2-20-2019

Rev. 2.0

SS-PLC-3000-HYD
HYDRAULIC
BRINE MAKER

WITH AUTOMATIC SALINITY AND PLC CONTROL

INSTALLATION
START-UP
MAINTENANCE
MANUAL

PENGWYN
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LIMITED WARRANTY

PENGWYN warrants Hydraulic Automatic Brine Maker to be free of defects in material and workmanship, under normal use and service for a period of one (1) year from date of shipment. PENGWYN's obligation under this warranty is limited to repairing or replacing at its factory, or other location designated by PENGWYN, any part or parts thereof which are returned within thirty (30) days of the date when failure occurs or defect is noted, with transportation charges prepaid, and which upon examination appears to PENGWYN's satisfaction to have been defective. **Such free repair or replacement does not include transportation charges, or the cost of installing the new part or any other expense incident thereto. Pengwyn will not be liable for other loss, damage, or expense directly or indirectly arising from the use of its products, nor will PENGWYN be liable for special, incidental or consequential damages.**

Ordinary wear and tear, and damage from abuse, misuse, neglect or alteration are not covered by this warranty. PENGWYN assumes no liability for expenses incurred or repairs made outside PENGWYN's factory except by written consent. PENGWYN's warranty also does not cover the requirement of calibration. All calibration is to be performed by the end user after receiving training and with the use of the technical manual. This warranty is null and void if instructions and operating procedures are not followed.

Equipment or parts not manufactured by this company, but which are furnished in connection with PENGWYN products, are covered directly by the warranty of the manufacturer supplying them. However, PENGWYN will assist in obtaining adjustment on such equipment or parts when necessary.

THIS WARRANTY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND OF ANY OTHER OBLIGATION OR LIABILITY OF PENGWYN.

PRODUCT IMPROVEMENT LIABILITY DISCLAIMER

PENGWYN reserves the right to make any changes in or improvements on its products without incurring any liability or obligation whatever and without being required to make any corresponding changes or improvements in products previously manufactured or sold.

Field plumbing and wiring is the responsibility of the customer and should be done in accordance with PENGWYN's circuit requirements and applicable building codes.

Table of Contents

Hydraulic System Benefits

The PENGWYN Hydraulic Brine System incorporates ten (10+) years of experience in brine making machinery. The hydraulic powered brine maker has some major advantages over the electric powered models.

- The only high voltage electric power to the brine maker is located at the hydraulic power unit which is remote from the operator's push button station.
- The push button station is operated with 24 volt DC current which is inherently safe for the operator eliminating troublesome GFI circuits.
- The variable speed hydraulic pumps allow infinitely variable flow adjustment via hydraulic flow controls. This eliminates troublesome globe valves in the brine lines which plug up, leak and put non-productive back pressure on the brine system.
- The system includes hydraulic power and control for the cleanout dumping cylinders eliminating the need for dump truck hydraulic jumper hose disconnects which rust.
- The system includes as standard a 150 GPM hydraulic driven truck fill station. PENGWYN can supply a wired remote control box if desired.
- Almost all pipe thread connections are eliminated. Those who have had experience with salt brine and pipe threads are familiar with how brine will creep around these connections and present a perpetual housekeeping problem due to leakage.
- The hydraulic brine pumps have silicon carbide seals with four (4) times the expected life of ceramic seals. In the event of a pump problem the pumps are easy to remove for maintenance.

Brine Maker Requirements

Electrical:

- 3ph 208v, 60hz 60A MINIMUM electrical service

Temperature controlled space:

- 50° F MAXIMUM room temperature for frequent or continuous operation.
  - Ventilation may be required in small or well insulated spaces to remove excess heat generated by brine making operations
- 33° F MINIMUM to prevent fresh water from freezing.
  - small heater or heat tape my be required to maintain minimum temperature of fresh water pipe

Fresh Water:

- 1-1/2″ tap water supply line MINIMUM
- Fresh water inlet MUST have a back-flow preventer
- 60PSI MAXIMUM inlet pressure
- Ensure that unit is protected from over pressure and water hammer potentially caused by other systems

Control Room Requirements:

- Location for the control adjacent to the Hopper and in line of sight for dumping and truck loading.
- Low salinity light must be located where it can be seen by yard personnel while performing their normal duties.

Thermostat Requirements

- Location outside the control room for the thermostat.
  - out of direct sunlight in order to read accurate outside temp
- Thermostat must be set at 22° F to prevent freezing
  - a higher setting may cause difficulty in maintaining maximum control room Temp
  - A lower setting may allow brine hoses to freeze if salinity is allowed to remain low for extended periods

Hopper/Frame Requirements

WARNING: THE HOPPER COULD WEIGH FROM 10,000 LBS TO 15,000 LBS WHEN IT IS BEING DUMPED, THEREFORE, THE LIFTING FRAME MUST BE WELL ANCHORED FOR SAFETY.

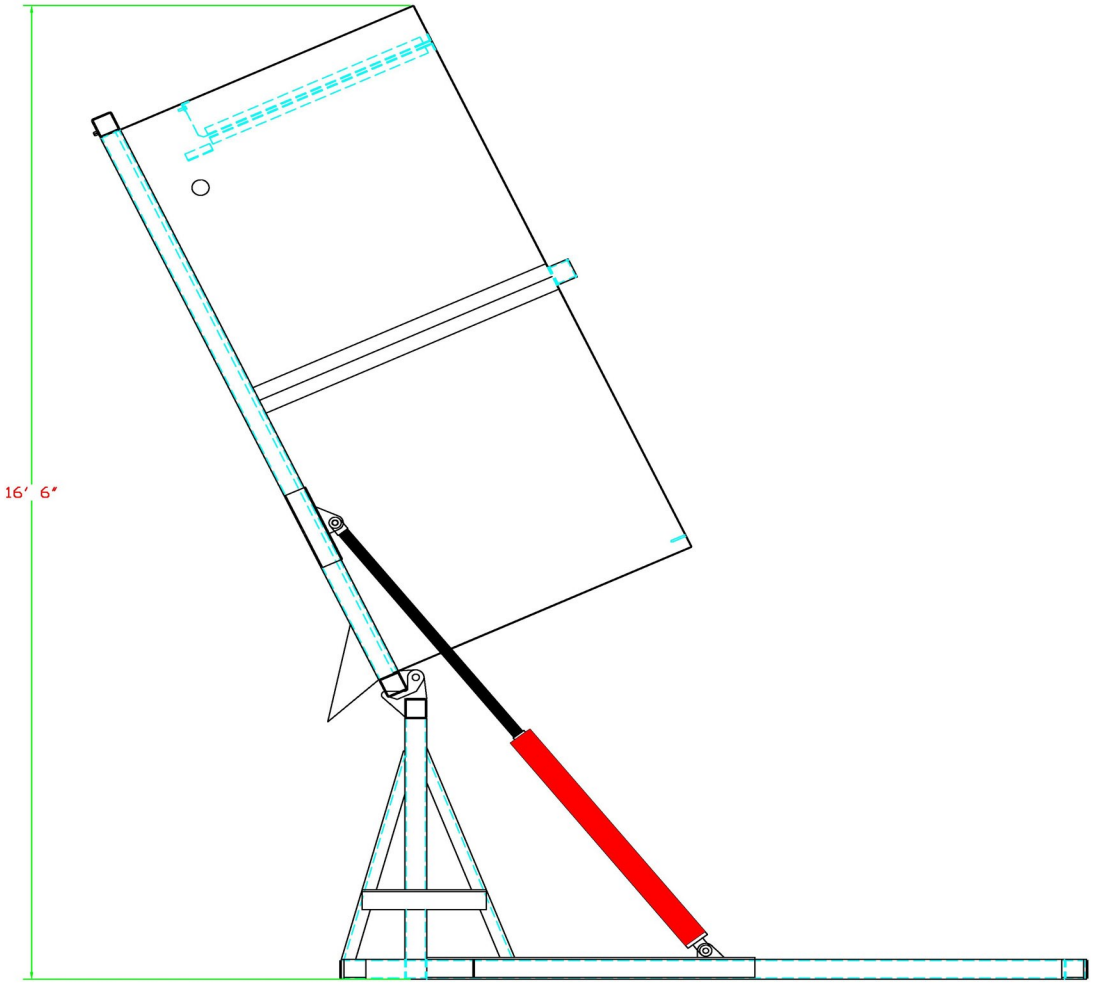
- A pad 14FT by 24FT is adequate for most installations with one 6000 gallon storage tank.
- 8″ thick concrete pad MINIMUM
- 3/4″ -10 galvanized all-thread epoxied into a 6″ to 7″ hole into the concrete.
  - The anchor bolts should be either the J bolt style put in when the con crete is poured or epoxy style.
- Access to the brine maker Hopper on two sides.
  - A long side for loading salt, and a short side for clean out to a front-end loader.
- Overhead clearance of 16′6″ MINIMUM for hopper cleanout.
- All carbon steel framework and fittings located in the brine hopper area will eventually corrode, therefore, it is recommended that proper plastic, stainless steel and brass materials be used.
- The centrifugal pumps will not self prime and therefore must be mounted as low as possible so that their suction ports are flooded.

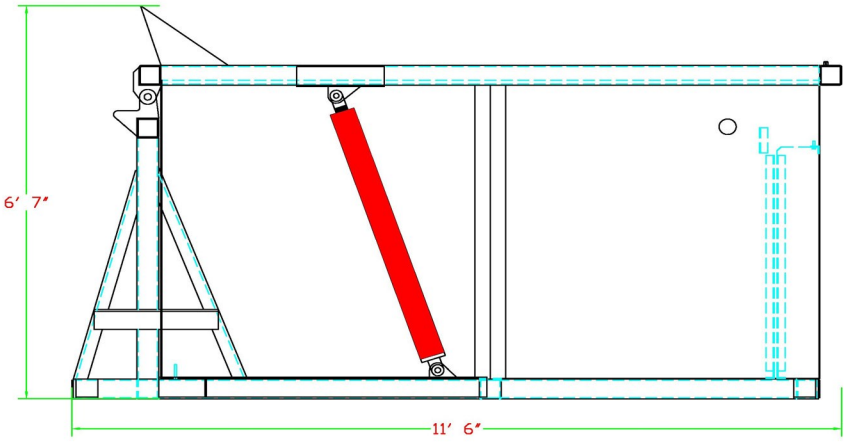
Storage Tanks:

- The 2″ bulkhead for the storage tank transfer pump inlet should be located as high on the tank as possible to prevent back flow to the hopper through the Centrifugal Pump.
- The storage tank float wire bulkhead and strain relief should be installed as high as possible in the storage tank.
- The float weight should be adjusted to about 6″ from the float.
- The storage tank shut down float must be adjusted to shut off the transfer pump before the brine level reaches the transfer pump inlet.

  NOTE: Filling above the bulkhead would back flow upon transfer pump shut down, so tank volume above the transfer bulkhead is not useable.

Dump Clearance



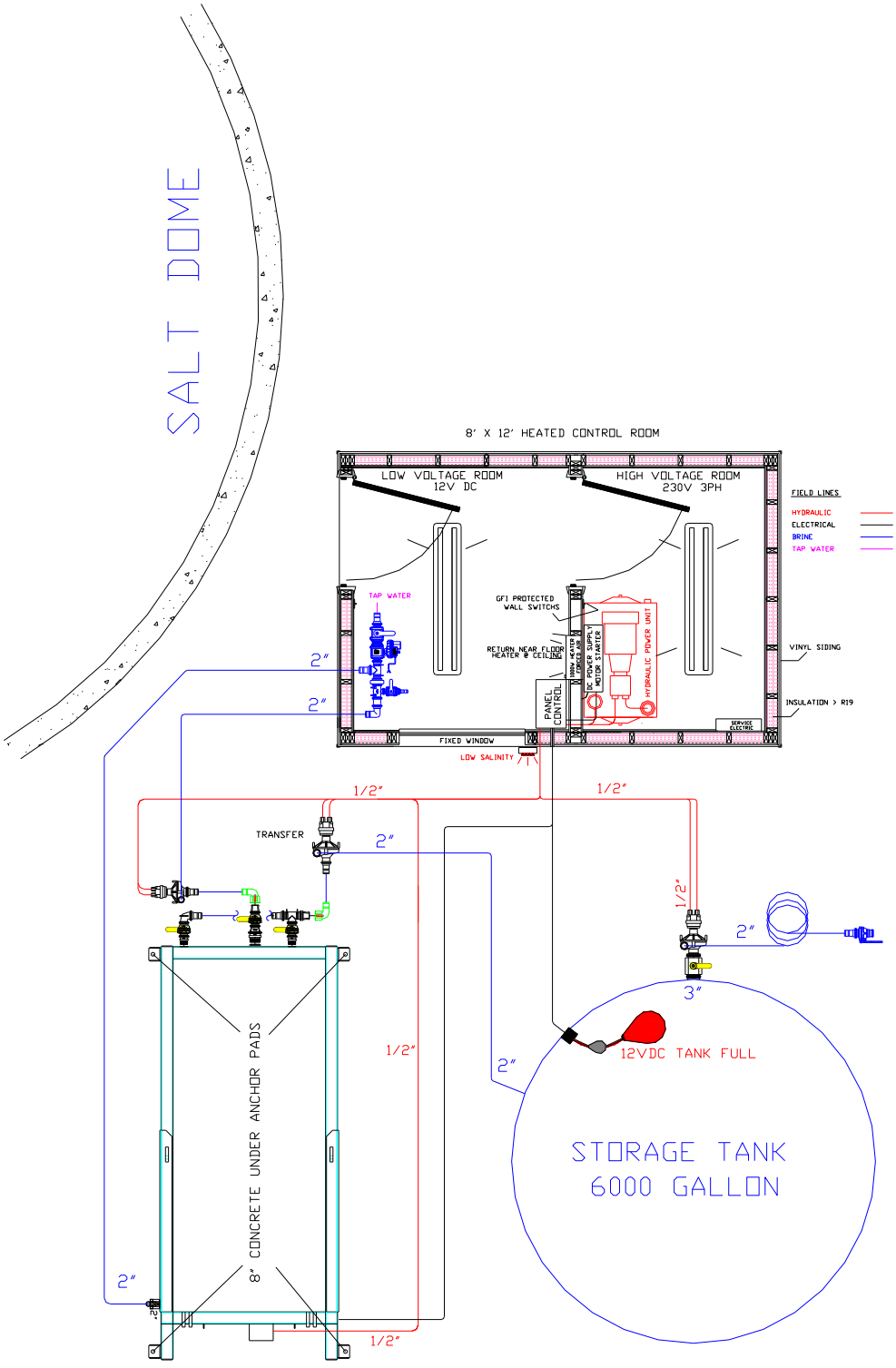


Make A Layout Diagram of Your Brine Site

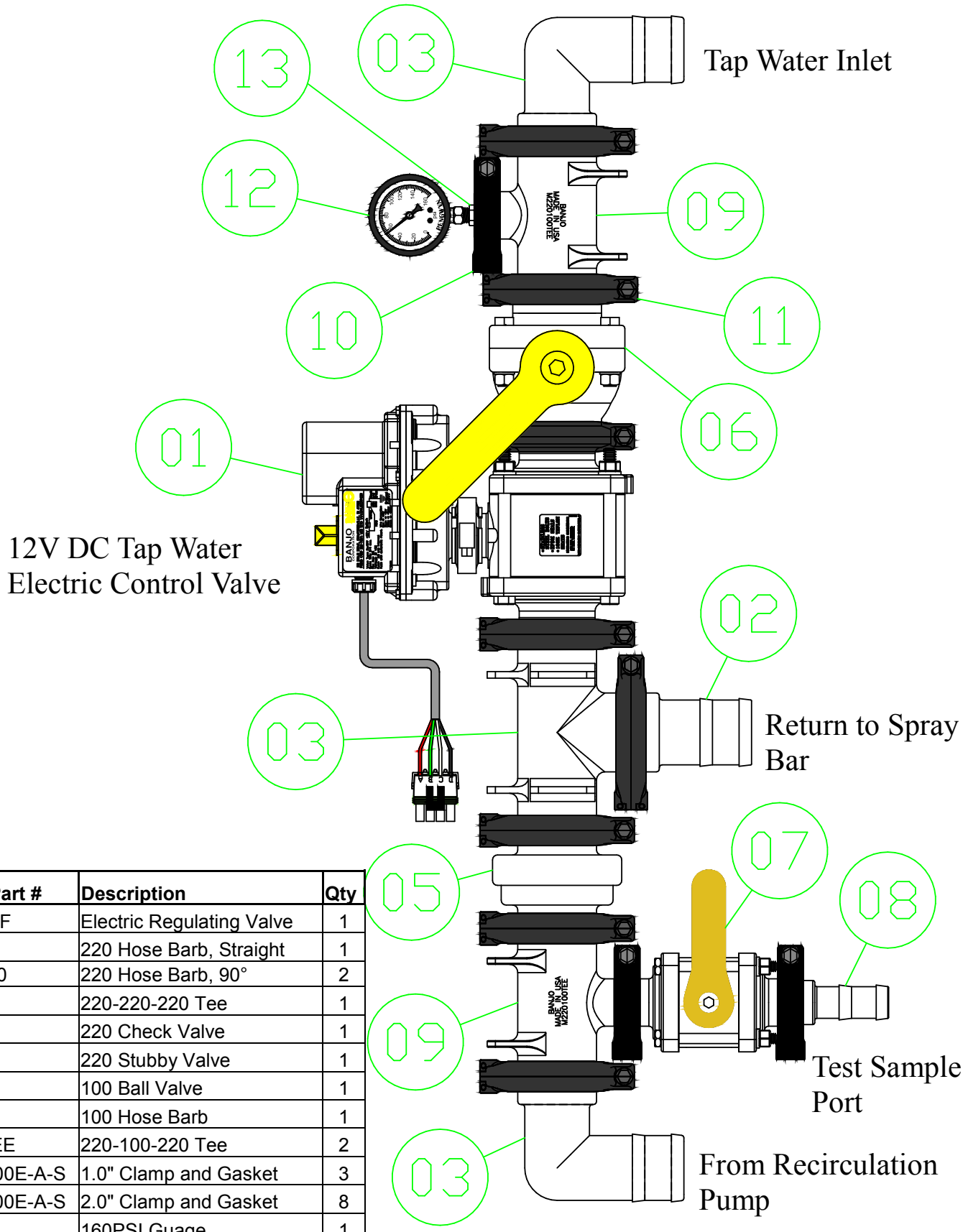
Note: All brine sites are different. The following steps are general in nature and will be adjusted to suit the site's specific requirements.

- Design the concrete pad. The concrete must be at least 8″ thick under the salt hopper. A pad 14FT by 24FT is adequate for most installations with one 6000 gallon storage tank.
- Locate the salt hopper towards one corner of the pad so that salt can be loaded from one side and clean out can be accomplished at the end opposite the brine plumbing.
- Determine the location of the control console so the operator can visually and safely control the dumping. Also, the control panel should be handy for operating the switch for turning on the truck loading pump (See page 9).
- Locate the storage tank and the bottom port 3″ plumbing to keep the suction plumbing as short as practical.
- Locate the hydraulic power unit and tap water supply as close as possible to the inside wall adjacent the out side brine equipment.
- Determine where to locate the penetrations for plumbing to go from inside to outside.

Sample Layout Diagram



Tap Water Plumbing



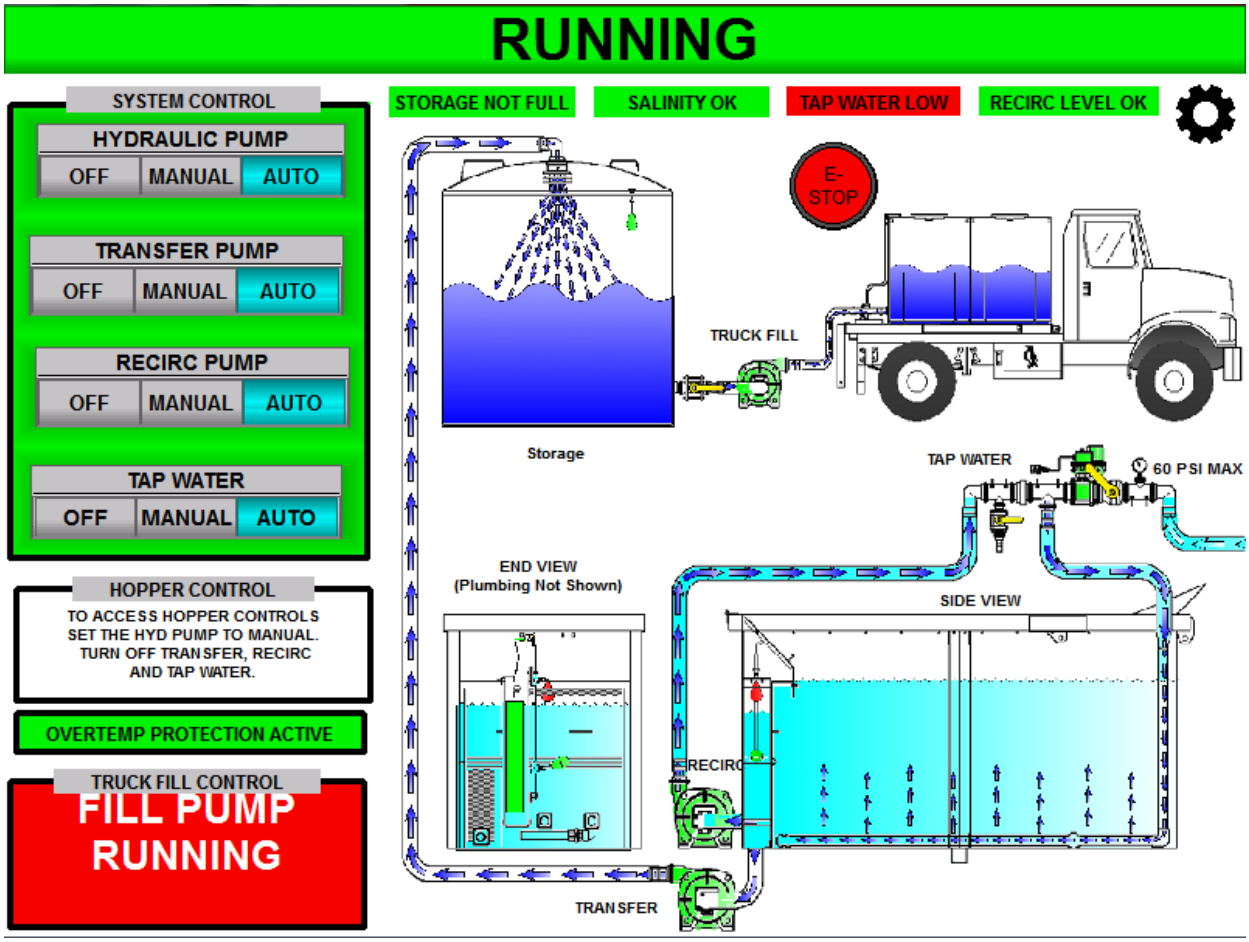
Item #	Pengwyn Part #	Description	Qty
01	MEVR220CF	Electric Regulating Valve	1
02	M220BRB	220 Hose Barb, Straight	1
03	M220BRB90	220 Hose Barb, 90°	2
04	M220TEE	220-220-220 Tee	1
05	MCV220	220 Check Valve	1
06	MVS220CF	220 Stubby Valve	1
07	MV100CF	100 Ball Valve	1
08	M100BRB	100 Hose Barb	1
09	M220100TEE	220-100-220 Tee	2
10	BG-UFC0100E-A-S	1.0" Clamp and Gasket	3
11	BG-UFC0200E-A-S	2.0" Clamp and Gasket	8
12	PG-160	160PSI Guage	1
13	M100PLG025	1" Flange Plug w/ 1/4" FPT	1

Electrical System Description

The electrical system has the following features:

- The system is PLC controlled allowing great flexibility in timing and logic in controlling the automatic brine maker.
- All electrical power to the operators control console and the hydraulic valves is inherently safe 24 or 12 V-DC.
- When the storage tank is full and there is no other function required of the hydraulic system and the motor switch is in Automatic, the electric motor on the hydraulic power unit will shut down after a period of time. This will allow sufficient time to circulate brine in the lines to prevent freezing. Also, this saves electrical power.
- The low voltage control eliminates the need for troublesome GFI components.
- If remote operation is required a 24V-DC wired remote pendent can be supplied.
- Power for the brine maker is from an energy efficient single or three phase electric motor.

Control Panel Layout

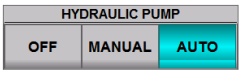


Control Panel Descriptions

Power:
Power to the control panel is supplied from the Hydraulic Power Unit's Starter Panel.

To power up the Control Box:	Plug in the battery on the side of the Power Unit. Then, turn the disconnect handle to the on position.
To power down the Control Box:	Turn off the power. Then, unplug the battery.

Hydraulic Pump:



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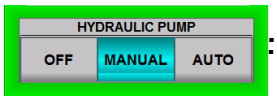
The hydraulic power unit will start and stop depending on the requirements of the sump control. The Background will appear green when the hydraulic pump is running.



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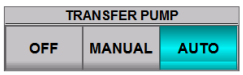
The hydraulic power unit will remain on until either the Auto or Off button is selected. There is a built in delay, once motor starts The Background will appear green indicating the hydraulic pump is running.

Transfer Pump:



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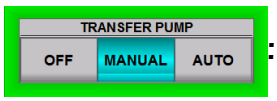
Transfer of brine from the salt hopper to the storage tank is controlled by the salinity float and the storage tank float. Brine will only be transferred when the salinity float is high (*indicating proper salinity*) and the storage tank float being low (*indicating available room for more brine solution*). Transfer will cease when one of these two conditions is not met. The Background will appear green when the transfer pump is running.

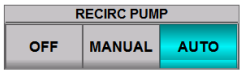


:

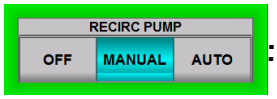
Transfer of brine from the salt hopper to the storage tank will not be based on positioning of float. Typically it is used to pump down remaining solution in the salt hopper in preparation for clean out. Care must be taken to ensure that the storage tank is not over filled. The Background will appear green when the transfer pump is running.

Control Panel Descriptions
(Continued)

Recirc Pump:

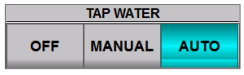


: Recirculation of brine solution is enabled by the recirculation float. The brine solution will be recirculated through the hopper pipes when the float is high to achieve the desired levelof concentration. When the storage tank becomes full, the recirculation will shut down after a time delay to ensure that all of the brine plumbing contains saturated brine. The Background will appear green when the pump is running.

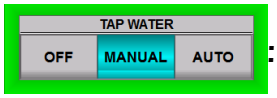


: Recirculation in manual mode is not based upon float position. Recirculation of brine solution will continue as long as the switch remains in this position. Care must be taken to ensure that the pump does not run dry when operating in this mode. The Background will appear green when the pump is running.

Tap Water:



: Tap water is added to the system based upon the position of the tap water float. When the float is down, tap water will automatically be added to the system until the level that operates the float is reached, turning the tap water off.



: Tap water is continuously added to the system in the Manual ON position. Care must be taken when setting tap water to MANUAL mode as there is the potential for over filling and spillage. A green light will appear indicating Tap Water Valve is OPEN.

Control Panel Descriptions
(Continued)

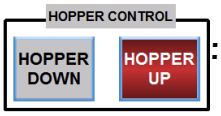
Salinity/Storage/Recirc/Tap Water Floats:

Floats are at or above operating level:

Floats are below operating level:

** NOTE: each indicator lists specific status with indicator text as pictured above.

Hopper Control:
In order to access the Hopper Controls, the Hydraulic Pump must be in Manual mode and the Transfer, Recirc., and Tap Water pumps must all be turned Off. Once these conditions are satisfied, you must hold the appropriate function (up or down) for three seconds before either action will begin. Action will stop when button/switch is released.



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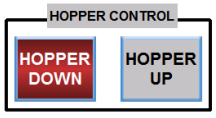
Raises the salt hopper for cleaning out accumulated non-dissolvable particles that are a characteristic of road salt. Care must be taken to ensure that any brine plumbing that can be damaged by raising the salt hopper is disconnected.



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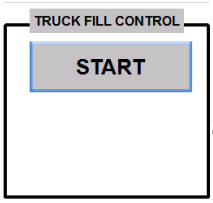
Lowers the salt hopper after clean-out is finished. Keep a clear distance anytime the salt hopper is being raised or lowered to prevent personal injury.

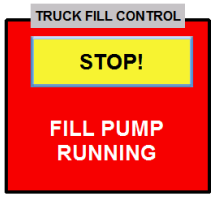
**NOTE: Hopper screen controls are deactivated when remote Hopper control pendant is installed.

Control Panel Descriptions
(Continued)

Fill Control:
Transfers brine from storage tanks to the truck mounted unit. This control is only active when remote switch is disconnected. Filling of equipment should be monitored at all times to prevent over-filling and spillage.



: The pump will turn on and "Fill Pump Running" will be displayed.



: Pressing Stop will stop the Truck Fill pump.

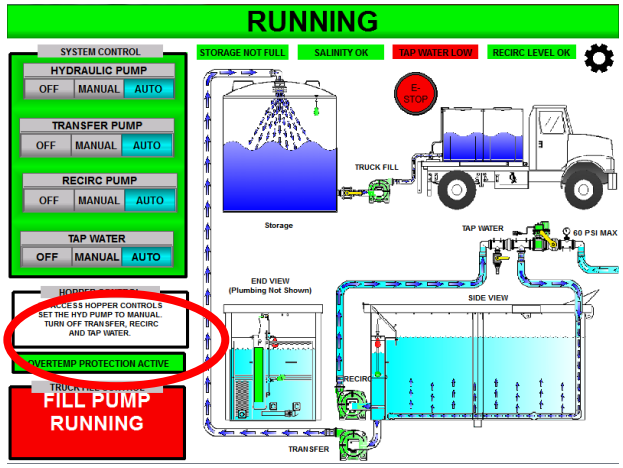
Truck Fill Procedure:

1. Connect fill hose to truck
2. ensure all valves in the truck fill line are open
3. Turn on hydraulic pump (in "Auto" pump will turn on automatically)
4. Turn on Truck Fill Pump
5. When tank is full, turn off Truck Fill pump
6. Close valve on truck fill line
7. Turn off hydraulic motor (in "Auto" pump will turn off automatically)

Hydraulic Oil Over Temperature Protection

Overtemp Protection Indicator:
If Hydralic oil goes over 190° F, Brine maker will be shut down. To reset alarm Oil temp must be brought below 190° F, and the system must be rebooted (power off for 30 seconds, then power on).

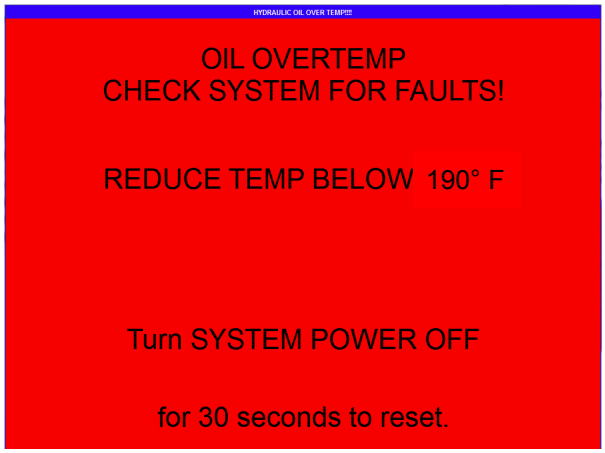
NOTE: If Oil Overtemp Protection is triggered, Check that room temp is being held below 50°F for Frequent or Continuous operation of the Brine Maker.



OVERTEMP PROTECTION ACTIVE : Overtemp Switch is properly installed, and system is Protected from over heating.

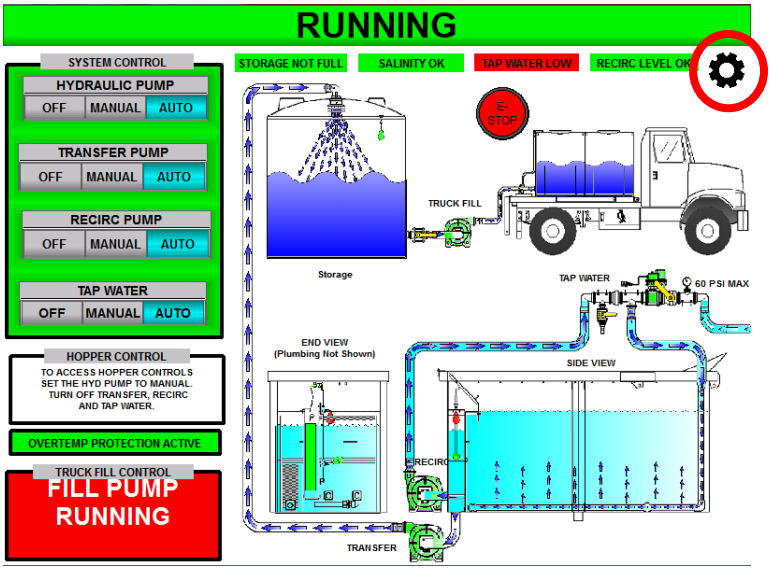
OVERTEMP PROTECTION NOT ACTIVE : Overtemp switch is not properly installed, and brine maker is not protected from over heating. System can be run, but hydraulic oil temp will not be monitored.

Fault message screen:

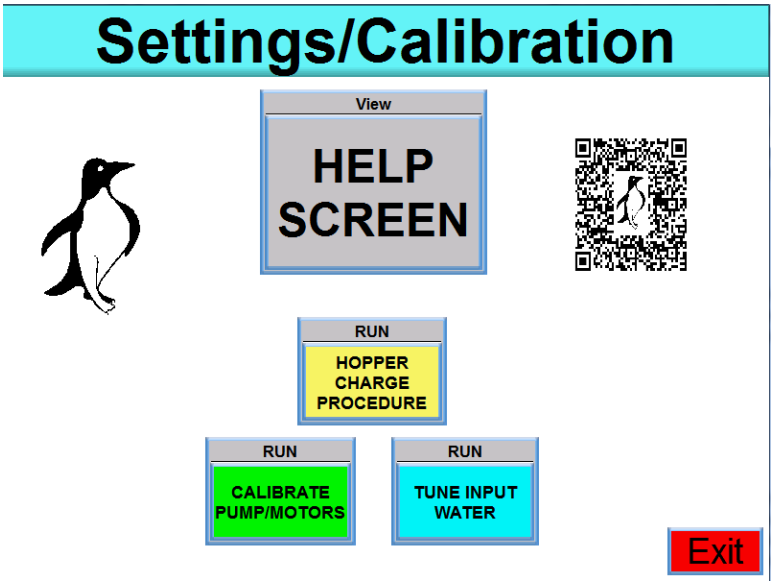


Control Panel Descriptions
(Continued)

Settings/Calibration:
Transfers brine from Enter the Settings/Calibration screen by toughing the sprocket icon "⚙" on the main screen:

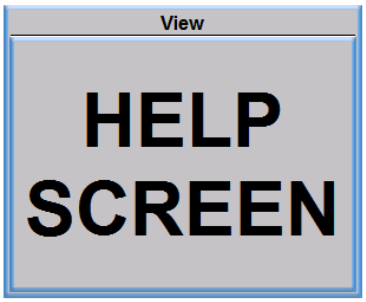


Settings/Calibration Screen:

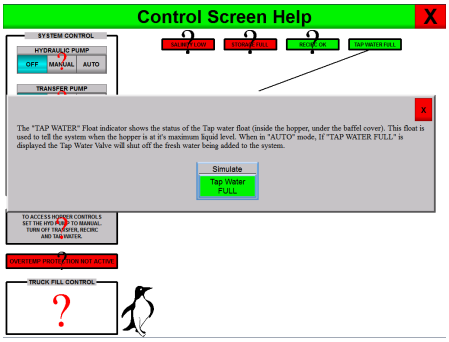


NOTE: All Brine Maker functions are disabled when entering Settings. Unit will have to be put back into production mode once unit is returned to the main screen.

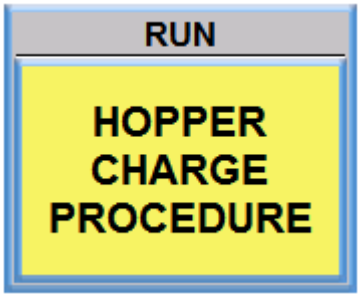
Settings/Calibration



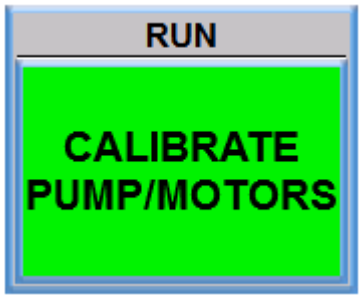
In the help screen any question icon can be selected and a description of that item's function will be displayed:



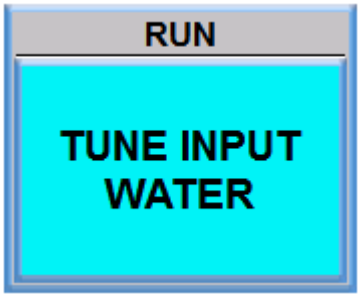
For some functions there are simulate buttons that will show what is displayed for a change in that state. All Brine Maker functions are disabled while in help mode.



This button will walk the operator through the initial charge procedure (detailed later in this manual) step by step, insuring that Brine maker is correctly started at the beginning of the season, and after clean out operations.

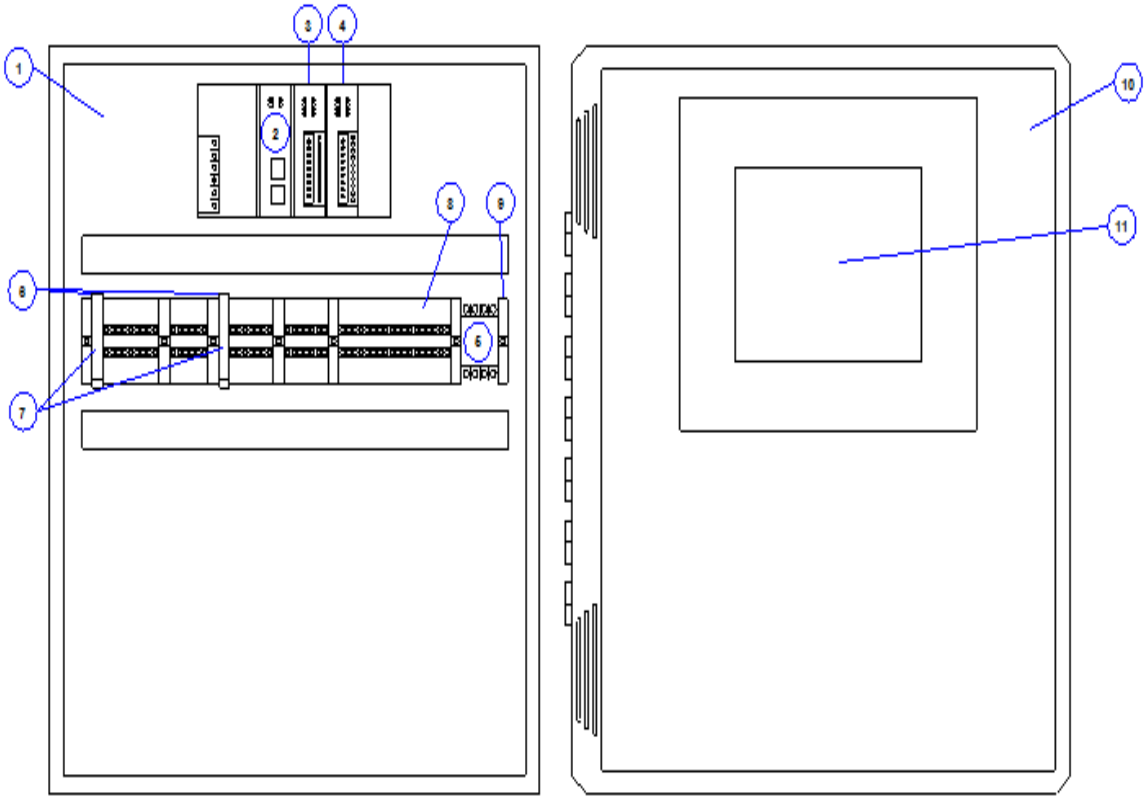


This Password protected screen walks the technician through motor calibrations (detailed later in this manual) using an internal current meter.



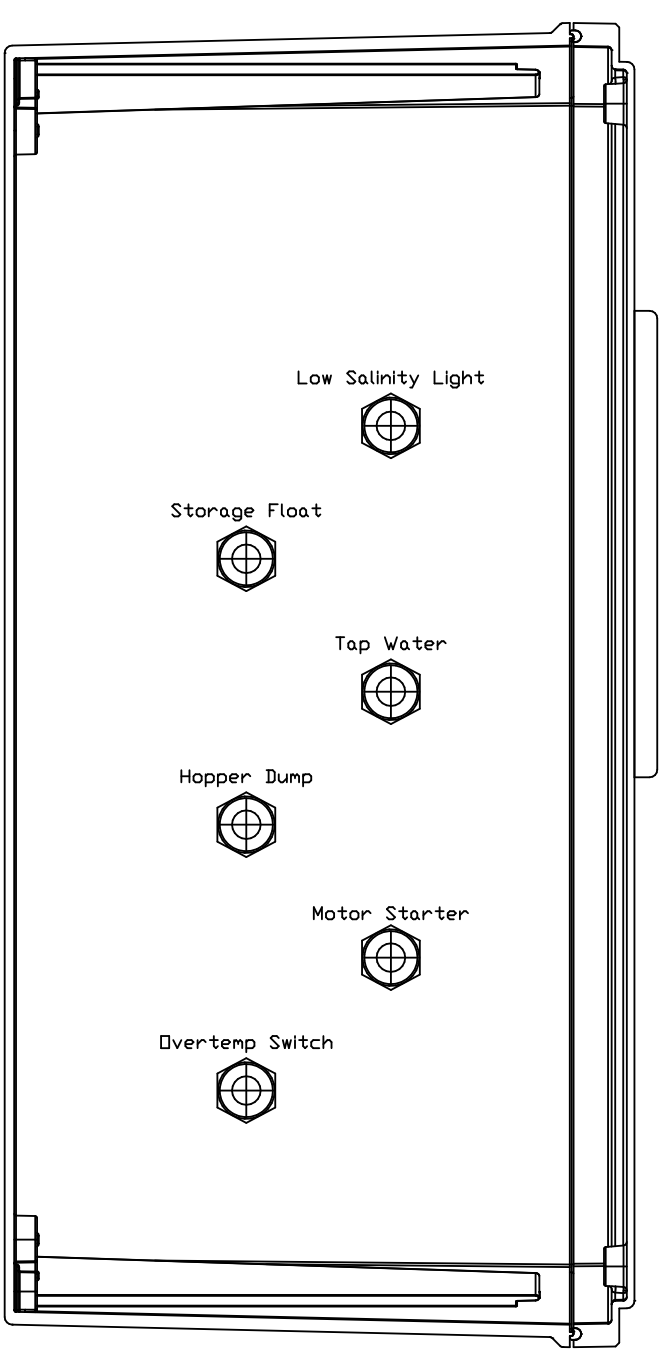
This Password protected screen walks the technician through step by step tuning operations (detailed later in this manual) that set the brine maker up for balanced, efficient brine production.

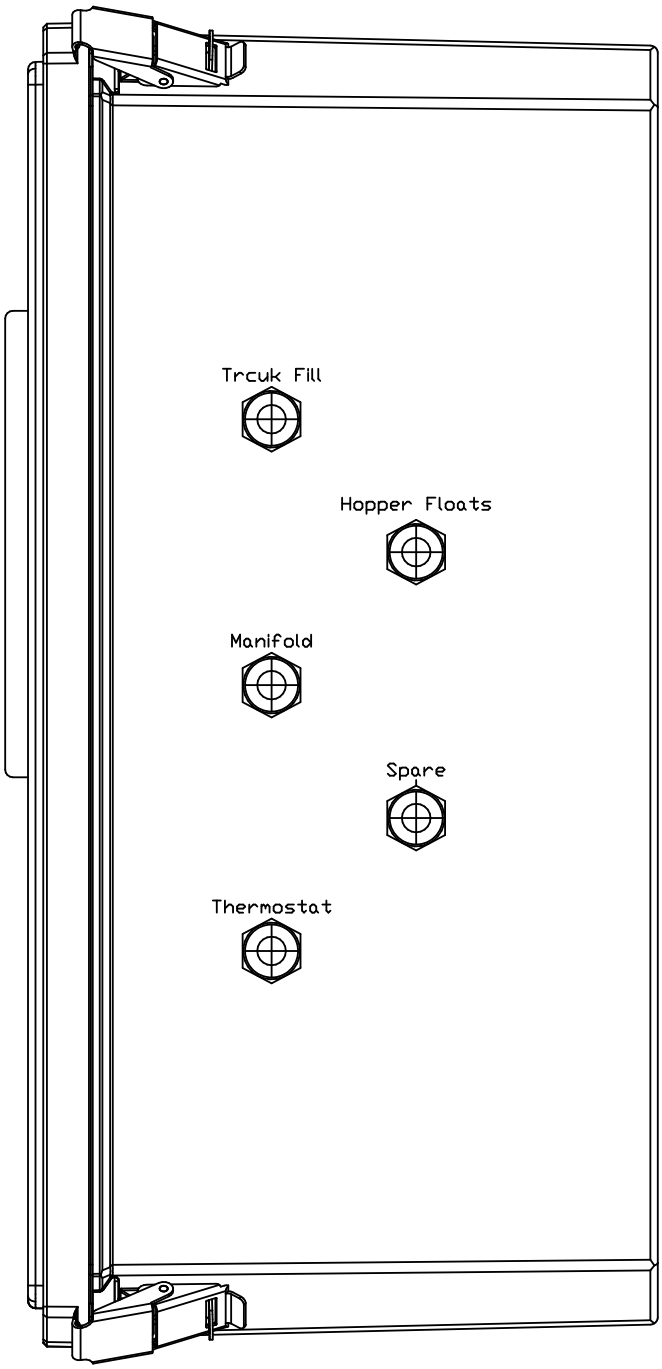
Control Box Layout



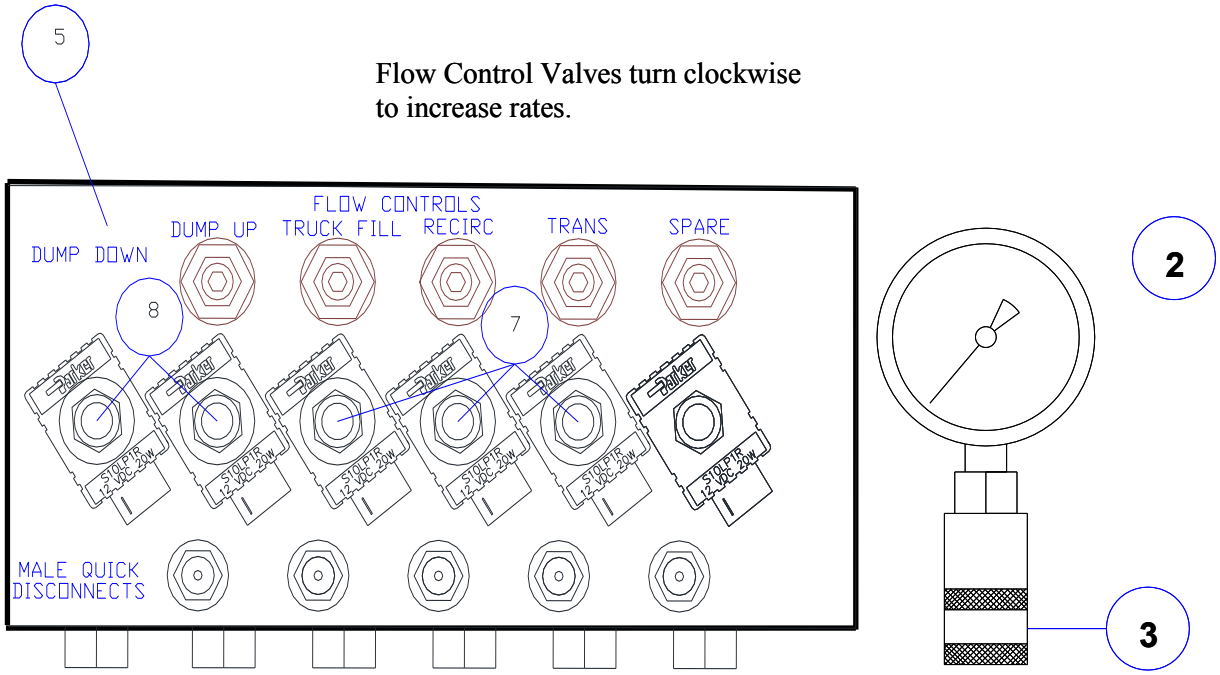
Control Panel Bill of Materials			
	Part #	**Description**	**Qty.**
1	HW-MP2016A	ENCLOSURE BACKPANEL	1
2	D2-240	PLC CPU	1
3	D2-16ND3	16PT DC INPUT CARD	1
4	F2-08TRS	8PT RELAY OUTPUT CARD	2
5	MK2P-S	OMRON DPDT 12V RELAY	1
6	DN-F10	FUSE HOLDERS	2
7	AGC6	6A FUSE	2
8	DN-T12	TERMINAL BLOCKS	47
9	DN-EB35	END BRACKETS FOR TB	7
10	HW-201610CHQR	ENCLOSURE	1
11	EA7-T8C	MICRO GRAPHIX SCREEN	1
x	OP-2CBL	PLC TO SCREEN CABLE	1

Control Box Side View



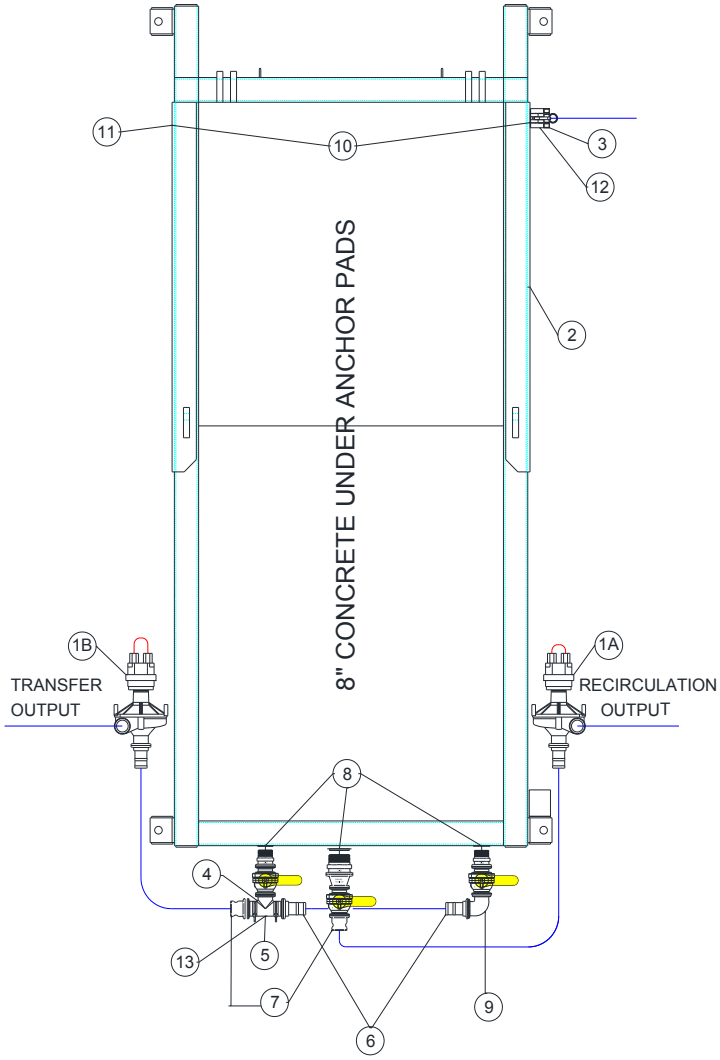


Hydraulic Manifold



Hydraulic Manifold Bill of Materials			
	Part #	**Description**	**Qty.**
1	CVH-103P	CHECK VALVE	6
2	PG-4000	PENGWYN GAUGE 4000 PSI	1
3	FIR14VNPT	1/4 FEMALE QCD	1
4	MIR14VNPT	1/4 MALE QCD	4
5	ABM MANIFOLD	B/M MANIFOLD DRILLED 4X6X12	1
6	RC-S10L	COIL	6
7	DSL101C	2-WAY SIZE 10 NC	4
8	DS103A	3-WAY SIZE 10	2
9	NVH101S	SIZE 10 CARTRIDGE FLOW CONTROL	5

Hopper View



Item #	Pengwyn Part #	Description	Qty.
01	9303C-HM1C-BU	Recirculation Pump	1.00
02	HOPPER	Hopper/Frame Assembly	1.00
03	HB200-90	2" Male NPT to 90Degree 2" Hose Barb	1.00
04	M220SWP90	Sweep, 2" Port, Flanged	2.00
05	MV220BL	3-Way Valve, 2" Port, Flanged	1.00
06	M221GSA	Flange Fitting, 2" PVC Glue Socket	2.00
07	M220A	2" QDC Male Adaptor, Flanged	2.00
08	MBF220	Bolted Tank Fitting, 2" Port, Female Thread, Flanged	3.00
09	M220CPG90	Coupling, 90Degrees, 2" Port, Flanged	2.00
10	TF200	Bulkhead Fitting, 2" Port, Female Threaded	2.00
11	PLUG200	2" Plug	1.00
12	SW200	Swivel, 2" Male Thread, 2" Female Thread	1.00
13	SL200-90	Street Elbow, 90Degrees, 2" Threads	4.00

Brine Maker On-Site Calibration

WARNING: The Motor Starter box door will need to be open during these tests. Only properly trained technicians should operate the Brine maker for Initial startup or On-Site Calibration.

- Check all hoses and wires are connected using full line sizes and shortest routing
- Check motor nameplate for max amps; write on sheet
- Turn on the electrical service panel
- Place amp meter on one leg of the motor

NOTE: Brine maker centrifugal pumps are NOT self priming. They must not be run dry or the shaft seals will be damaged. All suction ports must be flooded with liquid before starting. Make sure brine pumps are primed and operating before adjusting needle valves

- Turn on the Motor Starter box
- Press manual button on motor starter to "Bump" hydraulic motor to ensure correct rotation, Rewire if needed
- Check the hydraulic fluid level in the hydraulic reservoir. (Fill if necessary)
- Turn Hydraulic Motor to manual on PLC Screen, leave other three switches in off
- Check the load sense on gage on hydraulic pump, setting should be ~150 psi
- Write down the initial amperage of a no load motor; write on sheet
- Disconnect the brine hoses from the Hopper
- Operate Hopper up and down, to bleed the cylinders of air
- Check the hydraulic fluid level in the hydraulic reservoir. (Fill if necessary)
- Hold hopper down to deadhead the system, verify that the max pressure is 1500PSI on the gauge on hydraulic pump
- Reconnect the hoses to the Hopper
- Turn the main water supply ON
- Check for tap water leaks
- Set Tap water switch to auto
- Verify electric ball valve opens, and visually look inside hopper to see water filling
- Let it fill until there are 2-3 feet of water in the hopper

This creates a cushion to keep the salt from damaging the spraybars

- Add 1-2 buckets of salt to hopper, not filling more than 1 foot below top of hopper

this is to prevent a overfill and splash out of salt water

- Open recirculation ball valve
- Turn Hydraulic motor on and record current (should be approx. 13A for a 3 phase motor)
- Verify transfer ball valve is in "Production" setting, not "Pump Down" setting
- Turn recirculation pump to auto setting
- Check amperage draw with just the recirculation motor (Recirc Only); write on sheet

- - Difference between "No Load" and "Recirc Only" should be approx. 5-7 amps - -

- Recirculate Hopper until Salinity Float (Sloat) is indicating eutectic brine mixture
- Turn transfer switch to auto
- Check amperage draw with just the recirculation and transfer motors; write on sheet

- - Difference of "Recirc Only" to Recirc and Transfer should be approx. 7-8 amps - -

- Produce enough brine that bottom of storage tank is filled above suction port of Truck Fill Pump

- - Usually 2,000 to 4,000 gallons - -

- Attach Truck fill output hose to a storage tank (on truck, or back into the hopper or storage tank)
- Open ball valve at the cam-lock fitting and on the storage tank.
  Turn on truck fill pump
  Check amperage draw with all three motors; write on sheet

- - Difference of Recirc and Transfer to all 3 motors should be approx. 7-8 amps - -

Adjusting the Needle Valves

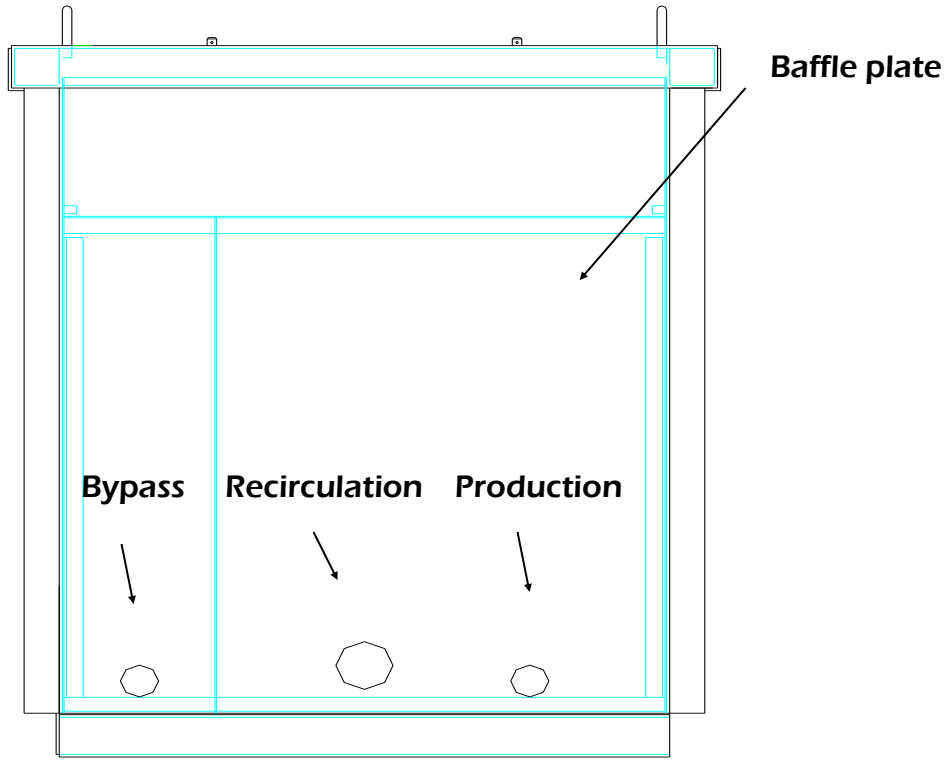
- Use 11/16" Wrench, loosen lock nut at base
- Using 3/16" Allen wrench, turn top of valve clockwise to decrease pressure and amperage; turn counter clockwise to increase pressure and amperage
- To finish calibrating needle valves, use 11/16" wrench and Allen wrench simultaneously. Hold needle valve in place with the Allen wrench, and tighten lock nut with 11/16" wrench

Clean-out and Maintenance Instructions

Initial Hopper Charge Procedure:

- Make sure that Hopper is all the way down on the frame
- Make sure hopper hoses are connected (Recirc, and Transfer)
- Make sure the Recirc valve is open
- Set the transfer valve to production position
- Make sure water shutoff valve is open
- Set brine maker controls (hydraulic motor, transfer, recirc, and tap water) to auto
- Once the water level is above 24″ in the hopper add salt
  Enough salt should be added so it mounds 2-3″ above the tap water fill level (approximately at the wing nuts)
- Once tap water reaches the fill level, tap water valve will turn off
- When salinity light turns off check salinity at the test port (on the water tap valve assembly) to ensure proper salinity levels.

The hopper must be cleaned regularly to remove undissolved debris regularly (approx. 100-200yds of salt used) during brine making operations.



Measuring un-dissolved debris in the hopper:

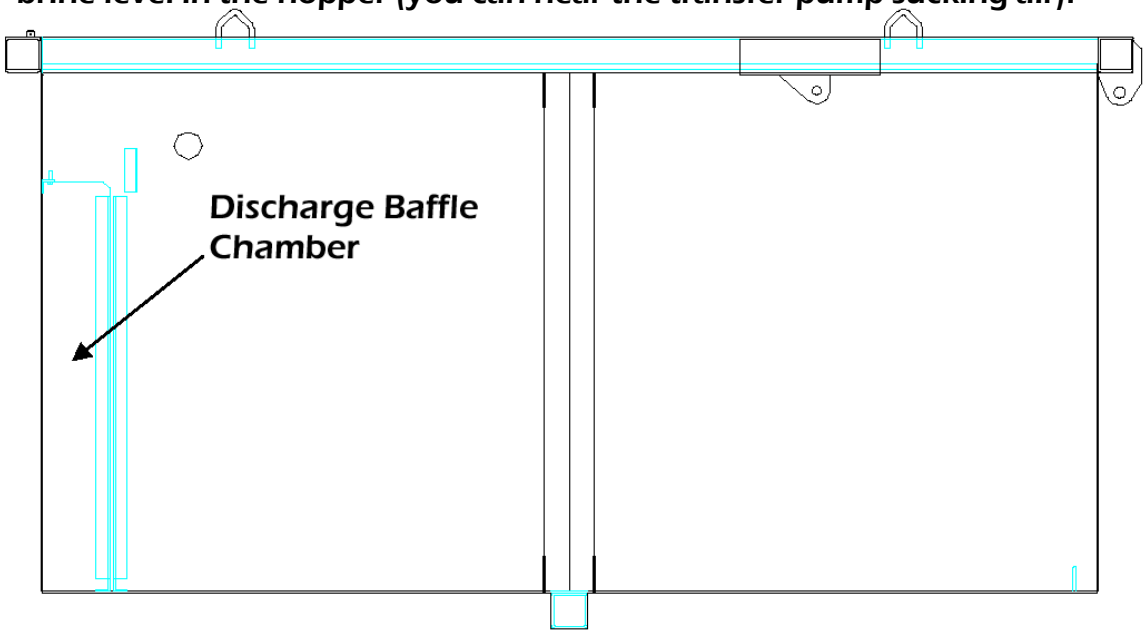
- When the Brine maker calls for salt (the red light is on)
- Probe the bottom of the hopper with a broomstick or similar item
- If there is more than 18 inches of debris in the bottom of the hopper a clean out is needed

Production Cleanout Procedure:

- Move transfer valve from production to the pump down position
- Turn on hydraulic pump (manual)
- Turn on Transfer pump (manual)
- Pump as much brine out of the hopper as possible
- The Brine will still be relatively saturated since the brine being produced for much of the production cycle is at 90%+ concentration, and the "Low Salinity" limit is set to roughly 86% concentration. This means that brine in the storage tanks should not drop below desired levels at any point due to pump down operations.
-

  NOTE: It is a good idea to check salinity often during operations, and just prior to pump down to make sure that proper concentration is maintained.

  NOTE: If there is a large amount of debris in the bottom of the hopper the baffle plate slots may be covered. If this happens the transfer pump may offload brine faster than the pump down well can refill. If this happens the transfer pump may need to be cycled off and on several times to get all the brine out of the hopper.
- Pump down is complete when the transfer pump suction port is above the brine level in the hopper (you can hear the transfer pump sucking air).



- Turn off the transfer pump and hydraulic pump
- Open baffle cover and rinse floats and baffle area
- Secure baffle cover back into place
- Once the hopper is pumped down:
  - Close the recirculation valve
  - Move the transfer valve to the Production position
  - Disconnect the hoses from the recirc. And transfer ports
  - The hopper can now be dumped
- Hopper should be cleaned immediately as the debris can form a solid cake that is very difficult to remove if left to dry

CAUTION! Check that all personnel are clear of the hopper, and that the hoses are disconnected before operating the hopper dump!

- Position front loader bucket in front of and below hopper spout
- Run hopper up to dump debris
- Once hopper is in the fully up position, and the bulk of the debris is removed the open the water tap valve (manual) to rinse the remaining debris
- Check that the spray bars are undamaged, and flowing tap water properly
- Spray out remaining debris with a hose or similar
- Once the hopper is clean, lower it back into place

CAUTION! Check that all personnel are clear of the hopper before operating hopper down!

- Reconnect hoses
- Open the Recirc. Valve
- Make sure the transfer valve is in the production position
- Charge hopper according to the "**Initial Hopper Charge Procedure**" above

Spring Cleanout:

- Follow **Production Cleanout Procedure** above
- Once the hopper is clean and back in position
- Fill hopper until Recirc level is reached (approximately half way to the tap water fill level)
- Run the Recirc pump for several minutes to clear out brine and debris from Recirc/Tap Water assembly & hoses
- Disconnect transfer hose
- Turn on transfer to empty wash water through transfer pump
- Reconnect transfer hose
- Remove hoses from Truck Fill Pump
- Rinse thoroughly with a hose or similar (several minutes) to ensure that all salt brine/debris is removed from pump

Note: pumps can be treated with an anticorrosive such as RV or 50/50 Antifreeze once the brine has been thoroughly rinsed out

DATE: _____ SITE: _____
SERIAL# _____

FILL TANK AND CASE DRAIN

MOTOR ROTATION

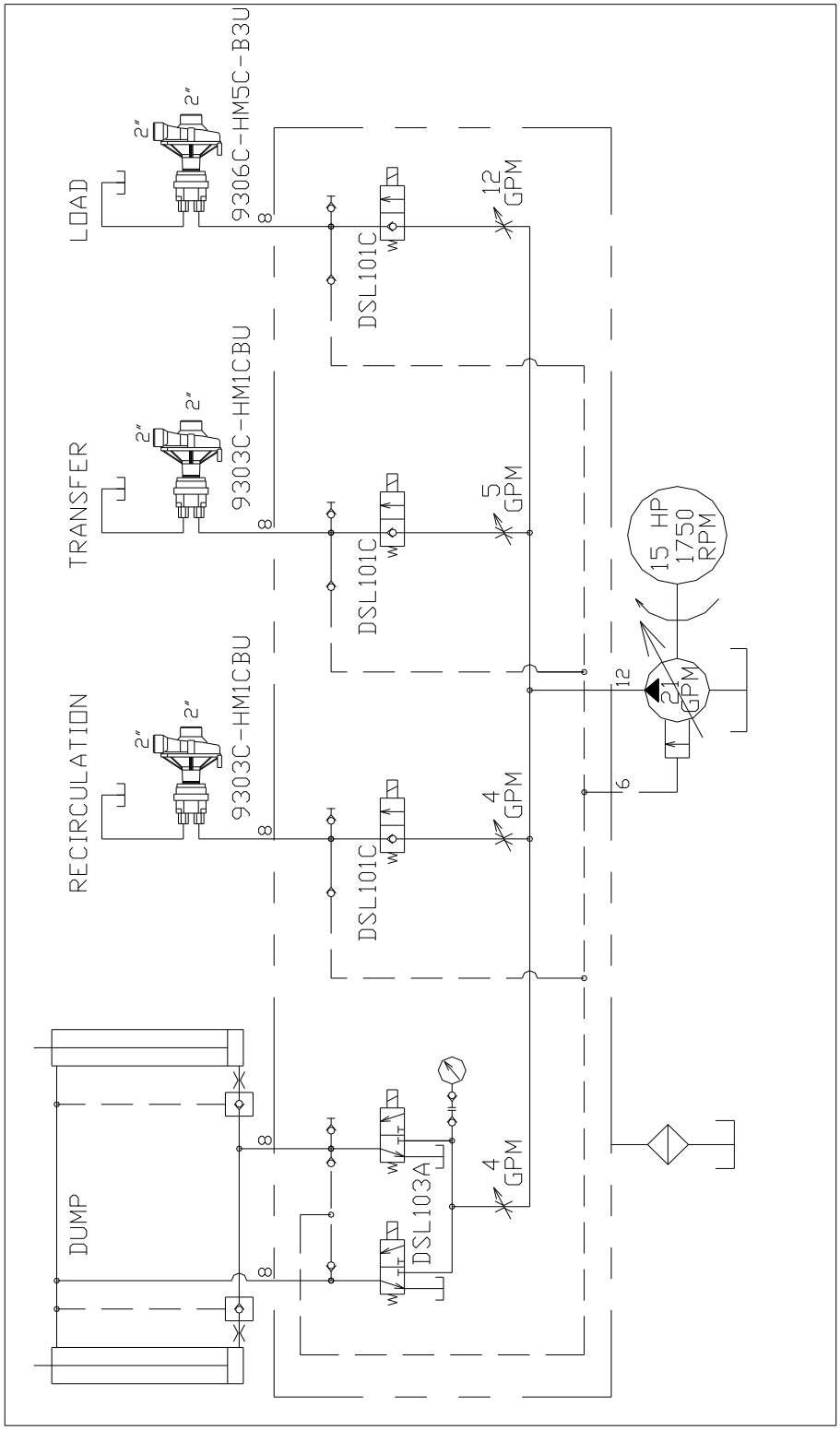
STORAGE, SALINITY, RECIRC, TAP WATER
FLOATS: ☐

LOAD SENSE PRESSURE PSI _____
PUMP PRESSURE PSI _____

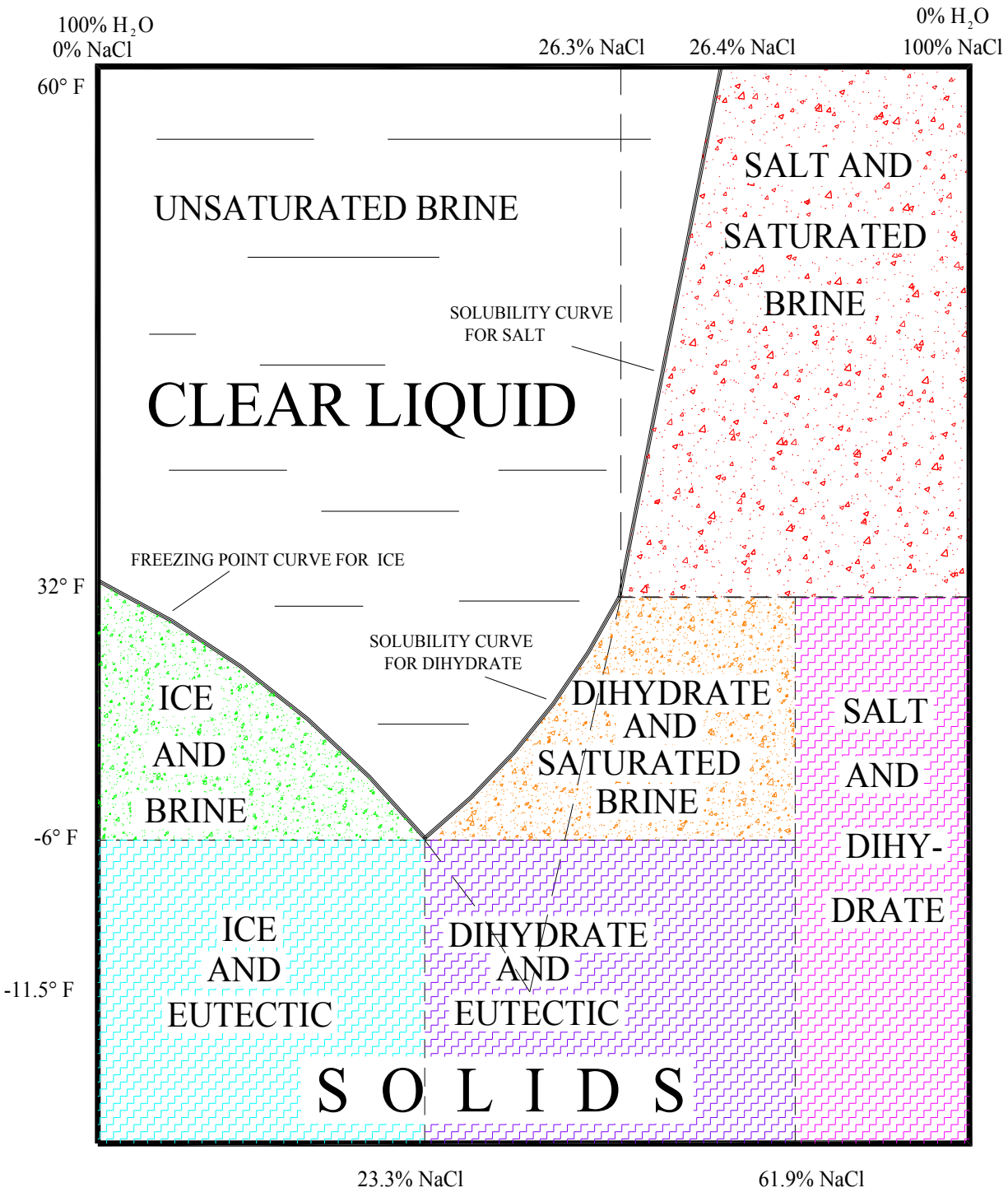
HOPPER UP ☐
HOPPER DN ☐
BOX ☐
TRANSFER ☐
RECIRCULATION ☐
TRUCK FILL ☐
BOX ☐
LOW SAL. LIGHT ☐

MAX AMPS (Marked on Motor Plaque): _____A
AMPS:
No Load:_____A
Recirc Only:_____A
Recirc and Transfer:_____A

Hydraulic Circuit Diagram

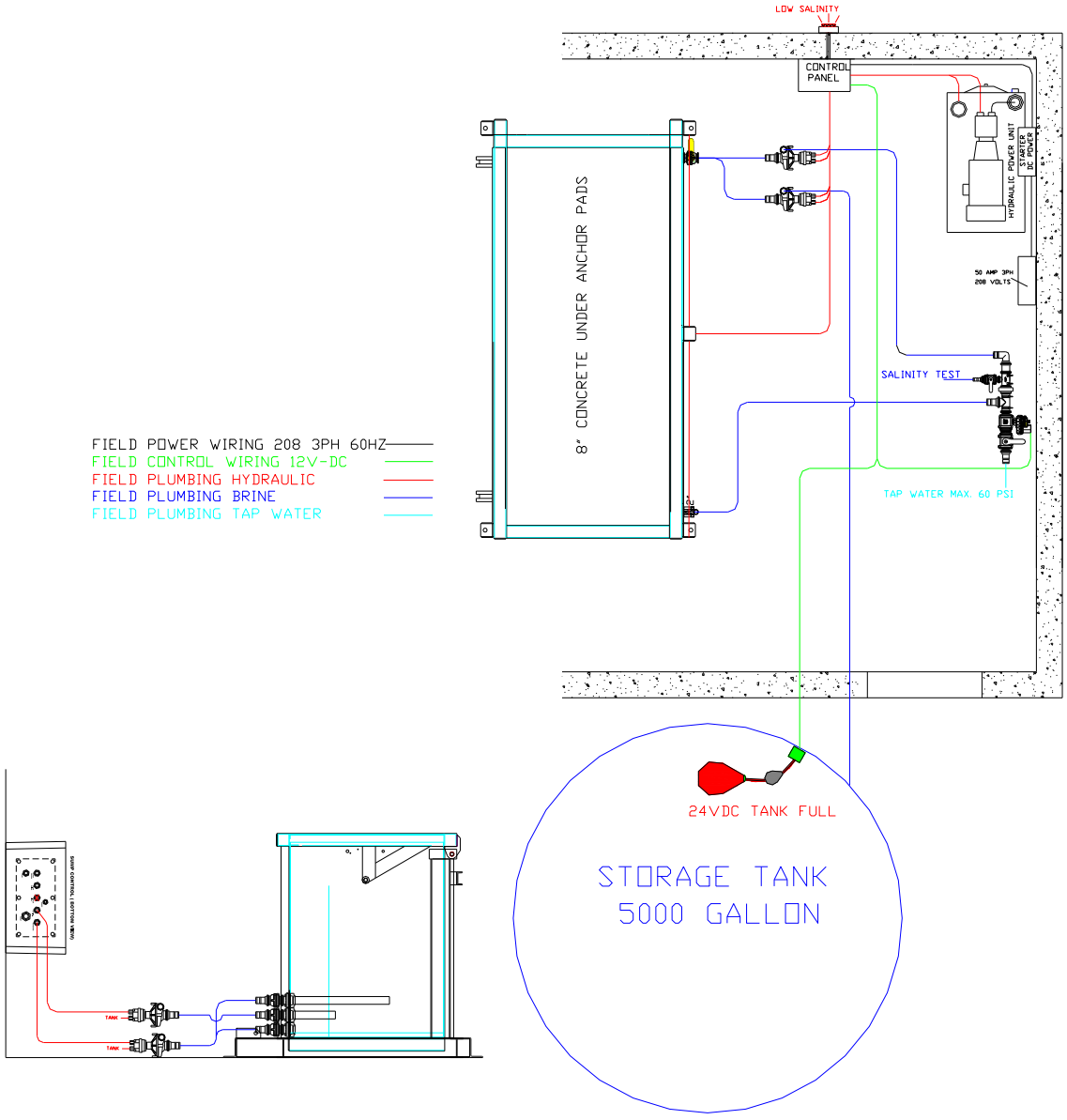


NaCl/H_2O PHASE CHART



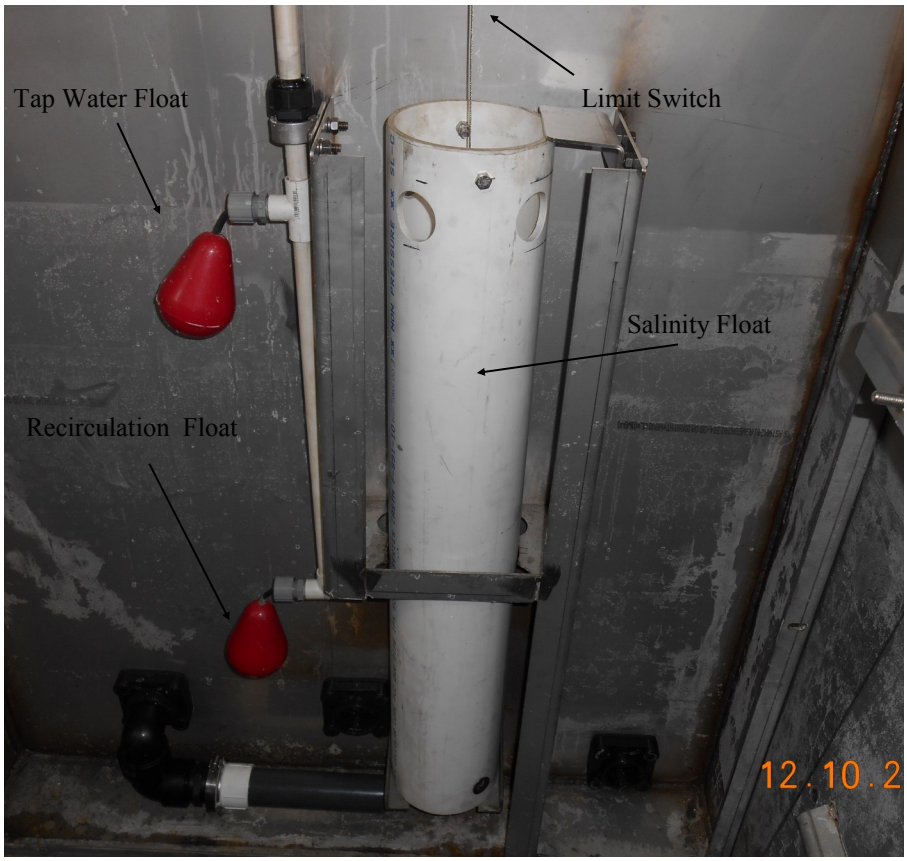
SALOMETER DEGREES	SPECIFIC GRAVITY	BAUME DEGREES	PERCENT SODIUM CHLORIDE BY WEIGHT	POUNDS PER GALLON OF BRINE (NaCl)	POUNDS PER GALLON OF BRINE (WATER)	FREEZING POINT DEGREES FAHRENHEIT
0	1.000	0.0	0.000	0.000	8.328	+32.0
2	1.004	0.6	0.528	0.044	8.318	+31.5
4	1.007	1.1	1.056	0.089	8.297	+31.1
6	1.011	1.6	1.584	0.133	8.287	+30.5
8	1.015	2.1	2.112	0.178	8.275	+30.0
10	1.019	2.7	2.640	0.224	8.262	+29.3
12	1.023	3.3	3.167	0.270	8.250	+28.8
14	1.026	3.7	3.695	0.316	8.229	+28.2
16	1.030	4.2	4.223	0.362	8.216	+27.6
18	1.034	4.8	4.751	0.409	8.202	+27.0
20	1.038	5.3	5.279	0.456	8.188	+26.4
22	1.042	5.8	5.807	0.503	8.175	+25.7
24	1.046	6.4	6.335	0.552	8.159	+25.1
26	1.050	7.9	6.863	0.600	8.144	+24.4
28	1.054	8.5	7.391	0.649	8.129	+23.7
30	1.058	9.0	7.919	0.698	8.113	+23.0
32	1.062	9.5	8.446	0.747	8.097	+22.3
34	1.066	10.0	8.974	0.797	8.081	+21.6
36	1.070	10.5	9.502	0.847	8.064	+20.9
38	1.074	11.0	10.030	0.897	8.047	+20.2
40	1.078	11.5	10.558	0.948	8.030	+19.4
42	1.082	12.0	11.086	0.999	8.012	+18.7
44	1.086	12.5	11.614	1.050	7.994	+17.9
46	1.090	12.9	12.142	1.102	7.976	+17.1
48	1.094	13.4	12.670	1.154	7.957	+16.2
50	1.098	13.9	13.198	1.207	7.937	+15.4
52	1.102	14.4	13.725	1.260	7.918	+14.5
54	1.106	14.8	14.253	1.313	7.898	+13.7
56	1.110	15.3	14.781	1.366	7.878	+12.8
58	1.114	15.8	15.309	1.420	7.858	+11.8
60	1.118	16.2	15.837	1.475	7.836	+10.9
62	1.122	16.7	16.365	1.529	7.815	+9.9
64	1.126	17.2	16.893	1.584	7.794	+8.9
66	1.130	17.7	17.421	1.639	7.772	+7.9
68	1.135	18.1	17.949	1.697	7.755	+6.8
70	1.139	18.6	18.477	1.753	7.733	+5.7
72	1.143	19.1	19.004	1.809	7.710	+4.6
74	1.147	19.6	19.532	1.866	7.686	+3.4
76	1.152	20.0	20.060	1.925	7.669	+2.2
78	1.156	20.4	20.588	1.982	7.645	+1.0
80	1.160	21.0	21.116	2.040	7.620	-0.4
82	1.164	20.4	21.644	2.098	7.596	-1.6
84	1.169	21.0	22.172	2.158	7.577	-3.0
86	1.173	21.4	22.700	2.218	7.551	-4.4
88	1.178	21.9	23.228	2.279	7.531	-5.8
88.3*	**1.179**	**22.0**	**23.310**	**2.288**	**7.528**	**-6.0***
90	1.182	22.3	23.755	2.338	7.506	-6.0*
92	1.186	22.7	24.283	2.398	7.479	-6.0*
94	1.191	23.3	24.811	2.459	7.460	-6.0*
95	1.193	23.5	25.075	2.491	7.444	-6.0*
96	1.195	23.7	25.339	2.522	7.430	-6.0*
97	1.197	23.9	25.603	2.552	7.417	-6.0*
98	1.200	24.2	25.867	2.585	7.409	-6.0*
99	1.202	24.4	26.131	2.616	7.394	-6.0*
99.6	1.203	24.5	26.285	2.634	7.386	-6.0*
100	1.204	24.6	26.395	2.647	7.380	-6.0*

Standard Brine System Wiring and Plumbing Diagram



NOTE: FIELD PLUMBING AND WIRING BY CUSTOMER
PER DOT CONTRACT AND TO APPLICABLE BUILDING CODES

Integral Sump Design



Integral Sump shown with baffling removed

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