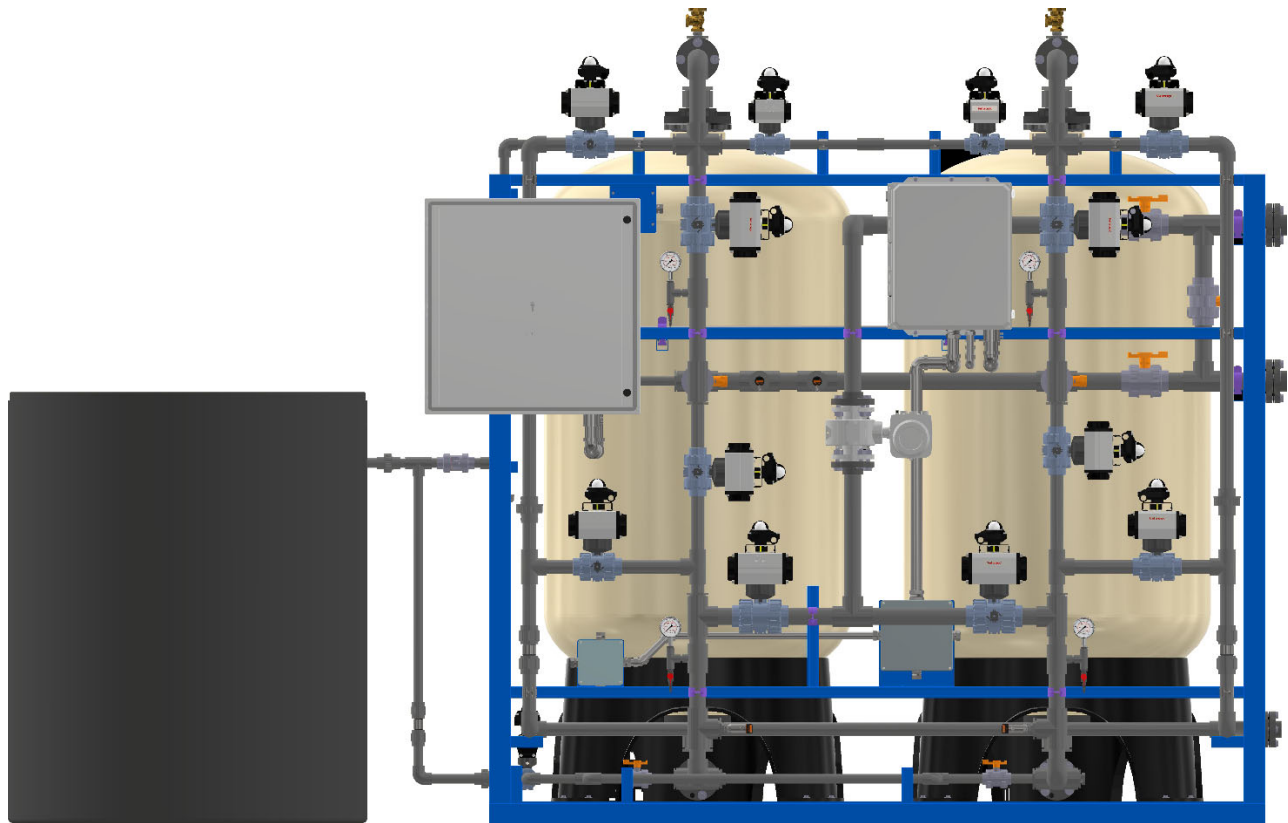




WATER SOFTENER DUPLEX ALTERNATING PLC MANUAL & USER GUIDE



Model: EWS XPSFD900SM

PRE-INSTALLATION INSTRUCTIONS:

The cycle times, sequence of cycles, salt dose refill time, and exchange capacity are pre-set to default by OEM. The OEM must guide the end user to change the values according to the hardness, day override, and regeneration time.

WATER TEST

Hardness	_____	gpg
Iron	_____	ppm
pH	_____	number
*Nitrates	_____	ppm
Manganese	_____	ppm
Sulphur	_____	yes/no
Total Dissolved Solids	_____	ppm

PRODUCT DATA FUTURE REFERENCE:

Softener Model:	EWS XPSFD900SM
System Size:	900,000 (1,800,000)
Meter Size:	2"
Configuration:	Duplex Alternating
Unit Capacity:	900.0 kgr@ 15lbs /ft ³
Hardness:	
Treated Water:	
Regen Time	Immediate Regeneration

Notes: _____

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THE SETUP GUIDE:

- To set up the system in the shortest period please go through the below sub-divisions
- Ground the skid, and connect the appropriate ground to the AC and DC earthing bars of the two panels
- Provide 120 v AC, 15 A, 1 ph supply to main PLC panel
- Check the earthing and grounding for the system and then power up
- Powering up you can see the home screen of the system and then login with the Maintenance credentials
- The credentials for login are Maintenance: Maintenance as username and password, can be changed later
- Connect the pneumatic air to the valve bank panel using a 3/8 size line
- Load the resin into the tanks with the instructions provided in the Tank Loading section
- Look into the Hardness analyzer installation section for installation and connection
- Bypass the hardness analyzer signal if not installed by going to maintenance screen
- Brine tank installation section provides details about the piping connection
- Refer to the setpoints provided in the manual to be entered into the settings screen
- Connect the piping for inlet, outlet, drain and brine
- Let the media and gravel be soaked for a period of 12 hours approx.
- Test the valves by operating from maintenance screen in manual mode
- Check for any errors or alarms in the system and eliminate those
- When ready for a test go to the process screen section and Start-up procedure for instructions

SOFTENER PLC PANEL

- Refer to the Electrical drawing and first cross-check the panel general arrangement and circuits based on the drawing
- Ground the AC and DC circuits of the panel including the instruments and all equipment
- Power up the panel to cross-check if the equipment is in good condition
- Check and make sure the grounding of the panel is good, do not proceed unless the earthing is checked and good
- Wiring must be tight; double check for that just in case briefly
- Once IO testing is completed successfully and all the installation regarding piping and instruments is also done, enter the setpoints for the process by navigating to the settings screen
- Rectify all the alarms on the system
- Make sure the media inside the tanks is soaked in water after installation for minimum eight hours
- Having completed the points above, the system is ready for operation in auto. But before starting the procedure, make sure to follow the instructions for the initial Startup in the start-up procedure section
- If the above points are addressed, then put the system in auto mode first, it closes all the valves at the first step
- For setup of the remote mode, the connection has to be established with the plant DCS and please contact Excalibur for further information

TANK LOADING:

Water Softener Model: EWS XPSFD900 SM

Top Inlet Diffuser

Bottom Hub & Lateral

Support Gravel Bed

Softening Resin

Installation and loading instructions per tank

Note that the Duplex Skid Mount Water Softening System comes with the hub & laterals already installed covered and secured by the gravel support bed.

Installation Cation Exchange Resin

Step 1: Remove the top flange of mineral tank and either the union or flex line flange to gain access to the top opening of the mineral tank.

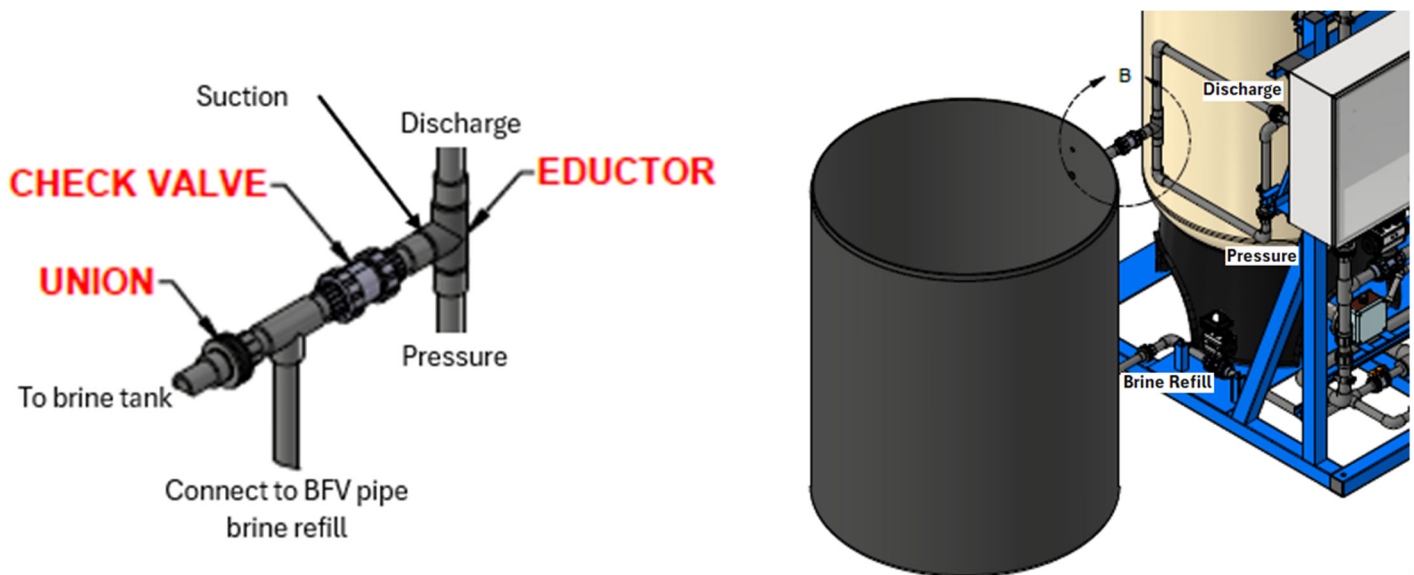
Step 2: Using a funnel add in the correct amount of Aldex C-800 cation exchange softening resin.

Step 3: Each tank is required to have 30, 1ft³ bags of resin max capacity 900,000 grains

Step 4: Once the correct amount of resin has been loaded re-assemble the flange or union to the plumbing and the flange onto the tank correctly.

BRINE TANK INSTALLATION

Located inside the brine tank will be the connection from the salt tank float to the eductor including unions and check valve for proper installation.



START-UP PROCEDURE:

Step 1 – Ensure plant air is operational and connected to inlet of valve air bank.

Step 2 - Open the 3-way bypass valve inlet / outlet to the softener.

Step 2 – From the Home Screen click Login and sign-in under maintenance.

Step 3 – From the Home Screen Select Maintenance Screen.

Step 4 – Advance to screen “Maintenance A”

Step 5 – Manually open valves A3 & A4, now open inlet manual valve to Tank A halfway only allowing water to now start to fill into the tank and air will escape to drain. Watch carefully and when water is at the top of the tank and water flowing to drain close valves A3 & A4, and open valves A1 & A6 this will rinse water down through resin flowing to drain. In this step now open the inlet manual valve to tank A all the way and rinse under full pressure for 5 minutes then close valves A1 & A6.

Step 6 – Advance to screen “Maintenance B”

Step 7 – Manually open valves B3 & B4, now open inlet manual valve to Tank A halfway only allowing water to now start to fill into the tank and air will escape to drain. Watch carefully and when water is at the top of the tank and water flowing to drain close valves B3 & B4, and open valves B1 & B6 this will rinse water down through resin flowing to drain. In this step now open the inlet manual valve to tank A all the way and rinse under full pressure for 5 minutes then close valves B1 & B6.

Step 8 - Advance to screen “ Maintenance BFV”

Step 9 – Manually open BFV valve and leave open for 30min which will add in the correct amount of water into the brine tank to make brine. After 30min manually close BFV valve and add water softening rock salt to brine salt tank.

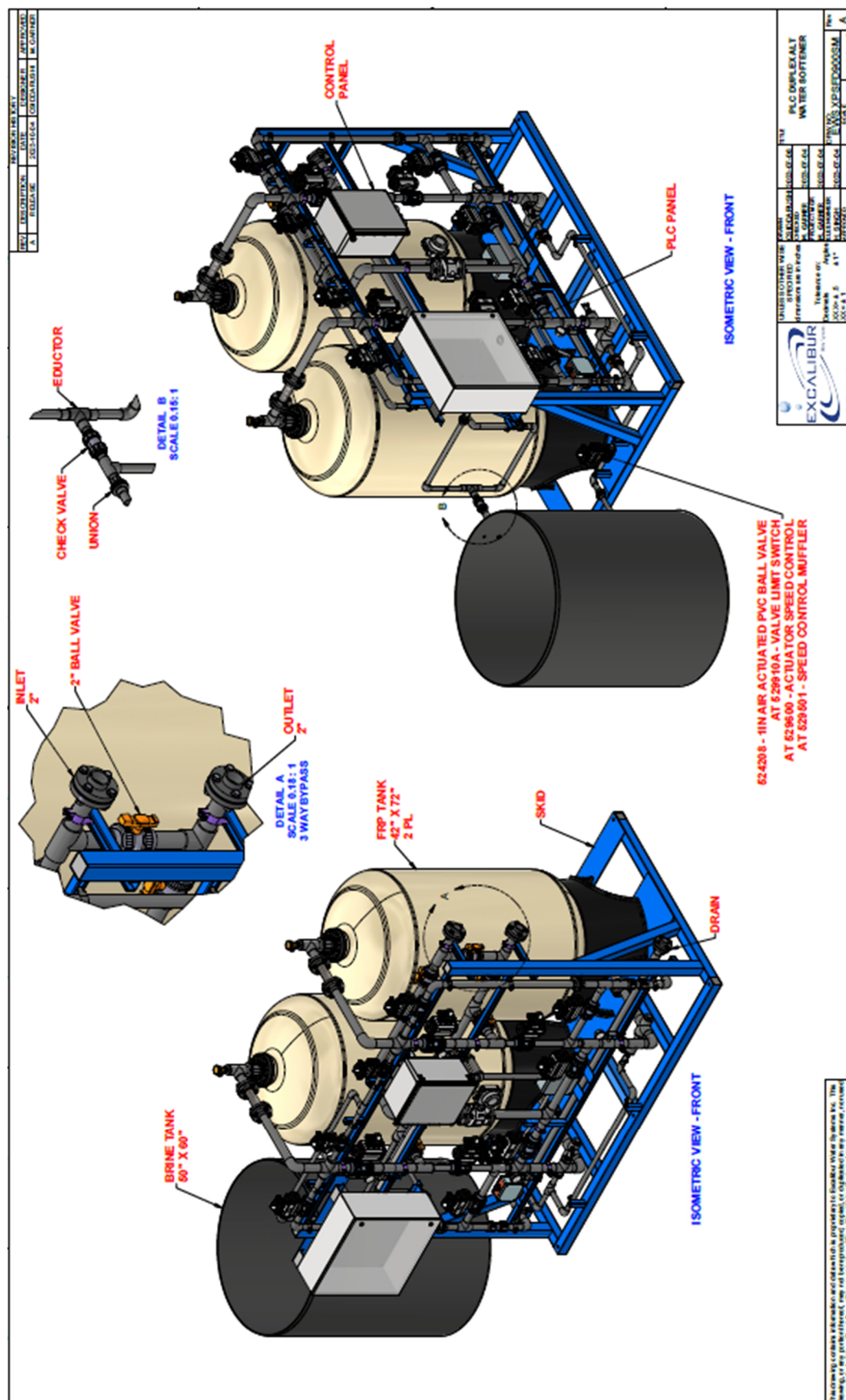
Step 10 – Go back to Home Screen and press Process button and start the softening process.

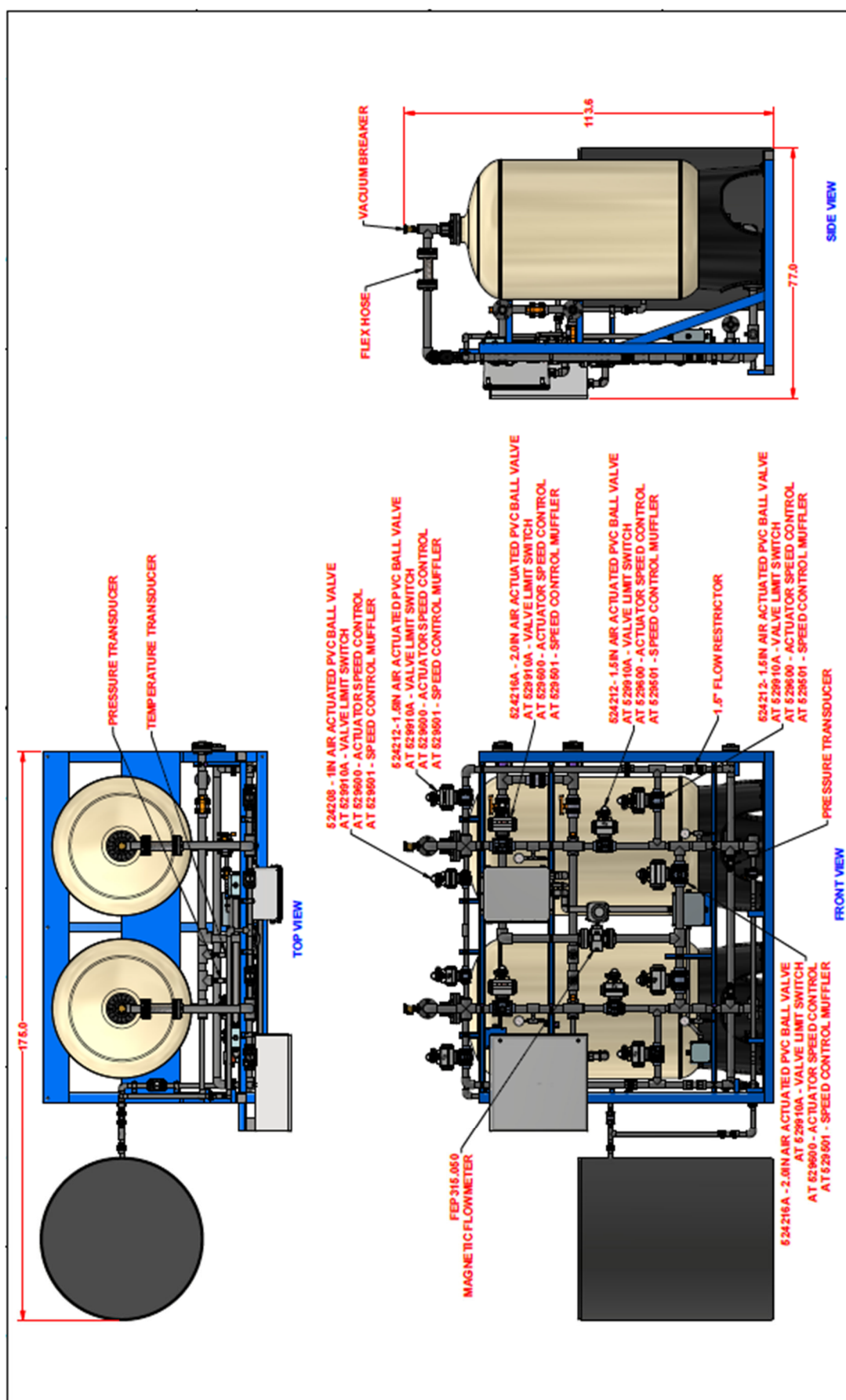
GROUNDING:

Ground the skid at the point shown in the image below, provided on the skid.



INSTALLATION DRAWING & REPLACEMENT COMPONENTS:





SOFTENER LOCATION:

Select a position that is flat and near a floor drain that can handle the water softener backwash discharge flow rate. Also, verify the product dimensions required for installation has the area space required. Power must also be supplied 120VAC Single Phase 60Hz 15A.

PIPING & INSTALLATION

Note:

- Install the piping conforming to federal, provincial, and local codes.
- Union or flanges are recommended at the control tank inlet, outlet, and drain connections.
- To enhance the monitoring of the system's performance sample valves and pressure gauges should be installed at the inlet and outlet of each tank.
- If the distance of the drain line is over a 10 ft. vertical or 25 ft. horizontal run, increase the drain line one pipe size over that provided by the manufacturer.
- Do not make a direct connection to the drain. Provide an air gap of at least four times the diameter of the pipe to conform to sanitation codes and to permit observation of the flow.

Install piping as shown on supplied layout drawing to Include unions and shut-off valves on the inlet and outlet of each softener. Also, include a shut-off valve for each injector provided with the system. It is recommended that a union be installed in each softener drain line to facilitate cleaning the backwash flow control.

VACUUM PROTECTION FLEX CONNECTORS

The pressure vessel is rated for an internal negative pressure of 5 Hg (17 Pa) vacuum below atmospheric. If negative pressure could ever exceed 5Hg (17 Pa), an adequate vacuum breaker must be installed on the highest point of the inlet to each softener pressure vessel.

System connections to the pressure vessel must accommodate vertical expansion between side, top, and bottom openings. Either flexibility in piping, as shown below, or flex connectors are recommended also shown below.

Flexibility in Piping

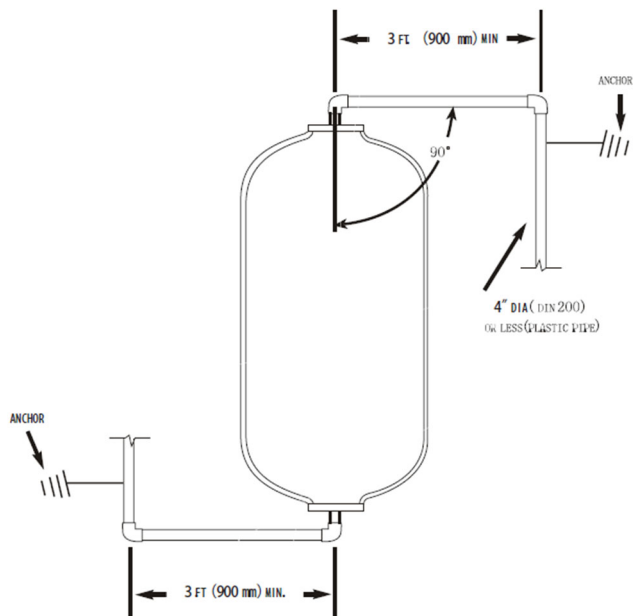
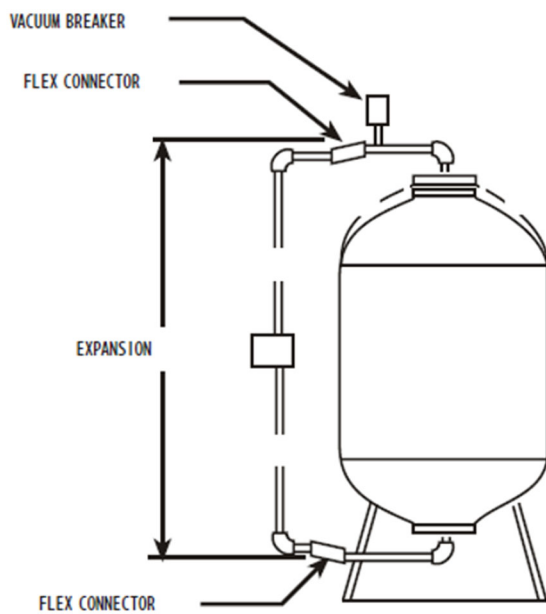
An effective alternative to flex connectors uses the inherent flexibility of right-angle system design. By calculating the amount of cantilever over-hang needed to absorb the torsional effect created by the pressure vessel vertical movement, it is possible to build the needed flexibility right into the piping system. This can be done with both top/bottom and side flow piping setups.

The figure shown on the next page is the acceptable minimum for the pressure vessel at its rated pressure of 150 psig. When using the pressure vessel at a lower pressure, the minimum pipe run length can be reduced, using this formula:

- a. Multiply pressure vessel pressure is psi * 36
- b. Divide above by 150
- c. Result is a minimum span of horizontal piping in inches

For example, if the pressure vessel pressure is 120 psi:

- $120 * 36 = 4,320$
- 4,320 divided by 150 = 28.8
- Minimum span of horizontal piping is 29 inches



HARDNESS ANALYZER INSTALLATION:

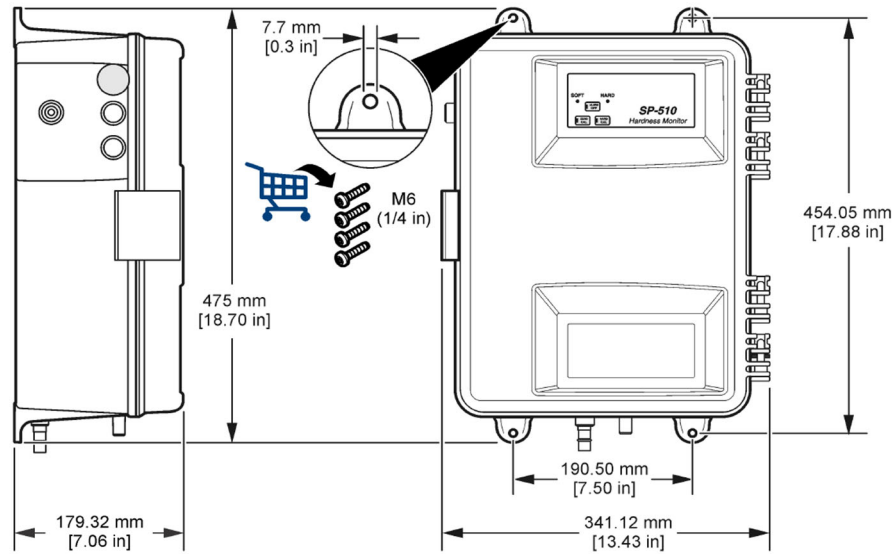
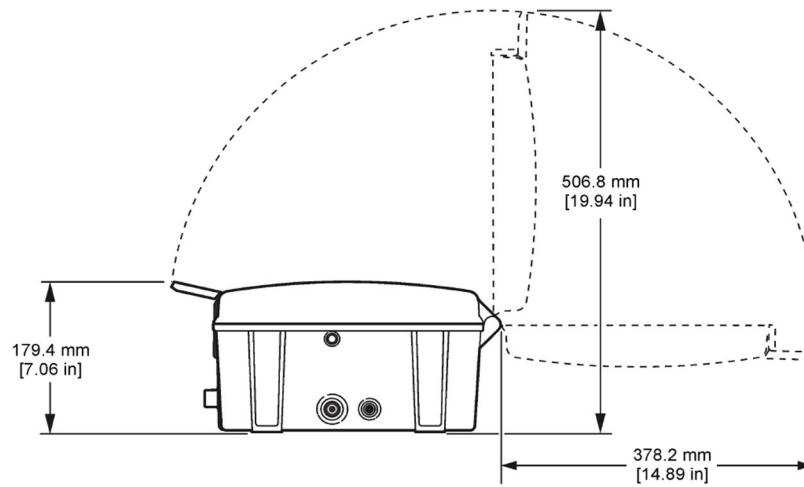
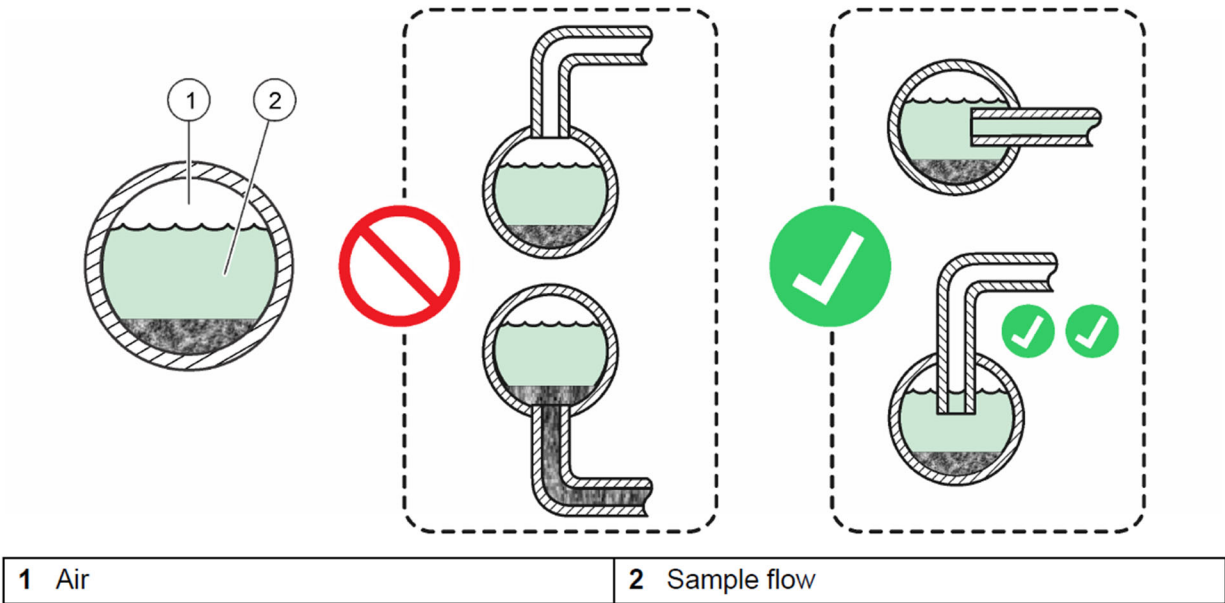


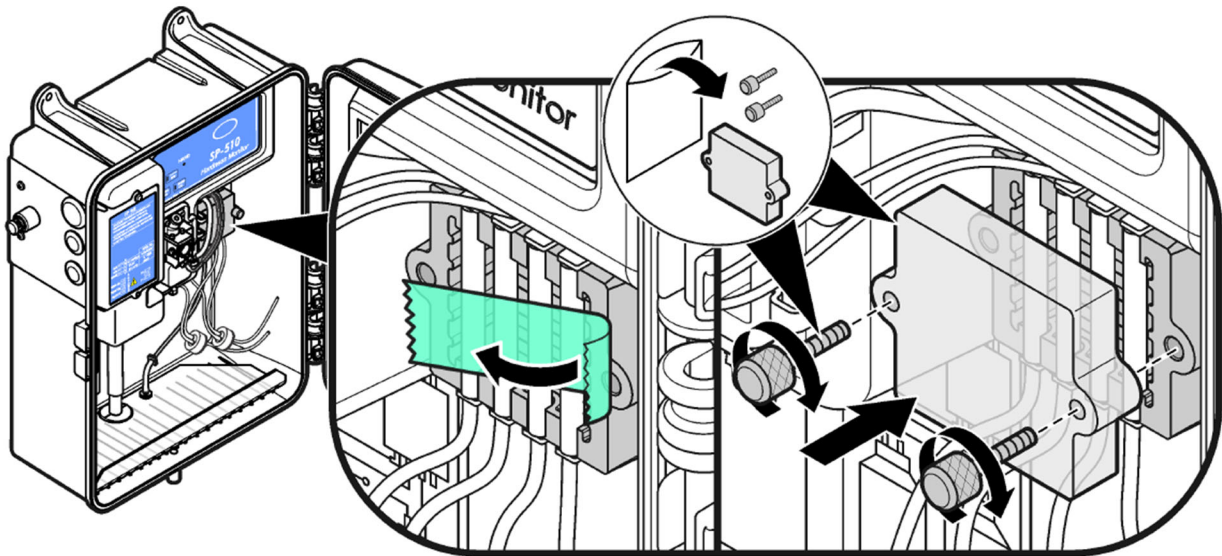
Figure 4 Door clearance

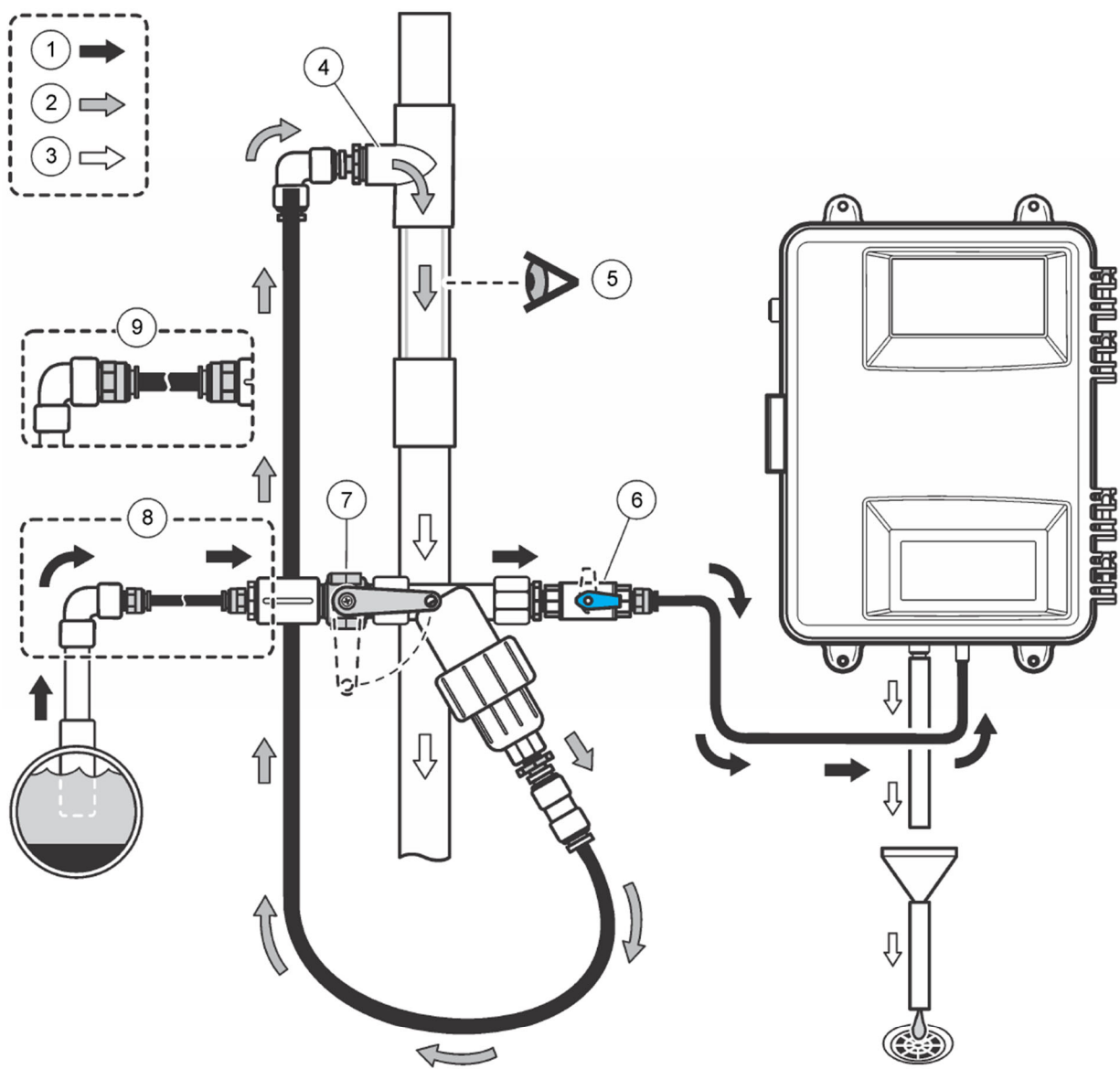


Installing the Sample point in the system outlet and the recommended way is to put a T and have it horizontally aligned to the ground. Please see below for images:



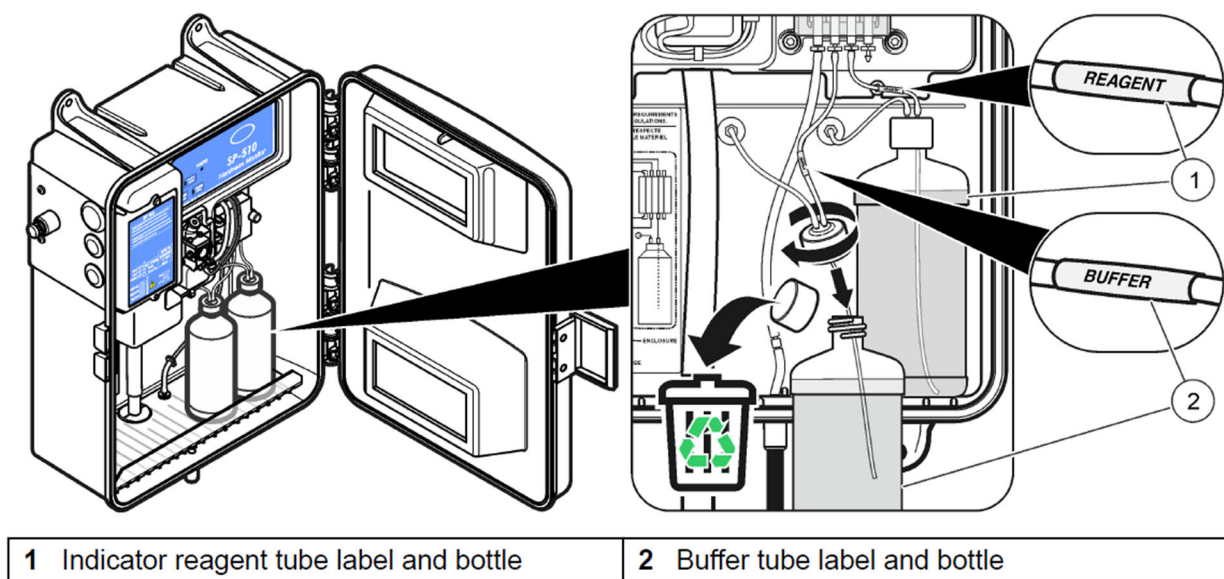
Remove the tape from the pump tubes before installation. The pressure plate and the screws are supplied with the installation kit.



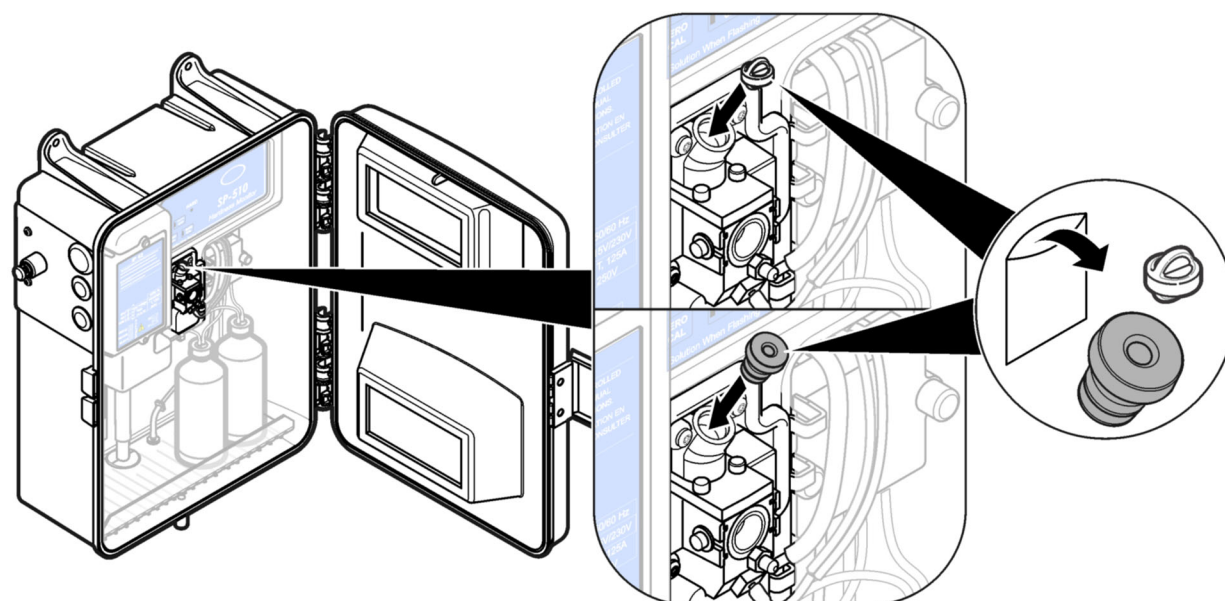


1 Sample flow	4 Bypass tee, unfiltered sample	7 Unfiltered-sample ball valve (shown open)
2 Bypass flow	5 Flow observation point	8 Low-flow valve option
3 Drainage flow	6 Filtered-sample bypass ball valve (shown open)	9 High-flow valve option

Install the buffer and indicator reagents



A stir bar is included in the installation kit. Install the stir bar in the colorimeter sample cell for correct operation



HARDNESS ANALYZER WIRING:

Please see the wiring details for the hardness analyzer shown below:

Hardness Analyzer			
PLC terminals	Instrument Connection	Instrument Terminals	Wire Tag
DB-A/P1.04	Power Black/Red	Ø1	L6
DB-A/P2.04	Neutral White	Ø2	N6
Panel AC ground	Ground Green	Analyzer Ground	G
DB-1/P2.03	Relay common (- 24 v DC)	1	18
1	Normally Closed	3	41
NA	Normally Open	NA	H6

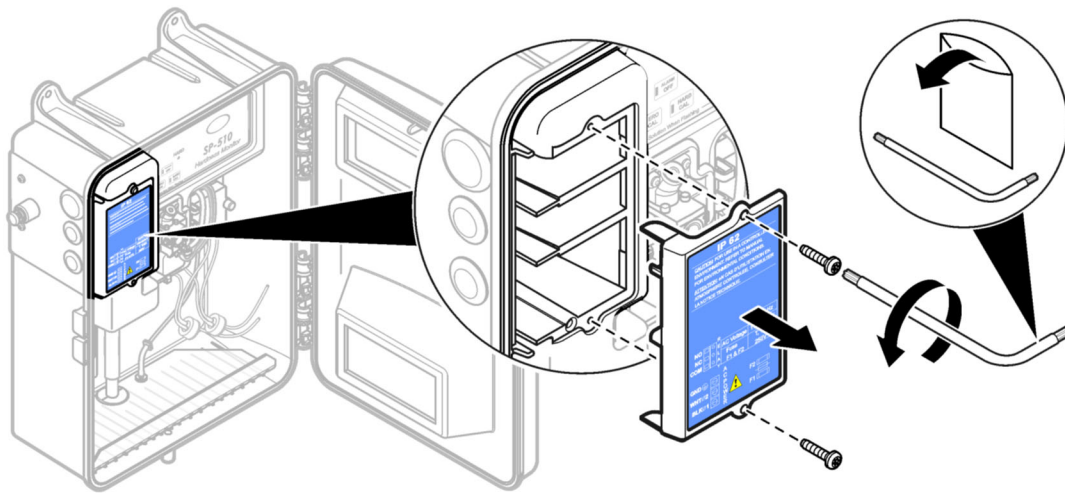
The hardness analyzer needs 110 volts AC, 60 Hz for the source of power, hence Terminal Ø1 is the hot wire and connects to point 04 on the P1 side of the distribution block A. The terminal Ø2 is the neutral wire and connects to terminal 04 on the P2 side of distribution block A. Ground from the instrument power side connects to the panel AC ground bar, which must be connected to the plant ground. Alternatively, it can be plugged into the wall socket for power.

Relay connection for hardness detected signal:

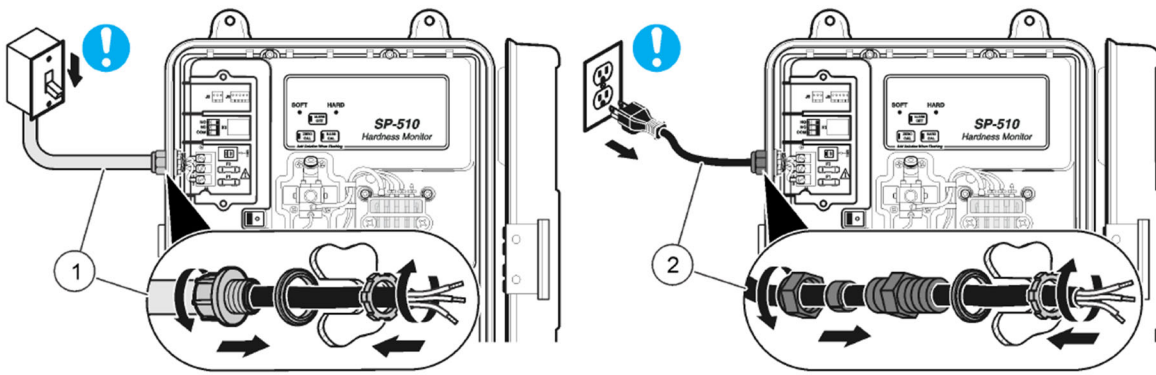
The (-) 24 v DC signal from the panel side (DB-1/P2.03) is connected to terminal 03 on the P2 of distribution board 1 and the other end connects to the relay common terminal 1 of the Hardness analyzer. A new wire from the relay terminal 3 in the hardness analyzer connects to terminal 1 in the panel. The signal is a failsafe type which will go off when hardness is detected.

Kindly refer to the images below for a better understanding:

- Take the access cover off for inserting the cables
- Connect the wires for power and signal to the PLC

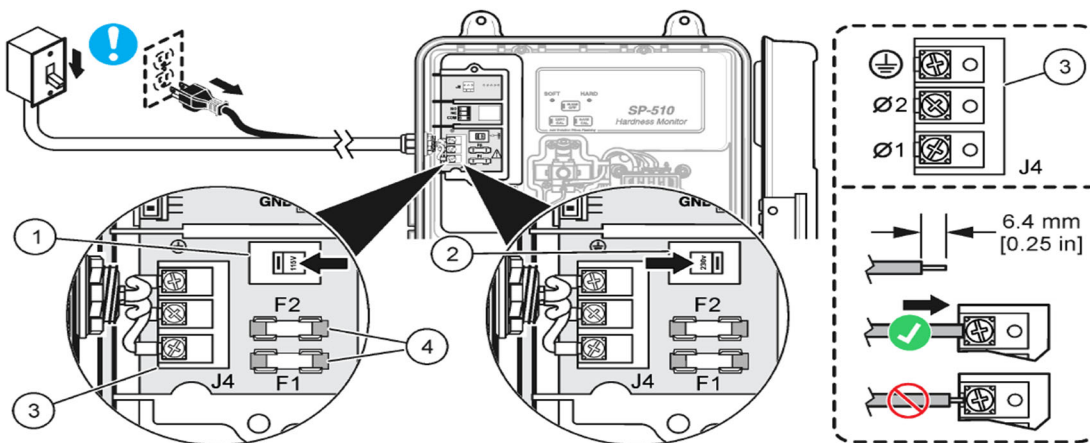


The Electrical connection can be done through the panel or from a socket near the installation location of the analyzer.



1 Conduit (preferred)

2 Power cord (optional)



1 Voltage switch (in 115 V position)

3 AC power connector

2 Voltage switch (in 230 V position)

4 Fuses (F1 and F2)

Relay connections:

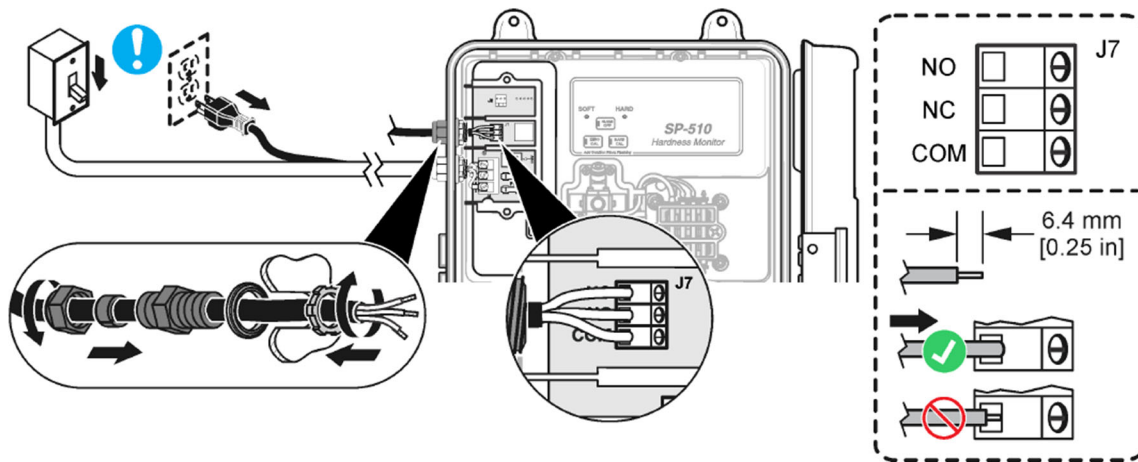


Table 2 Relay wiring

Terminal block	Terminal 1	Terminal 2	Terminal 3
J7	COM	Normally open (NO)	Normally closed (NC)

FLOWMETER QUICK PROGRAM SETUP:

The Watermaster transmitter is supplied with default passwords for access to 'Standard' and 'Advanced' level menus.

The two passwords are:

- 'Standard' access password: 2 or blank
- 'Advanced' access password: 3 or blank

Going into the standard access, leads to the easy setup menu, selecting that shows the steps highlighted below and the parameters set before shipping:

1. Language selection: English
2. Flowrate unit: ugal/min
3. Qmax: 277.000 ugal/min
4. Volume and Pulse unit: ugal
5. Pulse Width: 1000.30 ms
6. Pulses/Unit: 0.005000
7. Damping: 3.00 s
8. Mains Frequency: 60 Hz

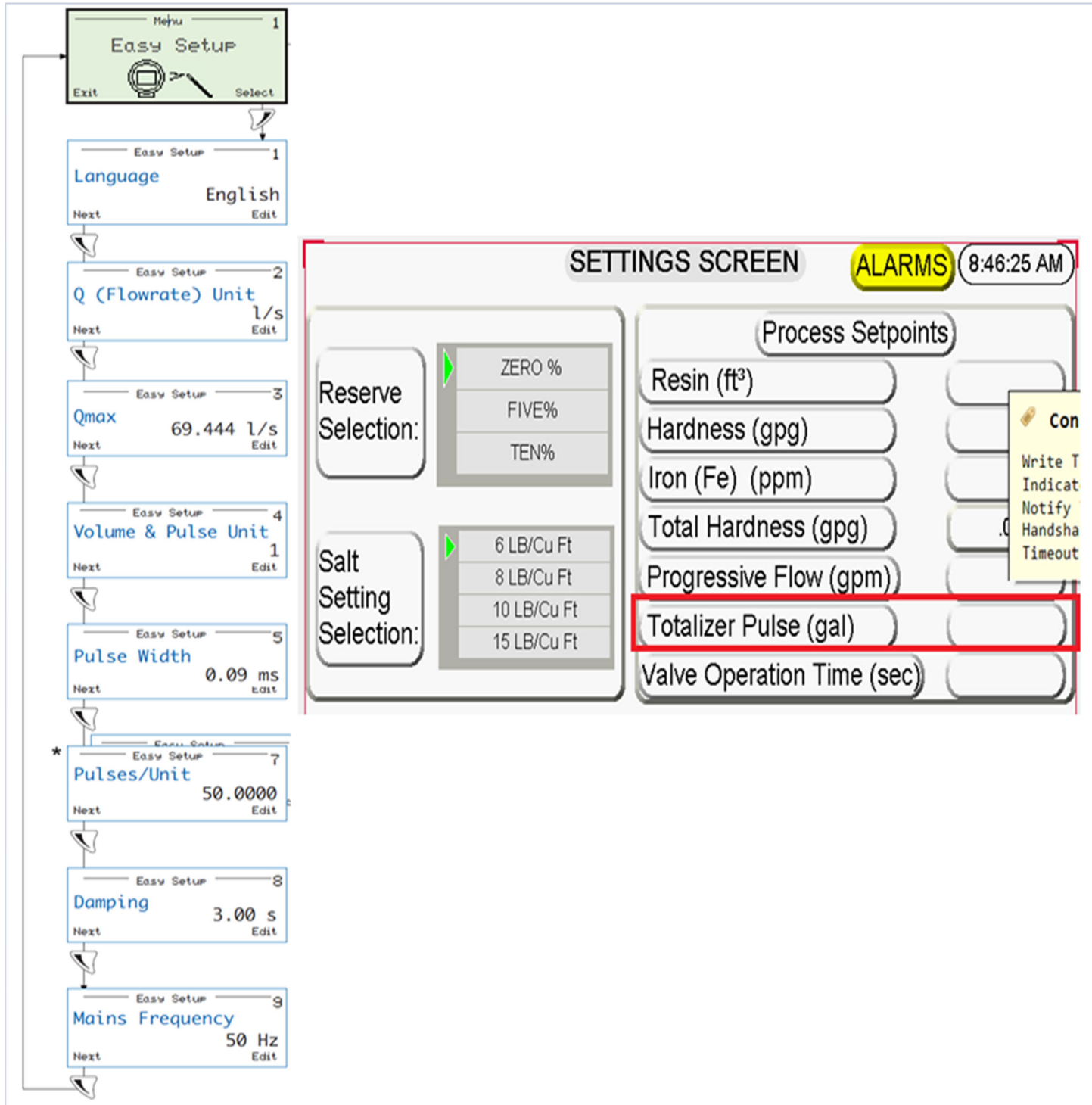
The language selected is English, flowrate unit is us gallons per minute, max flowrate set is 277.0 us gallons per minute, Volume and pulse unit is again in us gallons.

Pulse width is set as 1000.30 ms just slightly above one second.

Pulses/Unit is the pulse every xxx us gallons, for example if we want one pulse every 200 gallons then we simply divide 1 by 200 which gives us 0.005 as our answer hence the number entered in the meter is 0.005000 and this must be entered as 200 in the PLC set point in the settings screen shown below highlighted in red.

- On the settings screen now enter the Totalizer Pulse (gal) as to exactly what the flowmeters are set for.
- When the system will be in operation, the process screen will show the capacity remaining

As the tank softens water and generates these pulses based on the water it softened so far, the capacity can be seen decreasing in the trends or monitored manually by the operator in the process screen. Hence the volume pulse is a vital feature of the system for the proper functioning of the system.

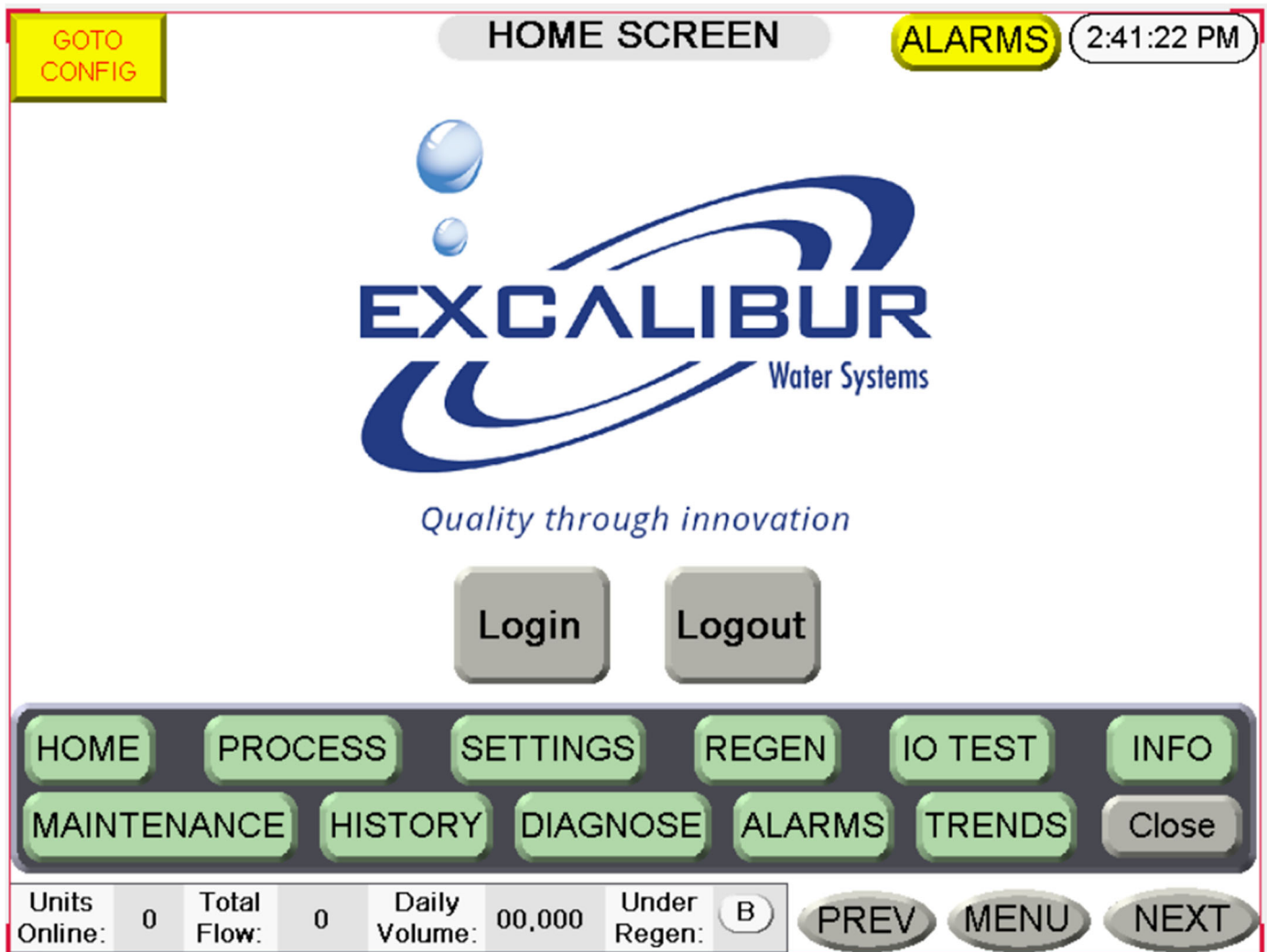


HMI SCREENS:

HMI screens are provided for control, monitoring, and data analysis of the system. Hence it comprises different sections like Home, Process, Settings, Info, History, Maintenance, Alarms, Trends and much more. Please see the details of each section as described in the manual:

HOME:

When HMI is powered up it first shows the home screen where a login and a logout button are provided. The operator of the system does not need to login as basic screens are accessible all the time. Maintenance personnel can log in using their credentials because they have access to important parameters and troubleshooting which is why the screens have been protected. The passwords can be changed from time to time and that can only be performed by maintenance personnel.



The bottom area of the screen from the center to the left provides information on the number of tanks softening the water, and the total volume flow of water being softened by the system every minute in gpm. Daily volume is the

volume of water softened till now from midnight and under regen informs which tank is under the regen process. This vital information is available on each screen.

IO TEST:

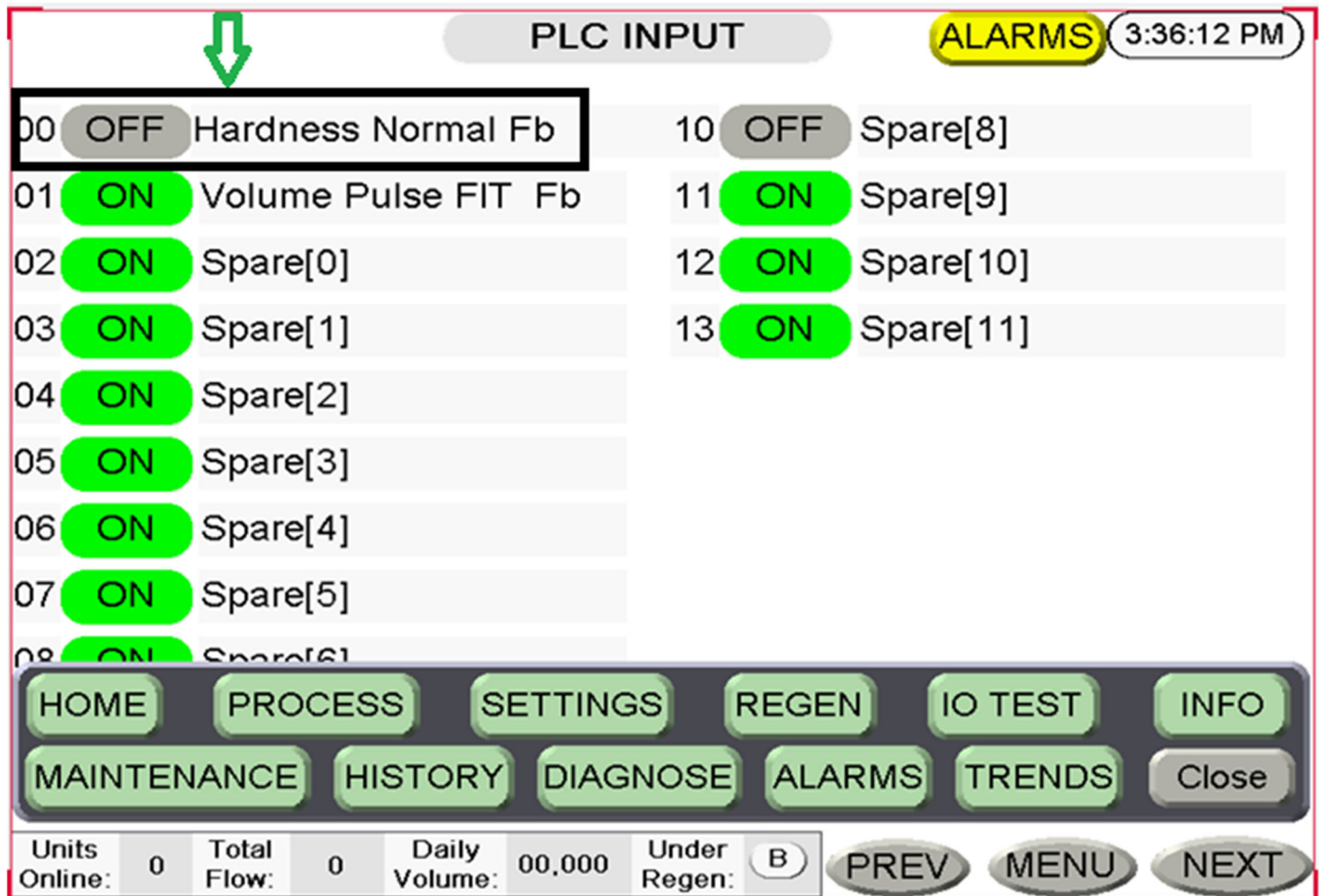
The screens designed in the application under the Input-Output test section comprise digital inputs, digital outputs, analogue inputs, IO-Link master communication, Modbus/TCP Valve bank outputs and IO-Link digital inputs. The onboard Digital inputs on the PLC are all rated for - 24 v DC and the circuits are all protected by a 50-mA fuse on the terminal, inputs are NPN type they need a - 24 v DC signal to activate the channel. The digital inputs on the IO-Link AL2341 devices are PNP type hence needs a + 24 v DC signal to activate the channel, all the valves are connected to these devices. The IO-Link master screen shows the communication status of each device linked to the master. The valve bank screen shows the air supply to each valve for opening.

The onboard digital output on the PLC are relay type and have a + 24 v DC signal connected to their commons. When a channel is active it delivers +24 v DC to energize the circuit. The analog input signals are 4-20 mA type, they are protected by a 50 mA fuse through the terminals, when a channel receives a signal the screen shows a value on the screen representing the field status.

The fastest way to test the digital signals is by navigating to the maintenance screens where the valve operation is provided. Valves can be operated from there to check the functioning, provided the system must be in the manual mode or the tank be in the maintenance mode. However, the analogue signals can be best tested on the analogue screen. This section helps check the IO of the panel by just going on to the screen.

DIGITAL INPUTS:

For example, let's check the first digital input of the system which is the onboard inputs. Pressing the IO TEST screen on the menu leads to the first digital inputs section and the very first input is on the top left section represented as shown in the image below.



The highlighted area specifies the terminal number 00 on the onboard PLC inputs. Also, it mentions the state as OFF when the signal is not active, additionally the name of the signal which in this case is Hardness Normal FB where FB stands for Feedback. Now refer to the electrical drawing in the digital input part where the signal will be defined by the same name on the first input, note down the terminal number for the signal from the drawing. Please note that the onboard digital inputs on the PLC are NPN type and -24 v DC is required at the terminal for the input to be active, please refer to the electrical drawing for circuits.

Similarly, all other IOs can be tested and troubleshooted. Once the signal is active the colour of the status will turn green, and it states ON to confirm that the PLC is receiving the signal as active and vice-versa. To check the other inputs of the system, press next in the lower right corner of the screen takes you to the next screen.

AL2341-1 INPUT

ALARMS 10:50:21 AM

X1.0	OFF	A1 Open Fb	X1.1	OFF	A6 Open Fb
X1.0	ON	A1 Close Fb	X1.1	ON	A6 Close Fb
X1.2	ON	A2 Open Fb	X1.3	ON	BFV Open Fb
X1.2	ON	A2 Close Fb	X1.3	ON	BFV Close Fb
X1.4	ON	A3 Open Fb	X1.5	ON	B1 Open Fb
X1.4	ON	A3 Close Fb	X1.5	ON	B1 Close Fb
X1.6	ON	A4 Open Fb	X1.7	ON	B2 Open Fb
X1.6	ON	A4 Close Fb	X1.7	ON	B2 Close Fb

HOME

PROCESS

SETTINGS

REGEN

IO TEST

INFO

MAINTENANCE

HISTORY

DIAGNOSE

ALARMS

TRENDS

Close

Units Online: 0

Total Flow: 0

Daily Volume: 00,000

Under Regen: B

PREV

MENU

NEXT

The screen above is the IO-Link digital inputs which are PNP type and these are used for the feedback signals from the valves used on the skid. Kindly refer to the electrical drawing for the panel for circuit details. The signals represented as spares with the brackets are the same tags used in the PLC code.

AL2341-2 INPUT

ALARMS 10:51:23 AM

X1.0	OFF	B4 Open Fb	X1.1	OFF	Spare[26]
X1.0	ON	B4 Close Fb	X1.1	ON	Spare[27]
X1.2	ON	B5 Open Fb	X1.3	ON	Spare[28]
X1.2	ON	B5 Close Fb	X1.3	ON	Spare[29]
X1.4	ON	B6 Open Fb	X1.5	ON	Spare[30]
X1.4	ON	B6 Close Fb	X1.5	ON	Spare[31]
X1.6	ON	Spare[22]	X1.7	ON	Spare[32]
X1.6	ON	Spare[23]	X1.7	ON	Spare[33]

HOME

PROCESS

SETTINGS

REGEN

IO TEST

INFO

MAINTENANCE

HISTORY

DIAGNOSE

ALARMS

TRENDS

Close

Units Online: 0

Total Flow: 0

Daily Volume: 00,000

Under Regen: B

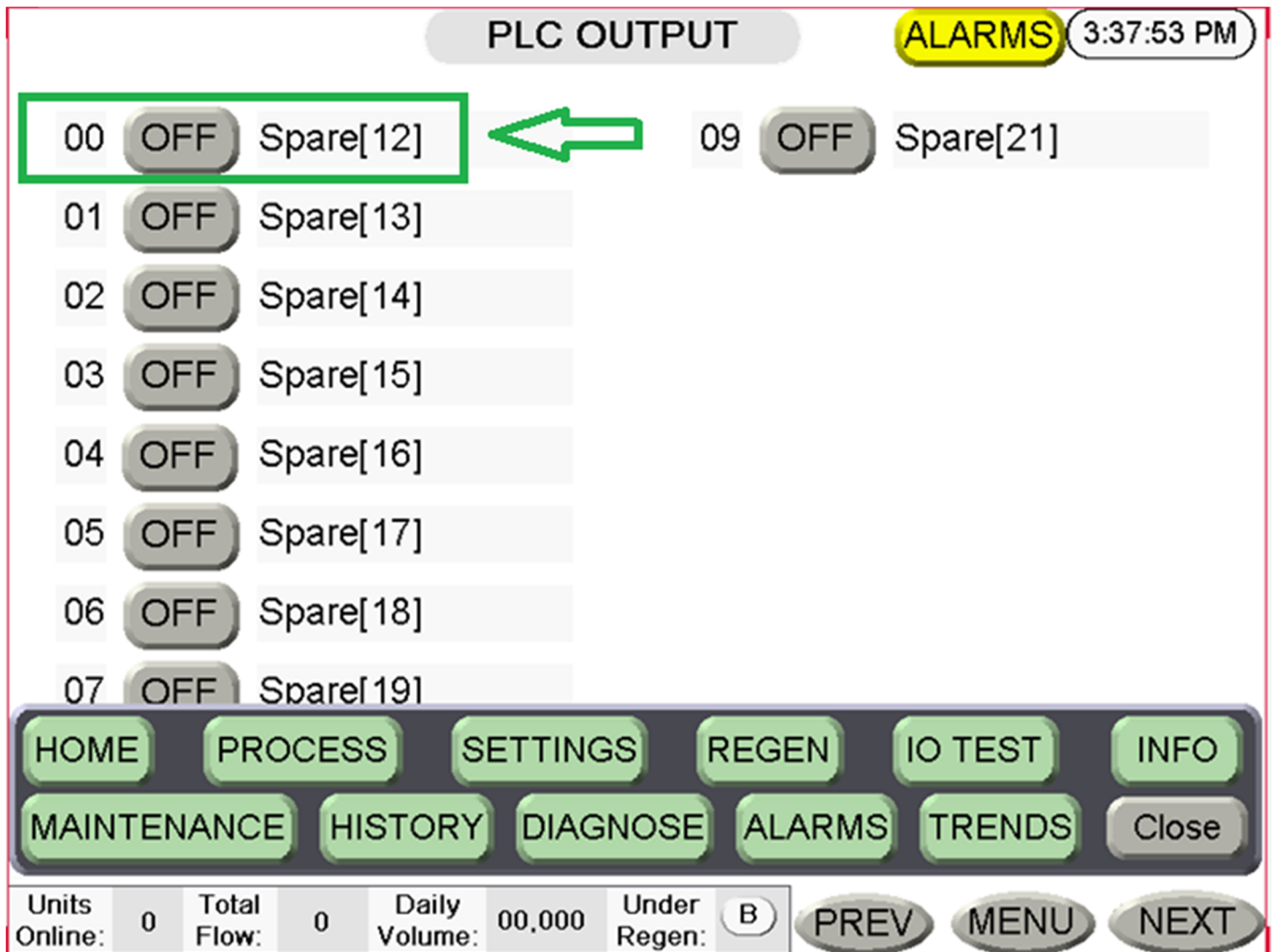
PREV

MENU

NEXT

DIGITAL OUTPUTS:

The digital output sections of the application consist of two screens where one for the onboard output and the other for valve bank pneumatic module output. Please refer the electrical drawing for circuit details. To energize the output from these screens the system must be in the manual mode, which can be switched from the process screen or the maintenance screen only. Please see the below image of the screen with an example of testing a channel.



Let's consider output 00 which is the first onboard channel and is pointed in the image above by an arrow. Find channel 00 in the digital output section of the electrical drawing. Press the grey button which shows **OFF** which turns green and states **ON** and will be energized when pressed. This can be verified by checking the voltage at the terminal of the PLC and a green light also turns on when channel is energized on the PLC. Similarly following the same procedure all the outputs can be tested.

VALVE BANK OUTPUT

ALARMS

10:52:54 AM

00	Open	Close	A1 Cmd	08	Open	Close	B2 Cmd
01	Open	Close	A2 Cmd	09	Open	Close	B3 Cmd
02	Open	Close	A3 Cmd	10	Open	Close	B4 Cmd
03	Open	Close	A4 Cmd	11	Open	Close	B5 Cmd
04	Open	Open	A5 Cmd	12	Open	Open	B6 Cmd
05	Open	Close	A6 Cmd	13	Open	Close	Spare[36]
06	Open	Close	BFV Cmd	14	Open	Close	Spare[37]
07	Open	Close	B1 Cmd	15	Open	Close	Spare[38]

HOME

PROCESS

SETTINGS

REGEN

IO TEST

INFO

MAINTENANCE

HISTORY

DIAGNOSE

ALARMS

TRENDS

Close

Units Online: 0
Total Flow: 0
Daily Volume: 00,000
Under Regen: B

The valve bank module is communicating with the PLC over Modbus/TCP and the PLC will generate an alarm when the communication fails, it can also be verified physically by looking at the valve bank module, a solid green light represents the healthy state of the unit with good communication. Testing the output can only be done either in the manual mode or when the tank is under maintenance. Pressing the open button for a valve provides air to the opening port of the actuator from the valve bank and hence the valve opens and then pressing the close button closes the valve.

ANALOG INPUT:

The analog input signals type used in this case are 4-20 mA, where a 4 mA means zero and 20 mA describes a full-scale reading (100%). The best will be to cross-check the signal using a multimeter.

ANALOG INPUT

ALARMS10:53:43 AM

00000System Flow in gpm

01Spare

HOMEPROCESSSETTINGSREGENIO TESTINFO

MAINTENANCEHISTORYDIAGNOSEALARMTRENDS

Close

Units Online:0Total Flow:0Daily Volume:00,000Under Regen:B

PREVMENUNEXT

IO-LINK MASTER

ALARMS
10:52:05 AM

Port 00	ON	Pressure trasnmitter main line
Port 01	ON	AL2341-1 Digital input module
Port 02	ON	Pressure trasnmitter tank A
Port 03	ON	Spare
Port 04	ON	Pressure trasnmitter tank B
Port 05	ON	Spare
Port 06	ON	Temperature trasnmitter main line

HOME
PROCESS
SETTINGS
REGEN
IO TEST
INFO

MAINTENANCE
HISTORY
DIAGNOSE
ALARMS
TRENDS
Close

Units Online: 0
 Total Flow: 0
 Daily Volume: 00,000
 Under Regen: B

PREV
MENU
NEXT

IO-Link master also communicates with the PLC over Modbus/TCP and then the devices communicate over IO-Link to the master. Master comprises of eight ports and status of communication for the port is shown as green when connected and grey when communication broken, power or other issues.

SETTINGS:

The Settings screen facilitates the fine-tuning of the system by providing critical parameters based on the site conditions. The recommended settings for the system are described underneath:

- **Reserve Selection:** Five percent, this would take down the percentage from the capacity and set the regen keeping a cushion. This feature prevents the system from passing hardness and can be helpful when the system is running in optimized mode
- **Salt Setting:** 10lbs/ft³, this parameter decides how much water needs to be added to the brine tanks during the brine fill stage. Another purpose of this is to determine the capacity after each regeneration in grains.
 $6\text{lbs/ft}^3 = 20,000 \text{ grains/ft}^3$ $8\text{lbs/ft}^3 = 24,000 \text{ grains/ft}^3$
 $10\text{lbs/ft}^3 = 27,000 \text{ grains/ft}^3$ $15\text{lbs/ft}^3 = 30,000 \text{ grains/ft}^3$
- **Resin (ft³):** Since the softener designed for the project is a duplex alternating 900k grain, the value always must be 30.
- **Hardness:** Enter the hardness of the water in grains per gallon (gpg) by getting it tested from the lab, the higher the value of hardness the lesser volume of water will be softened. Hardness testing expressed in mg/L or ppm must be converted to (gpg) dividing by 17.1 Example Hardness 300mg/L (ppm) / 17.1 = 17.55 gpg ~ 18gpg
- **Iron (Fe) (ppm):** Enter the value of ferrous clear water iron in the water and this will contribute to the total hardness going through the system.
- **Progressive Flow (gpm):** The max flow in gpm at which a tank can operate, above that a new tank is required online to accommodate for the total flow through the system. Hence based on this set point and the total flow, the system decides how many tanks are required to filter the flow of water through the system. As the system being a duplex alternating the system should not need to be operating as a progressive but, the functionality is provided with the intention of honoring the water demand. An alarm will be displayed on screen when it operates as a progressive flow, because that is not what the system was designed for.
- **Totalizer Pulse (gal):** It is a feature of the flowmeter that it generates a pulse of set duration every xxx gallons of water that passes through it. This value must match with the pulse output value for what the flowmeters are programmed. Based on that system knows when to set a tank for regeneration.
- **Valve Operation Time (Sec):** The maximum duration of time for a valve to move from close to the open position and vice-versa. Recommended set point is 10 seconds, if it does not work under that time it generates a fault.
- **Max Pressure Drop (psi):** It is the pressure difference between the main inlet water line to the tank outlet line. The max drop across a tank initiates the regeneration of the unit.
- **Max Operating Temperature:** The max operating set point for water temperature is the point above the entered value the system will stop operating and the max value accepted is 60 °C.

SETTINGS SCREEN

ALARMS

10:56:18 AM

Reserve
Selection:

ZERO %
FIVE%
TEN%

Salt
Setting
Selection:

6 LB/Cu Ft
8 LB/Cu Ft
10 LB/Cu Ft
15 LB/Cu Ft

Process Setpoints

Resin (ft³)

Hardness (gpg)

Iron (Fe) (ppm)

Total Hardness (gpg)

Progressive Flow (gpm)

Totalizer Pulse (gal)

Valve Operation Time (sec)

Reserve Volume (gal): 0

Capacity (gpg): 0

Pressure Drop Max Limit (psi):

Max Operating Temperature (°C)

Units
Online:

0

Total
Flow:

0

Daily
Volume:

00,000

Under
Regen:

B

PREV

MENU

NEXT

The Next screen is for entering the set points of regeneration per tank.

Note: Time in Minutes

SETTINGS SCREEN

ALARMS

10:57:56 AM

Regen Setpoints A

Backwash 1 A

Brine/Rinse A

Backwash 2 A

Rinse A

Regen Setpoints B

Backwash 1 B

Brine/Rinse B

Backwash 2 B

Rinse B

HOME

PROCESS

SETTINGS

REGEN

IO TEST

INFO

MAINTENANCE

HISTORY

DIAGNOSE

ALARMS

TRENDS

Close

Units Online: 0

Total Flow: 0

Daily Volume: 00,000

Under Regen: B

PREV

MENU

NEXT

The set-points on this screen are entered in terms of time, in minutes and specify the duration of each stage in the regeneration process.

- **Backwash 1:** 10 minutes
- **Brine/rinse:** 75 minutes
- **Backwash 2:** 6 minutes
- **Rinse:** 6 minutes
- **Brine Fill:** Based on the salt setting selection of the system

In most of the cases, the set-points are the same, but sometimes depending on the site conditions, these may have to be tweaked a bit to best suit the situation. Just for having the flexibility of adjusting them separately we have provided those for each tank.

REGEN:

The operator can manually put a tank into regen by going to the regen screen and selecting the tank to start the regeneration mode. The Pending regen sequence of tanks displays the tanks that are waiting for going into a regen, this usually happens when the system is running in optimized mode where it cannot set the regeneration mode for a tank and hence displays as it is in the queue.

Once the system gets a chance it puts the tank into regen based on the first in first out method. Only one tank is allowed to go into a regen at a time.

REGEN SCREEN

ALARMS10:59:13 AM

Set Manual Regen For:

Tank A

Tank B

Pending Regen Sequence of Tanks:

0

Touch to Advance the Regen Stage:

Advance

Volume Since Last Regen

Tank A0

Tank B0

Days Since Last Regen

Tank A0

Tank B0

Days Override Regen

Brine Tank Fill Time

0

Hardness Sample Delay (Hr)

Units Online:0

Total Flow:0

Daily Volume:00,000

Under Regen:B

PREV

MENU

NEXT

One can advance the regen process by pressing the advance button on the regen screen, which is only visible during the regen stage. Pressing the button automatically advances the stage of regen of the tank under regen.

Information such as volume since the last regen and the days since the last regen is provided for the operator to diagnose the system.

Days override regen can be entered from the HMI to automatically set the tank to undergo a regen if the tank has not done a regen for that many days, the range that can be entered is between 5 and 20.

Brine tank fill time, it is calculated by the system internally based on the salt settings selected and is displayed here for providing information to the operator.

Hardness Sample delay setpoint can be entered from HMI and the range is from 6 to 24 hours. This is to bypass the hardness detected signal for next xx hours entered only when it detects a hardness. This is to prevent the tanks going into regen as soon as one has finished, because it takes around 4 hours to make the brine after adding water and around 2 hours for a regen hence a minimum of six hours gap. This feature is only available in duplex alternating systems because they have only one brine tank.

MAINTENANCE:

Maintenance is very critical for the system, enabling it to be in operation for long term, we have provided dedicated rights to the maintenance personal for doing the maintenance while the system can be partially functional. But, we recommend to do any maintenance when the system is not in operation, but since it is water and process is affected we have provided up to some degree of functionality on some parts of the system under operation. We expect the maintenance personal to be aware of what they are doing but still recommend to take the most caution at work. Like disconnecting power before working on circuits and panels.

While the system is in operation mode one can still work on the tank to do the regular maintenance of a tank, however, one must take necessary precautions to work on the tank. We assume the maintenance team can do the maintenance and be taking necessary precautions while performing a task or troubleshooting the system. We recommend closing the manual valves so that water does not enter or go out of the tank when doing maintenance. The following can be accomplished from the maintenance screen:

- Set a tank into a regeneration cycle
- Advance the stages of a tank under regen
- Monitor the sequence of tanks which will go into regen
- Bypass a tank, only one at a time. Then operate the valves as desired by the personnel
- Bypass the Hardness Signal from the analyzer, in case it is not installed or under maintenance

When a tank is selected for maintenance work, let say Tank A was selected, then on the screen you will see an image of the valve being highlighted in red to be closed for tank A and opened on tank B. This only required when a person is performing maintenance, because we want to make sure there is water available for filling up the brine tank after the regen. Failing to do so, it affects the regeneration of the system and hence the quality of water for the process. So we ask the personal to acknowledge the instructions and do the needful, once completed the valves can be left as it is, not a problem. That is one of the reasons why the BFV valve is connected to both the tanks. Since the maintenance personal is already there to look into the system and hence we request them to operate the valve. The same procedure works for the other tank. The operator needs to acknowledge the message on the screen and do the needful, after acknowledging they can access the other screens of the system.

Maintenance on the BFV valve, since this valve is critical for brine tank water filling and affects both tanks for regen. Hence the maintenance for this valve is done as a separate request, but when the valve is put to maintenance none of the tanks can go into the regen cycle and hence we request them to possibly do it after the regen. If not possible then manually open the inlet and outlet of the tank which has capacity left to soften and do maintenance on this valve.

SELECT MANUAL

SELECT STOP

Select Remote

MAINTENANCE

ALARMS

9:17:21 AM

Set Manual Regen For:

Tank A

Tank B

Pending Regen Sequence of Tanks:

0

Touch to Advance the Regen Stage:

Advance

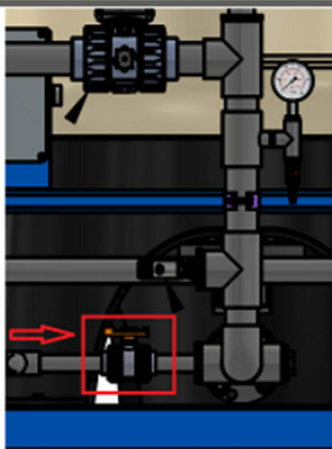
Bypass:

Release

Release

Release

To Bypass Hardness



Close the valve highlighted in image for Tank **B** and Open the **same valve on Tank A**.

Only one valve to be open at a time from Tank A or Tank B.

No Regen Until Maintenance for BFV is done.

Units Online: 0

Total Flow: 0

Daily Volume: 00,000

Under Regen: B

Acknowledge Required

When a tank is bypassed, the system then operates based on the availability of tanks.

MAINTENANCE A:

Let's assume tank A was put to bypass or maintenance mode, press next on the maintenance screen and takes to the TANK A valves. These valves can now be operated as desired by the maintenance personnel and troubleshoot the issues. If the system is in manual mode, then all the valves will be displayed on the screens in this section, otherwise only related to the tank put into bypass or maintenance mode will be visible.

SELECT
MANUAL

SELECT
STOP

Select
Remote

MAINTENANCE A

ALARMS

11:03:23 AM

A1 INLET VALVE

Open Fb

Close Fb

To open

To close

A2 OUTLET VALVE

Open Fb

Close Fb

To open

To close

A3 BW DRAIN

Open Fb

Close Fb

To open

To close

A4 BACKWASH

Open Fb

Close Fb

To open

To close

A5 BRINE VALVE

Open Fb

Close Fb

To open

To close

A6 RINSE DRAIN

Open Fb

Close Fb

To open

To close

HOME

PROCESS

SETTINGS

REGEN

IO TEST

INFO

MAINTENANCE

HISTORY

DIAGNOSE

ALARMS

TRENDS

Close

Units
Online:

0

Total
Flow:

0

Daily
Volume:

00,000

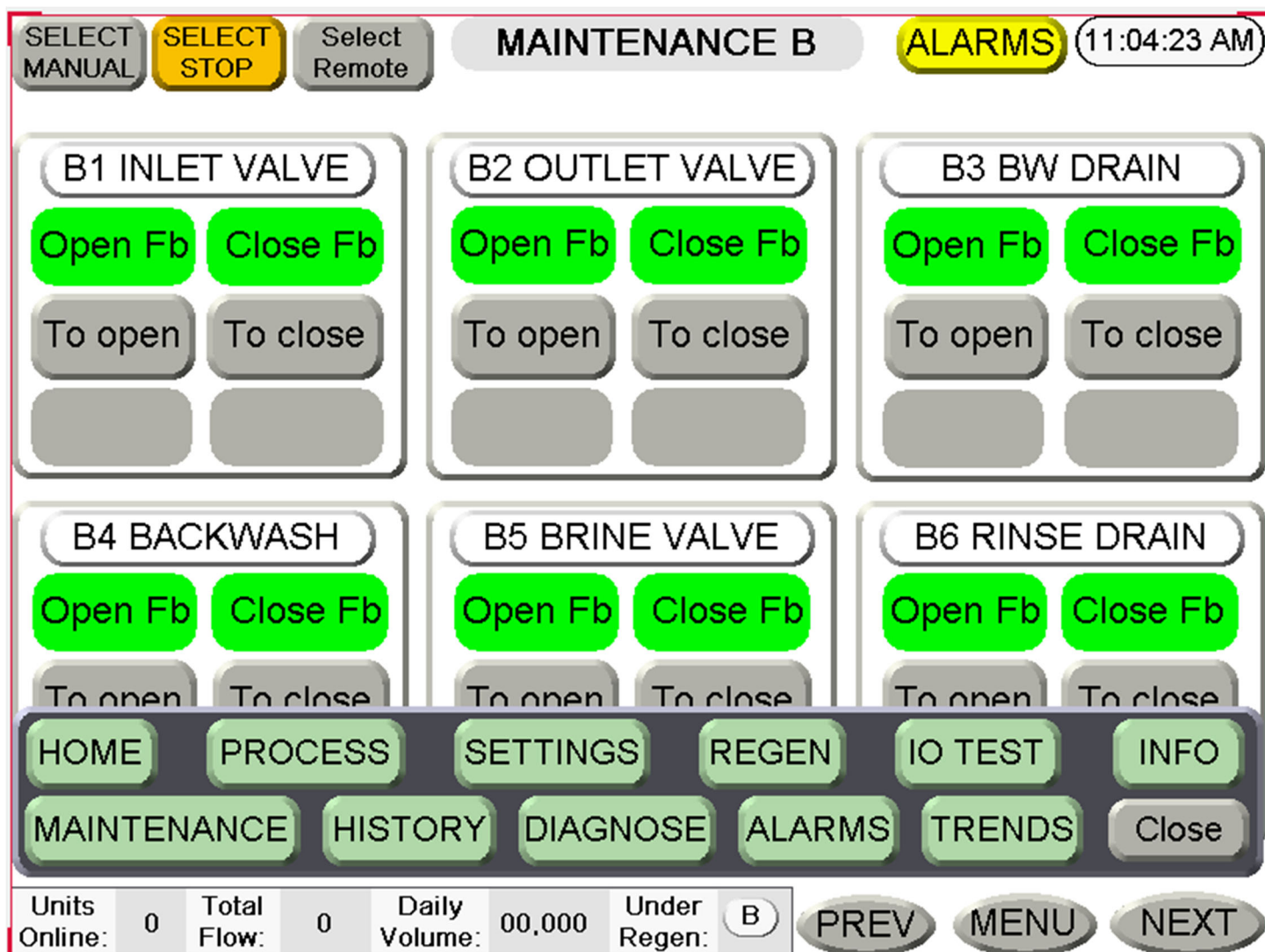
Under
Regen:

B

PREV

MENU

NEXT



This section provides screens for valves in tanks A, B, and Brine valve. Again, the valves are displayed only if the system is in manual or maintenance mode. To operate the valve press the To Open button for opening and To Close button for closing the valve. The open Fb and close Fb indications will confirm the position of the valve, if there is an issue in operation a fault will be displayed on the third row of the valve. Similar operations are provided for testing each valve.

SELECT MANUAL

SELECT STOP

Select Remote

MAINTENANCE BFV

ALARMS

9:24:52 AM

BFV VALVE

Open Fb

Close Fb

To open

To close

HOME

PROCESS

SETTINGS

REGEN

IO TEST

INFO

MAINTENANCE

HISTORY

DIAGNOSE

ALARMS

TRENDS

Close

Units Online: 0

Total Flow: 0

Daily Volume: 00,000

Under Regen: B

PREV

MENU

NEXT

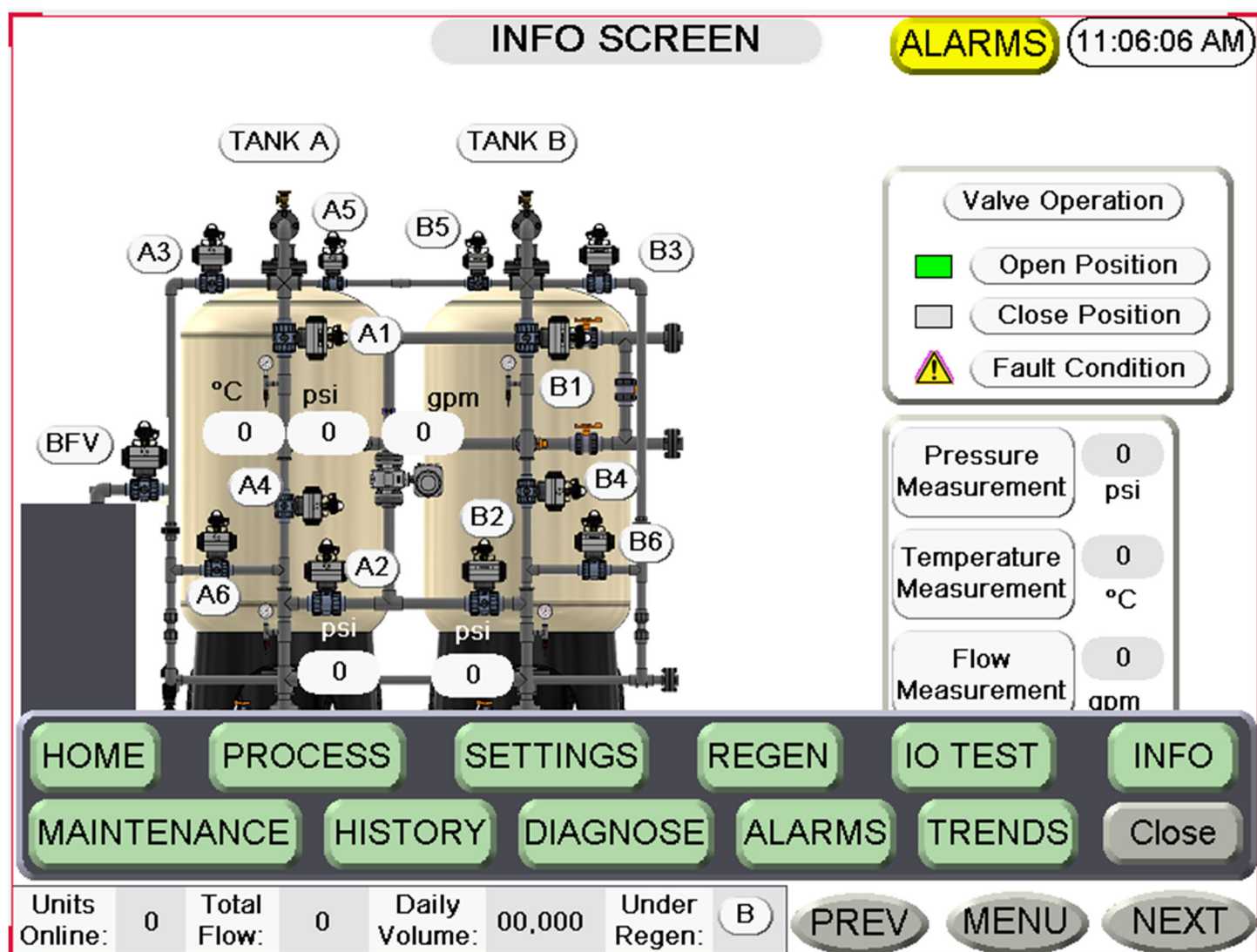
USER MAINTENANCE:

The last screen is provided to log in, log out, change passwords or reset a password for various users of the system. The User and password for the system are described as follows:

- Maintenance: Maintenance

The screenshot displays the 'MAINTENANCE' screen of a control system. At the top, there is a header bar with several buttons: 'SELECT MANUAL' (grey), 'SELECT STOP' (yellow), 'Select Remote' (grey), 'MAINTENANCE' (grey), 'ALARMS' (yellow), and a digital clock showing '11:05:26 AM' (white). Below the header, the main area is mostly blank. In the lower-middle section, there are four buttons: 'Login' (grey), 'Logout' (grey), 'Change Password' (grey), and 'Reset Password' (grey). Below these, there is a row of green buttons: 'HOME', 'PROCESS', 'SETTINGS', 'REGEN', 'IO TEST', and 'INFO'. Below that is another row of green buttons: 'MAINTENANCE', 'HISTORY', 'DIAGNOSE', 'ALARMS', 'TRENDS', and a 'Close' button (grey). At the bottom, there is a status bar with the following information: 'Units Online: 0', 'Total Flow: 0', 'Daily Volume: 00,000', 'Under Regen: B' (where 'B' is in a small circle), and three large buttons: 'PREV' (grey), 'MENU' (grey), and 'NEXT' (grey).

Units Online:	0	Total Flow:	0	Daily Volume:	00,000	Under Regen:	B	PREV	MENU	NEXT
---------------	---	-------------	---	---------------	--------	--------------	---	------	------	------



One can get to know about the tag names of valves, and colour coding for open, close and fault indications. Readings are displayed on the screen.

PROCESS SCREEN:

The most viewed screen on the HMI is the process screen, it provides information and control for:

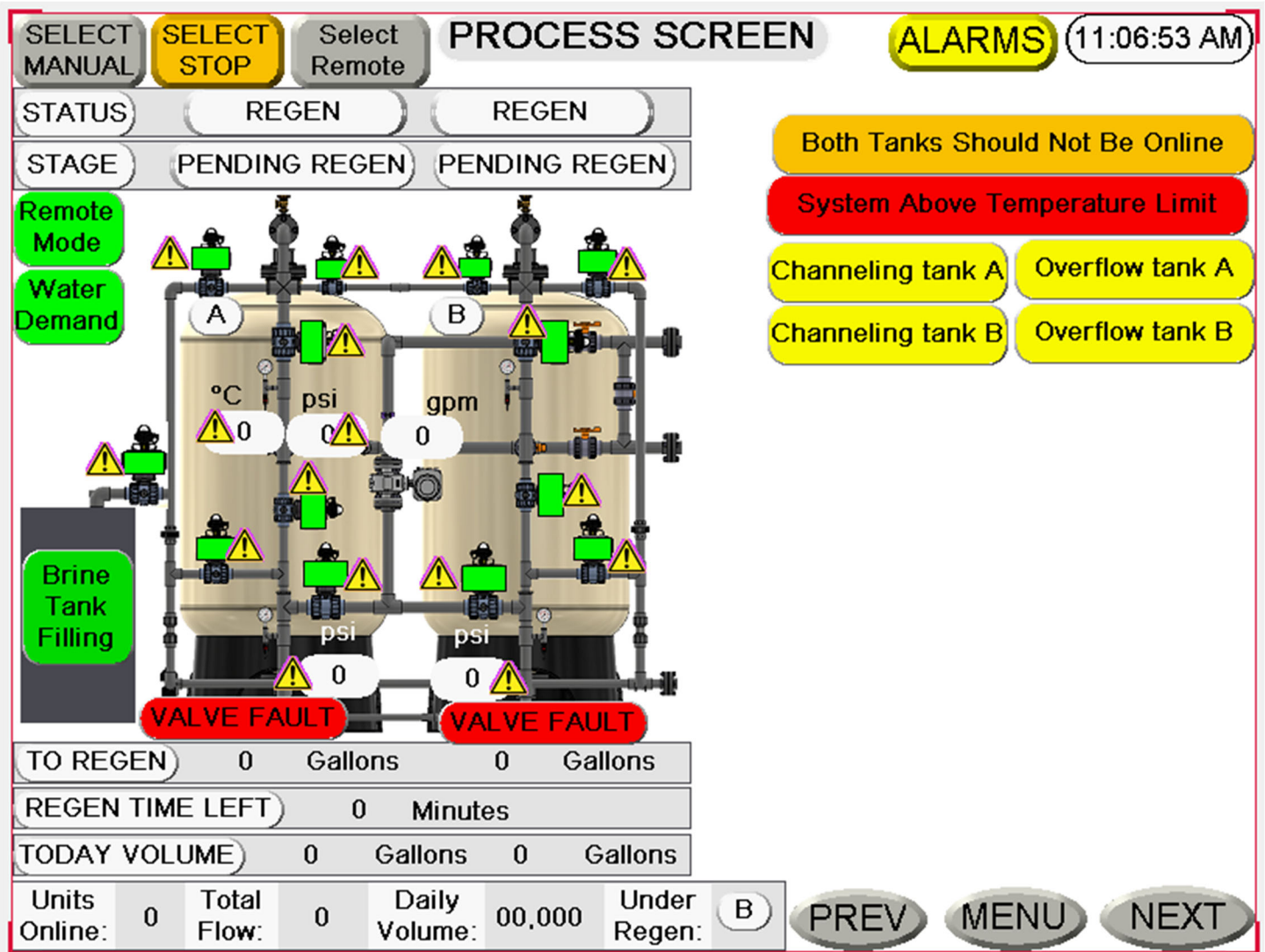
- Selection between the Manual/Auto, Start/Stop and Local/Remote Mode.
- Status information for Lead, Stand-By, Online, Faulted, Maintenance or Under Regeneration
- The total flow through the system
- Ready Status display
- Flow (gpm) through each tank
- Volume in gallons left TO REGEN the tank
- Tanks waiting for a regen turn under PENDING REGEN
- Time left for the regen to complete under REGEN TIME LEFT
- The volume of water softened since midnight under DAILY VOLUME
- Pressure in the main line and discharge of each tank
- Stages description in a regeneration
- Valve status as open to green, closed to gray and fault with a caution sign
- Brine Tank Fill Stage Status
- Faults indication on the valves
- Tank Faulted indication with valves that caused the tank to fault
- Brine tank valve status when open in the Brine Draw stage or the Brine tank refill stage

The operation of the system can be performed as described:

Press the **Select Auto** button to activate the auto-mode of the system and pressing the **select manual** puts the system back to manual mode.

For operation, the system must be in the auto-mode, it displays two more options one is **select start** and other is **select remote**. In the **select start** the system runs as a standalone unit and one tank is always online. The other mode is selected by pressing the **select remote** button, it activates the remote-mode where the system operates when a water demand bit is set to high (1) which opens the outlet valve of the tank and closes when the bit is low (0). The provision is provided in the PLC code for the same, but the communication has to be established with the plant DCS for it to function properly.

In simple terms, in remote mode the unit is run and stopped by the plant DCS and in the local mode, operator starts and stops the system based on the requirements.



SELECT AUTO BUTTON: The system is operated by switching it into auto mode, which can be done by pressing the AUTO button on the top left corner grey in colour.

SELECT MANUAL: Appears when the system is in auto already and pressing it switches to the manual mode. When pressed while the system is in auto and operational, stops the system and switches to manual mode.

SELECT START BUTTON: Once the system switches to auto mode then a new button will appear with SELECT MANUAL written on it and a SELECT START button just right beside it, this for operating the system in the local mode. Pressing the start initializes the system, one tank becomes a lead and all other tanks go online to find what is the flow through the system. Based on the flow through the system tanks are then brought online and put into standby mode.

SELECT STOP BUTTON: This button only appears when the system is operational and is orange in colour when pressed the system stops and the start button appears in its position.

SELECT REMOTE BUTTON: This button only appears when the system is in AUTO-MODE and when pressed the system gets ready to be in operation anytime and awaits a water-demand signal from the Plant control system over the ethernet communication. As soon as the system gets the waterdemand bit it opens the outlet valve of the lead and starts softening the water, when bit is low it closes the outlet valve and again goes to ready for operation stage. To go back to the local mode, press the select local button which appears when the system is in remote mode.

GENERAL SYSTEM FUNCTIONS

When the system is ready for a load trial meaning, it can soften water in automatic mode. There are some general functions of the system that can be helpful in operation and maintenance.

Stage Advance:

When a tank is under regen and one wants to advance the stages one at a time for troubleshooting the issues. Go to the maintenance screen and press the advance button to skip the current stage. Pressing it time and again can skip the entire regeneration process quickly.

Manual Regen:

The maintenance team can set tanks to go for a regen which is triggered manually, but only one is allowed at a time.

Bypass the Tank:

If a tank has faulted or the maintenance team needs to work on a tank then only one tank be set to bypass mode at a time. Press the Bypass button for the tank required to go into maintenance, once the issue is resolved it must be released to go back into normal service. The system then will work as a system with the number of tanks available and ready but not under maintenance or faulty condition. If a tank was put into maintenance when the tank was undergoing a regeneration, when the tank is released it puts a regen request for the tank back in the queue. Hence a new request for regen is not required to be submitted separately.

If a valve faults due for some reason, that tank by default goes into maintenance mode, but only one at a time. Now the valves of the tank can be operated by going on to the maintenance screen for that tank, even if the system is in operation.

Manual Mode:

When a major fault occurs in the system and the manual mode can be useful as one can just open the inlet and the outlet valves of the tanks which will soften the water required by the site. On the other hand, valves can be operated from maintenance screen or instrument issues can be looked at. After resolving the issues one can again start in auto mode.

INSTRUCTIONS GENERAL INFORMATION

Progressive Flow Design

Time Delayed Progressive Flow:

The progressive flow set point is the flow rate in gallons per minute and the PLC will bring the next ready tank online for softening. A **“Progressive Flow”** system moves the tanks from **“STANDBY”** to **“ONLINE”** based on the required *Flow Rate Demand*. As the demand increases or decreases, tanks are brought **“ONLINE”** to handle an increase in flow, or placed in **“STANDBY”** as flow decreases.

A unit **“PROGRESSIVE FLOW RATE ADD-POINT”** must be set.

This add-point is the flow rate at which one or more tanks will be brought online to meet flow demands.

Example: if the **“FLOW RATE ADD-POINT”** is set at 100.0 GPM, the first tank will handle 1-100 GPM, and the second tank will be brought **“ONLINE”** at 101 GPM, the third tank at 201 GPM, etc.

Tanks will be brought online after the system flow rate has passed this pre-set progressive flow add-point and maintained that flow demand for 30 seconds. If the flow rate increases rapidly and exceeds the add-point by 120%, tanks will be added immediately to meet the flow demand. Tanks will be taken off-line once the flow rate demand falls below 90% of the unit add-point for 90 seconds.

- A. All tanks are plumbed in PARALLEL
- B. Each tank consists of a magnetic flow meter which monitors the water flow and usages to initiate that tank into an IMMEDIATE Regeneration when the capacity in gallons reaches zero
- C. Tanks are brought **“ONLINE”** based on current SERVICE FLOW DEMAND and a programmed **“SET POINT”** in the Progressive Flow Set Point in Settings. As flow increases, more tanks are brought **“ONLINE”**. As flow decreases, tanks will drop **“OFFLINE”**
- D. Within the system engineering, only one tank can be in regeneration at a time. Future tanks requiring a regeneration will be displayed as **“PENDING REGEN”** and will commence on the initiated order
- E. Tanks may be brought offline and put into **“MAINTENANCE”** for work or service to be completed. Only one tank can be in maintenance at a time. When the tank is brought out of maintenance it will locate itself back into the system design in order of operation
- F. Manual regenerations can be initiated in the **“REGEN”** location if required. More than one tank can be manually regenerated but will commence after the previous one has completed the full regeneration. The tanks in this stage can again be viewed in the PENDING REGEN location of the screen

ALARMS:

Clear All Alarms

Ack All

ALARMS SCREEN

ALARMS

11:09:43 AM

Alarm Message	Ack Status	Occurrence Time	Acknowledge Time
Alarm Message	Alarm Ack	Occurrenc*	Ack Time

HOME

PROCESS

SETTINGS

REGEN

IO TEST

INFO

MAINTENANCE

HISTORY

DIAGNOSE

ALARMS

TRENDS

Close

Units Online: 0

Total Flow: 0

Daily Volume: 00,000

Under Regen: B

PREV

MENU

NEXT

As shown above, the alarms screen has features like description, acknowledge status, occurrence time and acknowledge time. Alarms can be cleared or reset, by doing that clear them from the history of alarms. If not cleared all alarms then a history of the last 250 alarms is provided in the system.

Technical details about troubleshooting the alarms of the system are provided in the troubleshooting section of the manual.

HISTORY AND DIAGNOSTICS:

These screens are provided to get information about the regeneration time stamp for the last 90 instances. The last regen details can be found by entering one on the select regen number section and similarly second last will be shown when entered two and so on till 90.

REGEN HISTORY

ALARMS 11:10:44 AM

	YEAR	MONTH	DAY	HOUR	MINUTES
TANK A	0	0	0	0	0
TANK B	0	0	0	0	0

REGEN DURATION IN MINUTES

TANK A 0

TANK B 0

SELECT REGEN NUMBER

HOME

PROCESS

SETTINGS

REGEN

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DIAGNOSE

ALARMS

TRENDS

Close

Units Online: 0

Total Flow: 0

Daily Volume: 00,000

Under Regen: B

PREV

MENU

NEXT

History for the number of days since the startup, total water softened till date and by each tank, as well as the total number of regeneration till date can be seen on the history screen. See the image on the next page, this information cannot be reset.

HISTORY SCREEN **ALARMS** 11:21:13 AM

NUMBER OF REGEN

TANK A	0
TANK B	0
TOTAL	0

VOLUME IN GALLONS

TANK A	0	x 100k
TANK B	0	x 100k
TOTAL	0	x 100k

DAYS SINCE STARTUP
0

HOMEPROCESSSETTINGSGENIO TESTINFO

MAINTENANCEHISTORYDIAGNOSEALARMTRENDS

Close

Units Online: 0 Total Flow: 0 Daily Volume: 00,000 Under Regen: BPREVMENUNEXT

DAILY ANALYSIS
ALARMS
11:22:17 AM

	VOLUME (gal)	RUN TIME (Min)	AVERAGE FLOW (gpm)	PEAK FLOW (gpm)
TANK A	0	0	0	0
TANK B	0	0	0	0
SYSTEM	0		0	0

REGEN

TANK A	0
TANK B	0
SYSTEM	0

SELECT DAY

HOME
PROCESS
SETTINGS
REGEN
IO TEST
INFO

MAINTENANCE
HISTORY
DIAGNOSE
ALARMS
TRENDS
Close

Units Online: 0
Total Flow: 0
Daily Volume: 00,000
Under Regen: B

PREV
MENU
NEXT

The Volume of water softened by each tank and the system is provided, total number of minutes the tank was softening water and based on the volume and time, average flow is calculated. Peak flow is the max flow registered by the system since midnight. Regeneration data is number of regen a tank has gone through in a day. All of these data are available for the last 90 instances only.

Today's data for water softened by each tank and the number of regenerations in a day are shown on the screen below.

TODAY DATA

ALARMS11:23:15 AM

NUMBER OF REGEN

TANK A0

TANK B0

SYSTEM0

VOLUME IN GALLONS

TANK A0

TANK B0

SYSTEM0

HOMEPROCESSSETTINGSCURRENTIO TESTINFO

MAINTENANCEHISTORYDIAGNOSEALARMSTRENDSClose

Units Online:0Total Flow:0Daily Volume:00,000Under Regen:B

PREVMENUNEXT

This screen shows information that can be reset for diagnosing the system performance and analysis. The information provided is since the system was last reset.

HISTORY SINCE RESET

ALARMS

11:23:40 AM

NUMBER OF REGEN

TANK A0

TANK B0

SYSTEM0

VOLUME IN GALLONS

TANK A0x 1000

TANK B0x 1000

SYSTEM0x 1000

DAYS LAST RESET

0

RESET DATA

RESET

HOMEPROCESSSETTINGSREGENIO TESTINFO

MAINTENANCEHISTORYDIAGNOSEALARMTRENDS

Close

Units Online:0Total Flow:0Daily Volume:00,000Under Regen:B

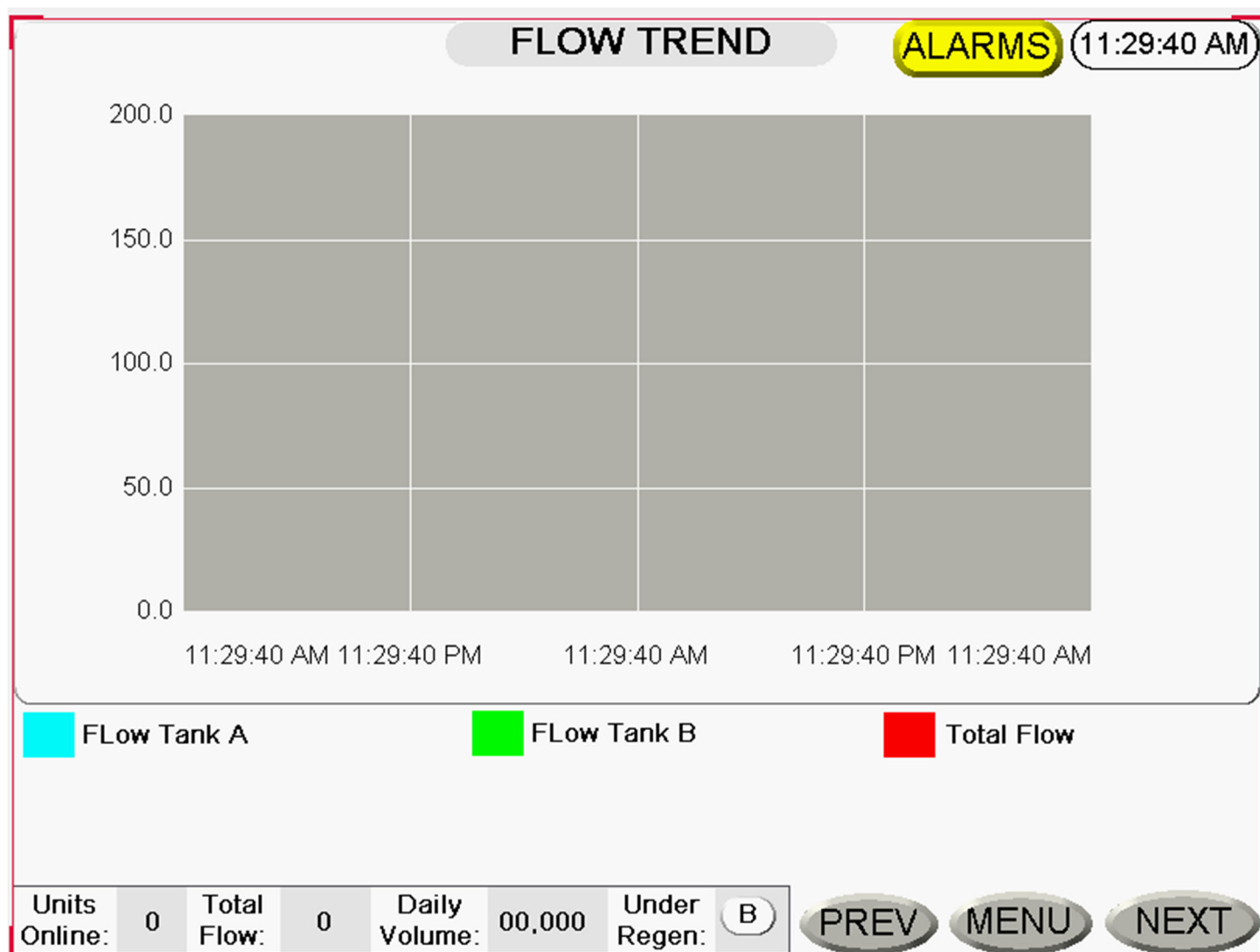
PREVMENUNEXT

TRENDS:

Trends are analogue charts for the readings of pressure and temperature transmitters, flowmeters, set-points and capacity of tanks. They help find the root cause analysis for troubleshooting an issue in the system.

Below is an example of a trend screen:

This screen is in particular for the flowmeter reading, each pen has a unique colour chosen for its quick identification and readings can be then compared to the other tanks for analysis.



SERVICE AND TROUBLESHOOTING:

Problem	Possible Cause	Solution
1. No Display on HMI	a. No power supplied to PLC	a. Repair and or check the power supply
2. No Data on HMI	a. Check Ethernet Cable and connection b. Wrong IP Address c. PLC is not in RUN mode	a. Replace or connect Ethernet Cable b. Check to make sure the IP address is unique and not duplicated c. Verify PLC in Run Mode
2. HMI does not display the correct time of day	a. Not set correctly at the time of installation b. Daylight Savings	a. Access programming with computer and reset correct time of day b. Verify the area and set the proper time in config settings.
1. IO Issues	a. IO working b. IO Not working	a. Check the PLC and voltage at the PLC circuit b. Contact manufacturer
1. Valve Not Operating	a. Communication issue b. Air pressure under 60 psi c. Valve operation time is not proper d. Open/Close Limit switch signal	a. Check Communication with valve bank b. Maintain air pressure between 60 to 90 psi c. Make sure valve operation time is at least 10 seconds d. Check the limit switches and wiring of the circuit
4. Display does not indicate the water flow reading.	a. Blown fuse b. Valve #2 is closed when on-line c. Flow meter connections	a. Replace fuse b. Check and repair connections to valve #2 c. Check all wiring flow meter connections
5. Softener does not regenerate automatically but does when REGEN is done manually	a. Meter is not connected/wired b. Meter wire not installed securely c. Defective meter	a. Connect meter check all wire connections b. Verify meter cable wires are installed securely c. Replace meter
6. Hard or untreated water is being delivered	a. System running in optimized mode b. Brine salt tanks low in salt c. Softener not regenerating	a. Put the tanks to regen manually b. Check brine solution in brine tanks add salt c. Check last regen time and water softened after that
7. Residual regenerant being delivered to service	a. Low water pressure b. Restricted drain line	a. Check incoming water pressure must remain at a minimum of 25 psi b. Check drain line for restrictions and is clear
13. Water running to drain in service position	a. Valves 3 & 6 might be open when in service or on stand-by	a. Check status valves 3 & 6 as these should be closed when in service or on standby

ALARMS AND CORRECTIVE ACTION:

Alarm Description	Cause of Alarm	Corrective Action
Valve Open or Close Fault	A. Limit Switch Faulty B. Wiring Issues	A. Replace Limit Switch B. Check for loose connections and wiring issues
Channelling Tank Alarms	Flow through the tank at less than 10 gpm for 30 minutes	Check for hardness detected error, check hardness in lab as well and set the tank for manual regen if required.
Overflow Alarms	Flow through the tank at more than 110 gpm for more than 90s	A. Possibly because of excess demand, wait for demand to come down B. Could be because tanks are not ready, resolve the valve issues C. Check the flowmeter for issues.
NO Regen Alarm	Tank did not go under regen in the last 15 days	Set tank in manual regen if required
Pressure drop alarm	The pressure drop across the tank is greater than the limit	Set the tank for regen and if persistent check the tank internals and hub laterals.
System Overflow	The total flow through the system is greater than 90 gpm for more than 5 minutes. The flow above system design flow	A. Check for the System average flow and demand of the water B. Contact OEM if it shows up often
Hardness Detected	Hardness in the water treated	The system needs a regen or double-checks the hardness analyzer readings with a plant lab chemist
Leakage Alarms	Outlet valve leakage issues	A. Check the closing limit range of the valve B. Check the flowmeter signal mA output
System Operation Issue	Two Tanks in operation for more than 15 minutes	Wait for the flow demand to decrease and if often contact supplier.
NO Lead Present	No tank was ready when the system started	All Tanks may be faulted, check air pressure supply into the valves

WARRANTY:

Industrial Duplex Alternating PLC Water Softener

Thank you for your purchase of our INDUSTRIAL TRIPLEX WATER SOFTENER. For proof of purchase, please retain your Invoice/Sales Order Copy.

Warranty ~ Offered

Excalibur Water Systems warrants its products to be free from defects in materials and workmanship to the original owner from the date on the proof of purchase as described below.

Warranty ~ Working Procedures

If during the suitable warranty period, a part is defective, then Excalibur Water Systems will repair or replace that part at no charge to the original owner, except for charges for nominal shipping,

Warranty ~ Coverage Outlined

Excalibur Water Systems guarantees, to the original owner, a period of 12 months from installation or 18 months from the shipment date, the system will be free of defects in materials and workmanship and to perform its proper functions whichever occurs first. To the original owner, the MINERAL TANKS carry an extended warranty and will not corrode, leak, burst or in any other form fail to perform their proper functions for 5 YEARS.

Warranty ~ Service

In the event you require service, Excalibur Water Systems will provide technical service assistance for your Commercial Water Softener. To obtain warranty service within 30 days of discovery of the defect, the notification must be given to Excalibur Water Systems.

General Provisions

The above warranties are effectively provided with the WATER SOFTENER is operated at water pressures not exceeding 110psi and at water temperatures not exceeding 110°F; also provided that the water softener is not subject to abuse, misuse, alteration, neglect, freezing, accident or negligence; and provided further that the water softener is not damaged as the result of any unusual force of nature such as but not limited to flood, hurricane, tornado or earthquake. Excalibur Water Systems is excused if failure to perform its warranty obligations is the result of strikes, government regulation, materials shortages or other circumstances beyond its control.

THERE ARE NO WARRANTIES ON THE WATER SOFTENER BEYOND THOSE SPECIFICALLY DESCRIBED ABOVE. ALL IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED TO THE EXTENT THEY MIGHT EXTEND BEYOND THE ABOVE PERIODS. THE SOLE OBLIGATION OF EXCALIBUR WATER SYSTEMS UNDER THESE WARRANTIES IS TO REPLACE OR REPAIR THE COMPONENT OR PART THAT PROVES TO BE DEFECTIVE WITHIN THE SPECIFIED PERIOD AND EXCALIBUR WATER SYSTEMS ARE NOT LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES. NO DEALER, AGENT, REPRESENTATIVE OR OTHER PERSON IS AUTHORIZED TO EXTEND OR EXPAND THE WARRANTIES EXPRESSED ABOVE.

Certain provinces or states do not allow limitations on how long an implied warranty lasts or exclusions or limitations of incidental or consequential damage, therefore limitations and exclusions in this warranty may not apply to you. This warranty extends you specific legal rights as you may have other rights which vary from province to province or state to state.

Excalibur Water Systems is a manufacturer of water treatment products.
142 Commerce Park Drive
Barrie, Ontario Canada

