



OPERATING MANUAL



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General Warning

The control valve, fittings and, or bypass are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicon lubricant may be used on black o-rings but is not necessary. **Avoid any type of lubricants, including silicone, on red or clear lip seals.**

The nuts and caps are designed to be unscrewed or tightened by hand or with the special plastic wrench. If necessary a pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place screwdriver in slots on caps and/or tap with a hammer.

Do not use pipe dope or other sealants on threads. Teflon tape must be used on threads of the 1" NPT elbow or the 1/4" NPT connection and on the threads for the drain line connection. Teflon tape is not necessary on the nut connection or caps because of o-rings seals.

After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, press the NEXT and REGEN buttons for 3 seconds or unplug power source jack from the printed circuit board (black wire) and plug back in. This resets the electronics

and establishes the service piston positions. The display should flash all wording, then flash the software version (e.g. 154) and then reset the valve to the service position. All plumbing should be done in accordance with local plumbing codes. The pipe size for the drain line should be a minimum of 1/2". Backwash flow rate in excess of 7 gpm or length in excess of 20' require 3/4" drain line.

Solder joints near the drain must be done prior to connecting the drain line flow control fitting. Leave at least 6" between the drain line flow control fitting and solder joints when soldering pipes that are connected on the drain line flow control fitting. Failure to do this could cause interior damage to the drain line flow control fitting.

When assembling the installation fitting package (inlet and outlet), connect the fittings to the plumbing system first and then attach the nut, split ring and o-ring. Heat from soldering or solvent cements may damage the nut, split ring or o-ring. Solder joints should be cool and solvent cements should be set before installing the nut, split ring, and o-ring. Avoid getting primer and solvent cement on any part of the o-rings, split rings, bypass valve or control valve.

Plug into an electrical outlet. Note: All electrical connections must be connected according to local codes. (be certain the outlet is uninterrupted.)

Install grounding strap on metal pipes.

Principles of Softening and Ion-Exchange

Softening of water by the exchange process involves the exchange or substitution of the hardness minerals, chiefly calcium and magnesium, for sodium minerals. The exchange is made possible because the minerals are ionic in nature (often called ionized impurities) which means they have an electrical charge. The ion exchange process is based on the fact that like charges repel one another, and unlike charges attract.

Calcium and magnesium ions in water are actually dissolved rock. They have been dissolved by water, the "universal solvent", as it trickles down through strata of rock and soil it dissolves calcium and magnesium deposits. This dissolved rock eventually finds its way into an underground aquifer and when water from the aquifer is pumped to the surface, it contains the dissolved hardness minerals of calcium and magnesium and is said to be hard water.

An ion exchange softener exchanges the hardness minerals, calcium, and magnesium, for sodium, from the softener resin. Sodium is less objectionable because it does not build up on surfaces as scale deposits.

All three minerals are positively charged ions called cations. The exchange takes place by passing water containing hardness minerals over a man-made ion exchange resin contained in a suitable tank. The resin, polystyrene divinyl benzene in most modern softeners, consist of millions of tiny plastic beads, all of which contain many negatively charged exchange sites to attract the positive cations. When the resin is in the regenerated state these negatively charged exchange sites hold positively charged sodium cations.

As the calcium and magnesium contact the resin beads in their travel through the resin tank, they displace the sodium ions from the exchange sites. During the ion exchange process, relatively small amounts of other strongly charged cations such as iron and manganese are also removed along with the calcium and magnesium.

Ion exchange is possible for two reasons: (1) All cations do not have the same strength of positive charge and (2) the resin prefers the stronger charged cations calcium and magnesium than it does the weaker sodium cations.

The exchanged sodium cations pass downward through the resin "bed" and out the softener outlet, thus, the softener delivers "soft" water.

Eventually, all of the resin exchange sites are occupied by calcium and magnesium and no further exchange can take place. The resin is said to be exhausted and must be regenerated.

The softener resin is regenerated with a dilute brine solution of sodium chloride (common salt) and water. During regeneration the flow of service water from the softener is first stopped. Brine is drawn from the brine tank mixing with a separate stream of water. The brine solution flows through the resin, contacting the resin beads loaded with calcium and magnesium ions. Even though the calcium and magnesium are more strongly charged than the sodium, the concentrated brine solution contains literally billions of weaker charged sodium ions which have the power to displace the smaller number of calcium and magnesium ions. When the calcium and magnesium ions are displaced, the positive sodium ions are attracted to the negative exchange sites is said to be regenerated and ready for the next softening cycle.

Specifications TABLE 1

Minimum/Maximum Operating Pressure	20-125 psi
Minimum/Maximum Operating Temperature	40°F (4°C) -110°F (38°C)
Current Draw & Voltage	0.5 Amperes 110 Volts Other options available

Table 2 contains a summary of specifications for the control valve and bypass valve.

Quick Reference Valve Specifications TABLE 2

Max Service flowrate (include bypass)	27 gpm (102.2 lpm) @ 15 psig (103 kPa) drop
Max Backwash flowrate (includes bypass)	27 gpm (102.2 lpm) @ 25 psig (172 kPa) drop
Regenerant Refill Rate	.5 gpm (1.9 lpm)
Inlet/Outlet Fitting Options	(a) 1" NPT elbow which has a unique drill out feature to allow a 1/4" NPT connections to the inlet and/or outlet (b) 3/4" & 1" PVC solvent weld fitting (c) 1" straight brass sweat fitting (d) 3/4" straight brass sweat fitting
Distributor Tube Opening	1.05" Diameter (3/4" U.S. PVC Pipe Size)
Tank Thread	2-1/2" - 8 NPSM
Control Valve Weight	4.5 lbs 2.0 kg
PC Board Memory	Nonvolatile EEPROM (Electronically erasable programmable read only memory)
Compatible with regenerants/chemicals	Sodium chloride, potassium chloride, potassium permanganate, sodium bisulfite, sodium hydroxide, hydrochloric acid, chlorine and chloramines

Control Valve Function and Cycles of Operation

The glass filled Noryl fully automatic control valve is designed as the primary control center to direct and regulate all cycles of a water softener. The control valve can be set to regenerate on demand (consumption of a predetermined amount of water) and/or as a time clock (passage of a particular number of days).

The control valve is compatible with a variety of regenerants and resin cleaners. The control valve is capable of routing the flow, of water in the necessary paths to regenerate or backwash water treatment systems. The injector regulates the flow of brine or other regenerants. The control valve regulates the flow rates for backwashing rinsing and the replenishing of treated water into a regenerant tank.

The control valve is designed to deliver high service (27 gpm @ 15 psig) and backwash (27 gpm @ 25 psig) flow rates when the bypass has straight fittings. The control valve uses no traditional fasteners (e.g. screws), instead clips, threaded caps and nuts and snap type latches are used. Caps and nuts only need to be firmly hand tightened because radial seals are used. Tools required to service the valve include one small blade screwdriver, one large blade screwdriver and pliers. A plastic wrench is available which eliminates the need for screwdrivers and pliers. Disassembly for servicing takes much less time than comparable products currently on the market.

The transformer power pack comes with a 15-foot power cord and is designed for use with the control valve. The transformer power pack is for dry location use only. The control valve remembers all settings for two hours if the power goes out. After two hours the only item that needs to be reset is the time of day, all other values are permanently stored in the nonvolatile memory. The control valve does not need batteries.

When the control valve is used as a down flow softener, two backwashes always occur. The softener will start regenerant prefill before regeneration, the prefill starts two hours before the regeneration time set. During the 2-hour period in which the brine is being made, treated (softened) water is still available. For example:regeneration time = 2:00 am, prefill option selected, downflow softener. Fill occurs at 12:00 a.m., start of backwash cycle occurs at 2:00 a.m.

REGENERATION STEPS AND PURPOSE:

- Brine fill** – Brine tank is filled to dissolve salt for next regeneration.
- Backwash** – Flow through the resin bed is reversed. Water flows upward expanding and agitating the resin bed.
- Brine in** – Brine is educted from the brine tank and passes through the resin bed in a downward flow, thus removing calcium and magnesium that has accumulated on the resin beads and is flush to drain.
- Backwash** – A second backwash is performed
- Rinse** – The resin is now flushed downward at a set flow rate. This resettles the bed and rinses out any remaining brine left in the resin bed.

EXCHANGE CAPACITY DATA

- 20,000 grain approx. per cu. Ft.
6 lbs. salt-sodium chloride
- 25,000 grain approx. per cu. Ft.
8 lbs. salt-sodium chloride
- 30,000 grain approx. per cu. Ft. 1
5 lbs. salt-sodium chloride
- Note: To convert parts per million (PPM) to grains divide by 17.1
- Example: Water hardness of 250 PPM
(250 PPM divided by 17.1 PPM/gr.) equals 14.6 gr.
- It is recommended that a good grade of solar or pellet salt be used.
- One-gallon water will dissolve approximately 3.0 lbs. of salt

Installation Preview

Conduct a visual check of all equipment for any damage that may have occurred during shipment.

Note: If there is obvious damage to any equipment, it should be noted on the carrier's Bill Of Lading. Open and inspect the contents of all closed crates, cartons, etc. and inspect for concealed damage. The manufacturer is not liable for any damage during transit.

Position the equipment in its proper location, setting on a flat surface. Level equipment as required. Equipment out of plumb can exhibit poor flow characteristics, which will affect the performance of the system.

Note: Pre-assembled units are shipped with media (resin & gravel), distributions tube, and control valve installed. Double-check the valve installation on the tank. Tighten if necessary. **Units shipped by UPS must be assembled on site. SEE INSTRUCTIONS ON PAGE 6.**

Unit should be positioned with the valve control facing forward.

Check the main line water pressure. The softener is designed for a minimum of 20 psi and a maximum of 125 psi working pressure. If the line pressure exceeds this limit, a pressure-reducing valve should be installed.

Maximum allowable water temperature is 40°F (4°C) – 110°F (38°C). A 120vac 60 cycle electrical source must be available for operation of the controller.

Connect raw water supply line to the inlet valve connection. Connect treated water outlet to service line. It is suggested that the pipe size be equal or one size larger than the valve connection.

STEP 1: Select Location

Locate main water supply for all faucets and appliances in home (if possible outside faucets should be separate so not to waste soft water).

Select location that is easily accessible to 110vac power. A 15-foot power cord is provided.

You will also need a drain close by for disposal.

Leave enough room so you can easily add salt when needed.

Locate the water softener at least 10 feet away from the hot water heater so that hot water does not backup and damage the softener.

Make sure water softener is in a level spot. You may be required to put the softener on a platform, such as a piece of 3/4" plywood and shimmed to become level.

Make sure softener is behind any other water conditioning systems installed in series, except a system that is for taste and odor or a Reverse Osmosis system.

Select a location where water damage will be least likely to occur if a leak should develop.

If installing the softener in an outside location make sure to protect from the elements, such as rain, sunlight, and contamination.

Warning: When piping with copper, solder all piping as subassemblies before installing. Internal damage can result from the high heat of the torch.

Note: All piping is to meet your local and state code.

Position brine tank approximately 6" from the softener tank on a smooth surface.

Connect the brine air check assembly in the brine tank to the brine suction (eductor) connection. 5/8" tubing should be installed from the brine tank overflow to drain. This is a gravity drain designed to divert brine to the drain in the event of a malfunction, which would cause overflow of the brine tank.

STEP 2: Install A Bypass

Note: Always install a bypass, either a 3 valve system or the standard bypass for the valve you have. This will allow you to shut off the water supply to the softener, but still have water in the house if the softener is in need of repair.

After a location has been determine install bypass onto the control valve. (Figures 1 and 3 show standard bypass on valve.) (Figures 2 and 4 show 3 valve bypass plumbing.)

Note: If installing a 3 valve bypass valve, do so now. Close main water supply valve, at the well or at the water meter.

Shut off electrical or fuel supply to the water heater.

Open a faucet to drain pipes.

The bypass (provided with some models) easily connects to the valve body using nuts that only require hand tightening. The split ring retainer design holds the nut on and allows load to be spread over the entire nut surface area reducing the chance for leakage. Make certain the nut is placed on first, then the split retainer ring, followed by the o-ring to make the seal. A silicon lubricant may be used on the black o-ring seals. This design allows for an approximate 2-degree misalignment of the plumbing. This design will allow for minor plumbing misalignments, but should never handle the weight of the plumbing system.

Note: This manual is used for a range of products. Some parts of the system you have may be different.

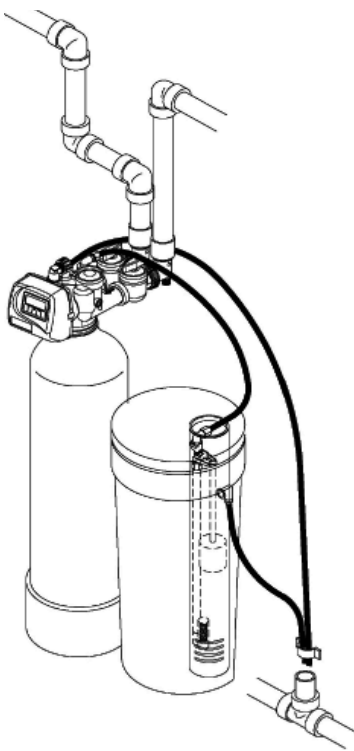


Figure 1: Plumbing with by pass (STANDARD).

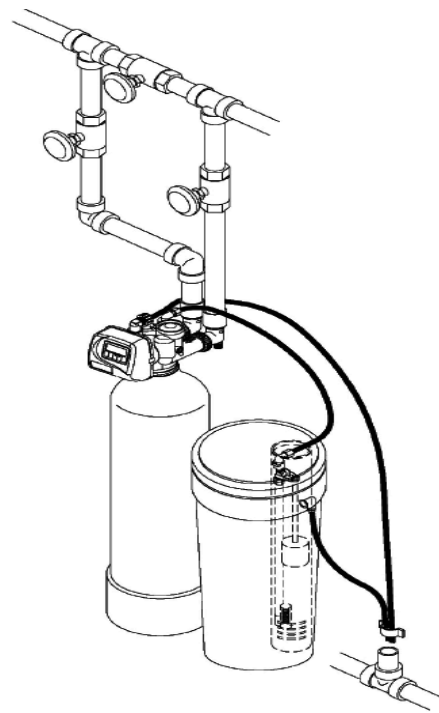


Figure 2: Plumbing with 3 valve bypass.

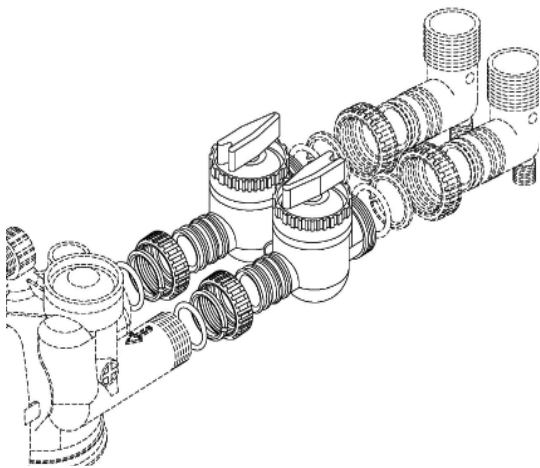


Figure 3: Bypass (STANDARD).

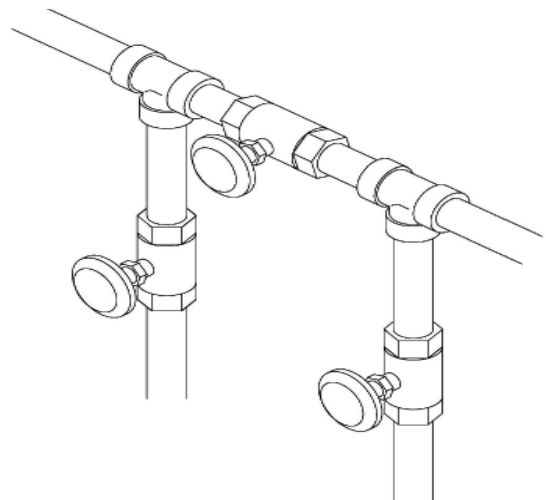
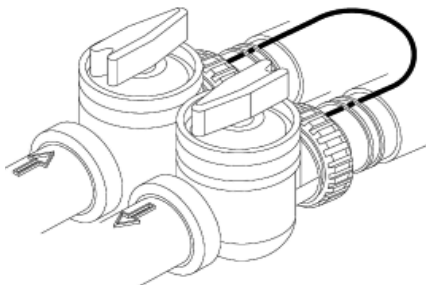
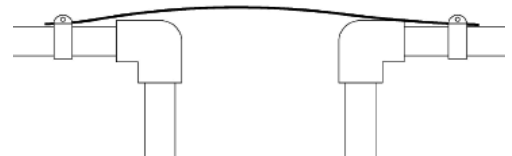


Figure 4: 3 valve bypass plumbing.



When installing sweat copper follow state and federal codes by using a lead free solder and flux. Use a joint compound to seal threaded pipe. Some homes use the cold water pipes for an electrical ground (metal only). When finished with plumbing, a ground wire should be connected to the copper pipes to complete the ground circuit. Use tow clamps and #4 copper for this.

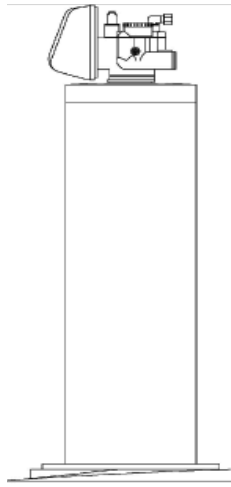


STEP 3: Move Filter into place

Make sure floor is level.

Measure, cut, and install pipe and fittings to the bypass valve (dry fit only to make sure you have a proper fit) inlet and outlet side. Be sure hard water is supplied to the inlet side. Trace pipe to be sure.

The installation fittings connect to the control valve or the bypass valve using nuts that only require hand tightening. Hand tighten nut connections between control valve and installation fittings, control valve and bypass valve, and bypass valve and installation fittings allow for easy serviceability. Do not use a pipe wrench to tighten nuts on installation fittings. Hand tighten only.



Note: When assembling the installation fitting package, connect the fitting to the plumbing system first and then attach the nut, split ring, and o-ring. Heat from soldering or solvent cements may damage the nut, split ring, and o-ring. Make sure solder joints are cool before assemble is started.

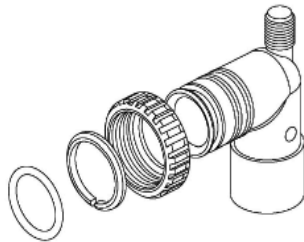
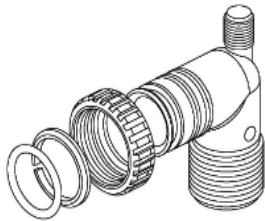
Slip the nut onto the fitting first, then the split ring second and the o-ring last. Hand tighten the nut. If the fitting is leaking tightening the nut will not stop the leak. Remove the nut, remove the fitting, and check for damage or misalignment of the o-ring.

STEP 4: Move brine tank next to softener and connect brine line to valve

With brine tank next to the softener tank connect the brine line to valve body.

1" PVC MALE NPT ELBOW

3/4" OR 1" PVC SOLVENT ELBOW



1" BRASS SWEAT

3/4" BRASS SWEAT

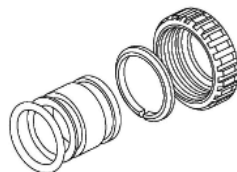
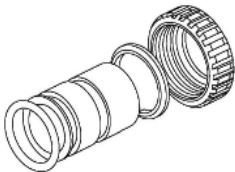


Figure 8: Four types of installation fittings.

Split ring retainer design holds the nut on and allows load to be spread over the entire nut surface area reducing the chance for leakage. The split ring design, incorporated into the installation fittings allows approximately 2 degrees off axis alignment to the plumbing system. The installation fittings are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.

Control valves that use a regenerant, come equipped with a 3/8" refill flow control assembly.

To complete the regenerant line connections orientate the outlet in the desired direction and push the plastic insert into the poly tube. Push the poly tube into the nut. Do not use pipe dope or other sealant on threads. The threads for the compression nut do not need Teflon tape. Tight the nut securely to create a pressure tight connection. A plier or crescent wrench may be used to tighten or unscrew the nut. The nut, gripper and retainer sleeve is a 3-piece assembly that can come apart if removed from the elbow body. Parts must be reassembled exactly as shown in refill flow control assembly drawing to function properly. If the nut is completely removed from the body, slip the nut, plastic gripper and retainer sleeve on the tube then tighten on to the fitting. Complete the connection by installing the loose end of the tubing to the brine valve in the brine tank.

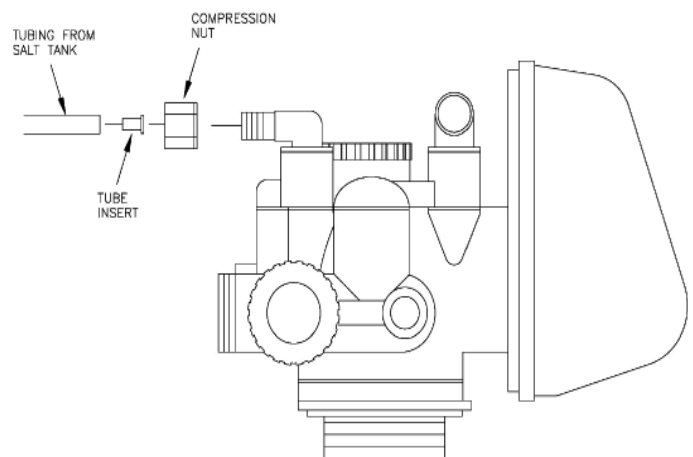


Figure 9: Brine Draw Connection

Connect the Drain Line

If the drain is a 5/8" flexible poly tube, slide the nut onto the poly tube, then place the poly tube insert into the end of the poly tube and tighten the nut on to the 3/4" drain line fitting. The nut is only designed for use with flexible poly tube. Use other nuts if attaching different materials. Run line to a drain. Making sure you have 1 1/2" airgap. You may use floor drain, standpipe or any open type drain (see Fig 10 & 11).

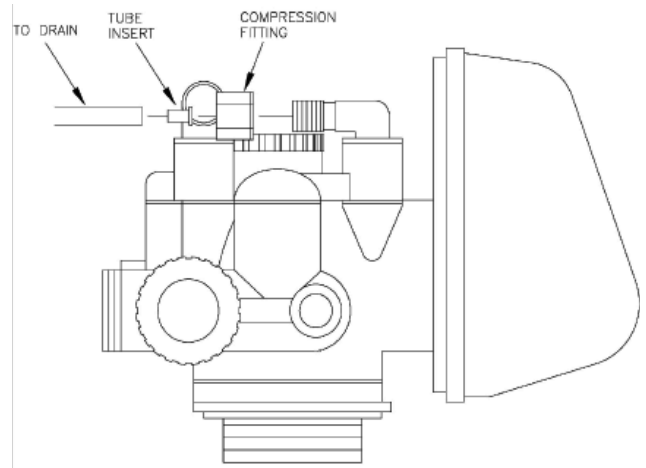
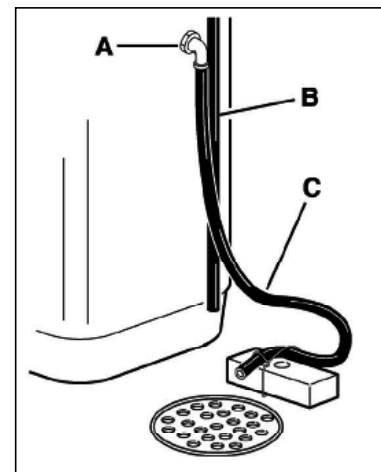


Figure 12: Drain Line Connection



A – Adapter overflow elbow
B – Overflow hose
C – Valve drain hose

Figure 10: Drain Line Connection

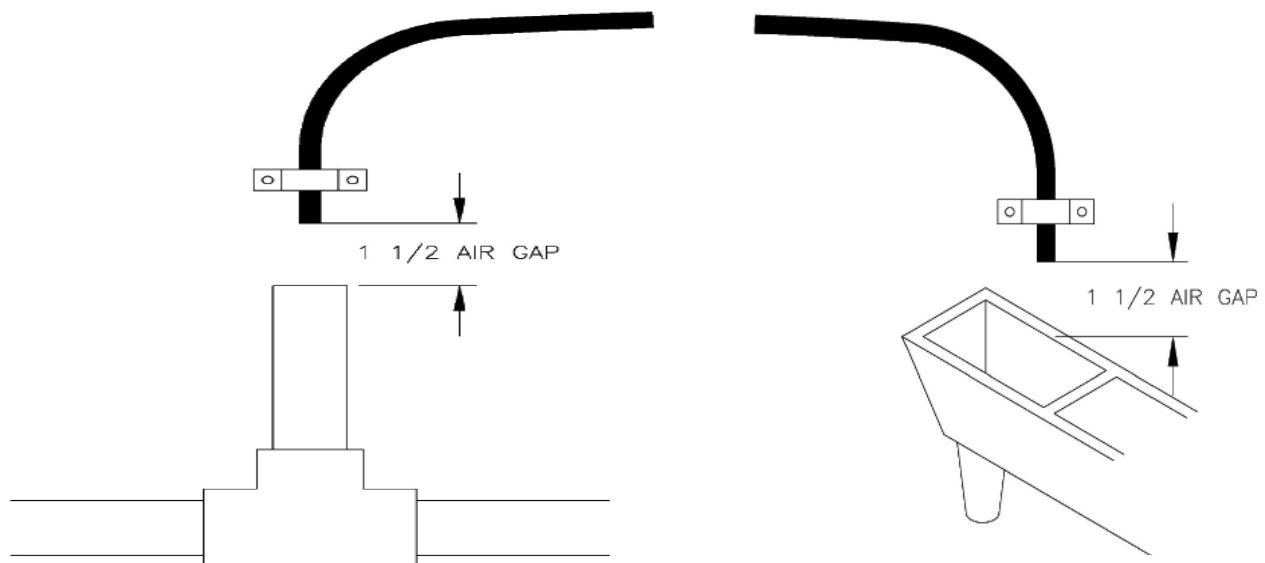


Figure 11: Also be sure drain line has an air gap.

Step 5: Start-Up

Add salt to the brine tank.

Using a bucket, pour approximately 3 gallons of water into the brine tank.

Plug in the power cord.

Place the bypass valve in the shut off position (see bypass valve operation below).

Turn on the water supply to the unit.

Press and hold the Regen button for approximately three seconds. Release the button when you hear the valve motor start to turn.

Unplug the power cord after the valve stops moving and the display shows "Backwash".

Partially open the inlet on the bypass valve until you hear water flowing.

Observe the drain line. Open the inlet valve all the way after all the air is vented from the system.

Allow the system to backwash until the drain line runs clear.

There may be some initial color in the water. This is normal.

Plug in the power cord.

Manually advance the valve to the "Softening" position by pressing the Regen button. You will need to press it five times, pausing between presses to allow the valve to stop at each cycle.

Open a hot and cold water faucet to bleed any remaining air from the system.

Turn the water heater back on.

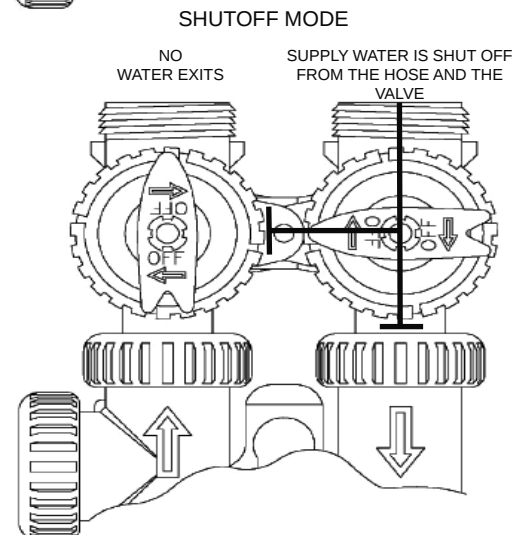
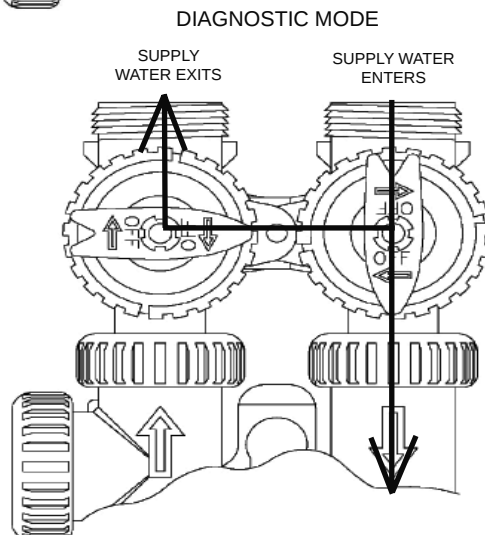
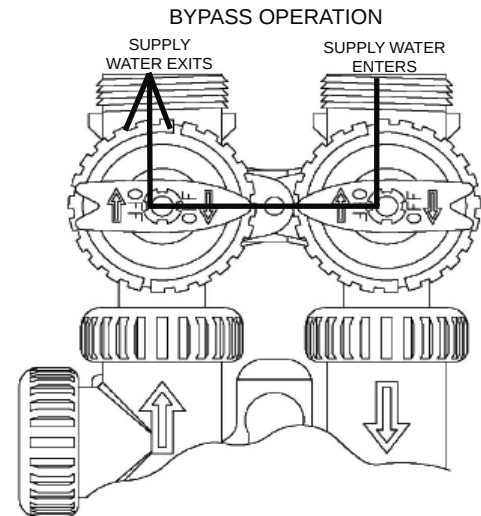
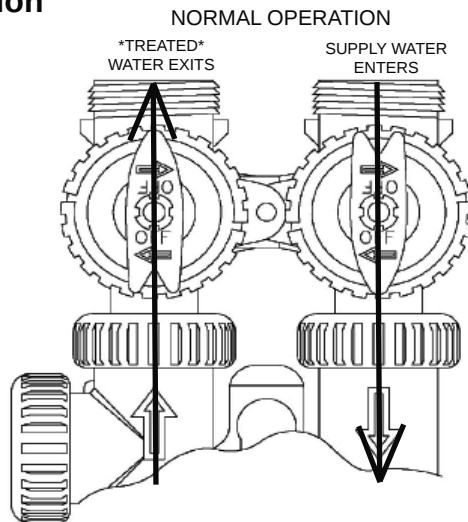
The valve is preprogrammed at the factory for the most efficient operation. The only programming needed at startup is to set the hardness and time of day.

To set the time of day, press the Set Clock button then use the up or down arrow buttons to set the hour (pay attention to the AM/PM indicator in the upper right hand corner of the display). Press the Next button and then use up or down arrow buttons to set the minutes. Press the Next button to return to the main display.

It's a good idea to set the hardness 10% higher than the measured water hardness to compensate for other contaminants that the softener may remove that are not measured by the hardness test.. It is also necessary to add 2 grains to the hardness setting for each ppm of iron in the water. For example: if the water measures 18 grains with the hardness test kit and there is 1.5 ppm of iron, then $18 \times 1.1 = 19.8$ and $1.5 \times 2 = 3$. Therefore $19.8 + 3 = 22.8$ so you would set the hardness at 23 grains.

To set the hardness press the Next and the up arrow button simultaneously to bring up the "Set Hardness" display. Use the up and down arrow buttons to set the hardness. Press the Next button four times to get back to the main display.

Bypass Valve Operation



General Operation

When the system is operating one of two displays will be shown. Pressing NEXT will alternate between the displays. One of the displays is always the current time of day. The second display is one of the following: days remaining or gallons remaining. Days remaining is the number of days left before the system goes through a regeneration cycle. Capacity remaining is the number of gallons that will be treated before the system goes through a regeneration cycle. The user can scroll between the displays as desired.

If the system has called for a regeneration that will occur at the preset time of regeneration, the words REGEN TODAY will appear on the display.

When water is being treated (i.e. water is flowing through the system) the word "Softening" flashes on the display.

Cleaning Iron Out of the Water Softening System

The system is designed to remove minerals like calcium and magnesium from household water. Periodic resin bed cleaning is recommended if your water contains iron. Clean the bed at least every six months, or more if iron appears in the soft water between cleanings. Resin cleaners such as citric acid or metabisulfate are available from your water treatment dealer.

Checking for a Salt Bridge

A hard crust or "Salt Bridge" can form in the lower half of the salt storage tank. This can be deceiving because the tank will appear to have plenty of salt, but underneath, salt has hardened and when the system regenerates, water cannot quite reach this level to be made into brine (water and salt).

Breaking a Salt Bridge

Take a wooden broom handle and carefully push it down into the salt, working it up and down. If the tool strikes a hard object (be sure it's not the bottom or sides of the tank), it's probably a salt bridge. Carefully break the bridge with the broom handle. Do not pound on the walls of the tank.

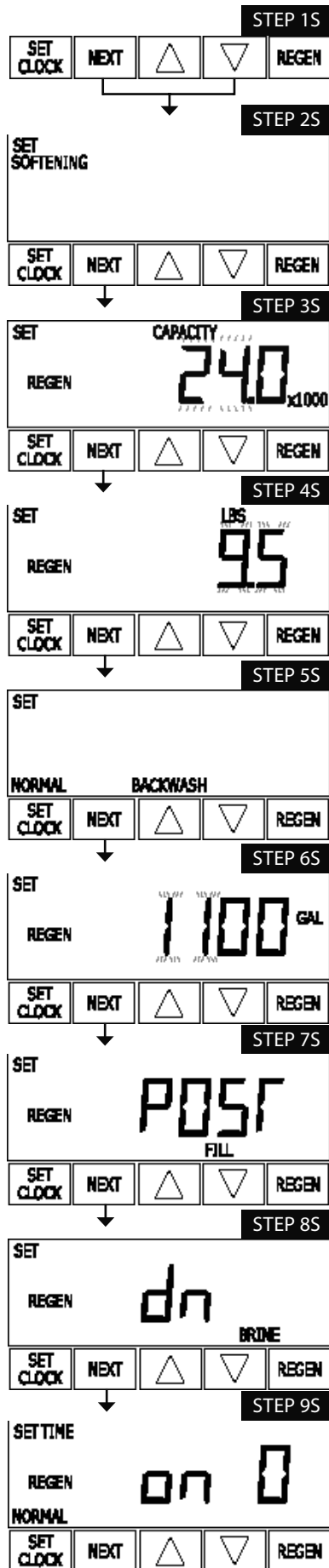
NOTE: Salt bridges are typically caused by high humidity or using the wrong kind of salt. In humid areas it is best to fill with less salt, more often. Use only nugget, pellet or coarse solar salt with a purity of 99.5% or higher. DO NOT use rock, block, granulated, and ice cream-making salts, or salt with iron-removing additives.

Advance Programming Features

The following section explains the advanced programming, diagnostic, and valve history features of the system. It is intended for use by the service technician or water treatment dealer. Do not attempt to access these features if you are not qualified. Improper settings can cause the unit to malfunction, and could have a negative effect on the water quality.

OEM Softener System Setup Quick Reference

This is a quick reference setup procedure. See OEM Softener System Setup Detail for more information on available settings.



STEP 1S – Press NEXT and Down buttons simultaneously for 3 seconds. If screen in step 2S does not appear in 5 seconds the lock on the valve is activated. To unlock press, NEXT, Up, and SET CLOCK in sequence, then press NEXT and Down simultaneously for 3 seconds.

STEP 2S – Choose Softening using Down or Up buttons. Press NEXT to go to Step 3S. Press REGEN to exit OEM Softener System Setup.

STEP 3S – Enter the ion exchange capacity in grains of hardness as calcium carbonate for the system based on test data using Down or Up buttons. Press NEXT to go to Step 4S. Press REGEN to return to previous step.

STEP 4S – Enter the pounds of salt per regeneration using Down or Up buttons. Press NEXT to go to Step 5S. Press REGEN to return to previous step.

STEP 5S – Backwash: Select “NORMAL” or “LONGER” using Down or Up buttons. See Tables 4 or 5 for backwash times. Press NEXT to go to Step 6S. Press REGEN to return to previous step.

STEP 6S – Set Gallons Capacity using Down or Up buttons:

- “AUTO” (reserve capacity automatically estimated and gallons capacity automatically calculated from grains capacity and water hardness);
- “oFF” (regeneration based on day override); or
- number of gallons (20 to 50,000).

See Setting Options Table for more detail. Press NEXT to go to Step 7S. Press REGEN to return to previous step.

STEP 7S – Set Refill option using Down or Up buttons:

- “PoST” to refill the brine tank after the final rinse; or
- “PrE” to refill the brine tank two hours before the regeneration time set.

Press NEXT to go to Step 8S. Press REGEN to return to previous step.

STEP 8S – Set regenerant downflow or upflow using Down or Up buttons:

- “dn” if the regenerant is to flow downward through the media; or
- “UP” if the regenerant is to flow upward through the media.

Prior to selecting a regenerant flow direction, verify the correct valve body, main piston, regenerant piston, and stack are being used, and that the injector or injector plug(s) are in the correct locations.

Press NEXT to go to Step 9S. Press REGEN to return to previous step.

STEP 9S – Set Regeneration Time Option using Down or Up buttons:

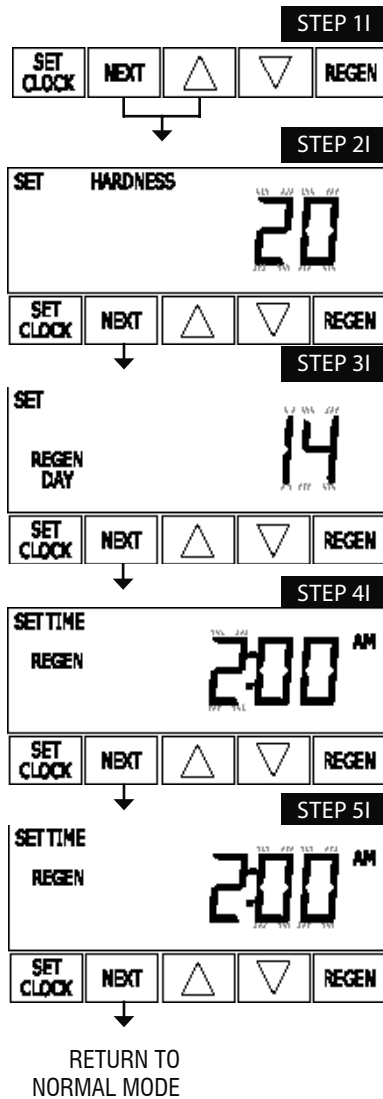
- “NORMAL” means regeneration will occur at the preset time;
- “on 0” means regeneration will occur immediately when the gallons capacity reaches 0 (zero); or
- “NORMAL + on 0” means regeneration will occur at one of the following:
 - the preset time when the gallons capacity falls below the reserve or the specified number of days between regenerations is reached whichever comes first; or
 - after 10 minutes of no water usage when the gallon capacity reaches 0 (zero).

See Setting Options Table for more detail. Press NEXT to exit OEM Softener System Setup. Press REGEN to return to previous step.

Setting Options Table

Volume Capacity	Regeneration Time Option	Day Override	Result
AUTO	NORMAL	oFF	Reserve capacity automatically estimated. Regeneration occurs when volume capacity falls below the reserve capacity at the next Regen Set Time
AUTO	NORMAL	Any number	Reserve capacity automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity falls below the reserve capacity or the specified number of days between regenerations is reached.
AUTO	On 0	oFF	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs immediately when volume capacity reaches 0. Time of regeneration will not be allowed to be set because regeneration will always occur when volume capacity reaches 0.
AUTO	NORMAL on 0	oFF	Reserve capacity automatically estimated. Regeneration occurs when volume capacity falls below the reserve capacity at the next Regen Set Time or regeneration occurs after 10 minutes of no water usage when volume capacity reaches 0.
AUTO	NORMAL on 0	Any number	Reserve capacity automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity falls below the reserve capacity or the specified number of days between regenerations is reached or regeneration occurs after 10 minutes of no water usage when volume capacity reaches 0.

Installer Display Settings



STEP 1I - Press NEXT and Up simultaneously for 3 seconds.

STEP 2I – Hardness: Set the amount of hardness in grains of hardness as calcium carbonate per gallon using the Down or Up buttons. The default is 20 with value ranges from 1 to 150 in 1 grain increments. Note: The grains per gallon can be increased if soluble iron needs to be reduced. This display will show “-nA-” if “FILTER” is selected in Step 2F or if ‘AUTO’ is not selected in Step 6S. Press NEXT to go to step 3I. Press REGEN to exit Installer Display Settings.

STEP 3I – Day Override: When gallon capacity is set to off, Day Override sets the number of days between regenerations. When gallon capacity is set to AUTO or to a number, Day Override sets the maximum number of days between regenerations. If value set to “oFF” regeneration initiation is based solely on gallons used. If value is set as a number (allowable range from 1 to 28) a regeneration initiation will be called for on that day even if sufficient number of gallons were not used to call for a regeneration. Set Day Override using Down or Up buttons:

- number of days between regeneration (1 to 28); or
- “oFF”.

See Setting Options Table for more detail on setup. Press NEXT to go to step 4I. Press REGEN to return to previous step.

STEP 4I – Next Regeneration Time (hour): Set the hour of day for regeneration using Down or Up buttons. AM/PM toggles after 12. The default time is 2:00 a.m. This display will show “REGEN on 0 GAL” if “on 0” is selected in Step 9S or Step 7F. Press NEXT to go to step 5I. Press REGEN to return to previous step.

STEP 5I – Next Regeneration Time (minutes): Set the minutes of day for regeneration using Down or Up buttons. This display will not be shown if “on 0” is selected in Step 9S or Step 7F. Press NEXT to exit Installer Display Settings. Press REGEN to return to previous step.

To initiate a manual regeneration immediately, press and hold the “REGEN” button for three seconds. The system will begin to regenerate immediately. The control valve may be stepped through the various regeneration cycles by pressing the “REGEN” button.

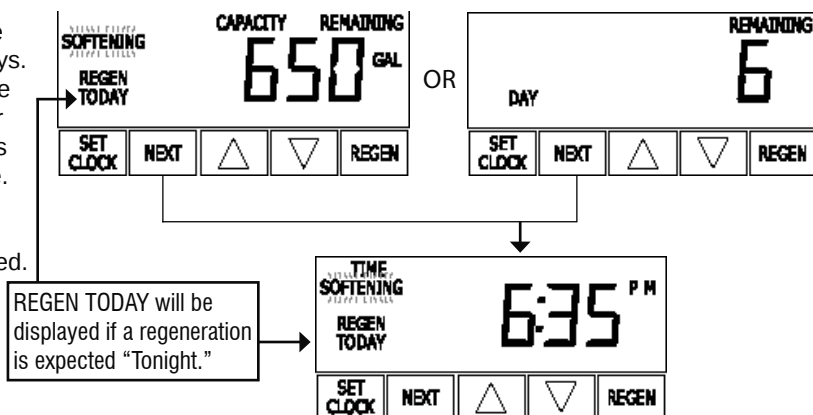
User Display Settings

General Operation

When the system is operating one of two displays will be shown. Pressing NEXT will alternate between the displays. One of the displays is always the current time of day. The second display is one of the following: days remaining or gallons remaining. Days remaining is the number of days left before the system goes through a regeneration cycle. Capacity remaining is the number of gallons that will be treated before the system goes through a regeneration cycle. The user can scroll between the displays as desired.

If the system has called for a regeneration that will occur at the preset time of regeneration, the words REGEN TODAY will appear on the display.

When water is being treated (i.e. water is flowing through the system) the word “Softening” flashes on the display.



Regeneration Mode

Typically a system is set to regenerate at a time of low water usage. An example of a time with low water usage is when a household is asleep. If there is a demand for water when the system is regenerating, untreated water will be used.



When the system begins to regenerate, the display will change to include information about the step of the regeneration process and the time remaining for that step to be completed. The system runs through the steps automatically and will reset itself to provide treated water when the regeneration has been completed.

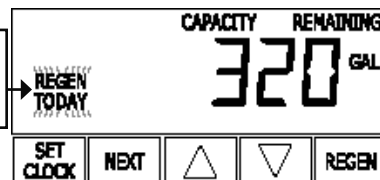
Manual Regeneration

Sometimes there is a need to regenerate the system sooner than when the system calls for it, usually referred to as manual regeneration. There may be a period of heavy water usage because of guests or a heavy laundry day.

To initiate a manual regeneration at the preset delayed regeneration time, when regeneration time option is set to "NORMAL" or "NORMAL + on 0", press and release "REGEN". The words "REGEN TODAY" will flash on the display to indicate that the system will regenerate at the preset delayed regeneration time.

If you pressed the "REGEN" button in error, pressing the button again will cancel the request. Note: If the regeneration time option is set to "on 0" there is no set delayed regeneration time so "REGEN TODAY" will not activate if "REGEN" button is pressed.

REGEN TODAY will Flash if a regeneration is expected "Tonight."



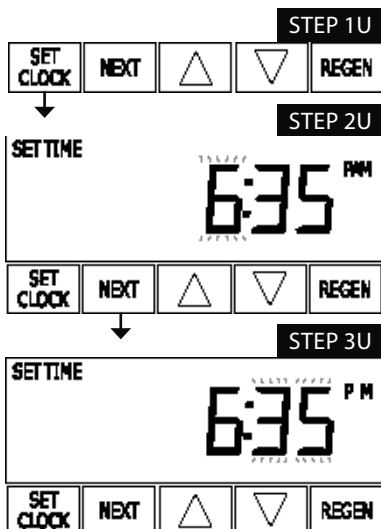
To initiate a manual regeneration immediately, press and hold the "REGEN" button for three seconds. The system will begin to regenerate immediately. The request cannot be cancelled.

Note: For softeners, if brine tank does not contain salt, fill with salt and wait at least two hours before regenerating.

Set Time of Day

The user can also set the time of day. Time of day should only need to be set after power outages lasting more than 8 hours, if the

battery has been depleted and a power outage occurs, or when daylight saving time begins or ends. If a power outage lasting more than 8 hours occurs, the time of day will flash on and off which indicates the time of day should be reset. If a power outage lasts less than 8 hours and the time of day flashes on and off, the time of day should be reset and the battery replaced.



STEP 1U – Press SET CLOCK.

STEP 2U - Current Time (hour): Set the hour of the day using Down or Up buttons. AM/PM toggles after 12. Press NEXT to go to step 3U.

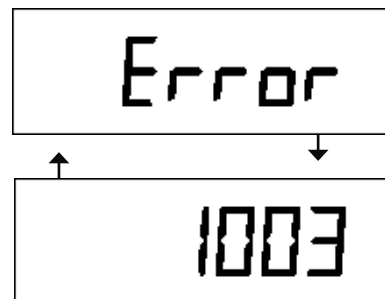
STEP 3U - Current Time (minutes): Set the minutes of the day using Down or Up buttons. Press NEXT to exit Set Clock. Press REGEN to return to previous step.

Power Loss

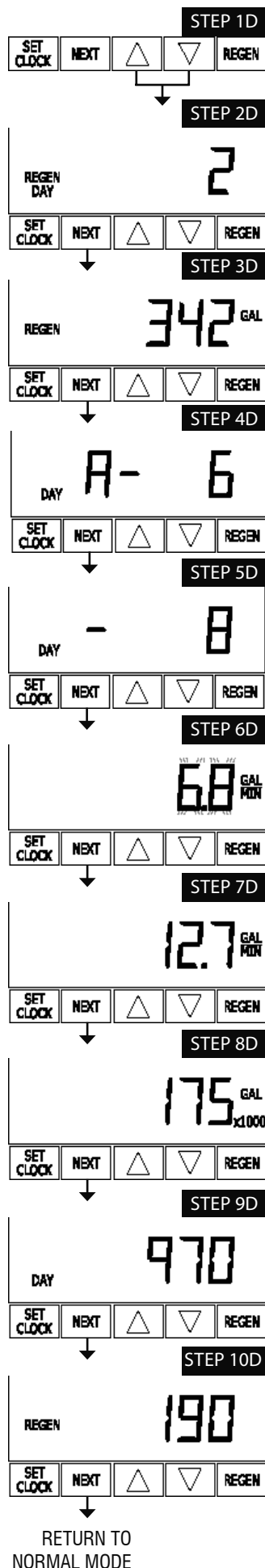
If the power goes out, the system will keep time for up to 8 hours or until the battery is depleted. If a power outage of more than 8 hours occurs, the time of day will flash on and off which indicates the time of day should be reset. The system will remember the rest. If a power outage lasts less than 8 hours and the time of day flashes on and off, the non rechargeable battery should be replaced.

Error Message

If the word "ERROR" and a number are alternately flashing on the display contact the OEM for help. This indicates that the valve was not able to function properly.



Diagnostics



STEP 1D – Press Down or Up simultaneously for three seconds. If screen in step 2D does not appear in 5 seconds the lock on the valve is activated. To unlock press Down, NEXT, Up, and SET CLOCK in sequence, then press NEXT and Down simultaneously for 3 seconds.

STEP 2D – Days, since last regeneration: This display shows the days since the last regeneration occurred. Press the NEXT button to go to Step 3D. Press REGEN to exit Diagnostics.

STEP 3D – Gallons, since last regeneration: This display shows the number of gallons that have been treated since the last regeneration. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 4D. Press REGEN to return to previous step.

STEP 4D – Gallons, reserve capacity used for last 7 days: If the valve is set up as a softener, a meter is installed and Set Gallons Capacity is set to "Auto," this display shows 0 day (for today) and flashes the reserve capacity. Pressing the s button will show day 1 (which would be yesterday) and flashes the reserve capacity used. Pressing the s button again will show day 2 (the day before yesterday) and the reserve capacity. Keep pressing the s button to show the gallons for days 3, 4, 5 and 6. The Down button can be pressed to move backwards in the day series. Press the NEXT button at any time to go to Step 5D. Press REGEN to return to previous step.

STEP 5D - Gallons, 63 day usage history: This display shows day 1 (for yesterday) and flashes the number of gallons treated yesterday. Pressing the Up button will show day 2 (which would be the day before yesterday) and flashes the number of gallons treated on that day. Continue to press the s button to show the maximum number of gallons treated for the last 63 days. This display will show dashes if a water meter is not installed. Press the NEXT button at any time to go to Step 6D. Press REGEN to return to previous step.

STEP 6D – Flow rate, current: Turn the water on at one or more taps in the building. The flow rate in gallons per minute will be displayed. If flow stops the value will fall to zero in a few seconds. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 7D. Press REGEN to return to previous step.

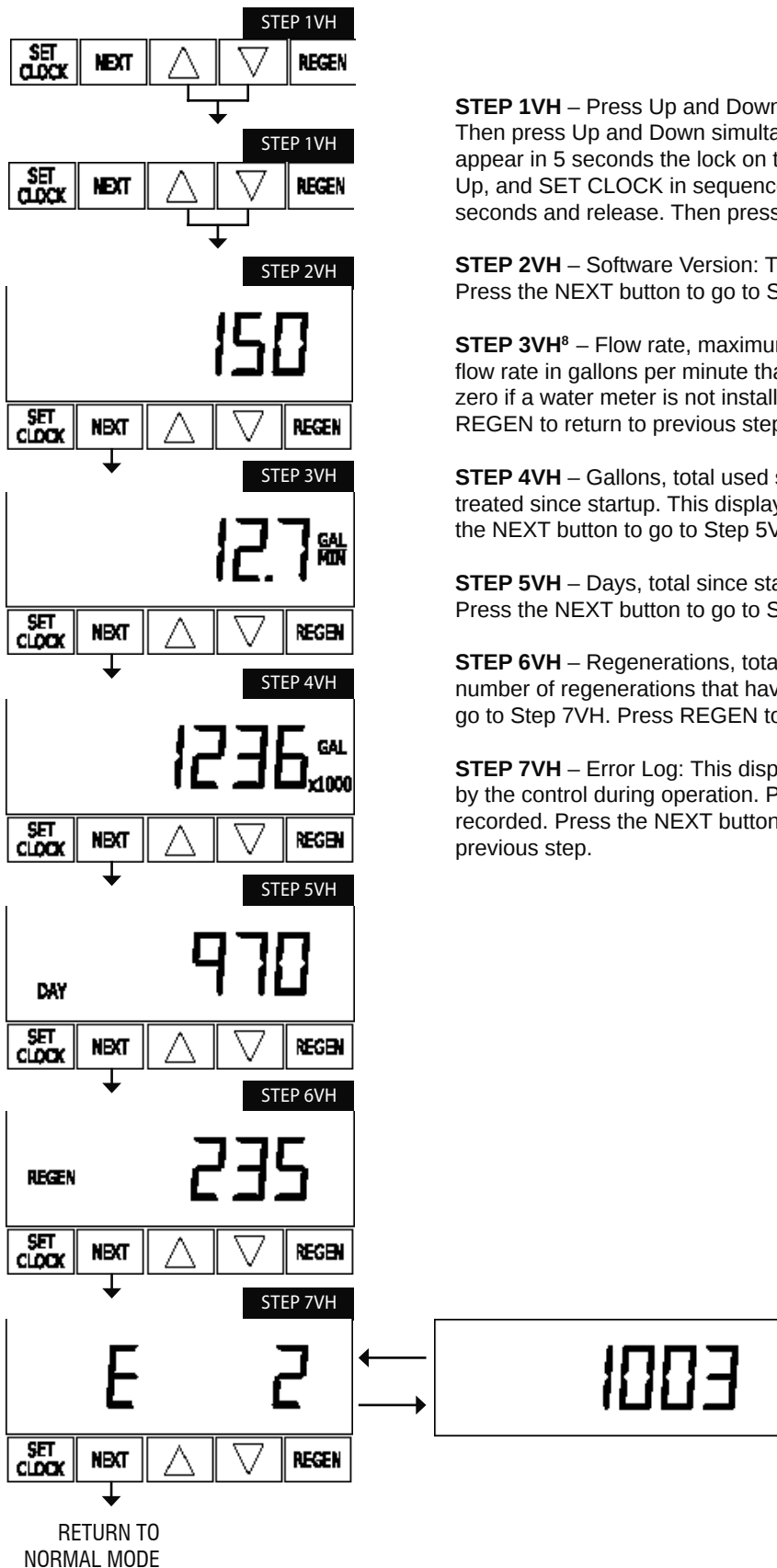
STEP 7D – Flow rate, maximum last seven days: The maximum flow rate in gallons per minute that occurred in the last seven days will be displayed. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 8D. Press REGEN to return to previous step.

STEP 8D – Gallons, total used since last reset: The total number of gallons used since last reset will be displayed. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 9D. Press REGEN to return to previous step.

STEP 9D – Days, total number since last reset: The total number of days the control valve has been in service since last reset will be displayed. Press the NEXT button to go to Step 10D. Press REGEN to return to previous step.

STEP 10D – Regenerations, total number since last reset: The total number of regenerations that have occurred since last reset will be displayed. Press the NEXT button to exit Diagnostics. Press REGEN to return to previous step.

When desired, all information in Diagnostics may be reset to zero when the valve is installed in a new location. To reset to zero, press NEXT and t buttons simultaneously to go to the Service/OEM screen, and release. Press Down and Up simultaneously to reset diagnostic values to zero. Screen will return to user display.



Valve History

STEP 1VH – Press Up and Down simultaneously for three seconds and release. Then press Up and Down simultaneously and release. If screen in step 2VH does not appear in 5 seconds the lock on the valve is activated. To unlock press Down, NEXT, Up, and SET CLOCK in sequence, then press Up and Down simultaneously for 3 seconds and release. Then press Up and Down simultaneously and release.

STEP 2VH – Software Version: This display shows the software version of the valve. Press the NEXT button to go to Step 3VH. Press REGEN to exit Valve History.

STEP 3VH⁸ – Flow rate, maximum since startup: This display shows the maximum flow rate in gallons per minute that has occurred since startup. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 4VH. Press REGEN to return to previous step.

STEP 4VH – Gallons, total used since start-up: This display shows the total gallons treated since startup. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 5VH. Press REGEN to return to previous step.

STEP 5VH – Days, total since start-up: This display shows the total days since startup. Press the NEXT button to go to Step 6VH. Press REGEN to return to previous step.

STEP 6VH – Regenerations, total number since start-up: This display shows the total number of regenerations that have occurred since startup. Press the NEXT button to go to Step 7VH. Press REGEN to return to previous step.

STEP 7VH – Error Log: This display shows a history of the last 10 errors generated by the control during operation. Press the Up or Down buttons to review each error recorded. Press the NEXT button to exit Valve History. Press REGEN to return to previous step.

⁸ Values in steps 3VH through 7VH cannot be reset.

RESIDENTIAL WATER CONDITIONING LIMITED WARRANTY

This Water Conditioner is guaranteed to be free of material of manufacturing defects at the time of installation, where originally installed. The warranty period begins on the installation date, but shall not begin later than six (6) months from the date of manufacture.

There is a five (5) year warranty on Fiberglass resin tanks; 5 year warranty on salt tank and control valve; 1 year warranty on component materials and workmanship. Water softener resin subject to iron, manganese, and chlorine levels greater than 1 ppm are expressly not covered by the 5 year warranty.

Labor is not included. Warranty is limited to repair or replacement of defective part (manufacturer's choice). Freight and shipping are not covered by this warranty, and are for the customer's account. **Return Goods Authorization (RGA) require on returns. Collect freight returns will not be accepted.**

This limited warranty does not cover failure in service due to fire, freezing, abuse, shipping damages, misapplication, sunlight damage, high temperature failure (i.e. hot water back up), improper electrical connection or hi/low voltage, nor does it extend to consequential damages such as water damage, or salt damage.

Distributed by: _____ **Date:** _____ **Model #:** _____ **Serial #:** _____

Softener Panel

5 Button

To Change Factory Settings:

Simultaneously Press **NEXT** & **UP** then release:



1. Configuration **Softener**



Press Next:

2. Grain Capacity **30K**



Press Next:

3. Pounds of Salt per Regen *Example 9lbs*



Press Next:

4. Backwash Duration **Normal**



Press Next:

5. Gallons Capacity **Auto**



Press Next:

6. Brine Refill **Post**



Press Next:

7. Regenerant Flow **dn**



Press Next:

8. Regeneration Initiation **Normal**

Installer Set-up:

Simultaneously Press **NEXT** & **UP** then release:



1. Hardness (Grains) *Example 30*



Press Next:

2. Calendar Override **14**



Press Next:

3. Time of Regen (hour) **2:00AM**



Press Next:

4. Time of Regen (minute) **2:00AM**

Diagnostic:

Simultaneously Press **UP** & **DOWN** then release:



1. Number of Days Since Last Regen



Press Next:

2. Number of Gallons Since Last Regen



Press Next:

3. Reserve Capacity Gallons Used Last 7 Days



Press Next:

4. Daily Gallon Usage For Last 64 Days



Press Next:

5. Current Flow Rate



Press Next:

6. Max Flow Rate in The Last 7 Days



Press Next:

7. Total Gallons Since Last Reset



Press Next:

8. Number of Days Since Last Reset



Press Next:

9. Number of Regenerations Since Last Reset

Valve History:

Simultaneously Press **UP** & **DOWN TWICE**:



1. Software Version



Press Next:

2. Max Flow Rate Since Start-up



Press Next:

3. Total Number of Gallons Since Start-up



Press Next:

4. Total Number of Days Since Start-up



Press Next:

5. Total Number of Regenerations Since Start-up



Press Next:

6. Number of Error Occurances Since Start-up