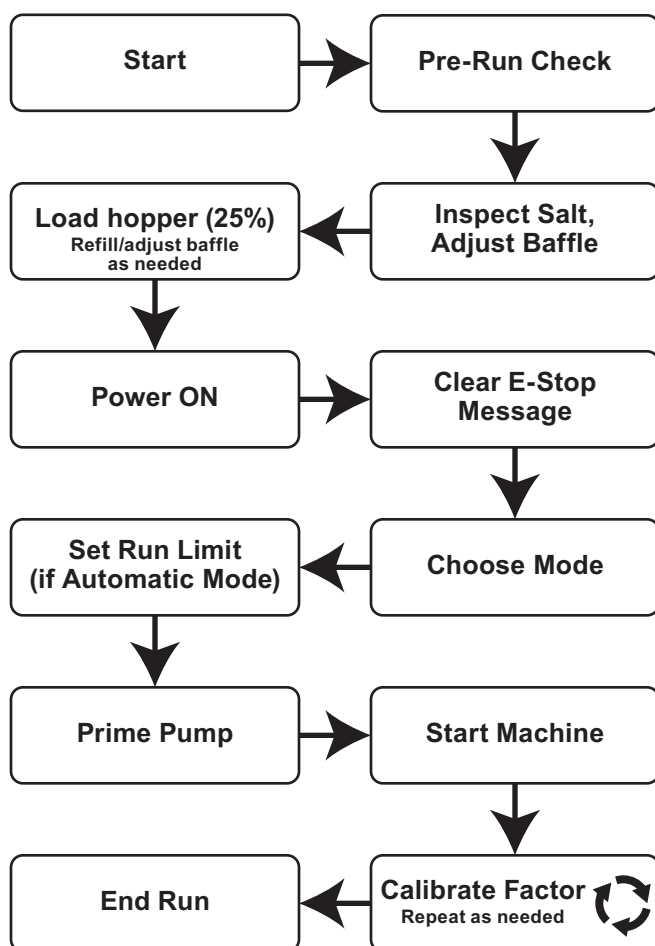
MACHINE INTRODUCTION

OPERATING INSTRUCTIONS

Normal Brine Production

This section describes how to use the machine to produce brine and how to change several user-adjustable settings. While the entire section is written from the perspective of a fresh, clean, dry-bowl start, experienced users can refer to whichever section is relevant to the current status of their machine.

Basic Operation Flowchart



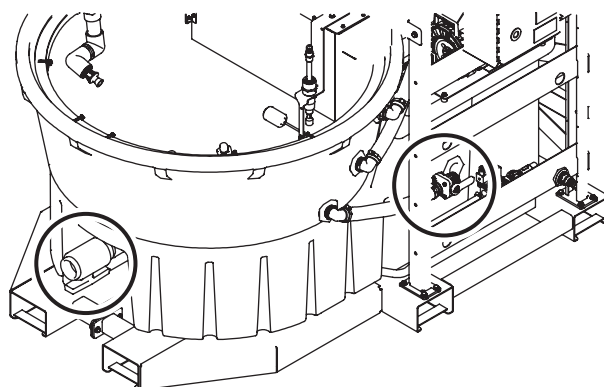
Pre-Run Check

The following items should be checked before starting the machine for the first time each season or anytime the machine is started from a drained mixing tank.

NOTE: Before making brine, ensure the mixing tank drain valve and the transfer valve are closed.

Before energizing the machine:

- Check the auger and hammer mill bearings and grease if needed.
- Adjust the circulation nozzle positions so that they are pointing slightly down from level.
- Adjust and/or install the appropriate adjustable baffle slides for your salt quality. See "Salt Baffles" in the Machine Introduction section.
- Close the mixing tank valves.



After the machine is powered ON and connected to water:

- Verify the water flow by activating the water valve in **JOG MODE** (see "Operating Modes" in the Machine Introduction section for mode descriptions). All six fresh water nozzles should spray. Ensure the fresh water nozzles are spraying in a star pattern. Clean any nozzles that do not spray.
- Verify that both the auger and hammer mill are free to turn by activating the auger forward in **JOG MODE**. When the auger is activated in **JOG MODE**, the hammer mill should also activate.

MACHINE INTRODUCTION

Powering ON the Machine

Turn ON the power source to power ON the machine. Upon initial power up, you will see the *EMERGENCY STOP SCREEN* displayed.

Emergency Stop Screen



This screen is shown when the machine is powered ON, even if the **EMERGENCY STOP** button is not pressed. Ensure the **EMERGENCY STOP** button is not engaged by rotating it clockwise and then touch the screen to dismiss the message.

When the **EMERGENCY STOP** button is pressed, the system is turned OFF and the *EMERGENCY STOP SCREEN* is shown. If the **EMERGENCY STOP** button is pressed, the screen cannot be dismissed.

MACHINE INTRODUCTION

SALT BAFFLES

The brine maker is equipped with three sets of adjustable baffle slides—small, medium, and large. These baffles slides are used to help adjust the salt feed rate based upon the quality of your salt.

Dryer, free-flowing salt will typically require that the adjustable baffle be moved to a more closed position and/or a larger baffle slide be installed. Wetter, clumpier salt will typically require the baffles to be in a more open position and/or a smaller baffle slide.

Until you are familiar with your salt quality, it is recommended to fill the hopper only approximately 25% full, so that the baffles can be more easily adjusted. Note that salt quality may vary greatly from batch to batch, so adjustment may be required when a new supply of salt is acquired.

As discussed in the Optimization section, optimum function of the machine is when the water rarely shuts OFF and the auger is typically running at 80% or greater.

If the water is constantly turning ON and OFF, it is an indication that the water flow is out-pacing the salt flow. Open the salt baffles, install a smaller baffle slide and/or reduce your water flow.

If the salinity is consistently above 23.3%, or the auger and/or hammer mill are being clogged, it is an indication of too much salt flow. Close the salt baffles, and/or install a larger baffle slide.

MACHINE INTRODUCTION

LOADING

⚠ WARNING

Always make sure personnel are clear when using and filling equipment.

⚠ WARNING

Overloading the salt hopper could cause an accident. Do not overfill.

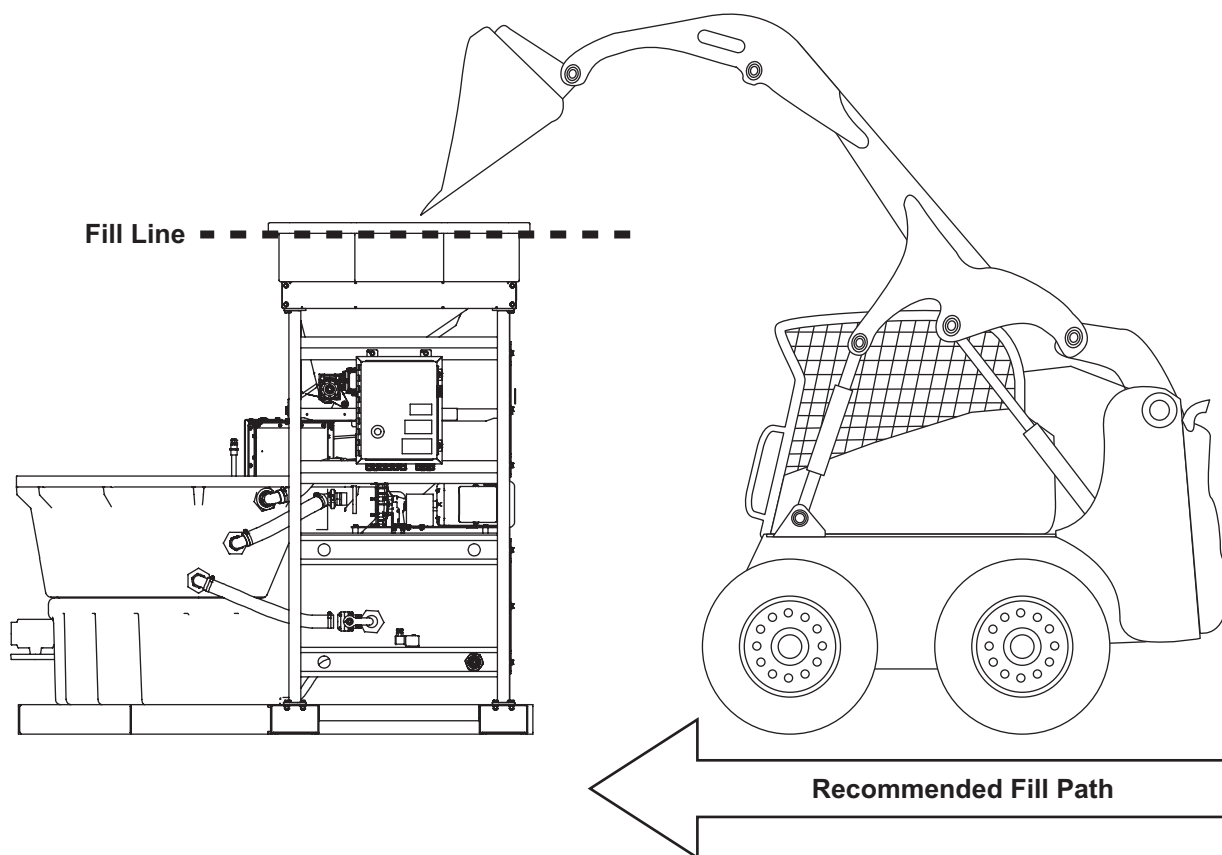
⚠ CAUTION



Read and adhere to Material Safety Data Sheet requirements.

NOTE: This brine maker is designed and programmed to mix rock salt (sodium chloride) and water *only*. It is not intended for use with magnesium chloride, calcium chloride, potassium chloride or any other material or additives. The use of additives during brine production will negatively affect the salinity sensor, and will make accurate salinity control impossible. Any additives must be added after brine has left the mixing tank. Do not use this equipment for purposes other than those specified in this manual.

A skid-steer style loader is recommended for adding salt. Carefully load salt hopper up to the fill line. It holds approximately 1 cubic yard of salt.

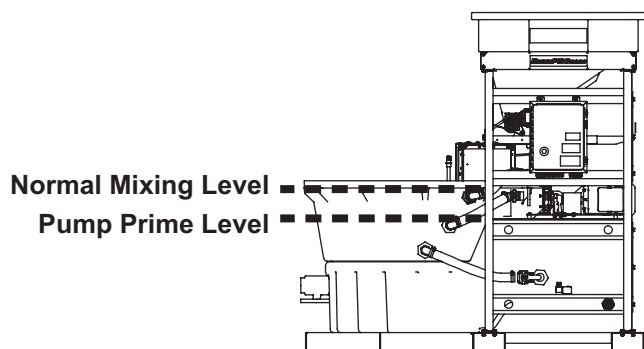


MACHINE INTRODUCTION

PUMP PRIMING

NOTE: Running the pump with no liquid will cause damage. Make sure the pump is primed before producing brine.

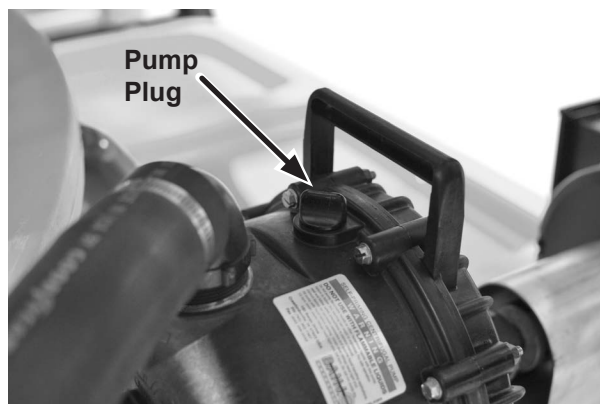
Make sure the circulation pump is appropriately primed every time the unit is started. If the pump does not automatically prime within 20 seconds of the circulation pump starting (no visible churn in the mixing tank), stop the unit and manually prime the pump following the instructions under "Manual Pump Priming" in this section. Manually priming the pump is usually not necessary after the unit is in regular use and there is brine in the mixing bowl.



Manual Pump Priming

To manually prime the circulation pump, follow the steps below.

1. Fill the mixing tank past the Pump Prime Level with water or brine (done automatically upon starting **AUTOMATIC** or **BATCH MODE**).
2. Stop the unit and enter **JOG MODE**.
3. Remove the pump plug and fill the chamber with at least 64 oz of water or brine from the mixing tank.



4. Replace the plug and jog the pump for a few seconds to remove any air in the circulation system.
5. Repeat Steps 3 and 4 until the pump is primed. The liquid in the mixing tank will begin to noticeably churn once the pump is primed.

OPERATION

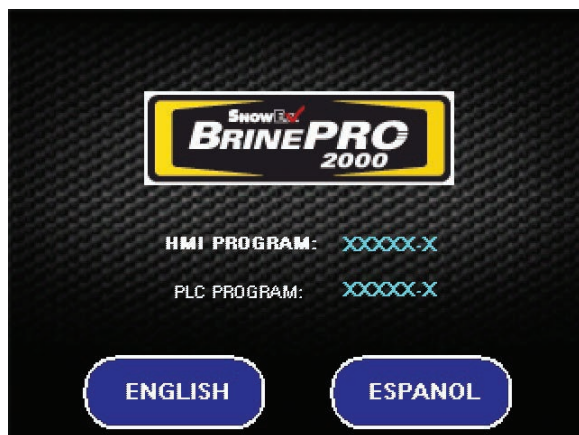
MACHINE OPERATION – NORMAL MODES

⚠ CAUTION

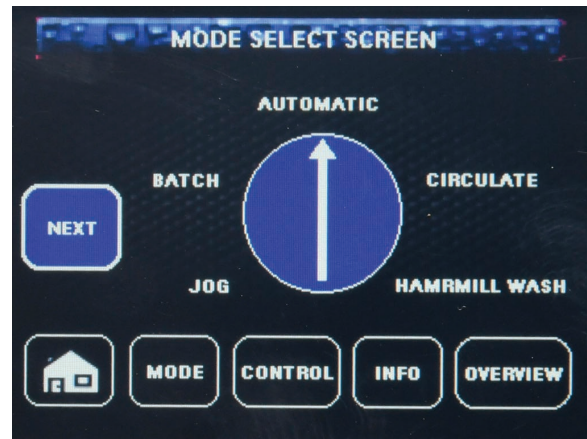
For emergencies press the physical **EMERGENCY STOP** button on the Control Box. Do not attempt to manually stop the unit.

NOTE: Before running the unit, be sure that the manual control on the automatic water valve mounted on the machine is open. If you will not be running the machine for several days, be sure to close the water valve.

On the *HOME SCREEN* (below) you will see the current software versions and will be prompted for a language selection. Touch the appropriate language button to continue. To return to this screen at any point, select the **HOME** button.



Once the language selection has been made the *MODE SELECT SCREEN* will be displayed.



To select a mode, repeatedly touch the arrow until it points towards the desired mode. Press **NEXT** to continue to the corresponding mode control screen. You can return to the *MODE SELECT SCREEN* by touching the **MODE** button.

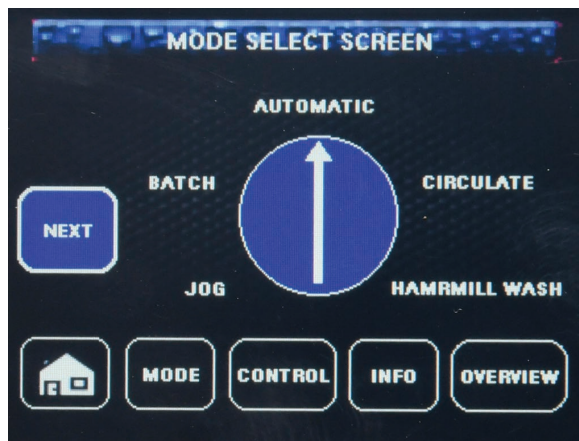
OPERATION

Automatic Mode

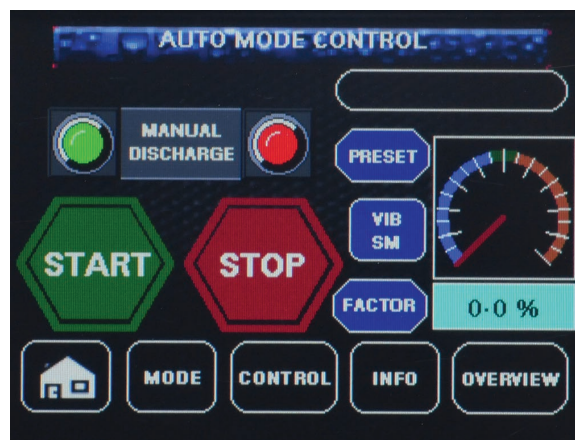
This mode will continuously make and pump out brine until the user-set auto RUN LIMIT is reached. Use this mode to fill large external storage tanks and other high volume applications. While this mode is active, the system will automatically prevent holding tank overflow due to backflow from external storage tanks. If backflow occurs while **AUTOMATIC MODE** is active, the discharge pump will activate once the liquid in the holding tank reaches the appropriate level.

NOTE: Using dirty or poor quality salt can lead to sediment build up in the holding tank, which can prevent the discharge pump from functioning. Be sure to use high quality salt and regularly check the holding tank for sediment build up, cleaning as necessary.

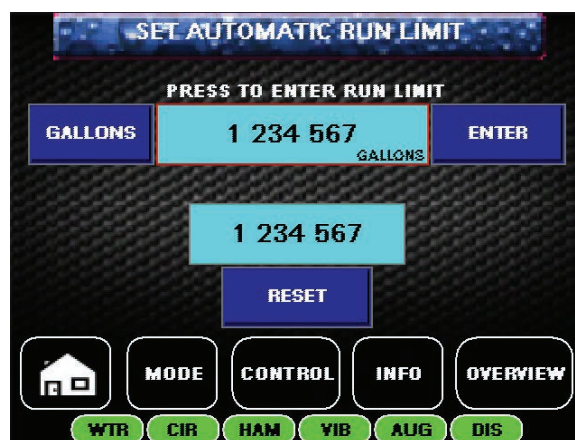
Select **AUTOMATIC** on the *MODE SELECT SCREEN* by repeatedly touching the arrow until it points toward "AUTOMATIC". Press **NEXT** to continue to the *AUTO MODE CONTROL* screen.



From the *AUTO MODE CONTROL* screen, touch **SET** to enter the *SET AUTOMATIC RUN LIMIT* screen.



Set Automatic Run Limit



Enter the amount of brine to be created by touching the box labeled **PRESS TO ENTER RUN LIMIT**. A number input screen will appear: enter the amount of brine to be created and touch **ENTER** to return to the *SET AUTOMATIC RUN LIMIT* screen.



It is recommended to use a value of 10%–15% below the remaining capacity of the external tank when operating the machine for the first few times. This

OPERATION

buffer can be adjusted once the user is more familiar with the amount of brine produced by the machine and their tank capacity.

Touch **ENTER** on the *SET AUTOMATIC RUN LIMIT* screen to accept the value. The newly entered value should appear in the lower box.

The VOLUME COUNTER is initially set to the RUN LIMIT value and counts down as brine is produced. This shows how much brine the unit has left to create. The unit will stop creating brine when this value hits zero and "Auto Run Limit Reached" will be displayed on the control screen. To continue operation, or to reset the value at any time, touch **RESET** on this screen.

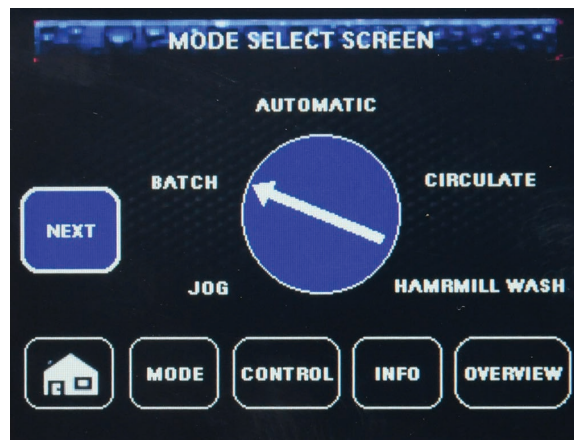
The VOLUME COUNTER can be reset by touching the **RESET** button on the *SET AUTOMATIC RUN LIMIT* screen. Reset this value before each run to keep a count of how much brine has been made since the run started. Touch the **CONTROL** button to return to the *AUTO MODE CONTROL* screen.

To begin the automatic brine making process touch the green **START** button.

To view additional information, touch **INFO**. See "Information Screen" in the Machine Introduction section for more details.

Batch Mode

In this mode the brine maker will fill its own holding tank and then stop brine production.

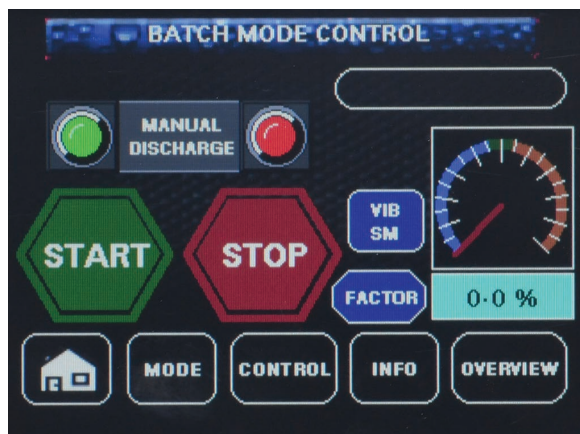


NOTE: The discharge pump cannot prevent the unit from overflowing due to gravity-driven backflow when in *BATCH MODE*. Be sure to close the valves on or disconnect any external storage tanks connected to the brine maker or backflow and leakage may occur.

Select **BATCH** on the *MODE SELECT SCREEN* by repeatedly touching the arrow until it points toward "BATCH". Press **NEXT** to continue.

OPERATION

Once the **NEXT** button is pushed, the **BATCH MODE CONTROL** screen will be displayed. To begin brine making production, touch the green **START** button. The machine will produce brine until the holding tank is filled.



To pump out the brine, touch the green **MANUAL DISCHARGE** button near the top of the screen. The discharge pump will remain on until the red **MANUAL DISCHARGE** button is touched, or the holding tank is emptied. Touch the red **STOP** button to stop brine production. The discharge pump can still be operated after **STOP** is touched.

Calibration Procedure

This section details the procedure to calibrate the salinity measure of the brine maker using the included refractometer. Calibration is recommended on new machines, the first time a machine is used in a season, and any time the salt supply changes.

NOTE: Refer to the manufacturer's instructions included with the refractometer for information on the use of the device.

NOTE: The accuracy of the salinity measurement is dependent upon the proper calibration of the refractometer. Follow the manufacturer's instructions to set the zero (null) point. Regularly check the zero point and adjust as required.

NOTE: Salt quality and water supply can have an effect on the measurement of salinity. It is recommended to verify calibration of the brine maker when any of these variables change.

NOTE: The Brine Pro™ 2000 brine maker conductivity sensor automatically compensates for mixture temperature. For this reason, manual measurements that do not account for temperature may differ from the indicated salinity. The included refractometer will perform best when kept at approximately the same temperature as the solution in the tank; keeping the refractometer with the brine maker is generally sufficient.

Definitions

Factor: A setting in the brine maker software which converts the raw conductivity sensor data to the INDICATED SALINITY percentage displayed on the screen. The FACTOR can be adjusted by touching the **FACTOR** button on either the *BATCH* or *AUTO MODE CONTROL* screen.

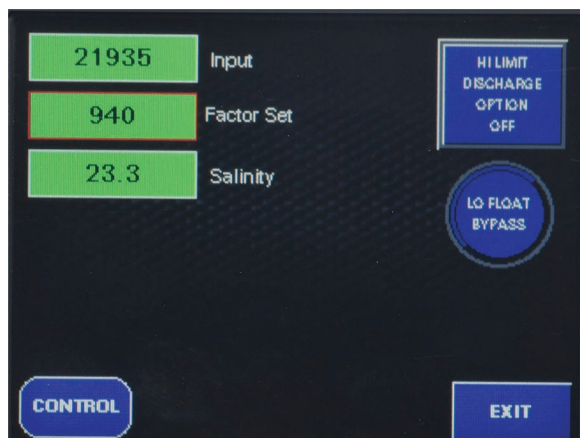
Indicated Salinity: The salinity percentage indicated on the screen of the brine maker.

Measured Salinity: The salinity percentage measured by the refractometer.

OPERATION

Factor Adjustment

To access the FACTOR adjustment, which is required for calibration, press the **FACTOR** button located on either the *AUTO MODE CONTROL* or *BATCH MODE CONTROL* screens.



Touch the green box next to "Factor Set" to bring up a keypad. Enter the desired FACTOR and then press **ENTER** to return to the previous screen.

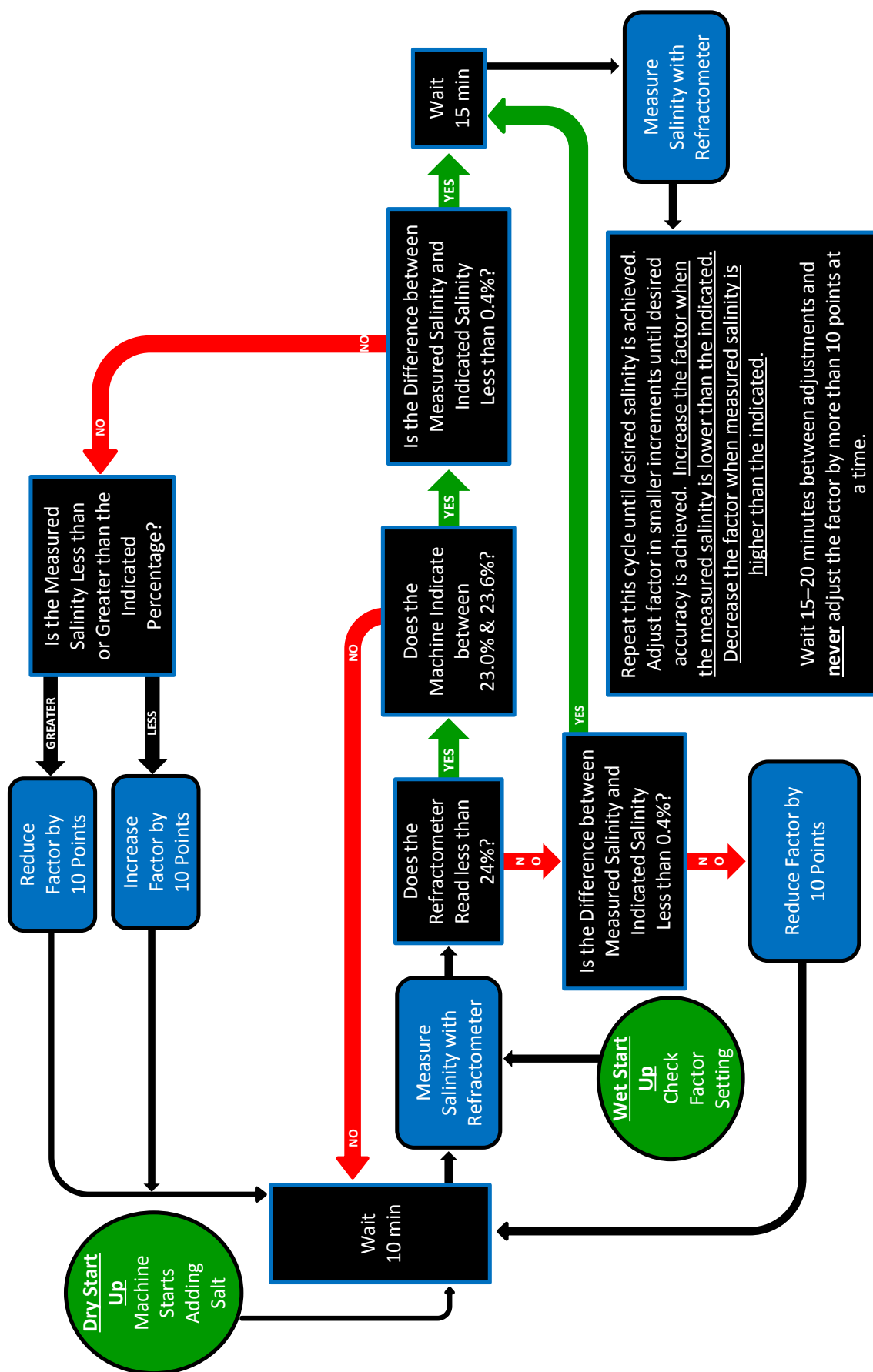
Press the **CONTROL** button to return to either the *AUTO MODE CONTROL* or *BATCH MODE CONTROL* screens.

Procedure

1. If you are verifying the calibration of an already operating brine maker, start at Step 3. Start the machine in **AUTOMATIC** or **BATCH MODE**. Wait until the bowl fills with water and the machine begins to add salt.
2. Wait 10 minutes.
3. Measure the salinity with the refractometer.
 - a. If the measured salinity is 24% or greater and:
 - 1) the difference between the measured and indicated salinity is greater than 0.4%
 - a) reduce the FACTOR by 10 points, and
 - b) return to Step 2.
 - b. If the measured salinity is less than 24%, proceed to Step 4.
4. If the indicated salinity on the brine maker screen is:
 - a. less than 23.0% or greater than 23.6%:
 - 1) return to Step 2.
 - b. 23.0%–23.6%, continue to Step 5.
5. Compare the measured and indicated salinities:
 - a. If the difference between the two results is greater than 0.4%, and the measured salinity from the refractometer is greater than the indicated value on the brine maker screen:
 - 1) reduce the FACTOR by 10 points, and
 - 2) return to Step 2.
 - b. If the difference between the two numbers is greater than 0.4%, and the measured salinity is less than the indicated value:
 - 1) increase the FACTOR by 10 points, and
 - 2) return to Step 2.
 - c. If the difference between the two numbers is less than or equal to 0.4%:
 - 1) wait 15 minutes,
 - 2) measure the salinity with the refractometer, and
 - 3) proceed to Step 6.
6. Continue adjusting the FACTOR in small increments until the desired accuracy is achieved, waiting 15–20 minutes between each adjustment:
 - increase the FACTOR when the measured salinity is lower than the indicated salinity, or
 - decrease the FACTOR when the measured salinity is higher than the indicated salinity.

NOTE: Never adjust the FACTOR in increments greater than 10 points at a time.

Brine Pro™ Brine Maker Calibration Flow Chart



End of Run

After completing a run of brine production:

- Be sure to shut off the water source connected to the brine maker.
- Be sure to close the valves on any external storage tanks connected to the brine maker, or back flow may occur.
- If the machine will be sitting for an extended period of time, be sure to run the **HAMMERMILL WASH MODE** prior to shut down.
- If desired, brine may be left in the mixing tank to speed the start of the next brine production run. Leaving brine in the mixing tank can build salt crystals on the conductivity sensor, which will affect the accuracy of salinity measurement.
- Wipe the submerged body of the conductivity sensor before restarting production if brine is left in the mixing tank.

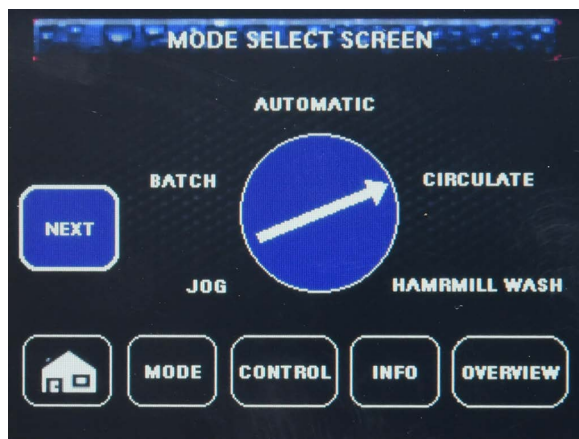
OPERATION

MACHINE OPERATION – SPECIAL MODES

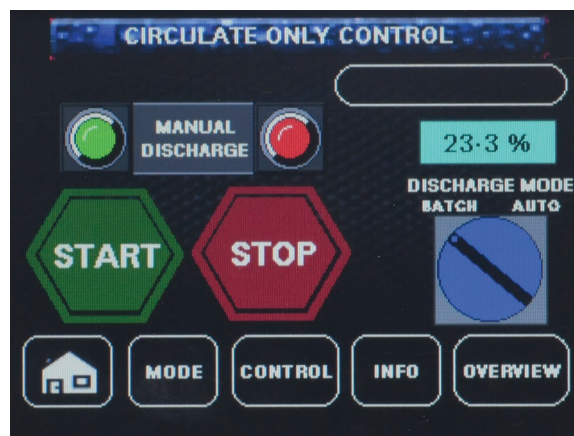
Circulate Mode

This mode is designed to manually reduce the amount of usable salt in the mixing tank. In **CIRCULATE MODE**, the machine will continue to mix the brine while automatically cycling the fresh water valve to produce good brine from the salt reserve in the mixing tank. Typically **CIRCULATE MODE** should be run at least every 3,000–7,000 gallons of brine. A few inches of salt in the mixing tank is normal, but large amounts of salt in the mixing tank will reduce the efficiency of the machine. To increase the effectiveness of **CIRCULATE MODE**, you can use a shovel to stir the salt/sediment in the bottom of the mixing tank. When stirring, be careful to avoid damaging the fresh water inlets on the bottom of the mixing tank.

Select **CIRCULATE** on the **MODE SELECT SCREEN** by repeatedly touching the arrow until it points toward circulate.



Press **NEXT** to continue to the **CIRCULATE ONLY CONTROL** screen.



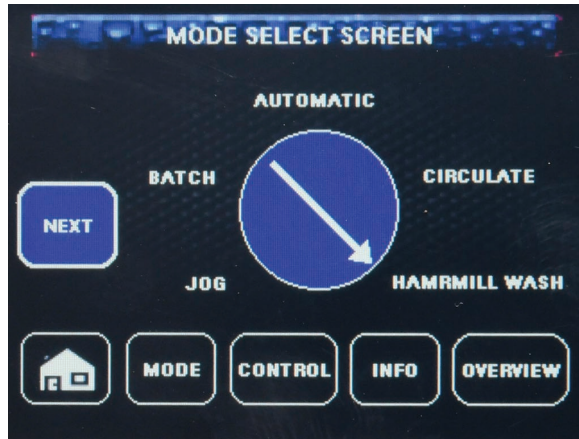
The discharge behavior of the machine while running **CIRCULATE MODE** will be based upon the selector switch located on the **CIRCULATE ONLY CONTROL** screen. For example, if **AUTOMATIC MODE** is selected, the holding tank will automatically discharge when the unit senses it is full. If **BATCH MODE** is selected, the machine will stop when it senses that the holding tank is full. The tank can be drained by selecting the green **MANUAL DISCHARGE** button.

NOTE: If manually stirring the sediment in the mixing tank, be careful to avoid damaging the fresh water inlets located on the bottom of the mixing tank.

OPERATION

Hammermill Wash Mode

In this mode, the hammer mill will spin while the circulation pump runs in order to clean out any residual salt inside the hammer mill.



Select **HAMRMILL WASH** on the *MODE SELECT SCREEN* by repeatedly touching the arrow until it points toward "HAMRMILL WASH". Press **NEXT** to continue to the *HAMMERMILL WASH CONTROL* screen.



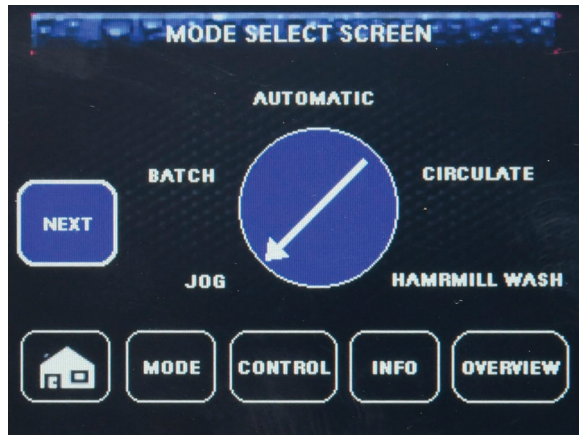
Touch the green **START** button to begin the hammer mill wash cycle. The hammer mill will spin and the circulation pump will run for the PRESET TIME (default 2 minutes) and then automatically stop. The PRESET TIME can be adjusted by touching the blue **PRESS TO ENTER** button and entering a new time. Touch the red **STOP** button to stop the hammer mill wash cycle before the PRESET TIME has been reached.

OPERATION

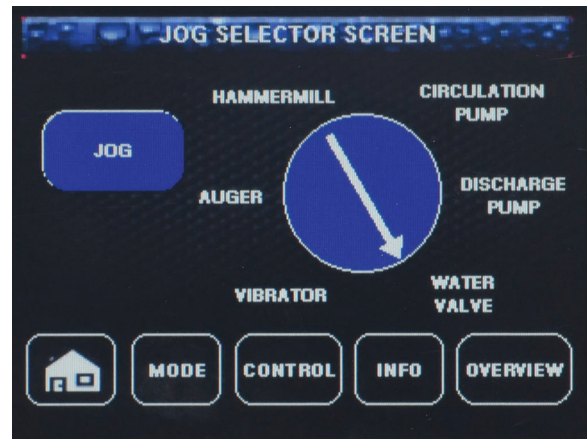
Jog Mode

The **JOG MODE** is used to manually control sub-systems independently for troubleshooting and testing. Avoid jogging for extended periods of time as this mode may affect brine production. For example, jogging 100 gallons of water into the mixing tank will dramatically decrease the salinity and may require the mixing tank be drained before brine production can continue.

Select **JOG** on the *MODE SELECT SCREEN* by repeatedly touching the arrow until it points toward "JOG". Press **NEXT** to continue to the *JOG SELECTOR SCREEN*.



From the *JOG SELECTOR SCREEN*, select the sub-system you want to manually turn ON by repeatedly touching the arrow until it points towards the desired sub-system. Once the desired sub-system is selected, touch and hold the **JOG** or **JOG REVERSE** button to turn it ON. The sub-system will function only while the **JOG** button is actively pressed.



NOTE: Jogging the circulation pump for an extended period while not primed will result in damage to the pump and may result in leaking.

OVERVIEW

The Brine Pro™ 2000 brine maker is a sophisticated piece of equipment and successful operation depends on it being operated in as competent a manner as possible. Users can do a great deal to ensure the machine is reliable and productive; this section will describe a variety of ways in which an owner/operator can optimize their brine maker investment.

Overall Elements

The Operator

The operator is the most critical element in machine performance and consequently should be chosen and trained with care. The ideal candidate will be careful, methodical, and able to read and/or follow instructions. The person must demonstrate an ability to operate the machine, take salinity measurements with the refractometer and make corresponding factor adjustments, evaluate salt quality and flow and make corresponding adjustments to the baffles, and perform all maintenance operations including filling the hopper and cleaning the filter set (if so equipped).

Additionally, the individual chosen should have sufficient mechanical skill so as to be able to learn the machine and make adjustments on an as-needed basis, and should be provided regular opportunities to gain experience operating the machine and become accustomed to its performance.

Salt Quality

The impact of salt quality on trouble-free brine maker operation is difficult to overstate. Ideal salt is dry, free from insoluble contaminants, and relatively dust free.

Dry salt is preferred because it will flow from the hopper to the auger more easily; indeed, with very dry salt it may be necessary to close the feed hopper baffles or use a larger sliding baffle plate. Wet salt, identified by salt that is clumpy, won't flow freely, or holds its shape when formed like a snowball, can fail to flow by bridging in the hopper or jam up the hammer mill, lowering throughput. To reduce the impact of wet salt, consider opening the baffles more, installing smaller baffle plates, increasing the vibrator on-time, and ensuring that the spray bar is clean and functional.

However, very free-flowing salt can overload the auger motor. Closing the baffles or installing larger plates will help with this (remember to only fill the hopper 25% at a time until flow adjustment is complete).

'Clean' salt is mostly free from non-salt impurities.

This is particularly important because typical impurities won't dissolve in water. Consequently, they'll collect in (and eventually need to be removed from) the circulation pump, the mixing tank, the holding tank, and any onboard storage or spray tanks. Insoluble build up, if not corrected in time, can also lead to clogs in the mixing system, the hammer mill spray bar, and ultimately any spray equipment that uses the brine produced. Finally, damage to the circulation pump and spray equipment is possible if the nature of the insoluble material is sufficiently large or aggressive.

Low dust salt tends to feed better, especially with longer vibrator on-times. This is because the tiny particles involved will settle to the bottom of the hopper and reduce flow. When using dusty salt lower vibrator on-times may boost throughput.

Calibration Note

The brine maker is shipped set up to produce brine a salinity which is lower than many users prefer to ensure reliable function regardless of input conditions. All users are encouraged to tune individual machines to work best with local salt and water and to periodically verify satisfactory salinity of the brine produced.

Stabilization Time

It is better to make more, smaller, adjustments over a longer period of time when tuning. Whether adjusting the baffle settings or the salinity factor, allowing the machine to fully 'settle' after making an adjustment will help to ensure that full effect of the adjustment is understood before making subsequent adjustments. While the directional impact of large (10 point) factor adjustments should be visible within 15 minutes (at typical flow rates) smaller changes will take longer to reach stabilization. In testing, the brine maker was regularly found to reach stable operation from dry starts within 1500 gallons of throughput.

User Controlled Settings

The Brine Pro™ 2000 brine maker is equipped with several user controlled settings that allow a user to tune multiple machine parameters based upon the quality of salt used. These include settings to tune the vibrator, discharge pump, and **SALTMIZER MODE**.

To navigate to the User Controlled settings, go to the *AUTO* or *BATCH MODE CONTROL* screen. Next touch **VIB SM** button which will take you to the *TIMER SETTINGS* screen.



The vibrator for the salt hopper can be configured to run longer or shorter depending on the salt quality being used. Dry, fine-grained salt may need less vibration (longer OFF time, shorter ON time) while moist, coarse salt may need more vibration (shorter OFF time, longer ON time). If salt accumulates in the mixing tank quickly, consider decreasing the VIBRATOR ON TIME. Experiment with these settings to find the appropriate values for your situation.

Vibrator Off Time: The interval the vibrator will be turned OFF. (Default: 30 seconds).

Vibrator On Time: The interval the vibrator will be ON. (Default: 10 seconds).

SaltMizer Trigger Frequency: The number of gallons of brine produced between activations of the **SALTMIZER MODE**. The small yellow number below the box is the current gallon count. Press the **R** button to reset this counter.

In **SALTMIZER MODE**, the unit will stop adding salt and continue adding water while mixing to produce brine from the salt reserve in the mixing tank. Once the salinity drops, it will stop adding water and continue to mix the solution causing the salinity to rise again. The water valve will cycle ON and OFF based upon the salinity reading to continue brine production. If there is a large amount of undissolved salt accumulating in the mixing tank, consider reducing the SALTMIZER TRIGGER FREQUENCY value.

Discharge Pump Time-out: The number of minutes the discharge pump will run before stopping. This setting prevents the discharge pump from continuously running if sediment in the holding tank prevents the triggering of the low float switch.

This value may need to be increased if the discharge pump is unable to completely drain the holding tank in the allocated time. This can occur if there is a large amount of back pressure from an external storage tank which slows the discharge cycle.

OPTIMIZATION

OPTIMUM FUNCTION

Throughput

When the water rarely shuts off and the auger is >80%, brine is being made about as fast as possible. Under these conditions, the water and salt flows are fully balanced, neither outpacing the other.

Hammer Mill Flow

The flow of liquid and salt out of the hammer mill should be balanced and free.

Example of good flow:



Example of bad flow (note the salt "extruding"):



Liquid flow which is unbalanced from left to right and/or semi-solid salt paste 'extruding' from the bottom of the hammer mill are indicative that one or more spray bar jets are subject to restricted flow. Learning to recognize this symptom and taking appropriate measures to correct the issue can prevent hammer mill jamming and reduced throughput.

Dishcharge Pump

It's normal for the discharge pump ON time to vary. Factors which can impact how long the discharge pump runs include the amount of sediment in the holding tank, the distance to any outboard storage, any intervening grade, the length of hose used for connection, the method of connection to the tanks, and how full the receiving tanks are. If the discharge pump fails to reduce the amount of liquid in the holding tank to about 2" depth before shutting off, consider increasing the DISCHARGE PUMP TIME-OUT and/or cleaning the holding tank.

Mixing Tank Sediment

It's normal and desirable for there to be 4"–8" of sediment in the bottom of the mixing tank. The automated SaltMizer function seeks to keep this sediment at a manageable level by reducing the amount of salt trapped in the mix-tank sediment, but eventually insoluble debris will accumulate and need to be cleaned out. See "Circulate" and "SaltMizer" under "Operating Modes" in the Machine Introduction section, and "Periodic Maintenance" in the Maintenance section.

Miscellaneous

It's normal for there to be some motion visible at the auger drive motor in use. This is a result of the design of the mechanical connection between the auger motor and auger and is nothing to be concerned about.

MAINTENANCE

PERIODIC MAINTENANCE

WARNING

- Always shut off and lock out the power source before servicing.
 - All guards and covers must be in place before operating.
 - Do not operate a machine in need of maintenance.
 - Before operating, servicing and cleaning, locate and become familiar with the **EMERGENCY STOP** button.
 - Drowning Hazard: Do not climb into the mixing or holding tank.
 - Do not climb into the salt hopper. Moving parts may cause serious injury.
- To reduce the undissolved salt buildup in the mixing tank, run the **CIRCULATE MODE**. Typically this should be run every 3,000–7,000 gallons. See "Circulate Mode" under "Machine Operation – Special Modes" in the Operation section of this manual for more information.
 - Completely flush out the mixing tank as desired, or any time a yardstick inserted into the tank near the circulation pump inlet indicates a depth of about 14" or less from the sediment to the liquid surface. Using clean, high quality salt can greatly reduce the frequency that clean outs are required; use of poor quality salt can also increase the difficulty of the clean out process.
 - Completely flush out the holding tank as desired, or any time a yardstick inserted into the tank near the discharge pump or the float sensors indicates a depth of about 26" or less from the top of the sediment to the top surface of the tank. More frequent clean outs will be required if poor quality salt is used. Using clean, high quality salt can greatly reduce the frequency that clean outs are required. An optional filter accessory is available to help reduce the debris accumulation in the holding tank.
- Grease all hammer mill and salt feed auger bearings after every 10 hours of use (≈9,000 gallons of brine).
 - Paint or oil all bare metal surfaces as needed.
 - Once per week, or anytime the touchscreen behaves erratically, wipe the touchscreen with a soft cloth.
 - Once per week, inspect unit for defects: broken, worn or bent parts and similar.
 - Once per week, inspect all tubing, hoses and harnesses for cracks and leaks.
 - Once per week, check the hammer mill belt for fraying or cracking.
 - The solenoid valve can stick in the open position if the valve body builds up sediment internally. The solenoid valve can be disassembled from the top and cleaned out if needed. Be sure to turn OFF the external water source before disassembly. If your solenoid valve requires frequent clean outs, consider adding a filter to your fresh water source.
 - To adjust hammer mill belt tension, loosen the motor mounting bolts and slide forward or backward. Tighten once adjustment is made.
 - Inspect and retighten fasteners after the first run and periodically to ensure structural integrity.
 - Inspect the electric motors at regular intervals. Qualified personnel are required to perform maintenance on the motor. Removing parts without the manufacturer's authorization will void the warranty.

MAINTENANCE

CLEANING

1. Run the unit until the salt hopper is empty.
2. You may reduce salt remaining in the mixing tank by running the **CIRCULATE MODE**. After running **CIRCULATE MODE**, solids left in the mixing tank will typically be insoluble debris and not salt.

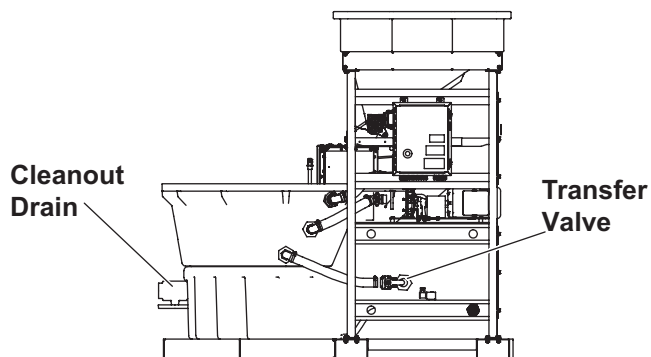
⚠ CAUTION

Do not open the mixing tank transfer valve while the holding tank is full. Opening while full will cause the holding tank to overflow.

3. Pump out any brine in the holding tank. Once the holding tank is empty, open the mixing tank transfer valve to transfer brine from the mixing tank to the holding tank. Pump out the holding tank again to empty.

NOTE: If using a scoop or shovel to remove the solids remaining in the mixing tank, be careful to avoid damaging the fresh water inlet nozzles on the bottom of the mixing tank.

4. Empty the mixing tank using the cleanout drain located at the front of the machine and flush into a skid-steer bucket or empty as you see fit. Remove all remaining solids in the mixing tank. Using high quality, clean salt can greatly reduce the effort required for cleaning. Disposal of unused salt/brine must comply with local regulations.



5. Carefully remove any solids remaining in the holding tank. A drain plug is provided on the holding tank for aiding in the washout of solids. Poor quality salt will tend to leave more solids behind and can affect machine performance.
6. Wash down with a hose. If necessary, a pressure washer may be used. Note that the control box is water resistant only. **Do not spray water near or pressure wash the control box.**

END OF SEASON AND STORAGE

- Thoroughly wash out unit with a garden hose or similar to remove salt accumulation. Wash the hammer mill out until the hammers rotate freely.
- Grease all hammer mill and auger salt feed bearings.
- Inspect the hammer mill for wear and rotate or replace components as needed.
- Do not leave unused material in hopper for a prolonged period of time; material can solidify, causing blockage.
- Paint or oil all bare metal surfaces as needed.
- Cover feed hopper and mixing tank with a tarp or similar covering to prevent debris from accumulating.
- Optional: For a thorough cleaning of the pumping system, run startup with an empty salt hopper. The mixing pump may need to be re-primed. See "Pump Priming" in the Machine Introduction section.

TROUBLESHOOTING

TROUBLESHOOTING

⚠ WARNING

Before operating, servicing and cleaning, locate and become familiar with the EMERGENCY STOP button.

⚠ WARNING

Always shut off and lock out the power source before servicing.

⚠ WARNING

Drowning Hazard: Do not climb into the mixing or holding tank.

⚠ WARNING

Do not climb into the salt hopper. Moving parts may cause serious injury.

For control operation see Operation section.

When service is necessary, call 1-800-725-8377.

TROUBLESHOOTING



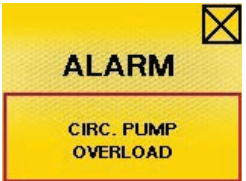
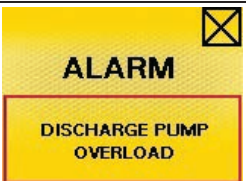
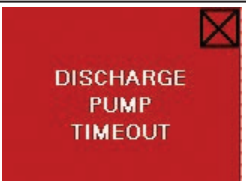



Problem	Possible Cause	Suggested Solution
Salinity becomes too low and unit shuts down (Low Salinity Alarm message)	1. Hopper is empty	1a. Check the hopper salt level; fill as required.
	2. Salt clog in hopper	2a. Jog the vibrator to agitate salt. 2b. Manually clear the salt clog.
	3. Auger jam	3a. Jog the auger in both directions. 3b. Manually clear the auger jam.
	4. Clogged hammer mill	4a. Jog the hammer mill to clear clog. 4b. Flush the hammer mill using the HAMMERMILL WASH MODE . 4c. Service the hammer mill bearings.
	5. Circulation system malfunction	5a. Jog the pump to verify it is functional. 5b. Clear the circulation nozzles. 5c. Prime the pump.
Salinity becomes too high and unit shuts down (High Salinity Alarm message)	1. No water flow into mixing tank	1a. Check hose pressure. 1b. Check hose for kinks. 1c. Check that water source is ON. 1d. Check that the manual water intake valve on the machine is turned ON.
	2. Too much salt flow	2a. Move the salt baffle to a more closed position and/or switch to a larger baffle.
	3. Solenoid valve malfunction	3a. Disassemble and clean solenoid valve. 3b. Call for service.
Slow brine production	1. Slow water flow into mixing tank	1a. Check hose pressure. 1b. Check hose for kinks. 1c. Check that water source is ON. 1d. Check that the manual water intake valve on the machine is turned ON.
	2. Wet, clumpy salt	2a. Change the vibrator ON time and the vibrator OFF time to improve salt flow. 2b. Adjust salt baffle to a more open position and/or switch to a larger baffle. 2c. Allow salt to dry before loading into hopper.
	3. Control malfunction	3a. Reset the control by turning the power OFF and ON again at wall breaker.
	4. Large amount of salt in mixing tank	4a. Run the CIRCULATE MODE to reduce usable salt. 4b. Clean out the mixing tank.
Unexpected operation	1. Control malfunction	1a. Reset the control by turning the power OFF and ON again at wall breaker.
VFD display inside control box shows error code: SCF3	1. Auger motor electrical short	1a. Call for service.
Frequent auger jams	1. Large debris in salt	1a. Jog the auger in both directions. 1b. Manually remove debris from auger. 1c. Remove debris from salt before loading into hopper.
	2. Too much salt flow	2a. Move the salt baffle to a more closed position and/or switch to a larger baffle.

TROUBLESHOOTING






Problem	Possible Cause	Suggested Solution
Flow rate displays 0 gal/min while water status light is on	1. No water flow into mixing tank	1a. Check hose pressure. 1b. Check hose for kinks. 1c. Check that water source is ON. 1d. Check that the manual water intake valve on the machine is turned ON. 1e. Jog water valve and listen for water flow.
	2. Flow meter clogged or damaged	2a. Call for service.
	3. Solenoid valve malfunction	3a. Disassemble and clean solenoid valve. 3b. Call for service.
Water flows into machine while water status light is OFF	1. Solenoid valve stuck open	1a. Disassemble and clean solenoid valve.
Machine turns OFF repeatedly	1. Salinity below 22.8% for more than 2 minutes	1a. See "Salinity becomes too low and unit shuts down (Low Salinity Alarm message)" above.
	2. Water flow over 20 gal/min	2a. Throttle back water supply to below 20 gal/min.
	3. Damaged flow meter	3a. Call for service.
Touchscreen behaves erratically	1. Touchscreen dirty	1a. Wipe touchscreen with a soft cloth.
	2. Touchscreen damaged	2a. Call for service.
Discharge pump time-out message	1. Debris in holding tank	1a. Clean out debris from holding tank, particularly near the float switches.
	2. <u>DISCHARGE PUMP TIME-OUT</u> value set too low for external holding tank back pressure.	2a. Increase <u>DISCHARGE PUMP TIME-OUT</u> setting. 2b. Reduce back pressure from external holding tank.
	3. External holding tank valve closed	3a. Open external holding tank valve.
	4. Discharge pump hose air bubble	4a. Lift discharge pump to allow air to drain from hose.
Noise from hammer mill	1. Debris from salt supply in hammer mill	1a. Wait 10–20 seconds for debris to pass through hammer mill.
		1b. Manually remove debris from hammer mill.
Discharge pump runs but holding tank does not drain	1. External holding tank valve closed	1a. Open external holding tank valve.
	2. Discharge pump hose air bubble	2a. Lift discharge pump to allow air to drain from hose.
Over-salt (machine adds continuously adds salt and never reaches 23.3% salinity)	1. Machine requires calibration	1a. Run CIRCULATE MODE to reduce the amount of salt in the mixing bowl, and then follow calibration procedure to calibrate machine.
Frequent hammer mill jams	1. Hammer mill spray bar plugged	1a. Clean hammer mill spray bar and/or supply hose. 1b. Purchase and install 1" spray bar hose accessory kit.
	2. Too much salt flow	2a. Move the salt baffle to a more closed position and/or switch to a larger baffle.

TROUBLESHOOTING

ERROR MESSAGES

Error Message	Trigger	Solution
 <p>AUGER JAMMED MACHINE SHUT DOWN PRESS HERE TO RELEASE</p>	Auger motor had 5 auto-reverse triggers in a row	See "Frequent auger jams" item in the Troubleshooting section
 <p>ALARM AUGER MOTOR OVERLOAD</p>	Auger motor interrupter trip inside control box.	See "Frequent auger jams" item in the Troubleshooting section and reset auger motor interrupter
 <p>ALARM CIRC. PUMP OVERLOAD</p>	Circulation pump motor interrupter trip inside control box.	Check circulation system for plugging and reset circulation pump motor interrupter
 <p>ALARM DISCHARGE PUMP OVERLOAD</p>	Discharge pump motor interrupter trip inside control box.	Reset discharge pump motor interrupter
 <p>DISCHARGE PUMP TIMEOUT</p>	Discharge pump ran for longer than the "Discharge Pump Time-out"	See "Discharge pump time-out message" item in the Troubleshooting section
 <p>EMERGENCY FLOAT HIGH ALARM</p>	Top float in the holding tank is in the up position	See "Discharge pump runs but holding tank does not drain" item in the Troubleshooting section
 <p>EXCESS WATER FLOW</p>	Fresh water flow in excess of 20 gal/min for at least 1 minute	Restrict water flow to less than 20 gal/min
 <p>ALARM HAMMER MILL OVERLOAD</p>	Hammer mill motor interrupter trip inside control box.	See "Frequent hammer mill jams" items in the Troubleshooting section and reset hammer mill motor interrupter

TROUBLESHOOTING

Error Message	Trigger	Solution
 <p>ALARM</p> <p>SAFETY SWITCH TRIPPED</p>	Hammer mill safety switch not closed	Ensure that the hammer mill screen is fully closed and verify the safety switch connection in the control box
 <p>HIGH SALINITY ALARM</p>	Salinity above 23.8% for more than 15 minutes	See "Salinity becomes too high and unit shuts down (High Salinity Alarm message)" item in the Troubleshooting section
 <p>LOW FLOAT SWITCH FAILURE</p>	The middle float switch in the holding tank is in the up position, but the low float switch is detected as being in the down position	Call for service
 <p>LOW SALINITY ALARM</p>	Salinity below 22.8% for more than 5 minutes	See "Salinity becomes too low and unit shuts down (Low Salinity Alarm message)" item in the Troubleshooting section.
 <p>LOW WATER FLOW</p>	Fresh water flow below 5 gal/min for at least 1 minute	Increase water flow to more than 5 gal/min.
<p>MAINTENANCE NOTICE</p> <p>PLEASE GREASE BEARINGS</p> 	Maintenance interval for hammer mill and auger bearings reached	Grease bearings and dismiss the message
 <p>MIDDLE FLOAT SWITCH FAILURE</p>	Middle float in the holding tank is registered as being in the down position, and the upper float is in the up position	Call for service
 <p>MIX FLOAT SWITCH FAILURE</p>	Mixing tank float still in down position after 250 gallons input during STARTUP MODE	<ol style="list-style-type: none"> 1. Check that the mixing tank valves are closed. 2. Call for service

GLOSSARY

GLOSSARY

Auxiliary Storage Tank: See Storage Tank.

Conductivity Sensor: The sensor on the brine maker which measures the conductivity of the brine. The conductivity reading is converted to the INDICATED SALINITY percentage via the FACTOR.

Factor: A setting in the brine maker software which converts the raw conductivity sensor data to the INDICATED SALINITY percentage displayed on the screen.

Holding Tank: The lower tank on the brine maker which holds the brine prior to being discharged from the machine.

Hopper: See Salt Feed Hopper.

HMI: Human Machine Interface. The technical term for the touchscreen. This is where the user interacts with the machine's software.

Indicated Salinity: The salinity percentage indicated on the screen of the brine maker.

Measured Salinity: The salinity percentage manually measured by the refractometer.

Mixing Tank: The large bowl-like tank on the front of the brine maker where fresh water and salt are mixed to create brine.

Over-salt: A state where the machine continuously adds salt but is never able to reach the target salinity of 23.3%. The salt builds up to a point where it can interfere with the circulation system. See the Troubleshooting section for recovery information.

PLC: Programmable Logic Controller. The primary controller of the brine maker.

Refractometer: The supplied measurement device for measuring the salinity of the brine. The refractometer operates on the principle that, as the concentration or density of a solution increases, its refractive index changes proportionately. The larger the concentration of salt in solution, the higher the reading on the refractometer's scale.

Salinity Sensor: See "Conductivity Sensor"

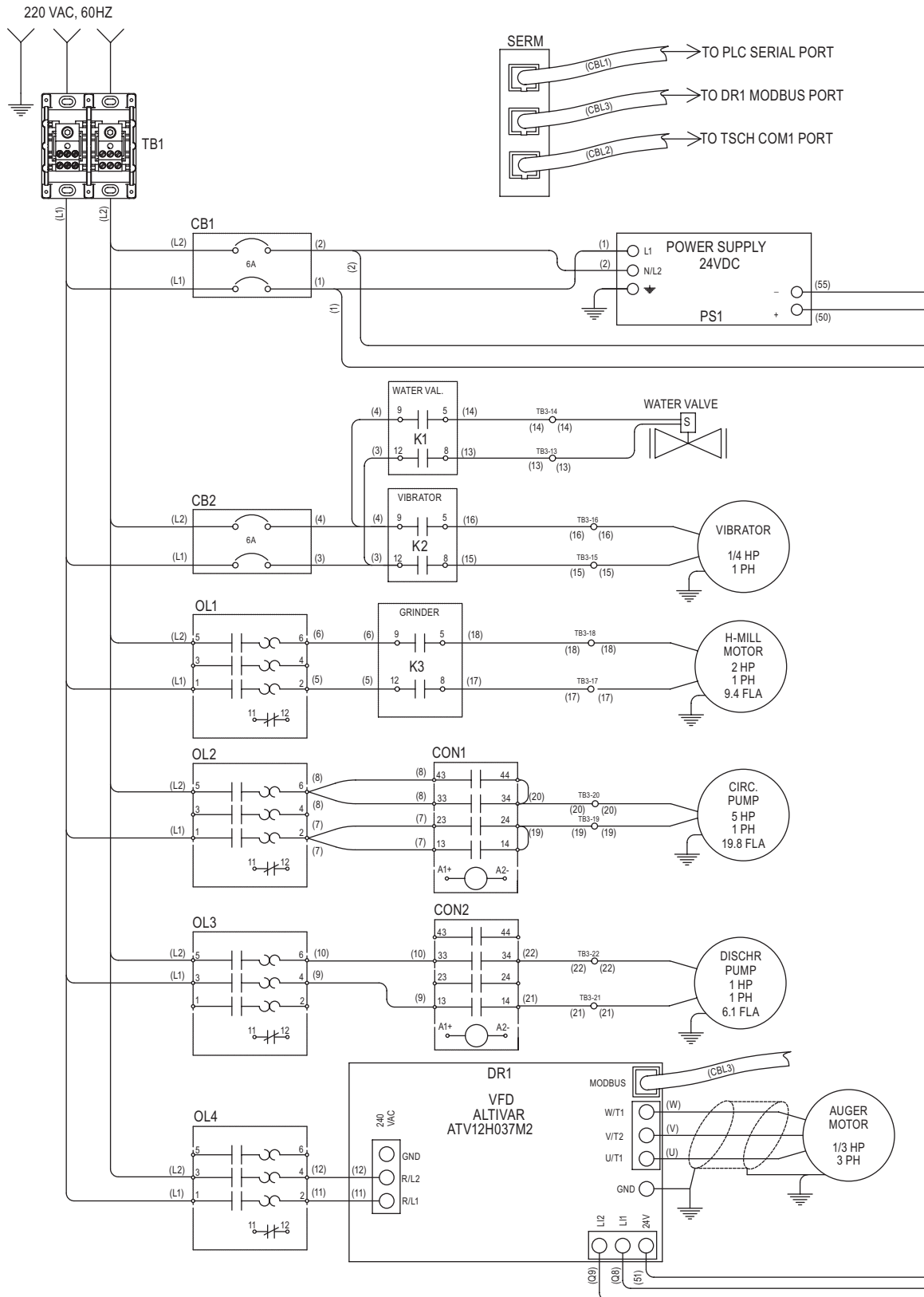
Salt Feed Hopper: The hopper located on the top of the brine maker which holds the salt supply.

Storage Tank: Any external tank connected to the discharge of the brine maker for the storage of brine. The tanks should always be equipped with a valve.

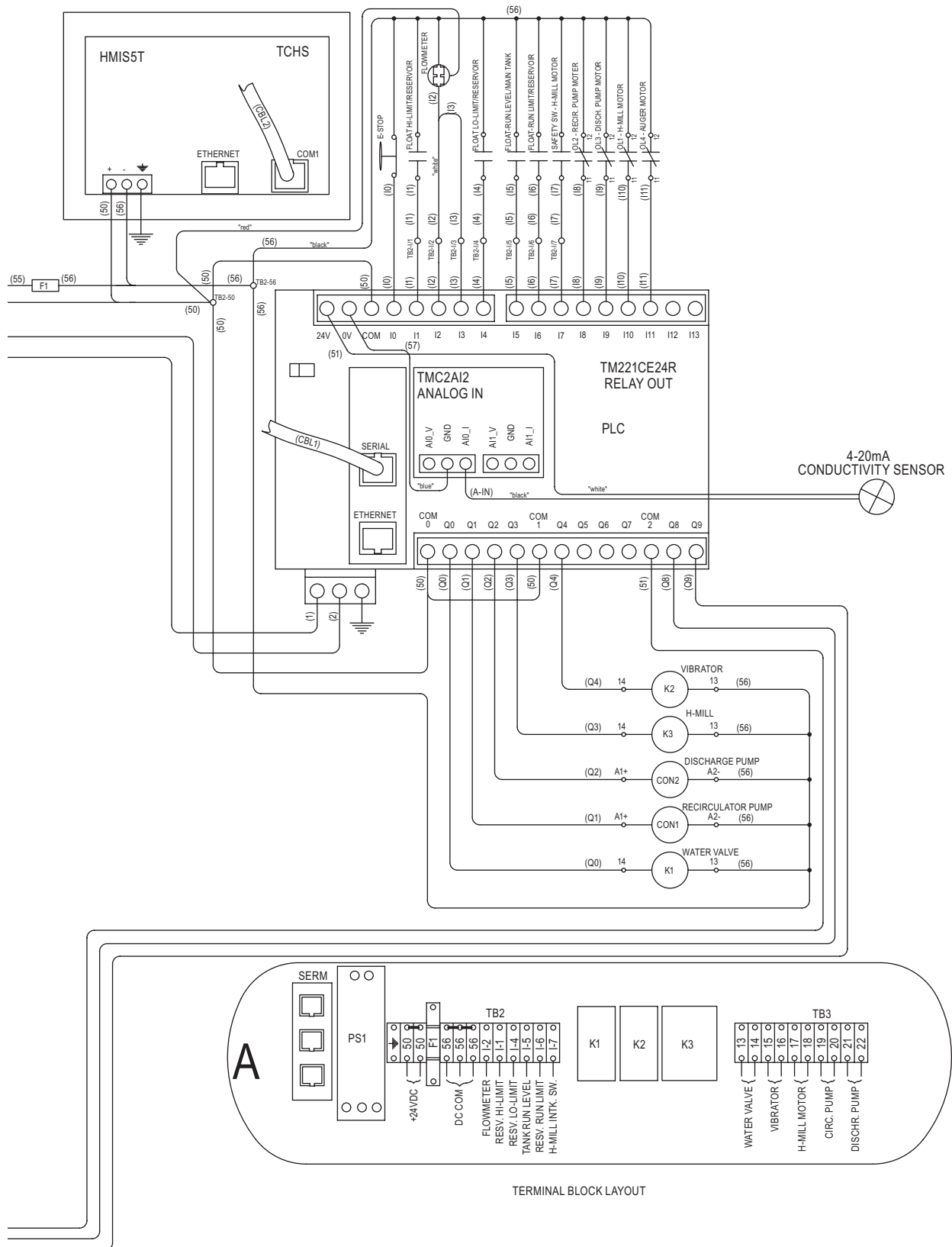
ELECTRICAL SCHEMATIC

⚠ WARNING

Always shut off and lock out the power source before servicing.



ELECTRICAL SCHEMATIC





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