Startup, Operation, and Maintenance Manual for Wash Water Treatment and Reuse Systems

FINAL DRAFT

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District 10 Storm Water Program

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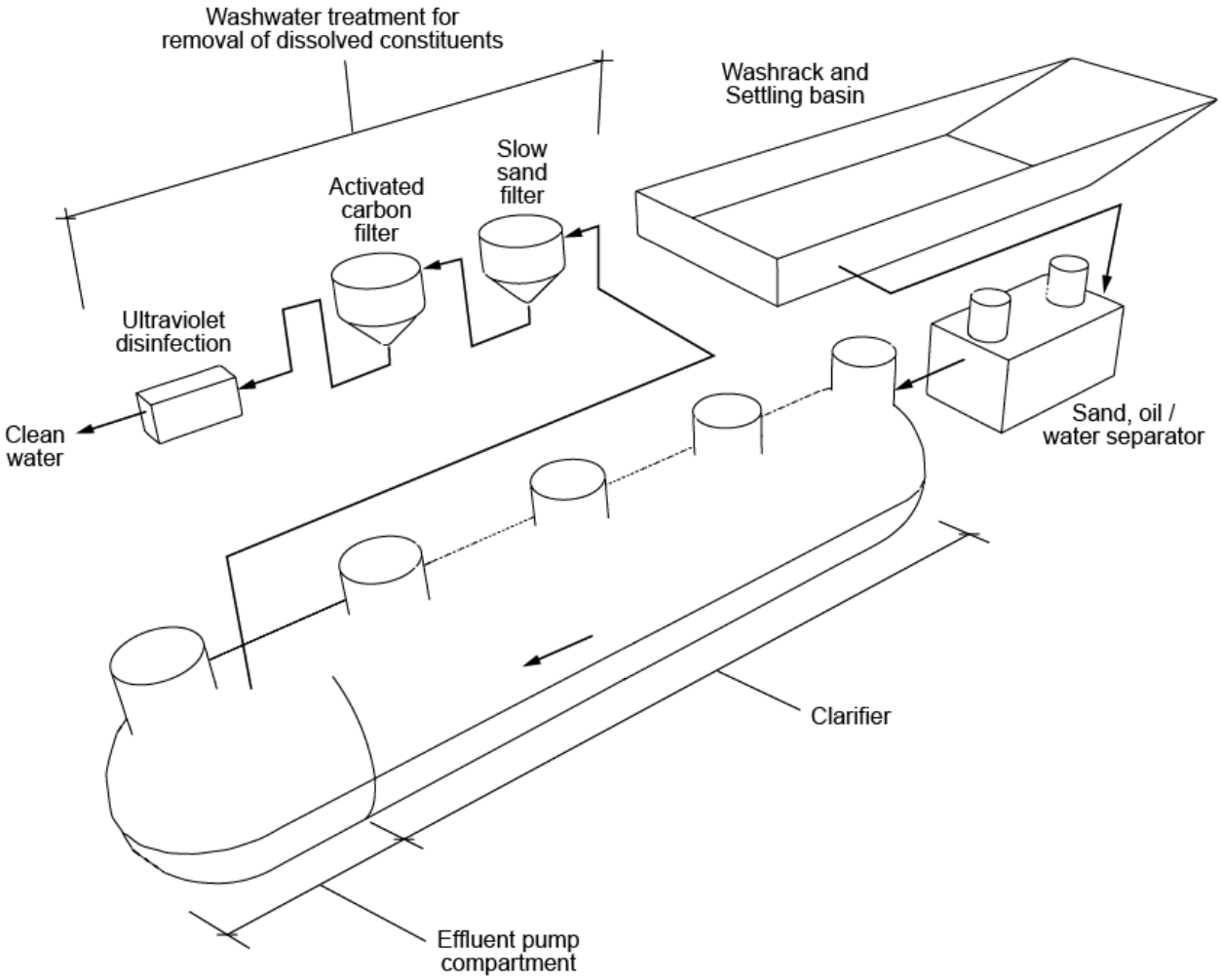
Caltrans District 10

Washrack Wastewater Treatment System

Start-up, Operations, and Maintenance Manual

December 2013



Contents

1. Overview of the Waste Wash Water Treatment System (WWWTS) 1

1.1. Overview 2

1.2. Purpose of WWWTS 2

2. Overview of Startup, Operation, and Sampling 3

2.1. Startup and Commissioning 3

2.2. Routine Operation and Maintenance 3

2.2.1 Record Keeping 3

2.2.2 Daily Maintenance 3

2.2.3 Weekly Maintenance 4

2.2.4 Monthly Maintenance 4

2.2.5 Annual Maintenance 4

2.3. Sampling and Data Collection 4

2.3.1 Sampling Locations 5

2.3.2 Sample Care and Handling 7

2.3.3 Sample Schedule 7

3. Rinse Pad and Sedimentation Basin 8

3.1. Startup and Commissioning 10

3.1.1 Appurtenances Check 10

3.1.2 Hydraulic Check 11

3.2. Routine Operation and Maintenance 11

3.3. Sampling and Data Collection 11

4. Sand, Oil, Water Separator 13

4.1. Startup and Commissioning 14

4.1.1 Appurtenance check 14

4.1.2 Leak check 14

4.1.3 Hydraulic check 14

4.2. Routine Operation and Maintenance 14

4.2.1 Tank Cleanout 15

4.3. Sampling and Data Collection 15

5. Clarifier 16

5.1. Startup and Commissioning 16

5.1.1 Appurtenance Check 16

5.1.2 Leak check 19

5.1.3 Pump vault check (systems with pump package only) 19

5.1.4 Pumping system check (systems with pump package only) 20

5.2. Routine Operation and Maintenance 22

5.2.1 Alarms (systems with pump package or high water sensors only) 22

5.2.2 High water level alarms (systems with pump package only) 22

5.2.3 Low water level alarms (systems with pump package only) 24

5.2.4 Replacing float switches (systems with pump package only) 24

5.2.5 Replacing pumps (systems with pump package only) 25

5.2.6 Tank cleanout 26

5.3. Sampling and Data Collection 26

6. Slow Sand Filter 27

6.1. Startup and Commissioning 28

6.1.1 Appurtenance check 28

6.1.2 Initial filling with water 29

6.1.3 Leak check 29

6.1.4 Hydraulic check 29

6.2. Routine Operation and Maintenance 30

6.2.1 Filtration Rate and Filter clogging 30

6.2.2 Cleaning the Filter 30

6.3. Sampling and Data Collection 31

7. Activated Carbon Filter 32

7.1. Startup and Commissioning 33

7.1.1 Appurtenance check 33

7.1.2 Initial filling with water 33

7.1.3 Leak check 33

7.1.4 Hydraulic check 33

7.1.5 Check UVA sensor 34

7.2. Routine Operation and Maintenance 34

7.2.1 Determine UVA baseline 34

7.2.2 UVA sensor automated cleaning of quartz cuvette 34

7.2.3 UVA sensor parts replacement 35

7.2.4 Carbon filter exchange 35

7.3. Sampling and Data Collection 37

8. UV Disinfection 38

8.1. Startup and Commissioning 39

8.1.1 Appurtenance check 39

8.1.2 Leak check 39

8.1.3 Hydraulic check 39

8.2. Routine Operation and Maintenance 39

8.2.1 Remove the Disinfection Unit 39

8.2.2 Clean the Disinfection Unit 40

8.2.3 Replace the Lamp in the Lamp Assembly 40

8.3. Sampling and Data Collection 41

9. Effluent Management System 42

9.1. Startup and Commissioning 44

9.1.1 Appurtenance check 44

9.1.2 Leak check 44

9.1.3 Hydraulic check 44

9.2. Routine Operation and Maintenance 45

9.3. Sampling and Data Collection 45

10. APPENDIXES 46

1. Overview of the Waste Wash Water Treatment System (WWWTS)

The cleaning of equipment at highway maintenance stations (HMS) results in the production of a waste wash water (WWW) that must be treated before it can be discharged to the environment or reuse. A low tech and easy to maintain process, described in this manual, has been developed specifically for this WWW (see Fig. 1-1). To ensure long-term reliable performance of the WWW treatment system (WWWTS), the following start-up, operation, and maintenance manual has been prepared. In this section, a brief introduction to the WWWTS and the primary system components is presented. For additional assistance on the information and instructions found in this manual, contact Water and Wastewater Branch staff in the Division of Engineering Services at (916) 227-8526.

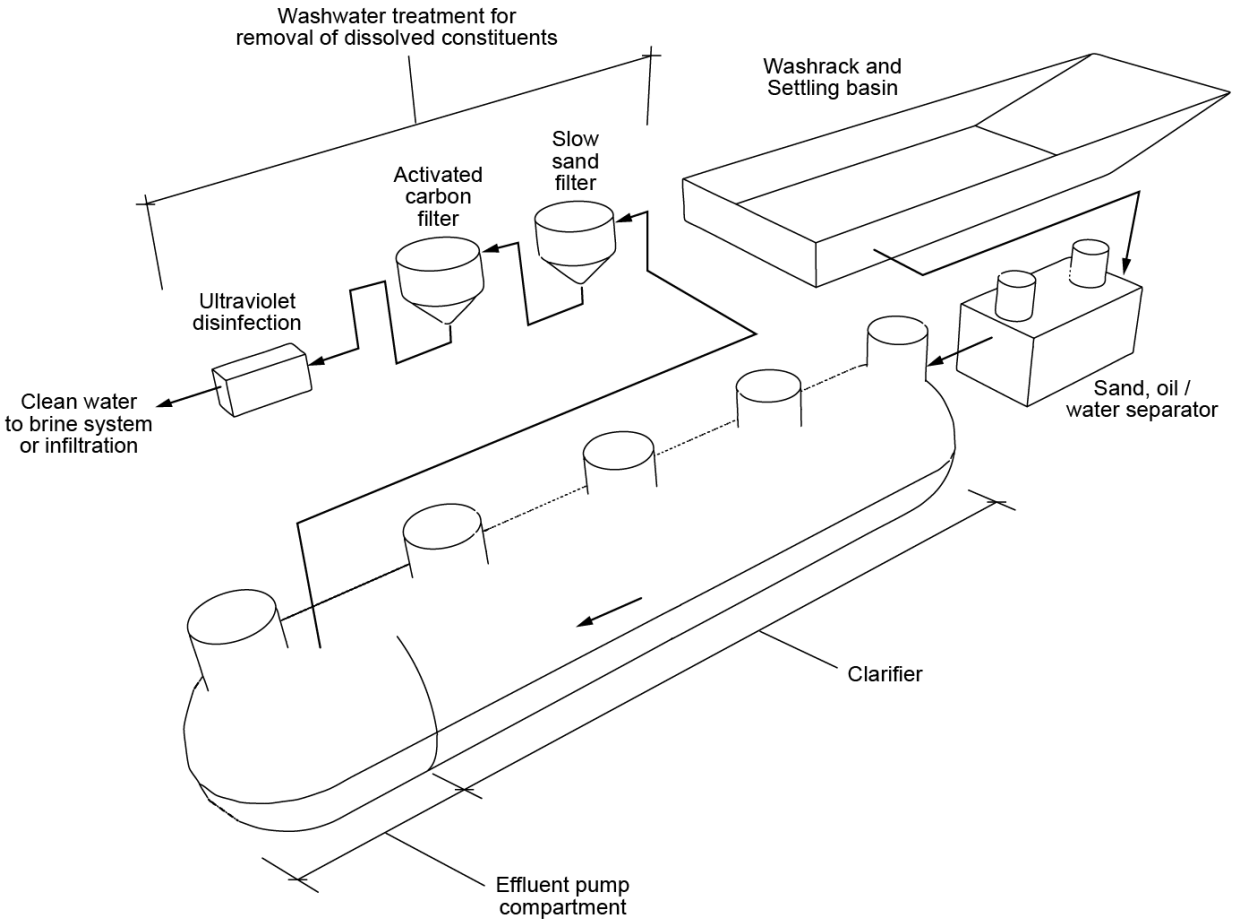


Figure 1-1
Conceptual view of the waste wash water treatment system (WWWTS)

1.1. Overview

The general theory of operation consists of the following steps:

1. Water and materials rinsed from trucks and other equipment flows into the sedimentation basin where a great fraction of the suspended solids and other debris will be retained. The sedimentation basin is cleaned on an as-needed basis using a loader.

2. Effluent from the sedimentation basin flows through a sand oil water separator (SOWS) to capture some floating petroleum and settleable matter. The SOWS will need to be pumped periodically to remove accumulated materials from the SOWS.

3. The clarifier is designed to facilitate sedimentation, without the need for coagulants or other chemicals. With proper upstream treatment, the clarifier may be able to operate for years before cleanout is necessary. Very fine solids will be captured in the clarifier.

4. A slow sand filter is used to remove remaining fine soilds and prepare the effluent for advanced treatment.

5. Activated carbon is used to remove dissolved organic and metallic constituents, including oil and diesel range organics.

6. UV disinfection is used to inactivate any remaining microorganisms.

7. Final effluent is pumped to a storage tank that can be used as an input to a salt brine production process, or delivered to an soil-based effluent dispersal system.

1.2. Purpose of WWWTS

The purpose of the wash rack and wash water treatment system at highway maintenance stations (HMS) is to facilitate the cleaning of equipment and ensure water quality suitable for a variety of alternative dispersal systems. The constituents of primary concern are toxic compounds, metals, hydrocarbons, salts, and chemicals used in vehicle maintenance and washing. The WWW treatment system described in this manual was designed to (1) be low maintenance and easy to maintain with basic tools and limited special training, (2) minimize the number of pumps and use simple controls, and (3) produce water that is suitable for recycling or onsite discharge. While the treatment system makes use of processes that are mostly passive, the operation and maintenance activities described in this manual are critical for long-term performance.

2. Overview of Startup, Operation, and Sampling

Operation and maintenance activities are essential to the successful long-term performance of this Onsite Wastewater Treatment System. The following list is provided as a guide to O&M activities; however, if any problems are observed at any time, Division of Engineering Services, Water and Wastewater Section (916) 227-8526, should be notified immediately.

2.1. Startup and Commissioning

An engineer from Division of Engineering Services, Water and Wastewater Section (916) 227-8526 and the equipment manufacturer should be at the site during start up to answer questions. **Note that all tanks should be started up full of fresh water for the startup testing and again before the system is put online and never allowed to fill up only with waste wash water.** Only after successfully completing this start up procedure should any waste wash water be directed into the system. This procedure should be conducted well in advance of opening the facility in case repairs or adjustments need to be made. It is important to take appropriate safety precautions regarding the safe handling of waste water and equipment used for waste water treatment.

2.2. Routine Operation and Maintenance

The routine maintenance procedures are outlined below. Specific maintenance activities are described in the following sections. Maintenance activities associated with certain equipment, such as pumping systems, brine generation, and online UVA measurements, should be obtained from the O&M manual provided by the equipment vendor.

2.2.1 Record Keeping

Maintain a written log book or diary describing all activities relating to the WWWTS. Once a month, send copies of the diary, by mail, fax or electronic transmission, to Department of Transportation, Division of Engineering Services, Water and Wastewater Section, 1801 30th St. MS 9-3/11H, Sacramento, CA 95814. To submit copies of the reports by fax or electronic transmission, contact the Division at (916) 227-8526. This information is very valuable for analysis and troubleshooting if problems should occur.

2.2.2 Daily Maintenance

Once a day:

- Record values from all flow meters and sensors associated with the water supply and WWWTS in system log book.

- Make a visual observation of the system to ensure that there is no water surfacing or alarm conditions.
- Record any operation and maintenance activities associated with the system, including:
    - Alarms
    - Any maintenance issues
    - Description of any maintenance issues and resolutions
    - Volume of brine produced from potable and treated water
    - Amount and nature of solids removed form sedimentation basin

2.2.3 Weekly Maintenance

Once a week, perform water quality testing as listed in Table 2-1 for weekly samples. Record all values and notes in system log book.

2.2.4 Monthly Maintenance

Once a month perform the following actions. Record all values and notes in system log book.

- Perform water quality testing listed in Table 2-1 for monthly samples.
- Measure solids and water level sediment basin, SOWS, and clarifer.
- Check the pump run times and event counters for all pumps once a month.
- Check that the effluent splitter box is working correctly and visually inspect infiltration area
- Check filtration rate for slow sand filter; if filtration rate is found to be low, perform maintenance activities (see Section 6).
- Clean UV lamp (see Section 8)

2.2.5 Annual Maintenance

Once a year perform the following actions. Record all values and notes in system log book.

- Perform water quality testing listed in Table 2-1 for annual samples.
- Test carbon filters to determine if they need to be replaced (see Section 7)
- Change UV lamp, if needed (see Section 8)

2.3. Sampling and Data Collection

Sampling and monitoring of the treatment system is to demonstrate compliance with Waste Discharge Requirements (WDRs) issued by the Regional Water Quality Control Board

(RWCQB). Review the WDRs for details on the monitoring and reporting requirements. Recommendations for additional sampling and evaluation criteria are discussed below.

2.3.1 Sampling Locations

Samples should be obtained from specified locations and using consistent sampling techniques for the most consistent and representative record of performance data. An overview of the sampling locations is shown on Fig. 2-1. As shown on Fig. 2-1, there are about 13 potential sampling points, including potable supply, waste washwater influent, intermediate process samples, and effluent. In some cases, a pump will need to be energized to move water to a specific sampling location.

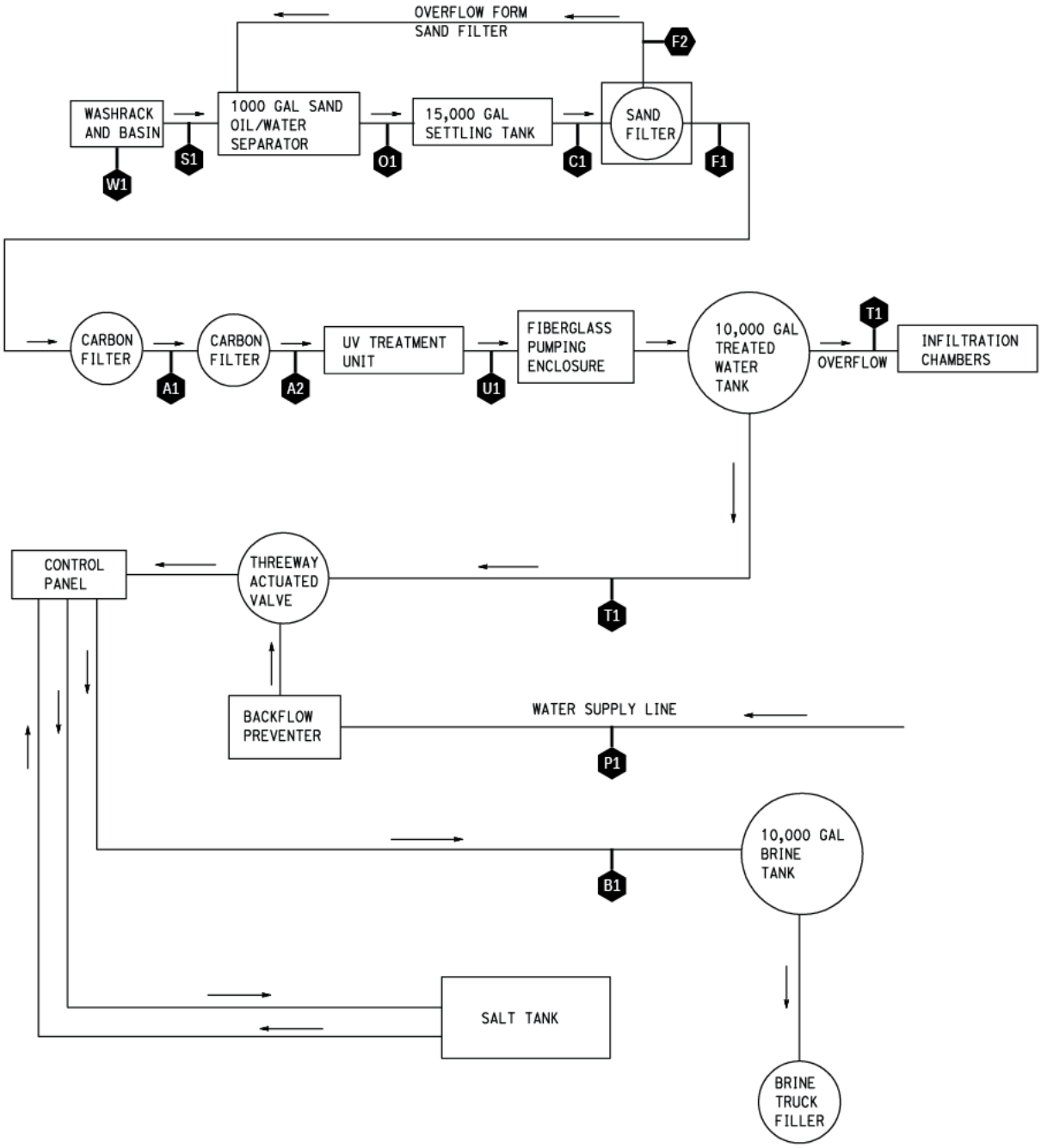


Figure 2-1
Flow diagram for the WWWTS including sample locations

2.3.2 Sample Care and Handling

Water samples that will be analyzed in a laboratory shall be collected by the laboratory or a consultant in laboratory provided containers and delivered for analysis to the laboratory pursuant to their direction. Check with the laboratory in advance for direction on sample volumes required, preservation techniques, and handling prior to analysis.

2.3.3 Sample Schedule

The samples should be analyzed according to the following schedule:

Table 2.1
Generic sampling matrix for waste wash water treatment systems in snow areas

	Parameter								
Sample	COD (mg/L)	TPH Diesel (μg/L)	TSS (mg/L)	TDS (mg/L)	Total coliform (No./100 mL)	Fecal coliform (No./100 mL)	pH	Cond. (mS/cm)	UVA (1/cm)
W1	M	M	M	M					
S1	M	M	M	M					
O1	M	M	M	M					
C1	M	M	M	M	M	M			
F1	M	M	M	M	M	M	W	W	W
F2									
A1		M					W	W	W
A2		M			M	M	W	W	W
U1					M	M			
T1	M	M	M	M	M	M	W	W	W
P1							W	W	W
B1									

Note: M = monthly; W = weekly

Use a testing laboratory that is certified by the California Department of Public Health. In general, samples shall be collected and delivered to the lab in accordance with their directions. A copy of all lab results obtained shall be sent to, the Department of Transportation, Division of Engineering Services, Water and Wastewater Section, 1801 30th Street, MS 9-3/11H, Sacramento, CA 95814. To submit copies of the reports by fax or electronic transmission, contact the Division at (916) 227-8526.

3. Rinse Pad and Sedimentation Basin

A sedimentation basin is an at-grade settling basin with an access ramp located at one end of the basin (as shown on Fig. 3-1). Runoff from the rinse pad drains into the sedimentation basin. The ramp is designed so that a loader can remove dirt and debris from the basin.

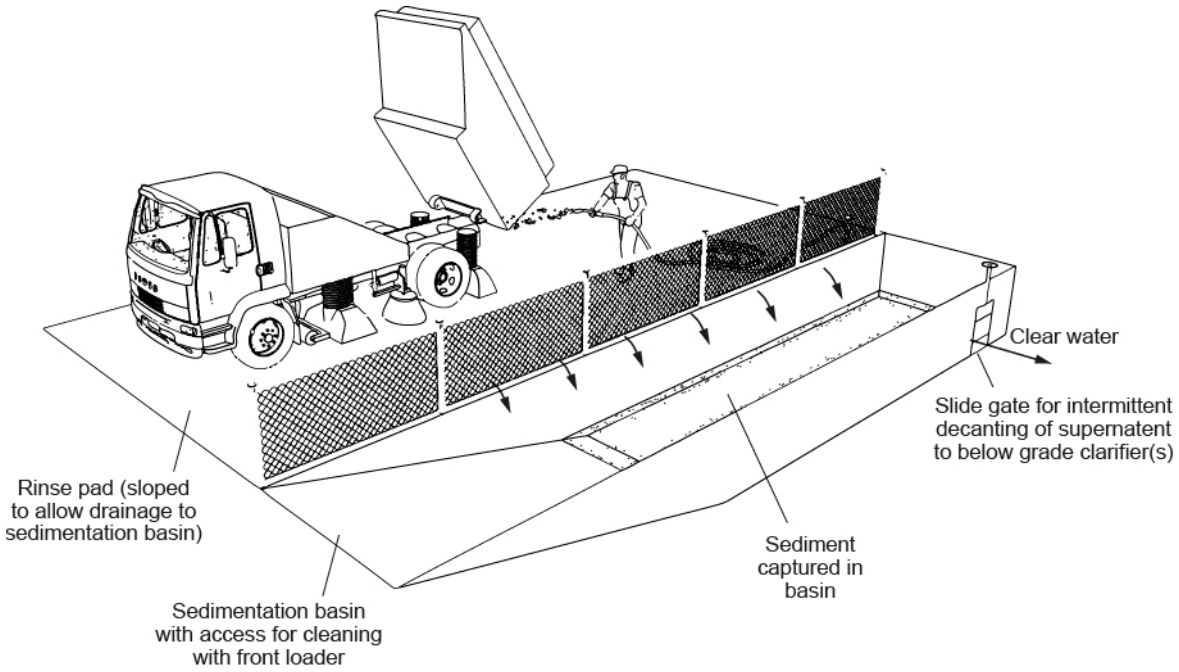


Figure 3-1
Conceptual view showing major elements of rinse pad with at-grade sedimentation basin

Vehicles such as sweepers, vacuum trucks, dump trucks, and sanders are often associated with heavy sediment loads. It is important to remove these solids via sedimentation to reduce loads to downstream systems that are more difficult and expensive to maintain (i.e., pumping out water and solids from large underground tanks). The rinse pad is graded to drain into the sedimentation basin by gravity. In the sedimentation basin, heavy particles and other debris (e.g., sand, gravel, leaves) settle to the bottom and clear water flows through a screened outlet box to the SOWS. When stored sediment needs to be removed, a front-end loader or other earth moving equipment can be used to clear the basin. Details from the plan sheets are shown on Figs. 3-2 and 3-3.

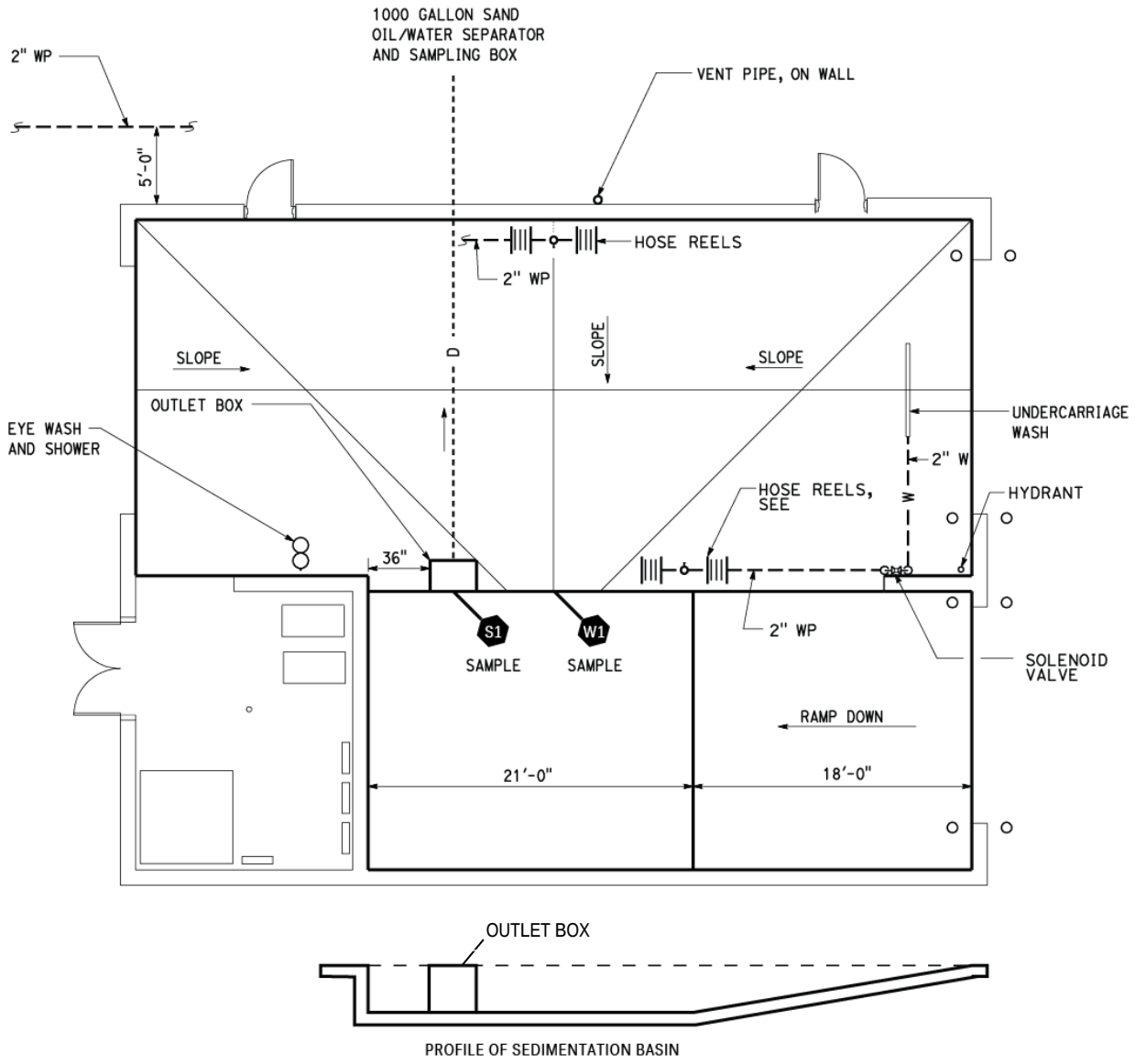


Figure 3-2
Plan view of generic wash pad with at-grade sedimentation basin; a profile of the sedimentation basin is also shown

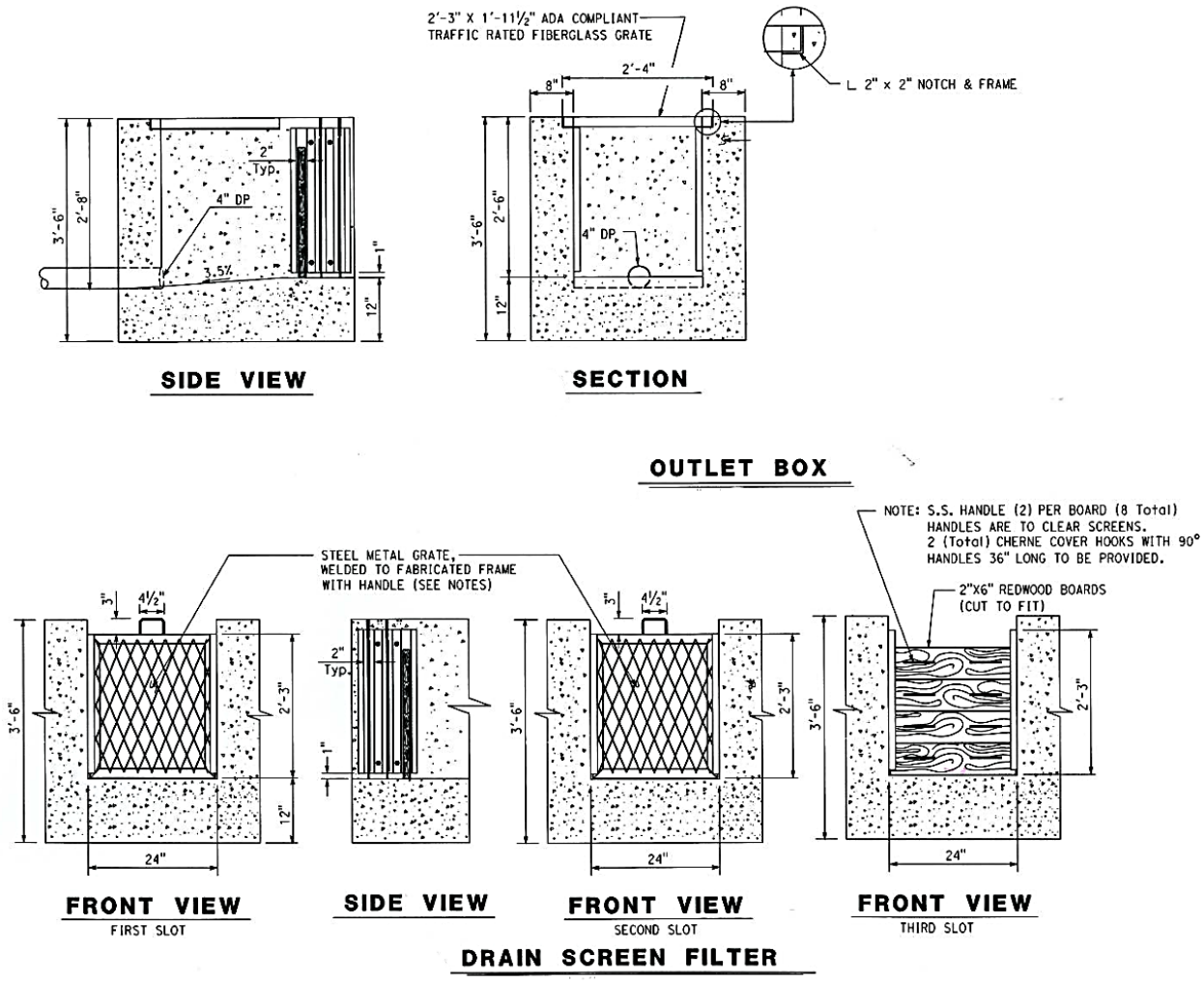


Figure 3-3
Sedimentation basin effluent structure: outlet box design (top) and screen filter (bottom)

3.1. Startup and Commissioning

The startup process is relatively simple for the sedimentation basin because there are no pumps or sensors involved in the operation. The primary considerations are checking the installation of the drain screens and checking the system hydraulics.

3.1.1 Appurtenances Check

The drain screens and redwood stop boards should be installed as shown on the plan sheets on Fig. 3-2. If needed, the coarse screen should be installed nearest to the opening to the

sedimentation basin and the finer screen should be installed behind the coarse screen. The screens should slide into the grooves easily.

3.1.2 Hydraulic Check

The purpose of the hydraulic check is to confirm that water flows through the system as intended. The following items should be checked at startup.

- Discharge water onto the washpad to simulate vehicle washing. Observe that the washpad is graded properly for free drainage and that water flows into the sedimentation basin and not off the other edges of the washpad.
- Water should be placed in the sedimentation basin to confirm that it drains properly. Water should not pond on the washpad.
- Ponded conditions have the potential to generate odors or create habitat for mosquitos.
- Finally, check that stormwater will not enter the washpad area and/or the WWWTS.

3.2. Routine Operation and Maintenance

The standard operation and maintenance procedures for the sedimentation basin include the following items:

- Remove solids from the basin using a loader as needed to minimize the generation of odors and the carryover of solids into the downstream processes.
- The screens should be cleaned to ensure that water does not accumulate in the basin long enough to cause nuisance conditions.
- If stop boards are used in addition to the screen(s) water can be decanted from the basin in a manner that maximizes the sedimentation and retention of fine suspended particles. Follow posted signage for instruction on basin management. One potential approach for management of water in the basin could consist of decanting the basin on Monday morning, or following other periods of limited use. Water should not be allowed to overtop the basin.

3.3. Sampling and Data Collection

Two sample locations are associated with the sedimentation basin, as shown on Fig 3-2. The two sample locations are:

- W1: water leaving the rinse pad and flowing into the sedimentation can be sampled at the point where it flows off the rinse pad and into the basin. Because of the great variation in water quality that occurs during the stages of vehicle washing, under ideal conditions a composite water sample should be collected such that the sample is representative. To collect a composite sample, a number of small flow-weighted subsamples are collected at regular intervals. The subsamples should then be combined together to form a composite sample.
- S1: effluent from the rinse pad can be collected at the outlet of the basin before it flows into the sand oil water separator. The specific methodology for collecting water samples will depend on the design of the basin. In general, care should be taken to ensure that the sample is not contaminated during the sample collection process.

4. Sand, Oil, Water Separator (SOWS)

The SOWS is a two-compartment underground concrete tank designed to promote the settling of coarse particles and the separation of lighter hydrocarbons (i.e., oil). The influent compartment is utilized to settle relatively large suspended solids that were not removed in the sedimentation basin. The effluent compartment is used to collect floating oil by constructing the outlet structure inlet 6 to 12 in. below the water surface. Under quiescent conditions, oil is separated from the water through natural flotation due to specific gravity (density) differences. The incoming solids settle in the bottom of the tank by gravity also due to density differences. A diagram of the process from the plan sheets is shown on Fig. 4-1. The SOWS tank should have water in it at all times and is filled with clean water during startup. Large quantities of extraneous flow (such as stormwater) should be diverted from the SOWS to avoid wash out of oil and solids, which will overwhelm downstream wastewater treatment units.

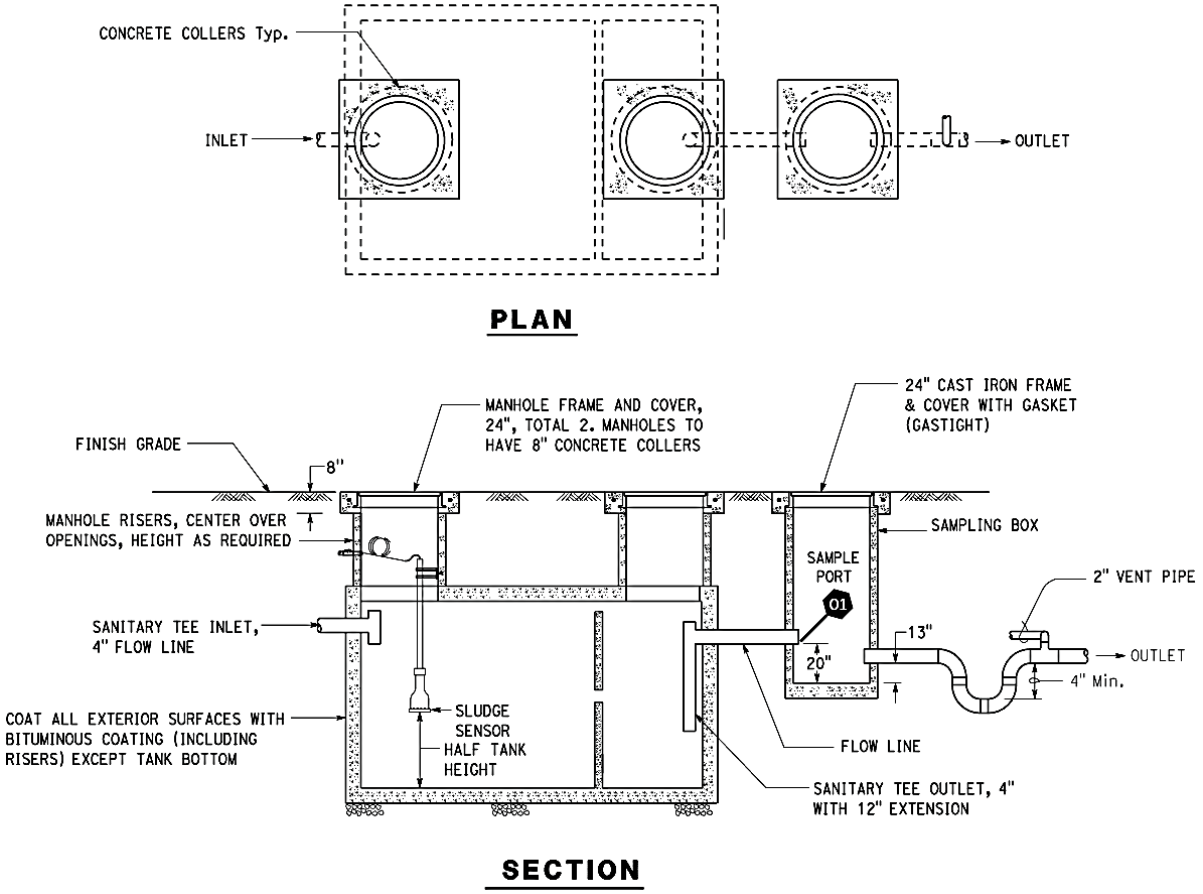


Figure 4-1
Schematic of sand, oil, water separator (SOWS)

4.1. Startup and Commissioning

The startup and commissioning process for the SOWS is limited to checking for proper installation of the process components, integrity of the tank, and hydraulic operation.

4.1.1 Appurtenance check

- Confirm the location of the sludge sensor in the first compartment of the SOWS.
- Locate the control unit for the sludge sensor.
- Obtain a copy of the manual and program and check the operation of the sludge level sensor placed in the tank. (Attach copy of the manual to this document)

4.1.2 Leak check

The SOWS should be tested for leaks during installation and again prior to start-up. The key elements of the procedure are as follows:

- All inlets and outlets are plugged and the water level is brought up two inches into the access riser, so that the inlet, outlet, and riser connections are all proven to be watertight prior to start-up.
- If risers have joints between sections, they also must be tested for watertight integrity.
- Confirm that the water level does not change after 24 hours.
- If there is a change in the water level, the cause must be determined and repaired prior to start up.

4.1.3 Hydraulic check

The purpose of the hydraulic check is to confirm that water flows through the system as intended. The following items should be checked at startup.

- The inlet water level should be at or below the invert of the inlet sanitary tee (as shown on Fig. 4-1)
- The outlet water level should be located at the invert of the outlet sanitary tee.
- Check that the required fall in the sampling box is present under normal operating conditions

4.2. Routine Operation and Maintenance

The operation and maintenance activities and their frequency will vary depending on type of facility that the unit serves. However, some general procedures should be followed to

guarantee the best performance of the SOWS. Visual inspections should be conducted regularly during periods of heavy usage.

4.2.1 Tank Cleanout

Oil and sediment depth should be checked periodically. Oils should be removed using oil adsorbent pillows. Sediment should be removed when the depth reaches the bottom of the cross over tee (about 12 to 24 in.). Sludge and oil removal via tank pumping will vary from facility to facility; cleaning frequency will vary depending on the operation of the sedimentation basin. Prior to tank pumping the following must be completed:

- If there are floating solids in the tank or if the pump/filter vault is impeding cleanout of the tank, remove the effluent filter and vault (if applicable).
- Pump tank contents
- If applicable, replace pump vault and/or effluent filter.
- Refill tank with water to a level above the inlet ports after pumping and before introducing new waste wash water into the tank
- Record all maintenance activities in the system diary. Also record any observations that were made regarding the tank or system in general

4.3. Sampling and Data Collection

Do not rely on manufacturer's literature or claims to determine performance. Typically, vendor literature does not address important characteristics such as highly variable flow rates and variations in suspended solids and oil concentrations (U.S. ACE, 1994, 1997, 2001). Sampling and testing the wastewater effluent should be conducted at least annually to monitor OWS performance.

- O1: effluent from the SOWS can be collected at the sampling box. The specific methodology for collecting water samples will depend on the installation of the sample box. In general, care should be taken to ensure that the sample is not contaminated during the sample collection process.

5. Clarifier

The clarifier is included as a pretreatment technology to removal the bulk of the fine particles that are not removed in the SOWS. Large clarifiers remove these smaller particles (i.e., <2 μm) via plain sedimentation, where particles are removed by gravity settling without the addition of chemical coagulants. Plain sedimentation requires a large volume to allow for the relatively slow settling of small particles; the detention time (or hydraulic retention time, HRT) ranges from 12 hours to several days depending on the settling characteristics of the particles present in the water (Shammas et al., 2005). The clarifiers are designed typically for flowrates up to about 2,500 gal/d, with a design average flow rate around 500 gal/d. The clarifier tank may be a single large compartment or may be split into multiple compartments.

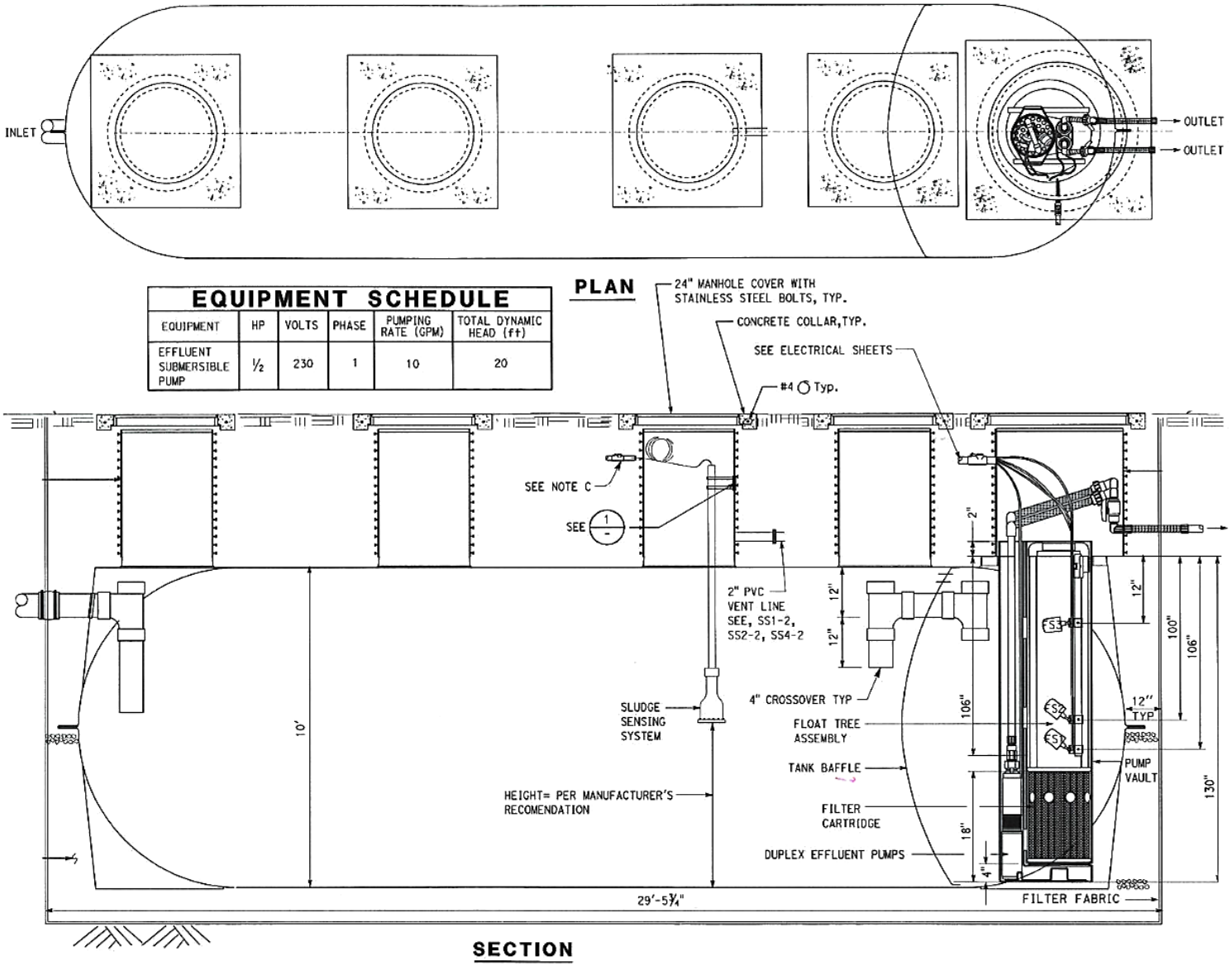
5.1. Startup and Commissioning

The startup and commissioning process for the clarifier is similar to that given for the SOWS, checking proper installation of the process components, integrity of the tank, and hydraulic operation. Note that clarifiers may include a pumping system (see Fig. 5-1) or can be stand-alone (see Fig. 5-2). Clarifiers that include effluent pumping have some additional startup operations, as described below.

5.1.1 Appurtenance Check

Items associated with the clarifier that require checking prior to start-up, include the influent and effluent structures, sludge sensors (if used), and security of riser lids.

- The cross-overs and inlet piping should be secure and free from movement. Check that water is able to move freely between the compartments.
- Check that all lids are secure. CAUTION! The tank access lid must be properly secured to the riser at all times. AN UNLOCKED LID OR OPEN TANK ACCESS IS A SAFETY HAZARD!
- Sludge sensors should be installed according to manufacturer specifications. The sensor unit should be mounted securely to the riser. It is recommended that the some basic testing be conducted to verify that the sludge sensor is collecting and reporting data properly.



EQUIPMENT SCHEDULE

EQUIPMENT	HP	VOLTS	PHASE	PUMPING RATE (GPM)	TOTAL DYNAMIC HEAD (ft)
EFFLUENT SUBMERSIBLE PUMP	½	230	1	10	20

Figure 5-1
Schematic of integrated clarifier and effluent pump system.

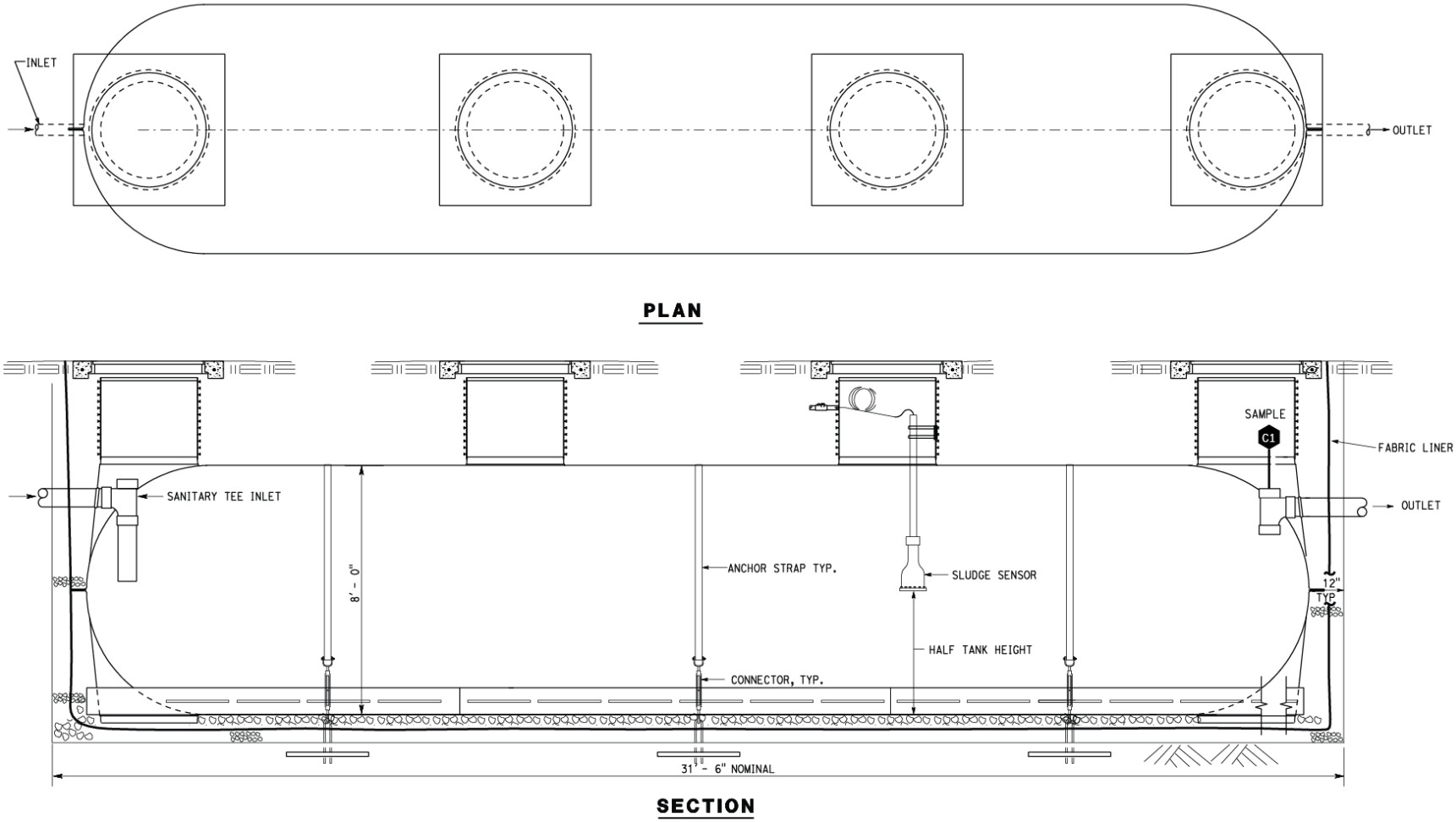


Figure 5-2
Schematic of stand-alone single compartment clarifier.

5.1.2 Leak check

The clarifier should have been water tested during installation. An additional leak test should be performed prior to start-up. In this test, all inlets and outlets are plugged and the water level is brought up two inches into the access riser, so that the inlet, outlet, and riser connections are all proven to be watertight prior to start-up. If risers have joints between sections, they also must be tested for watertight integrity. Confirm that the water level does not change after 24 hours. If there is a change in the water level, the cause must be determined and repaired prior to start up.

5.1.3 Pump vault check (systems with pump package only)

The ability to easily remove the pump vault for maintenance is essential and depends upon proper installation. To be certain that correct installation has been achieved and to avoid future maintenance problems, exercise the removal process described as follows (steps a-j).

WARNING! IMPORTANT! Before doing any work on either the wiring to the level control floats and pump or in the PLC, switch off the power to the system at the service entrance panel, set the circuit breakers in the panel to their "OFF" positions and red tag/lock out. Prior to testing alarms or performing maintenance that may activate an alarm, inform the district you are testing the alarm system.

a. Remove access riser cover from the septic tank that encloses the effluent duplex pump system.

b. Completely close the ball valve on the pump discharge assembly and disconnect the PVC union located next to the ball valve.

c. Remove each pump and set it aside on the access riser cover or on a piece of plastic film to protect it from mud or sand. The pump's electrical cord should be long enough and should not need to be disconnected.

d. Remove the float tree assembly and filter cartridge from the pump vault and lay it aside (disable alarms if needed).

e. Pull the pump vault out of the tank. There should be ample clearance between the ball valve and the splice box to allow unhindered removal of the vault.

f. Once vault removal is demonstrated, replace the effluent filter and float tree assembly into the vault and lower the vault into the tank. Caution: When replacing the float tree assembly be

careful to ensure the floats do not change elevations. To prevent the vault from floating, you may need to run clear water (from a hose protected against cross contamination of the water supply) into the vault to sink it. Replace pumps and reconnect plumbing.

g. Open the ball valve completely.

h. Replace access riser lid.

i. Reset circuit breakers to “ON” and switch on the power to the system at the service entrance panel.

j. Observe the discharge assembly for leaks once the pumps go on.

5.1.4 Pumping system check (systems with pump package only)

The tank pumps are operated utilizing a programmable logic controller (PLC) in combination with a float tree assembly. The tank pumping system has four float switches (floats) with the following functions:

Float Switch (Float) ID	Float Location	Float Function
FS3 94” above FS2	Top Float (Up position)	Sends alarm to maintenance personnel pagers, enables the lag pump
FS2 6” above FS1	Middle Float (Up position)	Initiates pump timed operation of the lead pump
FS1 1.5” above end of tree or above filter cartridge	Bottom Float (Down position)	Turns on low level alarm light Lead and lag pumps "Off"

a. Simulate normal operation. During normal operation, the bottom float FS1 (low effluent) will be in the up position (i.e., "On"). Ensure the float is in the up position prior to checking the system normal operation.

b. Check discharge pipe assembly. Fully open the ball valve on the discharge pipe assembly. Ensure the pumps are submerged in effluent before continuing.

c. Check the automatic operation of the alarms. Prior to testing alarms inform the district you are testing the alarm system. Check the operation of the high effluent level and alarm by raising the FS3 (top) float. The alarm light and audible alarm should become activated. If the light does not illuminate, check the lamp for possible damage. Lower the float to deactivate the

alarm light and audible alarm. Check for the automatic reset of the alarm by again lifting the float(s) and checking for activation of the alarm light and audible alarms.

d. Check the manual operation of the pumps. Turn pump 1 to manual operation in the control panel. Ensure that the pump is running. Using a loop ammeter, place the loop around the pump cable. The amperage should be in the range as specified by the manufacturer. If the amperage is significantly different than specified, check the connections and cable sizing. Measure the voltage while the pump is running. Record these values in the control panel on the label provided. Repeat for pump 2.

Tank Pumping System: Date of Start Up:_____

Voltage Pump #1:_____ Voltage Pump #2:_____

Amperage Pump #1:_____ Amperage Pump #2:_____

Should any situation occur that may require the adjustment or change of any settings, the Division of Engineering Services, Water and Wastewater Branch (916) 227-8526 should be notified of the changes. The setting change shall be recorded in the system diary with the following: the date and time the changes to settings were completed, reason for the change of the settings, the existing settings and the new settings.

e. Check the automatic operation of the lead pumps. Note: This check assumes that there is adequate water in the tank for normal pump operations. Switch both pumps to the automatic operation in the control panel and raising the FS2 float (middle) to energize the lead pump when activated under timer control. When activated by the timer, the lead pump (1 or 2 could be the lead pump depending on the cycle) shall energize (turn on) when the float is raised and deenergize when the float is lowered. The PLC control panel will switch the lag pump to the lead pump. Observe the complete cycling of the pumps through a minimum of three cycles and observe that the pumps alternate in the lead pump position and turn on and off with the float.

f. Check the operation of the high level alarm/lag pump enable. Ensure the high level alarm and lag pump enable feature of the PLC is set to operate under automatic control mode. Lift up the float FS3 and verify that pumps 1 and 2 turn on while under timer control conditions and that the warning of a high effluent level alarm has been activated.

g. Check the redundant off. Ensure the redundant off feature operates in both manual and automatic operation. Hold the FS1 float in the upright position and manually turn on both

pumps, 1 and 2 using the PLC. Lower the FS1 float and verify that both pumps have shut off. Switch the pump controls to automatic and lift the floats FS1, FS2, and FS3. Confirm that both pumps are running. Lower the FS1 float and verify that both pumps have shut off. Raise float FS1 and verify that the system resumes normal operations.

5.2. Routine Operation and Maintenance

The operation and maintenance activities for the clarifier should be minimal; the maintenance frequency will vary depending on usage. Visual inspections should be conducted regularly during periods of heavy usage.

5.2.1 Alarms (systems with pump package or high water sensors only)

Alarms are displayed by a red light and an audio sound. The alarms are used to monitor pumps and the tank conditions in the clarifier. Alarm conditions occur under the following situations: (a) high water shut off, (b) high water level, (c) low water level, and (d) pump failure. Note: Audio alarms are silenced by pushing the red light at the PLC.

When responding to an alarm, first discern whether a high- or low-level condition has caused the alarm. If it is due to pump failure (as indicated by a light on the recirculation panel), test each pump manually and locate the failed pump. There is a discussion below on pump replacement. Remove the access riser lid and visually inspect the liquid level. If the high liquid level has caused the alarm, follow the ensuing procedures. If a low liquid level caused the condition, see the following section.

5.2.2 High water level alarms (systems with pump package only)

When a high liquid level condition exists, the source of the problem needs to be determined. The following procedure can help for identification of the cause of the high water alarm:

a. When a high liquid level is present, first check the circuit breakers, switches, and fuses in the system control panel. If separate breakers in the main panel were used for the pumps and controls, also check these breakers. If a breaker is found to be tripped reset the breaker and observe the operation for continuous tripping. If tripping does not recur, then the problem has likely been found or corrected itself. Test the automatic function of the system as shown in the Startup and Commissioning section of this manual to verify proper operation.

b. If, after checking the circuit breakers, fuses, and switches, the pump still does not operate, move the switch to manual operation. If the pump engages, the problem is likely in the float system. If the motor contactor engages, but the pump doesn't run, go to Step f. Return the

switch to automatic operation. Do not leave a pump in the manual operation position unattended. If you do, the "redundant off/low level alarm" float should turn off the pump and sound a low-level alarm. However, in the event of a “redundant off” float failure, the pump can continue to operate without liquid, possibly drawing solids to the filter and causing potential failure problems.

c. Isolate the float switches and check to ensure all floats are operating properly. If a float is found to be faulty, refer to the section below on replacing inoperative floats.

d. Check pumps for discharge flow. Close the ball valve, disconnect the union in the discharge plumbing assembly and turn the union so that it is facing down. Engage the pump and visually inspect the approximate flow rate being discharged. If you are unsure of the discharge rate, measure the time it takes to fill a five-gallon bucket with the discharge. Check this value against the appropriate pump curve. If the flow rate is insufficient, the pump may need to be cleaned.

e. If the pump operates in the proper flow range, check all downstream valves to ensure that they are in the open position. If the valves are all open, test the discharge pressure of the pump.

f. Check the panel to verify that the motor contactor engages. If it engages, but the pump doesn't operate, then it is either a pump failure or a bad electrical connection. If the motor contactor does not engage, check the voltage feeding the motor contactor. If the motor contactor is receiving the correct input power but will not engage, it may be necessary to replace the contactor.

IMPORTANT! Before doing any work on either the wiring to the level control floats and pump or in the pump control panel, switch off the power to the system at the service entrance panel, set the circuit breakers in the panel to their “OFF” positions.

g. Remove the access riser lid and the stainless steel screws from the splice box lid, being careful not to drop the screws into the tank. If the splice box was submerged, or if there is a crack in the conduit, there may be water in the splice box. If water is present, remove the water with a syringe or other appropriate method. Carefully check the splices to ensure that they are intact and remain watertight. If all splices are found to be watertight, replace the splice box lid. In the control panel, carefully tug on each wire going to the splice box. Correct any wires that are loose. Reactivate and retest the system.

h. If the system operates but can't keep up with the flow, check the system for watertight integrity. A leaking tank can infiltrate enough water to overcome the pump. Also check for leaking fixtures and stormwater intrusion from canopies gutter drains or at-grade riser lids as potential sources of excess flow.

5.2.3 Low water level alarms (systems with pump package only)

When a low liquid level condition exists, the source of the problem is likely one of three things:

a. The "Pumps Off" float has failed in the closed position. If the liquid level is at the "redundant off/low level alarm", it is possible that the "pumps off" float has failed with the circuit closed or there is a loose electrical connection. To check the reason for failure, lift the "redundant off/low level alarm" float. If the pump immediately engages, check the electrical connections for the "pumps off" float. If the connections are found to be adequate, check for proper operation of the float switch and replace if faulty.

b. The tank may be siphoning. Inspect the liquid level in the tank. If the liquid level is below the "redundant off/low level alarm" float, then likely the problem is either a leaky tank or siphoning. Siphoning typically occurs when the system is pumping downhill. A system will not necessarily siphon every time it operates. It is dependent on the system design. A siphoning system can be retrofitted with an anti-siphon valve. Most siphoning problems will manifest in the first months of operation.

c. If the hydraulics of the system do not allow for siphoning, then it is likely that the tank is leaking. Fill the tank to a normal operating level and return to inspect the tank at a later time. If the liquid level is below the normal operating level, the tank is leaking and needs to be repaired or replaced.

5.2.4 Replacing float switches (systems with pump package only)

IMPORTANT! Before doing any work on either the wiring to the level control floats and pump or in the pump control panel, switch off the power to the system at the service entrance panel, set the circuit breakers in the panel to their “OFF” positions and red tag/lockout.

a. Remove the float tree assembly from the vault. There is no reason to move the settings of the floats to remove and replace a float. After noting the tether length, snap the inoperative float out of the holding collar.

b. Remove the inoperative float and replace it with a new one. Refer to electrical plans and specification for installation of new float.

c. Splice the float wires to the wires from the control panel following the instructions provided by the equipment manufacturer.

d. Replace the float in the collar, using the same tether length, and return the tree assembly to the pump vault.

e. Reconnect power and test the unit per the instructions provided in the startup and commissioning of this part of this section.

f. Record all maintenance activities in the system diary. Also record any observations that you made regarding the tank or system in general.

5.2.5 Replacing pumps (systems with pump package only)

The pump unit is a water well turbine type pump that has a useful life of approximately 7 - 10 years. No maintenance is required during the normal operating life. Pumps may fail or become clogged. If pump failure is not due to obvious conditions such as a fouled or jammed turbine, then the pump should be replaced with a spare pump that matches the failed pump.

IMPORTANT! Before doing any work on either the wiring to the level control floats and pump or in the pump control panel, switch off the power to the system at the service entrance panel, set the circuit breakers in the panel to their “OFF” positions redtag/lockout.

a. Close the ball valve on the discharge plumbing assembly, disconnect the union, and carefully remove the pump and attached plumbing from the tank Vault. Disconnect the pump from the discharge plumbing assembly.

b. Disconnect the pump wiring at the splice box. Refer to electrical plans and specs if there is any question related to wiring.

c. Remove the inoperative pump and replace it with a new one of the same type as listed in the pump specifications. Push the pump cable through to the splice box. Leave an adequate length of electrical cord coiled inside the riser to allow for easy removal of the pump. An adequate length of cord should be left to allow for easy removal for future disconnecting and re-splicing.

d. Splice the pump wires to the appropriate wires from the control panel following the manufacturer instructions. Always use watertight heat shrink splice kits for all connections!

e. Reattach the discharge plumbing assembly and carefully lower the pump into the PVC sleeve alongside the pump vault. Be careful not to lower the pump by the cable or to pinch the cable when lowering it into the sleeve. Reconnect the union and open the ball valve.

f. Reconnect power and test the unit per the instructions provided in startup and commissioning part of this section.

g. The failed pump should be sent to the manufacturer's representative for repair.

h. Record all maintenance activities in the system diary. Also record any observations that you made regarding the tank or system in general.

5.2.6 Tank cleanout

Prior to tank pumping the following must be completed:

a. For systems with pump packages: if there is floating solids (scum) and/or oils in the tank, remove the pumps, float tree, effluent filter, and pump vault. Otherwise the floating materials could be drawn past the inlet ports and can cause future clogging problems.

b. Pump tank contents.

c. If applicable, replace pump vault assembly.

d. Refill tank with water to a level above the inlet ports after pumping and before introducing new waste wash water into the tank.

e. Record all maintenance activities in the system diary. Also record any observations that you made regarding the tank or system in general.

5.3. Sampling and Data Collection

- C1: effluent from the clarifier can be collected at the outlet tee. The specific methodology for collecting water samples will depend on site specific factors. Sample C1 can also be collected at the slow sand filter (see Section 6).

6. Slow Sand Filter

A slow sand filter (SSF) consists of a bed of filter sand where water to be treated is applied at the top of the filter and treated water is collected at the bottom, after passage through the sand bed. A schematic of the SSF is shown on Fig. 6.

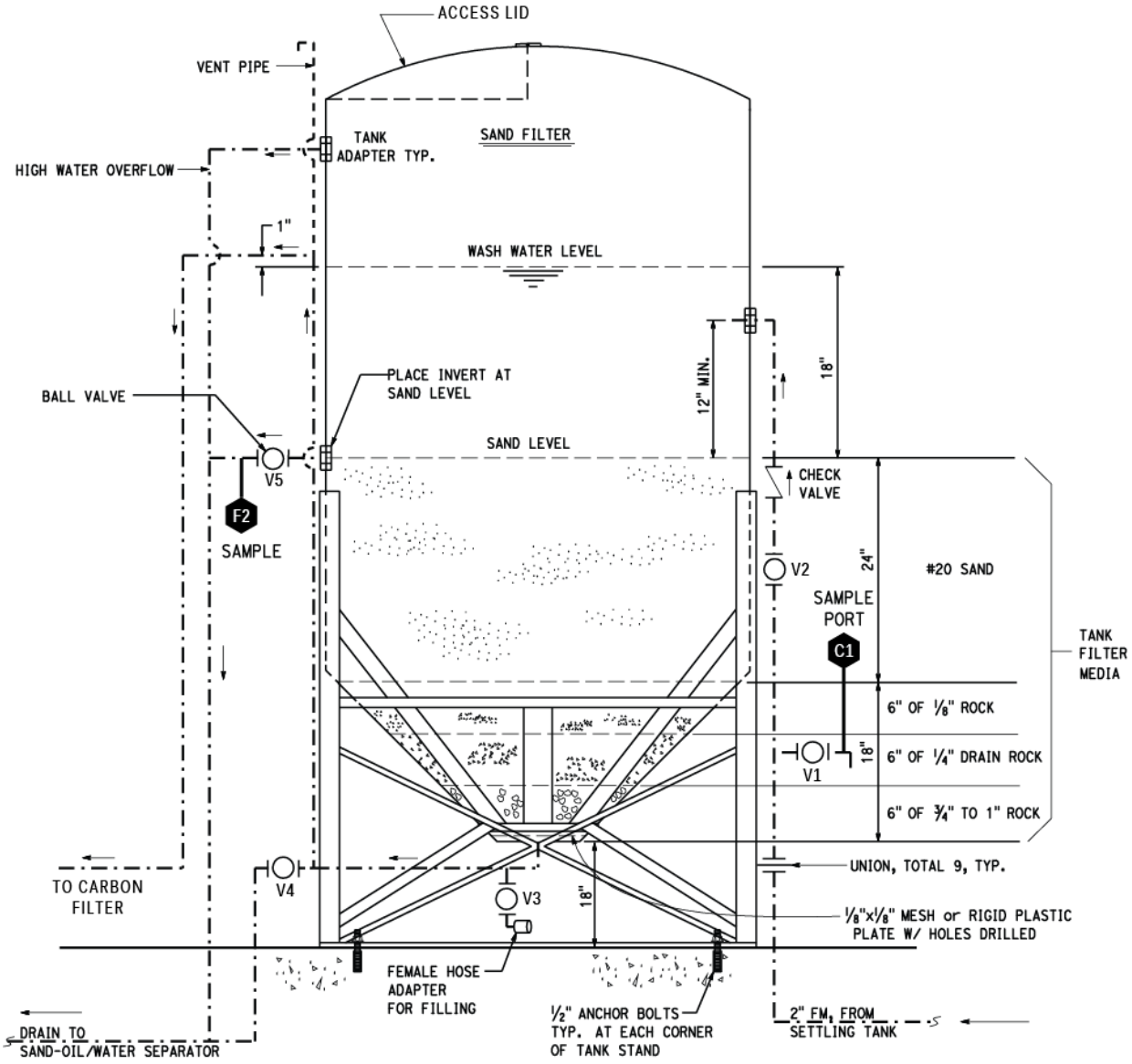


Figure 6-1
Schematic of slow sand filter unit.

The SSF technology is among the oldest processes used in water treatment because of its simplicity of operation and reliable performance. The SSF technology operates by gravity pressure, with water head accumulating above the sand bed to create a pressure differential that pushes water through the filter. As with other filters, particles contained in the water that is passing through the SSF become entrapped in the sand bed. However, in a SSF, a biological film (i.e., biofilm) forms throughout the sand bed with a visible layer, known as schmutzdecke, present at the surface. Particles and microorganisms in the influent water are adsorbed by the biofilm during the process of treatment. As the biofilm develops, treatment improves until a steady state performance is reached. Over time, the SSF will begin to clog, at which point the surface layer should be scrapped and removed. Replacement sand should be added after several scrapping events to maintain the sand filter bed depth.

6.1. Startup and Commissioning

The startup and commissioning process for the SOWS is limited to checking for proper installation of the process components, integrity of the tank, and hydraulic operation.

6.1.1 Appurtenance check

Several important procedures are needed for proper startup of the sand filter.

- Check installation of all plumbing and components related to operation of the sand filter as shown on the plan sheets. Test all manual valves and the check valve for proper operation.
- If filter is constructed of white or semitransparent plastic, and is located in an area that receives direct or indirect sunlight, it is recommended that the filter should be covered with a dark or reflective covering material to inhibit algae growth inside of the filter. Algae growth will result in an increased rate of clogging and increase O&M requirements.
- Check that appropriate size sand media was placed in the filter housing. Sand bed should be level and filled to the side drain invert level. Use a shovel or other long handled tool to smooth sand bed if required.
- Check that access lid allows access to the sand filter. The access lid will be used for periodic inspection and sand filter maintenance.
- Check that a flow diffuser is in place. The flow diffuser should dissipate the energy of the influent to the sand filter such that the sand bed is not disturbed during dosing and normal operation.

6.1.2 Initial filling with water

Before filling with water for the first time, it is important to check the position of relevant valves and to fill the sand filter from the bottom to eliminate the formation of air pockets that would reduce filter performance.

- During initial filling (i.e., no water present in the filter), valves V1 and V4 should be closed. Valves V2, V3, and V5 should be open.
- Connect a hose at the location of valve V3. Fill the tank from the bottom at a flowrate of about 10 gal/min or less.
- If the sand was not washed prior to placement in the filter, there could be significant fines that washout of the filter. The water should be left on to flush these sand fines out of the filter through valve V5. After the water runs clear through valve V5, close V5 and allow the filter to fill to the normal operating level (i.e., invert of effluent pipe).
- Turn off the water hose used for filling the filter and close valve V3. Mark the normal operating water level with tape for future reference. The water level should never drop below this level during regular operation.

6.1.3 Leak check

The sand filter should be tested for leaks during installation and again prior to start-up.

- After filling the filter with water to the normal operating level, confirm that the water level does not change after 24 hours.
- If there is a change in the water level, the cause must be determined and repaired prior to start up.

6.1.4 Hydraulic check

The purpose of the hydraulic check is to confirm that water flows through the system as intended. The following items should be checked at startup.

- During normal operation, valves V1, V3, V4, and V5 should be closed. Valve V2 should be open.
- When the pump system in the clarifier if energized, clarified effluent should be pumped into the top of the sand filter. After passing through the sand bed, filtered water passes through the underdrain and over the elevated outlet. The outlet is elevated to maintain water head on the sand filter.

- At startup, it is recommended to estimate the initial filtration rate by one or more methods, e.g., (a) record the time needed to collect a unit volume of water from the filter outlet or (b) record the time required for the water level to drop a predetermined amount. Record this value in the log book for future reference.

6.2. Routine Operation and Maintenance

The operation and maintenance activities and their frequency will vary depending on the amount of usage and performance of the clarifier.

6.2.1 Filtration Rate and Filter clogging

Slow sand filter (SSF) develop a biofilm layer at the top of the sand referred to as the schmutzdecke, or dirt layer. This biofilm helps the filter to perform optimally and should be allowed to develop. However, if the filter is overloaded with carbon, which serves as food for the biofilm, or particulates, the rate of clogging will increase. Clogging is determined by observing the filtration rate, i.e., the rate at which the water dosed on to the filter is drained by gravity out of the filter.

During normal operation, effluent from the SSF is expected to flow from the outlet between 4 and 6 gal/min. As described above, there are two methods for measuring the drawdown: (1) measure the water level decrease over time in the SSF or (2) measure the effluent flow over time from the SSF. When the drawdown rate slows to less than about 4 gal/min it is necessary to maintain the SSF. Alternately, if the filtration rate slows considerably, to the point where water is passing through the overflow and not able to keep up with influent flow, maintenance is required. The maintenance steps to recover the filtration rate are outlined below.

6.2.2 Cleaning the Filter

Because the clogging occurs primarily at the sand surface, it is possible to remediate the filter by scraping and removing the clogging layer.

a. Disengage the pump that is used for loading the sand filter and make sure that there is some capacity in the system for drainage during filter maintenance.
b. Drain the water head from the filter by opening valve V5.
c. After the water is at or below the sand level, remove the clogging layer from the filter. The clogging layer is approximately the top 0.5 in. Several methods are available for removing the clogging layer (a) a square point shovel can be used to scrape the surface,

(b) a 5 hp or greater shop vacuum can be used to vacuum off the top surface, or (c) a vacuum truck can be used to remove the clogging surface.

d. All scrapings should be removed from the filter and disposed of according to local requirements. Based on previous experience, the material is not expected to be hazardous but can be tested by a certified laboratory to verify.
e. If desired, the filter can be backwashed using the methods described in Sec. 6.1.2. The flowrate during backwashing should be between 20 and 40 gal/min.
f. Refill to invert elevation as described in Sec. 6.1.2.
g. Restore normal operating condition and place the feed pump back to automatic control. Check that the positions of all valves are in the position for normal operation.

Figure 6-2
View of sand filter surface being scrapped during maintenance at UCD pilot facility

6.3. Sampling and Data Collection

F2: backwash water can be samples at the slow sand filter (not a regular measurement). The specific methodology for collecting water samples will depend on site specific factors. In general, care should be taken to ensure that the sample is not contaminated during the sample collection process.

7. Activated Carbon Filter

The effluent from the SSF will be relatively free of particles, but will still contain dissolved constituents that may not be suitable for discharge and that could interfere with disinfection processes. The purpose of the activated carbon filters (see Fig. 7-1) is to remove these compounds from the wash water so it may be safely discharged or reused. Activated carbon provides a surface for the adsorption of organic compounds. When these surfaces have been utilized (i.e., filled with adsorbed compounds), the activated carbon is exhausted and must be replaced.

An in-line ultraviolet absorbance (UVA) meter is used to monitor the activated carbon performance. The UVA meter indicates the relative level of organic and other UV absorbing compounds in the wash water entering and exiting the activated carbon filters. When the percent difference between the influent and effluent UV absorbance drops below a programmed threshold, the carbon filters require servicing.

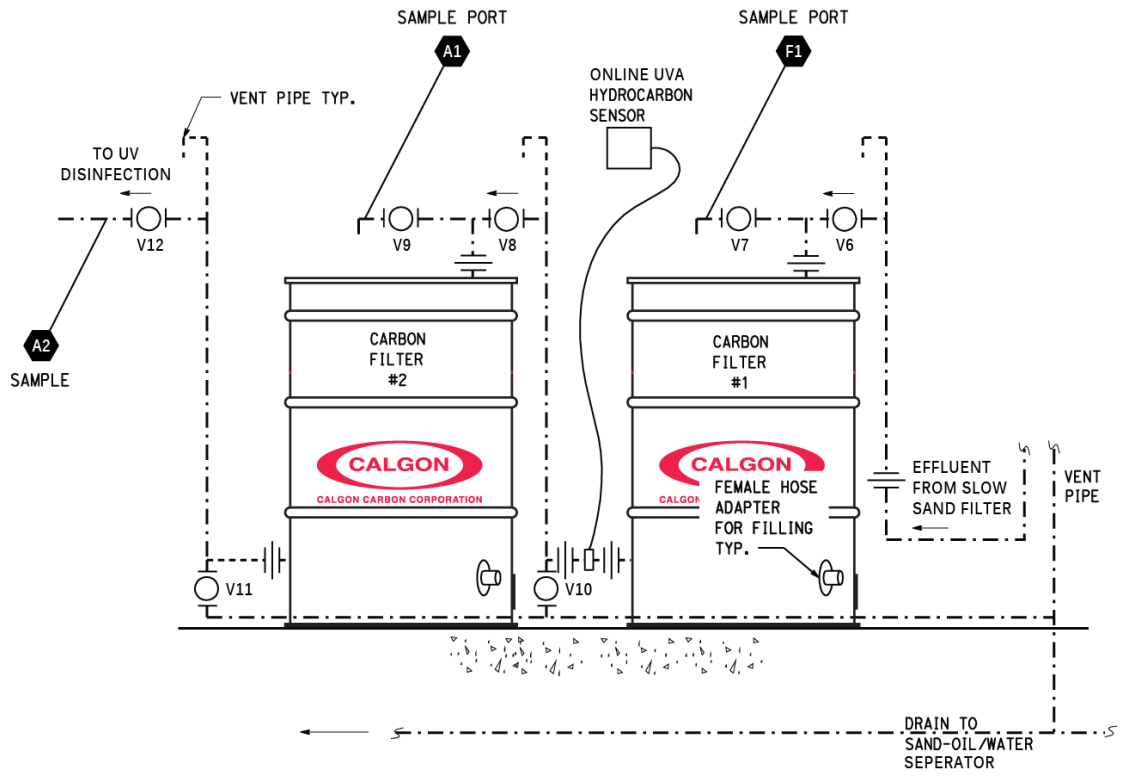


Figure 7-1
Schematic of granular activated carbon adsorption system

7.1. Startup and Commissioning

Startup of the activated carbon filter includes checking the installation and materials to ensure all components have been provided and installed to specification. Go through the following checklist prior to starting up the system.

7.1.1 Appurtenance check

Several important procedures are needed for proper startup of the sand filter.

- Check installation of all plumbing and components related to operation of the carbon filter as shown on the plan sheets. Test all manual valves for proper operation.
- Check that the online UVA sensor is installed as shown on the plan sheets.
- Check lid on carbon drum but unlatching band clamp and opening the lid. Replace the lid and fasten latch to ensure the drum can be easily resealed.

7.1.2 Initial filling with water

Before filling with water for the first time, it is important to check the position of relevant valves and to fill the sand filter from the bottom to eliminate the formation of air pockets that would reduce filter performance. As described in Appendix B, the carbon filter should be filled slowly from the bottom and left to stand for about 1 week to prepare the carbon filter for use. It is important that the carbon filter be filled from the bottom. Filling in this upflow mode ensures that air does not get entrained in the carbon bed. If air remains trapped in the carbon bed during system operation, the system will be hydraulically compromised. For guidance on filling and preparation of the carbon filter, see Appendix B.

7.1.3 Leak check

The carbon filter should be tested for leaks during installation and again prior to start-up.

- After filling the filter with water to the normal operating level and allowing the filter to stand for several days, confirm that the water level does not change after 24 hours.
- If there is a change in the water level, the cause must be determined and repaired prior to start up.

7.1.4 Hydraulic check

The purpose of the hydraulic check is to confirm that water flows through the system as intended. The following items should be checked following the initial filling and subsequent leak check.

- During normal operation, valves V6, V8, and V12 should be open. Valves V7, V9, V10, and V11 should be closed.
- After passing through the sand bed, sand filter effluent should flow by gravity to the carbon filters. Confirm that water enters the top and exits at the bottom of the first filter, and then flows to the second filter where water again enters at the top and exits at the bottom.

7.1.5 Check UVA sensor

Check the UVA_{254} sensor. See "Real UV254 M3000 Owner's Manual – Version 1" ("Owner's Manual") provided as Appendix C of this Manual for complete instructions)

7.2. Routine Operation and Maintenance

The carbon filter system will require some maintenance to keep the UVA sensor operational and to replace the carbon filters as needed. Based on preliminary estimates, a carbon filter will last between one and two years. With two filters in series, the general approach is to operate the first drum to contaminant breakthrough (as determined using the UVA sensor or water quality sampling). After the first drum reaches contaminant breakthrough, the second drum should be moved to the first position and a new drum installed in the second position. Thus, the effluent water is always carbon filtered and each drum is operated to contaminant breakthrough.

7.2.1 Determine UVA baseline

Soon after the system becomes operational, the following steps should be completed to determine the initial effluent UVA values. This procedure should be repeated periodically if the baseline

- Determine characteristic baseline GAC influent UVA_{254} by recording readings during the first six weeks of operation
- Program initial effluent UVA_{254} setpoint to baseline plus 0.20 cm^{-1} (value subject to change depending on site specific variability)
- Take influent and effluent water samples over multiple days of operation and send them to a certified lab for analysis of the target constituent (e.g., TPH-diesel). Record the UVA_{254} of the water sample at the time of sampling.

7.2.2 UVA sensor automated cleaning of quartz cuvette

The quartz cuvette is cleaned automatically using the RealClean automatic cleaning system. The Owner's Manual for the RealClean system is provided as Appendix C. Ensure the

“Cleaning System” is enabled on the monitor menu screen by selecting 1 on the menu. Set the cleaning cycle to initiate once every day.

A container is filled with dilute bleach (10% solution) and placed on the ground next to the monitor. Depending on the length of tube between the cleaning solution bottle and the monitor, the default “Cleaning Frequency” may or may not be appropriate. The default setting of 120 seconds is appropriate for tube length of 24 – 36”.

This alarm is programed to go off after 23 cycles based on a cleaning solution bottle size of 1 L, which holds enough solution for 25 cycles. The alarm for the cleaning solution can be disabled. Ensure that the cleaning solution container is checked on a regular basis if the alarm is not enabled.

7.2.3 UVA sensor parts replacement

The UV lamp is rated for 12,000 hr of operation, or 500 days if the monitor is never turned off. The UV lamp must be replaced when the low UV lamp alarm alarms. However, it is recommended that the UV lamp be replaced every 18 months regardless. The UVA_{254} monitor can be powered down when vehicle washing will not occur for several days in a row (i.e., holidays) to extend the life of the UV lamp to the full 18 months.

It is recommended that the blue ribbon cable also be replaced at the time the UV lamp is replaced or every 12 to 18 months.

7.2.4 Carbon filter exchange

The high UVA alarm serves as a notification that the activated carbon should be tested for contaminant breakthrough. To test for contaminant breakthrough, analyze filter influent and effluent samples for target constituents. Wash water analysis should include any constituents that are identified in the RWQCB WDRs. A list of suggested additional analytes is provided in Table 7-1.

As an optional technique for periodic testing an adsorption indicator, such as an organic dye, can be used to test AC performance and to indicate when the AC needs to be replaced. The recommended dye is methylene blue, which has been studied extensively in textile and printing industry applications (Rozada et al. 2003; Wang et al. 2005). It has a deep blue color that provides a visual indication of whether the activated carbon requires replacement. The dye is added to the filter influent and the color of the filter effluent is observed at a time corresponding to one hydraulic retention time (HRT; approx. 2.5 min at a flowrate of 10 gal/min). If the effluent

remains clear, or not as blue as the influent, after one bed volume (BV; approx.. 25 gal) has passed through the filter canister, then the activated carbon has adsorption capacity remaining. If it is determined that the AC does not need to be replaced, then the alarm can be reprogrammed to allow for less of a gap between filter influent and effluent UVA_{254}. The methylene blue test can be implemented at any time if it is suspected that activated carbon needs replacement. Specific steps to perform a dye test are given below.

Table 7-1
Recommended constituents to be measured to assess carbon adsorption system

Constituent	Method of Analysis	Reporting limit
Chemical oxygen demand (COD)	EPA 410.4	0.7 mg/L
Dissolved organic carbon (DOC)	EPA 415.1	1.0 mg/L
Iron	EPA 200.7	20 µg/L
Total organic carbon (TOC)	EPA 415.1	1.0 mg/L
Total petroleum hydrocarbons (TPH), diesel	EPA 8015M	200 µg/L
Total petroleum hydrocarbons (TPH), motor oil	EPA 8015M	100 µg/L
Turbidity	EPA 180.1	0.01 NTU
Ultraviolet absorbance at 254 nm	SM 5910B; EPA 415.3	0.0045 cm-1

Validation of exhausted activated carbon using methylene blue dye

a. Methylene blue, an organic dye used as an adsorption indicator, will be used to determine if the GAC has reached exhaustion and if the trigger UVA_{254} needs to be reduced
b. The dye is a color-based indicator of relative GAC exhaustion and serves as a visual basis for establishing the need for GAC replacement.
c. Apply the methylene blue validation test when the UVA_{254} meter alarms or if the trigger UVA_{254} value is not reached after 1 year of operation
d. Add the dye to the top of the SSF; dose the filter manually with 100 gal of clarifier effluent
e. Once the dye is visible the SSF effluent, take a sample in a clear container
f. When the dye has run through to a GAC filter for 3 system volumes (approximately 50 gal, or 12 min at 4 gal/min), sample the GAC filter effluent, also in a clear glass jar
g. Compare the two samples side-by-side
h. If the GAC filter effluent runs clear, the dye has been adsorbed and the GAC does not need to be replaced. The trigger UVA_{254} value can be increased per step 2 above

i. If the effluent is equally blue or nearly so, the GAC filter media is exhausted and must be replaced

7.3. Sampling and Data Collection

F1: effluent from the slow sand filter can be collected at the sample tap.

A1: effluent from the first activated carbon filter can be collected at the sample tap.

A2: effluent from the second activated carbon filter can be collected at the sample tap.

8. UV Disinfection

The UV disinfection system (see Fig. 8-1) is needed to ensure that the treated water is safe for water reuse. The upstream systems in the treatment train are designed to make the wash water suitable for effective UV disinfection. The treated effluent is disinfected as it flows through the UV unit housing and around the UV lamp.

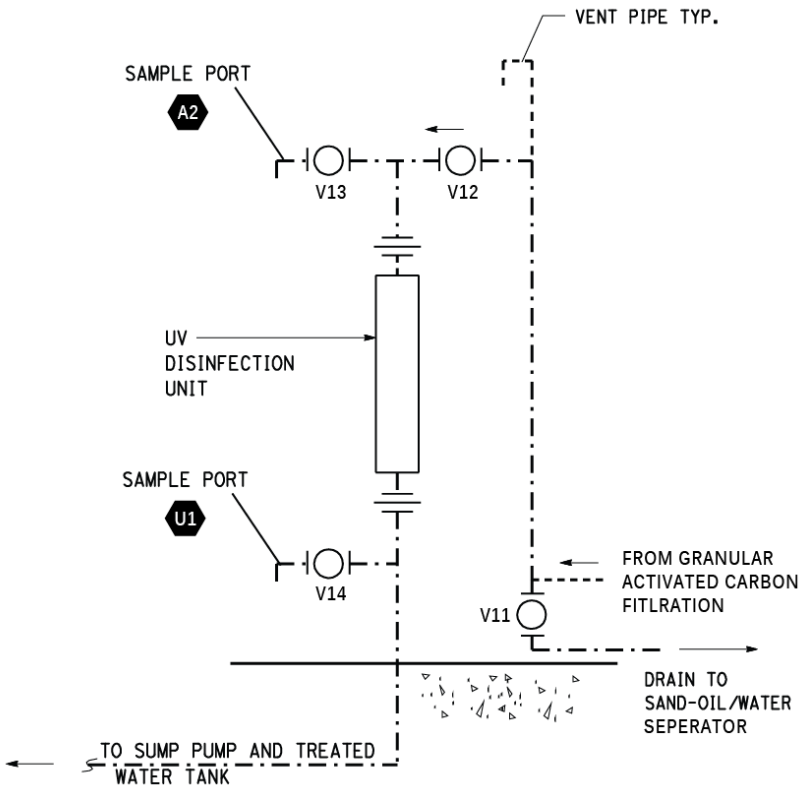


Figure 8-1
Schematic of UV disinfection system

WARNING: Do not look directly at an operating UV lamp or expose skin to UV lamp light! UV radiation burns retinas and skin! When servicing any wastewater treatment equipment, wear clothing that covers all parts of the body that may be exposed to wastewater or effluent, wear appropriate personal protection equipment (rubber gloves, goggles, and boots), and always protect eyes and skin from UV rays.

8.1. Startup and Commissioning

The UV system, consisting of the UV lamp and power cord, lamp assembly, unit housing and quick-disconnect, and control panel, should have been installed according to the manufacturer instructions and design specifications. See the “Installation and Maintenance Instructions for Orenco® UV and AXUV Disinfection Units” (Instructions) provided as Appendix C of this Manual for complete instructions.

8.1.1 Appurtenance check

The UV disinfection system should be inspected to confirm proper installation and look for potential problems.

- Check installation of all plumbing and components related to operation of the UV disinfection system as shown on the plan sheets. Test all manual valves for proper operation.
- Check that the control panel is operational and functioning as specified in vendor literature.
- Confirm that the UV lamp is installed correctly. Turn off power to UV lamp before removing from housing to prevent accidental exposure to unprotected eyes and skin.

8.1.2 Leak check

The UV disinfection system should be inspected for leaks during installation and again prior to start-up.

8.1.3 Hydraulic check

The purpose of the hydraulic check is to confirm that water flows through the system as intended. Water should be able to flow through the UV system at flowrates up to 10 gal/min without obstruction or overflow.

8.2. Routine Operation and Maintenance

To ensure sufficient exposure of the effluent to the ultraviolet light from the lamp, the disinfection unit must be cleaned annually and the lamp replaced once every one or two years. The following text is extracted from the vendor’s O&M manual (see Appendix C)

8.2.1 Remove the Disinfection Unit

a. In the control panel, turn off all circuit breakers.
b. Unfasten the coil of power cord so that you have enough slack to pull the disinfection unit out. It is not necessary to disconnect the cord from the disinfection unit.

c. Pull the disinfection unit out of the quick-disconnect coupling and lift it out of the housing.

IMPORTANT: DO NOT pull the disinfection unit up by the cord!

d. Carefully grasp the lamp tube/handle assembly at the top. Do not pull on the cord! Pull the lamp tube/handle assembly out of the disinfection unit housing.
e. Tilt the disinfection unit and drain the water back into the washrack.
f. Lay the disinfection unit on a protective sheet of plastic on the ground.

8.2.2 Clean the Disinfection Unit

a. Wipe any buildup off of the outside of the disinfection unit.
b. Support the disinfection unit contact chamber on the edge of the basin, and use a hose and long-handled bottle brush to break up any buildup inside the disinfection unit. Drain the unit back into the basin when finished.
c. Hold the lamp assembly over the washrack and gently hose it off. Wipe off any debris, if necessary. To remove stains or coating from the Teflon® sleeve, rub it gently with a soft sponge and detergent. Remove stubborn stains with isopropyl alcohol on a sponge.

8.2.3 Replace the Lamp in the Lamp Assembly

IMPORTANT: Handle the UV lamp with care. Avoid touching the glass surface of the lamp! Oils from your fingers can damage the lamp and shorten its life!

a. Loosen and remove the handle assembly from the lamp tube assembly.

NOTE: Be sure that the bulb freely turns in the sleeve while you are loosening the handle.

b. Disconnect the socket on the power cord from the pins on the lamp and dispose of the lamp in accordance with local regulations.

NOTE: You must properly dispose of the old lamp at an appropriate recycling center or other facility, as it contains mercury.

c. Connect the socket on the power cord to the pins on the lamp.

d. Insert the lamp and electrical cord into the lamp tube assembly and gently slide the lamp in until the end of the lamp reaches the bottom of the Teflon® sleeve.

e. Begin threading the handle assembly onto the lamp tube assembly by hand and then torque the handle assembly nut to 35-45 inch-pounds (4-5 newton-meters force). Be certain that

the o-ring is seated properly in the groove in the tube assembly so it can create a waterproof seal.

NOTE: Overtightening can damage the tube assembly or handle assembly. Be careful not to overtighten.

f. If it becomes necessary to remove and reinstall the cord grip, use a torque wrench to tighten the cord grip to 35-45 inch-pounds of torque (4-5 newton-meters force) when reinstalling the cord grip.

NOTE: Overtightening can damage the cord grip and cord. Be careful not to overtighten.

g. Reinstall the Disinfection UnitStep 4a: Follow the instructions in the installation section of this document for reinstalling the disinfection unit into the quick-disconnect coupling.

h. In the control panel, turn on all of the circuit breakers.

i. Check the numeric display of the current sensor in the panel to ensure the lamp is functioning.

8.3. Sampling and Data Collection

U1: effluent from the UV disinfection system can be collected at the sample tap. For microbial measurements, it is recommended to clean the sample tap with ethanol and then rinse with DI water prior to sample collection. The specific methodology for collecting water samples will depend on site specific factors. In general, care should be taken to ensure that the sample is not contaminated during the sample collection process.

Analysis of water samples from points A2 and U1 can be used to determine the inactivation of microorganisms in the UV disinfection system.

9. Effluent Management System

The final disinfected product water is considered suitable for a variety of industrial reuse applications including use in deicing brine solutions (winter season) and onsite infiltration (summer season). Views of the effluent management system are shown on Figs. 9-1 to 9-4.

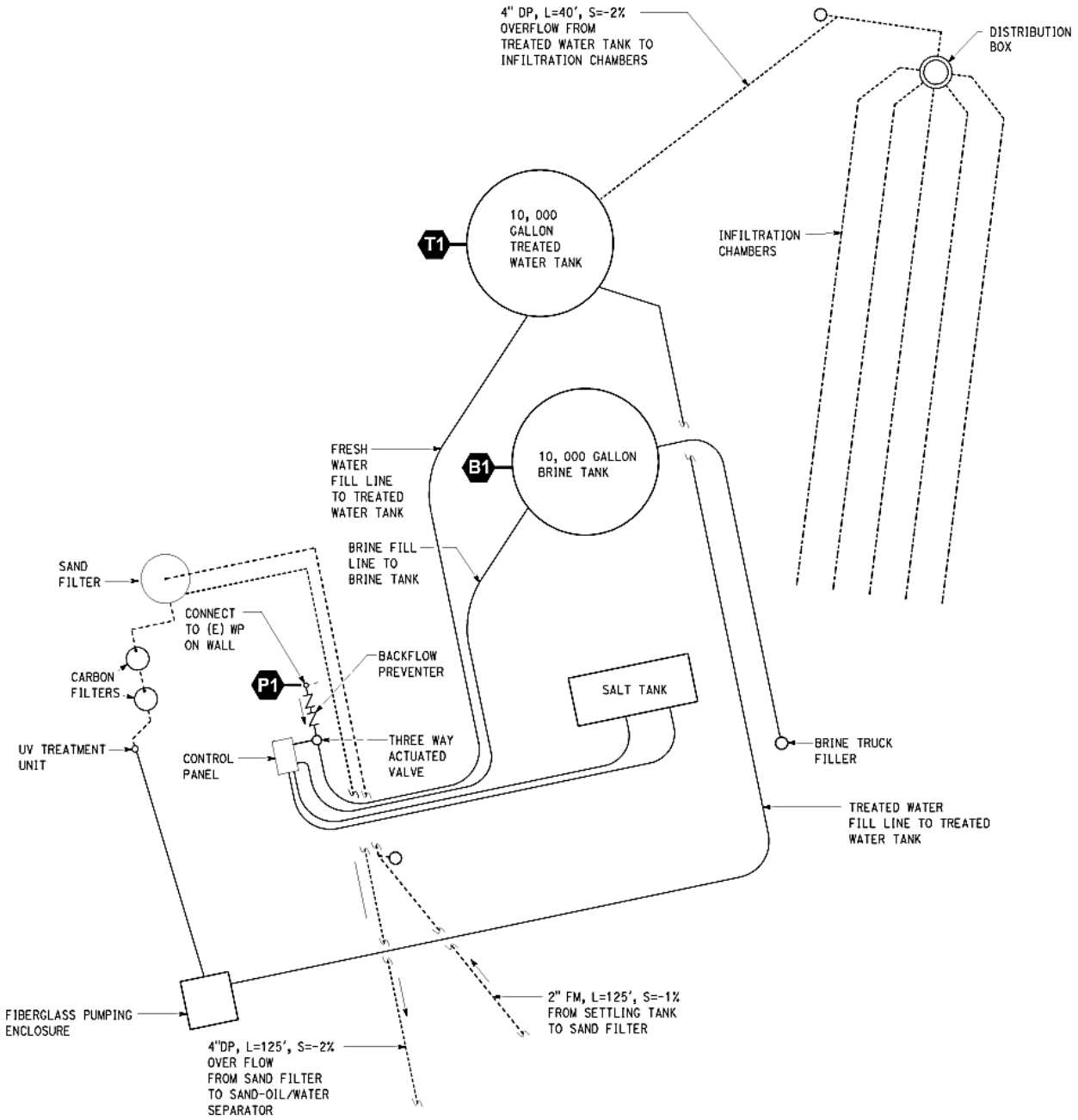


Figure 9-1
Schematic of effluent management system (typ. Woodfords MS)

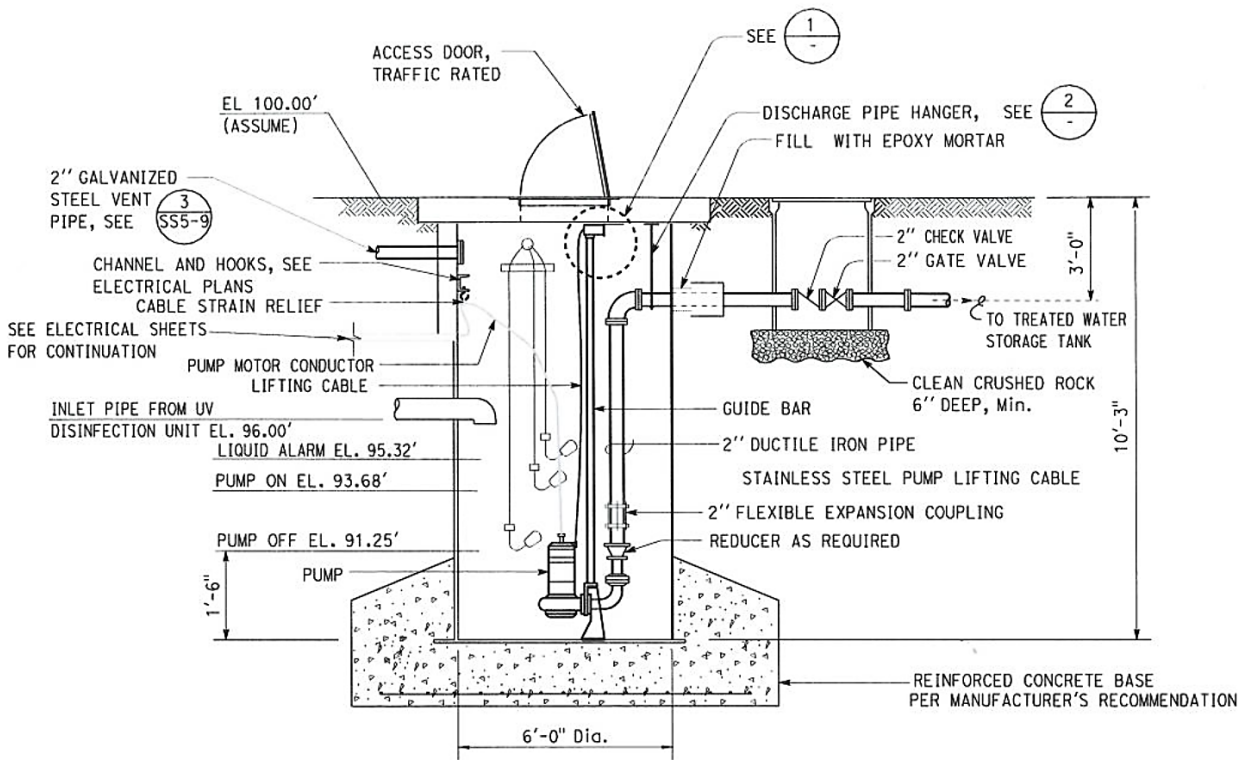


Figure 9-2
Schematic of effluent pumping system to at-grade storage tanks

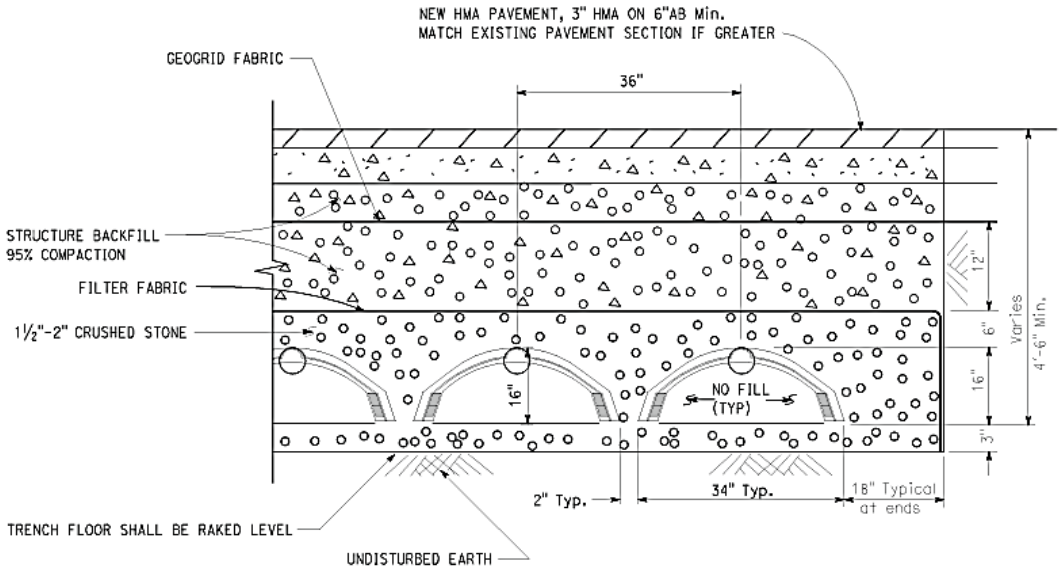


Figure 9-3
Schematic of effluent dispersal system
(note: that pavement extends 5 ft beyond trench dimensions)

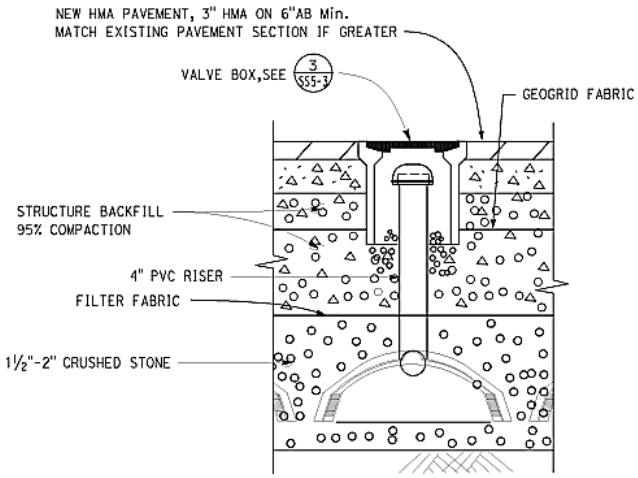


Figure 9-4
Schematic of observation wells in effluent dispersal system

9.1. Startup and Commissioning

The effluent management system startup will depend on the final design and operations plan. Some general startup considerations are given below, e.g., see Fig. 9-1.

9.1.1 Appurtenance check

The effluent storage and dispersal system should be inspected to confirm proper installation and look for potential problems.

- Check installation of all plumbing and components related to operation of the effluent storage and dispersal system as shown on the plan sheets. Test all manual valves for proper operation.
- Where a pumping system is used to lift effluent to the storage tanks, see information supplied by equipment vendor. A typical lift station is shown on Fig. 9-2.

9.1.2 Leak check

The effluent storage and dispersal system should be inspected for leaks during installation and again prior to start-up.

9.1.3 Hydraulic check

The purpose of the hydraulic check is to confirm that water flows through the system as intended. If a pumping system is used to deliver water to the storage tank, consult the vendor

literature for information on pump system hydraulics. The storage tank should be plumbed to allow effluent to pass to the soil infiltration system or accumulate in the tank. An overflow from the storage tank should also be present.

9.2. Routine Operation and Maintenance

The operation and maintenance of the effluent dispersal system and reuse storage tank will include the following items.

- Where a pumping system is used, see information supplied be equipment vendor.
- At snow stations, any storage tanks that will store effluent that will be used in the preparation of brine solutions should be emptied prior to the start of road salting operations to maximize the total volumetric storage of salt laden water.
- For more information of the use and with brine systems, see specific vendor information.
- Check operation of effluent dispersal system (see Fig. 9-3 and 9-4 for guidance).
- Watch for snow buildup on storage tanks located outdoors. Monitor for water freezing in the effluent storage tanks. Heat bands have been installed to prevent freezing in the effluent storage tank. Verify their operation and the settings are correct. Adjust if needed.

9.3. Sampling and Data Collection

T1: the final product water can be sampled at the effluent storage tank or at the effluent dispersal system. The specific methodology for collecting water samples will depend on site specific factors. In general, care should be taken to ensure that the sample is not contaminated during the sample collection process.

B1: the water produced using the brine system can be collected at the brine tank.

P1: the potable water will need to be evaluated to determine background constituents in water water supply. The sample can be collected at the hose bib used for washing.

10. APPENDIXES

APPENDIX A – Filter Sand Specifications

APPENDIX B – Literature for Carbon Adsorption System

APPENDIX C – Literature for online UVA Sensor

APPENDIX D – Literature for UV Disinfection System

APPENDIX E – Literature for Brine System

APPENDIX A – Filter Sand Specifications

SRI SUPREME

PRODUCT: #20 **DATE:** 2/8/2012 **LAB TECH:**

OPENING MICRON	OPENING INCHES	STANDARD SIEVE	WEIGHT	% RETAINED	% PASSED		SPEC.	OTHER
37500	1.5	1 1/2"						
25000	1	1"						
19000	0.75	3/4"						
16000	0.625	5/8"						
12500	0.5	1/2"						
9500	0.375	3/8"						
6300	0.25	1/4"						
4750	0.187	#4						
4000	0.157	#5						
3350	0.132	#6						
2800	0.11	#7						
2360	0.0937	#8						
2000	0.0787	#10						
1700	0.0661	#12						
1400	0.0555	#14						
1180	0.0469	#16						
1000	0.0394	#18	2	0.4%	99.6%			
850	0.0331	#20	88	17.8%	82.2%			
710	0.0278	#25	294	59.5%	40.5%			
600	0.0234	#30	388	78.5%	21.5%			
500	0.0197	#35	458	92.7%	7.3%			
425	0.0165	#40	477	96.6%	3.4%			
355	0.0139	#45	487	98.6%	1.4%			
300	0.0117	#50	492	99.6%	0.4%			
250	0.0098	#60						
212	0.0083	#70						
180	0.007	#80						
150	0.0059	#100						
106	0.0041	#140						
75	0.0029	#200						
PAN	**PAN**	**PAN**	494	100.0%	0.0%			

COMMENTS:

APPENDIX B – Literature for Carbon Adsorption System

FLOWSORB®

CALGON

CALGON CARBON CORPORATION

Description

Designed for low-flow water treatment applications, prefabricated 55-gallon FLOWSORB® canisters contain all the operating elements found in a full-scale adsorption system. These small, economical treatment systems hold 180 pounds of granular activated carbon for applications including:

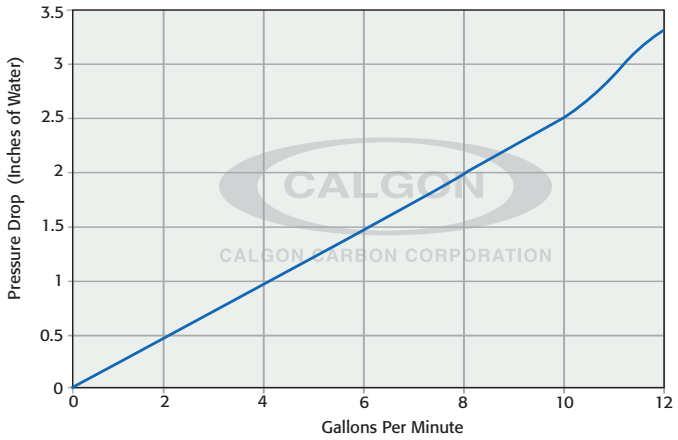
- Small wastewater streams
- Groundwater remediation
- Underground storage tank leaks
- Well pump tests
- Product purification or de-colorization
- Tank cleaning water treatment
- Batch water or product treatment
- Carbon adsorption pilot testing
- Emergency spill treatment
- Monitoring well water treatment

Features

FLOWSORB® offers several features and benefits to industrial, commercial, and municipal users including:

- Low cost per unit makes carbon treatment economical
- Simple installation and operation
- Space above carbon bed facilitates flow distribution or back-flushing
- Flexibility to be used in series or parallel operation
- Supplied with virgin or reactivated carbon
- Practical disposal option: pre-approved spent carbon canisters may be returned to Calgon Carbon Corporation for safe carbon reactivation
- Continuous treatment at various flow rates and concentrations

Pressure Drop



Specifications

Vessel	Open head steel canister
Cover	Removable steel cover, 12 gauge bolt ring
Internal Coating	Heat-cured phenolic epoxy
External Coating	Baked enamel (white)
Temperature Limit	150ºF (65.6ºC) continuous 250ºF (121.1ºC) intermittent
Inlet	2″ FNPT
Outlet	2″ FNPT
Carbon	180 lbs. granular activated carbon: Specify FILTRASORB® 300 or reactivated grade
Ship Weight	219 lbs. (99.4 kg)
Identification	Sequentially numbered for traceability

Typical Operating Parameters

Flow Rate	10 gpm (37.8 l/m)
Contact Time	4.5 minutes
Pressure Drop	< 1 psi (clean water and carbon)
Operating Pressures	Recommend operation at less than 5 psig

Installation

FLOWSORB® canisters are shipped with dry activated carbon; the carbon must be wetted and de-aerated prior to use. This procedure displaces air from the internal structure of the carbon granule, thus assuring that the liquid to be treated is in contact with the carbon surface.

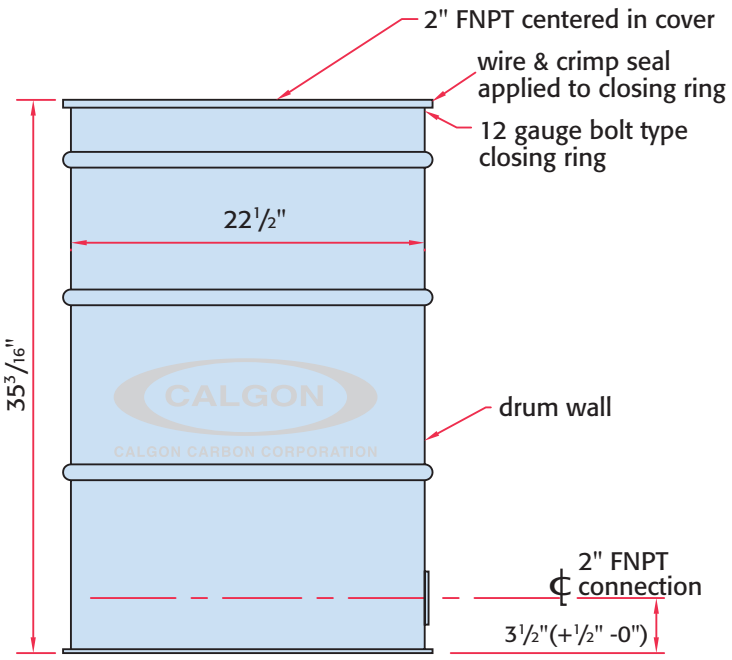
Prior to operation each canister must be filled with clean water; the water should be introduced into the bottom outlet connection. The unit should sit for approximately 48 hours to allow most of the carbon's internal surface to become wetted as shown on the wetting curve.

After wetting, the carbon bed can be de-aerated by draining the canister and refilling the canister upflow with clean water. This procedure will eliminate any air pockets which may have formed between the carbon granules. The FLOWSORB® is now ready for operation.

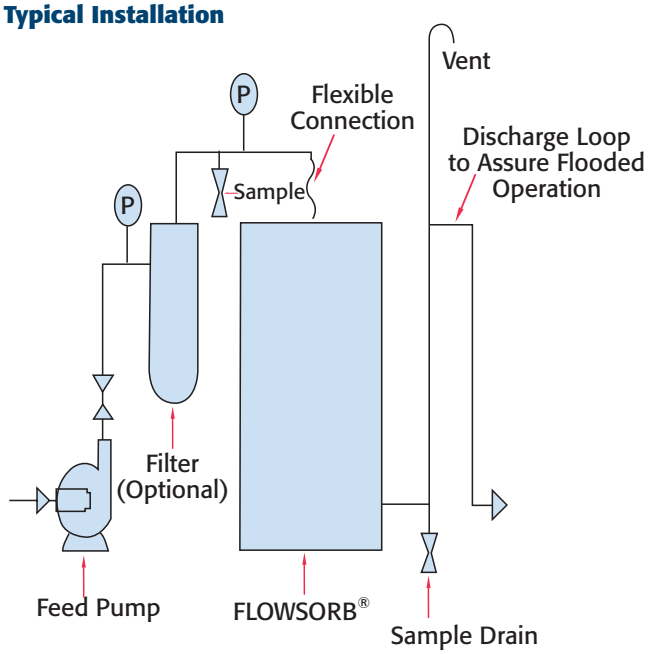
Canisters should be set on a flat, level surface and piped as recommended in the installation illustration. The influent pipe connection should be attached to the unit by using a flexible connection. Some minor deflection of the lid may occur if pressure builds due to filtration or other flow blockage downstream.

FLOWSORB® discharge piping should include an elevated piping loop to ensure that the canister remains flooded with water at all times. In addition to the piping loop, a drain connection is recommended on the discharge piping; this allows drainage of the unit prior to disconnection or temporary shut-down.

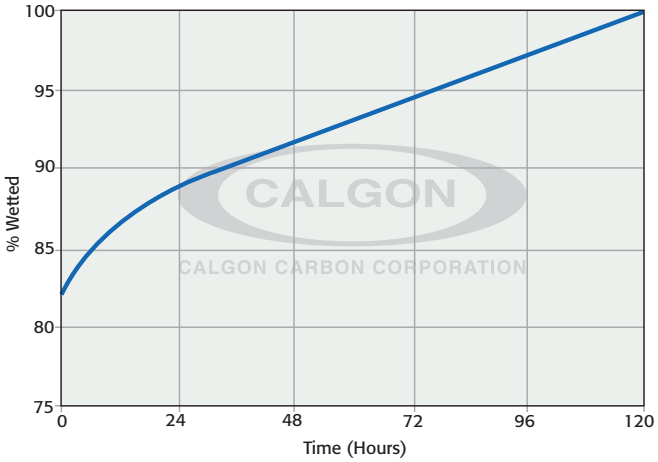
A filter should be installed if the liquid to be treated contains substantial amounts of suspended solids. A simple cartridge or screen filter helps prevent pressure buildup in the carbon bed.



Typical Installation



Wetting Curve for GAC (77°F/25°C)



Operation

FLOWSORB® canisters should be full of clean water before treatment begins. Flow rate to the canister should be determined based on required contact time between the liquid and the carbon media. In groundwater treatment applications, the recommended contact time is typically 8-10 minutes with a resultant flow of approximately 5 gpm. Consult your Calgon Carbon Corporation Technical Sales Representative for advice about proper contact time for your application.

FLOWSORBS® can be manifolded in parallel operation for higher flow rates. For series operation, two FLOWSORBS® can be piped together sequentially, as normal pressure drop will not exceed the recommended operating pressure.

These canisters have space for bed expansion and can be back flushed by introducing clean water or liquid at approximately 20-25 gpm to the outlet and taking backflush water from the inlet.

How to Estimate FLOWSORB® Life

The treatment table on this page lists the volume of water that can be purified by the FLOWSORB® for typical contamination situations. Most applications, however, involve a unique mixture of organic chemical contaminants including some chemicals that adsorb at different capacities or strengths. Please consult with your Calgon Carbon Technical Sales Representative for more information about carbon usage rates.

Calgon Carbon Liquid Purification System

FLOWSORB® is a unit specifically designed for a variety of small flow applications. Calgon Carbon Corporation offers a wide range of carbon adsorption systems and services for a greater range of flow rates and carbon usages to meet specific applications.

Return of FLOWSORB®

Arrangements should be made at the time of purchase to return canisters containing spent carbon. Calgon Carbon will provide instructions on how to sample the spent carbon and arrange for carbon acceptance testing. The spent carbon is reactivated by Calgon Carbon and all of the contaminants are thermally destroyed. The company will not accept FLOWSORB® for landfill, incineration, or other means of disposal.

FLOWSORB® cannot be returned to Calgon Carbon unless the carbon acceptance procedure has been completed, an acceptance number provided, and the return labels (included with the unit at the time of purchase) are attached. FLOWSORB® must be drained and inlet/outlet connections must be plugged prior to return to Calgon Carbon.

Theoretical Treatment Capacity for Typical Cases

	Case 1 **1,600,000 Gallons**	**Case 2** **400,000 Gallons**	**Case 3** **85,000 Gallons**
Benzene	20 ppb	200 ppb	2 ppm
Toluene	40 ppb	400 ppb	4 ppm
Xylene	40 ppb	400 ppb	4 ppm
	Case 4 **1,900,000 Gallons**	**Case 5** **550,000 Gallons**	**Case 6** **125,000 Gallons**
TCE	50 ppb	500 ppb	5 ppm
PCE	50 ppb	500 ppb	4 ppm
	Case 7 **230,000 Gallons**	**Case 8** **50,000 Gallons**	**Case 9** **10,000 Gallons**
Phenol	1 ppm	10 ppm	100 ppm
Total SOC	10 ppm	100 ppm	1,000 ppm

Each case represents a groundwater or wastewater stream that contains the combination of contaminants listed. The treatment capacity indicates the total gallons of that particular water that may be treated before any of the specific contaminants are present in the treated water as noted. Theoretical capacity based on 5 gpm water at 70ºF or less and 180 lbs. of FILTRASORB® 300. Background TOC is < 1 ppm except phenol cases as noted. Contaminants reduced to < 5 ppb except phenol case which is for 95% phenol reduction.

Warranty

There are no expressed or implied warranties or any warranty of merchantability or fitness for a particular purpose associated with the sale of this product.

Safety Message

It is unlikely that a worker would be able to physically enter a FLOWSORB® canister; however, the following information and precautions apply to partially closed canisters or situations where carbon is to be removed from the canister and stored elsewhere.

Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing carbon, appropriate sampling and work procedures for potentially low oxygen spaces should be followed including all applicable federal and state requirements.

CALGON
CALGON CARBON CORPORATION

Making Water and Air Safer and Cleaner

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#08-01A Suntec Tower Two
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Your local representative

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APPENDIX C – Literature for online UVA Sensor

REAL UVT ONLINE

ORTHO-BEAM TECHNOLOGY

Real UV254 M3000

Owner's Manual

Version 1

REAL TECH INC.
WWW.REALTECH.CA
T. 1 877 779 2888
F. 905 579 6580
701 ROSSLAND ROAD EAST,
UNIT #358, WHITBY, ON L1N 9K3

TABLE OF CONTENTS

OVERVIEW 2
Figure 1: Ortho-Beam Technology Inside Look 2

SPECIFICATIONS 3

SAFETY 4

INSTALLATION GUIDE 5
Unpacking 5
Mounting and Plumbing 6
Figure 2: Inlet and Drain Water Connections 6
Electrical Connections 7
Figure 3: Main Terminal Block 7

OPERATOR INTERFACE 8
Figure 4: Operator Interface Panel 8

OPERATION 8
Start-Up 8
Zero (Calibration) 9
Menu Structure 10
4-20 mA Setup 13
RS-232 Data Logging 13
Figure 5: Main Board 13
Dehumidifier for Humidity Control of Real UV254 M3000 15
Figure 6: Replacing Dehumidifier 15

MAINTENANCE 16
Cleaning Quartz Flow Cell 16
Figure 7: Removing the Quartz Flow Cell for Cleaning 15
Replacing UV Lamp 17

WARRANTY 17

OVERVIEW

Thank you for purchasing the Real UV254 M3000.

The Real UV254 M3000 is a continuous UV 254nm organic testing monitor which utilizes Real Tech Inc.'s patent pending Ortho-Beam technology.

How the Real UV254 M3000 Works

The Real UV254 M3000's innovative Ortho-Beam technology is designed to take sensor readings at 90 degree angles to each other through two different path lengths through a rectangular quartz flow cell. The two sensor readings give the amount of light able to pass through two different path lengths of the test water. From these two measurements alone the UV transmittance (UVT) or UV absorbance (UVA) of the test water is calculated without the need for DI water for calibration.

By continuously taking readings in either direction through the flow cell, calibration is performed every time a sample is taken. Therefore, quartz fouling and lamp fluctuations are inherently compensated for by the measurement process itself, improving accuracy.

The following illustration (Figure 1) below provides an inside look at the Real UV254 M3000's Ortho-Beam technology.

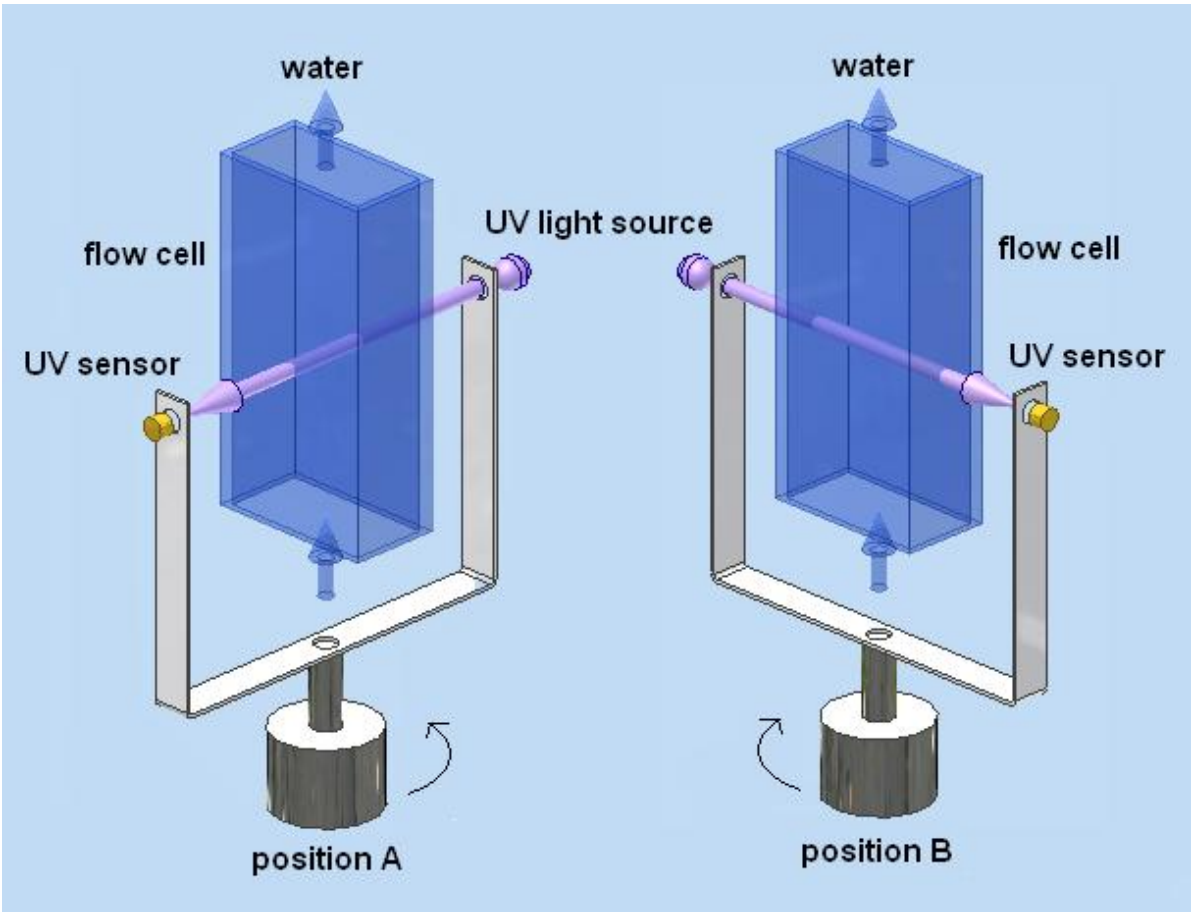


Figure 1: Ortho-Beam Technology Inside Look

SPECIFICATIONS

The Real UV254 M3000's Patent Pending Ortho-Beam technology provides increased accuracy, reduced maintenance and affordability.

REAL UV254 M3000 TECHNICAL SPECIFICATIONS	
RANGE	0 - 100 % UVT, 0 - 2 UVA
ACCURACY	± 1.0 % UVT
REPEATABILITY	± 0.1 % UVT
RESOLUTION	0.1 % UVT, 0.001 UVA
UNITS	Operator configurable: cm^{-1}, m^{-1}
PATH LENGTH	1cm
SAMPLING TIME	10 seconds
FLOW RATE	300 - 800 mL / min
CALIBRATION	Ortho-Beam technology allows continuous automatic calibration during operation
CLEANING	• Significantly reduced cleaning requirements due to Ortho-Beam technology • Automatic cleaning optional
SELF DIAGNOSTICS	Continuous detection leaks, lamp output, humidity, temperature and electrical fault
OPERATOR INTERFACE	Full menu structure with up/down scrolling
DISPLAY	• 4 line x 20 character backlit LCD • Indicator light for system alarms and warnings
ALARMS	Dry-contact terminals allow operator configurable alarms
HUMIDITY CONTROL	Humidity sensor with large regeneratable desiccant system
OUTPUTS	• 4-20 mA output configurable to either UVT or UVA • RS232 for configuration via PC
WAVELENGTH	253.7 nm
LIGHT SOURCE	Low pressure mercury UV lamp
LAMP LIFE	2 years
DIMENSIONS	14"h x 12"w x 8"d
ENCLOSURE	NEMA 4X, wall mountable
FLUID CONNECTIONS	1/4" tube compression in/out
ELECTRICAL	24 VDC 30W power adapter (accepts 90-250 VAC 50/60 Hz)
STORAGE TEMP	-20 to 60°C (-4 to 140°F)
OPERATING TEMP	0 to 45°C (32 to 113°F)
WARRANTY	2 year limited warranty
OPTIONS	• Dual feed • Real Clean automatic chemical cleaning • Open channel / Non-pressurized pump system

SAFETY

READ AND FOLLOW ALL SAFETY INSTRUCTIONS.

Visually inspect the monitor prior to installation. If the quartz flow cell or UV lamp is broken or damaged in any way, do not use. Contact supplier for replacement parts.

Ensure that all responsible personnel carefully read this manual before installing or servicing the Real UV254 M3000.

Failure to properly install and maintain this device may impact the effectiveness of the monitor.

WARNING!

The Real UV254 M3000 contains a UV lamp, which emits light at the UV 254nm wavelength.

Never look directly at the UV light, result may cause permanent eye damage and burn unprotected skin.

Never disassemble the Real UV254 M3000 without ensuring unit is turned off by unplugging power supply to the monitor.

Improper use of this device may cause injury.

SAVE THESE INSTRUCTIONS.

INSTALLATION GUIDE

Unpacking

To begin, remove the Real UV254 M3000 from the packaging and carefully inspect the instrument to ensure that no visible damage has occurred during shipping.

Next, ensure to remove the packing material that is contained in the inside of the instrument.

It is important to note that the quartz flow cell and the rotating arm for the Real UV254 M3000 have been shipped separately.

To begin, position the flat on the motor so it is facing out as shown in Illustration 1.A. Then place the rotating arm on the motor shaft as shown on right and tighten the shaft locking screw with a #1 Philips screw driver as shown on right in Illustration 1.B.

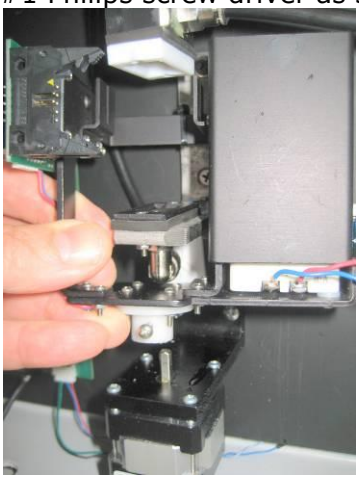


Illustration 1.A

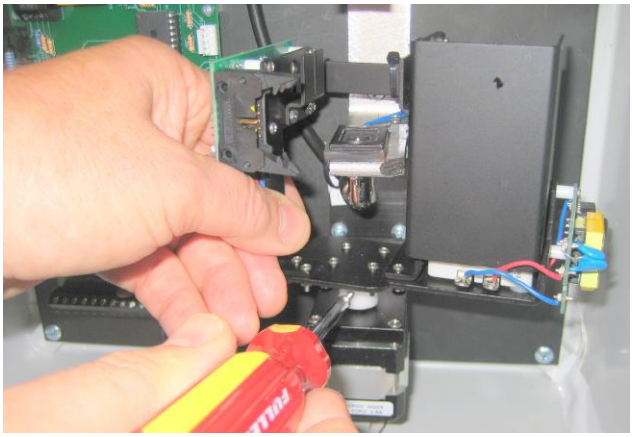


Illustration 1.B

Remove the quartz flow cell carefully from packing and insert it into position under the clamping flow tube as shown below in Illustration 2.A. Once in place, carefully and slowly lower clamp to ensure it is aligned with flow tube, as shown in Illustration 2.B and Illustration 2.C.

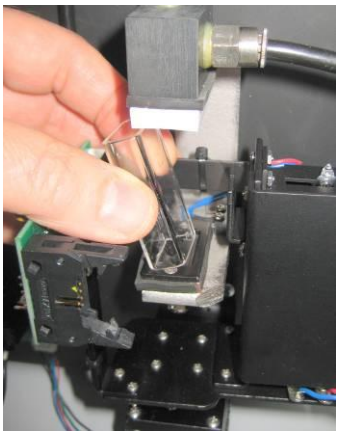


Illustration 2.A

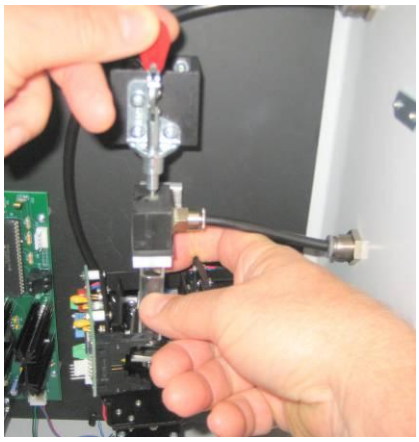


Illustration 2.B

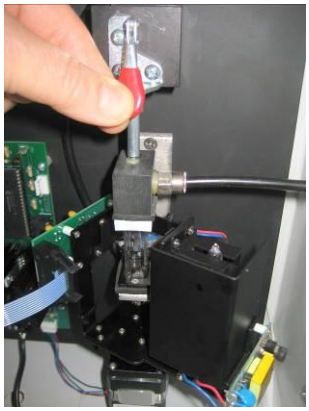


Illustration 2.C

Connect flex ribbon connector to the rotating arm as shown below in Illustration 3.A. Press the connector as shown in Illustration 3.B, so the top and bottom hold down clamps click into position, as shown in Illustration 3.C.

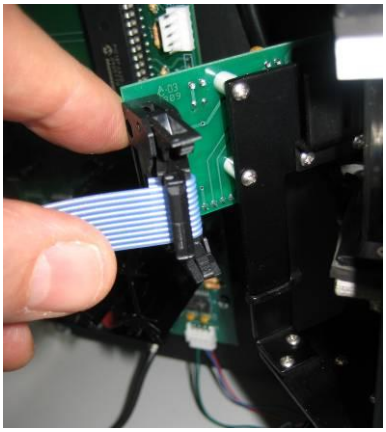


Illustration 3.A

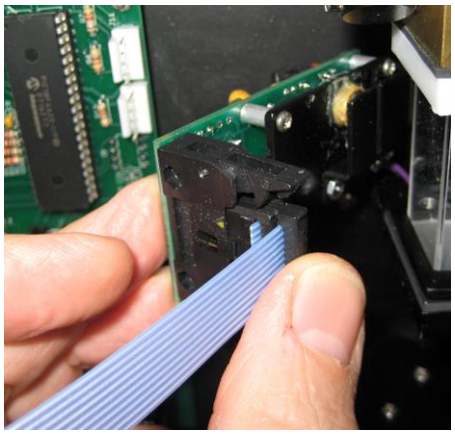


Illustration 3.B

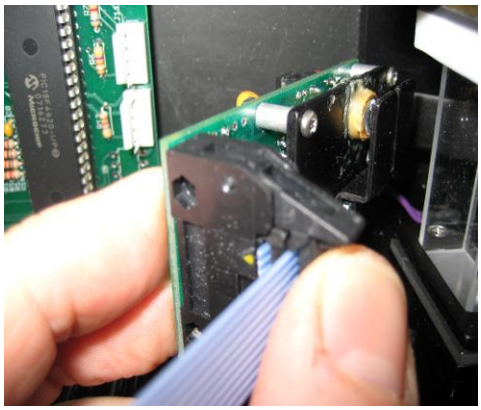


Illustration 3.C

Mounting and Plumbing

Piping is required to be 1/4" OD flex tubing of whatever pressure rating is needed for the particular site.

The customer must install a shut off valve to shut off the flow to the monitor when servicing is required and a flow control valve to regulate the flow to 0.3 - 0.8 L/min.

The recommended flow rate for the monitor is approximately .75 L/min. This flow rate is regulated by the use of suitable flow control valve on the INLET tubing. The test water must be allowed to flow unrestricted to the drain, so that no significant water pressure occurs inside the monitor.

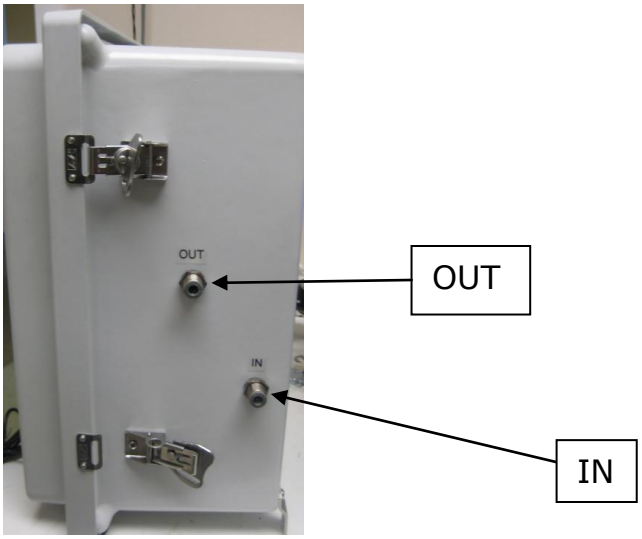


Figure 2: Inlet and Drain Water Connections

The Real UV254 M3000 will operate without recalibration or cleaning for an extended period of time under most water conditions. However, if water has very high turbidity or large suspended particles, then at least a 5 micron sediment filter is recommended to ensure accurate readings.

The monitor should be attached to the wall at all four provided mounting holes. The type of screws used will depend on the installation site. When selecting the type of screws to be used, it should be noted that the monitor weighs just less than 20lbs and therefore the mounting should be sturdy enough to support this.

Electrical Connections

The 24 VDC power is supplied to the Real UV254 M3000 by means of a DC power adapter that is plugged into a wall outlet of 100-240 VAC 50/60 Hz. The two 24 VDC wires from the adapter are run through the connector in the bottom of the monitor. The bare wire is connected to terminal #11 (-) and the white wire (+) is connected to terminal #12 (see below).

Both 24 VDC power and communication lines feed into the monitor via one 3/4" electrical conduit fitting on the bottom of the monitor and must be connected to the terminal block on the main control board.

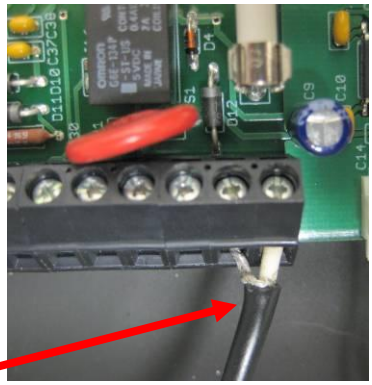
Primary communication is provided by a 4-20mA current loop output. RS-232 is also included to allow direct connection to a PC COM port if desired. A configurable dry contact is also available. These provide the operator with alarms for operator configured UVT/UVA set-points and system failure alarms. Dry contact connections are from terminals #5 & #6. The 4-20 ma output connections are from negative terminal #3 and positive terminal #4.

Dual Feed Option - For the dual feed option a second pair of 4-20 ma outputs connections are from negative terminal #1 and positive terminal #2. This output signal is for the Influent water stream.

Automatic Chemical Clean Option – Power to the optional Automatic chemical clean system is provided at connector terminals #9 and #10 which run to the left terminal block on the circuit board in the chemical clean cabinet. Matching the correct polarity is important. The chemical clean logic is through connector terminals #7 & #8 which run to the right terminal block on the circuit board in the chemical clean cabinet. Polarity is not important.

1	2	3	4	5	6	7	8	9	10	11	12
		4-20 ma Influent -	4-20 ma Influent +	Dry Contact Out	Dry Contact Out	Clean Out	Clean Out	24 VDC Out -	24 VDC Out +	24 VDC In -	24 VDC In +

Figure 3: Main Terminal Block



White wire on #12
Bare ground wire #11

OPERATOR INTERFACE

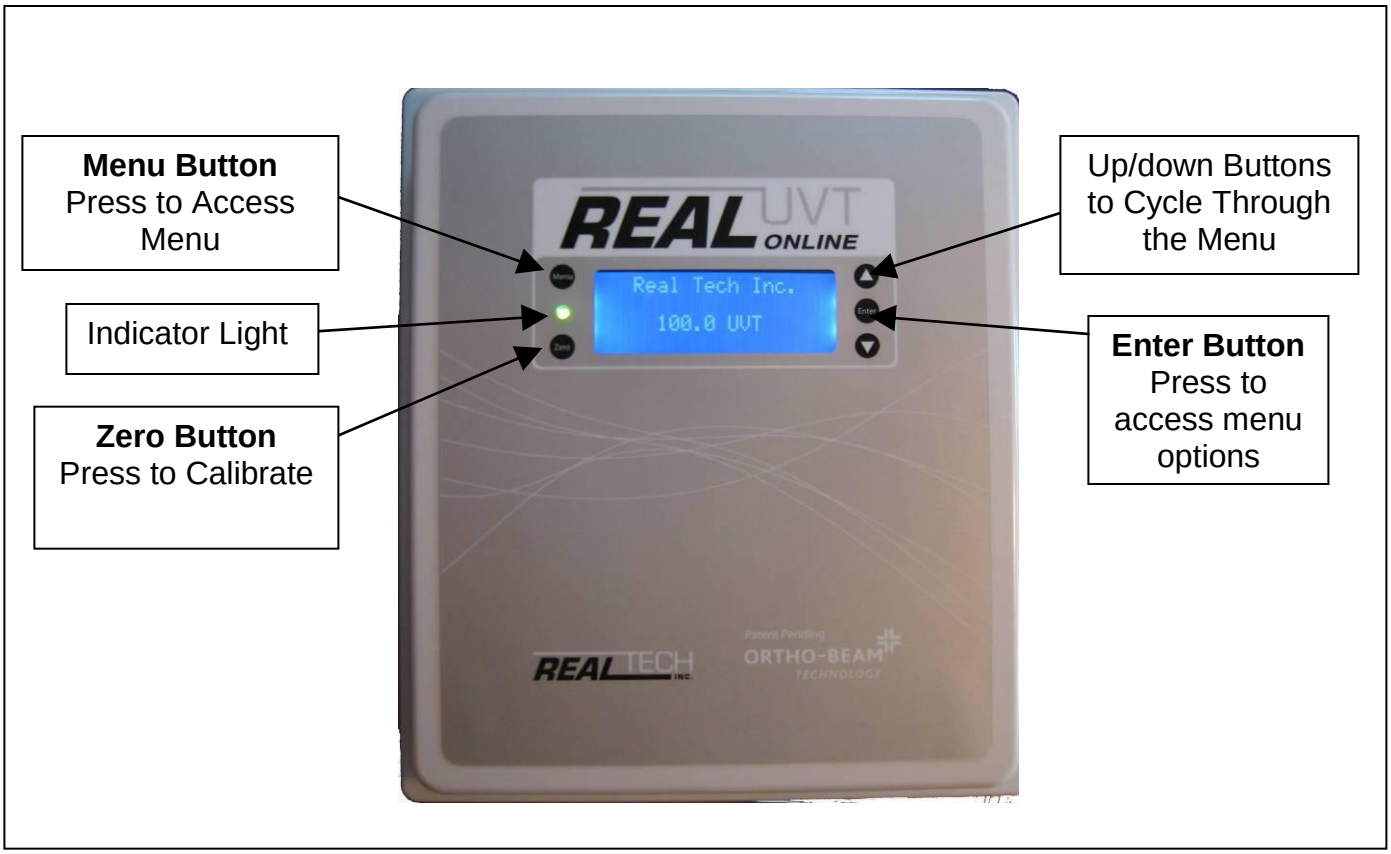


Figure 4: Operator Interface Panel

OPERATION

**** PLEASE NOTE THAT BEFORE PLUGGING IN THE REAL UV254 M3000 IT IS ESSENTIAL THAT ALL PACKING MATERIAL FROM INSIDE THE MONITOR IS REMOVED SINCE THE MONITOR HAS MOVING PARTS THAT MUST NOT BE RESTRICTED***

Start-Up

Before plugging in the monitor check to make sure the electrical connections discussed in the 'Installation Guide' section of this manual are correct. Also, make sure the quartz flow cell is installed and the red flow cell lever is in the fully down position.

Note that in areas of high humidity, before turning on water flow leave the Real UV254 M3000 door closed for a minimum of three hours to allow for the dehumidifier to dry the air inside enclosure.

After the monitor has been installed as described in the 'Installation Guide' section, operation of the monitor is very straight forward.

Start-up Instructions:

1) After making sure that the flow rate has been set to 0.3 – 1.0 L/min and the drain is unrestricted and not kinked, open the inlet valve to allow test water to flow through the monitor and check for any leaks in the flow cell, piping and fittings for at least 10 minutes before proceeding to next step. Ensure there are no bubbles flowing through the flow cell.
2) Plug in the power supply.
3) Configure the monitor to your application by going into the menu structure and setting such parameters as UVA or UVT etc.

Note that after installation the monitor must be zeroed (calibrated) before the UVT/UVA readings can be assumed to be accurate.

Zero (Calibration)

The monitor must be initially calibrated to a pure 100% UVT water sample of either DI or RO reference water before accurate UVT/UVA data can be read **OR** if the water flowing through the monitor has a known UVT or UVA as measured using a lab or portable spectrometer.

Using RO or DI water method

a. Make sure the door to the monitor is closed properly. Make sure both door clamps are secure.
b. Make sure the monitor is powered up.
c. Shut off the water supply to the monitor if not already done.
d. Disconnect the ¼" supply tubing at the inlet connection on the monitor.
e. Fill the wash bottle supplied with DI water and connect the ¼" bottle tubing to the inlet connection on the monitor.
f. Hold a finger over the small vent hole in the centre of the wash bottle cap.
g. Squeeze the bottle to get the DI water to flow through the monitor.
h. Once the fluid starts to flow remove finger from the vent hole and place bottle on top of monitor. The fluid should continue to flow through the monitor. If it stops go back to step f.
i. The LCD display should display a UVT/UVA reading.
j. Let about half the DI water run through the monitor before pressing the **Zero** button. Use then down arrow to select "Zero to DI Water" press "enter" and the monitor will calibrate itself to 100% in UVT mode or 0.000 in UVA mode.
k. The monitor has now been calibrated to DI water. Disconnect the wash bottle hose from the inlet of the monitor, reconnect the supply tubing and open the valve to allow the test water to flow.
l. Connect the supply line to the monitor and open the valve to start the flow running.

Using Known UVT or UVA water method

Note -This feature only works in UVT mode, if your unit is programmed for UVA then switch it temporarily to UVT in the menu then back to UVA when calibrated.

a. *Press the **Zero** button and use the down arrow to select "Custom Zero" then press "enter".*
b. Use the up down arrow keys until the known UVT is displays the known UVT value then press "enter".
c. The monitor is now calibrated to the correct value.

MAIN MENU STRUCTURE

Menu Item	Description
Averaging	
On:1 Off:0	
Average	press **Enter** then ▲▼ to select running average for last 10 readings
UVT/UVA mode	
0:UVT	
1:UVA	
Select	press **Enter** then ▲▼ to select UVT or UVA mode
Setpoints	
UVT Warning	press **Enter** then ▲▼ to select UVT warning set point
UVT Alarm	press **Enter** then ▲▼ to select UVT alarm set point
UVA Warning	press **Enter** then ▲▼ to select UVA warning set point
UVA Alarm	press **Enter** then ▲▼ to select UVA alarm set point
4-20mA Setup	
4mA UVT	press **Enter** then ▲▼ to select 4 ma UVT reading for scaling
20mA UVT	press **Enter** then ▲▼ to select 20 ma UVT reading for scaling
4mA UVA	press **Enter** then ▲▼ to select 4 ma UVA reading for scaling
20mA UVA	press **Enter** then ▲▼ to select 20 ma UVA reading for scaling
Secondary Data	
Water 1	displays the water output after it passes through the flow cell 1 cm position
Water 2	displays the water output after it passes through the flow cell 2 cm position
Lamp 1	displays the lamp output after it passes through the flow cell 1 cm position
Lamp 2	displays the lamp output after it passes through the flow cell 2 cm position
Temperature	displays temperature inside cabinet - Celsius
Humidity	displays the relative humidity inside cabinet - RH
Status Code	displays status code for system diagnostics
Dry Contact Setup	
See Set Alarms	
0: Nothing	
1: Alarm	
Select	press **Enter** then ▲▼ to select 0 or 1 to turn on/off dry contact
Cleaning System	
Enable Clean	press **Enter** then ▲▼ to select 0 or 1 to turn on automatic cleaning system if supplied
Reset Clean	press **Enter** then ▲▼ to select 0 or 1 to reset fluid alarms after refilling fluid
Force Clean	press **Enter** then ▲▼ to select 0 or 1 to force the cleaning system to begin a cleaning cycle
Pumping Time	press **Enter** then ▲▼ to select 60, 90 or 120 seconds
Clean Frequency	
0: No Cleaning	
1: 4 hours	
2: 12 hours	
3: 24 hours	

4: 3 days	
5: 1 week	
6: 2 weeks	
7: 1 month	
Select	press **Enter** then ▲▼ to select cleaning frequency 0 - 7
Rotation	
On:1 Off:0	
Select	press **Enter** then ▲▼ to turn on/off the rotating arm
Ref Position	
Steps	press **Enter** then ▲▼ to change motor alignment, increasing the # adjusts the position clockwise
RS-232 Data Log	
Setup	
Baud Rate :9600	fixed parameters for RS-232 logging
Parity :none	fixed parameters for RS-232 logging
Stop Bits :1	fixed parameters for RS-232 logging
Flow Ctrl :none	fixed parameters for RS-232 logging
Data for Log	
Add:1 Remove:0	
Sensors	press **Enter** then ▲▼ to select all lamp and water sensor data
Temp/Humid	press **Enter** then ▲▼ to select cabinet temp and humidity data
UVT	press **Enter** then ▲▼ to select UVT data
UVA	press **Enter** then ▲▼ to select UVA data
Status	press **Enter** then ▲▼ to select status code for alarms & diagnostics
Datalog Frequency	
0: No Data Log	
1: 10 seconds	
2: 1 minute	
3: 10 minutes	
4: 1 hour	
Select	press **Enter** then ▲▼ 1 - 4 to select logging frequency
Alarms	
Humidity	alarm status (0 = no alarm 1 = alarm)
Temperature	alarm status (0 = no alarm 1 = alarm)
Leak Detection	alarm status (0 = no alarm 1 = alarm)
UVT Warning	alarm status (0 = no alarm 1 = alarm)
UVT Alarm	alarm status (0 = no alarm 1 = alarm)
UVA Warning	alarm status (0 = no alarm 1 = alarm)
UVA Alarm	alarm status (0 = no alarm 1 = alarm)
Lamp Failure	alarm status (0 = no alarm 1 = alarm)
Lamp Low	alarm status (0 = no alarm 1 = alarm)
Lamp High	alarm status (0 = no alarm 1 = alarm)
Cleaning	alarm status (0 = no alarm 1 = alarm)
Clean Fluid Empty	alarm status (0 = no alarm 1 = alarm)
Clean Fluid Low	alarm status (0 = no alarm 1 = alarm)
System Fault	alarm status (0 = no alarm 1 = alarm)

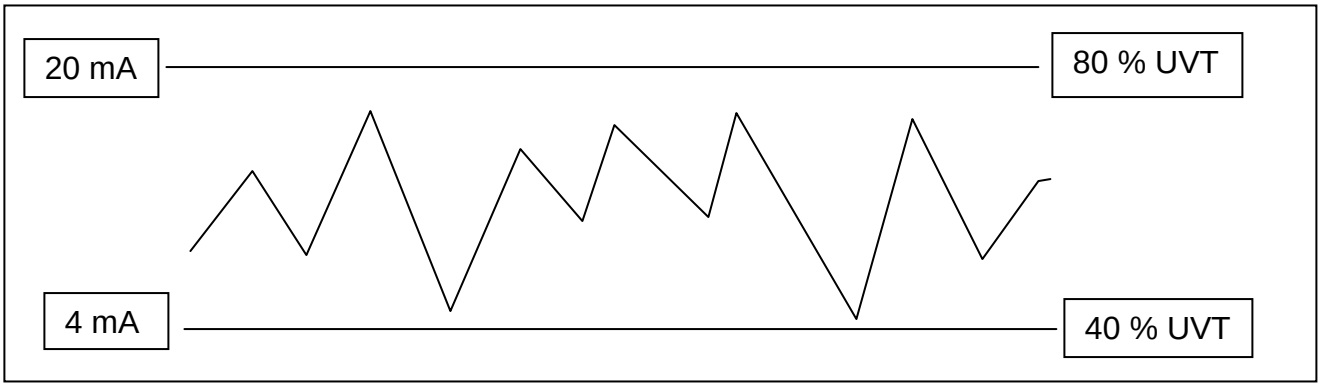
Set Alarms	
See Dry Contact	
0: Disabled	
1: Alarm	
Humidity	press **Enter** then ▲▼ to select high cabinet humidity alarm
Temperature	press **Enter** then ▲▼ to select high cabinet temperature alarm
Leak Detection	press **Enter** then ▲▼ to select leak inside cabinet alarm
UVT Warning	press **Enter** then ▲▼ to select low UVT warning point as alarm
UVT Alarm	press **Enter** then ▲▼ to select low UVT alarm point as alarm
UVA Warning	press **Enter** then ▲▼ to select high UVA warning point as alarm
UVA Alarm	press **Enter** then ▲▼ to select high UVA alarm point as alarm
Lamp Failure	press **Enter** then ▲▼ to select lamp failure alarm
Lamp Low	press **Enter** then ▲▼ to select low lamp output alarm
Lamp High	press **Enter** then ▲▼ to select high lamp output alarm
Cleaning	press **Enter** then ▲▼ to select when cleaning cycle active
Clean Fld Empty	press **Enter** then ▲▼ to select when cleaning solution empty alarm
Clean Fluid Low	press **Enter** then ▲▼ to select when cleaning solution low alarm
System Fault	press **Enter** then ▲▼ to select internal system error alarm
Mute	
Alarms	press **Enter** then ▲▼ 0 or 1 to select audible alarms
Dual Feed	
Enable	press **Enter** then ▲▼ to select 0 to disable or 1 to enable
Idle Time	press **Enter** then ▲▼ to select number of minutes to wait while switching between sample lines
Cycle Time	press **Enter** then ▲▼ to select minutes for total dual feed cycle time (15 - 60 minutes)
Dark Current	
Set Value	press **Enter** then ▲▼ to adjust the water sensor dark current

4-20 mA Setup

The Real UV254 M3000 is equipped with a 4-20 mA output capability.

The 4-20 mA can be set to produce a user selectable UVT or UVA value for the low (4 ma) and a separate value for high (20 ma) up to 110% UVT.

The graph below is an example of a 4-20 mA for a customer who wanted to log UVT values between 40% and 80% UVT readings.

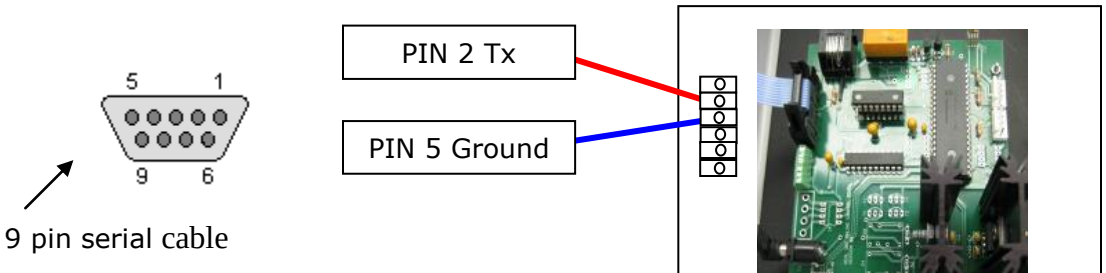


Example Illustration

RS-232 Data Logging

The Real UV254 M3000 has the capability to data log various performance variables on a local computer via an RS-232 interface. The data log frequency as well as the specific data to be logged is configurable. Refer to RS-232 Data Log in the menu structure.

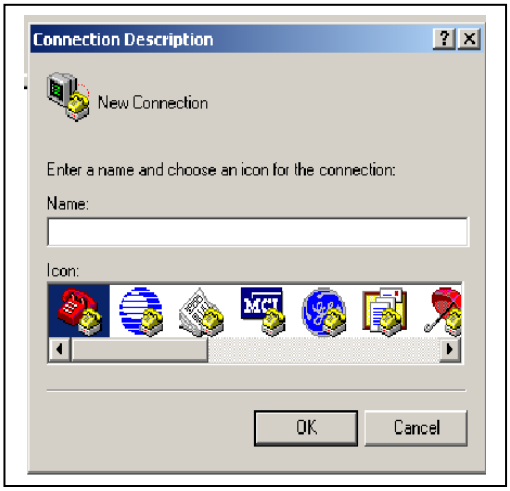
The RS-232 data feed is through a 9 pin serial cable to a com port on a local computer supplied by the owner. Only 2 wires are used as shown below in Figure 5. If the computer does not have a 9 pin serial port then a USB to serial adapter can be used.



Pin number	Description	Board connection
2	Tx	Second from top
5	ground	Third from top

Figure 5: Main Board

With the wires connected as shown above and the serial cable plugged into the computer, click on START then click RUN and type *HYPERTRM* or click the following:
programs/accessories/communications/hyperterminal

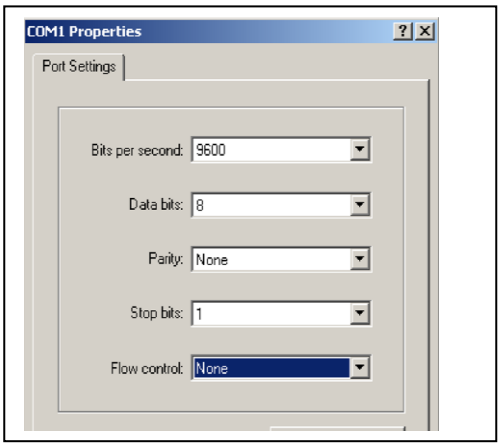


The screen shown on the left will appear. Type any name in the line and click OK.

Then pick the com port you will be using on the next screen.

The screen shown on the left will appear.
Enter the following information into this screen:

Bits per second – **9600**
Data bits – **8**
Parity – **none**
Flow control – **none**
Click **OK**



The next step will be to click **File/Properties**. Pick **settings** at the top of the page, and then pick **ASCII Setup**.

Check boxes

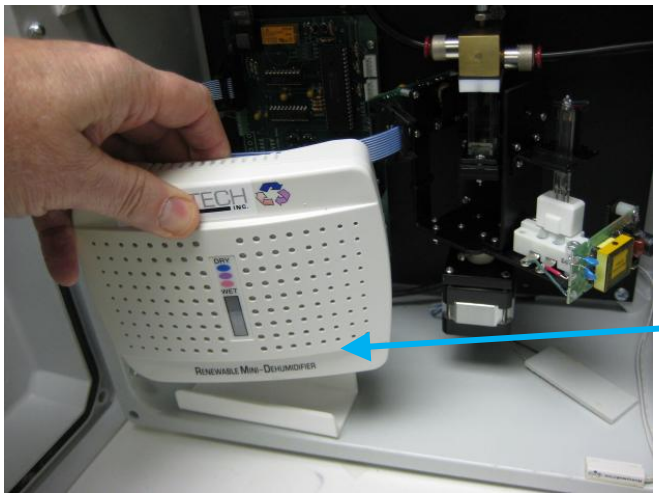
- Send line ends with line feeds
- Echo typed characters locally
- Append line feeds to incoming line ends
- Wrap lines that exceed terminal width

Click **OK** on both screens

Dehumidifier for Humidity Control of Real UV254 M3000

The Real UV254 M3000 includes a dehumidifier to control the humidity inside the monitor. The dehumidifier is located inside the Real UV254 M3000 at the bottom left corner and will maintain low relative humidity (RH) to prevent condensation from forming on the quartz flow cell walls. The dehumidifier is designed to maintain low humidity inside the Real UV254 M3000 for 6-12 months before regeneration.

To regenerate simply remove the dehumidifier (as shown in Figure 14 below) and plug into a 110 - 240 VAC wall outlet for 10-12 hours. The colour bar on the front will turn dark blue when the dehumidifier is fully regenerated. There is no limit to the number of times the dehumidifier can be regenerated. When replacing the dehumidifier back inside the Real UV254 M3000, ensure that the dehumidifier is close to the left inside wall of monitor when in place.



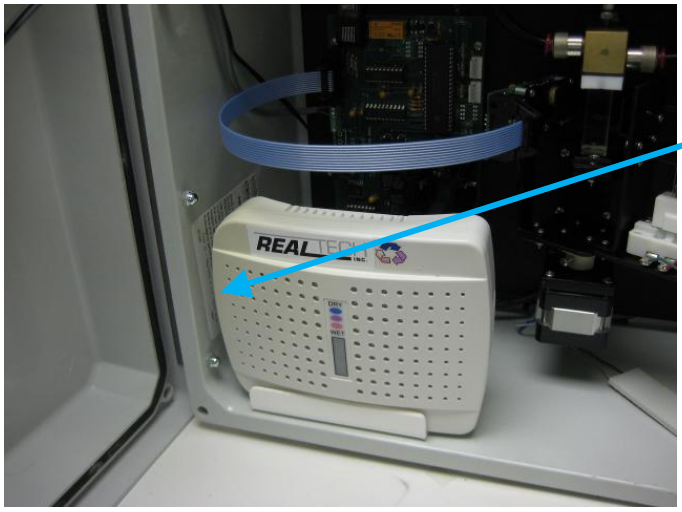


Figure 6: Replacing Dehumidifier

MAINTENANCE

Cleaning Quartz Flow Cell

The quartz flow cell can be cleaned in acid or and cleaning solutions to remove residue that has accumulated on the inside surface.

Similar to the calibration methods for the Real UV254 M3000, cleaning of the quartz flow cell can be performed using either the in-situ method or the manual method. The in-situ method is recommended since it is much faster and easier and just as effective.

1. **In-Situ quartz flow cell cleaning method**

   a. Shut off the water supply to the monitor if not already done.
   b. Disconnect the ¼" supply tubing at inlet connection on the monitor.
   c. Fill the wash bottle supplied with cleaning fluid and connect the ¼" bottle tubing to the inlet connection on the monitor.
   d. Hold a finger over the small vent hole in the centre of the wash bottle cap.
   e. Squeeze the bottle to get the cleaning fluid to flow through the monitor.
   f. Once the fluid starts to flow remove finger from the vent hole and place bottle on top of monitor. The fluid should continue to flow through the monitor. If it stops go back to step f.
   g. Let all the fluid run through the quartz flow cell until the bottle is empty then disconnect the hose and bottle from the fitting.
   h. Let the fluid remain in the quartz flow cell for several minutes until the quartz flow cell is clean.
   i. Connect the supply line to the unit and open the valve to start the flow running.
   j. Note that it is recommended to recalibrate the monitor at this time.

2. **Manual quartz flow cell cleaning method and quartz flow cell removal**

   a. Shut off power to the monitor and close the water supply.
   b. Open door of the monitor and place a paper towel or cloth below flow cell because some water may be still be in the cell.
   c. Slowly lift the RED lever of the quartz flow cell clamp as shown in Figure 4.
   d. Grip the quartz flow cell with two fingers at the top and carefully remove from the holder.
   e. Clean the quartz flow cell.
   f. Place the quartz flow cell back in the holder (ensuring that there are no fingerprints on both sides of the quartz flow cell where the light path comes through).
   g. Lower the RED lever of the quartz flow cell clamp very slowly to lock the quartz flow cell in place, making sure the quartz flow cell is properly aligned as you lower the clamp.
   h. Close the door of the monitor.
   i. Open the valve to start the test water flowing.

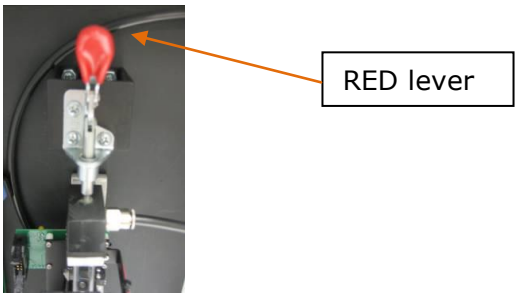


Figure 7: Removing the Quartz Flow Cell for Cleaning

Replacing UV Lamp

The lamp rated life of 12,000 hrs, however under normal use it should last much longer. When the lamp status light turns from green to amber it is time to order a new lamp. Contact Real Tech Inc. or your supplier for a replacement lamp.

WARRANTY

Real Tech Inc. warrants to the original purchaser of this instrument that it will be free of defects in material and workmanship, in normal use and service, for a period of two years from date of delivery to the original purchaser. Real Tech Inc.'s obligation under this warranty is limited to replacing, at Real Tech Inc.'s factory, the instrument or any part thereof. Excluded from this limited warranty are the accessories and supply type items.

The original purchaser is responsible for return of the instruments, or parts thereof, to Real Tech Inc.'s factory. This includes all freight charges incurred in shipping to and from Real Tech Inc.'s factory.

Real Tech Inc. is not responsible for any personal injury and/or damage to the instrument, or parts thereof, resulting from any accident, improper use of the instrument or negligence on the part of the user of the instrument. Real Tech Inc. is not responsible for any personal injury or defects to the instrument resulting from repairs or alterations made by any person or company not authorized by Real Tech Inc.

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Carefully inspect this product for shipping damage, if damaged, immediately notify the shipping company and arrange an on-site inspection. Real Tech Inc. cannot be responsible for damage in shipment and cannot assist with claims without an on-site inspection of the damage.

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For further assistance or service please contact:

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E-mail: service@realtech.ca
Website: www.realtech.ca

APPENDIX D – Literature for UV Disinfection System

Orenco® UV Disinfection Unit

Orenco Systems®
Incorporated
800-348-9843

Installation and Maintenance Instructions for Orenco® UV and AXUV Disinfection Units

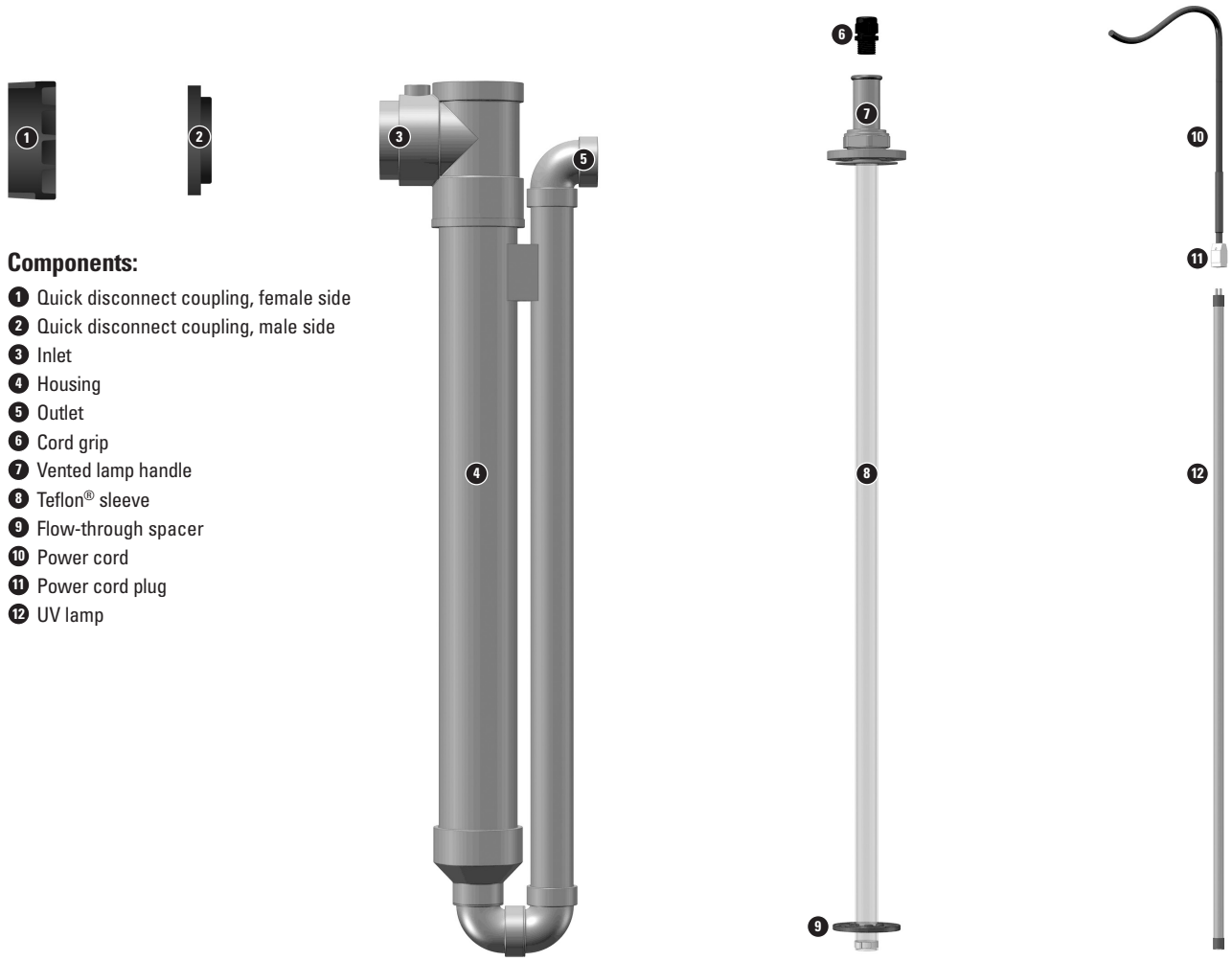
Before You Begin

WARNING: Do not look directly at an operating UV lamp or expose skin to UV lamp light! UV radiation burns retinas and skin!

Orenco's UV and AXUV Disinfection units feature a UV lamp and power cord, lamp assembly, unit housing, and quick-disconnect coupling for installation in a pump basin, gravity discharge basin, or discharge tank. A current sensor and ballast for the UV disinfection unit are included in Orenco UV control panels, which are purchased separately.

IMPORTANT: *The power cord for the disinfection unit can be installed through a splice box, or a conduit can be run through the riser. Do not run the power cord with pump wiring or float wiring! The power cord is 25 feet (7.6 m) long. Do not splice the power cord!*

The control panel can be installed on a nearby building or on a post. If the control panel contains pump control circuitry, do not install it on the wall outside a residential space, as the relay contact noise, when the pump turns on and off, may be noticeable and bothersome. It can, however, be installed on the wall of a garage or shed.



Components:

1. Quick disconnect coupling, female side
2. Quick disconnect coupling, male side
3. Inlet
4. Housing
5. Outlet
6. Cord grip
7. Vented lamp handle
8. Teflon® sleeve
9. Flow-through spacer
10. Power cord
11. Power cord plug
12. UV lamp

Orenco UV Disinfection Unit Components (Control Panel Components Not Shown)

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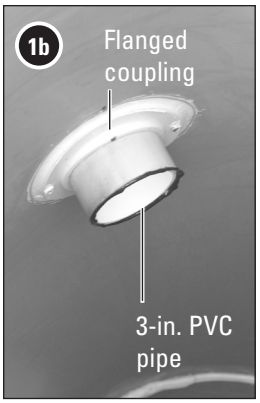

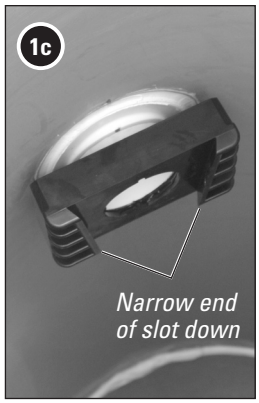

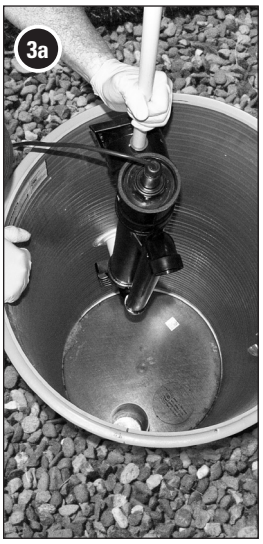

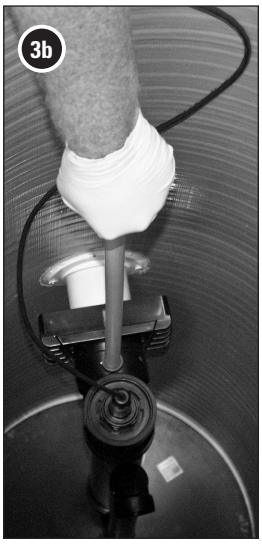

Step 1: Install Quick-Disconnect Coupling

NOTE: *If you have purchased your pump basin from Orenco, the flanged coupling and female side of the quick-disconnect coupling may be pre-installed.*

IMPORTANT: *If the flanged coupling and female side of the quick-disconnect coupling are not pre-installed, do not apply primer to either of these pieces. They are ABS. Primer intended for PVC will weaken the ABS material.*

Step 1a: Cut a section of 3-inch (75 mm) PVC pipe to 9 inches (230 mm).

Step 1b: Apply glue to the inside of the flanged coupling and press the pipe into the coupling. Leave 3 inches (75 mm) of pipe inside the riser or tank.

Step 1c: Glue and install the female side of the quick-disconnect coupling onto the pipe stub.

NOTE: *Be sure that the narrow end of the slot on the coupling is pointed down toward the bottom of the basin or riser, as shown in Photo 1c.*

Step 1d: Glue and install a reducer on the pipe stub outside of the riser.

Step 2: Install Splice Box, if Necessary

If the splice box for the unit has not been pre-installed on the basin or tank riser, install it using the instructions supplied with the splice box. You can use either an internal splice box or Orenco's External Splice Box. Follow all applicable electrical codes when installing the splice box.

NOTE: *Instead of using a splice box, you can run conduit for the disinfection unit's cable directly through the riser using a watertight grommet.*

Step 3: Install Disinfection Unit

Once the basin or tank has been backfilled, you can install the disinfection unit.

Step 3a: Lower the disinfection unit into the basin and slide it into the quick-disconnect coupling.

Step 3b: Firmly seat the unit into the quick-disconnect coupling.

Step 3c: Neatly coil the excess power cord and secure it to the splice box with a cable tie. If you are using an Orenco external splice box, secure the cable with the hook-and-loop strip supplied with the splice box (as shown).

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Step 4: Install Wiring

Step 4a: Turn off all circuit breakers in the control panel before you begin.

Step 4b: Run conduit from the splice box or through the riser wall to the control panel, following applicable electrical codes.

IMPORTANT: *DO NOT route the power cord for the UV unit with pump power cords or float power cords!*

Step 4c: If a splice box is used, pull the disinfection unit's power cord through one of the cord grips on the splice box and tighten the cord grip so that the cord cannot slide through; then feed the cord into the conduit. If no splice box is used, just feed the cord into the conduit. Pull the cord through the conduit to the control panel. Whether or not a splice box is used, seal the conduit around the cord with approved electrical sealant.

NOTE: *Leave at least five feet (1.5 m) of coiled power cord in the basin or riser so that you can easily remove the disinfection unit for servicing.*

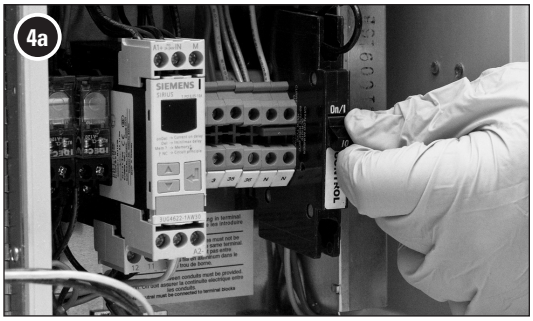
Step 4d: Consult the wiring diagram clipped inside the control panel and terminate the wires at whichever terminals are designated as "UV Power Terminals" on the drawing.

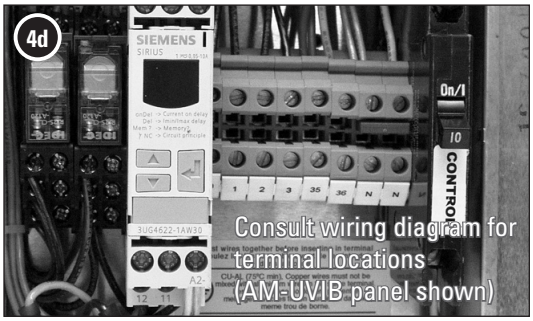
Step 5: Turn on Power

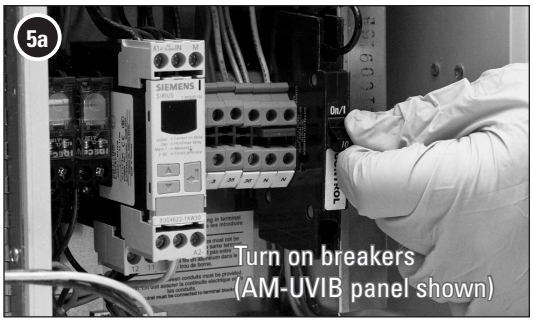
Step 5a: When power is available to the control panel, turn on the main circuit breaker to the panel.

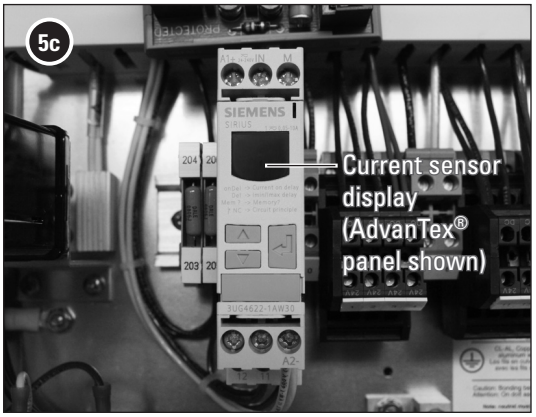
Step 5b: Turn on the remaining circuit breakers, if any.

Step 5c: Check the numeric display on the current sensor in the panel to ensure the lamp is functioning. The current sensor monitors the function of the lamp. A normal reading is about 0.28 amps. If the sensor reading is 0.22 amps or less, that means the lamp is not correctly connected or has failed and may need to be replaced.









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Troubleshooting the UV Disinfection Unit

During system operation, if the lamp fails or if it is not correctly connected, the current sensor will read “0.”

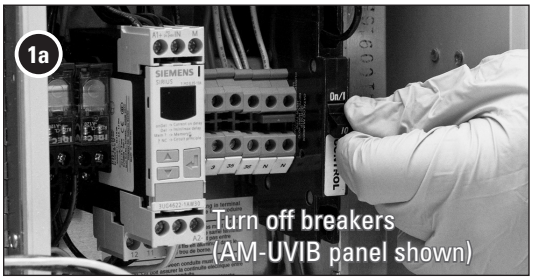
For AXUV units, when the current sensor reads “0,” the AdvanTex Treatment System’s discharge pump will be automatically disabled so that no untreated effluent is discharged. If a VeriComm™ Monitoring System is being used, it will send an alert to the service provider. The service provider will then visit the site, check the connections and the lamp, and replace the lamp if necessary. If the UV unit is powered through a VeriComm Monitoring System, a local alarm will sound if the service provider does not provide service within approximately 18 hours.

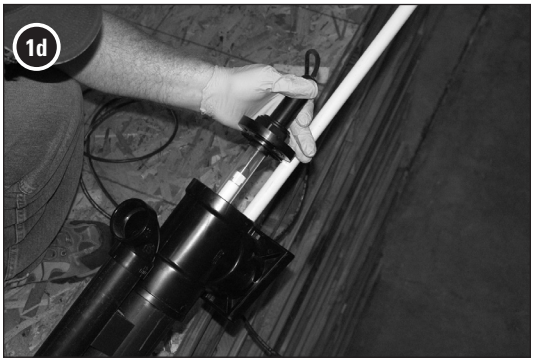
Additional troubleshooting instructions are clipped to the inside of the control panel.

Maintaining the UV Disinfection Unit and Replacing the Lamp

In a pump basin, gravity discharge basin, or discharge tank, treated effluent is disinfected as it flows through the housing and around the UV lamp. To ensure sufficient exposure of the effluent to the ultraviolet light from the lamp, the disinfection unit must be cleaned annually and the lamp replaced once every two years.

WARNING: Do not look directly at an operating UV lamp or expose skin to its light! UV radiation burns retinas and skin! When servicing any wastewater treatment equipment, wear clothing that covers all parts of the body that may be exposed to wastewater or effluent, wear appropriate personal protection equipment (rubber gloves, goggles, and boots), and always protect eyes and skin from UV rays.





Step 1: Remove the Disinfection Unit

Step 1a: In the control panel, turn off all circuit breakers.

Step 1b: Unfasten the coil of power cord so that you have enough slack to pull the disinfection unit out. It is not necessary to disconnect the cord from the disinfection unit.

Step 1c: Pull the disinfection unit out of the quick-disconnect coupling and lift it out of the basin.

IMPORTANT: *DO NOT pull the disinfection unit up by the cord!*

Step 1d: Carefully grasp the lamp tube/handle assembly at the top. ***Do not pull on the cord!*** Pull the lamp tube/handle assembly out of the disinfection unit housing.

Step 1e: Tilt the disinfection unit and drain the water back into the basin.

Step 1f: Lay the disinfection unit on a protective sheet of plastic on the ground.

Step 2: Clean the Disinfection Unit

Step 2a: Wipe any buildup off of the outside of the disinfection unit.

Step 2b: Support the disinfection unit contact chamber on the edge of the basin, and use a hose and long-handled bottle brush to break up any buildup inside the disinfection unit. Drain the unit back into the basin when finished.

Step 2c: Hold the lamp assembly over the basin and gently hose it off. Wipe off any debris, if necessary. To remove stains or coating from the Teflon® sleeve, rub it gently with a soft sponge and detergent. Remove stubborn stains with isopropyl alcohol on a sponge.

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Step 3: Replace the Lamp in the Lamp Assembly

IMPORTANT: *Handle the UV lamp with care. Avoid touching the glass surface of the lamp! Oils from your fingers can damage the lamp and shorten its life!*

Step 3a: Loosen and remove the handle assembly from the lamp tube assembly.

NOTE: *Be sure that the bulb freely turns in the sleeve while you are loosening the handle.*

Step 3b: Disconnect the socket on the power cord from the pins on the lamp and dispose of the lamp in accordance with local regulations.

NOTE: *You must properly dispose of the old lamp at a recycling center, as it contains mercury.*

Step 3c: Connect the socket on the power cord to the pins on the lamp.

Step 3d: Insert the lamp and electrical cord into the lamp tube assembly and gently slide the lamp in until the end of the lamp reaches the bottom of the Teflon® sleeve.

Step 3e: Begin threading the handle assembly onto the lamp tube assembly by hand and then torque the handle assembly nut to 35-45 inch-pounds (4-5 newton-meters force). Be certain that the o-ring is seated properly in the groove in the tube assembly so it can create a waterproof seal.

NOTE: *Overtightening can damage the tube assembly or handle assembly. Be careful not to overtighten.*

Step 3f: If it becomes necessary to remove and reinstall the cord grip, use a torque wrench to tighten the cord grip to 35-45 inch-pounds of torque (4-5 newton-meters force) when reinstalling the cord grip.

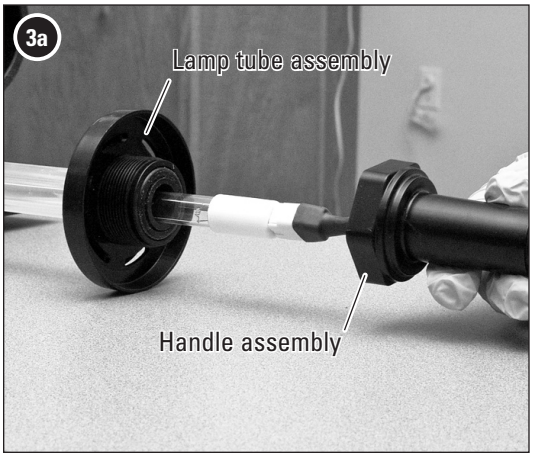
NOTE: *Overtightening can damage the cord grip and cord. Be careful not to overtighten.*

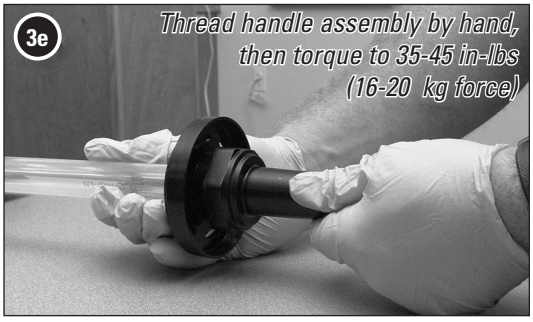
Step 4: Reinstall the Disinfection Unit

Step 4a: Follow the instructions in the installation section of this document for reinstalling the disinfection unit into the quick-disconnect coupling.

Step 4b: In the control panel, turn on all of the circuit breakers.

Step 4c: Check the numeric display of the current sensor in the panel to ensure the lamp is functioning.





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UV Disinfection Unit Installation/Inspection/Maintenance Form

Record your UV disinfection unit installation information, as well as annual inspection and cleaning results and any other maintenance activity performed on the UV disinfection unit.

Date of Installation:_____ **Name of Installer:** _____

Installation Site:_____

Remarks:_____

Date of Inspection/Cleaning/Lamp Replacement	Other Maintenance Performed?	Notes

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APPENDIX E – Literature for Brine System

ACCUBRINE™
AUTOMATED BRINE MAKER

Operators Manual
Model # AB, RTF, ABS, ABS2

May 2010

Notes:

Index 3-4

Basic Operations and Operator Interface (HMI) Guide

- Brine Batch Production 5-9
- Home screen Graphics
  - Water Level & Concentration Graph 10
  - Liquid Flow 11
  - Batch Information/Animations 11
  - Eutectic Curve 12
  - Data Log 13
  - Tank Farm 14
- Remote Truck Fill - RFID Operation 15-17
- Warning Beacon 18
- Recycled Water 19
- Faults 20-23
- Roll Tarp Operation 24-25
- Inline Salt Tank Heater Operation 26
- Parts 27

Advanced Operations and Machine Configuration

- High Level Passwords 28-29
- Remote Truck Fill - RFID Setup 29-32
- Additive System - Blended Products 33-38
- Additive System - Recirculation, Tank Transfers 39-40
- Recycled Water Setup 41

Machine Set Up

- Page 1 - Brine production 42-46
- Page 2 - Storage Tanks, Air Purge, Forcing valves, Remote Truck Fill, Inline Salt Tank Heater, 47-52
- Page 3 - Additive Injection, Micro Ingrediant, Crossover Activation 53-55

- Operating Modes 56
- Switch Box 57
- Accubrine Plumbing Configuration Drawings 58-61
- Help Page 62
- Save/Reload My Settings 63
- Data Downloads from HMI 64-68
- Accubrine Data Manager Tool Installation 69-74
- Using the Accubrine Data Manager Tool 75-78
- Date and Time 79
- HMI Care and Maintenance 80-84
- Compact Flash Card 85-87
- LAN Access/Web Gate 88-94

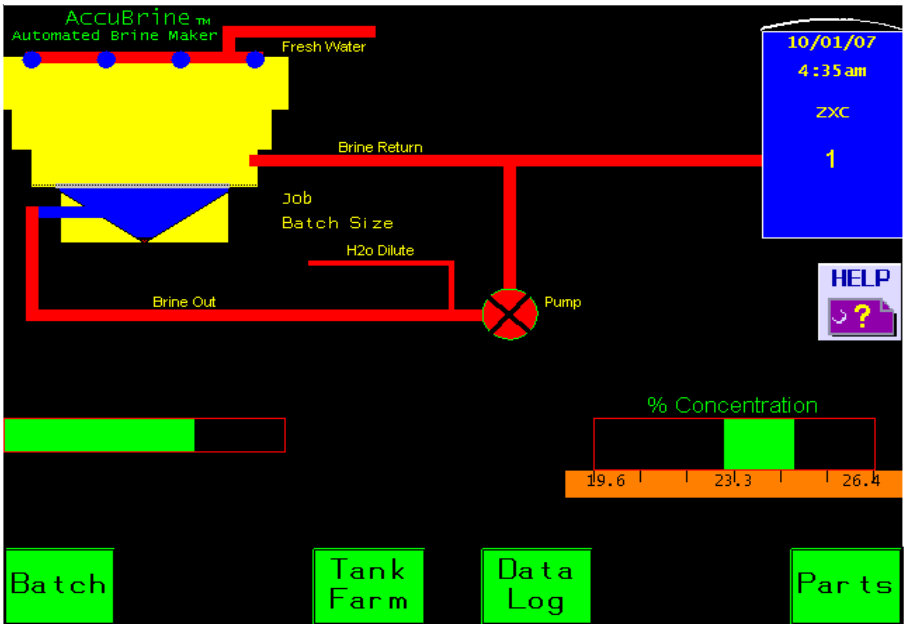
Index Continued:

Start Up Procedure 95

Parts
- Main Control panel and Pump 96-98
- Salt Tank Parts 99-106
- Clamps & Gaskets 107
- Storage Tank Plumbing Kit and Level Sensor 108
- Roll Tarp 108
- Modular Panel Example 109
- Electric Valves 110-112

Preventative Maintenance Schedule 113
Trouble Shooting Guide 114-115
Conductivity Analyzer Single Point Calibration 116-117
Conductivity Analyzer 3 Point Calibration 118-119
Auto/Manual Valve Positions and Operation 120-121
Cleaning Salt Tank & Sump 122
Off Season Storage Prep. 123-125
Complete Parts List 126-133
Manufacturer Warranty 134-135
Warranty Claim Form 136
Warranty Claim Instructions 137
Return Materials Authorization Form 138

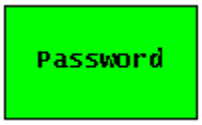
Producing A Brine Batch

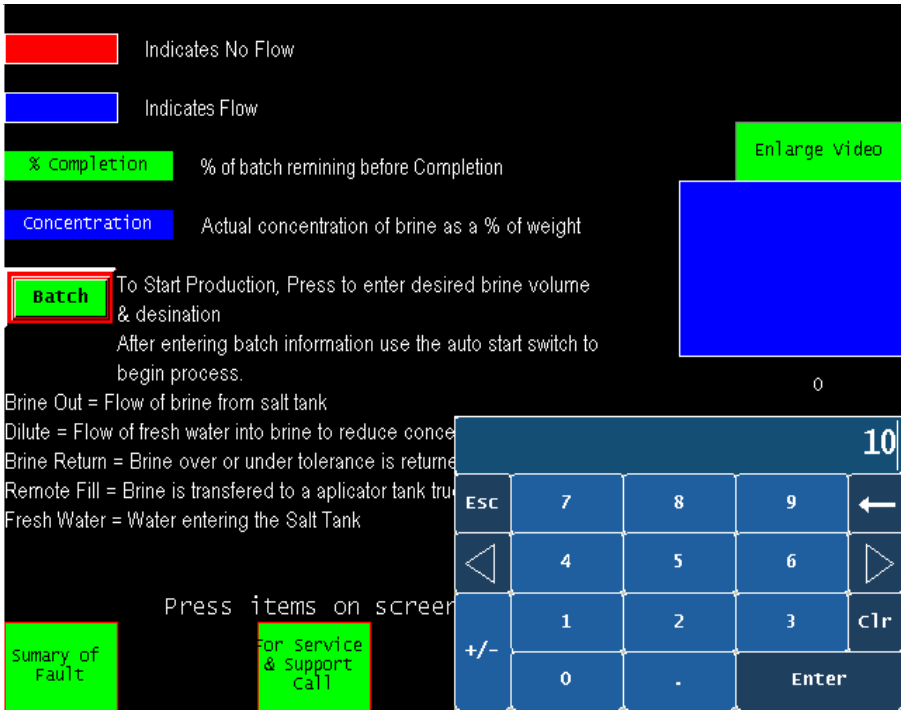


To access the Batch page, set Password to 10.

To Change the password press the help button.

Then Press the Password button.



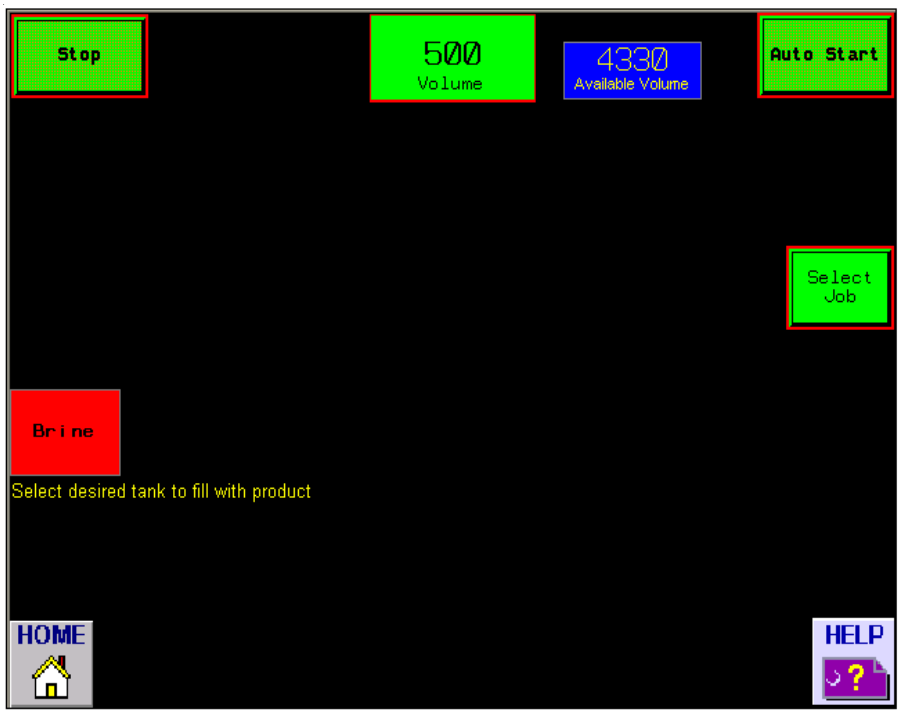


By Pressing the Password button, a key pad appears as shown. Key in 10 and press the Enter button.

Press the Escape button to go back to the HOME page.

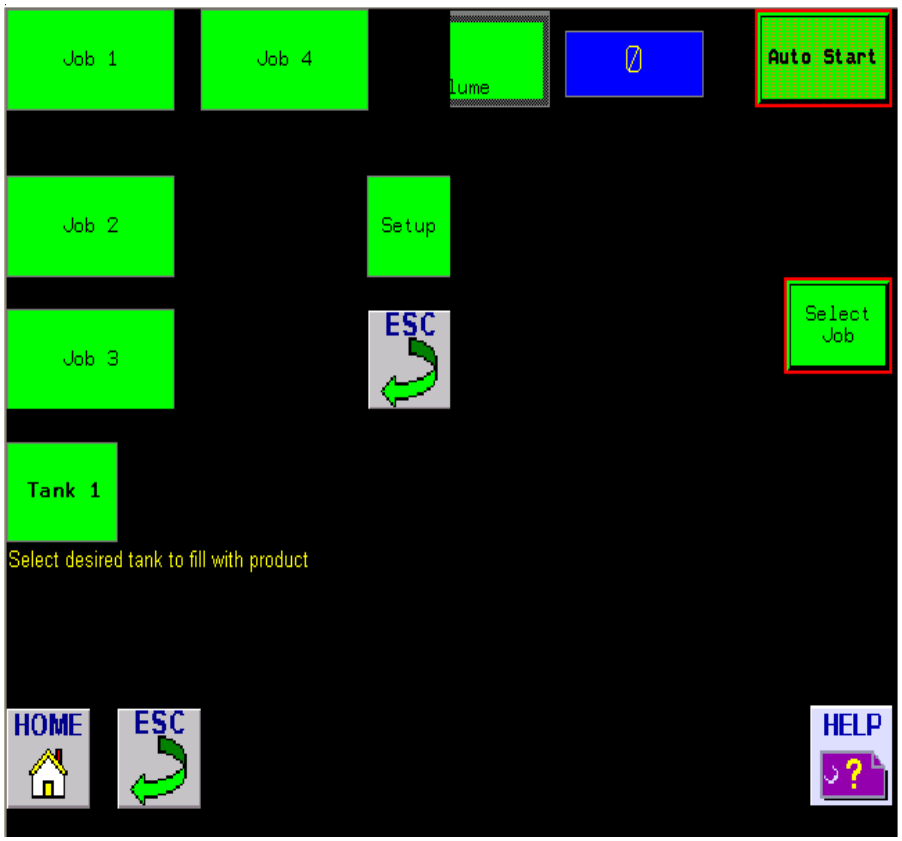
Press the Batch Button to produce brine.

<u>Caution: To produce a batch of product. The machine must be in Normal or Winterize mode. Use Simulate mode for training only. See Operating Modes section.</u>

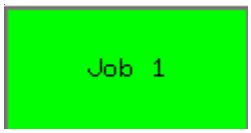


Select a Job to record Data to by pressing the Select Job Button.

A pop up window appears as shown below.

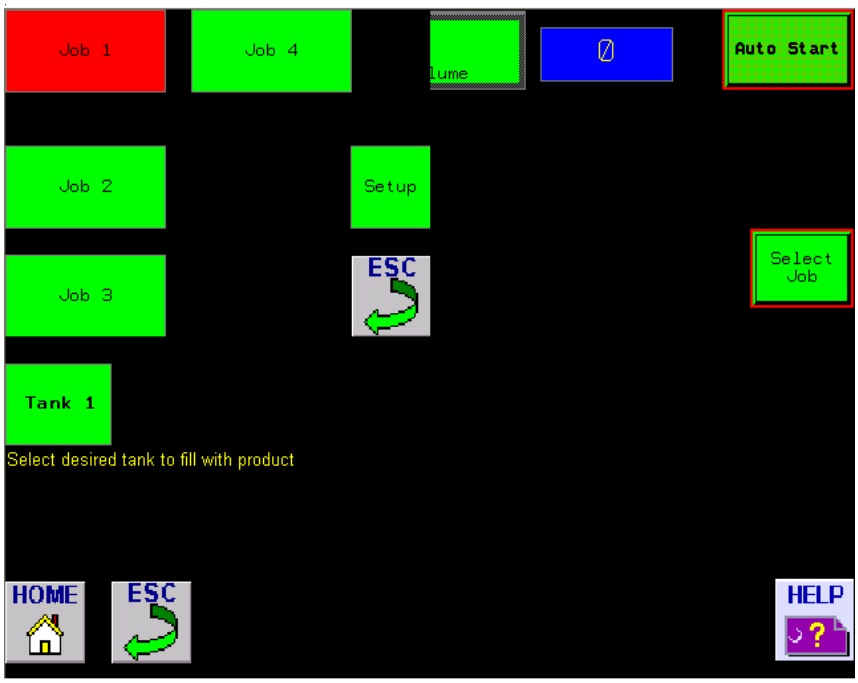


Press the desired Job to record data to from the pop up window.



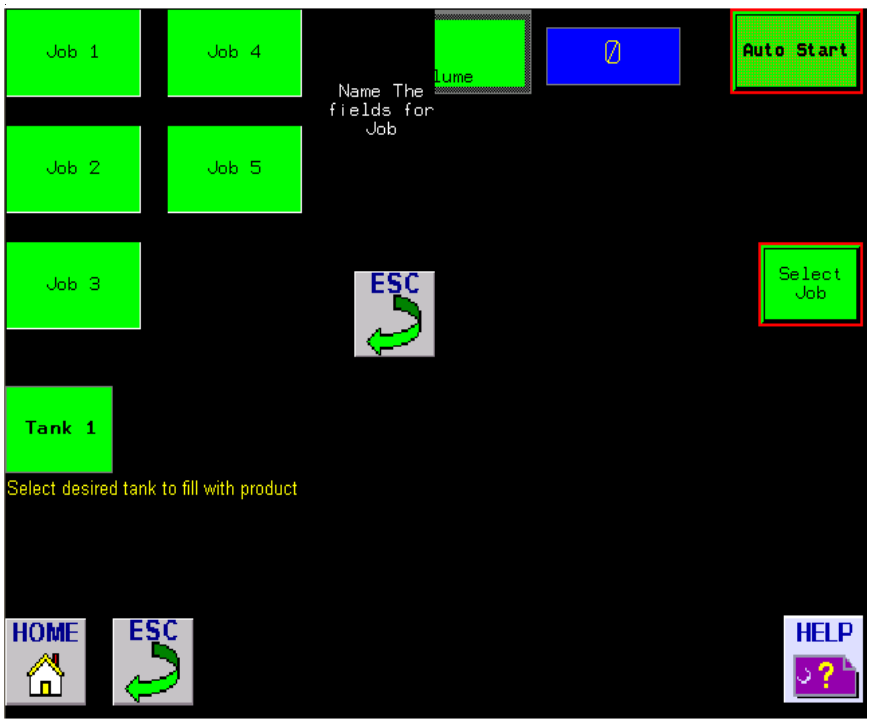
The selected Job will appear in red.

Note: Through out this manual, when a button is pressed and turns red, that feature has been Activated.

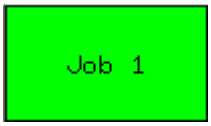


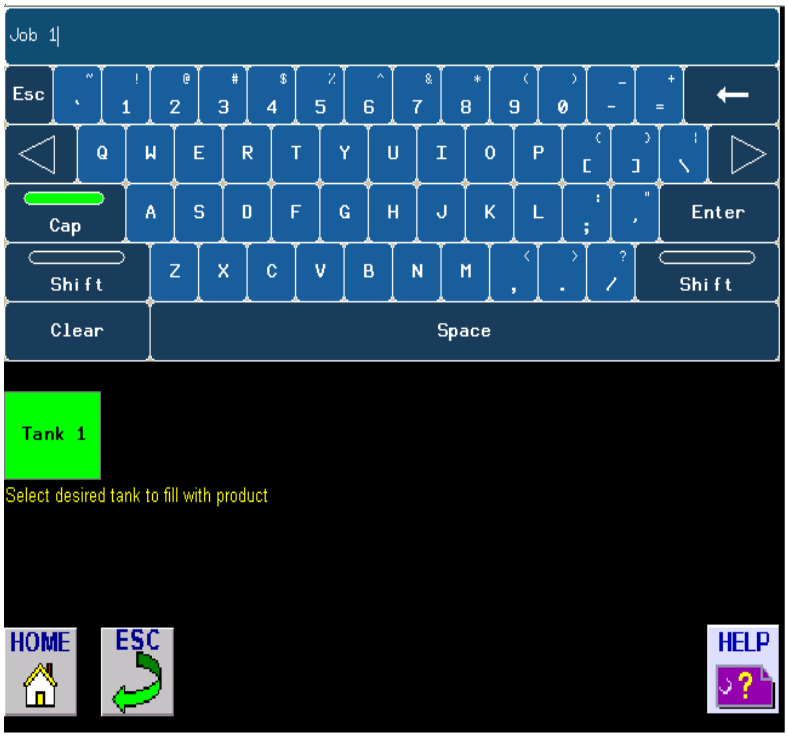
Press the setup button to name each Job.

A pop up window appears as shown below.

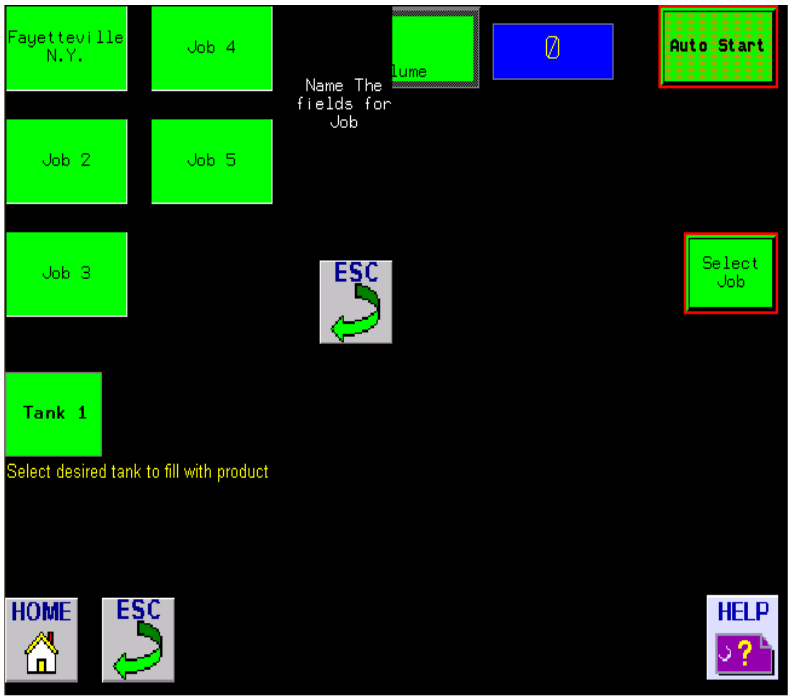


Select the Job 1 button and a keyboard display will appear.

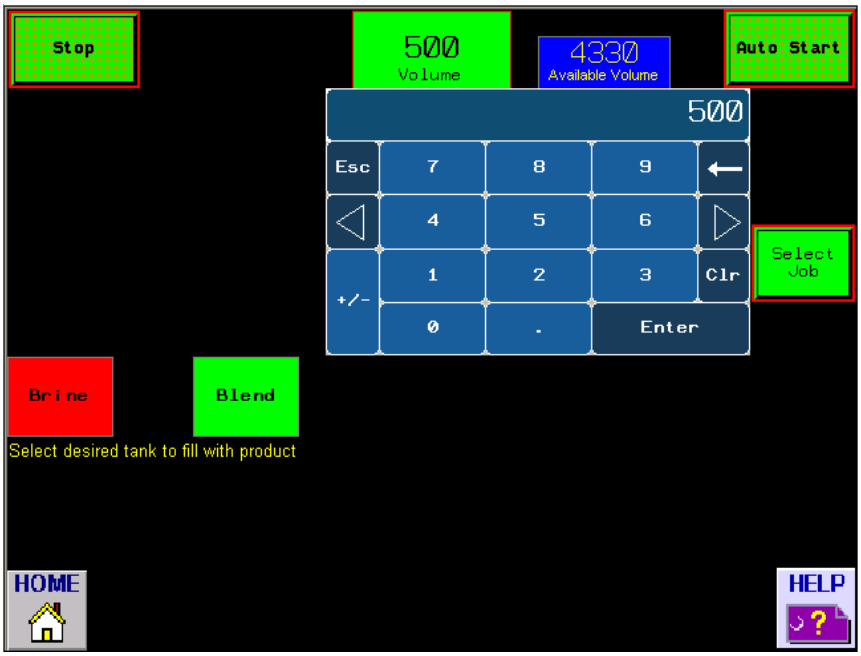




Type in the name of the desired Job on the keyboard and press enter.



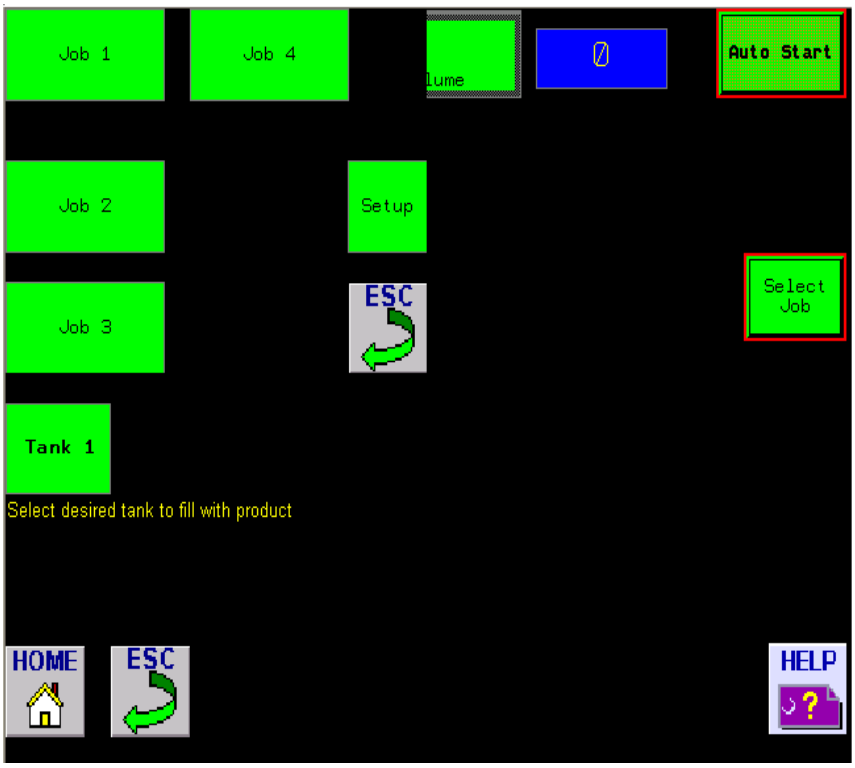
The name entered will be displayed as shown. Do this for each Job as desired. When finished, push the ESC button to stay at the Batch page.



The available volume indicator shows how much brine can be made and sent to the brine storage tank.

Press the Green Total Volume button on the batch page to select the quantity of brine to produce.

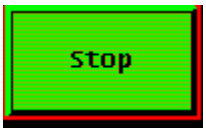
Key in the desired quantity of brine to produce via key pad then press the ENTER button.

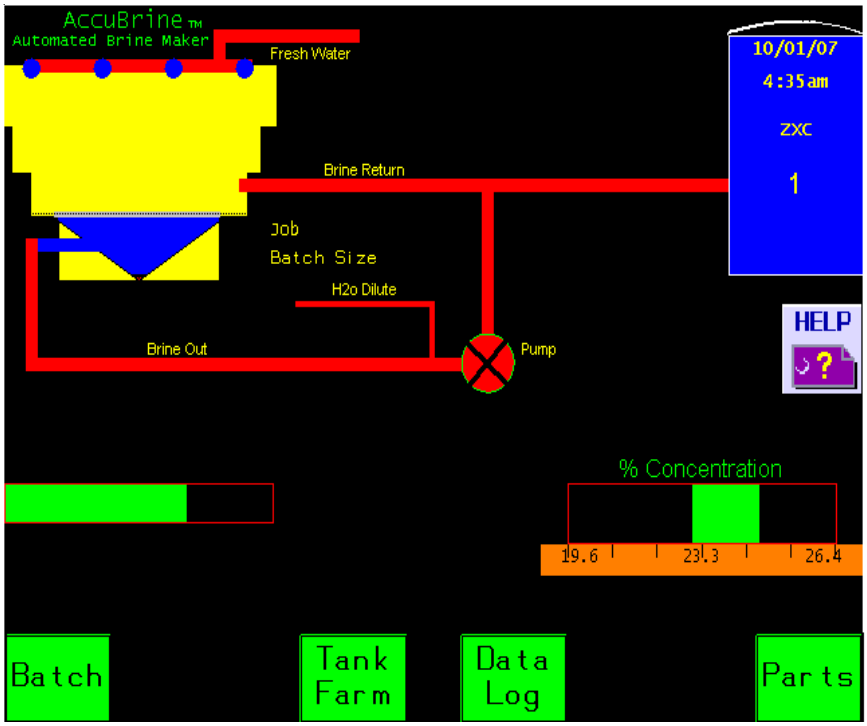


To start producing Brine. Press the Job Select button and select specific job if desired.

Press the ESC button then press the Auto Start button from the display or use the Auto / Hand switch on the panel by rotating to Auto and releasing.

To Stop a batch at any time, either press the Stop button on the display from the Batch Page or use the Auto /Hand Switch and momentarily rotate to Hand and back to center.





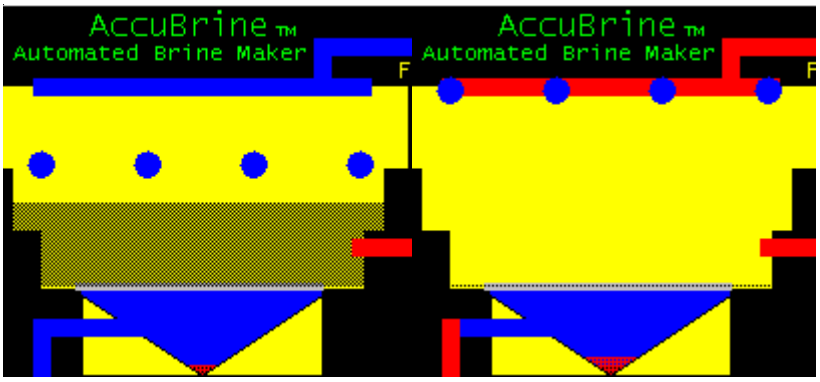
If the Auto start button was pressed then the display will change to the main screen.

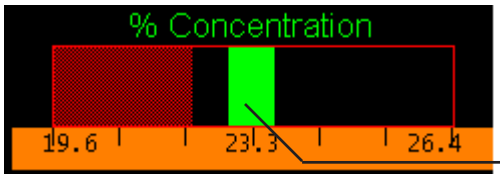
If the Auto / Hand Switch was used to start the batch press the Home button to return to the HOME screen. ESC to go to previous page.

Or

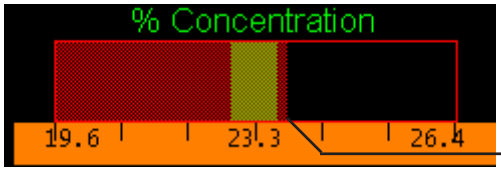
Understanding the HOME Screen

The Gray shaded area in the yellow, shown below is a visual for the water level in the salt tank. The blue dots above the yellow salt tank represent water flow to the salt tank. When the red line above the salt tank turns blue, there is fresh water flow to the salt tank.

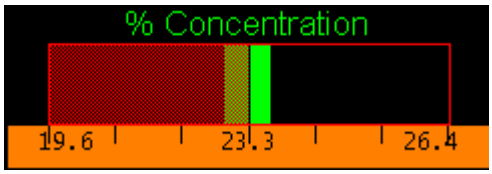




Concentration Below Target (Weak Brine)



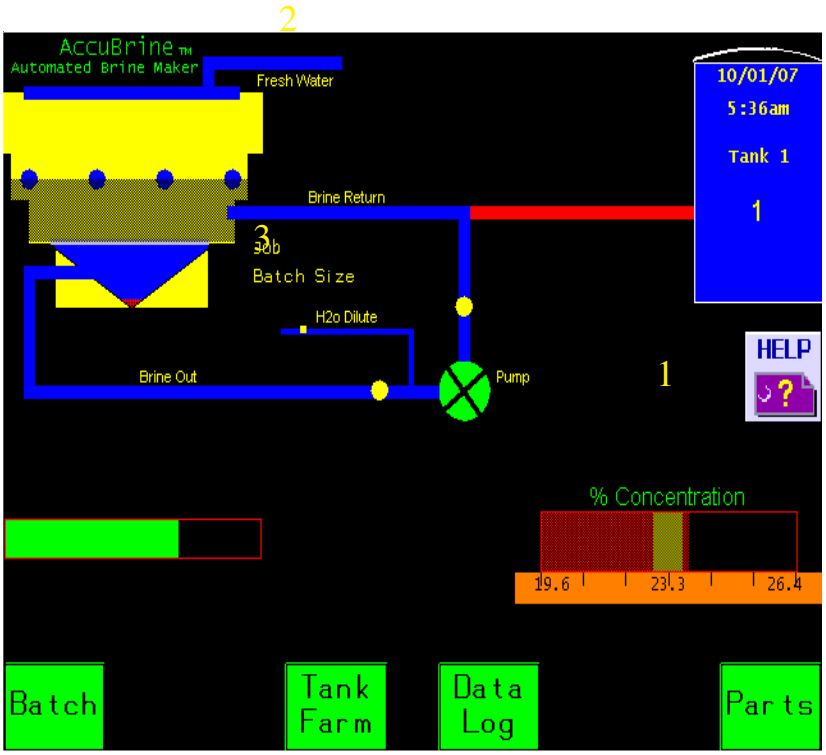
Concentration Over Target (Strong Brine)



Concentration At Target (Good Brine)

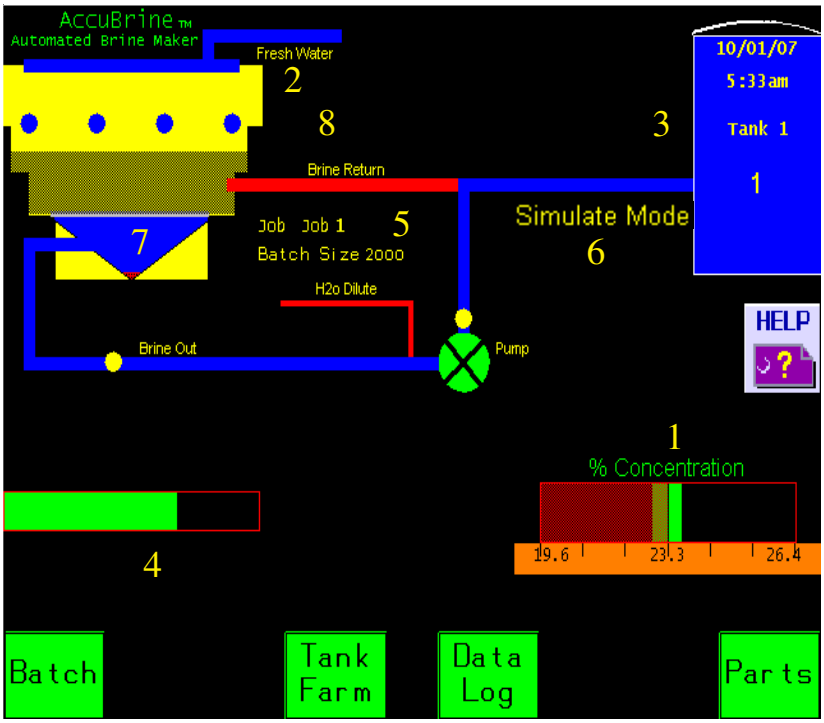
The green rectangle represents the acceptable concentration with deviation.

The right edge of the red line represents the actual concentration.



As brine is being produced. The animation on the screen illustrates what is occurring with the machine. (see call out numbers)

1. Brine is over-concentrated and is being diverted to Salt Tank.
2. Fresh water is flowing to the Salt tank.
3. The Dilute valve is opening to dilute the over concentrated brine to the desired concentration.



As seen to the left:

1. Brine is within tolerance.

2. Water is flowing to the Salt tank.

3. Product Flow is to Storage tank 1.

4. Batch is approximately 75% complete.

5. Data is logged to Job 1 & the batch size is 2,000.

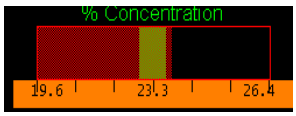
6. The system is in Simulate Mode (See Operating Modes section).

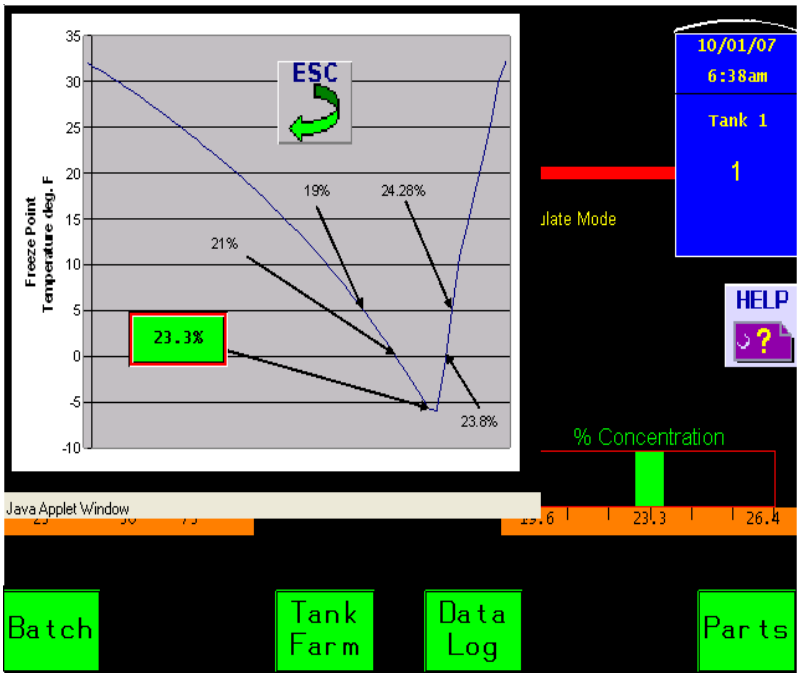
7. Material build up in Sump is indicated in Red.

8. Recycled Water (If feature is installed) is flowing to the salt tank.

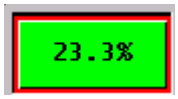
Salt Concentration and Eutectic Curve

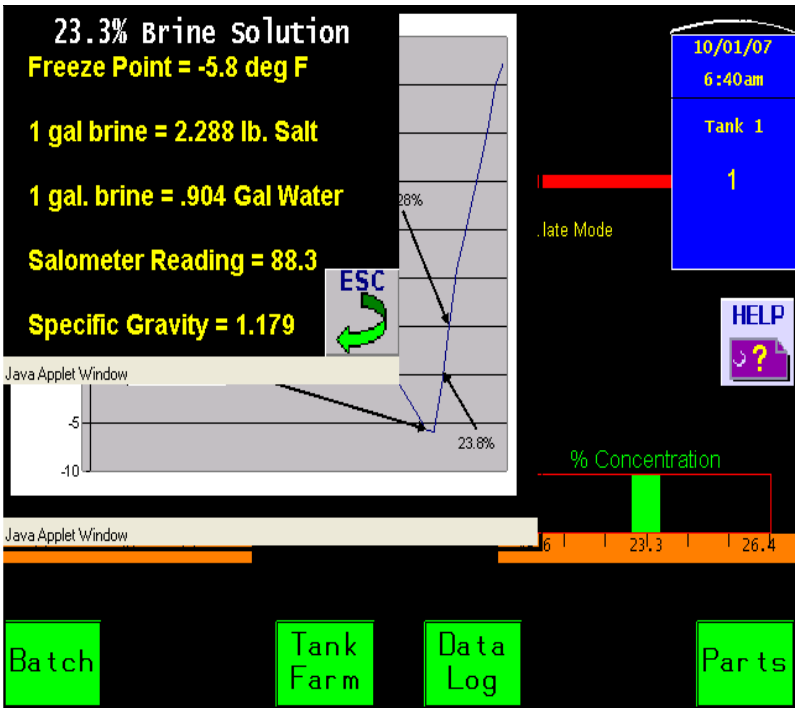
By touching the concentration meter, a pop up window appears to illustrate the eutectic point of Salt Brine.





Touching the 23.3% button gives specifics on brine at it's eutectic point.





Press the ESC button to close the window.

Data Log Report

10/14/09
14:17:04

Accubrine Data Log Report

Daily Log	Job 1	Job 2	Job 3	Job 4	Total Product
Brine Production	2958	0	0	0	2958
Water Usage Fresh	2692	0	0	0	2692
Reycycle Water	See Total	See Total	See Total	See Total	0
Salt Usage / ton	3.4	0.0	0.0	0.0	3
Additive 1	0	0	0	0	0
Additive 2	0	0	0	0	0
Additive 3	0	0	0	0	0
Total Job Volume	2958	0	0	0	

Season Log	Job 1	Job 2	Job 3	Job 4	Total Product
Brine Production	2958	0	0	0	2958
Water Usage Fresh	2692	0	0	0	2692
Reycycle Water	See Total	See Total	See Total	See Total	0
Salt Usage / ton	3	0	0	0	3
Additive 1	0	0	0	0	0
Additive 2	0	0	0	0	0
Additive 3	0	0	0	0	0
Total Job Volume	2958	0	0	0	

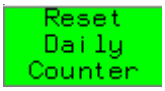
HOME

Reset Daily Counter

Reset Season Counter

By pressing the Data Log button on the HOME page, the screen to the left appears.

Data Log: The machine will record the amount of Brine produced, water, recycled water, additives and salt used in separate logs that are associated with the Job.

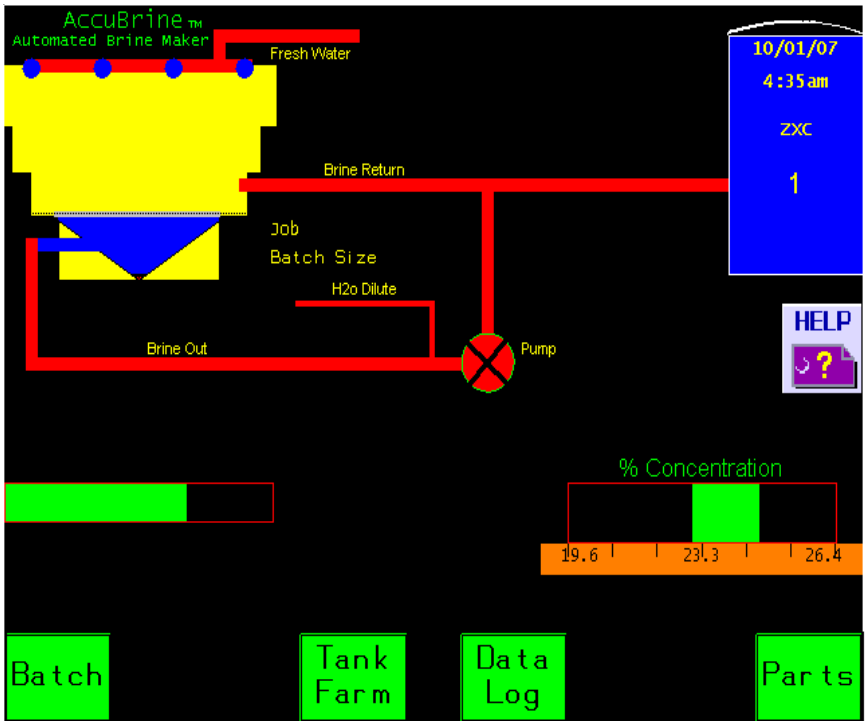


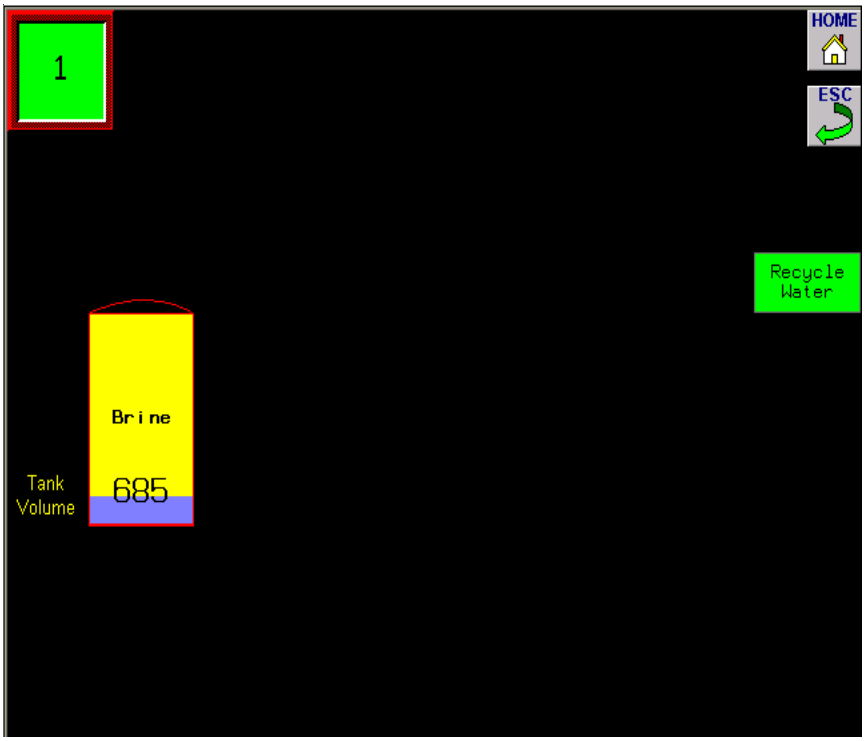
To reset the Daily log, press the Reset Daily Log button. Daily data may be reset to zero at any time. Note: You must select each job individually to reset to zero.

The Season log keeps a running tally of production and may only be reset with a high level password activated (see High Level Password section). The Reset Season Counter button will only be visible when the high level password is activated.

Storage Tank Farm

The Tank Farm page shows the storage tanks installed and the current volumes in each tank. To access this page, press the tank farm button on the Home page.

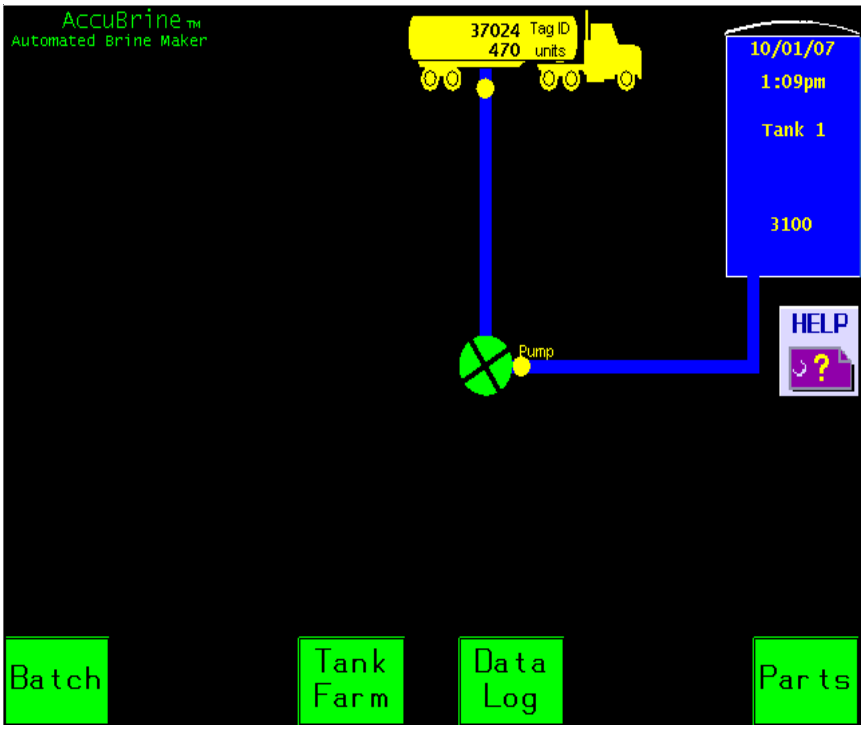




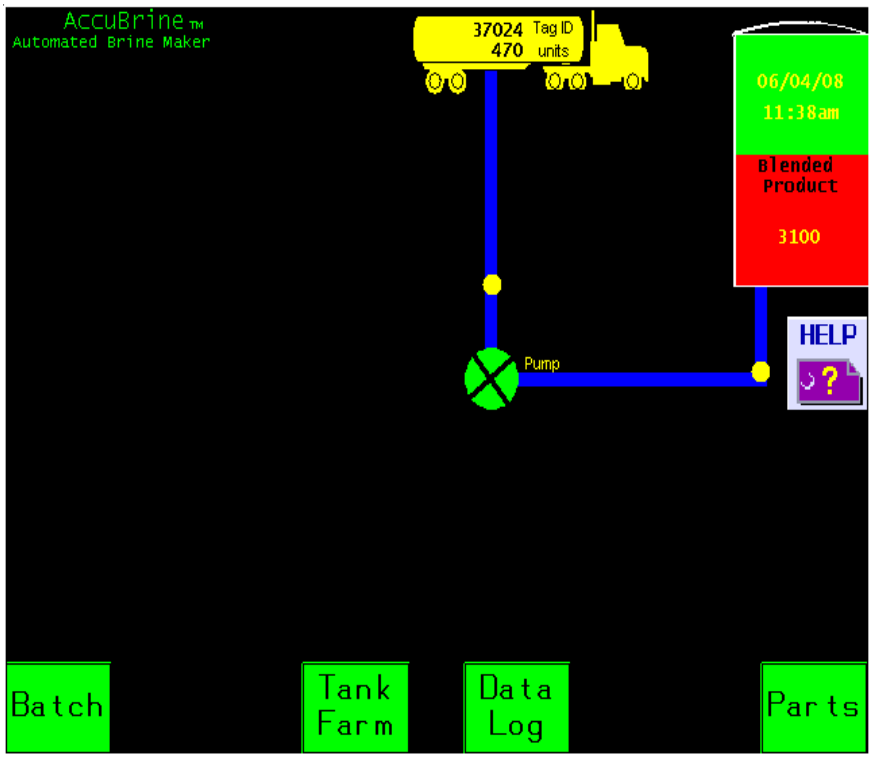
The 1 in the green box indicates that tank number 1 (brine storage) is installed for this system.

Remote Truck Fill and RFID (if installed)

The Remote fill feature allows trucks to be filled at the touch of a button from a remote switch box. Upon activation, product is diverted to the truck from the Salt tank (if making brine), Brine storage tank or Blended Product storage tank, without the operator needing to open or close valves and start pumps.

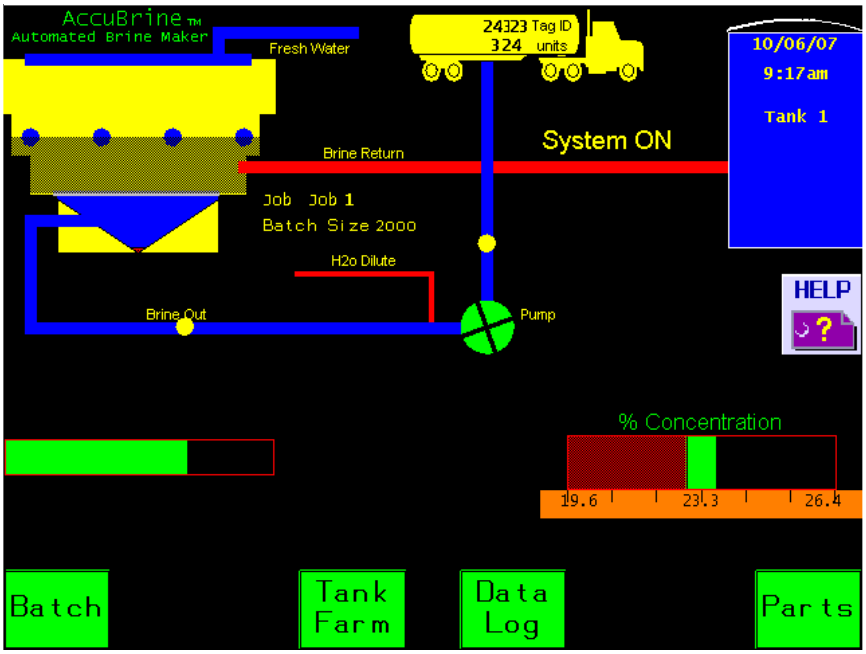


Graphics of HOME screen illustrating Remote fill in operation: Filling Truck from the Brine Storage tank.

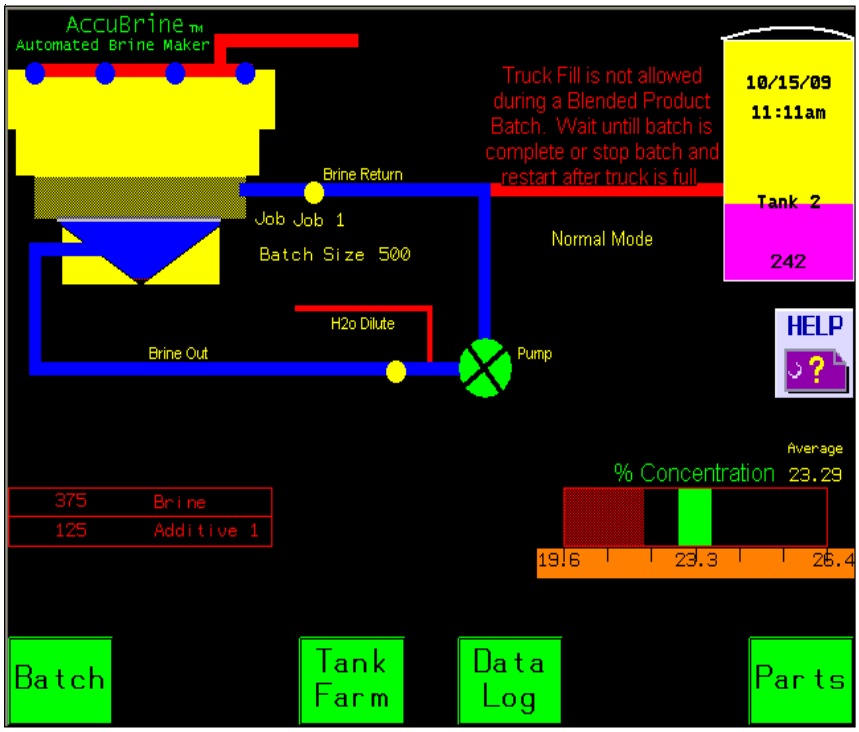


Graphics of HOME screen illustrating Remote fill in operation: Filling Truck from Blended Product Storage tank.

Remote Truck Fill and RFID Operation (if installed) cont.



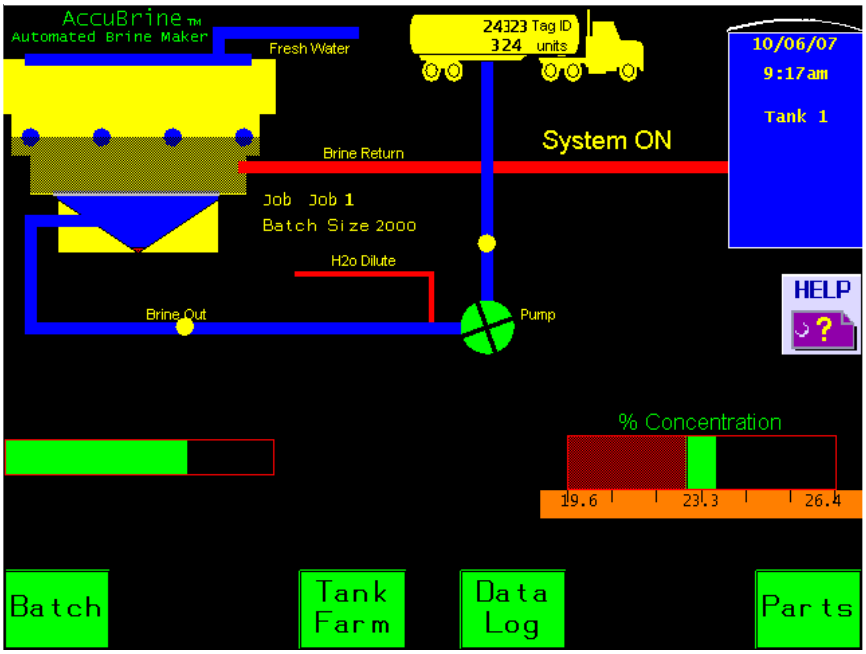
HOME screen graphics illustrating the Remote Truck Fill system in operation during a brine production batch. Filling the truck with fresh brine from Salt Tank when the brine concentration is within the specified range.

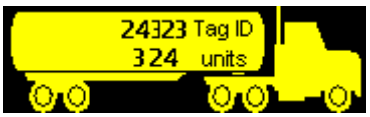


When an attempt to fill a truck with the remote fill is made during a Blended Product batch, a notice will pop up stating that the Blended batch must complete before truck filling is allowed. It is possible to fill a truck with Blended Product during a Brine batch. The brine batch will pause to allow the truck to be loaded. The brine batch will then continue from where it was interrupted.

Remote Truck Fill and RFID Operation (if installed) cont.

The RFID system uses RFID tags to identify what truck is receiving product, when the truck was loaded, what product the truck received and the volume loaded. This data is recorded and stored for use when desired. The system can be set up to load a specific product, a maximum volume, and prevent loading if an ID tag does not match, for security purposes. See RFID Setup Section.





The Tag ID number represents the RFID tag that was read by the RFID card reader. The volume will count up as the truck is being loaded.

The RFID card reader and Truck fill operation switches are combined in one enclosure. The card is passed in front of the reader here. A beep will be heard to indicate the card has been read.

The truck can then be loaded using the start stop switch.

A digital readout will indicate number of gallons being loaded. (see pg. 54 for display value offset)

The green indicator light will light up when an RFID card has been scanned. The light and ID tag will stay active for 45 seconds after turning the switch to stop. This allows the truck to be topped off if needed.

An emergency stop switch is provided and will stop pump.

Warning Beacon

The Warning Beacon red strobe light will blink steadily with a machine fault. If the salt tank runs out of salt (user defined on set up page 1) and the specified brine concentration cannot be met within 30 minutes, the light will blink for 5 seconds and turn off for 5 seconds and repeat. When a scheduled automatic start occurs, such as winterize mode, and automatic tank fill, the beacon will blink for one minute prior to machine start. The illustration below shows the Warning Beacon.

Deactivating the Warning Beacon:

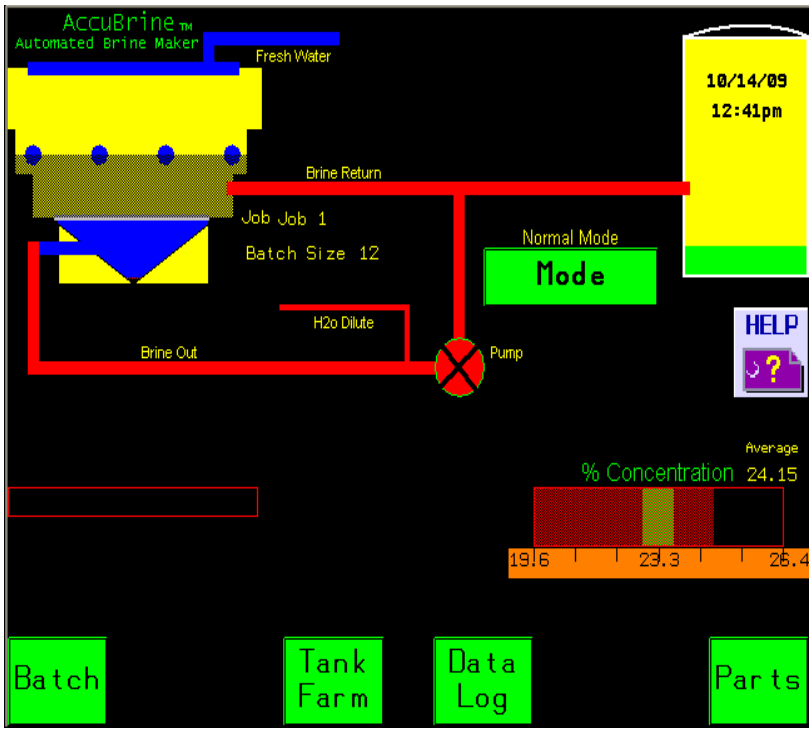
The Warning Beacon displaying the fault mode will turn off when the machine faults have been corrected and acknowledged from the faults screen. Note: If after 4 hours, the faults have not been corrected and acknowledged, the light will turn off automatically.

The Warning Beacon displaying the Salt Tank Out of Salt mode will turn off when the machine is restarted.

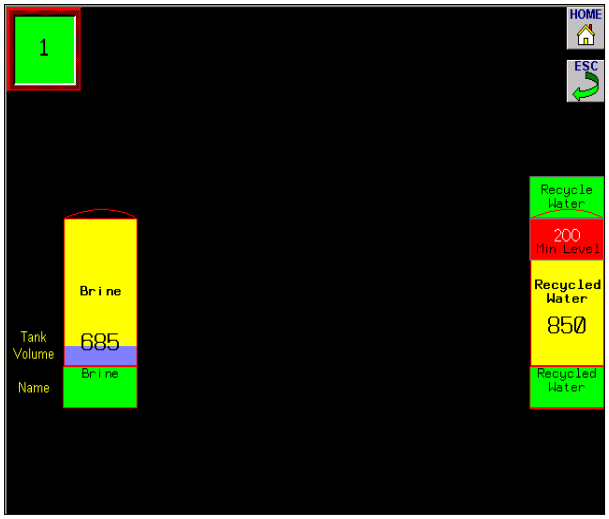
The warning beacon should be installed in a location easily visible to the operator. See example below.

Recycled Water

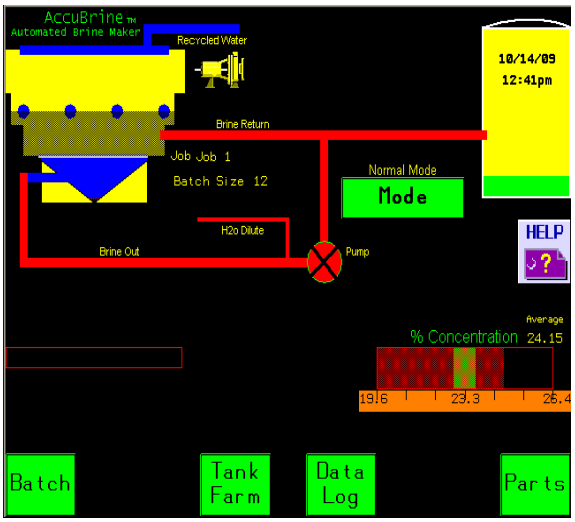
The recycled water system uses recycled or grey water from other processes such as storm run off or truck wash water to make brine. The brinemaker will automatically switch to fresh water when the recycled water level in the storage tank reaches the minimum level.



To view the level of recycled water in the storage tank, press the green Tank Farm button on the Main screen.

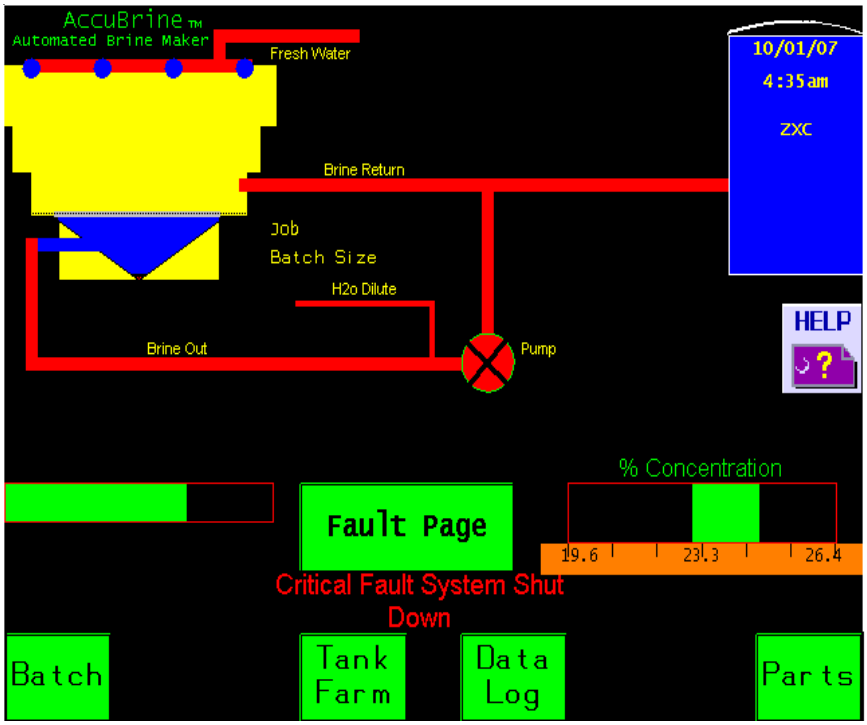


The Tank Farm page shows the Recycled Water tank with the minimum level, and the current tank volume.

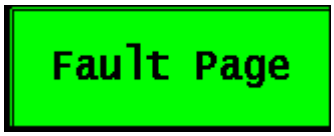


When a batch is started, the Main page shows the Recycled Water pump has turned on, and the recycled water is being sent to the salt tank.

Machine Fault The machine is constantly monitoring valves and sensors. If a sensor or valve fails, the machine will shut down and a fault will appear on the main page.



Press the blinking Fault Page Button to view the fault.



The fault button will turn red indicating what failure has occurred.

For example: The machine had a fault with the tank valve. By pressing the fault page button, you are led to this fault page. At this point the Tank valve fault button would be red.

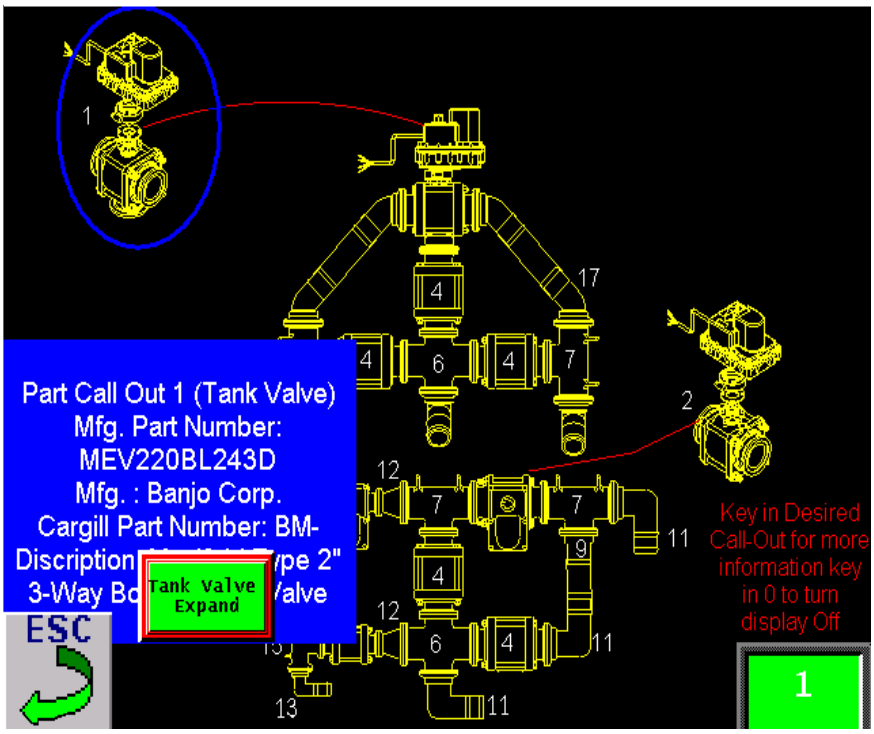
Press the red fault button for possible solutions to the problem. For example:

A pop up window will appear to give basic trouble shooting tips and what fuse to check.

If this does not solve the problem and a part needs to be replaced then press the green PART BUTTON.

Once the problem is corrected press the RESET BUTTON located in the center of the fault page.

Note: It is possible to ignore or disable alarms. This is helpful in diagnosing a problem and if the device is operating correctly but the sensing circuit has failed. Ignore the alarm by pressing the disable alarm button.



Once the Part button is pressed, the display will show where the part is located with a blue circle.

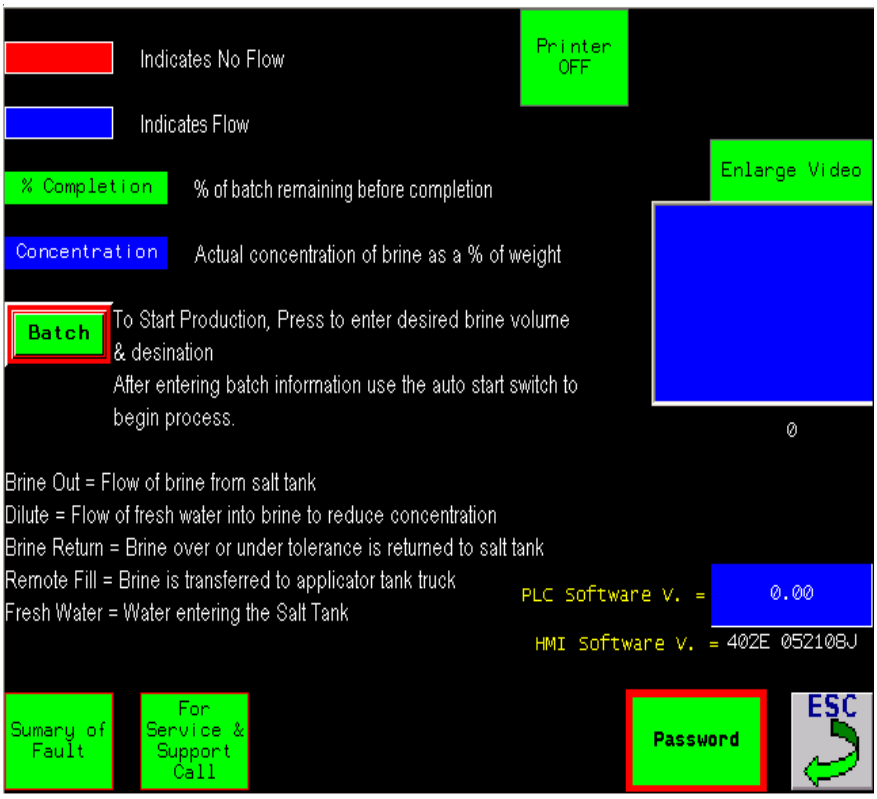
The part number will be in the blue box. Some parts have more detailed drawings and are illustrated via a green expand button.

Expanded view of Tank Valve.

Summary of Faults

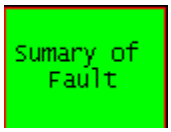
After a machine fault occurs, a log is created of that fault and is displayed on the Summary of Faults page.

To access the Summary of Faults page, press the HOME button.

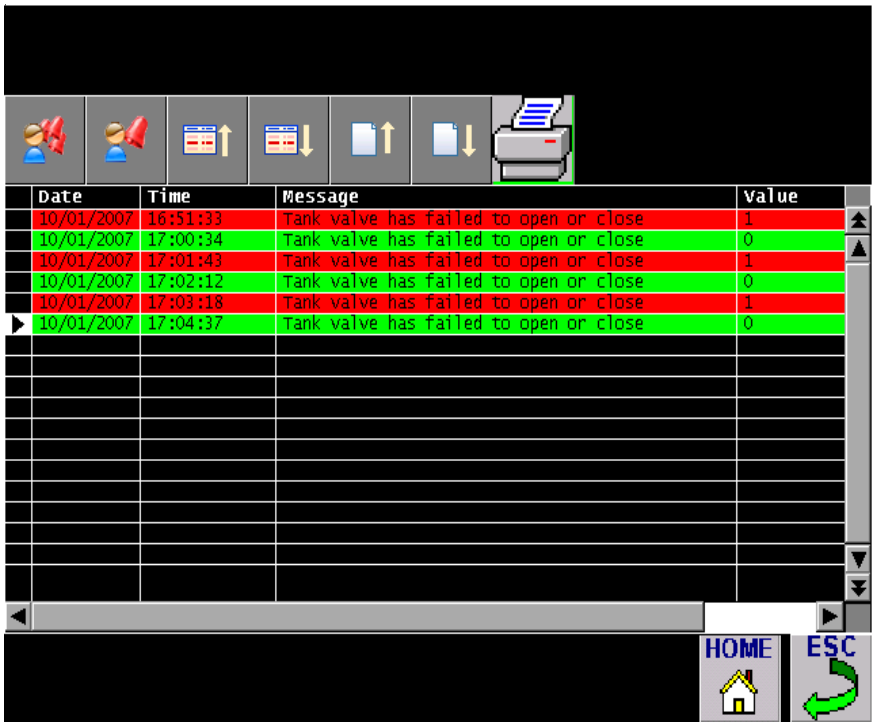


From the HOME page press the HELP button

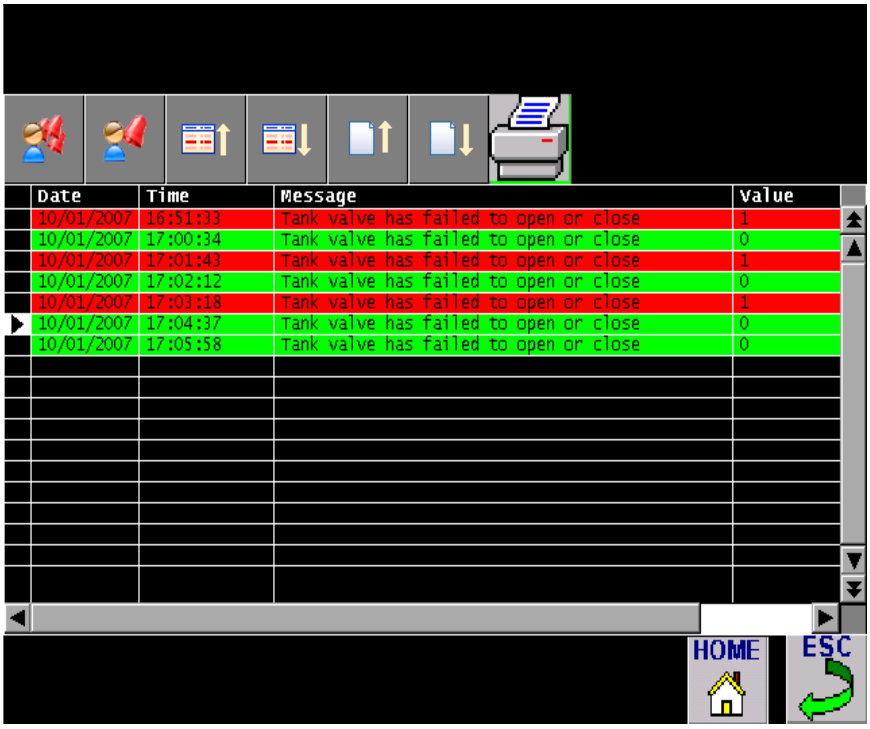
Press the Summary of Faults button in the lower left corner.



Summary of Faults Page



The summary of fault page gives the time and date of a fault along with a description. The red lines illustrate when the fault occurred. The green lines illustrate when the fault was corrected.



To clear and acknowledge the fault, press the acknowledge button.

Press the HOME button to return to HOME page or.

Press the ESC button to return to previous page.

Roll Tarp Operation

The Roll Tarp is used to keep debris such as leaves from entering the salt tank, and when the inline heater is used to keep the salt tank from freezing.

When the Roll Tarp is not being used, it can be rolled up on the steel support pipe and rested on the supports mounted on the back, top lip of the salt tank.

The handle for operating the tarp is stored on the "J" hook. Unhook and turn handle to unroll the tarp towards the front of the salt tank.

Roll Tarp Operation Cont.

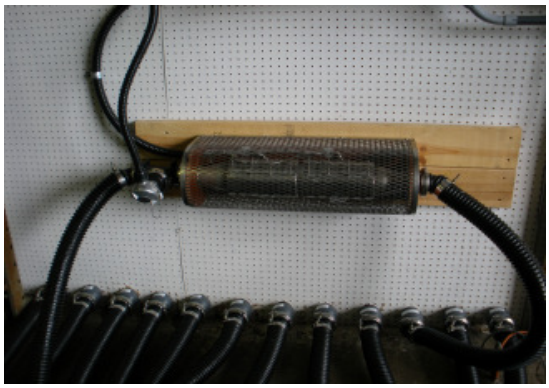
After unrolling the tarp, the handle should be replaced on the "J" hook to store.

To open tarp, unhook handle and roll tarp back towards rear of salt tank until it rests on the supports.

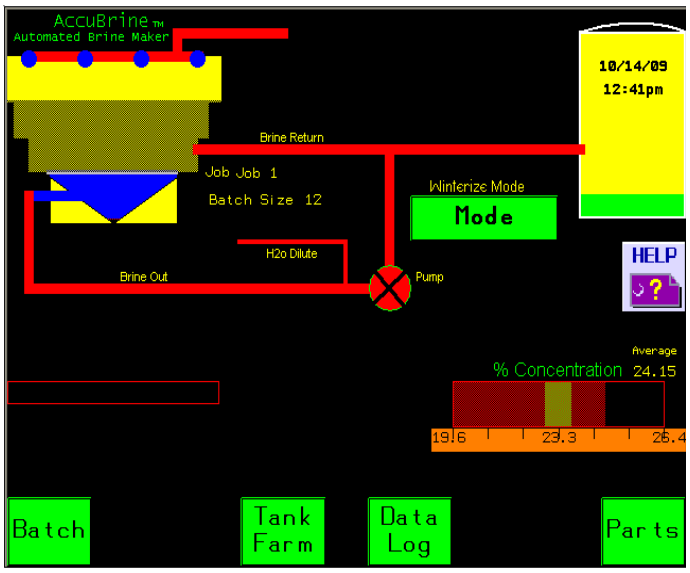
If the tarp becomes dirty, clean with mild soap and water.

Inline Salt Tank Heater

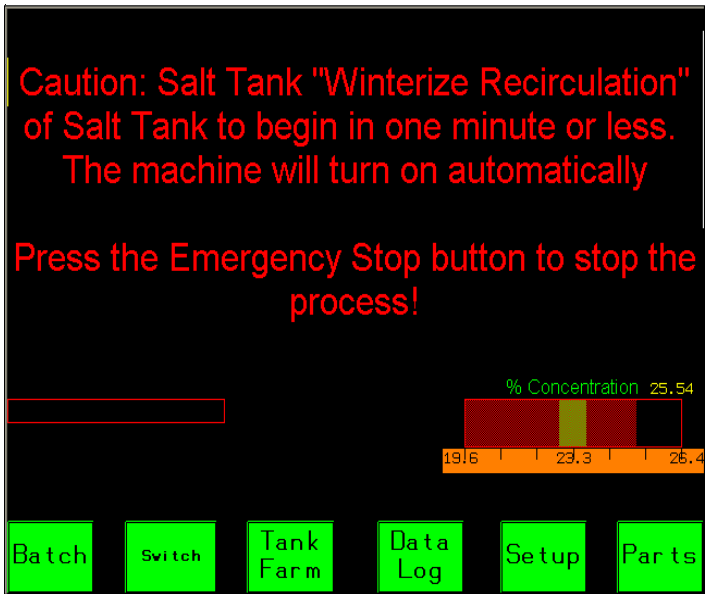
The Inline Salt Tank Heater is used when the liquid inside the salt tank is in danger of freezing. The heater is activated to run automatically when the Winterize Mode is selected (See Operating Mode section).The heater may be run manually as well (See Inline Salt Tank Heater Setup section).



Above the green Mode button, you will see the Winterize Mode has been activated. The preset timer to recirculate the salt tank will come begin. When the timer reaches the prescribed time, the warning below will be visible on the screen.



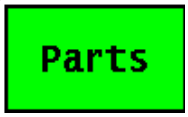
Before the pump turns on, a Caution will popup stating the Winterize process will begin in one minute. After one minute, the pump will start the recirculation process.

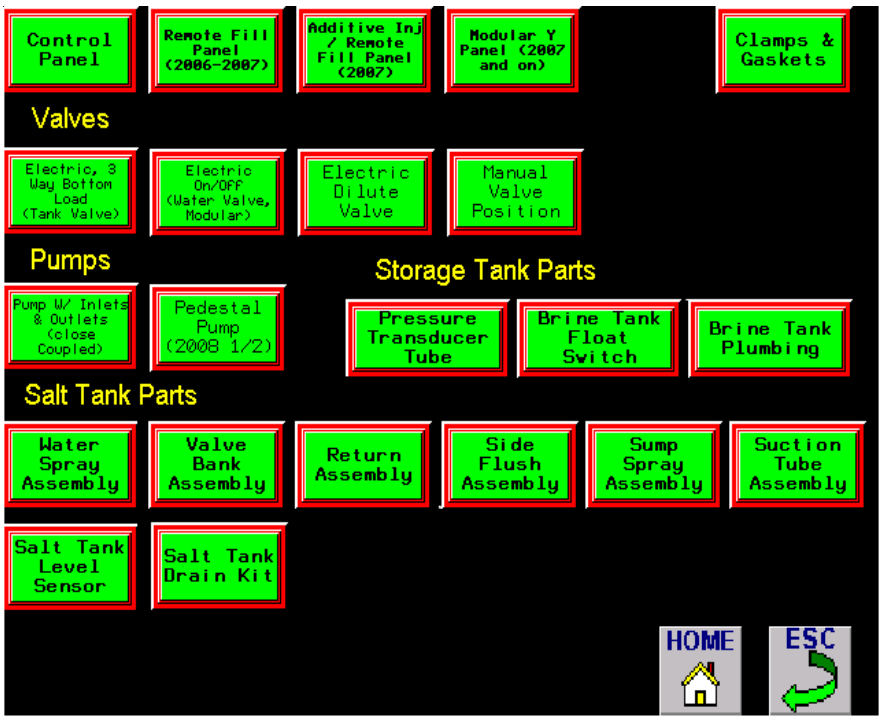


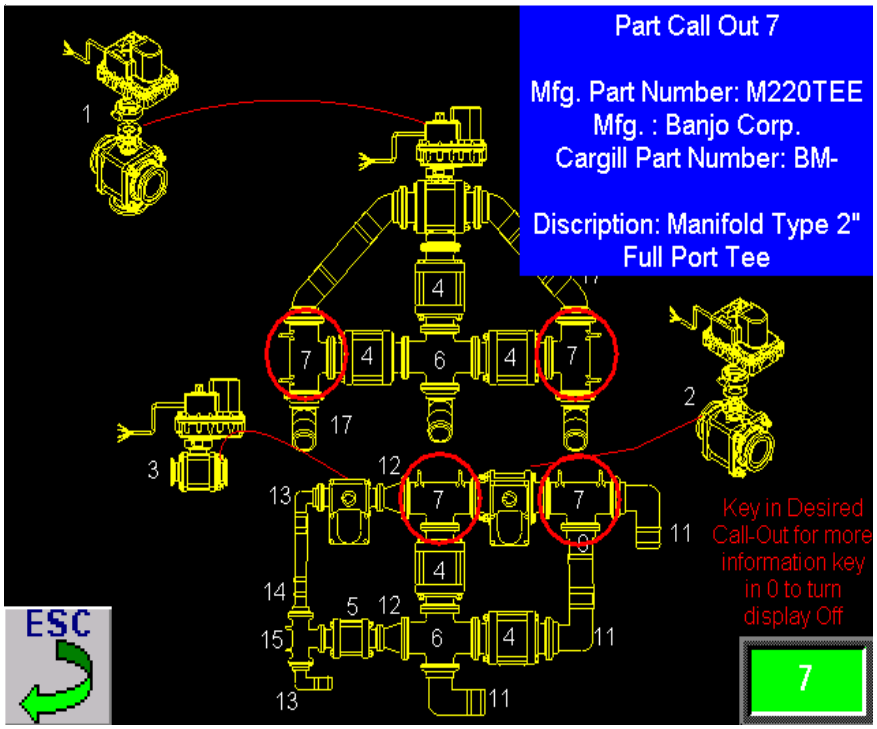
The temperature sensor for the heater will sense the liquid and if the temperature is lower than the ON temperature setting, the heater will turn on. The heater will stay on until the liquid in the salt tank reaches the preset temperature limit. After the heater turns off, the Winterize mode will resume counting down until the next cycle.

Parts and Mechanical Items

To view the various parts on the machine (salt tank and control panel) Click on the parts button on the bottom of the HOME page. You will be directed to the Parts Selection page. Select the desired area to find the part.



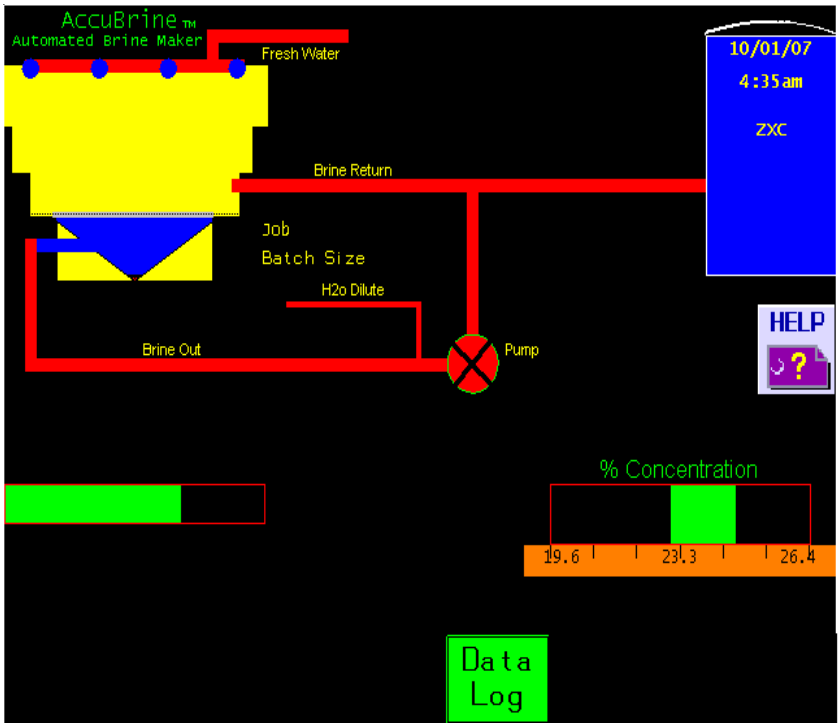




Other parts may be called up at any time. Key in the desired number from the drawing into the green box located in the lower right corner. To key in a value, touch the green box. A key pad will appear. Key in the value that corresponds with the parts diagram and press enter. The selected part will appear with a red circle around that part.

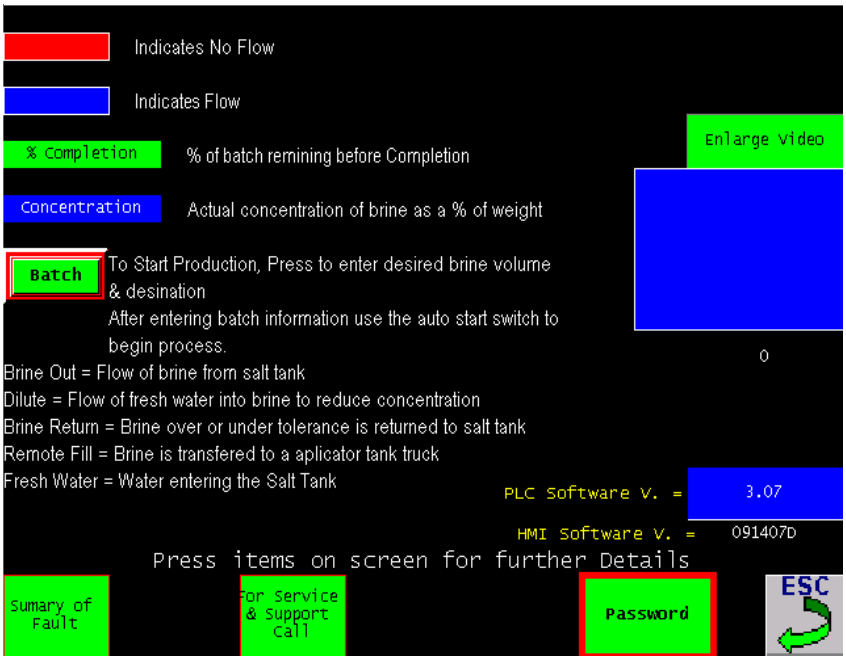
Passwords

The system is protected by various passwords that allow different levels of function.



HOME page with 0 (Zero) as the password. Note: The only function available with password 0 activated is the data log.

To Change the password press the help button

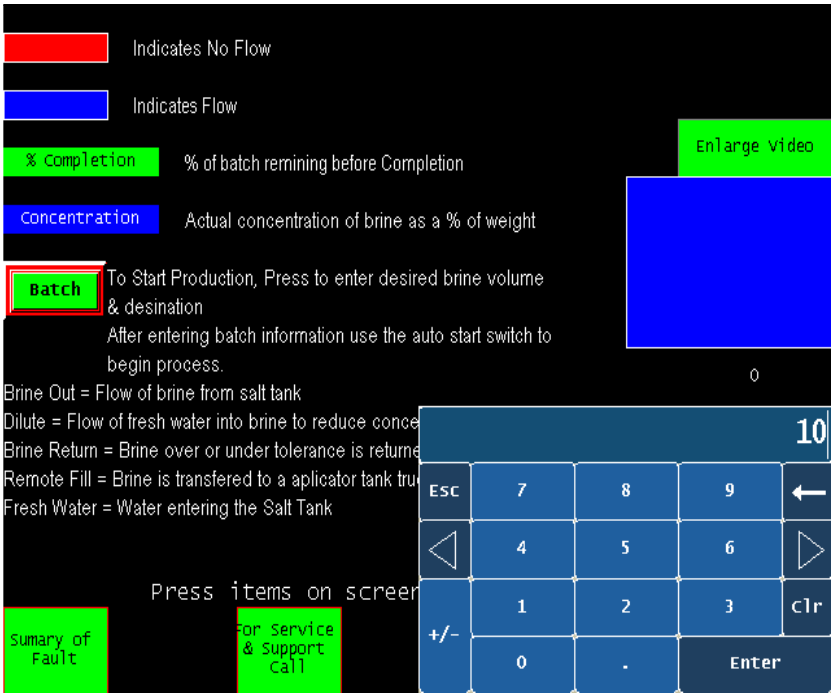


Then Press the Password button

Key in desired password on the keypad and push enter.

<u>There are 4 passwords that allow different functions</u>

Password 10: Allows for basic operation.
Password 20: Same as 10 with the added ability to Force Product from tank to tank.
Password 4096: Allows set up of machine settings.
Password 2048: Allows for set up of the Display, capturing current machine settings, retrieving data to USB port, and using video if installed.

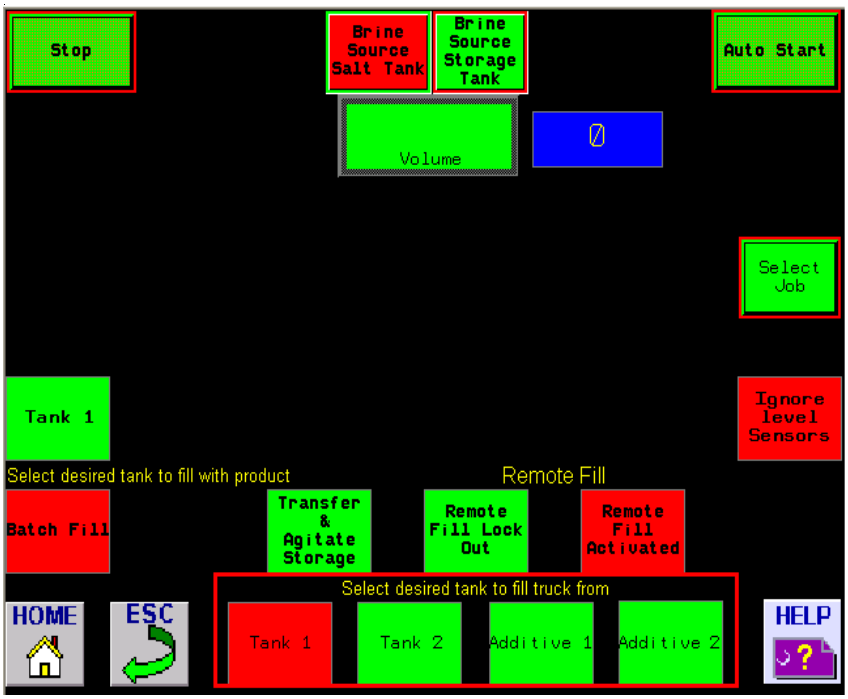


By Pressing the Password button, a key pad appears as shown. Key in desired password and press the Enter button.

Press the Escape button to go back to the HOME page.

Note: The password will revert back to 10 after 45 seconds or you return to the HOME page.

Remote Fill Settings from Batch page with password 4096 activated

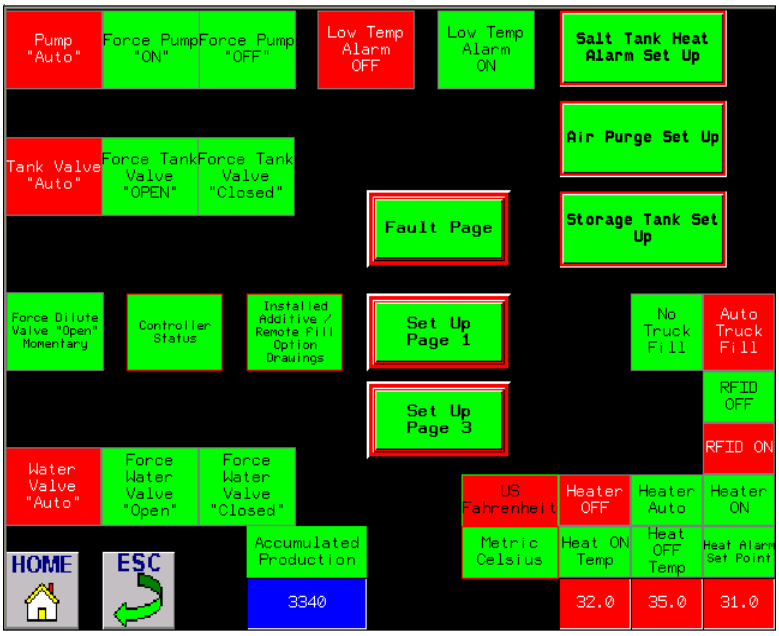


From the Batch page, the operator can activate the Remote Truck fill operation by pressing the Remote Fill Activated button.

To select what product to fill trucks with, select the Tank 1 - Brine, or Tank 2 - Blended Product, Additive 1 or Additive 2 tank (if installed).

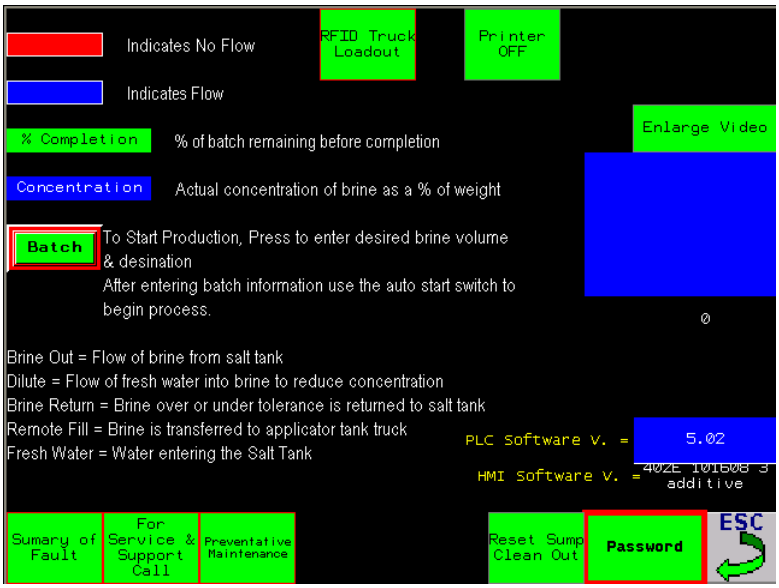
To lock out the Truck fill remote switch for times when not in use and for security, press the REMOTE FILL LOCK OUT BUTTON. This will protect the system from vandalism.

Remote Truck Fill and RFID Setup

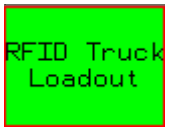


To activate the RFID system, enter password 4096 and go to the setup page 2. Press the RFID On button. It will turn red when active.

The Truck Fill and RFID system can be set up to fill trucks with or without RFID tags, deliver a specific product to the truck and a maximum volume based on which tag is used. To access the RFID set up page, enter password 4096



Press the RFID Truck Loadout button



This will bring up the RFID setup page.

Remote Truck Fill and RFID Setup cont.

To setup the RFID page, first pass one RFID tag in front of the card reader. Two numerical values will be displayed in the blue code box.

Press the green Tag ID code button.

Type in the yellow code number displayed in the blue code box when the keypad pops up.

Note: The actual tag number in red is the same number written on the RFID tag.

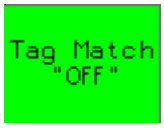
Press the yellow "Tag 1" to name the RFID tag just swiped. It is suggested to use the last five digits of the card number and for example, Truck #6.

Press the green Load Out Product button and a selection menu will appear. Use the up and down arrows to select which product (brine, blend, additives 1 or 2) to assign to the tag just entered.

Press the blue Maximum Volume button and enter a maximum volume delivered to a truck every time that card is read. When this volume is reached the pump will shut off.

Remote Truck Fill and RFID Setup cont.

To activate or deactivate the Tag Match, Tag to Product, and Maximum Volume features. Press the buttons listed below. The buttons will turn red and switch to "On" to activate. Press again to deactivate.



Truck fill operates without RFID tag.

Truck fill operates only when an RFID tag is used and has been setup on the RFID page.

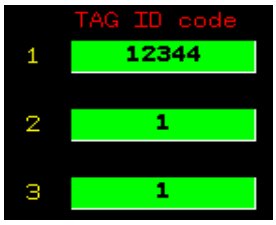
Operator must select which tank/product to deliver to the truck fill from the Batch page.

The correct product, selected earlier, is delivered to the truck fill.

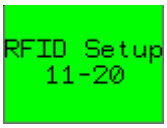
Operator decides how much product to deliver to truck.

Truck fill will stop pumping when the Maximum Volume is reached.

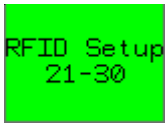
Note: All Tag ID Code positions must have a 1 in the green box if a tag code is not entered.



The RFID system will allow up to 40 different RFID tags to be setup. Press the green RFID Setup 11-20 button to access tags 11-20.

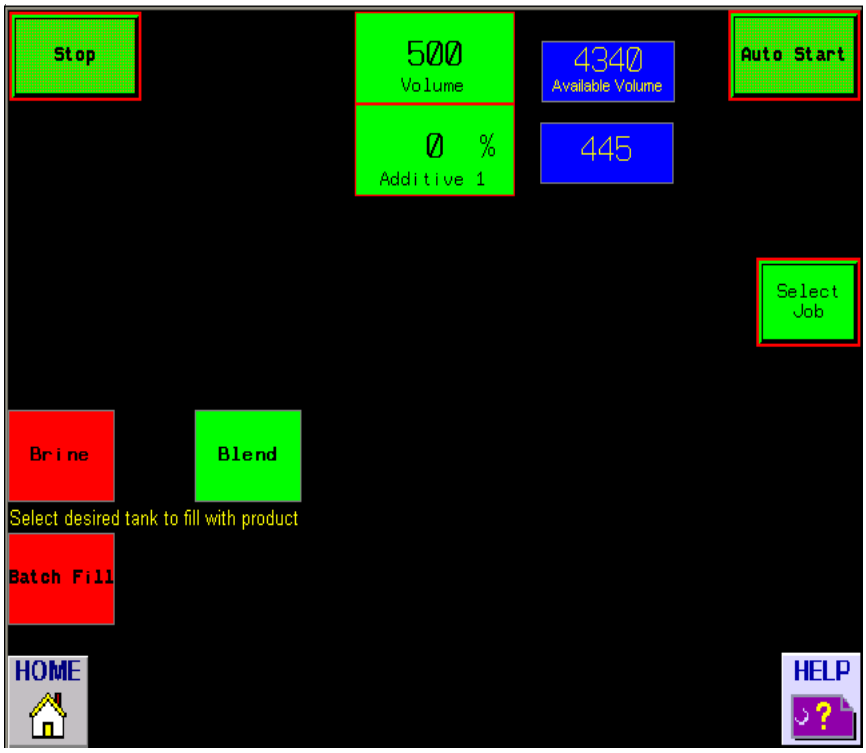


When this button is pressed, the next 10 tags will be available for set up.



Producing a Blended Product Batch

A blended product is a custom mix of another additive(s) in conjunction with the salt brine.

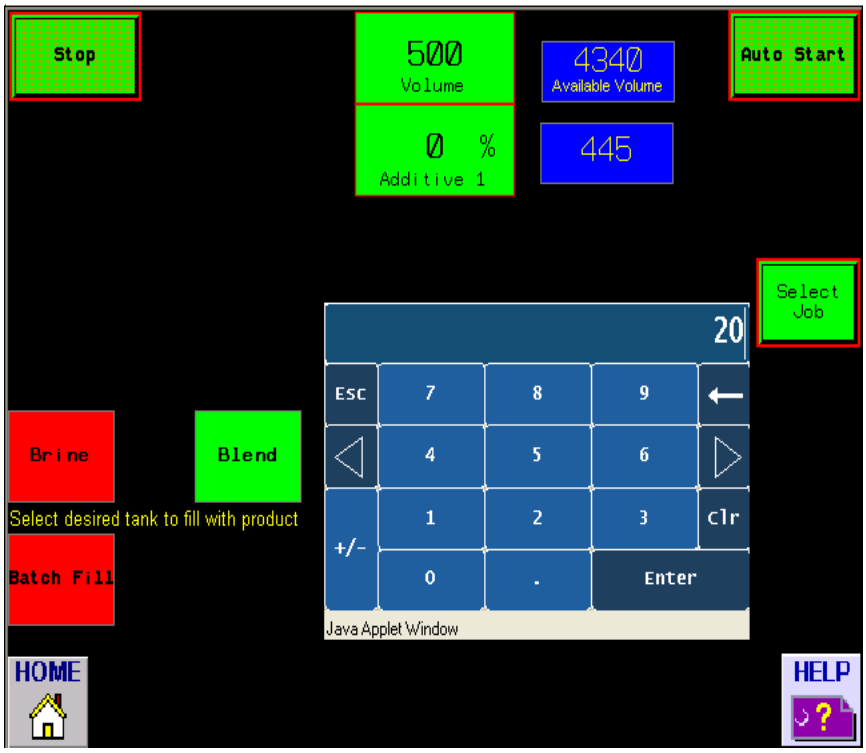


Enter the desired total quantity of Blended Product to produce by pressing the Total gallons button.

A key pad will appear. Key in numeric value of product to produce then press the ENTER BUTTON.

Desired Ratio of Additive

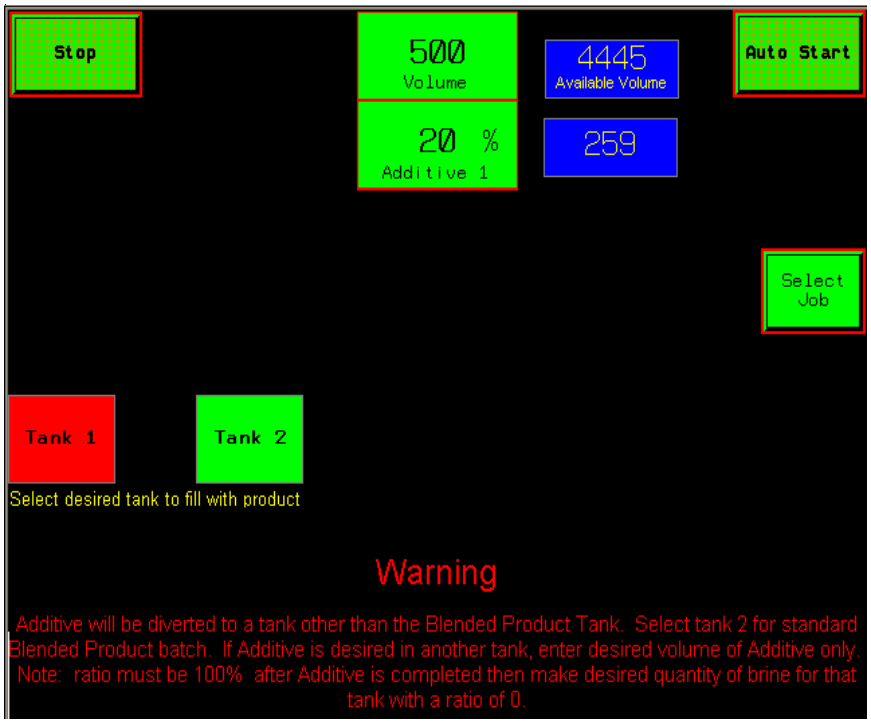
To select the desired ratio of Additive as a percent of total product to add to the brine, press the % Additive button



Enter a numeric value to represent desired additive ratio (% of total volume).

Enter a Value between 0-100, for example for 20% additive and 80% brine, key in 20.

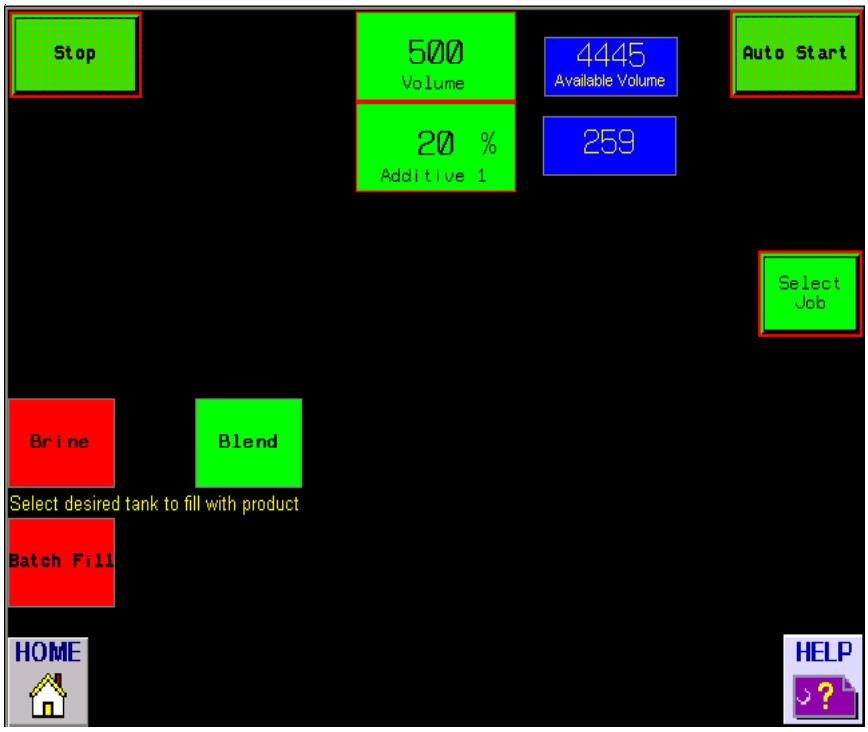
Press the ENTER BUTTON



Tank 2 will always be the Blended Product tank mixing vessel. If an additive Ratio is between 1-100% & tank 1 is the selected tank then a warning will appear as shown to inform to switch to the Blended Product tank or tank 2.

To change to tank 2 for a Blended Product batch press the Tank 2 button.

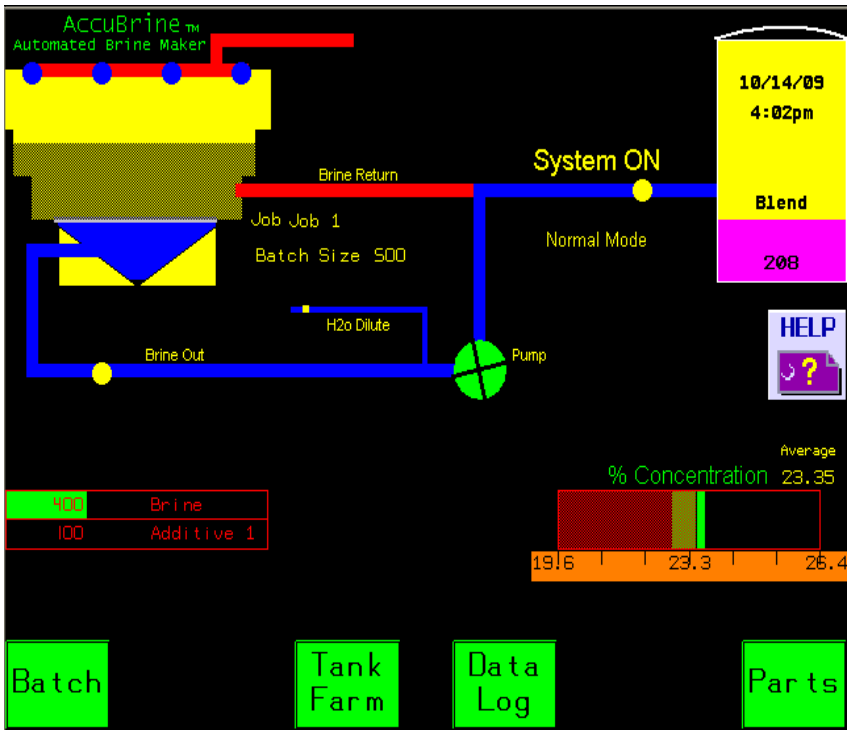
The button will turn red and the warning will disappear.



The information in the blue box is information as it relates to a Blended Product.

The value to the right of the Volume button is the available volume in tank 2. This is the maximum quantity of material that may be produced before the tank will overflow.

Is the quantity of Additive available in the Additive storage tank.



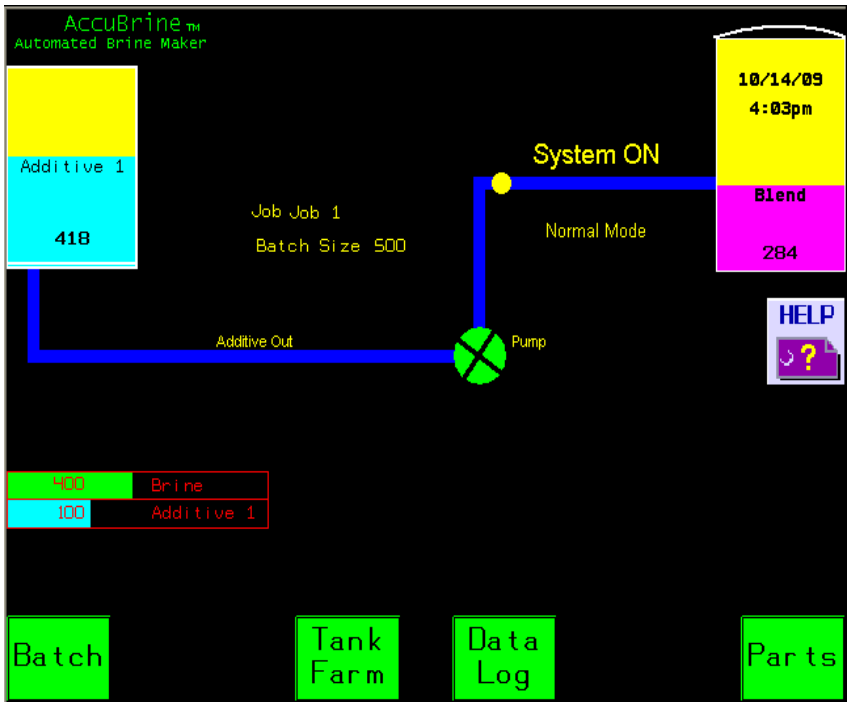
Press the Auto Start button

The machine will calculate the correct quantity of material to be produced given the total volume and Ratio and each will be displayed in the progress graph below.

Graph showing brine being produced.

In this example: A batch of 500 units was entered with a ratio of 20%. The machine calculates the quantity of each material to produce, 400 units of brine and 100 units of Additive will be mixed to produce a Blended Product.

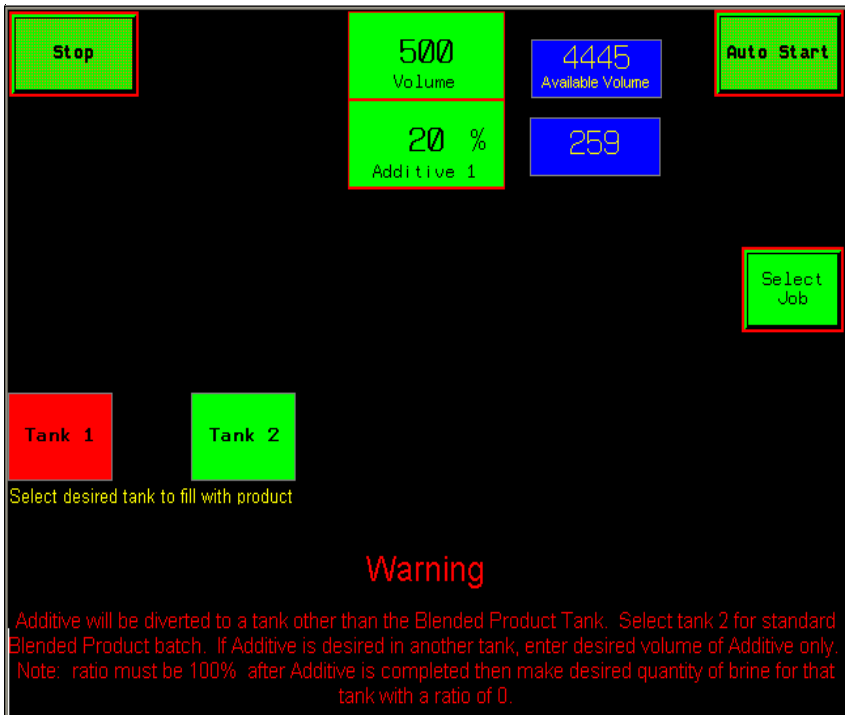
The machine will first produce 1/2 of the desired brine, from the above example 200 units / 2 = 400 units and then add 100 units of Additive 1 then add the remaining 200 units of Brine.



The graphics change on the display as the additive is being added to the Blended Product tank.

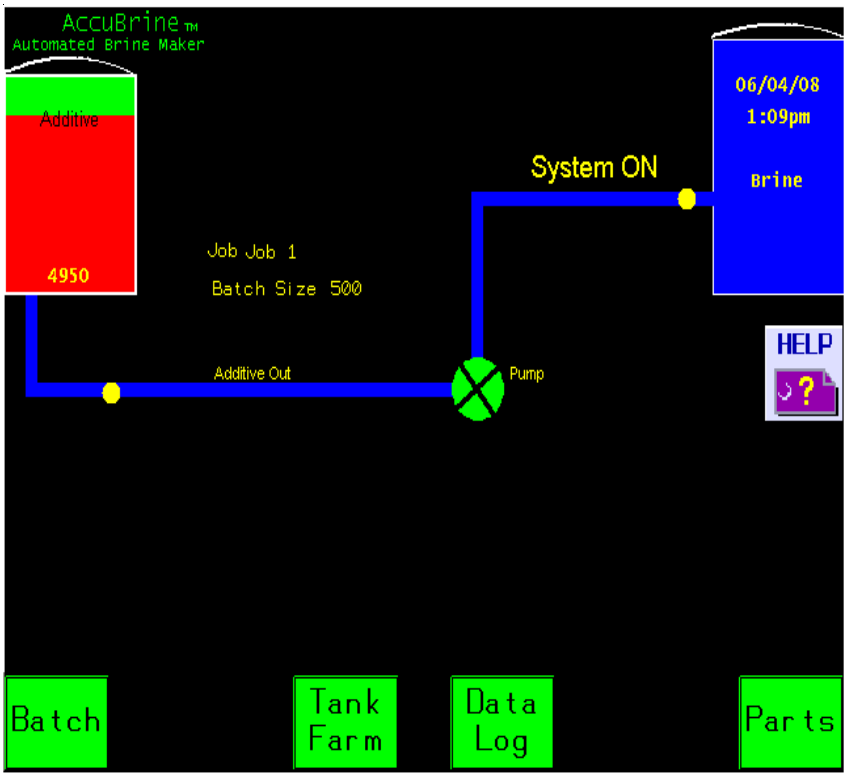
Non Standard Blend and Brine Batch Production

The Brine storage tank may be used to store a Blended product.

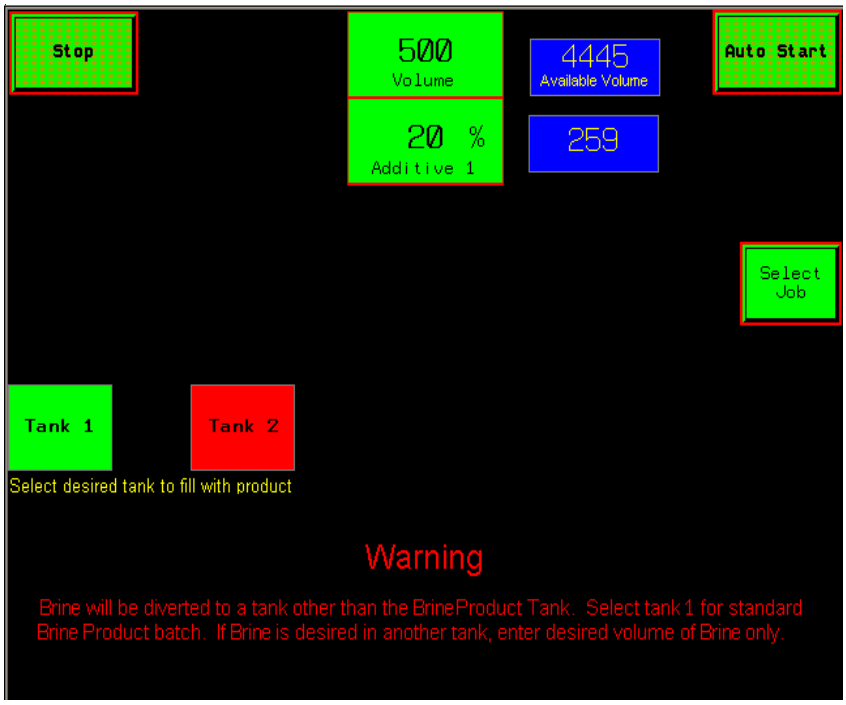


If it is desired to put Blended product into the Brine tank, select tank 1, a warning will appear (as shown on left).

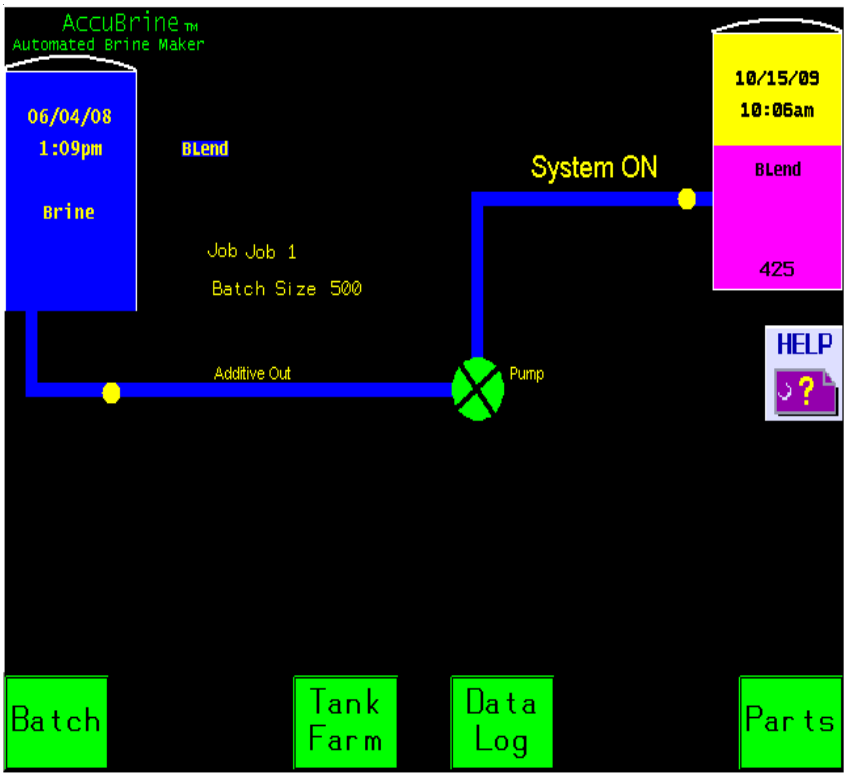
It is not possible to produce a standard Blended Product between 1 - 99 % and divert to Tank 1. You must select 100% additive, and a volume then press Auto Start. You can then produce a Brine batch into the Brine tank to produce the nonstandard blended product.



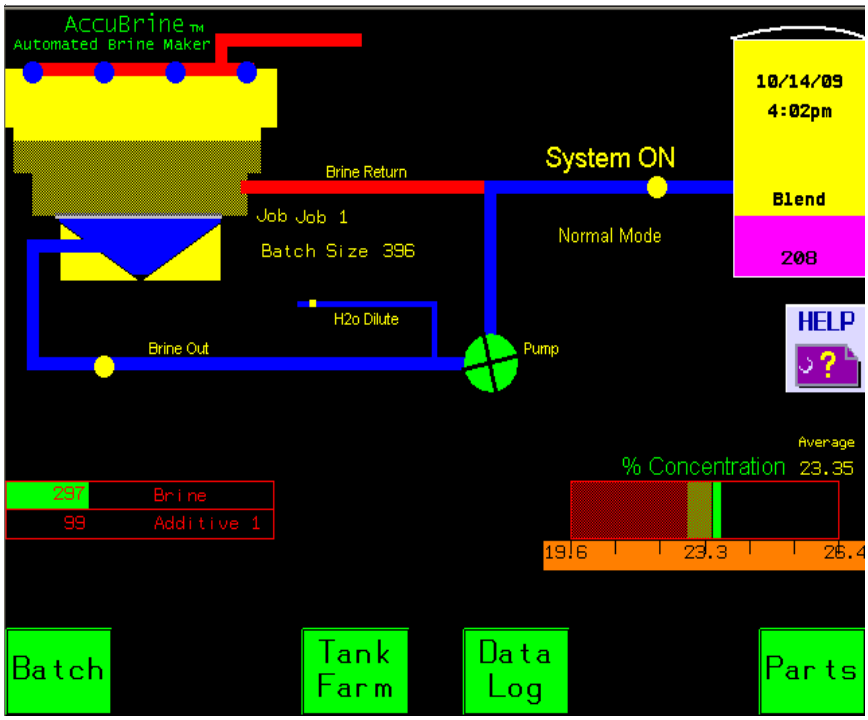
The illustration to the left shows that 100% additive is flowing to the Brine Storage tank.



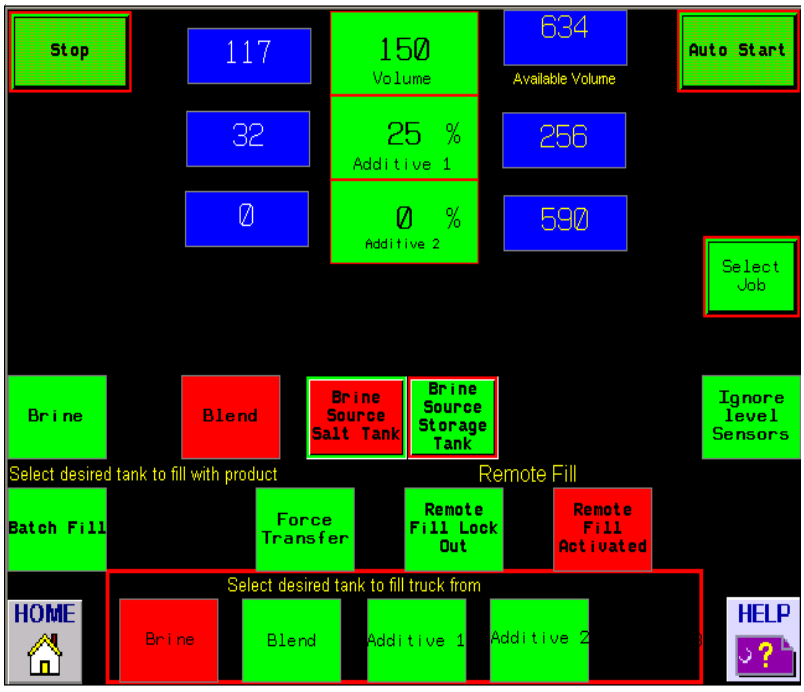
If it is desired to put Brine product into the Blended tank, select tank 2 and warning will appear (as shown on left). To continue, press the start button and brine will be sent to tank 2



The illustration to the left shows that 100% Brine is flowing to the Blended Product storage tank.



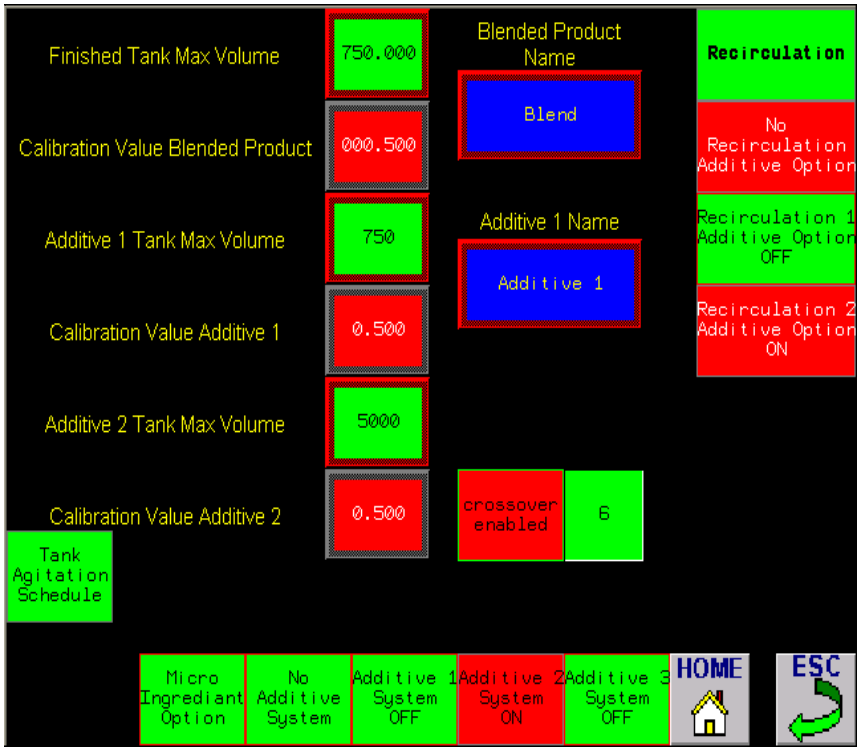
Premature Shut down If a Blended Product batch is stopped prior to completion due to a machine fault or operator interference, the machine will inform on the batch page, as to the new batch size and ratio required to complete the last incomplete batch. To resume the batch, go to the batch page and key in suggested batch size and ratio and restart batch.



For example: A batch of 150 units was started at 25% ratio of additive 1 and the operator turned the machine off prior to completion.

To finish the incomplete batch, the new volume will be 117 units at 32% ratio. When this new batch size is completed, the original batch of 150 units at 25% ratio will be complete.

Additive System Recirculation .

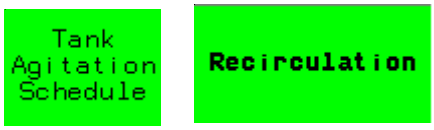


The recirculation for Additive 2 has been activated in the illustration above.

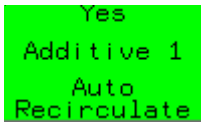
To set up the additive system to recirculate product tanks, go to set up page 3.

To activate the recirculation for an additive, select the Recirculation 1 additive or Recirculation 2 additive button.

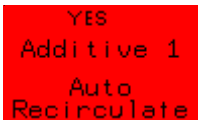
To set up the "ON" time and "OFF" time for storage tank recirculation, press either the Tank Agitation Schedule or Recirculation buttons.



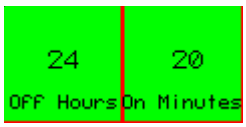
Select which storage tank to recirculate.



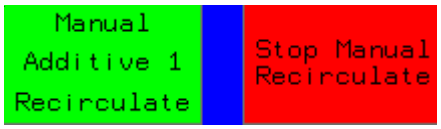
The button will turn red and turn to "ON".



Touch the Hours Off and Minutes On buttons to set up the recirculation schedule for each tank desired. The example to the right shows the storage tank will recirculate for 20 minutes every 24 hours. If multiple tanks are scheduled, one tank will recirculate and then continue with the next tank.

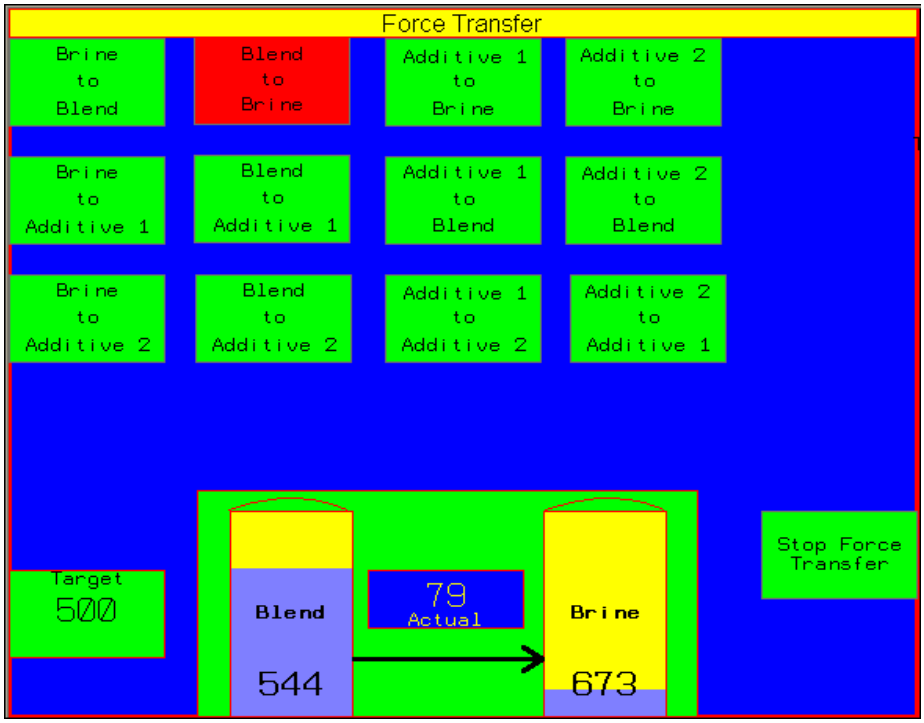


To recirculate a storage tank manually, touch the Manual Recirculate button. The recirculation will continue until the Stop Manual Recirculation button is pressed or the Remote Truck fill switch is activated.



FORCE TRANSFERS OF LIQUIDS

To move liquids between storage tanks, such as brine to blended product, go to the Force Transfer page with password 4096 active.



Press the Batch button.

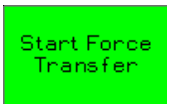
Press the Force Transfer button.

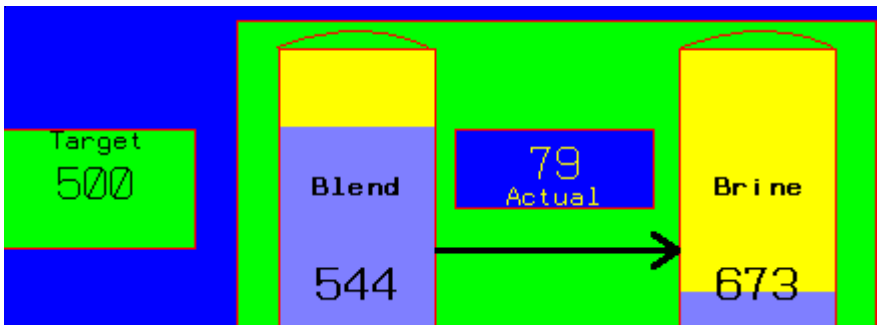
Select the button that corresponds to the liquids you want to transfer.

Press the Target button and enter the volume of liquid to transfer.

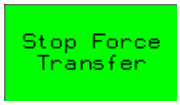
In this case, 500 gallons of Blend product is being transferred to the Brine storage tank.

Press the Start Transfer button to begin the liquid transfer.





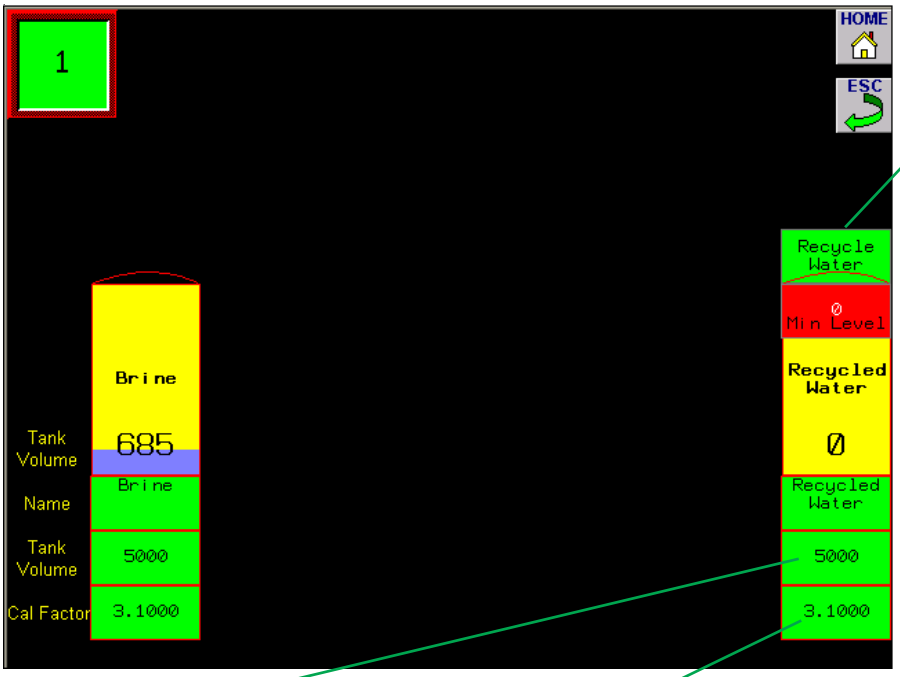
Press the Stop Transfer button if you want to stop the transfer. Starting a batch or operating the truck fill will also stop the transfer.

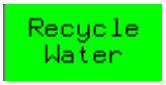


Recycled Water Setup

This machine has the capability (if installed) to use a recycled water and fresh water supply to dissolve the salt to produce brine. The three way electrically actuated valve and auxilliary pump is controlled by the Control Panel to use the recycled water until the volume in the storage tank reaches a user defined minimum level. The actuated valve then changes position to allow fresh water to continue the brine making process.

To access the Recycled Water tank settings, enter password 4096, press the Tank Farm button on the Home page.





Press the Recycle Water button to ACTIVATE and set storage tank calibration, and minimum volume levels.

Press the Min Level button to set the low liquid level. This value will leave enough liquid in the tank to prevent the pump from running dry before the control panel switches to the fresh water source. When the liquid level in the recycled water storage tank is above this Min level, the recycled water will be used.

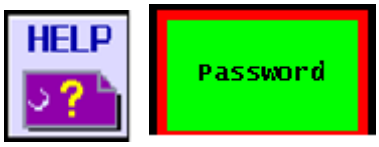
Press this green button to enter the tanks maximum volume. The keypad for the Recycled Water tank will be displayed. This value should be approximately 5 percent less than the tank capacity.

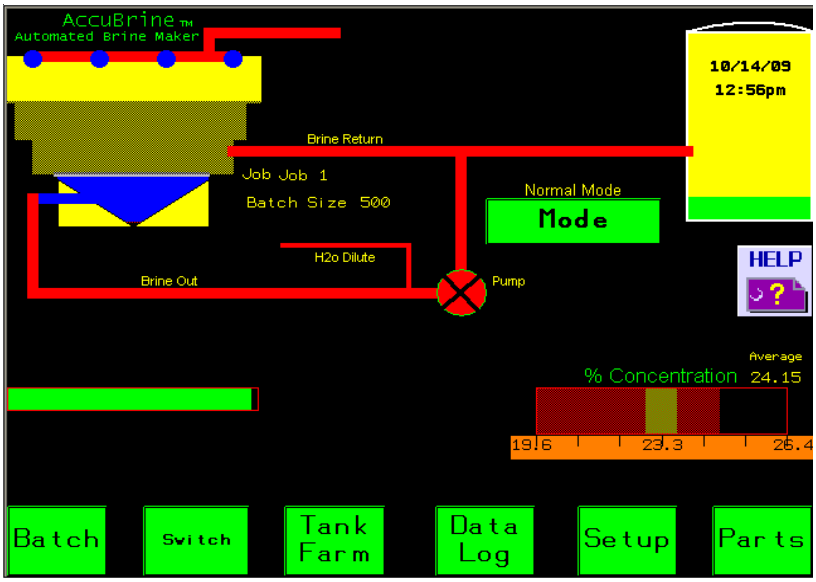
Press this green button to enter the calibration value. This value correlates the liquids pressure being read by the transducer to volume. The value can be moved up or down to reflect actual tank volume.

The Recycled Water tank setup is now complete. The brinemaker will use recycled water when the level is above the Minimum volume and revert to the fresh water source when below the Minimum volume.

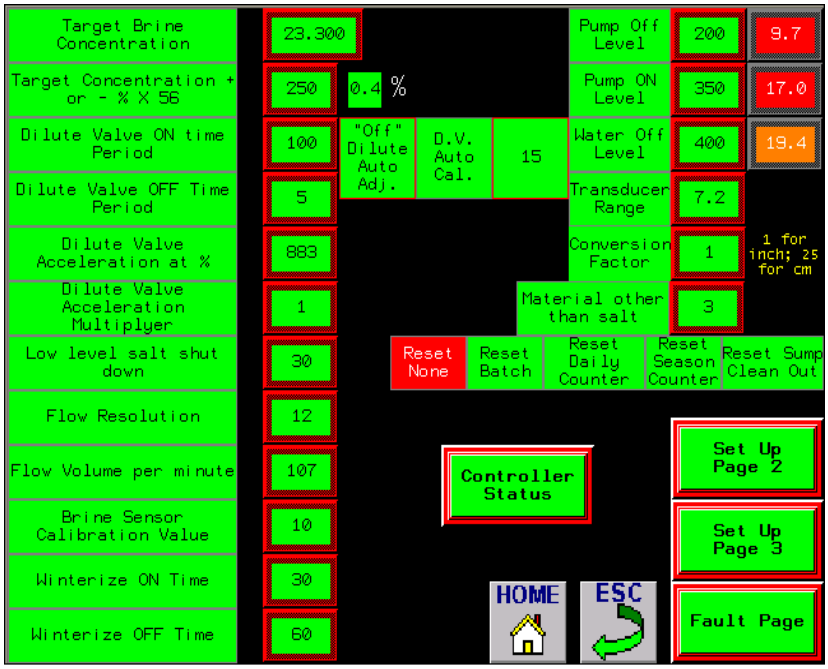
Machine Set Up Page 1

To access Set Up page from the HOME page, press HELP then press ENTER PASSWORD, key in password of 4096 then press ENTER then press ESC to go back to the HOME page. The Set Up button will be at the bottom of the page.





Press the SETUP button to access set up page 1.

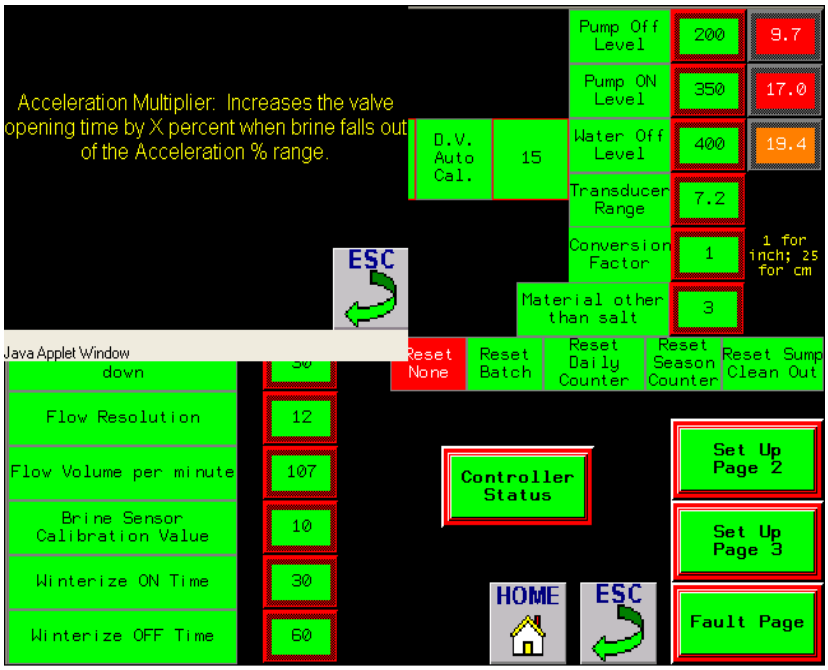


Set up page 1

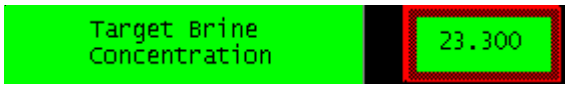
Page 1 set up has basic machine settings for brine production only.

By pressing the green text button by each setting, a description of the setting appears. Press the Dilute Valve Acceleration Multiplyer button below for an example.

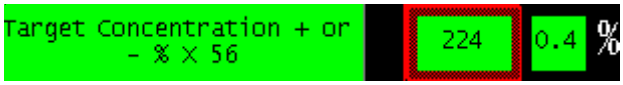
Machine Set Up Page 1 Cont.



A popup window describing the Dilute Valve Acceleration Multiplyer appears.

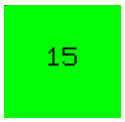


Target Brine Concentration: This setting is the desired target concentration of the salt brine. Set this to the concentration that is desired. Units are in % salt divided by % total weight.



Target concentration + or -: Concentration of brine that is considered acceptable. By changing the value in the red box, the corresponding number to the right changes. The value + or - is 1/2 of the overall percentage therefore, if the values are 224 and 0.4% and the target concentration is 23.3%, the acceptable brine would be 23.3% + or - .2% or 23.1 to 23.5% concentration by weight.

Dilute Valve Auto Adjust: This setting is used to automatically adjust the dilute valve to regulate brine concentration. This function OVERRIDES the Dilute Valve "ON", Dilute Valve "OFF", Dilute Valve Acceleration, and Dilute Valve Multiplier settings.



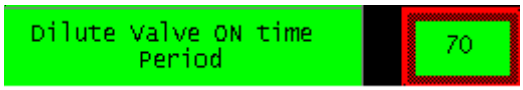
Press the far right green button and enter a value that determines the number of clicks it takes for the valve to fully open. In this case, 15 clicks will open the valve fully. This is the factory setting.

Press the middle green button to start the "Auto Calibration" of the dilute valve. The valve will self calibrate until the valve opens in 15 clicks.

Machine Set Up Page 1 Cont.

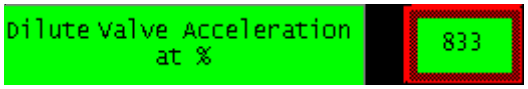
Press the "OFF" Dilute Auto Adj. green button to ACTIVATE the "Auto Adjust" feature of the dilute valve. This will OVERRIDE the Dilute Valve "ON", Dilute Valve "OFF", Dilute Valve Acceleration, and Dilute Valve Multiplier settings.

This button will turn red when the feature is activated.

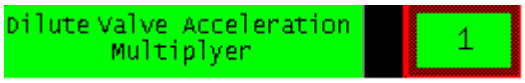


Dilute valve on time Period: Adjust the speed of which the dilute valve adjusts itself. The higher the value the faster it opens. Lower values slow the valve down. This is a critical setting and should be custom fit to the machine. Over time this value may need to be changed to adjust for wear on the machine. If the value is to high, the concentration of the brine will begin to hunt over and then under the specified concentration. If the value is to low, the dilute valve may never open. Note: depending on the speed of the valve, this number may be between 5 and 100. Units are in milliseconds.

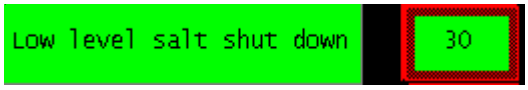
Dilute Valve Off Time Period: This value is the amount of time after an adjustment of the dilute valve before it adjusts itself again. Setting this value to high, the process will become slow. Setting the value to low can cause the machine to hunt. Units are in seconds, suggested values 2-5.



Dilute valve Acceleration at %: Is the deviation from the concentration where the dilute valve will increase speed if the concentration is outside of this tolerance. For example: If the target concentration is 23.3% and the deviation is 833 then the valve would increase speed if the actual concentration is (833/56) therefore 23.3% + or - 1.4% (56 units moves .1%). Setting this value to low will make the machine hunt.

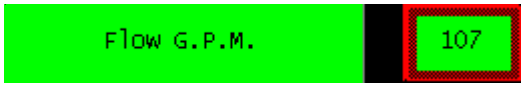


Dilute Valve Acceleration Multiplier: This value speeds up the valve by __ times to speed the valve up if the concentration is outside of tolerance + or - .
Adjust this setting to 1 if the valve speed is fast and it may be raised to 2 if the valve speed is very slow. Adjusting this value above 1 can cause hunting, however if fine tuned correctly can make the machine ramp up more rapidly.

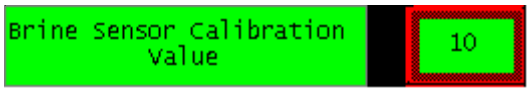


Low Level Shut Down: Is the amount of time before the machine shuts down if minimum concentration is not met. Time value is in minutes set between 10 & 30.

Machine Set Up Page 1 Cont.



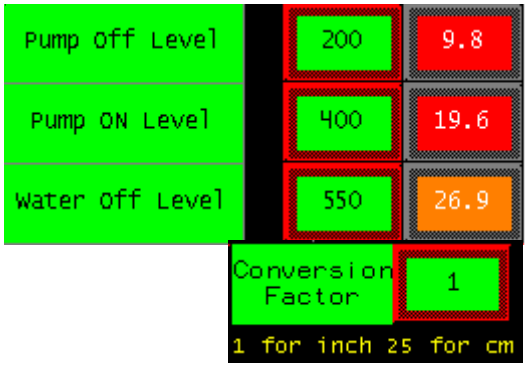
Flow Volume: Flow rate is the units per minute that the machine is producing in a brine only (non-Blended Product) going to Tank 1 or (brine storage tank). Upon initial calibration, set at 107 for units without modular panel set at 90 for units with modular panels. If amount produced is less than actual, lower the value. If amount produced is more than actual, raise the value.



Brine Sensor Calibration Value: This is a correction value for the conductivity analyzer. If actual brine concentration is weaker than the machine indicates, lower the value. If concentration is stronger than target, raise the value. Base line setting is 10 (value of 10 there is no correction).

Winterize ON Time: Is the amount of time that brine is recirculated between the control panel and the salt tank. Value is in Seconds.

Winterize Off Time: Is the amount of time between recirculating cycles (Winterize ON Time). Value is in Hours.



Salt Tank Water Level: These values determine the point at which the pump turns On and Off, and controls the water level in the salt tank. The values in red represent the water level in inches above the sensor on the salt tank. Select each green button for description of function.

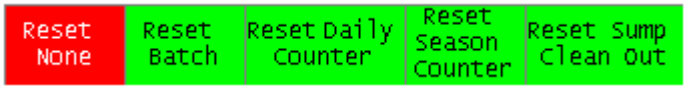
Pump off level: This is the low level limit. Adjust this to protect the pump from running dry. Value normally will be 6-10" or 14.5 - 24.0 cm if conversion factor was set to 25.

Pump on Level: This is the level where the pump turns on. This value must be higher than Pump Off Level. For systems with high flow, a value of around 14" is a good starting point..

Water Off Level: Adjust the maximum quantity of water that will be added to the salt tank. Keeping this value low will reduce overflow when adding salt. This value must be greater than Pump on level.

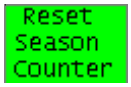
Conversion Factor: Select 1 for standard measurements in inches, or select 25 for metric measurements in centimeters.

Machine Set Up Page 1 Cont.

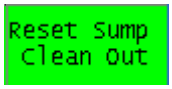


Reset Batch: Resets the batch size to zero. Use this if that machine locks up and a batch size can not be entered.

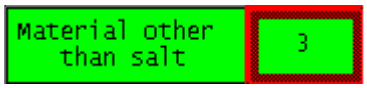
Reset Daily Counter: Resets the current activated data log or Job size to zero. Each job must be selected and reset individually.



Reset season Counter: Resets the current activated data log or Job size to zero. Each job must be selected and reset individually.



Reset Sump Clean Out: Resets the warning on the salt tank and the full sump indicator turns from red to blue to indicate a clean sump. Press this button and reset after clean out of the salt tank.

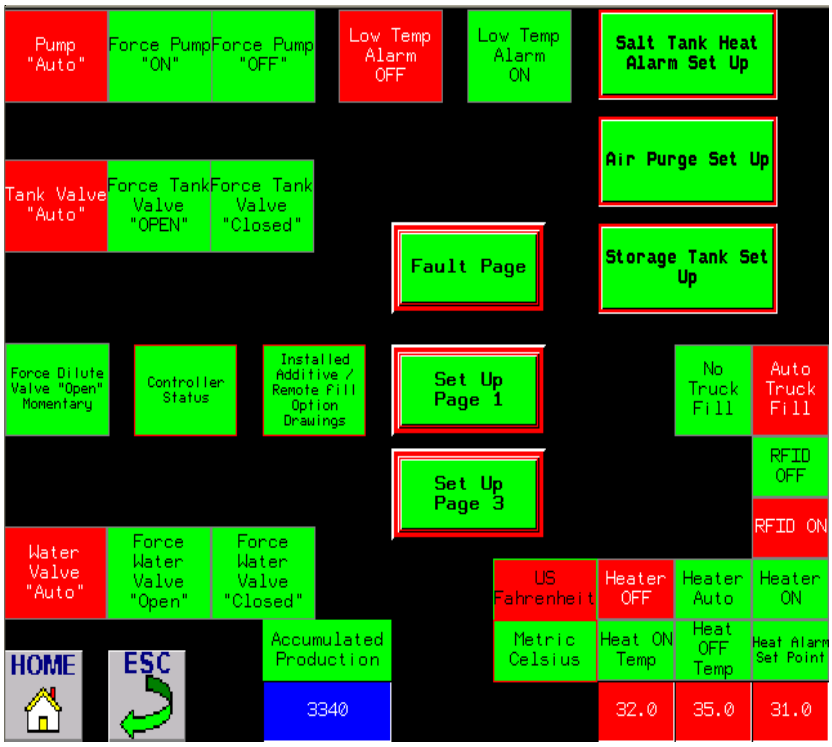


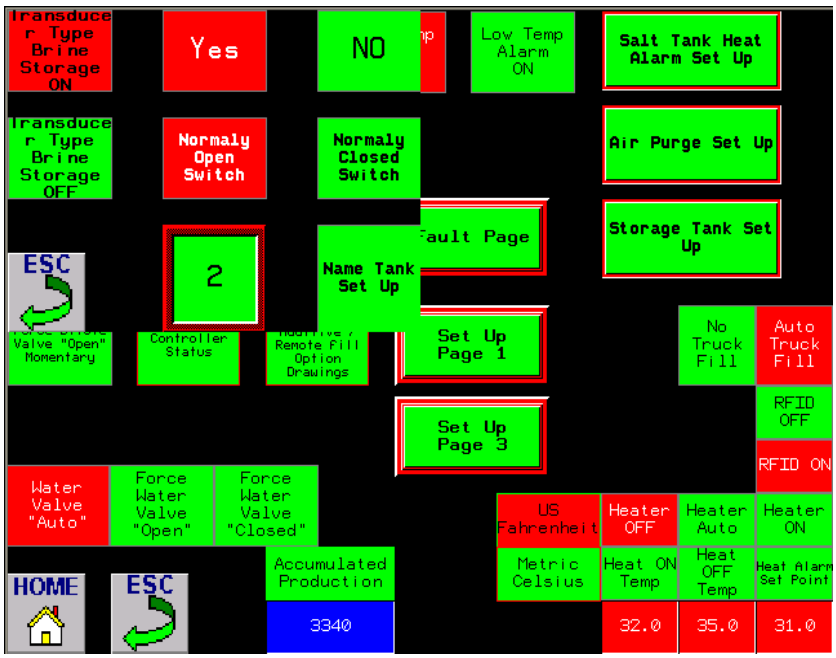
Material Other Than Salt: This setting calculates the theoretical amount of sediment in the salt tank. Estimate the amount of foreign material in the salt and key the value as a percentage in here. The lower the value the less often the salt tank will need to be cleaned.

Transducer Range: This setting is the maximum pressure reading on the transducer located on the salt tank. Units are in PSI. Standard reading is 7.2.

Machine Set Up Page 2

Storage Tank Set Up
Remote Truck Fill
Air purge
Forcing main control panel valves & pump
Inline Salt Tank Heater
Controller Status
Accumulated Production





From setup page 1, select the Setup Page 2 button..

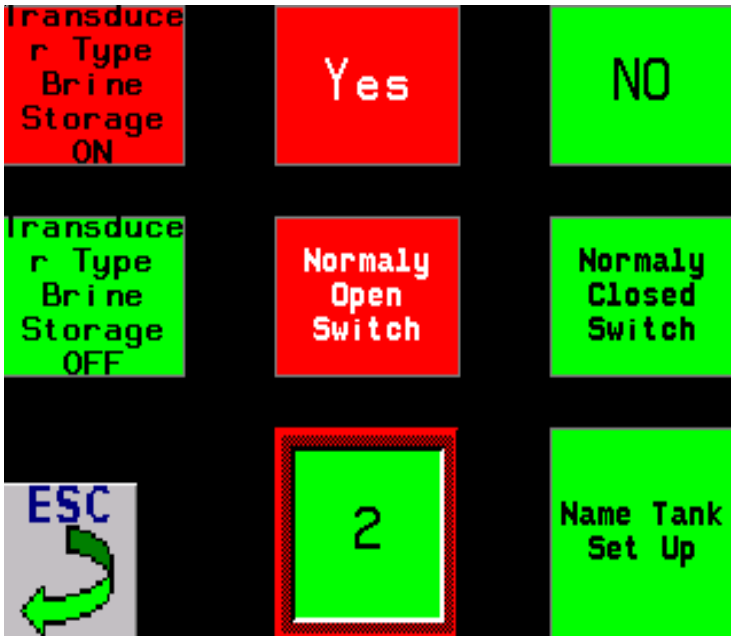
Press the Storage Tank Setup button to view tank setup page.

Press the Number of Tanks button and enter the number of installed storage tanks with pressure transducers on the key pad and press enter.

Press the Transducer Type-Brine Storage On button to select pressure transducer for the brine storage tank.

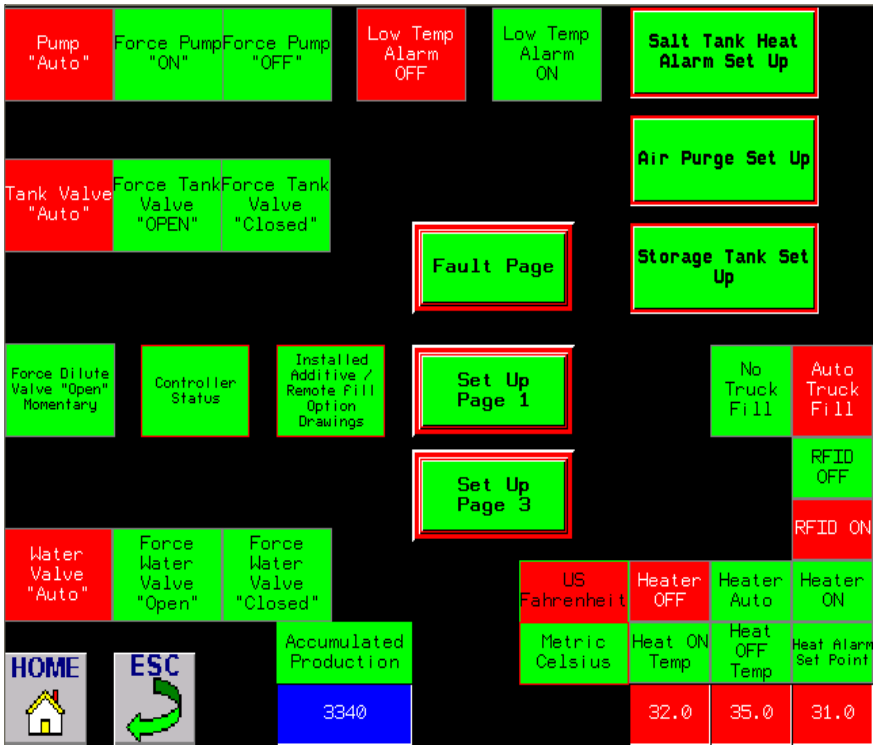
Activating this button over-rides the Normally Open or Closed buttons used for a float switch.

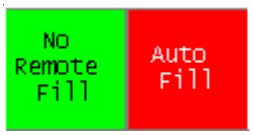
Machine Set Up Page 2 Cont.



Press the Name Tank Set Up button and enter the name for each installed tank on the keyboard and press enter..

Key in the desired name for each storage tank. Note: with an additive injection system the default name of Tank 1 is dedicated to Brine and Tank 2 is dedicated for Blended Product. Name the tanks appropriately. For example Tank 1 (default name) to Brine 6,000 Gal & Tank 2 (default name) to Blended Product 80/20 6000Gal.



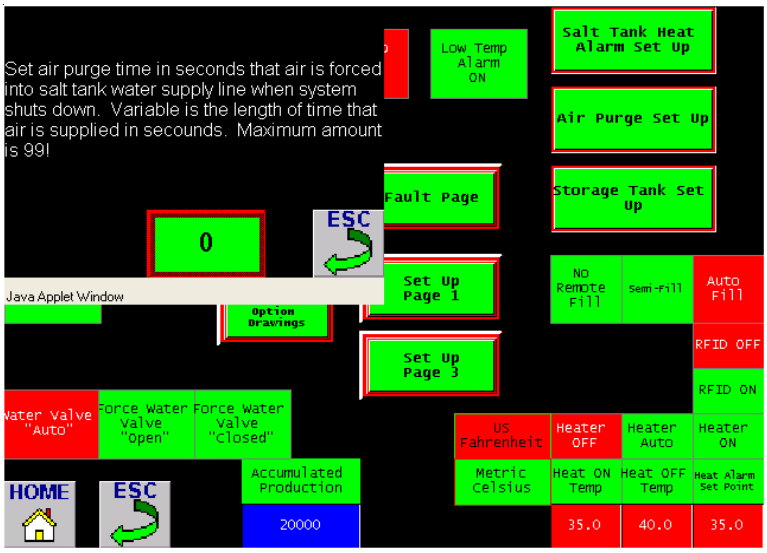


Remote Truck Fill Option: If Remote Truck fill is installed, Select the Auto fill button to activate the appropriate programing and funtionality for the Remote Truck fill feature.

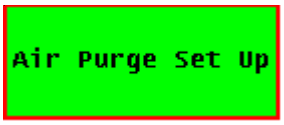
Machine Set Up Page 2 Cont.

Air Purge Setup

This is used to set the amount of time that the air purge will open the solenoid valve to purge the water line between the control panel and the salt tank. *Units are in seconds*. The Air Purge activates each time the machine is shut down. It is recommended to have approx. 90 psi and a 1/2" unrestricted supply.

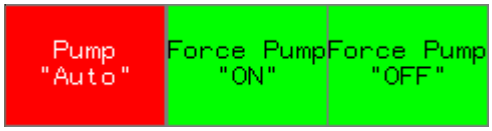


Select the Air Purge Setup button.



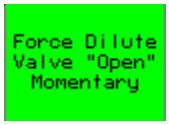
Enter a value, in number of seconds for the Air Purge to stay on. Increase number if fresh water hose does not purge enough of the water.

Forcing Operation: This should only be done for trouble shooting or for manually overriding the machine for non standard operation such as troubleshooting a valve. Under normal operation, the Auto button should be Red. To move liquids, the machine must be running then press the desired force button. When the machine is stopped or started, the forcing buttons will be reverted back to AUTO. **Forcing valves or pump may damage machine and / or cause machine to operate erratically.**

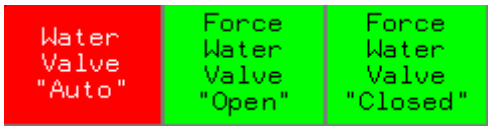


Force pump on*:* Forces the pump to run regardless of machine operation and liquid level in the system.

Force Tank Valve Open: Forces the tank valve open to divert flow to the storage tank in a standard machine. With the modular panel, it forces product to the modular manifold outlet bank.



Force Dilute valve: Opens the dilute valve momentarily as long a button is pushed. This will allow fresh water to enter into the pump inlet and into salt tank and /or output flow.

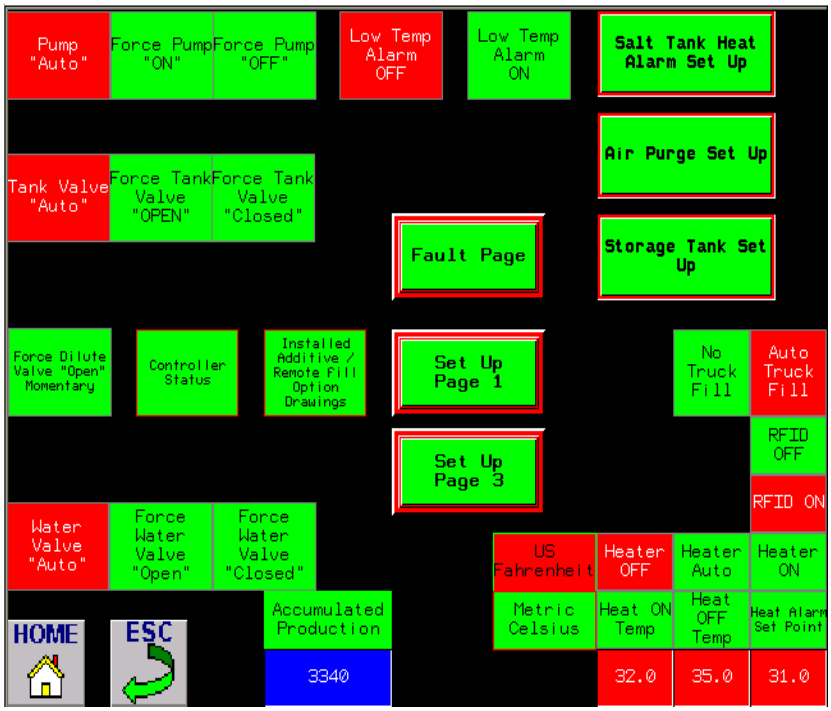


Force water Valve*:* Forces the water valve open to allow fresh water flow to the Salt tank.

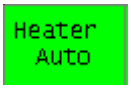
Machine Set Up Page 2 Cont.

Inline Salt Tank Heater Setup

To access the settings for the Inline Salt Tank Heater, enter password 4096 and go to setup page two.

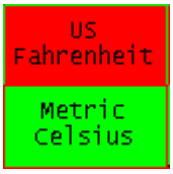


Select "Off" if heater is not installed.

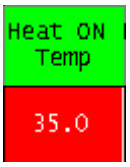


Select "Auto" if heater is installed and it is desired to have heater turn on automatically as needed via thermostat in Winterize Mode.

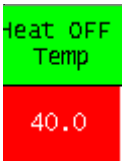
Forces the Heater ON. "Caution must be used". The liquid inside the heater must be recirculating to prevent overheating and possible damage.



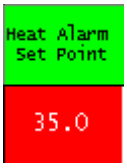
Select the U.S. Fahrenheit or Metric Celsius button based on the machines wiring diagram and which input is used for the thermostat. Input 0 is for Fahrenheit, and Input 1 is for Celsius.



Heat On Temp: Is the Temperature at which the heater will be turned ON if HEATER AUTO is selected. *Touch the red numeric value to adjust the setting.*



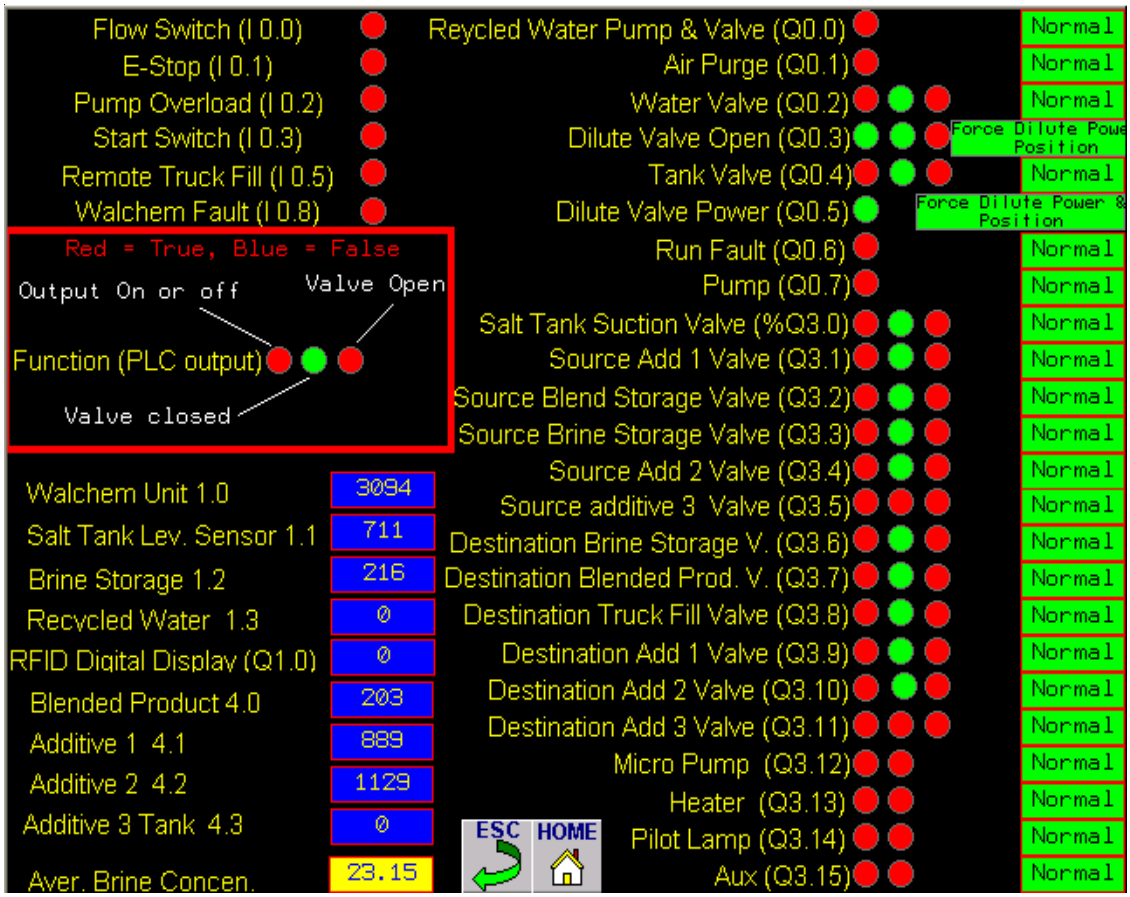
Heat OFF Temp: Is the Temperature at which the heater will be turned OFF after it has been turned on (from above), if HEATER AUTO is selected. The heater turns on at the set point above and will heat the liquid until it reaches this point. Note: If AUTO is selected, this value must be greater than the ON setting. *Touch the red numeric value to adjust the setting.*

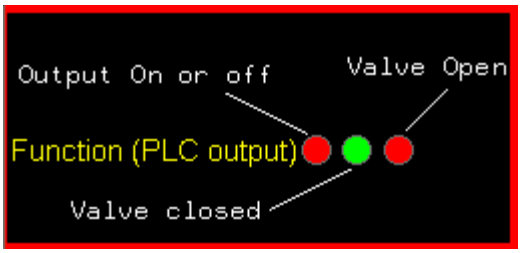


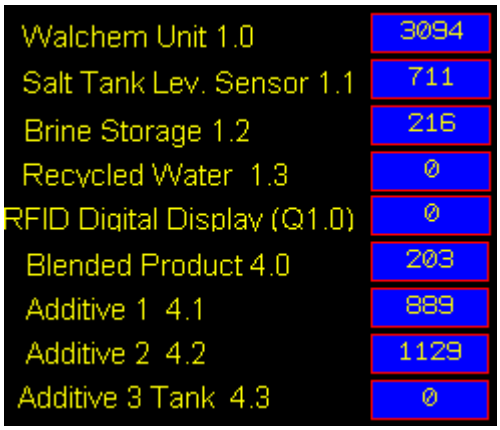
Heat Alarm Set Point: This is the point at which an alarm will illustrate the low temperature warning on the salt tank. Set this value at or below the ON temperature.

Machine Set Up Page 2 Cont.

The Controller Status page displays information about the status of valves, pressure transducers, pump, and other systems on the brinemaker. It can be used as a tool to troubleshoot these items as well as view operational information and force valves open.



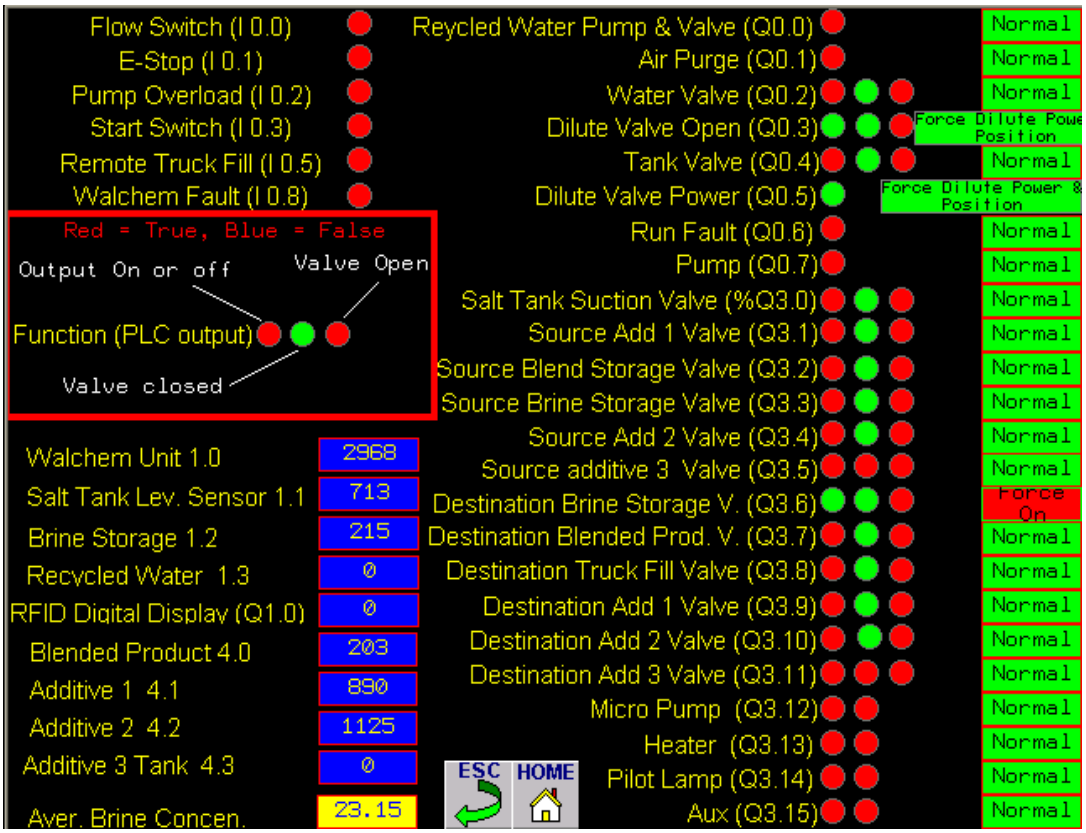




The legend shown at left describes the color indicators and their meanings.

The table to the left shows output numbers for pressure transducers and the conductivity analyzer. The numbers are from 0 to 4095 (full scale) representing the 4 to 20 milliamp reading from each item. For example: The 1129 for the Additive 2 Tank means that the output is about one quarter of full scale and the tank should be approximately one quarter on the HMI touch screen. The items reading zero are either: not installed, installed incorrectly (wiring), have no liquid in the storage tank, or have failed.

Machine Set Up Page 2 Cont.



To force a valve open and check for proper operation, touch the green NORMAL button for the valve you want to open.

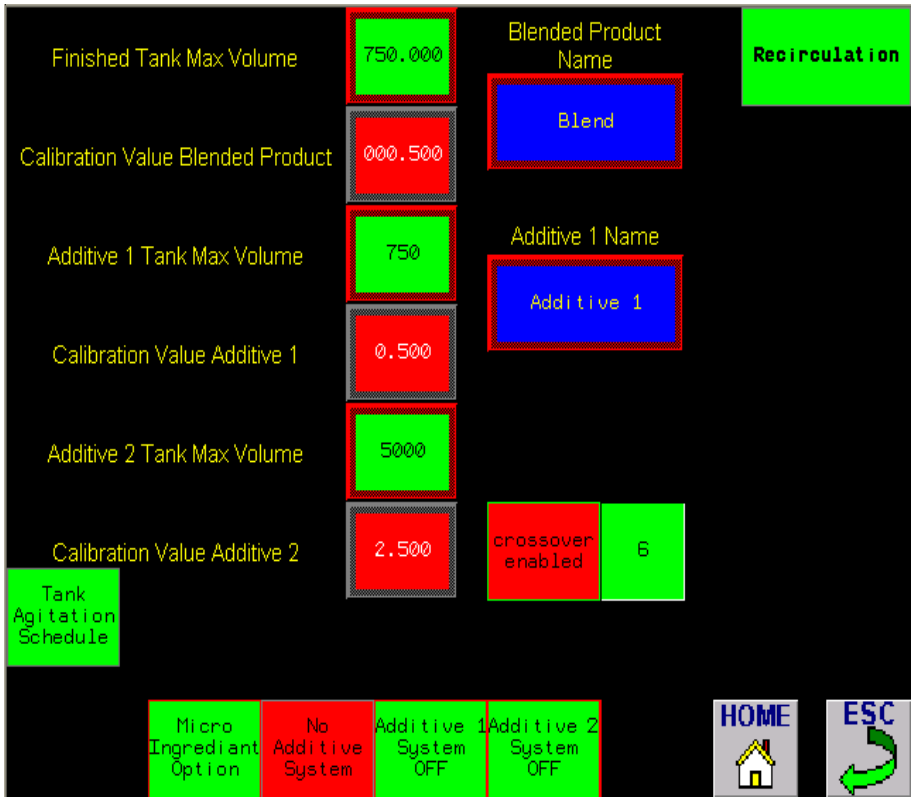
The button will turn red and state FORCE ON. The CLOSE indicator has changed fro green to red indicating the valve has opened.

The Average Brine Concentration indicator shows the concentration of the brine produced per batch. It will reset and begin again with each new batch.

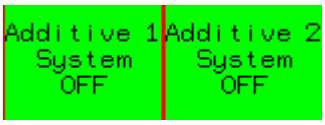
Set Up Page 3

Additive systems
Storage Tanks
Cross Over

Micro Ingrediants
Recirculation / Tank Agitation



Press to select the appropriate button below to activate a 1 additive, or 2 additive system.



Select the No Additive System button if there is not an additive system installed.

Storage Tank Setup

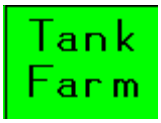
The maximum volumes, calibration values and names for the liquid storage tanks can be setup here or the Tank Farm page.

Press the green button to enter the maximum volume of the Blended Product storage tank. It is recommended to enter a volume 5% less of the total volume to prevent the tank from over filling.

Press the red button to enter the calibration value for the storage tank. It is recommended to enter a value of 1 to start. When a known volume of liquid (IE: 1000 gallons) is in the storage tank, adjust the calibration value up or down to accurately reflect the actual volume.

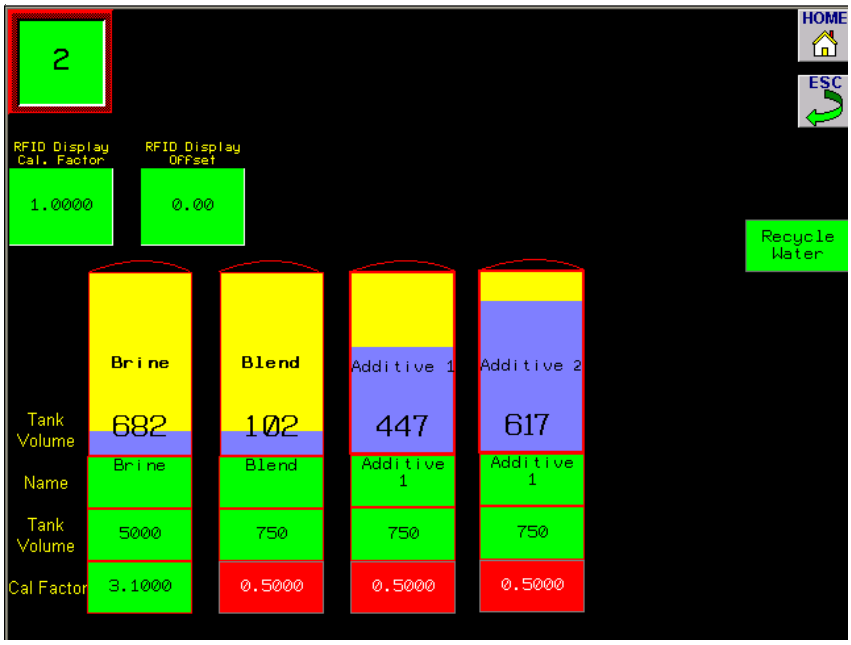
Continue this process for the Additive 1, and the Additive 2 storage tanks if applicable..

The storage tank setup can be done on the Tank Farm page as well. From the Main/Home page, select the Tank Farm button.



Set Up Page 3 Cont.

Storage Tank Setup from Tank Farm



The Tank Farm page shows all the storage tanks applicable to the type of system selected. For example: A 2 Additive system without Recycled Water has been selected here.

Press this green button to enter the name of the storage tank if desired.

Press this green button to enter the tanks maximum volume. This value should be approximately 5 percent less than the tank capacity to prevent overfilling.

Press this green button to enter the calibration value. This value correlates the liquids pressure being read by the transducer to volume. This value can be moved up or down to reflect actual tank volume.

Enter the name, maximum tank volume, and calibration factor for each storage tank.

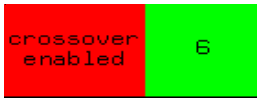
RFID Digital Display Setup

Press the RFID Display Offset button if the display number is off from the actual volume delivered. For example: When filling a truck, the touch screen shows 250 gallons were delivered to the truck. The card reader display shows 245 gallons were delivered. Press the RFID Display Offset button and enter 5. This will correct the displayed value on the card reader to 250.

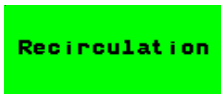
Press the RFID Display Cal. Factor button if the display number is off from the actual volume delivered. This cal factor multiplies the Offset factor by the value entered here. For example: Offset value 5 X Cal factor 1 = 5. (Note: This number will typically stay at 1)

Set Up Page 3 Cont.

The Crossover is used for a 1 or 2 additive system to prevent small amounts of additives from being sent into the salt tank during the blended product process. After the additive is added to the blended product tank, the crossover keeps the three way tank valve open to the blended product tank for (in this case, 6 seconds) until brine flushes the valves and plumbing.

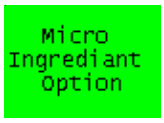


Press the crossover button to activate this feature. Press the button to the right of the crossover to enter a value in seconds. (5 or 6 seconds is recommended)



OR

Press the Recirculation or Tank Agitation button to access the setup page. (See pages 39 - 40)



Press the Micro Ingrediant button to access the setup page.

Micro Ingrediants

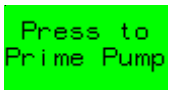
Micro Ingrediant Option: The Micro Ingrediant Option injects trace amounts of micro ingrediants into the finished product. These could include anti-foaming agents, dyes etc. Press the Micro Ingrediant Option button to go to set up page.

Select which product to add the Micro Ingrediant to. Select the Reset button to turn off the addition of the Micro Ingrediants to the products.

Select which product/s to add Micro Ingrediants into while filling trucks. Select the Reset button to turn off the addition of the Micro Ingrediants while filling trucks.

Press this button to enter the pump flow in units per minute. This example is set at 1.6 gpm. Use key pad and press enter when completed. Note: Pump flow may be found on pump label.

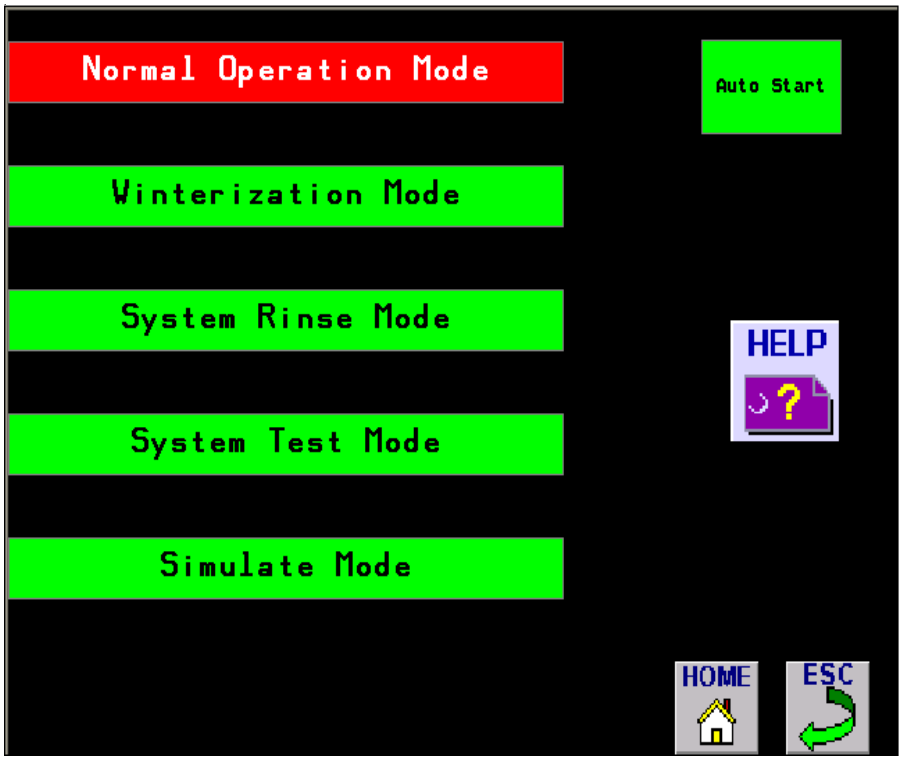
Press this button to enter the desired ratio of Micro Ingrediant per units of product. Note: You must use like units. For this example, 1.6 gallon of additive per 5,000 gallons of product. (Refer to manufacturers label for correct ratios)



Press button to manually prime pump. Depending on length of supply tubing, this may take several minutes to prime.

Operating Modes

To access Mode page, Enter password of 4096, Go to the HOME page and press the Mode button.



Normal Operation Mode: Machine is able to make brine, and do other production and delivery functions with options equipped on machine.

Winterization Mode: Machine starts timers that are setup for recirculating the salt tank, storage tanks and inline heater. When Brine and Blend products need to be produced, or when the Remote Truck Fill is started, the Winterize Mode will be paused. Winterize Mode will resume when the batch is complete or truck fill is shut off.

System Rinse Mode: Machine flushes out the main control panel and pump with fresh water. **Caution:** Close suction/brine out valve on salt tank and remove hose to brine storage tank to prevent fresh water from entering storage tank before activating mode. Lines will be filled with fresh water. Take appropriate actions to prevent freezing of lines. ***Select System Rinse Mode button and press Auto Start.***

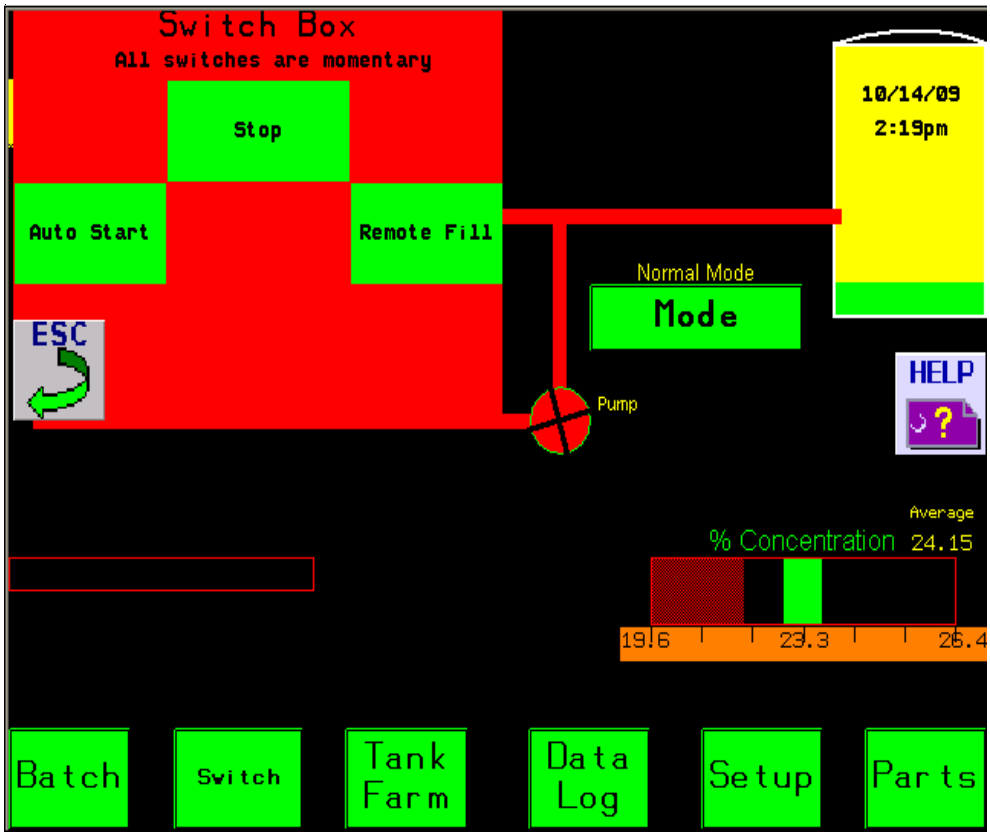
System Test Mode: Machine cycles actuated valves and pump on the Main Control panel and checks operation. If a valve fails, the machine will fault. ***Select System Test Mode button and press Auto Start.***

Simulate Mode: Machine simulates brine production. Brine concentration, and the liquid level in salt tank are simulated. **Caution:** Valves will open and close and pump will operate. To run the simulate mode without the pump running, turn off pump circuit breaker. Close all valves at storage tanks to prevent liquid from back flowing into system. Close fresh water supply valve to prevent fresh water from being added to salt tank. This is a good feature for training operators with out actually making product.

HMI Switch Box

The HMI Remote Switch Box feature allows operation of the Auto Start, Remote Truck Fill and Stop switches from the HMI or Webgate from a remote location if a physical switch is damaged.

To access the switch box, enter Password 4096, go to the Home page, and press the Switch button.



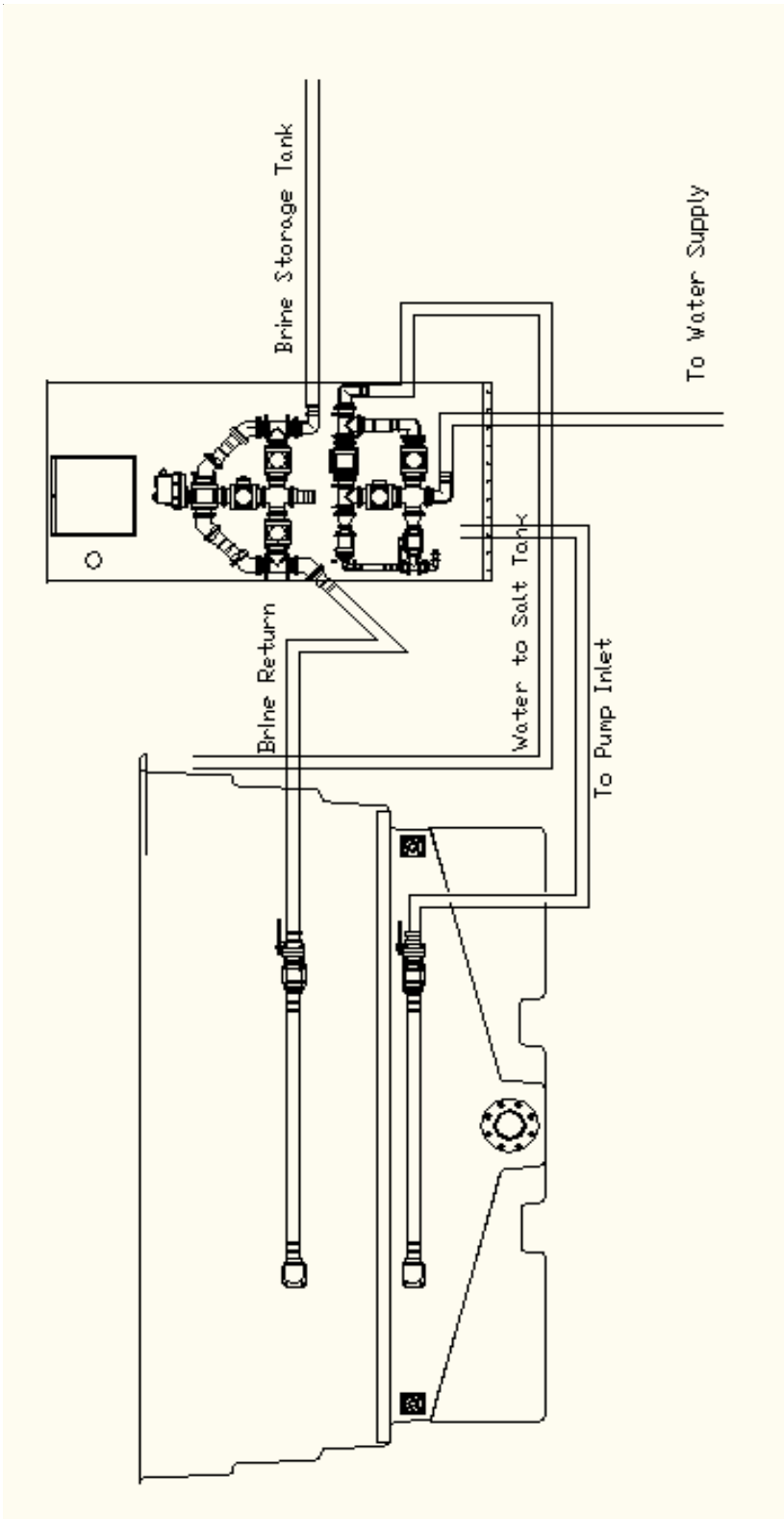
Stop Button: Stops the current batch production. This is a momentary button.

Start Button: Starts the current batch production. This is a momentary button.

Remote Fill Button: Has the same functionality as the physical Remote Truck fill button at fill point. Use if remote switch becomes inoperative.

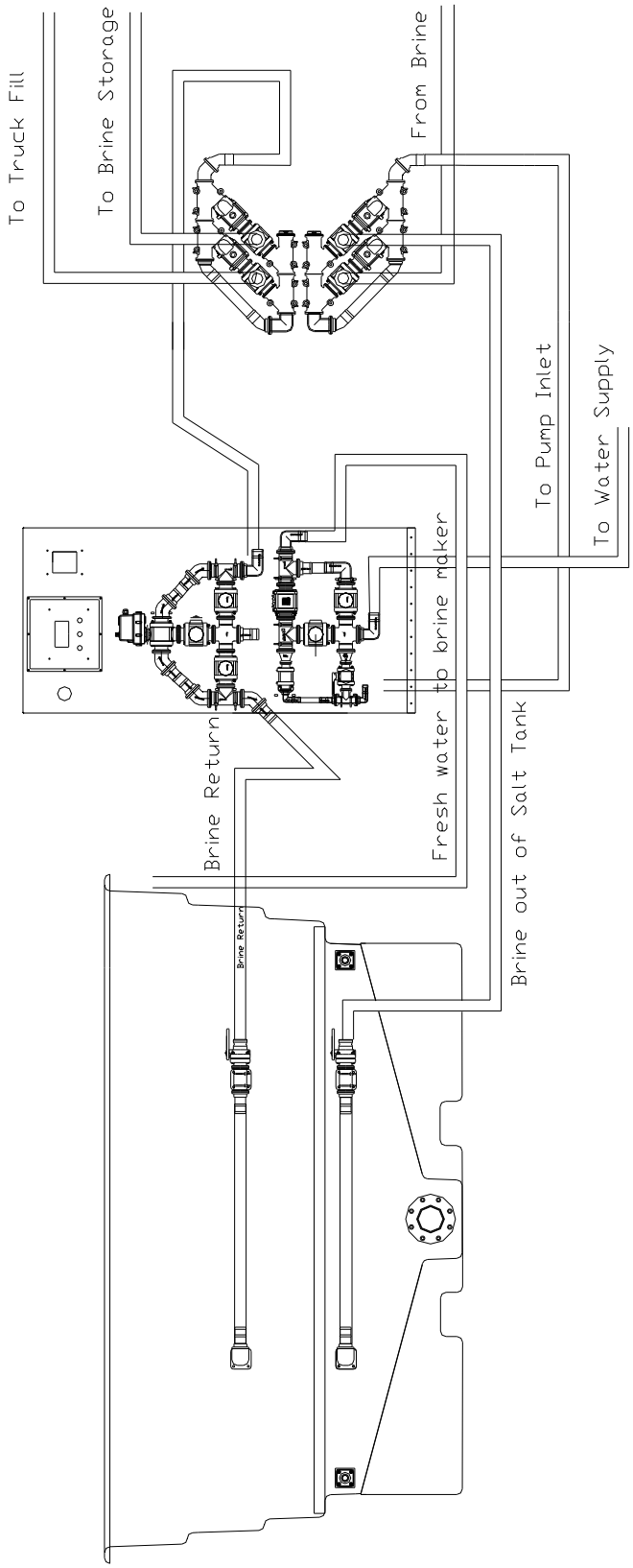
Plumbing Configuration Drawings

Accubrine Model: AB - Brine Production



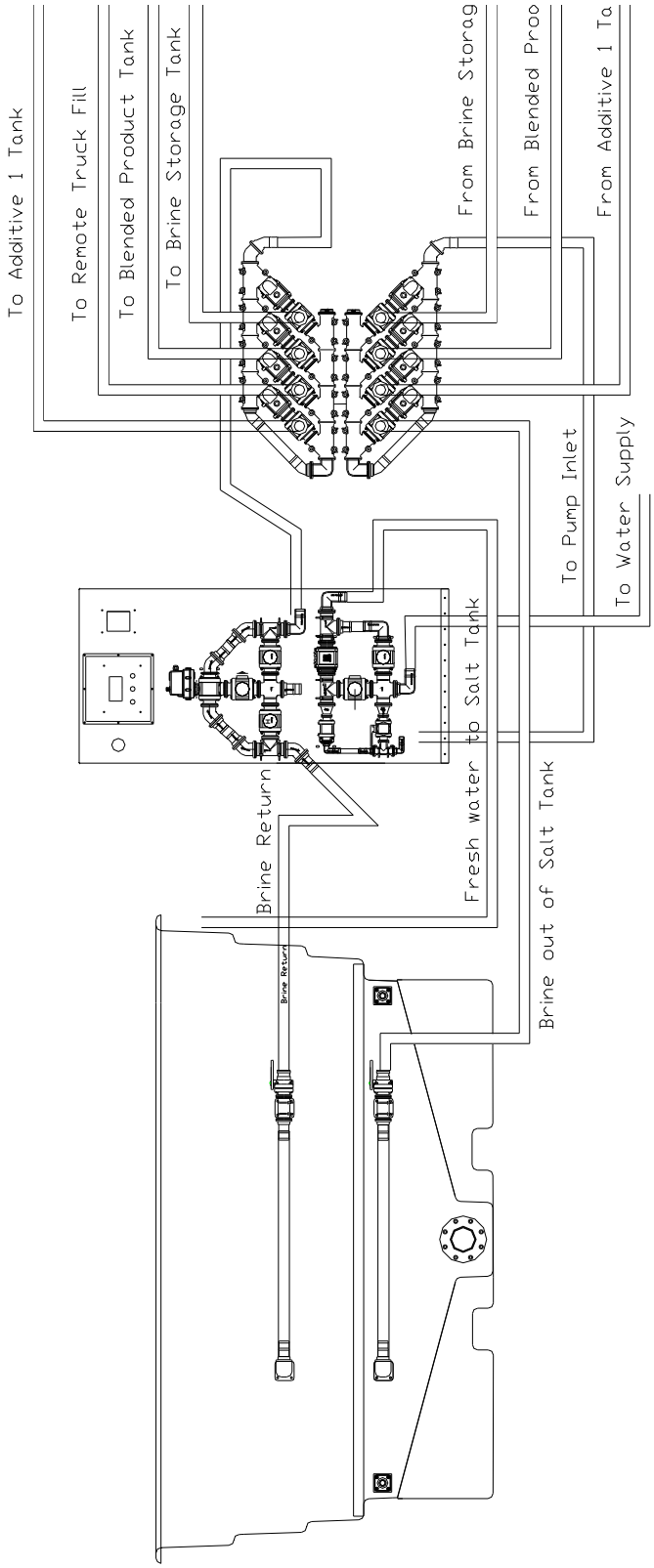
Plumbing Configuration Drawings Cont.

Accubrine Model: RTF - Brine Production and Remote Truck Fill



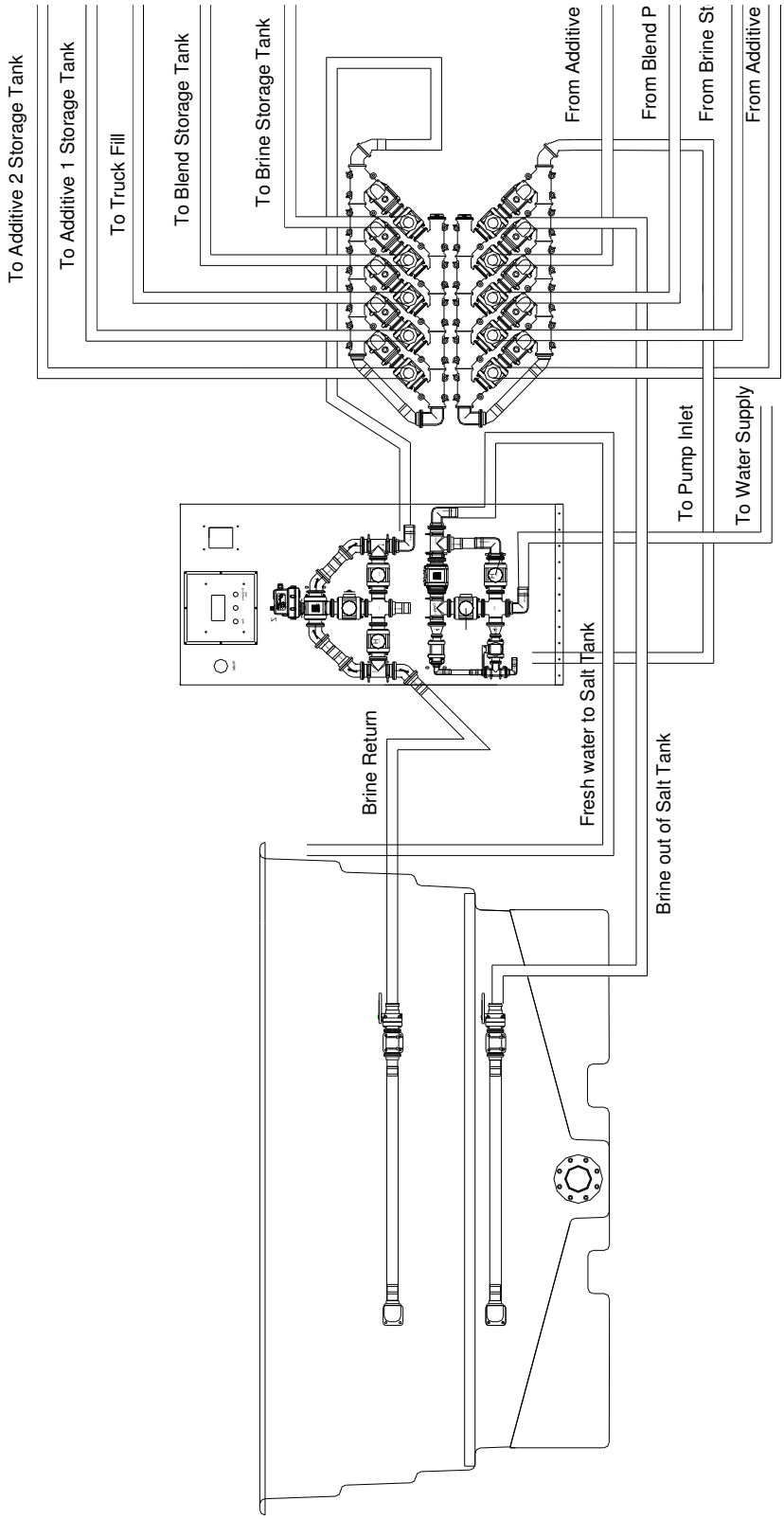
Plumbing Configuration Drawings Cont.

Accubrine Model: ABS - Brine Production, 1 Additive and Remote Truck Fill



Plumbing Configuration Drawings Cont.

Accubrine Model: ABS2 - Brine Production, 2 Additive and Remote Truck Fill

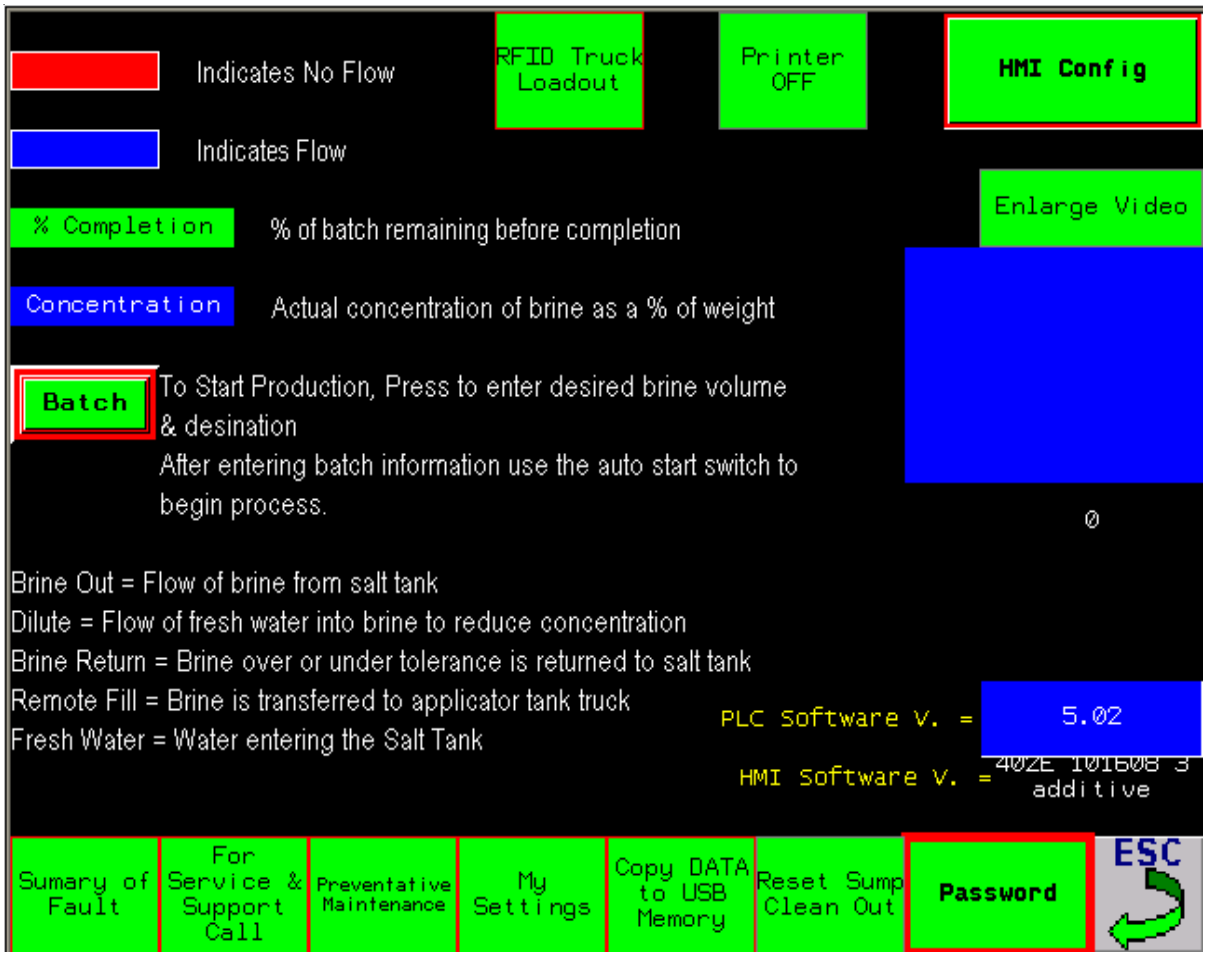


Help Screen, HMI Configuration, My Settings, and Copy Data to USB Features

When password 2048 is activated, the HMI configuration, My Settings and, Copy Data to USB features become available.

From the HOME screen, press the button.

Change password to 2048, then press enter.

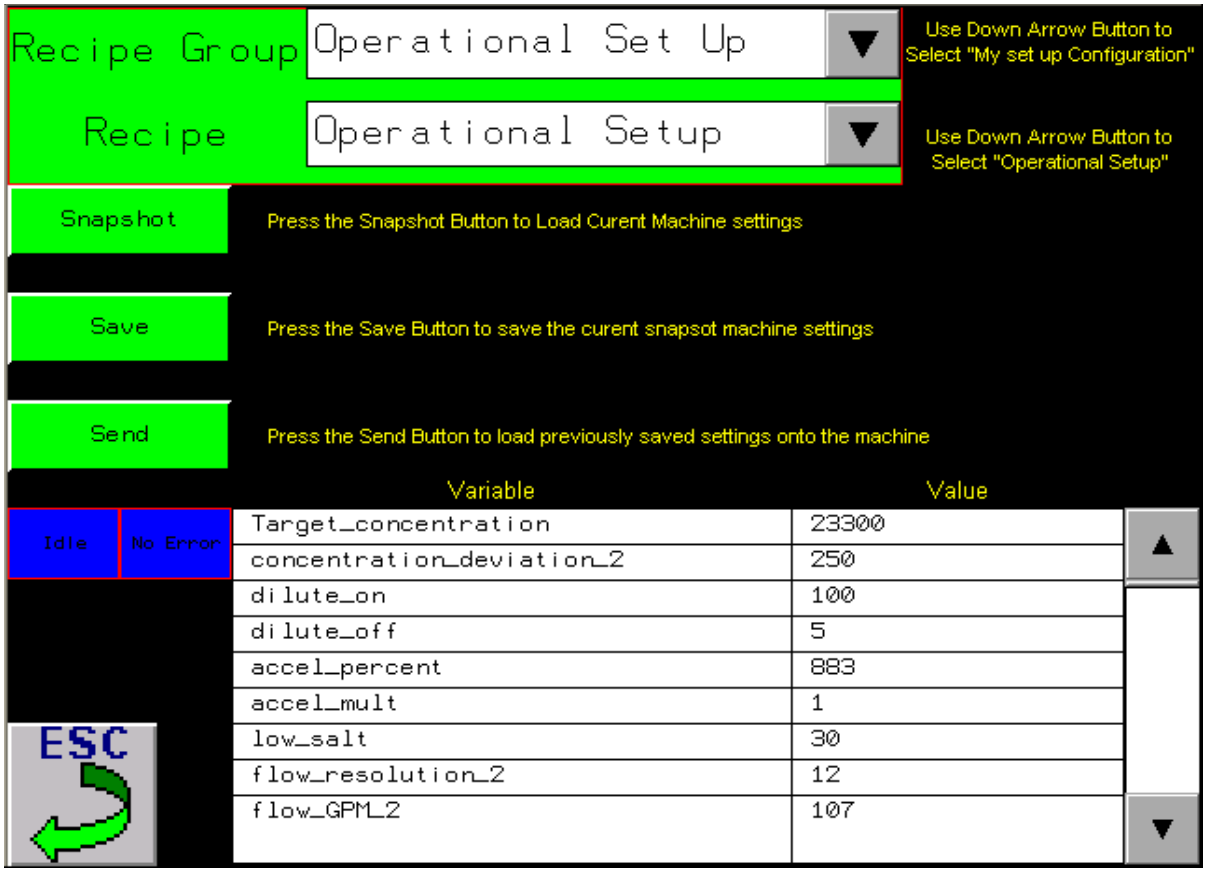


Press button to activate “Print” button on all screens. Press green “Print” button to print current screen if printer is connected. Note: Installed printer must be compatible with Hewlett Packard PCL 6 driver.

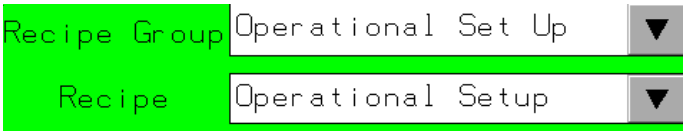
Press button to enlarge video screen if video camera is installed.

Saving and Reloading Machine Configuration - My Settings

Press the My Settings button to access Recipe screen to save and reload current Operational machine settings.



This screen will allow you to take a snapshot of the current machines Operational settings, Data Log Settings, and Preventative Maintenance settings to reload if settings were changed by mistake.



Press first down arrow and select Operational Setup, Data Log, or PM Log.

Press first down arrow and select Operational Setup, Data Log, or PM Log.

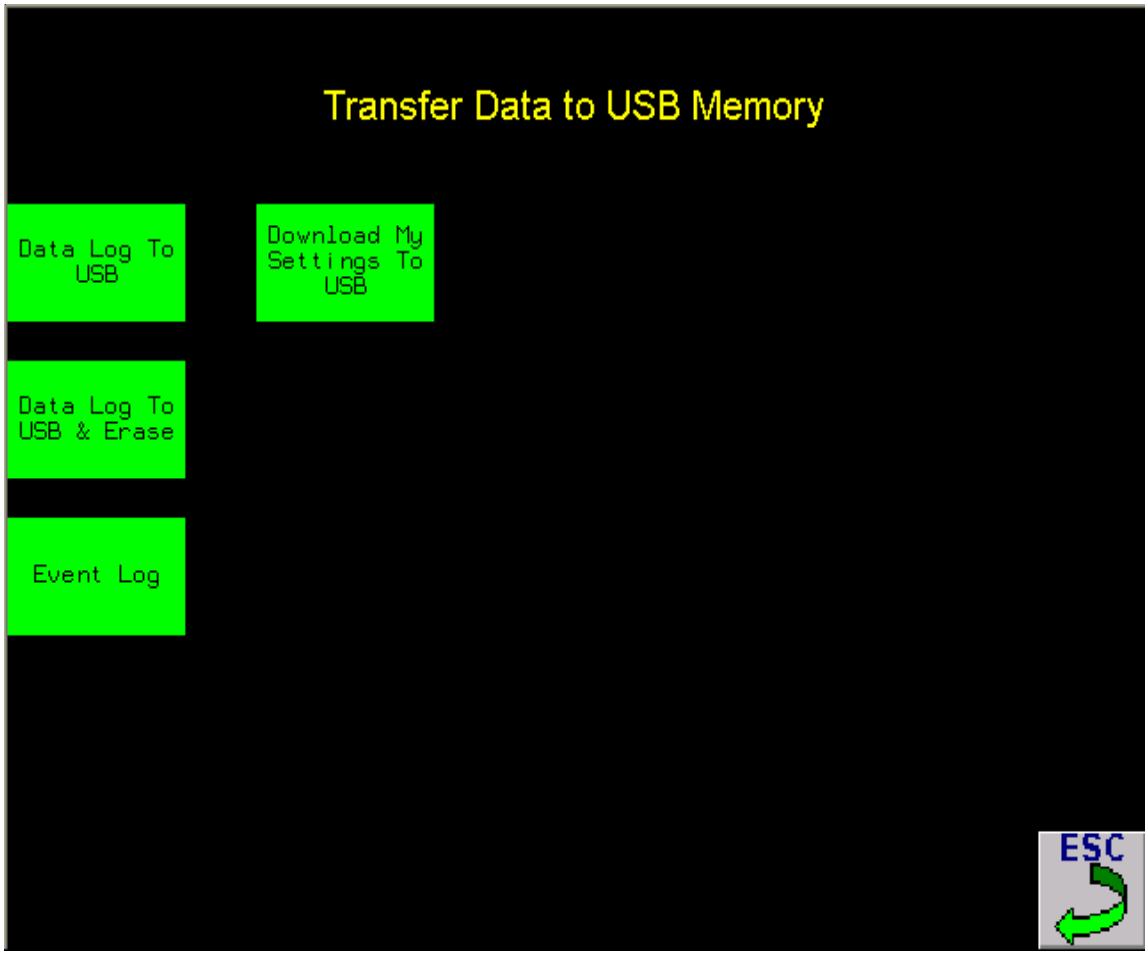
Press the Snapshot Button to capture the machines current configuration settings. The values for each item above will populate with the current setting.

Press the Save Button to save the machines current configuration settings.

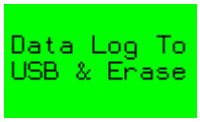
Press the Send Button to reload the previously saved machine settings into the setup pages.

Copy Data to USB Flash Drive Memory

Install a portable flash drive into the supplied USB connector on side of control panel enclosure. Press button to access the Transfer Data to USB selection page.



Select this button to download the data collected from production and truck loading to a portable USB memory stick. Insert a formatted (Fat32) USB memory stick into the USB port on the side of the HMI enclosure. The message: USB device is plugged in. Press the "Data Log to USB" button.



Select this button to download the data collected from production and truck loading to a portable USB memory stick and erase all data stored in internal memory.

Select this button to download the fault data that has occurred, to a portable USB memory stick.

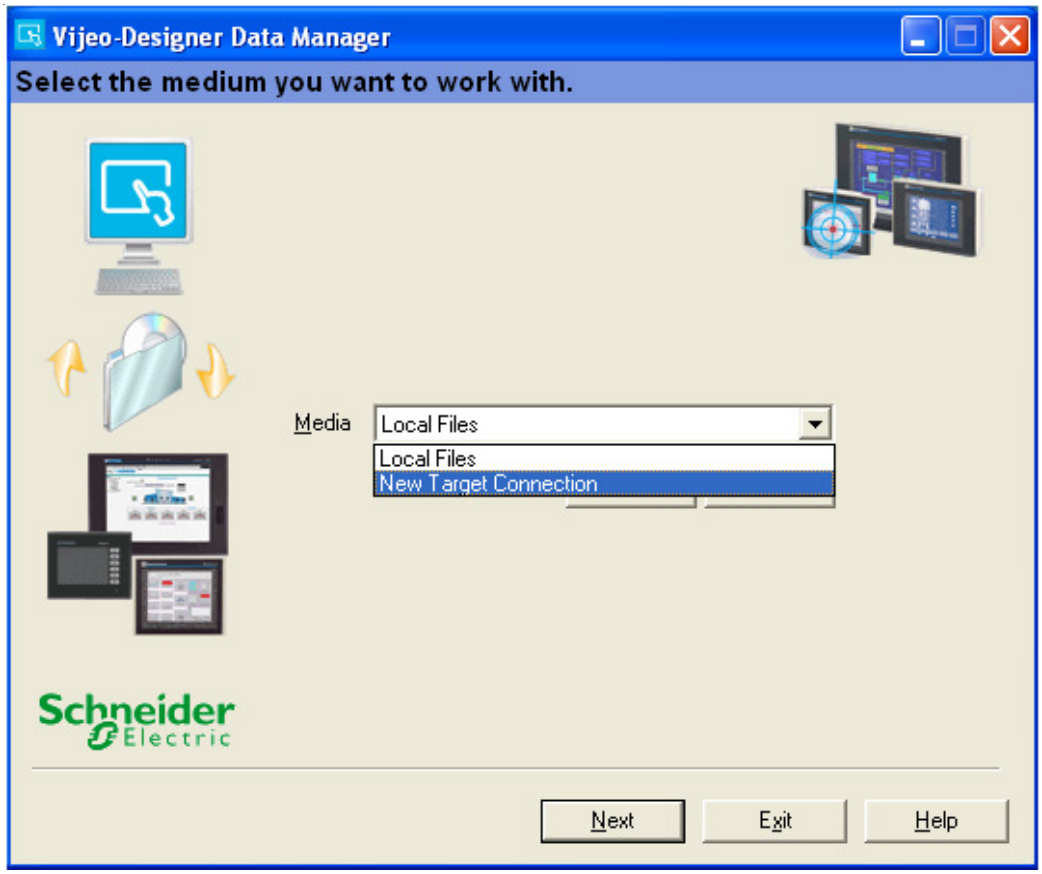
Select this button to download "My Settings" (the brinemakers setup variables) to a portable USB memory stick.

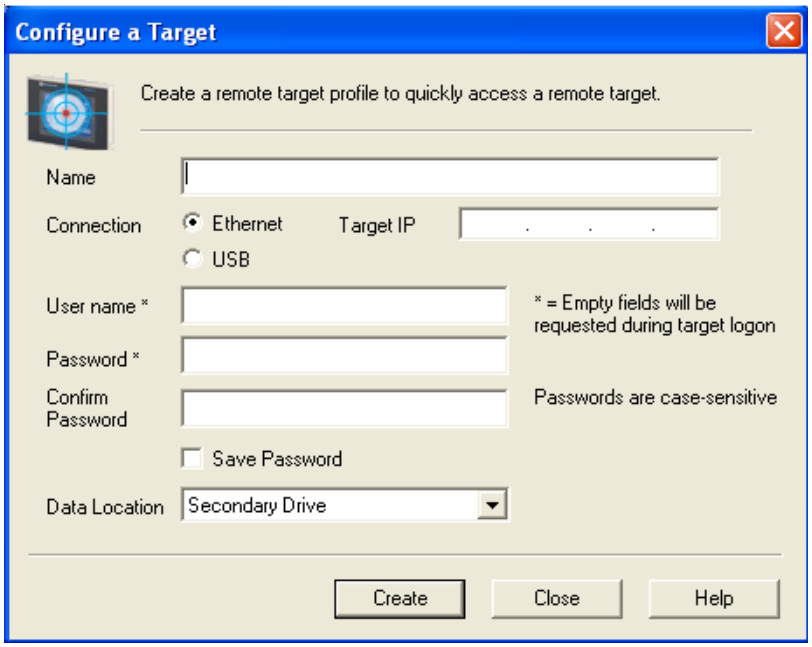
HMI Data Download with LAN or USB Memory Stick

1. Data may be extracted with 2 methods:
   a. By direct communication between the Accubrine HMI and a computer with a network connection (LAN). To download data via LAN connection, Vijeo Designer Data Manager Software must be loaded onto the target/owners computer.
   b. By plugging in a USB flash drive directly into the HMI. (USB port located on the side of the HMI - see page 64)

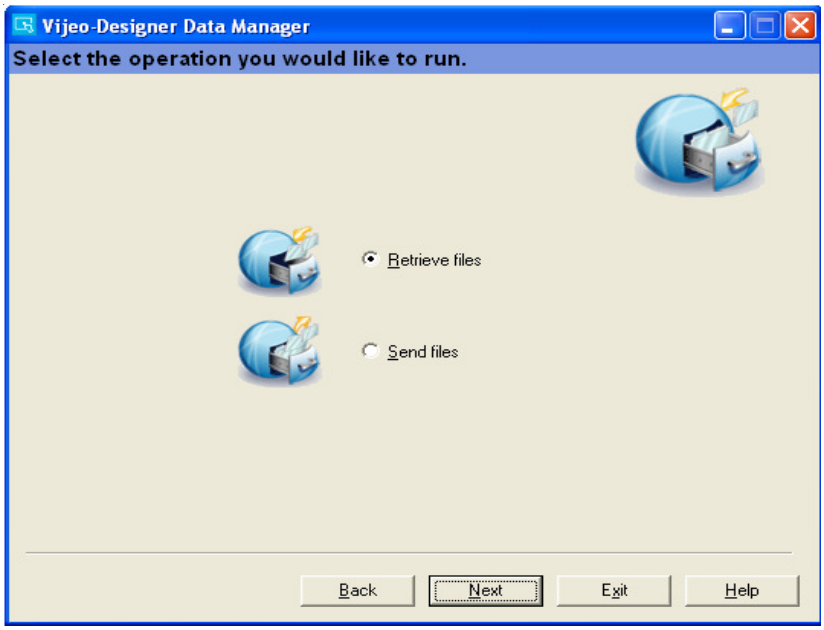
2. HMI Data logs are available on a daily basis after midnight. Note that data logs created prior to midnight will not be available for download until after that time.

3. To download via LAN network the HMI must have the LAN option enabled and you must connect your PC to the HMI via ethernet cable.
   a. Start **Vijeo Designer Data Manager**.
   b. Under media, select: ***New Target Connection***
   c. Then select ***Create***

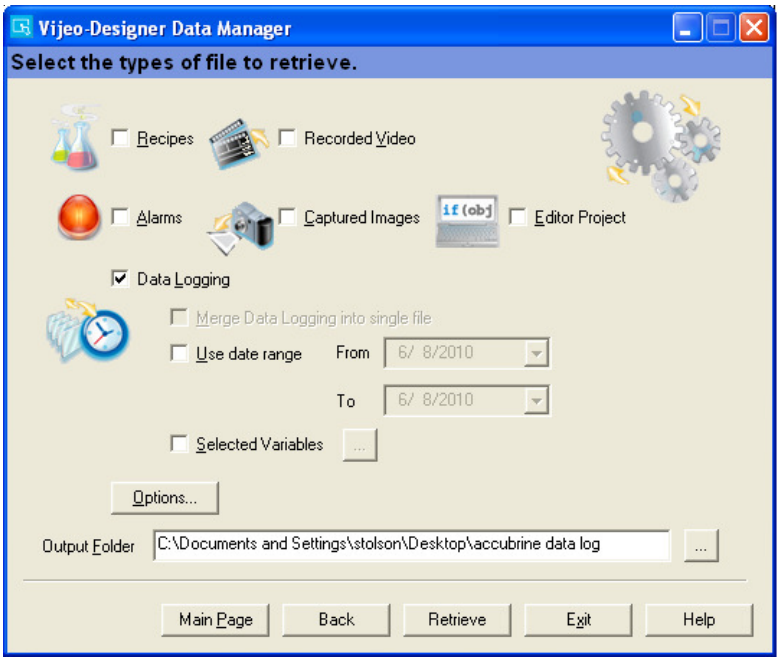




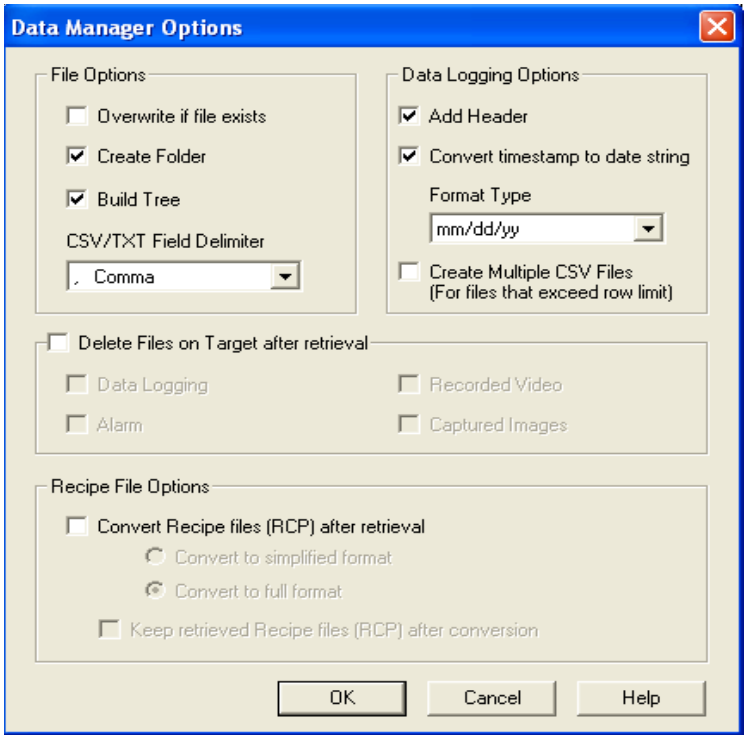
d. On the **Configure Target screen:** Name: create a name such as Accubrine data download (or select a connection previously created).
e. Select: ***Ethernet***
f. Enter the Touch screen/HMI IP address: ***196.170.86.54***
g. User name: enter ***accubrine***
h. Password: enter ***4096***
i. Data Location: select ***Secondary Drive***
j. Select: ***Create***
k. <u>You will be taken back to the previous page</u>



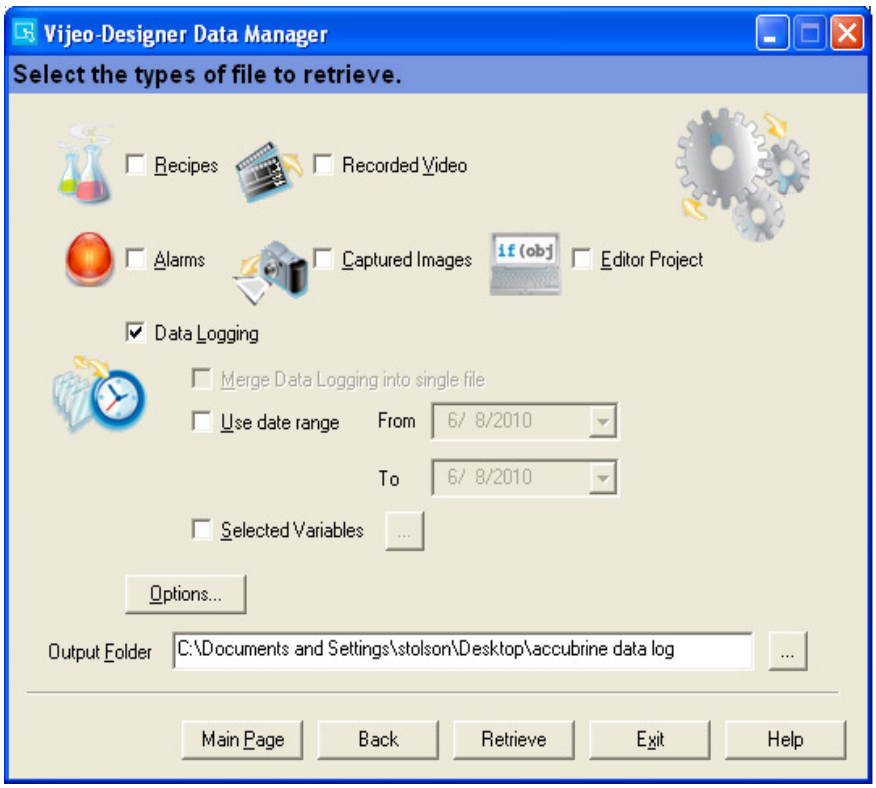
l. Make sure **Retreive Files** is selected and press ***Next.***



m. Select*: **data logging***
n. Press the ***options button***

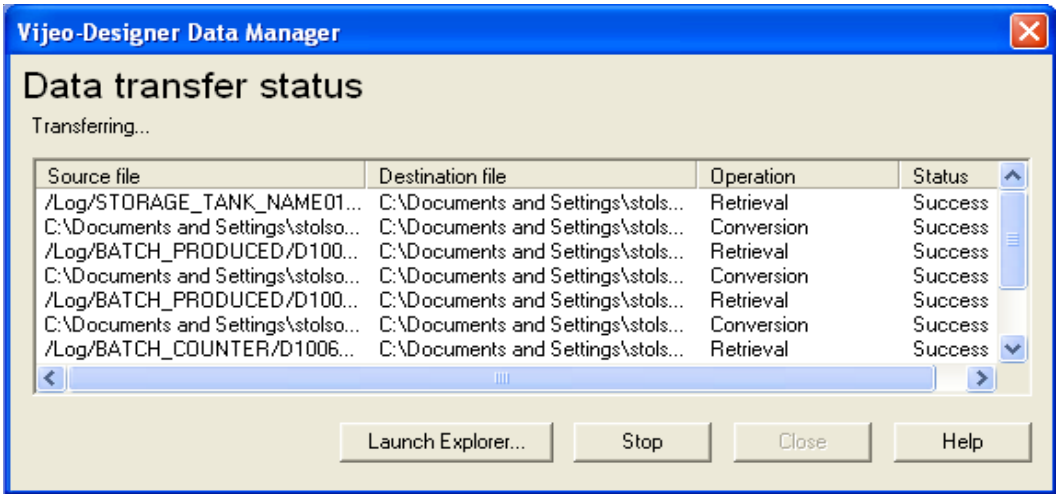


o. Select: ***Overwrite if file exists.*** Caution this will override previous downloaded data. If previous data is to be stored, save new data in new folder and location.
s. Select: ***Create a folder***
t. CSV/TXT Delimiter, select ***comma***
u. Select: ***Header***
v. Select: **Convert time stamp to *date string***
w. Format type, select: ***mm/dd/yy***
x. Select: Delete files on target (HMI) after retrieval, if desired and **press OK.**



y. **Output Folder:** Use the preselected desktop location for the output folder or use the drop down button to select another location on your PC.

z. Press **Retrieve**



aa. A progress/status page will pop up showing the retrieval process.

bb. When complete, press **Close.**

cc. Retrieval process is complete and you may press **Exit** to close the **Vijeo Designer Data Manager** program.

Accubrine Data Manager - RFID and Truckfill Data Extraction Tool

This data extraction tool is used to extract, convert, and report RFID and Truckfill data generated by the Accubrine system and downloaded to a USB memory stick or PC via LAN access.(See pages 64-68) The data manager is located on a CD that is supplied with the brinemaker. Follow the installation and operational instructions on the following pages.

Installing AccuBrine® Data Manager

You should be a Windows user and have some experience installing software on Windows computers.

1. Check your system requirements.
2. Prepare for the installation.
3. Complete the installation.

Check Your System Requirements

The following sections list the minimum hardware and software requirements for running AccuBrine® Data Manager.

Hardware

- Computer 32-Bit Processor minimum 400 megahertz (MHz)
- Recommended 1 gigahertz (GHz) RAM; Minimum 96 megabytes (MB)
- Recommended 335 megabytes (MB) available hard disk space for AccuBrine® Data Manager and its software prerequisites.
- VGA or higher resolution monitor with minimum 800x600 pixel resolution./li>

Software

AccuBrine® Data Manager Setup does not install the following required software components.

Supported Operating Systems

Windows XP with SP2, Windows Vista, and Windows 7

Microsoft Windows .NET Framework 3.5

AccuBrine® Data Manager does not install .NET Framework 3.5. Before installing AccuBrine Data Manager, you must download and install the .NET Framework 3.5 from this Microsoft Web site.

Accubrine Data Manager - Installation cont.

Vijeo-Designer Data Manager 5.0

Installation is required by AccuBrine® Data Manager and its installation files are included. For further information on the Vijeo-Designer Data Manager please refer to the AccuBrine® brinemaker operator's manual.

Each of these components is installed separately; only the AccuBrine® Data Manager setup support files are automatically removed when you uninstall AccuBrine® Data Manager. After installing required components, AccuBrine® Data Manager Setup will verify that the computer where AccuBrine® Data Manager will be installed also meets all of the other requirements for a successful installation.

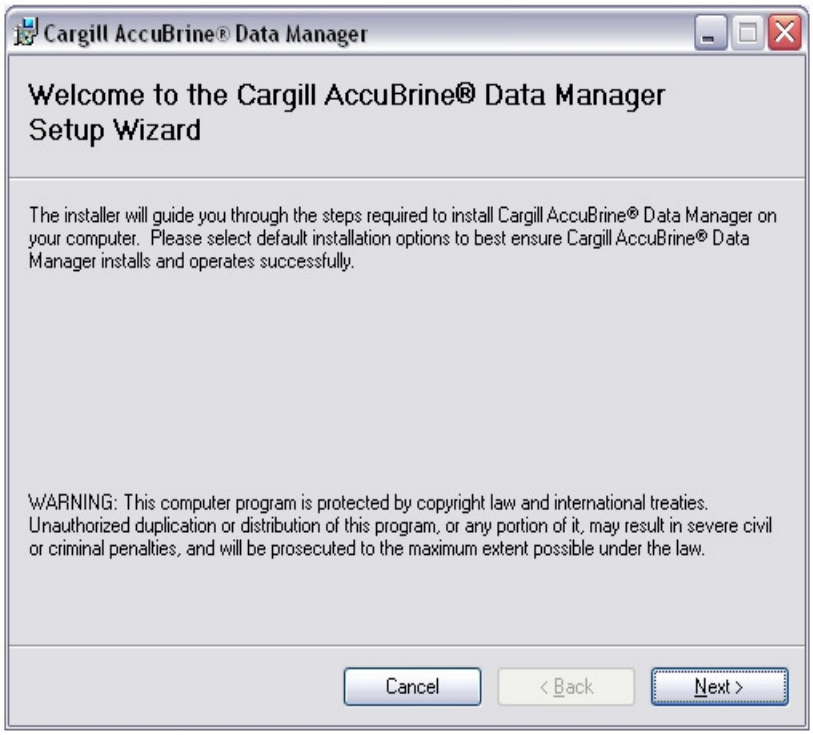
Preparing for the Installation

Before you install, you must check that you have administrator privileges for the Windows computer you are installing on. If you do not have administrator privileges, ask your system administrator to add you to the Administrator group on your computer or ask the system administrator to perform the installation on your behalf. /p>

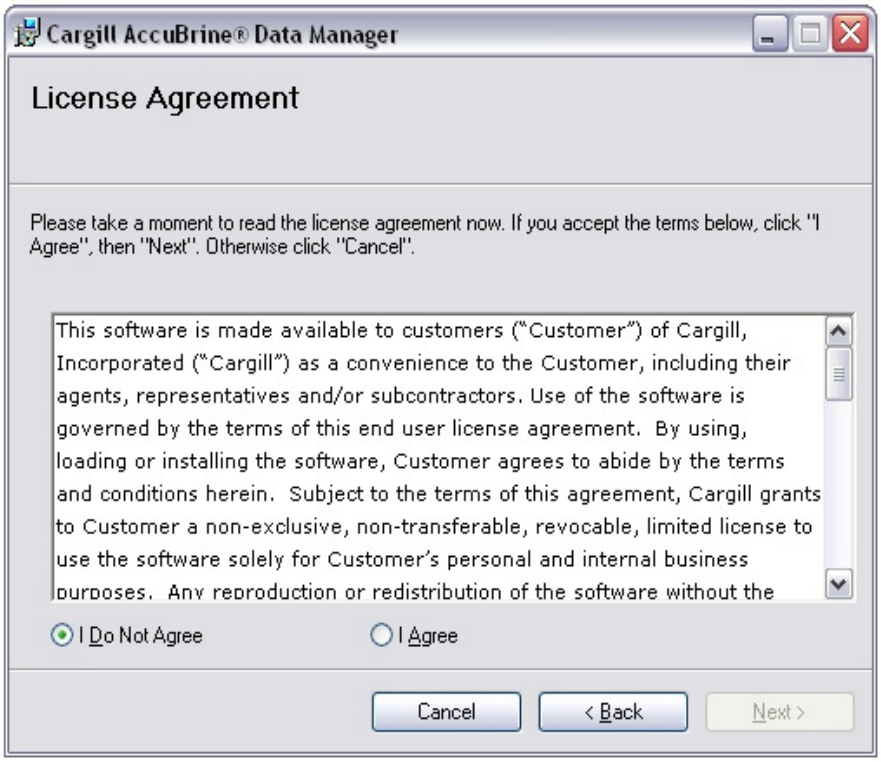
Before starting any installation, we recommend that you close all programs that are currently running. This will help to ensure that the installation program can copy all the required files to your computer.

Installing AccuBrine® Data Manager

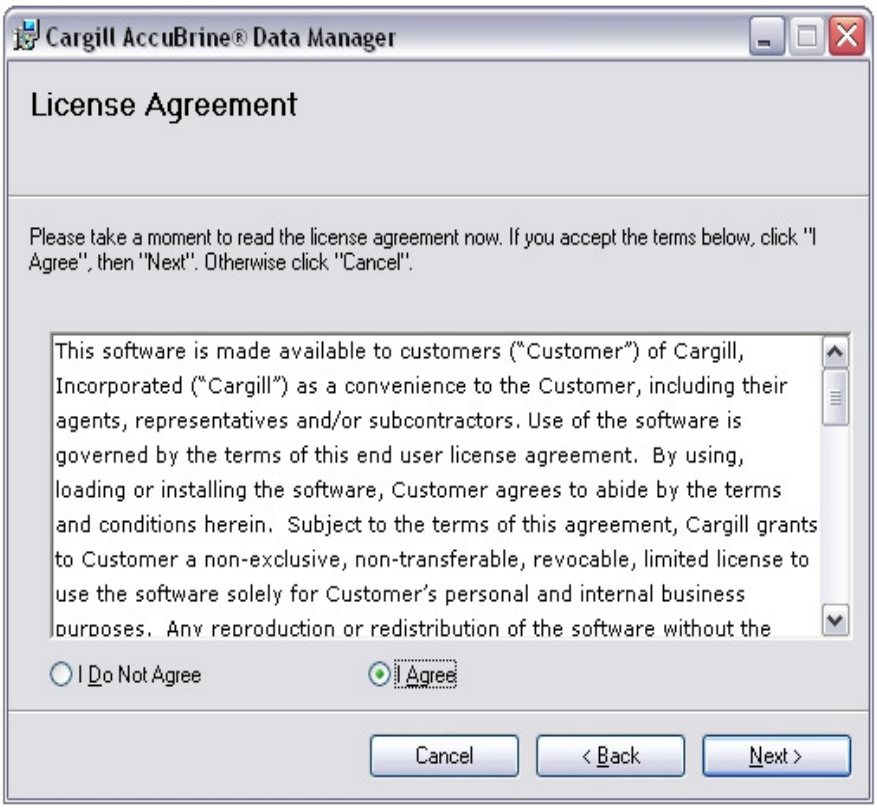
1. Copy AccuBrine® Data Manager install files from your installation media (flash drive, CD, etc.) and paste them onto your computer.
2. Run setup.exe (from the location where you saved the install files on your machine) and follow the installation wizard's on-screen instructions to install AccuBrine Data Manager. By default, Data Manager installs to: C:\Program Files\Cargill, Incorporated\Cargill AccuBrine® Data Manager\



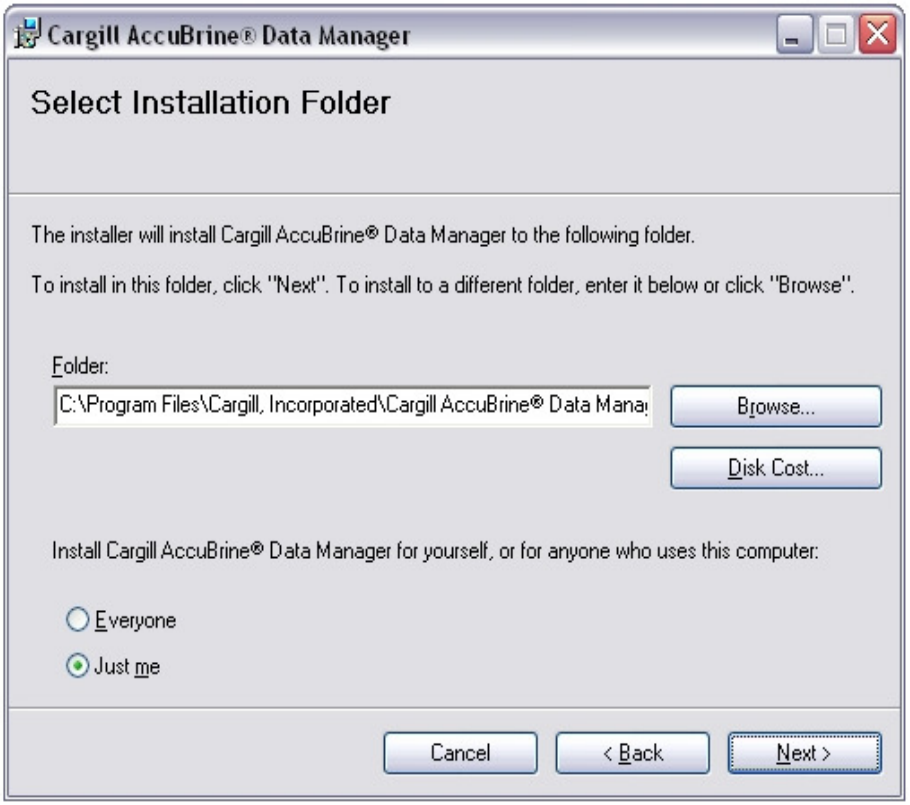
Accubrine Data Manager - Installation cont.

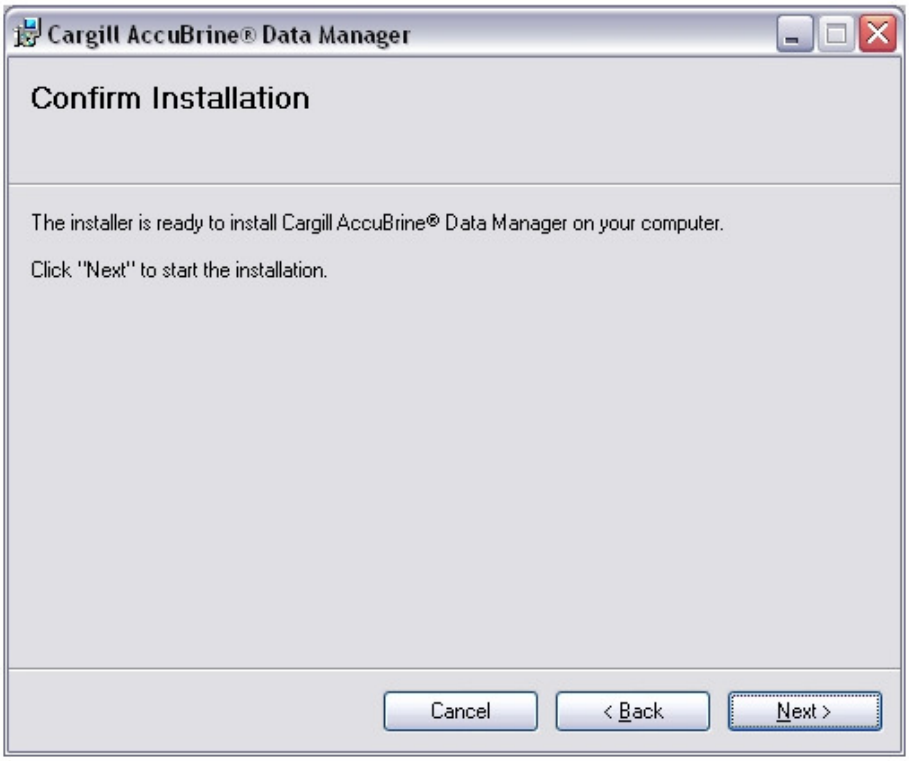


Please read the license agreement and select "I Agree" to continue the install process.

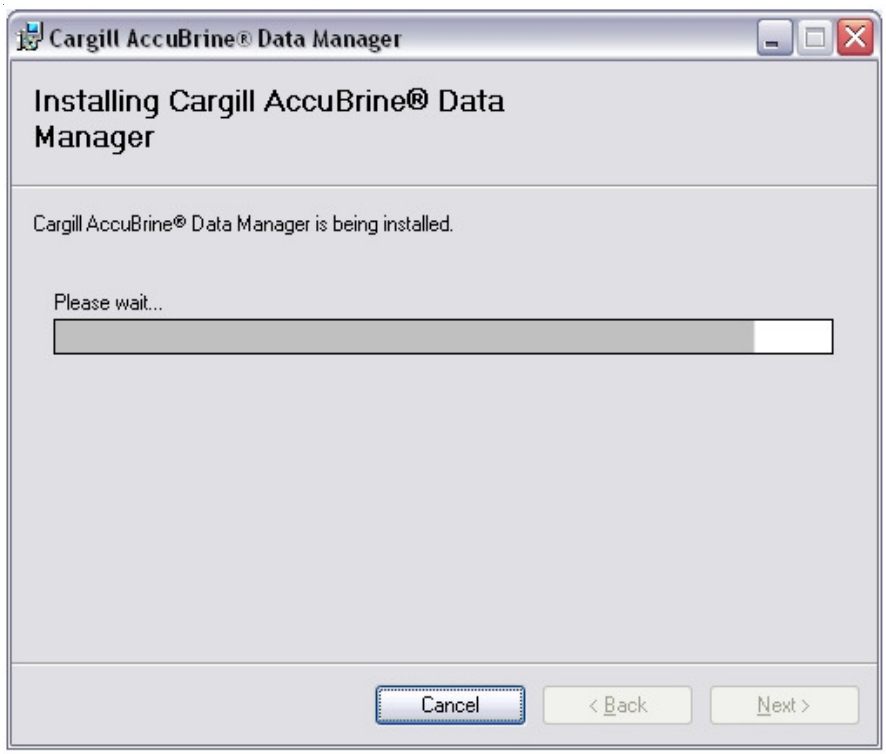


Accubrine Data Manager - Installation cont.

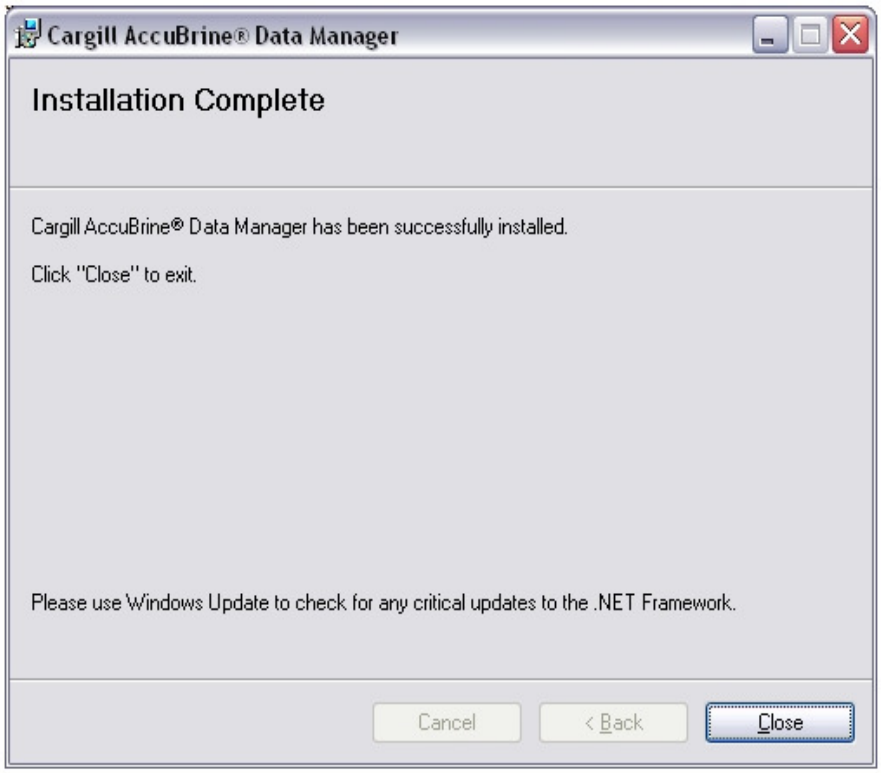




Accubrine Data Manager - Installation cont.

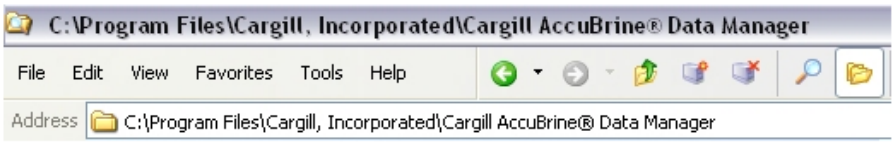


If the installation detects that Vijeo-Designer Data Manager 5.0 is not installed, it will run the Vijeo-Designer Data Manager install wizard. Install Vijeo-Designer Data Manager on the same drive as AccuBrine® Data Manager. If you end the Vijeo-Designer Data Manager installation before it succesfully completes, the AccuBrine® Data Manager installation will terminate without installing successfully.



Accubrine Data Manager - Installation cont.

Default Installation Folder



Desktop Shortcut

Start Menu Shortcut

To start the Accubrine data Manager, double click on the desktop icon or access through the start menu.

If you desire to remove the Data Manager tool, follow the instructions below.

Removing AccuBrine® Data Manager

Remove the Data Manager from your computer by using the Add/Remove Programs in the Windows Control Panel.

1. Select the Windows' Start button.
2. Select Settings and then select Control Panel.
3. Open the Add/Remove Programs application.
4. Select AccuBrine® Data Manager in the programs list.
5. Select Remove.
6. Follow the on-screen instructions to remove Data Manager and Command Line from your computer.

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AccuBrine® Data Manager Overview

AccuBrine® Data Manager is a graphical user interface program that can convert AccuBrine® automated brine maker data log files (.dat) into Microsoft Excel files (.xls).

Using AccuBrine® Data Manager

Data Logging files (.dat) are records of RFID - Truck Fill events captured during the operation of the AccuBrine® automated brine maker.

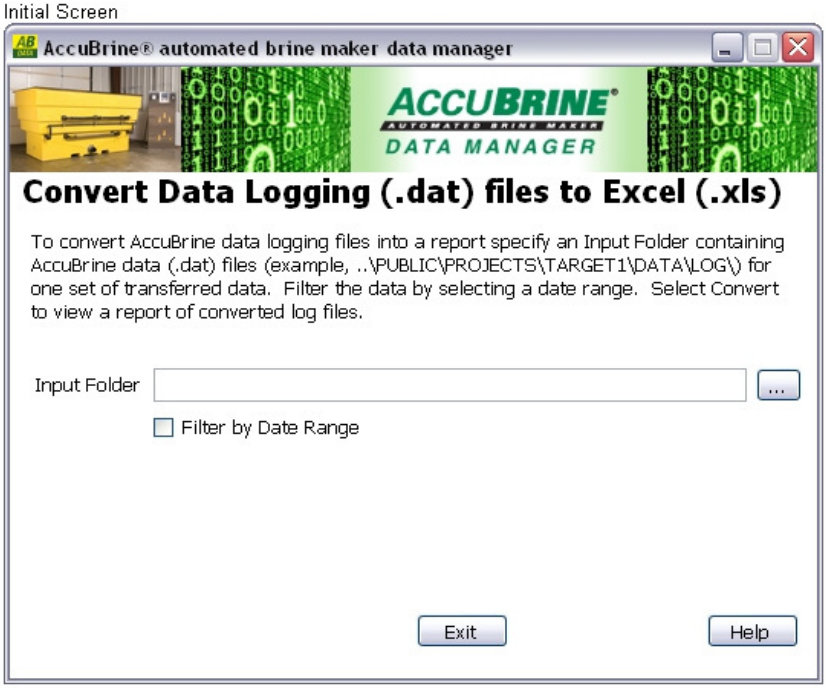
For Instructions to retrieve files from AccuBrine® automated brine maker refer to the AccuBrine Operators Manual to copy data to a USB Flash memory drive.

Converting Data Logging Files into Microsoft Excel report

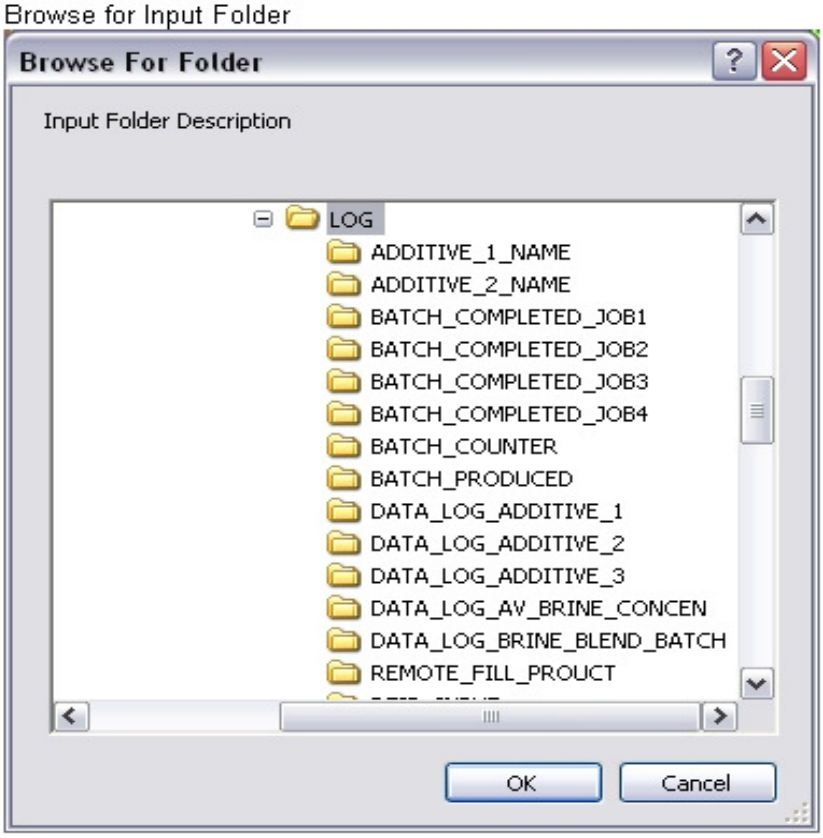
1. Start AccuBrine® Data Manager. In the Windows Start menu, point to Programs, Cargill, Inc. and click Cargill AccuBrine® Data Manager.
2. **Input Folder:** Specify the folder that contains the files to convert. Click the Input folder ellipsis button and use Windows Explorer to specify the Input folder. Alternatively, you can type the file path directly into the Input folder field.
3. **Use Date Range:** When selected, AccuBrine® Data Manager converts only the Data Logging files that were created within the specified date range. Specify the date range using the From and To fields.
4. Click **Convert** to convert the files and preview the report.
5. To Save the report to a Microsoft Excel file, select the [Save] toolbar button and specify the location where to save the file.
6. To create another report, close the report preview window.

*AccuBrine® Data Manager converts the dates in data logging files to the Time Zone and Daylight Saving Time settings of the computer where the AccuBrine® Data Manager is installed.

Initial Screen

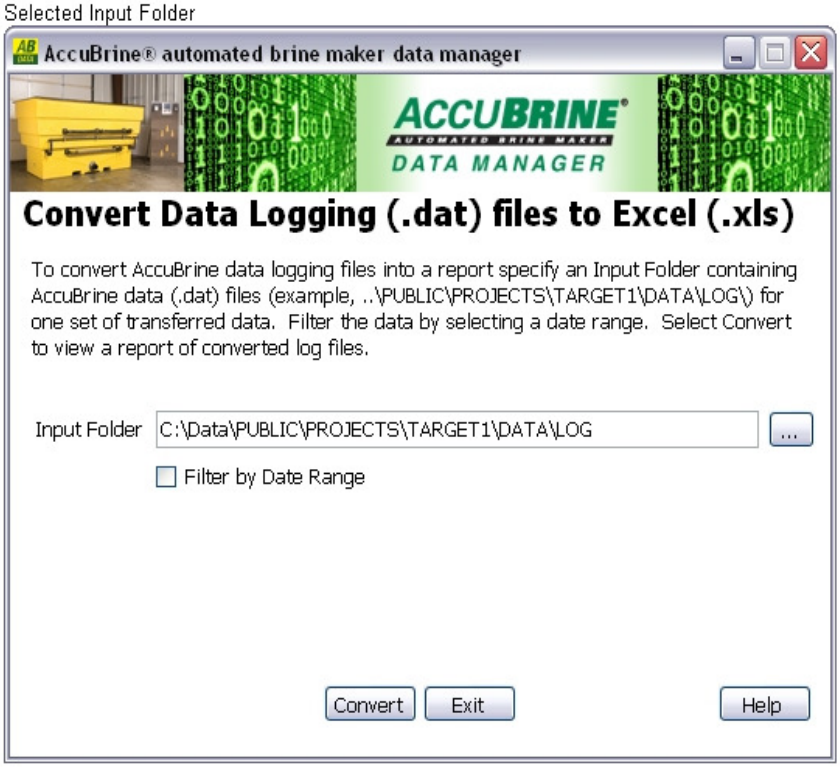


Browse for Input Folder



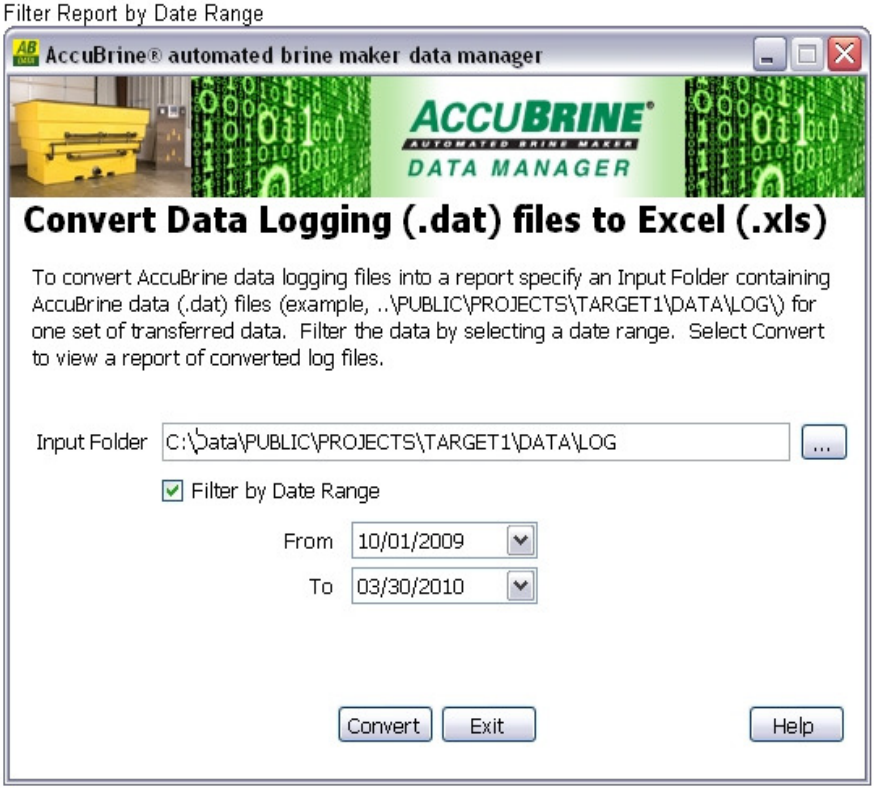
The input folder must be the LOG folder where all the data log files are stored (USB memory stick or location where data was stored from LAN access download). Do NOT select an individual folder within the LOG folder.

Selected Input Folder



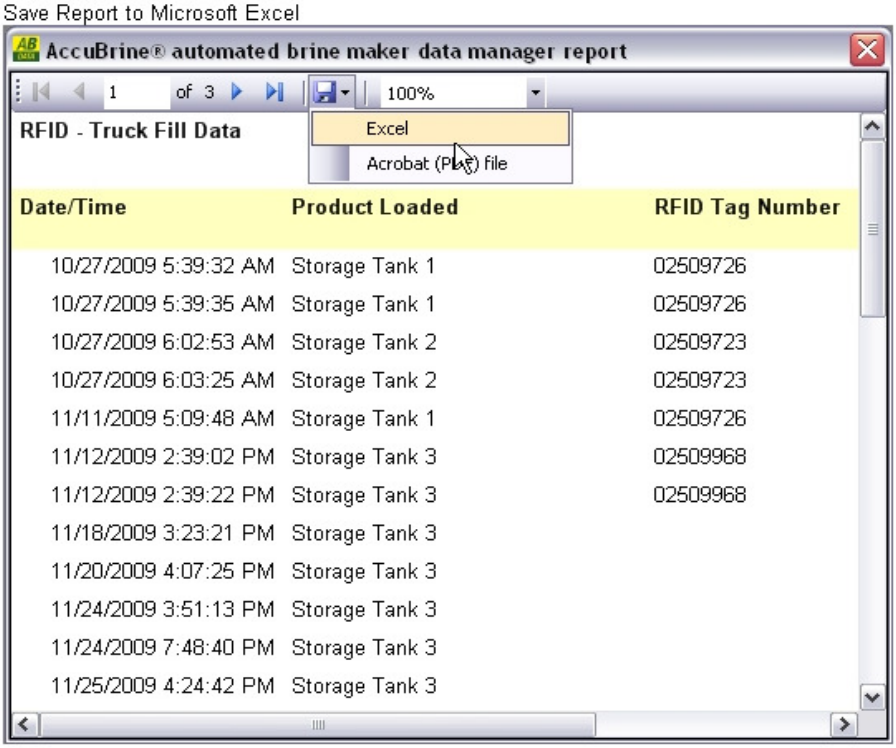
If the data to be extracted falls within a particular date range, select the filter by date range box, and enter the date ranges in the boxes below.

Filter Report by Date Range



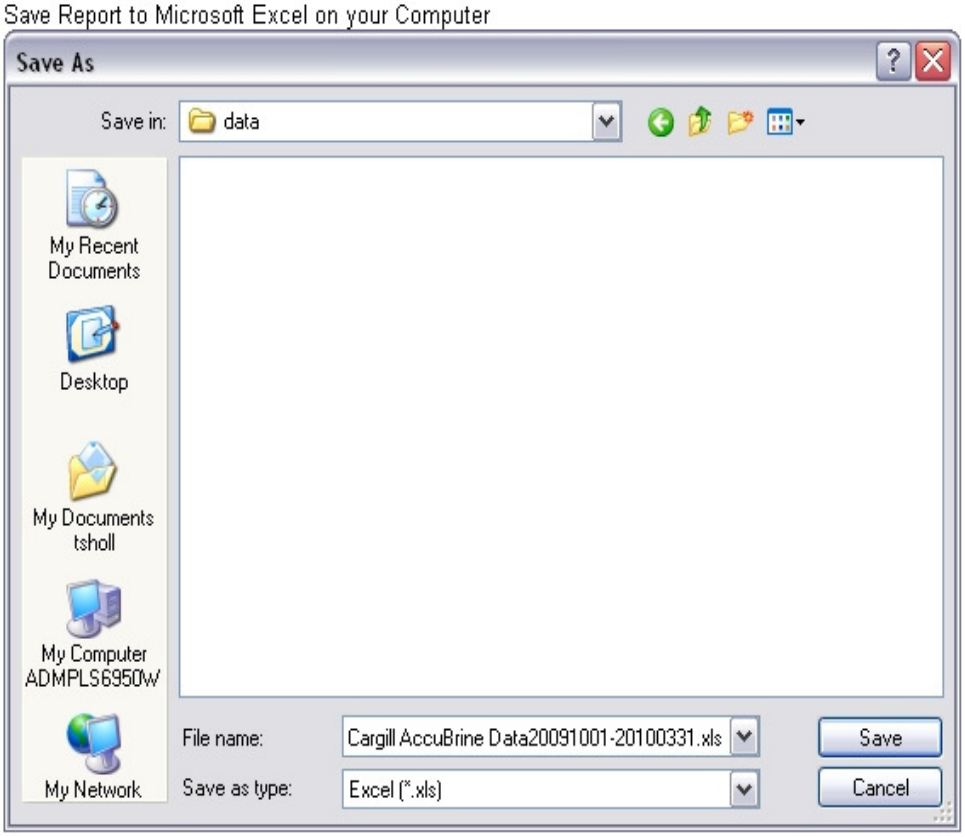
Press the convert button and a preview of the data report will be generated. If you choose not to save the report, select new dates or press the Exit button to end the Data Manager session.

Save Report to Microsoft Excel



To save a copy of the data report, select File, then Save As and select where you want to save the file. You can then name the file as in the example below. Press the Save button.

Save Report to Microsoft Excel on your Computer



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AccuBrine® Data Manager Support

For additional technical information about using this product, call the AccuBrine® Helpdesk at 1-866-900-SALT (7258) or visit the AccuBrine® Web site (http://www.accubrine.com).

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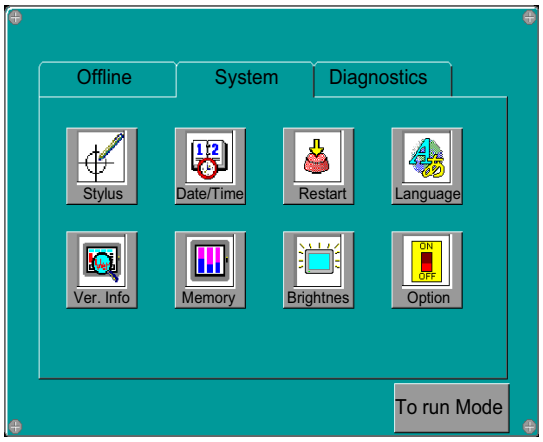
Display Setup

Enter password 2048, press the HMI config button from the help page (See pg.42), select Date and Time.

The following illustration displays System tab on XBT GT4000/5000/6000/7000 series units:



Stylus

This setting is not supported for XBT GT1100/1130 series units.

Date/Time

The following table describes how to change the date or time on an XBT GT unit.

Step	Action
1	In the Settings menu, touch the System tab.
2	Touch the Date/Time icon.
3	Touch any of the Date or Time fields and a data entry keypad will display. Use this keypad to define the selected date or time setting.

Restart

The following table describes how to force an XBT GT unit to restart.

Step	Action
1	In the Settings menu, touch the System tab.
2	Touch the Restart icon.
3	Touch the Restart button to restart the XBT GT unit.

Language

The following table describes how to select the language used by the XBT GT system (Settings menu and run-time messages) and user application.

Step	Action
1	In the Settings menu, touch the System tab.

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Display Maintenance: Cleaning the display

Regular Cleaning

Introduction

The regular cleaning is composed of:

- Cleaning the front panel,
- Cleaning the Gasket and procedures.

Cleaning the display

When the surface or the frame of the display gets dirty, soak a soft cloth in water with a neutral detergent, wring the cloth tightly, and wipe the display.

⚠ CAUTION

RISK OF EQUIPMENT DAMAGE

Do not use hard or pointed objects to operate the touch-screen panel, since it can damage the panel surface.
Do not use paint thinner, organic solvents, or a strong acid compound to clean the unit.

Failure to follow this instruction can result in injury or equipment damage.

Cleaning the Gasket

The gasket protects the XBT GT and improves its water resistance.

A gasket which has been used for a long period of time may have scratches or dirt on it, and could have lost much of its water resistance. Be sure to change the gasket at least once a year, or when scratches or dirt become visible.

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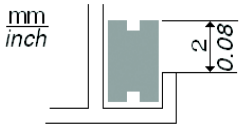
Inserting the Gasket

The gasket must be inserted correctly into the groove for the XBT GT's moisture resistance to be equivalent to IP65.

The upper surface of the gasket should protrude approximately 2mm [0.08 inch] out from the groove. Be sure to check that the gasket is correctly inserted before installing the XBT GT into a panel.

Note: Be sure the gasket's seam is not inserted into any of the unit's corners. Insert the joint only in the straight sections of the groove, preferably in the bottom section. Inserting it into a corner may lead to its eventually tearing.



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Periodic Check Points

Introduction

To keep your XB GT unit in its best condition, please, check the following points periodically.

- XBT GT Operation Environment,
- Electrical Specifications,
- Related Items.

XBT GT Operation Environment

- The operating temperature is within the allowable range (0°C to 50°C) (32°F to 122°F)?
- The operating humidity is within the specified range (10%RH to 90%RH), dry bulb temperature of 39°C (102°F) or less?
- The operating atmosphere is free of corrosive gases?

XBT GT Electrical Specifications

- The input voltage is appropriate?
  - DC19.2V to DC28.8V.

Related Items

- Are all power cords and cables connected properly? Have any become loose?
- Are all mounting brackets holding the unit securely?
- Are there many scratches or traces of dirt on the installation gasket?

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Replacing the Backlight

Introduction

The XBT GT1000/2000/4000 series units' backlight cannot be replaced by the customer. When the backlights need to be replaced, please contact your local XBT GT distributor.

The XBT GT5000/6000/7000 series units' backlight can be replaced by the customer. Please see the Instruction Sheet that comes with replacement backlights for details on how to replace the backlight. Contact your local XBT GT distributor for more information.

⚠ WARNING

RISK OF UNINTENDED EQUIPMENT OPERATION

Do not create XBT GT touch panel switches for system functions that may cause injury and/or equipment damage.
If the XBT GT unit's backlight burns out and the unit is not set to Standby Mode, the touch panel remains active. If the operator fails to notice that the backlight is burned out and touches the panel, unintended equipment operation can occur.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

How to Determine if the Backlight is Burned Out

If your XBT GT unit's backlight suddenly turns OFF, use the following steps to determine if the backlight is actually burned out:

- If the XBT GT unit's "Backlight Control" is not set and the screen has gone blank, your backlight is burned out.
- If the XBT GT unit's "Backlight Control" is set to Standby Mode and the screen has gone blank, and touching the screen or performing another input operation does not cause the display to reappear, your backlight is burned out.

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Precautions

When using the XBT GT Unit and a CF Card, follow the precautions below:

- Prior to inserting or removing a CF Card, be sure to turn the XBT GT unit's CF Card ACCESS switch OFF and to confirm that the ACCESS lamp is not lit. If you do not, CF Card internal data may be damaged or lost.
- Check that the CF Card DIP Switches setting are appropriate.
- While a CF Card is being accessed, NEVER turn OFF or reset the XBT GT, or insert or remove the CF Card. Prior to performing these operations, create and use a special XBT GT application screen that will prevent access to the CF Card.
- Prior to inserting a CF Card, familiarize yourself with the CF Card's front and rear face orientation, as well as the CF Card connector's position. If the CF Card is not correctly positioned when it is inserted into the Mulit Unit, the CF Card's internal data and the XBT GT unit may be damaged or broken.
- Be sure to use only CF Cards manufactured by Schneider Electric. XBT GT unit performance cannot be guaranteed when using another manufacturer's CF Card.
- Once XBT GT data is lost, it cannot be recovered. Since accidental data loss can occur at any time, be sure to back up all XBT GT screen and CF Card data regularly.

⚠ CAUTION

RISK OF EQUIPMENT DAMAGE

Be sure to follow the instructions given below to prevent the CF Card's internal data from being destroyed or a CF Card malfunction from occurring:

- DO NOT bend the CF Card.
- DO NOT drop or strike the CF Card against another object.
- Keep the CF Card dry.
- DO NOT touch the CF Card connectors.
- DO NOT disassemble or modify the CF Card.

Failure to follow this instruction can result in injury or equipment damage.

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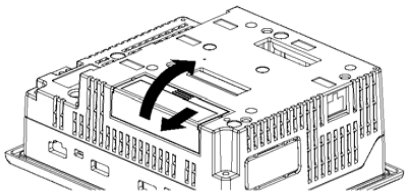
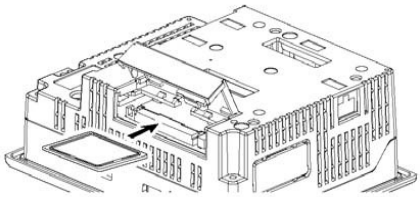
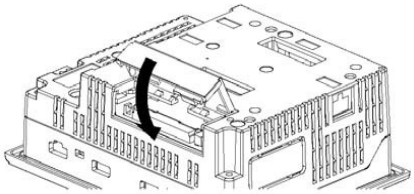
HMI Display - Compact Flash Memory Card

Remove the rear cover of machines HMI panel to access.

Inserting the CF Card

Use the following steps to insert the CF Card.

Step	Action
1	Slide the CF Card Cover in the direction shown here, then upwards to open the cover. 
2	Insert the CF Card in the CF Card Slot, until the ejector button is pushed forward. 
3	Close the cover. (As shown). 
4	Confirm that the CF Card Access LED turns ON. You cannot access to the CF Card with the CF Card cover opened. However, if the CF Card is being accessed, the access will be continued even if you open it on the way.

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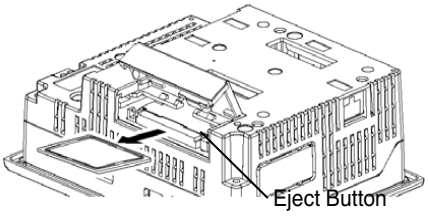
Removing the CF Card

Simply reverse the steps shown in the previous "inserting CF Card" explanation.

Prior to removing the CF Card, confirm that the CF Card Access LED is turned OFF.

The following figure displays how to remove the CF Card:



CF Card Handling

The CF card has a life expectancy of 100,000 write cycles. Therefore, be sure to back up all CF Card data regularly to another storage media. (100,000 times assumes the overwriting of 500 kilobytes of data in DOS format).

The following table presents two methods to back up data.

If	Then	And
Your PC is equipped with a PC Card Slot	To view CF Card data on a personal computer, first, insert the CF Card into a CF Card Adaptor XBT ZGADT.	Save data CF Card on the PC.
Your PC is not equipped with a PC Card Slot	Use a standard XBT ZGADT type PC Card or CF Card reader.	Save data CF Card on the PC.

Note: Depending on the setup of your PC, it's possible that the Card reader may not operate correctly.
The connection between a personal computer and CF Card reader has been tested using an Windows® compatible machine. Check that CF Card reader is correctly installed and configured. Please contact your PC or CF Card reader manufacturer directly for details.

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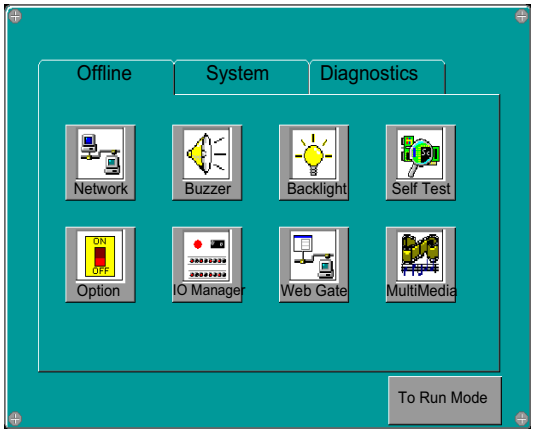
The following illustration shows the Offline tab on XBT GT4000/5000/6000/7000 series units:



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HMI Display Webgate Setup: Enter password 2048. Select HMI config from same help page.

Network Settings

The following table describes how to change the network settings (IP address) on all XBT GT units (except on XBT GT1100).

Step	Action
1	In the Settings menu, touch the Offline tab.
2	Touch the Network icon.
3	Touch any of the three fields (IP Address, Subnet Mask, or Default Gateway) and a keypad will appear.
4	Enter the desired network addresses.

Note: In order for changes to the network settings to take effect, the XBT GT will restart when you touch "To Run Mode" and return to the application.

Touch Buzzer

The following table describes how to change the buzzer settings on the XBT GT unit.

Step	Action
1	In the Settings menu, touch the Offline tab.
2	Touch the Buzzer icon.
3	Touch the desired buzzer mode. The factory setting is When Press Touch object. • None: Selecting this will turn the buzzer OFF. • When Press Touch Object: The buzzer will only sound when a Touch Object is touched.

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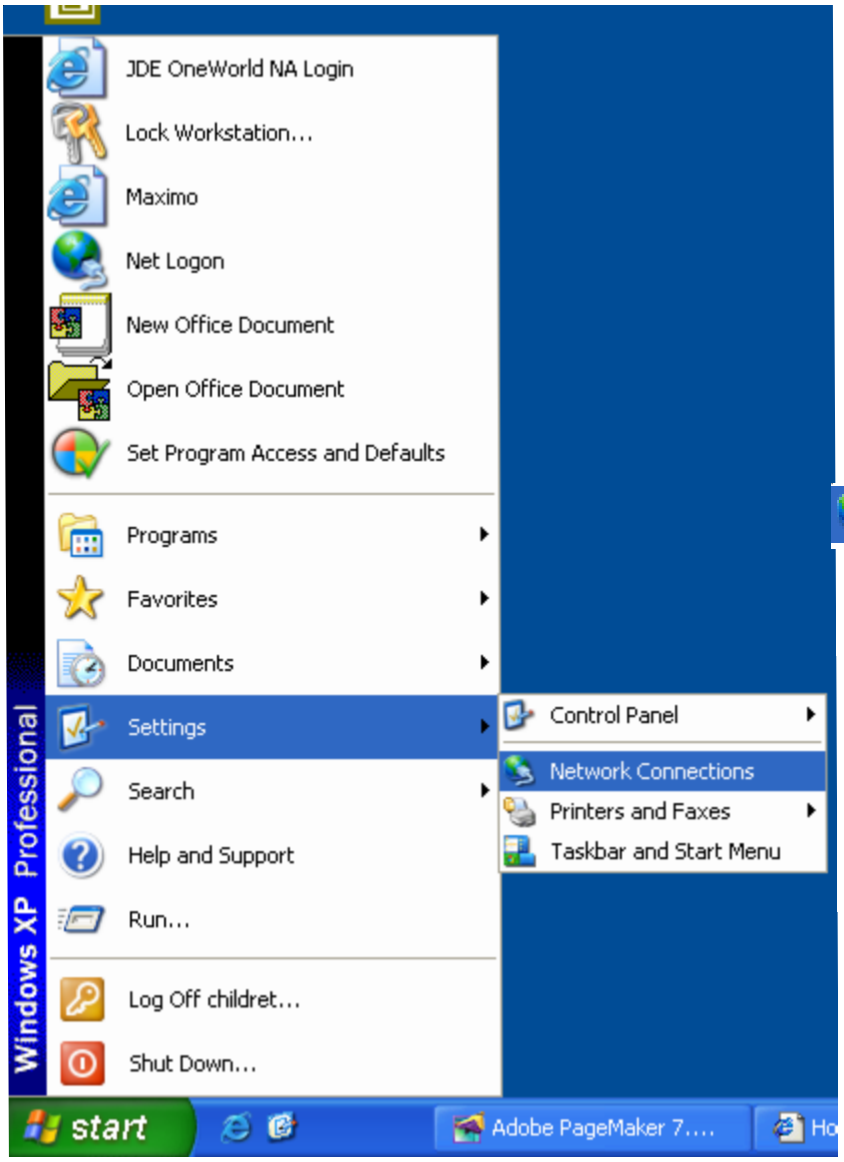
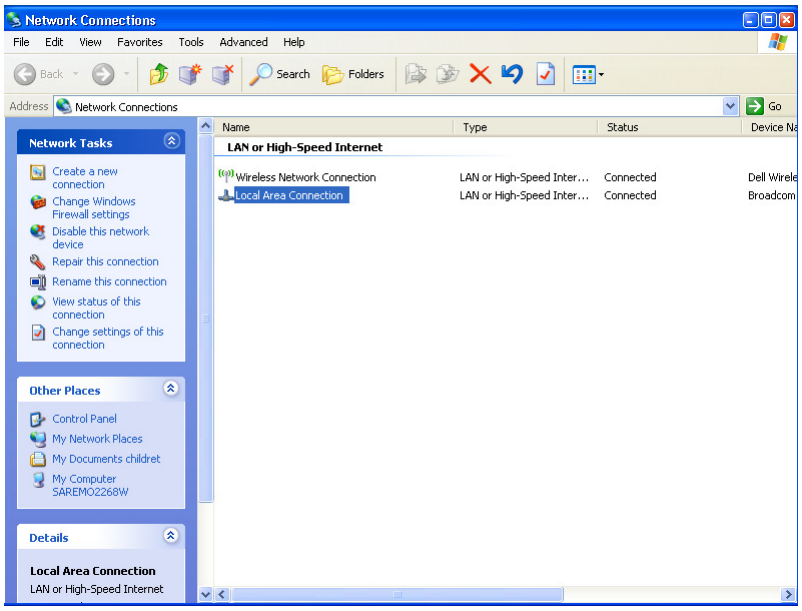


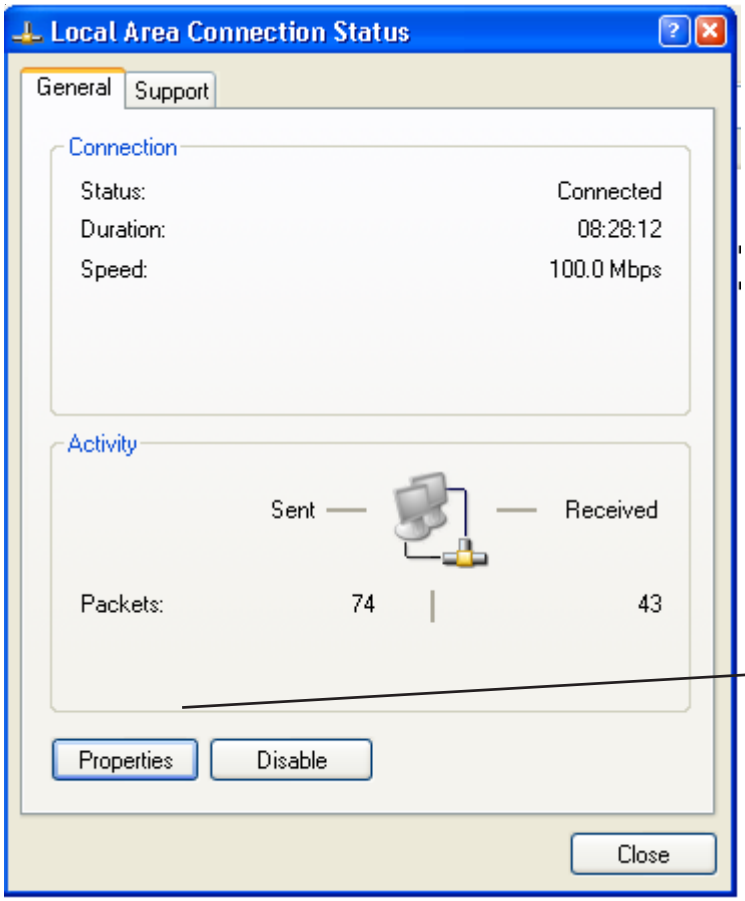
From you computer desktop click start.

Click Settings

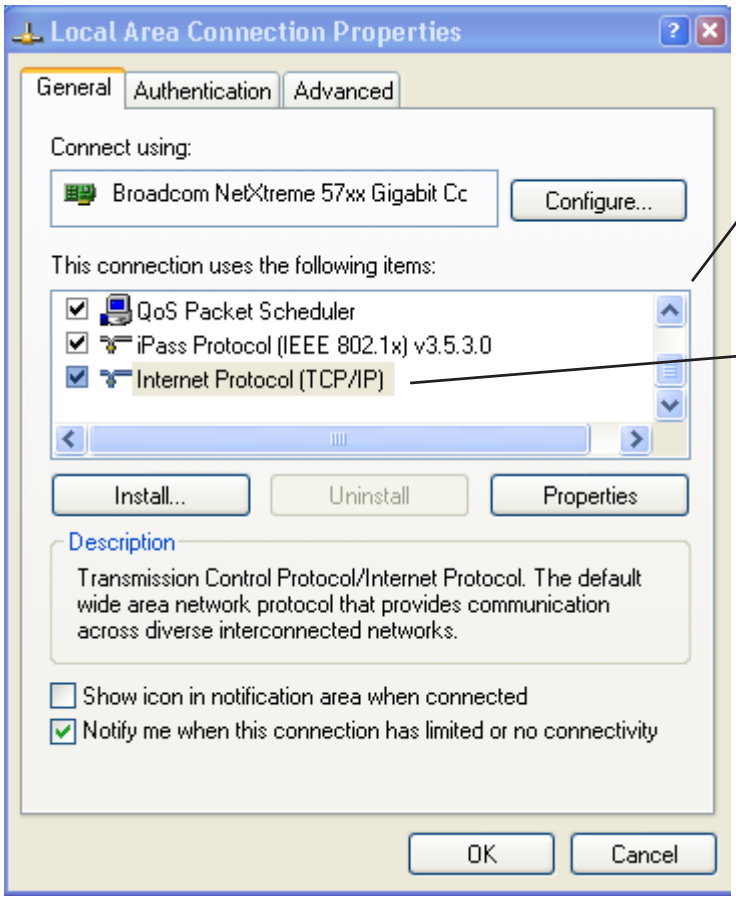
Click Network Connections



Click Local Area Connection

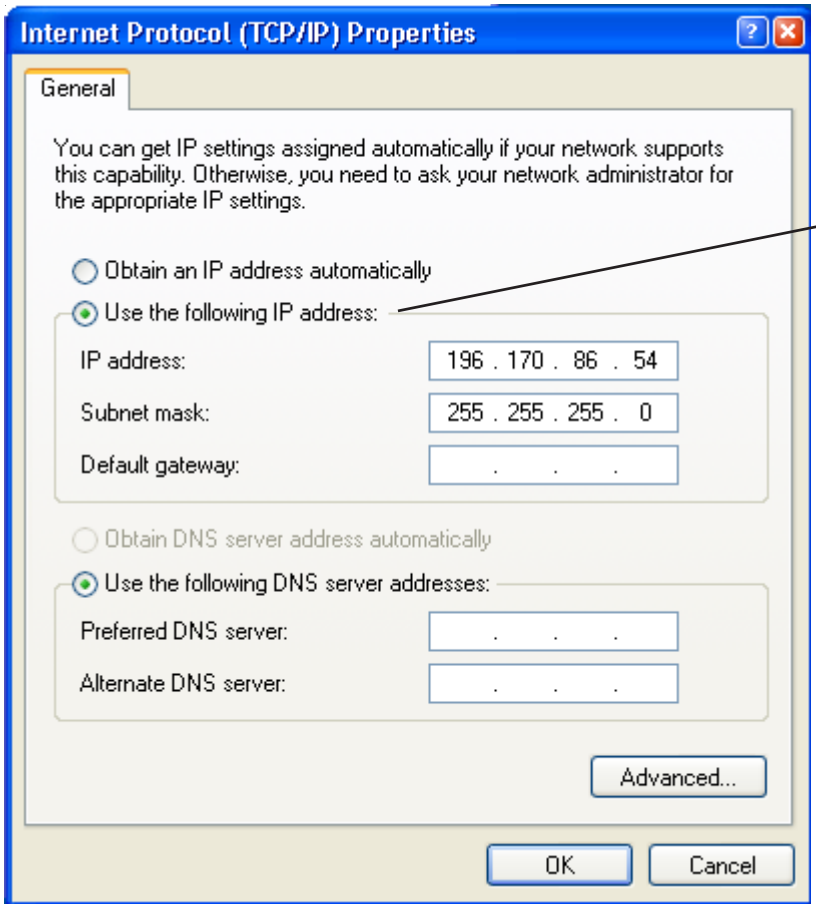


Click Properties



Use the slide bar and scroll to the bottom to go to Internet protocol

double click on internet protocol



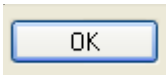
Click on the small circle. *USE the following IP address*

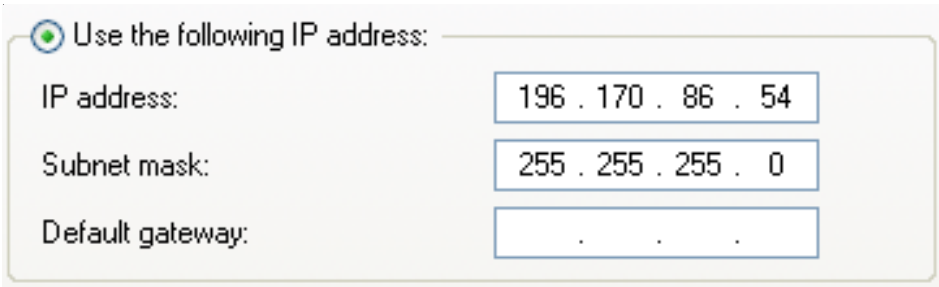
Enter the address of

IP 196.170.86.54

Subnet Mask: 255.255.255.0

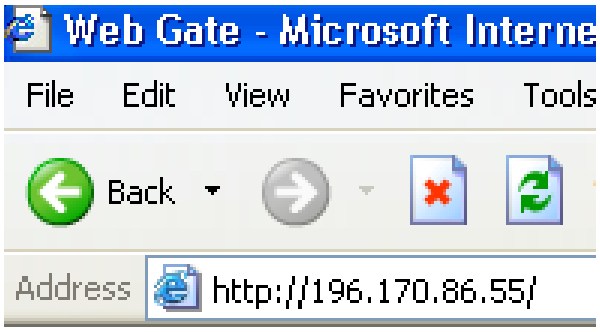
Click OK

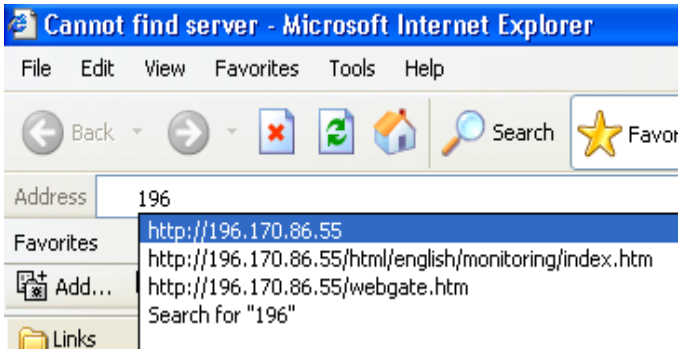




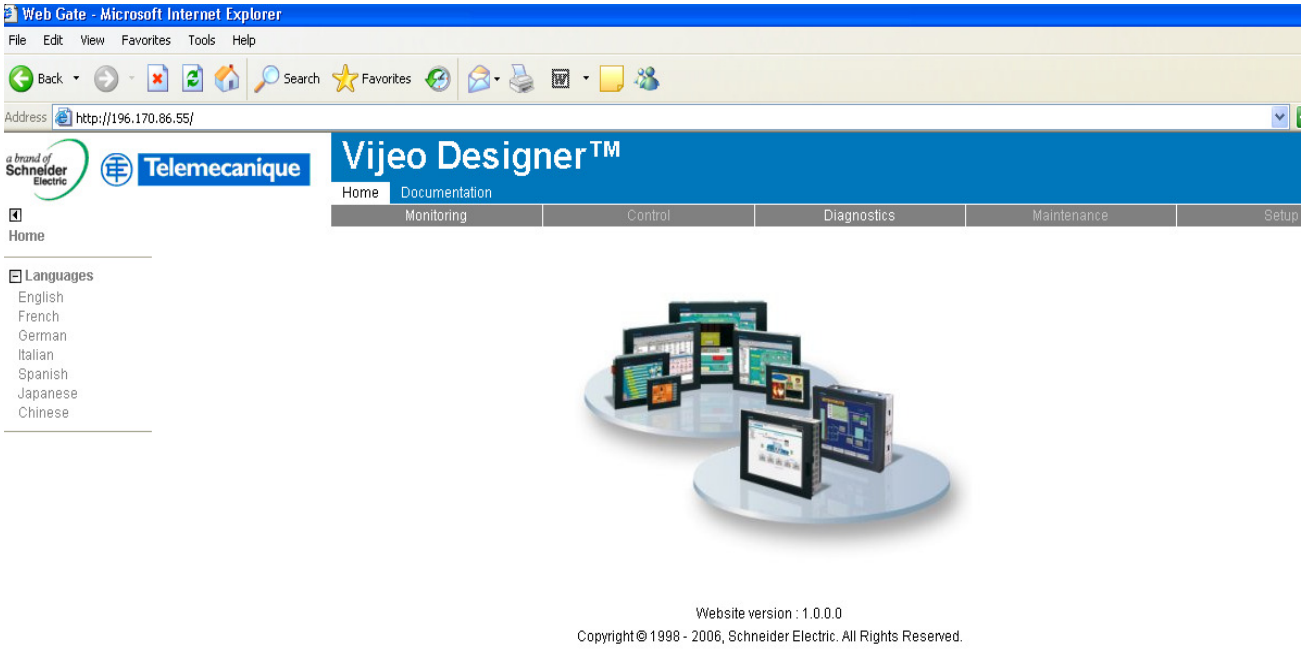
Start windows explorer from the computer desktop by double clicking the internet explorer icon, this will be located at the bottom of your screen.

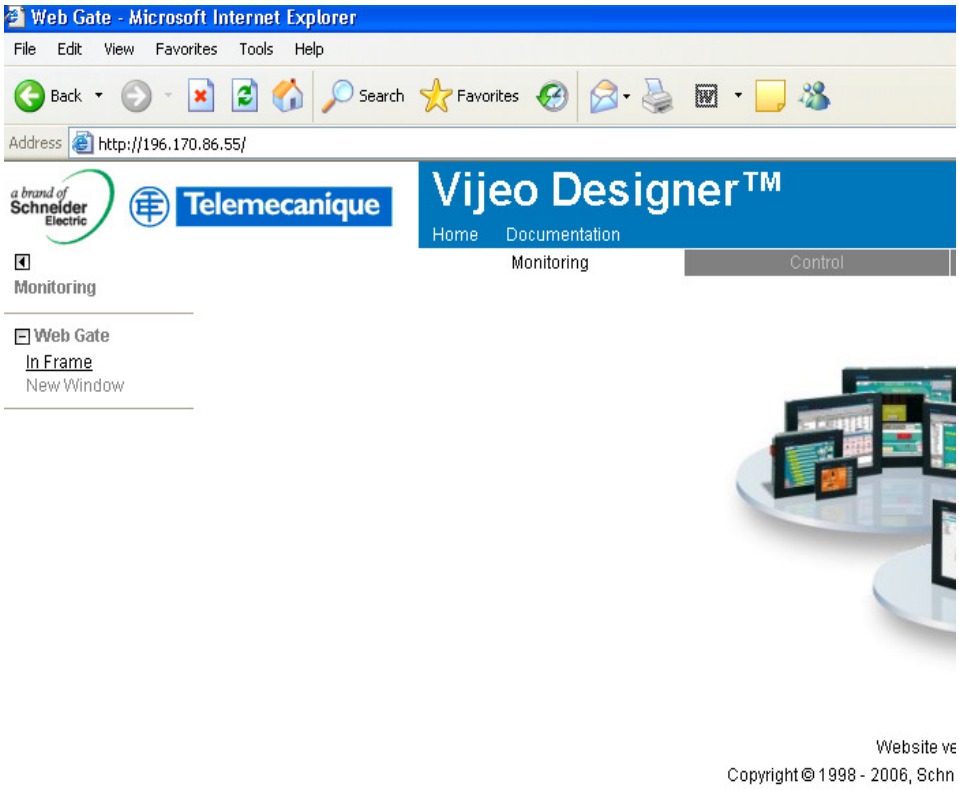
When Windows explorer starts, key in the following address: http://196.170.86.55/ , (note after you have done this once you may be able to start typing 196... and it will appear automatically).





Webgate and communication between your PC and the desktop unit will begin at this point and you will see the screen below. If you are unable to connect to the HMI, you may have to disable any firewalls on your PC that are preventing the connection from taking place.

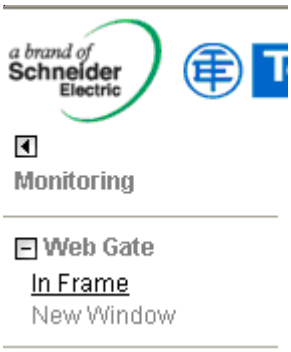


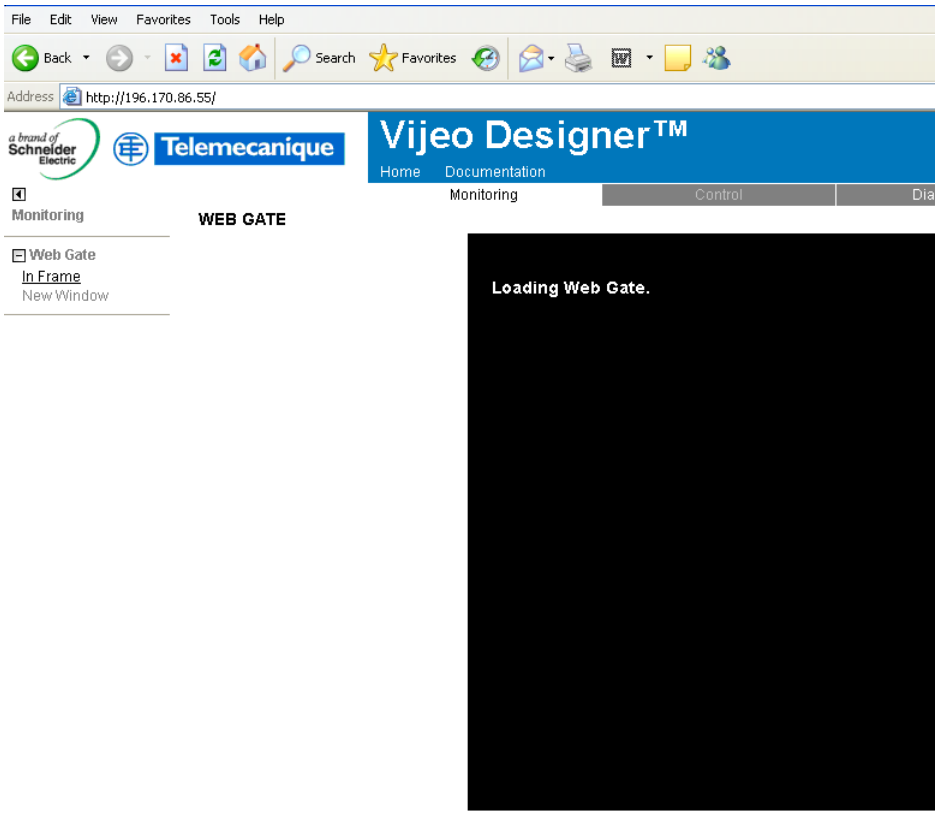


To view what is on the Accubrine desktop:

Click Monitoring

Then Click In Frame

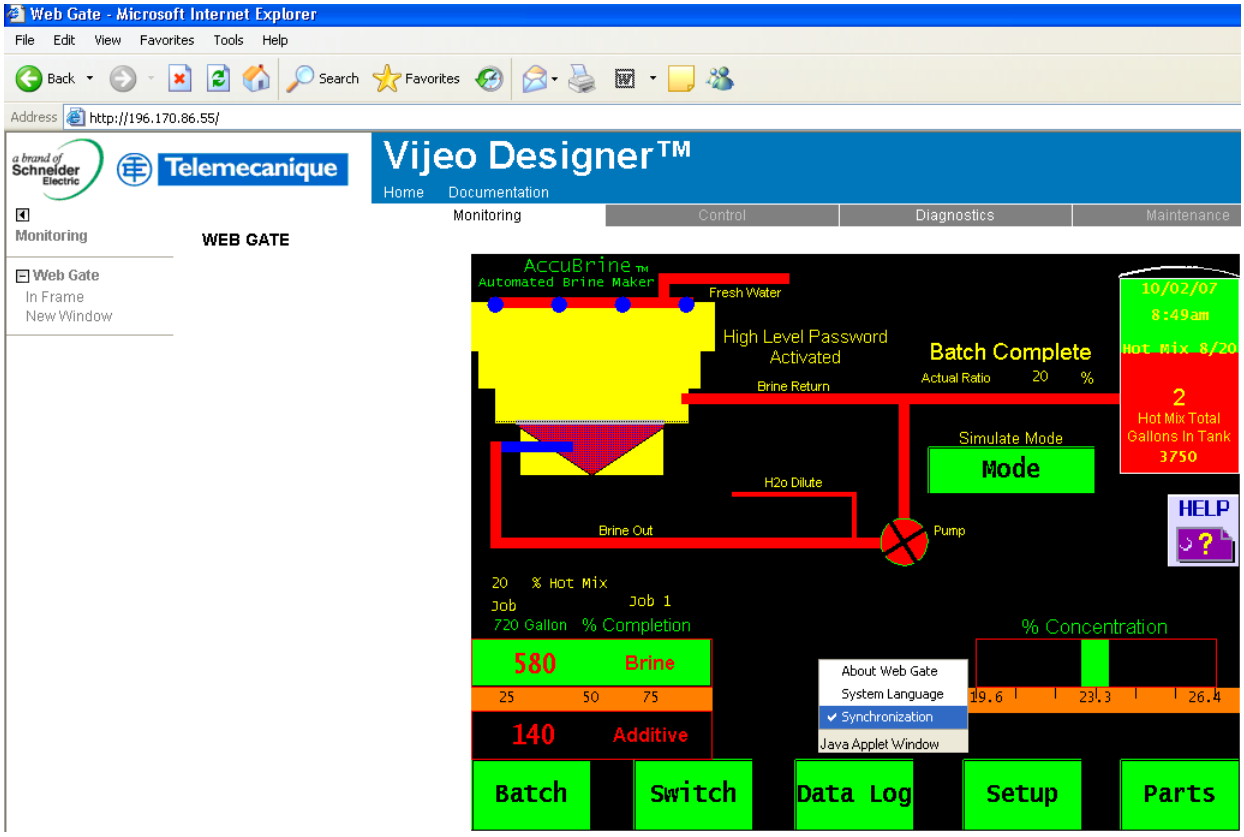




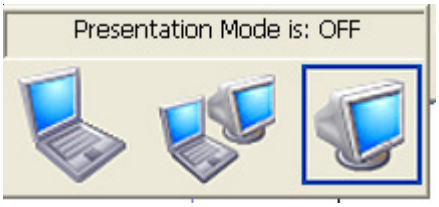
Loading of images will begin.

Right click on the center of the display and a Synchronization button will appear. Click on Synchronization.

At this point what is displayed on the desktop will appear on the computer screen. Use the desktop display to scroll through the windows as you normally would do.



Note: If using a projector, press the blue function button or Fn and F8 button on you computer keypad.

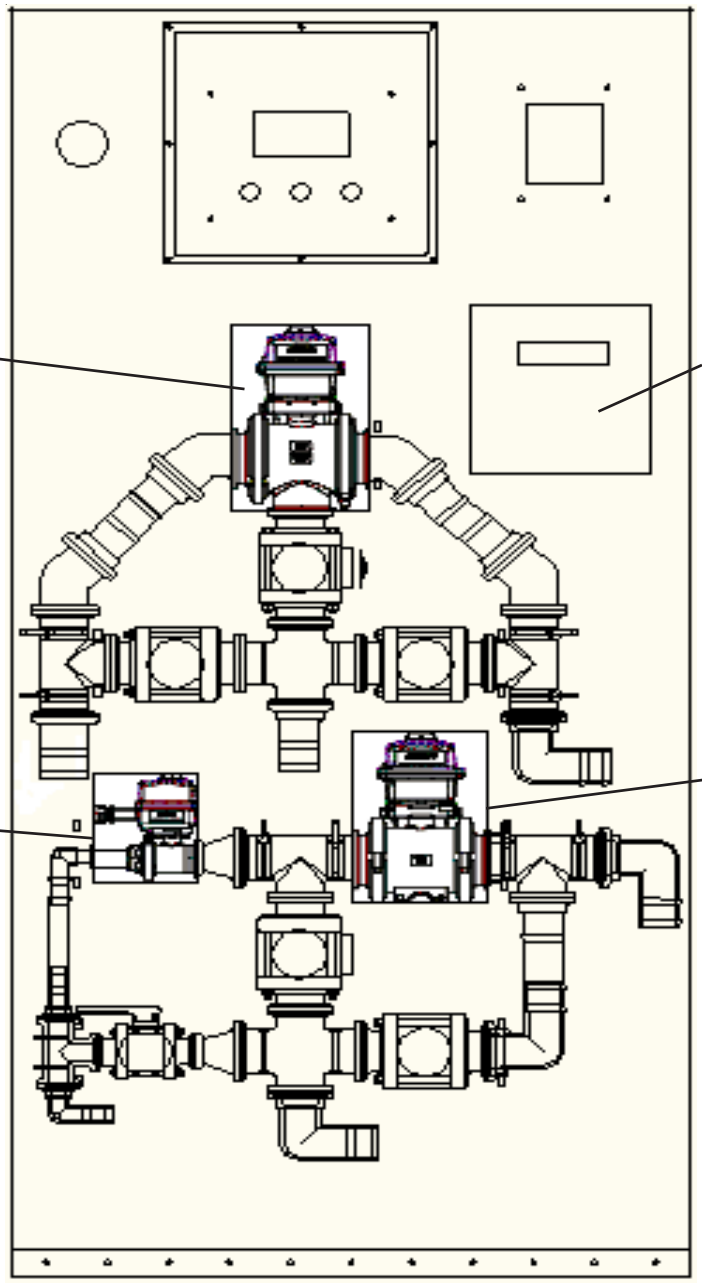


Accubrine Start-up Procedure

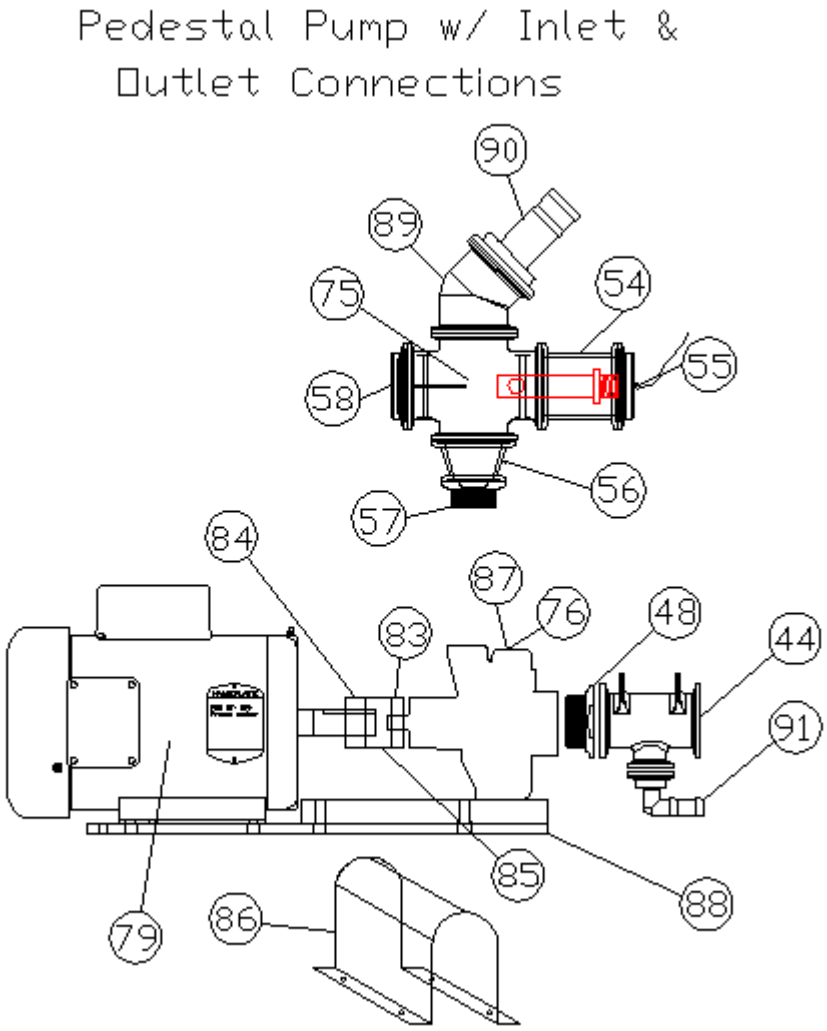
- Before firing the machine for the first time. Make sure that power supply is correct. 220V between the main lugs and 110V between each of the main lugs and neutral. No voltage between neutral and ground.
- Press each of the black fuse holders located on the terminal blocks in the control panel enclosure, to make sure they are seated.
- Ensure settings are loaded into PLC, Enter Password 4096 and go to setup page 1. If values are in, you will see various numeric values. If not, they will all be 0. To reload, go to Home page and press Help, enter password 2048. Press the My Settings button, to go to the My Settings page. Press the Send button to load the factory settings into the setup pages. Return to the Setup pages and verify/turn on appropriate options as machine is equipped. IE: Truck Fill, RFID etc.
- Do not put salt in the Salt Tank at this time.
- Disconnect the hose leading to the Brine storage tank as fresh water will be discharged.
- Close main electrical cover before turning on water supply.
- Verify water supply is off.
- Check and make sure all hose clamps, and manifold clamps are secure.
- Open all 2" valves on Salt Tank and close all 1" and 1/2" cleanout valves.
- Have all valves in normal Automatic position on main panel. All valves on main control panel should be in the verticle position.
- If equipped with modular panel, place all valve handles in the automatic position.
- Open manual dilute valve on main panel. This helps to prime the pump.
- Turn on water supply and brine maker water supply valves and begin to fill salt tank. Check for leaks. Fill tank to grate. Monitor water pressure when all valves are closed, and as main water valve cycles. For optimum performance, pressure should not exceed 40 PSI static at any time to include spike and hammer (80 PSI max.). If this occurs install a pressure regulator.
- Put machine in Simulate Mode: Enter password 4096 then ESC to Home page then press Mode then press the Simulate Mode button.
- Start a batch: Home page, press Batch button, key in 150 for quantity. If equipped with additive, select 0 for the ratio and select tank 1 (Brine).
- Once pump starts and is primed close the manual dilute valve on main panel.
- Check for leaks.
- Reconnect hose leading to the Brine Storage tank.
- Put machine in Normal mode: Enter password 4096 then ESC to Home page then press Mode, then press Normal Operation Mode. press the Home button.
- Place salt in hopper and produce a batch.

Parts: Main control panel, Rear View

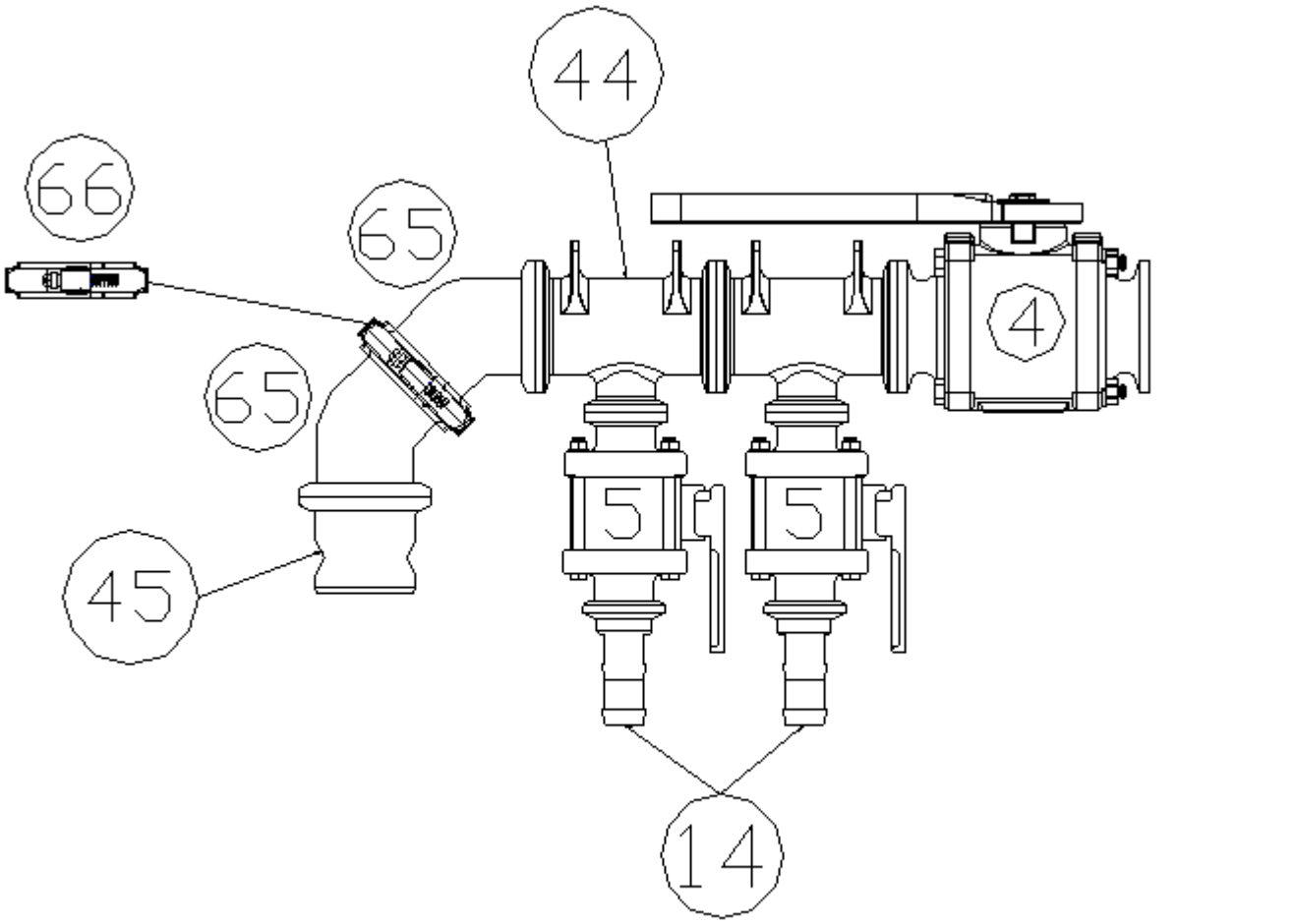
Note: Circled part numbers refer to the same parts/HMI callout numbers available on the HMI touch screen. These are listed on the Complete Parts pages at the back of this manual.



Pedestal Pump Inlet and Outlet with Conductivity Sensor Assembly

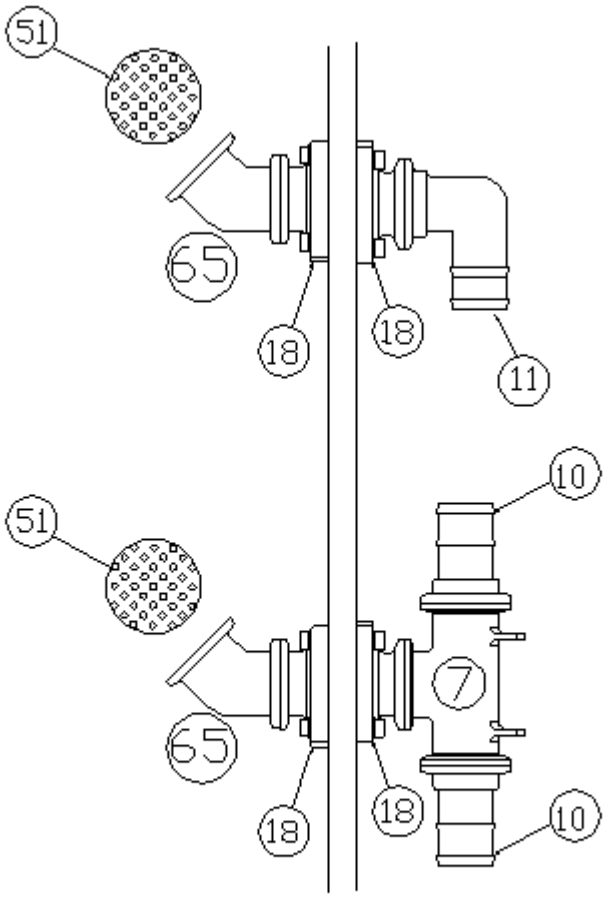


Salt Tank Water Inlet Valve assembly.



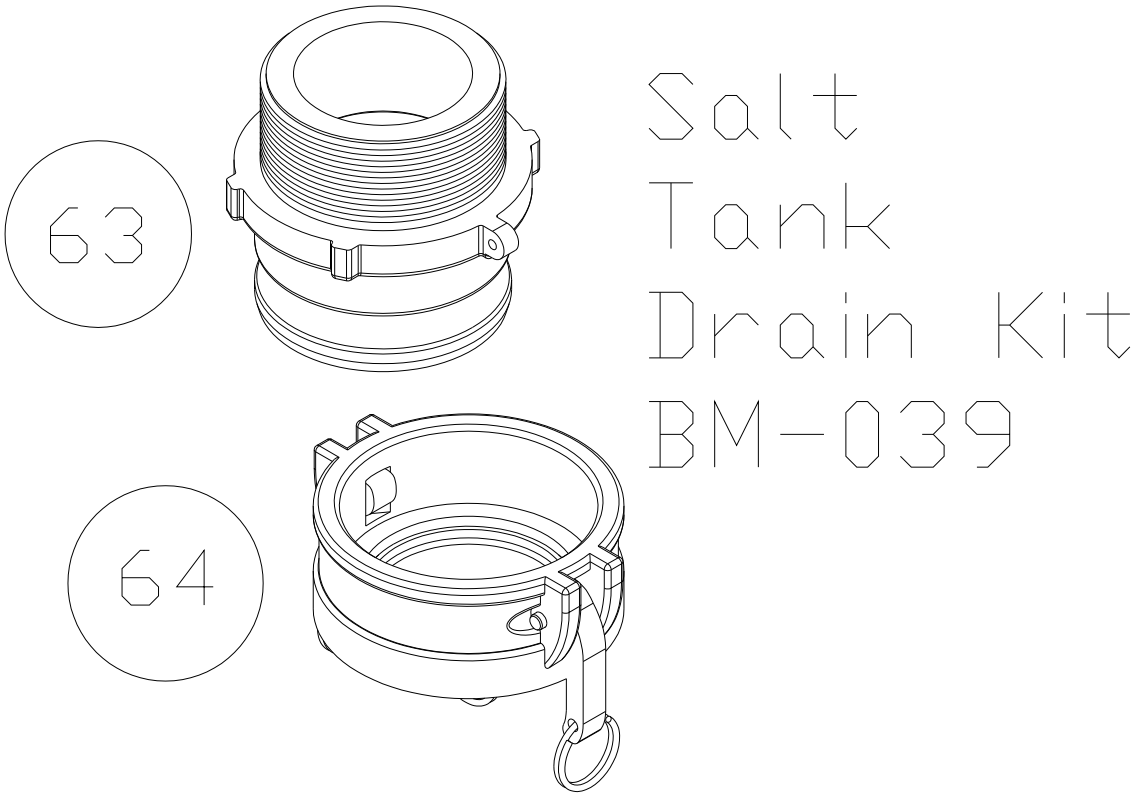
Salt Tank / Water Inlet Valve Bank

Salt Tank Water Spray Assembly

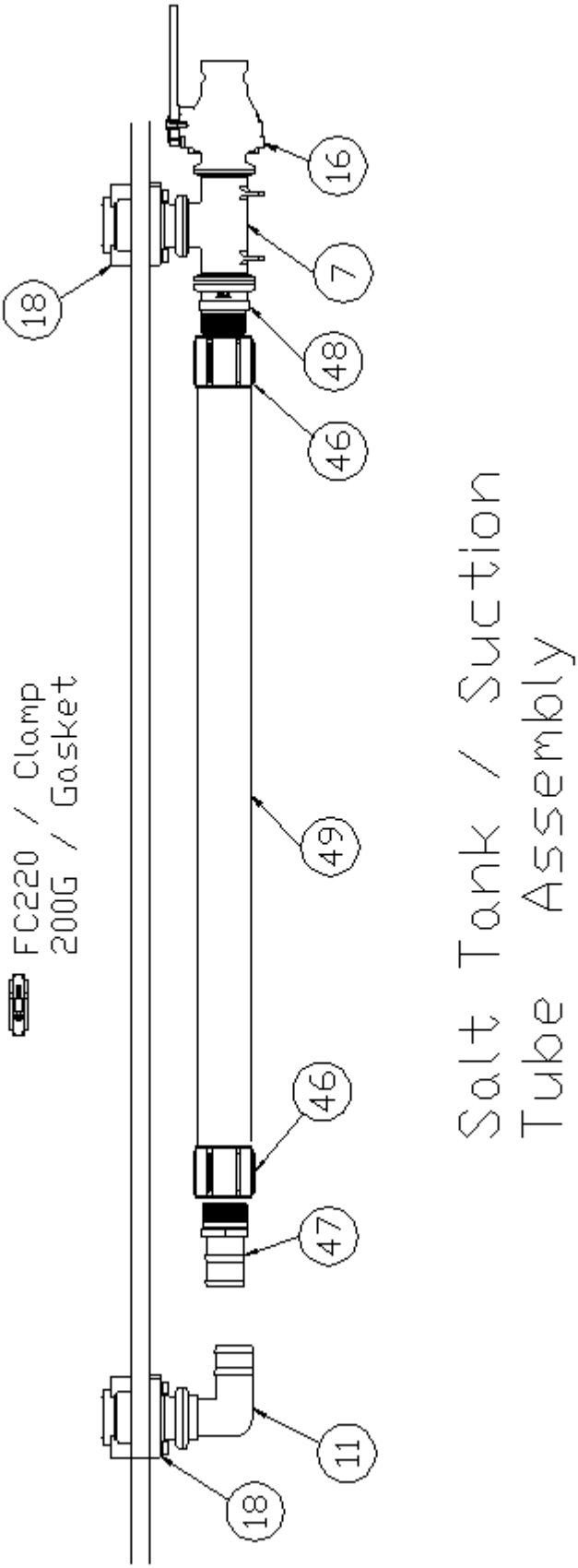


Salt Tank Water Spray Assembly

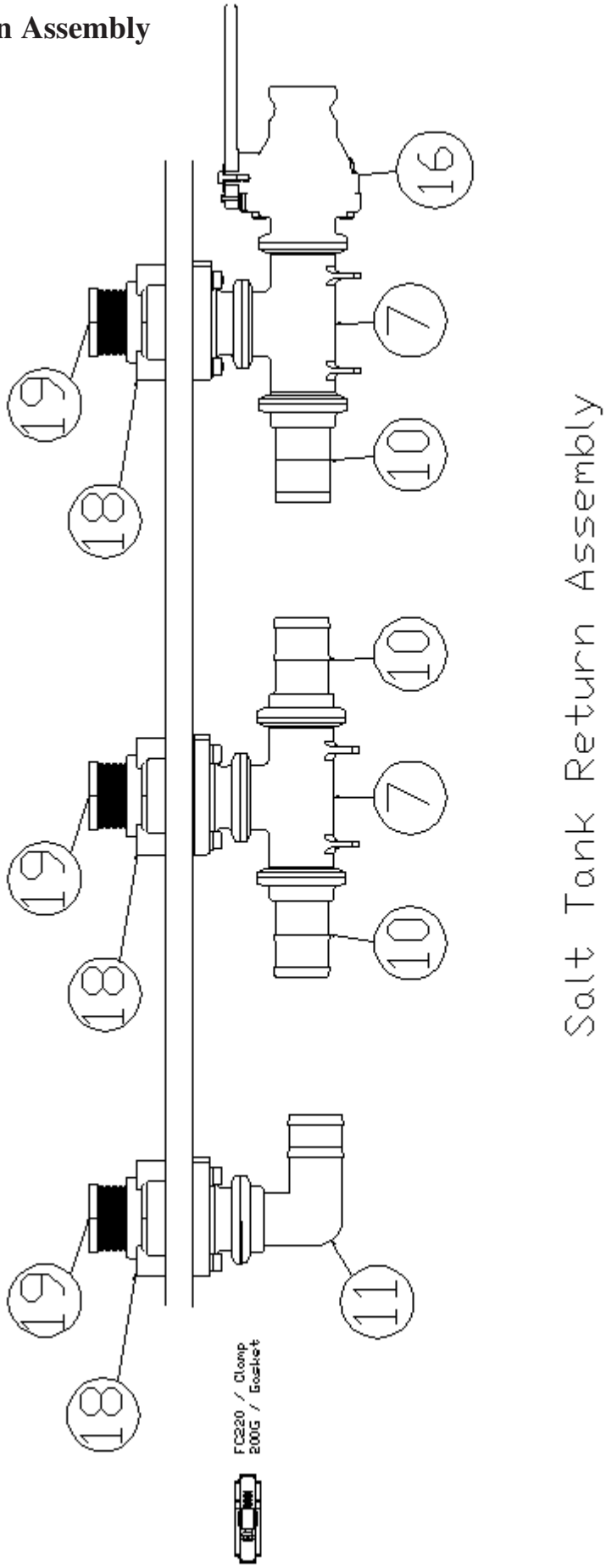
Salt Tank Drain Kit - Supplied With Salt Tank



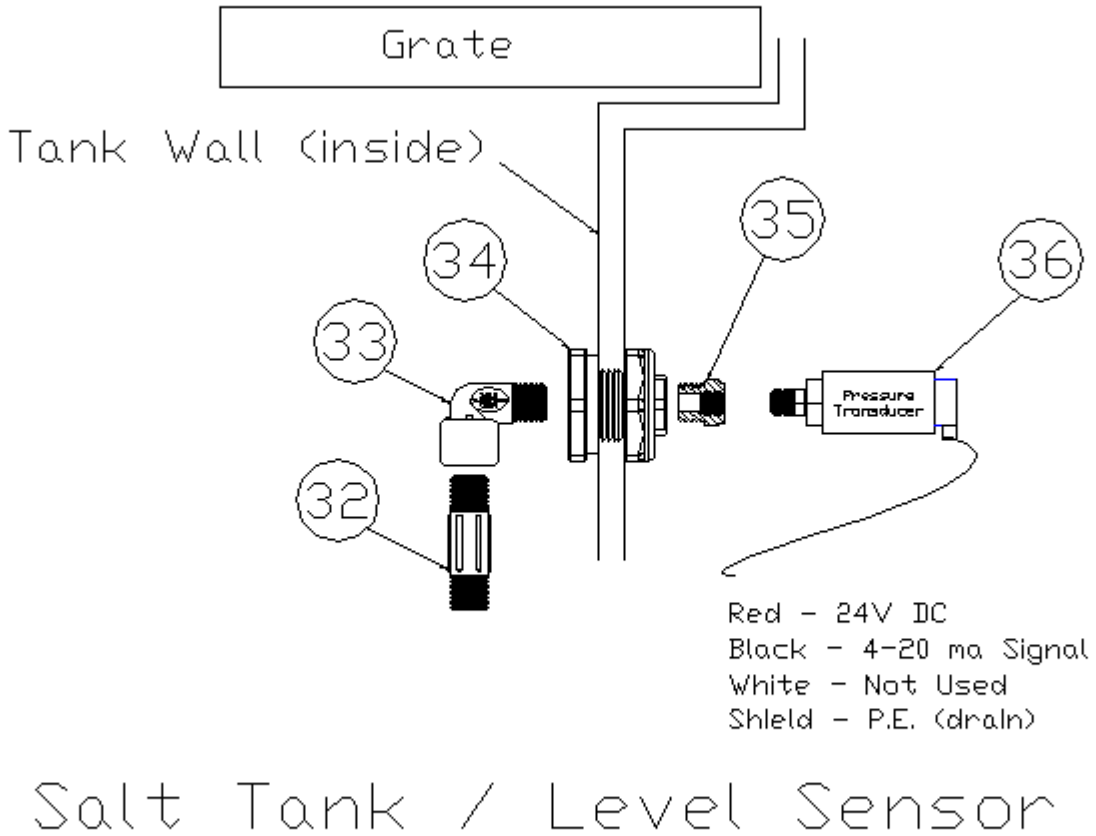
Salt Tank Suction Tube Assembly



Salt Tank Return Assembly

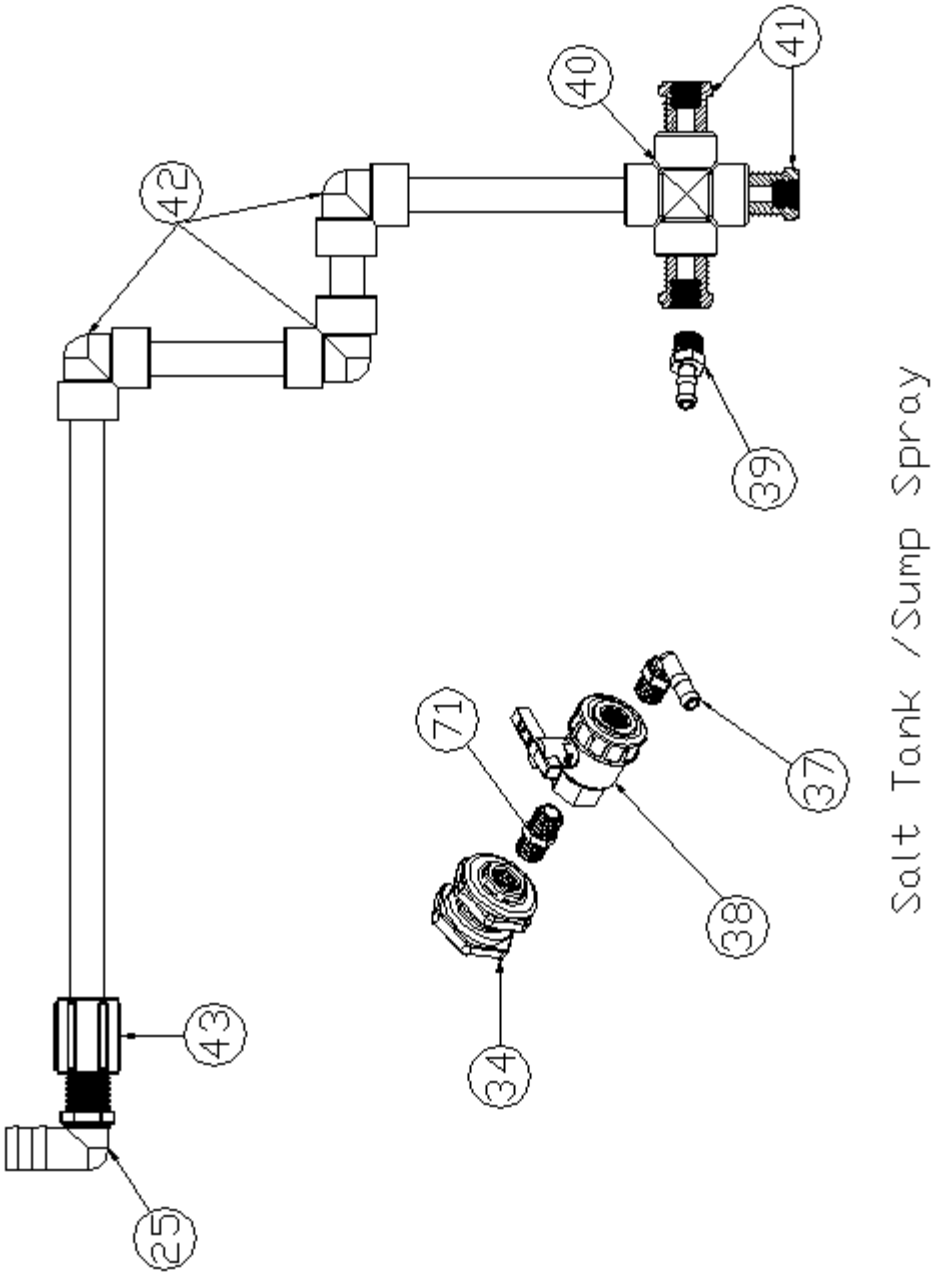


Salt Tank Level Sensor

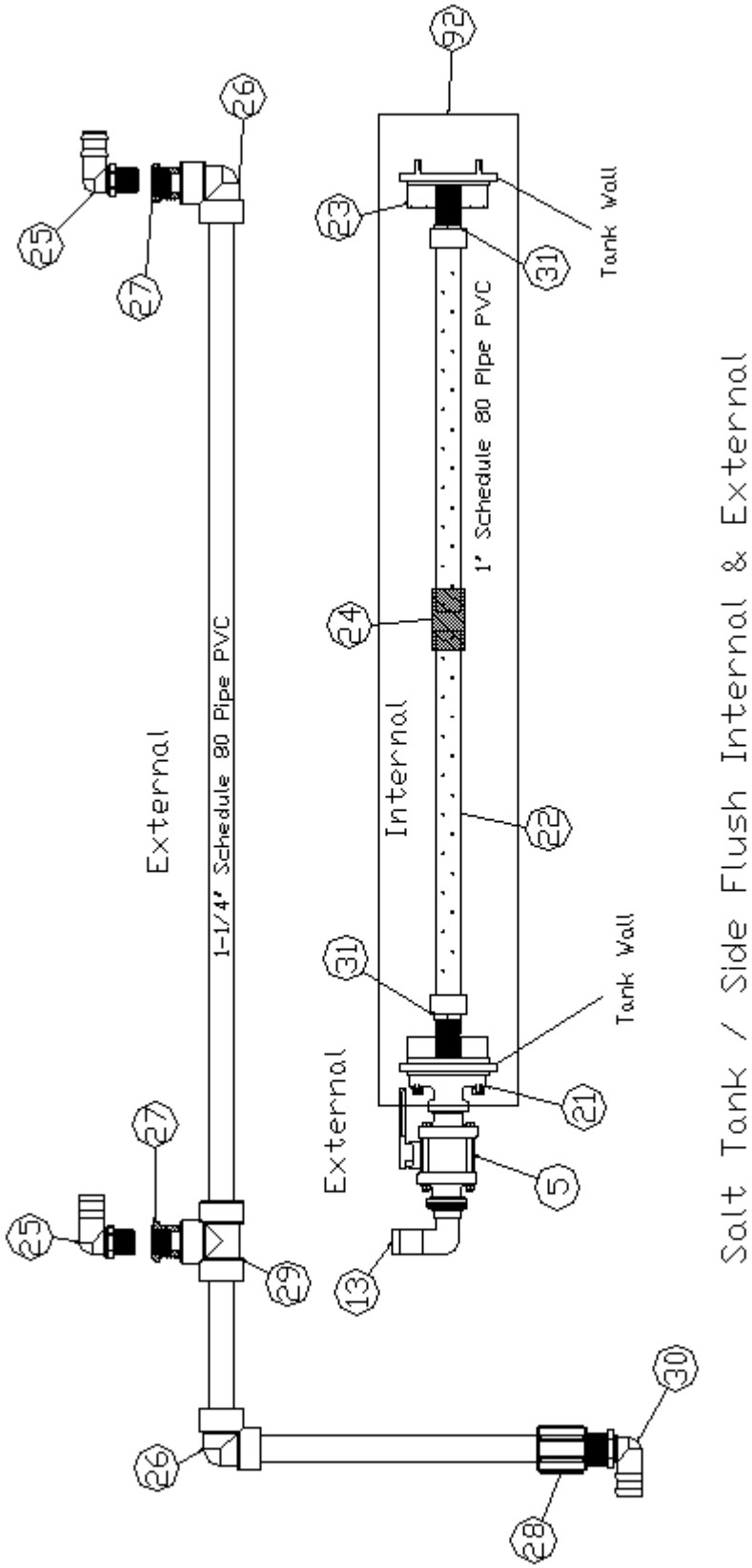


Salt Tank / Level Sensor

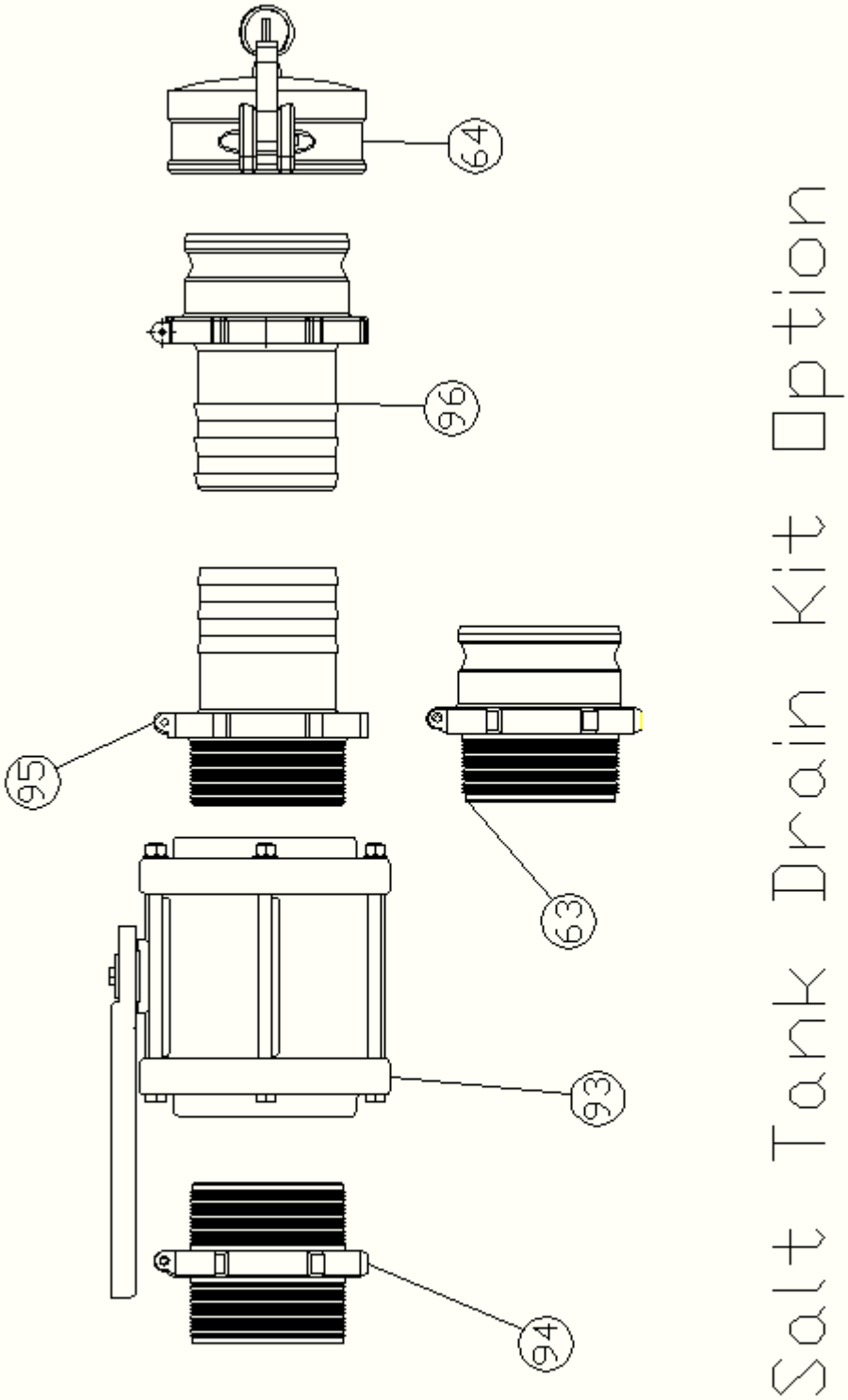
Salt Tank Sump Spray Assembly



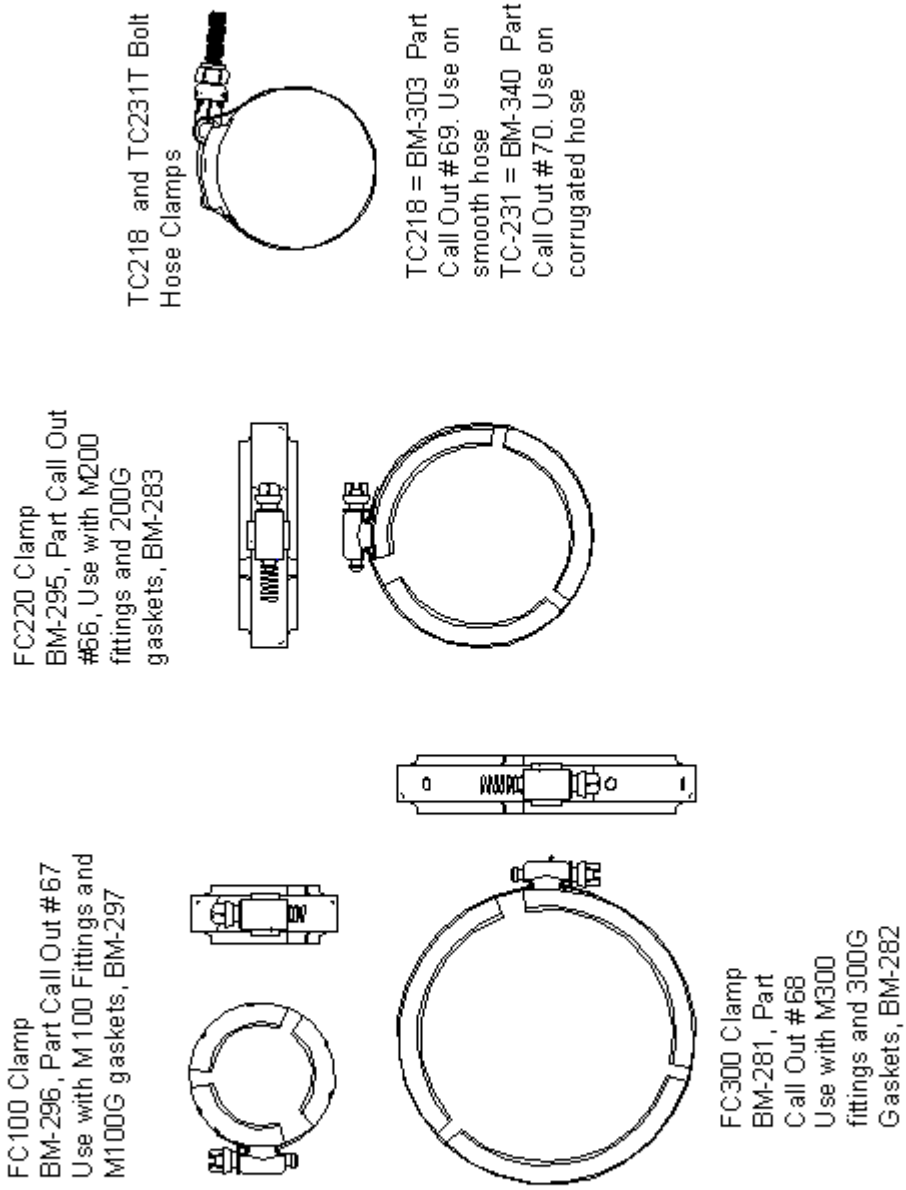
Salt Tank Side Flush



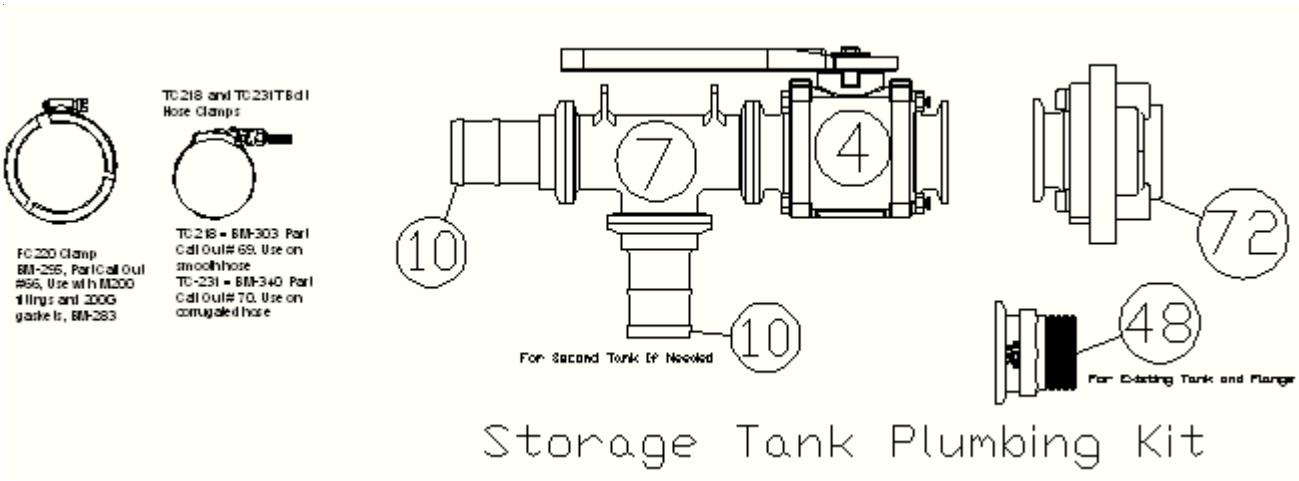
Salt Tank Drain Kit Option



Clamps and Required Gaskets

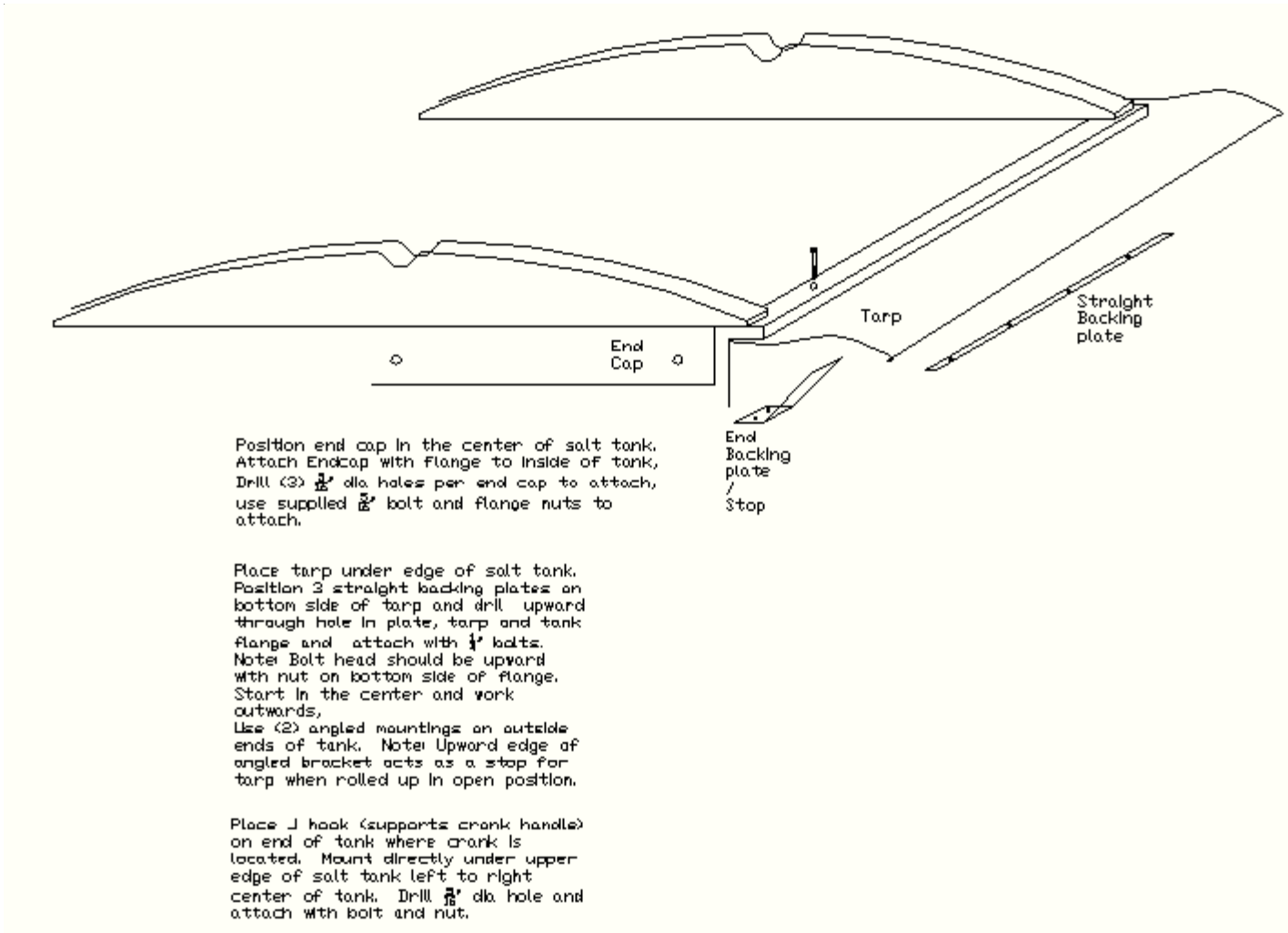


Storage Tank Plumbing Assembly

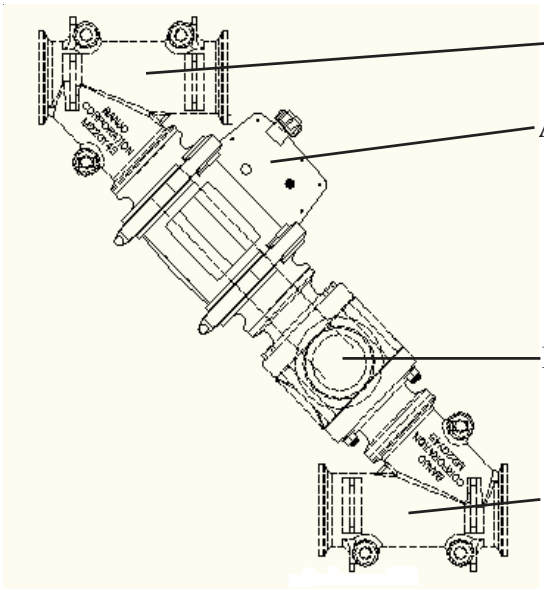


Roll Tarp Cover

Cargill BM# - 244



4 X 4 Modular Panel and Valve Module Example

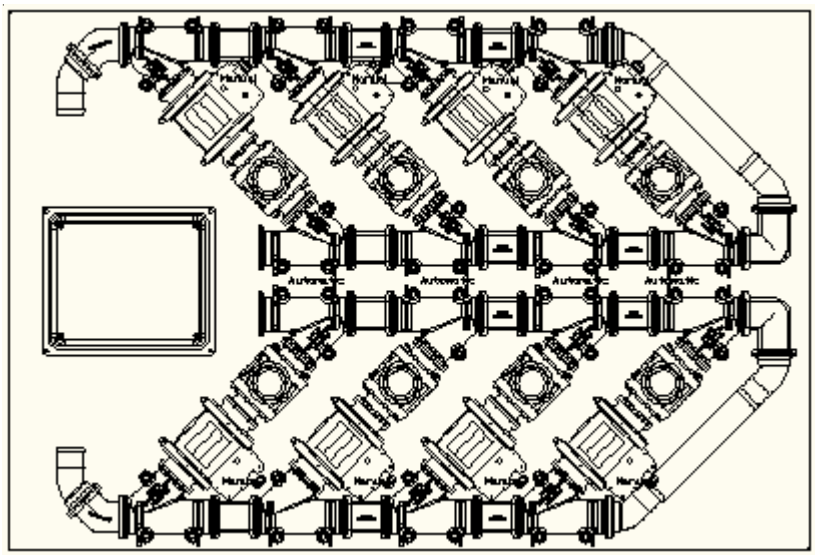


BM-069, Modular Plumbing Module

4 X 4 Sub Panel (4 Discharge Valves and 4 Suction Valves)

Discharge Valves from pump to
Storage Tanks & Truck Fill

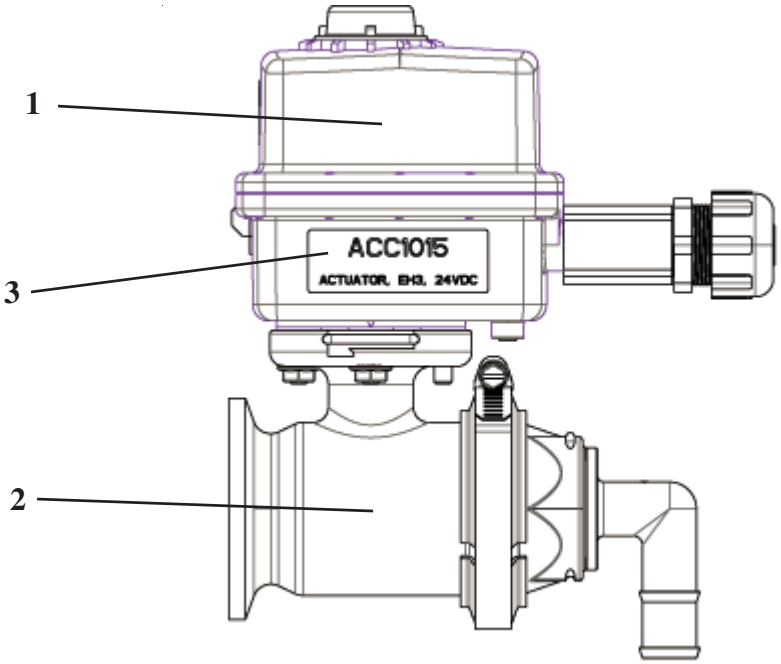
Electrical Enclo-
sure on Sub Panel



Suction Valves from Salt tank &
Storage Tanks to Pump

Dilute Valve Assembly, BM -599, KZ CO. #ACC1105

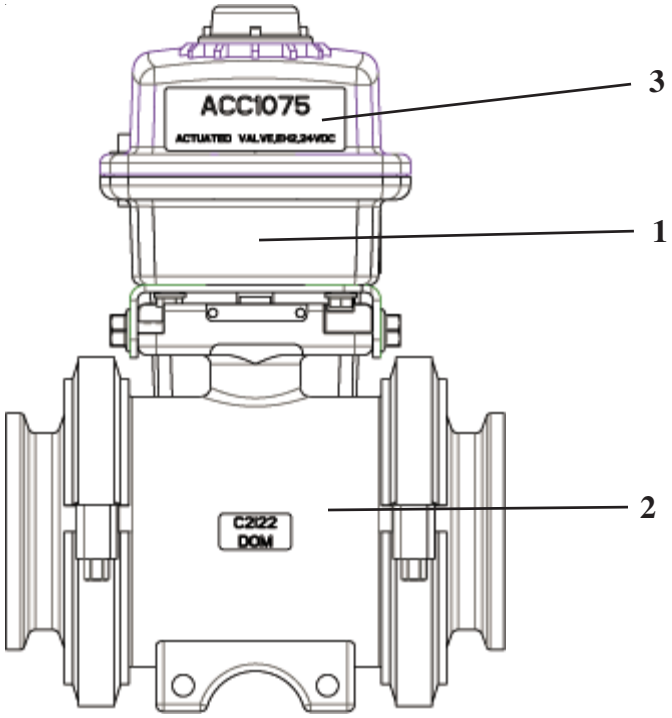
HARNESS PINOUT:
BLACK (GND)
BLUE (COM, USER SUPPLIED FEEDBACK, POW+)
WHITE (SIGNAL 1, 24 VDC+ to OPEN)
RED (24VDC POW+)
ORANGE (COM SIGNAL @ OPEN)
PURPLE (COM SIGNAL @ CLOSED)
GREEN (UL LISTED GND)



DET	QTY	PART NUMBER	DESCRIPTION
3	1	EH-502	LABEL, EH ACTUATOR, 2.5" X 1", THERMAL TRANSFER, WHITE
2	1	C2F-008	VALVE SUB ASSY, QX4 2-WAY, 1" HP
1	1	ACC1015	ACTUATOR,EH3,3.5 SEC@24VDC

2 Way On/Off (Water & Subpanel) Valve Assembly, BM-600, KZ CO. #ACC1175

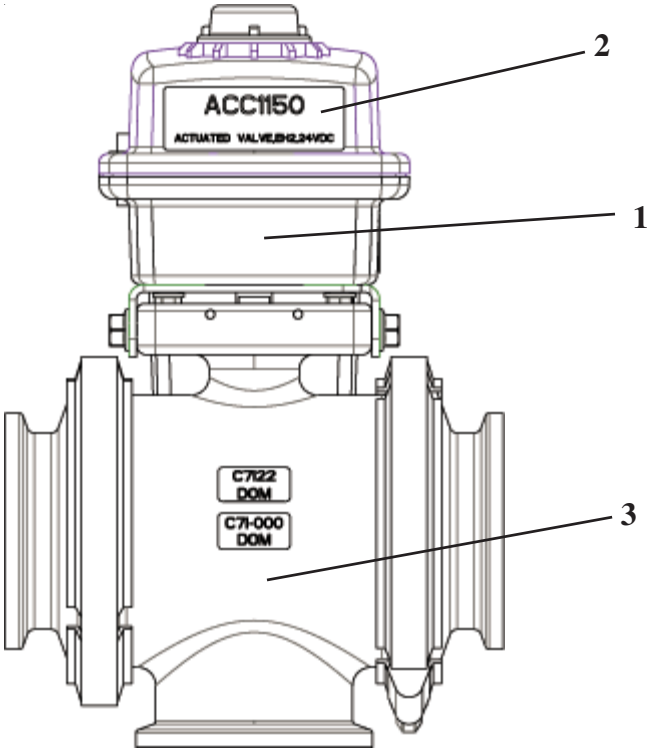
HARNESS PINOUT:
BLACK (GND)
BLUE (COM, USER SUPPLIED FEEDBACK, POW+)
WHITE (SIGNAL 1, 24 VDC+ to OPEN)
RED (24VDC POW+)
ORANGE (COM SIGNAL @ OPEN)
PURPLE (COM SIGNAL @ CLOSED)
GREEN (UL LISTED GND)



DET	QTY	PART NUMBER	DESCRIPTION
3	1	EH-502	LABEL, EH ACTUATOR, 2.5" X 1", THERMAL TRANSFER, WHITE
2	1	C2I22	VALVE KIT, EH2, 2" FP, 2-WAY, 2" FP FLG
1	1	ACC1030	ACTUATOR,EH2,SOLID STATE 4 SEC@24VDC

3 Way Bottom Load (Tank)Valve Assembly, BM-601, KZ CO. #ACC1150

HARNESS PINOUT:
BLACK (GND)
BLUE (COM, USER SUPPLIED FEEDBACK, POW+)
WHITE (SIGNAL 1, 24 VDC+ to OPEN)
RED (24VDC POW+)
ORANGE (COM SIGNAL @ OPEN)
PURPLE (COM SIGNAL @ CLOSED)
GREEN (UL LISTED GND)

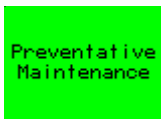


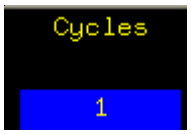
DET	QTY	PART NUMBER	DESCRIPTION
3	1	C7I22	VALVE KIT, EH2, 2" FP, 3-WAY, 2" FP FLG
2	1	EH-502	LABEL, EH ACTUATOR, 2.5" X 1", THERMAL TRANSFER, WHITE
1	1	ACC1060	ACTUATOR,EH2,SOLID STATE 4 SEC@24VDC, 90DEG

Preventative Maintenance Schedule

This Preventative Maintenance page monitors and records number of cycles for the actuated valves, and hours of operation for the pump head and motor for the main control panel and auxilliary recycled water pump if applicable.

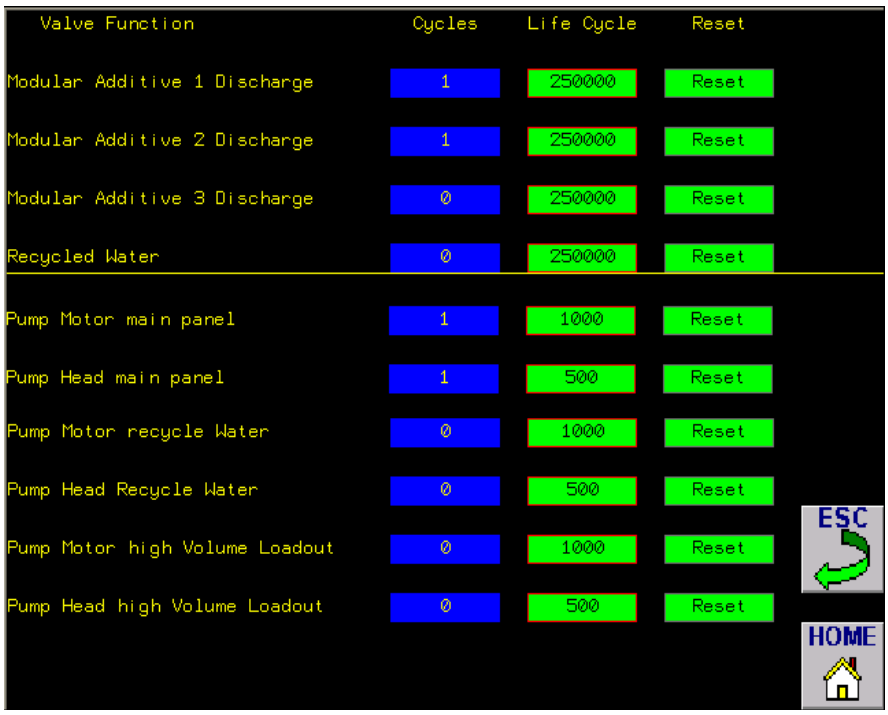
To access the Preventative Maintenance page go to the Help page and press the Preventative Maintenance button.





The blue box indicates the number of Actual cycles or hours each valve or pump/ motor has reached.

The Life Cycle box indicates the number of Expected cycles for each valve or number of hours of operation before routine periodic maintenance should be conducted. This may be inspection, rebuild, or even replacement. The life cycles for valves is expected to be 250,000. The hours for the pump head is excpected to be 500, and the hours for the motors is expected to be 1000.



The Reset box when pressed, will reset the actual number of cycles or hours to 0 when inspection, rebuild, or replacement has taken place.

Press the P.M. Page 2 button to access the second page of valves, pumps, and motors.

Trouble Shooting Guide

- Valve Failure - could affect these valves:
  Water Valve - Open
  Tank Valve – To Return
  Optional valves for Remote Fill and Additive injection, Recirculation.
  - The system monitors the valve when in the deenergised position. When the valve change position contact does not have +24 VDC, the valve goes to its normal state (white wire to actuator is not energized). When alarm is withnesed, this may be caused by any of the following scenarios.
    1. Power supply failure- Generally several alarms may be activated. All actuators operate on a 24 VDC circuit, if the power supply fails then a valve actuator failure may be present.
    2. Valve circuit has failed – Wire has come loose:
       Refer to wiring diagram to trace to terminals and check all connections.
    3. Fuse Blown –
       Use wiring diagram or trouble shoot from the display to find possible fuses. Note: A blown fuse illuminates red when it has failed, the fuse holder must be energized to illuminate red depending on the state of the machine. These circuits may or may not be energized, therefore physically check all fuses.
    4. Actuator failed to change position due to actuator failure.
       Replace actuator
    5. Valve actuator is changing position but valve position has failed.
       Disable alarm and repair or replace actuator.

Fault: 4-20ma Signals

1. Check wiring,and make sure that the signal wire from sensor terminal 2 of the connector at the sensor is attached to the + terminal of the PLC. Check that terminal 1 to the plug has + 24VDC. Refer to wiring diagram sent with machine.

2. If Wiring is correct: With the machine energized remove the black plug where the wires land into the PLC and then reconnect.

3. Reset fault and attempt another batch.

Pump Thermal Overload

The pump is activated ON to the run state via a motor starter with a built in thermal overload. This thermal overload protects the electric motor form excess current draw.

1. Improperly set thermal overload – Adjust thermal overload to amperage rating on motor do not exceed 110% of motor rating.
2. Low voltage from supply – Since I = E/R as voltage drops, current will increase. Low voltage at peak periods of use on an electric grid or within the structure may cause this voltage drop. Solutions may be to isolate circuits to balance the electric load from a service panel or it might be possible to convert a system to a 3 phase motor in extreme cases.
3. Pump motor is drawing excess current –

   Wear and tear on motor may cause excess friction thus leading to overpower requirements. This is usually witnessed by a squeak or growling noise from the motor. Locked or jammed impeller on the pump head.

   Pump pumping heavy liquid – with use of the additive injection system, the product being pumped may be heavier than the pump was designed for.

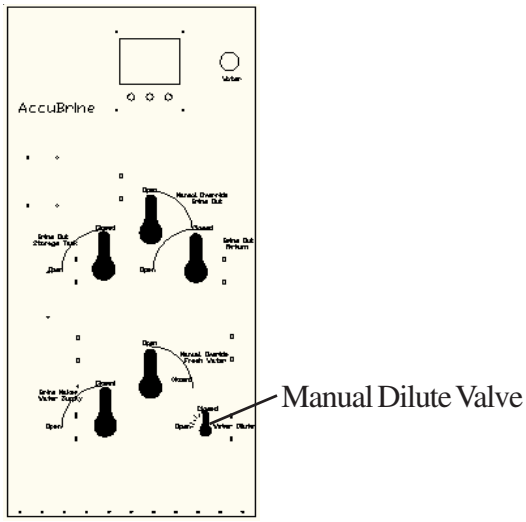
Concentration: Over and Undershooting

This is witnessed by the concentration of the brine being over tolerance and then under tolerance.

1. This is caused by the machine not being able to dial in a desired concentration. As the dilute valve adjusts, to much water is added in the dilution process then the valve adjusts again and not enough water is added.
2. Brine tolerance to tight: Set concentration + or – to 300 or above. Adjust the dilute on time downward. Ideally it should take12 or more actuations of the dilute valve to open fully. To test, set the desired concentration of brine to 19.6% and put the machine in Simulate Mode and make a batch. Watch the dilute valve and count the number of valve bumps it takes to fully open from the closed position.
3. Excess water pressure – High water pressure may allow an excess amount of water to pass through the dilute valve. Installing a pressure regulator on the water supply side limiting the pressure to the 40-50 PSI in a static position will greatly enhance the dilution performance.

Walchem Electrodless Conductivity Analyzer Calibration - Single Point

This single point calibration procedure should be used when the operating temperature of the brine, salt and water are 10 or more degrees above or below normal expected temperatures in the brine making season (sensor is calibrated at the factory at 38 degrees F.). This procedure will be accomplished with the brinemaker recirculating brine to and from the salt tank in the batch making process. The concentrated brine will be diluted manually with the manual dilute valve on the lower front right portion of the brinemaker control panel Make sure there is plenty of salt and water in the salt tank to fully concentrate the brine and prevent the fresh water to the top of the salt tank from coming on during this process.



On setup page 1, set the Target Brine Concentration to 26.2%. This will set the specified concentration on the concentration graph on the touch screen to the extreme right of the graph.
Set the Target Concentration (+ or -) % to 100. This will narrow the green band on the concentration graph on the touch screen.
Go to the Batch page and enter 500 gallons.

Press Auto Start. Allow the brine to recirculate to the salt tank for 15 minutes to become fully concentrated and equalize the temperature of the liquid and conductivity sensor.

Open the manual dilute valve about 1/3rd of full travel.

Take two or three brine samples at the salt tank return hose quick coupler. Open one wing of the coupler to allow a small stream of brine to leak out. Collect about one cup of brine and test with a hand held salt brine concentration tester.

If the collected brine concentration is higher than 23.3%, open the dilute valve some more. Open valve in small increments to prevent under shooting the 23.3% concentration.

If the collected brine concentration is under the 23.3%, close the dilute valve a small amount.

Continue sampling, testing, and adjusting the dilute valve until the concentration is 23.3% + or - 0.1% .

Walchem Electrodless Conductivity Analyzer Calibration - Single point cont.

When the brine sample is at the 23.3% concentration, perform the calibration procedure on the Walchem Conductivity Analyzer located on the back right side of the control panel. Open the clear plastic cover.

1. Press the **exit** button until "conductivity A" is displayed.
2. Press the **enter** button until calibrate is displayed.
3. Press the **enter** button.
4. Press the **enter** button.
5. Use the **left and right arrow** buttons, to move the flashing cursor to the correct positions and the **up and down arrows** to enter the value of sample concentration taken earlier. For Ex. **23.3**
6. Press the **enter** button twice.
7. Press the **exit button.** The Single-point Calibration process is complete.
8. The concentration on the analyzer and touch screen should now read very close to 23.3%.
9. Go to the setup page 1 and return the Target Brine Concentration setting back to 23.3%
10. Return the Target Concentration (+ or -) % back to 350 or 0.6%.
11. Let the 500 gallon batch complete and monitor the machines performance.

If this procedure does not improve the accuracy of the brine concentration, refer to the 3 point calibration section on the next page and perform that process.

Walchem 410 series Electrodless Conductivity Analyzer Calibration - 3 point

Purpose: This 3 point calibration procedure should be performed at machine installation, and when the operating temperature of the brine, salt and water are 10 or more degrees above or below normal expected temperatures in the brine making season (sensor is temperature calibrated at the factory at 38 degrees F.). This procedure will be accomplished with the brinemaker recirculating brine to and from the salt tank in the BATCH making process. The concentrated brine will be diluted MANUALLY with the manual dilute valve on the lower front right portion of the brinemaker control panel to CREATE brine liquids of a specific concentration. Make sure there is plenty of salt and water in the salt tank to fully concentrate the brine during this process.

Creating Specific Concentration Liquids Procedure:

1). On the Accubrine touch screen, with password 4096 activated, go to setup page 1, set the Target Brine Concentration to 26.2%. This will set the specified concentration range on the concentration graph to the extreme right of the graph.

2). Set the Target Concentration (+ or -) % to 100. This will narrow the green band on the concentration graph on the touch screen.

3). Close the 2" fresh water valve on the salt tank to prevent water from entering the salt tank during the calibration process.

4). Go to the Batch page and enter 500 gallons.

5). Press Auto Start. Allow the brine to recirculate back to the salt tank for 15 minutes to become fully concentrated and equalize the conductivity sensor to the temperature of the liquid.

6). Open the manual dilute valve about 1/3rd of full travel. Note: This process allows us to CREATE the 3 calibrating solutions.

7). Take two or three brine samples at the salt tank **return** hose quick coupler by opening ONE wing of the coupler to allow a small stream of brine to leak out. Collect about one cup of brine and test with a hand held salt brine concentration tester.

If the collected brine concentration is higher than 22.0%, **open** the dilute valve a small amount. Note: Open the dilute valve in small increments to prevent under shooting the 22.0% concentration.
If the collected brine concentration is under the 22.0%, **close** the dilute valve a small amount.
Continue sampling, testing, and adjusting the dilute valve until the concentration is 22.0% + or - 0.1%.

Walchem Electrodless Conductivity Analyzer Calibration - 3 point cont.

Walchem 410 Sensor Calibration: When the brine sample is at the 22.0% concentration, enter the multi point calibration screen on the Walchem Conductivity Analyzer located on the back right side of the control panel.

A. Press the **exit** button until the % concentration and SENSOR is displayed on the analyzer screen.

B. Press the **enter** button and then the **next** button until CALIBRATE is displayed.

C. Press the **next** button until MULTI POINT is displayed.

D. Press the **enter** button.

E. Use the **UP** arrow button to change the 2 to a 3 and press **enter**. If the analyzer asks you to RINSE SENSOR, press **next**. The analyzer will then ask you to put the sensor into the first solution. With the machine running and the dilute valve metering in fresh water, we **created** the FIRST solution of 22.0%

F. Use the **left** and **right arrow** buttons, to move the flashing cursor to the correct positions and the **up and down arrows** to enter the value of sample concentration taken earlier. For Ex. **22.0**

G. Press the **enter** button to enter the first actual sample concentration into the analyzer.

H. Press the **enter button** when the conductivity reading (in MS – Milli-Siemens) stabilizes. Approximately 10 seconds. The analyzer display will now ask you to place the sensor into the second solution.

I. Return to step 7 and repeat above procedure to CREATE and ENTER the next solution of 23.3% and then 24.5%.

J. When all three solutions have been entered into the analyzer, CAL SUCCESSFUL will be displayed. If an error message occurs, repeat the multi-point calibration process.

K. Press the exit button until the concentration and temperature are displayed. The concentration on the analyzer and touch screen should now read very close to 23.3%.

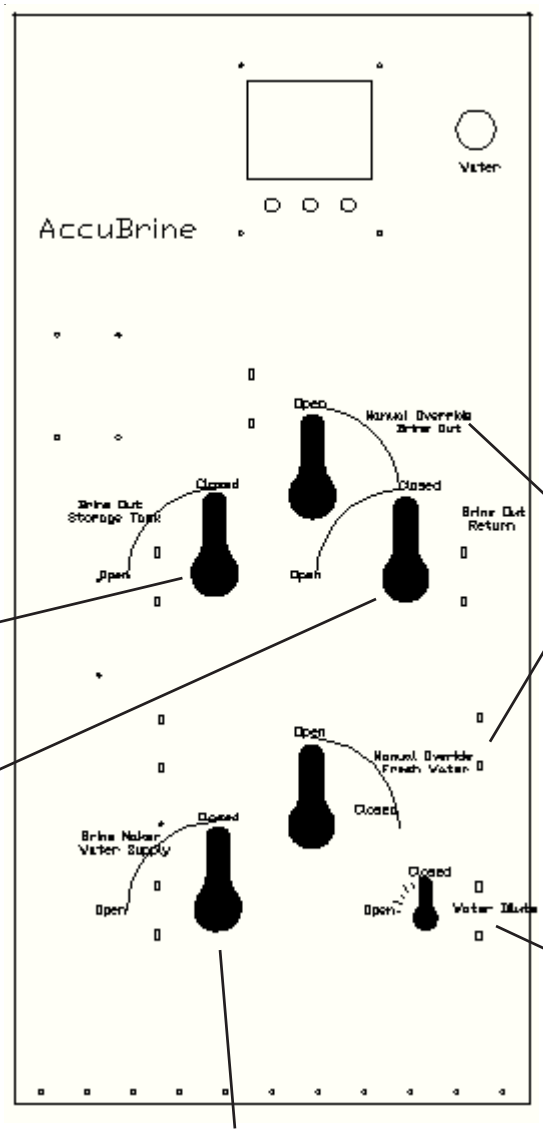
L. Go to the setup page 1 and return the Target Brine Concentration setting back to 23.3%

M. Return the Target Concentration (+ or -) % setting back to 350 or 0.6%.

N. Let the 500 gallon batch complete and monitor the machines performance.

Main Control Panel Automatic Valve Position .

The valves are shown in the normal auto position. The manual positions can be used in the event of an actuated valve failure. To make brine manually, follow the steps below



1. Close the Manual Overide valves for the Brine Out and Fresh Water to direct flow <u>to</u> the manual valves and <u>away</u> from the electric valves.

2. Open the <u>Tank valve</u> if brine is at the desired concentration to send to storage tank.

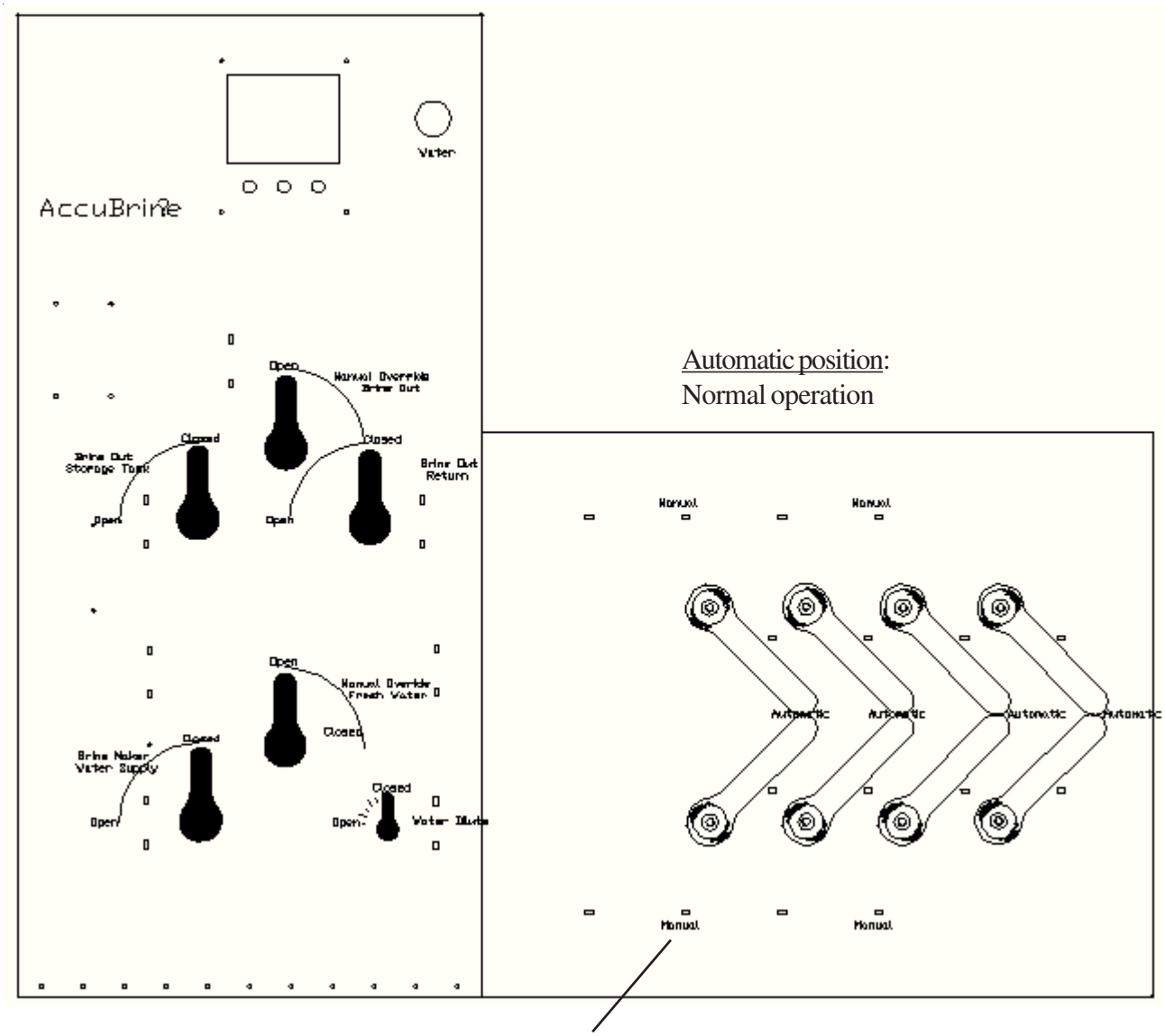
3. Open the <u>Return valve</u> if brine is lower than the desired concentration and send back to salt tank.

4. Open the Water Dilute valve slowly if brine is higher than the desired concentration.

5. Open the Brine Maker Water Supply valve to add water to the salt tank.

Main Control Panel and Sub Panel - Additives and Remote Fill Valve Positions

All valves are shown in the automatic position. The manual positions can be used in the event of an actuated valve failure. To make brine manually, see previous page for valve positions on main panel. The valve positions for the modular panel, regardless of function are illustrated below.



Automatic position:
Normal operation

Manual position: Opens valve to direct flow to the same location as the electric valve. Turn handle 180 degrees.

Half Way between the Manual and Automatic position: This position blocks flow to the electric valve.
Note: The electric valves fail in the open position.

ACCUBRINE™
AUTOMATED BRINE MAKER

Accubrine ™ Automated Brine maker - Salt Tank Cleanout Procedure

Periodic cleaning and removal of sediment and debris from the salt tank is required to keep the brine maker operating efficiently. Before cleaning the salt tank, it's best to have the salt level as low as possible to prevent the salt from becoming a hard layer, and prevent corrosion from forming on the screen during storage. With three inches or less of salt remaining on the screen, the screen can be removed from the salt tank with the supplied nylon straps. Use care when removing as damage may occur to screen or salt tank. Clean off salt screen and return to salt tank after tank cleanout.

A. Lowering the brine level in Salt Tank

1. Input password 4096
2. Go to Set up page 1
3. Take note of the "pump-off setting". Set pump-off to a value of "50".
4. Close the 2" water supply valve on the end of the salt tank to prevent more water from being added.
5. Run a small batch of 500 gallons of brine. The machine will send brine to the storage tank. (Increase "Target Concentration + or -" setting to allow brine to be sent to storage tank.) Very Important!!! The sound of the pump will change when the liquid level gets below the suction lines to the pump. Have someone shut off system as soon as pump change is heard prevent damage to the seals of the pump.
6. This will lower the liquid level to the suction line on the salt tank. Return to setup page one and set the "pump-off setting" and "Target Concentration + or -" to original settings.

B. Cleaning the Salt Tank & Sump

1. Open the "Water Manual Override" valve on the control panel to send water to the salt tank. Clean sides of the salt tank with a brush and water to remove deposits.
2. Close the 2" water valve on salt tank, located on end of salt tank.
2. Remove 4" drain cover on front of the salt tank. Caution: A large volume of liquid will flow through the fitting when cap is removed. If valve is installed, use loader bucket to remove liquid if desired.
3. Open the (2) 1" Valves located next to the 2" water valve on salt tank valve bank.
4. Open the (2) 1" Valves located on the lower portion on the front side of salt tank for the spray bars to move sediment into sump.
5. Open the (3) 1/2" valves located on the lower back side of the salt tank for the sump nozzles to move sediment out of sump through the 4" cleanout.
6. When water flushing from the sump is clean, the sump cleaning process is complete.
7. Close the "Water Manual Override" valve on the control panel.
8. Open the 2" Water valve on Salt Tank.
9. Wait 1 minute and close the lower (2) 1" valves on front of salt tank and (3) ½" valves on rear of salt tank. This allows the cleanout lines to drain completely.
10. Close the (2) 1" valves located next to the 2" water valve on end of salt tank.
11. Go to Setup page 1 on the HMI display. Reset the "Sump Clean Out" button.
12. Reset password to 10 to prevent tampering.

Important: When the cleaning process is finished, allow the salt tank fresh water and cleanout lines to drain completely. Failure to do so could cause freeze damage.

The Accubrine™ Automated Brinemaker salt tank is now ready to start the brine making process. Make sure all valves are in correct operating position if starting a brine batch. Prime the pump with manual dilute valve before starting pump. This will prevent damage from running pump dry.

Accubrine ™ Automated Brine maker Off Season Storage Procedure

Before cleaning the Salt Tank, it's best to have the salt level as low as possible to prevent the salt from becoming a hard layer, and prevent corrosion from forming on the screen during storage. With three inches or less of salt remaining on the screen, the screen can be removed from the salt tank with the supplied nylon straps. Use care when removing as damage may occur to screen or salt tank. Clean off salt screen and return to salt tank after tank cleanout.

A. Lowering the brine level in Salt Tank

1. Input password 4096
2. Go to Set up page 1
3. Take note of the "pump-off setting". Set pump-off to a value of "50".
4. Close the 2" water supply valve on the end of the salt tank to prevent more water from being added.
5. Run a small batch of 500 gallons of brine. The machine will send brine to the storage tank, (Increase "Target Concentration + or -" setting to allow brine to be sent to storage tank.) Very Important!!! The sound of the pump will change when the liquid level gets below the suction lines to the pump. Have someone shut off system as soon as pump change is heard prevent damage to the seals of the pump.
6. This will lower the liquid level to the suction line on the salt tank. Return to setup page one and set the "pump-off setting" and "Target Concentration + or -" to original settings.

B. Cleaning the Salt Tank & Sump

1. Open the "Water Manual Override" valve on the control panel to send water to the salt tank. Clean sides of the salt tank with a brush and water to remove deposits.
2. Close the 2" water valve on salt tank, located on end of salt tank.
2. Remove 4" drain cover on front of the salt tank. Caution: a large volume of liquid will flow through the fitting when cap is removed. If valve is installed, use loader bucket to remove liquid.
3. Open the (2) 1" Valves located next to the 2" water valve on salt tank valve bank.
4. Open the (2) 1" Valves located on the lower portion on the front side of salt tank for the spray bars to move sediment into sump.
5. Open the (3) 1/2" valves located on the lower back side of the salt tank for the sump nozzles to move sediment out of sump through the 4" cleanout.
6. When water flushing from the sump is clean, the sump cleaning process is complete.

C. Accubrine™ Control Panel and Pump Cleanout Procedure Using Simulate Mode

1. Close 4" cleanout valve or reinstall cap on salt tank.
2. Verify that all 2" valves (three) on salt tank are open.

Accubrine ™ Automated Brine maker Off Season Storage Procedure Cont.

1. Open the "Brine Maker Water Supply" valve on lower left front of control panel. This will put fresh water back into salt tank. Fill salt tank until water level is about 2 inches above screen.
2. Close the "Brine Maker Water Supply" valve.
3. Close the valve on the brine storage tank and disconnect hose from tank. This will prevent fresh water from entering the storage tank. Put end of hose on ground where water can be discharged.
4. Open the manual "Water Dilute" valve on the bottom right portion of the control panel (this will make sure the pump is primed for the next step).
5. Move the "To Salt Tank" valve handle on the subpanel from "Automatic" to "Manual". This will open the path to recirculate the water back to salt tank.
6. On the control panel, turn the Hand-Off-Auto switch to the Hand position. This will start the pump. Run for 20 seconds to prime the pump.
7. Turn the Hand-Off-Auto switch to the center (off) position.
8. Turn off the manual "Water Dilute" valve on the bottom right portion of the control panel.
9. Return the "To Salt Tank" valve handle on the subpanel from "Manual" to "Automatic".
10. Enter password 4096 and then return to the main page.
11. Press the "Mode" button to go to the mode page.
12. Select "Simulate Mode"
13. Return to the main page.
14. Press the "Batch" button and enter a batch of 200 gallons.
15. Press "Auto Start". This will simulate a batch of brine being made.
16. When the "Simulated" concentration enters the "Green" range on the touch screen, the automatic valves to the Brine Storage Tank will open and flush the lines and valves with fresh water.
17. When the concentration enters the "Green" range, open the manual Remote Truck Fill valve and turn the Remote Truck Fill switch to "On". This will flush the Truck Fill automatic valves on the subpanel and lines.
18. Return to the Batch page and press "Stop".
19. Go to the main page and Press the "Mode" button to go to the mode page.
20. Select "Normal Mode"
21. Return to the main page.
22. Manually drain Salt Tank and all storage tank lines.
23. Reconnect hose to Brine Storage Tank.
24. Close "Water Manual Override" valve on control panel.
25. Open the 2" Water valve on Salt Tank.
26. Wait 1 minute and close the lower (2) 1" valves on front of salt tank and (3) ½" valves on rear of salt tank. This allows the lines to drain completely.
27. Close the (2) 1" valves located next to the 2" water valve on end of salt tank.
28. Go to Setup page 1 on the HMI display. Reset the "Sump Clean Out" button.
29. Reset password to 10 to prevent tampering.

Accubrine ™ Automated Brine maker Off Season Storage Procedure Cont.

Important: When the cleaning process is finished, allow the salt tank fresh water and cleanout lines to drain completely. Failure to do so could cause freeze damage.

D. Accubrine™ Control Panel leaks and stainless steel cleaning

1. Look for any leaks on the control panel and subpanel. Replace any pinched or damaged gaskets. Tighten any loose hose or fitting clamps snugly.
2. Use a high quality stainless steel cleaner on all stainless steel parts to clean and prevent corrosion. WD-40 also works very well.
3. It is not necessary to turn the power off to the machine. Leaving the power on to the machine will help prevent moisture from entering the control cabinet. The touch screen will go into screen saver mode.

The Accubrine™ Automated Brinemaker is now ready to store for the season.

ACCUBRINE™
AUTOMATED BRINE MAKER

Complete Parts List

The HMI Callout Numbers listed below are the same as the circled number in the Parts pages available on the HMI touch screen. The BM # is the Cargill inventory/order number. To order parts, call the Accubrine call center at 1-866-900-7258

BM #	HMI #	DESCRIPTION	MFG_NAME	MFG_PART_ID
BM-631		CONNECTOR,TRANSDUCER XMLG	Allen Bradly	871A-TR4-D1
BM-590		SLING FOR GRATE REMOVAL/ASSEMBLY	AMER. WIRE & ROPE	27-40763
BM-201	#60	PUMP, W/SI-C SEAL	AMT PUMPS CO.	315C-976-98
BM-202		PUMP, 200GPM 5 HP. 3 phase	AMT PUMPS CO.	4240-98
BM-203		PUMP, 200GPM, NO MOTOR	AMT PUMPS CO.	3152-K8
BM-204		PUMP, 200GPM, HIGH FLOW WITH 7.5HP MOTOR	AMT PUMPS CO.	315G-98
BM-585		PUMP, 4250-98SP, 300GPM, Standard 3 Phase 10 HP MOTOR	AMT PUMPS CO.	4250-98SPL
BM-205		PUMP, 4250-98SP, 300GPM, HIGH FLOW WITH 15HP MOTOR	AMT PUMPS CO.	4250-98SPL
BM-206		PUMP, 3HP,208-230/460 3phase	AMT PUMPS CO.	315D-999-98
BM-207		VITON SEAL FOR 4900 SERIES (SHAFT SEAL)	AMT PUMPS CO.	1640-161-97
BM-208		VITON SEAL FOR 4900 SERIES (CASING SEAL)	AMT PUMPS CO.	2119-013-00
BM-209		SILICON CARBIDE/VITON KIT	AMT PUMPS CO.	3156-300-92
BM-593		SEAL KIT , VITON & SIL. CARB. for the 4250 series	AMT PUMPS CO.	
BM-594		SHAFT SEAL for the 4250 series	AMT PUMPS CO.	
BM-595		casing cover (stainless steel) for the 4250 series	AMT PUMPS CO.	
BM-596		15hp motor (only) for the 4250 series	AMT PUMPS CO.	
BM-597		7.5hp motor (only) for the 315G series	AMT PUMPS CO.	
BM-639		SHIM KIT	AMT PUMPS CO.	1806-044-90
BM-640		O-RING	AMT PUMPS CO.	2105-037-00
BM-210		HOSE, 1/2 ID X 20" LG-EPDM SPRAY AG200	Apache Hose & Belt	10040507
BM-211		HOSE, 2" ID X 300 FT MED DUTY WATER	Apache Hose & Belt	13021503
BM-212		HOSE, 1 1/4" DIA X 250 FT EPDM SPRAY	Apache Hose & Belt	10040507
BM-213		HOSE, 2" ID ENFORCE FERT SOL HS W/HELIX	Apache Hose & Belt	12012964
BM-214		HOSE, 2" ID 150 PSI WATER DISCHARGE	Apache Hose & Belt	15611
BM-584		HOSE, 3/4" I.D. x 1.140" O.D. Yellow,PVC 600# Spray hose,	Apache Hose & Belt	15010009
BM-636		3" I.D. Enforcer/Reinforced Fertilizer Solution Hose	Apache	
BM-637		4" I.D. Enforcer/Reinforced Fertilizer Solution Hose	Apache	
BM-611		Locknut, Conduit, 1" Steel	APPLETON	BL100
BM-215		VALVE, SOLENOID (24VDC)	ASCO	8210G003 24VDC
BM-216		NOZZLE TIP, 1/4 MPT GREEN PP	BEX	F6560
BM-217		FUSE (.125 AMP/TYPE FU520/5x20 GMA)	BUSSMANN	GMA-.125
BM-218		FUSE (15 AMP/TYPE FU520/5x20 GMA)	BUSSMANN	GMA-15
BM-219		FUSE (10 AMP/TYPE FU520/5x20 GMA)	BUSSMANN	GMA-10
BM-220		FUSE (6.3 AMP/TYPE FU520/5x20 GDC)	BUSSMANN	GDC-6.3
BM-221		FUSE (5.0 AMP/TYPE FU520/5x20 GDC)	BUSSMANN	GDC-5.0
BM-222		FUSE (3.15 AMP/TYPE FU520/5x20 GDC)	BUSSMANN	GDC-3.15A
BM-223		FUSE (2.0 AMP/TYPE FU520/5x20 GDC)	BUSSMANN	GDC-2.0
BM-224		FUSE (1.0 AMP/TYPE FU520/5x20 GDC)	BUSSMANN	GDC-1.0
BM-225		FUSE (6.3 AMP/TYPE FU520/5x20 GMC)	BUSSMANN	GMC-6.3
BM-226		FUSE (5 AMP/TYPE FU520/5x20 GMC)	BUSSMANN	GMC-5.0
BM-227		FUSE (3 AMP/TYPE FU520/5x20 GMC)	BUSSMANN	GMC-3.0
BM-228		FUSE (2 AMP/TYPE FU520/5x20 GMC)	BUSSMANN	GMC-2.0
BM-229		FUSE (1 AMP/TYPE FU520/5x20 GMC)	BUSSMANN	GMC-1.0
BM-230		TWO-GANG BOX (TYPE FSC)	CANTEX	5133713
BM-231		TWO-GANG COVER (TYPE FSC)	CANTEX	5133410
BM-615		SanDisk Cruzer Micro Skin - USB flash drive - 2 GB	CDW	1500341
BM-232		LOCKING CONNECTOR, 30AMP 3 POLE 4 WIRE	Cooper Wiring Devices	L1430CY
BM-233		LOCKING PLUG, 30AMP 3 POLE 4 WIRE	Cooper Wiring Devices	L1430PY
BM-610		LOCKING PLUG, 30AMP 3 POLE 5 WIRE	Cooper Wiring Devices	L2130PY
BM-234		ROLL TARP	COVER OF INDIANA	ROLL TARP
BM-235	#97	LEVEL SWITCH, SIDE MOUNT	GEMS	160450
BM-236	#1.1	ENCLOSURE (24"x20"x8")	HAMMOND MFG	PJ242008RL
BM-237		ENCLOSURE, WINDOW (24"x20"x8")	HAMMOND MFG	PJ242008RLW
BM-238		ENCLOSURE (10"x8"x6")	HAMMOND MFG	PJ1086
BM-239		ENCLOSURE (12"x10"x6")	HAMMOND MFG	PJ12106
BM-240		ENCLOSURE (12"x10"x6")	HAMMOND MFG	PJ12106RL
BM-241		ENCLOSURE (18"x16"x8")	HAMMOND MFG	PJ18168RL
BM-242		ENCLOSURE (16"x14"x8")	HAMMOND MFG	PJ16148RL

ACCUBRINE™
AUTOMATED BRINE MAKER

BM #	HMI #	DESCRIPTION	MFG_NAME	MFG_PART_ID
BM-243		ENCLOSURE (10"x8"x6")	HAMMOND MFG	PJ1086RL
BM-244		GAUGE, WATER PRESSURE (0-160PSI)	HYPRO	WGG160C
BM-245		STRAINER, HYPRO, 1/2 FPT	HYPRO	10570
BM-246		MALE PIPE THREAD, 1/2" x 1/2"	HYPRO	A12B
BM-247		MALE PIPE THREAD, 3/4" x 1/2"	HYPRO	A3412B
BM-248	#78	HYPRO PUMP SS 1 PHASE, 230 V, ODP MOTOR	HYPRO	COMSV77
BM-249		1/4" FPT X 1/4FPT ELL	HYPRO	LL14B
BM-250		HOSE CLAMP, 1/2" ID HOSE , SS WORM DRIVE	HYPRO	6J
BM-251	#77	HYPRO PUMP , PUMP HEAD ONLY	HYPRO	COMSV7X
BM-252	#76	PEDESTAL PUMP ONLY	HYPRO	COPSV7
BM-253	#79	MOTOR, (for pedistal pump) 3 HP 230 60HZ 1 PHASE	Leeson	131637
BM-591		MOTOR, 3 HP 230V 60HZ 3 PHASE	Leeson	G130099.00
BM-592		MOTOR, WASHGUARD 3 HP 230V 60HZ 3 PHASE	Leeson	G120911.00
BM-254	#83	HUB, 5/8" BORE X 2-7/64 OD WITH KEYWAY	LOVEJOY	685144-37242
BM-255	#84	HUB, 1-1/8" BORE X 2-7/64 OD WITH KEYWAY	LOVEJOY	685144-11093
BM-256	#85	SPIDER SHAFT COULPING HUB, 2-7/64	LOVEJOY	685144-11070
BM-613		Hub, 7/8" Bore X 2-7/64 OD w/ Keyway (3 Phase Leeson Motor)	LOVEJOY	
BM-587		Seal Kit - Hypro	HYPRO	2120-0039S
BM-257		BAND HEATER, 3 1/2" X 3 3/4" 1900 WATTS	MC MASTER CARR	8160T23
BM-258	#24	ROLL COVER, BLK PE 1 5/16 X 1 9/16 OD	MC MASTER CARR	5872K51
BM-259	#36	PRESSURE TRANSDUCER (NEFF)	NEFF ENGINEERING	615-2-1-1-2-1
BM-260		FIBERGLASS END CAPS (TWO PER SET)	Premier Fiberglass	
BM-261		2.75 ID RUBBER GROMMET - GROOVE DIAMETER 3"	Rubber Prod. Distrb.	G3327
BM-262		ONE-TOUCH FITTING FEMALE CONNECTOR 1/4	SMC Corp. of America	KQ2FO7-35
BM-263		ONE-TOUCH FITTING MALE ELBOW 1/4" x 90*	SMC Corp. of America	KQ2LO7-35S
BM-264		ONE-TOUCH FITTING FEMALE CONNECTOR 1/4	SMC Corp. of America	KQ2SO7-35
BM-265		CONDUCTIVITY TESTER	WALCHEM	WEC410
BM-614		CONDUCTIVITY TESTER (New - 10/10/2009)	WALCHEM	WEC410-54PN-S
BM-641		WEC 410 Sensor	Walchem	190988-05
BM-266		PIPE SADDLE (WELD MOUNT) PP W/SS PLTS 1"	ZSI Inc.	S-5021-S-SS
BM-267		PIPE SADDLE PP W/SS PLTS 1 1/4"	ZSI Inc.	S-5027-S-SS
BM-268	#40	CROSS, 1" PVC FEMALE	SPEARS MFG	820-010
BM-598		SANDISK 512MB CF CARD (SDCFJ-512-388)	CDW	869078
BM-580		Plug, 3 phase, 5 prong	HUBBELL	HBL2811
BM-599		Dilute valve assembly - EH3, 24VDC	KZ CO Inc.	ACC1105
BM-600		Water valve assembly - EH2, 24VDC	KZ CO Inc.	ACC1075
BM-601		Tank valve assembly	KZ CO Inc.	ACC1150
BM-602		Dilute valve only - valve sub assbly, QX4 2-way, 1"HP	KZ CO Inc.	C2F-008
BM-603		Dilute valve actuator - EH3,3.5 SEC@24VDC	KZ CO Inc.	ACC1015
BM-604		Water valve only- valve sub assbly, EH2, 2" FP, 2 Way, 2" FP FLG	KZ CO Inc.	C2122
BM-605		Water valve actuator - EH2, Solid State, 4 Sec @ 24VDC	KZ CO Inc.	ACC1030
BM-606		Tank valve only - valve sub assbly, EH2, 2" FP, 3 Way, 2" FP FLG	KZ CO Inc.	C7122
BM-607		Tank valve actuator - EH2, Solid State, 4 Sec @ 24VDC, 90 DEG.	KZ CO Inc.	ACC1060
BM-608		Dilute valve fitting assbly, 3/4" Hosebarb, 90 DEG. Poly	KZ CO Inc.	QHP-075L
BM-617		RFID Tags - Key Fob style	RF Logics	IDK50
BM-627		RFID Card Reader	RF Logics	RFK101W
BM-642		RFID READER WITH RS232 OUTPUT	RFLOGICS	# RF10 (RS232 OU
BM-643		DISPLAY PD6000-7R0	PRECISION DIGITAL	# PD6000-7R0
BM-629		24VDC to 12 VDC Power Supply	Rhino	PSP12-024S
BM-632		CABLE (MINI DIN)	L-COM	DK238MF-3
BM-633		USB CONNECTOR, PANEL MOUNT,05M LENGHT	L-COM	WPUSBAX-05M
BM-634		USB CONNECTOR, CAP	L-COM	WPUSB-CVR
BM-635		3 CONDUCTOR SHILD CABLE (75 FT)	BELDEN	
BM-269	#51	OUTLET, PERF SPRAY 3/16"	ATE	
BM-270	#92 incl.	FLUSH TUBE, 1" PVC PIPE (FAB)	ATE	
BM-271	#55	PLUG, 3" (MODIFIED COMM'L) OS TAP	ATE	
BM-272	#58	PLUG, 3" (MODIFIED COMM'L)INS TAP	ATE	
BM-561		FLOW REDUCER INSERT ASSY (Dilute valve)	ATE	
BM-562	#88	PUMP RISER	ATE	

ACCUBRINE™
AUTOMATED BRINE MAKER

BM #	HMI #	DESCRIPTION	MFG_NAME	MFG_PART_ID
BM-563		HEATER UNIT ASSEMBLY	ATE	
BM-571	#87	PEDISTAL PUMP REBUILD KIT	ATE	
BM-100		1 1/4 PVC Flange (Modified) for Press. Tran.(PVC) and tube	ATE	851-012
BM-99		1 1/4 PVC Adaptor for Press. Tran.(PVC) and tube	ATE	
BM-93		PVC X M220 Adaptor	ATE	
BM-583		PVC X M330 Adaptor	ATE	
BM-578		Valve Handle Labels (does not include milling of handles)	ATE	
BM-579		Hose Labels - set	ATE	
BM-582		Modified M220CROSS	ATE	
BM-586		BM-253,Motor, 3 Hp, 1 Ph (Leeson #131637),& BM-252 Pedistal Pump (Hypro#COPSV7)		ATE
BM-609		KZ Dilute valve insert	ATE	
BM-612		3 Phase Wash Down Motor, Mounts, Coupler and Guard	ATE	
BM-624		Enclosure Strut	ATE	
BM-644		ALUMINUM RETROFIT PLATE (PUMP)	ATE	
BM-273	# 1	TANK VALVE ASSEMBLY	BANJO	MEV220BL243D
BM-274	#2	WATER VALVE ASSEMBLY	BANJO	MEV220CF243D
BM-275	#3	DILUTE VALVE ASSEMBLY	BANJO	MEV100CF243D
BM-276	#62	REMOTE FILL VALVE ASSEMBLY	BANJO	MEV220SL243D
BM-277		COUPLING, 1" X 90°	BANJO	EL100-90
BM-278	#54	COUPLING, 3 IN	BANJO	M300CPG
BM-279	#75	CROSS, 3" FEMALE	BANJO	M300CR
BM-280	#53	REDUCER, 3"X 2" FEMALE	BANJO	M300220BRB90
BM-281	#68	CLAMP, 3"	BANJO	FC300
BM-282		GASKET, 3" (EPDM)	BANJO	300G
BM-283		GASKET,2" (EPDM)	BANJO	200G
BM-284	#56	ADAPTOR, 3" X 2"	BANJO	M300220CPG
BM-285	#10	HOSE FITTING, 2"	BANJO	M220BRB
BM-286	#9	HOSE FITTING, 2" (MODIFIED COMM'L)	BANJO	M220BRB
BM-287	#6	CROSS, 2"	BANJO	M220CR
BM-288	#12	REDUCER COUPLING, 2" X 1"	BANJO	M220100CPG
BM-289	#14	HOSE FITTING, 1"	BANJO	M100125BRB
BM-290	#15	TEE, 1"	BANJO	M100TEE
BM-291	#7	TEE, 2"	BANJO	M220TEE
BM-292	#61	MANUAL VALVE, 2",3 WAY	BANJO	MV220BL
BM-293		HANDLE, EXTENDERS	BANJO	V25153138BL
BM-294	#13	HOSE FITTING, 1 1/4" X 1" X 90°	BANJO	M100125BRB90
BM-295	#66	CLAMP, 2"	BANJO	FC220
BM-296	#67	CLAMP, 1" BANJO	BANJO	FC100
BM-297		GASKET, 1" BANJO	BANJO	M100G
BM-298	#16	VALVE W/QUICK COUPLER	BANJO	MVSF220FP
BM-299		FLANGE, TANK	BANJO	MBF223
BM-300		FLANGE, TANK	BANJO	MBF200
BM-301	#19	NOZZLE, RETURN SPRAY (MODIFIED COMM'L.)	BANJO	PLUG200
BM-302	#72	FLANGE, TANK	BANJO	MBF220
BM-303	#69	CLAMP, T-BOLT HOSE	BANJO	TC218
BM-304	#48	ADAPTOR,THREADED 2" MPT	BANJO	M220MPT
BM-305	#47	HOSE FITTING, 2" MPT x HOSE FITTING	BANJO	HB200
BM-306		VALVE ONLY, 2" FP MANIFOLD	BANJO	MEV220XR1
BM-307		1" MANIFOLD FLANGE ENDPLATE	BANJO	VE10278A
BM-308	#45	ADAPTOR, MALE CAMLOCK	BANJO	M220A
BM-309	#65	COUPLING, 2" X 45°	BANJO	M220CPG45
BM-310	#44	TEE, REDUCING 2" X 1"	BANJO	M220100TEE
BM-311	#11	HOSE FITTING, 2" X 90°	BANJO	M220BRB90
BM-312		CLAMP, HOSE 1-1/4	BANJO	TC162
BM-313	#18	FLANGE HALF, 2"	BANJO	BF278
BM-314	#18A	GASKET, 2"	BANJO	BF220GE
BM-315	#25	HOSE FITTING,1" MPT X 1 1/4 HOSE X 90°	BANJO	HB100/125-90
BM-316	#37	HOSE FITTING,1/2" MPTX 1/2 HOSE X 90°	BANJO	HB050-90
BM-317	#38	UNION VALVE, 1/2"	BANJO	UV050FP

ACCUBRINE™
AUTOMATED BRINE MAKER

BM #	HMI #	DESCRIPTION	MFG_NAME	MFG_PART_ID
BM-318	#71	NIPPLE, CLOSE 1/2"	BANJO	NIP050-SH
BM-319	#30	HOSE FITTING, 1 1/4 MPT X 1 1/4 HOSEX90°	BANJO	HB125-90
BM-320	#32	NIPPLE, 1/2" X 3" LONG	BANJO	NIP050-3
BM-321	#33	STREET ELL, 1/2" X 90°	BANJO	SL050-90
BM-322	#34	FLANGE, TANK W/GASKET	BANJO	TF050
BM-323	#35	BUSHING, REDUCER 1/2" X 1/4"	BANJO	RB050-025
BM-324	#52	THREADED ADAPTOR, 2" SS	BANJO	M220MPTSS
BM-325		2" PLUG, BANJO	BANJO	M220PLG
BM-326		1" X 90° FLANGED BARB	BANJO	M100BRB90
BM-327		1" FLANGED BARB	BANJO	M100BRB
BM-328	#5	VALVE, 1" BALL	BANJO	MV100CF
BM-329	#39	HOSE BARB, 1/2 IPS X 1/2 ID HOSE	BANJO	HB050
BM-330		3" STN.STL. THREADED ADAPTER	BANJO	M300MPTSS
BM-331	#57	1 1/2" STN.STL. THREADED ADAPTER	BANJO	M220150MPTSS
BM-332		3" PLUG	BANJO	M300PLG
BM-333		4" STN. STL. THREADED FLANGE	BANJO	BFC400SS
BM-334	#63	4" CAMLOCK FITTING	BANJO	400F
BM-335	#64	4" CAMLOCK CAP	BANJO	400CAP
BM-336	#23	TANK FLANGE, 1"	BANJO	MBF100
BM-337	#20	TEE HANDLE 1" VALVE (AS PURCHASED)	BANJO	V10353TB
BM-338		2" X 6" FULL PORT FLANGE	BANJO	M220CPG6
BM-339	#21	TANK FLANGE, 1" LONGER BOLTS	BANJO	MBF105
BM-340	#70	CLAMP, T-BOLT HOSE (2.31"-2.62")	BANJO	TC231
BM-341		2" CAMLOCK FEMALE/ 90 DEG BARB	BANJO	200C90
BM-342		2" CAMLOCK FEMALE / STRAIGHT BARB	BANJO	200C
BM-343	#4	VALVE, 2"	BANJO	MV220CFSH
BM-344		2" X FP FLANGE X 2" FPT INLET	BANJO	MV220SL
BM-345		2" CAP	BANJO	200CAP
BM-346	#74	2" FP X 2" FP MANIFOLD COUPLING	BANJO	M220CPG90
BM-347		1" FLANGE X 3/4" MALE THREAD	BANJO	M100075MPT
BM-348		2" X 2" FULL PORT FLANGE	BANJO	M220CPG
BM-349		3" FLANGE X 3" HOSE BARB	BANJO	M300BRB
BM-350		3" FLANGE X 3" THRD-EPDM	BANJO	MBF300
BM-351		3" FLANGED MANIFOLD VALVE	BANJO	MV300CF
BM-352		3" FLANGED X 3" HB-90 DEGREE	BANJO	M300BRB90
BM-353		3" STBY VLV QDC X FLNG LNG HNDL	BANJO	MVSF300
BM-354		3" MANIFOLD TEE	BANJO	M300TEE
BM-355		90 DEGREE MOUNTING BRACKET	BANJO	V25271
BM-356		1 SEC 24V HT 5 WIRE MOTOR ASSM (FAST)	BANJO	EV41243C
BM-357		90 DEG FMLE CPLP 2" FPT	BANJO	200D90
BM-358	#8	2" FULL PORT FLANGE X 2 " HOSE BARB 45 D	BANJO	M220BRB45
BM-359		FITTING, 1" POLY ELBOW 90 DEG	BANJO	EL100-90
BM-360		CAPLUG 1-1/8"	BANJO	V20353C
BM-361	#73	2" FP Y 45 MANIFOLD FITTING	BANJO	M220Y45
BM-362	#17	VALVE ACTUATOR ONLY (SLOW) 1/2" SHAFT	BANJO	EV41243D
BM-363		3" TANK FLANGE ASSY	BANJO	TF300
BM-364	#93	4" VALVE	BANJO	V400
BM-365	#94	NIPPLE, 4" X SHORT POLY	BANJO	NIP400-SH
BM-366	#95	HOSE FITTING, 4" MPT X 4" HOSE BARB	BANJO	HB400
BM-367	#96	HOSE FITTING, MALE ADATPER 4" HOSE BARB	BANJO	400E
BM-564		VALVE ONLY 1" (Dilute Valve)	BANJO	MEV100XR1
BM-567		2" FP BL VALVE ONLY (Tank Valve)	BANJO	MEV220BLXR1
BM-569		2" VALVE ONLY - SIDE LOAD	BANJO	MEV220SLXR1
BM-572	#89	3" X 3" STD PORT MANIFOLD 45 CPLNG	BANJO	M300CPG45
BM-573	#90	MNFLD HOSE BARB 3" X 2" BARB	BANJO	M300220BRB
BM-574	#91	1" Manifold X 3/4" Elbow Cplg	BANJO	M100075BRB90
BM-581		1" Manifold X 3/4" Hose Barb	BANJO	M10075BRB
BM-588		3" manifold X 3" Male pipe thread	BANJO	M300MPT
BM-589		3"T-Bolt Hose Clamp	BANJO	TC331

ACCUBRINE™
AUTOMATED BRINE MAKER

BM #	HMI #	DESCRIPTION	MFG_NAME	MFG_PART_ID
BM-368		SALT TANK GRATE ASSEMBLY	D&V Prec. Sht Mtl	
BM-369		SS MOUNTING BRACKET	D&V Prec. Sht Mtl	
BM-370		BRACKET, 1" VALVE	D&V Prec. Sht Mtl	
BM-371		BRACKET, 2" VALVE	D&V Prec. Sht Mtl	
BM-372		PAN, FLOOR (CONTROL PANEL)	D&V Prec. Sht Mtl	
BM-373		ACCUBRINE CONTROL PANEL FACE	D&V Prec. Sht Mtl	
BM-374		PANEL, MOUNTING RIGHT 14GAUGE	D&V Prec. Sht Mtl	
BM-375		PANEL, MOUNTING LEFT 14 GAUGE	D&V Prec. Sht Mtl	
BM-376		BRACKET, 2" VALVE SPECIAL 10GAUGE	D&V Prec. Sht Mtl	
BM-377		LARGE HMI INTERFACE PANEL	D&V Prec. Sht Mtl	
BM-378		REMOTE FILL CONTROL PANEL	D&V Prec. Sht Mtl	
BM-379		STRAP, (3) HOLE	D&V Prec. Sht Mtl	
BM-380		TARP STOP	D&V Prec. Sht Mtl	
BM-381		J HOOK	D&V Prec. Sht Mtl	
BM-382		WALL MANIFOLD PANEL, 5 HOLE UNIT	D&V Prec. Sht Mtl	
BM-383		UNIVERSAL BRACE-REMOTE PANEL	D&V Prec. Sht Mtl	
BM-384		UNIVERSAL BRACE-REMOTE PANEL (REV A)	D&V Prec. Sht Mtl	
BM-385		WALL MANIFOLD PANEL, 4 HOLE UNIT	D&V Prec. Sht Mtl	
BM-386		WALL MANIFOLD PANEL, 3 HOLE UNIT	D&V Prec. Sht Mtl	
BM-387		Y-MODULE PANEL	D&V Prec. Sht Mtl	
BM-388		UNIVERSAL BRACE Y-MODULE PANEL	D&V Prec. Sht Mtl	
BM-389		Y-6 MODULE PANEL	D&V Prec. Sht Mtl	
BM-390		PANEL, MOUNTING RIGHT SPECIAL 10GAUGE	D&V Prec. Sht Mtl	
BM-391		PANEL, MOUNTING LEFT SPECIAL 10GAUGE	D&V Prec. Sht Mtl	
BM-570	#86	SHROUD - COVERS PUMP/MOTOR COUPLING	D&V Prec. Sht Mtl	
BM-625		4 X 4 KZ Sub Panel	D&V Prec. Sht Mtl	
BM-626		6 X 6 KZ Sub panel	D&V Prec. Sht Mtl	
BM-618		1" Manual Banjo Valve Bracket	D&V Prec. Sht Mtl	
BM-619		2" Manual Banjo Valve Bracket	D&V Prec. Sht Mtl	
BM-620		Enclosure Mounting Bracket Left	D&V Prec. Sht Mtl	
BM-621		Enclosure Mounting Bracket Right	D&V Prec. Sht Mtl	
BM-622		1" KZ Actuator Bracket	D&V Prec. Sht Mtl	
BM-623		2" KZ Actuator Bracket	D&V Prec. Sht Mtl	
BM-392		CONDUIT Liquid tight FITTING, 1/2"	Heyco Products Co.	8402
BM-393		1/2" BLACK MOUNTING BRKT	Heyco Products Co.	1027
BM-394		PLUG, DOME 2.50"	Heyco Products Co.	2790
BM-395	#1.77	CORDGRIP, LIQUID TIGHT, FITTING, 1/2"	Heyco Products Co.	3231
BM-396	#1.78	NYLON STRAIGHT NPT, FITTING, 1/2"	Heyco Products Co.	8402
BM-397	#1.79	NYLON 90 DEGREE NPT, FITTING, 1/2"	Heyco Products Co.	8425
BM-398	#1.80	SEALING WASHERS, 1/2"=	Heyco Products Co.	3260
BM-399	#1.81	NYLON STRAIGHT NPT, FITTING, 3/4"	Heyco Products Co.	8404
BM-400	#1.82	SEALING WASHERS, 3/4"=	Heyco Products Co.	3261
BM-401	#1.83	LIQUID TIGHT TUBING, 1/2"	Heyco Products Co.	8451
BM-402	#1.84	LIQUID TIGHT TUBING, 3/4"	Heyco Products Co.	8452
BM-403		1/2" NYLON CABLE CLAMPS	Heyco Products Co.	3375
BM-404		CORDGRIP, LIQUID TIGHT, FITTING, 1"	Heyco Products Co.	M8439
BM-405		LOCKNUT, NYLON, 1"	Heyco Products Co.	8467
BM-406		LABELS, 81-90	PHOENIX CONTACT	1051016 81-90
BM-407		RELAY, 3A (120VAC COIL)	PHOENIX CONTACT	29 66 19 7
BM-408	#1.35	POWER SUPPLY, (24VDC 10A)	PHOENIX CONTACT	29 38 60 4
BM-409	#1.36	RELAY, 3A (24VDC COIL)	PHOENIX CONTACT	29 66 63 4
BM-410	#1.37	RELAY, 3A (120VAC COIL)	PHOENIX CONTACT	29 66 65 0
BM-411	#1.38	TERMINALS, UT4 GRAY	PHOENIX CONTACT	30 44 10 2
BM-412		TERMINALS, UT4-TG GRAY	PHOENIX CONTACT	30 46 14 2
BM-413	#1.40	TERMINALS, UT4-PE GREEN	PHOENIX CONTACT	30 44 12 8
BM-414	#1.41	END ANCHORS, GRAY	PHOENIX CONTACT	08 00 88 6
BM-415		LABELS, 1-10	PHOENIX CONTACT	1051016 1-10
BM-416		FUSE, PLUGS 5x22MM (250VAC)	PHOENIX CONTACT	30 36 83 5
BM-417		FUSE, PLUGS 5x22MM (24VDC)	PHOENIX CONTACT	30 36 81 9

ACCUBRINE™
AUTOMATED BRINE MAKER

BM #	HMI #	DESCRIPTION	MFG_NAME	MFG_PART_ID
BM-418	#1.52	JUMPERS, (2 POSITION)	PHOENIX CONTACT	30 30 33 6
BM-419		JUMPERS, (3 POSITION)	PHOENIX CONTACT	30 30 24 2
BM-420	#1.54	JUMPERS, (4 POSITION)	PHOENIX CONTACT	30 30 25 5
BM-421		RAIL, DIN (34MM X 2M LG)	PHOENIX CONTACT	08 01 73 3
BM-422		END BARRIERS, UT4	PHOENIX CONTACT	30 47 02 8
BM-423		RELAY, 3A (24VDC COIL)	PHOENIX CONTACT	29 66 17 1
BM-424		JUMPERS, (10 POSITION)	PHOENIX CONTACT	30 30 27 1
BM-425		JUMPERS, (20 POSITION)	PHOENIX CONTACT	30 30 36 5
BM-426	#1.51	FUSE BLOCK, 5x22MM (250VAC)	PHOENIX CONTACT	30 46 10 0
BM-427	#1.50	FUSE BLOCK, 5x22MM (24VDC)	PHOENIX CONTACT	30 46 09 0
BM-428		LABELS, 221-230	PHOENIX CONTACT	1051016 221-230
BM-429		JUMPER, BAR	PHOENIX CONTACT	2966692
BM-430		POWER SUPPLY, (24VDC 5A)	PHOENIX CONTACT	29 38 58 1
BM-431	#1.5	PLC BASE, (TWIDO)	SQUARE D	TWDLCAA24DRF
BM-432	#1.6	HIGH LEVEL INPUT ANALOG MODULE, (TWIDO) old plc	SQUARE D	TWDAM12HT
BM-433	#1.6	LOW LEVEL INPUT ANALOG MODULE, (TWIDO) old plc for heater	SQUARE D	TWDALM3LT
BM-434		MEMORY MODULE, (TWIDO) for plc memory	SQUARE D	TWDXCPMFK32
BM-435		HMI UNIT	SQUARE D	XBTN401
BM-436		CABLE, FOR HMI UNIT	SQUARE D	XBTZ968
BM-437	#1.11	BREAKERS, CIRCUIT 2 POLE (20A)	SQUARE D	60147
BM-438		BREAKERS, CIRCUIT 2 POLE (10A)	SQUARE D	60144
BM-439	#1.13	MOTOR STARTER, 32A (120V COIL)	SQUARE D	LC1D32G7
BM-440	#1.14	OVERLOAD, THERMAL (0-21A)	SQUARE D	LRD21
BM-441		CONTACTOR, 9A (120V COIL)	SQUARE D	LC1K0910G7
BM-442		ROTARY, DISCONNECT 43A WITH ROD	SQUARE D	VCCF3
BM-443	#1.17	POWER DISTRIBUTION BLOCK	SQUARE D	9080LBA161101
BM-444	#1.18	GROUND BAR	SQUARE D	PK9GTA
BM-445		PLUG, 22MM	SQUARE D	ZB5SZ3
BM-446	#1.20	RELAY, 6A (120V COIL)	SQUARE D	LC1K0610G7
BM-447		SWITCH, SELECTOR (BUTTON)	SQUARE D	ZB4BD7
BM-448		PUSH BUTTON, (BASE W 1 N.C. CONTACT)	SQUARE D	XB4BT42
BM-449		CONTACT BLOCKS, (N.O.)	SQUARE D	ZBE101
BM-450		CONTACT BLOCKS, (BASE WITH N.C.)	SQUARE D	ZB4BZ102
BM-451		LEGEND PLATE, (E-STOP)	SQUARE D	ZBY2330
BM-452		LEGEND PLATE, (AUTO/OFF)	SQUARE D	ZBY2385
BM-453		BLUE, TRANSDUCER, PRESSURE (0-3 PSI)	SQUARE D	XLM-E001U1C21
BM-454		CONNECTOR FOR TRANSDUCER	SQUARE D	XZ-CC43FCP40B
BM-455		CABLE, FOR HMI UNIT 1METER	SQUARE D	TWDXCARJ010
BM-456	#1.12	BREAKERS, CIRCUIT 1 POLE (10A)	SQUARE D	60110
BM-457		CABLE, FOR HMI UNIT 3 METER	SQUARE D	TWDXCARJ030
BM-458		LARGE HMI UNIT COLOR	SQUARE D	XBTG4330
BM-459		PUSH BUTTON (START) ,22MM	SQUARE D	ZB4BA333
BM-460		PUSH BUTTON (STOP) ,22MM	SQUARE D	ZB4BL434
BM-461		22MM BASE WITH N.O CONTACT BLOCK	SQUARE D	ZB4BZ101
BM-462		PUSH BUTTON, BLACK	SQUARE D	ZB4BA2
BM-463		PUSH BUTTON, BLUE	SQUARE D	ZB4BA6
BM-464		PILOT LIGHT , 24VDC LED GREEN	SQUARE D	ZB4BVB3
BM-465		HANDLE, DISCONNECT	SQUARE D	GS1 AH 102
BM-466		ROTARY, DISCONNECT 30A	SQUARE D	LK3 DU 3
BM-467		SHAFT, DISCONNECT	SQUARE D	GS1 AE 7
BM-468		SELECTOR SWITCH, BLACK 3 MOMENTARY	SQUARE D	ZB5AD7
BM-469		BREAKERS, CIRCUIT 3 POLE (50A)	SQUARE D	MG24545
BM-470		MOTOR STARTER, 50A (120V COIL)	SQUARE D	LC1D50G7
BM-471		OVERLOAD, THERMAL (37-50A)	SQUARE D	LRD3357
BM-472		ROTARY, DISCONNECT 63A WITH ROD	SQUARE D	VCCF4
BM-473		OVERLOAD, THERMAL (48-65A)	SQUARE D	LRD3359
BM-474		BREAKERS, CIRCUIT 3 POLE (63A)	SQUARE D	MG24546
BM-475		PUSH BUTTON ENCLOSURE, 3 HOLE UNIT	SQUARE D	XALD03
BM-476		CONTACT BLOCK , N.O.	SQUARE D	ZENL1111

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AUTOMATED BRINE MAKER

BM #	HMI #	DESCRIPTION	MFG_NAME	MFG_PART_ID
BM-477		CONTACT BLOCK , N.C.	SQUARE D	ZENL1121
BM-478		PILOT LIGHT , 24VDC LED	SQUARE D	ZALVB3
BM-479		GREEN LENS FOR LED PILOT LIGHT	SQUARE D	ZB5AV033
BM-480		E-STOP BUTTON , 22MM	SQUARE D	ZB5AT44
BM-481		SELECTOR SWITCH , 2 POISTION ,22MM	SQUARE D	ZB5AD2
BM-482		LEGEND PLATE, START/STOP	SQUARE D	ZBY2366
BM-483		BREAKERS, CIRCUIT 3 POLE (30A)	SQUARE D	60182
BM-484		OVERLOAD, THERMAL (17-25A)	SQUARE D	LRD1522
BM-485		HMI UNIT B/W	SQUARE D	XBTGT2120
BM-486		HMI UNIT WITH VIDEO INPUT	SQUARE D	XBTGT4340
BM-487		HMI ADAPTER INTERFACE CABLE	SQUARE D	XBTZG909
BM-488		EXPANSION INPUT/OUTPUT MODULE (4)	SQUARE D	TWDDMM8DRT
BM-489		PILOT LIGHT HEAD GREEN	SQUARE D	ZB4BV033
BM-490		OVERLOAD, THERMAL (23-28A)	SQUARE D	LRD1530
BM-491		HMI ADAPTER INTERFACE CABLE	SQUARE D	XBTZ9780
BM-492		CABLE, PC TO B/W HMI , USB TO USB	SQUARE D	XBTZG935
BM-493		SELECTOR SWITCH, 3 POSITION MAINT	SQUARE D	ZB4BJ3
BM-494		E-STOP BUTTON	SQUARE D	ZB4BT4
BM-495		22MM BASE UNIT W/ 2-N.O. CONTACTS BLOCKS	SQUARE D	ZB4BZ103
BM-496		LEGEND PLATE, (HAND-OFF-AUTO)	SQUARE D	ZBY2387
BM-497		PLC BASE, MODULE UNIT(TWIDO)	SQUARE D	TWDLMDA20DRT
BM-498		INPUT MODULE , 16PT	SQUARE D	TWDDDI16DT
BM-499		OUTPUT MODULE , 16PT	SQUARE D	TWDDRA16RT
BM-500		ANALOG INPUT , 4PT new plc	SQUARE D	TWDAMM6HT
BM-501		SERIAL LINK ADAPTER RS485	SQUARE D	TWDNOZ485D
BM-502		BREAKERS, CIRCUIT 3 POLE (15A)	SQUARE D	60179
BM-453		Pressure Transducer - Silver, 0 - +1 Bar range	SQUARE D	XML-G001D21
BM-630		TRANSDUCER, PRESSURE,XMLG	SQUARE D	XMLG001D21SAL
BM-638		MEMORY MODULE, (TWIDO) for NEW plc memory 64K	Square D	TWDXCPMFK64
BM-503		5/16-18" 18-8 Stainless Steel Flange Lock Nut	FASTENAL	110129151
BM-504		3/16 Dia .126-.250" Grip Range SSB64S Stainless Rivet	FASTENAL	41425
BM-505	#31	1" SlipxMPT PVC Sched 80 Male Adapter Coupling	FASTENAL	836-010
BM-506	#46	2" SlipxFPT PVC Sched 80 Female Adapter Coupling	FASTENAL	835-020
BM-507		2" SlipxSlip PVC Sched 80 90Deg Socket Elbow	FASTENAL	806-020
BM-508		3/8-16 x 2" Pipe 304 S/S Round Bend U-Bolt	FASTENAL	74638
BM-509		5/16-18 x 3/4" 18-8 Stainless Steel Carriage Bolt	FASTENAL	74429
BM-510		3/8-16 x 3" 18-8 Stainless Steel Carriage Bolt	FASTENAL	74441
BM-511		3/8-16" 18-8 Stainless Steel Flange Lock Nut	FASTENAL	110129152
BM-512	#41	1"x1/2" SPGxFPT PVC Sched 80 Flush Thrd Reducing Bushing	FASTENAL	838-130
BM-513	#42	1" SlipxSlip PVC Sched 80 90Deg Socket Elbow	FASTENAL	806-010
BM-514	#43	1" SlipxFPT PVC Sched 80 Female Adapter Coupling	FASTENAL	835-010
BM-515	#28	1-1/4" SlipxFPT PVC Sched 80 Female Adapter Coupling	FASTENAL	835-012
BM-516	#26	1-1/4" SlipxSlip PVC Sched 80 90Deg Socket Elbow	FASTENAL	806-012
BM-517	#29	1-1/4" SxSxS PVC Sched 80 Socket Tee	FASTENAL	801-012
BM-518	#27	1-1/4"x1" SPGxFPT PVC Sched 80 Flush Thrd Reducing Bushing	FASTENAL	838-168
BM-519		10-24 x 1/2" Plain Finish Button Head Socket Cap Screw	FASTENAL	24030
BM-520		3/4"-10 316 S/S Nylon Insert Lock Nut Type NE	FASTENAL	77867
BM-521		3/8"x4" 1000Lb-WLL 304 Stainless Steel Welded Eye Bolt	FASTENAL	74667
BM-522		1/4-20 x 1/2" Stainless Steel Button Head Socket Cap Screw	FASTENAL	73752
BM-523		10-24 18-8 Stainless Steel Nylon Insert Lock Nut	FASTENAL	70857
BM-524		5/16" x 3/4" T316 Stainless Steel Flat Washer	FASTENAL	1778015
BM-525		#10-32 x 1/2" Phillips 18-8 S/S Pan Head Machine Screw	FASTENAL	72515
BM-526		5/16"-18 x 1" 18-8 Stainless Steel Hex Cap Screw	FASTENAL	70055
BM-527		3/8-16 18-8 Stainless Steel Nylon Insert Lock Nut	FASTENAL	70862
BM-528		5/16-18 x 1" 18-8 Stainless Steel Carriage Bolt	FASTENAL	74430
BM-529		1/4" x 1 3/8" Acorn Nut Sleeve Anchor Zinc	FASTENAL	50342
BM-530		1/4 x 1-1/2" Hot Dipped Galvanized, Hex Lag Screw	FASTENAL	22088
BM-531		#6 x 3/8" Phillips 18-8 SS Oval Head Sheet Metal Screw	FASTENAL	72290
BM-532		#10 x 5/8" Phillips 18-8 S/S Oval Head Sheet Metal Screw	FASTENAL	72292

BM #	HMI #	DESCRIPTION	MFG_NAME	MFG_PART_ID
BM-533		1/2" Schedule 40 Female Adapter	FASTENAL	704423
BM-534		3/4" Schedule 40 Female Adapter	FASTENAL	704424
BM-535		1/2" Schedule 40 Male Terminal Adapter	FASTENAL	704417
BM-536		3/4" Schedule 40 Male Terminal Adapter	FASTENAL	704418
BM-537		5/16"-18 x 1 1/4" 18-8 Stainless Steel Hex Cap Screw	FASTENAL	70057
BM-538		1/4"-20 x 2" 18-8 Stainless Steel Hex Cap Screw	FASTENAL	70011
BM-539		5/16"-18 Hex Full Nut 316 Stainless Steel	FASTENAL	77711
BM-540		1/4"-20 18-8 Stainless Steel Hex Full Nut	FASTENAL	70710
BM-541		1/4" x 11/16 " 18-8 Stainless Steel Flat Washer	FASTENAL	71014
BM-542		10-32 x 5/8" 18-8 S/S Button Head Socket Cap Screw	FASTENAL	73744
BM-543		10-32x3/8" Hex Washer Slot Type F Zinc Thread Cutting	FASTENAL	32392
BM-544		10-32x1/2" Hex Washer Slot Type F Zinc Thread Cutting	FASTENAL	32393
BM-545		3/4"x1/2" SPIGxFPT PVC Sched 40 Bushing	FASTENAL	471658
BM-546		1/4-20 x 3/4" 18-8 S/S Button Head Socket Cap Screw	FASTENAL	73754
BM-547		1/4" Zinc Plated USS Flat Washer	FASTENAL	1133004
BM-548		10-32 18-8 Stainless Steel Nylon Insert Lock Nut	FASTENAL	70858
BM-549		5/16-18 x 1-1/2" 18-8 Stainless Steel Carriage Bolt	FASTENAL	74432
BM-550		1" SlipxSlip PVC Sched 80 Socket Coupling	FASTENAL	470438
BM-551		1-1/4" SlipxSlip PVC Sched 80 Socket Coupling	FASTENAL	470439
BM-552		10/32 X 1/2 PHILLIPS PAN THREAD CUTTING SCREW TY-F, 410SS	FASTENAL	175969
BM-553		#10 .218x.437" T316 Stainless Steel Flat Washer	FASTENAL	78009
BM-554		5/16-18 x 5" 18-8 Stainless Steel Carriage Bolt	FASTENAL	74404
BM-555		5/16-18 18-8 Stainless Steel Nylon Insert Lock Nut	FASTENAL	70861
BM-556		1/2" MPT x Close PVC Sched 80 Threaded Pipe Nipple	FASTENAL	470793
BM-557		1/2" FPTxFPT PVC Sched 40 Coupling	FASTENAL	471564
BM-558		2" Standard Pipe & Rigid Conduit Strut Pipe Clamps	FASTENAL	48886
BM-559		3/4" Rigid/Thin Wall Conduit-Zinc Strut Pipe Clamps	FASTENAL	49061
BM-560		2" SlipxSlip PVC Sched 80 Socket Coupling	FASTENAL	470441

ACCUBRINE®
AUTOMATED BRINE MAKER

AccuBrine® automated brine maker

Manufacturer Warranty Terms

One-Year Limited Brine Maker Warranty

Cargill Deicing Technology (CDT) warrants to customers who purchase new AccuBrine® automated brine makers from CDT's authorized distributors or from CDT ("original purchasers") that the AccuBrine® automated brine maker ("Brine Maker") will be free from defects in material and workmanship for a period of one (1) year beginning after the completion date of installation and customer training, and that CDT will repair any defect in material or workmanship, and repair or replace any defective part, subject to the conditions, limitations, and exclusions set forth herein. CDT will cover all parts and labor for the first year of qualified repairs or replacements for original purchasers.

Conditions, Limitations, Exclusions

This warranty is subject to the additional following conditions, limitations, and exclusions:

To obtain warranty service, the following conditions must be met:

- The original purchaser must complete the warranty registration form included with the shipped brine maker after installation and training.
- The original purchaser must notify CDT or an authorized distributor of the need for warranty service within five (5) business days of discovering any defect in material or workmanship and/or any defective part.
- Warranty service must be performed by CDT or an authorized CDT service representative.

This warranty is subject to the following limitations:

- This warranty applies only if the Brine Maker is put to ordinary, reasonable, brine making uses.
- CDT may from time to time change the design of its products. Nothing contained in this warranty shall be construed as obligating CDT to incorporate such designs into previously manufactured products, nor shall such changes be construed as an admission that previous designs were defective.

The following items are excluded from this warranty:

- Parts that are not from the original manufacturer are not covered by this warranty.
- Any defect resulting from an individual or entity's misuse, alteration, improper adjustment, neglect, or accident—including but not limited to any damage caused to any components by vehicles or other mobile equipment striking any component of the Brine Maker—is not covered by this warranty. If the Brine Maker must be stored prior to installation and customer training, this warranty does not cover any damage to the Brine Maker or its components resulting from the purchaser's neglect or failure to use due care in handling and storing the Brine Maker.

ACCUBRINE®
AUTOMATED BRINE MAKER

AccuBrine® automated brine maker

Manufacturer Warranty Terms

Disclaimer of Further Warranty

EXCEPT AS OTHERWISE PROVIDED IN THIS DOCUMENT, CDT MAKES NO WARRANTIES OF MERCHANTABILITY, QUALITY, FITNESS FOR A PARTICULAR PURPOSE, CAPACITY, DESCRIPTION OR OTHERWISE—WHETHER EXPRESS, IMPLIED, STATUTORY, OR ARISING FROM COURSE OF PERFORMANCE, COURSE OF DEALING OR USAGE OF TRADE. THERE ARE NO ORAL AGREEMENTS OR WARRANTIES COLLATERAL TO OR AFFECTING THE SUPPLY AGREEMENT.

This One (1) Year Limited Brine Maker Warranty is specifically intended for the original purchasers of AccuBrine® automated Brine Makers. CDT expressly disclaims any warranty of any type to any subsequent purchasers of the automated Brine Makers.

If applicable state law provides that an implied warranty of merchantability, an implied warranty of fitness for a particular purpose, or any other implied warranty applies to CDT, then any such implied warranty is limited to the duration of this warranty.

Limitation of Remedy and Damages

CDT's liability under this warranty, and under any implied warranty required by law, is limited to repair of any defect in workmanship, and repair or replacement of any defective part, shall in no event exceed the purchase price of the product. CDT shall in no event be liable for incidental, special, or consequential damages (including lost profits) whether the claim is based on contract, tort, strict liability or any other theory.

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ACCUBRINE™
AUTOMATED BRINE MAKER

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AccuBrine® automated brine maker

Warranty Claim Form

Date of Claim: _____

Claim #: _____

Owner Information:

Owner Name: _____
Owner Address: _____
_____
_____
_____

Owner Phone: _____

Owner Fax number: _____

Owner E-mail: _____

Claimant Information:

Claimant Name: _____
Claimant Address: _____
_____
_____
_____

Claimant Phone: _____

Claimant Fax number: _____

Claimant E-mail: _____

Brine Maker Information:

Tank Serial Number: _____

Control Panel Serial #: _____

Brine Maker Location: _____

For Internal Cargill Use Only:

Claim Number_____
Original Ship Date: _____
Disposition of Claim: _____
Approved By: _____

Part in Question:

Description of Part: _____
(Include digital pictures as well, if applicable)

Location of Part on unit: _____

Manufacturer Part Number: _____

Cargill Part Number: _____

Please remit by mail, fax or email to:

Cargill Deicing Technology
Attn: Warranty Department
24950 Country Club Blvd, Suite 450
North Olmsted, OH 44070

Phone: 866-900-7258
Fax: 440-716-4732
Email: accubrine_service@cargill.com

Issue Claimed:
(Describe in detail, include probable cause)

_____
_____
_____
_____

FOR DEALER USE ONLY

Will you need assistance with installing the part? **Yes ?** **No ?**

Labor ($/hr) _____
Travel Time: ($/hour) _____
Mileage ($.xx/mile) _____

Part cost (if applicable) ($) _____
Shipping (if applicable) ($) _____

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AB204 11/10/09

ACCUBRINE®
AUTOMATED BRINE MAKER

AccuBrine® automated brine maker

Customer Warranty Claim instructions

If you purchased your brine maker from a dealer, please contact your local dealer.

If you purchased your brine maker directly from CDT (Cargill Deicing Technology), please call the Customer Service Department at 866-900-SALT (7258) and provide information as shown on the "Warranty Claim Form". You may also fax, e-mail or mail the form to the Customer Service Department as indicated on the form.

Notification of a claim does not guarantee payment of a claim. Claim approval is subject to terms of the Manufacturer Warranty Terms.

AB206 11/10/09

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ACCUBRINE™
AUTOMATED BRINE MAKER

ACCUBRINE®
AUTOMATED BRINE MAKER

AccuBrine® automated brine maker

Return Materials Authorization Form

To Be Completed By Customer/Dealer

Contact Name:	Company Name:	Return Ship Address (if different)
Phone No:	Address:	
Fax No:		
Date:		Return Ship Via:

Cargill Part Number	Warranty Yes/No	Qty	Reason for Return	Original PO# / Invoice #

When form is completed please e-mail to accubrine_service@cargill.com or fax to 440-716-4732

YOUR RMA NUMBER IS: (Assigned by Cargill)	

When you receive your RMA number please return item(s) to:

Anderson Tool & Engineering
1735 W 53rd St
Anderson, IN 46013
Attn: AccuBrine® Product Engineer

Mark the RMA number on the outside of the box.

For Cargill Internal Use Only
Date part(s) received:
Date to Credit Dept:

Parts returned under a warranty claim are governed by Cargill Deicing Technology's Limited Brine Maker Warranty.
Parts returned in original condition for credit are governed by the following terms and conditions:

a. Buyer must include original invoice for parts with return form.

b. Parts must be returned in their original condition, custom made parts are not returnable.

c. Partial kits are not returnable. Only complete parts as identified in applicable invoices are acceptable.

d. All authorized parts shall be returned to Cargill Deicing Technology at the Buyer's expense.

e. Upon receipt of parts, Cargill Deicing Technology shall inspect such parts and if found acceptable, shall credit Buyer for the cost of the parts and charge the buyer a 20 percent restocking fee.

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AB205 11/10/09